



# **Radio Frequency Exposure Evaluation Report**

**For**

**Philips Respironics Inc.**

**Philips Dream Station**

**Continuous Airway Pressure Device**

**with Bluetooth radio module FCC ID: THO1116426, IC ID: 3234B-1116426, Model: 1116426**

**in combination with**

**Dream Station Cellular Modem (CDMA)**

**with Gemalto CDMA module FCC ID: QIPPCS3**

**or**

**Dream Station Wi-Fi Accessory**

**with AzureWave Technologies Wi-Fi module FCC ID: TLZ-CU288**

**or**

**Dream Station 2G/3G Accessory**

**with Cinterion EHS5-US 2G/3G FCC ID: QIPEHS5-US**

## **Applied Rules and Standards**

**CFR Part Part 1 (1.1307 &1.1310), Part 2 (2.1091),  
FCC KDB 447498 D01 General RF Exposure Guidance v06**

**Industry Canada RSS-102, Issue 5 of March 2015**

**Report number: EMC\_PHIL4-007-14001\_MPE**

**DATE: 09-01-2017**

## 1 Administrative Data

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

<b>Company Name:</b>	CETECOM Inc.
<b>Department:</b>	Compliance
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<b>Compliance Manager:</b>	Peter Nevermann
<b>Responsible Project Leader:</b>	Kris Lazarov

### 1.2 Identification of the Client / Manufacturer

<b>Manufacturer's Name:</b>	Respironics Inc. (Philips Respironics)
<b>Manufacturers Address:</b>	1001 Murry Ridge Lane
<b>City/Zip Code</b>	Murrysville, PA 15668
<b>Country</b>	USA
<b>Contact Person:</b>	Jonathan Kurtz
<b>Phone No.</b>	724-387-7578
<b>e-mail:</b>	Jonathan.Kurtz@Philips.com

## 2 Equipment under Assessment

<b>Marketing Name / Model No:</b>	CPAP Device: 700x110 (US) & 700x120 (Canada) WLAN Radio: 100700W (US) & 100710W (Canada)
<b>HW Version :</b>	00
<b>FCC-ID :</b>	THO1116426
<b>IC-ID:</b>	3234B-1116426 / M/N: 1116426
<b>Product Description:</b>	Bluetooth modular radio transmitter (BDR/EDR and LE) incorporated in the Continuous Airway Pressure Device (Philips Dream Station); <b>Note: subject to this RF exposure evaluation report is the co-location of the Bluetooth modular radio (BT BTR/EDR or LE mode) located on the mother board of the host device (the Philips Dream Station) with either the Wi-Fi modular transmitter (FCC ID: TLZ-CU288) as incorporated in the Dream Station Wi-Fi Accessory, with the CDMA modular transmitter (FCC ID: QIPPCS3) as incorporated in the Dream Station Cellular Modem Accessory or with the 2G/3G modular transmitter (FCC ID: QIPEHS5-US)</b>
<b>Frequency Range / number of channels:</b>	<u>Bluetooth:</u> Nominal band: 2400 – 2483.5; Center to center: LE: 2402 (Ch.0) – 2480 (Ch.39), 40 channels Center to center: BDR/EDR: 2402 (Ch.0) – 2480 (Ch.78), 79 channels <u>WLAN 802.11b/g/n:</u> Nominal band: 2400 – 2483.5; Ch. 1, 2412 MHz to Ch. 11, 2462 MHz, 11 channels. <u>CDMA:</u> 850 MHz: 825.03-848.97; 799 channels 1900 MHz: 1850.05-1909.95; 1199 channels
<b>Type(s) of Modulation:</b>	Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK Wi-Fi: IEEE 802.11 b/g/n: CCK, BPSK, QPSK, 16QAM, 64QAM CDMA
<b>Antenna Information as declared:</b>	Bluetooth: internal, 1.5 dBi Wi-Fi: internal, 3.17 dBi CDMA: internal, 2 dBi GSM/UMTS: internal, 0 dBi 850 MHz, 2 dBi 1900 MHz
<b>Max. Output Powers:</b>	Bluetooth: 4.1 dBm, avg, eirp, rated Wi-Fi: 18.53 dBm, avg, conducted, measured CDMA: 25dBm, avg, conducted, measured GSM/UMTS: 0.26 W UMTS 850, 0.24 W UMTS 1900
<b>Co-located Transmitters/ Antennas?</b>	<input checked="" type="checkbox"/> Yes (Bluetooth and WiFi or Bluetooth and CDMA or Bluetooth and GSM/UMTS) <input type="checkbox"/> No
<b>Device Category:</b>	<input checked="" type="checkbox"/> Fixed Installation <input checked="" type="checkbox"/> Mobile (mark mobile if both possible) <input type="checkbox"/> Portable <input type="checkbox"/> mixed Mobile and Portable
<b>Exposure Category:</b>	<input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled
<b>Test Sample Status:</b>	Production

