IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Ammar Al-Ali	
U.S. Patent No.:	10,687,743	Attorney Docket No. 50095-0133IP2
Issue Date:	June 23, 2020	
Appl. Serial No.:	16/791,955	
Filing Date:	February 14, 2020	
Title:	PHYSIOLOGICAL MEASUREMENT DEVICES, SYSTEMS, AND METHODS	

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PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT NO. 10,687,743 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42

TABLE OF CONTENTS

I. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104 1
A. Standing 1
B. Challenge and Relief Requested 1
II. SUMMARY OF THE '743 PATENT 2
A. Brief Description 2
B. Summary of the Prosecution History 5
C. Level of Ordinary Skill in the Art 6
III. CLAIM CONSTRUCTION UNDER 37 C.F.R. §§ 42.104(b)(3) 7
IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE 7
A. Ground 2A: Claims 1, 3-6, 9-13, and 22-25 are obvious over Sarantos in view of Shie 7
1. Overview of Sarantos 7
2. Overview of Shie 10
3. Combination of Sarantos and Shie 10
4. Analysis 15
B. Ground 2B: Claim 7 is obvious over Sarantos and Shie in view of Utter 42
1. Overview of Utter 42
2. Sarantos-Shie-Utter (SSU) Combination 46
3. Analysis 51
C. Ground 2C: Claim 8 is obvious over Sarantos, Shie, and Han 51
1. Overview of Han 51
2. Sarantos-Shie-Han Combination 52
3. Analysis 54
D. Ground 2D: Claims 14 and 16-21 are obvious over Sarantos, Shie, Utter, and Han 56
1. Sarantos-Shie-Utter-Han (SSUH) Combination 56
2. Analysis 57
V. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION 61
A. 314(a) – *Fintiv* 61
1. Factor 1: Neither Party has yet Requested a Stay with Respect to the '743 Patent 63
2. Factor 2: The Board and Parties can Only Speculate as to the Trial Date, and Statistics Disfavor Denial 64

3. Factor 3: Petitioner's Diligence and Investment in IPR Disfavors Denial 66
4. Factor 4: The Petition's Grounds are Materially Different from Any that Might be Raised in Litigation.....69
5. Factor 5: The PTAB Parties are Not Different Than District Court Parties 72
6. Factor 6: The Merits of this Petition Compel Institution.....73
B. 325(d) – Advanced Bionics 75

VI. PAYMENT OF FEES – 37 C.F.R. §42.103.....78

VII. CONCLUSION.....79

VIII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8.....79
A. Real Parties-In-Interest Under 37 C.F.R. §42.8(b)(1).....79
B. Related Matters Under 37 C.F.R. §42.8(b)(2).....79
C. Lead And Back-Up Counsel Under 37 C.F.R. §42.8(b)(3).....80
D. Service Information 80

LIST OF EXHIBITS

APPLE-1001	U.S. Patent No. 10,687,743
APPLE-1002	U.S. Patent No. 10,687,743 File History
APPLE-1003	Declaration of Dr. Brian Anthony
APPLE-1004	U.S. Patent No. 8,670,819 to Iwamiya
APPLE-1005	U.S. Patent No. 9,392,946 to Sarantos
APPLE-1006	U.S. Patent No. 8,446,275 to Utter
APPLE-1007	U.S. Patent No. 6,483,976 to Shie
APPLE-1008	U.S. Patent Pub. No. 2016/0058312 ("Han")
APPLE-1009	U.S. Patent Pub. No. 2015/0018647 ("Mandel")
APPLE-1010 – APPLE-1012	RESERVED
APPLE-1013	Design of Pulse Oximeters, J.G. Webster; Institution of Physics Publishing, 1997 ("Webster")
APPLE-1014	PCT Pub. No. WO 2013089712 ("Kokovidis")
APPLE-1015	U.S. Patent No. 10,905,348 to Grunwald
APPLE-1016	U.S. Patent No. 6,014,576 to Raley
APPLE-1017	U.S. Patent No. 10,470,695 (the "'695 patent")

APPLE-1018 – APPLE-1030 RESERVED

APPLE-1031 *Masimo Corporation, et al. v. Apple Inc*., Redacted Complaint, ITC Inv. No. 337-TA-1276

APPLE-1032 RESERVED

APPLE-1033 Bronzino, *The Biomedical Engineering Handbook*, CRC Press, Inc. (1995) ("Bronzino")

APPLE-1034 Severinghaus et al., Recent Developments in Pulse Oximetry, Anesthesiology, Vol. 76, No. 6 (June 1992)

APPLE-1035 Duffy, MIO Alpha BLE Review, PC Magazine (Jan. 28, 2013) available at https://www.pcmag.com/reviews/mio-alpha-ble

APPLE-1036 U.S. Patent No. 10,687,745 (the "'745 patent")

APPLE-1037 – APPLE-1059 RESERVED

APPLE-1060 Combined Civil and Criminal Federal Court Management Statistics (Sep. 30, 2023) | United States Courts (uscourts.gov), https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0630.2023.pdf

APPLE-1061 Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) ("*Director's Guidance*")

APPLE-1062 Apple's Complaint for Patent Infringement (Design), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01377 (D. Del. Oct. 20, 2022)

APPLE-1063 Apple's Complaint for Patent Infringement (Utility), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Oct. 20, 2022)

APPLE-1064	Defendant Masimo Corporation's Answer to Complaint and Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Dec. 12, 2022)
APPLE-1065	Order Granting Joint Motion to Amend the Case Schedule, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Sep. 21, 2023)
APPLE-1066	Stipulation by Apple Inc.
APPLE-1067	Email Identifying Masimo's District Court Invalidity Grounds (Nov. 16, 2023)
APPLE-1068	Excerpt of Apple's District Court Expert Invalidity Report (Nov. 22, 2023)
APPLE-1069	Order Granting Unopposed Motion to Stay Certain Patent Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Jan. 10, 2023)
APPLE-1070	[RESERVED]
APPLE-1071	U.S. Patent No. 10,687,745 to Al-Ali ("the '745 patent")
APPLE-1072	Institution Decision, *Apple Inc. v. Masimo Corp.*, IPR2022-01291 Pap. 15 (PTAB Feb. 1, 2023)
APPLE-1073	U.S. Patent No. 10,470,695 to Al-Ali ("the '695 patent")
APPLE-1074	Final Written Decision, *Apple Inc. v. Masimo Corp.*, IPR2020-01722 Pap. 29 (PTAB May 5, 2022)

LISTING OF CHALLENGED CLAIMS

Claim 1	
[1pre]	A physiological measurement device comprising:
[1a]	one or more emitters configured to emit light in an initial light pattern;
[1b]	an optical transmission material configured to be positioned between the one or more emitters and a tissue measurement site, wherein the optical transmission material is configured to alter a direction of at least a portion of the light emitted from the one or more emitters to shape an output light pattern by which the emitted light is directed toward a surface of the tissue measurement site, wherein the output light pattern comprises a different geometric shape than the initial light pattern;
[1c]	a plurality of detectors configured to detect at least a portion of the light after passing through tissue, the plurality of detectors further configured to output at least one signal responsive to the detected light;

[1d]	a light block configured to prevent at least a portion of the light emitted from the one or more emitters from reaching the plurality of detectors without first reaching the tissue;
[1e]	a surface comprising a dark-colored coating, the surface positioned between the plurality of detectors and the tissue, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface; and
[1f]	a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signals.
Claim 3	
[3]	The physiological measurement device of claim 1, wherein the optical transmission material comprises glass.
Claim 4	
[4]	The physiological measurement device of claim 1, wherein the optical transmission material comprises plastic.

Claim 5	
[5]	The physiological measurement device of claim 1, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to a shape of a portion of the tissue measurement site bounded by the light block.
Claim 6	
[6]	The physiological measurement device of claim 1, wherein the dark-colored coating comprises black pigment.
Claim 7	
[7]	The physiological measurement device of claim 1, wherein the device is configured to wirelessly transmit physiological parameter data to a separate device.
Claim 8	
[8]	The physiological measurement device of claim 1, further comprising a touch-screen display configured to present information related to the determined physiological parameter.

Claim 9	
[9]	The physiological measurement device of claim 1, wherein the output light pattern comprises a width and a length, and wherein the width is different than the length.
Claim 10	
[10]	The physiological measurement device of claim 1, wherein the output light pattern comprises an oval shape.
Claim 11	
[11]	The physiological measurement device of claim 1, wherein the physiological parameter is oxygen saturation.
Claim 12	
[12]	The physiological measurement device of claim 1, wherein the physiological parameter is pulse rate.
Claim 13	
[13]	The physiological measurement device of claim 1, wherein the opening defined in the dark-colored coating comprises a width and a length, and wherein the width is larger than the length.

Claim 14	
[14pre]	A physiological measurement device comprising:
[14a]	one or more optical sources configured to emit light of one or more wavelengths in an initial light pattern proximate a wrist of a user;
[14b]	an optical transmission material configured to be positioned between the one or more optical sources and a tissue measurement site, wherein the optical transmission material is configured to alter a direction of at least a portion of the light emitted from the one or more optical sources to shape an output light pattern by which the emitted light is projected toward a surface of the tissue measurement site, the output light pattern comprising a different geometric shape than the initial light pattern;
[14c]	a plurality of detectors configured to detect at least a portion of the light after passing through tissue, the plurality of detectors further configured to output at least one signal responsive to the detected light, wherein the one or more optical sources and the plurality of detectors are arranged in a reflectance measurement configuration;

[14d]	a light block configured to prevent at least a portion of light emitted from the one or more optical sources from reaching the plurality of detectors without first reaching the tissue;
[14e]	a surface comprising a dark-colored coating, the surface positioned between the plurality of detectors and the tissue, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface;
[14f]	a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of the user responsive to the one or more signals; and
[14g]	a touch-screen display configured to present information responsive to the determined physiological parameter;
[14h]	wherein the physiological measurement device is configured to wirelessly transmit physiological parameter data to a separate device.

Claim 16	
[16]	The physiological measurement device of claim 14, wherein the optical transmission material comprises at least one of glass and plastic.
Claim 17	
[17]	The physiological measurement device of claim 14, wherein the output light pattern comprises a width and a length, and wherein the width is different than the length.
Claim 18	
[18]	The physiological measurement device of claim 14, wherein the physiological parameter is oxygen saturation.
Claim 19	
[19]	The physiological measurement device of claim 14, wherein the physiological parameter is pulse rate.
Claim 20	
[20]	The physiological measurement device of claim 14, wherein the opening defined in the dark-colored coating comprises a width and a length, and wherein the width is larger than the length.

Claim 21	
[21]	The physiological measurement device of claim 14, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to a shape of a portion of the tissue measurement site bounded by the light block.
Claim 22	
[22pre]	A physiological measurement device comprising:
[22a]	one or more emitters configured to emit light;
[22b]	a diffuser configured to be positioned between the one or more emitters and a tissue measurement site;
[22c]	a circular shaped light block;
[22d]	a plurality of detectors configured to detect at least a portion of the light after the light passes through a portion of the tissue measurement site bounded by the light block, wherein the plurality of detectors are arranged in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site bounded by the circular shaped light block, wherein the plurality of detectors are further configured to output at least one signal responsive to the detected light;

[22e]	wherein the light block is configured to prevent at least a portion of light emitted from the one or more emitters from reaching the plurality of detectors without first reaching tissue; and
[22f]	a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of the user responsive to the one or more signals.
Claim 23	
[23]	The physiological measurement device of claim 22, wherein the one or more emitters are configured to emit the light in an initial light pattern, and wherein the diffuser comprises an optical transmission material configured to alter a direction of at least a portion of the light emitted from the one or more emitters to shape an output light pattern by which the emitted light is directed toward a surface of the tissue measurement site, and wherein the output light pattern comprises a different geometric shape than the initial light pattern.
Claim 24	
[24]	The physiological measurement device of claim 22, wherein the physiological parameter is oxygen saturation.

Claim 25	
[25]	The physiological measurement device of claim 22, wherein the physiological parameter is pulse rate.

Apple Inc. ("Petitioner" or "Apple") petitions for *Inter Partes* Review ("IPR") of claims 1, 3-14, and 16-25 (the "Challenged Claims") of U.S. Patent 10,687,743 ("the '743 Patent"). Apple submits that this Petition demonstrates a reasonable likelihood of prevailing with respect to at least one Challenged Claim, and respectfully requests institution of IPR and cancellation of all Challenged Claims as unpatentable.

I. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Standing

Apple certifies that the '743 Patent is available for IPR. Apple is not barred or estopped from requesting this review challenging the Challenged Claims on the below-identified grounds.

B. Challenge and Relief Requested

Apple requests IPR of the Challenged Claims on the grounds set forth in the table shown below. Additional explanation and support for each ground is set forth in the Declaration of Brian Anthony, Ph.D. (APPLE-1003), referenced throughout this Petition. APPLE-1003, ¶¶[1]-[144].

Ground	Claims	Basis for Rejection (35 U.S.C. § 103)
2A	1, 3-6, 9-13, 22-25	Sarantos in view of Shie
2B	7	Sarantos in view of Shie and Utter
2C	8	Sarantos in view of Shie and Han

Ground	Claims	Basis for Rejection (35 U.S.C. § 103)
2D	14, 16-21	Sarantos in view of Shie, Utter, and Han

The '743 Patent claims priority to provisional application 62/188,430, filed on July 2, 2015. While Petitioner does not take a position as to whether the '743 Patent is entitled to a priority date of July 2, 2015, for the purposes of this petition only, Petitioner has used July 2, 2015 as the earliest possible priority date ("Critical Date") of the Challenged Claims. Each of the prior art references applied in the Grounds listed above qualifies as prior art to the '743 Patent on at least the bases shown below:

Reference	Filed	Published	35 U.S.C. §102 Prior Art Basis
Sarantos	05/28/2015	07/19/2016	§102(a)(2)
Shie	05/09/2001	11/19/2002	§102(a)(1), §102(a)(2)
Han	12/12/2014	03/03/2016	§102(a)(2)
Utter	04/23/2012	05/21/2013	§102(a)(1), §102(a)(2)

II. SUMMARY OF THE '743 PATENT

A. Brief Description

The '743 Patent, entitled "Physiological Measurement Devices, Systems, and Methods," describes a "non-invasive, optical-based physiological monitoring system." APPLE-1001, Face, Abstract; APPLE-1003, ¶¶[[15]-[30]. FIGS. 7A and 7B of the '743 patent are reproduced below:

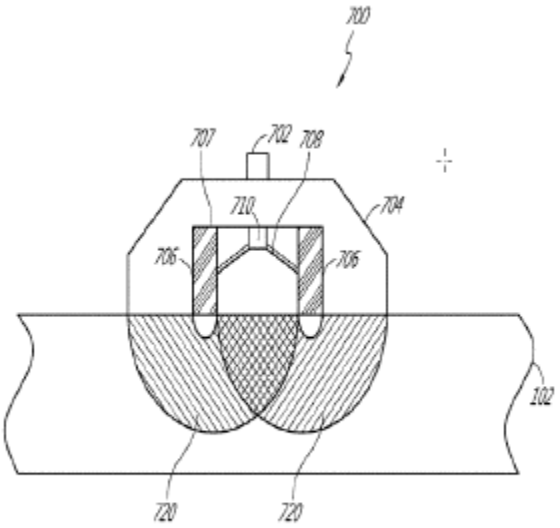


FIG. 7A

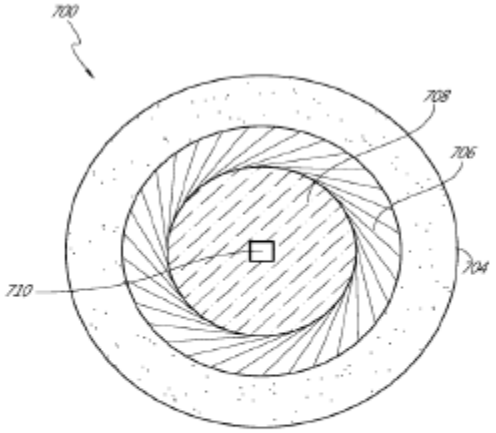


FIG. 7B

APPLE-1001, FIG. 7A (left), FIG. 7B (right).

