



# Radio Frequency Exposure Evaluation Report

**FOR:**

Respironics Inc.

**Model:**

See Section 3.2

**Marketing Name:**

DreamStation 2 Auto CPAP Advanced

**Product Description:**

CPAP machine with integral Cell modem and BT

**FCC ID:** THO1141623

**IC:** 3234B-1141623

**Per:**

CFR Part Part1 (1.1307 & 1.1310), Part 2 (2.1091),  
FCC KDB 447498 D01 General RF Exposure Guidance v06  
ISED RSS-102 Issue 6

**Report number:** EMC\_PHIL4\_114\_22001\_FCC\_ISED\_RF\_Exposure

**DATE:** 2024-02-15



**CETECOM Inc.**

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

## 1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 6 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

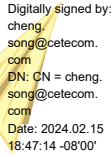
The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

| Company          | Description                                  | Model #         |
|------------------|----------------------------------------------|-----------------|
| Respironics Inc. | CPAP machine with integral Cell modem and BT | See Section 3.2 |

### Report reviewed by: TCB Evaluator

| 2024-02-15 | Compliance | James Donnellan<br>(Senior Technical Project Engineer) |  |
|------------|------------|--------------------------------------------------------|--------------------------------------------------------------------------------------|
| Date       | Section    | Name                                                   | Signature                                                                            |

### Responsible for the Report:

| 2024-02-15 | Compliance | Cheng Song<br>(EMC Engineer) | cheng.<br>song@c<br>etecom.<br>com<br><br>Digitally signed by:<br>cheng.<br>song@cetecom.<br>com<br>DN: CN = cheng.<br>song@cetecom.<br>com<br>Date: 2024.02.15<br>18:47:14 -08'00' |
|------------|------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Date       | Section    | Name                         | Signature                                                                                                                                                                                                                                                                |

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the Test Report

|                                           |                        |
|-------------------------------------------|------------------------|
| <b>Company Name:</b>                      | CETECOM Inc.           |
| <b>Department:</b>                        | Compliance             |
| <b>Street Address:</b>                    | 411 Dixon Landing Road |
| <b>City/Zip Code</b>                      | Milpitas, CA 95035     |
| <b>Country</b>                            | USA                    |
| <b>Telephone:</b>                         | +1 (408) 586 6200      |
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| <b>Senior Technical Project Engineer:</b> | James Donnellan        |
| <b>Responsible Project Leader:</b>        | Sangeetha Sivaraman    |

### 2.2 Identification of the Client / Manufacturer

|                        |                      |
|------------------------|----------------------|
| <b>Client's Name:</b>  | Respironics Inc.     |
| <b>Street Address:</b> | 6501 Living Place    |
| <b>City/Zip Code</b>   | Pittsburgh, PA 15206 |
| <b>Country</b>         | USA                  |

### Identification of the Manufacturer

|                               |                |
|-------------------------------|----------------|
| <b>Manufacturer's Name:</b>   | Same as Client |
| <b>Manufacturers Address:</b> |                |
| <b>City/Zip Code</b>          |                |
| <b>Country</b>                |                |

### 3 Equipment under Assessment

#### 3.1 EUT Specifications

|                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Brand                                                                                              | Respironics Inc.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Model No                                                                                           | See Section 3.2                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| HW Version                                                                                         | 00                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| SW Version                                                                                         | V1.0.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| FCC-ID                                                                                             | THO1141623                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| IC:                                                                                                | 3234B-1141623                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Marketing Name:                                                                                    | DreamStation 2 Auto CPAP Advanced                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Product Description                                                                                | CPAP machine with integral Cell modem and BT                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Radio Information as declared                                                                      | <p><b>Cellular:</b></p> <ul style="list-style-type: none"> <li>• u-blox LARA-R6001D (CAT-1)</li> <li>• FCC ID: XPYUBX21BE01; IC ID: 8595A-UBX21BE01</li> <li>• LTE Bands: 1, 2, 3, 4, 5, 7, 8, 12, 13, 18, 19, 20, 26, 28, 38, 39, 40, 41</li> <li>• UMTS Bands I, II, V, VIII</li> <li>• GSM Bands 850, 900, 1800, 1900</li> </ul> <p><b>Bluetooth:</b></p> <ul style="list-style-type: none"> <li>• Dialog DA14585 SoC</li> <li>• Bluetooth 5.0 Low Energy</li> </ul> |
| Antenna Information as declared                                                                    | Cellular: Flexible Polymer Antenna, 4dBi gain<br>Bluetooth LE: PCB Trace Antenna, 2.81dBi gain                                                                                                                                                                                                                                                                                                                                                                          |
| Power Supply/ Rated Operating Voltage Range                                                        | Vmin: 10.8 VDC / Vnom: 12 VDC / Vmax: 13.2 VDC                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Operating Temperature Range                                                                        | 5 °C to 35 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| EUT Diameter:                                                                                      | n < 60 cm                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Sample Revision                                                                                    | <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Note:</b> Details about the Equipment Under Test (EUT) are provided by the client or applicant. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### 3.2 Model Number

