identified transparent windows within an opening in Cramer's preferred photodiode, the CLT 2160, but did not provide a clear and convincing reason to modify Lumidigm to include such material within the openings or to incorporate the CLT 2160 photodiode in Lumidigm. *See* RX-0670 at 5:33-35, Fig. 6; RX-1221; RIB at 112-113.[48,49]

f. Element [19E]: "one or more processors configured to receive one or more signals from at least one of the four photodiodes and output measurements responsive to the one or more signals, the measurements indicative of the oxygen saturation of the user"

As discussed above in the context of the preamble limitations, the evidence indicates that one of skill in the art would not have been enabled to use the Lumidigm wristwatch embodiment to measure oxygen saturation. In particular, Lumidigm only discloses that spectroscopic changes correlated with oxygenation "may be detected according to the methods described above." RX-0411 at 19:22-26. Complainants have presented credible evidence that one of ordinary skill in the art would not have been able to successfully implement this detection in a wristwatch at the time of the Poeze patents. *See* CIB at 126-29; CRB at 44-46. Accordingly, for the same reasons discussed above in the context of the preamble, Apple has not shown by clear and convincing evidence that the "one or more processors" limitation of '502 patent claim 19 is met by Lumidigm.

[48] As discussed above in the context of the "opaque lateral surfaces" limitation of '501 patent claim 1, the undersigned finds the CLT 2160 datasheet to be reliable evidence for the structure of the photodiode disclosed in Cramer. *See* Part IV.G.1.f *supra*.

[49] Apple identifies a similar "can package" photodiode with a window described in Webster. RX-0035.0094-95 ("In the can package . . ., the photodiode chip is mounted on a metallic stem and is sealed with a cap that has a window to allow incident light to reach the semiconductor surface.").

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g. Element [20]: "further comprising a thermistor"

Claim 20 of the '502 patent depends from claim 19, further requiring a thermistor. With respect to this limitation, Apple identifies Lumidigm's disclosure of "preprocessing steps" including "performing explicit corrections to account for sensor-to-sensor variations or environmental influences of temperature, humidity, and pressure." RX-0411 at 14:21-28. Lumidigm notes that "[t]hese and other techniques are well known in the art," *id.* at 14:29, and Dr. Warren testified that "a person of ordinary skill would realize that such a temperature measurement could easily be done with a thermistor." Tr. (Warren) at 1223:1-20. Apple identifies examples of suitable thermistors in Webster, which explicitly discloses a thermistor to compensate for LED temperature changes: "One way to compensate for LED temperature changes is to have a temperature sensor built into the probe along with the LEDs and photodiode." RX-0035.0085 (citation omitted). A thermistor is also identified as part of an oxygen sensor in a different chapter of Webster. *Id.* at 42. Apple submits that one of ordinary skill in the art would have been motivated to use one of the thermistors disclosed in Webster in Lumidigm's wristwatch embodiment with a reasonable expectation of success. RIB at 123-24; Tr. (Warren) at 1239:22-1240:3.

Complainants argue that Lumidigm fails to disclose or suggest a thermistor. *See* CIB at 140. With respect to Webster, Complainants submit that the two thermistors identified by Apple are in separate chapters describing different devices. *Id.* at 153-54; *see* Tr. (Madisetti) at 1336:5-18.

In consideration of the parties' arguments, the undersigned finds that Lumidigm includes an explicit suggestion to account for environmental influences including temperature in the operation of its biometric sensor, *see* RX-0411 at 14:21-28, and Apple has shown that one of

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ordinary skill in the art would have had reason to use a thermistor to achieve this goal. *See* Tr. (Warren) at 1223:1-20. Moreover, the undersigned finds that one of ordinary skill in the art would have had a reasonable expectation of success adding a thermistor to Lumidigm's wristwatch embodiment, because it involves "the mere application of a known technique to a piece of prior art ready for the improvement." *KSR*, 500 U.S. at 417. In the context of accounting for environmental influences, Lumidigm recognizes that "[t]hese and other techniques are well known in the art," *id.* at 14:29, and this is corroborated by Webster, which describes the use of a thermistor to "compensate for LED temperature changes." RX-0035.0085. In a separate chapter, Webster also discloses a thermistor that is used with an oxygen sensor. *Id.* at 42. The undersigned agrees with Complainants that Apple has failed to show that any of the thermistors disclosed in Webster could be directly implemented in Lumidigm's device, but "it is not necessary that [two pieces of prior art] be physically combinable to render obvious" the asserted patent. *Allied Erecting and Dismantling Co., Inc. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (quoting *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983)). The disclosures in Webster provide clear evidence that thermistors would have been known to persons of ordinary skill in the art to measure the temperature described in Lumidigm.

h. Element [21]: "wherein the one or more processors are further configured to receive a temperature signal from the thermistor and adjust operation of the user-worn device responsive to the temperature signal"

Claim 21 of the '502 patent depends from claim 20, further requiring that "the one or more processors are further configured to receive a temperature signal from the thermistor and adjust operation of the user device responsive to the temperature signal." The evidence shows that this limitation to be met for the same reasons discussed above in the context of '502 patent claim 20. In particular, Lumidigm explicitly discloses "preprocessing steps" including

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"performing explicit corrections to account for sensor-to-sensor variations or environmental influences of temperature, humidity, and pressure." RX-0411 at 14:21-28. One of ordinary skill in the art would have recognized that these preprocessing steps would have been performed by the processor disclosed in Lumidigm, as discussed above in the context of the "one or more processors" limitation, using a temperature signal from a thermistor, as discussed above in the context of '502 patent claim 20.

i. Element [22]: "wherein the plurality of emitters comprise at least four emitters, and wherein each of the plurality of emitters comprises a respective set of at least three LEDs"

Claim 22 of the '502 patent depends from claim 21, further requiring that "the plurality of emitters comprise at least four emitters, and wherein each of the plurality of emitters comprises a respective set of at least three LEDs." As discussed above in the context of the "plurality of emitters" limitation, Lumidigm discloses "a plurality of light sources" that "may comprise light emitting diodes ('LEDs')," including "sets of LEDs." RX-0411 at 6:22-53. Figure 7A of Lumidigm discloses an embodiment with four sets of eight LEDs. *Id.* at 9:26-34 (Fig. 7A). *See* Tr. (Warren) at 1220:13-1221:6; RDX-8.36. As discussed above, the Figure 7A embodiment also meets the "four photodiodes" requirement of element [19B]. *See* RDX-8.37 (identifying Figure 7A and 7B as meeting the four photodiodes limitation).

* * *

For the reasons discussed above, the evidence fails to clearly and convincingly disclose a combination of elements meeting the limitations of claim 22 of the '502 patent, and Apple has not shown a reasonable expectation of success in achieving a combination of these elements in Lumidigm's wristwatch embodiment.

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3. '502 Patent Claim 28

As discussed below, the evidence fails to clearly and convincingly show that claim 28 of the '502 patent is rendered obvious by Lumidigm alone or in combination with other prior art.

a. Element [28 preamble]: "A user-worn device configured to non-invasively measure an oxygen saturation of a user, the user worn device comprising:"

For the same reasons discussed above in the context of the preamble limitations of '502 patent claim 19 (Element 19 [Preamble]), the preamble limitations of '502 patent claim 28 are not met by Lumidigm because one of ordinary skill in the art would not have been enabled to measure oxygen saturation using the Lumidim watch embodiment.

b. Element [28A]: "a first set of light emitting diodes (LEDs), the first set of LEDs comprising at least an LED configured to emit light at a first wavelength and an LED configured to emit light at a second wavelength"

With respect to the first LEDs limitation of '502 patent claim 28, Apple identifies Lumidigm's disclosure that its light sources "can each have the same wavelength characteristics or can be comprised of sources with different center wavelengths in a spectral range from about 300 nm to about 10,000 nm." RX-0411 at 6:43-46; RIB at 88-90. Lumidigm provides that "the collection of light sources 34 can include some sources that have the same wavelengths as others and some sources that are different." *Id.* at 6:46-48. Lumidigm explicitly discusses the benefits of pairs of light sources, noting that two light sources having the same wavelength "can be combined to increase the resulting signal-to-noise ratio of the measurement," while two light sources with different wavelengths can "provide unique and useful information about the tissue optical properties." *Id.* at 7:34-53. There is no dispute that Lumidigm thus discloses LEDs emitting at different wavelengths, and Apple identifies the sensor geometries in Figs. 3, 5-6, and 7A-B of Lumidigm as meeting this limitation. RIB at 89-90. Lumidigm provides that "any of

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the sensor geometries previously disclosed or other equivalent configurations can be used" in the wristwatch embodiment. *Id.* at 11:65-12:2.

c. Element [28B]: "a second set of LEDs spaced apart from the first set of LEDs, the second set of LEDs comprising at least an LED configured to emit light at the first wavelength and an LED configured to emit light at the second wavelength"

With respect to the second LEDs limitation of '502 patent claim 28, Apple identifies Lumidigm's disclosure of "sets of LEDs . . . with differing wavelength characteristics that lie within the spectral range from about 350 nm to about 1100 nm." RX-0411 at 6:48-55. Lumidigm explicitly discusses the benefits of pairs of light sources, noting that two light sources having the same wavelength "can be combined to increase the resulting signal-to-noise ratio of the measurement," while two light sources with different wavelengths can "provide unique and useful information about the tissue optical properties." *Id.* at 7:34-53. Apple further cites U.S. Patent Application No. 10/262,403, which is incorporated by reference in Lumidigm, *see* RX-0411 at 1:40-44, and explicitly discloses multiple sets of LEDs with the same wavelengths emitted by LEDs in each set. *See* RX-0460 at ¶ 54, Fig. 6. There is no dispute that Lumidigm thus discloses a second set of LEDs emitting at the same wavelengths as the first set of LEDs, and Apple identifies the sensor geometries in Figs. 3, 5-6, and 7A-B of Lumidigm as meeting this limitation. Lumidigm states that in "any of the sensor geometries previously disclosed or other equivalent configurations can be used" in the wristwatch embodiment. *Id.* at 11:65-12:2.

d. Element [28C]: "four photodiodes arranged in a quadrant configuration on an interior surface of the user-worn device and configured to receive light after at least a portion of the light has been attenuated by tissue of the user"

As discussed above in the context of the "photodiodes" limitations of '501 patent claim 1 and '502 patent claim 19, the undersigned finds that Lumidigm discloses silicon detectors that

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are photodiodes. *See* RX-0411 at 6:56-63, 9:26-45. With respect to the claimed "quadrant configuration," Apple points to Lumidigm's Figure 7B, where detectors are arranged in a two-dimensional array. *See* Tr. (Warren) at 1225:13-1226:1; RDX-8C.44; RX-0411 at 9:34-45, Fig. 7B; RIB at 91.

e. Element [28D]: "a thermistor configured to provide a temperature signal"

As discussed above in the context of '502 patent claims 20 and 21, the undersigned finds that Lumidigm, in combination with Webster, provides a reason to modify Lumidigm to include a thermistor and shows a reasonable expectation of success. *See* RX-0411 at 14:21-28; RX-0035.0085.

f. Element [28E]: "a protrusion arranged above the interior surface, the protrusion comprising: a convex surface"

As discussed above in the context of the "protrusion" limitation of '501 patent claim 1, the undersigned finds that one of skill in the art would have reason to modify Lumidigm to achieve this limitation, and a reasonable expectation of success. *See* RX-0411 at 4:54-56, 8:1-10, Fig. 2; RX-0666 at 19:5-8, Fig. 28; RX-0670 at 5:45-51, Fig. 3, Fig. 6.

g. Element [28F]: "a plurality of openings in the convex surface, extending through the protrusion, and aligned with the four photodiodes, each opening defined by an opaque surface configured to reduce light piping"

As discussed above in the context of the "plurality of openings" limitation of claim 22 (Element [19C]), the evidence fails to clearly and convincingly show a plurality of openings aligned with the four photodiodes in the context of the "four photodiode" embodiments relied upon by Apple for Element [28C].

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h. Element [28G]: "a plurality of transmissive windows, each of the transmissive windows extending across a different one of the openings"

As discussed above in the context of the "optically transparent material" limitation of '502 patent claim 19 (Element [19D]), Lumidigm clearly discloses an "optical relay" that is transmissive and is positioned above an opening for a detector. *See* RX-0411 at 8:19-26; *see* Tr. (Warren) at 1221:16-1222:25. Lumidigm discloses a single window, but Dr. Warren suggests that "a person of skill would know that you could do an individual faceplate for each of the individual openings as a means to provide light but still optimize the process." Tr. (Warren) at 1221:1-1222:25. Dr. Warren identifies several prior art references with such windows extending across openings over photodiodes. *Id.* at 1193:23-1194:14; RDX-8C.11 (citing RX-0670; RX-0666; RX-0667).

i. Element [28H]: "at least one opaque wall extending between the interior surface and the protrusion, wherein at least the interior surface, the opaque wall and the protrusion form cavities, wherein the photodiodes are arranged on the interior surface within the cavities"

For the reasons discussed above in the context of the "opaque lateral surface" limitation of '501 patent claim 1 and the "opaque material" limitation of '502 patent claim 19 (Elements [1E] and [19C]), the undersigned finds Lumidigm, in combination with the other prior art, discloses the requirements of this limitation. *See* RX-0411 at 7:66-8:11, Fig. 2; RX-0670 at 2:46-51, 5:33-35, 5:46-48, Fig. 3, Fig. 6; RX-1221.

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j. Element [28I]: "one or more processors configured to receive one or more signals from at least one of the photodiodes and calculate an oxygen saturation measurement of the user, the one or more processors further configured to receive the temperature signal"

As discussed above in the context of the "one or more processors" limitation of '502 patent claim 19 (Element [19E]), Lumidigm does not disclose a processor configured to calculate an oxygen saturation measurement.[50,51]

k. Element [28J]: "a network interface configured to wirelessly communicate the oxygen saturation measurement to at least one of a mobile phone or an electronic network"

With respect to the "network interface" limitation, Apple identifies a "communications system 344" disclosed in Lumidigm and depicted on Figure 9, which "may comprise a wired, wireless, modem, and/or other type of interfacing connection and permits data to be exchanged with external devices." RX-0411 at 13:9-12, Fig. 9. In the context of a key fob embodiment, Lumidigm discloses "short-range wireless techniques based upon RF signals 103 . . . to communicate between the fob and a corresponding reader." *Id.* at 11:38-42. In this embodiment, the transmission can be "a simple confirmed or denied signal" or "the most recent measured spectrum is transmitted to the reader and the comparison and decision is accomplished at the reader or at a host to which the reader is connected." *Id.* at 11:49-55. Apple further

[50] As discussed above in the context of the "one or more processors" limitation of '501 patent claim 1 (Element [1F]), Lumidigm does disclose a "processor" that receives signals from a sensor and outputs measurements indicative of physiological parameters. *See* RX-0411 at 12:56-13:14.

[51] As discussed above in the context of the "thermistor" limitations of '502 patent claims 20 and 21 (Elements [20] and [21]), the evidence shows that one of ordinary skill in the art would have reason to incorporate a thermistor in the Lumidigm wristwatch embodiment. *See* RX-0411 at 14:21-28; RX-0035.0085.

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submits that "RF signals 103" are depicted in Figure 8B in the context of the wristwatch embodiment.

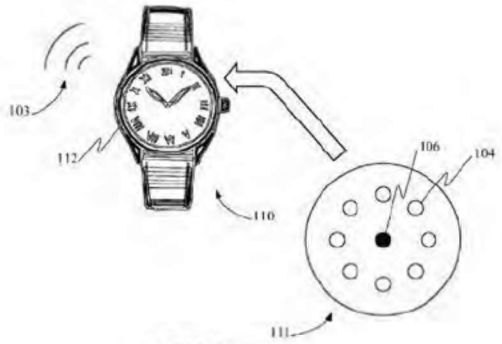


FIG. 8B

Id. at Fig. 8B; RIB at 94-95. Complainants dispute whether Lumidigm discloses this limitation in combination with the wristwatch embodiment and/or the extended functionality for measuring physiological parameters. CIB at 141-42; CRB at 51.

In consideration of the parties' arguments, the undersigned finds that Lumidigm clearly discloses a network interface for wireless communication with an electronic network in its wristwatch embodiment. *See* RX-0411 at 11:38-55, Fig. 8B. This does not include the communication of an oxygen saturation measurement, however, because no such measurement is disclosed in Lumidigm, for the reasons discussed above in the context of the preamble of '502 patent claim 19 (Element [19 preamble]).

l. Element [28K]: "a user interface comprising a touch-screen display, wherein the user interface is configured to display indicia responsive to the oxygen saturation measurement of the user"

With respect to the "user interface comprising a touch-screen display" limitation, Apple points to Lumidigm's disclosure of embodiments of "a personal electronic device that may be configured with biometric capability in the form of a PDA" and "a combined cellular telephone/PDA." RX-0411 at 12:21-48, Fig. 8D, Fig. 8E. Apple argues that such devices were

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known to have touchscreen displays. RIB at 95-96; *see* Tr. (Warren) at 1226:23-1227:3. Apple further cites an embodiment disclosed in Lumidigm wherein the portable electronic device can access the internet "to display the retrieved information on the portable electronic device." RX-0411 at 21:29-33. Apple further asserts the widespread availability of touch-screen user interfaces, and Dr. Warren testified that a person of ordinary skill would have been able to incorporate a touch-screen into any portable device. RIB at 129-33; *see* Tr. (Warren) at 1226:23-1227:5. Apple identifies a touch-screen disclosed in U.S. Patent No. 9,001,047 (RX-0673, "Apple '047), and Dr. Warren testified that it would have been obvious to incorporate such a touch-screen with the display of a blood oxygen measurement disclosed in Lumidigm. Tr. (Warren) at 1240:4-1242:9. Apple also identifies certain references to "touch buttons" in Webster. RIB at 133 (citing RX-0035 at 114, 137, 218-223).

Complainants argue that Lumidigm provides no clear disclosure of a touch-screen in combination with its wristwatch embodiment and/or the extended functionality for measuring physiological parameters. CIB at 141-42; CRB at 51. With respect to Apple '047, Complainants argue that there is no disclosure of a user-worn device or any display of a physiological parameter such as an oxygen saturation measurement. CIB at 156-57; *see* Tr. (Madisetti) at 1337:3-11. Complainants argue that Apple has failed to show any motivation to combine or likelihood of success in adding a touch-screen to the wristwatch embodiment in Lumidigm. CIB at 157; CRB at 84-85.

In consideration of the parties' arguments, the undersigned agrees with Complainants that Lumidigm fails to disclose a touch-screen user interface for display of an oxygen saturation measurement in conjunction with the wristwatch embodiment, and Apple has not clearly and convincingly shown that this addition would be obvious. Dr. Warren's testimony on this issue is

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conclusory. *See* Tr. (Warren) at 1226:22-1227:7, 1240:4-17, 1241:1-17; RDX-8.83-84. Apple relies on Lumidigm's identification of certain portable electronic devices with screens, but with no reference to touch-screen input. *See* RIB at 131 (citing RX-0411 Figs. 8B-8E, 3:35-37, 21:29-36). Moreover, the cellular phone and PDA embodiments are identified as separate from the wristwatch embodiment, with no suggestion that parts of these different portable electronic devices should be combined. *See id.* at 10:42-13:26. Lumidigm's wristwatch embodiment is depicted as an analog clock face with no screen for displaying any measurement. *See id.* at 11:60-12:2, Fig. 8B.[52]

The undersigned further finds that Apple has not clearly and convincingly identified a reason one of ordinary skill would have combined Lumidigm's wristwatch with the touch-screen interface disclosed in Apple '047 and shown that such a combination would have had a reasonable expectation of success. Dr. Warren's testimony on these issues is conclusory and fails to offer any reason for adding a touch-screen to Lumidigm's wristwatch—he merely offers his opinion that a touch-screen "is a well-known mechanism" and that "a person of ordinary skill would realize that, to add the features of . . . [a] touchscreen to Lumidigm, they could look to a number of references, but . . . Apple would be an obvious choice." Tr. (Warren) at 1240:4-1242:9. With respect to this limitation, Dr. Warren appears to have relied on the "touch-screen display" in the claim language as his only reason for incorporating this feature, and the Federal Circuit has held that such an approach is inadequate to prove obviousness. *See InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014) (reversing jury's finding of

[52] As discussed above regarding Element [28J], Lumidigm discloses a network interface for wirelessly communicating the measurement of a physiological parameter from the wristwatch to an external device (where it can be read). *See* Element [28J] *supra*; RX-0411 at 11:38-55; RIB at 94-95.

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obviousness where expert used the asserted patent as a "roadmap" and her "testimony primarily consisted of conclusory references to her belief that one of ordinary skill in the art could combine these references, not that they would have been motivated to do so.").

Apple '047 also fails to disclose any use of a touch-screen in a wristwatch—it is primarily directed to "a rectangular touch screen display with a portrait view and a landscape view." *See* RX-0673 at 2:53-3:57 (describing embodiments of rectangular touch screen displays), Fig. 2; *see* Tr. (Warren) at 1240:18-25 (describing Apple '047). Apple's prior art touch-screen does not appear to be compatible with the wristwatch disclosed in Lumidigm, which has an analog clock face with a circular shape, and Dr. Warren did not provide testimony addressing this issue. *See* RX-0411 at Fig. 8B. Moreover, to the extent that Apple relies on Webster, Apple has not shown that any of the displays or user interfaces identified in Webster are touch-screens. *See* RX-0035 at 114, 137, 218-223.[53]

m. Element [28L]: "a storage device configured to at least temporarily store at least the measurement"

With respect to the "storage device" limitation, Apple identifies Lumidigm's disclosure of computer hardware elements in Figure 9, including storage device 338, memory 348, and computer-readable storage medium 340b. RX-0411 at 12:63-13:9. Lumidigm provides that "[t]he storage devices typically hold information defining the stored spectra as well as any personalized-setting information that may be used." *Id.* at 13:12-14. Complainants dispute this limitation, arguing that there is no clear disclosure of the storage devices in Figure 9 in

[53] Complainants argue that Apple failed to cite Webster with respect to this limitation in its pre-hearing brief. *See* CRB at 84. The undersigned agrees with Complainants that this contention is untimely, but even if these disclosures in Webster were considered, it would not change the determination regarding obviousness.

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combination with the wristwatch embodiment and/or the extended functionality for measuring physiological parameters. CIB at 141-42; CRB at 51.

In consideration of the parties' arguments, the undersigned finds that Lumidigm discloses a storage device configured to store measurements from its biometric sensor. As discussed above in the context of the "one or more processors" limitation of '501 patent claim 1, Lumidigm explicitly notes that some of the components in Figure 9 could be used in portable devices, which includes the "wristwatch" embodiment. RX-0411 at 13:21-37 (identifying a "second set of embodiments" involving "a portable electronic device having extended functionality," and including "a cellular telephone, a personal digital assistant, an electronic fob, and a watch" as examples of the "electronic arrangement"), 2:58-61, 17:67-18:2. Lumidigm explicitly provides that "[t]he storage devices typically hold information defining the stored spectra," and the blood oxygen measurement described in Lumidigm is defined by "spectroscopic changes" that are "correlated with oxygenation." *Id.* at 13:12-14, 19:24-26. Accordingly, the "storage device" limitation of '502 patent claim 28 is disclosed in Lumidigm, except to the extent that this limitation requires storage of an oxygen saturation measurement.

n. Element [28M]: "a strap configured to position the user-worn device on the user"

With respect to the "strap" limitation, Apple identifies the strap depicted in Lumidigm's "wristwatch" embodiment. *See* RX-0411 at 11:60-64, Fig. 8B. There is no dispute that Lumidigm meets the "strap" limitation of '502 patent claim 28.

