



## **FCC TEST REPORT**

**FCC ID: 2AATL-6233BUUB**

On Behalf of

**FN-LINK TECHNOLOGY LIMITED**

**WIFI/Bluetooth MODULE**

**Model No.: 6233BUUB**

Prepared for : FN-LINK TECHNOLOGY LIMITED  
Address : No.8, Litong Road, Liuyang Economic & Technical Development  
Zone, Changsha, Hunan, 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 : A2305037-C01-R03  
Date of Receipt : May 22, 2023  
Date of Test : May 22, 2023-October 18, 2023  
Date of Report : November 2, 2023  
Version Number : V0

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### TEST REPORT DECLARATION

Applicant : FN-LINK TECHNOLOGY LIMITED  
 Address : No.8, Litong Road, Liuyang Economic & Technical Development Zone, Changsha, Hunan, China  
 Manufacturer : FN-LINK TECHNOLOGY LIMITED  
 Address : No.8, Litong Road, Liuyang Economic & Technical Development Zone, Changsha, Hunan, China  
 EUT Description : WIFI/Bluetooth MODULE  
 (A) Model No. : 6233BUUB  
 (B) Trademark : **FN-LINK** 欧智通

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



Approved by (name + signature).....: Reak Yang  
Project Manager



Date of issue.....: November 2, 2023

**Revision History**

Revision	Issue Date	Revisions	Revised By
V0	November 2, 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
Conducted Emission	FCC Part 15: 15.207 ANSI C63.10	P
6dB Bandwidth	FCC PART 15:15.247(a)(2) ANSI C63.10	P
Output Power	FCC Part 15: 15.247(b)(3) ANSI C63.10	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10	P
Conducted Spurious & Band Edge Emission	FCC Part 15: 15.247(d) ANSI C63.10	P
Power Spectral Density	FCC PART 15:15.247(e) ANSI C63.10	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d) ANSI C63.10	P
Antenna Requirement	FCC Part 15: 15.203	P
<p>Note: 1. P is an abbreviation for Pass.</p> <p>2. F is an abbreviation for Fail.</p> <p>3. N/A is an abbreviation for Not Applicable.</p> <p>4. The conclusion of this test report is judged by actual test data without considering measurement uncertainty.</p>		

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

EUT Name : WIFI/Bluetooth MODULE  
Model No. : 6233BUUB  
DIFF. : N/A  
Power supply : DC 3.3V from USB adapter board

Radio Technology : 2.4G WIF

Operation frequency : 2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20  
2422MHz~2452MHz for IEEE802.11n/HT40

Channel No. : 802.11b/802.11g /802.11n(HT20): 11CH  
802.11(HT40): 7CH

Modulation type : IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)  
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)  
IEEE 802.11n:OFDM(64QAM, 16QAM, QPSK, BPSK)

Antenna Type : Rob Antenna, max gain 3.35dBi,  
(Antenna information is provided by applicant.)

Software version : V1.0  
Hardware version : V1.0

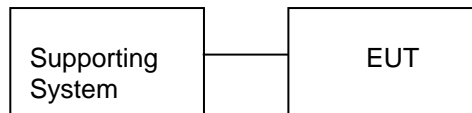
## 2.2. Accessories of Device (EUT)

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

## 2.3. Tested Supporting System Details

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

## 2.4. Block Diagram of connection between EUT and simulators



## 2.5. Test Mode Description

Duty cycle :100% Keeping TX			
Mode	data rate (Mbps)(see Note)	Channel	Frequency (MHz)
IEEE 802.11b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11 n/HT20	6.5	Low :CH1	2412
	6.5	Middle: CH6	2437
	6.5	High: CH11	2462
IEEE 802.11 n/HT40	13.5	Low :CH3	2422
	13.5	Middle: CH6	2437
	13.5	High: CH9	2452

Note: According exploratory test, EUT will have maximum output power in those data rate. So those data rate were used for all test.

Channel list:					
For IEEE 802.11b, g, n/HT20					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH1	2412	CH5	2432	CH9	2452
CH2	2417	CH6	2437	CH10	2457
CH3	2422	CH7	2442	CH11	2462
CH4	2427	CH8	2447		
For IEEE 802.11 n/HT40					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH1	2422	CH5	2442		
CH2	2427	CH6	2447		
CH3	2432	CH7	2452		
CH4	2437				



## 2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35°C	24°C
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  
 Designation Number: CN1236

July 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	$5.06 \times 10^{-8}$ GHz
Uncertainty for conducted RF Power	0.40dB
Uncertainty for temperature	0.2°C
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	1316.3003K03-10 2082-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	Farad	Alpha-3A1
CE	EZ-EMC	Farad	Alpha-3A1
RF-CE	MTS 8310	MW	V2.0.0.0

### 3. SPURIOUS EMISSION

#### 3.1. Test Limits

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
<sup>1</sup> 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	( <sup>2</sup> )

##### 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)	
Note 1: The peak limit is 20 dB higher than the average limit			
Note 2: Peak limit applies (AVG limit + 20 dB) as well as RSS-247 Section 5.5			

### 3.2. Test Procedure

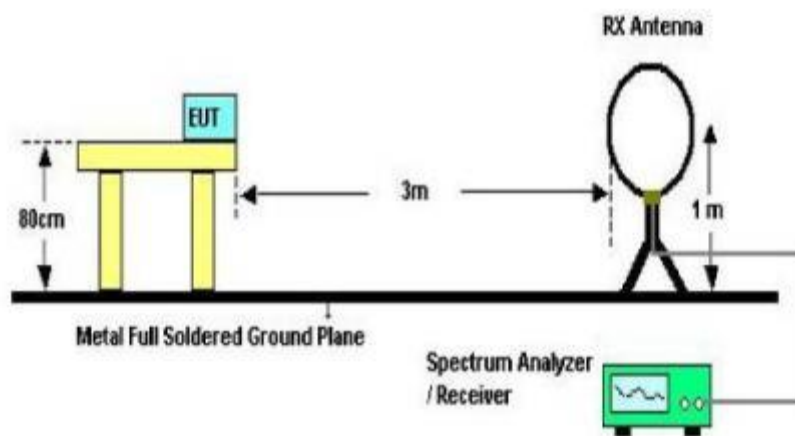
The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz. The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above 1GHz testing, the table was rotated 360 degrees to determine the position of the highest radiation. The Test antenna shall vary between 1m and 4m, both Horizontal and Vertical antenna are set of make measurement.

The initial step in collecting radiated emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Quasi Peak Detector mode premeasured

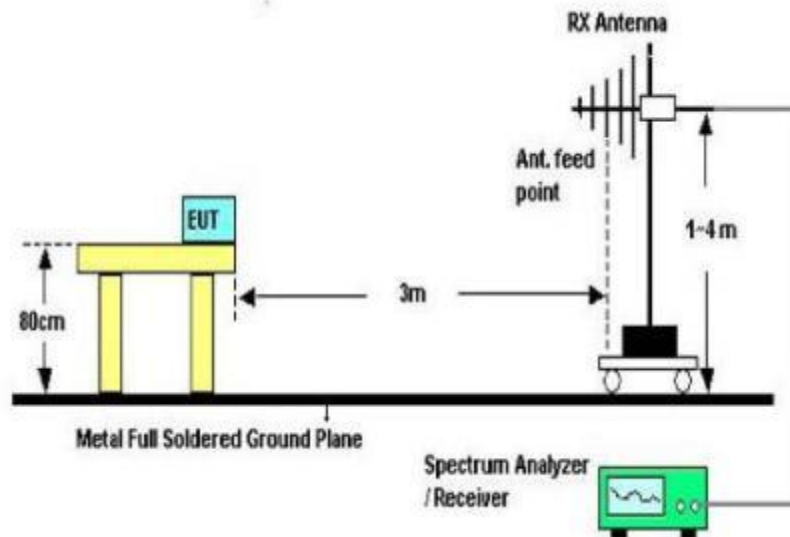
If Peak value comply with QP limit below 1GHz, the EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

For the actual test configuration, please see the test setup photo.

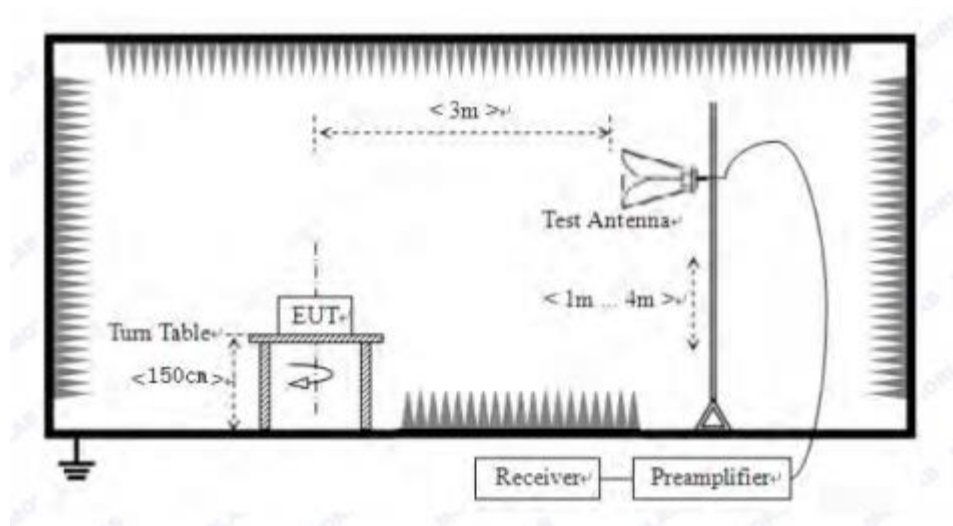
### 3.3. Test Setup



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

### 3.4. Test Results

Test Condition

Continual Transmitting in maximum power.

9KHz~150KHz	RBW200Hz	VBW1KHz
150KHz~30MHz	RBW9KHz	VBW 30KHz
30MHz~1GHz	RBW120KHz	VBW 300KHz
Above1GHz	RBW1MHz	VBW 3MHz

We have scanned the EUT from 9kHz up to the 10th harmonic of the fundamental.

Detailed information please see the following page.

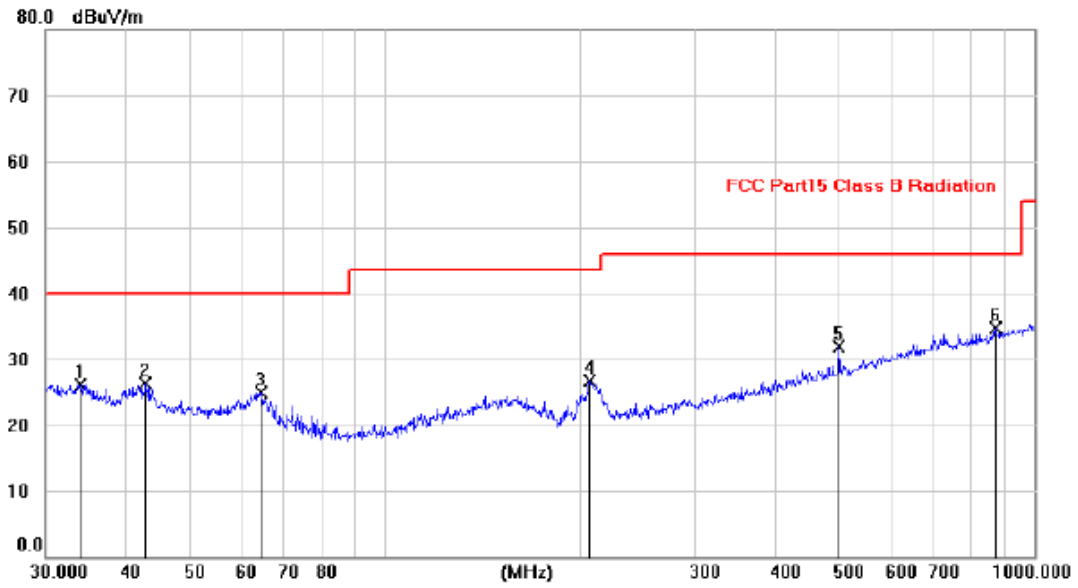
From 9KHz to 30MHz: Conclusion: PASS

Note: 1.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2.Only show the test data of the worst Channel in this report.

From 30MHz to 1000MHz: Conclusion: PASS

Vertical:

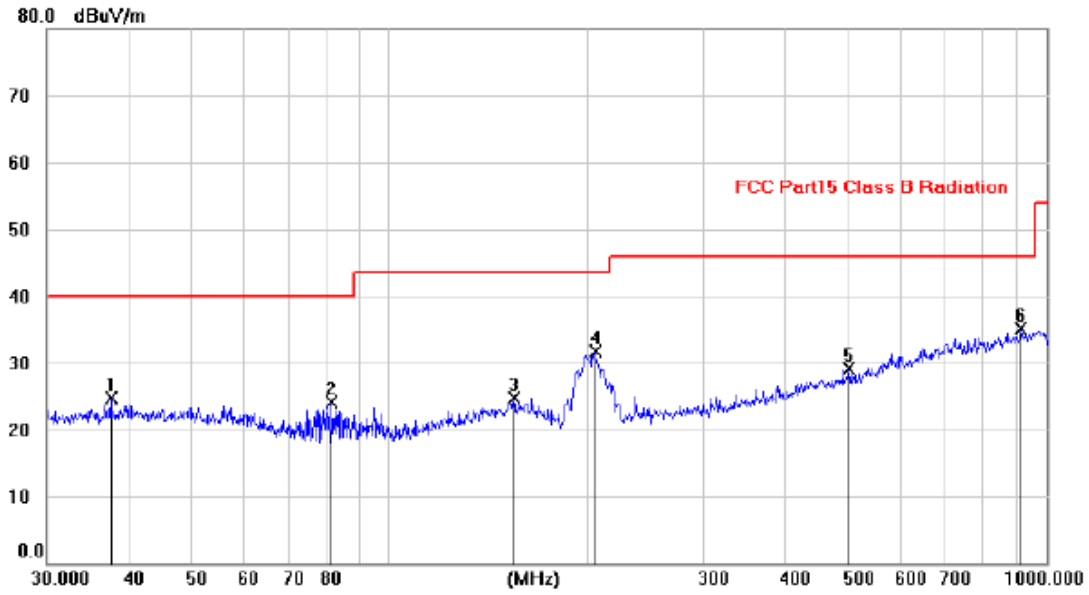


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree degree	Comment
1		33.9769	12.48	13.70	26.18	40.00	-13.82	peak		
2		42.8947	12.17	14.23	26.40	40.00	-13.60	peak		
3		64.6292	12.72	12.28	25.00	40.00	-15.00	peak		
4		206.9290	15.75	11.02	26.77	43.50	-16.73	peak		
5		500.0672	13.64	18.21	31.85	46.00	-14.15	peak		
6	*	872.0813	11.02	23.68	34.70	46.00	-11.30	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. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Antenna Height cm	Table Degree	Comment
1		37.5962	10.66	14.11	24.77	40.00	-15.23	peak		
2		81.6782	14.15	9.92	24.07	40.00	-15.93	peak		
3		154.7301	9.57	15.05	24.62	43.50	-18.88	peak		
4		205.6030	20.70	11.00	31.70	43.50	-11.80	peak		
5		500.0088	10.97	18.21	29.18	46.00	-16.82	peak		
6	*	914.0365	10.86	24.23	35.09	46.00	-10.91	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 b mode, Channel 2412MHz was listed in this report.

From 1G-25GHz

Test Mode: IEEE 802.11b 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
4824	46.62	V	33.95	10.18	34.26	56.49	74	-17.51	PK
4824	35.51	V	33.95	10.18	34.26	45.38	54	-8.62	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	48.74	H	33.95	10.18	34.26	58.61	74	-15.39	PK
4824	39.06	H	33.95	10.18	34.26	48.93	54	-5.07	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX Mid									
4874	46.60	V	33.93	10.2	34.29	56.44	74	-17.56	PK
4874	30.90	V	33.93	10.2	34.29	40.74	54	-13.26	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.30	H	33.93	10.2	34.29	57.14	74	-16.86	PK
4874	35.19	H	33.93	10.2	34.29	45.03	54	-8.97	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX High									
4924	44.84	V	33.98	10.22	34.25	54.79	74	-19.21	PK
4924	35.48	V	33.98	10.22	34.25	45.43	54	-8.57	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	45.57	H	33.98	10.22	34.25	55.52	74	-18.48	PK
4924	33.55	H	33.98	10.22	34.25	43.50	54	-10.50	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
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.									



