

Qingdao Intelligent&Precise Electronics Co., Ltd

# C2PC RF TEST REPORT

**Report Type:**

FCC Part 15.247 & ISED RSS-247 RF report

**Model:**

ZDRK8812CU

**REPORT NUMBER:**

201202905SHA-001

**ISSUE DATE:**

January 28, 2021

**DOCUMENT CONTROL NUMBER:**

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**Factory:** Qingdao Intelligent&Precise Electronics Co., Ltd  
No.218, Qianwangang Road, Qingdao Economic&Technological  
Development Zone, Shandong, China.

**FCC ID:** 2AJVQ-RK8812CU  
**IC:** 22470-RK8812CU

### SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

**47CFR Part 15 (2019):** Radio Frequency Devices (Subpart C)

**ANSI C63.10 (2013):** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

**RSS-247 Issue 2 (February 2017):** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

**RSS-Gen Issue 5 (March 2019) Amendment 1:** General Requirements for Compliance of Radio Apparatus

**PREPARED BY:**

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**TEST REPORT**

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## Revision History

Report No.	Version	Description	Issued Date
201202905SHA-001	Rev. 01	Initial issue of report	January 28, 2021

**TEST REPORT****Measurement result summary**

<b>TEST ITEM</b>	<b>FCC REFERANCE</b>	<b>IC REFERANCE</b>	<b>RESULT</b>
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	RSS-Gen Issue 5 Clause 8.9&8.10	Pass

*Notes: 1: NA =Not Applicable*

**TEST REPORT**

**1 GENERAL INFORMATION**

**1.1 Description of Equipment Under Test (EUT)**

Product name:	Wireless Module
Type/Model:	ZDRK8812CU
PMN:	ZDRK8812CU
Description of EUT:	This product is based on the original FCC ID:2AJVQ-RK8812CU, IC:22470-RK8812CU. This time the antenna and antenna switch were moved 1.5mm. By technical analysis and evaluation, only the worst case (802.11 n40) of Radiated Emissions in restricted frequency bands was retested.
Rating:	DC 3.3V
EUT type:	<input checked="" type="checkbox"/> Table top <input type="checkbox"/> Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	January 20, 2021
Date of test:	January 23,2022~ January 24, 2021

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**1.2 Technical Specification**

Frequency Band:	2400MHz ~ 2483.5MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n(HT20), IEEE 802.11n(HT40)
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n(HT20): OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n(HT40): OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Operating Frequency:	2412MHz to 2462MHz for IEEE 802.11b/g/n(HT20) 2422MHz to 2452MHz for IEEE 802.11n(HT40)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20) 7 Channels for 802.11n(HT40)
Channel Separation:	5 MHz
Antenna:	PIFA Antenna Antenna 0: 1.06dBi, Antenna 1: 2.72dBi

**1.3 Antenna information**

Mode	Tx/Rx Function	Beamforming function	CDD function	Directional gain (dBi)
802.11b	1Tx/1Rx	NO	NO	-
802.11g	1Tx/1Rx	NO	NO	-
802.11n(HT20)	2Tx/2Rx	NO	NO	1.97
802.11n(HT40)	2Tx/2Rx	NO	NO	1.97

Note: For 802.11b and 802.11g mode, it only supports 1TX.  
For 802.11n modes, it can support 2TX, all the two transmit signals are completely uncorrelated with each other, so the directional gain =  $10 \log ((10^{G1/10} + 10^{G2/10} + \dots + 10^{Gn/10}) / N_{ANT})$

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**1.4 Description of Test Facility**

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN1175
	IC Registration Lab Registration code No.: 2042B-1
	VCCI Registration Lab Registration No.: R-4243, G-845, C-4723, T-2252
	A2LA Accreditation Lab Certificate Number: 3309.02



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**2 TEST SPECIFICATIONS**

**2.1 Standards or specification**

47CFR Part 15 (2019)  
 ANSI C63.10 (2013)  
 KDB 558074 (v05r02)  
 RSS-247 Issue 2 (February 2017)  
 RSS-Gen Issue 5 (March 2019) Amendment 1

