RF REPORT

FCC ID: 2AZFE-AN1

On Behalf of

Shenzhen Shadow Crown Technology Co.,Ltd.

LED Projector

Model No.: An1, An2, An3, E88, LU-1, An2 Pro, E88 Pro, NX-2, NS-1, NS-1 PRO

Prepared for	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th Floor, Industrial Building,Longwang Miao, Fuyong District , Shenzhen, Guangdong, P.R.China.

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2303044-C01-R02
Date of Receipt	:	March 23, 2023
Date of Test	:	March 23, 2023 to April 13, 2023
Date of Report	:	April 13, 2023
Version Number	:	V0

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TEST REPORT DECLARATION

Applicant	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th Floor, Industrial Building,Longwang Miao, Fuyong District , Shenzhen, Guangdong, P.R.China.
Manufacturer	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th Floor, Industrial Building,Longwang Miao, Fuyong District , Shenzhen, Guangdong, P.R.China.
EUT Description	:	LED Projector
(A) Model No.	:	An1, An2, An3, E88, LU-1, An2 Pro, E88 Pro, NX-2, NS-1, NS-1 PRO
(B) Trademark	:	N/A

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with above listed standard(s) requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature)	:	Yannis Wen Project Engineer
Approved by (name + signature)	:	Reak Yang Project Manager
Date of issue	:	April 13, 2023

Revision History

Revision	Issue Date	Revisions	Revised By
V0	April 13, 2023	Initial released Issue	Yannis Wen

1 General Information

1.1 Description of Device (EUT)

Product Name	:	LED Projector
Trademark	:	N/A
Model Number	:	An1, An2, An3, E88, LU-1, An2 Pro, E88 Pro, NX-2, NS-1, NS-1 PRO
DIFF	:	There is no difference between the models except the appearance color. So all the test were performed on the model An1.
Power Supply	:	AC 120/60Hz
Operation Frequency	:	802.11b/g/n(HT20): 2412MHz to 2462MHz; 802.11n(HT40): 2422MHz to 2452MHz
Number of Channels	:	802.11b/g/n(HT20): 11 Channels; 802.11n(HT40): 7 Channels
Modulation Type	:	802.11b: DSSS(CCK, DQPSK, DBPSK); 802.11g: OFDM(BPSK, QPSK, 16QAM, 64QAM); 802.11n(HT20 and HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	:	FPC antenna
Antenna Gain	:	3.5dBi(Max)

1.2 Test Lab information

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: CN0085

2 Summary of test

2.1 Test Standard description:

The tests were performed according to following standards:

FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

2.2 Summary of test

Item	Requirement	Method	Result
Antenna requirement	Part 15.203		Pass
Conducted Emission at AC power line	FCC Part 15.207(a)	ANSI C63.10-2013 section 6.2	Pass
Occupied Bandwidth	FCC Part 15.247(a)(2)	ANSI C63.10-2013, section 11.8	Pass
Maximum Conducted Output Power	FCC Part 15.247(b)(3)	ANSI C63.10-2013, section 11.9.1	Pass
Power Spectral Density	FCC Part 15.247(e)	ANSI C63.10-2013, section 11.10	Pass
Emissions in non-restricted frequency bands	FCC Part 15.247(d)	ANSI C63.10-2013 section 11.11	Pass
Band edge emissions (Radiated)	FCC Part 15.247(d)	ANSI C63.10-2013 section 6.6.4	Init
Emissions in restricted frequency bands (below 1GHz)	FCC Part 15.247(d)	ANSI C63.10-2013 section 6.6.4	Pass
Emissions in restricted frequency bands (above 1GHz)	FCC Part 15.247(d)	ANSI C63.10-2013 section 6.6.4	Pass

2.3 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 with 2.4G	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		

Setting output power (Max)			
802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
15±2dBm	15±2dBm	15±2dBm	15±2dBm

2.4 Measurement Uncertainty (95% confidence levels, k=2)

Item	**Uncertainty**
Uncertainty for Power point Conducted Emissions Test	1.63dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.74dB(Polarize: V)
	3.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for radio frequency	5.06×10^{-8}GHz
Uncertainty for conducted RF Power	0.40dB
Uncertainty for temperature	0.2℃
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2.5 Test Equipment

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	1316.3003K03-102082-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	Weihuang	WHTH-1000-40-880	/	100631	2022.08.22	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	MWRFtest	2.0.0.0

3 Evaluation Results (Evaluation)

3.1 Antenna requirement

Test 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.

3.1.1 Conclusion:

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

4 Radio Spectrum Matter Test Results (RF)

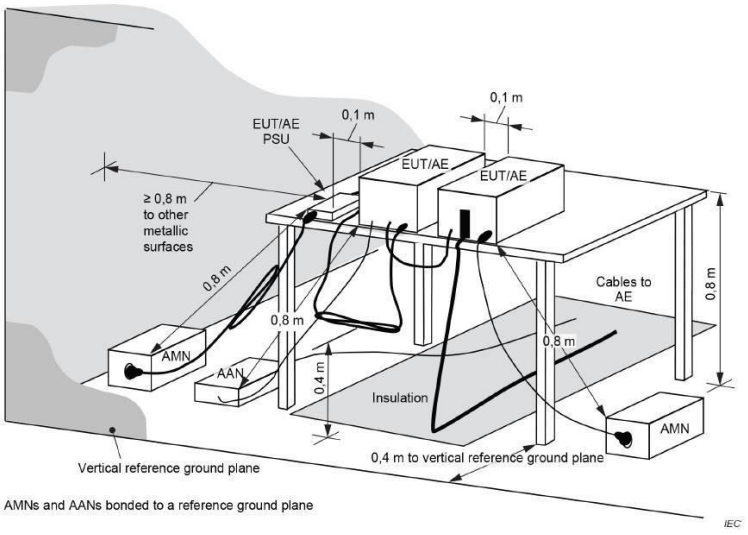
4.1 Conducted Emission at AC power line

Test Requirement:	Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).
Test Limit:	Frequency of emission (MHz) / Conducted limit (dBμV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 *Decreases with the logarithm of the frequency.
Test Method:	Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices

4.1.1 E.U.T. Operation:

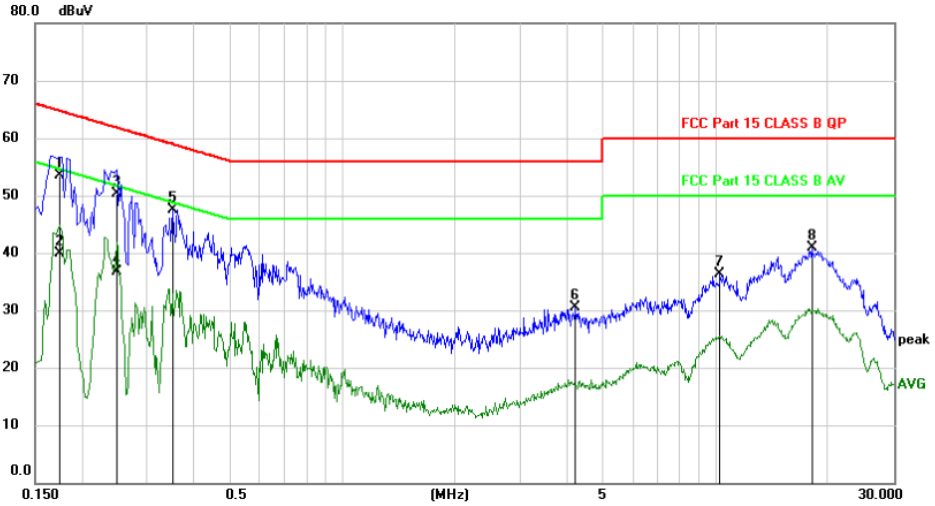
Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	IEEE 802.11b				

4.1.2 Test Setup Diagram:



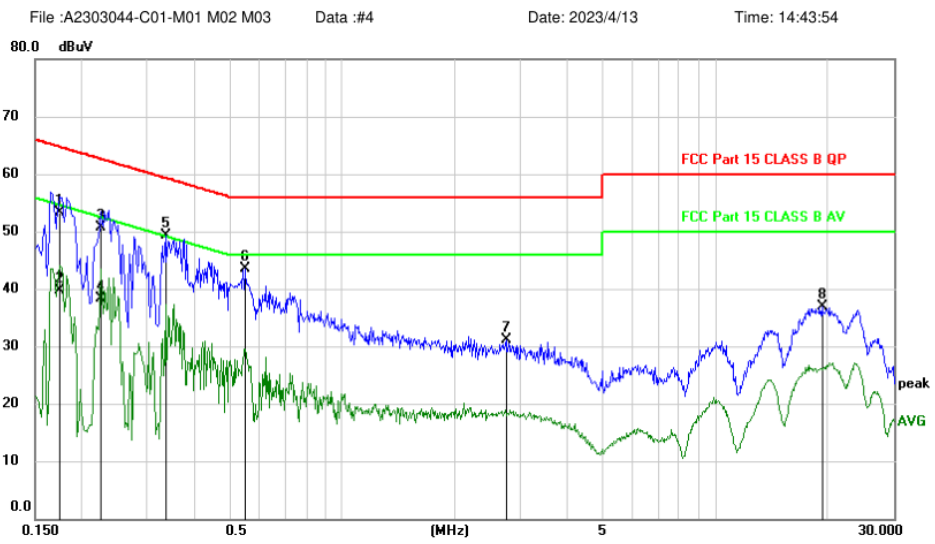
4.1.3 Test Result:

IEEE 802.11b / Line: Line / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1740	43.64	9.93	53.57	64.77	-11.20	QP	
2		0.1740	29.88	9.93	39.81	54.77	-14.96	AVG	
3		0.2490	40.25	9.97	50.22	61.79	-11.57	QP	
4		0.2490	26.80	9.97	36.77	51.79	-15.02	AVG	
5		0.3509	37.52	9.95	47.47	58.94	-11.47	peak	
6		4.2150	20.50	9.98	30.48	56.00	-25.52	peak	
7		10.2870	26.18	10.22	36.40	60.00	-23.60	peak	
8		18.0510	30.46	10.42	40.88	60.00	-19.12	peak	

IEEE 802.11b / Line: Neutral / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1740	43.28	9.93	53.21	64.77	-11.56	QP	
2		0.1740	29.72	9.93	39.65	54.77	-15.12	AVG	
3		0.2250	40.81	9.94	50.75	62.63	-11.88	QP	
4		0.2250	28.45	9.94	38.39	52.63	-14.24	AVG	
5	*	0.3360	39.30	9.94	49.24	59.30	-10.06	peak	
6		0.5490	33.53	9.94	43.47	56.00	-12.53	peak	
7		2.7449	21.26	9.92	31.18	56.00	-24.82	peak	
8		19.2780	26.41	10.45	36.86	60.00	-23.14	peak	

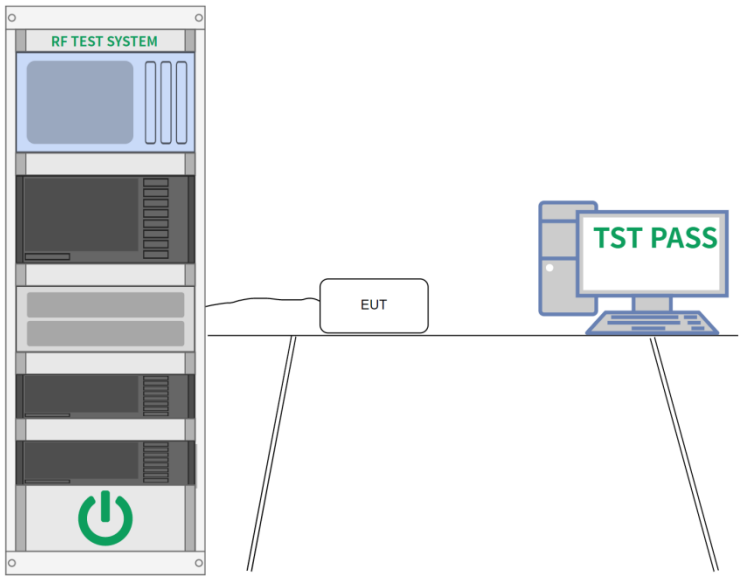
4.2 Occupied Bandwidth

Test Requirement:	Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Limit:	Section (a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	DTS bandwidth
Procedure:	a) Set RBW = 100 kHz. b) Set the VBW >= [3 × RBW]. c) Detector = peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	All modes				

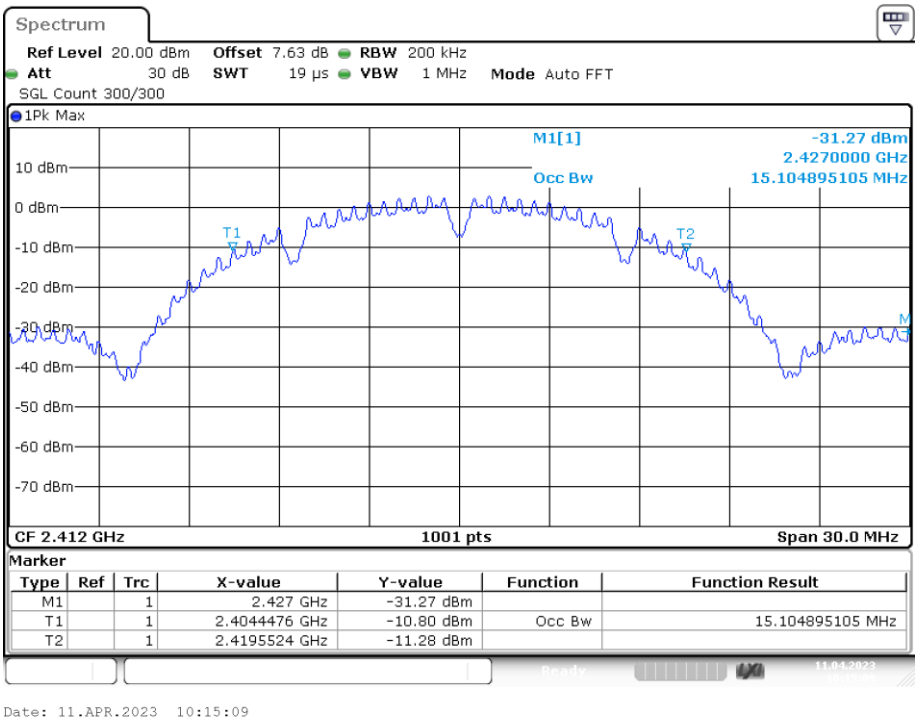
4.2.2 Test Setup Diagram:



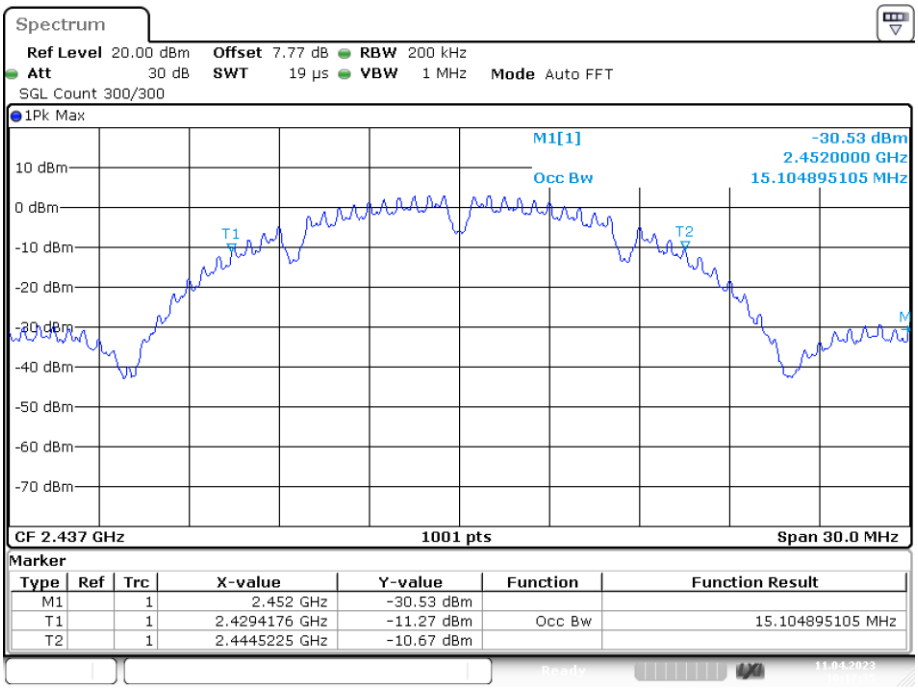
4.2.3 Test Result:

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	802.11b	2412	Ant 1	15.105	10.05	0.5	Pass
NVNT	802.11b	2437	Ant 1	15.105	10.05	0.5	Pass
NVNT	802.11b	2462	Ant 1	15.105	10.02	0.5	Pass
NVNT	802.11g	2412	Ant 1	16.603	16.35	0.5	Pass
NVNT	802.11g	2437	Ant 1	16.663	16.35	0.5	Pass
NVNT	802.11g	2462	Ant 1	16.963	16.59	0.5	Pass
NVNT	802.11n(HT20)	2412	Ant 1	17.712	17.82	0.5	Pass
NVNT	802.11n(HT20)	2437	Ant 1	17.892	17.82	0.5	Pass
NVNT	802.11n(HT20)	2462	Ant 1	17.802	17.82	0.5	Pass
NVNT	802.11n(HT40)	2422	Ant1	36.444	36.36	0.5	Pass
NVNT	802.11n(HT40)	2437	Ant1	36.324	36.54	0.5	Pass
NVNT	802.11n(HT40)	2452	Ant1	36.384	36.36	0.5	Pass

OBW NVNT b 2412MHz Ant1



OBW NVNT b 2437MHz Ant1



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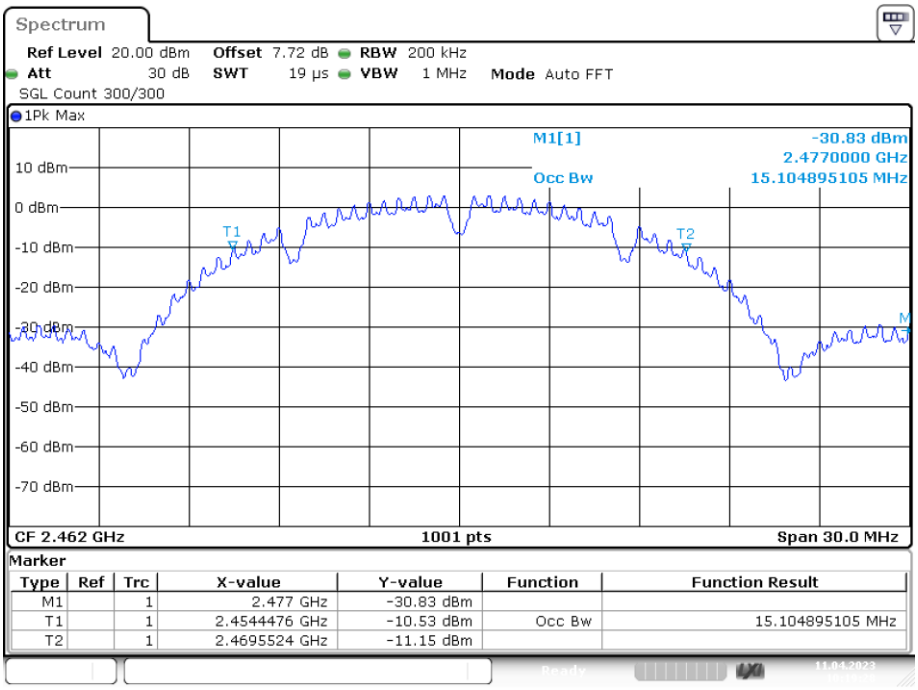

