

**Exhibit D-1**  
**Initial Invalidity Claim Chart for U.S. Patent No. 10,736,507**  
***A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring (“Mendelson”)***

*A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring* (“Mendelson”), which was published on September 3, 2006, is prior art to U.S. Patent No. 10,736,507 (the “’507 patent”) pursuant to at least pre-AIA 35 U.S.C. §§ 102(a), 102(b), and/or 102(e) under the ’507 patent’s proper priority date. Mendelson anticipates and/or renders obvious the asserted claims of the ’507 patent under pre-AIA 35 U.S.C. §§ 102 and/or 103.

As set forth in the chart below, all asserted claims of the ’507 patent are anticipated and/or rendered obvious over Mendelson under at least the apparent construction of the claims advanced by Masimo based on its Preliminary Infringement Contentions served on May 25, 2023 (the “Infringement Contentions”). The excerpts cited herein are exemplary. For any claim limitation, Apple may rely on excerpts cited for any other limitation and/or additional excerpts not set forth fully herein to the extent necessary to provide a more comprehensive explanation for a reference’s disclosure of a limitation. Where an excerpt refers to or discusses a figure or figure items, that figure and any additional descriptions of that figure should be understood to be incorporated by reference as if set forth fully therein. Apple expressly reserves the right to use the entirety of any reference and otherwise to supplement these contentions to add additional information showing that Mendelson invalidates the asserted claims of the ’507 patent.

To the extent that any of the below claim limitations are found to not be expressly disclosed by the below reference, Apple contends that any such limitation would have been obvious, either based on the knowledge of one of ordinary skill in the art or based on any of the art cited for the ’507 patent in Apple’s Initial Invalidity Contentions, which are incorporated herein by reference. In particular, as evidenced by the below and in Apple’s Initial Invalidity Contentions, the ’507 patent is merely a collection of prior art elements that fails to meet the statutory requirement of nonobviousness under § 103, and the factors delineated in *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), weigh against a finding of nonobviousness.

For example, it would have been obvious to a person of ordinary skill in the art to combine the teaching of Mendelson with the teachings of the other references charted for the ’507 patent in Apple’s Initial Invalidity Contentions; such references are in the same field of art, and discuss various techniques and improvements that would have been known to yield predictable results when applied to the technology claimed in the ’507 patent, and a person of ordinary skill therefore would have been motivated to so combine them in view of the disclosures therein.

Apple also contends that one of ordinary skill in the art would find such limitation obvious for at least one or more of the following reasons: (1) the combination would unite old elements with no change in their respective function; (2) the combination would have been a predictable variation of a work in the same or a different field of endeavor; (3) the modification would have used a known technique

to improve a similar device in the same way; (4) the modification was a known problem for which there was an obvious solution; (5) the modification would have been “obvious to try”; (6) the modification was known work in one field of endeavor that would have prompted variations of it for use in either the same or different field based on design incentives or other market forces; (7) there was an explicit teaching, suggestion, or motivation in the prior art for the modification.

These Initial Invalidity Contentions are based on Apple’s present understanding of the ’507 patent claims and Masimo’s theories of infringement against Apple. Apple expressly does not agree that, under a correct construction or reading of the claims, that Apple’s accused products meet the limitations of the asserted claims of the ’507 Patent or that the claims satisfy the requirements of 35 U.S.C. § 112. Apple’s contentions herein are not, and should in no way be seen as, admissions as to or adoptions of any particular claim scope or construction, or as an admission that any particular element is met by any accused product in any particular way. Apple therefore objects to any attempt to imply claim construction from this chart. Apple’s Initial Invalidity Contentions do not represent Apple’s agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein. However, at least under Masimo’s apparent application of the claims for the purposes of infringement (which Apple expressly disagrees with), Mendelson would have rendered the asserted claims of the ’507 patent invalid. Except where specifically noted otherwise, this chart applies the apparent constructions of claim terms as used by Masimo in its Infringement Contentions; such use, however, does not imply that Apple adopt or agree with Masimo’s constructions in any way. Apple further reserves the right to supplement these contentions in response to any claim construction orders by the Court.

Apple is investigating this prior art and has not yet completed discovery from third parties who may have information concerning it. Pursuant to Federal Rule of Civil Procedure 26(e), the Local Rules of the District of Delaware, and the Orders of record in this matter Apple reserves the right to modify, amend, and/or supplement these contentions as information becomes available (*e.g.*, witness testimony and/or non-public documentation) and as discovery proceeds.

| Claim 13                                                                                                                                                          | Prior Art                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <p>13[pre] A computer-implemented method of informing a user of mobile measurement of oxygen saturation ("SpO2"), the computer-implemented method comprising:</p> | <p>Under at least the apparent construction based on Masimo's Infringement Contentions, and to the extent that the preamble is limiting, Mendelson discloses and/or renders obvious a computer-implemented method of informing a user of mobile measurement of oxygen saturation ("SpO2").</p> <p>For example, Mendelson discloses and/or suggests a body-worn pulse oximeter comprising a sensor module and a receiver module that communicates with a mobile device such as a PDA which implements the claimed method and informs a user of a measurement of blood oxygen saturation.</p> <p><i>See, e.g., Mendelson, Abstract</i> ("To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO2), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.").</p> <p>Mendelson, 1-2 ("A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO2) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO2 and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO2). Noninvasive spectrophotometric measurements of SpO2 are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an</p> |

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|  | <p>alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> <p>Mendelson, 2 (“The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small (<math>\phi = 22\text{mm}</math>) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module. The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module</p> |
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|  | <p>runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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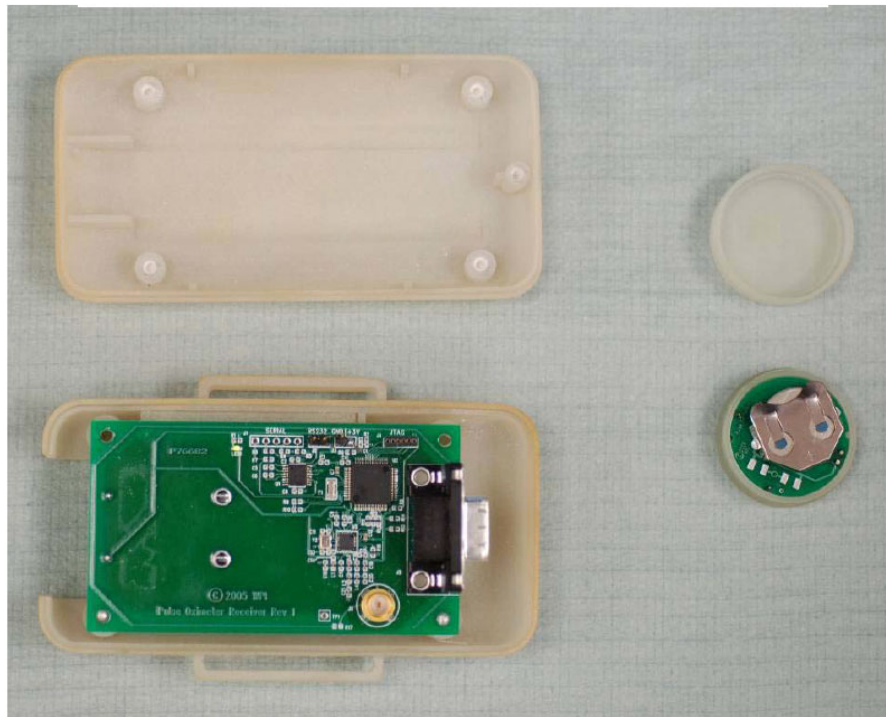
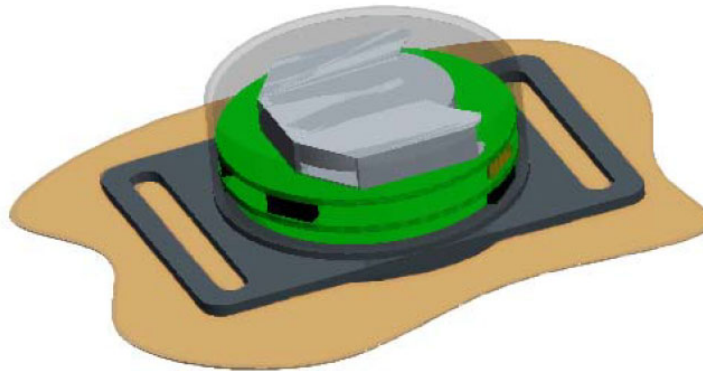


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

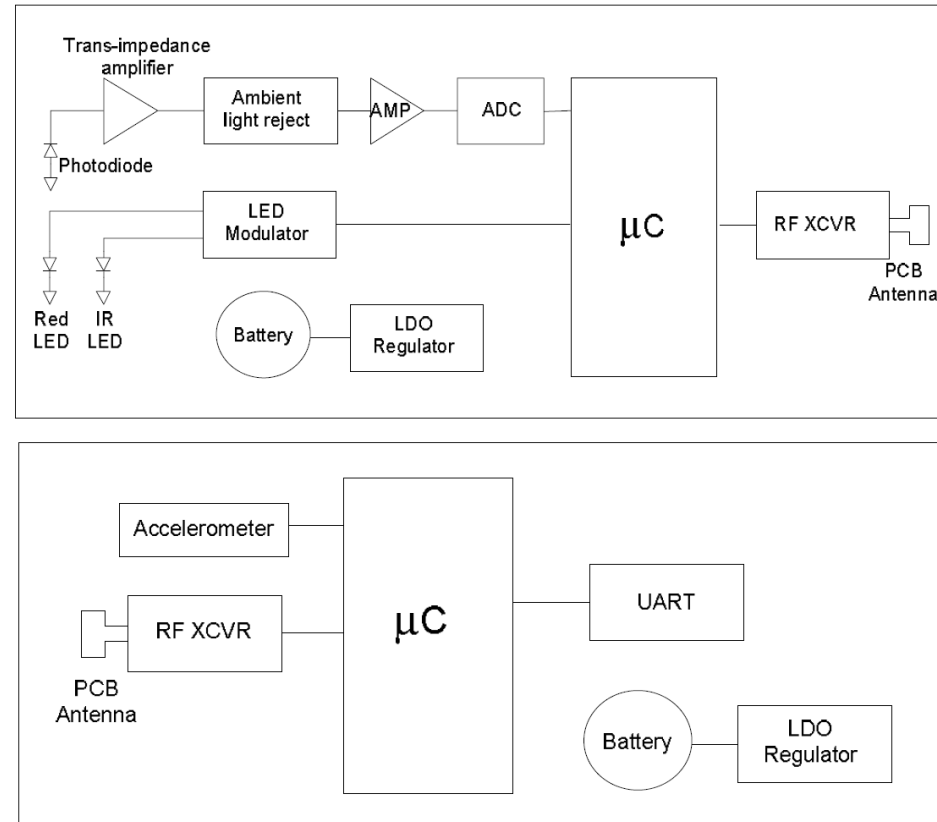


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

Mendelson, Figure 3:



Fig. 3. Sample PDA Graphical User Interface (GUI).

