FCC TEST REPORT

FCC ID: 2A6KK-S100

On Behalf of

SHENZHEN WOPET SMART TECHNOLOGY CO., LTD.

2.1 CH Soundbar Speaker System

Model No.: S100

Prepared for	:	SHENZHEN WOPET SMART TECHNOLOGY CO., LTD.
Address	:	ROOM 923, BLOCK A, ECONOMIC BUILDING, HUAFENG, HEADQUARTERS NO. 288, XIXIANG AVENUE, LAODONG COMMUNITY, XIXIANG STREET, BAOAN DISTRICT, SHENZHEN CHINA

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2305205-C01-R01
Date of Receipt	:	July 4, 2023
Date of Test	:	July 4, 2023- July 7, 2023
Date of Report	:	July 7, 2023
Version Number	:	V0

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TEST REPORT DECLARATION

Applicant	:	SHENZHEN WOPET SMART TECHNOLOGY CO., LTD.
Address	:	ROOM 923, BLOCK A, ECONOMIC BUILDING, HUAFENG, HEADQUARTERS NO. 288, XIXIANG AVENUE, LAODONG COMMUNITY, XIXIANG STREET, BAOAN DISTRICT, SHENZHEN CHINA
Manufacturer	:	SHENZHEN MENGXIANG TECHNOLOGY CO., LTD.
Address	:	Shenzhen New District of Longhua City, Dalang street, Tong Fu village industrial zone,16 building 3floor
EUT Description	:	2.1 CH Soundbar Speaker System
		(A) Model No. : S100
		(B) Trademark : WOHOME, WOGREE

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10:2013

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

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

Tested by (name + signature).....…..:	Lucas Pang Project Engineer	Lucas Pang
Approved by (name + signature)…....:	Reak Yang Project Manager	
Date of issue……..:	July 7, 2023	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	July 7, 2023	Initial released Issue	Lucas Pang

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Standards Paragraph	Result
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1) ANSI C63.10 :2013	P
Bandwidth	FCC Part 15: 15.215 ANSI C63.10 :2013	P
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) ANSI C63.10 :2013	P
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 :2013	P
Dwell Time	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 :2013	P
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10 :2013	P
Antenna requirement	FCC Part 15: 15.203	P

Note: 1. P is an abbreviation for Pass.
2. F is an abbreviation for Fail.
3. N/A is an abbreviation for Not Applicable.
4. The conclusion of this test report is judged by actual test data without considering measurement uncertainty.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Description	:	2.1 CH Soundbar Speaker System
Model Number	:	S100
Diff	:	N/A
Power supply	:	DC 15V from adapter with AC 120V/60Hz
Radio Technology	:	Bluetooth V5.0 EDR
Operation frequency	:	2402-2480MHz
Channel No.	:	79 Channels
Channel spacing	:	1MHz
Modulation type	:	GFSK, π/4 DQPSK, 8DPSK
Antenna Type	:	Internal Antenna, max gain -0.68dBi Antenna information is provided by applicant.
Software version	:	V1.0
Hardware version	:	V1.0
Connector cable loss	:	N/A
Intend use environment	:	Residential, commercial and light industrial environment

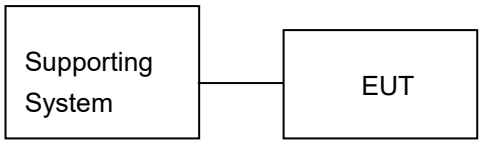
2.2. Accessories of Device (EUT)

Accessories	:	AC Adapter
Manufacturer	:	SHENZHEN FIT-POWER TECHNOLOG CO., LTD
Model	:	TP04-150200U
Ratings	:	INPUT:100-240V~50/60Hz 1.2A OUTPUT: 15.0V⎓2.0A 30.0W

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDoC
1.	Notebook PC	Lenovo	ThinkPad E14	N/A	N/A

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Tested mode, channel information		
Mode	**Channel**	**Frequency (MHz)**
GFSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480
π/4 DQPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480
8DPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	24℃
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	980kPa

2.7. Test Facility

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103,
Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961

September 15, 2019 Certificated by IC
Registration Number: 12135A

2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	**Uncertainty**
Uncertainty for Power point Conducted Emissions Test	1.63dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.74dB(Polarize: V)
	3.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for radio frequency	5.06×10^{-8}GHz
Uncertainty for conducted RF Power	0.40dB
Uncertainty for temperature	0.2℃
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2.9. Test Equipment List

Equipment	Manufacture	Model No.	Firmware version	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	/	N/A	2022.05.17	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	2.3	102137	2022.08.22	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2022.08.22	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-102082-Wa	2022.08.22	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2022.08.22	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2021.08.30	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2021.08.30	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00059	2021.08.30	2Year
RF Cable	Resenberger	Cable 1	/	RE1	2022.08.22	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2022.08.22	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2022.08.22	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2022.08.22	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2022.08.22	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2022.08.22	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2022.08.23	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	/	00946	2021.08.30	2 Year
Preamplifier	SKET	LNPA_1840-50	/	SK2018101801	2022.08.22	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2022.08.22	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2022.08.22	1 Year
Temp. & Humid. Chamber	Teelong	TL-HW408S	/	TL-20191205-01	2022.07.28	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2022.08.22	1 Year
Adjustable attenuator	MWRFtest	N/A	/	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	/	N/A	N/A	N/A

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EZ-EMC	Farad	Alpha-3A1
CE	EZ-EMC	Farad	Alpha-3A1
RF-CE	MTS 8310	MW	V2.0.0.0

3. MAXIMUM PEAK OUTPUT POWER

3.1. Limit

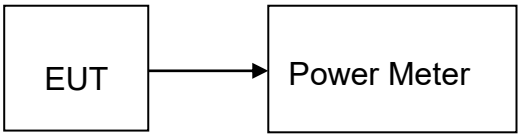
Please refer section 15.247.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts, the e.i.r.p shall not exceed 4W

3.2. Test Procedure

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the peak power detection.

3.3. Test Setup



3.4. Test Result

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	EIRP	Limit (dBm)	Verdict
NVNT	1-DH1	2402	Ant1	-7.929	≤30	-8.609	≤36	Pass
NVNT	1-DH1	2441	Ant1	-8.304	≤30	-8.984	≤36	Pass
NVNT	1-DH1	2480	Ant1	-8.791	≤30	-9.471	≤36	Pass
NVNT	1-DH3	2441	Ant1	-8.487	≤30	-9.167	≤36	Pass
NVNT	1-DH5	2441	Ant1	-8.428	≤30	-9.108	≤36	Pass
NVNT	2-DH1	2402	Ant1	**-5.601**	≤20.97	-6.281	≤36	Pass
NVNT	2-DH1	2441	Ant1	-6.217	≤20.97	-6.897	≤36	Pass
NVNT	2-DH1	2480	Ant1	-7.106	≤20.97	-7.786	≤36	Pass
NVNT	2-DH3	2441	Ant1	-6.351	≤20.97	-7.031	≤36	Pass
NVNT	2-DH5	2441	Ant1	-6.656	≤20.97	-7.336	≤36	Pass
NVNT	3-DH1	2402	Ant1	-6.177	≤20.97	-6.857	≤36	Pass
NVNT	3-DH1	2441	Ant1	-6.525	≤20.97	-7.205	≤36	Pass
NVNT	3-DH1	2480	Ant1	-6.852	≤20.97	-7.532	≤36	Pass
NVNT	3-DH3	2441	Ant1	-6.213	≤20.97	-6.893	≤36	Pass
NVNT	3-DH5	2441	Ant1	-6.375	≤20.97	-7.055	≤36	Pass

4. BANDWIDTH

4.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 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.

4.2. Test Procedure

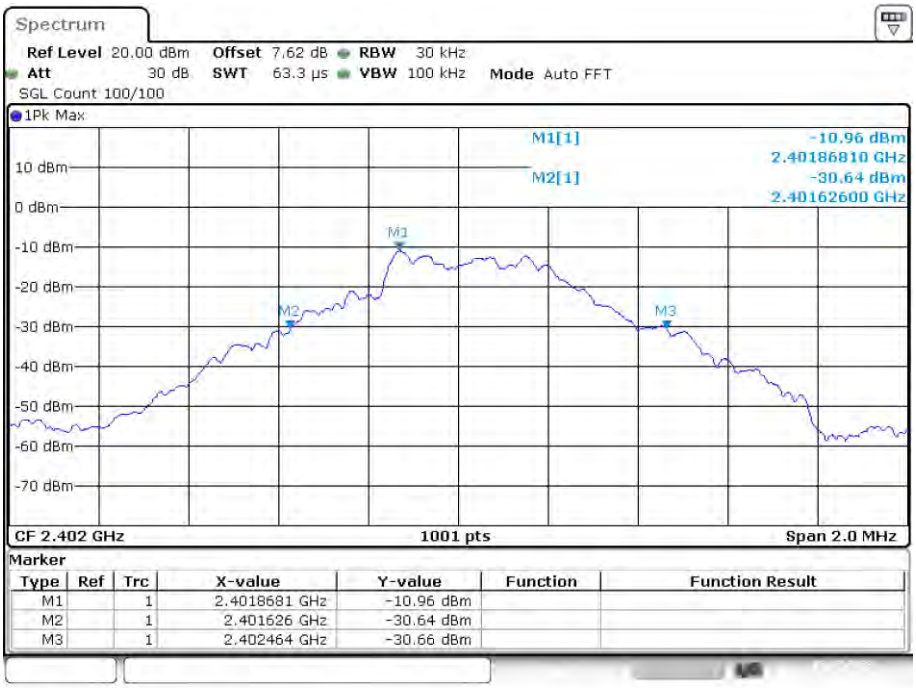
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

-20dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)	Limit -20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	Ant1	0.838	N/A	Pass
NVNT	1-DH1	2441	Ant1	0.834	N/A	Pass
NVNT	1-DH1	2480	Ant1	0.844	N/A	Pass
NVNT	2-DH1	2402	Ant1	1.256	N/A	Pass
NVNT	2-DH1	2441	Ant1	1.282	N/A	Pass
NVNT	2-DH1	2480	Ant1	1.26	N/A	Pass
NVNT	3-DH1	2402	Ant1	1.218	N/A	Pass
NVNT	3-DH1	2441	Ant1	1.216	N/A	Pass
NVNT	3-DH1	2480	Ant1	1.216	N/A	Pass

-20dB Bandwidth NVNT 1-DH1 2402MHz Ant1



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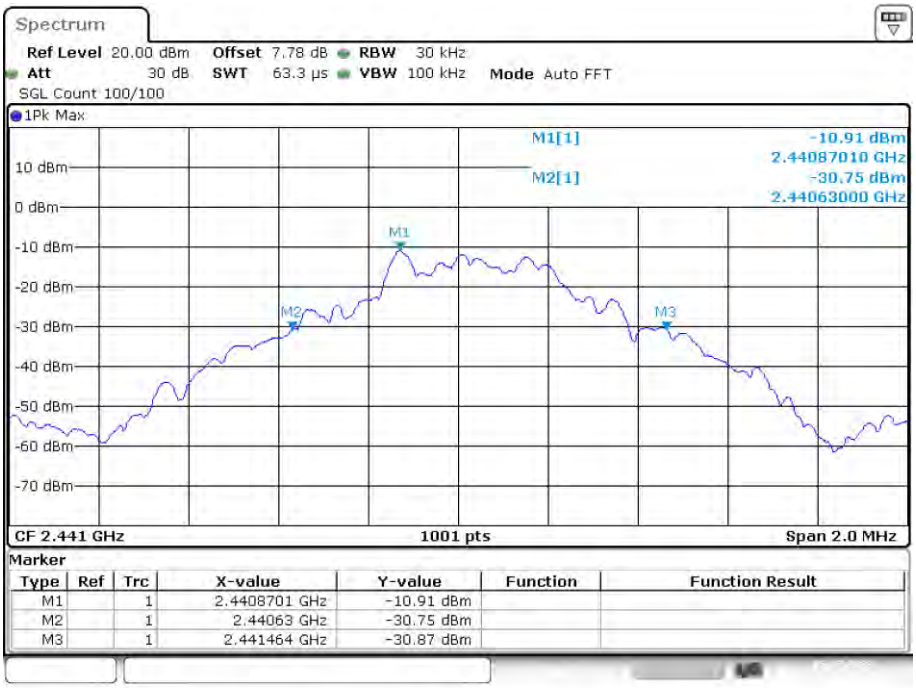
-20dB Bandwidth NVNT 1-DH1 2441MHz Ant1



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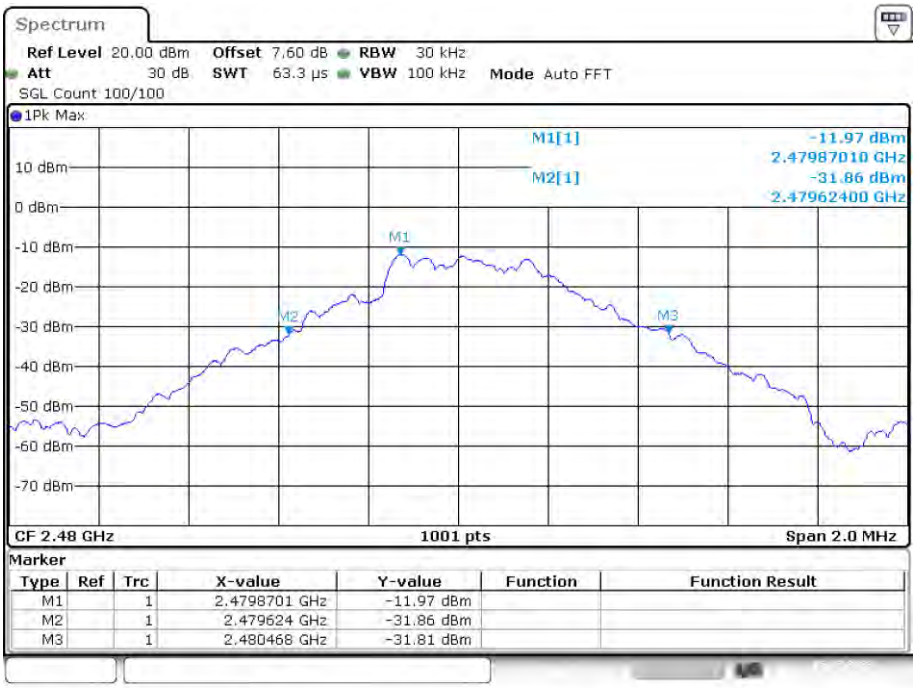
-20dB Bandwidth NVNT 1-DH1 2480MHz Ant1



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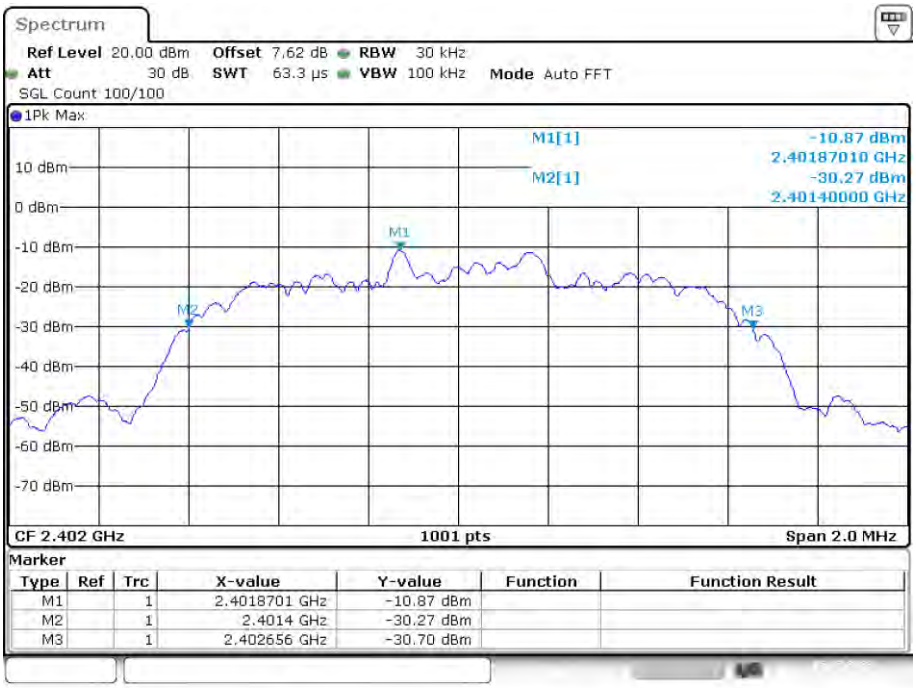
-20dB Bandwidth NVNT 2-DH1 2402MHz Ant1



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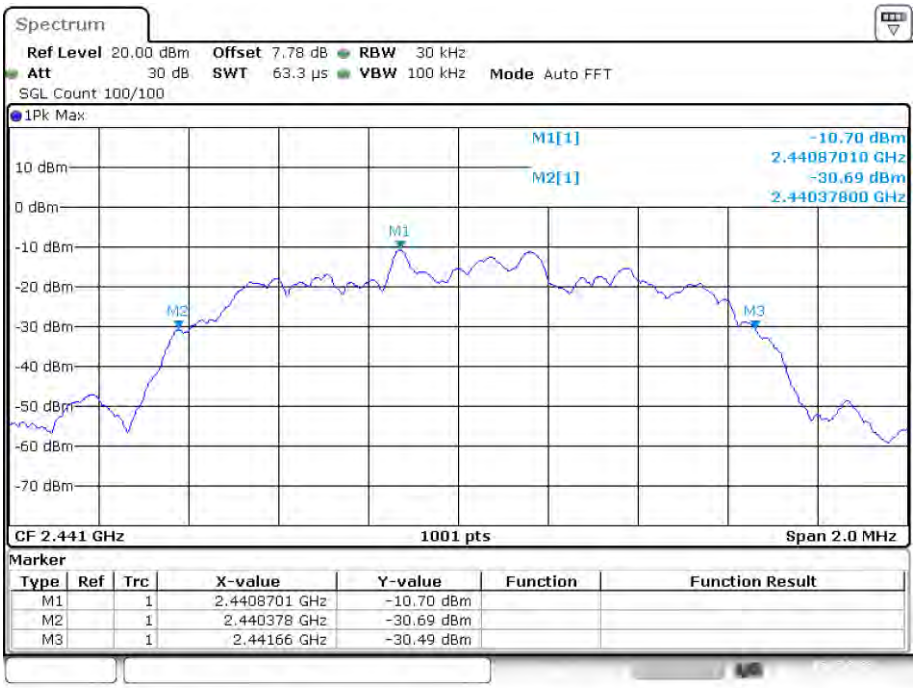

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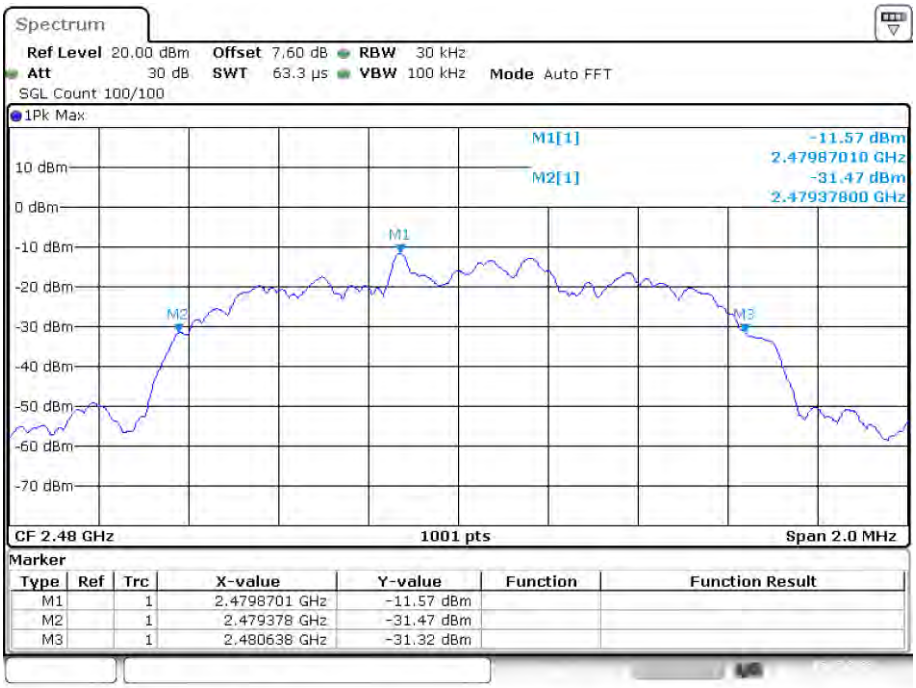

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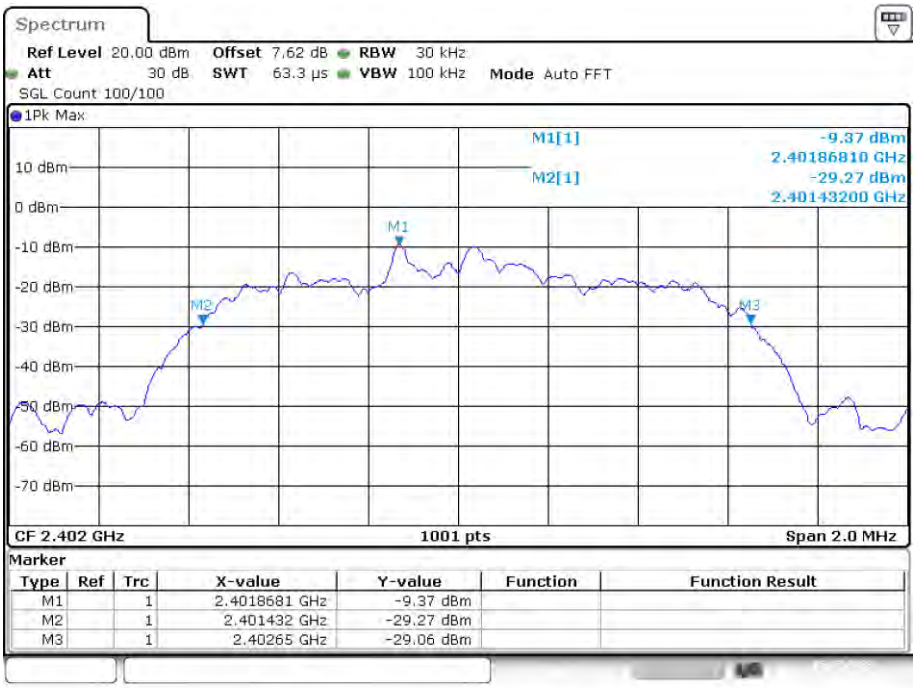
-20dB Bandwidth NVNT 3-DH1 2402MHz Ant1



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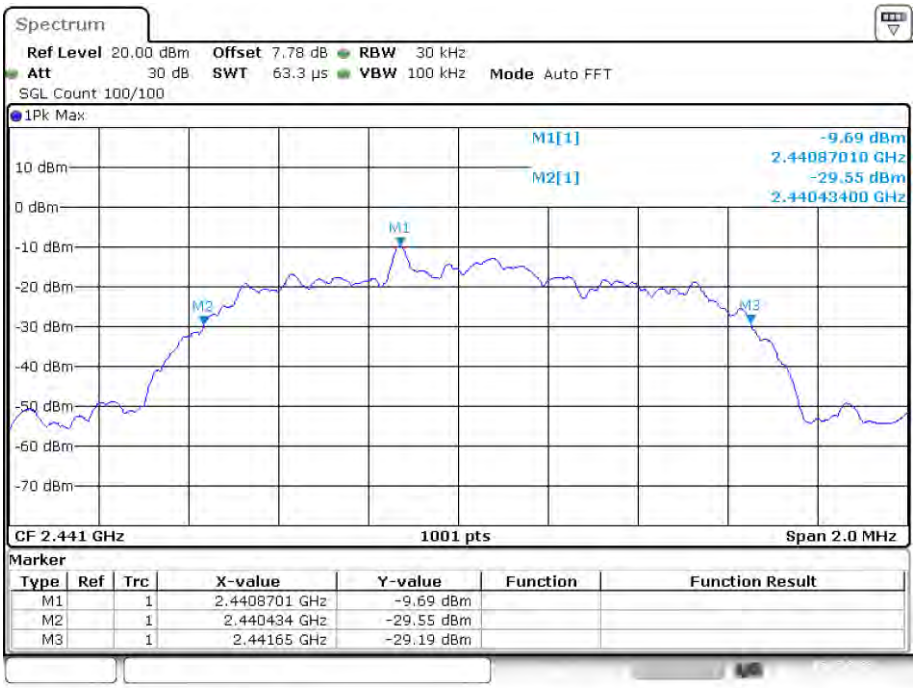
-20dB Bandwidth NVNT 3-DH1 2441MHz Ant1