* * *

For the reasons discussed above, the evidence fails to clearly and convincingly disclose a combination of elements meeting the limitations of claim 28 of the '502 patent, and Apple has

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not shown a reasonable expectation of success in achieving a combination of these elements in Lumidigm's wristwatch embodiment.

4. '648 Patent Claim 12

As discussed below, the evidence fails to clearly and convincingly show that claim 12 is obvious in view of Lumidigm alone or in combination with other asserted prior art.

a. Element [8 preamble]: "A user-worn device configured to non-invasively determine measurements of a physiological parameter of a user, the user-worn device comprising:"

For the same reasons discussed above in the context of the preamble limitations of '501 patent claim 1 (Element 1[A]), Lumidigm meets the preamble limitations of '648 patent claim 8 requiring a "user-worn device configured to non-invasively determine measurements of a physiological parameter of a user."

b. Element [8A]: "a first set of light emitting diodes (LEDs), the first set comprising at least an LED configured to emit light at a first wavelength and at least an LED configured to emit light at a second wavelength"

For the same reasons discussed above in the context of Element [28A] of the'502 patent, the evidence shows that this limitation is met by Lumidigm.

c. Element [8B]: "a second set of LEDs spaced apart from the first set of LEDs, the second set of LEDs comprising an LED configured to emit light at the first wavelength and an LED configured to emit light at the second wavelength"

For the same reasons discussed above in the context of Element [28B] of the'502 patent, the evidence shows that this limitation is met by Lumidigm.

d. Element [8C]: "four photodiodes"

For the same reasons discussed above in the context of the "four photodiodes" limitations of'502 patent claim 19 (Element [19B]), the undersigned finds that the "four photodiodes" limitation of '648 patent claim 8 is met by Lumidigm.

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e. Element [8D]: "a protrusion comprising a convex surface, at least a portion of the protrusion comprising an opaque material"

For the same reasons discussed above in the context of the "protrusion" and "opaque lateral surface" limitations of '501 patent claim 1 (Elements [1C], [1D], and [1E]), the evidence shows that Lumidigm, in view of the prior art, provides a reason to modify the optical surface to form a "protrusion comprising a convex surface" with a portion of the protrusion (the openings) comprising an opaque material.

f. Element [8E] and Element [8F]: "a plurality of openings provided through the protrusion and the convex surface, the openings aligned with the photodiodes" and "a separate optically transparent window extending across each of the openings"

For the same reasons discussed above in the context of the "plurality of openings" limitations of '502 patent claim 19 (Element [19C]), the evidence fails to show, clearly and convincingly, a "plurality of openings" with a "separate optically transparent window extending across each of the openings" in combination with the "four photodiodes" embodiments of Lumidigm relied upon by Apple. *See* RIB at 82, 91, 98.

g. Element [8G]: "one or more processors configured to receive one or more signals from at least one of the photodiodes and output measurements of a physiological parameter of a user"

For the same reasons discussed above in the context of the "one or more processors" limitation of '501 patent claim 1 (Element [1F]), the undersigned finds that the "one or more processors" limitation of '648 patent claim 8 is met by Lumidigm.

h. Element [8H]: "a housing"

With respect to the "housing" limitation, Apple identifies Lumidigm's disclosure that "the biometric reader 111 is built in the case of a wristwatch 112." RX-0411 at 11:60-64, Fig.

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8B. There is no dispute that Lumidigm thus discloses a housing in its "wristwatch" embodiment. The evidence shows that this limitation is met by Lumidigm.

i. Element [8I]: "a strap configured to position the housing proximate tissue of the user when the device is worn"

For the same reasons discussed above in the context of the "strap" limitation of '502 patent claim 28 (Element [28M]), the evidence shows that the "strap" limitation of '648 patent claim 8 is met by Lumidigm.

j. Element [12]: "wherein the physiological parameter comprises oxygen or oxygen saturation"

'648 patent claim 12 depends from claim 8 and further requires that "the physiological parameter comprises oxygen or oxygen saturation." For the same reasons discussed above in the context of the preamble limitations of '502 patent claim 19, this limitation is not met by Lumidigm, because the evidence shows that one of ordinary skill would not have been able to successfully configure Lumidigm's wristwatch to measure blood oxygen.

5. '648 Patent Claim 24

As discussed below, the evidence fails to clearly and convincingly show that claim 24 of the '648 patent is rendered obvious by Lumidigm alone or in combination with other prior art.

a. Element [20 preamble]: "A user-worn device configured to non-invasively determine measurements of a user's tissue, the user-worn device comprising:"

Complainants dispute this limitation on the grounds that Lumidigm does not disclose measurement of a "physiological parameter" (*see* CIB at 124-125). For the same reasons discussed above in the context of the preamble limitations of '501 patent claim 1, Lumidigm discloses the preamble limitations of '648 patent claim 20 requiring a "user-worn device configured to non-invasively determine measurements of a user's tissue." Moreover, the preamble language of Element [20 preamble] does not necessarily require measurement of a

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"physiological parameter," only "measurements of a user's tissue." Lumidigm clearly shows that the biometric functionality of the wristwatch embodiment requires "measurements of a user's tissue," and Complainants do not dispute that the wristwatch embodiment of Lumidigm performs biometric functionality. *See* RX-0411 at 5:30-44 (describing biometric identification of an individual based on comparing "tissue spectral data taken at the time of use and compared to stored tissue spectral data from prior ***measurement***") (emphasis added); CIB at 125 (describing Lumidigm's wristwatch as "identifying a user or authorizing them to do something using 'tissue spectral data'").

b. Element [20A]: "a plurality of light emitting diodes (LEDs)"

For the same reasons discussed above in the context of Element [1A] of the '501 patent claim 1, this limitation is met by Lumidigm.

c. Element [20B]: "at least four photodiodes configured to receive light emitted by the LEDs, the four photodiodes being arranged to capture light at different quadrants of tissue of a user"

For the same reasons discussed above in the context of Element [28C] of the '502 patent, the evidence shows that this limitation is met by Lumidigm.

d. Element [20C]: "a protrusion comprising a convex surface"

For the same reasons discussed above in the context of the "protrusion" limitation of '501 patent claim 1 (Element [1C]), the evidence clearly and convincingly shows that Lumidigm's disclosures, in view of the prior art, provide a reason to modify Lumidigm's "optical surface" to form a protrusion comprising a convex surface, and a reasonable expectation of success in doing so.

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e. Element [20D]: "and a plurality of through holes, each through hole including a window and arranged over a different one of the at least four photodiodes"

For the same reasons discussed above in the context of Element [19C] of the '502 patent, the evidence is insufficient to show, clearly and convincingly, that the prior renders obvious a protrusion comprising a plurality of through holes where each through hole is "arranged over a different one of the at least four photodiodes," in combination with all other elements of this claim.

f. Element [20E]: "one or more processors configured to receive one or more signals from at least one of the photodiodes and determine measurements of oxygen saturation of the user"

For the same reasons discussed above in the context of the preamble of '502 patent claim 19, the undersigned finds that the "one or more processors" limitation of '648 patent claim 20 is not met by Lumidigm, because one of ordinary skill would not have been able, without undue experimentation, to configure Lumidigm's wristwatch to determine measurements of oxygen saturation.

g. Element [24]: "wherein the protrusion comprises opaque material configured to substantially prevent light piping"

Claim 24 of the '648 patent depends from claim 20, further requiring that "the protrusion comprises opaque material configured to substantially prevent light piping." For the same reasons discussed above in the context of the "opaque lateral surface" limitation of '501 patent claim 1 (Element [1E]), the undersigned finds that "opaque material configured to substantially prevent light piping" is disclosed by Lumidigm, but not in combination with all the other elements of claim 20.

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6. '648 Patent Claim 30

Claim 30 of the '648 patent depends from claim 20, further requiring that "the protrusion further comprises one or more chamfered edges." Apple contends that chamfered edges were well-known in the art. *See* Tr. (Warren) at 1228:24-1229:10. Apple further submits that chamfered edges are depicted in Seiko 131 and in Cramer. *See* RX-0666 at Fig. 5; RX-0670 at Fig. 3; Tr. (Warren) at 1236:3-16. Dr. Warren explained that such features would be implemented for comfort, in accordance with Lumidigm's teaching that modifications to the sensor surface could be made "to incorporate ergonomic features." Tr. (Warren) at 1228:24-1229:10 (quoting RX-0411 at 7:57-63). Dr. Warren further testified that "a person of ordinary skill would understand that chamfered edges have been around for many decades as a means to soften transitions between surfaces and make items such as watches more wearable." *Id.* at 1236:17-1237:3.

Complainants argue that Lumidigm fails to disclose or suggest a chamfered edge. CIB at 142-43. Complainants argue that the chamfered edges disclosed in Cramer are not on the alleged protrusions. *Id.* at 147. Similarly, Complainants argue that the chamfered edges disclosed in Seiko 131 are not on the alleged protrusion. *Id.* at 150. Complainants argue that Apple has failed to show why a person of ordinary skill would have been motivated to use a chamfered edge in Lumidigm's wristwatch embodiment with a reasonable expectation of success. CRB at 76-78.

In consideration of the parties' arguments, the evidence shows that chamfered edges were known in the prior art, and one of ordinary skill in the art would have reason to implement a chamfered edge on the sensor surface of Lumidigm's wristwatch for ergonomic reasons with a reasonable expectation of success. The record contains numerous examples of chamfered edges

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in the prior art, including on the front face of Lumidigm's wristwatch and on the back face of Cramer's wristwatch. *See* RX-0411 at Fig. 8B; RX-0670 at Fig. 3.[54] This is clear evidence that chamfered edges were used in wristwatches and would have been known to persons of ordinary skill in the art. *See* Tr. (Warren) at 1228:24-1229:10, 1236:17-1237:3. Lumidigm provides an express motivation to modify the curvature of its sensor surface "to incorporate ergonomic features that allow for good optical and mechanical coupling with the tissue being measured, or for other technical or stylistic reasons." RX-0411 at 7:58-63.

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Although the prior art provides a reason to incorporate a chamfered edge into a protrusion on the back face of a wristwatch, with a reasonable expectation of success, the evidence fails to show that this limitation in combination with the other limitations of claim 30 (including all limitations of independent claim 20) are rendered obvious. Accordingly, Apple has not shown that claim 30 of the '648 patent is invalid for obviousness.

7. Objective Indicia of Non-Obviousness

Complainants contend that the asserted claims of the Poeze patents are not obvious in view of certain objective indicia of non-obviousness, including skepticism and failure of others, unexpected results, copying, and commercial success. CIB at 158-75; CRB at 85-96. For the

[54] Complainants argue that the chamfered edges in Cramer are not on the alleged convex portions of the protrusion, CIB at 147, but claim 30 does not require the chamfered edge and the convex surface to be on the same part of the protrusion—the claim language recites "a protrusion comprising a convex surface," and "wherein the protrusion further comprises one or more chamfered edges." *See* '648 patent claim 20, claim 30.

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reasons set forth below, the evidence regarding the objective indicia of non-obviousness do not weigh significantly against an obviousness finding.

a. Skepticism and Unexpected Results for Convex Protrusions

Complainants contend that there was skepticism in the industry for convex protrusions, citing evidence from Apple's development of the Apple Watch wherein Apple engineers identified [redacted]. *See* CX-1789C; CX-1790C. [redacted] CX-0114C at 2-3. An Apple patent application filed in July 2016 described benefits of a convex protrusion: "A convex shape can enable improved contact with the user's skin and can be more comfortable for the user than other shapes." CX-1569 at 9:35-37. Another Apple patent filed in May 2016 described a protrusion "configured to create pressure to skin." CX-1806 at ¶ [0033]. "By applying localized pressure to the individual's skin, the pressure gradient across arterial walls can be reduced, which can lead to an increase in pulsatile (AC) signal." *Id.* at ¶ [0032].

Complainants also contend that the results of a convex protrusion were unexpected within Cercacor. *See* CIB at 162. Mr. Kiani testified that Cercacor engineers were surprised that they achieved a stronger signal when trying to measure hemoglobin and glucose levels using a protrusion that applied pressure to a finger. Tr. (Kiani) at 98:9-99:16. Complainants argue that this result conflicts with a prior art patent, U.S. Patent No. 6,801,799 (CX-1733, "Mendelson"), which warned against pressure on the skin during pulse oximetry measurements. *See* CX-1733 at 2:47-57 ("[V]ariations in contact pressure between the sensor and the skin can cause large

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errors in reflection pulse oximetry (as compared to transmission pulse oximetry) since some of the blood near the superficial layers of the skin may be normally displaced away from the senor housing towards deeper subcutaneous structures."); *see* Tr. (Madisetti) at 1374:9-12. Complainants also cite the testimony of Robert Rowe, one of the Lumidigm inventors, who described a shape that matches the skin, *e.g.*, a concave shape to match a cylindrical body part, as a way to achieve "good coupling." RX-0279C (Rowe Dep. Tr.) at 69:8-21.

Apple disputes Complainants' interpretation of Apple's engineering documents, asserting that Apple engineers [redacted] RRB at 66-67. [redacted] Tr. (Block) at 905:23-907:24. With respect to the documents describing the effect of [redacted] CX-0281C (Block Dep. Tr.) at 218:16-219:5. Apple argues that there is no evidence in the prior art for skepticism regarding a convex protrusion. RIB at 146-47; RRB at 67-68. Apple submits that the Mendelson patent cited by Dr. Madisetti does not disclose or discuss a convex protrusion. *See* Tr. (Warren) at 1244:18-1245:7 (discussing CX-1733/RX-0688). Apple cites another prior reference, Nippon, which describes the benefits of pressure on the skin for increasing signal strength. RX-0665 at 5:12-17, Fig. 3b; *see* Tr. (Warren) at 1245:8-16. Apple further cites the convex protrusions disclosed in Seiko 131 and Cramer. *See* RX-0666 at 3:22-28, 19:6-8, Fig. 28; RX-0670 at 5:45-51, Fig. 3, Fig. 6; *see* Tr. (Warren) at 1194:15-1195:5, 1245:1-1246:12. Apple argues that Mr. Kiani's surprise regarding the effect of a convex protrusion does not reflect the knowledge of one of skill in the art. RRB at 67. Apple disputes Complainants' characterization of Mr. Rowe's testimony, which did not explicitly reference any

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concave shape. *Id.* With respect to the Apple patent applications describing convex protrusion, Apple argues that these features were not individually claimed to be novel. *Id.* at 68.

In reply, Complainants argue that Mendelson teaches the undesirability of displacing blood away from the sensor, which would be caused by a convex protrusion. CRB at 91. Complainants contend that Nippon fails to disclose a convex protrusion and was considering during the prosecution of the Poeze patents. *Id.* at 91-92. Complainants submit that Mr. Rowe's testimony is consistent with the teachings in Mendelson and that Mr. Kiani's testimony regarding the surprising benefits of a convex protrusion is consistent with the advantages described in Apple's patent applications. *Id.* at 92-94.

In consideration of the parties' arguments, the evidence does not show that there was skepticism in the industry regarding convex surfaces. As discussed above in the context of the "protrusion" limitation of '501 patent claim 1, there is no evidence in the prior art that convex surfaces were disfavored before the invention of the Poeze patents. The parties have identified prior art physiological sensors with concave, convex, and flat surfaces, which is convincing evidence that the shape of the sensor surface was a design choice for persons of ordinary skill in the art "to match the profile of a device in which it is mounted, to incorporate ergonomic features that allow for good optical and mechanical coupling with the tissue being measured, or for other technical or stylistic reasons." RX-0411 at 7:57-63; *see also* RX-0666 at 3:22-28, Fig. 28; RX-0670 at 5:45-51, Fig. 3; RX-0665 at 5:12-17, Fig. 3b. The Apple engineering documents that Complainants cite to show alleged skepticism are not clearly directed to the accused convex protrusions, and the undersigned agrees with Apple that this evidence should be discounted in view of the evidence that the back surface of the Apple Watch had a convex shape even before the pulse oximetry feature was implemented. *See* RRB at 66-67.

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In addition, the undersigned finds that Complainants have not shown that a gain in signal strength with convex surfaces was an unexpected result that demonstrates non-obviousness. Complainants have identified evidence that both Cercacor engineers and Apple engineers were [redacted] but the evidence in the prior art is mixed on the question of whether this result should have been unexpected. *Compare* CX-1733 at 2:47-57 (describing "large errors" caused by "variations in contact pressure") *to* RX-0665 at 5:12-17 (recognizing that a detector that "protrudes into the tissue slightly" has the effect of "increasing the signal strength of the detected signal.").[55] Moreover, to the extent that an improvement in signal strength is attributable to the increased pressure caused by a convex protrusion, the record shows that this effect was recognized in the prior art: Seiko 131 identifies a convex surface that improves "positive contact between the body surface and outside surface of the light transmittance plate." RX-0666 at 3:22-28, Fig. 28.; and Nippon describes increased signal strength from a protrusion into the tissue. RX-0665 at 5:12-17, Fig. 3b. The Federal Circuit has discounted evidence of unexpected results when the result was produced by a feature known in the prior art. *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1385 (Fed. Cir. 2015) ("[T]he offered secondary consideration actually results from something other than what is both claimed and novel in the claim, so there is no nexus to the merits of the claimed invention." (citing *In re Huai–Hung Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011) (internal quotations removed)).

[55] In the pulse oximeter described in the specification of the Poeze patents, the benefits of a convex protrusion are attributed to the reduced thickness of the finger—not the pressure on the skin. *See* JX-0001 at 21:9-34 (describing signal gain in the context of the Beer Lambert law, which relates transmittance to the path length traveled by the light: "In an embodiment where the protrusion 305 is a convex bump, the thickness of the finger can be reduced to 10 mm (from 12 mm) for some fingers and the effective light mean path is reduced to about 16.6 mm from 20 mm.").

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b. Skepticism and Failures Measuring Pulse Oximetry at the Wrist

Complainants further cite evidence that the [redacted] in the Apple Watch is evidence that measuring pulse oximetry at the wrist would have been non-obvious. CIB at 165-72; CRB at 85-88. Complainants identify evidence that Apple [redacted]. *See* CX-1793C ([redacted]). Paul Mannheimer was hired to be Apple's sensor architect in 2014, and he expressed skepticism that pulse oximetry could be successfully implemented in a wristwatch. Tr. (Mannheimer) at 996:25-997:5. Stephen Waydo, the director of Apple's team for health algorithms, also expressed skepticism that blood oxygen could be measured on the wrist, calling the development this feature "extremely challenging." Tr. (Waydo) at 938:21-24. This skepticism was shared by other Apple engineers. *See* CX-0295C (Shui Dep. Tr.) at 108:13-21; CX-0283C (Lefort) at 198:8-199:2. Apple did not implement a blood oxygen feature in any of the first six Apple Watches that were commercially released from 2015 to 2019. Tr. (Mannheimer) at 1013:7-20. [redacted] CX-0177C at 13; *see* Tr. (Mannheimer) at 1015:9-19; Tr. (Land) at 982:3-983:12. Apple engineers filed for a patent on a sensor window design for the Apple Watch in July 2016, which issued as U.S. Patent No. 10,702,211 in July 2020. CX-1569. The first Apple Watch with a pulse oximetry feature was released in September 2020: the Apple Watch Series. RX-0333.

Apple argues that the skepticism of its engineers regarding the implementation of pulse oximetry in the Apple Watch was related to "[redacted]." RRB at 52-53. Dr. Warren cited

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evidence that his own students had built pulse oximeters that could take measurements at the wrist as early as 2002. Tr. (Warren) at 1216:10-25; RX-0632; RX-0504; RX-0508. Apple further argues that the evidence regarding the Apple Watch is irrelevant, because the Poeze Patents provide no teachings for measuring blood oxygen on the wrist. RRB at 68.

In consideration of the parties' arguments, the undersigned finds that the skepticism of Apple engineers regarding pulse oximetry at the wrist (and discussed in Part IV.G.2.a *supra*) is consistent with the finding *supra* that Lumidigm's wristwatch embodiment, as modified in view of the combinations Apple proposes, does not disclose or render obvious a device for measuring blood oxygenation at the wrist. However, while this evidence is highly relevant to the obviousness determination for the reasons discussed in Parts IV.G.2-6 above,[56] this evidence does not weigh significantly in terms of objective indicia of non-obviousness because the asserted claims apply to any "user-worn device," including user-worn devices that are not on the wrist. *See Therasense Inc. v. Becton Dickinson and Co.*, 593 F.3d 1325, 1336 (Fed. Cir. 2010) (objective evidence of non-obviousness should be "commensurate in scope with the claims which the evidence is offered to support"); *id.* (evidence of long-felt but unsolved need to solve "short fill" problem did not weigh against obviousness finding where the claims "are not limited to sensors that prevent short fill");'501 patent at 11:45-48 ("In some embodiments, the measurement site 102 is located somewhere along a non-dominant arm or a non-dominant hand, e.g., a right-handed person's left arm or left hand."); *id.* at 8:21-23 (discussing "measurement sites, including, for example, a finger, toe, hand, foot, ear, forehead, or the like"); *id.* at 10:22-24

[56] As discussed *supra*, Apple's obviousness arguments rely on the wristwatch embodiment of Lumidigm as the primary reference.

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("[m]any of the foregoing arrangements allow the sensor to be attached to the measurement site while the device is attached elsewhere on the patient, such as the patient's arm").[57]

c. Apple's Alleged Copying of Masimo Technology

Complainants further allege that Apple copied Masimo's patented technology in its development of the pulse oximetry feature in the Apple Watch. CIB at 172-73; CRB at 94-96. Complainants cite testimony and evidence showing that Apple [redacted]. *See* Tr. (Waydo) at 945:10-946:6; CX-0125C; CX-0126C. Beginning in 2013, Apple met with Masimo employees [redacted]. *See* CX-1793C ([redacted]); CX-0185C at 20 ([redacted]); Tr. (Kiani) at 104:14-22, 107:1-108:18. Apple hired several Masimo employees, including Masimo's Chief Medical Officer, Michael O'Reilly, and one of the named inventors of the Poeze patents, Steve Lamego. *See* Tr. (Kiani) at 110:23-111:23; CX-1615C. Complainants allege that Apple sought to obtain Masimo's technology by hiring Dr. Mannheimer from Nellcor, a Masimo competitor that was found to have infringed Masimo's patents in 2004. CIB at 168-69. Complainants submit that Apple has provided no credible explanation for the convex shape of the back crystal in the design of the Apple Watch and argue that an inference of copying is appropriate. CRB at 95. Complainants cite evidence that [redacted]. *See* CX-0285C (Dua Dep. Tr.) at 105:22-107:9; CX-0096C. Complainants further submit that [redacted]

[57] In addition, the asserted claim of the '501 patent is not limited to devices that perform pulse oximetry.

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[redacted]

See Tr. (Waydo) at 932:19-933:4; CX-0127C; CX-0097C at 3; CX-0094C.

