CFR 47 FCC PART 15 SUBPART C(DTS)

TEST REPORT

For

RV Propane Gas Detector

MODEL NUMBER: ICGD-2023

REPORT NUMBER: E01A23030778F00101

ISSUE DATE: March 28, 2023

FCC ID:2A3BE-ICGD-2023

Prepared for

Wuhu Youfan E-Commerce Co.,Ltd.
No. 369 industrial Road, Anhui Xinwu Economic Development Zone, Wuhu County, Wuhu City, China

Prepared by

Dong Guan Anci Electronic Technology Co., Ltd.

1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	March 28, 2023	Initial Issue	Duke

Summary of Test Results

Summary of Test Results			
Test Item	**Clause**	**Limit/Requirement**	**Result**
Antenna Requirement	N/A	FCC Part 15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	ANSI C63.10-2013, Clause 6.2	FCC Part 15.207	Pass
Conducted Output Power	ANSI C63.10-2013, Clause 11.9.1.3	FCC Part 15.247 (b)(3)	Pass
6dB Bandwidth and 99% Occupied Bandwidth	ANSI C63.10-2013, Clause 11.8.1	FCC Part 15.247 (a)(2)	Pass
Power Spectral Density	ANSI C63.10-2013, Clause 11.10.2	FCC Part 15.247 (e)	Pass
Conducted Band edge and spurious emission	ANSI C63.10-2013, Clause 11.11	FCC Part 15.247(d)	Pass
Radiated Band edge and Spurious Emission	ANSI C63.10-2013, Clause 11.11 & Clause 11.12	FCC Part 15.205/15.209	Pass
Duty Cycle	ANSI C63.10-2013, Clause 11.6	None; for reporting purposes only.	Pass

*The measurement result for the sample received is <Pass> according to <CFR 47 FCC PART 15 SUBPART C(DTS)> when <Accuracy Method> decision rule is applied.

CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Wuhu Youfan E-Commerce Co.,Ltd.
Address:	No. 369 industrial Road, Anhui Xinwu Economic Development Zone, Wuhu County, Wuhu City, China

Manufacturer Information

Company Name:	Wuhu Youfan E-Commerce Co.,Ltd.
Address:	No. 369 industrial Road, Anhui Xinwu Economic Development Zone, Wuhu County, Wuhu City, China

EUT Information

EUT Name:	RV Propane Gas Detector
Model:	ICGD-2023
Brand:	Shyion
Sample Received Date:	March 22, 2023
Sample Status:	Normal
Sample ID:	A23030778 001
Date of Tested:	March 23, 2023 to March 28, 2023

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART C(DTS)	**Pass**

Prepared By:

Dyson

Project Engineer

Checked By:

Duke

Project Engineer

Approved By:

Tiger

Laboratory Supervisor

2. TEST METHODOLOGY

All tests were performed in accordance with the standard CFR 47 FCC PART 15 SUBPART C(DTS).

3. FACILITIES AND ACCREDITATION

Site Description

Name of Firm	:	Dong Guan Anci Electronic Technology Co., Ltd.
Site Location	:	1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech Industrial Development Zone, Dongguan City,evelopment Zone, Dongguan City, Guangdong Pr., China.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

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

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

Test Item	Measurement Frequency Range	K	U(dB)
Conducted emissions from the AC mains power ports	0.009 MHz ~ 0.15 MHz	2	4.00
Conducted emissions from the AC mains power ports	0.15 MHz ~ 30 MHz	2	3.62
Radiated emissions	9kHz ~ 30MHz	2	2.20
Radiated emissions	30 MHz ~ 1 GHz	2	3.16
Radiated emissions	1 GHz ~ 18 GHz	2	5.64
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name		RV Propane Gas Detector
Model		ICGD-2023
Ratings		DC 12V
Power Supply	DC	12V

Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2402 MHz to 2480 MHz
Bluetooth Version:	4.2
Bluetooth Mode:	LE
Type of Modulation:	GFSK
Number of Channels:	40
Channel Separation:	2 MHz
Maximum Peak Power:	-0.08 dBm
Antenna Type:	PCB antenna
Antenna Gain:	1.37dBi
Normal Test Voltage:	12Vdc

5.2. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	11	2424	22	2446	33	2468
1	2404	12	2426	23	2448	34	2470
2	2406	13	2428	24	2450	35	2472
3	2408	14	2430	25	2452	36	2474
4	2410	15	2432	26	2454	37	2476
5	2412	16	2434	27	2456	38	2478
6	2414	17	2436	28	2458	39	2480
7	2416	18	2438	29	2460	/	/
8	2418	19	2440	30	2462	/	/
9	2420	20	2442	31	2464	/	/
10	2422	21	2444	32	2468	/	/

5.3. MAXIMUM AVERAGE EIRP

Test Mode	Frequency (MHz)	Channel Number	Maximum Peak Output Power (dBm)	Maximum EIRP (dBm)
LE 1M	2402 ~ 2480	0-39[40]	-0.08	1.29

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
LE 1M	CH 0(Low Channel), CH 19(MID Channel), CH 39(High Channel)	2402 MHz, 2440 MHz, 2480 MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software Version		Wifi Test Tool v1.6.0 release		
Modulation Type	Transmit Antenna Number	Test Software setting value		
		CH 0	CH 19	CH 39
GFSK(1Mbps)	1	Max	Max	Max

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	2402-2480	PCB antenna	1.37

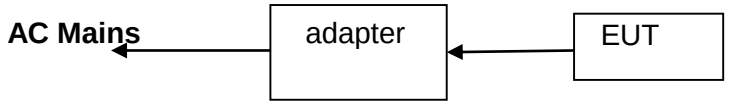
Test Mode	Transmit and Receive Mode	Description
LE 1M	☒1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
Note: 1.BT&WLAN 2.4Gcan't transmit simultaneously. (declared by client)		

5.7. SUPPORT UNITS FOR SYSTEM TEST

The EUT has been tested as an independent unit

Equipment	**Manufacturer**	**Model No.**
Adapter	GQ	GQ18-120150-CC

5.8. SETUP DIAGRAM



6. MEASURING EQUIPMENT AND SOFTWARE USED

Test Equipment of Conducted RF					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Spectrum Analyzer	Rohde & Schwarz	FSV40	US40240623	2022-10-29	2023-10-28
RF Test Software	MWRF-test	MTS 8310	N/A	N/A	N/A
Radio Frequency control box	MWRF-test	MW200-RFCB	MW220111ANCI	2022-05-13	2023-05-12
Radio Frequency control box	MWRF-test	MW200-RFCB 2#	/	2022-05-13	2023-05-12

Test Equipment of Radiated emissions below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	100302	2022/5/13	2023/5/12
Bilog Antenna	Schwarzbeck	VULB9163	VULB9163-1290	2022/12/12	2023/12/11
RF Cable	ZKJC	ZT06S-NJ-NJ-11M	19060398	2022/5/13	2023/5/12
RF Cable	ZKJC	ZT06S-NJ-NJ-0.5M	19060400	2022/5/13	2023/5/12
RF Cable	ZKJC	ZT06S-NJ-NJ-2.5M	19060404	2022/5/13	2023/5/12
EMI Test Receiver	ROHDE&SCHWARZ	ESPI7	100502	2022/10/8	2023/10/7
3m Semi-anechoic Chamber	Keysight	9m*6m*6m	N/A	2021/11/13	2024/11/12

Test Equipment of Radiated emissions above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Low noise Amplifiers	A-INFO	LA1018N4009	J1013130524001	2022/5/13	2023/5/12
Horn antenna	A-INFO	LB-10180-SF	J2031090612123	2022/5/15	2023/5/14
RF Cable	ZKJC	ZT26-NJ-NJ-11M	19060401	2022/5/13	2023/5/12
RF Cable	ZKJC	ZT26-NJ-NJ-2.5M	19060402	2022/5/13	2023/5/12
RF Cable	ZKJC	ZT26-NJ-NJ-0.5M	19060403	2022/5/13	2023/5/12
Spectrum Analyzer	Rohde & Schwarz	FSV40	US40240623	2022-10-29	2023-10-28
3m Semi-anechoic Chamber	Keysight	9m*6m*6m	N/A	2021/11/13	2024/11/12
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A	N/A

Test Equipment of Conducted emissions					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	101358	2022/5/13	2023/5/12
1# Shielded Room	chengyu	8m*4m*3.3m	N/A	2022/11/22	2025/11/21
LISN	ROHDE&SCHWARZ	ENV216	101413	2022/10/8	2023/10/7
Test Software	Farad	EZ-EMC (Ver.ANCI-3A1)	N/A	N/A	N/A
RF Cable	N/A	ZT06S-NJ-NJ-2.5M	19044022	2022/05/13	2023/05/12

7. ANTENNA PORT TEST RESULTS

7.1. CONDUCTED OUTPUT POWER

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3)	Peak Conduct Output Power	1 watt or 30 dBm	2400-2483.5

TEST PROCEDURE

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).
Measure peak emission level, the indicated level is the peak output power, after any corrections for external attenuators and cables.

TEST ENVIRONMENT

Temperature	23.4℃	Relative Humidity	50%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data"

7.2. 6DB BANDWIDTH

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2) ISED RSS-247 5.2 (a)	6 dB Bandwidth	≥ 500 kHz	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth and clause 6.9 for Occupied Bandwidth.

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Frequency Span	For 6 dB Bandwidth: Enough to capture all products of the modulation carrier emission
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 6 dB Bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.

b) 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 6 dB relative to the maximum level measured in the fundamental emission.

TEST ENVIRONMENT

Temperature	24℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data"

7.3. POWER SPECTRAL DENSITY

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.10.

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	PEAK
RBW	3 kHz ≤ RBW ≤ 100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST ENVIRONMENT

Temperature	24℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix

7.4. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.11 and 11.13.

Connect the EUT to the spectrum analyser and use the following settings for reference level measurement:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.
Change the settings for emission level measurement:

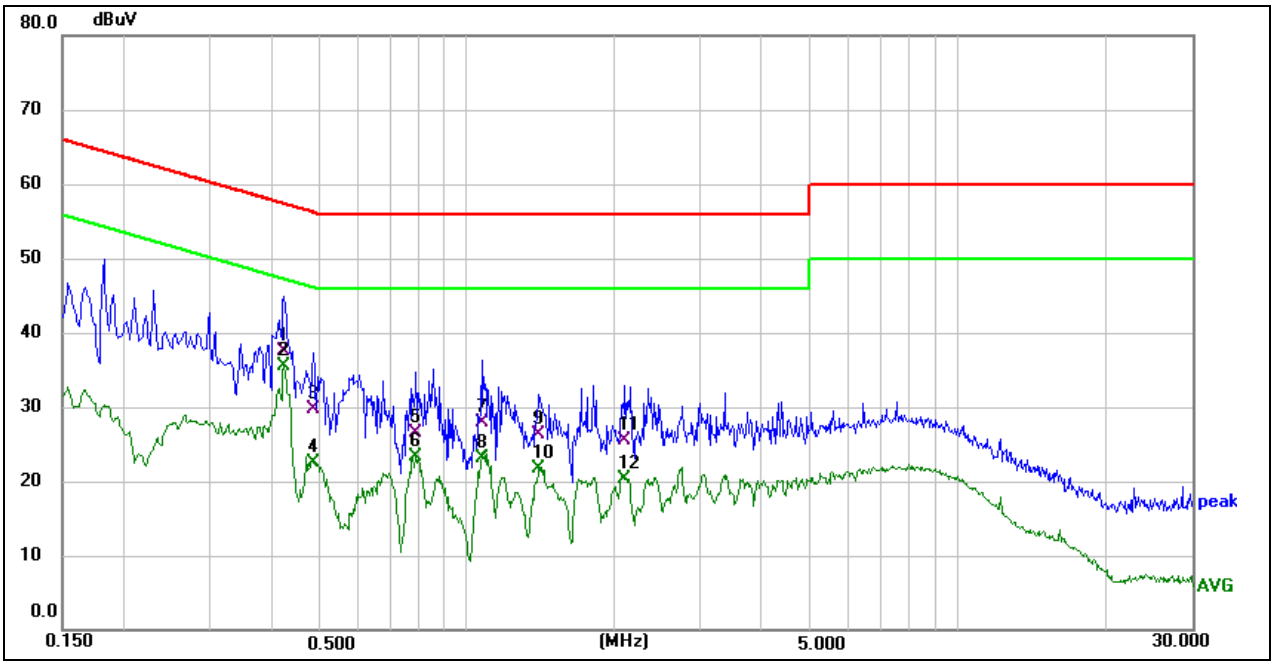
Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.

