FCC TEST REPORT

FCC ID: 2A5EC-BAFX1278

On Behalf of

BAFX Products

WIFI OBDII READER

Model No.: BAFX1278

Prepared for	:	BAFX Products
Address	:	S84W18740 Enterprise Dr Muskego, WI 53150 United States

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	:	A2202099-C01-R01
Date of Receipt	:	February 21, 2022
Date of Test	:	February 22, 2022-March 2, 2022
Date of Report	:	March 2, 2022
Version Number	:	V0

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TEST REPORT DECLARATION

Applicant	:	BAFX Products
Address	:	S84W18740 Enterprise Dr Muskego, WI 53150 United States
Manufacturer	:	ShenZhen Aut-Tech Electronic Co., Ltd.
Address	:	Room 506, Building 6th, Yuehai Industrial Area, Nanshan Dist., Shenzhen, Guangdong, China
EUT Description	:	WIFI OBDII READER
	(A) Model No.	: BAFX1278
	(B) Trademark	: BAFX Products

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)…....:	Simple Guan Project Manager	
Date of issue…… ……..:	March 2, 2022	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	March 2, 2022	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 :2013	N/A
6dB Bandwidth	FCC PART 15:15.247(a)(2) ANSI C63.10 :2013	P
Output Power	FCC Part 15: 15.247(b)(3) ANSI C63.10 :2013	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Conducted Spurious & Band Edge Emission	FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Power Spectral Density	FCC PART 15:15.247(e) ANSI C63.10 :2013	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d) 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.	

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

Description/PMN	:	WIFI OBDII READER
Model Number/HVIN(s)	:	BAFX1278
Diff.	:	N/A
Trademark	:	BAFX Products
Test Voltage	:	DC 12V from battery
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	:	Internal antenna, Maximum Gain is 1dBi
Software version	:	V1.0
Hardware version/FVIN	:	V1.0

2.2.Accessories of Device (EUT)

Accessories1 : /

Manufacturer : /

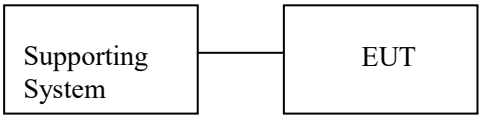
Model : /

Ratings : /

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.	Battery	VARTA	55B24L	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	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					
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℃	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
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	2.74dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB(Polarize: V)
	2.57dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.16dB(Polarize: H)
	4.13dB(Polarize: V)
Uncertainty for radio frequency	5.4×10-8
Uncertainty for conducted RF Power	0.37dB
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.	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	2020.09.02	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	102137	2021.08.25	1Year
Spectrum analyzer	Agilent	N9020A	MY499100060	2021.08.25	1Year
Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2021.08.25	1Year
Receiver	R&S	ESCI	101165	2021.08.25	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2020.04.12	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2020.04.12	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2021.08.30	2Year
RF Cable	Resenberger	Cable 1	RE1	2021.08.25	1Year
RF Cable	Resenberger	Cable 2	RE2	2021.08.25	1Year
RF Cable	Resenberger	Cable 3	CE1	2021.08.25	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2021.08.25	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2021.08.25	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126-466	2021.08.25	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2021.08.25	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	00946	2021.08.30	2 Year
Preamplifier	SKET	LNPA_1840-50	SK2018101801	2021.08.25	1 Year
Power Meter	Agilent	E9300A	MY41496628	2021.08.25	1 Year
Power Sensor	DARE	RPR3006W	15100041SNO91	2021.08.25	1 Year
Temp. & Humid. Chamber	Weihuang	WHTH-1000-40-880	100631	2021.04.21	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	20140927-6	2021.08.25	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

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])

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 1GH and above 1GHz. The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above1GHz testing, the table was rotated 360 degrees to determine the position of the highest radiation

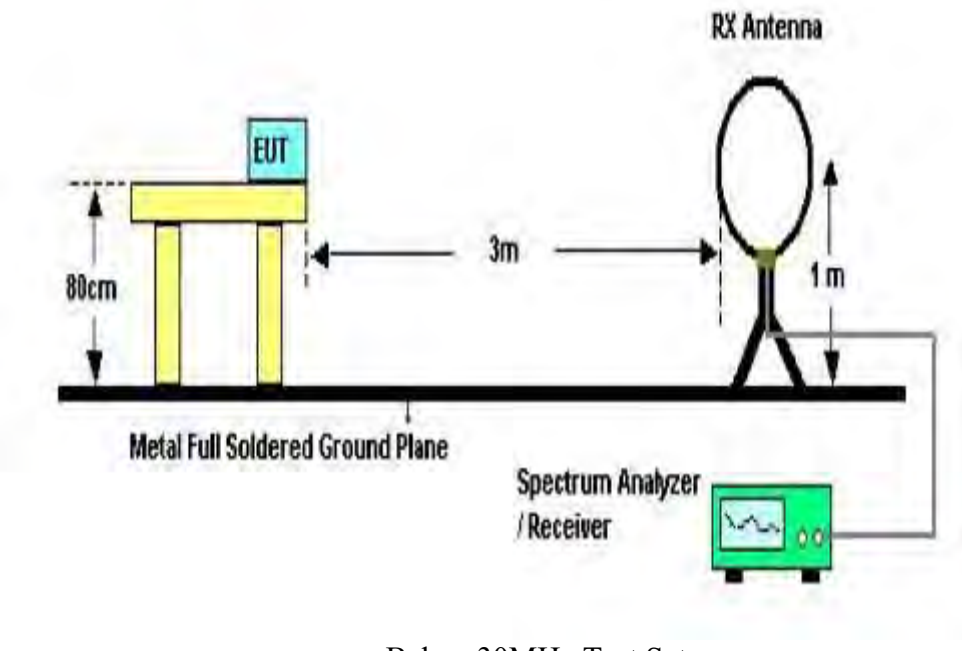
The Test antenna shall vary between 1m and 4m, both Horizontal and Vertical antenna are set of make measurement.

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

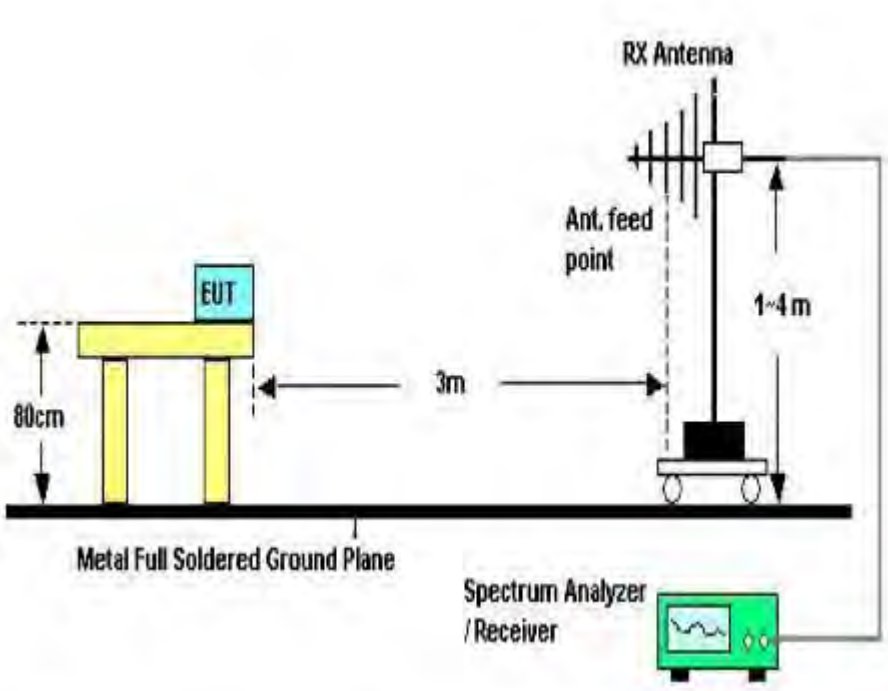
If Peak value comply with QP limit below 1GHz, the EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

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

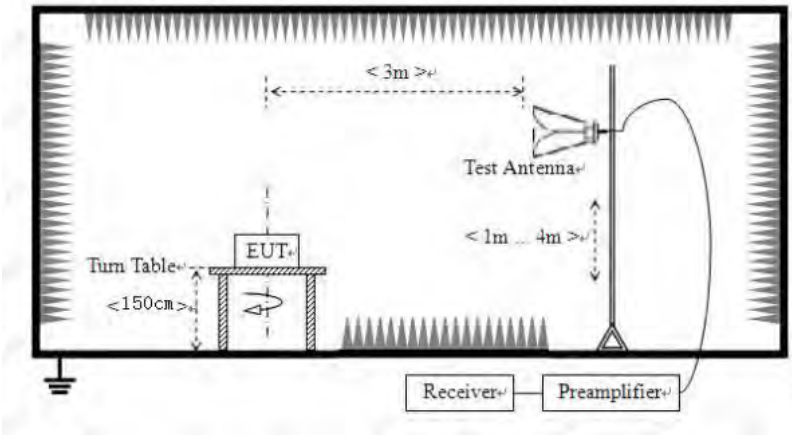
3.3.Test Setup



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.

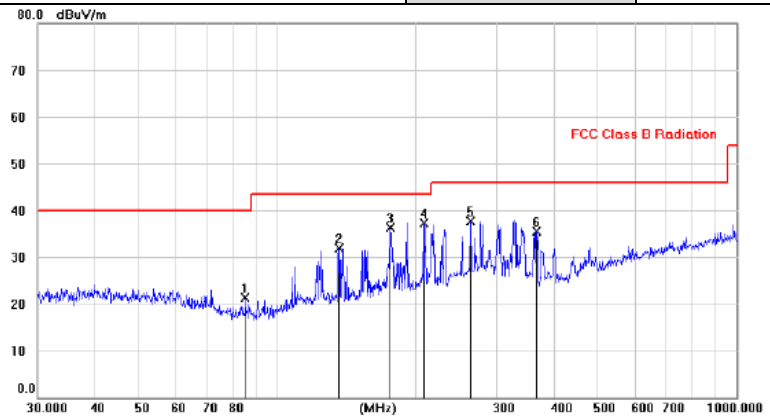
Detailed information please see the following page.

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.

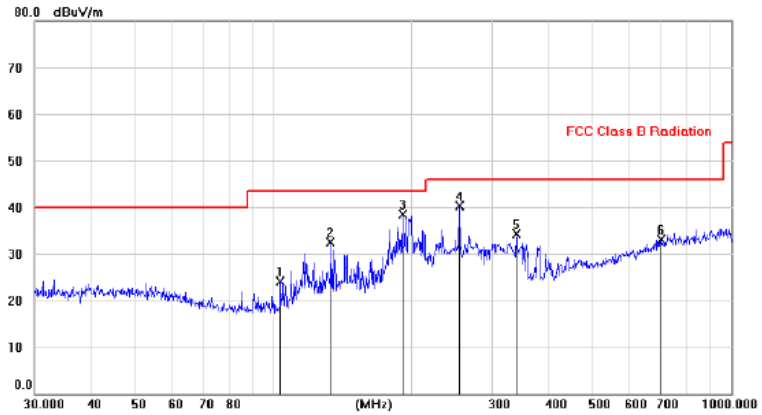
2.Only show the test data of the worst Channel in this report.

From 30MHz to 1000MHz: Conclusion: PASS			
EUT Description	WIFI OBDII READER	**Temperature**	24℃
Model No.	BAFX1278	**Humidity**	56%
Pol	Vertical	**Test mode**	802.11b 2412MHz
Test Voltage	DC 12V		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		85.0092	11.41	9.98	21.39	40.00	-18.61	peak			
2		136.0139	17.83	14.02	31.85	43.50	-11.65	peak			
3		175.7132	23.07	13.28	36.35	43.50	-7.15	peak			
4	*	208.3120	26.25	11.04	37.29	43.50	-6.21	peak			
5		263.5416	24.71	13.08	37.79	46.00	-8.21	peak			
6		367.0375	19.90	15.58	35.48	46.00	-10.52	peak			

Pol	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		103.5509	12.88	11.20	24.08	43.50	-19.42	peak			
2		133.3534	18.76	13.83	32.59	43.50	-10.91	peak			
3	*	191.5209	27.10	11.38	38.48	43.50	-5.02	peak			
4		255.3542	27.35	12.88	40.23	46.00	-5.77	peak			
5		339.0335	19.18	15.05	34.23	46.00	-11.77	peak			
6		702.8280	11.27	21.78	33.05	46.00	-12.95	peak			

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

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

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	47.01	V	33.95	10.18	34.26	56.88	74	-17.12	PK
4824	34.06	V	33.95	10.18	34.26	43.93	54	-10.07	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	47.71	H	33.95	10.18	34.26	57.58	74	-16.42	PK
4824	35.21	H	33.95	10.18	34.26	45.08	54	-8.92	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX Mid									
4874	45.51	V	33.93	10.20	34.29	55.35	74	-18.65	PK
4874	35.75	V	33.93	10.20	34.29	45.59	54	-8.41	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.29	H	33.93	10.20	34.29	57.13	74	-16.87	PK
4874	35.09	H	33.93	10.20	34.29	44.93	54	-9.07	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX High									
4924	48.48	V	33.98	10.22	34.25	58.43	74	-15.57	PK
4924	35.98	V	33.98	10.22	34.25	45.93	54	-8.07	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	46.78	H	33.98	10.22	34.25	56.73	74	-17.27	PK
4924	34.92	H	33.98	10.22	34.25	44.87	54	-9.13	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	47.14	V	33.95	10.18	34.26	57.01	74	-16.99	PK
4824	34.46	V	33.95	10.18	34.26	44.33	54	-9.67	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	47.74	H	33.95	10.18	34.26	57.61	74	-16.39	PK
4824	35.25	H	33.95	10.18	34.26	45.12	54	-8.88	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX Mid									
4874	46.42	V	33.93	10.20	34.29	56.26	74	-17.74	PK
4874	35.84	V	33.93	10.20	34.29	45.68	54	-8.32	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.26	H	33.93	10.20	34.29	57.10	74	-16.90	PK
4874	34.75	H	33.93	10.20	34.29	44.59	54	-9.41	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX High									
4924	48.56	V	33.98	10.22	34.25	58.51	74	-15.49	PK
4924	36.06	V	33.98	10.22	34.25	46.01	54	-7.99	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	46.06	H	33.98	10.22	34.25	56.01	74	-17.99	PK
4924	34.73	H	33.98	10.22	34.25	44.68	54	-9.32	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	46.66	V	33.95	10.18	34.26	56.53	74	-17.47	PK
4824	34.47	V	33.95	10.18	34.26	44.34	54	-9.66	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	47.56	H	33.95	10.18	34.26	57.43	74	-16.57	PK
4824	34.32	H	33.95	10.18	34.26	44.19	54	-9.81	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX Mid									
4874	45.58	V	33.93	10.20	34.29	55.42	74	-18.58	PK
4874	35.57	V	33.93	10.20	34.29	45.41	54	-8.59	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.83	H	33.93	10.20	34.29	57.67	74	-16.33	PK
4874	34.89	H	33.93	10.20	34.29	44.73	54	-9.27	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX High									
4924	48.41	V	33.98	10.22	34.25	58.36	74	-15.64	PK
4924	35.62	V	33.98	10.22	34.25	45.57	54	-8.43	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	45.92	H	33.98	10.22	34.25	55.87	74	-18.13	PK
4924	34.69	H	33.98	10.22	34.25	44.64	54	-9.36	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	47.37	V	33.95	10.18	34.26	57.24	74	-16.76	PK
4844	34.20	V	33.95	10.18	34.26	44.07	54	-9.93	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
4844	48.00	H	33.95	10.18	34.26	57.87	74	-16.13	PK
4844	34.93	H	33.95	10.18	34.26	44.80	54	-9.20	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX Mid									
4874	46.50	V	33.93	10.20	34.29	56.34	74	-17.66	PK
4874	35.40	V	33.93	10.20	34.29	45.24	54	-8.76	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.85	H	33.93	10.20	34.29	57.69	74	-16.31	PK
4874	35.24	H	33.93	10.20	34.29	45.08	54	-8.92	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX High									
4904	49.08	V	33.98	10.22	34.25	59.03	74	-14.97	PK
4904	35.94	V	33.98	10.22	34.25	45.89	54	-8.11	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/
4904	46.26	H	33.98	10.22	34.25	56.21	74	-17.79	PK
4904	34.88	H	33.98	10.22	34.25	44.83	54	-9.17	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/

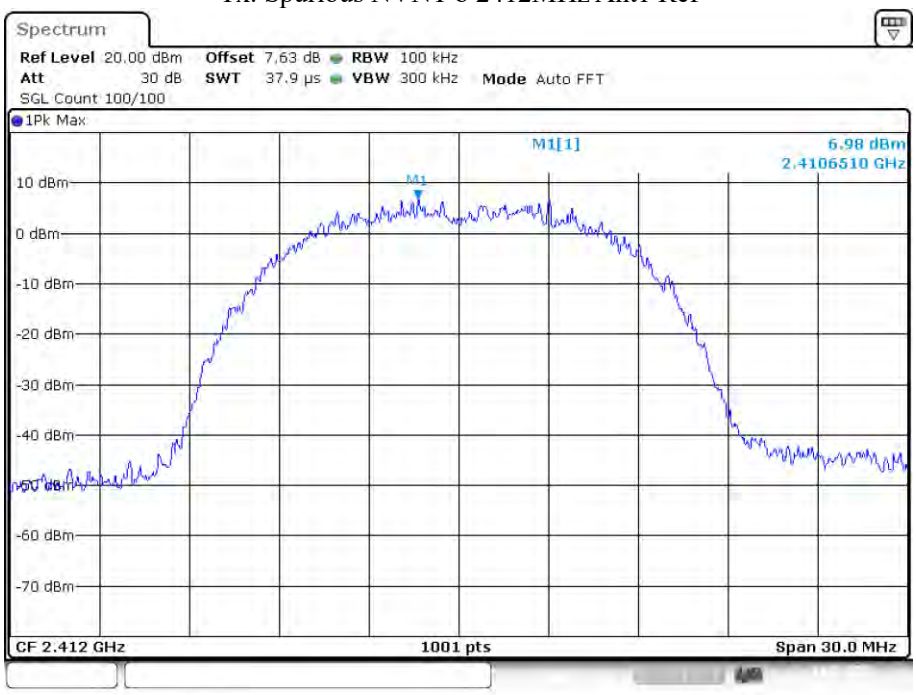
Note:

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.

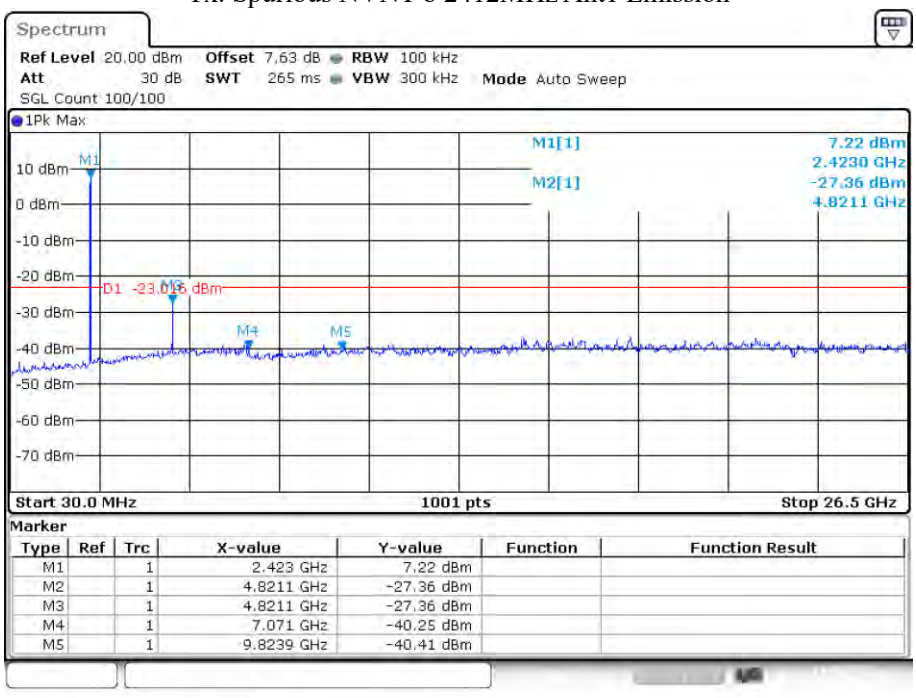
Conducted RF Spurious Emission

Tx. Spurious NVNT b 2412MHz Ant1 Ref



Date: 24.FEB.2022 05:34:12

Tx. Spurious NVNT b 2412MHz Ant1 Emission

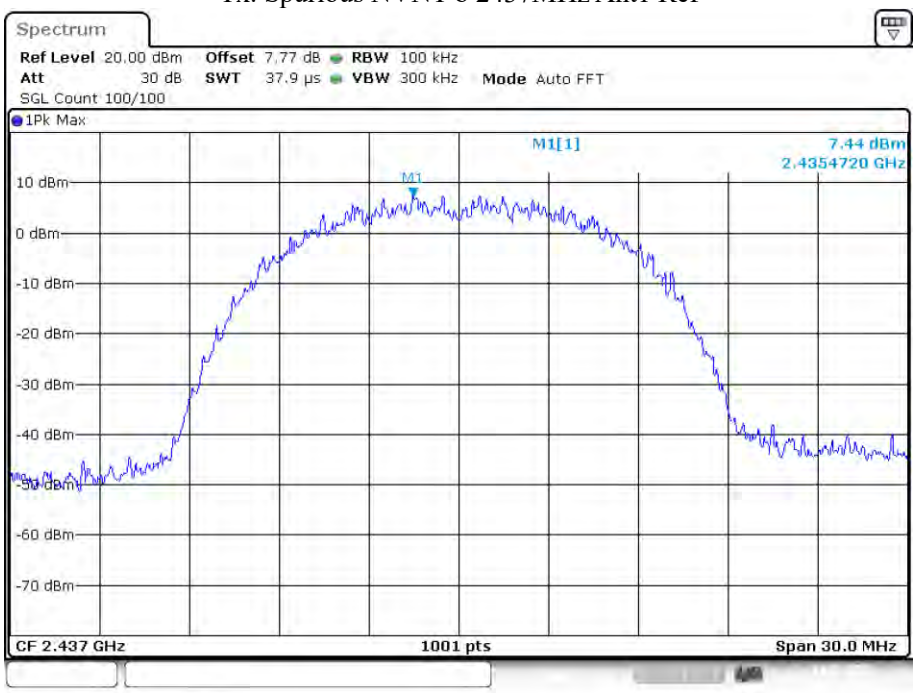


Marker

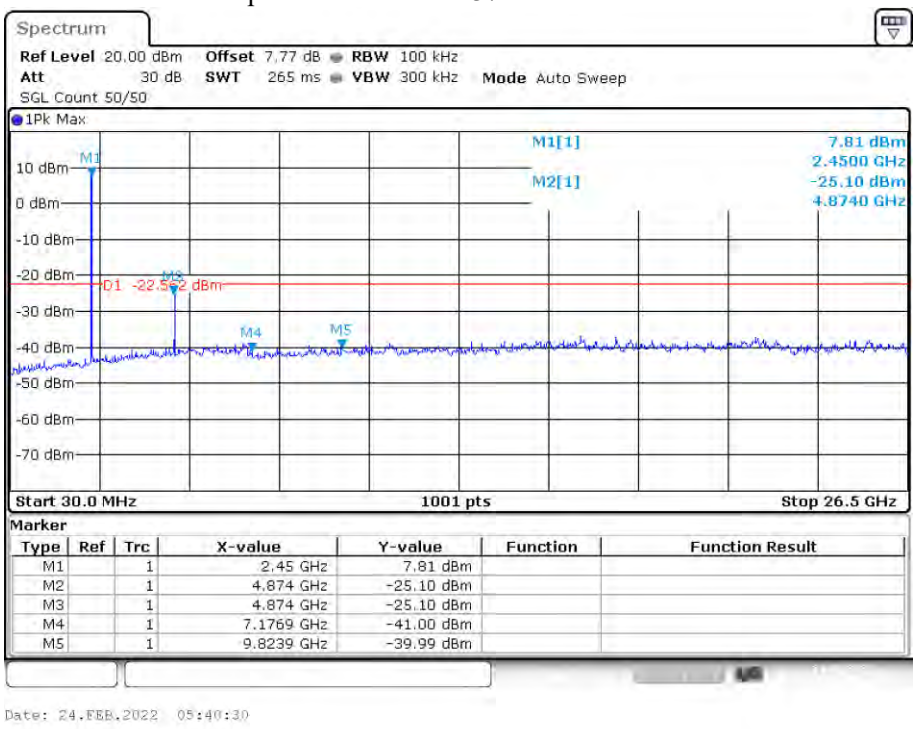
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	7.22 dBm		
M2		1	4.8211 GHz	-27.36 dBm		
M3		1	4.8211 GHz	-27.36 dBm		
M4		1	7.071 GHz	-40.25 dBm		
M5		1	9.8239 GHz	-40.41 dBm		