Apple argues that the pulse oximetry features of the Apple Watch could not have been copied from the Poeze patent claims, because the applications reciting these claims were not filed until after the Apple Watch Series 6 had been released. RIB at 140. Apple further argues that it could not have copied the patented features from any Masimo product, because the first Masimo product embodying the asserted claims was not released to the public until January 2022—during discovery in this investigation. *Id.* Apple's engineers have consistently testified that they did not copy Masimo or any other company's technology. *Id.* at 140-41 (citing Tr. (Block) at 902:10-12, 914:1-7; Tr. (Waydo) at 932:6-9, 933:8-11; Tr. (Land) at 972:19-22, 991:23-25; Tr. (Venugopal) at 833:13-17; Tr. (Mehra) at 893:15-17; Tr. (Mannheimer) at 1007:22-1008:7; CX-0283C (Charbonneau-Lefort Dep. Tr.) at 171:21-173:8, 201:10-19; CX-0285C (Dua Dep.) at 160:20-161:5). Apple contends that [redacted] was not related to the development of the pulse oximetry feature for the Apple Watch and argues that there is no evidence that this product practices any asserted claim. RIB at 142. [redacted]. *Id.* at 143; RRB at 70 (citing Tr. (Diab) at 243:9-17; Tr. (Scruggs) at 446:8-23). Apple submits that none of the employees hired from Masimo contributed to the design of the pulse oximetry feature in the Apple Watch. RIB at 142-43. (citing Tr. (Land) at 972:23-973:3, Tr. (Waydo) at 950:1-15; Tr. (Venogupal) at 833:14-17. Apple explains that [redacted] during the development of the Apple Watch to avoid the disclosure of information regarding an "unreleased feature." CX-0285C (Dua Dep. Tr.) at

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105:22-107:9. With respect to Dr. Waydo's discussion of [redacted], Apple submits that this was related to the problem of taking measurements during motion, which was not implemented in the Apple Watch. CX-0299C (Waymo Dep. Tr.) at 173:3-174:8; Tr. (Waydo) at 932:6-18.

In consideration of the parties' arguments, the undersigned finds no significant credible evidence that Apple copied Masimo's patented technology. Complainants accuse numerous former Masimo employees of copying Masimo's technology but fails to identify the patented features that were allegedly copied. Complainants' theory that Apple's hiring of Dr. Mannheimer from Nellcor was motivated by a desire to copy Masimo's technology lacks evidentiary support. The allegation that Apple copied the convex shape of the Apple Watch's back crystal from Masimo is purely speculative, and as discussed above, such convex surfaces were known in the prior art. Complainants fail to identify which features of the [redacted] pulse oximeters used as benchmarks were allegedly copied by Apple, and there is no evidence that any of these products practices asserted claims of the Poeze patents. Complainants' allegations are insufficient to demonstrate copying. *See Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004) ("Not every competing product that arguably falls within the scope of a patent is evidence of copying. Otherwise every infringement suit would automatically confirm the nonobviousness of the patent."); *see also Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) ("Our case law holds that copying requires evidence of efforts to replicate a specific product, which may be demonstrated through internal company documents, direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a

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replica, or access to the patented product combined with substantial similarity to the patented product.").

d. Commercial Success of Apple Watch Products

Complainants allege that the commercial success of the Apple Watch Series 6 and 7 products is objective evidence of non-obviousness. CIB at 173-75; CRB at 95-96. According to Complainants' expert Daniel McGavock, sales of the Apple Watch Series 6 far exceeded the sales of previous Apple Watches, and Apple advertised the blood oxygen feature as the key differentiator of the Series 6 over the Series 5. Tr. (McGavock) at 1416:10-21, 1422:8-1425:13; CX-0252; CX-1451; CX-1532; CX-1289. Mr. McGavock referenced third party reviews identifying the blood oxygen feature as the key feature for the Apple Watch Series 6. Tr. (McGavock) at 1418:21-1419:8 (citing CX-1634; CX-1301). Dr. Madisetti agreed with Mr. McGavock that there was a nexus between the blood oxygen feature of Apple Watch Series 6 and its commercial success. Tr. (Madisetti) at 1380:14-1381:4.

Apple argues that the commercial success of the Apple Watch Series 6 and 7 is attributable to many features. RIB at 144; RRB at 71; *see* Tr. (Warren) at 1242:16-25; Tr. (Land) at 970:10-971:6. According to Deidre Caldbeck, Apple's Director of Product Marketing for the Apple Watch, pulse oximetry is "not even in the top 30 use apps on Apple Watch." CX-0275 (Caldbeck Dep. Tr.) at 65:21-22, 66:3-12. Apple argues that its marketing materials describe many different features of the Apple Watch Series 6 in addition to pulse oximetry. *See, e.g.*, CX-1447; CX-0252; CX-1532; CX-1451. Apple further points out that Mr. McGavock cited certain third-party reviews of the Apple Watch that criticized the pulse oximetry feature of the Apple Watch Series 6. *See* Tr. (McGavock) at 550:20-551:17 (citing CX-1616; CX-1293; CX-1409).

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In consideration of the parties' arguments and the record evidence, the undersigned finds that the Apple Watch Series 6 was commercially successful and that this may be due in some part to its blood oxygen monitoring features. There is no dispute that the Apple Watch Series 6 was commercially successful. *See* Tr. (McGavock) at 1419:9-1420:1; CX-1285 (*AppleInsider*: "Apple Watch far outsold all other smartwatches in Q4 2020"). Apple's marketing materials upon introduction of the Apple Watch Series 6, as well as certain third-party reviewers, identified the measurement of blood oxygen as a key new feature. *See, e.g.,* CX-0252; CX-1289; CX-1451; CX-1301 (*New York Times*: "The new Apple Watch can be summed up in two words: blood oxygen."); CX-1643 (*Independent*: "it's the blood oxygen sensor that dominated the introduction, and which is the new feature that Apple has spent the most time talking about.").

The evidence does not persuasively indicate, however, that the sales of the Apple Watch Series 6 are largely attributable to the blood oxygen feature, as market analysts have recognized the Apple Watch's "blend of sleek design, good usability on a small screen, and a growing portfolio of health and fitness apps." CX-1644 (Strategy Analytics). Moreover, it is not clear that the Apple Watch Series 6 was significantly more successful than other smartwatches, because the growth in Apple's smartwatch sales from 2020 to 2021 is in line with the growth of smartwatch sales across the industry. *See id.* (Apple's growth in smartwatch sales is 46%, and the overall industry growth in smartwatch sales is 47%). This evidence shows that much of the success of the Apple Watch Series 6 can be attributed to the growing market for smartwatches rather than the specific implementation of the pulse oximetry feature claimed in the patents-at issue. *See id.* ("Online sales of fitness-led devices that help to support personal healthcare remain popular and are the main driver of the smartwatch boom."); *see also* CX-0275 (Caldbeck Dep.) at 65:21-22, 66:3-12 (blood oxygen app in Apple Watch is "not even in the top 30 used

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apps on Apple Watch"). The Federal Circuit has discounted evidence of commercial success in such circumstances, where "the evidence does not show that the commercial success was the result of claimed and novel features." *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1313 (Fed. Cir. 2006) (recognizing that the commercial success was due in part to "aesthetic appeal and improved comfort" and features that were known in the prior art).

The undersigned thus finds that there is little evidence of a significant nexus between Apple's commercial success and the allegedly nonobvious features of the asserted Poeze patent claims, particularly for claim 12 of the '501 patent (which is not limited to blood oxygen measurements). Accordingly, this commercial success does not meaningfully affect the obviousness analysis discussed above.

H. Invalidity – Written Description and Enablement

Apple contends that the asserted claims of the Poeze patents are invalid for lack of written description and/or enablement pursuant to 35 U.S.C. § 112, relying on the testimony of Dr. Warren. RIB at 147-53; RRB at 73-76; Tr. (Warren) at 1246:24-1248:4. Complainants dispute Apple's allegations, identifying support in the specification of the Poeze patents and relying on the testimony Dr. Madisetti. CIB at 175-83; CRB at 100-105; Tr. (Madisetti) at 1347:14-1353:25. For the reasons discussed below, the evidence shows, clearly and convincingly, that '502 patent claim 28 and '648 patent claim 12 are invalid for lack of written description. The evidence does not show, clearly and convincingly, that the other asserted claims are invalid for lack of written description and/or lack of enablement.

1. Combination of LEDs, Photodiodes, and Openings (All Asserted Claims)

Apple argues that all of the asserted claims of the Poeze patents are invalid for lack of written description because the specification fails to disclose an embodiment that includes "(a)

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multiple LEDs, (b) multiple photodiodes, and (c) a protrusion with a plurality of openings, positioned or arranged over the photodiodes, each of which includes an opaque lateral surface or is lined with an opaque material." RIB at 148. Apple further argues that the specification fails to disclose sets of three or more LEDs or three or more photodiodes. *Id.* at 147-51; RRB at 73-75; *see* Tr. (Warren) at 1246:24-1247:7

Complainants identify Fig. 7B of the Poeze patents, which depicts two emitters 104, two photodiodes 106, one or more opening(s) 703, a protrusion 705b that is a "convex bump," and a shielding enclosure 790. JX-001 at 27:13-41.

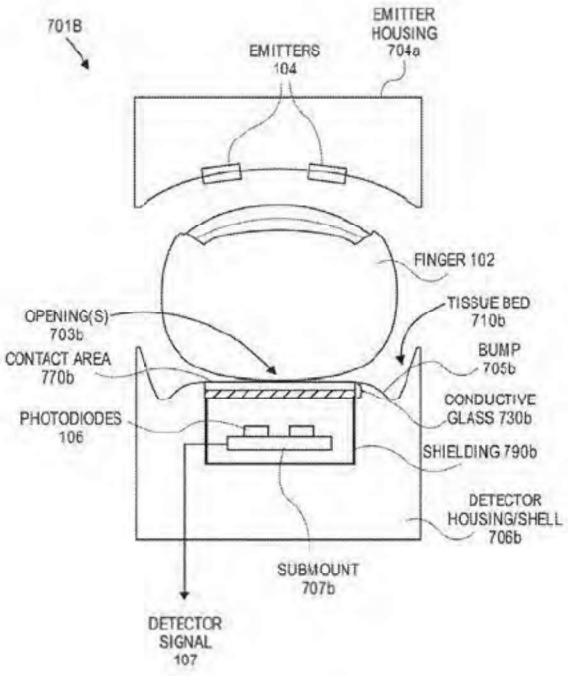


FIG. 7B

Id. at Fig. 7B. Figure 7B depicts two emitters and two detectors. *Id.* There are "one or more openings 703b," and "each of the openings 703 can include a separate window of the conductive glass 703b." *Id.* at 27:18-24. The specification provides that "shielding enclosure 790b . . . can have all the features of the shielding enclosure 790a." *Id.* at 27:28-29. "The shielding or

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enclosure a can include an opaque material to not only reduce electrical noise, but also ambient optical noise." *Id.* at 27:1-3. The specification expressly provides that the sensors 701 depicted in Figure 7A and 7B "can be implemented with any of the sensors 101, 201, 301 described above." *Id.* at 26:25-26. One embodiment of sensor 301 is depicted in Figure 3C, which shows four photodetectors in four separate openings. *Id.* at 19:38-48.

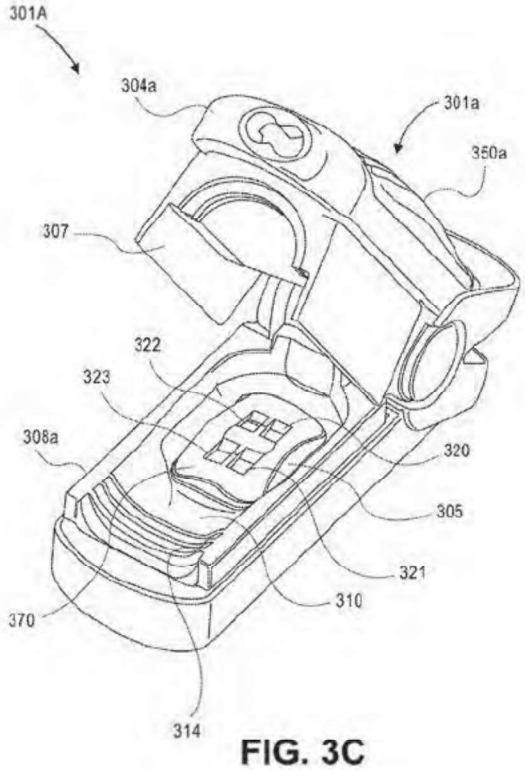


FIG. 3C

Id. at Fig. 3C. Complainants cite a disclosure from another part of the specification describing a "system 100 that comprised four LEDs in emitter 104 and four independent detector streams from detectors 106." *Id.* at 44:22-29, Fig. 21. Moreover, in Figure 13, "n emitters and n detectors are shown," although "the number of emitters and detectors need not be the same in certain implementations." *Id.* at 33:37-39, Fig. 13. Dr. Madisetti testified that these disclosures

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provide full written description support for multiple LEDs, three or more photodiodes, and opaque lateral surfaces. Tr. (Madisetti) at 1347:18-1349:6.

In consideration of the parties' arguments, the evidence fails to show, clearly and convincingly, that the asserted claims reciting three or more LEDs, three or more photodiodes, and a protrusion with a plurality of openings over the photodiodes with opaque lateral surfaces lack written description. The specification of the Poeze patents expressly states that Figure 3C and Figure 7B are not distinct embodiments—"[t]he features of the sensors 701 can be implemented with any of the sensors 101, 201, 301 described above. JX-001 at 26:25-26. Figure 3C clearly depicts four photodiodes in separate openings. *Id.* at 19:38-48, Fig. 3C. Figure 7B clearly depicts these openings in a convex protrusion with opaque lateral surfaces. *Id.* at 27:13-41, Fig. 7B. Although Figure 7B only depicts two emitters, the specification describes sensor 101 including an emitter 104, which "can include one or more sources of optical radiation, such as LEDs . . . ." *Id.* at 12:5-9. In one embodiment, "the emitter 104 can emit optical radiation at three (3) or more wavelengths . . . ." *Id.* at 12:35-44. Moreover, the specification discloses that the number of emitters can match the number of detectors in the context of Figure 13, which is described as "an example multi-stream operation of the system of FIG. 1." *Id.* at 6:45-47, 33:37-39, Fig. 1, Fig. 13. In view of these disclosures, the evidence fails to clearly and convincingly show that the inventors lacked possession of a device with three or more LEDs, three or more photodiodes, and a protrusion with a plurality of openings over the photodiodes with opaque lateral surfaces. *Cf. Invidior Inc. v. Dr. Reddy's Labs., S.A.*, 930 F.3d 1325, 1349 (Fed. Cir. 2019) (finding disclosure "reasonably conveyed to a skilled artisan" the claimed films, and noting that "[t]he specification need not recite the claimed invention *in haec verba*").

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Accordingly, the undersigned finds that Apple has not shown by clear and convincing evidence that the asserted claims of the Poeze patents are invalid for lack of written description with respect to the limitations requiring three or more LEDs, three or more photodiodes, and a protrusion with a plurality of openings over the photodiodes with opaque lateral surfaces.

2. Four Sets of at Least Three LEDs ('502 patent claim 22)

Apple contends that '502 patent claim 22 is invalid for lack of written description, because the specification fails to disclose four sets of at least three LEDs. RIB at 151; RRB at 75. Dr. Warren testified that he found no such disclosure in the specification of the Poeze patents. Tr. (Warren) at 1247:8-12. Apple argues that Figure 7B only depicts two emitters and the specification's reference to "sets of optical sources" is insufficient to disclose the claimed "at least four emitters . . . wherein each of the plurality of emitters comprises a respective set of at least three LEDs." JX-002 at claim 22.

Complainants argue that Dr. Warren's conclusory testimony is insufficient to show lack of written description. CIB at 180. Dr. Madisetti identified disclosures in the specification where multiple emitters are disclosed and the emitters are described as sets of optical sources. Tr. (Madisetti) at 1349:7-1350:3. In particular, the specification provides that "the emitter 104 can include one or more sources of optical radiation, such as LEDs . . . ." JX-001 at 12:5-8. And "[i]n an embodiment, the emitter 104 includes sets of optical sources that are capable of emitting visible and near-infrared optical radiation." *Id.* at 12:9-12. The specification incorporates by reference a patent application, U.S. Application No. 2006/0211924, which describes an array of emitters. *Id.* at 12:16-20. Figure 13 describes sets of emitters that are numbered to match the number of detectors. *Id.* at 33:37-39, Fig. 13.

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Here, the evidence of record fails to show, clearly and convincingly, that four sets of at least three LEDs claimed in '502 patent claim 22 lack written description in the specification of the Poeze patents. Although there is no explicit disclosure of the claimed four sets of at least three LEDs, the specification provides that "the emitter 104 can include one or more sources of optical radiation, such as LEDs . . . ." JX-001 at 12:6-9. The specification also provides that the "emitter 104 can include sets of light-emitting diodes (LEDs) as its optical source." JX-001 at 13:16-17; *see also id.* at 12:9-12 ("In an embodiment, the emitter 104 includes sets of optical sources that are capable of emitting visible and near-infrared optical radiation."). Figure 13 depicts multiple "emitter set(s)" numbered 1 through n. *Id.* at 33:18-51.

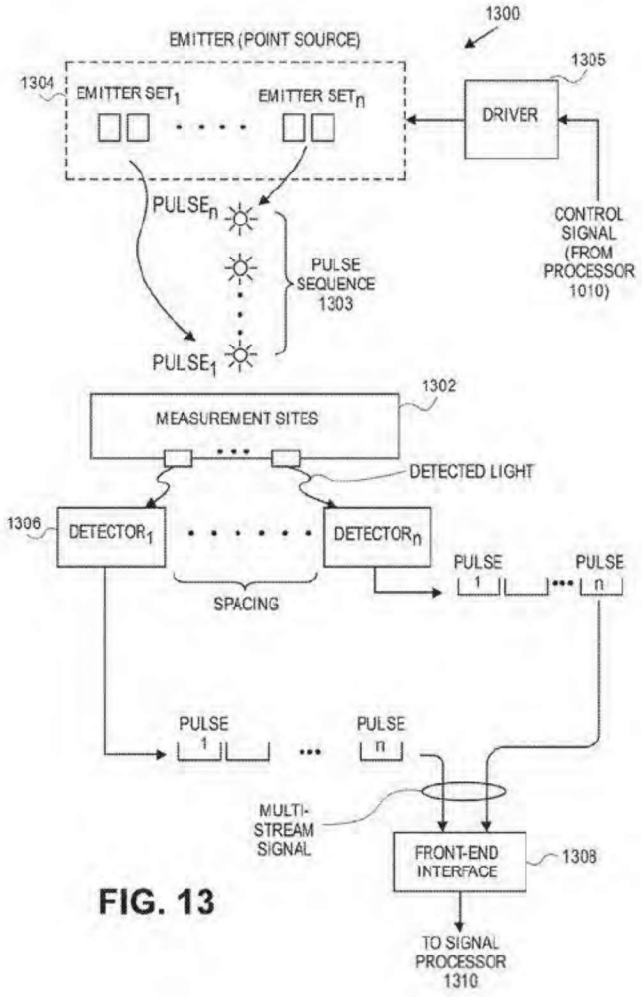


FIG. 13

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Id. at Fig. 13. As discussed above, Figure 13 provides written description support for at least four sets of emitters, because the number of emitters matches the number of detectors, and the specification discloses at least four detectors. *See id.* at 33:37-39, Fig. 13. The specification further provides written description support for three LEDs in each set by referring to "sets of light-emitting diodes (LEDs)" with both "sets" and "LEDs" plural. *See id.* at 13:16-17; *see also id.* at 12:9-12 ("sets of optical sources"). Apple has not identified any reason that one of ordinary skill would read the plural "LEDs" as being limited to sets of two, and sets of three or more would be consistent with the disclosure that the emitters can be arranged in an array. *See id.* at 12:17-25.[58] In view of these disclosures, the evidence fails to clearly and convincingly show that the inventors lacked possession of a device with four sets of at least three LEDs. *Cf. Invidior v. Dr. Reddy's Labs.*, 930 F.3d at 1349.

Accordingly, Apple has not shown by clear and convincing evidence that '502 patent claim 22 is invalid for lack of written description with respect to the claimed four sets of three LEDs.

3. Separate Sets of LEDs Emitting at a First Wavelength and a Second Wavelength ('502 patent claim 28; '648 patent claim 12)

Apple contends that '502 patent claim 28 and '648 patent claim 12 are invalid for lack of written description, because the specification fails to disclose separate sets of LEDs emitting at the same "first wavelength" and "second wavelength." RIB at 151-52; RRB at 75. Dr. Warren testified that he found no disclosure for this limitation in the specification of the Poeze patents. Tr. (Warren) at 1247:13-17. Apple argues that the specification's reference to "sets of optical

[58] U.S. Patent Application Publication No. 2006/0211924 is incorporated by reference as an example of emitters arranged in an array.

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sources" is insufficient to disclose the claimed two sets of LEDs each with "an LED configured to emit light at a first wavelength and an LED configured to emit light at a second wavelength." JX-002 at claim 28; JX-003 at claim 12.

Complainants argue that Dr. Warren's testimony is conclusory and insufficient to show lack of written description. CIB at 179. Dr. Madisetti identified disclosures in the specification of the Poeze patents "including sets of LEDs with different wavelengths." Tr. (Madisetti) at 1349:7-1350:3. In their briefing, Complainants point to the two emitters depicted in Figures 7A and 7B and the disclosure that "[i]n an embodiment, the emitter 104 includes sets of optical sources that are capable of emitting visible and near-infrared optical radiation." JX-001 at 12:9-12, Fig. 7A, Fig. 7B. Complainants also cite other disclosures describing different arrangements of emitters. *See id.* at 9:60-63, 12:13-25, 13:16-21, 21:51-54, 33:30-38, 38:8-22.

In consideration of the parties' arguments, the evidence of record shows, clearly and convincingly, that there is insufficient written description support for the limitations in '502 patent claim 28 and '648 patent claim 12 describing two sets of LEDs that each have LEDs emitting light at the same "first wavelength" and the same "second wavelength." This limitation does not merely require that there be two sets of LEDs, each emitting light at two different wavelengths—the claim language requires matching wavelengths in each set of LEDs, and there is no such disclosure in the specification of the Poeze patents. Complainants primarily rely on a disclosure in the specification that "[i]n an embodiment, the emitter 104 includes sets of optical sources that are capable of emitting visible and near-infrared optical radiation." JX-001 at 12:9-12; CIB at 180. Another part of the specification describes an embodiment where "the plurality of sets of optical sources may each comprise at least one top-emitting LED and at least one super luminescent LED." *Id.* at 9:60-62. But while these portions of the specification describe sets of

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LEDs that are capable of emitting at different wavelengths, there is no disclosure of two separate sets of LEDs using the same wavelengths in each set.[59]

The specification repeatedly describes multiple wavelengths of light in sets of LEDs, but there is no disclosure of matching wavelengths between sets of LEDs. When describing emitters that are capable of emitting visible and near-infrared optical radiation, the specification describes two different wavelengths, three different wavelengths, or up to eight different wavelengths. *Id.* at 12:60-13:7. The specification does not describe any two LEDs having the same wavelength, however, instead emphasizing "a variety of wavelengths of visible or near-infrared optical radiation." *Id.* Similarly, when describing emitters using super luminescent LEDs and top emitting LEDs, the specification describes the different capabilities of these LEDs. *See id.* at 13:16-25 (describing "top-emitting LEDs emitting light at about 850 nm to 1350 nm" for optical radiation and "SLEDs or side-emitting LEDs to transmit near infrared optical radiation because these types of sources can transmit at high power or relatively high power.").

Consistent with Dr. Warren's testimony, these disclosures would not convey to persons of ordinary skill in the art that sets of LEDs with matching wavelengths were part of the alleged invention—there is no suggestion that two LEDs emit the same wavelengths or any benefit ascribed to such a pairing. This is similar to the claim limitation that was found invalid for lack of written description in *Purdue Pharma L.P. v. Faulding Inc.*, where the Federal Circuit found "nothing in the written description . . . that would suggest to one skilled in the art that the [claimed] ratio is an important defining quality of the formulation, nor does the disclosure even

[59] As discussed above in the context of obviousness, LEDs meeting this limitation are explicitly disclosed in the prior art in Lumidigm. *See* RX-0411 at 6:43-48. The Federal Circuit has held, however, that "it is the specification itself that must demonstrate possession," and "a description that merely renders the invention obvious does not satisfy the requirement." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010).

