



FCC TEST REPORT

FCC ID: 2BSOH-WC-NODE-H

On Behalf of

Saudi WakeCap Company for Information Systems Technology

Asset Node

Model No.: WC-NODE-H, WC-NODE-S, WC-NODE-F

Prepared for : Saudi WakeCap Company for Information Systems Technology
Address : 2803 Prince Muhammad Ibn Abd Al Aziz, 8092 Al Olaya, Riyadh,
Saudi Arabia

Prepared By : Shenzhen PSI Testing Co., Ltd.
Address : 1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road,
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TEST REPORT DECLARATION

Applicant : Saudi WakeCap Company for Information Systems Technology
Address : 2803 Prince Muhammad Ibn Abd Al Aziz, 8092 Al Olaya, Riyadh, Saudi Arabia
Manufacturer : Shenzhen Xinhai Electronic Co.,Ltd.
3rd Floor Building C, Hengchao Industrial Park, Wanda Industrial Zone, Zhoushi
Address : Road,Langxin Community, Shiyan Street, Baoan District, Shenzhen City,
Guangdong Province,P.R.China
EUT Description : Asset Node
(A) Model No. : WC-NODE-H, WC-NODE-S, WC-NODE-F
(B) Trademark : WakeCap

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.225

RSS 210 Issue 10, RSS Gen Issue 5, ANSI C63.10:2020

The device described above is tested by Shenzhen PSI Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen PSI Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the FCC Part15 requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen PSI Testing Co., Ltd.

Tested by (name + signature).....:	Jensen Wang Test Engineer	
Approved by (name + signature).....:	Simple Guan Project Manager	
Date of issue.....	September 23, 2025	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	September 23, 2025	Initial released Issue	Jensen Wang

1. General Information

1.1. Description of Device (EUT)

EUT : Asset Node

Model No. : WC-NODE-H, WC-NODE-S, WC-NODE-F

DIFF : There is no difference between the models except the appearance. So all the test were performed on the model WC-NODE-H.

Power supply : DC 3V from battery

Radio Technology : NFC

Operation frequency : 13.56MHz

Channel No. : 1 Channel

Modulation : ASK

Antenna Type : Internal antenna

Software version : V1.0

Hardware Version/
FVIN : V1.0

1.2. Accessories of Device (EUT)

Accessories1 : N/A
Manufacturer : N/A
Model : N/A
Ratings : N/A

1.3. Ancillary Equipment Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1.	N/A	N/A	N/A	N/A	N/A

1.4. Test Lab Information

Shenzhen PSI Testing Co., Ltd.

1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China

September 13, 2023 File on Federal Communication Commission
Registration Number: 916281

2. Summary of test

2.1. Summary of test result

Description of Test Item	Standard	Results
Conducted Emission	15.207(a)	PASS
Radiated emissions	15.209(a)&15.225	PASS
Fundamental field strength limit	15.225(a)	PASS
Frequency stability	15.225(e)	PASS
Band edge compliance	15.225	PASS
Antenna Requirement	15.203	PASS

2.2. Block Diagram



2.3. Test mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
1	CH1	13.56
Note: According exploratory test, EUT will have maximum output power in those data rate. so those data rate were used for all test.		

2.4. Test Conditions

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

2.5. Measurement Uncertainty (95% confidence levels, k=2)

Item	Uncertainty
Power Line Conducted Emissions Test	2.13dB
Radiation Emission test in 3m chamber(Below 30MHz)	4.07dB
Radiation Emission test in 3m chamber(30MHz to 1GHz)	4.51dB
Radiation Emission test in 3m chamber(1GHz to 18GHz)	5.07dB
Radiation Emission test in 3m chamber(18GHz to 40GHz)	5.21dB
Radio Frequency	48.24KHz
Conducted RF Power	0.41dB
Power Spectral Density	0.39 dB
Occupied-Bandwidth	968Hz
Duty Cycle	1%
Conducted-Spurious Emission	1.26dB