Mendelson, Figure 4:

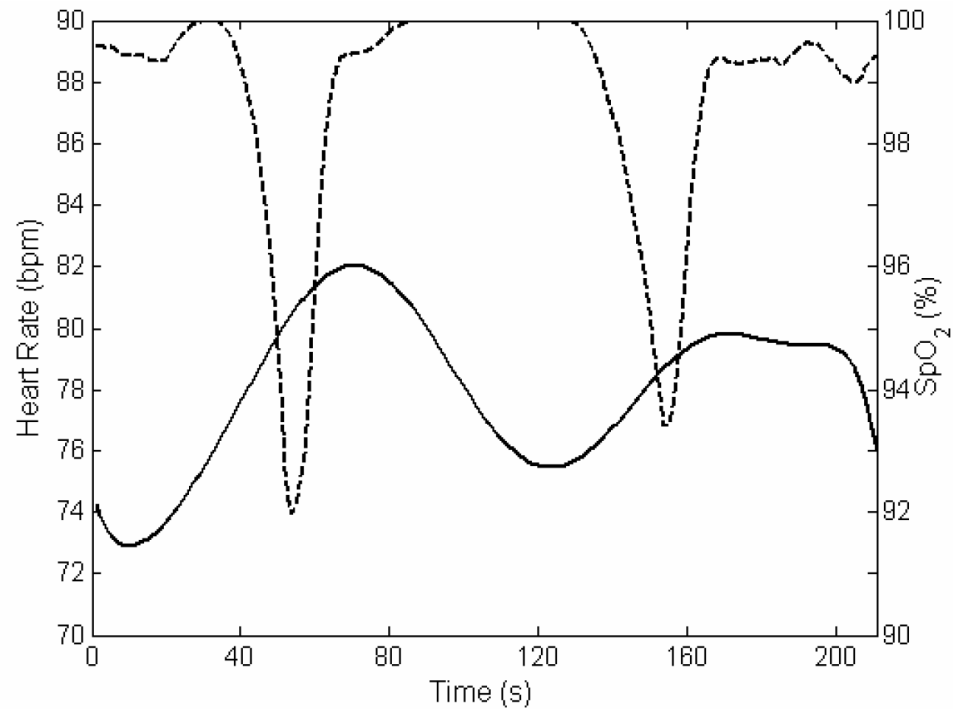


Fig. 4. Typical HR (solid line) and SpO<sub>2</sub> (dashed line) recording of two voluntary hypoxic episodes.

To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.

13[a] outputting, from an optical

Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious outputting, from an optical sensor of an SpO2 measurement system, one or more

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| <p>sensor of an SpO2 measurement system, one or more signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue; and</p> | <p>signals responsive to light from a light source attenuated by tissue of the user at a measurement site, said one or more signals responsive to an oxygen saturation of said tissue.</p> <p>For example, Mendelson discloses and/or suggests outputting signals from LED light captured by the sensor module of the pulse oximeter.</p> <p><i>See, e.g., Mendelson, Abstract (“To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO2), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.”).</i></p> <p>Mendelson, 1-2 (“A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO2) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO2 and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO2). Noninvasive spectrophotometric measurements of SpO2 are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> |
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|  | <p>Mendelson, 2 (“The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small (<math>\phi = 22\text{mm}</math>) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module. The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard</p> |
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|  | <p>UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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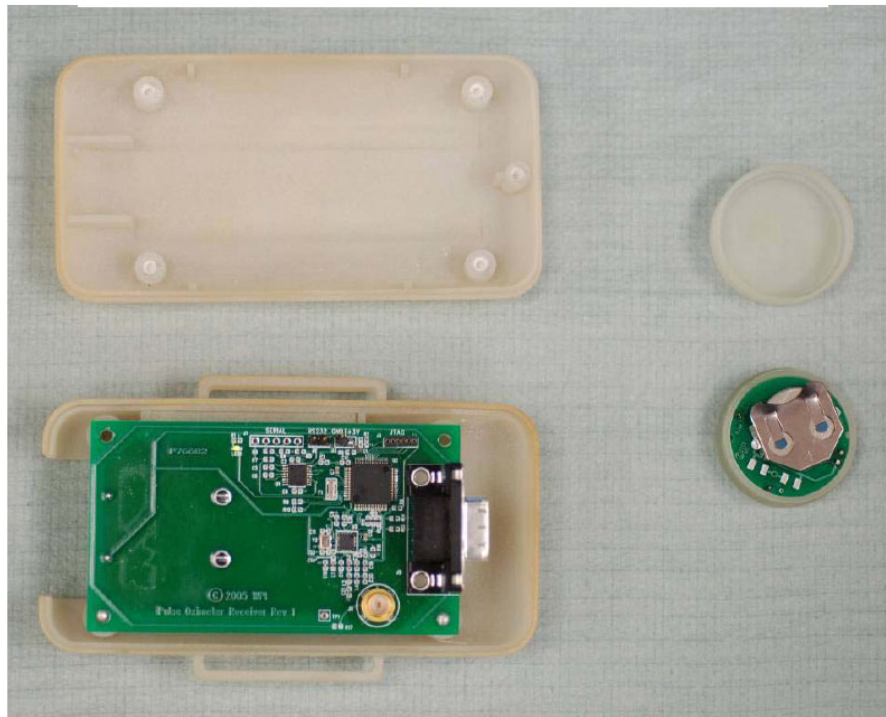
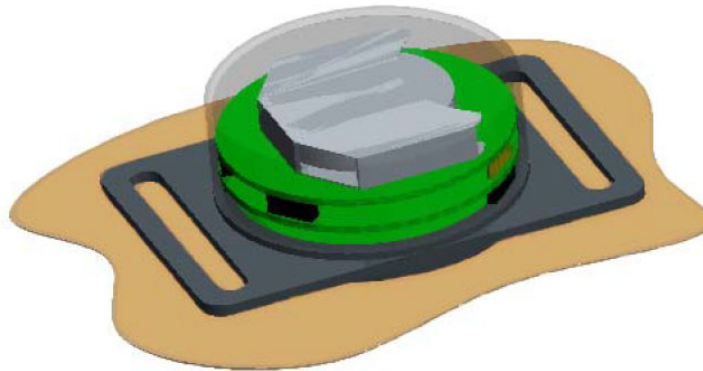


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Mendelson, Figure 2:

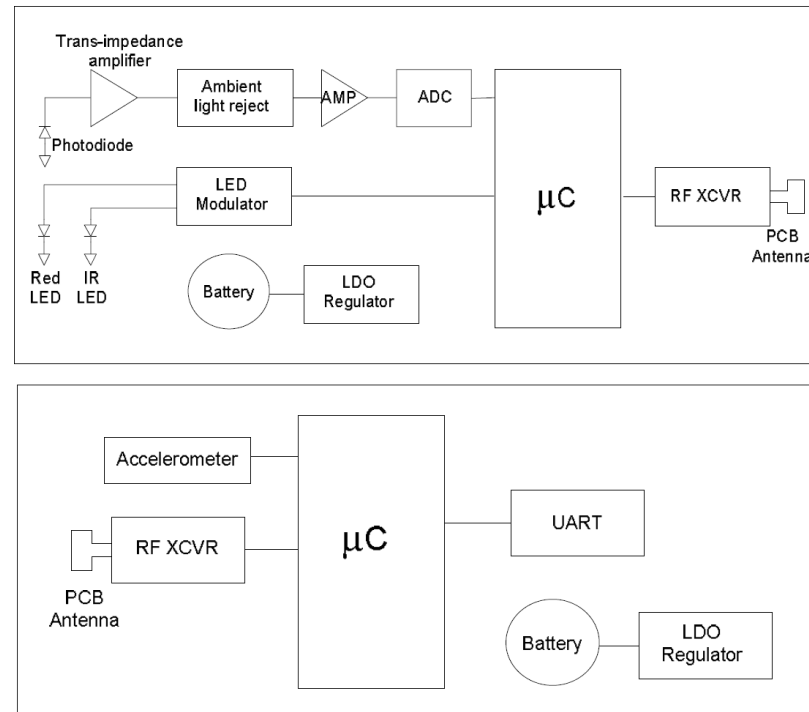


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

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| <p>13[b] via a processing board of the SpO2 measurement system, the processing board in data communication with the optical sensor and a mobile computing device including a display:</p> | <p>Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious via a processing board of the SpO2 measurement system, the processing board in data communication with the optical sensor and a mobile computing device including a display.</p> <p>For example, Mendelson discloses and/or suggests a receiver unit which contains a processing board in communication with the sensor unit and the mobile computing device such as the PDA that includes a display.</p> <p><i>See, e.g., Mendelson, Abstract</i> (“To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO2), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.”).</p> <p>Mendelson, 1-2 (“A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO2) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO2 and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO2). Noninvasive spectrophotometric measurements of SpO2 are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> |
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|  | <p>UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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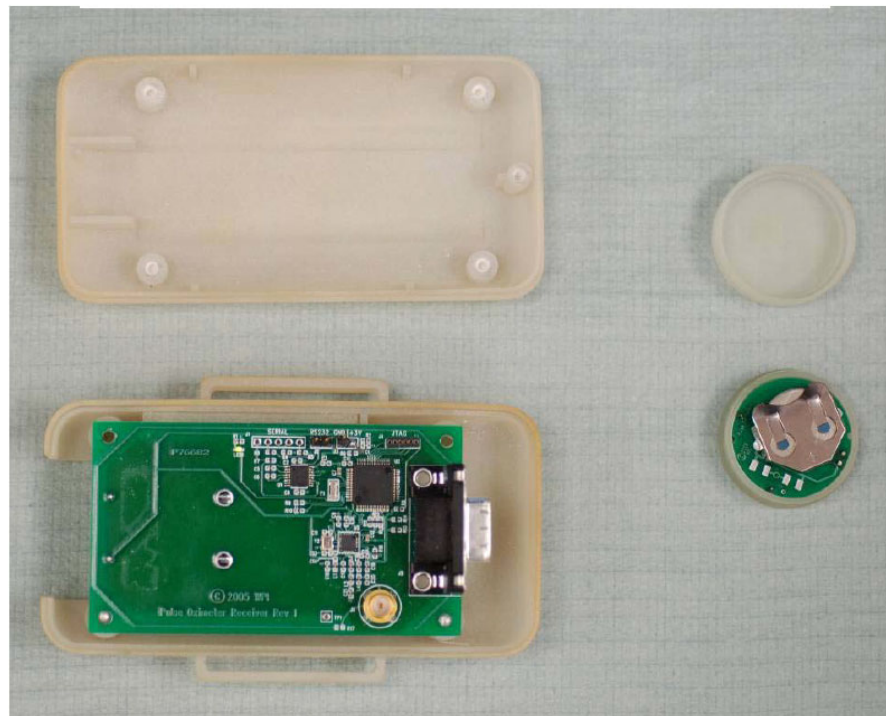


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

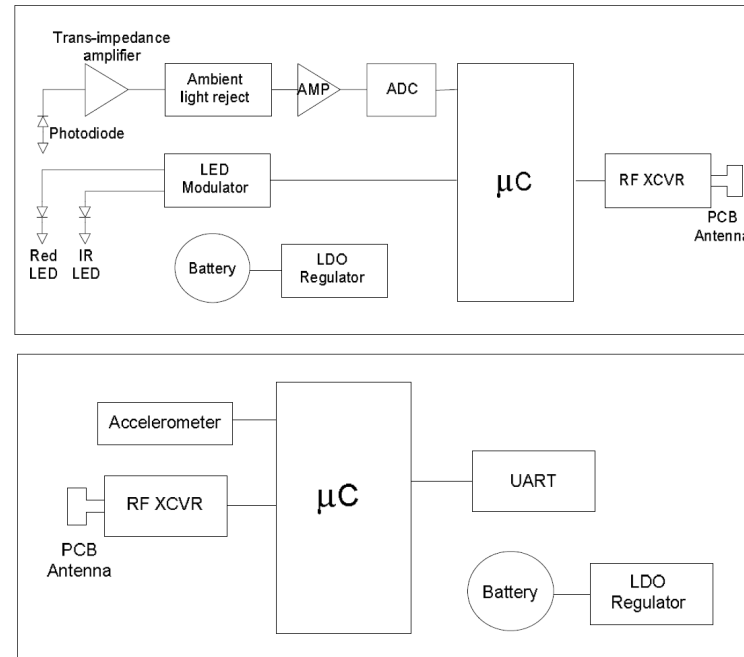


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.