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motivate one to calculate the ratio." 230 F.3d 1320, 1327 (Fed. Cir. 2000); *see also Ariad*, 598 F.3d at 1352 (noting that a description that "merely renders the invention obvious does not satisfy the requirement").[60]

Accordingly, the evidence shows, clearly and convincingly, that '502 patent claim 28 and '648 patent claim 12 are invalid for lack of written description.

4. Touch-Screen Display ('502 patent claim 28)

Apple contends that '502 patent claim 28 is invalid for lack of enablement, because the specification fails to enable a "touch-screen display" that "displays indicia responsive" to any "measurement." RIB at 152; RRB at 75-76. Dr. Warren testified that he only found two brief references to touch-screens in the patent specification. Tr. (Warren) at 1247:18-23. Apple argues that these disclosures are insufficient to enable a person of ordinary skill in the art to use a touch-screen on a user-worn device to display an oxygen saturation measurement. RIB at 152. Complainants argue that the specification discloses a touch-screen as one example of a user interface and further provides that physiological measurements can be shown on a display. CIB at 181-82; CRB at 104; *see* Tr. (Madisetti) at 1352:5-24, 1381:7-1382:8.

[60] Complainants argue that Dr. Warren's testimony at hearing was conclusory, but the specification clearly supports Dr. Warren's testimony that there is no disclosure in the specification of two sets of LEDs with matching wavelengths. *See* Tr. (Warren) at 1247:13-17. And Dr. Madisetti did not address this limitation in his rebuttal testimony, only identifying disclosures in the specification describing "sets of LEDs with different wavelengths" but failing to offer any opinion as to whether these disclosures support the claimed two sets of LEDs using the same two wavelengths. *See* Tr. (Madisetti) at 1349:7-1350:3, 1350:22-1352:4. Moreover, the written description analysis is not limited to expert testimony. *See, e.g., University of Rochester v. G.D. Searle & Co., Inc.*, 358 F.3d 916, 927 (Fed. Cir. 2004) ("[A] patent can be held invalid for failure to meet the written description requirement, based solely on the language of the patent specification. After all, it is in the patent specification where the written description requirement must be met.").

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In consideration of the parties' arguments, the undersigned finds that the evidence fails to show, clearly and convincingly, the lack of an enabling disclosure for the claimed "touch-screen display" in the specification of the Poeze patents.

To prove a claim is invalid for lack of enablement, "a challenger must show by clear and convincing evidence that a person of ordinary skill in the art would not be able to practice the claimed invention without 'undue experimentation.'" *Amgen Inc. v. Sanofi, Aventisub LLC*, 987 F.3d 1080, 1084 (Fed. Cir. 2021) (internal quotations omitted). Whether undue experimentation is needed is "not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations." *Id.* (quoting *In re Wands*, 858 F.2d 731, 736-37 (Fed. Cir. 1988)). The "*Wands*" factors are: "(1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims." *Id.* at 1084. The Federal Circuit has stated that "after the challenger has put forward evidence that some experimentation is needed to practice the patented claim, the factors set forth in *Wands* then provide the factual considerations that a court may consider when determining whether the amount of that experimentation is either 'undue' or sufficiently routine such that an ordinarily skilled artisan would reasonably be expected to carry it out." *Amgen*, 987 F.3d at 1084-85.

Here, Apple has not presented any argument regarding the majority of the *Wands* factors, instead citing to a single sentence of expert testimony regarding the lack of explicit guidance in the specification. Apple does not provide, for example, any supporting evidence regarding the state of the prior art with respect to touchscreens and their use, or the quantity of experimentation

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necessary.[61] Further, the specification discloses a monitoring device 200a that includes a display 210a and "can employ any of a variety of user interface designs, such as frames, menus, touch-screens, and any type of button." JX-001 at 17:20-26. The specification also discloses a monitor 209b, which "can include display 210b that can indicate a measurement for glucose," and "[o]ther analytes and forms of display can also appear on the monitor 209b." *Id.* at 17:67-18:3. This monitor is part of the claimed user-worn device, as "the monitor 209b can include a belt clip or straps (see, e.g., FIG. 2C) that facilitate attachment to a patient's belt, arm, leg, or the like." *Id.* at 17:56-59.

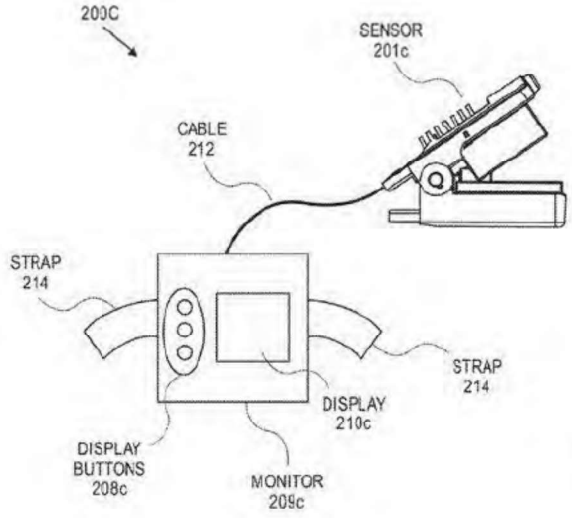


FIG. 2C

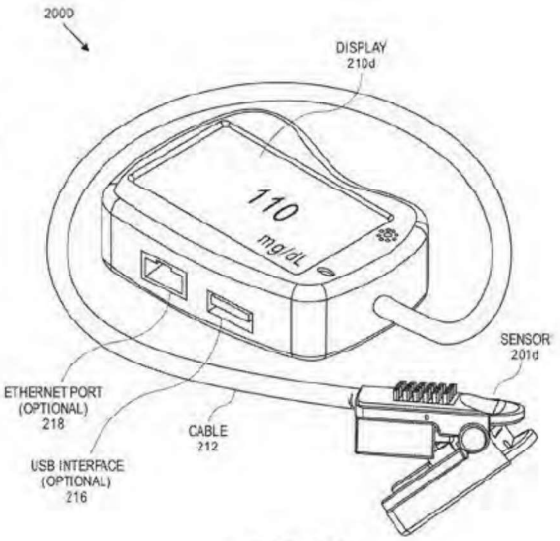


FIG. 2D

Id. at Fig. 2C, Fig. 2D. Although these features are described in the context of different figures, the specification provides that "certain of the features of the monitoring devices 200 shown in FIGS. 2A through 2D can be combined with features of the other monitoring devices shown." *Id.* at 16:39-42. Dr. Madisetti reviewed the disclosures of the patent and testified that "the

[61] To the contrary, Dr. Warren elsewhere testified that a touchscreen "could be incorporated in any visual depiction for a portable device." Tr. (Warren) at 1226:25-1227:7.

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touchscreen display and indicia of measurement are fully enabled in the asserted claims." Tr. (Madisetti) at 1381:7-1382:8.

In view of the above, Apple has not shown, clearly and convincingly, that '502 patent claim 28 is invalid for lack of enablement with respect to the claimed "touch-screen display."

5. Light Piping ('501 patent claim 12, '502 patent claim 28, '648 patent claim 24)

Apple contends that '501 patent claim 12, '502 patent claim 28, and '648 patent claim 24 are invalid for lack of enablement with respect to limitations describing opaque surfaces that "avoid" or "reduce" "light piping." RIB at 152-53; RRB at 76. Apple further contends that '648 patent claim 24 is invalid for lack of written description with respect to being "configured to substantially prevent light piping." *Id.* Dr. Warren testified that the specification only provides "a vague correlation" between the use of opaque materials and the reduction of light piping. Tr. (Warren) at 1247:24-1248:4.

Complainants argue that Dr. Warren's conclusory testimony is insufficient to meet Apple's clear and convincing burden. CIB at 182. Complainants submit that the specification explicitly teaches the use of a hard opaque plastic to reduce light piping. *Id.* at 183 (citing JX-0001 at 7:65-8:7, 43:32-36). Complainants further cite an embodiment described in the specification wherein adding height "assists in deflecting light piping through the sensor." JX-0001 at 25:47-62. Dr. Madisetti reviewed these disclosures and offered his opinion that the written description and enablement requirements have been met for each of the "light piping" limitations. Tr. (Madisetti) at 1350:4-21, 1352:25-1353:11.

In consideration of the parties' arguments, the evidence of record fails to show, clearly and convincingly, that the specification of the Poeze patents fails to enable the "light piping" limitations of the asserted claims or lacks adequate written description with respect to '648

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patent claim 24. As with the "touchscreen" arguments, Apple has not presented any argument regarding the majority of the *Wands* factors, instead citing to a single sentence of expert testimony regarding the lack of explicit guidance in the specification. *See* RIB at 152-53; CRB at 104-105. Moreover, the specification explicitly teaches that "[t]he protrusion can advantageously include plastic, including a hard opaque plastic, such as a black or other colored plastic, helpful in reducing light noise," and "[s]uch light noise includes light piping." JX-0001 at 7:65-8:7. In reference to the Figure 3 embodiments, a "noise shield" is disclosed that "may be configured to reduce noise, such as from ambient light and electromagnetic noise." *Id.* at 43:30-33. The specification provides that the noise shield "may be constructed from materials having an opaque color, such as black or a dark blue, to prevent light piping." *Id.* at 43:33-36. This teaching is also referenced in the context of Figures 7A and 7B, where the specification describes a "shielding enclosure" that "can include an opaque material to not only reduce electrical noise, but also ambient optical noise." *Id.* at 27:1-3.[62] *See generally* CIB at 182-183.

In view of the above, Apple has failed to show by clear and convincing evidence that any asserted claims are invalid for lack of enablement with respect to the "light piping" limitations.

Further, the undersigned finds that Apple has not shown by clear and convincing evidence that '648 patent claim 24 is invalid for lack of written description with respect to being "configured to substantially prevent light piping." Apple's written description argument is unclear and appears to be based on the same issues discussed with regard to enablement. *See* RIB at 152-53. For the reasons discussed *supra*, including the specification's descriptions

[62] In another embodiment where "an extension" is used "to increase the height of [a] partially cylindrical protrusion," "the added height assists in deflecting light piped through the sensor." JX-001 at 25:43-62.

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regarding light piping and the lack of sufficient expert testimony or other record evidence, Apple has not met its burden.

I. Prosecution Laches and Unclean Hands

Apple argues that the Poeze patents are unenforceable due to prosecution laches and the doctrine of unclean hands because of Complainants' delays in patent prosecution. RIB at 153-59; RRB at 77-79.

Apple submits that the provisional applications that led to the Poeze patents were filed in July and August 2008, and Masimo continued to file related continuations and continuations-in-part through July 2010. *See* JX-001; JX-002; JX-003. After a five-year gap (and after the first Apple Watch was released), Masimo filed a new continuation application in December 2015. *See* U.S. Patent App. No. 14/981,290 (cited in JX-001; JX-002; JX-003). Masimo then filed several additional continuation applications between December 2018 and March 2020,[63] and then filed the applications leading to the three asserted Poeze patents on September 24, 2020, within days of the release of the Apple Watch Series 6. *See* JX-001; JX-002; JX-003; RX-0333 (9/15/20 press release announcing Apple Watch Series 6).

Apple argues that the twelve-year delay between the 2008 filings of the original provisional applications and the 2020 filings of the continuation applications for the Poeze patents warrants a determination that the patents are unenforceable due to prosecution laches. RIB at 153-59. Apple submits that Masimo has provided no credible explanation for the long delay in filing the continuation applications and that the totality of the circumstances shows that Masimo lacked diligence in prosecuting the Poeze patents. *Id.* at 155-57. Apple argues that the

[63] Apple argues that these continuation applications were filed after the release of version of the Apple Watch in 2018 and 2019. *See* RDX-1.16.

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timing of Masimo's patent application filings shows that the delays in prosecution were intentional—taking advantage of the growth in the market for wearable technology and allowing Masimo to draft claims targeting Apple Watch products after their release. *Id.* at 156-57.

Apple submits that it has suffered prejudice due to Masimo's patent prosecution delays, because Apple invested heavily in the development of the Apple Watch products, including the blood oxygen feature. RIB at 157-58; RRB at 78. Apple argues that Masimo gained an improper litigation advantage by waiting to draft its patent claims until after the release of the Apple Watch Series 6, noting that the prosecuting attorney for the Poeze patents admitted that he had [redacted] of the Apple Watch Series 6 during prosecution. *See* Tr. (Cromar) at 1031:13-22. Apple argues that the prosecution of other patents in the family of the Poeze patents is irrelevant to the inquiry into whether Masimo was diligent with respect to the prosecution of the asserted Poeze patents. RRB at 77-78.

Apple argues that Masimo's conduct with respect to the prosecution of the Poeze patents meets the legal requirements for unenforceability due to prosecution laches and also that this conduct should bar Complainants' claims for relief in this investigation under the doctrine of unclean hands. RIB at 158-59; RRB at 77-79.

Complainants argue that Apple has failed to meet its burden with respect to prosecution laches or unclean hands. CIB at 183-85; CRB at 105-108. Complainants submit that the prosecution of applications in the family of the Poeze patents was continuous throughout the alleged 12-year period identified by Apple. CIB at 183-84. Mr. Cromar testified that there were "a dozen applications being actively prosecuted" during the alleged five-year "gap" between 2010 and 2015. Tr. (Cromar) at 1039:7-12. Complainants' expert on PTO practice and procedure, Robert Stoll, testified that there was a "continuous unbroken chain of patent

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prosecution" in the family of the Poeze patents. Tr. (Stoll) at 1415:2-10. Complainants argue that the legal precedent requires considering diligence with respect to all of these related patent applications. CRB at 106. Complainants dispute Apple's timeline tying patent application filings to versions of the Apple Watch, which were released every year from 2015 to 2020. *Id.* at 106-107. Complainants argue that there is nothing improper about drafting claims to cover competitors' products. *Id.* at 107-108. Complainants further argue that there can be no prejudice to Apple because the specification of the Poeze patents was published in February 2010. *See* CX-0137 (U.S. Patent Pub. No. 2010/0030040).

In consideration of the parties' arguments, the undersigned finds that Apple has not carried its burden to show that the Poeze patents should be found unenforceable due to prosecution laches or unclean hands. To establish a defense of prosecution laches, an accused infringer must show: (1) that the patentee's delay in prosecution was unreasonable and inexcusable under the totality of circumstances, and (2) that the accused infringer suffered prejudice attributable to the delay. *Cancer Rsch. Tech. Ltd. v. Barr Labs., Inc.*, 625 F.3d 724, 728-29 (Fed. Cir. 2010). The Federal Circuit has held that "an examination of the totality of the circumstances[] include[s] the prosecution history of all of a series of related patents." *Symbol Techs., Inc. v. Lemelson Med., Educ. & Rsch. Found.*, 422 F.3d 1378, 1386 (Fed. Cir. 2005) ("*Symbol Techs.*").

Here, the record evidence is insufficient to support a finding of unreasonable or inexcusable delay with respect to the prosecution of the Poeze patents. Apple cites a five-year delay in the filing of continuation applications between 2010 and 2015, but there was continuous prosecution activity in the family of the Poeze patents during this time. *See* Tr. (Cromar) at

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1038:7-19.[64] The fact that the 2015 continuation application could have been filed earlier is not a sufficient basis for finding of prosecution laches, as the Federal Circuit has recognized that "[t]here are legitimate grounds for refiling a patent application which should not normally be grounds for a holding of laches, and … [t]he doctrine should be applied only in egregious cases of misuse of the statutory patent system . *Symbol Techs.*, 422 F.3d at 1385. The next application in the Poeze patent family was a divisional application (U.S. Patent Application No. 16/212,537) filed in December 2018, and the Federal Circuit has held that "[f]iling a divisional application in response to a requirement for restriction" is a "legitimate reason for refiling a patent application . . . even when one defers the filing of a divisional application until just before the issuance of the parent application." *Id.* In the context of this continuous prosecution activity in the family of the Poeze patents, Apple's arguments tying certain patent application filings to release dates for the Apple Watch is unpersuasive. *See* RDX-1C.16. Apple has failed to identify actions by Masimo that resemble the type of conduct recognized by the Federal Circuit as unjustifiable prosecution delay, such as refiling applications containing previously-allowed claims, repetitive filing of applications that were merely placeholders, or a "consistent pattern of receiving a rejection on an application, filing a continuation application without any amendments, and abandoning the original application." *See Hyatt v. Hirshfeld*, 998 F.3d 1347, 1361-62, 1366-69 (Fed. Cir.

[64] U.S. Patent Application No. 12/497,523, filed on July 2, 2009, issued as U.S. Patent No. 8,347,825 on May 7, 2013; U.S. Patent Application No. 12/497/528, filed on July 2, 2009, issued as U.S. Patent No. 8,577,431 on November 5, 2013; and U.S. Patent Application No. 12/829,352, filed on July 1, 2010, issued as U.S. Patent No. 9,277,880 on March 8, 2016. *See* JX-0001 (identifying continuation applications); JX-004 at 418-26 (information disclosure statement identifying Masimo's pending patent applications and issued patents).

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2021).[65] The record evidence in this investigation is insufficient to support a finding of prosecution laches.

Moreover, because the undersigned does not find evidence of bad faith conduct by Masimo during the prosecution of the Poeze patents, there is no basis for any finding of unclean hands. Apple's unclean hands defense is based solely on Masimo's alleged misconduct during the prosecution of the Poeze patents, RIB at 158-59, and Apple does not argue that any particular conduct would be the basis for a finding of unclean hands without a finding of inequitable conduct.

V. U.S. PATENT NO. 10,687,745

The '745 patent is entitled "Physiological Monitoring Devices, Systems, and Methods," naming inventor Ammar Al-Ali and issuing from an application filed on March 31, 2020, claiming priority to a provisional application filed on July 2, 2015, and a non-provisional application filed on June 28, 2016. JX-009.

A. Specification

The specification of the '745 patent describes a method for pulse oximetry wherein an emitter irradiates a surface area on the skin. *See* JX-009 at 6:21-54, Fig. 2. The patent refers to this method as "three-dimensional (3D) pulse oximetry in which the emitted light irradiates a larger volume of tissue . . . as compared to the 2D point optical source approach." *Id.* at 6:21-26.

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[65] Apple points to evidence that Masimo's patent prosecution counsel had [redacted] during prosecution, Tr. (Cromar) at 1031:13-22, but the Federal Circuit has held that "there is nothing improper, illegal or inequitable in filing a patent application for the purpose of obtaining a right to exclude a known competitor's product from the market; nor is it in any manner improper to amend or insert claims intended to cover a competitor's product the applicant's attorney has learned about during the prosecution of a patent application." *Kingsdown Med. Consultants, Ltd. v. Hollister Inc.*, 863 F.2d 867, 874 (Fed. Cir. 1988). Moreover, Apple has not provided evidence showing that newly asserted claim limitations were specifically drawn to the Accused Products.

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In one embodiment, a "light diffuser 304 receives the optical radiation emitted from the emitter 302 and spreads the optical radiation over an area." *Id.* at 7:42-44.

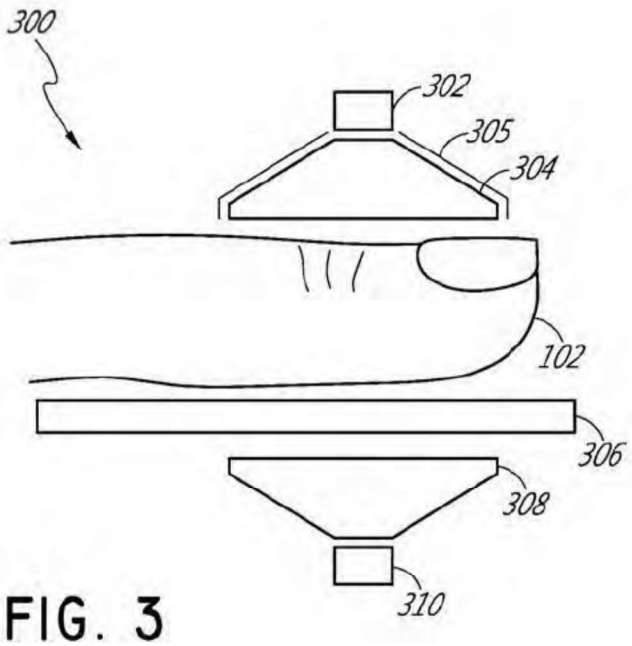


FIG. 3

Id. at Fig. 3. The specification provides examples of the diffuser distributing light "in a predefined geometry (e.g., a rectangle, square, or circle)." *Id.* at 8:9-12. The specification further describes a "light concentrator 308," which "is a structure to receive the emitted optical radiation, after attenuation by the tissue measurement site 102." *Id.* at 9:11-18.

In a separate embodiment, a "3D sensor 700 can be placed on a portion of the patient's body that has relatively flat surface, such as, for example a wrist, because emitter 702 and detector 710 are located on the same side of the tissue measurement site 102." *Id.* at 10:40-51.

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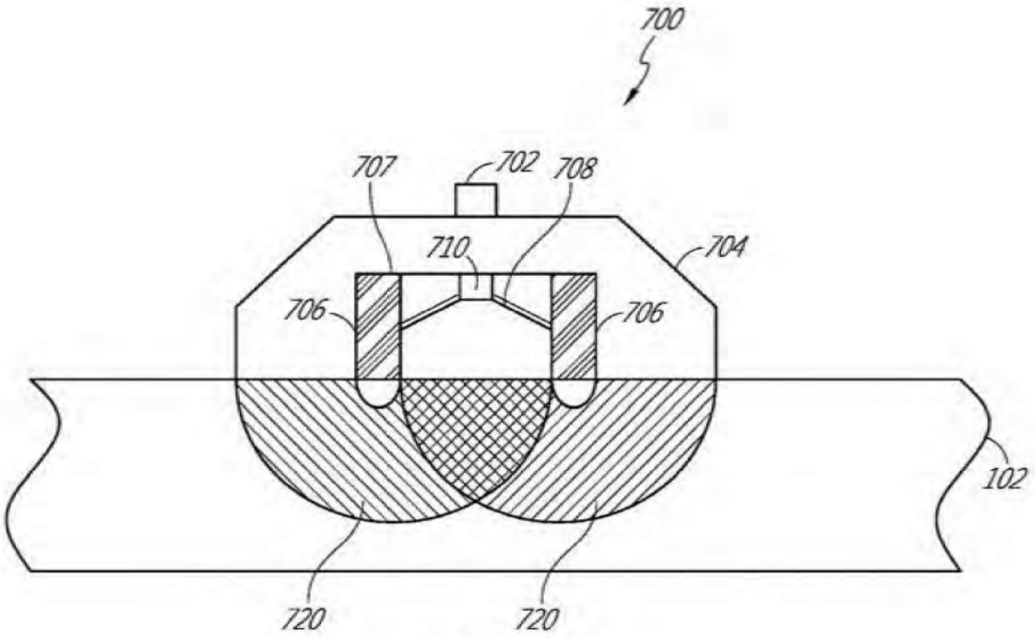


FIG. 7A

Id. at Fig. 7A. This embodiment includes a "light diffuser 704" that "receives the optical radiation emitted from the emitter 702 and homogenously spreads the optical radiation over a wide, donut-shaped area." *Id.* at 10:65-11:9, Fig. 7B. This embodiment further comprises a "light blocker 706" that "includes an annular ring having a cover portion 707 sized and shaped to form a light isolation chamber for the light concentrator 708 and the detector 710." *Id.* at 11:11-13.