2.6. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware Version	Last Cal.	Cal. Interval
1.	9*6*6 anechoic chamber	SKET	9*6*6	N/A	/	2022.12.20	3 Year
2.	Test Receiver	Rohde&Schwarz	ESCI 7	101032/003	4.42 SP3	2024.12.18	1 Year
3.	L.I.S.N.#1	Rohde&Schwarz	ENV216	102282	/	2024.12.18	1 Year
4.	L.I.S.N.#2	RFT	NNB111	13835240	/	2024.12.18	1 Year
5.	Loop Antenna	Schwarz beck	FMZB 1519B	00128	/	2025.01.02	2 Year
6.	Bilog Antenna	Schwarz beck	VULB 9168	01448	/	2025.01.02	2 Year
7.	Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101648	3.70	2024.12.18	1 Year
8.	Horn Antenna	Schwarz beck	BBHA 9120 D	02706	/	2025.01.02	2 Year
9.	Amplifier	SKET	LAPA_01G18 G-45dB	SK2022032901	/	2024.12.18	1 Year
10.	Horn Antenna	Schwarz beck	BBHA 9170	00946	/	2024.12.31	2 Year
11.	Amplifier	SKET	LNPA_0118G- 45	SK2020010801	/	2024.12.18	1 Year
12.	RF Power Probe	Rohde&Schwarz	NRP-Z11	1138.3004.02-1 111533-Fz	/	2024.12.18	1 Year
13.	RF Sensor Unit	Tachoy	TR1029-2	20220428P00 8	/	2024.12.18	1 Year
14.	Spectrum Analyzer	Agilent	N9020A	MY51281067	A.14.03	2024.12.18	1 Year
15.	Temp. & Humid Chamber	Auchno	9606	/	/	2024.12.18	1 Year
16.	Regulated DC Power Supply	Xinouhua	ADC120V10 A	202211251638		2024.12.18	1 Year
17.	Cable	SKET	Cable-RE-1	#02/#03	/	2024.12.18	1 Year
18.	Cable	SKET	Cable-RE-2	#01	/	2024.12.18	1 Year
19.	Cable	SKET	Cable-RE-3	#04	/	2024.12.18	1 Year
20.	Cable	SKET	Cable-CE-1	A-E-24	/	2024.12.18	1 Year
21.	6dB Attenuator	Schwarzbeck	DGA 9552N 6dB	CK4186	/	2024.12.18	1 Year
22.	Power meter	Agilent	E4419B	GB40202121	/	2024.12.18	1 Year
23.	Comprehensive Test Instrument	Rohde&Schwarz	CMW 500	145266	/	2024.12.18	1 Year
For Test Software Information							
Item	Software Name	Manufacturer		Version			
RE	EZ EMC	Farad		PSI-3A1			
CE	EZ EMC	Farad		PSI-3A1			
RF	RTS	TACHOY		V1.0.0			

3. Occupied bandwidth and 20dB Bandwidth

3.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in FCC part 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

3.2. Test Procedure

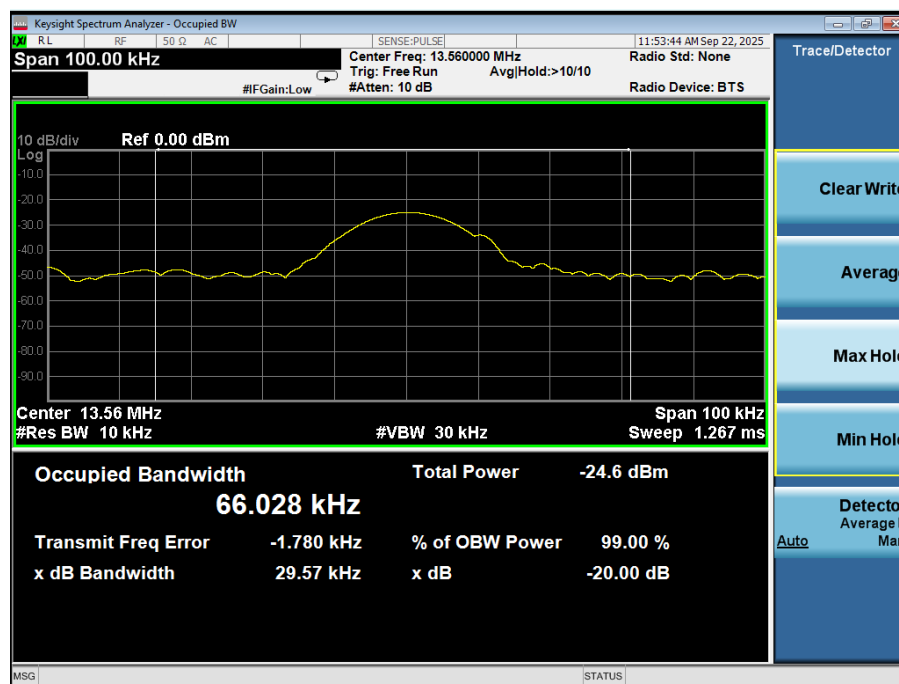
The transmitter output was directly connected to a spectrum analyzer with a 50Ω cable. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3KHz RBW and 10kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

