FCC TEST REPORT

FCC ID: 2A34K-MINU

On Behalf of

Shanghai eSurvey GNSS Co., Ltd.

Smart Antenna for GIS Application

Model No.: MINU

Prepared for	:	Shanghai eSurvey GNSS Co., Ltd.
Address	:	Lianhang Rd, Pujiang Town, Minhang District, Shanghai, 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	:	A2307161-C01-R02
Date of Receipt	:	July 26, 2023
Date of Test	:	July 26, 2023- September 22, 2023
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TEST REPORT DECLARATION

Applicant	:	Shanghai eSurvey GNSS Co., Ltd.
Address	:	Lianhang Rd, Pujiang Town, Minhang District, Shanghai, China
Manufacturer	:	Shanghai eSurvey GNSS Co., Ltd.
Address	:	Lianhang Rd, Pujiang Town, Minhang District, Shanghai, China
EUT Description	:	Smart Antenna for GIS Application
		(A) Model No. : MINU
		(B) Trademark : N/A

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).....…..:	Yannis Wen Project Engineer	Yannis Wen
Approved by (name + signature)…....:	Reak Yang Project Manager	
Date of issue……...:	September 22, 2023	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	September 22, 2023	Initial released Issue	Yannis Wen

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	:	Smart Antenna for GIS Application
Model Number	:	MINU
Diff	:	N/A
Power supply	:	DC 3.7V from battery, DC 5V from adapter
Radio Technology	:	Bluetooth EDR
Operation frequency	:	2402-2480MHz
Channel No.	:	79 Channels
Channel spacing	:	1MHz
Modulation type	:	GFSK, π/4 DQPSK, 8-DPSK
Antenna Type	:	Internal antenna, max gain 2dBi (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

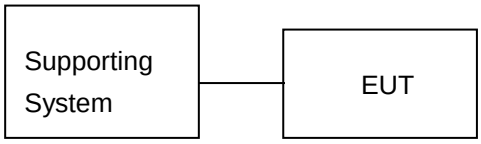
2.2. Accessories of Device (EUT)

Accessories	:	POWER ADAPTER
Manufacturer	:	Shengdi Electronic Technology Co., Ltd
Model	:	CT-11
Ratings	:	INPUT: 100-240V~50/60Hz 0.3A OUTPUT: 5V==2000mA

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDoC
1.	Notebook PC	Lenovo	ThinkPad E490	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
8-DPSK	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: CN0085

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	2023.08.16	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2023.08.16	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-102082-Wa	2023.08.16	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2023.08.16	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2023.08.28	1Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2023.08.19	1Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00128	2023.08.19	1Year
RF Cable	Resenberger	Cable 1	/	RE1	2023.08.16	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2023.08.16	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2023.08.16	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2023.08.16	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2023.08.16	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2023.08.16	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2023.08.16	1Year
Horn Antenna	SCHWARZBECK	BBHA 9170	/	00946	2023.08.19	1Year
Preamplifier	SKET	LNPA_1840-50	/	SK2018101801	2023.08.16	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2023.08.16	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2023.08.16	1 Year
Temp. & Humid. Chamber	Teelong	TL-HW408S	/	TL-20191205-01	2023.07.25	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2023.08.16	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	EZ	Alpha-3A1
CE	EZ-EMC	EZ	Alpha-3A1
RF-CE	MTS 8310	MW	V2.0.0.0

3. MAXIMUM PEAK OUTPUT POWER

3.1. Limit

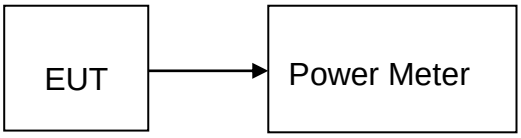
Please refer section 15.247.

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)	Duty Factor (dB)	E.I.R.P. (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	Ant1	-4.566	0	-2.566	21	Pass
NVNT	1-DH1	2441	Ant1	-3.987	0	-1.987	21	Pass
NVNT	1-DH1	2480	Ant1	-3.95	0	-1.95	21	Pass
NVNT	1-DH3	2441	Ant1	-4.592	0	-2.592	21	Pass
NVNT	1-DH5	2441	Ant1	-4.896	0	-2.896	21	Pass
NVNT	2-DH1	2402	Ant1	-4.967	0	-2.967	21	Pass
NVNT	2-DH1	2441	Ant1	-4.31	0	-2.31	21	Pass
NVNT	2-DH1	2480	Ant1	-4.154	0	-2.154	21	Pass
NVNT	2-DH3	2441	Ant1	-3.539	0	-1.539	21	Pass
NVNT	2-DH5	2441	Ant1	-3.809	0	-1.809	21	Pass
NVNT	3-DH1	2402	Ant1	-3.786	0	-1.786	21	Pass
NVNT	3-DH1	2441	Ant1	-3.781	0	-1.781	21	Pass
NVNT	3-DH1	2480	Ant1	-3.778	0	-1.778	21	Pass
NVNT	3-DH3	2441	Ant1	-3.692	0	-1.692	21	Pass
NVNT	3-DH5	2441	Ant1	-3.34	0	-1.34	21	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

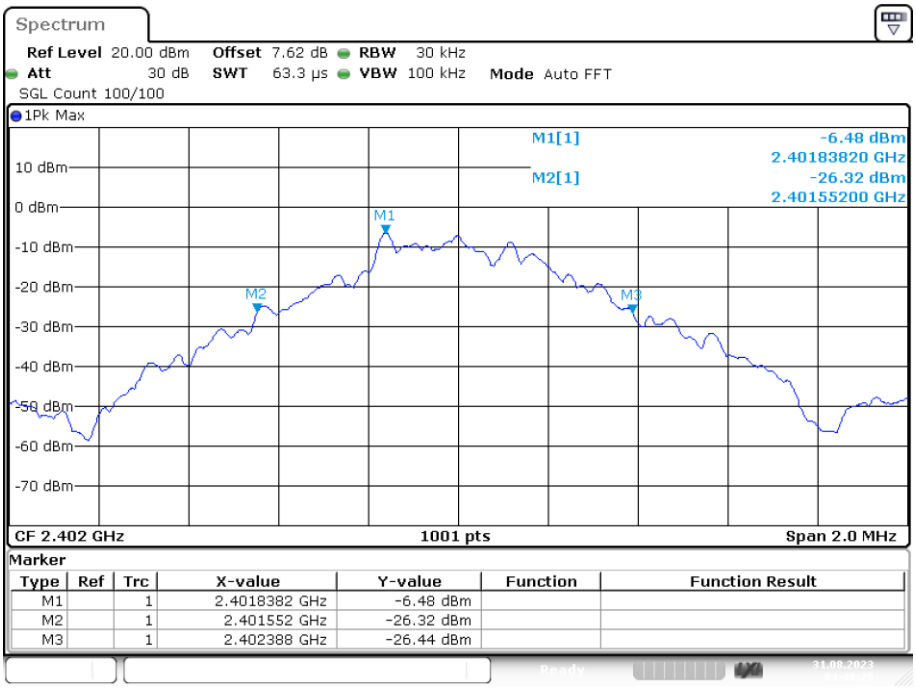
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

-20dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)
NVNT	1-DH1	2402	Ant1	0.836
NVNT	1-DH1	2441	Ant1	0.86
NVNT	1-DH1	2480	Ant1	0.852
NVNT	2-DH1	2402	Ant1	1.254
NVNT	2-DH1	2441	Ant1	1.216
NVNT	2-DH1	2480	Ant1	1.226
NVNT	3-DH1	2402	Ant1	1.25
NVNT	3-DH1	2441	Ant1	1.21
NVNT	3-DH1	2480	Ant1	1.204

-20dB Bandwidth NVNT 1-DH1 2402MHz Ant1



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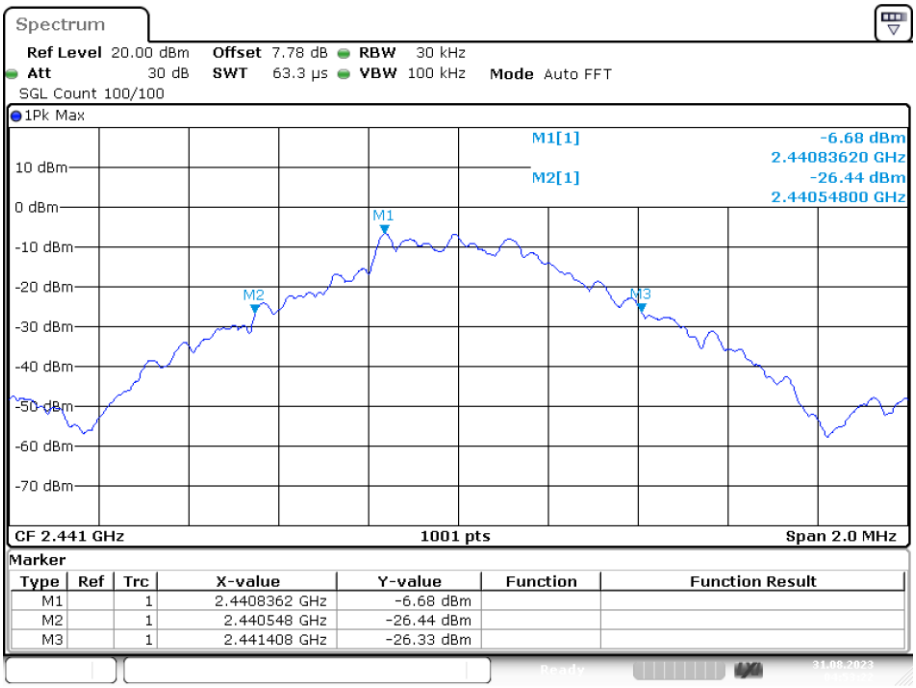
-20dB Bandwidth NVNT 1-DH1 2441MHz Ant1



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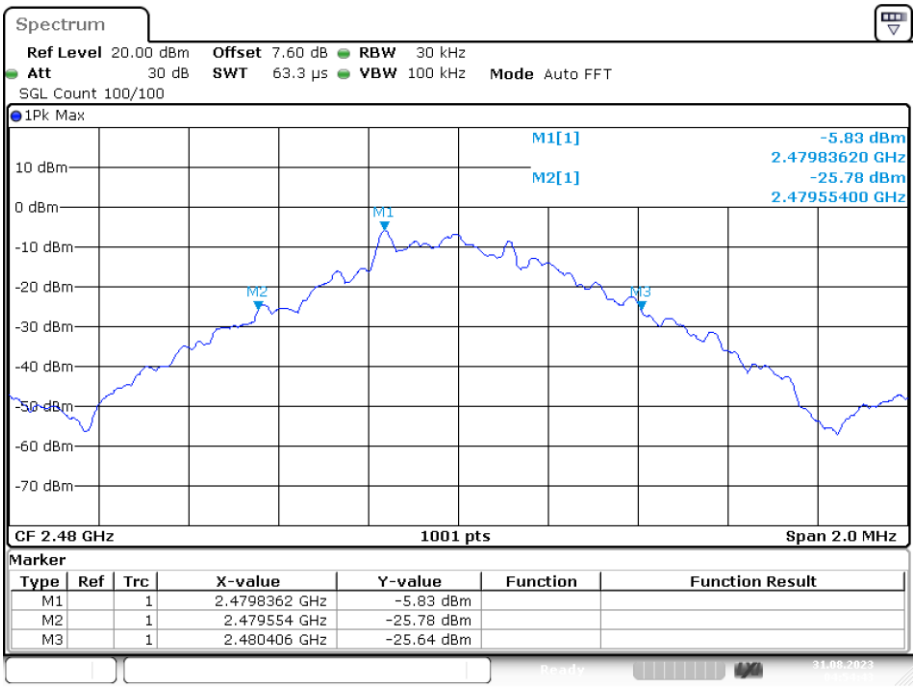
-20dB Bandwidth NVNT 1-DH1 2480MHz Ant1



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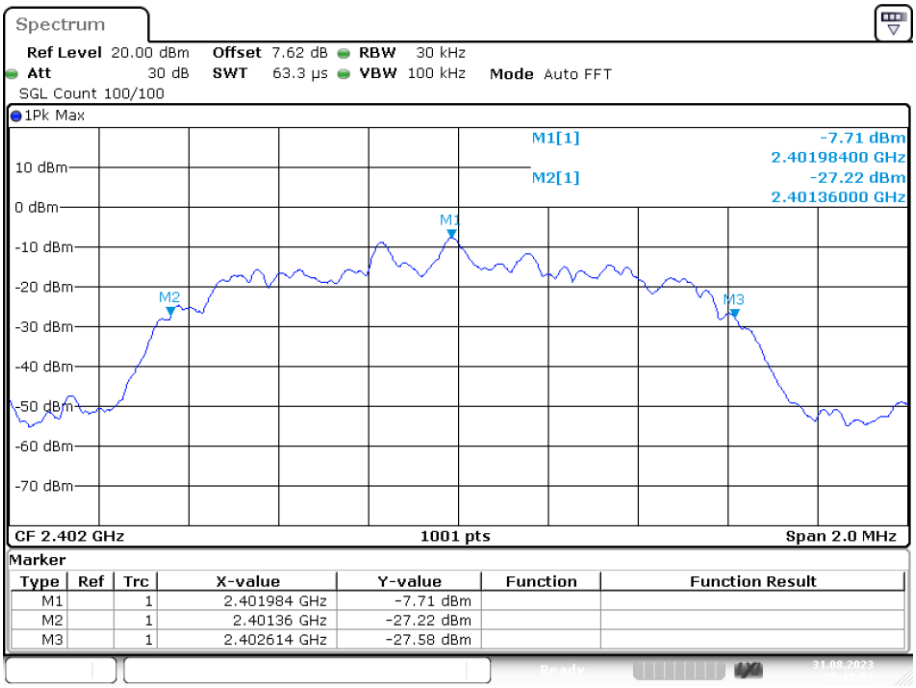
-20dB Bandwidth NVNT 2-DH1 2402MHz Ant1