B. Claims

Complainants assert infringement of claims 9 and 27, and they rely on claim 18 for domestic industry. Claim 9 depends from claim 1, recited below:

> 1. A physiological monitoring device comprising:
>
> a plurality of light-emitting diodes configured to emit light in a first shape;
>
> a material configured to be positioned between the plurality of light-emitting diodes and tissue on a wrist of a user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape

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by which the light emitted from one or more of the plurality of light-emitting diodes is projected towards the tissue;

a plurality of photodiodes configured to detect at least a portion of the light after the at least the portion of the light passes through the tissue, the plurality of photodiodes further configured to output at least one signal responsive to the detected light;

a surface comprising a dark-colored coating, the surface configured to be positioned between the plurality of photodiodes and the tissue when the physiological monitoring device is in use, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface;

a light block configured to prevent at least a portion of the light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the tissue; and

a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal.

JX-009 at 15:31-61.

9. The physiological monitoring device of claim 1, wherein the physiological parameter comprises oxygen saturation.

Id. at 16:21-23. Claim 18 depends from claim 15, recited below:

15. A physiological monitoring device comprising:

a plurality of light-emitting diodes configured to emit light proximate a wrist of a user;

a light diffusing material configured to be positioned between the plurality of light-emitting diodes and a tissue measurement site on the wrist of the user when the physiological monitoring device is in use;

a light block having a circular shape;

a plurality of photodiodes configured to detect at least a portion of the light emitted from the plurality of light-emitting diodes after the light passes through the light diffusing material and a portion of the tissue measurement site encircled by the light block, wherein the plurality of photodiodes are arranged in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site encircled by the light block, wherein the plurality of photodiodes are further configured to output at least one signal

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responsive to the detected light, and wherein the plurality of light-emitting diodes and the plurality of photodiodes are arranged in a reflectance measurement configuration;

wherein the light block is configured to optically isolate the plurality of light-emitting diodes from the plurality of photodiodes by preventing at least a portion of light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the portion of the tissue measurement site;

a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal; and

wherein the physiological monitoring device is configured to transmit physiological parameter data to a separate processor.

Id. at 16:36-17:3.

18. The physiological monitoring device of claim 15, wherein the physiological parameter comprises oxygen saturation.

Id. at 17:10-12. Claim 27 depends from claim 20, recited below:

20. A system configured to measure one or more physiological parameters of a user, the system comprising:

a physiological monitoring device comprising:

a plurality of light-emitting diodes configured to emit light in a first shape;

a material configured to be positioned between the plurality of light-emitting diodes and tissue of the user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of light-emitting diodes is projected towards the tissue;

a plurality of photodiodes configured to detect at least a portion of the light after the at least the portion of the light passes through the tissue, the plurality of photodiodes further configured to output at least one signal responsive to the detected light;

a surface comprising a dark-colored coating, the surface configured to be positioned between the plurality of photodiodes and the tissue when the physiological monitoring device is in use, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface;

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a light block configured to prevent at least a portion of light from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the tissue; and

a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal; and

a processing device configured to wirelessly receive physiological parameter data from the physiological monitoring device, wherein the processing device comprises a user interface, a storage device, and a network interface configured to wirelessly communicate with the physiological monitoring device, and wherein the user interface includes a touch-screen display configured to present visual feedback responsive to the physiological parameter data.

Id. at 17:20-18:18.

27. The system of claim 20, wherein at least one of the plurality of light-emitting diodes is configured to emit light of a first wavelength and at least one of the plurality of light-emitting diodes is configured to emit light of a second wavelength, the second wavelength being different than the first wavelength.

Id. at 16:21-23.

C. Level of Ordinary Skill in the Art

The parties have stipulated to the same level of ordinary skill in the art for the '745 patent as the Poeze patents:

> [A] person with a working knowledge of physiological monitoring technologies. The person would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, including but not limited to physiological monitoring technologies. Alternatively, the person could have also had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline.

Joint Stipulation of Facts ¶ 10, EDIS Doc. ID 770692 (May 13, 2022).

D. Claim Construction

The parties dispute the construction of the term "second shape" in claims 1 and 20, but they agree that the differences between their proposed constructions do not affect any disputed

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issue. *See* CIB at 185-86; RIB at 163-64. Accordingly, this term shall be construed to have its plain and ordinary meaning, which the parties agree is "a shape different from the first shape." *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (Claims must be construed "only to the extent necessary to resolve the controversy.").

E. Infringement

Complainants allege that the Accused Products infringe claims 9 and 27 of the '745 patent, relying on a theory of induced infringement with respect to claim 27. CIB at 188-202. Apple only disputes infringement with respect to the "first shape" and "second shape" limitations. RIB at 164-73; RRB at 81-88. For the reasons discussed below, the undersigned finds that Complainants have not shown, by a preponderance of the evidence, that the Accused Products infringe claims 9 or 27 of the '745 patent.

1. '745 Patent Claim 9

a. Element [1 preamble]: "A physiological monitoring device comprising"

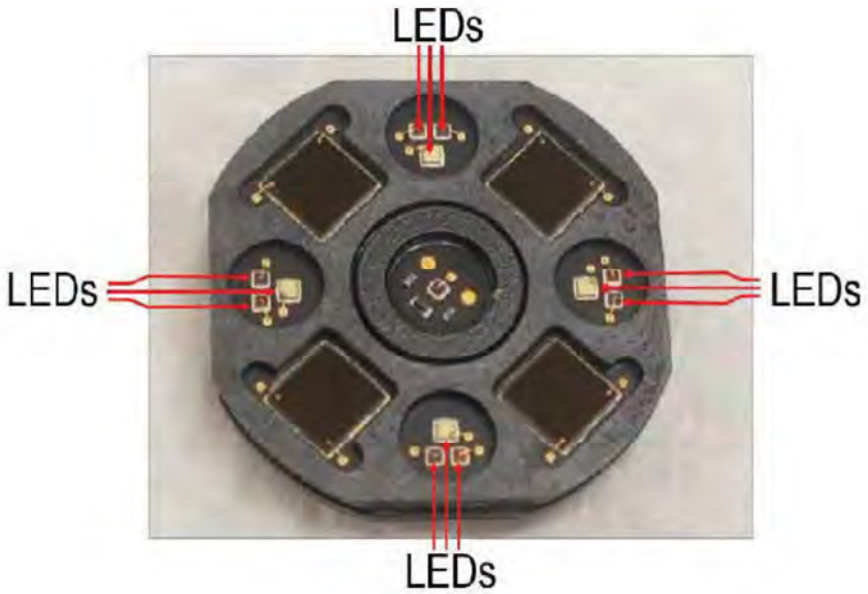
There is no dispute that each of the Accused Products is a "physiological monitoring device" as required by the preamble of claim 1. *See* CIB at 188.[66] Dr. Madisetti identified evidence that the Accused Products are devices that can measure blood oxygen. Tr. (Madisetti) at 729:24-730:6; CDX-0011C.073; CX-0241C (Apple Watch Series First Look); CX-1532 at 4-5 (Apple Watch Series 6 Press Release); CX-1447 at 7 (Apple Watch Series 7 website); CX-1449 at 2 (Apple Watch Series 7 website). Accordingly, the evidence of record shows that the preamble limitations are met by the Accused Products.

[66] The parties have stipulated that the preambles of the asserted patent claims are limiting. *See* Joint Stipulation of Facts ¶ 9, EDIS Doc. ID 770692 (May 13, 2022).

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b. Element [1A] "a plurality of light-emitting diodes configured to emit light in a first shape"

There is no dispute that each of the Accused Products has a plurality of light-emitting diodes emitting light in a shape. *See* CIB at 188-90. Dr. Madisetti identified four sets of red, infrared, and green LEDs on the sensor board of the Accused Products. Tr. (Madisetti) at 730:7-731:1.



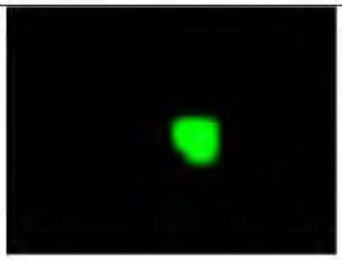
CDX-0011C.074 (labeling LEDs on CX-1548C at 37); *see also* CX-0281C (Block Dep. Tr.) at 83:11-85:16 (identifying LEDs in the Accused Products); Tr. (Mehra) at 855:4-856:14 (describing LEDs in the Accused Products); CX-0057C at 2 (Series 6 schematic); CX-0059C at 2 (Series 7 schematic).

Dr. Madisetti also used a camera to capture images of the light emitted by the LEDs in the Accused Products. Tr. (Madisetti) at 724:14-729:23, 730:7-731:1.

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Green (Surface)	Red (Surface)	IR (Surface)
		

CDX-0011C.074 (citing CX-1546C at 5, 15, 1); CIB at 189-90. Dr. Madisetti also captured images of the light 2mm from the LEDs—before passing through a [redacted] Tr. (Madisetti) at 745:5-25.

Green [redacted]	Red [redacted]	IR [redacted]
		

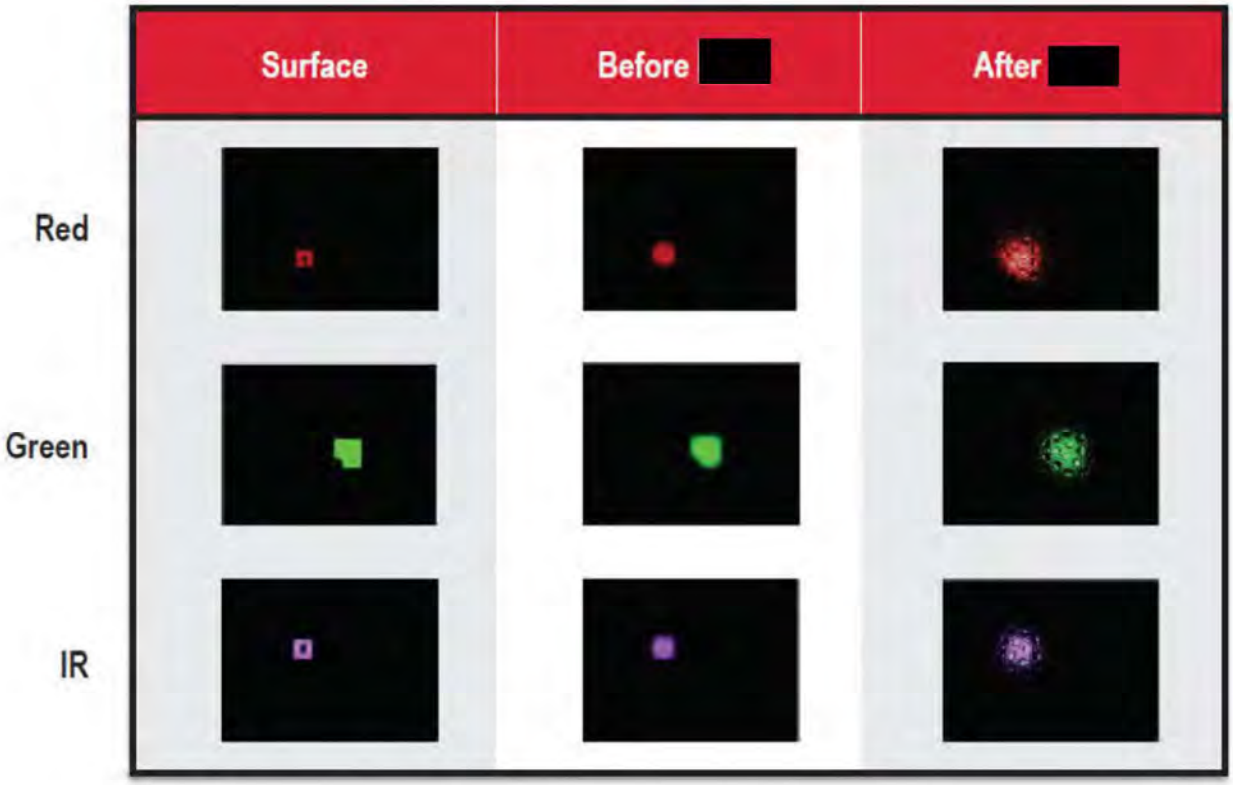
CX-1546C at 5, 15, 1; *see* CDX-0011C.091; CIB at 189-90.[67] There is no dispute that this light is emitted in a shape, and accordingly, the evidence of record shows that this limitation is met.

[67] As discussed *infra* in the context of the "material" limitation, the relevant "first shape" is the shape of the light before passing through the lens.

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c. Element [1B]: "a material configured to be positioned between the plurality of light-emitting diodes and tissue on a wrist of a user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of light-emitting diodes is projected towards the tissue"

With respect to the "material configured to be positioned between the plurality of light-emitting diodes and tissue on a wrist of a user," Dr. Madisetti identified a [redacted] that is positioned between the LEDs and the wrist of the user. Tr. (Madisetti) at 731:25-732:24; CDX-0011C.076. Dr. Madisetti used a camera to capture images of the light 2mm from the LEDs—before passing through [redacted]. Tr. (Madisetti) at 745:5-25; CDX-0011C.091 (citing CX-1546C at 5, 15, 1). He also captured images of the light after passing through [redacted] and compared the shape of the light at three locations—at the LEDs, before [redacted] and after [redacted]. Tr. (Madisetti) at 732:25-733:18, 747:3-12.



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CDX-0011C.091 (citing CX-154C at 1, 5, 15). He offered his opinion that the "first shape" at the surface of the LEDs and before [redacted] is different from the "second shape" after [redacted]. Tr. (Madisetti) at 732:25-733:18, 747:3-12. He testified at the hearing: "So you can see clearly with our naked eye that the shapes before [redacted], which is the first shape, and the second shape, which is after [redacted], are different." *Id.* at 733:15-17.

Apple argues that this limitation is not infringed for two reasons: (1) the "first shape" emitted by the LEDs is not the same "first shape" entering [redacted]; and (2) [redacted] is not configured to change the "first shape" into a "second shape." RIB at 164-73; RRB at 81-88. These two issues are addressed separately below:

(i) "first shape"

Apple argues that the plain language of the claim requires the "first shape" of the light emitted at the LEDs to be the same "first shape" of the light received by [redacted]. RIB at 164-65. Apple points to Figure 7A, where there is no gap between the emission of light at LED 702 and the light diffuser 704 where the light is received. JX-009 at 10:65-11:2, Fig. 7B; *see* Tr. (Sarrafzadeh) at 1112:22-1113:10. Apple engineer Dr. Venugopal testified that the LEDs in the Accused Products "have a square shape" and emit light that "is square in shape." Tr. (Venugopal) at 830:4-5, 830:19-22. He further explained that the light emitted from the LEDs "spreads significantly in all direction[s] based on the physics of the LED surface and spreads towards the microlens array and assumes a generally circular shape." *Id.* at 830:25-831:3. Apple's expert Dr. Sarrafzadeh offered opinions that are consistent with Dr. Venugopal's testimony, identifying the square shape of light emitted from the LEDs, which "changes to more of a circular shape, as expected by Lambertian emission." Tr. (Sarrafzadeh) at 1115:2-15. He described the shape of the light at the LEDs as "more of a square shape-ish" and "a concave

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polygon." *Id.* at 1115:25-1116:11. He described the shape of the light received by [redacted] as "more of a closer to a circle shape" and a "convex polygon." *Id.* Relying on "fundamentals of geometry," he testified that "concave polygons are fundamentally different from convex polygons." *Id.* He offered his opinion that "the shape that is emitted at the surface of LED is fundamentally different from the shape that is received by [redacted], as we saw in the three examples, and we know that because of physics." *Id.* at 1116:23-1117:8.

Complainants disagree with Apple's interpretation of this claim language, arguing that the designation of the "first shape" in the claims does not require that the shape be unchanged between the LEDs and [redacted]. CIB at 186. Complainants submit that the specification only discusses changes in shape caused by the "beam shaper" that receives light from the LEDs before reaching the user's skin. *See* JX-009 at 7:42-56. Complainants identify a gap between the light emitter and the beam shaper depicted in Figure 3 of the specification, arguing that Apple's interpretation of the claim language would exclude this embodiment. CIB at 187; *see* JX-009 at Fig. 3. Dr. Madisetti reviewed the disclosures in the specification and offered his opinion that the claims "do not require the material to receive light in the same shape that was emitted by the LEDs." Tr. (Madisetti) at 746:13-747:2. Complainants argue that the "first shape" is any shape emitted from the LEDs in between the LEDs and the material. *See* CRB at 110 ("In the claims, the 'first shape' refers to any shape of light emitted by the LEDs before the claimed 'material' changes it into a second shape.").

In consideration of the parties' arguments, the undersigned finds that the language of claim 1 does not require that the emitted light has the same "first shape" at the surface of the LEDs as it has at the surface of the "material configured to change the first shape into a second shape." The first limitation of the claim provides that the LEDs are "configured to emit light in a

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first shape," but the term "emit" is not necessarily limited to the surface of the LEDs. There is light "emitted" from the LEDs described in several other limitations of the claim—light that has been changed into a second shape is described as "light emitted from one or more of the plurality of light-emitting diodes," and certain light that is affected by the light block is also described as "light emitted from the plurality of light-emitting diodes." *See* JX-009 at 15:38-41, 15:54-57. Accordingly, while Apple has offered a plausible interpretation of the claim language to refer to the shape of light at the surface of the LEDs, it is clear from other limitations of the claim that the term "emit" is not limited to this meaning.[68]

The specification of the '745 patent supports this interpretation of the "first shape" limitation. When describing the Figure 3 embodiment that is shown with a gap between the emitter and the light diffuser, the specification provides that "[t]he light diffuser 304 receives the optical radiation emitted from the emitter 302 and spreads the optical radiation over an area." JX-009 at 7:42-44, Fig. 3. The same language is used in the context of Figure 7A, which does not show a gap between the emitter and the light diffuser: "The light diffuser 704 receives the optical radiation emitted from the emitter 702 and homogenously spreads the optical radiation over a wide, donut-shaped area." *Id.* at 10:65-11:2, Fig. 7A. In both embodiments the light "emitted from" the LEDs is the light received at the light diffuser, which takes this light and spreads it into a wide shape. The spreading and/or shaping of light by the light diffuser is

[68] Claim 15 also refers to light that has passed through a light diffusing material as "light emitted from one or more of the plurality of light-emitting diodes," and certain light that is affected by the light block is also described as "light emitted from the plurality of light-emitting diodes." *See* JX-009 at 16:44-63.

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emphasized in the specification,[69] and there is no discussion in the specification of the shape of the light at the surface of the LEDs.

The undersigned thus finds that the reading of the "first shape" limitation that most naturally aligns with the patent's description of the invention is that the light emitted by the LEDs in a "first shape" refers to the shape of the light that is received by the light diffuser, *i.e.* the claimed "material," which is "configured to change the first shape into a second shape."[70] The undersigned thus finds that both Complainants' and Apple's proposed constructions are incorrect. The "first shape" does not refer to "any" shape of the light between the LEDs and the light diffuser, as proposed by Complainants (*see* CRB at 110), and there is no separate requirement that the shape of the light at the surface of the LEDs be the same as the shape of the light that is received by the light diffuser, as proposed by Apple. Accordingly, there is no basis for Apple's non-infringement argument regarding the "first shape."

(ii) "second shape"

With respect to the "second shape," Apple submits that [redacted] is not configured to change the shape of the light passing through it. RIB at 170-73; RRB at 86-87. Dr. Venugopal testified that "[redacted]." Tr. (Venugopal) at 831:4-9. With respect to the shape of the light passing through [redacted], he testified that "[redacted]." *Id.* Reviewing Dr. Madisetti's images of the light before and after [redacted]

[69] The specification describes "the disclosed systems, devices and methods to implement three-dimensional (3D) pulse oximetry in which the emitted light irradiates a larger volume of tissue at the measurement site 102 as compared to the 2D point optical source approach," which is described as "conventional pulse oximetry." JX-009 at 6:21-25, 5:41-43, Fig. 1, Fig. 2.

[70] The cases that Apple cites regarding antecedent basis are consistent with this construction, *see* RIB at 164, because the two limitations of the claim refer to the same "first shape."

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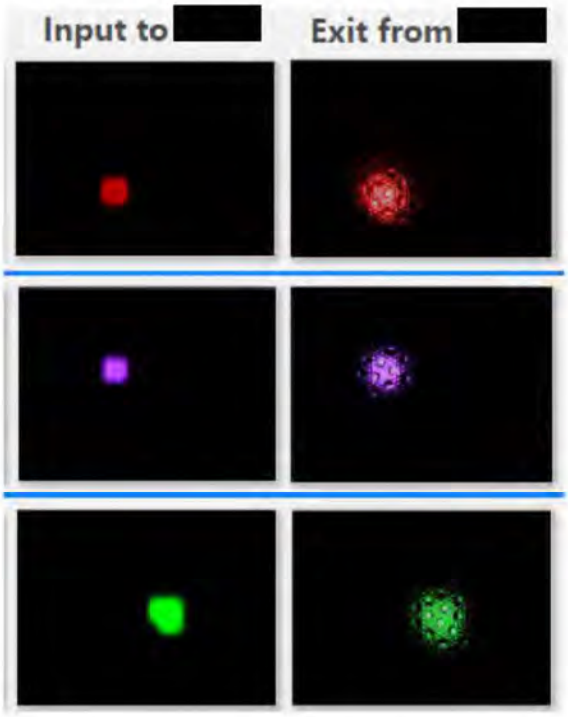
Dr. Sarrafzadeh offered his opinion that these were the same shape: "the input to [redacted] shapes are more or less a circular form, and as they exit [redacted] they are also more or less a circular form." Tr. (Sarrafzadeh) at 1118:1-11. Dr. Sarrafzadeh acknowledges that there are "dark spots" in the [redacted] images, but he explains that these are variations in intensity rather than shape. *Id.* at 1119:24-1120:4. Apple further argues that Dr. Madisetti failed to explicitly analyze the difference between the "first shape" before [redacted] and the "second shape" after [redacted]. RIB at 172-73.

In reply, Complainants cite Dr. Madisetti's testimony that there is a change in shape between the images before [redacted] and after [redacted]. *See* Tr. (Madisetti) at 747:3-12; CDX-0011C.091. Complainants dispute Dr. Sarrafzadeh's analysis of the dark spots in Dr. Madisetti's images and argue that there is no support for his testimony that intensity variations are not a change in shape. CRB at 115. Complainants cite the '745 patent specification's discussion of a circle and donut as distinct shapes, arguing that a shape is not solely defined by its perimeter. JX-009 at 10:65-11:2. Complainants argue that the difference in shape before and after [redacted] is "self-evident," and "readily apparent." CIB at 194; CRB at 118.

In consideration of the parties' arguments, the undersigned finds that Complainants have failed to carry their burden to prove infringement with respect to the "second shape" limitation. The undersigned agrees with Apple that Dr. Madisetti's analysis with respect to this limitation was unreliable and conclusory. *See* RIB at 160-62. His primary infringement analysis compared the images of the light at the LEDs with images of light after [redacted], *see* Tr. (Madisetti) at 733:5-18; CDX-0011C.077, but as discussed above, the relevant "first shape" is immediately before [redacted], because it is [redacted] that must be configured to change the light from the "first shape" to the "second shape." When Dr. Madisetti compared images of light immediately

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before and after [redacted], he only offered conclusory testimony that "you can clearly see that the shape changes." Tr. (Madisetti) at 747:3-12; CDX-0011C.091. Complainants rely on this testimony and argue that the difference between the shapes is "self-evident" or "readily apparent." CIB at 194; CRB at 118. Apple disputes Complainants' contentions, however, and Dr. Sarrafzadeh describes the shapes of the two sets of images as "more or less circular," with shapes that are "relatively the same." *Id.* at 1118:1-24.



RDX-0007.144C (citing CX-0307iC).