### 3 Assessment

This RF Exposure evaluation report provides information about 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 5 under given 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.

Company	Description	Model #
Philips Respironics Inc.	Continuous Airway Pressure Device with Bluetooth modular radio (BDR/EDR)	700x110 (US) 700x120 (Canada)
Philips Respironics Inc.	Cellular Modem Accessory with CDMA modular radio	100600C (US) 100610C (Canada)
Philips Respironics Inc.	Wi-Fi Accessory with Wi-Fi modular radio	100700W (US) 100710W (Canada)
Philips Respironics Inc.	2G/3G Accessory with GSM and UMTS radio	200601C, 200602C

#### Responsible for Testing Laboratory:

2017-09-01      Compliance      Dr. Peter Nevermann  
(Director RC&E)

Date	Section	Name	Signature
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#### Responsible for the Report:

2017-09-01      Compliance      Kris Lasarov  
(Sr. EMC Engineer)

Date	Section	Name	Signature
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#### 4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

##### 4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
300 – 1500	$f \text{ (MHz)} / 1500$	30
1500 – 100.000	1.0	30

IC

300 – 6000	$0.02619 \times f \text{ (MHz)}^{0.6834}$	6
1500 – 100.000	1.0	30

##### 4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.109(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm;  
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm;

IC

300MHz < = operating frequency < 6 GHz: excluded if EIRP <  $0.0131 \times f \text{ (MHz)}^{0.6834}$

##### 4.3 EMC Output Power Limits (ERP/EIRP) acc. to FCC part 22/24 / IC RSS-132, RSS-133 (to be additionally taken into account for maximum antenna gain considerations)

part 22: 7W ERP / 38.5dBm (IC: 11.5W / 40.6dBm EIRP)

part 24: 2W EIRP / 33.0dBm

Per KDB 447498 D01 FCC allows calculative estimation of RF exposure for mobile applications when routine environmental evaluation categorical exclusion applies and also for fixed applications. When categorical exclusion cannot be claimed for mobile applications MPE measurement is required for TCB approval.

RSS-102 of Industry Canada does generally not require RF exposure evaluation for fixed or mobile applications which stay below the given exclusion limits.

#### **4.4 RF Exposure Estimation (MPE Estimation)**

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of it's radiating structures from the body of persons according to it's use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm<sup>2</sup> or W/m<sup>2</sup>)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

## 5 Evaluations

### 5.1 Routine Environmental Evaluation Applicability

Based on the maximum output power test results from the associate emc report provided with this filing or on the declared maximum tune-up tolerance and documented peak antenna gain values.

Transmission Mode	Max conducted output power	duty cycle	Time averaged conducted output power	Gain	EIRP time averaged	FCC / IC Limits for Routine Environmental Evaluation Applicability, EIRP	excluded?
	dBm	%	dBm	dBi	dBm	dBm	
Bluetooth (LE)		<100			4.1	36.9 / 34.3	yes
CDMA 850		100			27.0	33.9 / 31.1	yes
CDMA 1900		100			27.0	36.9 / 33.5	yes
WLAN 2.4 GHz		<100			21.7	36.9 / 34.3	yes
GPRS class 12 850	32.23	50	29.23	0	29.23	33.9 / 31.1	yes
GPRS class 12 1900	30.41	50	27.41	2	29.41	36.9 / 33.5	yes
UMTS 850	24.15	100	24.15	0	24.15	33.9 / 31.1	yes
EGPRS class 12 850	30.45	50	27.45	0	27.45	33.9 / 31.1	yes
EGPRS class 12 1900	29.29	50	26.29	2	28.29	36.9 / 33.5	yes
UMTS 1900	23.80	100	23.80	2	25.80	36.9 / 33.5	yes