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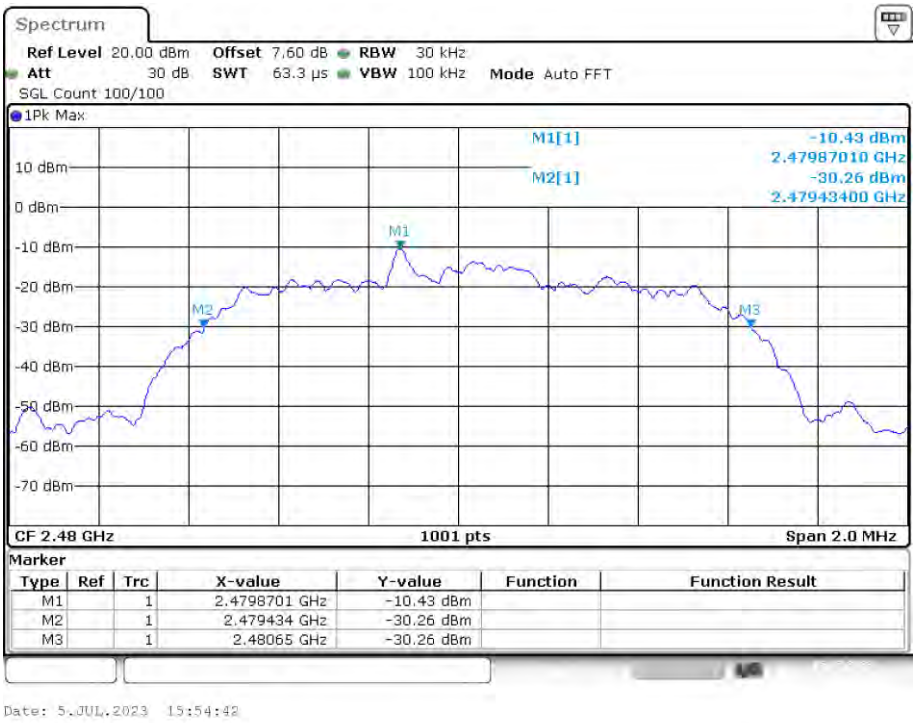
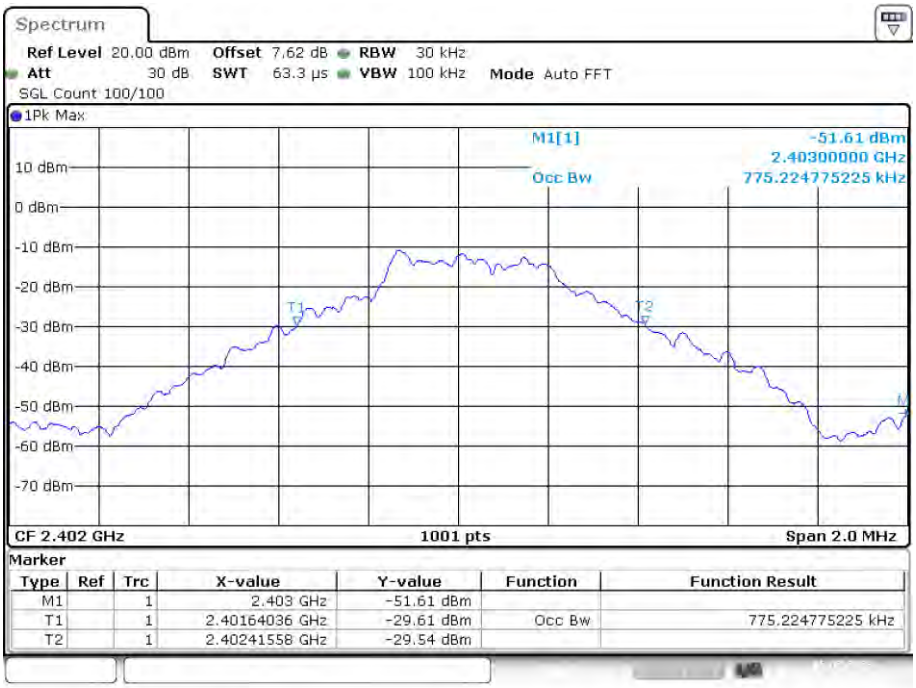
-20dB Bandwidth NVNT 3-DH1 2480MHz Ant1



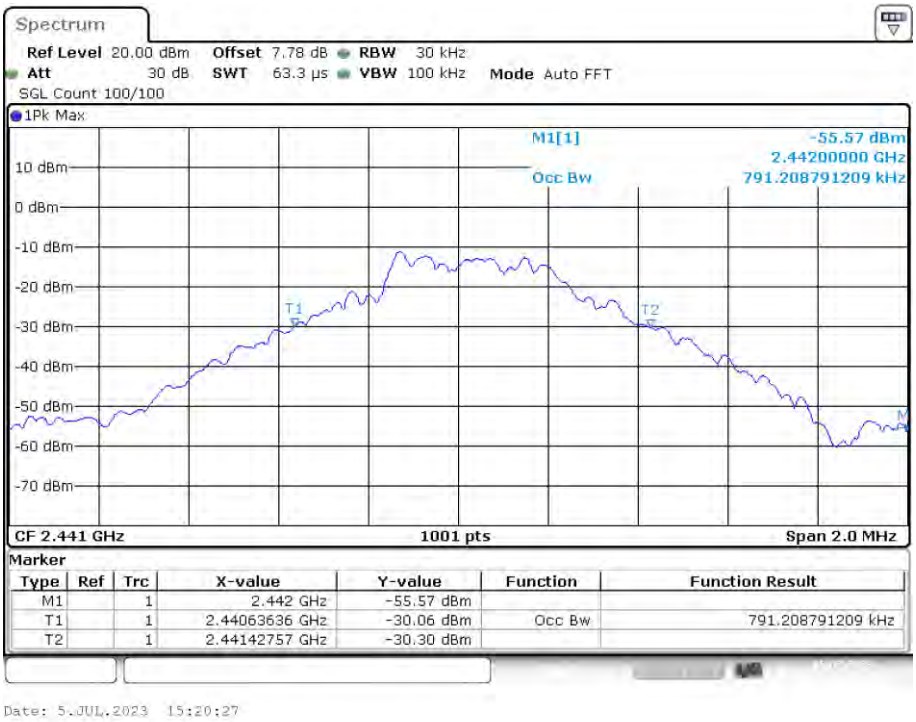
Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	1-DH1	2402	Ant1	0.775
NVNT	1-DH1	2441	Ant1	0.791
NVNT	1-DH1	2480	Ant1	0.825
NVNT	2-DH1	2402	Ant1	1.159
NVNT	2-DH1	2441	Ant1	1.145
NVNT	2-DH1	2480	Ant1	1.155
NVNT	3-DH1	2402	Ant1	1.151
NVNT	3-DH1	2441	Ant1	1.147
NVNT	3-DH1	2480	Ant1	1.155

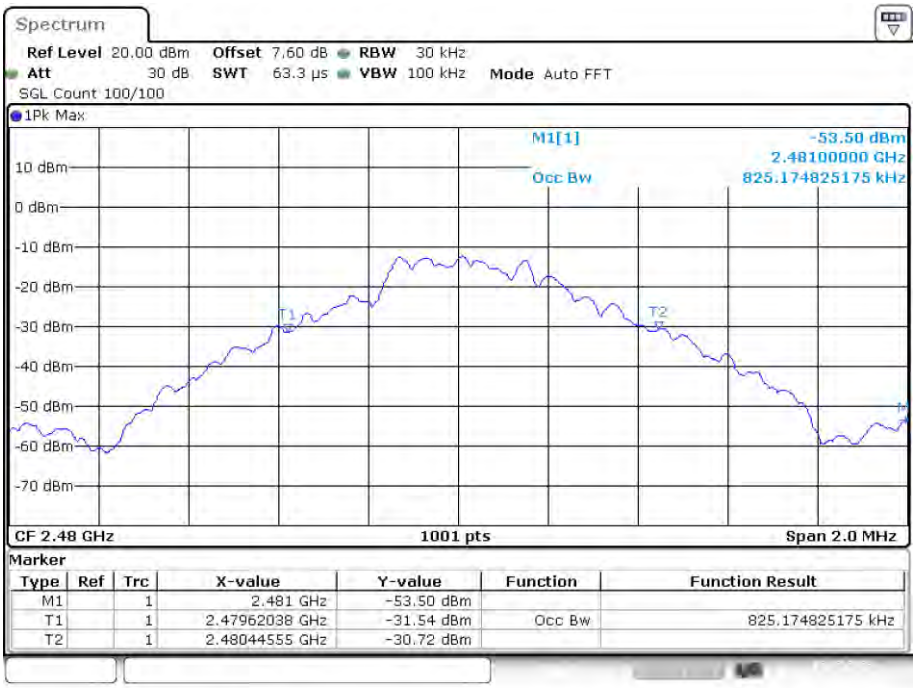
OBW NVNT 1-DH1 2402MHz Ant1



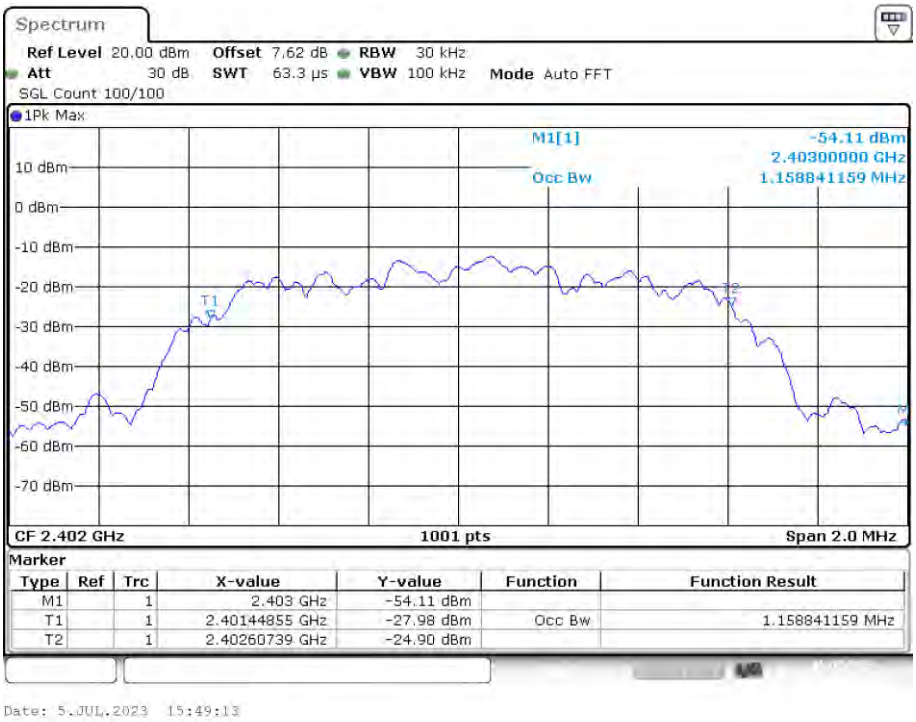
OBW NVNT 1-DH1 2441MHz Ant1



OBW NVNT 1-DH1 2480MHz Ant1

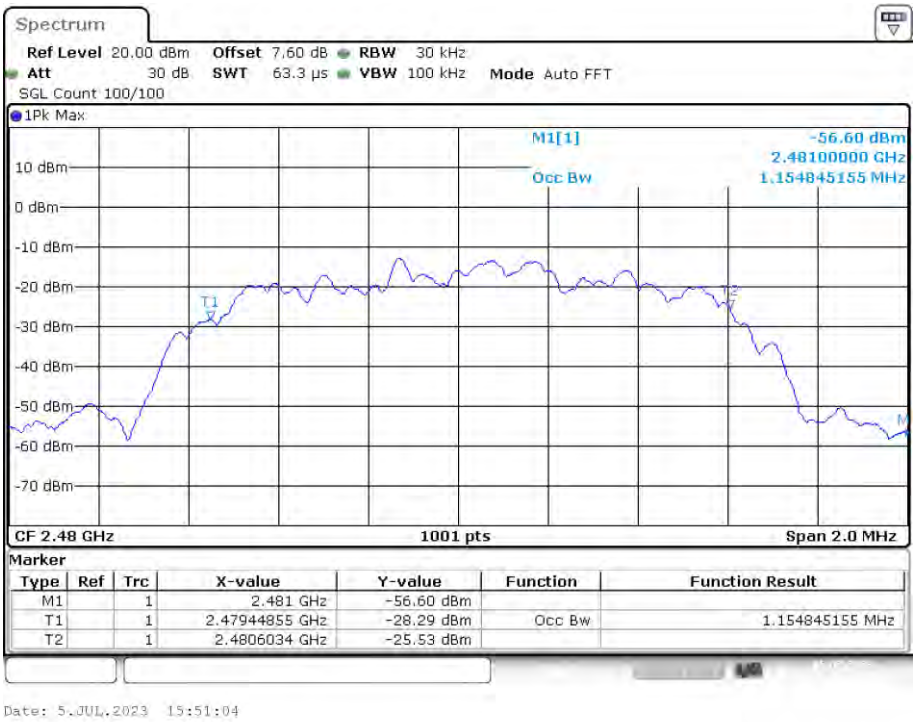


OBW NVNT 2-DH1 2402MHz Ant1

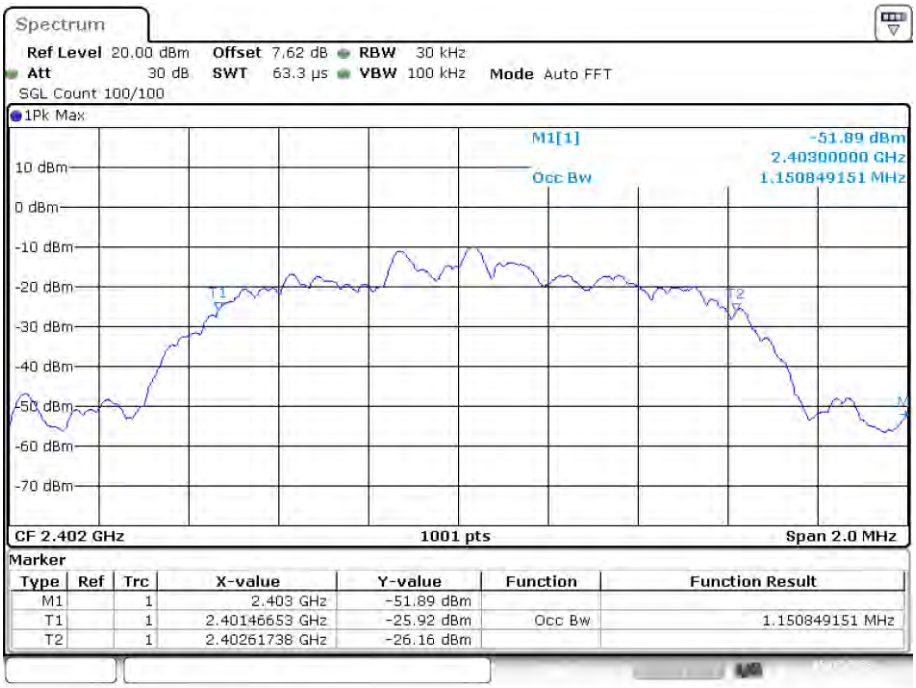


OBW NVNT 2-DH1 2441MHz Ant1

OBW NVNT 2-DH1 2480MHz Ant1



OBW NVNT 3-DH1 2402MHz Ant1



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OBW NVNT 3-DH1 2441MHz Ant1

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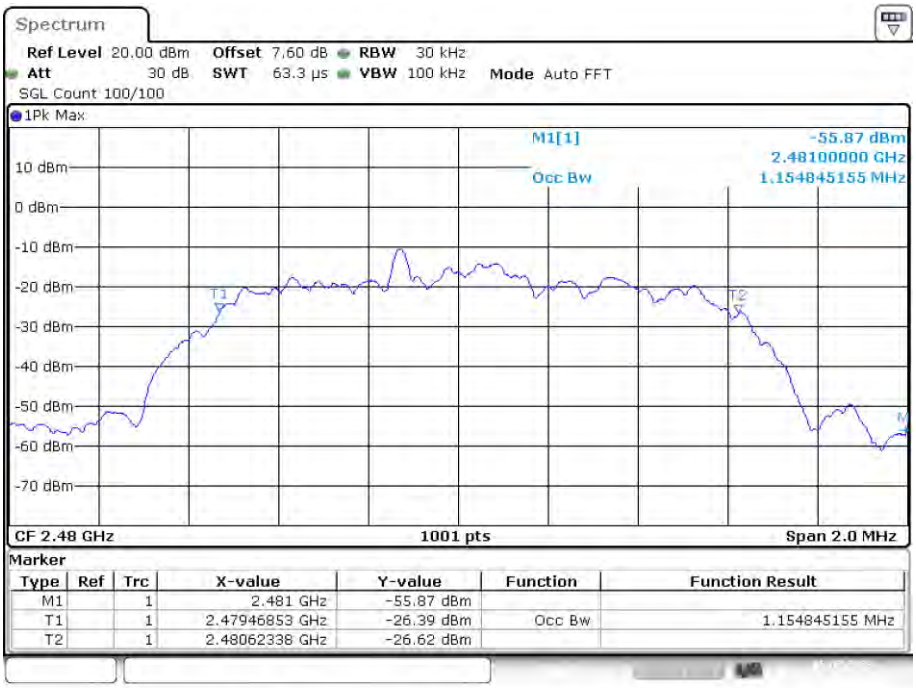
OBW NVNT 3-DH1 2480MHz Ant1



5. CARRIER FREQUENCY SEPARATION

5.1. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW

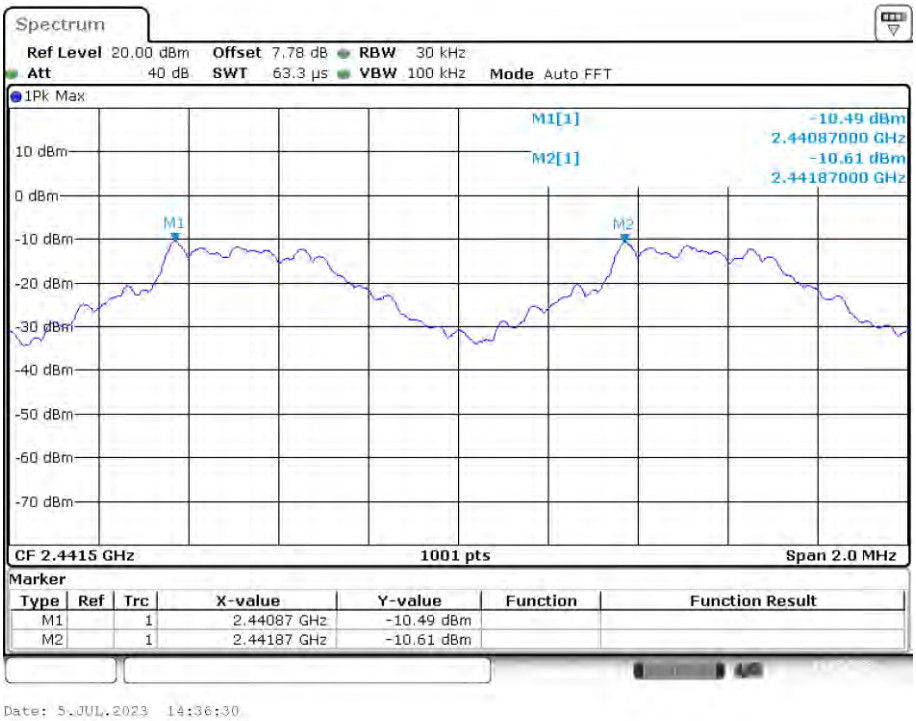
5.2. Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The carrier frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW.

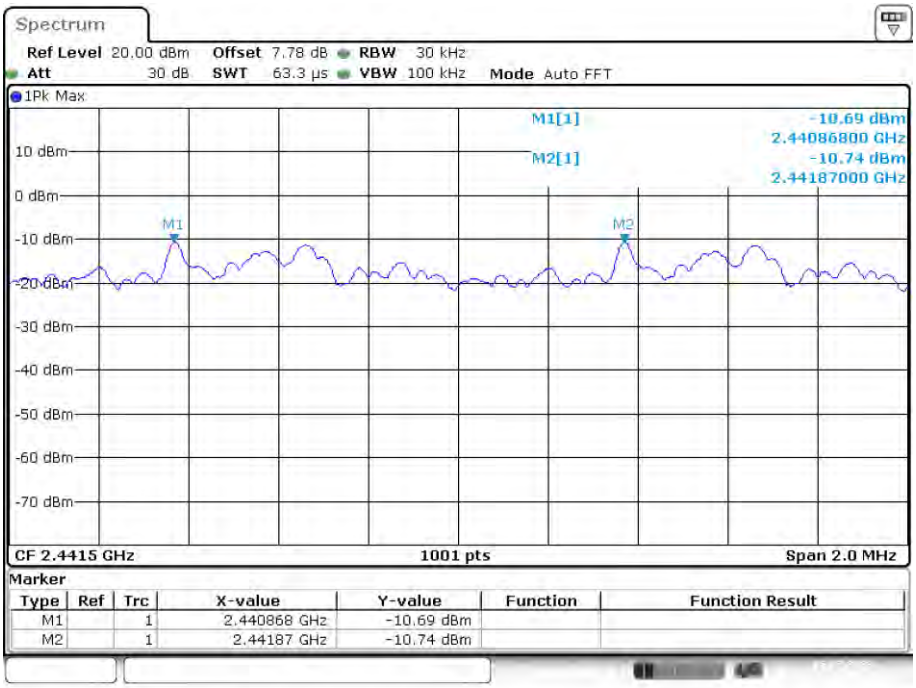
5.3. Test Result

Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	Ant1	2440.87	2441.87	1	0.025	Pass
NVNT	2-DH1	Ant1	2440.868	2441.87	1.002	0.025	Pass
NVNT	3-DH1	Ant1	2440.868	2441.87	1.002	0.025	Pass

CFS NVNT 1-DH1 2441MHz Ant1

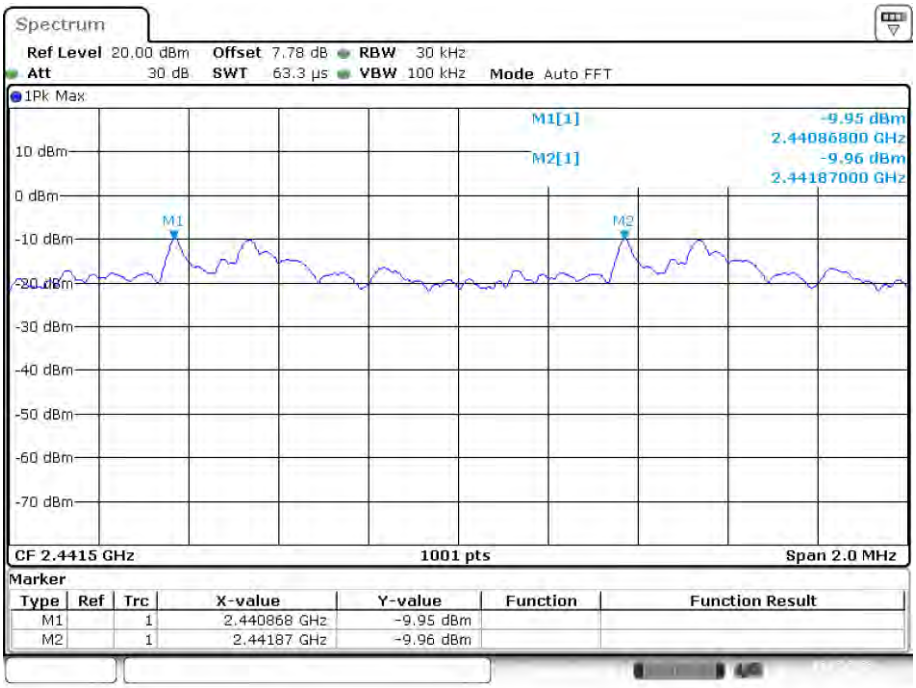


CFS NVNT 2-DH1 2441MHz Ant1



Date: 5.JUL.2023 14:49:04

CFS NVNT 3-DH1 2441MHz Ant1



Date: 5.JUL.2023 15:03:23

6. NUMBER OF HOPPING CHANNEL

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

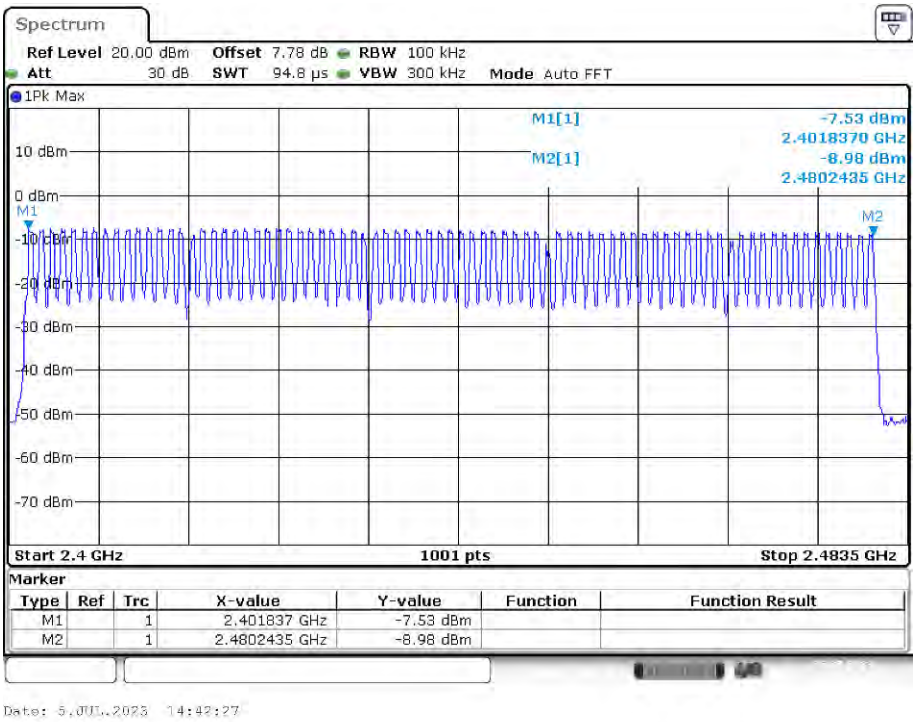
6.2. Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The number of hopping channel was measured by spectrum analyzer with 100kHz RBW and 300KHz VBW.