3.3. Test Setup



3.4. Test Result

Mode	Freq (MHz)	20dB Bandwidth (KHz)	99% Bandwidth	Limit (kHz)	Conclusion
Tx Mode	13.56	29.57	66.028	/	PASS



4. Radiated emissions

4.1. Limit

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Note:

- a) The tighter limit applies at the band edges.

For example: F.S limit at 88MHz is 100uV/m

- b) If measurement is made at 3m distance, then F.S Limit at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d2/d1)^2$.

For example:

F.S Limit at 30m(d2) distance is 30uV/m(L_{d2}), then F.S Limit at 3m(d1) distance is

$$L_{d1} = 30\text{uV/m} * (30/3)^2 = 100 * 30\text{uV/m} = 69.54 \text{ dBuV/m}$$

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

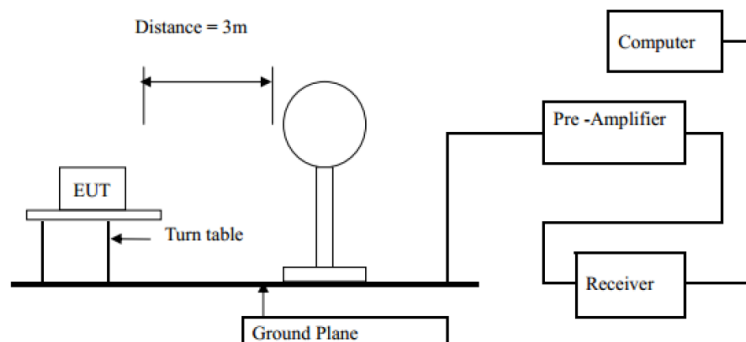
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

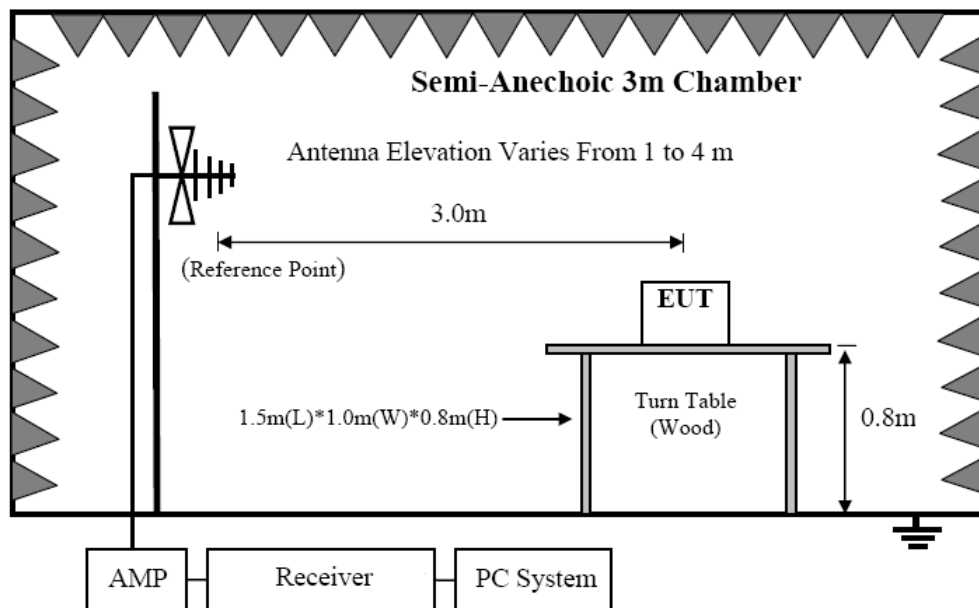
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

