IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

OMNI MEDSCI, INC., *Plaintiff,* v. SAMSUNG ELECTRONICS, CO. LTD., SAMSUNG ELECTRONICS AMERICA, INC., FOSSIL GROUP, INC., FOSSIL STORES I, INC., FOSSIL PARTNERS, L.P., ONEPLUS TECHNOLOGY (SHENZHEN) CO., LTD., and ŌURA HEALTH OY, *Defendants.*	Civil No. 2:24-cv-01070-JRG-RSP JURY TRIAL DEMANDED

DEFENDANTS' SUPPLEMENTAL INVALIDITY AND
SUBJECT MATTER ELIGIBILITY CONTENTIONS

Pursuant to Patent Rules 3-3 and 3-4 and the Docket Control Order entered by the Court (Dkt. 65), Defendants Samsung Electronics, Co. Ltd., Samsung Electronics America, Inc. (collectively "Samsung"), Fossil Group, Inc., Fossil Stores I, Inc., Fossil Partners, L.P. (collectively "Fossil"), and Ōura Health Oy ("Oura") (collectively "Defendants") hereby provide their Invalidity Contentions to Omni MedSci, Inc. ("Omni" or "Plaintiff").

Defendants' Invalidity Contentions include the accompanying claim charts concerning U.S. Patent Nos. 9,055,868 ("the '868 Patent"); 9,651,533 ("the '533 Patent"); 10,517,484 ("the '484 Patent"); 10,874,304 ("the '304 Patent"); 11,160,455 ("the '455 Patent"); 12,193,790 ("the '790 Patent") (collectively the "Asserted Patents"), and 12,268,475 ("the '475 Patent").[1]

Defendants also submit their Subject Matter Eligibility Contentions concerning the

[1] The '484, '455, and '790 Patents are asserted against only Samsung and Fossil, not Oura.

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Asserted Patents in accordance with the Court's July 25, 2019, Standing Order Regarding Subject Matter Eligibility Contentions Applicable to All Patent Infringement Cases Assigned to Chief District Judge Rodney Gilstrap ("Standing Order") and the Docket Control Order.

I. Introduction

As disclosed in its respective P. R. 3-1 Infringement Contentions served on Defendants, Plaintiff asserts the following patents and claims:

Patent	**Asserted Claims**[2]	**Omni's Alleged Priority Date**	**Chart Prefix**
'868 Patent	Samsung: 7, 9 Fossil: 7-9 Oura: 7, 9	September 3, 2002	A
'533 Patent	Samsung: 11, 12 Fossil: 12 Oura: 11, 12	December 31, 2012	B
'484 Patent	Samsung: 8-10 Fossil: 8-9 Oura: n/a	December 31, 2012	C
'304 Patent	Samsung: 11, 14-16, 19-22 Fossil: 11, 14, 19-20 Oura: 11-14, 19-20	December 31, 2012	D
'455 Patent	Samsung: 1-3, 8-10, 15 Fossil: 1, 8 Oura: n/a	December 31, 2012	E
'790 Patent	Samsung: 7 Fossil: 7 Oura: n/a	December 31, 2012	F
'475 Patent	Samsung: 1, 5-8, 11-13 Fossil: 1, 5, 8, 11-13 Oura: 1, 5-8, 11-13	December 31, 2012	G

The claims identified above are referenced as "the Asserted Claims" unless reference is made specifically with respect to particularly identified one or more of the Asserted Patents and/or one or more of the Asserted Claims. By identifying Omni's alleged priority date for the Asserted

[2] *See* n.1.

Claims of each patent above, Defendants do not concede that Omni's claims of priority are correct. Further, the citation of prior art herein and the accompanying exhibits are not intended to reflect Defendants' claim construction contentions, which will be disclosed in due course in accordance with the Docket Control Order. Instead, Defendants' Invalidity Contentions and Subject Matter Eligibility Contentions as set forth herein and in the accompanying exhibits may reflect Plaintiff's apparent claim constructions based on its Infringement Contentions, with which Defendants disagree.

As further detailed in and supported by these Invalidity Contentions, Defendants contend that each of the Asserted Claims is invalid under at least 35 U.S.C. §§ 101, 102, 103, and/or 112.[3] Defendants reserve the right to prove the invalidity of the Asserted Claims on bases other than those required to be disclosed in these disclosures pursuant to P.R. 3-3.

II. Amendment / Supplementation

Defendants' Invalidity Contentions and Subject Matter Eligibility Contentions pertain to the Asserted Claims as identified in Plaintiff's Infringement Contentions. To the extent the Court later allows Plaintiff to amend its infringement contentions and/or assert one or more claims other than the Asserted Claims, Defendants reserve the right to modify, amend, or supplement these Invalidity Contentions and Subject Matter Eligibility Contentions accordingly—for example, to show the invalidity and/or ineligibility of any such newly Asserted Claims.

These Invalidity Contentions and Subject Matter Eligibility Contentions are based on Defendants' current understanding of the Asserted Claims and Plaintiff's apparent view of the

[3] References to Title 35 of the United States Code are to statutes prior to amendment under the America Invents Act ("AIA"), to the extent that the Asserted Patents have effective filing dates prior to applicable AIA effective dates, and to the current statutory provisions with respect to Asserted Patents having effective filing dates after the applicable AIA effective dates.

scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. A *Markman* Order in this case has not yet been issued, and in no way should these Invalidity Contentions and Subject Matter Eligibility Contentions be taken as any admission or acquiescence by Defendants as to the proper scope of the Asserted Claims and/or proper claim constructions of terms and phrases recited in those claims. By identifying prior art that anticipates and/or renders obvious the Asserted Claims, Defendants do not admit that the claim limitations are capable of construction, do not admit that any claim limitations are supported with an appropriate written description and enabling disclosure in the applicable patent specifications, and do not adopt Plaintiff's apparent claim constructions or admit the accuracy of any particular claim construction.[4] Defendants reserve all rights to later challenge or oppose any claim constructions advanced by Plaintiff and to present their own claim construction positions as permitted by the Court.

Defendants further reserve the right to revise these Invalidity Contentions and Subject Matter Eligibility Contentions in view of the Court's construction of terms and phrases recited in one or more of the Asserted Claims, additional information obtained during discovery, additional infringement theories put forth by Plaintiff during fact and/or expert discovery, any findings as to the priority date(s) of the Asserted Claims, and/or positions that Plaintiff, its fact witnesses, or its expert witness(es) may take concerning claim construction, infringement, and/or invalidity issues, as permitted by the Court. Defendants further reserve the right to supplement their accompanying P.R. 3-4(b) document productions should they later discover additional prior art documents,

[4] Defendants do not concede that Plaintiff's apparent interpretation of the claims is correct, but rather assert the well-established principle that whatever infringes a claim if later in time anticipates if earlier in time. *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1378 (Fed. Cir. 2001). Thus, where Plaintiff for purposes of its infringement case alleges that a feature of an accused product meets a particular limitation recited in one or more of the Asserted Claims, then that feature, should it be found in the prior art, would also cause that limitation to be met for invalidity purposes.

information, testimony, prior art systems and related documentation, and/or software or hardware code, including information provided by third parties after the date of service of these Invalidity Contention and Subject Matter Eligibility Contentions.

Additionally, Plaintiff has not identified in its contentions regarding the level of ordinary skill in the art for any of the Asserted Patents. Thus, Defendants have based their Invalidity and Subject Matter Eligibility Contentions on the level of skill in the art apparent from the face of the asserted patents. For the avoidance of doubt, Defendants contend that the asserted claims are invalid for the reasons set forth in their Invalidity and Subject Matter Eligibility contentions under any plausible definition of the level of ordinary skill for each of the Asserted Patents. Nevertheless, Defendants reserve the right to revise these Invalidity Contentions and Subject Matter Eligibility Contentions in response to any position taken by Plaintiff on the level of ordinary skill in the art applicable to a given Asserted Patent.

Defendants may further rely on inventor admissions concerning the scope or state of the prior art relevant to the Asserted Claims, the patent prosecution histories of the Asserted Patents, related patents and/or patent applications, any deposition or trial testimony of the named inventors on the Asserted Patents, and the papers filed and any evidence produced or submitted by Plaintiff in connection with these cases or other related litigation. Defendants reserve the right to contend that one or more of the Asserted Claims are invalid under 35 U.S.C. § 102(f) in the event Defendants obtain evidence that one or more of the named inventors did not invent the subject matter in the Asserted Claims.

Prior art not included in these Invalidity Contentions and Subject Matter Eligibility Contentions, whether known or not known to Defendants, may become relevant. Defendants are currently unaware of the extent, if any, to which Plaintiff will contend that limitations of the

Asserted Claims are not disclosed in the prior art identified in these Invalidity Contentions and Subject Matter Eligibility Contentions. Accordingly, Defendants reserve the right to identify other references that would disclose the allegedly missing limitation(s) of the claimed method, device, or system.

The references identified in these Invalidity Contentions and Subject Matter Eligibility Contentions, which include the attached claim charts, may disclose the elements of the Asserted Claims explicitly and/or inherently, render those elements alone or in combination obvious to those of ordinary skill in the art even absent an explicit or inherent disclosure, and/or they may be relied upon to show the state of the art in the relevant time frame. References identified in these Invalidity Contentions and Subject Matter Eligibility Contentions, as well as the "References Cited" on the face of the Asserted Patents and the patents cited within the body of the Asserted Patents, may be used to illustrate, but not limit the scope of, the state of the art to which the Asserted Patents pertain (i.e., at a time prior to the date of alleged inventions of the Asserted Claims of the Asserted Patents). Moreover, Defendants reserve the ability to rely on later-identified sources of information, including but not limited to witness testimony and other discovery, to establish the state of the art in the relevant time frame pertaining to the Asserted Patents.

Because discovery has just recently begun, Defendants anticipate that additional prior art and invalidity bases may be found. Defendants' investigation and analysis of the prior art is continuing, and thus Defendants reserve the right to supplement, amend, and/or revise the information provided herein as Defendants conduct further investigation and/or analysis, including identifying, charting, and relying on additional references.

Additionally, in view of likely third-party discovery that will be taken, Defendants reserve the right to present additional items of prior art under 35 U.S.C. §§ 102(a), (b), (e), and/or (g)

and/or § 103 located during discovery or further investigation, and to assert contentions of invalidity under 35 U.S.C. §§ 102(c), (d), or (f). For example, Defendants expect to issue subpoenas to third parties believed to have knowledge, documents, and/or other evidence concerning invalidity of one or more of the Asserted Claims.

In addition to the positions and prior art identified in these Invalidity Contentions and Subject Matter Eligibility Contentions (including the accompanying claim charts), Defendants also incorporate by reference all invalidity contentions and subject matter eligibility contentions, prior art,[5] and invalidity claim charts (including, without limitation, all anticipation positions, obviousness positions [including all prior art combinations and motivations to combine], indefiniteness positions, written description positions, and non-enablement positions) concerning one or more of the Asserted Patents, as disclosed at any time. This includes without limitation disclosures in previous or related litigation, in United States Patent & Trademark Office ("USPTO") proceedings, by the Plaintiff, by any other parties accused of patent infringement by the Plaintiff, or by the named inventors or any individuals associated with the prosecution and/or any form of post-grant review or reexamination of the Asserted Patents.

Specifically, for example, Defendants identify, as prior art upon which they may rely to show the invalidity of the Asserted Claims, the prior art references disclosed by parties in any other litigation (including inter partes review and/or reexamination proceedings) involving one or more of the Asserted Patents, any patent related to any of the Asserted Patents, and/or any other patent allegedly assigned to Plaintiff claiming priority to the Asserted Patents (collectively, "Other Omni Proceedings").

[5] Prior art appearing in the file histories of the Asserted Patents is not required to be separately produced by Defendants under P. R. 3-4(b).

Plaintiff has a present and ongoing duty to produce to Defendants all relevant documents from any Other Omni Proceedings, including but not limited to all prior art, invalidity contentions, and expert reports on invalidity (among other relevant items).

Defendants reserve the right to supplement or otherwise amend these Invalidity Contentions and Subject Matter Eligibility Contentions in response to any relevant discovery provided by third parties, Plaintiff, opening or rebuttal expert reports, fact or expert depositions, or in response to any claim construction ruling(s) issued by this Court (regardless of how and when such ruling is made). Defendants also reserve the right to supplement or otherwise amend these Invalidity Contentions and Subject Matter Eligibility Contentions in response to any rebuttal evidence disclosed by Plaintiff or as otherwise may be necessary or appropriate under the circumstances.

III. P. R. 3-3(a) – Identification of Prior Art

Pursuant to P.R. 3-3(a), and subject to Defendants' reservations of rights, Defendants identify each item of prior art that anticipates or renders obvious the Asserted Claims below.[6]

A. U.S. Patent No. 9,055,868

Invalidity claim charts identifying disclosures in the references identified in the tables below as to the Asserted Claims of the '868 Patent are provided in attached Exhibits A1 through

[6] Defendants' disclosure of prior art is premised on the alleged priority dates of the Asserted Patents as identified in Plaintiff's Infringement Contentions. Defendants contend Plaintiff is not entitled to the alleged priority dates and reserve the right to modify, amend, or supplement their invalidity contentions with additional prior art references if any Asserted Claim is shown to not be entitled to the respective alleged priority date or if Plaintiff alleges any other priority date for any of the Asserted Claims. Notwithstanding that reservation of rights, Defendants also reserve the right to argue that they have been unduly prejudiced should Plaintiff allege a different priority date for any of the Asserted Claims, and that accordingly Plaintiff should not be allowed to do so.

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Table 1-A: Prior Art Patents and Printed Publications for the ’868 Patent

Patent No. or Title (Primary Inventor/Author)	**Date of Issue/ Publication**	**Filing Date**
US 2003/0208113 (“Mault”) [Ex. A1]	Nov. 6, 2003	July 18, 2001
US 6,067,463 (“Jeng”) [Ex. A2]	May 23, 2000	Jan. 5, 1999
US 5,891,022 (“Pologe”) [Ex. A3]	April 6, 1999	Sept. 25, 1996
US 2002/0198473 (“Kumar”) [Ex. A4]	Dec. 26, 2002	March 28, 2002
US 2004/0002634 (“Nihtila”) [Ex. A5]	Jan. 1, 2004	June 28, 2002
JP 2000-74829 (“Shigeki”) [Ex. A6]	Sept. 2, 1999	March 14, 2000
US 6,168,563 (“Brown”) [Ex. A7]	Jan. 2, 2001	March 17, 1999
US 2002/0049389 (“Abreu”) [Ex. A8]	April 25, 2002	Feb. 23, 2001
US 6,602,191 (“Quy”) [Ex. A9]	Aug. 5, 2003	Dec. 15, 2000
US 5,830,137 (“Scharf”) [Ex. A10]	Nov. 3, 1998	Nov. 18, 1996

Table 2-A: Prior Art Systems and Inventions for the ’868 Patent

Name of System or Invention	**Date of Sale / Offer for Sale / Public Use / Known by Others**
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by ChoiceMMed, including but not limited to ChoiceMMed MD300C318T, and its accessories (e.g., sensor probe)	At least as early as 2011-05-20
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Criticare Systems, Inc., including but not limited to Criticare 504, and its accessories (e.g., sensor probe)	At least as early as 1988
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by GE Marquette Medical Systems, Inc., including but not limited to Dash 2000 Patient Monitor, and its accessories (e.g., sensor probe)	At least as early as 1999
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Masimo Corp., including but not limited to Rad-5 and Rad-5v Signal Extraction Pulse Oximeters, Radical, Rad-57™, SET® Pulse Oximetry Devices and Rainbow SET™ Devices, and their accessories (e.g., sensor probe)	At least as early as 2004 (Rad-5/ Rad-5v), 2007 (Radical), 2008 (Rad-57™), 2009 (SET®/Rainbow SET™).
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Mindray DS USA,	At least as early as 2008

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Inc, including but not limited to Accutorr V, and its accessories (e.g., sensor probe)	
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Covidien AG / Nellcor Puritan Bennett Inc., including but not limited to Nellcor OxiMax Pulse Oximeters, Nellcor N-595 Pulse Oximter, Nellcor OxiMax N-600X Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 2002 (OxiMax Pulse Oximeters and OmniMax N-595), 2011 (OxiMax N-600X)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Nonin Medical, Inc., including but not limited to Onyx, PalmSAT™, and Nonin® Model 7500 Digital Pulse Oximeter, Nonin Onyx® 9500, and their accessories (e.g., sensor probe)	At least as early as 1988 (Onyx), 2007 (PalmSAT™), 2007 (Nonin Onyx® 9500), and 2008 (Nonin® Model 7500)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Novametrix Medical Systems Inc., including but not limited to Novametrix Model 513 and Model 2001, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 513) and 2007 (Model 2001)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Respironics, Inc., including but not limited to Models 920, 920M and 920M PLUS Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 920 and 920M) and 2007 (Model 920M PLUS)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Smiths Medical, including but not limited to BCI 3304 Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Utech Co., Ltd., including but not limited to UT100 Handheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2010
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Welch Allyn, including but not limited to Propaq® CS Vital Signs Monitor and Propaq® Encore Vital Signs Monitor, and their accessories (e.g., sensor probe)	At least as early as 2011 (Propaq® Encore Vital Signs Monitor) and 2012 (Propaq® CS Vital Signs Monitor)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Philips Medical Systems, including but not limited to M4529A DigitalHandheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Palco Labs Inc,	At least as early as 2007

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
including but not limited to Model 120 Mini Pulse Oximeter, and its accessories (e.g., sensor probe)	
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by BCI Inc., including but not limited to Capnocheck® Sleep Capnograph/Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Datex-Ohmeda, including but not limited to TuffSat, and its accessories (e.g., sensor probe)	At least as early as 2007

For each of the prior art devices identified above, Defendants have listed and produced documents as evidence of the relevant features and functionality to the extent that they are presently available and have been located. Defendants have obtained or are in the process of attempting to obtain the identified devices and will make them available for inspection to the extent they are obtained. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Further, Defendants are actively searching for information regarding at least the systems, devices, and/or inventions listed above in Table 2-A.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly. Defendants continue to investigate each of the identified devices, including through potential discovery needed to be obtained via third party subpoenas, and reserve the right to supplement these contentions and

accompanying claim charts after further investigation.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself as well as to any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '868 Patent. Defendants' investigation of such prior art systems is still ongoing, and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether any of the third-party prior art systems anticipate or render obvious the Asserted Claims of the '868 Patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '868 Patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third-party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit.

Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

In addition, Defendants identify, responsive to Plaintiff's Infringement Contentions, the patents, publications, and/or systems listed in Tables 1-A and 2-A as evidence of the state of the art as it relates to physiological monitoring devices / systems.

Each of these references show that the concept of "physiological monitoring" is not novel and was well-known for many years before the alleged priority date of the '868 Patent, as discussed in more detail in Section IV.B (obviousness). In light of the references discussed herein, the Asserted Claims of the '868 Patent cannot be valid.

Each prior art patent, publication, or product identified above was either effectively filed or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date of the '868 Patent to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because Defendants have not yet completed discovery in this case, including taking depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, Defendants reserve the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

B. U.S. Patent No. 9,651,533

Invalidity claim charts identifying disclosures in the references identified in the tables below as to the Asserted Claims of the ’533 Patent are provided in attached Exhibits B1 through B8.

Table 1-B: Prior Art Patents and Printed Publications for the ’533 Patent

Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
US 2011/0028802 (“Addison”) [Ex. B1]	February 3, 2011	July 31, 2009
US 2015/0057511[7] (“Basu”) [Ex. B2]	February 26, 2015	March 27, 2013
US 2005/0049468 (“Carslon”) [Ex. B3]	March 3, 2005	September 3, 2003
US 2012/0197093 (“LeBoeuf”) [Ex. B4]	August 2, 2012	January 25, 2012
US 9,241,676 (“Lisogurski”) [Ex. B5]	January 26, 2016	May 31, 2012
US 9,596,990 (“Park”) [Ex. B6]	March 21, 2017	November 6, 2013
US 8,923,918 (“Kreger”) [Ex. B7]	December 30, 2014	December 18, 2010
US 7,507,207 (“Sakai”) [Ex. B8]	March 24, 2009	October 5, 2004

Table 2-B: Prior Art Systems and Inventions for the ’533 Patent

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by ChoiceMMed, including but not limited to ChoiceMMed MD300C318T, and its accessories (e.g., sensor probe)	At least as early as 2011-05-20
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Criticare Systems, Inc., including but not limited to Criticare 504, and its accessories (e.g., sensor probe)	At least as early as 1988
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by GE Marquette Medical Systems, Inc., including but not limited to Dash 2000 Patient Monitor, and its accessories (e.g., sensor probe)	At least as early as 1999
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Masimo Corp., including but not limited to Rad-5 and Rad-5v Signal	At least as early as 2004 (Rad-5/ Rad-5v), 2007 (Radical), 2008 (Rad-

[7] Invalidity contentions relying on this reference herein will make reference to the Provisional Application No. 61/616524, which is incorporated by reference into Basu.

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Extraction Pulse Oximeters, Radical, Rad-57™, SET® Pulse Oximetry Devices and Rainbow SET™ Devices, and their accessories (e.g., sensor probe)	57™), 2009 (SET®/Rainbow SET™).
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Mindray DS USA, Inc, including but not limited to Accutorr V, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Covidien AG / Nellcor Puritan Bennett Inc., including but not limited to Nellcor OxiMax Pulse Oximeters, Nellcor N-595 Pulse Oximter, Nellcor OxiMax N-600X Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 2002 (OxiMax Pulse Oximeters and OmniMax N-595), 2011 (OxiMax N-600X)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Nonin Medical, Inc., including but not limited to Onyx, PalmSAT™, and Nonin® Model 7500 Digital Pulse Oximeter, Nonin Onyx® 9500, and their accessories (e.g., sensor probe)	At least as early as 1988 (Onyx), 2007 (PalmSAT™), 2007 (Nonin Onyx® 9500), and 2008 (Nonin® Model 7500)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Novametrix Medical Systems Inc., including but not limited to Novametrix Model 513 and Model 2001, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 513) and 2007 (Model 2001)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Respironics, Inc., including but not limited to Models 920, 920M and 920M PLUS Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 920 and 920M) and 2007 (Model 920M PLUS)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Smiths Medical, including but not limited to BCI 3304 Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Utech Co., Ltd., including but not limited to UT100 Handheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2010
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Welch Allyn, including but not limited to Propaq® CS Vital Signs Monitor and Propaq® Encore Vital Signs Monitor, and their accessories (e.g., sensor probe)	At least as early as 2011 (Propaq® Encore Vital Signs Monitor) and 2012 (Propaq® CS Vital Signs Monitor)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Philips Medical	At least as early as 2007

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Systems, including but not limited to M4529A DigitalHandheld Pulse Oximeter, and its accessories (e.g., sensor probe)	
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Palco Labs Inc, including but not limited to Model 120 Mini Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by BCI Inc., including but not limited to Capnocheck® Sleep Capnograph/Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Datex-Ohmeda, including but not limited to TuffSat, and its accessories (e.g., sensor probe)	At least as early as 2007

For each of the prior art devices identified above, Defendants have listed and produced documents as evidence of the relevant features and functionality to the extent that they are presently available and have been located. Defendants have obtained or are in the process of attempting to obtain the identified devices and will make them available for inspection to the extent they are obtained. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Further, Defendants are actively searching for information regarding at least the systems, devices, and/or inventions listed above in Table 2-B.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and

Defendants reserve the right to supplement these contentions accordingly. Defendants continue to investigate each of the identified devices, including through potential discovery needed to be obtained via third party subpoenas, and reserve the right to supplement these contentions and accompanying claim charts after further investigation.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself as well as to any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '533 Patent. Defendants' investigation of such prior art systems is still ongoing, and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether any of the third-party prior art systems anticipate or render obvious the Asserted Claims of the '533 Patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '533 Patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third-party discovery during this

lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

In addition, Defendants identify, responsive to Plaintiff's Infringement Contentions, the patents, publications, and/or systems listed in Tables 1-B and 2-B as evidence of the state of the art as it relates to physiological monitoring devices / systems.

Each of these references show that the concept of "physiological monitoring" is not novel and was well-known for many years before the alleged priority date of the '533 Patent, as discussed in more detail in Section IV.B (obviousness). In light of the references discussed herein, the Asserted Claims of the '533 Patent cannot be valid.

Each prior art patent, publication, or product identified above was either effectively filed or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date of the '533 Patent to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because Defendants have not yet completed discovery in this case, including taking

depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, Defendants reserve the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

C. U.S. Patent No. 10,517,484

Invalidity claim charts identifying disclosures in the references identified in the tables below as to the Asserted Claims of the ’484 Patent are provided in attached Exhibits C1 through C14.

Table 1-C: Prior Art Patents and Printed Publications for the ’484 Patent

Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
US 9,241,676 (“Lisogurski”) [Ex. C1]	Jan. 26, 2016	May 31, 2012
US 2015/0057511 (“Basu”) [Ex. C2]	Feb. 26, 2015	Mar. 27, 2013
US 6,616,613 (“Goodman”) [Ex. C3]	Sep. 9, 2003	Apr. 29, 2000
WO 2012/099536 (“Kassim”) [Ex. C4]	Jul. 26, 2012	Jan. 20, 2011
US 9,095,291 (“Soller”) [Ex. C5]	Aug. 4, 2015	Aug. 7, 2009
US 11,638,532 (“Poeze”) [Ex. C6]	May 2, 2023	Jul. 1, 2010
US 2012/0150047 (“Terumoto”) [Ex. C7]	June 14, 2012	Nov. 14, 2011
US 8,172,761 (“Rulkov”) [Ex. C8]	May 8, 2012	Oct. 4, 2011
US 2011/0066050 (“Moon”) [Ex. C9]	Mar. 17, 2011	Sep. 15, 2009
US 2005/0049468 (“Carlson”) [Ex. C10]	Mar. 3, 2005	Sep. 3, 2003
US 8,108,036 (“Tran”) [Ex. C11]	Jan. 31, 2012	Jun. 18, 2009
Plug-and-Play, Single-Chip Photoplethysmography (“Chandrasekar”) [Ex. C12]	Sep. 2012	N/A
US 8,923,918 (“Kreger”) [Ex. C13]	Dec. 30, 2014	Dec. 18, 2010
US 7,507,207 (“Sakai”) [Ex. C14]	Mar. 24, 2009	Oct. 5, 2004

Table 2-C: Prior Art Systems and Inventions for the ’484 Patent

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by ChoiceMMed, including but not limited to ChoiceMMed MD300C318T, and its accessories (e.g., sensor probe)	At least as early as 2011-05-20
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Criticare Systems,	At least as early as 1988

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Inc., including but not limited to Criticare 504, and its accessories (e.g., sensor probe)	
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by GE Marquette Medical Systems, Inc., including but not limited to Dash 2000 Patient Monitor, and its accessories (e.g., sensor probe)	At least as early as 1999
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Masimo Corp., including but not limited to Rad-5 and Rad-5v Signal Extraction Pulse Oximeters, Radical, Rad-57™, SET® Pulse Oximetry Devices and Rainbow SET™ Devices, and their accessories (e.g., sensor probe)	At least as early as 2004 (Rad-5/ Rad-5v), 2007 (Radical), 2008 (Rad-57™), 2009 (SET®/Rainbow SET™).
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Mindray DS USA, Inc, including but not limited to Accutorr V, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Covidien AG / Nellcor Puritan Bennett Inc., including but not limited to Nellcor OxiMax Pulse Oximeters, Nellcor N-595 Pulse Oximter, Nellcor OxiMax N-600X Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 2002 (OxiMax Pulse Oximeters and OmniMax N-595), 2011 (OxiMax N-600X)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Nonin Medical, Inc., including but not limited to Onyx, PalmSAT™, and Nonin® Model 7500 Digital Pulse Oximeter, Nonin Onyx® 9500, and their accessories (e.g., sensor probe)	At least as early as 1988 (Onyx), 2007 (PalmSAT™), 2007 (Nonin Onyx® 9500), and 2008 (Nonin® Model 7500)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Novametrix Medical Systems Inc., including but not limited to Novametrix Model 513 and Model 2001, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 513) and 2007 (Model 2001)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Respironics, Inc., including but not limited to Models 920, 920M and 920M PLUS Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 920 and 920M) and 2007 (Model 920M PLUS)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Smiths Medical, including but not limited to BCI 3304 Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2008

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Utech Co., Ltd., including but not limited to UT100 Handheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2010
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Welch Allyn, including but not limited to Propaq® CS Vital Signs Monitor and Propaq® Encore Vital Signs Monitor, and their accessories (e.g., sensor probe)	At least as early as 2011 (Propaq® Encore Vital Signs Monitor) and 2012 (Propaq® CS Vital Signs Monitor)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Philips Medical Systems, including but not limited to M4529A DigitalHandheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Palco Labs Inc, including but not limited to Model 120 Mini Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by BCI Inc., including but not limited to Capnocheck® Sleep Capnograph/Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Datex-Ohmeda, including but not limited to TuffSat, and its accessories (e.g., sensor probe)	At least as early as 2007

For each of the prior art devices identified above, Defendants have listed and produced documents as evidence of the relevant features and functionality to the extent that they are presently available and have been located. Defendants have obtained or are in the process of attempting to obtain the identified devices and will make them available for inspection to the extent they are obtained. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35

U.S.C. §§ 102 and/or 103.

Further, Defendants are actively searching for information regarding at least the systems, devices, and/or inventions listed above in Table 2-C.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly. Defendants continue to investigate each of the identified devices, including through potential discovery needed to be obtained via third party subpoenas, and reserve the right to supplement these contentions and accompanying claim charts after further investigation.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself as well as to any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '484 Patent. Defendants' investigation of such prior art systems is still ongoing, and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether any of the third-party prior art systems anticipate or render obvious the Asserted Claims of the '484 Patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '484 Patent. Defendants have obtained, and are in the process of obtaining,

additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third-party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

In addition, Defendants identify, responsive to Plaintiff's Infringement Contentions, the patents, publications, and/or systems listed in Tables 1-C and 2-C as evidence of the state of the art as it relates to physiological monitoring devices / systems.

Each of these references show that the concept of "physiological monitoring" is not novel and was well-known for many years before the alleged priority date of the '484 Patent, as discussed in more detail in Section IV.B (obviousness). In light of the references discussed herein, the Asserted Claims of the '484 Patent cannot be valid.

Each prior art patent, publication, or product identified above was either effectively filed or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date of the '484 Patent to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such

reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because Defendants have not yet completed discovery in this case, including taking depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, Defendants reserve the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

D. U.S. Patent No. 10,874,304

Invalidity claim charts identifying disclosures in the references identified in the tables below as to the Asserted Claims of the ’304 Patent are provided in attached Exhibits D1 through D19.

Table 1-D: Prior Art Patents and Printed Publications for the ’304 Patent

Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
US 2015/0057511A1 (“Basu”) [Ex. D1]	2/26/2015	3/27/2013
US 2005/0049468A1 (“Carlson”) [Ex. D2]	3/3/2005	9/3/2003
US 6,616,613 (“Goodman”) [Ex. D3]	9/9/2003	4/27/2000
US 6,519,037B2 (“Jung”) [Ex. D4]	2/11/2003	6/1/2001
WO 2012/99536 (“Kassim”) [Ex. D5]	7/26/2012	1/20/2011
US 2011/0237911A1 (“Lamego”) [Ex. D6]	9/29/2011	3/28/2011
US 2010/0217102A1 (“LeBoeuf”) [Ex. D7]	8/26/2010	1/21/2010
US 9,241,676 (“Lisogurski”) [Ex. D8]	1/26/2016	5/31/2012
US 5,746,206 (“Mannheimer”) [Ex. D9]	5/5/1998	6/10/1996
US 2003/0208113A1 (“Mault”) [Ex. D10]	11/6/2003	7/18/2001
US 2011/0082711A1 (“Poeze”) [Ex. D11]	4/7/2011	10/5/2010
US 5,891,022 (“Pologe”) [Ex. D12]	4/6/1999	9/25/1996
US 8,108,036 (“Tran”) [Ex. D13]	1/31/2012	6/18/2009
US 2012/0197093A1 (“Valencell”) [Ex. D14]	8/2/2012	1/25/2012

Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
D. Chandrasekar, et al., "Plug-and-Play, Single-Chip Photoplethysmography" ("Chandrasekar2012") [Ex. D15]	8/28/2012 - 9/1/2012	received 3/29/12
US 7,507,207 ("Sakai") [Ex. D16]	3/24/2009	10/5/2004
US 8,923,918 ("Kreger") [Ex. D17]	12/30/2014	12/18/2010
US 2006/0184040 ("Keller") [Ex. D18]	8/17/2006	12/7/2005
US 7,139,076 ("Marbach") [Ex. D19]	11/21/2006	8/8/2003

Table 2-D: Prior Art Systems and Inventions for the '304 Patent

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by ChoiceMMed, including but not limited to ChoiceMMed MD300C318T, and its accessories (e.g., sensor probe)	At least as early as 2011-05-20
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Criticare Systems, Inc., including but not limited to Criticare 504, and its accessories (e.g., sensor probe)	At least as early as 1988
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by GE Marquette Medical Systems, Inc., including but not limited to Dash 2000 Patient Monitor, and its accessories (e.g., sensor probe)	At least as early as 1999
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Masimo Corp., including but not limited to Rad-5 and Rad-5v Signal Extraction Pulse Oximeters, Radical, Rad-57™, SET® Pulse Oximetry Devices and Rainbow SET™ Devices, and their accessories (e.g., sensor probe)	At least as early as 2004 (Rad-5/ Rad-5v), 2007 (Radical), 2008 (Rad-57™), 2009 (SET®/Rainbow SET™).
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Mindray DS USA, Inc, including but not limited to Accutorr V, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Covidien AG / Nellcor Puritan Bennett Inc., including but not limited to Nellcor OxiMax Pulse Oximeters, Nellcor	At least as early as 2002 (OxiMax Pulse Oximeters and OmniMax N-595), 2011 (OxiMax N-600X)

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
N-595 Pulse Oximter, Nellcor OxiMax N-600X Pulse Oximeter, and their accessories (e.g., sensor probe)	
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Nonin Medical, Inc., including but not limited to Onyx, PalmSAT™, and Nonin® Model 7500 Digital Pulse Oximeter, Nonin Onyx® 9500, and their accessories (e.g., sensor probe)	At least as early as 1988 (Onyx), 2007 (PalmSAT™), 2007 (Nonin Onyx® 9500), and 2008 (Nonin® Model 7500)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Novametrix Medical Systems Inc., including but not limited to Novametrix Model 513 and Model 2001, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 513) and 2007 (Model 2001)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Respironics, Inc., including but not limited to Models 920, 920M and 920M PLUS Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 920 and 920M) and 2007 (Model 920M PLUS)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Smiths Medical, including but not limited to BCI 3304 Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Utech Co., Ltd., including but not limited to UT100 Handheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2010
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Welch Allyn, including but not limited to Propaq® CS Vital Signs Monitor and Propaq® Encore Vital Signs Monitor, and their accessories (e.g., sensor probe)	At least as early as 2011 (Propaq® Encore Vital Signs Monitor) and 2012 (Propaq® CS Vital Signs Monitor)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Philips Medical Systems, including but not limited to M4529A DigitalHandheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Palco Labs Inc, including but not limited to Model 120 Mini Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by BCI Inc., including but not limited to Capnocheck® Sleep Capnograph/Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Datex-Ohmeda, including but not limited to TuffSat, and its accessories (e.g., sensor probe)	At least as early as 2007

For each of the prior art devices identified above, Defendants have listed and produced documents as evidence of the relevant features and functionality to the extent that they are presently available and have been located. Defendants have obtained or are in the process of attempting to obtain the identified devices and will make them available for inspection to the extent they are obtained. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Further, Defendants are actively searching for information regarding at least the systems, devices, and/or inventions listed above in Table 2-D.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly. Defendants continue to investigate each of the identified devices, including through potential discovery needed to be obtained via third party subpoenas, and reserve the right to supplement these contentions and accompanying claim charts after further investigation.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself as well as to any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '304 Patent. Defendants' investigation of such prior art systems is still ongoing, and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether any of the third-party prior art systems anticipate or render obvious the Asserted Claims of the '304 Patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '304 Patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third-party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in

Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

In addition, Defendants identify, responsive to Plaintiff's Infringement Contentions, the patents, publications, and/or systems listed in Tables 1-D and 2-D as evidence of the state of the art as it relates to physiological monitoring device/system.

Each of these references show that the concept of "physiological monitoring" is not novel and was well-known for many years before the alleged priority date of the '304 Patent, as discussed in more detail in Section IV.B (obviousness). In light of the references discussed herein, the Asserted Claims of the '304 Patent cannot be valid.

Each prior art patent, publication, or product identified above was either effectively filed or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date of the '304 Patent to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because Defendants have not yet completed discovery in this case, including taking depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, Defendants reserve the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

E. U.S. Patent No. 11,160,455

Invalidity claim charts identifying disclosures in the references identified in the tables below as to the Asserted Claims of the ’455 Patent are provided in attached Exhibits E1 through E18.

