



TEST REPORT

APPLICANT : Justice Tech Solutions, LLC

PRODUCT NAME : Dock station

MODEL NAME : securebook 6DSW

BRAND NAME : Justice Tech Solutions

FCC ID : 2AS4KJTS-SEBOOK6DS

STANDARD(S) : 47 CFR Part 15 Subpart C

RECEIPT DATE : 2022-10-11

TEST DATE : 2022-10-18 to 2022-11-09

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Change History		
Version	Date	Reason for change
1.0	2022-11-30	First edition

1. Summary of Test Result

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	N/A	Duty Cycle of Test Signal	Oct. 18, 2022	Su Xiaoxian	PASS	No deviation
3	15.247(b)	Maximum Peak Conducted Output Power	Oct. 19, 2022	Su Xiaoxian	PASS	No deviation
4	15.247(b)	Maximum Average Conducted Output Power	Oct. 19, 2022	Su Xiaoxian	PASS	No deviation
5	15.247(a)	Bandwidth	Oct. 23, 2022	Su Xiaoxian	PASS	No deviation
6	15.247(d)	Conducted Spurious Emission and Band Edge	Oct. 23, 2022	Su Xiaoxian	PASS	No deviation
7	15.247(e)	Power Spectral Density	Oct. 23, 2022	Su Xiaoxian	PASS	No deviation
8	15.207	Conducted Emission	Oct. 21, 2022	Fan Zehang	PASS	No deviation
9	15.247(d)	Restricted Frequency Bands	Oct. 21, 2022 Nov. 06, 2022	Su Zhan	PASS	No deviation
10	15.209, 15.247(d)	Radiated Emission	Oct. 25, 2022	Su Zhan	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013 and KDB558074 D01 v05r02.

Note 2: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 3: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.



1.1. Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart C Radio Frequency Devices



1.2. Test Equipment List

1.2.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2022.03.01	2023.02.28
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial Cable	CB02	RF02	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.2.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2022.03.03	2023.03.02
LISN	8127449	NSLK 8127	Schwarzbeck	2022.03.03	2023.03.02
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2022.07.06	2023.07.05
Coaxial Cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

1.2.3 List of Software Used

Description	Manufacturer	Software Version
Test System	MaiWei	2.0.0.0
Morlab EMCR V1.2	Morlab	V1.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0

**1.2.4 Radiated Test Equipments**

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2022.07.06	2023.07.05
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2022.05.25	2025.05.24
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2022.02.11	2025.02.10
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2022.07.13	2025.07.12
Test Antenna – Horn	BBHA9170#773	BBHA 9170	Schwarzbeck	2022.07.14	2025.07.13
Coaxial Cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-40GHz)	CB05	EMC05	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L3203	Tonscend	2022.07.08	2023.07.07
18-26.5GHz pre-Amplifier	46732	S10M100L3802	Tonscend	2022.07.08	2023.07.07
26-40GHz pre-Amplifier	56774	S40M400L4002	Tonscend	2022.07.08	2023.07.07
Notch Filter	N/A	WRCG-2400-2483.5-60SS	Wainwright	2022.07.08	2023.07.07
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05



1.3. Measurement Uncertainty

Test Items	Uncertainty	Remark
Peak Output Power	±2.22dB	Confidence levels of 95%
Power Spectral Density	±2.22dB	Confidence levels of 95%
Bandwidth	±5%	Confidence levels of 95%
Conducted Spurious Emission	±2.77dB	Confidence levels of 95%
Restricted Frequency Bands	±5%	Confidence levels of 95%
Radiated Emission	±2.95dB	Confidence levels of 95%
Conducted Emission	±2.44dB	Confidence levels of 95%

1.4. Testing Laboratory

Laboratory Name	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone	+86 755 36698555
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2. General Description

2.1. Information of Applicant and Manufacturer

Applicant	Justice Tech Solutions, LLC
Applicant Address	13530 Fifth Street , Chino , CA
Manufacturer	Justice Tech Solutions, LLC
Manufacturer Address	13530 Fifth Street , Chino , CA

2.2. Information of EUT

Product Name:	Dock station
Sample No.:	2#
Hardware Version:	N/A
Software Version:	N/A
Modulation Technology:	DSSS, OFDM
Modulation Type:	Refer to section1.3
Wireless Technology:	802.11b, 802.11g, 802.11n (HT20), 802.11n (HT40)
Operating Frequency Range:	2412MHz–2472MHz
Antenna Type:	FPC Antenna
Antenna Gain:	ANT 0: 2.94dBi; ANT 1: 4.09dBi
Directional Gain:	7.10dBi _{Note 2}

Note 1: The EUT supports a MIMO function. Physically, the EUT provides two completed transmitters and two receivers for 802.11n modulation mode.

Modulation Mode:	TX Function
802.11b/g	1TX
802.11n	2TX

Note 2: According to KDB 662911 D01, the directional gain = $G_{ANT} + 10\log(N_{ANT})$ dBi, where G_{ANT} is the maximum antenna gain in dBi, N_{ANT} is the number of outputs.

Note 3: For conducted test item Conducted Output Power and Power Spectral Density of each modulation mode, we recorded the test result of two antennas separately, for other conducted test items both of the two antennas were tested separately, we only recorded the worst test result (ANT 0) in this report.

Note 4: All radiation test items for 802.11n modulation mode operate at MIMO mode during the test. Other modulation mode operate at SISO mode, both of the two antennas were tested separately, we only recorded the worst test result(ANT 0) in this report.

Note 5: We use the dedicated software to control the EUT continuous transmission.



Note 6: For a more detailed description, please refer to Specification or User’s Manual supplied by the applicant and/or manufacturer.

2.3. Channel List of EUT

Test Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11b/g/n (HT20)	1	2412	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442		
Test Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11n (HT40)	3	2422	8	2447
	4	2427	9	2452
	5	2432	10	2457
	6	2437	11	2462
	7	2442		

Note 1: The black bold channels were selected for test.

2.4. Test Configuration of EUT

2.4.1. Modulation Type and Data Rate of EUT

Mode	Bandwidth (MHz)	Modulation Technology	Modulation Type	Data Rate	RU Size
802.11b	20	DSSS	DBPSK	1/2/5.5/11Mbps	N/A
			DQPSK		
			CCK		
802.11g	20	OFDM	BPSK	6/9/12/18/24/36/48/54 Mbps	N/A
			QPSK		
			16QAM		
			64QAM		
802.11n	20/40 (HT20/40)	OFDM	BPSK	MCS0~MCS7	N/A
			QPSK		
			16QAM		
			64QAM		

Note1: The worst-case mode (bold face) in all data rates has been determined during the pre-scan, only the test data of the worst-case were recorded in this report.

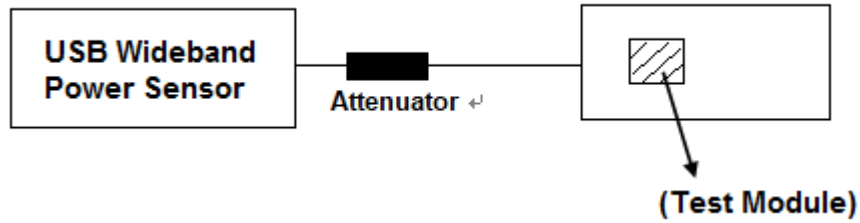
2.5. Test Conditions

Temperature (°C)	15-35
Relative Humidity (%)	30-60
Atmospheric Pressure (kPa)	86-106

