



FCC&IC TEST REPORT

FCC ID: 2A6KK-FW70

IC: 30008-FW70

On Behalf of

SHENZHEN WOPET SMART TECHNOLOGY CO., LTD.

Automatic Pet Feeder

Model No.: FW70PLUS, FW70

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

Prepared By : Shenzhen Alpha Product Testing Co., Ltd.
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Version Number : V0

TABLE OF CONTENTS

<u>Description</u>	<u>Page</u>
1. Summary of Standards And Results -----	6
1.1. Description of Standards and Results -----	6
2. General Information -----	7
2.1. Description of Device (EUT) -----	7
2.2. Accessories of Device (EUT) -----	8
2.3. Tested Supporting System Details-----	8
2.4. Block Diagram of connection between EUT and simulators-----	8
2.5. Test Mode Description -----	9
2.6. Test Conditions -----	9
2.7. Test Facility -----	10
2.8. Measurement Uncertainty -----	10
2.9. Test Equipment List-----	11
3. Spurious Emission -----	12
3.1. Test Limits-----	12
3.2. Test Procedure-----	15
3.3. Test Setup-----	15
3.4. Test Results-----	16
4. Power line Conducted Emission -----	35
4.1. Test Limits-----	35
4.2. Test Procedure-----	35
4.3. Test Setup-----	35
4.4. Test Results-----	36
5. Conducted Maximum Output Power -----	38
5.1. Test limits-----	38
5.2. Test Procedure-----	38
5.3. Test Setup-----	38
5.4. Test Results-----	38
6. Peak Power Spectral Density -----	46
6.1. Test limits-----	46
6.2. Test Procedure-----	46
6.3. Test Setup-----	46
6.4. Test Results-----	47
7. Bandwidth -----	54
7.1. Test limits-----	54
7.2. Test Procedure-----	54
7.3. Test Setup-----	54
7.4. Test Results-----	54
8. Band Edge Check -----	66
8.1. Test limits-----	66
8.2. Test Procedure-----	66
8.3. Test Setup-----	66
8.4. Test Results-----	66
9. Frequency stability -----	77

9.1. Test limit -----	77
9.2. Test Procedure-----	77
9.3. Test Setup-----	77
9.4. Test Results-----	77
10. Antenna Requirement -----	79
10.1. Standard Requirement-----	79
10.2. Antenna Connected Construction -----	79
10.3. Results-----	79
11. Test setup photo-----	80
11.1. Photo of Radiated Emission test-----	80
11.2. Photo of Conducted Emission test -----	81
12. EUT Photo -----	82

TEST REPORT DECLARATION

Applicant : SHENZHEN WOPET SMART TECHNOLOGY CO., LTD.
 Address : ROOM 923, BLOCK A, ECONOMIC BUILDING, HUAFENG, HEADQUARTERS NO. 288, XIXIANG AVENUE, LAODONG COMMUNITY, XIXIANG STREET, BAOAN DISTRICT, SHENZHEN CHINA
 Manufacturer : SHENZHEN WOPET SMART TECHNOLOGY CO., LTD.
 Address : ROOM 923, BLOCK A, ECONOMIC BUILDING, HUAFENG, HEADQUARTERS NO. 288, XIXIANG AVENUE, LAODONG COMMUNITY, XIXIANG STREET, BAOAN DISTRICT, SHENZHEN CHINA
 EUT Description : Automatic Pet Feeder
 (A) Model No. : FW70PLUS, FW70
 (B) Trademark : N/A

Measurement Standard Used:

**FCC Rules and Regulations Part 15 Subpart C Section 15.247,
 RSS-247 Issue 2, RSS-Gen Issue 5, ANSI C63.10:2013, CISPR 16-1-4:2010**

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.....: August 10, 2023

Revision History

Revision	Issue Date	Revisions	Revised By
V0	August 10, 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 RSS-GEN(8.8) ANSI C63.10 :2013	P
6dB Bandwidth	FCC PART 15:15.247(a)(2) RSS-247(5.2 a) ANSI C63.10 :2013	P
Output Power	FCC Part 15: 15.247(b)(3) RSS-247(5.4 d) ANSI C63.10 :2013	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) RSS-Gen(8.9), RSS-247(5.5) ANSI C63.10 :2013	P
Conducted Spurious & Band Edge Emission	FCC Part 15: 15.247(d) RSS-Gen(8.9), RSS-247(5.5) ANSI C63.10 :2013	P
Power Spectral Density	FCC PART 15:15.247(e) RSS-247(5.2 b) ANSI C63.10 :2013	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d) RSS-GEN(6.13) ANSI C63.10 :2013	P
Frequency stability	RSS-GEN(6.11)	P
Antenna Requirement	FCC Part 15: 15.203 RSS-GEN(6.8)	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. Decision rules for the conclusion of this test report: decision by actual test data without considering measurement uncertainty.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Description/PMN : Automatic Pet Feeder

Model Number/HVIN(s) : FW70PLUS, FW70

Diff. : There is no difference, except for the appearance color and size. The circuit and principle are the same. All tests were conducted using the FW70PLUS model.

Test Voltage : DC 5V from USB or DC 4.5V from battery

Radio Technology : 2.4G WIFI

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): 11
802.11(HT40): 7

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 : Internal antenna, Maximum Gain is 1.95dBi.

Software Version : V1.0

Hardware version/FVIN : V1.0

Remark:

1. The worst-case simultaneous transmission configuration was evaluated with no non-compliance found. Results in this report are only for 2.4G Wi-Fi function, and there is no other transmitter involved.
2. In this report, the main test model is FW70PLUS, and the main test model serial number is F0000025

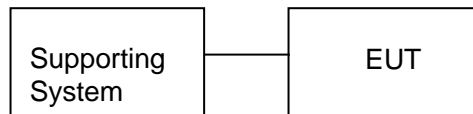
2.2. Accessories of Device (EUT)

Accessories : ADAPTER
Manufacturer : Shenzhen Tianyin Electronics Co., Ltd.
Model : TPA-46B050100UU
Ratings : Input: 100-240V~ 50/60Hz 0.2A
Output: 5.0V=1.0A

2.3. Tested Supporting System Details

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

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Duty cycle :100%Keeping TX			
Mode	Data rate (Mbps)	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	Low :CH3	2422
	13	Middle: CH6	2437
	13	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 and IEEE 802.11 n/HT40 with 2.4G					
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		

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 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°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	2022.08.22	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2022.08.22	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-10 2082-Wa	2022.08.22	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2022.08.22	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2021.08.30	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2021.08.30	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00059	2021.08.30	2Year
RF Cable	Resenberger	Cable 1	/	RE1	2022.08.22	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2022.08.22	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2022.08.22	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2022.08.22	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2022.08.22	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2022.08.22	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2022.08.23	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	/	00946	2021.08.30	2 Year
Preamplifier	SKET	LNPA_1840 -50	/	SK2018101801	2022.08.22	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2022.08.22	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2022.08.22	1 Year
Temp. & Humid. Chamber	Teelong	TL-HW408S	/	TL-20191205-01	2023.07.25	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2022.08.22	1 Year
Adjustable attenuator	MWRFTest	N/A	/	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	/	N/A	N/A	N/A

Software Information

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

3. 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
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)

RSS-GEN Restricted frequency band

Table 7 – Restricted frequency bands ^{Note 1}		
MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12

6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

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			

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Table 5 – General field strength limits at frequencies above 30 MHz	
Frequency (MHz)	Field strength (μV/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz		
Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement distance (m)
9 - 490 kHz ^{Note 1}	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

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

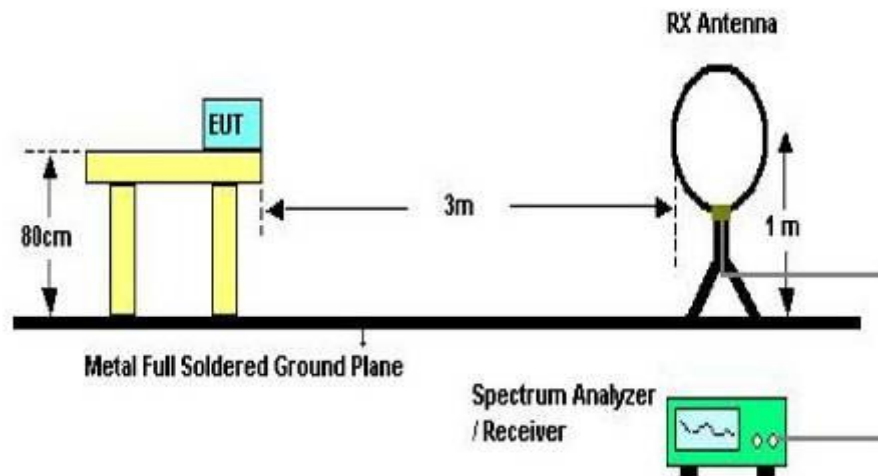
The Test antenna shall vary between 1m and 4m, both Horizontal and Vertical antenna are set of make measurement.

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

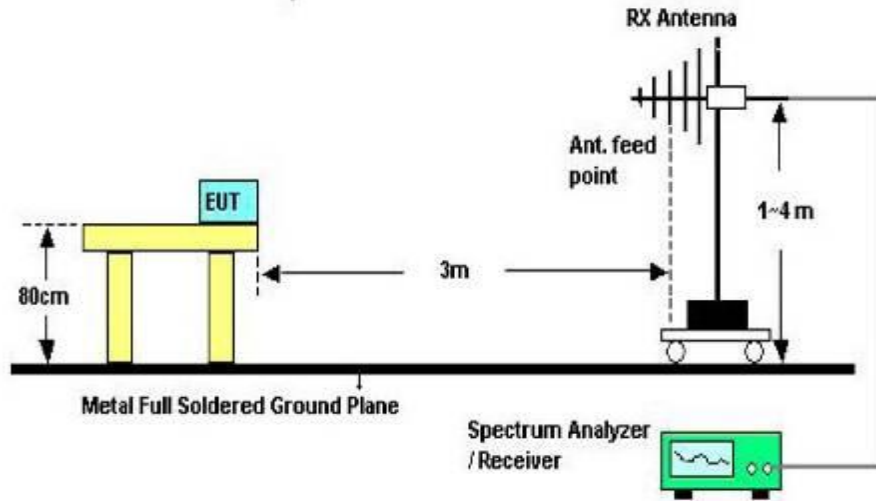
If Peak value comply with QP limit below 1GHz, the EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

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

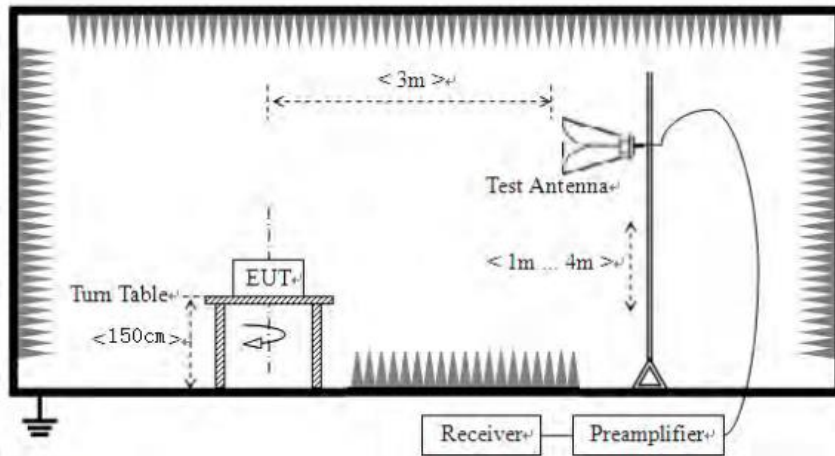
3.3. Test Setup



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.

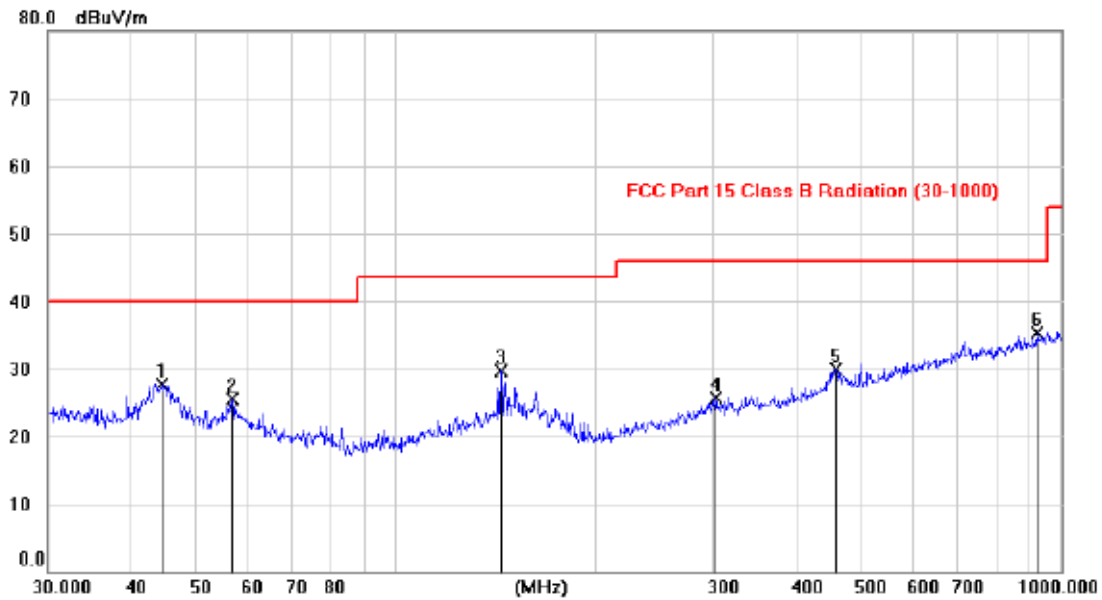
From 9KHz to 30MHz: Conclusion: PASS

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.

Test result for 802.11b (High Channel), AC 120V/ 60Hz

Vertical:

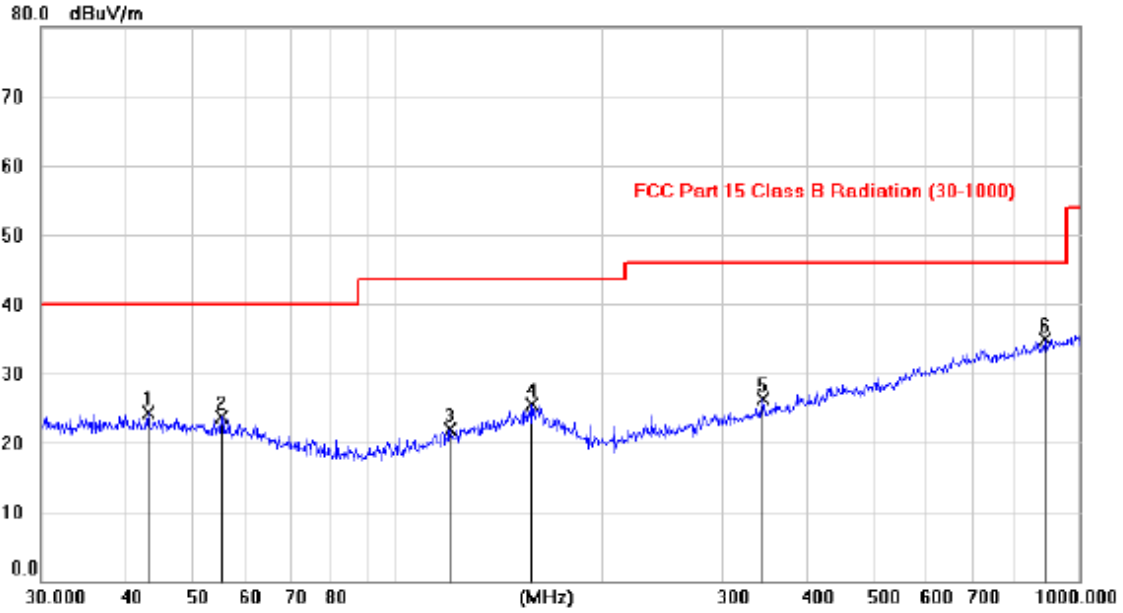


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		44.6494	13.65	14.15	27.80	40.00	-12.20	peak			
2		56.9247	12.04	13.42	25.46	40.00	-14.54	peak			
3		144.2167	15.10	14.62	29.72	43.50	-13.78	peak			
4		303.1182	11.57	14.17	25.74	46.00	-20.26	peak			
5		459.9738	12.25	17.66	29.91	46.00	-16.09	peak			
6	*	920.0390	10.90	24.32	35.22	46.00	-10.78	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		43.1210	10.09	14.22	24.31	40.00	-15.69	peak	
2		55.3823	10.16	13.57	23.73	40.00	-16.27	peak	
3		119.4780	8.93	12.97	21.90	43.50	-21.60	peak	
4		158.0754	10.49	15.04	25.53	43.50	-17.97	peak	
5		343.9430	11.16	15.14	26.30	46.00	-19.70	peak	
6	*	892.6038	11.01	23.94	34.95	46.00	-11.05	peak	

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

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

Notes: Above is below 1GHz test data. This report only shall the worst case mode for b 2412MHz.

