UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

Omni MedSci, Inc., *Plaintiff/Counter-Defendant*, **v.** **Apple Inc.,** *Defendant/Counter-Plaintiff*.	**Case No. 2:18-cv-429-RWS** **JURY TRIAL DEMANDED**

SECOND AMENDED COMPLAINT FOR PATENT INFRINGEMENT AND DEMAND FOR JURY TRIAL

Plaintiff, Omni MedSci, Inc. ("Omni MedSci"), alleges as follows:

The Parties

1. Plaintiff Omni MedSci is a Michigan corporation having its principal place of business at 1718 Newport Creek Drive, Ann Arbor, Michigan 48103. Dr. Mohammed N. Islam is the principal of Omni MedSci. Dr. Islam is a tenured Professor of Optics and Photonics in the Electrical and Computer Engineering Department, and a Professor of Biomedical Engineering, at the University of Michigan's College of Engineering. Omni MedSci is part of the Omni family of companies, which create, develop, and commercialize Dr. Islam's optical technology in various fields. The Omni companies also develop and provide unique optical products to the U.S. Department of Defense and intelligence community.

2. Defendant Apple Inc. ("Apple") is a California corporation, having a regular and established place of business at 1 Infinite Loop, Cupertino, California 95014. Apple may be served

with process through its registered agent for service of process C T Corporation System (C0168406).

Jurisdiction and Venue

3. This is a complaint for patent infringement under 35 U.S.C. §§ 101, *et seq*. The Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338.

4. The court has personal jurisdiction over Apple, and venue under 28 U.S.C. §§1391(a)(1) and 1400(b) is proper in this district, because Apple has two regular and established places of business in this district and because Apple offers for sale and sells infringing Apple Watches in this district at those locations.

5. A lawsuit, Case No. 2:18-cv-134-RWS, is currently pending in this district between Omni MedSci and Apple involving several of the same patents and much of the same Apple Watch technology as is at issue in the present lawsuit.

The Patents-in-Suit

6. On October 16, 2018, the U.S. Patent and Trademark Office issued U.S. Patent No. 10,098,546 ("the '546 patent") (Exhibit A) to Dr. Mohammed N. Islam.

7. On January 9, 2018, the U.S. Patent and Trademark Office issued U.S. Patent No. 9,861,286 ("the '286 patent") (Exhibit B) to Dr. Mohammed N. Islam. This patent is also asserted against Apple in Case No. 2:18-cv-134-RWS. In the present lawsuit, the '286 patent is asserted only against the Series 4 Apple Watch, a watch that did not exist at the time of the complaint in Case No. 2:18-cv-134-RWS and was not accused in that Case.

8. On February 6, 2018, the U.S. Patent and Trademark Office issued U.S. Patent No. 9,885,698 ("the '698 patent") (Exhibit C) to Dr. Mohammed N. Islam. This patent is also asserted against Apple in Case No. 2:18-cv-134-RWS. In the present lawsuit, the '698 patent is asserted

only against the Series 4 Apple Watch, a watch that did not exist at the time of the complaint in Case No. 2:18-cv-134-RWS and was not accused in that Case.

9. On February 29, 2018, the U.S. Patent and Trademark Office issued U.S. Patent No. 10,188,299 ("the '299 patent") (Exhibit D) to Dr. Mohammed N. Islam.

10. On February 26, 2019, the U.S. Patent and Trademark Office issued U.S. Patent No. 10,213,113 ("the '113 patent") (Exhibit E) to Dr. Mohammed N. Islam.

11. The '546 patent, the '286 patent, the '698 patent, the '299 patent, and the '113 patent are, collectively, the "Patents-in-Suit."

12. Omni MedSci has been, and remains, the owner by assignment of the Patents-in-Suit.

Background Facts

13. By 2012, Omni MedSci had invented technology for using lasers in medical and other applications, including wearable measurement devices incorporating lasers and other components that can detect and monitor physiological parameters such as glucose, ketones, heart rate, blood constituents, and dental carries.

14. On December 31, 2012, Omni MedSci filed a set of patent applications covering its developments using lasers for medical and other applications.

15. Between June 2014 and July 2016, Dr. Islam had a series of meetings and email exchanges with Apple personnel regarding the technology underlying his then-pending patent applications, including some of the now-issued Patents-in-Suit. In those exchanges, Apple was offered the opportunity to license or acquire Omni MedSci's patented and patent-pending technology, but Apple declined.

16. On June 11-12, 2014, Dr. Islam met with Apple employees Drs. Michael O'Reilly and Michael Hillman at Apple's headquarters in Cupertino, California to discuss Omni MedSci's then patent-pending technology.

17. Dr. Hillman then arranged for a meeting with Dr. Islam and approximately ten Apple employees at Apple's headquarters in Cupertino, California to discuss technical details of Omni MedSci's then patent-pending technology. The meeting took place at Apple on February 5, 2015.