4.2. Block Diagram of Test setup

In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



In 3m Anechoic Chamber Test Setup Diagram for frequency 30MHz-1GHz



4.3. Test Procedure

Procedure of Preliminary Test

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 4.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2020.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

The antenna was placed at 3 meter away from the EUT as stated in ANSI C63.10:2020. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Receiver quickly scanned from 9KHz to 30MHz and 30MHz to 1GHz The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The test mode(s) described in clause 2.4 were scanned during the preliminary test:

After the preliminary scan, we found the test mode producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Receiver scanned from 9KHz to 30MHz and 30MHz to 1GHz. Emissions were

scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 200Hz for 9 KHz to 150 KHz measure, 10 KHz for 150 KHz to 30MHz measure and 120 KHz for 30 MHz to 1GHz measure .

4.4. Test Result

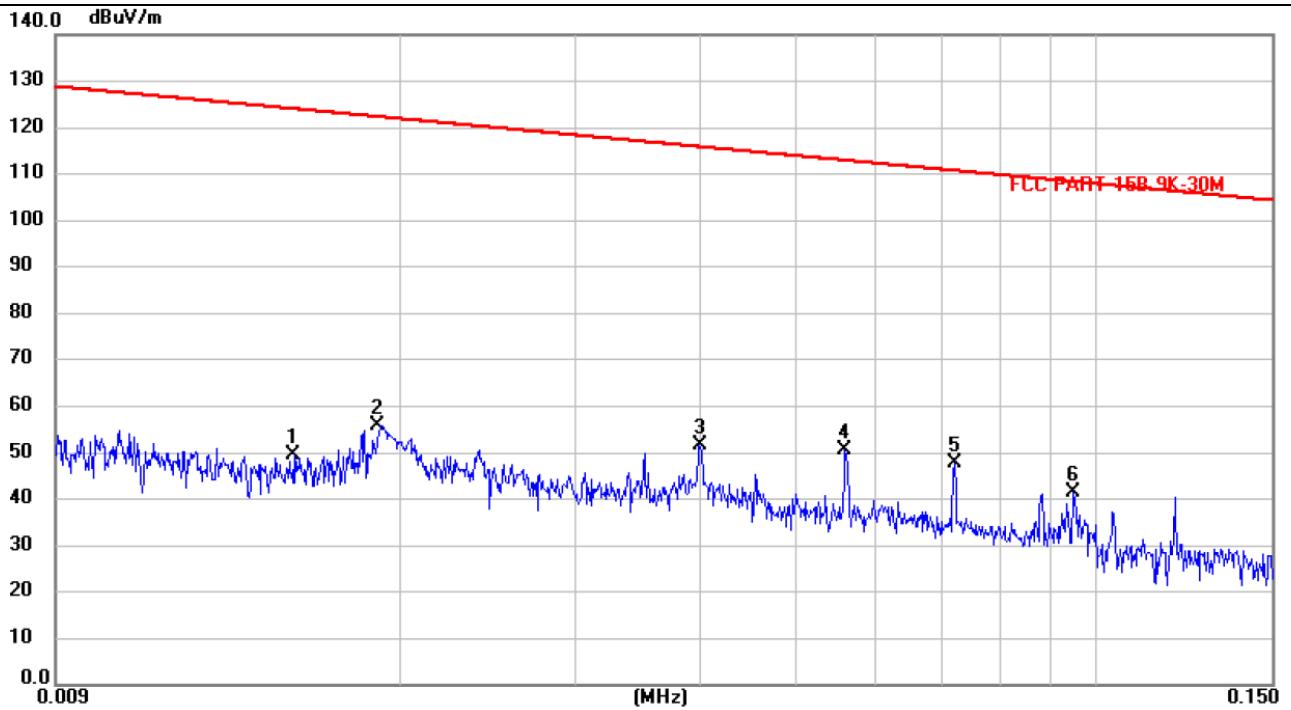
PASS. (See below detailed test result)

Detailed information please see the following page.

