



FCC TEST REPORT

FCC ID: L73-M17S

On Behalf of

Sanwa Electronic Instrument Co., Ltd

2.4GHz Radio Control System

Model No.: M17S

Prepared for : Sanwa Electronic Instrument Co., Ltd
Address : 1-2-50, Yoshida Honmachi, Higashi-Osaka, Osaka 578, Japan

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 : A2410019-C01-R05
Date of Receipt : October 12, 2024
Date of Test : October 12, 2024 - November 7, 2024
Date of Report : November 7, 2024
Version Number : V0
Test Result : Pass

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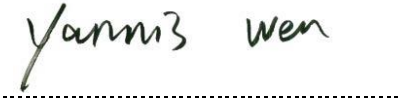
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TEST REPORT DECLARATION

Applicant : Sanwa Electronic Instrument Co., Ltd
Address : 1-2-50, Yoshida Honmachi, Higashi-Osaka, Osaka 578, Japan
Manufacturer : Dongguan Fountain Electronics
Address : Qiaolian Industrial District, Erhuan St., DongkengTown, Dongguan City, Guangdong, P.R.China
EUT Description : 2.4GHz Radio Control System
(A) Model No. : M17S
(B) Trademark : SANWA

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	
Approved by (name + signature).....:	Jack Xu Project Manager	
Date of issue.....:	November 7, 2024	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	November 7, 2024	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	:	2.4GHz Radio Control System
Model Number	:	M17S
Diff	:	N/A
Power supply	:	DC 5V from type-C and DC 3.7V from battery.
Radio Technology	:	2.4G Technology
		1)2404-2470MHz
		2)2405-2471MHz
Operation frequency	:	3)2412-2478MHz
		4)2413-2479MHz
Channel No.	:	34Channel
Modulation type	:	GFSK
Antenna Type	:	Internal antenna, Maximum Gain is 2dBi (Antenna information is provided by applicant.)
Software version	:	SP-147 Ver.0.00.10
Hardware version	:	311A21051A
Intend use environment	:	Residential, commercial and light industrial environment

Channel list:

2404-2470MHz:

Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)
1CH	2404	10CH	2422	19CH	2440	28CH	2458
2CH	2406	11CH	2424	20CH	2442	29CH	2460
3CH	2408	12CH	2426	21CH	2444	30CH	2462
4CH	2410	13CH	2428	22CH	2446	31CH	2464
5CH	2412	14CH	2430	23CH	2448	32CH	2466
6CH	2414	15CH	2432	24CH	2450	33CH	2468
7CH	2416	16CH	2434	25CH	2452	34CH	2470
8CH	2418	17CH	2436	26CH	2454		
9CH	2420	18CH	2438	27CH	2456		

2405-2471MHz:

Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)
1CH	2405	10CH	2423	19CH	2441	28CH	2459
2CH	2407	11CH	2425	20CH	2443	29CH	2461
3CH	2409	12CH	2427	21CH	2445	30CH	2463
4CH	2411	13CH	2429	22CH	2447	31CH	2465
5CH	2413	14CH	2431	23CH	2449	32CH	2467
6CH	2415	15CH	2433	24CH	2451	33CH	2469
7CH	2417	16CH	2435	25CH	2453	34CH	2471
8CH	2419	17CH	2437	26CH	2455		
9CH	2421	18CH	2439	27CH	2457		

2412-2478MHz:

Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)
1CH	2412	10CH	2430	19CH	2448	28CH	2466
2CH	2414	11CH	2432	20CH	2450	29CH	2468
3CH	2416	12CH	2434	21CH	2452	30CH	2470
4CH	2418	13CH	2436	22CH	2454	31CH	2472
5CH	2420	14CH	2438	23CH	2456	32CH	2474
6CH	2422	15CH	2440	24CH	2458	33CH	2476
7CH	2424	16CH	2442	25CH	2460	34CH	2478
8CH	2426	17CH	2444	26CH	2462		
9CH	2428	18CH	2446	27CH	2464		

2413-2479MHz

Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)
1CH	2413	10CH	2431	19CH	2449	28CH	2467
2CH	2415	11CH	2433	20CH	2451	29CH	2469
3CH	2417	12CH	2435	21CH	2453	30CH	2471
4CH	2419	13CH	2437	22CH	2455	31CH	2473
5CH	2421	14CH	2439	23CH	2457	32CH	2475
6CH	2423	15CH	2441	24CH	2459	33CH	2477
7CH	2425	16CH	2443	25CH	2461	34CH	2479
8CH	2427	17CH	2445	26CH	2463		
9CH	2429	18CH	2447	27CH	2465		

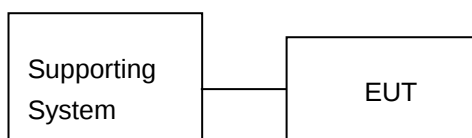
2.2. Accessories of Device (EUT)

Accessories : /
Manufacturer : /
Model : /
Ratings : /

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDoC
1.	Notebook PC	Lenovo	T430	N/A	N/A

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Mode	Channel
GFSK	Low
	Middle
	High

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	24℃
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	98kPa

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

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 Radiation Emission test in 3m chamber (18GHz to 40GHz)	4.31 dB(Polarize: V)
	4.30 dB(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	2022.05.18	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	2.3	102137	2024.08.08	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2024.08.08	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-10 2082-Wa	2024.08.08	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2024.08.08	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2023.08.28	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2023.08.19	2Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00128	2023.08.19	2Year
RF Cable	Resenberger	Cable 1	/	RE1	2024.08.08	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2024.08.08	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2024.08.08	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2024.08.08	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2024.08.08	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2024.08.08	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2024.08.08	1Year
Horn Antenna	SCHWARZBECK	BBHA 9170	/	00946	2023.08.19	2Year
Preamplifier	SKET	LNPA_1840 -50	/	SK2018101801	2024.08.08	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2024.08.08	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2024.08.08	1 Year
Electronic Thermo-Hygrometer	S.H.Qixiang	HTC-1	/	N/A	2024.08.11	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2024.08.08	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	MWRFtest	V2.0.0.0

3. MAXIMUM PEAK OUTPUT POWER

3.1. Limit

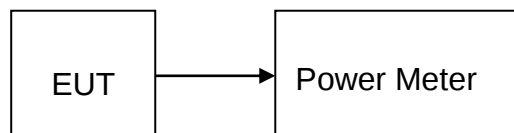
Please refer section 15.247.

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

2404-2470MHz

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	2.4G	2404	Ant1	9.101	21	Pass
NVNT	2.4G	2437	Ant1	8.702	21	Pass
NVNT	2.4G	2470	Ant1	8.374	21	Pass

2405-2471MHz

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	2.4G	2405	Ant1	9.603	21	Pass
NVNT	2.4G	2437	Ant1	9.472	21	Pass
NVNT	2.4G	2471	Ant1	9.062	21	Pass

2412-2478MHz

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	2.4G	2412	Ant1	8.896	21	Pass
NVNT	2.4G	2444	Ant1	8.397	21	Pass
NVNT	2.4G	2478	Ant1	8.247	21	Pass

2413-2479MHz

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	2.4G	2413	Ant1	8.875	21	Pass
NVNT	2.4G	2445	Ant1	8.338	21	Pass
NVNT	2.4G	2479	Ant1	8.365	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

2404-2470MHz

Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)
NVNT	2.4G	2404	Ant1	1.852
NVNT	2.4G	2437	Ant1	1.688
NVNT	2.4G	2470	Ant1	1.68

2405-2471MHz

Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)
NVNT	2.4G	2405	Ant1	1.648
NVNT	2.4G	2437	Ant1	1.632
NVNT	2.4G	2471	Ant1	1.636

2412-2478MHz

Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)
NVNT	2.4G	2412	Ant1	1.744
NVNT	2.4G	2444	Ant1	1.664
NVNT	2.4G	2478	Ant1	1.668

2413-2479MHz

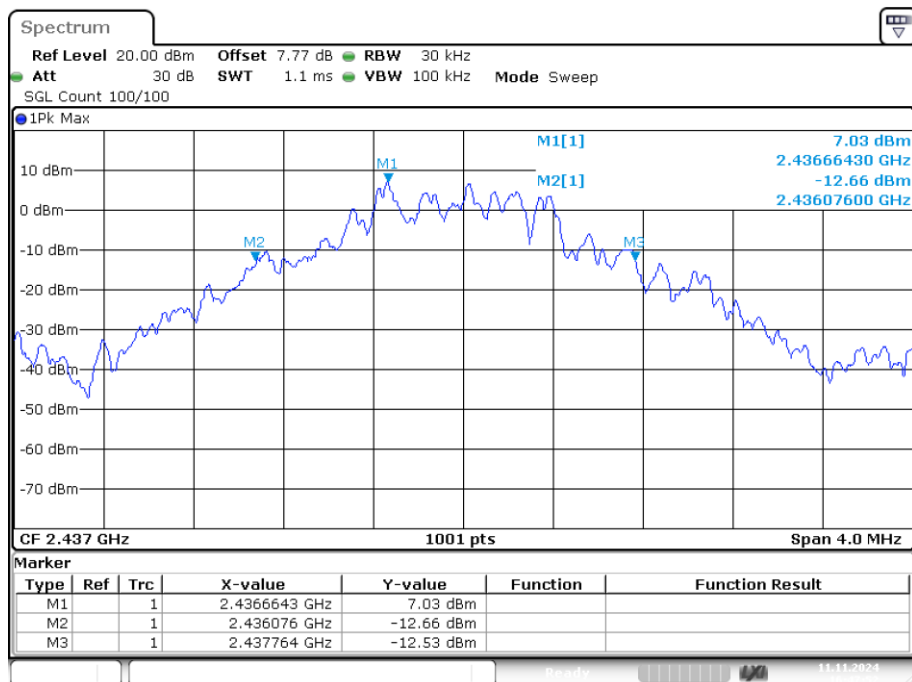
Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)
NVNT	2.4G	2413	Ant1	1.74
NVNT	2.4G	2445	Ant1	1.68
NVNT	2.4G	2479	Ant1	1.72

-20dB Bandwidth NVNT 2.4G 2404MHz Ant1



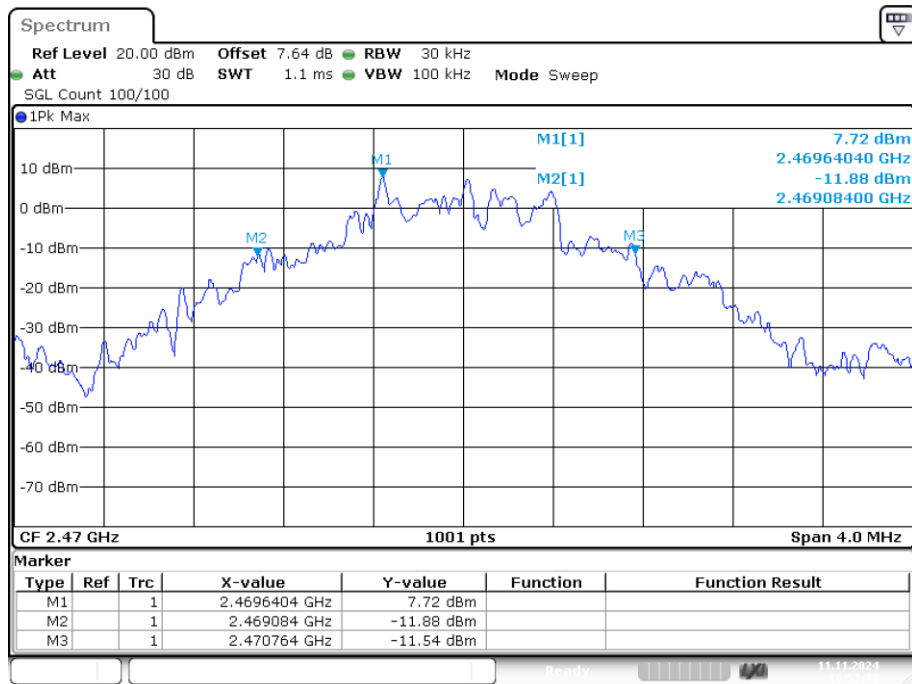
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-20dB Bandwidth NVNT 2.4G 2437MHz Ant1



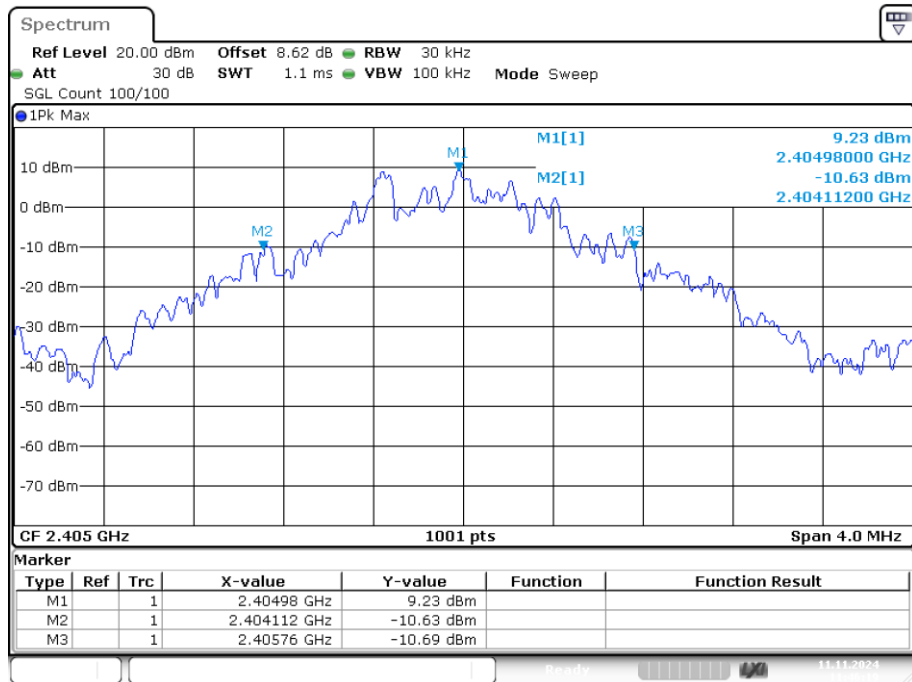
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-20dB Bandwidth NVNT 2.4G 2470MHz Ant1



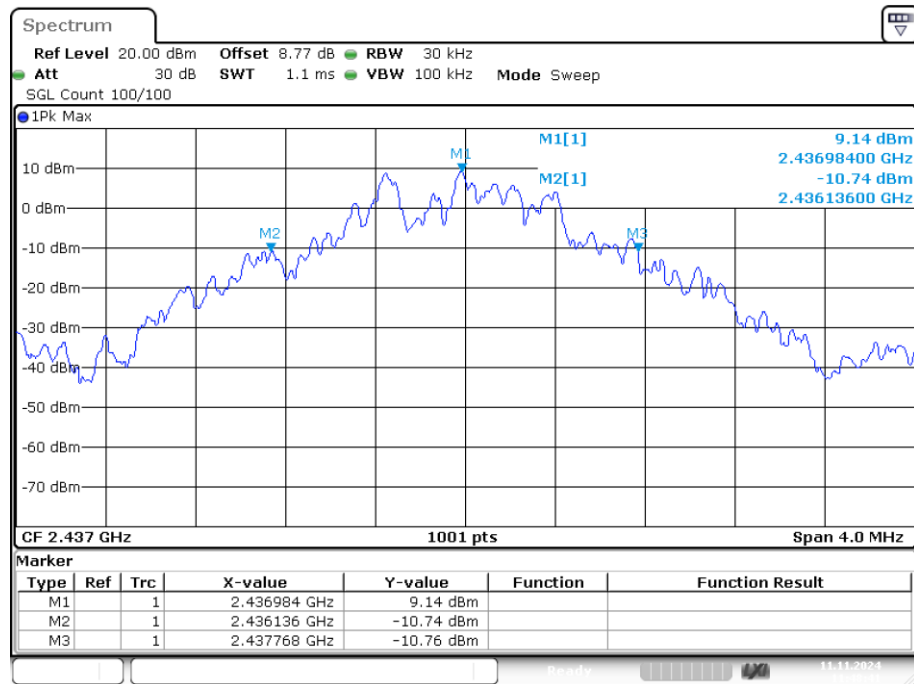
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-20dB Bandwidth NVNT 2.4G 2405MHz Ant1



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-20dB Bandwidth NVNT 2.4G 2437MHz Ant1



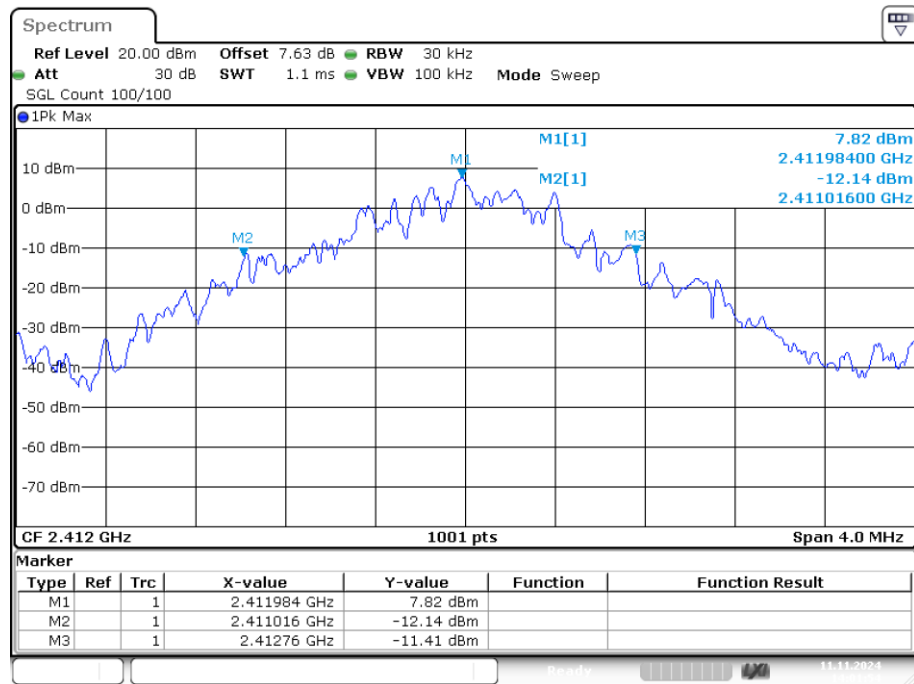
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-20dB Bandwidth NVNT 2.4G 2471MHz Ant1