FIGS. 7A and 7B above depict side and top views, respectively, of a three-dimensional pulse oximetry sensor according to an embodiment of the '743 patent. APPLE-1001, 5:28–33. Sensor 700 includes emitter 702, light diffuser 704, light block (or blocker) 706, light concentrator 708, and detector 710. APPLE-1001, 10:49–51. The sensor functions to irradiate tissue measurement site 102, e.g., a patient's wrist, and detects emitted light that is reflected by the tissue measurement site. APPLE-1001, 10:43–49. "[L]ight blocker 706 includes an annular ring having a cover portion 707 sized and shaped to form a light isolation chamber for the light concentrator 708 and the detector 710." APPLE-1001, 11:10–12. "[L]ight blocker 706 and cover 707 ensures that the only light detected by the detector 710 is light that is reflected from the tissue measurement site." APPLE-

1001, 11:16–19; APPLE-1003, ¶[31].

FIG. 8 of the '743 patent is reproduced below:

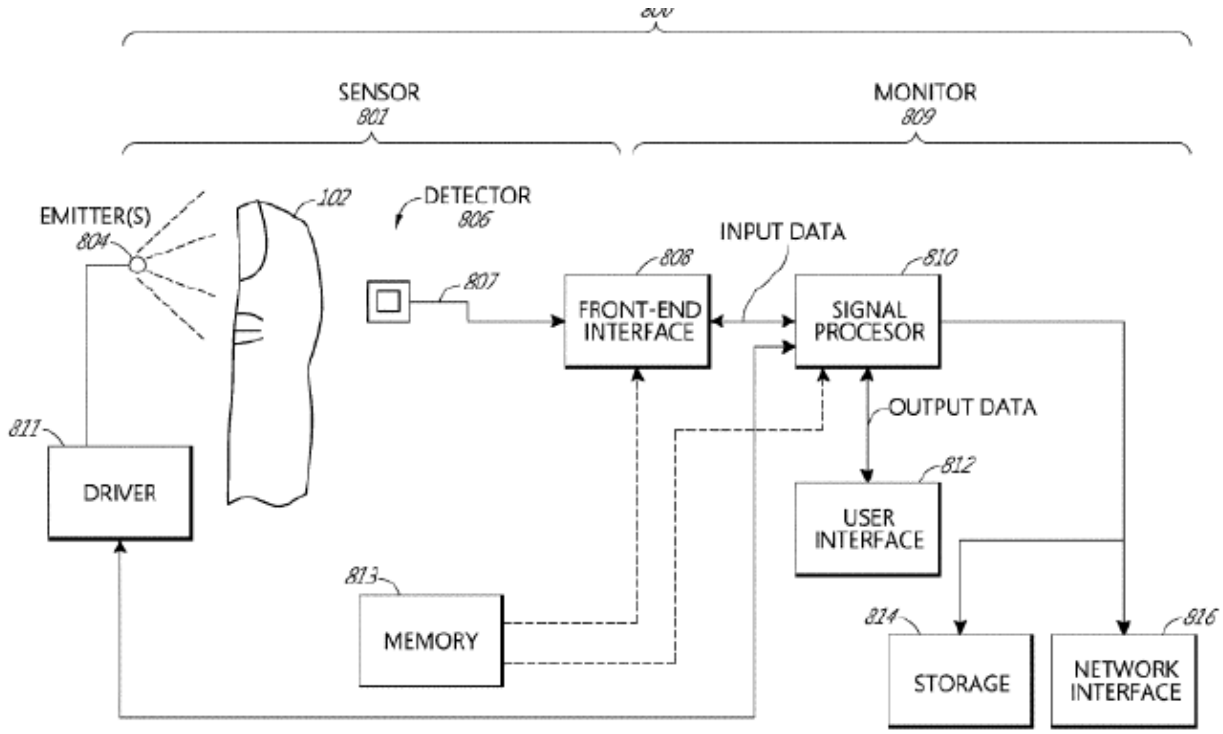


FIG. 8

APPLE-1001, FIG. 8.

FIG. 8 above illustrates "a block diagram of an example pulse oximetry system capable of noninvasively measuring one or more blood analytes in a monitored patient." APPLE-1001, 5:34–37. Pulse oximetry system 800 includes sensor 801 (or multiple sensors) coupled to physiological monitor 809. APPLE-1001, 12:21–23. Sensor 801 includes emitter 804 and detector 806. APPLE-1001, 12:32–34. Monitor 809 includes signal processor 810, which "includes processing logic that determines measurements for desired analytes based on the signals

received from the detector 806." APPLE-1001, 13:33-40. Monitor 809 also includes user interface 812 that provides "an output, e.g., on a display, for presentation to a user of pulse oximetry system 800." APPLE-1001, 13:33–35, 13:64–66; APPLE-1003, ¶¶[32]-[33].

B. Summary of the Prosecution History

Masimo filed application 16/791,955 ("'955 Application") that issued as the '743 Patent with a request for accelerated examination on February 14, 2020, approximately one month after Masimo initiated its serial litigation campaign against Apple through its January 9, 2020 complaint in the U.S. District Court for the Central District of California (CDCA) (Case No. 8:20-cv-00048).

On April 9, 2020 and May 22, 2020 (both within three months of filing the '955 Application), the Examiner issued notice of allowances without issuing a single rejection. APPLE-1002, 141, 403-404. The '743 Patent's file history is without any indication that Masimo brought the prior art applied in this Petition to the examiner's attention prior to allowance or grant of claims in the '955 Application. Instead, the notice of allowance limits its discussion to U.S. Patent Pub. No. 2014/0361147 ("Fei") and U.S. Patent No. 5,830,137 ("Scharf"). APPLE-1002, 146-148.

The references and grounds of rejection applied in this Petition are materially different from those addressed by the examiner during

prosecution. Further, this Petition compellingly demonstrates the obviousness of the Challenged Claims, including the claim feature (portion of feature [1b] – "shape an output light pattern by which the emitted light is directed toward a surface of the tissue measurement site, wherein the output light pattern comprises a different geometric shape than the initial light pattern") deemed allowable by the examiner in the notice of allowance. APPLE-1002, 146-148; *see infra* §IV.A.4.a.[1b].

C. Level of Ordinary Skill in the Art

A person of ordinary skill in the art relating to the subject matter of the '743 Patent ("POSITA") would have had a working knowledge of physiological monitoring technologies. A POSITA would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, including but not limited to physiological monitoring technologies. APPLE-1003, ¶¶[18]-[20]. Alternatively, the person could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline. *Id.*

III. CLAIM CONSTRUCTION UNDER 37 C.F.R. §§ 42.104(b)(3)

All claim terms should be construed according to the *Phillips* standard. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. §42.100. Apple submits that no claim terms need be construed to resolve issues of controversy in the present Petition. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011).

IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

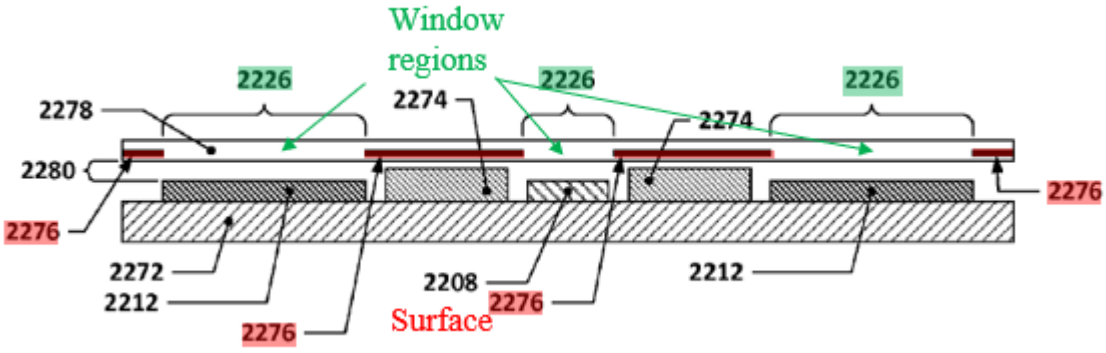
A. Ground 2A: Claims 1, 3-6, 9-13, and 22-25 are obvious over Sarantos in view of Shie

1. Overview of Sarantos

Sarantos describes a "wristband-type wearable fitness monitor" that measures "physiological parameters" of the wearer, such as the person's "heart rate" and "blood oxygenation levels." APPLE-1005, 2:5-14, 5:55-59, 7:12-14, 13:39-47. The monitor performs these measurements using a photoplethysmographic (PPG) sensor, which includes one or more light sources (e.g., LEDs) and an array of photodetectors. *Id*., 1:9-10, 43-47, 7:12-16, 15:23-43. Sarantos describes that when the monitor "is worn by a person in a manner similar to a wristwatch, the back face" of the monitor "may be pressed against the person's skin, allowing the light sources" of the PPG sensor "to illuminate the person's skin." *Id*., 1:48-51, 7:12-23. The light "diffuses through the person's flesh and a

portion of this light is then emitted back" (i.e., reflected) "out of the person's skin in close proximity to where the light was introduced into the flesh." *Id*., 7:24-28; The photodetector array of the PPG sensor measures the "intensity" of this reflected light, and provides signals representing the intensity to "control logic" of the measurement device. APPLE-1005, 2:5-14, 7:12-23, 13:39-47. The control logic can then calculate different physiological parameters based on characteristics of the reflected light signal. *Id*., 1:54-56, 7:12-23. For example, the person's heart rate can be calculated based on "fluctuations in the amount of light from the light source that is emanated back out of the flesh" that correspond fluctuations in blood volume associated with each beat of the person's heart. *Id*., 7:23-60; APPLE-1003, ¶[34].

Sarantos's FIG. 22 depicts an example cross-section of a simplified representation of a PPG sensor used in its wrist-worn reflectance-based physiological monitor device. APPLE-1005, 16:60-67. The PPG sensor has ***a dark-colored coating*** or in-mold label 2276 (highlighted in red) to block light. APPLE-1005, 5:55-58; APPLE-1003, ¶[35].



APPLE-1005, FIG. 22[1].

In Sarantos, light source 2208 emits light through a window into a user's skin, wherein the light is reflected back to the sensor and detected by photodetector elements 2212. APPLE-1005, 17:16-25. The light travels through transparent/translucent windows regions 2226 (annotated in green above) ***defined in the dark-colored coating*** 2276 (also referred to as in-mold label 2276) applied to window 2278. *Id*.; APPLE-1003, ¶[36]. Sarantos discloses that "in-mold label 2276 may be black or otherwise rendered opaque to light to prevent light from entering or exiting the PPG sensor through the window 2278 except through window regions 2226." APPLE-1005, 17:1-16. Sarantos explains that various masking techniques may be used to block stray light from reaching the photodetector elements 2212, including "a painted or silk-screened mask" applied

[1] This and other figures in the petition have been annotated with text and mark ups in color for emphasis.

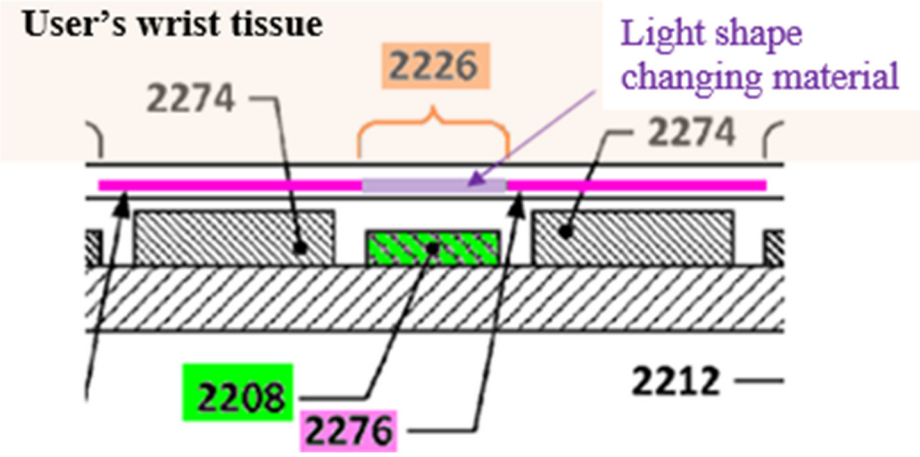
to the window 2278. *Id*.

2. Overview of Shie

Shie describes a diffuser that has a "light diffusing and shaping advantages" and changes a first shape of light into a second shape regardless of the first shape of the light. APPLE-1007, 6:61-7:7; APPLE-1003, ¶¶[zz]. The diffuser includes a "plurality of surface micro-structures" that "are designed to homogenize light passing through" the diffuser "to produce a predetermined pattern of smoothly varying, non-discontinuous light exiting the" diffuser. APPLE-1007, Abstract. Shie describes that the exiting light "is therefore altered according to both the macro-optical characteristic of the" diffuser "as well as the homogenizing characteristics of the micro-structures." *Id*.; APPLE-1003, ¶[37].

3. Combination of Sarantos and Shie

It would have been obvious to a POSITA to use the light shape changing material of Shie in the window region 2226 (orange) between light source 2208 (green) of Sarantos's wristwatch sensor and the user's wrist tissue, shown in FIG. 22 below, to change the shape of light emitted by light emitting devices included in light source 2208 into a second shape projected onto the tissue. APPLE-1005, 7:12-16, FIG. 22; APPLE-1003, ¶[44].



APPLE-1005, FIG. 22 (modified and zoomed in).

Shie explains that "optical elements [that] receive[] light from a light source having particular characteristics defined by the properties of the light source and then alter the light propagating through the optical element" were known in the art. APPLE-1007, 1:42-45. This includes "[d]iffusers [that] have been applied as a separate layer to optical elements in order to add both light diffusing and directing characteristics." *Id.*, 2:13-15. Shei provides numerous examples of various lens shapes and structures that provide the disclosed light shaping functionality, regardless of the initial shape of the light. As Shei describes, each disclosed light shaping element includes "micro-structures" that function "to control the direction of light output from a light source so as to shape the light output into a desired distribution pattern or envelope." *Id.*, 5:35-45. A POSITA would have recognized that, for example, the circular light shaping elements depicted described with respect to FIGs. 1a, 1b, 3a, 3b, 8a, and 8b of Shie would have been beneficially

applied to the circular arrangements described in Sarantos. APPLE-1003, ¶[45]. Similarly, the light shaping elements depicted with respect to Shie's FIGs. 5a, 5b, 6a, and 6b would have been beneficially applied to the square or rectangular arrangements described by Sarantos. *Id*. Other embodiments/examples described in Shie would have been beneficially applied to those or other arrangements described by Sarantos depending on desired design characteristics. *Id*.

A POSITA would have been motivated to implement region 2226 between LEDs 2208 and the user's wrist tissue in the device of Sarantos using a light shape changing material (as taught by Shie), to direct more of the emitted light toward the tissue so as to increase power efficiency by shining light closer to photodiodes, as light not then reflected and incident on the photodiodes represents wasted power. APPLE-1003, ¶[46]. For example, a POSITA would have found it obvious that the "pulsatile component of absorption… is a small fraction of the received signal… used by the pulse oximeter instrument to perform its measurements," and thus, "it is important that the incident light be of significant magnitude to result in transmitted signals that have sufficient amplitude to provide accurate readings." APPLE-1016, 3:40-48; APPLE-1003, ¶[46]. A POSITA knew that directing the light emitted toward the tissue to shine light closer to the photodiodes is one way of increasing the signal level of the light detected by the photodiodes that minimizes power consumption while still providing adequate radiated power for

pulse oximetry. *Id.*; APPLE-1009, 76, 105; APPLE-1006, [0223] ("focus emitted light to a certain depth and location… so that the photodetector receives the maximum possible amount of scattered light"). Applying Shie's teachings to Sarantos would have furthered Sarantos' express goal of providing "a significant improvement in the amount of AC light measurable by a photodetector without incurring a significant power consumption penalty" by configuring the resulting device to capture more of the light signal. APPLE-1005, 9:51-57; APPLE-1003, ¶[46].

