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18 *Fractus, S.A.*

19 **UNITED STATES DISTRICT COURT**
20 **SOUTHERN DISTRICT OF CALIFORNIA**

21 Fractus, S.A.,
22 Plaintiff,
23 v.
24 Resmed Corp.,
25 Defendant.

Case No. 3:25-CV-02680-LL-JLB

FIRST AMENDED COMPLAINT
DEMAND FOR JURY TRIAL

FIRST AMENDED COMPLAINT

1 Plaintiff Fractus S.A. (“Fractus” or “Plaintiff”), hereby submits this
2 Complaint for patent infringement against Defendant Resmed Corp. (“Resmed” or
3 “Defendant”). Plaintiff alleges the following:

4 **THE PARTIES**

5 1. Fractus, S.A. is a foreign corporation duly organized and existing
6 under the laws of Spain with its principal place of business in Barcelona, Spain.

7 2. Fractus is the owner by assignment of all right, title, and interest in U.S.
8 Patents Nos. 8,362,960, 8,456,365, 8,593,349, 8,674,887, and 8,810,458
9 (collectively, the “Patents-in-Suit”).

10 3. On information and belief, Defendant Resmed Corp. is a corporation
11 organized under the laws of the State of Minnesota with its principal place of
12 business in this district in San Diego, California.

13 **JURISDICTION AND VENUE**

14 4. This action arises under the patent laws of the United States, 35 U.S.C.
15 § 1 *et seq.*, including but not limited to §§ 271, 281, 282(a), 283, 284, and 285. This
16 Court has subject matter jurisdiction over this action pursuant to 28 U.S.C. §§ 1331
17 and 1338(a).

18 5. This Court has personal jurisdiction over Defendant. On information
19 and belief, Defendant resides in the State of California in this judicial district. On
20 information and belief, Defendant has regularly conducted and continue to conduct
21 business in the State of California and in this judicial district. On information and
22 belief, Defendant has committed acts of infringement in the United States, in
23 California, and in this judicial district by making, using, offering for sale, selling,
24 or importing products that infringe the Patents-in-Suit, or by inducing others to
25 infringe the Patents-in-Suit.

26 6. Venue is proper in this judicial district pursuant to 28 U.S.C. § 1400(b)
27 and 28 U.S.C. § 1391. On information and belief, Defendant resides in this judicial
28 district. On information and belief, Defendant maintains a regular and established

1 place of business in this federal judicial district, including Defendant's corporate
2 offices at 9001 Spectrum Center Blvd., San Diego, CA 92123; and Defendant has
3 committed acts of infringement in this judicial district by making, using, offering
4 for sale, selling, or importing products that infringe the Patents-in-Suit, or by
5 inducing others to infringe the Patents-in-Suit.

6 **PATENTS-IN-SUIT**

7 7. On June 4, 2013, the United States Patent and Trademark Office (the
8 "USPTO") issued U.S. Patent No. 8,456,365 (the "'365 Patent") to Fractus for an
9 invention entitled, "Multi-Band Monopole Antennas for Mobile Communications
10 Devices." A true and correct copy of the '365 Patent is attached hereto as Exhibit A.

11 8. On March 18, 2014, the USPTO issued U.S. Patent No. 8,674,887 (the
12 "'887 Patent") to Fractus for an invention entitled, "Multi-Band Monopole Antenna
13 for a Mobile Communications Device." A true and correct copy of the '887 Patent
14 is attached hereto as Exhibit B.

15 9. On November 26, 2013, the USPTO issued U.S. Patent No. 8,593,349
16 (the "'349 Patent") to Fractus for an invention entitled, "Miniature Antenna Having
17 a Volumetric Structure." A true and correct copy of the '349 Patent is attached
18 hereto as Exhibit C.

19 10. On January 29, 2013, the USPTO issued U.S. Patent No. 8,362,960
20 (the "'960 Patent") to Fractus for an invention entitled, "Handheld Device with Two
21 Antennas, and Method of Enhancing the Isolation Between the Antennas." A true
22 and correct copy of the '960 Patent is attached hereto as Exhibit D.

23 11. On August 19, 2014, the USPTO issued U.S. Patent No. 8,810,458 (the
24 "'458 Patent") to Fractus for an invention entitled, "Handheld Device with Two
25 Antennas, and Method of Enhancing the Isolation Between the Antennas." A true
26 and correct copy of the '458 Patent is attached hereto as Exhibit E.

FACTUAL ALLEGATIONS

12. Fractus is a company specializing in advanced antenna technologies based in Barcelona, Spain. Fractus was founded by two college friends, Ruben Bonet and Carles Puente. Dr. Puente, a Professor at the Universitat Politècnica de Catalunya, is the lead inventor on the Patents-in-Suit. Dr. Puente's early research work focused on fractal antennas and evolved over time into the widely applicable and flexible antenna designs that appear in and are covered by the Patents-in-Suit.

13. Fractus has designed antennas for and/or has licensed the right to use its technology to leading companies across a variety of industries, including HTC, LG, RIM, Motorola, Samsung, Asus, ZTE, CommScope, Vivint, and ADT. Since its incorporation Fractus has cumulatively sold more than 40 million antennas to customers. Among the numerous awards and honors the company has received for its innovative work, Fractus won the 2004 Frost & Sullivan Award for technological innovation and was named a 2005 Davos World Economic Forum Technology Pioneer and one of Red Herring's top innovative companies for 2006. Fractus inventors were finalists for the European Patent Office ("EPO") European Inventor Award in 2014, and in April 2017 Fractus received the "European Inspiring Company Award" by the London Stock Exchange and the Elite Group. In October 2017, Fractus was selected by the EPO as an example of an IP strategist for small and medium-sized enterprises. In 2021, Fractus endowed a chair at Pompeu Fabra University in Spain, to enhance technology transfer and research into 6G wireless communications. And, in September 2022, Fractus and the Universitat Politècnica de Catalunya partnered in the creation of a research and technology hub to develop "deep tech" solutions for global challenges.

14. The Patents-in-Suit were filed as a result of novel research by Fractus into antenna design for wireless devices, spanning across miniature antennas, multi-band monopole internal antennas, wireless devices comprising multiple antennas, and antennas for multifunctional wireless devices. Designers of wireless devices

1 often face a number of challenges related to internal antennas capable of enabling
2 efficient multiband operation. As with all antennas, these components both radiate
3 and respond to electromagnetic waves. In the cramped confines of wireless devices,
4 electromagnetic waves given off or absorbed by neighboring components in close
5 proximity to an antenna can significantly impair the antenna's performance and
6 efficiency. Without careful design, these problems may degrade an antenna's
7 electromagnetic performance to the point that the device ceases to function in its
8 intended manner or may require the designer to compromise on other desirable
9 device attributes, such as size. The Patents-in-Suit solve these problems through a
10 variety of novel solutions enabling multiband operation and small size without the
11 efficiency impairments normally faced by these antennas.

12 **RESMED'S INFRINGING PRODUCTS**

13 15. Resmed makes, uses, sells, offers for sale, and/or imports products in
14 the United States, including, but not limited to the Resmed AirSense 10 products,
15 the Resmed AirCurve 10 products, the Resmed Connectivity Module products, the
16 Resmed AirSense 11 products, and the Resmed AirCurve 11 products (collectively,
17 the "Infringing Products"). The Infringing Products use Fractus's patented
18 technology to provide built-in wireless connectivity, including for remote
19 monitoring and management, which is central to the health benefits and commercial
20 value of the Infringing Products.

21 16. The above list is representative. The above list and the information
22 provided in this Complaint regarding the listed example products is representative,
23 and should not be construed as limiting the scope of this Complaint.

24 **NOTICE AND WILLFULNESS**

25 17. Fractus first provided Resmed with notice of the Patents-in-Suit via a
26 letter in June, 2021. The letter informed Resmed that Fractus believed Resmed was
27 infringing Fractus's patents. The letter provided a full list of Fractus's patents
28 (including every Patent-in-Suit) and specifically identified particular Fractus

1 patents—including the '887 Patent, the '349 Patent, and the '365 Patent—which
2 Resmed's products infringed.

3 18. In July, 2021, Resmed acknowledged receiving Fractus's letter, and
4 indicated that Resmed was willing to review claim charts supporting Fractus's
5 infringement claims. Fractus responded in August, 2021 and offered to share claim
6 charts under a non-disclosure agreement in order to protect the information
7 exchanged. In September 2021, Resmed stated that there was no need for a non-
8 disclosure agreement. Fractus once again offered to share information under a non-
9 disclosure agreement in October, 2021, and Resmed responded in December, 2021,
10 stating again that a non-disclosure agreement was unnecessary.

11 19. In November, 2022, Fractus informed Resmed of additional infringing
12 Resmed products and additional Fractus patents infringed by Resmed—including
13 the '960 Patent and the '458 Patent. Yet again, Fractus reiterated its request to share
14 claim charts under a non-disclosure agreement in order to protect the information
15 exchanged. In December, 2022, Resmed responded by again refusing to sign a non-
16 disclosure agreement with Fractus.

17 20. Thus, Resmed has had actual knowledge of each of the Patents-in-Suit
18 since at least June, 2021.