Date: 24.FEB.2022 05:36:44

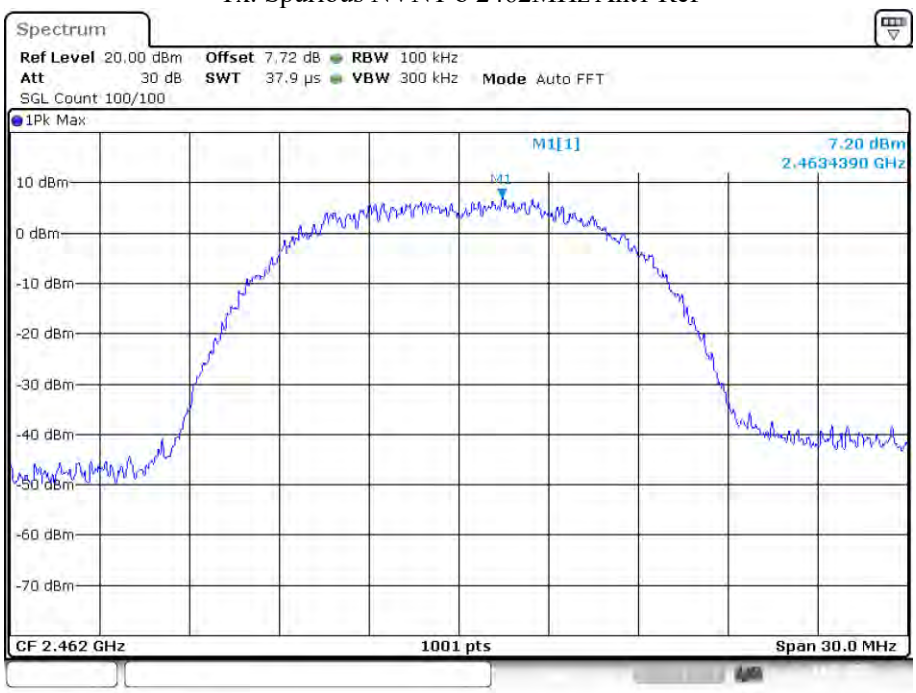
Tx. Spurious NVNT b 2437MHz Ant1 Ref



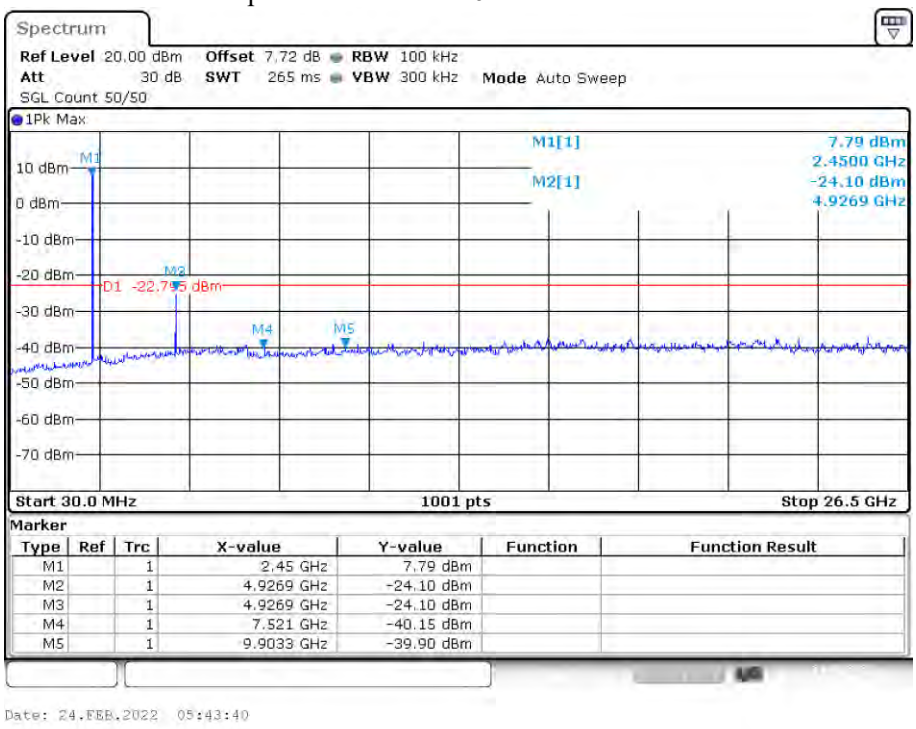
Tx. Spurious NVNT b 2437MHz Ant1 Emission



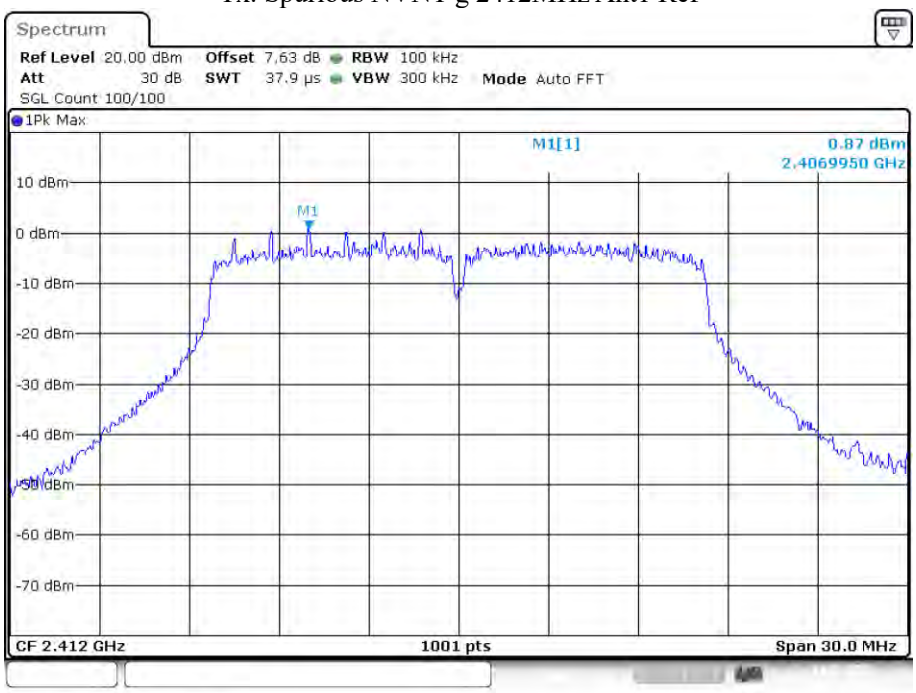
Tx. Spurious NVNT b 2462MHz Ant1 Ref



Tx. Spurious NVNT b 2462MHz Ant1 Emission

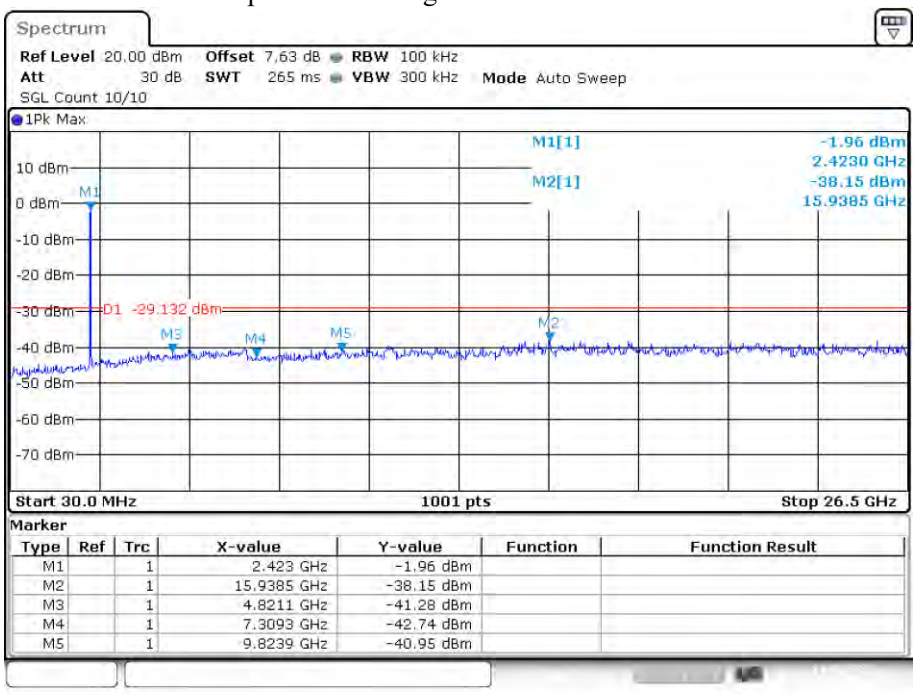


Tx. Spurious NVNT g 2412MHz Ant1 Ref



Date: 24.FEB.2022 05:45:16

Tx. Spurious NVNT g 2412MHz Ant1 Emission

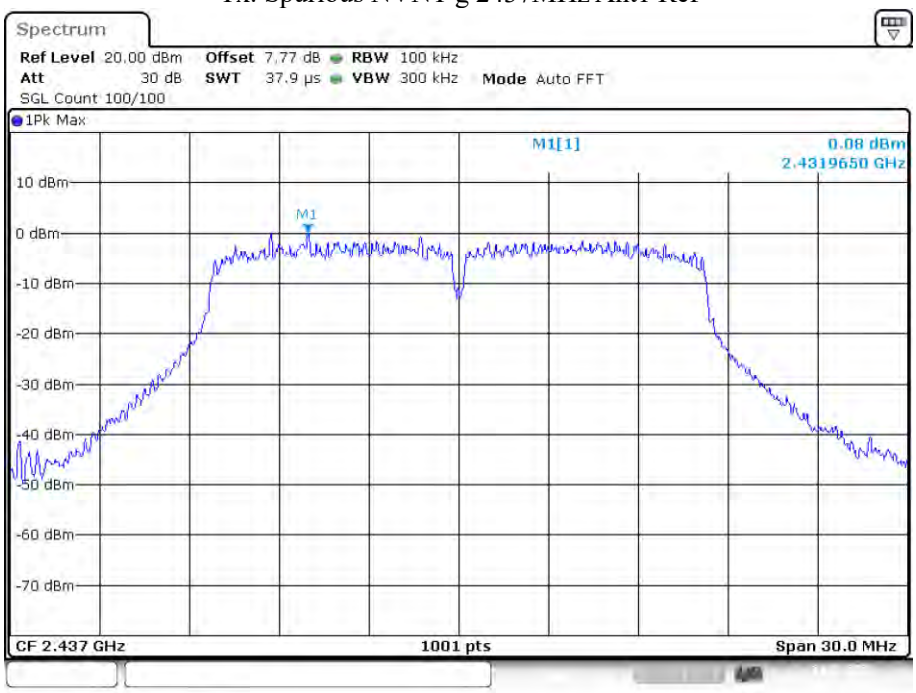


Marker

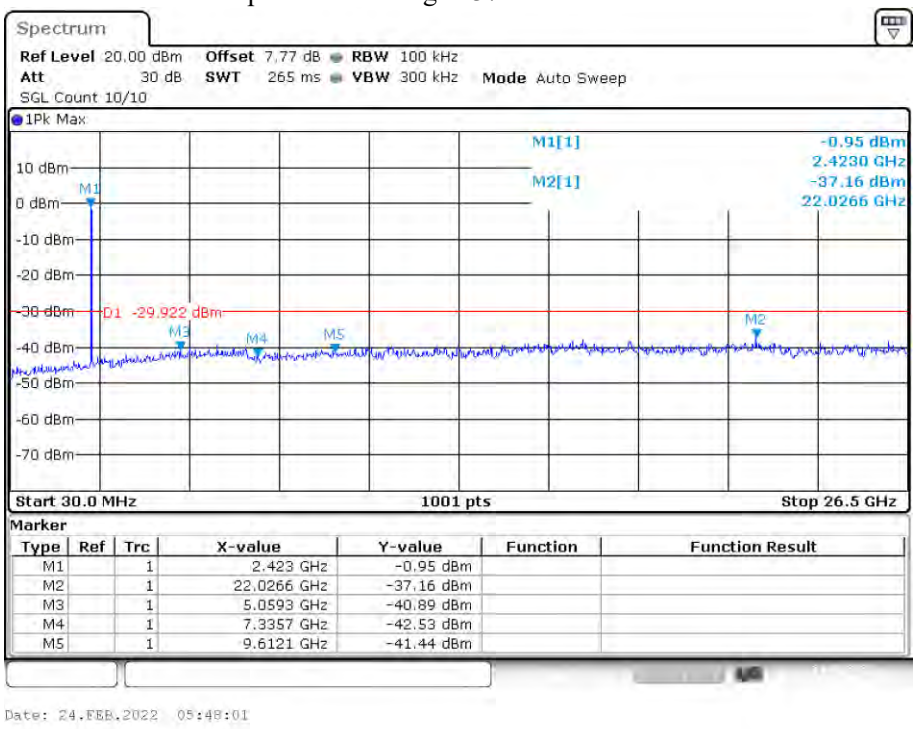
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-1.96 dBm		
M2		1	15.9385 GHz	-38.15 dBm		
M3		1	4.8211 GHz	-41.28 dBm		
M4		1	7.3093 GHz	-42.74 dBm		
M5		1	9.8239 GHz	-40.95 dBm		

Date: 24.FEB.2022 05:45:34

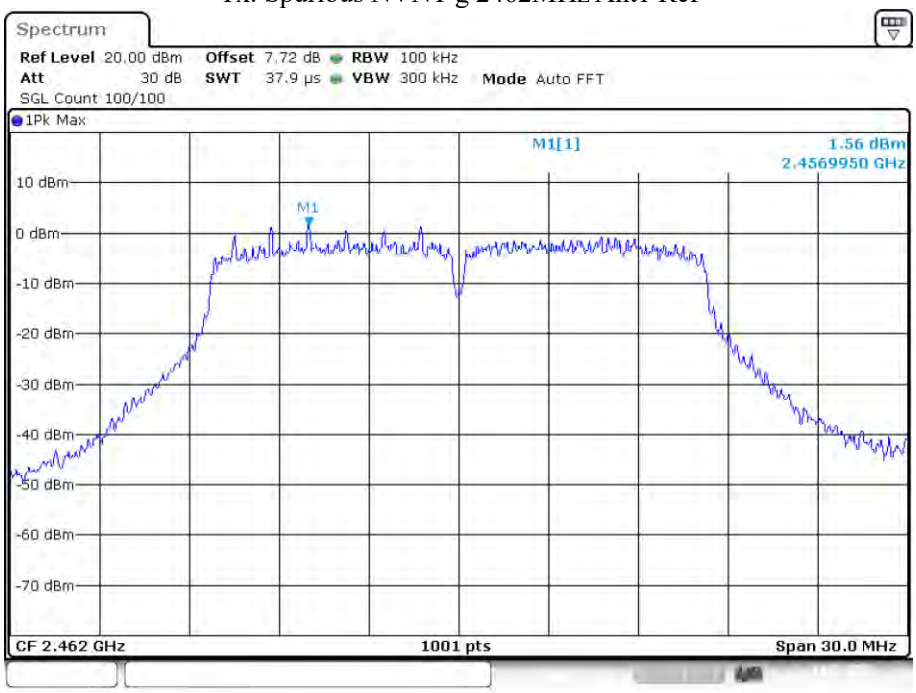
Tx. Spurious NVNT g 2437MHz Ant1 Ref



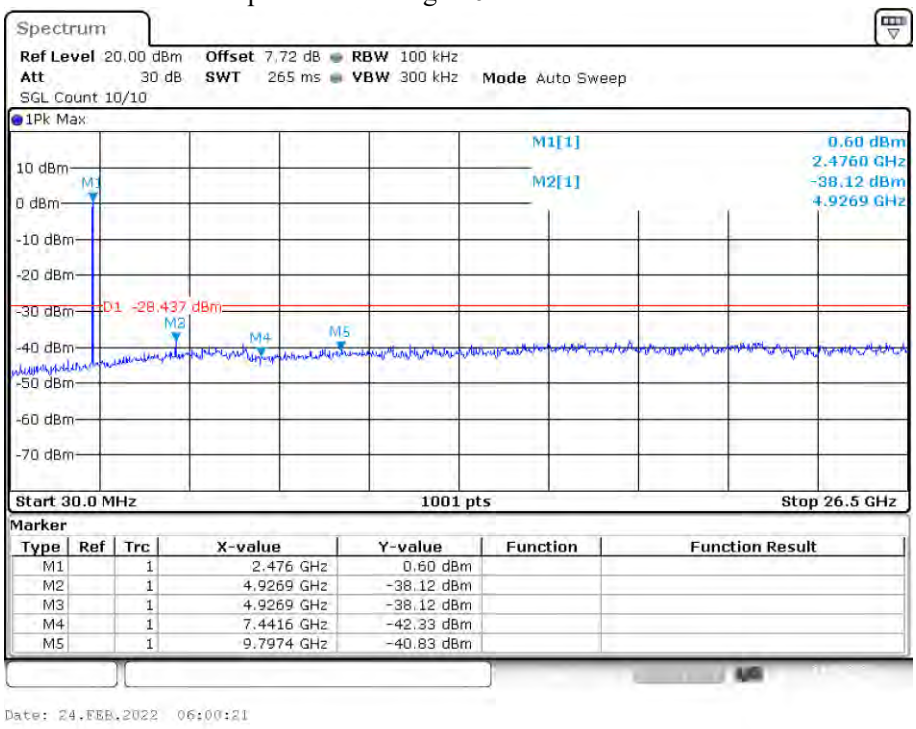
Tx. Spurious NVNT g 2437MHz Ant1 Emission



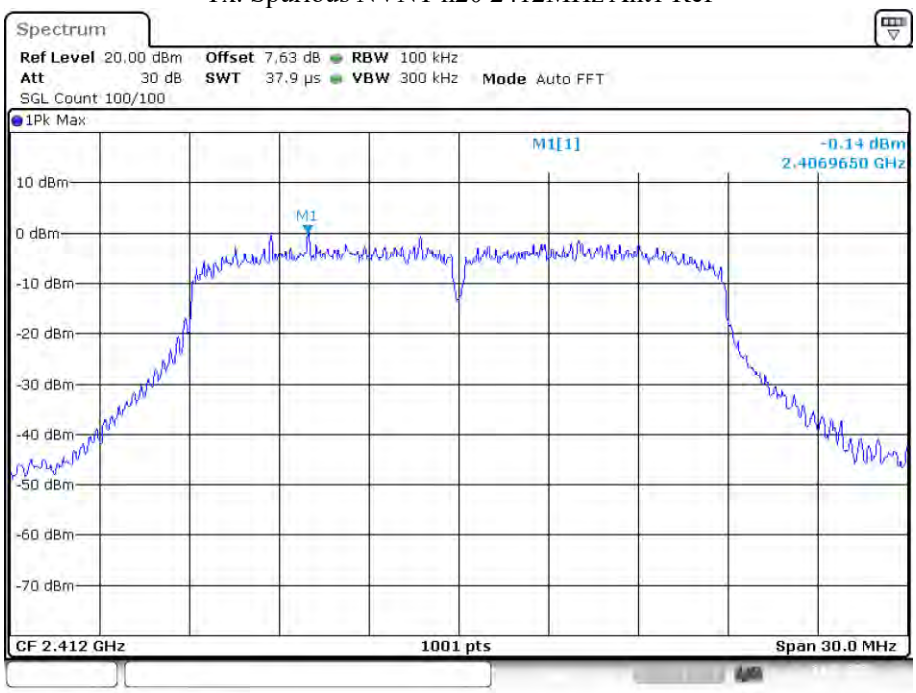
Tx. Spurious NVNT g 2462MHz Ant1 Ref



Tx. Spurious NVNT g 2462MHz Ant1 Emission

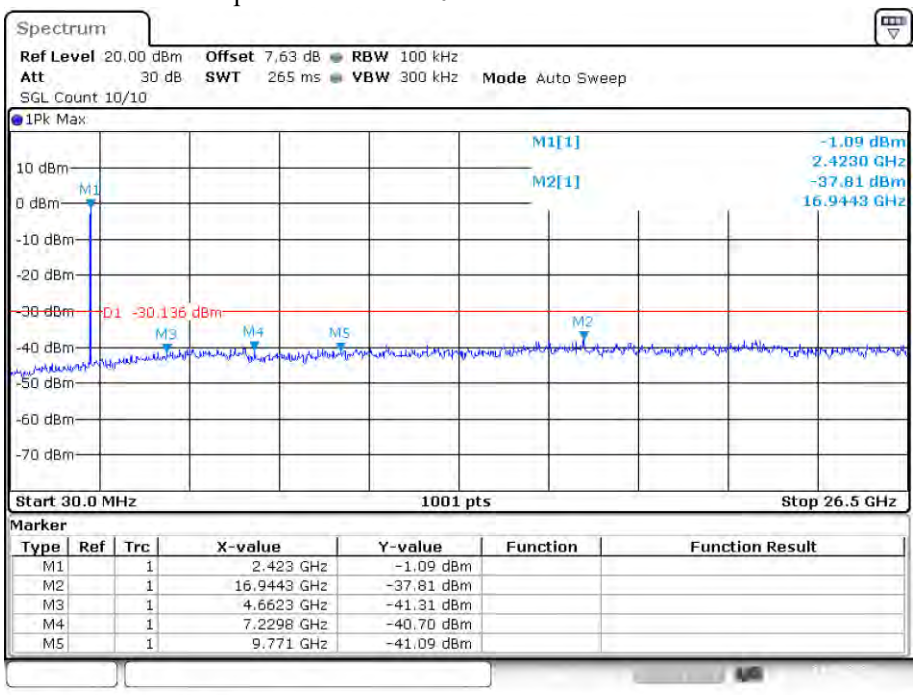


Tx. Spurious NVNT n20 2412MHz Ant1 Ref



Date: 24.FEB.2022 06:03:58

Tx. Spurious NVNT n20 2412MHz Ant1 Emission

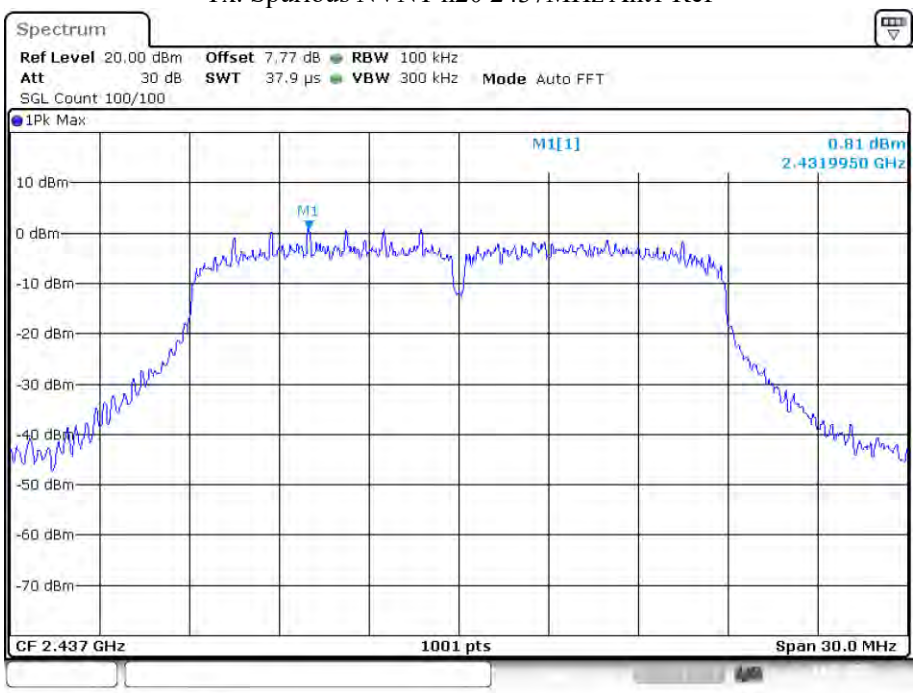


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-1.09 dBm		
M2		1	16.9443 GHz	-37.81 dBm		
M3		1	4.6623 GHz	-41.31 dBm		
M4		1	7.2298 GHz	-40.70 dBm		
M5		1	9.771 GHz	-41.09 dBm		