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	48.49	V	33.93	10.18	34.26	58.34	74	-15.66	PK
4824	36.67	V	33.93	10.18	34.26	46.52	54	-7.48	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	47.14	H	33.93	10.18	34.26	56.99	74	-17.01	PK
4824	35.41	H	33.93	10.18	34.26	45.26	54	-8.74	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX Mid									
4874	49.39	V	33.95	10.20	34.26	59.28	74	-14.72	PK
4874	35.62	V	33.95	10.20	34.26	45.51	54	-8.49	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	48.09	H	33.95	10.20	34.26	57.98	74	-16.02	PK
4874	34.68	H	33.95	10.20	34.26	44.57	54	-9.43	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX High									
4924	47.15	V	33.98	10.22	34.25	57.10	74	-16.90	PK
4924	33.44	V	33.98	10.22	34.25	43.39	54	-10.61	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	46.63	H	33.98	10.22	34.25	56.58	74	-17.42	PK
4924	32.71	H	33.98	10.22	34.25	42.66	54	-11.34	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	48.22	V	33.93	10.18	34.26	58.07	74	-15.93	PK
4824	36.25	V	33.93	10.18	34.26	46.10	54	-7.90	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	47.88	H	33.93	10.18	34.26	57.73	74	-16.27	PK
4824	35.48	H	33.93	10.18	34.26	45.33	54	-8.67	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX Mid									
4874	49.85	V	33.95	10.20	34.26	59.74	74	-14.26	PK
4874	35.65	V	33.95	10.20	34.26	45.54	54	-8.46	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	48.66	H	33.95	10.20	34.26	58.55	74	-15.45	PK
4874	35.00	H	33.95	10.20	34.26	44.89	54	-9.11	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	33.53	V	33.98	10.22	34.25	43.48	54	-10.52	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	46.30	H	33.98	10.22	34.25	56.25	74	-17.75	PK
4924	32.61	H	33.98	10.22	34.25	42.56	54	-11.44	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 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	48.07	V	33.93	10.18	34.26	57.92	74	-16.08	PK
4824	36.06	V	33.93	10.18	34.26	45.91	54	-8.09	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	47.93	H	33.93	10.18	34.26	57.78	74	-16.22	PK
4824	35.51	H	33.93	10.18	34.26	45.36	54	-8.64	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX Mid									
4874	49.95	V	33.95	10.20	34.26	59.84	74	-14.16	PK
4874	35.36	V	33.95	10.20	34.26	45.25	54	-8.75	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	48.30	H	33.95	10.20	34.26	58.19	74	-15.81	PK
4874	34.52	H	33.95	10.20	34.26	44.41	54	-9.59	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX High									
4924	47.42	V	33.98	10.22	34.25	57.37	74	-16.63	PK
4924	33.18	V	33.98	10.22	34.25	43.13	54	-10.87	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	46.94	H	33.98	10.22	34.25	56.89	74	-17.11	PK
4924	32.74	H	33.98	10.22	34.25	42.69	54	-11.31	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

Note:

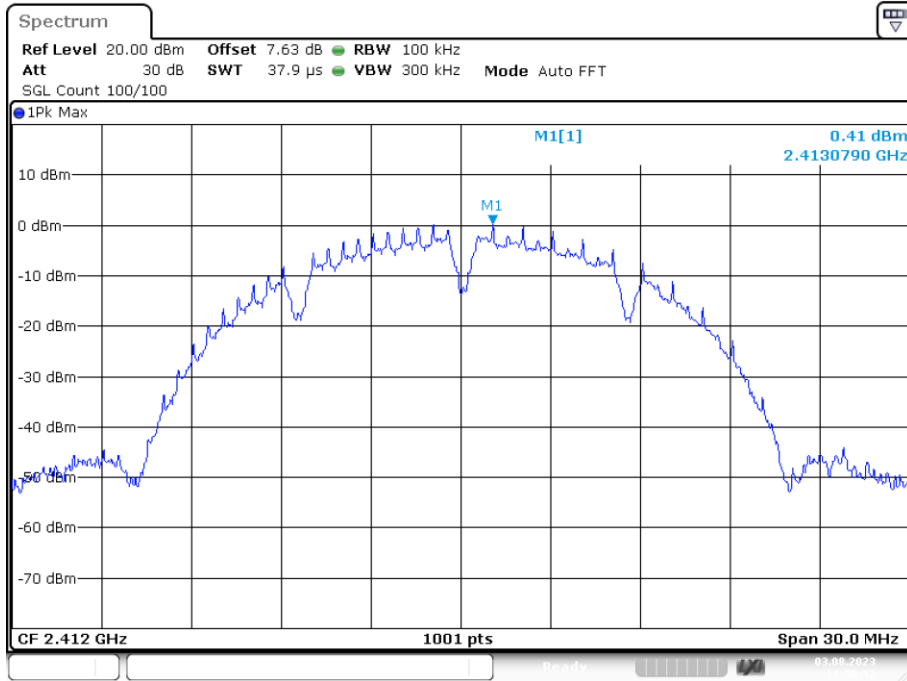
1, Result = Read level + Antenna factor + cable loss-Amp factor

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

Test Mode: IEEE 802.11n 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	48.99	V	33.93	10.18	34.26	58.84	74	-15.16	PK
4844	36.87	V	33.93	10.18	34.26	46.72	54	-7.28	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
4844	47.74	H	33.93	10.18	34.26	57.59	74	-16.41	PK
4844	35.29	H	33.93	10.18	34.26	45.14	54	-8.86	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX Mid									
4874	49.26	V	33.95	10.20	34.26	59.15	74	-14.85	PK
4874	35.40	V	33.95	10.20	34.26	45.29	54	-8.71	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	48.81	H	33.95	10.20	34.26	58.70	74	-15.30	PK
4874	34.48	H	33.95	10.20	34.26	44.37	54	-9.63	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX High									
4904	47.87	V	33.98	10.22	34.25	57.82	74	-16.18	PK
4904	33.15	V	33.98	10.22	34.25	43.10	54	-10.90	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/
4904	46.92	H	33.98	10.22	34.25	56.87	74	-17.13	PK
4904	32.08	H	33.98	10.22	34.25	42.03	54	-11.97	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.									

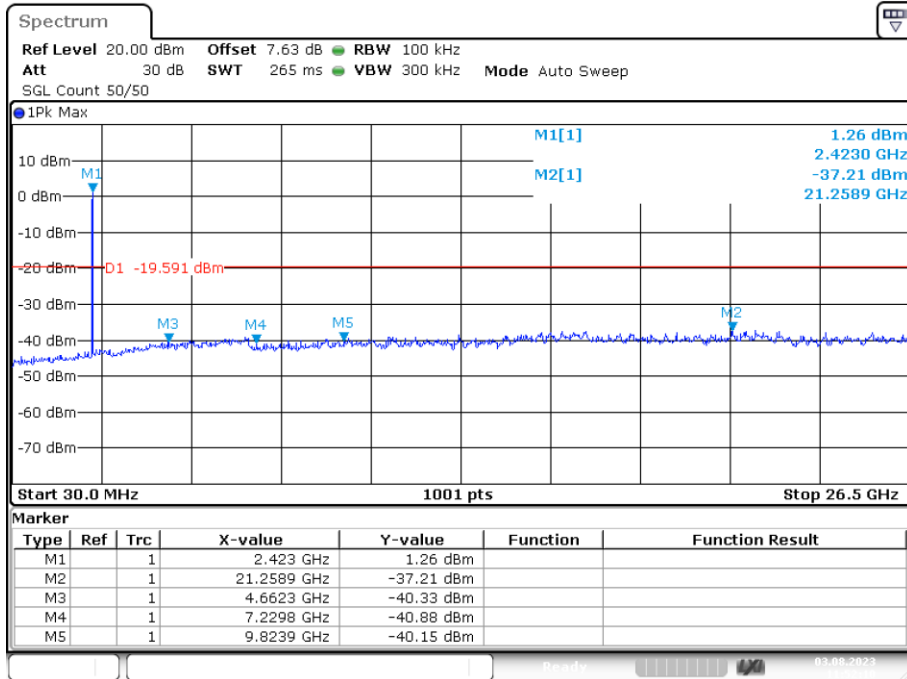
Conducted RF Spurious Emission

Tx. Spurious NVNT b 2412MHz Ant1 Ref



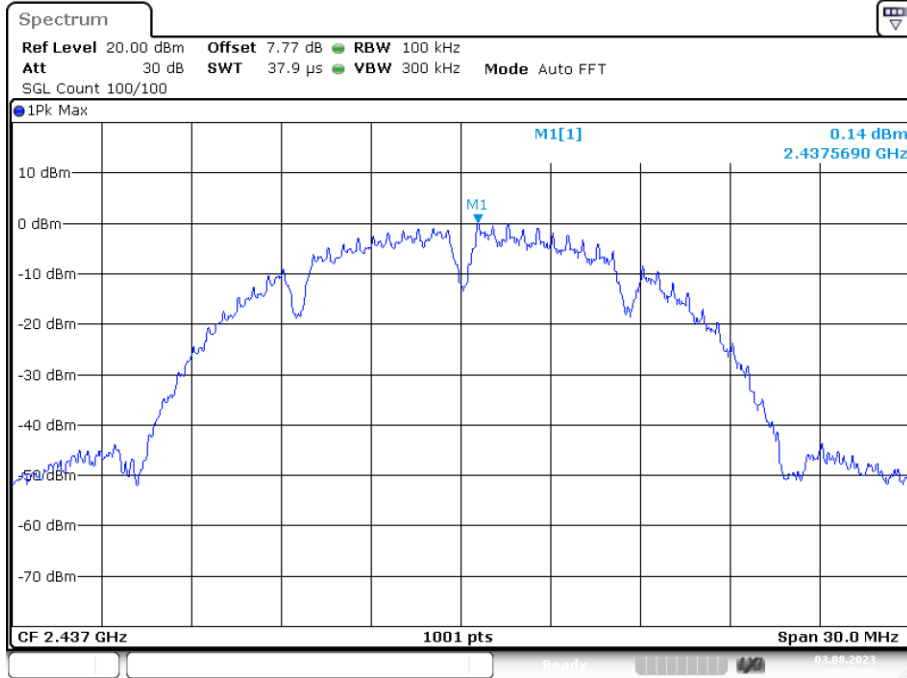
Date: 3.AUG.2023 11:50:52

Tx. Spurious NVNT b 2412MHz Ant1 Emission

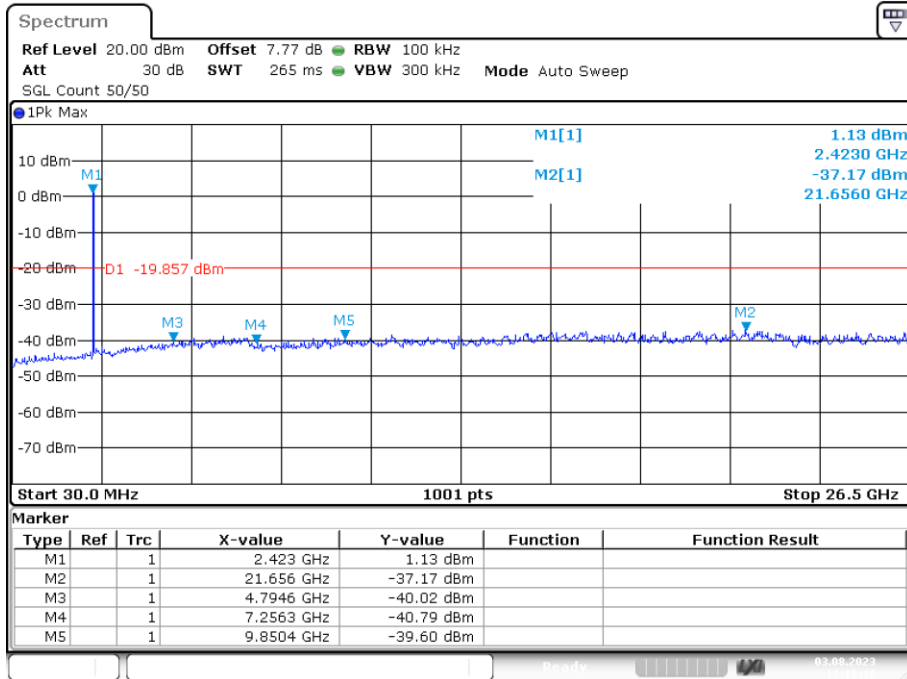


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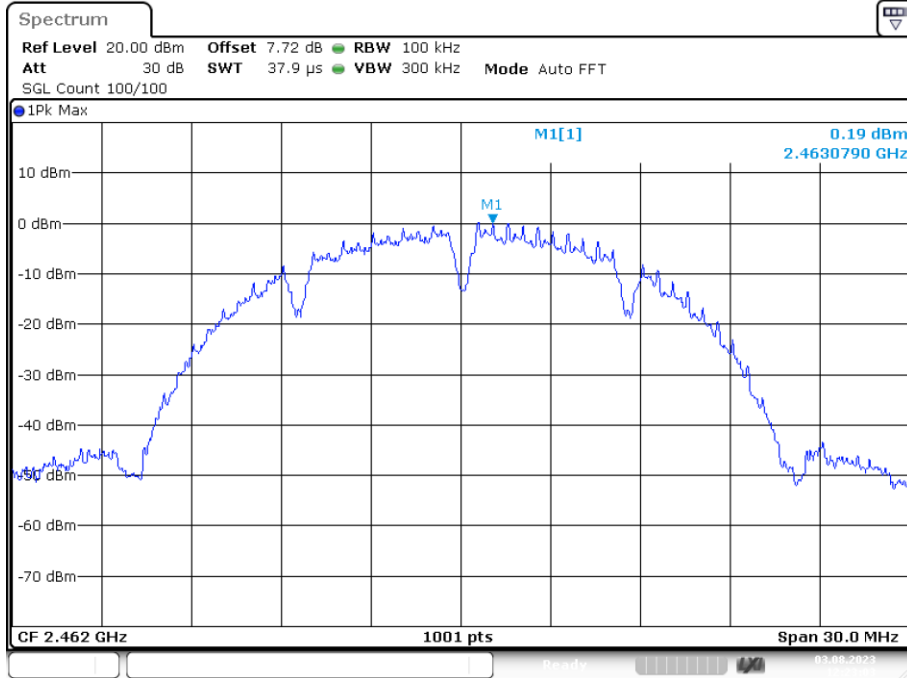
Tx. Spurious NVNT b 2437MHz Ant1 Ref



Tx. Spurious NVNT b 2437MHz Ant1 Emission

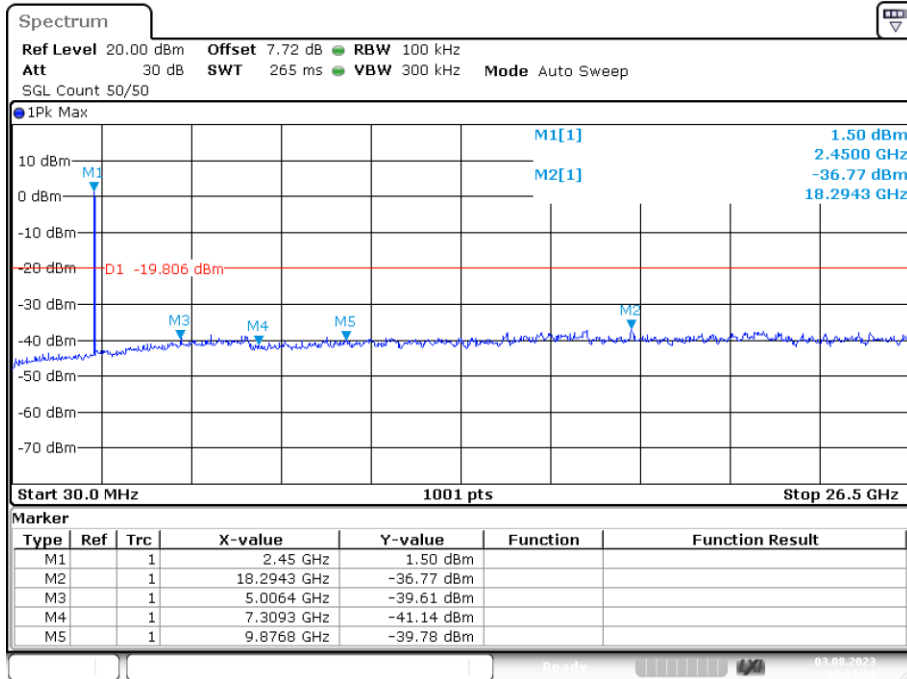


Tx. Spurious NVNT b 2462MHz Ant1 Ref



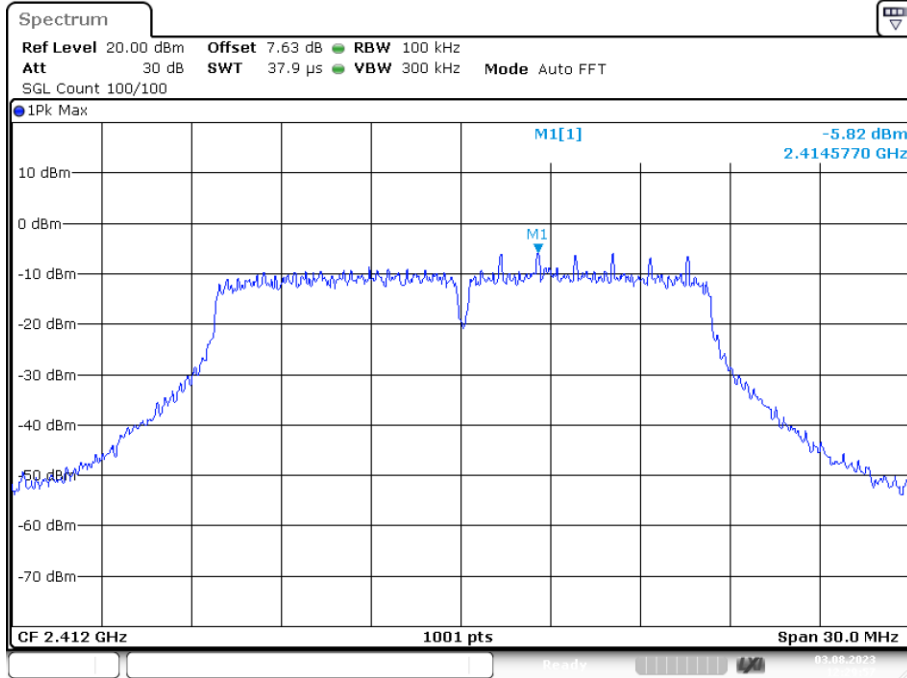
Date: 3.AUG.2023 12:23:02

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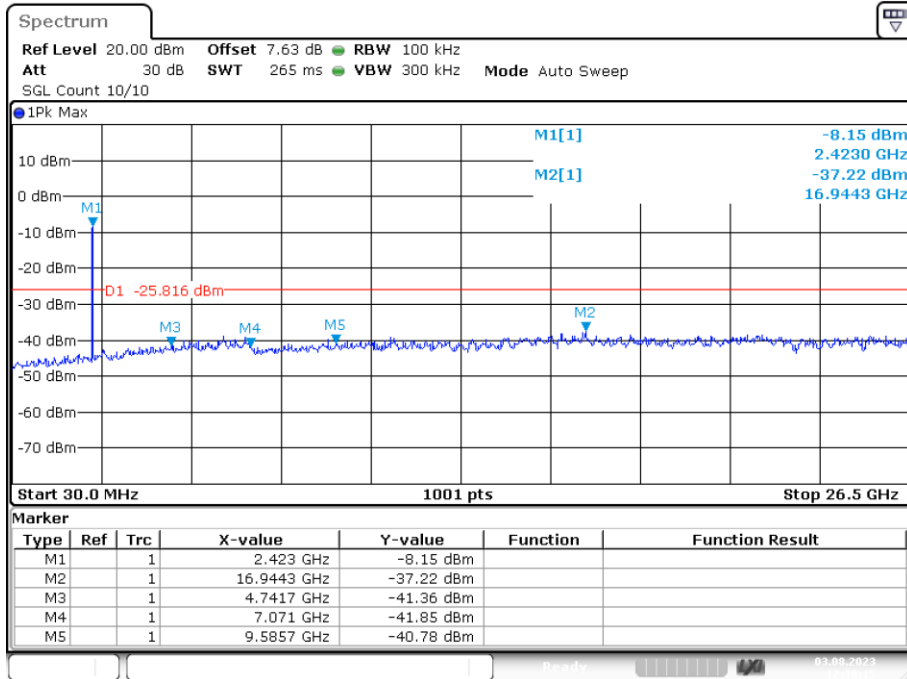