The undersigned finds that neither Dr. Madisetti nor Dr. Sarrafzadeh have disclosed a reliable methodology for identifying shapes or determining whether one shape is different from another. Their testimony at hearing comparing the "first shape" images to the "second shape" images was conclusory and unreliable, with Dr. Madisetti failing to even identify the allegedly different shapes that he observed. Indeed, on cross-examination, Dr. Madisetti was presented with several shape outlines and was asked for his opinion on whether the shapes were the same

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or different. Tr. (Madisetti) at 782:6-783:12. Despite Complainants' argument that changes in shape are "self-evident," Dr. Madisetti could not offer an opinion as to whether certain at least somewhat different images represented a change in "shape." *Id.* (stating that he could not say whether RDX-12.3 and RDX-12.5 showed a change in shape); *see also id.* at 1384:23-1385:10 (indicating that images in RDX-12.5 were known to him from his own testing). Dr. Madisetti's inability to compare such shapes underscores the lack of any reliable methodology in his infringement analysis. *See* RIB at 168-69.[71]

Moreover, the '745 patent specification describes shapes that are "substantially rectangular, square, circular, oval, or annular, among others." JX-009 at 3:12-14; *see also id.* at 8:9-12 ("a predefined geometry (e.g., a rectangle, square, or circle)"). Another part of the specification describes "a wide, donut-shaped area." *Id.* at 10:65-11:2.[72] Dr. Madisetti did not use any such descriptors to identify shapes in his images of the emitted light in Accused Products—he only offered conclusory opinions that certain shapes were "different" or observing

[71] The specification indicates that that a diffuser may provide a "defined area shape" only in some embodiments of the invention. *See* JX-009 at 3:5-14 ("In certain embodiments of the present disclosure, the diffuser comprises glass, ground glass, glass beads, opal glass, or a microlens-based, band-limited, engineered diffuser that can deliver efficient and uniform illumination. ***In some embodiments, the diffuser is further configured to define a surface area shape*** by which the emitted spread light is distributed onto a surface of the tissue measurement site. The defined surface area shape can include, by way of non-limiting example, a shape that is substantially rectangular, square, circular, oval, or annular, among others."). This language also indicates that light diffusion, in itself, does not necessarily provide changes in "shape." This is reflected in claim 15 of the '745 patent, which is asserted for domestic industry (as part of dependent claim 18) but not for infringement, requiring a "light diffusing material" without any limitations regarding the shape of the light. *Id.* at 16:36-17:3.

[72] All of these references to shapes in the specification refer to the "second shape" after the light diffuser, which is projected on to the skin. There is no discussion of the "first shape" of light before the light diffuser, except in the context of prior art "point optical sources," wherein the measurement site is an "irradiated circular area of the point optical source." JX-009 at 5:54-0, Fig. 1.

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"changes" between images. *See* Tr. (Madisetti) at 733:5-18, 747:3-12.[73] The undersigned agrees with Complainants that there are differences in the emitted light before and after [redacted],[74] but Complainants have failed to present sufficient credible evidence that these differences represent two different "shapes." A preponderance of the evidence does not support a finding that the Accused Products meet this limitation.

In addition, there is no evidence in the record that Apple configured [redacted] to change the shape of the light. Dr. Venugopal testified that [redacted] for the Apple Watch Series 6 was designed "[redacted]." Tr. (Venugopal) at 826:13-829:14. Apple engineering documents corroborate Dr. Venugopal's testimony—showing that Apple considered [redacted]. RX-0895C at 317. Complainants are not required to prove intent with respect to an apparatus claim, but the Apple engineering documents in the record are consistent with Dr. Venugopal's testimony that light passing through [redacted]" Tr. (Venugopal) at 831:4-9. It is Complainants' burden to prove that [redacted] is configured to change the emitted light from a first shape to a second shape, and a preponderance of the evidence does not support a finding that the Accused Products meet this limitation.

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[73] Although it is not clear that he applied any reliable methodology, Dr. Sarrafzadeh was more willing to describe specific shapes in the images of the Accused Products, such as "a square shape," "square shape-ish," "closer to a circle shape," or "more or less a circular form." Tr. (Sarrafzadeh) at 1115:17-1118:11.

[74] One visible difference between the images is the pattern of light and dark spots in the "second shape" images. *See* CX-0307iC at 10-21. Dr. Sarrafzadeh stated that the images have "light there, but the cameras don't show them" due to camera "deficiencies." Tr. (Sarrafzadeh) at 1118:4-8, 1119:24-1120:4. Dr. Madisetti's testing shows that there is light in the dark spots when viewed with a lower intensity threshold. CX-0307iC at 11 (images showing no dark spots with "intensity threshold at 0.05"); *see* RRB at 86-87. In any case, it is unclear whether such spots indicate a change in "shape."

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d. Element [1C]: "a plurality of photodiodes configured to detect at least a portion of the light after the at least the portion of the light passes through the tissue, the plurality of photodiodes further configured to output at least one signal responsive to the detected light"

There is no dispute that each of the Accused Products has four photodiodes configured to detect light after it passes through a user's tissue, outputting signals responsive to the detected light. *See* CIB at 196-77; *see* Tr. (Madisetti) at 733:19-734:15; CDX-0011C.078 (citing CX-1548C (Apple Watch Series 7 photograph) at 37; CX-1646C (Apple Watch Series 6 photograph); CX-0059C (Apple Watch Series 7 CAD drawings) at 2; CX-0057C (Apple Watch Series 6 CAD drawings); CX-0281C (Block Dep. Tr.) at 7:21-72:5; CX-0297C (Venugopal Dep. Tr.) at 95:5-96:11; CX-0299C (Waydo Dep. Tr.) at 28:22-29:8). The evidence of record shows that this limitation is met.

e. Element [1D]: "a surface comprising a dark-colored coating, the surface configured to be positioned between the plurality of photodiodes and the tissue when the physiological monitoring device is in use, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface"

There is no dispute that each of the Accused Products has a surface with a dark-colored coating positioned between the photodiodes and the user's skin, with openings above each photodiode allowing light to pass through. *See* CIB at 197; Tr. (Madisetti) at 734:16-735:18; CDX-0011C.079 (citing CX-0070C (Apple Watch Series 7 Specification) at 5; CX-0068C (Apple Watch Series 6 Specification) at 5; CX-0297C (Venugopal Dep. Tr.) at 188:16-189:1, 192:14-194:15; CX-0291C (Mehra Dep. Tr.) at 105:20-106:14, 111:19-112:8); *see also* Tr. (Block) at 901:13-902:3. The evidence of record shows that this limitation is met.

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f. Element [1E]: "a light block configured to prevent at least a portion of the light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the tissue"

There is no dispute that each of the Accused Products has an optical barrier that blocks light from the LEDs from reaching the photodiodes without first reaching the user's tissue. *See* CIB at 198; Tr. (Madisetti) at 735:19-736:19; CDX-0011C.080 (citing CX-0059C (Apple Watch Series 7 CAD drawings) at 1; CX-0057C (Apple Watch Series 6 CAD drawings) at 1; CX-0297C (Venugopal Dep. Tr.) at 92:6-93:3; CX-0281C (Block Dep. Tr.) at 59:5-20, 61:3-6, 81:5-22). The evidence of record shows that this limitation is met.

g. Element [1F]: "a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal"

There is no dispute that each of the Accused Products has a processor that receives and processes signals from the photodiodes and determines an oxygen saturation measurement. *See* CIB at 199; Tr. (Madisetti) at 736:20-737:12; CDX-0011C.081 (citing CX-0013C (ASIC schematic) at 12; CX-0100C ([redacted] ERS) at 7; CX-0299C (Waydo Dep. Tr. at 38:19-2, 39:2-6, 50:11-14, 68:12-21, 72:10-22, 73:16-19). The evidence of record shows that this limitation is met.

h. Element [9]: "wherein the physiological parameter comprises oxygen saturation"

Claim 9 of the '745 patent depends from claim 1, "wherein the physiological parameter comprises oxygen saturation." There is no dispute that each of the Accused Products measures oxygen saturation. *See* CIB at 199; Tr. (Madisetti) at 737:13-23; CDX-0011C.082 (citing CX-1447 (Apple Watch Series 7 website) at 7; CX-1532 (Apple Watch Series 6 website) at 4). The evidence of record shows that this limitation is met.

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Accordingly, the evidence does not show infringement of claim 9 because Complainants have not proven, by a preponderance, that the Accused Products have a material that is configured to change emitted light from a "first shape" into a "second shape," as required by claim 1.

2. '745 Patent Claim 27

a. Element [20 preamble]: "A system configured to measure one or more physiological parameters of a user, the system comprising: a physiological monitoring device comprising:"

The preamble of claim 20 of the '745 patent requires "[a] system configured to measure one or more physiological parameters of a user," including "a physiological monitoring device." The alleged "system" is an Accused Product in communication with an Apple iPhone. *See* CIB at 199-200. As discussed above in the context of the preamble of '745 patent claim 1, there is no dispute that the Accused Products are devices that can measure blood oxygen. *See* CIB at 201. Moreover, there is no dispute that the Accused Products can be used with an Apple iPhone. *Id*; *see* Tr. (Madisetti) at 738:25-740; CDX-0011C.085 (citing CX-1271 (Apple website) at 1; CX-0010 (Apple website) at 2-3; CX-0299C (Waydo Dep. Tr.) at 74:6-75:17). The evidence of record shows that this limitation is met.

b. Element [20A]: "a plurality of light-emitting diodes configured to emit light in a first shape"

Claim 20 has a "plurality of light-emitting diodes" limitation that is identical to the limitation of claim 1. As discussed above in the context of claim 1, there is no dispute that each of the Accused Products has a plurality of light-emitting diodes emitting light in a shape. *See* CIB at 201. The evidence of record shows that this limitation is met.

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c. Element [20B]: "a material configured to be positioned between the plurality of light-emitting diodes and tissue of the user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of light-emitting diodes is projected towards the tissue"

Claim 20 has a "material configured to change the first shape into a second shape" limitation that is identical to the limitation of claim 1. For the reasons discussed above in the context of claim 1, the undersigned finds that Complainants have not shown that the Accused Products have a material that is configured to change emitted light from a "first shape" into a "second shape."

d. Element [20C]: "a plurality of photodiodes configured to detect at least a portion of the light after the at least the portion of the light passes through the tissue, the plurality of photodiodes further configured to output at least one signal responsive to the detected light"

Claim 20 has a "plurality of photodiodes" limitation that is identical to the limitation of claim 1. As discussed above in the context of claim 1, there is no dispute that each of the Accused Products has four photodiodes configured to detect light after it passes through a user's tissue, outputting signals responsive to the detected light. *See* CIB at 201. The evidence of record shows that this limitation is met.

e. Element [20D]: "a surface comprising a dark-colored coating, the surface configured to be positioned between the plurality of photodiodes and the tissue when the physiological monitoring device is in use, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface"

Claim 20 has a "surface comprising a dark-colored coating" limitation that is identical to the limitation of claim 1. As discussed above in the context of claim 1, there is no dispute that each of the Accused Products has a surface with a dark-colored coating positioned between the

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photodiodes and the user's skin, with openings above each photodiode allowing light to pass through. *See* CIB at 201. The evidence of record shows that this limitation is met.

f. Element [20E]: "a light block configured to prevent at least a portion of the light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the tissue"

Claim 20 has a "light block" limitation that is identical to the limitation of claim 1. As discussed above in the context of claim 1, there is no dispute that each of the Accused Products has an optical barrier that blocks light from the LEDs from reaching the photodiodes without first reaching the user's tissue. *See* CIB at 201. The evidence of record shows that this limitation is met.

g. Element [20F]: "a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal"

Claim 20 has a "processor" limitation that is identical to the limitation of claim 1. As discussed above in the context of claim 1, there is no dispute that each of the Accused Products has a processor that receives and processes signals from the photodiodes and determines an oxygen saturation measurement. *See* CIB at 201. The evidence of record shows that this limitation is met.

h. Element [20G]: "a processing device configured to wirelessly receive physiological parameter data from the physiological monitoring device, wherein the processing device comprises a user interface, a storage device, and a network interface configured to wirelessly communicate with the physiological monitoring device, and wherein the user interface includes a touch-screen display configured to present visual feedback responsive to the physiological parameter data"

There is no dispute that an Apple iPhone is a processing device with a user interface, storage device, and wireless interface that can wirelessly communicate with the Accused

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Products, receive oxygen saturation data and present an oxygen saturation measurement on a touch-screen display. *See* CIB at 201; Tr. (Madisetti) at 740:6-24; CDX-0011C.086 (citing CX-0010C (Apple website) at 5; CX-1492 (Apple website) at 4; CX-0299C (Waydo Dep. Tr.) at 74:11-75:17). The evidence of record shows that this limitation is met.

i. Element [27]: "wherein at least one of the plurality of light-emitting diodes is configured to emit light of a first wavelength and at least one of the plurality of light-emitting diodes is configured to emit light of a second wavelength, the second wavelength being different than the first wavelength"

Claim 27 of the '745 patent depends from claim 20, further requiring that "at least one of the plurality of light-emitting diodes is configured to emit light of a first wavelength and at least one of the plurality of light-emitting diodes is configured to emit light of a second wavelength, the second wavelength being different than the first wavelength." There is no dispute that the Accused Products contain green (525 nm), red (660 nm), and infrared (850 nm) LEDs. *See* CIB at 202; Tr. (Madisetti) at 740:25-741:14; CDX-0011C.087 (citing CX-0059C (Apple Watch Series 7 drawing) at 2; CX-0057C (Apple Watch Series drawing) at 2; CX-0297C (Venugopal Dep. Tr.) at 53:1-55:14). The evidence of record shows that this limitation is met.

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Accordingly, the evidence does not show direct infringement of claim 27 because Complainants have not proven, by a preponderance, that the Accused Products have a material that is configured to change emitted light from a "first shape" into a "second shape," as required by claim 20 (from which claim 27 depends).

3. Induced Infringement

Complainants contend that Apple induces infringement of '745 patent claim 27 by importing the Accused Products to be used in connection with Apple iPhones. CIB at 199-200.

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Complainants submit that Apple had knowledge of the '745 patent as of the filing of the original complaint on June 30, 2021. *See* CX-1254C (Apple interrogatory responses) at 35. Complainants identify documentation from Apple instructing users how to connect the Accused Products with Apple iPhones. *See* CX-1727 (Apple Watch User Guide) at 1. Dr. Madisetti identified documentation from Apple instructing users how to pair an Apple Watch with an iPhone and use the Health app to monitor blood oxygen on the iPhone. Tr. (Madisetti) at 738:25-740:5; CDX-0011C.085 (citing CX-1727 (Apple Watch User Guide) at 1; CX-0010 (Apple website) at 2-3; CX-0299C (Waydo Dep. Tr.) at 74:11-75:17).

Apple argues that Complainants failed to carry their burden to show that Apple had the necessary specific intent for induced infringement. RRB at 88. Apple argues that that there is no testimonial evidence that Apple actively induced its users to infringe or that Apple knew that its users' actions would constitute infringement. *Id.*

In consideration of the parties' arguments, the undersigned finds that a preponderance of the evidence supports a finding that Apple knew of the alleged infringement of claim 27 as of the filing of the Complaint, which contained allegations of infringement (including a claim chart for claim 27) similar to the evidence presented at the hearing. *See* Complaint Exhibit 18 (June 30, 2021). In addition, there is no dispute that Apple has provided instructions to its users for pairing the Accused Products with Apple iPhones to monitor blood oxygen through Apple's Health app. *See* CX-1727 (Apple Watch User Guide) at 1; CX-0010 (Apple website) at 2-3; CX-0299C (Waydo Dep. Tr.) at 74:11-75:17. The Commission has found induced infringement based on similar evidence when there has been an underlying finding of direct infringement. *See, e.g., Certain Beverage Brewing Capsules*, Inv. No. 337-TA-929, Comm'n Op. at 17-21, EDIS Doc. ID 577827 (Apr. 5, 2016).

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The undersigned finds that Apple has not induced infringement of claim 27, however, because Complainants have not shown underlying direct infringement of this claim.

F. Domestic Industry—Technical Prong

The domestic industry products that Complainants rely on for the '745 patent are the Circle sensor (CPX-0021C) and the Wings sensor (CPX-0029C),[75] the RevA sensor (CPX-0052C), the RevD sensor (CPX-0058C), and the RevE sensors (CPX-0019C, CPX-0020C, CPX-0065C)(collectively, "the '745 DI Products"). CIB at 203.[76] Complainants allege that each of the '745 DI Products practices '745 patent claim 18, which depends from claim 15. *Id.* at 203-11.

1. '745 Patent Claim 18

a. Element [15 preamble]: "A physiological monitoring device comprising:"

There is no specific dispute that each of the '745 DI Products is a "physiological monitoring device" as required by the preamble of claim 15. *See* CIB at 204; RIB at 175-77.[77] Mr. Scruggs testified that each of the '745 DI Products "supported the ability to measure oxygen saturation and pulse rate." Tr. (Suggs) at 393:17-20. Dr. Madisetti also observed a demonstration by Dr. Scruggs of the RevA, RevD, and RevE devices measuring oxygen saturation. Tr. (Madisetti) at 749:23-750:11. Dr. Madisetti also relied on a demonstration by Mr. Scruggs of the Circle and Wings sensors connected to a Rad-97 monitor. *Id.* at 754:24-

[75] Complainants assert that the Circle sensor and Wings sensor practice the '745 patent when connected to a Rad-97 monitor (CPX-0014a). CIB at 203, 209-10.

[76] Complainants also rely on the Masimo W1 as a domestic industry product, but for the reasons discussed *supra* in the context of the Poeze patents, evidence regarding this product will not be considered.

[77] Apple disputes whether certain of the '745 DI Products were operable before the filing of the Complaint, *see* RIB at 174-75, and this issue is addressed *infra*, Section VII.

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755:3. For these reasons and those discussed below with regard to Element [15H], the evidence of record shows that this limitation is met.

b. Element [15A]: "a plurality of light-emitting diodes configured to emit light proximate a wrist of a user"

There is no dispute that each of the '745 DI Products has a plurality of light-emitting diodes. *See* CIB at 204. Dr. Madisetti identified the LEDs in each of the '745 DI Products. Tr. (Madisetti) at 750:22-751:11; CDX-0011C.098. Mr. Scruggs testified that the '745 DI Products each contain LEDs. Tr. (Scruggs) at 393:12-394:3. The evidence of record shows that this limitation is met.

c. Element [15B]: "a light diffusing material configured to be positioned between the plurality of light-emitting diodes and a tissue measurement site on the wrist of the user when the physiological monitoring device is in use"

Mr. Scruggs identified "a diffusing media above the LEDs" in the '745 DI Products, which is [redacted] for the Circle, Wings, RevA, RevD, and RevE sensors. Tr. (Scruggs) at 401:2-13. Dr. Madisetti observed the [redacted] "diffusing the light" in a demonstration by Mr. Scruggs. Tr. (Madisetti) at 760:18-22; *see also* RX-0266C (demonstration of RevA sensor); RX-0267C (demonstration of RevD sensor); RX-0268C (demonstration of RevE sensor). Dr. Madisetti identified the location of the diffusing material in each of the '745 DI Products. Tr. (Madisetti) at 751:12-752:2; CDX-011C.099 (citing CX-1132C (Circle CAD) at 2; CX-0656C (Circle photo); CX-1137C (Wings CAD) at 6; CX-0658C (Wings photo); CX-111C (RevA CAD); CX-0661C (RevA photo); CX-1058C (RevD photo) at 442; CX-0666C (RevD photo); CX-1125C (RevE CAD) at 2; CX-0653C (RevE photo); CX-0655C (RevE photo); CX-0676C (RevE photo); CX-1058C (RevE photo) at 593). Complainants

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further submit that this material is located on the side of the product that contacts the user's wrist in each of the '745 DI Products, thus meeting this limitation. CIB at 205-07.

Apple argues that Dr. Madisetti's analysis of photos and images is insufficient to prove that the material above the LEDs in the '745 DI Products is a "light diffusing material." RIB at 175-76. Dr. Sarrafzadeh called this analysis "unscientific" and "unreliable given that the components are actually quite small." Tr. (Sarrafzadeh) at 1127:1-1128:4; RDX-7C.0162. Dr. Sarrafzadeh further testified that [redacted] is not always a diffusing material." Tr. (Sarrafzadeh) at 1127:15-1128:8. Apple further argues that the documentation for the '745 DI Products is unreliable because of certain discrepancies between the physical exhibits and Masimo's schematics. RIB at 175.

In consideration of the parties' arguments, the undersigned finds that Complainants have shown, by a preponderance of the evidence, that the '745 DI Products have a "light diffusing material" meeting this limitation. Mr. Scruggs described the diffusing material in each of the '745 DI Products, noting the "milky color" above the LEDs. Tr. (Scruggs) at 401:2-13. He specifically identified the [redacted] material in the Circle, Wings, RevA, RevD, and RevE sensors. *Id.*Dr. Madisetti confirmed the location of the material identified by Mr. Scruggs in photos and schematics of each of the '745 DI Products. Tr. (Madisetti) at 751:12-752:2. Dr. Sarrafzadeh raises some questions regarding the reliability of Dr. Madisetti's analysis, but the appearance of the '745 DI Products in videos and photographs is consistent with Mr. Scruggs's testimony. *See* CDX-011C.099. On this record, a preponderance of the evidence supports a finding that each of the '745 DI Products meets this claim limitation with a light diffusing material positioned between the LEDs and the user's wrist.

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d. Element [15C]: "a light block having a circular shape"

There is no dispute that each of the '745 DI Products has a light block that forms a circular shape around the LEDs. *See* CIB at 207. Dr. Madisetti identified the circular light block photographs and schematics of each of the '745 DI Products. Tr. (Madisetti) at 752:3-10; CDX-0011C.100. Mr. Scruggs described a "light barrier . . . that surrounds the emitters so it separates the LEDs from the photodiodes." Tr. (Scruggs) at 400:9-12. The evidence of record shows that this limitation is met.

e. Element [15D]: "a plurality of photodiodes configured to detect at least a portion of the light emitted from the plurality of light-emitting diodes after the light passes through the light diffusing material and a portion of the tissue measurement site encircled by the light block, wherein the plurality of photodiodes are arranged in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site encircled by the light block"

There is no dispute that each of the '745 DI Products has photodiodes that are arranged in a circular array around the light block that are configured to detect light that is reflected from the user's skin. *See* CIB at 207-08. Dr. Madisetti identified the arrangement of photodiodes in photographs and schematics of each of the '745 DI Products. Tr. (Madisetti) at 752:22-754:8; CDX-0011C.101. The evidence of record shows that this limitation is met.

f. Element [15E]: "wherein the plurality of photodiodes are further configured to output at least one signal responsive to the detected light"

There is no specific dispute that the photodiodes in each of the '745 DI Products are configured to output a signal responsive to detected light. *See* CIB at 208; RIB at 175-77. Dr. Madisetti identified circuit diagrams showing the output of the photodiodes in the RevA, RevD, and RevE devices. Tr. (Madisetti) at 754:9-755:6; CDX-0011C.102 (citing CX-0701C (RevA diagram) at 2, 6; CX-0710C (Rev D diagram) at 3, 7; CX-0705C (RevE diagram). With

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respect to the Circle and Wings sensors, Dr. Madisetti relied on a demonstration by Mr. Scruggs showing these sensors outputting oxygen saturation information to a separate Rad-97 monitor. Tr. (Madisetti) at 754:24-755:3. Mr. Scruggs explained that "the signal from the photodiodes was transmitted through a cable to the Rad-97 instrument." Tr. (Scruggs) at 403:18-404:2 (describing Circle sensor), 404:14-19 (describing Wings sensor). For these reasons, and those discussed in relation to Element [15H], the evidence of record shows that this limitation is met.

g. Element [15F]: "wherein the plurality of light-emitting diodes and the plurality of photodiodes are arranged in a reflectance measurement configuration"

There is no dispute that the photodiodes in each of the '745 DI Products are located on the same side as the LEDs and are thus arranged to detect light that is reflected from the user's wrist. *See* CIB at 209; Tr. (Madisetti) at 755:7-25; CDX-0011C.103. The evidence of record shows that this limitation is met.

h. Element [15G]: "wherein the light block is configured to optically isolate the plurality of light-emitting diodes from the plurality of photodiodes by preventing at least a portion of light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the portion of the tissue measurement site"

There is no dispute that the light block in each of the '745 DI Products separates the LEDs from the photodiodes, blocking at least a portion of light from reaching the photodiodes without first reaching the user's skin. *See* CIB at 209; Tr. (Madisetti) at 756:1-15; CDX-0011C.104. The evidence of record shows that this limitation is met.