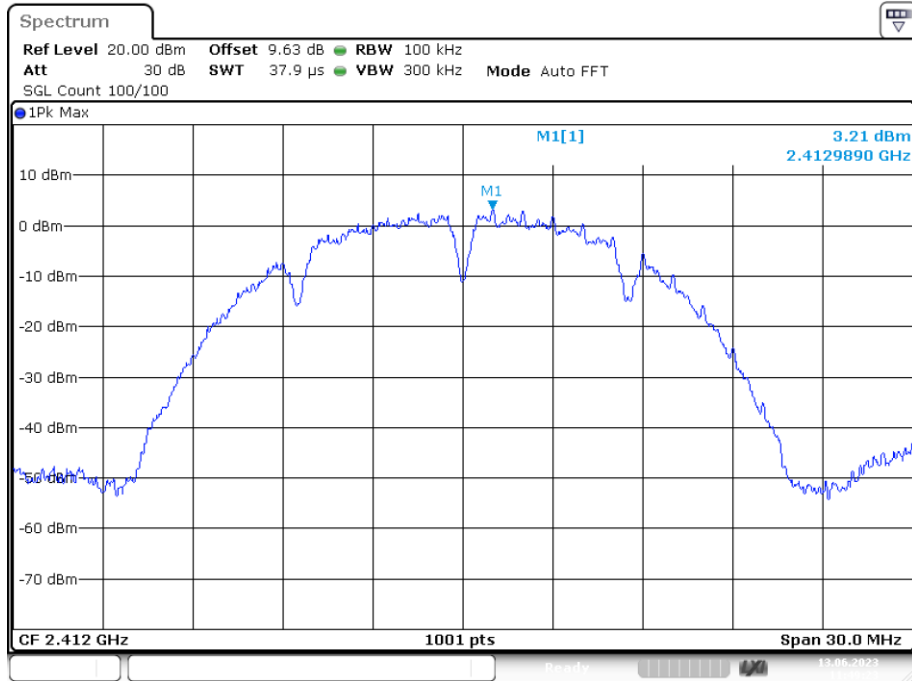
Test Mode: IEEE 802.11g TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824	44.81	V	33.95	10.18	34.26	54.68	74	-19.32	PK
4824	38.61	V	33.95	10.18	34.26	48.48	54	-5.52	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	51.09	H	33.95	10.18	34.26	60.96	74	-13.04	PK
4824	38.62	H	33.95	10.18	34.26	48.49	54	-5.51	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX Mid									
4874	45.53	V	33.93	10.2	34.29	55.37	74	-18.63	PK
4874	32.20	V	33.93	10.2	34.29	42.04	54	-11.96	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.65	H	33.93	10.2	34.29	55.49	74	-18.51	PK
4874	32.19	H	33.93	10.2	34.29	42.03	54	-11.97	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX High									
4924	47.52	V	33.98	10.22	34.25	57.47	74	-16.53	PK
4924	34.77	V	33.98	10.22	34.25	44.72	54	-9.28	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	45.71	H	33.98	10.22	34.25	55.66	74	-18.34	PK
4924	33.74	H	33.98	10.22	34.25	43.69	54	-10.31	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
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: IEEE 802.11n HT20 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
4824	45.90	V	33.95	10.18	34.26	55.77	74	-18.23	PK
4824	37.84	V	33.95	10.18	34.26	47.71	54	-6.29	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	51.08	H	33.95	10.18	34.26	60.95	74	-13.05	PK
4824	36.03	H	33.95	10.18	34.26	45.90	54	-8.10	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX Mid									
4874	45.43	V	33.93	10.2	34.29	55.27	74	-18.73	PK
4874	33.91	V	33.93	10.2	34.29	43.75	54	-10.25	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.88	H	33.93	10.2	34.29	55.72	74	-18.28	PK
4874	33.03	H	33.93	10.2	34.29	42.87	54	-11.13	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX High									
4924	46.32	V	33.98	10.22	34.25	56.27	74	-17.73	PK
4924	34.12	V	33.98	10.22	34.25	44.07	54	-9.93	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	48.97	H	33.98	10.22	34.25	58.92	74	-15.08	PK
4924	33.61	H	33.98	10.22	34.25	43.56	54	-10.44	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
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: IEEE 802.11n HT40 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
4844	46.59	V	33.95	10.18	34.26	56.46	74	-17.54	PK
4844	38.11	V	33.95	10.18	34.26	47.98	54	-6.02	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
4844	47.61	H	33.95	10.18	34.26	57.48	74	-16.52	PK
4844	39.49	H	33.95	10.18	34.26	49.36	54	-4.64	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX Mid									
4874	43.32	V	33.93	10.2	34.29	53.16	74	-20.84	PK
4874	33.47	V	33.93	10.2	34.29	43.31	54	-10.69	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.68	H	33.93	10.2	34.29	55.52	74	-18.48	PK
4874	35.77	H	33.93	10.2	34.29	45.61	54	-8.39	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX High									
4904	45.94	V	33.98	10.22	34.25	55.89	74	-18.11	PK
4904	36.04	V	33.98	10.22	34.25	45.99	54	-8.01	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/
4904	46.63	H	33.98	10.22	34.25	56.58	74	-17.42	PK
4904	34.29	H	33.98	10.22	34.25	44.24	54	-9.76	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/
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.									

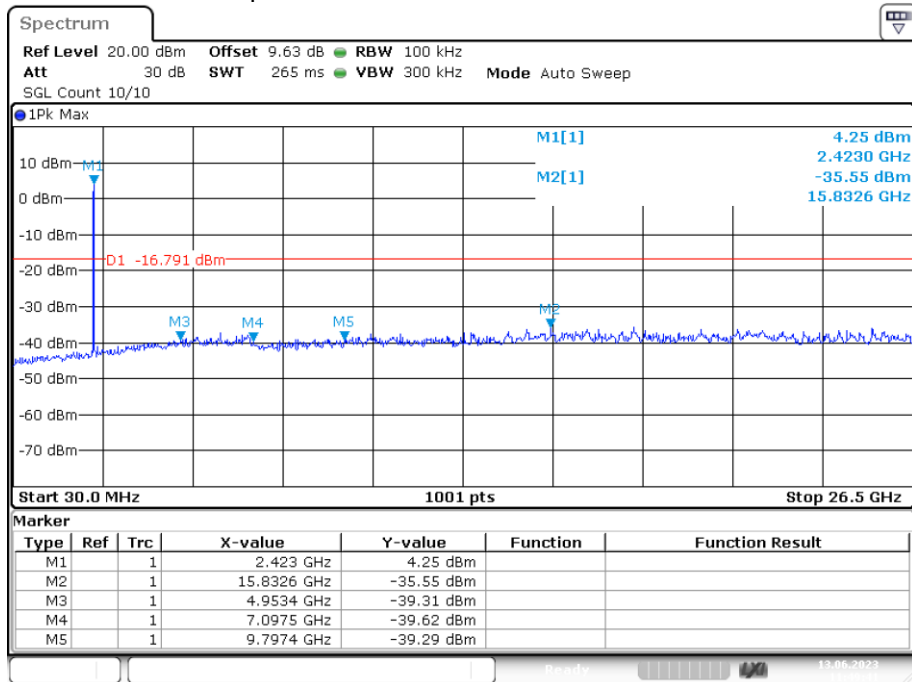
Conducted RF Spurious Emission

Tx. Spurious NVNT b 2412MHz Ant1 Ref



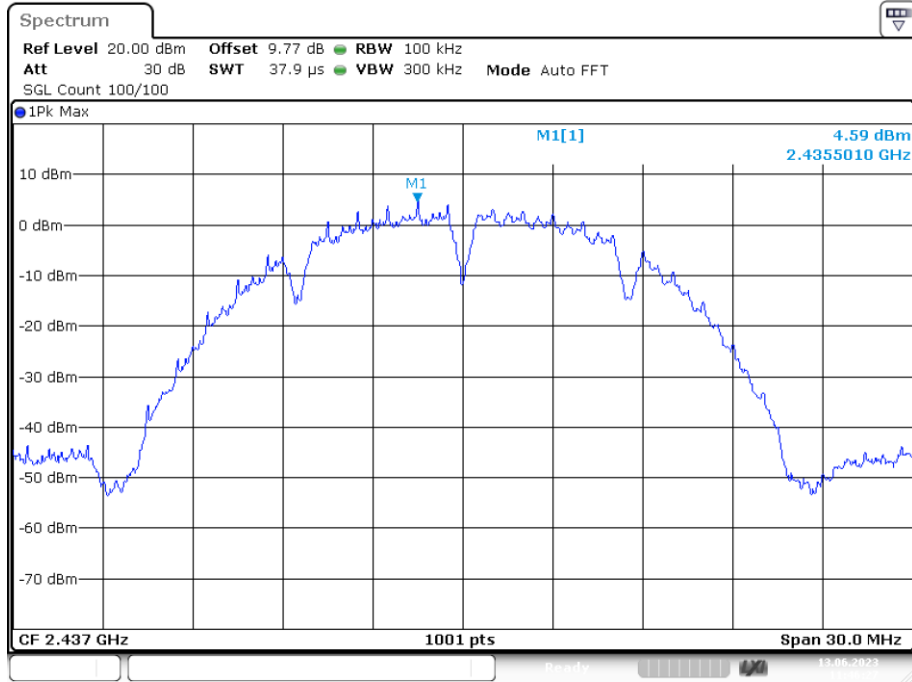
Date: 13.JUN.2023 11:49:23

Tx. Spurious NVNT b 2412MHz Ant1 Emission



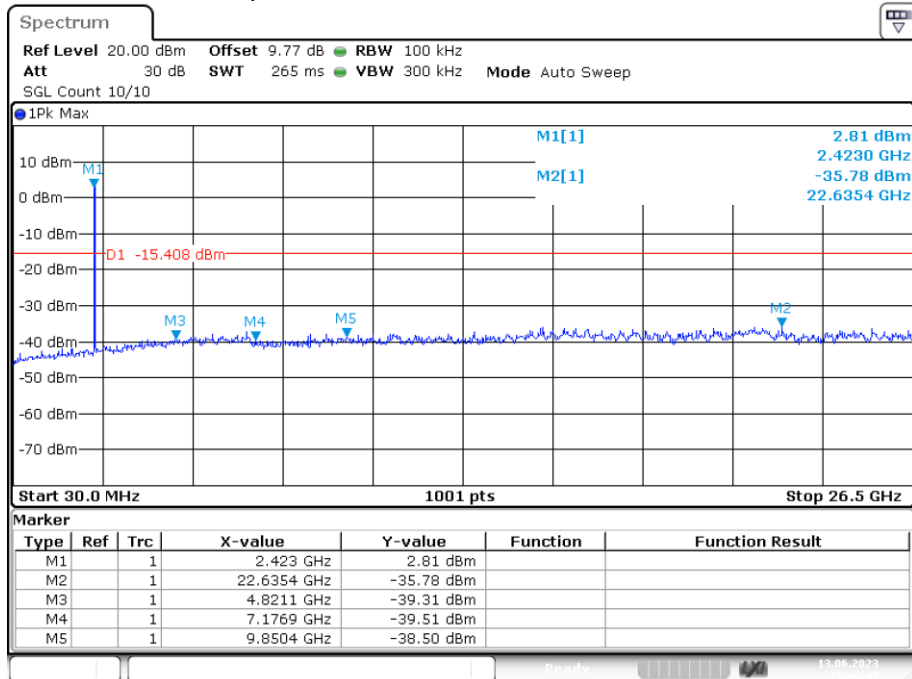
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Tx. Spurious NVNT b 2437MHz Ant1 Ref



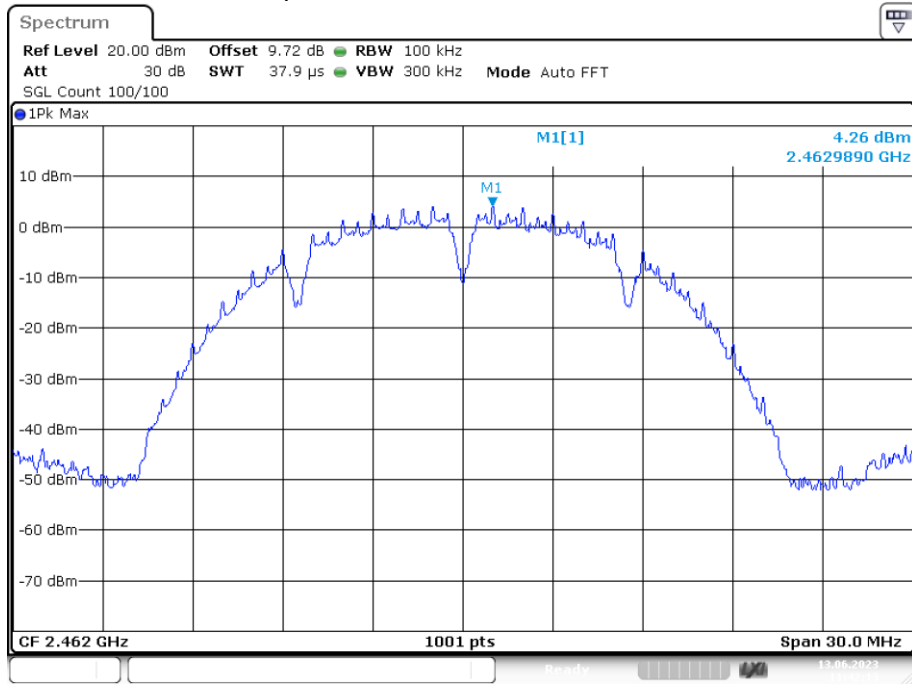
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Tx. Spurious NVNT b 2437MHz Ant1 Emission



