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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

WILLOW LABORATORIES, INC.,
Patent Owner.

Case IPR2024-00296
U.S. Patent 10,984,911

PATENT OWNER RESPONSE

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I. INTRODUCTION

Apple's Petition arises from parallel litigation in Delaware district court ("Delaware Litigation") between Masimo and Apple. Apple was not, historically, a company that had any involvement in physiological monitoring devices. But, around 2013, Apple decided to enter the field and sought out Masimo for its technology. Despite claiming an interest in integrating Masimo's technology into Apple products, Apple began poaching Masimo's employees, one after another. The poached employees included Chief Technical Officer Marcelo Lamago—an inventor of the '911 Patent challenged here and the three Masimo patents that the ITC recently found Apple infringed. Lamago took Masimo's sensor design knowledge with him to Apple. And in the Delaware Litigation, Masimo accuses Apple's Watches of infringing Masimo's patented technology, including key features disclosed and claimed in the '911 Patent.

The '911 Patent discloses and claims innovative and nonobvious approaches for improving the accuracy of noninvasive physiological monitoring devices. Masimo's approach uses at least three LEDs to emit light of at least three different wavelengths into the skin and at least one detector to detect some of that light after it has passed through tissue. A novel light block surrounds the detector to protect it from ambient light as well as a major source of inaccuracy—light piping. Light piping is light that reaches the detector without first passing through tissue.

Masimo's approach reduces light piping and thus improves measurement accuracy by including, among other things, a light block having a top with only one opening through which light can reach the detector, with the area of the opening being smaller than the detection surface area of the detector.

Apple filed its Petition on the one-year deadline. But the Petition fails to show obviousness for many reasons.

Independent Claims 1 and 19 of the '911 Patent require a physiological monitoring device comprising a "light block" with "only one opening through which light is configured to pass" to the detector. Apple argues the detector assembly of its primary reference, Abdul-Hafiz (a Masimo reference), discloses this feature because it has an "optical housing" that surrounds the detector and has one aperture. But Apple is wrong. Apple ignores that Abdul-Hafiz's detector assembly also surrounds the detector with an EMI shield that is positioned between the optical housing and detector and has four square openings. Apple's expert testified that the EMI shield blocks light, and thus, light must pass through the EMI shield's four openings to reach the detector. Apple never proposes removing the EMI shield from Abdul-Hafiz, nor would a POSITA have done so. Thus, a POSITA would have understood that Abdul-Hafiz does not have a light block with "only one opening" because it includes a light-blocking EMI shield with four openings.

Independent Claims 1 and 10, their dependent claims, and dependent Claim 20 all require the “opening” or “window” in the light block to have an area smaller than the detection surface area of the detector. Apple argues that its primary reference, Abdul-Hafiz, discloses these limitations. But Masimo’s expert confirms—and the Board already found—that Apple is wrong. Specifically, as the Board correctly determined, Abdul-Hafiz lacks these limitations because it does not disclose the dimensions or area of its aperture (the alleged “opening”/“window”) relative to the detection surface area of its detector. Indeed, the alleged “opening”/“window” and “detection surface area” are only shown in the figures of the Abdul-Hafiz patent publication, which are not to scale and cannot be relied upon to show particular sizes or proportions.

Every independent claim also requires “at least three LEDs” comprising “at least three” different wavelengths. Apple concedes that Abdul-Hafiz’s two LED pulse oximetry system does not have “at least three” LEDs. Instead, Apple argues that a POSITA would have been motivated based on Raley to modify Abdul-Hafiz to include four LEDs of four different wavelengths, to make Abdul-Hafiz measure multiple blood analytes including at least oxygen saturation, carboxyhemoglobin, and methemoglobin. But Apple fails to show obviousness. Raley (and the prior art) did not enable a POSITA to measure the blood analytes Apple relies on using four wavelengths of light. A POSITA would not have reasonably expected Apple’s

proposed modification to succeed. And, for many reasons, a POSITA would not have been motivated to modify Abdul-Hafiz as proposed.

Additionally, dependent Claims 2-4, 11-13, and 23-25 require that the “at least three LEDs” comprise at least “eight” or “twelve” LEDs. These claims depend from Claims 1, 10, and 19, which require that the LEDs comprise “at least three” different wavelengths. Attempting to satisfy these claims, Apple argues that based on Secker a POSITA would have multiplied the LEDs of its Abdul-Hafiz+Raley combination sensor by four, resulting in four sets of four LEDs (totaling 16 LEDs) where each set of LEDs has a different wavelength. But neither Secker, nor any combination reference, discloses a physiological monitoring device with at least eight or twelve LEDs comprising at least three different wavelengths. And for several reasons, a POSITA would not have been motivated to add many more LEDs to the Abdul-Hafiz+Raley sensor.

Apple has failed to demonstrate that the asserted references render the challenged claims unpatentable. Masimo, therefore, respectfully requests that the Board affirm the patentability of the challenged claims.

II. MASIMO'S PIONEERING TECHNOLOGY

Masimo is the technology leader in the field of noninvasive physiological monitoring.¹ In 1989, Masimo was a small startup operating in an inventor's condo. Today, Masimo is a publicly traded company employing 6,300 people worldwide with annual revenues exceeding \$1.1 billion. Masimo technology is used in clinical care to monitor over 200 million patients per year. This growth followed Masimo's development of a range of technologies that revolutionized the field of noninvasive physiological monitoring. Other Masimo patents have withstood extensive attacks, including in litigation through trials, inter-partes reexaminations, an ITC investigation, IPRs, and appeals.²

Masimo developed innovative sensor designs that allow more accurate noninvasive measurement of multiple physiological parameters, such as oxygen saturation, carboxyhemoglobin, and more. EX2029, 98:9-102:1. Extracting the signal needed for such measurements presents difficult challenges. *Id.*, 98:9-100:3.

¹ Patent Owner herein refers to itself as "Masimo" because Masimo Corporation is the exclusive licensee to certain rights in the '911 Patent.

² See, e.g., *Mallinckrodt, Inc. v. Masimo Corp.*, 147 Fed. Appx. 158, 2005 WL 2139867 at *3 (Fed. Cir. Sept. 7, 2005); *Masimo Corp. v. Philips Elec. N. Am. Corp.*, 2015 WL 2379485 at *1 (D. Del. May 18, 2015); EX2003 (ITC Commission Opinion); EX2004-2009 (PTAB denials of institution for IPR2022-01271-IPR2022-01276); *Masimo Corp. v. Apple Inc.*, 2023 WL 5921622, at *9 (Fed Cir. Sept. 12, 2023); *Apple Inc. v. Masimo Corp.*, 2024 WL 137336, at *1 (Fed. Cir. Jan. 12, 2024); *Apple Inc. v. Masimo Corp.*, 2024 WL 139570, at *1 (Fed. Cir. Jan. 12, 2024).

Masimo faced difficulties reducing errors in the detected signal, such as the measurement inaccuracies that result when emitted light reaches a detector without first being attenuated by the user's tissue. EX2030, 122:1-129:3, 226:16-230:1. The '911 Patent inventors discovered solutions to these problems and sought to protect their inventions, including those recited in the '911 Patent. *Id.*, 138:9-141:14.

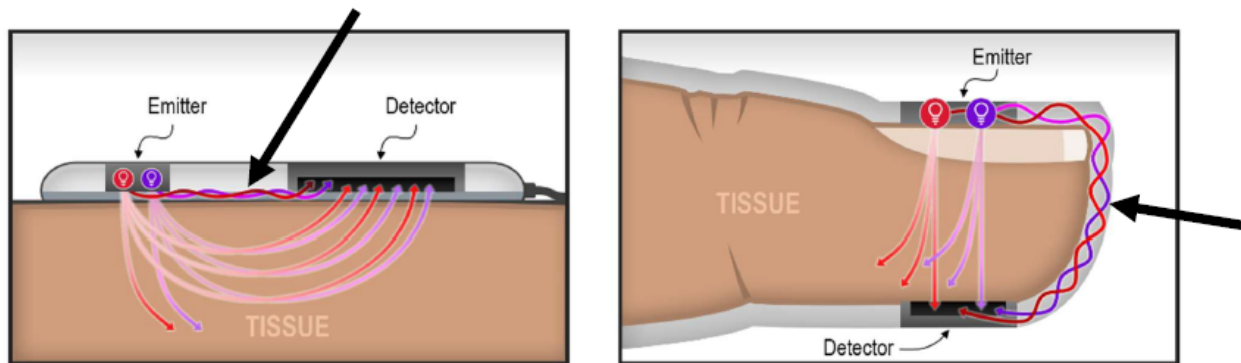
A. '911 Patent Overview

The '911 Patent is directed to devices and methods for noninvasively determining measurements of the user's physiological parameters, such as oxygen saturation and pulse rate. *See, e.g.*, EX1001, cover, 3:23-58, 5:34-51, Claims. The claimed inventions result from research conducted by Ammar Al-Ali, Mohamed Diab, and their co-inventors on more accurately measuring multiple physiological parameters. EX2030, 122:1-129:3, 138:9-141:14. The claimed sensor designs include features to measure physiological parameters more accurately in difficult conditions, such as for determining additional parameters and at various measurement locations, including "a finger," "a foot," "an ear," or "a forehead or other tissue surface." *See, e.g.*, EX1001, 5:66-6:3, 6:42-55, 15:14-23, FIGS. 1, 32, 46, Claims.

For example, the claimed devices and methods determine multiple physiological parameters by utilizing at least three LEDs configured to emit light of at least three different wavelengths, and at least one detector configured to detect

emitted light after attenuation by the user's tissue. *See, e.g., id.*, Claims 1, 10, 19.

The claimed devices and methods include a light block that reduces a significant problem encountered by the inventors—light piping. *Id.*; EX2030, 122:1-123:17, 126:7-128:21, 130:23-131:19, 227:18-230:1. Light piping occurs when light goes directly from a light source to a detector without first being attenuated by the user's tissue. *See, e.g.,* EX1001, 6:45-47; EX2079 ¶46. The black arrows in the illustration below show examples of light piping.



Light piping causes inaccuracy in noninvasive physiological measurements because light that reaches the detector without first being attenuated by the user's tissue provides no information about the parameters of the tissue being measured. EX2079 ¶47. Importantly, the claimed devices and methods reduce light piping and improve measurement accuracy by including a light block formed at least partly of black material and having a top with only one opening through which light can reach the detector, with the area of the opening being smaller than the area of the detector. *See, e.g.,* EX1001, Claims 1, 10, 20; EX2079 ¶47. The unique arrangements of

claimed features improve sensor accuracy and provide the ability to measure difficult physiological parameters at different measurement sites. EX2079 ¶47.

B. Introduction To The Independent Claims

The '911 Patent has three independent claims—Claims 1, 10, and 19.

Claim 1 exemplifies some of the elements at issue, and recites:

1. A physiological monitoring device comprising:
 - at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three different wavelengths;
 - 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;
 - 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, wherein the shoebox structure is at least partially formed of a black material, wherein a top of the shoebox structure includes only one opening through which light is configured to pass, the opening comprising an area smaller than a detection surface area of the at least one detector; and
 - a processor configured to receive and process one or more signals responsive to the outputted at least one signal and determine a physiological parameter of a user responsive to the one or more signals.

EX1001, Claim 1.³ Claims 1 and 10, their dependents (Claims 2-9 and 11-18), and Claim 20 (which depends from Claim 19) all require an opening (or window) through which light is configured to pass to the detector, where the opening has an area *smaller than* the detection surface area of the detector. And as the Board's

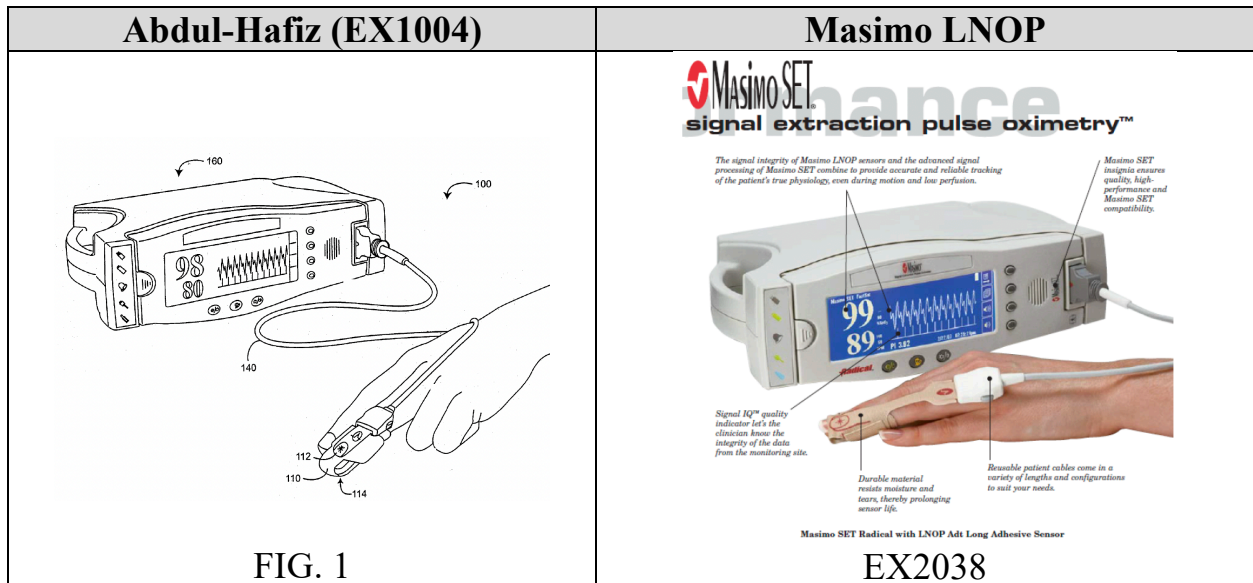
³ All emphases and annotations are added unless indicated otherwise.

