



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: 5G Sub-6 GHz LGA Module
Model No.: RG500U-LA
Brand Name: QUECTEL
FCC ID: XMR2023RG500ULA
Standards: 47 CFR Part 2.1091
FCC KDB 447498 D01 v06
Report No.: PD20230197RF03
Issue Date: 2024/03/01
Test Result: PASS *

* The above equipment has been tested and compliance with the requirement of the relative standards by Hefei Panwin Technology Co., Ltd.

Reviewed By: Jerry Zhang

Approved By: Alec Yang

Hefei Panwin Technology Co., Ltd.

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Revision History

Report No.	Version	Description	Issue Date	Note
PD20230197RF03	1	Initial Report	2024/03/01	Valid

Remark:

- We, Hefei Panwin Technology Co., Ltd., would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Hefei Panwin Technology Co., Ltd., the test report shall not be reproduced except in full.

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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	5G Sub-6 GHz LGA Module
Model	RG500U-LA
Hardware Version	R1.0
Software Version	RG500ULAAAR03A03M4G
SN	Conducted: D1Y23J94F000137 Radiated: D1Y23J94F000093
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	TX Freq. (MHz)	Maximum conducted output power (dBm)	Antenna Gain (dBi)
UMTS Band II	1850 to 1910	25.00	1.37
UMTS Band IV	1710 to 1755	25.00	1.14
UMTS Band V	824 to 849	25.00	1.18
LTE Band 2	1850 to 1910	25.00	1.37
LTE Band 4	1710 to 1755	25.00	1.14
LTE Band 5	824 to 849	25.00	1.18
LTE Band 7	2500 to 2570	25.00	1.48
LTE Band 26 (814 to 824)	814 to 824	25.00	1.18
LTE Band 26 (824 to 849)	824 to 849	25.00	1.18
LTE Band 38	2570 to 2620	25.00	0.81
LTE Band 66	1710 to 1780	25.00	1.37
LTE Band 71	663 to 698	25.00	-1.00
NR Band n2	1850 to 1910	25.00	1.37
NR Band n5	824 to 849	25.00	1.18
NR Band n7	2500 to 2570	25.00	1.48
NR Band n38	2570 to 2620	25.00	0.81
NR Band n66	1710 to 1780	25.00	1.37
NR Band n71	663 to 698	25.00	-1.00
NR Band n78 (3450 to 3550)	3450 to 3550	28.00	2.00

A.2 Test Results of Maximum Permissible Exposure

Band	Maximum Power (dBm)	Antenna Gain (dBi)	FCC EIRP Limit (dBm)	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 to meet FCC ERP/ EIRP and MPE limit (dBi)	Max gain allowed (dBi)
WCDMA Band II	25.00	1.37	33.01	1.0000	0.0862	12.0	8.0	8.0	8.0
WCDMA Band IV	25.00	1.14	30.00	1.0000	0.0818	12.0	5.0	5.0	5.0
WCDMA Band V	25.00	1.18	40.60	0.5493	0.1503	9.4	13.5	9.4	9.4
LTE Band 2	25.00	1.37	33.01	1.0000	0.0862	12.0	8.0	8.0	8.0
LTE Band 4	25.00	1.14	30.00	1.0000	0.0818	12.0	5.0	5.0	5.0
LTE Band 5	25.00	1.18	40.60	0.5493	0.1503	9.4	13.5	9.4	9.4
LTE Band 7	25.00	1.48	33.01	1.0000	0.0885	12.0	8.0	8.0	8.0
LTE Band 26 (814 to 824)	25.00	1.18	52.15	0.5427	0.1521	9.4	25.0	9.4	9.4
LTE Band 26 (824 to 849)	25.00	1.18	40.60	0.5493	0.1503	9.4	13.5	9.4	9.4
LTE Band 38	25.00	0.81	33.01	1.0000	0.0758	12.0	8.0	8.0	8.0
LTE Band 66	25.00	1.37	30.00	1.0000	0.0862	12.0	5.0	5.0	5.0
LTE Band 71	25.00	-1.00	36.92	0.4420	0.1131	8.5	9.8	8.5	8.5
NR Band n2	25.00	1.37	33.01	1.0000	0.0862	12.0	8.0	8.0	8.0
NR Band n5	25.00	1.18	40.60	0.5493	0.1503	9.4	13.5	9.4	9.4
NR Band n7	25.00	1.48	33.01	1.0000	0.0885	12.0	8.0	8.0	8.0
NR Band n38	25.00	0.81	33.01	1.0000	0.0758	12.0	8.0	8.0	8.0
NR Band n66	25.00	1.37	30.00	1.0000	0.0862	12.0	5.0	5.0	5.0
NR Band n71	25.00	-1.00	36.92	0.4420	0.1131	8.5	9.8	8.5	8.5
NR Band n78 (3450 to 3550)	28.00	2.00	30.00	1.0000	0.1989	9.0	2.0	2.0	2.0

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.

A.3 Collocated Power Density Calculation

WWAN LTE Worst case situation	WWAN NR Worst case situation	Σ Worst case situation of WWAN LTE + WWAN NR
0.1521	0.1989	0.3511

Note:

1. For collocation analysis, LTE band 26 is chosen for summation due to the highest (power density/limit) among all LTE modes.
2. For collocation analysis, NR n78 is chosen for summation due to the highest (power density/limit) among all NR modes.
3. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN LTE+ WWAN NR.
4. Considering the WWAN LTE module collocation with the WWAN NR transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant.

Appendix B – The EUT Appearance

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

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