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 NR Module
Model No.:	AG568N-NA
Brand Name:	QUECTEL
FCC ID:	XMR2024AG568NNA
Standards:	47 CFR Part 2.1091 FCC KDB 447498 D01 v06
Report No.:	PD20230212RF03
Issue Date:	2024/03/22
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.

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
PD20230212RF03	1	Initial Report	2024/03/22	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.

CONTENTS

Test Report

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 NR Module		
Model	AG568N-NA		
Hardware Version	R2.0		
Software Version	AG568NAAR06A13M8G_OCPU		
SN	Conducted: E1A23LJ15000062 Radiated: E1A23LJ15000019		
Antenna Type	☑ External ☐ Integrated		
Frequency Band(s)	**Band**	**Tx (MHz)**	**Rx (MHz)**
	LTE Band 2	1850 to 1910	1930 to 1990
	LTE Band 4	1710 to 1755	2110 to 2155
	LTE Band 5	824 to 849	869 to 894
	LTE Band 12	699 to 716	729 to 746
	LTE Band 66	1710 to 1780	2110 to 2200
	NR Band n2	1850 to 1910	1930 to 1990
	NR Band n5	824 to 849	869 to 894
	NR Band n12	699 to 716	729 to 746
	NR Band n66	1710 to 1780	2110 to 2200
	NR Band n77	3700 to 3980 3450 to 3550	3700 to 3980 3450 to 3550
	NR Band n78	3700 to 3800 3450 to 3550	3700 to 3800 3450 to 3550

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. Wm^2)

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)	Maximum Antenna Gain (dBi)
LTE Band 2	1850 to 1910	25.00	0.98
LTE Band 4	1710 to 1755	25.00	0.54
LTE Band 5	824 to 849	25.00	0.12
LTE Band 12	699 to 716	25.00	0.97
LTE Band 66	1710 to 1780	25.00	0.54
NR Band n2	1850 to 1910	25.00	0.98
NR Band n5	824 to 849	25.00	0.12
NR Band n12	699 to 716	25.00	0.98
NR Band n66	1710 to 1780	25.00	0.54
NR Band n77	3450 to 3550	28.00	-1.50
NR Band n77	3700 to 3980	28.00	-1.50
NR Band n78	3450 to 3550	28.00	-1.50
NR Band n78	3700 to 3800	28.00	-1.50

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)
LTE Band 2	25.00	0.98	33.01	1.0000	0.0788	12.0	8.0	8.0	8.0
LTE Band 4	25.00	0.54	30.00	1.0000	0.0712	12.0	5.0	5.0	5.0
LTE Band 5	25.00	0.12	40.60	0.5493	0.1177	9.4	13.5	9.4	9.4
LTE Band 12	25.00	0.97	36.92	0.4660	0.1688	8.7	9.8	8.7	8.7
LTE Band 66	25.00	0.54	30.00	1.0000	0.0712	12.0	5.0	5.0	5.0
NR Band n2	25.00	0.98	33.01	1.0000	0.0788	12.0	8.0	8.0	8.0
NR Band n5	25.00	0.12	40.60	0.5493	0.1177	9.4	13.5	9.4	9.4
NR Band n12	25.00	0.98	36.92	0.4660	0.1692	8.7	9.8	8.7	8.7
NR Band n66	25.00	0.54	30.00	1.0000	0.0712	12.0	5.0	5.0	5.0
NR Band n77 (3450 to 3550)	28.00	-1.50	30.00	1.0000	0.0889	9.0	2.0	2.0	2.0
NR Band n77 (3700 to 3980)	28.00	-1.50	30.00	1.0000	0.0889	9.0	2.0	2.0	2.0
NR Band n78 (3450 to 3550)	28.00	-1.50	30.00	1.0000	0.0889	9.0	2.0	2.0	2.0
NR Band n78 (3700 to 3800)	28.00	-1.50	30.00	1.0000	0.0889	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	WWAM NR Worst case situation	Σ Worst case situation of WWAN LTE + WWAN NR
0.1688	0.1688	0.3376

Note:

1. For collocation analysis, LTE band 12 is chosen for summation due to the highest (power density/limit) among all LTE modes.

2.For collocation analysis, NR n12 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 A.1: External Photograph" and " Attachment A.2: Internal Photograph" file.

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