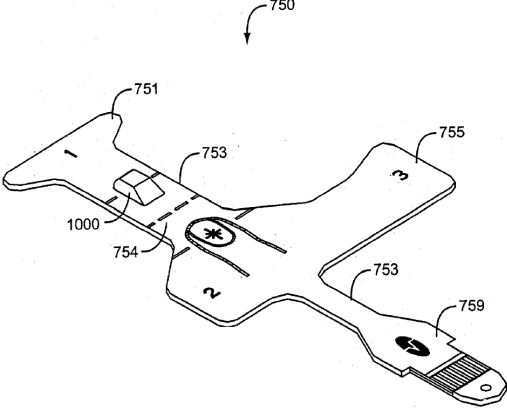
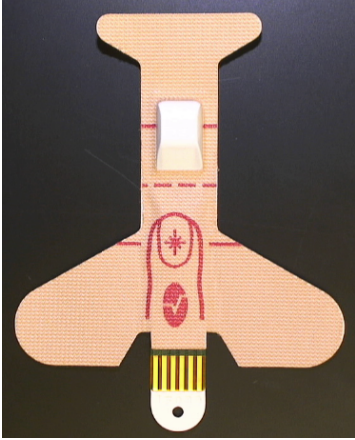
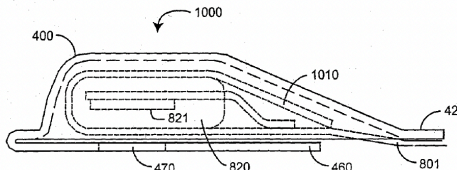
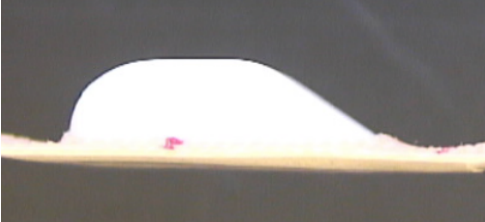
institution decision correctly found, Apple fails to show that the asserted prior art discloses at least that requirement of Claims 1-18 and 20. Paper 8, 43-44.

III. APPLE'S REFERENCES

Apple's unpatentability grounds rely on three references: Abdul-Hafiz, Raley, and Secker. Pet. 1. These references were presented to and considered by the Patent Office during prosecution of the '911 Patent. EX1002, 245 (#564: patent issuing from Abdul-Hafiz), 235 (#273: Raley), 228 (#78: Secker).

Additionally, Apple's primary reference, Abdul-Hafiz, describes Masimo's LNOP (low noise optical probe) sensors, as shown below. EX2079 ¶52.



Abdul-Hafiz (EX1004)	Masimo LNOP
 FIG. 7C	 EX2039
 FIG. 6A	 EX2040

Apple and its expert in the Delaware Litigation rely on the above Masimo LNOP sensor as a primary reference, and argues it is virtually indistinguishable from Abdul-Hafiz's sensor. EX2035; EX2037; EX2079 ¶¶52-53. Further, Abdul-Hafiz issued as U.S. Patent No. 7,096,054 (EX2042), which is identified as a patent covering the above LNOP sensor on Masimo's patent marking website (EX2043).

IV. LEVEL OF ORDINARY SKILL IN THE ART

The '911 Patent has an effective filing date of March 1, 2005. A POSITA at the time of the '911 Patent would have been a person with a working knowledge of physiological monitoring technologies and/or optical sensors used in physiological monitoring technologies. EX2079 ¶37. 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. *Id.* Alternatively, the person could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline. *Id.*

Apple proposes a different level of skill that requires no coursework, training, or experience with optics, optical physiological sensors, or physiology, and focuses on data processing rather than sensor design. Pet. 7. Accordingly, Masimo's definition of the level of skill is more accurate. EX2079 ¶40. Thus, the Board should again "adopt [Masimo's] definition of the POSITA." Paper 8, 17.

Also, Apple's expert (Kenny) assumes in his analysis that a POSITA would have had a particular understanding or capabilities because he or she had "already developed a system such as described by Abdul-Hafiz." EX1003 ¶42. But Abdul-Hafiz is a pulse oximetry system, and Kenny conceded that he's never developed a pulse oximeter or even published in the field. EX2080, 151:19-152:6. Accordingly, Kenny himself does not have the level of understanding or capability presumed in his declaration.

Regardless, Apple does not contend that the level of skill in the art affects the patentability of the challenged claims. Pet. 7; EX1003 ¶¶22-23. And under any proposed level of skill, the claims' patentability is confirmed for at least the reasons set forth below. EX2079 ¶42.

V. LEGAL STANDARDS

“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). The Board is not “free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner during an IPR.” *In re Magnum Oil Tools, Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016). “The petitioner must instead articulate specific reasoning, based on evidence of record,” as set out in its petition “to support the legal conclusion of obviousness.” *Id.* at 1380. The Board “must base its decision on arguments that were advanced by a party.” *Id.* at 1381. The Board cannot “decide unpatentability theories never presented by the petitioner.” *Id.*

To prevail on any obviousness ground, a petitioner must show “both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1367-68 (Fed. Cir. 2016) (cleaned up).

Furthermore, “the prior art, taken as a whole, must enable a skilled artisan to make and use the claimed invention” without undue experimentation. *Raytheon Techs. Corp. v. Gen. Elec. Co.*, 993 F.3d 1374, 1380 (Fed. Cir. 2021).

A petitioner may not simply identify individual claim components—it must show why a “skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed.” *In re Kotzab*, 217 F.3d 1365, 1371 (Fed. Cir. 2000). The petitioner must support even simple modifications of a reference with some motivation to make the change. *See In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984).

A petitioner also may not rely on “mere conclusory statements.” *Magnum*, 829 F.3d at 1380. Rather, the petitioner must set forth “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418-19 (2007) (cleaned up). Similarly, a petitioner cannot simply rely on an expert’s unsubstantiated and conclusory opinions. *See* 37 C.F.R. § 42.65 (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”); *Harmonic*, 815 F.3d at 1363 (affirming petitioner’s failure to establish obviousness where expert testimony “add[ed] nothing beyond the conclusory statements in [the] petition.”).

Moreover, an appropriate obviousness inquiry cannot involve even a “hint of hindsight.” *Star Sci., Inc. v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1375 (Fed. Cir. 2011). A petitioner may not “simply retrace[] the path of the inventor with hindsight, discount[] the number and complexity of the alternatives, and conclude[] that the invention ... was obvious.” *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1364 (Fed. Cir. 2008). Likewise, “care must be taken to avoid hindsight reconstruction by using the patent in suit as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit.” *In re NTP, Inc.*, 654 F.3d 1279, 1299 (Fed. Cir. 2011) (cleaned up).

VI. CLAIM CONSTRUCTION

The Board should give the claims their plain and ordinary meaning, consistent with the specification, as a POSITA would understand them. 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (*en banc*). In the Delaware Litigation, Masimo explains that the claims have their plain meaning and thus require no construction. EX2031, 57-84. Masimo takes the same position here. EX2079 ¶¶60-61.

Unlike Masimo, Apple presents inconsistent claim constructions in the parallel proceedings. In the Delaware Litigation, Apple argues that the disputed terms require the following express, narrow constructions: (1) a “cavity” is a

“hollowed-out space” within a one-piece “solid body”; (2) “a light block...” is a “coined term” and thus limited to an exemplary embodiment in the specification; (3) “a top of the [shoebox structure/light block]” mandates a particular device orientation; and (4) an “opening” requires “empty space” despite being an opening for light. EX2031, 57-84. Apple relies on these narrow constructions for noninfringement arguments. EX2032 ¶¶473-474, 487-490, 498, 528-539, 512-523. But here, Apple and its declarant (Kenny) did not even mention those constructions.

Kenny did not even know that Apple set forth its claim construction arguments in the Delaware Litigation months before he submitted his declaration in this IPR. EX2080, 24:6-11. Kenny confirmed that “at that time [of his declaration], and even now today, I haven’t seen any of the materials” from the Delaware Litigation. *Id.*, 23:17-22. Instead of applying its Delaware constructions, Apple now seeks broader claim scope to support the Petition’s patentability challenges by arguing “no express constructions are required.” *Compare* EX2031, 57-84 *with* Pet. 7-8. Apple thus violates a fundamental tenet of patent law—claims “must be interpreted and given the same meaning for purposes of both validity and infringement analysis.” *Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001). Apple’s position is improper for multiple reasons.

First, the Board’s rules “place an affirmative burden on petitioners to ‘set forth: ... how the challenged claim is to be construed.’” *OrthoPediatrics Corp. v.*

K2M, Inc., Case IPR2018-01548, Paper 9, 10 (March 1, 2019) (quoting 37 C.F.R. § 42.104(b)(3)). “This burden continues by requiring petitioners to adequately explain ‘how the construed claim is unpatentable.’” *Id.* (quoting 37 C.F.R. § 42.104(b)(4)).

Apple fails to satisfy these requirements because the Petition never mentions, much less explains, how the prior art allegedly meets Apple’s constructions of “cavity” and “a top...” in the Delaware Litigation. Pet. §III. Apple thus failed to meet its burden to show the unpatentability of any claim. *See, e.g., Hologic, Inc. v. Enzo Life Sciences, Inc.*, IPR2018-00019, Paper 17, 6-9 (PTAB Apr. 18, 2018) (“*Hologic*”) (denying institution because while “Petitioner was free to advocate unpatentability under a claim construction it considered to be correct[,] [i]t did not do so.”); *Jiawei Tech. Ltd. v. Simon Nicholas Richmond*, IPR2014-00937, Paper 22, 7-8 (PTAB Dec. 16, 2014).

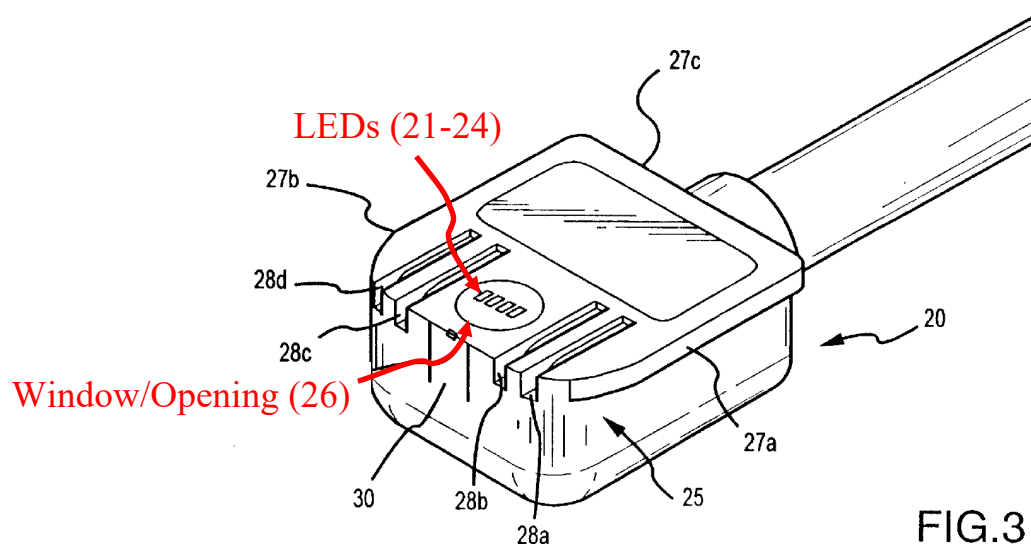
Second, Apple had “a duty of candor and good faith to the Office.” 37 C.F.R. § 42.11(a). Indeed, “petitioners have an **obligation** to inform the PTAB of all claim construction arguments in related district court litigation, regardless of their inconsistency with arguments advanced at the PTAB.” Kim Leung et al., *The Importance of Candor in PTAB Practice*, Fish & Richardson P.C. (Dec. 17, 2019), <https://www.fr.com/insights/thought-leadership/blogs/the-importance-of-candor-in-ptab-practice-2/>. Yet Apple’s Petition never informed the Board about its claim construction arguments in Delaware. Apple’s attempt to hide its inconsistent claim

construction positions from the Board provides, at minimum, an independent reason why the Petition fails to show unpatentability.

Third, in its Petition, Apple could not argue unpatentability under its Delaware constructions of “cavity” and “a top...” because the Petition references do not meet Apple’s Delaware constructions of those terms, as explained below.

A. Raley Does Not Disclose A “Cavity” Under Apple’s Delaware Construction

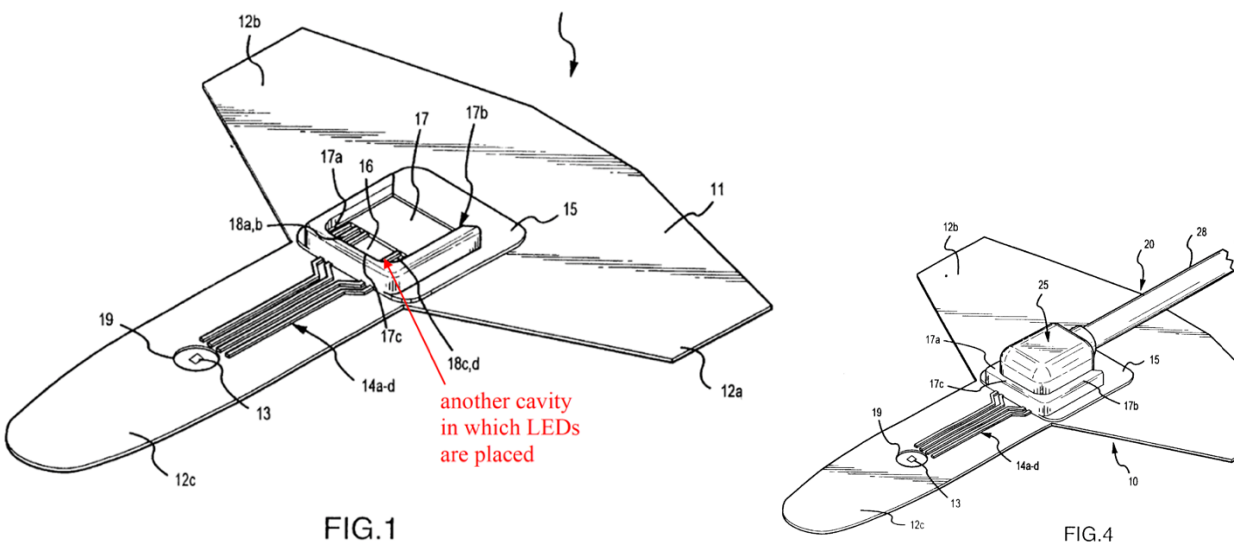
Apple argues in Delaware that “cavity” (Claims 1, 10) means “a ***hollowed-out*** space ***within a solid body***.” EX2031, 57. But Apple’s only “cavity” argument depends on Raley. Apple first argues that the interconnect cable segment (20) of Raley discloses “at least three LEDs recessed into a cavity”:



Pet. 29, 31 (Masimo’s annotations to EX1005, FIG. 3). But Raley shows above that the surface of the LEDs (21-24) is on the same level as the window/opening (26) and the surrounding flat surface of the interconnect cable segment (20). EX1005, FIG.