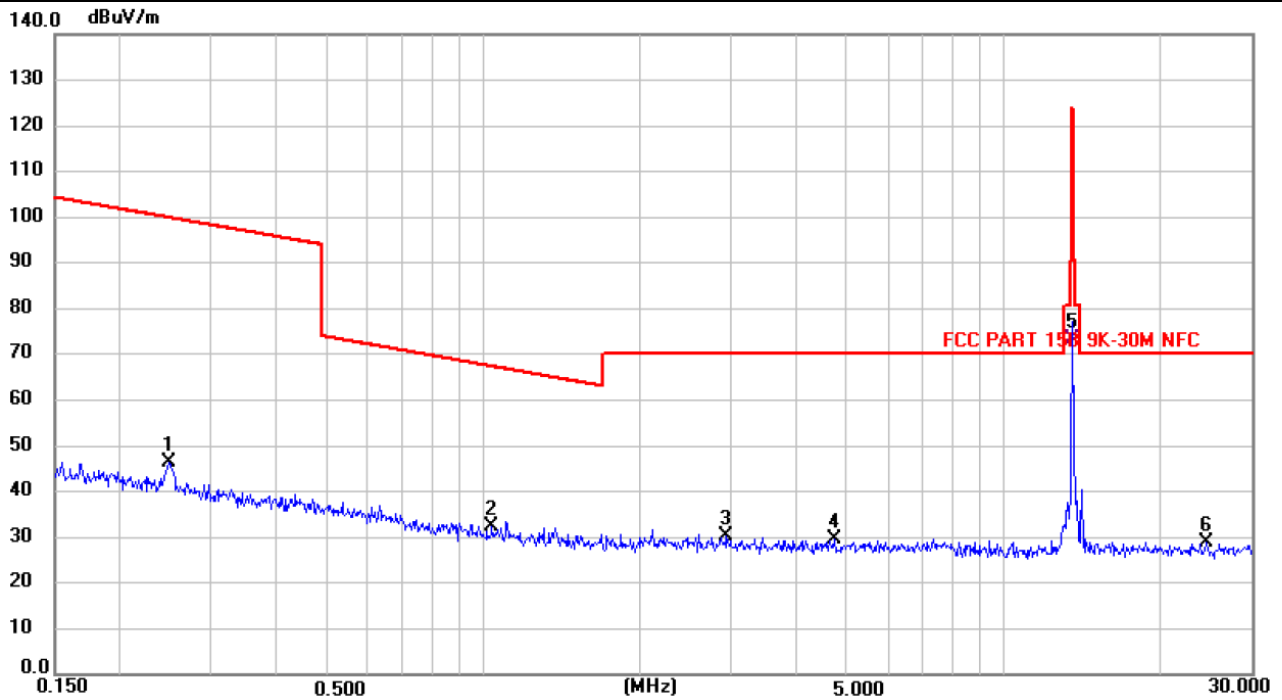
From 9KHz to 30MHz: Conclusion: PASS

Frequency Range	: 9KHz~30MHz
Test Mode	: TX: 13.56MHz
Test Results	: PASS
Note:	1. The test results are listed in next pages. 2. This mode is worst case mode, so this report only reflected the worst mode. 3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.

X



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.0156	29.88	19.48	49.36	124.01	-74.65	peak
2	0.0190	36.39	19.51	55.90	122.29	-66.39	peak
3	0.0400	32.02	19.53	51.55	115.81	-64.26	peak
4 *	0.0560	31.12	19.47	50.59	112.88	-62.29	peak
5	0.0720	28.22	19.55	47.77	110.70	-62.93	peak
6	0.0948	22.02	19.50	41.52	108.30	-66.78	peak



