

FCC AND ISCED CERTIFICATION TEST REPORT

Applicant:	Guangzhou Shikun Electronics Co., Ltd
Address:	NO.6 Liankun Road, Huangpu District, Guangzhou, China
Manufacturer:	Guangzhou Shikun Electronics Co., Ltd
Address:	NO.6 Liankun Road, Huangpu District, Guangzhou, China
Product Description:	IEEE 802.11a/b/g/n/ac 2T2R Wi-Fi Module Integrated BT 2.1/3.0/4.2/5.0
Brand Name:	N/A
Tested Model:	SKI.WB822CU.5
FCC ID:	2AR82-SKIWB822CU5
Report No.:	JCF231222208-001
Received Date:	Dec. 22, 2023
Tested Date:	Dec. 22, 2023 - Jan. 20, 2024
Issued Date:	Jan. 23, 2024
Test Standards:	FCC Rules and Regulations Part 15 Subpart C, RSS-247 Issue 3 August 2023
Test Procedure:	ANSI C63.10:2013, RSS-Gen Issue 5 A2, Feb. 2021
Test Result:	Pass

Prepared By:	
	
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Approved By:	
	
<u>Talent Zhang/Engineer</u>	

Note: The test results in this report apply exclusively to the tested model / sample. Without written approval of Guangzhou Jingce Testing Technology Co., Ltd. the test report shall not be reproduced except in full.

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jan. 23, 2024	Original Report	/

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1. Test Report Declare

Applicant:	Guangzhou Shikun Electronics Co., Ltd
Address:	NO.6 Liankun Road, Huangpu District, Guangzhou, China
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Address:	NO.6 Liankun Road, Huangpu District, Guangzhou, China
Product Name:	IEEE 802.11a/b/g/n/ac 2T2R Wi-Fi Module Integrated BT 2.1/3.0/4.2/5.0
Brand Name:	N/A
Model Name:	SKI.WB822CU.5

We Declare:

The equipment described above is tested by Guangzhou Jingce Testing Technology Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Guangzhou Jingce Testing Technology Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests except as provided information by clients.

2. Summary of Test Results

Summary of Test Results			
Clause	Test Items	FCC/ISED Rules	Test Result
1	20 dB Bandwidth and 99 % Occupied Bandwidth	FCC 15.247 (a) (1) RSS-247 Clause 5.1 (a) RSS-Gen Clause 6.7	Pass
2	Conducted Output Power	FCC 15.247 (b) (1) RSS-247 Clause 5.1 (b)	Pass
3	Carrier Hopping Channel Separation	FCC 15.247 (a) (1) RSS-247 Clause 5.1 (b)	Pass
4	Number of Hopping Frequency	15.247 (a) (1) III RSS-247 Clause 5.1 (d)	Pass
5	Time of Occupancy (Dwell Time)	15.247 (a) (1) III RSS-247 Clause 5.1 (d)	Pass
6	Conducted Band edge	FCC 15.247 (d) RSS-247 Clause 5.5	Pass
7	Radiated Band edge and Spurious	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 RSS-GEN Clause 8.10	Pass
8	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Pass
9	Antenna Requirement	FCC 15.203 RSS-GEN Clause 6.8	Pass

3. Test Laboratory

Guangzhou Jingce Testing Technology Co., Ltd.

Add.: No.192, Kezhu Road, Huangpu District, Guangzhou, Guangdong, China

Association for Laboratory Accreditation(A2LA). Certificate Number: 6594.01

FCC Designation Number: CN1331. Test Firm Registration Number: 360543

IC Test Firm Registration Number: 28796

Conformity Assessment Body identifier: CN0138

4. Equipment Under Test

4.1. Description of EUT

EUT Name:	IEEE 802.11a/b/g/n/ac 2T2R Wi-Fi Module Integrated BT 2.1/3.0/4.2/5.0
Model Number:	SKI.WB822CU.5
EUT Function Description:	Refer to user manual
Power Supply:	DC 3.3V±0.3
Hardware Version:	N/A
Software Version:	N/A
Radio Specification:	Up to Bluetooth V5.0
Operation Frequency:	2402 MHz - 2480 MHz
Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Data Rate:	1Mbps, 2Mbps, 3Mbps
Antenna Type:	Shrapnel Antenna, MAX. Gain: 1.72 dBi

Note 1: EUT is the ab. of equipment under test.