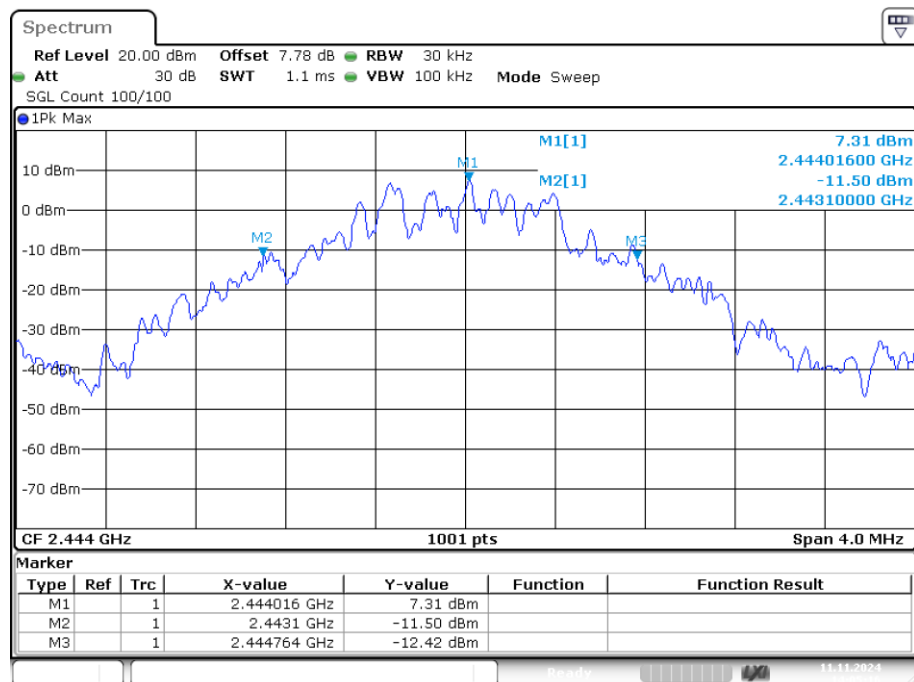
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-20dB Bandwidth NVNT 2.4G 2412MHz Ant1



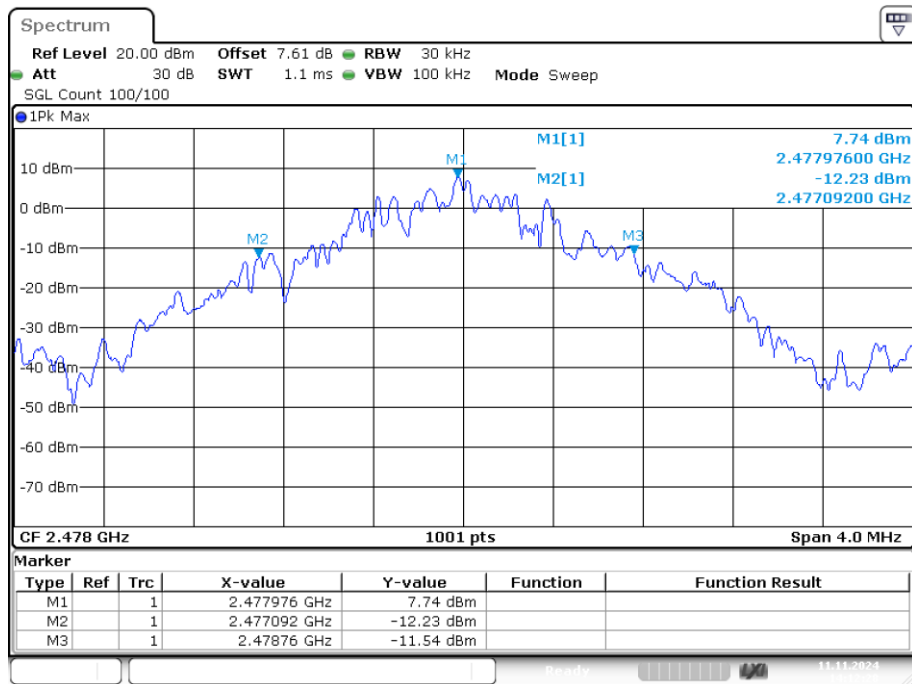
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-20dB Bandwidth NVNT 2.4G 2444MHz Ant1



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-20dB Bandwidth NVNT 2.4G 2478MHz Ant1



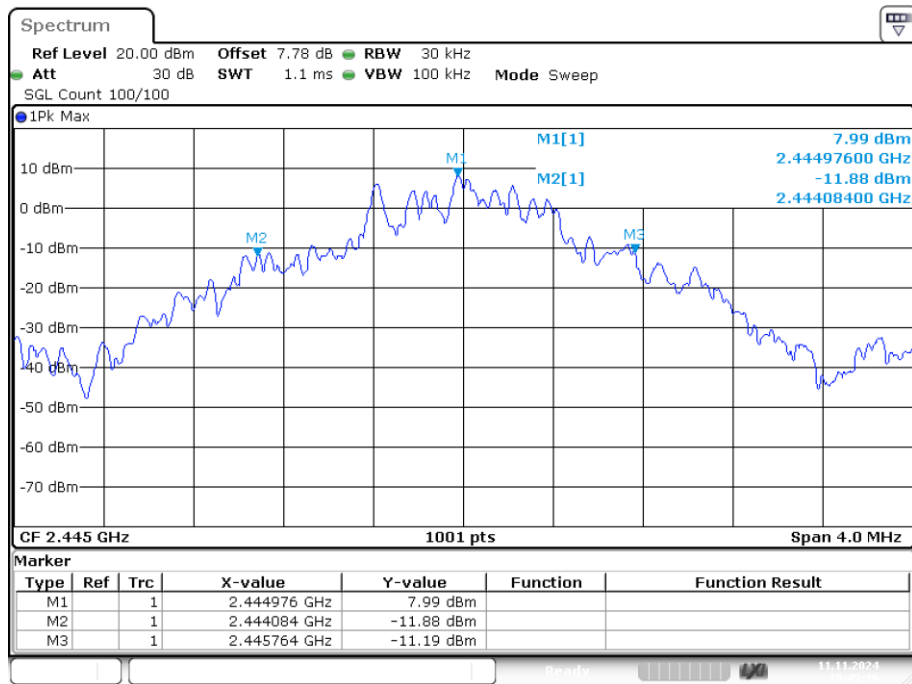
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-20dB Bandwidth NVNT 2.4G 2413MHz Ant1



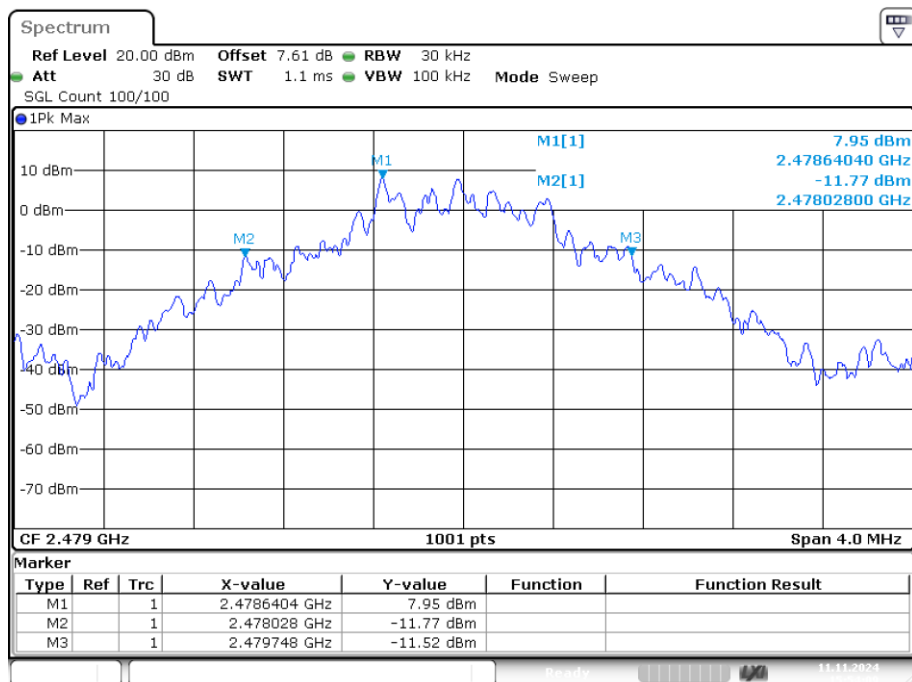
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-20dB Bandwidth NVNT 2.4G 2445MHz Ant1



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-20dB Bandwidth NVNT 2.4G 2479MHz Ant1



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Occupied Channel Bandwidth

2404-2470MHz

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	2.4G	2404	Ant1	1.566
NVNT	2.4G	2437	Ant1	1.678
NVNT	2.4G	2470	Ant1	1.734

2405-2471MHz

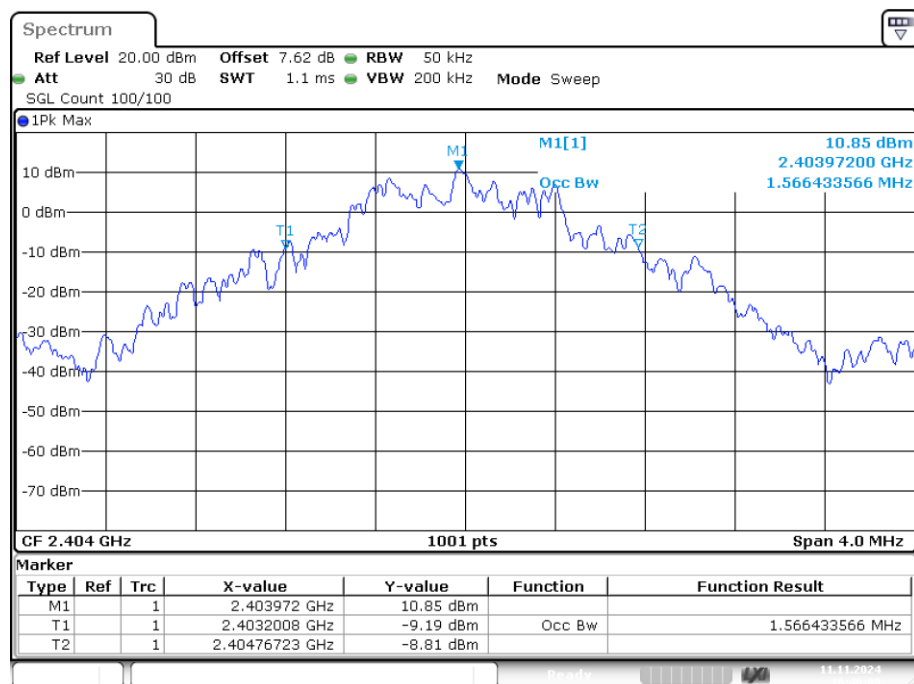
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	2.4G	2405	Ant1	1.694
NVNT	2.4G	2437	Ant1	1.634
NVNT	2.4G	2471	Ant1	1.634

2412-2478MHz

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	2.4G	2412	Ant1	1.626
NVNT	2.4G	2444	Ant1	1.698
NVNT	2.4G	2478	Ant1	1.726

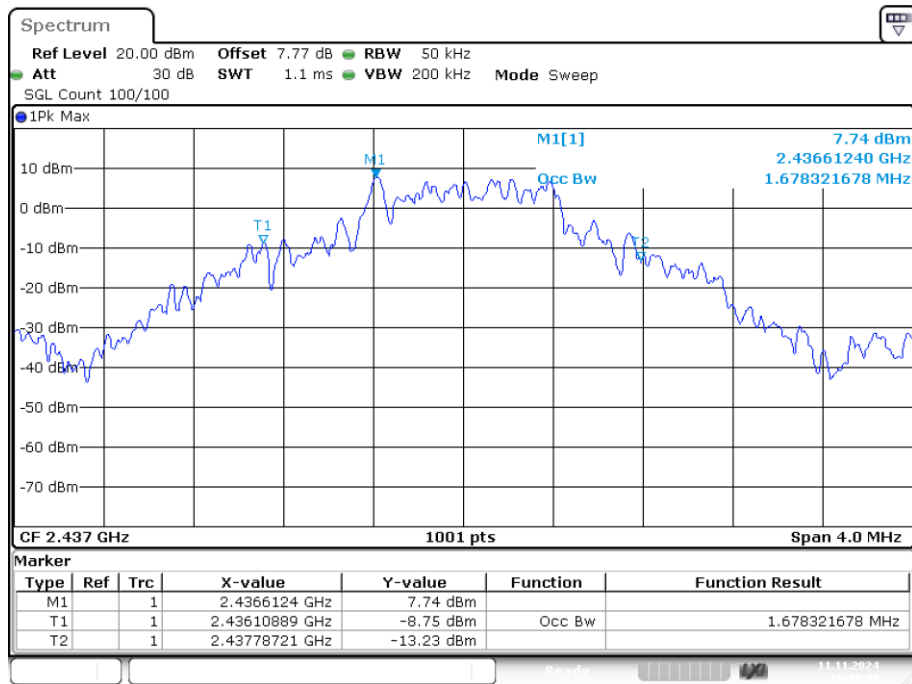
2413-2479MHz

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	2.4G	2413	Ant1	1.586
NVNT	2.4G	2445	Ant1	1.658
NVNT	2.4G	2479	Ant1	1.586

OBW NVNT 2.4G 2404MHz Ant1

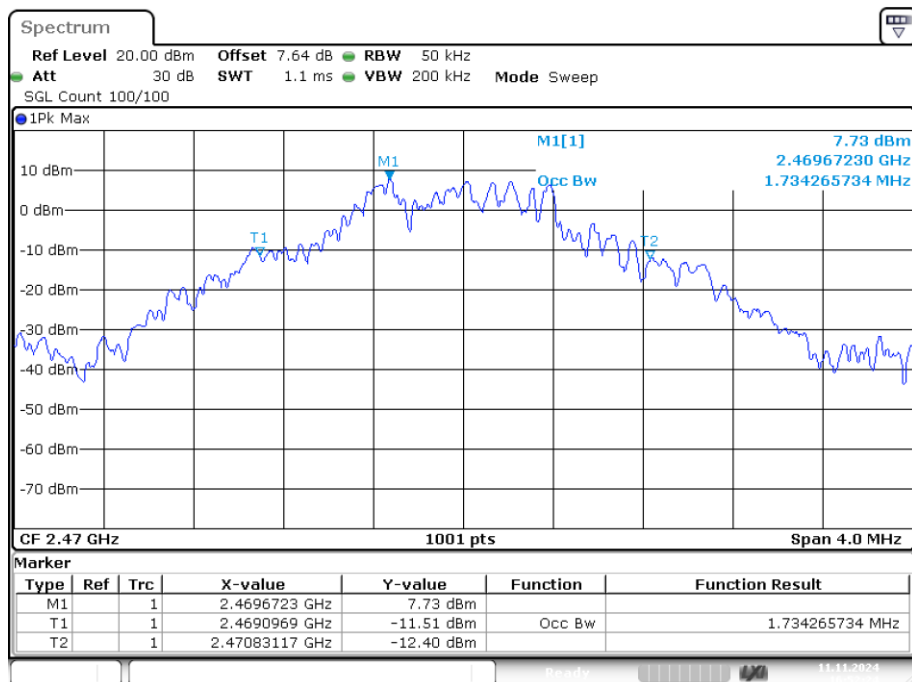
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OBW NVNT 2.4G 2437MHz Ant1



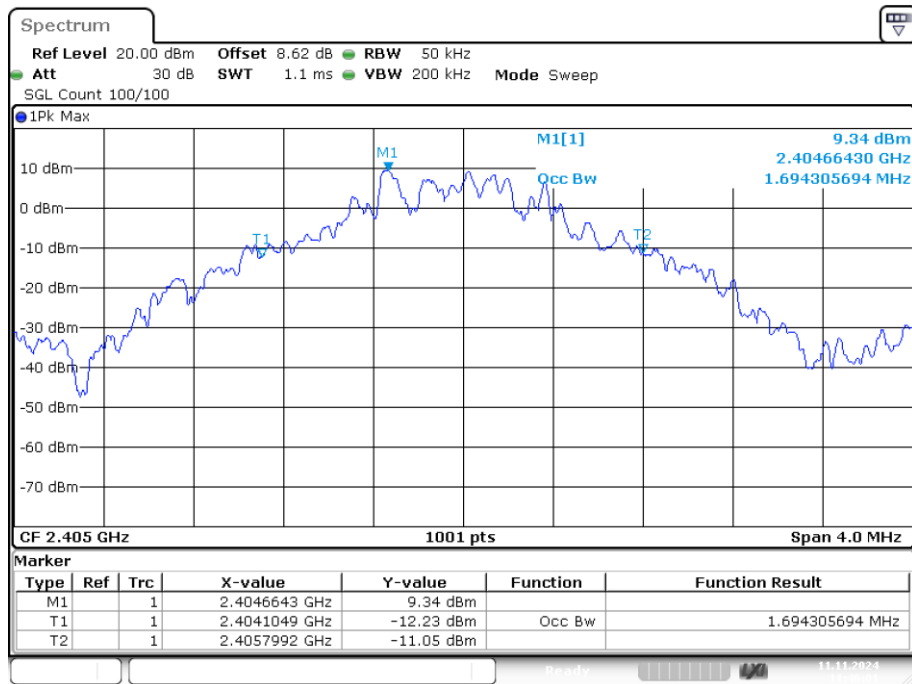
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OBW NVNT 2.4G 2470MHz Ant1



