

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

WILLOW LABORATORIES, INC.,
Patent Owner.

IPR2024-00296
Patent 10,984,911 B2

Before RICHARD H. MARSCHALL, DAVID COTTA, and
ALYSSA A. FINAMORE, *Administrative Patent Judges*.

FINAMORE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Apple Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of U.S. Patent No. 10,984,911 B2 (“the ’911 patent”) (Ex. 1001). Pet. 1. We issued a Decision granting institution of an *inter partes* review (Paper 8).

During trial, Willow Laboratories, Inc. (“Patent Owner”) filed a Response (Paper 13, “PO Resp.”). Petitioner filed a Reply (Paper 16, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 21, “Sur-reply”). An oral hearing took place April 2, 2025. We entered the transcript (Paper 29, “Tr.”) into the record.

This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we conclude Petitioner has proven, by a preponderance of the evidence, that claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of the ’911 patent are unpatentable.

II. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies itself as a real party-in-interest. Pet. 104. Patent Owner identifies itself and Masimo Corporation as real parties-in-interest. Paper 4, 1.

B. *Related Matters*

Petitioner and Patent Owner identify the following district court action involving the ’911 patent as a related matter: *Masimo Corp. v. Apple Inc.*, Case 1:22-cv-01378 (D. Del. filed Oct. 20, 2022) (“the Delaware Litigation”). Pet. 104; Paper 4, 1. Patent Owner also identifies as related

matters the following *inter partes* review proceedings involving patents that Patent Owner is asserting in the Delaware Litigation:

Petitioner	Case No.	Patent No.
Apple Inc.	IPR2024-00290	8,190,223
Apple Inc.	IPR2024-00243	10,722,159
Apple Inc.	IPR2024-00244	10,722,159
Apple Inc.	IPR2024-00293	10,736,507
Apple Inc.	IPR2024-00294	10,736,507
Apple Inc.	IPR2024-00241	10,687,743
Apple Inc.	IPR2024-00242	10,687,743

Paper 4, 2. Petitioner further identifies as a related matter its request for reexamination of claims 1–6, 8, 10–15, 17, 19–26, and 28 of the ’911 patent, namely application no. 90/019,893. Paper 28, 1.

C. The ’911 Patent

The ’911 patent, titled “MULTIPLE WAVELENGTH SENSOR EMITTERS,” issued on April 20, 2021, from an application filed on September 22, 2020. Ex. 1001, codes (22), (45), (54). The ’911 patent claims priority to several applications and has an earliest-claimed priority date of March 1, 2005. *Id.* at codes (60), (63).

Spectroscopy is a technique for measuring the concentration of certain constituents of a solution from the intensity of light transmitted through the solution. Ex. 1001, 2:6–28. Pulse oximetry uses spectroscopy to noninvasively determine oxygen saturation and pulse rate. *Id.* at 2:28–30. Pulse oximetry involves transmitting optical radiation of red and infrared wavelengths to a tissue site, responding to the intensity of the optical radiation after absorption by pulsatile arterial blood flowing within the tissue site, determining measurements for oxygen saturation and pulse rate based

on the response, and outputting representative plethysmographic waveforms. *Id.* at 2:30–38. According to the '911 patent, there is a need to noninvasively measure multiple physiological components, in addition to oxygen saturation and pulse rate, such as carboxyhemoglobin, methemoglobin, fractional oxygen saturation, total hemoglobin, bilirubin, and blood glucose. *Id.* at 3:23–31.

The '911 patent describes a physiological measurement system having a multiple wavelength sensor assembly with enhanced measurement capabilities as compared to conventional pulse oximetry. Ex. 1001, 5:34–37. In particular, the multiple wavelength sensor assembly measures blood constituent and related parameters in addition to oxygen saturation and pulse rate and also measures oxygen saturation and pulse rate with increased accuracy. *Id.* at 5:39–45.

Figures 1 and 2A, reproduced below, show a physiological measurement system and a multiple wavelength sensor assembly, respectively. Ex. 1001, 3:62–65, 5:34–37, 5:52–54.

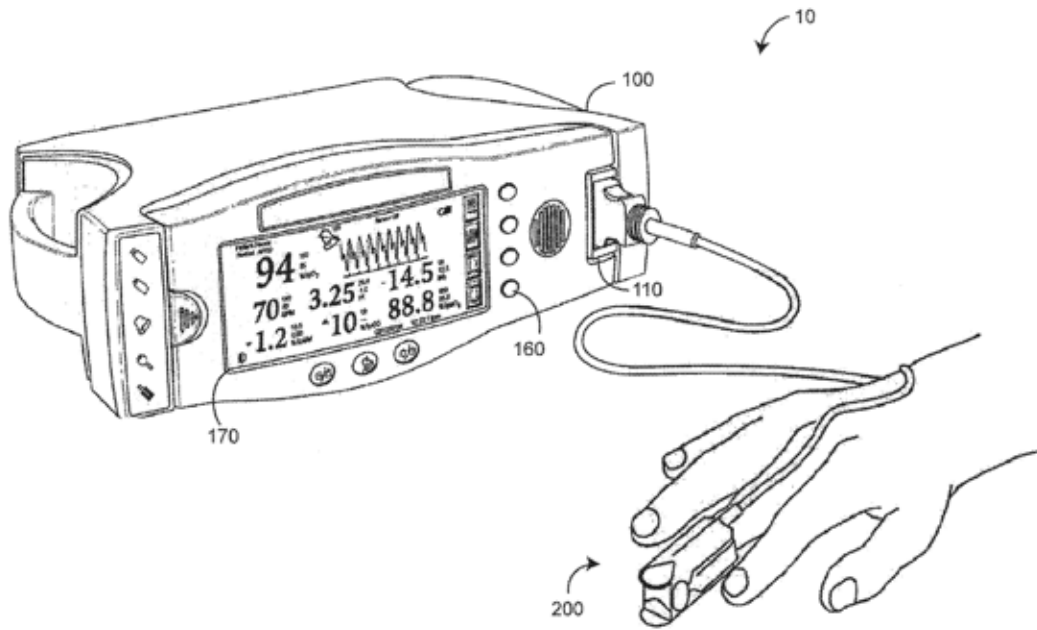


FIG. 1

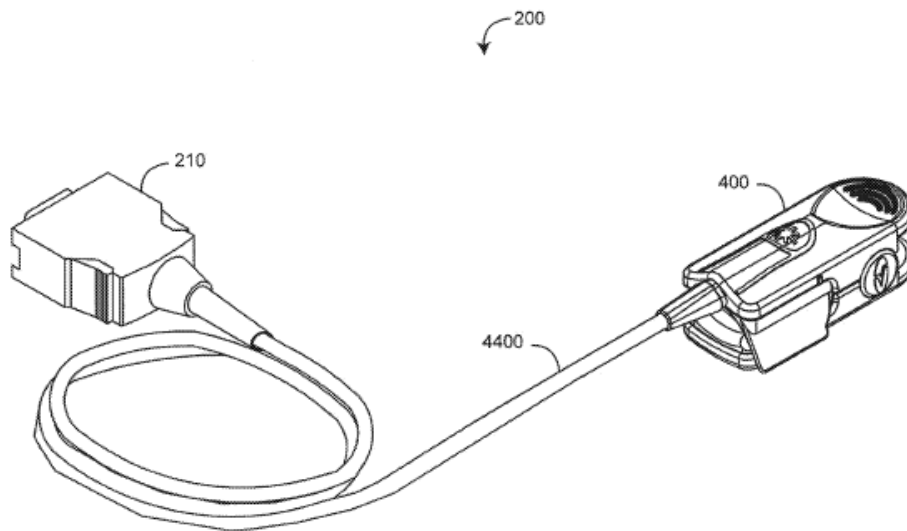


FIG. 2A

Figure 1 is a perspective view of physiological measurement system 10 including monitor 100 and multiple wavelength sensor assembly 200, and Figure 2A is a perspective view of multiple wavelength sensor assembly 200. *Id.* at 3:62–65, 5:34–37, 5:52–54. Monitor 100 includes

keys 106 for operating modes and alarms, display 170 for providing readouts of measured parameters, and monitor sensor port 110. *Id.* at 5:46–51.

Multiple wavelength sensor assembly 200 includes monitor connector 210 for plugging into monitor sensor port 110, sensor 400 adapted to attach to a tissue site, e.g., a patient's finger, and sensor cable 4400 extending between monitor connector 210 and sensor 400. *Id.* at 5:46–47, 5:52–54, Figs. 1, 2A.

Figure 46, reproduced below, shows sensor 400 in detail. Ex. 1001, 5:13–14, 19:5–7.

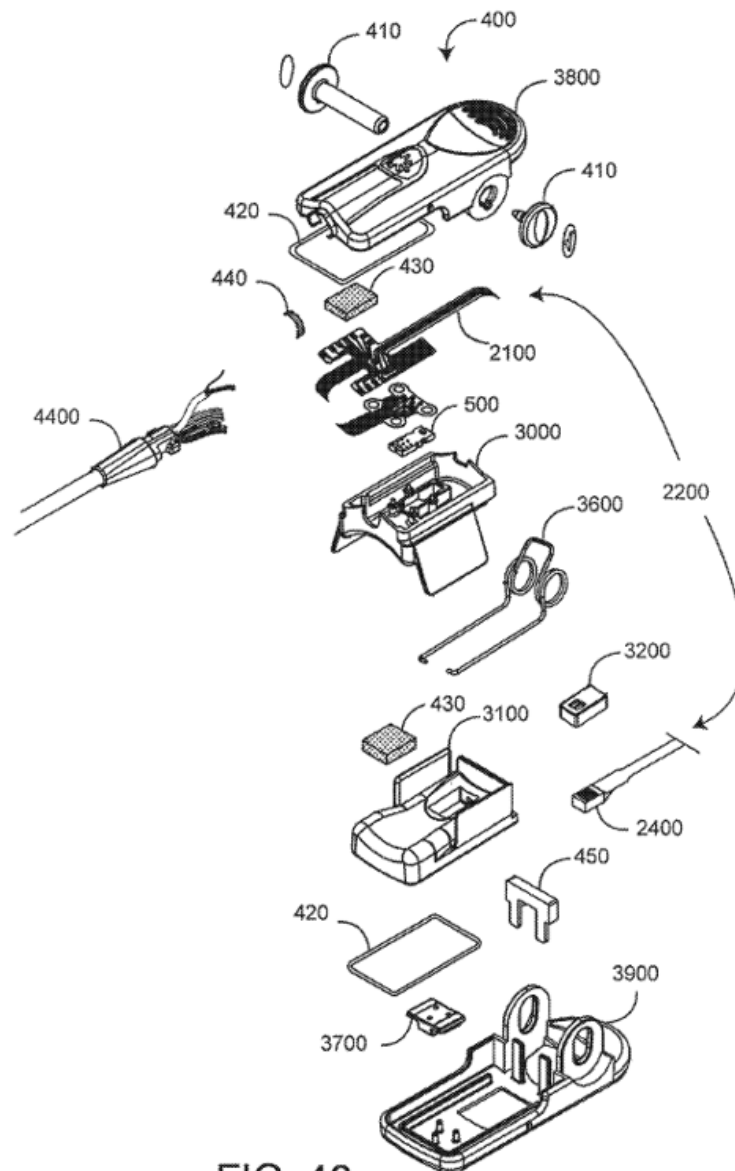


Figure 46 is a detailed exploded perspective view of multiple wavelength sensor 400. Ex. 1001, 5:12–13, 19:5–7. Sensor 400 includes flex circuit assembly 2200 that attaches to sensor cable 4400. *Id.* at 19:7–8, Fig. 2. Flex circuit assembly 2200 includes flex circuit 2100, emitter assembly 500, and detector assembly 2400. *Id.* at 19:8–10. Emitter assembly 500 responds to drive signals received from a sensor controller in monitor 100 via sensor cable 4400 and transmits optical radiation having a plurality of wavelengths to a tissue site. *Id.* at 6:6–10. Emitter assembly 500 includes an emitter array made up of multiple light emitting diodes (LEDs) for emitting optical radiation having multiple wavelengths of predetermined nominal values, thereby allowing for multiple parameter measurements. *Id.* at 7:10–21. Detector assembly 2400 provides a sensor signal to monitor 100 via sensor cable 4400 in response to optical radiation received after attenuation by the tissue site. *Id.* at 6:10–13.

Emitter assembly 500 and the portion of flex circuit assembly 2200 attached to sensor cable 4400 is housed in emitter shell 3800 and emitter pad 3000. *Id.* at 19:10–13. The portion of flex circuit assembly 2200 having detector assembly 2400 is housed in detector shell 3900 and detector pad 3100. *Id.* at 19:13–15. Detector assembly 2400 inserts into shoebox 3200, which in turn inserts into detector pad 3100. *Id.* at 15:14–15, 19:15–17. Emitter shell 3800 and detector shell 3900 are fastened by and rotate about hinge pins 410, which insert through coils of spring 3600. *Id.* at 19:17–20.

Figures 32A and 32B, reproduced below, show shoebox 3200 for housing detector assembly 2400. Ex. 1001, 4:47–49, 15:14–15.

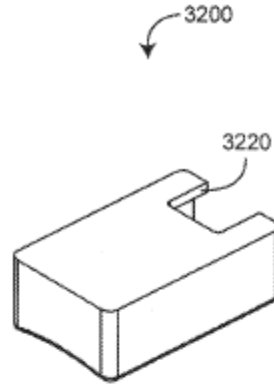


FIG. 32A

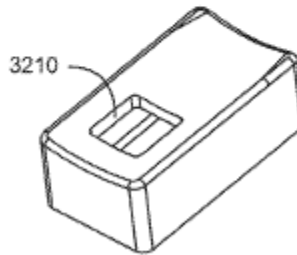


FIG. 32B

Figure 32A and 32B are perspective bottom and perspective top views of the shoebox, respectively. *Id.* at 4:47–49. As shown in Figure 32A, on a bottom surface, shoebox 3200 includes flex circuit notch 3220 that accommodates the tail of flex circuit 2200. *Id.* at 15:17–19. As shown in Figure 32B, on a top surface, shoebox 3200 includes detector window 3210 that provides an optical path from a tissue site to detector 2410 of detector assembly 2400. *Id.* at 15:15–17. In one embodiment, shoebox 3200 is

colored black or other substantially light absorbing color, while emitter pad 3000 and detector pad 3100 are each colored white or other substantially light reflecting color. *Id.* at 15:19–23.

D. Challenged Claims

Petitioner challenges claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of the '911 patent. Pet. 1. Claims 1, 10, and 19 are independent. Independent claim 1, reproduced below with Petitioner's labels¹ for the limitations in brackets and with emphasis added, is illustrative of the claimed subject matter.