3; EX2079 ¶64. Therefore, Raley’s LEDs are not “recessed.” *Id.*; EX2079 ¶64. Further, Apple agrees the LEDs (21-24) are “flush with” the window/opening (26). Paper 6, 5. Because Raley’s LEDs are “flush with” the window/opening (26), they are not “in a hollowed-out-space.” EX1005, FIG. 3; EX2079 ¶64.

Apple also argues that the LEDs of cable segment (20) (shown above) are recessed into “another cavity” in Raley’s connector (17):



Pet. 29, 31 (excerpted); EX1005, FIG. 4. However, the LEDs would be recessed into this alleged cavity only when Raley’s connector (17) was connected to the cable segment (20). EX1005, FIGS. 1, 3, 5:15-62, 6:6-12; EX2079 ¶65. But even then, the LEDs would not be recessed into a cavity “within *a solid body*” because the alleged cavity is formed of two components—the connector (17) and the cable segment (20). EX1005, FIGS. 1, 3, 5:15-47, 5:57-62, 6:6-12; EX2079 ¶65. Each of those components is a separate solid body, not a single solid body. *Id.*

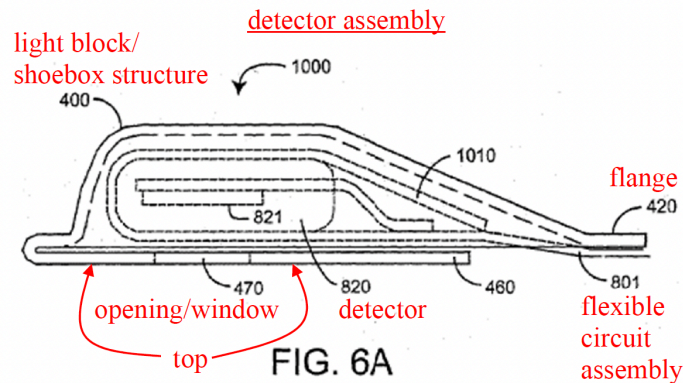
Apple further argues in Delaware that (a) “the plain and ordinary meaning of ‘recessed into’ requires setting the LEDs back into a pre-existing cavity,” and (b) “LEDs [that] are mounted on a flat substrate” do not satisfy the claim language. EX2081 ¶476. But here, Apple does not argue, much less show, that Raley meets either of these requirements. Indeed, Raley satisfies neither requirement because it does not disclose whether its LEDs are placed into a “pre-existing” cavity or mounted on a flat substrate. EX1005; EX2079 ¶66. Instead, as Apple’s expert admits, “the exact structure at that location is not explicitly described” and “Raley doesn’t provide a detailed engineering diagram or explicit specifications of the individual components.” EX2080, 100:21-101:18; EX2079 ¶66.

Therefore, the only reference Apple relies on for this element does not disclose a “cavity” under Apple’s Delaware construction. EX2079 ¶67.

**B. Abdul-Hafiz Does Not Disclose “A Top...”
Under Apple’s Delaware Construction**

Apple argues in Delaware that “a top of the [shoebox structure/light block]” (Claims 1, 10, 19) means “the uppermost structure that covers the [shoebox structure/light block].” EX2031, 68. Apple also argues there that the light block’s “base” cannot also be its “top.” *Id.*, 75 (“*the claims distinguish the ‘top’* portion of the [light block] structure *from its ‘base.’*”); EX2032 ¶528 (“the claim term ‘top’ refers to an uppermost structure and an uppermost position relative to the base of the light block.”).

Here, Apple relies only on Abdul-Hafiz for the “top.” Apple argues that Abdul-Hafiz’s bottommost “base 460” discloses the claimed “top”:



APPLE-1004, FIG. 6A

Pet. 43, 67-69, 73. But the alleged light block’s “base” is (1) not the uppermost structure and (2) cannot also be its “top” under Apple’s Delaware construction. Thus, the only reference Apple relies on for this element does not disclose a “top” under Apple’s Delaware construction. EX2079 ¶69.

Accordingly, Apple fails to show obviousness because its Petition references do not meet its Delaware constructions of “cavity” and “a top.” And Apple also fails to show the unpatentability of any claim because its Petition did not, and could not, present a challenge under at least the constructions of “cavity” and “a top” that Apple considers correct. *Hologic*, 8-9.

VII. GROUND 1A FAILS TO DEMONSTRATE OBVIOUSNESS

In Ground 1A, Apple argues that modifying Abdul-Hafiz based on Raley renders obvious Claims 1, 6, 8, 10, 15, 17, 19-21, 26, and 28. Pet. 1. But Apple fails to show that Abdul-Hafiz discloses or suggests a limitation of Claims 1 and 19: a light block with “only one opening.” EX2079 ¶¶74-79. Apple also fails to show that Abdul-Hafiz discloses or suggests a limitation of Claims 1 and 10: “the opening” (or “window”) having “an area smaller than a detection surface area of the at least one detector.” *Id.* ¶¶80-97.

Additionally, Apple argues that a POSITA would have modified Abdul-Hafiz based on Raley to measure three or four physiological parameters, or at least oxygen saturation, carboxyhemoglobin, and methemoglobin, using four different wavelengths of light. Pet. 15-20, 55-59. But the prior art did not enable a POSITA to measure such parameters using only four wavelengths of light. EX2079 ¶¶106-115. Apple also fails to show that a POSITA would have reasonably expected the proposed modification to succeed, or that a POSITA would have been motivated to modify Abdul-Hafiz as Apple proposes. EX2079 ¶¶116-134. Instead, Apple’s arguments are based in impermissible hindsight. For at least these reasons, Apple has not met its burden of demonstrating that any claim is unpatentable.

A. Apple Fails To Establish Any Reference Discloses The Claimed Light Block

The independent claims recite a “light block [at least partially] surrounding the at least one detector” with numerous additional requirements.

- Claims 1 and 19 require that the “light block” has “only one opening through which light is configured to pass” to the at least one detector
- Claims 1 and 10 require that the “opening” (Claim 1) or “window” (Claim 10) has “an area smaller than a detection surface area of the at least one detector”⁴

But Abdul-Hafiz discloses neither requirement of the claims, as explained below.

1. Apple Fails To Establish That Any Reference Discloses A Light Block With “Only One Opening” (Claims 1, 19)

Abdul-Hafiz’s discloses a shielded detector assembly (1000). EX1004, FIGS. 6-7, 9-11, ¶¶39-41, 45-48; EX2079 ¶74. In that shielded detector assembly (1000), the detector (820) is enclosed by both an optical housing (400) and an EMI shield (1005, 1010), as shown below.

⁴ Claim 20, which depends from Claim 19, likewise requires that the “opening” has “an area ... smaller than a detection surface area of the at least one detector.”

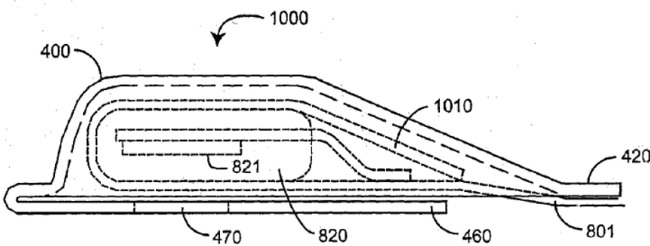


FIG. 6A

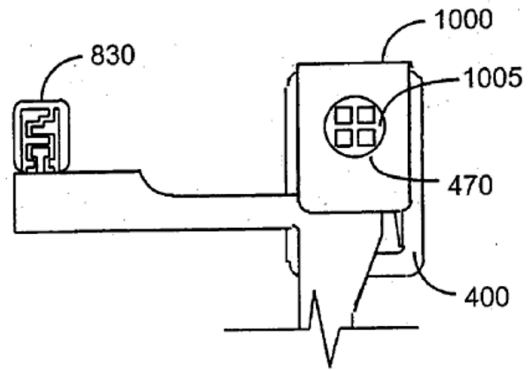


FIG. 11B

EX1004, FIGS. 6A, 11B, ¶¶39, 46-47; EX2080; 108:4-16; EX2079 ¶74. The optical housing (400) has an aperture (470), as shown above (left). EX1004, FIGS. 6A, 11B, ¶¶39; EX2079 ¶74. The aperture (470) reveals the fixed portion (1005) of the underlying EMI shield, which has the four square holes shown above (right). EX1004, FIGS. 6A, 11B, ¶¶39, 46-47; EX2080; 108:17-109:20; EX2079 ¶74.

Apple's grounds rely on the shielded detector assembly (1000) of Abdul-Hafiz. *See, e.g.*, Pet. 36-51, 61-65; EX2080, 106:22-108:3. And for the "light block" with "only one opening" (or window) limitations, Apple argues Abdul-Hafiz's optical housing (400) is the alleged "light block" and aperture (470) is the alleged "only one opening." Pet. 35-43, 72-73.

Apple ignores the presence of the EMI shield (1005, 1010) in its arguments. *See, e.g.*, Pet. 20-59. Similarly, the Board previously ignored the EMI shield because Apple asserts that Abdul-Hafiz's optical housing (400) alone is the alleged "light block." Paper 8, 39. But ignoring the EMI shield is error and contradicts "the longstanding principle that the prior art must be considered for all its teachings, *not*

selectively.” *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019); *see, e.g., St. Jude Med., LLC v. Snyders Heart Valve LLC*, 977 F.3d 1232, 1243 (Fed. Cir. 2020) (affirming PTAB’s nonobviousness finding where there was “no ‘adequate[]’ or ‘persua[sive]’ explanation by [petitioner] for why a relevant artisan would keep [some components] while replacing [the other component] to which it is attached.”).

The EMI shield of Abdul-Hafiz’s detector assembly cannot be ignored. Apple’s expert repeatedly admitted at his deposition that the EMI shield (1005, 1010) in the detector assembly (1000) would block at least some light from reaching the detector (820/821). EX2080, 109:13-20, 110:22-111:5, 111:18-112:2, 112:22-113:15, 115:8-17, 160:9-161:2. Indeed, a POSITA would have understood that the EMI shield (1005, 1010) in Abdul-Hafiz’s detector assembly (1000) blocked at least some stray light because such EMI shielding is normally made of optically opaque material like copper. EX2080, 105:8-106:21, 112:9-21; EX1004 ¶¶46-47, FIGS. 10-11; EX2079 ¶77.

Moreover, and importantly, Apple never proposes removing the EMI shield (1005, 1010) from the Abdul-Hafiz’s detector assembly (1000). And a POSITA would not have removed the EMI shield (1005, 1010) from Abdul-Hafiz because it protects the underlying detector (820/821) from both stray light (e.g., ambient light and light piping) and electromagnetic interference, thereby improving measurement

accuracy. EX1004, FIGS. 6, 10-11, ¶¶39, 46-47; EX2079 ¶¶78-79. Thus, because Abdul-Hafiz’s detector assembly (1000) includes the light-blocking EMI shield (1005) with **four openings** (shown below), a POSITA would have understood that it does not disclose a light block with “only one opening” as Claims 1 and 19 require.

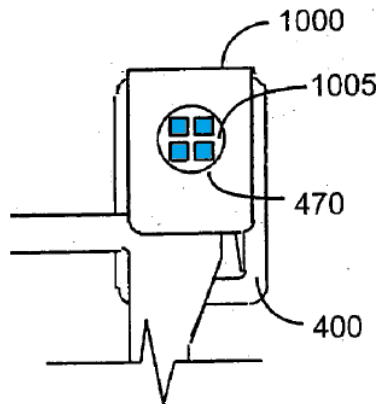


FIG. 11B

EX2079 ¶¶78-79.

2. The Board Correctly Found That Abdul-Hafiz Fails To Disclose An Opening/Window With An Area Smaller Than A Detection Surface Area Of The At Least One Detector (Claims 1, 10, 20)

In its Institution Decision, the Board found that Apple’s ground fails because it relies on a reference that fails to disclose a limitation of Claims 1 and 10, their dependent claims, and dependent Claim 20. Specifically, the Board reasoned:

Petitioner argues the entire surface of photodiode chip 821 facing aperture 470 is the recited detection surface area (Pet. 46–47 (citing Ex. 1003 ¶ 101)), and Patent Owner argues only the portion of this surface of photodiode chip 821 that fixed shield 1005 permits light to reach is the recited detection surface area (Prelim. Resp. 42 (citing Ex. 2002 ¶¶ 80–81)). Neither party, however, has provided an express construction for “detection surface area.” Even if we agree with Petitioner that the

entire surface of photodiode chip 821 facing aperture 470 discloses the recited detection surface area, *the shape and dimensions of photodiode chip 821 and detector 820 remain unclear from Abdul-Hafiz's disclosure.*

Paper 8, 44. Because Abdul-Hafiz does not disclose the shape and dimensions of its photodiode (821) and detector (820), the Board found that Abdul-Hafiz does not disclose an “opening” or “window” with an area smaller than a detection surface area of the at least one detector, which is a limitation of Claims 1, 10, and 20. Accordingly, the Board concluded that Apple failed to show obviousness for independent Claims 1 and 10, their challenged dependent claims (Claims 2-4, 6, 8 and Claims 11-13, 15, 17, respectively), and Claim 20. *Id.*, 44-47. And as explained below, the Board’s conclusion is correct.

3. Apple Fails To Establish Any Reference Discloses An Opening/Window With An Area “Smaller Than A Detection Surface Area Of The At Least One Detector” (Claims 1, 10, 20)

Apple relies on the aperture (470) in Abdul-Hafiz’s optical housing (400) as the alleged “opening”/“window” in its grounds. Pet. 35-43, 67-69.

