FCC ID: 2AE3Q-AUROTR

Maximum Permissible Exposure (MPE)

According to FCC 1.1310: 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)

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 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

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

MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 * P * G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = Average 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

Pd = $\frac{30 * P * G}{377 * D^2}$

From the 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.

Measurement Result

BT:

Operation Frequency: 2402MHz~2480MHz

Power density limited: 1mW/ cm^2

Antenna Type: PCB antenna

WIFI antenna gain: 5.3dBi;

R=20cm

mW=10^(dBm/10)

antenna gain Numeric=10^(dBi/10)= 10^(5.3/10)=3.39

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2	(mW/cm2)
				(dBm)	(mW)	Numeric		
2402	BLE(GFSK)	0.77	0±1	1	1.258925	3.39	0.00085	1
2440		0.88	0±1	1	1.258925	3.39	0.00085	1
2480		1.1	1±1	2	1.584893	3.39	0.00107	1

eMTC/NB-ioT

Antenna Type: FPC antenna

Antenna gain: Band2:3.6dBi;Band4:3.6dBi;Band5:1.9dBi;Band12:0.9dBi;Band13:0.9dBi;
Band25:3.6dBi; Band26:1.9dBi; Band66:3.6dBi;
EGPRS 850:1.9dBi; EGPRS 1900:3.6dBi;

modulation	Channel Freq. (MHz)	Max		Antenna		Evaluation result	Power density Limits
		tune-up power		Gain		(mW/cm2)	(mW/cm2)
		(dBm)	(mW)	(dBi)	Numeric		
EGPRS850	1850.2	26.5	446.684	1.9	1.55	0.1376	1.00
EGPRS1900	824.2	25	316.228	3.6	2.29	0.1441	0.55
eMTC Band 2	1880	22	158.489	3.6	2.29	0.0722	1.00
eMTC Band 4	1754.3	22.50	177.828	3.6	2.29	0.0810	1.00
eMTC Band 5	836.5	20.5	112.202	1.9	1.55	0.0346	0.56
eMTC Band 12	715.3	21.50	141.254	0.9	1.23	0.0346	0.48
eMTC Band 13	782	22.00	158.489	0.9	1.23	0.0388	0.52
eMTC Band 25	1850.7	24.00	251.189	3.6	2.29	0.1145	1.00
eMTC Band 26A	823.3	21.00	125.893	1.9	1.55	0.0388	0.55
eMTC Band 26B	836.5	21.00	158.489	1.9	1.55	0.0488	0.56
eMTC Band 66	1779.3	22.00	141.254	3.6	2.29	0.0644	1.00
NB-iot Band 2	1850.2	21.5	158.489	3.6	2.29	0.0722	1.00
NB-iot Band 4	1754.8	22.00	141.254	3.6	2.29	0.0644	1.00
NB-iot Band 5	836.5	21.5	141.254	1.9	1.55	0.0435	0.56
NB-iot Band 12	669.2	21.50	141.254	0.9	1.23	0.0346	0.45
NB-iot Band 13	777.2	21.50	141.254	0.9	1.23	0.0346	0.52
NB-iot Band 25	1850.2	21.50	141.254	3.6	2.29	0.0644	1.00
NB-iot Band 66	1779.8	21.50	141.254	3.6	2.29	0.0644	1.00
NB-iot Band 71	663.2	21.50	141.254	0	1.00	0.0281	0.44

Note: BT&EGPRS&eMTC and NB-iOt cannot be transmitted at the same time.

Conclusion:

The conclusion should be 0.1441＜0.44 for Max Power Density, Compliance the RF Exposure requirement.

Signature: Alex

Date: 2024-11-9

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