Table 1-E: Prior Art Patents and Printed Publications for the ’455 Patent

Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
US 2015/0057511A1 (“Basu”) [Ex. E1]	2/26/2015	3/27/2013
US 2005/0049468A1 (“Carlson”) [Ex. E2]	3/3/2005	9/3/2003
US 6,616,613 (“Goodman”) [Ex. E3]	9/9/2003	4/27/2000
US 6,519,037B2 ("Jung") [Ex. E4]	2/11/2003	6/1/2001
WO 2012/99536 (“Kassim”) [Ex. E5]	7/26/2012	1/20/2011
US 2011/0237911A1 (“Lamego”) [Ex. E6]	9/29/2011	3/28/2011
US 2010/0217102A1 (“LeBoeuf”) [Ex. E7]	8/26/2010	1/21/2010
US 9,241,676 (“Lisogurski”) [Ex. E8]	1/26/2016	5/31/2012
US 5,746,206 (“Mannheimer”) [Ex. E9]	5/5/1998	6/10/1996
US 2003/0208113A1 (“Mault”) [Ex. E10]	11/6/2003	7/18/2001
US 2011/0082711A1 (“Poeze”) [Ex. E11]	4/7/2011	10/5/2010
US 5,891,022 (“Pologe”) [Ex. E12]	4/6/1999	9/25/1996
US 8,108,036 (“Tran”) [Ex. E13]	1/31/2012	6/18/2009
US 2012/0197093A1 (“Valencell”) [Ex. E14]	8/2/2012	1/25/2012
D. Chandrasekar, et al., “Plug-and-Play, Single-Chip Photoplethysmography” (“Chandrasekar2012”) [Ex. E15]	8/28/2012 - 9/1/2012	received 3/29/12
US 7,507,207 ("Sakai") [Ex. E16]	3/24/2009	10/5/2004
US 8,923,918 ("Kreger") [Ex. E17]	12/30/2014	12/18/2010
US 8,725,226 (“Isaacson”) [Ex. E18]	5/13/2014	11/13/2009

Table 2-E: Prior Art Systems and Inventions for the ’455 Patent

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by ChoiceMMed, including but not limited to ChoiceMMed MD300C318T, and its accessories (e.g., sensor probe)	At least as early as 2011-05-20
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Criticare Systems,	At least as early as 1988

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Inc., including but not limited to Criticare 504, and its accessories (e.g., sensor probe)	
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by GE Marquette Medical Systems, Inc., including but not limited to Dash 2000 Patient Monitor, and its accessories (e.g., sensor probe)	At least as early as 1999
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Masimo Corp., including but not limited to Rad-5 and Rad-5v Signal Extraction Pulse Oximeters, Radical, Rad-57™, SET® Pulse Oximetry Devices and Rainbow SET™ Devices, and their accessories (e.g., sensor probe)	At least as early as 2004 (Rad-5/ Rad-5v), 2007 (Radical), 2008 (Rad-57™), 2009 (SET®/Rainbow SET™).
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Mindray DS USA, Inc, including but not limited to Accutorr V, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Covidien AG / Nellcor Puritan Bennett Inc., including but not limited to Nellcor OxiMax Pulse Oximeters, Nellcor N-595 Pulse Oximter, Nellcor OxiMax N-600X Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 2002 (OxiMax Pulse Oximeters and OmniMax N-595), 2011 (OxiMax N-600X)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Nonin Medical, Inc., including but not limited to Onyx, PalmSAT™, and Nonin® Model 7500 Digital Pulse Oximeter, Nonin Onyx® 9500, and their accessories (e.g., sensor probe)	At least as early as 1988 (Onyx), 2007 (PalmSAT™), 2007 (Nonin Onyx® 9500), and 2008 (Nonin® Model 7500)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Novametrix Medical Systems Inc., including but not limited to Novametrix Model 513 and Model 2001, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 513) and 2007 (Model 2001)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Respironics, Inc., including but not limited to Models 920, 920M and 920M PLUS Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 920 and 920M) and 2007 (Model 920M PLUS)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Smiths Medical, including but not limited to BCI 3304 Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2008

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Utech Co., Ltd., including but not limited to UT100 Handheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2010
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Welch Allyn, including but not limited to Propaq® CS Vital Signs Monitor and Propaq® Encore Vital Signs Monitor, and their accessories (e.g., sensor probe)	At least as early as 2011 (Propaq® Encore Vital Signs Monitor) and 2012 (Propaq® CS Vital Signs Monitor)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Philips Medical Systems, including but not limited to M4529A DigitalHandheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Palco Labs Inc, including but not limited to Model 120 Mini Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by BCI Inc., including but not limited to Capnocheck® Sleep Capnograph/Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Datex-Ohmeda, including but not limited to TuffSat, and its accessories (e.g., sensor probe)	At least as early as 2007

For each of the prior art devices identified above, Defendants have listed and produced documents as evidence of the relevant features and functionality to the extent that they are presently available and have been located. Defendants have obtained or are in the process of attempting to obtain the identified devices and will make them available for inspection to the extent they are obtained. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35

U.S.C. §§ 102 and/or 103.

Further, Defendants are actively searching for information regarding at least the systems, devices, and/or inventions listed above in Table 2-E.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly. Defendants continue to investigate each of the identified devices, including through potential discovery needed to be obtained via third party subpoenas, and reserve the right to supplement these contentions and accompanying claim charts after further investigation.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself as well as to any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '455 Patent. Defendants' investigation of such prior art systems is still ongoing and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether or not any of the third-party prior art systems anticipate or render obvious the Asserted Claims of the '455 Patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the '455 Patent. Defendants have obtained, and are in the process of obtaining,

additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants' possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

In addition, Defendants identify, responsive to Plaintiff's Infringement Contentions, the patents, publications, and/or systems listed in Tables 1-E and 2-E as evidence of the state of the art as it relates to physiological monitoring devices / systems.

Each of these references show that the concept of "physiological monitoring" is not novel and was well-known for many years before the alleged priority date of the '455 Patent, as discussed in more detail in Section IV.B (obviousness). In light of the references discussed herein, the Asserted Claims of the '455 Patent cannot be valid.

Each prior art patent, publication, or product identified above was either effectively filed or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date of the '455 Patent to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such

reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because Defendants have not yet completed discovery in this case, including taking depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, Defendants reserve the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

F. U.S. Patent No. 12,193,790

Invalidity claim charts identifying disclosures in the references identified in the tables below as to the Asserted Claims of the ’790 Patent are provided in attached Exhibits F1 through F14.

Table 1-F: Prior Art Patents and Printed Publications for the ’790 Patent

Patent No. or Title (Primary Inventor/Author)	**Date of Issue/ Publication**	**Filing Date**
US 9,241,676 (“Lisogurski”) [Ex. F1]	Jan. 26, 2016	May 31, 2012
US 2015/0057511 (“Basu”) [Ex. F2]	Feb. 26, 2015	Mar. 27, 2013
US 6,616,613 (“Goodman”) [Ex. F3]	Sep. 9, 2003	Apr. 29, 2000
WO 2012/099536 (“Kassim”) [Ex. F4]	Jul. 26, 2012	Jan. 20, 2011
US 9,095,291 (“Soller”) [Ex. F5]	Aug. 4, 2015	Aug. 7, 2009
US 11,638,532 (“Poeze”) [Ex. F6]	May 2, 2023	Jul. 1, 2010
US 2012/0150047 (“Terumoto”) [Ex. F7]	June 14, 2012	Nov. 14, 2011
US 8,172,761 (“Rulkov”) [Ex. F8]	May 8, 2012	Oct. 4, 2011
US 2011/0066050 (“Moon”) [Ex. F9]	Mar. 17, 2011	Sep. 15, 2009
US 2005/0049468 (“Carlson”) [Ex. F10]	Mar. 3, 2005	Sep. 3, 2003
US 2008/0242958 (“Al-Ali”) [Ex. F11]	Oct. 2, 2008	Mar. 26, 2008
Plug-and-Play, Single-Chip Photoplethysmography (“Chandrasekar”) [Ex. F12]	September 2012	N/A
US 8,923,918 (“Kreger”) [Ex. F13]	Dec. 30, 2014	Dec. 18, 2010
US 7,507,207 (“Sakai”) [Ex. F14]	Mar. 24, 2009	Oct. 5, 2004

Table 2-F: Prior Art Systems and Inventions for the ’790 Patent

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by ChoiceMMed, including but not limited to ChoiceMMed MD300C318T, and its accessories (e.g., sensor probe)	At least as early as 2011-05-20
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Criticare Systems, Inc., including but not limited to Criticare 504, and its accessories (e.g., sensor probe)	At least as early as 1988
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by GE Marquette Medical Systems, Inc., including but not limited to Dash 2000 Patient Monitor, and its accessories (e.g., sensor probe)	At least as early as 1999
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Masimo Corp., including but not limited to Rad-5 and Rad-5v Signal Extraction Pulse Oximeters, Radical, Rad-57™, SET® Pulse Oximetry Devices and Rainbow SET™ Devices, and their accessories (e.g., sensor probe)	At least as early as 2004 (Rad-5/ Rad-5v), 2007 (Radical), 2008 (Rad-57™), 2009 (SET®/Rainbow SET™).
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Mindray DS USA, Inc, including but not limited to Accutorr V, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Covidien AG / Nellcor Puritan Bennett Inc., including but not limited to Nellcor OxiMax Pulse Oximeters, Nellcor N-595 Pulse Oximter, Nellcor OxiMax N-600X Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 2002 (OxiMax Pulse Oximeters and OmniMax N-595), 2011 (OxiMax N-600X)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Nonin Medical, Inc., including but not limited to Onyx, PalmSAT™, and Nonin® Model 7500 Digital Pulse Oximeter, Nonin Onyx® 9500, and their accessories (e.g., sensor probe)	At least as early as 1988 (Onyx), 2007 (PalmSAT™), 2007 (Nonin Onyx® 9500), and 2008 (Nonin® Model 7500)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Novametrix Medical Systems Inc., including but not limited to Novametrix Model 513 and Model 2001, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 513) and 2007 (Model 2001)

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Respironics, Inc., including but not limited to Models 920, 920M and 920M PLUS Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 920 and 920M) and 2007 (Model 920M PLUS)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Smiths Medical, including but not limited to BCI 3304 Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Utech Co., Ltd., including but not limited to UT100 Handheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2010
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Welch Allyn, including but not limited to Propaq® CS Vital Signs Monitor and Propaq® Encore Vital Signs Monitor, and their accessories (e.g., sensor probe)	At least as early as 2011 (Propaq® Encore Vital Signs Monitor) and 2012 (Propaq® CS Vital Signs Monitor)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Philips Medical Systems, including but not limited to M4529A DigitalHandheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Palco Labs Inc, including but not limited to Model 120 Mini Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by BCI Inc., including but not limited to Capnocheck® Sleep Capnograph/Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Datex-Ohmeda, including but not limited to TuffSat, and its accessories (e.g., sensor probe)	At least as early as 2007

For each of the prior art devices identified above, Defendants have listed and produced documents as evidence of the relevant features and functionality to the extent that they are presently available and have been located. Defendants have obtained or are in the process of

attempting to obtain the identified devices and will make them available for inspection to the extent they are obtained. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Further, Defendants are actively searching for information regarding at least the systems, devices, and/or inventions listed above in Table 2-F.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly. Defendants continue to investigate each of the identified devices, including through potential discovery needed to be obtained via third party subpoenas, and reserve the right to supplement these contentions and accompanying claim charts after further investigation.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself as well as to any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '790 Patent. Defendants' investigation of such prior art systems is still ongoing, and discovery has not yet been received from third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether any of the third-party

prior art systems anticipate or render obvious the Asserted Claims of the ’790 Patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the ’790 Patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third-party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants’ possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

In addition, Defendants identify, responsive to Plaintiff’s Infringement Contentions, the patents, publications, and/or systems listed in Tables 1-F and 2-F as evidence of the state of the art as it relates to physiological monitoring devices / systems.

Each of these references show that the concept of “physiological monitoring” is not novel and was well-known for many years before the alleged priority date of the ’790 Patent, as discussed in more detail in Section IV.B (obviousness). In light of the references discussed herein, the

Asserted Claims of the ’790 Patent cannot be valid.

Each prior art patent, publication, or product identified above was either effectively filed or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date of the ’790 Patent to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because Defendants have not yet completed discovery in this case, including taking depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, Defendants reserve the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

G. U.S. Patent No. 12,268,475

Invalidity claim charts identifying disclosures in the references identified in the tables below as to the Asserted Claims of the ’475 Patent are provided in attached Exhibits G1 through G14.

Table 1-G: Prior Art Patents and Printed Publications for the ’475 Patent

Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
US 9,241,676 (“Lisogurski”) [Ex. G1]	Jan. 26, 2016	May 31, 2012
US 2015/0057511 (“Basu”) [Ex. G2]	Feb. 26, 2015	Mar. 27, 2013
US 6,616,613 (“Goodman”) [Ex. G3]	Sep. 9, 2003	Apr. 29, 2000
WO 2012/099536 (“Kassim”) [Ex. G4]	Jul. 26, 2012	Jan. 20, 2011
US 9,095,291 (“Soller”) [Ex. G5]	Aug. 4, 2015	Aug. 7, 2009
US 11,638,532 (“Poeze”) [Ex. G6]	May 2, 2023	Jul. 1, 2010
US 2012/0150047 (“Terumoto”) [Ex. G7]	June 14, 2012	Nov. 14, 2011
US 8,172,761 (“Rulkov”) [Ex. G8]	May 8, 2012	Oct. 4, 2011

Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
US 2011/0066050 ("Moon") [Ex. G9]	Mar. 17, 2011	Sep. 15, 2009
US 2005/0049468 ("Carlson") [Ex. G10]	Mar. 3, 2005	Sep. 3, 2003
US 2008/0242958 ("Al-Ali") [Ex. G11]	Oct. 2, 2008	Mar. 26, 2008
US 2010/0217102 ("LeBeouf") [Ex. G12]	Aug. 26, 2010	Jan. 21, 2010
US 8,108,036 ("Tran") [Ex. G13]	Jan. 31, 2012	Jun. 18, 2009
US 8,922,788 ("Addison-788") [Ex. G14]	Dec. 30, 2014	Dec 22, 2012

Table 2-G: Prior Art Systems and Inventions for the '475 Patent

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by ChoiceMMed, including but not limited to ChoiceMMed MD300C318T, and its accessories (e.g., sensor probe)	At least as early as 2011-05-20
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Criticare Systems, Inc., including but not limited to Criticare 504, and its accessories (e.g., sensor probe)	At least as early as 1988
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by GE Marquette Medical Systems, Inc., including but not limited to Dash 2000 Patient Monitor, and its accessories (e.g., sensor probe)	At least as early as 1999
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Masimo Corp., including but not limited to Rad-5 and Rad-5v Signal Extraction Pulse Oximeters, Radical, Rad-57™, SET® Pulse Oximetry Devices and Rainbow SET™ Devices, and their accessories (e.g., sensor probe)	At least as early as 2004 (Rad-5/ Rad-5v), 2007 (Radical), 2008 (Rad-57™), 2009 (SET®/Rainbow SET™).
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Mindray DS USA, Inc, including but not limited to Accutorr V, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Covidien AG / Nellcor Puritan Bennett Inc., including but not limited to Nellcor OxiMax Pulse Oximeters, Nellcor N-595 Pulse Oximter, Nellcor OxiMax N-600X Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 2002 (OxiMax Pulse Oximeters and OmniMax N-595), 2011 (OxiMax N-600X)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Nonin Medical, Inc., including but not limited to Onyx, PalmSAT™, and	At least as early as 1988 (Onyx), 2007 (PalmSAT™), 2007 (Nonin

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
Nonin® Model 7500 Digital Pulse Oximeter, Nonin Onyx® 9500, and their accessories (e.g., sensor probe)	Onyx® 9500), and 2008 (Nonin® Model 7500)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Novametrix Medical Systems Inc., including but not limited to Novametrix Model 513 and Model 2001, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 513) and 2007 (Model 2001)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Respironics, Inc., including but not limited to Models 920, 920M and 920M PLUS Pulse Oximeter, and their accessories (e.g., sensor probe)	At least as early as 1999 (Model 920 and 920M) and 2007 (Model 920M PLUS)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Smiths Medical, including but not limited to BCI 3304 Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2008
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Utech Co., Ltd., including but not limited to UT100 Handheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2010
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Welch Allyn, including but not limited to Propaq® CS Vital Signs Monitor and Propaq® Encore Vital Signs Monitor, and their accessories (e.g., sensor probe)	At least as early as 2011 (Propaq® Encore Vital Signs Monitor) and 2012 (Propaq® CS Vital Signs Monitor)
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Philips Medical Systems, including but not limited to M4529A DigitalHandheld Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Palco Labs Inc, including but not limited to Model 120 Mini Pulse Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by BCI Inc., including but not limited to Capnocheck® Sleep Capnograph/Oximeter, and its accessories (e.g., sensor probe)	At least as early as 2007
Pulse oximeters or similar products publicly disclosed, used, sold, or offered for sale by Datex-Ohmeda, including but not limited to TuffSat, and its accessories (e.g., sensor probe)	At least as early as 2007

For each of the prior art devices identified above, Defendants have listed and produced documents as evidence of the relevant features and functionality to the extent that they are presently available and have been located. Defendants have obtained or are in the process of attempting to obtain the identified devices and will make them available for inspection to the extent they are obtained. To the extent that one or more documents (*e.g.*, user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103.

Further, Defendants are actively searching for information regarding at least the systems, devices, and/or inventions listed above in Table 2-G.

Discovery is ongoing, and Defendants may serve third parties with document subpoenas. One or more of these devices, along with related documentation, may be invalidating, and Defendants reserve the right to supplement these contentions accordingly. Defendants continue to investigate each of the identified devices, including through potential discovery needed to be obtained via third party subpoenas, and reserve the right to supplement these contentions and accompanying claim charts after further investigation.

Defendants' reference to a particular product, device, or software program in these contentions should be interpreted as a reference to the system itself as well as to any corresponding patents, publications, or product literature relating to the cited system. Upon information and belief, the systems were publicly disclosed, used, sold, or offered for sale in the United States before the alleged priority date of the Asserted Claims of the '475 Patent. Defendants' investigation of such prior art systems is still ongoing, and discovery has not yet been received from

third parties who may have information concerning such prior art systems. Accordingly, subsequent discovery may reveal information that affects the disclosures and contentions herein. For example, subsequent discovery may provide additional information regarding whether any of the third-party prior art systems anticipate or render obvious the Asserted Claims of the ’475 Patent. As such, Defendants reserve all rights to supplement their invalidity contentions.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the ’475 Patent. Defendants have obtained, and are in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third-party discovery during this lawsuit, which Defendants reserve the right to rely upon to corroborate the prior art status of the prior art identified herein. Defendants reserve the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, Defendants will make all such devices, software programs, or other products in Defendants’ possession, custody, or control available for inspection by Plaintiff.

Consequently, Defendants reserve the right to amend, modify, or supplement these Invalidity Contentions should additional information become available to them through discovery.

In addition, Defendants identify, responsive to Plaintiff’s Infringement Contentions, the patents, publications, and/or systems listed in Tables 1-G and 2-G as evidence of the state of the art as it relates to physiological monitoring devices / systems.

Each of these references show that the concept of "physiological monitoring" is not novel and was well-known for many years before the alleged priority date of the '475 Patent, as discussed in more detail in Section IV.B (obviousness). In light of the references discussed herein, the Asserted Claims of the '475 Patent cannot be valid.

Each prior art patent, publication, or product identified above was either effectively filed or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date of the '475 Patent to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because Defendants have not yet completed discovery in this case, including taking depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, Defendants reserve the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

H. State of the Art

Defendants identify, responsive to Plaintiff's infringement contentions, the references listed in Tables 1-A through 1-G, Tables 2-A through 2-G, and the following patents, publications, and systems as evidence of the state of the art as it relates to each of the Asserted Patents:

- U.S. Patent No. 3,514,538
- U.S. Patent No. 3,789,601
- U.S. Patent No. 4,015,595
- U.S. Patent No. 4,589,078
- U.S. Patent No. 4,591,659
- U.S. Patent No. 4,941,236

- U.S. Patent No. 5,028,787
- U.S. Patent No. 5,222,496,
- U.S. Patent No. 5,254,388
- U.S. Patent No. 5,259,381
- U.S. Patent No. 5,267,152
- U.S. Patent No. 5,334,916
- U.S. Patent No. 5,348,002
- U.S. Patent No. 5,370,114
- U.S. Patent No. 5,527,261
- U.S. Patent No. 5,555,882
- U.S. Patent No. 5,590,652
- U.S. Patent No. 5,632,272
- U.S. Patent No. 5,638,818
- U.S. Patent No. 5,687,721
- U.S. Patent No. 5,746,206
- U.S. Patent No. 5,795,300
- U.S. Patent No. 5,807,261
- U.S. Patent No. 5,830,137
- U.S. Patent No. 5,879,294
- U.S. Patent No. 5,924,069
- U.S. Patent No. 6,018,673
- U.S. Patent No. 6,064,898
- U.S. Patent No. 6,067,463
- U.S. Patent No. 6,081,782
- U.S. Patent No. 6,108,634
- U.S. Patent No. 6,120,460
- U.S. Patent No. 6,126,595
- U.S. Patent No. 6,152,876
- U.S. Patent No. 6,158,245
- U.S. Patent No. 6,168,563
- U.S. Patent No. 6,171,237
- U.S. Patent No. 6,172,743
- U.S. Patent No. 6,174,291
- U.S. Patent No. 6,178,343
- U.S. Patent No. 6,278,975
- U.S. Patent No. 6,285,454
- U.S. Patent No. 6,293,915
- U.S. Patent No. 6,336,900
- U.S. Patent No. 6,343,223
- U.S. Patent No. 6,393,311
- U.S. Patent No. 6,483,976
- U.S. Patent No. 6,505,133
- U.S. Patent No. 6,553,242
- U.S. Patent No. 6,584,336

- U.S. Patent No. 6,591,239
- U.S. Patent No. 6,591,239
- U.S. Patent No. 6,602,191
- U.S. Patent No. 6,605,038
- U.S. Patent No. 6,608,562
- U.S. Patent No. 6,648,820
- U.S. Patent No. 6,705,990
- U.S. Patent No. 6,705,991
- U.S. Patent No. 6,801,799
- U.S. Patent No. 6,816,266
- U.S. Patent No. 6,886,964
- U.S. Patent No. 6,912,413
- U.S. Patent No. 6,937,885
- U.S. Patent No. 6,961,599
- U.S. Patent No. 6,990,365
- U.S. Patent No. 7,031,728
- U.S. Patent No. 7,236,811
- U.S. Patent No. 7,346,174
- U.S. Patent No. 7,403,804
- U.S. Patent No. 7,507,207
- U.S. Patent No. 7,624,028
- U.S. Patent No. 7,658,613
- U.S. Patent No. 7,899,506
- U.S. Patent No. 8,095,195
- U.S. Patent No. 8,108,036
- U.S. Patent No. 8,125,331
- U.S. Patent No. 8,172,761
- U.S. Patent No. 8,326,390
- U.S. Patent No. 8,537,343
- U.S. Patent No. 8,670,819
- U.S. Patent No. 8,725,226
- U.S. Patent No. 8,764,651
- U.S. Patent No. 8,923,918
- U.S. Patent No. 9,055,868
- U.S. Patent No. 9,241,676
- U.S. Patent No. 9,392,946
- U.S. Patent No. 9,596,990
- U.S. Patent No. 9,651,633
- U.S. Patent No. 9,820,658
- U.S. Patent No. 10,517,484
- U.S. Patent No. 10,729,335
- U.S. Patent No. 10,729,335
- U.S. Patent No. 10,874,304
- U.S. Patent No. 11,160,455

- U.S. Patent No. 11,242,072
- U.S. Patent No. 11,330,993
- U.S. Patent No. 11,342,072
- U.S. Patent No. 12,193,790
- "Plug-and-Play, Single-Chip Photoplethysmography", by D. Chandrasekar, B. Arnetz, P. Levy, A. Basu
- "Supercontinuum generation from ~1.9 to 4:5 μm in ZBLAN fiber with high average power generation beyond 3:8 μm using a thulium-doped fiber amplifier" by O. Kulkarni, V. Alexander, M. Kumar, M.Freeman, M. N. Islam, F. Terry, Jr., M. Neelakandan, and A. Chan
- "Supercontinuum Generation in Silica Fibers by Amplified Nanosecond Laser Diode Pulses" by C. Xia, M. Kumar, M. Cheng, O. Kulkarni, M. Islam, A. Galvanauskas, F. Terry, Jr., M. Freeman, D. Nolan, and W. Wood
- "Towards a Wearable Non-invasive Blood Glucose Monitoring Device" by J. Anders, J. Solanki, O. Choudhary, S. Chouksey, N. Malvia, P. Chaturvedi, and P. Sen
- "Open Data Kit Sensors: Mobile Data Collection with Wired and Wireless Sensors" by R. Chaudhri, W. Brunette, M. Goel, R. Sodt, J. VanORden, M. Falcone, G. Borriello
- "Android Based Body Area Network for the Evaluation of Medical Parameters" by M. Wagner, B. Kuch, C. Cabrera, P. Enoksson, A. Sieber
- "Noninvasice Cardiac Output Estimation Using a Novel Photoplethsymogram Index" by L. Wang, E. Pickwell-MacPherson, Y.P. Liang, Y.T. Zhang
- "Towards a Wearable Non-invasive Blood Glucose Monitoring Device" by J. Andrews, J. Solanki, O. Choudhary, S. Chouksey, N. Malvia, P. Chaturvedi, P. Sen
- U.S. Patent No. 5,511,553
- U.S. Patent No. 5,554,273
- U.S. Patent No. 5,592,124
- U.S. Patent No. 5,822,473
- U.S. Patent No. 5,942,749
- U.S. Patent No. 5,953,713
- U.S. Patent No. 6,931,269
- U.S. Patent No. 7,023,557
- U.S. Patent No. 7,187,900
- U.S. Patent No. 8,050,730
- U.S. Patent No. 8,079,735
- U.S. Patent No. 8,852,103
- U.S. Patent No. 8,996,088
- U.S. Patent No. 9,239,951
- U.S. Patent Pub. No. 2007/0149868
- U.S. Patent Pub. No. 2007/0194939
- "The Biomedical Engineering Handbook," by Joseph D. Bronzino (1995)
- E.F. Schubert, Light-Emitting Diodes (Cambridge Univ. Press, 2nd ed. reprinted 2014)
- JP 3552090

IV. P. R. 3-3(b) – Invalidity Grounds

Pursuant to P.R. 3-3(b), Defendants contend that certain prior art references below anticipate one or more Asserted Claims and that to the extent the identified prior art references do not anticipate the Asserted Claims, those claims are invalid as obvious under 35 U.S.C. §103. Each anticipatory prior art reference, either alone or in combination with other prior art, also renders the Asserted Claims invalid as obvious. In particular, each anticipatory prior art reference may be combined with (1) information generally known to persons skilled in the art at the time of the alleged invention, and/or (2) any of the other identified prior art references. To the extent that Plaintiff contends that any of the anticipatory prior art fails to disclose one or more limitations of the Asserted Claims, Defendants contend that any difference between the reference and the corresponding patent claims would have been obvious to one of ordinary skill in the art. Thus, all anticipation charts should be interpreted as both reflecting anticipation by the reference as well as invalidity due to single reference obviousness, to the extent that Plaintiff contends that any limitation is missing.

A. Anticipation

As stated above, Defendants incorporate by reference all other invalidity contentions related to the Asserted Patents served on or otherwise provided to Plaintiff, whether past or future. In accordance with P.R. 3-3(a), prior art references anticipating the Asserted Claims are provided below. The prior art listed below anticipates the Asserted Claims under the proper construction of the claims and/or under Plaintiff's apparent interpretation of the claims reflected by Plaintiff's Complaint and Infringement Contentions.

1. U.S. Patent No. 9,055,868

The Asserted Claims of the '868 Patent are anticipated and/or rendered obvious by prior

art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’868 Patent Asserted Claims in the claim charts of Exhibits A1 through A10 (collectively “Appendix A”) which are hereby incorporated by reference as if fully set forth herein. The claim charts of Appendix A show how these prior art references teach or suggest each and every element of the ’868 Patent Asserted Claims. For each reference or combination of references suggested by each chart and/or herein, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’868 Patent Asserted Claims are invalid in view of the prior art references cited in the claim charts of Appendix A, Defendants further contend that the ’868 Patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102(a), 102(b), and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems. In addition to contending that the ’868 Patent Asserted Claims are invalid in view of the explicit disclosures of the prior art references cited in the claim charts of Appendix A, Defendants further contend that the knowledge of skill evidenced by those references render those claims invalid. Defendants further contend that, even if a prior art reference does not expressly disclose all limitations as arranged or combined in the same manner as an asserted claim, a skilled artisan reading the reference would at once envisage the claimed arrangement or combination. *See, e.g.*, *Kennametal Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015).

Defendants’ reference to particular components, circuits, software programs, devices, or products in the claim charts of Appendix A should be interpreted alternatively as both as a

reference to the product itself and to any corresponding patents, publications, or product literature cited in Appendix A that relates to the cited component, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art component(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the ’868 Patent, all prior art cited during reexamination proceedings of the ’868 Patent, all prior art as described in any future *inter partes* review proceedings of the ’868 Patent, and all prior art disclosed during previous litigation proceedings.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Omni Proceedings wherein invalidity contentions have been, or will be, provided regarding the ’868 Patent, its foreign counterparts, or any parent or child patent of the ’868 Patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure, embodiment, or other material, the identification should be understood to include the referenced figure, embodiment, or other material as well. Consistent with P.R. 3-3(c), Defendants’ citations to specific statements, figures, or disclosures in a prior art reference are

sufficient to put Plaintiff on notice where each element of each asserted claim is found in the prior art. However, it should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix A.

2. U.S. Patent No. 9,651,533

The Asserted Claims of the ’533 Patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’533 Patent Asserted Claims in the claim charts of Exhibits B1 through B8 (collectively “Appendix B”) which are hereby incorporated by reference as if fully set forth herein. The claim charts of Appendix B show how these prior art references teach or suggest each and

every element of the ’533 Patent Asserted Claims. For each reference or combination of references suggested by each chart and/or herein, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’533 Patent Asserted Claims are invalid in view of the prior art references cited in the claim charts of Appendix B, Defendants further contend that the ’533 Patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102(a), 102(b), and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems. In addition to contending that the ’533 Patent Asserted Claims are invalid in view of the explicit disclosures of the prior art references cited in the claim charts of Appendix B, Defendants further contend that the knowledge of skill evidenced by those references render those claims invalid. Defendants further contend that, even if a prior art reference does not expressly disclose all limitations as arranged or combined in the same manner as an asserted claim, a skilled artisan reading the reference would at once envisage the claimed arrangement or combination. *See, e.g.*, *Kennametal Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015).

Defendants’ reference to particular components, circuits, software programs, devices, or products in the claim charts of Appendix B should be interpreted alternatively as both as a reference to the product itself and to any corresponding patents, publications, or product literature cited in Appendix B that relates to the cited component, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art component(s), circuit(s), software

program(s), device(s) or product(s) that are referenced in the charts.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the ’533 Patent, all prior art cited during reexamination proceedings of the ’533 Patent, all prior art as described in any future *inter partes* review proceedings of the ’533 Patent, and all prior art disclosed during previous litigation proceedings.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Omni Proceedings wherein invalidity contentions have been, or will be, provided regarding the ’533 Patent, its foreign counterparts, or any parent or child patent of the ’533 Patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure, embodiment, or other material, the identification should be understood to include the referenced figure, embodiment, or other material as well. Consistent with P.R. 3-3(c), Defendants’ citations to specific statements, figures, or disclosures in a prior art reference are sufficient to put Plaintiff on notice where each element of each asserted claim is found in the prior art. However, it should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior

art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix B.

3. U.S. Patent No. 10,517,484

The Asserted Claims of the ’484 Patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’484 Patent Asserted Claims in the claim charts of Exhibits C1 through C14 (collectively “Appendix C”) which are hereby incorporated by reference as if fully set forth herein. The claim charts of Appendix C show how these prior art references teach or suggest each and every element of the ’484 Patent Asserted Claims. For each reference or combination of references suggested by each chart and/or herein, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’484 Patent Asserted Claims are invalid in view of the

prior art references cited in the claim charts of Appendix C, Defendants further contend that the ’484 Patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102(a), 102(b), and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems. In addition to contending that the ’484 Patent Asserted Claims are invalid in view of the explicit disclosures of the prior art references cited in the claim charts of Appendix C, Defendants further contend that the knowledge of skill evidenced by those references render those claims invalid. Defendants further contend that, even if a prior art reference does not expressly disclose all limitations as arranged or combined in the same manner as an asserted claim, a skilled artisan reading the reference would at once envisage the claimed arrangement or combination. *See, e.g.*, *Kennametal Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015).

Defendants’ reference to particular components, circuits, software programs, devices, or products in the claim charts of Appendix C should be interpreted alternatively as both as a reference to the product itself and to any corresponding patents, publications, or product literature cited in Appendix C that relates to the cited component, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art component(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the ’484 Patent, all prior art cited during reexamination proceedings of the ’484 Patent, all prior art as described in any future *inter partes* review proceedings of the ’484 Patent,

and all prior art disclosed during previous litigation proceedings.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Omni Proceedings wherein invalidity contentions have been, or will be, provided regarding the ’484 Patent, its foreign counterparts, or any parent or child patent of the ’484 Patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure, embodiment, or other material, the identification should be understood to include the referenced figure, embodiment, or other material as well. Consistent with P.R. 3-3(c), Defendants’ citations to specific statements, figures, or disclosures in a prior art reference are sufficient to put Plaintiff on notice where each element of each asserted claim is found in the prior art. However, it should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the

identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix C.

4. U.S. Patent No. 10,874,304

The Asserted Claims of the ’304 Patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’304 Patent Asserted Claims in the claim charts of Exhibits D1 through D19 (collectively “Appendix D”) which are hereby incorporated by reference as if fully set forth herein. The claim charts of Appendix D show how these prior art references teach or suggest each and every element of the ’304 Patent Asserted Claims. For each reference or combination of references suggested by each chart and/or herein, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’304 Patent Asserted Claims are invalid in view of the prior art references cited in the claim charts of Appendix D, Defendants further contend that the ’304 Patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102(a), 102(b), and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants

continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems. In addition to contending that the ’304 Patent Asserted Claims are invalid in view of the explicit disclosures of the prior art references cited in the claim charts of Appendix D, Defendants further contend that the knowledge of skill evidenced by those references render those claims invalid. Defendants further contend that, even if a prior art reference does not expressly disclose all limitations as arranged or combined in the same manner as an asserted claim, a skilled artisan reading the reference would at once envisage the claimed arrangement or combination. *See, e.g.*, *Kennametal Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015).

Defendants’ reference to particular components, circuits, software programs, devices, or products in the claim charts of Appendix D should be interpreted alternatively as both as a reference to the product itself and to any corresponding patents, publications, or product literature cited in Appendix D that relates to the cited component, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art component(s), circuit(s), software program(s), device(s), or product(s) that are referenced in the charts.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the ’304 Patent, all prior art cited during reexamination proceedings of the ’304 Patent, all prior art as described in any *inter partes* review proceedings of the ’304 Patent, and all prior art disclosed during previous litigation proceedings.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Omni Proceedings wherein invalidity contentions have been, or will be, provided regarding the ’304 Patent, its foreign

counterparts, or any parent or child patent of the ’304 Patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure, embodiment, or other material, the identification should be understood to include the referenced figure, embodiment, or other material as well. Consistent with P.R. 3-3(c), Defendants’ citations to specific statements, figures, or disclosures in a prior art reference are sufficient to put Plaintiff on notice where each element of each asserted claim is found in the prior art. However, it should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining

certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix D.

5. U.S. Patent No. 11,160,455

The Asserted Claims of the ’455 Patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’455 Patent Asserted Claims in the claim charts of Exhibits E1 through E18 (collectively “Appendix E”) which are hereby incorporated by reference as if fully set forth herein. The claim charts of Appendix E show how these prior art references teach or suggest each and every element of the ’455 Patent Asserted Claims. For each reference or combination of references suggested by each chart and/or herein, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’455 Patent Asserted Claims are invalid in view of the prior art references cited in the claim charts of Appendix E, Defendants further contend that the ’455 Patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102(a), 102(b), and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems. In addition to contending that the ’455 Patent Asserted Claims are invalid in view of the explicit disclosures of the prior art references cited in the claim charts of Appendix E, Defendants

further contend that the knowledge of skill evidenced by those references render those claims invalid. Defendants further contend that, even if a prior art reference does not expressly disclose all limitations as arranged or combined in the same manner as an asserted claim, a skilled artisan reading the reference would at once envisage the claimed arrangement or combination. *See, e.g.*, *Kennametal Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015).

Defendants' reference to particular components, circuits, software programs, devices, or products in the claim charts of Appendix E should be interpreted alternatively as both as a reference to the product itself and to any corresponding patents, publications, or product literature cited in Appendix E that relates to the cited component, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art component(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '455 Patent, all prior art cited during reexamination proceedings of the '455 Patent, all prior art as described in any future *inter partes* review proceedings of the '455 Patent, and all prior art disclosed during previous litigation proceedings.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Omni Proceedings wherein invalidity contentions have been, or will be, provided regarding the '455 Patent, its foreign counterparts, or any parent or child patent of the '455 Patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the

references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure, embodiment, or other material, the identification should be understood to include the referenced figure, embodiment, or other material as well. Consistent with P.R. 3-3(c), Defendants' citations to specific statements, figures, or disclosures in a prior art reference are sufficient to put Plaintiff on notice where each element of each asserted claim is found in the prior art. However, it should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an

Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix E.