Date: 3.AUG.2023 12:24:20

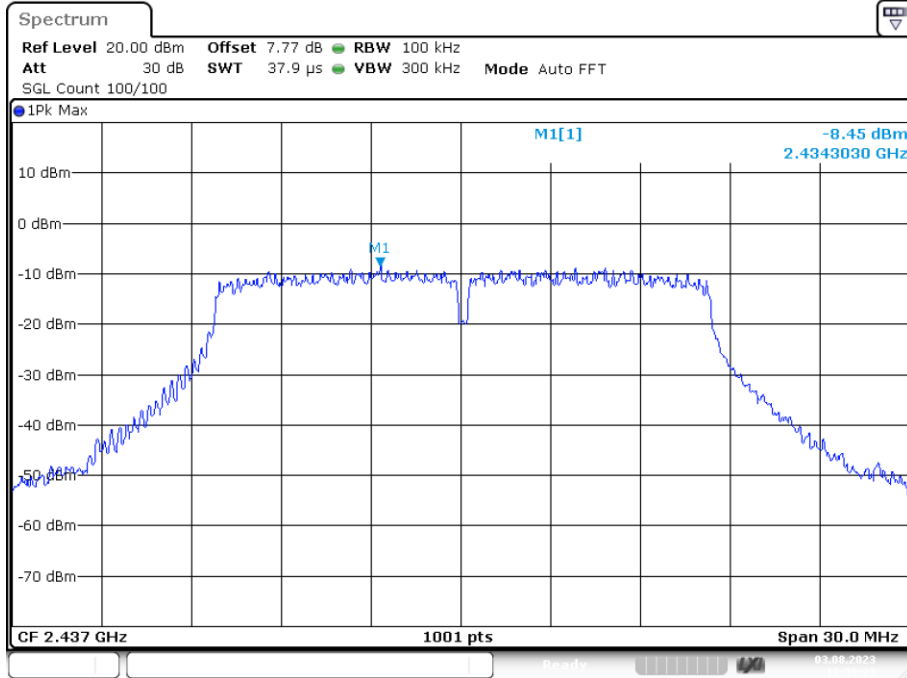
Tx. Spurious NVNT g 2412MHz Ant1 Ref



Tx. Spurious NVNT g 2412MHz Ant1 Emission

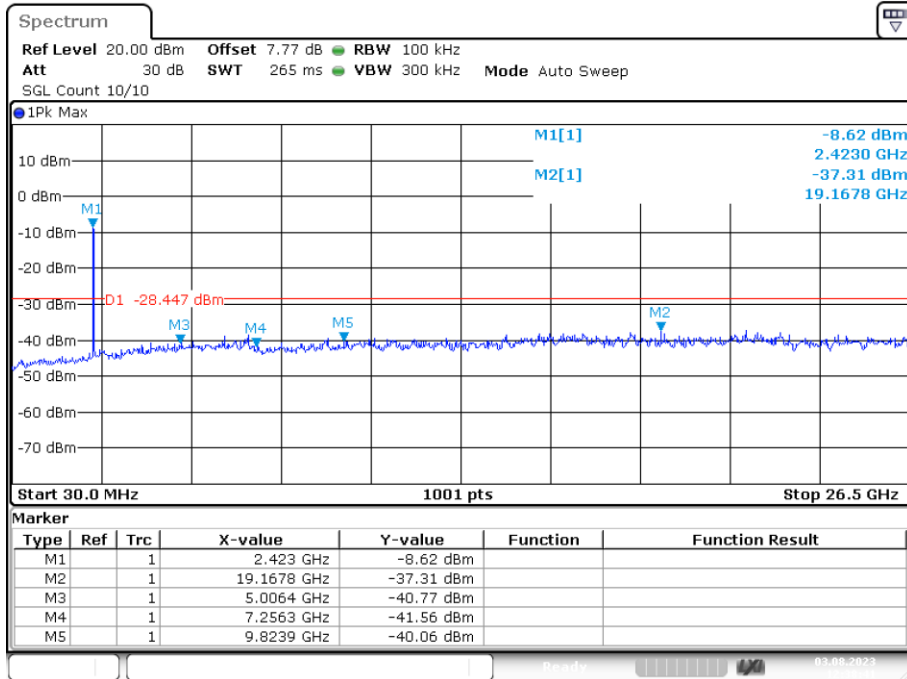


Tx. Spurious NVNT g 2437MHz Ant1 Ref



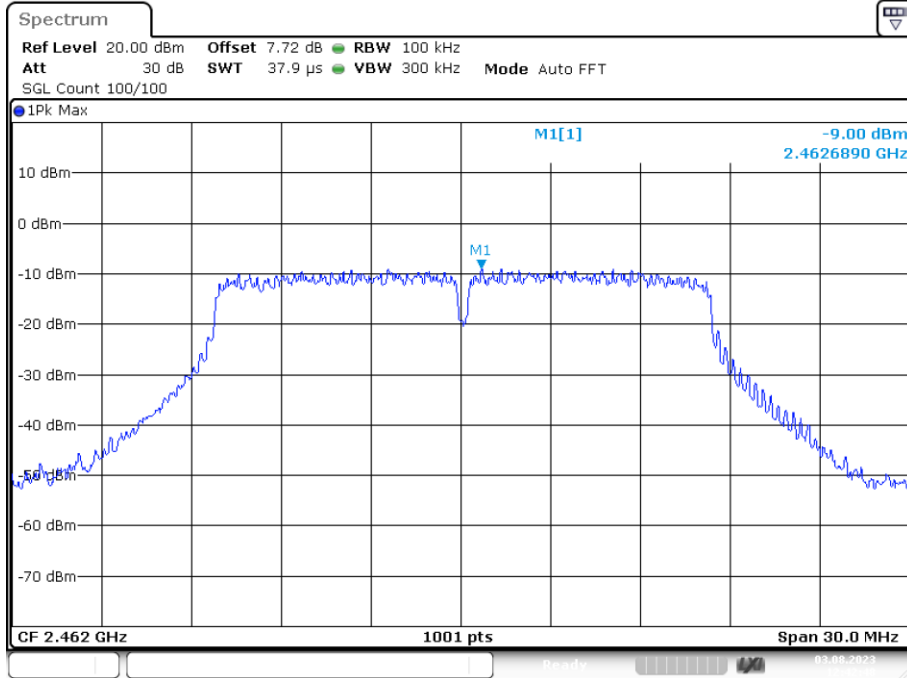
Date: 3.AUG.2023 12:38:23

Tx. Spurious NVNT g 2437MHz Ant1 Emission



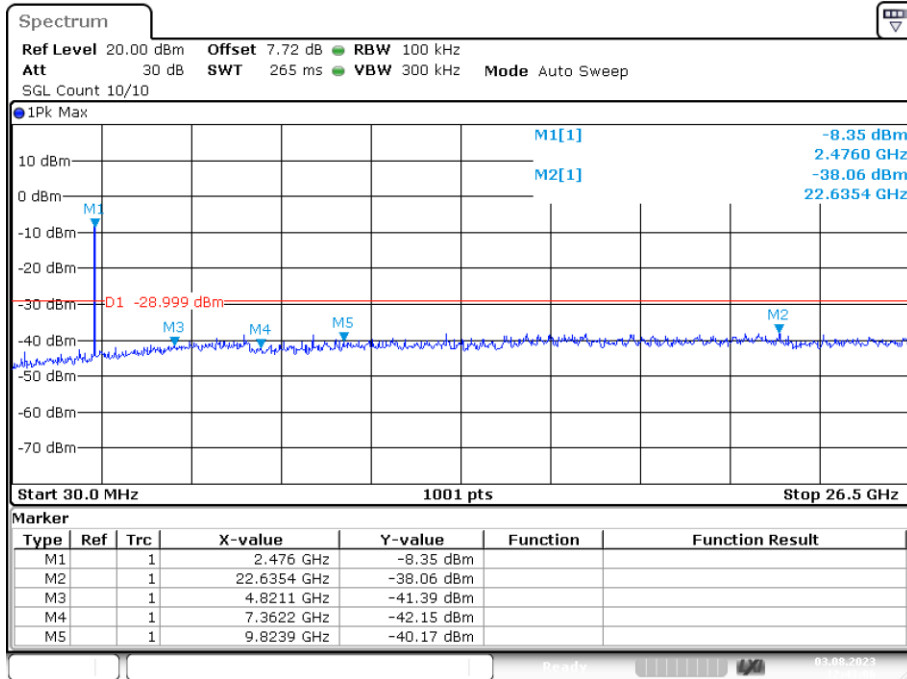
Date: 3.AUG.2023 12:38:41

Tx. Spurious NVNT g 2462MHz Ant1 Ref



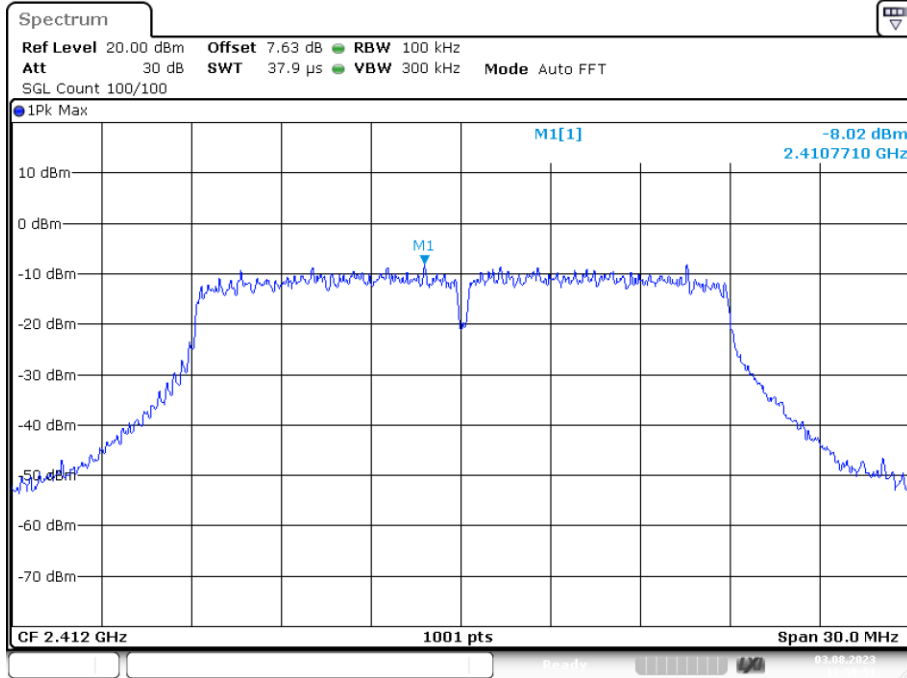
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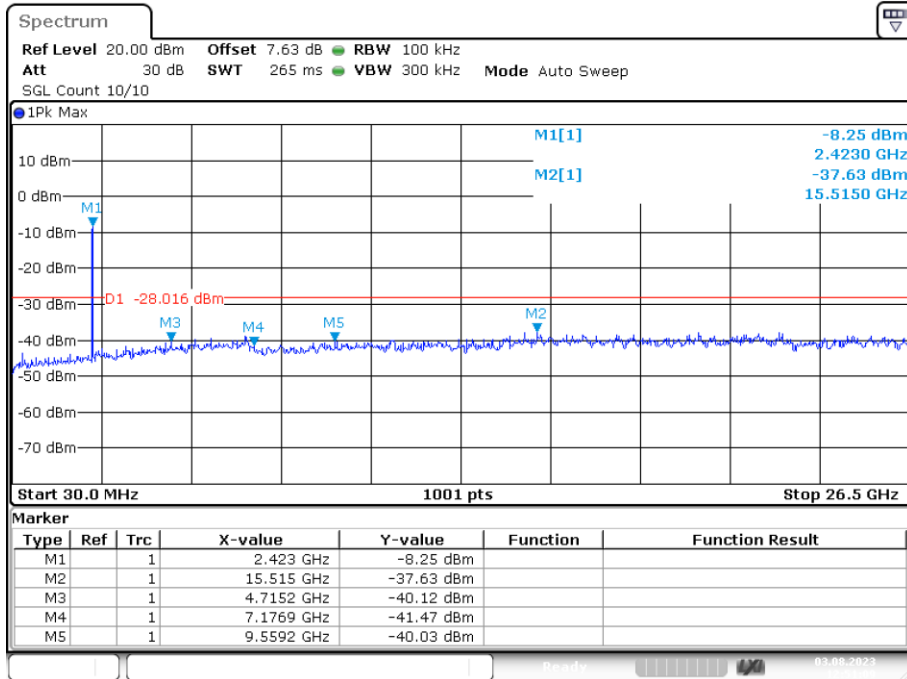


Date: 3.AUG.2023 12:43:06

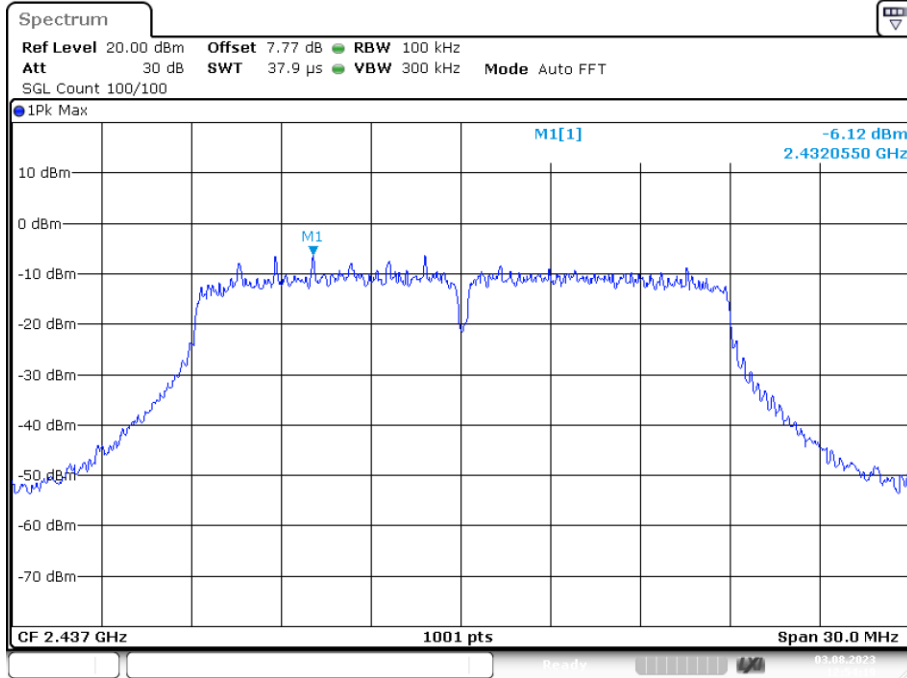
Tx. Spurious NVNT n20 2412MHz Ant1 Ref



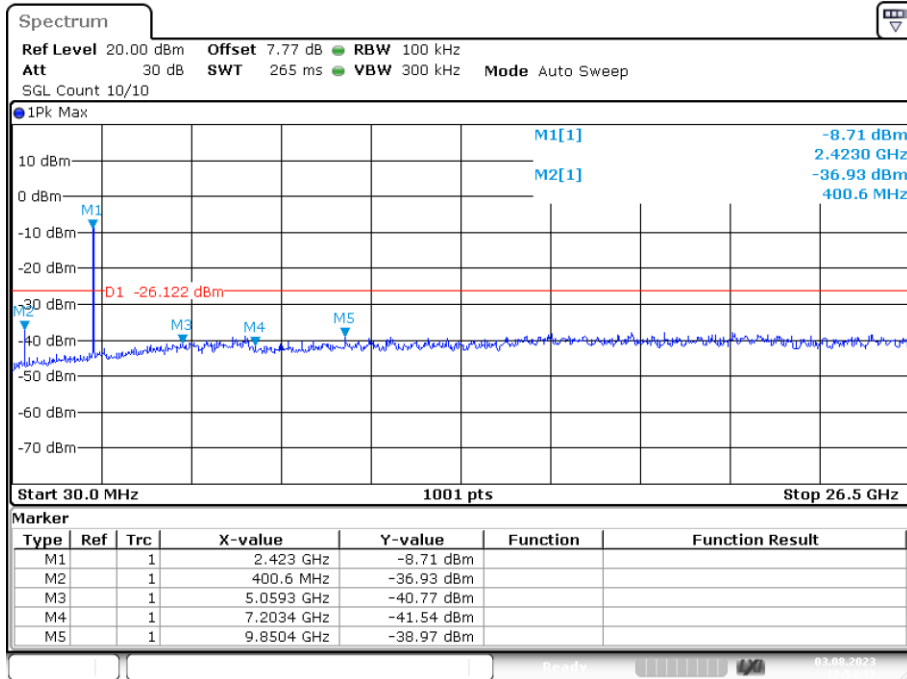
Tx. Spurious NVNT n20 2412MHz Ant1 Emission