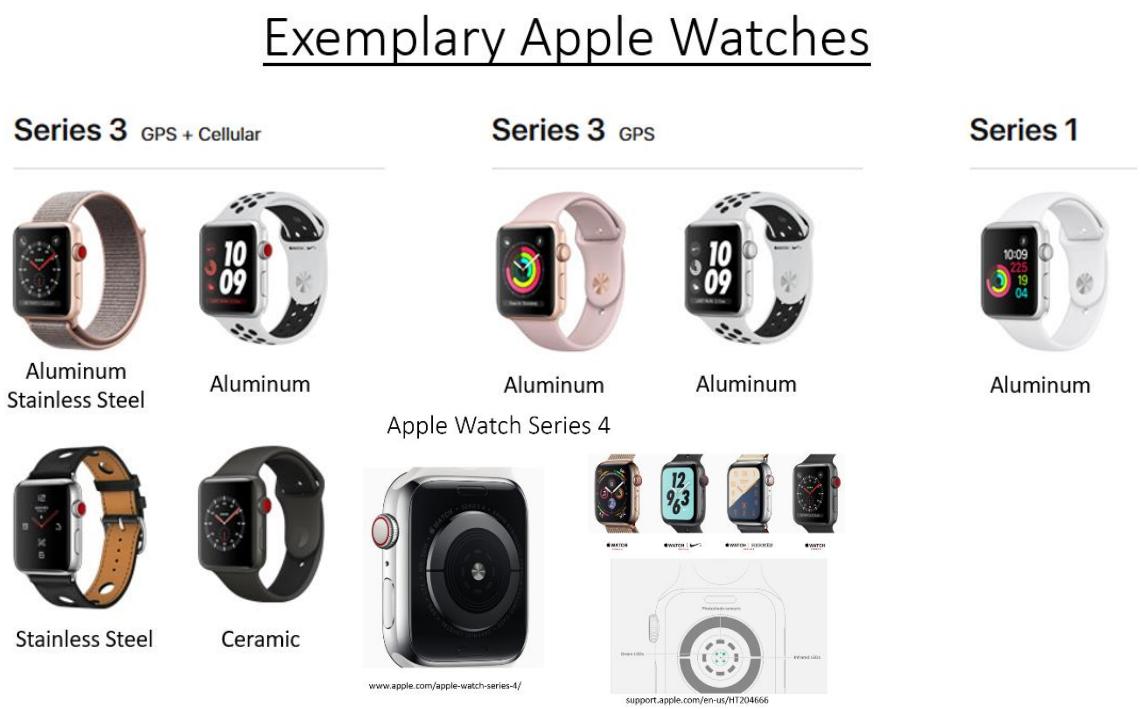
18. On July 14, 2016, Apple employee Greg Joswiak emailed Dr. Islam inviting him to provide additional information about his technology. Mr. Joswiak indicated that he would share the information with his team at Apple.

19. Four days later, Apple employees Drs. Ed Hull and Shonn Hendee arranged a meeting with Dr. Islam and approximately ten Apple employees at Apple's headquarters in Cupertino, California to discuss technical details of Omni MedSci's then patent-pending technology. The meeting took place at Apple on July 18, 2016. At the meeting, Dr. Islam shared the published patent application for the '546 patent and the published parent patent applications for the '698 and '286 patents.

20. Dr. Islam continued to correspond with Apple employees regarding the status of his pending patent applications and technological development. On December 21, 2017, Dr. Islam emailed Drs. O'Reilly, Hull, and Hendee enclosing copies of the allowed claims for the '268 and '698 patents. In response, Dr. O'Reilly emailed Dr. Islam stating, "We [Apple] don't wish to receive any information about any of your IP [Intellectual Property]."

Apple's Infringing Apple Watch Products

21. On information and belief,[1] Apple has made and sold several models of its Apple Watch product, including, for example, "Series 1," "Series 2," "Series 3 GPS," "Series 3 GPS + Cellular," and "Series 4" watches. Omni MedSci asserts infringement by all models, including the models sold to date and models sold in the future, which are covered by the claims of the Patents-in-Suit (collectively, "Watches"). Exemplary Watches advertised on Apple's web site (https://www.apple.com/watch/compare/, captured on March 8, 2018 and October 10, 2018) as shown below:



22. The Watches are wearable devices that measure a physiological parameter, namely, heart rate.

[1] For allegations based on information and belief, Omni MedSci believes that the allegations will have evidentiary support after a reasonable opportunity for investigation and discovery.

23. The Watches measure heart rate non-invasively using light emitting diodes ("LEDs").

24. The light emitted from the LEDs in the Watches includes near-infrared wavelengths.

25. The Watches can modulate the light emitted from the LEDs.

26. The Watches can use a lock-in technique, such as synchronous demodulation, which is used to detect the modulation frequency.

27. The Watches can improve the signal-to-noise ratio of the LED light reflected from the skin by increasing the intensity of the light emitted from the LEDs.

28. The Watches can also improve the signal-to-noise ratio of the LED light reflected from the skin by increasing the pulse rate of the LEDs.

29. The Watches have one or more lenses that deliver the light from the LEDs to a Watch wearer's skin.

30. The one or more lenses in the Watches include a spectral filter.

31. The Watches have at least two detectors that receive LED light reflected from the skin.

32. The detectors in the Watches capture light while the LEDs are off.

33. The Watches have one or more analog to digital converters that process the reflected light received by the detectors.