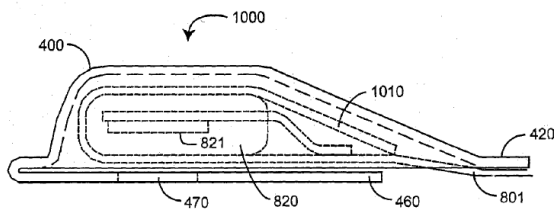


FIG. 6A

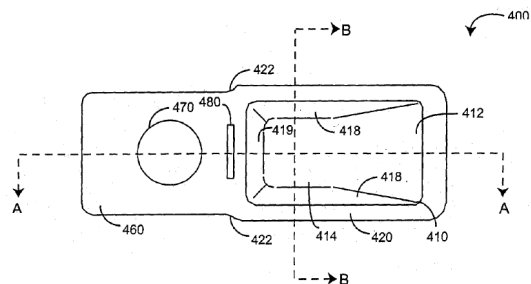
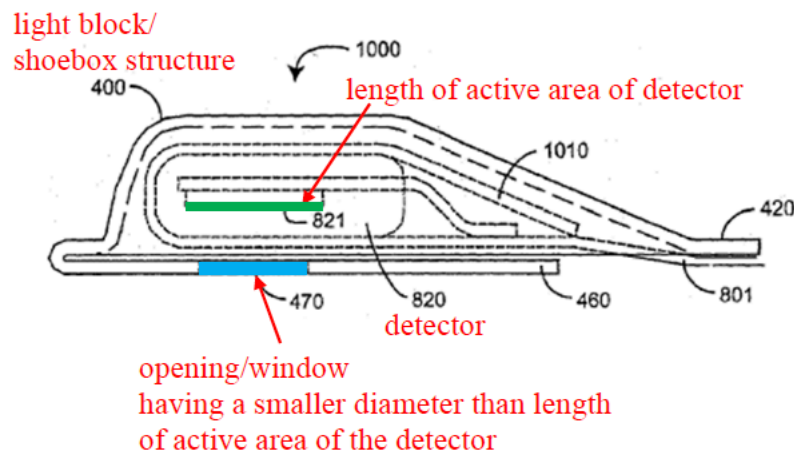


FIG. 4A

EX1004, FIGS. 6A, 4A. But for several reasons, Abdul-Hafiz does not disclose an “opening”/“window” with “an area smaller than a detection surface area of the at least one detector.”

a) **Abdul-Hafiz’s Figures Do Not Disclose The Precise Dimensions Or Sizes Apple Relies On**

Apple argues that “Abdul-Hafiz shows figures where the aperture has a smaller diameter than the length of the active area of the detector, and thus a POSITA would have understood or found it obvious that Abdul-Hafiz’s aperture [470] (opening/window) has an area smaller than the active area of the photodiode chip 821 (detection surface area).” Pet. 50.



APPLE-1004, FIG. 6A

Id., 47 (Apple’s annotations). Apple thus relies on precise dimensions and sizes inferred from Abdul-Hafiz’s figures (primarily FIGS. 6A, 10) to argue that it discloses this element. *Id.*, 46-51, 69. Apple is wrong.

Abdul-Hafiz fails to disclose the dimensions or sizes that Apple relies on. Indeed, “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.” *Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000); *White v. H.J. Heinz Co.*, 640 F. App’x 930, 934 (Fed. Cir. 2016) (same). Abdul-Hafiz’s figures do not disclose an opening or window with an area smaller than a detection surface area of the detector because its specification is silent on the precise dimensions and sizes that Apple relies on, as explained below.

Abdul-Hafiz does not explicitly disclose that its figures are drawn to scale. *See generally* EX1004; EX2079 ¶84. Apple does not contend otherwise. Pet. 47-51; EX1003 ¶¶101-106. Thus, Apple’s reliance on Abdul-Hafiz’s not-to-scale figures should be rejected. *See, e.g., Nystrom v. TREX Co.*, 424 F.3d 1136, 1149 (Fed. Cir. 2005) (“[A]rguments based on drawings not explicitly made to scale in [prior art] patents *are unavailing*.”).

Indeed, when challenging other Masimo patents, Apple and its declarant, Dr. Kenny, have repeatedly explained the law that “*patent figures should not be interpreted as precise and drawn to scale* unless otherwise stated.” *See, e.g., Apple Inc. v. Masimo Corp.*, IPR2020-01714, Paper 20, 19 (Oct. 29, 2021); *Apple Inc. v. Masimo Corp.*, IPR2020-01714, EX1047 ¶46 (Oct. 29, 2021) (same); *Apple Inc. v.*

Masimo Corp., IPR2020-01538, Paper 27, 18 (Aug. 31, 2021) (same); *Apple Inc. v. Masimo Corp.*, IPR2020-01538, EX1047 ¶42 (Aug. 31, 2021) (same). Thus, Apple cannot credibly rely on Abdul-Hafiz’s figures here as precise or drawn to scale. *Id.*; EX2079 ¶84.

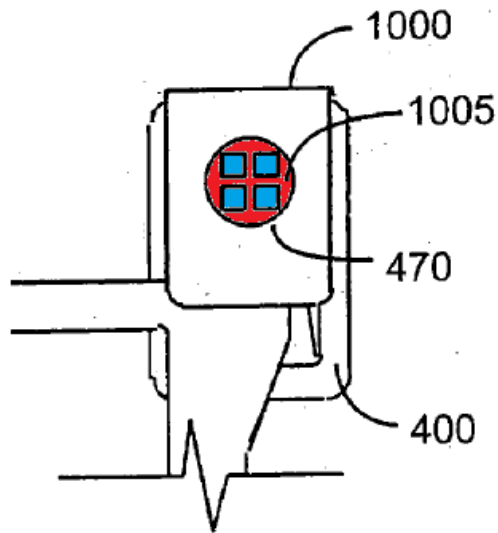
Additionally, Abdul-Hafiz’s specification never describes the dimensions of the features Apple relies on: the diameter of the aperture (470) and the length and width of the detector (820)/photodiode chip (821). EX1004 ¶¶5, 7, 33-34, 37, 39, 46; EX2079 ¶85. It also never describes the precise sizes of those components or how those component sizes compare to one another. EX1004 ¶¶5-7, 33-34, 37-39, 46; EX2079 ¶85. Therefore, Abdul-Hafiz’s figures “*do not define the precise proportions of the elements and may not be relied on to show particular sizes*” of its aperture (470) or detector (820)/photodiode chip (821) because its specification is silent on this issue. *Hockerson-Halberstadt*, 222 F.3d at 956. Accordingly, Apple fails to show that the alleged “opening”/“window” has “an area smaller than a detection surface area of the at least one detector.” EX2079 ¶¶82-85. The Board thus correctly found that Apple’s obviousness grounds fail for these claims because Apple fails to show that Abdul-Hafiz clearly discloses “the shape and dimensions of photodiode chip 821 and detector 820” relative to the aperture (470). Paper 8, 44.

Further, Apple argues that FIG. 3 of Abdul-Hafiz “more clearly shows that the aperture 322 has a smaller length than the length of the detector 310.” Pet. 47-

48. But FIG. 3 concerns a different embodiment—it does not include the aperture (470) and/or photodiode (820/821) of Apple’s “Abdul-Hafiz+Raley” combination. EX1003, FIG. 3. Regardless, Apple does not propose combining these different embodiments or articulate any motivation for doing so. Pet. 47-48; EX2079 ¶¶86.

b) Apple Improperly Ignores Abdul-Hafiz’s Disclosure

Only one figure of Abdul-Hafiz—FIG. 11B—shows both the area of the alleged “opening”/“window” (470) *and* the “detection surface area of the at least one detector” (821). EX1004, FIG. 11B, ¶¶46-47; EX2079 ¶¶87. But FIG. 11B shows that Abdul-Hafiz’s aperture (470) includes a fixed EMI shield (1005, red) that blocks light from reaching all but four areas of the underlying photodiode (821, blue). *Supra* §VII.A.1. The EMI shield (1010), which includes fixed shield 1005, is directly folded over the detector (820) such that it becomes a “shielded detector assembly” (1000). EX1004 ¶¶46-47; EX2079 ¶¶87.

**FIG. 11B**

EX1004, FIG. 11B. A POSITA would have understood that the four blue areas shown above 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). EX2079 ¶¶87-88. And as shown below, the area of the “opening”/“window” alleged by Apple (green) (Pet. 48-50) is ***larger*** than the detection surface area (blue) disclosed by Abdul-Hafiz. EX2079 ¶89.

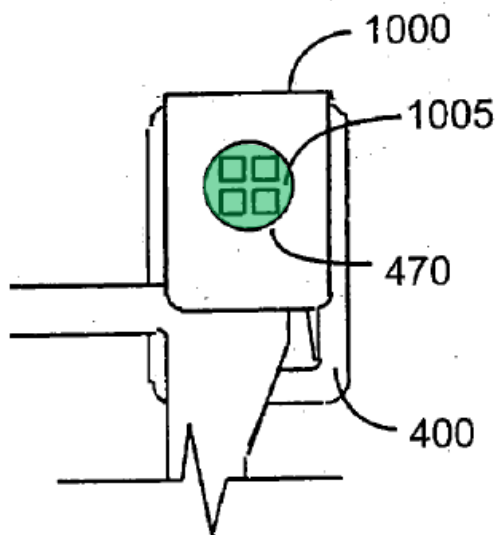


FIG. 11B

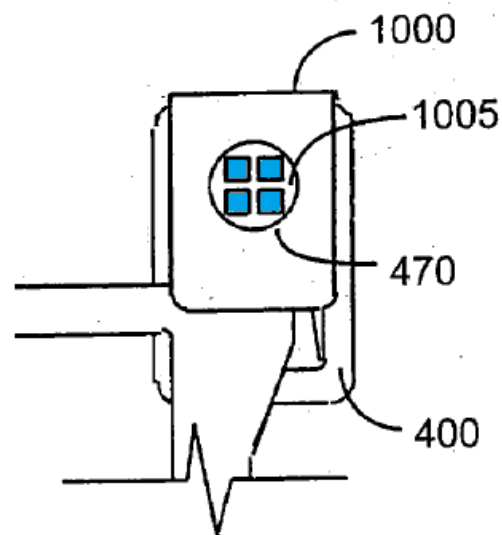


FIG. 11B

EX1004, FIG. 11B; EX2079 ¶¶89. The green area includes all the detection area shaded in blue and more. A POSITA also would have understood the detection surface area (blue) to be approximately the same size as the four holes in fixed shield (1005) because the fixed shield (1005) is directly applied to the detector (820). EX1004 ¶¶46-47, FIGS. 6A, 10-11; EX2079 ¶¶89.

Accordingly, Abdul-Hafiz does not disclose that the “opening”/“window” alleged by Apple has “an area smaller than a detection surface area of the at least one detector.” EX2079 ¶¶87-91.

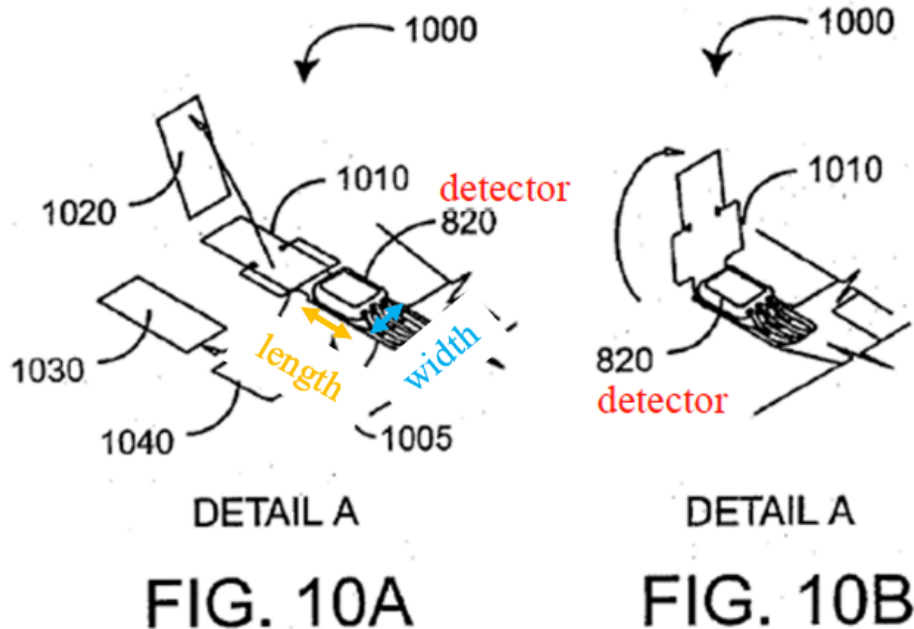
c) **Apple Improperly Assumes A Detection Surface Area From Abdul-Hafiz's Figures**

Apple argues that (1) “Abdul-Hafiz shows figures [FIGS. 3, 6] where the aperture has a smaller diameter than the length of the [detection surface area] of the detector, and thus” (2) “a POSITA would have understood or found it obvious that Abdul-Hafiz’s aperture (opening/window) has an area smaller than the active area of the photodiode chip 821 (detection surface area).” Pet. 46-50. Apple’s first argument fails because Abdul-Hafiz’s drawings do not disclose precise dimensions or sizes, as explained above. *Supra* §VII.A.3.a.

Apple’s second argument requires reading FIGS. 10A-10B of Abdul-Hafiz imprecisely (i.e., that the non-square detector (820/821) is a “square”) while Apple’s first argument requires reading FIG. 6A precisely (i.e., that the diameter of aperture (470) is smaller than the width of the alleged detection surface area (821)). Pet. 49-50. Therefore, Apple’s two arguments are materially inconsistent. EX2079 ¶93.

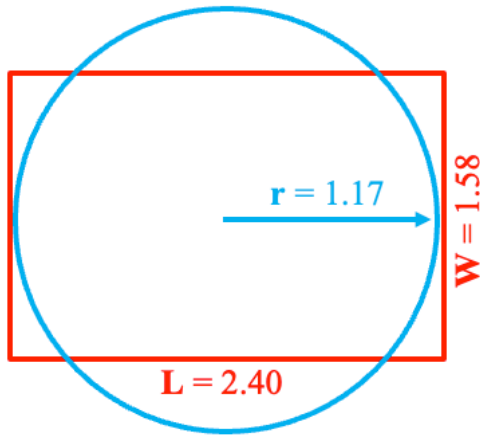
Apple’s second argument fails too. Apple relies on FIGS. 3 and 6 to argue that Abdul-Hafiz’s aperture diameter is smaller than the length of its detection surface area, but those figures show only one dimension of the detector (820/821)—its length. EX1004, FIGS. 3, 6; EX2079 ¶94. Because Abdul-Hafiz does not show the width of the detector (820), Apple misleadingly argues the detector is “*square* or rectangular” so that Apple can assume that its length and width are the same. Pet. 48-50. But Apple is wrong. Even if Abdul-Hafiz’s drawings disclosed precise

dimensions or sizes (which is incorrect), FIGS. 10A-10B shows that the detector has a ***non-square rectangular shape***—not the “square” shape that Apple asserts.



