



RF Test Report

Applicant: Quectel Wireless Solutions Co., Ltd.
Address: Building 5, Shanghai Business Park Phase III (Area B), No.1016
Tianlin Road, Minhang District, Shanghai, China, 200233
Product: LTE Cat 1 Module
Model No.: EC600U-LA
Brand Name: QUECTEL
FCC ID: XMR2024EC600ULA
Standards: 47 CFR Part 2.1091
FCC KDB 447498 D01 v06
Report No.: PD20240081RF02
Issue Date: 2024/07/09
Test Result: PASS *

* Testing performed at Hefei Panwin Technology Co., Ltd. on the above equipment indicates the product meets the requirements of the relevant standards.

Reviewed By: Charlie Wang

Approved By: Alec Yang

Hefei Panwin Technology Co., Ltd.

Floor 1, Zone E, Plant 2#, Mingzhu Industrial Park, No.106 Chuangxin
Avenue, High-tech Zone, Hefei City, Anhui Province, China
TEL: +86-0551-63811775

Revision History

Report No.	Version	Description	Issue Date	Note
PD20240081RF02	01	Initial Report	2024/07/09	Valid

Remark:

- The samples tested have been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and have been proven to meet the applicable limit requirements.

CONTENTS

1 Test Laboratory	4
1.1 Notes of the Test Report	4
1.2 Testing Laboratory	4
2 General Description of Equipment under Test	4
2.1 Details of Application	4
2.2 Details of EUT	5
3 Test Condition	6
3.1 Laboratory Environment	6
4 Maximum Permissible Exposure (MPE)	7
Appendix A – Test Results	8
Appendix B – The EUT Appearance	11

1 Test Laboratory

1.1 Notes of the Test Report

This report is invalid without signature of auditor and approver or with any alterations. The report shall not be partially reproduced without written approval of the testing company. Entrusted test results are only responsible for incoming samples. If there is any objection to the testing report, it shall be raised to the testing company within 15 days from the date of receiving the report. In the test results, "NA" means "not applicable", and the test items marked with "Δ" are subcontracted projects.

1.2 Testing Laboratory

Company Name	Hefei Panwin Technology Co., Ltd.
Address	Floor 1, Zone E, Plant 2#, Mingzhu Industrial Park, No.106 Chuangxin Avenue, High-tech Zone, Hefei City, Anhui Province, China
Telephone	+86-0551-63811775
Post Code	230031

2 General Description of Equipment under Test

2.1 Details of Application

Applicant	Quectel Wireless Solutions Co., Ltd.
Applicant Address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer Address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233

2.2 Details of EUT

Product	LTE Cat 1 Module
Model	EC600U-LA
Hardware Version	R1.0
Software Version	EC600ULAACR03A06M08
Antenna Type	☒ External ☐ Integrated
Note: The declared of product specification for EUT and/or Antenna presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.	

3 Test Condition

3.1 Laboratory Environment

Temperature	Min.= 20℃, Max.=30℃
Relative Humidity	Min.= 25%, Max.=75%
Ground System Resistance	< 1 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

4 Maximum Permissible Exposure (MPE)

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Table 1 to § 1.1310(e)(1)—Limits for Maximum Permissible Exposure (MPE)				
Frequency Range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3–3.0	614	1.63	*(100)	≤6
3.0–30	1842/f	4.89/f	*(900/f ²)	<6
30–300	61.4	0.163	1.0	<6
300–1,500	--	--	f/300	<6
1,500–100,000	--	--	5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
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
300–1,500	--	--	f/1500	<30
1,500–100,000	--	--	1.0	<30
f = frequency in MHz. * = Plane-wave equivalent power density.				

The transmitter is using external antennas that operate at 20 cm or more from nearby persons. The maximum permitted level is calculated using the general equation:

$$S = PG / 4\pi R^2$$

Where:

S = power density (in appropriate units, e.g. Wm²)

P = power input to the antenna (in appropriate units, e.g., W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., m)

Solve S, the power density at 20 cm is shown in Appendix A, so the limit is kept.