1. 1[p] A physiological monitoring device comprising:
 - 1[a] at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three different wavelengths;
 - 1[b] at least one detector configured to detect at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by tissue, the at least one detector configured to output at least one signal responsive to the detected light;
 - 1[c] a light block surrounding the at least one detector, the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure, 1[d1] wherein the shoebox structure is at least partially formed of a black material, 1[d2] ***wherein a top of the shoebox structure includes only one opening through which light is configured to pass***, 1[d3] ***the opening comprising an area smaller than a detection surface area of the at least one detector***; and
 - 1[e] a processor configured to receive and process one or more signals responsive to the outputted at least one signal and

¹ For independent claim 1, Petitioner's labels listed under "Listing of Challenged Claims" (Pet. v) do not correspond to the labels in the analysis of the claim (*id.* at 20–59). We follow the labels in Petitioner's analysis of independent claim 1.

determine a physiological parameter of a user responsive to the one or more signals.

Ex. 1001, 19:36–57.

Independent claim 10 is similar to independent claim 1 but additionally recites an “electromagnetic interference shield positioned between the at least three LEDs and the at least one detector” and does not recite the light block includes “only one opening through which light is configured to pass.” *Compare* Ex. 1001, 20:7–30, *with id.* at 19:36–57. Claims 2–4, 6, and 8 depend from independent claim 1, and claims 11–13, 15, and 17 depend from independent claim 10. *Id.* at 19:58–63, 19:66–67, 20:3–4, 20:31–36, 20:40–41, 20:44–45. Apart from the dependency, claims 2–4, 6, and 8 are identical to claims 11–13, 15, and 17, respectively. *Id.*

Independent claim 19 recites a method for determining a physiological parameter and includes limitations similar to those of independent claim 1 except that independent claim 19 does not recite the light block’s opening “compris[es] an area smaller than a detection surface area of the at least one detector.” *Compare* Ex. 1001, 20:48–67, *with id.* at 19:36–57. Claims 20, 21, 23–26, and 28 depend from independent claim 19. *Id.* at 21:1–7, 21:11–18, 21:21–23.

E. Asserted Grounds and Evidence

Petitioner asserts the following two grounds of unpatentability for claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of the ’911 patent:

Claims Challenged	35 U.S.C. § ²	References/Basis
1, 6, 8, 10, 15, 17, 19–21, 26, 28	103(a)	Abdul-Hafiz, ³ Raley ⁴
2–4, 11–13, 23–25	103(a)	Abdul-Hafiz, Raley, Secker ⁵

Pet. 1. In support of these grounds, Petitioner submits a Declaration of Dr. Thomas W. Kenny (Ex. 1003) and a Supplemental Declaration of Dr. Thomas W. Kenny (Ex. 1079). *Id.* Patent Owner deposed and cross-examined Dr. Kenny and submits a transcript of Dr. Kenny’s deposition (Ex. 2080).

In opposition, Patent Owner submits a Declaration of Vijay K. Madisetti, Ph.D. (Ex. 2079). Petitioner deposed and cross-examined Dr. Madisetti and submits a transcript of Dr. Madisetti’s deposition (Ex. 1083). Petitioner also submits pages from an Expert Rebuttal Report of Vijay K. Madisetti, Ph.D. Regarding Validity of U.S. Patent No. 10,984,911 (Ex. 1082), which is from the Delaware Litigation.

² The ’911 patent has an uncontested priority date of March 1, 2005 (Ex. 1001, code (60)), which is before AIA revisions to 35 U.S.C. §§ 102 and 103 took effect on March 16, 2013. We therefore apply the pre-AIA version of the statute in this Decision. This Decision, however, is not impacted by which version of the statute applies.

³ Abdul-Hafiz et al., US 2004/0039272 A1, published Feb. 26, 2004 (“Abdul-Hafiz”) (Ex. 1004).

⁴ Raley, US 6,014,576, issued Jan. 11, 2000 (“Raley”) (Ex. 1005).

⁵ Secker, US 5,188,108, issued Feb. 23, 1993 (“Secker”) (Ex. 1006).

III. ANALYSIS

A. *Level of Ordinary Skill in the Art*

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The prior art may reflect the level of ordinary skill in the art. *Id.*

Petitioner refers to Dr. Kenny’s declaration testimony for the definition of a person of ordinary skill in the art (“POSITA”). Pet. 7 (citing Ex. 1003 ¶ 22). Dr. Kenny testifies:

In my opinion, a person of ordinary skill in the art relating to the subject matter of the ’911 Patent as of March 1, 2005 (“POSITA” or “one of ordinary skill”) would have had a Bachelor of Science degree in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, with at least one to two years of relevant work experience with capture and processing of data or information including but not limited to physiological information, or equivalents thereof. A greater amount of education, *i.e.*, a doctorate in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field would also qualify for the hypothetical person of ordinary skill in the art in lieu of fewer years of work experience. Additional education or industry experience may compensate for a deficit in one of the other aspects of the requirements stated above.

Ex. 1003 ¶ 22.

Patent Owner relies on Dr. Madisetti’s declaration testimony for the definition of a POSITA. PO Resp. 10–11 (citing Ex. 2079 ¶ 37).

Dr. Madisetti testifies:

It is my opinion that a person of ordinary skill in the art at the time of the ’911 Patent would be a person with a working knowledge of physiological monitoring technologies and/or optical sensors used in physiological monitoring technologies.

The person would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, software, or optical technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, or designing and using optical sensors or systems, including but not limited to physiological monitoring technologies. 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.

Ex. 2079 ¶ 37.

The main differences between the parties' definitions of the POSITA appear to be that Patent Owner specifies that the POSITA's knowledge and experience may include optical sensors and that the POSITA may have a degree emphasizing software. We do not deem these differences material, particularly because the optical sensors and technologies at issue are those used in physiological monitoring technologies. Moreover, both parties agree that the POSITA would have a working knowledge of physiological monitoring technologies. Ex. 1003 ¶ 22; Ex. 2079 ¶ 37. Nonetheless, we find the additional specificity of Patent Owner's definition to be helpful. Also, Patent Owner's definition appears to be consistent with the level of skill in the art reflected in the prior art of record and the disclosure of the '911 patent.

Accordingly, for purposes of this Decision, we adopt Patent Owner's proposed definition of the POSITA. We note, however, that we would reach the same outcome under either definition of the POSITA. *See also* PO Resp. 12 (Patent Owner asserting "under any proposed level of skill, the claims' patentability is confirmed for at least the reasons set forth below.").

Patent Owner argues Dr. Kenny is not a POSITA under his proffered definition. PO Resp. 11. According to Patent Owner, Dr. Kenny assumes in

his analysis that a POSITA would have developed a pulse oximetry system like the one described in Abdul-Hafiz, but Dr. Kenny admits he has never developed a pulse oximeter. *Id.* (citing Ex. 1003 ¶ 69⁶; Ex. 2080, 151:19–152:6). Dr. Kenny, however, clarified that a POSITA would not have had to develop a pulse oximetry system like Abdul-Hafiz’s system. Ex. 1079 ¶ 7; Ex. 2080, 22:7–20, 92:16–93:16. Moreover, as set forth above, we are adopting Patent Owner’s definition of the POSITA, which does not require the POSITA to have developed a pulse oximetry system. Therefore, we decline to find that Dr. Kenny is not a POSITA because he has not developed a pulse oximetry system.

B. Claim Construction

We interpret a claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2023). Under this standard, we construe the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*; *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc). Furthermore, we expressly construe the claims only to the extent necessary to determine whether Petitioner has shown that the challenged claims are unpatentable. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d

⁶ Patent Owner cites to paragraph 42 of Dr. Kenny’s Declaration as support for its argument, which includes a quote from the Declaration. PO Resp. 11. The quoted language appears in paragraph 69, which is on page 42 of the Declaration. Thus, we understand that Patent Owner is citing to paragraph 69, and that the reference to paragraph 42 is a typographical error. *See also* Ex. 2080, 92:21 (citing paragraph 69 of Dr. Kenny’s Declaration).

1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Petitioner asserts that “[a]ll claim terms should be construed according to the *Phillips* standard” and that “no express constructions are required.” Pet. 7–8. Patent Owner similarly asserts that “the claims have their plain meaning and thus require no construction.” PO Resp. 14. Based on the parties’ arguments, however, we need to expressly construe “a detection surface area of the at least one detector” to determine whether Petitioner has shown that the challenged claims are unpatentable. We also need to address Patent Owner’s argument that Petitioner has failed to show unpatentability of the challenged claims due to its inconsistent claim constructions in this proceeding and the Delaware Litigation.

1. “a detection surface area of the at least one detector”

Independent claim 1 recites “the opening comprising an area smaller than a detection surface area of the at least one detector,” and independent claim 10 similarly recites “the window having an area smaller than a detection surface area of the at least one detector.” Ex. 1001, 19:51–53, 2:23–25. Each of these limitations is in dispute in this proceeding, and each of these limitations recites “a detection surface area of the at least one detector.”

Petitioner argues the active area of the detector, namely the surface area of the light-detecting side of the detector, is the detection surface area. Pet. 47; Reply 6 (citing Ex. 1082 ¶ 911). Patent Owner argues the detection

surface area is only the area of the detector that light reaches. PO Resp. 31 (citing Ex. 2079 ¶¶ 87–88). We agree with Petitioner.

To support its construction, Patent Owner relies on Dr. Madisetti's testimony regarding a POSITA's understanding of Figure 11B of Abdul-Hafiz. Ex. 2079 ¶¶ 87–88. More pertinent to claim construction, however, is a POSITA's understanding of the claim term in view of the Specification. *See, e.g., Phillips*, 415 F.3d at 1315 (“As we stated in *Vitronics*, the specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’” (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Circ. 1996))). In this regard, Petitioner points to Dr. Madisetti's Rebuttal Expert Report, which was submitted on behalf of Patent Owner in the Delaware Litigation, where, upon reviewing the Specification of the '911 patent for written description support for the claims, Dr. Madisetti testifies that “[a] POSITA would have known that the detection surface area of a given detector is essentially the entire surface area of the detector.” Ex. 1082 ¶ 912. During oral argument, Patent Owner attempts to reconcile the apparent inconsistency between this testimony and Patent Owner's proposed construction. Tr. 34:20–36:12. In particular, Patent Owner asserts that, according to the '911 patent Specification, the entire surface of the light-detecting side of the detector is the area that light reaches because there is “nothing blocking the entire area of the of the light-detecting side of the detector from receiving light.” *Id.* at 35:12–13. Patent Owner's assertion, however, ignores EMI shield grid 2444 and foil 2450 that are placed on and at least partly cover the light-detecting side of the detector. Ex. 1001, 13:38–53, Fig. 24. Accordingly, we find Dr. Madisetti's testimony regarding a POSITA's understanding of the

detection surface area in view of the ‘911 patent Specification supports Petitioner’s construction, and we adopt Petitioner’s construction of “a detection surface area of the at least one detector” as the surface area of the light-detecting side of the detector.

2. Petitioner’s Inconsistent Claim Constructions

According to Patent Owner, unlike this proceeding where Petitioner argues that no express constructions are required, Petitioner proffers narrow constructions for the claim terms “cavity,” “a light block,” “a top of the [shoebox structure/light block],” and “opening” in the Delaware Litigation to support its noninfringement arguments. PO Resp. 14–15 (citing Ex. 2031, 57–84; Ex. 2032 ¶¶ 473–474, 487–490, 498, 512–523, 528–539). Patent Owner argues Petitioner’s inconsistent claim constructions are improper for three reasons: (1) Petitioner fails to meet the burden to show how the challenged claims are to be construed and how the construed claims are unpatentable because Petitioner never explains how the prior art meets its constructions from the Delaware Litigation; (2) Petitioner violated its duty of candor and good faith to the Office by not informing the Board about its constructions from the Delaware Litigation; and (3) the prior art in the Petition does not meet Petitioner’s constructions of “cavity” and “a top of the [shoebox structure/light block]” from the Delaware Litigation. *Id.* at 15–17.

Although Patent Owner’s reasons suggest Petitioner is required to use its claim construction from the Delaware Litigation in this proceeding, Patent Owner does not provide any authority that binds Petitioner to its claim construction from the Delaware Litigation. Petitioner cannot have a

burden to show how the challenged claims are unpatentable under a construction that it is not relying on in this proceeding.

Moreover, we appreciate that informing the Board of a claim construction position from a related district court litigation may be helpful and a best practice. However, we do not see any material difference between Petitioner's claim construction in this proceeding and its claim construction in the Delaware Litigation. For instance, as discussed in sections III.C.3.a–b, Petitioner has persuasively identified a “cavity” and “a top of the [shoebox structure/light block]” in the prior art even under its constructions of these terms from the Delaware Litigation. For these reasons, we disagree with Patent Owner that Petitioner's inconsistent claim constructions present an independent reason why Petitioner has failed to show unpatentability of the challenged claims.

C. Obviousness Based on Abdul-Hafiz and Raley

Petitioner challenges claims 1, 6, 8, 10, 15, 17, 19–21, 26, and 28 under pre-AIA 35 U.S.C. § 103(a), contending the claimed subject matter would have been obvious over Abdul-Hafiz and Raley. Pet. 8–74; Reply 1–22. Patent Owner argues this asserted ground fails to establish obviousness. PO Resp. 17–58; Sur-reply 2–21.

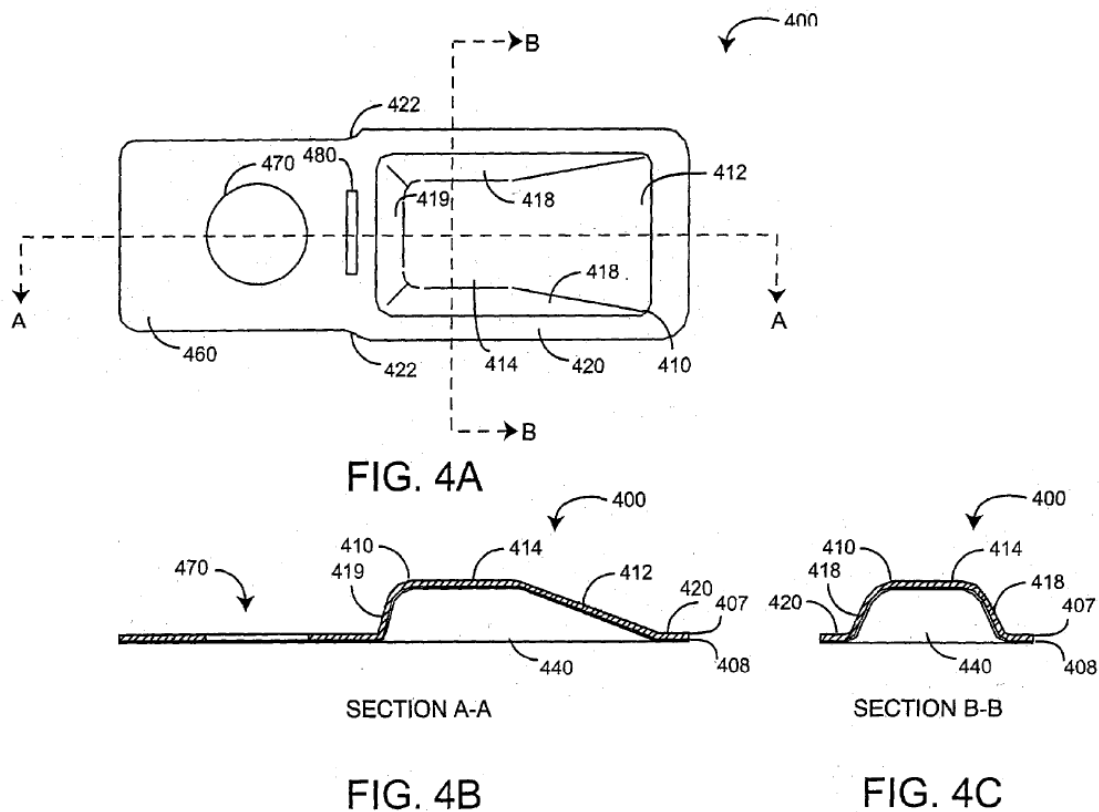
We begin our analysis of this asserted ground of unpatentability with an overview of each of the asserted references. We then turn to the parties' contentions for each of the claims subject to this ground.