Applying Shie's teachings regarding light shaping elements to Sarantos' device would have also allowed for the resulting device to increase accuracy of measurements by directing light towards a sufficient spatial area to decrease the likelihood of irregular readings caused by moles or other small or local aberrations on the skin. APPLE-1003, ¶[47]. For example, a POSITA would have understood that "the skin surface, tissue, muscle, bone and especially blood cause light scattering which increases the absorbance of light" (APPLE-1009, 68-70), and "most of the total attenuation is due to the scattering of light away from the detector by the highly heterogeneous tissue." *Id.*; APPLE-1033, 62. "The problem has been to contend with the wide variation in scattering and nonspecific absorption properties of very complex heterogeneous tissue" (APPLE-1033, 60) and "[l]ight scattering is still a source of inaccuracy in pulse oximeters." APPLE-

1009, 51. "The intensity of back scattered light from the skin depends… also on the structure and pigmentation of the skin." APPLE-1009, 105. A POSITA would have understood that pigments and dyes present on the skin can cause measurement errors. APPLE-1009, 36; APPLE-1034, 10 ("pigment may cause error"); APPLE-1003, ¶[47]. Thus, a POSITA would have found it obvious that illuminating a larger pulsatile vascular bed would reduce the likelihood of high measurement variation resulting from the local effect of moles and skin aberrations and enhance the quality of the measurement. *Id*.; APPLE-1009, 105.

Moreover, by implementing the window region 2226 between LEDs 2208 and the user's wrist tissue in Saranto's device using Shie's light shape changing material, a POSITA would have found it obvious that light diffusion would have allowed the designers of the resulting device to match the light intensity to the general shape of the body, or to provide sufficient illumination over a heterogeneous region of tissue, so as to be insensitive to local tissue variations, and provide the most accurate physiological parameter detection. APPLE-1003, ¶[48].

Applying Shei's teachings regarding shaping elements to Sarantos would have also allowed the resulting device to be designed to obscure appearance of the light source from a user. APPLE-1003, ¶[49]. A POSITA would have found it obvious that users purchasing wrist-worn devices made decisions based partly on a device's appearance and would look at the front as well as the back of the device.

APPLE-1003, ¶[49]. Typically, the back of a watch has an opaque cover to conceal the electronic components from a user's view. APPLE-1004, 5:66-67 ("the back cover 3 is formed of a metal, such as stainless steel"); APPLE-1006, [0236], FIG. 2B; APPLE-1035, 1. An optical element with diffusing microstructures (as taught by Shie), which forms a portion of the back cover, would obscure the light source's appearance from the user while allowing light transmission toward the tissue. APPLE-1003, ¶[49].

Light shape changing materials were known in the art to be used for such purposes, so a POSITA would have reasonably expected Shie's light shape changing material (e.g., diffuser) to work successfully in Sarantos's sensor. APPLE-1033, 60-62; APPLE-1003, ¶[50].

4. Analysis

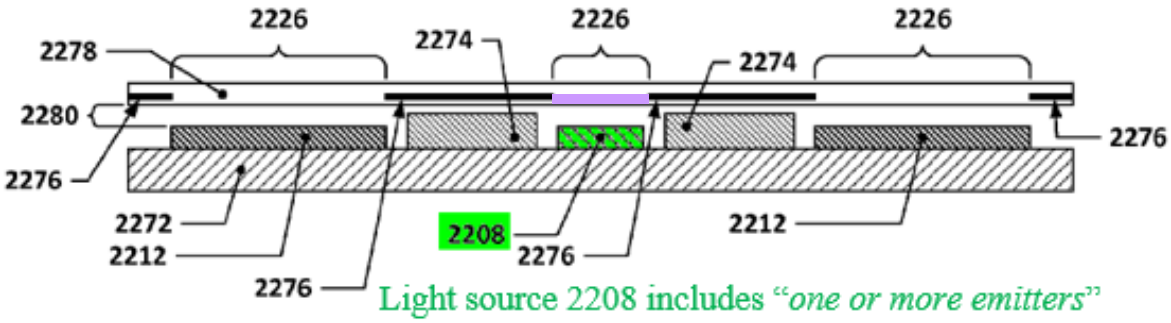
(a) Claim 1

[1pre]

To the extent the preamble is limiting, the Sarantos-Shie Combination ("**SSC**") renders obvious [1pre]. In particular, Sarantos discloses a "wristband-type wearable fitness monitor" including a photoplethysmography (PPG) sensor, which is a "***physiological measurement device***." APPLE-1005, 7:12-16; APPLE-1003, ¶[51].

[1a]

SSC's physiological measurement device has a light source (e.g., 2208 shown in green in Sarantos's FIG. 22 below) that includes a plurality of LEDs ("***one or more emitters***"). APPLE-1005, 2:18-19, 13:34-53, 17:1-25. Because light emitted from a LED has an initial light pattern, it would have been obvious to a POSITA that light emitted from the Sarantos's LEDs would have been "***configured to emit light at an initial light pattern***." APPLE-1003, ¶[52].



APPLE-1005, FIG. 22.

Although FIG. 22 does not explicitly depict a plurality of emitters, such an implementation is depicted in the example shown in Sarantos' FIG. 18. For instance, as shown below in FIG. 18, the light source 1808 includes a plurality of LEDs 1810. APPLE-1005, 15:24-43; APPLE-1003, ¶[53].

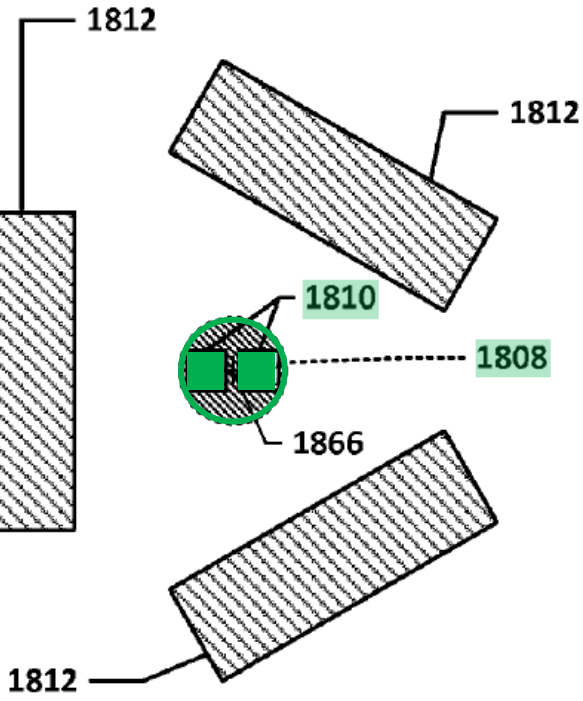
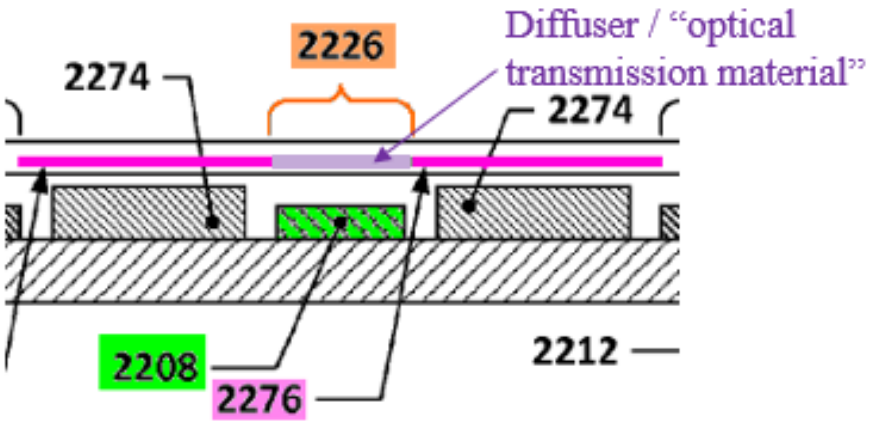


FIG. 18

APPLE-1005, FIG. 18.

[1b]

As shown in the snapshot of Sarantos's FIG. 22 below, LEDs in SSC's light source 2208 (shown in green) emit light through a window 2226 (referenced in orange and colored in purple) defined by in-mold labels 2276 (shown in pink). APPLE-1005, 17:1-25, Fig. 22; APPLE-1003, ¶[54].



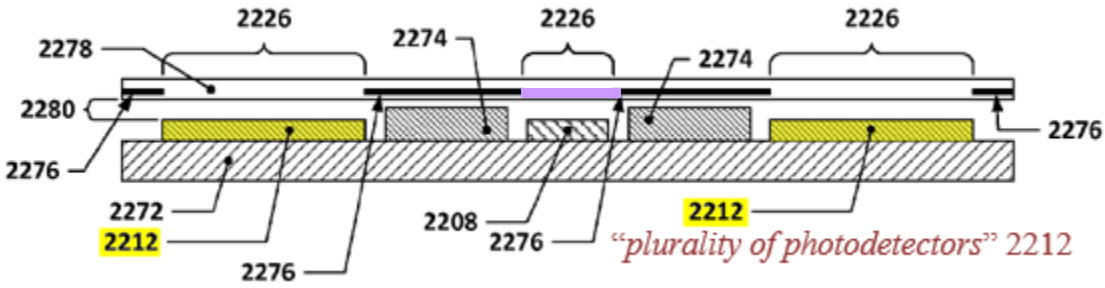
APPLE-1005, FIG. 22 (modified and zoomed in).

As noted above in §IV.A.3, in the SSC, the window 2226 includes Shie's diffuser ("***optical transmission material***"), which has "light diffusing and shaping advantages" and can increase light transmission. APPLE-1007, 6:61-7:7. As indicated above in Sarantos' FIG. 22, the diffuser ("***optical transmission material***") is "configured to be positioned between the one or more emitters [2208] and a tissue measurement site," which is on the top side (not shown) of the figure. APPLE-1003, ¶[55]. And because the diffuser is light diffusing with shaping advantages, it would have been obvious to a POSITA that when light passes the diffuser/optical transmission material from the emitters 2208 towards the user's skin, SSC's "***optical transmission material is configured to alter a direction of at least a portion of the light emitted from the one or more emitters to shape an output light pattern by which the emitted light is directed toward a surface of the tissue measurement site***." APPLE-1003, ¶[55].

As noted in [1a], light emitted from a LED has an initial light pattern. It would have been obvious to a POSITA that when light passes through a diffuser, the diffusion action generally causes the multiple directions of the light to increase or spread and alter and impact the shape of the output light pattern. APPLE-1003, ¶[56], *see infra* [9]. For this reason, SSC renders obvious [1b].

[1c]

As shown in Sarantos' FIG. 22 below, "two HAR photodetector elements 2212" (highlighted in yellow) "are positioned on either side of a light source 2208." APPLE-1005, 17:1-3; APPLE-1003, ¶[57].



APPLE-1005, FIG. 22 (modified).

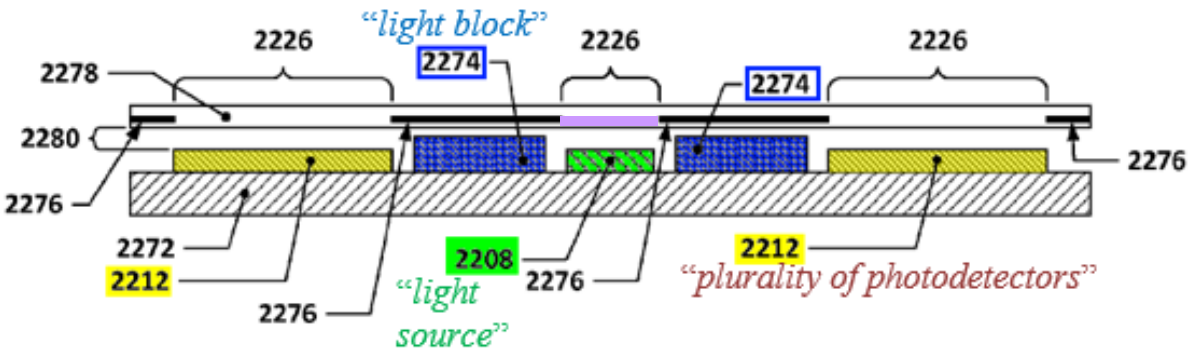
The "light from the light source 2208 [is allowed] to shine through its associated window region 2226 and into the person's skin, where the light then diffuses into the surrounding flesh and is then emitted back out of the person's skin and into the HAR photodetector elements 2212 through the respective window regions 2226 associated with the HAR photodetector elements 2212." APPLE-1005, 17:19-25. Accordingly, SSC's physiological measurement device includes

photodetector elements 2212 ("***a plurality of detectors***") that are "***configured to detect at least a portion of the light after passing through tissue***." APPLE-1005, 17:1-3, FIG. 22; APPLE-1003, ¶[58].

The photodetectors can also provide a control logic unit "a signal indicative of an amount of detected light from the photodetector element." APPLE-1005, 20:24-33. Thus, SSC's "***the plurality of detectors*** [are] ***further configured to output at least one signal responsive to the detected light***." APPLE-1003, ¶[59].

[1d]

Sarantos teaches that "to reduce the chance that light from the light source 2208 will reach either of the HAR photodetector elements 2212 *without first being diffused through the person's skin*, the light source 2208 may be separated from the HAR photodetector elements 2212 within the PPG sensor by walls 2274, which may extend to the window 2278 or may stop short of the window 2278." APPLE-1005, 17:25-32. "The walls 2274 may prevent light from the light source 2208 from reaching the HAR photodetector elements 2212 by following paths completely within the housing of the PPG sensor." APPLE-1005, 17:39-51. In this manner, SSC's walls 2274 (shown in dark blue below) are "***light block[s] configured to prevent at least a portion of the light emitted from the one or more emitters from reaching the plurality of detectors without first reaching the tissue***." APPLE-1003, ¶[60].



APPLE-1005, FIG. 22 (modified).

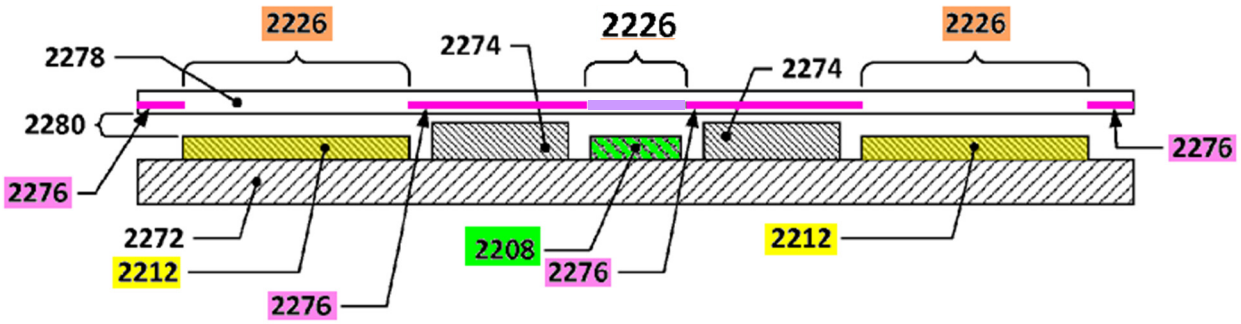
[1e]

SSC's device includes a window 2278 that is "offset from the substrate 2272" and is described as follows:

> [Window 2278] is made from a translucent or transparent material, such as transparent acrylic, with an ***in-mold label 2276 embedded within it***. The ***in-mold label 2276 may be black or otherwise rendered opaque to light to prevent light from entering or exiting the PPG sensor through the window 2278 except through window regions 2226***. In other implementations, other masking techniques, such as a painted or silk-screened mask applied to the window 2278, may be used.

APPLE-1005, 17:1-12 (Emphasis added). As shown below in Sarantos' FIG. 22, SSC's device includes a window 2278 ("***surface***") that is "***positioned between the plurality of detectors and the tissue***." Window 2278 "***compris[es] a dark-colored coating***" in the form of in-mold labels 2276 (shown in pink) that can

be black or opaque to light to prevent light from entering or exiting. APPLE-1005, 17:1-25. Sarantos explains that various types of surfaces with dark-colored coatings may be used to block stray light from reaching the photodetector elements 2212, including "a painted or silk-screened mask" applied to the window 2278. *Id.*; APPLE-1003, ¶¶[61]-[62].



APPLE-1005, FIG. 22 (modified).

Window regions 2226 (which meet the definition of "***opening[s]***" provided by Masimo for purposes of infringement) shown in orange above the photodetector elements 2212, are defined in the in-mold labels 2276 ("***wherein an opening defined in the dark-colored coating***"). As noted above, in the SSC device, light passes through these window regions 2226 ("***an opening … is configured to allow at least a portion of light reflected from the tissue to pass through the surface***"). APPLE-1005, 17:1-12; APPLE-1003, ¶[63].