Appendix A – Test Results

A.1 Maximum Measured Conducted Output Power and Antenna Gain

Band	Burst Turn up Power(dBm)	Division Factors (dB)	Time-Averaged Tune up Power (dBm)
GSM850	35.00	-9.03	25.97
GSM1900	32.00	-9.03	22.97

Remark:
To average the power, the division factor is as follows,
1Txslot = 1 transmit time slot out of 8 time slots => conducted power divided by (1/8) => -9.03 dB

Band	TX Freq. (MHz)	Maximum conducted output power (dBm)	Maximum Antenna Gain (dBi)
GSM 850	824 to 849	25.97	2.13
GSM 1900	1850 to 1910	22.97	1.59
LTE Band 2	1850 to 1910	25.00	1.59
LTE Band 4	1710 to 1755	25.00	2.00
LTE Band 5	824 to 849	25.00	2.13
LTE Band 7	2500 to 2570	25.00	3.00
LTE Band 66	1710 to 1780	25.00	2.00

A.2 Test Results of Maximum Permissible Exposure

Band	Frequency (MHz)	Maximum Power (dBm)	Antenna Gain (dBi)	FCC EIRP Limit (dBm)	FCC ERP/EIRP Limit (W)	FCC MPE Result (mW/cm ²)	MPE Limit (mW/cm ²)	FCC MPE Result / FCC MPE Limit Ratio	Ant Gain to Meet FCC MPE limit (dBi)	Ant Gain to Meet FCC ERP/EIRP limit (dBi)	Max Gain Allowed (dBi)
GSM 850	824.0	25.97	2.13	40.60	7.000	0.1284	0.5493	0.2338	8.4	12.5	8.4
GSM 1900	1850.0	22.97	1.59	33.01	2.000	0.0568	1.0000	0.0568	14.0	10.0	10.0
LTE Band 2	1850.0	25.00	1.59	33.01	2.000	0.0907	1.0000	0.0907	12.0	8.0	8.0
LTE Band 4	1710.0	25.00	2.00	30.00	1.000	0.0997	1.0000	0.0997	12.0	5.0	5.0
LTE Band 5	824.0	25.00	2.13	40.60	7.000	0.1027	0.5493	0.1870	9.4	13.5	9.4
LTE Band 7	2500.0	25.00	3.00	33.01	2.000	0.1255	1.0000	0.1255	12.0	8.0	8.0
LTE Band 66	1710.0	25.00	2.00	30.00	1.000	0.0997	1.0000	0.0997	12.0	5.0	5.0
Bluetooth	2402.0	23.00	5.00	NA	NA	0.1255	1.0000	0.1255	NA	NA	NA
WLAN 2.4GHz	2412.0	23.00	5.00	NA	NA	0.1255	1.0000	0.1255	NA	NA	NA
WLAN 5GHz	5180.0	23.00	5.00	NA	NA	0.1255	1.0000	0.1255	NA	NA	NA

Note 1: For mobile or fixed location transmitters, minimum separation distance is 20cm, even if calculations indicate EMF distance is less.

Note 2: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

Note 3: Chose the maximum RF output tune up power of all antennas among same frequency WWAN bands and the maximum antenna gain to perform MPE calculation conservatively.

Note 4: This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN is less than or equal to 28dBm and for Bluetooth is less than or equal to 28dBm.

Note 5: A maximum antenna gain of 5dBi for WLAN/BT has been assumed for all collocated antennas.

A.3 Exposure calculations for multiple sources

In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

The product also has multiple transmitters The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	WWAN + WiFi 2.4G + WiFi 5G + Bluetooth

No.	Mode	Result Ratio	Total Ratio	Limit	Result
1	GSM 850*	0.2338	0.6103	1.0000	PASS
	Bluetooth	0.1255			
	WLAN2.4GHz	0.1255			
	WLAN5GHz	0.1255			

Remark*: This WWAN Band was recalculated on worst Band.

Note: Considering the WWAN module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.

Appendix B – The EUT Appearance

Refer to “Attachment A.1: External Photograph” and “ Attachment A.2: Internal Photograph” file.

***** End of the Report *****