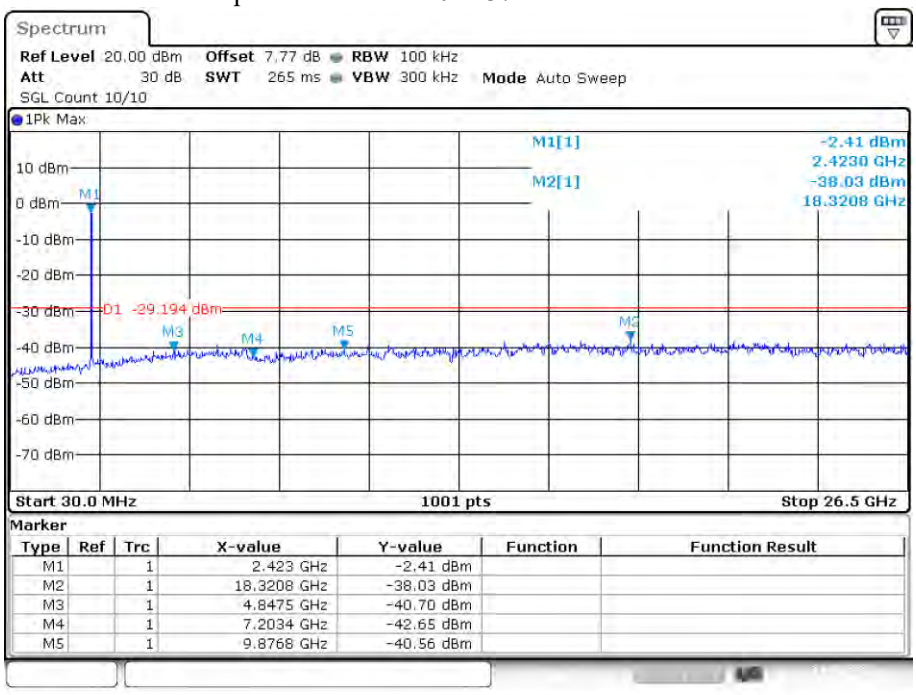
Date: 24.FEB.2022 06:04:16

Tx. Spurious NVNT n20 2437MHz Ant1 Ref



Date: 24.FEB.2022 06:06:11

Tx. Spurious NVNT n20 2437MHz Ant1 Emission

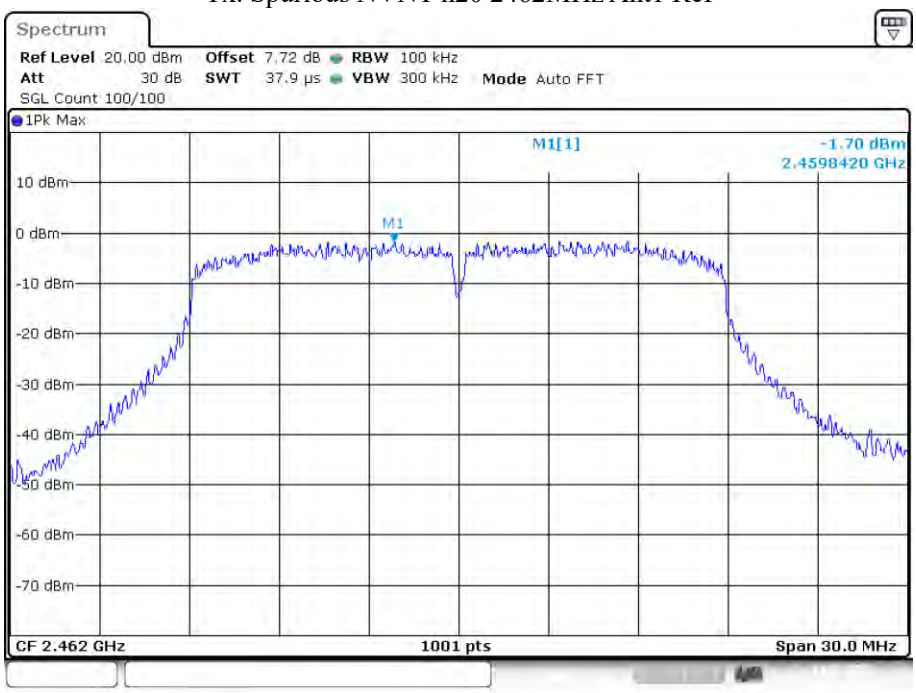


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-2.41 dBm		
M2		1	18.3208 GHz	-38.03 dBm		
M3		1	4.8475 GHz	-40.70 dBm		
M4		1	7.2034 GHz	-42.65 dBm		
M5		1	9.8768 GHz	-40.56 dBm		

Date: 24.FEB.2022 06:06:29

Tx. Spurious NVNT n20 2462MHz Ant1 Ref



Date: 24.FEB.2022 06:08:44

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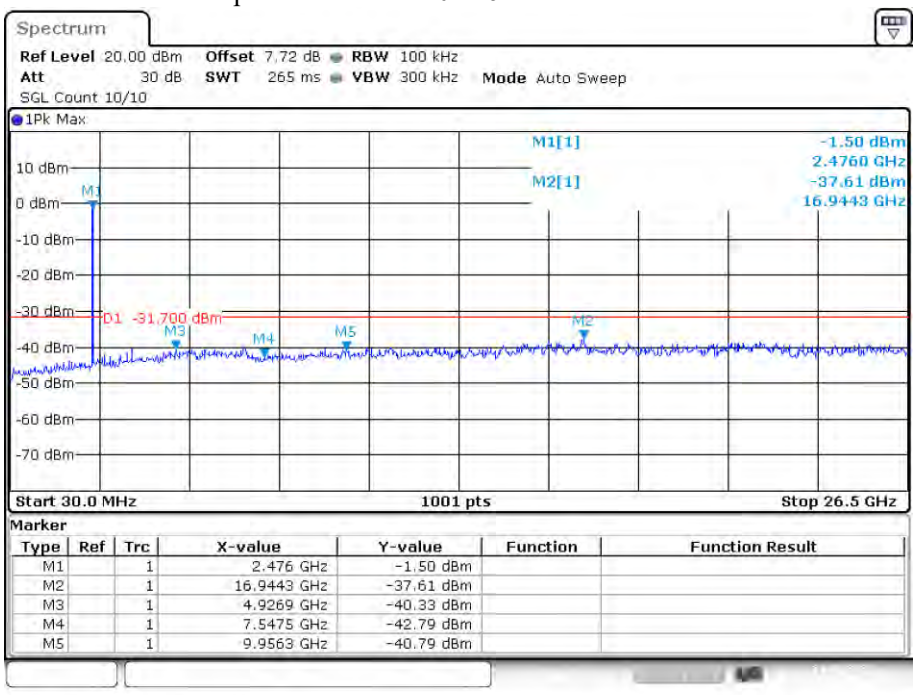
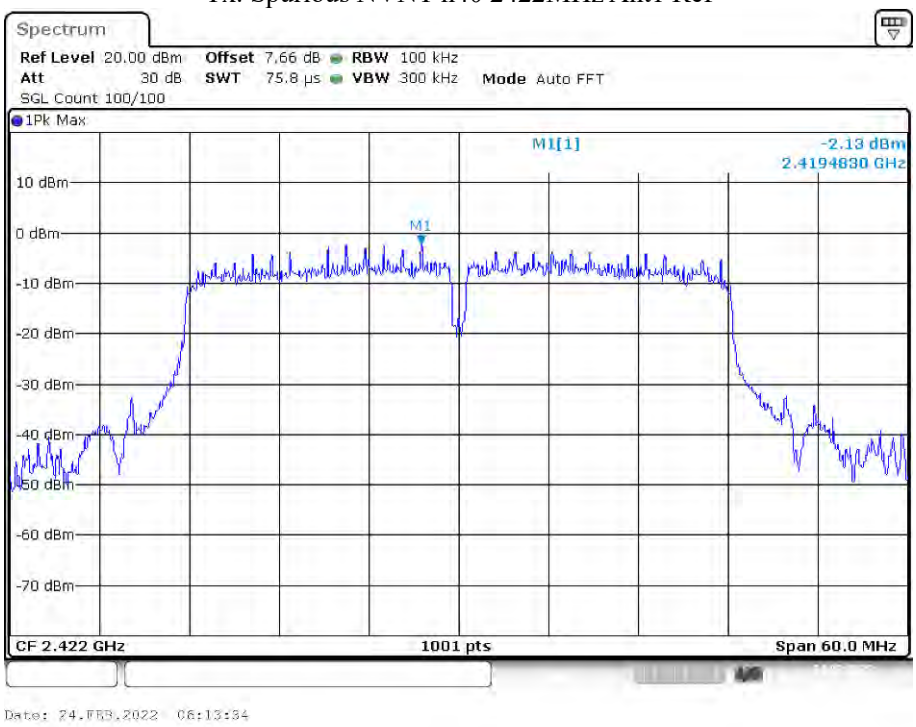


Marker

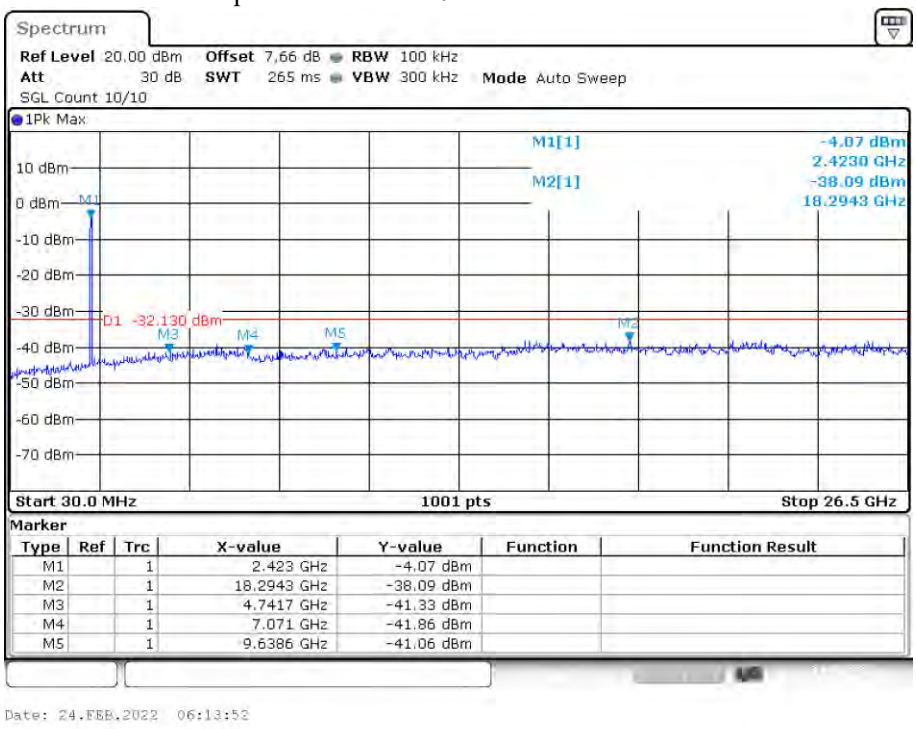
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.476 GHz	-1.50 dBm		
M2		1	16.9443 GHz	-37.61 dBm		
M3		1	4.9269 GHz	-40.33 dBm		
M4		1	7.5475 GHz	-42.79 dBm		
M5		1	9.9563 GHz	-40.79 dBm		

Date: 24.FEB.2022 06:09:01

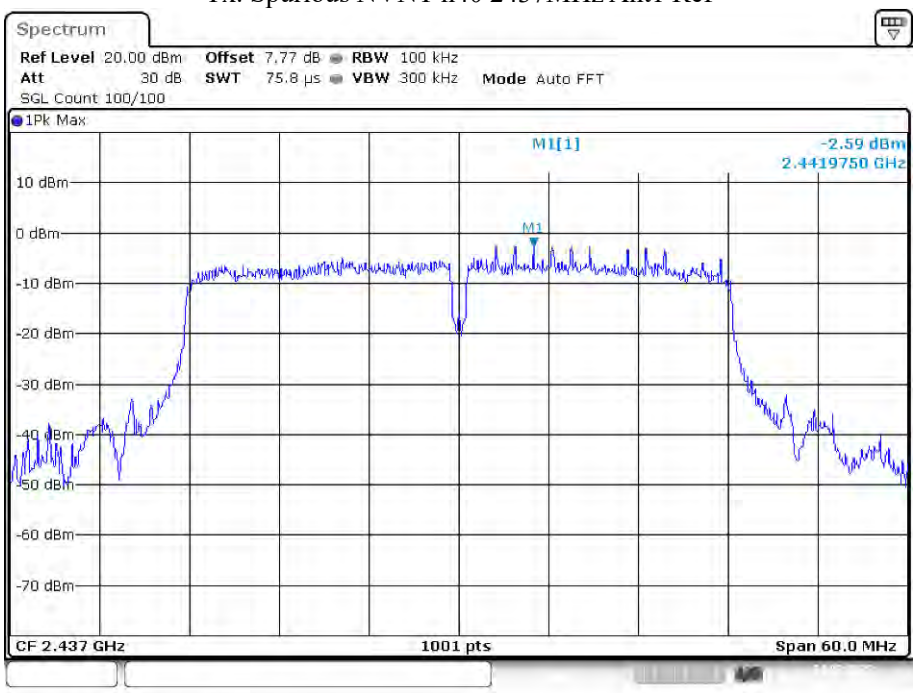
Tx. Spurious NVNT n40 2422MHz Ant1 Ref



Tx. Spurious NVNT n40 2422MHz Ant1 Emission

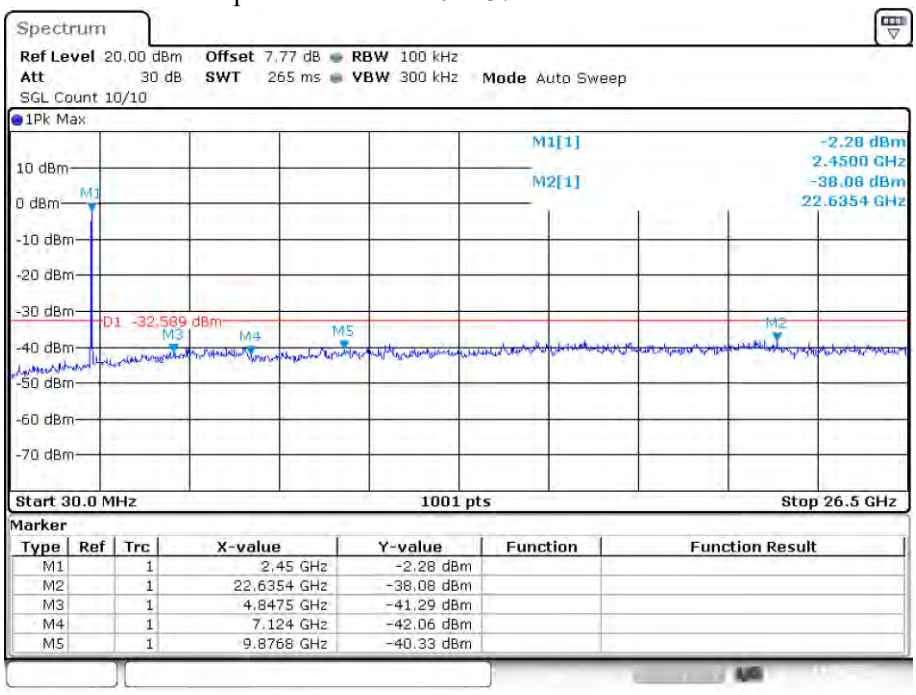


Tx. Spurious NVNT n40 2437MHz Ant1 Ref



Date: 24.FEB.2022 06:16:55

Tx. Spurious NVNT n40 2437MHz Ant1 Emission

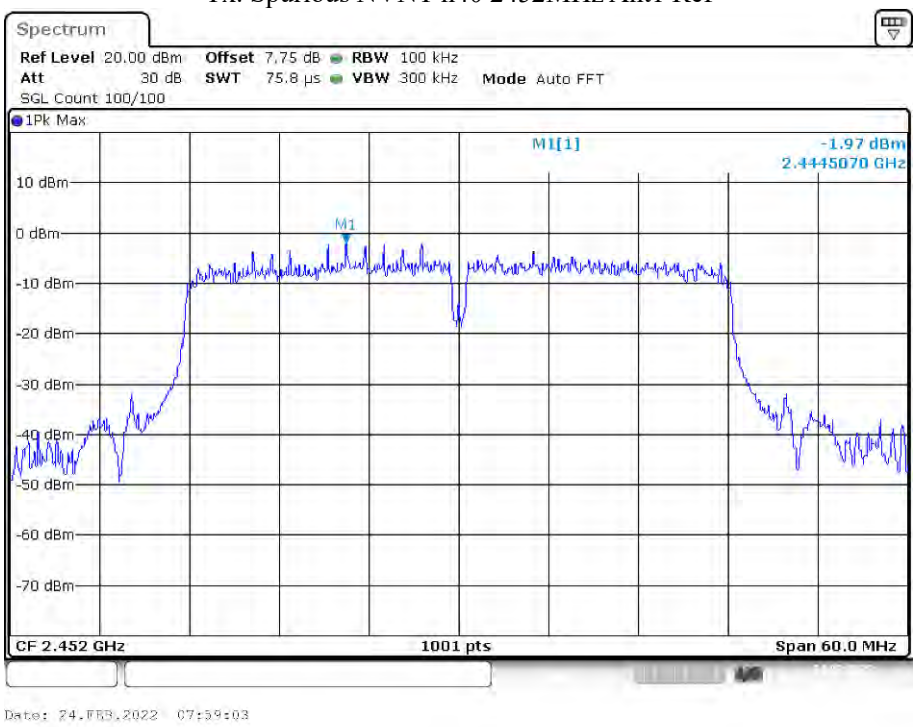


Marker

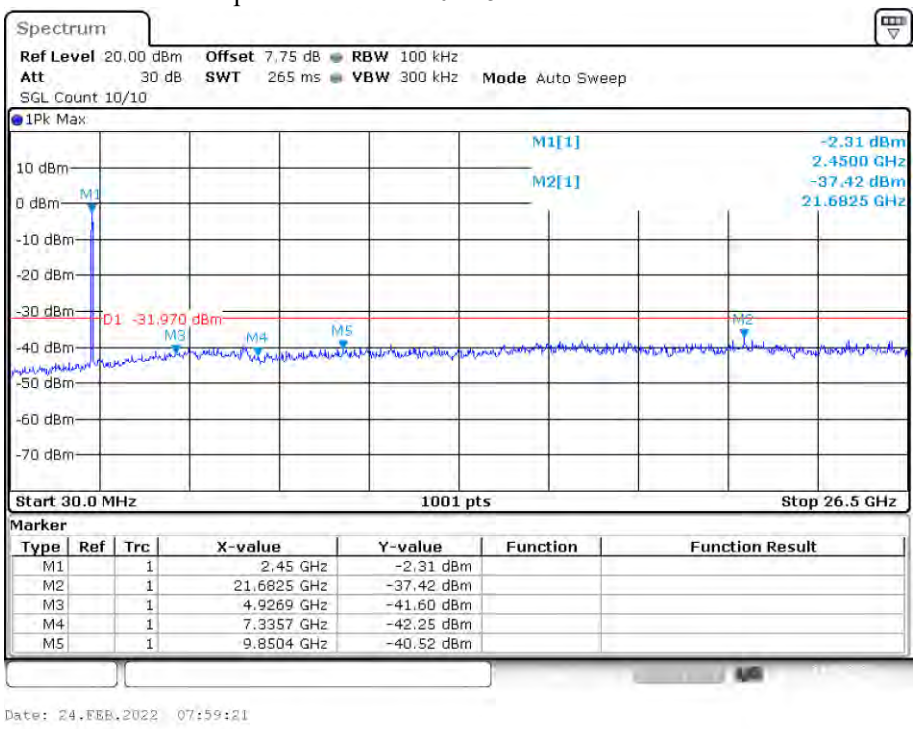
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-2.28 dBm		
M2		1	22.6354 GHz	-38.08 dBm		
M3		1	4.8475 GHz	-41.29 dBm		
M4		1	7.124 GHz	-42.06 dBm		
M5		1	9.8768 GHz	-40.33 dBm		

Date: 24.FEB.2022 06:17:13

Tx. Spurious NVNT n40 2452MHz Ant1 Ref



Tx. Spurious NVNT n40 2452MHz Ant1 Emission



4. POWER LINE CONDUCTED EMISSION

4.1. Test Limits

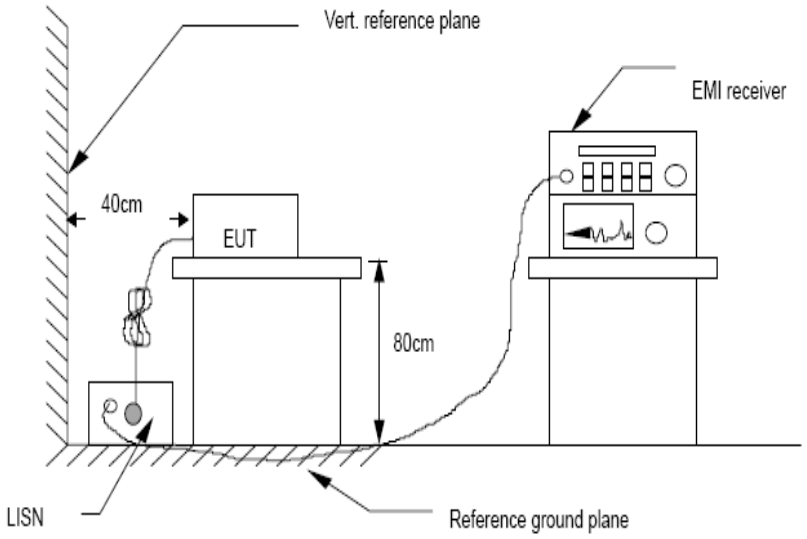
Frequency	Limits dB(μV)	
MHz	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

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

EUT battery powered test not applicable.