EX1004, FIGS. 10A-10B; EX2079 ¶¶94. Apple thus provides no basis for its assumption that the detection surface area of the detector (821) is a square. Apple’s unexplained assertion that Abdul-Hafiz somehow discloses a square detector (820) reveals the impermissible hindsight in Apple’s arguments. EX2079 ¶¶94.

Further, if Abdul-Hafiz’s drawings disclosed precise dimensions or sizes (which is incorrect), FIGS. 10A-10B (above) show that the width of Abdul-Hafiz’s rectangular detector is smaller than the diameter of the aperture (470). EX1004, FIGS. 10A-10B; EX2079 ¶¶95. Thus, a POSITA would have understood that Abdul-Hafiz’s aperture area (blue) is not necessarily smaller—and may be larger—than its detection surface area (red), as shown below. EX2079 ¶¶95.

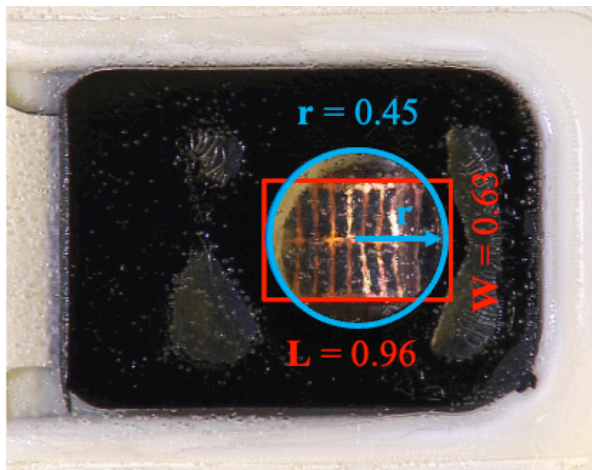


Area of Aperture
 $\pi \times r^2 = \pi \times 1.17^2 = 4.30 \text{ units}^2$

is greater than

Detection Surface Area
 $L \times W = 2.40 \times 1.58 = 3.79 \text{ units}^2$

Id. The above illustration of Abdul-Hafiz's aperture (blue) relative to its detection surface area (red) accurately represents the proportions/sizes from its figures. EX2079 ¶¶96. Apple's depiction—which inexplicably has a square detector—does not. Pet. 49-50; EX2079 ¶¶95-96. Thus, even if Abdul-Hafiz's drawings disclosed precise dimensions or sizes (which is incorrect), the alleged “opening”/“window” would have an area that is larger, not “smaller,” than the detection surface area. EX2079 ¶¶95-96. Indeed, the Abdul-Hafiz patent covers the Masimo LNOP sensor, which also has an aperture with an area *larger than* the detection surface area:



Area of Aperture
 $\pi \times r^2 = \pi \times 0.45^2 = 0.64 \text{ units}^2$

is greater than

Detection Surface Area
 $L \times W = 0.96 \times 0.63 = 0.60 \text{ units}^2$

EX2045; EX2079 ¶¶96.

Apple also assumes that Abdul-Hafiz’s aperture (470) has “a diameter that is equal to or smaller than each side length of [the] square or rectangle” detection surface area. Pet. 49-50. Again, Apple is wrong for at least the reasons explained above, because Abdul-Hafiz does not disclose a “square” detection surface area. Apple also relies on Abdul-Hafiz’s statement (regarding FIG. 6A) that “[a] detector 820 is enclosed in the optical housing 400, 500 so that the active area 821 is *aligned with* the housing aperture 470, 670.” EX1004 ¶¶37, 39. But “aligned with” does not teach the shape of Abdul-Hafiz’s detector/detection surface area or suggest that the aperture (470) is smaller than the detection surface area. *Id.*; EX2079 ¶97. Therefore, Apple fails to show that the area of the Abdul-Hafiz’s aperture (470) (the alleged “opening” or “window”) is smaller than the detector surface area of its detector (820/821). EX2079 ¶¶92-97; Paper 8, 43-44 (Board finding same).

B. Apple Fails To Establish That A POSITA Would Have Been Motivated To Modify Abdul-Hafiz To Have A Smaller Opening/Window Or Only One Opening, Or Reasonably Expected Such Modifications To Succeed

Apple fails to establish that a POSITA would have been motivated to modify Abdul-Hafiz to have a light block with “only one opening” (Claims 1, 19) or an “opening”/“window” with “an area smaller than a detection surface area of the at least one detector” (Claims 1, 10, 20), or reasonably expected such modifications to succeed. Grounds 1A-1B fail for these reasons.

**1. Modifying Abdul-Hafiz To Have Only One Opening
(Claims 1, 19)**

Abdul-Hafiz does not have a light block with “only one opening,” as required by Claims 1 and 19. *Supra* §VII.A.1. And Apple does not even argue, much less show, that a POSITA would have been motivated to modify Abdul-Hafiz to include “only one opening” or reasonably expected that modification to succeed. Pet. 44-51. Therefore, the Petition fails to establish that Claims 1 and 19 would have been obvious to a POSITA. EX2079 ¶¶99.

**2. Modifying Abdul-Hafiz To Have A Smaller Opening/Window
(Claims 1, 10, 20)**

Apple argues that a POSITA “would have understood or found it obvious that Abdul-Hafiz’s aperture” meets the claim language. *Id.*, 50. But Abdul-Hafiz does not disclose that aperture (470) has “an area smaller than a detection surface area of the at least one detector.” *Supra* §§VII.A.2-3. And Apple does not propose modifying Abdul-Hafiz or combining it with another reference to have a smaller aperture (470). Pet. 50-51. Thus, Apple fails to even argue, much less show, that a POSITA would have been motivated to modify Abdul-Hafiz to have a smaller “opening”/“window,” or reasonably expected any such modification to succeed. Therefore, the Petition fails to establish that Claims 1 and 10 would have been obvious to a POSITA. EX2079 ¶¶100-101.

Accordingly, for the reasons in this section, the Petition fails to establish obviousness for Claims 1, 10, and 19, and thus Grounds 1A-1B fail. *Id.* ¶102.

C. The Proposed Combination Of Abdul-Hafiz And Raley Does Not Render Obvious Any Challenged Claim (Claims 1, 10, 19)

Every independent claim requires “at least three LEDs configured to emit light of at least three different wavelengths” (Claims 1, 10) or that “at least three wavelengths of light are emitted from the at least three LEDs” (Claim 19).

Apple concedes that Abdul-Hafiz’s pulse oximeter has only two LEDs and emits light of only two wavelengths (“red and infrared”). Pet. 8, 19-20; EX1004 ¶2. Because Abdul-Hafiz lacks the claimed LEDs, Apple seeks to modify it based on Raley. Pet. 14-59. Specifically, Apple proposes modifying Abdul-Hafiz’s two-wavelength pulse oximeter based on Raley by adding two LEDs of different unspecified wavelengths (for a total of four LEDs of different wavelengths), “a data processing circuit,” and “data processing instructions.” *See, e.g., id.*, 15-20, 55-59. Apple argues that a POSITA would have modified Abdul-Hafiz in this way because “using at least four LEDs to measure at least four of oxygen saturation, oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin was common practice.” *Id.*, 55; *see id.*, 15-20, 55-59. Apple also argues that a POSITA would have modified Abdul-Hafiz as proposed because carboxyhemoglobin and methemoglobin measurements can be “useful” or can be used to “compensate for errors in the measurement of oxygen saturation.” *Id.*, 15-20, 55-59.

Apple’s arguments fail because (1) Raley (and the prior art) did not enable a POSITA to measure at least oxygen saturation, carboxyhemoglobin, and methemoglobin with four LEDs of four different wavelengths as Apple proposes, (2) a POSITA would not have reasonably expected the proposed modification of Abdul-Hafiz based on Raley to succeed, and (3) a POSITA would not have been motivated to modify Abdul-Hafiz based on Raley as proposed. EX2079 ¶105. Indeed, Apple fails to show any device that could measure carboxyhemoglobin or methemoglobin with LEDs of only four wavelengths or even identify which four wavelengths would be required. Even today, Masimo is the only company in the world that has released any commercial product that noninvasively measures carboxyhemoglobin or methemoglobin. And Masimo uses at least eight wavelengths for such measurements, not only four as Apple proposes. Thus, Grounds 1A-1B fail to show obviousness of any claim.

1. **Raley And The Prior Art Did Not Enable Measuring Oxygen Saturation, Carboxyhemoglobin, and Methemoglobin Using Only Four LEDs Of Four Different Wavelengths**

The prior art must enable a POSITA to make and use *the specific disclosures being relied upon* for obviousness. *See, e.g., Raytheon*, 993 F.3d at 1380-81 (the evidence “must enable the portions of [the reference’s] disclosure being relied upon” for obviousness); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 297 (Fed. Cir. 1985) (“The test of whether a particular compound described in

the prior art may have been relied upon to show that the claimed subject matter at issue would have been obvious is ***whether the prior art provided an enabling disclosure with respect to the disclosed prior art compound.***). Rebutting 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.” *In re Kumar*, 418 F.3d 1361, 1368 (Fed. Cir. 2005); *see Raytheon*, 993 F.3d at 1380-81.

Apple proposes modifying Abdul-Hafiz’s two-wavelength pulse oximeter based on Raley into a four-wavelength sensor that measures “three or more” or “at least four” parameters including oxygen saturation, carboxyhemoglobin, and methemoglobin. *See, e.g.*, Pet. 15-20, 55-59. Thus, measuring at least oxygen saturation, carboxyhemoglobin, and methemoglobin is central to Apple’s alleged motivations to modify Abdul-Hafiz. *Id.*

Apple’s obviousness theory relies on specific disclosures of Raley to argue that using four wavelengths of light to measure the identified parameters would have motivated its proposed modifications to Abdul-Hafiz. *Id.* The Board previously stated that Masimo “does not challenge the enablement of Raley’s teaching” (Paper 8, 30), but that is incorrect. Masimo challenges the enablement of Raley’s teaching because Raley (and Apple’s other prior art) did not enable a POSITA to measure the identified analytes using only four different wavelengths of light.

Before the '911 Patent, no one had developed a device that could do what Apple proposes. By seeking to measure the identified analytes using four wavelengths of light, Apple proposes making Abdul-Hafiz's pulse oximeter into a *different device*—a pulse **CO-oximeter**. EX1011, 45; EX2079 ¶109. But *Masimo was the first* to make such a device, the Rad-57™ pulse CO-oximeter, which was not released or even announced until after the '911 Patent. EX2046 (March 2005 press release announcing Rad-57™ is the “**First Device** to Noninvasively Measure Carbon Monoxide in the Blood...”); EX2047 (late-2006 study explaining “[t]he Masimo Rad-57 is *the first* commercially available pulse oximeter that can measure methemoglobin and carboxyhemoglobin.”); EX2057, 129; EX2079 ¶109. For years after the '911 Patent, the Rad-57™ remained the only device that could noninvasively measure the parameters central to Apple's obviousness theory (i.e., oxygen saturation, carboxyhemoglobin, and methemoglobin). *See, e.g.*, EX2047 (2006 study); EX2048 (2009 article stating that “[o]nly one prehospital device is presently capable of measuring both CO and MET: the RAD-57™...”); EX2049, 125 (2009 study); EX2079 ¶109. Further, POSITAs recognized that a critical feature of the Rad-57™ was that it “*uses eight wavelengths of light* instead of the usual two and is thereby able to measure more than two species of human hemoglobin.”⁵

⁵ Like Masimo's Rad-57™, even Apple recognizes that the '911 Patent describes using “*eight LEDs* ... for measuring HbCO (carboxyhemoglobin) and/or METHb

EX2047, 892; EX2046, 1; EX2079 ¶109. Thus, the real-world development of noninvasive monitoring confirms that at the time of the '911 Patent, a POSITA would not have been able to use four wavelengths of light to measure the parameters Apple identifies (at least oxygen saturation and carboxyhemoglobin and/or methemoglobin) without undue experimentation. EX2079 ¶109.

Apple ignores reality and instead focuses on theory mentioned in Raley and non-ground prior art. Apple speculates that using four total wavelengths would have made it a “standard algebra problem” to solve four equations for four “unknowns” (“four of oxygen saturation, oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin”). Pet. 57-58. But that “standard algebra problem” has never been solved, even today. Raley and the non-ground prior art (Jarman, etc.) that Apple relies on did not enable a POSITA to successfully measure these four analytes with four wavelengths of light. *Id.* ¶110.

First, Apple relies on Raley. Pet. 15-20, 25-27, 55-59. Raley generically mentions that its sensor could be used with a monitor that executed “data processing instructions stored in memory ... to determine an estimate of the blood analyte levels.” EX1005, 3:52-4:46; EX2079 ¶111. Raley theorizes that it is mathematically “possible to measure additional analytes ... with one additional wavelength for each

(methemoglobin) in addition to SpO₂ (oxygen saturation) and pulse rate.” Pet. 4-5 (quoting EX1001, 8:7-13, 2:28-30, 3:19-26).

component.” EX1005, 3:33-36; EX2079 ¶111. Raley also vaguely mentions that its FIG. 3 sensor with four emitters (21-24) theoretically “would be useful” for measuring “blood analytes such as such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin and methemoglobin.” EX1005, 5:63-6:2, 1:41-45, 3:33-36; EX2079 ¶111. While Raley speculates about what the future of noninvasive monitoring “will” hold, it never explains how to measure these four blood analytes using only four wavelengths of light. EX1005; EX2079 ¶111. That should not be surprising because no such device existed at the time of the ’911 Patent.