TEST ENVIRONMENT

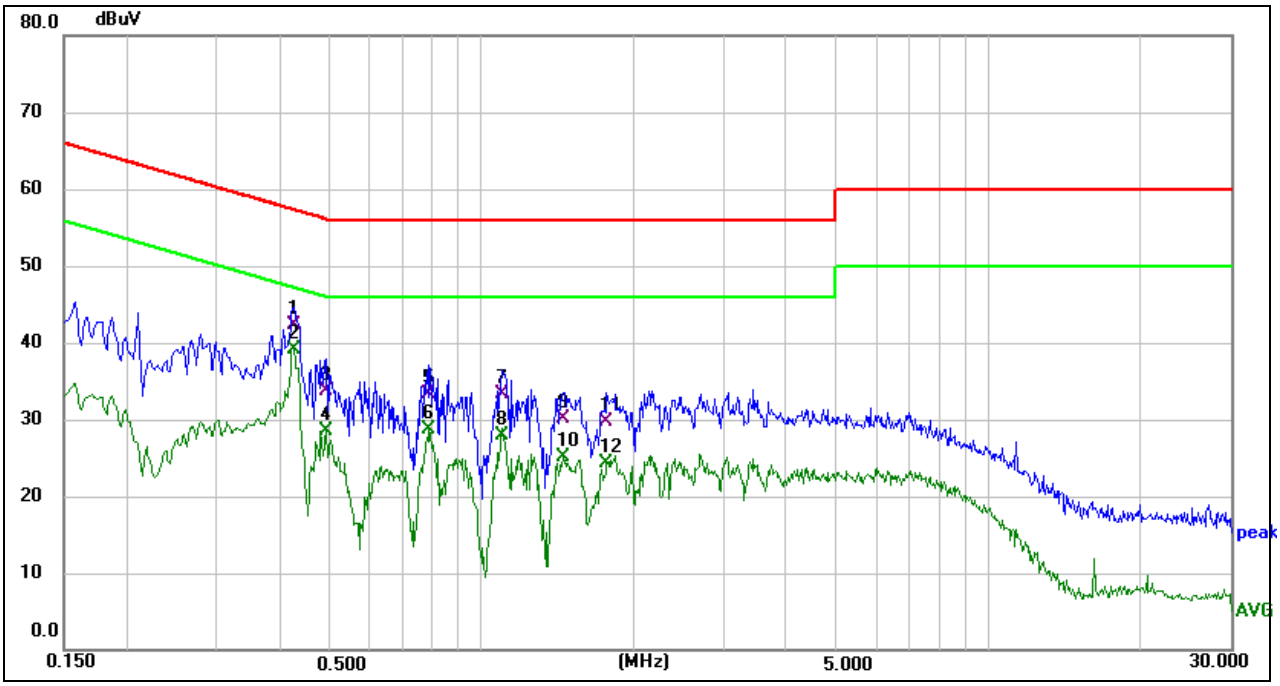
Temperature	23.5℃	Relative Humidity	52.6%
Atmosphere Pressure	101kPa		

TEST RESULTS



Site:		**Phase:N**	**Temperature(C):23.5(C)**
Limit:	**FCC Part 15 C Conduction(QP)**		**Humidity(%):52.6%**
EUT:	**RV Propane Gas Detector**	**Test Time:**	**2023-03-27 19:24:52**
M/N.:	**ICGD-2023**	**Power Rating:**	**AC 120V/60Hz**
Mode:	**BT mode**	**Test Engineer:**	**Sunshine**
Note:			

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Margin (dB)	Detector	Comment
1	0.4220	26.78	10.67	37.45	57.41	-19.96	QP	
2 *	0.4220	24.87	10.67	35.54	47.41	-11.87	AVG	
3	0.4860	18.86	10.76	29.62	56.24	-26.62	QP	
4	0.4860	11.79	10.76	22.55	46.24	-23.69	AVG	
5	0.7900	16.69	9.78	26.47	56.00	-29.53	QP	
6	0.7900	13.47	9.78	23.25	46.00	-22.75	AVG	
7	1.0740	17.84	9.97	27.81	56.00	-28.19	QP	
8	1.0740	13.11	9.97	23.08	46.00	-22.92	AVG	
9	1.4100	16.33	10.01	26.34	56.00	-29.66	QP	
10	1.4100	11.70	10.01	21.71	46.00	-24.29	AVG	
11	2.1060	15.72	9.88	25.60	56.00	-30.40	QP	
12	2.1060	10.49	9.88	20.37	46.00	-25.63	AVG	



Site:		**Phase:L1**	**Temperature(C):23.5(C)**
Limit:	**FCC Part 15 C Conduction(QP)**		**Humidity(%):52.6%**
EUT:	**RV Propane Gas Detector**	**Test Time:**	**2023-03-27 19:29:53**
M/N.:	**ICGD-2023**	**Power Rating:**	**AC 120V/60Hz**
Mode:	**BT mode**	**Test Engineer:**	**Sunshine**
Note:			

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Margin (dB)	Detector	Comment
1	0.4260	31.65	10.61	42.26	57.33	-15.07	QP	
2 *	0.4260	28.57	10.61	39.18	47.33	-8.15	AVG	
3	0.4940	23.94	9.70	33.64	56.10	-22.46	QP	
4	0.4940	18.77	9.70	28.47	46.10	-17.63	AVG	
5	0.7900	23.59	9.80	33.39	56.00	-22.61	QP	
6	0.7900	18.83	9.80	28.63	46.00	-17.37	AVG	
7	1.1019	23.44	9.92	33.36	56.00	-22.64	QP	
8	1.1019	18.05	9.92	27.97	46.00	-18.03	AVG	
9	1.4500	20.11	10.01	30.12	56.00	-25.88	QP	
10	1.4500	15.01	10.01	25.02	46.00	-20.98	AVG	
11	1.7700	19.63	10.04	29.67	56.00	-26.33	QP	
12	1.7700	14.23	10.04	24.27	46.00	-21.73	AVG	

7.5. DUTY CYCLE

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

TEST ENVIRONMENT

Temperature	24℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix

8. RADIATED TEST RESULTS

LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz ~ 1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

TEST PROCEDURE

Below 30 MHz

The setting of the spectrum analyser

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.

2. The EUT was arranged to its worst case and then 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. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. 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 and average detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made

to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.

8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB.

Below 1 GHz and above 30 MHz

The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.

2. 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. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. 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.

Above 1G

The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.

2. 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. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

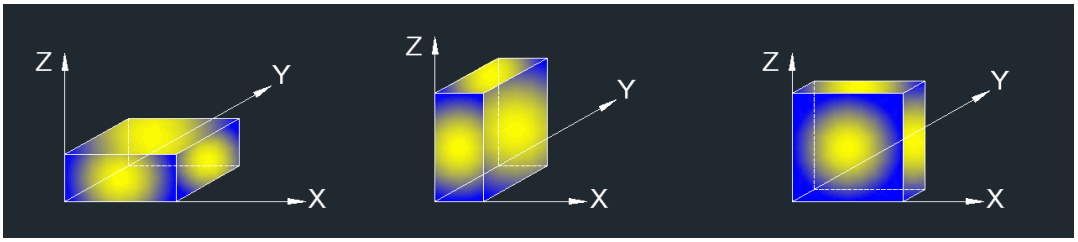
3. The EUT was placed on a turntable with 1.5 m above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

X axis, Y axis, Z axis positions:



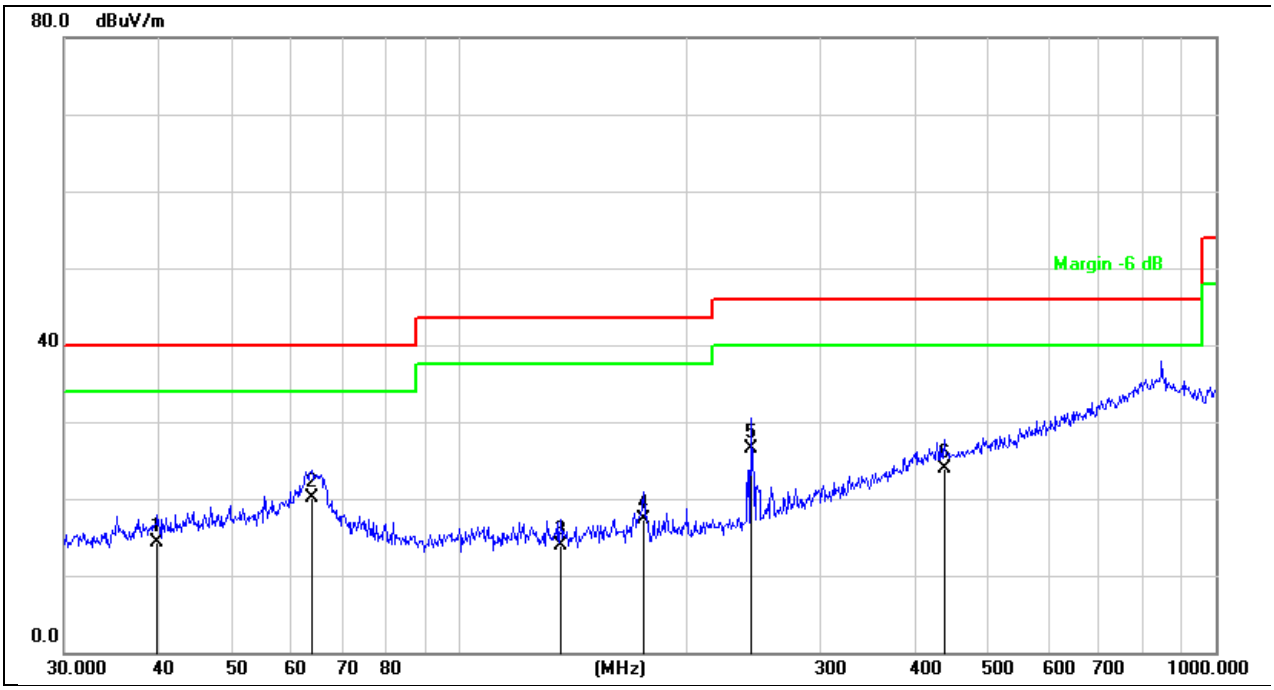
Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

TEST ENVIRONMENT

Temperature	26℃	Relative Humidity	54%
Atmosphere Pressure	101kPa		

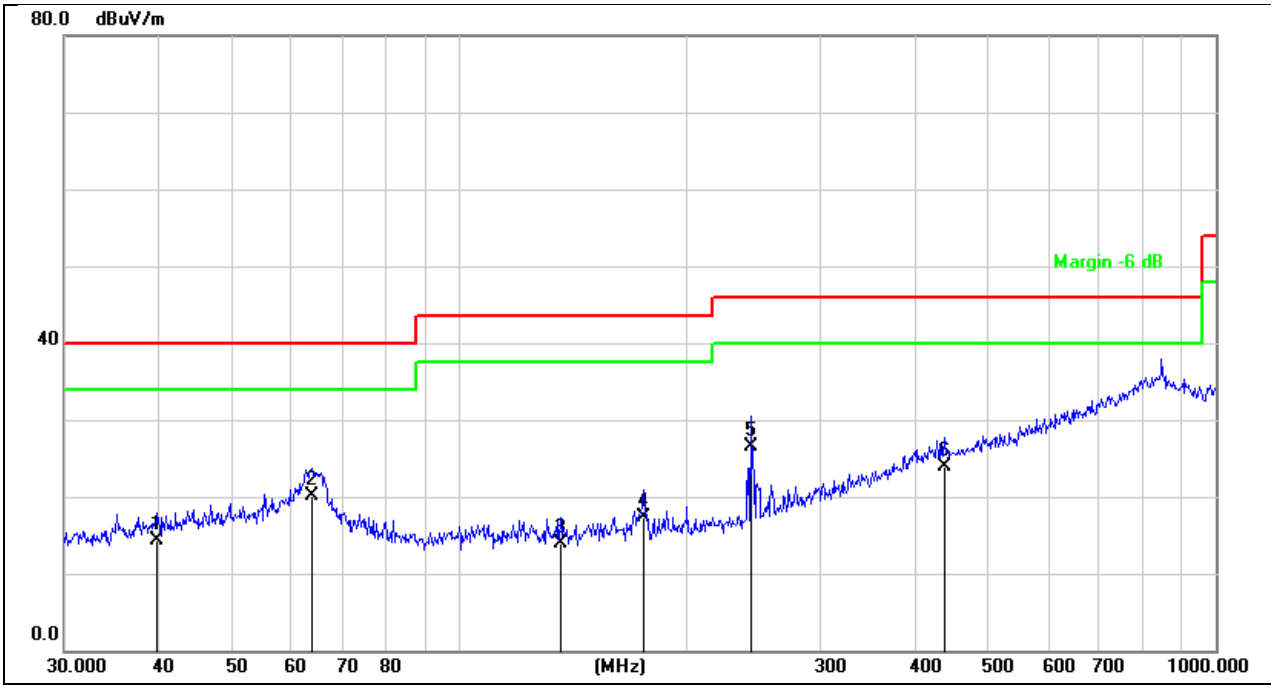
TEST RESULTS

Radiated Spurious Emission :
The data of the mode (GFSK 2402MHz) are recorded in the following pages.



Site:	**ChamberA-2**	**Antenna::Horizontal**	**Temperature(C):26(C)**
Limit:	**FCC Part 15 Class B 3m Radiation(QP)**		**Humidity(%):54%**
EUT:	**RV Propane Gas Detector**	**Test Time:**	**2023/03/28 0:58:24**
M/N.:	**ICGD-2023**	**Power Rating:**	**AC 120V/60Hz**
Mode:	**TX2402**	**Test Engineer:**	**Sunshine**
Note:			

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	39.8541	24.74	-10.48	14.26	40.00	-25.74	QP	200	42	
2	63.7588	29.20	-9.07	20.13	40.00	-19.87	QP	200	135	
3	135.9822	25.70	-11.81	13.89	43.50	-29.61	QP	200	130	
4	175.0367	28.59	-11.24	17.35	43.50	-26.15	QP	200	241	
5 *	242.5252	36.57	-10.01	26.56	46.00	-19.44	QP	200	241	
6	437.1198	25.97	-2.01	23.96	46.00	-22.04	QP	200	102	



Site:	**ChamberA-2**	**Antenna::Vertical**	**Temperature(C):26(C)**
Limit:	**FCC Part 15 Class B 3m Radiation(QP)**		**Humidity(%):54%**
EUT:	**RV Propane Gas Detector**	**Test Time:**	**2023/03/28 1:00:36**
M/N.:	**ICGD-2023**	**Power Rating:**	**AC 120V/60Hz**
Mode:	**TX2402**	**Test Engineer:**	**Sunshine**
Note:			

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)	Remark
1	40.1347	31.53	-10.45	21.08	40.00	-18.92	QP	100	38	
2	50.9420	30.00	-9.44	20.56	40.00	-19.44	QP	100	40	
3 *	61.9951	36.72	-8.99	27.73	40.00	-12.27	QP	100	142	
4	155.3644	30.00	-11.58	18.42	43.50	-25.08	QP	100	123	
5	175.0368	29.89	-11.24	18.65	43.50	-24.85	QP	100	125	
6	279.0436	28.35	-8.02	20.33	46.00	-25.67	QP	100	148	

Above 1000MHz~10th Harmonics:

Operation Mode:	TX Mode (CH00: 2402MHz)	Test Date :	2023-03-28
Frequency Range:	1-25GHz	Temperature :	26℃
Test Result:	PASS	Humidity :	54 %
Measured Distance:	3m	Test By:	Sunshine

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4804	V	94.02	74.99	-32.3	63.02	42.69	74	54	-10.98	-11.31
7206	V	97.52	76.75	-37.2	60.32	39.55	74	54	-13.68	-14.45
9608	V	98.41	78.42	-39.8	58.61	38.62	74	54	-15.39	-15.38
12010	V	96.75	76.99	-40.5	56.25	36.49	74	54	-17.75	-17.51
14412	V	97.3	78.11	-41.7	55.6	36.41	74	54	-18.4	-17.59
16814	V	94.85	75.36	-40	54.85	35.36	74	54	-19.15	-18.64
4804	H	94.45	74.34	-31.6	62.85	42.74	74	54	-11.15	-11.26
7206	H	95.75	75.75	-35.5	60.25	40.25	74	54	-13.75	-13.75
9608	H	96.94	77.82	-38.3	58.64	39.52	74	54	-15.36	-14.48
12010	H	94.63	75.41	-39	55.63	36.41	74	54	-18.37	-17.59
14412	H	97.3	78.25	-42	55.3	36.25	74	54	-18.7	-17.75
16814	H	95.62	75.77	-39.3	56.32	36.47	74	54	-17.68	-17.53

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+ Probe Factor +Cable Loss.
(3) The average measurement was not performed when the peak measured data under the limit of average detection.
(4) Measuring frequencies from 1GHz to 25GHz.

