

RF Exposure Evaluation Declaration

FCC ID: 2AAJGR5020
Applicant: Guangzhou Robustel Co., Ltd.
Product: High Speed Smart 5G Router
Model No.: R5020-5G-A09GL-A, R5020-5G-A09GL-B
Trademark: 
FCC Rule Part(s): Part15 Subpart C (Section 15.247)
Result: Complies

Reviewed By:

Vincent Yu

Approved By:

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.

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Revision History

Report No.	Version	Description	Issue Date	Note
2208RSU044-U3	Rev. 01	Initial Report	2022-11-11	Valid

CONTENTS

Description	Page
1. General Information	4
1.1. Applicant.....	4
1.2. Manufacturer	4
1.3. Testing Facility.....	4
1.4. Product Information	5
1.5. Antenna Details.....	5
1.6. Device Classification	6
2. RF Exposure Evaluation.....	7
2.1. Test Limits	7
2.2. Test Result.....	8

1. General Information

1.1. Applicant

Guangzhou Robustel Co., Ltd.
 501, Building #2,63 Yongan Road, Huangpu District, Guangzhou

1.2. Manufacturer

Guangzhou Robustel Co., Ltd.
 501, Building #2,63 Yongan Road, Huangpu District, Guangzhou

1.3. Testing Facility

<input type="checkbox"/>	Test Site – MRT Suzhou Laboratory Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China Laboratory Accreditations A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: <input type="checkbox"/> R-20025 <input type="checkbox"/> G-20034 <input type="checkbox"/> C-20020 <input type="checkbox"/> T-20020 <input type="checkbox"/> R-20141 <input type="checkbox"/> G-20134 <input type="checkbox"/> C-20103 <input type="checkbox"/> T-20104
<input type="checkbox"/>	Test Site – MRT Shenzhen Laboratory Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China Laboratory Accreditations A2LA: 3628.02 CNAS: L10551 FCC: CN1284 ISED: CN0105
<input type="checkbox"/>	Test Site – MRT Taiwan Laboratory Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) Laboratory Accreditations TAF: L3261-190725 FCC: 291082, TW3261 ISED: TW3261

1.4. Product Information

Product Name	High Speed Smart 5G Router
Model No.	R5020-5G-A09GL-A, R5020-5G-A09GL-B
Wi-Fi Specification	802.11a/b/g/n/ac
Antenna Information	Refer to Section 1.5
Power Type	AC Adapter Input or PoE Input
Operating Environment	Vehicle Use and Indoor Use
Operating Temperature	-25 to +70 °C
Input Voltage	9 to 36V DC (without Ignition sensing) 10 to 30V DC (with Ignition sensing)
Accessories	
Adapter	Model: GQ24-120150-AX Input: 100-240V ~ 50/60Hz, 1.0A Max Output: 12.0V, 1.5A, 18W
Remark:	
<ol style="list-style-type: none"> 1. This device contains a certified WCDMA/LTE/5G NR module (FCC ID: XMR2020RM500QAE). 2. Model difference information refers to Applicant's model difference declaration letter. 3. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. 	

1.5. Antenna Details

Antenna Type	Frequency Band (MHz)	N _{SS}	Max. Peak Gain (dBi)	Max. Peak Gain (at any elevation angle above 30 degrees)	CDD Directional Gain (dBi)	
					For Power	For PSD
Wi-Fi Antenna (2*2 MIMO)						
Dipole Antenna #1	2.400 ~ 2483.5	1	2.0	--	2.0	5.01
	5150 ~ 5250	1	3.0	3.0	3.0	6.01
	5725 ~ 5850		3.0	--	3.0	6.01
Dipole Antenna #2	2.400 ~ 2483.5	1	3.1	--	3.1	6.11
	5150 ~ 5250	1	2.4	2.4	2.4	5.41
	5725 ~ 5850		2.4	--	2.4	5.41

Note: The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 2$, $N_{SS} = 1$.

If all antennas have the same gain, G_{ANT} , Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

$$\text{Array Gain} = 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.01;$$

- For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB for $N_{\text{ANT}} \leq 4$;

1.6. Device Classification

According to the user manual, the antenna of this device is at least 24 cm away from the body of the user, this device is classified as a Mobile Device. So, the RF exposure evaluation requirements of § 2.1091 for mobile device exposure conditions subject to MPE limits.

2. RF Exposure Evaluation

2.1. Test Limits

According to FCC Part 2.1091, A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the RF source's radiating structure(s) and the body of the user or nearby persons.

According to FCC Part 1.1307(b)(3)(i)(C), for the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1.920 R ²
1.34-30	3.450 R ² /f ²
30-300	3.83 R ²
300-1500	0.0128 R ² f
1500-100,000	19.2 R ²

f = frequency in MHz, R = minimum separation distance in meters.