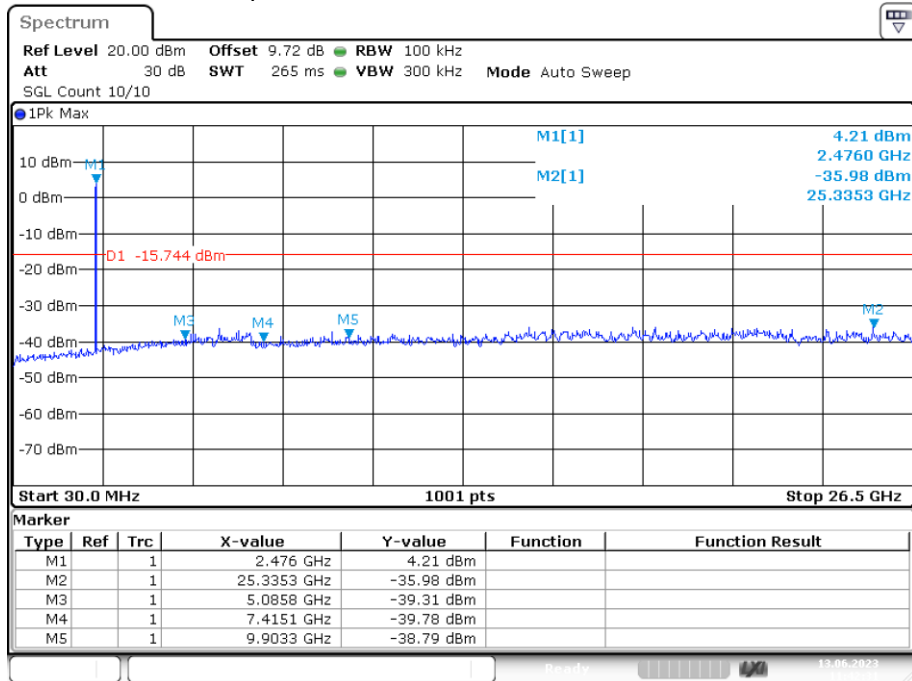
Date: 13.JUN.2023 11:46:45

Tx. Spurious NVNT b 2462MHz Ant1 Ref



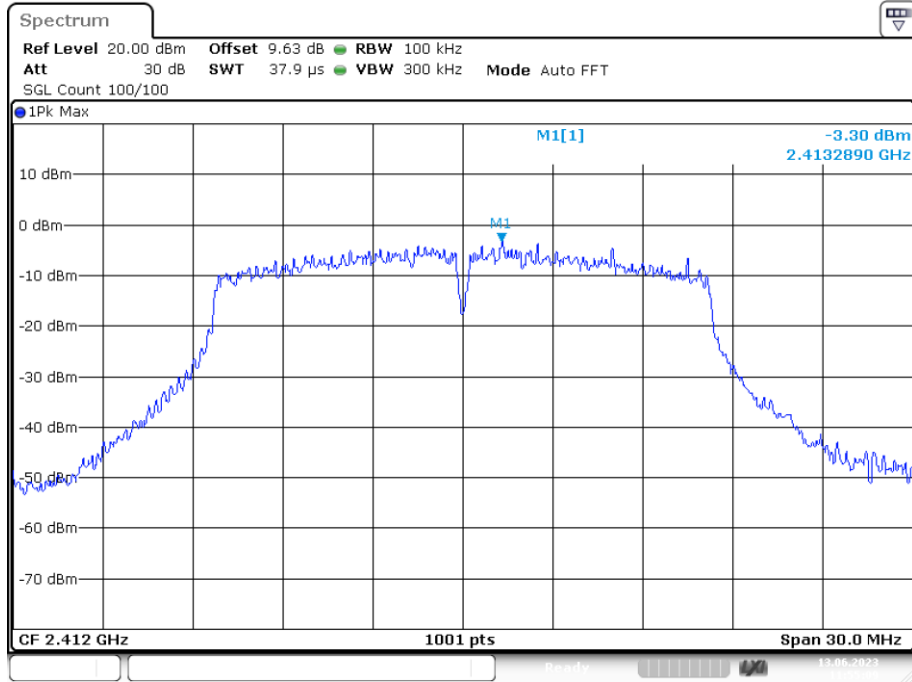
Date: 13.JUN.2023 11:42:12

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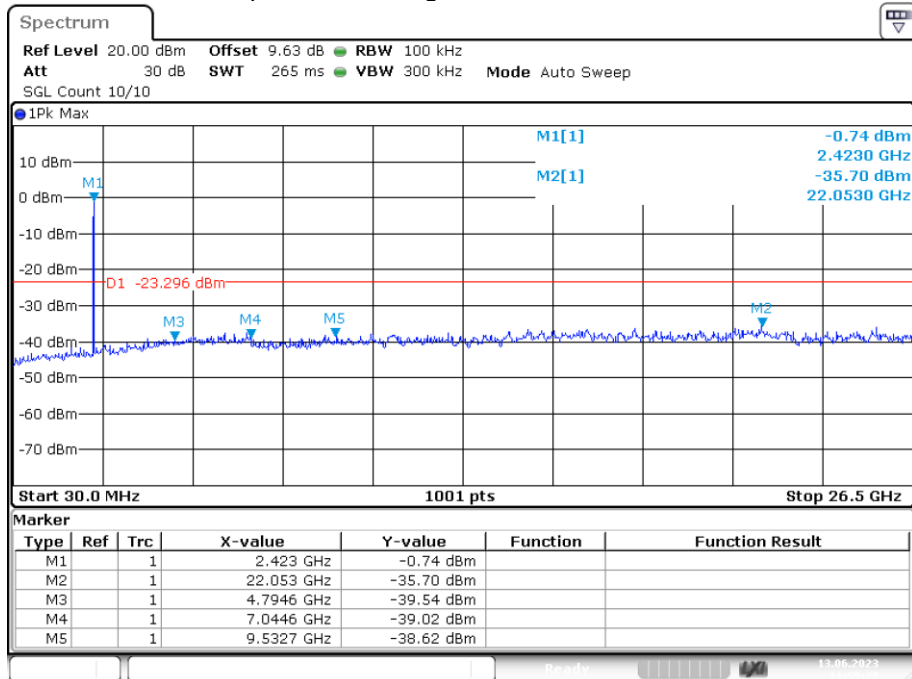
Date: 13.JUN.2023 11:42:30

Tx. Spurious NVNT g 2412MHz Ant1 Ref



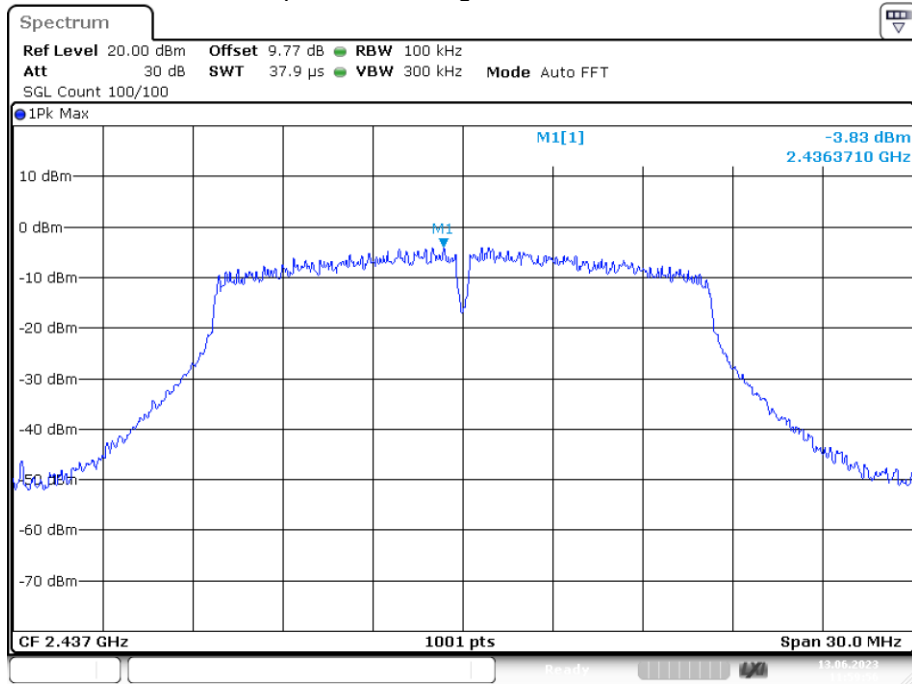
Date: 13.JUN.2023 11:55:10

Tx. Spurious NVNT g 2412MHz Ant1 Emission



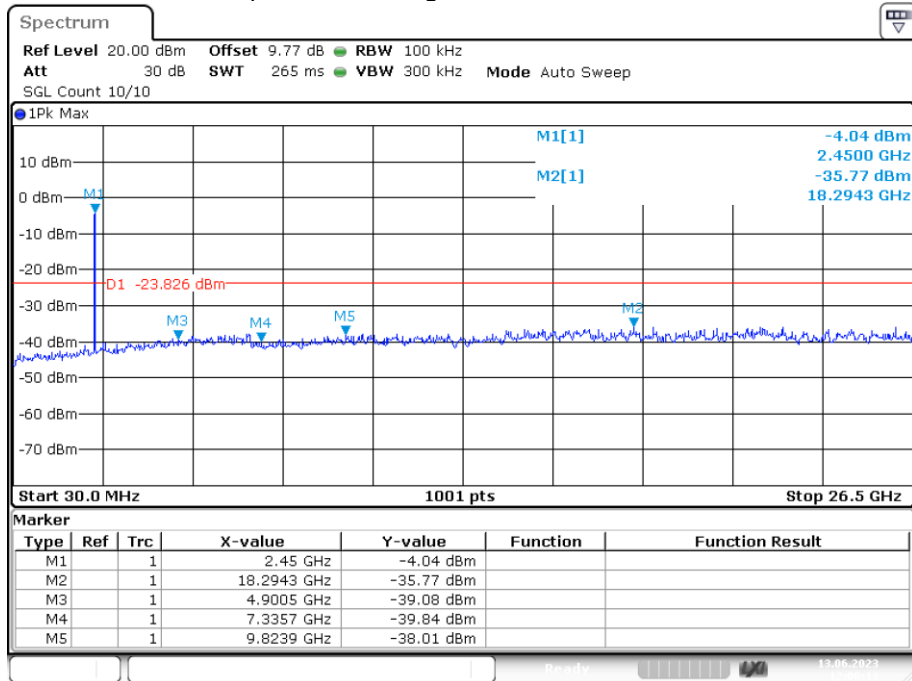
Date: 13.JUN.2023 11:55:28

Tx. Spurious NVNT g 2437MHz Ant1 Ref



Date: 13.JUN.2023 11:59:56

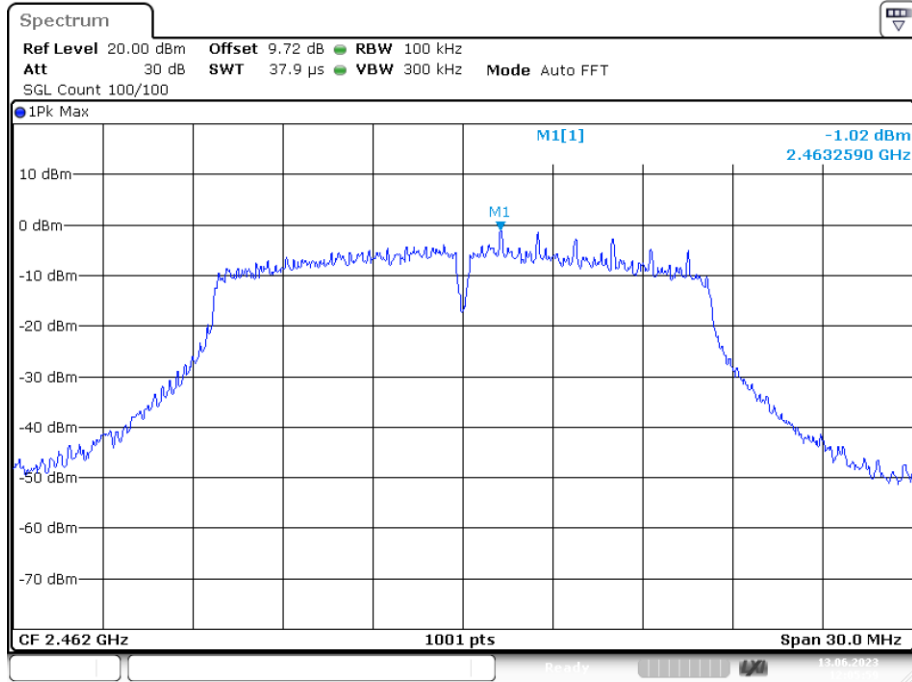
Tx. Spurious NVNT g 2437MHz Ant1 Emission



Date: 13.JUN.2023 12:00:14

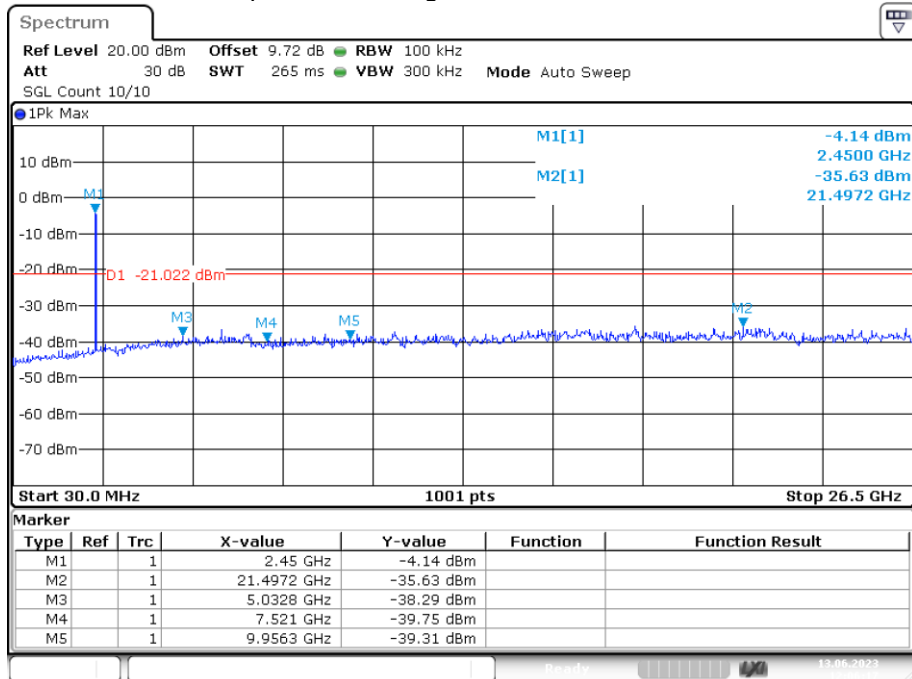


Tx. Spurious NVNT g 2462MHz Ant1 Ref



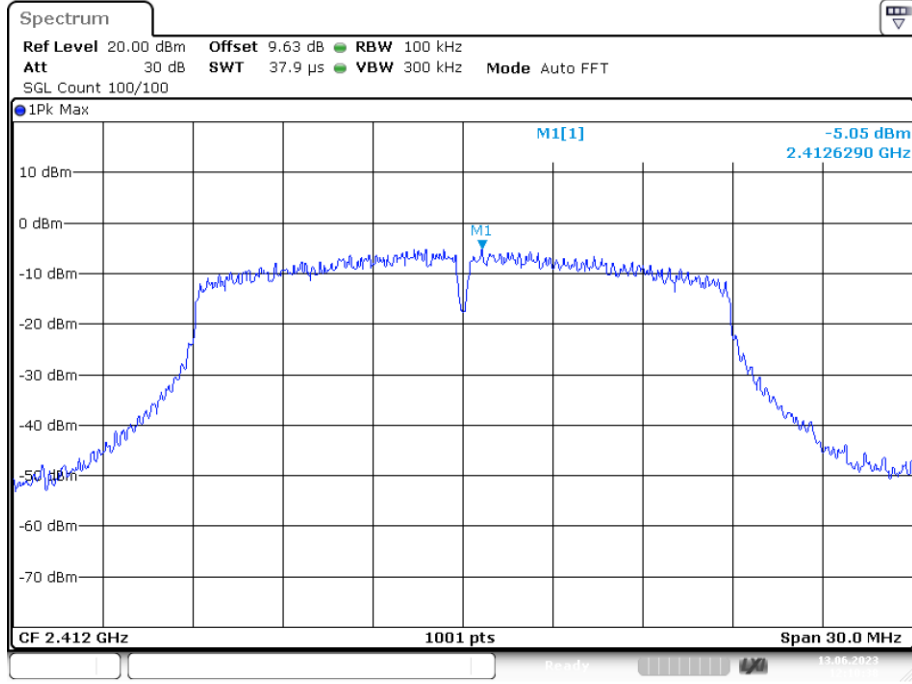
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Tx. Spurious NVNT g 2462MHz Ant1 Emission



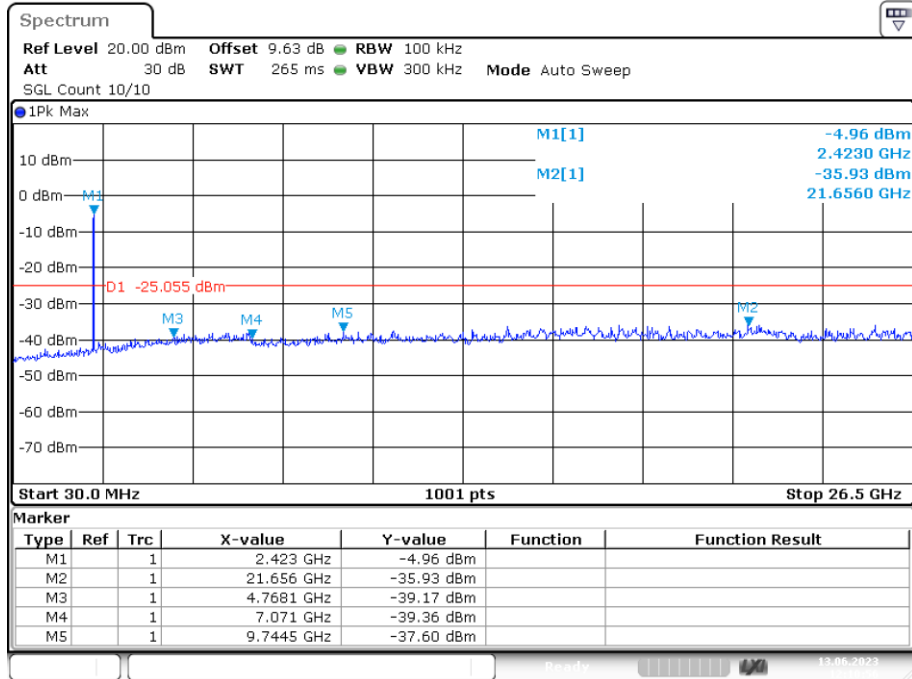
Date: 13.JUN.2023 12:06:17

Tx. Spurious NVNT n20 2412MHz Ant1 Ref



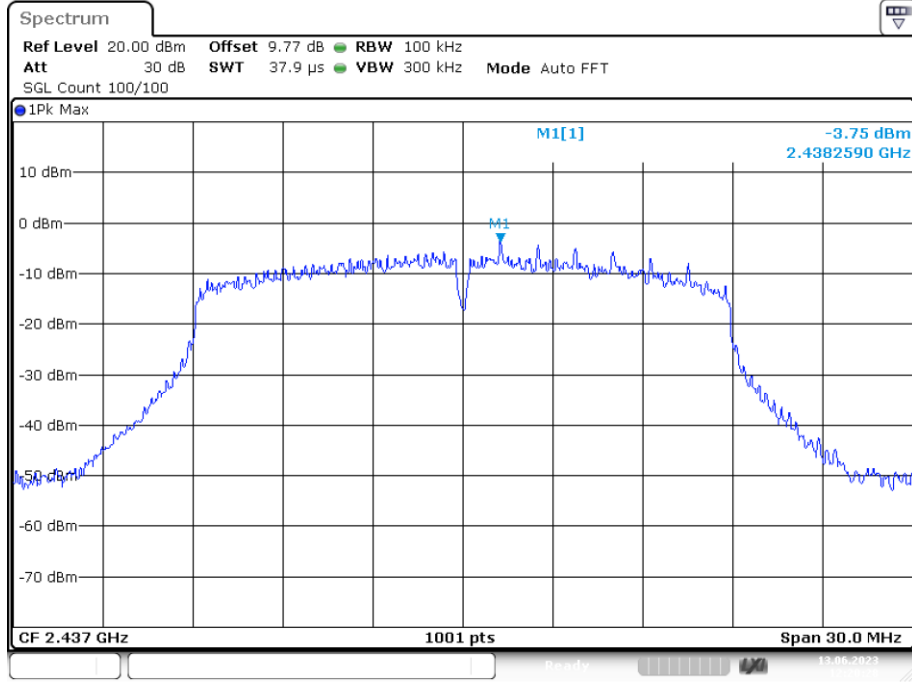
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Tx. Spurious NVNT n20 2412MHz Ant1 Emission



