



FCC Maximum Permissible Exposure(MPE) Estimation Report

Product Name: HSPA Module

Model: MU609T

Report No.: SYBH(Z-SAR)003102012-2

FCC ID: QISMU609T

	APPROVED	CHECKED	PREPARED
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DATE	2012-11-06	2012-11-06	2012-11-06

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※ ※ Modified History ※ ※

REV.	DESCRIPTION	ISSUED	REMARK
Rev.1.0	Initial Test Report Release	2012-10-12	Sun Shaobin
Rev.1.1	Update the data using the maximum conducted output power to be given in the tune-up information for calculation.	2012-11-06	Sun Shaobin

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1 EUT Description

Device Information:			
DUT Name:	HSPA Module		
Type Identification:	MU609T		
IMEI No:	867594010012627		
Device Type :	Fixed device		
Exposure Category:	Uncontrolled environment/general population		
Hardware Version :	MD1MC609TM		
Software Version :	11.103.11.00.00		
Antenna Type :	External antenna		
Device Operating Configurations:			
Supporting Mode(s)	GSM850/1900,UMTS Band II/V		
Test Modulation	GSM(GMSK),UMTS(QPSK)		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824-849	869-894
	GSM1900	1850-1910	1930-1990
	UTMS Band II	1850-1910	1930-1990
	UTMS Band V	824-849	869-894

1.1 General Description

MU609T HSPA/UMTS/GSM/GPRS/EDGE dual mode Wireless Module is subscriber equipment in the UMTS/GSM system. MU609T implement such functions as RF signal receiving/transmitting, HSPA/HSDPA/HSUPA/WCDMA and EDGE/GPRS/GSM protocol processing, data service etc. Externally it provides LGA interface.

2 Test specification(s)

SUPPLEMENT C Edition 01-01 to OET65c	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields – Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions
ANSI Std C95.1-1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991)
KDB 447498 D01	Mobile Portable RF Exposure Procedures and Equipment Authorization Policies

3 Testing laboratory

Test Site	The Reliability Laboratory of Huawei Technologies Co., Ltd.
Test Location	Zone K3, Huawei Industrial Base, Bantian Industry Area, Longgang District, Shenzhen, Guangdong, China
Telephone	+86 755 28780808
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State of accreditation	The Test laboratory (area of testing) is accredited according to ISO/IEC 17025. CNAS Registration number: L0310 A2LA TESTING CERT #2174.0

4 Applicant and Manufacturer

Company Name	HUAWEI TECHNOLOGIES CO., LTD
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

5 Application details

Start Date of test	2012-10-12
End Date of test	2012-11-06

6 Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

7 FCC RF Exposure Requirements

An estimation of MPE in this application for product is used to ensure if it comply to the rules of the standard in the regulation list above.

Maximum permissible exposure (MPE) refers to the RF energy that is acceptable for human exposure. It is broken down into two categories, Occupational/controlled and General population/uncontrolled.

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.

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.

We analysis if it comply with the limits for General population/uncontrolled exposure. The FCC's MPE limits for field strength and power density are given in 47CFR 1.1310(Table below).These limits are generally based on recommended exposure guidelines published by the National Council on Radiation Protection and Measurements (NCRP), and also partly based on guidelines recommended by the American National Standards Institute (ANSI) in Section 4.1 of ANSI/IEEE C95.1.

Table: Limits For Maximum Permissible Exposure (MPE)

(A) Limits for Occupational/controlled Exposure				
Frequency Range(MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength(H)(A/m)	Power Density (S)(mW/cm ²)	Averaging Time (minute) E ² , H ² or S
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				
Frequency Range(MHz)	Electric Field Strength(E)(V/m)	Magnetic Field Strength(H)(A/m)	Power Density (S)(mW/cm ²)	Averaging Time (minute) E ² , H ² or S
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	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	

A rough estimation of the expected exposure in power flux density on a given point can be made with the following equation:

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

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

R = distance to the centre of radiation of the antenna

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the user's manual. Therefore, the S of the device is calculated with $R=20\text{cm}$, and if it is below the limit S , then we can conclude the device complies with the rules.

8 RF Exposure Evaluation

8.1 Operation in GSM850

(uplink: 824-849MHz, downlink: 869-894MHz)

Mode	P _{max} (dBm)	P _{max} (mW)	G (dBi)	G	R(cm)	S (mW/cm ²)	MPE Limit (mW/cm ²)	Conclusion
1TS	33.5*(1/8)	279.84	4.28	2.68	20	0.149	0.549	PASS
2TS	31.5*(2/8)	353.13	4.28	2.68	20	0.188	0.549	PASS
3TS	30.5*(3/8)	420.76	4.28	2.68	20	0.224	0.549	PASS
4TS	28.5*(4/8)	353.97	4.28	2.68	20	0.189	0.549	PASS

Due to the Table, we can conclude the max power density level at 20 cm is 0.224mW/cm², which is below the uncontrolled exposure limit of 0.549mW/cm² at 824MHz, so we can conclude it is into compliance.

8.2 Operation in GSM1900

(uplink: 1850-1910MHz, downlink: 1930-1990MHz)

Mode	P _{max} (dBm)	P _{max} (mW)	G (dBi)	G	R(cm)	S (mW/cm ²)	MPE Limit (mW/cm ²)	Conclusion
1TS	30.5*(1/8)	140.25	2.00	1.58	20	0.044	1.0	PASS
2TS	28.5*(2/8)	176.99	2.00	1.58	20	0.056	1.0	PASS
3TS	27.5*(3/8)	210.88	2.00	1.58	20	0.067	1.0	PASS
4TS	26.0*(4/8)	199.05	2.00	1.58	20	0.063	1.0	PASS

Due to the Table, we can conclude the max power density level at 20 cm is 0.067mW/cm², which is below the uncontrolled exposure limit of 1.0mW/cm² at 1850MHz, so we can conclude it is into compliance.

8.3 Operation in UMTS Band II

(uplink: 1850-1910MHz, downlink: 1930-1990MHz)

$P_{\max}$ (dBm)	$P_{\max}$ (mW)	G (dBi)	G	R(cm)	S (mW/cm ²)	MPE Limit (mW/cm ²)	Conclusion
24.5	281.84	3	2.00	20	0.112	1.0	PASS

Due to the Table, we can conclude the max power density level at 20 cm is 0.112mW/cm², which is below the uncontrolled exposure limit of 1.0mW/cm² at 1850MHz, so we can conclude it is into compliance.

8.4 Operation in UMTS Band V

(uplink: 824-849MHz, downlink: 869-894MHz)

$P_{\max}$ (dBm)	$P_{\max}$ (mW)	G (dBi)	G	R(cm)	S (mW/cm ²)	MPE Limit (mW/cm ²)	Conclusion
24.5	281.84	4.28	2.68	20	0.150	0.549	PASS

Due to the Table, we can conclude the max power density level at 20 cm is 0.150mW/cm², which is below the uncontrolled exposure limit of 0.549mW/cm² at 824MHz, so we can conclude it is into compliance.

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