13[c] receiving said one or more signals

Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious the processing board receiving said one or more signals from the optical sensor.

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| <p>from the optical sensor;</p> | <p>For example, Mendelson discloses and/or suggests the receiver unit receiving the signals from the sensor unit.</p> <p><i>See, e.g., Mendelson, Abstract (“To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO2), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.”).</i></p> <p>Mendelson, 1-2 (“A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO2) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO2 and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO2). Noninvasive spectrophotometric measurements of SpO2 are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> <p>Mendelson, 2 (“The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small (<math>\phi = 22\text{mm}</math>) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor</p> |
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|  | <p>Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module. The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for</p> |
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|  | <p>the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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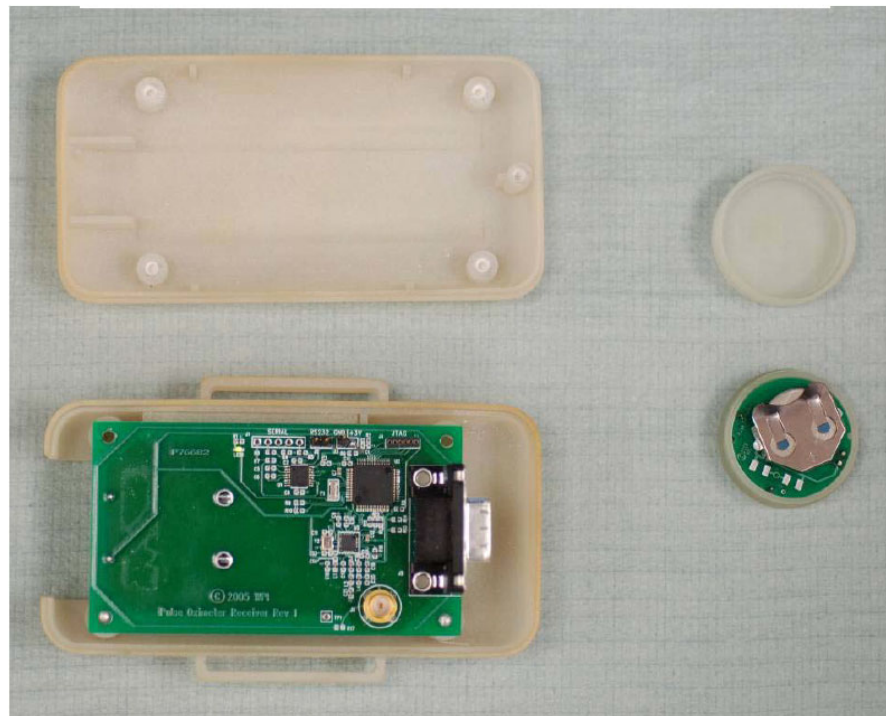


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

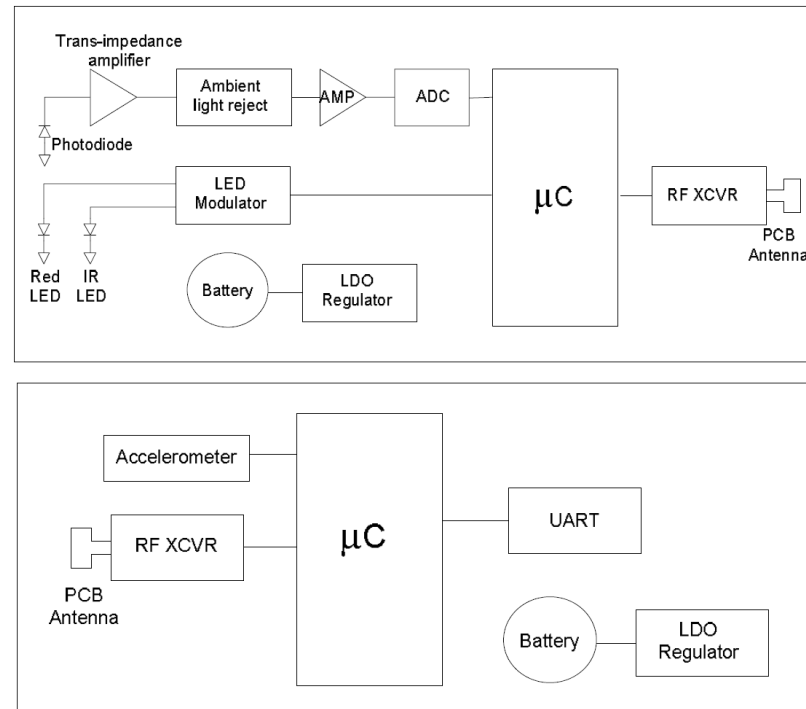


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter.  
Sensor Module (top), Receiver Module (bottom).

To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.

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| <p>13[d] processing said one or more signals to generate the SpO2 measurement values; and</p> | <p>Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious the processing board processing said one or more signals to generate the SpO2 measurement values.</p> <p>For example, Mendelson discloses and/or suggests a receiver module which processes signals from the sensor module to generate SpO2 values.</p> <p><i>See, e.g., Mendelson, Abstract</i> (“To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO2), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.”).</p> <p>Mendelson, 1-2 (“A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO2) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO2 and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO2). Noninvasive spectrophotometric measurements of SpO2 are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> |
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|  | <p>Mendelson, 2 (“The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small (<math>\phi = 22\text{mm}</math>) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module. The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard</p> |
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|  | <p>UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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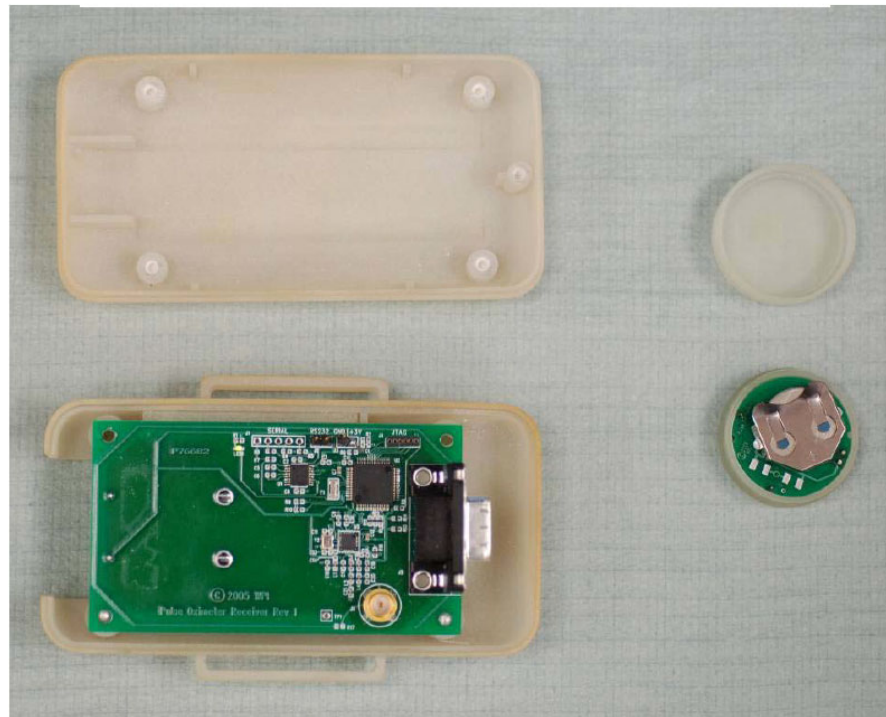


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

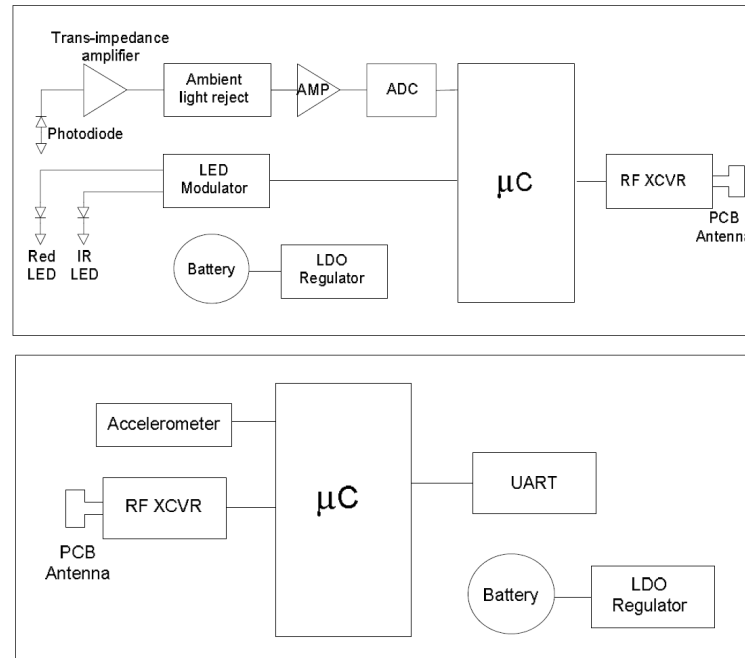


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.

13[e] outputting the SpO2 measurement values to the mobile

Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious the processing board outputting the SpO2 measurement values to the mobile computing device.

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| <p>computing device;<br/>and</p> | <p>For example, Mendelson discloses and/or suggests wirelessly communicating SpO2 information from the receiver module to a PDA.</p> <p><i>See, e.g., Mendelson, Abstract (“To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO2), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.”).</i></p> <p>Mendelson, 1-2 (“A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO2) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO2 and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO2). Noninvasive spectrophotometric measurements of SpO2 are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> <p>Mendelson, 2 (“The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small (<math>\phi = 22\text{mm}</math>) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical</p> |
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|  | <p>transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module. The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless</p> |
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|  | <p>communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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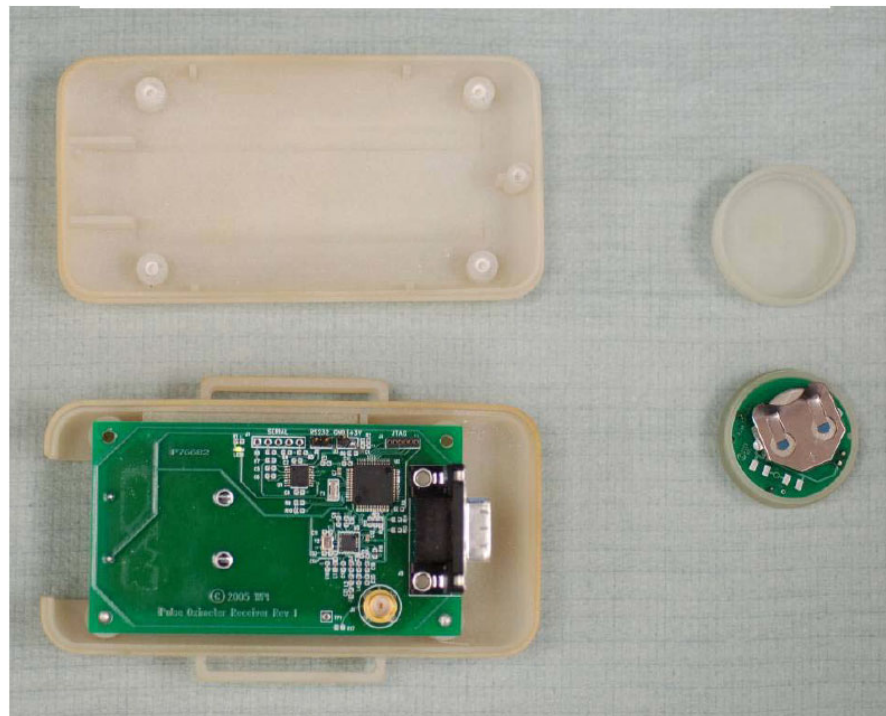