34. A receiver in the Watches can be synchronized to the LED light sources.

35. The Watches can capture light while the LEDs are off to improve the signal-to-noise ratio of the light captured from the LED light reflected from the skin by differencing between

the light captured while the LEDs are off and the light captured from the LED light reflected from the skin.

36. The Watches can communicate with an Apple smart phone or tablet.

Count 1 – Infringement of the '546 Patent

37. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

38. Apple has directly infringed and is directly infringing the '546 patent by making using, offering for sale, and selling the Watches, and importing the Watches into the United States.

39. Based on publicly available information, the Watches infringe at least claims 1, 2, 4, 5, 7-13, and 15-18 of the '546 patent. Omni MedSci may assert additional claims of the '546 patent after a reasonable opportunity for investigation and discovery.

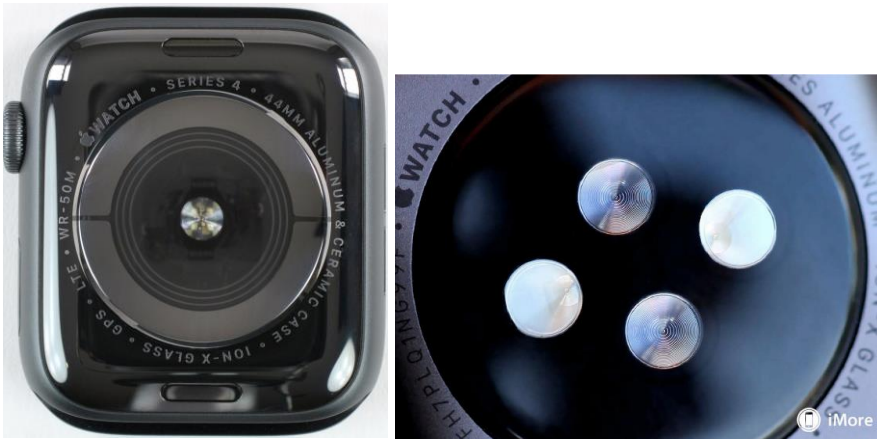
40. Apple's infringement is described further below with respect to exemplary claim 1. The analysis below is based on publicly available information.

41. Claim 1 recites: "A wearable device, comprising: a measurement device including a light source comprising a plurality of light emitting diodes (LEDs) for measuring one or more physiological parameters." Apple sells Watches, which are wearable, and that include a measurement device that can measure heart rate, which is a physiological parameter. The measurement device in the Watches uses multiple light emitting diodes for measuring the heart rate. *See, e.g.*, Apple's website at support.apple.com/en-us/HT204666 and www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521.

42. Claim 1 further recites: "the measurement device configured to generate, by modulating at least one of the LEDs having an initial light intensity, an optical beam having a plurality of optical wavelengths, wherein at least a portion of the optical beam includes a near-

infrared wavelength between 700 nanometers and 2500 nanometers." The Watches include infrared LEDs, which emit an optical beam with more than one wavelength. At least a portion of the wavelengths emitted are between 700 nanometers and 2500 nanometers. The LEDs are modulated and have an initial light intensity. *See, e.g.*, Apple website at support.apple.com/en-us/HT204666; www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; U.S. Patent Publication No. 2017/0281024.

43. Claim 1 further recites: "the measurement device comprising one or more lenses configured to receive and to deliver at least a portion of the optical beam to tissue." The Watches include one or more lenses that receive the optical beam from the LEDs and deliver a portion of that beam to a wearer's tissue.



44. Claim 1 further recites: "wherein the tissue reflects at least a portion of the optical beam delivered to the tissue." The wearer's tissue reflects at least part of the optical beam delivered to the tissue. *See, e.g.*, U.S. Patent Publication No. 2016/0058367.

45. Claim 1 further recites: "the measurement device further comprising a receiver, the receiver having a plurality of spatially separated detectors." The Watches include a receiver, with multiple photodiode detectors, each detector being separated from the others in space. *See, e.g.*,

www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2016/0058367.

46. Claim 1 further recites that the receiver includes "one or more analog to digital converters coupled to the spatially separated detectors, the one or more analog to digital converters configured to generate at least two receiver outputs." The receiver in the Watches uses analog to digital converters, coupled to the detectors, which generate at least two output signals. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058312; U.S. Pub. No. 2016/0038045.

47. Claim 1 further recites: "the receiver configured to: capture light while the LEDs are off and convert the captured light into a first signal and capture light while at least one of the LEDs is on and to convert the captured light into a second signal, the captured light including at least a portion of the optical beam reflected from the tissue." The receiver in the Watches can capture light while the LEDs are off and convert that light into a first signal. It also captures light from the LEDs, which light includes light reflected from the tissue, and converts that light into a second signal. *See, e.g.*, U.S. Pub. No. 2016/0058367.