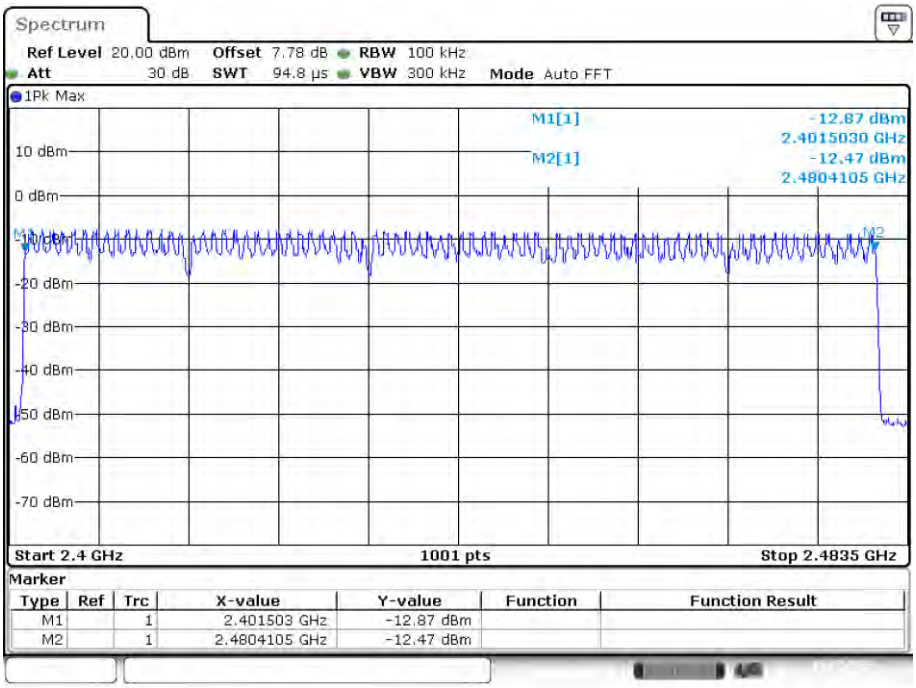
6.3. Test Result

Condition	Mode	Antenna	Hopping Number	Limit	Verdict
NVNT	1-DH1	Ant1	79	15	Pass
NVNT	2-DH1	Ant1	79	15	Pass
NVNT	3-DH1	Ant1	79	15	Pass

Hopping No. NVNT 1-DH1 2441MHz Ant1

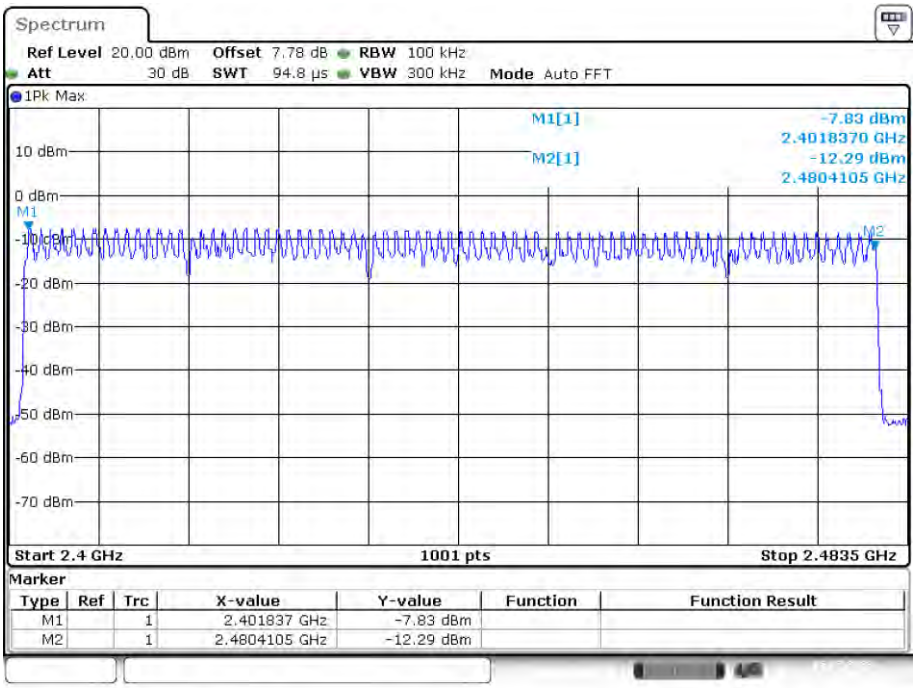


Hopping No. NVNT 2-DH1 2441MHz Ant1



Date: 5.JUL.2023 14:52:32

Hopping No. NVNT 3-DH1 2441MHz Ant1



Date: 5.JUL.2023 15:06:51

7. DWELL TIME

7.1. Test limit

Please refer section15.247

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 sec- onds multiplied by the number of hopping channel employed.

7.2. Test Procedure

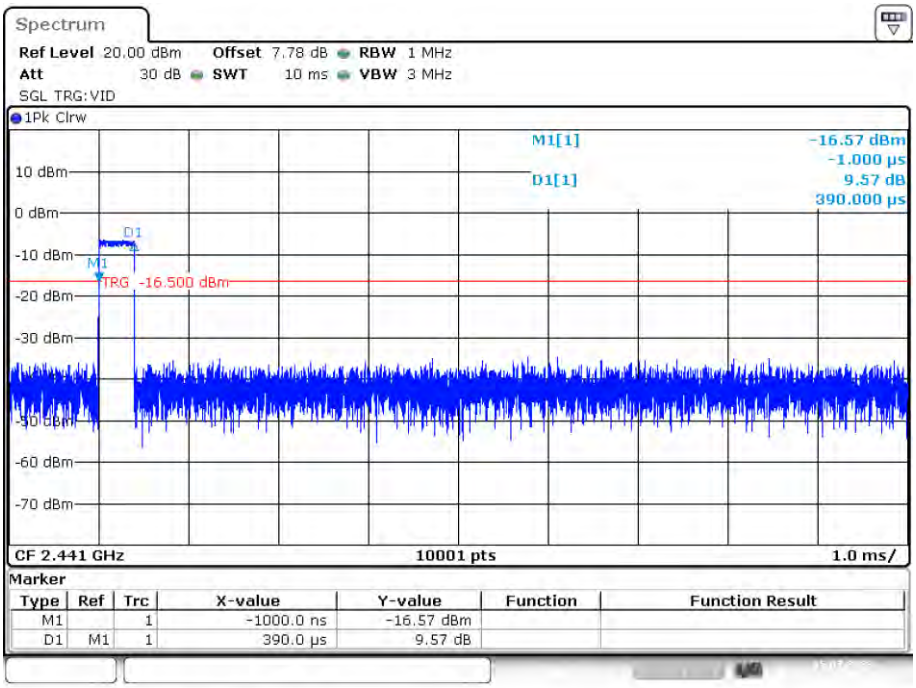
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW=1MHz, VBW=1MHz, Span = 0Hz, Sweep = auto.
5. Repeat above procedures until all frequency measured were complete.

7.3. Test Result

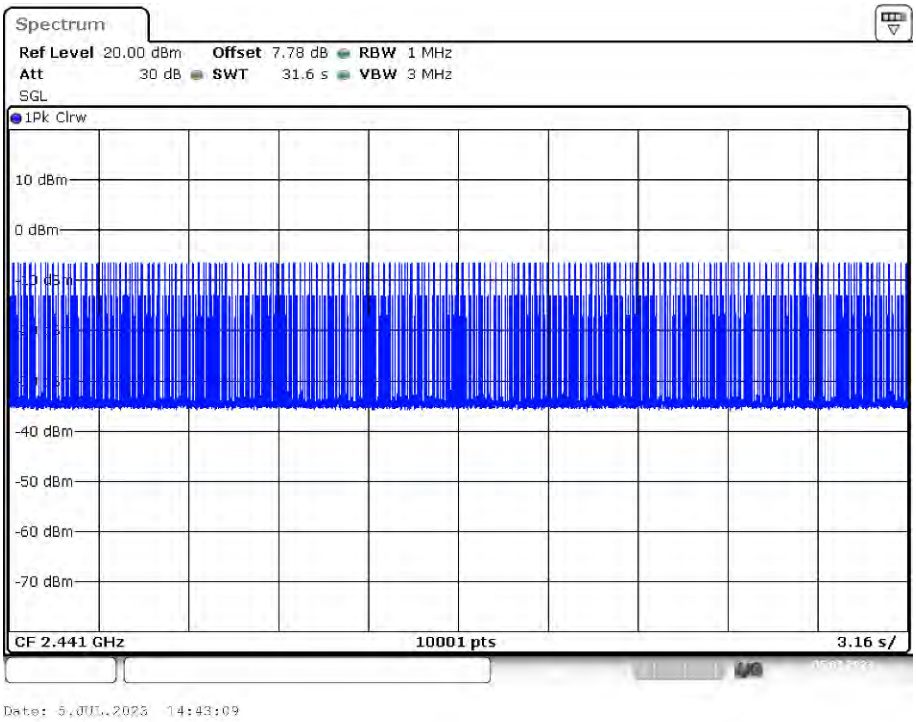
Note: Total Dwell Time= Pulse Time* Burst Count

Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2441	Ant1	0.39	123.24	316	31600	400	Pass
NVNT	1-DH3	2441	Ant1	1.644	264.684	161	31600	400	Pass
NVNT	1-DH5	2441	Ant1	2.894	303.87	105	31600	400	Pass
NVNT	2-DH1	2441	Ant1	0.399	126.483	317	31600	400	Pass
NVNT	2-DH3	2441	Ant1	1.647	258.579	157	31600	400	Pass
NVNT	2-DH5	2441	Ant1	2.873	295.919	103	31600	400	Pass
NVNT	3-DH1	2441	Ant1	0.401	127.919	319	31600	400	Pass
NVNT	3-DH3	2441	Ant1	1.65	264	160	31600	400	Pass
NVNT	3-DH5	2441	Ant1	2.896	324.352	112	31600	400	Pass

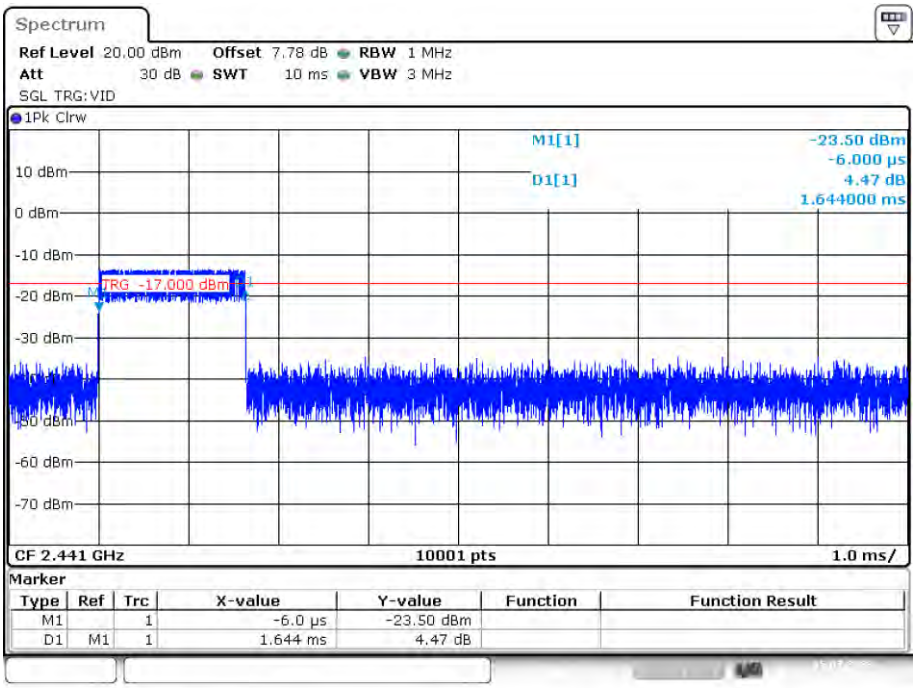
Dwell NVNT 1-DH1 2441MHz Ant1 One Burst



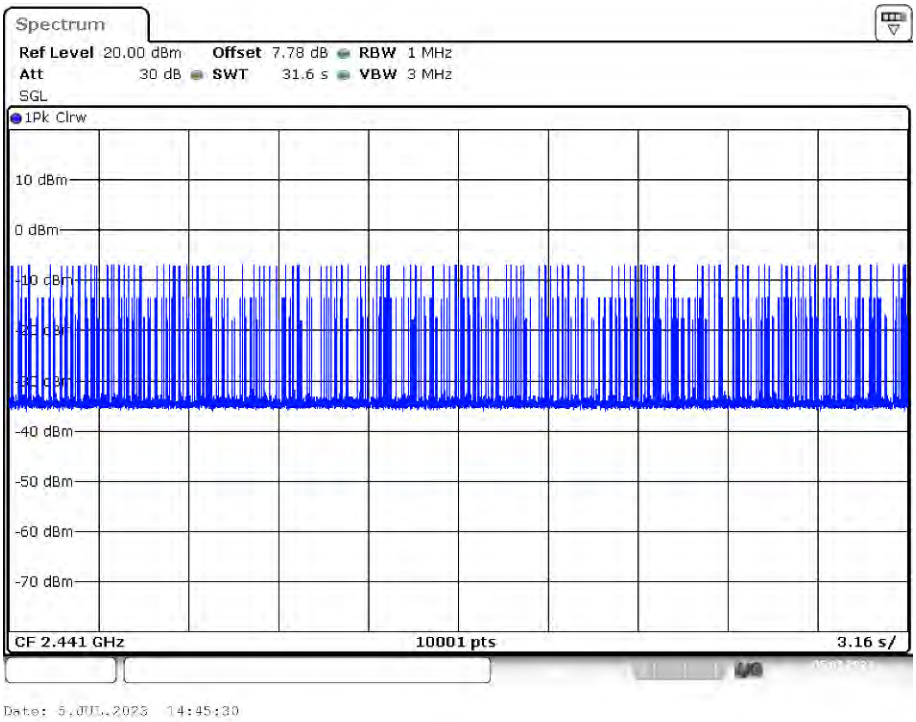
Dwell NVNT 1-DH1 2441MHz Ant1 Accumulated



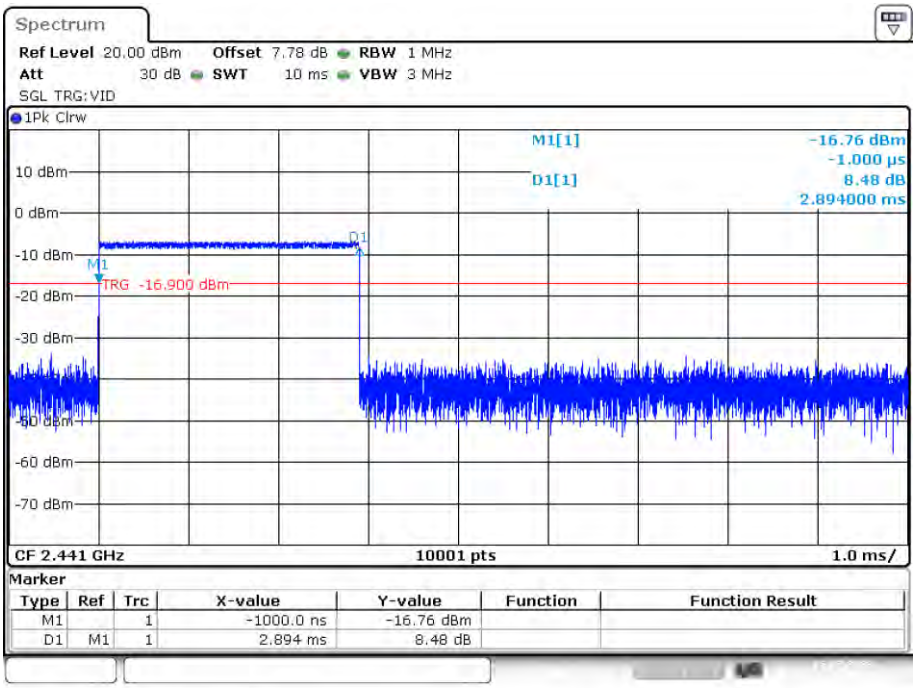
Dwell NVNT 1-DH3 2441MHz Ant1 One Burst



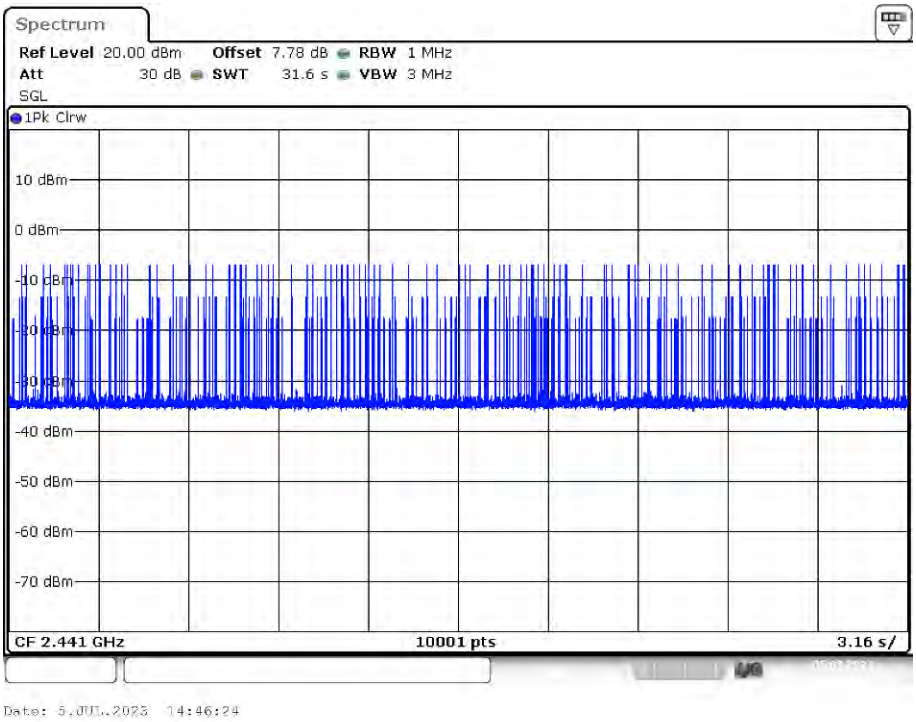
Dwell NVNT 1-DH3 2441MHz Ant1 Accumulated



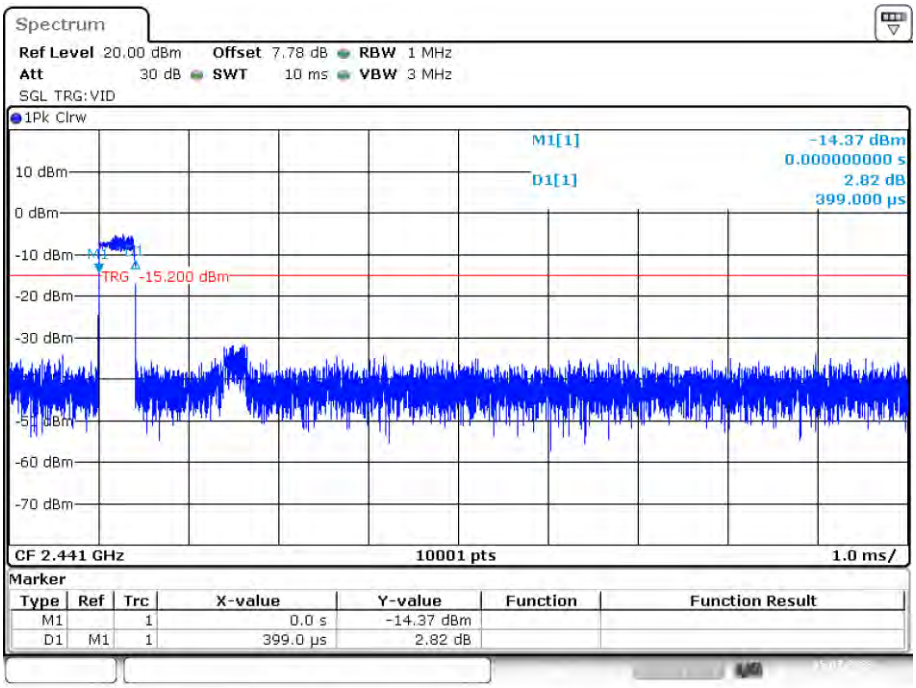
Dwell NVNT 1-DH5 2441MHz Ant1 One Burst



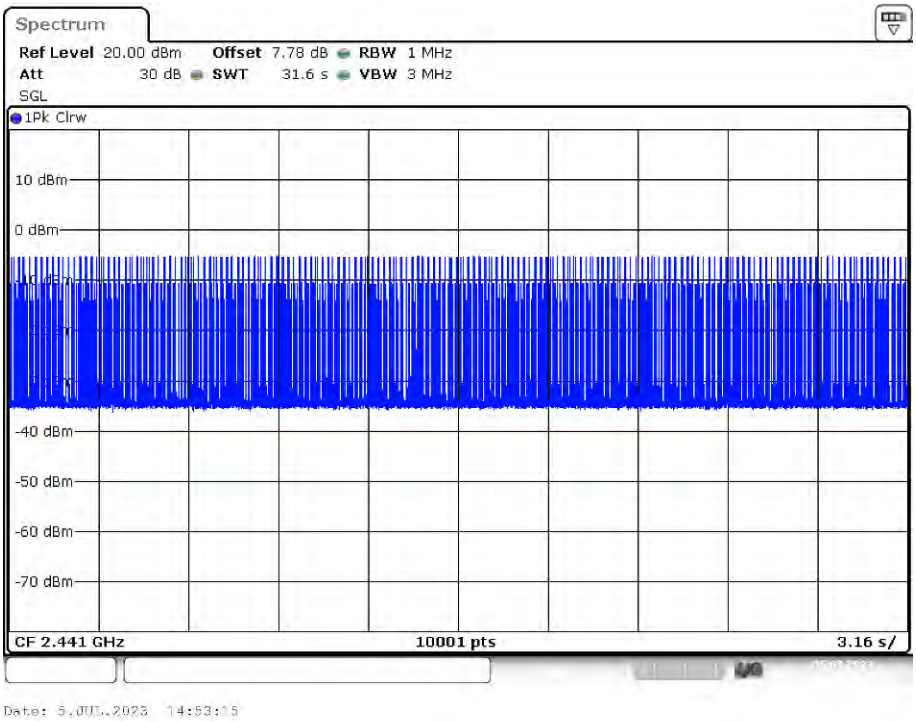
Dwell NVNT 1-DH5 2441MHz Ant1 Accumulated