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

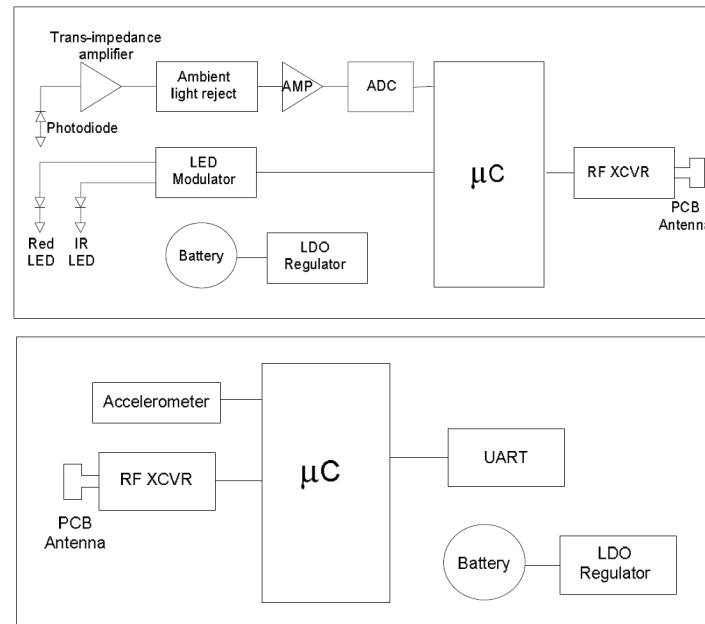


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.

13[f] via an application configured to execute commands

Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious via an application configured to execute commands on the mobile computing device.

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| <p>on the mobile computing device:</p> | <p>For example, Mendelson discloses and/or suggests a dedicated National Instruments LabVIEW program to control all interactions between the PDA and the wearable unit via a graphical user interface.</p> <p><i>See, e.g., Mendelson, Abstract (“To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO<sub>2</sub>), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.”).</i></p> <p>Mendelson, 1-2 (“A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO<sub>2</sub>) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO<sub>2</sub> and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO<sub>2</sub>). Noninvasive spectrophotometric measurements of SpO<sub>2</sub> are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> <p>Mendelson, 2 (“The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small (<math>\phi = 22\text{mm}</math>) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical</p> |
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|  | <p>transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module. The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless</p> |
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|  | <p>communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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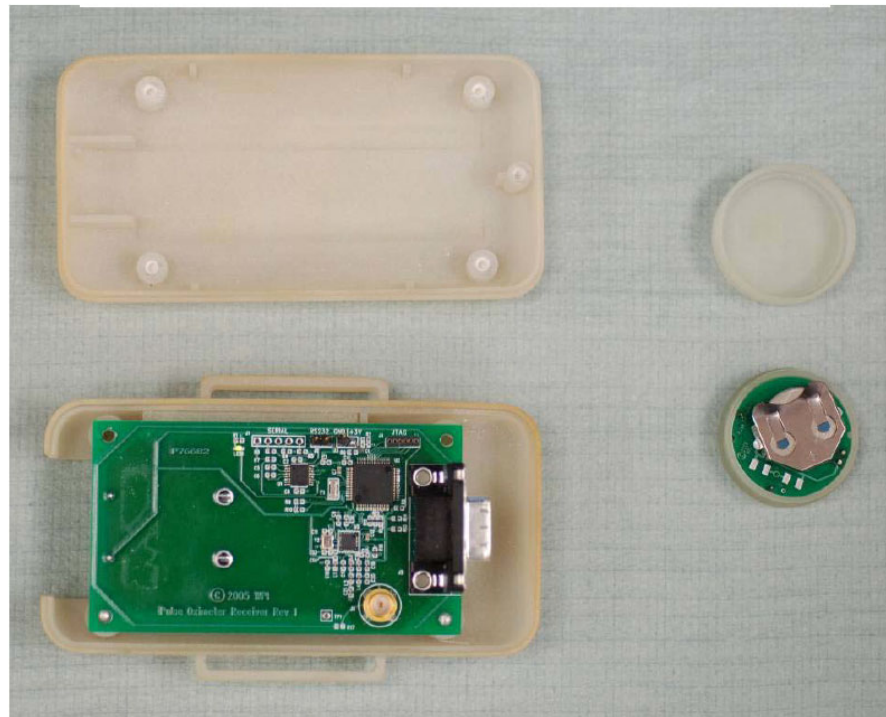


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

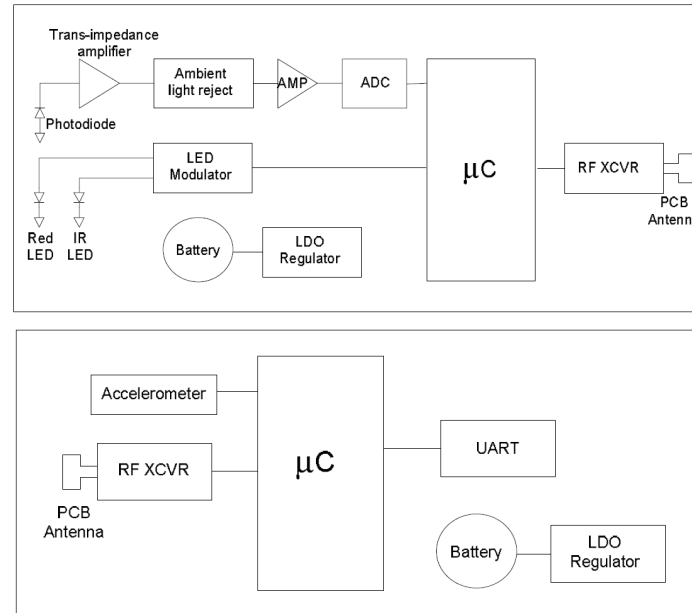


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

Mendelson, 3-4 (“A dedicated National Instruments LabVIEW program was developed to control all interactions between the PDA and the wearable unit via a graphical user interface (GUI). One part of the LabVIEW software is used to control the flow of information through the 802.11b radio system on the PDA. A number of LabVIEW VIs programs are used to establish a connection, exchange data, and close the connection between the wearable pulse oximeter and the PDA. The LabVIEW program interacts with the Windows CE™ drivers of the PDA’s wireless system. The PDA has special drivers provided by the manufacturer that are used by Windows CE™ to interface with the 802.11b radio hardware. The LabVIEW program interacts with Windows CE™ on a higher level and allows Windows CE™ to handle the drivers and the direct control of the radio hardware. The user interacts with the wearable system using a simple GUI, as depicted in Fig. 3. The GUI was configured to present the input and output information to the user and allows easy activation of various functions. In cases

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|                                                                                     | <p>of multiple wearable devices, it also allows the user to select which individual to monitor prior to initiating the wireless connection. Once a specific wearable unit is selected, the user connects to the remote device via the System Control panel that manages the connection and sensor control buttons. The GUI also displays the subject's vital signs, activity level, body orientation, and a scrollable PPG waveform that is transmitted by the wearable device. The stream of data received from the wearable unit is distributed to various locations on the PDA's graphical display. The most prominent portion of the GUI display is the scrolling PPG waveform, shown in Fig. 3. Numerical SpO2 and HR values are displayed in separate indicator windows. A separate tri-color indicator is used to annotate the subject's activity level measured by the wearable accelerometer. This activity level was color coded using green, yellow, or red to indicate low or no activity, moderate activity, or high activity, respectively. In addition, the subject's orientation is represented by a blue indicator that changes orientation according to body posture. Alarm limits could be set to give off a warning sign if the physiological information exceeds preset safety limits. One of the unique features of this PDA-based wireless system architecture is the flexibility to operate in a free roaming mode. In this ad-hoc configuration, the system's integrity depends only on the distance between each node. This allows the PDA to communicate with a remote unit that is beyond the PDA's wireless range. The ad-hoc network would therefore allow medical personnel to quickly distribute sensors to multiple casualties and begin immediate triage, thereby substantially simplifying and reducing deployment time.").</p> <p>To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.</p> |
| 13[g] generating a graphical user interface having a plurality of display portions; | <p>Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious generating a graphical user interface having a plurality of display portions.</p> <p>For example, Mendelson discloses and/or suggests a dedicated National Instruments LabVIEW program to control all interactions between the PDA and the wearable unit via a graphical user interface (GUI) with a plurality of display portions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

See, e.g., Mendelson, Figure 1:



Fig. 3. Sample PDA Graphical User Interface (GUI).

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|  | <p>monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple</p> |
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|  | <p>controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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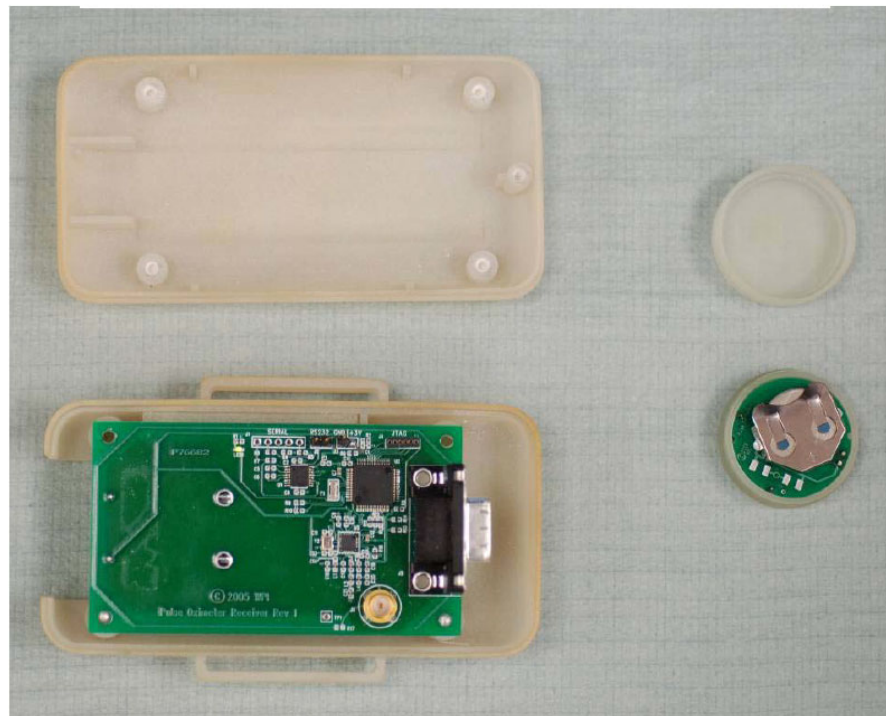


