

Maximum Public Exposure to RF (MPE) CFR 15.247 (i), CFR 1.1310 (e)

The maximum exposure level to the public from the RF power of the EUT shall not exceed a power density S as per the respective limits at a distance of 20 cm from the EUT.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

MPE for 902 MHz – 928 MHz

$$\text{Limit} = f / 1500 \text{ mW/cm}^2 = 915/1500 = 0.61 \text{ mW/cm}^2$$

$$\text{Peak Power (dBm)} = 21.71$$

$$\text{Peak Power (watts)} = 0.148$$

$$\text{Gain of transmit Antenna (dBi)} = 5.1 = 3.24 \text{ (numeric)}$$

$$d = \text{Distance} = 20 \text{ cm} = 0.2 \text{ m}$$

$$\begin{aligned} S &= (PG / 4\pi d^2) = \text{EIRP} / 4A = 0.148(3.24) / 4\pi * 0.2 * 0.2 \\ &= 0.4795 / 0.5030 = 0.9533 \text{ W/m}^2 \\ &= (0.9533 \text{ W/m}^2) (1\text{m}^2/\text{W}) (0.1 \text{ mW/cm}^2) \\ &= 0.09533 \text{ mW/cm}^2 \end{aligned}$$

which is << less than 0.6100 mW/cm²

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Model:

FCC Part 15 Certification/ RSS 247
P2SMRXV4
4171B-MRXV4
22-0237
August 30, 2022
MRX920v4

MPE for 2.4 GHz Bluetooth

Limit = 1.0 mW/cm²

Peak Power (dBm) = 8.00 (BT FCC ID: SQGBL653U)

Peak Power (watts) = 0.006 W

Gain of transmit Antenna (dBi) = +2.0 = 1.58 (numeric)

d = Distance = 20 cm = 0.2 m

$$\begin{aligned} S &= (PG / 4\pi d^2) = EIRP / 4A = 0.006 (1.580) / 4 * \pi * 0.2 * 0.2 \\ &= 0.009 / 0.5030 = 0.0188 \text{ W/m}^2 \\ &= (0.0188 \text{ W/m}^2) (1 \text{ m}^2/\text{W}) (0.1 \text{ mW/cm}^2) \\ &= 0.00188 \text{ mW/cm}^2 \end{aligned}$$

which is << less than 1.0 mW/cm²

Simultaneous MPE (900 MHz band +2.4 GHz band) Calculation:

Total MPE (%) = [(900 MHz MPE result/limit (f/1500))*100] + [(2.4 GHz MPE result/limit (1.0))*100] << 100%

$$= [(0.0953/0.61) * 100] + [(0.00188/1.0) * 100] = 15.81\% << 100\%$$

Calculation above shows device complies with the MPE requirement at distance of 20 cm.

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CANADA RSS-102, 2.5.2 Compliance:

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 $1.31 \times 10^{-2} f^{0.6834}$ in Watts (adjusted for tune-up tolerance where applicable), where f = frequency in MHz.

For 902-928MHz band

$$1.31 * 10^{-2} * 915^{0.6834} = 1.39 \text{ W}$$

EUT max EIRP = 21.71 dBm + 2.95 dBd (5.1 dBi-2.15) = 24.66 dBm or 0.292 Watts << 1.39 Watts

For 2.4 GHz band

$$1.31 * 10^{-2} * 2440^{0.6834} = 2.71 \text{ W}$$

EUT max EIRP = 8.00 dBm + 2.0 dBi = 10.0 dBm or 0.010 Watts << 2.71 Watts

Simultaneous Evaluation percentage=

$[\text{Max EIRP (BT)} / \text{Limit in Watts} * 100] + [\text{Max EIRP (900 MHz)} / \text{Limit in Watts} * 100] <<< 100\%$

$$[(0.010/2.71) * 100] + [(0.292/1.39) * 100] = 21.38 \% << 100 \%$$