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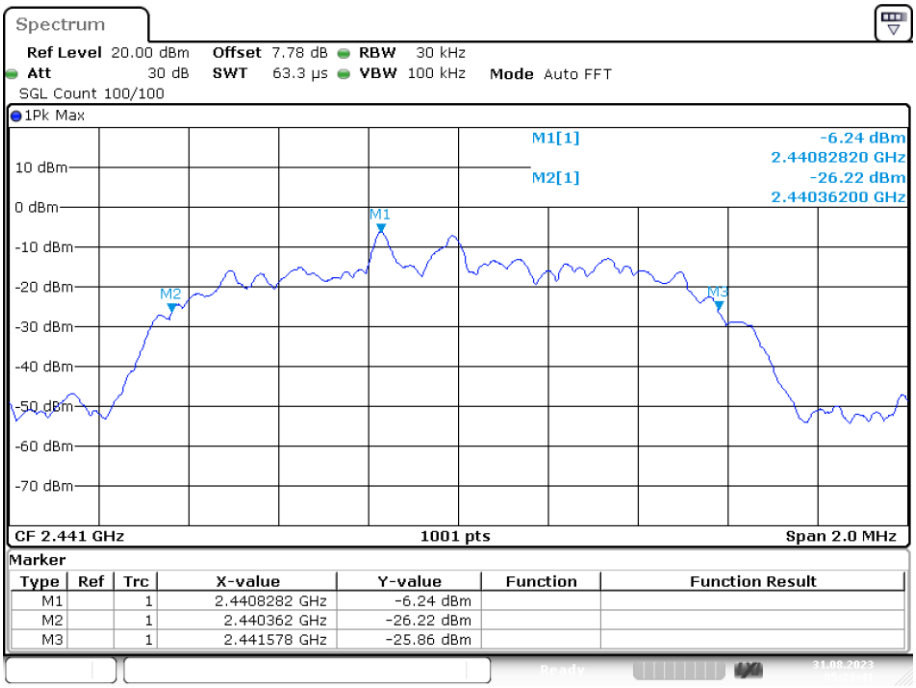

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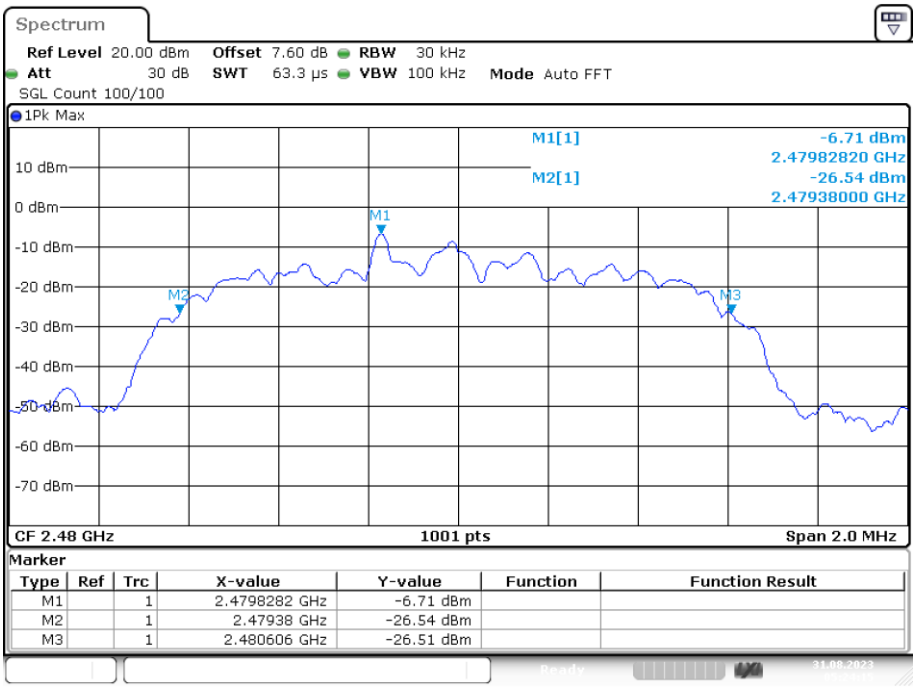

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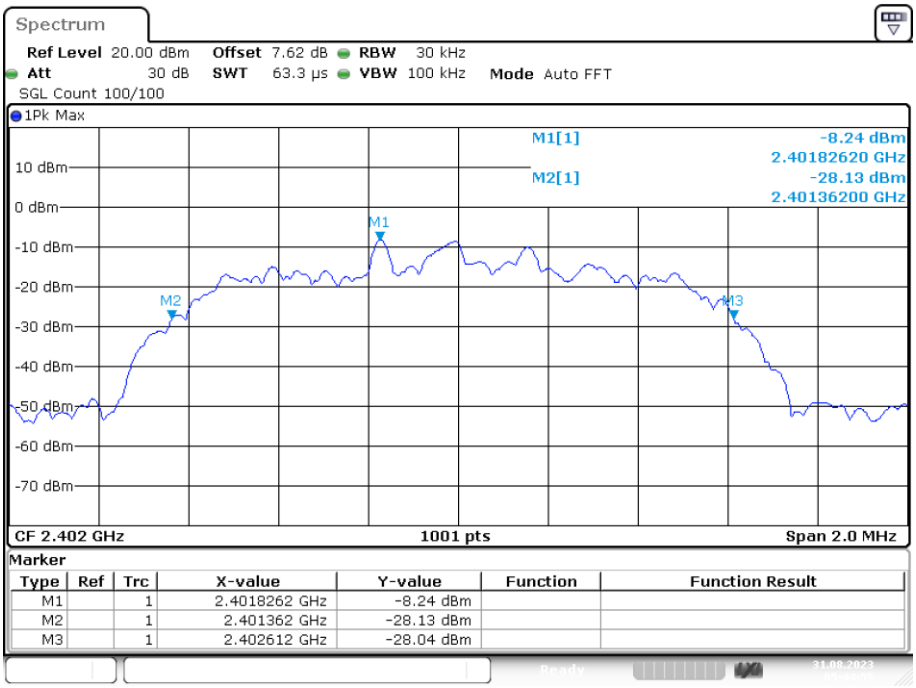
-20dB Bandwidth NVNT 3-DH1 2402MHz Ant1



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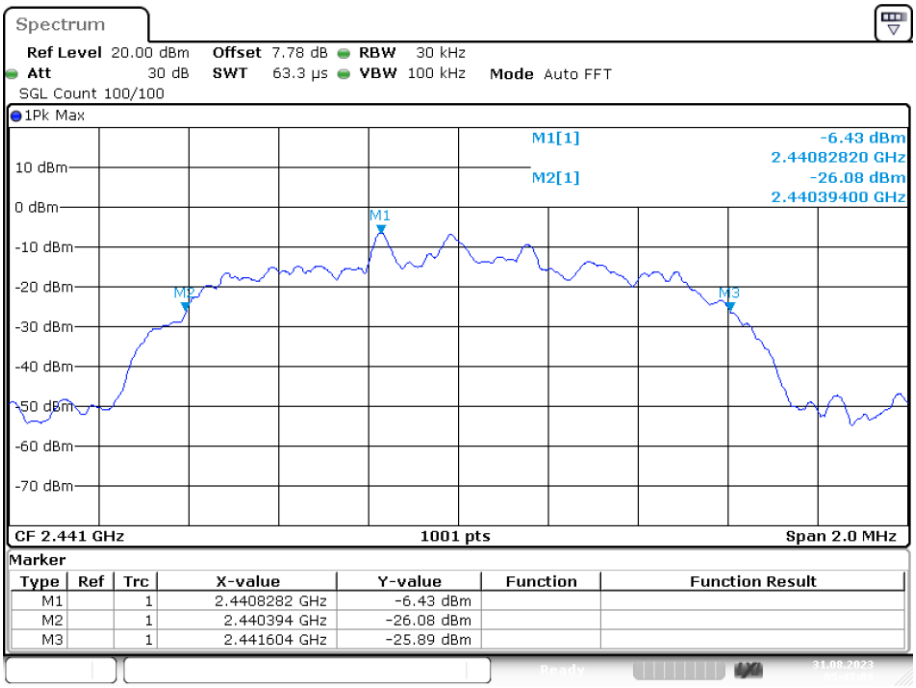
-20dB Bandwidth NVNT 3-DH1 2441MHz Ant1



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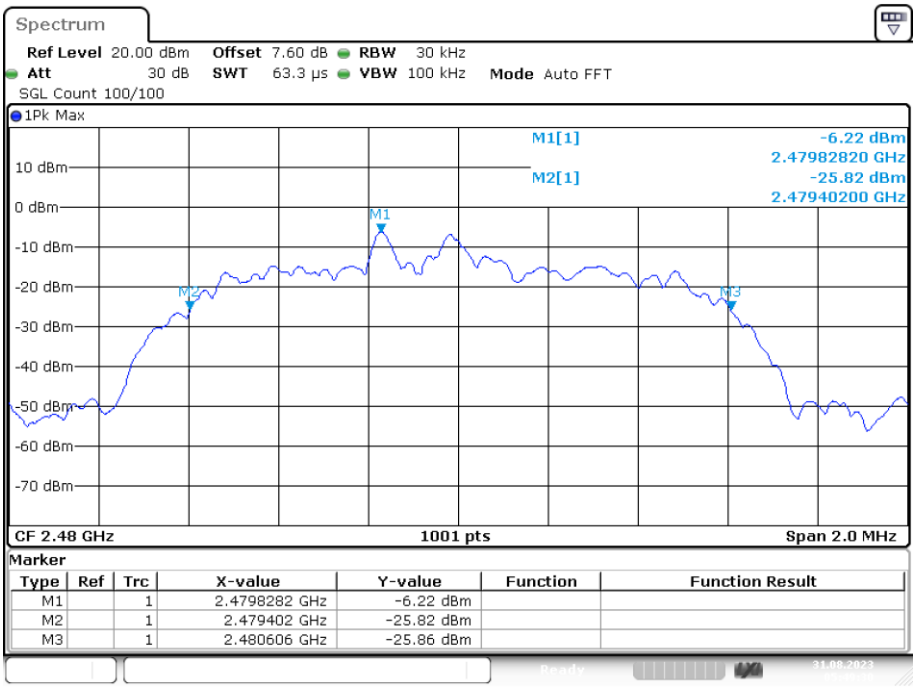
-20dB Bandwidth NVNT 3-DH1 2480MHz Ant1



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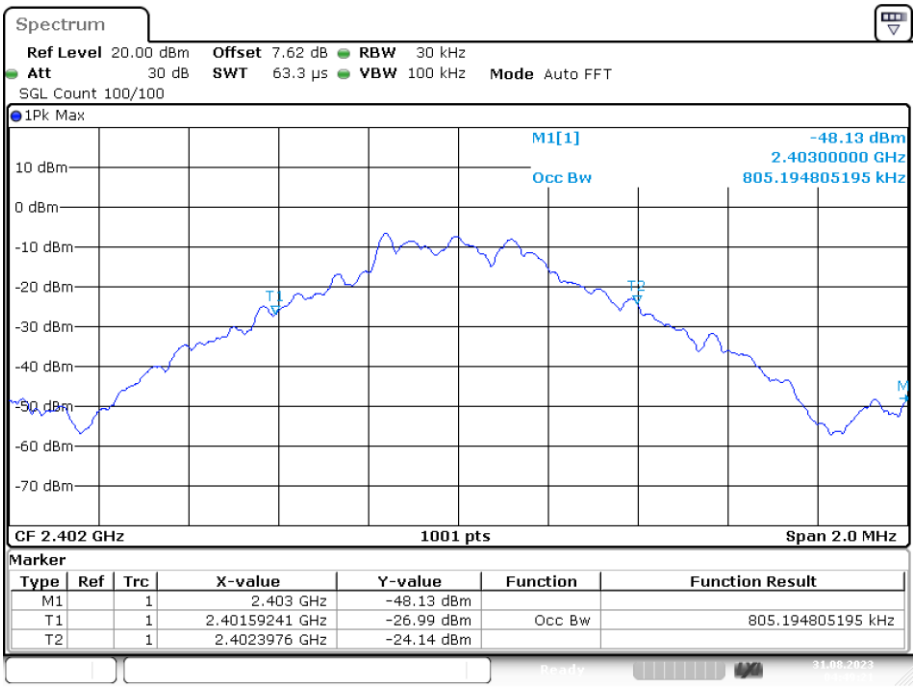
Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	1-DH1	2402	Ant1	0.805
NVNT	1-DH1	2441	Ant1	0.811
NVNT	1-DH1	2480	Ant1	0.819
NVNT	2-DH1	2402	Ant1	1.149
NVNT	2-DH1	2441	Ant1	1.157
NVNT	2-DH1	2480	Ant1	1.155
NVNT	3-DH1	2402	Ant1	1.147
NVNT	3-DH1	2441	Ant1	1.155
NVNT	3-DH1	2480	Ant1	1.163

OBW NVNT 1-DH1 2402MHz Ant1



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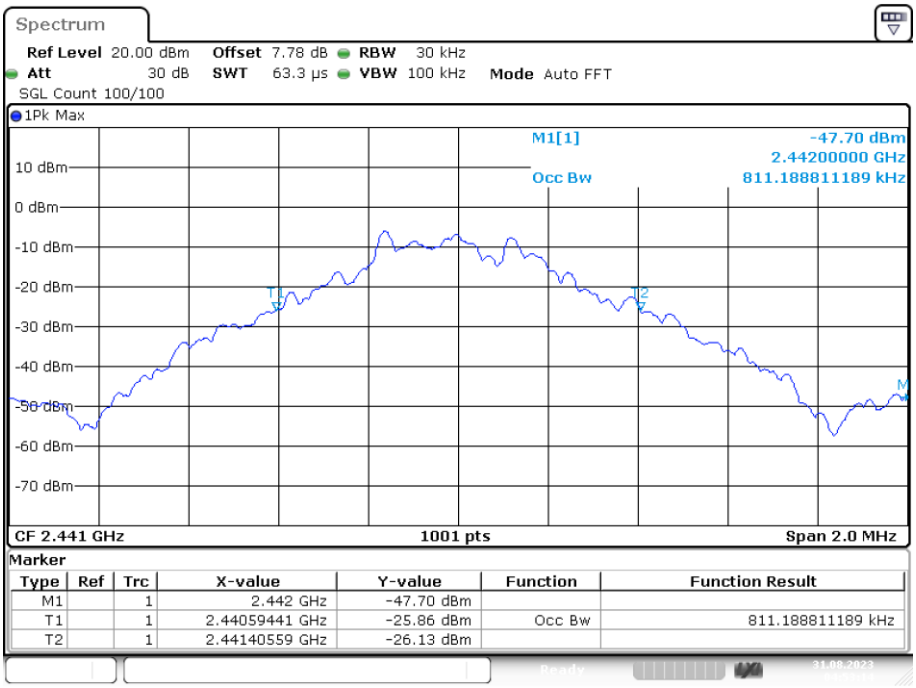
OBW NVNT 1-DH1 2441MHz Ant1



