

Prediction of MPE at a given distance

1. Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(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

2. Test Procedure

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

3. Result

Band		Burst-Averaged Output Power (dBm)	Division Factors (dB)	Frame-Averaged Output Power (dBm)
GSM 850	1Txslot	33.98	-9.03	24.95
	2Txslot	30.78	-6.02	24.76
	3Txslot	27.96	-4.26	23.70
	4Txslot	25.73	-3.01	22.72
PCS 1900	1Txslot	32.96	-9.03	23.93
	2Txslot	30.74	-6.02	24.72
	3Txslot	27.97	-4.26	23.71
	4Txslot	25.98	-3.01	22.97

Note:
 Division Factors
 To average the power, the division factor is as follows:
 1Txslot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) =>-9.03 dB
 2Txslots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02 dB
 3Txslots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26 dB
 4Txslots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01 dB

Worse case is as below:

Mode	Frequency (MHz)	Prediction distance (cm)	RF output power		MPE (mW/cm ²)	Limit (mW/cm ²)	MPE Test Exclusion
			dBm	mW			
EDR	2402	20	1.13	1.2972	0.00034	1	Yes
BLE	2440	20	6.38	4.3451	0.00111	1	Yes
2.4GWIFI	2462	20	13.56	22.6986	0.00593	1	Yes
5GWIFI U-NII-1	5230	20	13.78	23.8781	0.00582	1	Yes
5GWIFI U-NII-2A	5320	20	13.82	24.0991	0.00726	1	Yes
5GWIFI U-NII-2C	5670	20	13.67	23.2809	0.00847	1	Yes
5GWIFI U-NII-3	5785	20	13.11	20.4644	0.00673	1	Yes
GSM850	824.2	20	24.95	312.6079	0.04963	0.55	Yes
PCS1900	1850.2	20	23.93	247.1724	0.04917	1	Yes
WCDMA B5	826.4	20	24.95	312.6079	0.04963	0.55	Yes

WCDMA B2	1880.0	20	24.98	314.7748	0.08293	1	Yes
WCDMA B4	1752.6	20	24.46	279.2544	0.05556	1	Yes
LTE B2	1852.5	20	24.27	267.3006	0.05318	1	Yes
LTE B4	1732.5	20	24.02	252.3481	0.06649	1	Yes
LTE B5	836.5	20	24.04	253.5129	0.04025	0.56	Yes
LTE B7	2502.5	20	24.09	256.4484	0.08846	1	Yes
LTE B12	707.5	20	23.72	235.5049	0.03317	0.47	Yes
LTE B13	782.0	20	23.65	231.7395	0.03204	0.52	Yes
LTE B17	710.0	20	23.67	232.8091	0.03279	0.47	Yes
LTE B25	1882.5	20	23.77	238.2319	0.05607	1	Yes
LTE B26(L)	822.5	20	23.68	233.3458	0.03730	0.55	Yes
LTE B26(H)	836.5	20	23.73	236.0478	0.03773	0.56	Yes
LTE B41	2687.5	20	23.71	234.9633	0.09327	1	Yes

Maximum Simultaneous transmission MPE Ratios for
EDR/BLE+/2.4GWIFI/5GWIFI+GSM/WCDMA/LTE:

Max MPE ratio BLE/Limit	Max MPE ratio 5GWIFI/Limit	Max MPE Ratio LTE 41/Limit	Σ MPE ratios	Limit	Result
0.00111	0.00847	0.09327	0.110285	1	PASS

EDR/BLE/2.4GWIFI Antenna Gain: 1.18dBi,

U-NII-1: Max gain 0.88dBi,

U-NII-2A: Max gain 1.80dBi,

U-NII-2C: Max gain 2.62dBi,

U-NII-3: Max gain 2.18dBi,

GSM 850: Maximum Gain is -0.98dBi,

PCS1900: Maximum Gain is 0dBi,

WCDMA Band V: Maximum Gain is -0.98dBi,

WCDMA Band IV: Maximum Gain is 1.22dBi,

WCDMA Band II: Maximum Gain is 0dBi,

LTE Band 2: Maximum Gain is 0dBi.

LTE Band 4: Maximum Gain is 1.22dBi.

LTE Band 5: Maximum Gain is -0.98dBi.

LTE Band 7: Maximum Gain is 2.39dBi.

LTE Band 12: Maximum Gain is -1.50dBi.

LTE Band 13: Maximum Gain is -1.58dBi.

LTE Band 17: Maximum Gain is -1.50dBi.

LTE Band 25: Maximum Gain is 0.73dBi.

LTE Band 26: Maximum Gain is -0.95dBi.

LTE Band 41: Maximum Gain is 3.00dBi.

Meet MPE requirements, RF Exposure evaluation is not required.