19 21. On information and belief, Resmed has never disputed the validity of
20 the Patents-in-Suit.

21 22. Despite being on notice of its infringement of Fractus's patents,
22 Resmed continued to make, use, sell, offer for sale, and/or import products into the
23 United States that infringe the Patents-in-Suit.

24 23. On information and belief, Resmed has infringed or induced others to
25 make, use, sell, offer to sell, and/or import the Infringing Products with knowledge
26 of and/or willful blindness to the fact that such use infringes the Patents-in-Suit, and
27 have acted, and continue to act, willfully, wantonly, and in deliberate disregard of
28 Fractus's rights.

1 24. As a direct and proximate result of Resmed's infringement of the
2 Patents-in-Suit, Fractus has suffered and will continue to suffer irreparable harm for
3 which there is no adequate remedy at law. Because Fractus's remedy at law is
4 inadequate, Fractus seeks, in addition to damages, injunctive relief.

5 **COUNT ONE: INFRINGEMENT OF U.S. PATENT NO. 8,456,365**

6 25. The '365 Patent, entitled "Multi-Band Monopole Antennas for Mobile
7 Communications Devices," was duly and legally issued by the USPTO on June 4,
8 2013, after a full and fair examination. Fractus owns the '365 Patent by assignment.
9 (Exhibit A).

10 26. The '365 Patent is valid and enforceable. Resmed does not have, and
11 at no time has had, a license to practice any of the inventions claimed in the
12 '365 Patent.

13 27. The '365 Patent describes multiband antennas for use in mobile
14 communication devices.

15 28. As one example, claim 1 of the '365 Patent recites:

16 A mobile communication device, comprising:

17 a device housing;

18 a printed circuit board, the printed circuit board comprising:

19 a ground plane layer;

20 a feeding point;

21 a communication circuitry, the communication circuitry being mounted on
22 the printed circuit board;

23 wherein the communication circuitry is coupled to the feeding point and to
24 the ground plane layer;

25 a multi-band antenna capable of operating at multiple frequency bands, the
26 multi-band antenna including an antenna element;

27 wherein the antenna element operates in cooperation with the ground plane
28 layer;

1 the antenna element comprising:

2 a common conductor;

3 a first radiating arm connected to the common conductor;

4 a second radiating arm connected to the common conductor;

5 wherein the common conductor includes a feeding port, the feeding port
6 being coupled to the feeding point;

7 wherein at least a portion of the first radiating arm and at least a portion of
8 the second radiating arm are arranged on different planes;

9 wherein the first radiating arm is at least partially shaped according to a grid-
10 dimension curve; and

11 wherein the printed circuit board, the communication circuitry, and the multi-
12 band antenna are arranged inside the device housing.

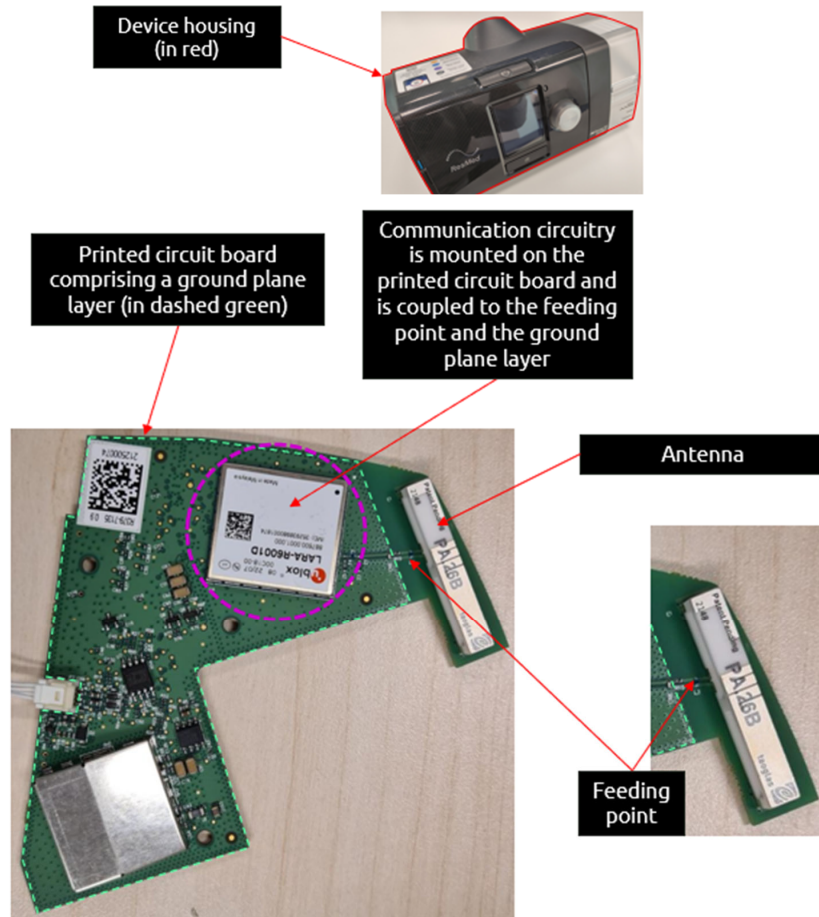
13 29. Resmed has directly infringed at least claim 1 of the '365 Patent by
14 making, using, selling, offering to sell, and/or importing products that infringe the
15 '365 Patent—including the Resmed AirCurve 10 products, the Resmed AirSense
16 10 products, and the Resmed Connectivity Module products—which meet every
17 limitation of at least claim 1 of the '365 Patent literally or under the doctrine of
18 equivalents, in violation of 35 U.S.C. § 271(a).

19 30. As an example, the Resmed AirCurve 10 satisfies all claim limitations
20 of at least claim 1 of the '365 Patent.¹

21 a. A mobile communication device, comprising: a device housing; a
22 printed circuit board, the printed circuit board comprising: a ground
23 plane layer; a feeding point; a communication circuitry, the
24 communication circuitry being mounted on the printed circuit board;
25 wherein the communication circuitry is coupled to the feeding point
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27 ¹ This description is illustrative and is not intended to be an exhaustive or limiting
28 explanation of any manner in which each Infringing Product infringes the '365
Patent.

and to the ground plane layer;



- b. a multi-band antenna capable of operating at multiple frequency bands, the multi-band antenna including an antenna element; wherein the antenna element operates in cooperation with the ground plane layer;

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Printed circuit board comprising a ground plane layer (in dashed green)

The antenna operates in cooperation with the ground plane layer

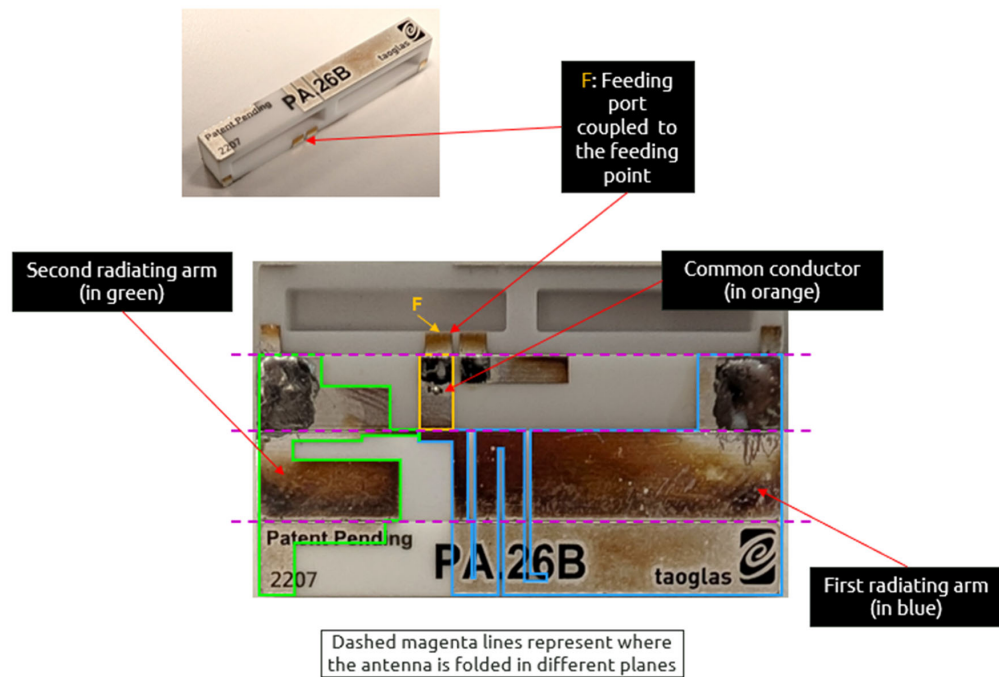
GSM 850
GSM 1900
WCDMA II
WCDMA V
LTE 2
LTE 4
LTE 5
LTE 7
LTE 12
LTE 13
LTE 26
LTE 38
LTE 41