6. U.S. Patent No. 12,193,790

The Asserted Claims of the ’790 Patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render obvious the ’790 Patent Asserted Claims in the claim charts of Exhibits F1 through F14 (collectively “Appendix F”) which are hereby incorporated by reference as if fully set forth herein. The claim charts of Appendix F show how these prior art references teach or suggest each and every element of the ’790 Patent Asserted Claims. For each reference or combination of references suggested by each chart and/or herein, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’790 Patent Asserted Claims are invalid in view of the prior art references cited in the claim charts of Appendix F, Defendants further contend that the ’790 Patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102(a), 102(b), and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems. In addition to contending that the ’790 Patent Asserted Claims are invalid in view of the explicit disclosures of the prior art references cited in the claim charts of Appendix F, Defendants further contend that the knowledge of skill evidenced by those references render those claims invalid. Defendants further contend that, even if a prior art reference does not expressly disclose all limitations as arranged or combined in the same manner as an asserted claim, a skilled artisan reading the reference would at once envisage the claimed arrangement or combination. *See, e.g.,*

Kennametal Inc. v. Ingersoll Cutting Tool Co., 780 F.3d 1376 (Fed. Cir. 2015).

Defendants' reference to particular components, circuits, software programs, devices, or products in the claim charts of Appendix F should be interpreted alternatively as both as a reference to the product itself and to any corresponding patents, publications, or product literature cited in Appendix F that relates to the cited encoder, decoder, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art encoder(s), decoder(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the '790 Patent, all prior art cited during reexamination proceedings of the '790 Patent, all prior art as described in any future *inter partes* review proceedings of the '790 Patent, and all prior art disclosed during previous litigation proceedings.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Omni Proceedings wherein invalidity contentions have been, or will be, provided regarding the '790 Patent, its foreign counterparts, or any parent or child patent of the '790 Patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text

refers to a figure, embodiment, or other material, the identification should be understood to include the referenced figure, embodiment, or other material as well. Consistent with P.R. 3-3(c), Defendants' citations to specific statements, figures, or disclosures in a prior art reference are sufficient to put Plaintiff on notice where each element of each asserted claim is found in the prior art. However, it should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix F.

7. U.S. Patent No. 12,268,475

The Asserted Claims of the '475 Patent are anticipated and/or rendered obvious by prior art. Pursuant to P.R. 3-3(a), Defendants identify the prior art references that anticipate or render

obvious the ’475 Patent Asserted Claims in the claim charts of Exhibits G1 through G14 (collectively “Appendix G”) which are hereby incorporated by reference as if fully set forth herein. The claim charts of Appendix G show how these prior art references teach or suggest each and every element of the ’475 Patent Asserted Claims. For each reference or combination of references suggested by each chart and/or herein, Defendants indicate whether the prior art renders the claim anticipated and/or obvious pursuant to P.R. 3-3(b).

In addition to contending that the ’475 Patent Asserted Claims are invalid in view of the prior art references cited in the claim charts of Appendix G, Defendants further contend that the ’475 Patent Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102(a), 102(b), and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, Defendants continue to investigate these items and to reserve the right to amend or supplement these contentions to include additional information or documents regarding such products and/or systems. In addition to contending that the ’475 Patent Asserted Claims are invalid in view of the explicit disclosures of the prior art references cited in the claim charts of Appendix G, Defendants further contend that the knowledge of skill evidenced by those references render those claims invalid. Defendants further contend that, even if a prior art reference does not expressly disclose all limitations as arranged or combined in the same manner as an asserted claim, a skilled artisan reading the reference would at once envisage the claimed arrangement or combination. *See, e.g.*, *Kennametal Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015).

Defendants’ reference to particular components, circuits, software programs, devices, or products in the claim charts of Appendix G should be interpreted alternatively as both as a reference to the product itself and to any corresponding patents, publications, or product literature

cited in Appendix G that relates to the cited encoder, decoder, circuit, software program, device, or product. In addition, Defendants may rely on other documents or things that have not yet been located to support its contentions regarding such prior art encoder(s), decoder(s), circuit(s), software program(s), device(s) or product(s) that are referenced in the charts.

Defendants incorporate by reference, as if set forth fully herein, all prior art cited during the prosecution of the ’475 Patent, all prior art cited during reexamination proceedings of the ’475 Patent, all prior art as described in any future *inter partes* review proceedings of the ’475 Patent, and all prior art disclosed during previous litigation proceedings.

Defendants further identify and hereby incorporate by reference as if set forth fully herein the prior art references and invalidity contentions as described in any Other Omni Proceedings wherein invalidity contentions have been, or will be, provided regarding the ’475 Patent, its foreign counterparts, or any parent or child patent of the ’475 Patent. Defendants reserve the right to use any and all portions of the publication, related publications, commercial embodiments of the publication, and other evidence that is discovered in these lawsuits to demonstrate and/or evidence the components, functionality, and capabilities of the devices and systems disclosed in the references charted.

Where Defendants identify a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure, embodiment, or other material, the identification should be understood to include the referenced figure, embodiment, or other material as well. Consistent with P.R. 3-3(c), Defendants’ citations to specific statements, figures, or disclosures in a prior art reference are sufficient to put Plaintiff on notice where each element of each asserted claim is found in the prior

art. However, it should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. Defendants therefore reserve the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

Defendants also reserve the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix G.

B. Obviousness

As stated above, Defendants incorporate by reference all other invalidity contentions related to the Asserted Patents served on or otherwise provided to Plaintiff, whether past or in the future. In addition to certain claims being anticipated at least under Plaintiff's apparent claim constructions as indicated above, the Asserted Claims are also invalid as obvious over the same teachings identified for anticipation. Further, the Asserted Claims are obvious over various

combinations of the references shown in the claim charts accompanying or incorporated by reference into this disclosure. No Asserted Claim goes beyond combining known elements to achieve predictable results or does more than choose between clear alternatives known to those of skill in the art. Thus, to the extent that an Asserted Claim is not anticipated, it is nevertheless invalid as obvious. Specifically, Defendants assert that any charted or incorporated reference in combination with one or more other charted or incorporated references renders the Asserted Claims obvious.

In *KSR International Co. v. Teleflex, Inc.*, the United States Supreme Court held that, among other things, "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." 550 U.S. 398, 416 (2007); *see also id.* at 417 ("[A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions."). A patent is obvious where "the content of the prior art, the scope of the patent claim, and the level of ordinary skill are not in material dispute, and the obviousness of the claim is apparent in light of these factors." *Id.* at 427. The Supreme Court found that "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *Id.* at 417.

Moreover, the Supreme Court recognizes that market pressures will motivate a person of ordinary skill to survey known art for solutions to problems. *Id.* at 421 ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp."). When a person of ordinary skill uses an identified, predictable solution to solve a problem, "it is likely the product not of innovation but of ordinary skill and

common sense." *Id.* In addition, when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. *Id.* at 417. If a person of ordinary skill can implement a predictable variation, U.S.C. § 103 bars its patentability. *Id.*

"'[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.'" *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1379 (Fed. Cir. 2023) (quoting *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007)). "Additionally, 'universal' motivations known in a particular field to improve technology provide 'a motivation to combine prior art references ***even absent any hint of suggestion*** in the references themselves.'" *Id.* (quoting *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 797-99 (Fed. Cir. 2021)) (original emphasis). Thus, motivations to combine, as well as the general state of the art, may be found in a variety of places including, but not limited to, in the references defined above, and the specification of the Asserted Patents. For example, each piece of prior art relates to systems and methods for physiological monitoring devices / systems. A person of ordinary skill in the art at the time of the alleged invention would have been motivated to combine any one piece of identified prior art with any other identified piece of prior art. For at least this reason, it would have been obvious to a person of skill in the art at the time of the alleged invention of the Asserted Claims to combine the various references cited herein so as to practice the Asserted Claims and there is a motivation in the art to make such a combination. Further reasons to combine the references identified in these charts include the nature of the problem being solved, the express, implied, and/or inherent teachings of the prior art, the knowledge of persons of ordinary skill in the art, the fact that the prior art is generally directed towards methods and systems for physiological monitoring, that such combinations would have

yielded predictable results, and that such combinations would have represented known alternatives to a person of ordinary skill in the art.

The law does not require evidence of a specific motivation to combine prior art where the combiation would yield expected results and at most simply represents a known alternative or design choice to one of skill in the art. *See Apple Inc. v. Samsung Elecs. Co*., 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co*., 869 F.3d 1336, 1344 (Fed. Cir. 2017); *KSR Int'l Co. v. Teleflex, Inc*., 127 S. Ct. 1727, 1739-40 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, and instead applying an "expansive and flexible" approach). Indeed, the Supreme Court held that a POSITA is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420-21.

Nevertheless, in addition to the information contained immediately above and elsewhere in these contentions, Defendants identify additional motivations and reasons to combine. For example, in addition to the specific motivations identified herein, motivation to modify a particular reference or to combine any two or more of the identified references comes from (a) the nature of the problem being solved, (b) the teachings of the prior art, (c) the knowledge of persons of ordinary skill in the art, (d) the fact that all of the references teach systems, apparatuses, and methods related to the subject matter and address the same technical issues described in the Asserted Patents, and (e) one would be motivated by considerations of efficiency, effectiveness, convenience, cost-savings, and accessibility, to combine the various teachings of the references. Additionally, one would be motivated to address the alleged problems or achieve the purported objectives identified in the Background sections of the Asserted Patents, of the references cited on

the face of the Asserted Patents, and of the other references cited herein.

In sum, motivations to modify or combine the identified references including the references listed above can be found via, for example, discussions in the cited references, the state of the art discussed in the references, and the knowledge of one of ordinary skill in the art. One of ordinary skill in the art would have been motivated to combine these references, because these references relate to common objectives and subject matter. The references share commonalities in terms of their general subject matter as well as the types of equipment, products, systems, and/or methods used. Further, certain prior art references explicitly or implicitly reference other prior art references, share common authors or inventors, were published in the same journals, were compiled by a common author of a compilation or reference book, were presented at the same conferences, and/or were developed at common companies, schools, or organizations, which would motivate one of ordinary skill in the art to combine them. These references are within the field of the Asserted Patents and are directed to similar subject matter within the field. Additionally, the references, and any products, devices, or processes described in the references, existed and/or were invented in the same time period providing further motivation for combination. These disclosures were provided without prejudice to any arguments or objections concerning the relevance of motivation to combine in connection with any invalidity contentions.

Defendants reserve the right to further specify the motivations to combine the prior art in response to positions that Plaintiff may take later in this case and as discovery, including third party discovery, proceeds. Defendants may rely on any and all portions of the prior art, other documents, and expert testimony to establish that a person of ordinary skill in the art would have been motivated to modify or combine the prior art so as to render the claims invalid as obvious. Moreover, Defendants reserve the right to rely on later identified sources of information, including

but not limited to witness testimony and other discovery, to establish the state of the art in the relevant time frame pertaining to the Asserted Patents.

Additionally, Defendants note that Plaintiff has neither provided any contention that secondary considerations of non-obviousness exist for any Asserted Patent nor provided any evidence of such secondary considerations. Defendants are not aware of any evidence supporting the existence of any such secondary considerations. This lack of evidence further renders the Asserted Claims obvious. Proving any such secondary considerations is Omni's burden. *See, e.g.*, *ZUP, LLC v. Nach Mfg., Inc.*, 896 F.3d 1365, 1373 (Fed. Cir. 2018) ("[A] patentee bears the burden of production with respect to evidence of secondary considerations of nonobviousness."). To the extent Omni is permitted to introduce contentions and/or evidence concerning secondary considerations in the future, Defendants reserve all rights to rebut those contentions if and when Omni identifies them. In the meantime, Defendants note the complete lack of any such evidence in the record. Moreover, Defendants further contend that, in any event, the evidence of obviousness for each asserted claim is so overwhelming that secondary considerations are necessarily insufficient to rebut Defendants' showing. *See, e.g.*, *Ohio Willow Wood Co. v. Alps South, LLC*, 735 F.3d 1333, 1344 (Fed. Cir. 2013) ("[W]here a claimed invention represents no more than the predictable use of prior art elements according to established functions, as here, evidence of secondary indicia are frequently deemed inadequate to establish non-obviousness.").

While Defendants reserve the right to rely on any combination of the references reflected in their charts or incorporated herein by reference, Defendants provide the following exemplary and non-exhaustive references and/or combinations evidencing invalidity of the claims of the Asserted Patents. The combinations of prior art listed below render obvious the Asserted Claims under the proper construction of the claims and/or under Plaintiff's apparent interpretation of the

claims as set forth by Plaintiff in its Complaint and Infringement Contentions.

1. U.S. Patent No. 9,055,868

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix A the prior art references that render obvious the Asserted Claims of the ’868 Patent and include below exemplary combinations showing the obviousness of the ’868 Patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix A, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of ordinary skill in the art at the time of the ’868 Patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix A, such reference may be combined with any other references listed in Appendix A for such element, thereby rendering the claims invalid for obviousness. To the extent a finder of fact determines that a limitation of any of the ’868 Patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the ’868 Patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a. Obviousness Rationale and Motivations to Combine

Obviousness: For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix A along with the knowledge of one of ordinary skill in the art to meet the limitations of the ’868 Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of

the ’868 Patent obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Omni’s Asserted Claims. Defendants may rely upon a subset of the identified references or all of the references identified herein, including all references in Appendix A, for purposes of obviousness depending on the Court’s claim construction, positions taken by Omni during this litigation, and further investigation and discovery.

Reservation of Rights: Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants’ inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

No More Than Ordinary Variations of Prior Art; No Unexpected Results: To the extent not anticipated, the ’868 Patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit’s “rigid” application of the teaching, suggestion, or motivation to combine test, instead espousing an “expansive and flexible” approach); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344 (Fed. Cir. 2017).

Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art references identified in Appendix A would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix A would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '868 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix A is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in Appendix A because all of these references relate to the same area of technology and/or are from analogous art. The ’868 Patent Asserted Claims are directed to a diagnostic system comprising a light source, a software application capable of operating on a control system, and a host. ’868 Patent at Abstract. The ’868 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the ’868 Patent Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine

the above prior art based on his/her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the ’868 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to wirelessly collecting and processing physiological information using a light source and related features.

Demand and Market Forces: For example, market forces suggested a demand for wirelessly collecting and processing physiological information using a light source, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to solutions of that time.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicant in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the ’868 Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the ’868 Patent, there are a finite number of approaches for wirelessly collecting and processing physiological information using a light source. For example, as of the priority date of the ’868 Patent, a POSITA would have been very familiar with basic elements of the ’868 Patent’s claims such as devices using light passing through a user’s body, including blood, to measure physiological information; semiconductor diodes; software; the wireless transmission of data, including via mobile phones

and the internet; tracking location of a remote device; differing inputs to a computing system, including voice commands, touchscreens, keypads, etc. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the ’868 Patent’s claims does not render them novel or non-obvious.

There are significant similarities in subject matter and objectives for each of many references used in these contentions for the ’868 Patent.

Wireless Physiological Monitoring References: For example, charted reference Mault, as well as numerous other references such as Kumar, Nihtila, Brown, and Quy all include teachings related to wirelessly collecting and analyzing physiological data, including data known to be collected using spectroscopy. These references provide numerous methods for collecting physiological data, as well as different methods for wirelessly transmitting and processing the data. For example, Mault teaches “a system embodiment comprising an electronic device 10, a blood glucose sensor 12, a physical activity monitor 14, an insulin pump 16, a communications network 20, and a remote computer system 22.” Mault at [0069]. Mault further teaches that “[e]lectronic device 10 can be carried by the person, for example a portable computer, personal digital assistant (PDA), wireless phone with computational functionality, visor-mounted device, or other device” and “[s]ensor 12 can be carried by the person and provides blood glucose measurements at intervals.” Mault at [0069]-[0070]. Mault teaches that “using a non-invasive spectroscopic technique, the PDA/module combination may be placed against part of the body to obtain a blood glucose reading.” Mault at [0073]. Kumar teaches “system architecture 100 for network-based monitoring of data from a patient-side physiological collecting device . . . includ[ing] one or more patient-side devices 102 for collecting data from a patient/client, one or more provider-side devices 104, and an engine implemented on a central server 106.” Kumar at [0067]. Kumar further teaches

that "[t]he system may be adapted to include web-enabled spirometers and oximeters, allowing healthcare practitioners to perform remote spirometry and oximetry tests." Kumar at [0072]. Kumar also teaches that "[t]he patient-side device may then be connected via a computing device 110, such as a computer, handheld devices such as personal digital assistants (PDAs) and pocket PCs . . . ." Kumar at [0072]. Nihtila teaches "a system for acquiring physiological data from a user and communicating the physiological data via a mobile terminal to a network server for integration into a virtual physiological model established for the user in accordance with an embodiment of the present invention." Nihtila at [0035]. Nihtila further teaches that "[t]he physiological data communicated from the mobile terminal 122 to the network 124 is routed to a server 126 which is configured to accept and process this data. . . . and executes processing software that, in general, operates on the physiological data received from each of a number of users." Nihtila at [0038]. Brown teaches "blood glucose monitor 16 operates in conjunction with data management unit 10 and handheld microprocessor unit 12 to: (a) perform a test or calibration sequence in which tests are performed to confirm that the system is operating properly; and, (b) perform the blood glucose test sequence in which blood glucose meter 16 senses the user's blood glucose level. Brown at 20:28-67. Brown further teaches that "each apparatus may be placed in communication with server 2018 via wireless communication networks, cellular networks, telephone networks, or any other network which allows each apparatus to exchange data with server 2018." Brown at 25:12-25. Quy is titled "Method and Apparatus for Health and Disease Management Combining Patient Data Monitoring with Wireless Internet Connectivity." Quy at Title. Quy teaches "[t]he system includes a wireless health-monitoring apparatus ('WHMA') 10 . . . [which] is linked in a wireless fashion to a wireless connection point of presence ("POP") 19, the same including at least a base station antenna 15 coupled to a server 17." Quy at 6:29-32. Quy teaches "[s]erver 17 is in turn connected

to the wired, or even a wireless (not shown) Internet 21, which may include the World Wide Web." Quy at 6:33-35.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that collect and transmit physiological data. These methods are known to be effective in collecting and transmitting data. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of collecting and transmitting physiological data.

Physiological Monitoring Using Spectroscopy References: For example, charted reference Mault, as well as numerous other references such as Jeng[8], Pologe, Shigeki, Kumar, Nihtila, Quy, Abreu, and Scharf. all include teachings related to physiological monitoring using spectroscopy. These references provide numerous methods for measuring physiological information, such as blood glucose levels and blood oxygenation, using measurements of light. For example, Mault teaches "sensor 12 may use spectroscopic detection of a glucose oxidase reaction . . . and may also use in-vivo spectroscopy techniques to measure blood glucose." Mault at [0073]. Jeng discloses "a method and apparatus for measuring the concentration of an analyte of interest, e.g. glucose, in blood non-invasively, i.e., without penetrating the skin or obtaining a biological sample from the body of a patient." Jeng at 4:28-39. Jeng further discloses that "[l]ight passing through the body part 'B' is transmitted through an aperture 49 and then through a lens system 50 to deliver light to a dispersive element 52." Jeng at 6:57-7:4. Pologe discloses "a system

[8] Mault incorporates Jeng by reference (*see* Mault at [0011], [0073]), thus, references to Jeng should be understood to be references to Mault and/or Jeng.

for performing photoplethysmographic measurements using wavelength division multiplexing." Pologe at 4:20-32. Pologe further discloses that "[t]he received light pulses may then be delivered back to the main test unit 12, via probe cable 16, where they are processed to determine the level of one or more blood analytes in the person's arterial blood." Pologe at 4:33-54. Shigeki discloses a "glucose sensor" that "measures the blood glucose concentration of blood flowing through the microvessels in the earlobe 4 of the human body." Shigeki at [0009]. Shigeki further discloses that "[t]he volume of blood flow is measured using the Doppler effect, so infrared light, which has good transmissibility through biological tissue, is used to minimize the attenuation of light reflected by hemoglobin." Shigeki at [0009]. Kumar discloses that "[t]he patient-side device is located with a patient and can be any device that gathers physiological data from the patient." Kumar at [0071]. Kumar further discloses that "[t]he system may be adapted to include web-enabled spirometers and oximeters, allowing healthcare practitioners to perform remote spirometry and oximetry tests." Kumar at [0203]. Nihtila discloses "systems and methods for using mobile communication techniques to enhance an understanding of the physiological state of an individual based on physiological information acquired from the individual in real-time." Nihtila at [0024]. Nihtila firther discloses that "a physiological data acquisition system of the present invention can include a blood sensing device 211 . . . [which] can be used to measure a number of blood related parameters," including "oxygen saturation, oxygen consumption, blood chemistry, and blood pressure, for example." Nihtila at [0054]. Quy teaches "while various types of medical devices have been mentioned, numerous other types may also be used in the embodiments of the invention, including pulse oximeters, syringe drivers, infusion pumps, spirometers, ventilators, anesthesia monitors, and so on." Quy at 12:51-13:22. Abreu teaches "FIG. 100(C) shows a schematic block diagram of one preferred far-infrared spectroscopy measuring apparatus of the present invention."

Abreu at [1159]. Abreu further teaches "[b]esides near-infrared spectroscopy, the present invention provides superior results and higher signal to noise ratio when using any other form of electromagnetic radiation such as for example mid-infrared radiation, radio wave impedance, photoacoustic spectroscopy, Raman spectroscopy, visible spectroscopy, ultraviolet spectroscopy, fluorescent spectroscopy, scattering spectroscopy, and optical rotation of polarized light as well as other techniques such as fluorescent (including Maillard reaction, light induced fluorescence, and induction of glucose fluorescence by ultraviolet light), colorimetric, refractive index, light reflection, thermal gradient, Attenuated Total Internal Reflection, molecular imprinting, and the like. Abreu at [0276]. Scharf teaches "[a] reflectance pulse oximeter that determines oxygen saturation of hemoglobin using two sources of electromagnetic radiation in the green optical region, which provides the maximum reflectance pulsation spectrum." Scharf at Abstract. Scharf further teaches "[t]he oximeter 10 of the present invention comprises two emitters of green light 12, 14 that illuminate a volume of intravascular blood 4." Scharf at 4:8-22.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that measure physiological information, such as blood glucose levels and blood oxygenation, using measurements of light. These methods use light to measure physiological information. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of measuring physiological information, such as blood glucose levels and blood oxygenation, using measurements of light.

Physiological Monitoring with Lenses References: For example, charted reference Jeng, as well as numerous other references such as Pologe, Shigeki, and Scharf all include teachings

related to using light with lens systems to collect physiological data. These references provide numerous methods for collecting physiological data using spectroscopy, including using systems with lenses. For example, Jeng teaches that "[t]he body part, e.g., a finger, earlobe, is positioned at the place where the beam from the source of light is focused. Light passing through the body part is transmitted through an aperture 24 and then through a lens system 25 to deliver light to the detector 20." Jeng at 6:31-44. Jeng further discloses that "Light passing through the body part 'B' is transmitted through an aperture 49 and then through a lens system 50 to deliver light to a dispersive element 52." Jeng at 6:57-7:4. Pologue discloses that "the WDM coupler can include any of a number of coupler types, such as those using lenses, prisms, interference filters, diffraction gratings, or butt coupling." Pologe at 3:43-55. Shigeki discloses that "[t]he wavelength of the light outputted from the first semiconductor laser 1 is 1.55 μm, which is within the glucose absorption wavelength band." Shigeki at [0009]. Shigeki further discloses that the light "passes through the earlobe 4 and is received by the first photodetector 20." Shigeki at [0009]. Abreu teaches "[t]he light radiation 2302 can be directly emitted from a light source 2300 and directly collected by a photodetector 2318, or the light radiation 2302 can be delivered and collected using optic fiber cables." Abreu at [1086]. Abreu further teaches "[a]n interface lens system can be used to convert the rays to spatial parallel rays, such as from an incident divergent beam to a spatially parallel beam." Abreu at [1086]. Scharf teaches "[s]uitable optical filters include custom-made molded acrylic aspheric lens/filters having peak wavelengths of 560 nm and 580 nm, respectively, and which have bandwidths of less than 5 nm, which are available from Innovations In Optics, Inc., address 38 Montvale Avenue, Suite 215, Storeham, Mass. 02180, (716) 279-0806." Scharf at 4:22-37. Scharf further teaches "Although shown as flat surfaces, face pieces 16, 18, and 91 can alternatively be shaped to form discrete lenses (not shown) to focus the radiant energy from the

LEDs 13a-13d and 15a-15d onto the skin 2 and into the blood 4 and from the skin 2 onto the photodiode 26, 62." Scharf at 8:59-65.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that measure physiological information using light with a lens system. These methods use light with a lens system to measure physiological information. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of measuring physiological information using light with a lens system.

Wavelength Division Multiplexing References: For example, charted reference Pologe, as well as numerous other references such as Jeng, Abreu, and Scharf all include teachings related to using wavelength division multiplexing to measure physiological information. These references provide numerous methods for using wavelength division multiplexing to measure physiological information, particularly relating to blood measurements. For example, Pologe teaches "the present invention relates to a system for performing photoplethysmographic measurements using wavelength division multiplexing." Pologe at 4:20-32. Pologe further discloses "the WDM coupler is capable of producing a wavelength multiplexed pulse on the single light guide that includes the spectral contents of all of the multiple light pulses. In this regard, the WDM coupler can include any of a number of coupler types, such as those using lenses, prisms, interference filters, diffraction gratings, or butt coupling. In addition, active WDM couplers can also be used." Pologe at 3:43-55. Jeng discloses that "[t]he band-pass filter set 14 selects one desired wavelength at a time by rotating the set to place a given filter in the path of the beam." Jeng at 6:11-30. Jeng further discloses that

"[a] lens system 47 is used to focus the light from the beam splitter onto the detector 48." Jeng at 6:45-56. Jeng discloses that "[l]ight passing through the body part 'B' is transmitted through an aperture 49 and then through a lens system 50 to deliver light to a dispersive element 52." Jeng at 6:57-7:4. Abreu teaches "[a] variety of radiation sources 2300 can be used in the present invention including LEDs with or without a spectral filter, a variety of lasers including diode lasers, halogen lights and white light sources having maximum output power in the near infrared region with or without a filter, and the like . . . ." Abreu at [1085]. Abreu further teaches "[t]he contact device filter system allowed passage of the glucose band which is used as a reference measuring point while simultaneously measuring thermal energy absorption outside the glucose band." Abreu at [1166]. Scharf teaches "[d]epending on the particular green light sources chosen, green optical filters 16, 18 might be needed. For example, if the Toshiba Ltd. part nos. TLGA183P and TLPGA-183P are used as green LEDs 13, 15 then narrow-band optical filters 16, 18 need to be used." Scharf at 4:22-37.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that use wavelength division multiplexing to measure physiological information. These methods use principles of wavelength division multiplexing to measure physiological information. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of using wavelength division multiplexing to measure physiological information.

Semiconductor Diode References: For example, charted reference Jeng, as well as numerous other references such as Pologe, Shigeki, Abreu, and Scharf all include teachings related

to using semiconductor diodes to measure physiological information. These references provide numerous methods for using semiconductor diodes to measure physiological information, particularly information related to a subject's blood. For example, Jeng teaches that "[t]he light sources are either laser diodes or light emitting diodes." Jeng at 15:1-27. Pologe teaches that "[t]he plurality of separate emitters includes multiple separate light sources, such as light emitting diodes (LEDs) and laser diodes." Pologe at 3:1-17. Shigeki teaches that "[t]he wavelength of the light outputted from the first semiconductor laser 1 is 1.55 μm, which is within the glucose absorption wavelength band" Shigeki at [0009]. Abreu teaches "[a] variety of radiation sources 2300 can be used in the present invention including LEDs with or without a spectral filter, a variety of lasers including diode lasers, halogen lights and white light sources having maximum output power in the near infrared region with or without a filter, and the like . . . ." Abreu at [1085]. Scharf teaches "The green light sources 12, 14 are shown schematically as including light emitting diodes (LEDs) 13, 15 in FIG. 1; however, other green light sources can be used, such as laser diodes, filtered white light sources, filtered broad-band LEDs, etc. Suitable LEDs 13, 15 include part. nos. TLGA-183P (peak wavelength 574 nm) and TLPGA-183P (peak wavelength 562 nm) from Toshiba Ltd. through various sources, such as Marktech International, 5 Hemlock Street, Latham, N.Y. 12110, (518) 786-6591." Scharf at 4:8-22.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that use semiconductor diodes to measure physiological information. These methods use semiconductor diodes to measure physiological information. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order

to better achieve their common goals of measuring physiological information.

Software Application References: For example, charted reference Mault, as well as numerous other references such as Jeng, Pologe, Shigeki, Kumar, Nihtila, Brown, Quy, Abreu, and Scharf all include teachings related to using software to analyze the collected physiological data. These references provide numerous methods for using software to analyze the collected physiological data, including generating a status of a user based on the physiological data. For example, Mault teaches that "FIG. 19 shows a flowchart representing a software program running on a computing device." Mault at [0187]. Mault further teaches that "Box 516 corresponds to performing a blood test at intervals, and providing the data to a glycemic response algorithm." Mault at [0187]. Mault teaches that "[t]he PDA has a software program, such as a calorie management program, having a glycemic response algorithm for the subject." Mault at [0109]. Jeng teaches that "[t]he computer controls the software operation for collecting data and storing measurement readings as a data file." Jeng at 6:31-44. Pologe teaches that "The received light pulses may then be delivered back to the main test unit 12, via probe cable 16, where they are processed to determine the level of one or more blood analytes in the person's arterial blood." Pologe at 4:33-54. Pologe further teaches that "[p]rocessing methods to determine the blood analyte levels are known and, therefore, will not be discussed further." Pologe at 4:33-54. Shigeki teaches that "[i]n the arithmetic control circuit 8, calculations are performed to calculate the amount of glucose using the relationship between glucose concentration values previously written to the EEPROM and the photodetector output values, and the relationship between glucose solution temperatures and the photodetector output values." Shigeki at [0012]. Kumar teaches that "[t]he present invention may be implemented on a program or code that can be stored in a computer-readable (or electronically-readable) medium." Kumar at [0087]. Kumar further teaches

that “[t]he data interpretation and analysis module 114 is used to interpret the data stream from the client-side device, perform mathematical analysis on the data using FFT, DFT, etc., and generate statistics.” Kumar at [0075]. Nihtila teaches that “The processing software integrates currently or recently acquired physiological data into the user's virtual physiological model (i.e., avatar).” Nihtila at [0038]. Nihtila further teaches that “The processing software further computes fitness data (FD) of various types, including, textual, graphical, animation, audio, video, or other form of fitness data.” Nihtila at [0040]. Brown teaches that “[w]hen inserted in the handheld microprocessor unit, the program cartridge provides the software necessary (program instructions) to program the handheld microprocessor unit for operation with the microprocessor-based data management unit.” Brown at 6:18-45. Brown further teaches that “Remotely Programmable Patient Apparatus 320 comprises a Patient Interaction Unit 322, which is connected through a patient communication network 324 to a Patient Data Management Unit 326.” Brown at 35:50-36:8. Quy teaches ”[a]pplication 62 may include an algorithm 63 for analyzing data from the HMD, and either application 62 or algorithm 63 may optionally access data from an external data source 74 and may further consult an artificial intelligence system 76.” Quy at 8:9-14. Quy further teaches “wireless application 70 may correspondingly send a large amount of health data to server application 62.” Quy at 8:47-62. Abreu teaches “[s]uitable analyzers include modified Fourier Transform Infrared (FTIR) spectrometers with chemometric software packages. Those are available from the PerkinElmer Corporation (Wellesley, Mass.) and Thermo Nicolet Company (Madison, Wis.).” Abreu at [1103]. Abreu further teaches “[p]rocessor 2324 can contain or be connected to a memory unit 2326 which can store data related to calibration, patient's measurement data, reference data, suitable algorithms, and the like.” Abreu at [1083]. Scharf teaches “[a] reflectance pulse oximeter that determines oxygen saturation of hemoglobin using two sources of

electromagnetic radiation in the green optical region, which provides the maximum reflectance pulsation spectrum." Scharf at Abstract. Scharf further teaches "the processor 30 collects data in the form of a digitized signal, calculates a coefficient for the oxygen saturation value from the digitized signal, determines the final saturation value by reading the saturation value for the calculated coefficient from a look-up table stored in memory, and then causes the display(s) 38, 40 to display a visual image corresponding to the final saturation value or other oximetry data." Scharf at 11:5-14.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that use software to analyze the collected physiological data. These methods use software to analyze the collected physiological data, including generating a status of a user based on the physiological data. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of using software to analyze the collected physiological data.

Touch Screen, Voice, and Manual Inputs References: For example, charted reference Mault as well as numerous other references such as Pologe, Kumar, Nihtila, Brown, and Quy all include teachings related to receiving touch screen, voice, or manual input to the system for measuring physiological data. These references provide numerous methods for receiving various inputs to systems that measure physiological data. For example, Mault teaches that "Other data entry mechanisms can be used, such as a stylus, touch pad, tracker device, biofeedback system, roller-jog dial, voice recognition, and the like." Mault at [0109]. Mault also teaches that "[t]he computer [which can be a PDA] can have a display, a microprocessor, memory (in the form of

RAM, ROM, and a data storage device), and data entry mechanisms such as a keyboard, buttons, stylus, voice entry, roller-jog dial, track ball, finger tracking device, and the like." Mault at [0121]. Pologe discloses that "[t]he main test unit 12 includes: . . . and an input device 34, such as a keypad or a touch screen, for allowing the user to input commands and other information to the processor unit 28." Pologe at 4:63, 5:9. Kumar teaches that "the system allows for the real-time streaming of raw, interpreted, and processed physiological data as well as textual/audio/video data from a patient/client to a health care provider." Kumar at [0010]. Nihtila teaches that "the user can input weight, height, age, gender, and other physical and personal information to the user's virtual physiological model via the mobile terminal's user interface 216." Nihtila at [0046]. Brown teaches that "the user input buttons may be replaced by switches, keys, a touch sensitive display screen, or any other data input device." Brown at 26:1-8. Brown further teaches "the patient interaction unit is a palm-top computer, the display means being provided by a display screen of the palm top computer, and the patient interaction unit input device is a palm-top computer input device such as a touch screen." Brown at claim 2. Brown teaches "the user interface includes a speech synthesizer for audibly communicating the queries and a speech recognizer for receiving spoken responses to the queries." Brown at 9:47-52. Quy teaches "[t]he deployment of voice processing technology may be used to enable an even more convenient user interface: i.e., one to which patients can talk." Quy at 4:62-65. Quy further teaches "[t]hese applications may accept as inputs data from a sensor 24 as well as from a manual input 36." Quy at 7:61-8:8.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that receiving touch screen, voice, or manual input to the system for measuring physiological data. These methods allow the systems to receive touch screen, voice, or manual input to the system. Moreover, to the extent that any of these references

includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of receiving touch screen, voice, or manual input to the system for measuring physiological data.

Remote Server with Storage References: For example, charted reference Mault as well as numerous other references such as Kumar, Nihtila, Brown, Quy, Abreu, and Scharf all include teachings related to using remote systems, such as servers, to store and/or process physiological information. These references provide numerous methods for using remote systems, such as servers, to store and/or process physiological information. For example, Mault teaches "[t]he portable computing device 30 is in linked to a communications network 52, allowing communication a remote computer system 54, which may be located at the person's home, doctor's office, or other remote location." Mault at [0079]. Mault teaches that "[a] remote server system 56 is also accessible through the communications network 52, and can be used to store a database of physiological parameters, activity, and diet relating to the person, for medical, nutritional, or computer expert system analysis." Mault at [0079]. Mault teaches that "[a] global positioning system (GPS) may also be added to the PDA, to facilitate medical rescue in an emergency." Mault at [0077]. Kumar teaches "the system includes one or more patient-side devices 102 for collecting data from a patient/client, one or more provider-side devices 104, and an engine implemented on a central server 106." Kumar at [0067]. Kumar teaches "the data may be stored in a secured storage device at the central server for later access, replay, and/or analysis." Kumar at [0083]. Nihtila teaches that "there is illustrated a system for acquiring physiological data from a user and communicating the physiological data via a mobile terminal to a network server for integration into a virtual physiological model established for the user in accordance with an embodiment of

the present invention." Nihtila at [0035]. Nihtila teaches "the mobile terminal 122 operates effectively as a modem to facilitated the transfer of acquired physiological data between the physiological sensor device, mobile terminal 122, network 124, and server 126 in real-time." Nihtila at [0044]. Brown teaches "[m]onitoring application 2048 is a controlling software application executed by server 2018 to perform the various functions described below." Brown at 27:11-14. Quy teaches "[s]erver 22 has a base server application 62 with which the same calculates or provides a response based at least in part on data from WHMA 10." Quy at 8:9-14. Quy further teaches "[i]t should also be noted that each of application 62, algorithm 63, external data source 74, or AI system 76, may physically reside on more than one server, e.g., on an array of servers for, e.g., storage or multiple processing purposes." Quy at 8:40-46. Abreu teaches "[t]he signal can be communicated by wires or radio telemetered to an externally placed receiver. The signal can then be processed, analyzed and stored." Abreu at Abstract; *see also* Abreu at [0099]. Scharf teaches "[t]he processor 30 and the remote display 40 are placed in circuit communication via a transmitter 42 and receiver 44." Scharf at 7:48-67. Scharf further teaches "the processor 30 is also in circuit communication with a remote display 40 to display a second visual image corresponding to the oximetry data." Scharf at 7:38-47.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that use remote systems, such as servers, to store and/or process physiological information. These methods use remote systems, such as servers, to store and/or process physiological information Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of using remote

systems, such as servers, to store and/or process physiological information.

b. Combinations

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix A with any other reference or references listed in Appendix A along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the ’868 Patent.