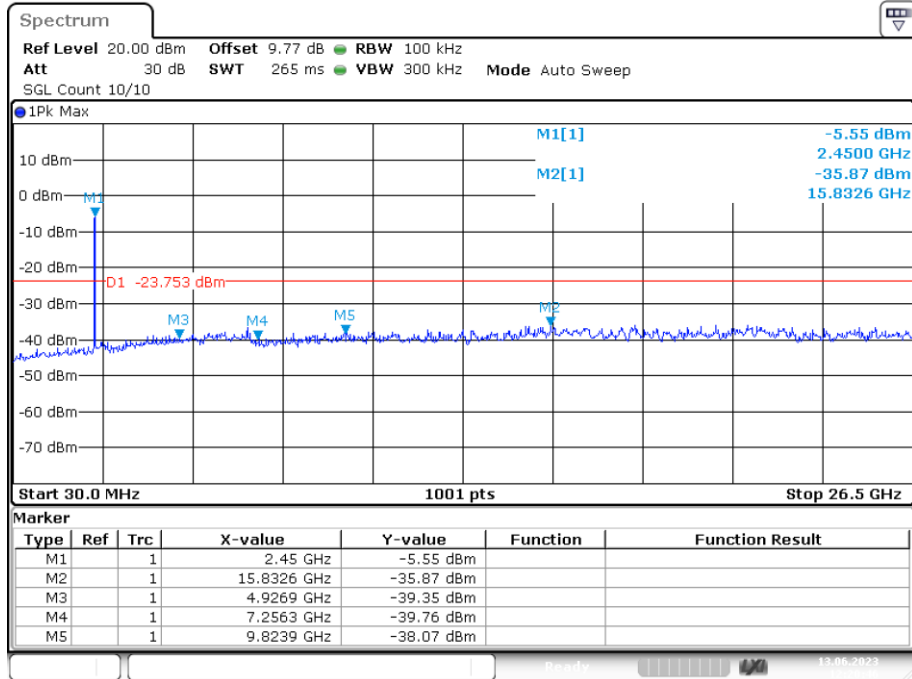
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Tx. Spurious NVNT n20 2437MHz Ant1 Ref



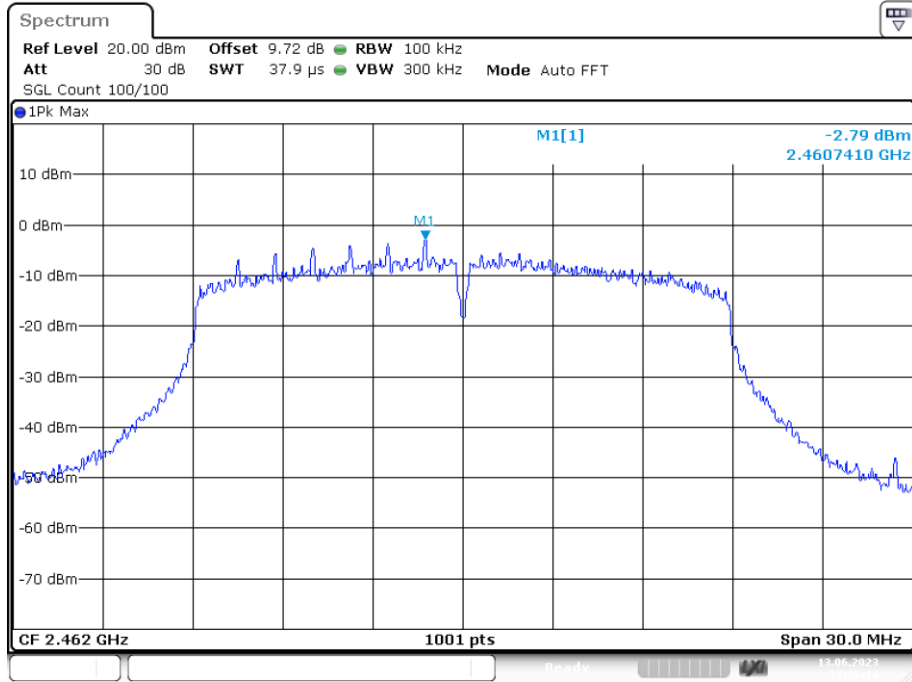
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Tx. Spurious NVNT n20 2437MHz Ant1 Emission



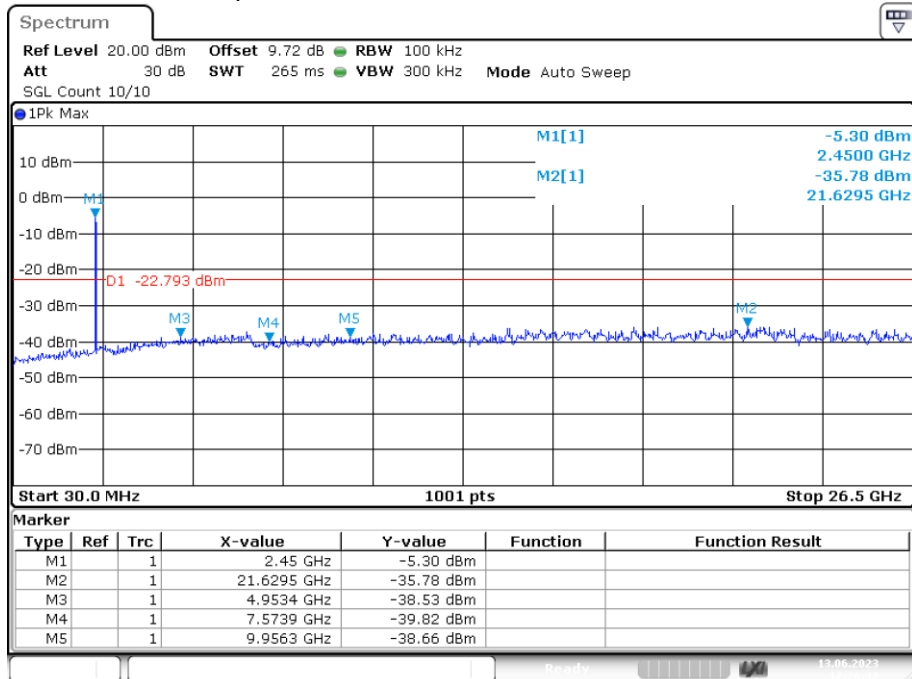
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Tx. Spurious NVNT n20 2462MHz Ant1 Ref



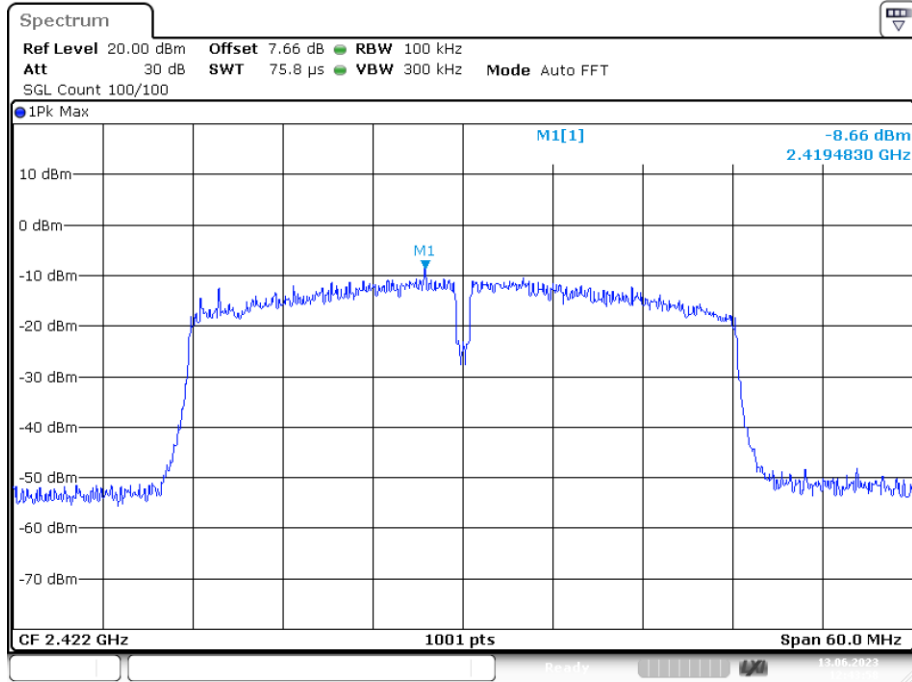
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Tx. Spurious NVNT n20 2462MHz Ant1 Emission



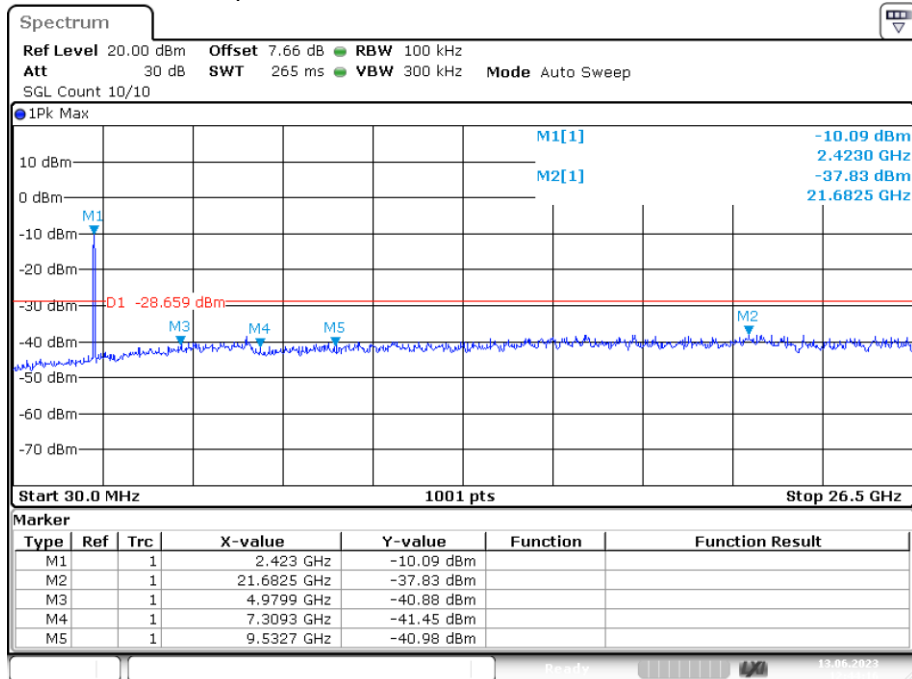
Date: 13.JUN.2023 12:26:32

Tx. Spurious NVNT n40 2422MHz Ant1 Ref



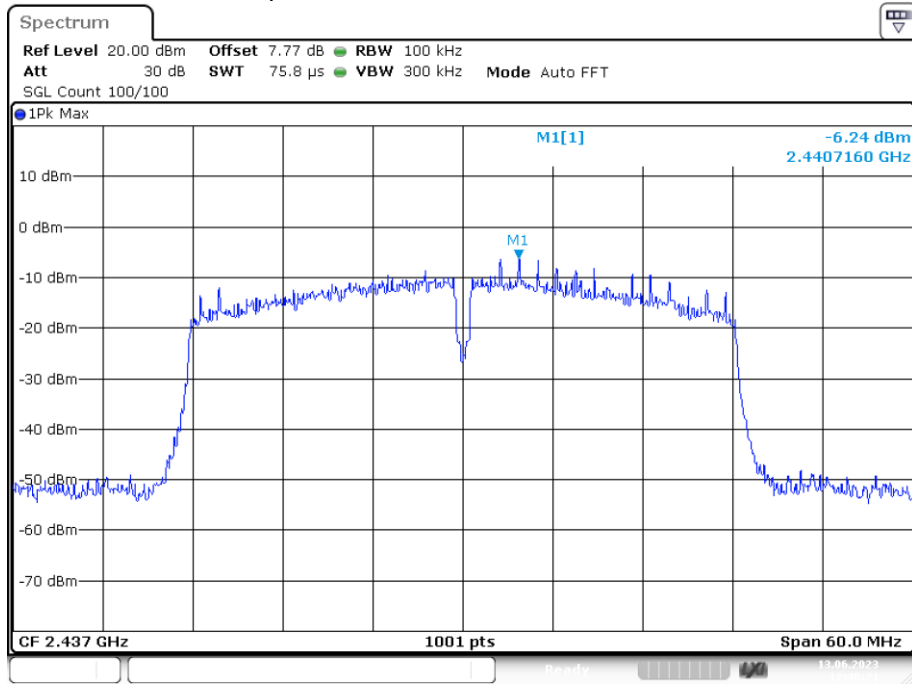
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Tx. Spurious NVNT n40 2422MHz Ant1 Emission