1. Abdul-Hafiz

Abdul-Hafiz is a U.S. patent application that published on February 26, 2004. Ex. 1004, code (43). There is no dispute that Abdul-Hafiz is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 1.

Abdul-Hafiz discloses low noise optical housing 400 for a pulse oximetry system sensor comprising LEDs and a detector. Ex. 1004 ¶¶ 2–7, 33. Low noise optical housing 400 is configured to accept a detector and provide ambient light and piped light reduction. *Id.* ¶ 33. “In particular, the low noise optical housing 400 advantageously incorporates the functions of a light barrier, opaque cover, spacer and aperture . . . in a relatively small, easy to manufacture, one-piece design.” *Id.*

Figures 4A–4C, reproduced below, show low noise optical housing 400. Ex. 1004 ¶¶ 17, 33.



Figures 4A–C are top, side cross-section, and front cross-section views, respectively, of low noise optical housing 400. *Id.* ¶¶ 17, 33. Low noise optical housing 400 has protruding cover 410, generally flat flange 420 disposed around the periphery of cover 410, and generally flat base 460

adjoining flange 420. *Id.* ¶ 33. Base 460 defines generally centered aperture 470 and slot 480. *Id.* ¶ 37. Slot 480 partially extends across the width of base 460 and allows base 460 to be easily folded so that aperture 470 is in proper alignment with the detector active area. *Id.*

Figure 6A, reproduced below, shows low noise optical housing 400 in a closed position enclosing a detector. Ex. 1004 ¶ 37.

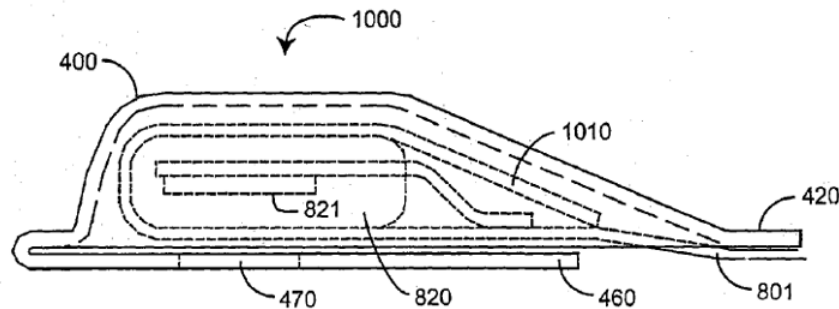


FIG. 6A

Figure 6A is a detailed side view of low noise optical housing 400 in the closed position enclosing detector 820. *Id.* ¶¶ 20, 37. “In a closed position . . . base 460 provides a bottom for the cover 410 and pocket 440 and optically shields the detector 820.” *Id.* ¶ 37. Detector 820 is enclosed in low noise optical housing 400 so that the active area of photodiode chip 821 is aligned with aperture 470. *Id.* ¶ 39. Figure 6A additionally depicts shielded detector assembly 1000 in which EMI shield 1010 also encloses detector 820. *Id.*

Low noise optical housing 400 is constructed of a flat substrate which is a laminate of two materials including outer white layer 407 and inner black layer 408. Ex. 1004 ¶ 34, Figs. 4B–C. “By utilizing a laminate of both white and black material, the low noise optical housing 400

advantageously functions both as a light absorber and as a light reflector.”
Id. ¶ 34.

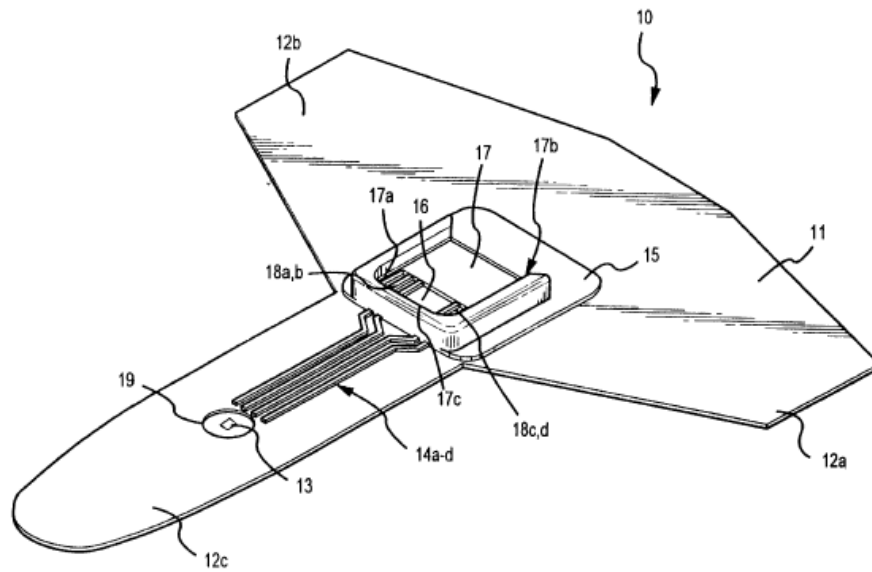
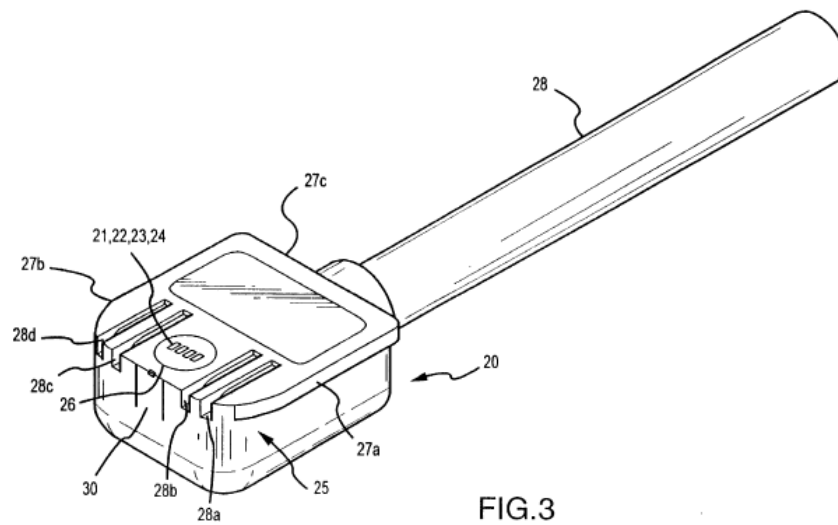
2. *Raley*

Raley is a U.S. patent that issued on January 11, 2000. Ex. 1005, code (45). There is no dispute that *Raley* is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 1.

Raley relates to “medical monitoring probes used in photoplethysmographic monitors and, in particular, to a probe architecture that enables the user of a photoplethysmographic monitor to use a universal probe-end for all monitors in combination with a probe-interconnect cable which is designed for a specific type of monitor.” Ex. 1005, 1:6–11. “One of the primary uses of photoplethysmography has been the monitoring of the oxygen saturation of a patient’s blood,” but the use of photoplethysmography is expanding “into the monitoring of additional blood analytes such as carboxyhemoglobin, methemoglobin and other dyshemoglobins.” *Id.* at 1:39–45. According to *Raley*, pulse oximeter instruments use a plurality of light-emitting devices, each of which transmits light at a predetermined wavelength that is “selected such that at least one is highly absorbed by oxygenated hemoglobin in the arterial blood and at least one is highly absorbed by reduced hemoglobin in the arterial blood.” *Id.* at 3:17–23. *Raley* explains that it is “also possible to measure additional analytes in the arterial blood, such as additional dyshemoglobins, with one additional wavelength of light for each component.” *Id.* at 3:33–36.

Raley discloses probe 40 for use with photoplethysmographic monitor architectures. Ex. 1005, 3:52–55. Probe 40 consists of two releasable connected segments: disposable probe-end 10 that accommodates

interconnect cable segment 20. *Id.* at 5:16–23. Figures 1, 3, and 4, reproduced below, show probe 40. *Id.* at 3:52–55, 5:16–19.



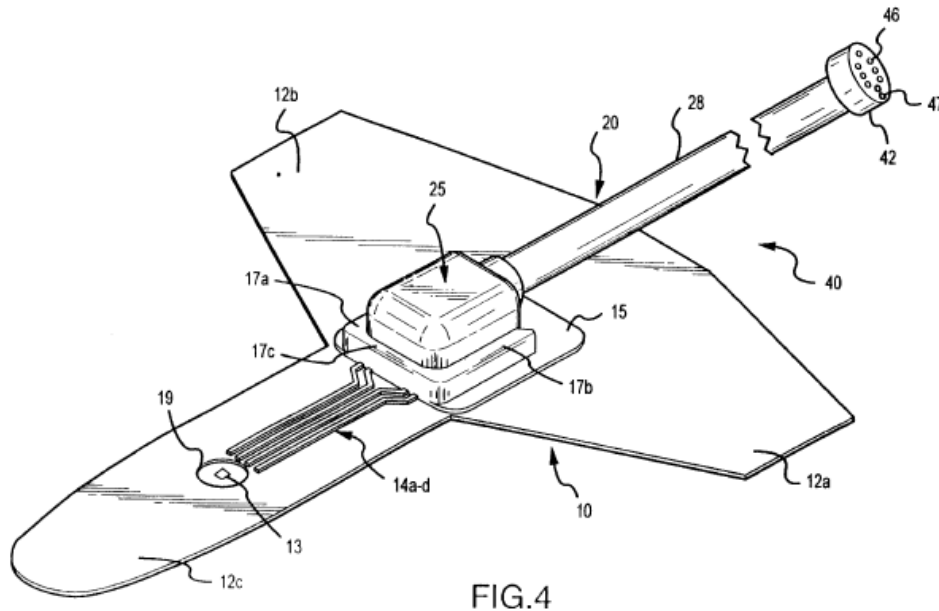


Figure 1 is a top perspective view of the disposable probe-end, and Figure 2 is a bottom perspective view of the interconnect cable segment. *Id.* at 2:47–48, 2:51–52. Figure 4 is a top perspective view of the combined probe-end and interconnect cable segment. *Id.* at 2:57–59.

As shown in Figure 1, probe-end 10 consists of flexible substrate 11 having three portions 12a–c that are designed to wrap around a patient's appendage, e.g., finger. *Id.* at 5:23–28. Substrate portion 12c includes photodetector 13 which is mounted in optically transmissive window 19 in substrate 11 and connected to connector 17 through flexible electrical circuits 14a–d. *Id.* at 5:35–38. Connector 17 has three lip portions 17a–c to accommodate connector-end 25 of interconnect cable segment 20. *Id.* at 5:38–41. Connector 17 also includes optically transmissive window 16 and electrical contacts 18a–c which connect flexible electrical circuits 14a–d with interconnect cable segment 20. *Id.* at 5:44–47.

As shown in Figure 3, connector-end 25 of interconnect cable segment 20 includes opening 26 for receiving four emitters 21, 22, 23, 24, which are useful in a photoplethysmographic monitor for measuring three or

four analytes such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin. Ex. 1005, 4:63–68, 5:65–6:2, Fig. 3. Ridges 27a–c fit under lip portions 17a–c to hold connector-end 25 onto probe-end 10. *Id.* at 6:6–8.

When interconnect cable segment 20 is combined with probe-end 10, light from emitters 21, 22, 23, 24 passes through opening 26 in connector-end 25 of interconnect cable segment 20 and window 16 in connector 17 of probe-end 10 and impinges on a patient's tissue. Ex. 1005, 4:63–68. Window 16 allows light to pass from emitters 21, 22, 23, 24 to a patient while protecting the patient from excess heat and also protecting the interconnect cable segment 20. *Id.* at 5:48–51.

3. *Independent Claim 1*

Petitioner sets forth an element-by-element comparison of independent claim 1 to Abdul-Hafiz and Raley. Pet. 20–59; Reply 1–12. Petitioner also articulates reasons why a POSITA would have combined the teachings of Abdul-Hafiz with a reasonable expectation of success. Pet. 14–20; Reply 13–22.

In particular, Petitioner relies on Abdul-Hafiz's pulse oximetry system 100, red and infrared LEDs 112, photodiode 114, low noise optical housing 400, and data processing circuit 107 for disclosing the recited physiological monitoring device, LEDs, at least one detector, light block, and processor, respectively. Pet. 20–23, 32–59. For the at least three LEDs recessed into a cavity, Petitioner relies on Raley's plurality of emitters 21, 22, 23, 24, which may be LEDs, that are recessed into a cavity covered by opening 26 of interconnect cable segment 20 that is recessed into a cavity formed in connector 17 and covered by window 16 of probe-end 10. *Id.* at

23–31. According to Petitioner, a POSITA would have understood that Raley’s four LEDs recessed into a cavity formed in connector 17 and covered by window 16 provide the benefit of protecting the patient from excess heat emitted by the LEDs. *Id.* at 30.

Patent Owner argues the asserted art does not disclose a “cavity” and “a top of the [shoebox structure/light block]” under Petitioner’s constructions of these claim terms in the Delaware Litigation. PO Resp. 17–20. Patent Owner also argues Petitioner fails to establish that the asserted art discloses a light block with only one opening comprising an area smaller than a detection surface area of the at least one detector. *Id.* at 22–36; Sur-reply 2–10. Patent Owner further argues that Petitioner’s proposed combination of the teachings of Abdul-Hafiz and Raley does not render obvious any challenged claim, and Patent Owner disputes Petitioner’s reasons for combining the teachings of Abdul-Hafiz and Raley. PO Resp. at 38–58; Sur-reply 10–21.

