

Quectel Wireless Solutions Co., Ltd.

GSM/GPRS Module

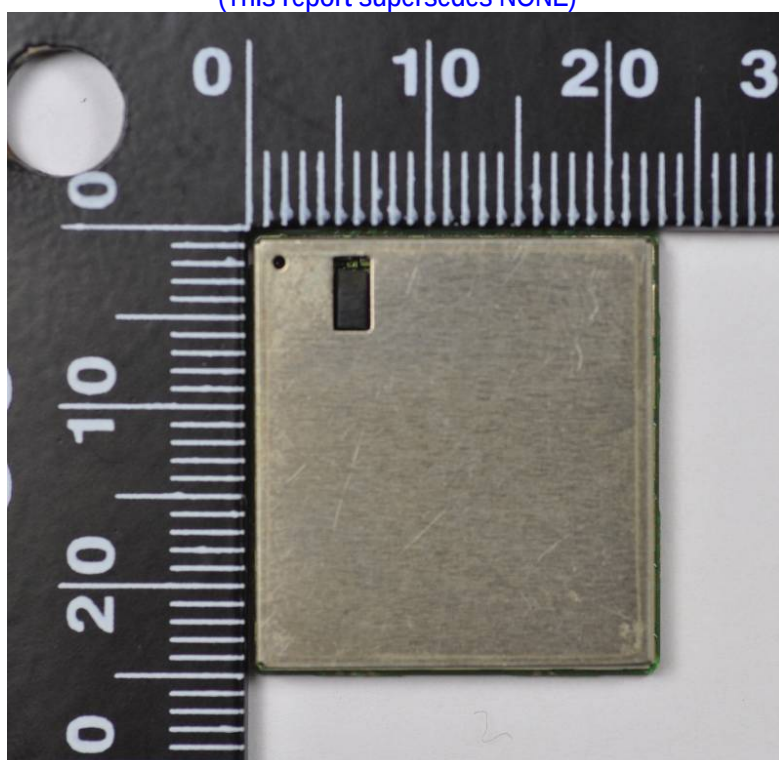
Main Model: M80

Serial Model: N/A

December 26, 2014

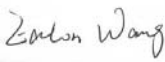
Report No.: 12050068-FCC-H1-R-V2

(This report supersedes NONE)



Modifications made to the product : None

This Test Report is Issued Under the Authority of:

		
Eaton Wang Compliance Engineer	Alex Liu Technical Manager	

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RF Exposure Test Report
To: FCC 2.1091

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Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety

Accreditations for Product Certifications

Country/Region	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC, (RCB 208)	RF , Telecom
Hong Kong	OFTA (US002)	RF , Telecom

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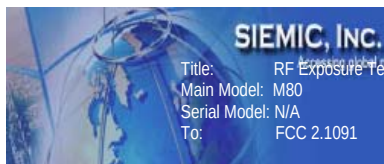
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1 EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programmers was to demonstrate compliance of the Quectel Wireless Solutions Co., Ltd., GSM/GPRS Module and Model: M80 against the current Stipulated Standards. The GSM/GPRS Module has demonstrated compliance with the FCC 2.1091.

EUT Information

EUT Description	:	GSM/GPRS Module
Main Model	:	M80
Serial Model	:	N/A
Antenna Gain	:	GSM 850: 0.5 dBi PCS 1900: 2 dBi (Note: The radio module will be sold without antenna, this antenna only used limited to ERP/EIRP or radiated spurious emission test.)
Input Power	:	SWITCHING POWER SUPPLY MODEL: P-050B INPUT: 100V-240V, 50/60Hz, 0.3A OUTPUT: 5.0V-2.0A P/N: B2152-0945
Maximum Conducted Peak Power to Antenna	:	GSM850: 31.84 dBm PCS1900: 29.27 dBm
Maximum Radiated ERP/EIRP	:	GSM850: 29.94 dBm / ERP PCS1900: 27.32 dBm / EIRP
Classification Per Stipulated Test Standard	:	FCC 2.1091:2012



Title: RF Exposure Test Report for GSM/GPRS Module
Main Model: M80
Serial Model: N/A
To: FCC 2.1091

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2 TECHNICAL DETAILS

Purpose	Compliance testing of GSM/GPRS Module with stipulated standards
Applicant / Client	Quectel Wireless Solutions Co., Ltd. Room 501, Building 13, No. 99 TianZhou Roud, Xuhui District, Shanghai
Manufacturer	Quectel Wireless Solutions Co., Ltd. Room 501, Building 13, No. 99 TianZhouRoud, Xuhui District, Shanghai
Laboratory performing the tests	SIEMIC (Nanjing-China) Laboratories NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China Tel: +86(25)86730128/86730129 Fax: +86(25)86730127 Email: China@siemic.com.cn
Test report reference number	12050068-FCC-H1-R-V2
Date EUT received	July 30, 2012
Standard applied	FCC 2.1091
Dates of test (from – to)	August 13, 2012 to August 14, 2012
No of Units	#1
Equipment Category	PCE
Trade Name	Quectel
RF Operating Frequency (ies)	GSM850 TX : 824.2 ~ 848.8 MHz; RX : 869.2 ~ 893.8 MHz PCS1900 TX : 1850.2 ~ 1909.8 MHz; RX : 1930.2 ~ 1989.8 MHz
Number of Channels	300CH (PCS1900) and 125CH (GSM850)
Modulation	GSM / GPRS: GMSK
GPRS Multi-slot class	8/10/12
FCC ID	XMR201208M80