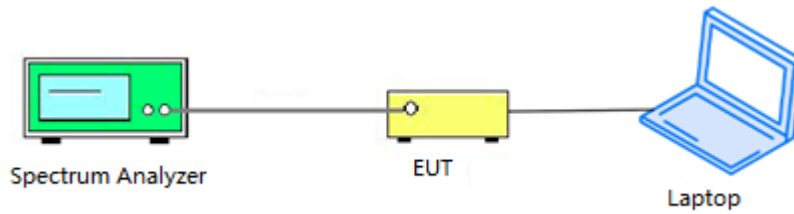
2.6. Test Setup Layout Diagram

2.6.1. Conducted Measurement

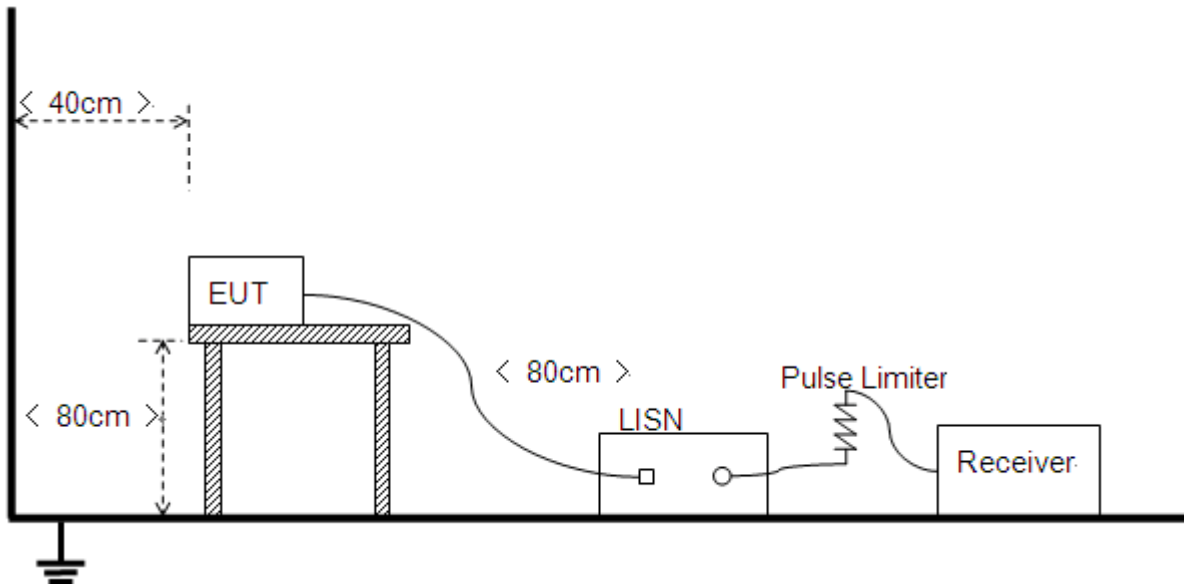
Power item



Other items

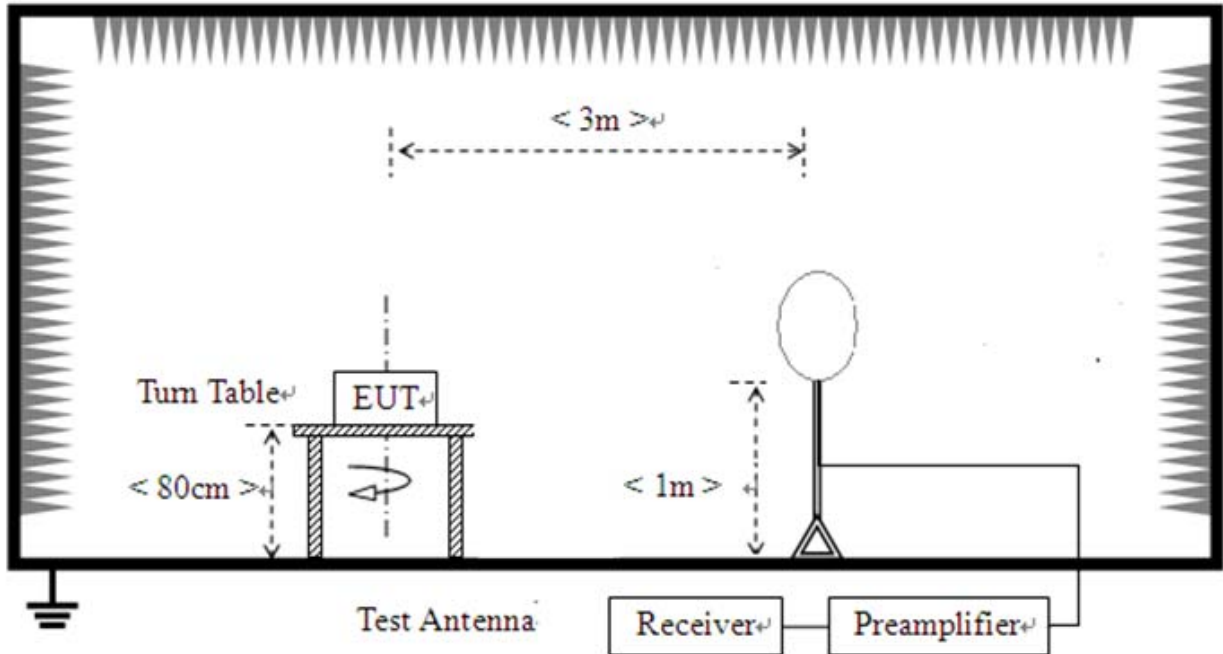


2.6.2. Conducted Emission Measurement

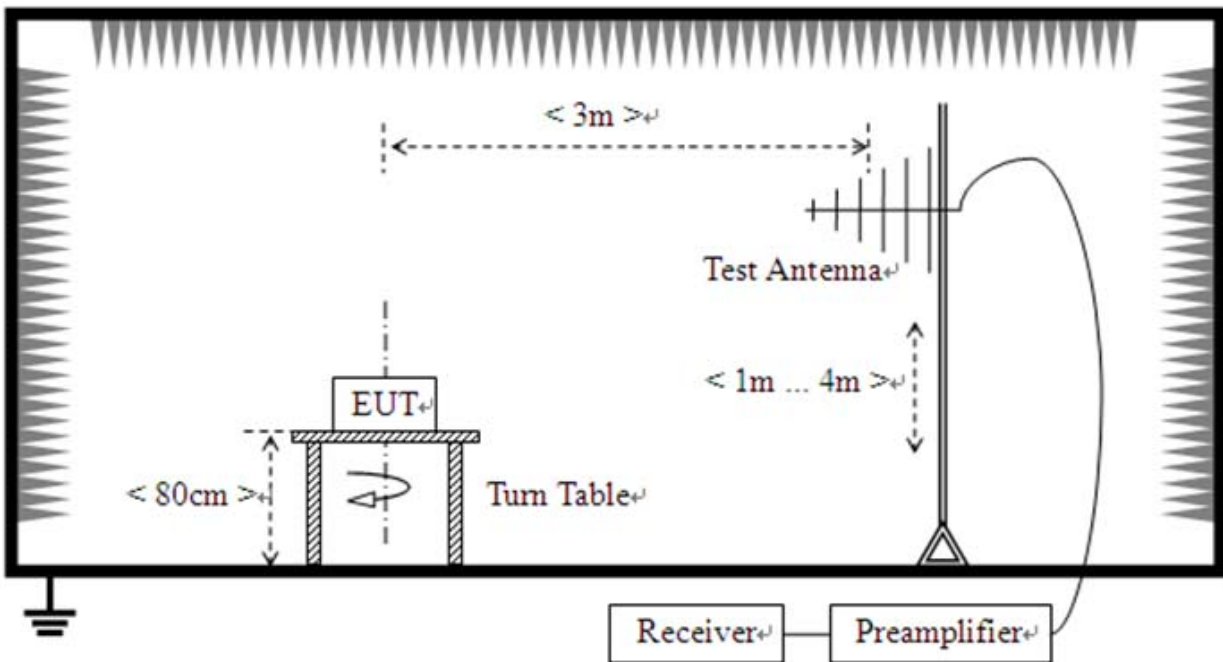


2.6.3.Radiation Measurement

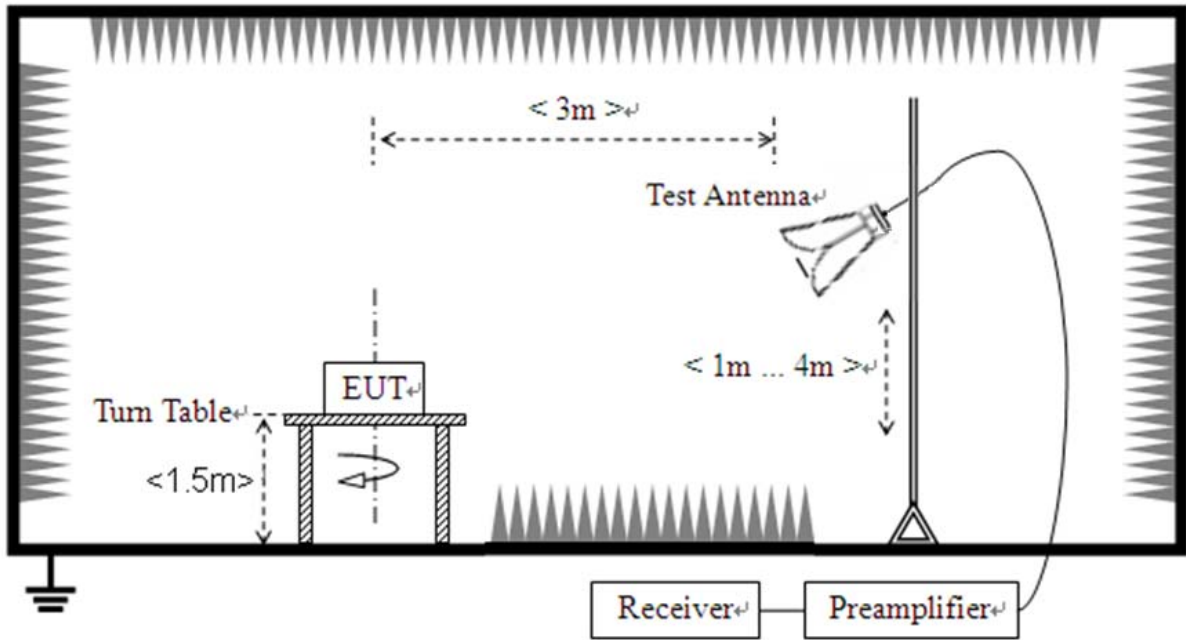
1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to 1GHz



3) For radiated emissions above 1GHz





3. Test Results

3.1. Antenna Requirement

3.1.1. Requirement

According to FCC 15.203, 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.

3.1.2. Test Result

Inside of the EUT has a FPC antenna coupled with the I-PEX connector. Please refer to the EUT internal photos.



3.2. Duty Cycle of Test Signal

3.2.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this sub clause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than $\pm 2\%$; otherwise, the duty cycle is considered to be non constant.

3.2.2. Test Result

Refer to Annex A.1 in this report.



3.3. Maximum Peak and Average Conducted Output Power

3.3.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum conducted output power of the intentional radiator shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in above of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2. Test Procedures

The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

3.3.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.3.4. Test Result

Refer to Annex A.2 and A.3 in this report.



3.4.6 dB Bandwidth

3.4.1.Requirement

According to FCC section 15.247(a) (2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

3.4.1.Test Procedures

KDB 558074 Section 8.2 was used in order to prove compliance.

3.4.2.Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.4.3.Test Result

Refer to Annex A.4 in this report.



3.5. Conducted Spurious Emissions and Band Edge

3.5.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

3.5.2. Test Procedures

KDB 558074 Section 8.5 and 8.7 was used in order to prove compliance.

3.5.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.5.4. Test Result

Refer to Annex A.5 and A.6 in this report.



3.6. Power Spectral Density

3.6.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm 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.

3.6.2. Test Procedures

The measured power spectral density was calculated by the reading of the spectrum analyzer and calibration. Following is the test procedure for PSD test:

- a) Set analyzer center frequency to channel center frequency
- b) Set span to 1.5 times DTS
- c) Set RBW to 30kHz
- d) Set VBW to 100kHz
- e) Detector = peak
- f) Sweep time = auto couple
- g) Trace mode = max hold
- h) Allow trace to fully stabilize
- i) Use the peak marker function to determine the maximum amplitude level and recorded as PD
- j) Use below formula to calculate the Conducted PSD value that at specified RBW:

Conducted PSD = PD - 10lg(30k/3k)

3.6.3. Test Setup Layout

Refer to chapter 2.6.1 in this report.

3.6.4. Test Result

Refer to Annex A.7 in this report.

3.7. Conducted Emission

3.7.1. Requirement

According to FCC section 15.207, 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.7.2. Test Procedures

The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

3.7.3. Test Setup Layout

Refer to chapter 2.6.2 in this report.

3.7.4. Test Result

Refer to Annex A.8 in this report.



3.8. Restricted Frequency Bands

3.8.1. Requirement

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

3.8.2. Test Procedures

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1\text{GHz}$, 100 kHz for $f < 1\text{GHz}$

VBW = 3 MHz

Sweep = auto

Detector function = peak/average

Trace = max hold

Allow the trace to stabilize

3.8.3. Test Setup Layout

Refer to chapter 2.6.3 in this report.

3.8.4. Test Result

Refer to Annex A.9 in this report.



3.9. Radiated Emission

3.9.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note1: For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

Note2: For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK). In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).



3.9.2. Test Procedures

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

3.9.3. Test Setup Layout

Refer to chapter 2.6.3 in this report.

3.9.4. Test Result

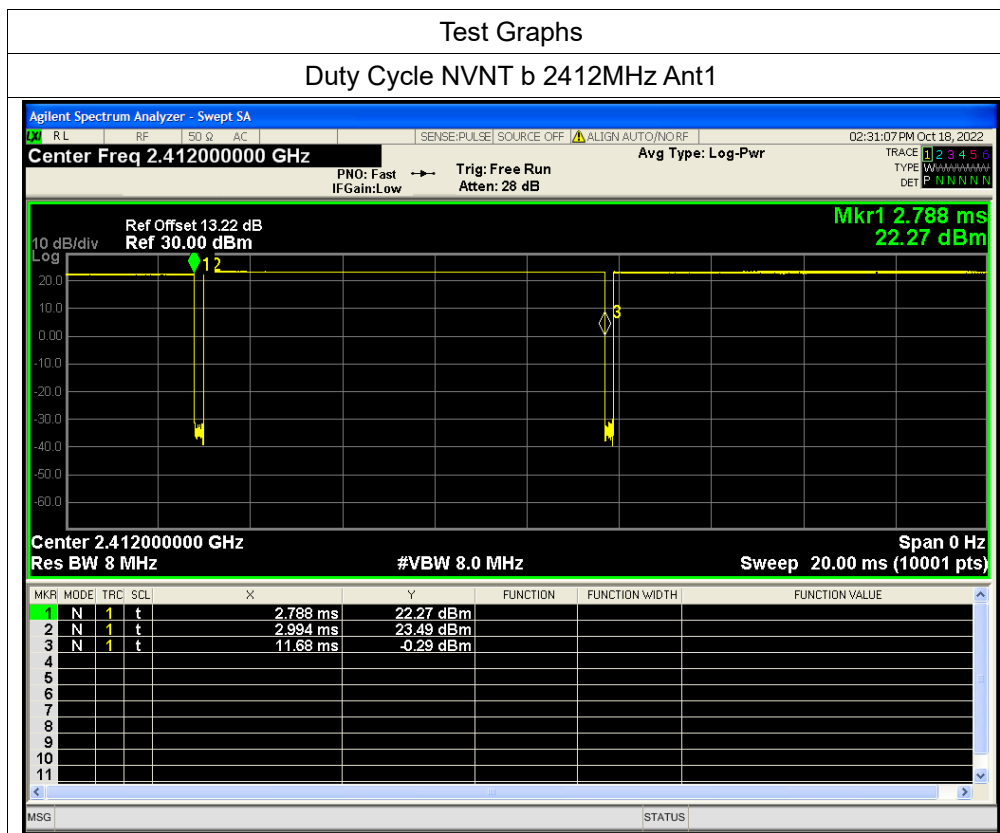
Refer to Annex A.10 in this report.

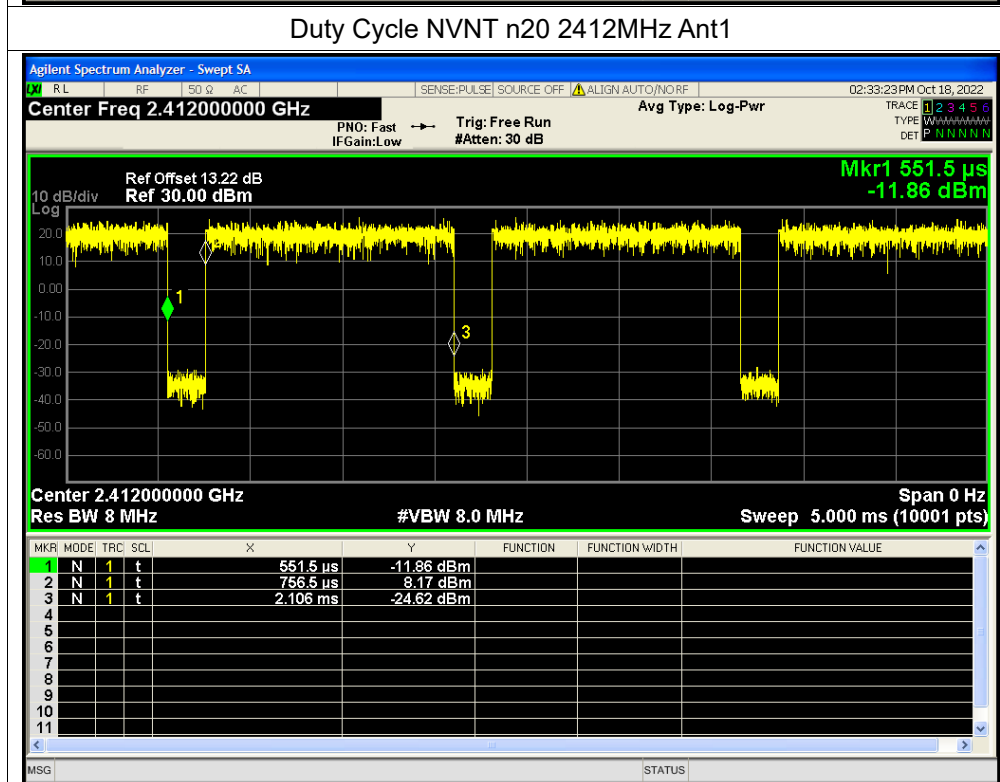
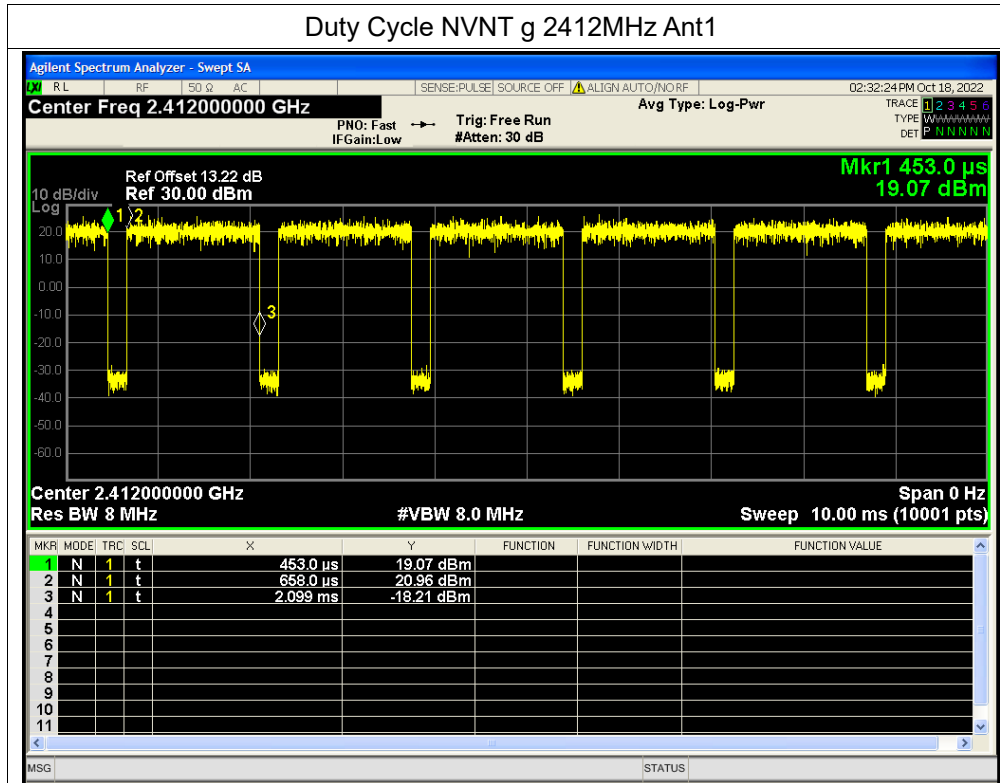


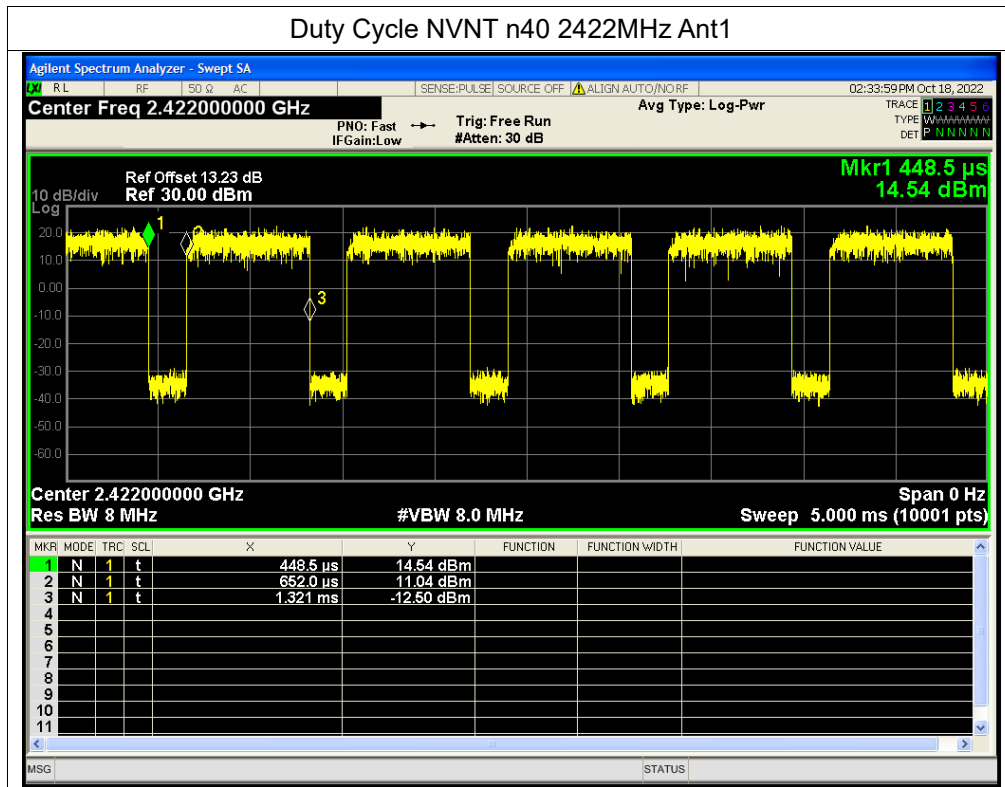
Annex A Test Data and Result

A.1. Duty Cycle of Test Signal

Condition	Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	b	2412	Ant1	97.68	0.1	0.12
NVNT	g	2412	Ant1	87.55	0.58	0.69
NVNT	n20	2412	Ant1	86.81	0.61	0.74
NVNT	n40	2422	Ant1	76.66	1.15	1.5