For example, and without limitation, the Asserted Claims of the ’868 Patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

(i) <u>Mault Combined with Jeng, Pologe, Shigeki, Abreu and/or Scharf</u>

A POSITA would have had reason to combine Mault with any one of Jeng, Pologe, Shigeki, Abreu and/or Scharf all of which relate to systems and methods for obtaining physiological measurements of a user. Each of Mault, Jeng, Pologe, Shigeki, Abreu, and Scharf relate to obtaining physiological measurements of a user, including blood measurements obtained by using light. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Jeng, Pologe, Shigeki, Abreu, and Scharf provide means—not necessarily expressly present in all other references—for measuring physiological data of a user using light. A POSITA would have understood that the systems and methods for Jeng, Pologe, Shigeki, Abreu, and Scharf were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for Jeng, Pologe, Shigeki, Abreu, and Scharf provide improvements such as advances in measuring physiological data of a user using light. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological data of a user using light would commonly be combined with a wireless, wearable system, and thus a

POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for measuring physiological data of a user using light, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(ii) Kumar Combined with Jeng, Pologe, Shigeki, Abreu, and/or Scharf

A POSITA would have had reason to combine Kumar with any one of Jeng, Pologe, Shigeki, Abreu and/or Scharf all of which relate to systems and methods for obtaining physiological measurements of a user. Each of Kumar, Jeng, Pologe, Shigeki, Abreu, and Scharf relate to obtaining physiological measurements of a user, including blood measurements obtained by using light. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Jeng, Pologe, Shigeki, Abreu, and Scharf provide means—not necessarily expressly present in all other references—for measuring physiological data of a user using light. A POSITA would have understood that the systems and methods for Jeng, Pologe, Shigeki, Abreu, and Scharf were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for Jeng, Pologe, Shigeki, Abreu, and Scharf provide improvements such as advances in measuring physiological data of a user using light. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological data of a user using light would commonly be combined with a wireless, wearable system, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for measuring physiological data of a user using

light, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iii) Nihtila Combined with Jeng, Pologe, Shigeki, Abreu, and/or Scharf

A POSITA would have had reason to combine Nihtila with any one of Jeng, Pologe, Shigeki, Abreu and/or Scharf all of which relate to systems and methods for obtaining physiological measurements of a user. Each of Nihtila, Jeng, Pologe, Shigeki, Abreu, and Scharf relate to obtaining physiological measurements of a user, including blood measurements obtained by using light. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Jeng, Pologe, Shigeki, Abreu, and Scharf provide means—not necessarily expressly present in all other references—for measuring physiological data of a user using light. A POSITA would have understood that the systems and methods for Jeng, Pologe, Shigeki, Abreu, and Scharf were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for Jeng, Pologe, Shigeki, Abreu, and Scharf provide improvements such as advances in measuring physiological data of a user using light. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological data of a user using light would commonly be combined with a wireless, wearable system, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for measuring physiological data of a user using light, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve

simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iv) Mault, Kumar, Nihtila, Brown, and/or Quy, Combined with any of the References Disclosing Remaining Features

A POSITA would have had reason to combine references Mault, Kumar, Nihtila, Brown, and/or Quy with any one of the references disclosing physiological monitoring using spectroscopy; physiological monitoring with lenses; wavelength division multiplexing; the use of semiconductor diodes; software applications; touch screen, voice, and manual inputs; and remote servers with storage (collectively, the "remaining features") all of which relate to systems and methods for obtaining physiological measurements of a user, including blood measurements. Each of the references teaching the remaining features relate to obtaining physiological measurements of a user, including blood measurements, using light. Indeed, such components and/or processes were conventional as of the time these references were known. Each of the references teaching the remaining features provide means—not necessarily expressly present in all other references—for obtaining physiological measurements of a user, including blood measurements, using light. A POSITA would have understood that the systems and methods for the references teaching the remaining features were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for the references teaching the remaining features provide improvements such as specific methods and systems for obtaining physiological measurements using light. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for a wireless system for collecting and processing physiological data would commonly be combined with obtaining physiological measurements (for example, blood glucose levels and blood oxygenation) using light, and thus a POSITA would have been motivated to combine the

teachings of these references. Two non-limiting examples of such combinations, which are provided for illustrative purposes only, include Brown in view of Jeng, Pologe, Shigeki, Abreu, and/or Scharf and Quy in view of Jeng, Pologe, Shigeki, Abreu, and/or Scharf. The combinations would apply known techniques for obtaining physiological measurements using light, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combinations would further be "obvious to try," because they would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

Furthermore, to the extent any limitation of an Asserted Claim is deemed not to be exactly disclosed by an item of prior art, then the claim is rendered obvious by combination of the prior art in Exhibits A1 through A10 standing alone, in combination with the reference(s) in any other claim chart, in combination with any system art identified in Table 2-A, in combination with Applicant's Admitted Prior Art, in view of the knowledge of a person of ordinary skill in the art, and/or in view of the wireless physiological monitoring references; the physiological monitoring using spectroscopy references; the physiological monitoring with lenses references; the wavelength division multiplexing references; the semiconductor diode references; the software application references; the touch screen, voice, and manual inputs references; the remote server with storage references, for the reasons discussed above.

2. U.S. Patent No. 9,651,533

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix B the prior art references that render obvious the Asserted Claims of the '533 Patent and include below exemplary combinations showing the obviousness of the '533 Patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix B, the limitation would have been obvious in light of the

disclosures within the reference and the knowledge of one of ordinary skill in the art at the time of the ’533 Patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix B, such reference may be combined with any other references listed in Appendix B for such element, thereby rendering the claims invalid for obviousness. To the extent a finder of fact determines that a limitation of any of the ’533 Patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the ’533 Patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a. Obviousness Rationale and Motivations to Combine

Obviousness: For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix B along with the knowledge of one of ordinary skill in the art to meet the limitations of the ’533 Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of the ’533 Patent obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Omni’s Asserted Claims. Defendants may rely upon a subset of the identified references or all of the references identified herein, including all references in Appendix

B, for purposes of obviousness depending on the Court's claim construction, positions taken by Omni during this litigation, and further investigation and discovery.

Reservation of Rights: Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

No More Than Ordinary Variations of Prior Art; No Unexpected Results: To the extent not anticipated, the '533 Patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach); *Apple Inc. v. Samsung Elecs. Co*., 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co*., 869 F.3d 1336, 1344 (Fed. Cir. 2017). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art

references identified in Appendix B would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix B would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the ’533 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix B is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to

improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in Appendix B because all of these references relate to the same area of technology and/or are from analogous art. The ’533 Patent Asserted Claims are directed to an optical measurement system with a personal device and a remote device. ’533 Patent at Claim 5. The ’533 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the ’533 Patent Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine the above prior art based on his/her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the ’533 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references concerning features related to known techniques for

increasing the signal-to-noise ratio and known components and functionalities of personal devices and remote devices.

Demand and Market Forces: For example, market forces suggested a demand for improving signal-to-noise ratio and wirelessly transmitting information from optical measurement systems to devices such as personal devices and remote devices, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to solutions of that time.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicant in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the ’533 Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the ’533 Patent, there are a finite number of approaches for increasing signal-to-noise ratio and communicating information to other devices. For example, as of the priority date of the ’533 Patent, a POSITA would have been very familiar with basic elements of the ’533 Patent’s claims such as increasing a light intensity, increasing a pulse rate, using a plurality of lenses to direct an output optical beam, and communicating information with a personal device and a remote device. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the ’533 Patent’s claims does not render them novel or non-obvious.

There are significant similarities in subject matter and objectives for each of many references used in these contentions for the ’533 Patent.

References disclosing techniques for increasing signal-to-noise ratio: For example,

charted reference Basu, as well as numerous other references such as Lisogurski, Carlson, LeBoeuf, and Park all include teachings related to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. These references provide numerous methods for increasing a light intensity and increasing a pulse rate of an LED. For example, Basu teaches that "[t]o maximize the signal-to-noise ratio in photoplethysmography, the LED intensity should be made as large as possible without saturating the detector. In the OPS 10, the LED intensity and modulation frequencies are programmable through the serial interface. In the case of the Vishay VCNL4000, the intensity is programmable from 10-200 mA in 10 mA increments." Basu at [0048]. Lisogurski teaches "that modulation of the light drive signal . . . may include modulation of parameters including drive current or light brightness, duty cycle, firing rate, modulation parameters, other suitable parameters, or any combination thereof" and that "[t]he system may increase the brightness of the light sources in response to the noise to improve the signal-to-noise ratio." Lisogurski at 27:44-55, 9:46-60. Carlson teaches that the "frequency is chosen in such a way that it is outside the frequency spectrum of sunlight and of ambient light which, according to FIG. 7 b, is in the range of above approximately 1000 Hz. Thus, the pulsoximeter signals are readily discriminated from electronic and parasitic contributions of environmental optical radiation outside the frequency fc+/−5 Hz increasing significantly the Signal-to-Noise and Signal-to-Background ratio." Carlson at [0069]. LeBoeuf teaches that "the intensity of the optical emitter 102 may be increased to increase the ratio of physiological optical scatter 111 from blood vessels with respect to unwanted sunlight" and that "it is important to consider the emitter pulsing frequency and sampling approach" because "choosing a frequency that is too low may result in unsatisfactory subtraction." LeBoeuf at [0123], [0139]. Park teaches that "the light source intensity may be increased to maintain the output signal

from the light detector within a desired range of output values." Park at 16:8-20.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with improving signal-to-noise ratio in optical measurement systems. These methods are known to be effective in improving the signal-to-noise ratio for such systems, and merely modulate the functioning of the existing LEDs in each system. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of improving signal-to-noise ratio.

References disclosing lenses: For example, charted reference Basu, as well as numerous other references such as Carlson, LeBoeuf, Park, and Sakai all include teachings related to using a plurality of lenses configured to receive a portion of the output optical beam and to deliver an analysis output beam to a sample. These references provide numerous methods for using lenses to direct an optical output beam. For example, Basu teaches that "[e]ach of the LEDs is separated from the photo detector by an optical barrier." Basu at [0087]. Carlson teaches "a beam-shaping element, such as e.g. diffractive or refractive lenses, to direct the emitted optical radiation of, e.g., the LED light source into the human or animal tissue and the photon detecting element in order to increase the optical signal power, detected by the pulsoximeter sensor, and thus increasing the Signal/Noise—and signal/Background ratio" Carlson at [0014]. LeBoeuf teaches that "the at least one sensor module include a lens positioned above at least one of the optical emitter and filter. The lens may include respective first and second portions configured to matingly engage respective first and second apertures in the light-opaque material." LeBoeuf at [0022]. Park teaches that "the transmissive structures may employ a material and/or optical design to facilitate low light loss (for

example, a lens) thereby improving SNR of the photo detector and/or reducing power consumption of the light emitter(s) and/or light detector(s)." Park at 11:32-57. Sakai teaches that "[i]nfrared light or green light is emitted to the human body via a light transmitting plate 2029." Sakai at 28:01-32.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with using lenses to direct an optical output beam. These methods are known to be effective in directing an optical output beam using known lens structures. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of directing an optical output beam.

References disclosing a personal device: For example, charted reference Basu, as well as numerous other references such as Addison, LeBoeuf, Park, and Kreger all include teachings related to a personal device. These references provide numerous methods for incorporating a personal device into an optical measurement system. For example, Basu teaches "a wireless ring which combines the sensor with a Bluetooth transmitter linked to an Android application running on the user's cell phone." Basu at [0057]. Addison teaches that "[o]utput 414 may be any suitable output device such as, for example, . . . one or more display devices (e.g., monitor, PDA, mobile phone, any other suitable display device, or any combination thereof), one or more audio devices, . . . or any combination thereof." Addison at [0069]. LeBoeuf teaches that "headsets configured to monitor an individual's physiology and/or environment may be wired to a device that stores and/or processes data or there may be a combination of wired and wireless communications." LeBoeuf at [0106]. Park teaches that a "secondary device may be equipped with a display to output data

obtained by the secondary device or data transferred to it by the biometric monitoring device, the external service, or a combination of data from the biometric monitoring device, the secondary device, and/or the external service." Park at 9:17-40. Kreger teaches "sensor data and measurements may be transmitted to remote medical personnel, internet servers, and others using WiFi transceiver 68, Bluetooth transceiver 72 or other RF transmitter such as for a cellular phone network. As well, the signals and measurements on the mobile 12 may be transferred via a cable connected to USB connector 28 c or docking connector 28 b to another computer storage device, over a computer network, to a personal computer, and so forth." Kreger at 7:39-46.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with incorporating a personal device into optical measurement systems. These methods are known to be effective in incorporating a personal device into such systems. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of communicating with a personal device.

References disclosing a remote device: For example, charted reference Basu, as well as numerous other references such as Addison, LeBoeuf, Park, and Kreger all include teachings related to a remote device. These references provide numerous methods for incorporating a remote device into an optical measurement system. For example, Basu teaches that "[a] 'cloud-based' RPM infrastructure can actively manage cardiovascular health (Fig. 1). Using OPS technology, cardiovascular parameters can be monitored on a 24-hour ambulatory basis using wearable biosensors, with wireless transmission of relevant data to the patient's electronic medical record."

Basu at [0055]. Carlson teaches that "health problems could be detected and an alarm signal could be generated which can be transmitted to a respective person, to a medical doctor, to a hospital, etc. so that help can be organised." Carlson at [0078]. LeBoeuf teaches that "the processed energy response signal is transmitted to a remote device, for example wirelessly transmitted." LeBoeuf at [0035]. Park teaches that "the secondary device may communicate with an external service such as www.fitbit.com or server (e.g., personal computer). Communication may be achieved through wired (e.g., Ethernet, USB) or wireless (e.g., WLAN, Bluetooth, RFID, NFC, cellular) circuitry and protocols to transfer data to and/or from the secondary device." Park at 8:53-9:16. Kreger teaches "sensor data and measurements may be transmitted to remote medical personnel, internet servers, and others using WiFi transceiver 68, Bluetooth transceiver 72 or other RF transmitter such as for a cellular phone network. As well, the signals and measurements on the mobile 12 may be transferred via a cable connected to USB connector 28 c or docking connector 28 b to another computer storage device, over a computer network, to a personal computer, and so forth." Kreger at 7:39-46.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with incorporating a remote device into optical measurement systems. These methods are known to be effective in incorporating a remote device into such systems. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of communicating with a remote device.

b. Combinations

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix B with any other reference or references listed in Appendix B along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the ’533 Patent.

For example, and without limitation, the Asserted Claims of the ’533 Patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

(i) Basu Combined with Lisogurski, Carlson, LeBoeuf, Park, Kreger, and/or Sakai

A POSITA would have had reason to combine Basu with any one of Lisogurski, Carlson, LeBoeuf, and Park all of which relate to systems and methods for optical measurement. Each of Lisogurski, Carlson, LeBoeuf, and Park relate to increasing signal-to-noise ratio in optical measurement systems. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Lisogurski, Carlson, LeBoeuf, and Park provide means—not necessarily expressly present in all other references—for increasing signal-to-noise ratio. A POSITA would have understood that the systems and methods for increasing signal-to-noise ratio were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for increasing intensity and pulse rate provide improvements such as increasing signal-to-noise ratio. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for increasing signal-to-noise ratio would commonly be combined with increasing intensity and pulse rate, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for increasing signal-to-noise ratio, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The

combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(ii) Basu Combined with Addison and/or Kreger

A POSITA would have had reason to combine Basu with Addison, which relates to systems and methods for optical measurement. Addison and Kreger relate to incorporating personal and remote devices into systems for optical measurement. Indeed, such components and/or processes were conventional as of the time these references were known. Addison and Kreger provide means—not necessarily expressly present in all other references—for incorporating personal and remote devices into systems for optical measurement. A POSITA would have understood that the systems and methods for incorporating personal and remote devices into systems for optical measurement were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for incorporating personal and remote devices into systems for optical measurement provide improvements such as improved mobility and remote medical monitoring. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement would commonly be combined with personal and remote devices, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for incorporating personal and remote devices into systems for optical measurement, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iii) Addison, Carslon, LeBoeuf, Lisogurski, Park, Kreger, Sakai, Combined with any of the References Disclosing Remaining Features

A POSITA would have had reason to combine references Addison, Carslon, LeBoeuf, Lisogurski, Park, Kreger, or Sakai with any one of the references disclosing increasing signal-to-noise ratio, lenses, a personal device, a remote device (collectively, the "remaining features") all of which relate to systems and methods for obtaining and processing physiological measurements of a user. Each of the references teaching the remaining features relate to obtaining and processing physiological measurements of a user using light. Indeed, such components and/or processes were conventional as of the time these references were known. Each of the references teaching the remaining features provide means—not necessarily expressly present in all other references—for obtaining and processing physiological measurements of a user. A POSITA would have understood that the systems and methods for the references teaching the remaining features were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for the references teaching the remaining features provide improvements such as specific methods and systems for obtaining and processing physiological measurements using light. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for a wireless system for collecting and processing physiological data would commonly be combined with obtaining physiological measurements (for example, blood glucose levels and blood oxygenation) using light, and thus a POSITA would have been motivated to combine the teachings of these references. The combinations would apply known techniques for obtaining physiological measurements using light, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combinations would further be “obvious to try,” because they would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

Furthermore, to the extent any limitation of an Asserted Claim is deemed not to be exactly disclosed by an item of prior art, then the claim is rendered obvious by combination of the prior art in Exhibits B1 through B8 standing alone, in combination with the reference(s) in any other claim chart, in combination with any system art identified in Table 2-B, in combination with Applicant's Admitted Prior Art, in view of the knowledge of a person of ordinary skill in the art, and/or in view of the References disclosing techniques for increasing signal-to-noise ratio, References disclosing lenses, References disclosing a personal device, and References disclosing a remote device, for the reasons discussed above.

3. U.S. Patent No. 10,517,484

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix C the prior art references that render obvious the Asserted Claims of the '484 Patent and include below exemplary combinations showing the obviousness of the '484 Patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix C, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of ordinary skill in the art at the time of the '484 Patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix C, such reference may be combined with any other references listed in Appendix C for such element, thereby rendering the claims invalid for obviousness. To the extent a finder of fact determines that a limitation of any of the '484 Patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '484 Patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear

alternatives known to those of ordinary skill in the art.

a. Obviousness Rationale and Motivations to Combine

Obviousness: For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix C along with the knowledge of one of ordinary skill in the art to meet the limitations of the ’484 Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of the ’484 Patent obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Omni’s Asserted Claims. Defendants may rely upon a subset of the identified references or all of the references identified herein, including all references in Appendix C, for purposes of obviousness depending on the Court’s claim construction, positions taken by Omni during this litigation, and further investigation and discovery.

Reservation of Rights: Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants’ inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

No More Than Ordinary Variations of Prior Art; No Unexpected Results: To the extent not anticipated, the ’484 Patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific

motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach); *Apple Inc. v. Samsung Elecs. Co*., 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co*., 869 F.3d 1336, 1344 (Fed. Cir. 2017). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art references identified in Appendix C would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix C would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the ’484 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix C is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in Appendix C because all of these references relate to the same area of technology and/or are from analogous art. The ’484 Patent Asserted Claims are directed to “A wearable device includes a measurement device to measure a physiological parameter adapted to be placed on a wrist or an ear of a user.” ’484 Patent at

Abstract. The ’484 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the ’484 Patent Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine the above prior art based on his/her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the ’484 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to wearable devices measuring physiological parameters.

Demand and Market Forces: For example, market forces suggested a demand for wearable devices for measuring physiological parameters, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to solutions of that time.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicant in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the ’484 Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to

combine the known options that are within his or her technical grasp. For the ’484 Patent, there are a finite number of approaches for providing a wearable device for measuring physiological parameters. For example, as of the priority date of the ’484 Patent, a POSITA would have been very familiar with basic elements of the ’484 Patent’s claims such as semiconductors, optical wavelengths, lenses, signal-to-noise ratio, detectors, analog to digital convertors, smart phones, tablets, cloud, and artificial intelligence. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the ’484 Patent’s claims does not render them novel or non-obvious.

There are significant similarities in subject matter and objectives for each of many references used in these contentions for the ’484 Patent.

References disclosing smart phone or tablet: For example, charted reference Basu, Rulkov, Goodman, Kassim, Poeze, Terumoto, Moon, Tran, and Kreger, as well as other references such as Mault, all include teachings related to incorporating a smart phone or tablet into an optical measurement system. For example, Rulkov discloses “a device such as a personal digital assistant, laptop computer, mobile telephone, exercise equipment, or the like for display and even processing of the user's real-time vital signs information.” Rulkov at 5:48-64. Basu discloses that “[i]n smart phones, for example, OPS detect when a phone is placed in a pocket, triggering touch-screen locking.” Basu at [0035]. Goodman discloses “FIG. 5 shows another possible configuration of system 10 wherein processing device 14 is a PDA (e.g. Palm Pilot™) having PPG sensor 12 interfaced therein.” Goodman at 13:26-42. Kassim discloses “the feedback unit may be a portable device, such as a mobile phone, smartphone, personal digital assistant (PDA), tablet, netbook or laptop, although this list is not exhaustive by any means.” Kassim at 12:12-19. Poeze discloses “the patient monitor may include a display device, a network interface communicating with any

one or combination of a computer network, a handheld computing device, a mobile phone, the Internet, or the like." Poeze at 2:47-60. Terumoto discloses "the wireless communication circuit 33 transmits the measurement data acquired at the measurement unit 10 (i.e., the raw data provided from the amplifier circuit 14, the processed data various processes has performed provided from the processing circuit 15, or the stored data provided from the memory 32) to the external personal computer or a cell phone." Terumoto at [0130]. Moon discloses, "FIG. 14 indicates how the wrist-worn transceiver 72 can communicate wirelessly with either a networked computer 198 (e.g. a tablet computer located at a central nursing station) or a hand-held computer 199 (e.g. a cell phone or PDA, typically carried by the medical professional)." Moon at [0107]. Tran teaches that while a patient with a wearable device is outside a mesh network range, "the wearable appliance communicates with the cell phone and provides information to the server 200 using the cellular connection." Tran, 34:4-30. Kreger discloses "In other embodiments, the mobile communications device can be any of a number of mobile phones such as an iPhone® or an Android® phone, a personal digital assistant (PDA) such as a Blackberry®, a portable audio playback device such as an MP3 player, a portable media playback device such as an iPod®, or a handheld tablet such as an iPad®." Kreger at 5:48-53. Mault teaches a blood glucose monitoring system including an electronic device that "can be a portable electronic device or system carried by the person, or a device or system combining multiple functionalities, such as:…a portable computer; any portable Internet access device; [or] a wireless phone…." Mault [0069]-[0070].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with incorporating a smart phone or tablet into optical measurement systems. These methods are known to be effective in incorporating a smart phone or tablet into such systems. Moreover, to the extent that any of these

references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of communicating with a smart phone or tablet.

References disclosing lenses: For example, charted reference Carlson, Poeze, and Soller, as well as numerous other references such as LeBoeuf and Park, all include teachings related to using one or more lenses configured to receive a portion of at least one of the output optical lights and to direct a lens output light to tissue. These references provide numerous methods for using lenses to direct an optical output beam. For example, Carlson teaches "us[ing] a beam-shaping element, such as e.g. diffractive or refractive lenses, to direct the emitted optical radiation of, e.g., the LED light source into the human or animal tissue and the photon detecting element in order to increase the optical signal power, detected by the pulsoximeter sensor, and thus increasing the Signal/Noise—and signal/Background ratio. The increase of the S/B ratio is estimated e.g. to a factor 5." Carlson at [0014]. Poeze teaches "[using] a lens which collects attenuated light exiting the measurement site and focuses onto one or more detectors. The protrusion can advantageously include plastic, including a hard opaque plastic, such as a black or other colored plastic, helpful in reducing light noise." Poeze at 7:52-8:7. Soller teaches "a variety of different collimating elements 56 can be used in sensor 10. Exemplary collimating elements include fiber faceplates (e.g., fiber optic windows), collimating hole devices, gradient index (GRIN) lenses, fiber bundles, lens arrays, optical windows (including shaped optical windows), and other similar devices." Soller at 18:37-56.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with using lenses to direct an

optical output beam. These methods are known to be effective in directing an optical output beam using known lens structures. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of directing an optical output beam.

References disclosing techniques for increasing signal-to-noise ratio: For example, charted reference Basu, Lisogurski, and Carlson, as well as numerous other references such as LeBoeuf and Park, all include teachings related to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. These references provide numerous methods for increasing a light intensity and increasing a pulse rate of an LED. For example, Basu teaches that "[t]o maximize the signal-to-noise ratio in photoplethysmography, the LED intensity should be made as large as possible without saturating the detector. In the OPS 10, the LED intensity and modulation frequencies are programmable through the serial interface. In the case of the Vishay VCNL4000, the intensity is programmable from 10-200 mA in 10 mA increments." Basu at [0058]. Lisogurski teaches "that modulation of the light drive signal . . . may include modulation of parameters including drive current or light brightness, duty cycle, firing rate, modulation parameters, other suitable parameters, or any combination thereof" and that "[t]he system may increase the brightness of the light sources in response to the noise to improve the signal-to-noise ratio." Lisogurski at 27:44-55, 9:46-60. Carlson teaches that the "frequency is chosen in such a way that it is outside the frequency spectrum of sunlight and of ambient light which, according to FIG. 7b, is in the range of above approximately 1000 Hz. Thus, the pulsoximeter signals are readily discriminated from electronic and parasitic contributions of environmental optical radiation outside the frequency fc+/−5 Hz

increasing significantly the Signal-to-Noise and Signal-to-Background ratio." Carlson at [0069]. LeBoeuf teaches that "the intensity of the optical emitter 102 may be increased to increase the ratio of physiological optical scatter 111 from blood vessels with respect to unwanted sunlight" and that "it is important to consider the emitter pulsing frequency and sampling approach" because "choosing a frequency that is too low may result in unsatisfactory subtraction." LeBoeuf at [0123], [0139]. Park teaches that "the light source intensity may be increased to maintain the output signal from the light detector within a desired range of output values." Park at 16:8-20.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with improving signal-to-noise ratio in optical measurement systems. These methods are known to be effective in improving the signal-to-noise ratio for such systems, and merely modulate the functioning of the existing LEDs in each system. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of improving signal-to-noise ratio.

References disclosing an analog to digital converter: For example, charted reference Basu, Goodman, Lisogurski, Rulkov, Moon, Poeze, Chandrasekar, Kreger, and Sakai all include teachings related to an analog to digital converter. These references provide numerous methods for using an analog to digital converter coupled to a detector. For example, Basu discloses "a digital interface for communication with a microcontroller." Basu at [0007]. Goodman discloses "On board analog-to-digital converter A/D 44 (10 bit, 5 channel input) is used to convert the conditioned PPG signals at B and B′ into time sampled digital signals which are then provided to processing device 14. Goodman at 11:66-12:21. Lisogurski discloses a "[f]ront end processing

circuitry 150 may perform various analog and digital processing of the detector signal." Lisogurski at 12:42-51. Rulkov discloses that "The microprocessor741 has a LED control715 connected to DAC702 for controlling the intensity of the LEDs737. The signal from the photodetector736 is transmitted to a high pass filter (HPF) 703 which sends it to an analog to digital converter704, and the signal from the photodetector737 is also sent directly to a second analog to digital converter704." Rulkov at 11:39-60. Moon discloses that "[a] filter removes any high-frequency noise (e.g. 60 Hz electrical noise) that is not related to the PPG waveform, and yields a preliminary waveform that is digitized with an analog-to-digital converter 176, and processed as described above to generate a DC portion of the PPG." Moon at [0091]. Poeze discloses "[f]ront-end interfaces 108 may be implemented using transimpedance amplifiers that are coupled to analog to digital converters in a sigma delta converter." Poeze at 40:15-27. Chandrasekar discloses "In principle, PPGs are considered simple devices; however, in practice, implementation requires a careful design involving optics (multiple paths, alignments, leakage barriers) and mixed signal electronics (transimpedance amplifiers, analog digital conversion, drivers, modulators, filters)." Chandrasekar at 1. Kreger discloses "Biosensor signals may also be received by one or more RF receivers in the dock 246 (not shown) and communicated to the mobile 212 via wired electrical connector 246, for example, to allow the wireless sensor to utilize the features of the wired audio input's anti-alias filters and analog to digital converter as will be explained in detail below." Kreger at 10:14-28. Sakai discloses "A/D converter 2013 d which converts a voltage value of analog signal into 10-bit digital value."

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with incorporating an analog to digital converter into optical measurement systems. These methods are known to be effective in

incorporating an analog to digital converter into such systems. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of signal processing.

References disclosing a cloud: For example, charted references Basu and Kassim, as well as numerous other references such as Mault and US2011/0082711A1, include teachings related to using a cloud. These references provide numerous methods for communicating with a cloud. For example, Basu teaches that "a "cloud-based" RPM infrastructure can actively manage cardiovascular health. Using OPS technology, cardiovascular parameters can be monitored on a 24-hour ambulatory basis using wearable biosensors, with wireless transmission of relevant data to the patient's electronic medical record." Basu at [0064]. Kassim teaches that "[t]he computer platform may further be connected to network resources 2006 which connect to the Internet or other components of a local public or private network. The network resources 2006 may provide instructions and data to the computer platform from a remote location on a network 2007." Kassim, 33:34-34:19. Mault teaches "[t]he PDA can access the communications network, such as the Internet, using a wireless connection. Data can be transferred to the remote system over the communications network 20." Mault, [0077]. US 2011/0082711A1 teaches "the camera is paired with an optical character recognition module so that scanned medical forms can be converted into data that can be uploaded for synchronization at a server in a network (e.g. a cloud computing network) or stored on the personal health organizer device." At [0048].

A person of skill in the art would understand that the functionality taught in this reference could be added to other methods and systems for measuring physiological parameters. These

methods provide communication with a cloud which allows for remote storage and computation on the cloud. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of measuring physiological parameters.

References disclosing artificial intelligence: For example, charted reference Tran, as well as other references such as Quy, include teachings related to using artificial inteligence. For example, Tran teaches "Various mathematical techniques and Artificial Intelligence (AI) analyzer can be applied. … AI approaches towards signal recognition include Artificial Neural Networks (ANN), dynamic recurrent neural networks (DRNN), fuzzy logic system, Genetic Algorithm (GA), and Hidden Markov Model (HMM)." Tran at 94:49-65. Quy teaches "[a]pplication 62 may include an algorithm 63 for analyzing data from the HMD, and either application 62 or algorithm 63 may optionally access data from an external data source 74 and may further consult an artificial intelligence system 76." Quy at 8:9-14.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems for measuring physiological parameters. These methods provide using artificial intelligence. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of measuring physiological parameters.

References disclosing spatially separated detectors: For example, charted references Lisogurski, Poeze, Soller, Terumoto, and Tran, all include teachings related to using detectors that

are spatially separated. These references provide numerous methods for using light detectors. For example, Lisogurski teaches that "[o]ne or more detector 318 may also be provided in sensor unit 312 for detecting the light that is reflected by or has traveled through the subject's tissue. Any suitable configuration of light source 316 and detector 318 may be used. In an embodiment, sensor unit 312 may include multiple light sources and detectors, which may be spaced apart." Lisogurski at 17:35-45. Poeze discloses that "multiple detectors are employed and arranged in a spatial geometry. This spatial geometry provides a diversity of path lengths among at least some of the detectors and allows for multiple bulk and pulsatile measurements that are robust." Poeze at 9:18-27. Soller discloses "a plurality of spectral detectors attached to the circuit board, each spectral detector being configured to analyze radiation derived from the radiation source" and depicts the detectors as spatially separated. Soller at 3:16-27; Fig. 34. Terumoto discloses "[t]he light sensor portions 101-1 to 101-n are located equally spaced from one another and to go round the armlet type housing 107 same as the fourth to sixth implementations." Terumoto at [0152]. Tran discloses "[t]he electrode array sensor can be a geometric array of discrete electrodes having an equally-spaced geometry of multiple nodes that are capable of functioning as sense and reference electrodes. In a typical tomography application the electrodes are equally-spaced in a circular configuration. Alternatively, the electrodes can have non-equal spacing and/or can be in rectangular or other configurations in one circuit or multiple circuits." Tran at 50:61-51:8.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that detect light. These methods provide using detectors that are spatially separated. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the

other references in order to better achieve their common goals of measuring physiological parameters.

References disclosing detection system is synchronized to the light source: For example, charted reference Lisogurski, Carlson, Poeze, Kreger, and Sakai all include teachings related to detection system is synchronized to the light source. These references provide numerous methods for synchronizing detection system with the light source. For example, Lisogurski discloses "he front end processing circuitry 150 may use the timing control signals to operate synchronously with light drive circuitry 120. For example, front end processing circuitry 150 may synchronize the operation of an analog-to-digital converter and a demultiplexer with the light drive signal based on the timing control signals." Lisogurski at 11:33-49. Carlson discloses "[t]he basic idea of using AC-Coupling or Lock-In Amplification (synchronous detection), is to temporarily modulate the optical radiation of the LED at the carrier frequency fc in order to shift the power spectrum of the pulsoximeter signals into a higher frequency range where environmental optical radiation is unlikely and electronic band pass filtering is technologically less stringent. AC-Coupling or Lock-In Amplification is well known out of the state of the art and is described in literature 3." Carlson at [0065]. Poeze teaches that "[a] control signal can be useful in order to synchronize, minimize, or reduce jitter in the timing of pulses emitted from the emitter 104. Accordingly, this control signal can be useful in order to cause optical radiation pulses emitted from the emitter 104 to follow a precise timing and consistent pattern." Poeze at 15:27-48. Kreger discloses "Thus, it is another object to provide compatible signals to the mobile's electrical connectors which may involve transforming the biosensor signals to match requisite impedance and signal levels, eliminate noise, cancel DC noise and drift, demultiplex or multiplex multiple measurements, provide electrical isolation, serialization, synchronization, and so forth." Kreger

at 3:17-23. Sakai discloses "he A/D converter 14 operates in synchronization with the light emission timing of the driver 12, to thereby convert the pulse wave detection signal detected upon light emission from the green LED 11 a and the body motion detection signal detected upon light emission from the infrared LED 11 b into digital data, and provides these digital data, as biological information, to the information processor 20." Sakai at 5:66-6:9.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with measuring physiological parameters. These methods are known to be effective in incorporating synchronizing detection system with the light source. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of signal processing.

b. Combinations

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix C with any other reference or references listed in Appendix C along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '484 Patent.