Second, Apple relies on Jarman (a non-ground reference). Pet. 18-20, 55-59. Jarman, like Raley, merely states that four LEDs of different wavelengths theoretically “could” be used to measure the concentration of four analytes—“O₂Hb [oxyhemoglobin], RHb [deoxyhemoglobin], COHb [carboxyhemoglobin], and MetHb [methemoglobin].” EX1007, 3:21-27, 5:21-6:16; EX2079 ¶112. And Jarman, like Raley, are Datex-Ohmeda references. *Compare* EX1005, 1 *with* EX1007, 1 *and* EX2050. But a POSITA would have recognized that Datex-Ohmeda never released a device—with any number of wavelengths—that could measure oxygen saturation and at least one of carboxyhemoglobin and methemoglobin. EX2079 ¶112. Even today, Datex-Ohmeda has no such device. Therefore, a POSITA would not have expected to be able to measure those analytes using the

aspirational-at-best discussion of a four-wavelength device in Datex-Ohmeda's patents (e.g., Raley, Jarman). *Id.*

Third, Apple relies on Jarman, Aoyagi, and Kuenster (all non-ground references) to argue that that measuring the identified blood analytes is as simple as using optical measurements at four wavelengths to solve for four unknowns (the analytes) with four equations. Pet. 55-59. In Apple's view, noninvasively measuring the parameters it relies is merely "the solution of a standard algebra problem" that requires only "well-established basic understanding." *Id.*, 58. But if that were true, someone would have developed such a device long before the time of the '911 Patent. EX2079 ¶113. And yet, no one was able to measure the identified parameters with only four wavelengths of light before or after the '911 Patent, because the measurements Apple relies on are very difficult to achieve. *Id.* The only explanation for Apple's blatant over-simplification of these measurements is hindsight.

Moreover, Apple's algebra argument is technically incorrect. A POSITA would have understood that measuring the "at least four" parameters Apple relies on with four wavelengths depends on more than four unknowns. EX1007, 5:38-40; EX2051, 8:53-60; EX2052, 3:37-55; EX2079 ¶114. Apple's algebra argument is an over-simplification, which can be shown by considering that while oxygen saturation is one parameter, measuring that parameter requires more than one

wavelength of light. And Raley does not address other potential problems such as path length, and Jarman merely assumes path length (ΔL) is constant and ignores it. *See generally* EX1005; EX1007, 5:38-40; *id.*, 5:21-6:28; EX2079 ¶114. But a POSITA would have understood that path length readily changes for many reasons (e.g., variations in tissue structure, motion, etc.) and is another unknown variable in the analyte measurements Apple relies on. EX2051, 8:53-60; EX2052, 3:37-55; EX1006, 2:64-3:4; EX2079 ¶114. Apple fails to show that the number of unknown analytes matches the number of wavelengths because that is an oversimplification. In reality, the analytes Apple relies on for motivating its proposed modifications of Abdul-Hafiz had never been noninvasively measured at the relevant time outside Masimo, and even Masimo needed eight wavelengths (not four) for those measurements. A POSITA would not have been able to use four wavelengths of light to measure the analytes Apple relies on, including carboxyhemoglobin and/or methemoglobin, without undue experimentation. EX2079 ¶114.

The remainder of Apple's prior art fares no better. Abdul-Hafiz does not mention the additional parameters Apple relies on. EX1004; EX2079 ¶115. Aoyagi and Kuenster both use at least five wavelengths to measure four parameters. EX1010, 7:33-8:22, 8:47-51; EX1012, 4:30-38, 5:27-29, 4:5-17; EX2079 ¶115. Barthelemy discloses three wavelengths, does not measure methemoglobin, and was never implemented in a "commercially acceptable [PPG] device." EX1008, Figure,

6:35-49; EX1007, 2:36-41; EX2079 ¶115. And Webster (EX1011, 54-55) merely mentions his student's project (Buinevicius), but that rudimentary pulse oximeter used "three wavelength[s]" and did not calculate methemoglobin. EX2056, 3 (describing only "theoretical approximations and calculations"), 15; EX2079 ¶115. Accordingly, the prior art did not enable a POSITA to use four wavelengths of light to measure the parameters identified by Apple. EX2079 ¶¶106-115. Apple's obviousness theory relies on specific disclosures of Raley and other references that were not enabled, and therefore, Grounds 1A-1B fail. *Id.* And because the prior art did not enable the disclosures Apple relies on (i.e., using four wavelengths to measure these analytes), Apple's insistence that a POSITA would have used four different wavelengths in Abdul-Hafiz to achieve these non-enabled measurements reveals the impermissible hindsight in Apple's analysis. EX2079 ¶115.

2. A POSITA Would Not Have Reasonably Expected the Proposed Modification Of Abdul-Hafiz To Succeed

For several reasons, a POSITA would not have reasonably expected Apple's proposed modification of Abdul-Hafiz based on Raley to succeed. *Id.* ¶116.

For at least the reasons that the prior art did not enable the disclosures that Apple relies on for its obviousness theory, a POSITA would not have reasonably expected to succeed at what Apple's proposed modification requires—using four wavelengths of light physiological parameters to measure the identified parameters such as carboxyhemoglobin with Abdul-Hafiz's pulse oximeter. *Supra* §VII.C.1;

EX2079 ¶117. For example, a POSITA would not have reasonably expected success in the proposed modification of Abdul-Hafiz and Raley because ***no one***, not even the company behind Raley and Jarman, was able to develop a device using four wavelengths of light to measure oxygen saturation, carboxyhemoglobin, and methemoglobin before the '911 Patent. *Supra* §VII.C.1; EX2079 ¶117.

Further, the Board previously found that Masimo's reasonable expectation of success arguments were "not commensurate with the scope of the claims" because the "claimed invention does not require measuring carboxyhemoglobin or methemoglobin or specific any particular accuracy." Paper 8, 31. But that finding was legally erroneous. Because Apple's obviousness combination is "based on information from a combination of sources, the question is whether a [POSITA] would have been motivated to select and combine this information, and ***with a reasonable expectation of achieving the desired result.***" *Ericsson Inc. v. Intell. Ventures I LLC*, 890 F.3d 1336, 1338 (Fed. Cir. 2018) (cleaned up). Here, the desired result of Apple's obviousness combination is "using at least four wavelengths ... provided by the four LEDs to measure at least" oxygen saturation, carboxyhemoglobin, and methemoglobin. Pet. 54-59. And a POSITA would not have reasonably expected to achieve the desired result of Apple's combination for the reasons explained above. Accordingly, Apple fails to show obviousness for any claim. EX2079 ¶¶118-119.

Moreover, Apple’s only arguments regarding the expectation of success in its proposed combination are generic and unexplained assertions, such as “a POSITA would have viewed the implementation of Abdul-Hafiz’s pulse oximetry system in a manner that applied Raley’s teachings 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.” Pet. 19. Apple and Kenny also summarily argue that the proposed combination is “merely improving/adding to Abdul-Hafiz’s system” and would be a “straightforward modification for a POSITA that was already relying on ... Abdul-Hafiz.” *Id.* But “mere conclusory statements” like Apple and Kenny provide “cannot satisfy the petitioner’s burden of demonstrating obviousness.” *Magnum*, 829 F.3d at 1380; *see, e.g., TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1358-63 (Fed. Cir. 2019) (“[C]onclusory expert testimony is inadequate to support an obviousness determination”).

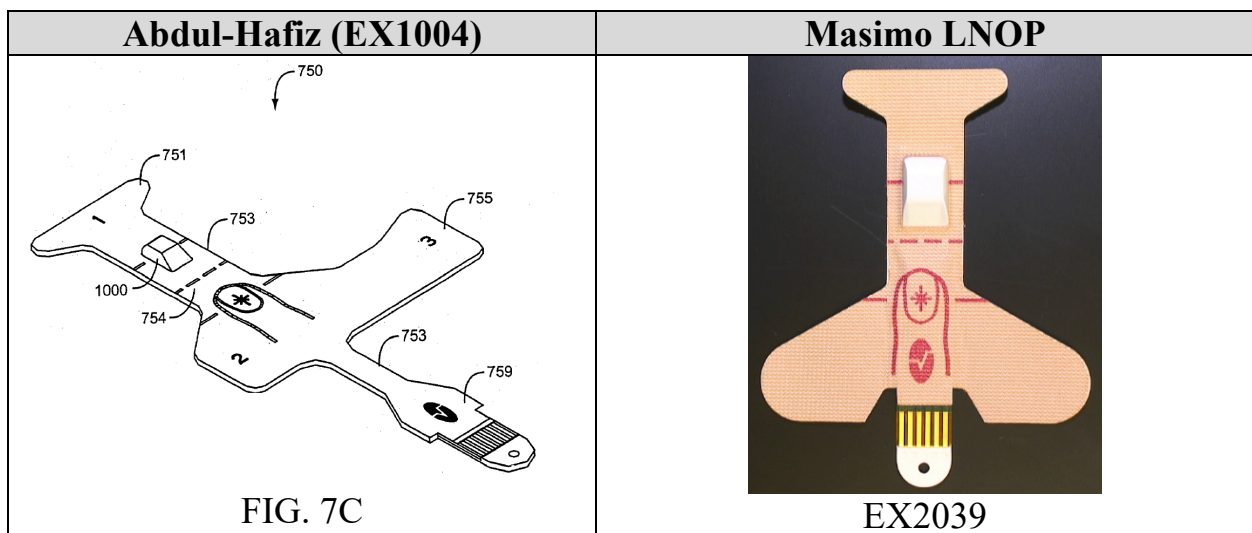
3. **A POSITA Would Not Have Been Motivated to Combine Abdul-Hafiz With Raley As Proposed**
 - a) **Measuring More Blood Analytes Would Not Have Motivated A POSITA To Modify Abdul-Hafiz As Proposed**

Measuring three or four blood analytes would not have motivated a POSITA to modify Abdul-Hafiz based on Raley as Apple proposes (i.e., to achieve a sensor that uses four different wavelengths of light) for at least the reasons that a POSITA

would not have been able to measure, or reasonably expected to succeed in measuring, three or four blood analytes using only four wavelengths of light.

Supra §§VII.C.1-2; EX2079 ¶120.

Further, a POSITA would not have modified Abdul-Hafiz as Apple proposes because doing so would frustrate Abdul-Hafiz’s intended purpose. Abdul-Hafiz, like the Masimo LNOP sensor it covers, was intended to be a low-cost disposable sensor made of a fabric “tape stock,” as shown below. EX1004, FIGS. 7A-7C, ¶11, claim 20; EX2038.



Low-cost disposable sensors like Abdul-Hafiz and the Masimo LNOP were preferred by hospitals because the entire device could be thrown away after single patient use, thereby reducing the risk of cross-contamination between patients. EX2058; EX1005, 1:22-25; EX2079 ¶122. Another advantage was that disposable sensors like Abdul-Hafiz reduced the logistical complexity of patient care—the sensor could simply be thrown away rather than cleaned, tracked, stored, and reused.

EX1005, 1:17-31, 2:64-67; EX2079 ¶122. And the Abdul-Hafiz, like the Masimo LNOP sensor it covers, accurately measured oxygen saturation while keeping costs low enough to achieve the benefits of a disposable sensor. EX2079 ¶122; *infra* §VII.C.3.b.

A POSITA would have understood that the modifications Apple proposes would have resulted in a sensor that was more complex, included more parts, and thus was more expensive to make. A POSITA also would have understood that including the sensor's LEDs in a separate reusable component (e.g., Raley's connector-end (25)) as Apple proposes would have further increased cost because of the need to inspect and clean that component between patients. *Id.* ¶123. Apple's proposed combination thus would have frustrated Abdul-Hafiz's intended purpose by transforming its low-cost, fully disposable sensor into a more expensive, partly reusable sensor. EX2079 ¶123. Accordingly, a POSITA would not have been motivated to modify Abdul-Hafiz's sensor as Apple proposes. *Id.*; *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (affirming Board finding no motivation to combine where doing so would render primary reference "inoperable for its intended purpose"); *Pollard Banknote Ltd. v. Nanografix Corp.*, 2020 WL 96682, at *6-8 (PTAB Jan. 8, 2020) (finding failure to show motivation where combination would defeat intended purpose of combination reference).

Moreover, “the benefits, both lost and gained, should be weighed against one another.” *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000); *cf.* Paper 8, 32-33. The above-described costs and inconvenience imposed by Apple’s proposed modifications would have cautioned a POSITA against modifying Abdul-Hafiz as proposed. EX2079 ¶124. Additionally, the prior art did not enable a POSITA to measure at least oxygen saturation, carboxyhemoglobin, and methemoglobin with only four wavelengths of light. *Supra* §VII.C.1. A POSITA also would not have reasonably expected such measurements to succeed at the time of the ’911 Patent. *Supra* §VII.C.2. Thus, a POSITA would not have been motivated to modify Abdul-Hafiz as Apple proposes because he or she would have understood that the added cost and inconvenience of doing so were not outweighed by any countervailing benefit. EX2079 ¶124.

b) Measuring Carboxyhemoglobin and Methemoglobin Contradicts Abdul-Hafiz’s Purpose And Would Not Have Motivated The Proposed Modification

Apple argues that measuring carboxyhemoglobin and methemoglobin would have motivated its proposed modification of Abdul-Hafiz based on Raley because such measurements may be helpful. Pet. 18-20, 25-27, 58-59. Apple also asserts that “compensat[ing] for errors in the measurement of oxygen saturation due to the presence of carboxyhemoglobin and methemoglobin” would have motivated a POSITA to combine Abdul-Hafiz and Raley. *Id.*, 18, 59. But for multiple reasons,

measuring carboxyhemoglobin and methemoglobin also would not have motivated Apple's proposed modification of Abdul-Hafiz. EX2079 ¶125.

First, as explained above, the prior art did not enable a POSITA to measure, and a POSITA would not have reasonably expected success in measuring, analytes included carboxyhemoglobin and methemoglobin using only four wavelengths of light. *Supra* §§VII.C.1-2. Further, a POSITA would not have been motivated to modify Abdul-Hafiz as Apple proposes because doing so frustrated Abdul-Hafiz's intended purpose as a low-cost disposable sensor and such negative consequences were not outweighed by any countervailing benefit. *Supra* §VII.C.3.a. For at least those reasons, measuring carboxyhemoglobin and methemoglobin would not have motivated a POSITA to modify Abdul-Hafiz as Apple proposes. EX2079 ¶126.

Second, Apple fails to identify even one example where carboxyhemoglobin and methemoglobin were used to improve the accuracy of oxygen saturation measurements. Apple's expert testified that he could not find such a device in the prior art. EX2080, 88:9-89:9. Indeed, Masimo's Rad-57TM Pulse CO-oximeter was the first device that could non-invasively measure carboxyhemoglobin and methemoglobin, and the Rad-57TM was not released until after the '911 Patent. *Supra* §VII.C.1. And not even Masimo's Rad-57TM could measure all the blood analytes Apple proposes with only four wavelengths—eight wavelengths were required. *Id.* Therefore, using measurements of carboxyhemoglobin and

methemoglobin to somehow improve oxygen saturation measurement accuracy in a four-wavelength sensor would not have motivated the proposed modification. EX2079 ¶127.