A.2. Maximum Peak Conducted Output Power

Maximum Peak Conducted Output Power

802.11b Mode

Channel	Frequency (MHz)	Measured Peak Power				Limit (dBm)		Verdict
		ANT 0		ANT 1		dBm	W	
		dBm	W	dBm	W			
1	2412	19.96	0.099	20.74	0.119	30	1	PASS
7	2442	19.70	0.093	20.75	0.119			PASS
13	2472	19.75	0.094	20.48	0.112			PASS

802.11g Mode

Channel	Frequency (MHz)	Measured Peak Power				Limit (dBm)		Verdict
		ANT 0		ANT 1		dBm	W	
		dBm	W	dBm	W			
1	2412	21.07	0.128	23.35	0.216	30	1	PASS
7	2442	21.56	0.143	23.72	0.236			PASS
13	2472	22.11	0.163	23.83	0.242			PASS

802.11n (HT20) Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
1	2412	20.76	21.73	24.28	0.268	28.90	0.77	PASS
7	2442	21.38	22.53	25.00	0.316			PASS
13	2472	21.52	21.56	24.55	0.285			PASS

Note: Directional gain = $4.09\text{dBi} + 10\log(2) = 7.10\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30 - (7.10 - 6) = 28.90\text{dBm}$

802.11n (HT40) Mode

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Total Power (dBm)	Total Power (W)	Limit		Verdict
		ANT 0	ANT 1			dBm	W	
3	2422	20.07	22.54	24.49	0.281	28.90	0.77	PASS
7	2442	20.37	22.29	24.44	0.278			PASS
11	2462	20.77	22.97	25.02	0.318			PASS

Note: Directional gain = $4.09\text{dBi} + 10\log(2) = 7.10\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30 - (7.10 - 6) = 28.90\text{dBm}$



A.3. Maximum Average Conducted Output Power

802.11b Mode

Frequency (MHz)	Average Power						Limit		Verdict	
	Measured		Duty Factor	Duty factor Calculated						
	ANT 0	ANT 1		ANT 0		ANT 1				
	dBm	dBm		dBm	W	dBm	W	dBm		W
2412	17.09	17.50	0.10	17.19	0.052	17.60	0.058	30	1	PASS
2442	16.70	17.42		16.80	0.048	17.52	0.056			PASS
2472	16.52	17.19		16.62	0.046	17.29	0.054			PASS

802.11g Mode

Frequency (MHz)	Average Power						Limit		Verdict	
	Measured		Duty Factor	Duty factor Calculated						
	ANT 0	ANT 1		ANT 0		ANT 1				
	dBm	dBm		dBm	W	dBm	W	dBm		W
2412	13.32	13.98	0.58	13.90	0.025	14.56	0.029	30	1	PASS
2442	13.27	13.94		13.85	0.024	14.52	0.028			PASS
2472	13.56	13.77		14.14	0.026	14.35	0.027			PASS

802.11n (HT20) Mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0	ANT 1		dBm	W			
	dBm	dBm		dBm	W			
2412	12.87	12.69	0.61	16.43	0.044	28.90	0.77	PASS
2442	12.82	12.54		16.33	0.043			PASS
2472	12.71	12.77		16.33	0.043			PASS

Note: Directional gain = 4.09dBi + 10log(2) = 7.10dBi > 6dBi, so the power limit shall be reduced to 30-(7.10-6) = 28.90dBm



802.11n (HT40) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT 0	ANT 1		dBm	W			
	dBm	dBm						
2422	12.62	12.38	1.15	16.43	0.044	28.90	0.77	PASS
2442	12.36	12.41		16.33	0.043			PASS
2462	12.12	12.46		16.33	0.043			PASS
<p>Note: Directional gain = 4.09dBi +10log(2) =7.10dBi > 6dBi, so the power limit shall be reduced to 30-(7.10-6) = 28.90dBm</p>								

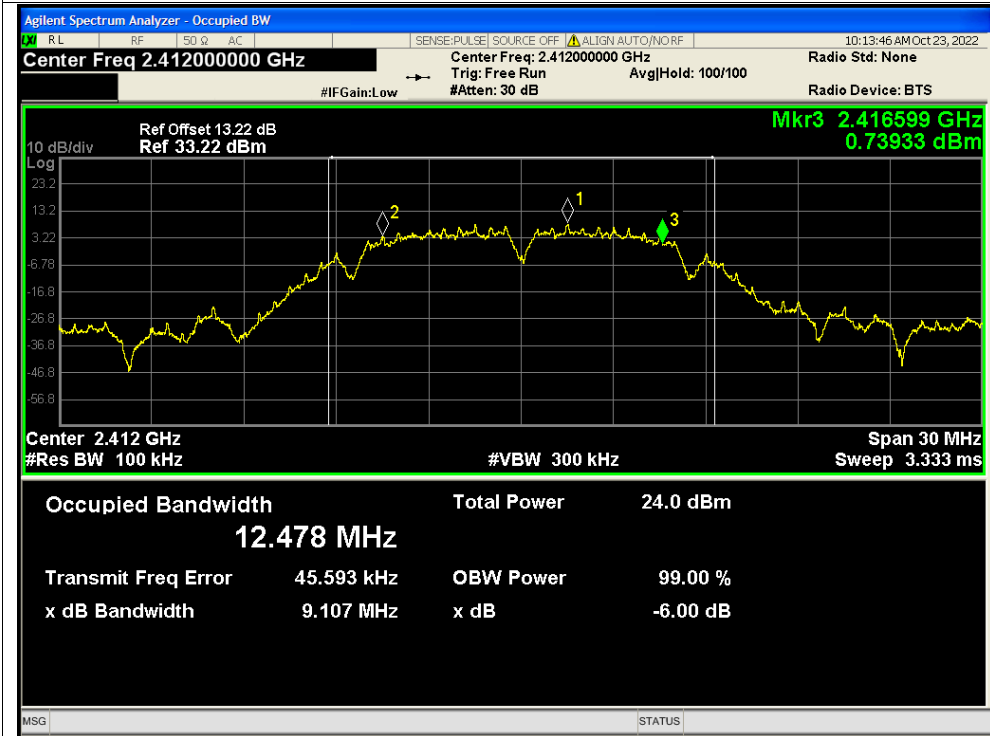
**A.4. 6 dB Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	b	2412	Ant1	9.107	0.5	Pass
NVNT	b	2442	Ant1	9.77	0.5	Pass
NVNT	b	2472	Ant1	9.572	0.5	Pass
NVNT	g	2412	Ant1	15.457	0.5	Pass
NVNT	g	2442	Ant1	16.045	0.5	Pass
NVNT	g	2472	Ant1	16.292	0.5	Pass
NVNT	n20	2412	Ant1	16.898	0.5	Pass
NVNT	n20	2442	Ant1	17.319	0.5	Pass
NVNT	n20	2472	Ant1	16.26	0.5	Pass
NVNT	n40	2422	Ant1	35.063	0.5	Pass
NVNT	n40	2442	Ant1	35.122	0.5	Pass
NVNT	n40	2462	Ant1	35.336	0.5	Pass