[1f]

Sarantos' FIG. 27 (reproduced below) is "a high-level block diagram" of SSC's device and illustrates that the SSC device includes control logic 2706 that includes "a processor" 2768. APPLE-1005, 20:24-33; APPLE-1003, ¶[64].

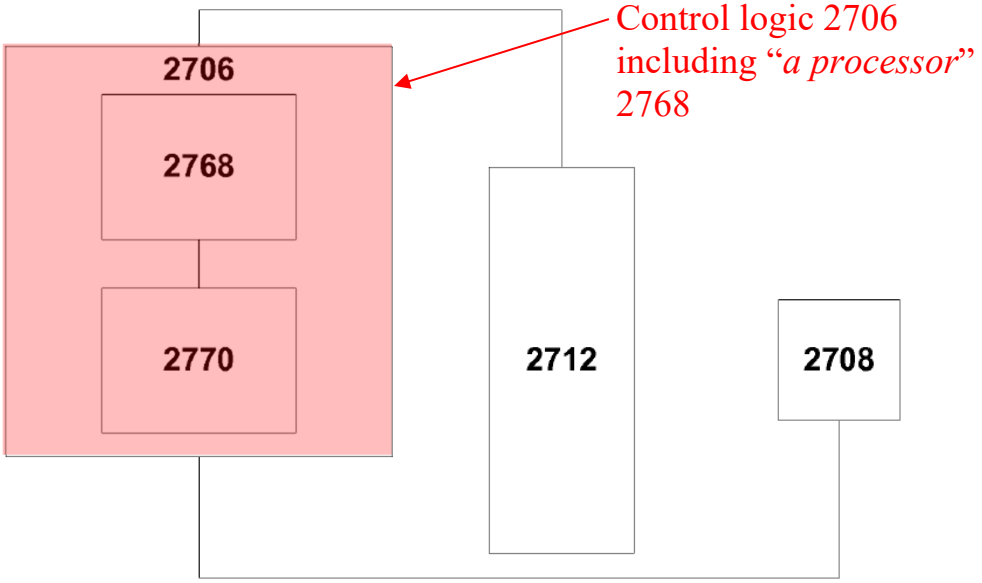


FIG. 27

APPLE-1005, FIG. 27.

"The control logic is operatively coupled with a light source 2708 and a photodetector element 2712. The control logic 2706 may thus cause the light source 2708 to emit light at desired times, and may receive a signal indicative of an amount of detected light from the photodetector element 2712." APPLE-1005, 20:24-33. In this manner, SSC renders obvious "***a processor configured to receive and process one or more signals responsive to the outputted at least one signal***."

APPLE-1003, ¶[65].

The control logic 2706 can then use the received and processed signals to determine a physiological parameter, such as the user's heart rate ("***and to determine a physiological parameter of a user responsive to the one or more signals***"). APPLE-1005, 20:7-14; APPLE-1003, ¶[66].

(b) Claim 3

[3]

As described above in [1b], Shie describes a diffuser that has "light diffusing and shaping advantages" and changes a first shape of light into a second shape regardless of the initial shape of the light. APPLE-1007, 6:61-7:7; APPLE-1003, ¶[67]. As explained in §IV.A.3, it would have been obvious to a POSITA to use Shie's diffuser as a light-changing material in the wristwatch sensor of Sarantos in between LEDs 2208 and the user's wrist tissue so as to change the shape of light emitted by LEDs 2208 into a second shape projected onto the tissue. APPLE-1005, 7:12-16, FIG. 22; APPLE-1003, ¶[67].

Shie further discloses a range of suitable materials for the diffuser, one such material being glass. APPLE-1007, 5:49-54 ("The present invention is not to be limited to forming these micro-structures in any particular material and therefore the optical elements described herein may be formed from such materials as ***sol-gel glass, quartz glass***, polycarbonate and acrylic plastics, epoxies, and any other

suitable plastic, ***glass***, or other moldable materials."). It would have been obvious to implement the light-shaping material using glass as taught in Shie due to its ability to be shaped into a suitable geometry for the application, its ability to support micro-structures that facilitate light diffusion, and its favorable temperature characteristics that allow glass to be used in a range of thermal environments. APPLE-1003, ¶[68].

The use of a glass diffuser in the combination also would have been obvious to a POSITA since it merely entails the use of a known solution to improve similar systems and methods in the same way. APPLE-1003, ¶[69]. "[W]hen a patent 'simply arranges old elements with each performing the same function it had been known to perform' and yields no more than one would expect from such an arrangement, the combination is obvious." *KSR*, 550 U.S. at 417. Here, applying Shie's teaching of a glass diffuser to Sarantos's sensor would have yielded a predictable result of a light-shaping diffuser that changes the shape of light emitted by LEDs 2208 into a second shape for projection onto the tissue regardless of the initial shape of the light. APPLE-1003, ¶[69]; *see* [1b].

(c) Claim 4

[4]

As noted above in [3], Shie discloses a range of suitable materials for the diffuser ("***optical transmission material***"), one such material being plastic.

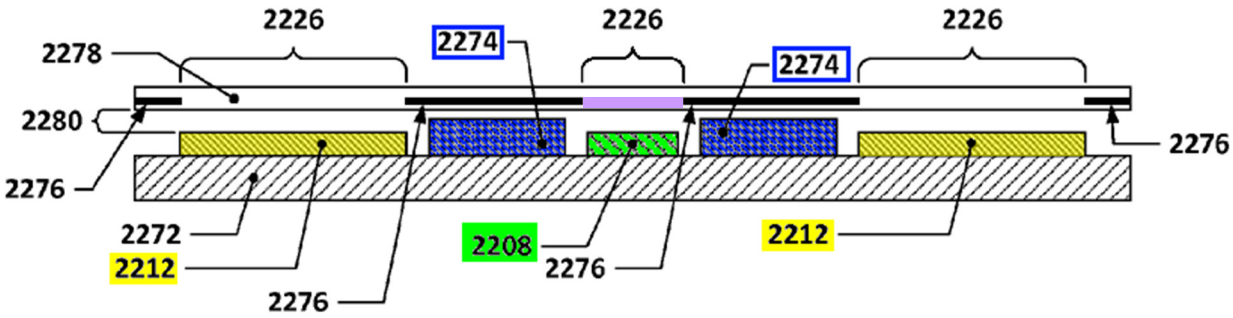
APPLE-1007, 5:49-54 ("The present invention is not to be limited to forming these micro-structures in any particular material and therefore the optical elements described herein may be formed from such materials as sol-gel glass, quartz glass, ***polycarbonate and acrylic plastics***, epoxies, and any other suitable ***plastic***, glass, or other moldable materials."); *see supra* [1b], §IV.A.3. It would have been obvious to implement the diffuser in the combination using a plastic material, as taught in Shie, due to its ability to be shaped into a suitable geometry for the application and its ability to support micro-structures that facilitate light diffusion. APPLE-1003, ¶[70].

The use of a plastic diffuser in the combination also would have been obvious to a POSITA since it merely entails the use of a known solution to improve similar systems and methods in the same way. APPLE-1003, ¶[71]. "[W]hen a patent 'simply arranges old elements with each performing the same function it had been known to perform' and yields no more than one would expect from such an arrangement, the combination is obvious." *KSR*, 550 U.S. at 417. Here, applying Shie's teaching of a plastic diffuser to Sarantos's sensor would have yielded a predictable result of a light-shaping diffuser that changes the shape of light emitted by LEDs 2208 into a second shape for projection onto the tissue. APPLE-1003, ¶[71]; *see* [1b].

(d) Claim 5

[5]

Sarantos discloses that "FIGS. 22 through 24 depict cross-sections of simplified representations of **various PPG sensors**, in accordance with **various example implementations**." APPLE-1005, 16:60-62, 6:52-54; APPLE-1003, ¶[72]. As discussed with respect to [1d], *supra*, Sarantos' walls 2274 (blue) shown in FIG. 22 provide the claimed light block:



APPLE-1005, FIG. 22 (modified).

Sarantos provides multiple exemplary arrangements of photodetectors that can comport with the layout shown in this cross-sectional design, and that each individually satisfy this claim. As shown in FIG. 22, the light block 2274 is spaced equidistantly between the light source 2208 and photodetector elements 2212. Sarantos describes FIG. 25 as "**an example implementation**" of a **PPG sensor** and therefore a POSITA would have recognized that FIG. 25 is one of the "**various PPG sensors**, in accordance with **various example implementations**"

corresponding to the cross-section view of FIG. 22. APPLE-1005, 19:31-35, 16:60-32; APPLE-1003, ¶[73]. A POSITA therefore would have viewed FIG. 25 and its corresponding disclosure as a natural extension of and incorporating the features of FIG. 22, including the light block 2274 spaced equidistantly between the light source and photodetector elements. APPLE-1003, ¶[73]. Alternatively, it would have been obvious to implement the wall 2274 of FIG. 22 in the annular arrangement of FIG. 25 to beneficially prevent light that has not been attenuated through the user's skin from reaching the photodetector elements. APPLE-1003, ¶[73]; APPLE-1005, 17:26-42; *see also Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 991 (Fed. Cir. 2009) ("Combining two embodiments disclosed adjacent to each other in a prior art patent does not require a leap of inventiveness.")

As shown below in FIG. 25, Sarantos discloses using annular photodetector elements. APPLE-1005, 19:22-35, Fig. 25 (showing annular photodetector element 2512 with a light source 2508 in the middle); APPLE-1003, ¶[74].

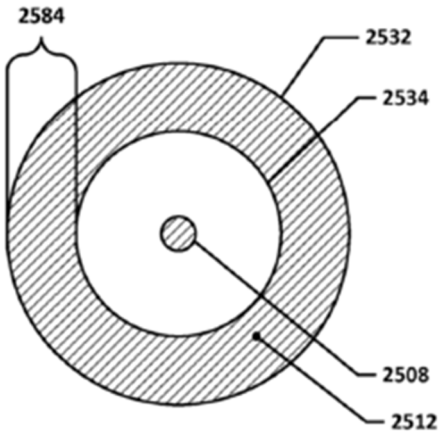


FIG. 25

APPLE-1005, FIG. 25.

A POSITA would have recognized that implementing the example annular arrangement of FIG. 25 to include the light block (wall 2274) expressly disclosed with respect to FIG. 22 (to beneficially prevent light that has not attenuated through the user's tissue from reaching the photodetector elements 2512), the light block would be arranged in a circular configuration. APPLE-1003, ¶[75]. Alternatively, it would have been obvious to at least arrange the light block (wall 2274) in a circular arrangement in the annular configuration of FIG. 25 because both the light source 2508 and photodetector elements 2512 have a circular arrangement. APPLE-1003, ¶[75]. This configuration in combination with FIG. 22's depiction of the wall 2274 being positioned equidistant between the light source and photodetector elements indicates that a circular arrangement for the wall 2274 in FIG. 25's configuration is the most obvious design choice. APPLE-

1003, ¶[75]. Given the annular configuration of detectors around a circular LED, the small form factor, and the limited space in Sarantos' PPG sensor described in FIGS. 22 and 25, a POSITA would have found a circular shape light block to be a reasonable and obvious design choice. APPLE-1003, ¶[75].

Furthermore, although photodetector element 2512 is described as a single photodetector element (APPLE-1005, 19:33-52), Sarantos is also clear that "it is to be understood that any of the implementations above with respect to a single photodetector element spaced apart from a light source may also be implemented ***using a plurality of photodetector elements*** arranged about the light source." APPLE-1005, 20:52-57. From Sarantos' disclosure, a POSITA would have found it obvious that the annular photodetector 6element 2512 of FIG. 25 can be implemented using a plurality of photodetector elements (depicted by red circles) arranged about the light source in an annular configuration, as depicted below. APPLE-1003, ¶[76].

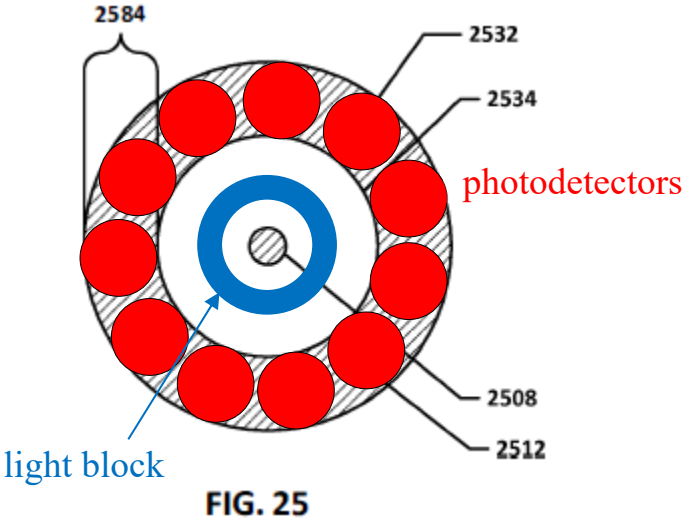


FIG. 25

APPLE-1005, FIG. 25 (modified).

Therefore, Sarantos demonstrates that at least the configuration of FIG. 25 includes a plurality of detectors arranged in an array having an annular configuration corresponding to an annular a portion of the tissue measurement site bounded by the annular light block. APPLE-1003, ¶[77].

As further alternative examples of how Sarantos satisfies this claim, FIGs. 15-16 illustrate multiple photodetector elements (three and four respectively) arranged in an array corresponding to a circular shape about their respective light sources. APPLE-1005, 14:56-15:8. FIG. 18 illustrates a similar circular configuration of photodetector elements surrounding a light source comprising two light-emitting devices. APPLE-1005, 15:24-43. A POSITA would have used any of these arrangements of photodetector elements in accordance with the layout taught in FIG. 22 by, *e.g.*, arranging the photodetector elements in a circular

configuration (as illustrated in FIGs. 15-16 and 18) with an insulated light block between the light source and the photodetectors (as illustrated in FIG. 22). APPLE-1003, ¶[78]. For instance, a POSITA, based on the teachings of Sarantos, would have implemented the circular configuration of the photodetectors shown below in FIG. 18 based on FIG. 22's layout. *Id*.

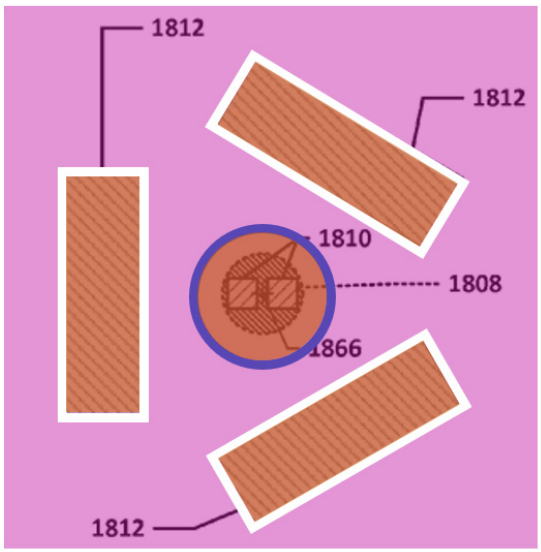


FIG. 18

APPLE-1005, FIG. 18 (annotated), with light block (blue), window with in-mold label (purple), window regions, photodetectors 1812, light source 1808.[2]

[2] The annotated Figure 18 illustrates an exemplary circular shape for the light block. A POSITA would have found it obvious that differently shaped light blocks (e.g., rectangular, triangular, etc.) could be used with the circular configuration of the photodetectors shown above. APPLE-1003, Footnote 1 (pg. 51).

As described above in [1d], the light block bounds the light emitted from the light source such that the light reaches the tissue measurement site without first reaching the photodetectors. A POSITA would have found it obvious that the spatial configuration of the array of photodetectors would correspond to the shape of the tissue bounded by the light block, as doing so would define a sufficiently large illumination of a region of heterogenous tissue and re-radiant emittance of light into the tissue to the photodetectors. APPLE-1003, ¶[79]. Accordingly, the photodetectors are arranged in an array having a spatial configuration corresponding to the tissue shape bound by the light block. APPLE-1003, ¶[79].

(e) Claim 6

[6]

See supra [1e]. For example, Sarantos discloses that "in-mold label 2276 may be black or otherwise rendered opaque to light to prevent light from entering or exiting the PPG sensor through the window 2278 except through window regions 2226." APPLE-1005, 17:1-16; APPLE-1003, ¶[80].