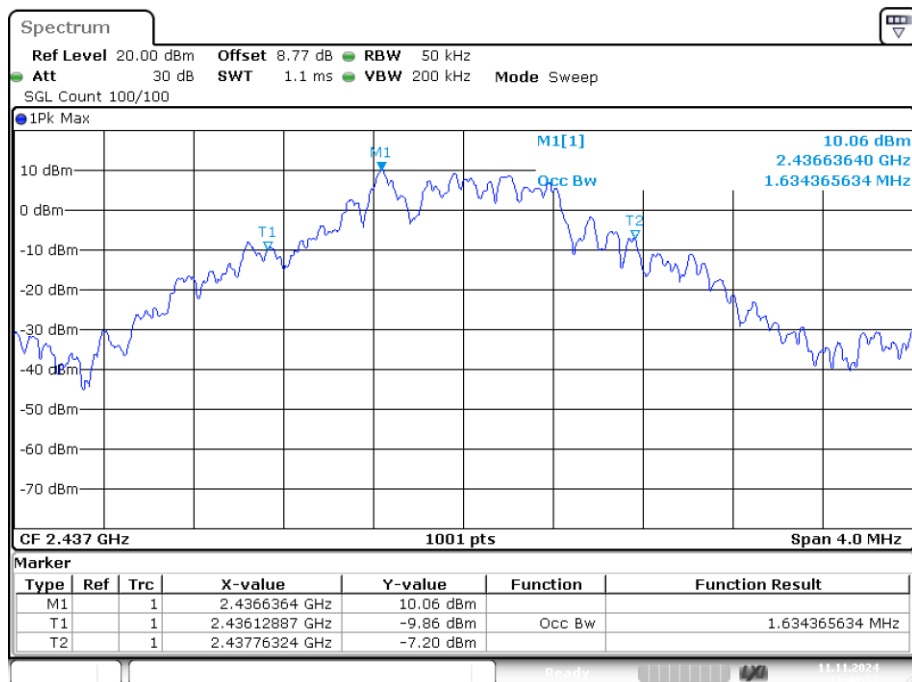
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OBW NVNT 2.4G 2405MHz Ant1



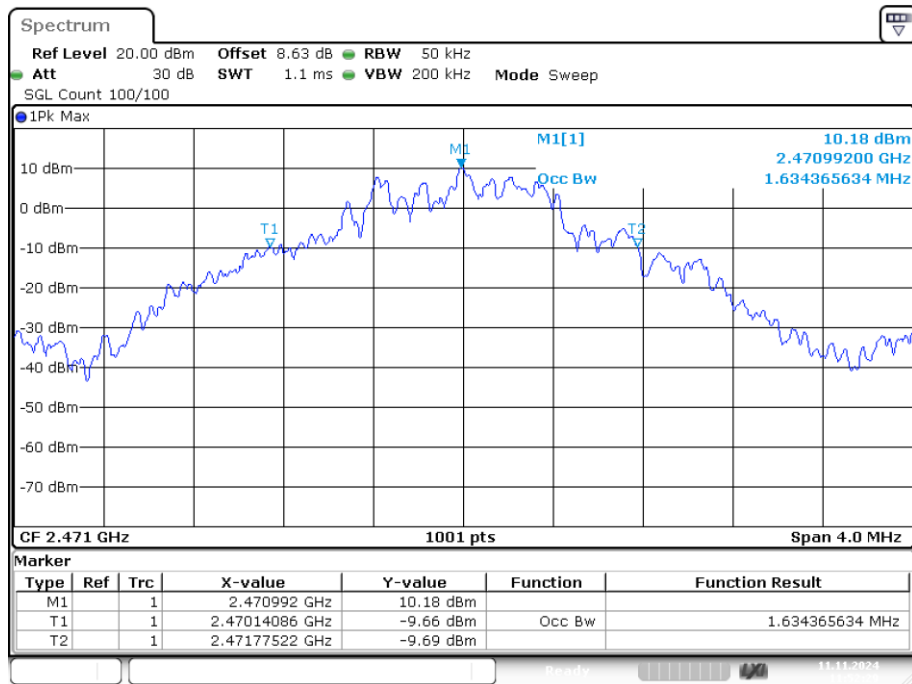
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OBW NVNT 2.4G 2437MHz Ant1



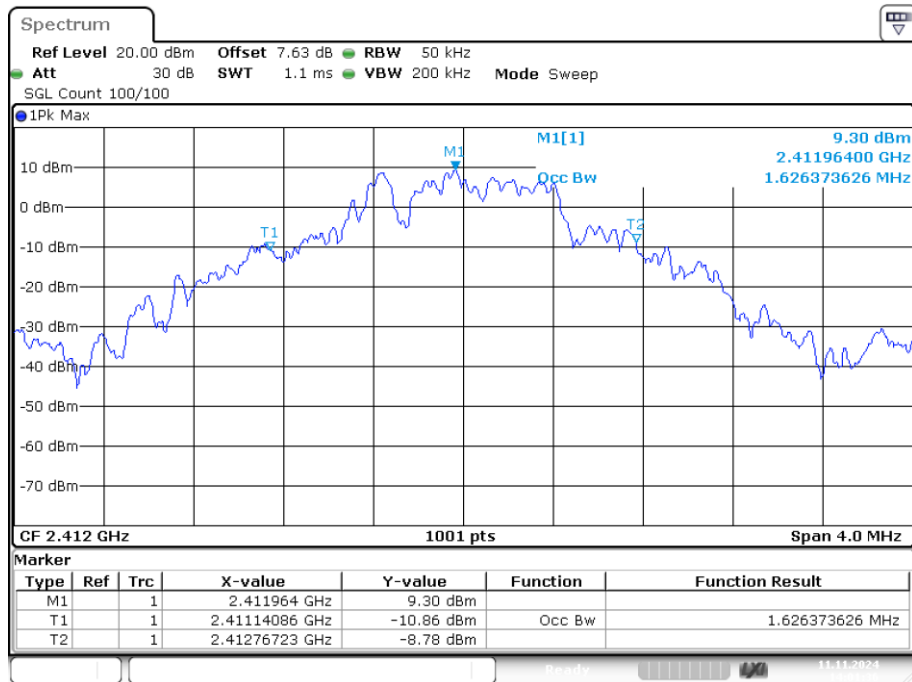
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OBW NVNT 2.4G 2471MHz Ant1



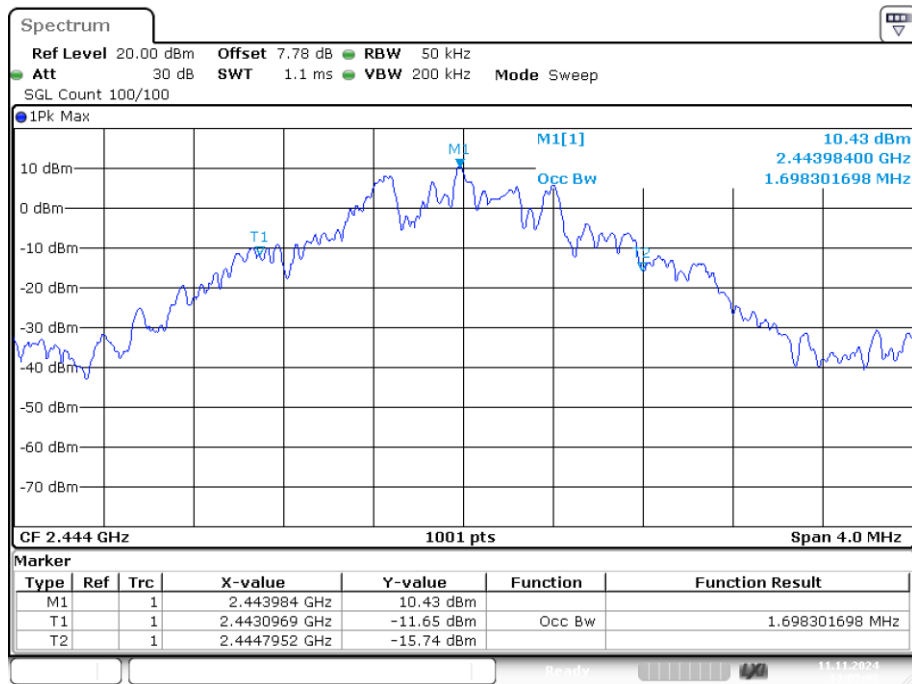
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OBW NVNT 2.4G 2412MHz Ant1



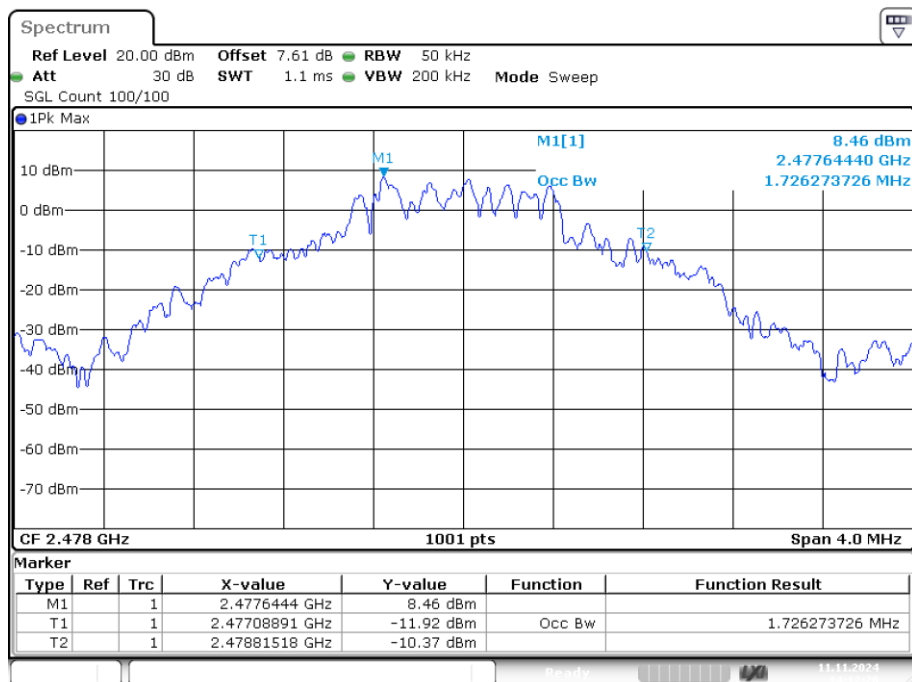
Date: 11.NOV.2024 14:01:36

OBW NVNT 2.4G 2444MHz Ant1



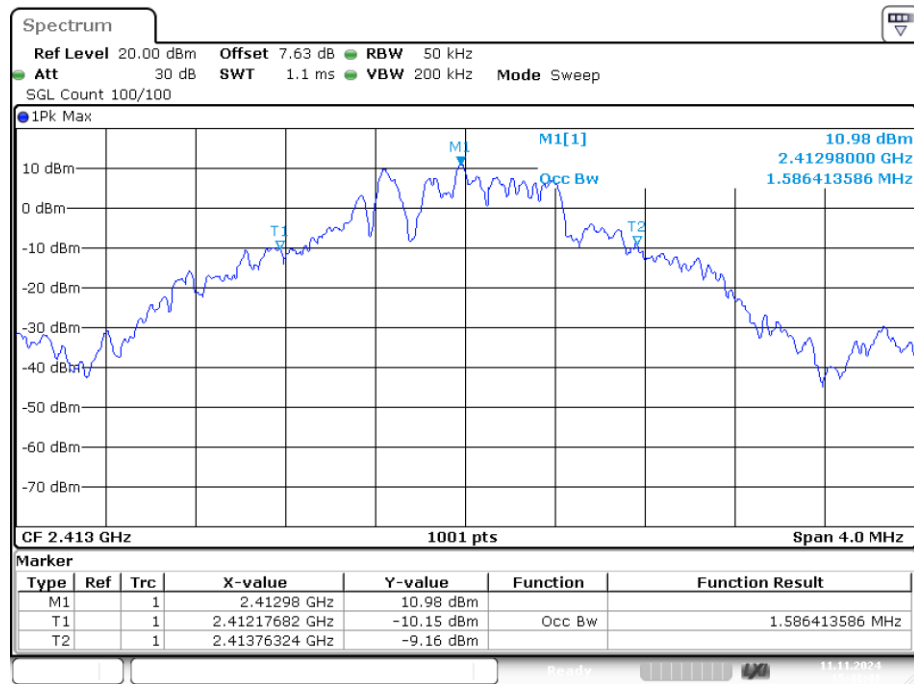
Date: 11.NOV.2024 14:05:07

OBW NVNT 2.4G 2478MHz Ant1



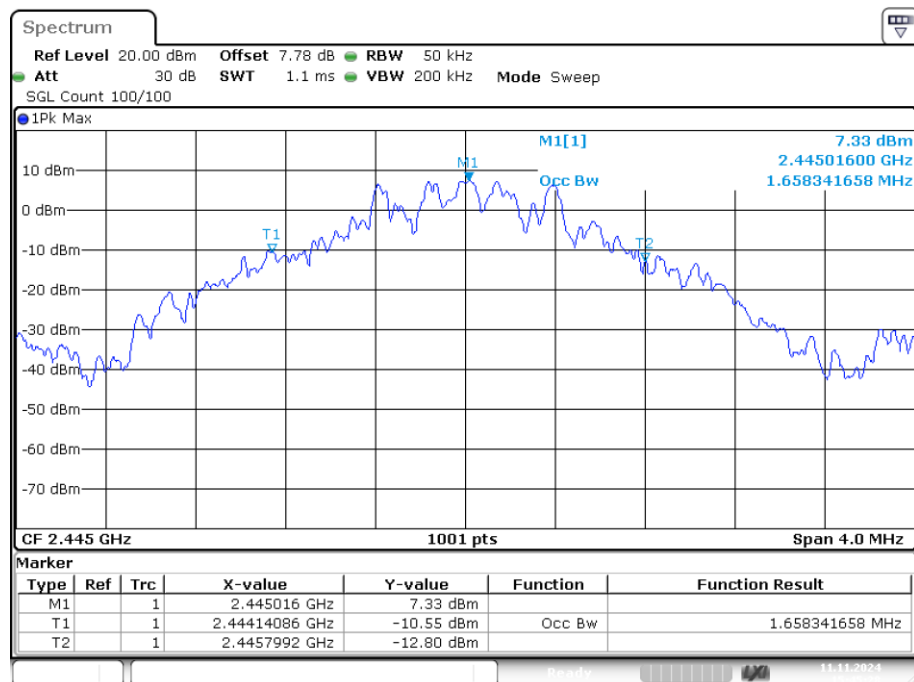
Date: 11.NOV.2024 14:12:20

OBW NVNT 2.4G 2413MHz Ant1



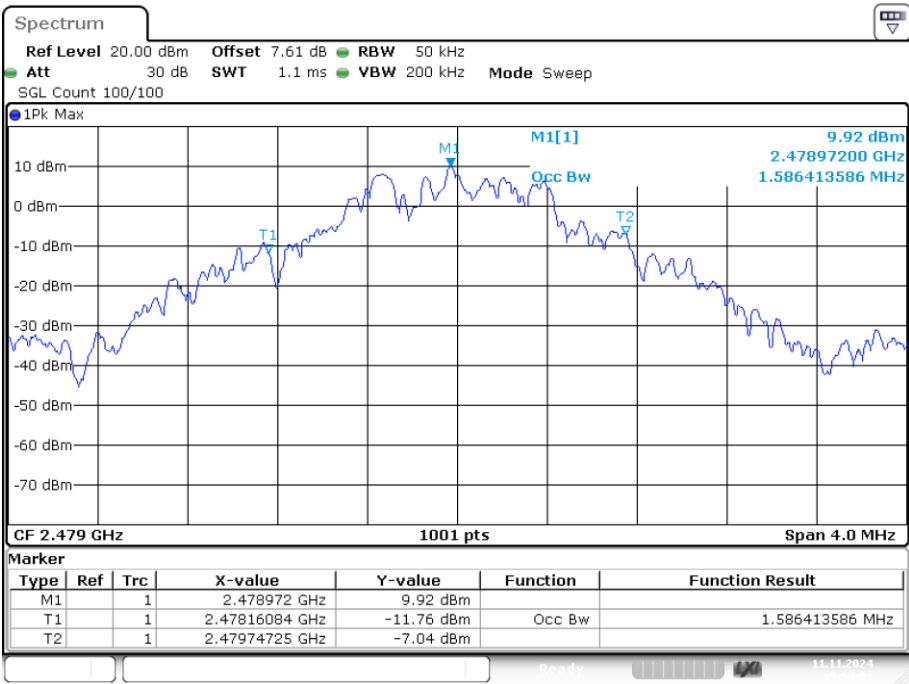
Date: 11.NOV.2024 15:41:40

OBW NVNT 2.4G 2445MHz Ant1



Date: 11.NOV.2024 15:45:27

OBW NVNT 2.4G 2479MHz Ant1



Date: 11.NOV.2024 15:54:01

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

2404-2470MHz

Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	2.4G	Ant1	2437.5	2439.5	2	1.125	Pass

2405-2471MHz

Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	2.4G	Ant1	2436.988	2438.99	2.002	1.088	Pass

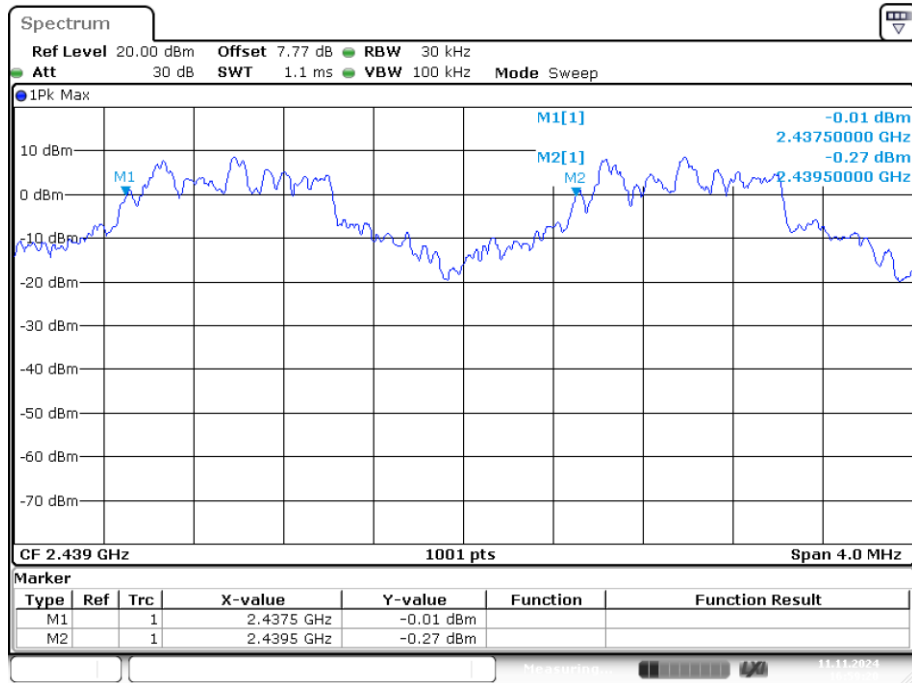
2412-2478MHz

Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	2.4G	Ant1	2444.096	2446.118	2.022	1.109	Pass