48. Claim 1 further recites: "the measurement device configured to improve a signal-to-noise ratio of the optical beam reflected from the tissue by differencing the first signal and the second signal and by differencing the two receiver outputs." The measurement device in the Watches improves the signal-to-noise ratio of the light reflected from the tissue by differencing the first signal and the second signal. It also improves the signal-to-noise ratio of the light reflected from the tissue by differencing the two receiver outputs. *See, e.g.*, U.S. Pub. No. 2016/0058367; U.S. Pub. No. 2016/0058312; U.S. Pub. No. 2016/0038045; U.S. Pub. No. 2016/0296173.

49. Claim 1 further recites: "the measurement device configured to further improve the signal-to-noise ratio of the optical beam reflected from the tissue by increasing the light intensity relative to the initial light intensity from at least one of the LEDs." The measurement device in the Watches improves the signal-to-noise ratio of the light reflected from the tissue by increasing LED brightness. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666.

50. Claim 1 further recites: "the measurement device further configured to generate an output signal representing at least in part a non-invasive measurement on blood contained within the tissue." The measurement device in the Watches generates a signal that represents the heart rate of the blood in the tissue. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058367.

51. Claim 1 further recites: "wherein the output signal is generated at least in part by using a Fourier transform of signals from the receiver including at least one of the first and second signals and signals from the at least two receiver outputs." The Watches apply a Fourier transform to at least one of the signals from the receiver to, in part, generate the output signal. *See, e.g.*, U.S. Pub. No. 2016/0051201.

52. Claim 1 further recites: "wherein the receiver further comprises one or more spectral filters positioned in front of at least some of the plurality of spatially separated detectors." The Watches include spectral filters in front of one or more of the Watch lenses. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666.

Count 2 – Infringement of the '286 Patent

53. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

54. Apple has directly infringed and is directly infringing the '286 patent by making using, offering for sale, and selling the Series 4 Watch, and importing the Series 4 Watch into the United States.

55. Based on publicly available information, the Series 4 Watch infringes at least claims 16 and 19 of the '286 patent. Omni MedSci may assert additional claims of the '286 patent after a reasonable opportunity for investigation and discovery.

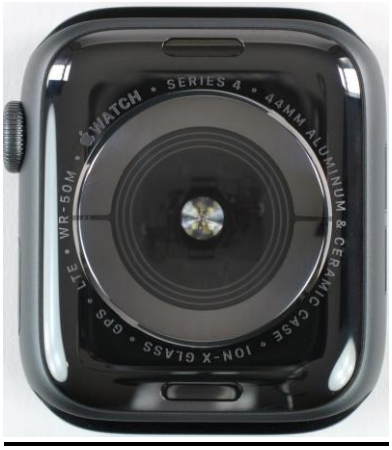
56. Apple's infringement is described further below with respect to exemplary claim 16. The analysis below is based on publicly available information.

57. Claim 16 recites: "A wearable device for use with a smart phone or tablet, the wearable device comprising: a measurement device including a light source comprising a plurality of light emitting diodes (LEDs) for measuring one or more physiological parameters." Apple sells Series 4 Watches, which are wearable devices that use multiple light emitting diodes. *See, e.g.*, Apple's website at http://support.apple.com/en-us/HT204666.

58. Claim 16 further recites: "the measurement device configured to generate, by modulating at least one of the LEDs having an initial light intensity." The Series 4 Watch modulates at least one of the LEDs, which fluctuate in brightness (intensity). *See, e.g.*, Apple's website at http://support.apple.com/en-us/HT204666.

59. Claim 16 further recites: "an optical beam having a plurality of optical wavelengths, wherein at least a portion of the plurality of optical wavelengths is a near-infrared wavelength between 700 nanometers and 2500 nanometers." The Series 4 Watch includes infrared LEDs, which emit wavelengths between 700 nanometers and 2500 nanometers. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2017/0281024.

60. Claim 16 further recites: "the measurement device comprising one or more lenses configured to receive and to deliver a portion of the optical beam to tissue." The Series 4 Watch includes one or more lenses capable of receiving and delivering a portion of an optical beam to skin.



61. Claim 16 further recites: "wherein the tissue reflects at least a portion of the optical beam delivered to the tissue." When the Series 4 Watch delivers the optical beam to the skin, the skin reflects at least a portion of that optical beam. *See, e.g.*, U.S. Patent Publication Nos. 2016/0058309 and 2016/0058367.

62. Claim 16 further recites: "wherein the measurement device is adapted to be placed on a wrist or an ear of a user." The Series 4 Watch is adapted to be placed on the user's wrist.

63. Claim 16 further recites: "the measurement device further comprising a receiver configured to: capture light while the LEDs are off and convert the captured light into a first signal and capture light while at least one of the LEDs is on and convert the captured light into a second signal, the captured light including at least a portion of the optical beam reflected from the tissue." The Series 4 Watch includes a receiver with sensors, which capture light while the LEDs are off and convert the captured light into a first signal and capture light while at least one of the LEDs is on and convert the captured light into a second signal, the captured light including at least a portion

of the input optical beam reflected from the skin. *See, e.g.,* Apple website at http://support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2016/0058367.

