

FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 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

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Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	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

Result

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)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

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

For simultaneously transmit system, the calculated power density should comply with:

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

Mode	Frequency (MHz)	Antenna Gain		Max Tune Up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
915M Radio	902.5-927.5	6.0	3.98	15.0	31.62	20	0.025	0.602
GSM850	824-849	5.0	3.16	26.0	398.11	20	0.250	0.55
PCS1900	1850-1910	5.0	3.16	23.0	199.53	20	0.125	1.0
WCDMA Band 2	1850-1910	5.0	3.16	25.0	316.23	20	0.199	1.0
WCDMA Band 4	1710-1755	5.0	3.16	25.0	316.23	20	0.199	1.0
WCDMA Band 5	824-849	5.0	3.16	25.0	316.23	20	0.199	0.55
LTE Band 2	1850-1910	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 4	1710-1755	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 5	824-849	5.0	3.16	25.0	316.23	20	0.199	0.55
LTE Band 7	2500-2570	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 12	699-716	5.0	3.16	25.0	316.23	20	0.199	0.466
LTE Band 13	777-787	5.0	3.16	25.0	316.23	20	0.199	0.518
LTE Band 25	1850-1915	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 26	814-824&824-849	5.0	3.16	25.0	316.23	20	0.199	0.543
LTE Band 38	2570-2620	5.0	3.16	25.0	316.23	20	0.199	1.0
LTE Band 41	2496-2690	5.0	3.16	25.0	316.23	20	0.199	1.0

- Note: 1. The tune up conducted power was declared by the applicant
2. The Sub-GHz Radio function can transmit at the same time with the GSM/WCDMA/LTE.
3. Please refer to the MPE report of the FCC ID: XMR201903EG25G for the GSM/WCDMA/LTE output power.

So the worst simultaneous transmitting consideration:

$$\text{The ratio} = \text{MPE}_{\text{Sub-GHz Radio}} / \text{limit} + \text{MPE}_{\text{GSM850}} / \text{limit} = 0.025/0.602 + 0.250/0.55 \\ = 0.496 < 1.0$$

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Pass