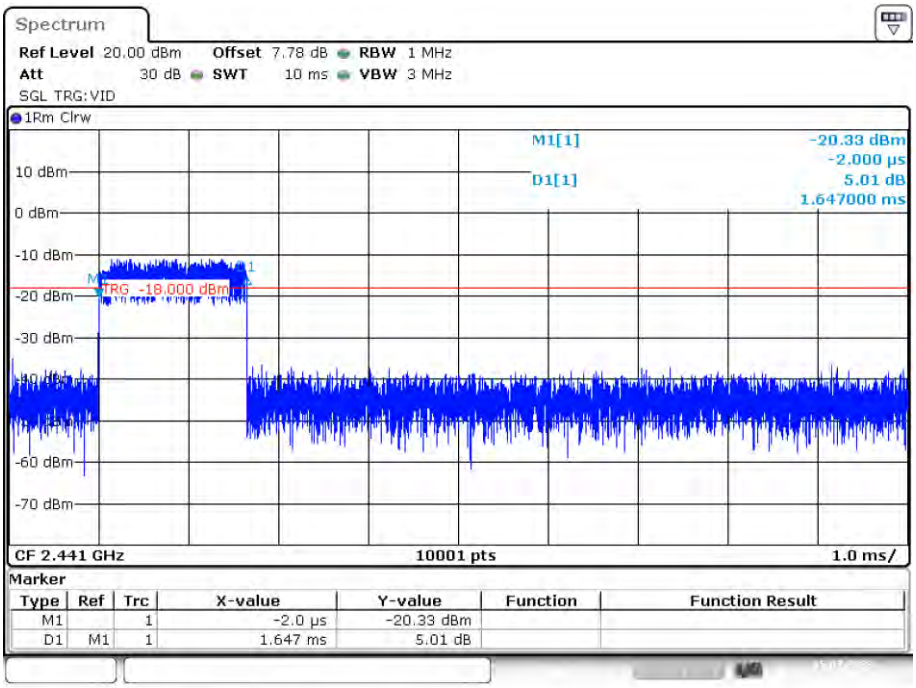
Dwell NVNT 2-DH1 2441MHz Ant1 One Burst



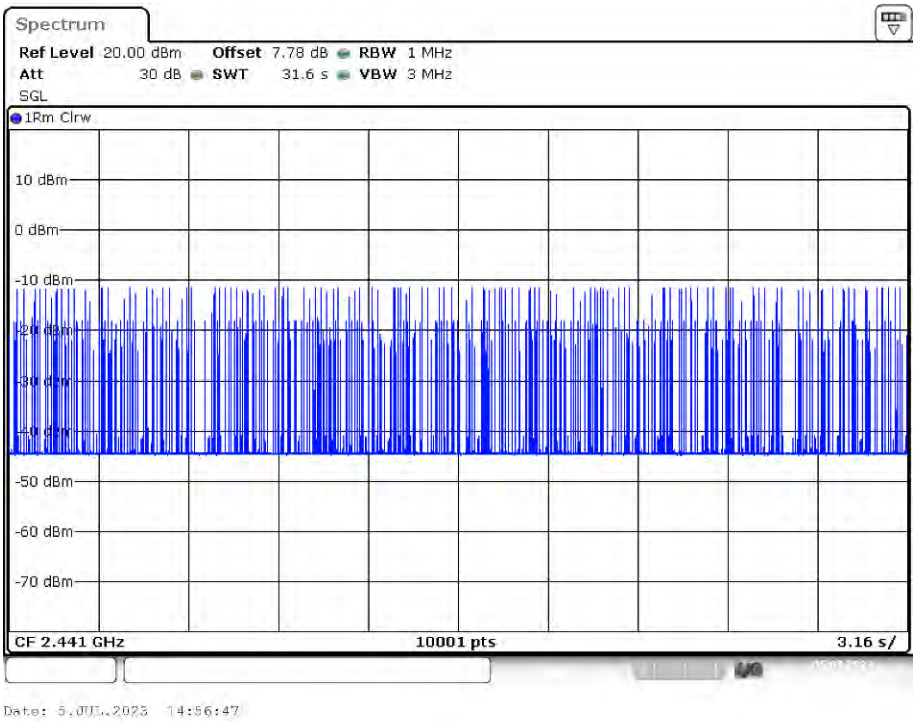
Dwell NVNT 2-DH1 2441MHz Ant1 Accumulated



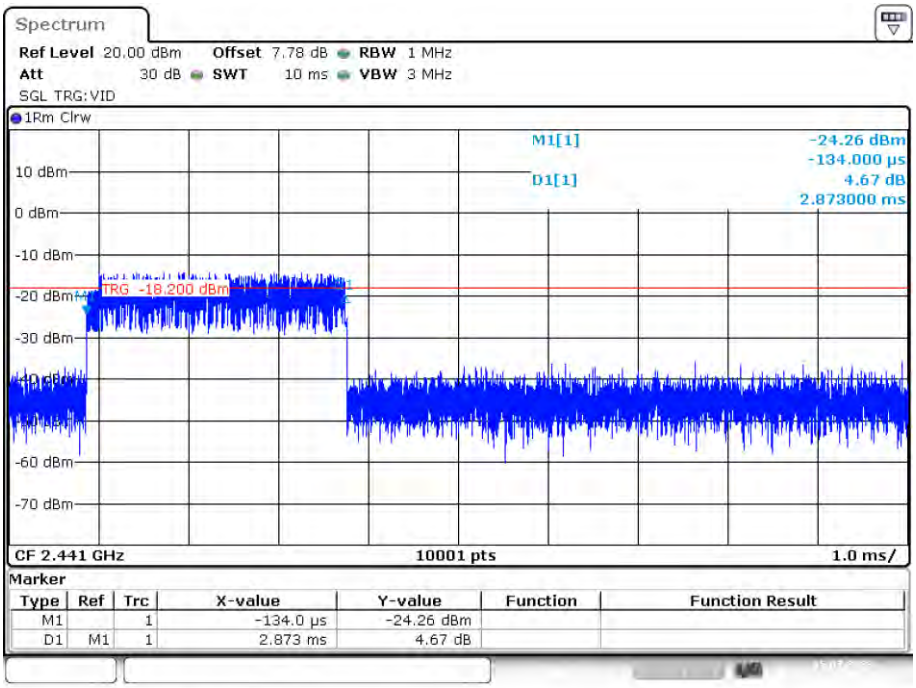
Dwell NVNT 2-DH3 2441MHz Ant1 One Burst



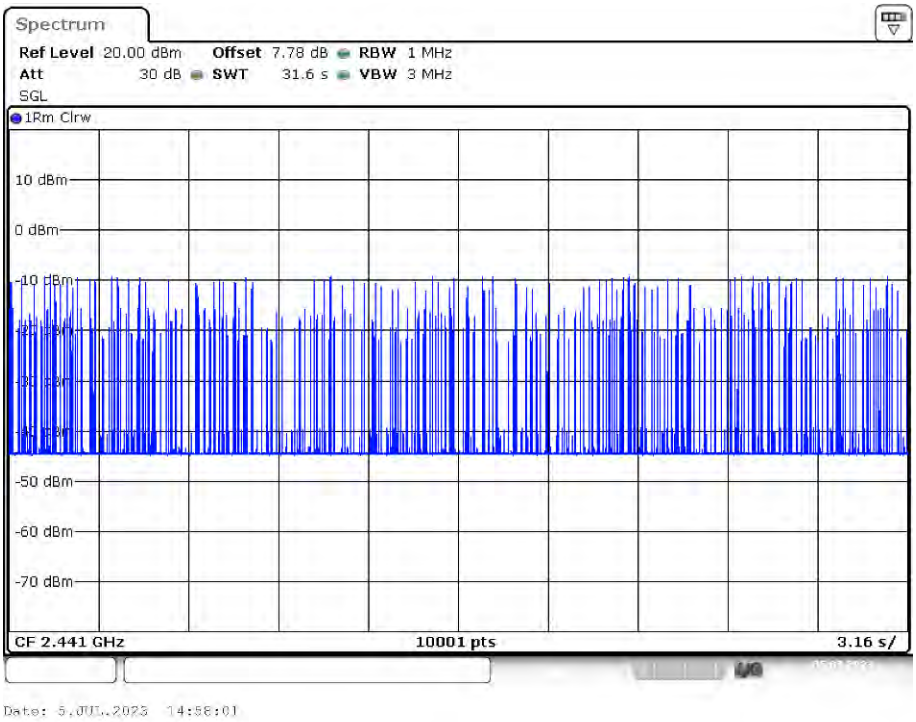
Dwell NVNT 2-DH3 2441MHz Ant1 Accumulated



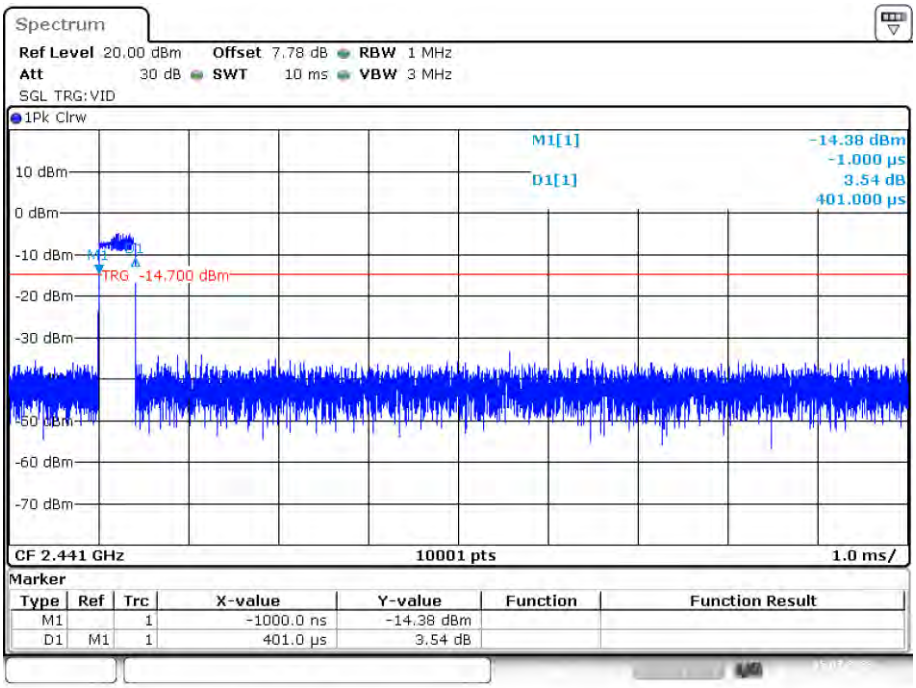
Dwell NVNT 2-DH5 2441MHz Ant1 One Burst



Dwell NVNT 2-DH5 2441MHz Ant1 Accumulated

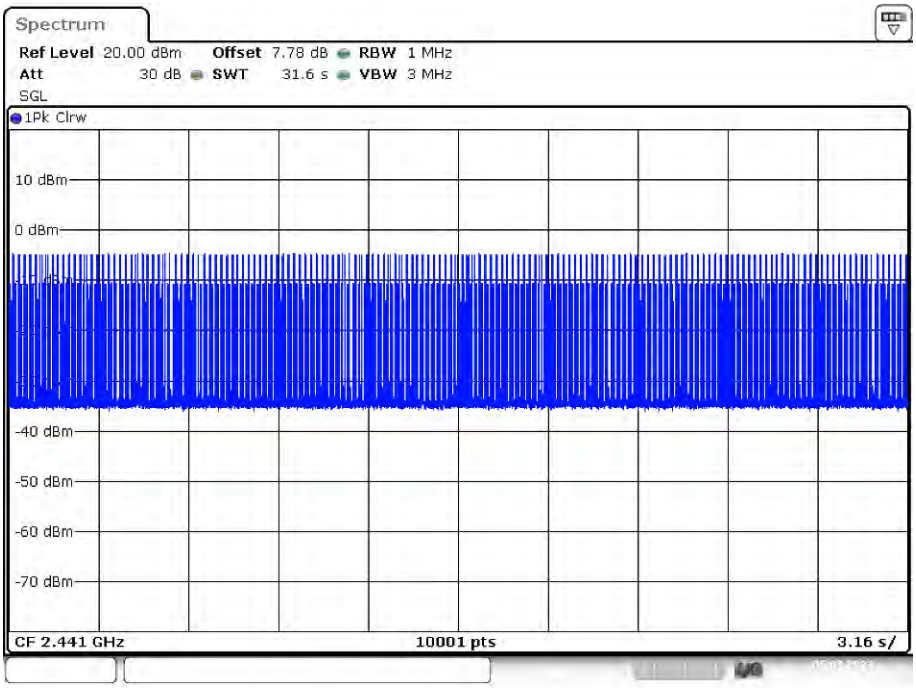


Dwell NVNT 3-DH1 2441MHz Ant1 One Burst



Date: 5.JUL.2023 15:07:01

Dwell NVNT 3-DH1 2441MHz Ant1 Accumulated



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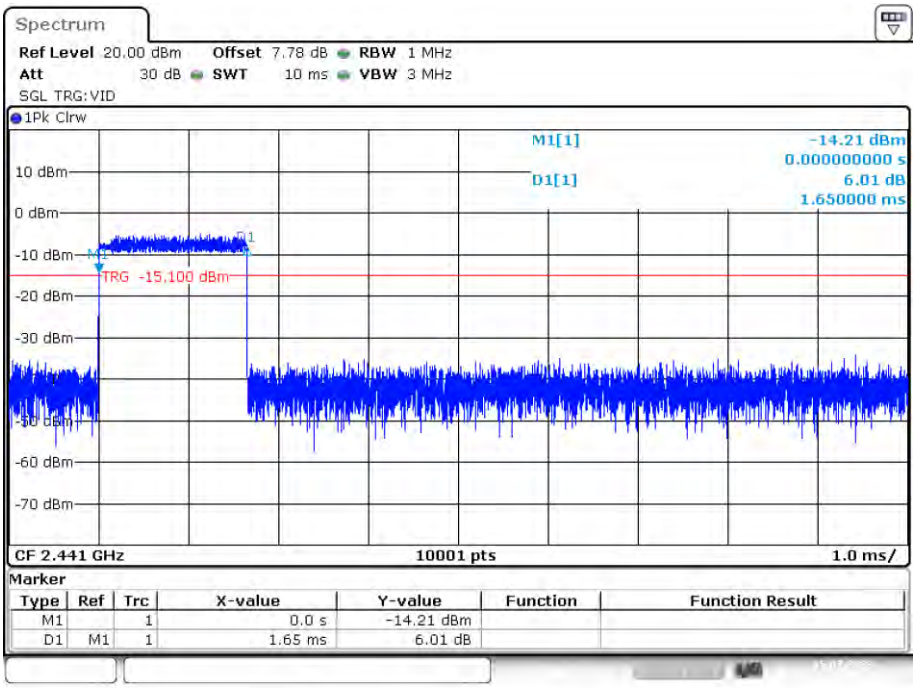
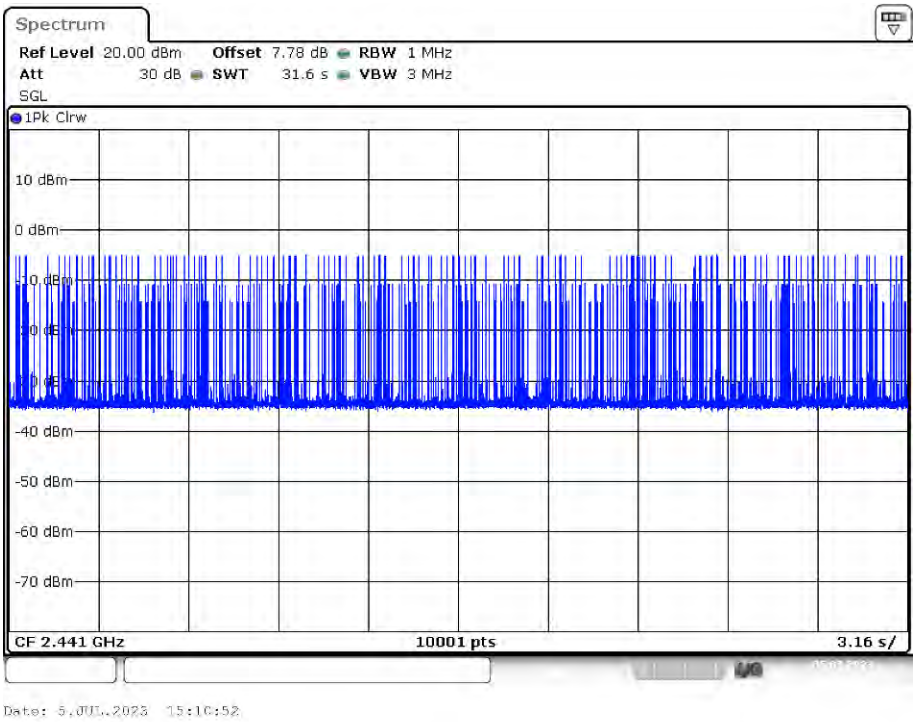
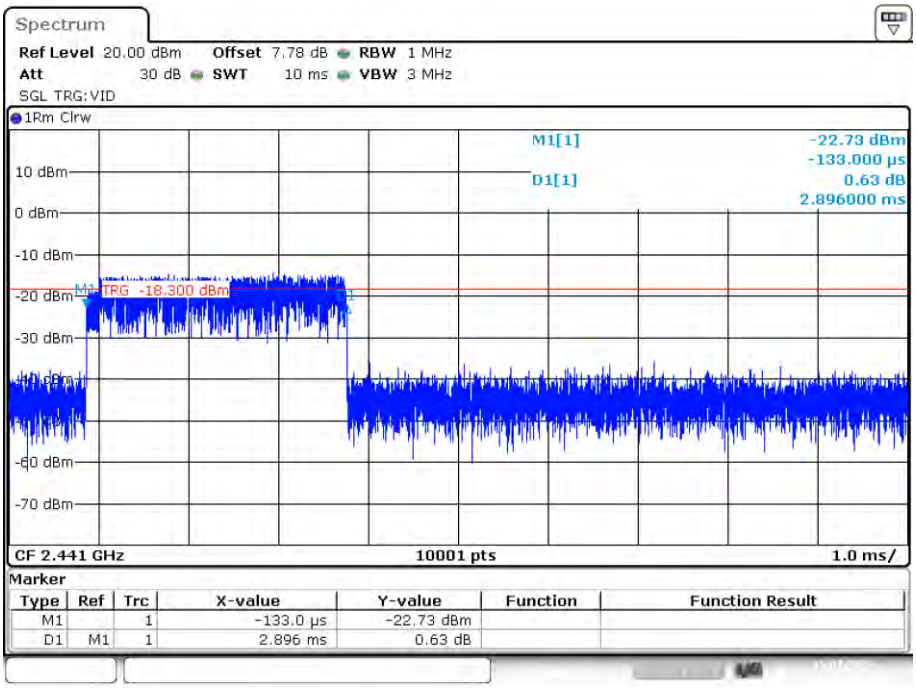
Dwell NVNT 3-DH3 2441MHz Ant1 One Burst



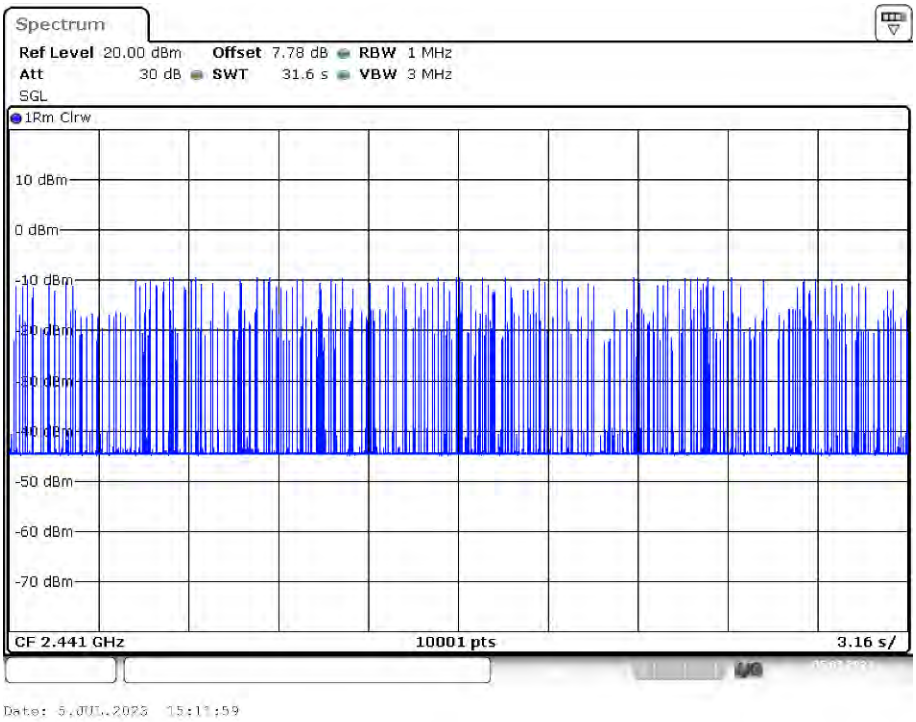
Dwell NVNT 3-DH3 2441MHz Ant1 Accumulated



Dwell NVNT 3-DH5 2441MHz Ant1 One Burst



Dwell NVNT 3-DH5 2441MHz Ant1 Accumulated



8. RADIATED EMISSIONS

8.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

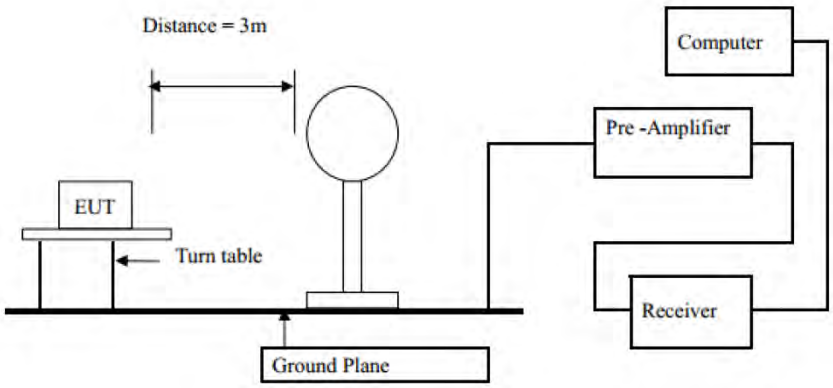
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 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])

15.209 Limit

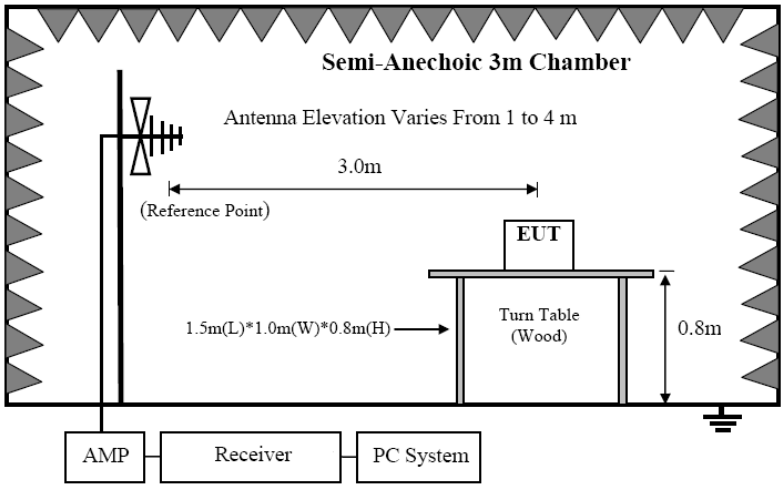
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

8.2. Block Diagram of Test setup

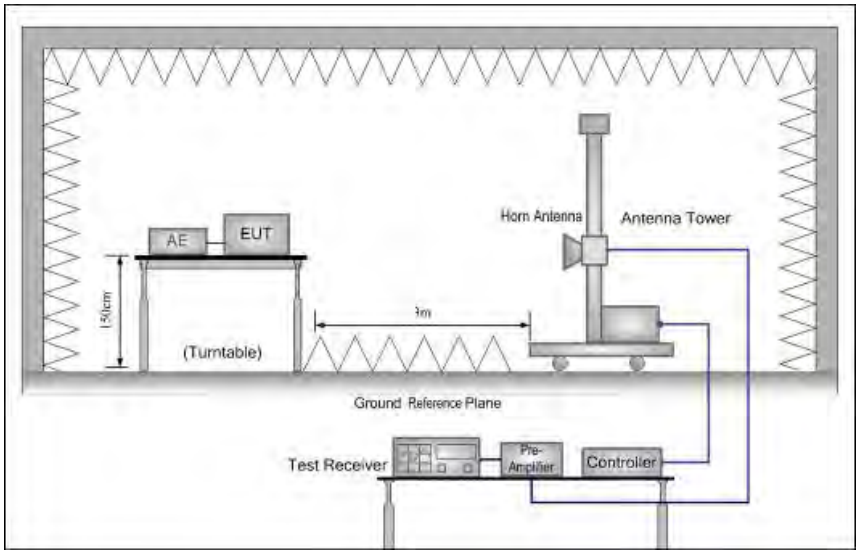
8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



8.2.2 In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

8.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and simulator as shown in section 1.4 and 6.1

(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.

(a) Change work frequency or channel of device if practicable.

(b) Change modulation type of device if practicable.

(c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

(4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated

(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013on Radiated Emission test.