| Model Number | Description                                        | Market |
|--------------|----------------------------------------------------|--------|
| LAX410H15C   | DreamStation 2 CPAP w/ Humid cell/BT               | FCC    |
| LAX420H15C   | DreamStation 2 Advanced CPAP w/ Humid cell/BT      | FCC    |
| LAX520H15C   | DreamStation 2 Advanced Auto CPAP w/ Humid cell/BT | FCC    |
| ARX410H15C   | DreamStation 2 CPAP w/ Humid cell/BT               | FCC    |
| ARX420H15C   | DreamStation 2 Advanced CPAP w/ Humid cell/BT      | FCC    |
| ARX520H15C   | DreamStation 2 Advanced Auto CPAP w/ Humid cell/BT | FCC    |
| BRX410H18C   | DreamStation 2 Auto CPAP (w/ dummytank) cell/BT    | FCC    |
| BRX420H18C   | DreamStation 2 Advanced CPAP w/ Humid cell/BT      | FCC    |
| BRX520H18C   | DreamStation 2 Advanced Auto CPAP w/ Humid cell/BT | FCC    |
| CAX410T12C   | DreamStation 2 Auto CPAP                           | ISED   |
| CAX410H12C   | DreamStation 2 Auto CPAP                           | ISED   |
| CAX510T12C   | DreamStation 2 Auto CPAP                           | ISED   |
| CAX510H12C   | DreamStation 2 Auto CPAP                           | ISED   |
| CAX521H12C   | DreamStation 2 Auto CPAP Advanced                  | ISED   |
| CAX521T12C   | DreamStation 2 Auto CPAP Advanced                  | ISED   |
| CAX521T12C15 | DreamStation 2 Auto CPAP Advanced                  | ISED   |

## 4 RF Exposure Limits and FCC and IC Basic Rules

### 4.1 Routine Environmental Evaluation Categorical Exclusion Limits according to FCC 1.1307(b)(3)(i)(B), and FCC 1.1307(b)(3)(ii)(B)

Single RF sources is exempt if the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold  $P_{th}$  (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive).  $P_{th}$  is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

$d$  = the separation distance (cm);

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

## 4.2 Field reference level (FRL) exposure exemption limits according to RSS-102 Issue 6, section 6.6

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the EIRP was derived.

## 5 Evaluations

### 5.1 Analysis of RF Exposure

#### Duty Cycle

The table below illustrates the highest possible duty cycle for each type of radio during operation.

| Mode         | Duty Cycle | Duty Cycle Correction [dBm] |
|--------------|------------|-----------------------------|
| LTE          | 1:1        | 0                           |
| GSM (1 Slot) | 1:8        | -9.031                      |

