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TEST REPORT

For RF

Report No. .....:	**CHTW24090007**	Report verification:
Project No. ……..……:	**SHT2407056602W**	
FCC ID .....:	**2BBCY3588S**	
Applicant's name .....:	**Lisheng Communications Co., Ltd.**	
Address .....:	5#, ChongXiang St., Econ & Tech. Area, Quanzhou, Fujian, China.	
Product Name.....:	**POC Two Way Radio / IP Two Way radio**	
Trade Mark.....:	LISHENG	
Model No.....:	Q-3588S	
Listed Model(s) .....:	3288T	
Standard.....:	**FCC CFR Title 47 Part 15 Subpart C § 15.225**	
Date of receipt of test sample…….:	Aug. 14, 2024	
Date of testing……...:	Aug. 15, 2024- Sep. 02, 2024	
Date of issue……..:	Sep. 03, 2024	
Result .....:	**PASS**	

Compiled by (position+printedname+signature) ... :	File administrators Caspar Chen	Caspar Chen
Supervised by (position+printedname+signature) ... :	Project Engineer Caspar Chen	Caspar Chen
Approved by (position+printedname+signature) ... :	RF Manager Xu yang	Xu Yang

Testing Laboratory Name.....:	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address .....:	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China

Contents

1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

FCC CFR Title 47 Part 15 Subpart C § 15.225: Operation within the band 13.110-14.010 MHz

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version information

Revision No.	Date of issue	Description
N/A	2024-09-03	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result	Test Engineer
5.1	Antenna requirement	15.203	PASS	Xiangyu Wei
5.2	AC Power Conducted Emissions	15.207	N/A	-
5.3	Field Strength of the Fundamental and Mask Measurement	15.225(a)(b)(c)	PASS	Yifan Wang
5.4	20dB Bandwidth	15.215	PASS	Xiangyu Wei
5.5	Radiated Spurious Emission	15.225(d)&15.209	PASS	Yifan Wang
5.6	Frequency Stability	15.225(e)	PASS	Xiangyu Wei

Note: The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Client Information

Applicant:	Lisheng Communications Co., Ltd.
Address:	5#, ChongXiang St., Econ & Tech. Area, Quanzhou, Fujian, China.
Manufacturer:	Lisheng Communications Co., Ltd.
Address:	5#, ChongXiang St., Econ & Tech. Area, Quanzhou, Fujian, China.

3.2. Product Description

Main unit information:	
Product Name:	POC Two Way Radio / IP Two Way radio
Trade Mark:	LISHENG
Model No.:	Q-3588S
Listed Model(s):	3288T
Power supply:	DC 3.7V from Battery
Hardware version:	P301_V2.0
Software version:	V1.0
Accessory unit information:	
Battery information:	LI-ION BATTERY PACK Model: 3588-BAT DC 3.7V 3800mAh 14.06Wh
Charger information:	Model: BC-3588 Input: 5V 1A Output: 4.2V 1A
Adapter information:	MODEL: TEKA-UCA20US INPUT: 100-240V~50/60Hz 0.35A MAX OUTPUT: 5.0V, 2.0A

3.3. Radio Specification Description

Radio function:	☒ NFC Reader
	☒ NFC Tags-Passive devicese
	☒ NFC Tags-Active devicese
Operation frequency:	13.56MHz
Modulation:	ASK
Channel number:	1
Antenna type:	FPC
Antenna Gain:	-5dBi

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China	
Contact information:	Phone: 86-755-26715499 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn	
Qualifications	Type	Accreditation Number
	FCC Registration Number	762235
	FCC Designation Number	CN1181

4. TEST CONFIGURATION

4.1. Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.