(f) Claim 9

[9]

Shie discloses "cylindrical" optical elements configured such that "a beam

of light entering the lens remains unaffected in its width and is spread by the cylindrical lens contour in a direction perpendicular to its width." APPLE-1007, 1:15-23; *see also id.*, FIGS. 2a-2b & 6:44-64 (describing a cylindrical lens 30 for "the curvature and contour of the cylindrical lens surfaces 34, 40 and 44 define the macro-optical characteristic of the lens 30"). Thus, a cylindrical lens, as taught in Shie, changes light that enters the lens from a first shape to a second shape having a length different from its width, due at least in part to the lens's spreading in the length dimension without corresponding spreading in the width dimension. APPLE-1003, ¶[81].

As discussed above in §IV.A.3, it would have been obvious to incorporate a light-shaping material, as taught in Shie, in the wristwatch sensor of Sarantos between LEDs 2208 and the user's wrist tissue, e.g., to change the shape of light emitted by LEDs 2208 into a second shape projected onto the tissue. APPLE-1005, 7:12-16, FIG. 22; APPLE-1003, ¶[82]. In this context, it also would have been obvious to use a cylindrical optical element as the light-shaping material in the combination to spread light in a length dimension but not the width as taught in Shie. *Id*.

A POSITA would have been motivated to implement a cylindrical light-shaping material in the combination to better project light toward portions of the wrist tissue nearest the high-aspect ratio (HAR) photodiodes (or otherwise to

project the light toward portions of the wrist tissue that would optimize the ability of light after attenuation by the wrist tissue to be re-emitted toward the HAR photodiodes). APPLE-1003, ¶[83]. By directing the light in this manner, the photodiodes have would captured more of the light signal and better produce reliable measurement information without requiring overly expensive, highly-sensitive detector elements. *Id.*

In some cases, the cylindrical light-shaping material would be particularly advantageous to spread the light toward photodiodes that are not arranged in a circular configuration but are instead positioned opposite each other on opposite sides of the sensor. APPLE-1003, ¶[84]. For instance, in Sarantos' FIG. 14 (reproduced below), "two HAR photodetector elements 1412 are shown with a light source 1408 interposed midway between them." APPLE-1005, 14:58-60. A cylindrical light-shaping material would have been advantageous to extend the light in one dimension toward portions of the tissue corresponding to the oppositely positioned photodiodes 1412. APPLE-1003, ¶[84].

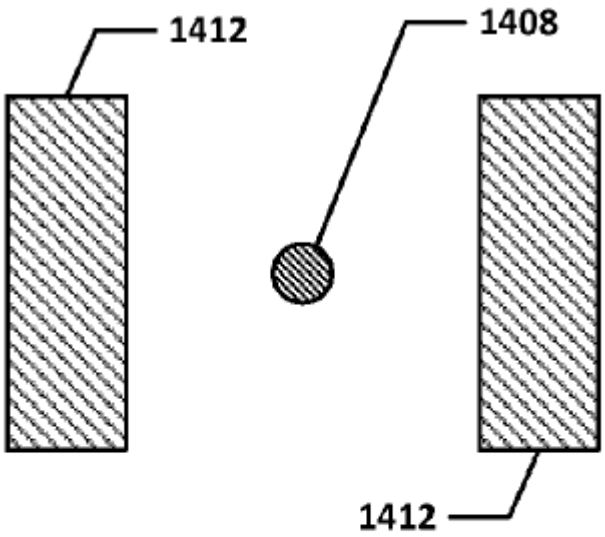


FIG. 14

APPLE-1005, FIG. 14.

(g) Claim 10

[10]

Further to the discussion in [9], in some cases, it would have been beneficial and obvious that the cylindrical light-shaping material would yield an output light pattern that comprises an oval shape. APPLE-1003, ¶[85]. For example, as discussed above in [5] and shown in Sarantos' FIG. 25 below, the SSC device can include an annular arrangement in which a light source 2508 is surrounded by an annular photodetector element 2512 and a light block (not shown). APPLE-1005,

19:22-35; APPLE-1003, ¶[85].

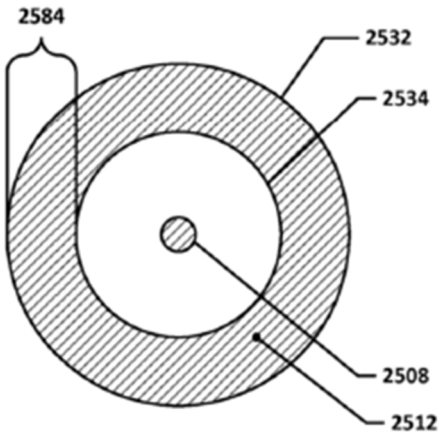


FIG. 25

APPLE-1005, FIG. 25.

It would have been obvious to a POSITA that such an arrangement would have been used when the output light pattern comprises an oval shape. APPLE-1003, ¶[86]. In particular, the annular arrangement shown in FIG. 25 would have been effective to detect light in an oval pattern. A POSITA would have been motivated to do so, to capture a greater amount of light from the tissue measurement site (user's skin). *Id*.

Notwithstanding the above, due to the language ("comprising") used in claim 10, ***any*** portion of the output light pattern that has an oval shape would satisfy this claim. And it would have been obvious to a POSITA that the output light pattern would have included at least one portion that has an oval shape. APPLE-1003, ¶[87].

(h) Claim 11

[11]

Sarantos's sensor measures oxygen saturation. APPLE-1005, 13:40-53 (disclosing measuring "blood oxygenation levels"); APPLE-1003, ¶[88].

(i) Claim 12

[12]

In the combination, Sarantos discloses that the sensor measurements can be used to determine a person's heart or pulse rate:

> As a person's heart beats, the person's blood vessels expand and contract in synch with the heart as the pumping of the heart exerts pressure on the person's blood which, in turn, results in cyclic pressure increases in the person's blood vessels. When a blood vessel expands, it allows more blood to flow into the vessel, which results in the amount of blood present in a given region of the person's flesh fluctuating in rhythm with the person's heart rate. This, in turn, results in fluctuations in the amount of light from the light source that is emanated back out of the flesh. The heart rate may then be determined by measuring the amount of light that emanates back out of the person's flesh via the above-described diffusion mechanism.

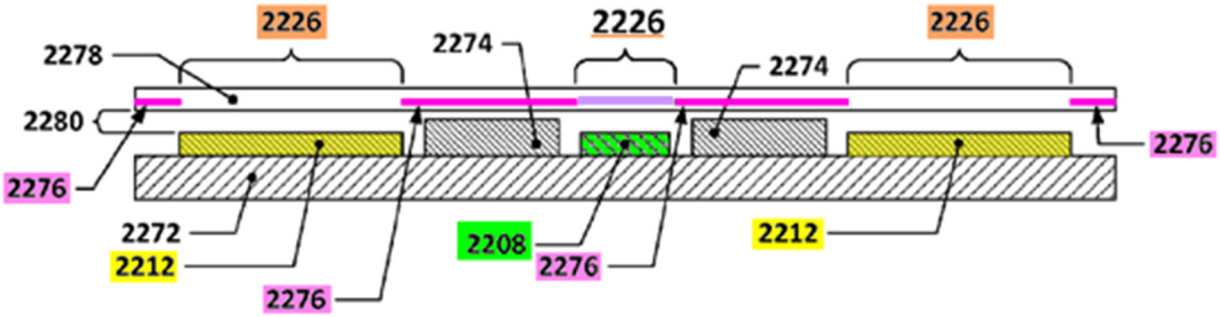
APPLE-1005, 7:36-48; *see also id.*, 3:15, 13:39-43, 17:16, 18:35-44; APPLE-

1003, ¶[89]-[90].

(j) Claim 13

[13]

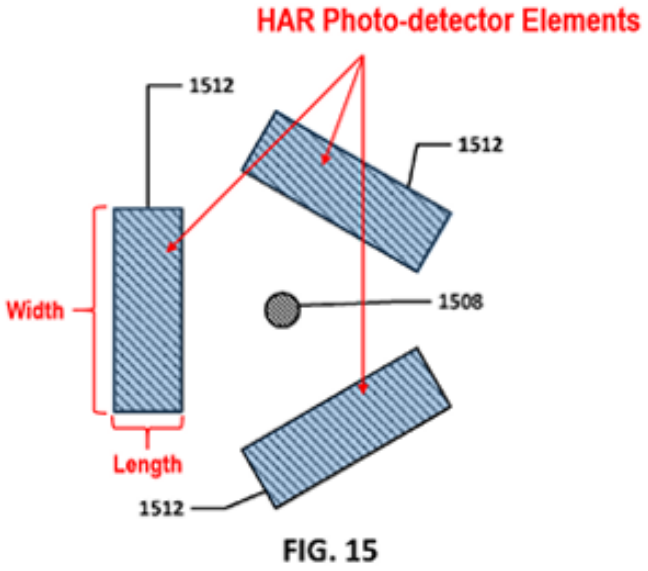
As discussed above with respect to [1e], Sarantos discloses a respective window for each photodiode in the sensor that permits diffuse light reflected from the tissue measurement site to reach the photodiode for detection and measurement. *See* [1e]; APPLE-1003, ¶[91]. For example, Sarantos' FIG. 22 depicts a surface with a dark-colored coating (window 2226 with in-mold label 2276) positioned between the photodiodes 2212 and tissue of user's wrist, wherein windows 2226 in the dark-colored coating allow light reflected from the tissue to reach photodiodes 2212. APPLE-1005, FIG. 22. In the annotated version of FIG. 22 below, windows 2226 are shown in orange, in-mold labels 2276 are shown in pink, and photodiodes 2212 are shown in yellow. APPLE-1003, ¶[91].



APPLE-1005, FIG. 22 (modified).

Sarantos discloses that the photodiodes have a "high-aspect ratio" ("HAR"), such that "at least 90% of the photodetector element active area[] … has a

maximum first dimension along a first axis that is at least twice as large as a maximum second dimension of the photodetector element along a second axis that is perpendicular or orthogonal to the first axis." APPLE-1005, 9:47-65; *generally id.*, 9:48-10:26, FIGS. 15-16, 18. For instance, Sarantos' FIG. 15 (reproduced below) shows that the HAR photodiodes can have a width larger than their length. APPLE-1003, ¶[92].



APPLE-1005, FIG. 15.

Sarantos further discloses that "the window regions 2226 through which the light reaches the HAR photodetector elements 2212 each overlap their respective HAR photodetector elements 2212" and "the window regions 2226 are *mutually coextensive* with their respective HAR photodetector elements 2212." APPLE-

1005, 17:42-47. Thus, it would have been obvious to a POSITA that the window regions (which meet the definition of "***opening[s]***" provided by Masimo for purposes of infringement) defined in the dark-colored coating each include a width and a length corresponding to the width and length of their respective HAR photodiodes, and the width is larger than the length. APPLE-1003, ¶[93].

(k) Claim 22

[22pre]

See [1pre]; APPLE-1003, ¶[94].

[22a]

See [1a]; APPLE-1003, ¶[95].

[22b]

See [1b][3]; APPLE-1003, ¶[96].

[22c]

See [1d], [5]; APPLE-1003, ¶[97].

[22d]

See [1c], [5]; APPLE-1003, ¶[98].

[22e]

See [1d]; APPLE-1003, ¶[99].

[3] The "diffuser" in [22b] corresponds to the "optical transmission material" in [1b].

[22f]

See [1f]; APPLE-1003, ¶[100].

(l) Claim 23

[23]

See [1a], [1b], [22]; APPLE-1003, ¶[101].

(m) Claim 24

[24]

See [11], [22]; APPLE-1003, ¶[102].

(n) Claim 25

[25]

See [12], [22]; APPLE-1003, ¶[103].

B. Ground 2B: Claim 7 is obvious over Sarantos and Shie in view of Utter

1. Overview of Utter

Utter describes "[g]eneral health and wellness management techniques and devices…configured for use with a data-capable personal worn or carried device. APPLE-1006, Abstract. In particular, Utter describes wrist-worn bands "that are configured to gather large amounts of personally relevant data that can be used to improve user health, fitness levels, medical conditions, athletic performance, sleeping physiology, and physiological conditions." APPLE-1006, 12:56-64. Utter's system can evaluate overall wellness of a user, including physical, mental,

and emotional health through collecting information about the user, including physiological information such as heart rate and blood oxygen saturation. *Id.*, 13:1-16, 13:41-43, 17:56-57 (describing "light/infrared ('IR') sensor" and "pulse/heart rate ('HR') monitor"), 21:6-17. As shown in Utter's exemplary FIG. 10 reproduced below, Utter's system provides "a graphical representation of a user's wellness" based on detected and received information. *Id.*, 25:38-55, 28:24-41; APPLE-1003, ¶[38].

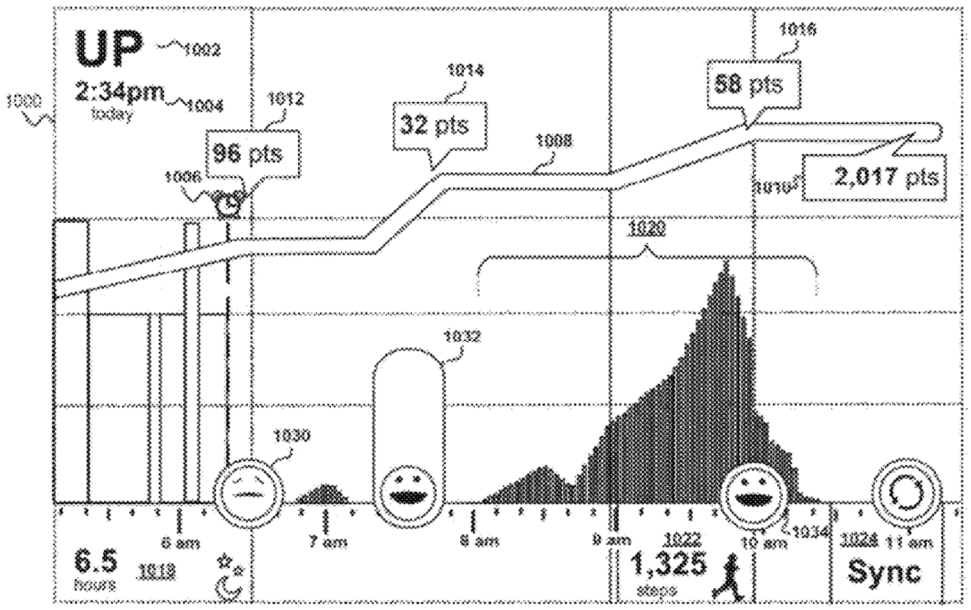


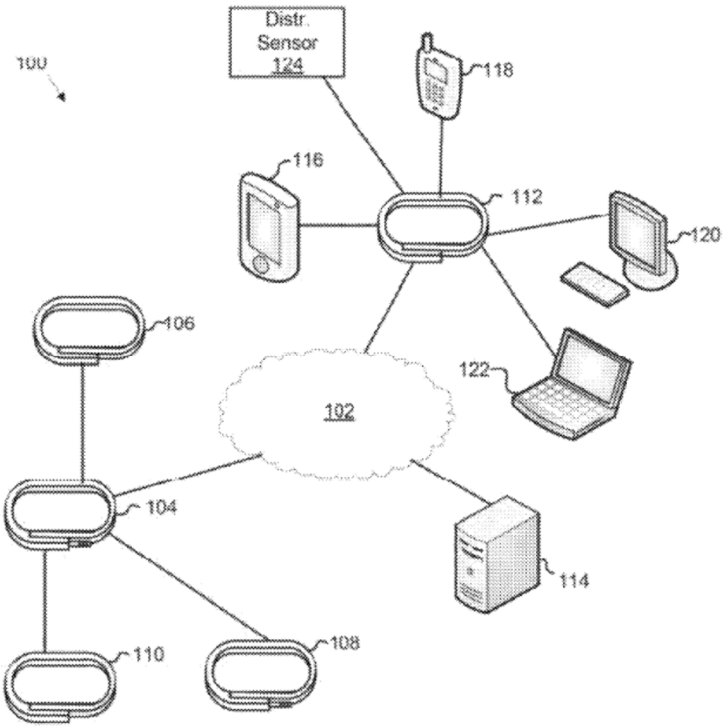
FIG. 10

APPLE-1006, FIG. 10.