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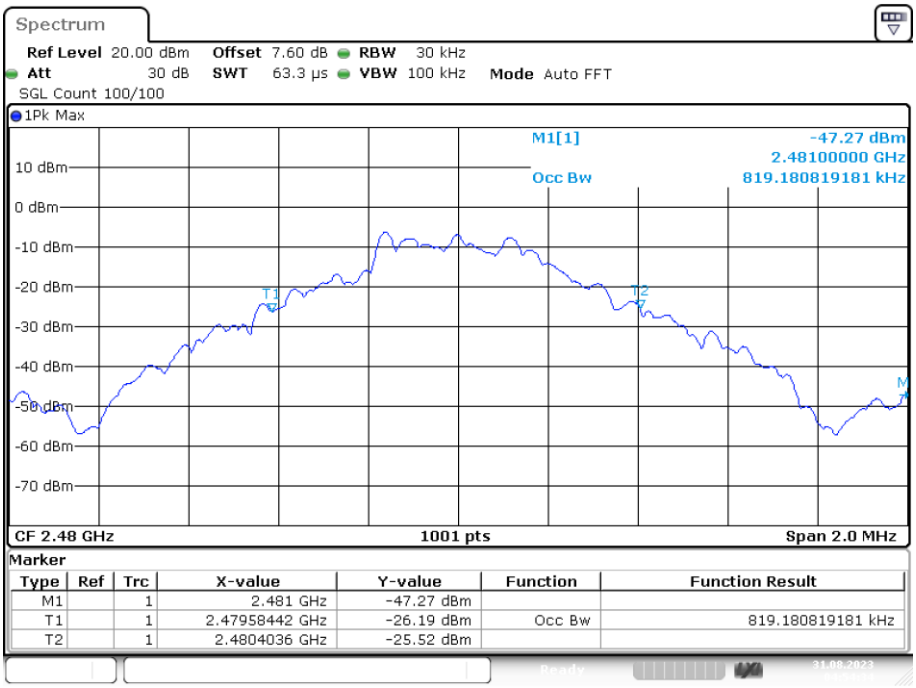

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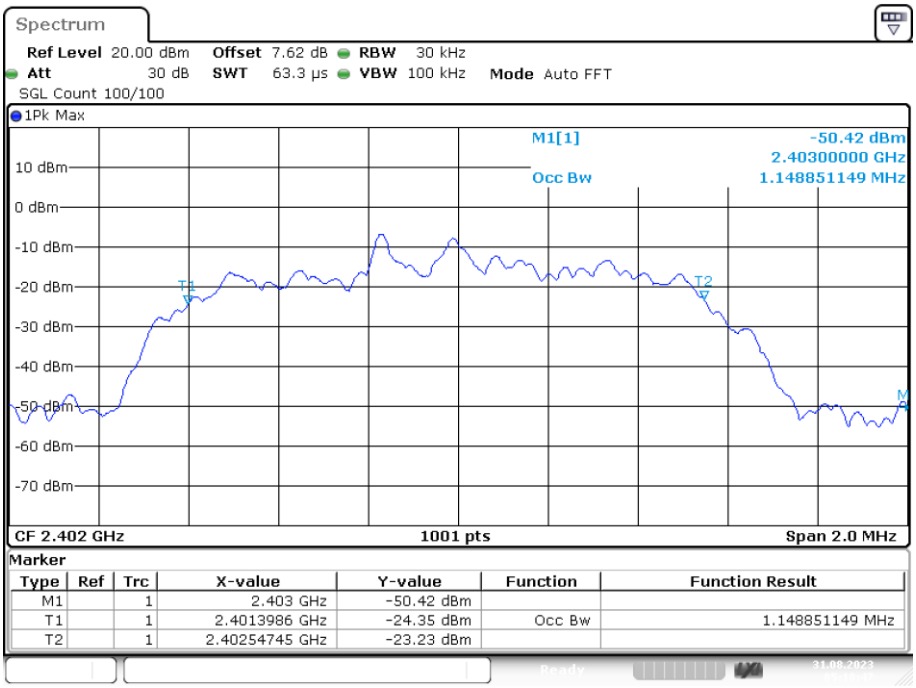
OBW NVNT 2-DH1 2402MHz Ant1



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.403 GHz	-50.42 dBm		
T1		1	2.4013986 GHz	-24.35 dBm	Occ Bw	1.148851149 MHz
T2		1	2.40254745 GHz	-23.23 dBm		

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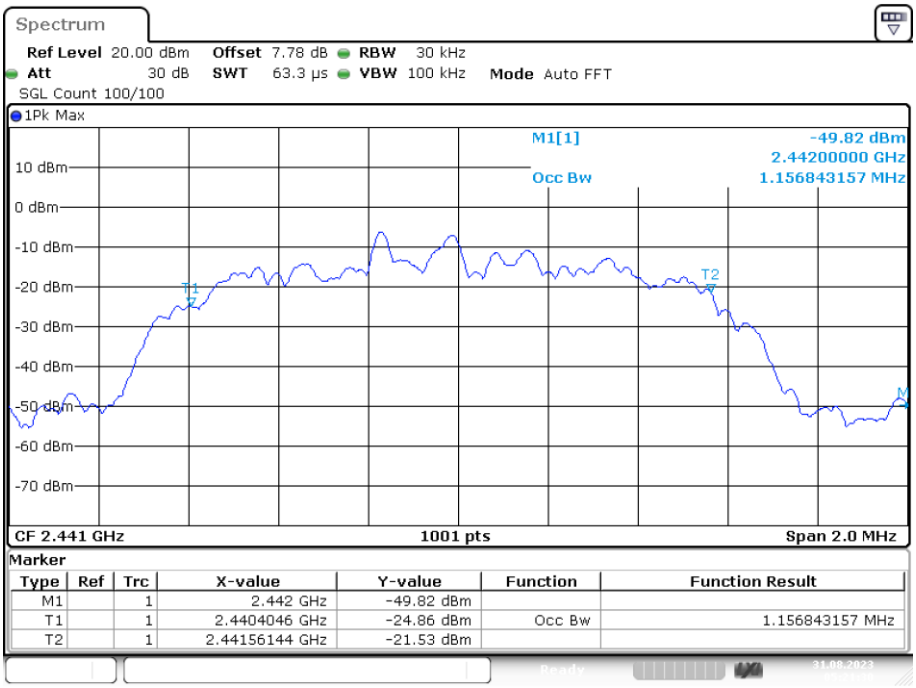
OBW NVNT 2-DH1 2441MHz Ant1



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.442 GHz	-49.82 dBm		
T1		1	2.4404046 GHz	-24.86 dBm	Occ Bw	1.156843157 MHz
T2		1	2.44156144 GHz	-21.53 dBm		

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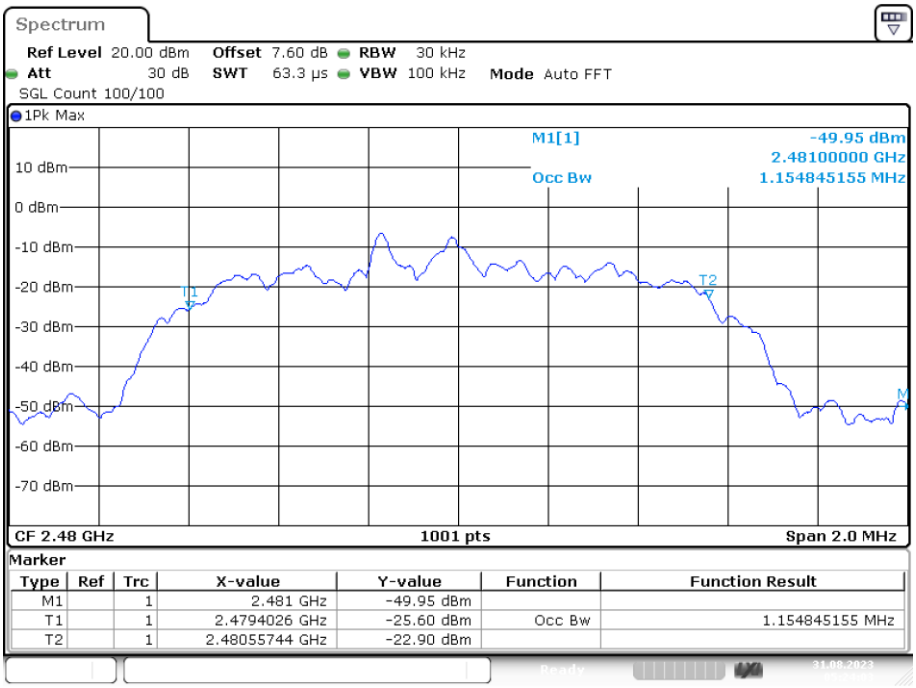
OBW NVNT 2-DH1 2480MHz Ant1



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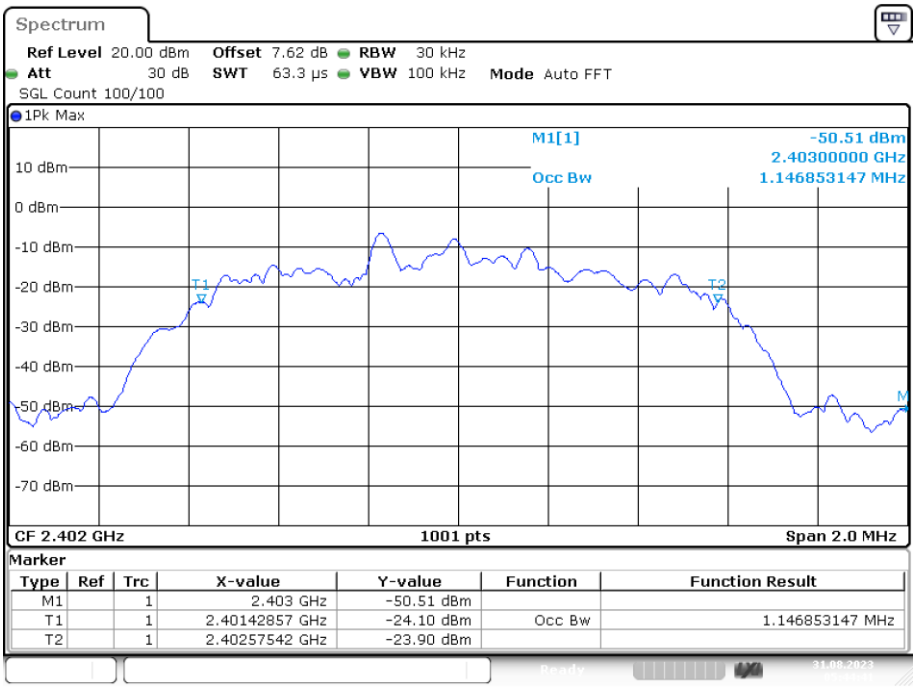
OBW NVNT 3-DH1 2402MHz Ant1



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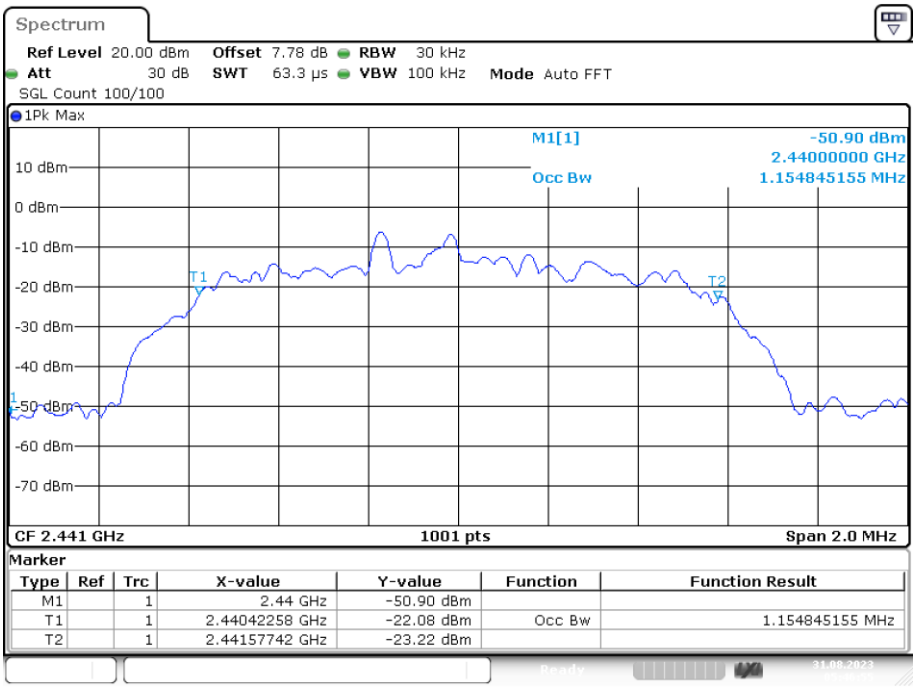
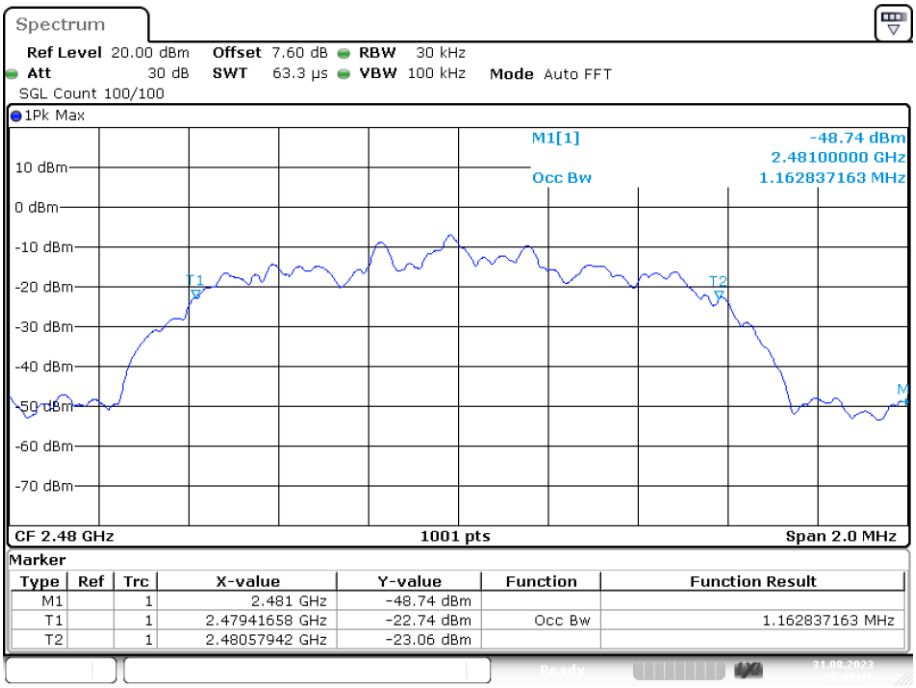
OBW NVNT 3-DH1 2441MHz Ant1