We focus our discussion on the aspects of Petitioner’s assertions that Patent Owner disputes. Accordingly, we address each disputed aspect in turn below.

a) “cavity”

Petitioner argues Raley teaches at least three LEDs recessed into a cavity. Pet. 28–31. According to Petitioner, Raley’s emitters 21, 22, 23, 24, which may be LEDs, are recessed into a cavity covered by opening 26 of interconnect cable segment 20 that is recessed into a cavity formed in connector 17 and covered by window 16 of probe-end 10. *Id.* (citing Ex. 1003 ¶¶ 79–80; Ex. 1004, 4:63–67, 5:38–51, Figs. 1, 3, 7C).

According to Patent Owner, in the Delaware Litigation, Petitioner construes “cavity” as “a hollowed-out space within a solid body” and argues that “recessed into” requires setting the LEDs back into a pre-existing cavity, not mounting the LEDs on a flat substrate. PO Resp. 17 (citing Ex. 2031, 57); 19 (citing Ex. 2081 ¶ 476). Patent Owner maintains Raley does not disclose the recited cavity under this construction. *Id.* at 17–19.

Patent Owner contends that Raley’s emitters 21, 22, 23, 24 are flush with opening 26, not recessed into a hollowed-out space. PO Resp. 17–18 (citing Ex. 1005, Fig. 3; Ex. 2079 ¶ 64). Patent Owner also contends that Raley’s cavity is formed by connector 17 being connected to interconnect cable segment 20 and that interconnect cable segment 20 and connector 17 are separate solid bodies, not a single solid body. *Id.* at 18 (citing Ex. 1005, 5:15–62, 6:6–12, Figs. 1, 3, 5; Ex. 2079 ¶ 65). Patent Owner further contends Petitioner does not and cannot argue that Raley’s LEDs are placed into a pre-existing cavity, as opposed to being mounted on a flat surface. *Id.* at 19 (citing Ex. 1005; Ex. 2079 ¶ 66; Ex. 2080 100:21–101:18).

In reply, Petitioner points to Dr. Kenny’s explanation of how Raley’s LEDs are recessed into a pre-existing cavity. Reply 2 (citing Ex. 1005, 6:61–7:5, 7:16–20, Figs. 1, 3; Ex. 1079 ¶¶ 9–11). According to Dr. Kenny, Raley’s Figure 3 shows “circular opening 26 accommodates the LED assembly,” and “[o]pening 26 has a vertical depth and is a cavity in the interconnect cable segment within which the LED assembly is recessed and set back into.” *Id.* Dr. Kenny further explains “a POSITA would have interpreted Raley’s disclosure to describe LEDs that are recessed into a cavity defined by the circular opening 26 in order to not be destroyed during the assembly of the interconnect cable segment 20 into the connector 17 and

to protect the patient from excess heat.” *Id.* (citing Ex. 2080, 74:12–20, 101:8–11; 102:13–103:7).

Dr. Kenny’s explanation finds support in Raley, and we find his explanation credible. Ex. 1079 ¶¶ 9–11. We agree that Raley’s opening 26 has a vertical depth. In order for emitters 21, 22, 23, 24 to be flush with opening 26 as depicted in Raley’s Figure 3 (*see* PO Resp. 17–18 (arguing that LEDs are flush with opening 26)), the opening must have a depth to accommodate the thickness of the emitters. We further agree that opening 26 is within a solid body, namely interconnect cable 20. We also agree that, in view of the structure and function of Raley’s probe 40 and interconnect cable segment 20, a POSITA would have understood opening 26 is designed to receive the emitters therein. Given that Raley’s interconnect cable segment 20 includes opening 26 that is designed to receive emitters 21, 22, 23, 24 therein, Petitioner has persuaded us that Raley’s LEDs are recessed into a cavity under both the plain and ordinary meaning of “cavity” and Petitioner’s construction from the Delaware Litigation.

b) “a top of the [light block/shoebox structure]”

Petitioner relies on Abdul-Hafiz’s low noise optical housing 400 for disclosing the recited light block comprising a shoebox structure and relies on a specific portion of substrate 460. Pet. 41–42. Specifically, Petitioner relies on the portion of substrate 460 that has aperture 470 therein and is folded to allow aperture 470 to align with the detector active area, for disclosing the recited top of the shoebox structure. *Id.* (citing Ex. 1003 ¶ 96; Ex. 1004, Abstract, ¶¶ 5–7, 37, Figs. 4A–B).

According to Patent Owner, in the Delaware Litigation, Petitioner construes “a top of the [shoebox structure/light block]” as “the uppermost structure that covers the [shoebox structure/light block]” and argues the base cannot also be the top. PO Resp. 19 (citing Ex. 2031, 68, 75; Ex. 2032 ¶ 528). Patent Owner argues Petitioner has not shown that Abdul-Hafiz discloses “a top of the [shoebox structure/light block]” under Petitioner’s construction of this claim term in the Delaware Litigation because Petitioner relies on Abdul-Hafiz’s bottommost base 460. *Id.* at 20 (citing Ex. 2079 ¶ 69).

We disagree with Patent Owner that Petitioner fails to show Abdul-Hafiz discloses “a top of the [shoebox structure/light block]” under Petitioner’s construction in the Delaware Litigation. In use, Abdul-Hafiz’s low noise optical housing 400 is positioned below a tissue site, e.g., a patient’s finger, with aperture 470 facing the tissue site to allow light passing through the tissue site to pass through aperture 470 in base 460 to detector 820 enclosed within low noise optical housing 400. Ex. 1004, Fig. 6A. Accordingly, the portion of base 460 with aperture 470 is the uppermost portion of low noise optical housing 400 enclosing detector 820. Thus, Petitioner has persuaded us that the portion of Abdul-Hafiz’s base 460 with aperture 470 discloses “a top of the [shoebox structure/light block]” under both the plain and ordinary meaning of the term and Petitioner’s construction from the Delaware Litigation.

c) light block with “only one opening through which light is configured to pass”

Petitioner relies on Abdul-Hafiz’s low noise optical housing 400 including aperture 470 for disclosing the recited light block with only one

opening. Pet. 41–44; Reply 3–4. According to Petitioner, “‘detector 820 is enclosed in the optical housing 400’ ‘so that **the active area of the photodiode chip 821 is aligned with the housing aperture 470.**’” Pet. 42 (citing Ex. 1004 ¶ 39, Fig. 6A). Petitioner argues “a POSITA would have understood that the aperture 470 is the only opening through which light is configured to pass.” *Id.* at 42–43 (citing Ex. 1003 ¶ 97).

Patent Owner argues Petitioner improperly ignores EMI shield 1005. PO Resp. 23–24; Sur-reply 2–3, 5. According to Patent Owner, Abdul-Hafiz’s detector assembly 1000 includes light-blocking EMI shield 1005 with four openings, and thus a POSITA would have understood the detector assembly does not include only one opening. PO Resp. 25 (citing Ex. 2079 ¶¶ 78–79). In support of its argument, Patent Owner provides an annotated version of Abdul-Hafiz’s Figure 11B, reproduced below. *Id.* (citing Ex. 2079 ¶ 78–79).

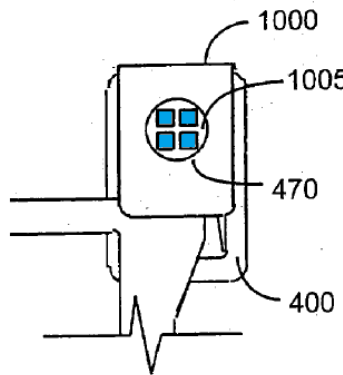


FIG. 11B

Figure 11B is a detailed bottom view of a neonate sensor optical assembly. Ex. 1004 ¶ 27. The neonate sensor assembly includes shielded detector assembly 1000 comprising low noise optical housing 400 with aperture 470, detector 820, and fixed shield 1005. *Id.* ¶¶ 39, 46. As shown in Figure 11B,

low noise optical housing 400 encloses detector 820 and fixed shield 1005 such that detector 820 and fixed shield 1005 are visible through aperture 470. *Id.* ¶¶ 39, 46, Fig. 11B. As also shown in Figure 11B, detector 820 is located behind fixed shield 1005, and detector 820 is visible through four openings in fixed shield 1005. *Id.* Patent Owner annotates Figure 11B to show in blue the four openings in fixed shield 1005 through which detector 820 is visible. PO Resp. 25 (citing Ex. 2079 ¶¶ 78–79). Patent Owner also argues EMI shield 1005 is a light block because it is made of an opaque material. Sur-reply 3. Patent Owner further argues that Petitioner does not propose removing EMI shield 1005 and thus has not shown that Abdul-Hafiz disclose a light block with only one opening. *Id.* at 4.

Patent Owner's arguments are unavailing because they are not commensurate with the scope of independent claim 1. Contrary to Patent Owner's arguments, independent claim 1 is not limited to only one light block. Ex. 1001, 19:35–57. That Abdul-Hafiz includes low noise optical housing 400 and fixed shield 1005 does not prevent it from meeting independent claim 1. Even if we were to agree with Patent Owner that fixed shield 1005 is a light block with four openings, we nonetheless agree with Petitioner that Abdul-Hafiz's low noise optical housing 400 with aperture 470 discloses a light block including only one opening (Pet. 41–43 (citing Ex. 1003 ¶¶ 96–97; Ex. 1004, Abstract, ¶¶ 5–7, 37, 39, Figs. 4A–C, 5A, 6A); Reply 3 (citing Ex. 1079 ¶ 14)). Thus, Petitioner has persuaded us that Abdul-Hafiz discloses the light block including only one opening recited in independent claim 1.

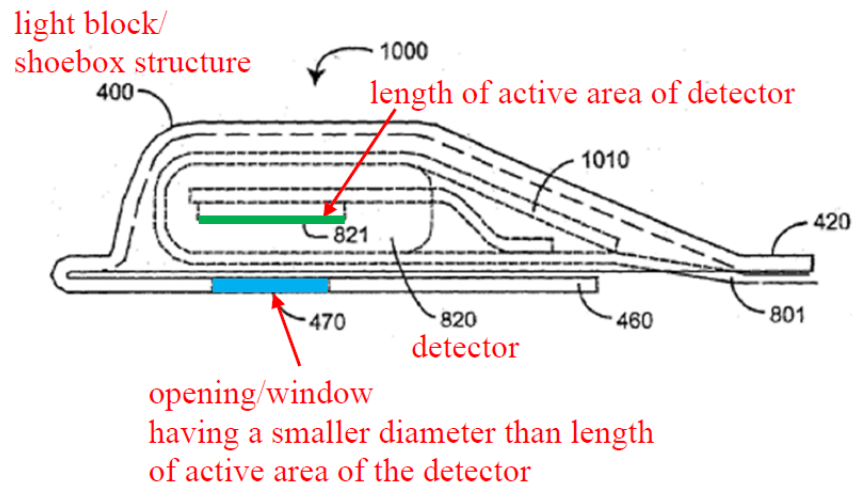
Additionally, Patent Owner argues Petitioner does not propose to modify Abdul-Hafiz to include a light block with only one opening as

recited in independent claim 1. PO Resp. 37 (citing Ex. 2079 ¶ 99); Sur-reply 10. However, Petitioner need not show that it would have been obvious to modify Abdul-Hafiz to include a light block with only one opening because Petitioner has persuaded us that Abdul-Hafiz discloses the recited light block having only one opening.

d) “the opening comprising an area smaller than a detection surface area of the at least one detector”

For the recited opening having an area smaller than a detection surface area, Petitioner argues that aperture 470 in Abdul-Hafiz’s low noise housing 400 aligns with the active area of photodiode chip 821 of detector 820 and reduces light piping. Pet. 46 (citing Ex. 1004, Abstract, ¶¶ 5, 7, 37, 39). Petitioner also argues Figure 6A, which is a side view of low noise housing 400 enclosing detector 820, shows aperture 470 having a diameter that is smaller than the length of the active area of photodiode chip 821. *Id.* at 46–47 (citing Ex. 1003 ¶ 101; Ex. 1004, Fig. 6A). In support of this argument, Petitioner provides an annotated version of Abdul-Hafiz’s Figure 6A, reproduced below. *Id.* at 47.

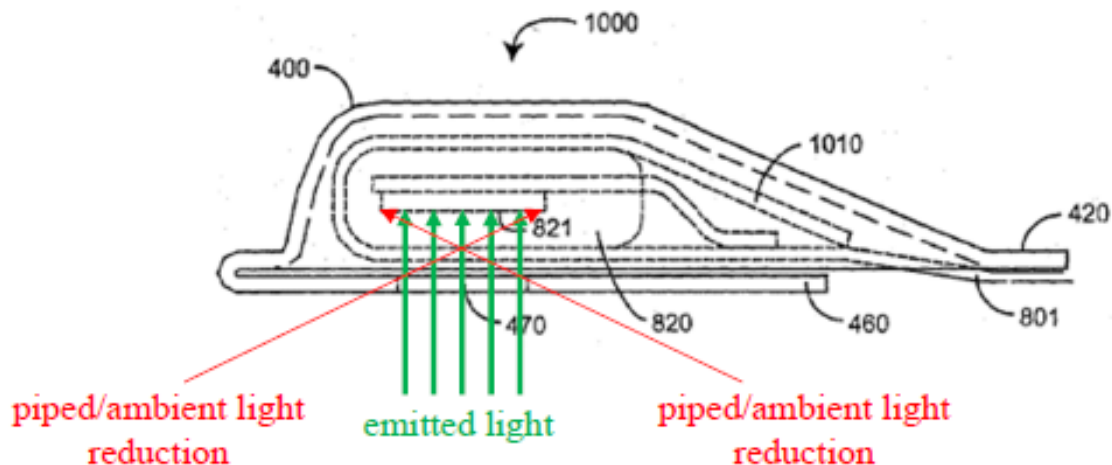
Abdul-Hafiz+Raley's shielded detector assembly



APPLE-1004, FIG. 6A

Figure 6A is a detailed side view of a low noise optical housing enclosing a detector. Ex. 1004 ¶ 20. Petitioner annotates the figure to show in green the surface of photodiode chip 821 facing aperture 470 and labels this surface “length of active area of detector.” Petitioner also annotates the figure to show in blue the diameter of aperture 470 and labels this portion of the figure “opening/window having a smaller diameter than length of active area of the detector.” As shown in Petitioner’s annotated version of Figure 6A, the diameter of aperture 470 in blue is shorter than the length of the surface of the photodiode chip 821 in green. Petitioner further argues that detector 820 has a square or rectangular shape and that aperture 470 has a circular shape. Pet. 48–49 (citing Ex. 1003 ¶ 103; Ex. 1004, Figs. 4A, 5A, 10A–C, 11B). According to Petitioner, “[a] POSITA would have recognized that a circle, having a diameter that is equal to or smaller than each side length of a square or rectangle, has a smaller surface area than that of the square or rectangle.” *Id.* at 49 (citing Ex. 1003 ¶ 104).