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

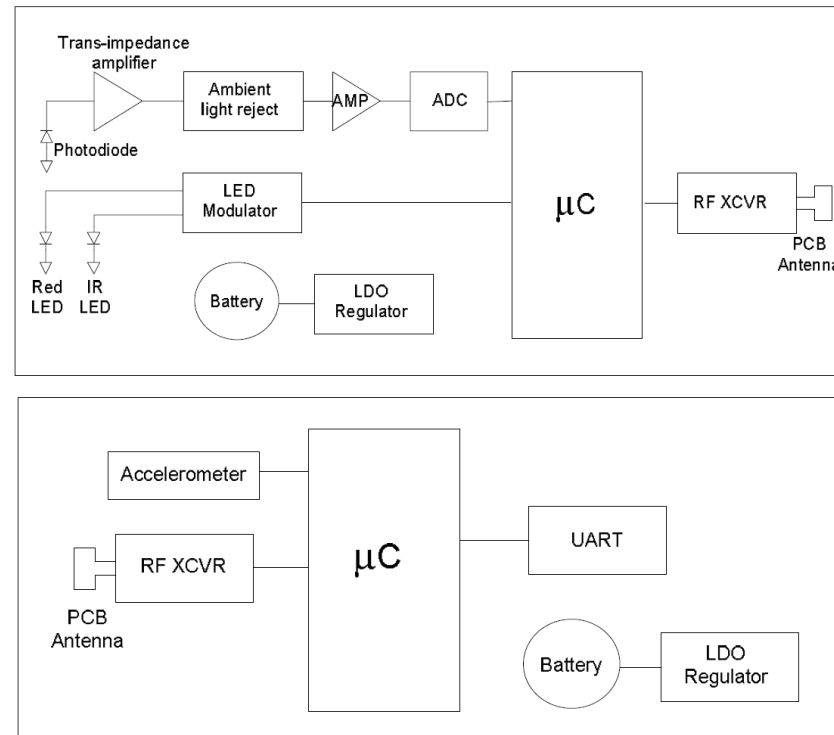


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

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Windows CE™ to handle the drivers and the direct control of the radio hardware. The user interacts with the wearable system using a simple GUI, as depicted in Fig. 3. The GUI was configured to present the input and output information to the user and allows easy activation of various functions. In cases of multiple wearable devices, it also allows the user to select which individual to monitor prior to initiating the wireless connection. Once a specific wearable unit is selected, the user connects to the remote device via the System Control panel that manages the connection and sensor control buttons. The GUI also displays the subject's vital signs, activity level, body orientation, and a scrollable PPG waveform that is transmitted by the wearable device. The stream of data received from the wearable unit is distributed to various locations on the PDA's graphical display. The most prominent portion of the GUI display is the scrolling PPG waveform, shown in Fig. 3. Numerical SpO2 and HR values are displayed in separate indicator windows. A separate tri-color indicator is used to annotate the subject's activity level measured by the wearable accelerometer. This activity level was color coded using green, yellow, or red to indicate low or no activity, moderate activity, or high activity, respectively. In addition, the subject's orientation is represented by a blue indicator that changes orientation according to body posture. Alarm limits could be set to give off a warning sign if the physiological information exceeds preset safety limits. One of the unique features of this PDA-based wireless system architecture is the flexibility to operate in a free roaming mode. In this ad-hoc configuration, the system's integrity depends only on the distance between each node. This allows the PDA to communicate with a remote unit that is beyond the PDA's wireless range. The ad-hoc network would therefore allow medical personnel to quickly distribute sensors to multiple casualties and begin immediate triage, thereby substantially simplifying and reducing deployment time.”).

Mendelson, Figure 4:

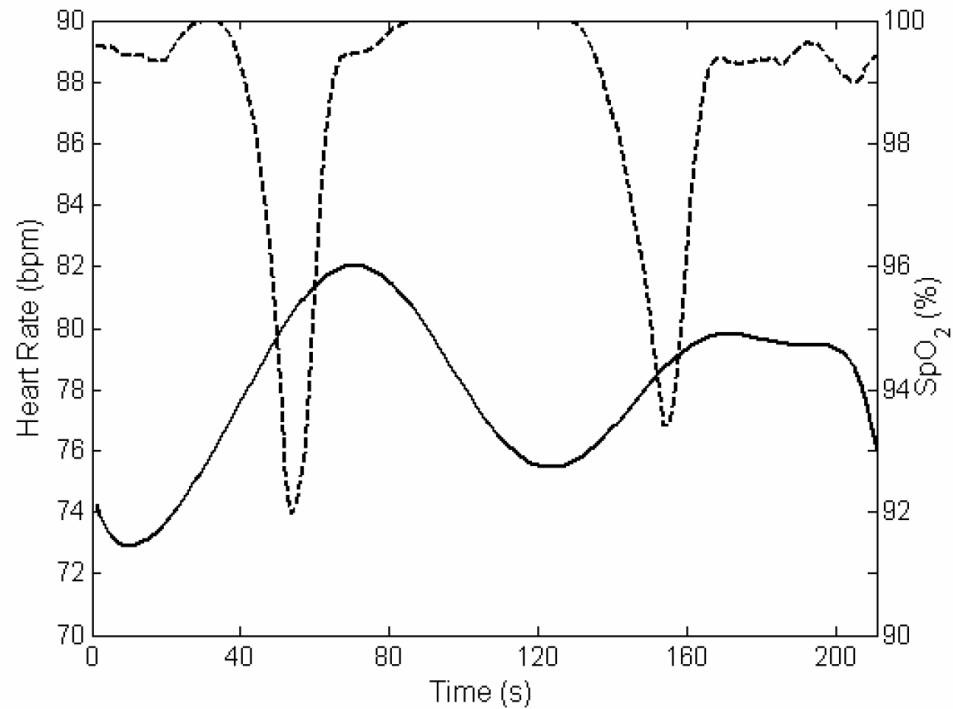


Fig. 4. Typical HR (solid line) and SpO<sub>2</sub> (dashed line) recording of two voluntary hypoxic episodes.

To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.

13[h] displaying, in at least one portion

Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious displaying, in at least one portion of the plurality of display portions, a representation

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| of the plurality of display portions, a representation of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values; and | <p>of a physiological parameter of a plurality of physiological parameters comprising at least the SpO2 measurement values.</p> <p>For example, Mendelson discloses and/or suggests displaying a representation of a physiological parameter such as heart rate and SpO2 values in portions of the PDA's display.</p> <p><i>See, e.g., Mendelson, Figure 3:</i></p> |
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Fig. 3. Sample PDA Graphical User Interface (GUI).

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|  | <p>controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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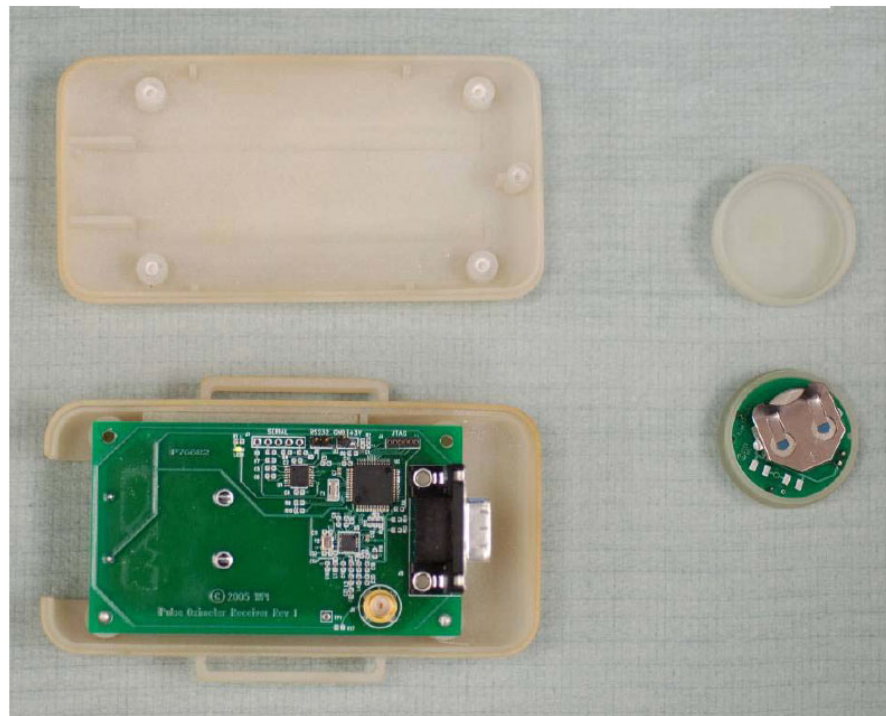


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

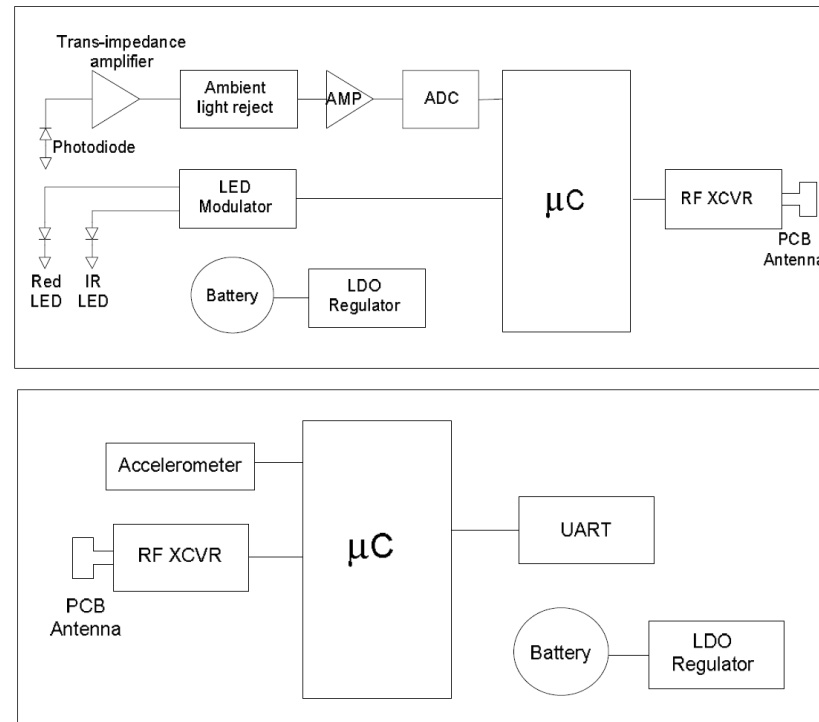


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

Mendelson, 3-4 (“A dedicated National Instruments LabVIEW program was developed to control all interactions between the PDA and the wearable unit via a graphical user interface (GUI). One part of the LabVIEW software is used to control the flow of information through the 802.11b radio system on the PDA. A number of LabVIEW VIs programs are used to establish a connection, exchange data, and close the connection between the wearable pulse oximeter and the PDA. The LabVIEW program interacts with the Windows CE™ drivers of the PDA’s wireless system. The PDA has special drivers provided by the manufacturer that are used by Windows CE™ to interface with the 802.11b radio

hardware. The LabVIEW program interacts with Windows CE™ on a higher level and allows Windows CE™ to handle the drivers and the direct control of the radio hardware. The user interacts with the wearable system using a simple GUI, as depicted in Fig. 3. The GUI was configured to present the input and output information to the user and allows easy activation of various functions. In cases of multiple wearable devices, it also allows the user to select which individual to monitor prior to initiating the wireless connection. Once a specific wearable unit is selected, the user connects to the remote device via the System Control panel that manages the connection and sensor control buttons. The GUI also displays the subject's vital signs, activity level, body orientation, and a scrollable PPG waveform that is transmitted by the wearable device. The stream of data received from the wearable unit is distributed to various locations on the PDA's graphical display. The most prominent portion of the GUI display is the scrolling PPG waveform, shown in Fig. 3. Numerical SpO2 and HR values are displayed in separate indicator windows. A separate tri-color indicator is used to annotate the subject's activity level measured by the wearable accelerometer. This activity level was color coded using green, yellow, or red to indicate low or no activity, moderate activity, or high activity, respectively. In addition, the subject's orientation is represented by a blue indicator that changes orientation according to body posture. Alarm limits could be set to give off a warning sign if the physiological information exceeds preset safety limits. One of the unique features of this PDA-based wireless system architecture is the flexibility to operate in a free roaming mode. In this ad-hoc configuration, the system's integrity depends only on the distance between each node. This allows the PDA to communicate with a remote unit that is beyond the PDA's wireless range. The ad-hoc network would therefore allow medical personnel to quickly distribute sensors to multiple casualties and begin immediate triage, thereby substantially simplifying and reducing deployment time.”).