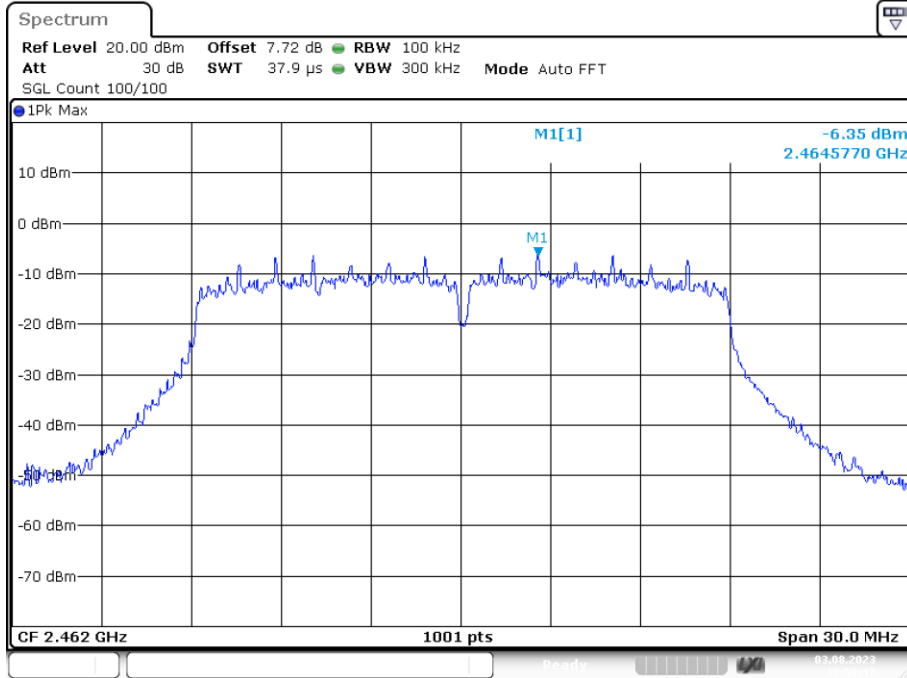
Tx. Spurious NVNT n20 2437MHz Ant1 Ref



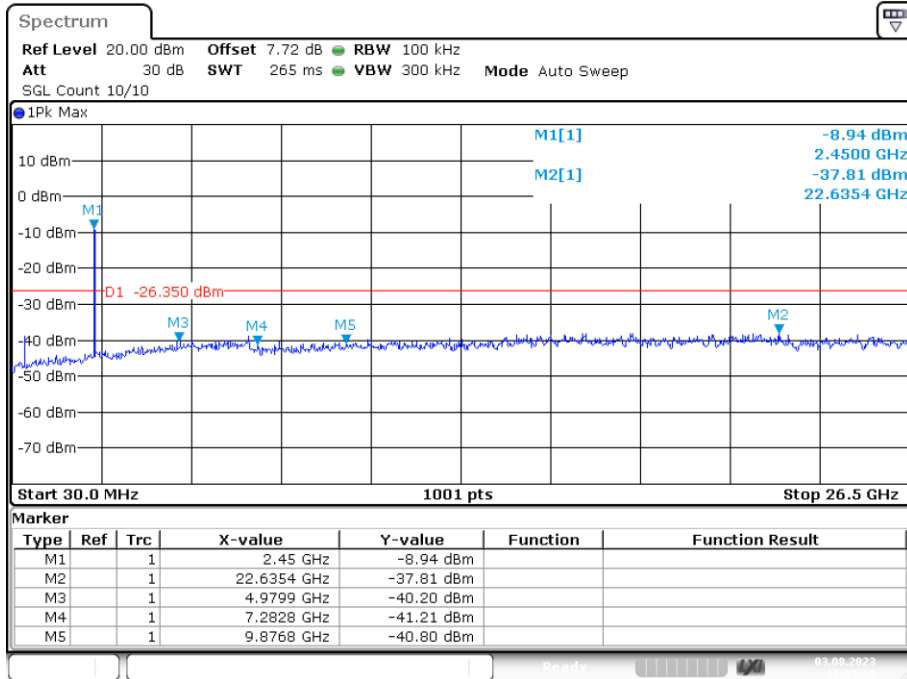
Tx. Spurious NVNT n20 2437MHz Ant1 Emission



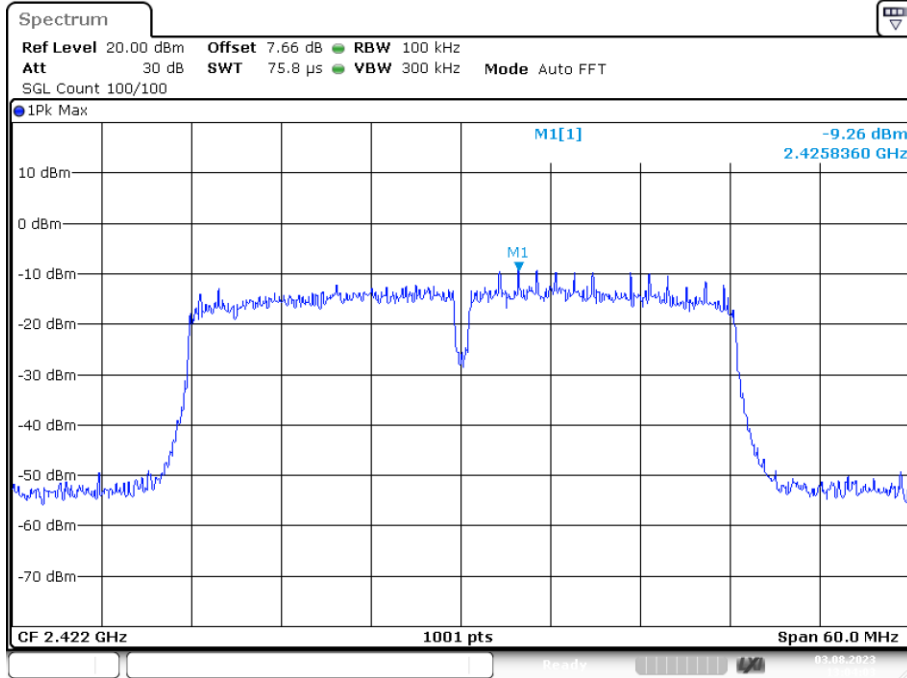
Tx. Spurious NVNT n20 2462MHz Ant1 Ref



Tx. Spurious NVNT n20 2462MHz Ant1 Emission

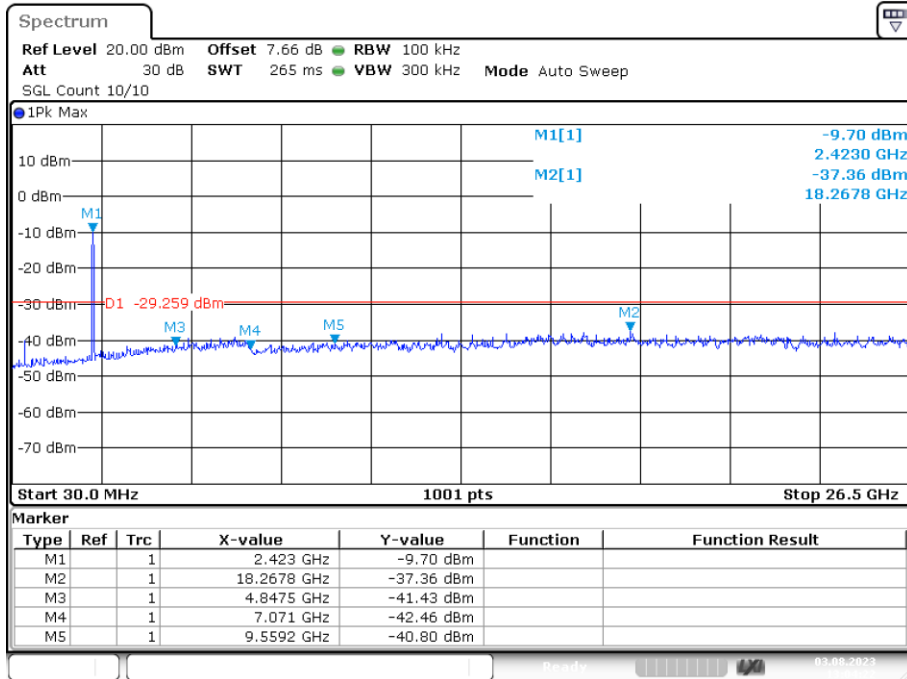


Tx. Spurious NVNT n40 2422MHz Ant1 Ref



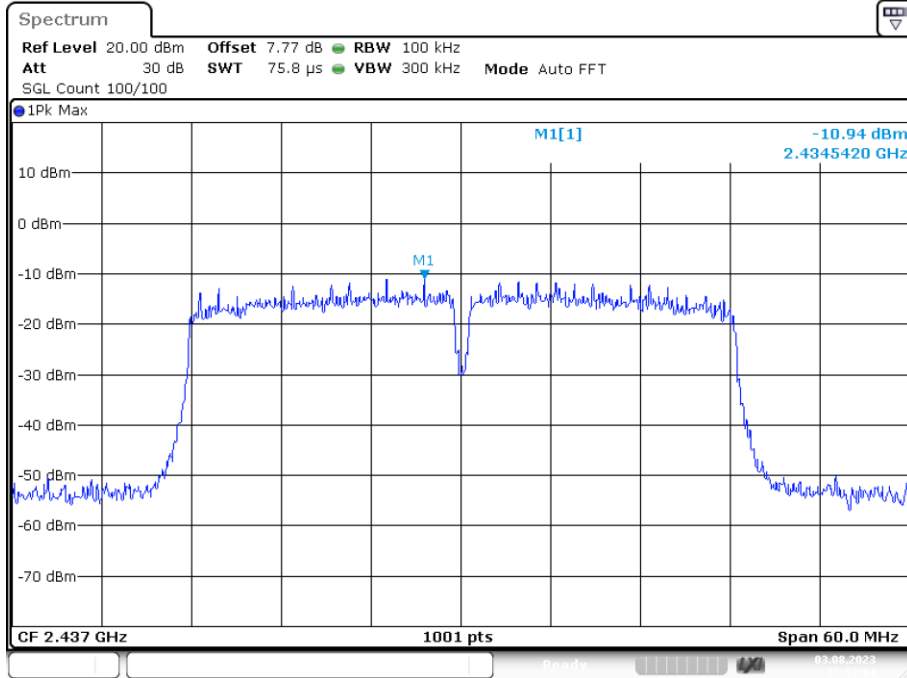
Date: 3.AUG.2023 13:04:03

Tx. Spurious NVNT n40 2422MHz Ant1 Emission

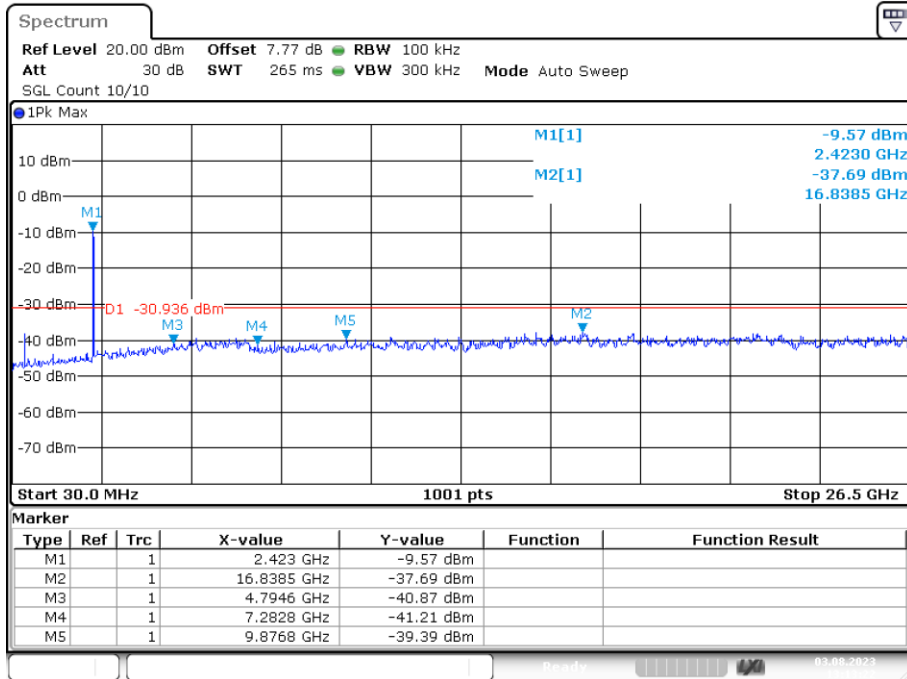


Date: 3.AUG.2023 13:04:21

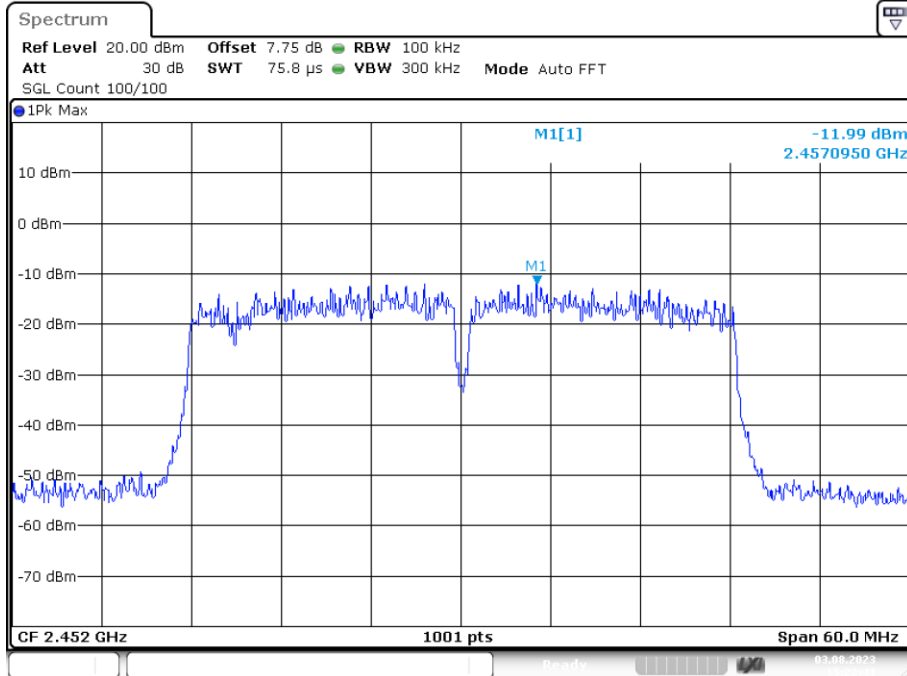
Tx. Spurious NVNT n40 2437MHz Ant1 Ref



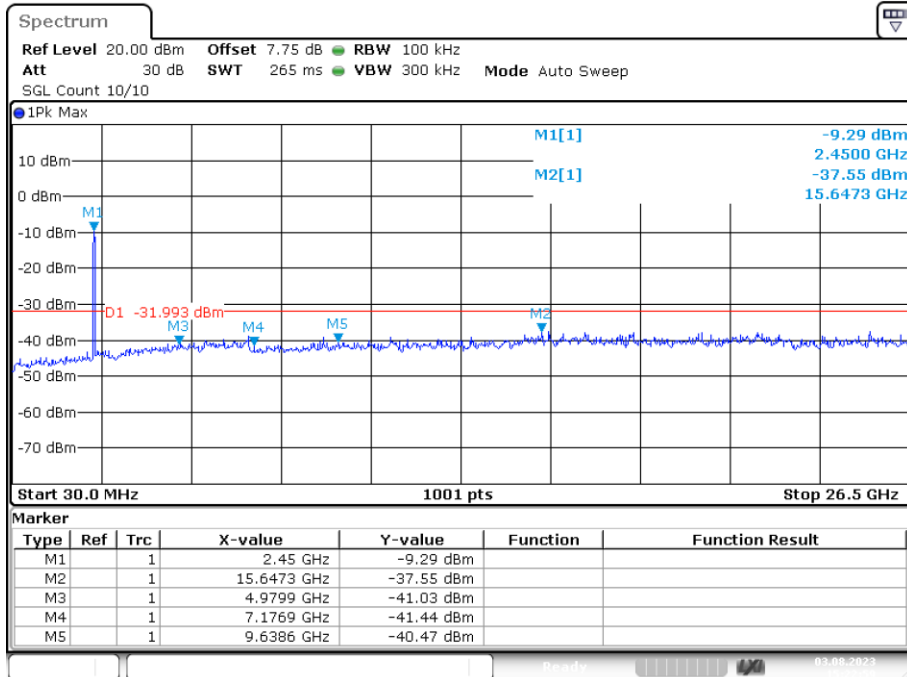
Tx. Spurious NVNT n40 2437MHz Ant1 Emission



Tx. Spurious NVNT n40 2452MHz Ant1 Ref



Tx. Spurious NVNT n40 2452MHz Ant1 Emission



4. POWER LINE CONDUCTED EMISSION

4.1. Test Limits

Frequency MHz	Limits dB(μ 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.