(6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

8.4. Test Result

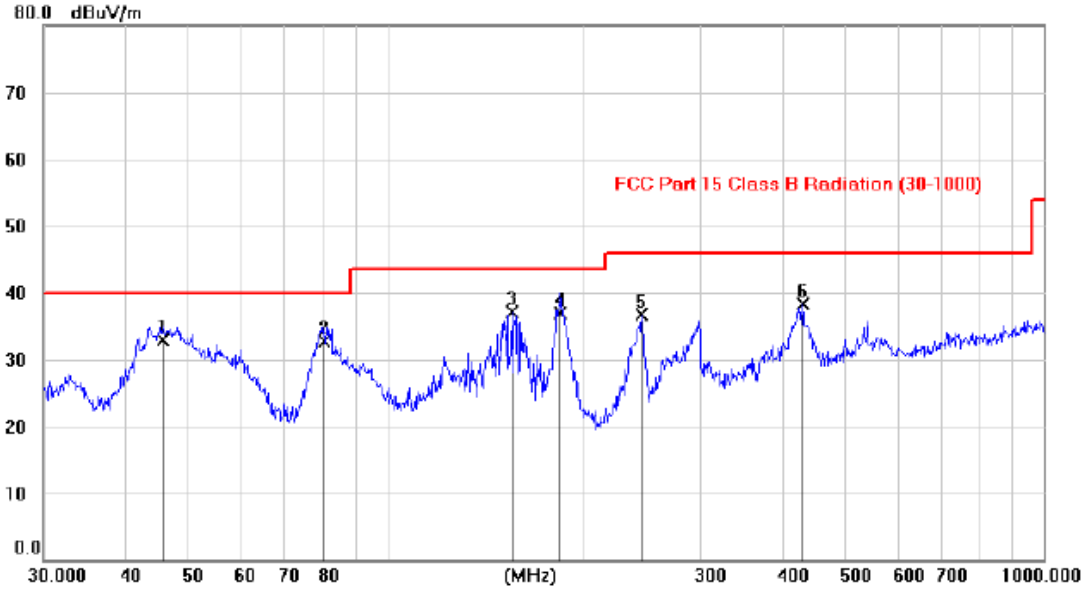
We have scanned the 10th harmonic from 9KHz to the EUT's highest frequency.
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

From 30MHz to 1000MHz: Conclusion: PASS

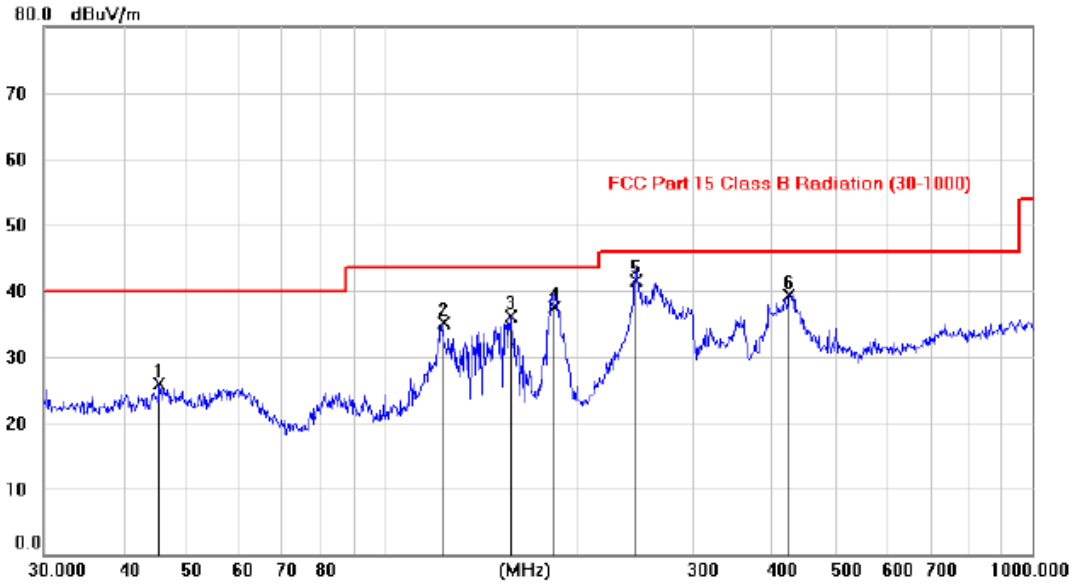
Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		45.6147	18.74	14.11	32.85	40.00	-7.15	QP			
2		80.1836	22.83	9.90	32.73	40.00	-7.27	QP			
3	*	155.3461	22.08	15.05	37.13	43.50	-6.37	peak			
4		184.3605	24.82	12.15	36.97	43.50	-6.53	QP			
5		244.3749	24.02	12.64	36.66	46.00	-9.34	peak			
6		429.5228	21.17	17.07	38.24	46.00	-7.76	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		45.2748	11.88	14.10	25.98	40.00	-14.02	peak			
2		123.8576	21.91	13.25	35.16	43.50	-8.34	peak			
3		157.3380	21.11	15.05	36.16	43.50	-7.34	peak			
4		183.8011	25.34	12.22	37.56	43.50	-5.94	QP			
5	*	245.4914	28.82	12.67	41.49	46.00	-4.51	QP			
6		423.3918	22.55	16.84	39.39	46.00	-6.61	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Remark: All modes have been tested, and only worst data of GFSK mode, Channel 2402MHz (AC 120V/ 60Hz) was listed in this report.

From 1G-25GHz

Test Mode: GFSK TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	c	V	33.93	10.18	34.26	58.70	74	-15.30	PK
4804	36.07	V	33.93	10.18	34.26	45.92	54	-8.08	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	47.20	H	33.93	10.18	34.26	57.05	74	-16.95	PK
4804	35.45	H	33.93	10.18	34.26	45.30	54	-8.70	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX Mid									
4882	49.20	V	33.95	10.20	34.26	59.09	74	-14.91	PK
4882	35.76	V	33.95	10.20	34.26	45.65	54	-8.35	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	48.24	H	33.95	10.20	34.26	58.13	74	-15.87	PK
4882	34.28	H	33.95	10.20	34.26	44.17	54	-9.83	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX High									
4960	47.39	V	33.98	10.22	34.25	57.34	74	-16.66	PK
4960	33.98	V	33.98	10.22	34.25	43.93	54	-10.07	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	46.08	H	33.98	10.22	34.25	56.03	74	-17.97	PK
4960	32.01	H	33.98	10.22	34.25	41.96	54	-12.04	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

Note:

1, Result = Read level + Antenna factor + cable loss-Amp factor

2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

From 1G-25GHz

Test Mode: π/4 DQPSK TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	48.35	V	33.93	10.18	34.26	58.20	74	-15.80	PK
4804	36.23	V	33.93	10.18	34.26	46.08	54	-7.92	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	47.32	H	33.93	10.18	34.26	57.17	74	-16.83	PK
4804	35.43	H	33.93	10.18	34.26	45.28	54	-8.72	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: π/4 DQPSK TX Mid									
4882	49.05	V	33.95	10.20	34.26	58.94	74	-15.06	PK
4882	35.99	V	33.95	10.20	34.26	45.88	54	-8.12	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	48.77	H	33.95	10.20	34.26	58.66	74	-15.34	PK
4882	34.73	H	33.95	10.20	34.26	44.62	54	-9.38	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: π/4 DQPSK TX High									
4960	47.53	V	33.98	10.22	34.25	57.48	74	-16.52	PK
4960	33.63	V	33.98	10.22	34.25	43.58	54	-10.42	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	46.62	H	33.98	10.22	34.25	56.57	74	-17.43	PK
4960	32.57	H	33.98	10.22	34.25	42.52	54	-11.48	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

Note:

1, Result = Read level + Antenna factor + cable loss-Amp factor

2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

From 1G-25GHz

Test Mode: 8- DQPSK TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	48.43	V	33.93	10.18	34.26	58.28	74	-15.72	PK
4804	36.49	V	33.93	10.18	34.26	46.34	54	-7.66	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	47.59	H	33.93	10.18	34.26	57.44	74	-16.56	PK
4804	35.93	H	33.93	10.18	34.26	45.78	54	-8.22	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: 8- DQPSK TX Mid									
4882	49.16	V	33.95	10.20	34.26	59.05	74	-14.95	PK
4882	35.01	V	33.95	10.20	34.26	44.90	54	-9.10	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	48.98	H	33.95	10.20	34.26	58.87	74	-15.13	PK
4882	34.36	H	33.95	10.20	34.26	44.25	54	-9.75	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: 8- DQPSK TX High									
4960	47.53	V	33.98	10.22	34.25	57.48	74	-16.52	PK
4960	33.82	V	33.98	10.22	34.25	43.77	54	-10.23	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	46.88	H	33.98	10.22	34.25	56.83	74	-17.17	PK
4960	32.90	H	33.98	10.22	34.25	42.85	54	-11.15	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

Note:

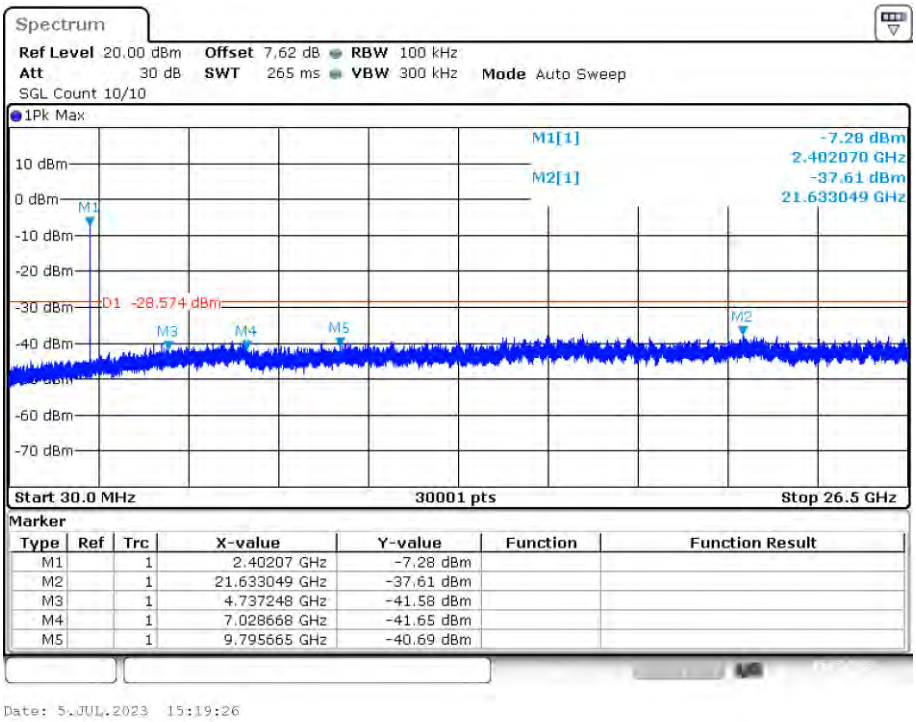
1, Result = Read level + Antenna factor + cable loss-Amp factor

2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Conducted RF Spurious Emission

Tx. Spurious NVNT 1-DH1 2402MHz Ant1 Ref

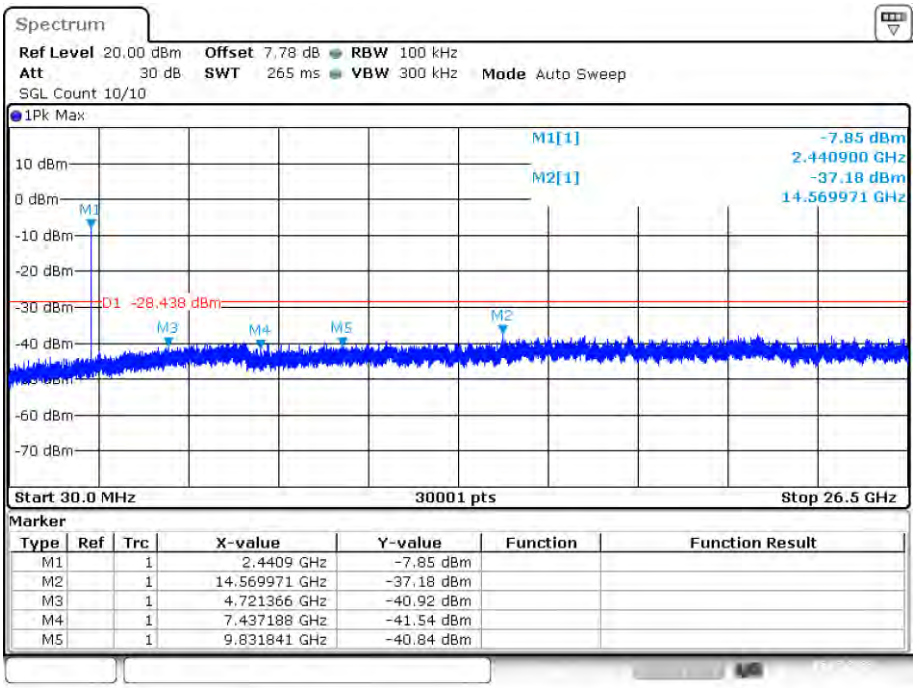
Tx. Spurious NVNT 1-DH1 2402MHz Ant1 Emission



Tx. Spurious NVNT 1-DH1 2441MHz Ant1 Ref

Date: 5.JUL.2023 15:20:52

Tx. Spurious NVNT 1-DH1 2441MHz Ant1 Emission



Marker

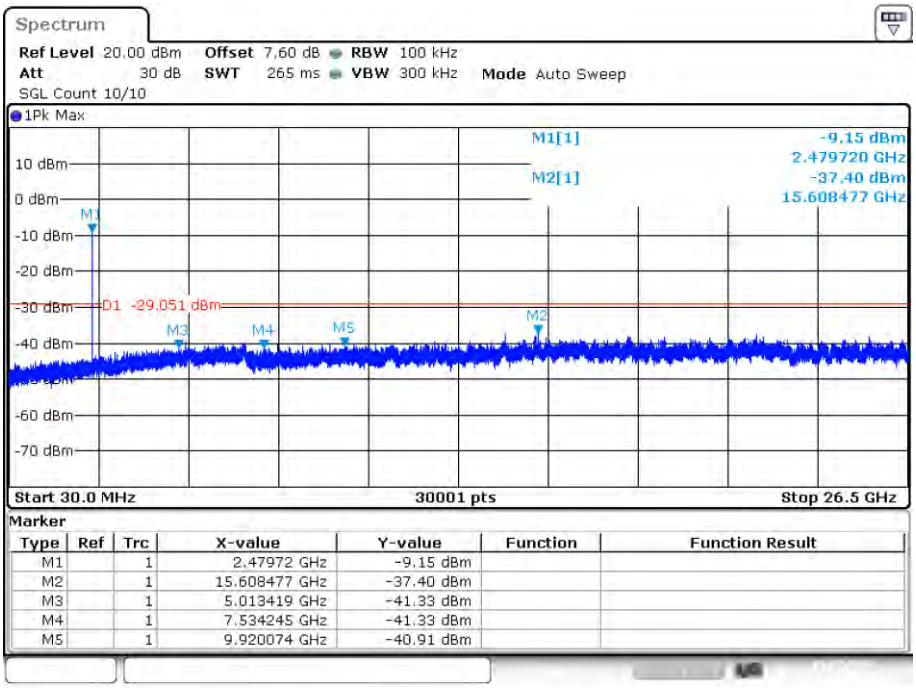
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4409 GHz	-7.85 dBm		
M2		1	14.569971 GHz	-37.18 dBm		
M3		1	4.721366 GHz	-40.92 dBm		
M4		1	7.437188 GHz	-41.54 dBm		
M5		1	9.831841 GHz	-40.84 dBm		

Date: 5.JUL.2023 15:21:06

Tx. Spurious NVNT 1-DH1 2480MHz Ant1 Ref

Date: 5.JUL.2023 15:22:36

Tx. Spurious NVNT 1-DH1 2480MHz Ant1 Emission

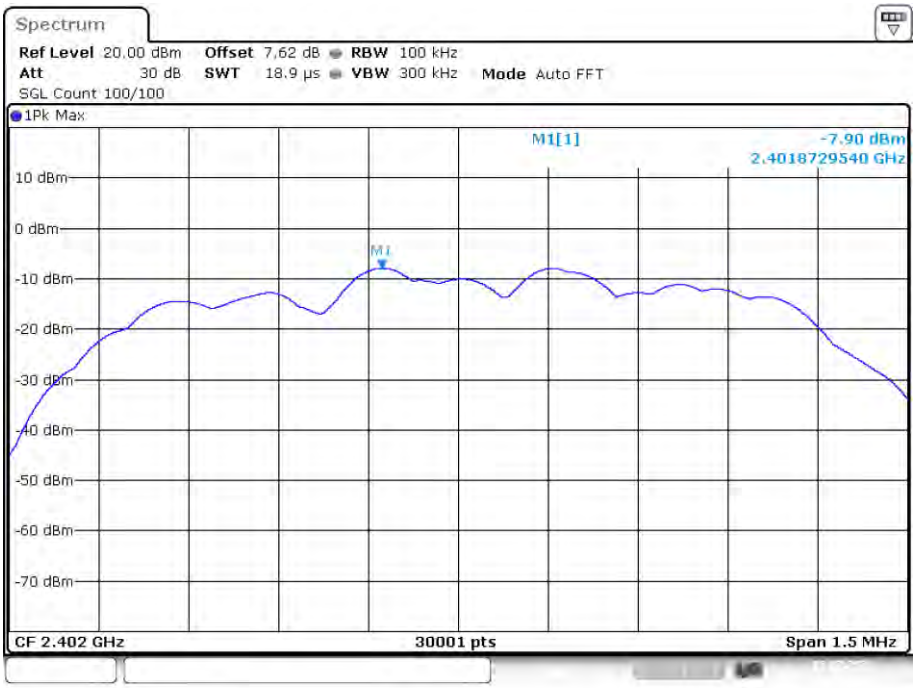


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47972 GHz	-9.15 dBm		
M2		1	15.608477 GHz	-37.40 dBm		
M3		1	5.013419 GHz	-41.33 dBm		
M4		1	7.534245 GHz	-41.33 dBm		
M5		1	9.920074 GHz	-40.91 dBm		

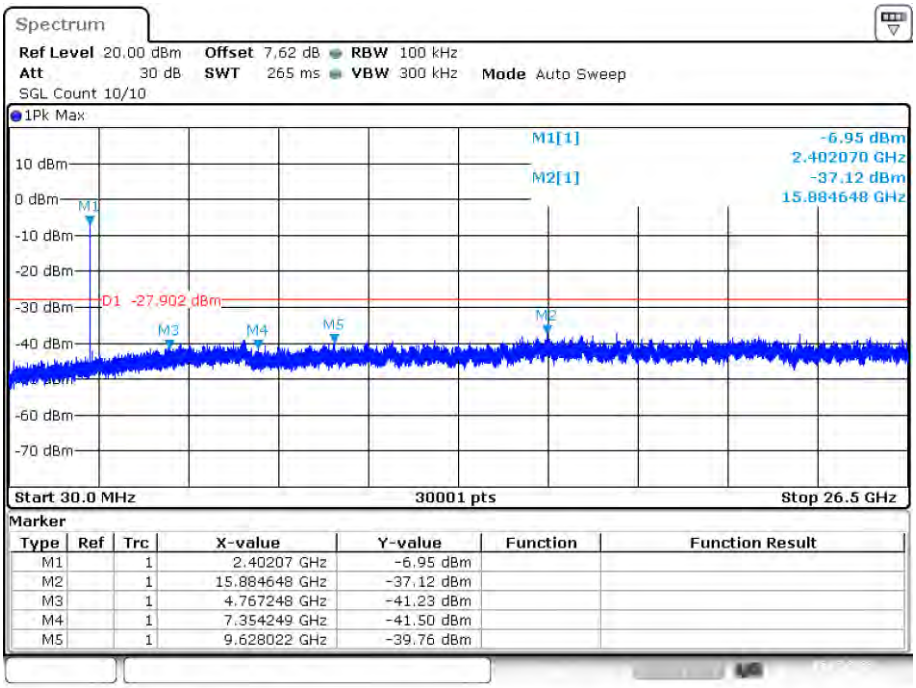
Date: 5.JUL.2023 15:22:50

Tx. Spurious NVNT 2-DH1 2402MHz Ant1 Ref



Date: 5.JUL.2023 15:50:00

Tx. Spurious NVNT 2-DH1 2402MHz Ant1 Emission



Marker

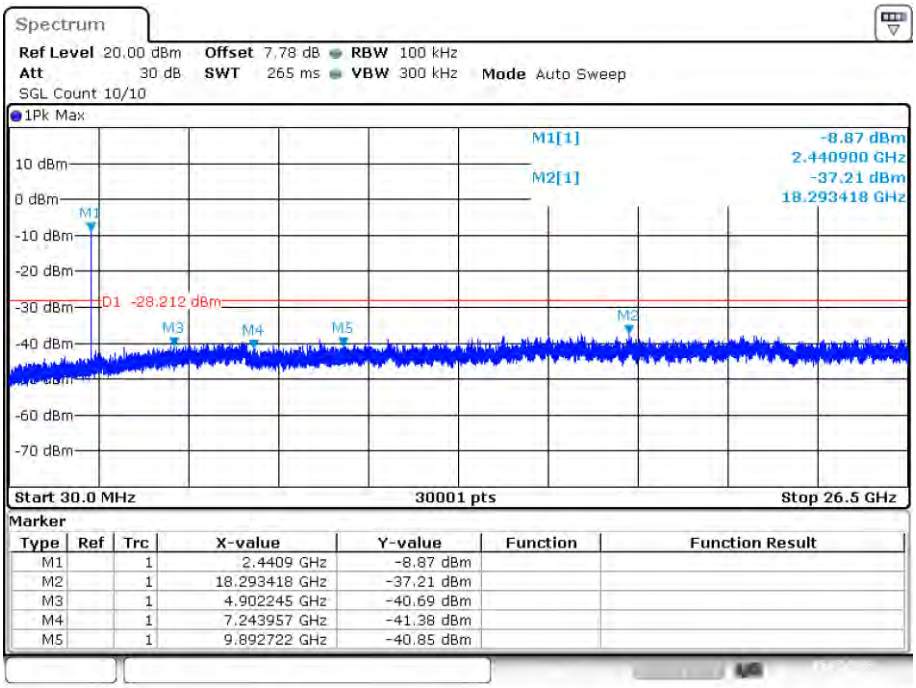
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40207 GHz	-6.95 dBm		
M2		1	15.884648 GHz	-37.12 dBm		
M3		1	4.767248 GHz	-41.23 dBm		
M4		1	7.354249 GHz	-41.50 dBm		
M5		1	9.628022 GHz	-39.76 dBm		

Date: 5.JUL.2023 15:50:13

Tx. Spurious NVNT 2-DH1 2441MHz Ant1 Ref

Date: 5.JUL.2023 15:47:36

Tx. Spurious NVNT 2-DH1 2441MHz Ant1 Emission

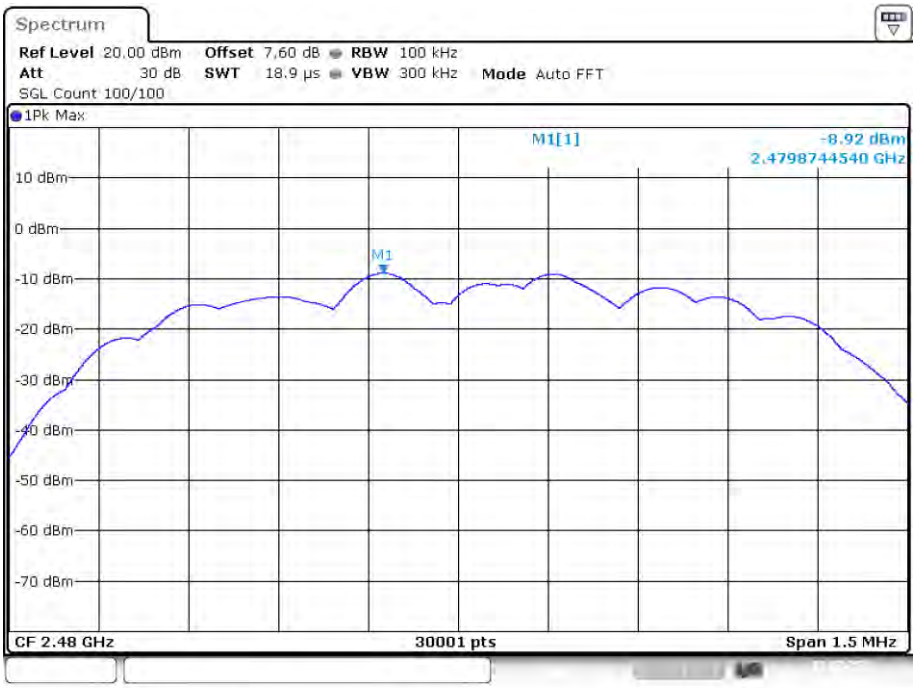


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4409 GHz	-8.87 dBm		
M2		1	18.293418 GHz	-37.21 dBm		
M3		1	4.902245 GHz	-40.69 dBm		
M4		1	7.243957 GHz	-41.38 dBm		
M5		1	9.892722 GHz	-40.85 dBm		

