TEST REPORT

Applicant:	renqiu xinmaizhong auto parts co.ltd
Address of Applicant:	Dajiang Village, Liangzhao Town, Renqiu City, Hebei Province, China
Manufacturer/Factory:	renqiu xinmaizhong auto parts co.ltd
Address of Manufacturer/Factory:	Dajiang Village, Liangzhao Town, Renqiu City, Hebei Province, China
Equipment Under Test (EUT)	
Product Name:	Air -warm Parking heater switch
Model No.:	XMZ-M4
FCC ID:	2BAZM-XMZM4
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.231
Date of sample receipt:	April 12, 2023
Date of Test:	April 13, 2023-May 11, 2023
Date of report issued:	May 12, 2023
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Luo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
01	*May 12, 2023*	*Original*

Prepared By: ***Date:*** *May 12, 2023*

Project Engineer

Check By: ***Date:*** *May 12, 2023*

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203	Pass
Conduction Emission	15.207	N/A
Field strength of the Fundamental Signal	15.231 (b)	Pass
Spurious Emissions	15.231 (b)/15.209	Pass
20dB Bandwidth	15.231 (c)	Pass
Deactivation Testing	15.231 (a)(1)	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not applicable.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	Air -warm Parking heater switch
Model No.:	XMZ-M4
S/N:	N/A
Test sample(s) ID:	GTS2023030476-1
Sample(s) Status:	Engineer sample
Operation Frequency:	433.92MHz
Modulation technology:	ASK
Antenna Type:	PCB Antenna
Antenna gain:	-5.716dBi(declare by applicant)
Power supply:	DC 6V(2 x DC3V “CR2025” Button Cell)

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode. The new battery used

Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which only the worst case was shown in this test report and defined as follows:

433.92MHz	Axis	X	Y	Z
	Field Strength(dBuV/m)	79.54	82.65	80.31

5.3 Description of Support Units

None.

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

- **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A.

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
No.123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China
Tel: 0755-27798480
Fax: 0755-27798960

5.6 Other Information Requested by the Customer

None.

5.7 Additional Instructions

EUT Software Settings:

Mode	Continuously transmitter by manufacturer, power set default

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July 02, 2020	July 01, 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	April 21, 2023	April 20, 2024
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 20, 2023	March 19, 2025
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June 12, 2022	June 11, 2023
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 23, 2022	June 22, 2023
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	April 21, 2023	April 20, 2024
9	Coaxial Cable	GTS	N/A	GTS211	April 21, 2023	April 20, 2024
10	Coaxial cable	GTS	N/A	GTS210	April 21, 2023	April 20, 2024
11	Coaxial Cable	GTS	N/A	GTS212	April 21, 2023	April 20, 2024
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	April 21, 2023	April 20, 2024
13	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 23, 2022	June 22, 2023
14	Band filter	Amindeon	82346	GTS219	June 23, 2022	June 22, 2023
15	Power Meter	Anritsu	ML2495A	GTS540	June 23, 2022	June 22, 2023
16	Power Sensor	Anritsu	MA2411B	GTS541	June 23, 2022	June 22, 2023
17	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 21, 2023	April 20, 2024
18	Splitter	Agilent	11636B	GTS237	June 23, 2022	June 22, 2023
19	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 29, 2022	Nov. 28, 2023
20	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 21, 2023	April 20, 2024
21	Breitband hornantenna	SCHWARZBECK	BBHA 9170	GTS579	Oct. 16, 2022	Oct. 15, 2023
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 16, 2022	Oct. 15, 2023
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 16, 2022	Oct. 15, 2023
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June 23, 2022	June 22, 2023
25	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 21, 2023	April 20, 2024

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	April 21, 2023	April 20, 2024
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 21, 2023	April 20, 2024
3	Spectrum Analyzer	Agilent	E4440A	GTS536	April 21, 2023	April 20, 2024
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 21, 2023	April 20, 2024
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 21, 2023	April 20, 2024
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 21, 2023	April 20, 2024
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 21, 2023	April 20, 2024
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 21, 2023	April 20, 2024

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	April 24, 2023	April 23, 2024
2	Barometer	KUMAO	SF132	GTS647	July 26, 2022	July 25, 2023

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: 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.	
EUT Antenna:	
The antenna is PCB antenna, reference to the appendix II for details.	