**Result: The co-located transmitters under consideration are all categorically excluded from stand-alone Routine Environmental Evaluation.**

## **5.2 Compliance with MPE (Power Density) limits**

### **Limits:**

**S<sub>max</sub> @ 824MHz = 0.55mW/cm<sup>2</sup>** (824MHz is worst case);

**S<sub>max</sub> @ 1850MHz and @ 2400MHz = 1.0mW/cm<sup>2</sup>:**

The highest power density is resulting from the formula:  $S = \text{EIRP} / 4 * \pi * r^2$ ;

The power density is calculated for the minimum distance  $r = 20\text{cm}$ ;

Highest source base time averaged EIRP with Bluetooth: 4.1 dBm;

Resulting maximum power density at 2400MHz: **S(2400MHz) = 0.0005 mW/cm<sup>2</sup>**

Highest source base time averaged EIRP with WLAN 2.4GHz: 21.7 dBm;

Resulting maximum power density at 2400MHz: **S(2400MHz) = 0.03 mW/cm<sup>2</sup>**

Highest source base time averaged EIRP with CDMA 850 and 1900 MHz: 27.0 dBm;

Resulting maximum power density at 850MHz: **S(850MHz) = 0.10 mW/cm<sup>2</sup>**



### 5.3 Simultaneous Transmission considerations (per KDB 447498 D01)

Possible simultaneous transmissions: Bluetooth and Wi-Fi or Bluetooth and CDMA.

Power density to the limit ratio for the Bluetooth transmitter:  $0.0005 \text{ mW/cm}^2 / 1.0 \text{ mW/cm}^2 = 0.0005$ ;

Power density to the limit ratio for the WLAN transmitter:  $0.03 \text{ mW/cm}^2 / 1.0 \text{ mW/cm}^2 = 0.03$ ;

Highest power density to the limit ratio for the CDMA transmitter:  $0.1 \text{ mW/cm}^2 / 0.55 \text{ mW/cm}^2 = 0.18$ ;

**$\Sigma$  of Power Density (MPE) ratios Bluetooth/Wi-Fi co-location =  $0.0005 + 0.03 = 0.0305 < 1$**

**$\Sigma$  of Power Density (MPE) ratios Bluetooth/CDMA co-location =  $0.0005 + 0.18 = 0.1805 < 1$**

Result for 2G/3G modem accessory:

Band	Time average EIRP in W	Power density at 20cm in $\text{W/m}^2$	worst case limit IC in $\text{W/m}^2$	percentage of limit used when co- transmitting	Verdict
BT		0.005		0.68	Pass
GPRS class 12 850	0.84	1.67	2.58	0.65	Pass
GPRS class 12 1900	0.87	1.74	2.58	0.68	Pass
UMTS 850	0.26	0.52	2.58	0.21	Pass
EGPRS class 12 850	0.56	1.11	4.48	0.25	Pass
EGPRS class 12 1900	0.68	1.34	4.48	0.31	Pass
UMTS 1900	0.38	0.76	4.48	0.17	Pass

**Result: The equipment fulfills the related MPE limits for the minimum distance between the antenna and the human body of 20cm for all possible simultaneous transmission combinations.**

#### **5.4 Maximum allowed Antenna Gain – Gmax**

not applicable since fixed internal antennae is used in the product (the Philips Dream Station Wi-Fi as well as CDMA Accessory).

## 6 Revision History

Date	Report Name	Changes to report	Report prepared by
2015-06-17	EMC_PHIL4-007-14001_MPE	First Version	Douglas Antioco
2017-09-01	EMC_PHIL4-007-14001_MPE_Rev1	Add the evaluation for 2G/3G accessory based on EHS5-US	Kris Lazarov