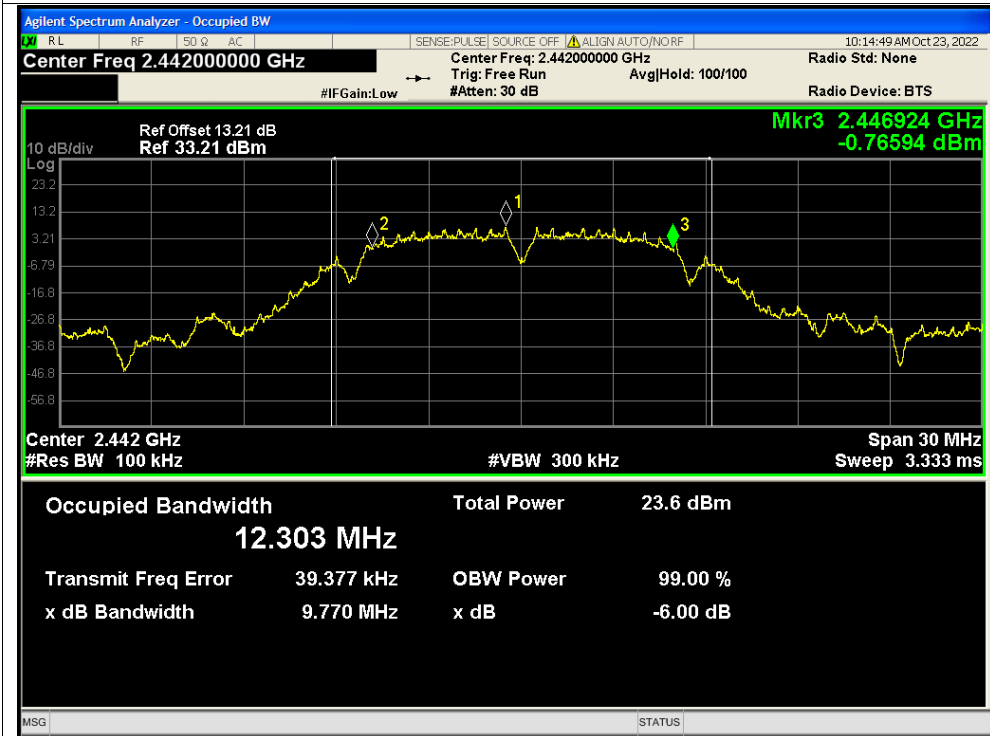


Test Graphs

-6dB Bandwidth NVNT b 2412MHz Ant1

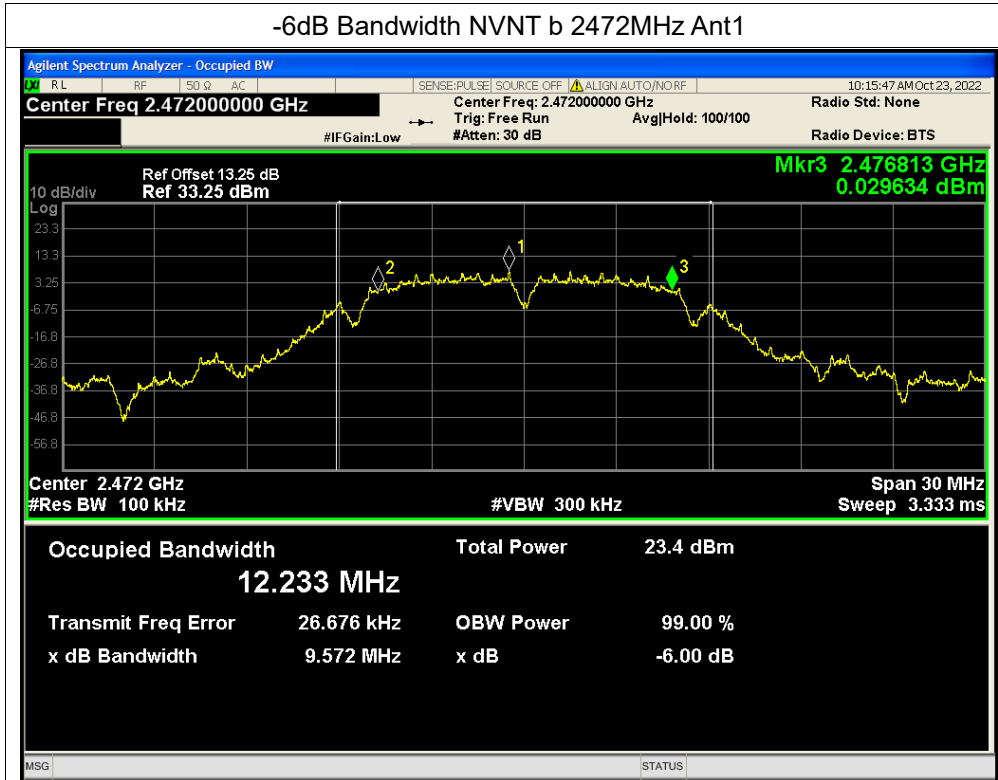


-6dB Bandwidth NVNT b 2442MHz Ant1

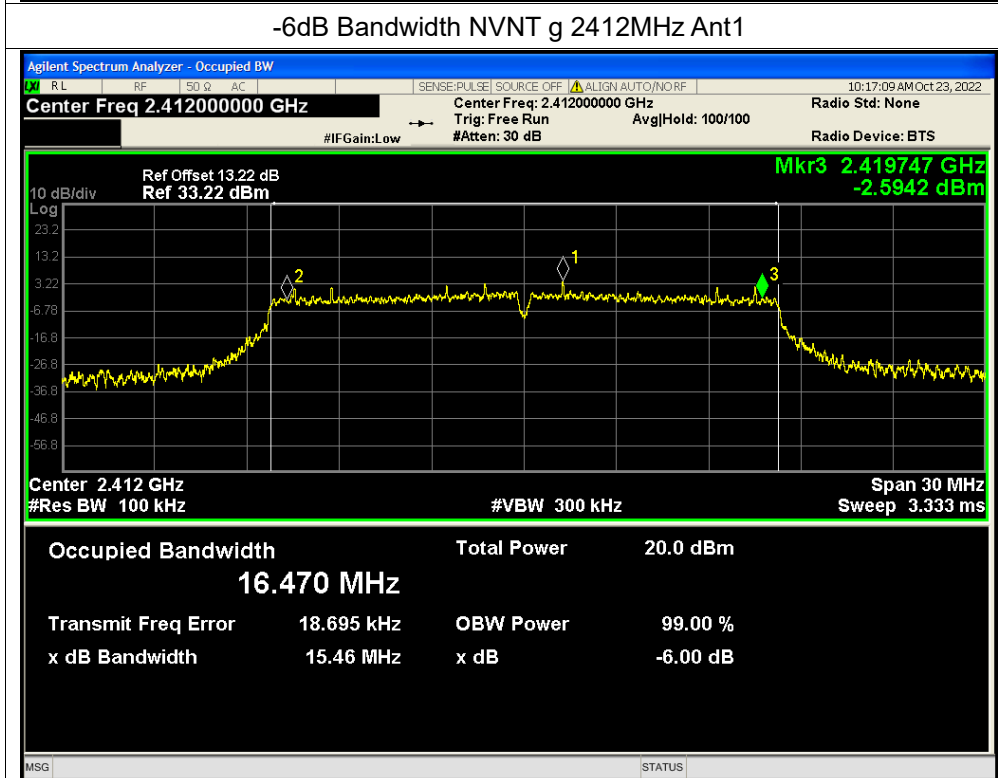




-6dB Bandwidth NVNT b 2472MHz Ant1

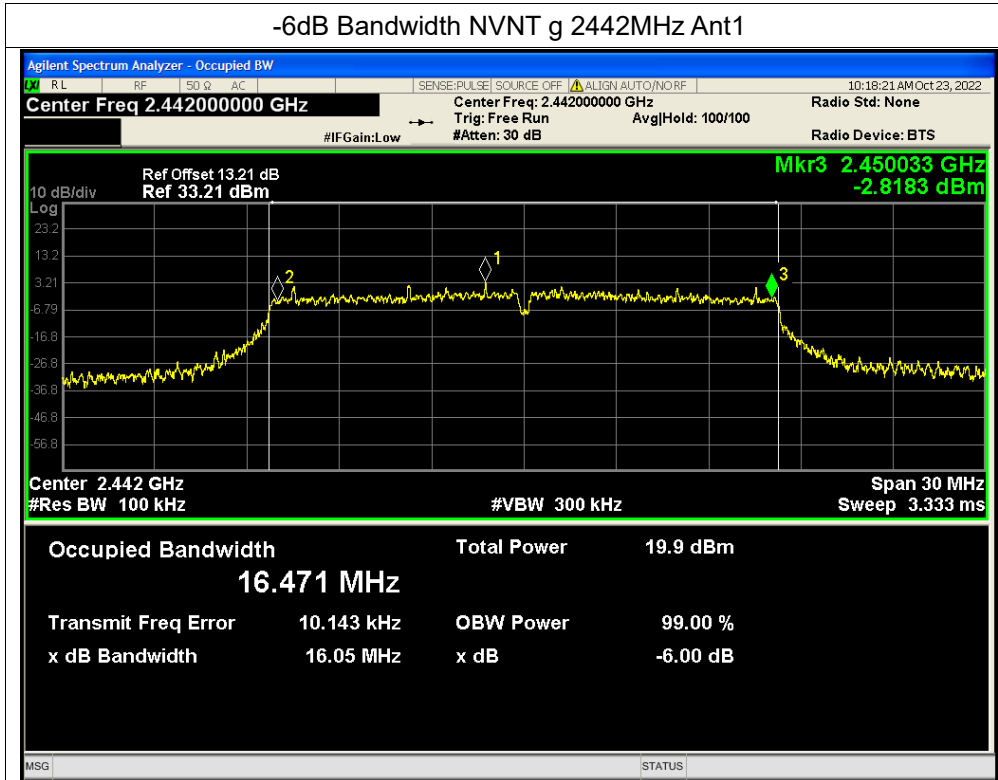


-6dB Bandwidth NVNT g 2412MHz Ant1

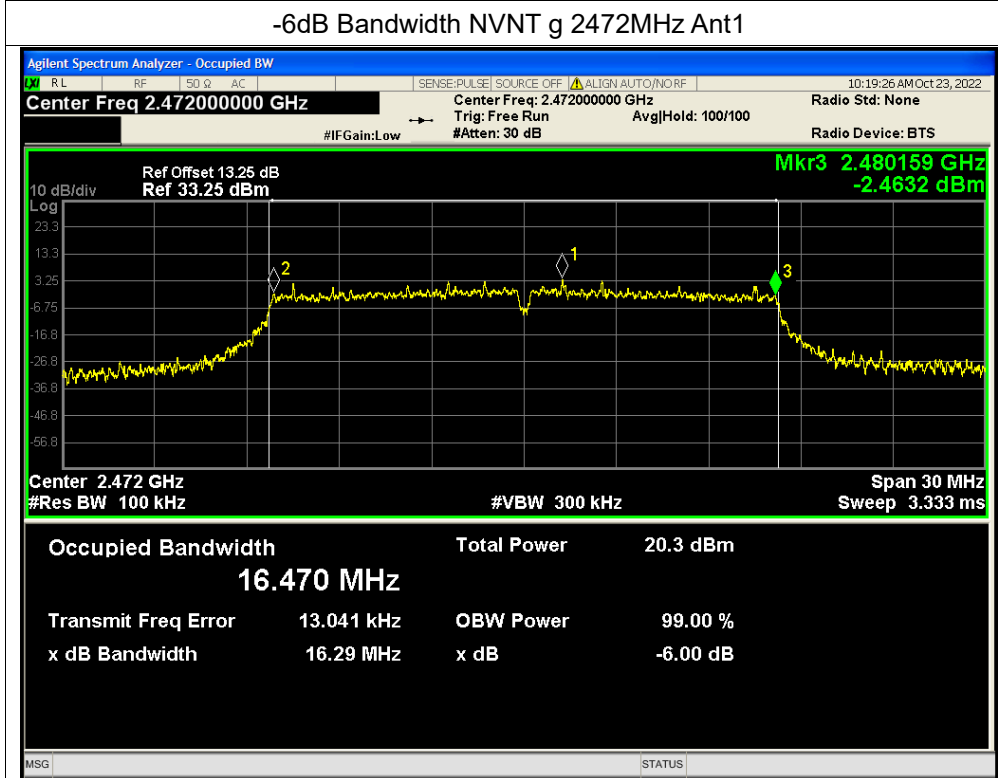




-6dB Bandwidth NVNT g 2442MHz Ant1

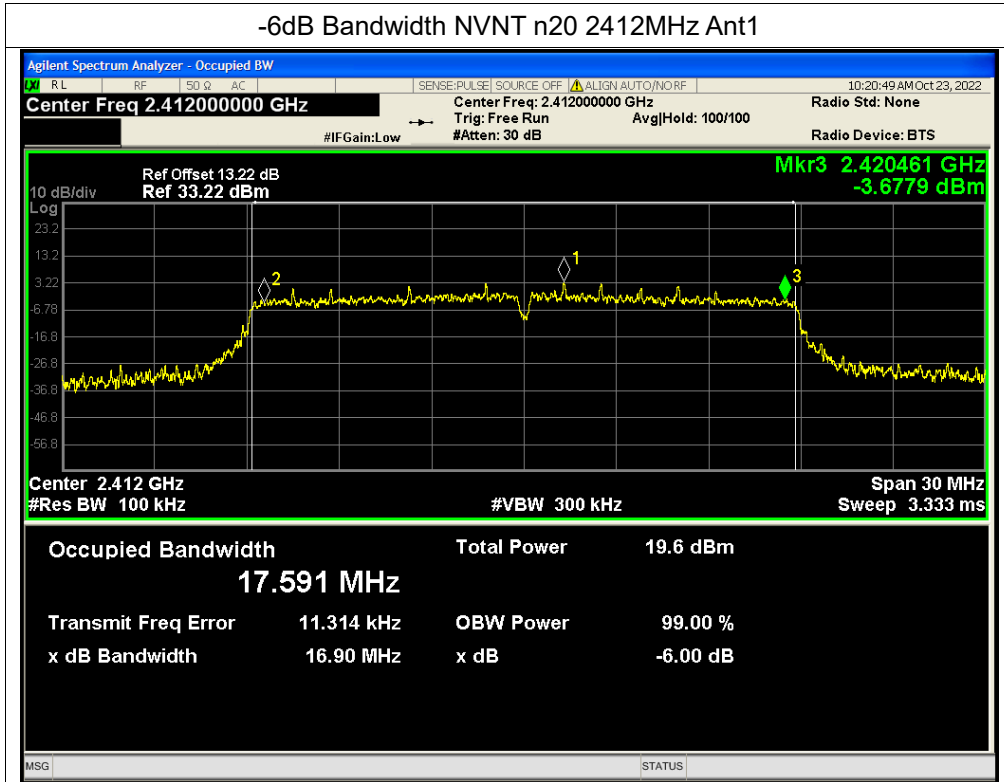


-6dB Bandwidth NVNT g 2472MHz Ant1

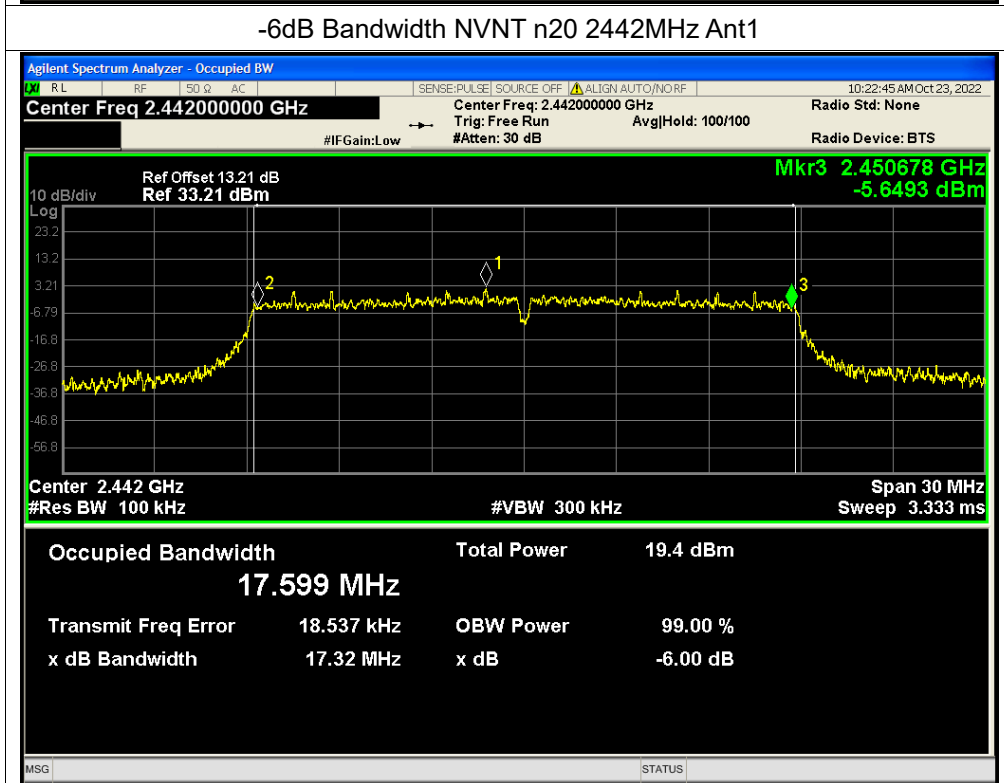




-6dB Bandwidth NVNT n20 2412MHz Ant1

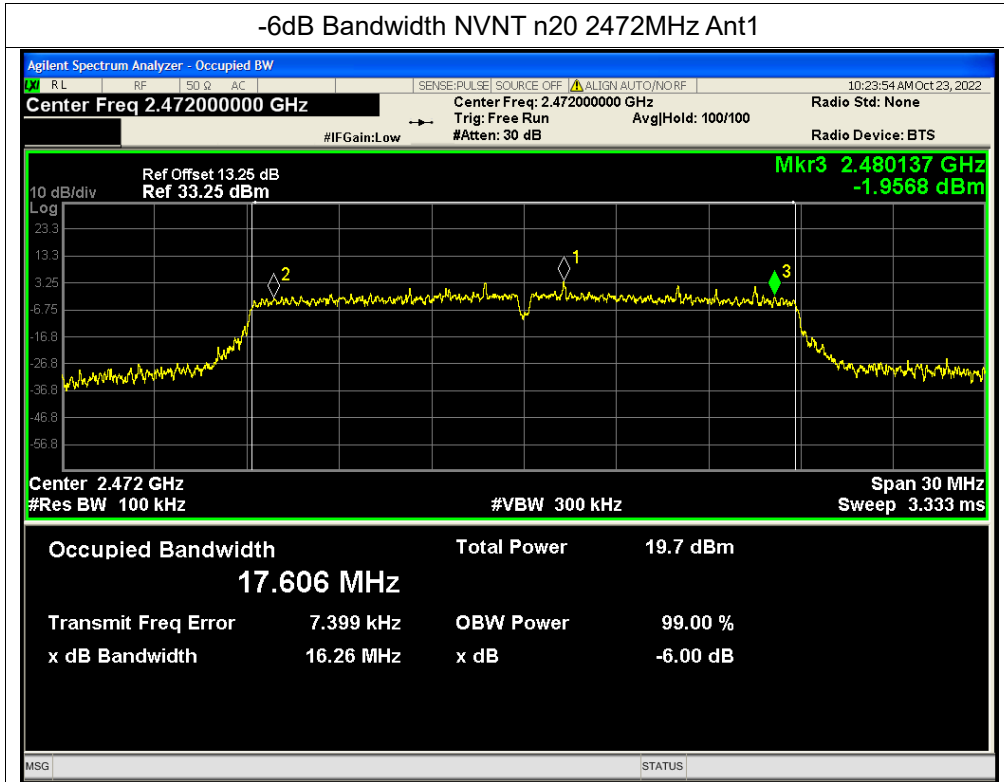


-6dB Bandwidth NVNT n20 2442MHz Ant1

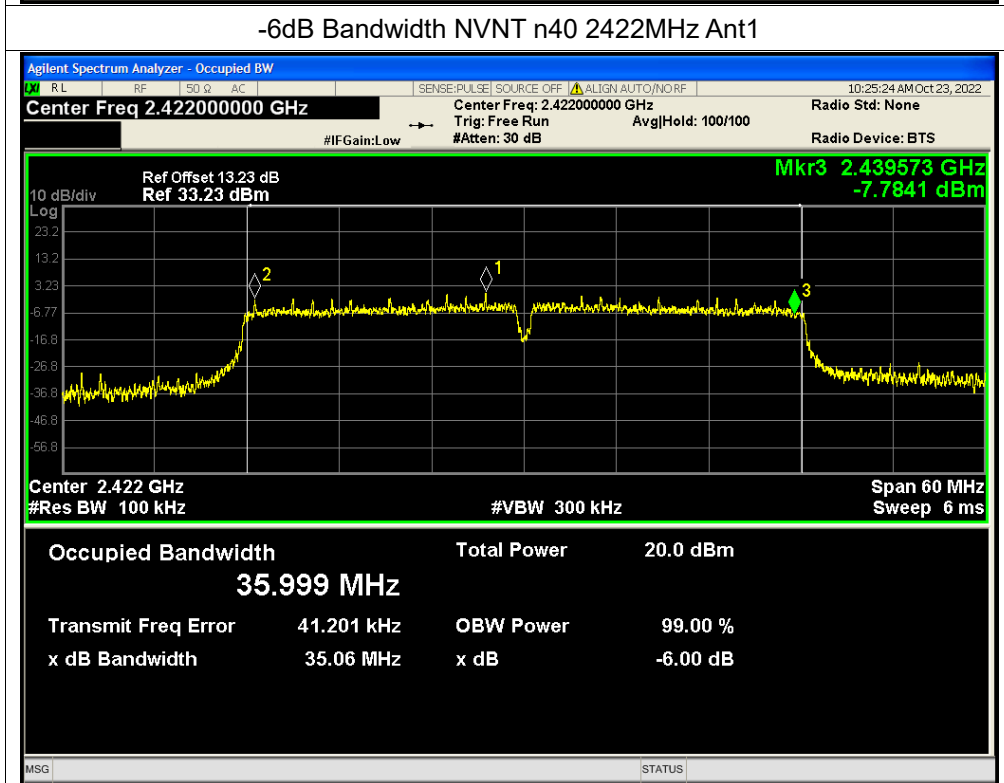




-6dB Bandwidth NVNT n20 2472MHz Ant1