Note 2: The antenna gain is declared by the customer and the laboratory is not responsible for the accuracy of the antenna gain.

4.2. Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	/	/

4.3. Packet Type Configuration

Test Mode	Packet Type	Setting(Packet Length)
GFSK	DH1	27
	DH3	183
	DH5	339
$\pi/4$ -DQPSK	2-DH1	54
	2-DH3	367
	2-DH5	679
8DPSK	3-DH1	83
	3-DH3	552
	3-DH5	1021

4.4. Test Channel Configuration

Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
GFSK hopping on Tx mode	CH0 to CH78	2402 to 2480
$\pi/4$ -DQPSK hopping on Tx mode	CH0 to CH78	2402 to 2480
8DPSK hopping on Tx mode	CH0 to CH78	2402 to 2480
GFSK hopping off Tx mode	LCH: CH0	2402
	MCH: CH39	2441
	HCH: CH78	2480
$\pi/4$ -DQPSK hopping off Tx mode	LCH: CH0	2402
	MCH: CH39	2441
	HCH: CH78	2480
8DPSK hopping off Tx mode	LCH: CH0	2402
	MCH: CH39	2441
	HCH: CH78	2480

4.5. Test environment conditions

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

Temperature range:	21-25 °C
Humidity range:	40-75%
Pressure range:	86-106 kPa

4.6. The Worse Case Power Setting Parameter

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software		MPTool		
Modulation Type	Transmit Antenna Number	Test Software Setting Value		
		CH 0	CH 39	CH 78
GFSK	1	Default	Default	Default
$\pi/4$ -DQPSK	1	Default	Default	Default
8DPSK	1	Default	Default	Default

4.7. Description of Available Antennas

Test Mode	Transmit and Receive Mode	Description
GFSK	☒ 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
$\pi/4$ -DQPSK	☒ 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
8DPSK	☒ 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

5. Description of Test Setup

5.1. Accessory

Description of Accessories	Manufacturer	Model Number	Description	Remark
/	/	/	/	/

5.2. Support Equipment

Equipment	Brand Name	Model Name	P/N
PC	Lenovo	T480	/

5.3. Test Setup

The EUT can work in Fixed Frequency mode.

5.4. Setup Diagram for Tests



6. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
AC Power Conduction emission	1.37 dB
All Radiated emissions	5.4dB
Conducted emissions	3.09 dB
Occupied Channel Bandwidth	1.1%
Conducted Output power	0.82dB
Power Spectral Density	0.82dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k = 2$.

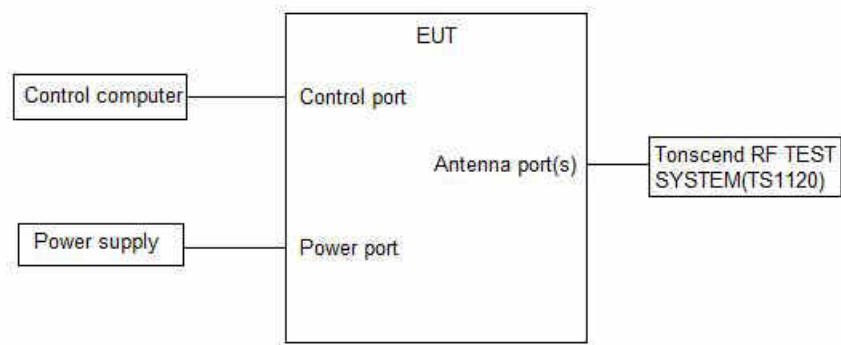
7. Measuring Instrument and Software Used