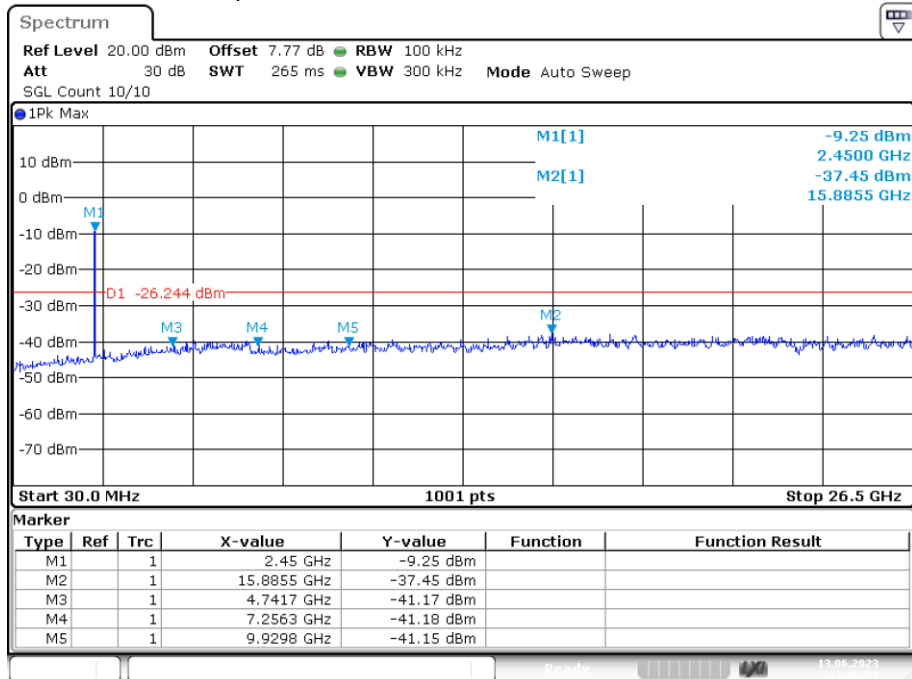
Date: 13.JUN.2023 12:44:15

Tx. Spurious NVNT n40 2437MHz Ant1 Ref



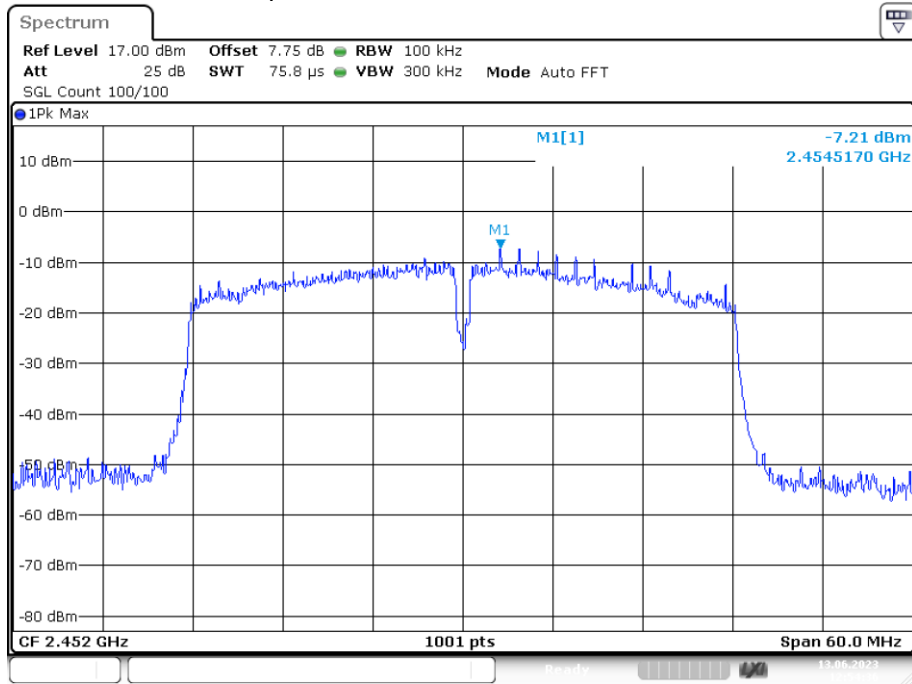
Date: 13.JUN.2023 12:48:21

Tx. Spurious NVNT n40 2437MHz Ant1 Emission



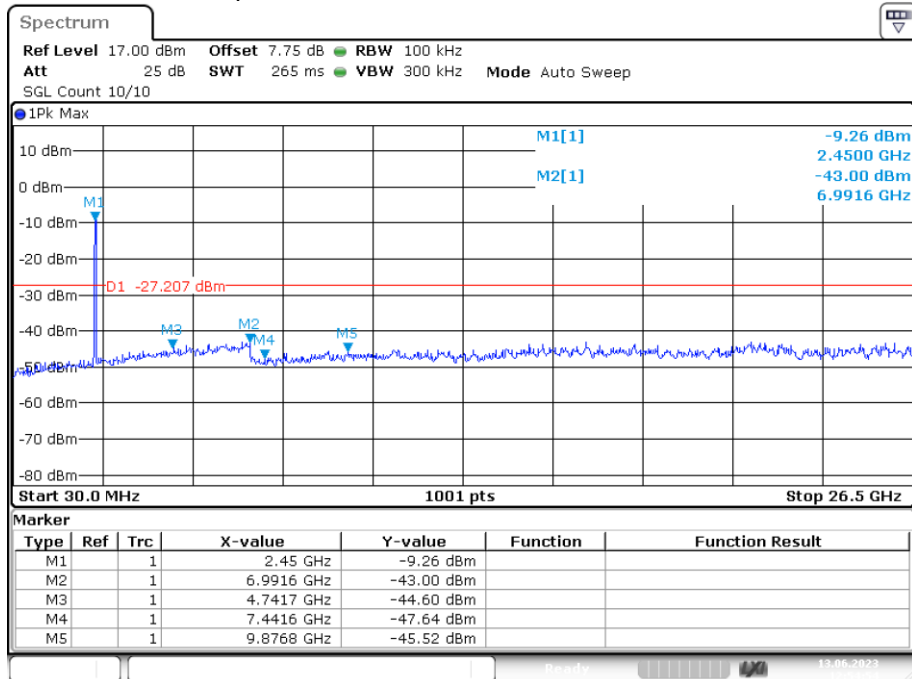
Date: 13.JUN.2023 12:48:39

Tx. Spurious NVNT n40 2452MHz Ant1 Ref



Date: 13.JUN.2023 12:54:36

Tx. Spurious NVNT n40 2452MHz Ant1 Emission



Date: 13.JUN.2023 12:54:54

## 4. POWER LINE CONDUCTED EMISSION

### 4.1. Test Limits

Frequency MHz	Limits dB( $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. \*Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

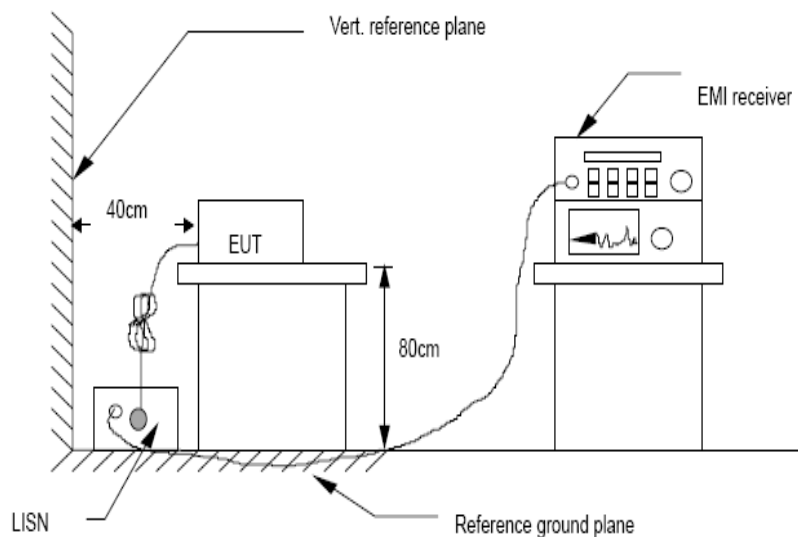
3. The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

### 4.2. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9 kHz.

### 4.3. Test Setup



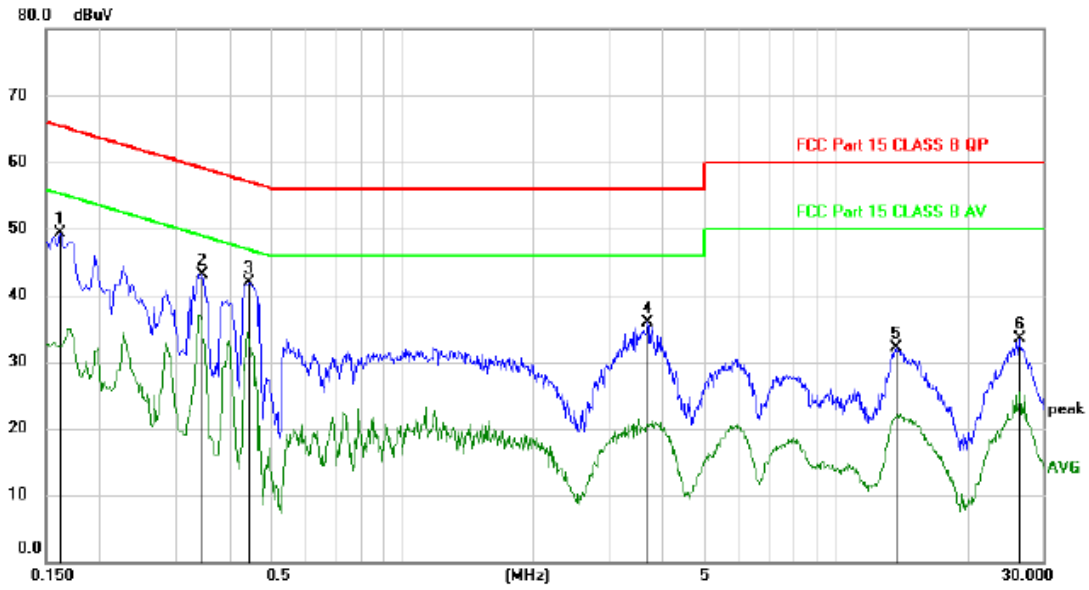
### 4.4. Test Results

PASS. (See below detailed test data)

Note: If peak Result comply with AV limit, QP and AV Result is deemed to comply with AV limit



Line:



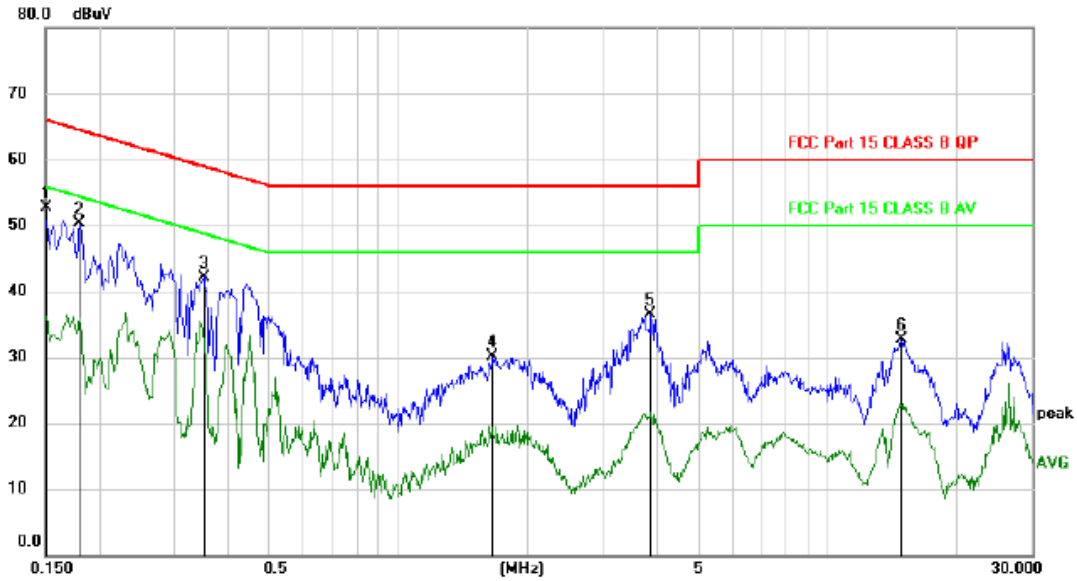
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1620	39.53	9.83	49.36	65.36	-16.00	peak	
2		0.3450	33.37	9.83	43.20	59.08	-15.88	peak	
3	*	0.4410	32.02	9.83	41.85	57.04	-15.19	peak	
4		3.6750	26.04	9.84	35.88	56.00	-20.12	peak	
5		13.7670	22.00	10.03	32.03	60.00	-27.97	peak	
6		26.5470	23.34	10.17	33.51	60.00	-26.49	peak	

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

(Reference Only)

Note: Measurement=Reading Level+Correc Factor.    Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

**Neutral:**



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1500	42.84	9.83	52.67	66.00	-13.33	peak	
2		0.1800	40.57	9.83	50.40	64.49	-14.09	peak	
3		0.3509	32.37	9.83	42.20	58.94	-16.74	peak	
4		1.6560	20.31	9.78	30.09	56.00	-25.91	peak	
5		3.8730	26.70	9.84	36.54	56.00	-19.46	peak	
6		14.9040	22.62	10.04	32.66	60.00	-27.34	peak	

\*:Maximum data    x:Over limit    !:over margin (Reference Only)

Note: Measurement=Reading Level+Correc Factor.    Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Note: All modes and channels have been tested and only the B mode 2412MHz mode with the worst data is listed.

## 5. CONDUCTED MAXIMUM OUTPUT POWER

### 5.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247.

Regulation 15.247(b) The limit of Maximum Peak Output Power Measurement is 1 W(30dBm)

### 5.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

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

5.2.2 Connected the EUT's antenna port to peak power meter by 20dB attenuator.

5.2.3 Measure out each mode and each bands peak output power of EUT.

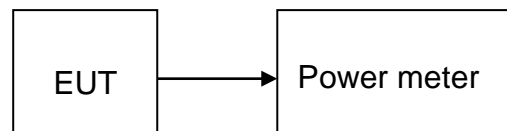
Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

5.2.4 The measure-and-sum technique shall be used for measuring in-band transmit power of a device.

Total power is the sum of the conducted power levels measured at the various output ports.

(First measure the power (mW) of each antenna separately, and the total power is equal to  $Ant1^{mW} + Ant2^{mW} + \dots$ )

### 5.3. Test Setup



### 5.4. Test Results

Mode	Frequency (MHz)	Antenna	Total Power (dBm)	Limit (dBm)	Verdict
b	2412	Ant1	17.563	30	Pass
b	2437	Ant1	<b>17.660</b>	30	Pass
b	2462	Ant1	17.086	30	Pass
g	2412	Ant1	16.854	30	Pass
g	2437	Ant1	16.683	30	Pass
g	2462	Ant1	16.736	30	Pass
n20	2412	Ant1	15.777	30	Pass
n20	2437	Ant1	15.378	30	Pass
n20	2462	Ant1	15.566	30	Pass
n40	2422	Ant1	15.287	30	Pass
n40	2437	Ant1	15.780	30	Pass
n40	2452	Ant1	15.569	30	Pass

## 6. PEAK POWER SPECTRAL DENSITY

### 6.1. Test limits

6.1.1 Please refer RSS-247 & FCC PART 15: 15.247.

6.1.2 For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

### 6.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

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

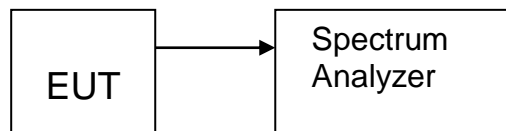
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 3kHz(Set the RBW to:  $3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$ .), VBW = 10kHz(Set the VBW  $\geq 3 \times \text{RBW}$ ), span  $\geq 1.5 \times \text{DTS bandwidth}$ ., detail see the test plot.

6.2.4 Record the max reading.

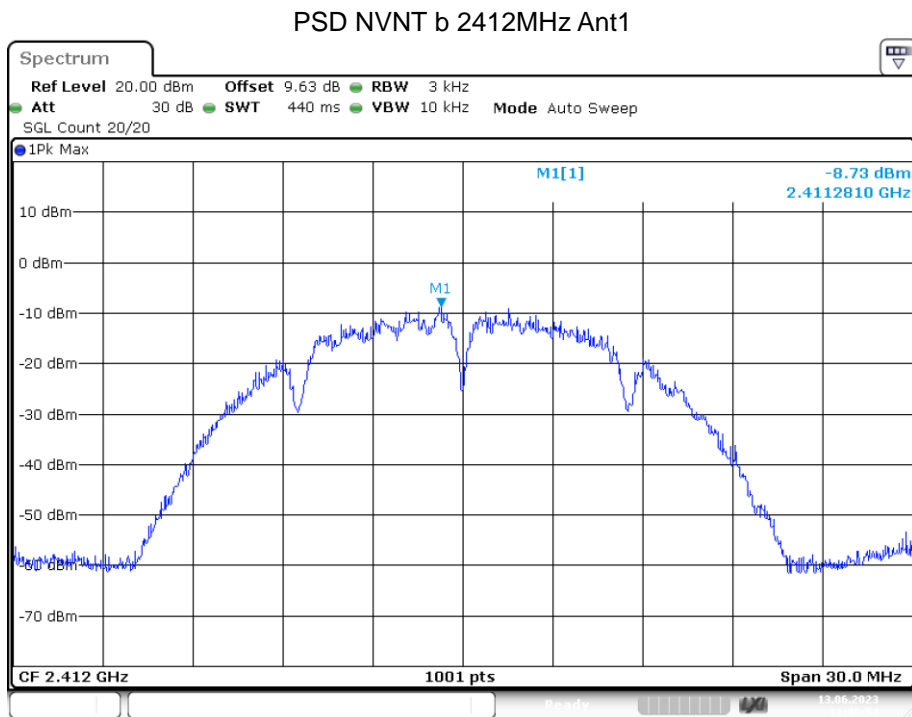
6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

