RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd.
FCC ID	XMR201707BG96
Product	Quectel BG96
Brand	Quectel
Model	BG96
Report No.	RXA1706-0199RF01R1
Issue Date	July 12,2017

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2017)/ FCC CFR 47 Part 22H (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Jiangpeng Lan	*Approved by: Kai Xu*

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

TABLE OF CONTENT

Summary of measurement results

No.	Test Type	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Radiated Power	22.913(a)(2)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	2.1051 / 22.917(a)	PASS
5	Peak-to-Average Power Ratio	22.913(d)/ KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 22.355	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 22.917(a)	PASS
8	Radiates Spurious Emission	2.1053 / 22.917 (a)	PASS
Date of Testing: June 24, 2017~July 3, 2017			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard.			

1. Test Laboratory

1.1. Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by any government agencies.

1.2. Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (recognition number is 428261)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

2. General Description of Equipment under Test

Client Information

Applicant	Quectel Wireless Solutions Co., Ltd.
Applicant address	7th Floor, Hongye Building, No. 1801 Hongmei Road, Xuhui District, Shanghai, China
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer address	7th Floor, Hongye Building, No. 1801 Hongmei Road, Xuhui District, Shanghai, China

General Information

EUT Description			
Model	BG96		
IMEI	864508030012063		
Hardware Version	R1.0		
Software Version	BG96MAR02A02M1G		
Power Supply	External power supply		
Antenna Type	The EUT don't have standard Antenna, The Antenna used for testing in this report is the after-market accessory (Dipole Antenna)		
Test Mode(s)	GSM 850: LTE Band 5/26;		
Test Modulation	(GSM)GMSK,8PSK; (LTE)QPSK 16QAM;		
LTE Category	M1		
Maximum E.R.P.	GSM 850:	32.13 dBm	
	LTE Band 5:	28.29 dBm	
	LTE Band 26:	28.60 dBm	
Rated Power Supply Voltage	3.8V		
Extreme Voltage	Minimum: 3.3V Maximum: 4.3V		
Extreme Temperature	Lowest: -40°C Highest: +85°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824 ~ 849	869 ~ 894
	LTE Band 5	824 ~ 849	869 ~ 894
	LTE Band 26	824 ~ 849	869 ~ 894
Note: The information of the EUT is declared by the manufacturer.			

Accessory equipment	
Evaluation Board	RF Cable
RS232-to-USB Cable	Antenna: Dipole Antenna
Headset	USB Cable

3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC CFR47 Part 2 (2017)

FCC CFR 47 Part 22H (2017)

ANSI C63.26 (2015)

KDB 971168 D01 Power Meas License Digital Systems v02r02

4. Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (X, Y axis), lie-down position (Z axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Z axis, vertical polarization) and the worst case was recorded.

All mode and data rates and positions were investigated. Subsequently, only the worst case emissions are reported.
The following testing in GSM/LTE is set based on the maximum RF Output Power.
Test modes are chosen to be reported as the worst case configuration below:

	Test items	Modes/Modulation
		GSM 850
Conducted Test cases	RF power output	GPRS(1Tx slot) EGPRS(1Tx slot)
	Occupied Bandwidth	GPRS(1Tx slot) EGPRS(1Tx slot)
	Band Edge Compliance	GPRS(1Tx slot) EGPRS(1Tx slot)
	Peak-to-Average Power Ratio	GPRS(1Tx slot) EGPRS(1Tx slot)
	Frequency Stability	GPRS(1Tx slot) EGPRS(1Tx slot)
	Spurious Emissions at Antenna Terminals	GPRS(1Tx slot)
Radiated Test cases	Effective Radiated Power	GPRS(1Tx slot) EGPRS(1Tx slot)
	Radiates Spurious Emission	GPRS(1Tx slot)

