🛟 eurofins

Radiofrequency radiation exposure evaluation: mobile devices

RESULT :

Pass

Test Specification

Test item Identification / Type No. FCC ID Test standard Gateway
Gateway
2AHCE-GW1
CFR47 FCC Part 2: Section 2.1091
CFR47 FCC Part 1: Section 1.1310
FCC KDB Publication 447498 D04

MPE Limit

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE)

are as following.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)						
(I) 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						
(II) 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						

f = frequency in MHz. * = Plane-wave equivalent power density.



Note1. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

Band	The Maximum Permissible Exposure (mW/cm ²)			
GSM850	0.549			
GSM1900	1.000			
LTE-M Band 2	1.000			
LTE-M Band 4	1.000			
LTE-M Band 5	1.000			
LTE-M Band 12	0.549			
LTE-M Band 13	0.466			
LTE-M Band 25	1.000			
LTE-M Band 26	0.543			
NB-IoT Band 2	1.000			
NB-IoT Band 4	1.000			
NB-IoT Band 5	1.000			
NB-IoT Band 12	0.549			
NB-IoT Band 13	0.466			
NB-IoT Band 25	1.000			
Wi-Fi 2.4GHz	1.000			
Bluetooth (Low Energy)	1.000			

The maximum permissible exposure for 300~1500 MHz is f/1500, for 1500~100,000MHz is 1.0. So



a) EUT RF Exposure Evaluation operations

RF exposure evaluation method is based on KDB 447498 D01, this calculation is based on the conducted power, maximum power and antenna gain with provides the minimum separation distance. The formula shown below is from OET Bulletin 65 Edition 97-01 Per KDB 447498 D01:

S= PG / $4\pi R^2$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Band	Maximum Tune up (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Result (mW/cm²)	Limit Value (mW/cm ²)	The MPE Ratio
GSM850	28.99	2.80	31.790	1510.080	0.299	0.549	0.545
GSM1900	25.99	3.31	29.300	851.138	0.169	1.000	0.169
LTE-M Band 2	25.00	3.31	28.310	677.642	0.134	1.000	0.134
LTE-M Band 4	25.00	3.31	28.310	677.642	0.134	1.000	0.134
LTE-M Band 5	25.00	2.80	27.800	602.560	0.119	1.000	0.119
LTE-M Band 12	25.00	2.24	27.240	529.663	0.105	0.549	0.191
LTE-M Band 13	25.00	2.24	27.240	529.663	0.105	0.466	0.225
LTE-M Band 25	25.00	3.31	28.310	677.642	0.134	1.000	0.134
LTE-M Band 26	25.00	2.80	27.800	602.560	0.119	0.543	0.220
NB-IoT Band 2	25.00	3.31	28.310	677.642	0.134	1.000	0.134
NB-IoT Band 4	25.00	3.31	28.310	677.642	0.134	1.000	0.134
NB-IoT Band 5	25.00	2.80	27.800	602.560	0.119	1.000	0.119
NB-IoT Band 12	25.00	2.24	27.240	529.663	0.105	0.549	0.191
NB-IoT Band 13	25.00	2.24	27.240	529.663	0.105	0.466	0.225
NB-IoT Band 25	25.00	3.31	28.310	677.642	0.134	1.000	0.134
Wi-Fi 2.4GHz	23.50	2.00	25.500	354.813	0.071	1.000	0.071
Bluetooth (Low Energy)	4.00	3.18	7.180	5.224	0.001	1.000	0.001
Note: R = 20cm π = 3.1416							

The MPE Ratio = Mac Result+Limit Value

TER = WWAN Antenna MPE ratio + Wi-Fi 2.4GHz Antenna MPE ratio + Bluetooth Antenna MPE ratio = 0.545+0.071+0.001= 0.617<1



Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.