2413-2479MHz

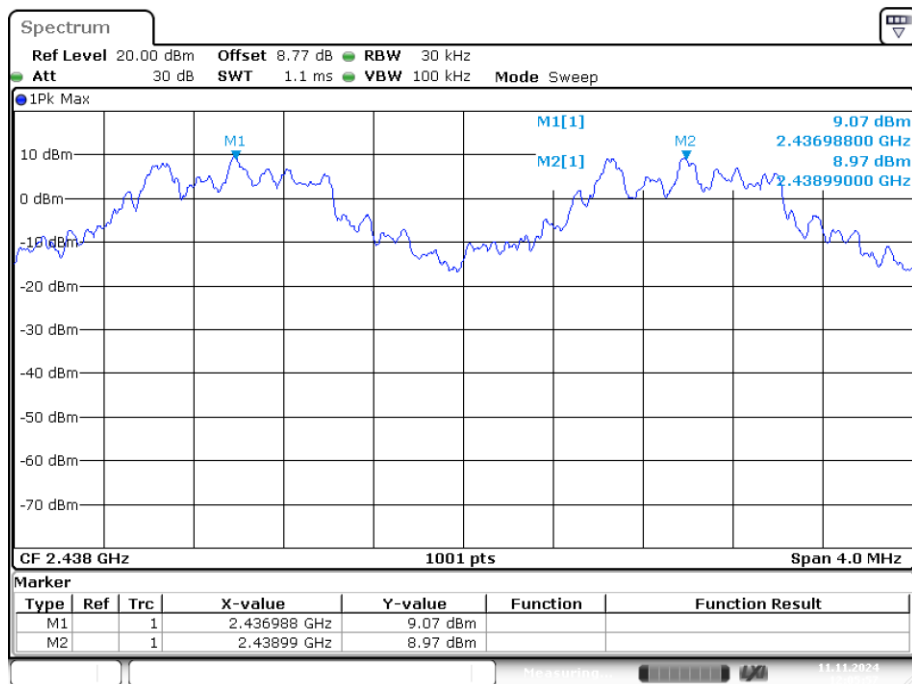
Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	2.4G	Ant1	2444.994	2446.968	1.974	1.12	Pass

CFS NVNT 2.4G 2437MHz Ant1



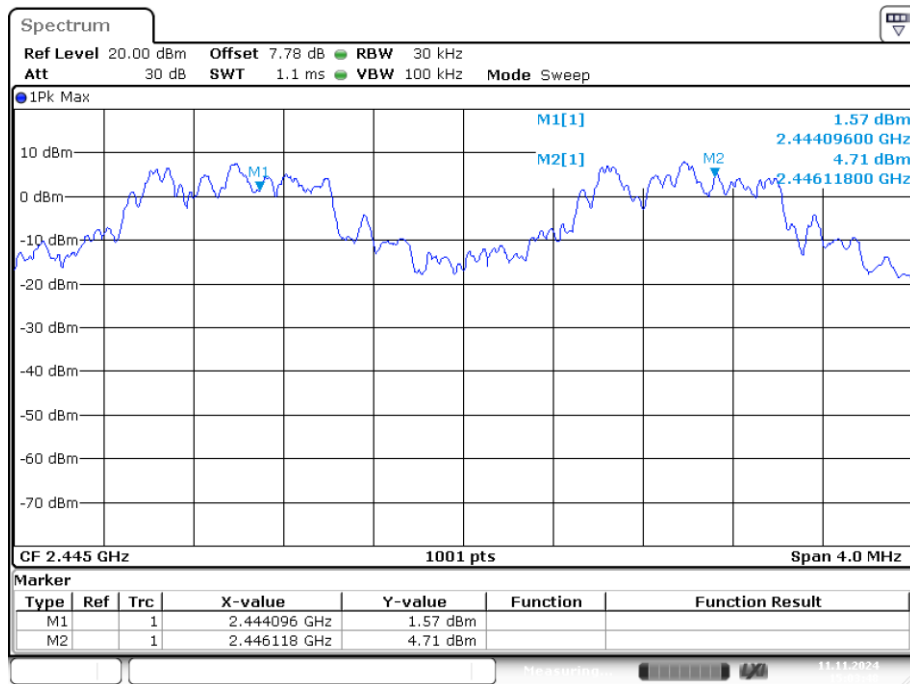
Date: 11.NOV.2024 16:59:21

CFS NVNT 2.4G 2437MHz Ant1



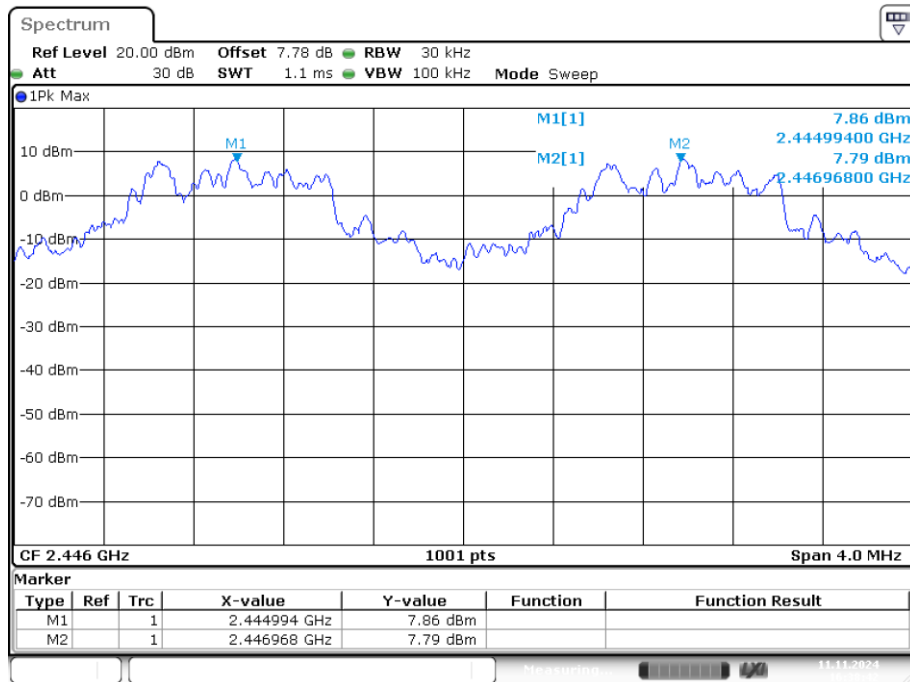
Date: 11.NOV.2024 12:05:57

CFS NVNT 2.4G 2444MHz Ant1



Date: 11.NOV.2024 15:03:48

CFS NVNT 2.4G 2445MHz Ant1



Date: 11.NOV.2024 16:38:41

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

2404-2470MHz

Condition	Mode	Antenna	Hopping Number	Limit	Verdict
NVNT	2.4G	Ant1	34	15	Pass

2405-2471MHz

Condition	Mode	Antenna	Hopping Number	Limit	Verdict
NVNT	2.4G	Ant1	34	15	Pass

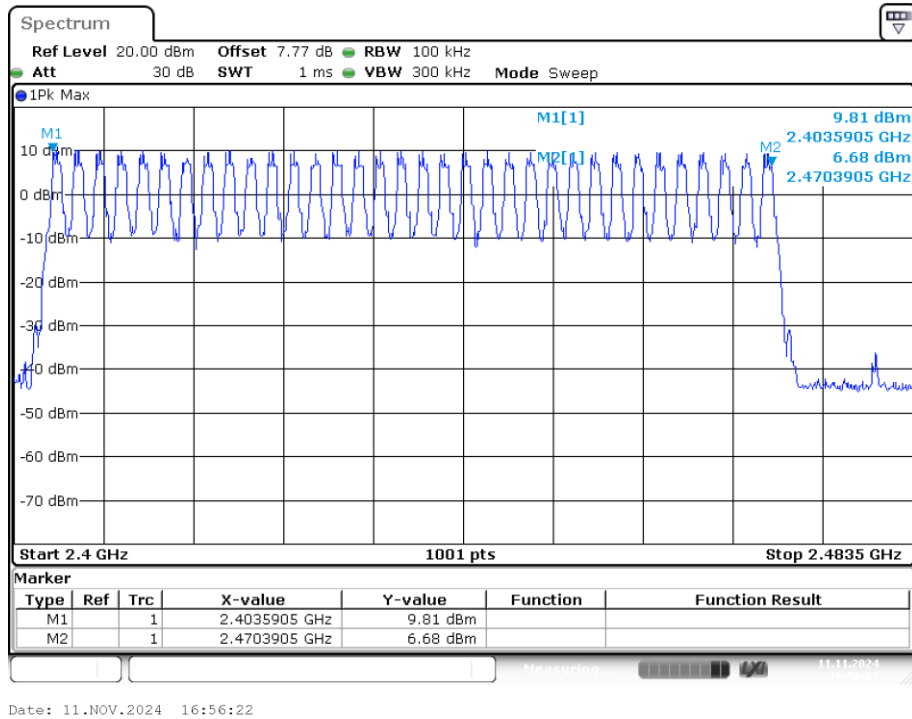
2412-2478MHz

Condition	Mode	Antenna	Hopping Number	Limit	Verdict
NVNT	2.4G	Ant1	34	15	Pass

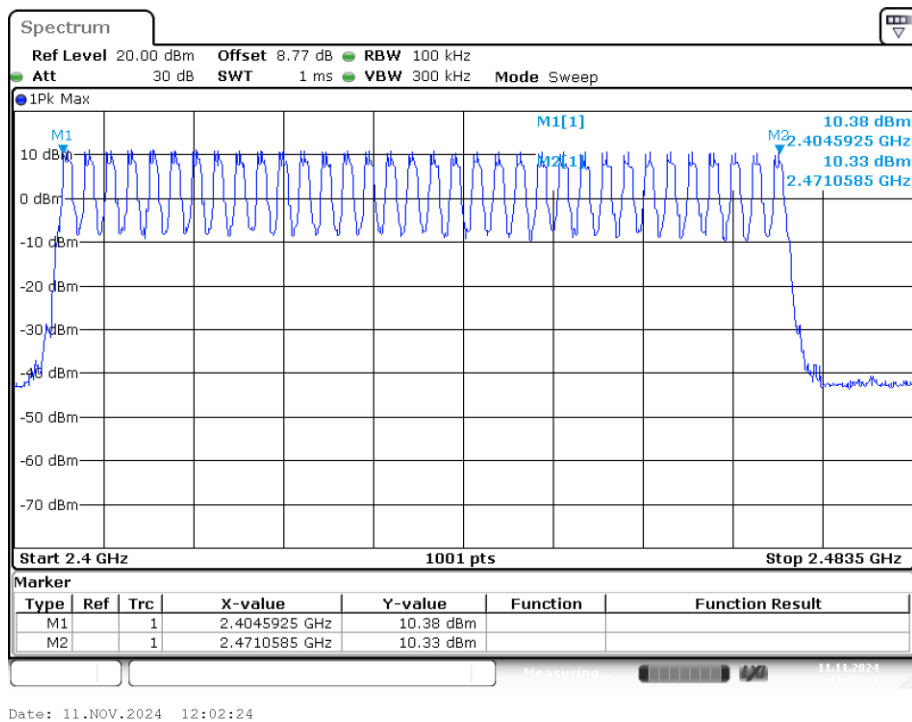
2413-2479MHz

Condition	Mode	Antenna	Hopping Number	Limit	Verdict
NVNT	2.4G	Ant1	34	15	Pass

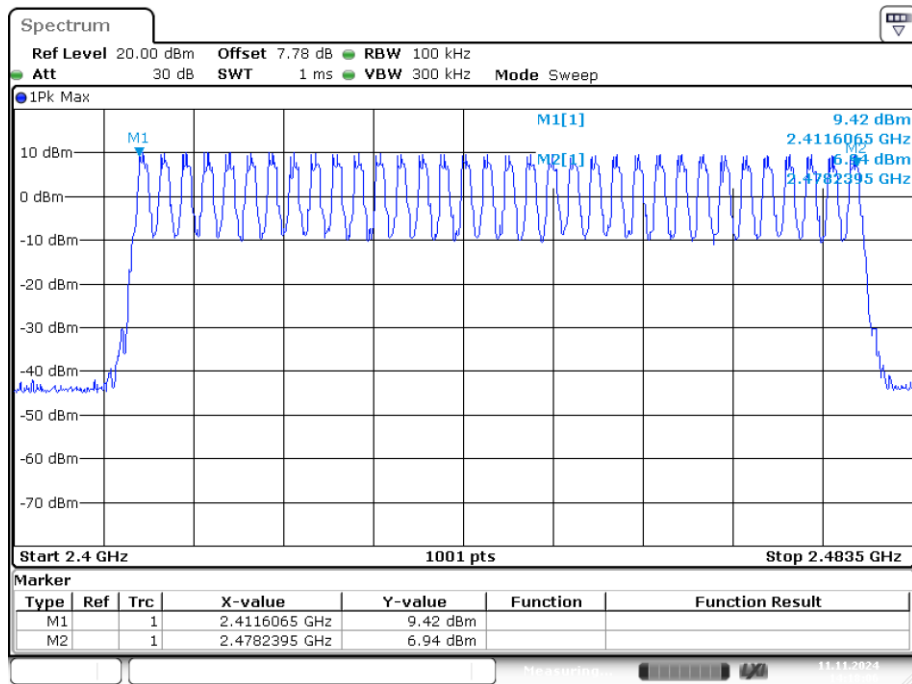
Hopping No. NVNT 2.4G 2437MHz Ant1



Hopping No. NVNT 2.4G 2437MHz Ant1

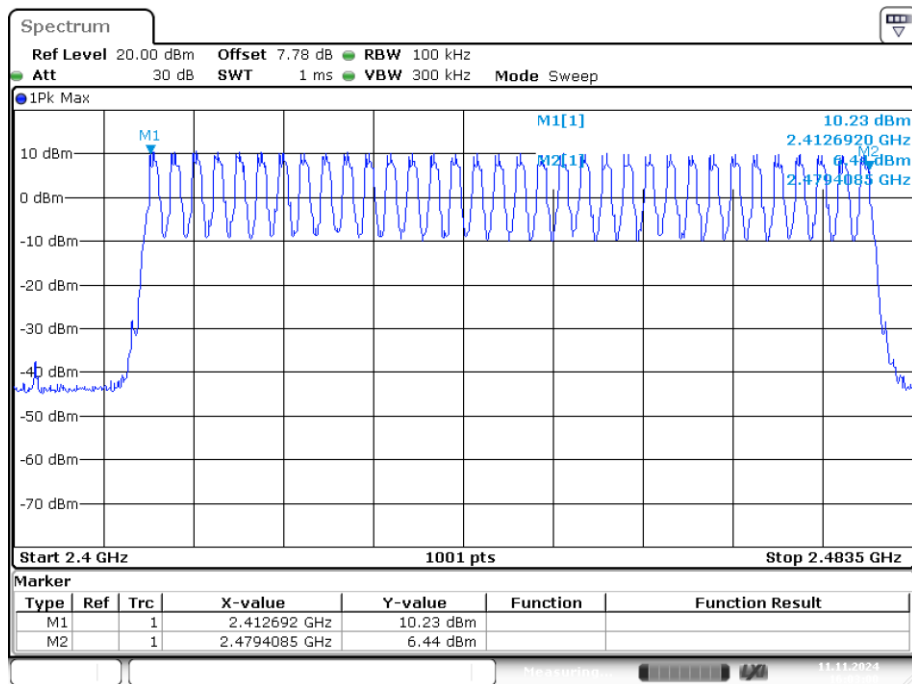


Hopping No. NVNT 2.4G 2444MHz Ant1



Date: 11.NOV.2024 14:18:07

Hopping No. NVNT 2.4G 2445MHz Ant1



Date: 11.NOV.2024 16:03:00

7. DWELL TIME

7.1. Test limit

Please refer section 15.247

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

2404-2470MHz

Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	2.4G	2437	Ant1	0.133	66.633	501	31600	400	Pass

2405-2471MHz

Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	2.4G	2437	Ant1	0.136	68.136	501	31600	400	Pass

2412-2478MHz

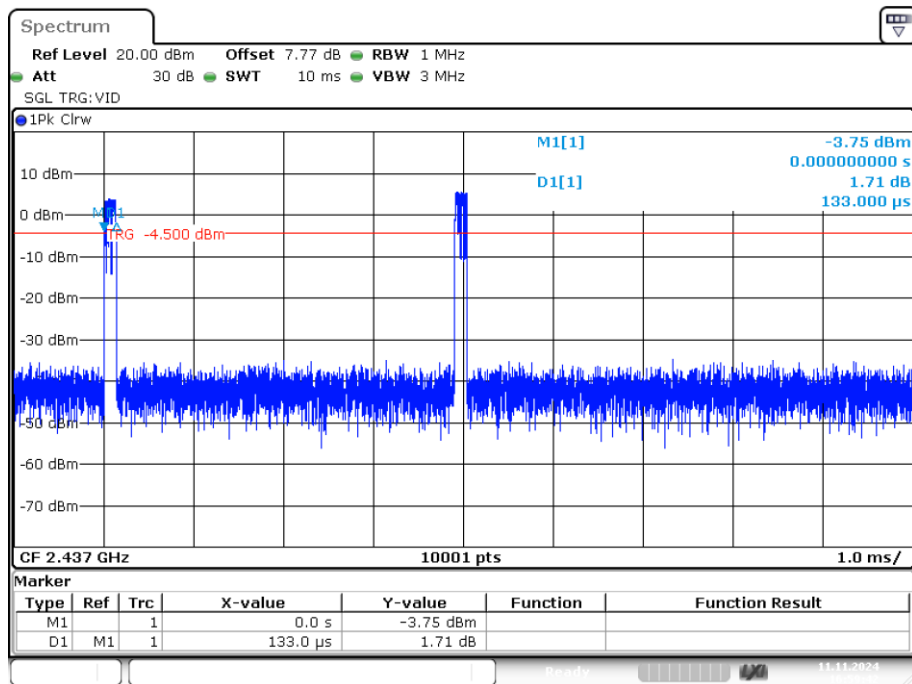
Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	2.4G	2444	Ant1	0.136	68.136	501	31600	400	Pass

2413-2479MHz

Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	2.4G	2445	Ant1	0.136	68.136	501	31600	400	Pass