5. CONDUCTED MAXIMUM OUTPUT POWER

5.1.Test limits

Please refer 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

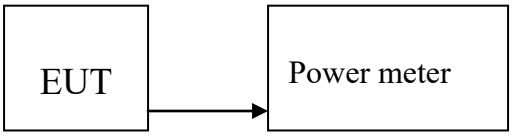
5.2.1 Place the EUT on the table and set it in transmitting mode.

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.

5.3.Test Setup



5.4.Test Results

PASS

Detailed information please see the following page.

Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Result
IEEE 802.11 b	CH1: 2412	21.023	30	PASS
	CH6: 2437	21.457	30	PASS
	CH11: 2462	21.767	30	PASS
IEEE 802.11 g	CH1: 2412	16.242	30	PASS
	CH6: 2437	16.834	30	PASS
	CH11: 2462	16.971	30	PASS
IEEE 802.11 n/HT20	CH1: 2412	16.056	30	PASS
	CH6: 2437	16.502	30	PASS
	CH11: 2462	16.795	30	PASS
IEEE 802.11 n/HT40	CH3: 2422	12.523	30	PASS
	CH6: 2437	12.727	30	PASS
	CH9: 2452	12.862	30	PASS

6. PEAK POWER SPECTRAL DENSITY

6.1.Test limits

6.1.1 Please refer 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.

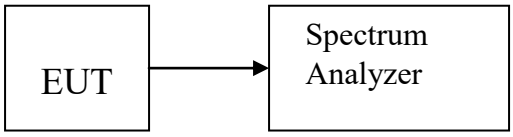
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 3kHz(Set the RBW to: 3 kHz≤RBW≤100 kHz.), VBW = 10kHz(Set the VBW≥3×RBW), span≥1.5×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.

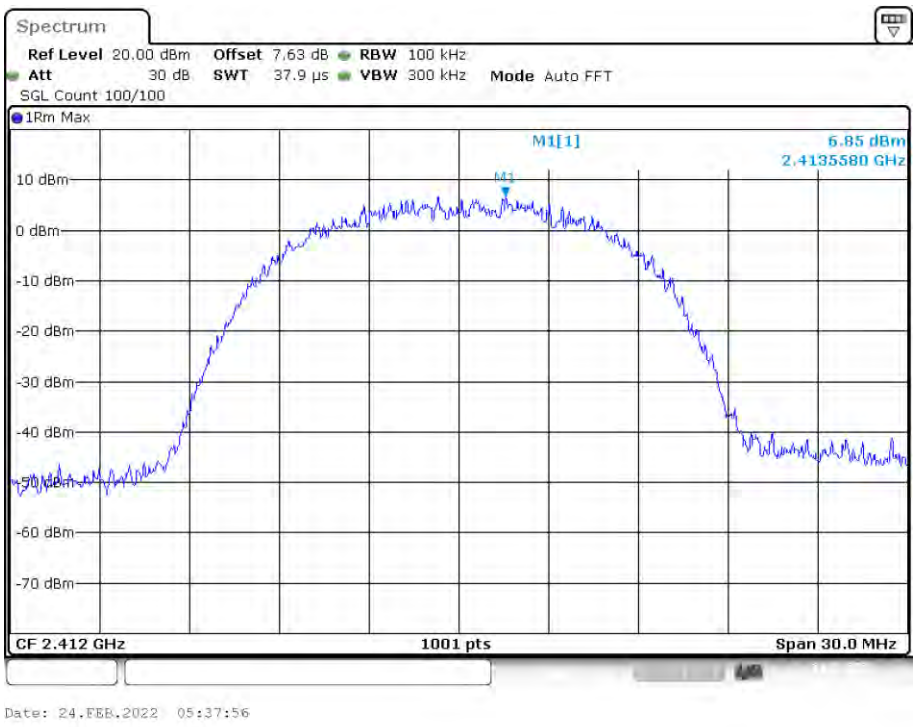
6.3.Test Setup



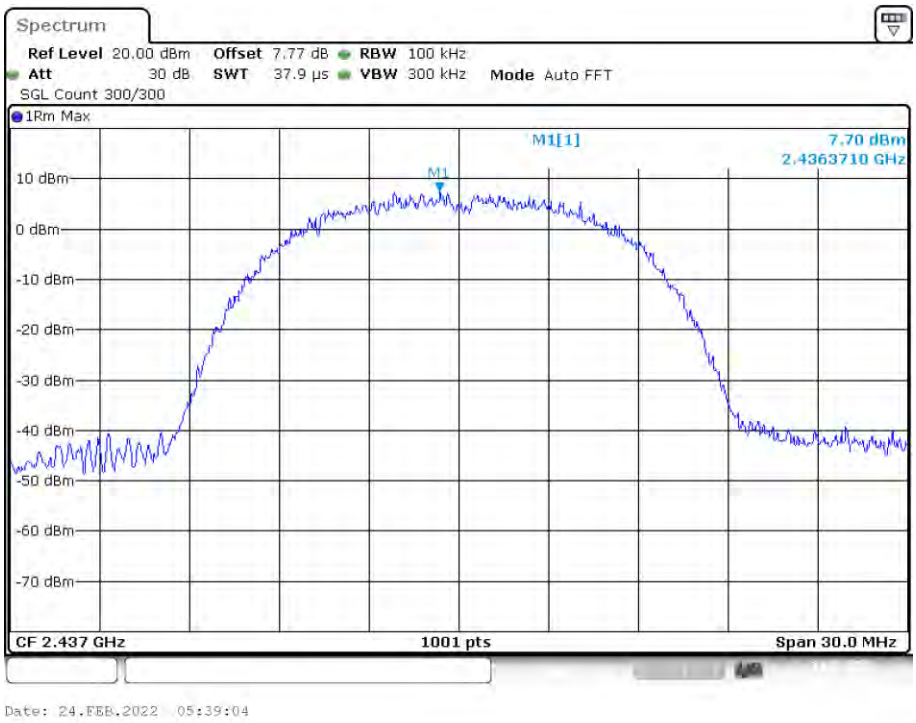
6.4.Test Results

Condition	Mode	Frequency (MHz)	Max PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	802.11b	2412	6.845	8	Pass
NVNT	802.11b	2437	7.697	8	Pass
NVNT	802.11b	2462	7.838	8	Pass
NVNT	802.11g	2412	-4.856	8	Pass
NVNT	802.11g	2437	-4.232	8	Pass
NVNT	802.11g	2462	-4.242	8	Pass
NVNT	802.11n(HT20)	2412	-5.07	8	Pass
NVNT	802.11n(HT20)	2437	-5.463	8	Pass
NVNT	802.11n(HT20)	2462	-4.434	8	Pass

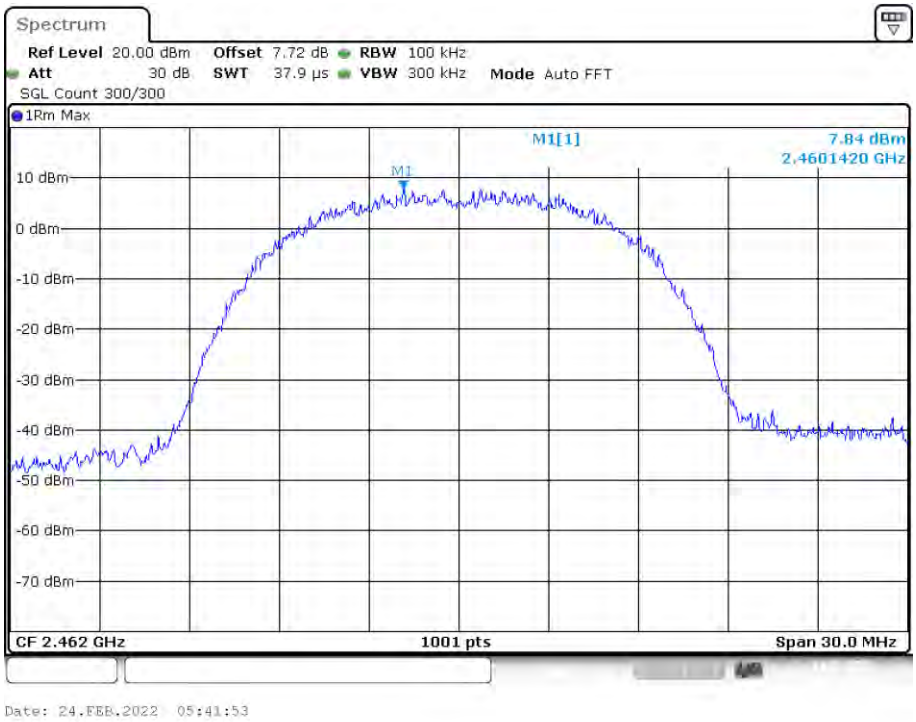
PSD NVNT b 2412MHz Ant1



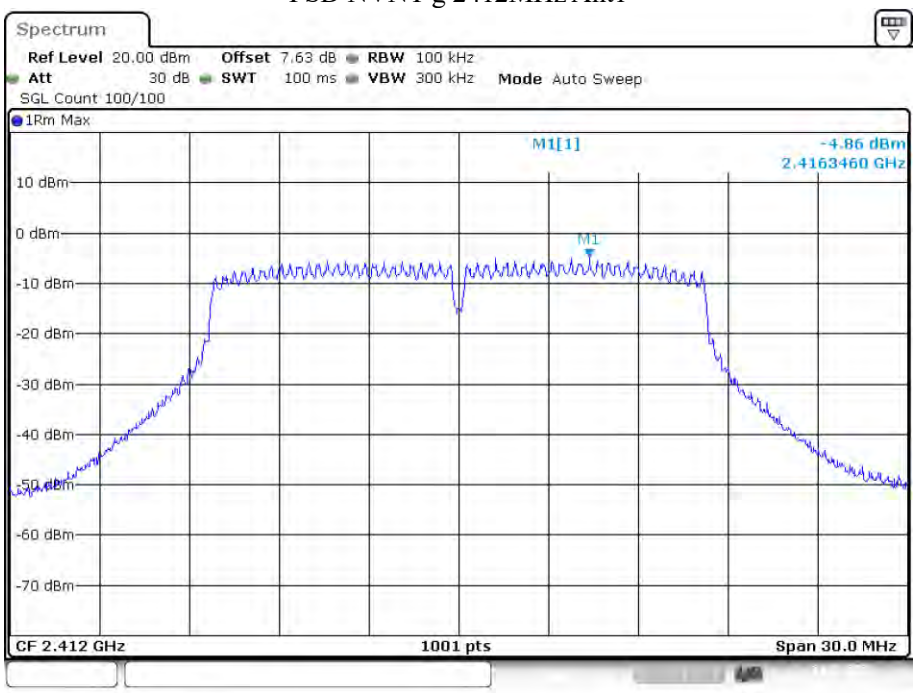
PSD NVNT b 2437MHz Ant1



PSD NVNT b 2462MHz Ant1

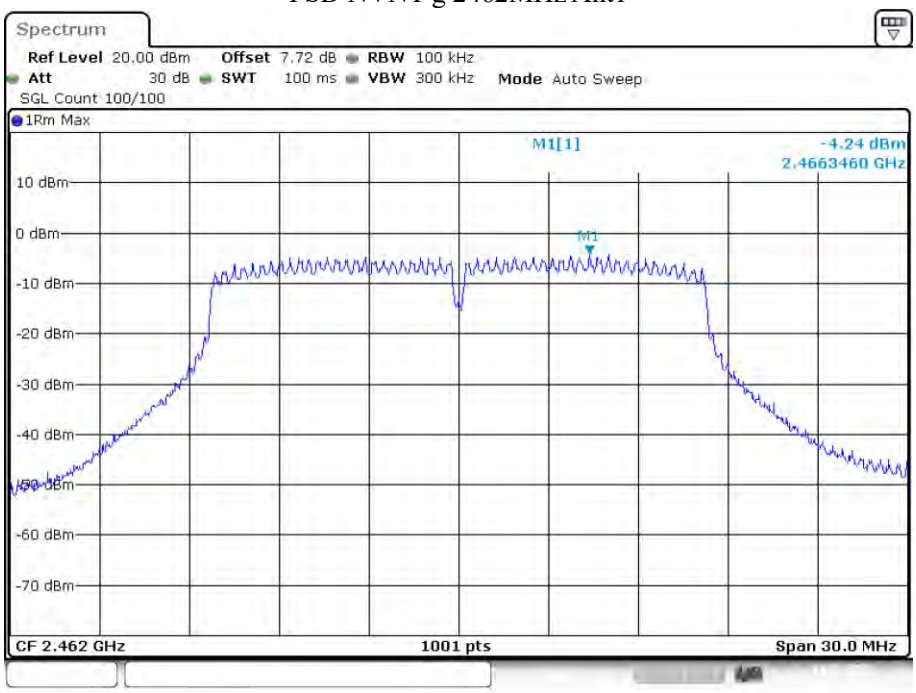


PSD NVNT g 2412MHz Ant1

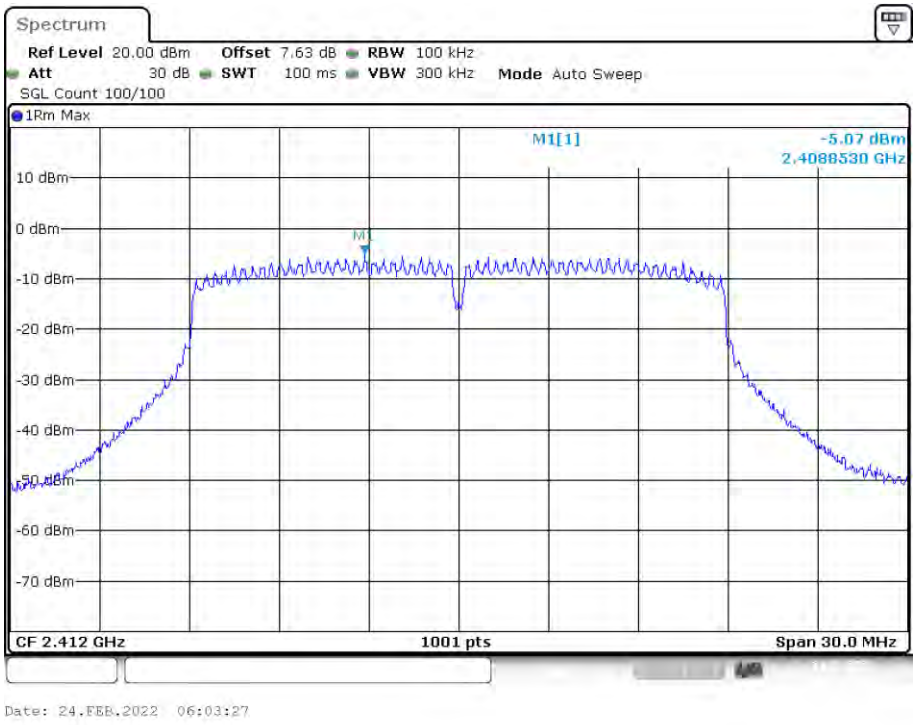


PSD NVNT g 2437MHz Ant1

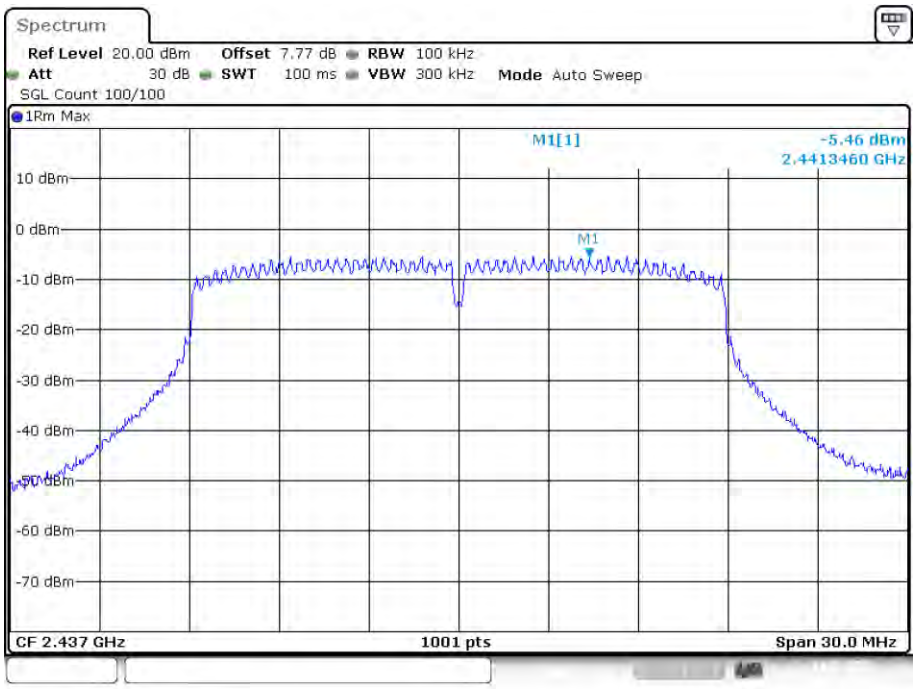
PSD NVNT g 2462MHz Ant1



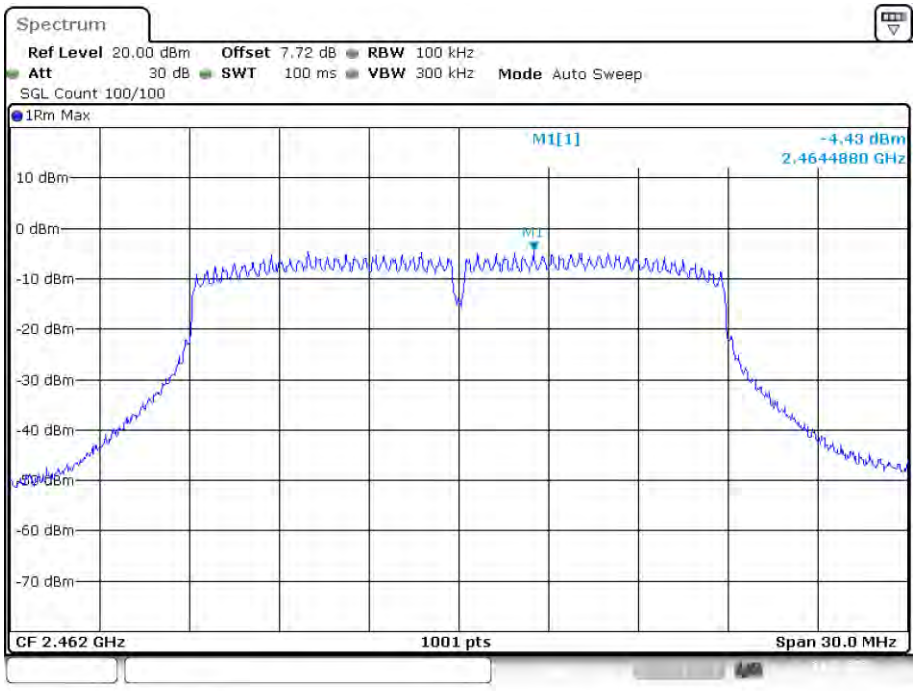
PSD NVNT n20 2412MHz Ant1



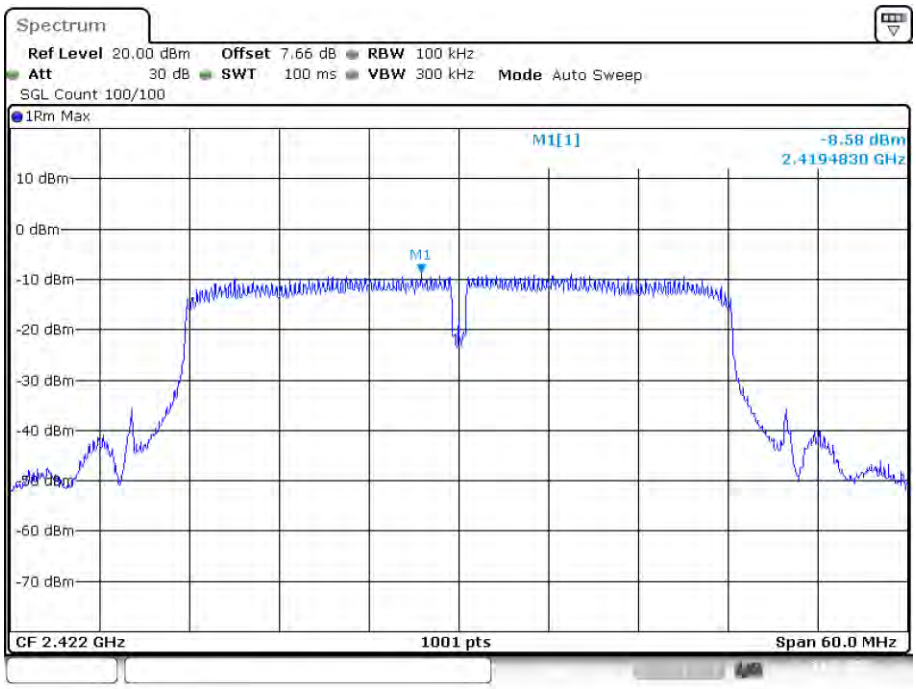
PSD NVNT n20 2437MHz Ant1



PSD NVNT n20 2462MHz Ant1

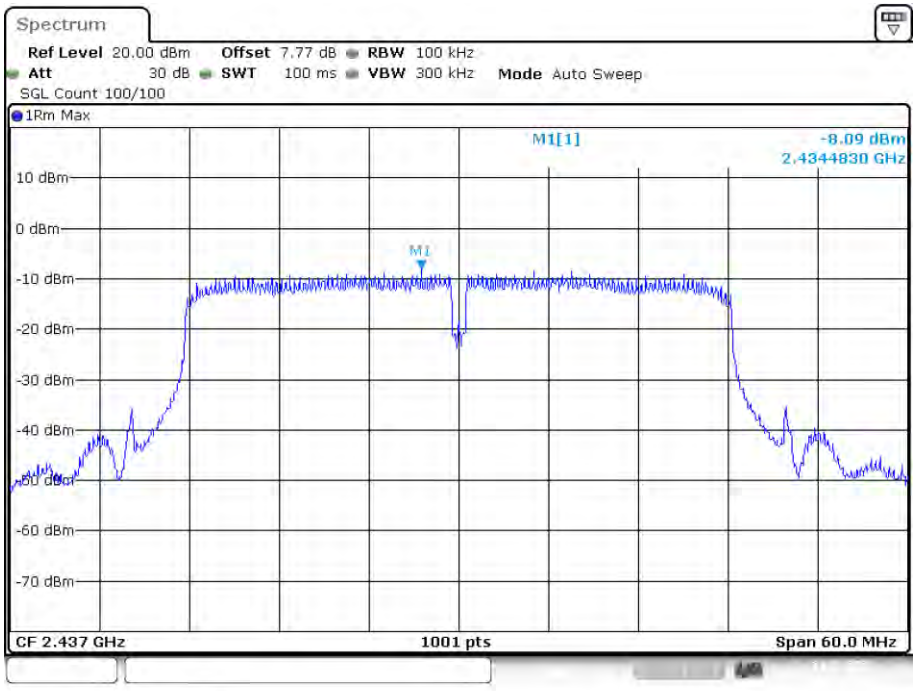


PSD NVNT n40 2422MHz Ant1



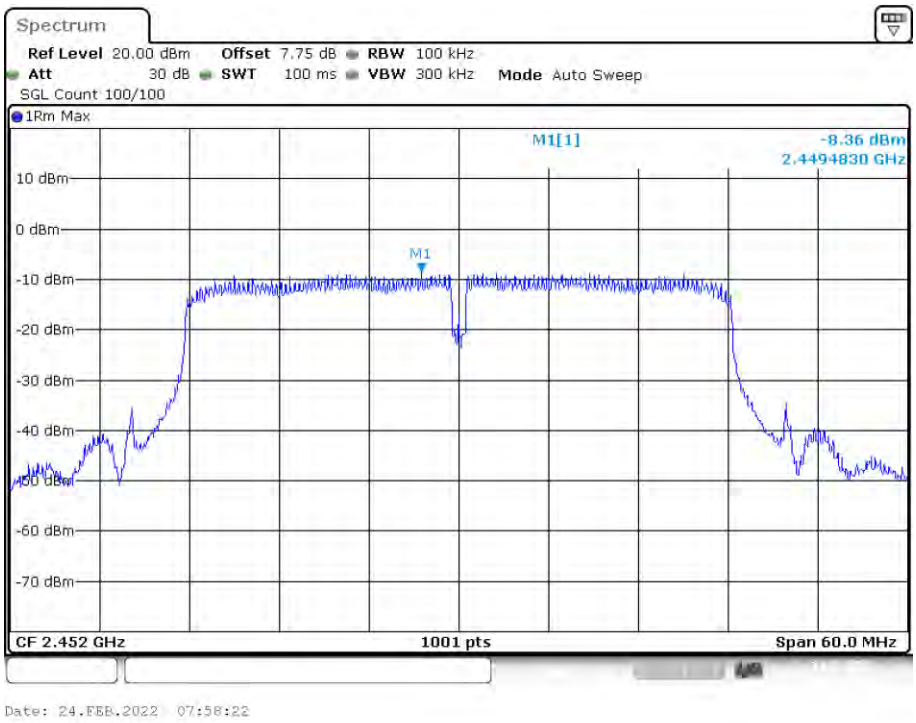
Date: 24.FEB.2022 06:12:57

PSD NVNT n40 2437MHz Ant1



Date: 24.FEB.2022 06:16:39

PSD NVNT n40 2452MHz Ant1



7. BANDWIDTH

7.1.Test limits

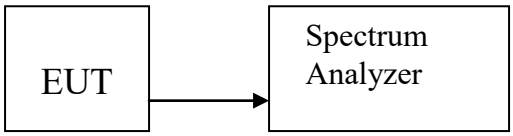
Please refer FCC PART 15: 15.247
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

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≥3*RBW =300kHz,, Peak Detector, Sweep time set auto, detail see the test plot.