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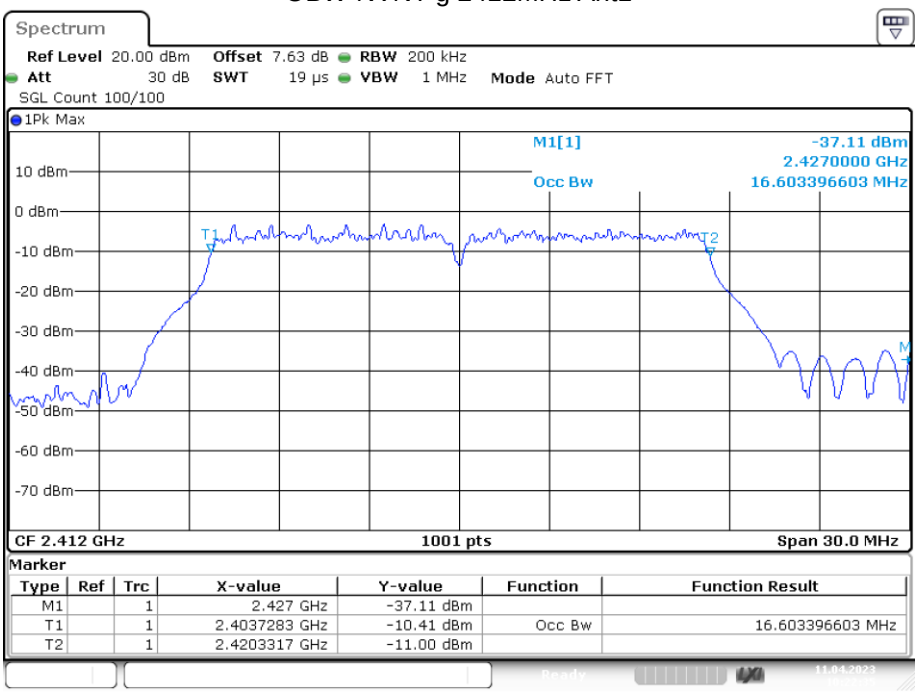

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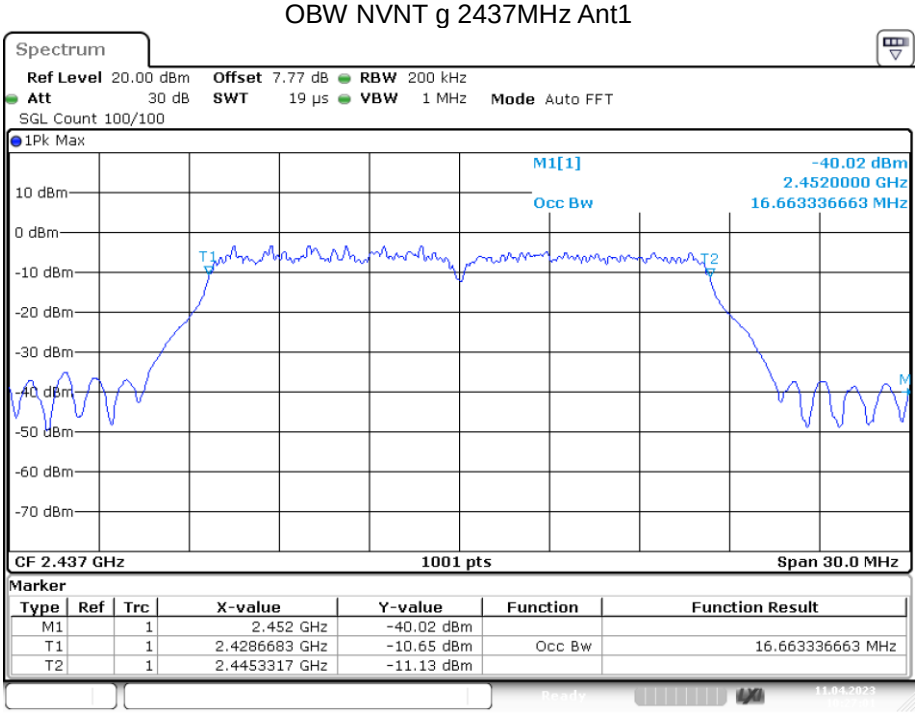

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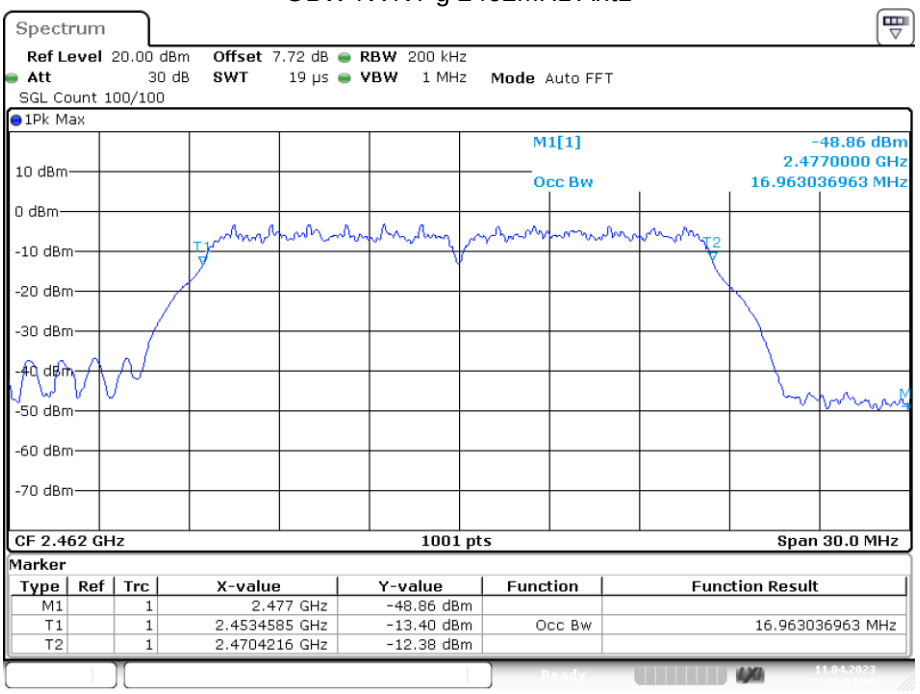

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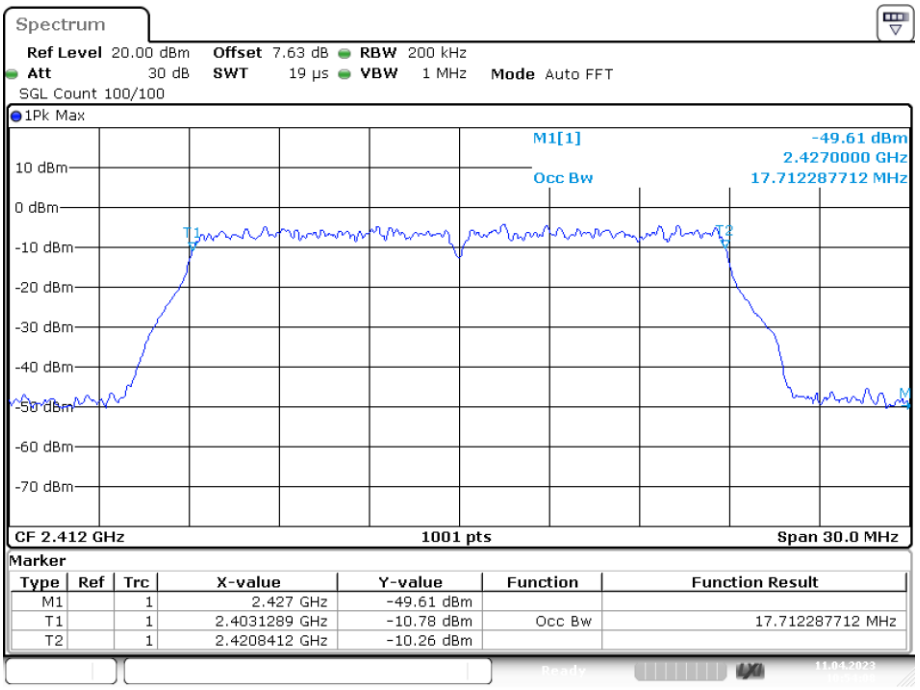

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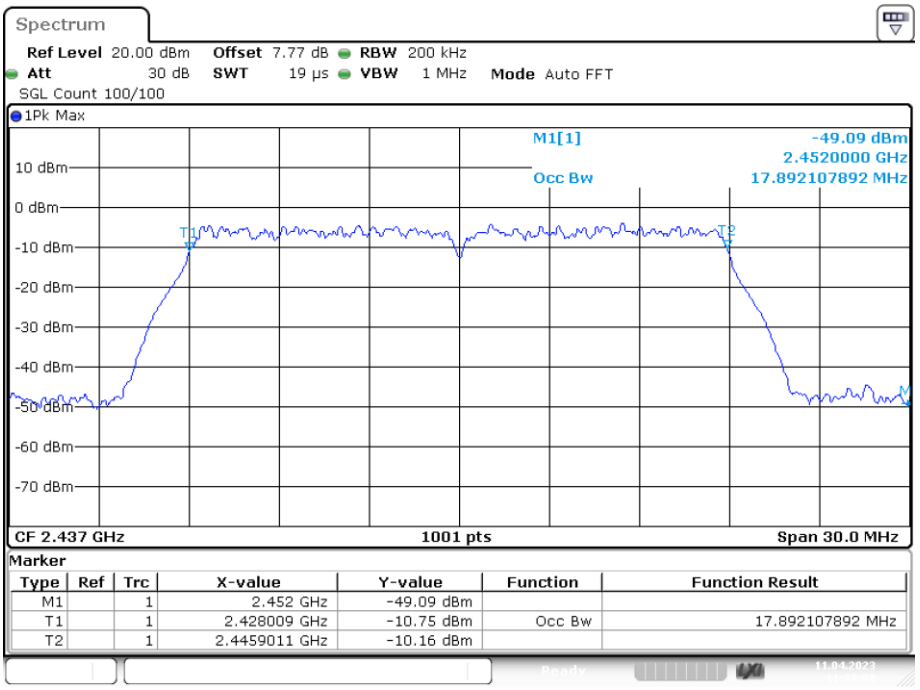

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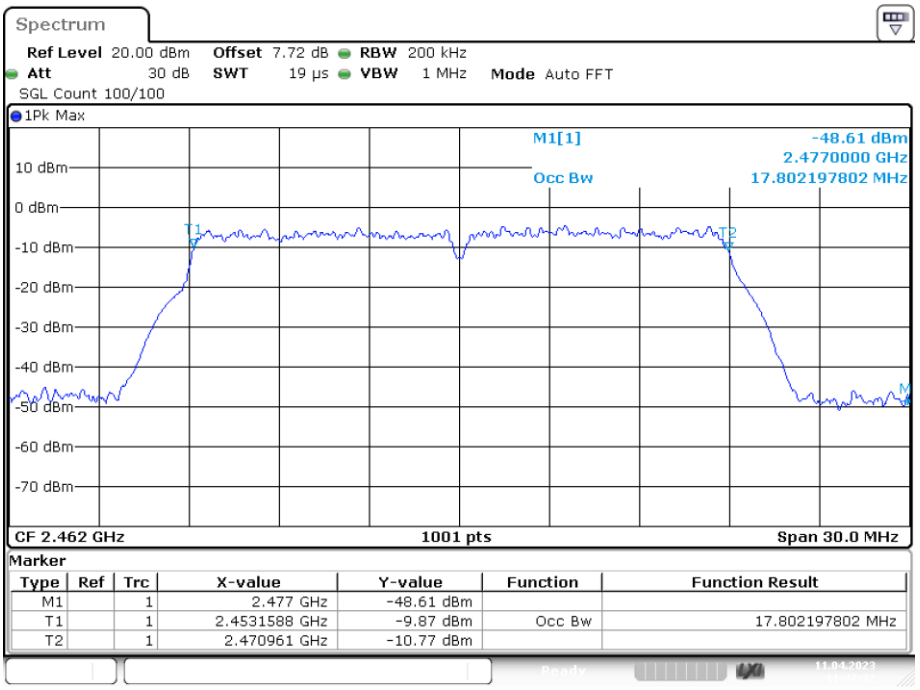

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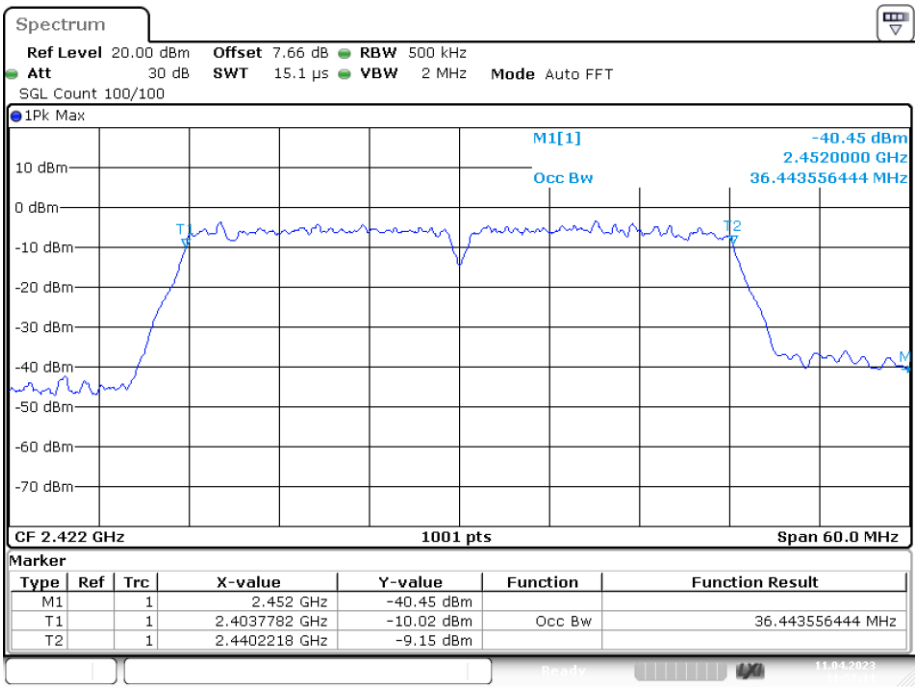

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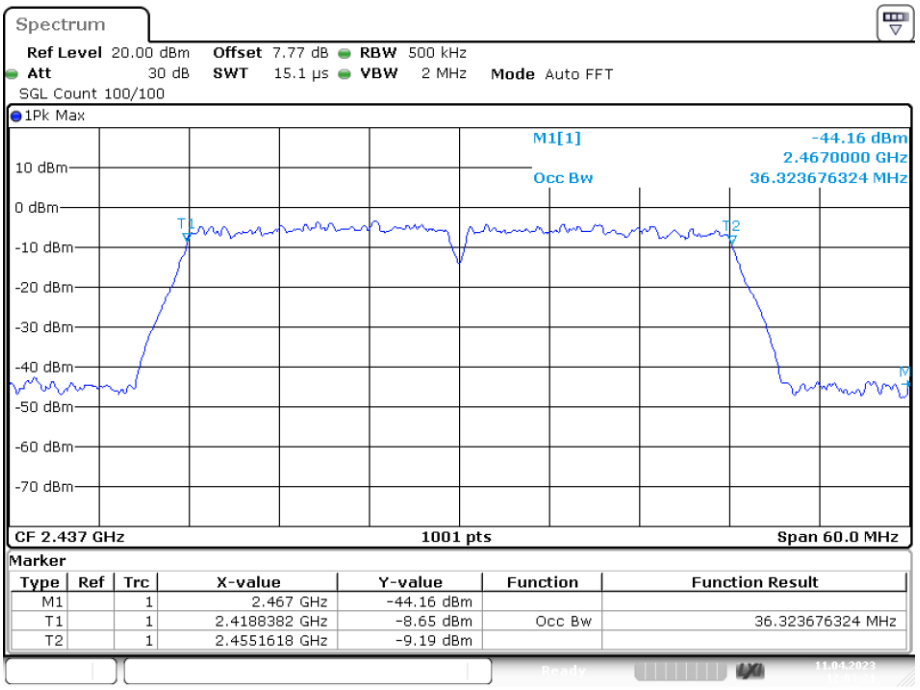

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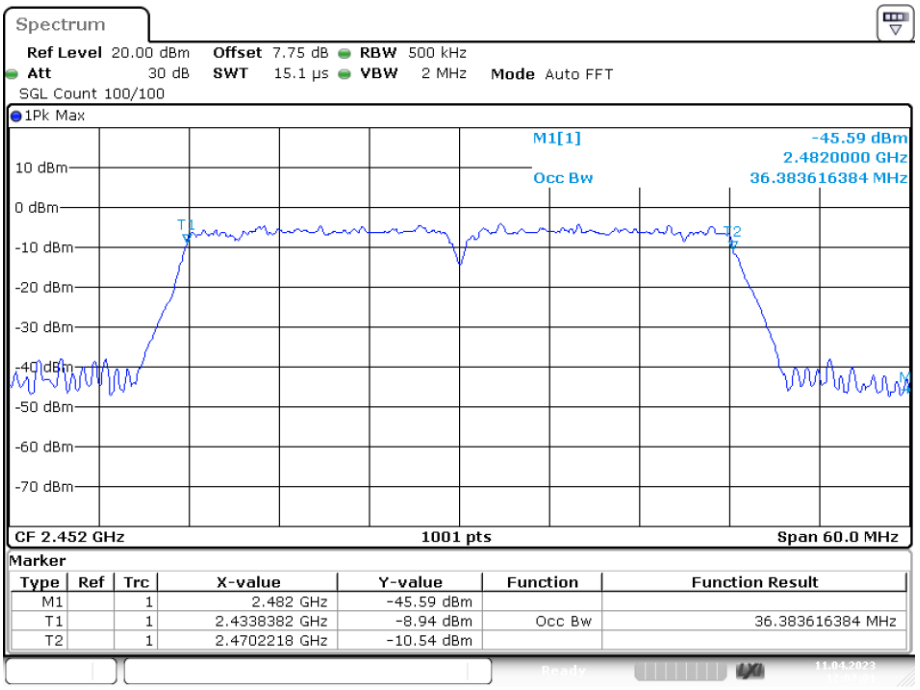

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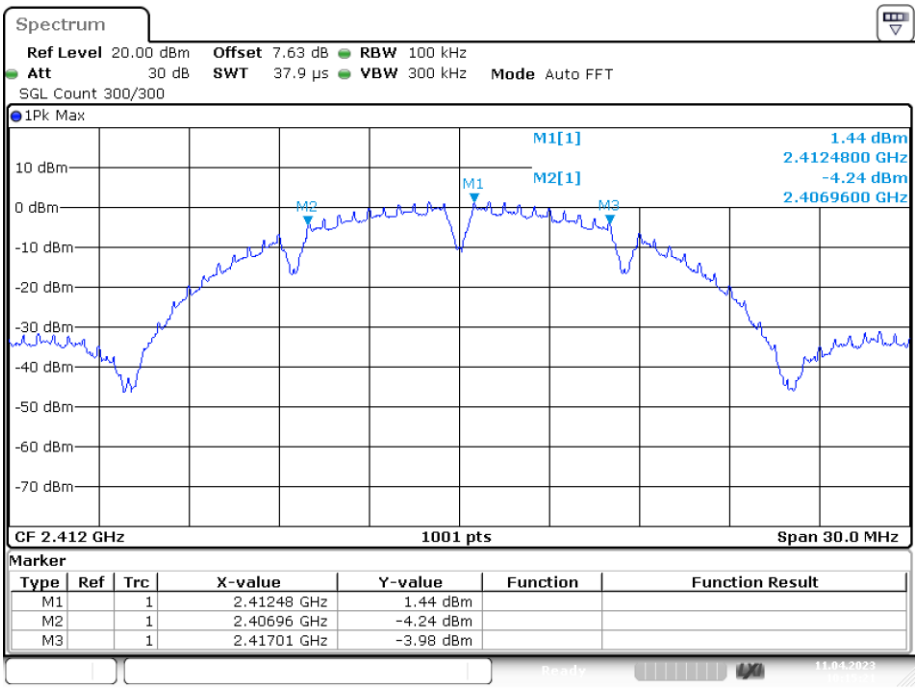
-6dB Bandwidth NVNT b 2412MHz Ant1