Operation Mode:	TX Mode (CH19: 2440MHz)	Test Date :	2023-03-28
Frequency Range:	1-25GHz	Temperature :	26℃
Test Result:	PASS	Humidity :	54 %
Measured Distance:	3m	Test By:	Sunshine

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4880	V	95.08	75.04	-32.3	62.78	42.74	74	54	-11.22	-11.26
7320	V	97.4	77.22	-37.2	60.2	40.02	74	54	-13.8	-13.98
9760	V	97.12	78.21	-39.8	57.32	38.41	74	54	-16.68	-15.59
12200	V	96.82	78.82	-40.5	56.32	38.32	74	54	-17.68	-15.68
14640	V	96.14	77.85	-41	55.14	36.85	74	54	-18.86	-17.15
17080	V	94.35	77.6	-41.1	53.25	36.5	74	54	-20.75	-17.5
4880	H	94.16	74.12	-31.6	62.56	42.52	74	54	-11.44	-11.48
7320	H	95.64	75.75	-35.5	60.14	40.25	74	54	-13.86	-13.75
9760	H	96.15	76.62	-38.3	57.85	38.32	74	54	-16.15	-15.68
12200	H	95.5	75.2	-39	56.5	36.2	74	54	-17.5	-17.8
14640	H	97.34	78.58	-42	55.34	36.58	74	54	-18.66	-17.42
17080	H	96.97	77.7	-41.5	55.47	36.2	74	54	-18.53	-17.8

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+ Probe Factor +Cable Loss.
(3) The average measurement was not performed when the peak measured data under the limit of average detection.
(4) Measuring frequencies from 1GHz to 25GHz.

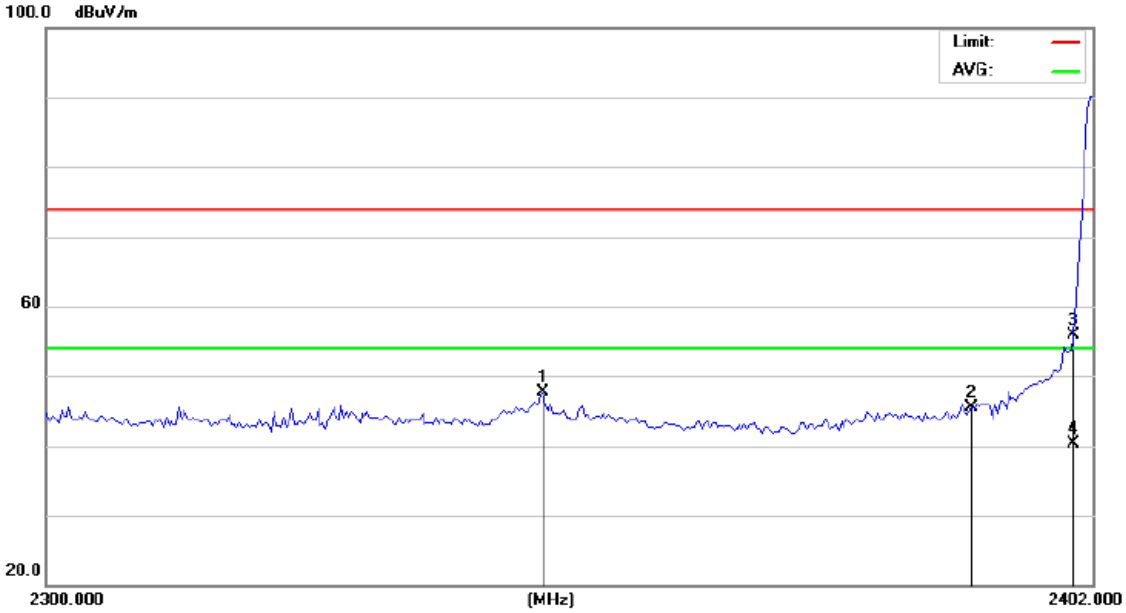
Operation Mode:	TX Mode (CH39: 2480MHz)	Test Date :	2023-03-28
Frequency Range:	1-25GHz	Temperature :	26℃
Test Result:	PASS	Humidity :	54 %
Measured Distance:	3m	Test By:	Sunshine

Freq.	Ant. Pol.	Reading Level(dBuV/m)		Correct Factor	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
(MHz)	H/V	PK	AV	dB	PK	AV	PK	AV	PK	AV
4960	V	94.62	75.32	-32.3	62.32	43.02	74	54	-11.68	-10.98
7440	V	97.48	77.45	-37.2	60.28	40.25	74	54	-13.72	-13.75
9920	V	98.21	78.82	-39.8	58.41	39.02	74	54	-15.59	-14.98
12400	V	96.83	96.75	-40.5	56.33	56.25	74	54	-17.67	2.25
14880	V	96.32	77.4	-41	55.32	36.4	74	54	-18.68	-17.6
17360	V	96.38	77.3	-41.1	55.28	36.2	74	54	-18.72	-17.8
4960	H	93.85	74.6	-31.6	62.25	43	74	54	-11.75	-11
7440	H	95.52	75.75	-35.5	60.02	40.25	74	54	-13.98	-13.75
9920	H	96.93	77.32	-38.3	58.63	39.02	74	54	-15.37	-14.98
12400	H	95.33	76.32	-39	56.33	37.32	74	54	-17.67	-16.68
14880	H	97.14	78.52	-42	55.14	36.52	74	54	-18.86	-17.48
17360	H	97.13	78.05	-41.5	55.63	36.55	74	54	-18.37	-17.45

Other harmonics emissions are lower than 20dB below the allowable limit.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+ Probe Factor +Cable Loss.
(3) The average measurement was not performed when the peak measured data under the limit of average detection.
(4) Measuring frequencies from 1GHz to 25GHz.

Band edge:



Site 843 Polarization: ***Horizontal*** Temperature: 26.5(C)

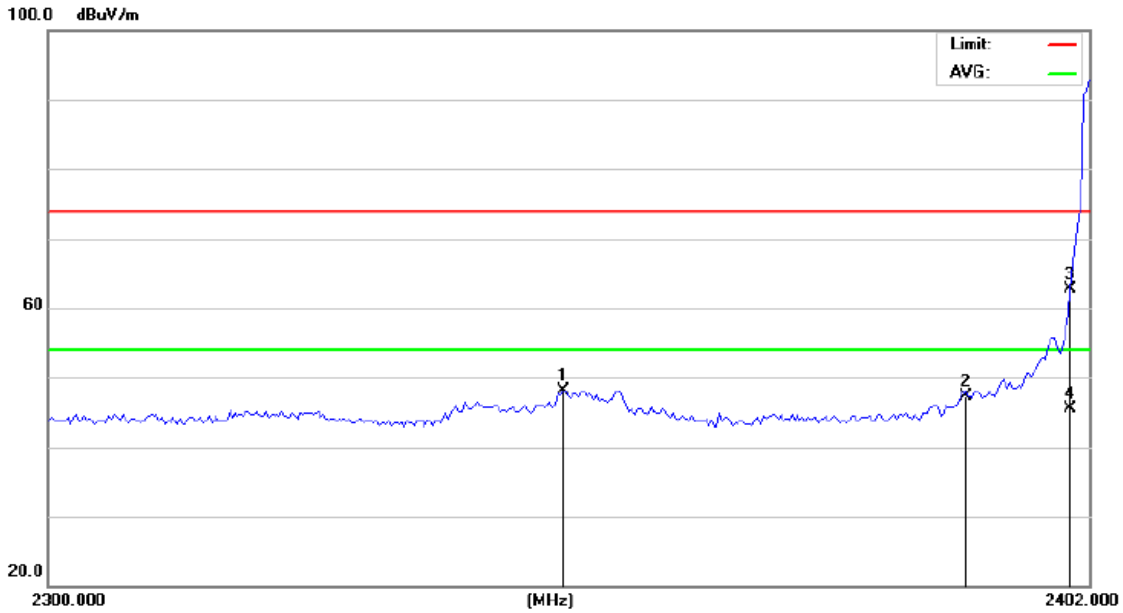
Limit: FCC Part 15 C 3m Above1G(Peak) Power: Battery 3V Humidity: 60.6 %

Mode: TX2402

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		2347.898	52.84	-5.11	47.73	74.00	-26.27	peak			
2		2390.000	50.24	-4.82	45.42	74.00	-28.58	peak			
3		2400.000	60.70	-4.75	55.95	74.00	-18.05	peak			
4	*	2400.000	45.02	-4.75	40.27	54.00	-13.73	AVG			

*:Maximum data x:Over limit !:over margin 〈Reference Only



Site 843 Polarization: *Vertical* Temperature: 26.5(C)

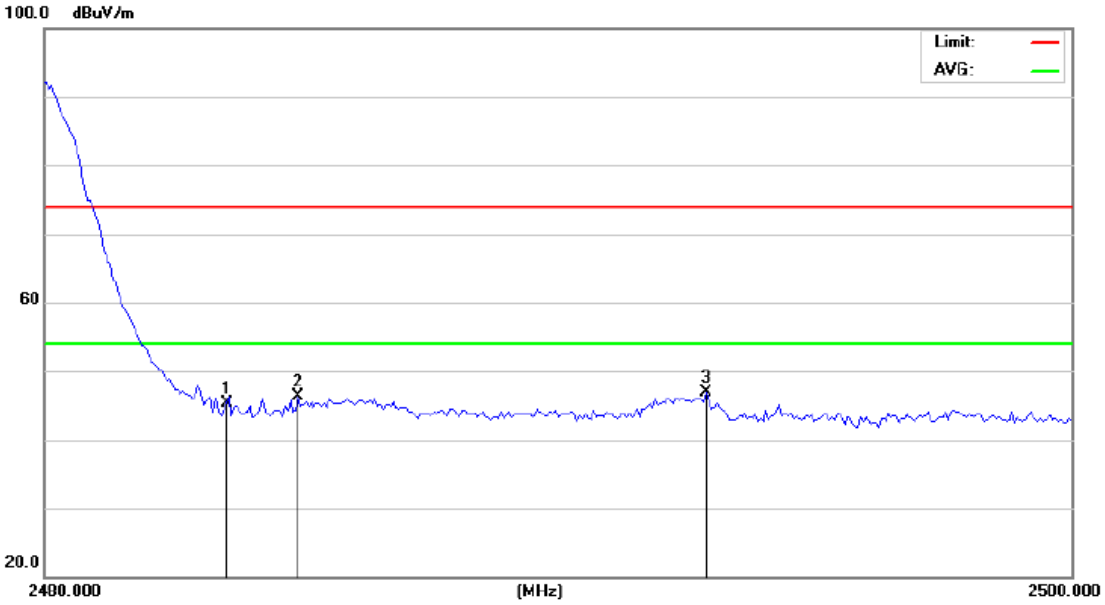
Limit: FCC Part 15 C 3m Above1G(Peak) Power: Battery 3V Humidity: 60.6 %

Mode: TX2402

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		2349.937	53.15	-5.09	48.06	74.00	-25.94	peak			
2		2390.000	52.18	-4.82	47.36	74.00	-26.64	peak			
3		2400.000	67.50	-4.75	62.75	74.00	-11.25	peak			
4	*	2400.000	50.25	-4.75	45.50	54.00	-8.50	AVG			

*:Maximum data x:Over limit !:over margin 〈Reference Only



Site 843 Polarization: *Horizontal* Temperature: 26.5(C)

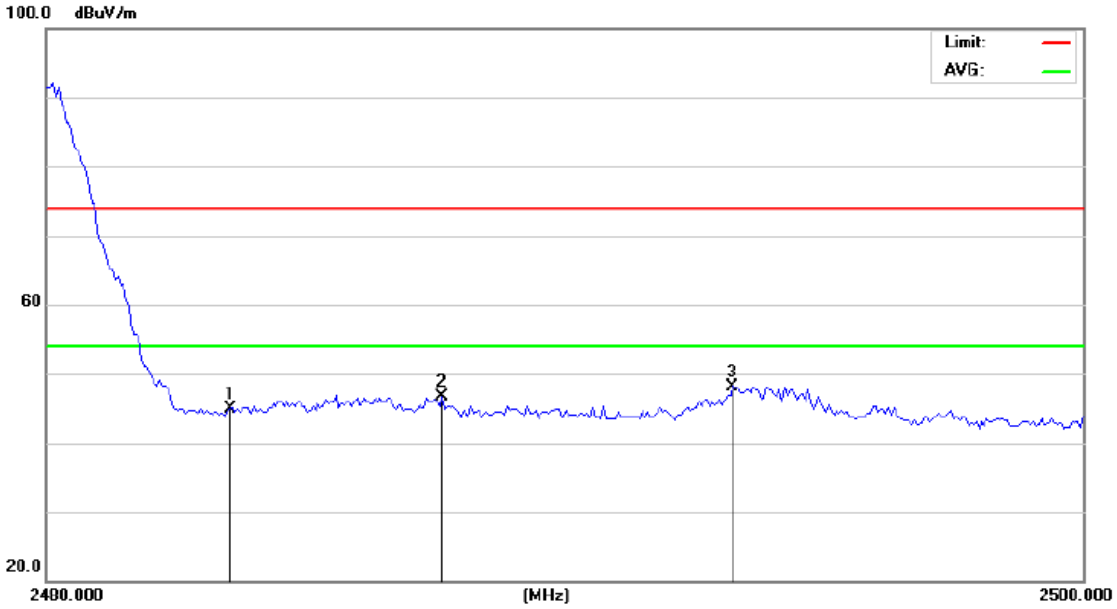
Limit: FCC Part 15 C 3m Above1G(Peak) Power: Battery 3V Humidity: 60.6 %

Mode: TX2480

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		2483.500	49.55	-4.19	45.36	74.00	-28.64	peak			
2		2484.935	50.44	-4.18	46.26	74.00	-27.74	peak			
3	*	2492.882	51.08	-4.14	46.94	74.00	-27.06	peak			

*:Maximum data x:Over limit !:over margin 〈Reference Only



Site 843 Polarization: *Vertical* Temperature: 26.5(C)

Limit: FCC Part 15 C 3m Above1G(Peak) Power: Battery 3V Humidity: 60.6 %

Mode: TX2480

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		2483.500	49.14	-4.19	44.95	74.00	-29.05	peak			
2		2487.631	50.85	-4.16	46.69	74.00	-27.31	peak			
3	*	2493.282	52.23	-4.14	48.09	74.00	-25.91	peak			

*:Maximum data x:Over limit !:over margin 〈Reference Only

9. ANTENNA REQUIREMENT

REQUIREMENT

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.247.