### 6.3. Test Setup



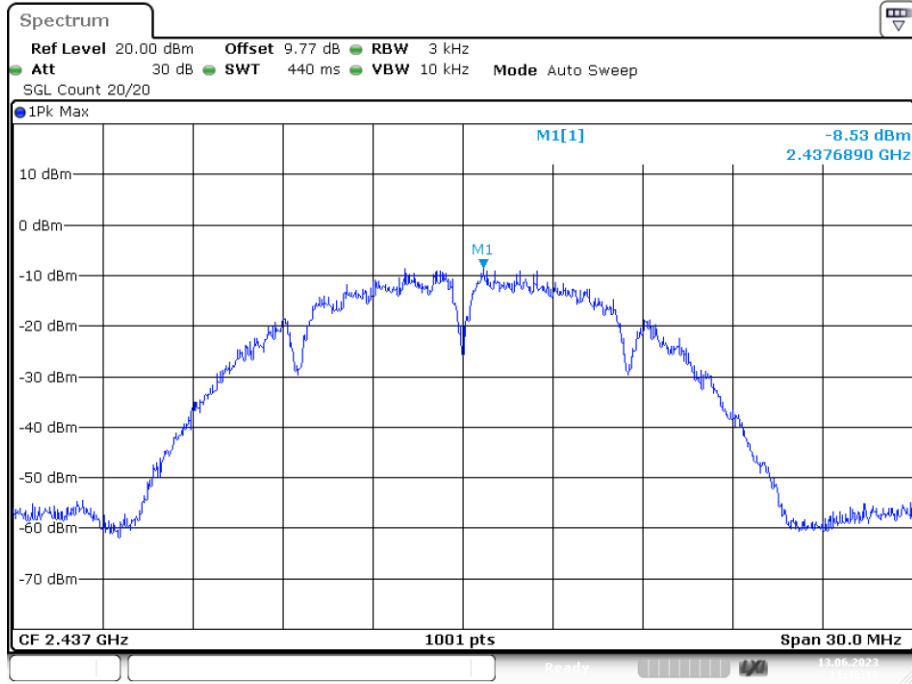
6.4. Test Results

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	-8.733	8	Pass
NVNT	b	2437	Ant1	-8.525	8	Pass
NVNT	b	2462	Ant1	-9.121	8	Pass
NVNT	g	2412	Ant1	-14.837	8	Pass
NVNT	g	2437	Ant1	-14.608	8	Pass
NVNT	g	2462	Ant1	-14.144	8	Pass
NVNT	n20	2412	Ant1	-14.192	8	Pass
NVNT	n20	2437	Ant1	-16.966	8	Pass
NVNT	n20	2462	Ant1	-16.259	8	Pass
NVNT	n40	2422	Ant1	-21.104	8	Pass
NVNT	n40	2437	Ant1	-20.192	8	Pass
NVNT	n40	2452	Ant1	-19.461	8	Pass

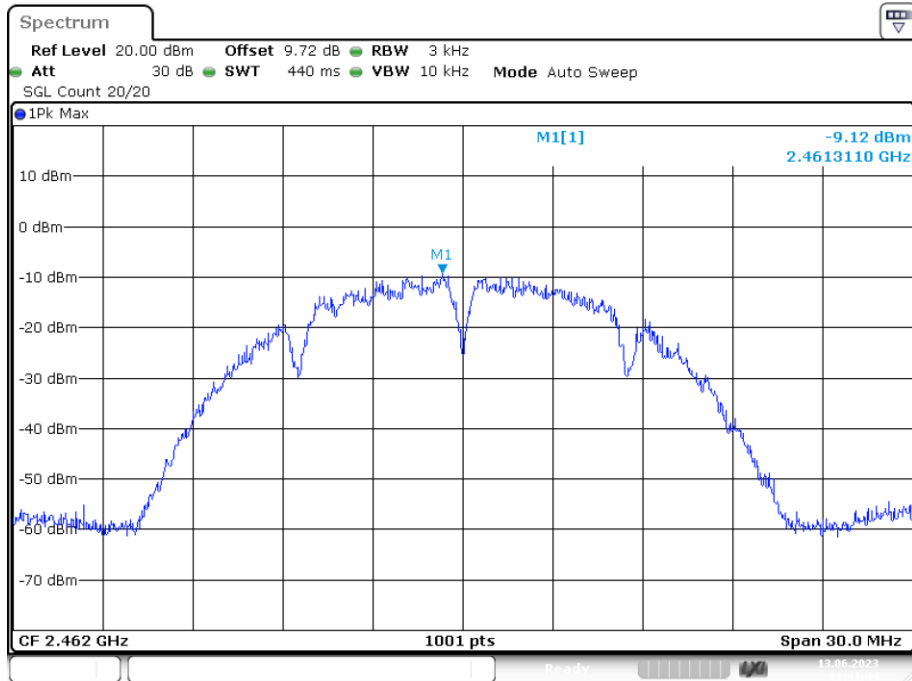


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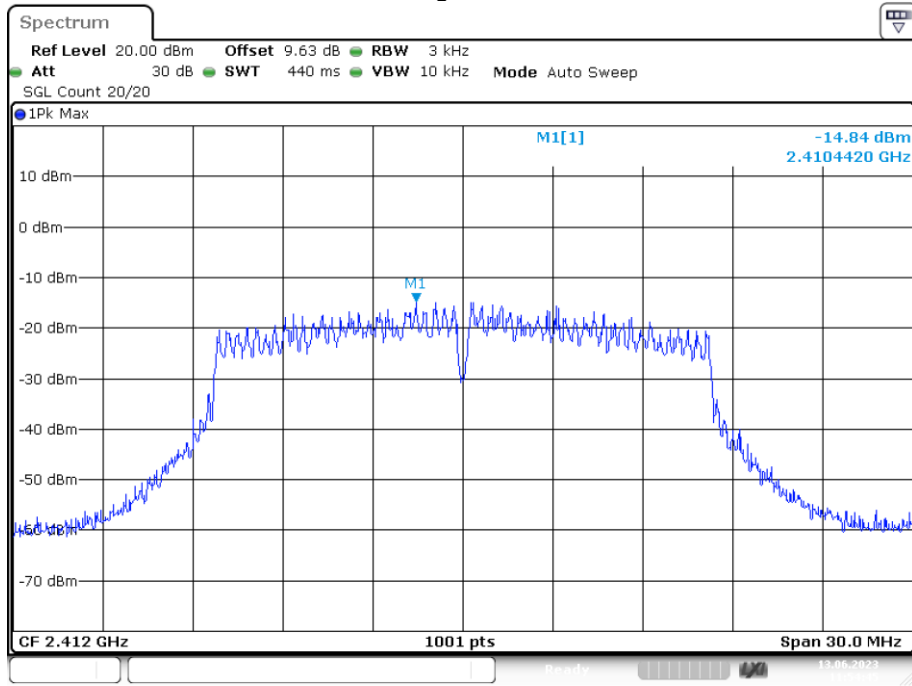
### PSD NVNT b 2437MHz Ant1



### PSD NVNT b 2462MHz Ant1

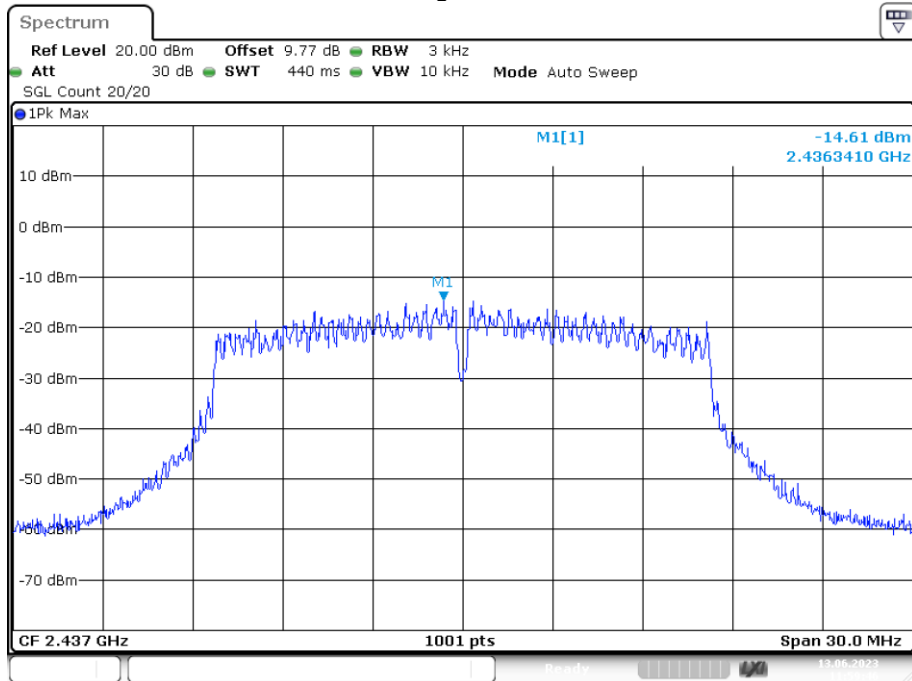


### PSD NVNT g 2412MHz Ant1



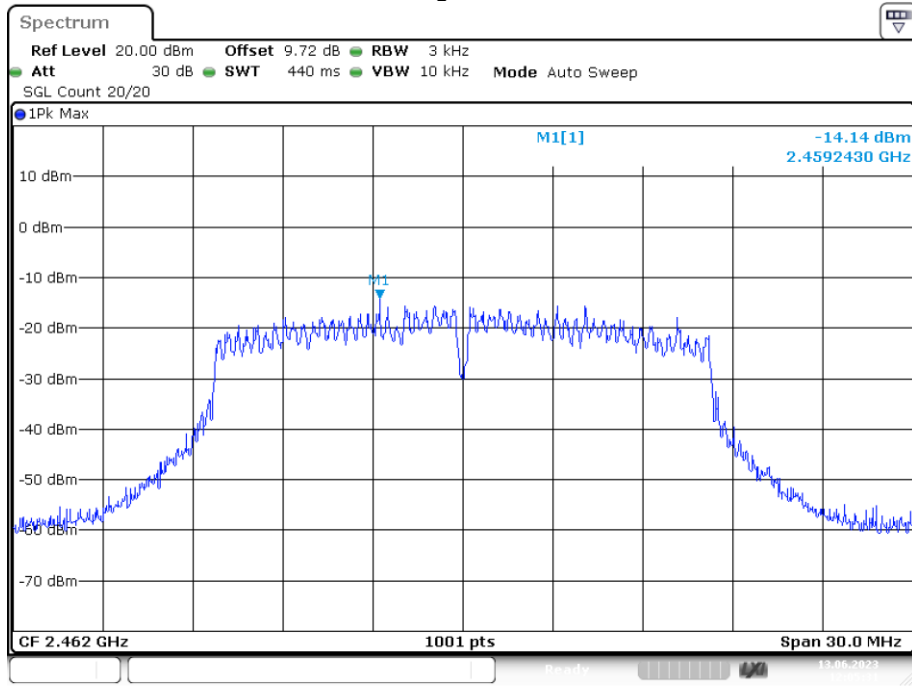
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### PSD NVNT g 2437MHz Ant1



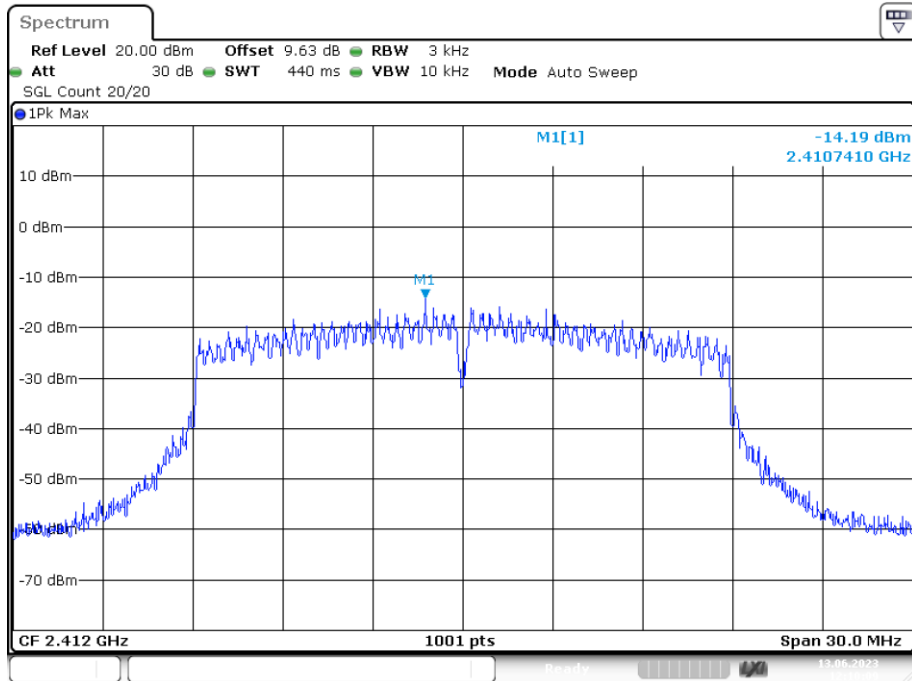
Date: 13.JUN.2023 11:59:46

### PSD NVNT g 2462MHz Ant1



Date: 13.JUN.2023 12:05:31

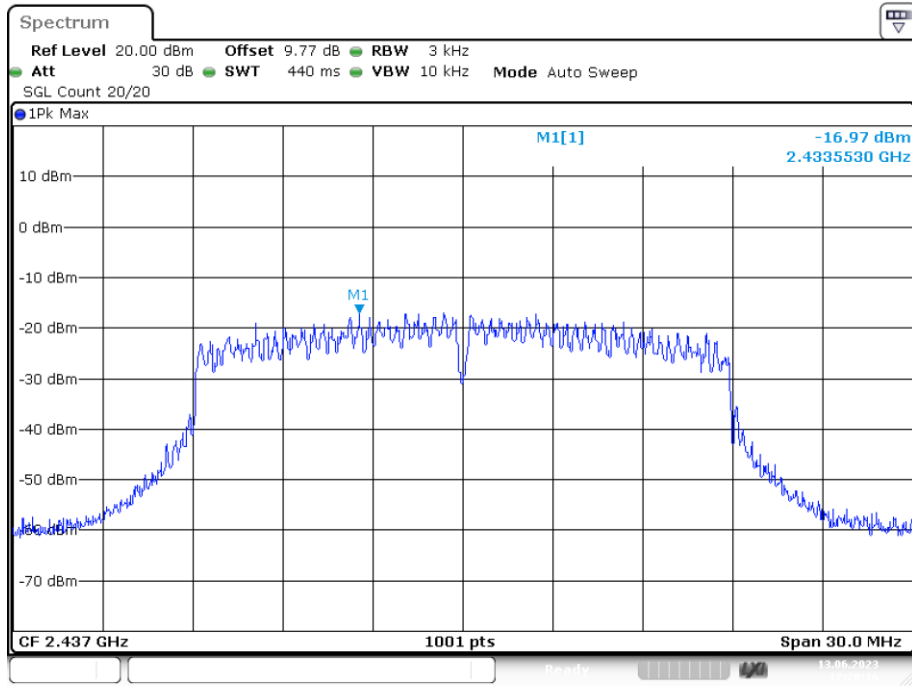
### PSD NVNT n20 2412MHz Ant1



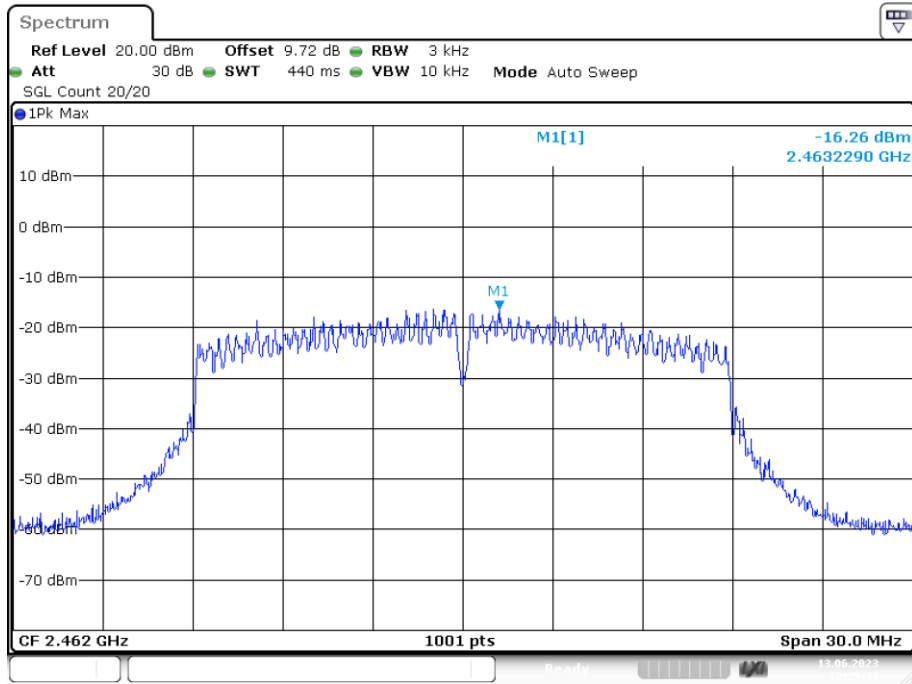
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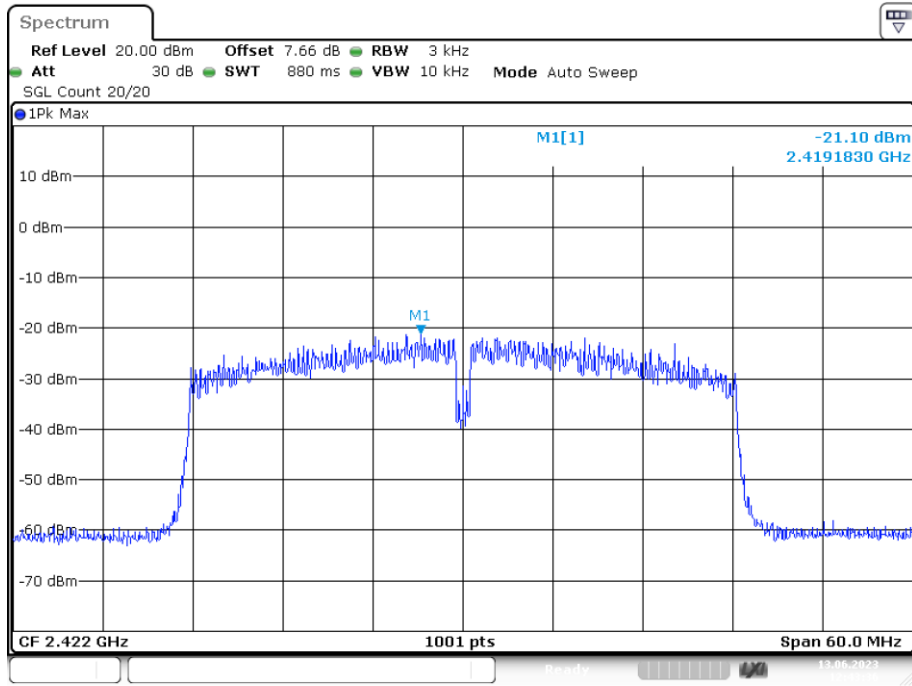
### PSD NVNT n20 2437MHz Ant1