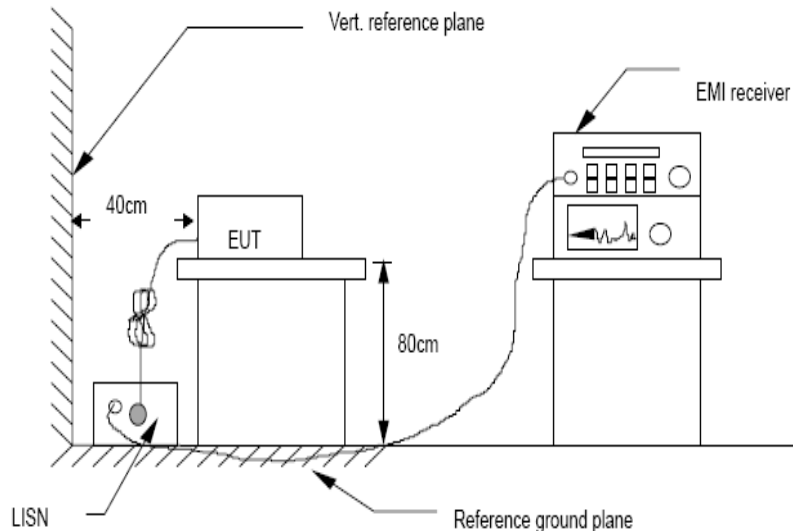
3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

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.

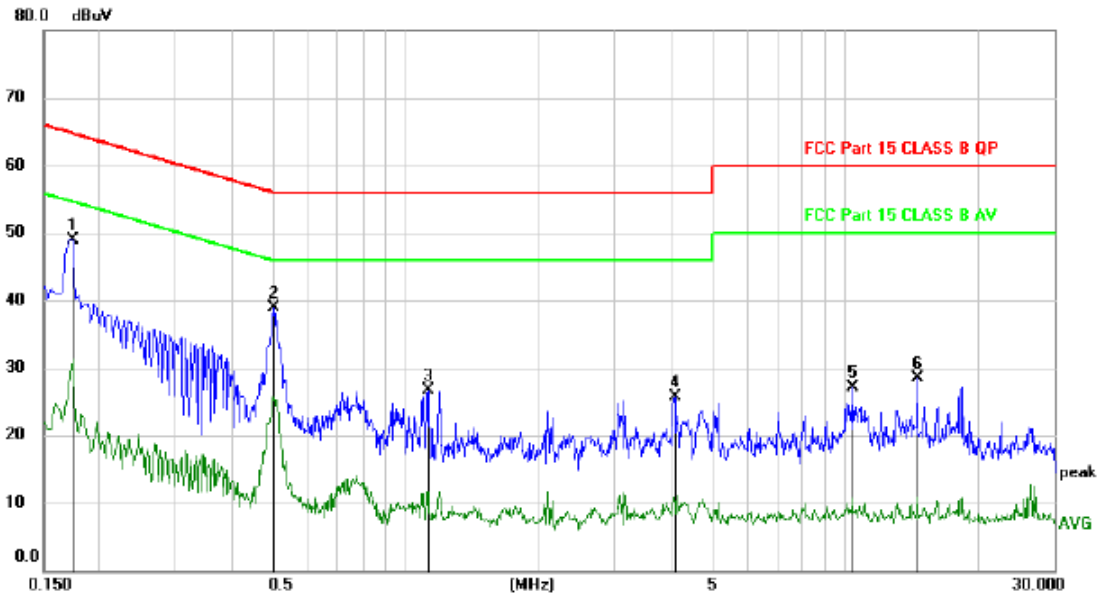
4.3. Test Setup



4.4. Test Results

Test result for 802.11b (2412MHz), AC 120V/ 60Hz

Line:



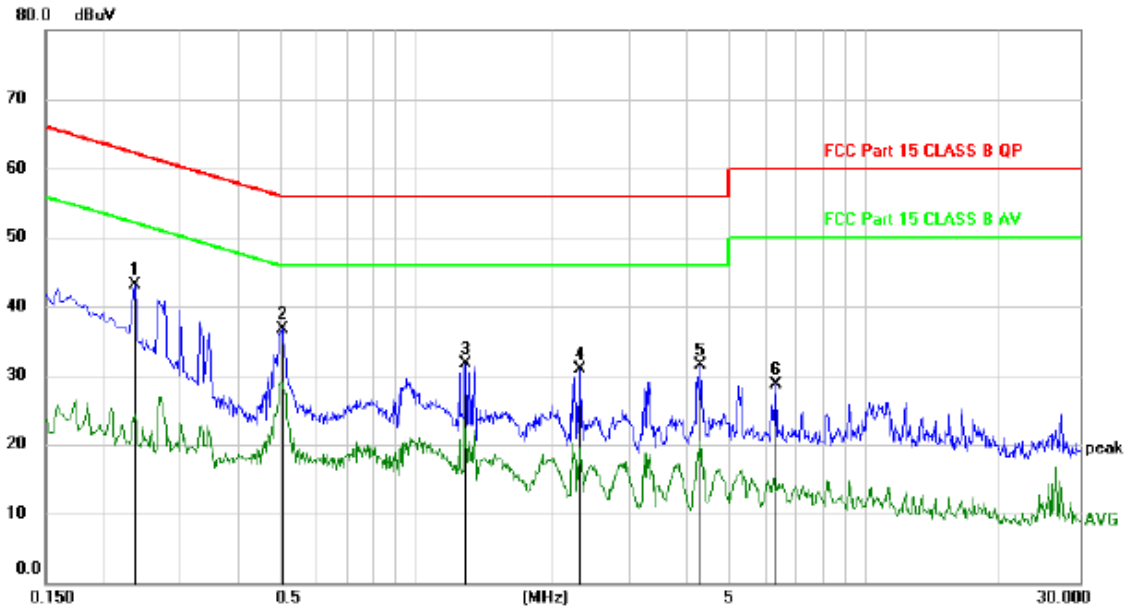
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1740	38.88	10.06	48.94	64.77	-15.83	peak	
2		0.5010	28.57	10.27	38.84	56.00	-17.16	peak	
3		1.1250	16.34	10.42	26.76	56.00	-29.24	peak	
4		4.1130	15.11	10.58	25.69	56.00	-30.31	peak	
5		10.4370	16.35	10.83	27.18	60.00	-32.82	peak	
6		14.6220	17.60	10.94	28.54	60.00	-31.46	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	*	0.2370	32.92	10.10	43.02	62.20	-19.18	peak	
2		0.5039	26.44	10.27	36.71	56.00	-19.29	peak	
3		1.2900	21.21	10.42	31.63	56.00	-24.37	peak	
4		2.3220	20.50	10.44	30.94	56.00	-25.06	peak	
5		4.3080	20.87	10.60	31.47	56.00	-24.53	peak	
6		6.3210	18.11	10.69	28.80	60.00	-31.20	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

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 1W(30dBm).

5.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

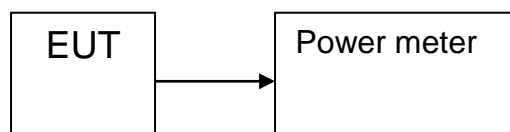
5.2.1 Place the EUT on the table and set it in transmitting mode.

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.

5.3. Test Setup



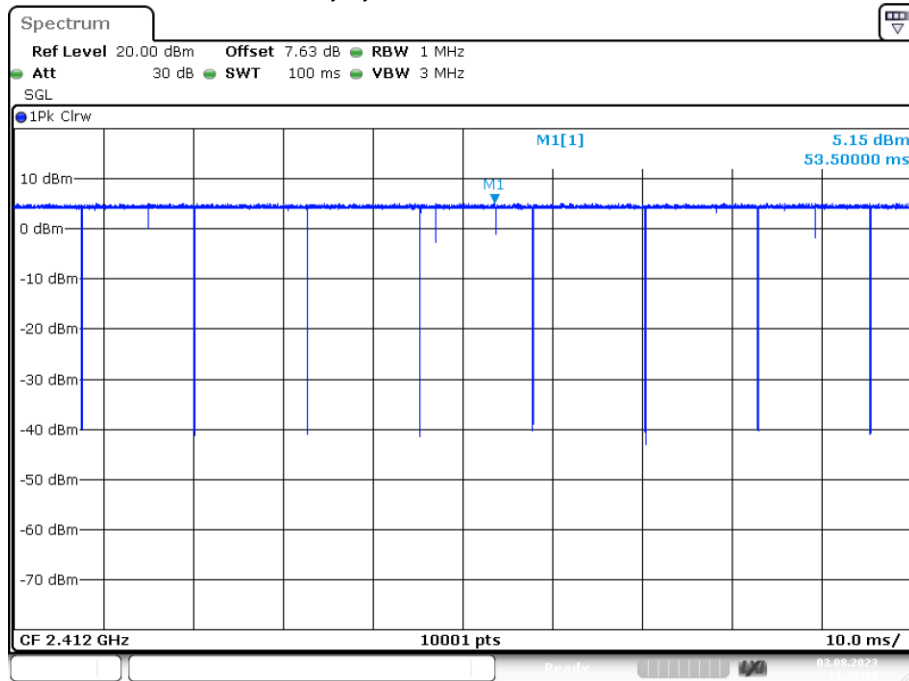
5.4. Test Results

Mode	Frequency (MHz)	Conducted Power (dBm)	Duty Cycle (%)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
b	2412	13.697	99.76	0.01	13.707	30	15.657	36	Pass
b	2437	13.885	99.83	0.01	13.895	30	15.845	36	Pass
b	2462	13.83	99.74	0.01	13.84	30	15.790	36	Pass
g	2412	13.761	98.68	0.06	13.821	30	15.771	36	Pass
g	2437	13.743	98.93	0.05	13.793	30	15.743	36	Pass
g	2462	13.756	98.83	0.05	13.806	30	15.756	36	Pass
n20	2412	13.843	98.54	0.06	13.903	30	15.853	36	Pass
n20	2437	13.586	98.88	0.05	13.636	30	15.586	36	Pass
n20	2462	13.228	98.87	0.05	13.278	30	15.228	36	Pass
n40	2422	13.877	97	0.13	13.057	30	15.007	36	Pass
n40	2437	12.938	97.6	0.11	13.048	30	14.998	36	Pass
n40	2452	12.987	97.51	0.11	13.097	30	15.047	36	Pass

Duty Cycle

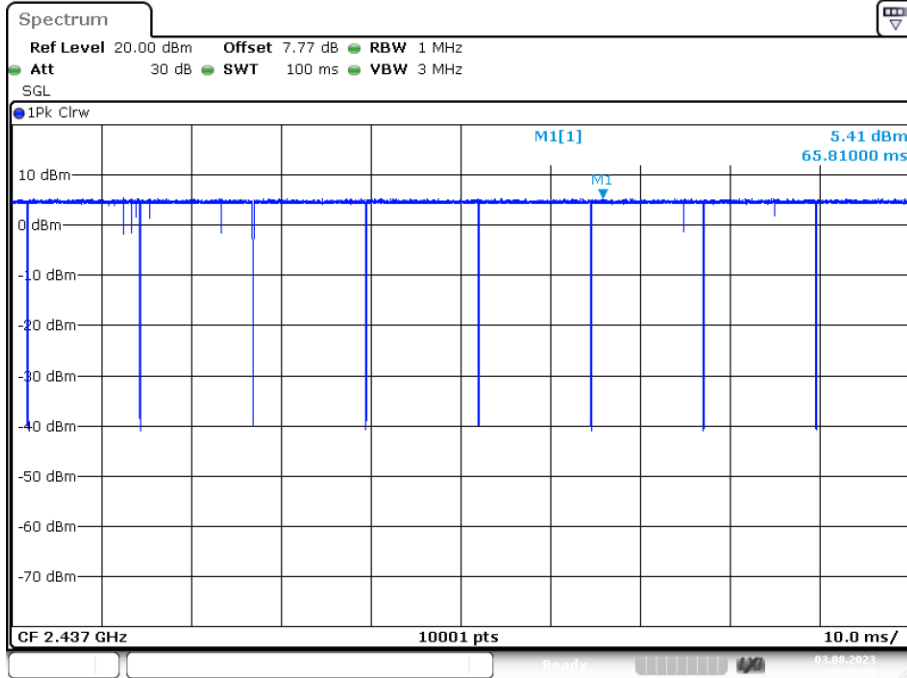
Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)
NVNT	b	2412	Ant1	99.76	0.01
NVNT	b	2437	Ant1	99.83	0.01
NVNT	b	2462	Ant1	99.74	0.01
NVNT	g	2412	Ant1	98.68	0.06
NVNT	g	2437	Ant1	98.93	0.05
NVNT	g	2462	Ant1	98.83	0.05
NVNT	n20	2412	Ant1	98.54	0.06
NVNT	n20	2437	Ant1	98.88	0.05
NVNT	n20	2462	Ant1	98.87	0.05
NVNT	n40	2422	Ant1	97	0.13
NVNT	n40	2437	Ant1	97.6	0.11
NVNT	n40	2452	Ant1	97.51	0.11