4.2. Test sample information

Test item	HTW sample no.
RF Radiated test items	YPHT24070566002
EMI test items	-

Note:

RF Radiated test items: Field Strength of the Fundamental and Mask Measurement, 20dB Bandwidth, Radiated Spurious Emission, Frequency Stability

EMI test items : AC Power Conducted Emissions

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?			
✓ No			
Item	Equipement	Trade Name	Model No.
1			
2			

4.4. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.5. Statement of the measurement uncertainty

Test Items	Measurement Uncertainty
AC Power Conducted Emissions	3.21 dB
Radiated emissions below 1GHz	4.54dB
Radiated emissions above 1GHz	5.10 dB
Occupied Bandwidth	0.002%

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.6. Equipments Used during the Test

● Radiated emission- 9kHz~30MHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/04/06	2026/04/05
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2024/08/12	2025/08/11
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2024/04/08	2027/04/07
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated emission- 30MHz~1GHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/04/06	2026/04/05
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2024/08/12	2025/08/11
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2023/02/22	2026/02/21
●	Pre-Amplifer	SCHWARZBECK	HTWE0295	BBV 9742	/	2024/5/24	2025/5/23
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

Requirement

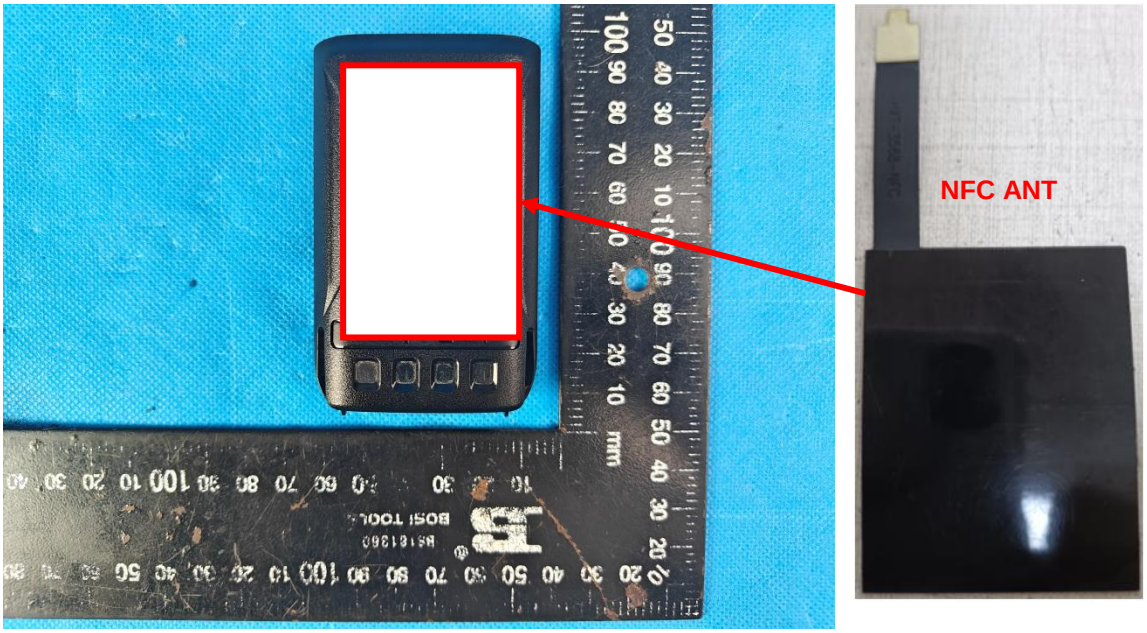
FCC CFR Title 47 Part 15 Subpart C Section 15.203:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

The antenna type is a FPC antenna, please refer to the below antenna photo.



5.2. AC Power Conducted Emissions

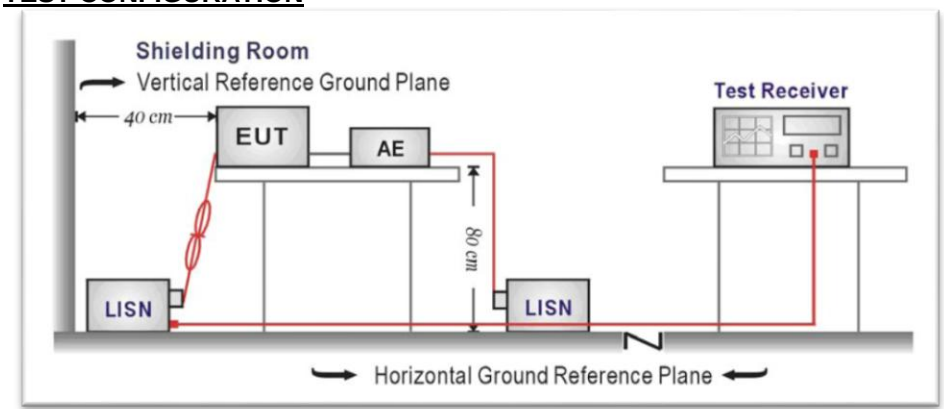
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10
2. The EUT was placed on a plat form of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50ohm / 50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor,was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