For example, and without limitation, the Asserted Claims of the '484 Patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

(i) <u>Carlson, Lisgurski, Chandersekar, Soller, Tran, and Sakai combined with References disclosing smart phone or tablet</u>

A POSITA would have had reason to combine references Carlson, Lisgurski, Moon, Soller, and Sakai with any one of References disclosing smart phone or tablet, all of which relate to systems and methods for incorporating a smart phone or tablet into an optical measurement

system. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing smart phone or tablet provide means—not necessarily expressly present in all other references—for incorporating a smart phone or tablet into an optical measurement system. A POSITA would have understood that the systems and methods for References disclosing smart phone or tablet were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using smart phone or tablet into an optical measurement system provide improvements such as the ability to coomunicate with smart phone or tablet. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for using smart phone or tablet would commonly be combined with optical measurement system, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using smart phone or tablet, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(ii) Rulkov, Basu, Goodman, Chandersekar, Kassim, Lisogurski, Moon, Terumoto, Tran, Kreger, and Sakai combined with References disclosing lenses

A POSITA would have had reason to combine references Rulkov, Basu, Goodman, Kassim, Lisogurski, Moon, Terumoto, Tran, Kreger, and Sakai with any one of References disclosing lenses, all of which relate to systems and methods for using lenses to direct an optical output beam. Each of References disclosing lenses relate to using one or more lenses configured to receive a portion of at least one of the output optical lights and to direct a lens output light to tissue. Indeed, such components and/or processes were conventional as of the time these

references were known. Each of References disclosing lenses provide means—not necessarily expressly present in all other references—for using lenses to direct an optical output beam. A POSITA would have understood that the systems and methods for References disclosing lenses were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using lenses provide improvements such as disrecting the light to tissue. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for using lenses to direct an optical output beam would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using lenses to direct an optical output beam, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iii) Kassim, Rulkov, Goodman, Moon, Chandersekar, Poeze, Soller, Terumoto, Tran, Kreger, and Sakai combined with References disclosing techniques for increasing signal-to-noise ratio

A POSITA would have had reason to combine Kassim, Rulkov, Goodman, Moon, Poeze, Soller, Terumoto, Tran, Kreger, and Sakai with any one of References disclosing techniques for increasing signal-to-noise ratio, all of which relate to systems and methods for increasing a light intensity and increasing a pulse rate of an LED. Each of References disclosing techniques for increasing signal-to-noise ratio relate to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. Indeed, such components and/or processes were conventional as of the time these references

were known. Each of References disclosing techniques for increasing signal-to-noise ratio provide means—not necessarily expressly present in all other references—for increasing signal-to-noise ratio relate to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. A POSITA would have understood that the systems and methods for References disclosing techniques for increasing signal-to-noise ratio were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for increasing a light intensity and increasing a pulse rate of an LED provide improvements such as increasing signal-to-noise ratio. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for increasing signal-to-noise ratio would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for increasing signal-to-noise ratio, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iv) <u>Carlson, Kassim, Soller, Chandersekar, Terumoto, and Tran combined with References disclosing an analog to digital converter</u>

A POSITA would have had reason to combine references Carlson, Kassim, Soller, Terumoto, and Tran with any one of References disclosing an analog to digital converter, all of which relate to systems and methods for using an analog to digital converter coupled to a detector. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing an analog to digital converter provide means—not necessarily expressly present in all other references—for using an analog to digital

converter coupled to a detector. A POSITA would have understood that the systems and methods for References disclosing an analog to digital converter were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using an analog to digital converter provide improvements such as ability to process a signal digitally. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for using an analog to digital converter would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using an analog to digital converter, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(v) Carlson, Rulkov, Chandersekar, Goodman, Kassim, Lisogurski, Moon, Poeze, Soller, Terumoto, Tran, Kreger, and Sakai combined with References disclosing a cloud

A POSITA would have had reason to combine references Carlson, Rulkov, Chandersekar, Goodman, Kassim, Lisogurski, Moon, Poeze, Soller, Terumoto, Tran, Kreger, and Sakai with any one of References disclosing a cloud, all of which relate to systems and methods for using a cloud. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing a cloud provide means—not necessarily expressly present in all other references—for using a cloud. A POSITA would have understood that the systems and methods for using a cloud were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using a cloud provide improvements such as remote storage and computing. A POSITA would further understand that in order to implement a wearable measurement device, the systems and

methods for measuring physiological parameters would commonly be combined with a cloud, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using a cloud, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(vi) Carlson, Rulkov, Chandersekar, Basu, Goodman, Kassim, Lisogurski, Moon, Poeze, Soller, Terumoto, Kreger, and Sakai combined with References disclosing artificial intelligence

A POSITA would have had reason to combine references Carlson, Rulkov, Chandersekar, Basu, Goodman, Kassim, Lisogurski, Moon, Poeze, Soller, Terumoto, Kreger, and Sakai with any one of References disclosing artificial intelligence, all of which relate to systems and methods for using artificial intelligence. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing artificial intelligence provide means—not necessarily expressly present in all other references—for using artificial intelligence. A POSITA would have understood that the systems and methods for References disclosing artificial intelligence were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using artificial intelligence provide improvements such as automation and improved processing power. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological parameters would commonly be combined with artificial intelligence, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for artificial intelligence, to wearable measurement devices that were ready for improvement, in order to yield

predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(vii) Carlson, Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon, Kreger, and Sakai combined with References disclosing spatially separated detectors

A POSITA would have had reason to combine references Carlson, Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon, Kreger, and Sakai with any one of References disclosing spatially separated detectors all of which relate to systems and methods for using spatially separated detectors. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing spatially separated detectors provide means—not necessarily expressly present in all other references—for using spatially separated detectors. A POSITA would have understood that the systems and methods for References disclosing spatially separated detectors were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for spatially separated detectors provide improvements such as improved detection quality. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological parameters would commonly be combined with spatially separated detectors, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using spatially separated detectors, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(viii) Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon,

Soller, Terumoto, and Tran combined with References disclosing detection system is synchronized to the light source

A POSITA would have had reason to combine references Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon, Soller, Terumoto, and Tran with any one of References disclosing detection system is synchronized to the light source, all of which relate to systems and methods for synchronizing a detection system with a light source. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing detection system is synchronized to the light source provide means—not necessarily expressly present in all other references—for synchronizing a detection system with a light source. A POSITA would have understood that the systems and methods for References disclosing detection system is synchronized to the light source were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for synchronizing a detection system with a light source provide improvements such as improved detection. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological parameters would commonly be combined with techniques for synchronizing a detection system with a light source, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for synchronizing a detection system with a light source, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

Furthermore, to the extent any limitation of an Asserted Claim is deemed not to be exactly disclosed by an item of prior art, then the claim is rendered obvious by combination of the prior art in

Exhibits C1 through C14 standing alone, in combination with the reference(s) in any other claim chart, in combination with any system art identified in Table 2-C, in combination with Applicant's Admitted Prior Art, in view of the knowledge of a person of ordinary skill in the art, and/or in view of the References disclosing smart phone or tablet, References disclosing lenses, References disclosing techniques for increasing signal-to-noise ratio, References disclosing an analog to digital converter, References disclosing a cloud, References disclosing artificial intelligence, References disclosing spatially separated detectors, References disclosing detection system is synchronized to the light source, for the reasons discussed above.

4. U.S. Patent No. 10,874,304

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix D the prior art references that render obvious the Asserted Claims of the '304 Patent and include below exemplary combinations showing the obviousness of the '304 Patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix D, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of ordinary skill in the art at the time of the '304 Patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix D, such reference may be combined with any other references listed in Appendix D for such element, thereby rendering the claims invalid for obviousness. To the extent a finder of fact determines that a limitation of any of the '304 Patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '304 Patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear

alternatives known to those of ordinary skill in the art.

a. Obviousness Rationale and Motivations to Combine

Obviousness: For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix D along with the knowledge of one of ordinary skill in the art to meet the limitations of the ’304 Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of the ’304 Patent obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Omni’s Asserted Claims. Defendants may rely upon a subset of the identified references or all of the references identified herein, including all references in Appendix D, for purposes of obviousness depending on the Court’s claim construction, positions taken by Omni during this litigation, and further investigation and discovery.

Reservation of Rights: Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art, including prior art systems that may anticipate and/or render obvious the Asserted Claims (e.g., System Art).. As such, Defendants’ inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

No More Than Ordinary Variations of Prior Art; No Unexpected Results: To the extent not anticipated, the ’304 Patent Asserted Claims represent no more than the result of

ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344 (Fed. Cir. 2017). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art references identified in Appendix D would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix

D would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the ’304 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix D is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in Appendix D because all of these references relate to the same area of technology and/or are from analogous art. The ’304 Patent

Asserted Claims are directed to a physiological measurement system. ’304 Patent at Abstract. The ’304 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the ’304 Patent Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine the above prior art based on his/her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the ’304 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to wearable devices measuring physiological parameters.

Demand and Market Forces: For example, market forces suggested a demand for wearable devices for measuring physiological parameters, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to solutions of that time.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicant in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the ’304 Patent, and there are a

finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the ’304 Patent, there are a finite number of approaches for providing a wearable device for measuring physiological parameters. For example, as of the priority date of the ’304 Patent, a POSITA would have been very familiar with basic elements of the ’304 Patent’s claims such as semiconductors, optical wavelengths, signal-to-noise ratio, detectors, analog to digital converters, smart phones/tablets, cloud, and their configurations and/or means for the same. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the ’304 Patent’s claims does not render them novel or non-obvious.

There are significant similarities in subject matter and objectives for each of many references used in these contentions for the ’304 Patent.

Reflective Surface References: For example, charted reference **LeBoeuf**, as well as numerous other references such as **Basu** and **Valencell** all include teachings related to physiological measurement systems. These references provide numerous methods for using a reflective surface in a sensor to direct the reflected light from a sample to a detector. For example, **LeBoeuf** teaches using a “cover 18” with a “cladding material 21 [which] may be reflective material” to “serve[] as a light guide that… collects light external to the earbud housing 16 and delivers the collected light to the optical detector 26”. LeBoeuf, [0103], [0107], [0115]. **Basu** teaches “[t]he battery 32 may additionally be arranged to provide a reflective surface for the light emitted by the LED 14 toward the photodiode 16.” Basu, [0088]. **Valencell** teaches “The light guiding region 2306 helps direct light to and/or from the sensor module …. In some embodiments, the light guiding region 2306 may be a reflector.” Valencell, [0152].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems for physiological measurements. These methods provide the benefit of improved delivery of the light reflected from tissue to the detectors in the sensor. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

SNR Techniques: For example, charted reference **Kassim**, as well as numerous other references such as **Carlson, Basu, Lisogurski, Marbach**, and **LeBoeuf** all include teachings related to physiological measurement systems. These references provide numerous methods for improving signal-to-noise ratio through various methods, including increasing light intensity, increasing pulse rate, and differencing detected signals. For example, **Kassim** teaches "a maximum of the true Red PPG signal (devoid of ambient noise) can simply be obtained by subtracting the obtained maximum value of the Red PPG signal, obtained when the Red LED is turned on, with the obtained maximum value of the ambient PPG signal." Kassim, 22:27-23:3. **Carlson** teaches that "shift[ing] [the] spectrum of signal" can result in "increasing significantly the Signal-to-Noise and Signal-to-Background ratio" when the "frequency is chosen in such a way that it is outside the frequency spectrum of sunlight and of ambient light." Carlson, [0069]. **Basu** teaches "[t]o maximize the signal-to-noise ratio in photoplethysmography, the LED intensity should be made as large as possible without saturating the detector." Basu, [0058]. **Lisogurski** teaches "dark subtractor 162 may subtract dark values from the Red and IR components to generate adjusted Red and IR signals. For example, dark subtractor 162 may determine a subtraction amount from the dark signal portion of the detection signal and subtract it from the peak portion of the

detection signal in order to reduce the effect of the dark signal on the peak. Lisogurski, 13:60-67. **Marbach** teaches "The LEDs are preferably pulse-modulated with a pulse frequency on the order of several kHz. Low power, quasi-continuous operation is possible by measuring intermittently, e.g., one measurement lasting 10 seconds every 5 minutes. …depending on the sampling rate and SNR requirements." Marbach, 17:1-7. **LeBoeuf** teaches "Channel A refers to inputs from sensors that collect physiological information plus noise information, and Channel B refers to inputs from sensors that collect primarily … noise information. … The filter 203 properties are updated to minimize the difference between Channel A and the post-processed Channel B, denoted as B. In this way, noise is removed from Channel A and Channel C contains predominantly physiological information." LeBoeuf, [0143].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems for physiological measurements. These methods and systems provide the benefit of increasing a signal-to-noise ratio of the measure signal. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Smartphone/Tablet References: For example, charted reference **Basu**, as well as numerous other references such as **Kassim**, **Kreger**, **Lisogurski**, **Tran**, all include teachings related to physiological measurement systems. These references provide numerous means for a physiological monitoring system to be configured for use with a smart phone or tablet. For example, **Basu** teaches "health ring 44 which can monitor heart rate on a 24 hour basis," and that "combines the sensor with a…wireless transmitter linked to an application running on the user's

cell phone." Basu, [0065]-[0066]. For example, **Kassim** teaches "[t]he optical measurement device 300 further comprises a coupling member 316 that can provide coupling between the measurement device 300 to a personal mobile processing device/feedback unit (not shown) in a cableless configuration," and that "the feedback unit may be a portable device, such as a mobile phone, smartphone, personal digital assistant (PDA), tablet, netbook or laptop, although this list is not exhaustive by any means." Kassim, 12:5-14. For example, **Kreger** teaches a "biosensor interface apparatus for use with a mobile communication device 10," that "can be any of a number of mobile phones such as an iPhone® or an Android® phone, a personal digital assistant (PDA) such as a Blackberry®, a portable audio playback device such as an MP3 player, a portable media playback device such as an iPod®, or a handheld tablet such as an iPad®." Kreger, 5:40-53; *see also* Kreger, 7:39-46. For example, **Lisogurski** teaches a "monitor [that] may be powered by a battery" with a "[u]ser interface [which] may include user input 182, display 184, and speaker 186. User input 182 may include any type of user input device such as a keyboard, a mouse, a touch screen, buttons, switches, a microphone, a joy stick, a touch pad, or any other suitable input device." Lisogurski, 15:19-23, 18:65-67. For example, **Mault** teaches a blood glucose monitoring system including an electronic device that "can be a portable electronic device or system carried by the person, or a device or system combining multiple functionalities, such as:…a portable computer; any portable Internet access device; [or] a wireless phone…." Mault [0069]-[0070]. For example, **Poeze** teaches "a personal health organizer software module 132 executed on a general purpose computing device 126, with the computing device 126 coupled with the health data collection device 112 via a communications link 128," where the "personal health organizer module 132 can be an executable program on an operating system of a device such as a mobile phone, a personal digital assistant, a portable music player, an electronic book reader, a netbook,

a TV media center, and a laptop or desktop computer. For example, the personal health organizer module 132 can be an application that is executed on the operating system of a mobile phone such as the iPhone manufactured by Apple, Inc., a Blackberry device manufactured by Research In Motion, Inc., the Pre manufactured by Palm, Inc, or a mobile device manufactured by HTC, Nokia, or Motorola, etc." Poeze, [0034]; *see also* Poeze [0010]. **Tran** teaches that while a patient with a wearable device is outside a mesh network range, "the wearable appliance communicates with the cell phone and provides information to the server 200 using the cellular connection." Tran, 34:4-30.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods and systems provide the benefit of more processing power and more convenient means to flag emergency situations. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Cloud References: For example, charted reference **Kassim**, as well as numerous other references such as **Mault, Basu, Lisogurski**, and **Poeze** all include teachings related to physiological measurement systems. These references provide numerous means for a physiological monitoring system to be configured for use a with cloud. For example, **Kassim** teaches that "[t]he computer platform may further be connected to network resources 2006 which connect to the Internet or other components of a local public or private network. The network resources 2006 may provide instructions and data to the computer platform from a remote location

on a network 2007." Kassim, 33:34-34:19. **Mault** teaches "[t]he PDA can access the communications network, such as the Internet, using a wireless connection. Data can be transferred to the remote system over the communications network 20." Mault, [0077]. **Basu** teaches "a cloud-based health monitoring and mentoring framework which integrates remote patient monitoring (RPM) with an online community involving medical caregivers and a social network of the patient's peers." Basu, [0081]. **Lisogurski** teaches "monitor 314 and/or multi-parameter physiological monitor 326 may be coupled to a network to enable the sharing of information with servers or other work-stations." Lisogurski, 18:62-65. **Poeze** teaches "the camera is paired with an opti cal character recognition module so that scanned medical forms can be converted into data that can be uploaded for synchronization at a server in a network (e.g. a cloud computing network) or stored on the personal health organizer device." Poeze, [0048].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems for physiological measurements. These methods improving the analysis capabilities of measurement systems due to the increased processing and storage power of a cloud. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Optical Detection Techniques References: For example, charted reference **Keller**, as well as numerous other references such as **Mault**, **Carlson, Lisogurski, Basu**, **Jung**, and **Marbach** all include teachings related to physiological measurement systems. These references provide numerous means for effective optical detection through various methods, including

synchronizing light sources and detectors and modulating the light source. For example, **Keller** teaches that "[t]he light source 102 may also be pulsed or flashed, in order, for example, to synchronize with the imaging devices 305, 504 (see, FIGS. 3 and 5, respectively) of the invention." Keller, [0088]. **Mault** teaches "electrical modulation of a single device may be used to obtain multiple wavelength emission" Mault, [0020]. **Carlson** teaches "us[ing] a light source modulation to temporarily modulate the optical radiation of the LED … in order to shift the power spectrum of the pulsometer signals into a higher frequency range." Carlson, [0063]-[0065]. **Lisogurski** teaches "front end processing circuitry 150 may use the timing control signals to operate synchronously with light drive circuitry 120." Lisogurski, 11:41-43. **Basu** teaches "[t]he LED 14 is modulated at 1 KHz frequency or higher. The received PD signal oscillates at the same frequency." Basu, [0037]. **Jung** teaches "[t]he three monochrome sources, however, are turned on and off rapidly, synchronous with the spectral measurements being taken." Jung, 68:26-30. **Lamego** teaches a "digital-to-analog conversion circuit 338" that includes "a synchronizing latch 323" which "accepts the synchronizing pulses which maintain synchronization between the activation of emitters 302 and the analog to digital conversion circuit 332." Lamego, [0044]-[0045]. **Marbach** teaches "The LEDs are preferably pulse-modulated with a pulse frequency on the order of several kHz. Low power, quasi-continuous operation is possible by measuring intermittently, e.g., one measurement lasting 10 seconds every 5 minutes." Marbach, 17:1-5.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems for physiological measurements. These methods and systems provide increased accuracy for monitoring physiological parameters. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any

one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Artificial Intelligence / Multivariate Techniques References: For example, charted reference **Tran**, as well as numerous other references such as **Mault** and **Marbach** all include teachings related to physiological measurement systems. These references provide numerous means for using artificial intelligence and multivariate techniques to make decisions and improve signal-to-noise ratios. For example, **Tran** teaches that "feed forward artificial neural networks (NNs) are used to classify valve-related heart disorders." Tran, 74:45-62. **Mault** teaches that "[f]eedback, generated by a specialist or computer expert system, may be transmitted to the PDA from the remote computer over the communications network." Mault, [0077]. **Marbach** teaches performing "measurement algorithms" on "multivariate input data" of measurement signals in order to "better the measurement accuracy a.k.a. SNR." Marbach, 12:19-27.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems for physiological measurements. These methods and systems provide increased decision-making capabilities and minimize noise interference. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Arc References: For example, charted reference **Isaacson**, as well as numerous other references such as **Jung**, and **LeBoeuf** all include teachings related to physiological measurement systems. These references provide numerous methods for utilizing a plurality of semiconductor sources and the plurality of spatially separated detectors are located on one or more arcs. For

example, **Isaacson** teaches emitters 10, 20 and detectors 12, 22 disposed on an arc. Isaacson, 4:64-5:9, Fig. 1. For example, **Jung** teaches "a fiber optic arrangement presented at the forward end of probe tip 1" which "utilizes a single central light source fiber optic…and a plurality of perimeter light receiver fiber optics, denoted as light receivers R1, R2 and R3." Jung, 11:21-50, Fig. 2; *see also* Jung 24:39-48, 24:39-62, 32:66-33:9, 39:41-40:14, Figs. 9, 10A-B, 20, 28A-B. For example, **LeBoeuf** teaches optical emitters 24 and optical detectors 26 configured in an arc. LeBoeuf, [0123]-[1024], Fig. 8B

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods provide the benefit of better acquisition of signals from the samples. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

b. Combinations

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix D with any other reference or references listed in Appendix D along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '304 Patent.

For example, and without limitation, the Asserted Claims of the '304 Patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

(i) <u>Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Reflective Surface References</u>

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix D, with any one of the Reflective Surface References all of which relate to systems and methods for physiological monitoring. Each of references **LeBoeuf, Basu** and **Valencell** relate to physiological monitoring systems which use a reflective surface to direct the reflected light from a sample to a detector. Indeed, such components and/or processes were conventional as of the time these references were known. Each of the Reflective Surface References provide means—not necessarily expressly present in all other references—for using a reflective surface in a sensor to direct the reflected light from a sample to a detector. A POSITA would have understood that the systems and methods for the Reflective Surface References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for incorporating reflective surfaces into sensors to direct the reflected light from a sample to a detector provide improvements such as enhancing the efficiency of the delivery of the light reflected from or transmitted through the tissue to the detectors in the sensor, minimizing loss of light intensity due to scattering. *E.g.*, LeBoeuf, [0125] ("An advantage of this configuration is … this configuration may reduce unwanted optical signals from regions that may not be relevant to the physiological activity of interest.") A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement systems would commonly be combined with reflective surfaces, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of including basic optical components, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be

"obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(ii) Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with SNR Techniques References

A POSITA would have had reason to combine references **Lisogurski**, **Kassim, Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix D, with any one of the SNR Techniques References all of which relate to systems and methods for physiological monitoring. Each of references **Kassim, Carlson, Basu, Lisogurski, Marbach**, and **LeBoeuf** relate to physiological monitoring systems which use various methods for improving signal-to-noise ratio. Indeed, such components and/or processes were conventional as of the time these references were known. Each of the SNR Techniques References provide means—not necessarily expressly present in all other references—for various methods, including increasing light intensity, increasing pulse rate, and differencing detected signals to improve the SNR of a detected signal. A POSITA would have understood that the systems and methods for the SNR Techniques References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for incorporating the usage of various SNR techniques into physiological measurement systems provide improvements such as reducing the effects of background noise or ambient light on the measurement signal and improving the accuracy of the measurement. *E.g.*, Kassim, 22:28-22:30 ("The inventors have recognized that by identifying and utilizing only significant information for Sp02 calculation, an efficient and accurate calculation can be carried out"). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement systems would commonly be combined with SNR improvement techniques, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would

apply known techniques of using known noise reduction and signal enhancement methods, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iii) Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Smartphone/Tablet References

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix E, with any one of Smartphone/Tablet References all of which relate to systems and methods for physiological monitoring. Each of references **Basu**, **Kassim**, **Kreger**, **Lisogurski**, **Mault**, **Poeze**, and **Tran** relate to physiological monitoring systems for use with a smartphone or tablet. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Smartphone/Tablet References provide means—not necessarily expressly present in all other references—for a physiological monitoring system to communicate with a smartphone or tablet. A POSITA would have understood that the systems and methods for Smartphone/Tablet References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for connectivity to smartphones or tablets provide improvements improving the analysis capabilities of measurement systems due to the increased processing power of smartphones and tablets and the additional resources provided by their ability to connect to wireless and cell networks. *E.g.*, Basu, [0066] (physiological monitoring system "combines the sensor with a…wireless transmitter linked to an application running on the user's cell phone."); Kreger, 13:1-3 ("Mobile device smart phone 444 may derive measurements, display plots, transmit medical records of biosensor data, and so forth."); Tran, 34:4-40 ("If the wearable

appliance detects a cellphone that is mesh network compatible, the wearable appliance communicates with the cell phone and provides information to the server 200 using the cellular connection."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical physiological measurement would commonly be combined with smartphone and personal computing technology and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of providing for connectivity to smartphone or personal computing devices in wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iv) Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Cloud References

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix D, with any one of the Cloud References all of which relate to systems and methods for physiological monitoring. Each of references **Kassim**, **Mault, Basu, Lisogurski**, and **Poeze** relate to connecting the physiological monitoring system with a cloud. Indeed, such components and/or processes were conventional as of the time these references were known. Each of the Cloud References provide means—not necessarily expressly present in all other references—for a physiological monitoring system to communicate with a cloud. A POSITA would have understood that the systems and methods for the Cloud References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for connectivity to a cloud provide improvements improving the analysis capabilities of measurement systems due to the

increased processing and storage power of a cloud and the additional resources provided by their ability to connect to the internet and other remote networks. *E.g.*, Kassim, 34:14-16 ("The network resources may include 15 storage devices for storing data and executable instructions at a location separate from the computer platform 2001"). *E.g.*, Mault, [0077] ("Data can be transferred to the remote system over the communications network 20, allowing examination by a dietician, physician, other specialist"). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical physiological measurement would commonly be combined with cloud connectivity and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of providing for connectivity to smartphone or personal computing devices in wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(v) <u>Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Optical Detection Techniques References</u>

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix D, with any one of the SNR Techniques References all of which relate to systems and methods for physiological monitoring. Each of references **Keller, Mault**, **Carlson, Lisogurski, Basu**, **Jung**, and **Marbach** relate to physiological monitoring systems which use various methods for effective optical detection. Indeed, such components and/or processes were conventional as of the time these references were known. Each of the Optical Detection References provide means—not necessarily expressly present in all other references—for various methods, including synchronizing light sources and detectors and modulating the light source for effective optical

detection of a sample. A POSITA would have understood that the systems and methods for the Optical Detection References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for incorporating the usage of various optical detection techniques into physiological measurement systems provide improvements such as improving the system's ability to effectively detect and measure samples of interest. *E.g.*, Carlson , [0065] ("AC-Coupling or Lock-In Amplification (synchronous detection), is to temporarily modulate the optical radiation of the LED at the carrier frequency fc in order to shift the power spectrum of the pulsoximeter signals into a higher frequency range where environmental optical radiation is unlikely and electronic band pass filtering is technologically less stringent."); Lamego, [0045] ("[D]river circuit," including "synchronizing latch 323 [that] accepts the synchronizing pulses which maintain synchronization between the activation of emitters 302 and the analog to digital conversion circuit 332" "is designed to minimize the noise from the emitters 302."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement systems would commonly be combined with optical detection techniques, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of using known optical detection methods, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(vi) <u>Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Artificial Intelligence / Multivariate Techniques References</u>

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix D, with

any one of the Artificial Intelligence / Multivariate Techniques References all of which relate to systems and methods for physiological monitoring. Each of references **Tran, Mault,** and **Marbach** relate to physiological monitoring systems which use artificial intelligence or multivariate techniques to improve their measurements. Indeed, such components and/or processes were conventional as of the time these references were known. Each of the Artificial Intelligence / Multivariate Techniques References provide means—not necessarily expressly present in all other references—for improving a system's decision-making and the SNR of a measured signal. A POSITA would have understood that the systems and methods for the Artificial Intelligence / Multivariate Techniques References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for incorporating the usage artificial intelligence and multivariate techniques into physiological measurement systems provide improvements such as improving the system's ability to effectively make decisions and make accurate measurements with minimal noise interference. *E.g.*, Tran, 5:57-65 ("For example, the system can perform patient behavior analysis such as eating/drinking/smoke habits and medication compliance, among others"). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement systems would commonly be combined with artificial intelligence and multivariate techniques, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of using known artificial intelligence models and multivariate calculation methods, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(vii) Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Arc References

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix D, with any one of Arc References all of which relate to systems and methods for physiological monitoring. Each of references **Isaacson**, **Jung**, and **LeBoeuf** relate to physiological monitoring systems with their light sources and/or detectors configured in an arc. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Arc References provide means—not necessarily expressly present in all other references—for configuring the detectors and/or emitters of a physiological measurement system in an arc formation. A POSITA would have understood that the systems and methods for Arc References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for configuring optical detectors and emitters in an arc formation would provide improvements such as increased measurement accuracy due to lessening the negative effects of light scattering and accounting for the contours of the tissue sample that is being measured. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement would commonly be combined detectors and emitters in an arc formation, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for varying the spatial configurations of emitters and detectors in wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

Furthermore, to the extent any limitation of an Asserted Claim is deemed not to be exactly disclosed by an item of prior art, then the claim is rendered obvious by combination of the prior art in Exhibits D1 through D19 standing alone, in combination with the reference(s) in any other claim chart, in combination with any system art identified in Table 2-D, in combination with Applicant's Admitted Prior Art, in view of the knowledge of a person of ordinary skill in the art, and/or in view of the Lens References, Light Intensity References, Three Wavelength References, Six LED References, Smartphone/Tablet References, Synchronize Light Source/Detector References, and/or Arc References for the reasons discussed above.

5. U.S. Patent No. 11,160,455

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix E the prior art references that render obvious the Asserted Claims of the '455 Patent and include below exemplary combinations showing the obviousness of the '455 Patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix E, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of ordinary skill in the art at the time of the '455 Patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix E, such reference may be combined with any other references listed in Appendix E for such element, thereby rendering the claims invalid for obviousness. To the extent a finder of fact determines that a limitation of any of the '455 Patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the '455 Patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according

to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a. Obviousness Rationale and Motivations to Combine

Obviousness: For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix E along with the knowledge of one of ordinary skill in the art to meet the limitations of the ’455 Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of the ’455 Patent obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Omni’s Asserted Claims. Defendants may rely upon a subset of the identified references or all of the references identified herein, including all references in Appendix E, for purposes of obviousness depending on the Court’s claim construction, positions taken by Omni during this litigation, and further investigation and discovery.

Reservation of Rights: Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art, including prior art systems that may anticipate and/or render obvious the Asserted Claims (e.g., System Art). As such, Defendants’ inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

No More Than Ordinary Variations of Prior Art; No Unexpected Results: To the extent not anticipated, the '455 Patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344 (Fed. Cir. 2017). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art references identified in Appendix E would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same

field or a different one. Further, the combinations of the prior art references identified in Appendix E would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the ’455 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix E is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in Appendix E because all of these

references relate to the same area of technology and/or are from analogous art. The ’455 Patent Asserted Claims are directed to a physiological measurement system. ’455 Patent at Abstract. The ’455 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the ’455 Patent Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine the above prior art based on his/her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the ’455 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to wearable devices measuring physiological parameters.

Demand and Market Forces: For example, market forces suggested a demand for wearable devices for measuring physiological parameters, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to solutions of that time.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicant in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to

solve a problem such as identified previously and/or described in the ’455 Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the ’455 Patent, there are a finite number of approaches for providing a wearable device for measuring physiological parameters. For example, as of the priority date of the ’455 Patent, a POSITA would have been very familiar with basic elements of the ’455 Patent’s claims such as semiconductors, optical wavelengths, lenses, signal-to-noise ratio, detectors, analog to digital converters, smart phones/tablets, cloud, and their configurations and/or means for the same. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the ’455 Patent’s claims does not render them novel or non-obvious.

There are significant similarities in subject matter and objectives for each of many references used in these contentions for the ’455 Patent.

Lens References: For example, charted reference **Carlson**, as well as numerous other references such as **LeBoeuf**, **Poeze**, **Pologe**, and **Valencell** all include teachings related to physiological measurement systems. These references provide numerous means and methods for using lenses to receive at least a portion of the output optical light and to deliver a lens output light to tissue, which were already well known in the art. For example, **Carlson** teaches using “a beam-shaping element, such as e.g. diffractive or refractive lenses, to direct the emitted optical radiation of, e.g., the LED light Source into the human or animal tissue and the photon detecting element in order to increase the optical signal power, detected by the pulsoximeter sensor, and thus increasing the Signal/Noise-and signal/Background ratio.” Carlson, [0014]; *see also* Carlson, [0024]; [0041], [0062], FIG. 6c. Fore example, **LeBoeuf** teaches “lenses 29L [] configured to focus inspection light 111 onto a particular region of the ear.” LeBoeuf, [0114]; *see also* LeBoeuf, [0011], [0019],

[0031], [0036], [0097], [0114], [0116] [0117], [0135], [0138], [0161], [0168]. For example, **Poeze** teaches "the device 112 includes an optional tissue thickness adjuster or tissue shaper 522, which can include one or more…lenses…." Poeze, [0102]. **Pologe** further teaches a "wavelength division multiplexing (WDM) coupler[]" using a lens to combine light signals from emitters into a "single multiplexed light signal on output cable 24." Pologe, 5:16-51. For example, **Valencell** teaches "optical lenses 715 [that] may be designed for the desired optical coupling between the skin/blood vessel region and the emitter 102 or detector 103." Valencell, [0118]; *see also* Valencell, [0016]-[0017], [0022]-[0023], [0038], [0119], [0121], [0124]-[0125], [0128]-[0131].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods provide the benefit of increasing the light intensity to increase signal-to-noise ratio, without increasing power usage. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Light Intensity References: For example, charted reference **Basu**, as well as numerous other references such as **Kassim**, **Lisogurski**, and **Valencell** all include teachings related physiological measurement systems. These references provide numerous methods for increasing the signal-to-noise ratio by increasing light intensity of at least one of the semiconductor sources from an initial light intensity. For example, **Basu** teaches "[t]o maximize the signal-to-noise ratio in photoplethysmography, the LED intensity should be made as large as possible without saturating the detector." Basu, [0058]. For example, **Kassim** teaches "the effects of ambient light

signals 30 can be reduced as much as possible by tuning the intensities of the IR and Red LEDs to be maximized as long as the detection assembly has not reached saturation." Kassim, 16:27-35. For example, **Lisogurski** discloses the "system may increase the brightness of the light sources in response to the noise to improve the signal-to-noise ratio." Lisogurski, 9:46-60. For example, **Valencell** teaches "the intensity of the optical emitter 102 may be increased to increase the ratio of physiological optical scatter 111 from blood vessels with respect to unwanted sunlight." Valencell, [0123].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods and systems provide the benefit of increasing a signal-to-noise ratio of the measure signal. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Three Wavelength References: For example, charted reference **Basu**, as well as numerous other references such as **Lisogurski**, **Lamego**, **LeBoeuf**, **Poeze**, and **Valencell** all include teachings related to physiological measurement systems. These references provide numerous methods for using three optical wavelengths for measuring at least a portion of the one or more of the physiological parameters and using one of said wavelengths to improve measurement of at least one of the one or more physiological parameters using the output signal corresponding to the other two optical wavelengths. For example, **Lisogurski** discloses that its light source "emit photonic signals having one or more wavelength of light" and "include any number of light sources with any suitable characteristics." Lisogurski, 10:48-60, 10:65-11:6,

17:17-39. For example, **Basu** teaches "three LEDs 14, 14′, and 15 may all emit different wavelengths. LEDs 15, and 14, for example, may emit light in the red and IR spectrum, respectively, while LED 14′ may emit light at a wavelength at which the presence of falsifying components can be detected." Basu, [0109]. For example, **Lamego** teaches a multiwavelength physiological monitor "utiliz[ing] at least three different wavelengths of light . . . to determine blood oxygen saturation," and that "adding wave lengths sensitive to additional significant absorbers can help the system compensate for the additional significant absorbers and enable more accurate calculation of the concentration of each absorber and the blood oxygen saturation." Lamego, [0033], [0035]; *see also* Lamego [0034], [0036]-[0037], [0041]. For example, **LeBoeuf** teaches"[t]he optical detectors 26 and emitters 24 may be of multiple wavelengths, with the goal of providing specialized physiological information for each wavelength. Referring to FIG. 19, for example, violet or UV light may be used to measure motion-related aspects of the ear, as violet and UV light may not penetrate greatly through the skin of the ear. Green, red, and IR wavelengths may have deeper penetration and provide information on the blood vessels and blood analyte levels. Blue wavelengths may be particularly useful for gauging changes in the size of the blood vessels." LeBoeuf, [0153]; *see also* LeBouef, [0163]. For example, **Poeze** teaches "the emitter 504 of the data collection device 112 can emit, in certain embodiments, combinations of optical radiation in various bands of interest. For example, in some embodiments, for analytes like glucose, the emitter 504 can emit optical radiation at three (3) or more wavelengths between about 1600 nm to about 1700 nm. In particular, the emitter 504 can emit optical radiation at or about 1610 nm, about 1640 nm, and about 1665 nm. In some circumstances, the use of three wavelengths within about 1600 nm to about 1700 nm enable sufficient SNRs of about 100 dB, which can result in a measurement accuracy of about 20 mg/dL or better for analytes like glucose." Poeze, [0109];

see also Poeze, [0108], [0110]-[0116]. For example, **Valencell** teaches "collecting light at different wavelengths, and processing these signals collectively, can be used to generate assessments of blood gas levels, such as blood oxygen (SpO2) and carbon dioxide (SpCO2), blood hemoglobin types and levels, or other blood constituents and their respective concentration levels. Multiple wavelengths may be generated by a signal multiwavelength optical emitter, multiple optical emitters, optically filtered optical emitters, or the like. In such case, multiple optical emitters 102 may be located between the two optical filters 715." Valencell, [0130].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods and systems provide the benefit of increased accuracy in measuring physiological parameters. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Six LED References: For example, charted reference **Lamego**, as well as numerous other references such as **LeBoeuf**, **Lisogurski**, and **Pologe** all include teachings related to physiological measurement systems. These references provide numerous means for utilizing a plurality of semiconductor sources comprising six light emitting diodes. For example, **Lamego** teaches a multiwavelength physiological monitor "includ[ing] . . . six . . . LEDs of different wavelengths," and that "adding wave lengths sensitive to additional significant absorbers can help the system compensate for the additional significant absorbers and enable more accurate calculation of the concentration of each absorber and the blood oxygen saturation." Lamego, [0041], [0035]; *see also* Lamego [0033]-[0034], [0036]-[0037]. For example, **LeBoeuf** teaches utilizing "multiple

light emitters… of different wavelengths." LeBoeuf, [0163]. For example, **Lisogurski** teaches "that light source 130 may include any number of light sources with any suitable characteristics," and that light source 130 ma include LEDs. Lisogurski, 10:42-11:8. For example, **Pologe** teaches a "main test unit 12 includes: an emitter module 18 having a plurality of emitters 20," and that the "emitters 20 may include…light emitting diodes (LEDs)." Pologe, 4:63-65, 5:16-20.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods and systems provide the benefit of increased accuracy in measuring physiological parameters. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Smartphone/Tablet References: For example, charted reference **Basu**, as well as numerous other references such as **Kassim**, **Kreger**, **Lisogurski**, **Tran**, all include teachings related to physiological measurement systems. These references provide numerous means for a physiological monitoring system to be configured for use with a smart phone or tablet. For example, **Basu** teaches "health ring 44 which can monitor heart rate on a 24 hour basis," and that "combines the sensor with a…wireless transmitter linked to an application running on the user's cell phone." Basu, [0065]-[0066]. For example, **Kassim** teaches "[t]he optical measurement device 300 further comprises a coupling member 316 that can provide coupling between the measurement device 300 to a personal mobile processing device/feedback unit (not shown) in a cableless configuration," and that "the feedback unit may be a portable device, such as a mobile phone, smartphone, personal digital assistant (PDA), tablet, netbook or laptop, although this list is

not exhaustive by any means." Kassim, 12:5-14. For example, **Kreger** teaches a "biosensor interface apparatus for use with a mobile communication device 10," that "can be any of a number of mobile phones such as an iPhone® or an Android® phone, a personal digital assistant (PDA) such as a Blackberry®, a portable audio playback device such as an MP3 player, a portable media playback device such as an iPod®, or a handheld tablet such as an iPad®." Kreger, 5:40-53; *see also* Kreger, 7:39-46. For example, **Lisogurski** teaches a "monitor [that] may be powered by a battery" with a "[u]ser interface [which] may include user input 182, display 184, and speaker 186. User input 182 may include any type of user input device such as a keyboard, a mouse, a touch screen, buttons, switches, a microphone, a joy stick, a touch pad, or any other suitable input device." Lisogurski, 15:19-23, 18:65-67. For example, **Mault** teaches a blood glucose monitoring system including an electronic device that "can be a portable electronic device or system carried by the person, or a device or system combining multiple functionalities, such as:…a portable computer; any portable Internet access device; [or] a wireless phone…." Mault [0069]-[0070]. For example, **Poeze** teaches "a personal health organizer software module 132 executed on a general purpose computing device 126, with the computing device 126 coupled with the health data collection device 112 via a communications link 128," where the "personal health organizer module 132 can be an executable program on an operating system of a device such as a mobile phone, a personal digital assistant, a portable music player, an electronic book reader, a netbook, a TV media center, and a laptop or desktop computer. For example, the personal health organizer module 132 can be an application that is executed on the operating system of a mobile phone such as the iPhone manufactured by Apple, Inc., a Blackberry device manufactured by Research In Motion, Inc., the Pre manufactured by Palm, Inc, or a mobile device manufactured by HTC, Nokia, or Motorola, etc." Poeze, [0034]; *see also* Poeze [0010]. **Tran** teaches that while a patient with a

wearable device is outside a mesh network range, "the wearable appliance communicates with the cell phone and provides information to the server 200 using the cellular connection." Tran, 34:4-30.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods and systems provide the benefit of more processing power and more convenient means to flag emergency situations. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Synchronize Light Source/Detector References: For example, charted reference **Carlson**, as well as numerous other references such as **Jung**, **Lamego**, **Lisogurski**, and **Poeze** all include teachings related to physiological measurement systems. These references provide numerous methods for utilizing a detection system that is configured to be synchronized to the light source. For example, **Carlson** teaches using "AC-Coupling or Lock-In Amplification (synchronous detection), is to temporarily modulate the optical radiation of the LED at the carrier frequency fc in order to shift the power spectrum of the pulsoximeter signals into a higher frequency range where environmental optical radiation is unlikely and electronic band pass filtering is technologically less stringent." Carlson, [0064]-[0065]; *see also* Carlson, [0011]-[0020], [0018]-[0020], [0027]. For example, **Jung** discloses a spectrometer system were "three monochrome sources, however, are turned on and off rapidly, synchronous with the spectral measurements being taken at, for example, a rate of 1000 Hz." Jung, 68:13-33. For example,

Lamego teaches a "digital-to-analog conversion circuit 338" that includes "a synchronizing latch 323" which "accepts the synchronizing pulses which maintain synchronization between the activation of emitters 302 and the analog to digital conversion circuit 332." Lamego, [0044]-[0045]; *see also* Lamego [0050]-[0051], [0069]. For example, **Lisogurski** teaches "light drive circuitry 120 may generate a light drive signal, which may be used to turn on and off the light source 130, based on the timing control signals. The front end processing circuitry 150 may use the timing control signals to operate synchronously with light drive circuitry 120." Lisogurski, 11:41-12:9; *see also* Lisogurski, 12:52-13:6 9 ("The peaks of detector current waveform 214 may be synchronous with light 'on' periods driving one or more emitters of a light source, such as light Source 130 of FIG. 1."). For example, **Poeze** teaches a "data collection device 112" including "a driver 520 that drives the emitter 504," wherein "[t]he driver 520 can be synchronized with other parts of the sensor 116 and can minimize or reduce jitter in the timing of pulses of optical radiation emitted from the emitter 504." Poeze, [0116]-[0117].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods and systems provide increased accuracy for monitoring physiological parameters. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Arc References: For example, charted reference **Isaacson**, as well as numerous other references such as **Jung**, and **LeBoeuf** all include teachings related to physiological measurement systems. These references provide numerous methods for utilizing a plurality of semiconductor

sources and the plurality of spatially separated detectors are located on one or more arcs. For example, **Isaacson** teaches emitters 10, 20 and detectors 12, 22 disposed on an arc. Isaacson, 4:64-5:9, Fig. 1. For example, **Jung** teaches "a fiber optic arrangement presented at the forward end of probe tip 1" which "utilizes a single central light source fiber optic…and a plurality of perimeter light receiver fiber optics, denoted as light receivers R1, R2 and R3." Jung, 11:21-50, Fig. 2; *see also* Jung 24:39-48, 24:39-62, 32:66-33:9, 39:41-40:14, Figs. 9, 10A-B, 20, 28A-B. For example, **LeBoeuf** teaches optical emitters 24 and optical detectors 26 configured in an arc. LeBoeuf, [0123]-[1024], Fig. 8B

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods provide the benefit of better acquisition of signals from the samples. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

b. Combinations

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix E with any other reference or references listed in Appendix E along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '455 Patent.

