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SAR Test Exclusion Exhibit For:

**Blustream In Instrument Sensor**

Prepared by:

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## **Product Description:**

The sensor uses patent pending intelligent technology to provide a constant stream of temperature and humidity data to an application on your smart phone to warn of hazardous conditions and prevent costly repairs, lost value of your valuable object. When the sensor detects dangerous conditions within its installed environment, push notifications are sent to your device, allowing you to take corrective action before damage occurs to your object.

## **Associated Antenna(s):**

The antenna associated with the EUT is a trace antenna. The antenna has a peak gain of 2.27 dBi.

## **Statement of compliance:**

The Blustream In Instrument Sensor was evaluated against the SAR test exclusion threshold listed in KDB 447498 D01 General RF Exposure Guidance v05r02 for 1-g body at a distance of 5mm, as well as, RSS-102 Issue 5 for a body-supported device at a distance of 5mm.

## Data and Calculations:

The EUT was evaluated against the SAR test exclusion threshold listed in KDB 447498 D01 General RF Exposure Guidance v05r02, section 4.3 (1). The EUT was found to be compliant with the SAR exclusion threshold, 1-g extremity, for 100MHz to 6000MHz.

Frequency = 2.440 GHz

ERP (dBm) = 1.1 dBm + 1 dBm (tune-up tolerance) = 2.1 dBm

ERP (mW) = 1.6 milliwatt

Minimum separation distance  $\leq$  5mm

$$[1.6\text{mW}/5\text{mm}] * [\sqrt{2.44\text{GHz}}] = 0.5$$

**0.5  $\leq$  3.0**

When evaluated against RSS 102 issue 5 section 2.5, table 1:

Frequency = 2.480 GHz

EIRP (dBm) = 1.1 dBm + 2.3 dBi + 1 dBm (tune-up tolerance) = 4.4 dBm

EIRP (mW) = 2.75 mW

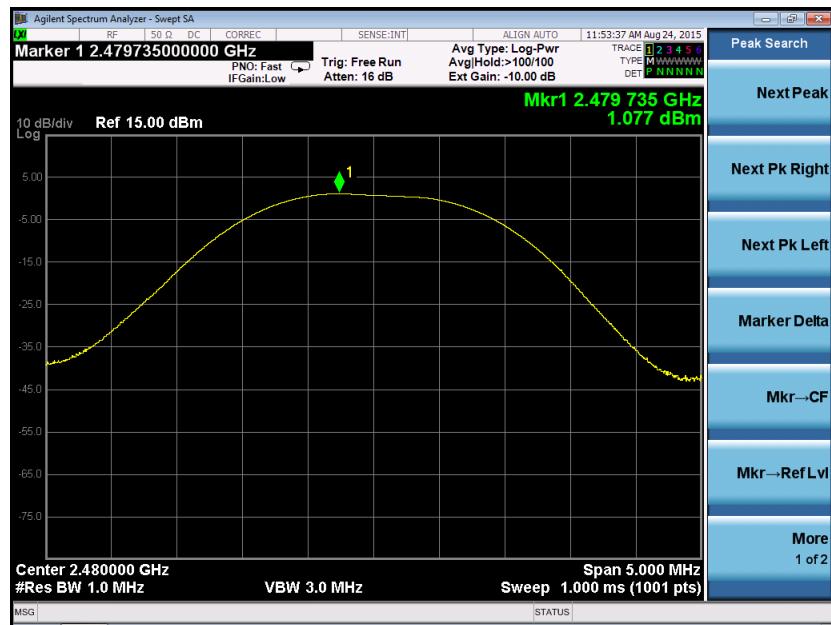
Interpolating between 2450 and 3500 MHz for 2480 MHz at separation distance of 5 mm yields exemption limit of 3.94 mW

**2.75 mW < 3.94 mW**

**Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance<sup>4,5</sup>**

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of $\leq$ 5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
$\leq$ 300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

## Screen Capture of maximum output power



Channel	Frequency (MHz)	Peak Conducted output Power (dBm)
0	2402	-1.8
19	2440	-0.3
39	2480	1.1



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### **MPE Calculation:**

The following MPE calculations are based on a measured conducted RF power of +1.1 dBm as presented to the antenna. The peak gain of this antenna 2.27 dBi.

#### **Prediction of MPE limit at a given distance**

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

where: S = power density

P = power input to the antenna

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

Maximum peak output power at antenna input terminal: 2.10 (dBm)

Maximum peak output power at antenna input terminal: 1.622 (mW)

Antenna gain(typical): 2.27 (dBi)

Maximum antenna gain: 1.687 (numeric)

Prediction distance: 20 (cm)

Prediction frequency: 2480 (MHz)

MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm<sup>2</sup>)

Power density at prediction frequency: 0.000544 (mW/cm<sup>2</sup>)

Maximum allowable antenna gain: 34.9 (dBi)

Margin of Compliance at 20 cm = 32.6 dB