Additionally, Petitioner asserts that, “based on Abdul-Hafiz’s disclosure, a POSITA would have understood or found it obvious that Abdul-Hafiz limiting the aperture diameter of its optical housing would desirably reduce the extraneous light entering through the opening of the housing and the finger as a light guide.” Pet. 50 (citing Ex. 1003 ¶ 106; Ex. 1004 ¶¶ 3, 33). In support of this assertion, Petitioner provides an annotated version of Abdul-Hafiz’s Figure 6A, reproduced below. *Id.* at 51 (citing Ex. 1003 ¶ 106; Ex. 1004 ¶¶ 3, 33).



APPLE-1004, FIG. 6A

Petitioner annotates the side view of low noise optical housing 400 shown in Figure 6A to include green arrows labeled “emitted light” passing through aperture 470 to photodiode chip 821. *Id.* Petitioner further annotates the figure to include red arrows located on either side of the green arrows and labeled “piped/ambient light reduction.” *Id.* The red arrows barely pass by the light and right sides of aperture 470 to reach photodiode chip 821. *Id.* According to Petitioner, “as shown in the . . . annotated figure, limiting the aperture diameter relative to the active area of the photodiode chip 821 prevents rays from optical noise sources such as ambient light 230 and piped

light 240, which are typically incident on the detector 114 at a large angle of incidence, from reaching the active area of the detector[.]” *Id.*

Patent Owner argues that Petitioner fails to show Abdul-Hafiz discloses an opening with an area smaller than a detection surface of the detector, as recited in independent claim 1. PO Resp. 26–36. More specifically, Patent Owner presents three reasons why Petitioner fails to identify the recited opening in Abdul-Hafiz: (1) Abdul-Hafiz’s figures do not disclose the precise dimensions or sizes on which Petitioner relies; (2) Petitioner improperly ignores Abdul-Hafiz’s disclosure; and (3) Petitioner improperly assumes a detection surface area from Abdul-Hafiz’s figures. *Id.*

Beginning with Patent Owner’s first reason, Patent Owner maintains “it is well established that *patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes* if the specification is completely silent on the issue.” PO Resp. 28 (quoting *Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000)); *see also* Sur-reply 6 (“[Petitioner’s] arguments based on Abdul-Hafiz’s undisputedly not-to-scale drawings fail as a matter of law.” (citing *Nystrom v. TREX Co.*, 424 F.3d 1136, 1149 (Fed. Cir. 2005))). In reply, Petitioner points to the drawings of the ’911 patent which provide support for the recited opening with a surface area smaller than a detection surface area and maintains that Patent Owner seeks to hold Petitioner to a higher standard of disclosure than the ’911 patent. Reply 5–6 (citing *In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994)). In response, Patent Owner asserts Petitioner’s reliance on *In re Epstein* is misplaced because that case does not permit the Board in an *inter partes* review to compare the

description of the challenged patent to the prior art's disclosure to determine what the prior art teaches. Sur-reply 7.

We need not decide whether Petitioner's reliance on *In re Epstein* is proper because we do not rely on the '911 patent's figures in determining whether Abdul-Hafiz's figures disclose an opening having an area smaller than a detection surface area, as recited in independent claim 1.

Furthermore, we disagree with Patent Owner that precedent prohibits Petitioner from relying on Abdul-Hafiz's not-to-scale figures to show Abdul-Hafiz discloses the recited opening. In *Hockerson-Halberstadt*, the court cautions that patent drawings not designated as drawn to scale cannot be relied upon to show "particular sizes" of elements if the specification is completely silent on the issue. *Hockerson-Halberstadt*, 222 F.3d at 956. Similarly in *Nystrom*, the court holds that speculative modeling premised on patent figures that are not drawn to scale cannot be the basis for invalidating claims reciting "specific dimensions." *Nystrom*, 424 F.3d at 1149. These cases, however, do not mean "that things patent drawings show clearly are to be *disregarded*." *In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972). Drawings must be evaluated for what they reasonably disclose to a POSITA. *In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979).

Petitioner relies on the shapes and relative sizes shown in the figures to demonstrate that Abdul-Hafiz's aperture has a smaller area than the detection surface area. In particular, Petitioner uses the area calculation based on the respective shape of aperture 470 and the detection surface of detector 820 and a comparison of the aperture's diameter to the length and width of the detection surface to show the area of the aperture is smaller than the detection surface area. Pet. 46–50. Abdul-Hafiz's figures do not need to be drawn to scale to reasonably disclose the shapes of aperture 470 and the

detection surface of detector 820. Also, Abdul-Hafiz's figures do not need to be drawn to scale to reasonably disclose the comparative sizes of the aperture's diameter relative to the length and width of the detection surface because the exact lengths are not needed to show one is longer, the same, or shorter than the other. Thus, contrary to Patent Owner's first reason, Petitioner is not relying on Abdul-Hafiz's figures to disclose particular sizes or specific dimensions, but rather to disclose shapes and relative sizes, which Abdul-Hafiz's not-to-scale figures reasonably disclose to a POSITA.

Turning to Patent Owner's second reason, Patent Owner alleges that Petitioner improperly ignores fixed shield 1005 which is folded over detector 820 and blocks light from reaching all but four areas of the underlying photodiode 821 of detector 820. PO Resp. 30–32. According to Patent Owner, “[a] POSITA would have understood that the four blue areas . . . are the detection surface area of the detector/photodiode (820/821) because the shield (1005) only permits light to reach those four areas of the detector/photodiode (820/821).” *Id.* at 31 (citing Ex. 2079 ¶¶ 87–88). Considering the four exposed areas of the photodiode the detection surface area, Patent Owner contends the area of Abdul-Hafiz's aperture 470 is larger, not smaller, than the detection surface area. *Id.* at 32 (citing Ex. 1004 ¶¶ 46–47, Figs. 6A, 10–11; Ex. 2079 ¶ 89). In support of this contention, Patent Owner provides two annotated versions of Abdul-Hafiz's Figure 11B, which are reproduced below. *Id.* (citing Ex. 1004, Fig. 11B; Ex. 2079 ¶ 89).

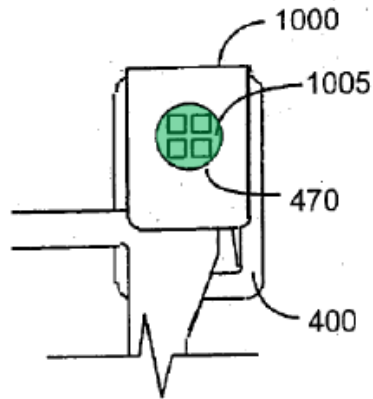


FIG. 11B

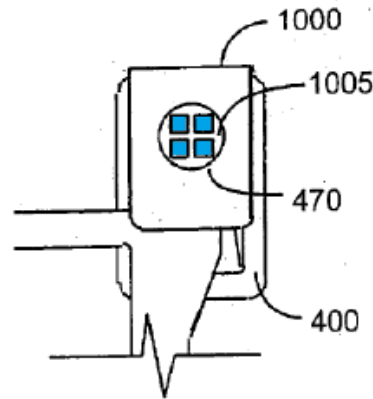


FIG. 11B

Figure 11B is a bottom view of a neonate sensor optical assembly including low noise optical housing 400 enclosing detector 820 and fixed shield 1005 such that detector 820 and fixed shield 1005 are visible through aperture 470 of the housing. Ex. 1004 ¶¶ 27, 39, 46, Fig. 11B. As shown in Figure 11B, detector 820 is located behind fixed shield 1005, and detector 820 is visible through four openings in fixed shield 1005. *Id.* ¶¶ 39, 46, Fig. 11B. In its annotated version of Figure 11B on the left, Patent Owner annotates the figure to show in green the area of aperture 470, and in its annotated version of Figure 11B on the right, Patent Owner annotates the figure to show in blue the area of detector 820 visible through fixed shield 1005. PO Resp. 32 (citing Ex. 1004, Fig. 11B; Ex. 2079 ¶ 89).

Patent Owner's second reason is premised on its proposed claim construction of "a detection surface of the at least one detector" as only the area of the detector that light reaches. As set forth above in section III.B.1, we do not adopt Patent Owner's proffered construction and instead construe "a detection surface of the at least one detector" as the surface area of the light-detecting side of the detector. As the detection surface area is not

limited to the detector's four exposed areas, which Patent Owner colors blue, Patent Owner's second reason fails.

With respect to Patent Owner's third reason, which charges Petitioner with incorrectly assuming a detection surface area from Abdul-Hafiz's figures, Patent Owner contends Abdul-Hafiz shows only the length, not the width, of detector 820. PO Resp. 33 (citing Ex. 1004, Figs. 3, 6; Ex. 2079 ¶¶ 94). Patent Owner also contends the precise dimensions shown in Figures 10A and 10B demonstrate that detector 820 has a rectangular shape, not a square shape, and that the width of detector 820 is smaller than the diameter of aperture 470. *Id.* at 33–34 (citing Ex. 1004, Figs. 10A, 10B; Ex. 2079 ¶¶ 94–95), 36. Patent Owner further contends the precise dimensions of Abdul-Hafiz's figures and Masimo's LNOP sensor, which, according to Patent Owner, Abdul-Hafiz covers, show the aperture has an area that is larger, not smaller, than the detection surface area. *Id.* at 35 (citing Ex. 2079 ¶¶ 95–96); Sur-reply 9–10. Additionally, Patent Owner contends Abdul-Hafiz's photodiode 821 being aligned with aperture 470 does not suggest the aperture is smaller than the detection surface area. PO Resp. 36 (citing Ex. 1004 ¶¶ 37, 39; Ex. 2079 ¶ 97).

In reply to Patent Owner's contentions, Petitioner further explains how Abdul-Hafiz's figures disclose the recited "the opening comprising an area smaller than a detection surface area of the at least one detector." Reply 5–11. Petitioner begins by providing an express definition of "a detection surface area of the at least one detector" as the surface area of the light-detecting side of the detector. *Id.* at 5–6 (citing Ex. 1082 ¶ 911). Petitioner next argues Figures 3 and 6A show the length of the light-detecting side of the detector is longer than the diameter of the aperture. *Id.* at 6–7 (citing Ex. 1004 ¶¶ 4, 33, 37, Ex. 1079 ¶¶ 19–21).

Petitioner then argues that the surface area of EMI shield 1005 is representative of the surface area of the light-detecting side of detector 820 and that Figure 11B shows the width of the light-detecting side of the detector is at least as wide as the diameter of the aperture. *Id.* at 8.

In response to Petitioner's additional explanation, Patent Owner asserts Abdul-Hafiz never discloses the detection surface area of detector 820 relative to EMI shield 1005. Sur-reply 7–9. According to Patent Owner, there is no dispute that Abdul-Hafiz's Figure 11B does not show the detector's outer boundaries and thus does not show any dimension of the detection surface area. *Id.* at 9 (citing Ex. 1004 ¶ 47, Fig. 11B; Ex. 2079 ¶¶ 87–88; Ex. 2080, 114:8–115:14).

At the outset, Patent Owner's argument that Abdul-Hafiz shows an aperture having an area that is larger, not smaller, than the detection surface area is unavailing. Patent Owner relies on the specific dimensions of Masimo's LNOP sensor, but Petitioner is relying on Abdul-Hafiz, not the LNOP sensor, for disclosing the recited opening. Thus, the dimensions of the LNOP sensor are irrelevant. Patent Owner also relies on the specific dimensions of Abdul-Hafiz's figures. As set forth above, however, Patent Owner argues, and we agree, that it is improper to rely on Abdul-Hafiz's figures, which are not drawn to scale, for disclosing particular sizes or specific dimensions.

Moreover, as set forth above in section III.B.1, we adopt Petitioner's construction of "a detection surface area of the at least one detector" as the surface area of the light-detecting side of the detector. In view of this construction, we disagree with Patent Owner's third reason, namely that Petitioner incorrectly assumes a detection surface area from Abdul-Hafiz's figures. There is no dispute that Abdul-Hafiz's Figure 6A shows the length

of the light-detecting side of detector 820 is longer than the diameter of aperture 470. We also disagree with Patent Owner that Figure 11B does not show any dimensions of the light-detecting side of detector 820 because we are persuaded a POSITA would have discerned that the surface area of fixed shield 1005 is representative of at least the width of the light-detecting side of detector 820. *See* Ex. 1079 ¶ 21 (testimony of Dr. Kenny explaining why the surface area of fixed shield 1005 is representative of the width of the light-detecting side of detector 820 and why the area of aperture 470 is less than that of the light-detecting side of the detector). Figures 8A, 8B, 10A, and 10B show that the width of fixed shield 1005 (not labeled but positioned directly below detector 820 in Figures 8A and 8B) is essentially the same size as the width of the light-detecting side of detector 820. Ex. 1004 ¶¶ 43, 46, Figs. 8A–B, 10A–B. Figure 11B shows the width of fixed shield 1005 is at least the same size as the diameter of aperture 470, and, in view of the width of fixed shield 1005 being essentially the same size as the width of the light-detecting side of detector 820, Figure 11B therefore shows the width of the light-detecting side of detector 820 is the same size as the diameter of aperture 470.

As Petitioner correctly explains, aperture 470 is a circle, and its area is calculated as $A = \pi r^2$, where r is the radius, and the surface area of the light-detecting side of detector 820, whether it is a rectangle or a square, is calculated as $A = lw$, where l is the length and w is the width. Pet. 49 (citing Ex. 1003 ¶ 104). Petitioner also correctly explains that, with aperture 470 having a diameter, which equals $2r$, that is at least the same as the width of the light-detecting side of detector 820 and with the light-detecting side of detector 820 having a length that is larger than the diameter of aperture 470, aperture 470 has a surface area that is smaller than the surface area of the

light-detecting side of detector 820. *Id.* Thus, we are persuaded that a POSITA would have interpreted Abdul-Hafiz's aperture 470 as disclosing "the opening comprising an area smaller than a detection surface area of the at least one detector" recited in independent claim 1.