TS Test System						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☒	Spectrum Analyzer	Keysight	N9030B	MY56320512	Sep. 12, 2023	Sep. 11, 2024
☒	Vector Signal Generator	Keysight	N5182B	MY57300334	Sep. 12, 2023	Sep. 11, 2024
☒	Signal Generator	Keysight	N5171B	MY57280639	Sep. 12, 2023	Sep. 11, 2024
☒	DC POWER	Keysight	E342A	MY59020356	Jul. 14, 2023	Jul. 13, 2024
☒	Incubator thermometer	GWS	EL-02JA	21107288	Sep. 12, 2023	Sep. 11, 2024
☒	Control unit(Power sensor)	Tonscend	JS0806-2	/	Sep. 12, 2023	Sep. 11, 2024
☒	Wideband radio communication tester	R&S	CMW500	163478	Jul. 11, 2023	Jul. 10, 2024
☒	Spectrum Analyzer	Keysight	N9020B	MY60112206	Sep. 12, 2023	Sep. 12, 2024
☒	Control unit(Power sensor)	Tonscend	JS0806-2	21H8060465	Sep. 12, 2023	Sep. 12, 2024
Software						
Used	Description	Manufacturer	Name		Version	
☒	Test software	Tonscend	JS1120-3		V3.3.10	
RSE Test System						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☒	EMI Receiver	R&S	ESW	101685	Jul. 12, 2023	Jul. 11, 2024
☒	Bilog Antenna	Schwarzbeck	VULB 9163	01416	Mar. 21, 2023	Mar. 20, 2024
☒	Horn Antenna 1	Schwarzbeck	BBHA 9120 D	02411	May. 25, 2023	May. 24, 2024
☒	Horn Antenna 2	ETS	BBHA 9170	1090	Sep. 04, 2023	Sep. 03, 2024
☒	loop-antenna	Schwarzbeck	FMZB 1513-60	00030	Jan. 14, 2024	Jan. 13, 2025
☒	Signal Pre-Amplifier	Tonscend	TAP01018050	AP21C806122	Jul. 10, 2023	Jul. 09, 2024

☒	Signal Pre-Amplifier	Tonscend	TAP9K3G32	AP20K806104	Jul. 10, 2023	Jul. 09, 2024
☒	Signal Pre-Amplifier	ETS	3116C-PA	00217677	Aug. 24, 2023	Aug. 23, 2024
☒	3m Fully-anechoic Chamber	ETS	RFD-100	/	Apr. 24, 2021	Apr. 23, 2024
Software						
Used	Description	Manufacturer	Name		Version	
☒	Test software	Tonscend	TS+		V3.0.0.4	
Conducted Emission Test For AC Power Port						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☒	LISN	R&S	ENV216	102154	Jul. 10, 2023	Jul. 09, 2024
☒	EMI Receiver	R&S	ESR3	102509	Jul. 12, 2023	Jul. 11, 2024
Software						
Used	Description	Manufacturer	Name		Version	
☒	Test software	EZ	EZ-EMC		EMEC-3A1	
Other Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
☒	Temperature & Humidity	Temperature	HTC-1	/	Nov. 02, 2023	Nov. 01, 2024

8. On Time and Duty Cycle

8.1. Block diagram of test setup



8.2. Limits

None; for reporting purposes only

8.3. Results

Test Mode	Ant.	Freq. (MHz)	ON Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Factor(dB)
DH5	Ant1	2402	2.88	3.73	77.21	1.12
		2441	2.88	3.73	77.21	1.12
		2480	2.88	3.73	77.21	1.12
2DH5	Ant1	2402	2.89	3.73	77.48	1.11
		2441	2.89	3.74	77.27	1.12
		2480	2.89	3.74	77.27	1.12
3DH5	Ant1	2402	2.89	3.74	77.27	1.12
		2441	2.89	3.74	77.27	1.12
		2480	2.89	3.73	77.48	1.11

Note: Duty Cycle Correction Factor=10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
If that calculated VBW is not available on the analyzer then the next higher value should be used.

8.4. Original test data





2DH5_Ant1_2441



2DH5_Ant1_2480



3DH5_Ant1_2402



9. 20 dB Occupied Bandwidth and 99 % Occupied Bandwidth

9.1. Block diagram of test setup

Same as section 8.1

9.2. Limit

CFR 47 FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 3			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (1) RSS-247 Clause 5.1 (a)	20 dB Occupied Bandwidth	N/A	2400-2483.5
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	N/A	2400-2483.5

9.3. Test Procedure

Connect the UUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 20 dB Occupied Bandwidth: 1 % to 5 % of the 20 dB bandwidth For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
VBW	For 20 dB Occupied Bandwidth: approximately 3×RBW For 99 % Occupied Bandwidth: ≥ 3×RBW
Span	approximately 2 to 3 times the 20 dB bandwidth
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB and 99 % relative to the maximum level measured in the fundamental emission.