FCC part 15C section 15.247 requirements:

Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

DESCRIPTION

Pass

10. AC POWER LINE CONDUCTED EMISSION

LIMITS

Please refer to CFR 47 FCC §15.207 (a) and ISED RSS-Gen Clause 8.8

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST PROCEDURE

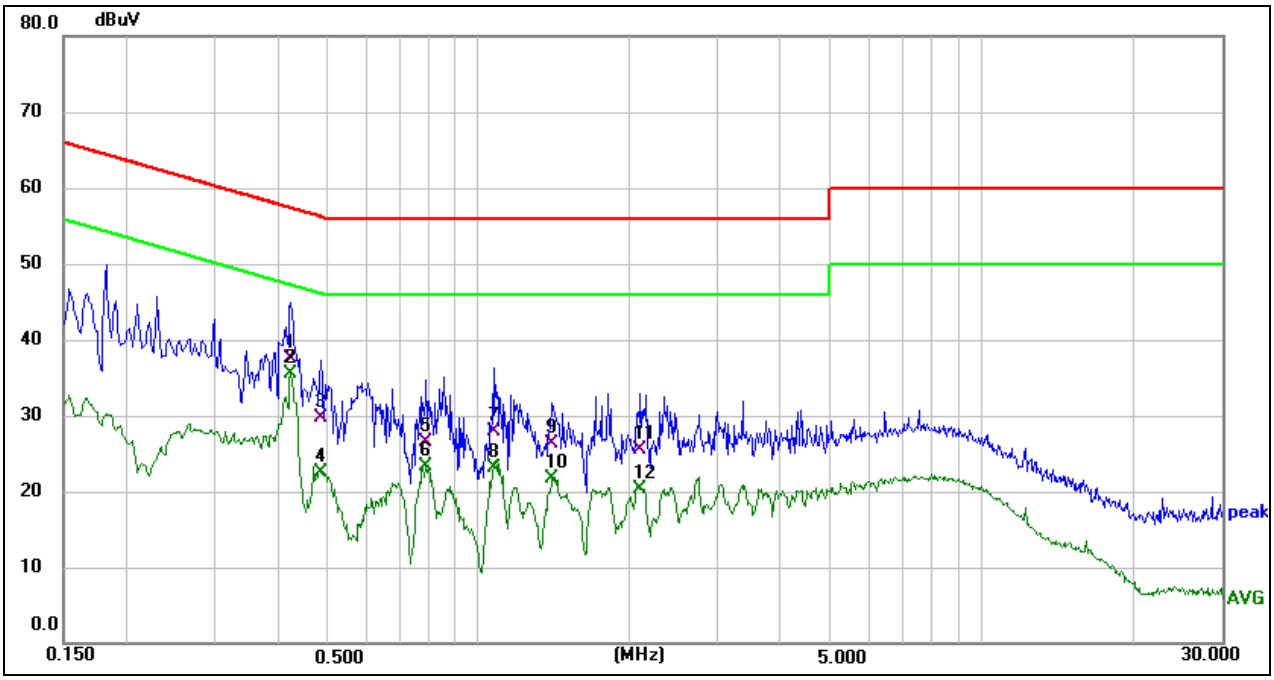
The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST ENVIRONMENT

Temperature	23.5℃	Relative Humidity	52.6%
Atmosphere Pressure	101kPa		

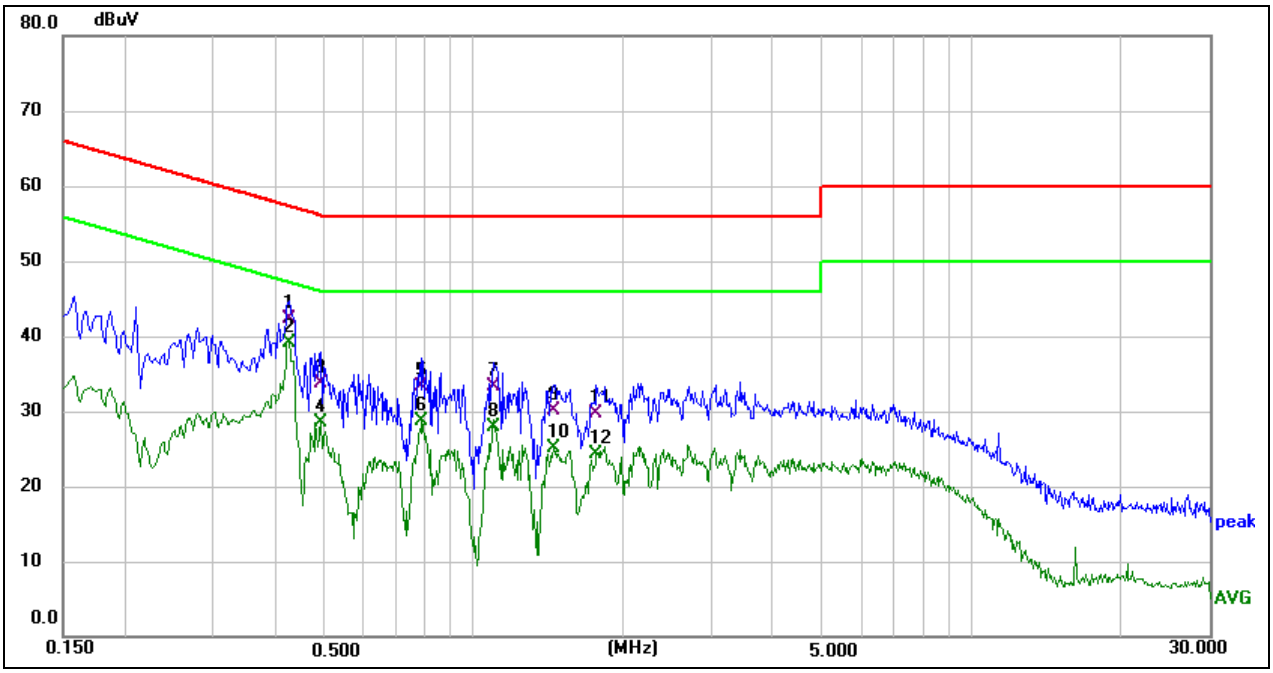
TEST RESULTS



Site:		**Phase:N**	**Temperature(C):23.5(C)**
Limit:	**FCC Part 15 B Conduction(QP)**		**Humidity(%):52.6%**
EUT:	**RV Propane Gas Detector**	**Test Time:**	**2023-03-27 19:24:52**
M/N.:	**ICGD-2023**	**Power Rating:**	**AC 120V/60Hz**
Mode:	**BT mode**	**Test Engineer:**	**Sunshine**
Note:			

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Margin (dB)	Detector	Comment
1	0.4220	26.78	10.67	37.45	57.41	-19.96	QP	
2 *	0.4220	24.87	10.67	35.54	47.41	-11.87	AVG	
3	0.4860	18.86	10.76	29.62	56.24	-26.62	QP	
4	0.4860	11.79	10.76	22.55	46.24	-23.69	AVG	
5	0.7900	16.69	9.78	26.47	56.00	-29.53	QP	
6	0.7900	13.47	9.78	23.25	46.00	-22.75	AVG	
7	1.0740	17.84	9.97	27.81	56.00	-28.19	QP	
8	1.0740	13.11	9.97	23.08	46.00	-22.92	AVG	
9	1.4100	16.33	10.01	26.34	56.00	-29.66	QP	
10	1.4100	11.70	10.01	21.71	46.00	-24.29	AVG	
11	2.1060	15.72	9.88	25.60	56.00	-30.40	QP	
12	2.1060	10.49	9.88	20.37	46.00	-25.63	AVG	

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



Site:		**Phase:L1**	**Temperature(C):23.5(C)**
Limit:	**FCC Part 15 B Conduction(QP)**		**Humidity(%):52.6%**
EUT:	**RV Propane Gas Detector**	**Test Time:**	**2023-03-27 19:29:53**
M/N.:	**ICGD-2023**	**Power Rating:**	**AC 120V/60Hz**
Mode:	**BT mode**	**Test Engineer:**	**Sunshine**
Note:			

No.	Frequency (MHz)	Reading Level(dBuV)	Factor (dB)	Measure-ment(dBuV)	Limit (dBuV)	Margin (dB)	Detector	Comment
1	0.4260	31.65	10.61	42.26	57.33	-15.07	QP	
2 *	0.4260	28.57	10.61	39.18	47.33	-8.15	AVG	
3	0.4940	23.94	9.70	33.64	56.10	-22.46	QP	
4	0.4940	18.77	9.70	28.47	46.10	-17.63	AVG	
5	0.7900	23.59	9.80	33.39	56.00	-22.61	QP	
6	0.7900	18.83	9.80	28.63	46.00	-17.37	AVG	
7	1.1019	23.44	9.92	33.36	56.00	-22.64	QP	
8	1.1019	18.05	9.92	27.97	46.00	-18.03	AVG	
9	1.4500	20.11	10.01	30.12	56.00	-25.88	QP	
10	1.4500	15.01	10.01	25.02	46.00	-20.98	AVG	
11	1.7700	19.63	10.04	29.67	56.00	-26.33	QP	
12	1.7700	14.23	10.04	24.27	46.00	-21.73	AVG	

Note: 1. Result = Reading + Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).
4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the modes have been tested, only the worst data was recorded in the report.

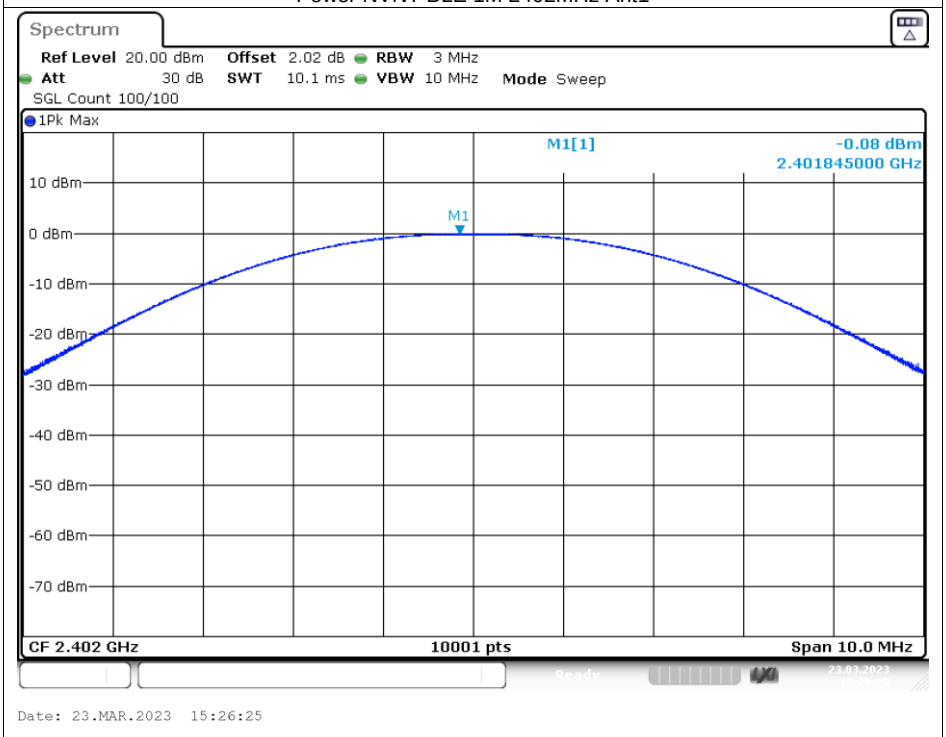
11. TEST DATA

Maximum Conducted Output Power

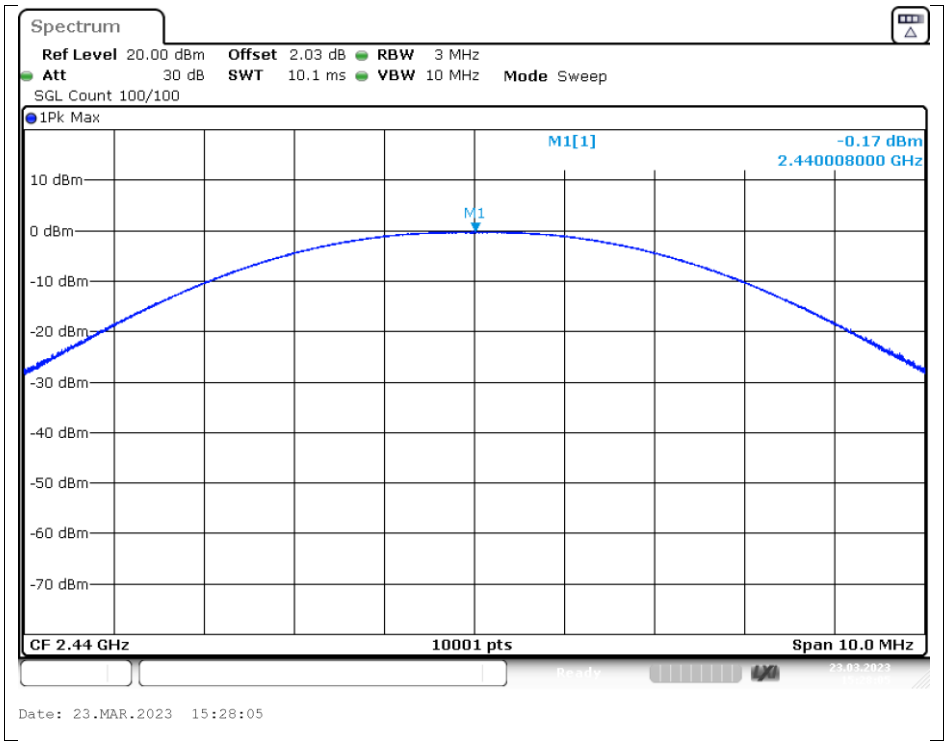
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-0.08	0	-0.08	30	Pass
NVNT	BLE 1M	2440	Ant1	-0.17	0	-0.17	30	Pass
NVNT	BLE 1M	2480	Ant1	-1.77	0	-1.77	30	Pass