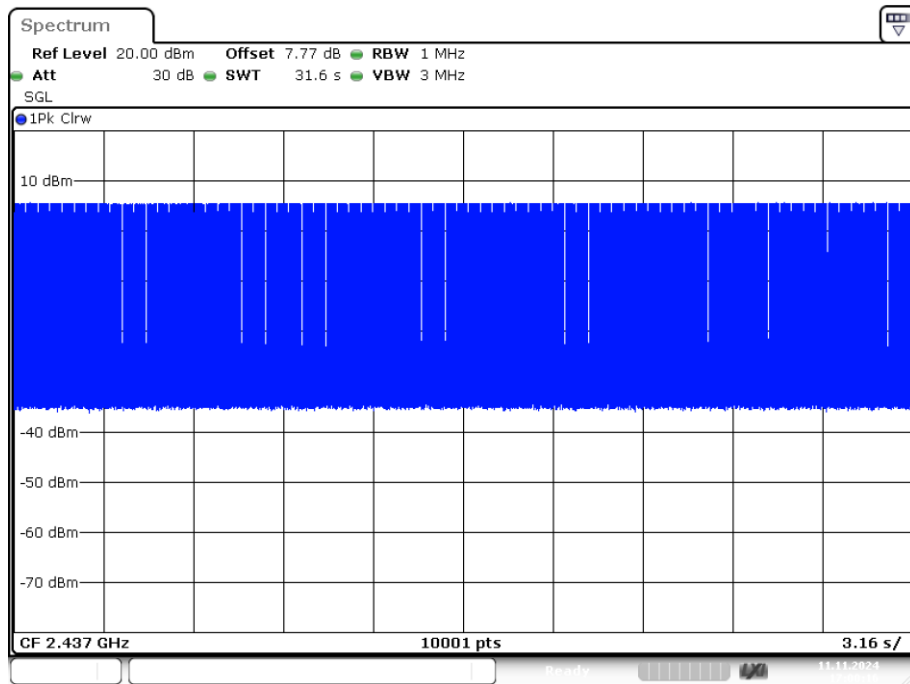
Note: Total Dwell Time= Pulse Time* Burst Count

Dwell NVNT 2.4G 2437MHz Ant1 One Burst



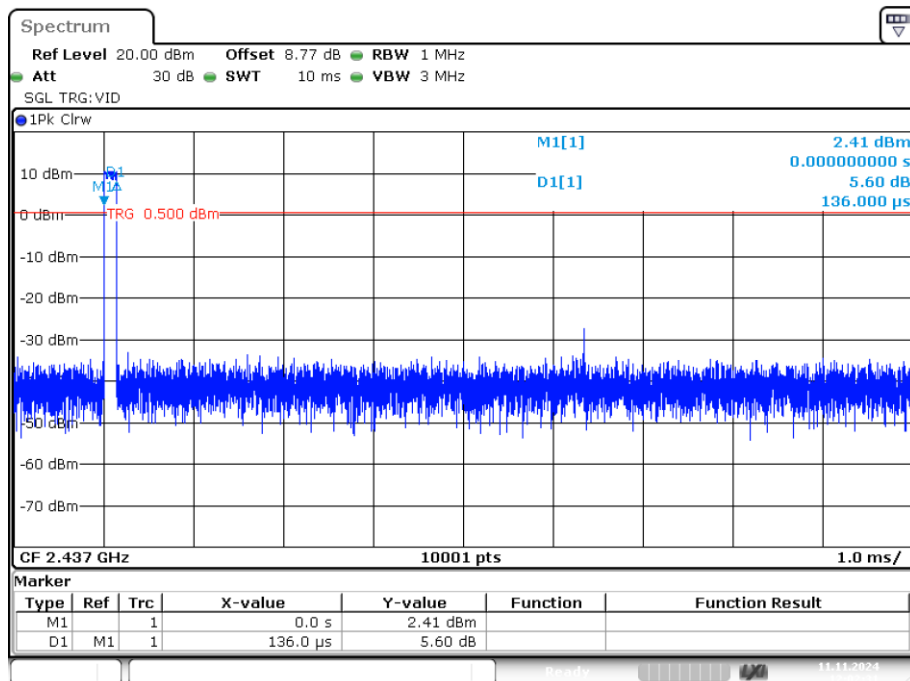
Date: 11.NOV.2024 16:59:42

Dwell NVNT 2.4G 2437MHz Ant1 Accumulated



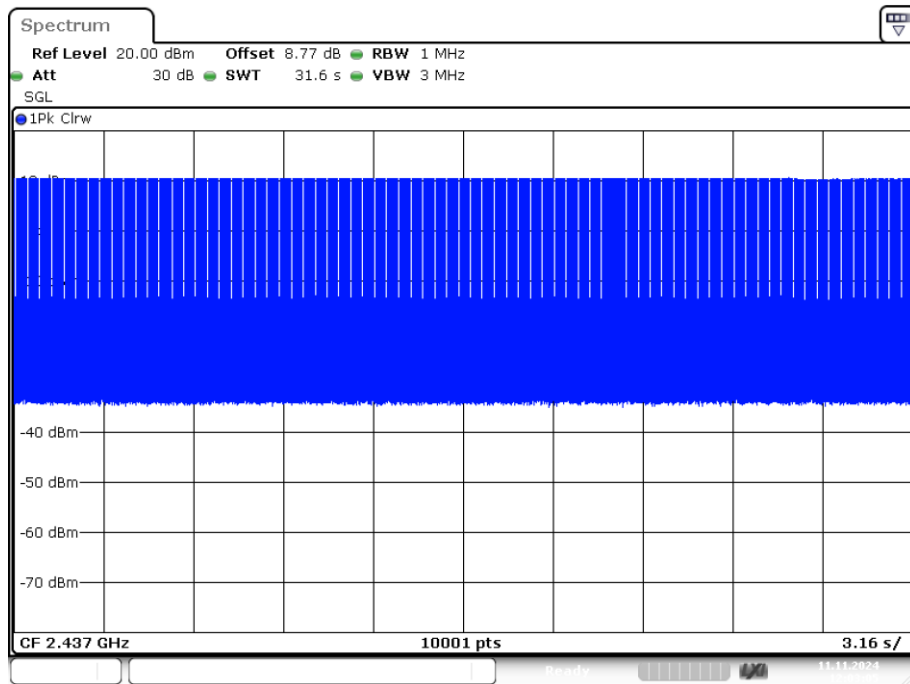
Date: 11.NOV.2024 17:00:17

Dwell NVNT 2.4G 2437MHz Ant1 One Burst



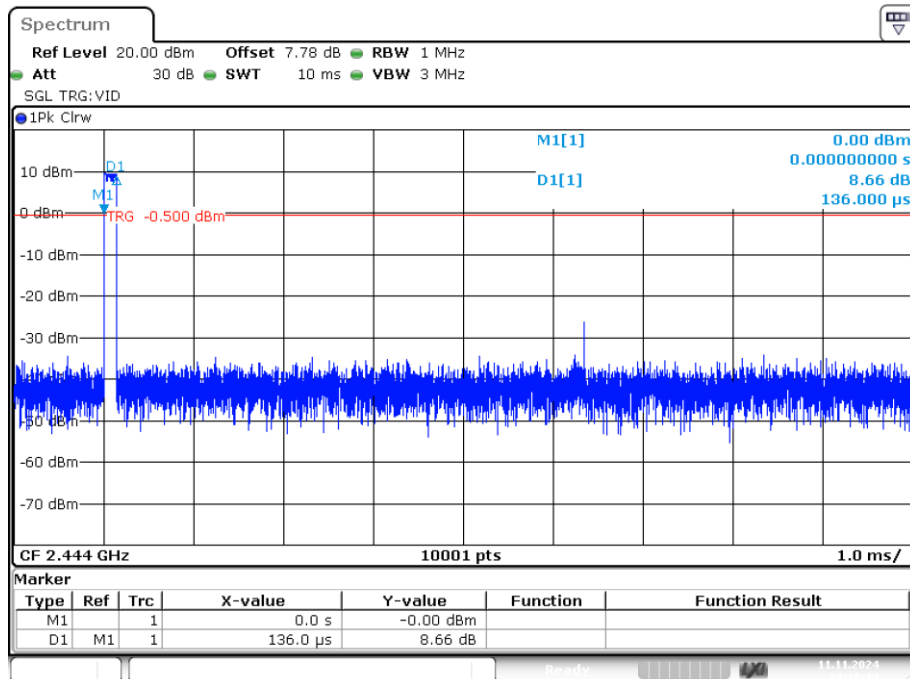
Date: 11.NOV.2024 12:02:31

Dwell NVNT 2.4G 2437MHz Ant1 Accumulated



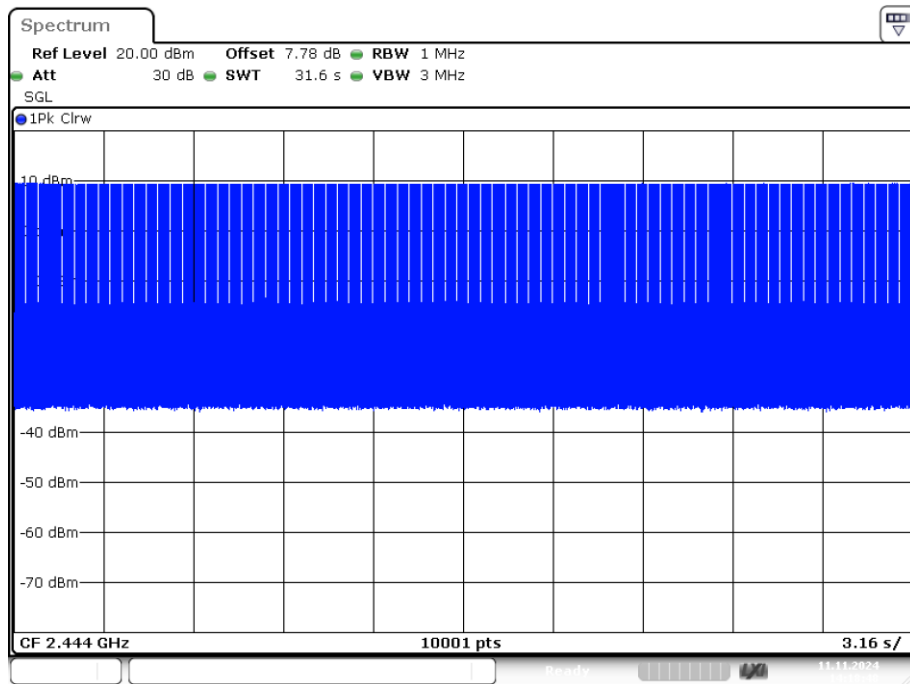
Date: 11.NOV.2024 12:03:05

Dwell NVNT 2.4G 2444MHz Ant1 One Burst



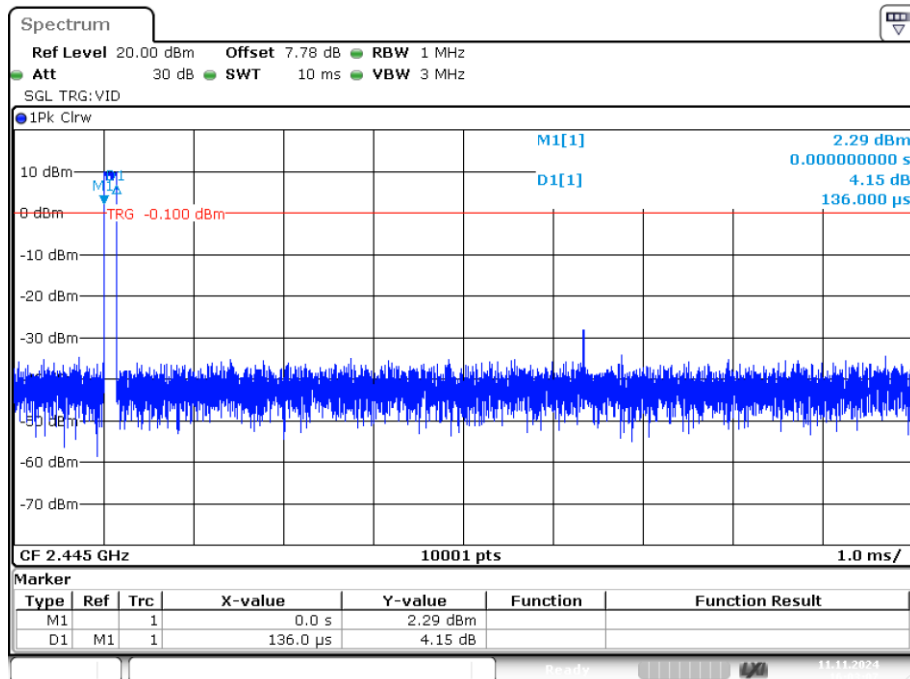
Date: 11.NOV.2024 14:18:14

Dwell NVNT 2.4G 2444MHz Ant1 Accumulated



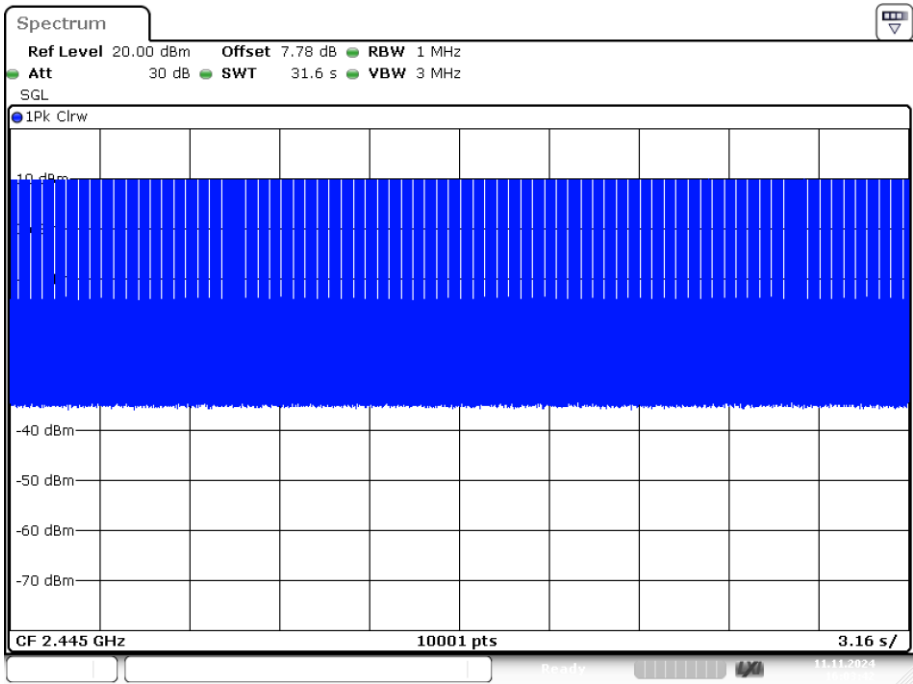
Date: 11.NOV.2024 14:18:48

Dwell NVNT 2.4G 2445MHz Ant1 One Burst



Date: 11.NOV.2024 16:03:07

Dwell NVNT 2.4G 2445MHz Ant1 Accumulated



Date: 11.NOV.2024 16:03:42

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

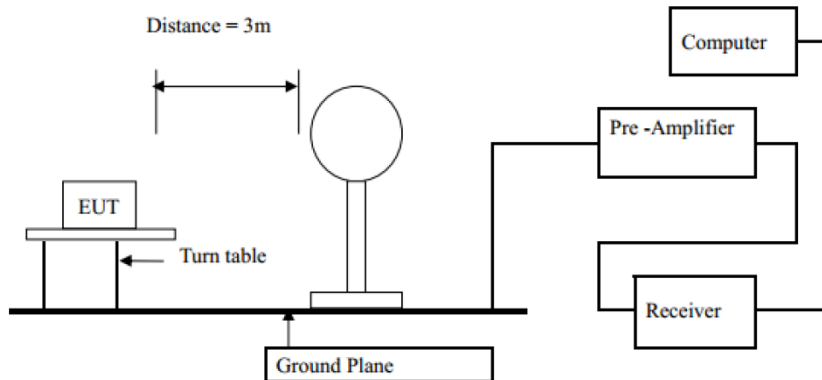
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 -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

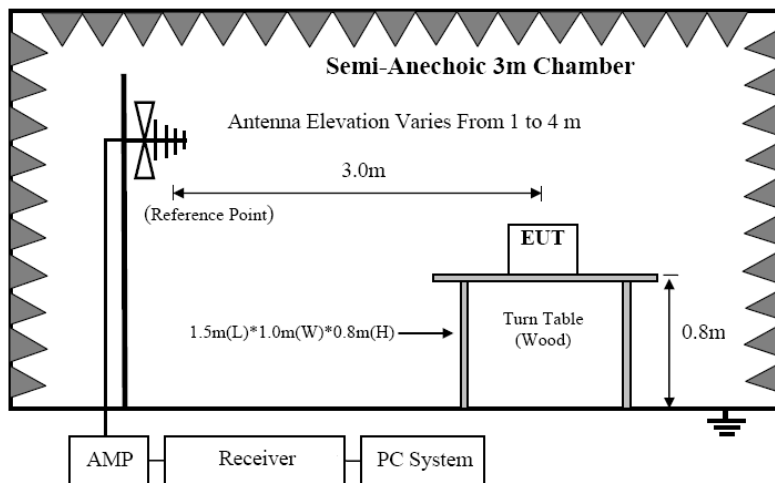
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

8.2. Block Diagram of Test setup

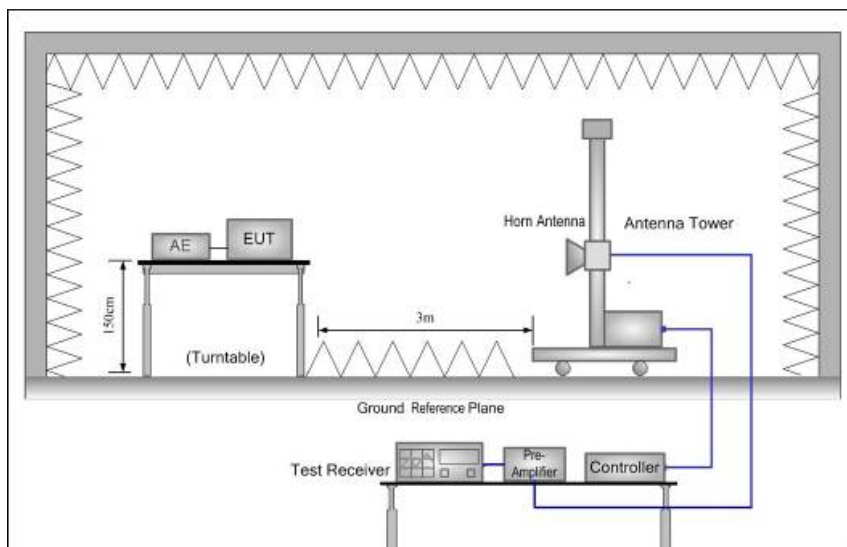
8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



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

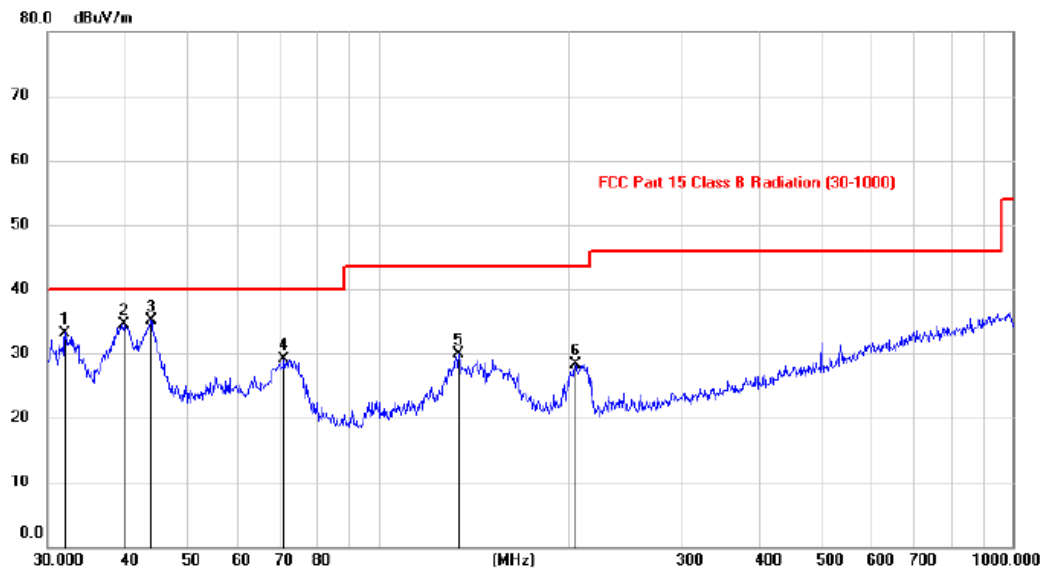
We have scanned the 10th harmonic from 9KHz to the EUT's highest frequency.
Detailed information please see the following page.

