

**47 C.F.R. Part 1, Subpart I, Section 1.1310**

**47 C.F.R. Part 2, Subpart J, Section 2.1091**

**47 C.F.R. Part 2, Subpart J, Section 2.1093**

**447498 D04 Interim General RF Exposure Guidance v01**

**Maximum Permissible Exposure Calculations**

**For: Pura Scents**

**FCC ID: 2BA2Z-PURAMINIV1**

EUT Device Category = General Population/Uncontrolled Exposure

EUT consists of the following:

**Bluetooth LE transceiver operating from 2402 MHz to 2480 MHz (Certified Module)**

**1 RFID/NFC transmitter operating at 13.56 MHz**

The distance used for separation in all cases is 20 mm even though in real use the separation should be much greater. If compliant at the worst possible case of 20 mm, the device is assumed to comply at greater separation distances.

MPE Summary:

According subpart 1.1307 (b)(1) and 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

<b>Limits for General Population/Uncontrolled Exposure</b>						
<b>Frequency (MHz)</b>	<b>Range</b>	<b>Electric Strength (V/m)</b>	<b>Field Magnetic Strength (A/m)</b>	<b>Field</b>	<b>Power Density (mW/cm<sup>2</sup>)</b>	<b>Averaging Time (Minutes)</b>
0.3-1.34	614		1.63		*(100)	30
1.34-30		824/f	2.19/f		*(180/f <sup>2</sup> )	30
30-300	27.5		0.073		0.2	30
300-1500	/		/		f/1500	30
1500-100,000	/		/		1.0	30

f = frequency in MHz;

\* = Plane-wave equivalent power density

**Calculated Formulary:**

Predication of MPE limit at a given distance:

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

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

PG = EIRP

MPE and Limit are calculated as follows:

**BLE Module, Highest Power Channel**

2.402 GHz to 2.48 GHz Frequency Band							
BLE Transceiver							
Freq	Conducted Output Power (dBm)	Max Antenna Gain (dBi)	Max EIRP (dBm)	Max EIRP (mW)	Power Density at 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Margin (mW)
2480	7.0	3.4	10.4	10.96	0.218	1.000	0.782

**Result:** The device meets FCC MPE limit at 20 cm for General Population/Uncontrolled Exposure as specified in 47 CFR §1.1310 and §2.1091

**NFC Radio**

Per § 1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions.

NFC Maximum EIRP = 0.000000100 W (at frequency = 13.56MHz) < 1mW

**Result:** Exempt RF Device

**Multiple Transmitter Ratio Test:**

FCC Rule Part 1.1307(b)(3)(ii):(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source(separation is not required).(B) 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.

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

Freq (MHz)	Distance	EIRP (dBm)	ERP (dBm)	ERP (mW)	Limit (mW)	Ratio
2480	20 cm	10.4	8.25	6.7	768	0.00872
13.56	20 cm	-39.73	-41.88	0.00010	1.0	0.00010

BLE Ratio + NFC Ratio = 0.00882 < 1, therefore **PASS**