Additionally, Patent Owner argues Petitioner does not propose to modify Abdul-Hafiz to include the recited opening comprising an area smaller than a detection surface area. PO Resp. 37 (citing Ex. 2079 ¶¶ 100–101). Patent Owner, however, acknowledges that Petitioner argues, in the Petition, that a POSITA would have found it obvious that Abdul-Hafiz's aperture meets the recited opening. *Id.*

In reply to Patent Owner's argument, Petitioner maintains it proposed that a POSITA would have found it obvious to modify Abdul-Hafiz to have a smaller aperture (470) and explained that a POSITA would have been motivated to modify Abdul-Hafiz to have a smaller "opening"/"window" to "desirably reduce the extraneous light entering through the opening of the housing and the finger as a light guide" and to prevent "rays from optical noise sources such as ambient light 230 and piped light 240, which are typically incident on the detector 114 at a large angle of incidence, from reaching the active area of the detector." Reply 11 (quoting Pet. 50–51) (citing Ex. 1079 ¶ 29). Petitioner also cites to Webster,⁷ Schulz,⁸ and Kimura⁹ to corroborate its rationale for modifying Abdul-Hafiz

⁷ *Design of Pulse Oximeters* (J G Webster ed., Inst. of Physics Publ'g 1997) ("Webster") (Ex. 1011). The citations to Webster refer to Petitioner's page numbering for the exhibit, not the native pagination.

⁸ Schulz et al., US 2004/0054291 A1, published Mar. 18, 2004 ("Schulz") (Ex. 1080).

⁹ Kimura et al., US 6,608,562 B1, issued Aug. 19, 2003 ("Kimura") (Ex. 1081).

to have a smaller aperture. *Id.* at 11–12 (citing Ex. 1011, 96–97, Fig. 6.6; Ex. 1079 ¶¶ 30–32; Ex. 1080 ¶ 73; Ex. 1081, 12:51–63, 14:19–47, 14:28–47).

In its Sur-reply, Patent Owner alleges Petitioner’s asserted obviousness is a new theory because Petitioner never mentions “modifying” Abdul-Hafiz, any “motivation,” or any of Webster, Schulz, and Kimura in the Petition. Sur-reply 10–11. Patent Owner also alleges Petitioner’s asserted obviousness fails for five reasons: (1) Petitioner improperly ignores EMI shield 1005, which allows only slightly oblique angles of incident light to reach the detector; (2) Abdul-Hafiz’s low noise optical housing 400 addresses any issue with extraneous light such that there would be no need to further address the same issue; (3) Petitioner does not identify in the prior art an opening having a smaller surface area than a detection surface area; (4) Petitioner never explains why a POSITA would have made Abdul-Hafiz’s aperture smaller than the detection surface area; and (5) Petitioner assumes the proposed modification is simple and thus would be reasonably expected to succeed, which is insufficient to show obviousness. *Id.* at 11–14 (citing Ex. 1011, 95–97; Ex. 1080 ¶ 73; Ex. 1081, 12:51–63, 14:19–47, Fig. 22; Ex. 2080, 114:15–115:2, 137:13–138:1, 138:4–19; 140:8–12; Ex. 2082 ¶ 186).

We disagree with Patent Owner that Petitioner’s asserted obviousness is a new theory because Petitioner does not expressly mention “modifying” Abdul-Hafiz, “motivation,” of any of Webster, Schulz, and Kimura in the Petition. In the Petition, Petitioner argues “based on Abdul-Hafiz’s disclosure, a POSITA would have understood or *found it obvious* that Abdul-Hafiz *limiting the aperture diameter of its optical housing* would *desirably reduce the extraneous light* entering through the opening of the

housing and the finger as a light guide.” Pet. 50 (emphasis added) (citing Ex. 1003 ¶ 106; Ex. 1004 ¶¶ 3, 33). Therefore, in the Petition, Petitioner argues a POSITA would have found it obvious to modify Abdul-Hafiz’s aperture to limit the diameter and thus reduce the area for the motivation of reducing the extraneous light. Petitioner further reasons, in the Petition, that a POSITA would have found it obvious to limit the diameter of Abdul-Hafiz’s aperture to “prevent[] rays from optical noise sources such as ambient light 230 and piped light 240, which are typically incident on the detector 114 at a large angle of incidence, from reaching the active area of the detector[.]” *Id.* at 51 (citing Ex. 1003 ¶ 106; Ex. 1004 ¶¶ 3, 33).

Petitioner does not refer to Webster, Schulz, and Kimura in the Petition but instead cites to them in its Reply to corroborate its reasons for modifying Abdul-Hafiz’s aperture that it set forth in the Petition. Reply 11–12. Thus, in its Petition, Petitioner asserts that it would have been obvious to modify Abdul-Hafiz to include an opening smaller than a detection surface area.

After reviewing Petitioner’s asserted obviousness and Patent Owner’s reasons against it in the Sur-reply, we are persuaded that a POSITA would have found it obvious to modify Abdul-Hafiz’s aperture to have an area smaller than the detection surface area to prevent optical noise sources such as ambient light and piped light reaching the detector. We disagree with Patent Owner that Petitioner does not explain why a POSITA would have made Abdul-Hafiz’s aperture smaller than the detection surface area.

Preventing optical noise sources explains why a POSITA would have made Abdul-Hafiz’s aperture smaller than the detection surface area because making the area of the aperture smaller than the detection surface area helps prevent optical noise sources from reaching the detector. Even if Abdul-Hafiz’s low noise housing 400 and fixed shield 1005 mitigate optical

noise from ambient light and piped light, there is always an implicit motivation to make something better. *See Dystar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006) (“[W]e have repeatedly held that an implicit motivation to combine exists . . . when the ‘improvement’ is technology-independent and the combination of references results in a product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient.”). Adding an additional protection against optical noise by limiting the diameter of Abdul-Hafiz’s aperture would have enhanced the optical noise mitigation of the low noise housing and fixed shield. Moreover, apart from Abdul-Hafiz, Petitioner does not identify in the prior art an opening having a smaller area than a detection surface area. Petitioner, however, identifies a known relationship between the size of the opening relative to the detection surface area and preventing optical noise from ambient light and piped light. Pet. 50 (citing Ex. 1004 ¶¶ 3, 33); Reply 11–12 (citing Ex. 1011, 96–97, Fig. 6.6; Ex. 1079 ¶¶ 30–32; Ex. 1080 ¶ 73; Ex. 1081, 12:51–63, 14:19–47, 14:28–47). When one parameter is known to influence a specific result, such as the size of the opening relative to the detection surface area preventing optical noise, discovering the optimum value of the parameter is generally obvious. *See In re Boesch*, 617 F.2d 272, 276 (Fed. Cir. 1980) (“Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.” (citing *In re Antoine*, 559 F.2d 618 (CCPA 1977); *In re Aller*, 220 F.2d 454 (CCPA 1955))). Furthermore, we agree with Petitioner that the proposed modification to Abdul-Hafiz, namely reducing the area of the aperture to be smaller than the detection surface area, is simple and that a

POSITA would have had a reasonable expectation of success in making the proposed modification.

For the reasons set forth above, Petitioner has persuaded us that Abdul-Hafiz's discloses "the opening comprising an area smaller than a detection surface area of the at least one detector" recited in independent claim 1. Petitioner also has persuaded us that a POSITA would have found it obvious to modify Abdul-Hafiz's aperture to have an area smaller than the detection surface area, thereby resulting in the recited opening.

e) Proposed Combination of Abdul-Hafiz and Raley

Petitioner argues:

A POSITA seeking to implement Abdul-Hafiz's pulse oximetry system would have found it obvious based on Raley's teachings to arrive at a predictable configuration of a pulse oximetry system . . . having a sensor with at least four LEDs with distinct center wavelengths and one or more photodetectors to measure the intensity of the light emitted by the four LEDs, and a data processing circuit that executes data processing instructions stored in memory to determine an estimate of three or four blood analyte levels based on the intensity signals.

Pet. 15–16 (citing Ex. 1003 ¶¶ 65–66; Ex. 1005, 3:52–4:9, 4:29–44, 5:63–6:2). Petitioner further argues that "[a] POSITA would have found it obvious and would have been motivated to incorporate Raley's teachings into Abdul-Hafiz's pulse oximetry system to expand the use of photoplethysmography into the monitoring of additional blood analytes" (*id.* at 18 (citing Ex. 1003 ¶ 67; Ex. 1005, 1:39–45, 3:52–4:9, 5:63–6:2)) and that "[a] POSITA would have found it obvious and would have been motivated to incorporate Raley's teachings into Abdul-Hafiz's pulse oximetry system to further compensate for errors in the measurement of oxygen saturation due to the presence of carboxyhemoglobin and methemoglobin in the blood

in above normal levels” (*id.* (citing Ex. 1003 ¶ 68; Ex. 1007, 1:63–2:14; Ex. 1008, 3:25–37)). Additionally, Petitioner argues “a POSITA would have viewed the implementation of Abdul-Hafiz’s pulse oximetry system in a manner that applied Raley’s teaches as merely the predictable result . . . of combining known prior art elements according to known methods, and would have expected success in enhancing Abdul-Hafiz’s system in this way.” *Id.* at 19 (citing Ex. 1003 ¶ 69; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 405 (2007)). In particular, Petitioner asserts “[a]dding two LEDs to a system that already contains two LEDs would be a straightforward modification for a POSITA that was already relying on the system of Abdul-Hafiz, which included circuits and data processing instructions for operating LEDs and gathering data associated with signals at two wavelengths.” *Id.* at 19–20 (citing Ex. 1003 ¶ 70).

Patent Owner argues that Petitioner’s proposed combination of the teachings of Abdul-Hafiz and Raley does not render obvious any challenged claim. PO Resp. 38–58; Sur-reply 14–21. More specifically, Patent Owner argues: (1) Raley and the prior art did not enable measuring oxygen saturation, carboxyhemoglobin, and methemoglobin using only four LEDs of four different wavelengths; (2) a POSITA would not have reasonably expected success in achieving the proposed combination; (3) a POSITA would not have been motivated to combine the teachings of Abdul-Hafiz and Raley as Petitioner proposes; and (4) Petitioner’s obviousness analysis is driven by hindsight and fails to treat each claim as a whole. PO Resp. 38–58; Sur-reply 14–21.

i. Enablement

Patent Owner contends “[t]he prior art must enable a POSITA to make and use ***the specific disclosures being relied upon*** for obviousness.” PO Resp. 39–40 (citing *Raytheon Techs. Corp. v. GE Co.*, 993 F.3d 1374, 1380–81 (Fed. Cir. 2021); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 297 (Fed. Cir. 1985)). Patent Owner also contends “[r]ebutting any presumption of prior art enablement merely requires the patent owner to come forward with evidence showing that the prior art ‘would not produce or would not be expected to produce the claimed subject matter.’” *Id.* at 40 (quoting *In re Kumar*, 418 F.3d 1361, 1368 (Fed. Cir. 2005)). According to Patent Owner, at the time of the ’911 patent, a POSITA would not have been able to use four wavelengths of light to measure oxygen saturation, carboxyhemoglobin, and methemoglobin as Petitioner proposes because no one has been able to make such a device. *Id.* at 41–46 (citing Ex. 1004; Ex. 1005, 1, 1:41–45, 3:33–36, 3:52–4:46, 5:63–6:2; Ex. 1006, 2:64–3:4; Ex. 1007, 1, 2:36–41, 3:21–27, 5:21–6:28; Ex. 1008, 6:35–49, Fig.; Ex. 1010, 7:33–8:22, 8:47–51; Ex. 1011, 45, 54–55; Ex. 1012, 4:5–17, 4:30–38, 5:27–29; Ex. 2046; Ex. 2047; Ex. 2048; Ex. 2049, 125; Ex. 2050; Ex. 2051, 8:53–60; Ex. 2052, 3:37–55; Ex. 2056, 3; Ex. 2057, 129; Ex. 2079 ¶¶ 106–115); Sur-reply 15–16.

In reply, Petitioner argues that a party challenging the enablement of the prior art may overcome the presumption of enablement with evidence that the practice of the invention would have required undue experimentation. Reply 13 (citing *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1354–55 (Fed. Cir. 2003); *In re Antor Media Corp.*, 689 F.3d 1282, 1287–90 (Fed. Cir. 2012)). Petitioner further argues Patent Owner completely ignores the *Wands* factors that must be considered to

show undue experimentation. *Id.* (citing *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988)). Petitioner also argues Patent Owner improperly focuses on the absence of commercial devices. *Id.* at 14–15. Additionally, Petitioner argues Patent Owner alleges that a POSITA would not have known how to measure different blood analytes with only four wavelengths of light due to other unknown variables but fails to show these unknown variables could not have been estimated, canceled out, or calculated. *Id.* at 15.

In response, Patent Owner asserts the *Wands* factors are not mandatory to overcome the presumption of the prior art's enablement. Sur-reply 15 (citing *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1213 (Fed. Cir. 1991); *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1330 (Fed. Cir. 2012)). Patent Owner also charges Petitioner with ignoring its explanation as to why Petitioner's asserted references do not enable measuring different blood analytes with only four wavelengths of light. *Id.* at 15–16.

Patent Owner correctly contends that the prior art must enable the specific disclosures relied upon for obviousness. The parties dispute the standard for overcoming the presumption that the prior art is enabled. We need not resolve this dispute because Patent Owner's non-enablement argument does not address the specific disclosures Petitioner relies on for obviousness. Patent Owner's non-enablement argument is based exclusively on Raley's teaching of measuring oxygen saturation, carboxyhemoglobin, and methemoglobin with only four LEDs of four different wavelengths. Petitioner relies on this teaching only to provide a reason for combining the teachings of Abdul-Hafiz and Raley, not to disclose a claim limitation. Pet. 14–59; *see Raytheon*, 993 F.3d at 1380 (“In general, a prior art reference

asserted under § 103 does not necessarily have to enable its own disclosure, i.e., be ‘self-enabling,’ to be relevant to the obviousness inquiry. . . . For example, a reference that does not provide an enabling disclosure for a particular claim limitation may nonetheless furnish the motivation to combine” (citations omitted)). Patent Owner does not challenge the enablement of Raley’s teaching of the recited at least three LEDs or Abdul-Hafiz’s disclosure of the recited detector, light block, or processor, which are the specific disclosures in the prior art that Petitioner relies on to teach the claim limitations. Pet. 20–59. Thus, Patent Owner has not rebutted the presumption that the specific prior art disclosures Petitioner relies on for obviousness are enabled.

ii. Reasonable Expectation of Success

Patent Owner contends a POSITA would not have expected Petitioner’s proposed combination of the teachings of Abdul-Hafiz and Raley to successfully measure different blood analytes such as carboxyhemoglobin using only four LEDs of four different wavelengths because no one was able to develop a device using four wavelengths of light to measure different blood analytes before the ’911 patent. PO Resp. 46–47 (citing Ex. 2079 ¶ 117). Patent Owner also contends that the question is whether a POSITA would have been motivated to select and combine information from a combination of courses with a reasonable expectation of achieving the desired result and that the desired result is using four LEDs of four different wavelengths to measure different blood analytes. *Id.* at 47 (quoting *Ericsson Inc. v. Intell. Ventures I LLC*, 890 F.3d 1336, 1338 (Fed. Cir. 2018)) (citing Ex. 2079 ¶¶ 118–119). Patent Owner further contends

that Petitioner's statements regarding the expectation of success are generic and unexplained assertions. *Id.* at 48.