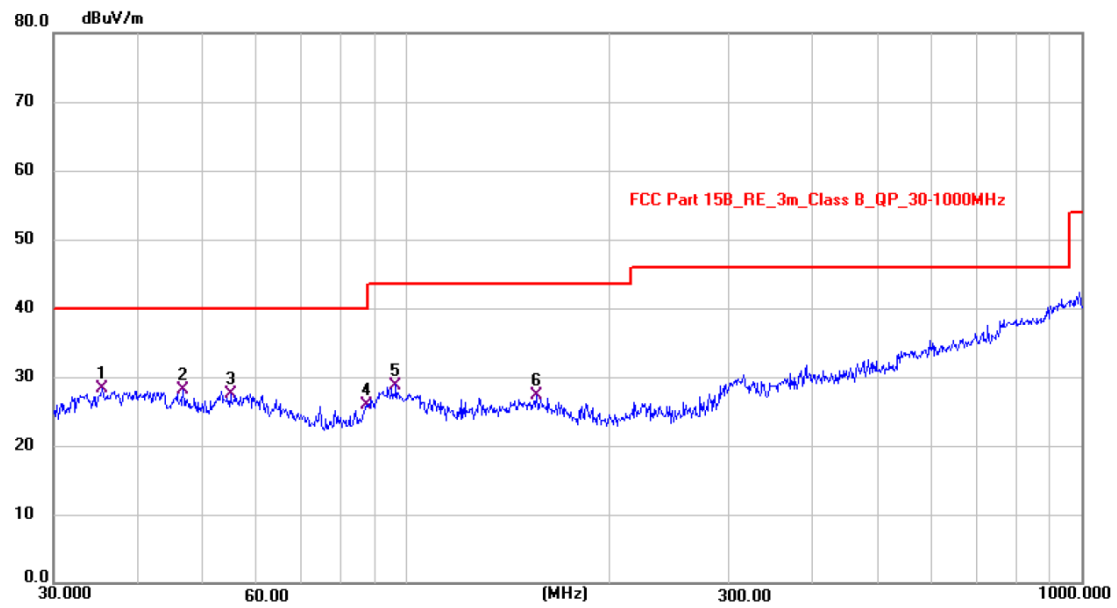
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	0.2485	26.35	19.98	46.33	99.91	-53.58	peak
2 *	1.0388	11.91	20.36	32.27	67.37	-35.10	peak
3	2.9307	9.50	20.63	30.13	70.00	-39.87	peak
4	4.7275	8.57	20.89	29.46	70.00	-40.54	peak
5	13.5600	52.26	20.95	73.21	124.00	-50.79	QP
6	24.5779	7.93	20.78	28.71	70.00	-41.29	peak

*:Maximum data x:Over limit !:over margin

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

From 30MHz to 1GHz: Conclusion: PASS

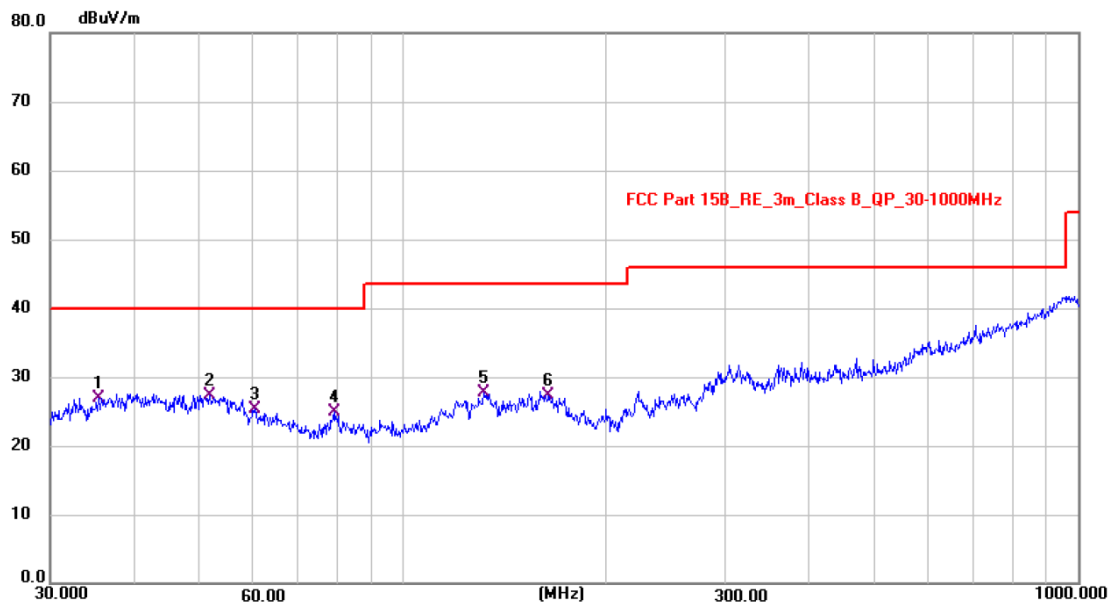
Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	35.4525	13.86	14.36	28.22	40.00	-11.78	QP
2	46.7892	13.62	14.41	28.03	40.00	-11.97	QP
3	54.8830	13.67	13.79	27.46	40.00	-12.54	QP
4	87.5327	15.24	10.73	25.97	40.00	-14.03	QP
5	96.6477	17.62	11.18	28.80	43.50	-14.70	QP
6	155.9781	12.36	15.02	27.38	43.50	-16.12	QP

