



## RF Exposure Evaluation Declaration

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**FCC ID:** XMR2020RM502QAE  
**Application:** Quectel Wireless Solutions Company Limited  
**Application Type:** Certification  
**Product:** 5G Sub-6 GHz M.2 Module  
**Model No.:** RM502Q-AE  
**Brand Name:** Quectel  
**Test Procedure(s):** KDB 447498 D01v06  
**Test Date:** October 08 ~ November 16, 2020

Reviewed By: *Sunny Sun*  
( Sunny Sun )

Approved By: *Robin Wu*  
( Robin Wu )



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

### Revision History

Report No.	Version	Description	Issue Date	Note
2010RSU005-U8	Rev. 01	Initial Report	11-16-2020	Valid

## 1. GENERAL INFORMATION

### 1.1. Applicant

Quectel Wireless Solutions Company Limited  
 Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District,  
 Shanghai, China 200233

### 1.2. Manufacturer

Quectel Wireless Solutions Company Limited  
 Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District,  
 Shanghai, China 200233

### 1.3. Testing Facility

<input checked="" type="checkbox"/>	<b>Test Site - MRT Suzhou Laboratory</b>
	<b>Laboratory Location (Suzhou - Wuzhong)</b>
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
	<b>Laboratory Location (Suzhou - SIP)</b>
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China
	<b>Laboratory Accreditations</b>
	A2LA: 3628.01 <span style="float: right;">CNAS: L10551</span>
	FCC: CN1166 <span style="float: right;">ISED: CN0001</span>
	VCCI: R-20025, G-20034, C-20020, T-20020
<input type="checkbox"/>	<b>Test Site - MRT Shenzhen Laboratory</b>
	<b>Laboratory Location (Shenzhen)</b>
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China
	<b>Laboratory Accreditations</b>
	A2LA: 3628.02 <span style="float: right;">CNAS: L10551</span>
	FCC: CN1284 <span style="float: right;">ISED: CN0105</span>
<input type="checkbox"/>	<b>Test Site - MRT Taiwan Laboratory</b>
	<b>Laboratory Location (Taiwan)</b>
	No. 38, Fuxing 2 <sup>nd</sup> Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
	<b>Laboratory Accreditations</b>
	TAF: L3261-190725
	FCC: 291082, TW3261 <span style="float: right;">ISED: TW3261</span>

## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

Product Name:	5G Sub-6 GHz M.2 Module
Model No.:	RM502Q-AE
Brand Name:	Quectel
IMEI:	Conducted Measurement: 867826050002666 Radiated Measurement: 867826050003060
Operating Temperature:	-20 ~ 60 °C
Power Type:	3.135 ~ 4.4Vdc, typical 3.7Vdc
UMTS Specification	
Single Band:	Band 2, 4, 5
Modulation:	Uplink up to 16QAM, Downlink up to 64QAM
Category:	Category 6
E-UTRA Specification	
Single Band:	Band 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 30, 38, 41, 48, 66, 71
Intra-Band:	CA_2C, CA_5B, CA_7C, CA_38C, CA_41C, CA_66C
Modulation:	UL & DL up to 256QAM
Category:	Category 18
5G NR Specification	
SA Band:	n2, n5, n7, n12, n25, n41, n66, n71, n77
SA UL MIMO Band:	n41
EN-DC Band:	DC_5A_n2A, DC_12A_n2, DC_13A_n2A, DC_2A_n5A DC_30A_n5A, DC_66A_n5A, DC_5A_n7A, DC_12A_n7A DC_2A_n12A, DC_12A_n25A, DC_2A_n41A, DC_25A_n41A DC_26A_n41A, DC_66A_n41A, DC_5A_n66A, DC_12A_n66A DC_13A_n66A, DC_14A_n66A, DC_71A_n66A, DC_2A_n71A DC_7A_n71A, DC_66A_n71A
HPUE Band:	n41, n77 (SA & UL MIMO)
SCS for NR cell:	FDD Band: 15kHz; TDD Band: 30kHz
Modulation:	UL & DL up to 256QAM

## 2.2. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
WCDMA/LTE Band 2, n2	1850 ~ 1910	Dipole	0.25
WCDMA/LTE Band 4	1710 ~ 1755		1.47
WCDMA/LTE Band 5, n5	824 ~ 849		2.68
LTE Band 7, n7	2500 ~ 2570		0.55
LTE Band 12, n12	699 ~ 716		-0.20
LTE Band 13	777 ~ 787		1.54
LTE Band 14	788 ~ 798		2.42
LTE Band 17	704~ 716		-0.20
LTE Band 25, n25	1850 ~ 1915		0.25
LTE Band 26	814~849		2.68
LTE Band 30	2305 ~ 2315		-3.06
LTE Band 38	2570 ~ 2620		0.78
LTE Band 41, n41	2496 ~ 2690		0.78
LTE Band 48	3550 ~ 3700		-4.29
LTE Band 66, n66	1710 ~ 1780		1.47
LTE Band 71, n71	663 ~ 698		1.22
n77	3700 ~ 3980		-4.11

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

### 3. RF Exposure Evaluation

#### 3.1. 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 <sup>2</sup> )	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:  $Pd = (Pout \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

Pd = power density in mW/cm<sup>2</sup>

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<sup>2</sup>. 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.