Utter describes that its system "is configured to process data, such as data representing parameters based on sensor measurements or the like, as well as derived parameters that can be derived (e.g., mathematically) based on data

generated by one or more sensors." APPLE-1006, 33:14-35; APPLE-1003, ¶[39].

Utter describes using "wireless communication" to "transfer data from one or more bands 104-112 to various destinations" including "mobile computing device 116, mobile communications device 118, [or] computer 120." APPLE-1006, 14:42-15:3, 24:18-25 ("Bands 106 and 110 may communicate with mobile communications device 118 and laptop 122 using any number of wireless communication technologies"); APPLE-1003, ¶[40].



APPLE-1006, FIG. 1

Both the wrist worn sensor devices and peripheral computing devices (such as mobile computing devices) can download and execute applications to conduct

"[a]nalysis, evaluation, or other operations…on data gathered by an application" which can be displayed as part of a "graphical user interface" on "mobile computing device 116 or any other type of client." *Id.*, 21:45-65, 36:15-30 ("Display engine 1454 can be configured to generate a graphical representation on an interface such as a touch-sensitive screen on a mobile phone 1472"). The data collection, processing, and displaying functions can be performed on the wrist-worn device, the mobile device, or distributed between the wrist-worn device, the mobile device "or any other device." *Id.*, 36:23-30; APPLE-1003, ¶[41].

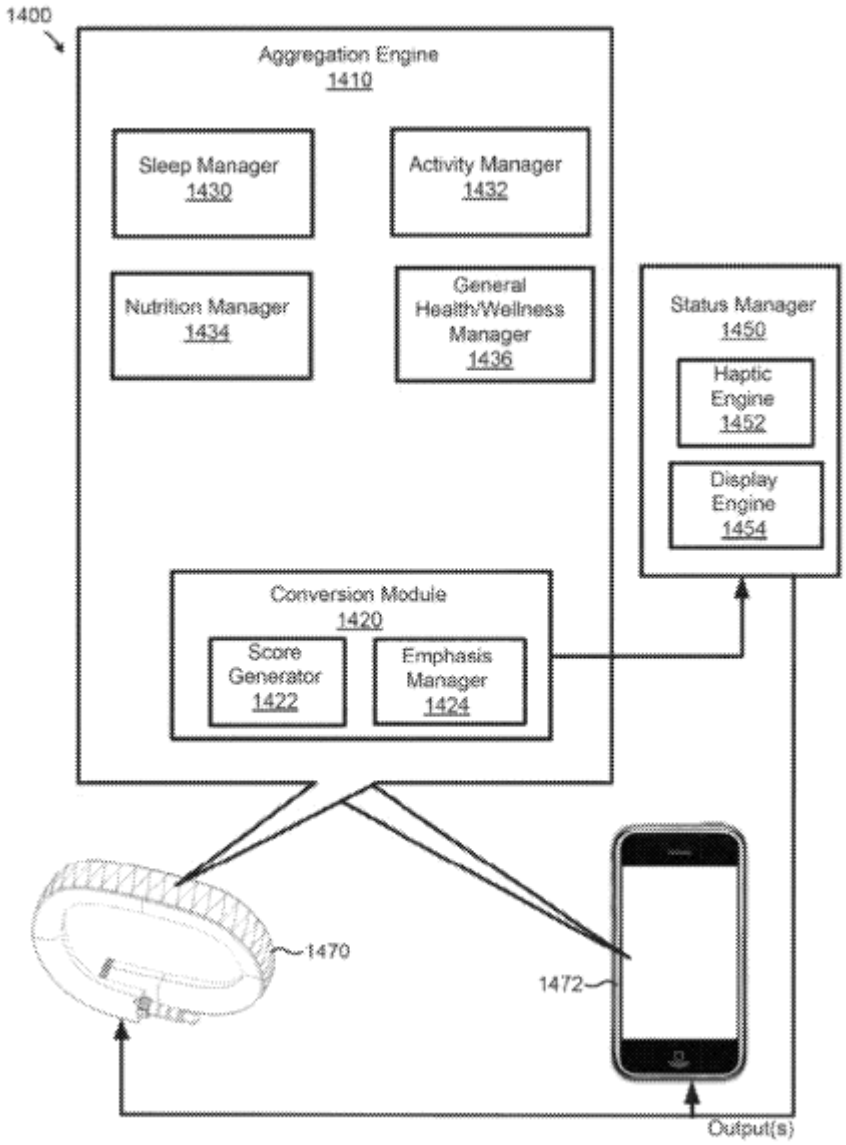


FIG. 14

APPLE-1006, FIG. 14.

2. Sarantos-Shie-Utter (SSU) Combination

A POSITA would have been motivated, would have found obvious, and would have reasonably expected success in beneficially applying the teachings of Utter to the Sarantos-Shie combination such that the resulting wrist-worn optical

biological information detecting apparatus would transmit physiological data wirelessly to a secondary device such as a mobile computing device, mobile phone, or computer, in the same manner as Utter's wrist-worn wearable physiological measurement device transmits information wirelessly from that device to a secondary device such as a mobile device or computer. APPLE-1006, 12:56-64, 13:1-16, 14:42-15:3, 24:18-25; APPLE-1003, ¶[104]. A POSITA would have understood that Utter's secondary devices, such a mobile computing device 116, mobile communications device, desktop computer, and laptop computer, all conventionally comprise, among many other components, a touch screen user interface, a storage device, one or more processors, and a network interface configured to wirelessly communicate with the primary physiological measurement device. APPLE-1006, 32:25-46, 36:21-23 (…a touch-sensitive screen on a mobile phone 1472), 13:57-65, 14:42-15:3, 24:18-25 ("Bands 106 and 110 may communicate with mobile communications device 118 and laptop 122 using any number of wireless communication technologies"), 24:59-4; APPLE-1003, ¶[104].

Indeed, Utter discloses that its configuration allows the secondary device to act as a user interface to the physiological measurement device, disclosing that "[a]nalysis, evaluation, or other operations…on data gathered by an application" which can be displayed as part of a "graphical user interface" on "mobile

computing device 116 or any other type of client." APPLE-1006, 21:45-65, 36:15-30 ("Display engine 1454 can be configured to generate a graphical representation on an interface such as a touch-sensitive screen on a mobile phone 1472"); APPLE-1003, ¶[105].

Utter further discloses that the secondary device (*i.e.*, mobile computing device or computer) can "perform various analyses and evaluations that can generate information as to a person's physical (e.g., healthy, sick, weakened, or other states, or activity level), emotional, or mental state" and "determine an aggregate value for producing a graphical representation of a user's wellness." APPLE-1006, 13:1-16, 25:38-41, 28:24-29:8; APPLE-1003, ¶[106]. A POSITA would have been motivated to wirelessly connect the wristband-type wearable optical biological information detecting apparatus of Sarantos to a secondary processing device having a user interface with a touch screen display, as taught by Utter, in order to increase the functionality of the system by utilizing the secondary display and processing capabilities of the secondary processing device, as described above. APPLE-1003, ¶[106].

A POSITA would have been motivated to transmit the physiological parameter data determined by Sarantos' wrist-worn wearable device, to a secondary device like a smart phone, as taught by Utter, to increase the functionality of the system without significantly increasing the power consumption

of Sarantos' sensor. APPLE-1003, ¶[107]; APPLE-1006, 14:42-15:3, 24:18-25, FIG. 1, FIG. 14.

For example, a POSITA would have found it obvious that it is important for wearable sensors, such as that described in Sarantos, to avoid power-consuming features, such as large amounts of data processing or elaborate graphical displays, because such added features may need a power supply unit with a sufficient battery capacity to power such functionality, which would have detrimentally increased the weight of the device APPLE-1003, ¶[108]; *see, e.g.,* APPLE-1004, 5:54-66, FIG. 1. By wirelessly transmitting information to a mobile computing device or laptop "using any number of wireless communication technologies," additional features can be realized, such as the calculation of additional metrics regarding the user's health, such as the aggregate wellness scores described by Utter, without the need to increase the battery capacity, and therefore weight, of Sarantos' sensor. APPLE-1003, ¶[108]; APPLE-1006, 14:42-15:3, 24:18-25, 13:1-16, 33:14-35, 25:38-41, 21:6-22, 28:23-29:8; APPLE-1009, 199 (describing that physiological measurement devices must "solve a need for the customer" and "meet the user's expectations" such as through "design of an optimal user interface").

Further, a POSITA would have found it obvious to modify Sarantos based on Utter, and would have reasonably expected success in doing so, because doing so entails the use of known solutions to improve similar systems and methods in

the same way. *KSR*, 550 U.S. at 417; APPLE-1003, ¶[109]. A POSITA would have recognized that applying Utter's teachings of transmitting physiological parameters wirelessly to a secondary computing device to Sarantos would have led to the predictable result, taught by Utter, of a mobile computing device, computer, or other computing device displaying information based on the received physiological parameters. APPLE-1006, 14:42-15:3, 24:18-25, 21:45-65, 36:15-30; APPLE-1003, ¶[109].

Transmitting the physiological parameter data calculated by Sarantos' wrist-worn sensor device to a secondary device to allow for combination with additional data to generate overall wellness data and trends (along with other applicable teachings of Utter) "can be used to improve user health, fitness levels, medical conditions, athletic performance, sleeping physiology, and physiological conditions." APPLE-1006, 12:56-64, 33:50-60 ("improve the user's health and wellness'), 34:15-27. For example, the resulting system can motivate the user to improve activity levels to improve overall health. *Id.*, 34:11-19, 35:26-31. Such wireless transmittal of physiological parameters can allow for sharing of information with other users. APPLE-1006, 14:23-42, 21:25-43; APPLE-1003, ¶[110].

For at least these reasons, a POSITA would have been motivated and found it obvious to implement the combination of Sarantos and Utter as described above.

APPLE-1003, ¶[111]. Such a modification would have been routine and straightforward to a POSITA, and it would have been clear that such a combination would predictably work and provide the expected functionality, because Utter describes a physiological measurement system that operated in the proposed manner. *Id*.

3. Analysis

(a) Claim 7

[7]

As described above in §IV.B.2, the Sarantos-Shie-Utter combination renders obvious a physiological measurement device wirelessly transmitting physiological parameter data to a separate device, such as a smart phone. APPLE-1005, 7:12-16, FIG. 22; APPLE-1006, 31:1-16, 37:41-63, 55:29-51, 57:20-58:9; APPLE-1003, ¶[112].

C. Ground 2C: Claim 8 is obvious over Sarantos, Shie, and Han

1. Overview of Han

Han describes various embodiments of a "photoplethysmographic (PPG) device" that "include[s] one or more light emitters and one or more light sensors to generate the multiple light paths for measuring a PPG signal and perfusion indices of a user." APPLE-1008, Abstract. The PPG sensor can detect information that can be used to determine, e.g., a pulse rate or blood oxygen saturation for a user.

Id., ¶[0026]. The PPG device can be implemented as a "wearable device 144 that can include a touch screen 128 and can be attached to a user using a strap 146." *Id.*, ¶[0029]; APPLE-1003, ¶[42].

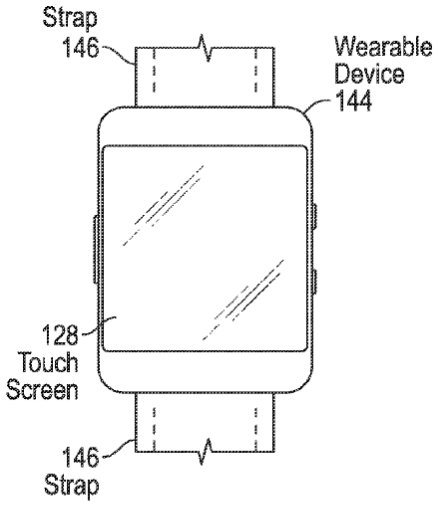


FIG. 1C

APPLE-1008, FIG. 1C.

The wearable device includes a processor that "together with an operating system can operate to execute computer code and produce and use data." APPLE-1008, ¶[0068]. The touchscreen display can display determined physiological parameter data for the user. *Id.*, ¶¶[0070]-[0071]; APPLE-1003, ¶[43].

2. Sarantos-Shie-Han Combination

A POSITA would have been motivated, would have found obvious, and would have reasonably expected success in beneficially applying the teachings of Han to the Sarantos-Shie combination such that the resulting wrist-worn

measurement device would have been implemented with a touch-screen display. APPLE-1003, ¶[113]. A POSITA would have recognized that Han's touchscreen would have increased the utility of the Sarantos-Shie device by allowing for an easy and intuitive way to provide user input to the wrist-worn device, including to parse tap and event gesture and make user selections. APPLE-1008, [0029], [0072]-[0077]; APPLE-1003, ¶[113]. A POSITA would have recognized that touchscreen user interfaces for mobile devices, including wrist-worn watch deices, were ubiquitous by 2015 and therefore implementing the Sarantos-Shie device to include a touchscreen interface on the display would have provided users with a familiar interface that they would have readily known how to use. APPLE-1003, ¶[113]. Furthermore, use of a touchscreen interface would have eliminated or reduced the need to provide other physical interface components such as buttons or keys, thereby contributing to a sleek, user-friendly design for the resulting device. *Id*.

Further, a POSITA would have found it obvious to enhance the Sarantos-Shie combination based on Han because doing so entails the use of known solutions to improve similar systems and methods in the same way. APPLE-1003, ¶[114]. Here, "when a patent 'simply arranges old elements with each performing the same function it had been known to perform' and yields no more than one would expect from such an arrangement, the combination is obvious." *KSR*, 550

U.S. at 417. A POSITA would have recognized that applying Han's teachings of a wrist-worn physiological monitor having a touchscreen to Sarantos-Shie would have led to the predictable result. APPLE-1008, [0029], [0072]-[0077]; APPLE-1003, ¶[114].

Accordingly, for at least these reasons, a POSITA would have been motivated and found it obvious to implement the combination of Sarantos, Shie, and Han as described above. APPLE-1003, ¶¶[zz]. Such a modification would have been routine and straightforward to a POSITA, and it would have been clear that such a combination would predictably work and provide the expected functionality, because Han describes a physiological measurement device that operated in the proposed manner. APPLE-1003, ¶[115]; *see, e.g.*, APPLE-1008, [0029], [0072]-[0077].

3. Analysis

(a) Claim 8

[8]

For the reasons noted above in §IV.C.2, Sarantos-Shie-Han render obvious a physiological measurement device that comprises a touch-screen display. APPLE-1003, ¶[zz]. Han discloses a touch-screen display 830, which "can be a combination of sensing device 832 and display device 824, where the sensing device 832 can be a transparent panel that is positioned in front of display device

824 or integrated with display device 824." APPLE-1008, FIG. 8, ¶¶[0070]-[0077]. The display device 824 can display various types of information including, e.g., a graphical user interface, images, and raw data. *Id.* Recall from §IV.A.1 that Sarantos discloses a "wristband-type wearable fitness monitor" that measures "physiological parameters" of the wearer, such as the person's "heart rate" and "blood oxygenation levels." APPLE-1005, 2:5-14, 5:55-59, 7:12-14, 13:39-47, FIG. 2; APPLE-1003, ¶[116].

It would have been obvious to a POSITA that the touch-screen display in the Sarantos-Shie-Han device would have been "***configured to present information related to the determined physiological parameter***." APPLE-1003, ¶[117]. In particular, a POSITA would have immediately recognized that displays are commonly used to display information, such as measured physiological parameter data, such as heart rate or blood oxygenation levels, so that the user can be informed of the user's health indicators. APPLE-1003, ¶[117]; APPLE-1014, ¶¶[0002]-[0010]; APPLE-1015, 14:1-40, 1:35-2:35. The provision of a display, as taught in Han, would have promoted user interaction with the device, and would have permitted a user to access data indicative of the user's health more readily. APPLE-1003, ¶[117]. The use of such a display in the combination would have entailed no more than the use of a known technique to improve similar devices in the same way and combining prior art elements according to known methods to

yield predictable results. *Id.*; *See KSR*, 550 U.S. at 417. The combination would have been predictable and had a reasonable expectation of success, particularly given that the elements of the combined system would each perform the same or similar functions as they had been known to perform in their respective individual systems. APPLE-1003, ¶[117].

