



RF Exposure Evaluation Report

For

Product Name: GSM/GPRS Module

Brand Name: Quectel

Model No.: GC10

Series Model : N/A

FCC ID: XMR201403GC10

Standards: FCC 47 CFR 2.1091

Test Report Number: C140328R01-RPB

Issued for

Quectel Wireless Solutions Co., Ltd.

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Issued by

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TESTING CERT #2541.01

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	April 21, 2014	Initial Issue	ALL	Jeff.Fang



1 TEST RESULT CERTIFICATION

Product Name:	GSM/GPRS Module
Brand Name:	Quectel
Model Name:	GC10
Series Model :	N/A
Device Category:	Mobile Device
Applicant:	Quectel Wireless Solutions Co., Ltd.
Address:	Room 501, Building 13, No.99 TianZhouRoad,Xuhui District, Shanghai
Manufacturer:	Quectel Wireless Solutions Co., Ltd.
Address:	Room 501, Building 13, No.99 TianZhouRoad,Xuhui District, Shanghai
Date of Test:	April 18, 2014
Test Result :	Conform

APPLICABLE STANDARDS	
Standard	Test Result
FCC 47 CFR 2.1091	No non-compliance noted

U-NII devices are subject to the radio frequency radiation exposure requirements specified in §§2.1091 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

Tested
by: Blent.Wang
Blent.Wang

Approved
by: Jeff Fang
Manager: Jeff.Fang



2 EUT DESCRIPTION

Product Name:	GSM/GPRS Module
Brand Name:	Quectel
Model Name:	GC10
Series Model :	N/A
Model Discrepancy:	N/A
Power Supply:	DC 4.0V
Frequency Range :	GSM/GPRS 850: 824.20 ~ 848.80 MHz GSM/GPRS 1900: 1850.20 ~ 1909.80 MHz
Transmit Power :	GSM 850: 32.19 dBm GPRS 850: 32.13 dBm GSM 1900: 29.10 dBm GPRS 1900: 29.00 dBm
Antenna Specification:	dipole Antenna Gain: 1.0 dBi

Note: for more details, please refer to the User's manual of the EUT.



3 RF Exposure Evaluation

3.1. RF Exposure Compliance Requirement

3.1.1. Limits

According 47 CFR 1.1310 FCC MPE limits for General population/Uncontrolled Exposure are showing in the Table1:

Table1

Frequency Range	Electric Field Strength [E] (V/m)	Magnetic Field Strength [H](A/m)	Power density [S](mW/cm ²)	Averaging time (min)
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	30

f = frequency in MHz

* = Plane-wave equivalent Power Density

The EUT will be only used with a separation of 20 cm or greater between the antennas and the user or nearby person and therefore can be consider a mobile transmitter per 47 CFR 2.1091(b). Due to deployment conditions, device has to comply with Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled Exposure.

3.1.2. Test Procedure

Based on FCC Bulletin OET 65, the MPE calculations in case of multiple transmitters have been e performed on the following and assumptions and equations:

1. For transmitters which operate in the frequency band with a same MPE limit the Power Densities are summed. The Total Power Density shall not exceed the Limit for this band.
2. For transmitters which operate in frequency bands with a different MPE the Power Densities are calculated separately for each band, and then divided by Limit for each band. The sum of these ratios shall not exceed 1.



3. Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

4. According Table3, limit for EV-DO transmitter in 824.2 – 848.8 MHz band shall be calculated at the lowest frequency (worst case) as:

$$824.2 / 1500 = 0.55 \text{ mW/cm}^2$$

3.2. EUT RF Exposure Evaluation

Modulation Mode	Frequency band (MHz)	Max. Conducted output power(dBm)	Antenna gain (dBi)	Distance (cm)	Duty cycle	Power density (mW/cm2)	Limit (mW/cm2)
GSM850	824.2-848.8	32.19	1.0	20	0.125	0.05185	0.55
GPRS850		32.13	1.0	20	0.25	0.10228	0.55
GSM1900	1850.2-1909.	29.10	1.0	20	0.125	0.02545	1
GPRS1900	8	29.00	1.0	20	0.25	0.04975	1