Date: 31.AUG.2023 05:46:55

OBW NVNT 3-DH1 2480MHz Ant1



Date: 31.AUG.2023 05:49:16

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

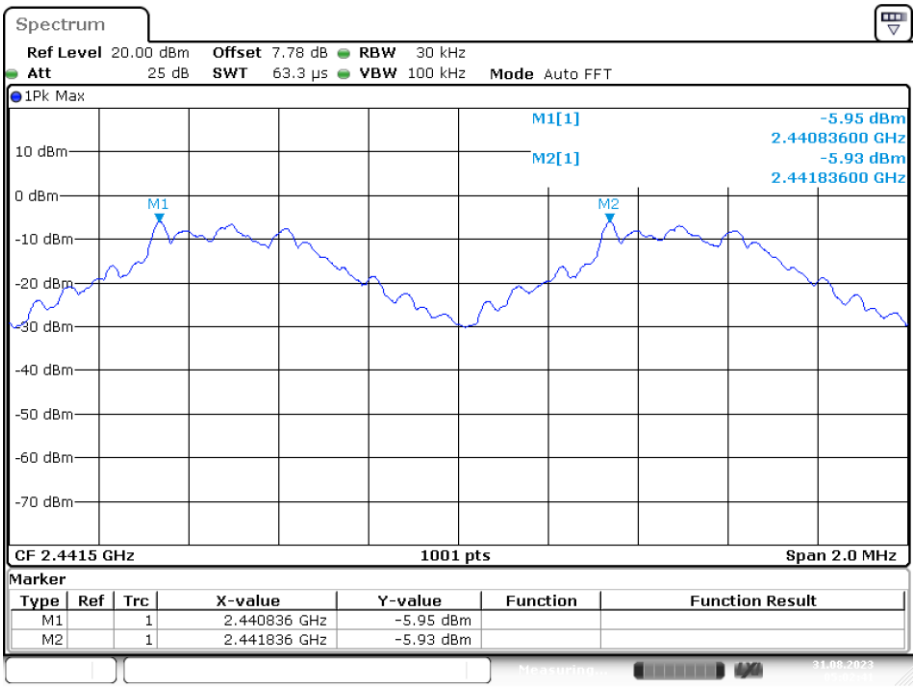
5.2. Test Procedure

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

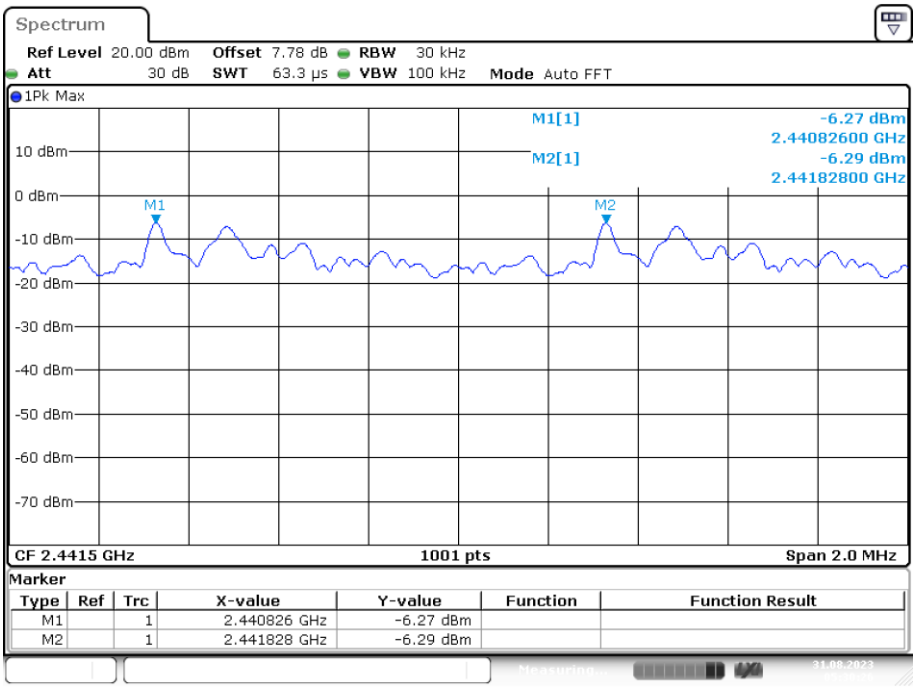
Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	Ant1	2440.836	2441.836	1	0.86	Pass
NVNT	2-DH1	Ant1	2440.826	2441.828	1.002	0.811	Pass
NVNT	3-DH1	Ant1	2440.828	2441.828	1	0.807	Pass

CFS NVNT 1-DH1 2441MHz Ant1



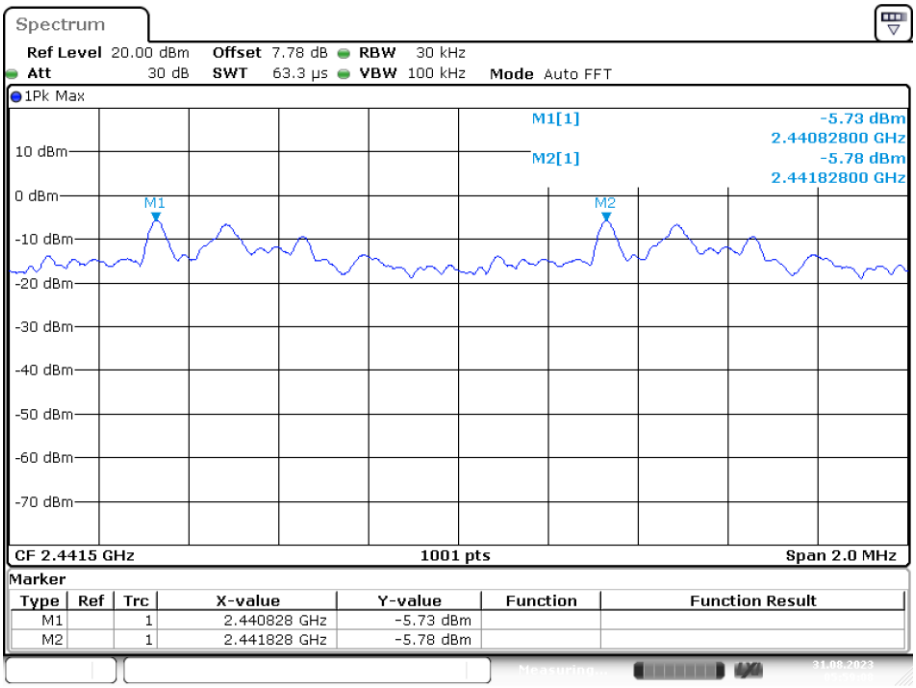
Date: 31.AUG.2023 05:02:41

CFS NVNT 2-DH1 2441MHz Ant1



Date: 31.AUG.2023 05:30:26

CFS NVNT 3-DH1 2441MHz Ant1



Date: 31.AUG.2023 05:59:08

6. NUMBER OF HOPPING CHANNEL

6.1. Limit

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

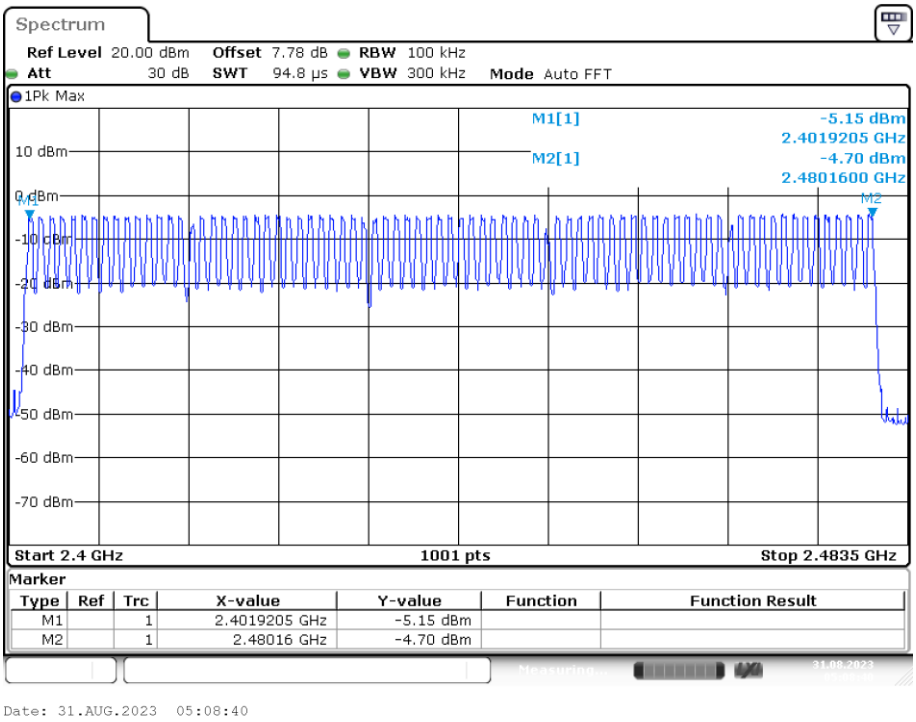
6.2. Test Procedure

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

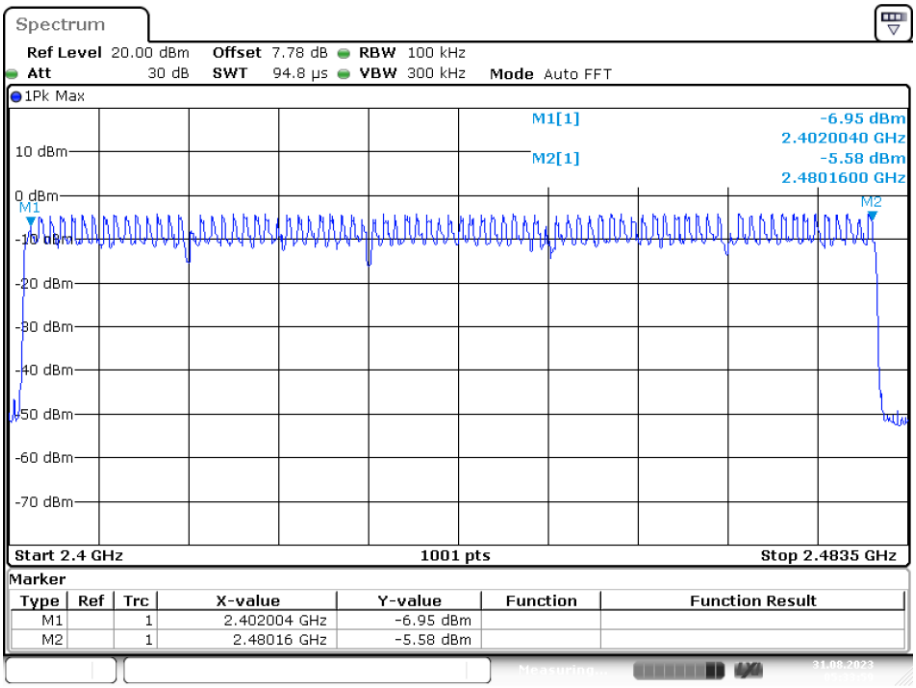
Condition	Mode	Antenna	Hopping Number	Limit	Verdict
NVNT	1-DH1	Ant1	79	15	Pass
NVNT	2-DH1	Ant1	79	15	Pass
NVNT	3-DH1	Ant1	79	15	Pass

