

RF Exposure Evaluation

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 KDB 447498 D01 V06 and 1.1307(b) and FCC PART2.1091 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)
(A) Limits for Occupational/Controlled Exposures				
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
300–1500			f/300	6
1500–100,000			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
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

Friis transmission formula: $Pd = (Pout \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

Pd = power density in mW/cm², **Pout** = output power to antenna in mW;

G = gain of antenna in linear scale, **Pi** = 3.1416;

R = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

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$$EIRP = E_{Meas} + 20 \log(d_{Meas}) - 104.7$$

EIRP is the equivalent isotropically radiated power, in dBm

E_{Meas} is the field strength of the emission at the measurement distance, in dB μ V/m

d_{Meas} is the measurement distance, in m

Test Result of RF Exposure Evaluation

Channel	Max Tune up power (dBm)	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
LTE BAND 2	23.0	199.53	0.0965	1.0	PASS
LTE BAND 4	23.0	199.53	0.0990	1.0	PASS
LTE BAND 5	23.0	199.53	0.1252	0.549	PASS
LTE BAND 12	23.0	199.53	0.1252	0.466	PASS
LTE BAND 13	23.0	199.53	0.1252	0.518	PASS
LTE BAND 17	23.0	199.53	0.1252	0.518	PASS
LTE BAND 66	23.0	199.53	0.0990	1.0	PASS

Remark: antenna gain:

LTE Band 2: 3.86dBi, LTE Band 4: 3.97dBi, LTE Band 5: 4.99dBi,
LTE Band 12: 4.99dBi, LTE Band 13: 4.99dBi, LTE Band 17: 4.99dBi,
LTE Band 66: 3.97dBi