64. Claim 16 further recites: "the measurement device configured to improve a signal-to-noise ratio of the optical beam reflected from the tissue by differencing the first signal and the second signal." The Series 4 Watch reduces the signal-to-noise ratio of the optical beam received from the skin by differencing the first signal and the second signal. *See, e.g.,* U.S. Patent Publication No. 2016/0058367.

65. Claim 16 further recites: "the light source configured to further improve the signal-to-noise ratio of the optical beam reflected from the tissue by increasing the light intensity relative to the initial light intensity from at least one of the LEDs." The Series 4 Watch improves the signal-to-noise ratio of the optical beam reflected from the skin by increasing the brightness (intensity) of the Series 4 Watch LEDs. *See, e.g.,* Apple website at http://support.apple.com/en-us/HT204666.

66. Claim 16 further recites: "the measurement device further configured to generate an output signal representing at least in part a non-invasive measurement on blood contained within the tissue." The Series 4 Watch can generate an output signal, which represents the user's heart rate. *See, e.g.,* Apple website at http://support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2016/0058367.

67. Claim 16 further recites: "wherein the receiver includes a plurality of spatially separated detectors." The Series 4 Watch includes a receiver with multiple photodiode sensors, which are spatially separated. *See, e.g.,* Apple website at http://support.apple.com/en-us/HT204666.

68. Claim 16 further recites: "wherein at least one analog to digital converter is coupled to the spatially separated detectors." The Series 4 Watch includes at least one analog to digital converter, which is coupled to the spatially separated photodiode sensors. *See, e.g.*, U.S. Patent Publication No. 2019/0038045.

Count 3 – Infringement of the '698 Patent

69. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

70. Apple has directly infringed and is directly infringing the '698 patent by making using, offering for sale, and selling the Series 4 Watch, and importing the Series 4 Watch into the United States.

71. Based on publicly available information, the Series 4 Watch infringes at least claims 1, 2, 3 and 5 of the '698 patent. Omni MedSci may assert additional claims of the '698 patent after a reasonable opportunity for investigation and discovery.

72. Apple's infringement is described further below with respect to exemplary claim 1. The analysis below is based on publicly available information.

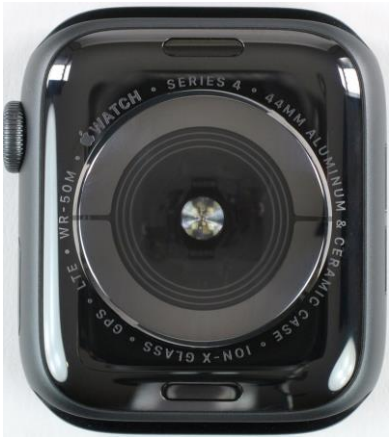
73. Claim 1 recites: "A wearable device, comprising: a measurement device including a light source comprising a plurality of light emitting diodes (LEDs) for measuring one or more physiological parameters." Apple sells Series 4 Watches, which are wearable devices that use multiple light emitting diodes. *See, e.g.*, Apple's website at http://support.apple.com/en-us/HT204666.

74. Claim 1 further recites: "the measurement device configured to generate, by modulating at least one of the LEDs having an initial light intensity." The Series 4 Watch

modulates at least one of the LEDs by fluctuating the LEDs' brightness (intensity). *See, e.g.*, Apple's website at http://support.apple.com/en-us/HT204666.

75. Claim 1 further recites: "an input optical beam having one or more optical wavelengths, wherein at least a portion of the one or more optical wavelengths is a near-infrared wavelength between 700 nanometers and 2500 nanometers." The Series 4 Watch includes infrared LEDs, which emit wavelengths between 700 nanometers and 2500 nanometers. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2017/0281024.

76. Claim 1 further recites: "the measurement device comprising one or more lenses configured to receive and to deliver a portion of the input optical beam to tissue." The Series 4 Watch includes one or more lenses capable of receiving and delivering a portion of an optical beam to skin.



77. Claim 1 further recites: "wherein the tissue reflects at least a portion of the input optical beam delivered to the tissue." When the Series 4 Watch delivers the optical beam to the skin, the skin reflects at least a portion of that optical beam. *See, e.g.*, U.S. Patent Publication Nos. 2016/0058309 and 2016/0058367.

78. Claim 1 further recites: "the measurement device further comprising a receiver, wherein the receiver includes a plurality of spatially separated detectors." The Series 4 Watch

includes a receiver with multiple photodiode sensors that are spatially separated. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2016/0058367.

79. Claim 1 further recites: "the detectors configured to: capture light while the LEDs are off and convert the captured light into a first signal; and capture light while at least one of the LEDs is on and convert the captured light into a second signal, the captured light including at least a portion of the input optical beam reflected from the tissue." The Series 4 Watch includes sensors, which capture light while the LEDs are off and convert the captured light into a first signal; and capture light while at least one of the LEDs is on and convert the captured light into a second signal, the captured light including at least a portion of the input optical beam reflected from the skin. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2016/0058367.

