

RF EXPOSURE Test Report

Product: Android board

Trade Mark: 

Model Number: RCS-3901

FCC ID: 2BAL6-RCS-3901

Prepared for

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's Name : Rcstars Industrial (Shenzhen) Co., LTD.
Address : 7/F, 2ND Bldg, Senyang High-Tech Park, No.7 Road,
Guangming High-Tech Park District, Shenzhen, China
Manufacturer's Name : Rcstars Industrial (Shenzhen) Co., LTD.
Address : 7/F, 2ND Bldg, Senyang High-Tech Park, No.7 Road,
Guangming High-Tech Park District, Shenzhen, China

Product description

Product name : Android board
Model Number : RCS-3901

Standards : FCC CFR 47 PART 1 , 1.1310

Test procedure : KDB 447498 D01 General RF Exposure Guidance v06

This device described above has been tested by Shenzhen HongBiao Certification& Testing Co., Ltd and the test results show that the equipment under test (EUT) is in compliance with the EMC requirements. And it is applicable only to the tested sample identified in the report.

Date of Test :

Date (s) of performance of tests : Oct. 12, 2023~Dec. 08, 2023

Test Result..... : **Pass**

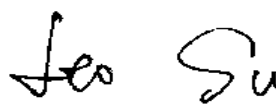
Testing Engineer :


(Z o e S u)

Technical Manager :


(G a r y L u)

Authorized Signatory :


(L e o S u)

[illegible]

1 General Description

1.1 Description of EUT

Product name:	Android board
Model name:	RCS-3901
Series Model:	N/A
Different of series model:	N/A
Operation frequency:	802.11b/g/n20:2412~2462 MHz 802.11n40:2422~2452 MHz U-NII-1: 5180 MHz to 5240 MHz, U-NII-2A: 5260 MHz to 5320 MHz, U-NII-2C: 5500 MHz to 5700 MHz, U-NII-3: 5745 MHz to 5825 MHz
Modulation type:	IEEE 802.11b : DSSS (DBPSK, DQPSK, CCK) IEEE 802.11g/n (HT20/HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK) OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n/ac;
Bit Rate of transmitter:	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20MHz) use 800 ns GI: 65.0/58.5/52.0/39.0/26.0/19.5/13.0/6.5 Mbps (MCS0~MCS7) 802.11n(40MHz) use 800 ns GI: 13.5/27/40.5/54/81/108/121.5/135Mbps 802.11a: Up to 54 Mbps 802.11n-HT20: Up to MCS7 802.11n-HT40: Up to MCS7 802.11ac-VHT20: Up to MCS8 802.11ac-VHT40: Up to MCS9 802.11ac-VHT80: Up to MCS9
Antenna type:	Built-in antenna
Antenna gain:	2.4G WiFi: 3.6dBi U-NII-1: 3.32dBi U-NII-2A: 1.83dBi U-NII-2C: 3.55dBi U-NII-3: 3.55dBi
Max. output power:	17.93dBm
Hardware version:	RCS-3901 V2.0
Software version:	Android 11
Battery:	N/A
Power supply:	DC 12V from adapter AC 120V/60Hz

Adapter information:	N/A
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1.2 Test Mode

Pretest Test Mode	Description of Mode
1	TX
2	/
3	/

1.3 Test Setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

1.4 Ancillary Equipment

Equipment	Model	S/N	Manufacturer
/	/	/	/

2 Test Facilities and Accreditations

2.1 Test Laboratory

Test Site	Shenzhen HongBiao Certification& Testing Co., Ltd
Test Site Location	Room 102, 201, Building 2, Yuanwanggu RFID Industrial Park, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen, China
Telephone:	(86-755) 2998 9321
Fax:	(86-755) 2998 5110
FCC Registration No.:	CN1341
A2LA Certificate No.:	6765.01

2.2 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15°C~35°C
Relative Humidity:	20%~75%
Air Pressure:	98kPa~101kPa

2.3 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Measurement Frequency Range	U, (dB)	Note
RF frequency	2×10^{-5}	
RF power, conducted	± 0.57 dB	
Conducted emission(150kHz~30MHz)	± 2.5 dB	
Radiated emission(30MHz~1GHz)	± 4.2 dB	
Radiated emission (above 1GHz)	± 4.7 dB	
Temperature	± 1 degree	
Humidity	± 5 %	
Occupied channel bandwidth	± 3 %	

2.4 Test Software

Software name	Manufacturer	Model	Version
Conducted test system	MWRF-test	MTS 8310	V2.0.0

3 List of Test Equipment

RF							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E041	MXG Anaio Signal Generator	Agilent	N5181A	MY47070421	2023-05-11	2024-05-10
2	HB-E042	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	132108	2023-05-11	2024-05-10
3	HB-E043	MXG Anaio Signal Generator	Agilent	N5182A	US46240335	2023-05-11	2024-05-10
4	HB-E044	Signal & spectrum Analyzer	R&S	FSV3044	101264	2023-05-11	2024-05-10
5	HB-E045	RF Control Box	Noyetec	NY100-R FCB	N/A	/	/
6	HB-E058	Thermometer Clock Humidity Monitor	N/A	HTC-1	N/A	/	/

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

4 RF Exposure

4.1 Standalone SAR test exclusion considerations

4.1.1. Limit

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).