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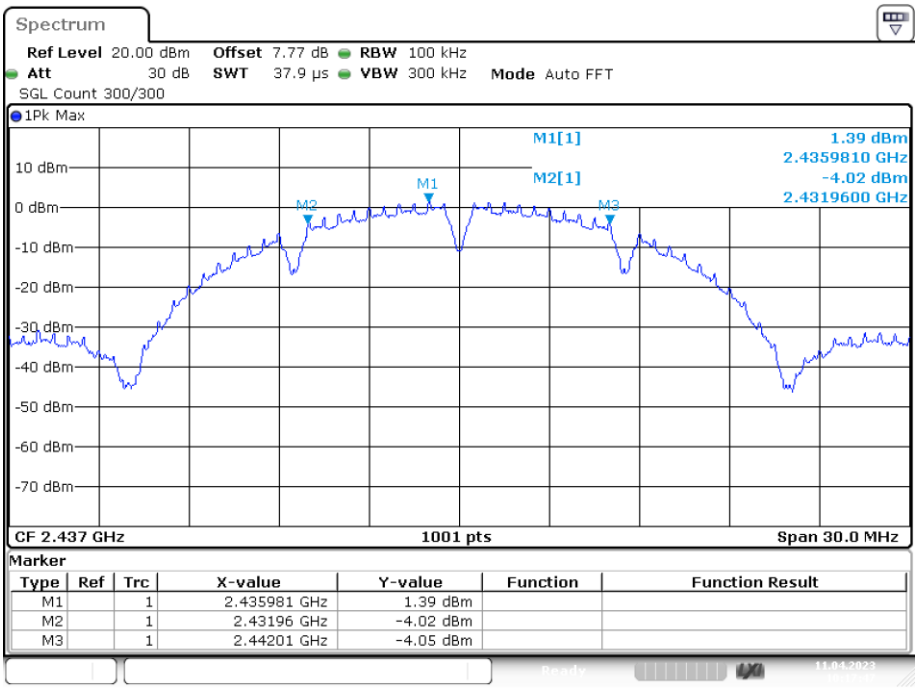

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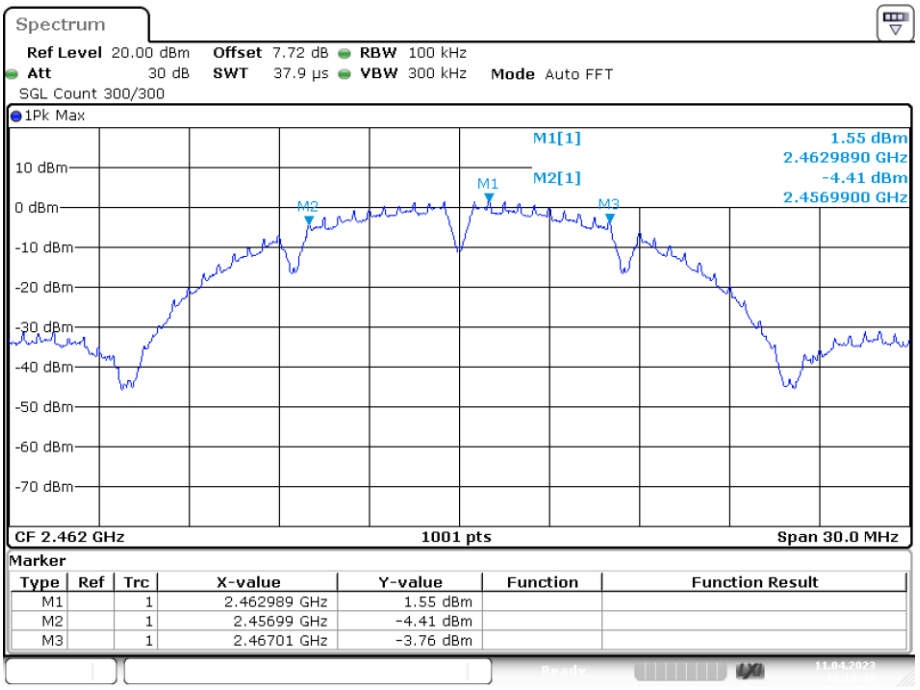

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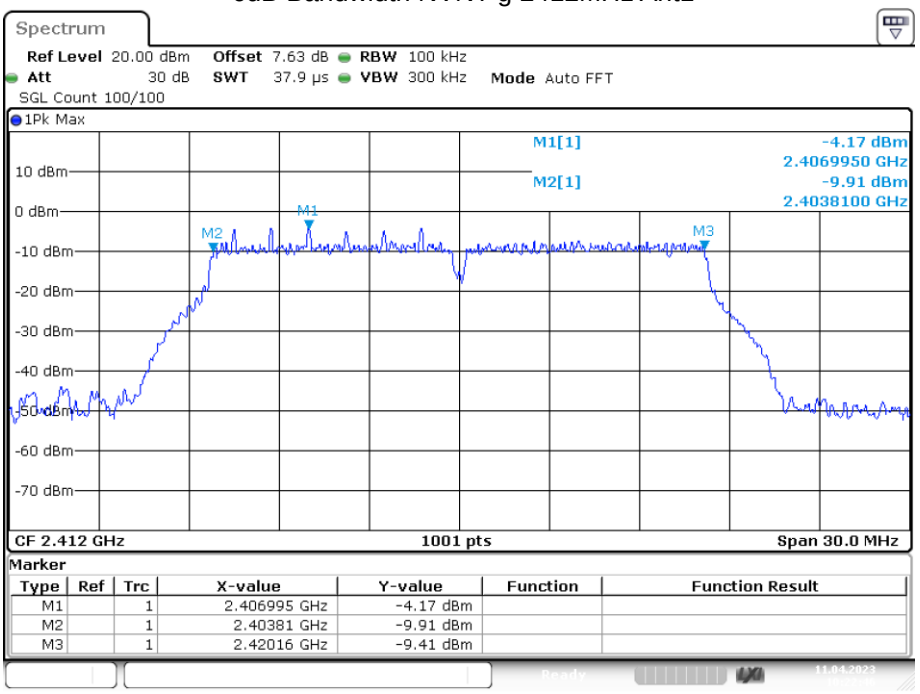

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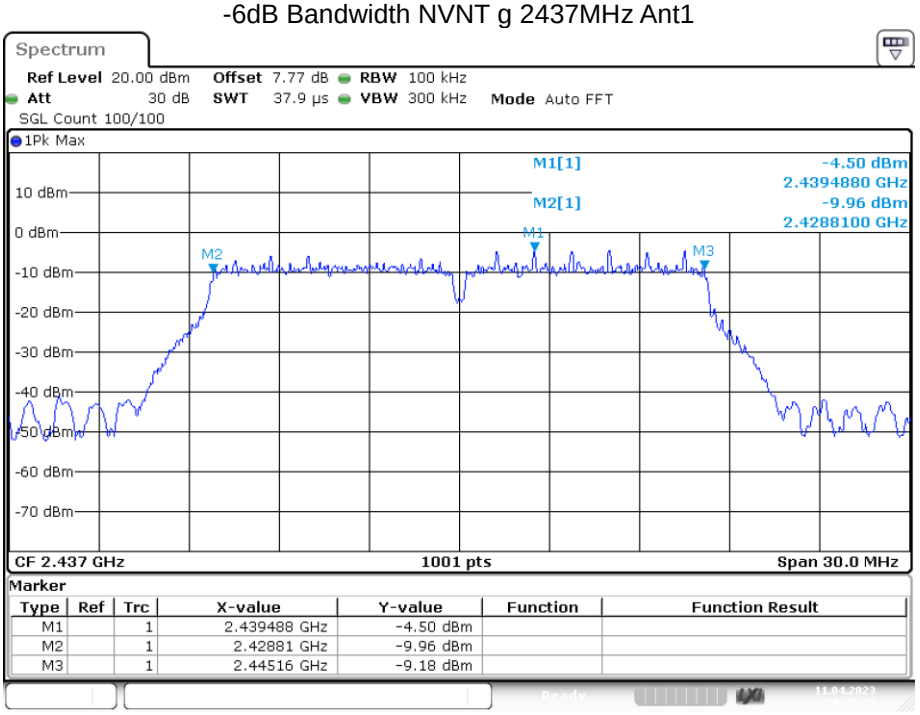
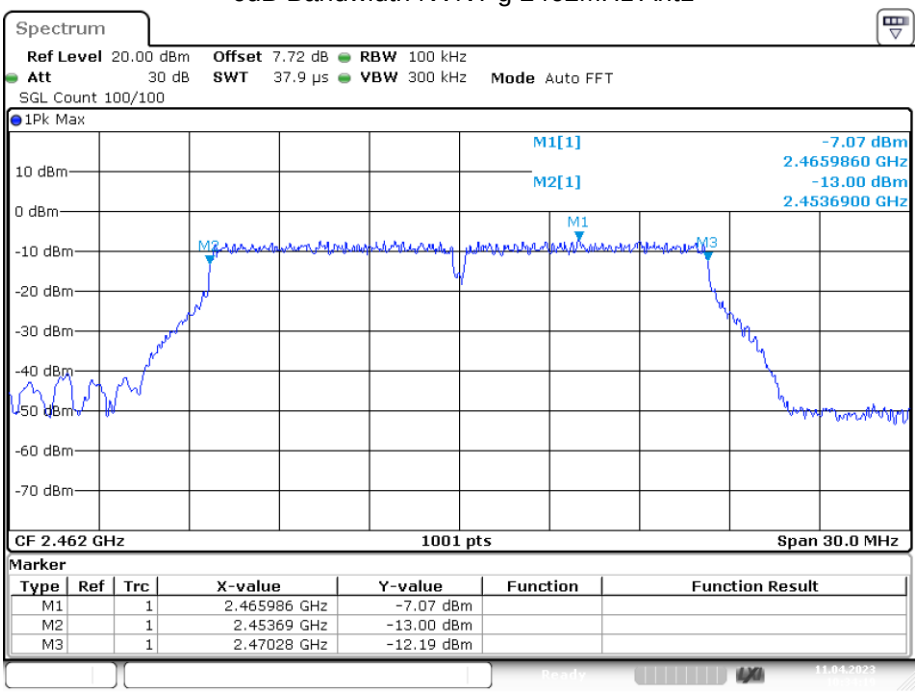
-6dB Bandwidth NVNT g 2437MHz Ant1