Test modes are chosen as the worst case configuration below for LTE Band 5/26

Test items	Modes	Bandwidth (MHz)					Modulation		RB			Test Channel		
		1.4	3	5	10	15	QPSK	16QAM	1	50%	100%	L	M	H
RF power output	LTE 5	O	O	O	O	-	O	O	O	O	O	O	O	O
	LTE 26	O	O	O	O	O	O	O	O	O	O	O	O	O
Effective Isotropic Radiated power	LTE 5	O	O	O	O	-	O	O	-	-	O	O	O	O
	LTE 26	O	O	O	O	O	O	O	-	-	O	O	O	O
Occupied Bandwidth	LTE 5	O	O	O	O	-	O	O	-	-	O	O	O	O
	LTE 26	O	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	LTE 5	O	O	O	O	-	O	O	O	-	O	O	-	O
	LTE 26	O	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	LTE 5	O	O	O	O	-	O	O	-	-	O	O	O	O
	LTE 26	O	O	O	O	O	O	O	-	-	O	O	O	O
Frequency Stability	LTE 5	O	O	O	O	-	O	O	-	-	O	-	O	-
	LTE 26	O	O	O	O	O	O	O	-	-	O	-	O	-
Spurious Emissions at Antenna Terminals	LTE 5	O	O	O	O	-	O	-	O	-	-	O	O	O
	LTE 26	O	O	O	O	O	O	-	O	-	-	O	O	O
Radiates Spurious Emission	LTE 5	O	O	O	O	-	O	-	O	-	-	O	O	O
	LTE 26	O	O	O	O	O	O	-	O	-	-	O	O	O
Note	1. The mark “O” means that this configuration is chosen for testing. 2. The mark “-” means that this configuration is not testing.													

5. Test Case Results

5.1. RF Power Output

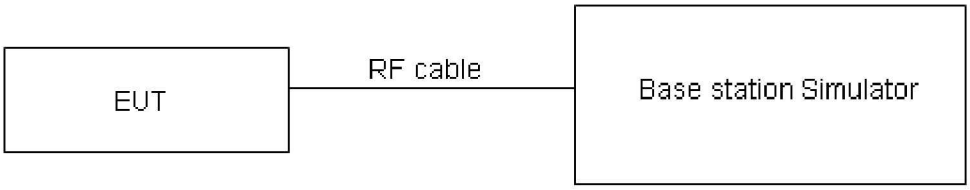
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.4 dB.

Test Results

GSM 850		Conducted Power(dBm)		
		Channel 128	Channel 190	Channel 251
		824.2 (MHz)	836.6 (MHz)	848.8 (MHz)
GPRS (GMSK)	1TXslot	32.25	32.28	32.31
	2TXslots	32.11	32.05	32.10
	3TXslots	31.21	31.26	31.31
	4TXslots	30.01	30.11	30.28
EGPRS (8PSK)	1TXslot	26.58	26.65	26.78
	2TXslots	26.51	26.48	26.61
	3TXslots	26.27	26.28	26.42
	4TXslots	26.05	26.06	26.19

LTE Band 5				Conducted Power(dBm)		
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20407/824.7	20525/836.5	20643/848.3
1.4MHz	QPSK	1	0	22.66	23.15	23.21
		1	3	22.72	23.20	23.43
		1	5	22.60	23.17	23.36
		3	0	22.93	23.14	23.32
		3	2	22.90	23.19	23.22
		3	3	22.89	23.21	23.27
		6	0	22.62	22.71	22.86
	16QAM	1	0	23.79	22.63	23.14
		1	3	23.80	22.78	23.41
		1	5	23.52	22.58	23.15
		3	0	23.44	22.73	22.71
		3	2	23.41	22.81	22.85
		3	3	23.32	22.71	22.91
		5	0	22.67	23.20	23.00
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20415/825.5	20525/836.5	20635/847.5
3MHz	QPSK	1	0	22.68	23.16	23.24
		1	3	22.75	23.25	23.47
		1	5	22.62	23.21	23.39
		3	0	22.96	23.19	23.36
		3	2	22.93	23.24	23.26
		3	3	22.91	23.25	23.32
		6	0	22.70	22.73	22.90
	16QAM	1	0	23.81	22.66	23.16
		1	3	23.83	22.82	23.44
		1	5	23.55	22.60	23.18
		3	0	23.47	22.78	22.75
		3	2	23.43	22.85	22.88
		3	3	23.35	22.76	22.95
		5	0	22.70	23.25	23.04
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20425/826.5	20525/836.5	20625/846.5
5MHz	QPSK	1	0	22.67	23.12	23.22

		1	3	22.73	23.24	23.44
		1	5	22.59	23.16	23.35
		3	0	22.94	23.15	23.33
		3	2	22.90	23.19	23.22
		3	3	22.88	23.22	23.28
		6	0	22.68	22.69	22.85
	16QAM	1	0	23.76	22.64	23.14
		1	3	23.81	22.79	23.42
		1	5	23.52	22.56	23.15
		3	0	23.44	22.76	22.72
		3	2	23.40	22.80	22.84
		3	3	23.33	22.72	22.92
		5	0	22.67	23.20	23.00
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20450/829	20525/836.5	20600/844
10MHz	QPSK	1	0	22.64	23.08	23.19
		1	3	22.72	23.20	23.42
		1	5	22.57	23.15	23.32
		3	0	22.91	23.10	23.29
		3	2	22.88	23.15	23.19
		3	3	22.85	23.17	23.24
		6	0	22.65	22.64	22.81
	16QAM	1	0	23.74	22.60	23.09
		1	3	23.77	22.77	23.38
		1	5	23.50	22.53	23.13
		3	0	23.41	22.72	22.69
		3	2	23.37	22.78	22.81
		3	3	23.30	22.67	22.88
		5	0	22.65	23.16	22.97