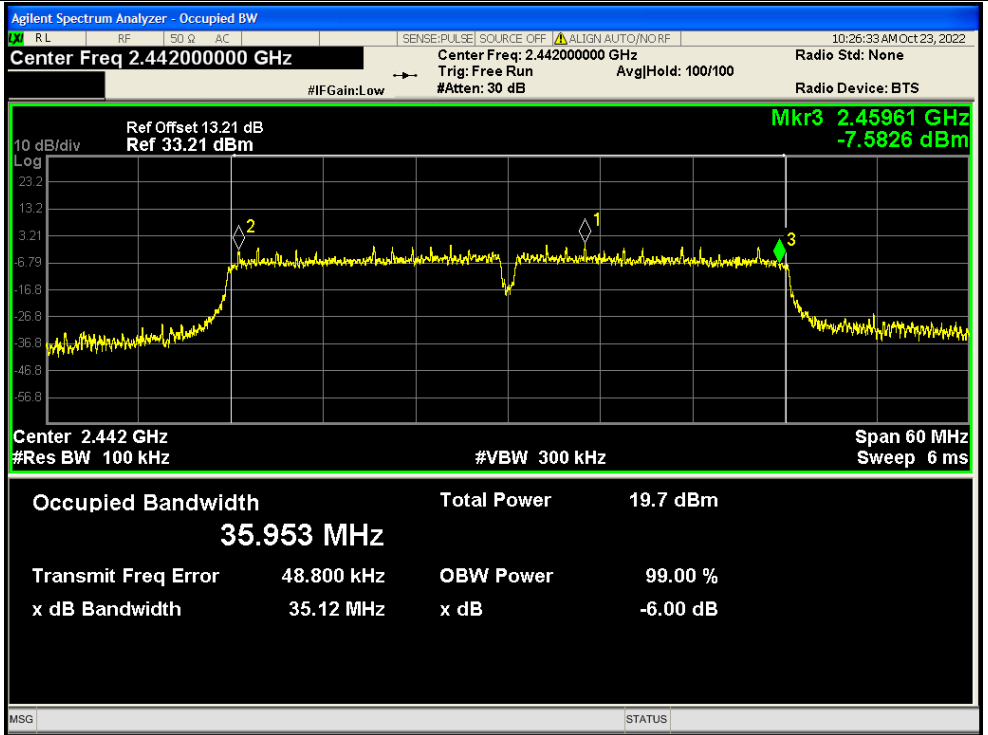


-6dB Bandwidth NVNT n40 2422MHz Ant1

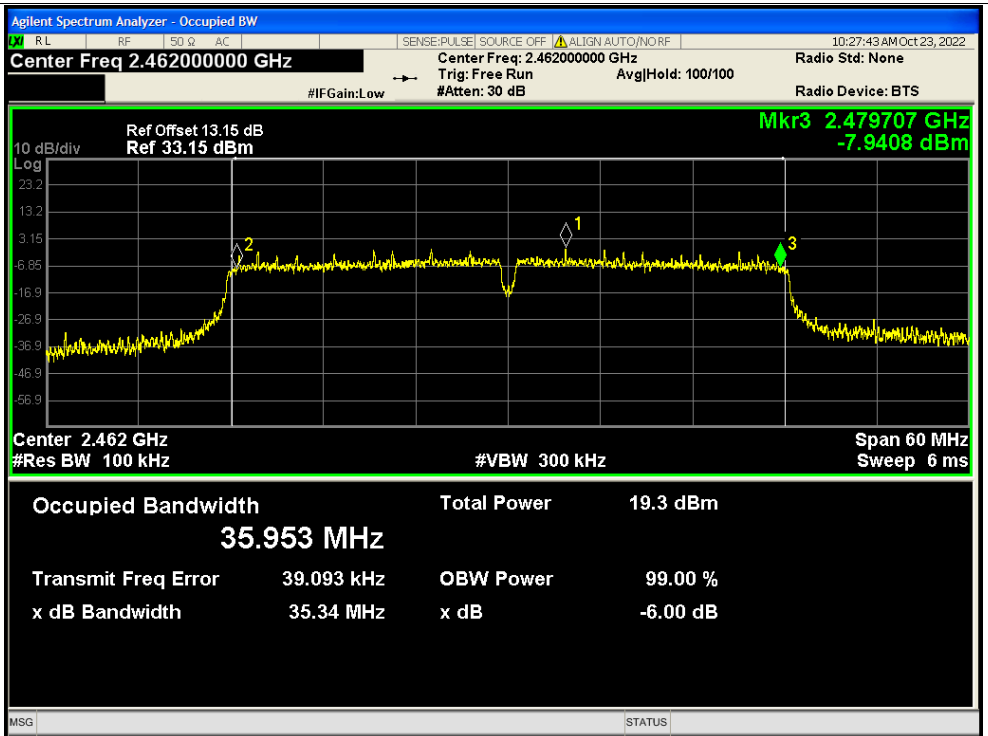




-6dB Bandwidth NVNT n40 2442MHz Ant1



-6dB Bandwidth NVNT n40 2462MHz Ant1



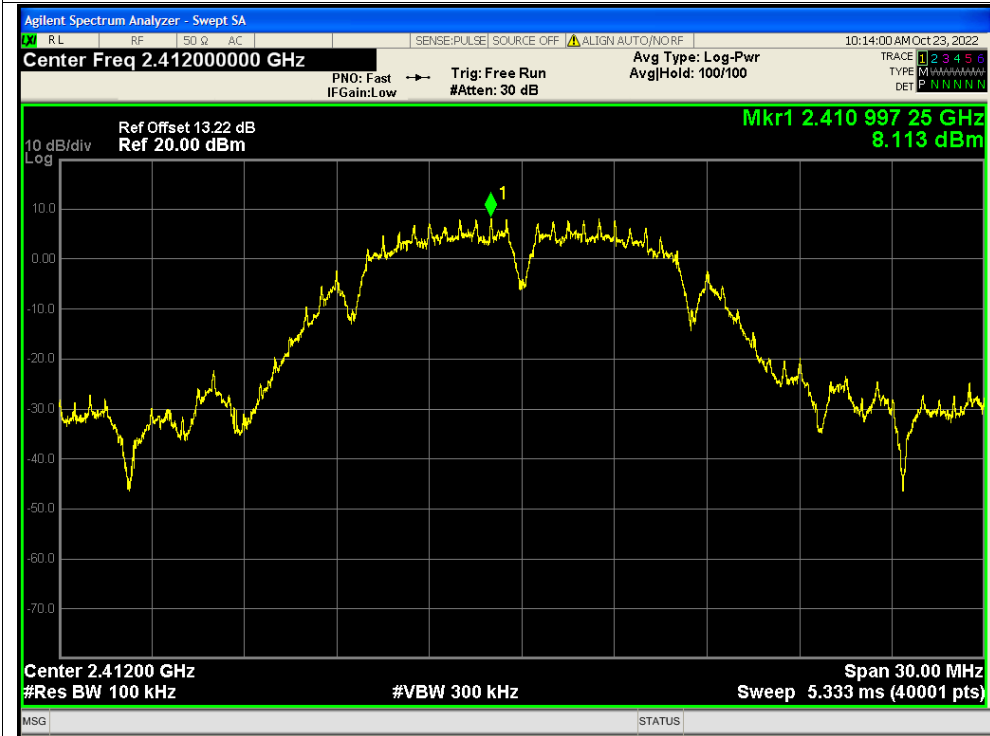
**A.5. Conducted Spurious Emissions**

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	Ant1	-36.16	-20	Pass
NVNT	b	2442	Ant1	-36.71	-20	Pass
NVNT	b	2472	Ant1	-36.59	-20	Pass
NVNT	g	2412	Ant1	-32.19	-20	Pass
NVNT	g	2442	Ant1	-32.49	-20	Pass
NVNT	g	2472	Ant1	-32.26	-20	Pass
NVNT	n20	2412	Ant1	-31.27	-20	Pass
NVNT	n20	2442	Ant1	-30.11	-20	Pass
NVNT	n20	2472	Ant1	-30.98	-20	Pass
NVNT	n40	2422	Ant1	-28.96	-20	Pass
NVNT	n40	2442	Ant1	-28.59	-20	Pass
NVNT	n40	2462	Ant1	-28.74	-20	Pass