Test Graphs

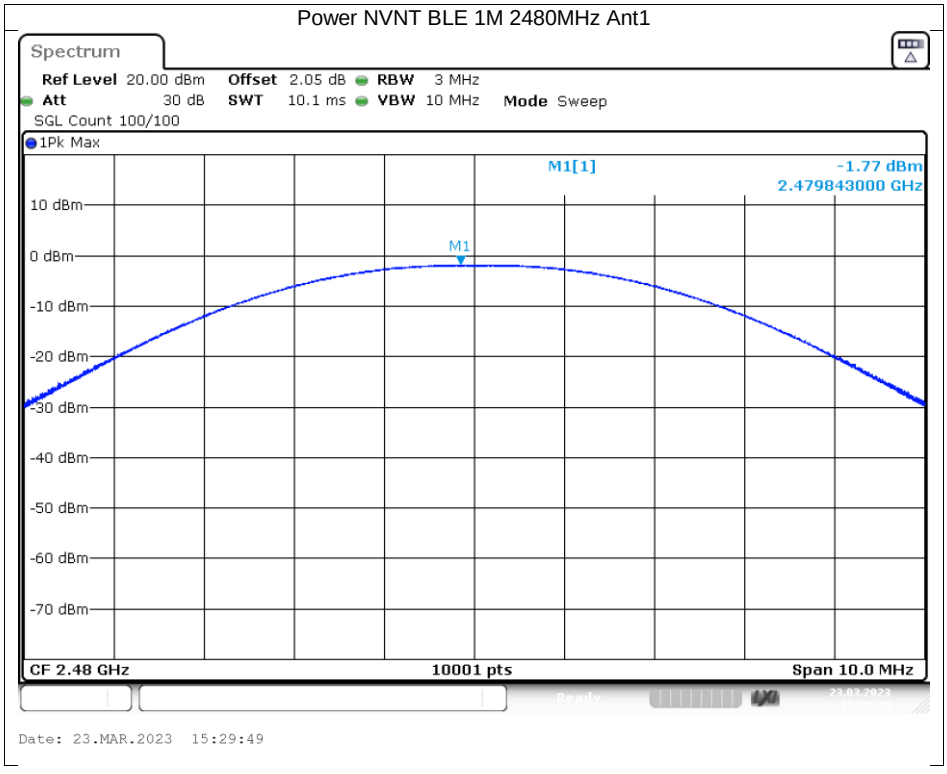
Power NVNT BLE 1M 2402MHz Ant1



Power NVNT BLE 1M 2440MHz Ant1



Power NVNT BLE 1M 2480MHz Ant1

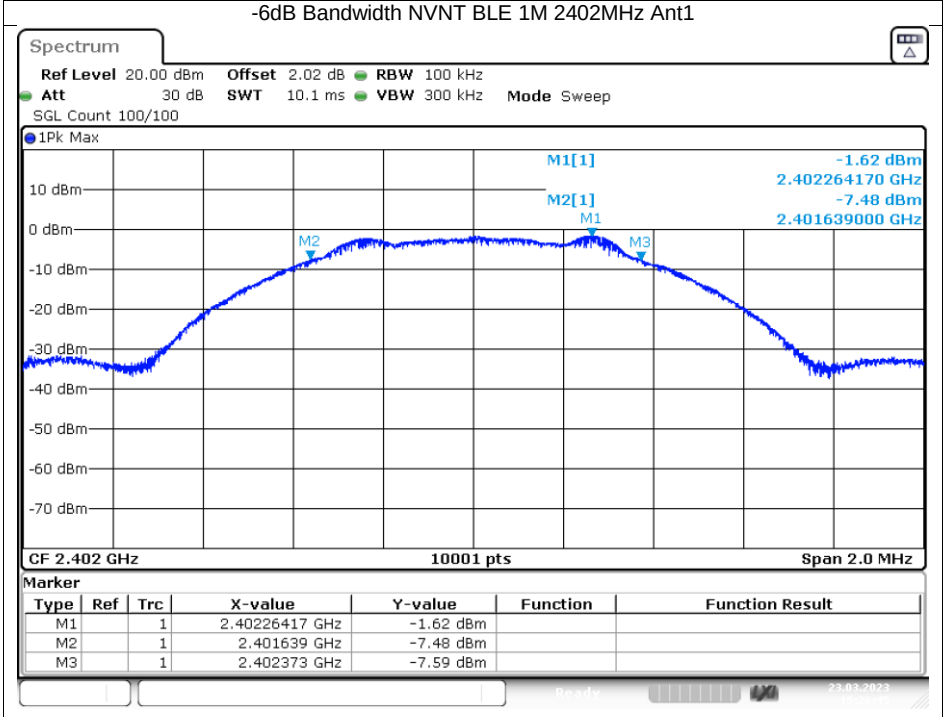


-6dB Bandwidth

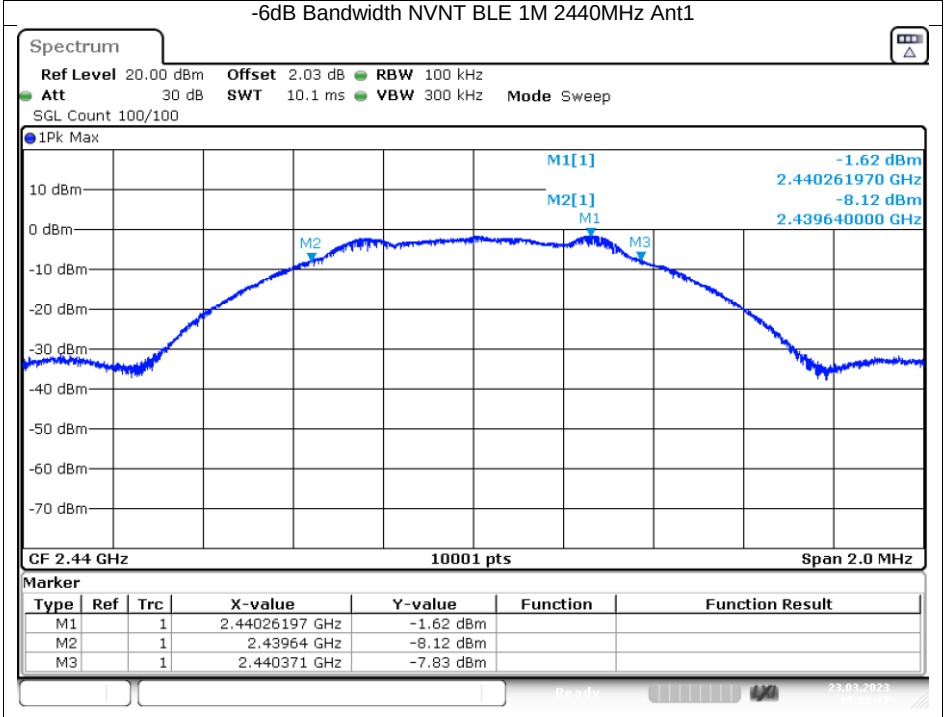
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.734	0.5	Pass
NVNT	BLE 1M	2440	Ant1	0.73	0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.73	0.5	Pass

Test Graphs

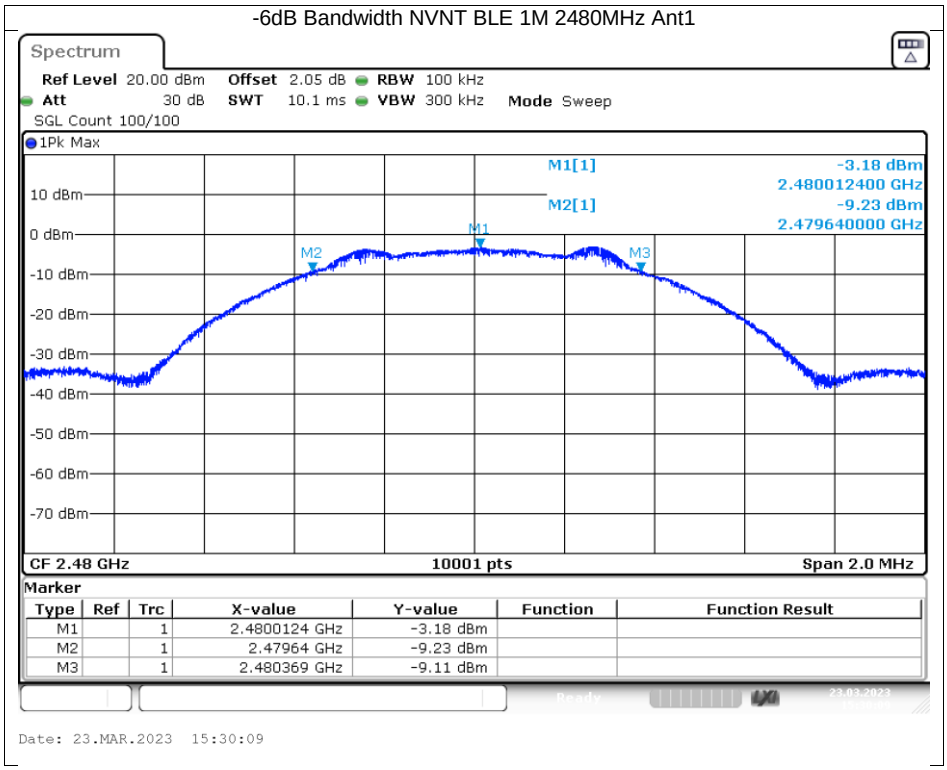
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1

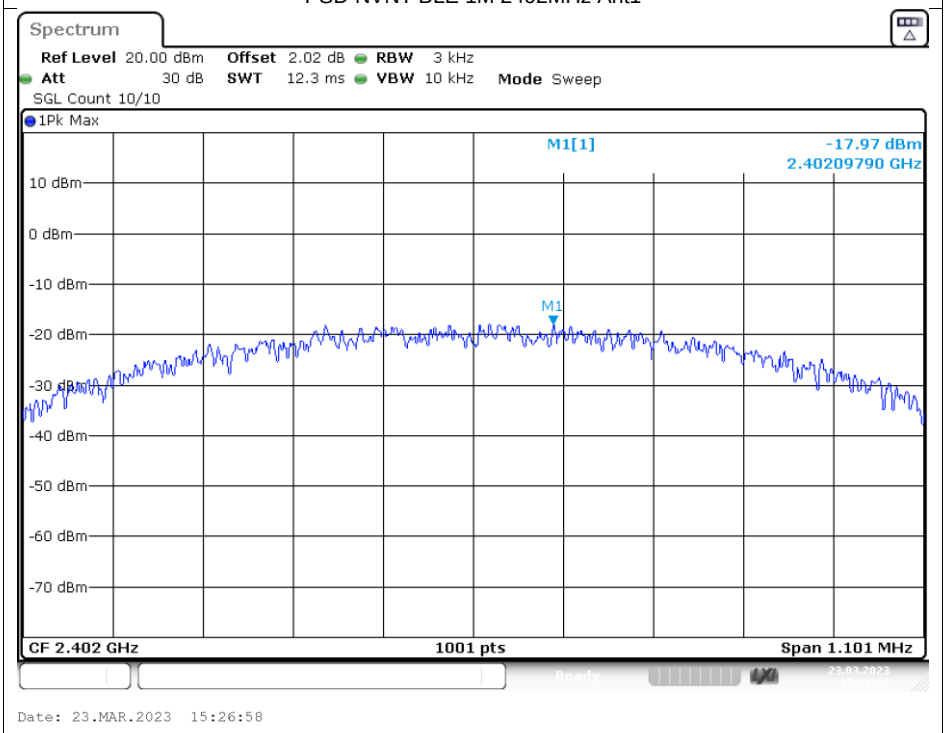


Maximum Power Spectral Density Level

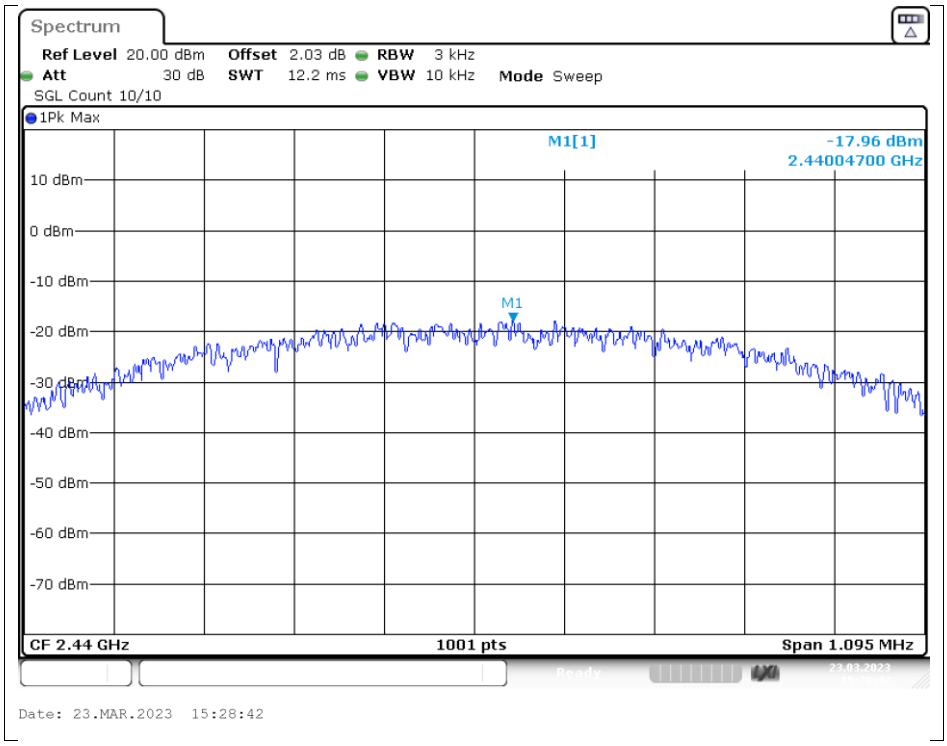
Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Duty Factor (dB)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	BLE 1M	2402	Ant1	-17.97	0	-17.97	8	Pass
NVNT	BLE 1M	2440	Ant1	-17.96	0	-17.96	8	Pass
NVNT	BLE 1M	2480	Ant1	-18.45	0	-18.45	8	Pass