Hopping No. NVNT 1-DH1 2441MHz Ant1



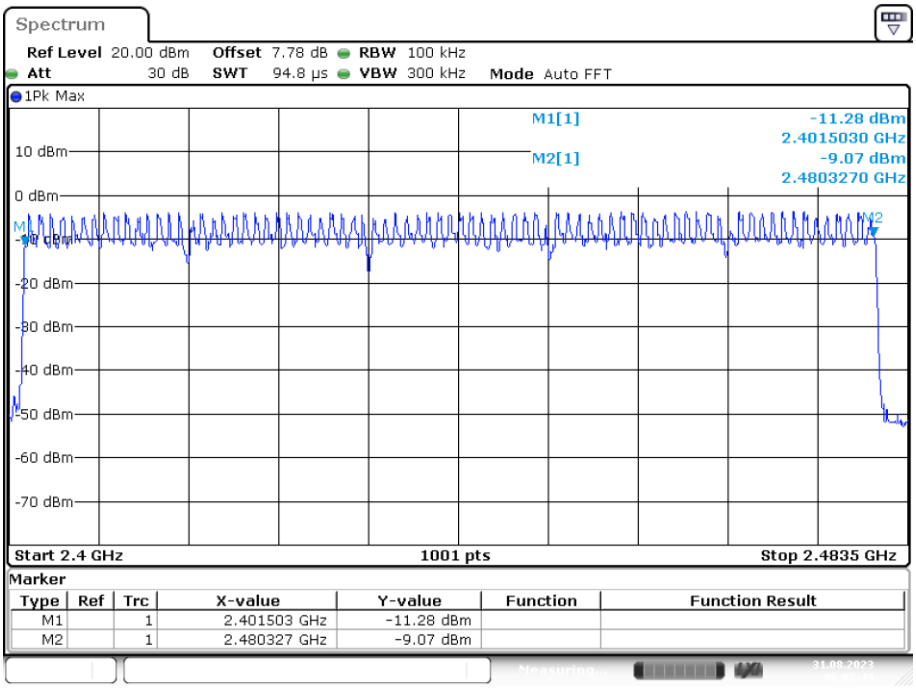
Date: 31.AUG.2023 05:08:40

Hopping No. NVNT 2-DH1 2441MHz Ant1



Date: 31.AUG.2023 05:33:59

Hopping No. NVNT 3-DH1 2441MHz Ant1



Date: 31.AUG.2023 06:02:44

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

7.2.1. Place the EUT on the table and set it in transmitting mode.

7.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

7.2.3. Set center frequency of spectrum analyzer = operating frequency.

7.2.4. Set the spectrum analyzer as RBW=1MHz, VBW=1MHz, Span = 0Hz, Sweep = auto.

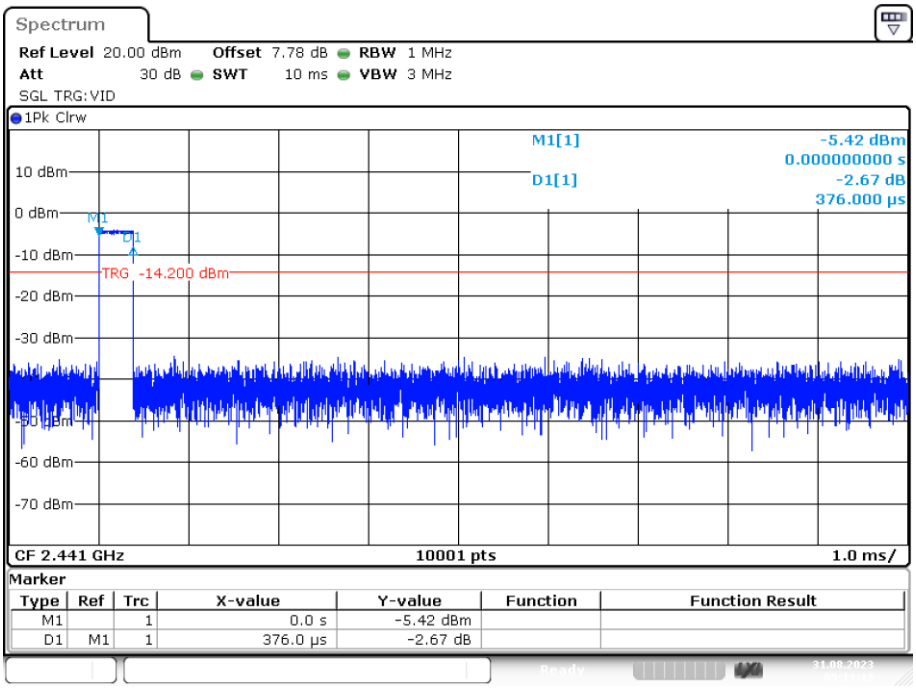
7.2.5. Repeat above procedures until all frequency measured were complete.

7.3. Test Result

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	0.376	118.816	316	31600	400	Pass
NVNT	1-DH3	2441	Ant1	1.632	249.696	153	31600	400	Pass
NVNT	1-DH5	2441	Ant1	2.88	331.2	115	31600	400	Pass
NVNT	2-DH1	2441	Ant1	0.386	121.976	316	31600	400	Pass
NVNT	2-DH3	2441	Ant1	1.629	254.124	156	31600	400	Pass
NVNT	2-DH5	2441	Ant1	2.885	297.155	103	31600	400	Pass
NVNT	3-DH1	2441	Ant1	0.387	123.066	318	31600	400	Pass
NVNT	3-DH3	2441	Ant1	1.636	271.576	166	31600	400	Pass
NVNT	3-DH5	2441	Ant1	2.887	334.892	116	31600	400	Pass

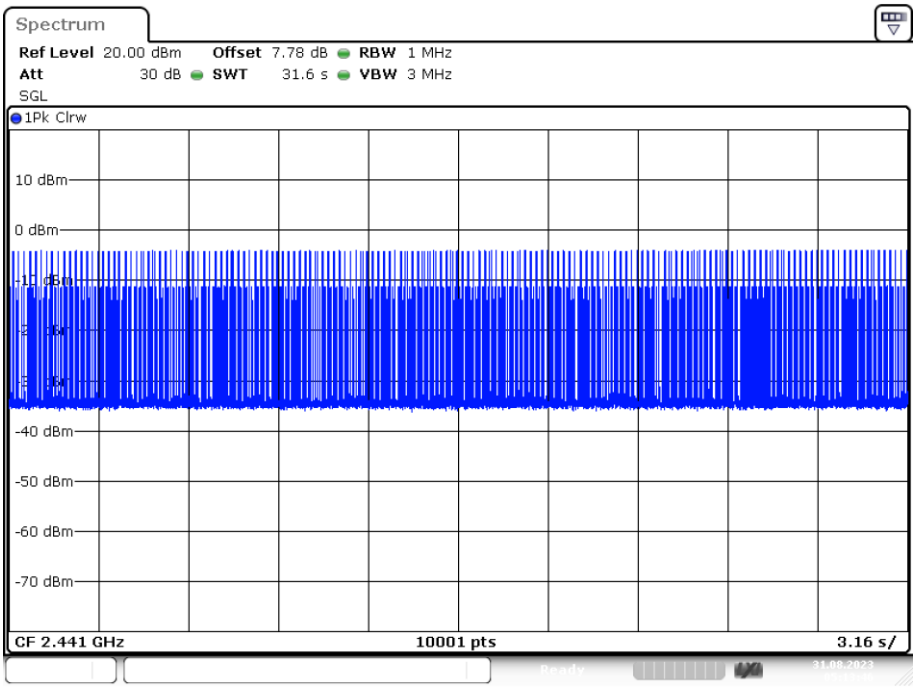
Note: Total Dwell Time= Pulse Time* Burst Count

Dwell NVNT 1-DH1 2441MHz Ant1 One Burst



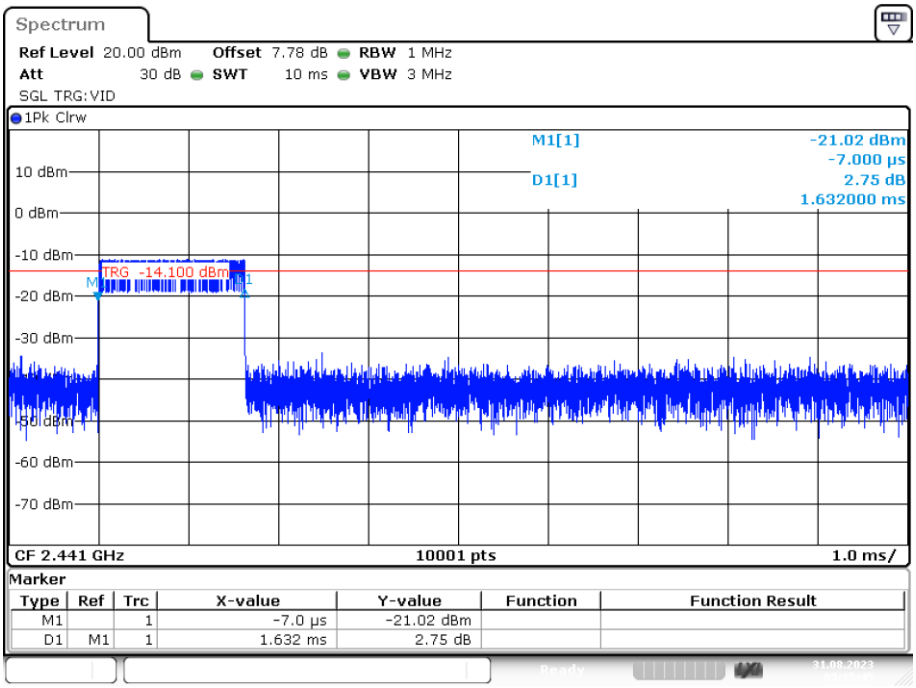
Date: 31.AUG.2023 05:13:11

Dwell NVNT 1-DH1 2441MHz Ant1 Accumulated



Date: 31.AUG.2023 05:13:46

Dwell NVNT 1-DH3 2441MHz Ant1 One Burst



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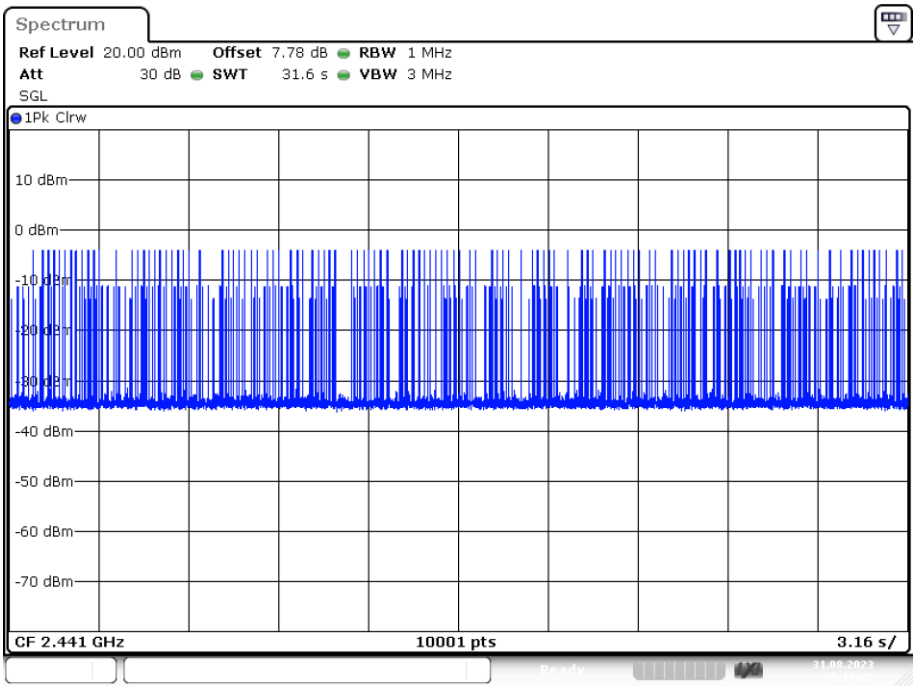
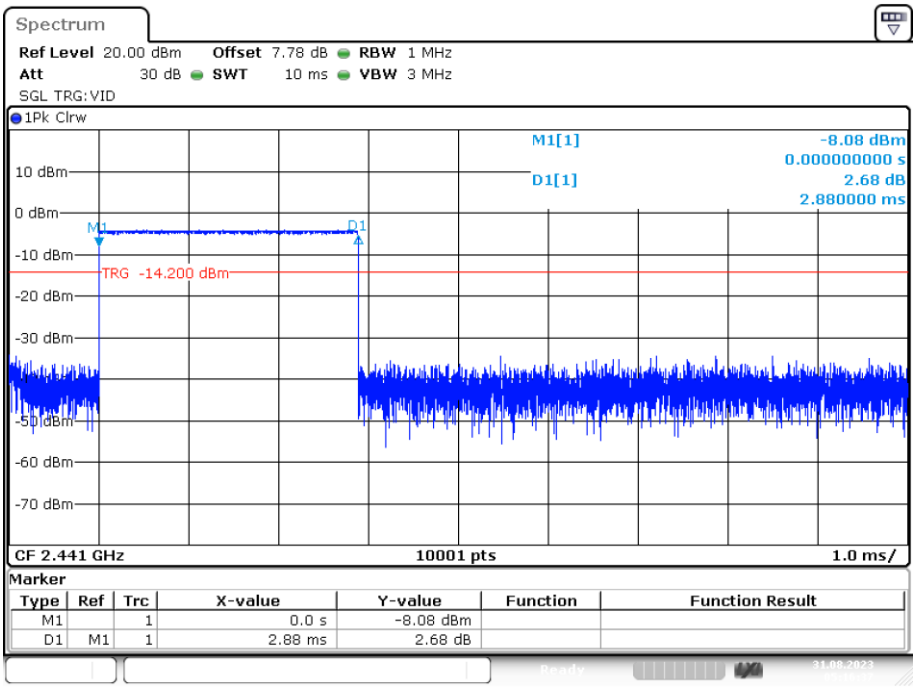