Mendelson, Figure 4:

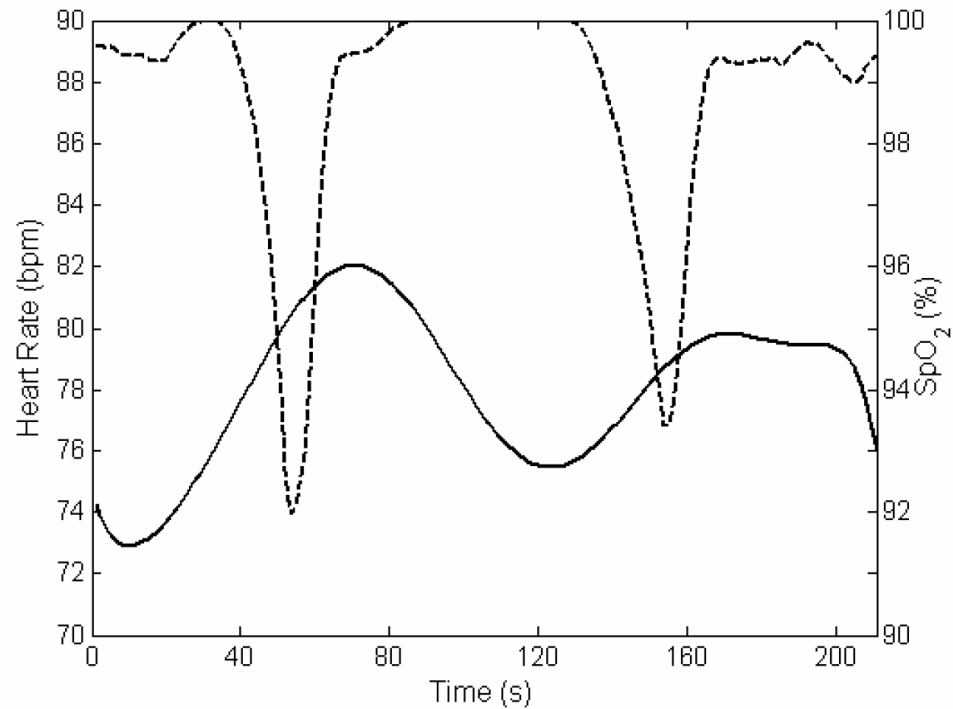


Fig. 4. Typical HR (solid line) and SpO<sub>2</sub> (dashed line) recording of two voluntary hypoxic episodes.

To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.

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| <p>13[i] displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application.</p> | <p>Under at least the apparent construction based on Masimo's Infringement Contentions, Mendelson discloses and/or renders obvious displaying, in a different portion of the plurality of portions, a plurality of user inputs configured to allow the user to interact with at least one of the plurality of display portions or the application.</p> <p>For example, Mendelson discloses and/or suggests displaying user inputs on a touch screen to allow the user to interact with the display portions in a different portion of the PDA display.</p> <p><i>See, e.g., Mendelson, Figure 3:</i></p> |
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Fig. 3. Sample PDA Graphical User Interface (GUI).

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|  | <p>Mendelson, Abstract (“To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO<sub>2</sub>), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.”).</p> <p>Mendelson, 1-2 (“A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO<sub>2</sub>) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO<sub>2</sub> and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO<sub>2</sub>). Noninvasive spectrophotometric measurements of SpO<sub>2</sub> are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> <p>Mendelson, 2 (“The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small (<math>\phi = 22\text{mm}</math>) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module. The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can</p> |
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|  | <p>monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple</p> |
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|  | <p>controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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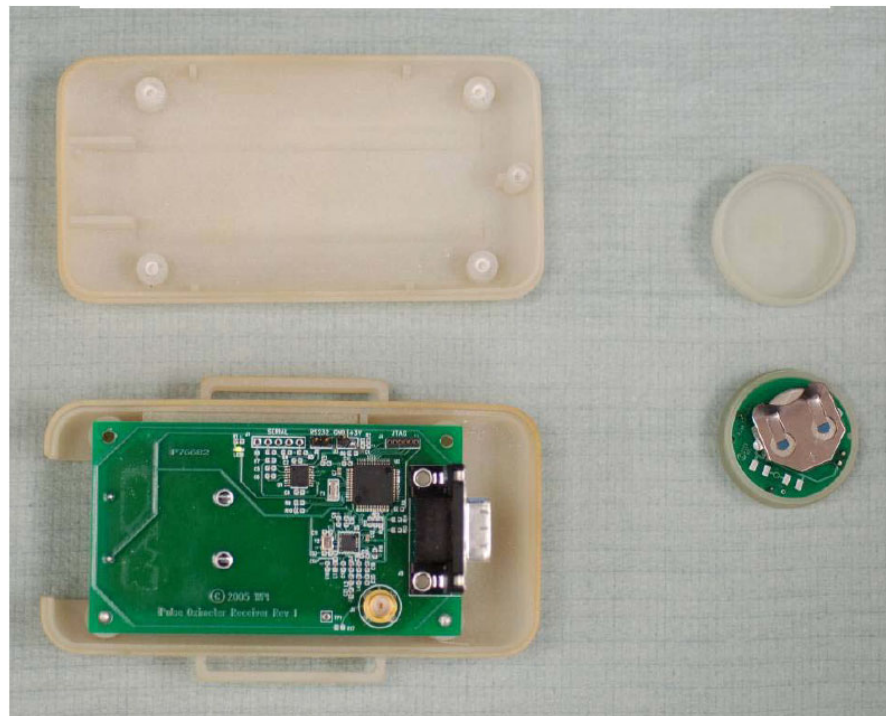


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

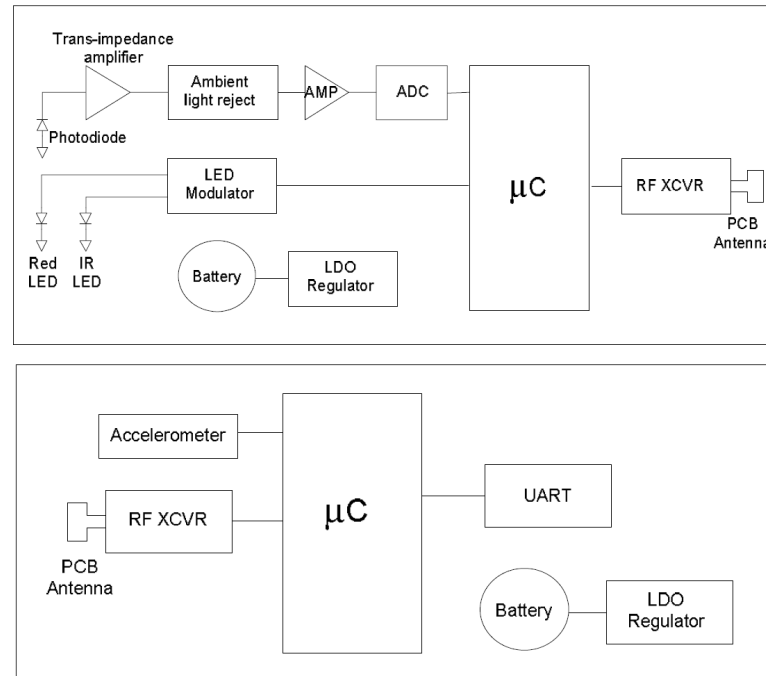


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter.  
Sensor Module (top), Receiver Module (bottom).

Mendelson, 3-4 (“A dedicated National Instruments LabVIEW program was developed to control all interactions between the PDA and the wearable unit via a graphical user interface (GUI). One part of the LabVIEW software is used to control the flow of information through the 802.11b radio system on the PDA. A number of LabVIEW VIs programs are used to establish a connection, exchange data, and close the connection between the wearable pulse oximeter and the PDA. The LabVIEW program interacts with the Windows CE™ drivers of the PDA’s wireless system. The PDA has special drivers provided by the manufacturer that are used by Windows CE™ to interface with the 802.11b radio hardware. The LabVIEW program interacts with Windows CE™ on a higher level and allows Windows CE™ to handle the drivers and the direct control of the radio hardware. The user interacts

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|                                                      | <p>with the wearable system using a simple GUI, as depicted in Fig. 3. The GUI was configured to present the input and output information to the user and allows easy activation of various functions. In cases of multiple wearable devices, it also allows the user to select which individual to monitor prior to initiating the wireless connection. Once a specific wearable unit is selected, the user connects to the remote device via the System Control panel that manages the connection and sensor control buttons. The GUI also displays the subject's vital signs, activity level, body orientation, and a scrollable PPG waveform that is transmitted by the wearable device. The stream of data received from the wearable unit is distributed to various locations on the PDA's graphical display. The most prominent portion of the GUI display is the scrolling PPG waveform, shown in Fig. 3. Numerical SpO2 and HR values are displayed in separate indicator windows. A separate tri-color indicator is used to annotate the subject's activity level measured by the wearable accelerometer. This activity level was color coded using green, yellow, or red to indicate low or no activity, moderate activity, or high activity, respectively. In addition, the subject's orientation is represented by a blue indicator that changes orientation according to body posture. Alarm limits could be set to give off a warning sign if the physiological information exceeds preset safety limits. One of the unique features of this PDA-based wireless system architecture is the flexibility to operate in a free roaming mode. In this ad-hoc configuration, the system's integrity depends only on the distance between each node. This allows the PDA to communicate with a remote unit that is beyond the PDA's wireless range. The ad-hoc network would therefore allow medical personnel to quickly distribute sensors to multiple casualties and begin immediate triage, thereby substantially simplifying and reducing deployment time.").</p> <p>To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.</p> |
| <b>Claim 14</b>                                      | <b>Prior Art</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 14[pre] The computer-implemented method of claim 13, | Under at least the apparent construction based on Masimo's Infringement Contentions, and to the extent that the preamble is limiting, Mendelson discloses and/or renders obvious the computer-implemented method of claim 13.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