For example, and without limitation, the Asserted Claims of the '455 Patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

(i) <u>Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Lens References</u>

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix E, with any one of Lens References all of which relate to systems and methods for physiological monitoring. Each of references **Carlson**, **LeBoeuf**, **Poeze**, **Pologe**, and **Valencell** relate to physiological monitoring systems utilizing lenses. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Lens References provide means—not necessarily expressly present in all other references—for a wearable device comprising one or more lenses configured to receive at least a portion of the output optical light and to deliver a lens output light to tissue. A POSITA would have understood that the systems and methods for Lens References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for wearable device comprising one or more lenses configured to receive at least a portion of the output optical light and to deliver a lens output light to tissue provide improvements such as focusing output optical light to increase the intensity of the light transmitted to the wearer's tissue thereby reducing the light source's power consumption, reducing the detrimental effects of ambient light, reducing the loss of energy due to scattered light, and increasing signal-to-noise ratio. *E.g.*, Carlson, [0014] (lens system "increase[s] the optical signal power, detected by the pulsoximeter sensor, and thus increase[s] the Signal/Noise-and signal/Background ratio."); LeBoeuf, [0114] ("Lenses 29L are configured to focus inspection light 111 onto a particular region of the ear."). Valencell, [0017] ("The first lens focuses light emitted by the optical emitter…."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement systems would commonly be combined with lens systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of

including basic optical components, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(ii) Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Light Intensity References

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix E, with any one of Light Intensity References all of which relate to systems and methods for physiological monitoring. Each of references **Basu, Kassim**, **Lisogurski**, and **Valencell** relate to physiological monitoring systems that utilize increased light intensity of their emitters to increase signal-to-noise ratio of their detection signal. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Light Intensity References provide means—not necessarily expressly present in all other references—for improving signal-to-noise ratio by increasing the intensity of light sources. A POSITA would have understood that the systems and methods for Light Intensity References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for improving signal-to-noise ratio by increasing the intensity of light sources provide improvements such as increasing the accuracy of measured physiological parameters. *E.g.*, Basu, [0058] ("To maximize the signal-to-noise ratio in photoplethysmography, the LED intensity should be made as large as possible without saturating the detector."); Kassim, 16:27-35 ("[T]he effects of ambient light signals 30 can be reduced as much as possible by tuning the intensities of the IR and Red LEDs to be maximized as long as the detection assembly has not reached saturation."), Lisogurski 9:46-60 ("[S]ystem may increase the brightness of the light sources in response to the noise to improve the

signal-to-noise ratio."); Valencell, [0123] ("[T]he intensity of the optical emitter 102 may be increased to increase the ratio of physiological optical scatter 111 from blood vessels with respect to unwanted sunlight."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurements systems would commonly be combined with circuity coupled to light sources that allow for the control of the light source's parameters, such as light intensity, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of allowing for the variability of light source parameters to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iii) Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Three Wavelength References

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix E, with any one of Three Wavelength References all of which relate to systems and methods for physiological monitoring. Each of references **Basu**, **Lamego**, **LeBoeuf**, **Poeze**, and **Valencell** relate to physiological monitoring systems utilizing three wavelengths and using one of said wavelengths to improve measurement of at least one of the one or more physiological parameters using the output signal corresponding to the other two optical wavelengths. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Three Wavelength References provide means—not necessarily expressly present in all other references—for using three optical wavelengths for measuring at least a portion of the one or more of the physiological parameters or using one of said wavelengths to improve measurement of at

least one of the one or more physiological parameters using the output signal corresponding to the other two optical wavelengths. A POSITA would have understood that the systems and methods for Three Wavelength References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for utilizing three optical wavelengths provide improvements such as the ability to target different physiological absorbers according to their wavelength sensitivity and therefore providing for more accurate measurements. *E.g.*, Basu, [0109] ("It is known that certain factors may render pulse oximetry unreliable because the presence of other components (e.g. methemoglobin or carboxyhemoglobin) in the blood may mimic the absorption of oxyhemoglobin at the IR LED frequency so that the reading is falsified. Such errors can be minimized by adding a third LED emitting light of a wavelength at which the component shows a different behavior than oxyhemoglobin and reduced hemoglobin."); Lamego, [0035] ("[A]dding wave lengths sensitive to additional significant absorbers can help the system compensate for the additional significant absorbers and enable more accurate calculation of the concentration of each absorber and the blood oxygen saturation."); Poeze, [0109] ("[T]he use of three wavelengths within about 1600 nm to about 1700 nm enable sufficient SNRs of about 100 dB, which can result in a measurement accuracy of about 20 mg/dL or better for analytes like glucose."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for multiwavelength emitters would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of the variability of light source parameters, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to

try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iv) Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Six LED References

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix E, with any one of Six LED References all of which relate to systems and methods for physiological monitoring. Each of references **Lamego**, **LeBoeuf**, **Lisogurski**, and **Pologe** relate to physiological monitoring systems using multiple LEDs as emitters. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Six LED References provide means—not necessarily expressly present in all other references—for utilizing six LED optical emitters in a light source. A POSITA would have understood that the systems and methods for Six LED References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for utilizing six LEDs provide improvements such as the ability to target different physiological absorbers according to their wavelength sensitivity and therefore providing for more accurate measurements, increasing intensity of optical output light, and reducing the detrimental effects on ambient light. *E.g.*, Lamego, [0035] ("[A]dding wave lengths sensitive to additional significant absorbers can help the system compensate for the additional significant absorbers and enable more accurate calculation of the concentration of each absorber and the blood oxygen saturation."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical physiological measurement would commonly be combined with multiple LED emitters and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for increasing the number of optical emitters in a light

to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(v) Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Smartphone/Tablet References

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix E, with any one of Smartphone/Tablet References all of which relate to systems and methods for physiological monitoring. Each of references **Basu**, **Kassim**, **Kreger**, **Lisogurski**, **Mault**, **Poeze**, and **Tran** relate to physiological monitoring systems for use with a smartphone or tablet. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Smartphone/Tablet References provide means—not necessarily expressly present in all other references—for a physiological monitoring system to communicate with a smartphone or tablet. A POSITA would have understood that the systems and methods for Smartphone/Tablet References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for connectivity to smartphones or tablets provide improvements improving the analysis capabilities of measurement systems due to the increased processing power of smartphones and tablets and the additional resources provided by their ability to connect to wireless and cell networks. *E.g.*, Basu, [0066] (physiological monitoring system "combines the sensor with a…wireless transmitter linked to an application running on the user's cell phone."); Kreger, 13:1-3 ("Mobile device smart phone 444 may derive measurements, display plots, transmit medical records of biosensor data, and so forth."); Tran, 34:4-40 ("If the wearable appliance detects a cellphone that is mesh network compatible, the wearable appliance

communicates with the cell phone and provides information to the server 200 using the cellular connection."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical physiological measurement would commonly be combined with smartphone and personal computing technology and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of providing for connectivity to smartphone or personal computing devices in wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

References Lisogurski and Basu Combined with Synchronize Light Source/Detector References

A POSITA would have had reason to combine references **Lisogurski** or **Basu**, or any of the references in Appendix E, with any one of Synchronize Light Source/Detector References all of which relate to systems and methods for physiological monitoring. Each of references **Carlson**, **Jung**, **Lamego**, **Lisogurski**, and **Poeze** relate to physiological monitoring systems that synchronize their detection systems to the their light sources. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Synchronize Light Source/Detector References provide means—not necessarily expressly present in all other references—for synchronizing the sampling of a detector to the output of a light source. A POSITA would have understood that the systems and methods for Synchronize Light Source/Detector References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for synchronizing the sampling of a detector to the output of a light source provide improvements such as increased measurement accuracy. *E.g.*, Carlson, [0065] ("AC-Coupling or Lock-In Amplification (synchronous

detection), is to temporarily modulate the optical radiation of the LED at the carrier frequency fc in order to shift the power spectrum of the pulsoximeter signals into a higher frequency range where environmental optical radiation is unlikely and electronic band pass filtering is technologically less stringent."); Lamego, [0045] ("[D]river circuit," including "synchronizing latch 323 [that] accepts the synchronizing pulses which maintain synchronization between the activation of emitters 302 and the analog to digital conversion circuit 332" "is designed to minimize the noise from the emitters 302."); Poeze, [0117] ("The driver 520 can be synchronized with other parts of the sensor 116 and can minimize or reduce jitter in the timing of pulses of optical radiation emitted from the emitter 504."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement would commonly be combined with detector and light source synchronization, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for varying the collection parameters of a detection system and the output parameters of light source in wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(vi) <u>Lisogurski, Kassim, Chandrasekar2012, Valencell, Mault, and Basu Combined with Arc References</u>

A POSITA would have had reason to combine references **Lisogurski**, **Kassim**, **Chandrasekar2012**, **Valencell**, **Mault**, or **Basu**, or any of the references in Appendix E, with any one of Arc References all of which relate to systems and methods for physiological monitoring. Each of references **Isaacson**, **Jung**, and **LeBoeuf** relate to physiological monitoring systems with their light sources and/or detectors configured in an arc. Indeed, such components and/or

processes were conventional as of the time these references were known. Each of Arc References provide means—not necessarily expressly present in all other references—for configuring the detectors and/or emitters of a physiological measurement system in an arc formation. A POSITA would have understood that the systems and methods for Arc References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for configuring optical detectors and emitters in an arc formation would provide improvements such as increased measurement accuracy due to lessening the negative effects of light scattering and accounting for the contours of the tissue sample that is being measured. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement would commonly be combined detectors and emitters in an arc formation, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for varying the spatial configurations of emitters and detectors in wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

Furthermore, to the extent any limitation of an Asserted Claim is deemed not to be exactly disclosed by an item of prior art, then the claim is rendered obvious by combination of the prior art in Exhibits E1 through E18 standing alone, in combination with the reference(s) in any other claim chart, in combination with any system art identified in Table 2-E, in combination with Applicant's Admitted Prior Art, in view of the knowledge of a person of ordinary skill in the art, and/or in view of the Lens References, Light Intensity References, Three Wavelength References, Six LED References, Smartphone/Tablet References, Synchronize Light Source/Detector

References, and/or Arc References for the reasons discussed above.

6. U.S. Patent No. 12,193,790

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix F the prior art references that render obvious the Asserted Claims of the ’790 Patent and include below exemplary combinations showing the obviousness of the ’790 Patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix F, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of ordinary skill in the art at the time of the ’790 Patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix F, such reference may be combined with any other references listed in Appendix F for such element, thereby rendering the claims invalid for obviousness. To the extent a finder of fact determines that a limitation of any of the ’790 Patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the ’790 Patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a. Obviousness Rationale and Motivations to Combine

Obviousness: For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix F along with the knowledge of one of ordinary skill in the art to meet the limitations of the ’790 Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of

the ’790 Patent obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Omni’s Asserted Claims. Defendants may rely upon a subset of the identified references or all of the references identified herein, including all references in Appendix F, for purposes of obviousness depending on the Court’s claim construction, positions taken by Omni during this litigation, and further investigation and discovery.

Reservation of Rights: Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art. As such, Defendants’ inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

No More Than Ordinary Variations of Prior Art; No Unexpected Results: To the extent not anticipated, the ’790 Patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit’s “rigid” application of the teaching, suggestion, or motivation to combine test, instead espousing an “expansive and flexible” approach); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344 (Fed. Cir. 2017).

Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art references identified in Appendix F would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix F would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '790 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix F is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in Appendix F because all of these references relate to the same area of technology and/or are from analogous art. The ’790 Patent Asserted Claims are directed to “An optical system comprises a wearable device for measuring one or more physiological parameters.” ’790 Patent at Abstract. The ’790 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the ’790 Patent Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine

the above prior art based on his/her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the ’790 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to wearable devices measuring physiological parameters.

Demand and Market Forces: For example, market forces suggested a demand for wearable devices measuring physiological parameters, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to solutions of that time.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicant in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the ’790 Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the ’790 Patent, there are a finite number of approaches for providing a wearable device for measuring physiological parameters. For example, as of the priority date of the ’790 Patent, a POSITA would have been very familiar with basic elements of the ’790 Patent’s claims such as semiconductors diodes, optical wavelengths, lenses, signal-to-noise ratio, detectors, and analog to digital convertors. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the ’790 Patent’s claims does not render them

novel or non-obvious.

There are significant similarities in subject matter and objectives for each of many references used in these contentions for the ’790 Patent.

References disclosing lenses: For example, charted reference Carlson, Poeze, and Soller, as well as numerous other references such as LeBoeuf and Park, all include teachings related to using one or more lenses configured to receive a portion of at least one of the output optical lights and to direct a lens output light to tissue. These references provide numerous methods for using lenses to direct an optical output beam. For example, Carlson teaches “us[ing] a beam-shaping element, such as e.g. diffractive or refractive lenses, to direct the emitted optical radiation of, e.g., the LED light source into the human or animal tissue and the photon detecting element in order to increase the optical signal power, detected by the pulsoximeter sensor, and thus increasing the Signal/Noise—and signal/Background ratio. The increase of the S/B ratio is estimated e.g. to a factor 5.” Carlson at [0014]. Poeze teaches “[using] a lens which collects attenuated light exiting the measurement site and focuses onto one or more detectors. The protrusion can advantageously include plastic, including a hard opaque plastic, such as a black or other colored plastic, helpful in reducing light noise.” Poeze at 7:52-8:7. Soller teaches “a variety of different collimating elements 56 can be used in sensor 10. Exemplary collimating elements include fiber faceplates (e.g., fiber optic windows), collimating hole devices, gradient index (GRIN) lenses, fiber bundles, lens arrays, optical windows (including shaped optical windows), and other similar devices.” Soller at 18:37-56.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with using lenses to direct an optical output beam. These methods are known to be effective in directing an optical output beam

using known lens structures. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of directing an optical output beam.

References disclosing techniques for increasing signal-to-noise ratio: For example, charted reference Basu, Lisogurski, and Carlson, as well as numerous other references such as LeBoeuf and Park, all include teachings related to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. These references provide numerous methods for increasing a light intensity and increasing a pulse rate of an LED. For example, Basu teaches that "[t]o maximize the signal-to-noise ratio in photoplethysmography, the LED intensity should be made as large as possible without saturating the detector. In the OPS 10, the LED intensity and modulation frequencies are programmable through the serial interface. In the case of the Vishay VCNL4000, the intensity is programmable from 10-200 mA in 10 mA increments." Basu at [0058]. Lisogurski teaches "that modulation of the light drive signal . . . may include modulation of parameters including drive current or light brightness, duty cycle, firing rate, modulation parameters, other suitable parameters, or any combination thereof" and that "[t]he system may increase the brightness of the light sources in response to the noise to improve the signal-to-noise ratio." Lisogurski at 27:44-55, 9:46-60. Carlson teaches that the "frequency is chosen in such a way that it is outside the frequency spectrum of sunlight and of ambient light which, according to FIG. 7b, is in the range of above approximately 1000 Hz. Thus, the pulsoximeter signals are readily discriminated from electronic and parasitic contributions of environmental optical radiation outside the frequency fc+/−5 Hz increasing significantly the Signal-to-Noise and Signal-to-Background ratio." Carlson at [0069].

LeBoeuf teaches that "the intensity of the optical emitter 102 may be increased to increase the ratio of physiological optical scatter 111 from blood vessels with respect to unwanted sunlight" and that "it is important to consider the emitter pulsing frequency and sampling approach" because "choosing a frequency that is too low may result in unsatisfactory subtraction." LeBoeuf at [0123], [0139]. Park teaches that "the light source intensity may be increased to maintain the output signal from the light detector within a desired range of output values." Park at 16:8-20.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with improving signal-to-noise ratio in optical measurement systems. These methods are known to be effective in improving the signal-to-noise ratio for such systems, and merely modulate the functioning of the existing LEDs in each system. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of improving signal-to-noise ratio.

References disclosing an analog to digital converter: For example, charted reference Basu, Goodman, Lisogurski, Rulkov, Moon, Poeze, Chandrasekar, Al-Ali, Kreger, and Sakai all include teachings related to an analog to digital converter. These references provide numerous methods for using an analog to digital converter coupled to a detector. For example, Basu discloses "a digital interface for communication with a microcontroller." Basu at [0007]. Goodman discloses "On board analog-to-digital converter A/D 44 (10 bit, 5 channel input) is used to convert the conditioned PPG signals at B and B′ into time sampled digital signals which are then provided to processing device 14. Goodman at 11:66-12:21. Lisogurski discloses a "[f]ront end processing circuitry 150 may perform various analog and digital processing of the detector signal." Lisogurski

at 12:42-51. Rulkov discloses that "The microprocessor741 has a LED control715 connected to DAC702 for controlling the intensity of the LEDs737. The signal from the photodetector736 is transmitted to a high pass filter (HPF) 703 which sends it to an analog to digital converter704, and the signal from the photodetector737 is also sent directly to a second analog to digital converter704." Rulkov at 11:39-60. Moon discloses that "[a] filter removes any high-frequency noise (e.g. 60 Hz electrical noise) that is not related to the PPG waveform, and yields a preliminary waveform that is digitized with an analog-to-digital converter 176, and processed as described above to generate a DC portion of the PPG." Moon at [0091]. Poeze discloses "[f]ront-end interfaces 108 may be implemented using transimpedance amplifiers that are coupled to analog to digital converters in a sigma delta converter." Poeze at 40:15-27. Chandrasekar discloses "In principle, PPGs are considered simple devices; however, in practice, implementation requires a careful design involving optics (multiple paths, alignments, leakage barriers) and mixed signal electronics (transimpedance amplifiers, analog digital conversion, drivers, modulators, filters)." Chandrasekar at 1. Kreger discloses "Biosensor signals may also be received by one or more RF receivers in the dock 246 (not shown) and communicated to the mobile 212 via wired electrical connector 246, for example, to allow the wireless sensor to utilize the features of the wired audio input's anti-alias filters and analog to digital converter as will be explained in detail below." Kreger at 10:14-28. Sakai discloses "A/D converter 2013 d which converts a voltage value of analog signal into 10-bit digital value." Al-Ali discloses "As shown in FIG. 2, the processor board 250 includes a front end signal conditioner 252, an analog-to-digital (A/D) converter 253, a digital signal processor (DSP) 258, a memory reader 256, emitter drivers 254 and digital-to-analog (D/A) converters 255." Al-Ai at [0045].

A person of skill in the art would understand that the functionality taught in these references

could be added to other methods and systems that are concerned with incorporating an analog to digital converter into optical measurement systems. These methods are known to be effective in incorporating an analog to digital converter into such systems. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of signal processing.

References disclosing spatially separated detectors: For example, charted references Lisogurski, Poeze, Soller, and Terumoto, all include teachings related to using detectors that are spatially separated. These references provide numerous methods for using light detectors. For example, Lisogurski teaches that "[o]ne or more detector 318 may also be provided in sensor unit 312 for detecting the light that is reflected by or has traveled through the subject's tissue. Any suitable configuration of light source 316 and detector 318 may be used. In an embodiment, sensor unit 312 may include multiple light sources and detectors, which may be spaced apart." Lisogurski at 17:35-45. Poeze discloses that "multiple detectors are employed and arranged in a spatial geometry. This spatial geometry provides a diversity of path lengths among at least some of the detectors and allows for multiple bulk and pulsatile measurements that are robust." Poeze at 9:18-27. Soller discloses "a plurality of spectral detectors attached to the circuit board, each spectral detector being configured to analyze radiation derived from the radiation source" and depicts the detectors as spatially separated. Soller at 3:16-27; Fig. 34. Terumoto discloses "[t]he light sensor portions 101-1 to 101-n are located equally spaced from one another and to go round the armlet type housing 107 same as the fourth to sixth implementations." Terumoto at [0152].

A person of skill in the art would understand that the functionality taught in these references

could be added to other methods and systems that detect light. These methods provide using detectors that are spatially separated. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of measuring physiological parameters.

References disclosing detection system is synchronized to the light source: For example, charted reference Lisogurski, Carlson, Poeze, Kreger, and Sakai all include teachings related to detection system is synchronized to the light source. These references provide numerous methods for synchronizing detection system with the light source. For example, Lisogurski discloses "he front end processing circuitry 150 may use the timing control signals to operate synchronously with light drive circuitry 120. For example, front end processing circuitry 150 may synchronize the operation of an analog-to-digital converter and a demultiplexer with the light drive signal based on the timing control signals." Lisogurski at 11:33-49. Carlson discloses "[t]he basic idea of using AC-Coupling or Lock-In Amplification (synchronous detection), is to temporarily modulate the optical radiation of the LED at the carrier frequency fc in order to shift the power spectrum of the pulsoximeter signals into a higher frequency range where environmental optical radiation is unlikely and electronic band pass filtering is technologically less stringent. AC-Coupling or Lock-In Amplification is well known out of the state of the art and is described in literature 3." Carlson at [0065]. Poeze teaches that "[a] control signal can be useful in order to synchronize, minimize, or reduce jitter in the timing of pulses emitted from the emitter 104. Accordingly, this control signal can be useful in order to cause optical radiation pulses emitted from the emitter 104 to follow a precise timing and consistent pattern." Poeze at 15:27-48. Kreger

discloses “Thus, it is another object to provide compatible signals to the mobile's electrical connectors which may involve transforming the biosensor signals to match requisite impedance and signal levels, eliminate noise, cancel DC noise and drift, demultiplex or multiplex multiple measurements, provide electrical isolation, serialization, synchronization, and so forth.” Kreger at 3:17-23. Sakai discloses “he A/D converter 14 operates in synchronization with the light emission timing of the driver 12, to thereby convert the pulse wave detection signal detected upon light emission from the green LED 11 a and the body motion detection signal detected upon light emission from the infrared LED 11 b into digital data, and provides these digital data, as biological information, to the information processor 20.” Sakai at 5:66-6:9.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with measuring physiological parameters. These methods are known to be effective in incorporating synchronizing detection system with the light source. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of signal processing.

b. Combinations

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix C with any other reference or references listed in Appendix C along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the ’790 Patent.

For example, and without limitation, the Asserted Claims of the ’790 Patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

(i) Rulkov, Basu, Goodman, Chandersekar, Kassim, Lisogurski, Moon, Terumoto, Al-Ali, Kreger, and Sakai combined with References disclosing lenses

A POSITA would have had reason to combine references Rulkov, Basu, Goodman, Kassim, Lisogurski, Moon, Terumoto, Al-Ali, Kreger, and Sakai with any one of References disclosing lenses, all of which relate to systems and methods for using lenses to direct an optical output beam. Each of References disclosing lenses relate to using one or more lenses configured to receive a portion of at least one of the output optical lights and to direct a lens output light to tissue. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing lenses provide means—not necessarily expressly present in all other references—for using lenses to direct an optical output beam. A POSITA would have understood that the systems and methods for References disclosing lenses were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using lenses provide improvements such as disrecting the light to tissue. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for using lenses to direct an optical output beam would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using lenses to direct an optical output beam, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(ii) Kassim, Rulkov, Goodman, Moon, Chandersekar, Poeze, Soller, Terumoto, Al-Ali, Kreger, and Sakai combined with References disclosing techniques for increasing signal-to-

noise ratio

A POSITA would have had reason to combine Kassim, Rulkov, Goodman, Moon, Poeze, Soller, Terumoto, Al-Ali, Kreger, and Sakai with any one of References disclosing techniques for increasing signal-to-noise ratio, all of which relate to systems and methods for increasing a light intensity and increasing a pulse rate of an LED. Each of References disclosing techniques for increasing signal-to-noise ratio relate to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing techniques for increasing signal-to-noise ratio provide means—not necessarily expressly present in all other references—for increasing signal-to-noise ratio relate to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. A POSITA would have understood that the systems and methods for References disclosing techniques for increasing signal-to-noise ratio were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for increasing a light intensity and increasing a pulse rate of an LED provide improvements such as increasing signal-to-noise ratio. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for increasing signal-to-noise ratio would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for increasing signal-to-noise ratio, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iii) Carlson, Kassim, Soller, Chandersekar, and Terumoto combined with References disclosing an analog to digital converter

A POSITA would have had reason to combine references Carlson, Kassim, Soller, and Terumoto with any one of References disclosing an analog to digital converter, all of which relate to systems and methods for using an analog to digital converter coupled to a detector. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing an analog to digital converter provide means—not necessarily expressly present in all other references—for using an analog to digital converter coupled to a detector. A POSITA would have understood that the systems and methods for References disclosing an analog to digital converter were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using an analog to digital converter provide improvements such as ability to process a signal digitally. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for using an analog to digital converter would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using an analog to digital converter, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iv) Carlson, Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon, Al-Ali, Kreger, and Sakai combined with References disclosing spatially separated detectors

A POSITA would have had reason to combine references Carlson, Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon, Al-Ali, Kreger, and Sakai with any one of References disclosing

spatially separated detectors all of which relate to systems and methods for using spatially separated detectors. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing spatially separated detectors provide means—not necessarily expressly present in all other references—for using spatially separated detectors. A POSITA would have understood that the systems and methods for References disclosing spatially separated detectors were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for spatially separated detectors provide improvements such as improved detection quality. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological parameters would commonly be combined with spatially separated detectors, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using spatially separated detectors, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(v) <u>Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon, Soller, Terumoto, and Al-Ali combined with References disclosing detection system is synchronized to the light source</u>

A POSITA would have had reason to combine references Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon, Soller, Terumoto, and Al-Ali with any one of References disclosing detection system is synchronized to the light source, all of which relate to systems and methods for synchronizing a detection system with a light source. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References

disclosing detection system is synchronized to the light source provide means—not necessarily expressly present in all other references—for synchronizing a detection system with a light source. A POSITA would have understood that the systems and methods for References disclosing detection system is synchronized to the light source were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for synchronizing a detection system with a light source provide improvements such as improved detection. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological parameters would commonly be combined with techniques for synchronizing a detection system with a light source, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for synchronizing a detection system with a light source, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

Furthermore, to the extent any limitation of an Asserted Claim is deemed not to be exactly disclosed by an item of prior art, then the claim is rendered obvious by combination of the prior art in Exhibits F1 through F14 standing alone, in combination with the reference(s) in any other claim chart, in combination with any system art identified in Table 2-F, in combination with Applicant's Admitted Prior Art, in view of the knowledge of a person of ordinary skill in the art, and/or in view of the References disclosing lenses, References disclosing techniques for increasing signal-to-noise ratio, References disclosing an analog to digital converter, References disclosing spatially separated detectors, References disclosing detection system is synchronized to the light source, for the reasons discussed above.

7. U.S. Patent No. 12,268,475

Pursuant to P.R. 3-3(a) and (b), Defendants identify in Appendix G the prior art references that render obvious the Asserted Claims of the ’475 Patent and include below exemplary combinations showing the obviousness of the ’475 Patent Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix G, the limitation would have been obvious in light of the disclosures within the reference and the knowledge of one of ordinary skill in the art at the time of the ’475 Patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix G, such reference may be combined with any other references listed in Appendix G for such element, thereby rendering the claims invalid for obviousness. To the extent a finder of fact determines that a limitation of any of the ’475 Patent Asserted Claims is not disclosed by one of the references identified above pursuant to P.R. 3-3(a), the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the ’475 Patent Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

a. Obviousness Rationale and Motivations to Combine

Obviousness: For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix G along with the knowledge of one of ordinary skill in the art to meet the limitations of the ’475 Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of the ’475 Patent obvious when the references are read in combination with each other, and/or when

read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Omni's Asserted Claims. Defendants may rely upon a subset of the identified references or all of the references identified herein, including all references in Appendix G, for purposes of obviousness depending on the Court's claim construction, positions taken by Omni during this litigation, and further investigation and discovery.

Reservation of Rights: Moreover, as mentioned above, Defendants have not yet completed their search or discovery concerning additional prior art, including prior art systems that may anticipate and/or render obvious the Asserted Claims (e.g., System Art). As such, Defendants' inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendants reserve the right to identify additional specific combinations as well as to detail and explain such combinations.

No More Than Ordinary Variations of Prior Art; No Unexpected Results: To the extent not anticipated, the '475 Patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendants further believe that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344 (Fed. Cir. 2017).

Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendants identify motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art references identified in Appendix G would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix G would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '475 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix G is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in Appendix G because all of these references relate to the same area of technology and/or are from analogous art. The ’475 Patent Asserted Claims are directed to “[a] wearable device to measure a user’s physiological parameters.” ’475 Patent at Abstract. The ’475 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the ’475 Patent Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine

the above prior art based on his/her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the ’475 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to wearable devices measuring physiological parameters.

Demand and Market Forces: For example, market forces suggested a demand for wearable devices measuring physiological parameters, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to solutions of that time.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicant in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the ’475 Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the ’475 Patent, there are a finite number of approaches for providing a wearable device for measuring physiological parameters. For example, as of the priority date of the ’475 Patent, a POSITA would have been very familiar with basic elements of the ’475 Patent’s claims such as biosensors, semiconductors, light emitting diodes, optical wavelengths, lenses, signal-to-noise ratio, detectors, processors, and analog to digital convertors. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the ’475 Patent’s

claims does not render them novel or non-obvious.

There are significant similarities in subject matter and objectives for each of many references used in these contentions for the ’475 Patent.

References disclosing lenses: For example, charted references Carlson, Poeze, LeBoeuf, Basu and Soller, as well as numerous other references, all include teachings related to using one or more lenses configured to receive a portion of at least one of the output optical lights and to direct a lens output light to tissue comprising skin. These references provide numerous methods for using lenses to direct an optical output beam. For example, Carlson teaches “us[ing] a beam-shaping element, such as e.g. diffractive or refractive lenses, to direct the emitted optical radiation of, e.g., the LED light source into the human or animal tissue and the photon detecting element in order to increase the optical signal power, detected by the pulsoximeter sensor, and thus increasing the Signal/Noise—and signal/Background ratio. The increase of the S/B ratio is estimated e.g. to a factor 5.” Carlson at [0014]. Poeze teaches “[using] a lens which collects attenuated light exiting the measurement site and focuses onto one or more detectors. The protrusion can advantageously include plastic, including a hard opaque plastic, such as a black or other colored plastic, helpful in reducing light noise.” Poeze at 7:52-8:7. LeBoeuf teaches that “the at least one sensor module include a lens positioned above at least one of the optical emitter and filter. The lens may include respective first and second portions configured to matingly engage respective first and second apertures in the light-opaque material.” LeBoeuf at [0022]. Basu teaches that “[e]ach of the LEDs is separated from the photo detector by an optical barrier.” Basu at [0087]. Soller teaches “a variety of different collimating elements 56 can be used in sensor 10. Exemplary collimating elements include fiber faceplates (e.g., fiber optic windows), collimating hole devices, gradient index (GRIN) lenses, fiber bundles, lens arrays, optical windows (including shaped optical windows),

and other similar devices." Soller at 18:37-56.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with using lenses to direct an optical output beam. These methods are known to be effective in directing an optical output beam using known lens structures. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of directing an optical output beam.

References disclosing techniques for increasing signal-to-noise ratio: For example, charted reference Basu, Lisogurski, LeBeouf, Tran, Kassim, and Carlson, as well as numerous other references, all include teachings related to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. These references provide numerous methods for increasing a light intensity and increasing a pulse rate of an LED. For example, Basu teaches that "[t]o maximize the signal-to-noise ratio in photoplethysmography, the LED intensity should be made as large as possible without saturating the detector. In the OPS 10, the LED intensity and modulation frequencies are programmable through the serial interface. In the case of the Vishay VCNL4000, the intensity is programmable from 10-200 mA in 10 mA increments." Basu at [0058]. Lisogurski teaches "that modulation of the light drive signal . . . may include modulation of parameters including drive current or light brightness, duty cycle, firing rate, modulation parameters, other suitable parameters, or any combination thereof" and that "[t]he system may increase the brightness of the light sources in response to the noise to improve the signal-to-noise ratio." Lisogurski at 27:44-55, 9:46-60. Carlson teaches that the "frequency is chosen in such a way that it is outside the frequency

spectrum of sunlight and of ambient light which, according to FIG. 7b, is in the range of above approximately 1000 Hz. Thus, the pulsoximeter signals are readily discriminated from electronic and parasitic contributions of environmental optical radiation outside the frequency fc+/−5 Hz increasing significantly the Signal-to-Noise and Signal-to-Background ratio." Carlson at [0069]. LeBoeuf teaches that "the intensity of the optical emitter 102 may be increased to increase the ratio of physiological optical scatter 111 from blood vessels with respect to unwanted sunlight" and that "it is important to consider the emitter pulsing frequency and sampling approach" because "choosing a frequency that is too low may result in unsatisfactory subtraction." LeBoeuf at [0123], [0139]. Tran teaches obtaining "differential measurement[s]" by processing "electrode output signals" from a patient, thereby "enhancing the signal to noise ratio." Tran at 37:28–29. Kassim teaches the "removal of ambient noise signal from an optical measurement." Kassim, 23:11-21.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with improving signal-to-noise ratio in optical measurement systems. These methods are known to be effective in improving the signal-to-noise ratio for such systems, and merely modulate the functioning of the existing LEDs in each system. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of improving signal-to-noise ratio.