Duty Cycle NVNT b 2412MHz Ant1



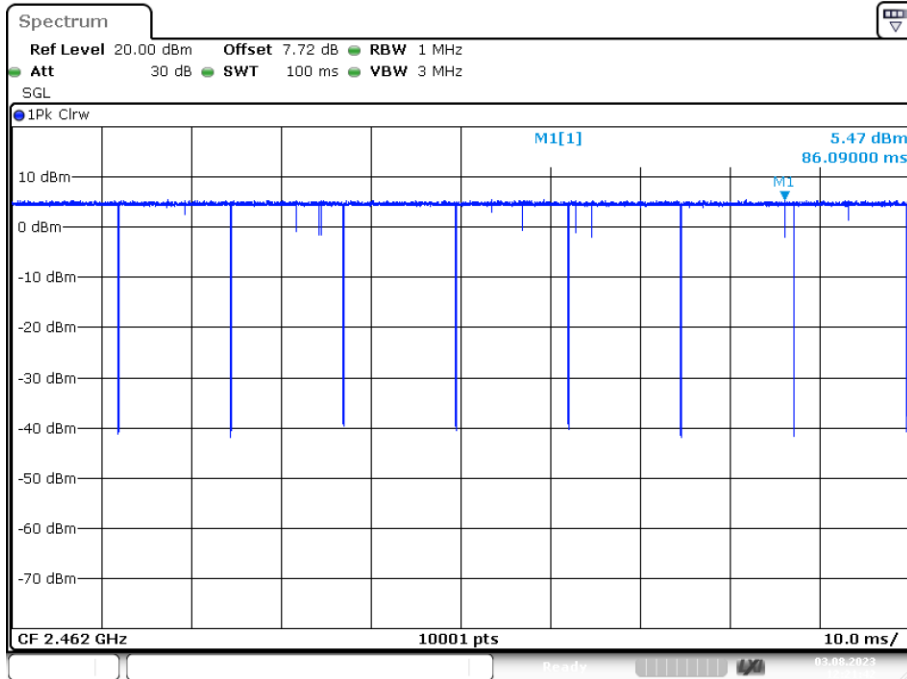
Date: 3.AUG.2023 11:49:39

Duty Cycle NVNT b 2437MHz Ant1



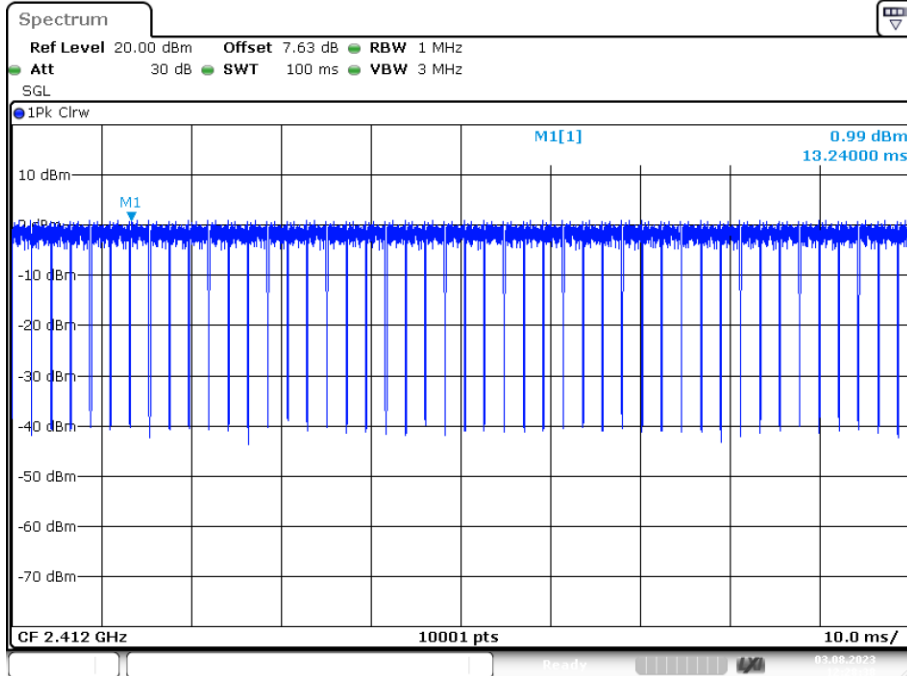
Date: 3.AUG.2023 12:16:01

Duty Cycle NVNT b 2462MHz Ant1



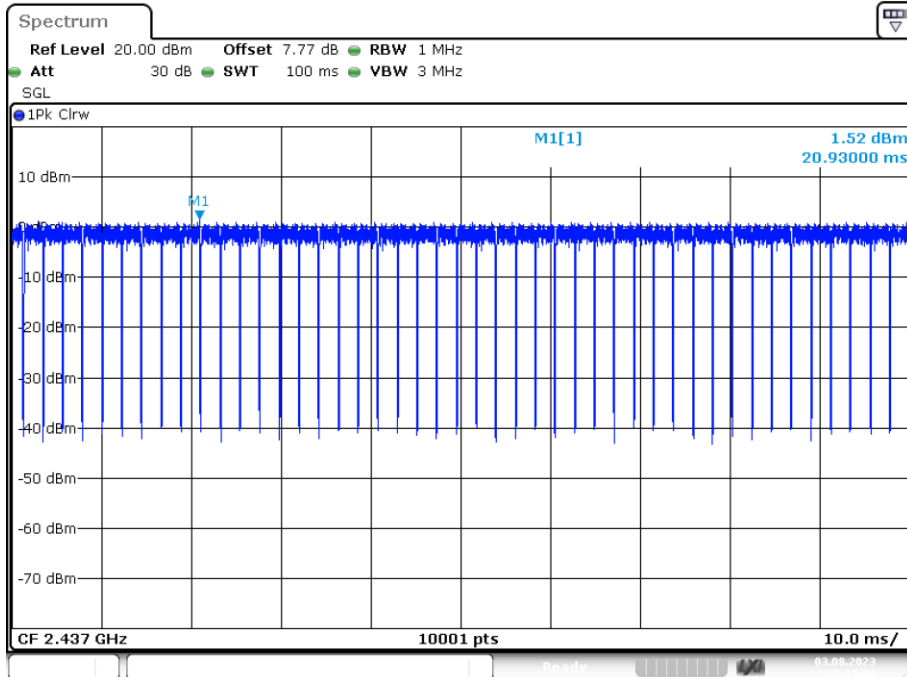
Date: 3.AUG.2023 12:21:41

Duty Cycle NVNT g 2412MHz Ant1



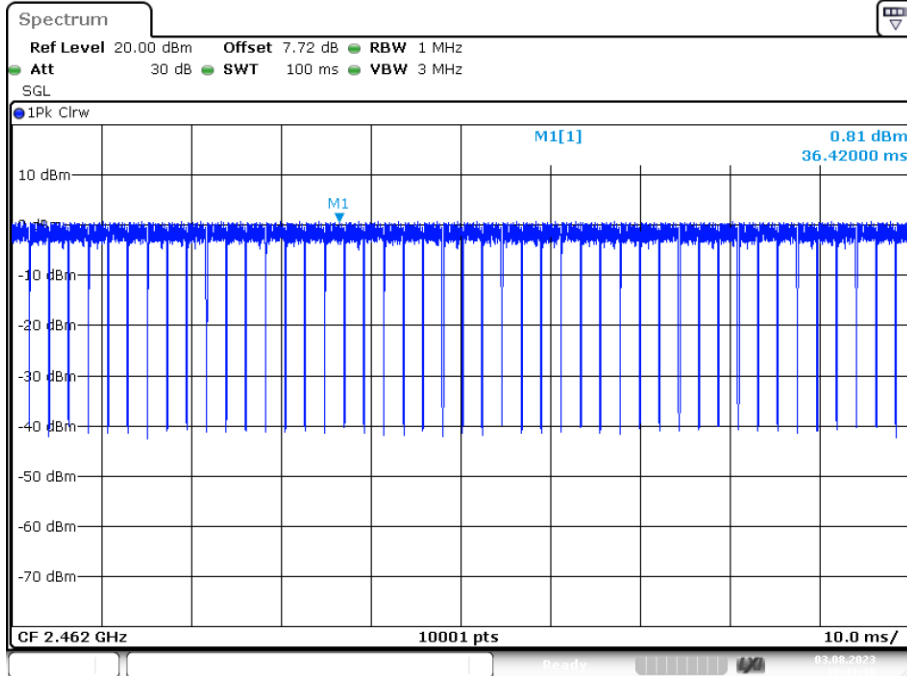
Date: 3.AUG.2023 12:28:38

Duty Cycle NVNT g 2437MHz Ant1



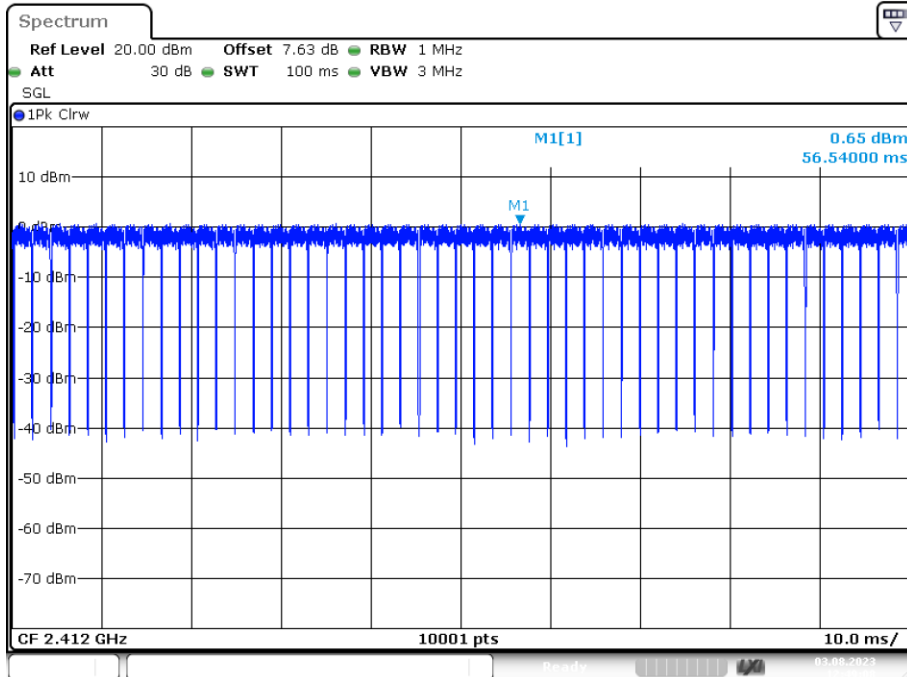
Date: 3.AUG.2023 12:37:08

Duty Cycle NVNT g 2462MHz Ant1



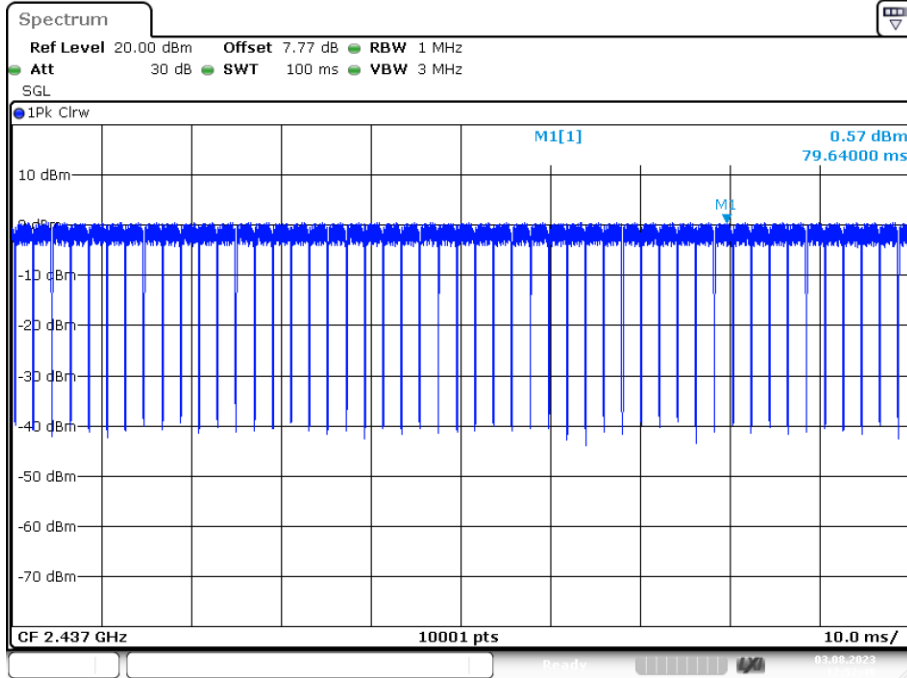
Date: 3.AUG.2023 12:41:10

Duty Cycle NVNT n20 2412MHz Ant1



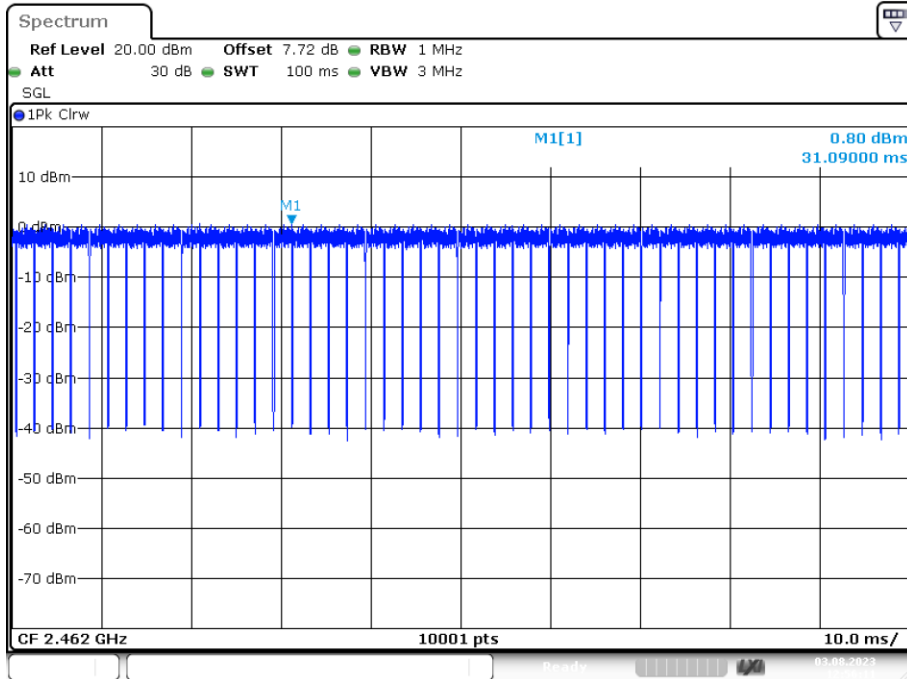
Date: 3.AUG.2023 12:49:08

Duty Cycle NVNT n20 2437MHz Ant1



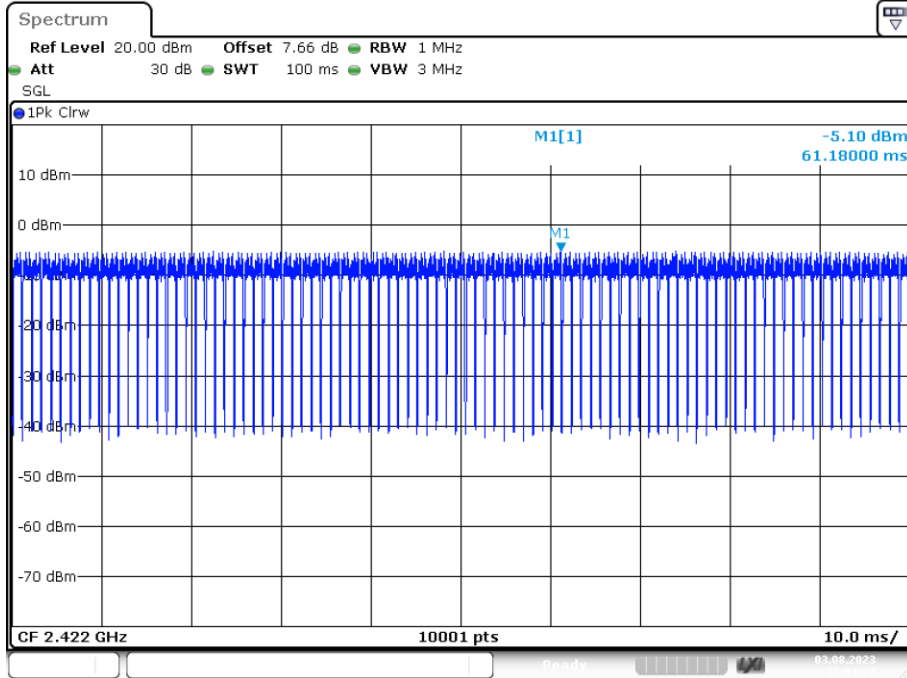
Date: 3.AUG.2023 12:52:49

Duty Cycle NVNT n20 2462MHz Ant1



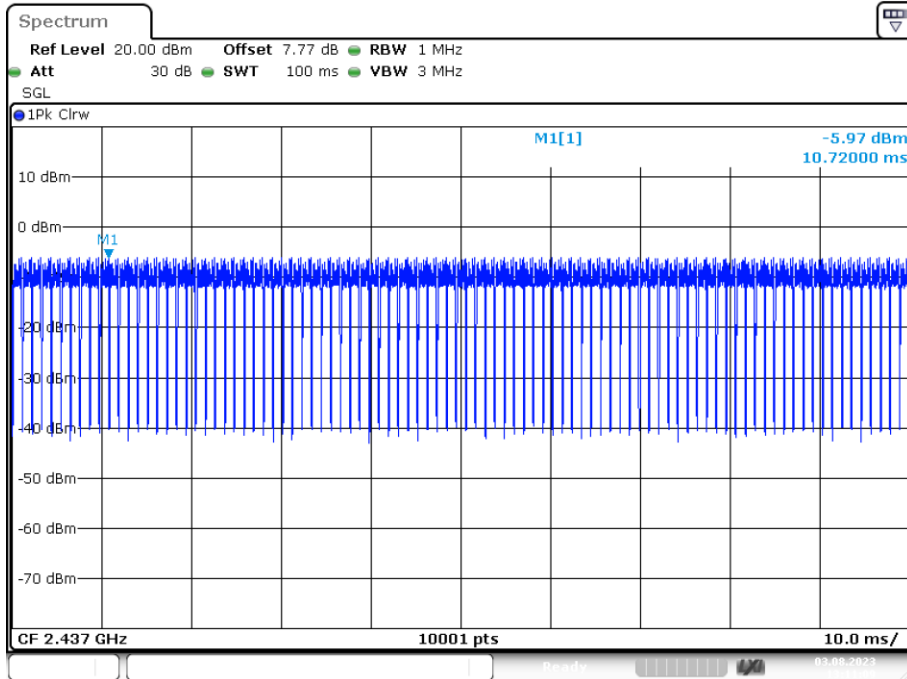
Date: 3.AUG.2023 12:56:12

Duty Cycle NVNT n40 2422MHz Ant1



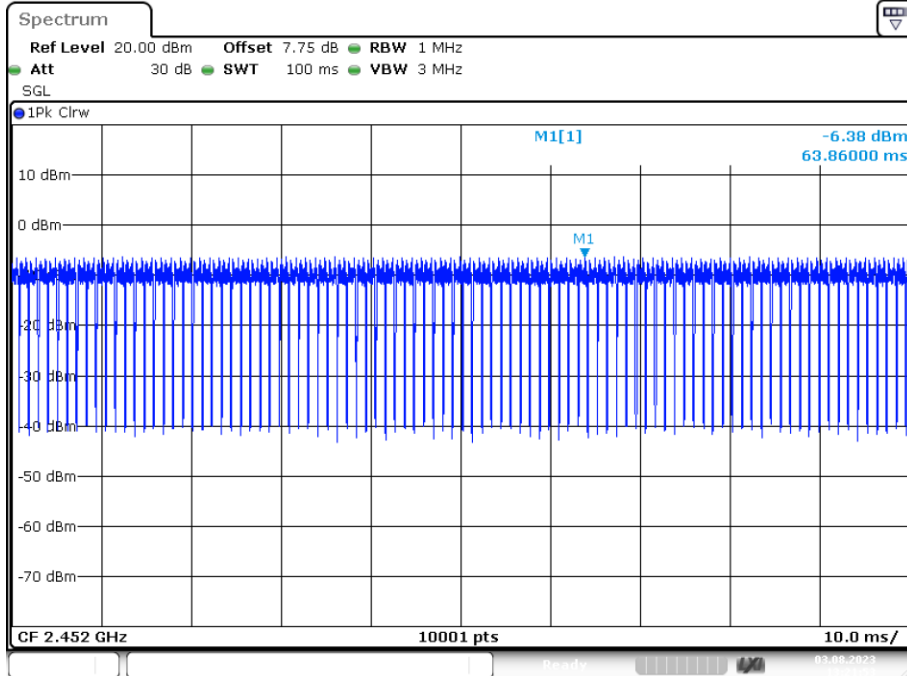
Date: 3.AUG.2023 13:01:27

Duty Cycle NVNT n40 2437MHz Ant1



Date: 3.AUG.2023 13:11:09

Duty Cycle NVNT n40 2452MHz Ant1



Date: 3.AUG.2023 13:21:53

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.

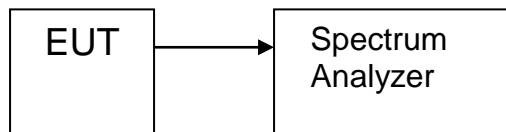
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

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 $\text{VBW} \geq 3 \times \text{RBW}$), span $\geq 1.5 \times \text{DTS bandwidth}$., detail see the test plot.

