



## RF Exposure Evaluation Declaration

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**FCC ID:** XMR2020EM160RGL2

**Application:** Quectel Wireless Solutions Company Limited

**Application Type:** Certification

**Product:** LTE-A Cat 16 M.2 Module

**Model No.:** EM160R-GL

**Brand Name:** **QUECTEL**

**Test Procedure(s):** KDB 447498 D01v06

**Test Date:** June 12 ~ August 17, 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
2009RSU020-U7	Rev. 01	Initial Report	09-02-2020	Valid

## General Information

<b>Applicant:</b>	Quectel Wireless Solutions Company Limited
<b>Applicant Address:</b>	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
<b>Manufacturer:</b>	Quectel Wireless Solutions Company Limited
<b>Manufacturer Address:</b>	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
<b>Test Site:</b>	MRT Technology (Suzhou) Co., Ltd
<b>Test Site Address:</b>	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 an FCC accredited testing laboratory (MRT Designation No. CN1166) on the FCC website.
- MRT facility is an ISED recognized testing laboratory (MRT Reg. No. CN0001) on the ISED website.
- 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 A2LA under the A2LA Program (Cert. No. 3628.01) and CNAS under the CNAS Program (Cert. No. L10551) in EMC, Safety, Radio, Telecommunications and SAR testing.

## 1. PRODUCT INFORMATION

### 1.1. Equipment Description

Product Name:	LTE-A Cat 16 M.2 Module
Model No.:	EM160R-GL
Brand Name:	<b>QUECTEL</b>
LTE Specification	
Single Band:	Band 2, 4, 5, 7, 12, 13, 14, 25, 26, 30, 38, 41, 48, 66
Intra-Band:	CA_41C
Category:	Category 16
UMTS Specification	
Single Band:	Band 2, 5
Category:	Category 6
Operating Temperature:	-25 ~ 75 °C
Power Type:	3.1 ~ 4.4Vdc, typical 3.7Vdc

### 1.2. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
WCDMA & LTE Band 2	1850 ~ 1910	Dipole	1.15
WCDMA & LTE Band 4	1710 ~ 1755		-0.50
WCDMA & LTE Band 5	824 ~ 849		1.85
LTE Band 7	2500 ~ 2570		1.32
LTE Band 12	699 ~ 716		-2.43
LTE Band 13	777 ~ 787		-0.10
LTE Band 14	788 ~ 798		2.40
LTE Band 25	1850 ~ 1915		1.15
LTE Band 26	814 ~ 849		1.85
LTE Band 30	2305 ~ 2315		-3.64
LTE Band 38	2570 ~ 2620		0.93
LTE Band 41	2496 ~ 2690		0.93
LTE Band 48	3550 ~ 3700		-3.37
LTE Band 66	1710 ~ 1780		-0.50

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 <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:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  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.

## 2.2. Test Result of RF Exposure Evaluation

Product	LTE-A Cat 16 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 EIRP (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	Result
WCDMA B2	1850 ~ 1910	25.00	1.15	26.15	33.00	0.0820	1.0000	6.85	10.86	6.85	Pass
WCDMA B4	1710 ~ 1755	25.00	-0.50	24.50	30.00	0.0561	1.0000	5.50	12.51	5.50	Pass
WCDMA B5	824 ~ 849	25.00	1.85	24.70	38.45	0.0587	0.5493	13.75	12.76	12.76	Pass
LTE B2	1850 ~ 1910	25.00	1.15	26.15	33.00	0.0820	1.0000	6.85	10.86	6.85	Pass
LTE B4	1710 ~ 1755	25.00	-0.50	24.50	30.00	0.0561	1.0000	5.50	12.51	5.50	Pass
LTE B5	824 ~ 849	25.00	1.85	24.70	38.45	0.0587	0.5493	13.75	12.76	12.76	Pass
LTE B7	2500 ~ 2570	25.00	1.32	26.32	33.00	0.0853	1.0000	6.68	10.69	6.68	Pass
LTE B12	699 ~ 716	25.00	-2.43	20.42	44.77	0.0219	0.4660	24.35	17.76	17.76	Pass
LTE B13	777 ~ 787	25.00	-0.10	22.75	44.77	0.0375	0.5180	22.02	14.97	14.97	Pass
LTE B14	788 ~ 798	25.00	2.40	25.25	44.77	0.0666	0.5253	19.52	12.41	12.41	Pass
LTE B25	1850 ~ 1915	25.00	1.15	26.15	33.00	0.0820	1.0000	6.85	10.86	6.85	Pass
LTE B26	814 ~ 849	25.00	1.85	24.70	38.45	0.0587	0.5427	13.75	12.82	12.82	Pass
LTE B30	2305 ~ 2315	25.00	-3.64	21.36	23.98	0.0272	1.0000	2.62	15.65	2.62	Pass
LTE B38	2570 ~ 2620	25.00	0.93	25.93	33.00	0.0779	1.0000	7.07	11.08	7.07	Pass
LTE B41	2496 ~ 2690	26.50	0.93	27.43	33.00	0.1101	1.0000	5.57	9.58	5.57	Pass
LTE B48	3550 ~ 3700	25.00	-3.37	21.63	23.00	0.0290	1.0000	1.37	15.38	1.37	Pass
LTE B66	1710 ~ 1780	25.00	-0.50	24.50	30.00	0.0561	1.0000	5.50	12.51	5.50	Pass

## **Appendix A – EUT Photograph**

Refer to “2009RSU020-UE” file.