#### FCC

| Tech-Band | Freq-Low[GHz] | Pwr[dBm] | Power Corrected by Duty Cycle [dBm] | Power[W] | Ant-G[dBi] | EIRP[W] | ERP[mW] | FCC 2.1091(c)(1)<br>Pth[mW] = ERP <sub>20cm</sub> |
|-----------|---------------|----------|-------------------------------------|----------|------------|---------|---------|---------------------------------------------------|
| UMTS II   | 1.8524        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 3060.00                                           |
| UMTS V    | 0.8264        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 1685.86                                           |
| LTE 2     | 1.8550        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 3060.00                                           |
| LTE 4     | 1.7150        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 3060.00                                           |
| LTE 5     | 0.8290        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 1691.16                                           |
| LTE 7     | 2.5050        | 23.50    | 23.50                               | 0.224    | 4.00       | 0.562   | 342.768 | 3060.00                                           |
| LTE 12    | 0.7040        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 1436.16                                           |
| LTE 13    | 0.7795        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 1590.18                                           |
| LTE 26    | 0.8190        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 1670.76                                           |
| LTE 38    | 2.5750        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 3060.00                                           |
| LTE 41    | 2.5010        | 24.00    | 24.00                               | 0.251    | 4.00       | 0.631   | 384.592 | 3060.00                                           |
| GSM 850   | 0.8242        | 33.50    | 24.47                               | 0.280    | 4.00       | 0.703   | 428.450 | 1681.37                                           |
| GSM 1900  | 1.8502        | 30.50    | 21.47                               | 0.140    | 4.00       | 0.352   | 214.734 | 3060.00                                           |
| Tech-Band | Freq-Low[GHz] | Pwr[dBm] | Power Corrected by Duty Cycle [dBm] | Power[W] | Ant-G[dBi] | EIRP[W] | ERP[mW] | FCC 2.1091(c)(1)<br>Pth[mW] = ERP <sub>20cm</sub> |
| BT LE     | 2.4020        | 9.29     | 9.29                                | 0.008    | 2.81       | 0.016   | 9.895   | 3060.00                                           |

The worst simultaneous transmissions is LTE B12 and BTLE:

TER (Total Exposure Ratio) = 0.27

RF exposure exemption applicable

## IC

| Tech-Band | Freq-Low [MHZ] | Pwr <sub>[dBm]</sub> | Power Corrected by Duty Cycle [dBm] | Power <sub>[W]</sub> | Ant-G [dBi] | EIRP <sub>[W]</sub> | Exemption limit for Routine Evaluation |
|-----------|----------------|----------------------|-------------------------------------|----------------------|-------------|---------------------|----------------------------------------|
| UMTS II   | 1852.4         | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 2.2                                    |
| UMTS V    | 826.4          | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 1.29                                   |
| LTE 2     | 1855.0         | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 2.24                                   |
| LTE 4     | 1715.0         | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 2.13                                   |
| LTE 5     | 829.0          | 24.00                | 23.50                               | 0.251                | 4.00        | 0.631               | 1.29                                   |
| LTE 7     | 2505.0         | 23.50                | 23.50                               | 0.224                | 4.00        | 0.562               | 2.75                                   |
| LTE 12    | 704.0          | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 1.16                                   |
| LTE 13    | 779.5          | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 1.24                                   |
| LTE 26    | 819.0          | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 1.28                                   |
| LTE 38    | 2575.0         | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 2.81                                   |
| LTE 41    | 2501.0         | 24.00                | 24.00                               | 0.251                | 4.00        | 0.631               | 2.75                                   |
| GSM 850   | 824.2          | 33.50                | 24.47                               | 0.280                | 4.00        | 0.703               | 1.29                                   |
| GSM 1900  | 1850.2         | 30.50                | 21.47                               | 0.140                | 4.00        | 0.352               | 2.24                                   |
| Tech-Band | Freq-Low [MHZ] | Pwr <sub>[dBm]</sub> | Power Corrected by Duty Cycle [dBm] | Power <sub>[W]</sub> | Ant-G [dBi] | EIRP <sub>[W]</sub> | Exemption limit for Routine Evaluation |
| BT LE     | 2402.0         | 9.294                | 9.294                               | 0.008                | 2.81        | 0.016               | 2.68                                   |

The worst simultaneous transmissions is LTE B12 and BTLE:  
 TER (Total Exposure Ratio) = 0.55  
 RF exposure exemption applicable

## 6 Revision History

| Date       | Report Name                              | Changes to report | Prepared by |
|------------|------------------------------------------|-------------------|-------------|
| 2024-02-15 | EMC_PHIL4_114_22001_FCC_ISED_RF_Exposure | Initial Release   | Cheng Song  |

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