7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.231 (b)& Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 6000MHz
Test site:	Measurement Distance: 3m

Receiver setup:

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Field strength of the fundamental signal)

Frequency	Limit (dBuV/m @3m)	Remark
433.92MHz	100.83	Peak Value
	80.83	Average Value

Limit:
(Spurious Emissions)

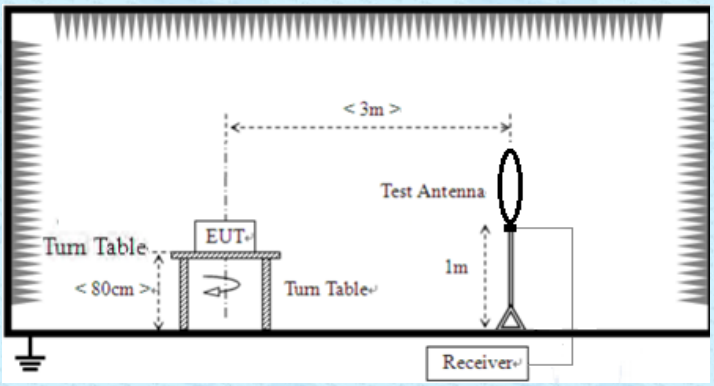
Fundamental Frequency (MHz)	Field Strength of fundamental (microvolts/meter)	Field Strength of Unwanted Emissions (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750**	125 to 735
174-260	3750	375
260-470	3750 to12500	375 to 1250
Above 470	12500	1250

Frequency (MHz)	Class B(dBuV/m @3m)	
	Peak	Average
Above 1000	74	54

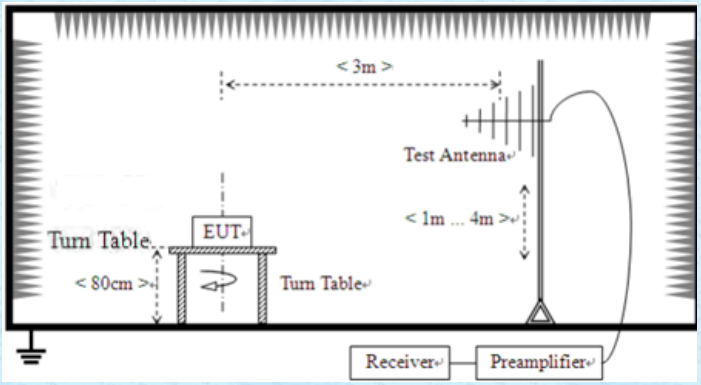
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits higher field strength.

Test setup:

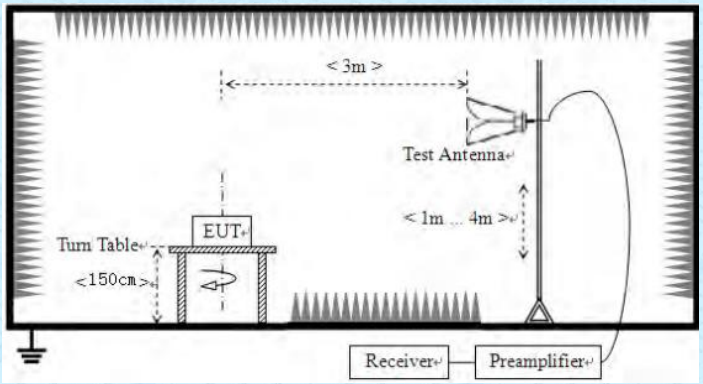
Below 30MHz



Below 1GHz



Above 1GHz



Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	50%	Press.:	1 010mbar
Test results:	Pass					

Measurement data:

7.2.1 Field Strength of The Fundamental Signal

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.92	90.68	16.39	3.02	30.00	80.09	100.83	-20.74	Horizontal
433.92	93.24	16.39	3.02	30.00	82.65	100.83	-18.18	Vertical

Average value:

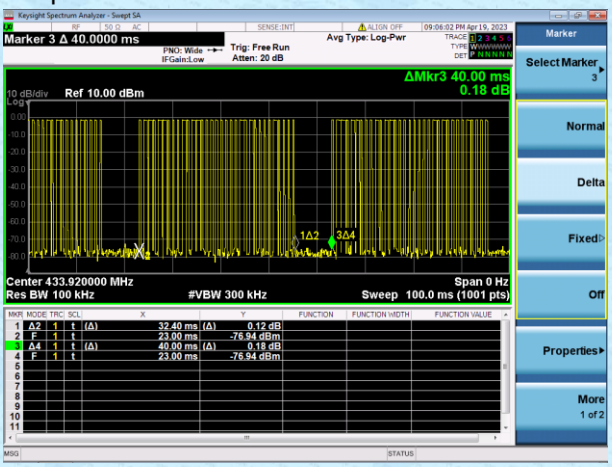
Frequency (MHz)	Peak Value (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	80.09	-6.65	73.44	80.83	-7.39	Horizontal
433.92	82.65	-6.65	76.00	80.83	-4.83	Vertical

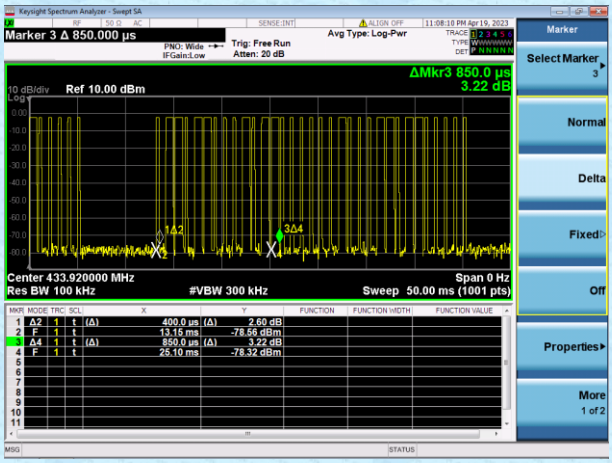
Remarks:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

Average value:	
Calculate Formula:	Average value=Peak value + Duty Cycle Factor
	Duty cycle factor=20 log(Duty cycle)
	Duty cycle=on time/100 milliseconds or period, whichever is less
Test data:	T on time =18.6(ms)
	T period =40(ms)
	Duty cycle=0.465
	duty cycle factor=-6.65

Test plot as follows:





7.2.2 Spurious Emissions

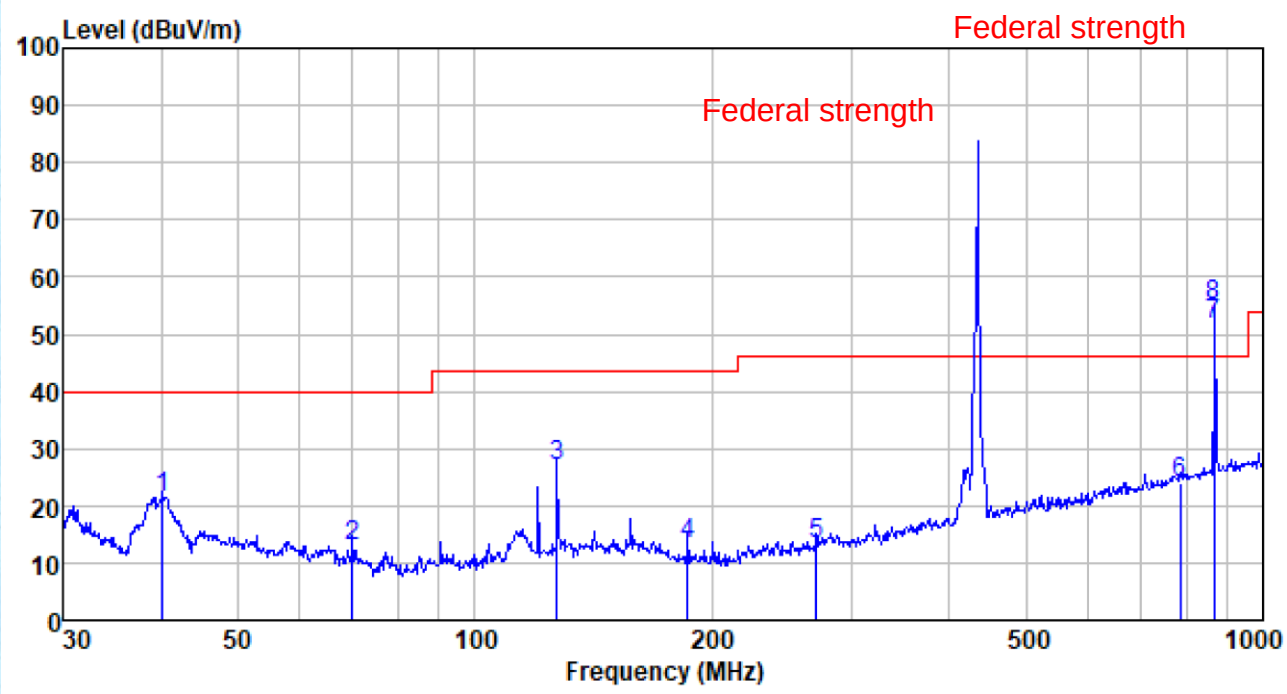
Measurement data:

9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Below 1GHz:

Mode:	**Transmitting mode**	**Polarization:**	**Horizontal**

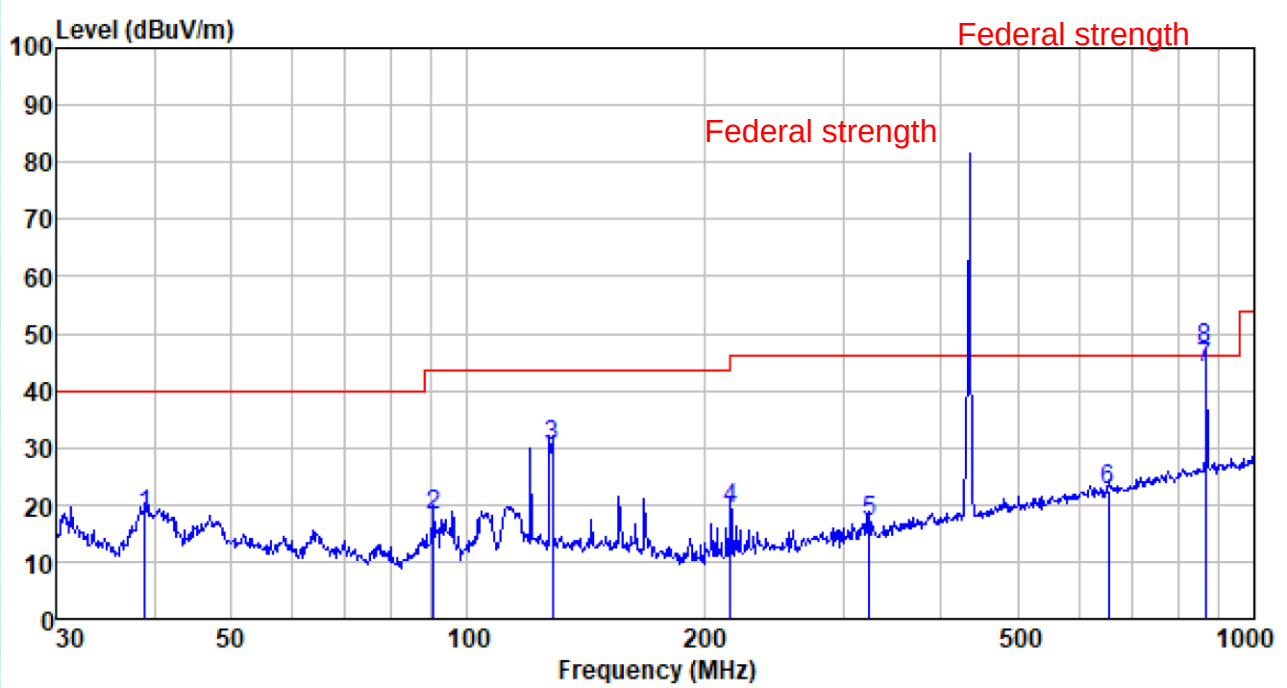


Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
40.14	37.18	13.50	0.66	30.00	21.34	40.00	-18.66	QP
69.85	31.27	10.53	0.94	30.00	12.74	40.00	-27.26	QP
127.22	44.05	11.65	1.41	30.00	27.11	43.50	-16.39	QP
186.44	31.40	9.93	1.77	30.00	13.10	43.50	-30.40	QP
271.33	28.75	12.22	2.23	30.00	13.20	46.00	-32.80	QP
785.09	27.13	22.43	4.40	30.00	23.96	46.00	-22.04	QP

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
867.84	56.64	23.51	4.73	30.00	54.88	80.83	-25.95	Peak