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)
(A) 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
(B) 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

MPE Calculation Method

Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where

P_d = Power density in mW/cm²

P_{out} = output power to antenna in mW

G = Numeric gain of the antenna relative to isotropic antenna

π = 3.1415926

R = distance between observation point and center of the radiator in cm(20cm)

P_d the limit of MPE, 1mW/cm².

If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

4.1.2. Test Result

2.4GWiFi:

Operation Frequency: WIFI 802.11b/g/n HT20: 2412-2462MHz,

802.11n HT40: 2422-2452MHz,

Power density limited: 1mW/ cm²

5GWiFi:

Operation Frequency:

U-NII-1: 5150 MHz to 5250 MHz,

U-NII-2A: 5250 MHz to 5350 MHz,

U-NII-2C: 5470 MHz to 5725 MHz,

U-NII-3: 5725 MHz to 5850 MHz

802.11a: 20 MHz

802.11n: 20 MHz, 40 MHz

802.11ac: 20 MHz, 40 MHz, 80MHz

Antenna Type: Built-in antenna;
WIFI antenna gain: 5dBi
R=20cm
 $mW=10^{(dBm/10)}$
antenna gain Numeric= $10^{(dBi/10)}=10^{(3/10)}=2$

2.4GWiFi:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna		Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	17.81	17±1	18	63.096	3.6	2.29	0.02876	1
2437		17.54	17±1	18	63.096	3.6	2.29	0.02876	1
2462		17.71	17±1	18	63.096	3.6	2.29	0.02876	1
2412	802.11g	17.65	17±1	18	63.096	3.6	2.29	0.02876	1
2437		17.69	17±1	18	63.096	3.6	2.29	0.02876	1
2462		17.69	17±1	18	63.096	3.6	2.29	0.02876	1
2412	802.11n H20	17.26	17±1	18	63.096	3.6	2.29	0.02876	1
2437		17.26	17±1	18	63.096	3.6	2.29	0.02876	1
2462		17.16	17±1	18	63.096	3.6	2.29	0.02876	1
2422	802.11n H40	17.93	17±1	18	63.096	3.6	2.29	0.02876	1
2437		17.71	17±1	18	63.096	3.6	2.29	0.02876	1
2452		17.6	17±1	18	63.096	3.6	2.29	0.02876	1

5GWiFi: UNII-1

Frequency (MHz)	Modulation mode	conducted power	Tune-up power	Max		Antenna		Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
5180	11a	12.64	12±1	13	19.953	3.32	2.15	0.00853	1
5200	11a	11.85	11±1	12	15.849	3.32	2.15	0.00677	1
5240	11a	11.62	11±1	12	15.849	3.32	2.15	0.00677	1
5180	11n (HT20)	11.54	11±1	12	15.849	3.32	2.15	0.00677	1
5200	11n (HT20)	11.46	11±1	12	15.849	3.32	2.15	0.00677	1
5240	11n (HT20)	11.34	11±1	12	15.849	3.32	2.15	0.00677	1
5190	11n (HT40)	12.64	12±1	13	19.953	3.32	2.15	0.00853	1
5230	11n (HT40)	11.85	11±1	12	15.849	3.32	2.15	0.00677	1
5180	11ac (HT20)	11.46	11±1	12	15.849	3.32	2.15	0.00677	1
5200	11ac (HT20)	11.41	11±1	12	15.849	3.32	2.15	0.00677	1
5240	11ac (HT20)	11.25	11±1	12	15.849	3.32	2.15	0.00677	1

5190	11ac (HT40)	11.92	11±1	12	15.849	3.32	2.15	0.00677	1
5230	11ac (HT40)	11.8	11±1	12	15.849	3.32	2.15	0.00677	1
5210	11ac (HT80)	10.02	10±1	11	12.589	3.32	2.15	0.00538	1

5GWiFi: U-NII-2A

Frequency (MHz)	Modulation mode	conducted power	Tune-up power	Max		Antenna		Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
		Ant A	Ant A	Ant A	Ant A	Ant A	Ant A	Ant A	
5260	11a	11.49	11±1	12	15.849	1.83	1.52	0.00481	1
5280	11a	11.07	11±1	12	15.849	1.83	1.52	0.00481	1
5320	11a	11.68	11±1	12	15.849	1.83	1.52	0.00481	1
5260	11n (HT20)	11.34	11±1	12	15.849	1.83	1.52	0.00481	1
5280	11n (HT20)	10.7	10±1	11	12.589	1.83	1.52	0.00382	1
5320	11n (HT20)	11.44	11±1	12	15.849	1.83	1.52	0.00481	1
5270	11n (HT40)	11.87	11±1	12	15.849	1.83	1.52	0.00382	1
5310	11n (HT40)	10.62	10±1	11	12.589	1.83	1.52	0.00481	1
5260	11ac (HT20)	11.43	11±1	12	15.849	1.83	1.52	0.00481	1
5280	11ac (HT20)	10.74	10±1	11	12.589	1.83	1.52	0.00382	1
5320	11ac (HT20)	11.57	11±1	12	15.849	1.83	1.52	0.00481	1
5270	11ac (HT40)	10.67	10±1	11	12.589	1.83	1.52	0.00382	1
5310	11ac (HT40)	10.55	10±1	11	12.589	1.83	1.52	0.00382	1
5290	11ac (HT80)	9.83	9±1	10	15.849	1.83	1.52	0.00303	1