References disclosing an analog to digital converter: For example, charted reference Basu, Goodman, Lisogurski, Rulkov, Moon, Poeze, Addison-788, and Al-Ali all include teachings related to an analog to digital converter. These references provide numerous methods for using an analog to digital converter coupled to a detector. For example, Basu discloses "a digital interface

for communication with a microcontroller." Basu at [0007]. Goodman discloses "On board analog-to-digital converter A/D 44 (10 bit, 5 channel input) is used to convert the conditioned PPG signals at B and B′ into time sampled digital signals which are then provided to processing device 14. Goodman at 11:66-12:21. Lisogurski discloses a "[f]ront end processing circuitry 150 may perform various analog and digital processing of the detector signal." Lisogurski at 12:42-51. Rulkov discloses that "The microprocessor741 has a LED control715 connected to DAC702 for controlling the intensity of the LEDs737. The signal from the photodetector736 is transmitted to a high pass filter (HPF) 703 which sends it to an analog to digital converter704, and the signal from the photodetector737 is also sent directly to a second analog to digital converter704." Rulkov at 11:39-60. Moon discloses that "[a] filter removes any high-frequency noise (e.g. 60 Hz electrical noise) that is not related to the PPG waveform, and yields a preliminary waveform that is digitized with an analog-to-digital converter 176, and processed as described above to generate a DC portion of the PPG." Moon at [0091]. Poeze discloses "[f]ront-end interfaces 108 may be implemented using transimpedance amplifiers that are coupled to analog to digital converters in a sigma delta converter." Poeze at 40:15-27. Addison-788 teaches that the "processing equipment may be configured to amplify, filter, sample, and digitize input signal 416, (e.g., using an analog-to-digital converter), and calculate physiological information from the digitized signal." Addison-788 at 17:7–12. Ali-Ali teaches that a "processor board 250 includes . . . an analog-to-digital (A/D) converter 253." Al-Ali at [0045].

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with incorporating an analog to digital converter into optical measurement systems. These methods are known to be effective in incorporating an analog to digital converter into such systems. Moreover, to the extent that any of

these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of signal processing.

References disclosing spatially separated detectors: For example, charted references Lisogurski, Poeze, Soller, Terumoto, and Tran all include teachings related to using detectors that are spatially separated. These references provide numerous methods for using light detectors. For example, Lisogurski teaches that "[o]ne or more detector 318 may also be provided in sensor unit 312 for detecting the light that is reflected by or has traveled through the subject's tissue. Any suitable configuration of light source 316 and detector 318 may be used. In an embodiment, sensor unit 312 may include multiple light sources and detectors, which may be spaced apart." Lisogurski at 17:35-45. Poeze discloses that "multiple detectors are employed and arranged in a spatial geometry. This spatial geometry provides a diversity of path lengths among at least some of the detectors and allows for multiple bulk and pulsatile measurements that are robust." Poeze at 9:18-27. Soller discloses "a plurality of spectral detectors attached to the circuit board, each spectral detector being configured to analyze radiation derived from the radiation source" and depicts the detectors as spatially separated. Soller at 3:16-27; Fig. 34. Terumoto discloses "[t]he light sensor portions 101-1 to 101-n are located equally spaced from one another and to go round the armlet type housing 107 same as the fourth to sixth implementations." Terumoto at [0152]. Tran discloses "[t]he electrode array sensor can be a geometric array of discrete electrodes having an equally-spaced geometry of multiple nodes that are capable of functioning as sense and reference electrodes. In a typical tomography application the electrodes are equally-spaced in a circular configuration. Alternatively, the electrodes can have non-equal spacing and/or can be in

rectangular or other configurations in one circuit or multiple circuits." Tran at 50:61-51:8.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that detect light. These methods provide using detectors that are spatially separated. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of measuring physiological parameters.

References disclosing detection system is synchronized to the light source: For example, charted reference Lisogurski, Carlson, Addison-788, and Poeze all include teachings related to detection system is synchronized to the light source. These references provide numerous methods for synchronizing detection system with the light source. For example, Lisogurski discloses "the front end processing circuitry 150 may use the timing control signals to operate synchronously with light drive circuitry 120. For example, front end processing circuitry 150 may synchronize the operation of an analog-to-digital converter and a demultiplexer with the light drive signal based on the timing control signals." Lisogurski at 11:33-49. Carlson discloses "[t]he basic idea of using AC-Coupling or Lock-In Amplification (synchronous detection), is to temporarily modulate the optical radiation of the LED at the carrier frequency fc in order to shift the power spectrum of the pulsoximeter signals into a higher frequency range where environmental optical radiation is unlikely and electronic band pass filtering is technologically less stringent. AC-Coupling or Lock-In Amplification is well known out of the state of the art and is described in literature 3." Carlson at [0065]. Poeze teaches that "[a] control signal can be useful in order to synchronize, minimize, or reduce jitter in the timing of pulses emitted from the emitter 104.

Accordingly, this control signal can be useful in order to cause optical radiation pulses emitted from the emitter 104 to follow a precise timing and consistent pattern." Poeze at 15:27-48. Addison-788 teaches the "front end processing circuitry 150 may use the timing control signals of control circuitry 110 to operate synchronously with light drive circuitry 120." Addison-788 at 7:63–65.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that are concerned with measuring physiological parameters. These methods are known to be effective in incorporating synchronizing detection system with the light source. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of signal processing.

"Worn By a User" References. For example, charted reference Lisogurski and Addison-788, teaches a wearable sensor for monitoring physiological conditions that is configured to determine whether the sensor is being worn by a user. For example, Addison-788 teaches a "physiological monitoring system," including a "pulse oximeter," that may "determine a probe-off condition" when the sensor is "fully or partially detached or moved from the desired target area of the subject," including when the sensor has "loosened, shifted, slid, moved, detached, repositioned in any other unsuitable arrangement, or any combination thereof." Addison-788 at 2:10–50. For example, Lisogurski discloses that its system "detect[s] a signal indicative of a system error such as a physiologically impossible value" and "a probe-off signal." Lisogurski at 36:66-37:2.

A person of skill in the art would understand that the functionality taught in these references

could be added to other methods and systems for measuring physiological parameters. These methods determining whether a wearable system for measuring physiological parameters is being worn by the user. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of measuring physiological parameters.

References disclosing artificial intelligence: For example, charted reference Tran, as well as other references such as Quy, include teachings related to using artificial intelligence. For example, Tran teaches "Various mathematical techniques and Artificial Intelligence (AI) analyzer can be applied. … AI approaches towards signal recognition include Artificial Neural Networks (ANN), dynamic recurrent neural networks (DRNN), fuzzy logic system, Genetic Algorithm (GA), and Hidden Markov Model (HMM)." Tran at 94:49-65. Quy teaches "[a]pplication 62 may include an algorithm 63 for analyzing data from the HMD, and either application 62 or algorithm 63 may optionally access data from an external data source 74 and may further consult an artificial intelligence system 76." Quy at 8:9-14.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems for measuring physiological parameters. These methods provide using artificial intelligence. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of measuring physiological parameters.

Smartphone/Tablet References: For example, charted references Basu, Lisogurski, Kassim, Addison-788, and Tran, as well as numerous other references such as Kreger, all include teachings related to physiological measurement systems. These references provide numerous means for a physiological monitoring system to be configured for use with a smart phone or tablet. For example, Basu teaches "health ring 44 which can monitor heart rate on a 24 hour basis," and that "combines the sensor with a…wireless transmitter linked to an application running on the user's cell phone." Basu, [0065]-[0066]. For example, Kassim teaches "[t]he optical measurement device 300 further comprises a coupling member 316 that can provide coupling between the measurement device 300 to a personal mobile processing device/feedback unit (not shown) in a cableless configuration," and that "the feedback unit may be a portable device, such as a mobile phone, smartphone, personal digital assistant (PDA), tablet, netbook or laptop, although this list is not exhaustive by any means." Kassim, 12:5-14. For example, Kreger teaches a "biosensor interface apparatus for use with a mobile communication device 10," that "can be any of a number of mobile phones such as an iPhone® or an Android® phone, a personal digital assistant (PDA) such as a Blackberry®, a portable audio playback device such as an MP3 player, a portable media playback device such as an iPod®, or a handheld tablet such as an iPad®." Kreger, 5:40-53; *see also* Kreger, 7:39-46. For example, Lisogurski teaches a "monitor [that] may be powered by a battery" with a "[u]ser interface [which] may include user input 182, display 184, and speaker 186. User input 182 may include any type of user input device such as a keyboard, a mouse, a touch screen, buttons, switches, a microphone, a joy stick, a touch pad, or any other suitable input device." Lisogurski, 15:19-23, 18:65-67. For example, Poeze teaches "a personal health organizer software module 132 executed on a general purpose computing device 126, with the computing device 126 coupled with the health data collection device 112 via a communications link 128,"

where the "personal health organizer module 132 can be an executable program on an operating system of a device such as a mobile phone, a personal digital assistant, a portable music player, an electronic book reader, a netbook, a TV media center, and a laptop or desktop computer. For example, the personal health organizer module 132 can be an application that is executed on the operating system of a mobile phone such as the iPhone manufactured by Apple, Inc., a Blackberry device manufactured by Research In Motion, Inc., the Pre manufactured by Palm, Inc, or a mobile device manufactured by HTC, Nokia, or Motorola, etc." Poeze, [0034]; *see also* Poeze [0010]. Tran teaches that while a patient with a wearable device is outside a mesh network range, "the wearable appliance communicates with the cell phone and provides information to the server 200 using the cellular connection." Tran, 34:4-30. Addison-788 teaches that its system "may be embedded in a small, compact object carried with or attached to the subject (e.g., a watch, other piece of jewelry, or a smart phone." Addison-788, at 16:33-36.

A person of skill in the art would understand that the functionality taught in these references could be added to other methods and systems that concern physiological monitoring. These methods and systems provide the benefit of more processing power and more convenient means to flag emergency situations. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of more accurate and efficient physiological monitoring.

Arc References: For example, charted reference LeBoeuf, as well as numerous other references such as Jung, and Isaacson all include teachings related to physiological measurement systems. These references provide numerous methods for utilizing a plurality of semiconductor

sources and the plurality of spatially separated detectors are located on one or more arcs. For example, LeBoeuf teaches optical emitters 24 and optical detectors 26 configured in an arc. LeBoeuf, [0123]-[1024], Fig. 8B. For example, Isaacson teaches emitters 10, 20 and detectors 12, 22 disposed on an arc. Isaacson, 4:64-5:9, Fig. 1. For example, Jung teaches "a fiber optic arrangement presented at the forward end of probe tip 1" which "utilizes a single central light source fiber optic…and a plurality of perimeter light receiver fiber optics, denoted as light receivers R1, R2 and R3." Jung, 11:21-50, Fig. 2; *see also* Jung 24:39-48, 24:39-62, 32:66-33:9, 39:41-40:14, Figs. 9, 10A-B, 20, 28A-B.

b. Combinations

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix G with any other reference or references listed in Appendix G, along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '475 Patent.

For example, and without limitation, the Asserted Claims of the '475 Patent would have been obvious to one of ordinary skill in the art in view of the following combinations:

(i) <u>Rulkov, Basu, Goodman, Kassim, Lisogurski, Moon, Terumoto, Tran, Addison-788 and Al-Ali combined with References disclosing lenses</u>

A POSITA would have had reason to combine references Rulkov, Basu, Goodman, Kassim, Lisogurski, Moon, Terumoto, Tran, Addison-788, and Al-Ali with any one of References disclosing lenses, all of which relate to systems and methods for using lenses to direct an optical output beam. Each of References disclosing lenses relate to using one or more lenses configured to receive a portion of at least one of the output optical lights and to direct a lens output light to tissue comprising skin. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing lenses provide means—not

necessarily expressly present in all other references—for using lenses to direct an optical output beam. A POSITA would have understood that the systems and methods for References disclosing lenses were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using lenses provide improvements such as directing the light to tissue comprising skin. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for using lenses to direct an optical output beam would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using lenses to direct an optical output beam, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(ii) Kassim, Rulkov, Goodman, Moon, Poeze, Soller, Terumoto, Addison-788, and Al-Ali, combined with References disclosing techniques for increasing signal-to-noise ratio

A POSITA would have had reason to combine Kassim, Rulkov, Goodman, Moon, Poeze, Soller, Terumoto, Addison-788, and Al-Ali with any one of References disclosing techniques for increasing signal-to-noise ratio, all of which relate to systems and methods for increasing a light intensity and increasing a pulse rate of an LED. Each of References disclosing techniques for increasing signal-to-noise ratio relate to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity and increasing a pulse rate of an LED. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing techniques for increasing signal-to-noise ratio provide means—not necessarily expressly present in all other references—for increasing signal-to-noise ratio relate to increasing the signal-to-noise ratio of optical measurement systems by increasing a light intensity

and increasing a pulse rate of an LED. A POSITA would have understood that the systems and methods for References disclosing techniques for increasing signal-to-noise ratio were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for increasing a light intensity and increasing a pulse rate of an LED provide improvements such as increasing signal-to-noise ratio. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for increasing signal-to-noise ratio would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for increasing signal-to-noise ratio, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iii) Carlson, Kassim, Soller, LeBeouf, Tran, and Terumoto combined with References disclosing an analog to digital converter

A POSITA would have had reason to combine references Carlson, Kassim, Soller, LeBeouf, Tran, and Terumoto with any one of References disclosing an analog to digital converter, all of which relate to systems and methods for using an analog to digital converter coupled to a detector. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing an analog to digital converter provide means—not necessarily expressly present in all other references—for using an analog to digital converter coupled to a detector. A POSITA would have understood that the systems and methods for References disclosing an analog to digital converter were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for using an analog to digital converter provide improvements such as ability to process a signal digitally.

A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for using an analog to digital converter would commonly be combined with optical measurement systems, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using an analog to digital converter, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(iv) Carlson, Rulkov, Basu, Goodman, Kassim, Moon, Al-Ali, LeBeouf, and Addison-788 combined with References disclosing spatially separated detectors

A POSITA would have had reason to combine references Carlson, Rulkov, Chandersekar, Carlson, Rulkov, Basu, Goodman, Kassim, Moon, Al-Ali, LeBeouf, and Addison-788 with any one of References disclosing spatially separated detectors all of which relate to systems and methods for using spatially separated detectors. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing spatially separated detectors provide means—not necessarily expressly present in all other references—for using spatially separated detectors. A POSITA would have understood that the systems and methods for References disclosing spatially separated detectors were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for spatially separated detectors provide improvements such as improved detection quality. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological parameters would commonly be combined with spatially separated detectors, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for using spatially

separated detectors, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(v) Rulkov, Basu, Goodman, Kassim, Moon, Soller, Terumoto, Tran, Addison-788, and Al-Ali combined with References disclosing detection system is synchronized to the light source

A POSITA would have had reason to combine references Rulkov, Chandersekar, Basu, Goodman, Kassim, Moon, Soller, Terumoto, Tran, Addison-788, and Al-Ali with any one of References disclosing detection system is synchronized to the light source, all of which relate to systems and methods for synchronizing a detection system with a light source. Indeed, such components and/or processes were conventional as of the time these references were known. Each of References disclosing detection system is synchronized to the light source provide means—not necessarily expressly present in all other references—for synchronizing a detection system with a light source. A POSITA would have understood that the systems and methods for References disclosing detection system is synchronized to the light source were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for synchronizing a detection system with a light source provide improvements such as improved detection. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological parameters would commonly be combined with techniques for synchronizing a detection system with a light source, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for synchronizing a detection system with a light source, to wearable measurement devices that were ready for improvement, in order to yield

predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

Furthermore, to the extent any limitation of an Asserted Claim is deemed not to be exactly disclosed by an item of prior art, then the claim is rendered obvious by combination of the prior art in Exhibits G1 through G14 standing alone, in combination with the reference(s) in any other claim chart, in combination with any system art identified in Table 2-G, in combination with Applicant's Admitted Prior Art, in view of the knowledge of a person of ordinary skill in the art, and/or in view of the References disclosing lenses, References disclosing techniques for increasing signal-to-noise ratio, References disclosing an analog to digital converter, References disclosing spatially separated detectors, References disclosing detection system is synchronized to the light source, for the reasons discussed above.

(vi) Lisogurski, Basu, Goodman, Kassim, Soller, Poeze, Terumoto, Rulkov, Moon, Carlson, Al-Ali, LeBeouf, and Tran combined with References disclosing determining whether a wearable sensor is being worn by a user

Lisogurski, Basu, Goodman, Kassim, Soller, Poeze, Terumoto, Rulkov, Moon, Carlson, Al-Ali, LeBeouf, and Tran, with any one of References disclosing an apparatus configured to determine, based in part on the output signal, that an apparatus is being worn by the user, all of which relate to systems and methods for determining that a wearable device is being worn by the user. Indeed, such components and/or processes were conventional as of the time these references were known. A POSITA would have understood that the systems and methods for References disclosing an apparatus configured to determine whether the apparatus is being worn by a user, based in part on the optical output signal, were intended to be incorporated into wearable measurement devices. A POSITA would understand that an apparatus configured to determine,

based in part on the output signal, that an apparatus is being worn by the user would provide improvements to wearable sensors such as improved detection and monitoring of physiological parameters. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for measuring physiological parameters would commonly be combined with techniques for configuring an apparatus to determine whether the apparatus was being worn by a user, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for configuring an apparatus to determine, based in part on an optical output signal, that the apparatus is being worn by a user, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(vii) Lisogurski, Basu, Goodman, Kassim, Soller, Poeze, Terumoto, Rulkov, Moon, Carlson, Al-Ali, LeBeouf, and Addison-788 Combined with Artificial Intelligence References

A POSITA would have had reason to combine references Lisogurski, Basu, Goodman, Kassim, Soller, Poeze, Terumoto, Rulkov, Moon, Carlson, Al-Ali, LeBeouf, and Addison-788 with any one of the Artificial Intelligence References all of which relate to systems and methods for physiological monitoring. Each of references Tran and Quy relate to physiological monitoring systems which use artificial intelligence or multivariate techniques to improve their measurements. Indeed, such components and/or processes were conventional as of the time these references were known. Each of the Artificial Intelligence References provide means—not necessarily expressly present in all other references—for improving a system's decision-making and the SNR of a measured signal. A POSITA would have understood that the systems and methods for the

Artificial Intelligence References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for incorporating the artificial intelligence techniques into physiological measurement systems provide improvements such as improving the system's ability to effectively make decisions and make accurate measurements with minimal noise interference. *E.g.*, Tran, 5:57-65 ("For example, the system can perform patient behavior analysis such as eating/drinking/smoke habits and medication compliance, among others"). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement systems would commonly be combined with artificial intelligence techniques, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of using known artificial intelligence models, to wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(viii) Goodman, Soller, Poeze, Terumoto, Rulkov, Moon, Carlson, Al-Ali, and LeBeouf Combined with Smartphone/Tablet References

A POSITA would have had reason to combine references Goodman, Soller, Poeze, Terumoto, Rulkov, Moon, Carlson, Al-Ali, and LeBeouf with any one of Smartphone/Tablet References all of which relate to systems and methods for physiological monitoring. Each of references Basu, Lisogurski, Kassim, Addison-788, Kreger, and Tran relate to physiological monitoring systems for use with a smartphone or tablet. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Smartphone/Tablet References provide means—not necessarily expressly present in all other references—for a physiological monitoring system to communicate with a smartphone or tablet. A POSITA would

have understood that the systems and methods for Smartphone/Tablet References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for connectivity to smartphones or tablets provide improvements improving the analysis capabilities of measurement systems due to the increased processing power of smartphones and tablets and the additional resources provided by their ability to connect to wireless and cell networks. *E.g.*, Basu, [0066] (physiological monitoring system "combines the sensor with a…wireless transmitter linked to an application running on the user's cell phone."); Kreger, 13:1-3 ("Mobile device smart phone 444 may derive measurements, display plots, transmit medical records of biosensor data, and so forth."); Tran, 34:4-40 ("If the wearable appliance detects a cellphone that is mesh network compatible, the wearable appliance communicates with the cell phone and provides information to the server 200 using the cellular connection."). A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical physiological measurement would commonly be combined with smartphone and personal computing technology and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques of providing for connectivity to smartphone or personal computing devices in wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

(ix) <u>Lisogurski, Basu, Goodman, Kassim, Soller, Poeze, Terumoto, Rulkov, Moon, Carlson, Al-Ali, Tran, and Addison-788 Combined with Arc References</u>

A POSITA would have had reason to combine references <u>Lisogurski, Basu, Goodman, Kassim, Soller, Poeze, Terumoto, Rulkov, Moon, Carlson, Al-Ali, Tran, and Addison-788</u>, with any one of Arc References all of which relate to systems and methods for physiological monitoring.

Each of references Isaacson, Jung, and LeBoeuf relate to physiological monitoring systems with their light sources and/or detectors configured in an arc. Indeed, such components and/or processes were conventional as of the time these references were known. Each of Arc References provide means—not necessarily expressly present in all other references—for configuring the detectors and/or emitters of a physiological measurement system in an arc formation. A POSITA would have understood that the systems and methods for Arc References were intended to be incorporated into wearable measurement devices. A POSITA would understand that systems and methods for configuring optical detectors and emitters in an arc formation would provide improvements such as increased measurement accuracy due to lessening the negative effects of light scattering and accounting for the contours of the tissue sample that is being measured. A POSITA would further understand that in order to implement a wearable measurement device, the systems and methods for optical measurement would commonly be combined detectors and emitters in an arc formation, and thus a POSITA would have been motivated to combine the teachings of these references. The combination would apply known techniques for varying the spatial configurations of emitters and detectors in wearable measurement devices that were ready for improvement, in order to yield predictable results. The combination would further be "obvious to try," because it would involve simple design choices from a finite number of identified, predictable solutions, with a reasonable expectation of success.

Furthermore, to the extent any limitation of an Asserted Claim is deemed not to be exactly disclosed by an item of prior art, then the claim is rendered obvious by combination of the prior art in Exhibits G1 through G14 standing alone, in combination with the reference(s) in any other claim chart, in combination with any system art identified in Table 2-G, in combination with Applicant's Admitted Prior Art, in view of the knowledge of a person of ordinary skill in the art, and/or in view of the References disclosing lenses, References disclosing techniques for increasing signal-to-noise ratio,

References disclosing an analog to digital converter, References disclosing spatially separated detectors, References disclosing detection system is synchronized to the light source, References disclosing determining whether an apparatus is being worn by a user, References disclosing smartphones/tablets, References disclosing artificial intelligence, and/or References disclosing arcs, for the reasons discussed above.

V. P.R. 3-3(c) – Claim Charts

Pursuant to Rule 3-3(c), Defendants identify invalidity claim charts identifying disclosures in the references identified in Sections III-IV supra as to the Asserted Claims of the Asserted Patents are provided in attached Appendix A ('868 Patent), Appendix B ('533 Patent), Appendix C ('484 Patent), Appendix D ('304 Patent), Appendix E ('455 Patent), Appendix F ('790 Patent), and Appendix G ('475 Patent).

Defendants have identified relevant portions and/or features of the prior art. However, the identified prior art may contain additional descriptions of or alternative support for the claim limitations. Defendants may rely on uncited portions or features of the identified prior art, other documents, and expert testimony, to provide context or to aid in understanding the identified prior art and the state of the art. Citations to a particular figure in a reference include the caption and description of the figure and any text relating to the figure. Similarly, citations to particular text referring to a figure include the figure and caption as well. Portions relevant to dependent claims incorporate by reference the citations to the chain of claims from which that dependent claim derives. Likewise, portions related to subsequent limitations that refer to claim elements identified, described, and/or cited to in earlier limitations may rely on the citations related to those portions of the claim chart that identify and/or describe these elements.

Throughout the invalidity claim charts in Appendices A-G, Defendants provide exemplary

citations showing where references disclose subject matter recited in preambles of the Asserted Claims, regardless of whether the preambles limit the claims. Defendants reserve the right to argue that the preambles are or are not limitations. Further, where an entry in a claim chart corresponding to a given limitation refers back to the discussion of another claim, the entry incorporates all evidence cited for the other claim.

As noted above, the asserted claims have not yet been construed. Additional portions of the references may become relevant after claim construction. Further, to the extent that any claim term is governed by 35 U.S.C. § 112 ¶ 6, the claim charts identify, by the citations provided, the structure(s), act(s), or material(s) in each reference performing the claimed function for each limitation of the asserted claims. Plaintiffs' claim construction positions, expert analysis and testimony, and additional discovery could all inform which portions of the references disclose a limitation, including under 35 U.S.C. § 112 ¶ 6, and whether any particular limitation is governed by 35 U.S.C. § 112 ¶ 6. Defendants' contentions are based on the information presently available, and Defendants reserve all rights to provide their claim construction positions in accordance with the Docket Control Order in this case.

VI. P. R. 3-3(d) – Other Grounds for Invalidity

A. U.S. Patent No. 9,055,868

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '868 Patent based on lack of written description under 35 U.S.C. § 112, first paragraph; lack of enablement under 35 U.S.C. § 112, first paragraph; indefiniteness under 35 U.S.C. § 112, second paragraph; and indefiniteness under 35 U.S.C. § 112, sixth paragraph. These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants

from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '868 Patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112, ¶ 1

The '868 Patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '868 Patent Asserted Claims at the time the '868 Patent was filed, at least as plaintiff appears to be asserting those limitations. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods, at least as plaintiff appears to be asserting the claims. For example, the claims of the '868 Patent do not provide sufficient written description of the limitations listed below.

The specification of the '868 Patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '868 Patent Asserted Claims without undue experimentation, at least as plaintiff appears to be asserting those limitations. For example, the claims of the '868 Patent fail to sufficiently enable the limitations listed below.

To the extent the following limitations are definite (under 35 U.S.C. § 112, ¶ 2), the

application that became the ’868 Patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112, ¶ 1:[9]

Term	Relevant Claim(s)
“a software application capable of generating data”	7
“a status of the user”	7
“at least a portion of the status or associated information”	7
“a multiplexer capable of combining the plurality of semiconductor diodes”	8

2. Invalidity Under 35 U.S.C. § 112, ¶ 2

“[T]he second paragraph of § 112 contains two requirements: first, the claim must set forth what the applicant regards as his invention, and second, it must do so with sufficient particularity and distinctness, *i.e.*, the claim must be sufficiently definite.” *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002) (internal quotation marks and alteration omitted). “Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention,” the claim is “invalid under § 112, paragraph 2.” *Id.* at 1349. Several of the ’868 Patent Asserted Claims are invalid because it would be apparent to one of skill in the art, based on the specification, that the invention set forth in these claims are not what the patentee regarded as his invention, at least as the claims are being asserted by the Plaintiff. *Id.* These claims are invalid under the “applicant regards” prong of § 112 at least because they contain elements that differ from and/or conflict with the ’868 Patent’s written description of the invention, at least as the claim elements are being asserted by Plaintiff, or because they omit elements that one of skill in the art would understand as part of the ’868 Patent’s invention based on the specification.

[9] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Independently, under § 112, ¶ 2, "a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '868 Patent Asserted Claims are also invalid as indefinite under § 112, ¶ 2 because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite.

The following limitations recited in the '868 Patent Asserted Claims are indefinite in whole, in part or in combination:[10]

Term	Relevant Claim(s)
"a part of a user's body comprising blood"	7
"physiological information associated with the user"	7
"wireless data"	7
"voice input signals and manually entered input signals"	7
"at least a portion of the status or associated information"	7
"a multiplexer capable of combining the plurality of semiconductor diodes"	8
"generating the input light beam comprising one or more wavelengths"	8
"adapted for use in a diagnostics"	9
"a plurality of associated wavelengths transmitted or reflected from the blood"	9

B. U.S. Patent No. 9,651,533

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '533 Patent based on lack of written description under 35 U.S.C. § 112, first paragraph; lack of enablement under 35 U.S.C. § 112, first paragraph; indefiniteness under 35 U.S.C. § 112, second paragraph; and indefiniteness under 35 U.S.C. § 112, sixth paragraph. These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is

[10] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '533 Patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112, ¶ 1

The '533 Patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '533 Patent Asserted Claims at the time the '533 Patent was filed, at least as plaintiff appears to be asserting those limitations. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods, at least as plaintiff appears to be asserting the claims. For example, the claims of the '533 Patent do not provide sufficient written description of the limitations listed below.

The specification of the '533 Patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '533 Patent Asserted Claims without undue experimentation, at least as plaintiff appears to be asserting those limitations. For example, the claims of the '533 Patent fail to sufficiently enable the limitations listed below.

To the extent the following limitations are definite (under 35 U.S.C. § 112, ¶ 2), the application that became the '533 Patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112, ¶ 1:[11]

Term	Relevant Claim(s)
"the light emitting diodes configured to generate an output optical beam with one or more optical wavelengths"	5
"the processed output signal"	5
"one of more detectors"	11
"to select a fraction of the one or more optical wavelengths"	11

2. Invalidity Under 35 U.S.C. § 112, ¶ 2

"[T]he second paragraph of § 112 contains two requirements: first, the claim must set forth what the applicant regards as his invention, and second, it must do so with sufficient particularity and distinctness, *i.e.*, the claim must be sufficiently definite." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002) (internal quotation marks and alteration omitted). "Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention," the claim is "invalid under § 112, paragraph 2." *Id.* at 1349. Several of the '533 Patent Asserted Claims are invalid because it would be apparent to one of skill in the art, based on the specification, that the invention set forth in these claims are not what the patentee regarded as his invention, at least as the claims are being asserted by the Plaintiff. *Id.* These claims are invalid under the "applicant regards" prong of § 112 at least because they contain elements that differ from and/or conflict with the '533 Patent's written description of the invention, at least as the claim elements are being asserted by Plaintiff, or because they omit elements that one of skill in the art would understand as part of the '533 Patent's invention based on the specification.

[11] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Independently, under § 112, ¶ 2, "a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '533 Patent Asserted Claims are also invalid as indefinite under § 112, ¶ 2 because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite.

The following limitations recited in the '533 Patent Asserted Claims are indefinite in whole, in part or in combination:[12]

Term	Relevant Claim(s)
"the light emitting diodes configured to generate an output optical beam with one or more optical wavelengths"	5
"the processed output signal"	5
"one of more detectors"	11
"to select a fraction of the one or more optical wavelengths"	11

C. U.S. Patent No. 10,517,484

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '484 Patent based on lack of written description under 35 U.S.C. § 112, first paragraph; lack of enablement under 35 U.S.C. § 112, first paragraph; indefiniteness under 35 U.S.C. § 112, second paragraph; and indefiniteness under 35 U.S.C. § 112, sixth paragraph. These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions

[12] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '484 Patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112, ¶ 1

The '484 Patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '484 Patent Asserted Claims at the time the '484 Patent was filed, at least as plaintiff appears to be asserting those limitations. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods, at least as plaintiff appears to be asserting the claims. For example, the claims of the '484 Patent do not provide sufficient written description of the limitations listed below.

The specification of the '484 Patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '484 Patent Asserted Claims without undue experimentation, at least as plaintiff appears to be asserting those limitations. For example, the claims of the '484 Patent fail to sufficiently enable the limitations listed below.

To the extent the following limitations are definite (under 35 U.S.C. § 112, ¶ 2), the application that became the '484 Patent fails to sufficiently describe or enable them as required by

35 U.S.C. § 112, ¶ 1:[13]

Term	Relevant Claim(s)
"wherein the output signal is indicative of one or more of the physiological parameters"	7-10
"increase the signal-to-noise ratio by comparing the first signal and the second signal"	7-10
"a property of at least some of the output signal is compared by at least one of the wearable device, the smart phone or tablet to a threshold"	8-10
"wherein the wearable device is at least in part configured to identify an object"	8-10
"wherein the wearable device is configured to use artificial intelligence to process at least a portion of the output signal"	10

2. Invalidity Under 35 U.S.C. § 112, ¶ 2

"[T]he second paragraph of § 112 contains two requirements: first, the claim must set forth what the applicant regards as his invention, and second, it must do so with sufficient particularity and distinctness, *i.e.*, the claim must be sufficiently definite." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002) (internal quotation marks and alteration omitted). "Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention," the claim is "invalid under § 112, paragraph 2." *Id.* at 1349. Several of the '484 Patent Asserted Claims are invalid because it would be apparent to one of skill in the art, based on the specification, that the invention set forth in these claims are not what the patentee regarded as his invention, at least as the claims are being asserted by the Plaintiff. *Id.* These claims are invalid under the "applicant regards" prong of § 112 at least because they contain elements that differ from and/or conflict with the '484 Patent's written description of the invention, at least as the claim elements are being asserted by Plaintiff, or because they omit elements that one of skill in the art would understand as part of the '484 Patent's

[13] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

invention based on the specification.

Independently, under § 112, ¶ 2, "a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the '484 Patent Asserted Claims are also invalid as indefinite under § 112, ¶ 2 because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite.

The following limitations recited in the '484 Patent Asserted Claims are indefinite in whole, in part or in combination:[14]

Term	Relevant Claim(s)
"spatially separated detectors"	7-10
"increase the signal-to-noise ratio by comparing the first signal and the second signal"	7-10
"wherein the detection system is configured to be synchronized to the light source"	7-10
"a cloud configured to receive over the wireless transmission link an output status"	7-10
"wherein the wearable device is at least in part configured to identify an object"	8-10
"gain configured to improve detection sensitivity"	9-10
"wherein the wearable device is configured to use artificial intelligence"	10

D. U.S. Patent No. 10,874,304

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '304 Patent based on lack of written description under 35 U.S.C. § 112, first paragraph; lack of enablement under 35 U.S.C. § 112, first paragraph; indefiniteness under 35 U.S.C. § 112, second paragraph; and indefiniteness under 35 U.S.C. § 112, sixth paragraph. These contentions shall not

[14] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '304 Patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112, ¶ 1

The '304 Patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '304 Patent Asserted Claims at the time the '304 Patent was filed, at least as plaintiff appears to be asserting those limitations. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods, at least as plaintiff appears to be asserting the claims. For example, the claims of the '304 Patent do not provide sufficient written description of the limitations listed below.

The specification of the '304 Patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '304 Patent Asserted Claims without undue experimentation, at least as plaintiff appears to be asserting those limitations. For example, the

claims of the ’304 Patent fail to sufficiently enable the limitations listed below.

To the extent the following limitations are definite (under 35 U.S.C. § 112, ¶ 2), the application that became the ’304 Patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112, ¶ 1:[15]

Term	Relevant Claim(s)
a cloud configured to receive over the wireless transmission link an output status comprising the at least a portion of the processed output signal, to process the received output status to generate processed data and to store the processed data, and wherein the cloud is capable of storing a history of at least a portion of the received output status over a specified period of time.	11
the light source configured to increase signal-to-noise ratio by increasing a light intensity relative to an initial light intensity from at least one of the plurality of semiconductor sources	11
wherein the measurement system is further configured to improve the signal-to-noise ratio by differencing the first signal and the second signal	11
wherein the light source is configured to further increase the signal-to-noise ratio by increasing a pulse rate of at least one of the plurality of semiconductor sources from an initial non-zero pulse rate	13
the receiver comprises a plurality of detectors arranged along a first arc, and wherein the plurality of semiconductor sources are arranged along a second arc that is offset from the first arc.	15, 21
wherein the first arc and the second arc are concentric	16, 22
the measurement device further configured to improve a signal-to-noise ratio of the input optical beam reflected from the tissue by: differencing the first signal and the second signal, and increasing the light intensity relative to the initial light intensity from at least one of the semiconductor sources	19
a measurement device including a light source comprising a plurality of semiconductor sources for measuring one or more physiological parameters	19
wherein the light source is configured to further improve the signal-to-noise ratio of the input optical beam reflected from the tissue by increasing a pulse rate of at least one of the plurality of semiconductor sources from an initial non-zero pulse rate	20

2. Invalidity Under 35 U.S.C. § 112, ¶ 2

“[T]he second paragraph of § 112 contains two requirements: first, the claim must set forth

[15] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

what the applicant regards as his invention, and second, it must do so with sufficient particularity and distinctness, *i.e.*, the claim must be sufficiently definite." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002) (internal quotation marks and alteration omitted). "Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention," the claim is "invalid under § 112, paragraph 2." *Id.* at 1349. Several of the '304 Patent Asserted Claims are invalid because it would be apparent to one of skill in the art, based on the specification, that the invention set forth in these claims are not what the patentee regarded as his invention, at least as the claims are being asserted by the Plaintiff. *Id.* These claims are invalid under the "applicant regards" prong of § 112 at least because they contain elements that differ from and/or conflict with the '304 Patent's written description of the invention, at least as the claim elements are being asserted by Plaintiff, or because they omit elements that one of skill in the art would understand as part of the '304 Patent's invention based on the specification.