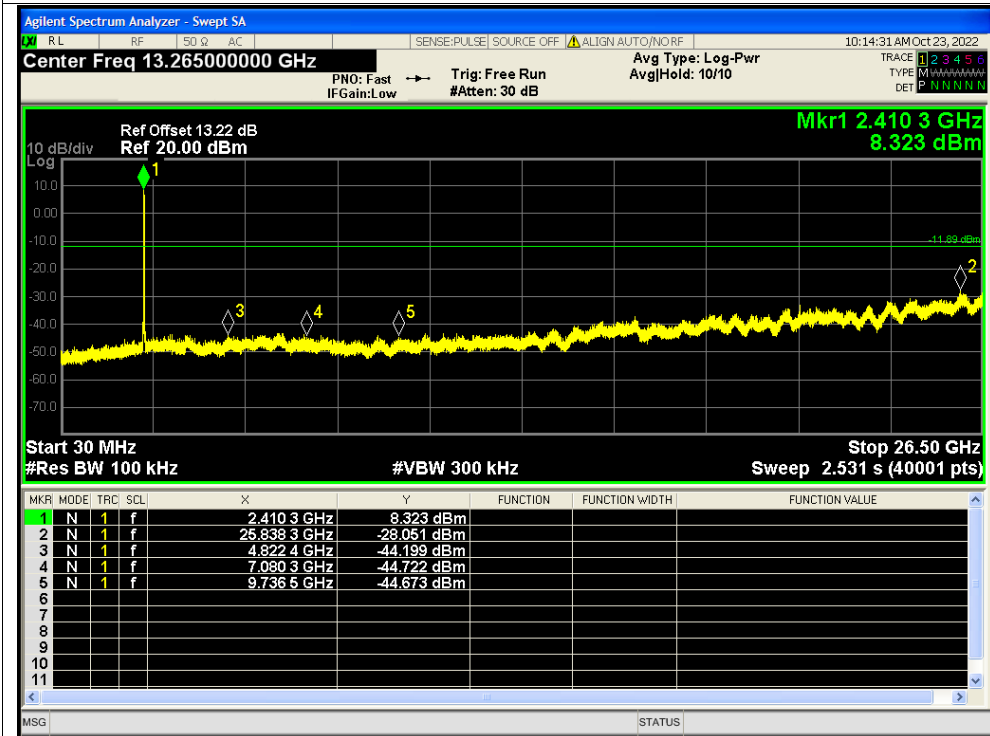


Test Graphs

Tx. Spurious NVNT b 2412MHz Ant1 Ref

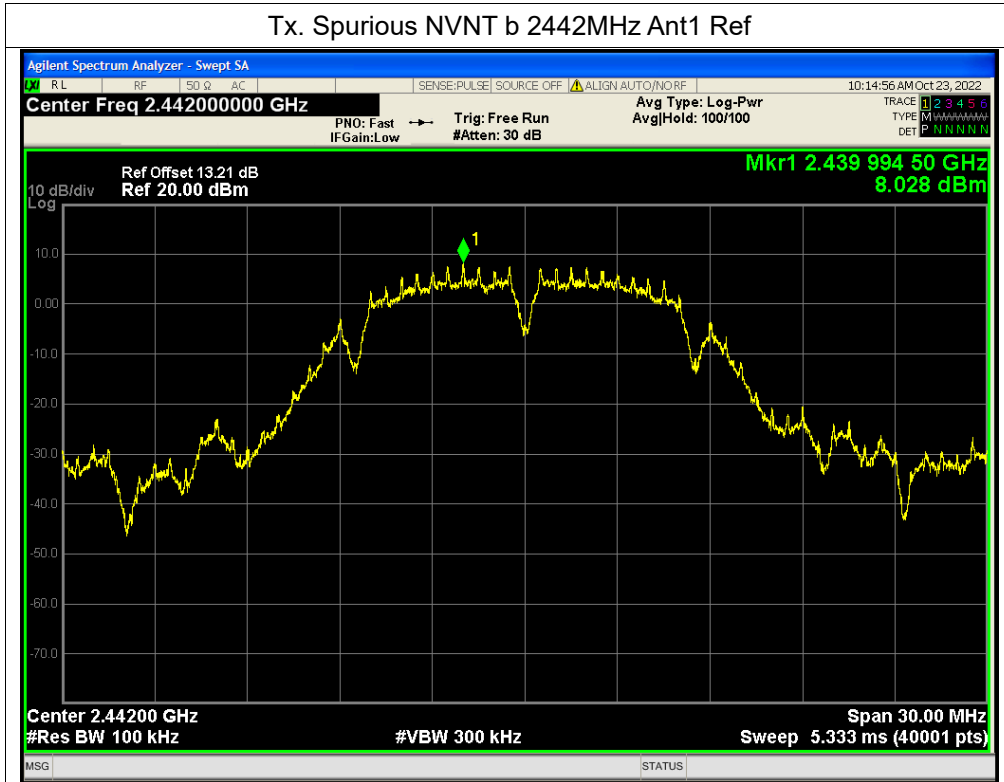


Tx. Spurious NVNT b 2412MHz Ant1 Emission

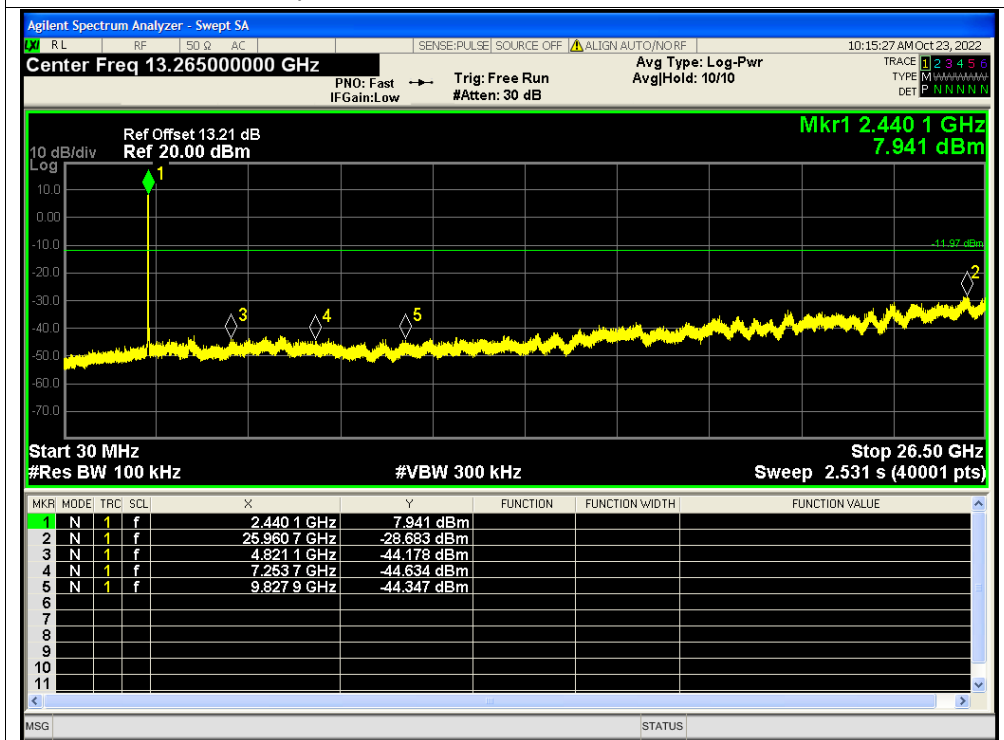




Tx. Spurious NVNT b 2442MHz Ant1 Ref

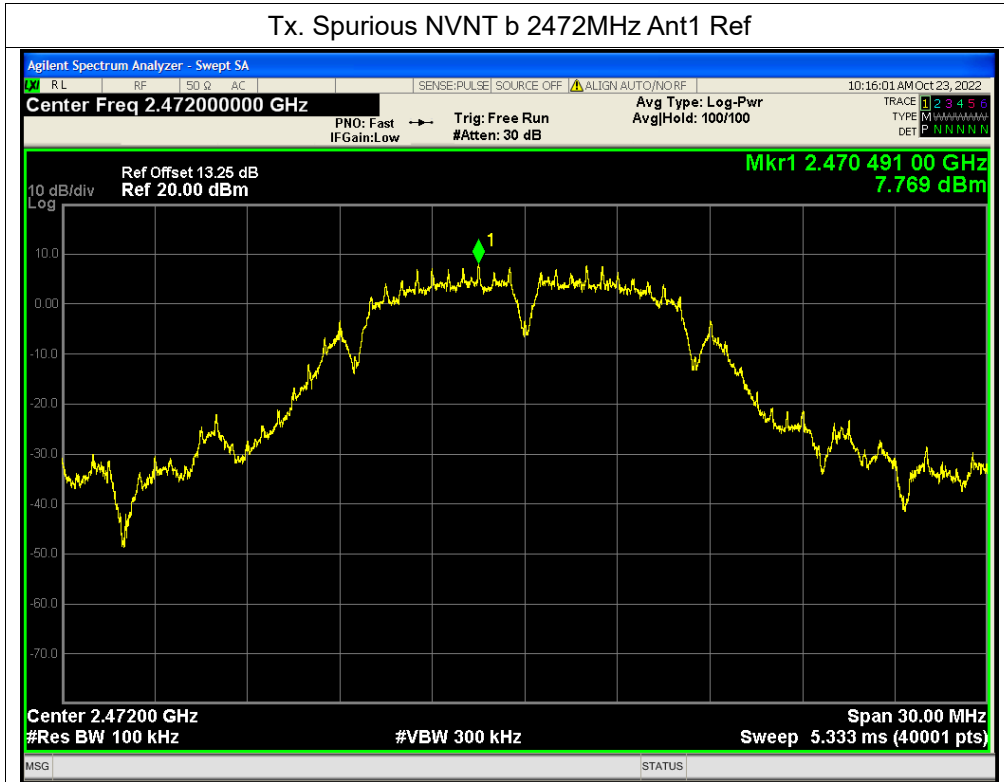


Tx. Spurious NVNT b 2442MHz Ant1 Emission

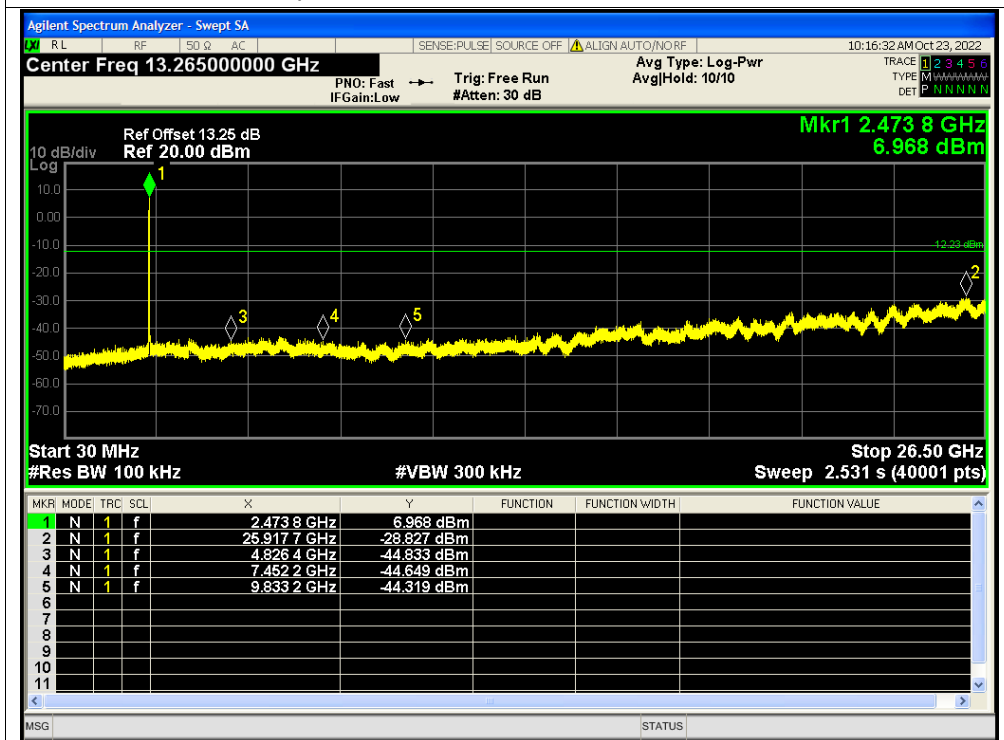




Tx. Spurious NVNT b 2472MHz Ant1 Ref

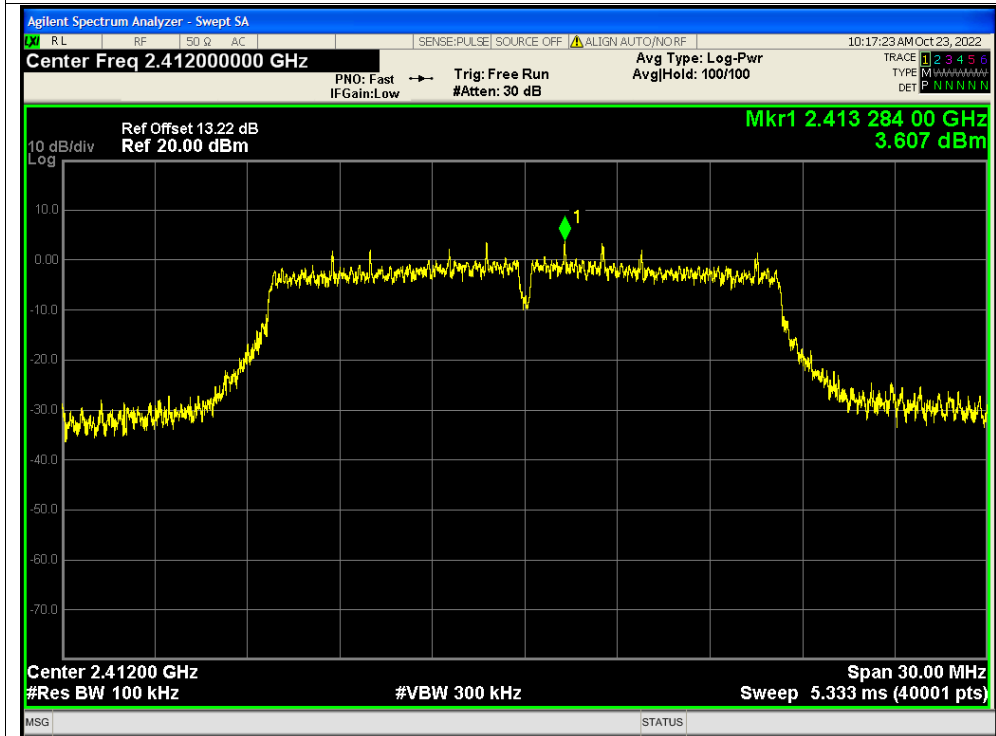


Tx. Spurious NVNT b 2472MHz Ant1 Emission

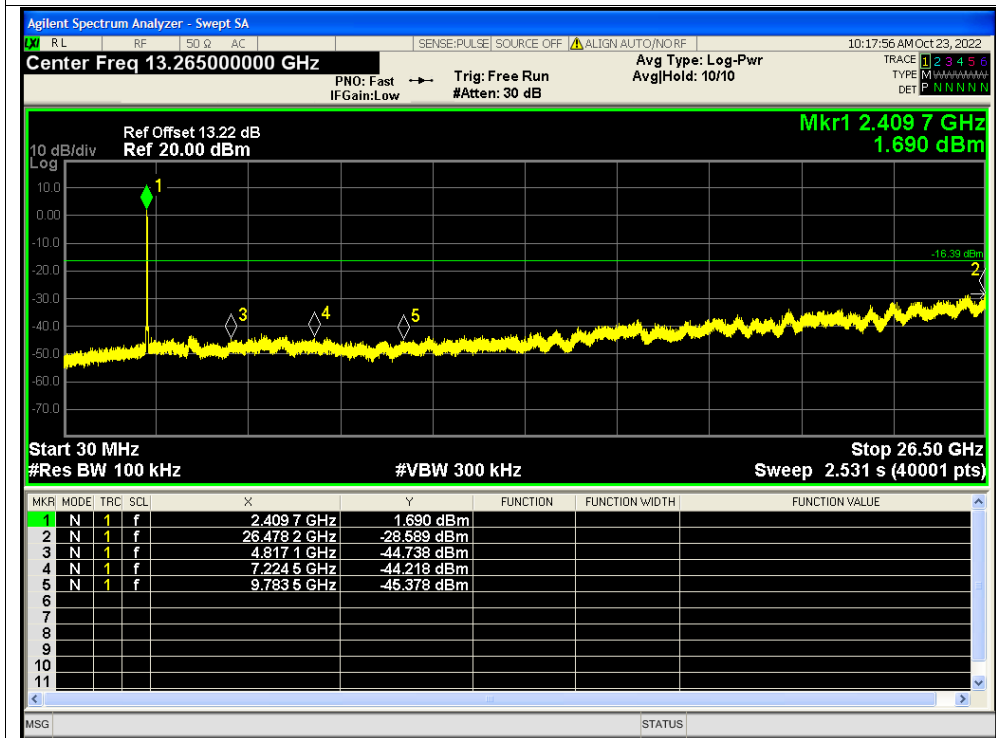




Tx. Spurious NVNT g 2412MHz Ant1 Ref

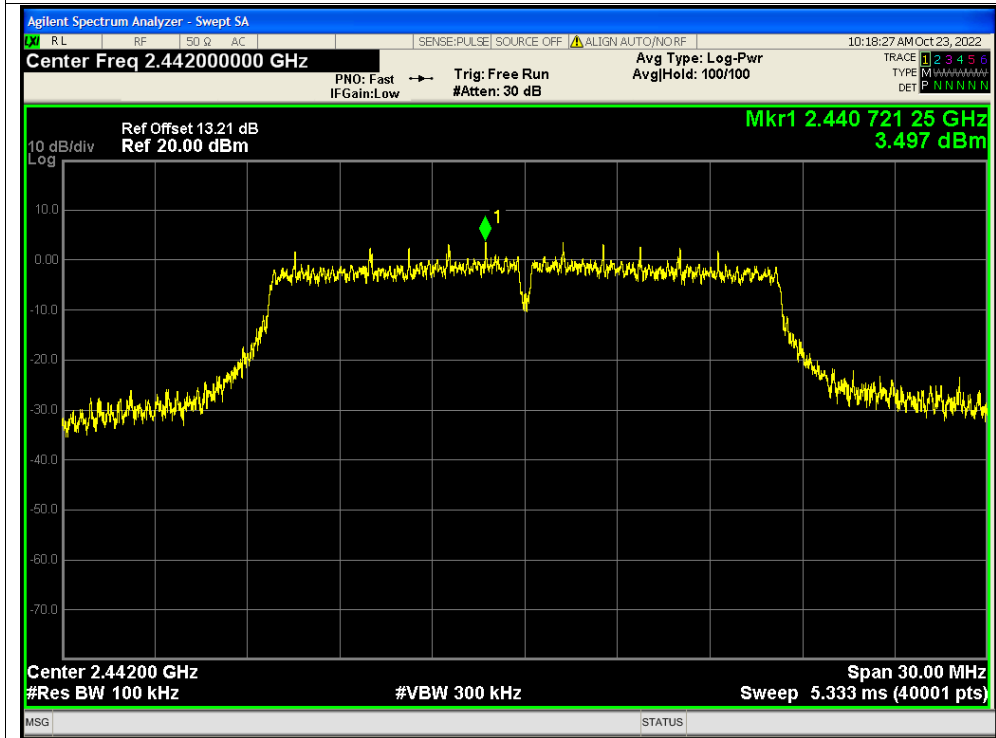


Tx. Spurious NVNT g 2412MHz Ant1 Emission

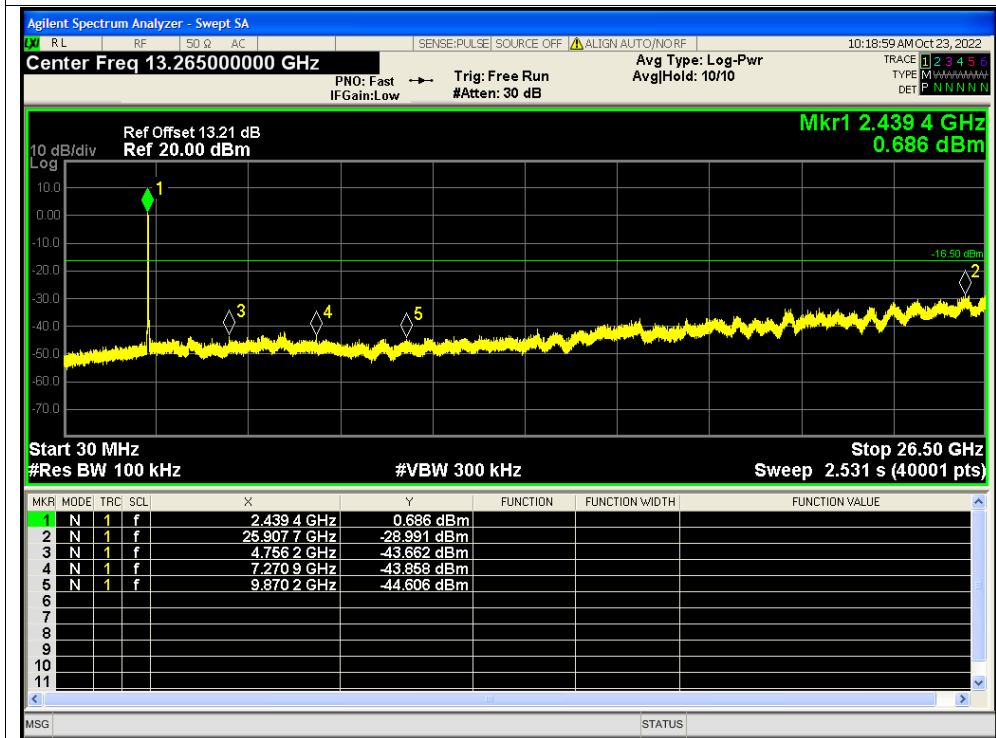




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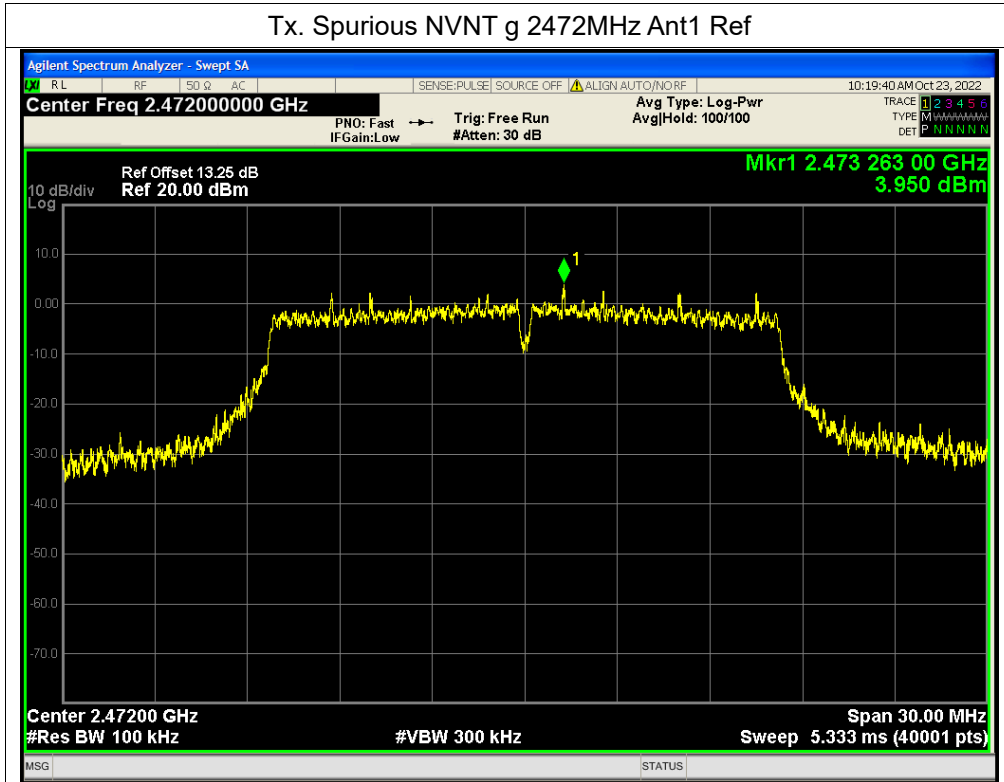