According to FCC Part 1.1307(b)(3)(ii)(B), in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

2.2. Test Result

Product	High Speed Smart 5G Router
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Max. Conducted Power (dBm)	Max. Antenna Gain (dBi)	Max. EIRP (dBm)	Compliance Distance (R) (cm)	ERP (W)	Threshold ERP (W)
802.11b/g/n/	2412 ~ 2462	16.02	3.1	19.12	24.0	0.0498	1.106
802.11a/n/ac	5180 ~ 5240	17.68	3.0	20.68	24.0	0.0713	1.106
	5745 ~ 5825	18.43	3.0	21.43	24.0	0.0847	1.106
WCDMA B2	1850 ~ 1910	25.00	4.0	29.00	24.0	0.4842	1.106
WCDMA B4	1710 ~ 1755	25.00	4.0	29.00	24.0	0.4842	1.106
WCDMA B5	824 ~ 849	25.00	2.0	27.00	24.0	0.3055	0.608
LTE B2	1850 ~ 1910	25.00	4.0	29.00	24.0	0.4842	1.106
LTE B4	1710 ~ 1755	25.00	4.0	29.00	24.0	0.4842	1.106
LTE B5	824 ~ 849	25.00	2.0	27.00	24.0	0.3055	0.608
LTE B7	2500 ~ 2570	25.00	4.0	29.00	24.0	0.4842	1.106
LTE B12	699 ~ 716	25.00	2.0	27.00	24.0	0.3055	0.515
LTE B13	777 ~ 787	25.00	2.0	27.00	24.0	0.3055	0.573
LTE B14	788 ~ 798	25.00	2.0	27.00	24.0	0.3055	0.581
LTE B17	704 ~ 716	25.00	2.0	27.00	24.0	0.3055	0.519
LTE B25	1850 ~ 1915	25.00	4.0	29.00	24.0	0.4842	1.106
LTE B26	814 ~ 849	25.00	2.0	27.00	24.0	0.3055	0.600
LTE B30	2305 ~ 2315	25.00	4.0	29.00	24.0	0.4842	1.106
LTE B38	2570 ~ 2620	25.00	4.0	29.00	24.0	0.4842	1.106
LTE B41	2496 ~ 2690	25.00	4.0	29.00	24.0	0.4842	1.106
LTE B48	3550 ~ 3700	25.00	3.5	28.50	24.0	0.4315	1.106
LTE B66	1710 ~ 1780	25.00	4.0	29.00	24.0	0.4842	1.106
LTE B71	663 ~ 698	25.00	2.0	27.00	24.0	0.3055	0.489
n2	1850 ~ 1910	25.00	4.0	29.00	24.0	0.4842	1.106
n5	824 ~ 849	25.00	2.0	27.00	24.0	0.3055	0.608
n7	2500 ~ 2570	25.00	4.0	29.00	24.0	0.4842	1.106
n12	699 ~ 716	25.00	2.0	27.00	24.0	0.3055	0.515
n25	1850 ~ 1915	25.00	4.0	29.00	24.0	0.4842	1.106
n41	2496 ~ 2690	28.00	4.0	32.00	24.0	0.9661	1.106
n66	1710 ~ 1780	25.00	4.0	29.00	24.0	0.4842	1.106

n71	663 ~ 698	25.00	2.0	27.00	24.0	0.3055	0.489
n77	3700 ~ 3980	28.00	3.5	31.50	24.0	0.8610	1.106

Note:

1. EIRP (dBm) = Max. Conducted Power (dBm) + Max. Antenna Gain (dBi)
2. $ERP (W) = 10^{[ERP (dBm) - 30]/10} = 10^{[EIRP (dBm) - 2.15 (dB) - 30]/10}$
3. The maximum conducted power for WCDMA/LTE/5G NR bands refer to the MPE report of FCC ID: XMR2020RM500QAE.

Operating Condition	WWAN Ant 0	WCDMA/LTE/5G NR Main Antenna (1Tx, 1Rx)
	WWAN Ant 1 + Ant 2	5G NR-MIMO Antenna (2TX, 2RX)
	WWAN Ant 3	WCDMA/LTE/5G NR Diversity Antenna (RX Only)
	WLAN Wi-Fi 1 Antenna +	802.11b/g/n for 2.4GHz Wi-Fi (2Tx, 2Rx)
	WLAN Wi-Fi 2 Antenna	802.11a/n/ac for 5GHz Wi-Fi (2Tx, 2Rx)
Simultaneously Transmitting Scenarios	WLAN (Wi-Fi 1 ANT + Wi-Fi 2 ANT) transmit simultaneously; WWAN Ant 0 transmit simultaneously with WLAN Wi-Fi 1 and Wi-Fi 2 Antenna WWAN Ant 1 + Ant 2 transmit simultaneously with WLAN Wi-Fi 1 and Wi-Fi 2 Antenna	

Worst-case mode: 2.4GHz WLAN + 5GHz WLAN NII-3 + 5G NR n41.

$$\text{Exposure Ratio} = 0.0498 / 1.106 + 0.0847 / 1.106 + 0.9661 / 1.106 = 0.9951 < 1.$$

Therefore, this device meets the RF Exposure requirements when it is installed and operated with a minimum distance of 24 cm between the radiator and user.

_____ The End _____