Test Graphs

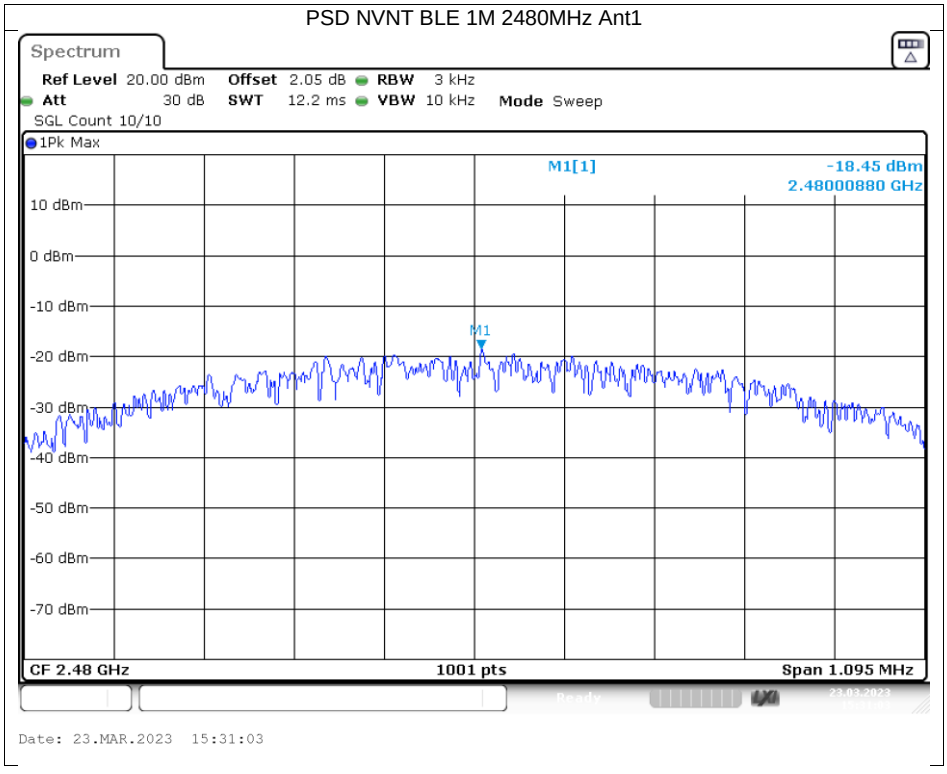
PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2440MHz Ant1



PSD NVNT BLE 1M 2480MHz Ant1

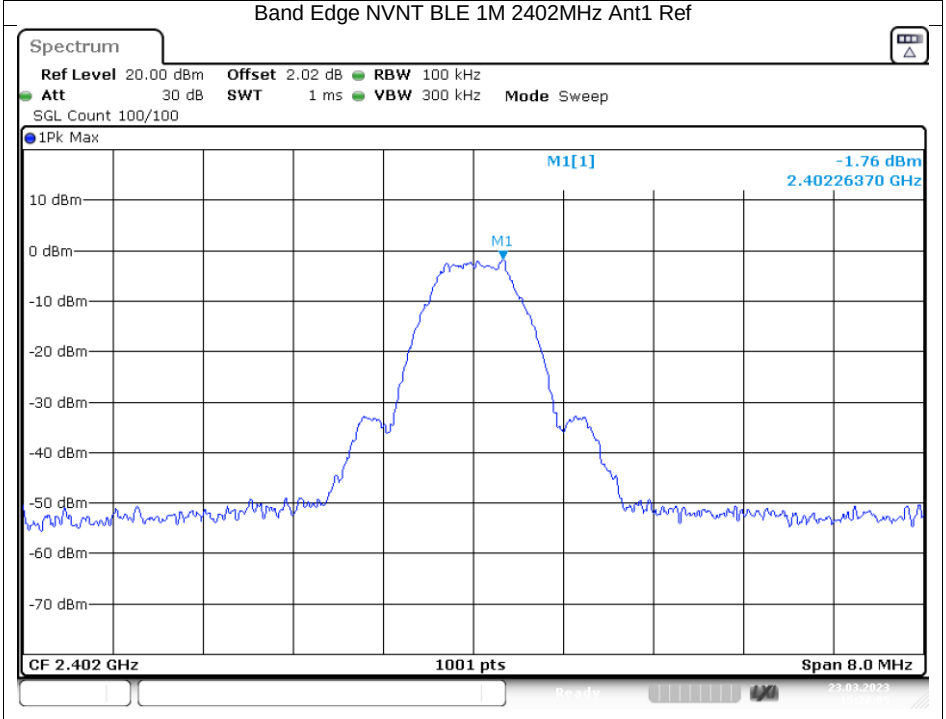


Band Edge

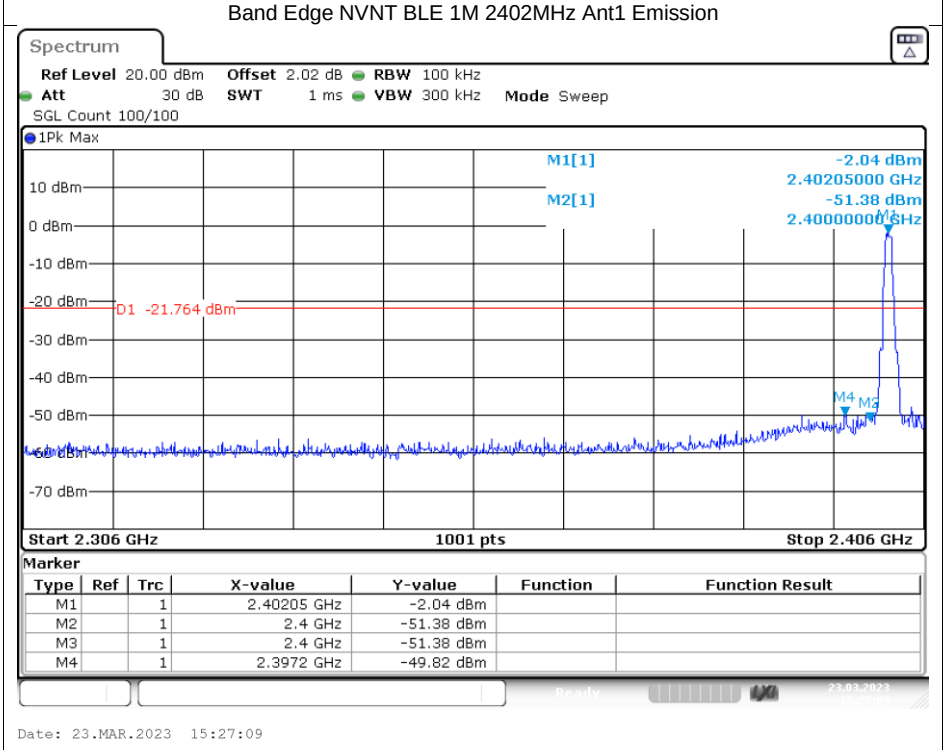
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-48.06	-20	Pass
NVNT	BLE 1M	2480	Ant1	-48.2	-20	Pass

Test Graphs

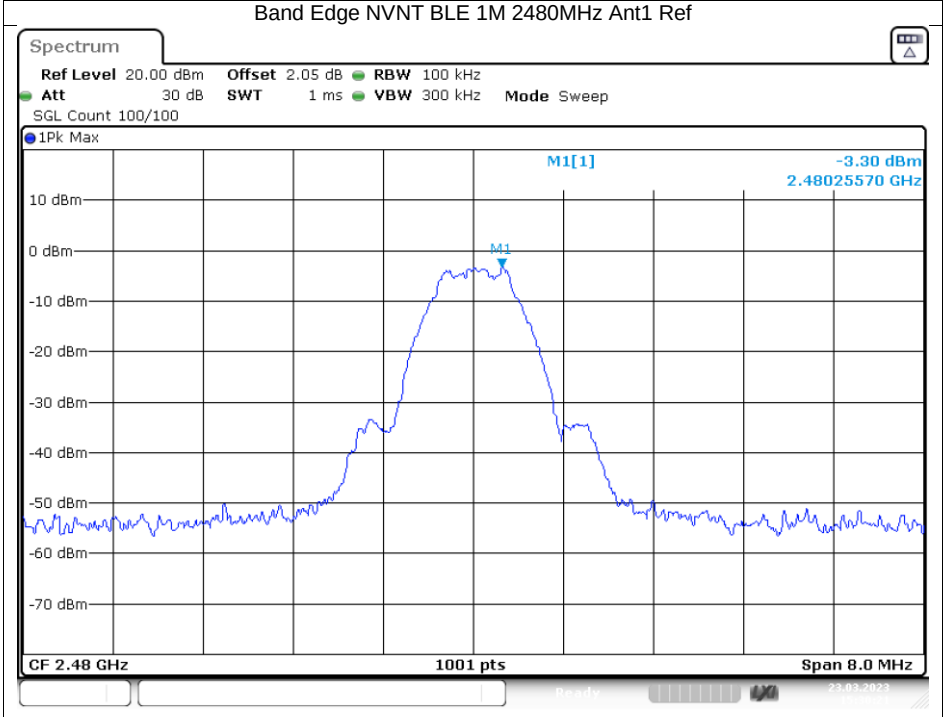
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



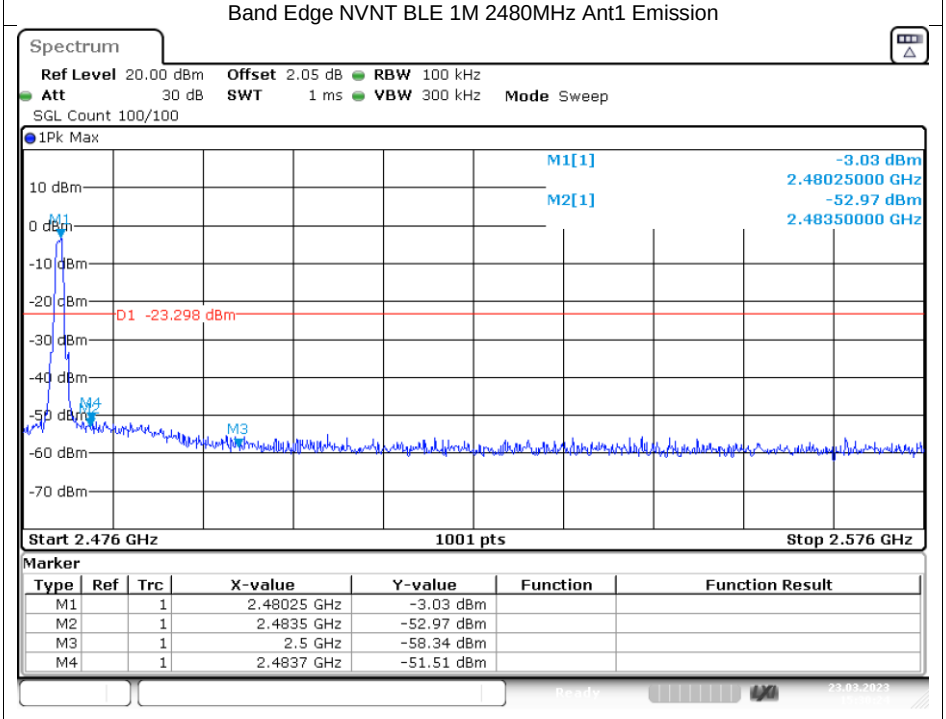
Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Band Edge NVNT BLE 1M 2480MHz Ant1 Emission