Source: FCC

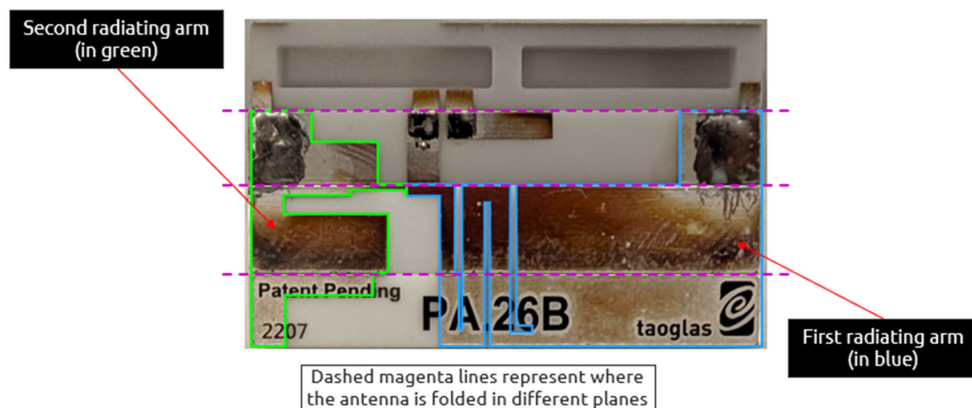
Multi-band antenna operation

- c. the antenna element comprising: a common conductor; a first radiating arm connected to the common conductor; a second radiating arm connected to the common conductor; wherein the common conductor includes a feeding port, the feeding port being coupled to the feeding point;

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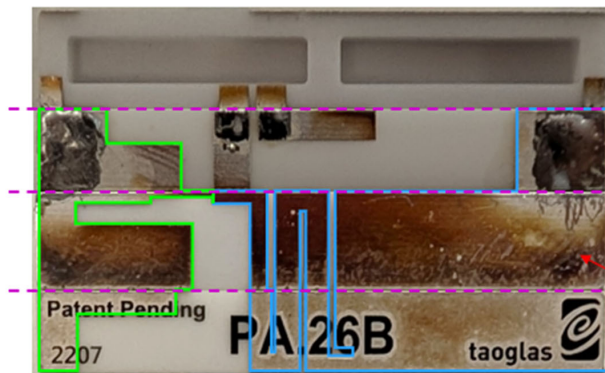
- d. wherein at least a portion of the first radiating arm and at least a portion of the second radiating arm are arranged on different planes;





Antenna's radiating arms on different planes

- e. wherein the first radiating arm is at least partially shaped according to a grid-dimension curve; and



Dashed magenta lines represent where the antenna is folded in different planes

First radiating arm (in blue)

$$\text{Grid dimension } (D_g) = \frac{\log(N_2) - \log(N_1)}{\log(2)} = \frac{\log(62) - \log(24)}{\log(2)} = 1.37 > 1$$

- f. wherein the printed circuit board, the communication circuitry, and the multi-band antenna are arranged inside the device housing.

Printed circuit board, communication circuitry, and multiband antenna are arranged inside the device housing



1 31. In addition to directly infringing the '365 Patent, on information and
2 belief, Resmed has actively induced others to directly infringe at least claim 1 of the
3 '365 Patent, in violation of 35 U.S.C. § 271(b). Defendant has induced, caused,
4 urged, encouraged, aided, and abetted Defendant's direct and indirect customers,
5 business partners, and/or end users, to make, use, offer for sale, and/or import
6 products infringing at least claim 1 of the '365 Patent. Defendant has done so by
7 acts including but not limited to distributing the Infringing Products, advertising
8 and marketing infringing products, selling infringing products to their customers,
9 and providing training, instructions and technical support directing customers
10 and/or end users to use the infringing products in an infringing manner (available
11 via, e.g., <https://www.Resmed.com/en-us/?s=aircurve+10>). For example, Resmed
12 advertises on its website that, "With each AirCurve 10 device offering built-in
13 cellular technology, you get unprecedented access to therapy data and remote access
14 to device settings, helping you to be more connected with your patients and even
15 more efficient in your business." ([https://www.Resmed.com/en-us/health-](https://www.Resmed.com/en-us/health-professionals/products/cpap/machines/aircurve-10-s/)
16 [professional/products/cpap/machines/aircurve-10-s/](https://www.Resmed.com/en-us/health-professionals/products/cpap/machines/aircurve-10-s/)). Such conduct was intended
17 to and actually resulted in direct infringement of the '365 Patent.

18 32. On information and belief, Defendant knew that its actions, including,
19 but not limited to the Infringing Products, would induce, have induced, and would
20 continue to induce infringement by its customers, clients, business partners,
21 developers, and/or end users, by continuing to sell, support, and instruct them on
22 making, using, or selling the Infringing Products.

23 33. With knowledge of the '365 Patent, Defendant has willfully,
24 deliberately, and intentionally infringed the '365 Patent.

25 34. As a direct and proximate result of Defendant's infringement of the
26 '365 Patent, Fractus has suffered damages in an amount to be determined, together
27 with interest and costs determined by the Court.
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1 35. Fractus has complied with the requirements of 35 U.S.C. § 287 with
2 respect to the '365 Patent.

3 **COUNT TWO: INFRINGEMENT OF U.S. PATENT NO. 8,674,887**

4 36. The '887 Patent, entitled "Multi-Band Monopole Antenna for a Mobile
5 Communications Device," was duly and legally issued by the USPTO on March 18,
6 2014, after a full and fair examination. Fractus owns the '887 Patent by assignment.
7 (Exhibit B).

8 37. The '887 Patent is valid and enforceable. Resmed does not have, and
9 at no time has had, a license to practice any of the inventions claimed in the '887
10 Patent.

11 38. The '887 Patent describes multiband antennas for use in mobile
12 communication devices.

13 39. As one example, claim 1 of the '887 Patent recites:

14 A mobile communication device comprising:

15 communications circuitry;

16 a circuit board comprising a ground plane and a feeding point, the feeding
17 point being coupled to the communications circuitry;

18 a mounting structure positioned within the mobile communication device, a
19 section of the mounting structure extending over the circuit board; and

20 a multi-band antenna secured to the mounting structure and laterally offset

21 from an edge of the ground plane, the multi-band antenna comprising:

22 a common conductor coupled to the feeding point;

23 first and second radiating arms coupled to and extending from the
24 common conductor; and

25 a space-filling curve constituting at least a part of the first radiating
26 arm, wherein the space-filling curve comprises at least ten
27 segments that are shorter than a tenth of a free-space operating
28 wavelength of the multi-band antenna, each of the segments

1 being connected to its neighboring segments at an angle such
2 that no pair of adjacent segments defines a longer straight
3 segment, wherein any periodicity of the space-filling curve
4 along a fixed straight direction of space involves a periodic
5 structure having a period defined by a non-periodic curve
6 comprising at least ten connected segments in which no pair of
7 adjacent ones of the connected segments defines a longer
8 straight segment.

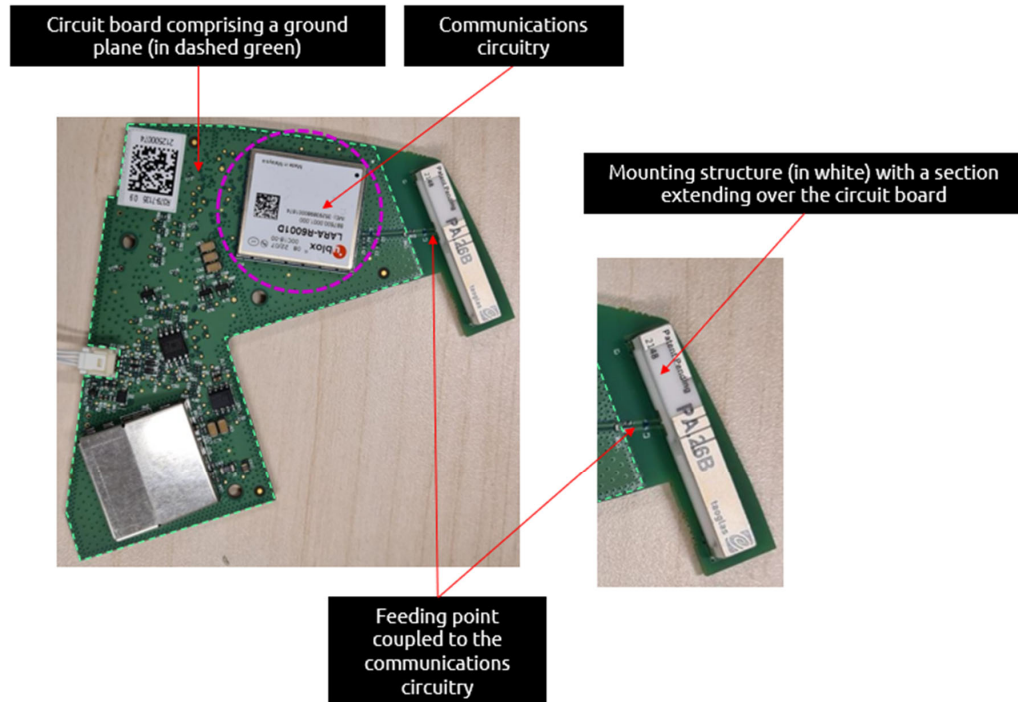
9 40. Resmed has directly infringed at least claim 1 of the '887 Patent by
10 making, using, selling, offering to sell, and/or importing products that infringe the
11 '887 Patent—including the Resmed AirCurve 10 products, the Resmed AirSense
12 10 products, and the Resmed Connectivity Module products—which meet every
13 limitation of at least claim 1 of the '887 Patent literally or under the doctrine of
14 equivalents, in violation of 35 U.S.C. § 271(a).