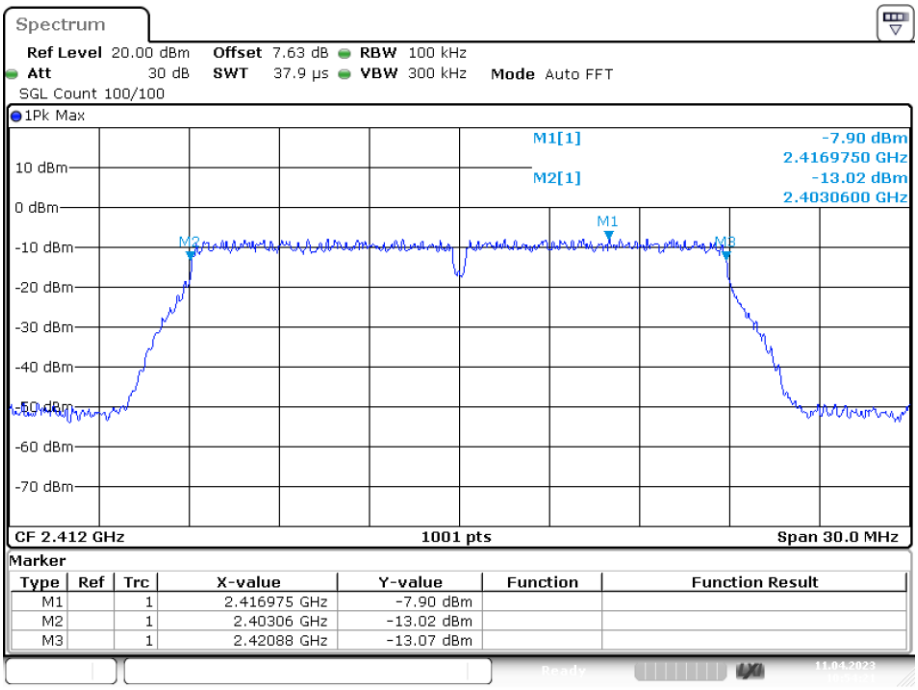
Date: 11.APR.2023 10:27:12

-6dB Bandwidth NVNT g 2462MHz Ant1



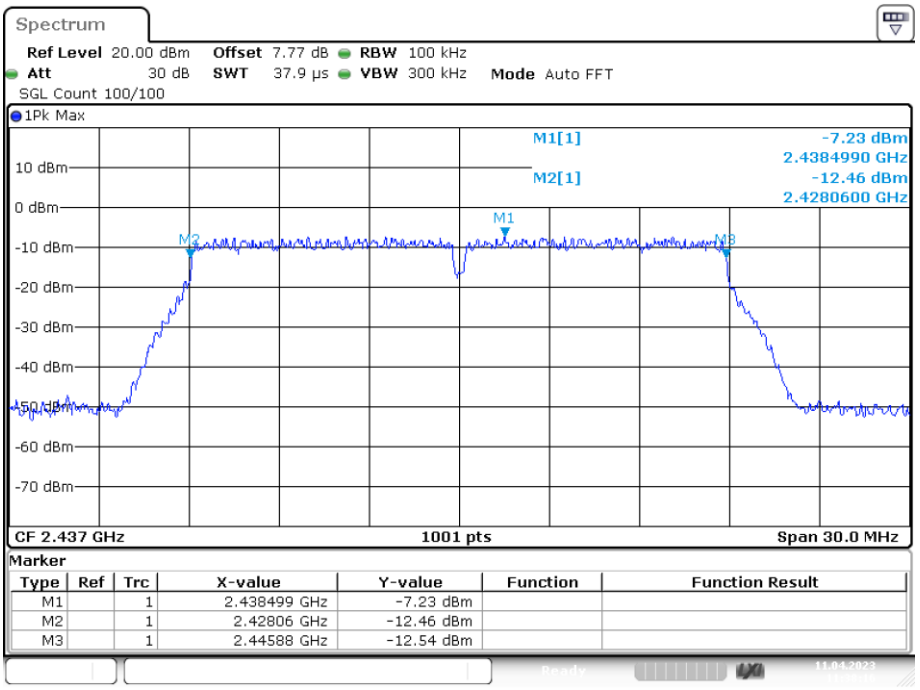
Date: 11.APR.2023 10:34:19

-6dB Bandwidth NVNT n20 2412MHz Ant1



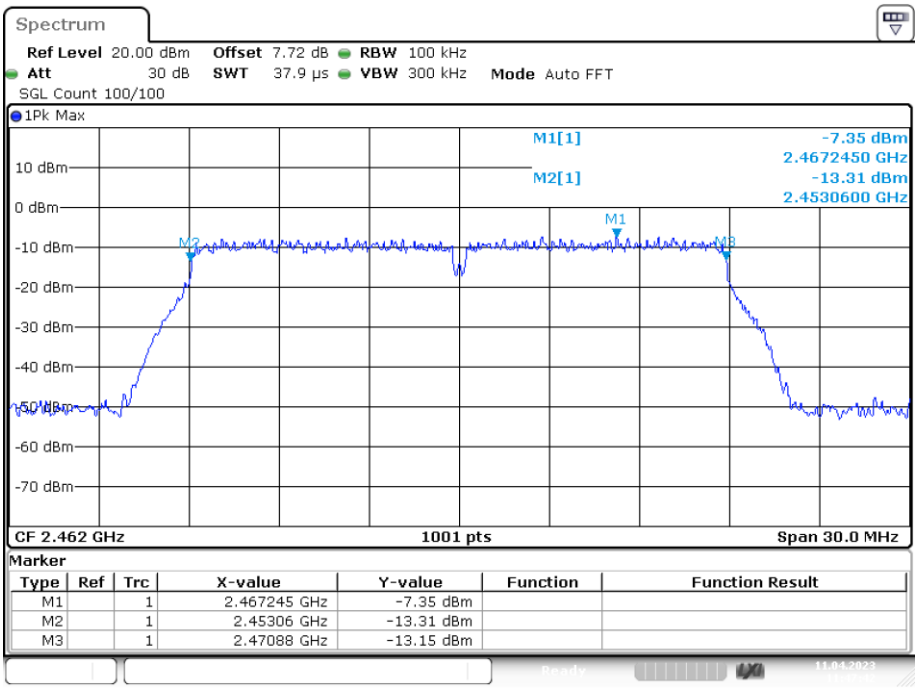
Date: 11.APR.2023 10:54:21

-6dB Bandwidth NVNT n20 2437MHz Ant1



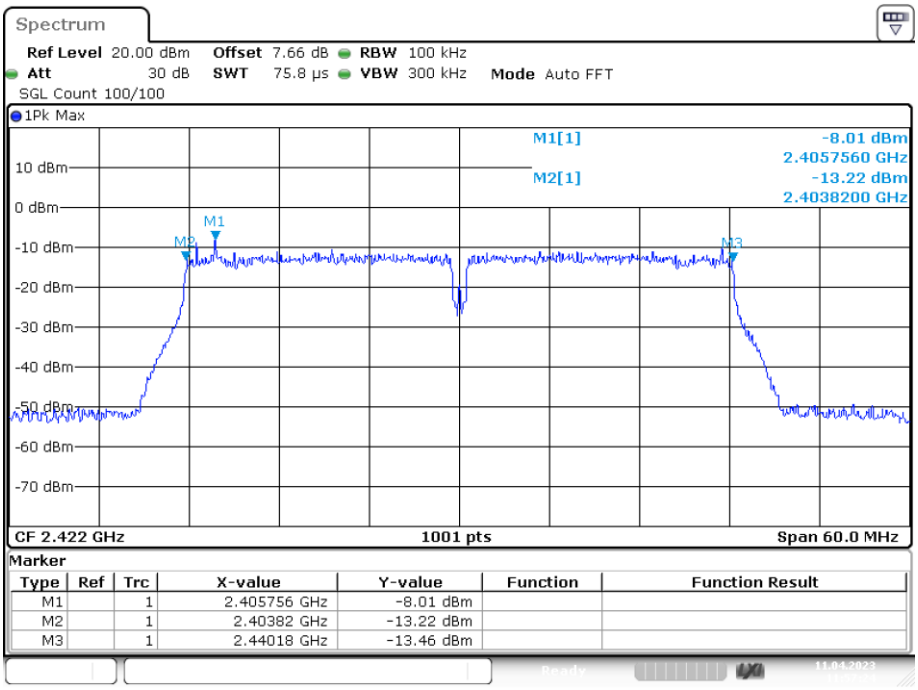
Date: 11.APR.2023 11:38:17

-6dB Bandwidth NVNT n20 2462MHz Ant1



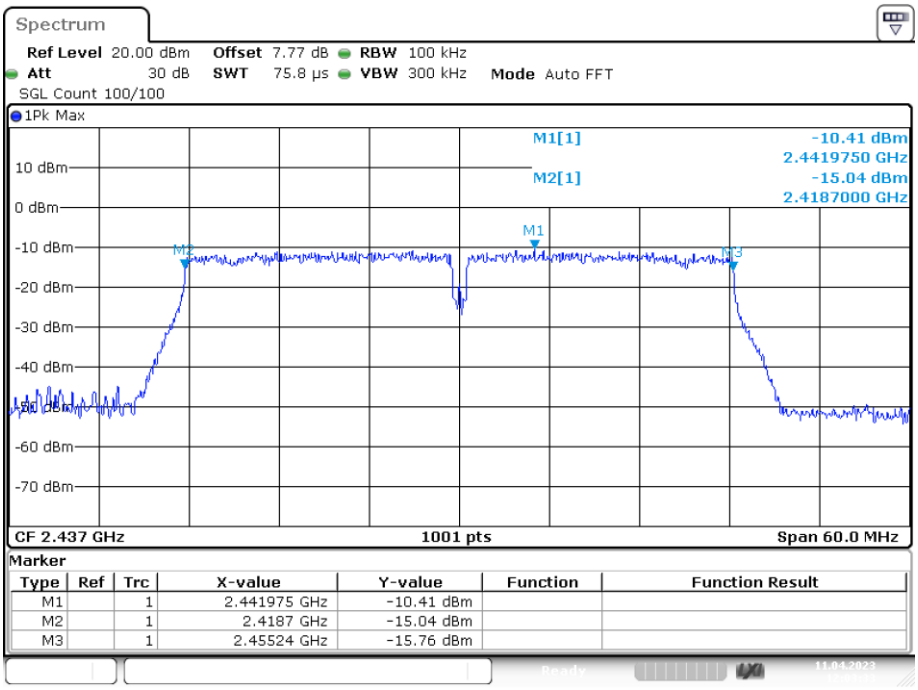
Date: 11.APR.2023 11:47:41

-6dB Bandwidth NVNT n40 2422MHz Ant1



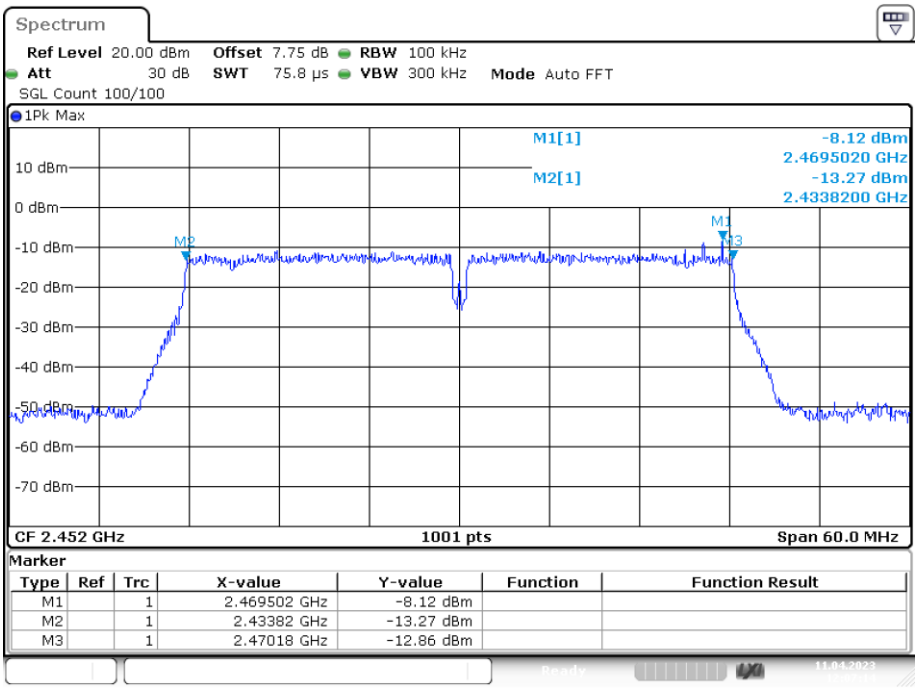
Date: 11.APR.2023 11:57:23

-6dB Bandwidth NVNT n40 2437MHz Ant1



Date: 11.APR.2023 12:03:34

-6dB Bandwidth NVNT n40 2452MHz Ant1



Date: 11.APR.2023 12:07:15

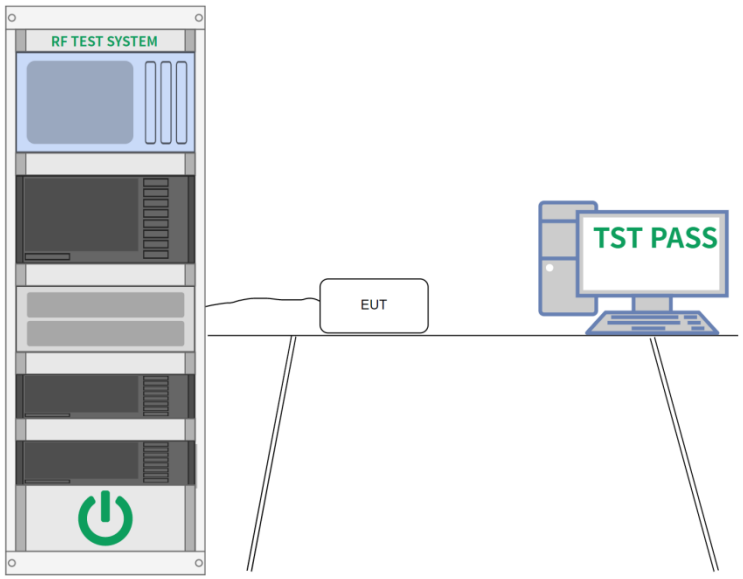
4.3 Maximum Conducted Output Power

Test Requirement:	For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Limit:	For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	Maximum peak conducted output power
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power

4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	All modes				

4.3.2 Test Setup Diagram:



4.3.3 Test Result:

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	15.564	0.01	30	Pass
NVNT	b	2437	Ant1	15.822	0.01	30	Pass
NVNT	b	2462	Ant1	15.877	0	30	Pass
NVNT	g	2412	Ant1	15.998	0.04	30	Pass
NVNT	g	2437	Ant1	15.996	0.03	30	Pass
NVNT	g	2462	Ant1	16.06	0.04	30	Pass
NVNT	n20	2412	Ant1	16.084	0.01	30	Pass
NVNT	n20	2437	Ant1	16.723	0.01	30	Pass
NVNT	n20	2462	Ant1	16.202	0.01	30	Pass
NVNT	n40	2422	Ant1	15.963	0.03	30	Pass
NVNT	n40	2437	Ant1	16.282	0.02	30	Pass
NVNT	n40	2452	Ant1	16.066	0.02	30	Pass

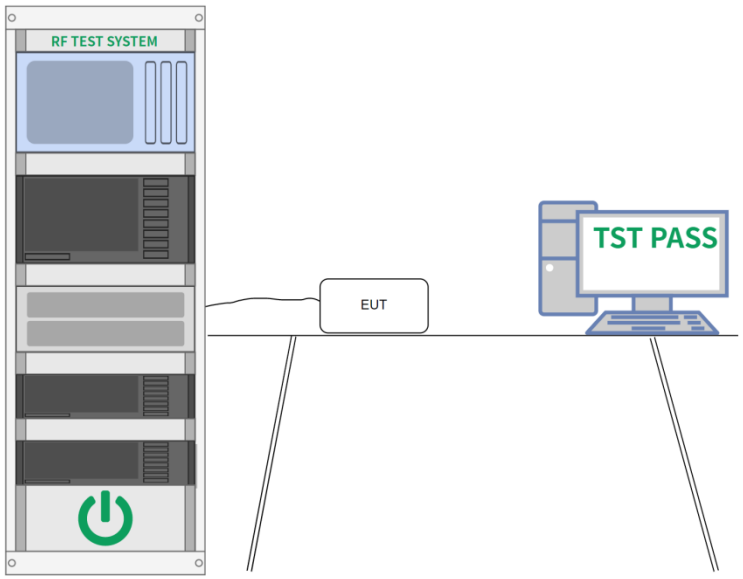
4.4 Power Spectral Density

Test Requirement:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Limit:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	Maximum power spectral density level in the fundamental emission

4.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	All modes				

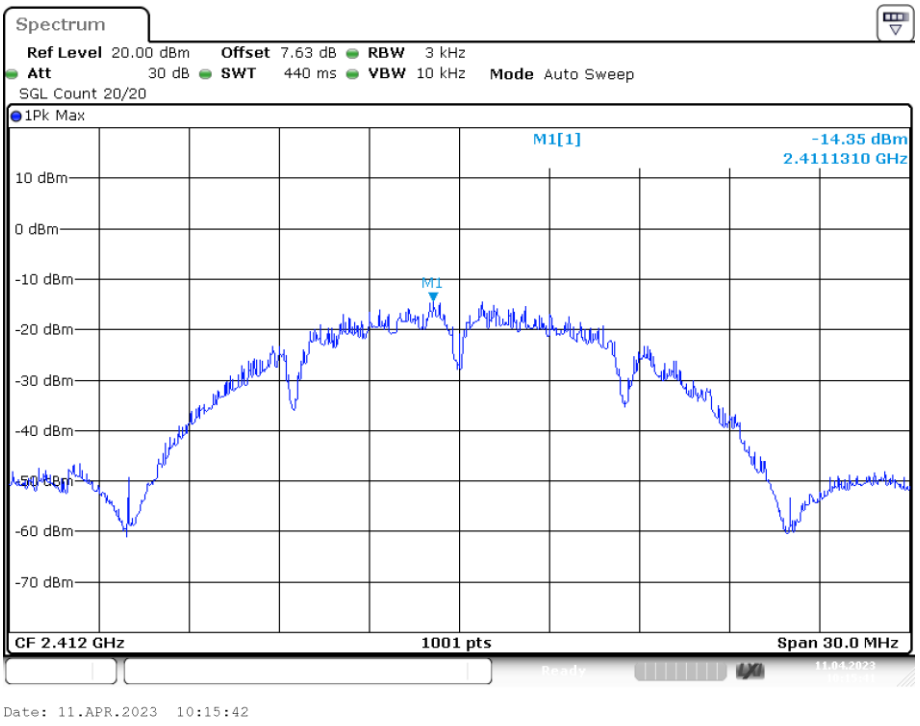
4.4.2 Test Setup Diagram:



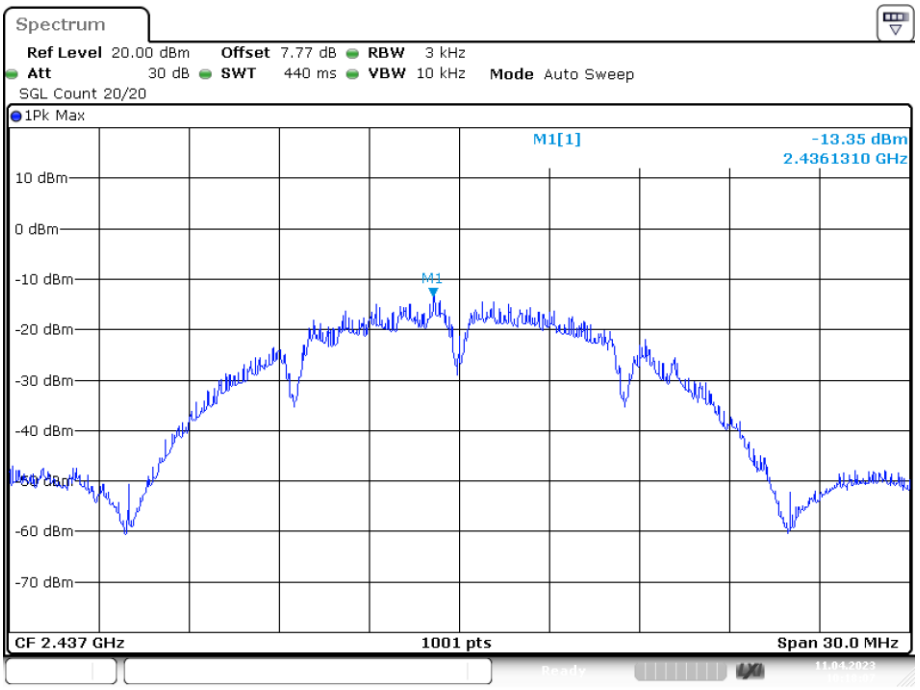
4.4.3 Test Result:

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	-14.352	8	Pass
NVNT	b	2437	Ant1	-13.35	8	Pass
NVNT	b	2462	Ant1	-13.227	8	Pass
NVNT	g	2412	Ant1	-18.908	8	Pass
NVNT	g	2437	Ant1	-19.114	8	Pass
NVNT	g	2462	Ant1	-18.742	8	Pass
NVNT	n20	2412	Ant1	-19.276	8	Pass
NVNT	n20	2437	Ant1	-19.119	8	Pass
NVNT	n20	2462	Ant1	-18.615	8	Pass
NVNT	n40	2422	Ant1	-20.896	8	Pass
NVNT	n40	2437	Ant1	-21.521	8	Pass
NVNT	n40	2452	Ant1	-21.219	8	Pass

PSD NVNT b 2412MHz Ant1

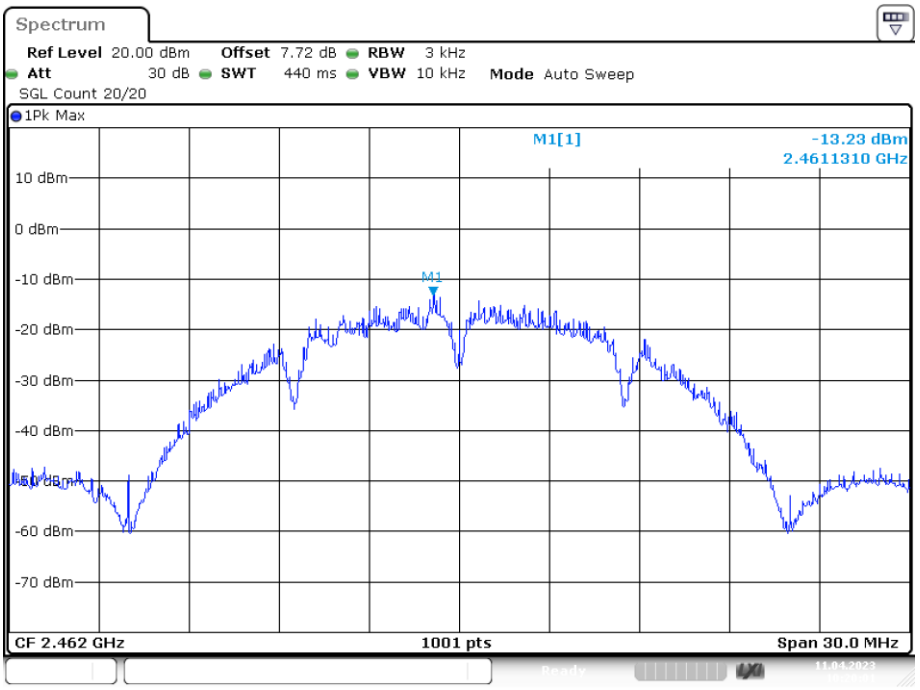


PSD NVNT b 2437MHz Ant1



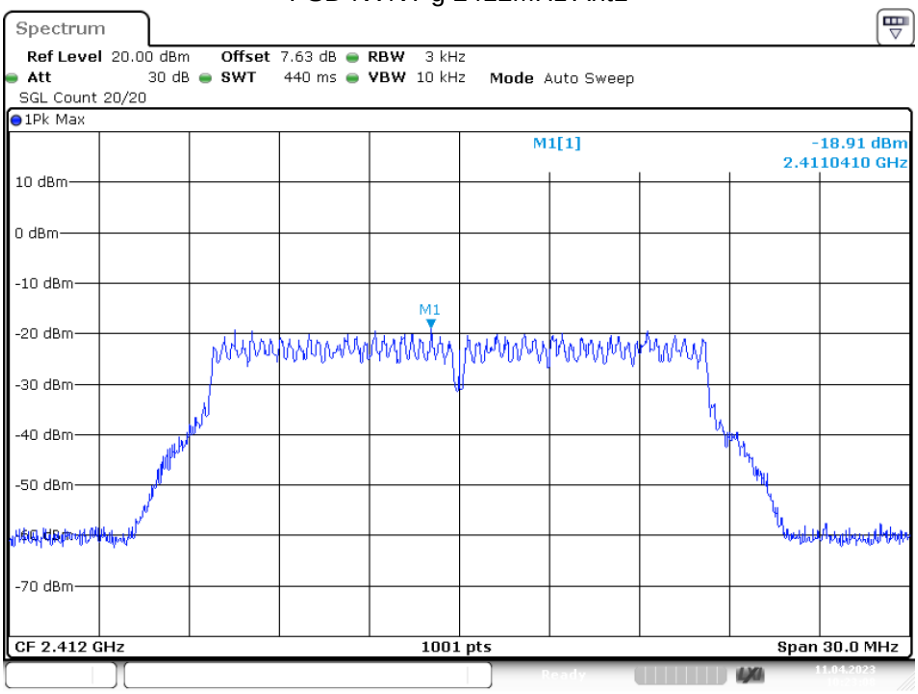
Date: 11.APR.2023 10:18:07

PSD NVNT b 2462MHz Ant1



Date: 11.APR.2023 10:20:01

PSD NVNT g 2412MHz Ant1



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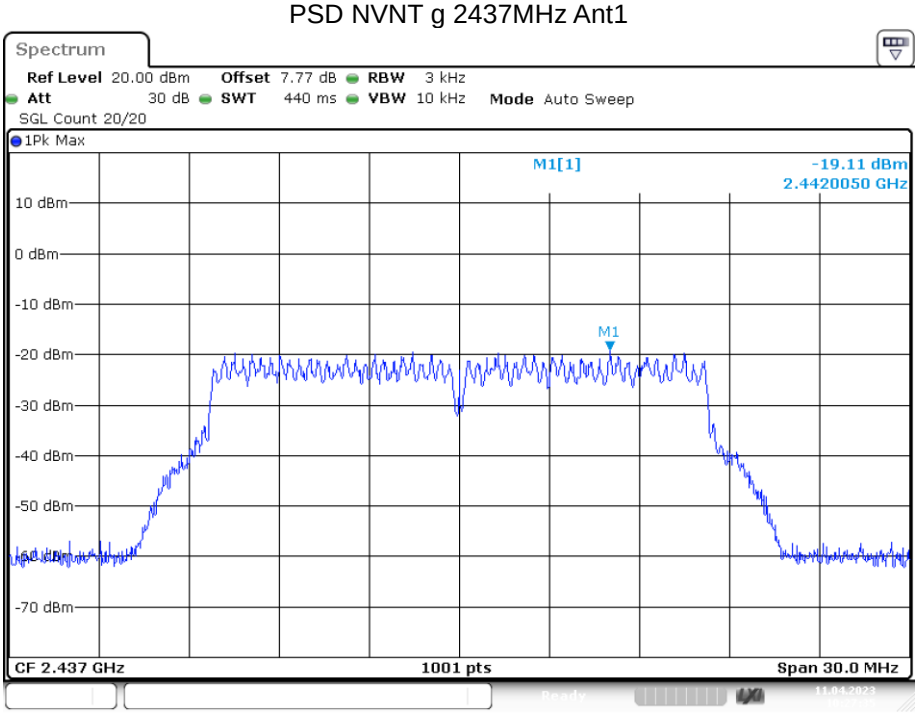