Frequency (MHz)	Level (dBuV/m)	Duty cylcle factor	Average Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
867.84	54.88	-6.65	48.23	60.83	-12.60	Average

Mode:	Transmitting mode	Polarization:	Vertical



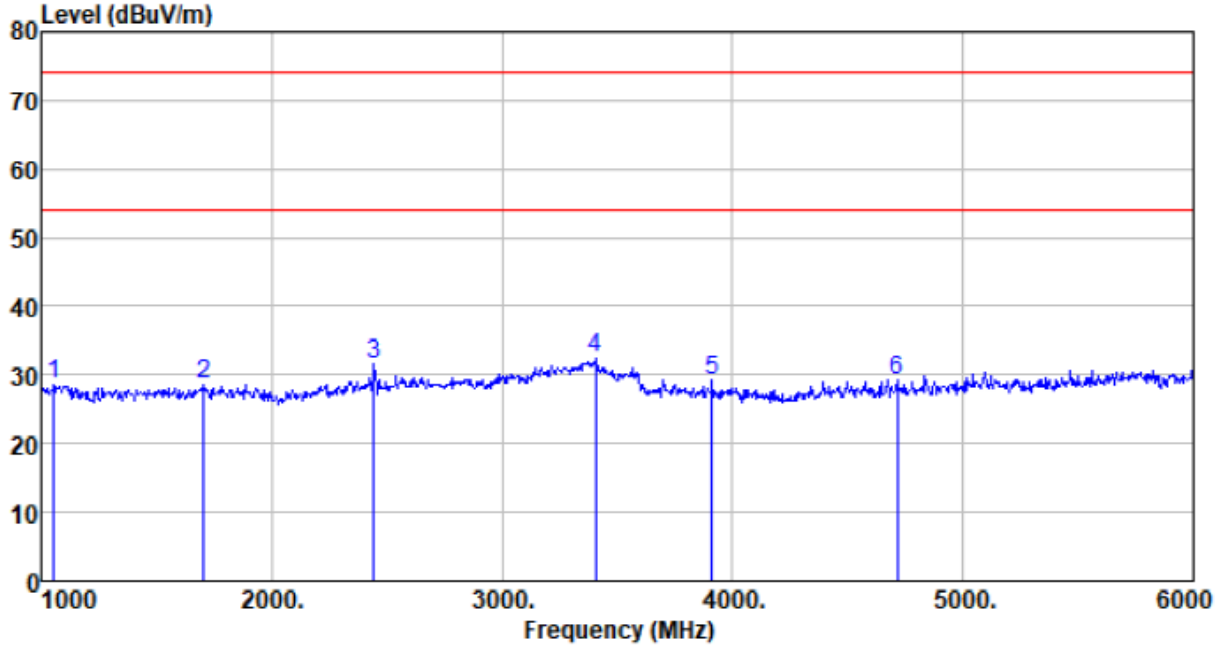
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
38.89	34.16	13.33	0.65	30.00	18.14	40.00	-21.86	QP
90.54	38.29	8.66	1.11	30.00	18.06	43.50	-25.44	QP
128.11	47.08	11.71	1.42	30.00	30.21	43.50	-13.29	QP
216.02	37.06	10.09	1.93	30.00	19.08	46.00	-26.92	QP
324.46	31.03	13.30	2.49	30.00	16.82	46.00	-29.18	QP
651.94	28.33	20.11	3.92	30.00	22.36	46.00	-23.64	QP

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
867.84	48.93	23.51	4.73	30.00	47.17	80.83	-33.66	Peak

Frequency (MHz)	Level (dBuV/m)	Duty cylcle factor	Average Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
867.84	47.17	-6.65	40.52	60.83	-20.31	Average

