

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 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 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: $Pd = (Pout * G) / (4 * pi * r^2)$

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.

Test Result of RF Exposure Evaluation

GSM 850(GPRS 1 link) mode

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest (824.2MHz)	1741.81	0.4929	0.549	PASS
Middle (836.6MHz)	1706.08	0.4828	0.549	PASS
Highest (848.8MHz)	1713.96	0.4850	0.549	PASS

PCS 1900(GPRS 1 link) mode

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest (1850.2MHz)	783.43	0.2611	1.0	PASS
Middle (1880.0MHz)	732.82	0.2442	1.0	PASS
Highest (1909.8MHz)	812.83	0.2709	1.0	PASS

WCDMA Band II(RMC 12.2Kbps link) mode

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest (1852.4MHz)	385.48	0.1284	1.0	PASS
Middle (1880.0MHz)	356.45	0.1188	1.0	PASS
Highest (1907.6MHz)	406.44	0.1354	1.0	PASS

WCDMA Band V(RMC 12.2Kbps link) mode

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest (826.4MHz)	372.39	0.1054	0.549	PASS
Middle (836.6MHz)	374.97	0.1061	0.549	PASS
Highest (846.6MHz)	328.85	0.0931	0.549	PASS

Remark:

GSM850/ WCDMA Band V: 1.53dBi

PCS1900/ WCDMA Band II: 2.24dBi

BT EDR mode

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest (2402MHz)	3.19	0.0012	1.0	PASS
Middle (2441MHz)	3.39	0.0012	1.0	PASS
Highest (2480MHz)	3.27	0.0012	1.0	PASS

Remark: antenna gain=2.62dBi

BT BLE mode

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest (2402MHz)	0.59	0.0002	1.0	PASS
Middle (2440MHz)	0.56	0.0002	1.0	PASS
Highest (2480MHz)	0.50	0.0002	1.0	PASS

Remark: antenna gain=2.62dBi

WiFi mode

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest (2412MHz)	55.59	0.0198	1.0	PASS
Middle (2437MHz)	55.85	0.0199	1.0	PASS
Highest (2462MHz)	57.68	0.0205	1.0	PASS

Remark: antenna gain=2.53dBi