Please refer to the clause 4.1

TEST RESULTS

☐ **Passed** ☒ **Not Applicable**

5.3. Field Strength of the Fundamental and Mask Measurement

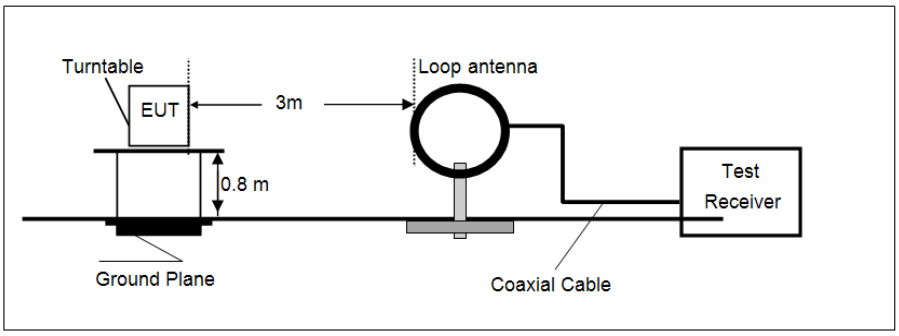
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.225(a)(b)(c)

Fundamental frequency(MHz)	Field strength of fundamental (uV/m @30m)	Field strength of fundamental (dBuV/m @3m)
13.553-13.567	15848	124.0
13.410-13.553&13.567-13.710	334	90.5
13.110-13.410&13.710-14.010	106	80.5

Note: Limit dBuV/m @3m =Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.

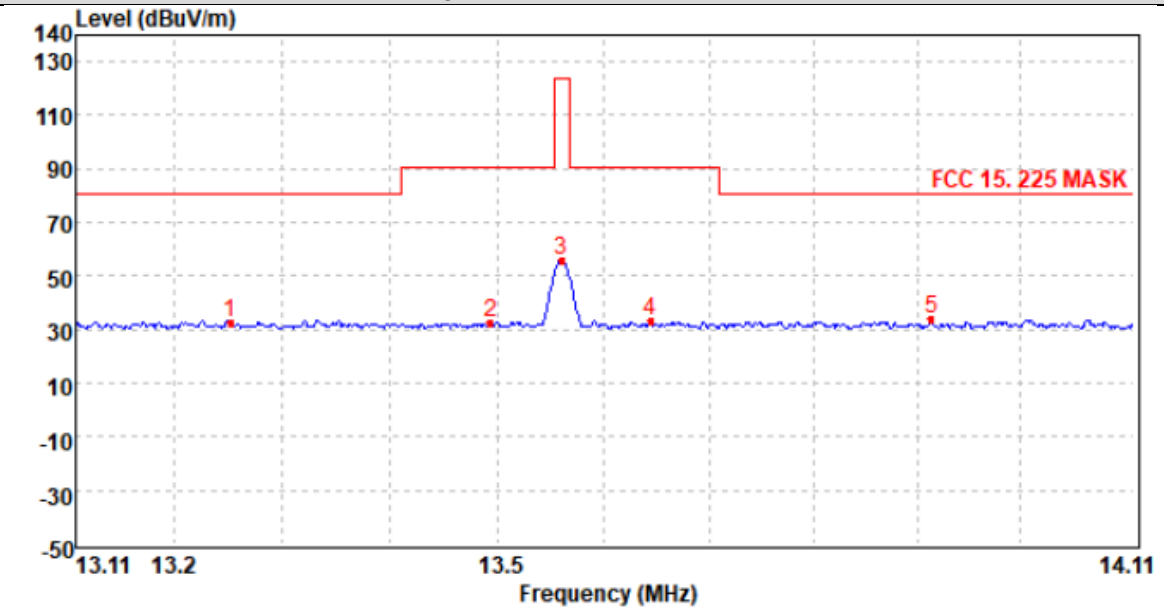
TEST MODE:

Please refer to the clause 4.1

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Field Strength of The Fundamental and Mask



Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	13.25	11.69	20.17	0.86	0.00	32.72	80.50	-47.78	Peak
2	13.49	11.48	20.07	0.84	0.00	32.39	90.50	-58.11	Peak
3	13.56	34.83	20.05	0.83	0.00	55.71	124.00	-68.29	Peak
4	13.64	12.27	20.01	0.82	0.00	33.10	90.50	-57.40	Peak
5	13.91	13.02	19.91	0.80	0.00	33.73	80.50	-46.77	Peak

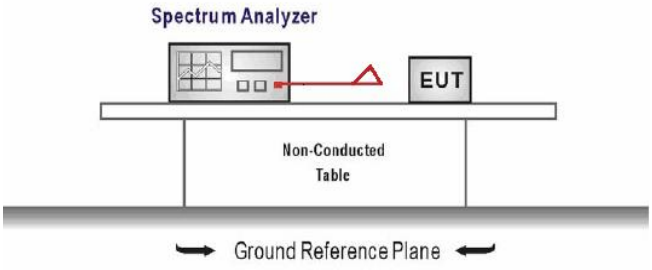
5.4. 20dB Bandwidth

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.215

Intentional radiators must be designed to ensure that the 20dB emission bandwidth in the specific band 13.553~13.567MHz.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
   RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW
   Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

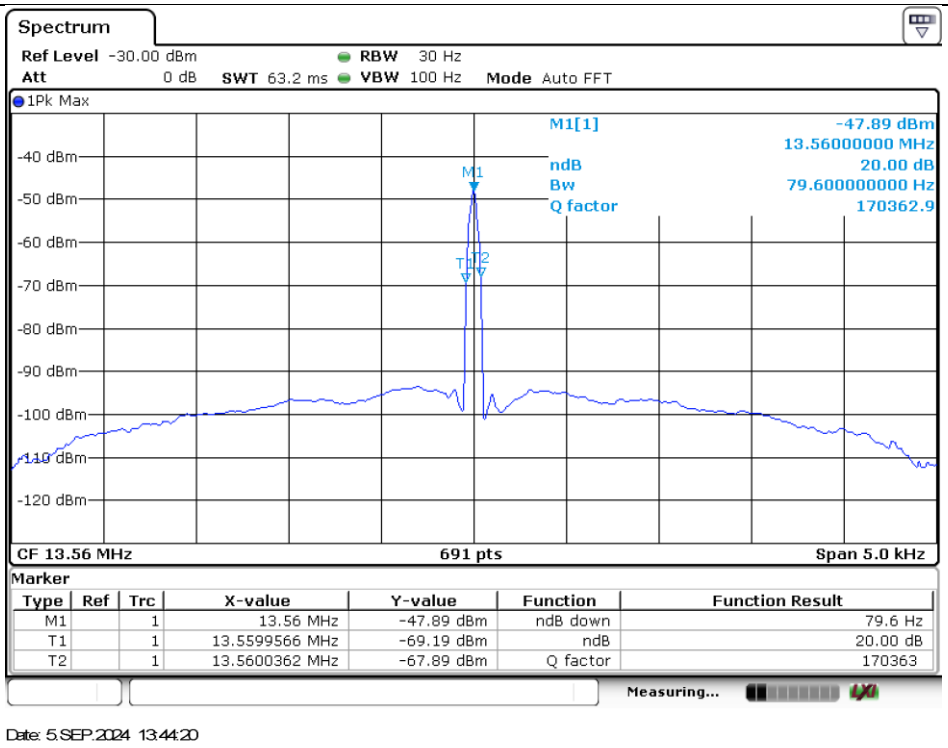
TEST MODE:

Please refer to the clause 4.1

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Frequency	Measurement data (MHz)	Limit (MHz)	Result
f_L	13.5599566	>13.553	PASS
f_H	13.5600362	<13.567	PASS



5.5. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209&15.225(d)

Limit for frequency below 30MHz:

Frequency	Limit (uV/m)	Measurement Distance(m)	Remark
0.009~0.490	2400/F(kHz)	300	Quasi-peak
0.490~1.705	24000/F(kHz)	30	Quasi-peak
1.705~30.0	30	30	Quasi-peak

Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

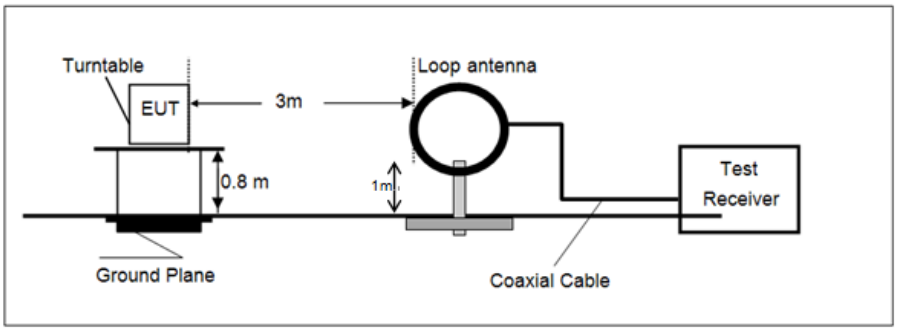
Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

Limit for frequency above 30MHz:

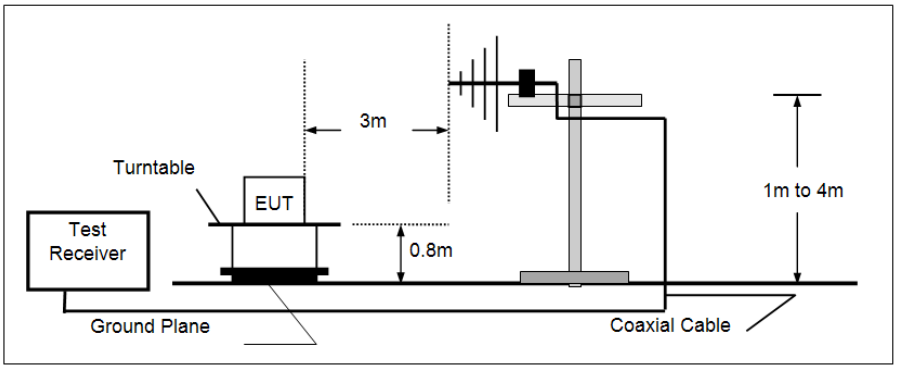
Frequency	Limit (dBuV/m@3m)	Remark
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Below 30MHz:
   RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
   (3) 30MHz to 1 GHz:
   RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
   If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

TEST MODE:

Please refer to the clause 4.1

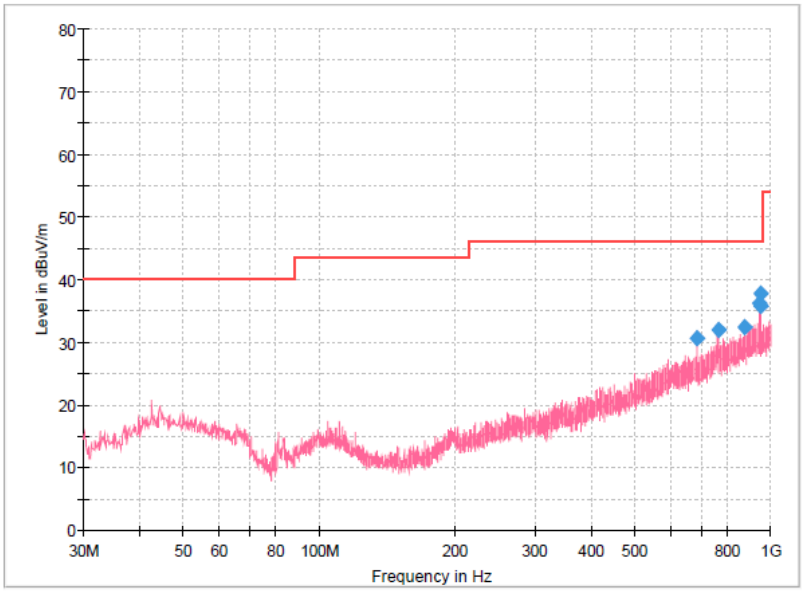
TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Test frequency range:	Below 30MHz

Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	0.04	9.55	22.34	2.17	0.00	34.06	116.69	-82.63	Peak
2	0.07	6.96	22.30	2.16	0.00	31.42	111.10	-79.68	Peak
3	0.81	14.87	22.20	2.09	0.00	39.16	69.45	-30.29	Peak
4	6.91	10.36	21.97	1.49	0.00	33.82	69.54	-35.72	Peak
5	13.55	34.64	20.05	0.83	0.00	55.52	69.54	-14.02	Peak
6	19.33	23.88	19.59	0.78	0.00	44.25	69.54	-25.29	Peak

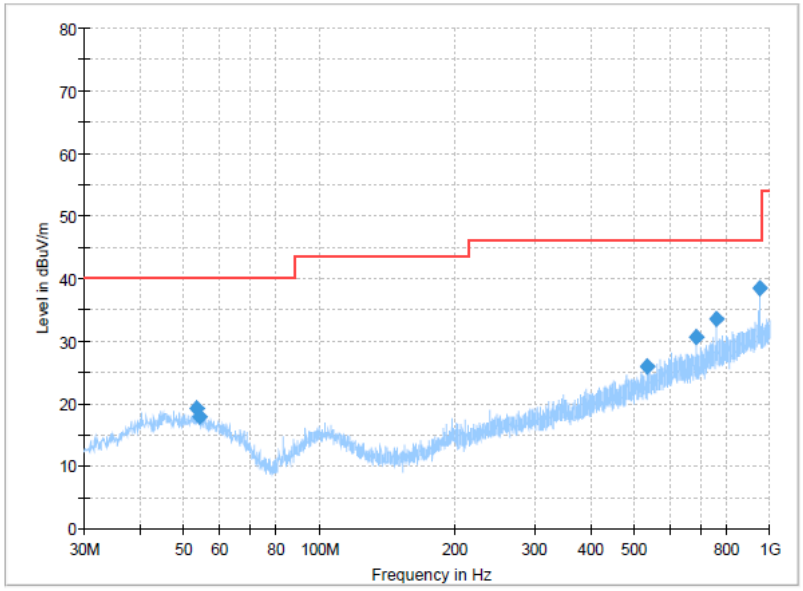
Test frequency range:	30MHz~1000MHz
Polarization:	Vertical



Final_Result

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
687.5388	30.62	46.00	15.38	100.0	V	0.0	2.5
763.8050	32.04	46.00	13.96	100.0	V	351.0	4.4
875.5975	32.43	46.00	13.57	100.0	V	18.0	6.5
945.1950	36.18	46.00	9.82	100.0	V	198.0	7.5
946.6500	35.80	46.00	10.20	100.0	V	0.0	7.5
948.4688	37.68	46.00	8.32	100.0	V	214.0	7.5

Polarization:	Horizontal



Final_Result

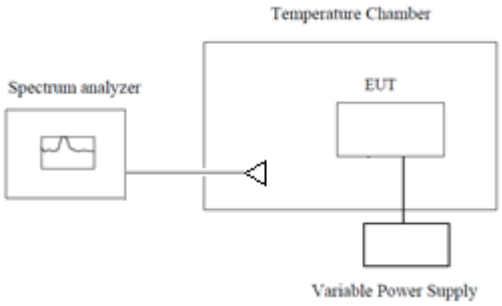
Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
53.4013	19.11	40.00	20.89	300.0	H	6.0	-8.6
54.1288	17.89	40.00	22.11	100.0	H	66.0	-8.8
532.5813	25.97	46.00	20.03	100.0	H	177.0	-0.9
687.5388	30.71	46.00	15.29	100.0	H	294.0	2.5
762.1075	33.57	46.00	12.43	300.0	H	56.0	4.4
948.2263	38.37	46.00	7.63	100.0	H	252.0	7.5

5.6. Frequency Stability

LIMIT

The frequency tolerance of the carrier signal shall be maintained within ±0.01% 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.

