RF Exposure Evaluation Report

Report No.:	SET2013-08559
Product:	GPRS Module
FCC ID:	PJ7-123X
Brand Name:	neoway
Applicant:	Shenzhen Neoway Technology Co.,Ltd.
Address:	4F-2#,Lianjian Science & Industry Park,Huarong Road,Dalang,Bao'an District,Shenzhen.P.R.C.
Issued by:	CCIC-SET
Lab Location:	Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China **Tel:** 86 755 26627338 **Fax:** 86 755 26627238

Test Report

Product ..... :	GPRS Module
Model No. ..... :	M660
Applicant ..... :	Shenzhen Neoway Technology Co.,Ltd.
Applicant Address ..... :	4F-2#,Lianjian Science & Industry Park,Huarong Road,Dalang,Bao'an District,Shenzhen.P.R.C.
Manufacturer ..... :	Shenzhen Eternity Technology Co.,Ltd
Manufacturer Address ..... :	Block A2,Yingzhan Industrial Zone, Longtian Community, KengziOffice,Pingshan New District,Shenzhen,Guangdong Province,P.R.China
Test Standards .....:	ANSI Std C95.1-1992: Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3KHz-300GHz.(IEEE Std C95.1-1992) RSS-102: Radio Frequency Exposure Compliance of Radiocommunication Apparatus （All Frequency Bands （Issue 4 of March 2010））
Test Result..... :	Pass
Tested by ..... :	2013.12.11 Lu Lei, Test Engineer
Reviewed by ..... :	2013.12.11 Shuangwen Zhang, Senior Engineer
Approved by..... :	2013.12.11 Wu Li'an, Manager

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1 .General Information

1.1 Description of EUT

Product Feature & Specification	
DUT Type	GPRS Module
Model Name	M660
FCC ID	PJ7-123X
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz
Antenna Type	Refer to Remark 2 and 3
HW Version	1230 V1.0
SW Version	M660_1230_LQS13000_V009B
Test of Modulation	GMSK

Remark 1: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Remark 2: The external antenna must be matched properly to achieve best performance regarding radiated power, DC-power consumption, modulation accuracy and harmonic suppression. Antenna matching networks are not included on the M660 Module PCB and should be placed in the host application.

Remark 3: An antenna was used via a UHL Type Connector, whose maximum antenna gain was 2dBi for Band 850 and 2dBi for Band 1900.

1.2 Test specifications

ANSI Std C95.1-1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3KHz-300GHz.(IEEE Std C95.1-1992)

RSS-102	Radio Frequency Exposure Compliance of Radiocommunication Apparatus （All Frequency Bands （Issue 4 of March 2010））
KDB 447498 D01V05	General RF Exposure Guidance

2 RF Exposure Limit Introduction

An estimation of MPE in this application for product is used to ensure if it complies 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/cm2）	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/f2)*	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/cm2）	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：

$$S = \frac{PG}{4\pi R^2}$$

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=20cm, and if it is below the limit S, then we can conclude the device complies with the rules. 3 Conducted RF Output Power（Unit：dBm）

3 Conducted RF Output Power（Unit：dBm）

Burst Average power						
Band	GSM850			GSM1900		
Channel	128	190	251	512	661	810
Frequency Band(MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
GSM(GMSK)	32.19	32.38	32.38	29.95	29.84	29.93
GPRS(GMSK)	32.03	32.18	32.18	29.54	29.22	29.03

4 RF Exposure Evaluation

Frequency Band (MHz)	GSM850	GPRS850
Antenna Gain (dBi)	2.00	2.00
Antenna Gain (numeric)	1.58	1.58
Power(mW)	1729.82	1651.96
R(cm)	20	20
S(mW/ cm²)	0.54	0.52
MPE Limit(mW/ cm²)	0.55	0.55
Conclusion	Pass	Pass

Note:

GSM850/GPRS850:(uplink: 824-849MHz, downlink: 869-894MHz)

For the GPRS mode, all the slots and channels were tested and just the worst data was record in this report.

According to the Table, we can conclude the max power density level at 20 cm is 0.54mW/cm ², which is below the uncontrolled exposure limit of 0.55mW/cm ²at 848MHz, so we can conclude it is into compliance.

Frequency Band (MHz)	GSM1900	GPRS1900
Antenna Gain (dBi)	2.00	2.00
Antenna Gain (numeric)	1.58	1.58
Power(mW)	988.55	899.50
R(cm)	20	20
S(mW/ cm²)	0.31	0.28
MPE Limit(mW/ cm²)	1.00	1.00
Conclusion	Pass	Pass

Note:

GSM1900/GPRS1900:(uplink: 1850-1910MHz, downlink: 1930-1990MHz)

For the GPRS mode, all the slots and channels were tested and just the worst data was record in

this report.

According to the Table, we can conclude the max power density level at 20 cm is 0.31mW/cm ^{2}; which is below the uncontrolled exposure limit of 1.0mW/cm ^{2} at 1850MHz, so we can conclude it is into compliance.

** END OF REPORT **