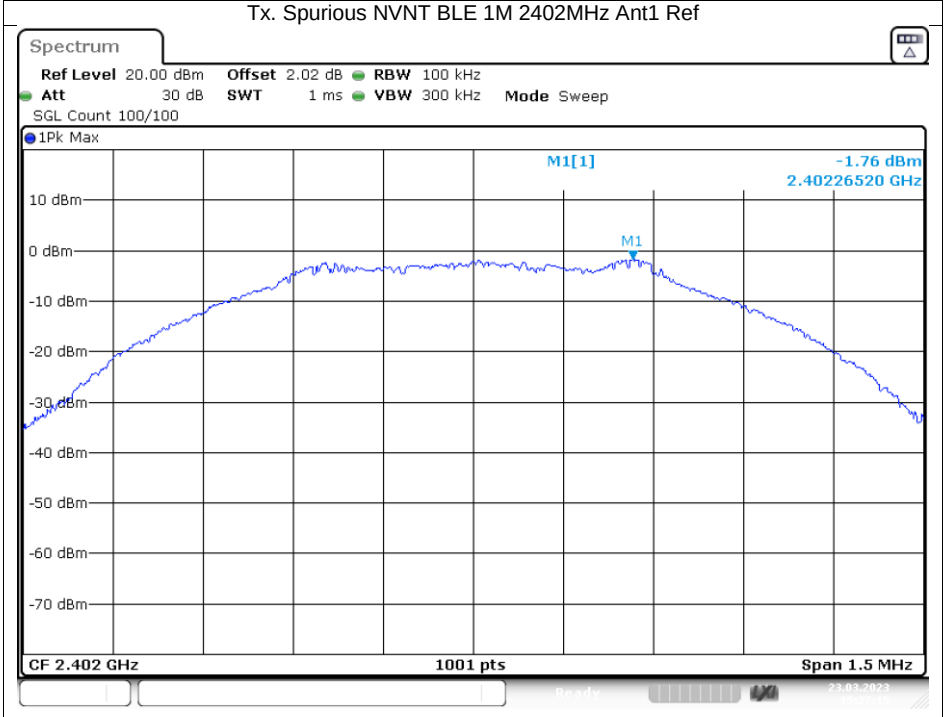


Conducted RF Spurious Emission

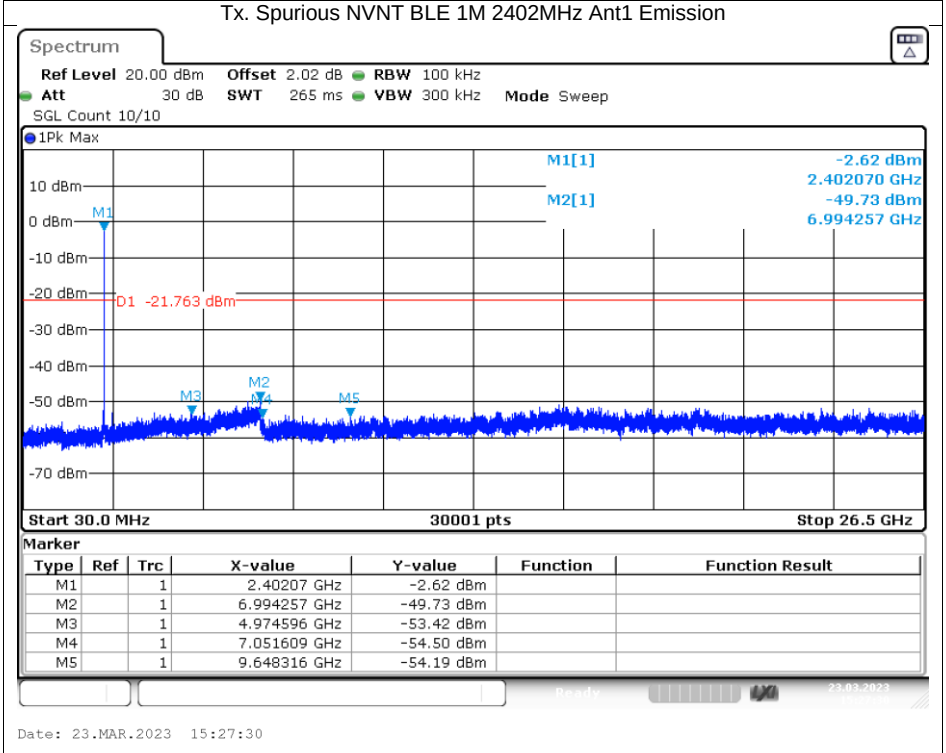
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-47.96	-20	Pass
NVNT	BLE 1M	2440	Ant1	-48.64	-20	Pass
NVNT	BLE 1M	2480	Ant1	-46.76	-20	Pass

Test Graphs

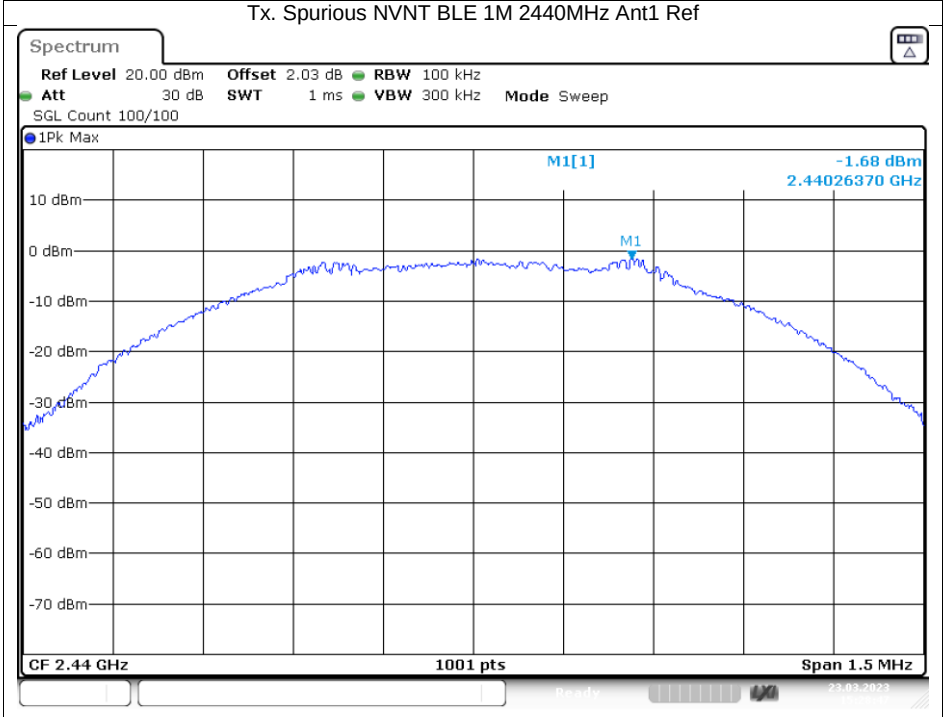
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission

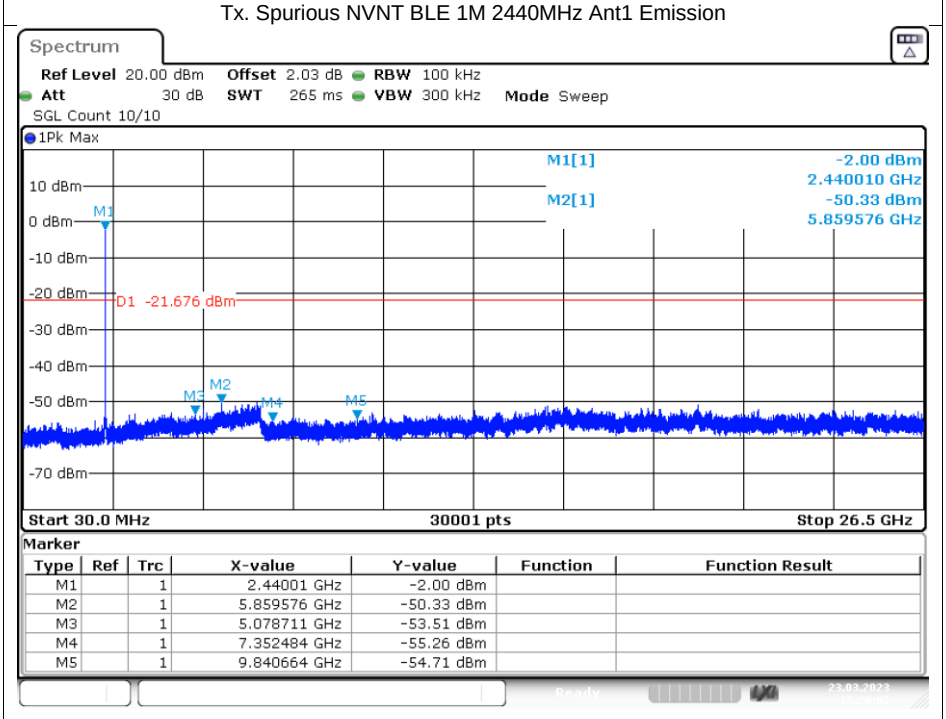


Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



Date: 23.MAR.2023 15:28:47

Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission

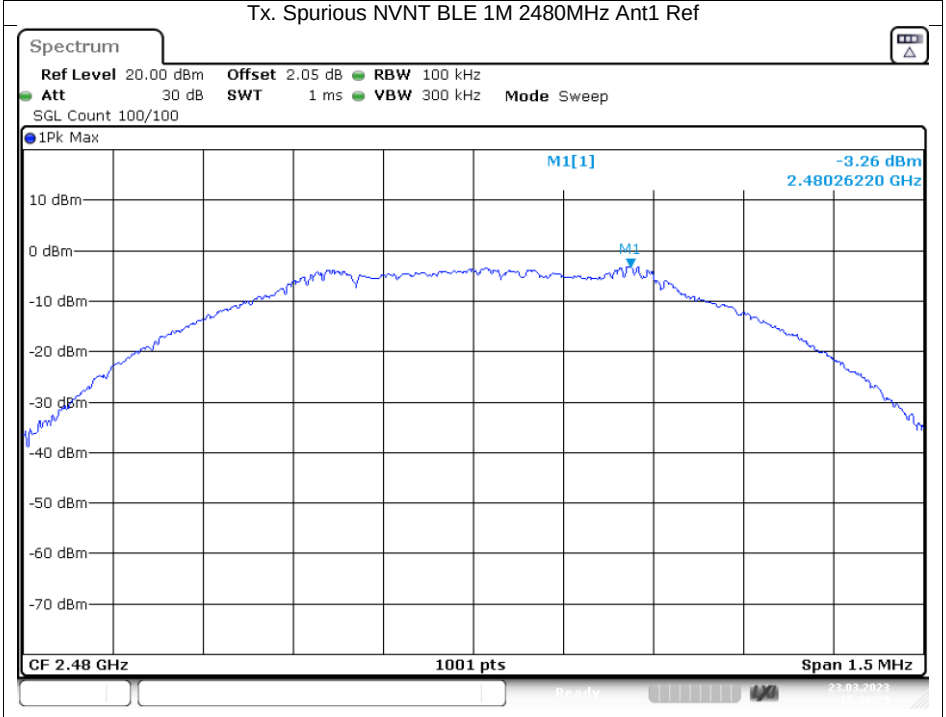


Marker

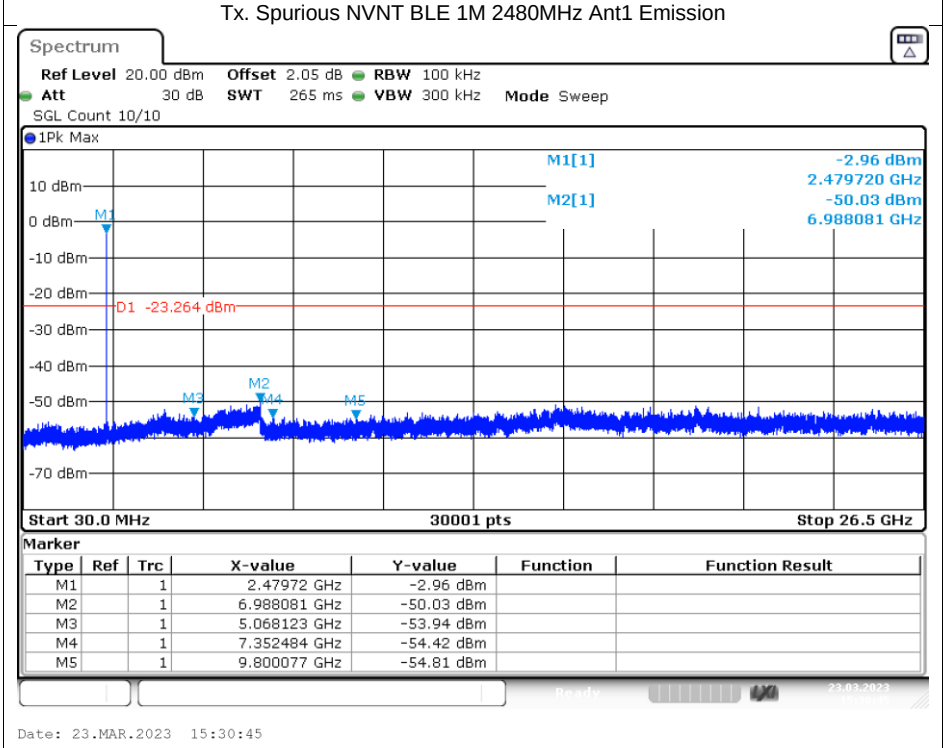
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.44001 GHz	-2.00 dBm		
M2		1	5.859576 GHz	-50.33 dBm		
M3		1	5.078711 GHz	-53.51 dBm		
M4		1	7.352484 GHz	-55.26 dBm		
M5		1	9.840664 GHz	-54.71 dBm		

Date: 23.MAR.2023 15:29:03

Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission



Duty Cycle

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	BLE 1M	2402	Ant1	100	0	0
NVNT	BLE 1M	2440	Ant1	100	0	0
NVNT	BLE 1M	2480	Ant1	100	0	0