Relatedly, a POSITA would not have been able at the time of the '911 Patent to measure carboxyhemoglobin and methemoglobin with only four wavelengths, and thus those measurements could not be used to improve oxygen saturation measurement accuracy in a four-wavelength device as Apple proposes. EX2079 ¶128; *supra* §VII.C.1. And the contrary opinion of Apple's expert was based on layers of speculation. EX2080, 87:11-88:8 ("I'm assuming...."; "[I]f I can...."). But Kenny's speculation is not evidence that a POSITA would have been motivated (or able) to use these complex measurements to somehow improve SpO₂ measurement accuracy. *See, e.g., Magnum*, 829 F.3d at 1380. Likewise, Kenny's statement that "I can use the signal for the carboxyhemoglobin" (whatever that is) to somehow improve SpO₂ measurement accuracy (EX2080, 87:11-88:8) is not evidence that a POSITA would have understood how to do the "compensation" that Apple proposes. *See, e.g., Magnum*, 829 F.3d at 1380.

Third, Apple assumes there was an accuracy problem with Abdul-Hafiz's oxygen saturation measurements. Pet. 18-20. But that is incorrect. Abdul-Hafiz covers the Masimo LNOP sensor, as explained above. *Supra* §III. And the accuracy of the Abdul-Hafiz design (i.e., Masimo's LNOP sensors) was known among

POSITAs and highly regarded in the industry. *See, e.g.*, EX2061, 3 (“Over 40 clinical studies have been published and presented in internationally respected forums documenting the significantly superior performance of Masimo SET Pulse Oximetry.”; showing Masimo SET outperformed competitors), 5 (“Masimo SET should clearly become the new standard for pulse oximetry.”); EX2038, 1-2 (“The signal integrity of Masimo LNOP sensors and the advanced signal processing of Masimo SET combine to provide accurate and reliable tracking of the patient’s true physiology, even during motion and low perfusion.”); EX2062, 1; EX2079 ¶129. Indeed, Apple’s expert conceded that Abdul-Hafiz says nothing about its pulse oximetry system suffering from inaccuracy. EX2080, 154:13-155:4. Given the widely acclaimed accuracy of Abdul-Hafiz’s sensor design, a POSITA would not have been motivated to modify Abdul-Hafiz based on Raley to somehow improve Abdul-Hafiz’s measurement accuracy. EX2079 ¶129.

Additionally, Apple’s insistence on solving an oxygen saturation accuracy problem in Abdul-Hafiz that did not exist with some type of unexplained “compensation” reveals its hindsight-based analysis. EX2079 ¶130. Apple’s generic “improve-the-accuracy” motivation is merely a theoretical benefit or possibility of achieving a beneficial result, which fails to show that a POSITA would have been motivated to make the specific combination that Apple relies upon. *Id.*; *see, e.g., ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312,

1328 (Fed. Cir. 2012) (rejecting generic “build something better” motivation in affirming nonobviousness finding).

Fourth, Apple’s proposed modification is based on Raley—a Datex-Ohmeda reference. Pet. 14-31; EX1005. But a POSITA would have recognized that Datex-Ohmeda’s pulse oximeters were calibrated to be “more insensitive to changes of carboxyhemoglobin and methemoglobin concentrations in blood” than other sensors at the time. EX2063, 9; EX2079 ¶131. Because devices like Raley were already “more insensitive” to carboxyhemoglobin and methemoglobin, a POSITA would not have been motivated to modify Abdul-Hafiz based on Raley to “compensate for errors in the measurement of oxygen saturation due to [these analytes].” Pet. 14-31.

Fifth, Apple speculates that “[a]n accurate measurement of carboxy[]hemoglobin [sic] ... *may* be needed when the patient is a smoker or if carbon monoxide poisoning is suspected” and “elevated methemoglobin levels in the blood *can* be caused by various medications, illegal drugs, and certain pathological conditions such as sickle cell anemia.” Pet. 18-20, 25-27; EX1003 ¶67. Similarly, Apple’s expert merely explained that carboxyhemoglobin and methemoglobin “*might*” have motivated the proposed modifications of Abdul-Hafiz. EX2080, 81:18-22 (“These [parameters] are examples of what one *might* be excited about.”); 83:16-84:15 (“And here’s some examples that *might* be the ones that a [POSITA] would pursue.”; “Raley describes some reasons why these parameters

might be important.”), 85:20-86:9; EX2079 ¶132. But Apple’s assertions that these other measurements *might* be useful do not show that a POSITA **would have been motivated** to modify Abdul-Hafiz to measure these parameters. EX2079 ¶132; *see, e.g., Adidas*, 963 F.3d at 1359 (obviousness inquiry asks what a POSITA would have been motivated to do, not what “could” be done).

Sixth, the Board’s institution decision stated there was generic need to compensate for oxygen saturation measurement errors due to the presence of carboxyhemoglobin and methemoglobin that allegedly would have motivated Apple’s proposed modification of Abdul-Hafiz based on Raley. Paper 8, 34. But that finding was incorrect. Even if such a need existed, it would not have motivated Apple’s proposed modification of Abdul-Hafiz because measuring carboxyhemoglobin and methemoglobin was not enabled by Raley (or any prior art) and not something a POSITA would have reasonably expected to succeed doing with only four wavelengths of light. EX2079 ¶133. Further, any such need would have been outweighed by the above-identified reasons that a POSITA would not have been motivated to modify Abdul-Hafiz to measure these other blood analytes relied on by Apple. EX2079 ¶133.

For at least the reasons in this Section, a POSITA would not have been motivated to modify Abdul-Hafiz as Apple proposes, and thus Grounds 1A-1B fail. EX2079 ¶¶125-134.

D. Apple’s Analysis Is Driven By Hindsight And Fails To Treat The Challenged Claims As An Integrated Whole (All Claims)

The Petition treats the challenged claims as mere lists of disparate parts, disregarding the part-to-part relationships that give the claims their meaning. For both grounds, Apple’s analysis begins by describing the challenged claim elements allegedly found in the asserted references. Pet. 8-14, 74-76. That is, Apple improperly “break[s] [each] invention into its component parts, then find[s] a prior art reference [allegedly] corresponding to each component.” *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332, 1337 (Fed. Cir. 2005). The Federal Circuit has cautioned against this hindsight-driven approach of “using the invention as a roadmap to find its prior art components.” *Id.*

Completely unhinged from any proper analysis, Apple then describes the “combination” structure it contrived using the challenged claims as its guide: “Abdul-Hafiz+Raley’s pulse oximetry system” (i.e., Ground 1A, Pet. 14-15) and “Abdul-Hafiz+Raley’s emitter assembly modified in view of Secker” (i.e., Ground 1B, Pet. 76-79). Apple starts with the claims and works backwards to cobble together each claim feature into combinations, *id.*, but “[t]his type of piecemeal analysis is precisely the kind of hindsight that the Board must not engage in.” *In re NTP*, 654 F.3d at 1299. Apple even argues that Abdul-Hafiz discloses the claimed shoebox structure and light block by comparing that reference against an the ’911 Patent. Pet. 43-44. Accordingly, Grounds 1A-1B fail because Apple’s analysis is

based on impermissible hindsight. *See, e.g., id.* (“Care must be taken to avoid hindsight reconstruction by using ‘the [challenged patent] as a guide’”) (internal citation omitted).

Apple tries to glue its analysis together by arguing, on a part-by-part basis, that a POSITA would have been motivated to combine Abdul-Hafiz embodiments with other references as needed to yield ***claim elements*** satisfied by its “Abdul-Hafiz+Raley combination” device (Pet. 15-20) and its “Abdul-Hafiz+Raley+Secker combination” device (*id.*, 79-86). Apple thus attempts to bypass the statutory requirement to consider the claimed invention “as a ***whole***”—a requirement that helps protect against exactly this hindsight by “***prevent[ing] evaluation of the invention part by part.***” *Princeton Biochemicals*, 411 F.3d at 1337. As a result, Apple’s obviousness arguments for Grounds 1A-1B fail because they are driven by hindsight. Apple merely argues reasons supporting the construction of the combination devices it fabricates using the challenged claims as its map (Pet. 15-20, 79-86)—i.e., improper reasons for combining its references “in the right way so as to achieve the [elements] of the [challenged claims].” *NTP*, 654 F.3d at 1299 (internal citation omitted).

Accordingly, no ground renders any claims unpatentable due to the impermissible hindsight underlying Apple’s arguments.

VIII. GROUND 1B FAILS TO DEMONSTRATE OBVIOUSNESS

In Ground 1B, Apple argues that modifying its Abdul-Hafiz+Raley combination sensor based on Secker renders obvious the additional limitations of dependent Claims 2-4, 11-13, and 23-25. Pet. 74-90. Apple does not argue that Secker itself satisfies any limitations of independent Claims 1, 10, and 19. *Id.* Thus, Ground 1B fails to demonstrate obviousness of the identified dependent claims for at least the same reasons discussed above for independent Claims 1, 10, and 19 and Ground 1A.

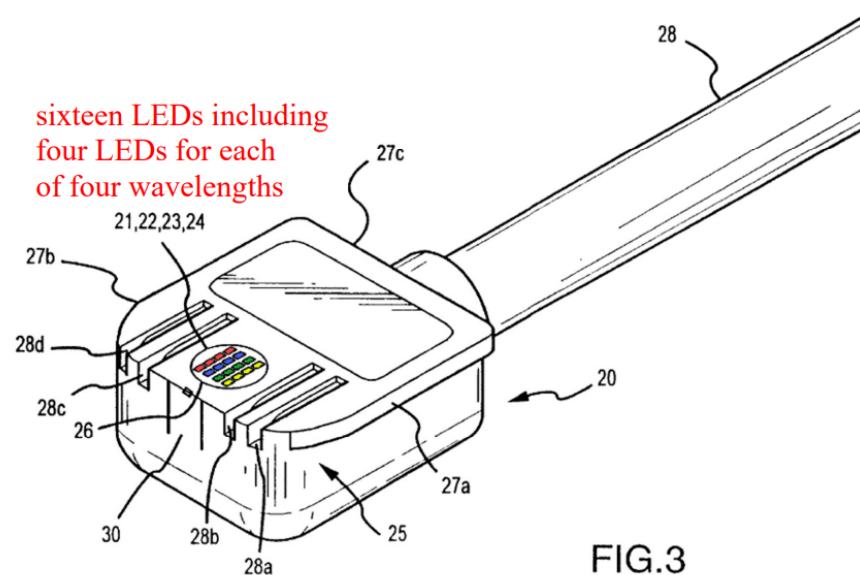
Ground 1B also fails to demonstrate obviousness for the additional reasons discussed below. None of Apple's references disclose the at least eight or twelve LEDs comprising three different wavelengths required by Claims 2-4, 11-13, and 23-25. And Apple fails to show that "accommodating different sized patients or different tissue site thicknesses" would have motivated a POSITA to modify the Abdul-Hafiz+Raley combination sensor into a 16-LED device as Apple proposes.

**A. No Reference Discloses At Least "Eight" Or "Twelve" LEDs
Comprising "At Least Three" Different Wavelengths
(Claims 2-4, 11-13, 23-25)**

Claims 1, 10, and 19 each require "at least three LEDs" configured to emit light of "at least three" different wavelengths. Claims 2-4, 11-13, and 23-25 require at least eight or twelve LEDs configured to emit light at three different wavelengths. Specifically, Claims 2, 11, and 23 further require that the at least three LEDs

comprise “at least eight LEDs.” Claims 3, 12, and 24 further require that “the at least eight LEDs comprise[] at least two LEDs of the same wavelength.” And Claims 4, 13, and 25 further require that the at least three LEDs comprise “at least twelve LEDs.”

Apple concedes that Abdul-Hafiz and Raley (and the Abdul-Hafiz+Raley combination that it relies on for independent Claims 1, 10, and 19) do not disclose the additional limitations of Claims 2-4, 11-13, and 23-25. Pet. 74-90. Instead, in an attempt to meet these limitations, Apple relies on Secker to propose including four of each of the LEDs in its Abdul-Hafiz+Raley combination. *Id.*, 82; EX2080, 148:8-13. Specifically, Apple proposes modifying its Abdul-Hafiz+Raley combination in view of Secker to “result in sixteen LEDs including four sets of four LEDs for each of four wavelengths arranged on the sensor that are selectable by the oximeter,” as shown below. *Id.*, 82.

Abdul-Hafiz+Raley's emitter assembly modified in view of Secker

Id., 82. But Apple fails to show obviousness because no combination reference discloses a physiological monitoring device comprising at least eight LEDs, much less at least twelve LEDs, with LEDs of “at least three” different wavelengths.

Apple argues that a POSITA would have modified the Abdul-Hafiz+Raley combination sensor in view of Secker to arrive at a device with four sets of four LEDs of different wavelengths. Pet. 76-90. But Apple never argues, much less shows, that Secker discloses at least eight or twelve LEDs comprising at least three different wavelengths. *Id.* Indeed, while Secker describes a sensor with potentially many LEDs, Secker’s disclosure is limited to only two different wavelengths—red and infrared. EX1006, 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; EX2079 ¶139. Apple’s own expert also explains that

Secker's disclosure is limited to "LEDs of one wavelength" and "LEDs of a second wavelength." EX1003 ¶168.

Apple's other references suffer the same shortcoming. Apple does not contend that Abdul-Hafiz or Raley discloses the LEDs required by Claims 2-4, 11-13, and 23-25. Pet. 76-90. Indeed, neither reference has at least eight or twelve LEDs comprising at least three different wavelengths. Abdul-Hafiz has only two LEDs comprising two different wavelengths. EX1004 ¶2; EX2079 ¶140. And Raley only has up to four LEDs comprising up to four different wavelengths. EX1005, FIG. 3, 5:63-66; EX2079 ¶140.