15 41. As an example, the Resmed AirCurve 10 satisfies all claim limitations
16 of at least claim 1 of the '887 Patent.²

17 a. A mobile communication device comprising: communications
18 circuitry; a circuit board comprising a ground plane and a feeding
19 point, the feeding point being coupled to the communications
20 circuitry; a mounting structure positioned within the mobile
21 communication device, a section of the mounting structure
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27 ² This description is illustrative and is not intended to be an exhaustive or limiting
28 explanation of any manner in which each Infringing Product infringes the '887
Patent.

extending over the circuit board; and



b. a multi-band antenna secured to the mounting structure and laterally offset from an edge of the ground plane,

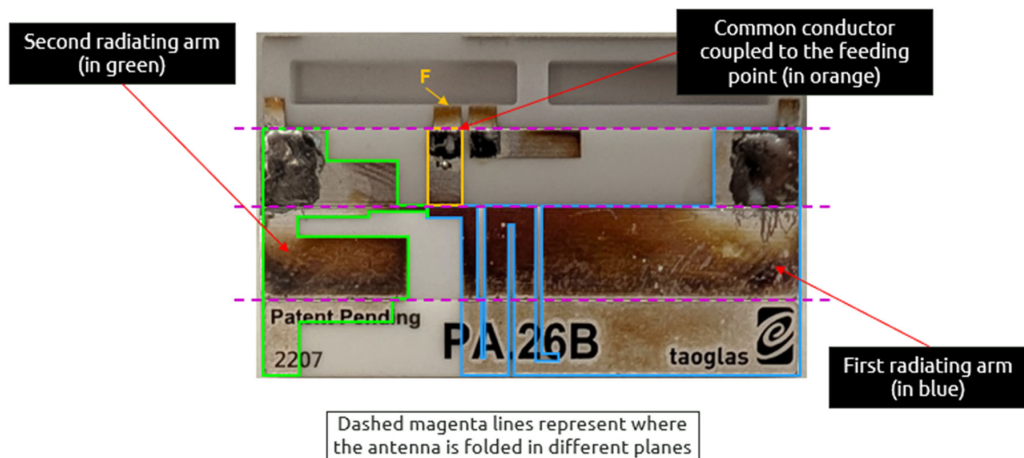


GSM 850
GSM 1900
WCDMA II
WCDMA V
LTE 2
LTE 4
LTE 5
LTE 7
LTE 12
LTE 13
LTE 26
LTE 38
LTE 41

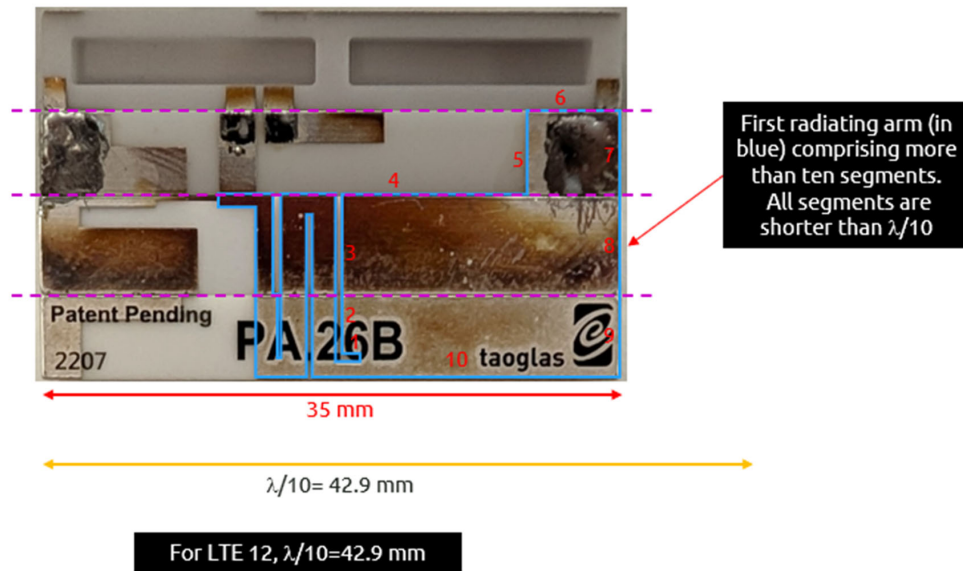
Source: FCC

Multi-band antenna operation

- 1 c. the multi-band antenna comprising: a common conductor coupled to
2 the feeding point; first and second radiating arms coupled to and
3 extending from the common conductor; and
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- 14 d. a space-filling curve constituting at least a part of the first radiating
15 arm, wherein the space-filling curve comprises at least ten segments
16 that are shorter than a tenth of a free-space operating wavelength of
17 the multi-band antenna, each of the segments being connected to its
18 neighboring segments at an angle such that no pair of adjacent
19 segments defines a longer straight segment, wherein any periodicity
20 of the space-filling curve along a fixed straight direction of space
21 involves a periodic structure having a period defined by a non-
22 periodic curve comprising at least ten connected segments in which
23 no pair of adjacent ones of the connected segments defines a longer
24 straight segment.
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42. In addition to directly infringing the '887 Patent, on information and belief, Resmed has actively induced others to directly infringe at least claim 1 of the '887 Patent, in violation of 35 U.S.C. § 271(b). Defendant has induced, caused, urged, encouraged, aided, and abetted Defendant's direct and indirect customers, business partners, and/or end users, to make, use, offer for sale, and/or import products infringing at least claim 1 of the '887 Patent. Defendant has done so by acts including but not limited to distributing the Infringing Products, advertising and marketing infringing products, selling infringing products to its customers, and providing training, instructions and technical support directing customers and/or end users to use the infringing products in an infringing manner (available via, e.g., <https://www.Resmed.com/en-us/?s=aircurve+10>). For example, Resmed advertises on its website that, "With each AirCurve 10 device offering built-in cellular technology, you get unprecedented access to therapy data and remote access to device settings, helping you to be more connected with your patients and even more efficient in your business." (<https://www.Resmed.com/en-us/health-professionals/products/cpap/machines/aircurve-10-s/>). Such conduct was intended

1 to and actually resulted in direct infringement of the '887 Patent.

2 43. On information and belief, Defendant knew that its actions, including,
3 but not limited to the Infringing Products, would induce, have induced, and would
4 continue to induce infringement by its customers, clients, business partners,
5 developers, and/or end users, by continuing to sell, support, and instruct them on
6 making, using, or selling the Infringing Products.

7 44. With knowledge of the '887 Patent, Defendant has willfully,
8 deliberately, and intentionally infringed the '887 Patent.

9 45. As a direct and proximate result of Defendant's infringement of the
10 '887 Patent, Fractus has suffered damages in an amount to be determined, together
11 with interest and costs determined by the Court.

12 46. Fractus has complied with the requirements of 35 U.S.C. § 287 with
13 respect to the '887 Patent.

14 **COUNT THREE: INFRINGEMENT OF U.S. PATENT NO. 8,593,349**

15 47. The '349 Patent, entitled "Miniature Antenna Having a Volumetric
16 Structure," was duly and legally issued by the USPTO on November 26, 2013, after
17 a full and fair examination. Fractus owns the '349 Patent by assignment. (Exhibit
18 C).

19 48. The '349 Patent is valid and enforceable. Resmed does not have, and
20 at no time has had, a license to practice any of the inventions claimed in the '349
21 Patent.

22 49. The '349 Patent describes antennas for use in wireless devices.

23 50. As one example, claim 15 of the '349 Patent recites:

24 A miniature antenna system comprising:

25 an antenna element comprising at least one radiating arm and a feeding point

26 coupled to a transmission medium;

27 a perimeter of the at least one radiating arm defines a grid dimension curve;

28 the antenna element forming a non-planar structure;