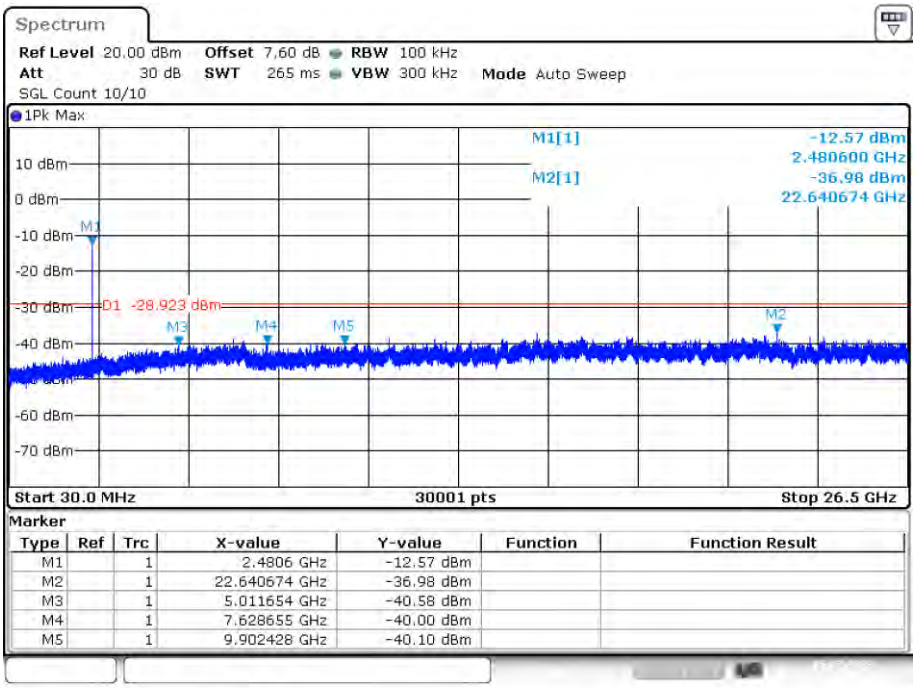
Date: 5.JUL.2023 15:47:50

Tx. Spurious NVNT 2-DH1 2480MHz Ant1 Ref



Date: 5.JUL.2023 15:51:52

Tx. Spurious NVNT 2-DH1 2480MHz Ant1 Emission

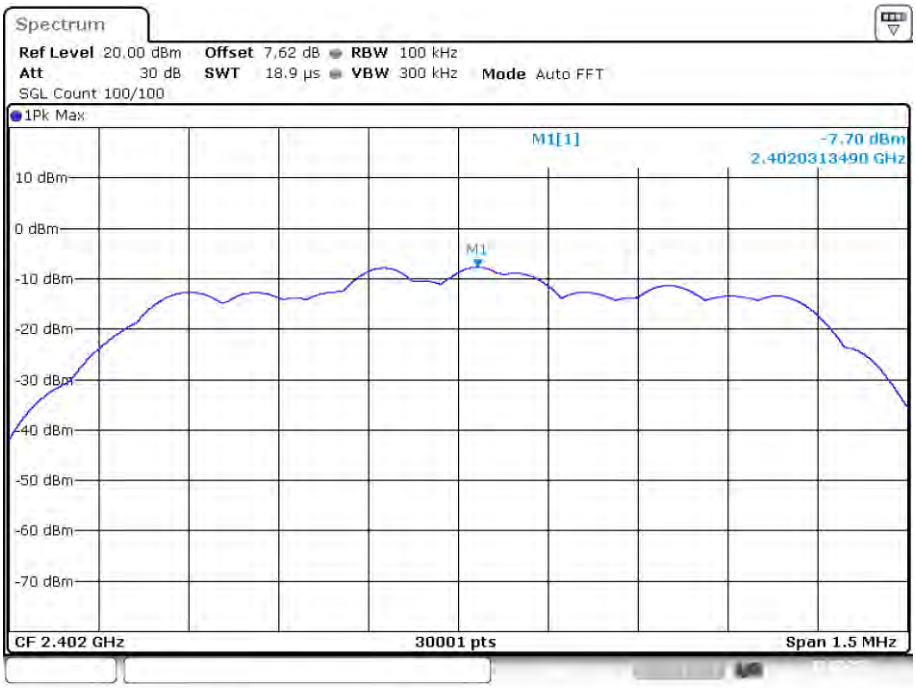


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4806 GHz	-12.57 dBm		
M2		1	22.640674 GHz	-36.98 dBm		
M3		1	5.011654 GHz	-40.58 dBm		
M4		1	7.628655 GHz	-40.00 dBm		
M5		1	9.902428 GHz	-40.10 dBm		

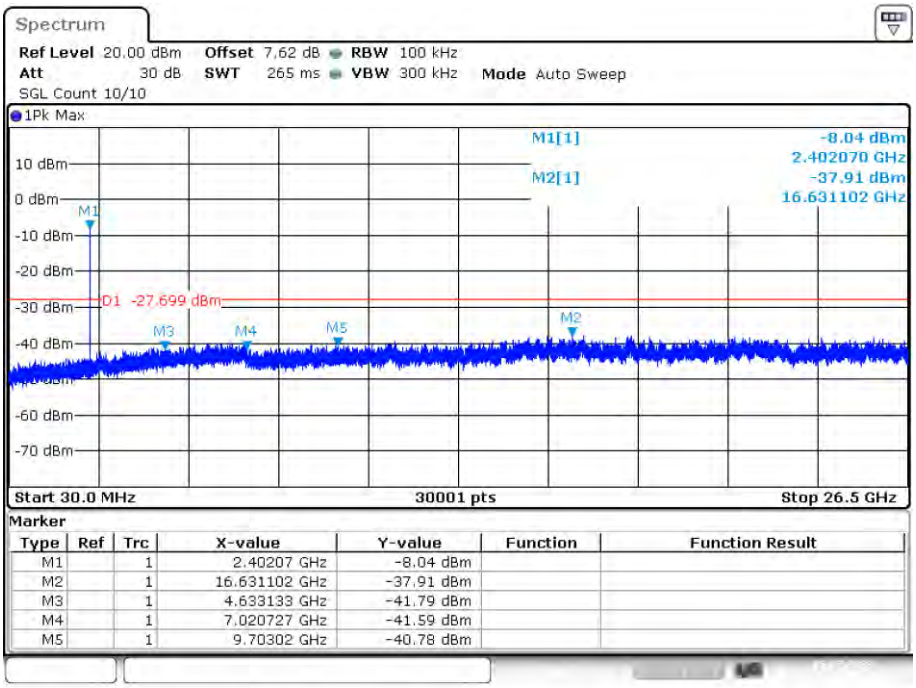
Date: 5.JUL.2023 15:52:06

Tx. Spurious NVNT 3-DH1 2402MHz Ant1 Ref



Date: 5.JUL.2023 16:00:04

Tx. Spurious NVNT 3-DH1 2402MHz Ant1 Emission



Marker

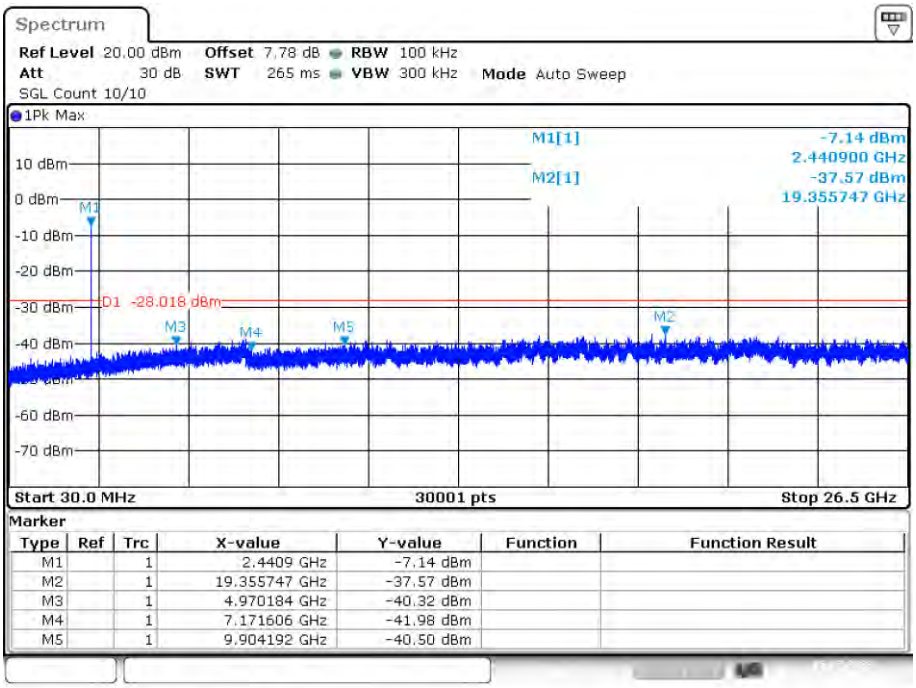
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40207 GHz	-8.04 dBm		
M2		1	16.631102 GHz	-37.91 dBm		
M3		1	4.633133 GHz	-41.79 dBm		
M4		1	7.020727 GHz	-41.59 dBm		
M5		1	9.70302 GHz	-40.78 dBm		

Date: 5.JUL.2023 16:00:18

Tx. Spurious NVNT 3-DH1 2441MHz Ant1 Ref

Date: 5.JUL.2023 15:57:56

Tx. Spurious NVNT 3-DH1 2441MHz Ant1 Emission



Marker

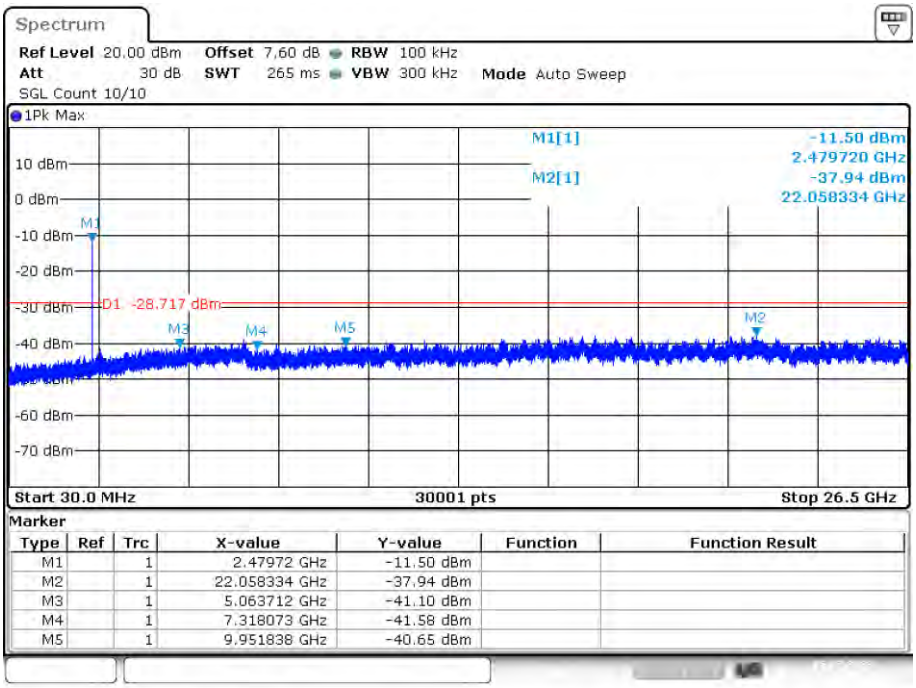
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4409 GHz	-7.14 dBm		
M2		1	19.355747 GHz	-37.57 dBm		
M3		1	4.970184 GHz	-40.32 dBm		
M4		1	7.171606 GHz	-41.98 dBm		
M5		1	9.904192 GHz	-40.50 dBm		

Date: 5.JUL.2023 15:58:10

Tx. Spurious NVNT 3-DH1 2480MHz Ant1 Ref

Date: 5.JUL.2023 15:55:17

Tx. Spurious NVNT 3-DH1 2480MHz Ant1 Emission



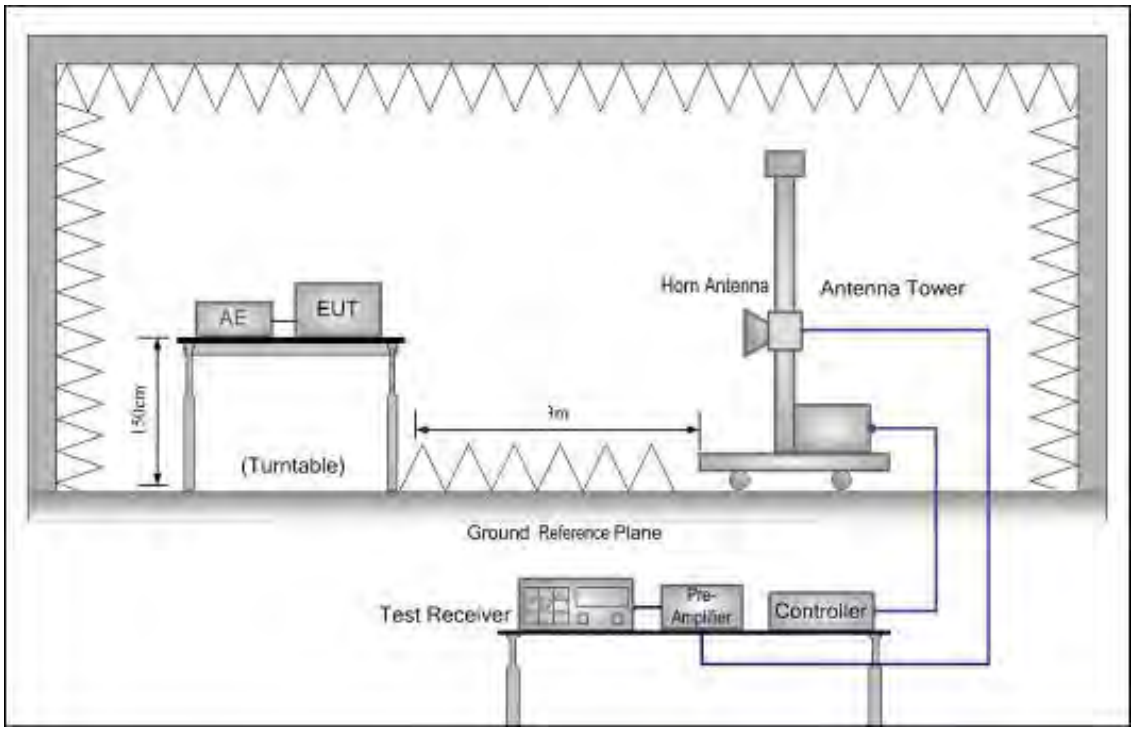
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47972 GHz	-11.50 dBm		
M2		1	22.058334 GHz	-37.94 dBm		
M3		1	5.063712 GHz	-41.10 dBm		
M4		1	7.318073 GHz	-41.58 dBm		
M5		1	9.951838 GHz	-40.65 dBm		

Date: 5.JUL.2023 15:55:31

9. BAND EDGE COMPLIANCE

9.1. Block Diagram of Test Setup



9.2. Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

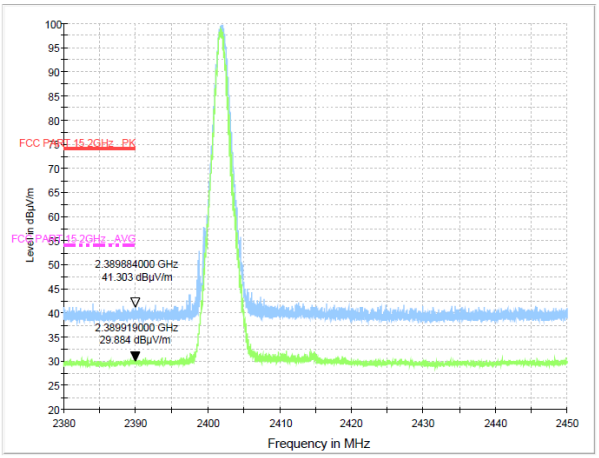
9.3. Test Procedure

All restriction band and non- restriction band have been tested ， only worse case is reported.

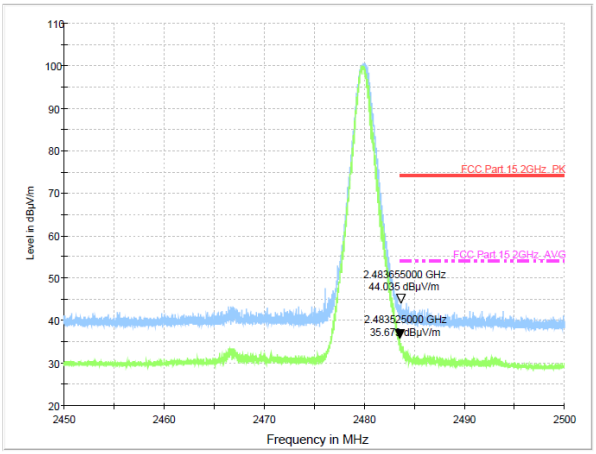
9.4. Test Result

PASS. (See below detailed test data)