7.3.Test Setup

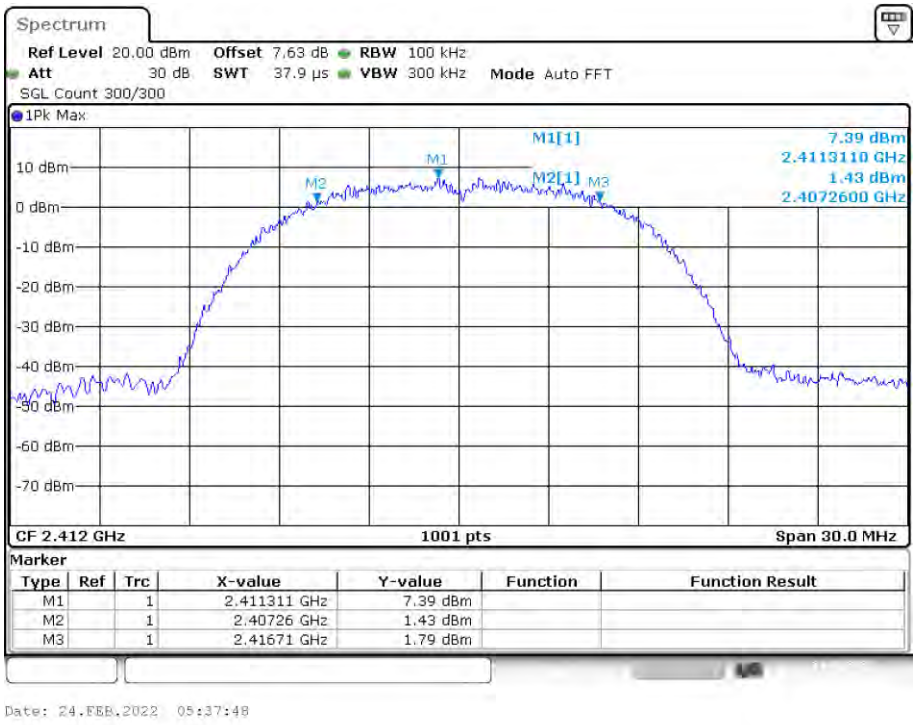


7.4.Test Results

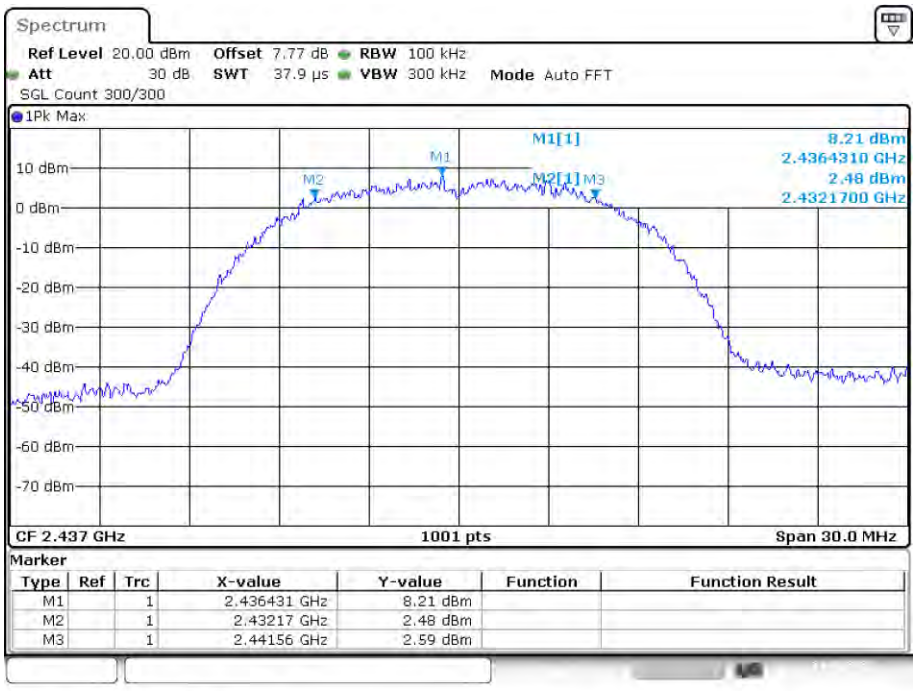
-6dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	b	2412	Ant1	9.45	0.5	Pass
NVNT	b	2437	Ant1	9.39	0.5	Pass
NVNT	b	2462	Ant1	9.33	0.5	Pass
NVNT	g	2412	Ant1	16.02	0.5	Pass
NVNT	g	2437	Ant1	15.81	0.5	Pass
NVNT	g	2462	Ant1	16.35	0.5	Pass
NVNT	n20	2412	Ant1	17.55	0.5	Pass
NVNT	n20	2437	Ant1	17.55	0.5	Pass
NVNT	n20	2462	Ant1	15.39	0.5	Pass
NVNT	n40	2422	Ant1	36.06	0.5	Pass
NVNT	n40	2437	Ant1	35.1	0.5	Pass
NVNT	n40	2452	Ant1	35.1	0.5	Pass