LTE Band 26				Conducted Power(dBm)		
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				26797/824.7	26915/836.5	27033/848.3
1.4MHz	QPSK	1	0	22.49	22.97	22.81
		1	3	23.01	23.13	22.94
		1	5	22.67	22.90	22.78
		3	0	22.84	22.77	22.90
		3	2	22.87	22.79	22.87
		3	3	22.77	22.71	22.79
		6	0	22.76	22.74	22.75
	16QAM	1	0	23.58	22.57	22.70
		1	3	23.76	22.75	22.34
		1	5	23.79	22.55	22.56
		3	0	23.30	22.43	22.52
		3	2	22.38	22.51	22.56
		3	3	23.18	22.19	22.50
		5	0	23.10	23.19	22.87
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				26805/825.5	26915/836.5	27025/847.5
3MHz	QPSK	1	0	22.46	22.95	22.77
		1	3	22.99	23.09	22.91
		1	5	22.64	22.85	22.74
		3	0	22.81	22.72	22.86
		3	2	22.85	22.75	22.82
		3	3	22.75	22.69	22.75
		6	0	22.74	22.73	22.73
	16QAM	1	0	23.55	22.53	22.67
		1	3	23.73	22.73	22.31
		1	5	23.76	22.53	22.52
		3	0	23.28	22.39	22.49
		3	2	22.35	22.46	22.52
		3	3	23.15	22.14	22.46
		5	0	23.08	23.15	22.82
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				26815/826.5	26915/836.5	27015/846.5
5MHz	QPSK	1	0	22.48	22.96	22.80

		1	3	23.02	23.14	22.95
		1	5	22.66	22.89	22.77
		3	0	22.84	22.77	22.90
		3	2	22.88	22.80	22.86
		3	3	22.77	22.73	22.80
		6	0	22.82	22.75	22.77
	16QAM	1	0	23.57	22.56	22.69
		1	3	23.76	22.77	22.34
		1	5	23.79	22.55	22.55
		3	0	23.31	22.44	22.53
		3	2	22.37	22.50	22.55
		3	3	23.18	22.19	22.50
		5	0	23.11	23.20	22.86
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				26840/829	26915/836.5	26990/844
10MHz	QPSK	1	0	22.47	22.92	22.78
		1	3	23.00	23.13	22.92
		1	5	22.63	22.84	22.73
		3	0	22.82	22.73	22.87
		3	2	22.85	22.75	22.82
		3	3	22.74	22.70	22.76
		6	0	22.80	22.71	22.72
	16QAM	1	0	23.52	22.54	22.67
		1	3	23.74	22.74	22.32
		1	5	23.76	22.51	22.52
		3	0	23.28	22.42	22.50
		3	2	22.34	22.45	22.51
		3	3	23.16	22.15	22.47
		5	0	23.08	23.15	22.82
BW	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				26865/831.5	26915/836.5	26965/841.5
15MHz	QPSK	1	0	22.44	22.88	22.75
		1	3	22.99	23.09	22.90
		1	5	22.61	22.83	22.70
		3	0	22.79	22.68	22.83
		3	2	22.83	22.71	22.79

		3	3	22.71	22.65	22.72
		6	0	22.77	22.66	22.68
	16QAM	1	0	23.50	22.50	22.62
		1	3	23.70	22.72	22.28
		1	5	23.74	22.48	22.50
		3	0	23.25	22.38	22.47
		3	2	22.31	22.43	22.48
		3	3	23.13	22.10	22.43
		5	0	23.06	23.11	22.79