80. Claim 1 further recites: "wherein at least one analog to digital converter is coupled to the spatially separated detectors and is configured to generate at least a first data signal from the first signal and at least a second data signal from the second signal." The Series 4 Watch includes at least one analog to digital converter, which is coupled to the spatially separated photodiode sensors, and is configured to generate at least a first data signal from the first signal and at least a second data signal from the second signal. *See, e.g.*, U.S. Patent Publication No. 2019/0038045.

81. Claim 1 further recites: "the measurement device configured to improve a signal-to-noise ratio of the input optical beam reflected from the tissue by differencing the first data signal and the second data signal." The Series 4 Watch reduces the signal-to-noise ratio of the optical beam received from the skin by differencing the first signal and the second signal. *See, e.g.*, U.S. Patent Publication No. 2016/0058367.

82. Claim 1 further recites: "to generate an output signal representing at least in part a non-invasive measurement on blood contained within the tissue." The Series 4 Watch can generate an output signal, which represents the user's heart rate. *See, e.g.,* Apple website at http://support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2016/0058367.

83. Claim 1 further recites: "wherein the modulating at least one of the LEDs has a modulation frequency and wherein the receiver is configured to use a lock-in technique that detects the modulation frequency." The Series 4 Watch LEDs have a modulation frequency of hundreds of times per second. Further, on information and belief, the Series 4 Watch receiver uses a lock-in technique that detects the modulation frequency. *See, e.g.,* Apple website at http://support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2008/0297487.

Count 5 – Infringement of the '299 Patent

84. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

85. Apple has directly infringed and is directly infringing the '299 patent by making using, offering for sale, and selling the Watches, and importing the Watches into the United States.

86. Based on publicly available information, the Watches infringe at least claims 1-9 and 14-20 of the '299 patent. Omni MedSci may assert additional claims of the '299 patent after a reasonable opportunity for investigation and discovery.

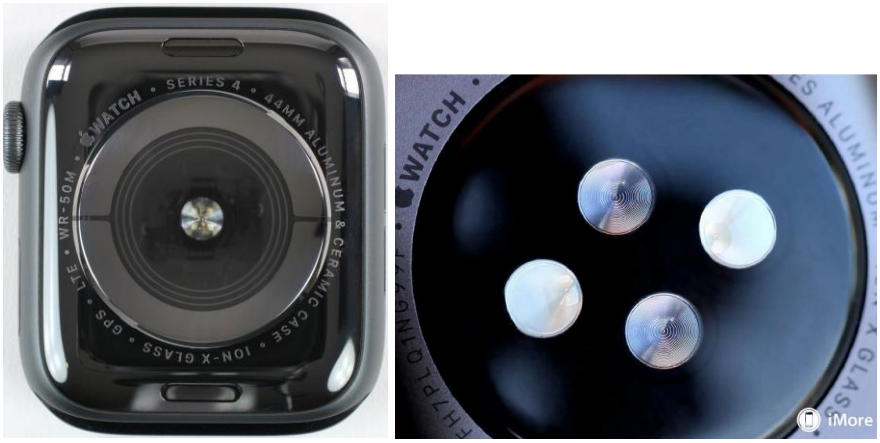
87. Apple's infringement is described further below with respect to exemplary claim 1. The analysis below is based on publicly available information.

88. Claim 1 recites: "A system comprising: a light source comprising a plurality of light emitting diodes." Apple sells Watches that include multiple light emitting diodes used for

measuring the heart rate. *See, e.g.*, Apple's website at support.apple.com/en-us/HT204666 and www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521.

89. Claim 1 further recites: "each of the light emitting diodes configured to generate an output optical beam having one or more optical wavelengths, wherein at least a portion of the one or more optical wavelengths is a near-infrared wavelength between 700 nanometers and 2500 nanometers." The Watches include infrared LEDs, which emit an optical beam with one or more wavelengths. At least a portion of the wavelengths emitted are between 700 nanometers and 2500 nanometers. The LEDs are modulated and have an initial light intensity. *See, e.g.*, Apple website at support.apple.com/en-us/HT204666; www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; U.S. Patent Publication No. 2017/0281024.

90. Claim 1 further recites: "a lens positioned to receive at least a portion of at least one of the output optical beams and to deliver a lens output beam to tissue." The Watches include lenses that receive the optical beam from the LEDs and deliver a portion of that beam to a wearer's tissue.



91. Claim 1 further recites: "a detection system located to receive at least a portion of the lens output beam reflected from the tissue." The Watches include a receiver, with multiple

photodiode detectors. Each detector can receive at least a portion of the beam output by the lens that is reflected from the wearer's skin. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058367.

92. Claim 1 further recites that the detection system is "configured to generate an output signal based on the received portion of the lens output beam reflected from the tissue, the output signal having a signal-to-noise ratio." The detection system in the Watches generates at least one output signal, which signal has a signal-to-noise ratio. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058367.

93. Claim 1 further recites: "wherein the detection system is further configured to be synchronized to the light source." The detection system in the Watches works by synchronizing with the light source. *See, e.g.*, U.S. Pub. No. 2016/0058367.