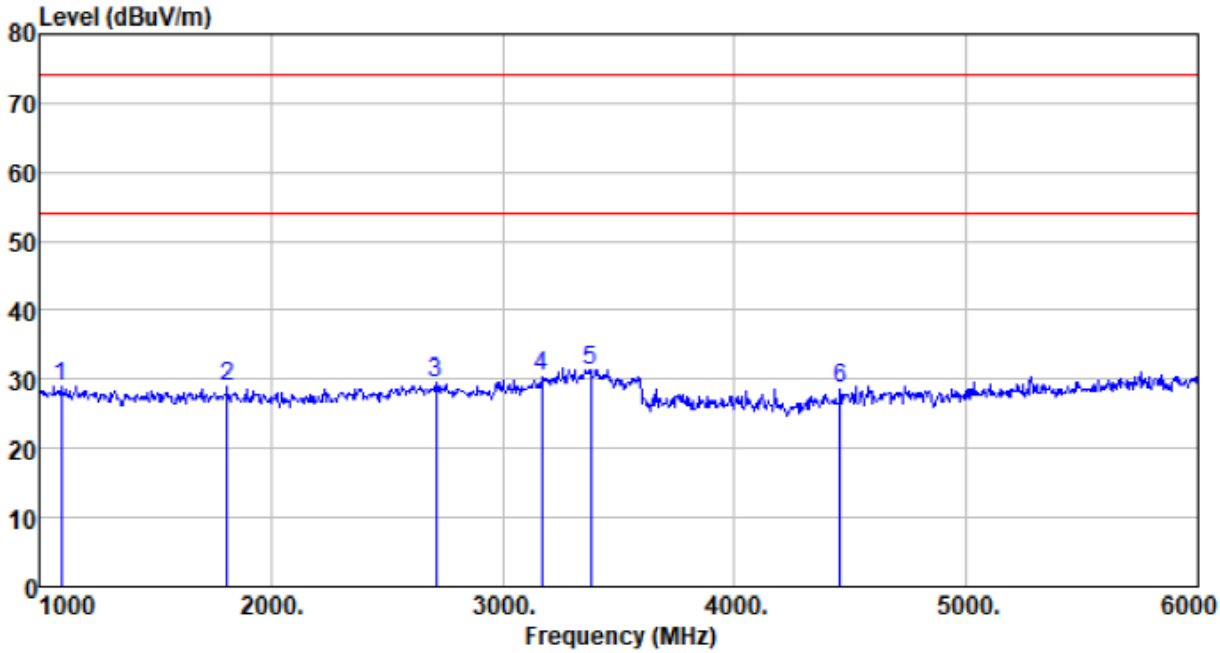
Above 1G:

Mode:	**Transmitting mode**	**Polarization:**	**Horizontal**



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
1055.000	37.96	24.52	2.02	35.76	28.74	74.00	-45.26	Peak
1705.000	36.81	25.66	2.40	36.32	28.55	74.00	-45.45	Peak
2445.000	37.87	27.53	2.96	36.89	31.47	74.00	-42.53	Peak
3405.000	37.77	28.40	3.64	37.34	32.47	74.00	-41.53	Peak
3910.000	33.01	29.56	3.91	37.39	29.09	74.00	-44.91	Peak
4715.000	31.41	31.07	4.57	37.70	29.35	74.00	-44.65	Peak

Mode:	Transmitting mode	Polarization:	Vertical

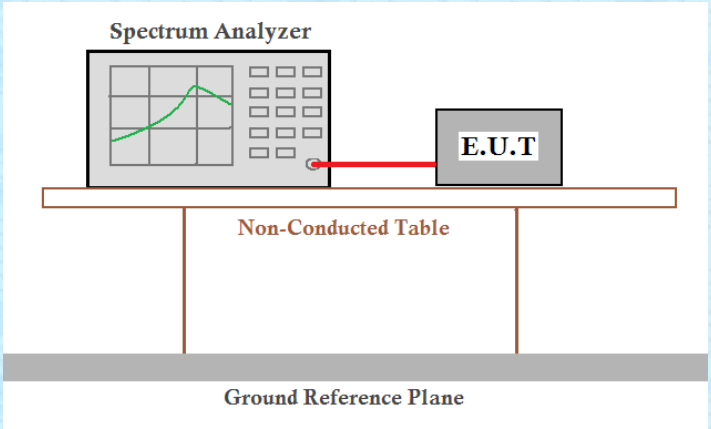


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
1095.000	38.19	24.60	2.07	35.80	29.06	74.00	-44.94	Peak
1810.000	37.06	25.82	2.49	36.38	28.99	74.00	-45.01	Peak
2710.000	35.46	28.01	3.17	37.10	29.54	74.00	-44.46	Peak
3170.000	35.76	28.40	3.59	37.32	30.43	74.00	-43.57	Peak
3380.000	36.73	28.40	3.64	37.34	31.43	74.00	-42.57	Peak
4455.000	31.18	30.63	4.38	37.59	28.60	74.00	-45.40	Peak