It would have been obvious to apply Han's suggestion for a touchscreen display in the combination to provide an intuitive and convenient method for a user to view information and provide inputs to the measurement device using touch technologies that were widely available by the Critical Date of the '743 patent. APPLE-1003, ¶[118]. Additionally, by providing a touch-screen display, separate input devices such as mechanical buttons could be eliminated, thereby streamlining the design of the device and providing room to maximize the display size without significantly increasing the overall size of the wristworn device. *Id.*

D. Ground 2D: Claims 14 and 16-21 are obvious over Sarantos, Shie, Utter, and Han

1. Sarantos-Shie-Utter-Han (SSUH) Combination

A POSITA would have been motivated, would have found obvious, and would have reasonably expected success in combining the teachings of Han with the Sarantos-Shie-Utter combination for the same reasons noted above in Section IV.C.2 or combine the teachings of Utter with the Saranto-Shie-Han combination

for the same reasons noted above in Section IV.B.2. APPLE-1003, ¶[119]. Regardless of how either combination is made, the outcome would be a SSUH device that is the same in both combinations. APPLE-1003, ¶[119].

2. Analysis

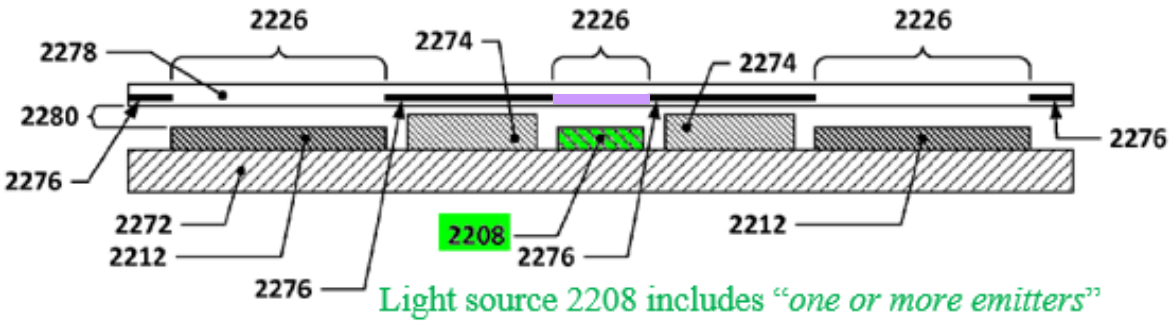
(a) Claim 14

[14pre]

See [1pre]; APPLE-1003, ¶[120].

[14a]

See [1a]. The SSUH device has a light source (e.g., 2208 shown in green in Sarantos's FIG. 22 below) that includes a plurality of LEDs ("***one or more optical sources***"). APPLE-1005, 2:18-19, 13:34-53, 17:1-25. Because light emitted from a LED has a wavelength and an initial light pattern, it would have been obvious to a POSITA that light emitted from the Sarantos's LEDs would have been "***configured to emit light of one or more wavelengths in an initial light pattern***." APPLE-1003, ¶[121].



APPLE-1005, FIG. 22 (modified).

In addition, because Sarantos's physiological sensor is a wristwatch, the LEDs emit light "***proximate a wrist of a user***." APPLE-1005, 7:12-25; APPLE-1003, ¶[122].

[14b]

See [1b]; APPLE-1003, ¶[123].

[14c]

See [1c]; APPLE-1003, ¶[124].

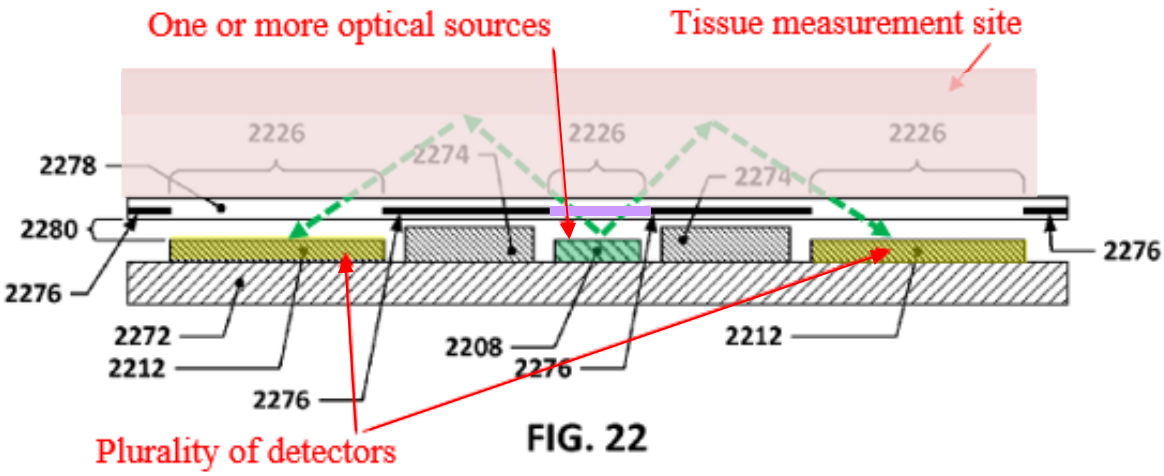
In addition, a POSITA would have been motivated to incorporate Shie's diffuser between LEDs 2208 and a user's tissue such that light emitted from LEDs 2208 travels through the light diffusing material of the diffuser and then passes into tissue that is encircled by the light block (walls 2274). APPLE-1005, 17:1-25; APPLE-1007, 6:61-7:7; APPLE-1003, ¶[125]. Photodetector elements 2212 are positioned just outside of walls 2274. APPLE-1005, Fig. 22; APPLE-1003, ¶[125].

Sarantos discloses multiple LEDs and a plurality of photodiodes wherein light is shone from the multiple LEDs into tissue and reflected back to the photodiodes. APPLE-1005, 17:1-4, 17:16-25, Fig 22. This is a reflectance measurement configuration. APPLE-1003, ¶[126].

According to the '743 Patent, "[r]eflective pulse oximetry is a method by which the emitter and detector are located on the same side of the tissue measurement site 102." APPLE-1001, 10:14-16; *see also id.*, FIGS. 6, 7A-7B.

This contrasts with transmissive pulse oximetry in which the emitter and detector are located on opposite sides of the measurement site. *See id.*, FIG. 3; APPLE-1003, ¶[127].

In the combination, Sarantos discloses that the LEDs and photo-detectors (i.e., photodiodes) are located on the same side of the a tissue measurement site, and are therefore arranged in a reflectance measurement configuration. *See* [1a], [1c]; APPLE-1005, 17:1-51, 15:23-44, FIG. 22 (reproduced below); APPLE-1003, ¶[128].



APPLE-1005, FIG. 22 (modified).

Therefore, SSUH renders obvious "***wherein the one or more optical sources and the plurality of detectors are arranged in a reflectance measurement configuration***." APPLE-1003, ¶[129].

[14d]

See [1d]; APPLE-1003, ¶[130].

[14e]

See [1e]; APPLE-1003, ¶[131].

[14f]

See [1f]; APPLE-1003, ¶[132].

[14g]

See [8]; APPLE-1003, ¶[133].

[14h]

See [7]; APPLE-1003, ¶[134].

(b) Claim 16

[16]

See [3], [4], [14]; APPLE-1003, ¶[135].

(c) Claim 17

[17]

See [9], [14]; APPLE-1003, ¶[136].

(d) Claim 18

[18]

See [11], [14]; APPLE-1003, ¶[137].

(e) Claim 19

[19]

See [12], [14]; APPLE-1003, ¶[138].

(f) Claim 20

[20]

See [13], [14]; APPLE-1003, ¶[139].

(g) Claim 21

[21]

See [5], [14]; APPLE-1003, ¶[140].

V. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. 314(a) – *Fintiv*

Consistent with Congressional intent, the goals of *Fintiv*, and the Interim Guidance issued by Director Vidal on June 21, 2022 ("*Director's Guidance*" or APPLE-1061), Petitioner respectfully asks the Board to reach the merits of the challenges raised in this Petition. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, 6 (PTAB Mar. 20, 2020)(precedential)("*Fintiv*"); APPLE-1061, 6-7, 9. As demonstrated below, a holistic analysis of the *Fintiv* framework favors institution.

The concerns addressed by *Fintiv* are simply not present. Not only will the Final Written Decision ("FWD") be rendered well in advance of trial in co-pending District Court proceedings based on median time-to-trial statistics, but Apple has

doubled-down with a comprehensive institution-invoked stipulation to ensure that there can be no redundancy between art considered in this IPR and art asserted in the District Court. *Director's Guidance*, 9; APPLE-1060, 14; APPLE-1066, 1.

More, the Petition presents compelling challenges, as it applies largely the same prior art to similarly address claims that closely resemble those of the '745 patent for which institution was recently granted. *See* APPLE-1072, 5, 23; APPLE-1071, 15:31-61 ('745 patent claim 1); APPLE-1001, 15:31-63 ('743 patent claim 1). More specifically, the Board instituted review of the '745 patent based on asserted grounds including the same combination of Iwamiya and Sarantos. *See Apple Inc. v. Masimo Corp.*, IPR2022-01291 Pap. 15, 23 (PTAB Feb. 1, 2023); APPLE-1072, 5, 23.

The present grounds are premised on Dr. Anthony's robustly corroborated testimony, which if unrebutted at trial, would compel a conclusion that the Challenged Claims are unpatentable by a preponderance of the evidence. For at least that additional reason, "the PTAB should not discretionarily deny institution under *Fintiv*." APPLE-1061, 3-5, 9; IPR2022-01242 Pap. 23 at 3, 5-6 (PTAB Feb. 27, 2023)(precedential)("*Commscope*").

Indeed, the Board's institution of an IPR based on the instant Petition would serve to efficiently address issues of invalidity, just as the Board's earlier review of

the related '695 patent resolved unpatentability of all challenged claims.[4]

1. Factor 1: Neither Party has yet Requested a Stay with Respect to the '743 Patent

Factor 1 does not favor denial. Neither party has indicated a lack of intent to request a stay of the related litigation with respect to the '743 patent[5], and the

[4] More specifically, the Board invalidated every challenged claim of the '695 patent based on references including Sarantos. *See Apple Inc. v. Masimo Corp.*, IPR2020-01722 Pap. 28, 26 (PTAB May 5, 2022) ("Petitioner has shown by a preponderance of the evidence that claims 6, 14, and 21 would have been obvious in view of the combined teachings of Sarantos, Mendelson-1991, and Chin"), 8-9 (reproducing '695 patent independent claim 1 and dependent claim 6, which, similar to the '743 patent's independent claim 1, together recite "a plurality of emitters," "a plurality of detectors," and "a light block" that "prevents at least a portion of light emitted…from being detected by the plurality of detectors without attenuation by the tissue"); APPLE-1074, 8-9, 26; APPLE-1073, 15:32-63 (claim 1), 16:16-19 (claim 6).

[5] Notably, Judge Noreika granted a stay of Masimo counterclaims asserting U.S. Patent Nos. 10,912,501, 10,912,502, 10,945,648, 10,687,745, and 7,761,127, until conclusion of an ongoing ITC matter, including all appeals. APPLE-1069, 1.

Board has indicated that it "will not attempt to predict" how a district court might adjudicate a future motion to stay, if/when filed. *See Fintiv,* 12; *Sand Revolution II, LLC v. Cont'l Intermodal Group – Trucking LLC*, IPR2019-01393, Pap. 24, 7 (June 16, 2020)("*Sand Revolution*")(informative); *Sotera Wireless Inc. v. Masimo Corp.*, IPR2020-01019 Pap. 12, 14 (PTAB Dec. 1, 2020)("*Sotera*")(precedential).

2. Factor 2: The Board and Parties can Only Speculate as to the Trial Date, and Statistics Disfavor Denial

As the Director recognizes, "scheduled trial dates are unreliable and often change." *Director's Guidance*, 8. Thus, the "PTAB will weigh this factor against exercising discretion to deny institution…if the median time-to-trial is…after the projected statutory deadline for the PTAB's [FWD]." *Id.*, 9. Indeed, the Delaware District Court, which presides over the related litigation and which is one of the country's busiest patent courts, recently granted a joint motion to amend the case schedule that moved the case management conference back by approximately two months, but has not yet set an estimated trial date. *See* APPLE-1065, 3 (indicating a "New Deadline" for "Trial" of "TBD").

Based on the October 20, 2022 filing date of Apple's original complaint, an average time-to-trial of 37.8 months, and the 18-month IPR schedule, the Board is expected to issue its FWD in June or July, 2025, nearly six months ahead of the statistically indicated December, 2025 district court trial date. APPLE-1060, 14.

Accordingly, Factor 2 disfavors denial. *Director's Guidance*, 9; *see also Masimo Corp. v. Apple Inc.*, IPR2023-00634 Pap. 1, 108 (Feb. 27, 2023)(Petition)(arguing against denial based on "published statistics indicat[ing] that the median time to trial for a civil action in the District of Delaware is almost three years").

More, in this case, several factors contribute to uncertainty with respect to the yet-scheduled trial date, including, for example, whether a single trial will be conducted to address all 6 of Apple's asserted utility patents, all 4 of Apple's asserted design patents, and all 5 of Masimo's counter-asserted utility patents (including the '743 patent). *See*, generally, APPLE-1062-1065, APPLE-1069. For example, it remains unclear whether the 5 Masimo patents that are subject to stay until conclusion of the related ITC matter, including all appeals, will eventually be tried together with the 5 additional Masimo patents that are not subject to stay, or if separate trials addressing those two sets of patents might instead be conducted in sequence. *See* APPLE-1069, 1.

For at least these reasons, Factor 2 disfavors denial.[6] *See Director's Guidance*, 9.

3. Factor 3: Petitioner's Diligence and Investment in IPR Disfavors Denial

Factor 3 disfavors denial. Apple's substantial investment in petitions addressing the 10 patents asserted by Patent Owner in District Court Litigation (including the 5 patents reasserted from ITC litigation) should counterbalance—

[6] Moreover, Apple has been diligent. Patent Owner filed its D. Del. counterclaims asserting 10 patents, including the '743 Patent, in the context of ongoing complex litigation, initiated by Masimo on January 9, 2020 by its C. D. Cal. complaint, that has thus far involved 37 patents and, in addition to the PTAB, forums including C.D. Cal., ITC, D. Del., and the Fed. Cir. In addition to today's filings, Apple has demonstrated at least a reasonable likelihood of success in proving unpatentability of 22 of these patents at the PTAB, and has indeed been found to have demonstrated unpatentability of claims in 18 of the corresponding 20 FWDs that have issued thus far. For at least that additional reason, Factor 2 favors institution. *See Apple Inc. v. Seven Networks, LLC*, IPR2020-00156, Pap. 10, 9 & n.8 (June 15, 2020)("*Seven Networks*")(factor 2 should be analyzed on a sliding scale based on petitioner diligence and relative trial dates).

and frankly outweigh—the resources invested in the co-pending District Court Litigation. It would be unjust to consider resources expended in District Court (equally by both parties), without considering Apple resources expended to prepare petitions that would be irretrievably lost without consideration on the merits.

For example, as explained below with respect to Factor 4, to ensure that an IPR proceeding instituted on the basis of this Petition will be a true alternative to district court litigation that might otherwise address overlapping issues, Apple stipulates that, if the Board institutes this IPR, Apple will not, for the instituted claims, seek resolution in the co-pending Delaware District Court proceeding of any ground of invalidity that utilizes any of the prior art asserted in this petition, i.e., Sarantos, Shie, Han, or Utter. APPLE-1066. Consistent with Apple's stipulation, Apple's district court expert invalidity report does not include any of Sarantos, Shie, Han, or Utter. APPLE-1068. As such, discretionary denial of the instant petition would prevent Apple from being heard, not only by the PTAB, but also by the District Court, both with respect to the compellingly meritorious grounds presented within this petition, and also with respect to any ground of invalidity utilizing any of Sarantos, Shie, Han, or Utter. *Id*.

In this way, Apple's stipulation is broader in several dimensions than a *Sotera* stipulation, at least according to Masimo. For instance, despite offering a *Sotera* stipulation in support of its petitions, after institution, Masimo advances in

district court invalidity grounds the same references that it applied within its instituted IPR petitions.[7]

For at least these reasons, *Fintiv* factor 3 disfavors denial. *See Seven Networks*, 11-12; *Sotera*, 16-17; *Snap, Inc. v. SRK Technology LLC*, IPR2020-00820, Pap. 15, 11-13 (Oct. 21, 2020)("*Snap*")(precedential).