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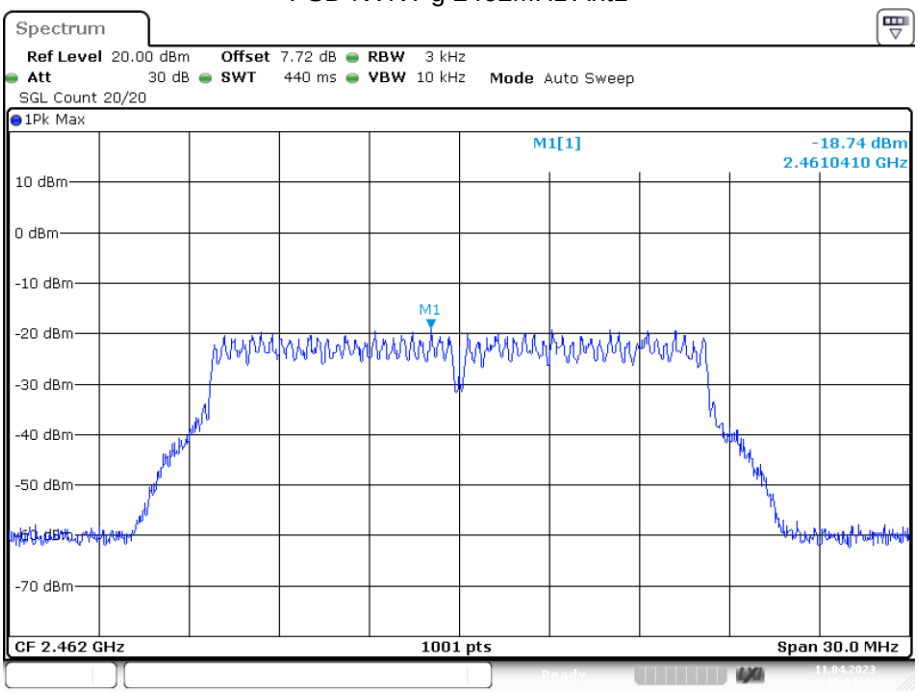
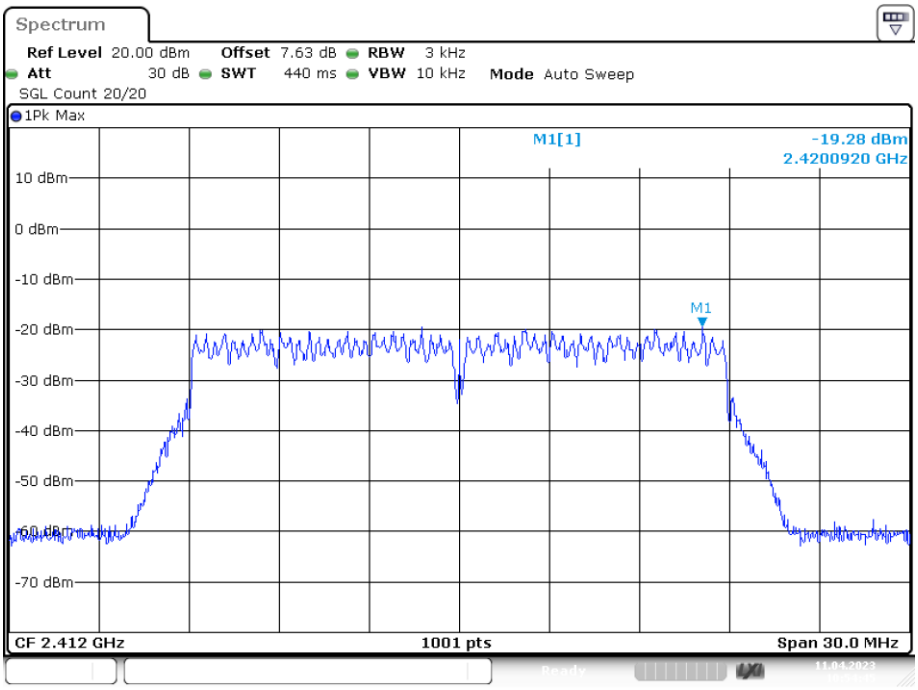
PSD NVNT g 2462MHz Ant1



Date: 11.APR.2023 10:34:42

PSD NVNT n20 2412MHz Ant1



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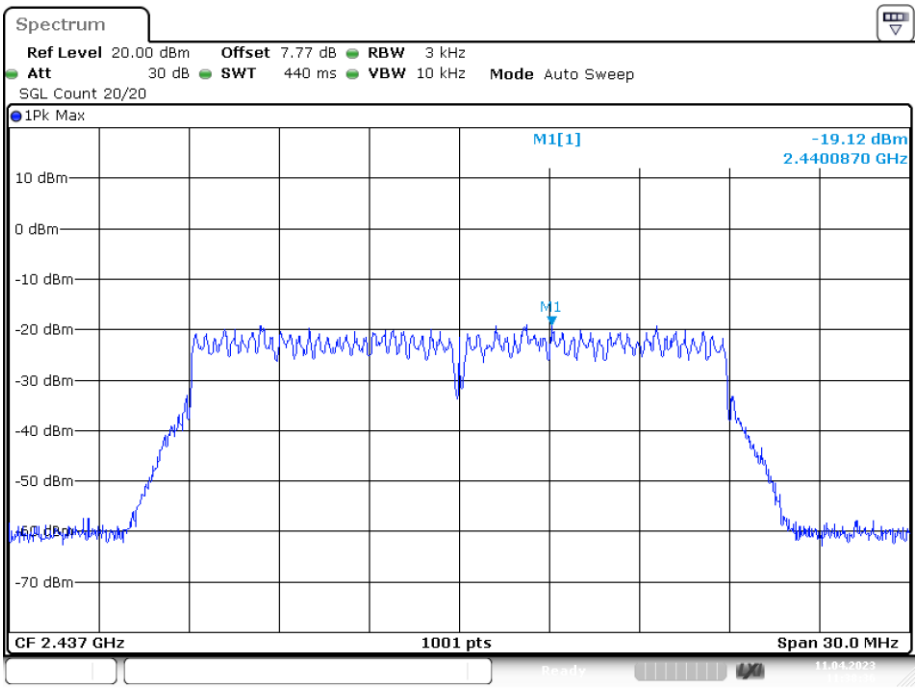

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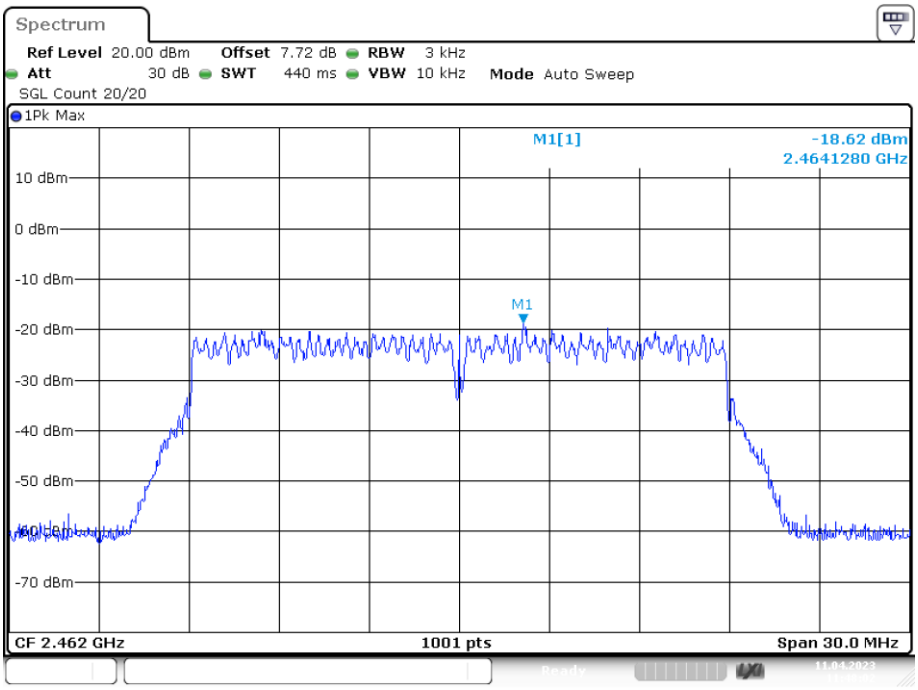
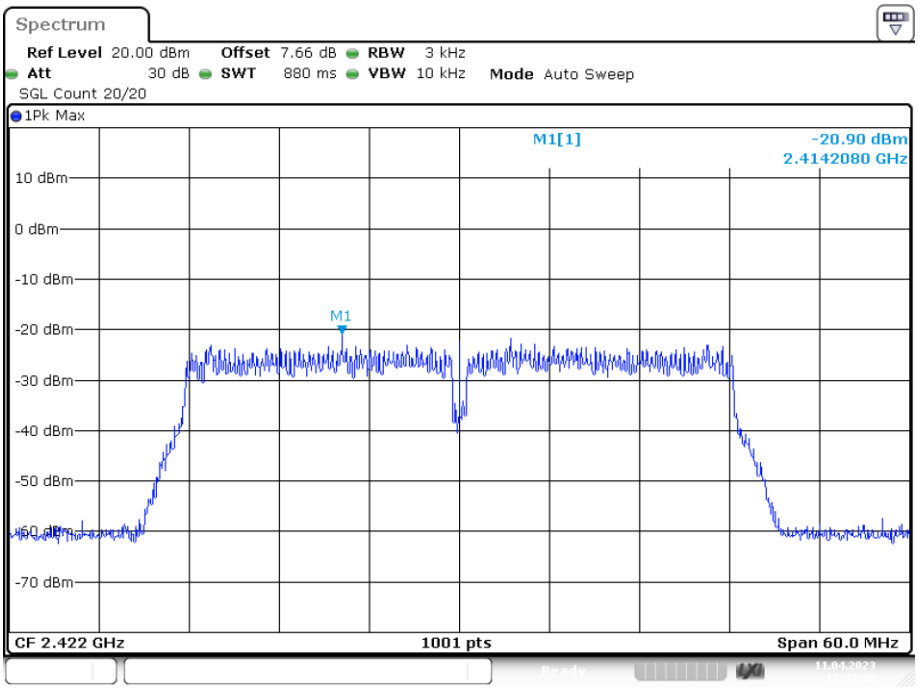


Date: 11.APR.2023 11:48:02

PSD NVNT n40 2422MHz Ant1



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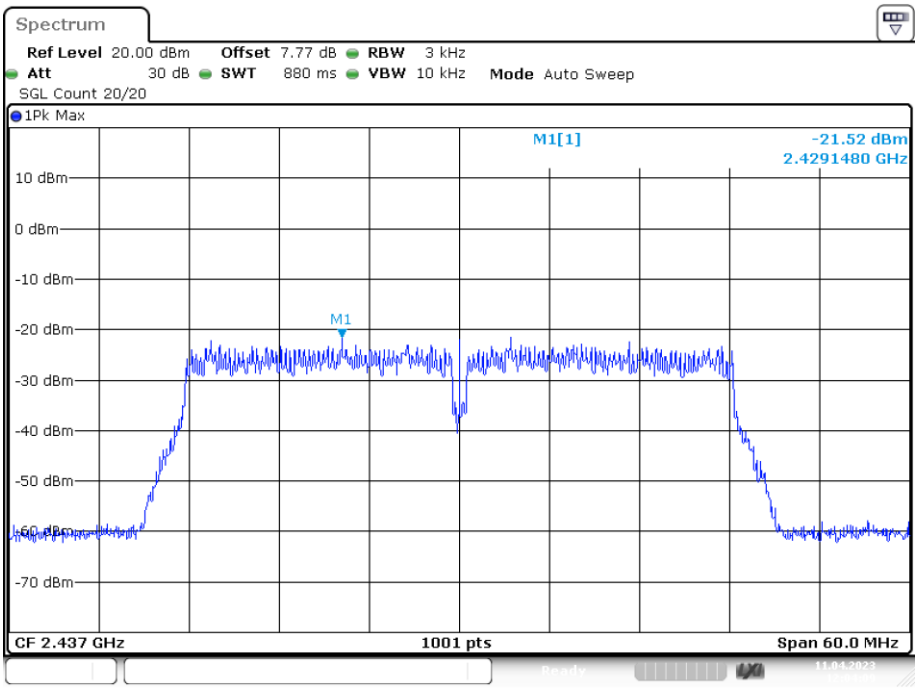
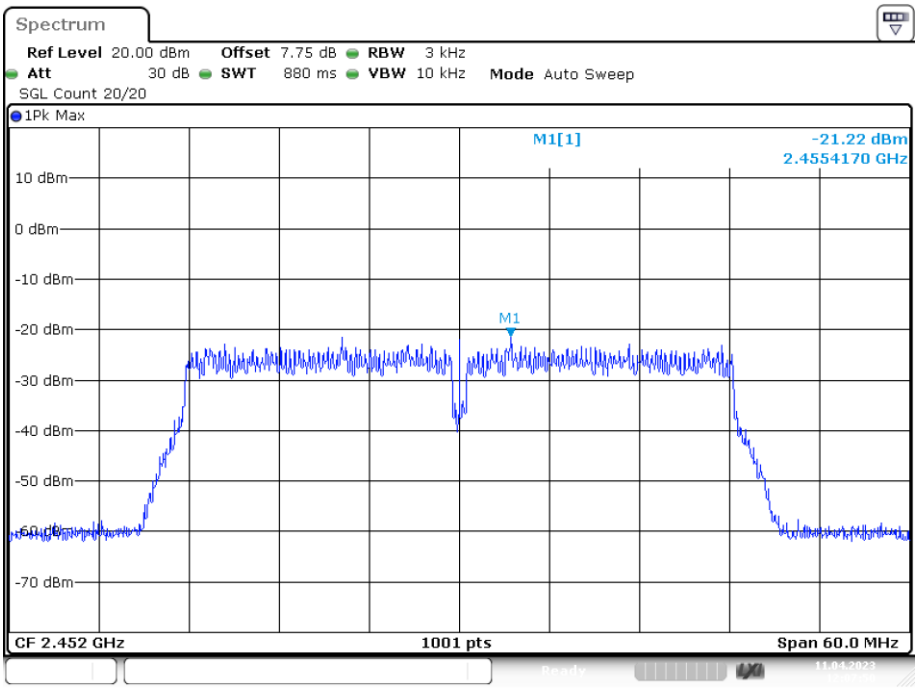
PSD NVNT n40 2437MHz Ant1



Date: 11.APR.2023 12:04:09

PSD NVNT n40 2452MHz Ant1



Date: 11.APR.2023 12:07:51

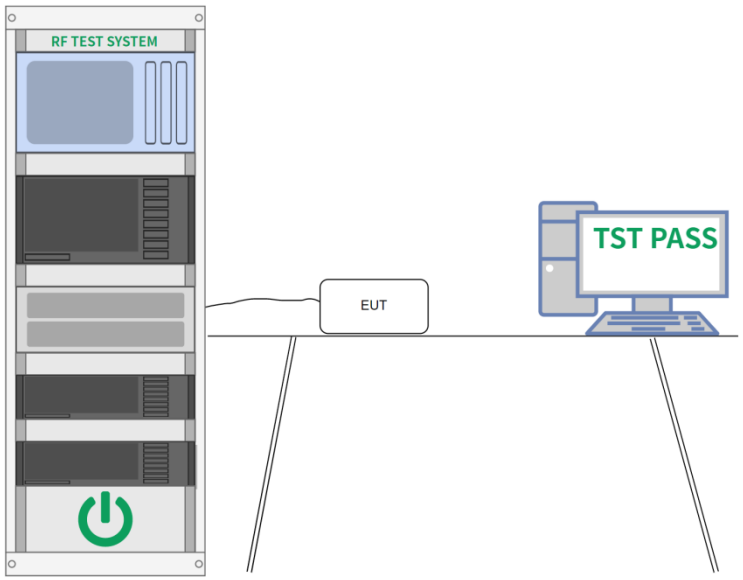
4.5 Emissions in non-restricted frequency bands

Test Requirement:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	Emissions in nonrestricted frequency bands
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

4.5.1 E.U.T. Operation:

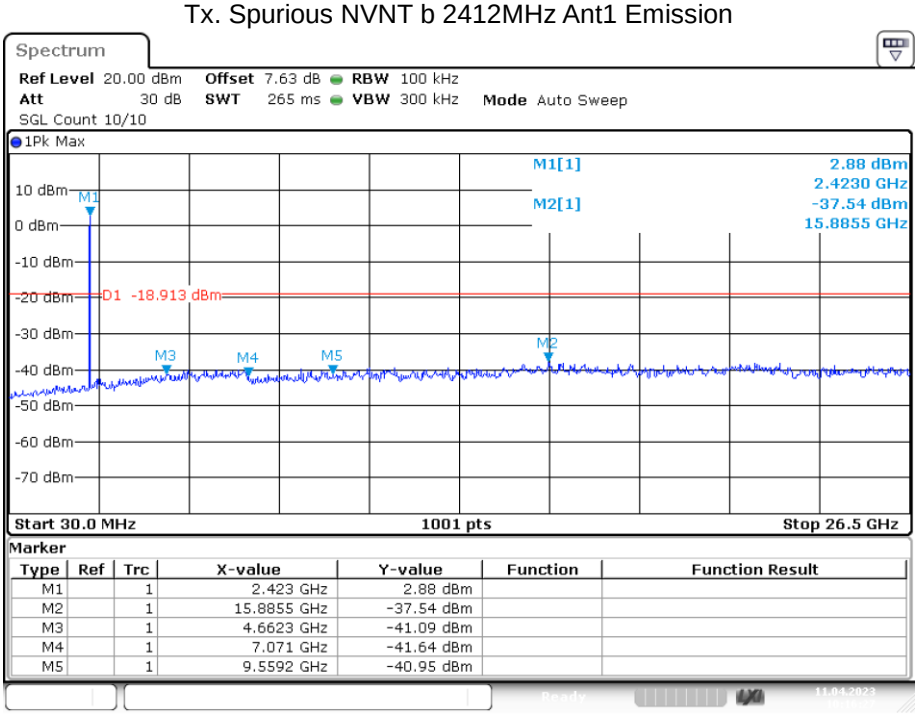
Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	All modes				

4.5.2 Test Setup Diagram:



4.5.3 Test Result:

Tx. Spurious NVNT b 2412MHz Ant1 Emission



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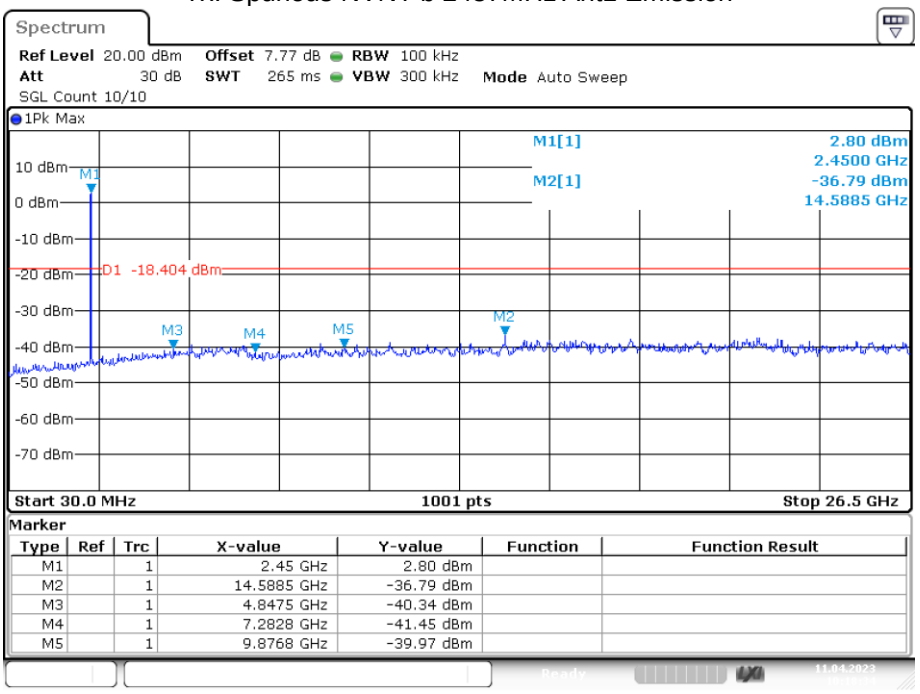
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	2.88 dBm		
M2		1	15.8855 GHz	-37.54 dBm		
M3		1	4.6623 GHz	-41.09 dBm		
M4		1	7.071 GHz	-41.64 dBm		
M5		1	9.5592 GHz	-40.95 dBm		