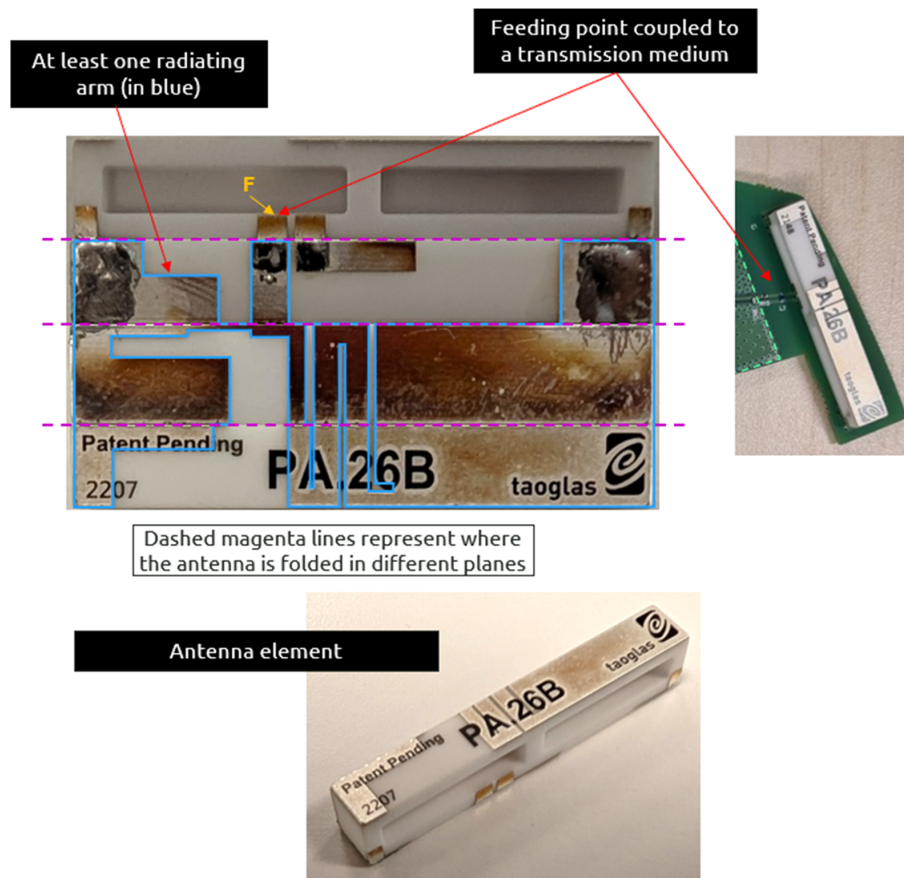
1 the at least one radiating arm being coupled to the feeding point;
2 a ground plane;
3 a dielectric material;
4 the perimeter of the at least one radiating arm comprising at least ten
5 segments, each segment of the at least ten segments forms an angle
6 with an adjacent segment of the at least ten segments and is shorter
7 than one-tenth of a longest free-space operating wavelength;
8 the grid dimension curve being a non-periodic curve that has a grid dimension
9 (D_g) greater than 1.3; and
10 physical dimensions of the antenna element being smaller than the longest
11 free-space operating wavelength of the antenna element divided by two
12 times π .

13 51. Resmed has directly infringed at least claim 15 of the '349 Patent by
14 making, using, selling, offering to sell, and/or importing products that infringe the
15 '349 Patent—including the Resmed AirCurve 10 products, the Resmed AirSense
16 10 products, and the Resmed Connectivity Module products—which meet every
17 limitation of at least claim 15 of the '349 Patent literally or under the doctrine of
18 equivalents, in violation of 35 U.S.C. § 271(a).

19 52. As an example, the Resmed AirCurve 10 satisfies all claim limitations
20 of at least claim 15 of the '349 Patent.³

21 a. A miniature antenna system comprising: an antenna element
22 comprising at least one radiating arm and a feeding point coupled to
23 a transmission medium;

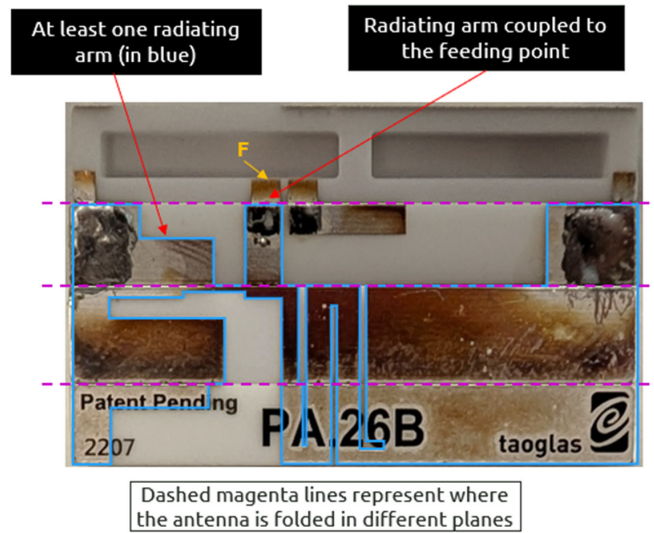
27 ³ This description is illustrative and is not intended to be an exhaustive or limiting
28 explanation of any manner in which each Infringing Product infringes the '349
Patent.



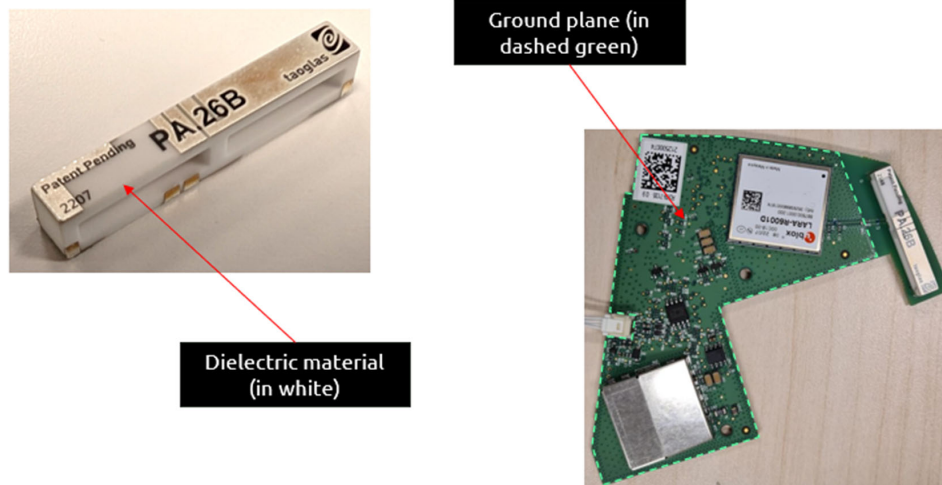
- b. a perimeter of the at least one radiating arm defines a grid dimension curve; the antenna element forming a non-planar structure; the at least one radiating arm being coupled to the feeding point;



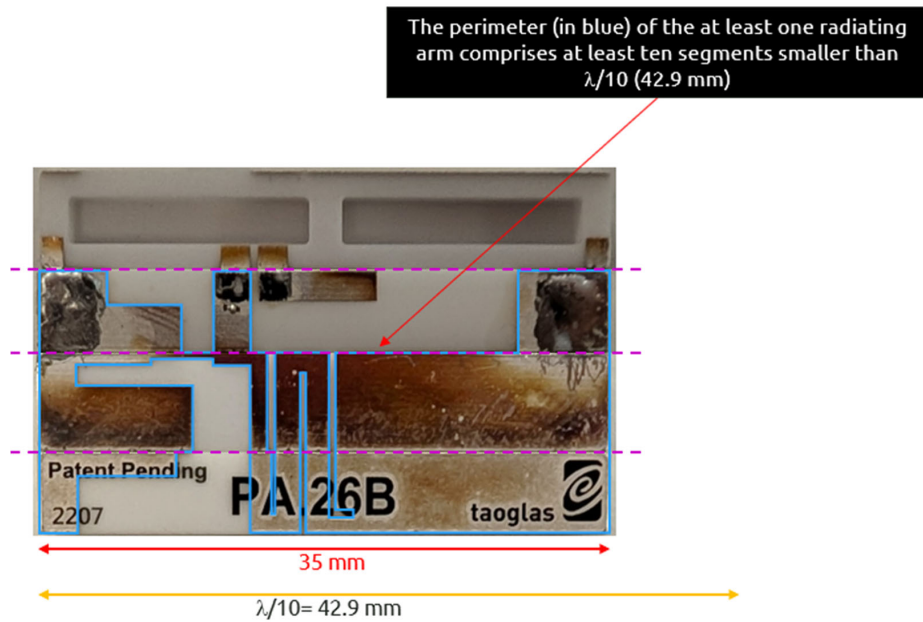
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c. a ground plane; a dielectric material;

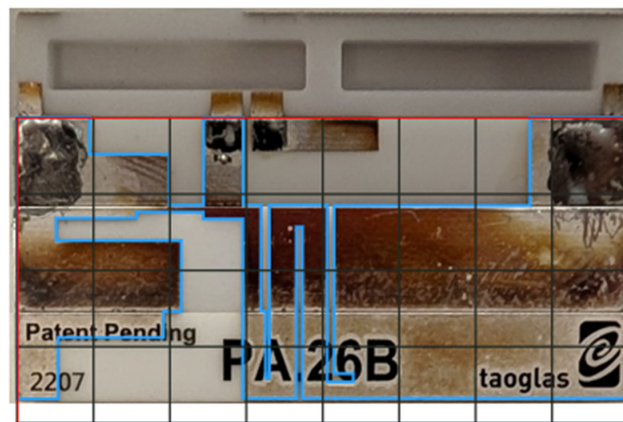


d. the perimeter of the at least one radiating arm comprising at least ten segments, each segment of the at least ten segments forms an angle with an adjacent segment of the at least ten segments and is shorter than one-tenth of a longest free-space operating wavelength;