Note: 1. *:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Horizontal:

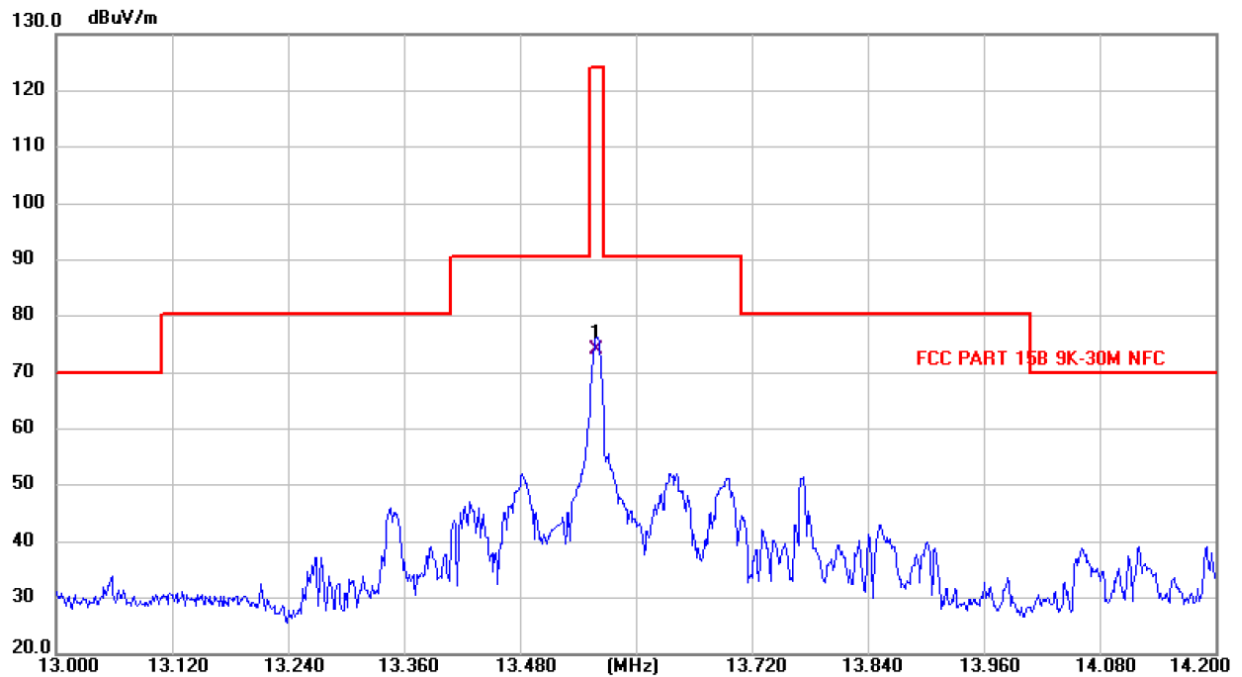
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	35.3905	12.62	14.36	26.98	40.00	-13.02	QP
2 *	51.7295	13.26	14.09	27.35	40.00	-12.65	QP
3	60.4917	12.01	13.24	25.25	40.00	-14.75	QP
4	79.1384	14.09	10.84	24.93	40.00	-15.07	QP
5	131.8154	13.51	14.17	27.68	43.50	-15.82	QP
6	164.5464	12.68	14.60	27.28	43.50	-16.22	QP

Note: 1. *:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Field Strength Emissions Result

Temperature	24°C	Relative Humidity	56%
Pressure	960hPa	Distance	3m
Test Mode	TX		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	13.5602	53.17	20.95	74.12	124.00	-49.88	QP

Note:

1: 30m to 3m correction factor calculation:

$$40 * \log(30m/3m) = 40$$

2: --Means other frequency and mode comply with standard requirements and at least have 20dB margin.