Date: 11.APR.2023 10:16:27

Tx. Spurious NVNT b 2437MHz Ant1 Emission



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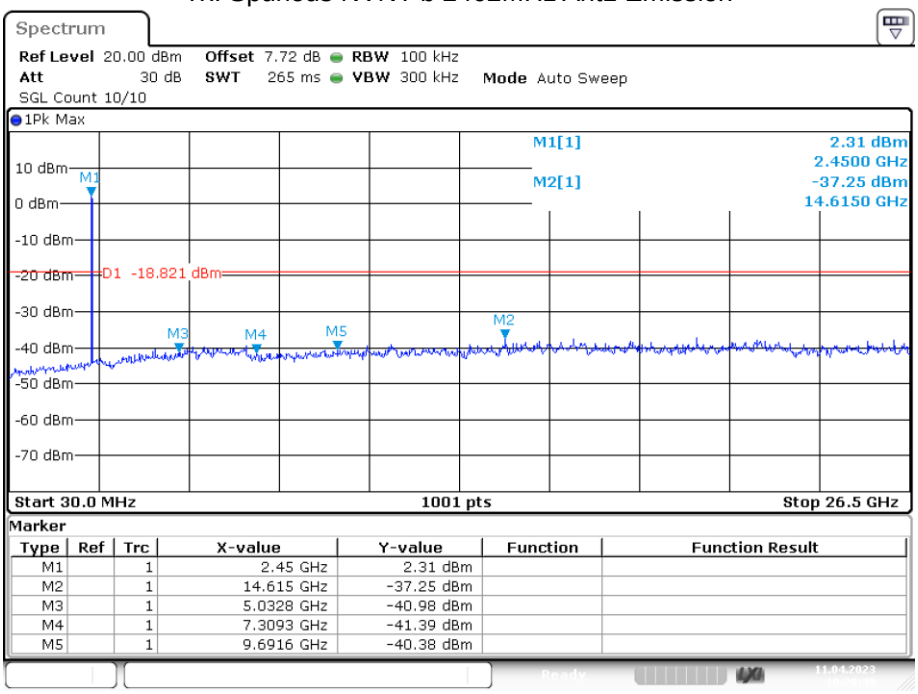
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	2.80 dBm		
M2		1	14.5885 GHz	-36.79 dBm		
M3		1	4.8475 GHz	-40.34 dBm		
M4		1	7.2828 GHz	-41.45 dBm		
M5		1	9.8768 GHz	-39.97 dBm		

Date: 11.APR.2023 10:18:33

Tx. Spurious NVNT b 2462MHz Ant1 Emission



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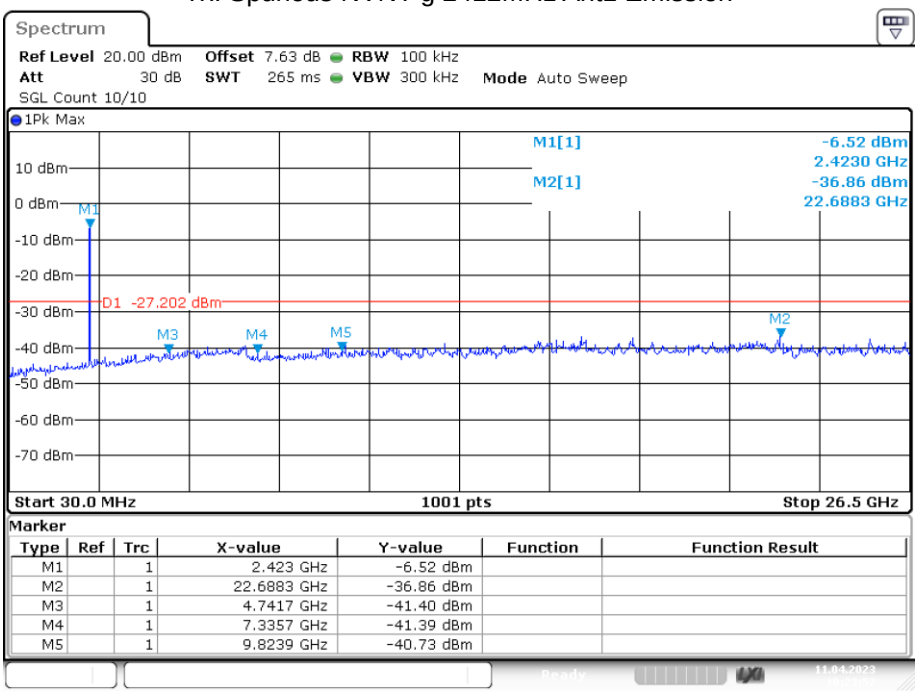
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	2.31 dBm		
M2		1	14.615 GHz	-37.25 dBm		
M3		1	5.0328 GHz	-40.98 dBm		
M4		1	7.3093 GHz	-41.39 dBm		
M5		1	9.6916 GHz	-40.38 dBm		

Date: 11.APR.2023 10:20:48

Tx. Spurious NVNT g 2412MHz Ant1 Emission



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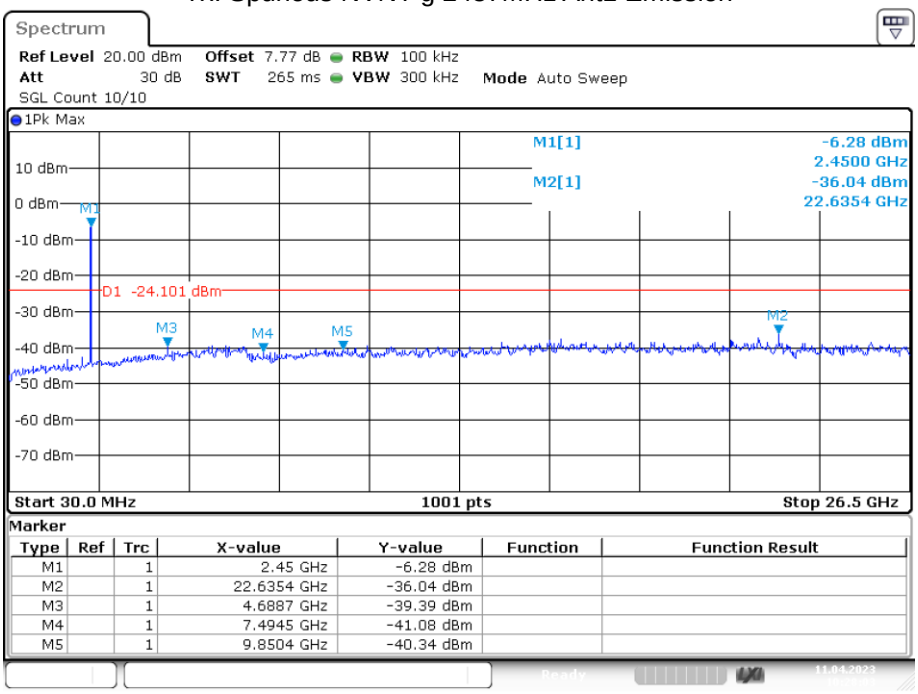
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-6.52 dBm		
M2		1	22.6883 GHz	-36.86 dBm		
M3		1	4.7417 GHz	-41.40 dBm		
M4		1	7.3357 GHz	-41.39 dBm		
M5		1	9.8239 GHz	-40.73 dBm		

Date: 11.APR.2023 10:23:51

Tx. Spurious NVNT g 2437MHz Ant1 Emission



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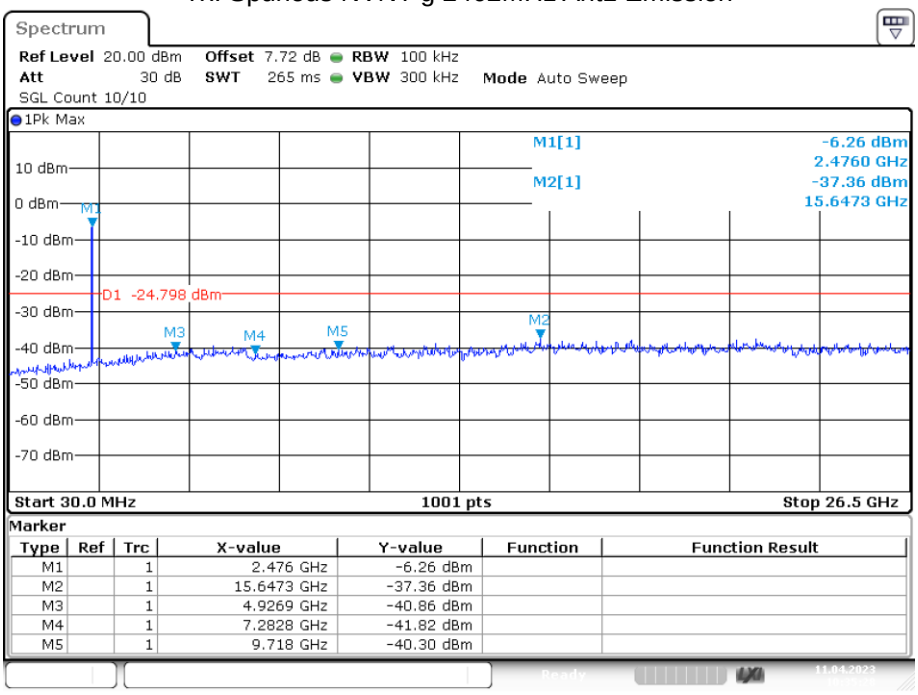
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-6.28 dBm		
M2		1	22.6354 GHz	-36.04 dBm		
M3		1	4.6887 GHz	-39.39 dBm		
M4		1	7.4945 GHz	-41.08 dBm		
M5		1	9.8504 GHz	-40.34 dBm		

Date: 11.APR.2023 10:28:03

Tx. Spurious NVNT g 2462MHz Ant1 Emission

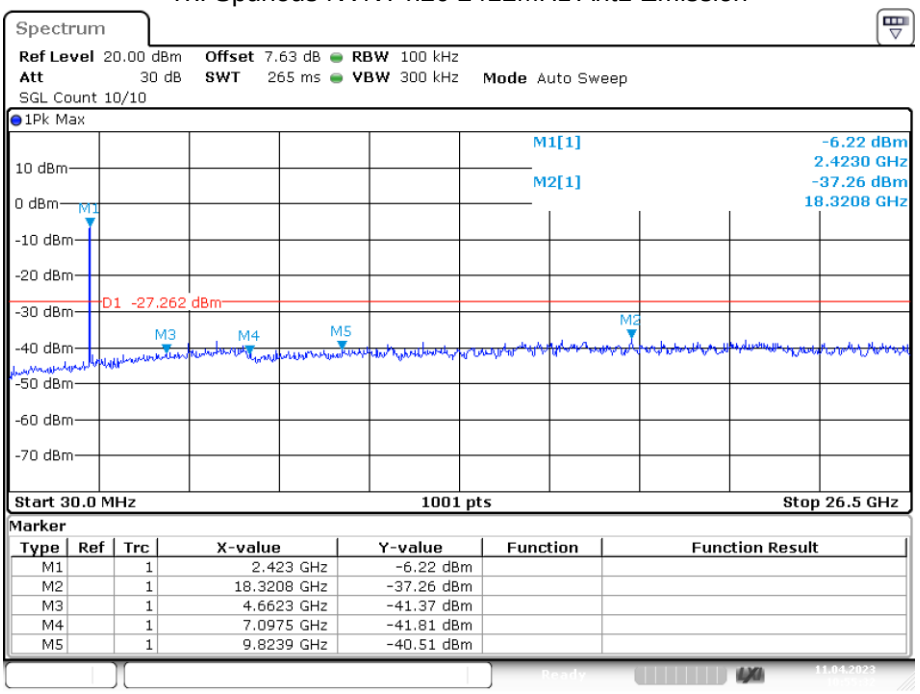


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.476 GHz	-6.26 dBm		
M2		1	15.6473 GHz	-37.36 dBm		
M3		1	4.9269 GHz	-40.86 dBm		
M4		1	7.2828 GHz	-41.82 dBm		
M5		1	9.718 GHz	-40.30 dBm		

Date: 11.APR.2023 10:35:28

Tx. Spurious NVNT n20 2412MHz Ant1 Emission



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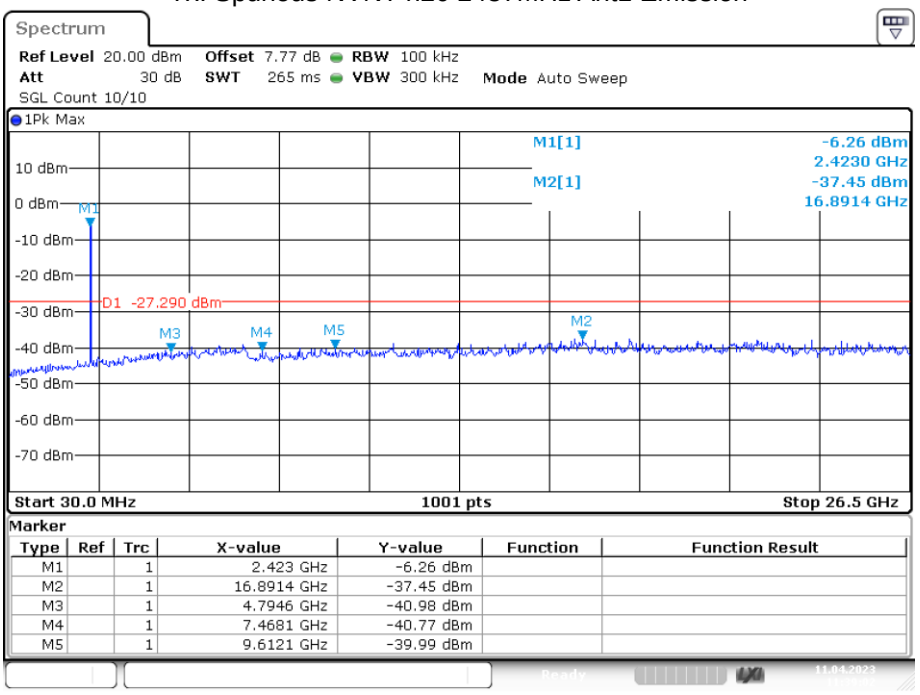
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-6.22 dBm		
M2		1	18.3208 GHz	-37.26 dBm		
M3		1	4.6623 GHz	-41.37 dBm		
M4		1	7.0975 GHz	-41.81 dBm		
M5		1	9.8239 GHz	-40.51 dBm		

Date: 11.APR.2023 10:55:32

Tx. Spurious NVNT n20 2437MHz Ant1 Emission



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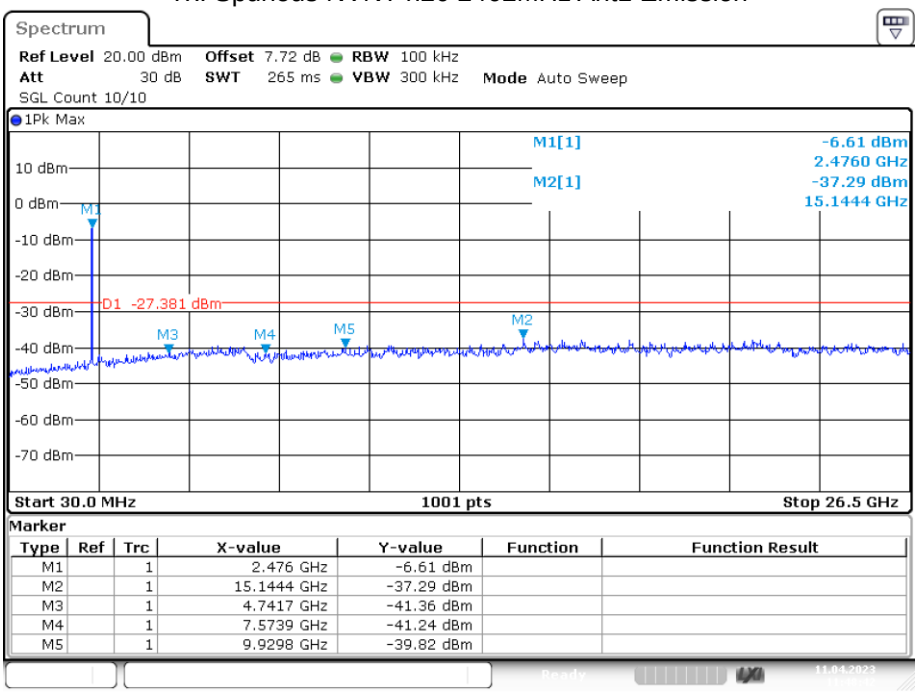
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-6.26 dBm		
M2		1	16.8914 GHz	-37.45 dBm		
M3		1	4.7946 GHz	-40.98 dBm		
M4		1	7.4681 GHz	-40.77 dBm		
M5		1	9.6121 GHz	-39.99 dBm		

Date: 11.APR.2023 11:39:02

Tx. Spurious NVNT n20 2462MHz Ant1 Emission



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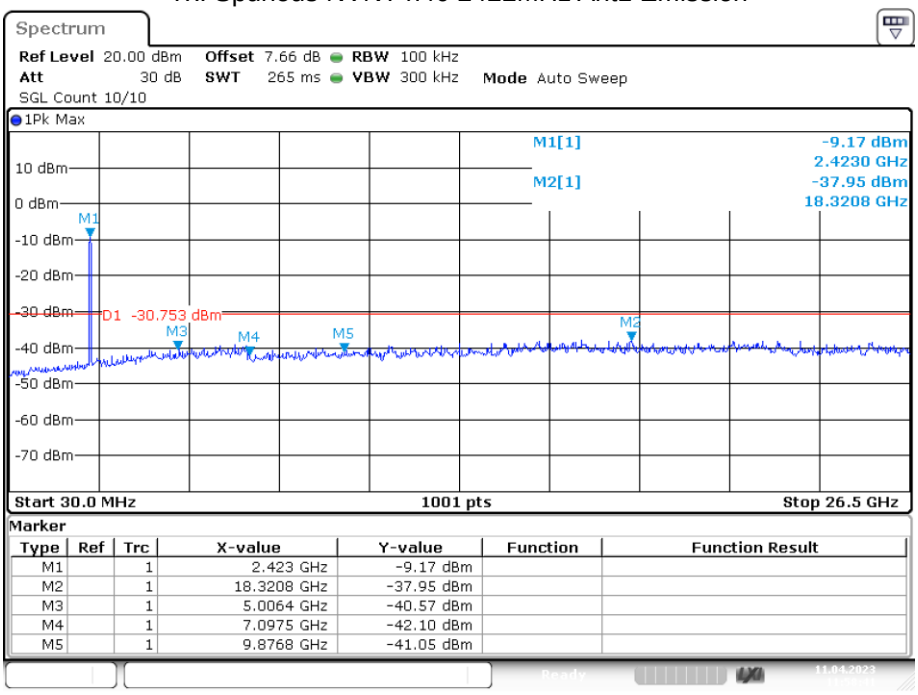
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.476 GHz	-6.61 dBm		
M2		1	15.1444 GHz	-37.29 dBm		
M3		1	4.7417 GHz	-41.36 dBm		
M4		1	7.5739 GHz	-41.24 dBm		
M5		1	9.9298 GHz	-39.82 dBm		