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

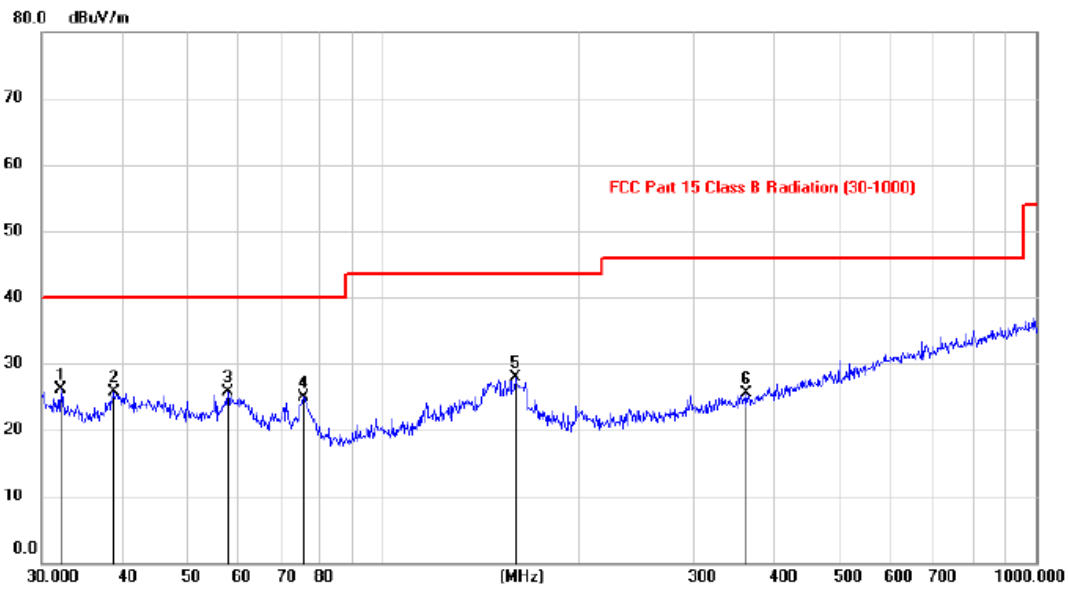
Vertical:



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		32.0518	19.60	13.60	33.20	40.00	-6.80	peak		
2		39.5988	20.08	14.47	34.55	40.00	-5.45	peak		
3	*	43.6892	20.80	14.23	35.03	40.00	-4.97	peak		
4		70.8646	17.87	11.15	29.02	40.00	-10.98	peak		
5		133.9785	15.95	13.88	29.83	43.50	-13.67	peak		
6		204.2616	17.32	10.97	28.29	43.50	-15.21	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	Measurement	Limit	Margin	Antenna Height	Table Degree
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree
1	*	32.0706	12.50	13.60	26.10	40.00	-13.90	peak	
2		38.7020	11.29	14.36	25.65	40.00	-14.35	peak	
3		57.9925	12.34	13.41	25.75	40.00	-14.25	peak	
4		75.6406	14.42	10.50	24.92	40.00	-15.08	peak	
5		159.4486	12.79	15.04	27.83	43.50	-15.67	peak	
6		360.8271	10.03	15.45	25.48	46.00	-20.52	peak	

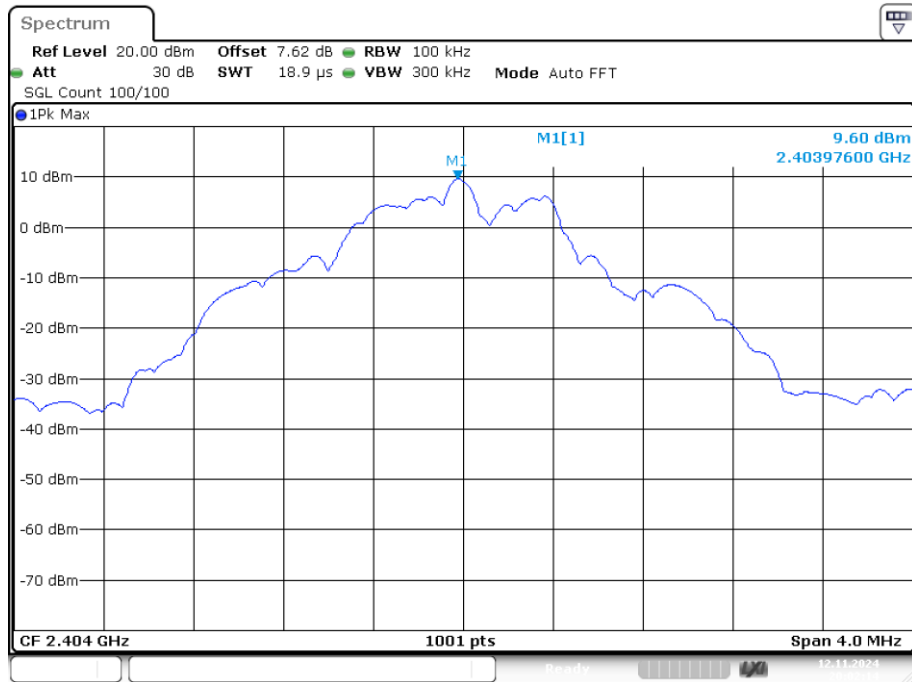
Note: 1. *:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Remark: All modes have been tested, and only worst data of GFSK (2413MHz) was listed in this report.

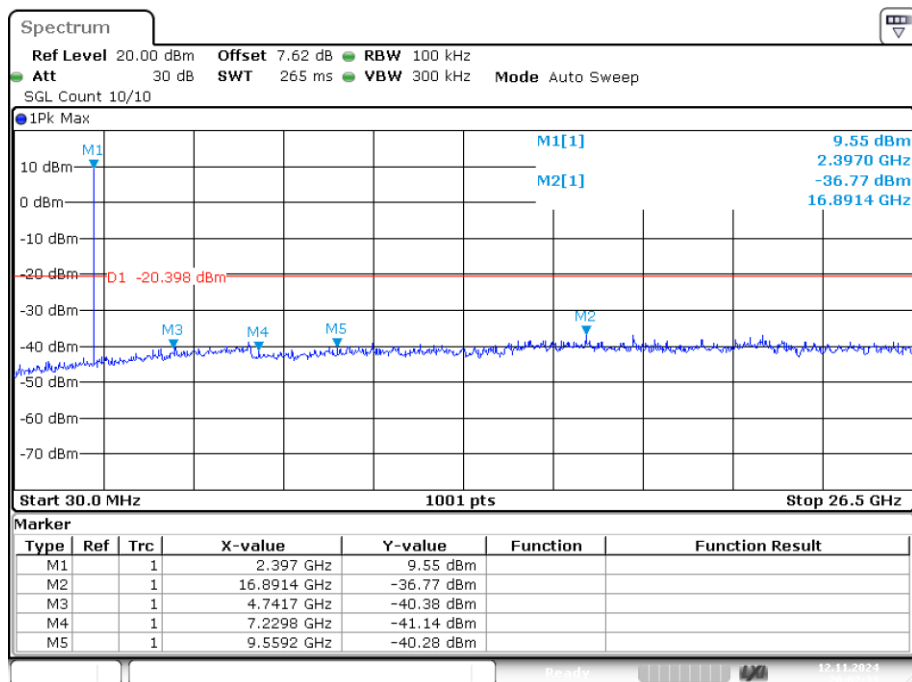
Conducted RF Spurious Emission

Tx. Spurious NVNT 2.4G 2404MHz Ant1 Ref



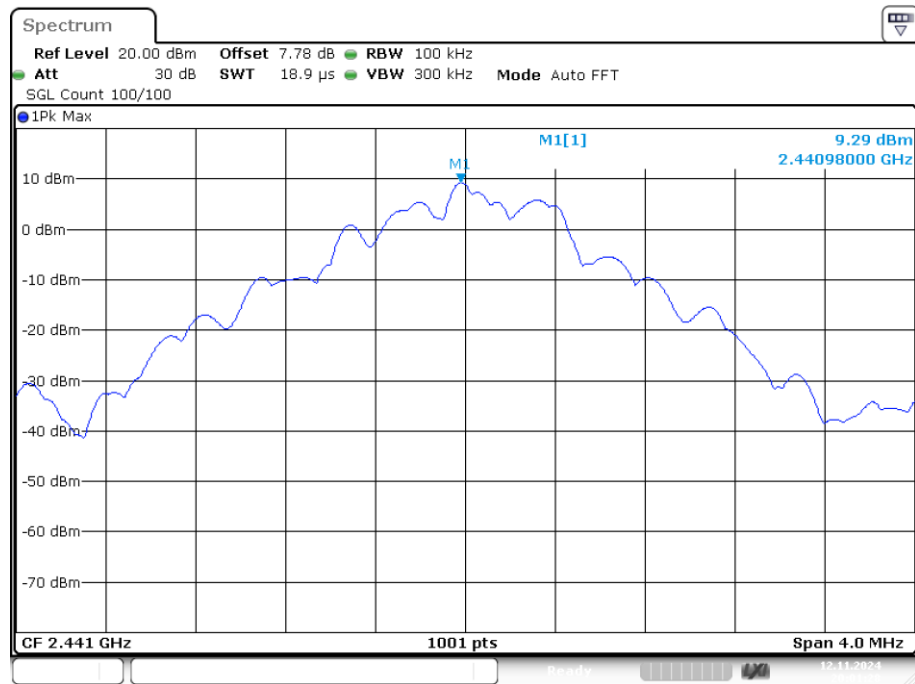
Date: 12.NOV.2024 20:02:14

Tx. Spurious NVNT 2.4G 2404MHz Ant1 Emission



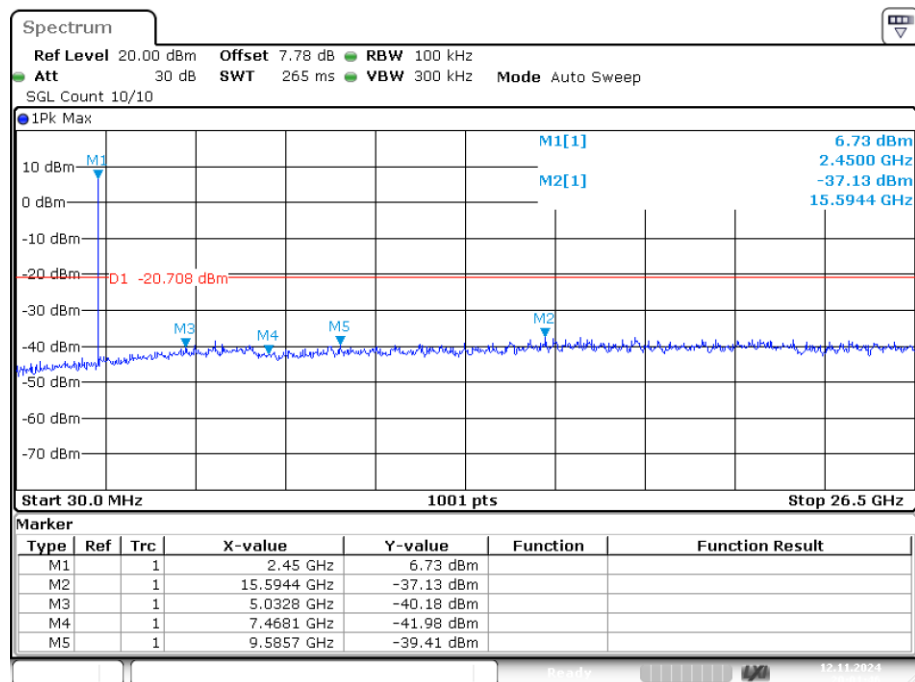
Date: 12.NOV.2024 20:02:32

Tx. Spurious NVNT 2.4G 2441MHz Ant1 Ref



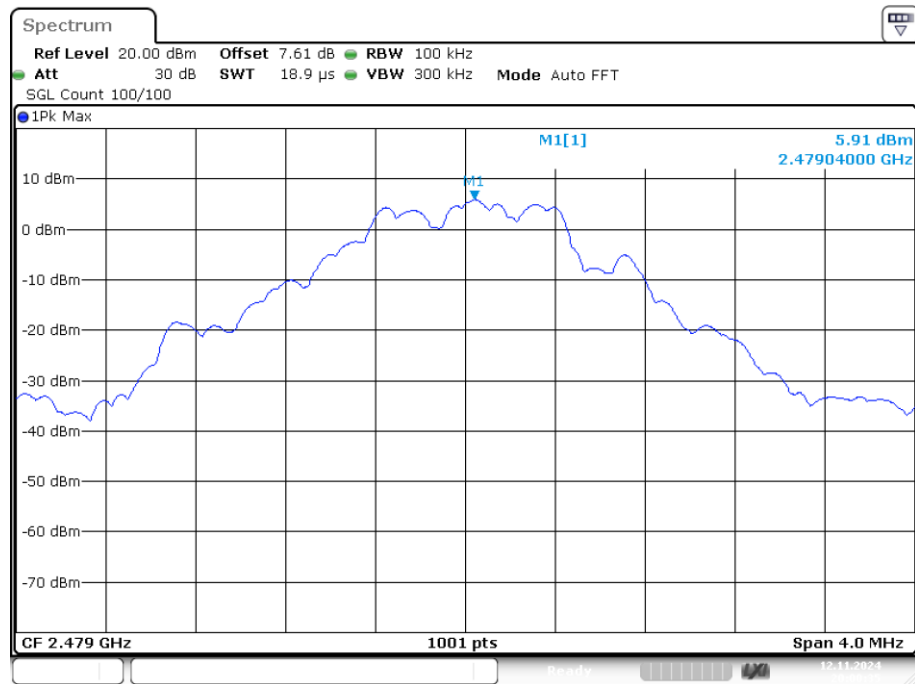
Date: 12.NOV.2024 20:01:28

Tx. Spurious NVNT 2.4G 2441MHz Ant1 Emission



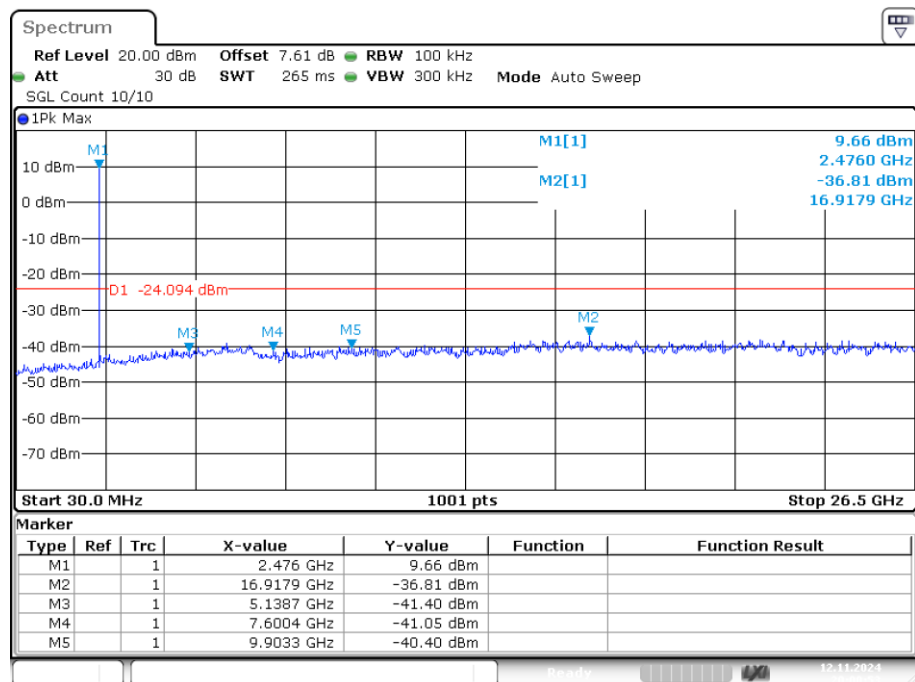
Date: 12.NOV.2024 20:01:46

Tx. Spurious NVNT 2.4G 2479MHz Ant1 Ref



Date: 12.NOV.2024 20:00:35

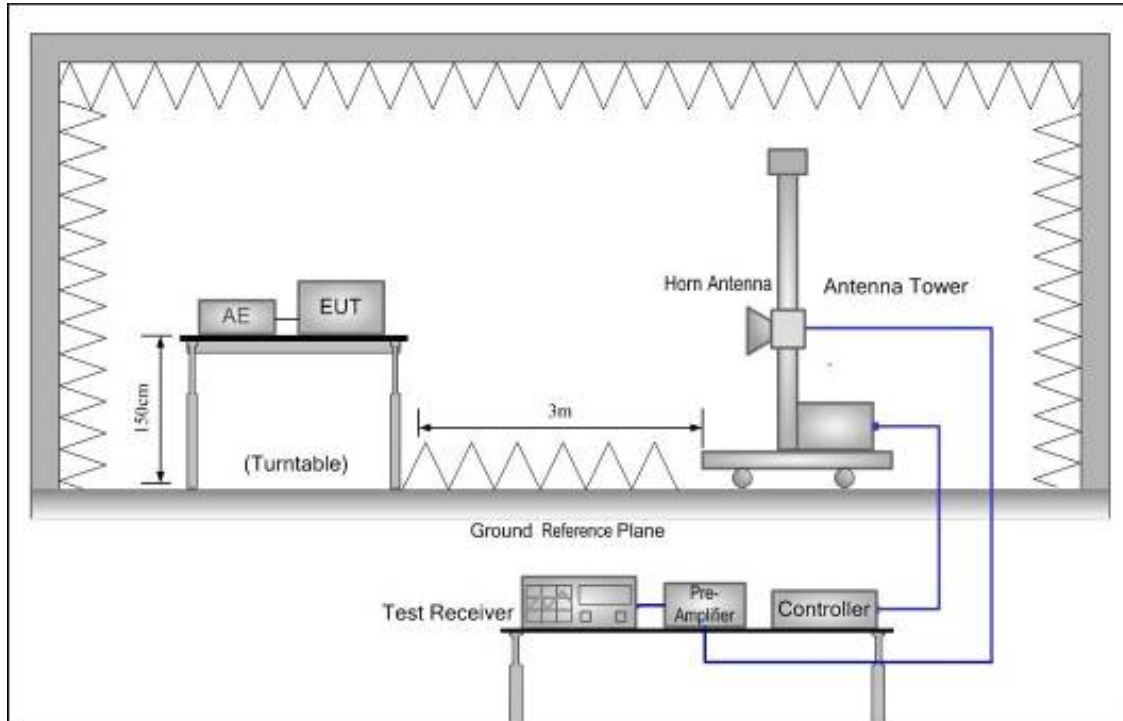
Tx. Spurious NVNT 2.4G 2479MHz Ant1 Emission