6.2.4 Record the max reading.

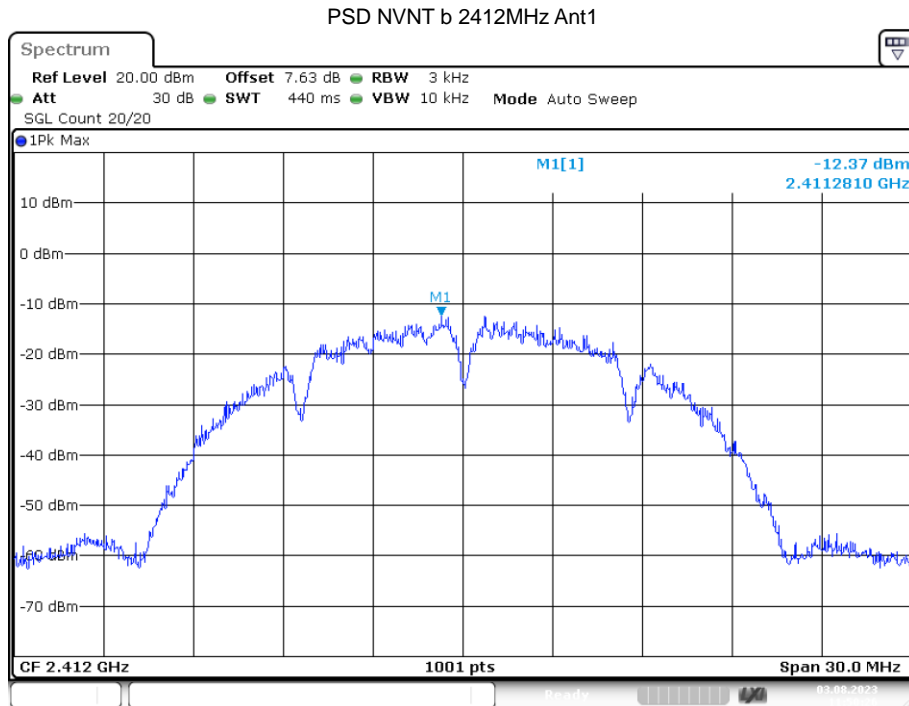
6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

6.3. Test Setup



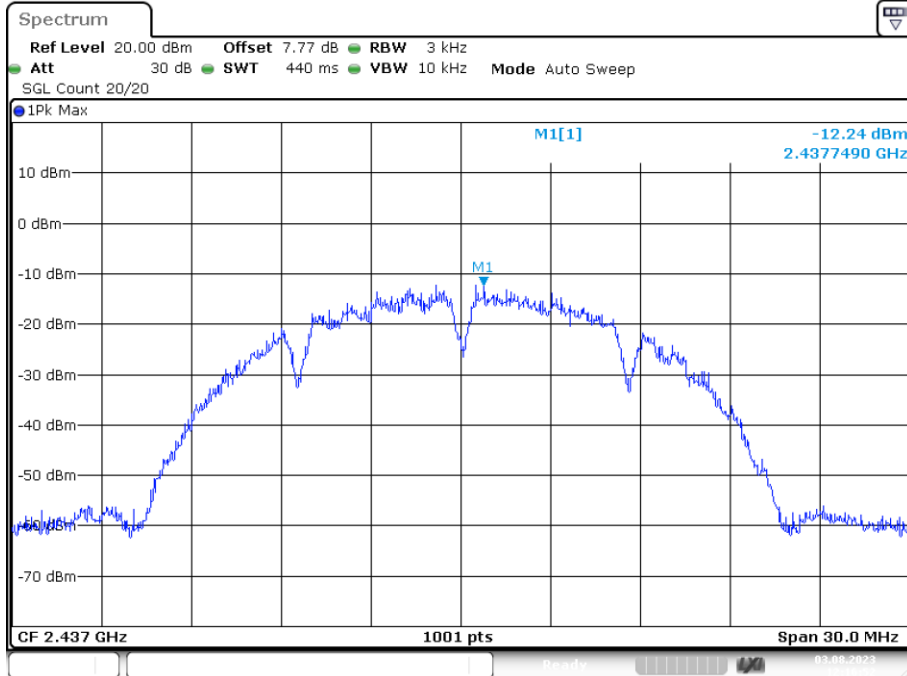
6.4. Test Results

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	-12.374	8	Pass
NVNT	b	2437	Ant1	-12.241	8	Pass
NVNT	b	2462	Ant1	-11.51	8	Pass
NVNT	g	2412	Ant1	-19.005	8	Pass
NVNT	g	2437	Ant1	-18.749	8	Pass
NVNT	g	2462	Ant1	-17.604	8	Pass
NVNT	n20	2412	Ant1	-19.587	8	Pass
NVNT	n20	2437	Ant1	-19.602	8	Pass
NVNT	n20	2462	Ant1	-19.903	8	Pass
NVNT	n40	2422	Ant1	-22.713	8	Pass
NVNT	n40	2437	Ant1	-22.059	8	Pass
NVNT	n40	2452	Ant1	-23.526	8	Pass



