

RF Exposure evaluation

FCC ID: 2AJYU-8MH0011

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Mobile Device

1. Reference

According to §1.1307(b)(1), 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 of the Commission’s guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

KDB447498 D01: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

2. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
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 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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

*=Plane-wave equivalent power density

3. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

4. Antenna Information

SIM6600-M2 can only use antennas certificated as follows provided by manufacturer;

Antenna No.	Model No. of antenna:	Type of antenna:	Gain of the antenna (Max.)	Frequency range:
WCDMA	/	External antenna	1.00dBi for WCDMA Band 2/4/5;	
LTE	/	External antenna	1.00dBi for LTE Band 2, 4, 5, 7, 12, 13, 17, 25, 26, 30,38, 40, 41, 66, 71	

5. Manufacturing Tolerance

< WCDMA >

Band	Mode	The Tune-up Maximum Power (Customer Declared)(dBm)
W-B2	RMC 12.2Kbps	23.0±1
	HSDPA Subtest-1	23.0±1
	HSDPA Subtest-2	22.0±1
	HSDPA Subtest-3	21.0±1
	HSDPA Subtest-4	20.0±1
	HSUPA Subtest-1	22.0±1
	HSUPA Subtest-2	21.0±1
	HSUPA Subtest-3	21.0±1
	HSUPA Subtest-4	20.0±1
	HSUPA Subtest-5	20.0±1
	HSPA+	21.0±1
	RMC 12.2Kbps	23.0±1
	HSDPA Subtest-1	23.0±1
	HSDPA Subtest-2	22.0±1
	HSDPA Subtest-3	21.0±1
	HSDPA Subtest-4	20.0±1

W-B4	HSUPA Subtest-1	22.0±1
	HSUPA Subtest-2	21.0±1
	HSUPA Subtest-3	21.0±1
	HSUPA Subtest-4	20.0±1
	HSUPA Subtest-5	20.0±1
	HSPA+	21.0±1
W-B5	RMC 12.2Kbps	23.0±1
	HSDPA Subtest-1	23.0±1
	HSDPA Subtest-2	22.0±1
	HSDPA Subtest-3	21.0±1
	HSDPA Subtest-4	20.0±1
	HSUPA Subtest-1	22.0±1
	HSUPA Subtest-2	21.0±1
	HSUPA Subtest-3	21.0±1
	HSUPA Subtest-4	20.0±1
	HSUPA Subtest-5	20.0±1
	HSPA+	21.0±1

< LTE >

Mode	Target Power		
	1RB	50%RB	100%RB
LTE BAND 2	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 4	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 5	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 7	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 12	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 13	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 17	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 25	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 26	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 30	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 38	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 40	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 41	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 66	22.5±1.5	22.5±1.5	22.5±1.5
LTE BAND 71	22.5±1.5	22.5±1.5	22.5±1.5

Mode	Target Power		
	1RB	50%RB	100%RB
16QAM			
LTE BAND 2	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 4	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 5	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 7	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 12	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 13	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 17	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 25	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 26	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 30	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 38	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 40	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 41	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 66	22.0±1.5	22.0±1.5	22.0±1.5
LTE BAND 71	22.0±1.5	22.0±1.5	22.0±1.5

6. Standalone MPE Result

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna is 1.0dBi, the RF power density can be obtained.

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
WCDMA B 2	24.0	251.1886	1.000	1.2589	0.0629	1.0000
WCDMA B 4	24.0	251.1886	1.000	1.2589	0.0629	1.0000
WCDMA B 5	24.0	251.1886	1.000	1.2589	0.0629	0.5509
LTE BAND 2	24.0	251.1886	1.000	1.2589	0.0629	1.0000
LTE BAND 4	24.0	251.1886	1.000	1.2589	0.0629	1.0000
LTE BAND 5	24.0	251.1886	1.000	1.2589	0.0629	0.5493
LTE BAND 7	24.0	251.1886	1.000	1.2589	0.0629	1.0000
LTE BAND 12	24.0	251.1886	1.000	1.2589	0.0629	0.466
LTE BAND 13	24.0	251.1886	1.000	1.2589	0.0629	0.518
LTE BAND 17	24.0	251.1886	1.000	1.2589	0.0629	0.4693
LTE BAND 25	24.0	251.1886	1.000	1.2589	0.0629	1.0000
LTE BAND 26	24.0	251.1886	1.000	1.2589	0.0629	0.5509
LTE BAND 30	24.0	251.1886	1.000	1.2589	0.0629	1.0000

LTE BAND 38	24.0	251.1886	1.000	1.2589	0.0629	1.0000
LTE BAND 40	24.0	251.1886	1.000	1.2589	0.0629	1.0000
LTE BAND 41	24.0	251.1886	1.000	1.2589	0.0629	1.0000
LTE BAND 66	24.0	251.1886	1.000	1.2589	0.0629	1.0000
LTE BAND 71	24.0	251.1886	1.000	1.2589	0.0629	0.442

Remark:

1. *Output power (Peak) including turn-up tolerance;*
2. *MPE evaluate distance is 20cm from user manual provide by manufacturer.*

7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

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