Independently, under § 112, ¶ 2, "a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Several of the '304 Patent Asserted Claims are also invalid as indefinite under § 112, ¶ 2 because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite.

The following limitations recited in the '304 Patent Asserted Claims are indefinite in whole, in part or in combination:[16]

[16] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
a receiver configured to: … synchronize to the light source	11
the light source configured to increase signal-to-noise ratio by increasing a light intensity relative to an initial light intensity from at least one of the plurality of semiconductor sources	11
wherein the measurement system is at least in part configured for selection or identification of an object	12
wherein the measurement system is configured to use artificial intelligence in making decisions	12
wherein the light source is configured to further increase the signal-to-noise ratio by increasing a pulse rate of at least one of the plurality of semiconductor sources from an initial non-zero pulse rate	13
the receiver comprises a plurality of detectors arranged along a first arc, and wherein the plurality of semiconductor sources are arranged along a second arc that is offset from the first arc.	15, 21
wherein the first arc and the second arc are concentric	16, 22
a receiver configured to: … synchronize to the modulation of the at least one of the semiconductor sources	19
the measurement device further configured to improve a signal-to-noise ratio of the input optical beam reflected from the tissue by: differencing the first signal and the second signal, and increasing the light intensity relative to the initial light intensity from at least one of the semiconductor sources	19
wherein the light source is configured to further improve the signal-to-noise ratio of the input optical beam reflected from the tissue by increasing a pulse rate of at least one of the plurality of semiconductor sources from an initial non-zero pulse rate	20

E. U.S. Patent No. 11,160,455

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the ’455 Patent based on lack of written description under 35 U.S.C. § 112, first paragraph; lack of enablement under 35 U.S.C. § 112, first paragraph; indefiniteness under 35 U.S.C. § 112, second paragraph; and indefiniteness under 35 U.S.C. § 112, sixth paragraph. These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or

acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '455 Patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112, ¶ 1

The '455 Patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '455 Patent Asserted Claims at the time the '455 Patent was filed, at least as plaintiff appears to be asserting those limitations. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods, at least as plaintiff appears to be asserting the claims. For example, the claims of the '455 Patent do not provide sufficient written description of the limitations listed below.

The specification of the '455 Patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '455 Patent Asserted Claims without undue experimentation, at least as plaintiff appears to be asserting those limitations. For example, the claims of the '455 Patent fail to sufficiently enable the limitations listed below.

To the extent the following limitations are definite (under 35 U.S.C. § 112, ¶ 2), the application that became the '455 Patent fails to sufficiently describe or enable them as required by

35 U.S.C. § 112, ¶ 1:[17]

Term	Relevant Claim(s)
A system for measuring one or more physiological parameters	1, 8, 15
the processed output signal	1, 8, 15
wherein the output signal is indicative of one or more of the physiological parameters	1, 8, 15
the wearable device configured to increase the signal-to-noise ratio by increasing light intensity of at least one of the [plurality of] semiconductor sources from an initial light intensity	1, 8, 15
increase the signal-to-noise ratio by comparing the first signal and the second signal	1, 8, 15
at least a portion of the one or more of the physiological parameters	1, 10
the plurality of semiconductor sources configured to generate an output optical light having a plurality of optical wavelengths	1
the plurality of semiconductor sources and the plurality of spatially separated detectors are located on one or more arcs	2, 9, 15
the light emitting diodes configured to generate an output optical light having one or more optical wavelengths	8, 15

2. Invalidity Under 35 U.S.C. § 112, ¶ 2

"[T]he second paragraph of § 112 contains two requirements: first, the claim must set forth what the applicant regards as his invention, and second, it must do so with sufficient particularity and distinctness, *i.e.*, the claim must be sufficiently definite." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002) (internal quotation marks and alteration omitted). "Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention," the claim is "invalid under § 112, paragraph 2." *Id.* at 1349. Several of the '455 Patent Asserted Claims are invalid because it would be apparent to one of skill in the art, based on the specification, that the invention set forth in these claims are not what the patentee regarded as his invention, at least as the claims are being asserted by the Plaintiff. *Id.* These claims are invalid under the "applicant regards" prong of § 112

[17] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

at least because they contain elements that differ from and/or conflict with the ’455 Patent’s written description of the invention, at least as the claim elements are being asserted by Plaintiff, or because they omit elements that one of skill in the art would understand as part of the ’455 Patent’s invention based on the specification.

Independently, under § 112, ¶ 2, “a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). Several of the ’455 Patent Asserted Claims are also invalid as indefinite under § 112, ¶ 2 because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite.

The following limitations recited in the ’455 Patent Asserted Claims are indefinite in whole, in part or in combination:[18]

Term	**Relevant Claim(s)**
spatially separated detectors	1, 2, 8, 9, 15
a plurality of detectors that are spatially separated from each other	1, 8, 15
wherein the detection system is configured to be synchronized to the light source	1, 8, 15
increase the signal-to-noise ratio by comparing the first signal and the second signal	1, 8, 15
the plurality of semiconductor sources configured to generate an output optical light having a plurality of optical wavelengths	1
the wearable device configured to increase the signal-to-noise ratio by increasing light intensity of at least one of the semiconductor sources from an initial light intensity	1
the plurality of semiconductor sources and the plurality of spatially separated detectors are located on one or more arcs	2, 9, 15
the light emitting diodes configured to generate an output optical light having one or more optical wavelengths	8, 15

[18] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

F. U.S. Patent No. 12,193,790

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the '790 Patent based on lack of written description under 35 U.S.C. § 112, first paragraph; lack of enablement under 35 U.S.C. § 112, first paragraph; indefiniteness under 35 U.S.C. § 112, second paragraph; and indefiniteness under 35 U.S.C. § 112, sixth paragraph. These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants' invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged scope of the '790 Patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112, ¶ 1

The '790 Patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the '790 Patent Asserted Claims at the time the '790 Patent was filed, at least as plaintiff appears to be asserting those limitations. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods, at least as plaintiff appears to

be asserting the claims. For example, the claims of the '790 Patent do not provide sufficient written description of the limitations listed below.

The specification of the '790 Patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the '790 Patent Asserted Claims without undue experimentation, at least as plaintiff appears to be asserting those limitations. For example, the claims of the '790 Patent fail to sufficiently enable the limitations listed below.

To the extent the following limitations are definite (under 35 U.S.C. § 112, ¶ 2), the application that became the '790 Patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112, ¶ 1:[19]

Term	Relevant Claim(s)
"a wearable device for measuring one or more physiological parameters"	7
"signal is indicative of one or more of the physiological parameters"	7
"wherein the wearable device is at least in part configured to identify an object"	7

2. Invalidity Under 35 U.S.C. § 112, ¶ 2

"[T]he second paragraph of § 112 contains two requirements: first, the claim must set forth what the applicant regards as his invention, and second, it must do so with sufficient particularity and distinctness, *i.e.*, the claim must be sufficiently definite." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002) (internal quotation marks and alteration omitted). "Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention," the claim is "invalid under § 112, paragraph 2." *Id.* at 1349. Several of the '790 Patent Asserted Claims are invalid because

[19] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

it would be apparent to one of skill in the art, based on the specification, that the invention set forth in these claims are not what the patentee regarded as his invention, at least as the claims are being asserted by the Plaintiff. *Id.* These claims are invalid under the "applicant regards" prong of § 112 at least because they contain elements that differ from and/or conflict with the '790 Patent's written description of the invention, at least as the claim elements are being asserted by Plaintiff, or because they omit elements that one of skill in the art would understand as part of the '790 Patent's invention based on the specification.

Independently, under § 112, ¶ 2, "a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Several of the '790 Patent Asserted Claims are also invalid as indefinite under § 112, ¶ 2 because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite.

The following limitations recited in the '790 Patent Asserted Claims are indefinite in whole, in part or in combination:[20]

Term	Relevant Claim(s)
"a plurality of detectors that are spatially separated from each other"	7
"increase the signal-to-noise ratio by comparing the first signal and the second signal"	7
"wherein the wearable device is at least in part configured to identify an object"	7
"wherein the detection system is configured to be synchronized to the light source"	7

[20] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

G. U.S. Patent No. 12,268,475

Pursuant to Rule 3-3(d), Defendants hereby identify grounds of invalidity for the ’475 Patent based on lack of written description under 35 U.S.C. § 112, first paragraph; lack of enablement under 35 U.S.C. § 112, first paragraph; indefiniteness under 35 U.S.C. § 112, second paragraph; and indefiniteness under 35 U.S.C. § 112, sixth paragraph. These contentions shall not be construed as an admission that any claim construction advanced by Defendants in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent Defendants from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff’s purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. Defendants’ invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court’s claim construction, as well as Plaintiff’s alleged scope of the ’475 Patent Asserted Claims. Consequently, Defendants only identify the issues under 35 U.S.C. § 112 of which they are presently aware.

1. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112, ¶ 1

The ’475 Patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the ’475 Patent Asserted Claims at the time the ’475 Patent was filed, at least as plaintiff appears to be asserting those limitations. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods, at least as plaintiff appears to

be asserting the claims. For example, the claims of the ’475 Patent do not provide sufficient written description of the limitations listed below.

The specification of the ’475 Patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the ’475 Patent Asserted Claims without undue experimentation, at least as plaintiff appears to be asserting those limitations. For example, the claims of the ’475 Patent fail to sufficiently enable the limitations listed below.

To the extent the following limitations are definite (under 35 U.S.C. § 112, ¶ 2), the application that became the ’475 Patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112, ¶ 1:[21]

Term	Relevant Claim(s)
“an apparatus adapted to be worn by a user”	1
“one or more biosensors adapted to be placed on the user”	1
“wherein measuring of the one or more physiological parameters comprises a differential measurement”	1
“the detection system further configured to: generate a first signal responsive to light received while the light emitting diodes are off,”	1, 8
“generate a second signal responsive to light received while at least one of the light emitting diodes is on, and”	1, 8
“increase the signal-to-noise ratio by comparing the first signal and the second signal; and”	1, 8
“signal is indicative of one or more of the physiological parameters”	1, 12
“wherein the apparatus is at least in part configured to determine, based at least in part on the output signal, that the apparatus is being worn by the user”	1, 8
“configured to use artificial intelligence in making decisions associated with at least a portion of the output signal”	5
“wherein the detection system comprises the plurality of detectors arranged along an arc.”	6
“wearable device configured to be worn by a user”	8
“lens positioned to direct at least a portion of the output light towards a bodily tissue of the user”	8

[21] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

Term	Relevant Claim(s)
"generate a third output signal using at least a portion of the first output signal and at least a portion of the second output signal, the third output signal having a third signal-to-noise ratio that is greater than the first signal-to-noise ratio and greater than the second signal-to-noise ratio, the third output signal being associated with a physiological parameter of the use"	8
the processor is further configured to modulate the light source with a modulation frequency.	13

2. Invalidity Under 35 U.S.C. § 112, ¶ 2

"[T]he second paragraph of § 112 contains two requirements: first, the claim must set forth what the applicant regards as his invention, and second, it must do so with sufficient particularity and distinctness, *i.e.*, the claim must be sufficiently definite." *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002) (internal quotation marks and alteration omitted). "Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention," the claim is "invalid under § 112, paragraph 2." *Id.* at 1349. Several of the '475 Patent Asserted Claims are invalid because it would be apparent to one of skill in the art, based on the specification, that the invention set forth in these claims are not what the patentee regarded as his invention, at least as the claims are being asserted by the Plaintiff. *Id.* These claims are invalid under the "applicant regards" prong of § 112 at least because they contain elements that differ from and/or conflict with the '475 Patent's written description of the invention, at least as the claim elements are being asserted by Plaintiff, or because they omit elements that one of skill in the art would understand as part of the '475 Patent's invention based on the specification.

Independently, under § 112, ¶ 2, "a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v.*

Biosig Instruments, Inc., 572 U.S. 898, 901 (2014). Several of the '475 Patent Asserted Claims are also invalid as indefinite under § 112, ¶ 2 because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite.

The following limitations recited in the '475 Patent Asserted Claims are indefinite in whole, in part or in combination:[22]

Term	Relevant Claim(s)
"differential measurement"	1
"a plurality of detectors that are spatially separated from each other"	1
"increase the signal-to-noise ratio by comparing the first signal and the second signal"	1
"wherein the detection system is configured to be synchronized to the light source"	1
"configured to use artificial intelligence in making decisions associated with at least a portion of the output signal"	5
"plurality of detectors arranged along an arc"	6

VII. Subject Matter Eligibility

Pursuant to the court's Standing Order Regarding Subject Matter Eligibility Contentions Applicable to All Patent Infringement Cases Assigned to Chief District Judge Rodney Gilstrap ("Order Regarding Eligibility"), Samsung provides the following Eligibility Contentions.

As described below, in Appendices A-G, and in Exhibits A101, B101, C101, D101, E101, F101, G101 (collectively "Appendix 101"), which are hereby incorporated by reference as if fully set forth herein, Defendants contend that the Asserted Claims of the Asserted Patents are drawn to subject matter that is not patentable under 35 U.S.C. § 101. Pursuant to section (a)(1) of the Order Regarding Eligibility, Appendix 101 contains a chart for each Asserted Patent identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis

[22] Listed claims also include all Asserted Claims dependent thereon, even if those claims are not individually listed.

therefor. Pursuant to section (a)(2)(A) of the Order Regarding Eligibility the charts of Appendix 101, read in conjunction with the discussion herein and in Appendices A-G, and together with the material described, referenced, or cited in the charts, further provide a description of the industry, at the relevant time, in which the Challenged Claims are alleged to be well understood, routine, and conventional, and the factual and legal basis therefor. Further, pursuant to sections (a)(2)(B) and (a)(3) of the Order Regarding Eligibility the charts of Appendix 101, read in conjunction with the discussion herein, and together with the material described, referenced, or cited in the charts, further provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Additionally, pursuant to section (b) of the Order Regarding Eligibility, Defendants are concurrently producing or making available for inspection and copying the materials on which Defendants presently seek to rely for subject-matter eligibility purposes. These prior art references and other materials are cited herein or in Appendices 101, A-G. For the avoidance of doubt, Defendants may rely on the materials identified in Section III, above. Without concession that expert testimony is necessary to resolve the subject matter eligibility of the Asserted Claims, Defendants reserve the right to further rely on expert testimony to be disclosed in accordance with the Docket Control Order. Defendants' search for prior art references, additional documentation, and/or corroborating evidence concerning prior art systems and devices is ongoing. Accordingly, Defendants reserve the right to supplement their production as Defendants obtain additional prior art references, documentation, and/or corroborating evidence concerning subject matter eligibility during the course of discovery.

Defendants reserve the right to supplement their document production pursuant to section (b) of the Order Regarding Eligibility as authorized by the Patent Local Rules, the Order Regarding Eligibility, or any other order of the Court.

A. U.S. Patent No. 9,055,868

Each of the Asserted Claims of the ’868 Patent is drawn to subject matter that is not patentable under 35 U.S.C. § 101. The ’868 Patent Asserted Claims are unpatentable for failure to recite patent eligible subject matter.

The ’868 Patent Asserted Claims are directed to abstract ideas and therefore not eligible subject matter under 35 U.S.C. § 101. *E.g.*, *Alice Corp. Pty. Ltd. v. CLS Bank Intern.*, 573 U.S. 208, 216 (2014). By way of example, the Asserted Claims of the ’868 Patent are generally directed to the abstract idea of collecting, processing, and storing light-based physiological data for diagnostics. Although the Asserted Claims recite concrete, tangible components, the specification provides no technical details but instead describes them—both individually and collectively—in generic and functional terms. *See, e.g.*, ’868 Patent at Figs. 1, 2, 4, 5 (illustrating exemplary embodiments via generic technology and functional language). This confirms that the recited physical components merely provide a generic environment in which to carry out the abstract idea of collecting, processing, and storing light-based physiological data. Indeed, the patent does not purport to have invented or improved signal generation or processing; data transmission or remote storage; or any sort of diagnostic technique. Thus, under *Alice* Step 1, the Asserted Claims of the ’868 Patent are directed to one or more ineligible concepts.

Under *Alice* Step 2, the ’868 Patent does not add an inventive step to the general abstract idea. The claimed elements, individually and as an ordered combination, recite only a “handful of generic computer components configured to implement” the abstract idea. *See Alice*, 573 U.S. at

226. Semiconductor diodes and the claimed lens system have long been used in optical sensing; touchscreens, location sensors, applications, and wireless transceivers are common in smartphones; and terms like "host," "digital file," and "control logic" represent generic computer components. Optical systems, phone applications, and remote storage are well-known, and their combination follows the general trend toward interconnectivity. *See Chamberlain Grp., Inc. v. Techtronic Indus. Co.*, 935 F.3d 1341, 1347–48 (Fed. Cir. 2019) (noting the ability to "transmit[] data wirelessly" is "not a technological improvement, but rather simply a feature of wireless communication"). The '868 Patent, moreover, does not recite any new or improved algorithm, measurement method, or hardware design. *See Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016) ("We have repeatedly held that such invocation of computers and networks that are not even arguably inventive are insufficient to pass the test of an inventive concept in the application of an abstract idea." (cleaned up)). Instead, the '868 Patent recites functional, result-oriented language that fails to transform the claimed abstract idea beyond routine and conventional tasks. *See, e.g., Intell. Ventures I LLC v. Cap. Fin. Corp.*, 850 F.3d 1332, 1342 (Fed. Cir. 2017). The law requires more.

Pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit A101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit A101 each Challenged Claim of the '868 Patent is directed to one or more abstract ideas and therefore is not directed to patent eligible subject matter. Exhibit A101 also identifies claim 7 as representative of the other Challenged Claims for purposes of the eligibility inquiry. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit A101, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged

Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Defendants provide the following description of the relevant industry at the relevant time. As of the alleged priority date for the '868 Patent, the relevant industry was well-developed. All individual elements disclosed and recited in the '868 Patent were conventional, routine, and well known in the medical device and wearable health tech industries. *See generally* Appendix A. As shown in the accompanying claim charts, none of the claimed concepts were new or merely on the verge of development as of the alleged priority date of the '868 Patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The '868 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

Further detail regarding Defendants' contentions that the Asserted Claims of the '868 Patent do not qualify as patent-eligible subject matter are contained in Exhibit A101.

B. U.S. Patent No. 9,651,533

Each of the Asserted Claims of the '533 Patent is drawn to subject matter that is not patentable under 35 U.S.C. § 101. The '533 Patent Asserted Claims are unpatentable for failure to recite patent eligible subject matter.

The '533 Patent Asserted Claims are directed to abstract ideas and therefore not eligible subject matter under 35 U.S.C. § 101. *E.g.*, *Alice*, 573 U.S. at 216. By way of example, the Asserted Claims of the '533 Patent are generally directed to the abstract idea of collecting,

processing, and storing light-based data for analysis. Although the Asserted Claims recite concrete, tangible components, the specification provides no technical details but instead describes them—both individually and collectively—in generic and functional terms. *See, e.g.*, ’533 Patent at 9:34-38, 2:26-29, 26:49-27:2. This confirms that the recited physical components merely provide a generic environment in which to carry out the abstract idea of collecting, processing, and storing light-based data. Indeed, the patent does not purport to have invented or improved signal generation or processing; data transmission or remote storage; or any sort of measurement technique. Thus, under *Alice* Step 1, the Asserted Claims of the ’533 Patent are directed to one or more ineligible concepts.

Under *Alice* Step 2, the ’533 Patent does not add an inventive step to the general abstract idea. The claimed elements, individually and as an ordered combination, recite only a “handful of generic computer components configured to implement” the abstract idea. *See Alice*, 573 U.S. at 226. Semiconductor diodes, filters, and lenses have long been used in optical sensing; touchscreens, receivers, and transmitters are common in smartphones; and a “remote device” represents a conventional computer or storage unit. Optical systems, phone applications, and remote storage are well-known, and their combination follows the general trend toward interconnectivity. *See Chamberlain*, 935 F.3d at 1347–48. The ’533 Patent, moreover, does not recite any new or improved algorithm, measurement method, or hardware design. Instead, the ’533 Patent recites functional, result-oriented language that fails to transform the claimed abstract idea beyond routine and conventional tasks. *See, e.g., Intell. Ventures*, 850 F.3d at 1342. The law requires more.

Pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit B101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual

and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit B101, each Challenged Claim of the ’533 Patent is directed to one or more abstract ideas and therefore is not directed to patent eligible subject matter. Exhibit B101 also identifies claim 11 as representative of the other Challenged Claims for purposes of the eligibility inquiry. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit B101, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Defendants provide the following description of the relevant industry at the relevant time. As of the alleged priority date for the ’533 Patent, the relevant industry was well-developed. All individual elements disclosed and recited in the ’533 Patent were conventional, routine, and well known in the optoelectronics and laboratory analytical instrumentation industries. *See generally* Appendix B. As shown in the accompanying claim charts, none of the claimed concepts were new or merely on the verge of development as of the alleged priority date of the ’533 Patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The ’533 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

Further detail regarding Defendants’ contentions that the Asserted Claims of the ’533 Patent do not qualify as patent-eligible subject matter are contained in Exhibit B101.

C. U.S. Patent No. 10,517,484

Each of the Asserted Claims of the ’484 Patent is drawn to subject matter that is not patentable under 35 U.S.C. § 101. The ’484 Patent Asserted Claims are unpatentable for failure to recite patent eligible subject matter.

The ’484 Patent Asserted Claims are directed to abstract ideas and therefore not eligible subject matter under 35 U.S.C. § 101. *E.g.*, *Alice*, 573 U.S. at 216. By way of example, the Asserted Claims of the ’484 Patent are generally directed to the abstract ideas of collecting, processing, and storing light-based physiological data for analysis. Although the Asserted Claims recite concrete, tangible components, the specification provides no technical details but instead describes them—both individually and collectively—in generic and functional terms. *See, e.g.*, ’484 Patent at 11:3-6, 32:45-65. This confirms that the recited physical components merely provide a generic environment in which to carry out the abstract idea of collecting, processing, and storing light-based data. Indeed, the patent does not purport to have invented or improved signal generation or processing; data transmission or remote storage; or any sort of measurement technique. Thus, under *Alice* Step 1, the Asserted Claims of the ’484 Patent are directed to one or more ineligible concepts.

Under *Alice* Step 2, the ’484 Patent does not add an inventive step to the general abstract idea. The claimed elements, individually and as an ordered combination, recite only a “handful of generic computer components configured to implement” the abstract idea. *See Alice*, 573 U.S. at 226. Semiconductor diodes, detectors, and lenses have long been used in optical sensing; touchscreens, receivers, and transmitters are common in smartphones; and the cloud is ubiquitous with modern computing. Optical systems, phone applications, and remote storage are well-known, and their combination follows the general trend toward interconnectivity. *See Chamberlain*, 935

F.3d at 1347–48. The ’484 Patent, moreover, does not recite any new or improved algorithm, measurement method, or hardware design. Instead, the ’484 Patent recites functional, result-oriented language that fails to transform the claimed abstract idea beyond routine and conventional tasks. *See, e.g.*, *Intell. Ventures*, 850 F.3d at 1342. The law requires more.

Pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit C101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit C101, each Challenged Claim of the ’484 Patent is directed to one or more abstract ideas and therefore is not directed to patent eligible subject matter. Exhibit C101 also identifies claim 8 as representative of the other Challenged Claims for purposes of the eligibility inquiry. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit C101, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Defendants provide the following description of the relevant industry at the relevant time. As of the alleged priority date for the ’484 Patent, the relevant industry was well-developed. All individual elements disclosed and recited in the ’484 Patent were conventional, routine, and well known in the medical device and wearable health tech industries. *See generally* Appendix C. As shown in the accompanying claim charts, none of the claimed concepts were new or merely on the verge of development as of the alleged priority date of the ’484 Patent. Instead, these concepts had been

known for years and were the subject of many published articles and/or patents from around the world. The ’484 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

Further detail regarding Defendants’ contentions that the Asserted Claims of the ’484 Patent do not qualify as patent-eligible subject matter are contained in Exhibit C101.

D. U.S. Patent No. 10,874,304

Each of the Asserted Claims of the ’304 Patent is drawn to subject matter that is not patentable under 35 U.S.C. § 101. The ’304 Patent Asserted Claims are unpatentable for failure to recite patent eligible subject matter.

The ’304 Patent Asserted Claims are directed to abstract ideas and therefore not eligible subject matter under 35 U.S.C. § 101. *E.g.*, *Alice*, 573 U.S. at 216. By way of example, the Asserted Claims of the ’304 Patent are generally directed to the abstract ideas of collecting, processing, and storing light-based physiological data for analysis. Although the Asserted Claims recite concrete, tangible components, the specification provides no technical details but instead describes them—both individually and collectively—in generic and functional terms. *See, e.g.*, ’304 Patent at 13:21-25, 33:45-64. This confirms that the recited physical components merely provide a generic environment in which to carry out the abstract idea of collecting, processing, and storing light-based physiological data. Indeed, the patent does not purport to have invented or improved signal generation or processing; data transmission or remote storage; or any sort of measurement technique. Thus, under *Alice* Step 1, the Asserted Claims of the ’304 Patent are directed to one or more ineligible concepts.

Under *Alice* Step 2, the ’304 Patent does not add an inventive step to the general abstract idea. The claimed elements, individually and as an ordered combination, recite only a “handful of

generic computer components configured to implement" the abstract idea. *See Alice*, 573 U.S. at 226. Semiconductor diodes and receivers have long been used in optical sensing; touchscreens, receivers, and transmitters are common in smartphones; and the cloud is ubiquitous with modern computing. Optical systems, phone applications, and remote storage are well-known, and their combination follows the general trend toward interconnectivity. *See Chamberlain*, 935 F.3d at 1347–48. The '304 Patent, moreover, does not recite any new or improved algorithm, measurement method, or hardware design. Instead, the '484 Patent recites functional, result-oriented language that fails to transform the claimed abstract idea beyond routine and conventional tasks. *See, e.g., Intell. Ventures*, 850 F.3d at 1342. The law requires more.

Pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit D101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit D101 each Challenged Claim of the '304 Patent is directed to one or more abstract ideas and therefore is not directed to patent eligible subject matter. Exhibit D101 also identifies claim 11 as representative of the other Challenged Claims for purposes of the eligibility inquiry. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit D101, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Defendants provide the following description of the relevant industry at the relevant time. As of the alleged

priority date for the ’304 Patent, the relevant industry was well-developed. All individual elements disclosed and recited in the ’304 Patent were conventional, routine, and well known in the medical device and wearable health tech industries. *See generally* Appendix D. As shown in the accompanying claim charts, none of the claimed concepts were new or merely on the verge of development as of the alleged priority date of the ’304 Patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The ’304 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

Further detail regarding Defendants’ contentions that the Asserted Claims of the ’304 Patent do not qualify as patent-eligible subject matter are contained in Exhibit D101.

E. U.S. Patent No. 11,160,455

Each of the Asserted Claims of the ’455 Patent is drawn to subject matter that is not patentable under 35 U.S.C. § 101. The ’455 Patent Asserted Claims are unpatentable for failure to recite patent eligible subject matter.

The ’455 Patent Asserted Claims are directed to abstract ideas and therefore not eligible subject matter under 35 U.S.C. § 101. *E.g.*, *Alice*, 573 U.S. at 216. By way of example, the Asserted Claims of the ’455 Patent are generally directed to the abstract ideas of collecting, processing, and storing light-based physiological data for analysis. Although the Asserted Claims recite concrete, tangible components, the specification provides no technical details but instead describes them—both individually and collectively—in generic and functional terms. *See, e.g.*, ’455 Patent at 16:66-17:3, 45:43-62. This confirms that the recited physical components merely provide a generic environment in which to carry out the abstract idea of collecting, processing, and storing light-based physiological data. Indeed, the patent does not purport to have invented or

improved signal generation or processing; data transmission or remote storage; or any sort of measurement technique. Thus, under *Alice* Step 1, the Asserted Claims of the ’455 Patent are directed to one or more ineligible concepts.

Under *Alice* Step 2, the ’455 Patent does not add an inventive step to the general abstract idea. The claimed elements, individually and as an ordered combination, recite only a “handful of generic computer components configured to implement” the abstract idea. *See Alice*, 573 U.S. at 226. Semiconductor sources, lenses, and detectors have long been used in optical sensing; touchscreens, receivers, and transmitters are common in smartphones; and the combination of optical systems and smartphones follows the general trend toward interconnectivity. *See Chamberlain*, 935 F.3d at 1347–48. The ’455 Patent, moreover, does not recite any new or improved algorithm, measurement method, or hardware design. Instead, the ’455 Patent recites functional, result-oriented language that fails to transform the claimed abstract idea beyond routine and conventional tasks. *See, e.g.*, *Intell. Ventures*, 850 F.3d at 1342. The law requires more.

Pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit E101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit E101 each Challenged Claim of the ’455 Patent is directed to one or more abstract ideas and therefore is not directed to patent eligible subject matter. Exhibit E101 also identifies claim 1 as representative of the other Challenged Claims for purposes of the eligibility inquiry. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit E101, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an

identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Defendants provide the following description of the relevant industry at the relevant time. As of the alleged priority date for the ’455 Patent, the relevant industry was well-developed. All individual elements disclosed and recited in the ’455 Patent were conventional, routine, and well known in the medical device and wearable health tech industries. *See generally* Appendix E. As shown in the accompanying claim charts, none of the claimed concepts were new or merely on the verge of development as of the alleged priority date of the ’455 Patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The ’455 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

Further detail regarding Defendants’ contentions that the Asserted Claims of the ’455 Patent do not qualify as patent-eligible subject matter are contained in Exhibit E101.

F. U.S. Patent No. 12,193,790

The Asserted Claim of the ’790 Patent is drawn to subject matter that is not patentable under 35 U.S.C. § 101. The ’790 Patent Asserted Claim is unpatentable for failure to recite patent eligible subject matter.

The ’790 Patent Asserted Claim is directed to abstract ideas and therefore not eligible subject matter under 35 U.S.C. § 101. *E.g.*, *Alice*, 573 U.S. at 216. By way of example, the Asserted Claim of the ’790 Patent is generally directed to the abstract idea of collecting and processing light-based data to determine physiological parameters. Although the Asserted Claim recites concrete, tangible components, the specification provides no technical details but instead

describes them—both individually and collectively—in generic and functional terms. *See, e.g.*, ’790 Patent at 7:50-55, 84:63-67, 32:28-67. This confirms that the recited physical components merely provide a generic environment in which to carry out the abstract idea of collecting and processing natural phenomena. Indeed, the patent does not purport to have invented or improved signal generation or processing; data transmission or remote storage; or any sort of measurement technique. Thus, under *Alice* Step 1, the Asserted Claim of the ’790 Patent is directed to one or more ineligible concepts.

Under *Alice* Step 2, the ’790 Patent does not add an inventive step to the general abstract idea. The claimed elements, individually and as an ordered combination, recite only a “handful of generic computer components configured to implement” the abstract idea. *See Alice*, 573 U.S. at 226. The claimed light source (e.g., LEDs), semiconductor diodes, lenses, detection system, detectors, and analog-to-digital converters are conventional and perform their ordinary, expected functions. The claimed enhancement of signal-to-noise ratio by increasing light intensity or by subtracting background signal is a well-known technique in signal processing and does not constitute an unconventional arrangement or improvement in technology. The ’790 Patent, moreover, does not recite any new or improved algorithm, measurement method, or hardware design. Instead, the ’790 Patent recites functional, result-oriented language that fails to transform the claimed abstract idea beyond routine and conventional tasks. *See, e.g.*, *Intell. Ventures*, 850 F.3d at 1342. The law requires more.

Pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit F101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit F101 each Challenged Claim of the ’790 Patent is directed to one or more abstract ideas and therefore is not

directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit F101, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Defendants provide the following description of the relevant industry at the relevant time. As of the alleged priority date for the '790 Patent, the relevant industry was well-developed. All individual elements disclosed and recited in the '790 Patent were conventional, routine, and well known in the medical device and wearable health tech industries. *See generally* Appendix F. As shown in the accompanying claim charts, none of the claimed concepts were new or merely on the verge of development as of the alleged priority date of the '790 Patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The '790 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period.

Further detail regarding Defendants' contentions that the Asserted Claims of the '790 Patent do not qualify as patent-eligible subject matter are contained in Exhibit F101.

G. U.S. Patent No. 12,268,475

The Asserted Claims of the '475 Patent are drawn to subject matter that is not patentable under 35 U.S.C. § 101. The '475 Patent Asserted Claims are unpatentable for failure to recite patent eligible subject matter.

The '475 Patent Asserted Claims are directed to abstract ideas and therefore not eligible

subject matter under 35 U.S.C. § 101. *E.g.*, *Alice*, 573 U.S. at 216. By way of example, the Asserted Claims of the ’475 Patent are generally directed to the abstract idea of collecting and processing light-based data to determine physiological parameters. Although the Asserted Claims recite concrete, tangible components, the specification provides no technical details but instead describes them—both individually and collectively—in generic and functional terms. *See, e.g.*, ’475 Patent at 3:18–19, 3:37–51, 15:20–21, 20:65–21:13. This confirms that the recited physical components merely provide a generic environment in which to carry out the abstract idea of collecting and processing natural phenomena. Indeed, the patent does not purport to have invented or improved signal generation or processing; data transmission or remote storage; or any sort of measurement technique. Thus, under *Alice* Step 1, the Asserted Claims of the ’475 Patent are directed to one or more ineligible concepts.

Under *Alice* Step 2, the ’475 Patent does not add an inventive step to the general abstract idea. The claimed elements, individually and as an ordered combination, recite only a “handful of generic computer components configured to implement” the abstract idea. *See Alice*, 573 U.S. at 226. The claimed light source (e.g., LEDs), semiconductor diodes, lenses, detection system, detectors, and analog-to-digital converters are conventional and perform their ordinary, expected functions. The claimed enhancement of signal-to-noise ratio by increasing light intensity or by subtracting background signal is a well-known technique in signal processing and does not constitute an unconventional arrangement or improvement in technology. The ’475 Patent, moreover, does not recite any new or improved algorithm, measurement method, or hardware design. Instead, the ’475 Patent recites functional, result-oriented language that fails to transform the claimed abstract idea beyond routine and conventional tasks. *See, e.g.*, *Intell. Ventures*, 850 F.3d at 1342. The law requires more.

Pursuant to section (a)(1) of the Order Regarding Eligibility, Exhibit G101 contains a chart identifying each exception to eligibility to which each Challenged Claim is directed and the factual and legal basis therefor. For avoidance of doubt, and as set forth above and in Exhibit G101 each Challenged Claim of the ’475 Patent is directed to one or more abstract ideas and therefore is not directed to patent eligible subject matter. Also, pursuant to section (a)(2)(B) and (a)(3) of the Order regarding Eligibility, Exhibit G101, read in conjunction with the preceding paragraphs herein provides: (i) a description of how each element of each Challenged Claim, both individually and in combination with the other elements of that claim, was well understood, routine, and/or conventional in the relevant industry at the relevant time and (ii) an identification of the factual or legal basis for how the Challenged Claims are otherwise ineligible for patent protection.

Finally, pursuant to section (a)(2)(A) of the Order Regarding Eligibility, Defendants provide the following description of the relevant industry at the relevant time. As of the alleged priority date for the ’475 Patent, the relevant industry was well-developed. All individual elements disclosed and recited in the ’475 Patent were conventional, routine, and well known in the medical device and wearable health tech industries. *See generally* Appendix G. As shown in the accompanying claim charts, none of the claimed concepts were new or merely on the verge of development as of the alleged priority date of the ’475 Patent. Instead, these concepts had been known for years and were the subject of many published articles and/or patents from around the world. The ’475 Patent contributed nothing beyond what was already conventional, routine, well-known technology as of the relevant time period. Further detail regarding Defendants’ contentions that the Asserted Claims of the ’475 Patent do not qualify as patent-eligible subject matter are contained in Exhibit G101.

VIII. P. R. 3-4 – Productions

Pursuant to P.R. 3-4(a), each Defendant is concurrently producing and/or making available for inspection documents and other materials sufficient to show the operation of any aspects or elements of the Accused Products identified by Plaintiff in its P.R. 3-1(c) charts.

Additionally, and pursuant to P.R. 3-4(b), Defendants are concurrently producing a copy of each item of prior art identified herein. These prior art references and corroborating evidence are cited in attached invalidity claim charts in Appendices 101, A-G. Defendants will also make available for inspection any prior art systems or devices upon request to the extent Defendants acquire such systems or devices. References that were cited during prosecution of the Asserted Patents may not be contained in Defendants' production as they are not required to be under the local patent rules. Defendants' search for prior art references, additional documentation, and/or corroborating evidence concerning prior art systems and devices is ongoing. Accordingly, Defendants reserve the right to supplement their production as Defendants obtain additional prior art references, documentation, and/or corroborating evidence concerning invalidity during the course of discovery.

Defendants reserve the right to supplement their P. R. 3-4 document production pursuant to the Patent Local Rules and the orders of the Court.

Dated: July 18, 2025 July 18, 2025 Respectfully Submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the above and foregoing document has been electronically filed using the CM/ECF filing system on July 18, 2025, which automatically sends email notifications to all counsel of record and which will permit viewing and downloading of same from the CM/ECF system.

/s/ Jared Smith
Jared Smith