APPENDIX: PHOTOGRAPHS OF TEST CONFIGURATION

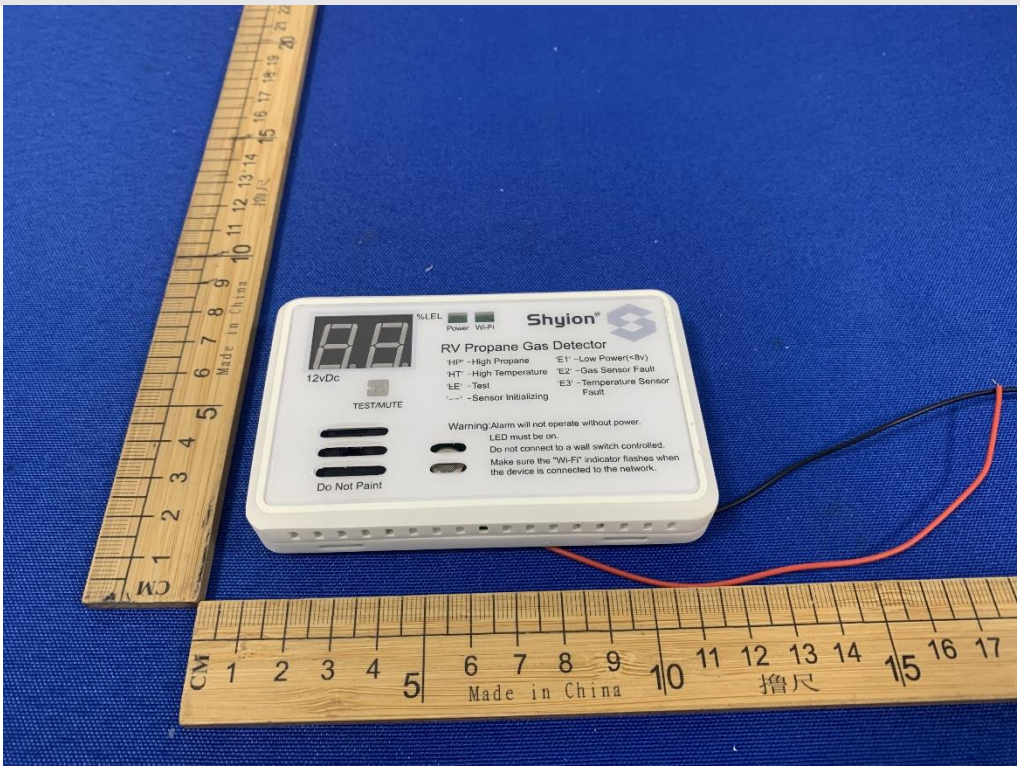
Radiated emissions below 1GHz

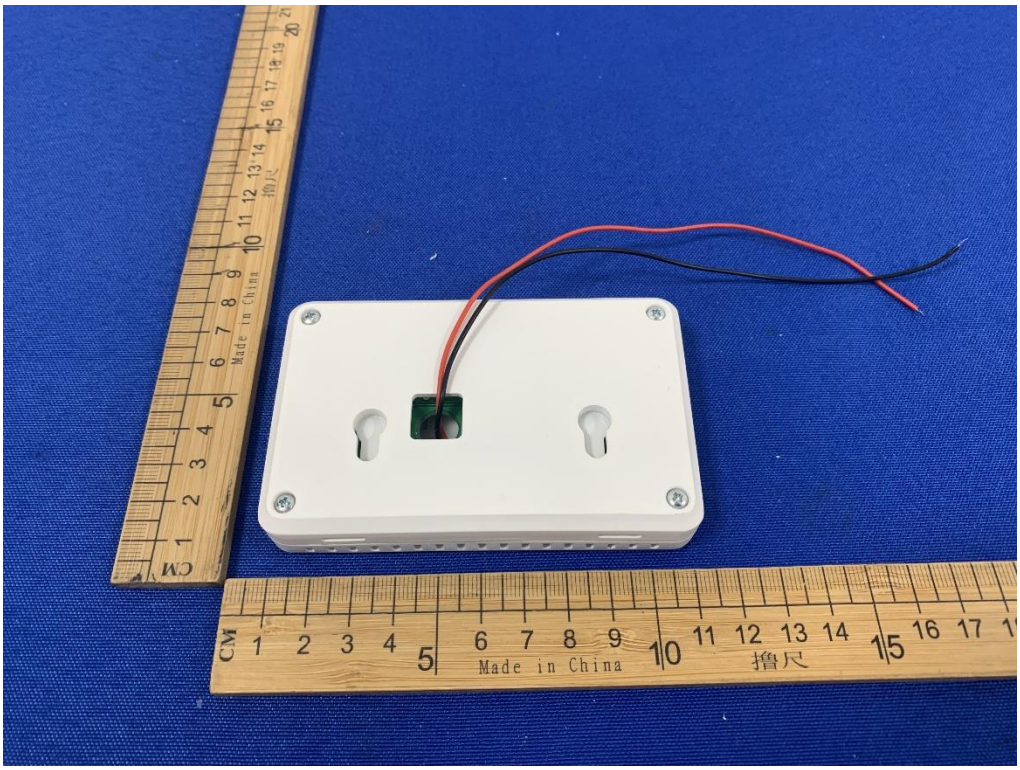
Radiated emissions above 1GHz

Conducted emissions

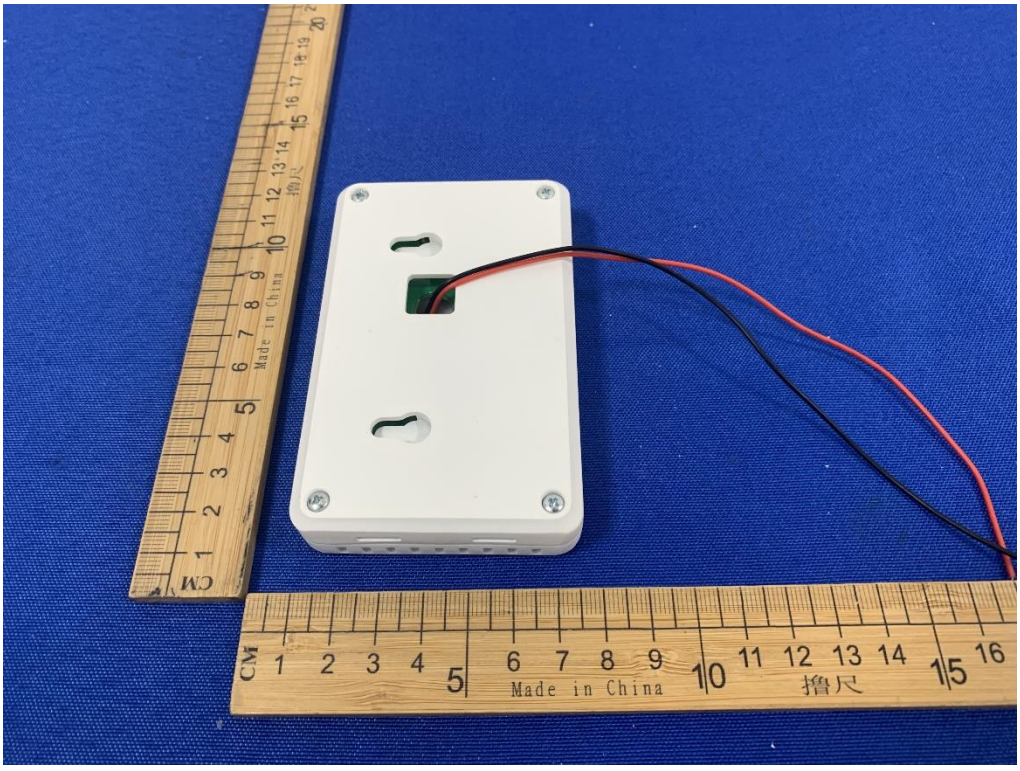
APPENDIX: PHOTOGRAPHS OF THE EUT

External

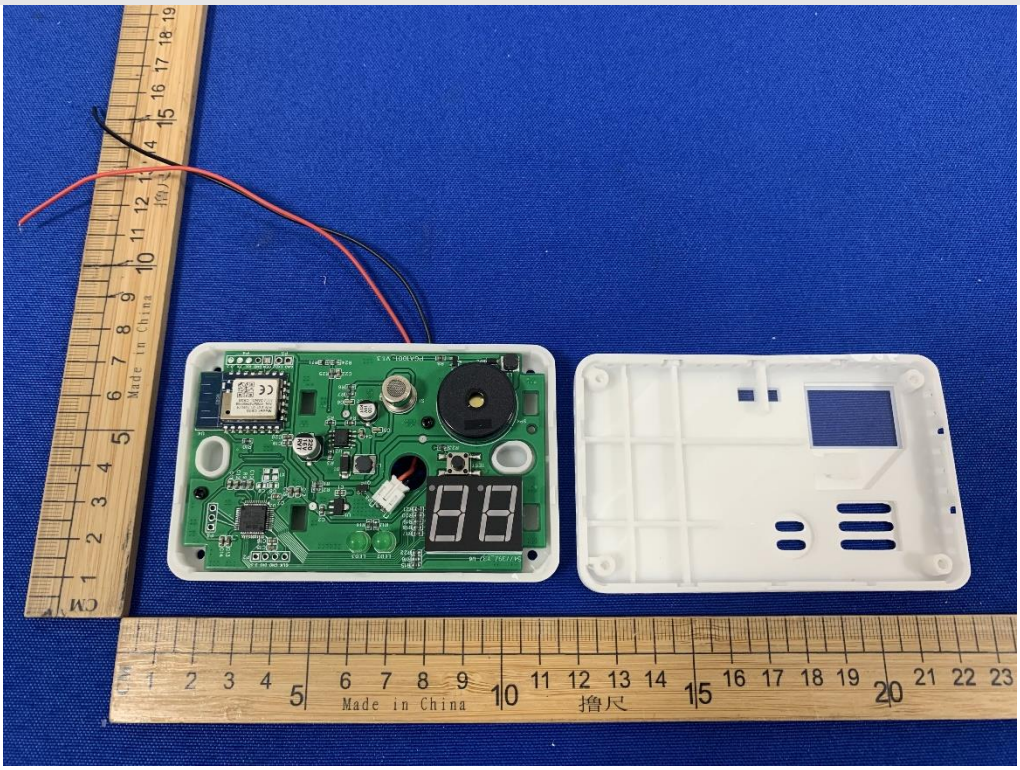


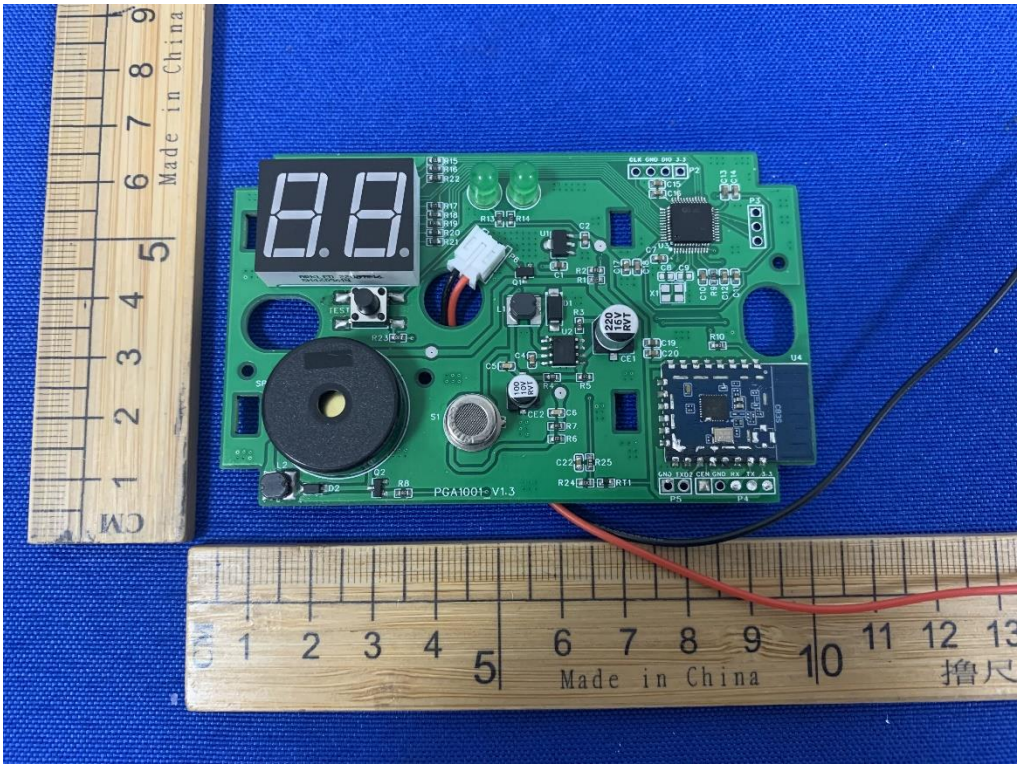


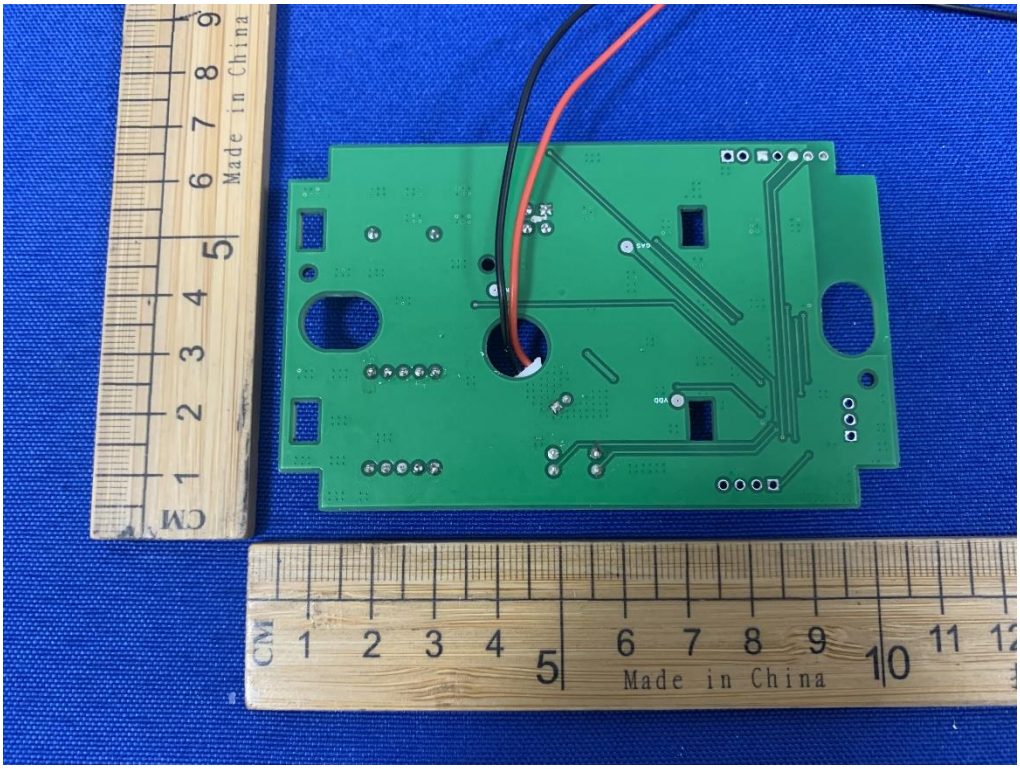

Shyion
RV Propane Gas Detector
Power
WiFi
12VDc
TEST/MUTE
Do Not Paint
Made in China


Made in China

Internal







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