

RF Exposure Compliance Requirement

1. Standard requirement

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

(a) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	F/300	6
1500-100000	--	--	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	F/1500	30
1500-100000	--	--	1.0	30

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

2. MPE Calculation Method

$E (V/m) = (30 * P * G)^{0.5} / d$ Power Density: $P_d (W/m^2) = E^2 / 377$

E=Electric Field (V/m)

P=Peak RF output Power (W)

G=EUT Antenna numeric gain (numeric)

d= Separation distance between radiator and human body (m)

The formula can be changed to

$P_d = (30 * P * G) / (377 * d^2)$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

3. Calculated Result and Limit

For BT FHSS Type only:

Normal mode-GFSK modulation type with DH5 data packet:

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2402	2.630	4.36	2.729	0.00143	1	Complies
2441	2.630	5.98	3.963	0.00207	1	Complies
2480	2.630	6.10	4.074	0.00213	1	Complies

EDR mode only-8DPSK modulation type with 3DH5 data packet::

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2402	2.630	2.49	1.774	0.00093	1	Complies
2441	2.630	4.67	2.931	0.00153	1	Complies
2480	2.630	4.98	3.148	0.00165	1	Complies

For DSSS (BLE)Type only::

Frequency (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
2402	1.0	-4.05	0.394	0.00008	1	Complies
2442	1.0	-4.14	0.385	0.00008	1	Complies
2480	1.0	-4.71	0.338	0.00007	1	Complies

The device is a synchronous transmitter with two wireless modules for emission signal at same time. Below worst case was recorded.

The max peak output power from the device should be
 $=4.074\text{mw}+0.394\text{mw}=\underline{4.468\text{mw}}=\underline{6.5\text{dBm}}$.

Power density is $\underline{0.00234(\text{mW}/\text{cm}^2)} < \text{Limit } 1 (\text{mW}/\text{cm}^2)$.

Conclusion:

The device meets the maximum permissible exposure requirement.