-6dB Bandwidth NVNT b 2412MHz Ant1

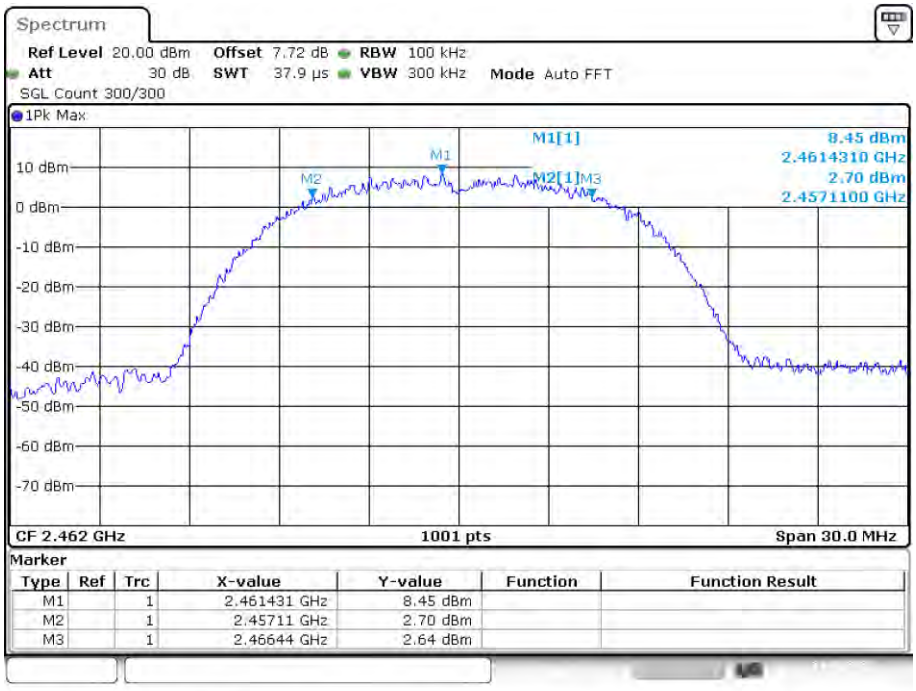


-6dB Bandwidth NVNT b 2437MHz Ant1



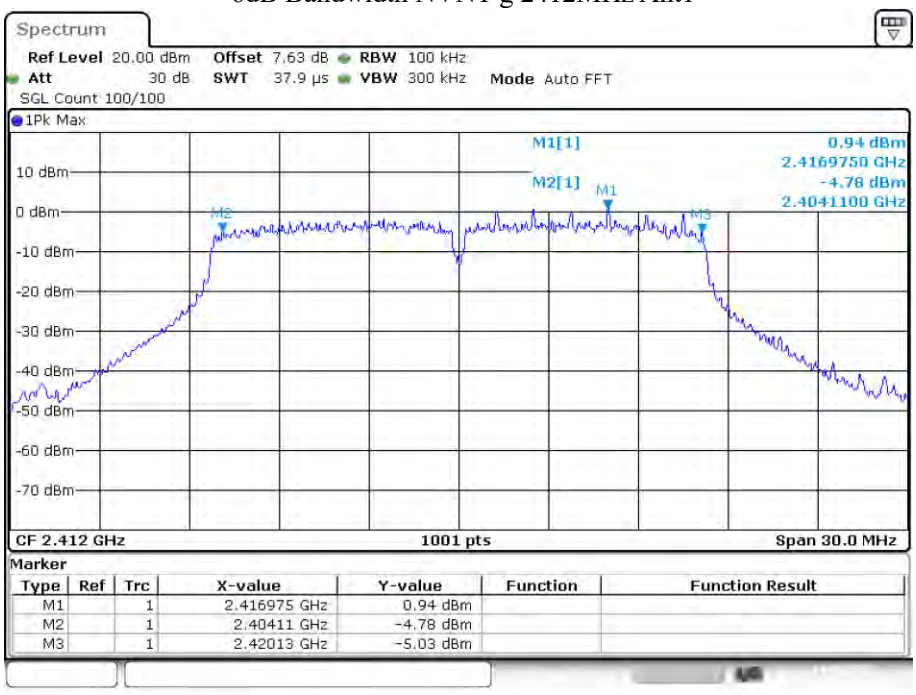
Date: 24.FEB.2022 05:38:52

-6dB Bandwidth NVNT b 2462MHz Ant1

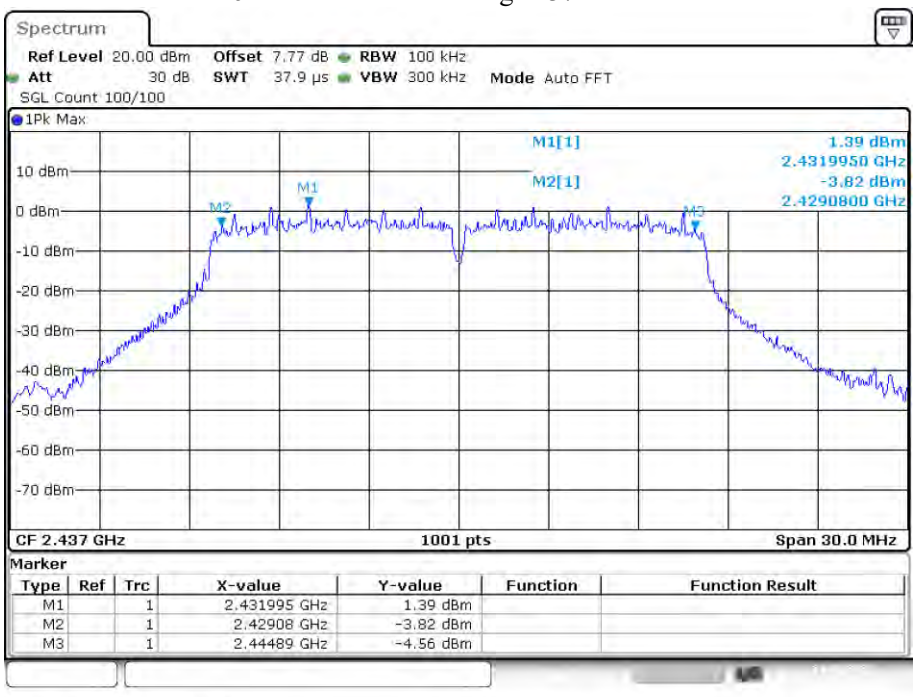


Date: 24.FEB.2022 05:41:41

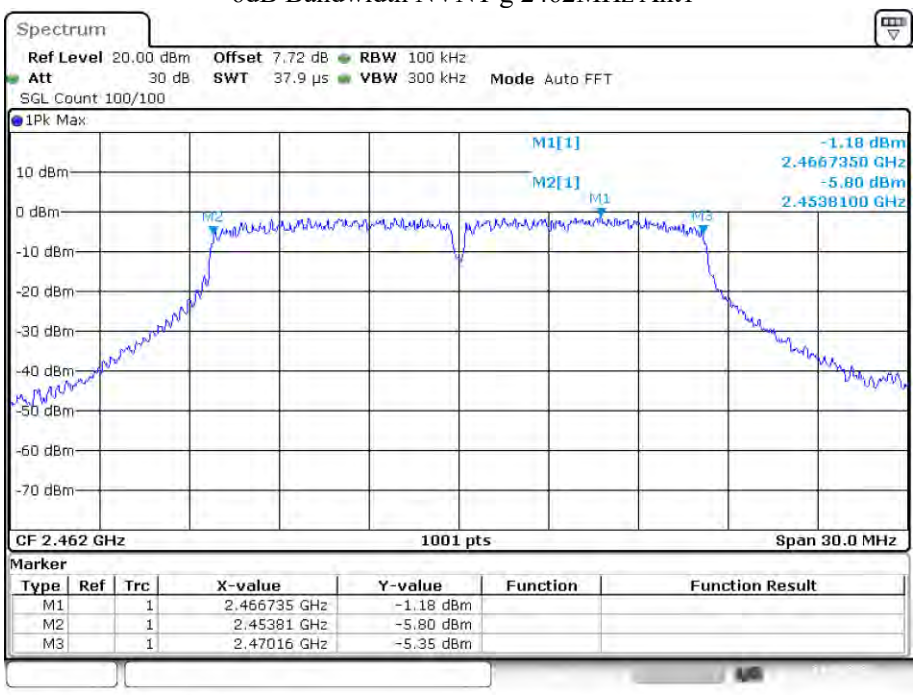
-6dB Bandwidth NVNT g 2412MHz Ant1



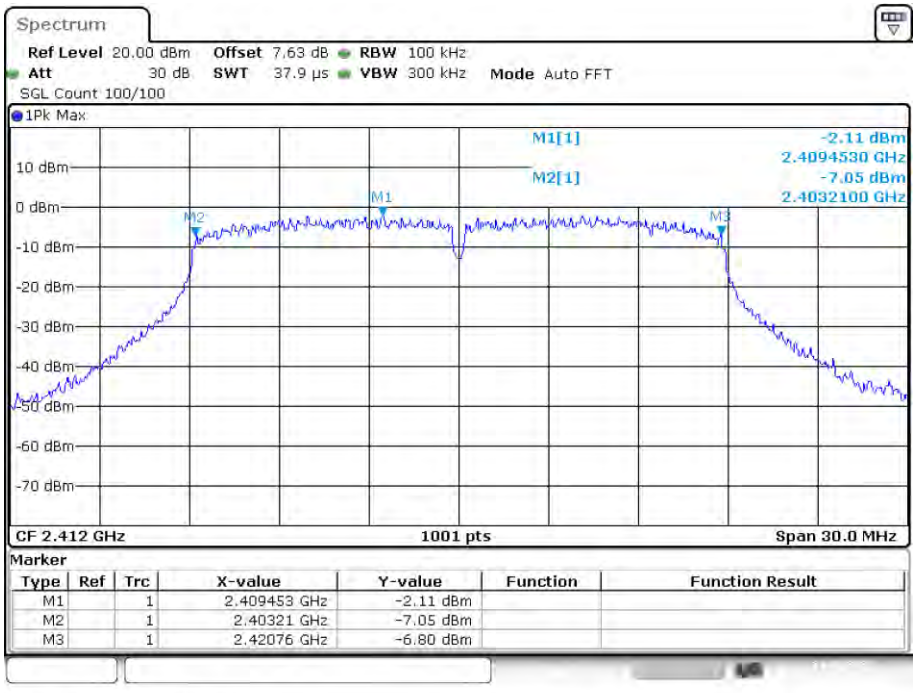
-6dB Bandwidth NVNT g 2437MHz Ant1



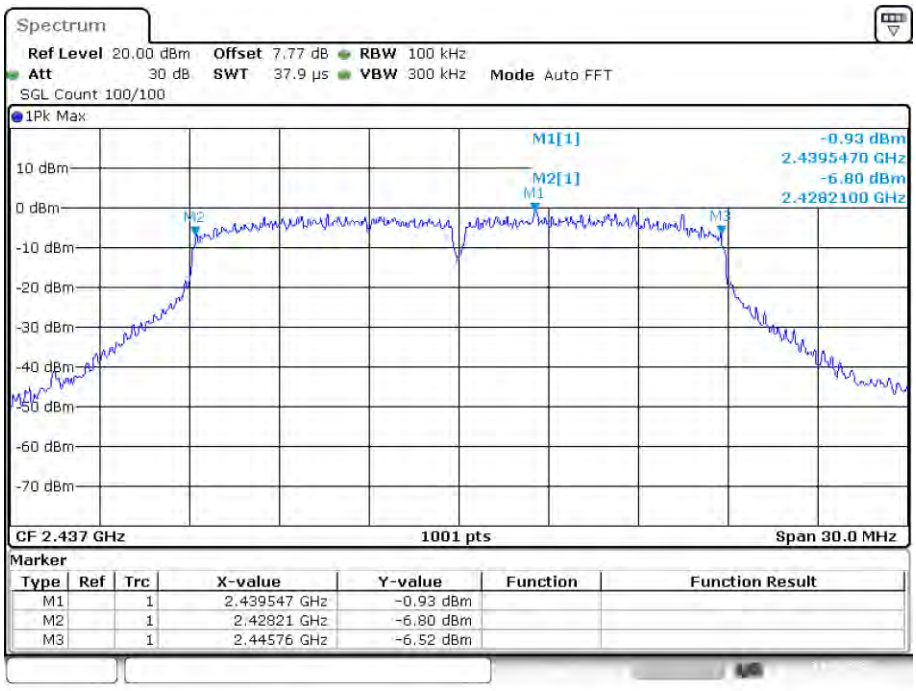
-6dB Bandwidth NVNT g 2462MHz Ant1



-6dB Bandwidth NVNT n20 2412MHz Ant1

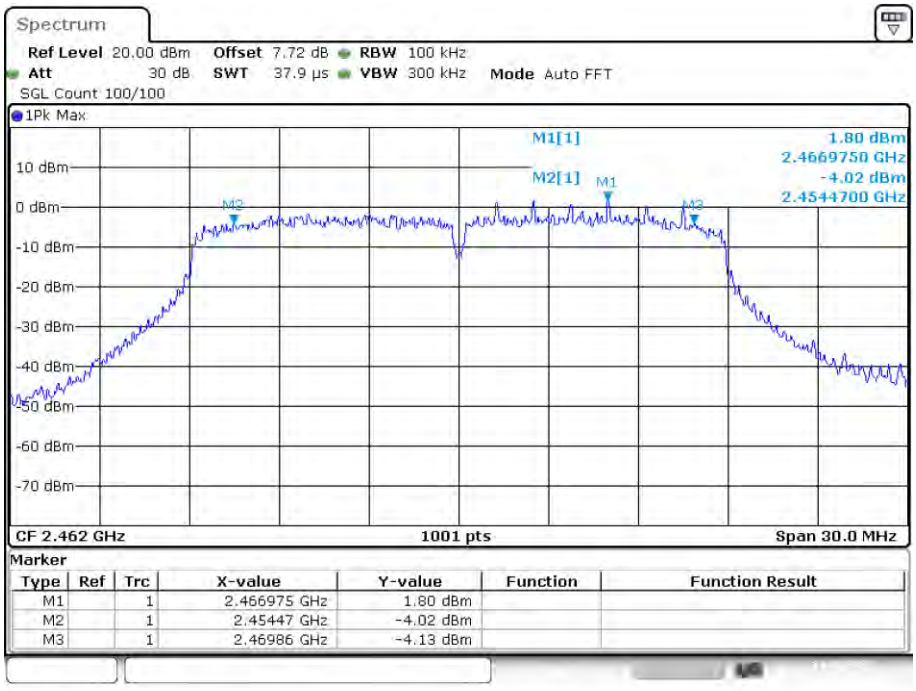


-6dB Bandwidth NVNT n20 2437MHz Ant1



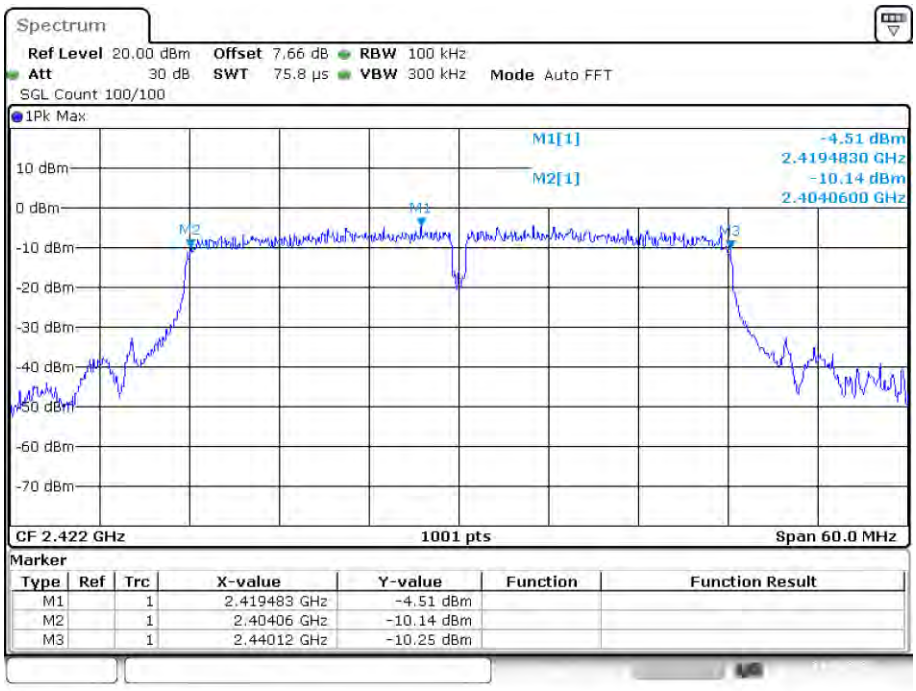
Date: 24.FEB.2022 06:05:31

-6dB Bandwidth NVNT n20 2462MHz Ant1



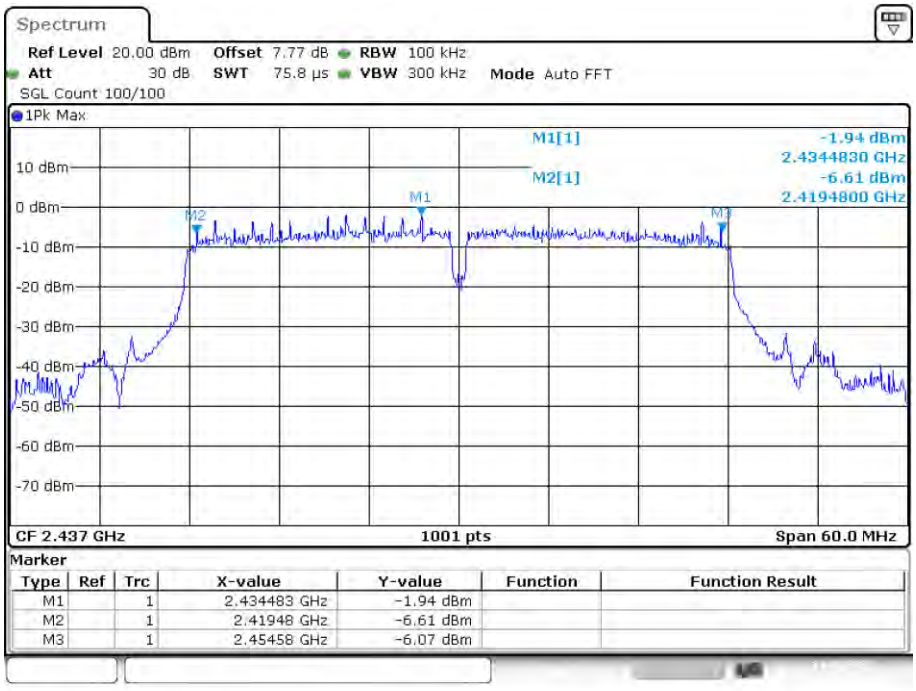
Date: 24.FEB.2022 06:07:44

-6dB Bandwidth NVNT n40 2422MHz Ant1



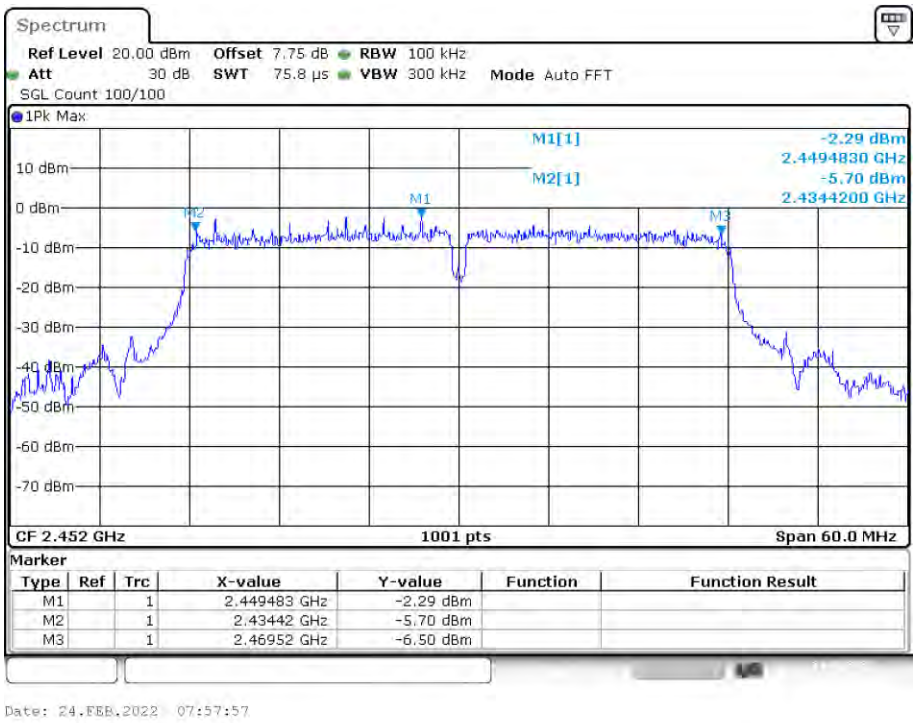
Date: 24.FEB.2022 06:12:32

-6dB Bandwidth NVNT n40 2437MHz Ant1



Date: 24.FEB.2022 06:16:13

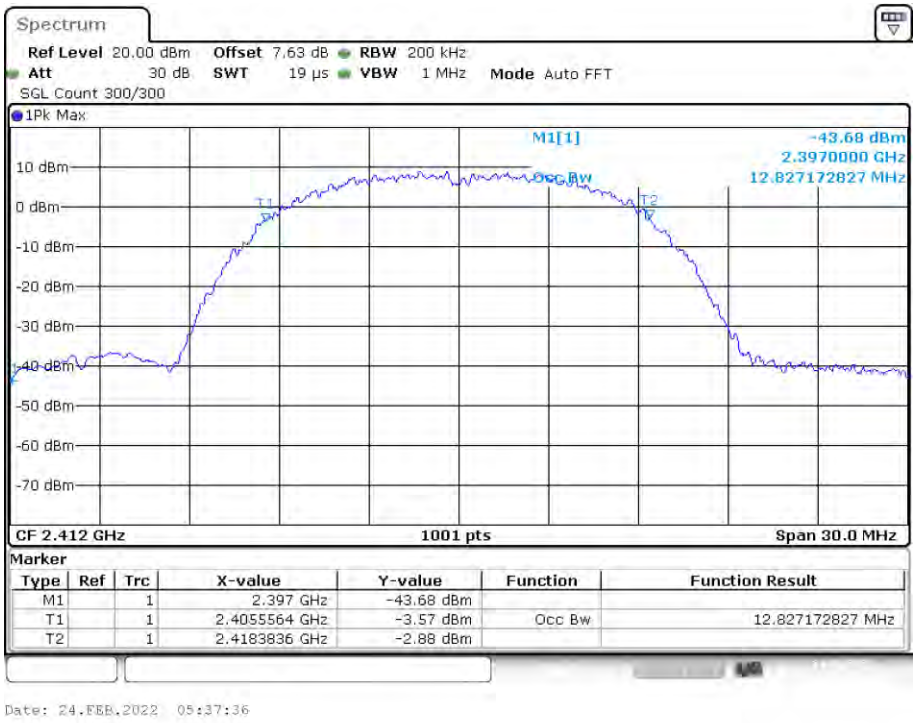
-6dB Bandwidth NVNT n40 2452MHz Ant1



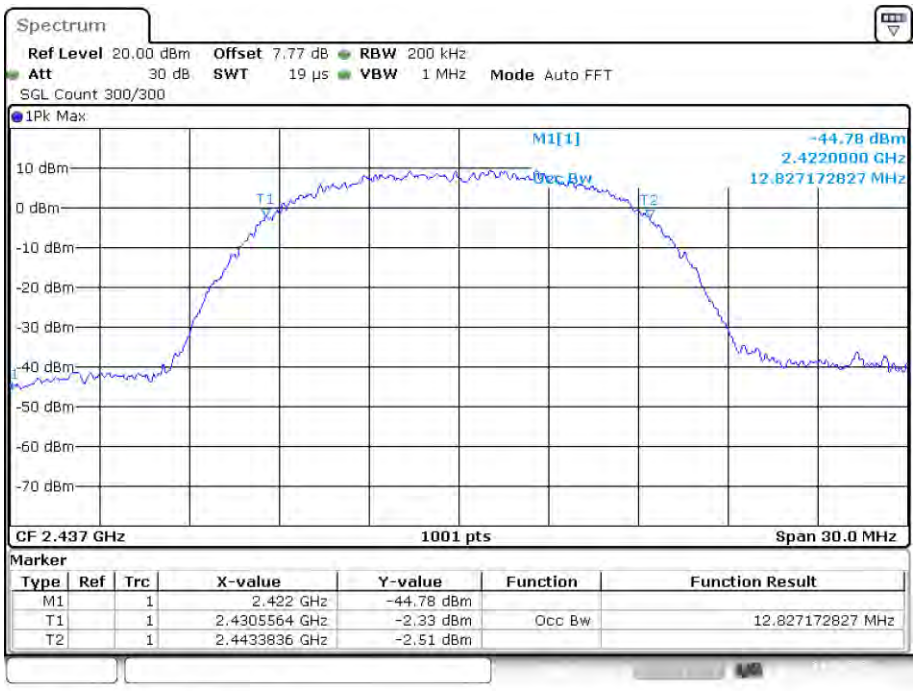
Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	b	2412	Ant1	12.827
NVNT	b	2437	Ant1	12.827
NVNT	b	2462	Ant1	12.857
NVNT	g	2412	Ant1	16.484
NVNT	g	2437	Ant1	16.334
NVNT	g	2462	Ant1	16.424
NVNT	n20	2412	Ant1	17.413
NVNT	n20	2437	Ant1	17.473
NVNT	n20	2462	Ant1	17.473
NVNT	n40	2422	Ant1	35.904
NVNT	n40	2437	Ant1	36.024
NVNT	n40	2452	Ant1	36.024