Accordingly, none of Apple's combination references teach at least eight or twelve LEDs comprising at least three different wavelengths. Because Apple fails "to prove that *all* claimed limitations are disclosed in the prior art," it fails to demonstrate obviousness of Claims 2-4, 11-13, and 23-25. *Par Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1194 (Fed. Cir. 2014); EX2079 ¶141. Further, the obviousness analysis "considers motivation to combine and reasonable expectation of success *only if* all the elements of an invention are found in the prior art." *Par*, 773 F.3d at 1194. Therefore, because Apple's combination references do not disclose the limitations of Claims 2-4, 11-13, and 23-25, the Board need not even reach Apple's arguments about motivation to combine or reasonable expectation of success for these claims. *Id.*

B. Apple Fails To Establish That A POSITA Would Have Been Motivated To Add More LEDs To The Abdul-Hafiz+Raley Combination (Claims 2-4, 11-13, 23-25)

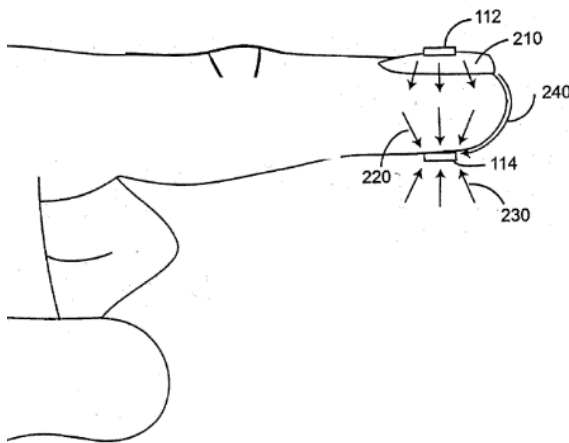
As shown above, Apple proposes modifying the Abdul-Hafiz+Raley combination sensor to include four times as many LEDs. Pet. 76-90. Based on Secker, Apple argues that “providing a sensor with multiple detector-LED spacings that automatically accommodates different sized patients or different tissue site thicknesses” would have motivated its proposed modification. Pet. 79-80; *id.*, 81-85. But for numerous reasons, a POSITA would not have been motivated to modify the Abdul-Hafiz+Raley sensor as Apple proposes. EX2079 ¶142.

1. Secker’s Describes An Approach Limited To Reflectance Sensors That Would Not Have Motivated A POSITA To Add More LEDs To The Transmittance Sensor Of Abdul-Hafiz+Raley

Secker describes a particular approach of using more LEDs to solve a problem that was limited to reflectance sensors. But Apple relies on Secker’s approach to propose adding LEDs to the Abdul-Hafiz+Raley sensor—a different type of sensor known as a transmittance sensor. Accordingly, Secker’s approach would not have motivated a POSITA to add more LEDs to the Abdul-Hafiz+Raley sensor. EX2079 ¶143.

Apple’s Abdul-Hafiz+Raley combination relies on a type of sensor known as a “transmittance” sensor. Pet. 22-31. Specifically, Apple’s combination is based on the adult finger-worn pulse oximetry sensor (750) in FIG. 7C of Abdul-Hafiz. *See*,

e.g., *id.*; EX2080, 142:4-10, 143:18-144:4. As shown below (left), transmittance sensors like Abdul-Hafiz have the light source and detector are on opposite sides of the tissue, such that some emitted light transmits through the tissue and is detected on the other side. EX1004, FIG. 2, ¶2; EX2079 ¶144. But in “reflectance” sensors like Secker (right), the light source and detector are on the same side of the tissue, such that some emitted light transmits into the tissue, reflects back to the sensor, and is detected on the same side. EX1006, 1:27-31, 2:41-47, FIGS. 1-10; EX2079 ¶144.



Transmittance Sensor
(EX1004, FIG. 2)

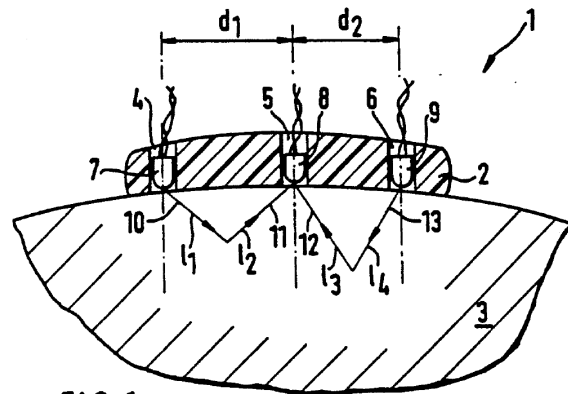


FIG.1

Reflectance Sensor
(EX1006, FIG. 1)

Secker states that “[t]he present invention relates to a sensor ... for performing non-invasive measurements of oxygen saturation *based on the reflection technique.*” EX1006, 1:6-9; 2:56-59. And Secker recognizes a unique problem faced by reflectance sensors. Specifically, Secker explains that in reflectance sensors, “the depth of penetration of human tissue is not identical for all wavelengths, i.e., the length of the light paths at various wavelengths is different.”

Id., 2:62-3:6; EX2079 ¶145. Secker explains that this problem of “differing depth of penetration at various wavelengths” is limited to reflectance sensors and “does *not* apply” to transmission sensors (which it calls “transmission” sensors). EX1006, 3:28-45; EX2079 ¶145. Secker also explains that different penetration depths for different wavelengths is a problem for reflectance sensors because it causes errors and “unsatisfying performance.” EX1006, 2:62-3:6, 3:32-34; EX2079 ¶145. Accordingly, Secker describes techniques to solve this reflectance problem by adding more LEDs that can be “selected such that the lengths of the light paths through the human tissue at both different wavelengths are substantially equal.” *See, e.g.*, EX1006, 3:7-32, Abstract; EX2079 ¶145.

Because different penetration depths for different wavelengths is only a problem for reflectance sensors, Secker repeatedly explains that its technique for achieving equal light paths for two different wavelengths is limited to reflectance sensors and not for transmission sensors. For example, it states that its “major objective” is “to provide a sensor and an apparatus for measuring ... based on the reflection technique....” EX1006, 2:56-61; EX2079 ¶146. Secker also states its disclosure is “more important for application in reflection oximetry, than it is for transmission oximetry” and “useful for reflection oximetry where the signal quality is worse than in transmission oximetry.” EX1006, 3:43-45, 8:56-60; EX2079 ¶146.

Secker mentions transmission sensors just five times. The first four times, Secker merely mentions transmissions sensors to distinguish them from reflectance sensors and the associated wavelength penetration depth issue Secker sought to solve. EX1006, 2:30-36; 3:28-45, 8:56-58. The fifth time, Secker simply states that its “method of performing an autocorrelation on the received signal, extracting the frequency thereof, selecting a standard function,” etc., is “even very useful for transmission oximetry.” EX1006, 8:60-9:2; EX2079 ¶147. But Apple does not even propose combining Secker’s “autocorrelation” method with the Abdul-Hafiz+Raley sensor.

In any event, Secker explains that its (a) its approach for adding/selecting LEDs and (b) autocorrelation method are separate solutions for separate problems. EX2079 ¶148. While Secker’s LED selection approach is for the problem with different wavelength penetration in reflectance sensors (EX1006, 14:52-15:63), Secker’s autocorrelation method is merely a signal processing technique applied to reduce the impact of “a noisy signal or a signal containing artefacts” on oxygen saturation measurements. EX1006, 7:64-8:55, 15:64-18:41, Abstract, FIGS. 11-13; EX2079 ¶148. That signal processing technique does not involve adding LEDs (or any hardware) to the sensor. *Id.* Thus, a POSITA would have understood that Secker’s autocorrelation method provides no reason to add LEDs to the Abdul-Hafiz+Raley sensor. EX1006, 8:60-9:2; EX2080, 151:2-14; EX2079 ¶148.

Moreover, Apple identifies nothing in Secker that supports adding more LEDs to a transmission sensor. Apple relies on various passages of Secker up through column 7, line 40. Pet. 76-90 (repeatedly relying on EX1006, 6:4-20, 6:38-7:40); EX1003 ¶¶155-158 (same). But Apple ignores Secker's confirmation in the next line that only "reflection sensors [are] described up to now." EX1006, 7:41-43; EX2079 ¶149. Apple also relies on 8:67-68 of Secker (Pet. 76-90), but that only concerns the irrelevant autocorrelation method discussed above. Apple further relies on 14:52-15:29 and 15:35-46 of Secker. *Id.* But those passages merely discuss the reflectance sensors of FIGS. 7-10 and the associated approach of using selectable LEDs to solve the reflectance sensing problem of different wavelengths penetrating different depths. EX1006, 14:52-15:46, FIGS. 7-10; EX2079 ¶149.

In sum, Secker never describes or even suggests taking its approach to resolving the reflectance sensor problem of differing penetration depths at different wavelengths and applying that approach to transmission sensors. EX1006, 6:4-20, 6:38-7:40, 8:67-68, 14:52-15:29, 15:35-46; EX2079 ¶150. Further, a POSITA would have understood that differing penetration depths at different wavelengths was not a problem in transmission sensors, where detected light passes all the way through the tissue. EX1006, 3:34-41; EX2079 ¶150. Accordingly, Secker would not have motivated a POSITA to add more LEDs to the transmittance sensor (Abdul-Hafiz+Raley) that Apple relies on. EX2079 ¶150.

2. **Abdul-Hafiz Does Not Motivate Or Even Suggest Apple’s Proposed Modification of the Abdul-Hafiz+Raley Sensor**

Apple argues that FIGS. 11A-E of Abdul-Hafiz motivates or suggests its proposed modification of the Abdul-Hafiz+Raley sensor. Pet. 78-80. Specifically, Apple argues that “[t]o further Abdul-Hafiz’s goal,” a POSITA would have looked to Secker to make “a sensor ... that automatically accommodates different sized patients or different tissue site thicknesses.” *Id.*, 79-80. But Apple blatantly misreads Abdul-Hafiz.

Abdul-Hafiz never describes or suggests a single sensor that accommodates different sized patients or tissue thicknesses, much less sets that functionality as its “goal.” EX2079 ¶152. Instead, Abdul-Hafiz describes that each of its sensors is for *one patient size/tissue thickness only*—adult, infant (3-10 kg), or neonate (< 3 kg). EX1004 ¶¶40 (“FIGS. 7A-B illustrate ... neonate sensor 700.”), 41 (“FIG. 7C illustrates ... adult sensor 750.”), 47 (referring to “an infant sensor (not illustrated)”); EX2079 ¶152. Indeed, the sensor 750 (FIG. 7C) that Apple relies on is specially designed only for an adult finger, whereas the sensor 700 (FIGS. 7A-B) has a very different design that is only for a neonate’s foot. EX1004 ¶¶2-3, 47, 49; EX2079 ¶152. Thus, a POSITA would have understood that Abdul-Hafiz does not even suggest one sensor that accommodates different patient sizes/tissue thicknesses. *Id.*

Abdul-Hafiz does not disclose or suggest otherwise in FIGS. 11A-E. Instead, those embodiments simply describe techniques that allow two sensors, each of which

is for ***one patient size/tissue thickness*** only, to “be manufactured from a single flex circuit part.” EX1004 ¶¶47, 49; EX2079 ¶153. FIGS. 11A-B describe a technique that allows one flex circuit to be made into (1) a sensor “appropriate for a neonate” and (2) a sensor “appropriate for an infant.” EX1004 ¶47; EX2079 ¶153. And FIGS. 11C-E describe a technique that allows one flex circuit to be made into (1) “a pediatric sensor” and (2) “an adult sensor.” EX1004 ¶49; EX2079 ¶153.

Accordingly, a POSITA would have understood that Abdul-Hafiz provides no motivation or suggestion to modify the Abdul-Hafiz+Raley sensor into one that accommodates different patient sizes/tissue thicknesses with only one sensor. EX2079 ¶154. Apple’s contrary argument is based on hindsight, not the disclosure of Abdul-Hafiz. *Id.*

3. Secker Does Not Even Describe Using More LEDs To Accommodate Different Patient Sizes Or Tissue Thicknesses

Apple argues that the motivation it relies on (i.e., adding “multiple detector-LED spacings that automatically accommodat[e] different sized patients or different tissue site thicknesses” is “described by Secker.” Pet. 80; *id.*, 76-90. Apple is wrong.

Secker discusses an approach of automatically selecting LEDs to obtain equal tissue penetration depth by different wavelengths in reflectance sensors, as explained above. But Secker never describes or suggests using that approach to accommodate different sized patients or tissue thicknesses. EX1006; EX2079 ¶156. Instead, Secker explains that its approach is “for very precise manual or automatic adaptation

to different kinds of measurement.” EX1006, 15:42-46; EX2079 ¶156. Specifically, Secker explains that its automatic LED selection approach is for sensors used on either (1) “*different places of application*” or (2) “*different tissue characteristics*.” EX1006, 14:41-42; *id.*, Abstract, 7:16-40, 14:52-15:46; EX2079 ¶156. Secker also clarifies that “tissue characteristics” means “extinction coefficients.” EX1006, 12:34-39; EX2079 ¶156.

A POSITA would have understood that both use cases of Secker’s approach are inapplicable to the Abdul-Hafiz+Raley sensor. The Abdul-Hafiz+Raley sensor is not used for different places of application—it is for one particular patient size/tissue thickness only (the adult finger), as explained above. The Abdul-Hafiz+Raley sensor is also not applied to different tissue characteristics (extinction coefficients) because it is only applied to the finger, where the extinction coefficients “are quite precisely known.” EX1006, 13:28-31; EX2079 ¶157. Because neither use case applies, a POSITA would not have been motivated to incorporate Secker’s LED selection approach into the Abdul-Hafiz+Raley sensor. EX2079 ¶157.

For at least the reasons in this Section, a POSITA would not have been motivated to modify the Abdul-Hafiz+Raley sensor in view of Secker and thus Ground 1B fails. EX2079 ¶¶158.

IX. CONCLUSION

For the reasons explained above, Petitioner has not shown by a preponderance of the evidence that the challenged claims are unpatentable. Masimo thus requests that the Board issue a final written decision that the challenged claims are not unpatentable.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: October 17, 2024

/Douglas B. Wentzel/

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), Counsel for Patent Owner Willow Laboratories, Inc. hereby certifies that this document complies with the type-volume limitation of 37 C.F.R. § 42.24(b). According to Microsoft Office Word 2010's word count, this document contains approximately 13,965 words, including any statement of material facts to be admitted or denied in support, and excluding the table of contents, table of authorities, mandatory notices under § 42.8, exhibit list, certificate of service or word count, or appendix of exhibits or claim listing.

KNOBBE, MARTENS, OLSON & BEAR, LLP

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CERTIFICATE OF SERVICE

I hereby certify that, pursuant to 37 C.F.R. § 42.6(e) and with the agreement of counsel for Petitioner, a true and correct copy of **PATENT OWNER RESPONSE AND EXHIBITS 2079-2081** is being served electronically on October 17, 2024, to the e-mail addresses shown below:

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