### PSD NVNT n20 2462MHz Ant1

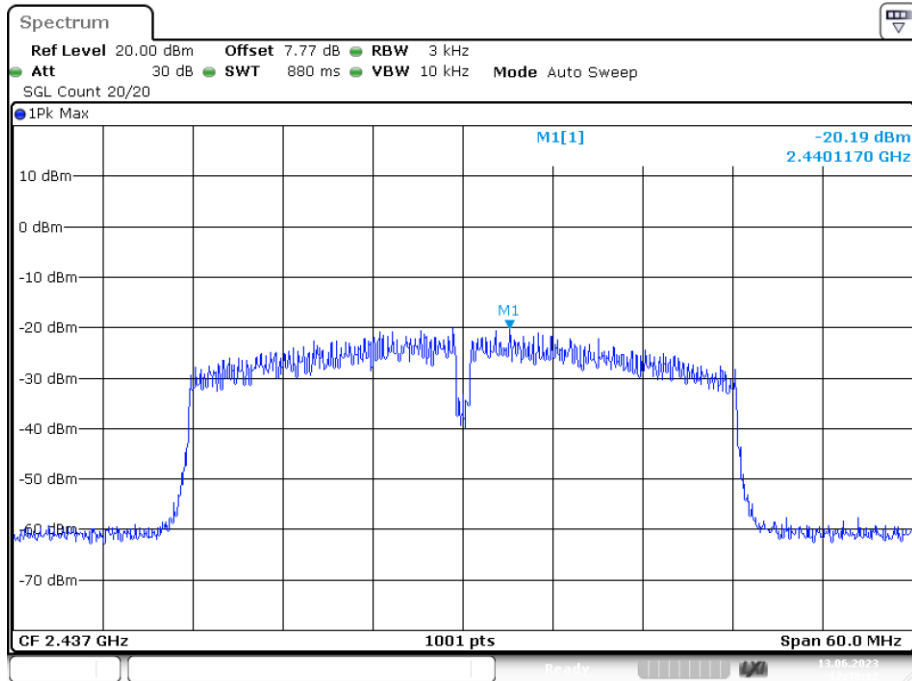


### PSD NVNT n40 2422MHz Ant1



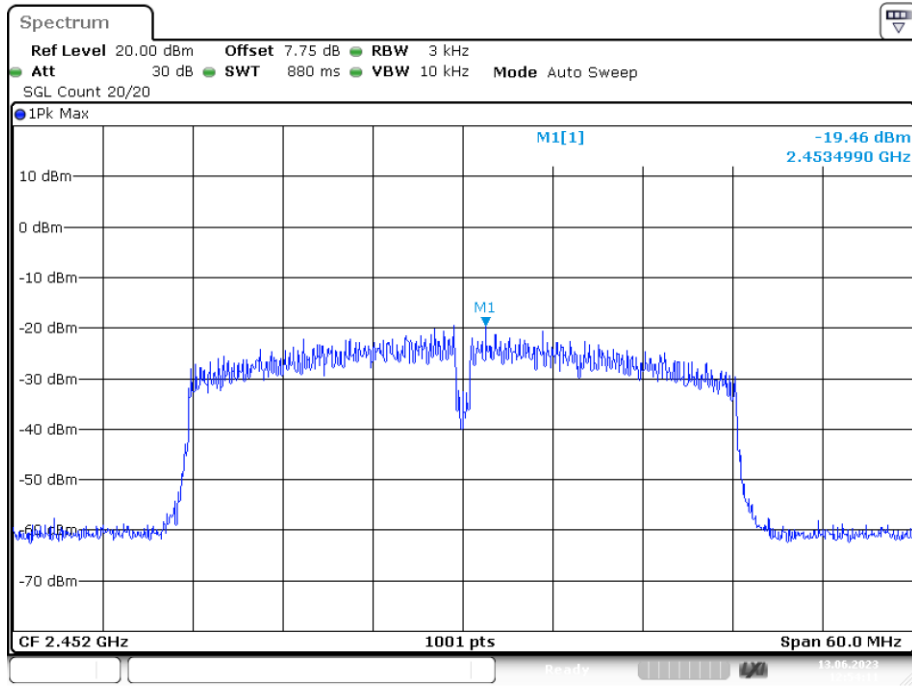
Date: 13.JUN.2023 12:43:36

### PSD NVNT n40 2437MHz Ant1



Date: 13.JUN.2023 12:48:12

PSD NVNT n40 2452MHz Ant1



Date: 13.JUN.2023 12:54:11

## 7. BANDWIDTH

### 7.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247

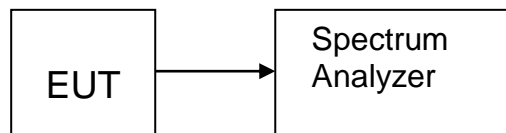
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

### 7.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

- a) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- b) The test receiver set RBW = 100kHz, VBW $\geq$ 3\*RBW =300kHz,, Peak Detector, Sweep time set auto, detail see the test plot.

### 7.3. Test Setup

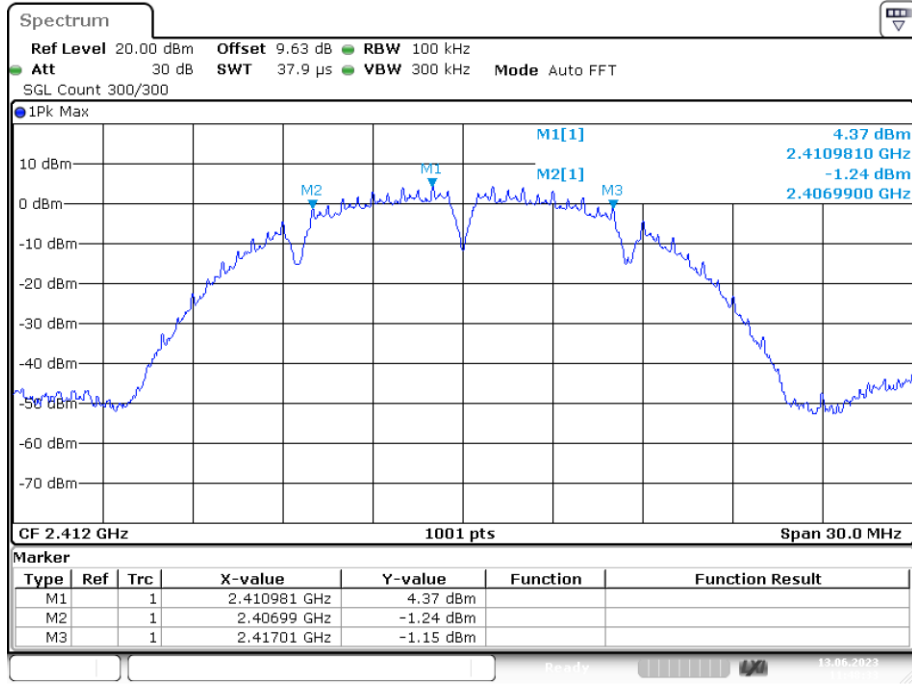


### 7.4. Test Results

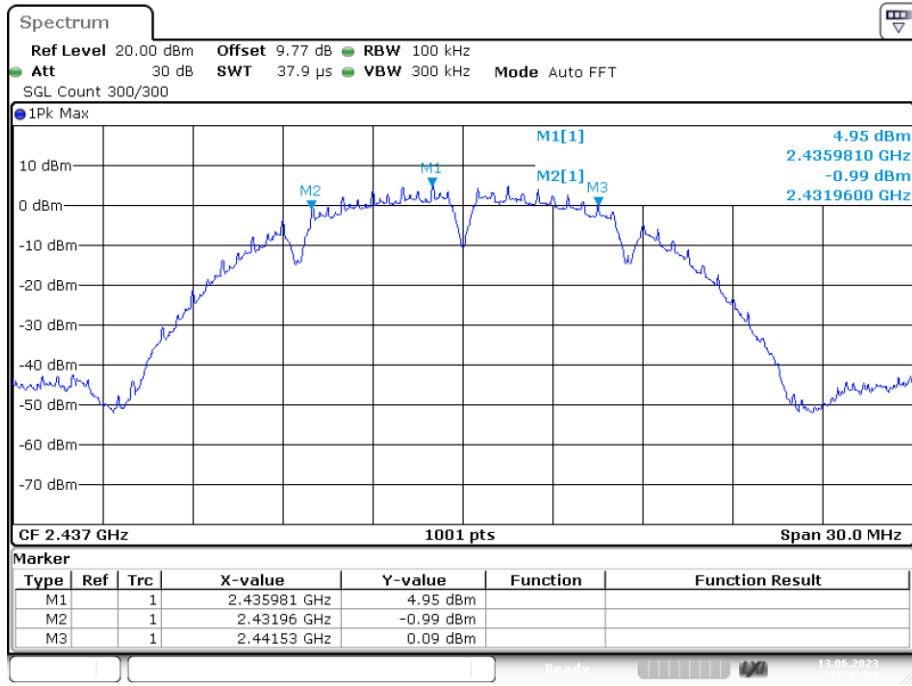
#### -6dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	b	2412	Ant1	10.02	0.5	Pass
NVNT	b	2437	Ant1	9.57	0.5	Pass
NVNT	b	2462	Ant1	10.05	0.5	Pass
NVNT	g	2412	Ant1	15.66	0.5	Pass
NVNT	g	2437	Ant1	15.03	0.5	Pass
NVNT	g	2462	Ant1	15.9	0.5	Pass
NVNT	n20	2412	Ant1	17.04	0.5	Pass
NVNT	n20	2437	Ant1	16.29	0.5	Pass
NVNT	n20	2462	Ant1	13.89	0.5	Pass
NVNT	n40	2422	Ant1	30.12	0.5	Pass
NVNT	n40	2437	Ant1	26.34	0.5	Pass
NVNT	n40	2452	Ant1	23.46	0.5	Pass