[7] For example, the Board instituted Masimo's *Sotera*-backed petition challenging Apple's D. Del.-asserted '257 patent, and Masimo has since revealed that it relies for its district court invalidity grounds on the same Markel and Mills references applied in that petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00745 Pap. 1, 12-13, 85 (Mar. 22, 2023); APPLE-1067, 1. Similarly, Masimo relies in district court on the same Chae reference applied in its now-instituted and *Sotera*-backed '352 patent petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00664 Pap. 1, 33, 94 (Mar. 6, 2023); APPLE-1067, 1. Finally, Masimo relies in district court on the same Kotanagi reference applied in its now-instituted and *Sotera*-backed '783 patent petition, further combined with product art. *Masimo Corp. v. Apple Inc.*, IPR2023-00634 Pap. 1, 6, 109 (Feb. 27, 2023); APPLE-1067, 1.

4. Factor 4: The Petition's Grounds are Materially Different from Any that Might be Raised in Litigation

Factor 4 strongly disfavors denial. First, Patent Owner asserts only '743 Patent claims 1, 4-8, 11, 12, 14, 16, 18, 19, and 21, and this Petition challenges claims 1, 3-14, and 16-25 of the '743 Patent claims. Accordingly, a significant number of the Challenged Claims (10 out of 23) will be left unaddressed in District Court Litigation. *See Seven Networks*, 21.

Second, to eliminate any doubt as to the absence of meaningful overlap between the District Court Litigation and IPR, Apple stipulates that, if the Board institutes this IPR, Apple will not, for the instituted claims, seek resolution in the co-pending District Court proceeding of any ground of invalidity that utilizes any of Sarantos, Shie, Han, or Utter. APPLE-1066.

By this stipulation, Factor 4 strongly disfavors denial, at least because Apple's stipulation guarantees that the prior art relied on in this IPR will not be relitigated/otherwise litigated in the co-pending District Court proceeding. *See Apple Inc. v. AliveCor, Inc.*, IPR2021-00972 Pap. 10, 13-16 (PTAB Dec. 8 2021)("*AliveCor*"); APPLE-1068 (demonstrating that Apple's district court expert invalidity report does not leverage Sarantos, Shie, Han, or Utter).

Notably, Apple's stipulation is substantially more robust than a *Sand Revolution* stipulation, by which a petitioner pledges not to pursue the same

grounds of invalidity in district court litigation, while leaving open the possibility of the same references applied within a petition being reasserted by the same petitioner in different district court invalidity grounds. *See Sand Revolution* at 11-12. For at least that reason, Apple respectfully submits that ***Apple's stipulation***, which ***guarantees that there will be no overlap*** between the prior art relied on in this IPR and the prior art relied on in the District Court proceeding, should be accorded substantially more weight than a *Sand Revolution* stipulation. *Cf. Sand Revolution* at 12.

Further, and as noted above with respect to Factor 3, Apple's stipulation is also broader than a *Sotera* stipulation, at least insofar as it is apparently Masimo's position that a *Sotera* stipulation leaves open the possibility of the same references applied within an instituted IPR petition being reasserted by the same petitioner in district court invalidity grounds that could not reasonably have been raised in that petition. *See Sotera*, 13-14, 19; 35 U.S.C § 315(e)(2). More specifically, Masimo's Delaware District Court invalidity positions with respect to Apple's '257, '352, and '783 patents rely on many of the same references already applied within Masimo's *Sotera*-backed and earlier-instituted IPR petitions, further combined with product art that is not eligible for PTAB consideration. *See* APPLE-1067, 1; IPR2023-00745 Pap. 1, 12-13, 85; IPR2023-00664 Pap. 1, 33, 94; IPR2023-00634 Pap. 1, 6, 109.

Whether the District of Delaware will allow Masimo to proceed in this manner remains to be seen, but recent decisions treating language of the § 315(e)(2) estoppel provision that is co-extensive with *Sotera* suggest that it might. *See Sotera*, 19; 35 U.S.C § 315(e)(2). For example, a recent D. Del. decision held that so long as printed publications are used in combination with product or system art such that the "combination is substantively different from the grounds that were raised or reasonably could have been raised" in the IPR, IPR estoppel does not apply. *Ioengine, LLC v. PayPal Holdings, Inc.* 607 F. Supp. 3d 464, 513 (D. Del. Jun. 15, 2022) (Bryson); *see also Chemours Co. FC, LLC v. Daikin Indus. Ltd.*, No. 1:17-cv-01612, 2022 WL 2643517, at *1 (D. Del. Jul. 8, 2022) (Noreika) (holding that IPR estoppel does not apply to prior art products, even if cumulative to references asserted in IPR).

In stark contrast with Masimo's *Sotera* stipulations and Masimo's reliance on overlapping references applied in IPR and the District Court Litigation, Apple's stipulation extinguishes the possibility of ***any overlap*** in prior art between this IPR and grounds resolved in counterpart D. Del. proceedings, thereby ensuring that IPR is a true alternative to the District Court Litigation with respect to that art.

Moreover, Masimo asserts only a subset of the claims challenged in this IPR (13 of 23). Further, official statistics indicate that the Board will issue its FWD months in advance of the District Court trial. APPLE-1060, 14

At least because ***the invalidity grounds to be resolved in the District Court Litigation involve no overlap in prior art and only a small subset of the Challenged Claims***, Factor 4 strongly disfavors denial. *See AliveCor*, 16; *Seven Networks*, 21.

5. Factor 5: The PTAB Parties are Not Different Than District Court Parties

Factor 5 should, at worst, be neutral. The Litigation involves the same parties. However, the *Fintiv* decision says nothing about weighing Factor 5 in favor of denial when the petitioner and the defendant in the parallel proceeding are the same; with respect to Factor 5, *Fintiv* instead notes that "if a petitioner is unrelated" the Board has weighed that "fact against exercising discretion to deny institution." *Fintiv*, 13-14; *see also Cisco Systems, Inc. v. Ramot at Tel Aviv University Ltd*., IPR2020-00122, Pap. 15, 10 (Crumbley, dissenting).

Neither the grounds of unpatentability advanced by the instant Petition nor the prior art itself will be addressed in the District Court Litigation, as the invalidity contentions omit the petitioned prior art. APPLE-1068. Presented with a similar situation, the Board in *Snap* resolved "the fifth *Fintiv* factor as neutral or, at most, weighing slightly in favor of exercising discretion to deny institution". *Snap*, 16.

6. Factor 6: The Merits of this Petition Compel Institution

Factor 6 strongly disfavors denial. Here, the strength of the merits alone outweighs any potential inefficiencies, regardless of whether the timing of the District Court Litigation is thought relevant (it is not, as demonstrated with respect to Factors 1-5). *Fintiv*, 14-15 (noting under Factor 6 that "if the merits of a ground raised in the petition seem particularly strong…institution of a trial may serve…overall system efficiency and integrity"). Indeed, institution was recently granted on a petition advancing similar prior art grounds against claims of the '745 patent, which recite similar subject matter. APPLE-1072, 5, 23.

With Factors 2, 3, 4, and 6 disfavoring denial, and with remaining Factors 1 and 5 otherwise neutral, discretion should not be exercised to deny institution (and thus, substantive consideration on the merits). *Fintiv*, 19 (declining to deny institution based on a "holistic" balancing of "all of the *Fintiv* factors").

Moreover, Director Vidal has further explained that "where the PTAB determines that the information presented at the institution stage presents a compelling unpatentability challenge, that determination alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*." *Director's Guidance*, 4-5. More specifically, the PTAB will not discretionarily deny institution if "the Petition presents challenges 'in which the evidence, if unrebutted in trial,

would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.'" *Commscope*, 3 (quoting *Director's Guidance*, 4); *Director's Guidance*, 3-5, 9.

The merits of this Petition are compelling. As the instant Petition demonstrates, evidence including the applied references and Dr. Anthony's robustly corroborated testimony, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.

Indeed, the Board has already found unpatentable every challenged claim of the related '695 Patent based on grounds including Sarantos, and is nearing conclusion of IPRs of the related '745 Patent based on grounds including Sarantos and Shie. IPR2020-01722 Pap. 28, 26 (PTAB May 5, 2022); IPR2022-01291 Pap. 15, 23 (PTAB Feb.1, 2023); IPR2022-01465 Pap. 15, 2 (PTAB Feb. 6, 2023).

The counterpart IPR2022-01291 trial is particularly relevant to the instant Petition's compelling merits, as Masimo has in that trial failed to effectively rebut Apple's evidence of unpatentability of at least the '745 Patent's independent claim 1, which is nearly identical to the '743 Patent's independent claim 1, over the Sarantos-Shie combination advanced in the instant Petition. *See* IPR2022-01291 Pap. 29, 44-50 (May 26, 2023), Pap. 39, 3-7 (Aug. 21, 2023); APPLE-1071, 15:31-61 ('745 patent claim 1); APPLE-1001, 15:31-58 ('743 patent claim 1).

Both because a holistic analysis of the *Fintiv* factors disfavors denial, and

because the merits of the instant Petition are compelling, Apple respectfully submits that the Board should not discretionarily deny institution under *Fintiv*.[8] *Fintiv*, 19; *Director's Guidance*, 3-5, 9; *Commscope*, 3.

B. 325(d) – Advanced Bionics

Advanced Bionics and the *Becton* factors strongly favor institution. *Advanced Bionics LLC v. MED-EL Elektromedizinische Gerate GmbH*, IPR2019-01469 Pap. 6 (PTAB Feb. 13, 2020)("*Advanced Bionics*")(precedential); *Becton, Dickinson and Co. v. B. Braun Melsungen AG*, IPR2017-01586 Pap. 8 (PTAB Dec. 15 2017)("Becton")(precedential).

Under the *Advanced Bionics* framework, discretionary denial under Section 325(d) is appropriate only if a condition in the framework's first prong is satisfied, and if there is no showing of material error under the second prong. *Advanced Bionics LLC v. MED-EL Elektromedizinische Gerate GmbH*, IPR2019-01469 Pap. 6 (PTAB Feb. 13, 2020). As stated in *Advanced Bionics*, those two prongs are:

[8] Apart from Petitioners' showing that *Fintiv* favors institution, the *Fintiv* framework should not be followed because it is legally invalid. The framework (1) exceeds the Director's authority, (2) is arbitrary and capricious, and (3) was adopted without notice-and-comment rulemaking.

> (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and
> (2) if either condition of [the] first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics., 8-10.

First, and as explained at length above (*supra*, §IV.D.), ***the examiner never issued a rejection during the '743 Patent's prosecution***, and instead issued a notice of allowance approximately eight weeks after application corresponding to the '743 Patent was filed. APPLE-1002, 145-153.

Although the face of the '743 Patent lists hundreds of other references cited by Masimo, Masimo failed to cite the Sarantos, Shie, and Utter references applied in this Petition to the examiner, despite being in possession of Apple's earlier IPR petitions challenging claims of the related '695 Patent based on those same references. *See*, *generally*, IPR2020-01722, -01723. Indeed, there is no indication in the '743 Patent's file history that the examiner was even aware of, let alone substantively considered, any of the prior art combinations applied in this Petition prior to allowing the application corresponding to the '743 Patent. *See*, *generally*, APPLE-1002. The Sarantos, Shie, and Utter references applied in this Petition are new, noncumulative prior art.

Han was cited, among more than 1,300 references, in an IDS (APPLE-1002, 214) but was not applied in any rejection. Aside from mere citation within the signed IDS, the record lacks any indication whatsoever that the Examiner considered either reference during prosecution. When considering similar prosecution histories lacking evidence of substantive consideration of a cited reference, the Board has consistently declined to exercise its discretion to deny institution under §325(d). *E.g., Scientific Design Co. v. Shell Oil Co.*, IPR2021-01537, Paper 7 at 24-26 (PTAB 2022) and IPR2022-00158, Paper 7 at 24-26 (PTAB 2022); *Digital Check Corp. d/b/a ST Imaging v. E-ImageData Corp*., IPR2017-00178, Paper 6 at 12-13 (PTAB 2017); *Fox Factory, Inc. v. SRAM, LLC*, IPR2016-01876, Paper 8 at 7-9 (PTAB 2017); *Praxair Distribution, Inc. v. INO Therapeutics, LLC d/b/a Ikaria, Inc.*, IPR2015-00893, Paper 14 at 8 (PTAB 2015); *Analytics For Life, Inc. et al v. 8825319 Canada Ltd.*, IPR2017-01742, Paper 9 at 5-6 (PTAB 2018); *ABS Global, Inc. et al v. Cytonome/ST, LLC*, IPR2017-02097, Paper 11 at 37-38 (PTAB 2018). Apple respectfully submits that, consistent with those decisions, the Board should not deny the instant Petition based on the mere inclusion of Han in an IDS should not be a basis for discretionary denial.

Because the ’743 Patent’s prosecution did not involve negotiation between the applicant and the examiner regarding the teachings of the prior art applied in the instant Petition, the instant Petition’s art, combinations thereof, and arguments

cannot be said to be the same as, or substantially similar to, art and arguments or prior art combinations previously presented to the Office in connection with the '743 Patent. *See*, *generally*, APPLE-1002.

Indeed, neither condition of the first prong of the *Advanced Bionics* framework is met, and there is no need to reach the second prong to resolve against discretionary denial under Section 325(d). *See*, *e.g.*, *Oticon Medical AB et. al. v. Cochlear Ltd.*, IPR2019-00975 Pap. 15, 20 (PTAB Oct. 16, 2019)(precedential) ("There is new, noncumulative prior art asserted in the Petition…[f]or at least this reason, we determine not to exercise our discretion under § 325(d)").

Further, this Petition compellingly demonstrates the obviousness of the Challenged Claims, including any claim features relied upon by the examiner in issuing the notice of allowance.

For at least these reasons, Apple respectfully submits that discretionary denial under 35 U.S.C. § 325(d) would be unwarranted. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential).

VI. PAYMENT OF FEES – 37 C.F.R. §42.103

Petitioner authorizes the Office to charge Deposit Account No. 06-1050 for the petition fee set in 37 C.F.R. §42.15(a) and for any other required fees.

VII. CONCLUSION

Accordingly, Petitioner respectfully requests IPR of the Challenged Claims.

VIII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Parties-In-Interest Under 37 C.F.R. §42.8(b)(1)

Apple Inc. is the petitioner and real party in interest.

B. Related Matters Under 37 C.F.R. §42.8(b)(2)

Petitioner is not aware of any disclaimers, reexamination certificates or petitions for *inter partes* review for the '743 Patent.

The '743 Patent is the subject of dispute between the parties at the District of Delaware and the ITC. APPLE-1063; APPLE-1064; APPLE-1031. This Petition is being filed concurrently with another petition for IPR of the '743 Patent (IPR2024-00241).[9]

Apple has also previously filed IPRs challenging Masimo patents asserted by Masimo in C. D. Cal. and at the ITC. Among these IPRs, three are particularly relevant due to related subject matter and claim scope. In IPR2020-01722

[9] Pursuant to the Trial Practice Guide, both petitions for IPR of the '743 Patent are being filed with a paper providing a succinct explanation of the differences between the petitions, why the issues addressed by the differences are material, and why the Board should exercise its discretion to institute both petitions.

challenging related U.S. Patent No. 10,470,695, the Board found all challenged claims (claims 6, 14, and 21) invalid. *Apple Inc. v. Masimo Corp.*, IPR2020-01722 Pap. 29, 2 (PTAB May 5, 2022). Patent Owner disclaimed the unchallenged claims of the '695 Patent following institution of the IPR.

In IPR2022-01291 and IPR2022-01465, the Board has instituted IPR of related U.S. Patent No. 10,687,745 based on challenges involving several of the same prior art references asserted in this Petition. The '745 Patent is the subject of *Masimo Corporation, et al. v. Apple Inc.*, ITC Inv. No. 337-TA-1276.

C. Lead And Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

Petitioner provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above. Petitioner consents to electronic service by email at IPR50095-0133IP2@fr.com.

Respectfully submitted,

Dated: December 12, 2023

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,361 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: December 12, 2023

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on December 12, 2023, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided via Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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