**2.2 Mode of operation during the test**

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

Software name	Manufacturer	Version	Supplied by
MP Tool	-	-	Client

**2.3 Test software list**

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

**2.4 Test peripherals list**

Item No.	Name	Band and Model	Description
1	Laptop computer	DELL 5480	-
2	Mouse	Dell	-

**2.5 Test environment condition:**

Test items	Temperature	Humidity
Radiated Emissions in restricted frequency bands	22°C	53% RH

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**2.6 Instrument list**

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESIB 26	EC 3045	2021-09-15
<input checked="" type="checkbox"/>	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2021-09-24
<input checked="" type="checkbox"/>	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2021-06-11
<input checked="" type="checkbox"/>	Horn antenna	R&S	HF 906	EC 3049	2022-01-16
<input type="checkbox"/>	Horn antenna	ETS	3117	EC 4792-1	2021-02-25
<input type="checkbox"/>	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2021-07-09
<input type="checkbox"/>	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2021-03-14
Tet Site					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Shielded room	Zhongyu	-	EC 2838	2022-01-11
<input type="checkbox"/>	Shielded room	Zhongyu	-	EC 2839	2022-01-11
<input checked="" type="checkbox"/>	Semi-anechoic chamber	Albatross project	-	EC 3048	2021-07-14
<input type="checkbox"/>	Fully-anechoic chamber	Albatross project	-	EC 3047	2021-07-14
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2021-03-03
<input type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3481	2022-01-04
<input type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3442	2022-01-04
<input checked="" type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3324	2021-09-05
<input type="checkbox"/>	Pressure meter	YM3	Shanghai Mengde	EC 3320	2021-07-14

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**2.7 Measurement uncertainty**

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

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**3 Radiated Emissions**

**Test result: Pass**

**3.1 Limit**

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

<b>Frequencies (MHz)</b>	<b>Field Strength (microvolts/meter)</b>	<b>Measurement Distance (meters)</b>
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

**3.2 Measurement Procedure**

**For Radiated emission below 30MHz:**

- a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) Both X and Y axes of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

**NOTE:**

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

**TEST REPORT****For Radiated emission above 30MHz:**

- a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f) The test-receiver system was set to peak and average detector function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

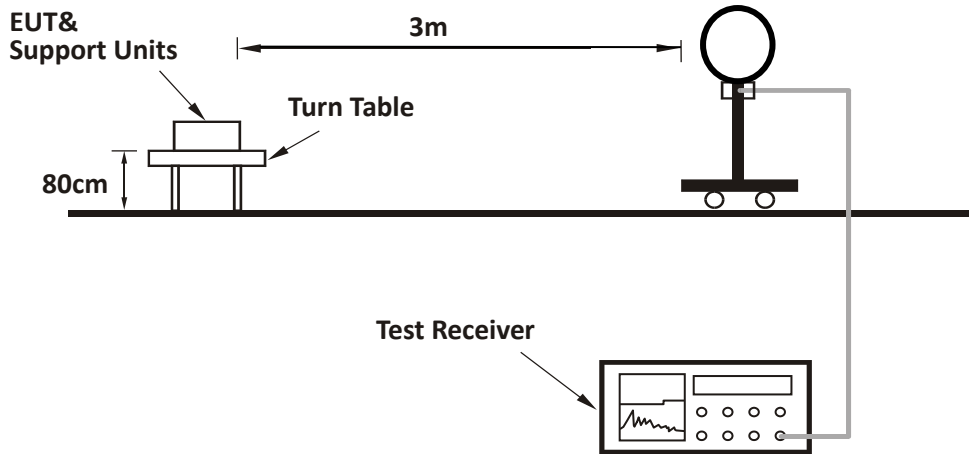
**Note:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 3 x RBW (Duty cycle  $\geq$  98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were evaluated and the worst-case emissions were reported