5.2. Effective Radiated Power

Ambient condition

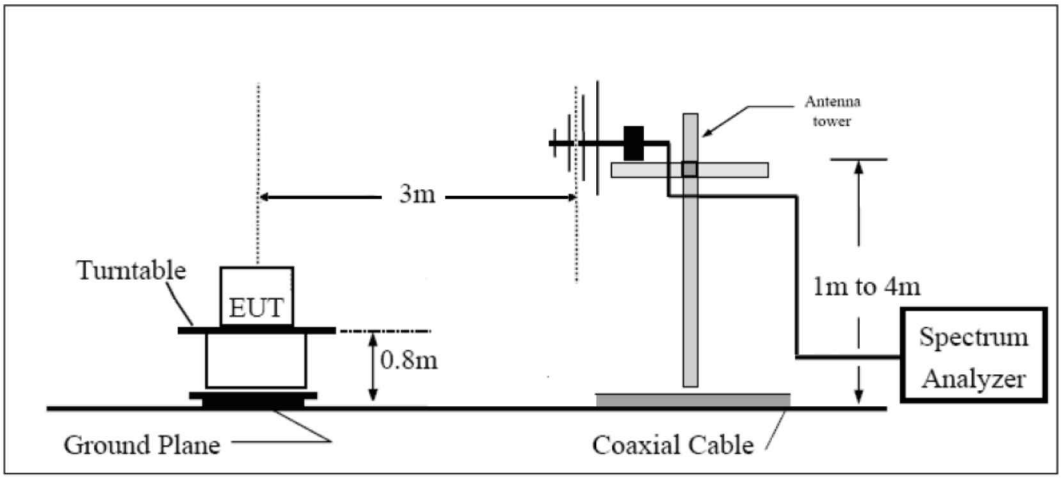
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

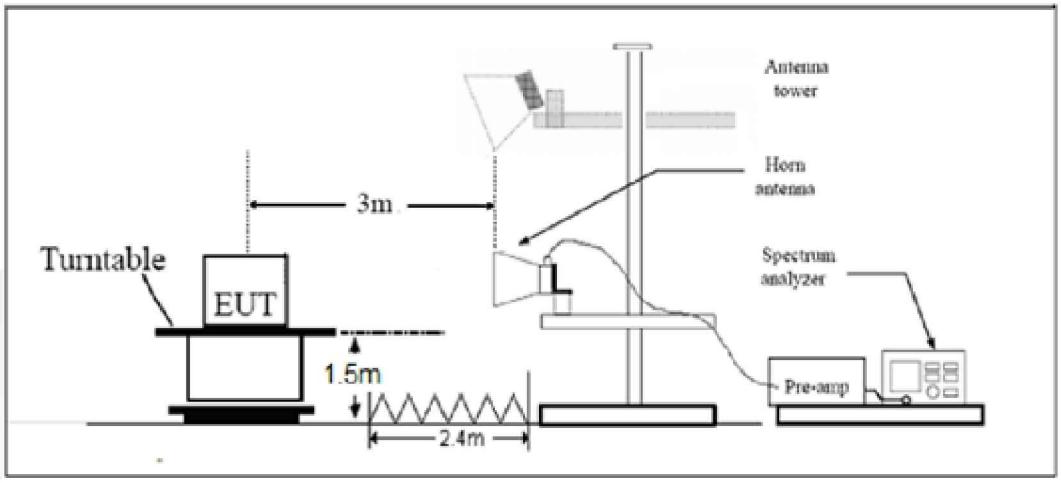
1. The testing follows ANSI C63.26 (2015) Section 5.5.2.3.
2. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna beteen 1.0m and 4.0m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
3. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100kHz,VBW=300kHz for 30MHz to 1GHz,, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + Ga
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

Test configuration

Below 1GHz:



Above 1GHz:



Limits

Rule Part 22.913(a) specifies that "Mobile/portable stations are limited to 7 watts ERP".

Limit	≤ 7 W (38.45 dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 1.19 dB

Test Results:

Mode	Polarization	Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	Limit (dBm)	Conclusion
GPRS 850	H	824.2	-24.38	-45.53	0.00	1.06	32.13	38.45	Pass
	H	836.6	-24.85	-45.38	0.00	1.24	31.80	38.45	Pass
	H	848.8	-25.27	-45.37	0.00	1.38	31.09	38.45	Pass
	V	824.2	-28.28	-45.65	0.00	1.06	28.23	38.45	Pass
	V	836.6	-27.19	-45.46	0.00	1.24	27.18	38.45	Pass
	V	848.8	-37.77	-45.49	0.00	1.38	25.68	38.45	Pass
EGPRS 850	H	824.2	-24.16	-45.53	0.00	1.06	26.43	38.45	Pass
	H	836.6	-24.88	-45.38	0.00	1.24	26.50	38.45	Pass
	H	848.8	-25.23	-45.37	0.00	1.38	26.63	38.45	Pass
	V	824.2	-37.36	-45.65	0.00	1.06	24.93	38.45	Pass
	V	836.6	-37.54	-45.46	0.00	1.24	25.00	38.45	Pass
	V	848.8	-37.48	-45.49	0.00	1.38	25.13	38.45	Pass