94. Claim 1 further recites: "a personal device comprising a wireless receiver, a wireless transmitter, a display, a microphone, a speaker, one or more buttons or knobs, a microprocessor, and a touch screen, the personal device configured to receive and process at least a portion of the output signal, wherein the personal device is configured to store and display the processed output signal." Apple sells a system, which includes personal devices (*e.g.*, iPhone) that have a wireless receiver, a wireless transmitter, a display, a microphone, a speaker, one or more buttons or knobs, a microprocessor and a touch screen. The personal devices can receive and process data (*e.g.*, heart rate information) from the Apple watch and store and display the processed data. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058312.

95. Claim 1 further recites: "wherein at least a portion of the processed output signal is configured to be transmitted over a wireless transmission link." Apple sells a system, with a personal device (*e.g.*, iPhone), which can transmit the data it receives (*e.g.*, heart rate information) and processes from Watches over a wireless transmission link to Apple's iCloud. *See, e.g.*, Apple website at support.apple.com/en-us/HT204666; www.imore.com/how-sync-your-health-data-ios-11-and-how-it-works; U.S. Pub. No. 2016/0058312.

96. Claim 1 further recites: "a remote device configured to receive over the wireless transmission link an output status comprising the at least a portion of the processed output signal, to process the received output status to generate processed data, and to store the processed data." Apple sells a system, which includes the Apple iCloud that can receive over a wireless transmission link an output status comprising at least a portion of the processed data transmitted from Apple personal devices (*e.g.*, iPhones). The Apple iCloud can then process the transmitted output status to generate and store data such as heart rate information. *See, e.g.*, Apple website at support.apple.com/en-us/HT204666; www.imore.com/how-sync-your-health-data-ios-11-and-how-it-works.

97. Claim 1 further recites: "wherein the output signal is indicative of one or more physiological parameters." The output signal from the Watches represents, *inter alia*, the wearer's heart rate. *See, e.g.*, U.S. Pub. No. 2016/0058367.

98. Claim 1 further recites: "the remote device is configured to store a history of at least a portion of the one or more physiological parameters over a specified period of time." Apple's iCloud stores historical user data, including health data. The stored health data includes historical heart rate information. *See, e.g.*, Apple website at support.apple.com/en-us/HT204666; www.imore.com/how-sync-your-health-data-ios-11-and-how-it-works.

99. Claim 1 further recites: "the light source configured to improve the signal-to-noise ratio of the output signal by increasing light intensity relative to an initial light intensity from at least one of the plurality of light emitting diodes and by increasing pulse rate relative to an initial pulse rate of at least one of the plurality of light emitting diodes." The Watches have the ability to improve the signal-to-noise ratio of the output signal "by increasing both LED brightness [light intensity] and sampling rate [pulse rate]." *See, e.g.*, Apple website at support.apple.com/en-us/HT204666.

100. Claim 1 further recites: "wherein the detection system includes a plurality of spatially separated detectors." The detection system in the Watches includes multiple photodiode detectors, each detector being separated from the others in space. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058367.

101. Claim 1 further recites: "wherein at least one analog to digital converter is coupled to at least one of the spatially separated detectors and is configured to generate at least two data signals." The Watches include at least one analog to digital converter, which is coupled to the spatially separated photodiode sensors. The A-to-D converter generates at least two signals, a first signal and a second signal. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058312; U.S. Pub. No. 2016/0038045.

102. Claim 1 further recites: "the system is configured to further improve the signal-to-noise ratio by differencing two of the at least two data signals." The Watches improve the signal-to-noise ratio of the light reflected from the tissue by differencing the first signal and the second

signal. *See, e.g.*, U.S. Pub. No. 2016/0058367; U.S. Pub. No. 2016/0058312; U.S. Pub. No. 2016/0038045; U.S. Pub. No. 2016/0296173.

103. Claim 1 further recites: "wherein the detection system further comprises one or more spectral filters positioned in front of at least some of the plurality of spatially separated detectors." The Watches include spectral filters on one or more of the Watch lenses. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666.

Count 6 – Infringement of the '113 Patent

104. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

105. Apple has directly infringed and is directly infringing the '113 patent by making using, offering for sale, and selling the Watches, and importing the Watches into the United States.

106. Based on publicly available information, the Watches infringe at least claims 1-15, 19, 22-27, and 29-31 of the '113 patent. Omni MedSci may assert additional claims of the '113 patent after a reasonable opportunity for investigation and discovery.

107. Apple's infringement is described further below with respect to exemplary claim 1. The analysis below is based on publicly available information.

108. Claim 1 recites: "A wearable device, comprising: a measurement device to measure a physiological parameter adapted to be placed on a wrist or an ear of a user." Apple sells Watches, which are wearable, and that include a measurement device that can measure heart rate, which is a physiological parameter. The Watches are designed to be worn on a user's wrist. *See, e.g.*, Apple's website at support.apple.com/en-us/HT204666 and www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521.