5GWiFi: U-NII-2C

Frequency (MHz)	Modulation mode	conducted power	Tune-up power	Max		Antenna		Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
		Ant A	Ant A	Ant A	Ant A	Ant A	Ant A	Ant A	
5500	11a	10.97	10±1	11	12.589	3.55	2.26	0.00567	1
5600	11a	11.29	11±1	12	15.849	3.55	2.26	0.00714	1
5700	11a	11.98	11±1	12	15.849	3.55	2.26	0.00714	1
5500	11n (HT20)	10.97	10±1	11	12.589	3.55	2.26	0.00567	1
5600	11n (HT20)	10.9	10±1	11	12.589	3.55	2.26	0.00567	1

5700	11n (HT20)	10.79	10±1	11	12.589	3.55	2.26	0.00567	1
5510	11n (HT40)	11.06	11±1	12	15.849	3.55	2.26	0.00714	1
5550	11n (HT40)	10.09	10±1	11	12.589	3.55	2.26	0.00567	1
5670	11n (HT40)	11.55	11±1	12	15.849	3.55	2.26	0.00714	1
5500	11ac (HT20)	10.76	10±1	11	12.589	3.55	2.26	0.00567	1
5600	11ac (HT20)	10.9	10±1	11	12.589	3.55	2.26	0.00567	1
5700	11ac (HT20)	11.83	11±1	12	15.849	3.55	2.26	0.00714	1
5510	11ac (HT40)	11	11±1	12	15.849	3.55	2.26	0.00714	1
5550	11ac (HT40)	11.47	11±1	12	15.849	3.55	2.26	0.00714	1
5670	11ac (HT40)	11.27	11±1	12	15.849	3.55	2.26	0.00714	1
5530	11ac (HT80)	10.83	10±1	11	12.589	3.55	2.26	0.00567	1
5610	11ac (HT80)	10.54	10±1	11	12.589	3.55	2.26	0.00567	1
5690	11ac (HT80)	11.44	11±1	12	15.849	3.55	2.26	0.00714	1

5GWiFi: U-NII-3

Frequency (MHz)	Modulation mode	conducted power	Tune-up power	Max		Antenna		Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain		Power density(mW/cm ²)	(mW/cm ²)
				(dBm)	(mW)	(dBi)	Numeric		
		Ant A	Ant A	Ant A	Ant A	Ant A	Ant A	Ant A	
5745	11a	14.23	14±1	15	31.623	3.55	2.26	0.01425	1
5785	11a	14.52	14±1	15	31.623	3.55	2.26	0.01425	1
5825	11a	14.7	14±1	15	31.623	3.55	2.26	0.01425	1
5745	11n (HT20)	14.21	14±1	15	31.623	3.55	2.26	0.01425	1
5785	11n (HT20)	14.45	14±1	15	31.623	3.55	2.26	0.01425	1
5825	11n (HT20)	14.66	14±1	15	31.623	3.55	2.26	0.01425	1
5755	11n (HT40)	13.05	13±1	14	25.119	3.55	2.26	0.01132	1
5795	11n (HT40)	13.94	13±1	14	25.119	3.55	2.26	0.01132	1
5745	11ac (HT20)	14.51	14±1	15	31.623	3.55	2.26	0.01425	1
5785	11ac (HT20)	14.71	14±1	15	31.623	3.55	2.26	0.01425	1
5825	11ac (HT20)	14.92	14±1	15	31.623	3.55	2.26	0.01425	1
5755	11ac (HT40)	12.67	12±1	13	19.953	3.55	2.26	0.00899	1

5795	11ac (HT40)	12.47	12±1	13	19.953	3.55	2.26	0.00899	1
5775	11ac (HT80)	13.75	13±1	14	25.119	3.55	2.26	0.01132	1

Conclusion:

NO	Maximum MPE Value					Limits (mW/c m ²)
	2.4G (mW/cm ²)	5GWiFi: UNII-1 (mW/cm ²)	5GWiFi: U-NII-2A (mW/cm ²)	5GWiFi: U-NII-2C (mW/cm ²)	5GWiFi: U-NII-2C (mW/cm ²)	
1	0.02876	0.00853	0.00481	0.00714	0.01425	1

For the max result: 0.02876≤1g SAR, No SAR is required.

******* END OF REPORT *******