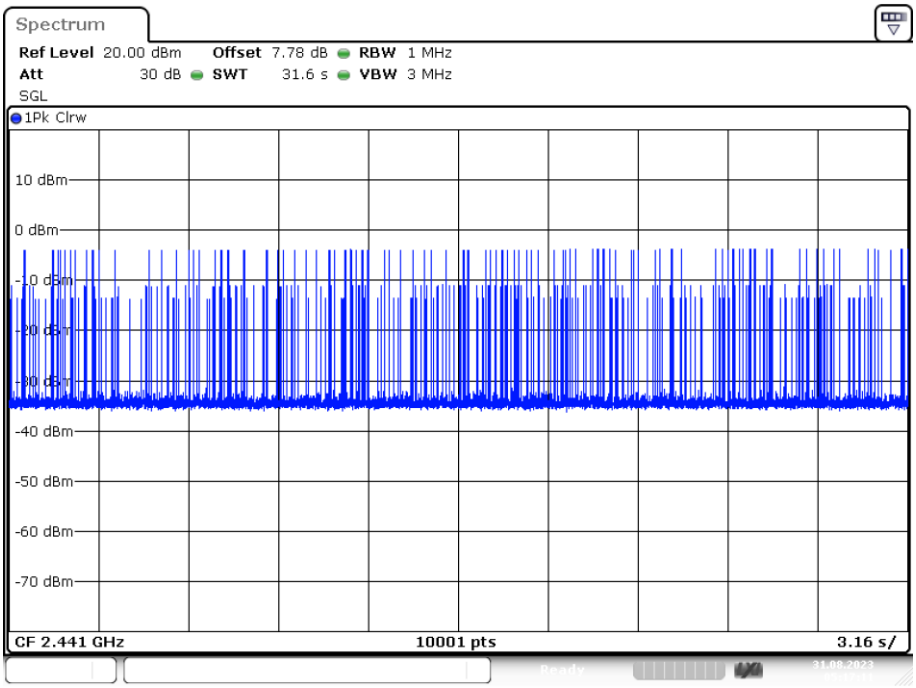
Date: 31.AUG.2023 05:16:20

Dwell NVNT 1-DH5 2441MHz Ant1 One Burst



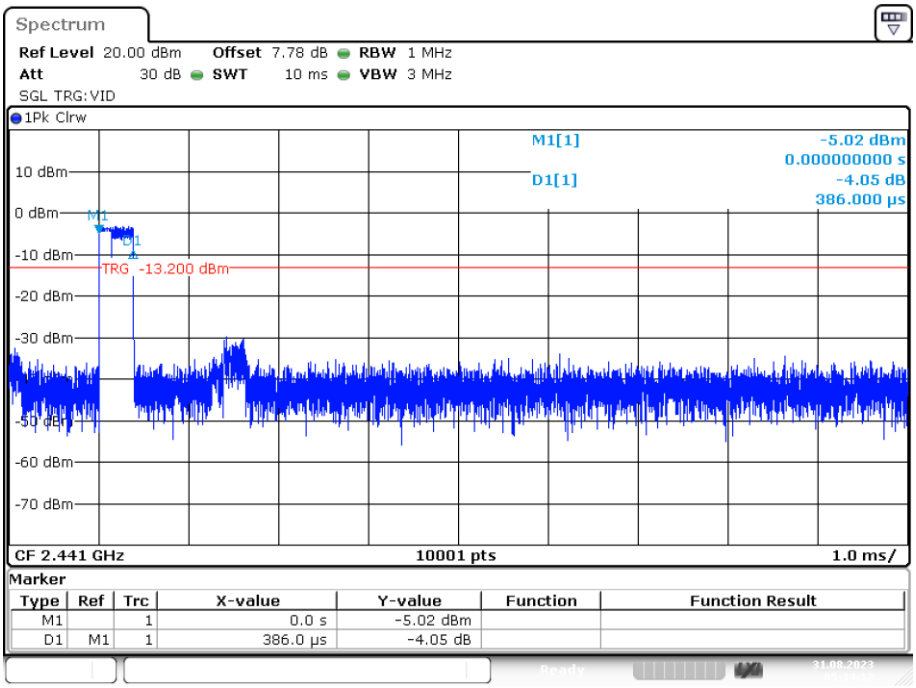
Date: 31.AUG.2023 05:16:37

Dwell NVNT 1-DH5 2441MHz Ant1 Accumulated



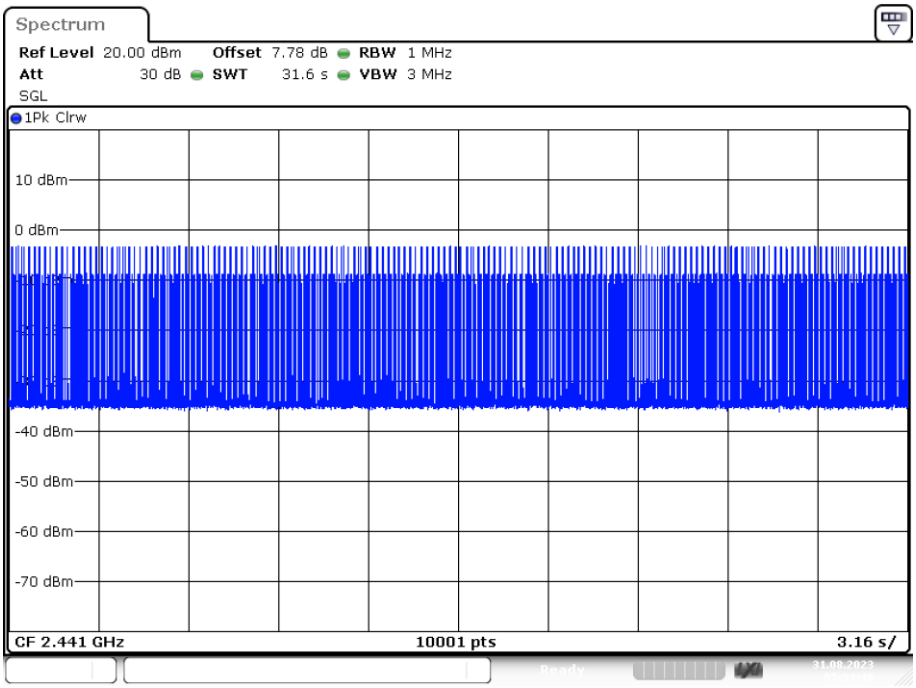
Date: 31.AUG.2023 05:17:11

Dwell NVNT 2-DH1 2441MHz Ant1 One Burst



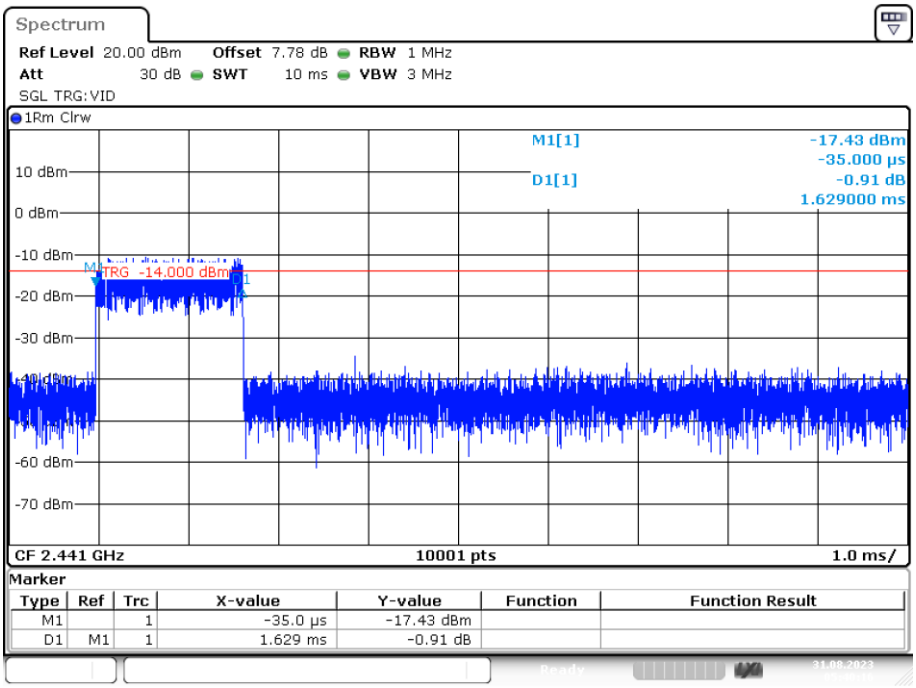
Date: 31.AUG.2023 05:34:11

Dwell NVNT 2-DH1 2441MHz Ant1 Accumulated



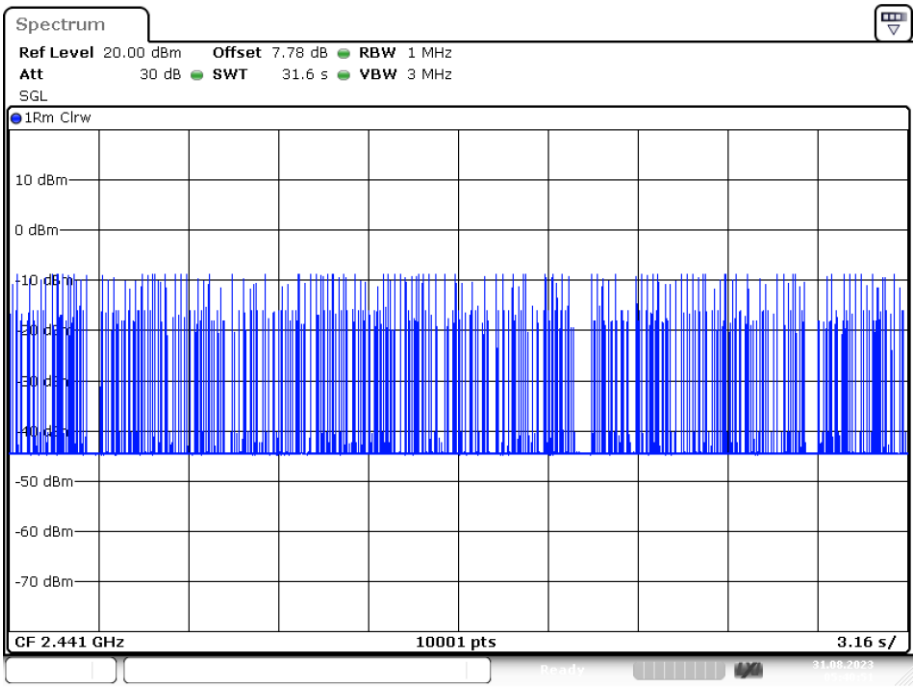
Date: 31.AUG.2023 05:34:46

Dwell NVNT 2-DH3 2441MHz Ant1 One Burst



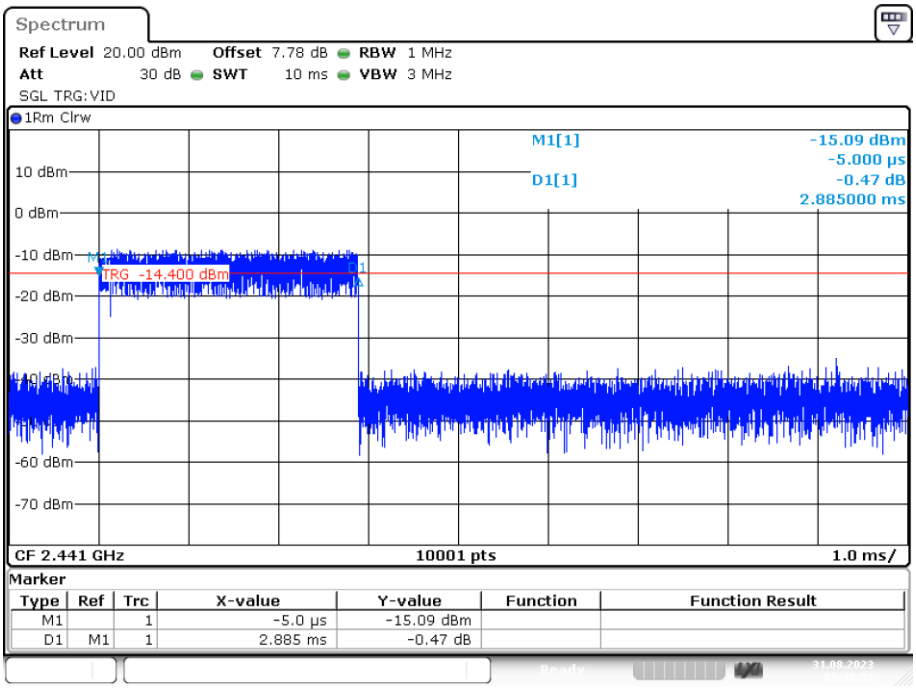
Date: 31.AUG.2023 05:40:17

Dwell NVNT 2-DH3 2441MHz Ant1 Accumulated



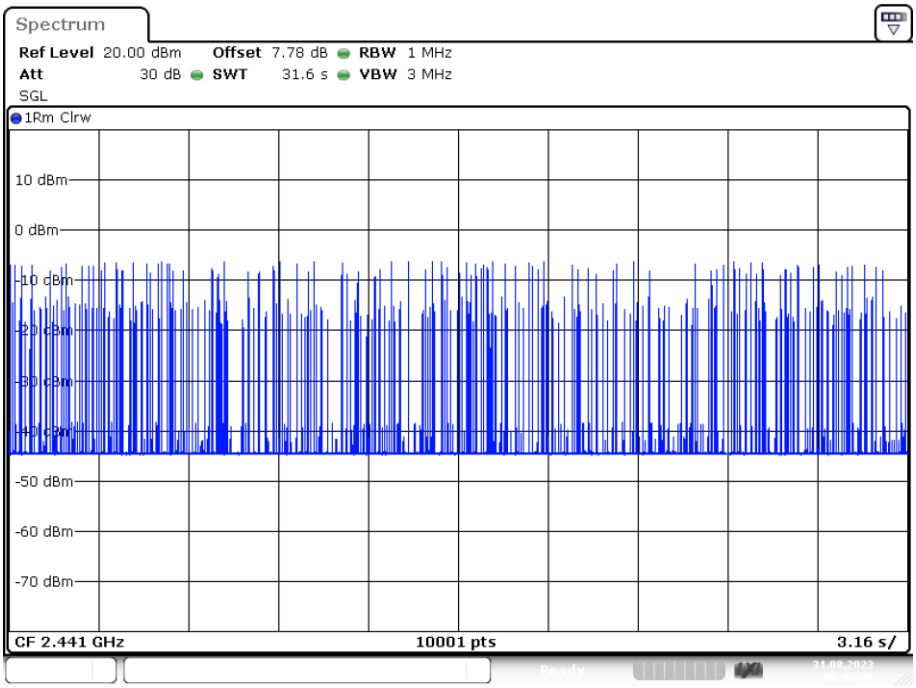
Date: 31.AUG.2023 05:40:51

Dwell NVNT 2-DH5 2441MHz Ant1 One Burst



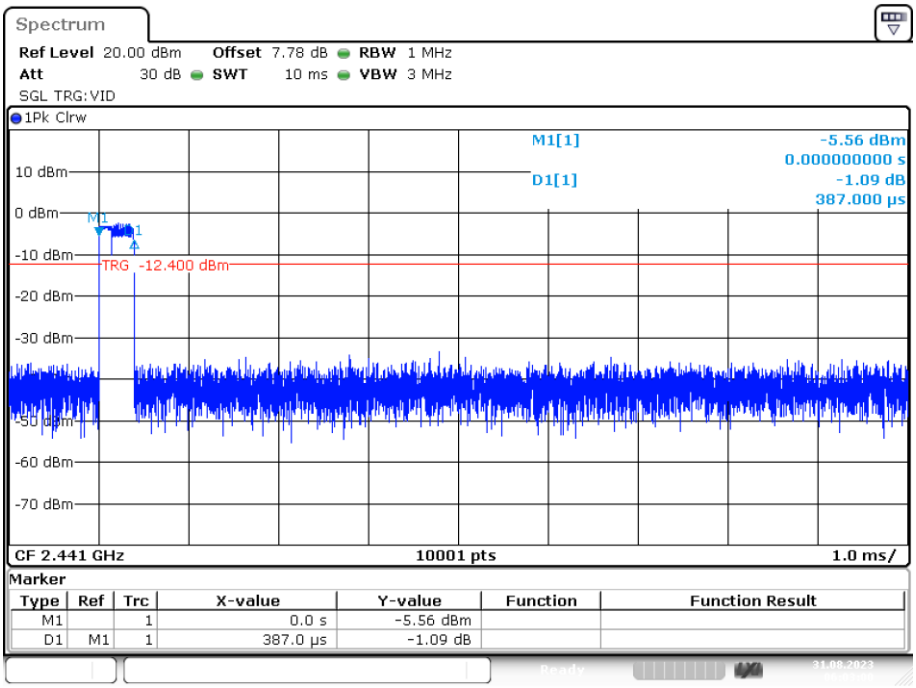
Date: 31.AUG.2023 05:42:51

Dwell NVNT 2-DH5 2441MHz Ant1 Accumulated



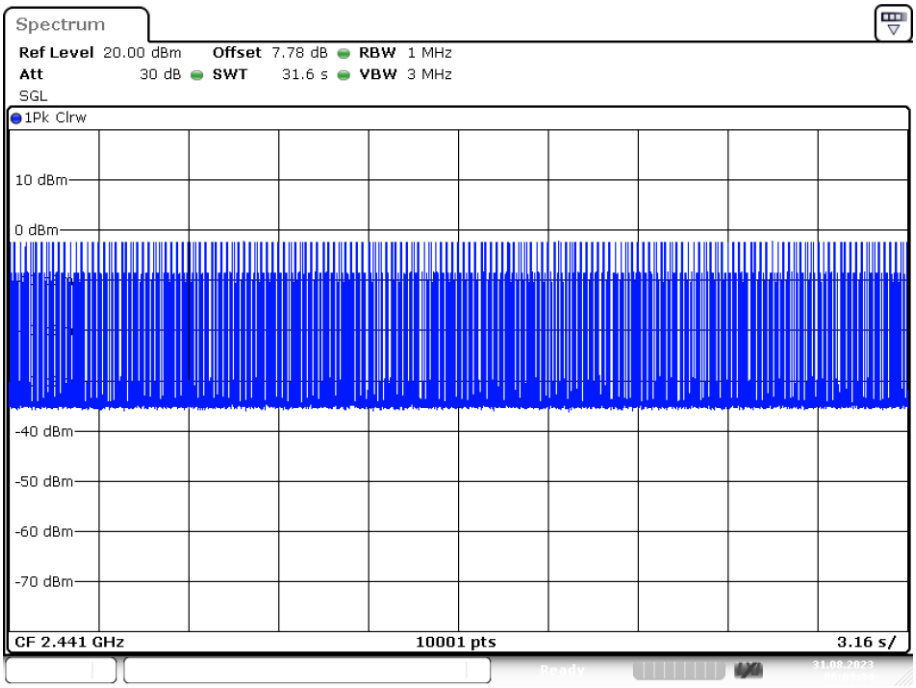
Date: 31.AUG.2023 05:43:26