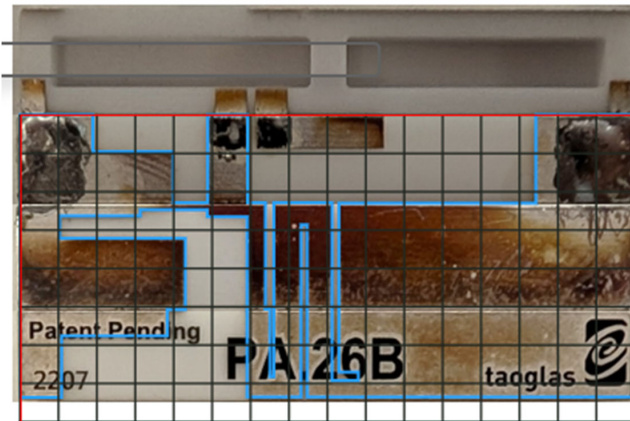


13 For LTE 12, $\lambda/10 = 42.9$ mm

- 14
- 15 e. the grid dimension curve being a non-periodic curve that has a grid
- 16 dimension (D_g) greater than 1.3; and



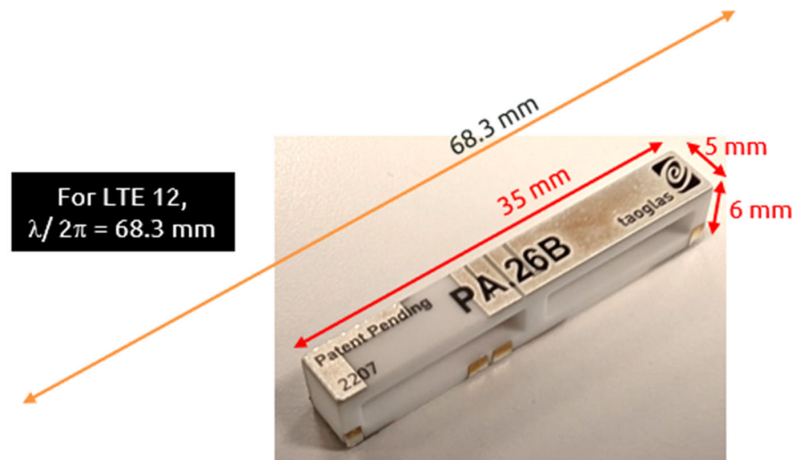
25 $N_1 = 26$



$$N_2 = 77$$

$$\text{Grid dimension } (D_g) = \frac{\log(N_2) - \log(N_1)}{\log(2)} = \frac{\log(77) - \log(26)}{\log(2)} = 1.57 > 1.3$$

- f. physical dimensions of the antenna element being smaller than the longest free-space operating wavelength of the antenna element divided by two times π .



The dimensions of the antenna are smaller than $\lambda/2\pi$ (68.3 mm)

1 53. In addition to directly infringing the '349 Patent, on information and
2 belief, Resmed has actively induced others to directly infringe at least claim 15 of
3 the '349 Patent, in violation of 35 U.S.C. § 271(b). Defendant has induced, caused,
4 urged, encouraged, aided, and abetted Defendant's direct and indirect customers,
5 business partners, and/or end users, to make, use, offer for sale, and/or import
6 products infringing at least claim 15 of the '349 Patent. Defendant has done so by
7 acts including but not limited to distributing the Infringing Products, advertising
8 and marketing infringing products, selling infringing products to their customers,
9 and providing training, instructions and technical support directing customers
10 and/or end users to use the infringing products in an infringing manner (available
11 via, e.g., <https://www.Resmed.com/en-us/?s=aircurve+10>). For example, Resmed
12 advertises on its website that, "With each AirCurve 10 device offering built-in
13 cellular technology, you get unprecedented access to therapy data and remote access
14 to device settings, helping you to be more connected with your patients and even
15 more efficient in your business." ([https://www.Resmed.com/en-us/health-](https://www.Resmed.com/en-us/health-professionals/products/cpap/machines/aircurve-10-s/)
16 [professionals/products/cpap/machines/aircurve-10-s/](https://www.Resmed.com/en-us/health-professionals/products/cpap/machines/aircurve-10-s/)). Such conduct was intended
17 to and actually resulted in direct infringement of the '349 Patent.

18 54. On information and belief, Defendant knew that its actions, including,
19 but not limited to the Infringing Products, would induce, have induced, and would
20 continue to induce infringement by its customers, clients, business partners,
21 developers, and/or end users, by continuing to sell, support, and instruct them on
22 making, using, or selling the Infringing Products.

23 55. With knowledge of the '349 Patent, Defendant has willfully,
24 deliberately, and intentionally infringed the '349 Patent.

25 56. As a direct and proximate result of Defendant's infringement of the
26 '349 Patent, Fractus has suffered damages in an amount to be determined, together
27 with interest and costs determined by the Court.
28

1 57. Fractus has complied with the requirements of 35 U.S.C. § 287 with
2 respect to the '349 Patent.

3 **COUNT FOUR: INFRINGEMENT OF U.S. PATENT NO. 8,362,960**

4 58. The '960 Patent, entitled "Handheld Device with Two Antennas, and
5 Method of Enhancing the Isolation Between the Antennas," was duly and legally
6 issued by the USPTO on January 29, 2013, after a full and fair examination. Fractus
7 owns the '960 Patent by assignment. (Exhibit D).

8 59. The '960 Patent is valid and enforceable. Resmed does not have, and
9 at no time has had, a license to practice any of the inventions claimed in the '960
10 Patent.

11 60. The '960 Patent describes wireless devices with two antennas and the
12 isolation between those antennas.

13 61. As one example, claim 1 of the '960 Patent recites:

14 A handheld device comprising:

15 a substantially rectangular ground plane;

16 a first antenna configured to transmit and receive electromagnetic wave
17 signals in at least three frequency bands used for mobile
18 communication services;

19 a second antenna configured to operate in at least one frequency band;

20 the first antenna extends in a direction substantially parallel to a first side of
21 the substantially rectangular ground plane;

22 the second antenna extends in a direction substantially parallel to a second
23 side of the substantially rectangular ground plane;

24 the first antenna is arranged near a short side of the substantially rectangular
25 ground plane; and

26 the first side and the second side are substantially orthogonal.

27 62. Resmed has directly infringed at least claim 1 of the '960 Patent by
28 making, using, selling, offering to sell, and/or importing products that infringe the

1 '960 Patent—including the Resmed AirCurve 11 products and the Resmed
2 AirSense 11 products—which meet every limitation of at least claim 1 of the '960
3 Patent literally or under the doctrine of equivalents, in violation of 35 U.S.C. §
4 271(a).

5 63. As an example, the Resmed AirCurve 11 satisfies all claim limitations
6 of at least claim 1 of the '960 Patent.⁴

7 a. A handheld device comprising: a substantially rectangular ground
8 plane;

9
10 a substantially rectangular ground
plane (dashed green line)



27 ⁴ This description is illustrative and is not intended to be an exhaustive or limiting
28 explanation of any manner in which each Infringing Product infringes the '960
Patent.

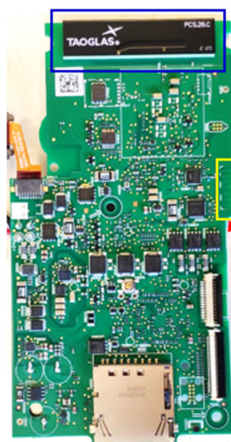
- b. a first antenna configured to transmit and receive electromagnetic wave signals in at least three frequency bands used for mobile communication services;

A first antenna (in blue) is configured to transmit and receive electromagnetic waves in at least the following frequency bands used for mobile communication services:
LTE 850(B5)/1700(B4)/1900(B2)



LTE CAT M1 Band 2
LTE CAT M1 Band 4
LTE CAT M1 Band 5
LTE CAT M1 Band 12
LTE CAT M1 Band 13
LTE CAT M1 Band 25
LTE CAT M1 Band 26
LTE CAT M1 Band 66
Bluetooth

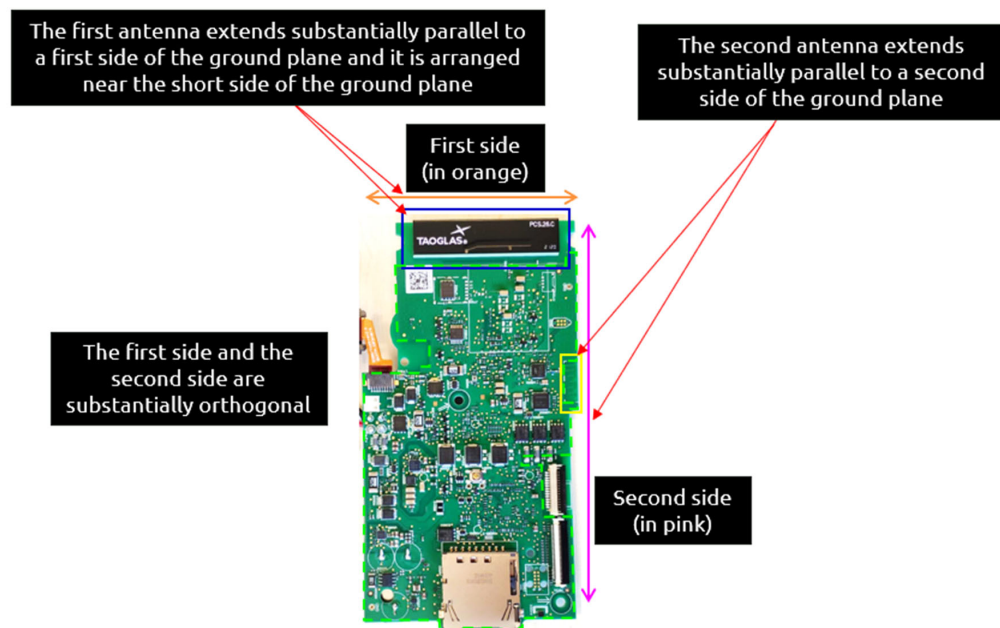
- c. a second antenna configured to operate in at least one frequency band;



LTE CAT M1 Band 2
LTE CAT M1 Band 4
LTE CAT M1 Band 5
LTE CAT M1 Band 12
LTE CAT M1 Band 13
LTE CAT M1 Band 25
LTE CAT M1 Band 26
LTE CAT M1 Band 66
Bluetooth

A second antenna (in yellow) is configured to operate in at least Bluetooth

- d. the first antenna extends in a direction substantially parallel to a first side of the substantially rectangular ground plane; the second antenna extends in a direction substantially parallel to a second side of the substantially rectangular ground plane; the first antenna is arranged near a short side of the substantially rectangular ground plane; and the first side and the second side are substantially orthogonal.