In reply, Petitioner essentially argues that Patent Owner's argument regarding reasonable expectation of success fails for the same reasons its non-enablement argument fails. Reply 16–17. In response, Patent Owner recognizes that Petitioner is relying on its reply to Patent Owner's non-enablement argument. Sur-reply 16.

We disagree with Patent Owner that the desired result with respect to reasonable expectation success is using four LEDs of four different wavelengths to measure different blood analytes. Rather, the desired result is the claimed invention. “The reasonable expectation of success requirement refers to the likelihood of success in combining references to meet the limitations of the claimed invention. ‘[F]ailure to consider the appropriate scope of the . . . patent’s *claimed invention* in evaluating the reasonable expectation of success . . . constitutes a legal error that [is] review[ed] without deference.’” *Intelligent Bio–Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016) (alterations in original) (quoting *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 966 (Fed. Cir. 2014)). The claimed invention does not require measuring different blood analytes such as carboxyhemoglobin, and thus Patent Owner's contentions regarding reasonable expectation of success are not commensurate with the scope of the claims. Moreover, Petitioner identifies each claim limitation in its proposed combination of the teachings of Abdul-Hafiz and Raley and explains how the combination would have resulted in each limitation. Pet. 19–59.

iii. Motivation to Combine

Patent Owner argues that measuring more blood analytes would not have motivated Petitioner's proposed combination of the teachings of Abdul-Hafiz and Raley. PO Resp. 48–51. Patent Owner also argues that measuring carboxyhemoglobin and methemoglobin to improve the accuracy oxygen saturation measurements would not have motivated the proposed combination. *Id.* at 51–56.

(a) Measuring More Blood Analytes

Patent Owner contends measuring three or four blood analytes would not have motivated a POSITA to combine the teachings of Abdul-Hafiz and Raley as Petitioner proposes because a POSITA would not have been able to measure, or reasonably expected to succeed in measuring, different blood analytes using only four LEDs with four different wavelengths. PO Resp. 48–49 (citing Ex. 2079 ¶ 120), 51. Patent Owner also contends modifying Abdul-Hafiz's pulse oximetry system to include additional LEDs, as Petitioner proposes, would frustrate the intended purpose of Abdul-Hafiz, namely providing a low-cost disposable sensor. *Id.* at 49–51 (citing Ex. 1004 ¶ 11, claim 20, Figs. 7A–C; Ex. 1005, 1:17–31, 2:64–67; Ex. 2038; Ex. 2058; Ex. 2079 ¶¶ 122–124).

In reply, Petitioner argues that “[t]he inquiry is not whether the multiple blood analyte device would be more expensive or costly but rather whether a POSITA would accept such additional costs/inconvenience to get the benefit of the measurement of an additional blood analyte” and that Patent Owner has not provided any evidence showing a POSITA would not. Reply 18–19. Petitioner also argues a POSITA would have been able to add more LEDs to Abdul-Hafiz's pulse oximetry system in such a way that

would result in a low-cost disposable sensor with enhanced blood analyte measure capabilities. *Id.* at 19–20 (citing Ex. 1079 ¶ 37).

In response, Patent Owner asserts that Petitioner has not provided any evidence that a POSITA would find the benefit of measuring additional blood analytes outweighs the additional costs associated with more LEDs. Sur-reply 18. Patent Owner also asserts that Dr. Kenny’s suggestion that a POSITA would have been able to combine the teachings of Abdul-Hafiz and Raley in such a way to preserve the low-cost attribute of Abdul-Hafiz’s sensor is conclusory and unsupported. *Id.* at 19.

We disagree with Patent Owner that adding more LEDs to Abdul-Hafiz’s pulse oximetry system would frustrate its intended purpose of providing a low-cost disposable sensor because we disagree with Patent Owner that Abdul-Hafiz’s intended purpose is providing a low-cost disposable sensor. As Patent Owner points out, Abdul-Hafiz discloses a disposable sensor using tape stock layer to secure the sensor to a tissue site. PO Resp. 49 (citing Ex. 1004 ¶ 11, claim 20, Figs. 7A–C). Abdul-Hafiz, however, never mentions an intent to keep the costs of its sensor low. Instead, Abdul-Hafiz discloses that its sensor is designed to reduce optical noise from ambient light and piped light. Ex. 1004 ¶¶ 3–4, Title.

Raley expressly suggests that a POSITA would add more LEDs with different wavelengths to measure more blood analytes. To wit, Raley teaches that its probe with four LEDs with four different wavelengths “would be useful in a photoplethysmographic monitor for measuring three or four blood analytes such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin.” Ex. 1005, 5:65–6:2. Although Patent Owner challenges the credibility of this teaching in Raley by contending no one has been able to measure different blood analytes using

only four LEDs with four different wavelengths, a teaching that provides a reason to combine various disclosures need not be enabling. *Raytheon*, 993 F.3d at 1380. Even if we now know that no one has been able to measure different blood analytes using only four LEDs with four different wavelengths, Raley shows that, at the time of the '911 patent, a POSITA would have expected that a probe with four LEDs with four different wavelengths would be useful to detect different blood analytes. *See Beckman Instruments Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed. Cir. 1989) (“Even if a reference discloses an inoperative device, it is prior art for all that it teaches.”). In view of Raley’s express teaching of a probe with four LEDs that measures three or four blood analytes, we are persuaded a POSITA would have been motivated to combine the teachings of Abdul-Hafiz’s pulse oximetry system and Raley’s additional LEDs to measure different blood analytes.

(b) Measuring Carboxyhemoglobin and Methemoglobin to Improve the Accuracy of Oxygen Saturation Measurements

Patent Owner contends that measuring carboxyhemoglobin and methemoglobin to improve the accuracy of oxygen saturation measurements would not have motivated a POSITA to combine the teachings of Abdul-Hafiz and Raley as Petitioner proposes for six reasons: (1) a POSITA would not have been able to measure, or reasonably expected to succeed in measuring, different blood analytes including carboxyhemoglobin and methemoglobin using only four LEDs with four different wavelengths, and modifying Abdul-Hafiz’s pulse oximetry system to include additional LEDs would frustrate Abdul-Hafiz’s intended purpose of providing a low-cost disposable sensor; (2) a POSITA would have known measuring

carboxyhemoglobin and methemoglobin could not be used to improve the accuracy of oxygen saturation measurements; (3) Petitioner improperly assumes there was an accuracy problem with Abdul-Hafiz's oxygen saturation measurements; (4) Raley teaches a Datex-Ohmeda pulse oximeter, and a POSITA would have recognized that Datex-Ohmeda pulse oximeters were calibrated to be more insensitive to carboxyhemoglobin and methemoglobin than other sensors; (5) Petitioner speculates that carboxyhemoglobin and methemoglobin measurements may be useful; and (6) a need to improve the accuracy of oxygen saturation measurements would not have motivated a POSITA to add more LEDs to Abdul-Hafiz's pulse oximetry system because measuring carboxyhemoglobin and methemoglobin was not enabled and not something a POSITA would have reasonably expected to succeed doing with only four wavelengths of light. PO Resp. 52–56 (citing Ex. 2038, 1–2; Ex. 2061, 3, 5; Ex. 2062, 1; Ex. 2063, 9; Ex. 2079 ¶¶ 125–134; Ex. 2080, 81:18–22, 83:16–84:15, 85:20–86:9, 87:11–89:9, 154:13–155:4); Sur-reply 19–21. Petitioner rebuts Patent Owner's reasons. Reply 20–22 (citing Ex. 1003 ¶¶ 67–68; Ex. 1005, 5:63–6:2; Ex. 1007, 1:63–2:14; Ex. 1008, 3:25–37; Ex. 1079 ¶¶ 39–41; Ex. 2046, 2; Ex. 2047; Ex. 2057, 5; Ex. 2063, 22).

After reviewing Petitioner's reasoning for modifying Abdul-Hafiz's pulse oximetry system to include additional LEDs with different wavelengths and Patent Owner's reasons against it, we find Petitioner has demonstrated that a POSITA would have modified Abdul-Hafiz as Petitioner proposes to measure carboxyhemoglobin and methemoglobin to improve the accuracy of oxygen saturation measurements. Patent Owner's first and sixth reasons repeat its contentions that a POSITA would not have been able to measure, or reasonably expected to succeed in measuring, different blood

analytes including carboxyhemoglobin and methemoglobin using only four LEDs with four different wavelengths and that modifying Abdul-Hafiz's pulse oximetry system to include additional LEDs would frustrate Abdul-Hafiz's intended purpose of providing a low-cost disposable sensor. We find these reasons unavailing for the reasons above in section III.C.3.e.iii.(a). We also find unavailing Patent Owner's third reason, which alleges there was no accuracy problem with Abdul-Hafiz's oxygen saturation measurements. There is always an implicit motivation to make something better. *Dystar*, 464 F.3d at 1368. Moreover, as Petitioner correctly argues, Patent Owner's reason is based on Masimo's LNOP sensor, which is irrelevant because Petitioner relies on Abdul-Hafiz, not the LNOP sensor. Reply 20–21. We similarly find unconvincing Patent Owner's fourth reason, which alleges Datex-Ohmeda pulse oximeters, like the one taught in Raley, were known to be calibrated to be more insensitive to carboxyhemoglobin and methemoglobin than other sensors. We agree with Petitioner that Datex-Ohmeda pulse oximeters are irrelevant because Petitioner relies on Raley, not a Datex-Ohmeda pulse oximeter. Raley expressly teaches that its probe with four LEDs would be useful for measuring carboxyhemoglobin and methemoglobin. Ex. 1005, 5:65–6:2. Patent Owner's remaining second and fifth reasons unsuccessfully challenge whether a POSITA would have measured carboxyhemoglobin and methemoglobin to improve the accuracy of oxygen saturation measurements. As Petitioner correctly observes, Jarman¹⁰ and Barthelemy¹¹ show that there was a known need in the art to compensate for errors in oxygen saturation

¹⁰ Jarman et al., US 5,983,122, issued Nov. 9, 1999 (“Jarman”) (Ex. 1007).

¹¹ Barthelemy et al., US 5,413,100, issued May 9, 1995 (“Barthelemy”) (Ex. 1008).

measurements resulting from carboxyhemoglobin and methemoglobin, and Raley teaches that a probe with four LEDs would be useful for measuring carboxyhemoglobin and methemoglobin. Pet. 18 (citing Ex. 1003 ¶¶ 67–68; Ex. 1005, 1:39–45, 3:52–4:9, 5:63–6:2; Ex. 1007, 1:63–2:14; Ex. 1008, 3:25–37); Reply 21. Moreover, teachings that provide a reason to combine various disclosures need not be enabling. *Raytheon*, 993 F.3d at 1380. Even if we know now that no one has been able to use carboxyhemoglobin and methemoglobin measurements to improve the accuracy of oxygen saturation measurements, Jarman, Barthelemy, and Raley demonstrate that, at the time of the '911 patent, a POSITA would have expected measuring carboxyhemoglobin and methemoglobin would have improved oxygen saturation measurements. In view of the teachings of Jarman and Barthelemy showing there was a known need to compensate for errors in oxygen saturation measurements resulting from carboxyhemoglobin and methemoglobin and Raley's teaching of a probe with four LEDs would be useful for measuring carboxyhemoglobin and methemoglobin, we are persuaded a POSITA would have been motivated to combine the teachings of Abdul-Hafiz's pulse oximetry system and Raley's additional LEDs to measure carboxyhemoglobin and methemoglobin to improve the accuracy of oxygen saturation measurements.

iv. Hindsight and Failure to Treat Each Claim as a Whole

Patent Owner contends that Petitioner employs a hindsight-driven approach of using the claim as a roadmap, whereby Petitioner treats the claim as a list of disparate parts and then finds a prior art disclosure corresponding to each part. PO Resp. 57. Patent Owner further contends Petitioner bypasses the statutory requirement to consider each claim as a

whole by arguing on a part-by-part basis that a POSITA would have been motivated to combine the teachings of Abdul-Hafiz and Raley as needed to yield each recited part. *Id.* at 58.

Contrary to Patent Owner's characterization of Petitioner's obviousness analysis, Petitioner first argues a POSITA would have combined the teachings of Abdul-Hafiz and Raley and provides reasons why a POSITA would have done so. Pet. 14–20. Petitioner then identifies each claim limitation in the proposed combination of Abdul-Hafiz and Raley. *Id.* at 20–59. We therefore disagree that Petitioner's obviousness analysis is based on only hindsight and fails to treat each claim as a whole.

f) Conclusion for Independent Claim 1

After considering the parties' arguments and evidence, we are persuaded that the limitations of independent claim 1 are found in Petitioner's proposed combination of Abdul-Hafiz and Raley and that a POSITA would have combined the teachings of Abdul-Hafiz and Raley to result in the claimed invention with a reasonable expectation of success. Petitioner has shown, by a preponderance of the evidence, that the subject matter of independent claim 1 would have been obvious over Abdul-Hafiz and Raley.

4. Claims 6, 8, 10, 15, 17, 19–21, 26, and 28

Petitioner sets forth an element-by-element comparison of each of claims 6, 8, 10, 15, 17, 19–21, 26, and 28 to its proposed combination of the teachings of Abdul-Hafiz and Raley. Pet. 59–74. Patent Owner's arguments are discussed above with respect to independent claim 1.

After considering the parties' arguments and evidence, we are persuaded that the limitations of each of claims 6, 8, 10, 15, 17, 19–21, 26,

and 28 are found in Petitioner’s proposed combination of Abdul-Hafiz and Raley and that a POSITA would have combined the teachings of Abdul-Hafiz and Raley to result in the claimed invention with a reasonable expectation of success. Petitioner has shown, by a preponderance of the evidence, that the subject matter of independent claims 6, 8, 10, 15, 17, 19–21, 26, and 28 would have been obvious over Abdul-Hafiz and Raley.

D. Obviousness Based on Abdul-Hafiz, Raley, and Secker

Petitioner challenges claims 2–4, 11–13, and 23–25 under pre-AIA 35 U.S.C. § 103(a), contending the claimed subject matter would have been obvious over Abdul-Hafiz, Raley, and Secker. Pet. 74–90; Reply 22–27. Patent Owner argues this asserted ground fails to establish obviousness. PO Resp. 59–70; Sur-reply 22–26.

As we discuss Abdul-Hafiz and Raley above in sections III.C.1 and 2, respectively, we begin our analysis of this asserted ground of unpatentability with an overview of Secker. We then turn to the parties’ contentions for each claim subject to this ground.

1. Secker

Secker is a U.S. patent that issued on February 23, 1993. Ex. 1006, code (45). There is no dispute that Secker is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 2.