Date: 12.NOV.2024 20:00:53

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

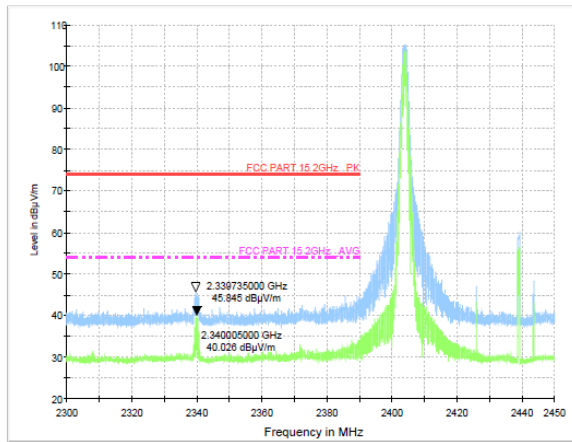
All restriction band and non- restriction band have been tested , only worse case is reported.

9.4. Test Result

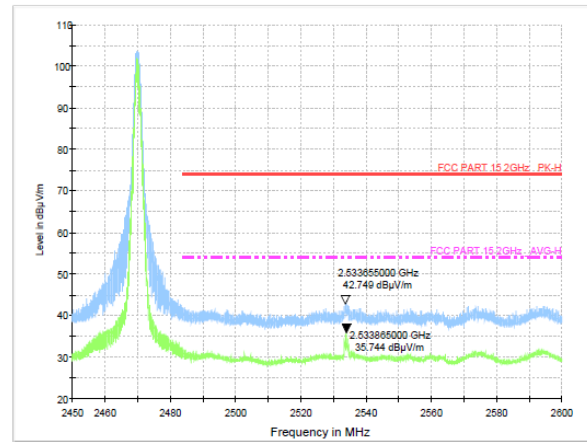
PASS. (See below detailed test data)