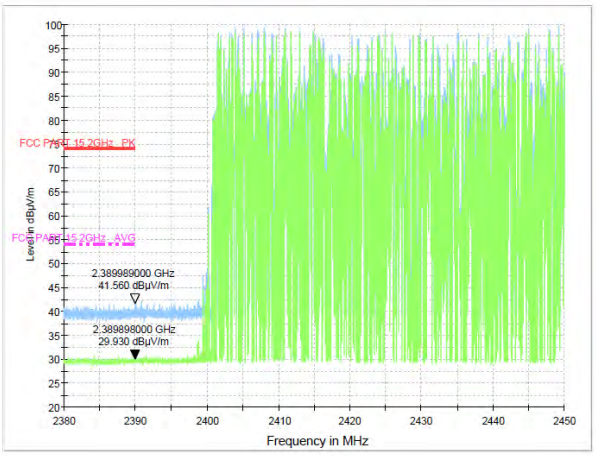
Test Mode: GFSK-Low Hopping-off



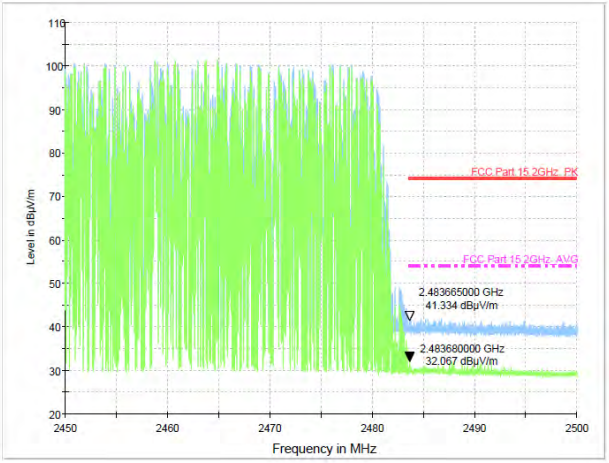
Test Mode: GFSK-High Hopping-off



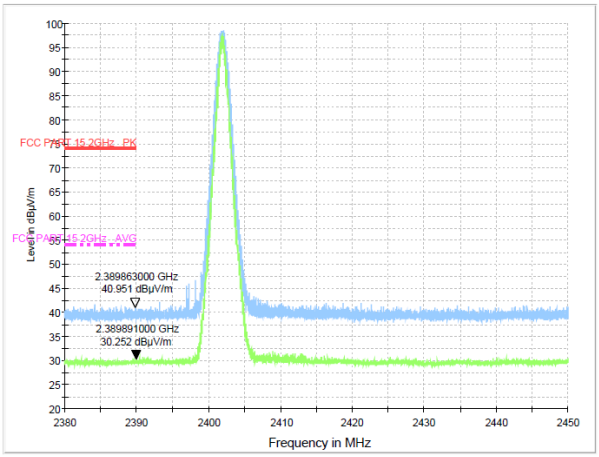
Test Mode: GFSK-Low Hopping-on



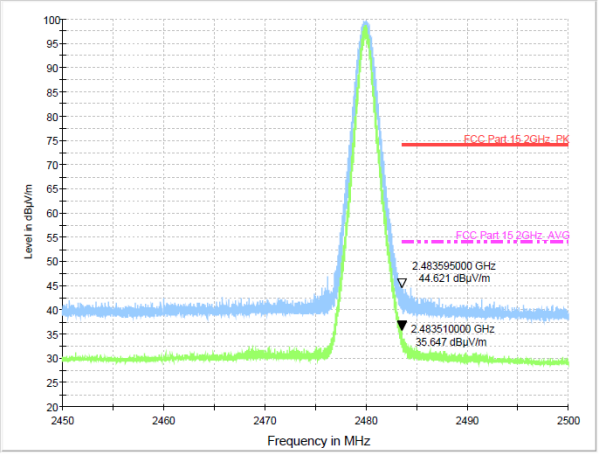
Test Mode: GFSK-High Hopping-on



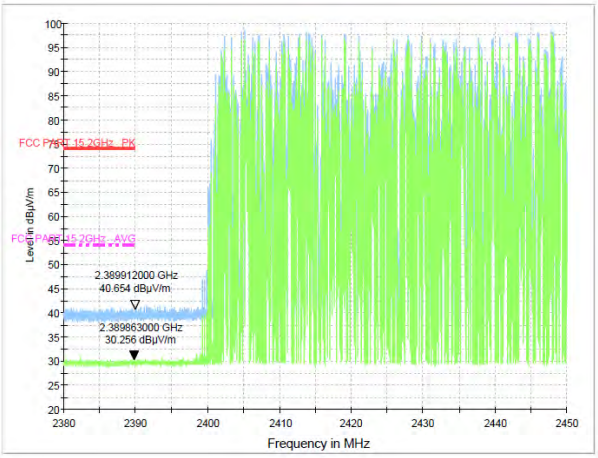
Test Mode: π/4 DQPSK-Low Hopping-off



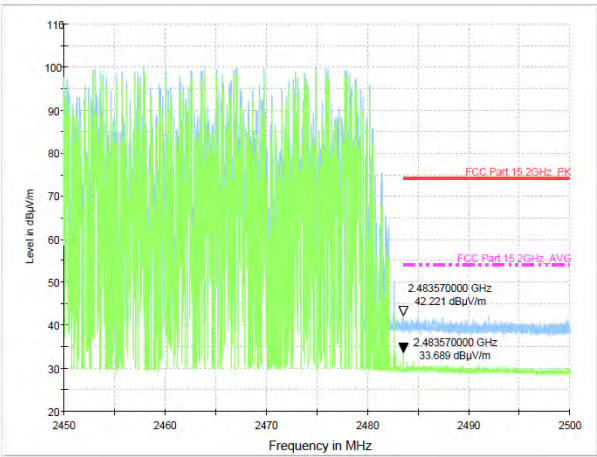
Test Mode: π/4 DQPSK-High Hopping-off



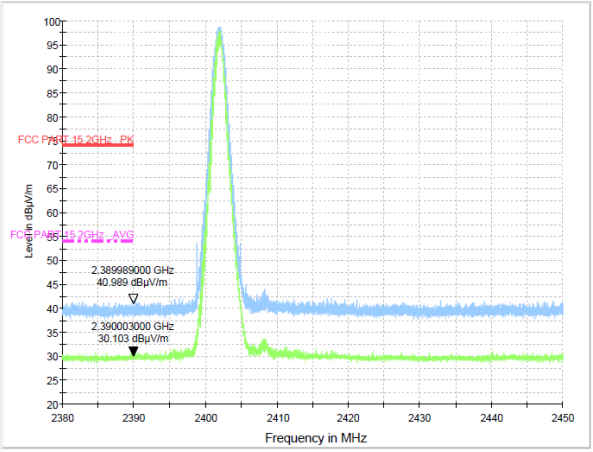
Test Mode: π/4 DQPSK-Low Hopping-on



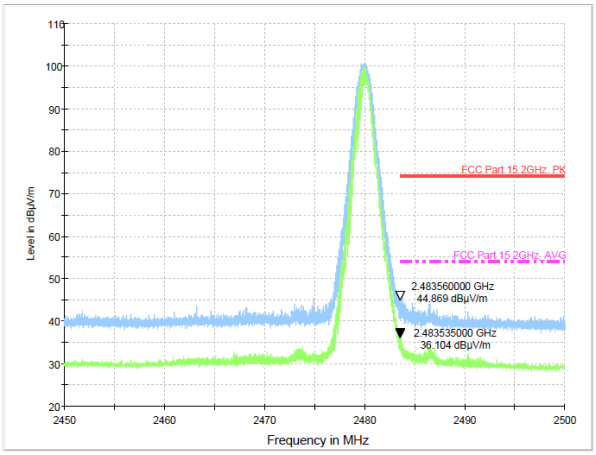
Test Mode: π/4 DQPSK-High Hopping-on



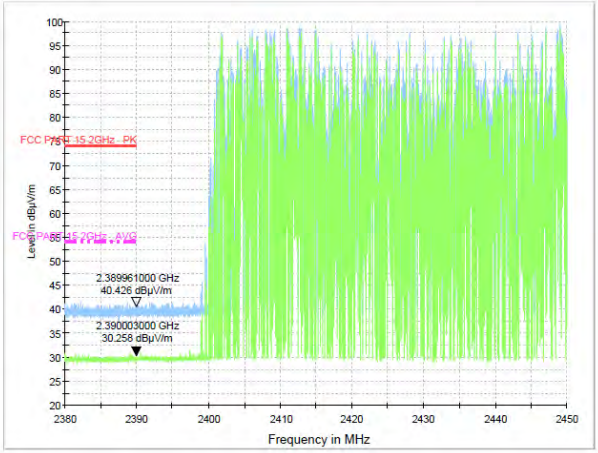
Test Mode: 8DPSK-Low Hopping-off



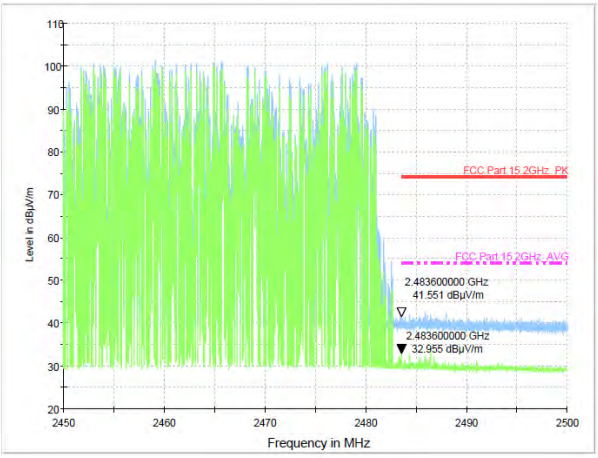
Test Mode: 8DPSK-High Hopping-off



Test Mode: 8DPSK-Low Hopping-on

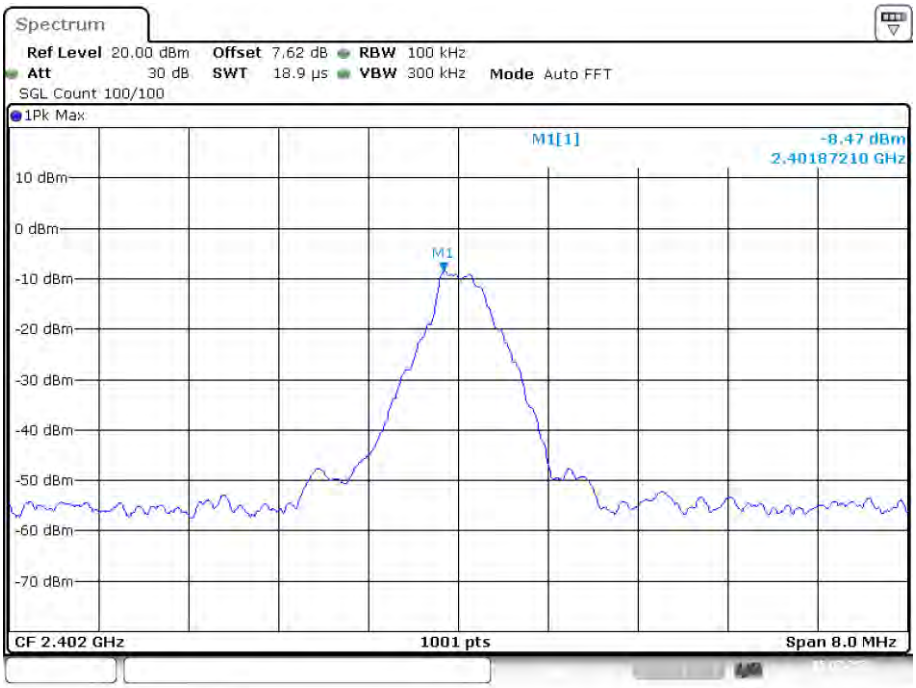


Test Mode: 8DPSK-High Hopping-on



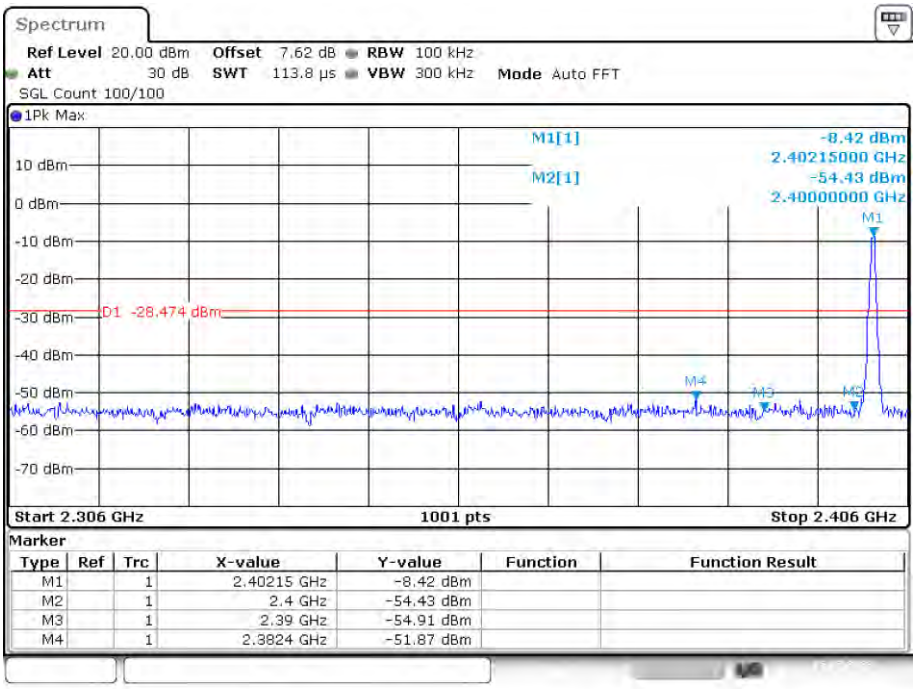
Conducted Method

Band Edge NVNT 1-DH1 2402MHz Ant1 No-Hopping Ref



Date: 5.JUL.2023 15:18:54

Band Edge NVNT 1-DH1 2402MHz Ant1 No-Hopping Emission

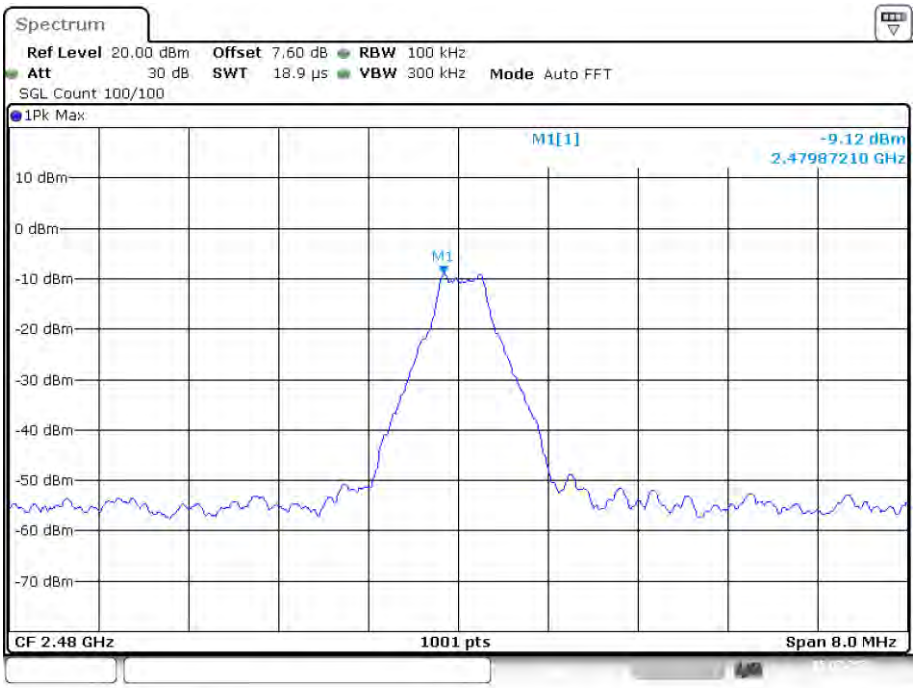


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40215 GHz	-8.42 dBm		
M2		1	2.4 GHz	-54.43 dBm		
M3		1	2.39 GHz	-54.91 dBm		
M4		1	2.3824 GHz	-51.87 dBm		

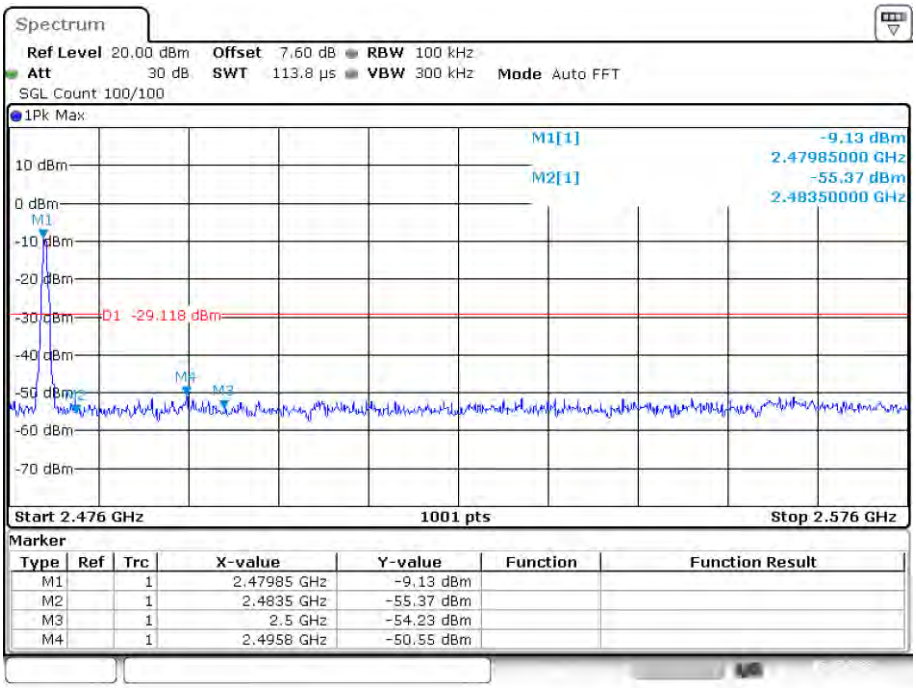
Date: 5.JUL.2023 15:19:00

Band Edge NVNT 1-DH1 2480MHz Ant1 No-Hopping Ref



Date: 5.JUL.2023 15:22:17

Band Edge NVNT 1-DH1 2480MHz Ant1 No-Hopping Emission

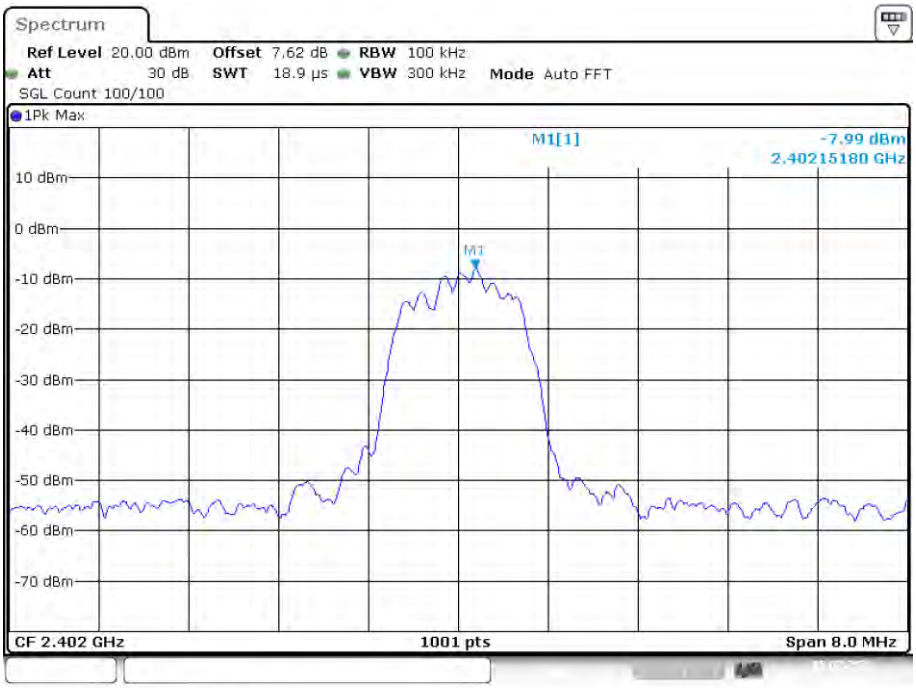


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47985 GHz	-9.13 dBm		
M2		1	2.4835 GHz	-55.37 dBm		
M3		1	2.5 GHz	-54.23 dBm		
M4		1	2.4958 GHz	-50.55 dBm		

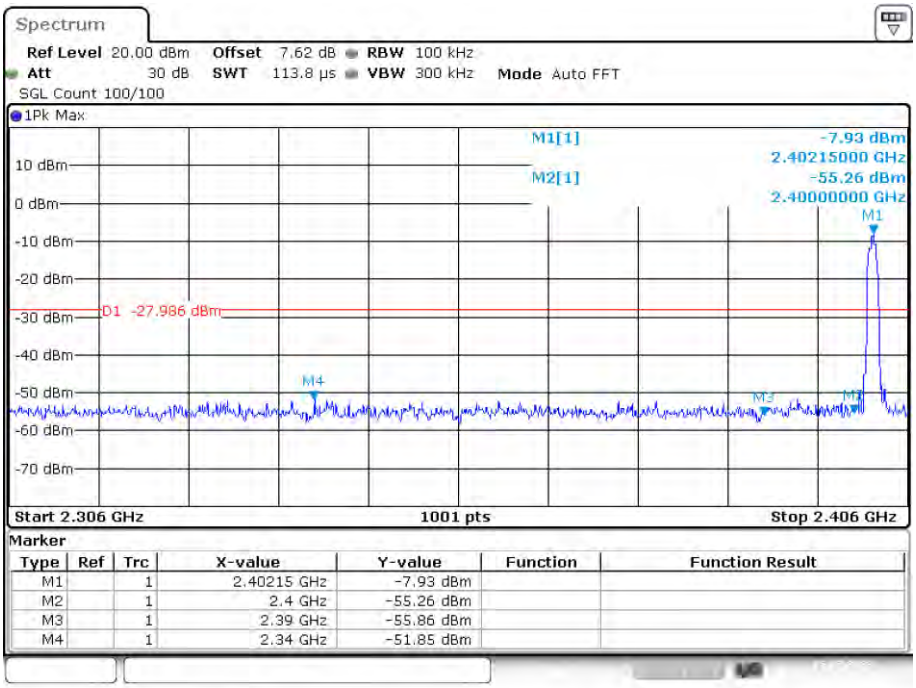
Date: 5.JUL.2023 15:22:23

Band Edge NVNT 2-DH1 2402MHz Ant1 No-Hopping Ref



Date: 5.JUL.2023 15:49:39

Band Edge NVNT 2-DH1 2402MHz Ant1 No-Hopping Emission

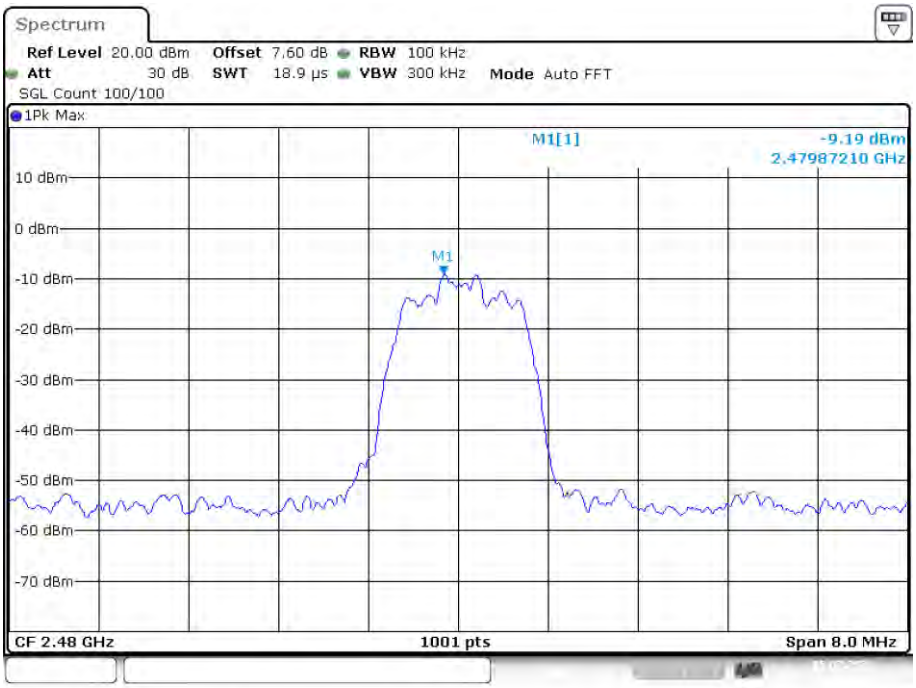


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40215 GHz	-7.93 dBm		
M2		1	2.4 GHz	-55.26 dBm		
M3		1	2.39 GHz	-55.86 dBm		
M4		1	2.34 GHz	-51.85 dBm		

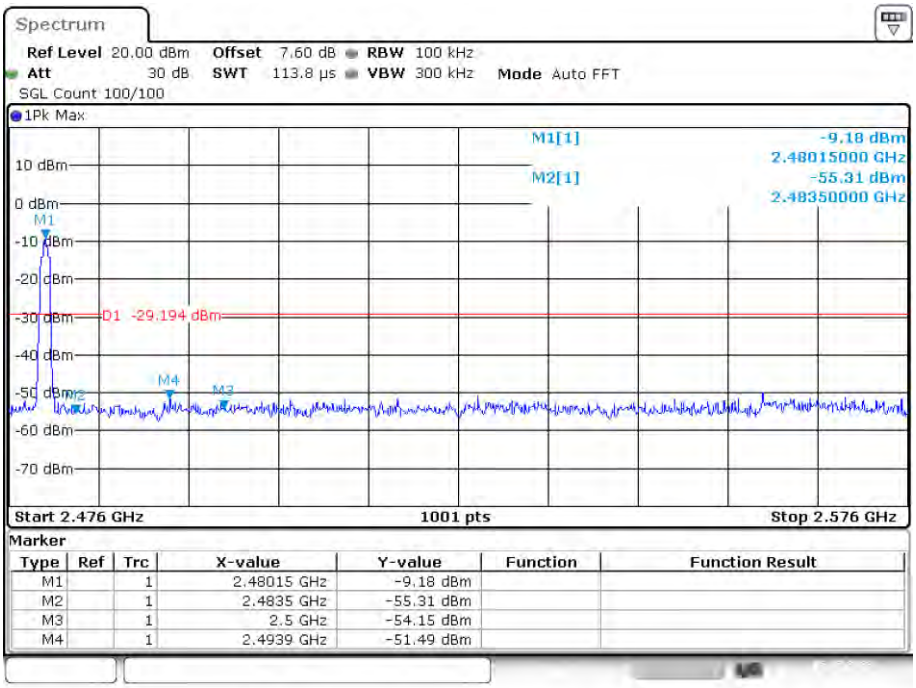
Date: 5.JUL.2023 15:49:45

Band Edge NVNT 2-DH1 2480MHz Ant1 No-Hopping Ref



Date: 5.JUL.2023 15:51:30

Band Edge NVNT 2-DH1 2480MHz Ant1 No-Hopping Emission

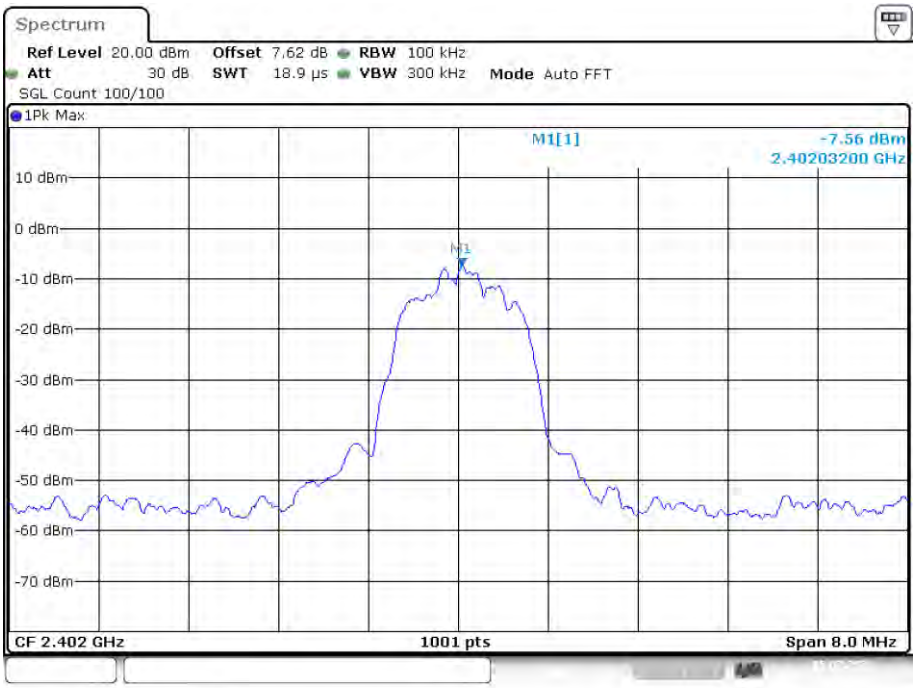


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.48015 GHz	-9.18 dBm		
M2		1	2.4835 GHz	-55.31 dBm		
M3		1	2.5 GHz	-54.15 dBm		
M4		1	2.4939 GHz	-51.49 dBm		