Dwell NVNT 3-DH1 2441MHz Ant1 One Burst



Date: 31.AUG.2023 06:03:00

Dwell NVNT 3-DH1 2441MHz Ant1 Accumulated



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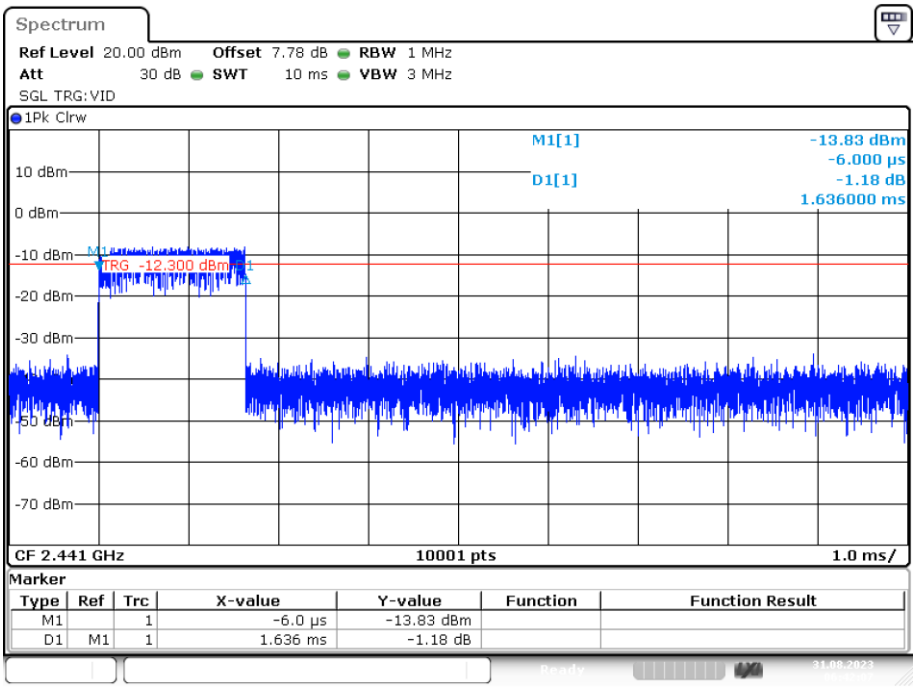
Dwell NVNT 3-DH3 2441MHz Ant1 One Burst



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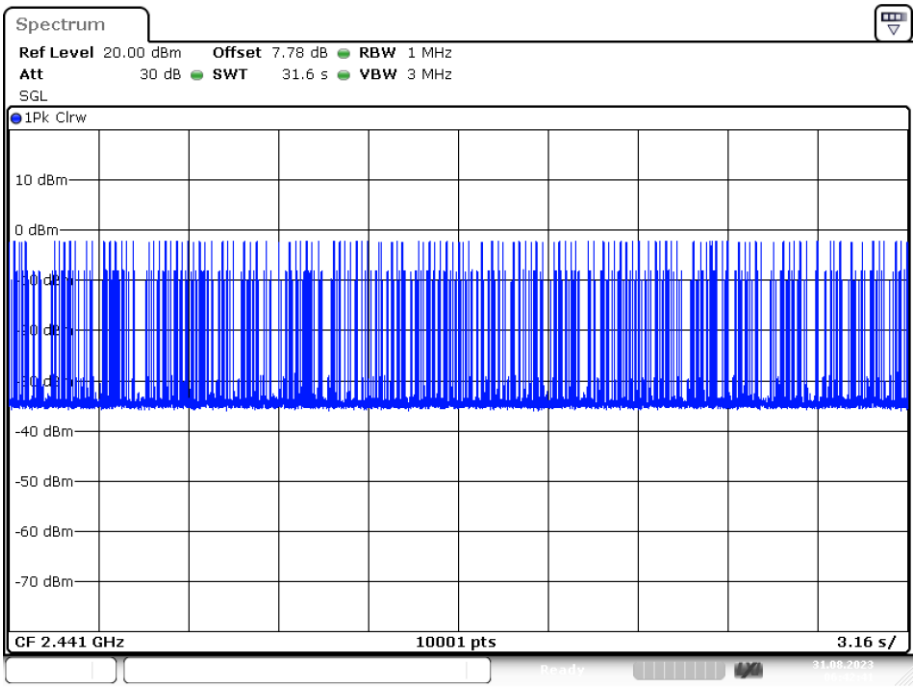
Dwell NVNT 3-DH3 2441MHz Ant1 Accumulated



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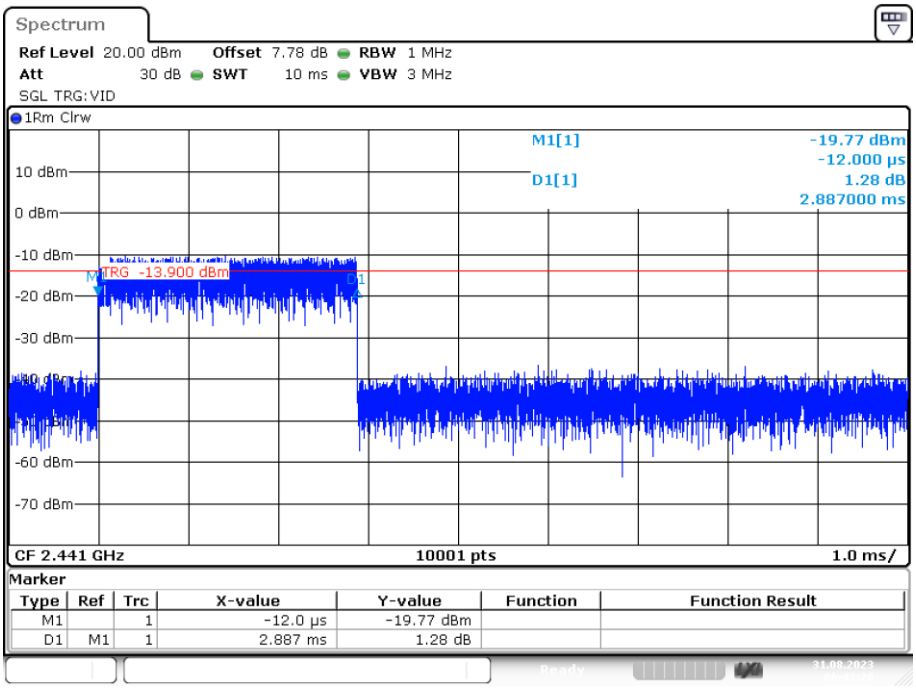
Dwell NVNT 3-DH5 2441MHz Ant1 One Burst



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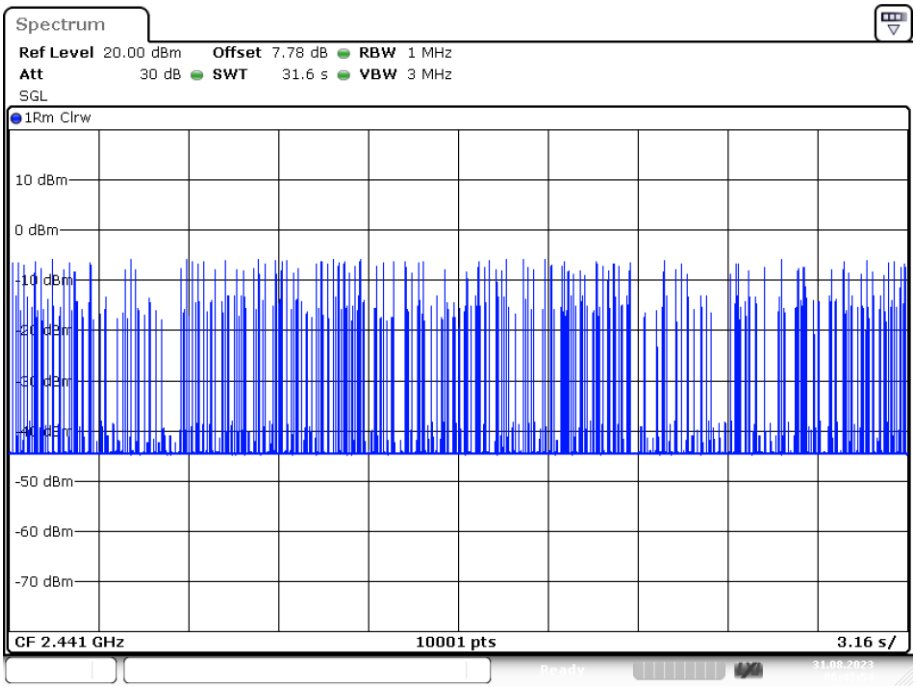
Dwell NVNT 3-DH5 2441MHz Ant1 Accumulated



Date: 31.AUG.2023 06:43:54

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

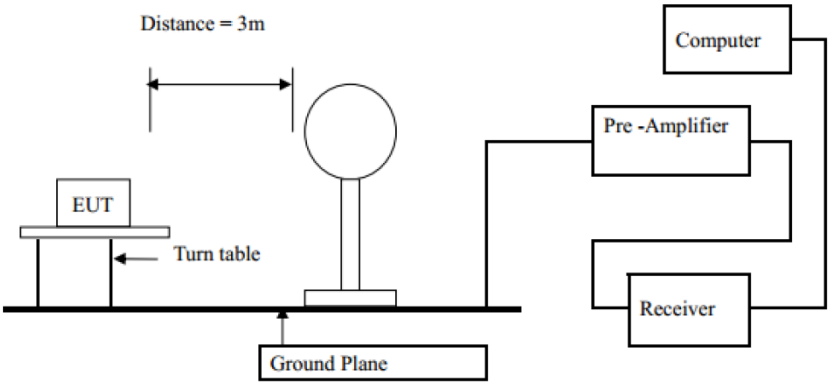
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 -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

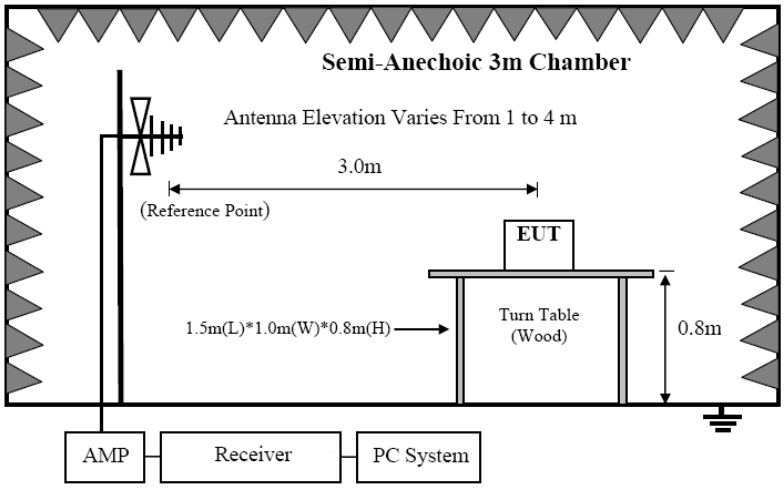
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