TEST CONFIGURATION



TEST PROCEDURE

1. The equipment under test was connected to an external power supply.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –20℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

TEST MODE:

Please refer to the clause 4.1

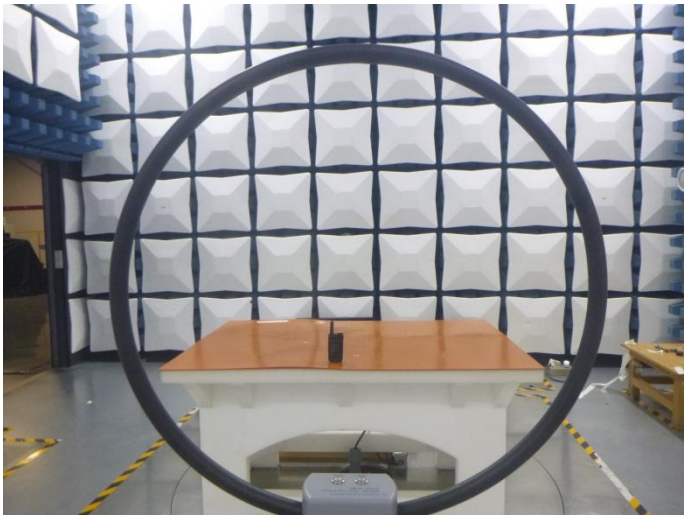
TEST RESULTS

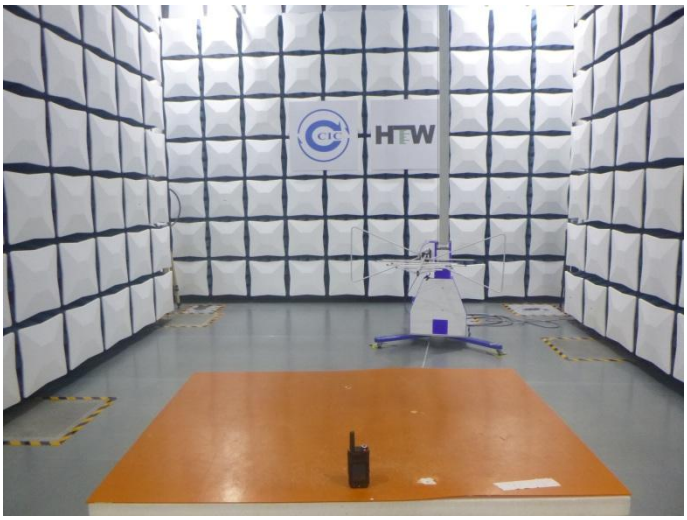
☒ **Passed** ☐ **Not Applicable**

Test Enviroment		Measurement data (MHz)	Frequency Error (%)	Limit	Result
Voltage	Temperature(℃)				
DC 3.70V	-20	13.56005490	0.0004	±0.01%	Pass
	-10	13.56006491	0.0005	±0.01%	Pass
	0	13.56007489	0.0006	±0.01%	Pass
	10	13.56001301	0.0001	±0.01%	Pass
	20	13.56000331	0.0000	±0.01%	Pass
	30	13.56001487	0.0001	±0.01%	Pass
	40	13.56001110	0.0001	±0.01%	Pass
	50	13.56002492	0.0002	±0.01%	Pass
DC 3.33V	20	13.56007491	0.0006	±0.01%	Pass
DC 4.07V	20	13.56006495	0.0005	±0.01%	Pass

6. TEST SETUP PHOTOS

Radiated Emissions





7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Refer to the test report No.: CHTW24090001

--------End of Report--------