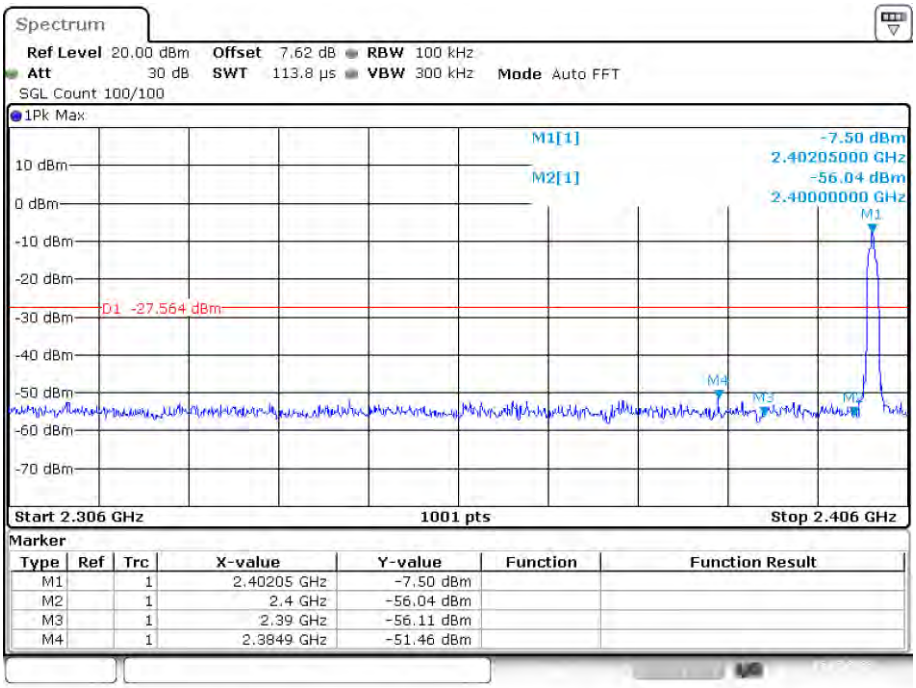
Date: 5.JUL.2023 15:51:36

Band Edge NVNT 3-DH1 2402MHz Ant1 No-Hopping Ref



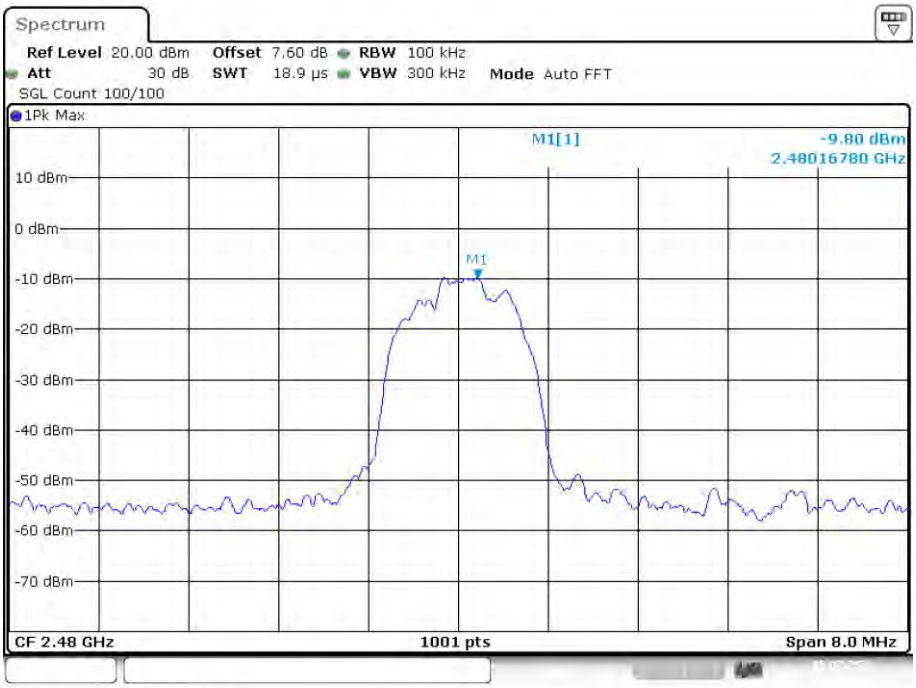
Date: 5.JUL.2023 15:59:41

Band Edge NVNT 3-DH1 2402MHz Ant1 No-Hopping Emission



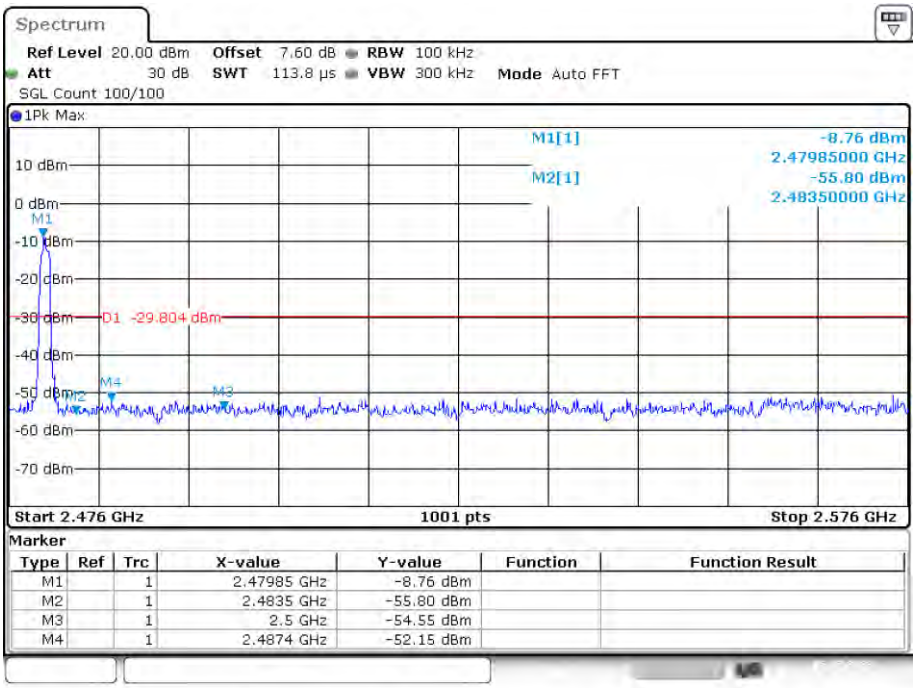
Date: 5.JUL.2023 15:59:46

Band Edge NVNT 3-DH1 2480MHz Ant1 No-Hopping Ref



Date: 5.JUL.2023 15:54:56

Band Edge NVNT 3-DH1 2480MHz Ant1 No-Hopping Emission

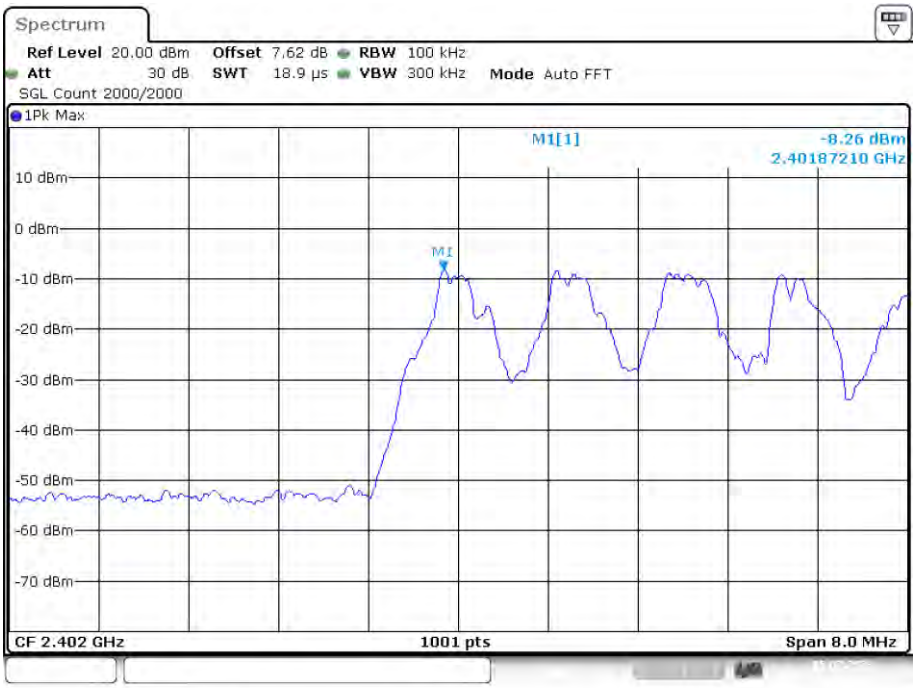


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47985 GHz	-8.76 dBm		
M2		1	2.4835 GHz	-55.80 dBm		
M3		1	2.5 GHz	-54.55 dBm		
M4		1	2.4874 GHz	-52.15 dBm		

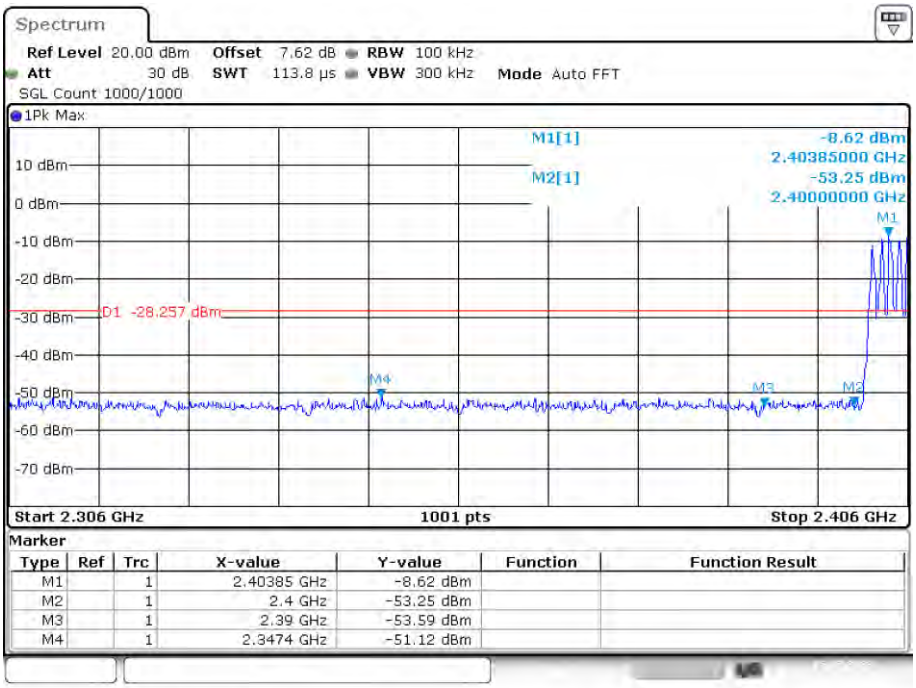
Date: 5.JUL.2023 15:55:02

Band Edge(Hopping) NVNT 1-DH1 2402MHz Ant1 Hopping Ref



Date: 5.JUL.2023 14:30:55

Band Edge(Hopping) NVNT 1-DH1 2402MHz Ant1 Hopping Emission

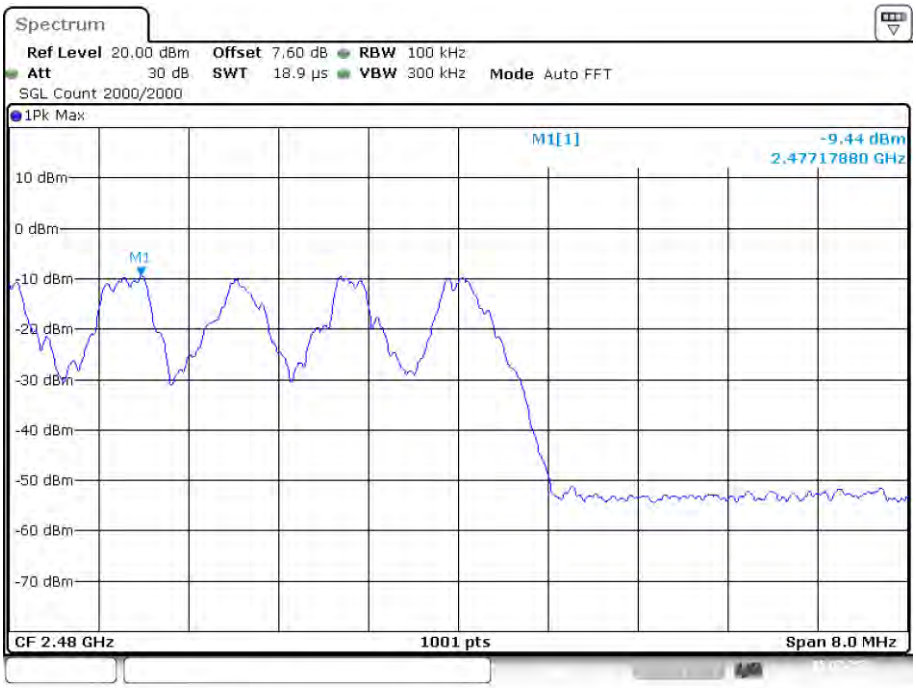


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40385 GHz	-8.62 dBm		
M2		1	2.4 GHz	-53.25 dBm		
M3		1	2.39 GHz	-53.59 dBm		
M4		1	2.3474 GHz	-51.12 dBm		

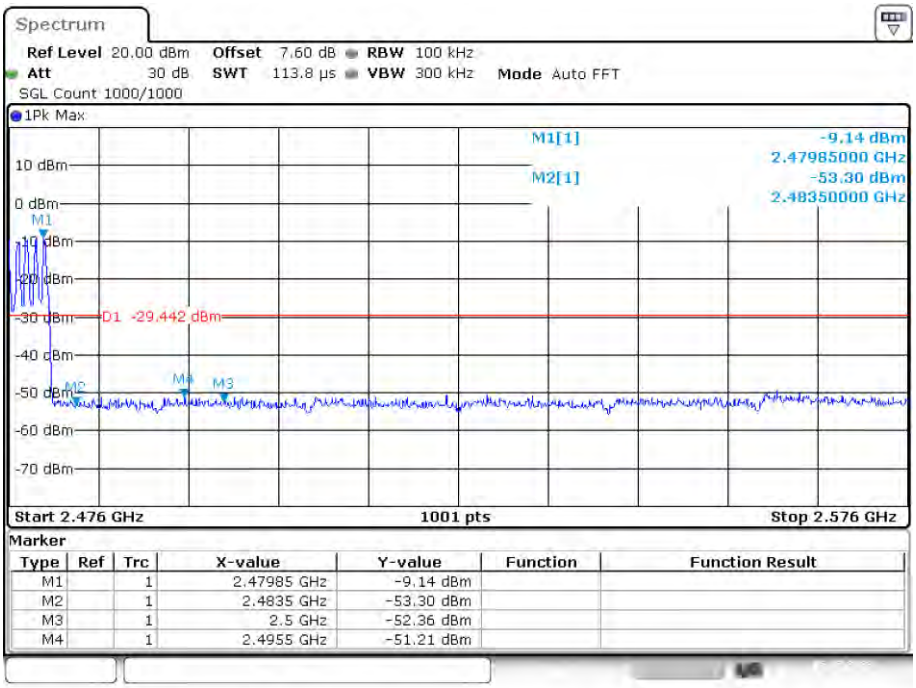
Date: 5.JUL.2023 14:31:24

Band Edge(Hopping) NVNT 1-DH1 2480MHz Ant1 Hopping Ref



Date: 5.JUL.2023 14:43:31

Band Edge(Hopping) NVNT 1-DH1 2480MHz Ant1 Hopping Emission

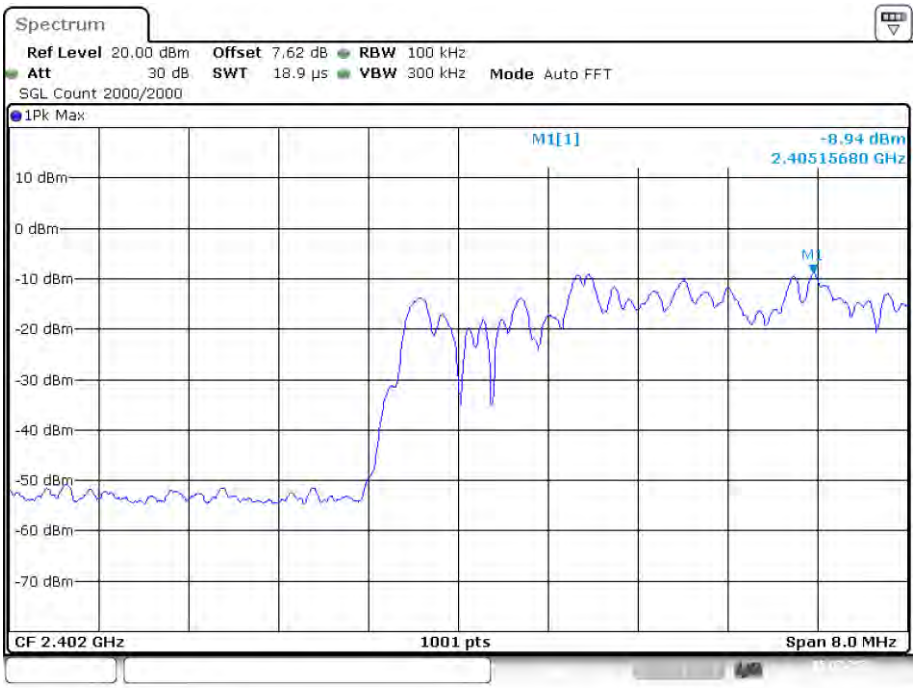


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47985 GHz	-9.14 dBm		
M2		1	2.4835 GHz	-53.30 dBm		
M3		1	2.5 GHz	-52.36 dBm		
M4		1	2.4955 GHz	-51.21 dBm		

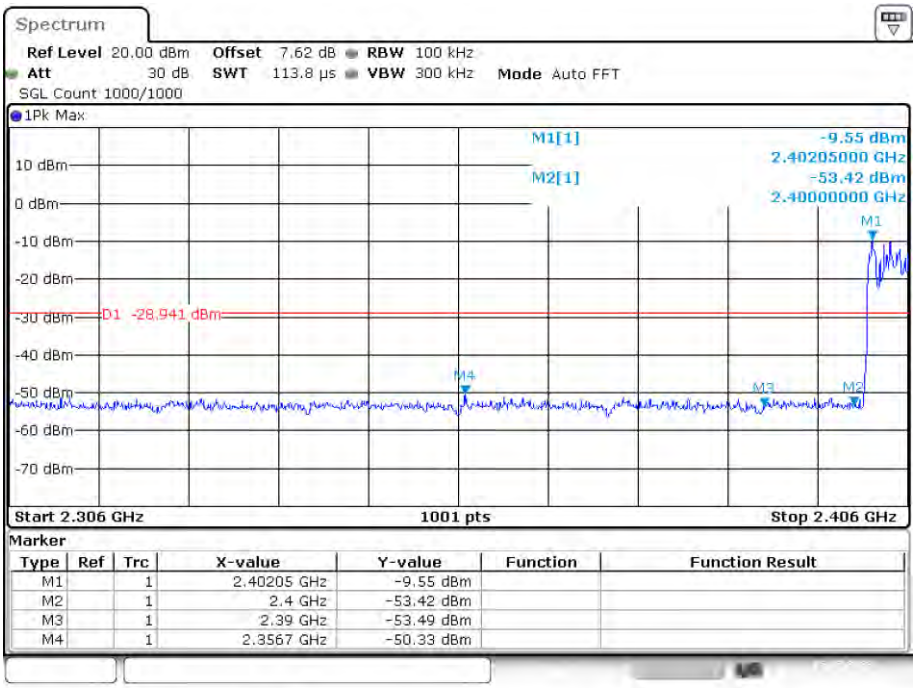
Date: 5.JUL.2023 14:44:00

Band Edge(Hopping) NVNT 2-DH1 2402MHz Ant1 Hopping Ref



Date: 5.JUL.2023 14:47:07

Band Edge(Hopping) NVNT 2-DH1 2402MHz Ant1 Hopping Emission



Marker

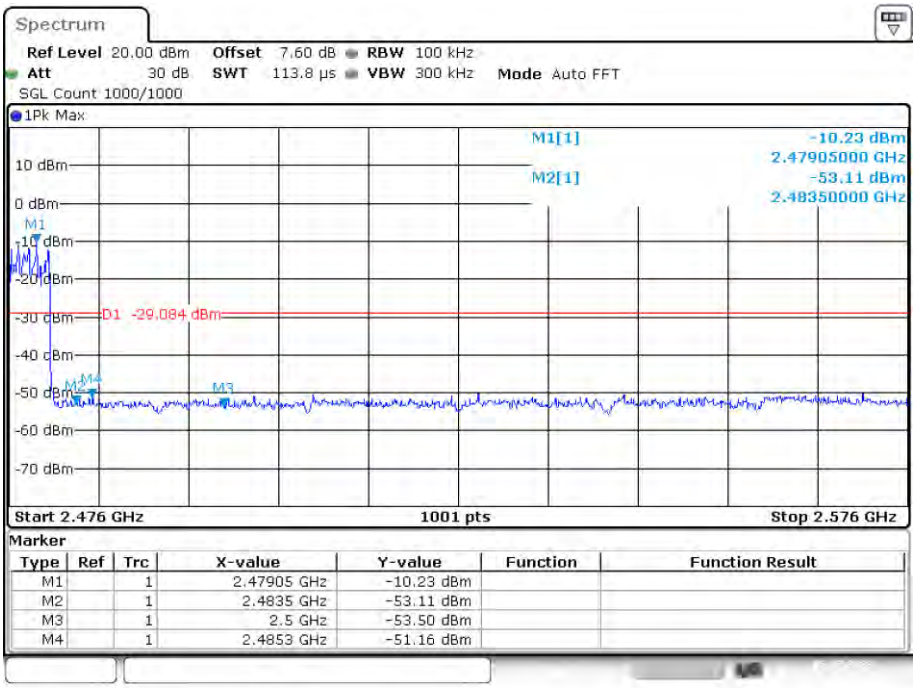
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40205 GHz	-9.55 dBm		
M2		1	2.4 GHz	-53.42 dBm		
M3		1	2.39 GHz	-53.49 dBm		
M4		1	2.3567 GHz	-50.33 dBm		

Date: 5.JUL.2023 14:47:36

Band Edge(Hopping) NVNT 2-DH1 2480MHz Ant1 Hopping Ref

Date: 5.JUL.2023 14:54:58

Band Edge(Hopping) NVNT 2-DH1 2480MHz Ant1 Hopping Emission

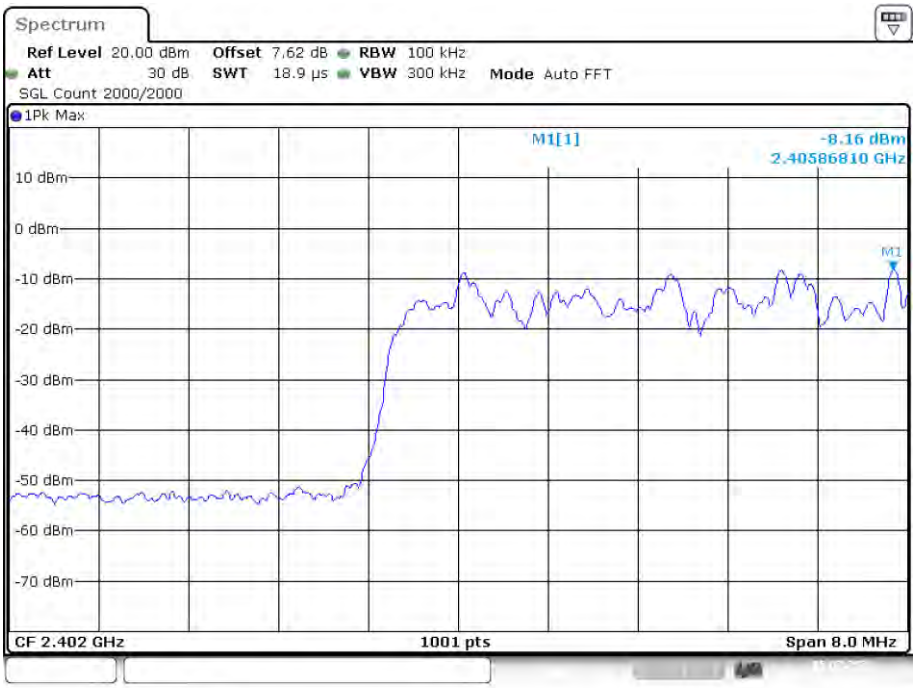


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47905 GHz	-10.23 dBm		
M2		1	2.4835 GHz	-53.11 dBm		
M3		1	2.5 GHz	-53.50 dBm		
M4		1	2.4853 GHz	-51.16 dBm		

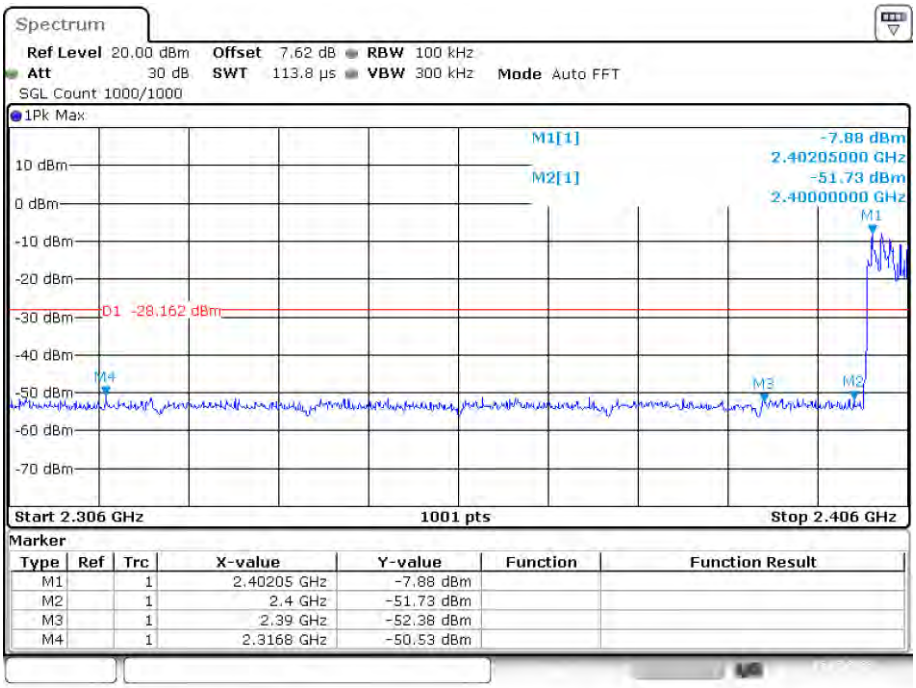
Date: 5.JUL.2023 14:55:27

Band Edge(Hopping) NVNT 3-DH1 2402MHz Ant1 Hopping Ref



Date: 5.JUL.2023 14:59:20

Band Edge(Hopping) NVNT 3-DH1 2402MHz Ant1 Hopping Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40205 GHz	-7.88 dBm		
M2		1	2.4 GHz	-51.73 dBm		
M3		1	2.39 GHz	-52.38 dBm		
M4		1	2.3168 GHz	-50.53 dBm		

Date: 5.JUL.2023 14:59:49