

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 FCC ID: O9U-B-DS-PRO

EUT Device Category = General Population/Uncontrolled Exposure
 EUT consists of one ISM band radio transmitting, operating over a range of: **2402 MHz to 2480 MHz**
 And one NFC radio operating at **13.56 MHz**

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

Limits for General Population/Uncontrolled Exposure					
Frequency Range (MHz)	Electric Strength (V/m)	Field Magnetic Strength (A/m)	Field Power Density (mW/cm ²)	Averaging Time (Minutes)	
0.3-1.34	614	1.63	*(100)	30	
1.34-30	824/f	2.19/f	*(180/f ²)	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/cm²)

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

PG = EIRP

MPE and Limit are calculated for this device as follows:

2.4 GHz Frequency Band								
Freq	Output Power (dBm)	Tune-up Tolerance (dB)	Max Antenna Gain (dBi)	Max EIRP (dBm)	Max EIRP (mW)	Power Density at 20 cm (mW/cm ²)	Limit (mW)	Margin (mW)
BLE								
2402	4.8	0.0	-1.0	3.8	2.4	0.0005	1.000	0.9995
2440	4.9	0.0	-1.0	3.9	2.5	0.0005	1.000	0.9995
2480	4.8	0.0	-1.0	3.8	2.5	0.0005	1.000	0.9995

Result: The device meets FCC MPE limit at 20 cm for General Population/Uncontrolled Exposure as specified in 47 CRF §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 = 0.00068726 mW (at frequency = 13.56MHz) < 1mW

Result: Exempt RF Device

For Simultaneous transmissions, the combined calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

$$=S_{BLE}/S_{BLE_LIMIT} + S_{NFC}/S_{NFC_LIMIT}$$

$$=0.0005+0.00068726$$

$$=0.00118726$$

$$< 1.0$$

Result: Simultaneous transmit meets the MPE exemption at 20cm