Tx. Spurious NVNT g 2442MHz Ant1 Emission

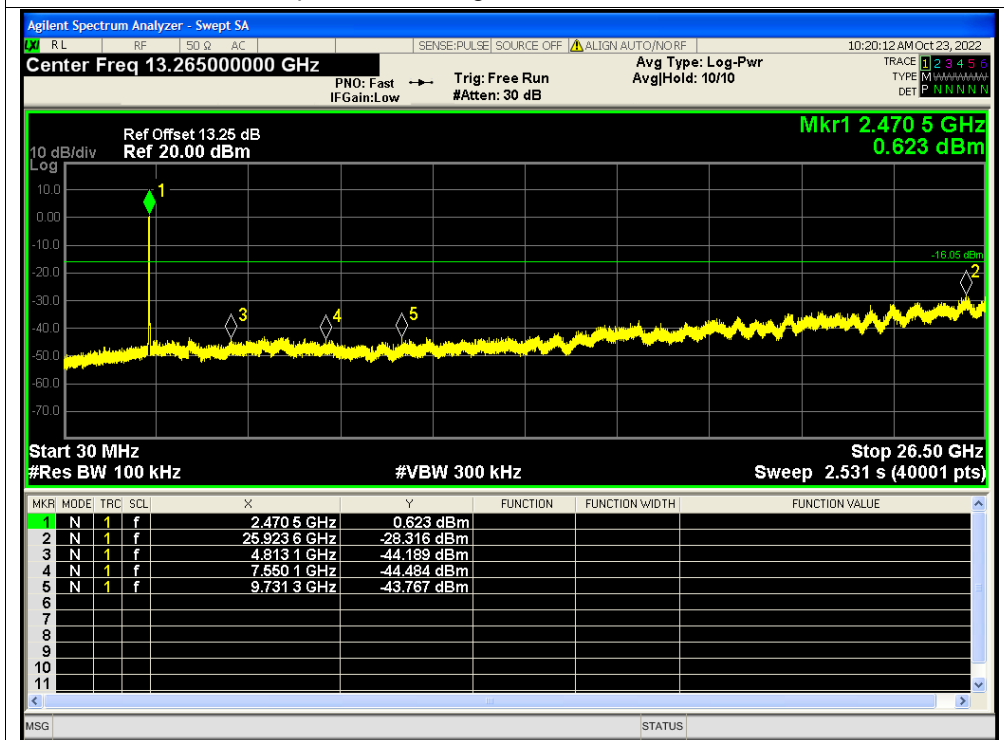




Tx. Spurious NVNT g 2472MHz Ant1 Ref

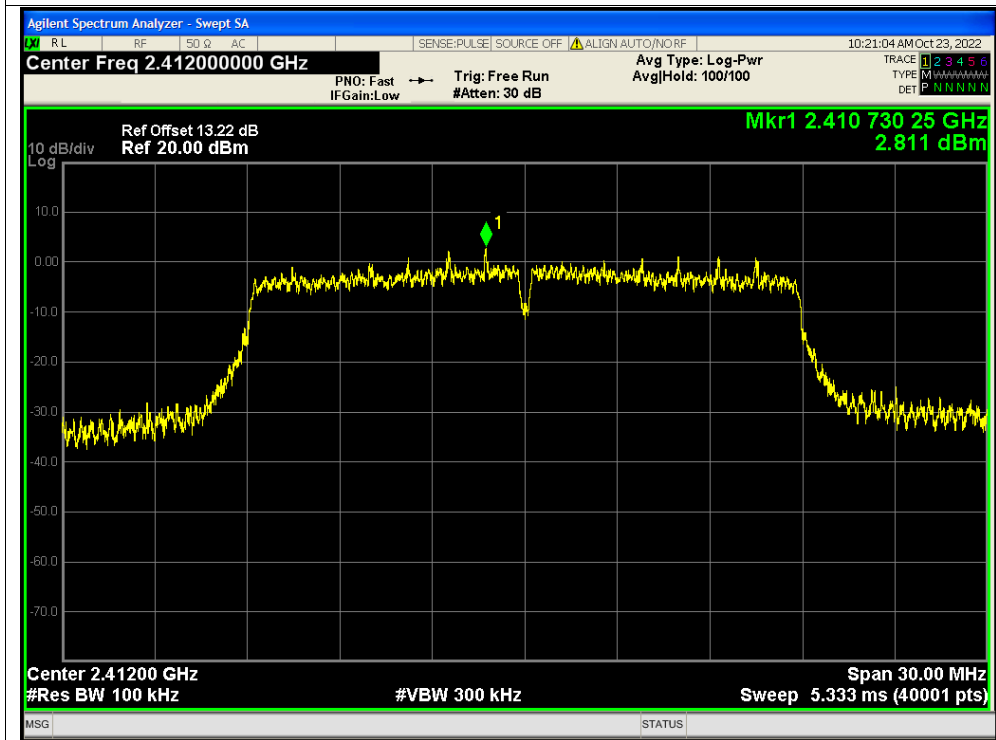


Tx. Spurious NVNT g 2472MHz Ant1 Emission

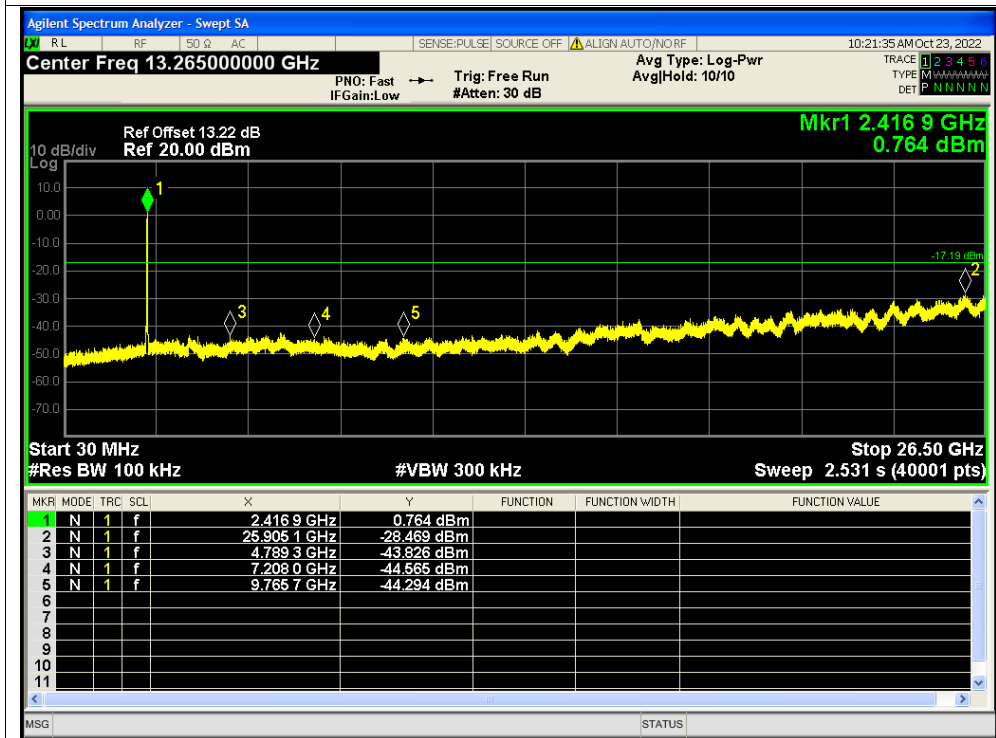




Tx. Spurious NVNT n20 2412MHz Ant1 Ref

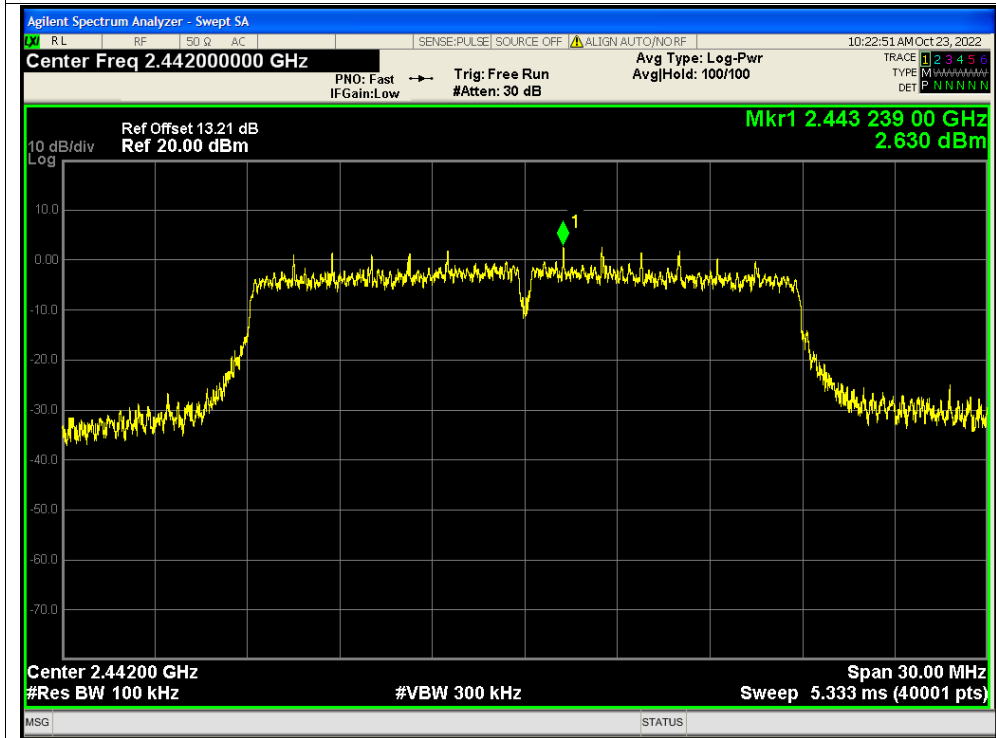


Tx. Spurious NVNT n20 2412MHz Ant1 Emission

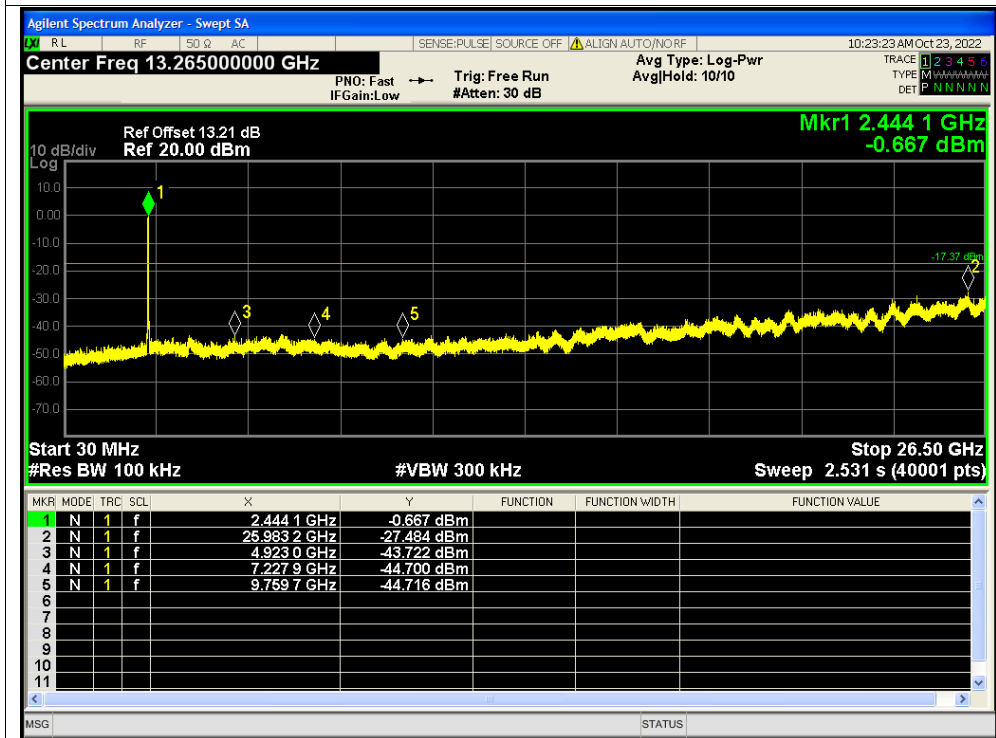




Tx. Spurious NVNT n20 2442MHz Ant1 Ref

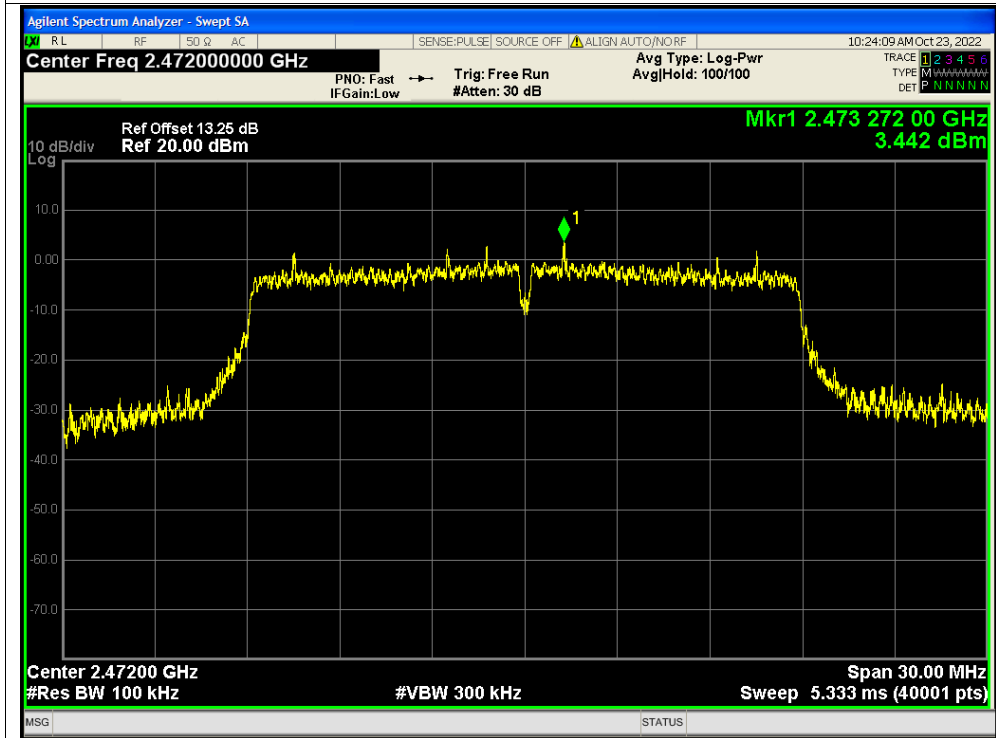