9.4. Results

20 dB Occupied Bandwidth:

Test Mode	Ant.	Freq. (MHz)	20dB EBW (MHz)	FL (MHz)	FH (MHz)
DH5	Ant1	2402	0.951	2401.541	2402.492
		2441	0.933	2440.544	2441.477
		2480	0.939	2479.532	2480.471
2DH5	Ant1	2402	1.353	2401.325	2402.678
		2441	1.347	2440.337	2441.684
		2480	1.347	2479.322	2480.669
3DH5	Ant1	2402	1.350	2401.316	2402.666
		2441	1.332	2440.334	2441.666
		2480	1.209	2479.391	2480.600

99 % Occupied Bandwidth

Test Mode	Ant.	Freq. (MHz)	OCB (MHz)	FL (MHz)	FH (MHz)
DH5	Ant1	2402	0.88282	2401.5571	2402.4399
		2441	0.86586	2440.5693	2441.4351
		2480	0.87057	2479.5712	2480.4418
2DH5	Ant1	2402	1.1844	2401.4144	2402.5988
		2441	1.2020	2440.3994	2441.6014
		2480	1.1873	2479.3936	2480.5809
3DH5	Ant1	2402	1.2103	2401.3803	2402.5906
		2441	1.1886	2440.4055	2441.5941
		2480	1.1848	2479.4076	2480.5924

9.5. Original test data

20 dB Occupied Bandwidth:





2DH5_Ant1_2441

Spectrum Analyzer 1
Sweep SA

KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF

Input Z: 50 Ω
Core C/Con R/Cal
Freq Ref: Int (S)

#Atten: 40 dB
Preamp: Off
μW Path: Standard

PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off

#Avg Type: Power (RMS)
Avg/Hold: 15/15
Trig: Free Run

1 2 3 4 5 6
M WWW WWW
P P P P P P

Center Frequency
2.44100000 GHz

Span
3.00000000 MHz

Sweep Span
Zero Span

Full Span

Start Freq
2.438500000 GHz

Stop Freq
2.442500000 GHz

AUTO TUNE

CF Step
300.000 kHz

Auto
Man

Freq Offset
0 Hz

X Axis Scale
Log
Lin

Signal Track
(Span zoom)

Local

1 Spectrum

Scale/Div 10 dB

Log

Ref Lvl Offset 12.13 dB

Ref Level 30.00 dBm

ΔMkr3 1.347 MHz

0.67 dB

Center 2.441000 GHz

#Res BW 30 kHz

#Video BW 100 kHz

Span 3.000 MHz

Sweep 1.07 ms (1001 pts)

5 Marker Table

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.440337 GHz	-22.97 dBm		
2	N	1	f	2.440871 GHz	-2.26 dBm		
3	Δ1	1	f (Δ)	1.347 MHz (Δ)	0.67 dB		
4							
5							
6							

Jan 10, 2024
9:22:19 AM

2DH5_Ant1_2480

Spectrum Analyzer 1
Sweep SA

KEYSIGHT
Input: RF
Coupling: DC
Align: Auto/No RF

Input Z: 50 Ω
Core C/Con R/Cal
Freq Ref: Int (S)

#Atten: 40 dB
Preamp: Off
μW Path: Standard

PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off

#Avg Type: Power (RMS)
Avg/Hold: 15/15
Trig: Free Run

1 2 3 4 5 6
M WWW WWW
P P P P P P

Center Frequency
2.48000000 GHz

Span
3.00000000 MHz

Sweep Span
Zero Span

Full Span

Start Freq
2.478500000 GHz

Stop Freq
2.481500000 GHz

AUTO TUNE

CF Step
300.000 kHz

Auto
Man

Freq Offset
0 Hz

X Axis Scale
Log
Lin

Signal Track
(Span zoom)

Local

1 Spectrum

Scale/Div 10 dB

Log

Ref Lvl Offset 12.99 dB

Ref Level 30.00 dBm

ΔMkr3 1.347 MHz

-0.78 dB

Center 2.480000 GHz

#Res BW 30 kHz

#Video BW 100 kHz

Span 3.000 MHz

Sweep 1.07 ms (1001 pts)

5 Marker Table

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	2.479322 GHz	-19.72 dBm		
2	N	1	f	2.480141 GHz	0.61 dBm		
3	Δ1	1	f (Δ)	1.347 MHz (Δ)	-0.78 dB		
4							
5							
6							

Jan 18, 2024
2:14:26 PM

3DH5_Ant1_2402