8.2. Block Diagram of Test setup

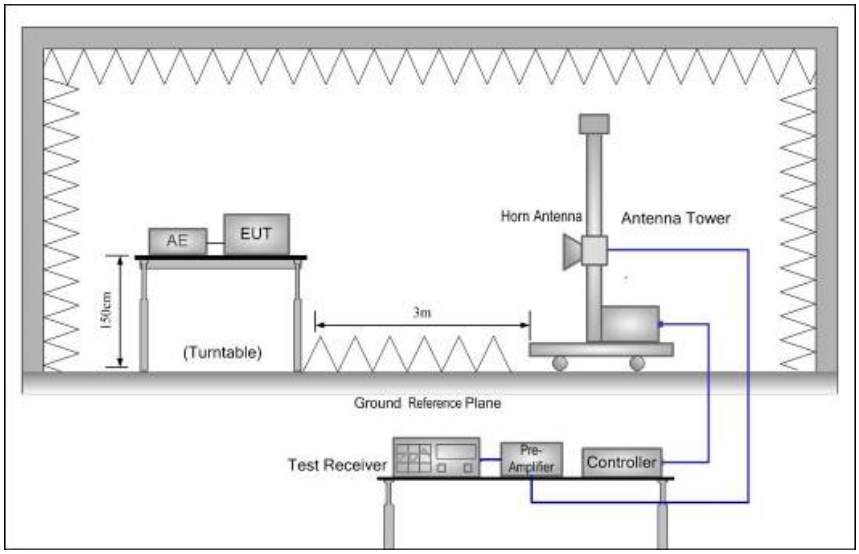
8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



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

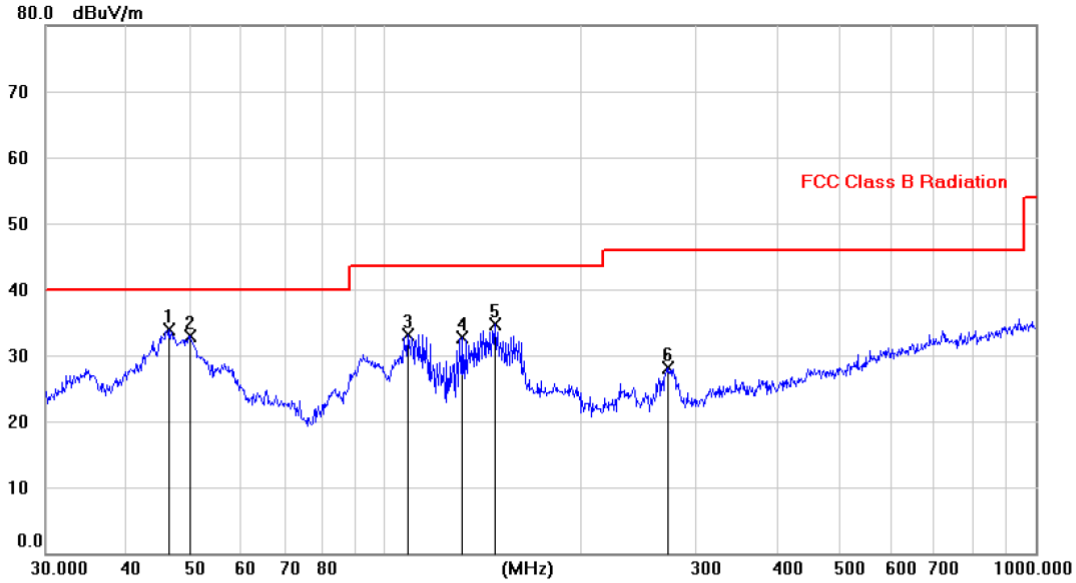
We have scanned the 10th harmonic from 9KHz to the EUT's highest frequency.
Detailed information please see the following page.

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

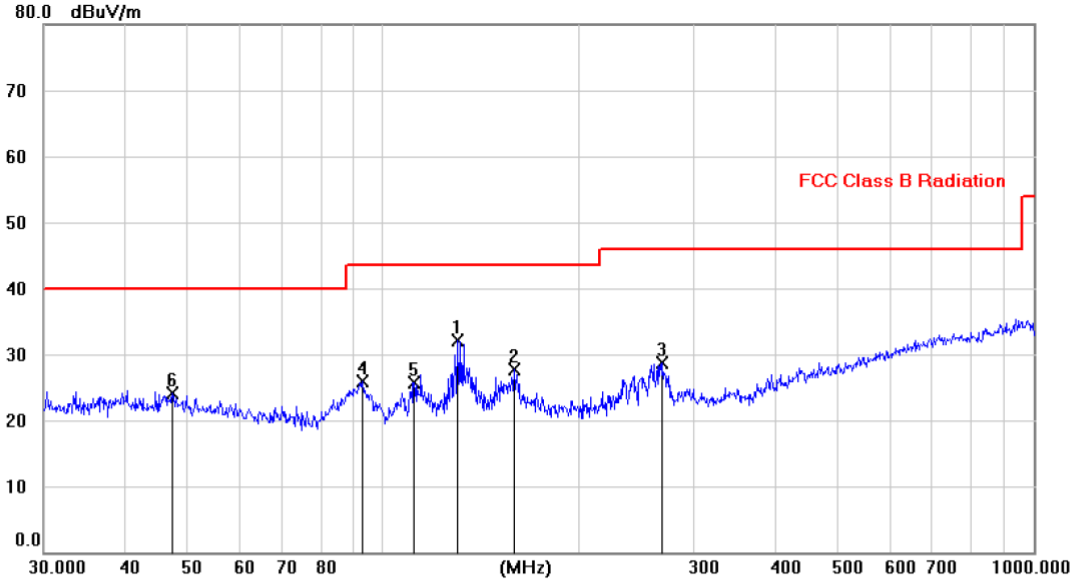
Vertical:



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	*	46.6173	19.89	14.09	33.98	40.00	-6.02	peak			
2		50.0974	18.84	14.02	32.86	40.00	-7.14	peak			
3		108.5200	21.46	11.68	33.14	43.50	-10.36	peak			
4		131.6191	18.99	13.71	32.70	43.50	-10.80	peak			
5		147.4898	19.83	14.87	34.70	43.50	-8.80	peak			
6		271.9277	14.86	13.34	28.20	46.00	-17.80	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	*	130.1809	18.60	13.60	32.20	43.50	-11.30	peak			
2		159.0202	12.72	15.04	27.76	43.50	-15.74	peak			
3		269.0192	15.52	13.26	28.78	46.00	-17.22	peak			
4		93.1020	15.58	10.35	25.93	43.50	-17.57	peak			
5		111.3468	13.71	11.99	25.70	43.50	-17.80	peak			
6		47.3973	10.04	14.07	24.11	40.00	-15.89	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 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	44.29	V	33.95	10.18	34.26	54.16	74	-19.84	PK
4804	37.41	V	33.95	10.18	34.26	47.28	54	-6.72	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	45.94	H	33.95	10.18	34.26	55.81	74	-18.19	PK
4804	36.11	H	33.95	10.18	34.26	45.98	54	-8.02	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX Mid									
4882	44.98	V	33.93	10.2	34.29	54.82	74	-19.18	PK
4882	33.64	V	33.93	10.2	34.29	43.48	54	-10.52	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	46.19	H	33.93	10.2	34.29	56.03	74	-17.97	PK
4882	33.93	H	33.93	10.2	34.29	43.77	54	-10.23	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX High									
4960	46.31	V	33.98	10.22	34.25	56.26	74	-17.74	PK
4960	35.59	V	33.98	10.22	34.25	45.54	54	-8.46	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	43.78	H	33.98	10.22	34.25	53.73	74	-20.27	PK
4960	34.29	H	33.98	10.22	34.25	44.24	54	-9.76	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.

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	46.34	V	33.95	10.18	34.26	56.21	74	-17.79	PK
4804	39.93	V	33.95	10.18	34.26	49.80	54	-4.20	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.88	H	33.95	10.18	34.26	52.75	74	-21.25	PK
4804	36.41	H	33.95	10.18	34.26	46.28	54	-7.72	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: π/4 DQPSK TX Mid									
4882	42.55	V	33.93	10.2	34.29	52.39	74	-21.61	PK
4882	36.77	V	33.93	10.2	34.29	46.61	54	-7.39	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	45.44	H	33.93	10.2	34.29	55.28	74	-18.72	PK
4882	35.88	H	33.93	10.2	34.29	45.72	54	-8.28	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: π/4 DQPSK TX High									
4960	43.95	V	33.98	10.22	34.25	53.90	74	-20.10	PK
4960	35.69	V	33.98	10.22	34.25	45.64	54	-8.36	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	43.47	H	33.98	10.22	34.25	53.42	74	-20.58	PK
4960	34.24	H	33.98	10.22	34.25	44.19	54	-9.81	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

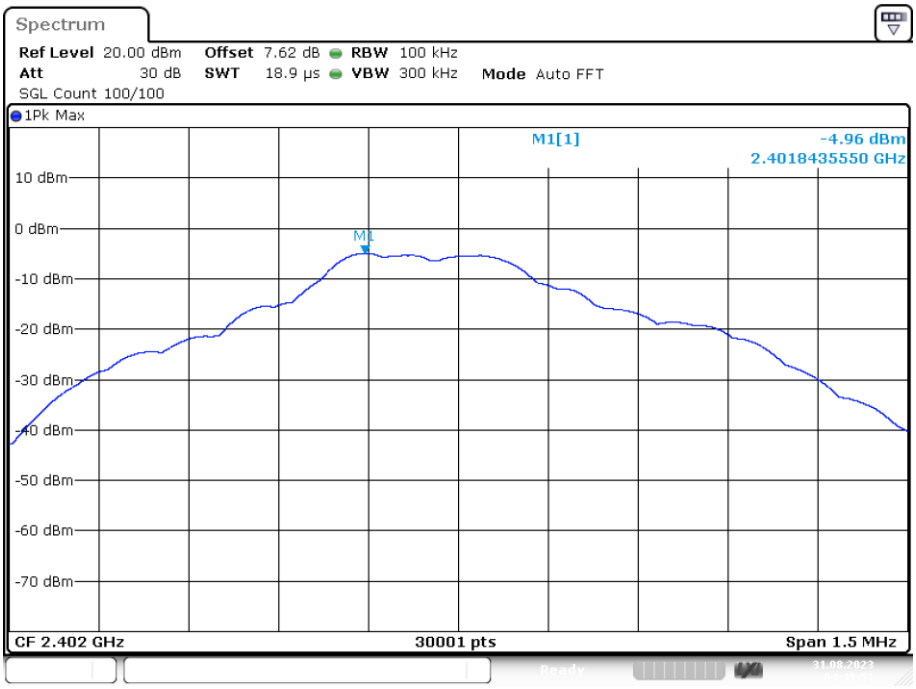
Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Test Mode: 8-DPSK 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	44.94	V	33.95	10.18	34.26	54.81	74	-19.19	PK
4804	38.34	V	33.95	10.18	34.26	48.21	54	-5.79	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.97	H	33.95	10.18	34.26	52.84	74	-21.16	PK
4804	34.46	H	33.95	10.18	34.26	44.33	54	-9.67	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: 8-DPSK TX Mid									
4882	42.86	V	33.93	10.2	34.29	52.70	74	-21.30	PK
4882	33.94	V	33.93	10.2	34.29	43.78	54	-10.22	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	45.73	H	33.93	10.2	34.29	55.57	74	-18.43	PK
4882	33.28	H	33.93	10.2	34.29	43.12	54	-10.88	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: 8-DPSK TX High									
4960	46.02	V	33.98	10.22	34.25	55.97	74	-18.03	PK
4960	35.08	V	33.98	10.22	34.25	45.03	54	-8.97	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	43.93	H	33.98	10.22	34.25	53.88	74	-20.12	PK
4960	32.65	H	33.98	10.22	34.25	42.60	54	-11.40	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



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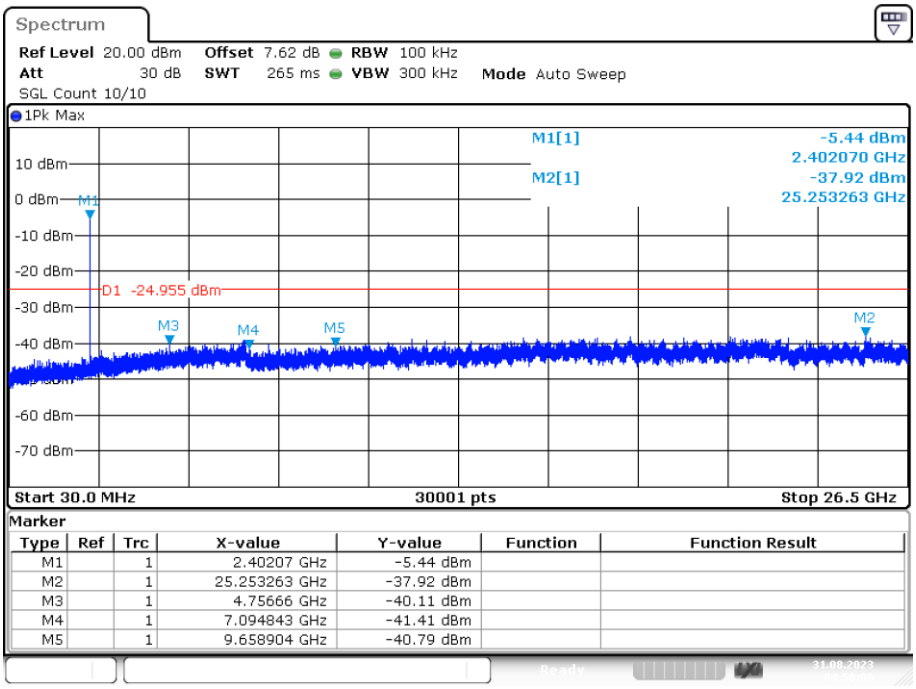
Tx. Spurious NVNT 1-DH1 2402MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40207 GHz	-5.44 dBm		
M2		1	25.253263 GHz	-37.92 dBm		
M3		1	4.75666 GHz	-40.11 dBm		
M4		1	7.094843 GHz	-41.41 dBm		
M5		1	9.658904 GHz	-40.79 dBm		

Date: 31.AUG.2023 04:50:05