3: Correct Factor=Cable Loss+ Antenna Factor- Amplifier Gain

$$\text{Measurement Result} = \text{Reading} + \text{Correct Factor}$$

$$\text{Margin} = \text{Measurement Result} - \text{Limit}$$

4. Xaxis / Y axis/Z axis were tested,report only recorded the worst result of X axis.

5. Frequency stability

5.1. Test limit

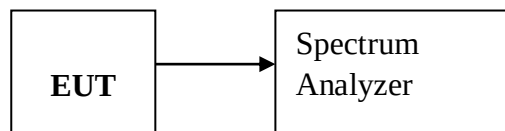
Please refer section RSS-Gen & 15.225e.

Regulation 15.225(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ (± 100 ppm) of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.2. Test Procedure

The following equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.3. Test Setup



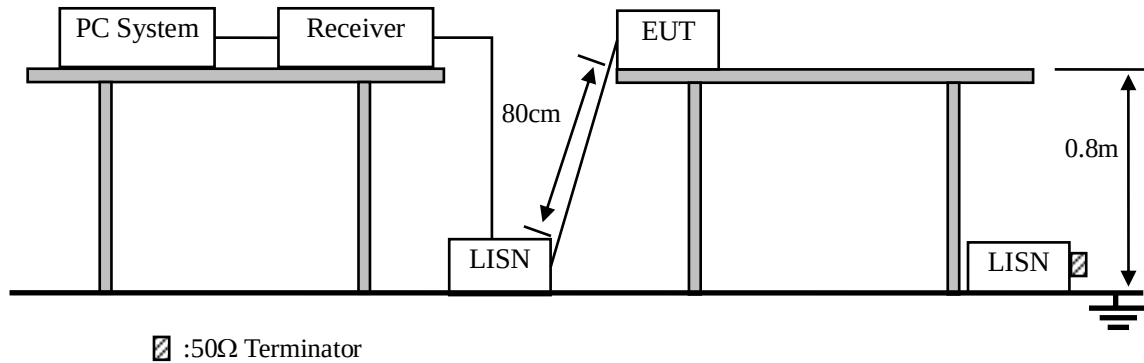
5.4. Test Results

PASS.

Detailed information please see the following page.

Assigned Frequency(MHz): 13.56MHz				
Voltage	Temperature	Measured Frequency (MHz)	Frequency stability	Limit
Low DC 2.7V	+20°C	13.561116	0.001116	±100 ppm ±0.001356MHz
Normal DC 3V	-10°C	13.560573	0.000573	
	-5°C	13.560610	0.000610	
	0°C	13.560205	0.000205	
	+10°C	13.560104	0.000104	
	+20°C	13.560286	0.000286	
	+30°C	13.560364	0.000364	
	+40°C	13.559962	-0.000038	
	+50°C	13.560768	0.000768	
	+60°C	13.560302	0.000302	
High DC 3.3V	+20°C	13.561095	0.001095	

6. Power Line Conducted Emissions



6.1. Block Diagram of Test Setup

6.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

6.3. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N1), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C64.10:2020 on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

6.4. Test Result

not applicable

Note: The EUT is supplied by Button battery, so this item does not applicable.

7. Antenna Requirements

7.1. Limit

For intentional device, according to RSS-Gen Section 6.8 and FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.209, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

7.2. Antenna Connected Construction

The antenna is internal antenna and no consideration of replacement. Please see EUT photo for details.

7.3. Results

The EUT antenna is Internal Antenna. It complies with the standard requirement.

8. Test setup photo

Reference to the **appendix I Test Setup Photo** for details.

9. Photos of EUT

Reference to the **appendix II external photos** and **appendix III internal photos** for details.

-----THE END OF REPORT-----