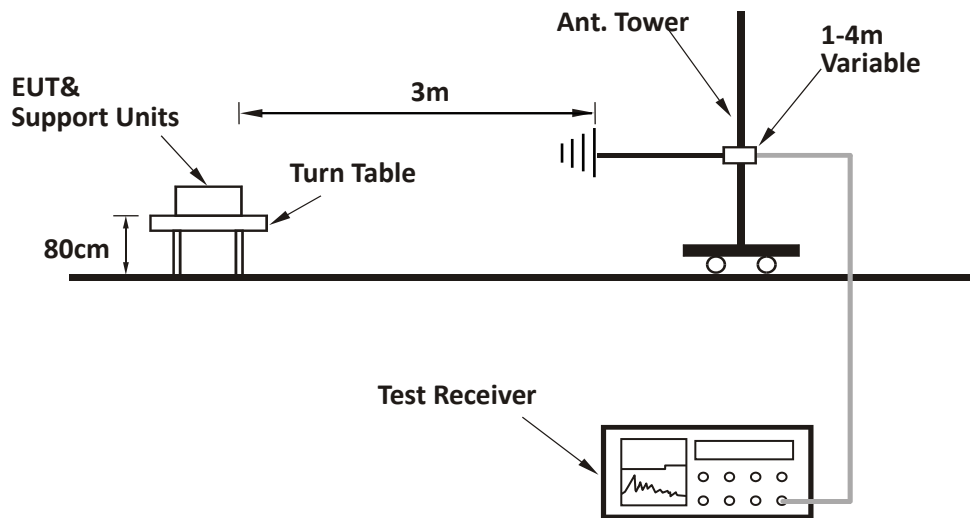
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**3.3 Test Configuration**

For Radiated emission below 30MHz:

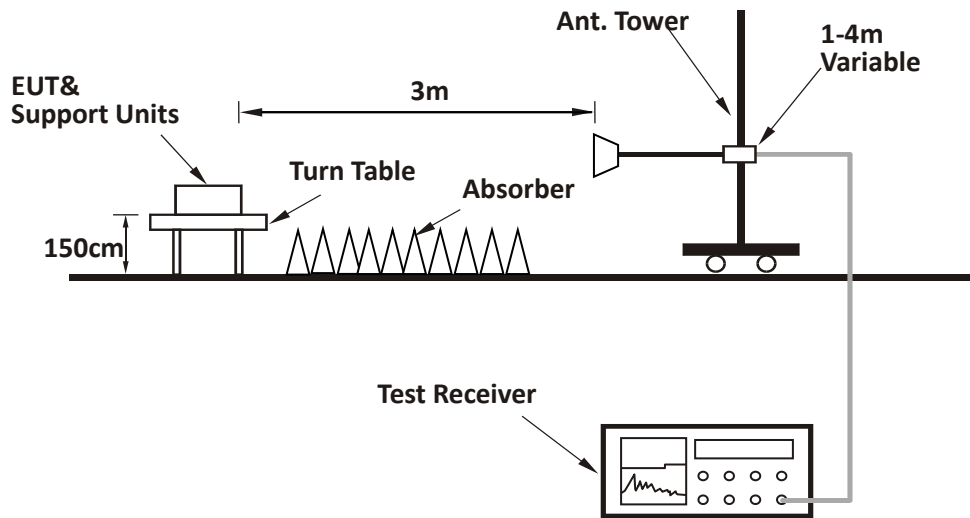


For Radiated emission 30MHz to 1GHz:



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**For Radiated emission above 1GHz:**



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**3.4 Test Results of Radiated Emissions**

**Test result above 1GHz:**

The emission was conducted from 1GHz to 25GHz

802.11n(HT40)

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	2422	101.60	Fundamental	/	PK
	H	2390	61.40	74.00	12.60	PK
	H	2390	46.70	54.00	7.30	AV
M	H	2437	101.40	Fundamental	/	PK
H	H	2452	101.70	Fundamental	/	PK
	H	2483.5	62.60	74.00	11.40	PK
	H	2483.5	47.30	54.00	6.70	AV

- Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.  
 2. Corrected Reading = Original Receiver Reading + Correct Factor  
 3. Margin = Limit - Corrected Reading  
 4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,  
 Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,  
 Limit = 40.00dBuV/m.  
 Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;  
 Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;  
 Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

\*\*\*\*\* END \*\*\*\*\*