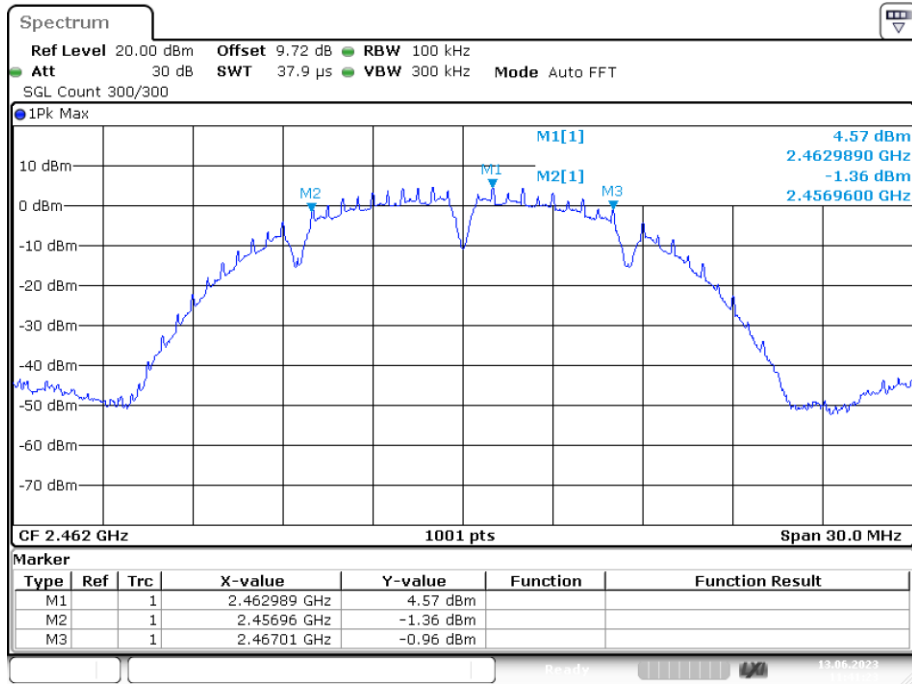
-6dB Bandwidth NVNT b 2412MHz Ant1



-6dB Bandwidth NVNT b 2437MHz Ant1

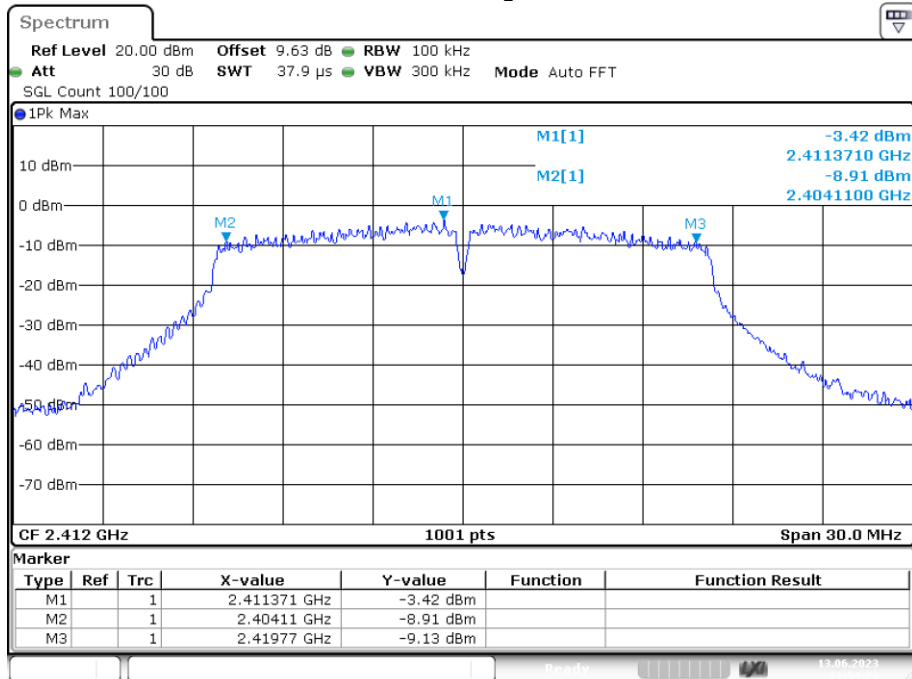


-6dB Bandwidth NVNT b 2462MHz Ant1



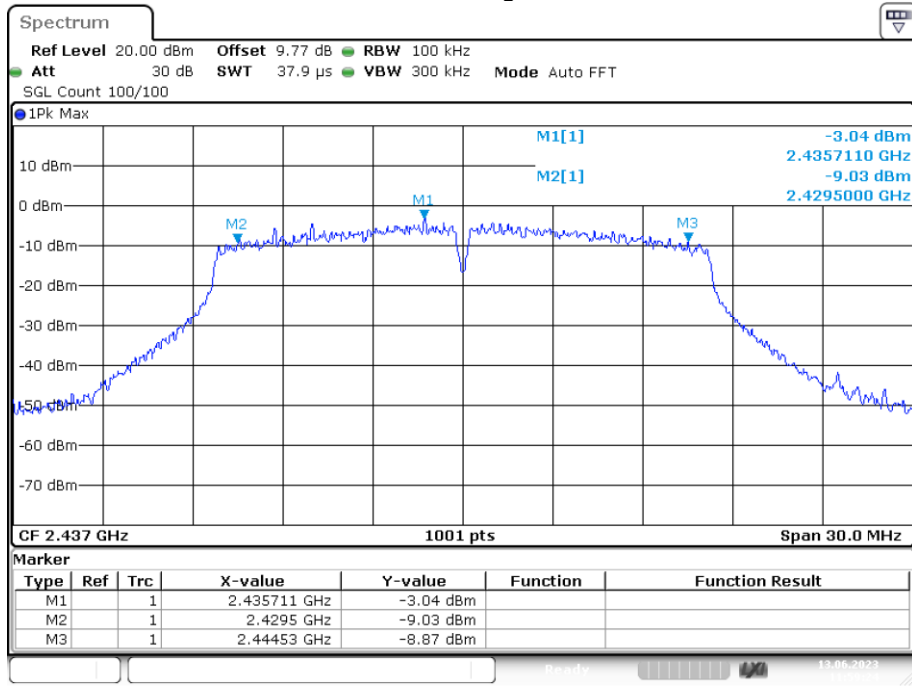
Date: 13.JUN.2023 11:41:23

-6dB Bandwidth NVNT g 2412MHz Ant1



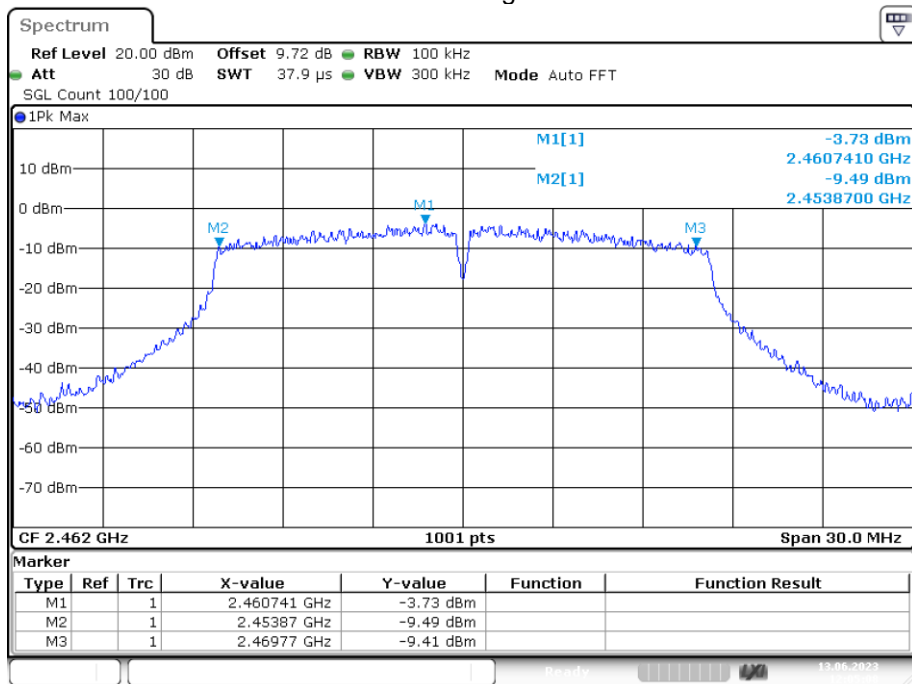
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-6dB Bandwidth NVNT g 2437MHz Ant1



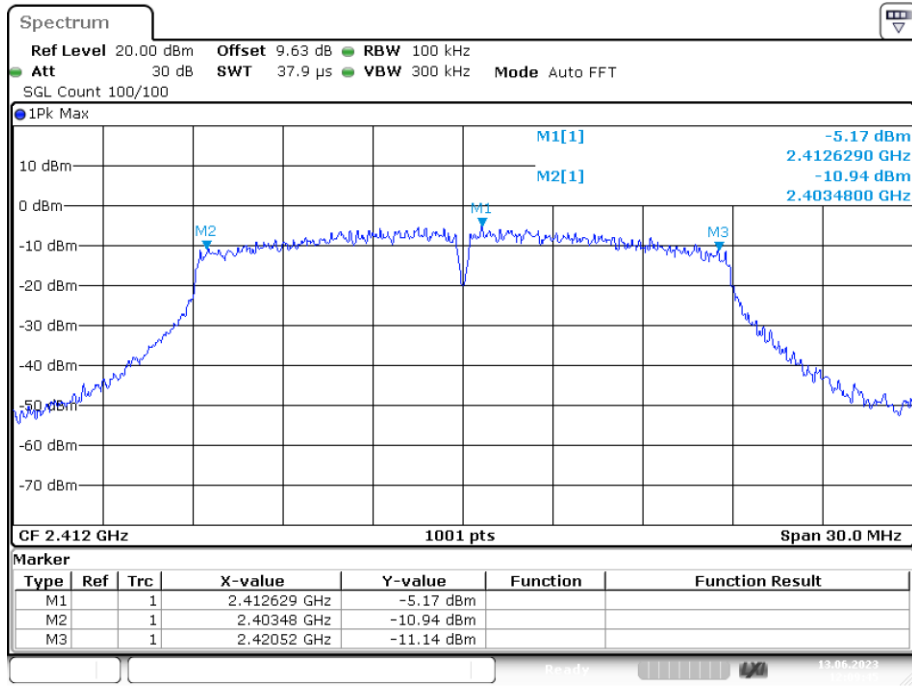
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-6dB Bandwidth NVNT g 2462MHz Ant1



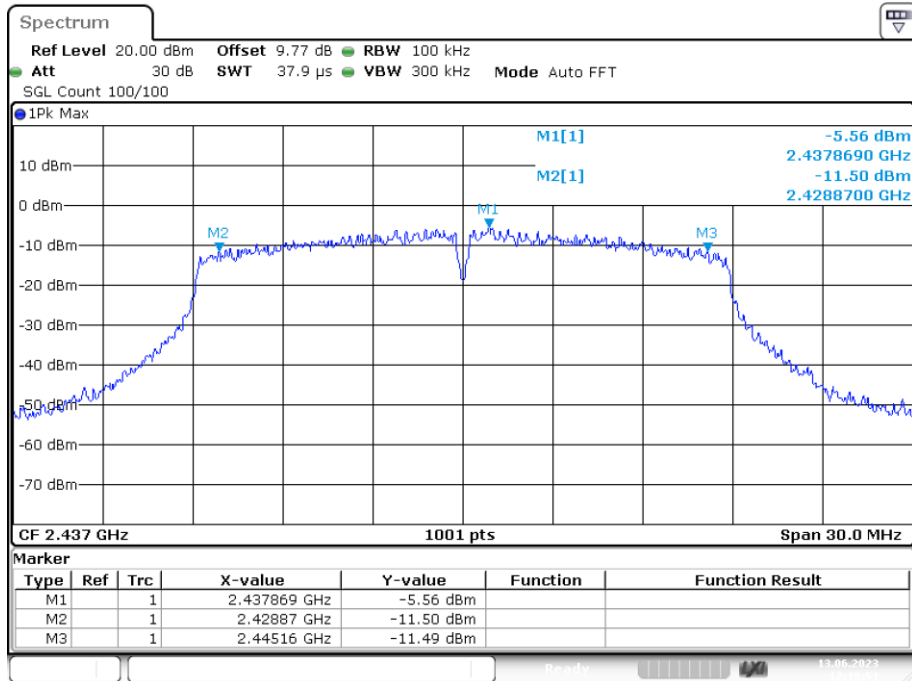
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-6dB Bandwidth NVNT n20 2412MHz Ant1



Date: 13.JUN.2023 12:09:45

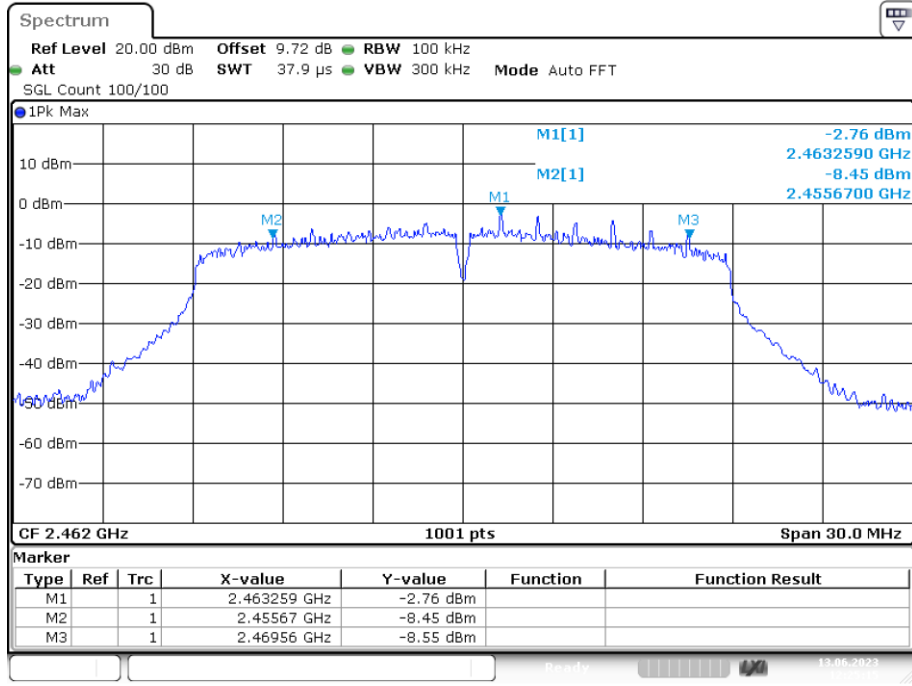
-6dB Bandwidth NVNT n20 2437MHz Ant1



Date: 13.JUN.2023 12:19:51

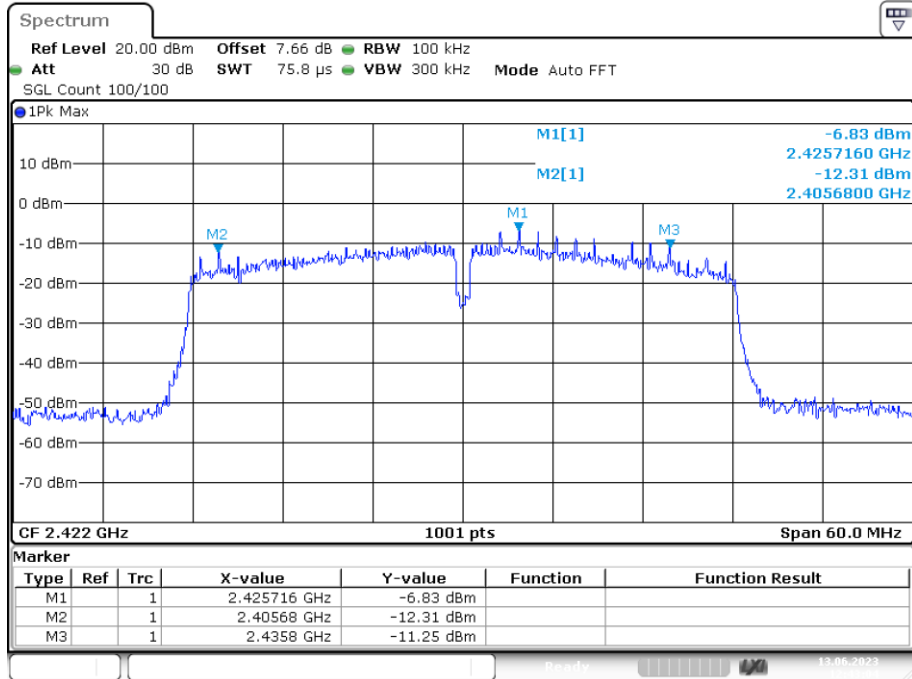


-6dB Bandwidth NVNT n20 2462MHz Ant1



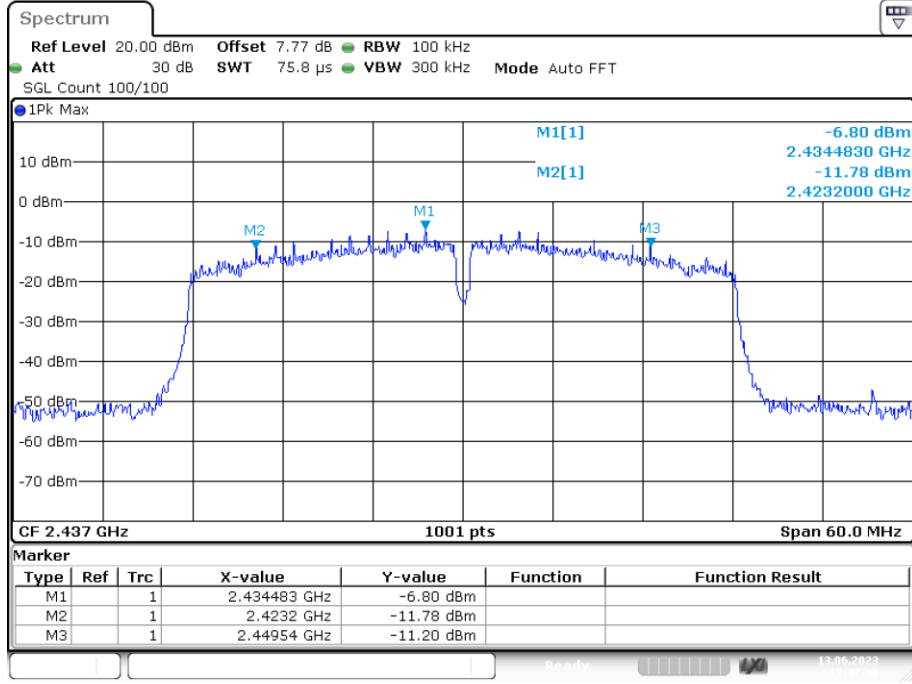
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-6dB Bandwidth NVNT n40 2422MHz Ant1



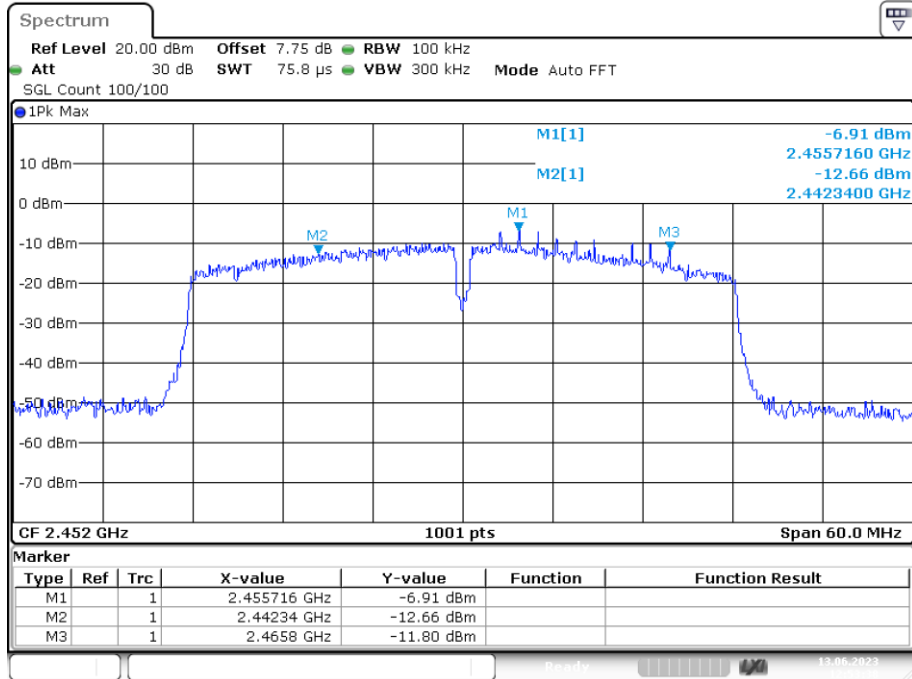
Date: 13.JUN.2023 12:43:04

-6dB Bandwidth NVNT n40 2437MHz Ant1



Date: 13.JUN.2023 12:47:40

-6dB Bandwidth NVNT n40 2452MHz Ant1



Date: 13.JUN.2023 12:53:38