64. In addition to directly infringing the '960 Patent, on information and belief, Resmed has actively induced others to directly infringe at least claim 1 of the '960 Patent, in violation of 35 U.S.C. § 271(b). Defendant has induced, caused, urged, encouraged, aided, and abetted Defendant's direct and indirect customers, business partners, and/or end users, to make, use, offer for sale, and/or import products infringing at least claim 1 of the '960 Patent. Defendant has done so by

1 acts including but not limited to distributing the Infringing Products, advertising
2 and marketing infringing products, selling infringing products to its customers, and
3 providing training, instructions and technical support directing customers and/or
4 end users to use the infringing products in an infringing manner (available via, e.g.,
5 <https://www.Resmed.com/en-us/?s=aircurve+11>). For example, Resmed advertises
6 on its website that, the Resmed AirSense 11 includes “wireless connectivity.”
7 ([https://www.resmed.com/en-us/health-professionals/products/](https://www.resmed.com/en-us/health-professionals/products/cpap/machines/airsense-11-elite/)
8 [cpap/machines/airsense-11-elite/](https://www.resmed.com/en-us/health-professionals/products/cpap/machines/airsense-11-elite/)). Such conduct was intended to and actually
9 resulted in direct infringement of the ’960 Patent.

10 65. On information and belief, Defendant knew that its actions, including,
11 but not limited to the Infringing Products, would induce, have induced, and would
12 continue to induce infringement by its customers, clients, business partners,
13 developers, and/or end users, by continuing to sell, support, and instruct them on
14 making, using, or selling the Infringing Products.

15 66. With knowledge of the ’960 Patent, Defendant has willfully,
16 deliberately, and intentionally infringed the ’960 Patent.

17 67. As a direct and proximate result of Defendant’s infringement of the
18 ’960 Patent, Fractus has suffered damages in an amount to be determined, together
19 with interest and costs determined by the Court.

20 68. Fractus has complied with the requirements of 35 U.S.C. § 287 with
21 respect to the ’960 Patent.

22 **COUNT FIVE: INFRINGEMENT OF U.S. PATENT NO. 8,810,458**

23 69. The ’458 Patent, entitled “Handheld Device with Two Antennas, and
24 Method of Enhancing the Isolation Between the Antennas,” was duly and legally
25 issued by the USPTO on August 19, 2014, after a full and fair examination. Fractus
26 owns the ’458 Patent by assignment. (Exhibit E).

27 70. The ’458 Patent is valid and enforceable. Resmed does not have, and
28 at no time has had, a license to practice any of the inventions claimed in the ’458

1 Patent.

2 71. The '458 Patent describes wireless devices with two antennas and the
3 isolation between those antennas.

4 72. As one example, claim 1 of the '458 Patent recites:

5 A wireless handheld or portable device comprising:

6 a ground plane;

7 the ground plane is inscribed in a rectangular area comprising a first side and

8 a second side, a length of the second side being greater than a length

9 of the first side;

10 a first antenna configured to transmit and receive electromagnetic waves

11 corresponding to at least three frequency bands;

12 the at least three frequency bands being used for mobile communication

13 services;

14 a second antenna configured to receive electromagnetic waves corresponding

15 to at least one frequency band;

16 the at least one frequency band being used for wireless connectivity services;

17 the first antenna extends in a direction substantially parallel to the first side;

18 the second antenna extends in a direction substantially parallel to the second

19 side;

20 the first antenna is arranged substantially close to the first side; and

21 the first antenna and the second antenna are located internally within the

22 wireless handheld or portable device.

23 73. Resmed has directly infringed at least claim 1 of the '458 Patent by

24 making, using, selling, offering to sell, and/or importing products that infringe the

25 '458 Patent—including the Resmed AirCurve 11 products and the Resmed

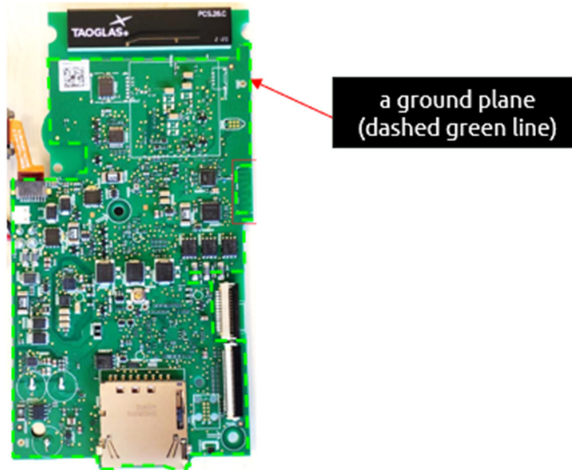
26 AirSense 11 products—which meet every limitation of at least claim 1 of the '458

27 Patent literally or under the doctrine of equivalents, in violation of 35 U.S.C.

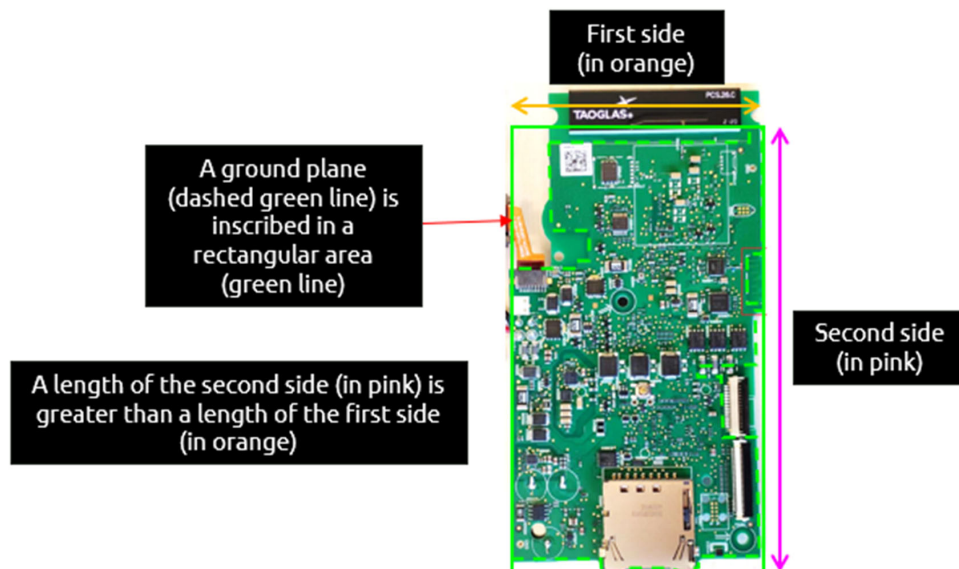
28 § 271(a).

74. As an example, the Resmed AirCurve 11 satisfies all claim limitations of at least claim 1 of the '458 Patent.⁵

a. A wireless handheld or portable device comprising: a ground plane;



b. the ground plane is inscribed in a rectangular area comprising a first side and a second side, a length of the second side being greater than a length of the first side;



⁵ This description is illustrative and is not intended to be an exhaustive or limiting explanation of any manner in which each Infringing Product infringes the '458 Patent.