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i. Element [15H]: "a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal"

Dr. Madisetti identified processors for each of the '745 DI Products that receive and process signals from the photodiodes. Tr. (Madisetti) at 756:16-757:13; CDX-0011C.105. For the Circle sensor and Wings sensor, Mr. Scruggs explained that the relevant processor is in the Rad-97 instrument, which is connected to the sensors via a cable. Tr. (Scruggs) at 403:11-404:2 ("So the Circle sensor gathered the raw physiological data from the wrist using the LEDs and detectors, and the signal from the photodiodes was transmitted through a cable to the Rad-97 instrument. And then the Rad-97 instrument uses its processors, and the Masimo SET pulse oximetry algorithm to calculate oxygen saturation and pulse rate."), 405:1-7 (same for Wings sensor). Dr. Madisetti also relied on a demonstration by Mr. Scruggs of the Circle and Wings sensors connected to a Rad-97 monitor. *Id.* at 754:24-755:3. Dr. Madisetti also observed a separate demonstration by Dr. Scruggs of the RevA, RevD, and RevE devices measuring oxygen saturation. Tr. (Madisetti) at 749:23-750:11. Mr. Al-Ali described internal testing of the oxygen saturation measurements of Masimo sensors at the time of the RevA sensors. Tr. (Al-Ali) at 271:16-277:13; CX-0378C at 32. He also described testing relevant to the RevD sensors and the RevE sensors. Tr. (Al-Ali) at 276:12-278:3, 316:2-317:20; CX-0494C. Complainants submit that this evidence shows that each of the '745 DI Products has a processor that receives and processes signals from the photodiodes to calculate oxygen saturation. CIB at 209-11; CRB at 121.

Apple argues that the evidence in the record is insufficient to show that any of the '745 DI Products calculates oxygen saturation. RIB at 176-77. As discussed above in the context of the Poeze patents, Apple submits that Complainants failed to identify the source code in the

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domestic industry products that calculates any physiological parameter. *Id.* at 47-48; *see* Tr. (Sarrafzadeh) at 1124:24-1125:11. Dr. Sarrafzadeh offered his opinion that the evidence presented by Complainants was insufficient to determine whether the '745 DI Products calculated oxygen saturation. Tr. (Sarrafzadeh) at 1122:20-1126:20. He specifically highlights an erroneous oxygen saturation reading of "81" during a demonstration of the Wings sensor. *Id.* at 1124:12-23. With respect to the Circle sensor and Wings sensor, Apple argues that the claim limitation is not satisfied because the identified "processor" is not in the sensor but in the separate Rad-97 instrument. RIB at 177; RRB at 91.

In consideration of the parties' arguments, the undersigned finds that Complainants have shown by a preponderance of the evidence that each of the '745 DI Products has a processor that receives signals from the photodiodes and determines an oxygen saturation measurement. With respect to the Circle sensor and Wings sensor, claim 15 does not preclude the "physiological-monitoring device" from comprising a sensor that is connected to a separate instrument via a cable. As discussed above in the context of the Poeze patents, the testimony of Mr. Scruggs and Mr. Al-Ali regarding the design, testing, and operation of Masimo's products is sufficient to show that the'745 DI Products measure oxygen saturation. The demonstrations of the '745 DI Products during discovery further confirm the operation of these products, and the minor inconsistencies identified by Dr. Sarrafzadeh do not refute Complainants' affirmative evidence that these products measure oxygen saturation.

Accordingly, the evidence shows by a preponderance that each of the '745 DI Products has a processor that receives signals from the photodiodes and determines an oxygen saturation measurement.

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j. Element [15I]: "wherein the physiological monitoring device is configured to transmit physiological parameter data to a separate processor"

There is no specific dispute that the '745 DI Products are configured to transmit oxygen saturation data to an additional processor. *See* CIB at 211; RIB at 175-77. For the Circle and Wings sensors, Dr. Madisetti identified Wi-Fi and Bluetooth functionality in the Rad-97 instrument that would facilitate transmission of oxygen saturation data. Tr. (Madisetti) at 758:8-11; CDX-0011C.107 (citing CX-0679 at 96, 99). For the RevA sensor, Dr. Madisetti identified a laptop that received oxygen saturation data during a demonstration by Mr. Scruggs. Tr. (Madisetti) at 757:16-23; CDX-0011C.106 (citing CX-0836C (demonstration photos) at 4). Dr. Madisetti identified two separate processors in the RevD and RevE sensors, explaining that oxygen saturation data is sent from the [redacted] processor to the [redacted] processor. Tr. (Madisetti) at 757:14-758:6; CDX-0011C.106 (citing CX-0709C (RevD schematic) at 3). For the RevE sensor, Dr. Madisetti further identifies a phone that received oxygen saturation during a demonstration by Mr. Scruggs. Tr. (Madisetti) at 757:24-758:4; CDX-0011C.106 (citing CX-0836C (demonstration photos) at 8-13). For these reasons, and those discussed in relation to Element [15H], the evidence of record shows that this limitation is met by the '745 DI Products.

k. Element [18]: "wherein the physiological parameter comprises oxygen saturation"

Claim 18 of the '745 patent depends from claim 15, "wherein the physiological parameter comprises oxygen saturation." As discussed above in the context of the "processor" limitation, the undersigned finds that the '745 DI Products measure oxygen saturation.

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Accordingly, because each limitation of claims 15 and 18 are satisfied, the evidence shows, by a preponderance, that each of the '745 DI Products practice claim 18 of the '745 patent.

2. Status of DI Products at the Time of the Complaint

Apple argues that no patent-practicing domestic industry article existed at the time of the complaint. RIB at 174-75; RRB at 12-14. Complainants dispute Apple's contention. CRB at 119-20. Specifically, Apple disputes whether the Circle and Wings sensors were operable with the Rad-97 monitor before the complaint was filed. RIB at 174-75. Apple further disputes whether the RevA sensor was operable with a laptop before the complaint was filed. *Id.* Complainants rely on Mr. Scruggs's testimony that the Circle sensor, Wings sensor, RevA sensor, and RevD sensor were built before the complaint was filed. Tr. (Scruggs) at 394:12-397:24. Complainants further rely on Mr. Al-Ali's testimony regarding clinical testing of Masimo Watch devices. Tr. (Al-Ali) at 262:7-264:13, 268:22-278:13, 313:14-318:22. Mr. Scruggs also testified that the Circle sensor was used in clinical studies at Masimo in October 2019. Tr. (Scruggs) at 475:8-15.

In consideration of the parties' arguments, the undersigned finds that at least the RevA, RevD, and RevE sensors were articles protected by the '745 patent that existed before the filing of the complaint. As discussed above in the context of the Poeze patents, the record evidence is sufficient to show that the RevA, RevD, and RevE devices existed prior to the filing of the complaint. Apple argues that the laptop Mr. Scruggs used to display the oxygen saturation measurement from the RevA sensor was not used with the RevA sensor before the filing of the complaint, RIB at 174, but this laptop is not part of the domestic industry article protected by claim 18 of the '745 patent. Mr. Scruggs's laptop was only used to demonstrate the final

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limitation of claim 15 [15I], which requires that the RevA sensor is "configured to transmit physiological parameter data to a separate processor." *See* Tr. (Madisetti) at 757:16-23; CX-0836C (demonstration photos) at 4. Mr. Scruggs's laptop was part of the demonstration showing that the RevA sensor was configured as required by the claims, but the laptop is not part of the domestic industry article—the RevA had the required configuration even in the absence of the laptop.[78] With respect to the RevD and RevE sensors, Apple argues that software was loaded on these devices after the complaint was filed, RIB at 42-43, but as discussed above in the context of the Poeze patents, *supra* Section IV.F.7, the evidence shows that these devices were tested before the filing of the complaint. *See* Tr. (Al-Ali) at 276:17-278:13, 316:2-317:20 (citing CX-0494C). Moreover, at least one of the RevE devices produced in discovery (CPX-0019C) can be considered to represent devices that existed at the time of the complaint, based on software that is dated July 9, 2021.

With respect to the Circle sensor and the Wings sensor, the associated Rad-97 monitor is necessary to the practice of the "determine a physiological parameter" limitation [15H], and the protected domestic industry article thus comprises the sensors together with the Rad-97 monitor. Although Complainants have identified some evidence that the Circle and Wings sensors were used in testing in 2019 and 2020, there is no evidence that these sensors were used together with the identified Rad-97 monitor in those tests. *See* Tr. (Scruggs) at 475:8-15; Tr. (Al-Ali) at 262:7-263:10. Mr. Scruggs explained how the Circle and Wings sensor could have worked with the Rad-97, but he never confirmed that these sensors were used with a Rad-97 monitor at any time

[78] As described by Mr. Al-Ali, an October 2020 presentation describes internal testing of the oxygen saturation measurements of prototype sensors consistent with the RevA design. Tr. (Al-Ali) at 272:16-277:13; CX-0378C at 32.

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before the filing of the complaint. *See* Tr. (Scruggs) at 403:11-404:2 ("It could work with many of the Masimo instruments. One example of that would be the Rad-97."). Complainants have not shown that the asserted domestic industry articles—the Circle sensor connected to the Rad-97 monitor and the Wings sensor connected to the Rad-97 monitor—existed as articles protected by claim 18 of the '745 patent before the filing of the complaint.

Accordingly, Complainants have shown that at least with respect to the RevA, RevD, and RevE sensors, domestic industry articles protected by the '745 patent existed before the filing of the complaint, and Complainants have thus satisfied the technical prong for the '745 patent with respect to a domestic industry existing at the time of the complaint.

Moreover, for the same reasons discussed above in the context of the Poeze patents, *supra* Part IV.F.7-8, the evidence shows satisfaction of the technical prong for a domestic industry in the process of being established. In particular, the evidence shows, by a preponderance, that Masimo has taken the necessary tangible steps to develop a product that will practice claim 18 of the '745 patent and shows a significant likelihood that this product development will lead to a device that practices the claim.

G. Invalidity – Obviousness

Apple contends that claims 9 and 27 of the '745 patent are obvious in view of the Apple Watch Series 0 and that claims 9, 18, and 27 of the '745 patent are obvious in view of U.S. Patent No. 8,670,819 to Iwamiya *et al.* (RX-0130, "Iwamiya") in combination with U.S. Patent No. 9,392,946 to Sarantos *et al.* (RX-0366, "Sarantos") and U.S. Patent No. 8,998,815 to Venkatraman *et al.*, (RX-0368, "Venkatraman"). RIB at 178-201; RRB at 94-110. Complainants dispute Apple's allegations of obviousness, identifying certain objective indicia of non-obviousness in support of their arguments. CIB at 212-34; CRB at 121-33.

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1. Apple Watch Series 0

The Apple Watch Series 0 was the first commercial Apple Watch, and Apple submits that it went on sale to the public on April 24, 2015, citing an Apple press release and the testimony of Apple and Masimo witnesses. RX-0023 (Apple Press Release); Tr. (Block) at 910:22-911:2; Tr. (Kiani) at 138:1-4. Complainants dispute whether Apple has shown that the Apple Watch Series 0 was publicly available before the priority date of the '745 patent in July 2015. CIB at 212-13. Complainants argue that the press release only describes an expected release date and that Apple's witness testimony is uncorroborated. *Id.*; CRB at 123.

The record shows clear and convincing evidence that the Apple Watch Series 0 was publicly on sale by April 24, 2015. Apple's press release represents that the Apple Watch will be "Available for Purchase Online April 24." RX-0023. Complainants argue that the statement in this press release was made in advance of the release date, but the April 2015 release date for the Apple Watch Series 0 was further corroborated by the testimony of Dr. Block and Dr. Venugopal. Tr. (Block) at 910:22-24 ("It was released in the spring of 2015."); Tr. (Venugopal) at 818:10-15 ("The first customer ship for Series 0 was in April of 2015."). Complainants have identified no evidence that the announced release date for the Apple Watch Series 0 was delayed and no reason to doubt the testimony of Apple's witnesses—when Mr. Kiani was asked about his knowledge of the release of the first Apple Watch, he testified that "I don't remember the exact timing, but I'm sure those dates are correct." Tr. (Kiani) at 138:1-4. The evidence thus shows that the Apple Watch Series 0 was publicly available in April 2015, which qualifies it as prior art under 35 U.S.C. § 102(a)(1).

Complainants further argue that Apple has failed to introduce reliable evidence for the structure and operation of the Apple Watch Series 0, identifying several discrepancies between

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the product photos relied upon by Dr. Sarrafzadeh and the features described in Apple schematics. CIB at 213-18. The undersigned agrees with Apple, however, that the discrepancies identified by Complainants are irrelevant to the asserted claims of the '745 patent. *See* RRB at 95-97. The parties' disputes regarding the structure and operation of the Apple Watch Series 0 that are relevant to the limitations of the asserted claims are addressed below.

a. '745 patent, claim 9

(i) Element [1 preamble]: "A physiological monitoring device comprising"

Apple contends that the Apple Watch Series 0 is a "physiological monitoring device" because it contains a heart rate sensor. RIB at 179; *see* Tr. (Sarrafzadeh) at 1092:7-13; Tr. (Waydo) at 937:2-8; Tr. (Land) at 957:5-15; RX-0396.0011C (Apple specification). Complainants do not specifically dispute this preamble limitation. *See* CIB at 212-24; CRB at 122-27.

(ii) Element [1A]: "a plurality of light-emitting diodes configured to emit light in a first shape"

Apple contends that the Apple Watch Series 0 has four LEDs that emit light in a shape. RIB at 179; *see* Tr. (Sarrafzadeh) at 1092:15-21; Tr. (Land) at 959:3-13; Tr. (Block) at 897:15-898:1. Dr. Venugopal testified that the Apple Watch Series 0 contained green and infrared LEDs, and the shape of the LEDs was square. Tr. (Venugopal) at 819:1-7, 820:16-821:11; RX-0392C.006 (Apple specification) at Fig. 2. Complainants do not specifically dispute this limitation. *See* CIB at 212-24; CRB at 122-27.

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(iii) Element [1B]: "a material configured to be positioned between the plurality of light-emitting diodes and tissue on a wrist of a user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of light-emitting diodes is projected towards the tissue"

Apple submits that the Apple Watch Series 0 has a "Fresnel lens" positioned between the LEDs and the user's wrist, which changes the shape of the light from the LEDs. RIB at 108-81. Dr. Venugopal identified the Fresnel lens as part of the Apple Watch Series 0. Tr. (Venugopal) at 819:1-7. Apple relies on an engineering requirement specification document for Apple's "Generation 1" optical sensing module, which was identified by Dr. Venugopal as applying to the Apple Watch Series 0 through 3. *Id.* at 820:10-15 (citing RX-0392C). Dr. Venugopal explained that "[t]he Fresnel lens had two purposes," which were "cosmetic obscuration" and "to have light emitted from the green LED to be collimated." *Id.* at 821:12-21. The green light is "positioned under the optical center," and "gets restricted to a certain angle so that most of it gets out of the window." *Id.* at 821:22-4, 822:22-25; RX-0392C.007 at Fig. 3. With respect to the infrared LED in the optical sensing module, Dr. Venugopal explained that "because it is not passing through an optical center, gets thrown off in a different direction, and it exits the watch and hits the skin a little bit further away." Tr. (Venugopal) at 823:4-9. He testified that the infrared light "has a crescent shape." *Id.* Dr. Sarrafzadeh relied on the Apple specification document and offered his opinion that the "Fresnel lens has these grooves as highlighted here, and these grooves take the shape of the LED and transform that into a crescent type of a shape." Tr. (Sarrafzadeh) at 1092:23-1093:8 (citing RX-0392C); *see* RDX-7.86C, RDX-7.87C.

Complainants argue that the testimony of Dr. Venugopal and Dr. Sarrafzadeh are insufficient to show that the Apple Watch Series 0 meets this limitation by clear and convincing

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evidence. CIB at 220-22. Complainants contend that there are no documents or testing to corroborate Apple's contention that the Fresnel lens changes the shape of the infrared light in the Apple Watch Series 0. *Id.* Complainants further cite an Apple patent (naming Dr. Venugopal among the inventors) describing a Fresnel lens whose effect is for a "light emitter to retain its optical power, collection efficiency, beam shape, and collection area such that the light undergoes minimal change." CX-1806 at ¶ 53.

Apple argues in reply that Dr. Sarrafzadeh's opinions are corroborated by the placement of the infrared LED in relation to the Fresnel lens shown in Apple's engineering documents, highlighting a close-up of the lens and the placement of the LEDs. RRB at 99-100.



RX-0392C.00 at Fig. 2. Apple submits that Dr. Sarrafzadeh and Dr. Venugopal explained how the offset placement of the infrared LED causes a change in shape as the light passes through a crescent-shaped portion of the Fresnel lens. *See* Tr. (Sarrafzadeh) at 1093:4-8; Tr. (Venugopal) at 823:4-9.

In consideration of the parties' arguments, the undersigned finds that Apple has failed to offer clear and convincing evidence that the Fresnel lens changes the shape of the light emitted by the infrared LED in the Apple Watch Series 0. Dr. Sarrafzadeh's testimony is conclusory—

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he asserts that the grooves on the Fresnel lens transforms the light "into a crescent type of a shape," but he merely showed a demonstrative with a drawing of a crescent that was not shown to be the result of any testing or observation of the Apple Watch Series 0. Tr. (Sarrafzadeh) at 1093:4-8; RDX-7.87C; Tr. (Madisetti) at 1358:3-5. Dr. Venugopal explained how the Fresnel lens collimates the green light at the optical center while throwing off the infrared light in a different direction because it is off-center, but he only offers a short conclusory statement about the shape of the infrared light: "It has a crescent shape." Tr. (Venugopal) at 821:22-823:9. Changing the shape of the infrared light is not one of the two purposes that Dr. Venugopal described for the Fresnel lens. *See id.* at 821:12-21.[79] The record contains no images of the light passing through the Fresnel lens or any explanation for why Apple would have designed the Fresnel lens to change the shape of the infrared light, and the conclusory testimony of Dr. Sarrafzadeh and Dr. Venugopal falls short of the clear and convincing standard necessary to prove invalidity. *See Motorola Mobility, LLC v. Int'l Trade Comm'n*, 737 F.3d 1345, 1349 (Fed. Cir. 2013) (where expert's testimony was "a single sentence, without explanation," finding that the ALJ and Commission did not "act unreasonably in finding this conclusory sentence did not rise to the level of clear and convincing evidence").

(iv) Element [1C]: "a plurality of photodiodes configured to detect at least a portion of the light after the at least the portion of the light passes through the tissue, the plurality of photodiodes further configured to output at least one signal responsive to the detected light"

Apple contends that the Apple Watch Series 0 has two photodiodes that detect light after it interacts with the user's tissue. RIB at 181; *see* Tr. (Sarrafzadeh) at 1093:9-12; Tr. (Land) at

[79] The Apple patent application cited by Complainants is consistent with Dr. Venugopal's testimony that the purpose of the Fresnel lens is to obscure internal components and to retain optical power. *See* CX-1806 at ¶ 53.

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959:3-13; Tr. (Venugopal) at 819:1-7; RX-0392C.006 at Fig. 2. Complainants do not specifically dispute this limitation. *See* CIB at 212-24; CRB at 122-27.

(v) Element [1D]: "a surface comprising a dark-colored coating, the surface configured to be positioned between the plurality of photodiodes and the tissue when the physiological monitoring device is in use, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface"

Apple submits that the Apple Watch Series 0 has a [redacted] back crystal, which is positioned between the photodiodes and the user's wrist and has openings to allow light reflected from the tissue to reach the photodiodes. RIB at 181-82; RRB at 101; *see* Tr. (Sarrafzadeh) at 1093:13-21; Tr. (Land) at 959:3-13. Dr. Sarrafzadeh testified that "the first layer of the [redacted] is a dark-colored coating." Tr. (Sarrafzadeh) at 1093:13-21; RDX-7.89C.[80] In the alternative, he offered his opinion that "one of ordinary skill knows that you can easily and low-tech add dark-colored coating to it." *Id.* Apple argues that dark-colored coatings were well-known in the prior art and would have been obvious to a person of ordinary skill in the art. RRB at 101 (citing RX-0366 (Sarantos) at 17:12-16; RX-0035.0202 (Webster)). Complainants dispute Apple's contentions, arguing that there is no evidence that the [redacted] surface of the Apple Watch Series 0 has layers and that Dr. Sarrafzadeh's testimony is insufficient to establish that adding a dark-colored coating would have been obvious. CIB at 222-23.

In consideration of the parties' arguments, the undersigned agrees with Complainants that Apple has failed to show, clearly and convincingly, that the [redacted] back crystal of the Apple Watch Series 0 is a "coating." There is no evidence that the [redacted] back crystal

[80] Complainants note that the image on RDX-7.89C is an Apple Watch Series 1, not an Apple Watch Series 0. *See* CIB at 215.

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comprises layers that can be described as a "coating," and Apple has failed to offer clear and convincing evidence that one of ordinary skill in the art would have added a dark-colored coating to the surface of the back crystal in the Apple Watch Series 0. *See, e.g.*, JX-0009 at 9:32-34 (referring to a "top surface coated with a light-absorbing material"). Dr. Sarrafzadeh offers conclusory testimony that a person of ordinary skill in the art would have been able to add a "low-tech" coating to the Apple Watch Series 0, but even if this opinion were reliable, Dr. Sarrafzadeh fails to identify any reason to add such a coating. Such testimony is insufficient to carry Apple's burden to prove obviousness by clear and convincing evidence. *See InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014) (reversing obviousness finding where expert's "testimony primarily consisted of conclusory references to her belief that one of ordinary skill in the art could combine these references, not that they would have been motivated to do so.").

(vi) Element [1E]: "a light block configured to prevent at least a portion of the light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the tissue"

With respect to the "light block" limitation, Apple relies on an Apple specification that depicts blocks labeled "[redacted]" between the emitters and detectors.

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RX-0396C.0017 at Fig. 6. [redacted]

[redacted]." Tr. (Land) at 961:22-962:13; *see also* Tr. (Sarrafzadeh) at 1093:22-1094:3. Complainants argue that the Apple specification cited by Mr. Land is unreliable, because it is dated July 2013—two years before the release of the Apple Watch Series 0—and it does not show the convex back surface that is in the final product. CIB at 216-17; CRB at 127; *see* Tr. (Madisetti) at 1356:10-22.

In consideration of the parties' arguments, the undersigned finds that Apple has shown by clear and convincing evidence that the Apple Watch Series 0 meets the "light block" limitation of the '745 patent claim 1. Mr. Land identified the Apple engineering requirement specification document as one that corresponds to the Apple Watch Series 0. Tr. (Land) at 961:7-21 (identifying RX-0396C). He described the optical path diagram in that document as "a schematic for some of the major elements in the Apple Watch." *Id.* at 961:22-962:13. The fact

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that the diagram does not show other features of the Apple Watch, such as the curved back crystal, is irrelevant to this limitation. Mr. Land's testimony and the diagram from Apple's specification clearly show that the Apple Watch Series 0 had the claimed "light block."