3 FCC §2.1091 - Maximum Permissible exposure (MPE)

3.1 Applicable Standard

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.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
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

* = Plane-wave equivalent power density

Test Data

Predication of MPE limit at a given distance

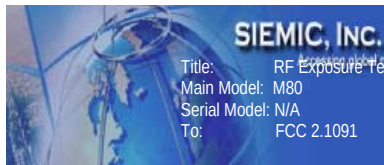
$$S = \frac{PG}{4\pi R^2}$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)



GPRS

- 1 slot: 1/8 duty factor
- 2 slots: 1/4 duty factor
- 3 slots: 3/8 duty factor
- 4 slots: 1/2 duty factor

1> The maximum power density at a distance of 0.2 m for GSM 850 is shown as below:
(Voice)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
0.5	1.122	33.500	2238.721	1/8	279.898	24.47	0.062	0.549

2> The maximum power density at a distance of 0.2 m for GPRS850 is shown as below:
(Slot 1)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
0.5	1.122	33.500	2238.721	1/8	279.898	24.47	0.062	0.549

3> The maximum power density at a distance of 0.2 m for GPRS850 is shown as below:
(Slot 2)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
0.5	1.122	33.500	2238.721	2/8	559.758	27.48	0.125	0.549

4> The maximum power density at a distance of 0.2 m for GPRS850 is shown as below:
(Slot 3)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
0.5	1.122	33.500	2238.721	3/8	839.460	29.24	0.187	0.549

5> The maximum power density at a distance of 0.2 m for GPRS850 is shown as below:
(Slot 4)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
0.5	1.122	30.500	1122.018	4/8	561.048	27.49	0.125	0.549

6> The maximum power density at a distance of 0.2 m for GSM1900 is shown as below:

(Voice)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
2.0	1.585	30.500	1122.018	1/8	140.281	21.47	0.044	1

7> The maximum power density at a distance of 0.2 m for GPRS1900 is shown as below:

(Slot 1)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
2.0	1.585	30.500	1122.018	1/8	140.281	21.47	0.044	1

8> The maximum power density at a distance of 0.2 m for GPRS1900 is shown as below:

(Slot 2)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
2.0	1.585	30.500	1122.018	2/8	280.543	24.48	0.088	1

9> The maximum power density at a distance of 0.2 m for GPRS1900 is shown as below:

(Slot 3)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
2.0	1.585	30.500	2238.721	3/8	420.727	26.24	0.133	1

10> The maximum power density at a distance of 0.2 m for GPRS1900 is shown as below:

(Slot 4)

Antenna Gain (dBi)	Antenna Gain (numeric)	Max Tune up power (dBm)	Average Output Power (mW)	Duty factor	The maximum sourced based time-averaged transmit power(mW)	The maximum sourced based time-averaged transmit power(dBm)	Calculated RF Exposure (mW/m ²)	Limit (mW/m ²)
2.0	1.585	30.500	1122.018	4/8	561.048	27.49	0.177	1

Result: Pass

Additional: (For Max allowed antenna calculate)

Step 1 ERP/EIRP calculate:

Frequency bands	Max Turn-up Conducted Peak power (dBm)	ERP/EIRP Limit (dBm)	Margin (dB)
GSM850	33.5	38.45	4.95
GSM1900	30.5	33.00	2.50

Step 2 MPE calculate:

Frequency bands	The maximum sourced based time-averaged transmit power(dBm)	Distance (cm)	Power Density Limit (mW/cm2)	Max allow antenna gain (dBi)
GSM850	29.24	20	0.549	5.17
GSM1900	27.49	20	1	9.52

Step 3:

If meet above step 1 and 2, the Max allows antenna gain show is below:

Frequency bands	Max allow antenna gain (dBi)
GSM850	4.95
GSM1900	2.50

Note:

The antenna under test with gain 0.5 dBi of GSM850 and 2 dBi of GSM1900.

Output power is conducted. This device is to be used in mobile or fixed applications only. Antenna gain including cable loss must not exceed 4.95 dBi of GSM850 and 2.50 dBi of GSM1900 for the purpose of satisfying the requirements of 2.1043 and 2.1091. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operated in conjunction with any antenna or transmitter not described under this FCC id. The final product operating with this transmitter must include operating instructions and antenna installation instructions, for end-users and installers to satisfy RF exposure compliance requirements. Compliance of this device in all final product configurations is the responsibility of the Grantee. Installation of this device into specific final products may require the submission of a Class II permissive change application containing data pertinent to RF Exposure, spurious emissions, ERP/EIRP, and host/module authentication, or new application if appropriate.