1 c. a first antenna configured to transmit and receive electromagnetic
2 wave signals in at least three frequency bands; the at least three
3 frequency bands being used for mobile communication services;
4

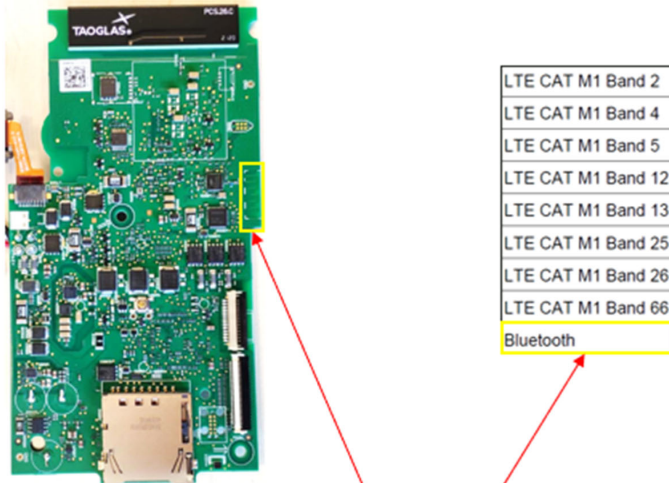
5 A first antenna (in blue) is configured to transmit and receive electromagnetic waves in at
6 least the following frequency bands used for mobile communication services:
LTE 850(B5)/1700(B4)/1900(B2)



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LTE CAT M1 Band 2
LTE CAT M1 Band 4
LTE CAT M1 Band 5
LTE CAT M1 Band 12
LTE CAT M1 Band 13
LTE CAT M1 Band 25
LTE CAT M1 Band 26
LTE CAT M1 Band 66
Bluetooth

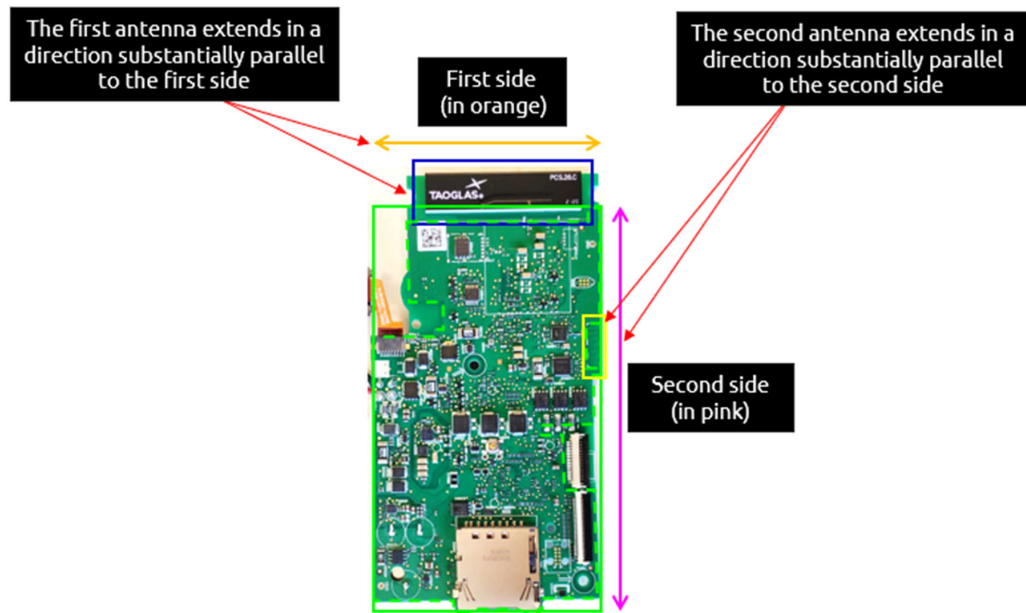
- 1 d. a second antenna configured to receive electromagnetic waves
2 corresponding to at least one frequency band; the at least one
3 frequency band being used for wireless connectivity services;



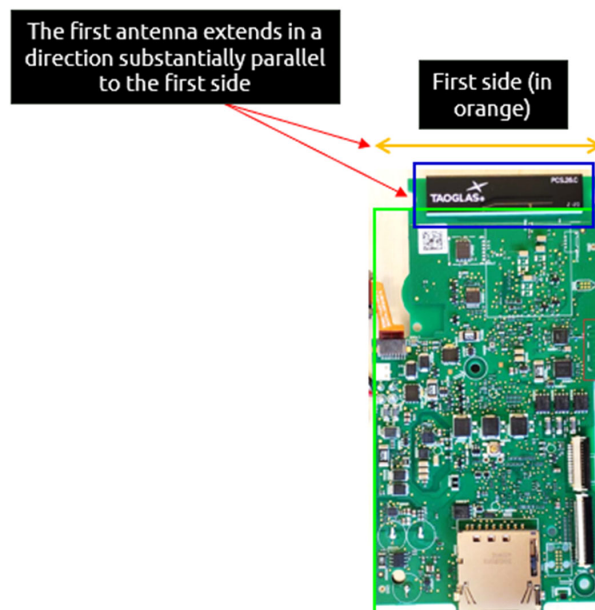
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A second antenna (in yellow) is configured to receive electromagnetic waves corresponding to the Bluetooth frequency band used for wireless connectivity services

- 1 f. the first antenna extends in a direction substantially parallel to the
2 first side; the second antenna extends in a direction substantially
3 parallel to the second side;

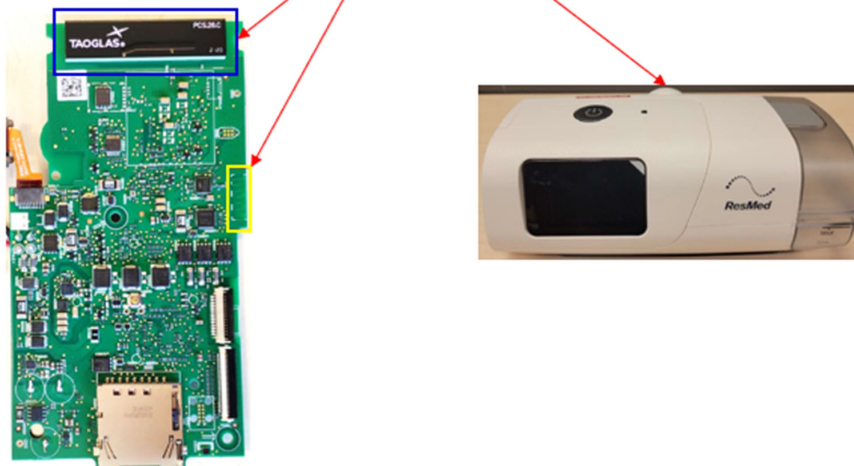


- 16 g. the first antenna is arranged substantially close to the first side; and



1 h. the first antenna and the second antenna are located internally within
2 the wireless handheld or portable device.

3 The first and second antennas are located internally within the
4 ResMed AirCurve 11



14 75. In addition to directly infringing the '458 Patent, on information and
15 belief, Resmed has actively induced others to directly infringe at least claim 1 of the
16 '458 Patent, in violation of 35 U.S.C. § 271(b). Defendant has induced, caused,
17 urged, encouraged, aided, and abetted Defendant's direct and indirect customers,
18 business partners, and/or end users, to make, use, offer for sale, and/or import
19 products infringing at least claim 1 of the '458 Patent. Defendant has done so by
20 acts including but not limited to distributing the Infringing Products, advertising
21 and marketing infringing products, selling infringing products to its customers, and
22 providing training, instructions and technical support directing customers and/or
23 end users to use the infringing products in an infringing manner (available via, e.g.,
24 <https://www.Resmed.com/en-us/?s=aircurve+11>). For example, Resmed advertises
25 on its website that, the Resmed AirSense 11 includes "wireless connectivity."
26 ([https://www.resmed.com/en-us/health-professionals/products/cpap/machines](https://www.resmed.com/en-us/health-professionals/products/cpap/machines/airsense-11-elite/)
27 [airsense-11-elite/](https://www.resmed.com/en-us/health-professionals/products/cpap/machines/airsense-11-elite/)). Such conduct was intended to and actually resulted in direct
28 infringement of the '458 Patent.

76. On information and belief, Defendant knew that its actions, including, but not limited to the Infringing Products, would induce, have induced, and would continue to induce infringement by its customers, clients, business partners, developers, and/or end users, by continuing to sell, support, and instruct them on making, using, or selling the Infringing Products.

77. With knowledge of the '458 Patent, Defendant has willfully, deliberately, and intentionally infringed the '458 Patent.

78. As a direct and proximate result of Defendant's infringement of the '458 Patent, Fractus has suffered damages in an amount to be determined, together with interest and costs determined by the Court.

79. Fractus has complied with the requirements of 35 U.S.C. § 287 with respect to the '458 Patent.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully prays for entry of judgment as follows:

- a) That Defendant has infringed and continues to infringe one or more claims of the Patents-in-Suit;
- b) That Plaintiff recover all damages to which it is entitled under 35 U.S.C. § 284, but in no event less than a reasonable royalty;
- c) That Defendant's conduct was willful and that Plaintiff should therefore recover an enhanced damages award pursuant to 35 U.S.C. § 284;
- d) That this case is exceptional and that Plaintiff shall therefore recover its attorneys' fees and other recoverable expenses, under 35 U.S.C. § 285;
- e) That Plaintiff shall recover from Defendant all pre- and post-judgment interest on the damages award, calculated at the highest interest rates allowed by law;
- f) That Plaintiff, as the prevailing party, shall recover from Defendant all taxable costs of court;
- g) That Defendant be permanently enjoined from further infringement of the

1 Patents-in-Suit; and

2 h) Awarding Plaintiff further relief as the Court deems appropriate.

3
4 Dated: September 2, 2026

Respectfully submitted,

5 /s/ Michael Ng

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26 Telephone: (305) 967-6100

27 Fax: (305) 967-6120

28 Attorneys for Plaintiff *Fractus, S.A.*

DEMAND FOR JURY TRIAL

Pursuant to Federal Rule of Civil Procedure 38(b) and Local Rule 38.1,
Fractus hereby demands a jury trial on all issues triable to a jury.

Dated: September 2, 2026

Respectfully submitted,

/s/ Michael Ng

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