### 3.2. Test Result of RF Exposure Evaluation

Product	5G Sub-6 GHz M.2 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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Gain according to ERP (EIRP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	Result
WCDMA B2	1850 ~ 1910	25.00	0.25	25.25	33.00	0.0666	1.0000	7.75	11.76	7.75	Pass
WCDMA B4	1710 ~ 1755	25.00	1.47	26.47	30.00	0.0883	1.0000	3.53	10.54	3.53	Pass
WCDMA B5	824 ~ 849	25.00	2.68	25.53	38.45	0.0711	0.5493	12.92	14.08	12.92	Pass
LTE B2	1850 ~ 1910	25.00	0.25	25.25	33.00	0.0666	1.0000	7.75	11.76	7.75	Pass
LTE B4	1710 ~ 1755	25.00	1.47	26.47	30.00	0.0883	1.0000	3.53	10.54	3.53	Pass
LTE B5	824 ~ 849	25.00	2.68	25.53	38.45	0.0711	0.5493	12.92	14.08	12.92	Pass
LTE B7	2500 ~ 2570	25.00	0.55	25.55	33.00	0.0714	1.0000	7.45	11.46	7.45	Pass
LTE B12	699 ~ 716	25.00	-0.20	22.65	44.77	0.0366	0.4660	22.12	17.68	17.68	Pass
LTE B13	777 ~ 787	25.00	1.54	24.39	44.77	0.0547	0.5180	20.38	15.48	15.48	Pass
LTE B14	788 ~ 798	25.00	2.42	25.27	44.77	0.0669	0.5253	19.50	14.54	14.54	Pass
LTE B17	704 ~ 716	25.00	-0.20	22.65	44.77	0.0366	0.4693	22.12	17.65	17.65	Pass
LTE B25	1850 ~ 1915	25.00	0.25	25.25	33.00	0.0666	1.0000	7.75	11.76	7.75	Pass
LTE B26	814 ~ 849	25.00	2.68	25.53	38.45	0.0711	0.5427	12.92	14.14	12.92	Pass
LTE B30	2305 ~ 2315	25.00	-3.06	21.94	23.98	0.0311	1.0000	2.04	15.07	2.04	Pass
LTE B38	2570 ~ 2620	28.00	0.78	28.78	33.00	0.1502	1.0000	4.22	8.23	4.22	Pass
LTE B41	2496 ~ 2690	28.00	0.78	28.78	33.00	0.1502	1.0000	4.22	8.23	4.22	Pass
LTE B48	3550 ~ 3700	25.00	-4.29	20.71	23.00	0.0234	1.0000	2.29	16.30	2.29	Pass
LTE B66	1710 ~ 1780	25.00	1.47	26.47	30.00	0.0883	1.0000	3.53	10.54	3.53	Pass
LTE B71	663 ~ 698	25.00	1.22	24.07	34.77	0.0508	0.4420	10.7	16.49	10.70	Pass

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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Gain according to EIRP (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	Result
n2	1850 ~ 1910	25.00	0.25	25.25	33.00	0.3969	1.0000	7.75	11.76	7.75	Pass
n5	824 ~ 849	25.00	2.68	25.53	38.45	1.3923	0.5493	12.92	14.08	12.92	Pass
n7	2500 ~ 2570	25.00	0.55	25.55	33.00	0.3969	1.0000	7.45	11.46	7.45	Pass
n12	699 ~ 716	25.00	-0.20	22.65	44.77	5.9666	0.4660	22.12	17.68	17.68	Pass
n25	1850 ~ 1915	25.00	0.25	25.25	33.00	0.3969	1.0000	7.75	11.76	7.75	Pass
n41	2496 ~ 2690	28.00	0.78	28.78	33.00	0.3969	1.0000	4.22	8.23	4.22	Pass
n66	1710 ~ 1780	25.00	1.47	26.47	30.00	0.1989	1.0000	3.53	10.54	3.53	Pass
n71	663 ~ 698	25.00	1.22	24.07	34.77	0.5967	0.4420	10.70	16.49	10.7	Pass
n77	3700 ~ 3980	28.00	-4.11	23.89	30.00	0.1989	1.0000	6.11	13.12	6.11	Pass

The End



## **Appendix A – EUT Photograph**

Refer to “2010RSU005-UE” file.