

RF Exposure Considerations for FCC ID: 2BDUMTHEBOX

The calculation of the MPE is as following:

Prediction of MPE limit at a prediction distance:

$$S = \frac{P.G}{4.\pi.R^2} = \frac{E.I.R.P}{4.\pi.R^2}$$

S: Power density (mW/cm²)

P: Peak output power at antenna terminal (mW)

G: Numerical Antenna gain

R: Distance of radiation to antenna (cm)

MPE calculation

Frequency (MHz)	Maximum E.I.R.P. (mW) (1)	R (cm)	Power Density S (mW/cm ²)	MPE limit (mW/cm ²)	% of limit	Limit (%)	Verdict
824.2-848.8 (GSM850) (2)	812.8	20	0.1617	0.566	28.57	100%	Below MPE limit for uncontrolled exposure
2402-2480 (BLE)	1.78	20	0.00035	1	0.035	100%	
Simultaneous transmissions				SUM =	28.60	100%	

(1): Power value is taken from EIRP (Conducted power + antenna gain)

(2): Worst case MPE for GSM / NB-IOT. See calculation below:

Note: Only BLE and GSM / NB-IOT can transmit simultaneously.

	Max conducted power	Antenna Gain	Max EIRP	Max EIRP	S	MPE	% of limit
	dBm	dBi	dBm	mW	(mW/cm ² @20cm)	(mW/cm ²)	
GSM850	26	3.1	29.1	812.8	0.1617	0.566	28.571
GSM1900	23	3.1	26.1	407.4	0.0810	1.000	8.105
NB-IOT / Band 2	22	3.1	25.1	323.6	0.0644	1.000	6.438
NB-IOT / Band 4	22	3.1	25.1	323.6	0.0644	1.000	6.438
NB-IOT / Band 5	22	3.1	25.1	323.6	0.0644	0.566	11.374
NB-IOT / Band 12	22	3.1	25.1	323.6	0.0644	0.477	13.497
NB-IOT / Band 13	22	3.1	25.1	323.6	0.0644	0.525	12.263
NB-IOT / Band 25	22	3.1	25.1	323.6	0.0644	1.000	6.438
NB-IOT / Band 26	22	3.1	25.1	323.6	0.0644	0.566	11.374
NB-IOT / Band 66	22	3.1	25.1	323.6	0.0644	1.000	6.438
NB-IOT / Band 71	22	3.1	25.1	323.6	0.0644	0.465	13.845

Conclusion: Therefore, the device complies with FCC's RF radiation exposure limits for general population for a mobile device.

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