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| <p>further comprising, via the application:</p>                                   | <p><i>See, e.g.,</i> Claim 13.</p> <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, Mendelson discloses and/or renders obvious the application.</p> <p>For example, Mendelson discloses and/or suggests a dedicated National Instruments LabVIEW program to control all interactions between the PDA and the wearable unit via a graphical user interface.</p> <p><i>See, e.g.,</i> disclosure associated with claim 13[f].</p> <p>To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.</p>                                                                                                                                                                                                           |
| <p>14[a] performing a trend analysis on received SpO2 measurement values; and</p> | <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, Mendelson discloses and/or renders obvious performing a trend analysis on received SpO2 measurement values.</p> <p>For example, Mendelson discloses or suggests the National Instruments LabVIEW program performing a trend analysis on the received SpO2 measurement values:</p> <p><i>See, e.g.,</i> Mendelson, 3-4 (“A dedicated National Instruments LabVIEW program was developed to control all interactions between the PDA and the wearable unit via a graphical user interface (GUI). One part of the LabVIEW software is used to control the flow of information through the 802.11b radio system on the PDA. A number of LabVIEW VIs programs are used to establish a connection, exchange data, and close the connection between the wearable pulse oximeter and the PDA. The LabVIEW program interacts with the Windows CE™ drivers of the PDA’s wireless system. The PDA has special drivers provided by the manufacturer that are used by Windows CE™ to interface with the 802.11b radio hardware. The LabVIEW program interacts with Windows CE™ on a higher level and allows Windows CE™ to handle the drivers and the direct control of the radio hardware. The user interacts with the wearable system using a simple GUI, as depicted in Fig. 3. The GUI was configured to present</p> |

the input and output information to the user and allows easy activation of various functions. In cases of multiple wearable devices, it also allows the user to select which individual to monitor prior to initiating the wireless connection. Once a specific wearable unit is selected, the user connects to the remote device via the System Control panel that manages the connection and sensor control buttons. The GUI also displays the subject's vital signs, activity level, body orientation, and a scrollable PPG waveform that is transmitted by the wearable device. The stream of data received from the wearable unit is distributed to various locations on the PDA's graphical display. The most prominent portion of the GUI display is the scrolling PPG waveform, shown in Fig. 3. Numerical SpO2 and HR values are displayed in separate indicator windows. A separate tri-color indicator is used to annotate the subject's activity level measured by the wearable accelerometer. This activity level was color coded using green, yellow, or red to indicate low or no activity, moderate activity, or high activity, respectively. In addition, the subject's orientation is represented by a blue indicator that changes orientation according to body posture. Alarm limits could be set to give off a warning sign if the physiological information exceeds preset safety limits. One of the unique features of this PDA-based wireless system architecture is the flexibility to operate in a free roaming mode. In this ad-hoc configuration, the system's integrity depends only on the distance between each node. This allows the PDA to communicate with a remote unit that is beyond the PDA's wireless range. The ad-hoc network would therefore allow medical personnel to quickly distribute sensors to multiple casualties and begin immediate triage, thereby substantially simplifying and reducing deployment time.”).

Mendelson, Figure 3:



Fig. 3. Sample PDA Graphical User Interface (GUI).

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|                                                                                                                                                                     | <p>To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p>14[b] displaying results of the trend analysis in at least one portion of the plurality of display portions.</p>                                                 | <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, Mendelson discloses and/or renders obvious displaying results of the trend analysis in at least one portion of the plurality of display portions.</p> <p>For example, Mendelson discloses and/or suggests the National Instruments LabVIEW program displaying the results of the trend analysis in at least one portion of the plurality of display portions.</p> <p><i>See disclosures associated with limitations 13[g], 13[h], 13[i], 14[b].</i></p> <p>To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.</p> |
| <b>Claim 16</b>                                                                                                                                                     | <b>Prior Art</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>16. The computer-implemented method of claim 13, further comprising, via the application, outputting one or more reminders to use the optical sensor to take</p> | <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, Mendelson discloses and/or renders obvious the computer-implemented method of claim 13.</p> <p><i>See, e.g., Claim 13.</i></p> <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, Mendelson discloses and/or renders obvious further comprising, via the application, outputting one or more reminders to use the optical sensor to take measurements of SpO2 measurement values at predetermined times or cycles.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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| measurements of SpO2 measurement values at predetermined times or cycles.                                                                                                                                                                                                                                                                            | <p>For example, a user could set a reminder to take future measurements via an application on the PDA of Mendelson.</p> <p>To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Claim 17</b>                                                                                                                                                                                                                                                                                                                                      | <b>Prior Art</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 17. The computer-implemented method of claim 13, further comprising, via the application, updating the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO2 measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts. | <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, Mendelson discloses and/or renders obvious the computer-implemented method of claim 13.</p> <p style="text-align: center;"><i>See, e.g., Claim 13.</i></p> <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, Mendelson discloses and/or renders obvious further comprising, via the application, updating the representation of the physiological parameter to comprise one or more of a plurality of graphical representations of the SpO2 measurement values, the plurality of graphical representations comprising at least one of bar graphs or charts.</p> <p>For example, Mendelson discloses and/or suggests bar graphs or charts which represent graphical representations of SpO2 measurement values.</p> <p style="text-align: center;"><i>See, e.g., Mendelson, 3-4</i> (“A dedicated National Instruments LabVIEW program was developed to control all interactions between the PDA and the wearable unit via a graphical user interface (GUI). One part of the LabVIEW software is used to control the flow of information through the 802.11b radio system on the PDA. A number of LabVIEW VIs programs are used to establish a connection, exchange data, and close the connection between the wearable pulse oximeter and the PDA. The LabVIEW program interacts with the Windows CE™ drivers of the PDA’s wireless system. The PDA has special drivers provided by the manufacturer that are used by Windows CE™ to interface with the 802.11b radio hardware. The LabVIEW program interacts with Windows CE™ on a higher level and allows</p> |

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|  | <p>Windows CE™ to handle the drivers and the direct control of the radio hardware. The user interacts with the wearable system using a simple GUI, as depicted in Fig. 3. The GUI was configured to present the input and output information to the user and allows easy activation of various functions. In cases of multiple wearable devices, it also allows the user to select which individual to monitor prior to initiating the wireless connection. Once a specific wearable unit is selected, the user connects to the remote device via the System Control panel that manages the connection and sensor control buttons. The GUI also displays the subject's vital signs, activity level, body orientation, and a scrollable PPG waveform that is transmitted by the wearable device. The stream of data received from the wearable unit is distributed to various locations on the PDA's graphical display. The most prominent portion of the GUI display is the scrolling PPG waveform, shown in Fig. 3. Numerical SpO2 and HR values are displayed in separate indicator windows. A separate tri-color indicator is used to annotate the subject's activity level measured by the wearable accelerometer. This activity level was color coded using green, yellow, or red to indicate low or no activity, moderate activity, or high activity, respectively. In addition, the subject's orientation is represented by a blue indicator that changes orientation according to body posture. Alarm limits could be set to give off a warning sign if the physiological information exceeds preset safety limits. One of the unique features of this PDA-based wireless system architecture is the flexibility to operate in a free roaming mode. In this ad-hoc configuration, the system's integrity depends only on the distance between each node. This allows the PDA to communicate with a remote unit that is beyond the PDA's wireless range. The ad-hoc network would therefore allow medical personnel to quickly distribute sensors to multiple casualties and begin immediate triage, thereby substantially simplifying and reducing deployment time.”).</p> <p>Mendelson, Figure 3:</p> |
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Fig. 3. Sample PDA Graphical User Interface (GUI).

Mendelson, 2 ("The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small ( $\phi = 22\text{mm}$ ) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module.

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|  | <p>The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen</p> |
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|  | <p>interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 1:</p> |
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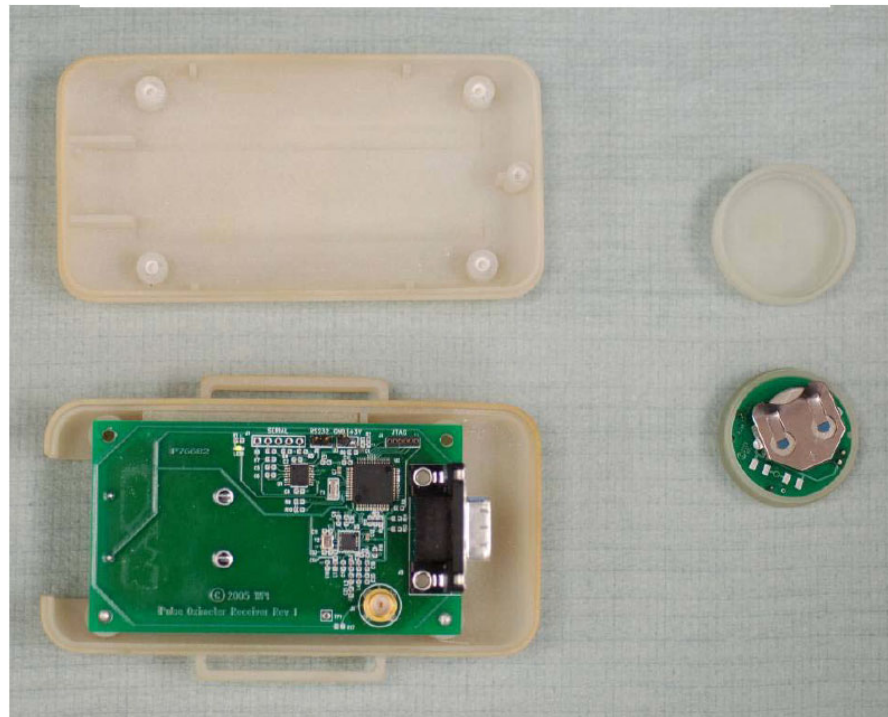


Fig. 1. (Top) Attachment of Sensor Module to the skin; (Bottom) photograph of the Receiver Module (left) and Sensor Module (right).

Mendelson, Figure 2:

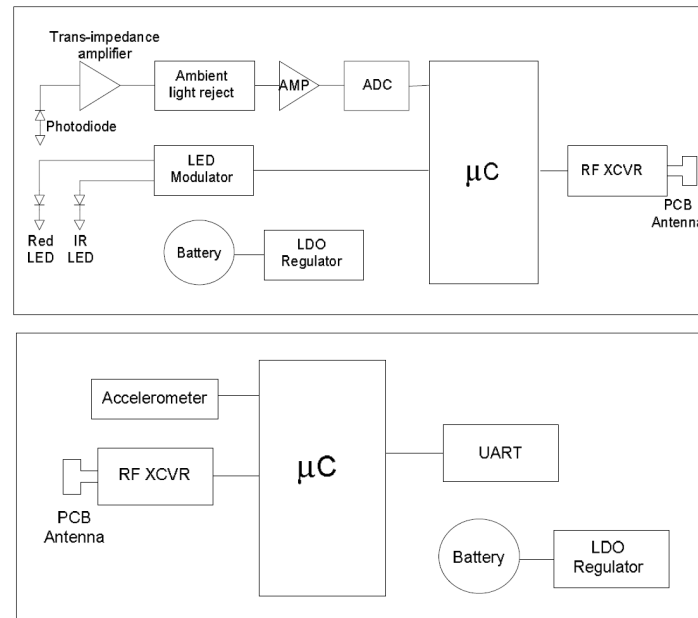


Fig. 2. System block diagram of the wearable, wireless, pulse oximeter. Sensor Module (top), Receiver Module (bottom).