Secker relates to “a sensor, an apparatus and a method for performing non-invasive measurements of oxygen saturation based on the reflection technique.” Ex. 1006, 1:6–9. Secker teaches a sensor with a multiplicity of transmitter LEDs of one wavelength and a multiplicity of transmitter LEDs of a second wavelength. *Id.* at 15:35–37. Figure 8, reproduced below, shows such a sensor.

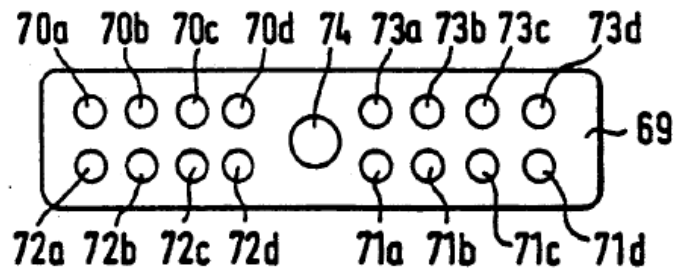


FIG. 8

Figure 8 depicts a self-adapting reflection sensor. *Id.* at 11:20–21. As shown in Figure 8, carrier body 69 includes red LEDs 70a–d and 71a–d, as well as infrared LEDs 72a–d and 73a–d. *Id.* at 15:39–41. According to Secker, “[s]uch a sensor may be used, in conjunction with an appropriate oximeter, for very precise manual or automatic adaptation to different kinds of measurement by selecting an appropriate red LED/infrared LED combination.” *Id.* at 15:42–46.

2. Claims 2–4, 11–13, and 23–25

Claims 2, 11, and 23 depend from independent claims 1, 10, and 19, respectively, and recite “wherein the at least three LEDs comprises at least eight LEDs.” Ex. 1001, 19:58–59, 20:31–32, 21:11–12. Claims 3, 12, and 24 depend from claims 2, 11, and 23, respectively, and recite “wherein the at least eight LEDs comprises at least two LEDs of the same wavelength. *Id.* at 19:60–61, 20:33–34, 21:13–14. Claims 4, 13, and 25 depend from independent claims 1, 10, and 19, respectively, and recite “wherein the at least three LEDs comprises at least twelve LEDs.” *Id.* at 19:62–63, 20:35–36, 21:15–16.

Petitioner sets forth an element-by-element comparison of each of claims 2–4, 11–13, and 23–25 to Abdul-Hafiz, Raley, and Secker.

Pet. 86–90; Reply 22–23. Petitioner also articulates reasons why a POSITA would have combined the teachings of Abdul-Hafiz with a reasonable expectation of success. Pet. 76–86; Reply 24–27.

Patent Owner argues none of the asserted art discloses eight or twelve LEDs comprising at least three different wavelengths. PO Resp. 59–62; Sur-reply 22–23. Patent Owner also argues Petitioner fails to establish that a POSITA would have been motivated to add more LEDs to the combination of Abdul-Hafiz and Raley. PO Resp. 63–70; Sur-reply 23–26.

We focus our discussion on the aspects of Petitioner’s assertions that Patent Owner disputes. Accordingly, we address each disputed aspect in turn below.

a) Eight or Twelve LEDs Comprising at Least Three Different Wavelengths

Petitioner argues the combined teachings of Abdul-Hafiz, Raley, and Secker would have resulted in a sensor with sixteen LEDs including four sets of four LEDs with the same wavelength. Pet. 86–89. Petitioner proposes to modify Abdul-Hafiz’s pulse oximetry system to include four LEDs of four different wavelengths, as taught by Raley. *Id.* at 76 (citing Ex. 1003 ¶ 155; Ex. 1005, 3:52–4:9, 4:29–44; 5:63–6:2). Petitioner argues Secker teaches four LEDs of the same wavelength and proposes to modify its combination of Abdul-Hafiz and Raley by replacing each LED in the combination of Abdul-Hafiz and Raley with four LEDs of the same wavelength, as Secker teaches. *Id.* at 86–89 (citing Ex. 1003 ¶¶ 168–171; Ex. 1004 ¶¶ 47, 49–50, Figs. 11A–E; Ex. 1006, 6:4–20, 6:38–7:40, 8:67–68, 14:52–15:29, 15:35–46, Fig. 8).

Patent Owner contends Petitioner fails to show obviousness because none of Abdul-Hafiz, Raley, and Secker discloses eight LEDs, much less twelve LEDs, of at least three different wavelengths as the claims require. PO Resp. 61; Sur-reply 22–23. Patent Owner asserts Secker teaches a plurality of LEDs having only two different wavelengths. PO Resp. 61–62 (citing Ex. 1003 ¶ 168; Ex. 1006, Abstract, 1:33–35, 11:58–66, 12:10–14, 13:4–6, 13:18–21, 13:45–49, 14:34–40, 15:39–57; Ex. 2079 ¶ 139); Sur-reply 22. Patent Owner further asserts that Abdul-Hafiz discloses two LEDs comprising two different wavelengths and that Raley teaches four LEDs comprising four different wavelengths. PO Resp. 62 (citing Ex. 1004 ¶ 2; Ex. 1005, Figs. 3, 5; Ex. 2079 ¶ 140); Sur-reply 22.

There is no dispute that none of Petitioner’s asserted references discloses eight LEDs, or twelve LEDs, of at least three different wavelengths. However, as Petitioner correctly argues, nonobviousness cannot be established by attacking references individually when the asserted obviousness is based on a combination of the teachings of the references. Reply 22–23 (citing *Bradium Techs. v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019); *Game & Tech. Co. v. Wargaming Grp. Ltd.*, 942 F.3d 1343, 1352 (Fed. Cir. 2019); *Merck & Co. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807–08 (Fed. Cir. 1989)). We agree with Petitioner that Raley teaches four LEDs of four different wavelengths and that Secker teaches four sets of four LEDs having the same wavelength. *Id.* at 23 (citing Ex. 1079 ¶ 42). In view of these teachings of Raley and Secker, we are persuaded that modifying the combination of Abdul-Hafiz and Raley by replacing each of Raley’s four LEDs of different wavelengths with four LEDs of the same wavelength, as Secker teaches, would have resulted in a sensor having sixteen LEDs comprising four different wavelengths, which encompasses at least eight

LEDs, and at least twelve LEDs, comprising at least three different wavelengths as recited in the claims.

b) Motivation to Combine

Petitioner argues Abdul-Hafiz discloses an emitter that can be attached at multiple different positions on the sensor assembly to accommodate different sized patients or different tissue site thicknesses. Pet. 78 (citing Ex. 1003 ¶¶ 156–157; Ex. 1004 ¶¶ 47, 49–50, Figs. 11A–E). Petitioner also argues Secker teaches an oximeter providing automatic selection of LEDs that are best suited for a certain application or tissue so that the sensor may provide a variety of applications and operate precisely with patients of different tissue characteristics. *Id.* at 80–81 (citing Ex. 1006, 6:4–20, 15:12–29). According to Petitioner, a POSITA would have modified the combination of Abdul-Hafiz and Raley by replacing each of Raley’s four LEDs of different wavelengths with four LEDs of the same wavelength, as Secker teaches “to accommodate different detector-LED spacings for different sized patients or different tissue site thicknesses, as suggested by Abdul-Hafiz and Secker.” *Id.* at 82 (citing Ex. 1003 ¶ 162; Ex. 1004 ¶¶ 47, 49–50, Figs. 11A–E; Ex. 1006, 6:4–20, 6:38–7:40, 8:67–68, 14:52–15:29, 15:35–46).

Patent Owner contends Petitioner has not shown a POSITA would have been motivated to add more LEDs to the combination of Abdul-Hafiz and Raley. PO Resp. 63–70. More specifically, Patent Owner asserts three reasons why a POSITA would not have been motivated to modify the combination of Abdul-Hafiz and Raley as Petitioner proposes: (1) Secker’s teachings are limited to reflectance sensors and would not have motivated a POSITA to add more LEDs to the transmittance sensor of the combined

teachings of Abdul-Hafiz and Raley; (2) Abdul-Hafiz does not suggest Petitioner's proposed modification to the combination of Abdul-Hafiz and Raley because Abdul-Hafiz does not disclose a single sensor that accommodates different sized patients; and (3) Secker does not teach using more LEDs to accommodate different patient sizes or tissue thicknesses. PO Resp. 63–70 (citing Ex. 1004 ¶¶ 2–3, 40, 47, Fig. 2; Ex. 1006, Abstract, 1:6–9, 1:27–31, 2:30–36, 2:41–47, 2:56–61, 2:62–3:45, 6:4–20, 6:38–7:43; 7:64–9:2, 12:34–39, 13:28–31, 14:41–42, 14:52–18:41, Figs. 1–13; Ex. 2079 ¶¶ 142–150, 152–154, 156–158; Ex. 2080, 142:4–10, 143:18–144:4, 151:2–14).

In reply, Petitioner argues that a POSITA would not have been precluded from using Secker's teachings regarding reflectance sensors in combination with prior art transmission sensors. Reply 24 (citing Ex. 1079 ¶ 43). Petitioner asserts, according to Webster, in transmission probes, the photodiode has to detect light transmitted through the tissue, and the detector has to be placed in line with the LEDs so that the maximum amount of transmitted light is detected. *Id.* (citing Ex. 1011, 104). Petitioner also asserts that, in line with Webster's recommendation to align the detector with the LEDs, Abdul-Hafiz discloses mounting the emitter at different positions to accommodate different sized patients or different tissue site thicknesses and invites a POSITA to look to other detector-emitter spacing adjustments. *Id.* at 24–25 (citing Ex. 1004 ¶¶ 47, 49–50, Figs. 11A–B, 11D–E). Petitioner further asserts a POSITA would have recognized that Secker's teachings allow detector-emitter spacing adjustment. *Id.* at 25 (citing Ex. 1079 ¶ 44). Moreover, Petitioner acknowledges Abdul-Hafiz does not disclose a single sensor that accommodates different sized patients and but maintains, in line with the teachings of Webster and Secker, that

Abdul-Hafiz discloses mounting the emitter at different positions to accommodate different sized patients or different tissue site thicknesses. *Id.* at 25–26 (citing Ex. 1004 ¶¶ 47, 49–50, Figs. 11A–B, 11D–E; Ex. 1006, 13:35–37, 14:19–22; Ex. 1011, 69, 143; Ex. 1079 ¶ 45). Petitioner also acknowledges Secker does not teach using more LEDs to accommodate different patient sizes or different tissue thicknesses but asserts a POSITA would have understood, based on the teachings of Webster and Secker, that the thickness of the finger changes the path length for the light transmitted through the finger and that these variations in finger tissue and thickness exist even in transmittance applications. *Id.* at 26–27 (citing Ex. 1006, 13:35–37, 14:19–22; Ex. 1011, 69, 143; Ex. 1079 ¶ 46).

In response, Patent Owner alleges Petitioner’s assertions based on Webster are new and improper because Webster is not part of Petitioner’s obviousness ground. Sur-reply 23. Patent Owner further alleges Petitioner’s new assertions based on Webster fail essentially for the same three reasons Petitioner’s original reasoning for modifying the combination of Abdul-Hafiz and Raley fails. *Id.* at 24–27.

After reviewing Petitioner’s reasoning for modifying the combination of Abdul-Hafiz and Raley to include more LEDs and Patent Owner’s reasons against it, we find Petitioner has demonstrated that a POSITA would have modified the combination of Abdul-Hafiz and Raley as Petitioner proposes to accommodate different detector-LED spacings for different sized patients or different tissue site thicknesses. As an initial matter, we disagree with Patent Owner that Petitioner’s assertions based on Webster are new and improper. Contrary to Patent Owner’s allegation, Petitioner is not changing its obviousness ground to be based on Abdul-Hafiz, Raley, Secker, and Webster. Rather, Petitioner cites to Webster to support its reasoning for

combining the teachings of Abdul-Hafiz, Raley, and Secker in response to Patent Owner's reasons against it. Reply 24. We also disagree with Patent Owner that Secker's teachings are limited to reflectance sensors. According to Secker, "the basic idea of the present invention *is more important* for application in reflection oximetry, than it is for transmission oximetry," but Secker does not suggest its teachings are inapplicable to transmission sensors. Ex. 1006, 3:43–45 (emphasis added). Although Patent Owner is correct that Secker teaches using a multiplicity of LEDs to accommodate different extinction coefficients associated with different tissues, not to accommodate different patient sizes or different tissue thicknesses, Secker nonetheless teaches employing multiple LEDs to provide different detector-LED spacings, namely different light paths for a certain wavelength through human tissue. Ex. 1006, 6:38–7:40, 15:35–46). Patent Owner is also correct that Abdul-Hafiz does not disclose a single sensor that accommodates different sized patients. Abdul-Hafiz, however, discloses a need for different detector-LED spacings for different sized patients or different tissue site thicknesses. Ex. 1004 ¶¶ 47, 49–50, Figs. 11A–B, 11D–E. Given Abdul-Hafiz's disclosure of a need for different detector-LED spacings for different sized patients or different tissue site thickness and Secker's teaching of using multiple LEDs to provide different detector-LED spacings, we are persuaded that a POSITA would have modified the combination of Abdul-Hafiz and Raley to add more LEDs to accommodate different detector-LED spacings for different sized patients or different tissue site thicknesses.

c) Conclusion for Claims 2–4, 11–13, and 23–25

After considering the parties’ arguments and evidence, we are persuaded that the limitations of each of claims 2–4, 11–13, and 23–25 are found in Petitioner’s proposed combination of Abdul-Hafiz, Raley, and Secker and that a POSITA would have combined the teachings of Abdul-Hafiz, Raley, and Secker to result in the claimed invention with a reasonable expectation of success. Petitioner has shown, by a preponderance of the evidence, that the subject matter of independent claims 2–4, 11–13, and 23–25 would have been obvious over Abdul-Hafiz, Raley, and Secker.

IV. CONCLUSION

Petitioner has shown, by a preponderance of the evidence, that all of the challenged claims are unpatentable.

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 6, 8, 10, 15, 17, 19–21, 26, 28	103(a)	Abdul-Hafiz, Raley	1, 6, 8, 10, 15, 17, 19–21, 26, 28	
2–4, 11–13, 23–25	103(a)	Abdul-Hafiz, Raley, Secker	2–4, 11–13, 23–25	
Overall Outcome			1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, 28	

V. ORDER¹²

In consideration of the foregoing, it is:

ORDERED that claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of U.S. Patent No. 10,984,911 B2 have been proven by a preponderance of the evidence to be unpatentable;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 318(b), upon expiration of the time for appeal of this decision, or the termination of any such appeal, a certificate shall issue canceling claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of U.S. Patent No 10,984,911 B2; and

FURTHER ORDERED that, as this is a Final Written Decision, a party seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

¹² Should Patent Owner wish to pursue amendment of a challenged claim in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner’s attention to the Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

IPR2024-00296
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