2404-2470MHz

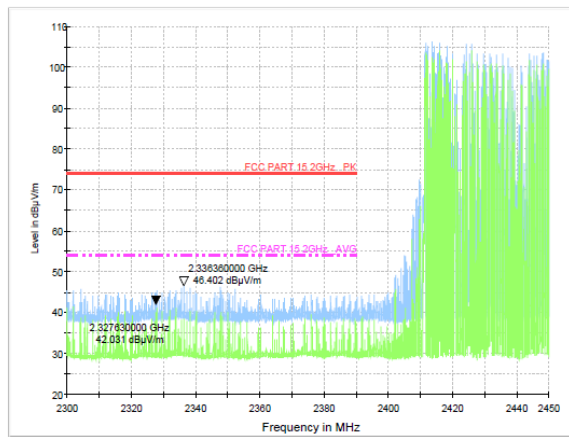
Test Mode: GFSK-Low Hopping-off



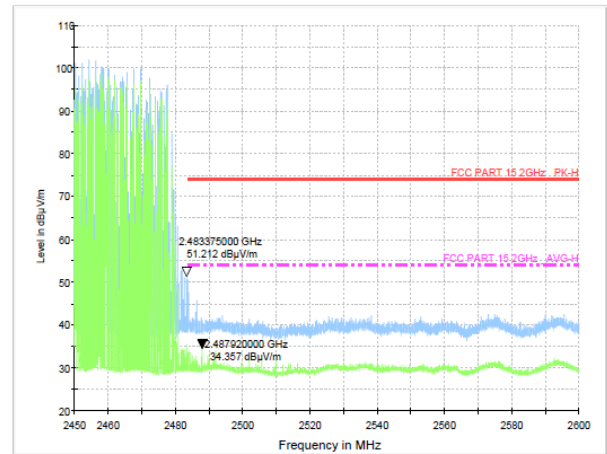
Test Mode: GFSK-High Hopping-off



Test Mode: GFSK-Low Hopping-on

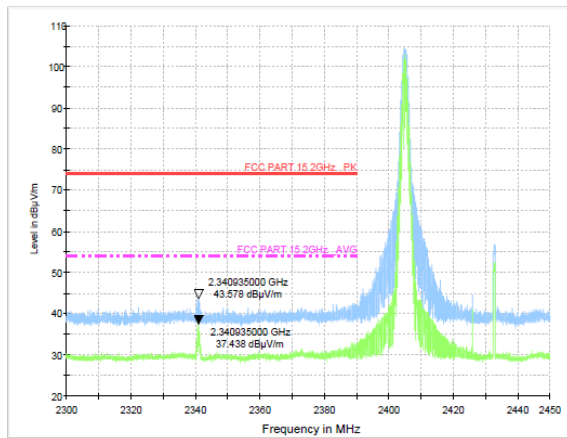


Test Mode: GFSK-High Hopping-on

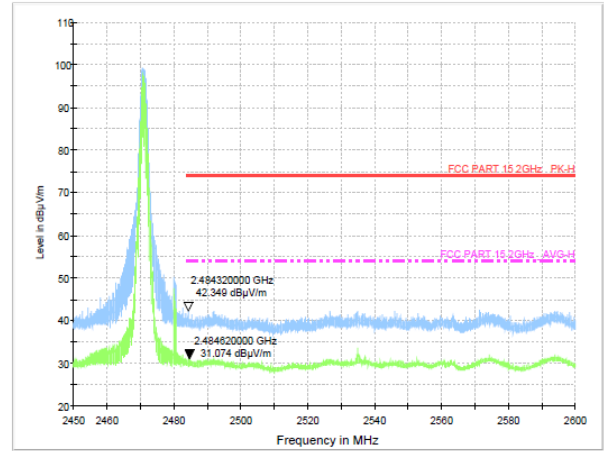


2405-2471MHz

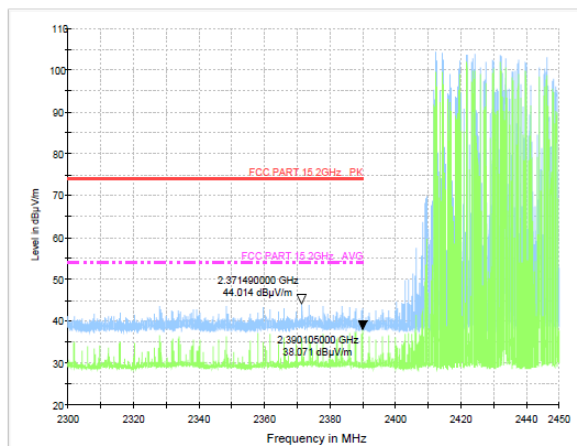
Test Mode: GFSK-Low Hopping-off



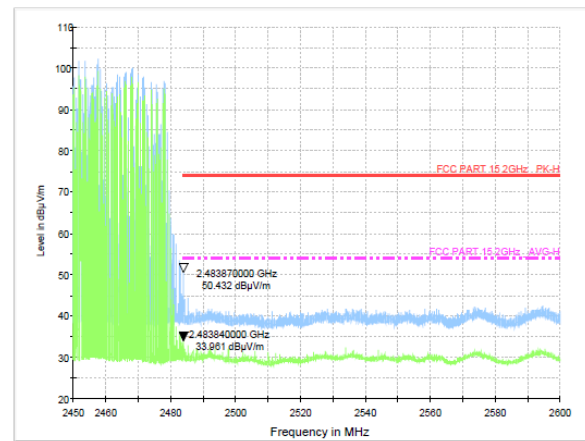
Test Mode: GFSK-High Hopping-off



Test Mode: GFSK-Low Hopping-on

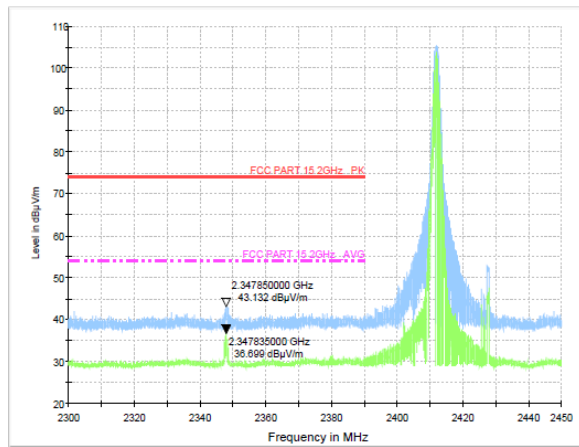


Test Mode: GFSK-High Hopping-on

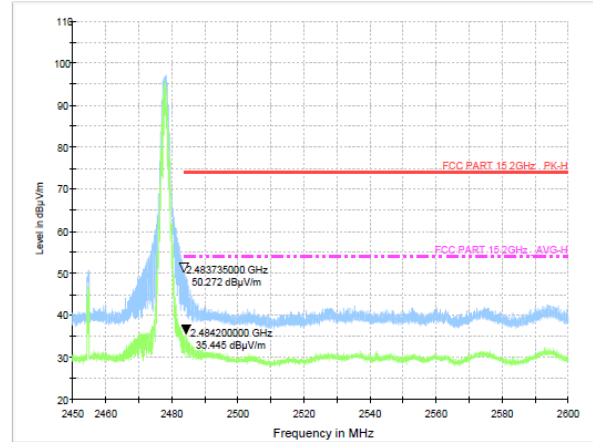


2412-2478MHz

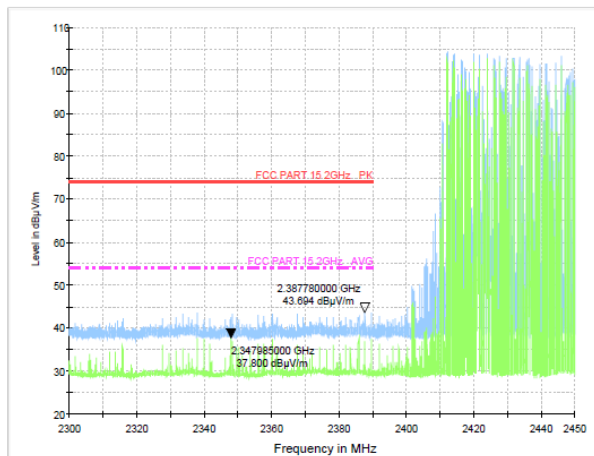
Test Mode: GFSK-Low Hopping-off



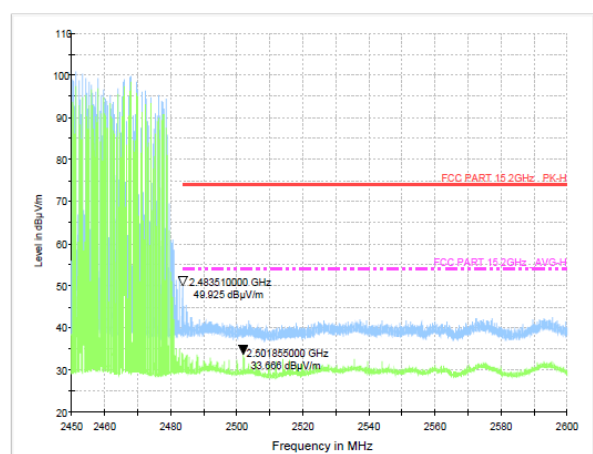
Test Mode: GFSK-High Hopping-off



Test Mode: GFSK-Low Hopping-on

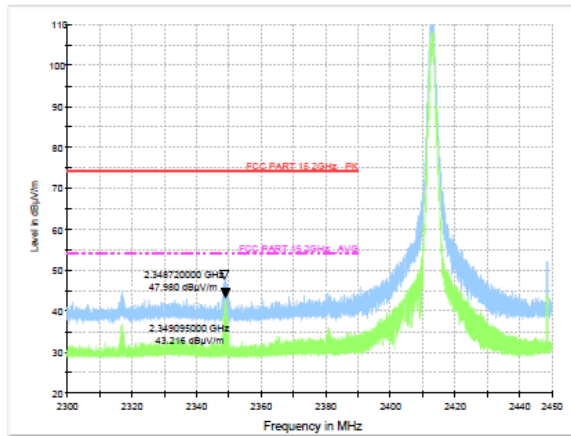


Test Mode: GFSK-High Hopping-on

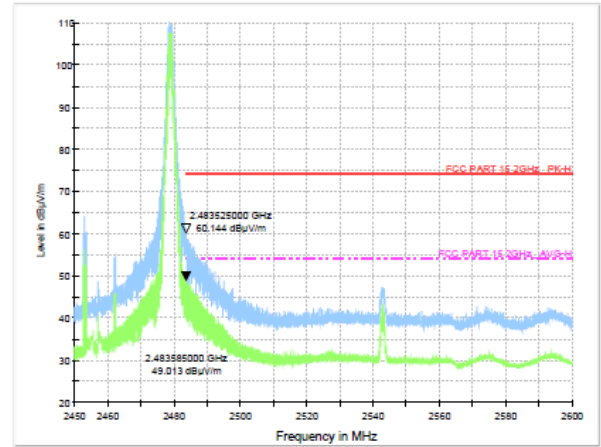


2413-2479MHz

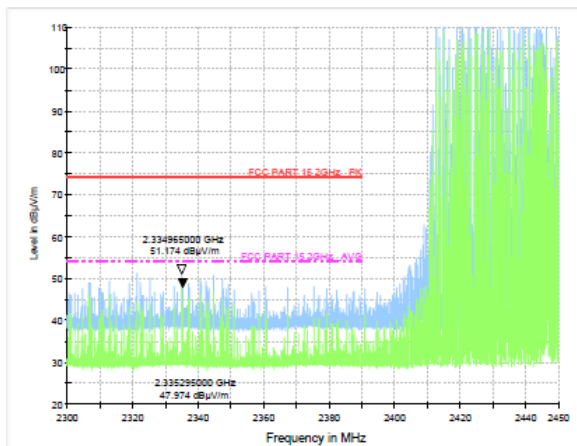
Test Mode: GFSK-Low Hopping-off



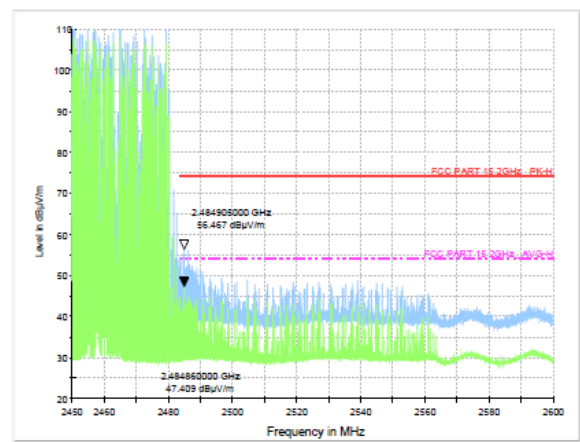
Test Mode: GFSK-High Hopping-off



Test Mode: GFSK-Low Hopping-on

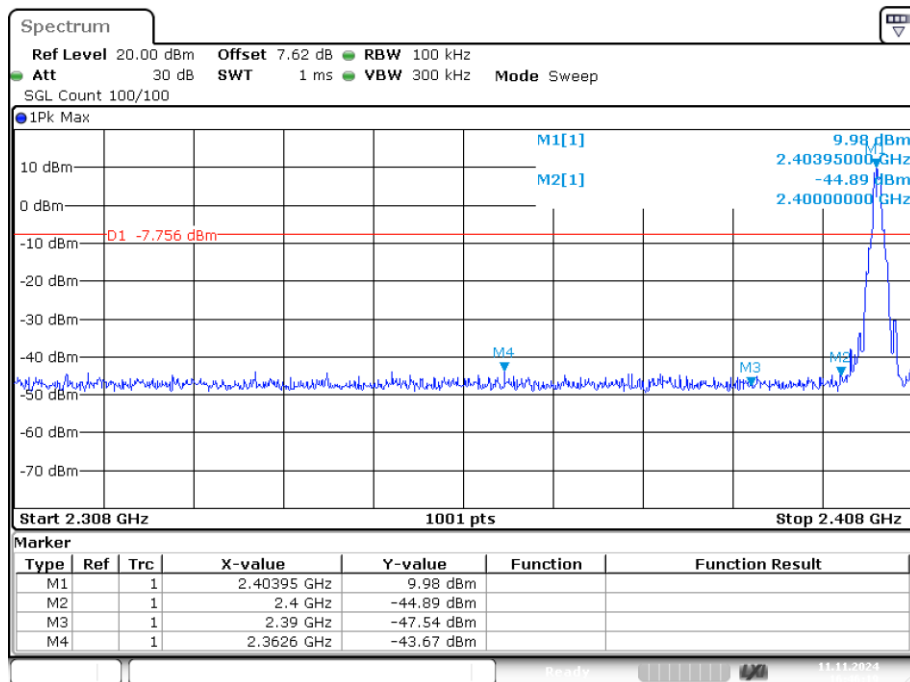


Test Mode: GFSK-High Hopping-on

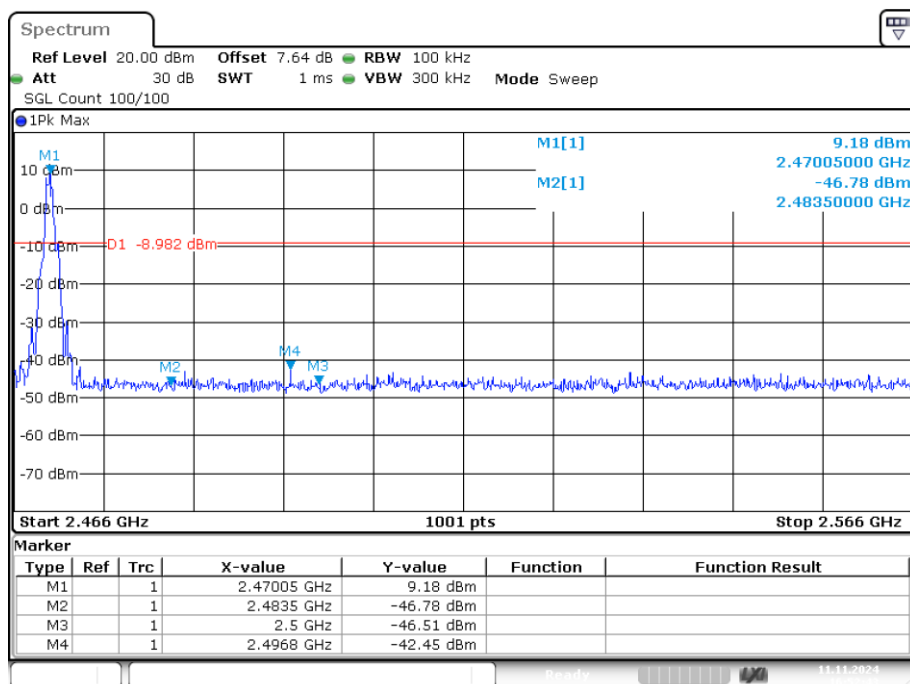


Note: 1. *:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Conducted Method**2404-0470MHz****Band Edge NVNT 2.4G 2404MHz Ant1 No-Hopping Emission**

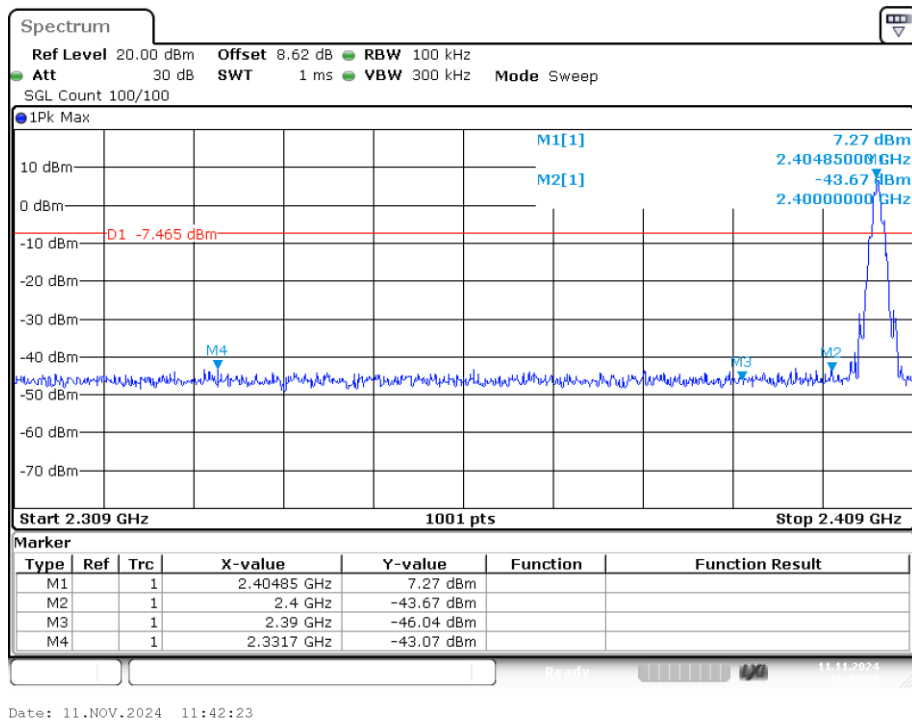
Date: 11.NOV.2024 16:46:19

Band Edge NVNT 2.4G 2470MHz Ant1 No-Hopping Emission

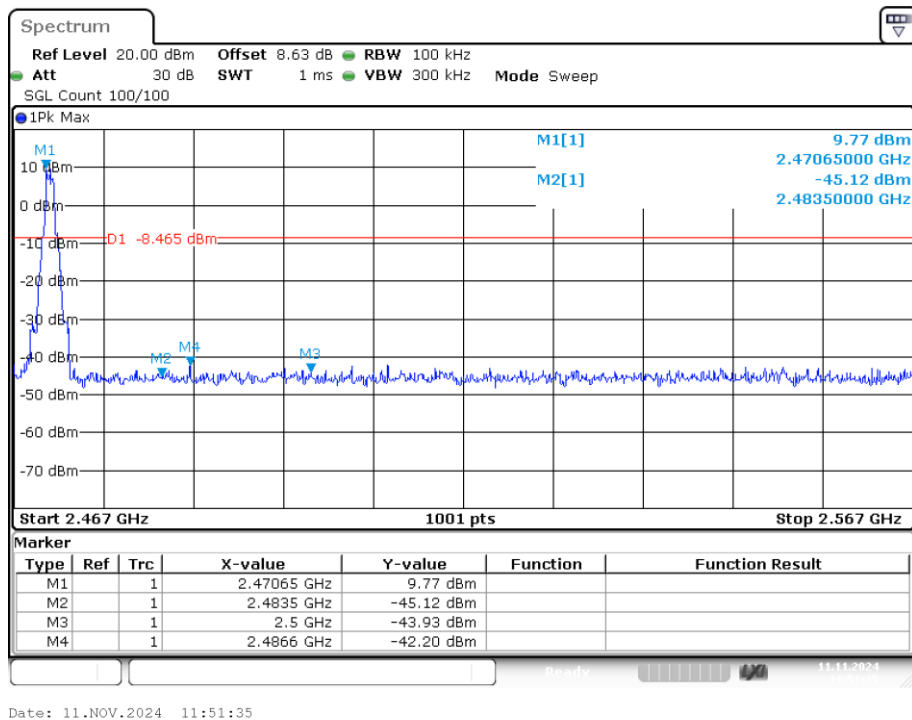
Date: 11.NOV.2024 16:52:43

2405-2471MHz

Band Edge NVNT 2.4G 2405MHz Ant1 No-Hopping Emission

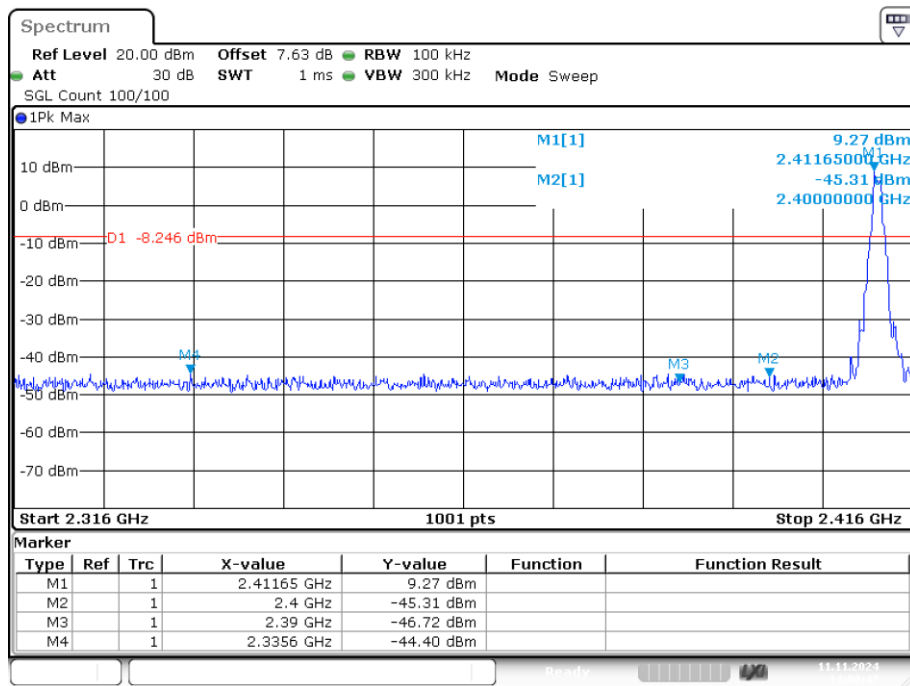


Band Edge NVNT 2.4G 2471MHz Ant1 No-Hopping Emission



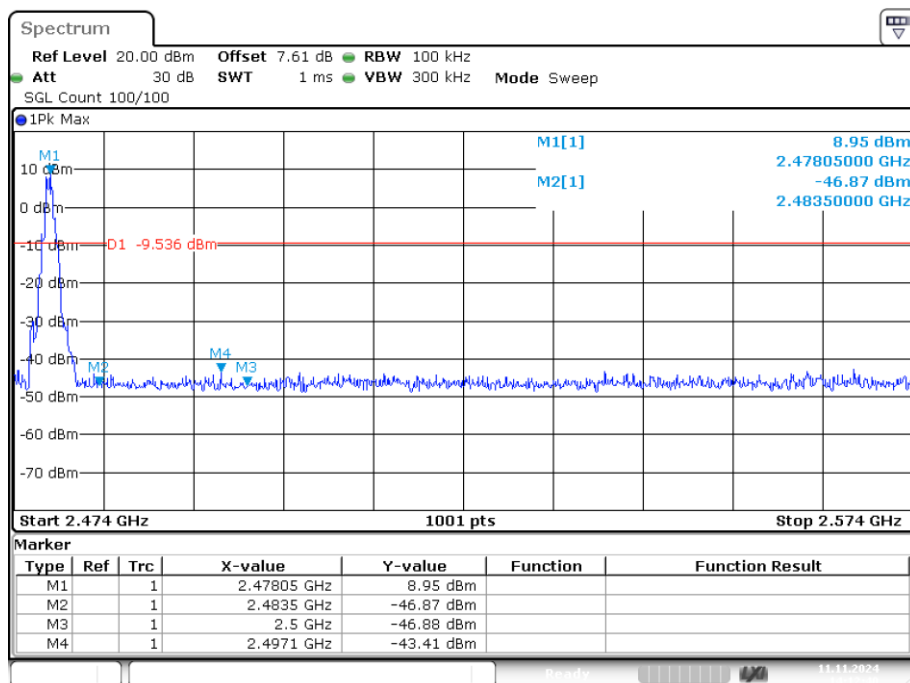
2412-2478MHz

Band Edge NVNT 2.4G 2412MHz Ant1 No-Hopping Emission



Date: 11.NOV.2024 14:00:47

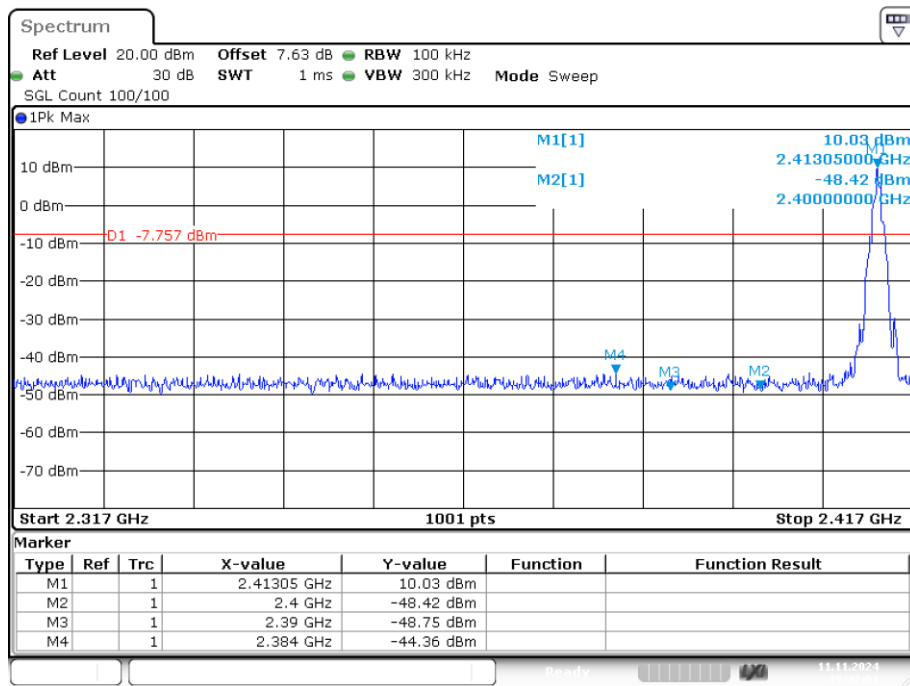
Band Edge NVNT 2.4G 2478MHz Ant1 No-Hopping Emission



Date: 11.NOV.2024 14:12:40

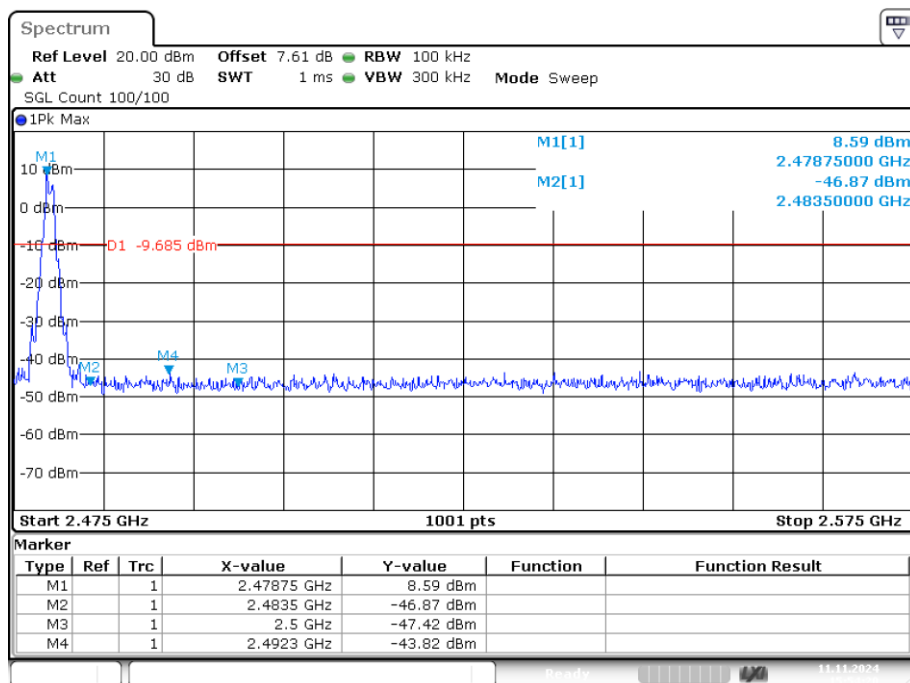
2413-2479MHz

Band Edge NVNT 2.4G 2413MHz Ant1 No-Hopping Emission



Date: 11.NOV.2024 15:42:01

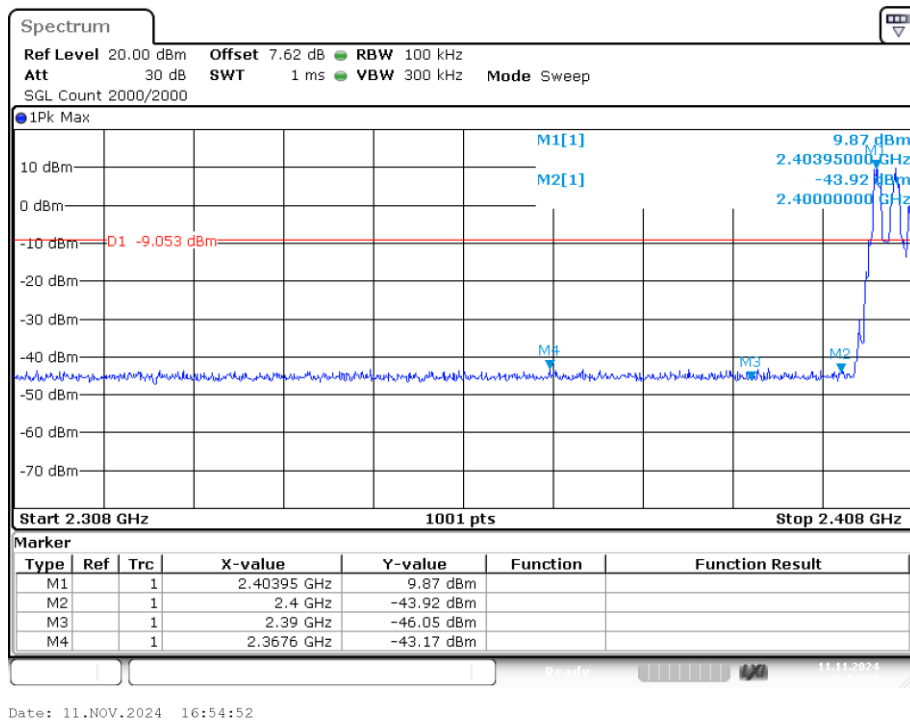
Band Edge NVNT 2.4G 2479MHz Ant1 No-Hopping Emission



Date: 11.NOV.2024 15:54:20

2404-2470MHz

Band Edge(Hopping) NVNT 2.4G 2404MHz Ant1 Hopping Emission



Band Edge(Hopping) NVNT 2.4G 2470MHz Ant1 Hopping Emission

