RF Exposure Evaluation Declaration

FCC ID:	XMR202009UG89
Application:	Quectel Wireless Solutions Company Limited
Application Type:	Certification
Product:	UMTS/HSPA+Module
Model No.:	UG89
Brand Name:	Quectel
Test Procedure(s):	KDB 447498 D01v06
Test Date:	August 04 ~ August 13, 2020

Reviewed By: Sunny Sun
(Sunny Sun)

Approved By: Robin Wu
(Robin Wu)

Revision History

Report No.	Version	Description	Issue Date	Note
2008RSU006-U2	Rev. 01	Initial Report	08-22-2020	Valid

General Information

Applicant:	Quectel Wireless Solutions Company Limited
Applicant Address:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Manufacturer:	Quectel Wireless Solutions Company Limited
Manufacturer Address:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC accredited (MRT Designation No. CN1166) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.**

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	UMTS/HSPA+ Module
Model No.:	UG89
Brand Name:	Quectel
GSM Features	
Band (s):	GSM850, PCS1900
Tx Frequency Range:	GSM850: 824.2 ~ 848.8MHz, PCS1900: 1850.2 ~ 1909.8MHz
Rx Frequency Range:	GSM850: 869.2 ~ 893.8MHz, PCS1900: 1930.2 ~ 1989.8MHz
Support Slot	Support GPRS & EDGE multi-slot class 12
Modulation:	GMSK, 8-PSK
UMTS Features	
Band (s):	Band II, V
Tx Frequency Range:	WCDMA Band II: 1852.4 ~ 1907.6MHz WCDMA Band V: 826.4 ~ 846.6MHz
Rx Frequency Range:	WCDMA Band II: 1932.4 ~ 1987.6MHz WCDMA Band V: 871.4 ~ 891.6MHz
Modulation:	QPSK, 16QAM (DL only)
Operating Temperature:	-35 ~ 75 °C
Supply Voltage:	3.3 ~ 4.5Vdc, typical 3.8Vdc

Note: The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1.2. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
GSM850	824.2 ~ 848.8	Dipole	2.29
PCS1900	1850.2 ~ 1909.8		1.59
WCDMA Band II	1852.4 ~ 1907.6		1.59
WCDMA Band V	826.4 ~ 846.6		2.29

Note: All antenna information (Antenna type and Peak Gain) is provided by the manufacturer.

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

Calculation Formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

r = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result of RF Exposure Evaluation

Product	UMTS/HSPA+ Module
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Maximum Conducted Power (dBm)	Antenna Gain (dBi)	ERP (EIRP) (dBm)	ERP (EIRP) Limit (dBm)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Gain according to EIRP (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	Result
GSM850	824 ~ 849	25.50	2.29	25.64	38.45	0.0729	0.5500	12.81	14.14	12.81	Pass
PCS1900	1850 ~ 1910	25.00	1.59	26.59	33.00	0.0907	1.0000	6.41	15.04	6.41	Pass
WCDMA Band II	1850 ~ 1910	25.00	1.59	26.59	33.00	0.0907	1.0000	6.41	12.01	6.41	Pass
WCDMA Band V	824 ~ 849	25.00	2.29	25.14	38.45	0.0650	0.5500	13.31	14.61	13.31	Pass

Note: The maximum conducted power is the max tune-up procedure power.

The End

Appendix A – EUT Photograph

Refer to “2008RSU006-UE” file.