109. Claim 1 further recites: "comprising at least a first light emitting diode and a second light emitting diode, the first light emitting diode configured to generate a first output optical beam, the first output optical beam having an initial light intensity and at least one near-infrared wavelength between 700 nanometers and 2500 nanometers, the second light emitting diode configured to generate a second output optical beam, the second output optical beam having an initial light intensity and at least one near-infrared wavelength between 700 nanometers and 2500 nanometers." The Watches include two infrared LEDs, which each emit an optical beam with an initial light intensity. Each LED emits at least one near-infrared wavelength between 700 nanometers and 2500 nanometers. *See, e.g.*, Apple website at support.apple.com/en-us/HT204666; www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; U.S. Patent Publication No. 2017/0281024.

110. Claim 1 further recites: "wherein the tissue reflects at least a portion of the optical beam delivered to the tissue." The wearer's tissue reflects at least part of the optical beam delivered to the tissue. *See, e.g.*, U.S. Patent Publication No. 2016/0058367.

111. Claim 1 further recites: "the measurement device further comprising a receiver, the receiver having a first detector and a second detector, the first and second detectors being spatially separated." The Watches include a receiver, with multiple photodiode detectors and each detector is separated from the others. *See, e.g.*, www.ifixit.com/Teardown/Apple+Watch+Series+3+Teardown/97521; support.apple.com/en-us/HT204666; U.S. Patent Publication No. 2016/0058367.

112. Claim 1 further recites that "the first detector configured to receive at least a first reflected portion of the first output optical beam, the second detector configured to receive at least a first reflected portion of the second output optical beam." The multiple detectors in the Watches

receive reflected light from the beams output by the LEDs. *See, e.g.*, U.S. Patent Publication No. 2016/0058367.

113. Claim 1 further recites that the receiver includes "one or more analog to digital converters coupled to the spatially separated detectors and configured to generate a first detector signal representing at least in part the first reflected portion of the first output optical beam and to generate a second detector signal representing at least in part the first reflected portion of the second output optical beam." The receiver in the Watches uses analog-to-digital converters, coupled to the detectors, which generate at least two output signals representing the reflected light from the LEDs. *See, e.g.*, support.apple.com/en-us/HT204666; U.S. Pub. No. 2016/0058312; U.S. Pub. No. 2016/0038045.

114. Claim 1 further recites: "and wherein the receiver is configured to generate an output signal at least in part by comparing the first detector signal and the second detector signal." The receiver in the Watches generates an output signal which it generates, in part, by comparing signals from the analog-to-digital converters. *See, e.g.*, U.S. Pub. No. 2016/0058312.

115. Claim 1 further recites: "the measurement device configured to improve signal-to-noise ratio of the output signal by increasing light intensity relative to the initial light intensity of at least the first light emitting diode." The measurement device in the Watches improves the signal-to-noise ratio of the receiver's output signal by increasing LED brightness. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666.

116. Claim 1 further recites: "wherein the measurement of the physiological parameter is at least in part a non-invasive measurement on blood." The measurement device in the Watches generates a signal that represents the heart rate of the wearer's blood. *See, e.g.*, Apple website at http://support.apple.com/en-us/HT204666.

117. Claim 1 further recites: "wherein the measurement device is configured to modulate at least the first light emitting diode at a modulation frequency." The Watches modulate the light by flashing the LEDs. *See, e.g.*, support.apple.com/en-us/HT204666.

118. Claim 1 further recites: "and wherein the receiver is configured to synchronize to the modulation frequency." The receiver in the Watches collect samples by synchronizing to the frequency of the modulation of the LEDs. *See, e.g*., U.S. Pub. No. 2016/0058367.

Count 7 – Willful Infringement

119. Omni MedSci reasserts and incorporates the allegations contained in the paragraphs above.

120. Based on the communications and meetings between Dr. Islam and Apple personnel, Apple knew of its infringement of the Patents-in-Suit or was willfully blind to its infringement.

121. Apple's infringement of the Patents-in-Suit has been willful.

Demand for Relief

WHEREFORE, Omni MedSci requests entry of judgment against Apple as follows:

A. Finding Apple liable for infringement of the Patents-in-Suit and that the infringement has been willful;

B. Awarding Omni MedSci damages under 35 U.S.C. § 271 adequate to compensate for Apple's infringement;

C. Permanently enjoining Apple, together with any officers, agents, servants, employees, and attorneys, and such other persons in active concert of participation with them, who receive actual notice of the Order, from further infringement of the Patents-in-Suit;

D. A declaration this case is exceptional within the meaning of 35 U.S.C. § 285 and awarding Omni MedSci its reasonable attorney fees, costs, and disbursements;

E. Awarding Omni MedSci interest in all damages awarded; and

F. Granting Omni MedSci all other relief to which it is entitled.

Demand for Jury Trial

Omni MedSci demands trial by jury for all issues so triable.

Respectfully submitted,

Date: February 26, 2019

/s/ Thomas A. Lewry

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CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing document was filed electronically in compliance with Local Rule CV-5(a). Therefore, this document was served on all counsel who are deemed to have consented to electronic service. Local Rule CV-5(a)(3)(A). Pursuant to Fed. R. Civ. P. 5(d) and Local Rule CV-5(d) and (e), all other counsel of record not deemed to have consented to electronic service were served with a true and correct copy of the foregoing by email on February 26, 2019.

/s/ Thomas A. Lewry