Remarks:

2. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

7.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.10:2013
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Test Frequency (MHz)	20dB bandwidth (kHz)	Limit (MHz)	Result
433.92	57.43	1.0848	Pass

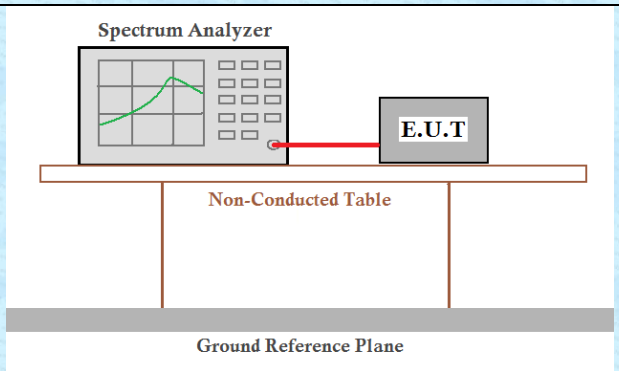
Note: Limit= Fundamental frequency×0.25%

433.92×0.25%=1.0848MHz

Test plot as follows:

Keysight Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN OFF
01:15:31 AM Apr 12, 2023
Ref Value 10.00 dBm
#IFGain:Low
Center Freq: 433.920000 MHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
10 dB/div
Log
Ref 10.00 dBm
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center 433.920000 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 500 kHz
Sweep 4.8 ms
Occupied Bandwidth
65.739 kHz
Total Power 4.46 dBm
Transmit Freq Error -8.262 kHz
% of OBW Power 99.00 %
x dB Bandwidth 57.43 kHz
x dB -20.00 dB
Amptd/Y Scale
Ref Value
10.00 dBm
Attenuation
[20 dB]
Scale/Div
10.0 dB
Presel Center
Presel Adjust
0 Hz
More
1 of 2
MSG
STATUS

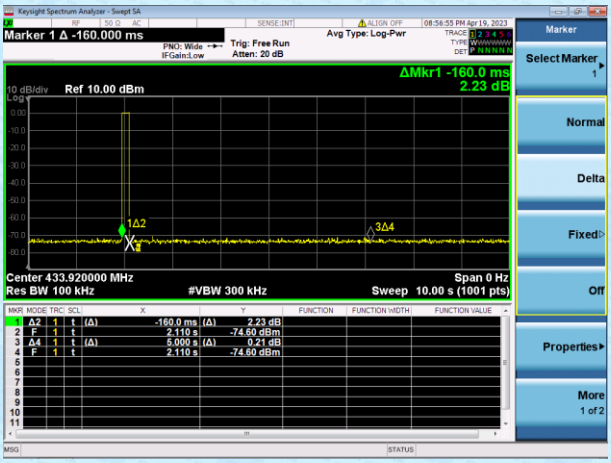
7.4 Deactivation Testing

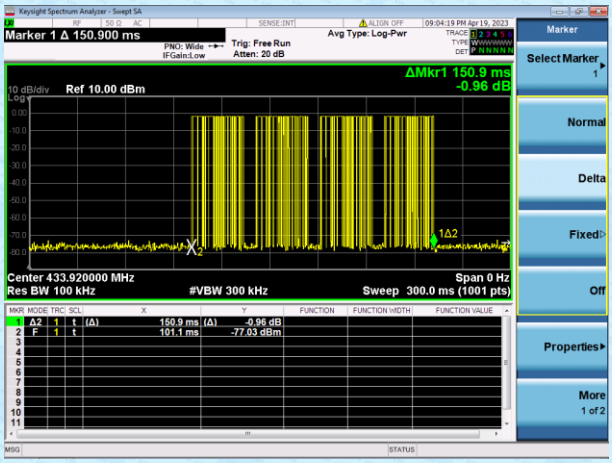
Test Requirement:	FCC Part15 C Section 15.231 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=1MHz, span=0Hz, detector: Peak
Limit:	Not more than 5 seconds
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Frequency (MHz)	Duration of each TX (ms)	Limit (second)	Result
433.92	150.9	<5.0	Pass

Test plot as follows:





8 Test Setup Photo

Reference to the **Appendix I** for details.

9 EUT Constructional Details

Reference to the **Appendix II** for details.

------ End ------