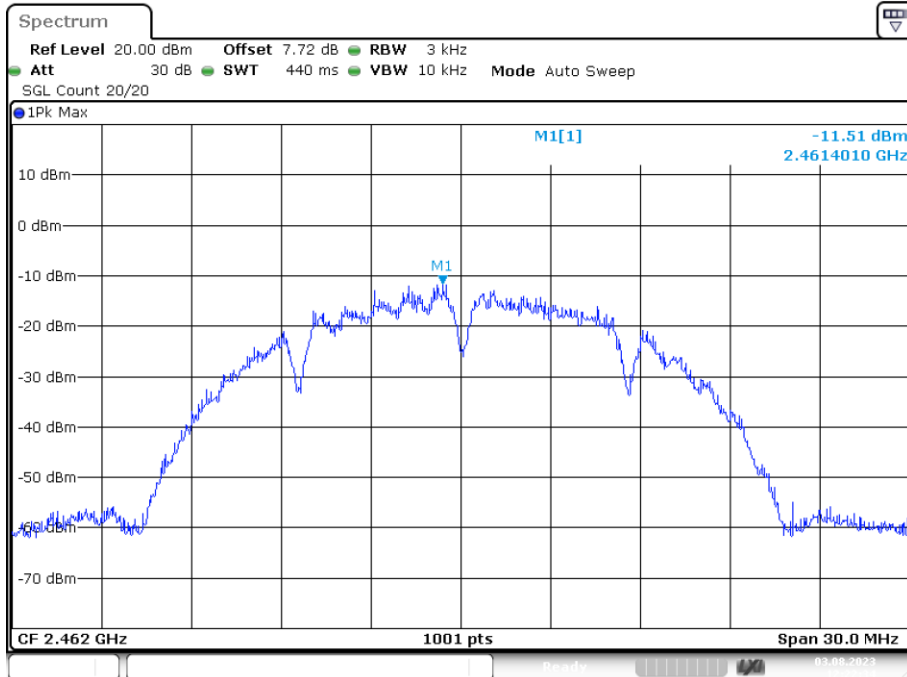
Date: 3.AUG.2023 11:50:27

PSD NVNT b 2437MHz Ant1



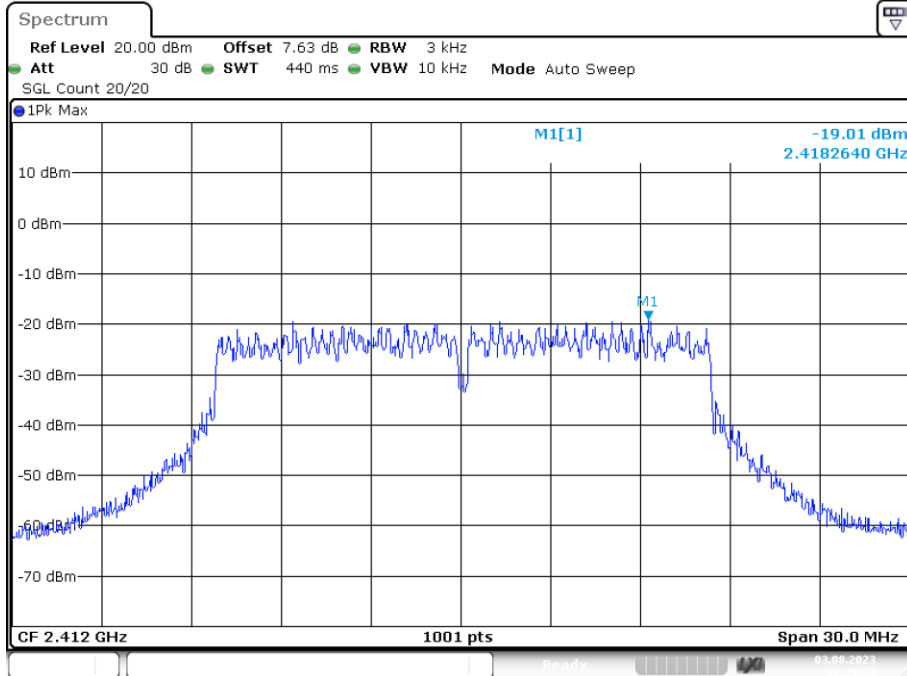
Date: 3.AUG.2023 12:16:53

PSD NVNT b 2462MHz Ant1



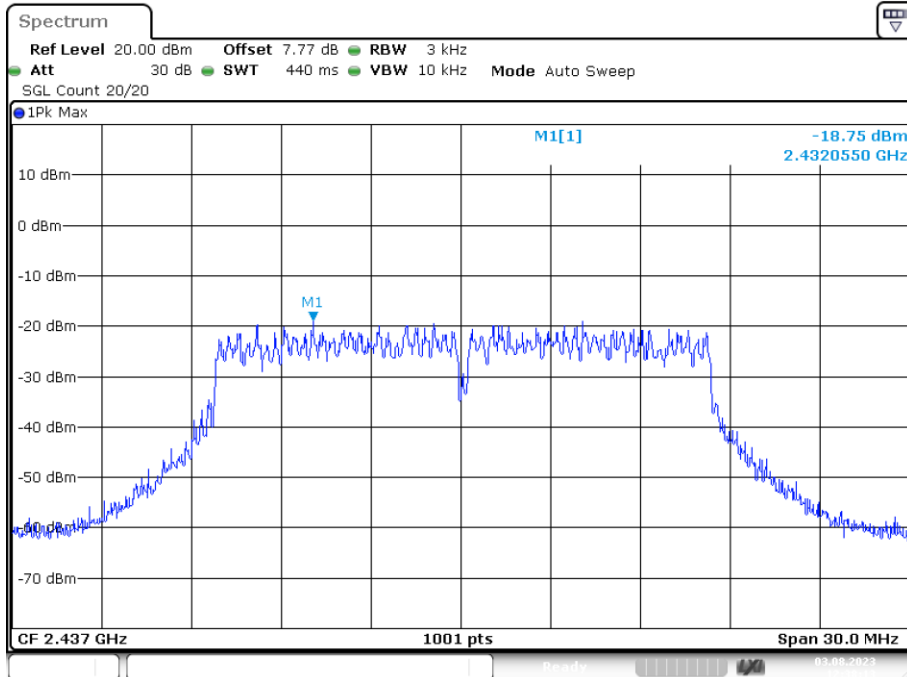
Date: 3.AUG.2023 12:22:34

PSD NVNT g 2412MHz Ant1



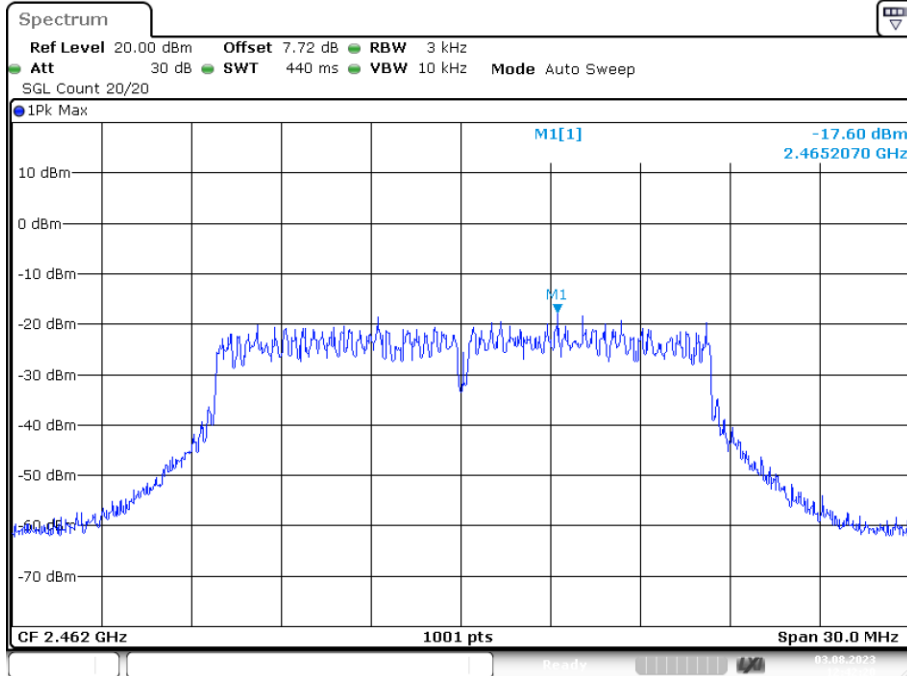
Date: 3.AUG.2023 12:29:32

PSD NVNT g 2437MHz Ant1

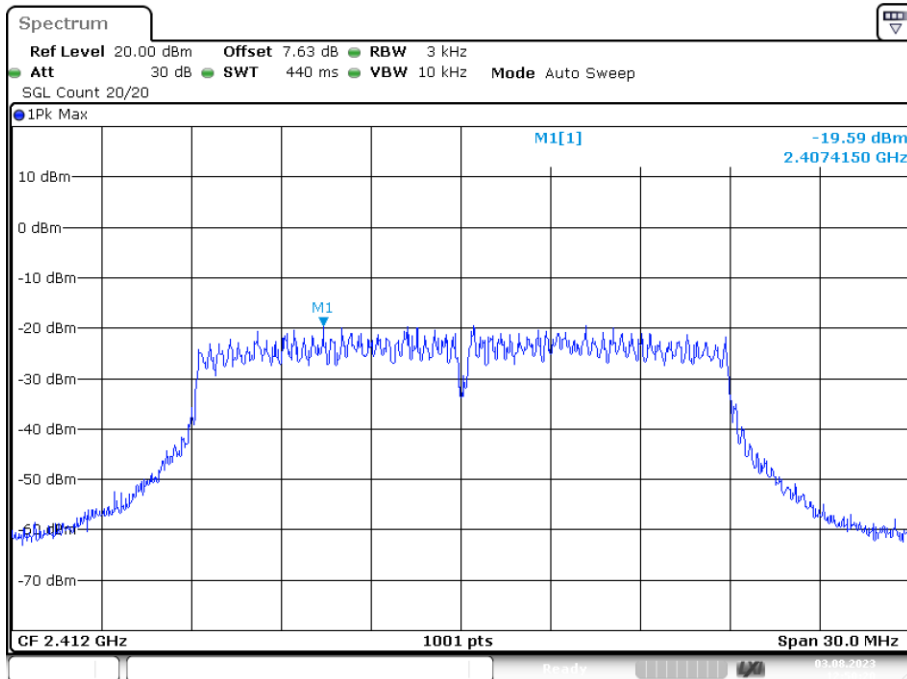


Date: 3.AUG.2023 12:38:13

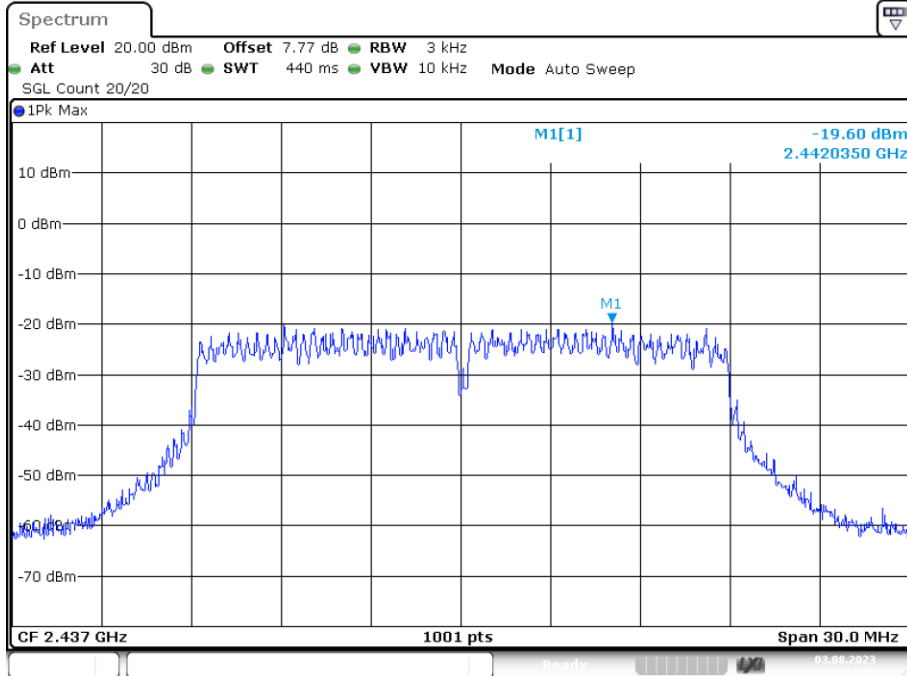
PSD NVNT g 2462MHz Ant1



PSD NVNT n20 2412MHz Ant1

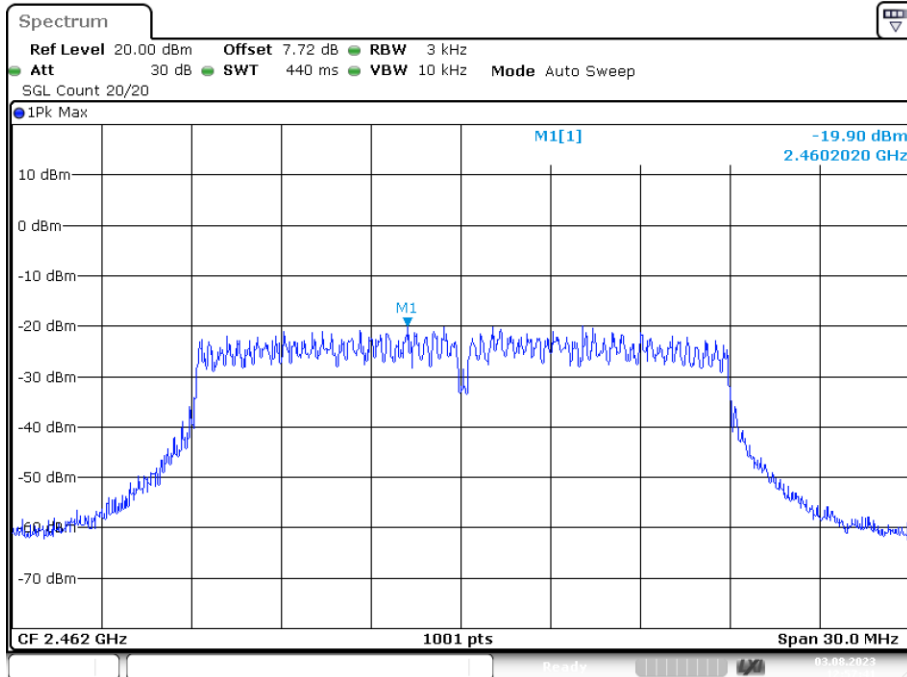


PSD NVNT n20 2437MHz Ant1



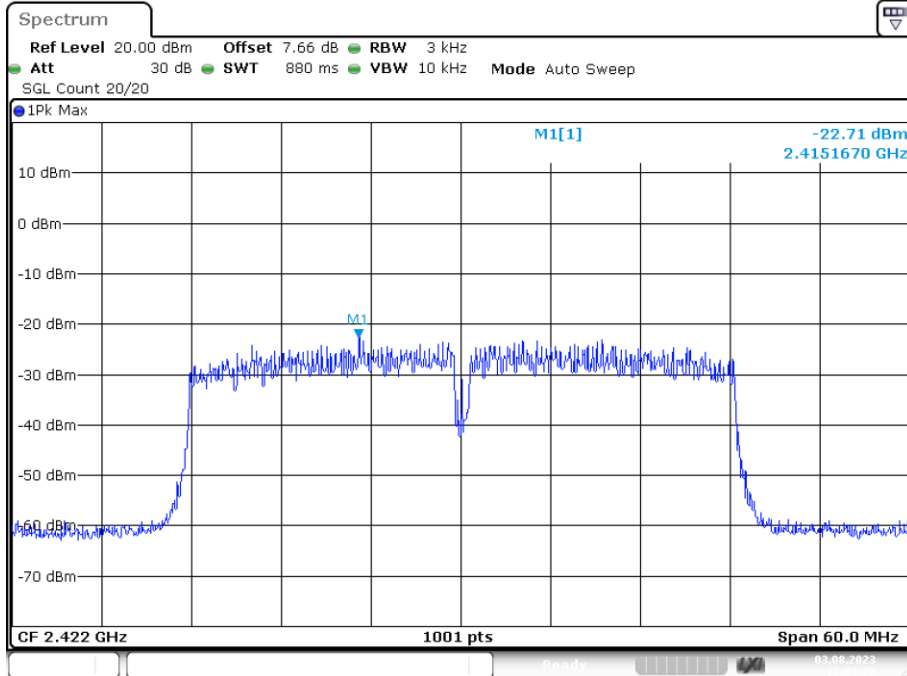
Date: 3.AUG.2023 12:54:05

PSD NVNT n20 2462MHz Ant1

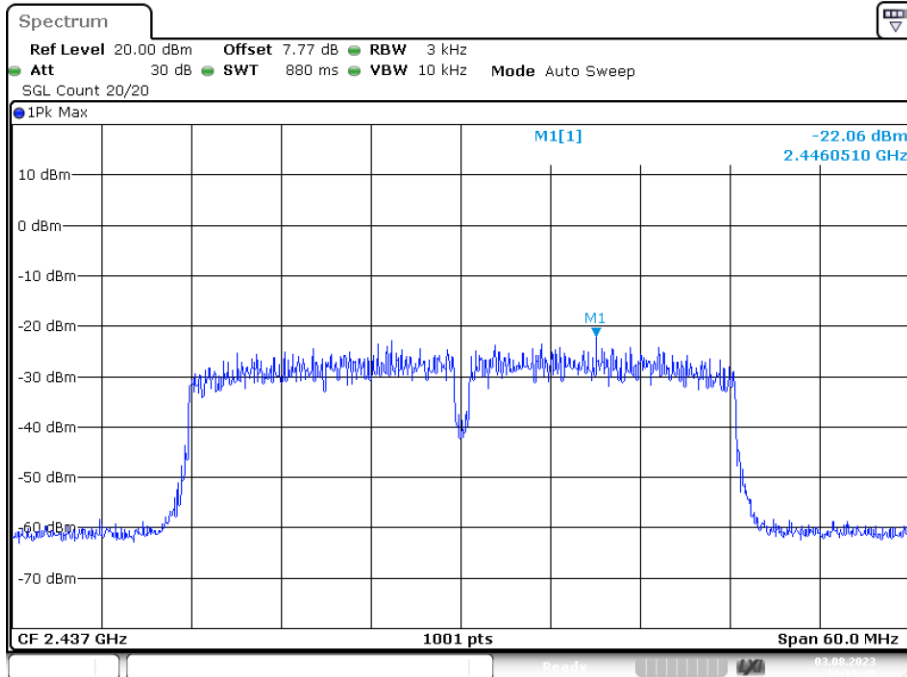


Date: 3.AUG.2023 12:57:40

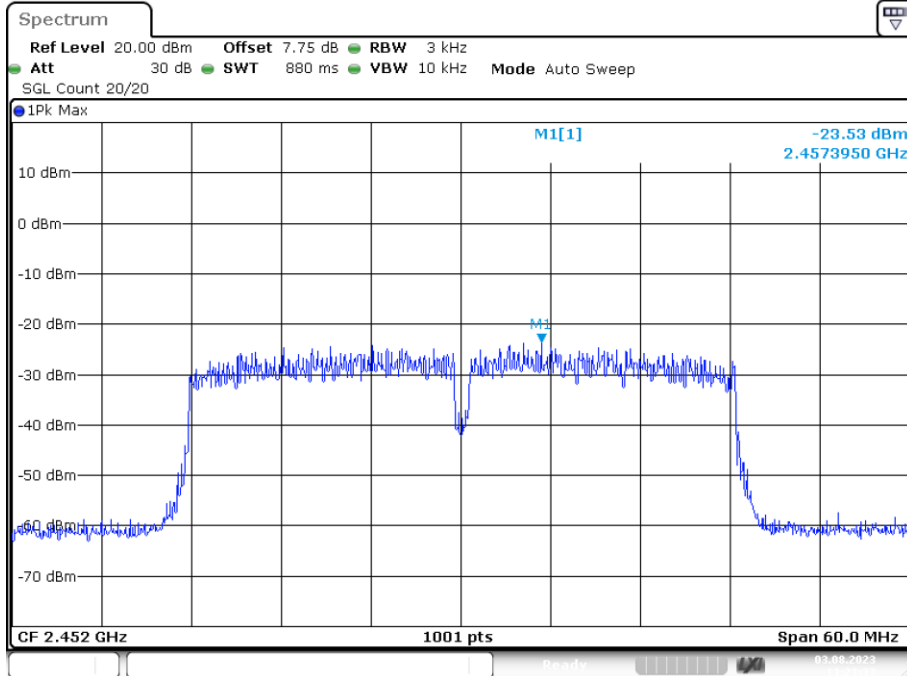
PSD NVNT n40 2422MHz Ant1



PSD NVNT n40 2437MHz Ant1



PSD NVNT n40 2452MHz Ant1



Date: 3.AUG.2023 13:23:33

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

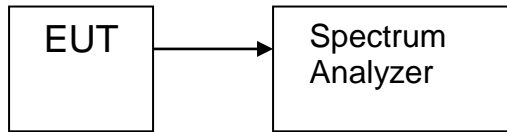
Details see the KDB558074 D01 Meas Guidance v05r02

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 = 1-5%BW, VBW \geq 3*RBW, Sweep time set auto, detail see the test plot for 99% Bandwidth.

c) The test receiver set RBW = 100kHz, VBW \geq 3*RBW = 300kHz, Sweep time set auto, detail see the test plot for 6dB Bandwidth.

7.3. Test Setup

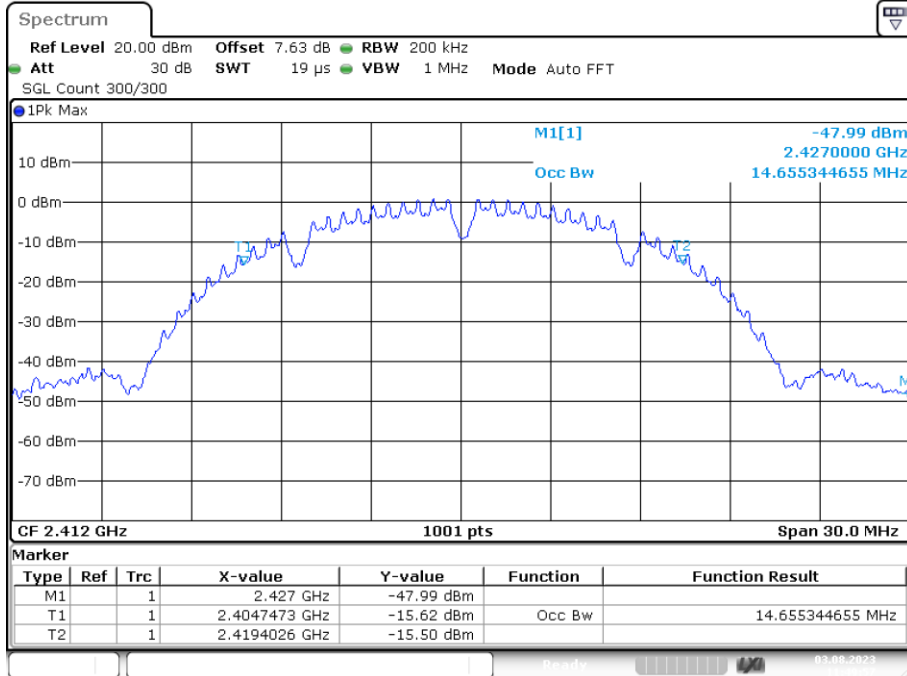


7.4. Test Results

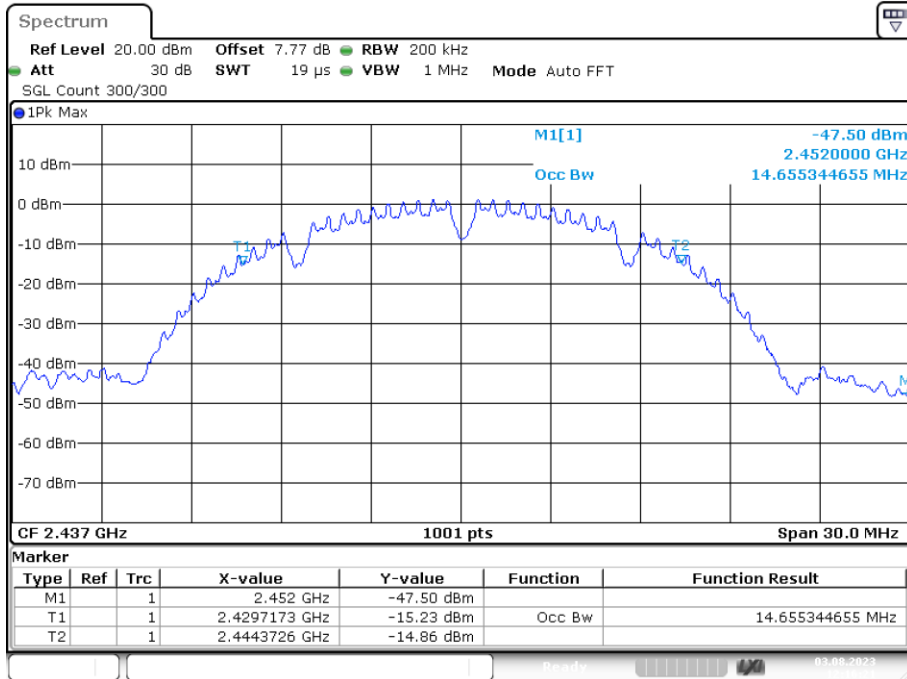
Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	b	2412	Ant1	14.655
NVNT	b	2437	Ant1	14.655
NVNT	b	2462	Ant1	14.685
NVNT	g	2412	Ant1	16.513
NVNT	g	2437	Ant1	16.454
NVNT	g	2462	Ant1	16.484
NVNT	n20	2412	Ant1	17.592
NVNT	n20	2437	Ant1	17.562
NVNT	n20	2462	Ant1	17.652
NVNT	n40	2422	Ant1	35.664
NVNT	n40	2437	Ant1	35.844
NVNT	n40	2452	Ant1	35.784

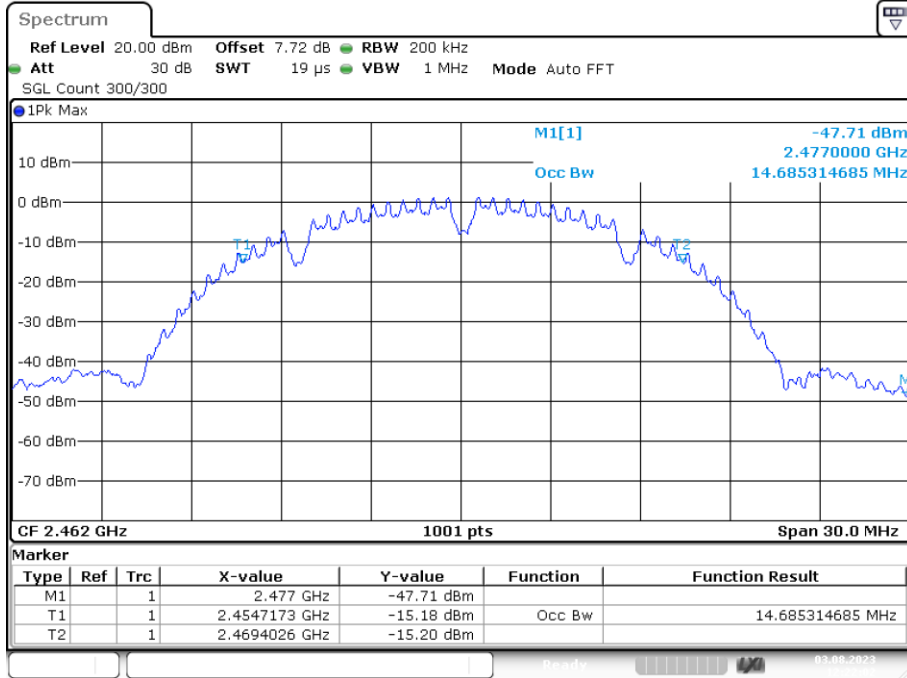
OBV NVNT b 2412MHz Ant1



OBV NVNT b 2437MHz Ant1

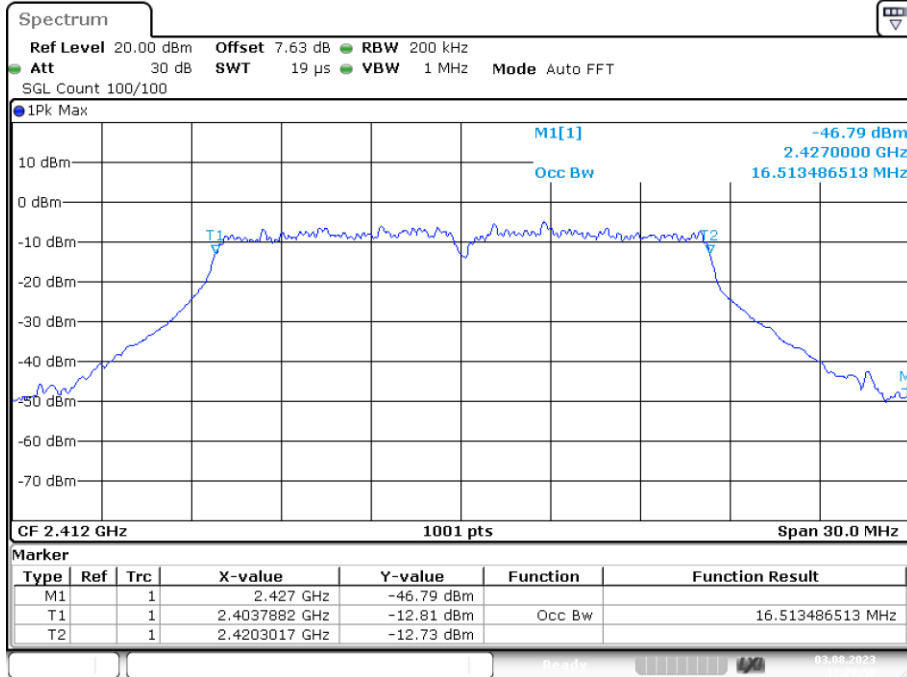


OBV NVNT b 2462MHz Ant1



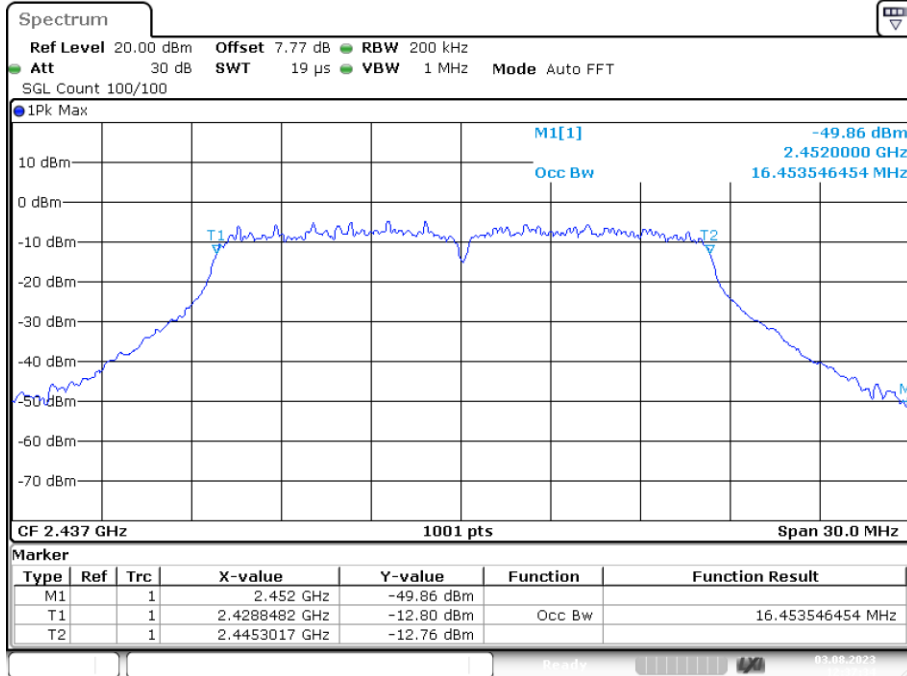
Date: 3.AUG.2023 12:22:02

OBV NVNT g 2412MHz Ant1



Date: 3.AUG.2023 12:28:57

OBV NVNT g 2437MHz Ant1



OBV NVNT g 2462MHz Ant1