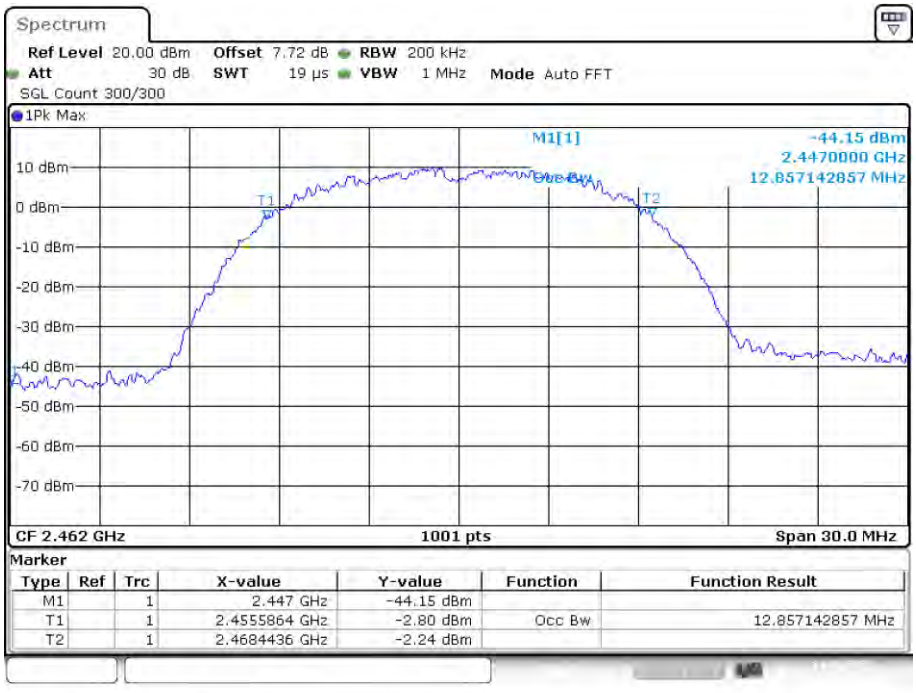
OBW NVNT b 2412MHz Ant1



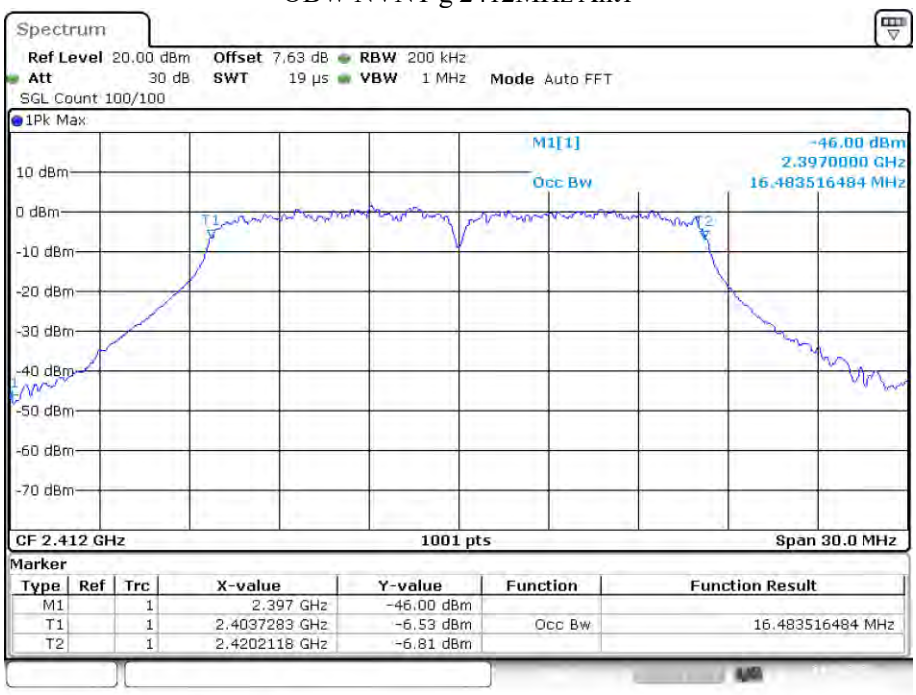
OBW NVNT b 2437MHz Ant1



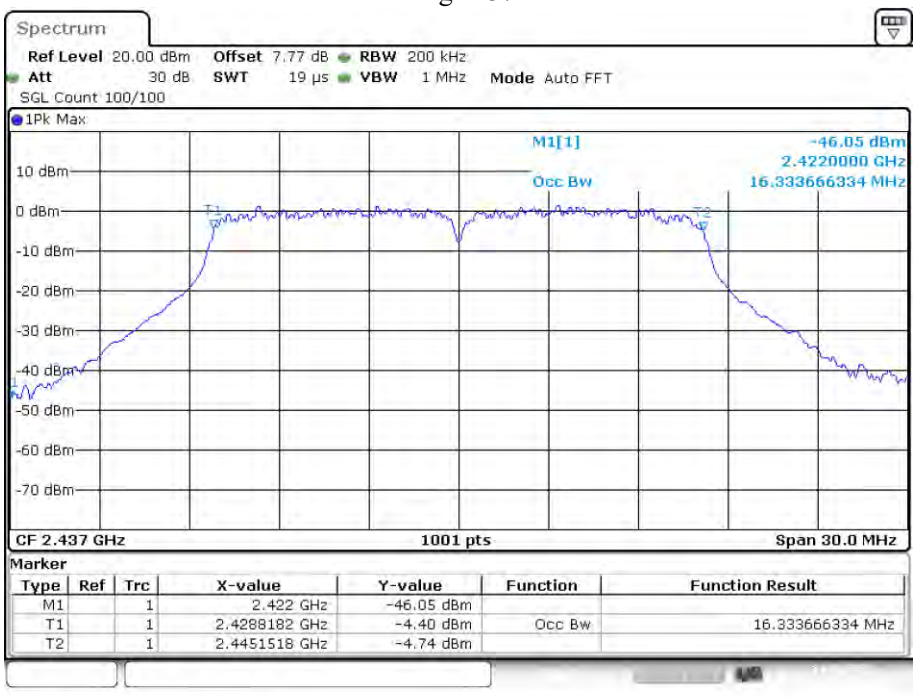
OBW NVNT b 2462MHz Ant1



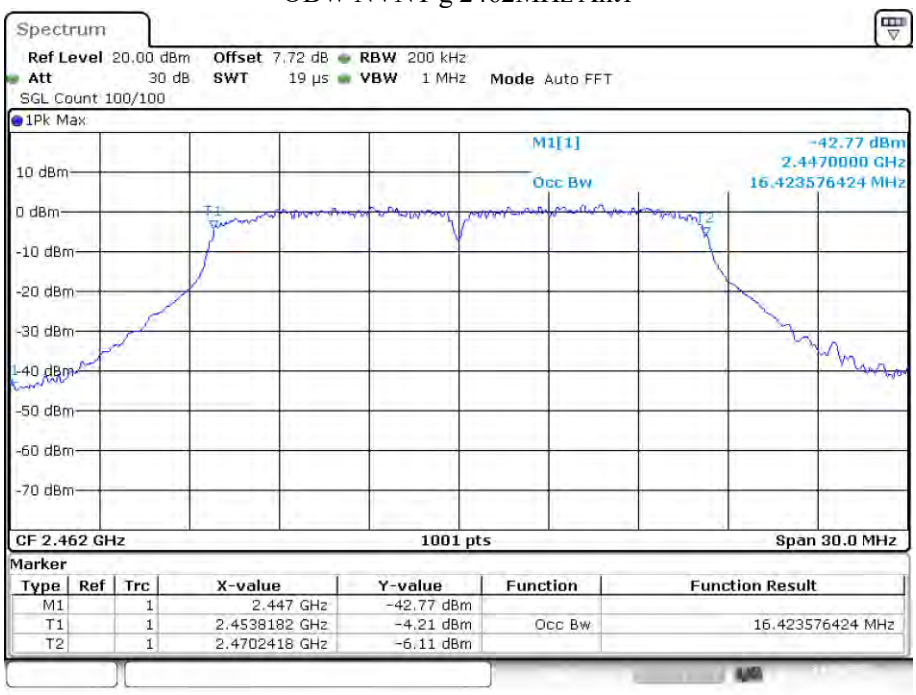
OBW NVNT g 2412MHz Ant1



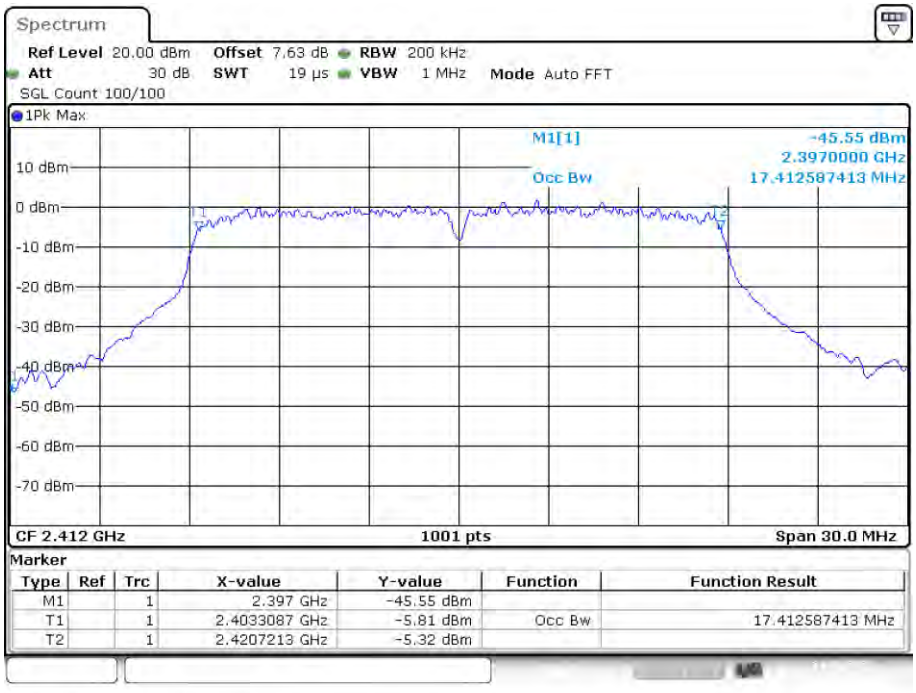
OBW NVNT g 2437MHz Ant1



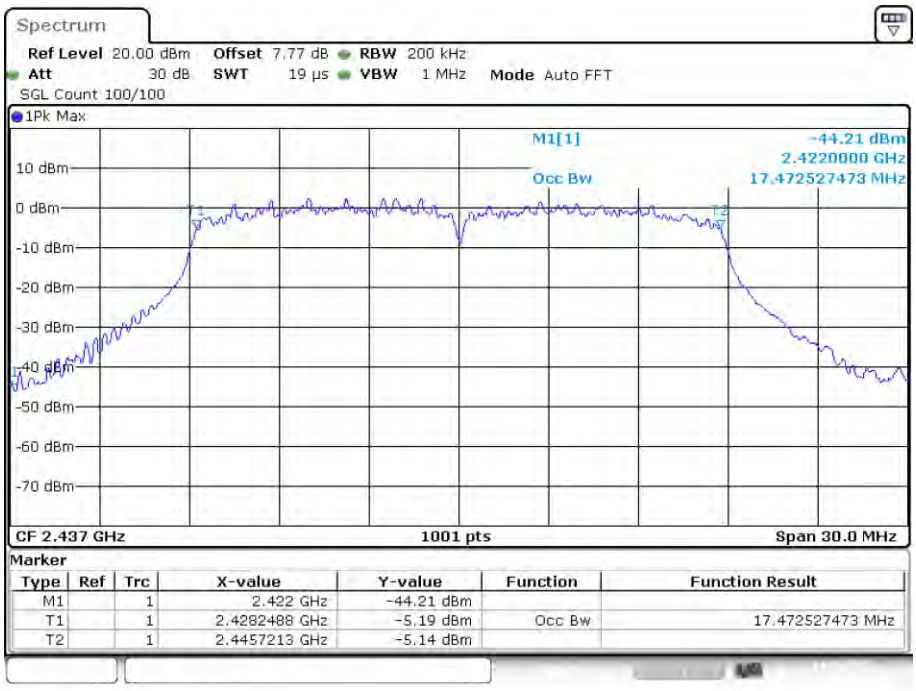
OBW NVNT g 2462MHz Ant1



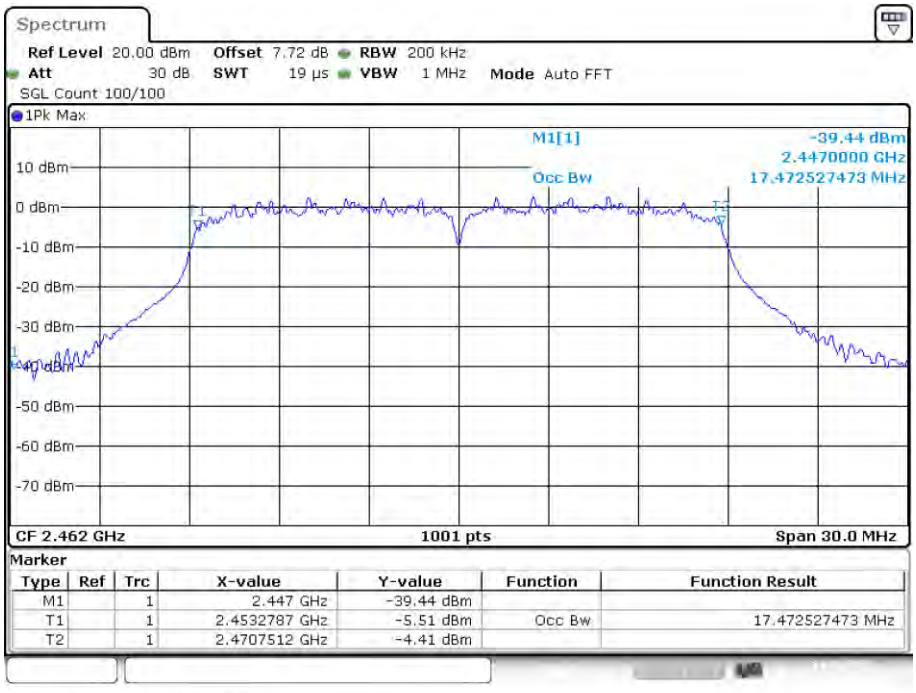
OBW NVNT n20 2412MHz Ant1



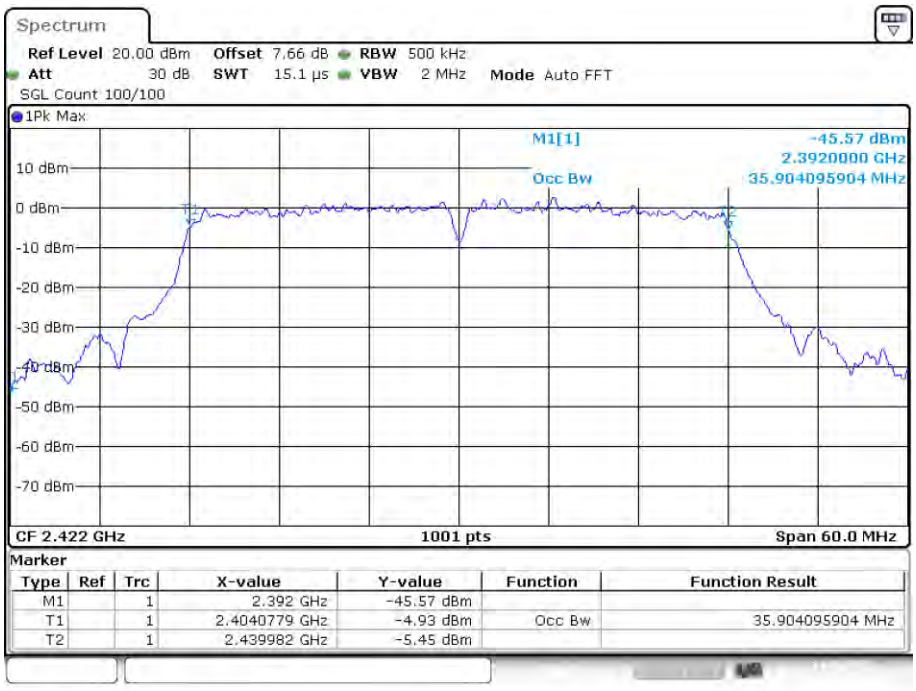
OBW NVNT n20 2437MHz Ant1



OBW NVNT n20 2462MHz Ant1



OBW NVNT n40 2422MHz Ant1



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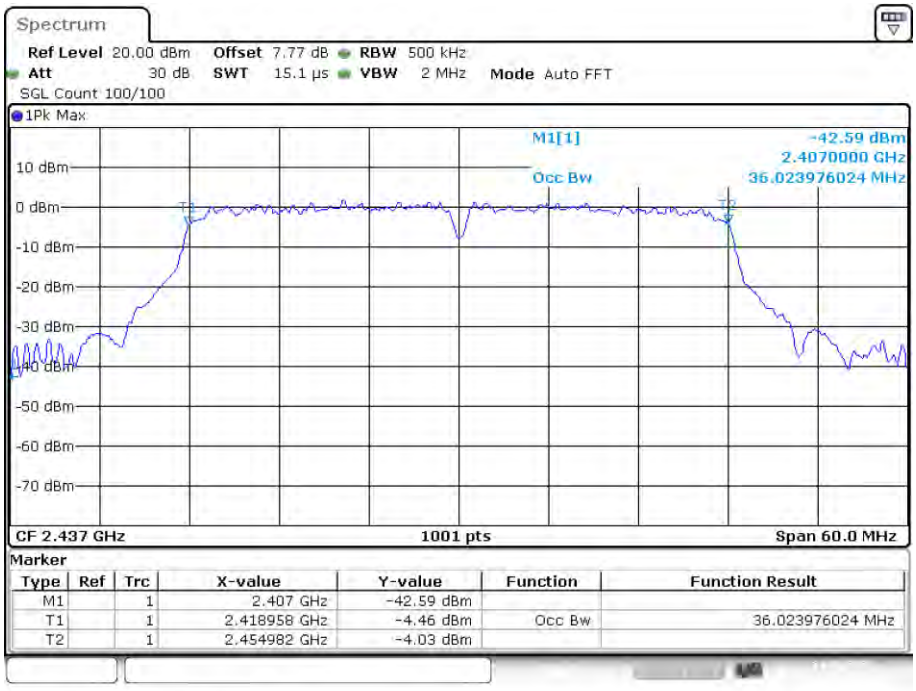
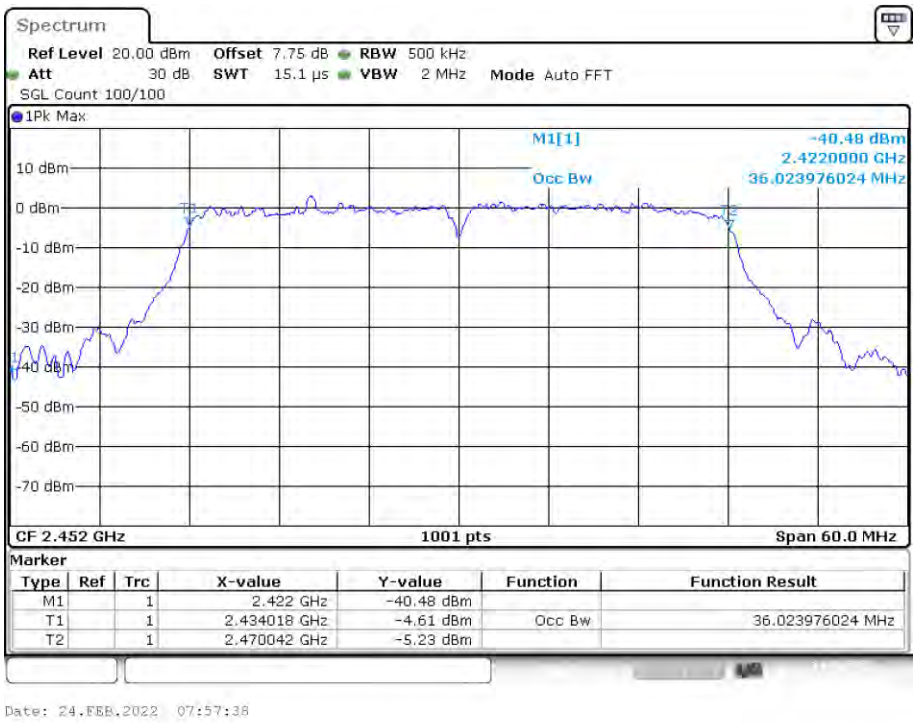
OBW NVNT n40 2437MHz Ant1



Date: 24.FEB.2022 06:15:55

OBW NVNT n40 2452MHz Ant1



8. BAND EDGE CHECK

8.1.Test limits

Please refer FCC PART 15: 15.247

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits and RSS-GEN limits.

8.2.Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

8.2.1 Put the EUT on a 1.5m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission

8.2.2 Check the spurious emissions out of band.

8.2.3 RBW 1MHz, VBW 3MHz, peak detector for peak value , RBW 1MHz ,VBW 10Hz , RMS detector for AV value.

8.3.Test Setup

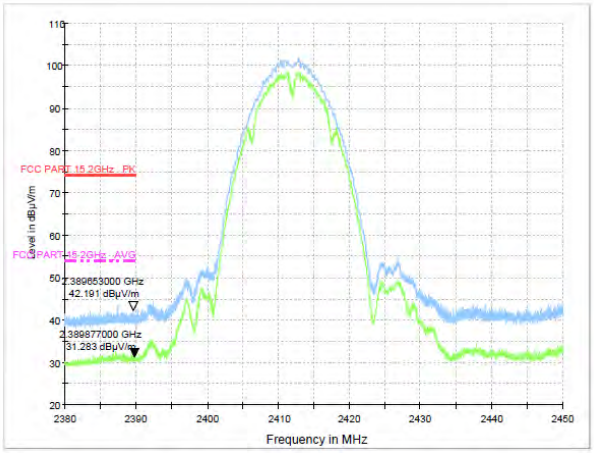
Same as 5.2.2.

8.4.Test Results

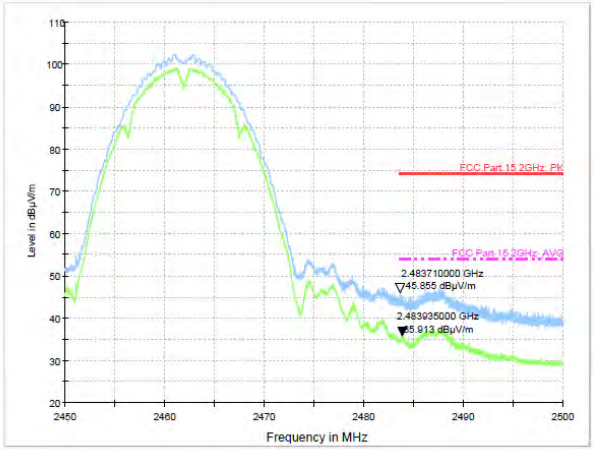
PASS.

Detailed information please see the following page.

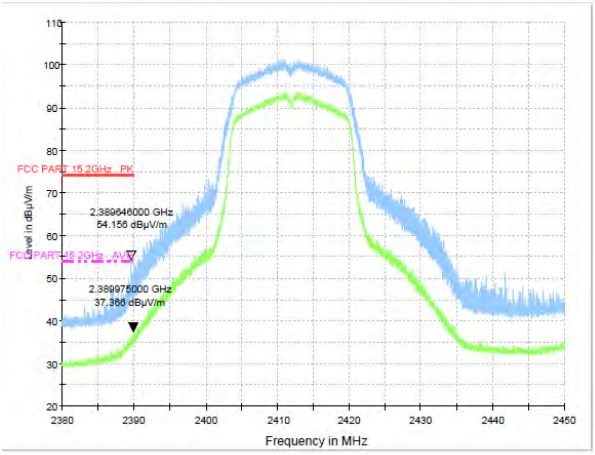
Test Mode: IEEE 802.11b-Low



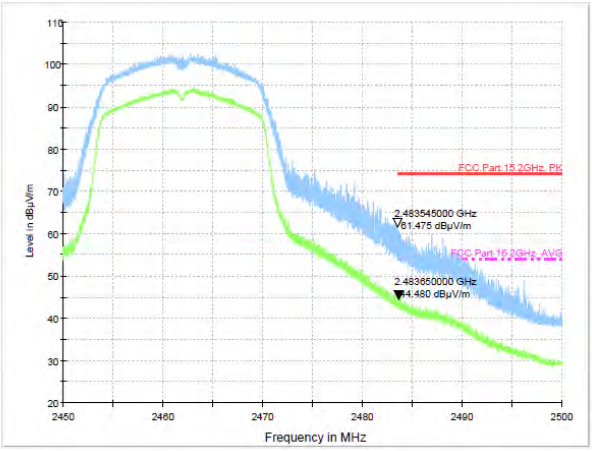
Test Mode: IEEE 802.11b-High



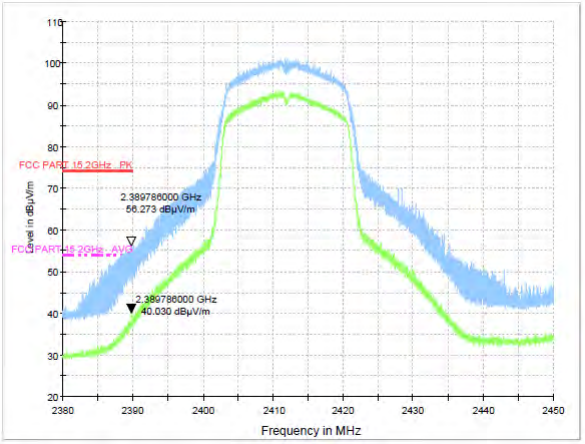
Test Mode: IEEE 802.11g-Low
Polarization: Vertical



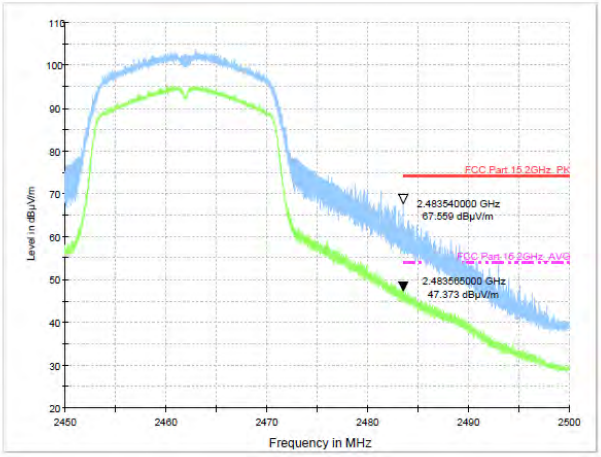
Test Mode: IEEE 802.11g-High
Polarization: Horizontal



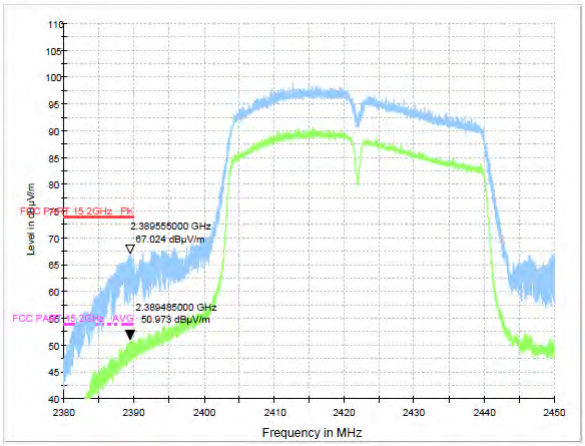
Test Mode: IEEE 802.11n20-Low



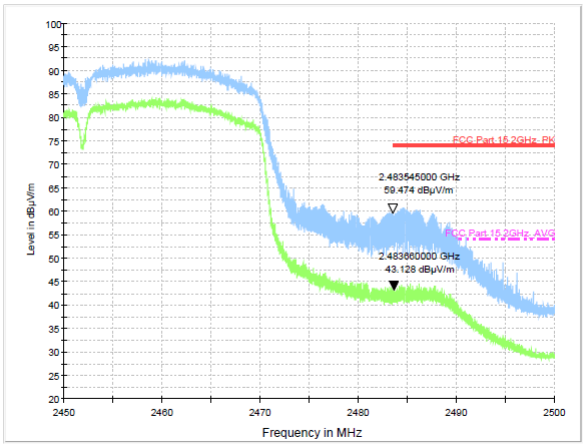
Test Mode: IEEE 802.11n20-High



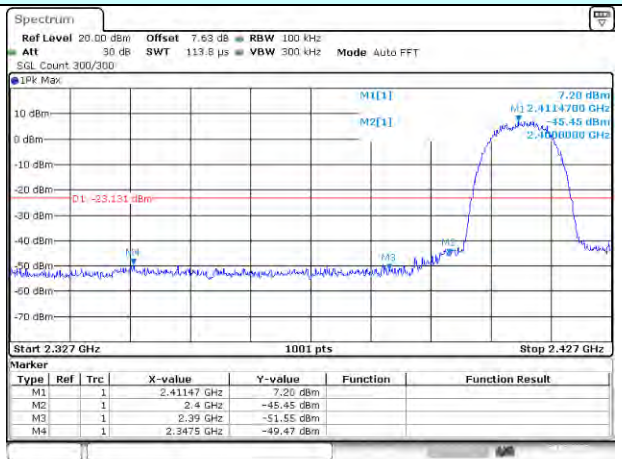
Test Mode: IEEE 802.11n40-Low



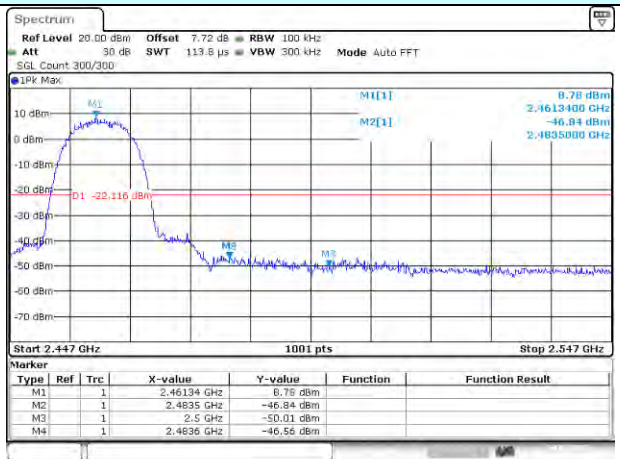
Test Mode: IEEE 802.11n40-High



Test mode: 802.11b

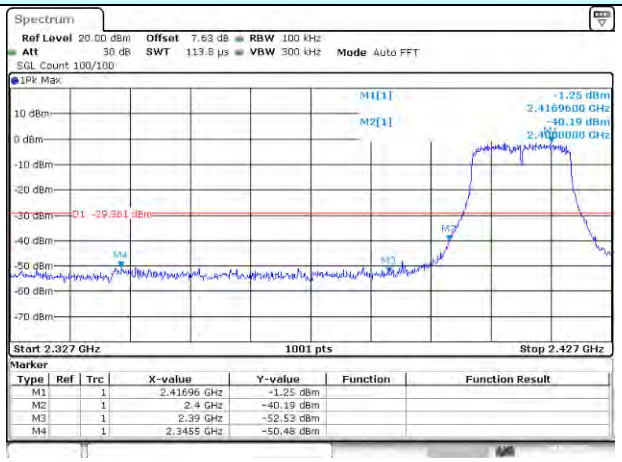


Lowest channel

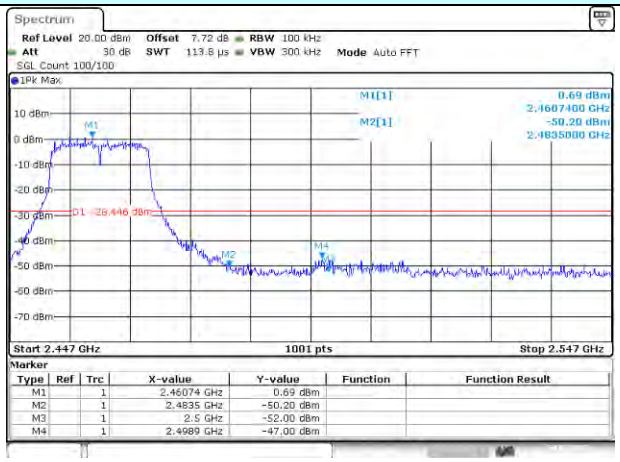


Highest channel

Test mode: 802.11g

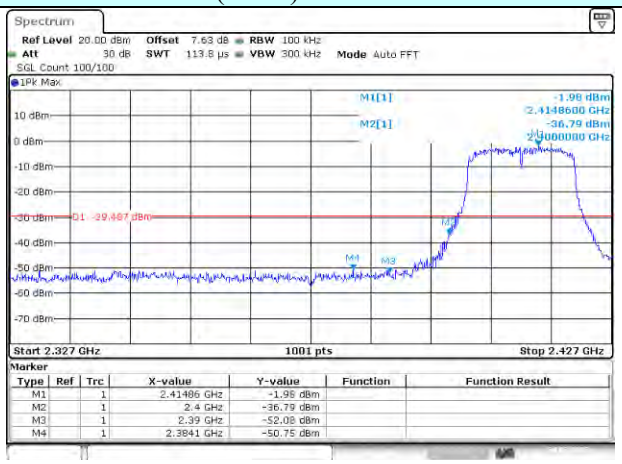


Lowest channel

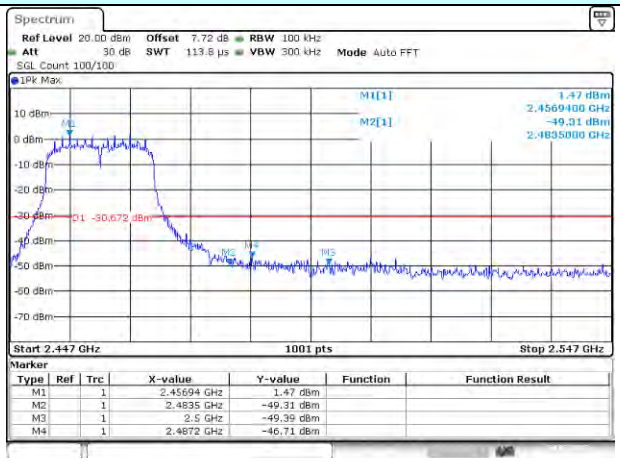


Highest channel

Test mode: 802.11n(HT20)

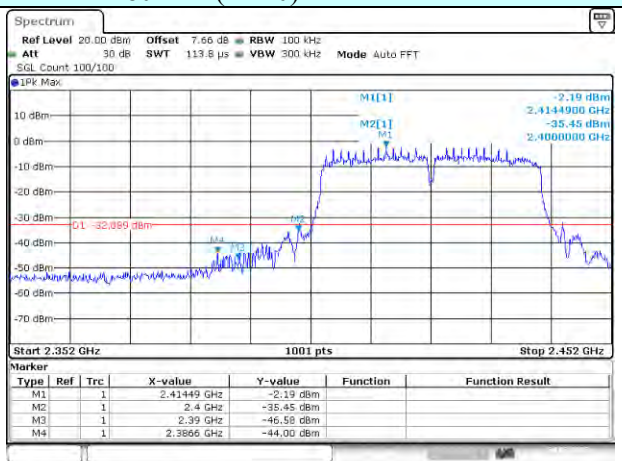


Lowest channel



Highest channel

Test mode: 802.11n(HT40)



Lowest channel

Highest channel

9. ANTENNA REQUIREMENT

9.1.Standard Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

9.2.Antenna Connected Construction

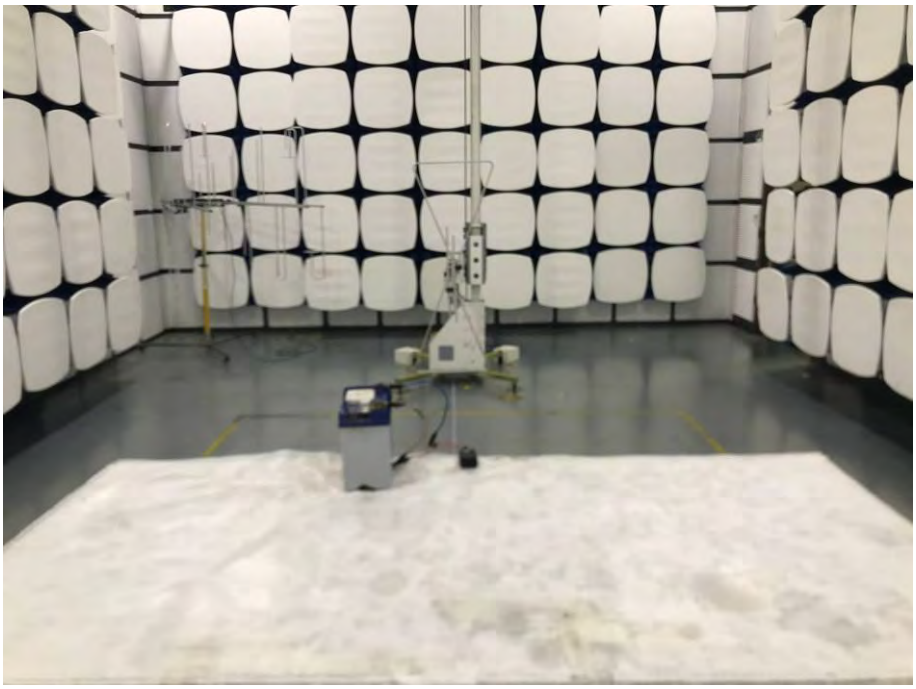
The antenna connector is unique antenna and no consideration of replacement. Please see EUT photo for details.