Date: 11.APR.2023 11:48:42

Tx. Spurious NVNT n40 2422MHz Ant1 Emission

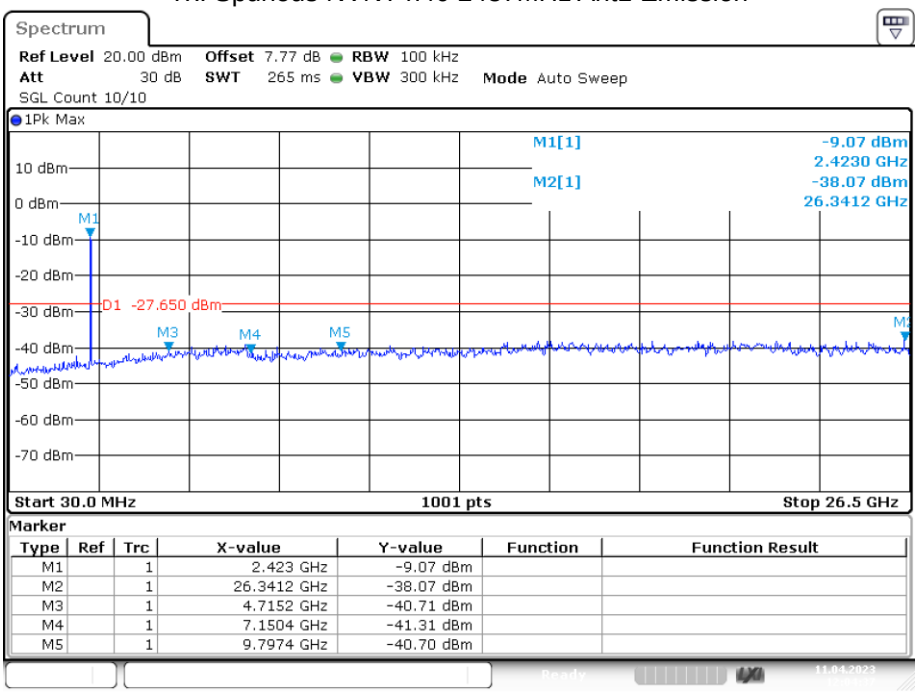


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-9.17 dBm		
M2		1	18.3208 GHz	-37.95 dBm		
M3		1	5.0064 GHz	-40.57 dBm		
M4		1	7.0975 GHz	-42.10 dBm		
M5		1	9.8768 GHz	-41.05 dBm		

Date: 11.APR.2023 11:58:41

Tx. Spurious NVNT n40 2437MHz Ant1 Emission

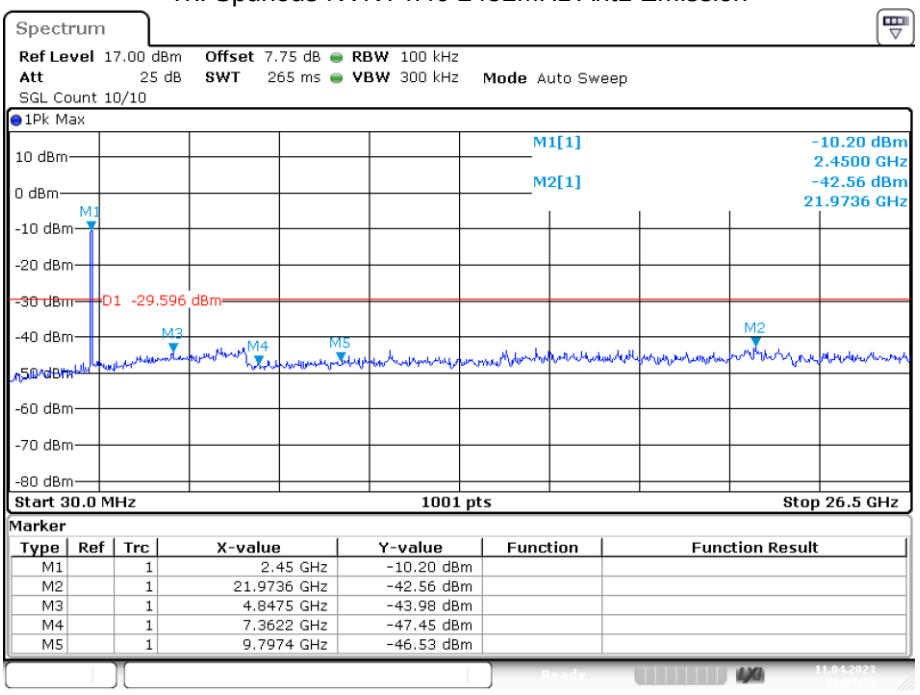


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-9.07 dBm		
M2		1	26.3412 GHz	-38.07 dBm		
M3		1	4.7152 GHz	-40.71 dBm		
M4		1	7.1504 GHz	-41.31 dBm		
M5		1	9.7974 GHz	-40.70 dBm		

Date: 11.APR.2023 12:04:37

Tx. Spurious NVNT n40 2452MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-10.20 dBm		
M2		1	21.9736 GHz	-42.56 dBm		
M3		1	4.8475 GHz	-43.98 dBm		
M4		1	7.3622 GHz	-47.45 dBm		
M5		1	9.7974 GHz	-46.53 dBm		

Date: 11.APR.2023 12:08:37

4.6 Band edge emissions

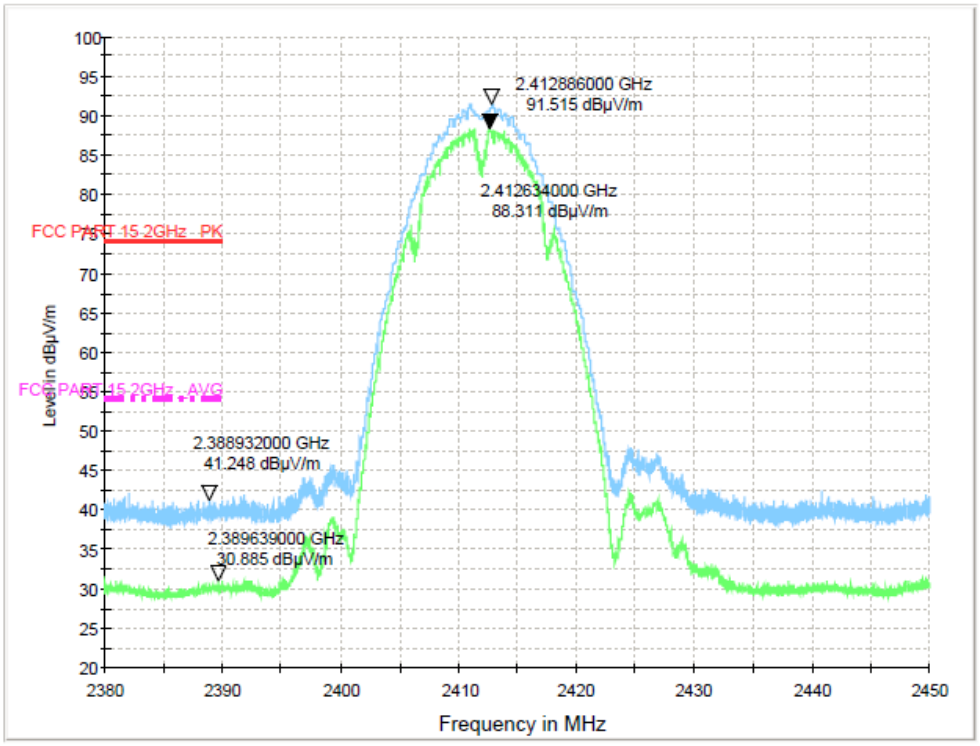
<table>
<tr><td>Test Requirement:</td><td>In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
</td></tr>
<tr><td>Test Method:</td><td>Radiated emissions tests</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2013 section 6.6.4</td></tr>
</table>

4.6.1 E.U.T. Operation:

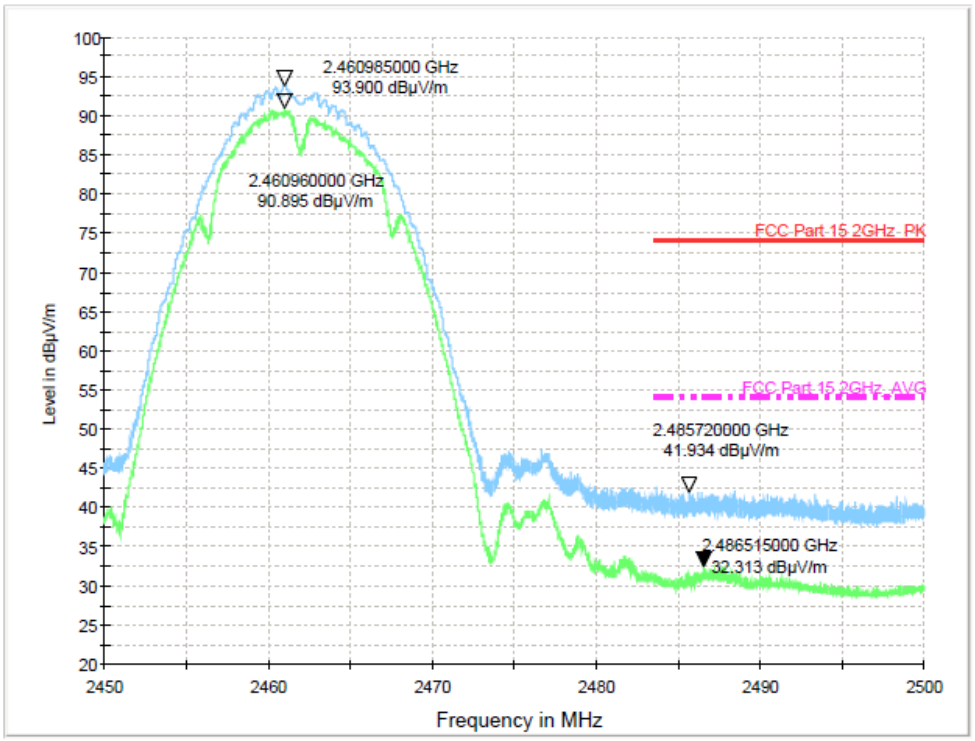
<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>23.8 °C</td><td>Humidity:</td><td>54.2 %</td><td>Atmospheric Pressure:</td><td>101.6 kPa</td></tr>
<tr><td colspan="2">Pre test mode:</td><td colspan="4">All modes</td></tr>
<tr><td colspan="2">Final test mode:</td><td colspan="4">All modes</td></tr>
</table>