(vii) Element [1F]: "a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal"

Apple contends that the Apple Watch Series 0 has a processor that receives signals from the photodiodes and calculates a pulse rate. RIB at 183; *see* Tr. (Sarrafzadeh) at 1094:4-9; Tr. (Land) at 959:3-13; RX-0392C.011. Complainants do not specifically dispute this limitation. *See* CIB at 212-24; CRB at 122-27.

(viii) Element [9]: "wherein the physiological parameter comprises oxygen saturation"

Claim 9 of the '745 patent depends from claim 1, "wherein the physiological parameter comprises oxygen saturation." The Apple Watch Series 0 does not measure oxygen saturation, but Dr. Sarrafzadeh offered his opinion that pulse oximetry would have been obvious to a person of ordinary skill in the art because such devices have been known since the 1970s. Tr. (Sarrafzadeh) at 1094:10-17. Apple cites testimony from Dr. Mehra that "pulse oximetry as a feature is essentially heart rate sensing, but comparing the amplitude of the signal at two different colors of light or wavelengths of light." Tr. (Mehra) at 852:7-17. Dr. Waydo testified that Apple's later development of a blood oxygen sensor built on its work on heart rate detection, because "the blood oxygen sensor is a PPG of photoplethysmography sensor, much like the heart rate sensors." Tr. (Waydo) at 923:12-23. Dr. Mannheimer testified that "putting a couple of LEDs in a Series 0 watch form factor" would produce a blood oxygen measurement, "but not to the level that we were looking for." Tr. (Mannheimer) at 1015:9-19.

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Complainants argue that Apple failed to identify what modifications to the Apple Watch Series 0 would be necessary to measure oxygen saturation. CIB at 218-20. Complainants further identify evidence that Apple engineers expressed skepticism regarding Apple's likelihood of success in implementing an oxygen saturation measurement in the Apple Watch. *See* Tr. (Mannheimer) at 1012:12-16; CX-0299C (Waydo Dep. Tr.) at 166:4-167:5; CX-0295C (Shui Dep. Tr.) at 108:15-21. Complainants argue that it is unlikely that one of ordinary skill in the art would have been successful in modifying the Apple Watch Series 0 to measure oxygen saturation when the record shows that Apple's team of engineers worked for several years after the Apple Watch's release to implement this feature. CIB at 220.

In consideration of the parties' arguments, the undersigned finds that Apple has failed to offer clear and convincing evidence that one of ordinary skill in the art would have modified the Apple Watch Series 0 to measure oxygen saturation with a reasonable expectation of success. Apple cites the testimony of its engineers that adding some LEDs would make it possible to measure oxygen saturation, but there is no clear explanation of the modifications that would be necessary. *See* Tr. (Mannheimer) at 1015:9-19. The Federal Circuit has found such generalized arguments for combining prior art features to be insufficient, holding that it may be necessary to provide "a clear, evidence-supported account of the contemplated workings of the combination" as "a prerequisite to adequately explaining and supporting a conclusion that a relevant skilled artisan would have been motivated to make the combination and reasonably expect success in doing so." *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017). Here, Apple has failed to explain how the addition of LEDs for measuring blood oxygen would have been implemented, and whether these modifications would affect other limitations of the '745

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patent—such as the Fresnel lens that Apple relies on for the "second shape" limitation.[81] In addition, the record contains testimony from multiple Apple engineers expressing skepticism regarding the implementation of pulse oximetry in the Apple Watch. *See* Tr. (Mannheimer) at 1012:12-16; CX-0299C (Waydo Dep. Tr.) at 166:4-167:5; CX-0295C (Shui Dep. Tr.) at 108:15-21. Apple has thus failed to show how one of ordinary skill in the art would have modified the Apple Watch Series 0 to measure blood oxygen and has failed to show, clearly and convincingly, that that there would have been a reasonable expectation of success in making any such modifications.

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Accordingly, the evidence fails to show that claim 9 of the '745 patent is obvious in view of the Apple Watch Series 0, because Apple has not clearly and convincingly shown that the Apple Watch Series 0 has a material that changes emitted light from a "first shape" to a "second shape," or that it would have been obvious for one of ordinary skill in the art to modify the Apple Watch Series 0 to have a "dark-colored coating" or to measure oxygen saturation.

b. '745 Patent Claim 27

(i) Element [20 preamble]: "A system configured to measure one or more physiological parameters of a user"

The preamble of claim 20 of the '745 patent requires "[a] system configured to measure one or more physiological parameters of a user," including "a physiological monitoring device." As discussed above in the context of the preamble of '745 patent claim 1, there is no dispute that the Apple Watch Series 0 is a "physiological monitoring device" because it contains a heart rate sensor. *See* RIB at 184.

[81] When Apple implemented a blood oxygen feature in the Apple Watch Series 6, the Fresnel lens was removed in favor of a microlens array. *See* Tr. (Venugopal) at 836:3-838:25.

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(ii) Element [20A]: "a plurality of light-emitting diodes configured to emit light in a first shape"

Claim 20 has a "plurality of light-emitting diodes" limitation that is identical to the limitation of claim 1. As discussed above in the context of claim 1, there is no dispute that the Apple Watch Series 0 has four LEDs that emit light in a shape. *See* RIB at 179, 185.

(iii) Element [20B]: "a material configured to be positioned between the plurality of light-emitting diodes and tissue of the user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of light-emitting diodes is projected towards the tissue"

Claim 20 has a "material configured to change the first shape into a second shape" limitation that is identical to the limitation of claim 1. For the reasons discussed above in the context of claim 1, the undersigned finds that Apple has not shown that the Apple Watch Series 0 has a material that changes a "first shape" into a "second shape."

(iv) Element [20C]: "a plurality of photodiodes configured to detect at least a portion of the light after the at least the portion of the light passes through the tissue, the plurality of photodiodes further configured to output at least one signal responsive to the detected light"

Claim 20 has a "plurality of photodiodes" limitation that is identical to the limitation of claim 1. As discussed above in the context of claim 1, there is no dispute that the Apple Watch Series 0 has two photodiodes that detect light after it interacts with the user's tissue. *See* RIB at 181, 185.

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(v) Element [20D]: "a surface comprising a dark-colored coating, the surface configured to be positioned between the plurality of photodiodes and the tissue when the physiological monitoring device is in use, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface"

Claim 20 has a "surface comprising a dark-colored coating" limitation that is identical to the limitation of claim 1. For the reasons discussed above in the context of claim 1, Apple has not shown that the Apple Watch Series 0 has a surface comprising a dark-colored coating or that one of ordinary skill in the art would have added such a coating.

(vi) Element [20E]: "a light block configured to prevent at least a portion of the light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the tissue"

Claim 20 has a "light block" limitation that is identical to the limitation of claim 1. For the reasons discussed above in the context of claim 1, the evidence shows that the Apple Watch Series 0 has a light block that prevents at least a portion of light from the LEDs from reaching the photodiodes.

(vii) Element [20F]: "a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal"

Claim 20 has a "processor" limitation that is identical to the limitation of claim 1. As discussed above in the context of claim 1, there is no dispute that the Apple Watch Series 0 has a processor that receives signals from the photodiodes and calculates a pulse rate. *See* RIB at 183, 185.

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(viii) Element [20G]: "a processing device configured to wirelessly receive physiological parameter data from the physiological monitoring device, wherein the processing device comprises a user interface, a storage device, and a network interface configured to wirelessly communicate with the physiological monitoring device, and wherein the user interface includes a touch-screen display configured to present visual feedback responsive to the physiological parameter data"

Apple contends and provided testimony that the Apple Watch Series 0 wirelessly communicates with an Apple iPhone comprising a user interface including a touch-screen display, a storage device, and a wireless interface. RIB at 185; *see* Tr. (Sarrafzadeh) at 1095:17-1096:5. Complainants dispute whether Apple has shown that an iPhone could display the pulse rate measurement of an Apple Watch Series 0, however, arguing that Apple failed to identify any application on the iPhone for presenting any visual feedback responsive to any physiological parameter data. CIB at 223.[82] In his testimony, Dr. Sarrafzadeh stated that the Apple Watch could wirelessly communicate with a cell phone such as an iPhone, and that "the app can provide a visual feedback to show the physiological parameters," thus showing that this limitation is met. *See* Tr. (Sarrafzadeh) at 1095:17-1096:5; RDX-7.94C. While Dr. Sarrafzadeh did not identify a particular app for these application, his testimony is unrebutted, and Apple's public statements at the time of the release of the Apple Watch Series 0 described "Apple Watch's health and fitness features" and offered customers assistance "to pair their Apple Watch with their iPhone." RX-0023.

[82] Apple argues that this argument has been waived, RRB at 102, but Complainants' pre-hearing brief includes a contention that "Apple provides no evidence to show how an iPhone meets the elements within [20G]." CPHB at 164.

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(ix) Element [27]: "wherein at least one of the plurality of light-emitting diodes is configured to emit light of a first wavelength and at least one of the plurality of light-emitting diodes is configured to emit light of a second wavelength, the second wavelength being different than the first wavelength"

Claim 27 of the '745 patent depends from claim 20, further requiring that "at least one of the plurality of light-emitting diodes is configured to emit light of a first wavelength and at least one of the plurality of light-emitting diodes is configured to emit light of a second wavelength, the second wavelength being different than the first wavelength." Apple submits that the Apple Watch Series 0 has green and infrared LEDs. RIB at 185; *see* Tr. (Sarrafzadeh) at 1096:6-10; Tr. (Land) at 959:3-13; Tr. (Venugopal) at 819:1-7, 820:16-821:11; RX-0392C.006 (Apple specification) at Fig. 2. Complainants do not specifically dispute this limitation. *See* CIB at 212-24; CRB at 122-27.

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For the reasons discussed above, the evidence of record fails to show that claim 27 of the '745 patent is obvious in view of the Apple Watch Series 0. Apple has not shown, clearly and convincingly, that the Apple Watch Series 0 has a material that changes emitted light from a "first shape" to a "second shape," and Apple has not shown, clearly and convincingly, that it would have been obvious to modify the Apple Watch Series 0 to have a "dark-colored coating" as required by the limitations of claim 20.

2. Iwamiya

U.S. Patent No. 8,670,819 is entitled "Optical Biological Information Detecting Apparatus and Optical Biological Information Detecting Method," naming inventors Hiroshi Iwamiya and Shuji Nakajima, and assignee Casio Computer Co. Ltd. RX-0130 ("Iwamiya"). Iwamiya issued on March 11, 2014, from an application filed on June 29, 2010, *id.*, and

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accordingly it is prior art to the '745 patent pursuant to 35 U.S.C. § 102(a)(1). Apple contends that claims 9, 18, and 27 of the '745 patent are obvious in view of Iwamiya in combination with other prior art patents. RIB at 186-99; RRB at 102-09.

a. '745 Patent Claim 9

(i) Element [1 preamble]: "A physiological monitoring device comprising"

There is no dispute that Iwamiya discloses a "physiological monitoring device" because it discloses an "optical biological information detecting apparatus." RX-0130; *see* RIB at 186; Tr. (Sarrafzadeh) at 1098:8-12; Tr. (Madisetti) at 1359:8-1365:6.

(ii) Element [1A]: "a plurality of light-emitting diodes configured to emit light in a first shape"

There is no dispute that Iwamiya discloses light-emitting diodes emitting light in a shape. RX-0130 at 6:7-11, Fig. 4; *see* RIB at 186; Tr. (Sarrafzadeh) at 1098:13-18; RDX-7.100C; Tr. (Madisetti) at 1359:8-1365:6.

(iii) Element [1B]: "a material configured to be positioned between the plurality of light-emitting diodes and tissue on a wrist of a user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of light-emitting diodes is projected towards the tissue"

There is no dispute that Iwamiya discloses an "annular light guide unit" that is positioned between the light-emitting diodes and a user's wrist and changes the shape of the light into an annular shape. RX-0130 at 6:11:14 ("an annular guide unit 7 that guides the observation light emitted from the light emitting units 6 and annularly diffuses and irradiates the observation light with respect to a skin H"), 6:22-31 (describing location of light guide unit 7), *see* RIB at 186-87; Tr. (Sarrafzadeh) at 1098:19-1099:2; RDX-7.101C; Tr. (Madisetti) at 1359:8-1365:6.

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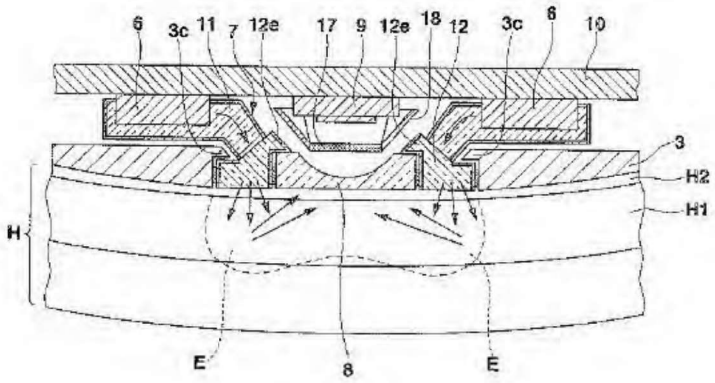


FIG.4

RX-0130 at Fig. 4.

(iv) Element [1C]: "a plurality of photodiodes configured to detect at least a portion of the light after the at least the portion of the light passes through the tissue, the plurality of photodiodes further configured to output at least one signal responsive to the detected light"

There is no dispute that Iwamiya discloses a plurality of photodiodes that output a signal responsive to light that is reflected from a user's tissue. RX-0130 at 8:20-23, Fig. 4; *see* RIB at 187-88; Tr. (Sarrafzadeh) at 1099:3-6, 1105:12-16; RDX-7.102C; Tr. (Madisetti) at 1359:8-1365:6.

(v) Element [1D]: "a surface comprising a dark-colored coating, the surface configured to be positioned between the plurality of photodiodes and the tissue when the physiological monitoring device is in use, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface"

Apple identifies a "light shielding frame" that surrounds the photodiodes in Iwamiya, RX-0130 at 8:38-42, and Dr. Sarrafzadeh testifies that it would have been obvious to add a dark-colored coating to this surface, and one example of such a coating is disclosed in Sarantos. Tr.

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(Sarrafzadeh) at 1099:7-15; RDX-7.103C (citing RX-0366 at 17:6-16, Fig. 22).[83] Dr. Sarrafzadeh submits that both Iwamiya and Sarantos are wrist-worn physiological monitoring devices, and one of ordinary skill in the art would have been motivated to add a dark-colored coating to Iwamiya to enhance the light shielding. Tr. (Sarrafzadeh) at 1100:15-1101:4. Dr. Sarrafzadeh testified that one of ordinary skill in the art would have expected success in implementing the "low-tech" and "low cost" addition of a dark-colored coating. *Id.* at 1101:5-10. Dr. Sarrafzadeh further cites Webster's disclosure that "black opaque material" can be an effective light shield. *Id.* at 1100:22-1101:4; RDX-7.109C; RX-0035 at 202.

Complainants argue that one of ordinary skill in the art would not have been motivated to add a dark-colored coating to Iwamiya because Iwamiya discloses "light shielding" that uses a reflective material. *See* Tr. (Madisetti) at 1361:9-12 (citing RX-0130 at 18:61-65). In reply, Apple argues that the reflective light shielding is disclosed in a separate embodiment of Iwamiya that is not relevant to the Figure 4 embodiment identified by Dr. Sarrafzadeh. RRB at 106-07.

In consideration of the parties' arguments, the undersigned finds that the evidence clearly and convincingly shows a reason to use a dark-colored coating for the "light shielding frame" in Figure 4. Dr. Sarrafzadeh convincingly explains that one of ordinary skill in the art would have reason to use a dark-colored coating, such as that disclosed in Sarantos, to improve the light-shielding properties of the Figure 4 embodiment, and that one of ordinary skill in the art would have expected success in implementing this change. While Iwamiya discloses a reflective light shielding component with respect to another embodiment (RX-0130 at 18:61-65), this does not

[83] Sarantos is U.S. Patent No. 9,392,946, which names inventors Chris W. Sarantos and Peter W. Richards, and issued from an application filed on May 28, 2015. RX-0366. Accordingly, Sarantos is prior art to the '745 patent pursuant to 35 U.S.C. § 102(a)(2).

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teach away from the use of other light shielding options or enhancements known in the art, particularly with respect to the Figure 4 embodiment, which does not mention "reflective" shielding. *See, e.g., Syntex (U.S.A.) LLC v. Apotex*, 407 F.3d 1371, 1379 (Fed. Cir. 2005) ("What a reference teaches a person of ordinary skill is not . . . limited to what a reference specifically 'talks about' . . . a reference will teach way when it suggests that the developments flowing from its disclosures are unlikely to produce the objective of the applicant's invention . . .").

(vi) Element [1E]: "a light block configured to prevent at least a portion of the light emitted from the plurality of light-emitting diodes from reaching the plurality of photodiodes without first reaching the tissue"

There is no dispute that Iwamiya discloses reflection layers 13 and 15 that are light blocks configured to prevent light from the light-emitting diodes from reaching the photodiodes without first reaching the tissue. RX-0130 at 6:67-7:3, 7:45-49, Fig. 3; *see* RIB at 189-90; Tr. (Sarrafzadeh) at 1099:16-21; RDX-7.104C; Tr. (Madisetti) at 1359:8-1365:6.

(vii) Element [1F]: "a processor configured to receive and process the outputted at least one signal and determine a physiological parameter of the user responsive to the outputted at least one signal"

There is no dispute that Iwamiya discloses a CPU that receives and processes signals from the photodiodes and "outputs the data as biological information" that represents a physiological parameter. RX-0130 at 9:40-43, Fig. 10; *see* RIB at 190-91; Tr. (Sarrafzadeh) at 1099:22-1100:1; RDX-7.105C; Tr. (Madisetti) at 1359:8-1365:6.

(viii) Element [9]: "wherein the physiological parameter comprises oxygen saturation"

Claim 9 of the '745 patent depends from claim 1, "wherein the physiological parameter comprises oxygen saturation." Dr. Sarrafzadeh testified that this limitation is obvious in view of

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Iwamiya's disclosure of a measurement of "biological information," because oxygen saturation is a type of biological information. Tr. (Sarrafzadeh) at 1100:2-8; RDX-7.106C; *see* RX-0130 at 9:1-7. Apple further submits that the prior art Sarantos reference explicitly discloses a measurement of oxygen saturation, explaining that "[i]f multiple light-emitting devices are used . . . photoplethysmographic techniques may also be used to measure other physiological parameters besides heart rate, such as blood oxygenation levels." RX-0366 at 13:44-47; *see* Tr. (Sarrafzadeh) at 1100:9-14. Dr. Sarrafzadeh offered his opinion that one of ordinary skill in the art would have been motivated to use the teaching in Sarantos to measure oxygen saturation in Iwamiya because both references describe wrist-worn physiological monitoring devices, and measuring oxygen saturation would enhance Iwamiya's device. Tr. (Sarrafzadeh) at 1100:15-20, 1101:12-19. Dr. Sarrafzadeh also offered his opinion that such a combination would be successful based on Sarantos's suggestion and the existence of oxygen saturation measurement devices in the prior art. *Id.* at 1101:20-1102:1.

Complainants argue that Iwamiya's disclosure of a measurement of "biological information" is insufficient to show a measurement of oxygen saturation. CIB at 225-26. Dr. Madisetti explained that Iwamiya only disclosed the use of one wavelength of light, which would be insufficient for measuring oxygen saturation. Tr. (Madisetti) at 1359:22-1361:1; CDX-0012C.065. Moreover, the only "biological information" disclosed in Iwamiya is heart rate. RX-0130 at 9:1-7 ("pulse wave"); *see* Tr. (Madisetti) at 1360:2-4. Complainants further identify an optical filter disclosed in Iwamiya that would block light below 900nm, which would preclude the wavelengths necessary for pulse oximetry. CIB at 227 (citing RX-0130 at 8:42-47, 18:55-60). Sarantos is also not primarily designed for the wavelengths necessary for pulse oximetry, noting that "[t]he aspect ratios and dimensional values discussed herein are tailored

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based on the green/yellow light spectrum and are not tailored for use in other spectrums, such as the red or infrared spectra." RX-0336 at 18:48-51. Complainants further argue that Apple has failed to identify a reason for combining Iwamiya and Sarantos or to show that such a combination would have a reasonable expectation of success. CIB at 228-30; CRB at 128-29.

In consideration of the parties' arguments, the undersigned finds that Apple has failed to show by clear and convincing evidence that it would have obvious for one of ordinary skill to combine Iwamiya and Sarantos to measure oxygen saturation. Because Iwamiya only discloses the use of one wavelength of light, the evidence indicates that one of ordinary skill in the art would not have been able to use the device in Iwamiya to measure oxygen saturation. Tr. (Madisetti) at 1359:22-1361:1. Moreover, Iwamiya operates at wavelengths that are not appropriate for pulse oximetry. *See* RX-0130 at 8:42-47; CIB at 227 (Iwamiya blocks light below 900 nm). Sarantos includes a suggestion to use multiple emitters with PPG sensors to measure blood oxygenation levels, but the only reason that Dr. Sarrafzadeh identifies for adding such a feature is that it "would enhance, by way of example, what the biological information of Iwamiya is." Tr. (Sarrafzadeh) at 1101:12-19. The Federal Circuit has held that such generic expert testimony is insufficient for obviousness. *See ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012) (where expert testified that a motivation would have been "to build something better," the court found that "[t]his testimony is generic and bears no relation to any specific combination of prior art elements.").[84]

[84] Moreover, Apple fails to explain how the multiple emitters described in Sarantos would have been implemented in Iwamiya in a way that is compatible with the annular light guide that is necessary to meet the "second shape" limitation. *See Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017) (reversing a finding of obviousness where the record lacked "a clear, evidence-supported account of the contemplated workings of the combination").

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Apple also has not clearly and convincingly shown that one of ordinary skill in the art would have had a reasonable expectation of success in modifying Iwamiya to measure oxygen saturation—the record contains testimony from multiple Apple engineers expressing skepticism regarding the implementation of pulse oximetry in a wrist-worn device. *See* Tr. (Mannheimer) at 1012:12-16; CX-0299C (Waydo Dep. Tr.) at 166:4-167:5; CX-0295C (Shui Dep. Tr.) at 108:15-21.

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Accordingly, Apple has failed to show that claim 9 of the '745 patent is obvious in view of Iwamiya in combination with Sarantos, because Apple has not shown, clearly and convincingly, that it would have been obvious to one of ordinary skill in the art to modify the device disclosed in Iwamiya with the teachings in Sarantos regarding a measurement of oxygen saturation with a reasonable expectation of success.

b. '745 Patent Claim 18

(i) Element [15 preamble]: "A physiological monitoring device comprising:"

There is no dispute that Iwamiya discloses a "physiological monitoring device" as required by the preamble of claim 15, as discussed above in the context of the preamble of claim 1. *See* RIB at 193.

(ii) Element [15A]: "a plurality of light-emitting diodes configured to emit light proximate a wrist of a user"

There is no dispute that Iwamiya discloses light emitting diodes, as discussed above in the context of claim 1. *See* RIB at 193. Moreover, there is no dispute that Iwamiya discloses a device that is worn on the wrist. *See* RX-0130 at 4:54-5, Fig. 4.

(iii) Element [15B]: "a light diffusing material configured to be positioned between the plurality of light-emitting diodes and a

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