9.3.Results

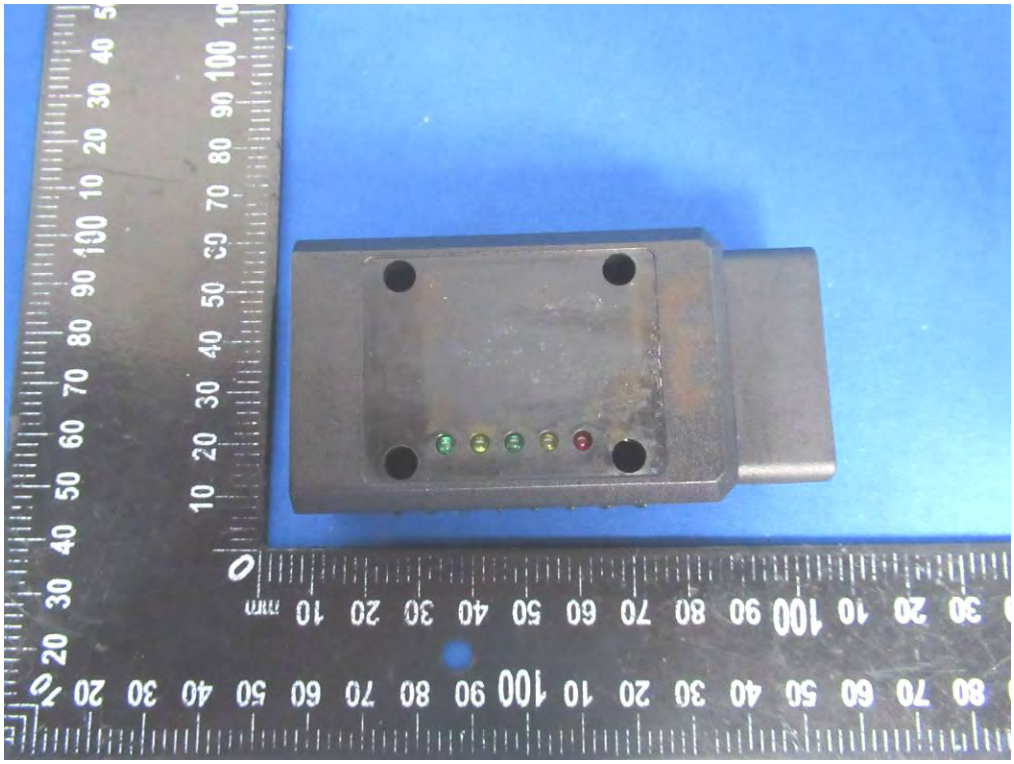
The EUT antenna is internal Antenna. It complies with the standard requirement.

10. TEST SETUP PHOTO

10.1. Photos of Radiated emission



11. PHOTOS OF EUT

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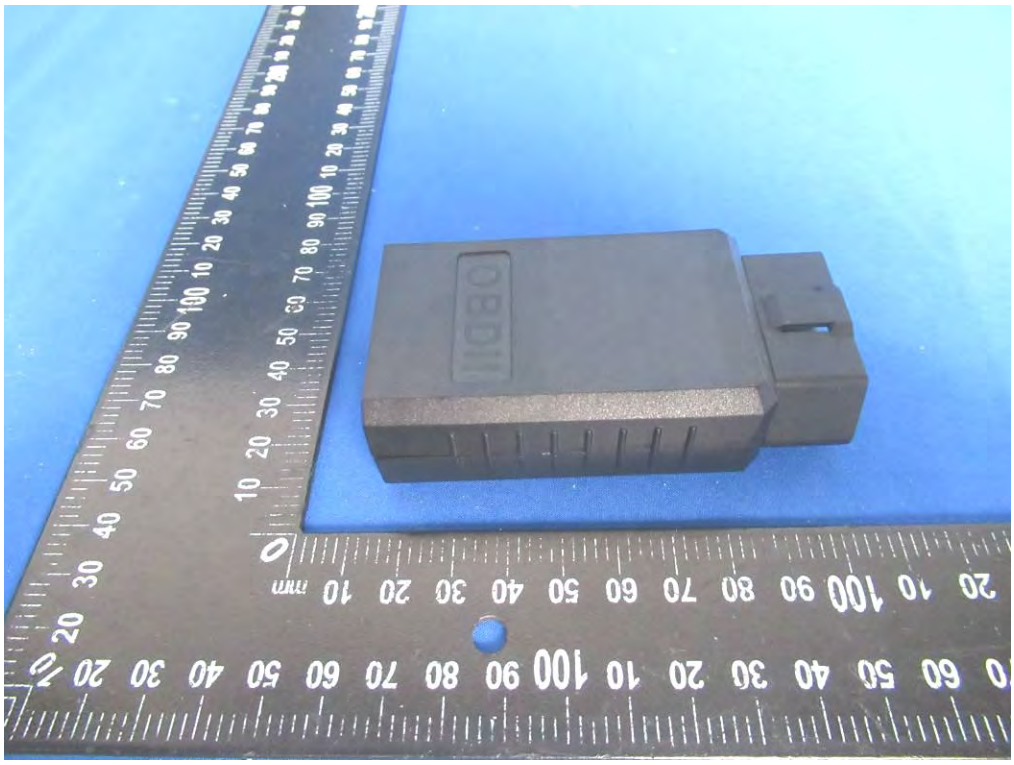
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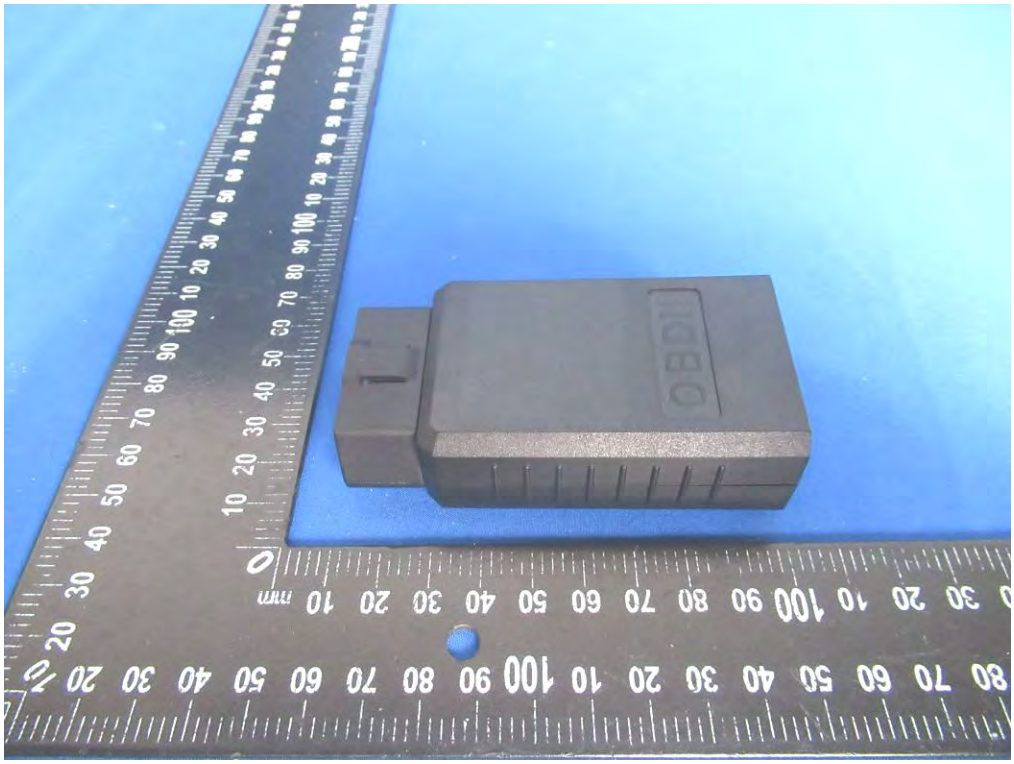

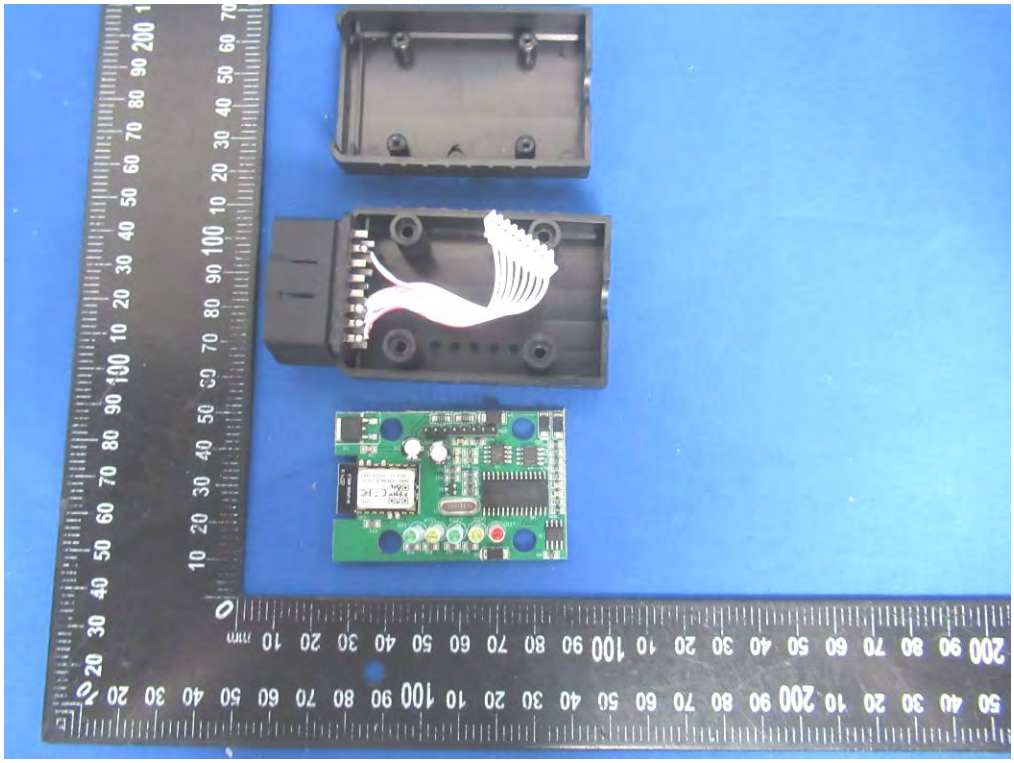

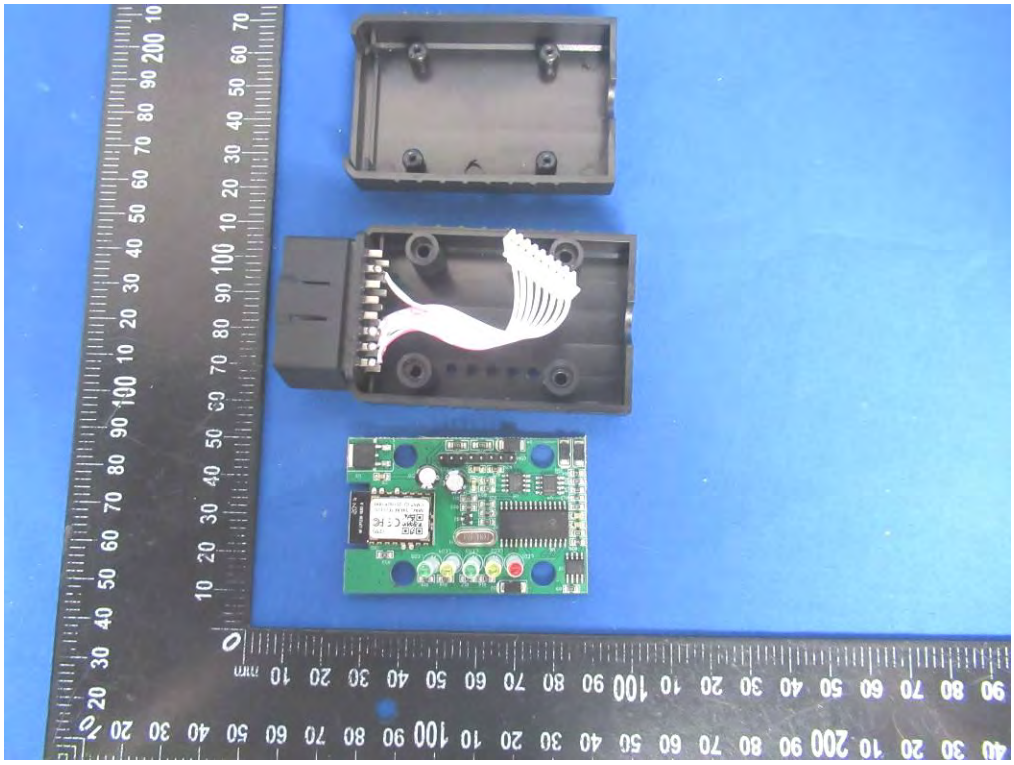

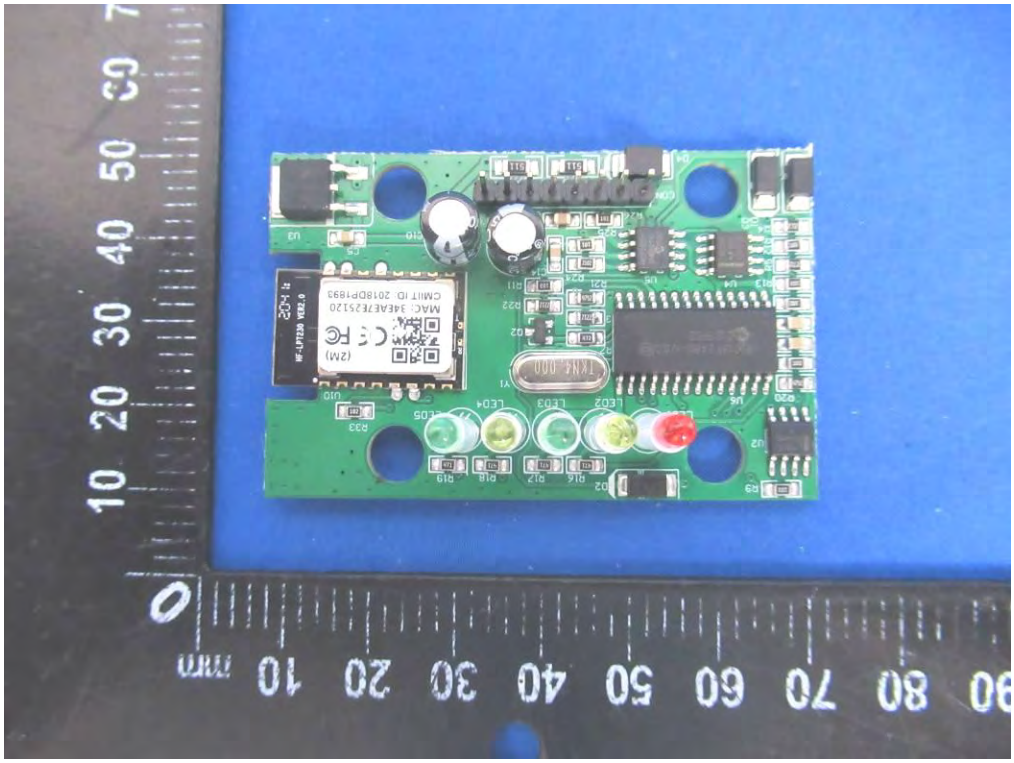

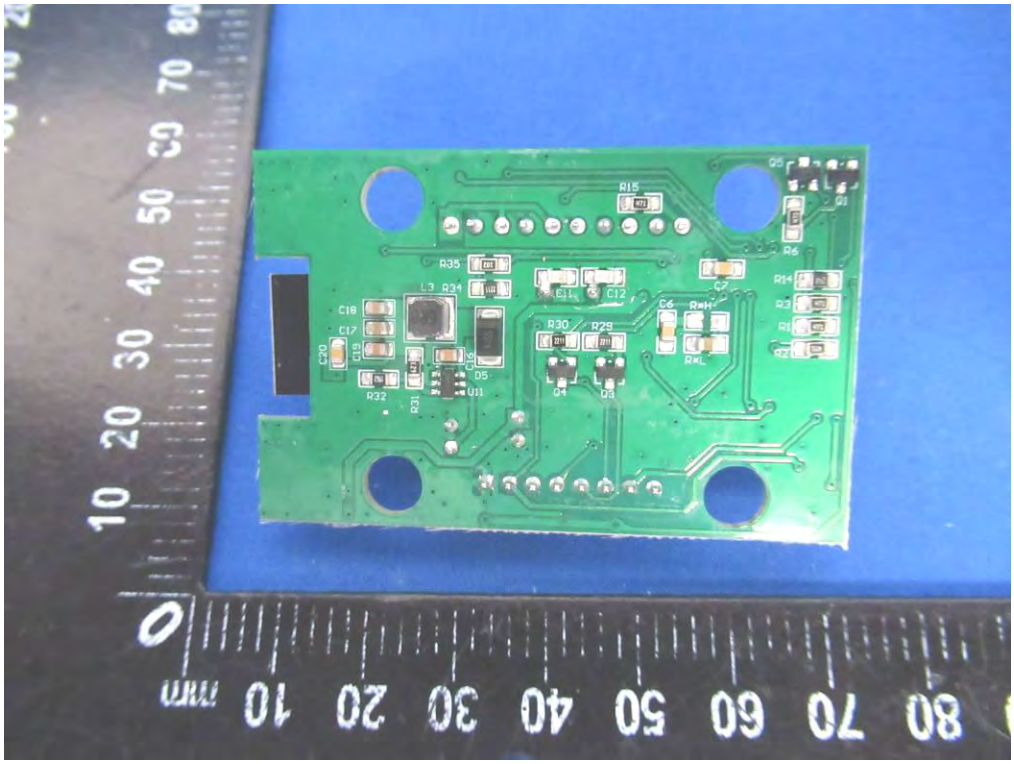

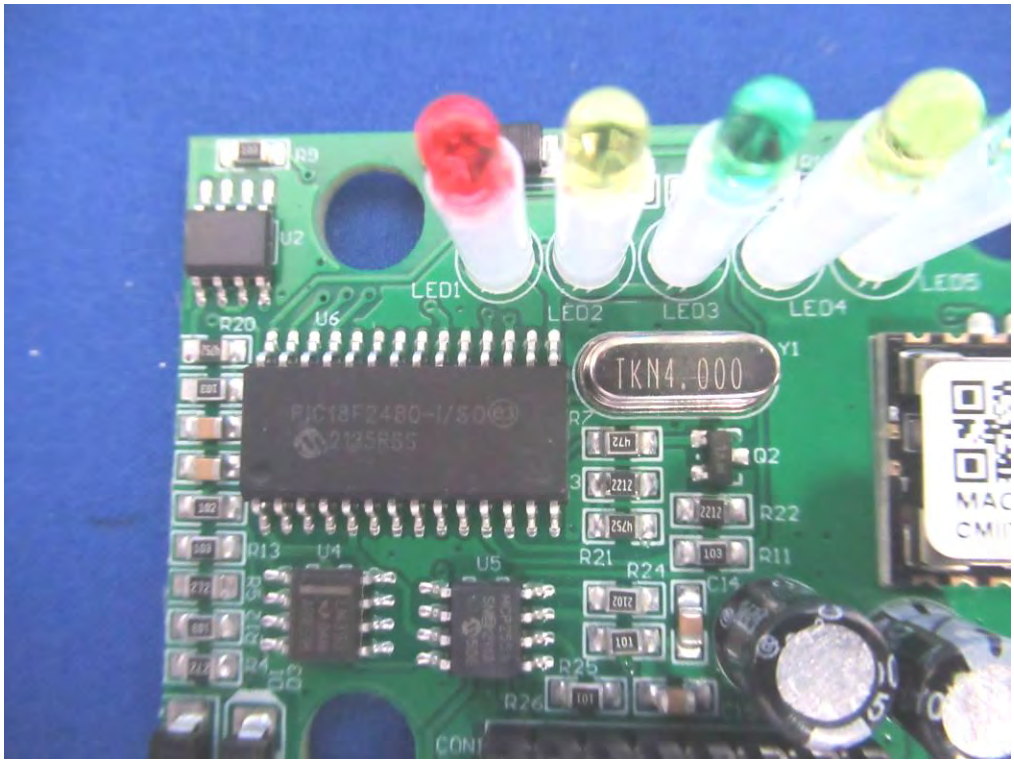

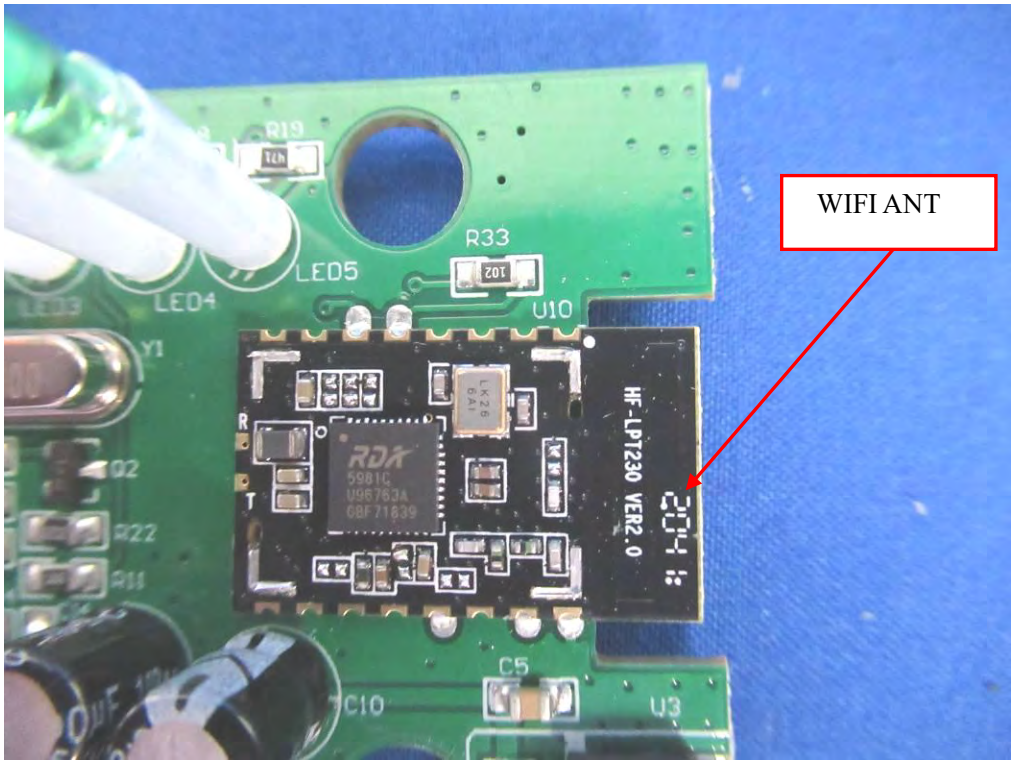

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