4.6.2 Test Result:

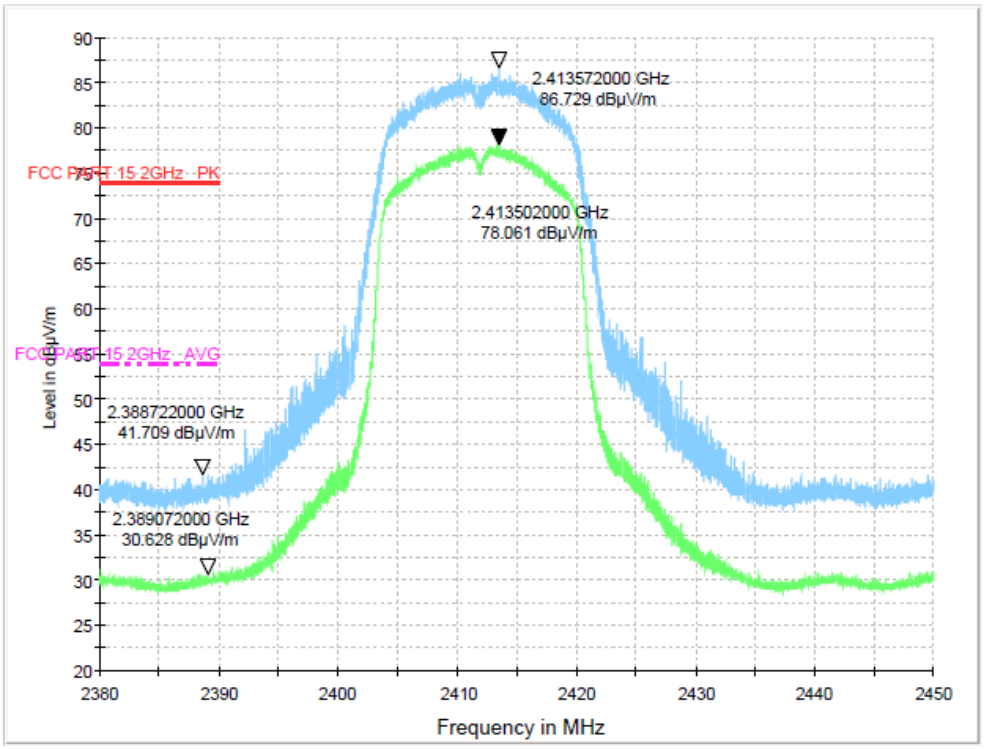
IEEE 802.11b / CH: L



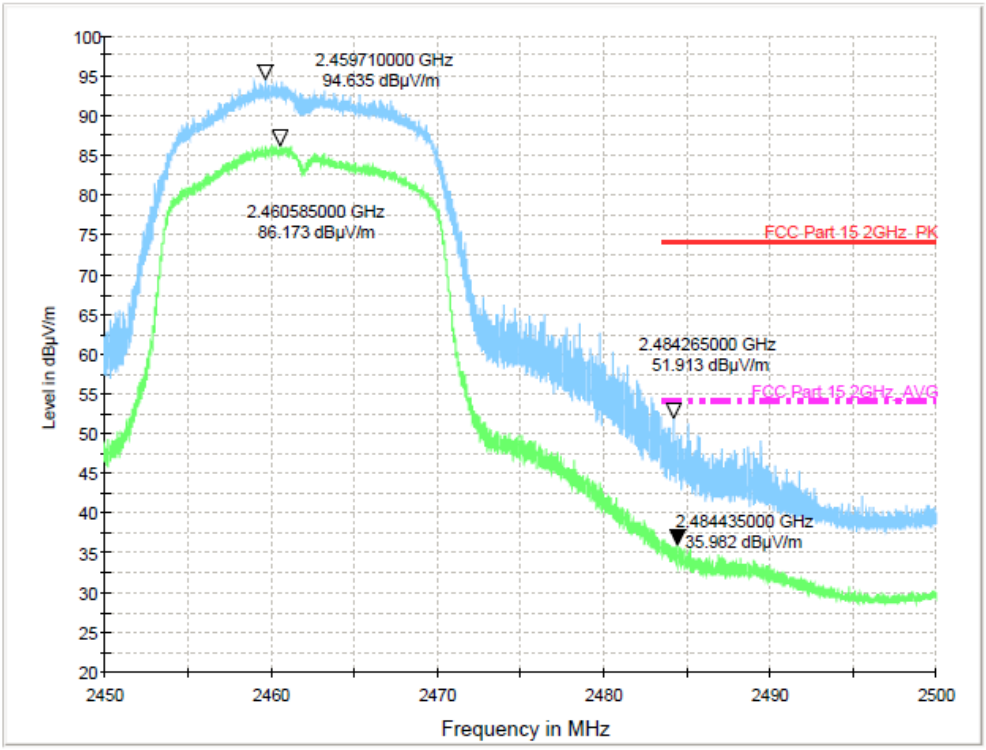
IEEE 802.11b / CH: H



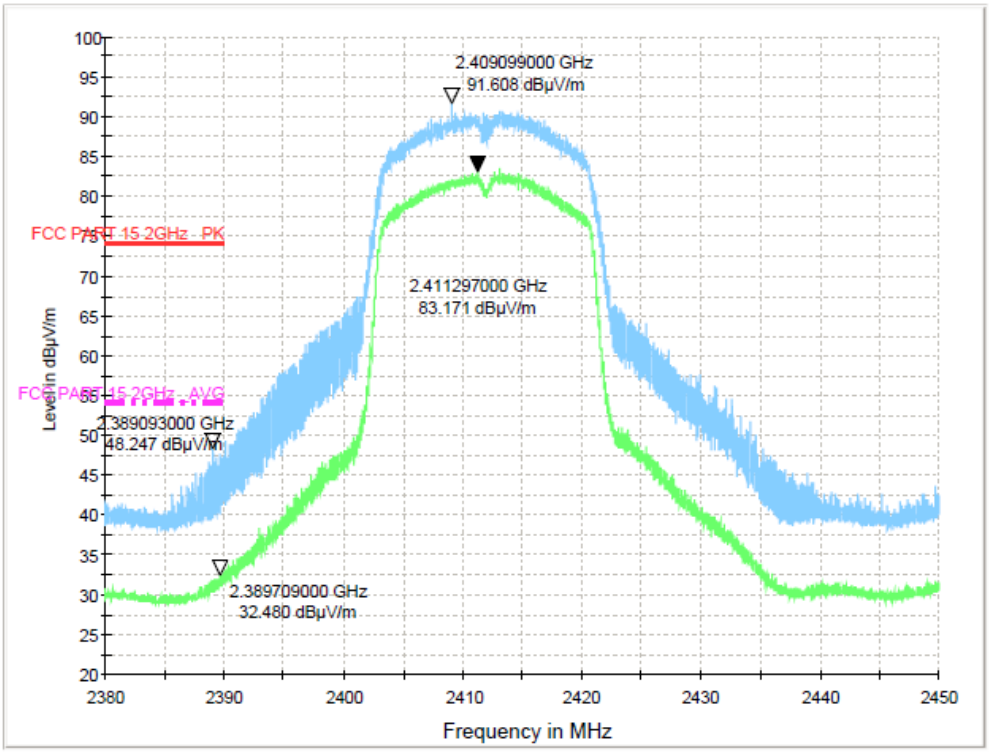
IEEE 802.11g / CH: L



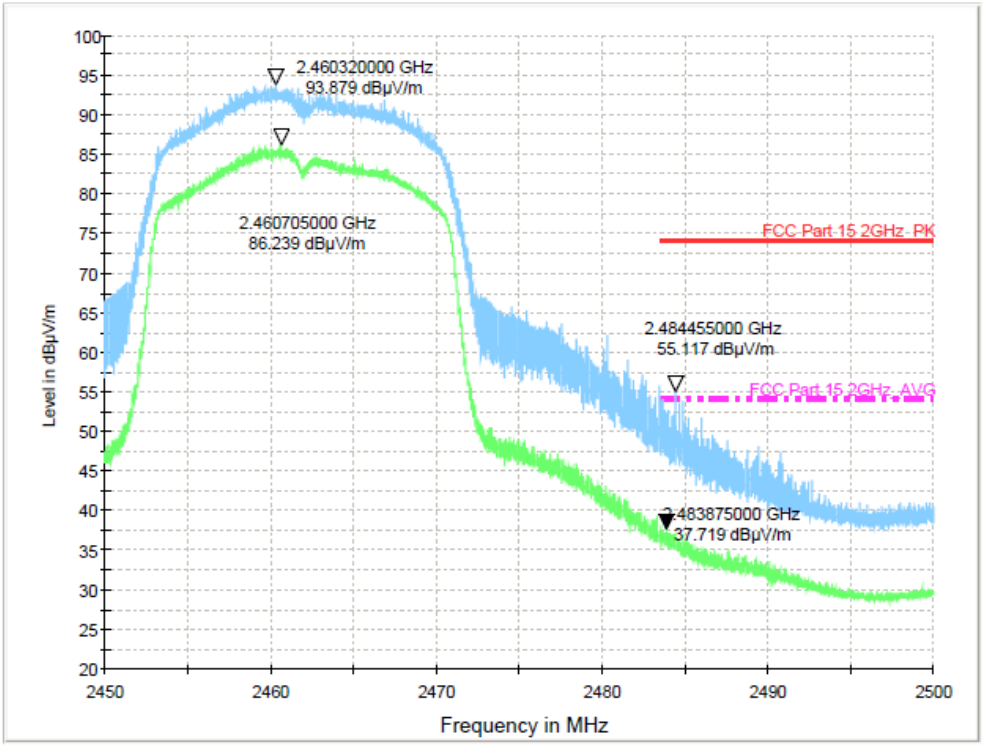
IEEE 802.11g / CH: H



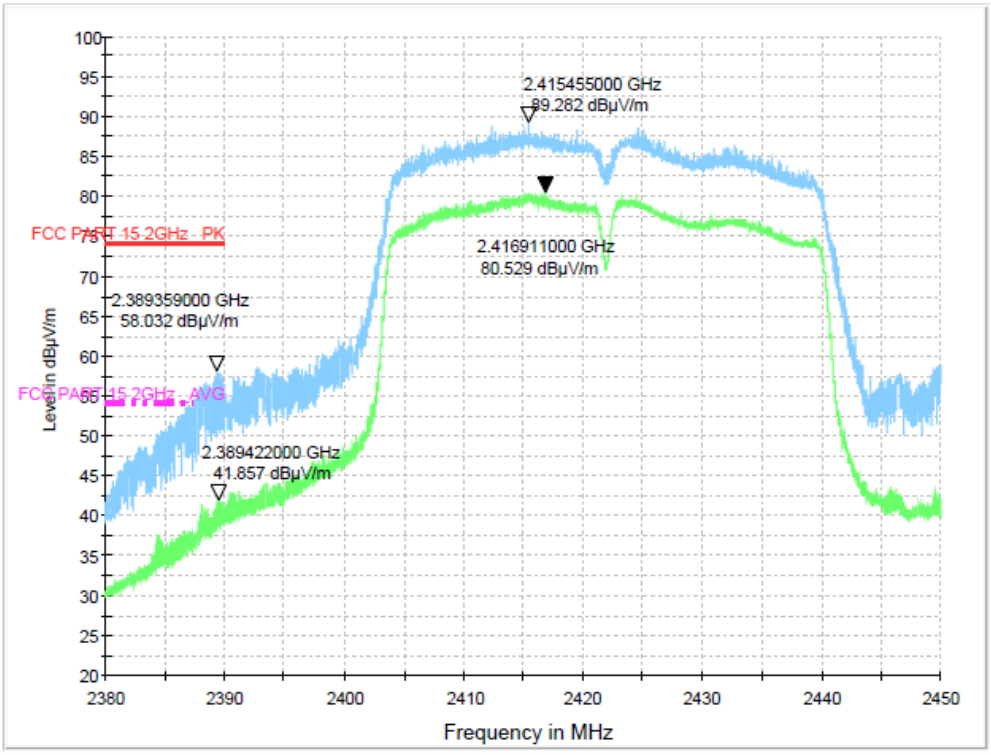
IEEE 802.11 n/HT20 / CH: L



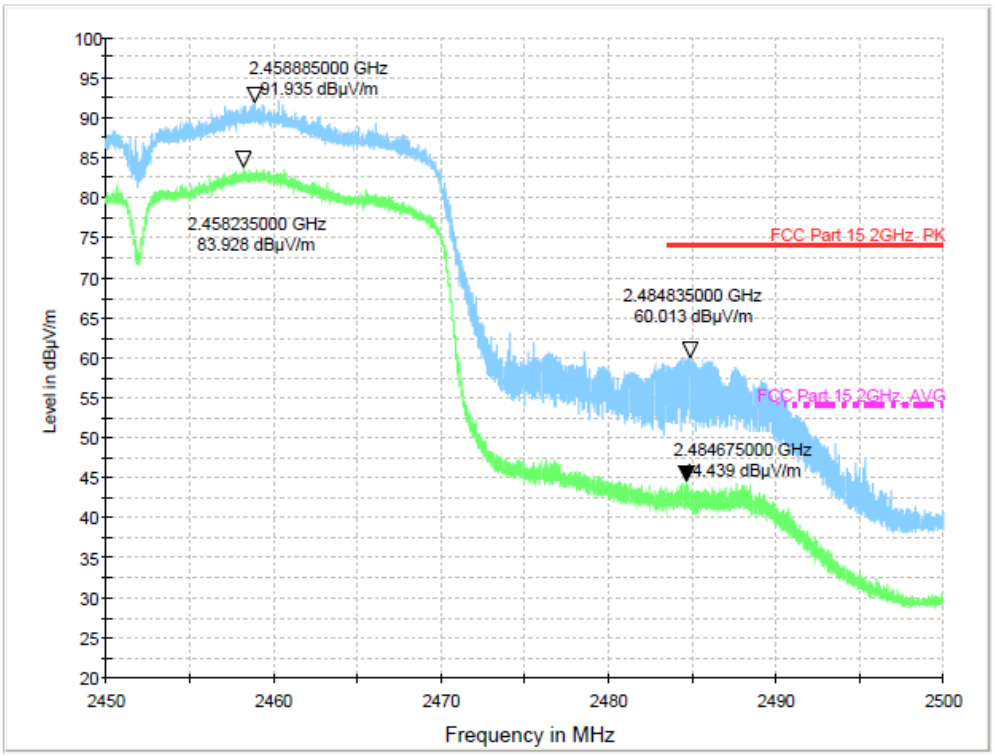
IEEE 802.11 n/HT20 / CH: H



IEEE 802.11 n/HT40 / CH: L



IEEE 802.11 n/HT40 / CH: H



4.7 Emissions in restricted frequency bands (below 1GHz)

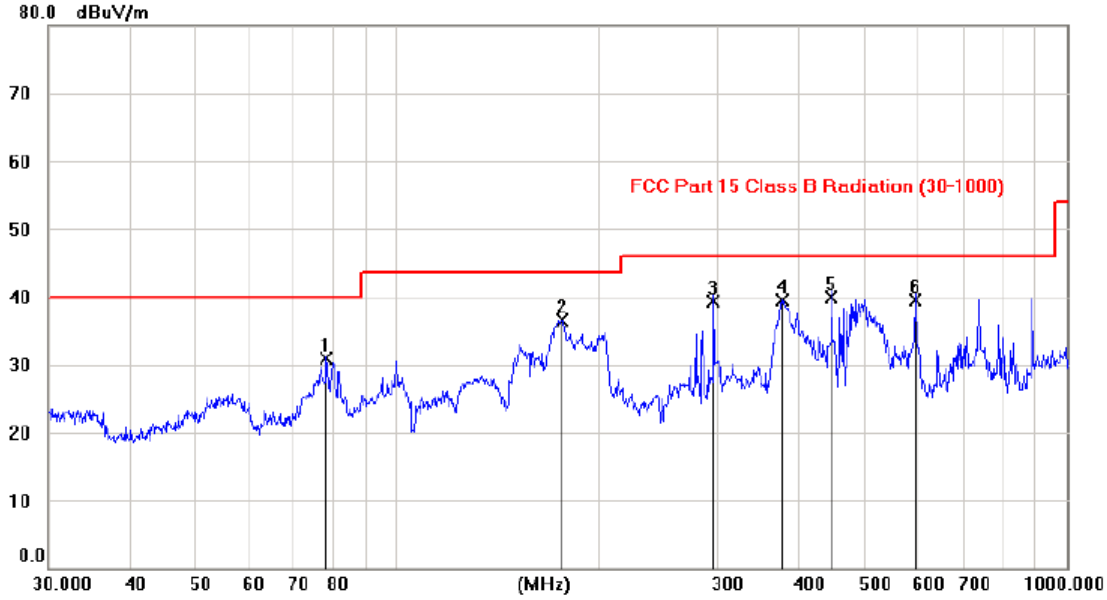
<table>
<tr><td>Test Requirement:</td><td>In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
</td></tr>
<tr><td>Test Method:</td><td>Radiated emissions tests</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2013 section 6.6.4</td></tr>
</table>

4.7.1 E.U.T. Operation:

<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>23.8 °C</td><td>Humidity:</td><td>54.2 %</td><td>Atmospheric Pressure:</td><td>101.6 kPa</td></tr>
<tr><td>Pre test mode:</td><td colspan="5">All modes</td></tr>
<tr><td>Final test mode:</td><td colspan="5">IEEE 802.11b</td></tr>
</table>

4.7.2 Test Result:

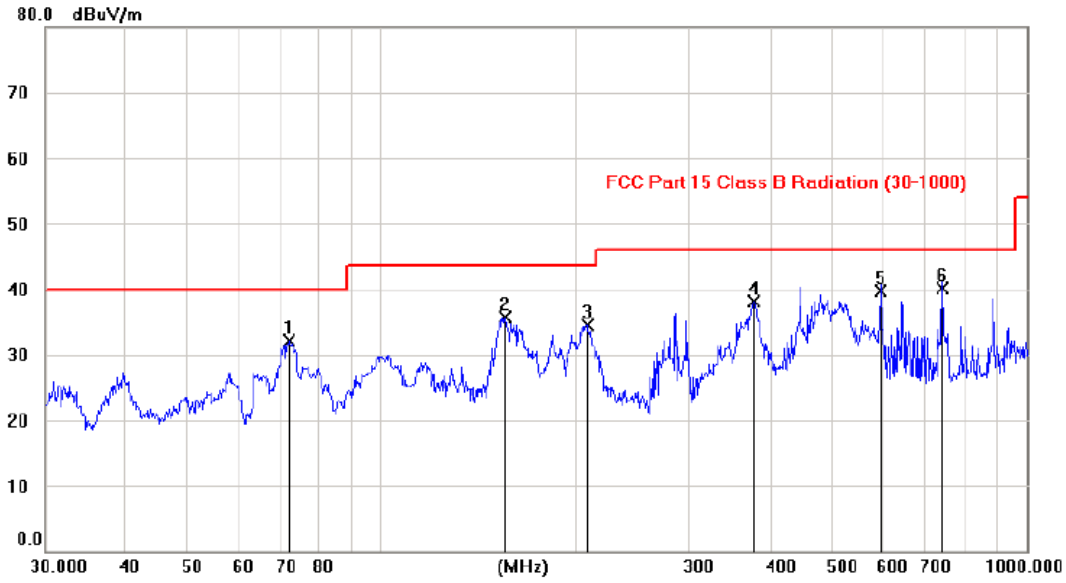
IEEE 802.11b / Polarization: Horizontal / CH: L



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		78.3217	20.90	10.10	31.00	40.00	-9.00	peak			
2		175.9598	23.25	13.25	36.50	43.50	-7.00	peak			
3		296.7033	25.21	14.03	39.24	46.00	-6.76	QP			
4		375.4553	23.70	15.79	39.49	46.00	-6.51	peak			
5	*	445.0593	22.43	17.45	39.88	46.00	-6.12	QP			
6		593.3962	19.45	20.09	39.54	46.00	-6.46	QP			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

IEEE 802.11b / Polarization: Vertical / CH: L



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		71.8991	21.06	11.11	32.17	40.00	-7.83	peak			
2		155.1647	20.68	15.05	35.73	43.50	-7.77	peak			
3		208.5800	23.54	11.05	34.59	43.50	-8.91	peak			
4		377.4796	22.17	15.84	38.01	46.00	-7.99	peak			
5		593.4655	19.65	20.09	39.74	46.00	-6.26	QP			
6	*	741.8250	17.76	22.29	40.05	46.00	-5.95	QP			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Note: All modes have been tested, and only worst data was listed in this report.

4.8 Emissions in restricted frequency bands (above 1GHz)

<table>
<tr><td>Test Requirement:</td><td>In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
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<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
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<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
</td></tr>
<tr><td>Test Method:</td><td>Radiated emissions tests</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2013 section 6.6.4</td></tr>
</table>

4.8.1 E.U.T. Operation:

<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>23.8 °C</td><td>Humidity:</td><td>54.2 %</td><td>Atmospheric Pressure:</td><td>101.6 kPa</td></tr>
<tr><td colspan="2">Pre test mode:</td><td colspan="4">All modes</td></tr>
<tr><td colspan="2">Final test mode:</td><td colspan="4">All modes</td></tr>
</table>

4.8.2 Test Result:

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	45.71	V	33.95	10.18	34.26	55.58	74	-18.42	PK
4824	34.93	V	33.95	10.18	34.26	44.80	54	-9.20	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	43.37	H	33.95	10.18	34.26	53.24	74	-20.76	PK
4824	35.08	H	33.95	10.18	34.26	44.95	54	-9.05	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX Mid									
4874	46.44	V	33.93	10.2	34.29	56.28	74	-17.72	PK
4874	33.08	V	33.93	10.2	34.29	42.92	54	-11.08	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.96	H	33.93	10.2	34.29	55.80	74	-18.20	PK
4874	32.22	H	33.93	10.2	34.29	42.06	54	-11.94	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX High									
4924	44.63	V	33.98	10.22	34.25	54.58	74	-19.42	PK
4924	34.09	V	33.98	10.22	34.25	44.04	54	-9.96	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	45.71	H	33.98	10.22	34.25	55.66	74	-18.34	PK
4924	34.03	H	33.98	10.22	34.25	43.98	54	-10.02	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	43.39	V	33.95	10.18	34.26	53.26	74	-20.74	PK
4824	37.07	V	33.95	10.18	34.26	46.94	54	-7.06	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	46.08	H	33.95	10.18	34.26	55.95	74	-18.05	PK
4824	36.08	H	33.95	10.18	34.26	45.95	54	-8.05	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX Mid									
4874	46.59	V	33.93	10.2	34.29	56.43	74	-17.57	PK
4874	34.28	V	33.93	10.2	34.29	44.12	54	-9.88	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.71	H	33.93	10.2	34.29	55.55	74	-18.45	PK
4874	32.07	H	33.93	10.2	34.29	41.91	54	-12.09	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX High									
4924	46.63	V	33.98	10.22	34.25	56.58	74	-17.42	PK
4924	37.19	V	33.98	10.22	34.25	47.14	54	-6.86	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	49.51	H	33.98	10.22	34.25	59.46	74	-14.54	PK
4924	32.53	H	33.98	10.22	34.25	42.48	54	-11.52	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

Note:

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

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

Test Mode: IEEE 802.11n HT20 TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4824	45.49	V	33.95	10.18	34.26	55.36	74	-18.64	PK
4824	35.85	V	33.95	10.18	34.26	45.72	54	-8.28	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	45.93	H	33.95	10.18	34.26	55.80	74	-18.20	PK
4824	35.44	H	33.95	10.18	34.26	45.31	54	-8.69	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX Mid									
4874	46.57	V	33.93	10.2	34.29	56.41	74	-17.59	PK
4874	31.98	V	33.93	10.2	34.29	41.82	54	-12.18	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.30	H	33.93	10.2	34.29	57.14	74	-16.86	PK
4874	34.51	H	33.93	10.2	34.29	44.35	54	-9.65	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT20 TX High									
4924	46.34	V	33.98	10.22	34.25	56.29	74	-17.71	PK
4924	35.94	V	33.98	10.22	34.25	45.89	54	-8.11	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	46.29	H	33.98	10.22	34.25	56.24	74	-17.76	PK
4924	35.39	H	33.98	10.22	34.25	45.34	54	-8.66	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	44.58	V	33.95	10.18	34.26	54.45	74	-19.55	PK
4844	34.14	V	33.95	10.18	34.26	44.01	54	-9.99	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
4844	43.51	H	33.95	10.18	34.26	53.38	74	-20.62	PK
4844	35.15	H	33.95	10.18	34.26	45.02	54	-8.98	AV
7266	/	/	/	/	/	/	/	/	/
9688	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX Mid									
4874	44.14	V	33.93	10.2	34.29	53.98	74	-20.02	PK
4874	33.68	V	33.93	10.2	34.29	43.52	54	-10.48	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	44.42	H	33.93	10.2	34.29	54.26	74	-19.74	PK
4874	34.94	H	33.93	10.2	34.29	44.78	54	-9.22	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11n HT40 TX High									
4904	45.08	V	33.98	10.22	34.25	55.03	74	-18.97	PK
4904	34.71	V	33.98	10.22	34.25	44.66	54	-9.34	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/
4904	48.16	H	33.98	10.22	34.25	58.11	74	-15.89	PK
4904	35.99	H	33.98	10.22	34.25	45.94	54	-8.06	AV
7356	/	/	/	/	/	/	/	/	/
9808	/	/	/	/	/	/	/	/	/

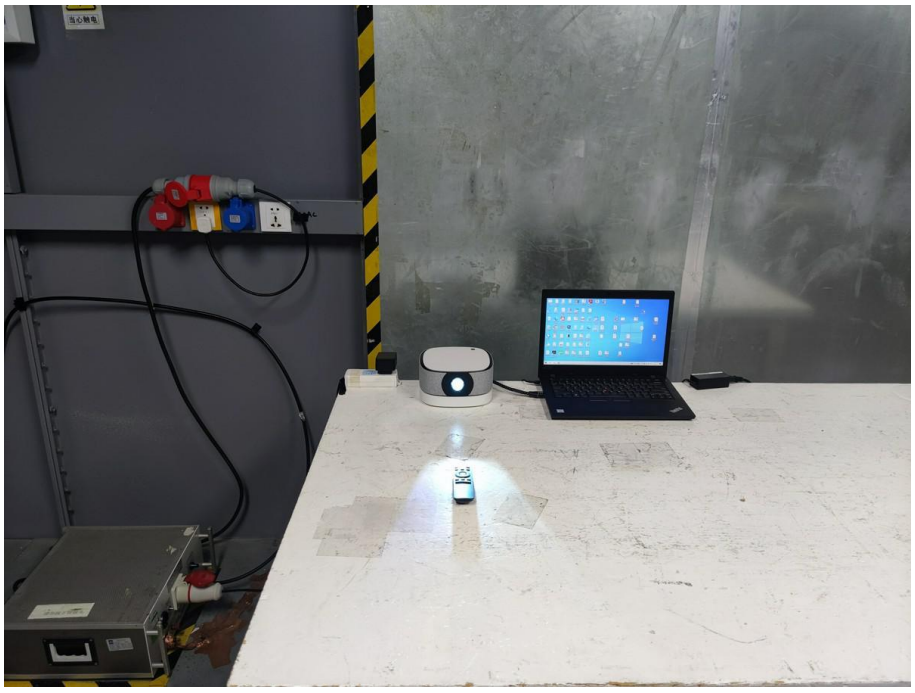
Note:

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.

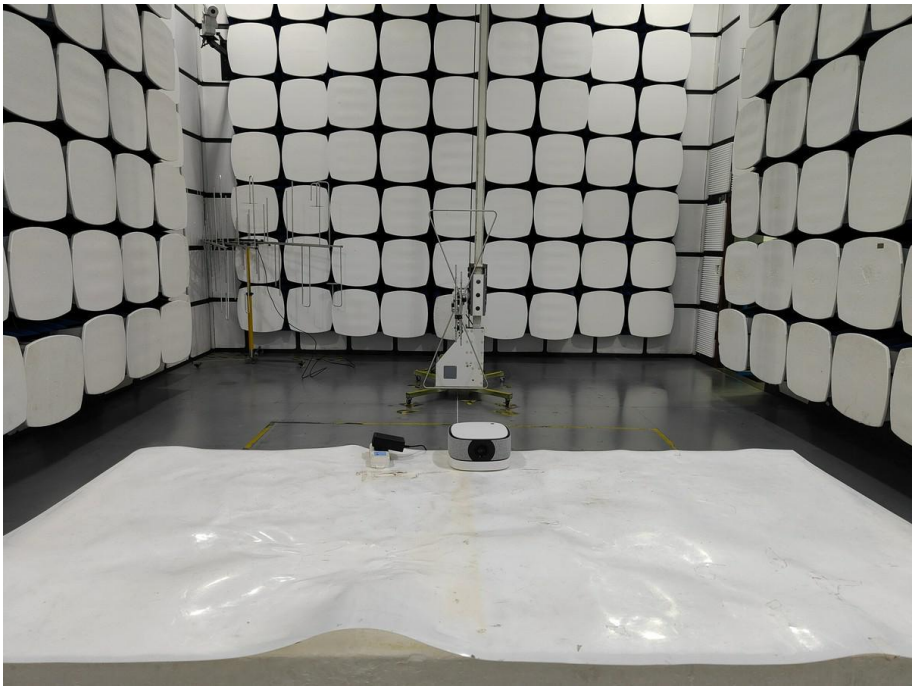
5 Test Setup Photos

Conducted Emission at AC power line



Band edge emissions (Radiated)
Emissions in restricted frequency bands (above 1GHz)

Emissions in restricted frequency bands (below 1GHz)



6 EUT Constructional Details (EUT Photos)

Please refer to the report A2303044-C01-R01.

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