Mendelson, 3-4 (“A dedicated National Instruments LabVIEW program was developed to control all interactions between the PDA and the wearable unit via a graphical user interface (GUI). One part of the LabVIEW software is used to control the flow of information through the 802.11b radio system on the PDA. A number of LabVIEW VIs programs are used to establish a connection, exchange data, and close the connection between the wearable pulse oximeter and the PDA. The LabVIEW program interacts with the Windows CE™ drivers of the PDA’s wireless system. The PDA has special drivers provided by the manufacturer that are used by Windows CE™ to interface with the 802.11b radio hardware. The LabVIEW program interacts with Windows CE™ on a higher level and allows Windows CE™ to handle the drivers and the direct control of the radio hardware. The user interacts with the wearable system using a simple GUI, as depicted in Fig. 3. The GUI was configured to present the input and output information to the user and allows easy activation of various functions. In cases

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|  | <p>of multiple wearable devices, it also allows the user to select which individual to monitor prior to initiating the wireless connection. Once a specific wearable unit is selected, the user connects to the remote device via the System Control panel that manages the connection and sensor control buttons. The GUI also displays the subject's vital signs, activity level, body orientation, and a scrollable PPG waveform that is transmitted by the wearable device. The stream of data received from the wearable unit is distributed to various locations on the PDA's graphical display. The most prominent portion of the GUI display is the scrolling PPG waveform, shown in Fig. 3. Numerical SpO2 and HR values are displayed in separate indicator windows. A separate tri-color indicator is used to annotate the subject's activity level measured by the wearable accelerometer. This activity level was color coded using green, yellow, or red to indicate low or no activity, moderate activity, or high activity, respectively. In addition, the subject's orientation is represented by a blue indicator that changes orientation according to body posture. Alarm limits could be set to give off a warning sign if the physiological information exceeds preset safety limits. One of the unique features of this PDA-based wireless system architecture is the flexibility to operate in a free roaming mode. In this ad-hoc configuration, the system's integrity depends only on the distance between each node. This allows the PDA to communicate with a remote unit that is beyond the PDA's wireless range. The ad-hoc network would therefore allow medical personnel to quickly distribute sensors to multiple casualties and begin immediate triage, thereby substantially simplifying and reducing deployment time.").</p> <p>Mendelson, Figure 4:</p> |
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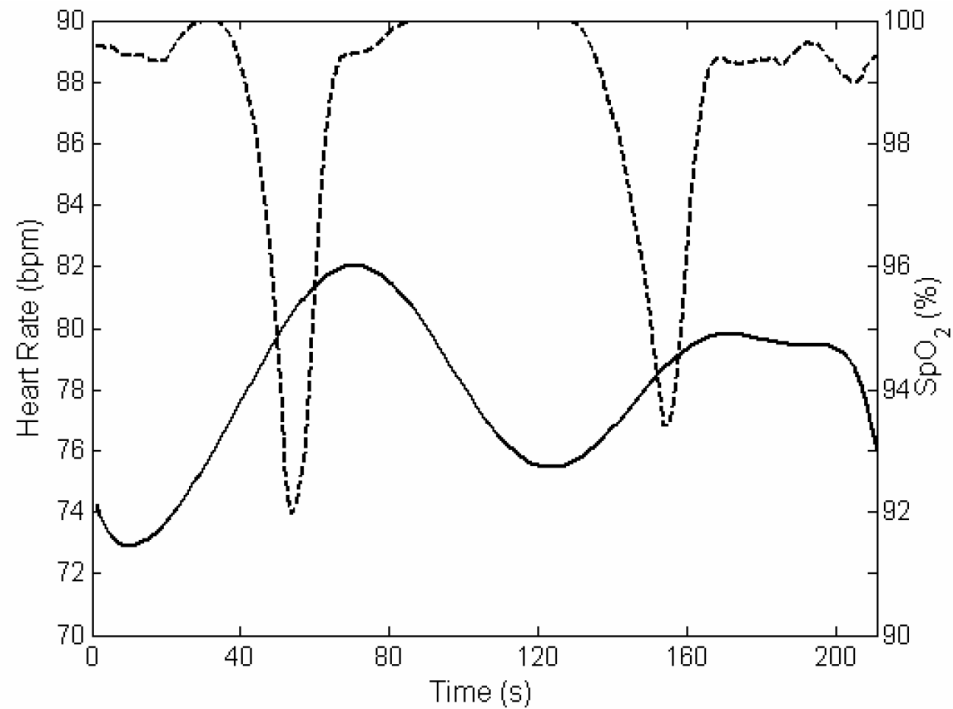


Fig. 4. Typical HR (solid line) and SpO<sub>2</sub> (dashed line) recording of two voluntary hypoxic episodes.

To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple's Initial Invalidity Contentions.

**Claim 19**

**Prior Art**

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| <p>19. The computer-implemented method of claim 13, further comprising wirelessly transmitting the SpO2 measurement values from the SpO2 measurement system to the mobile computing device.</p> | <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, Mendelson discloses and/or renders obvious the computer-implemented method of claim 13.</p> <p><i>See, e.g., Claim 13.</i></p> <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, Mendelson discloses and/or renders obvious further comprising wirelessly transmitting the SpO2 measurement values from the SpO2 measurement system to the mobile computing device.</p> <p>For example, Mendelson discloses and/or suggests wirelessly transmitting SpO2 values from the receiver module to the PDA.</p> <p><i>See, e.g., Mendelson, Abstract (“To save life, casualty care requires that trauma injuries are accurately and expeditiously assessed in the field. This paper describes the initial bench testing of a wireless wearable pulse oximeter developed based on a small forehead mounted sensor. The battery operated device employs a lightweight optical reflectance sensor and incorporates an annular photodetector to reduce power consumption. The system also has short range wireless communication capabilities to transfer arterial oxygen saturation (SpO2), heart rate (HR), body acceleration, and posture information to a PDA. It has the potential for use in combat casualty care, such as for remote triage, and by first responders, such as firefighters.”).</i></p> <p>Mendelson, 1-2 (“A potentially attractive approach to aid emergency medical teams in remote triage operations is the use of a wearable pulse oximeter to wirelessly transmit heart rate (HR) and arterial oxygen saturation (SpO2) to a remote location. Pulse oximetry is a widely accepted method that is used for noninvasive monitoring of SpO2 and HR. The method is based on spectrophotometric measurements of changes in the optical absorption of deoxyhemoglobin (Hb) and oxyhemoglobin (HbO2). Noninvasive spectrophotometric measurements of SpO2 are performed in the visible (600-700nm) and near-infrared (700-1000nm) spectral regions. Pulse oximetry also relies on the detection of photoplethysmographic (PPG) signals produced by variations in the quantity of arterial blood that is associated with periodic contractions and relaxations of the heart. Measurements can be performed in either transmission or reflection modes. In transmission pulse oximetry, the sensor can be attached across a fingertip, foot, or earlobe. In this configuration, the light emitting diodes (LEDs) and</p> |
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|  | <p>photodetector (PD) in the sensor are placed on opposite sides of a peripheral pulsating vascular bed. Alternatively, in reflection pulse oximetry, the LEDs and PD are both mounted side-by-side on the same planar substrate to enable readings from multiple body locations where transillumination measurements are not feasible. Clinically, forehead reflection pulse oximetry has been used as an alternative approach to conventional transmission-based oximetry when peripheral circulation to the extremities is compromised.”).</p> <p>Mendelson, 2 (“The prototype system, depicted in Fig. 1, consists of a body-worn pulse oximeter that receives and processes the PPG signals measured by a small (<math>\phi = 22\text{mm}</math>) and lightweight (4.5g) optical reflectance transducer. The system consists of three units: A Sensor Module, consisting of the optical transducer, a stack of round PCBs, and a coin-cell battery. The information acquired by the Sensor Module is transmitted wirelessly via an RF link over a short range to a body-worn Receiver Module. The data processed by the Receiver Module can be transmitted wirelessly to a PDA. The PDA can monitor multiple wearable pulse oximeters simultaneously and allows medics to collect vital physiological information to enhance their ability to extend more effective care to those with the most urgent needs. The system can be programmed to alert on alarm conditions, such as sudden trauma, or physiological values out of their normal range. It also has the potential for use in combat casualty care, such as for remote triage, and for use by first responders, such as firefighters. Key features of this system are small-size, robustness, and low-power consumption, which are essential attributes of wearable physiological devices, especially for military applications. The system block diagram (Fig. 2), is described in more detail below.”).</p> <p>Mendelson, 2-3 (“<i>Sensor Module</i>: The Sensor Module contains analog signal processing circuitry, ADC, an embedded microcontroller, and a RF transceiver. The unit is small enough so the entire module can be integrated into a headband or a helmet. The unit is powered by a CR2032 type coin cell battery with 220mAh capacity, providing at least 5 days of operation. <i>Receiver Module</i>: The Receiver Module contains an embedded microcontroller, RF transceiver for communicating with the Sensor Module, and a Universal Asynchronous Receive Transmit (UART) for connection to a PC. Signals acquired by the Sensor Module are received by the embedded microcontroller which synchronously converts the corresponding PD output to R and IR PPG signals. Dedicated software is used to filter the signals and compute SpO2 and HR based on the relative amplitude and frequency content of the reflected PPG signals. A tri-axis MEMS accelerometer detects changes in body activity, and the information obtained through the tilt sensing property of the accelerometer is used to determine the</p> |
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|  | <p>orientation of the person wearing the device. To facilitate bi-directional wireless communications between the Receiver Module and a PDA, we used the DPAC Airborne™ LAN node module (DPAC Technologies, Garden Grove, CA). The DPAC module operates at a frequency of 2.4GHz, is 802.11b wireless compliant, and has a relatively small (<math>1.6 \times 1.17 \times 0.46</math> inches) footprint. The wireless module runs off a 3.7VDC and includes a built-in TCP/IP stack, a radio, a base-band processor, an application processor, and software for a “drop-in” WiFi application. It has the advantage of being a plug-and-play device that does not require any programming and can connect with other devices through a standard UART. <i>PDA</i>: The PDA was selected based on size, weight, and power consumption. Furthermore, the ability to carry the user interface with the medic also allows for greater flexibility during deployment. We chose the HP iPAQ h4150 PDA because it can support both 802.11b and Bluetooth™ wireless communication. It contains a modest amount of storage and has sufficient computational resources for the intended application. The use of a PDA as a local terminal also provides a low-cost touch screen interface. The user friendly touch screen of the PDA offers additional flexibility. It enables multiple controls to occupy the same physical space and the controls appear only when needed. Additionally, a touch screen reduces development cost and time, because no external hardware is required. The data from the wireless-enabled PDA can also be downloaded or streamed to a remote base station via Bluetooth or other wireless communication protocols. The PDA can also serve to temporarily store vital medical information received from the wearable unit.”).</p> <p>Mendelson, Figure 3:</p> |
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Fig. 3. Sample PDA Graphical User Interface (GUI).

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|                                                                                                                                                                  | <p>To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Claim 20</b>                                                                                                                                                  | <b>Prior Art</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>20. The computer-implemented method of claim 13, further comprising, via the application, enabling the user to set reminders to take future measurements.</p> | <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, and to the extent that the preamble is limiting, Mendelson discloses and/or renders obvious the computer-implemented method of claim 13.</p> <p style="text-align: center;"><i>See, e.g., Claim 13.</i></p> <p>Under at least the apparent construction based on Masimo’s Infringement Contentions, Mendelson discloses and/or renders obvious further comprising, via the application, enabling the user to set reminders to take future measurements.</p> <p>For example, a user could set a reminder to take future measurements via an application on the PDA of Mendelson.</p> <p>To the extent Masimo contends or the Court determines that Mendelson does not expressly or inherently disclose this limitation, it would have been obvious to combine Mendelson with one or more references charted for this limitation in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions. A person of ordinary skill in the art would have had a reasonable expectation of success in combining Mendelson with one or more of those references for the reasons set forth in Apple’s Initial Invalidity Contentions.</p> |