Tx. Spurious NVNT n20 2442MHz Ant1 Emission

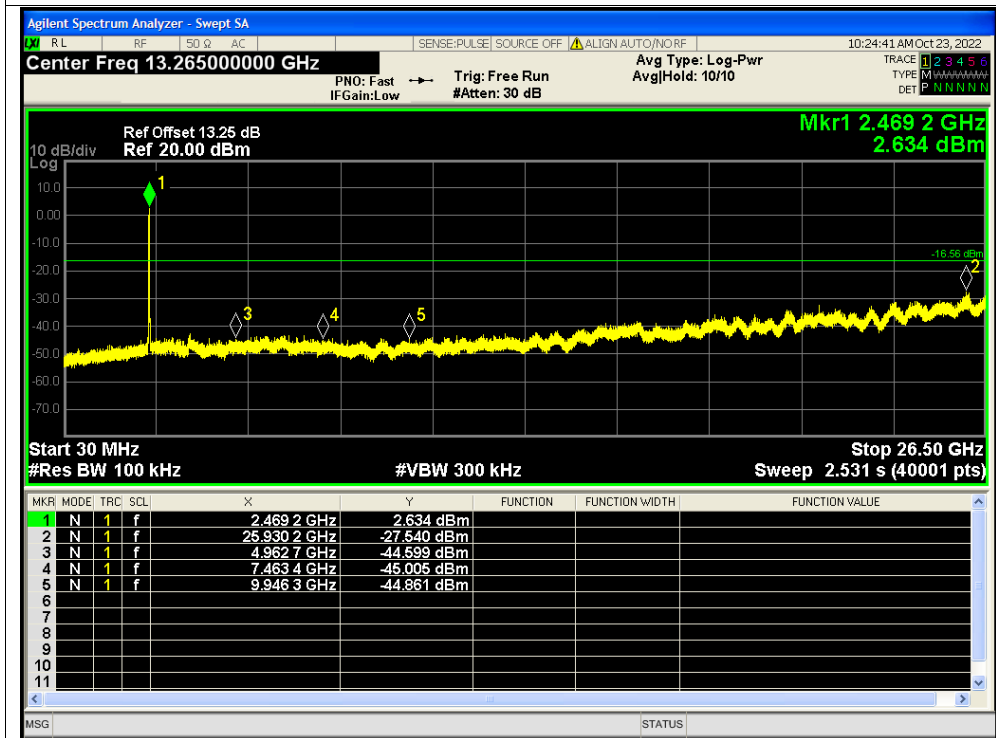




Tx. Spurious NVNT n20 2472MHz Ant1 Ref

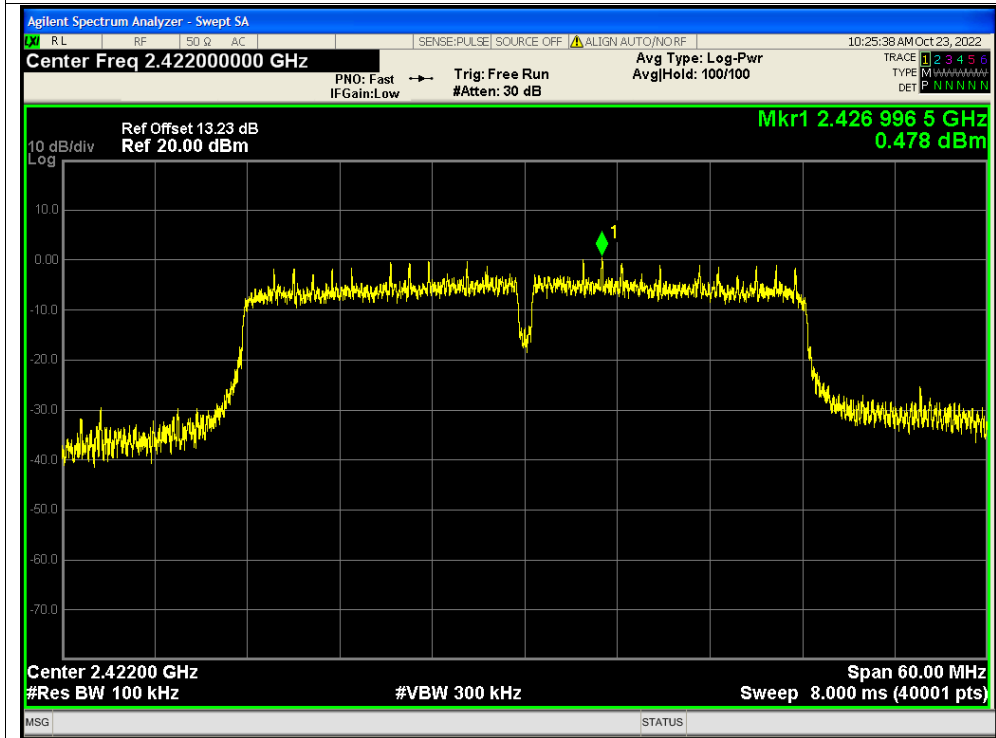


Tx. Spurious NVNT n20 2472MHz Ant1 Emission

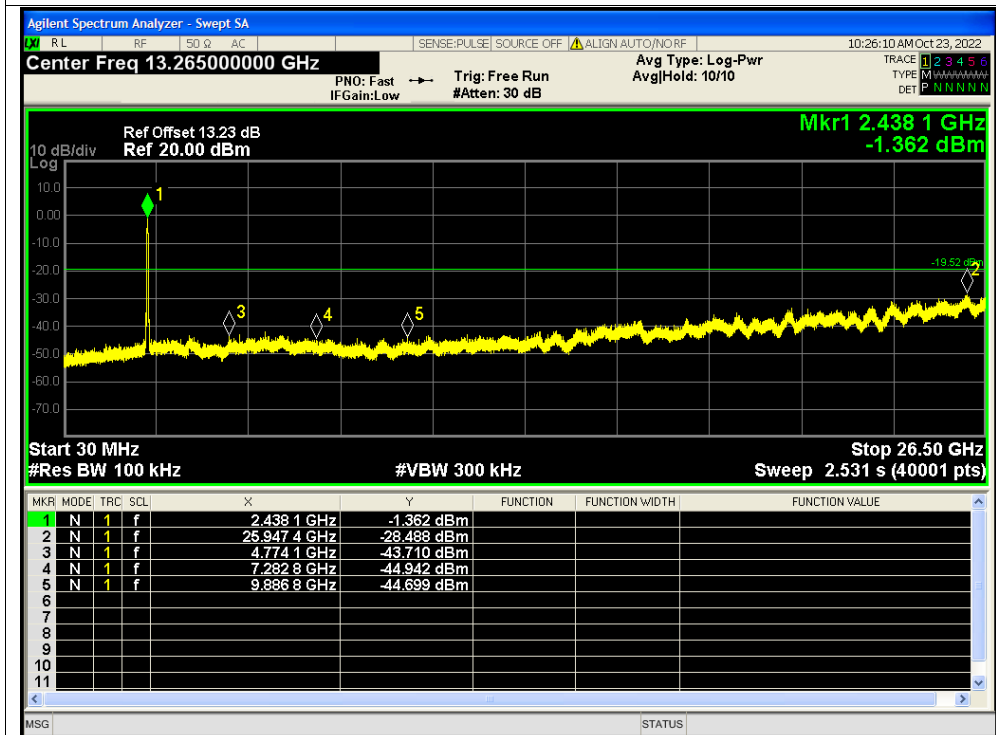




Tx. Spurious NVNT n40 2422MHz Ant1 Ref

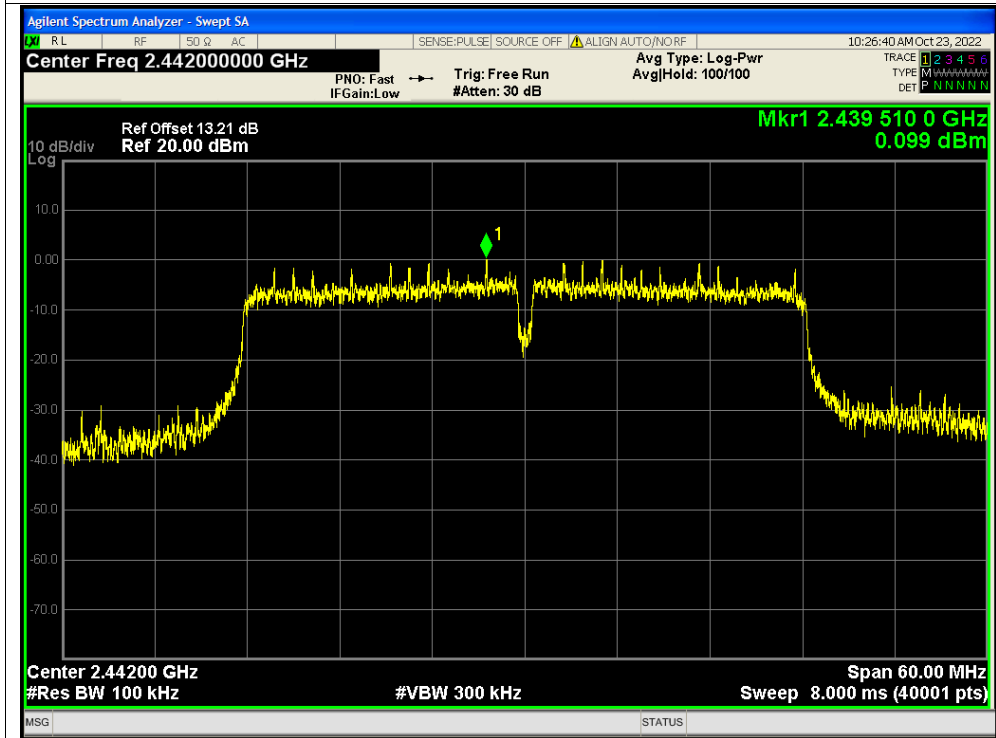


Tx. Spurious NVNT n40 2422MHz Ant1 Emission

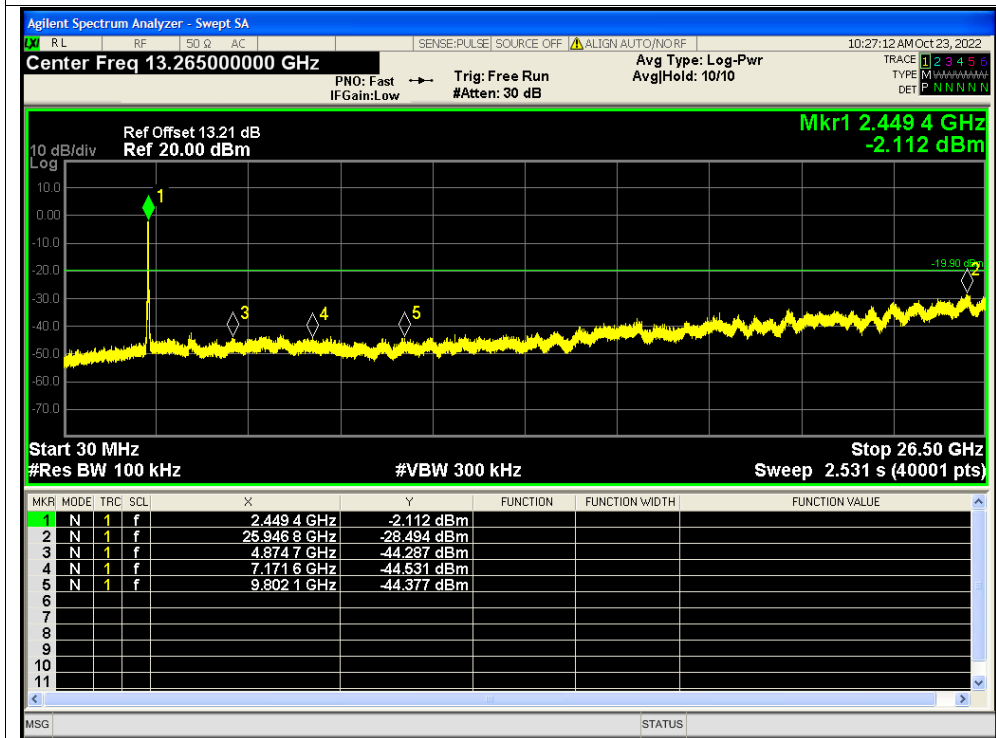




Tx. Spurious NVNT n40 2442MHz Ant1 Ref

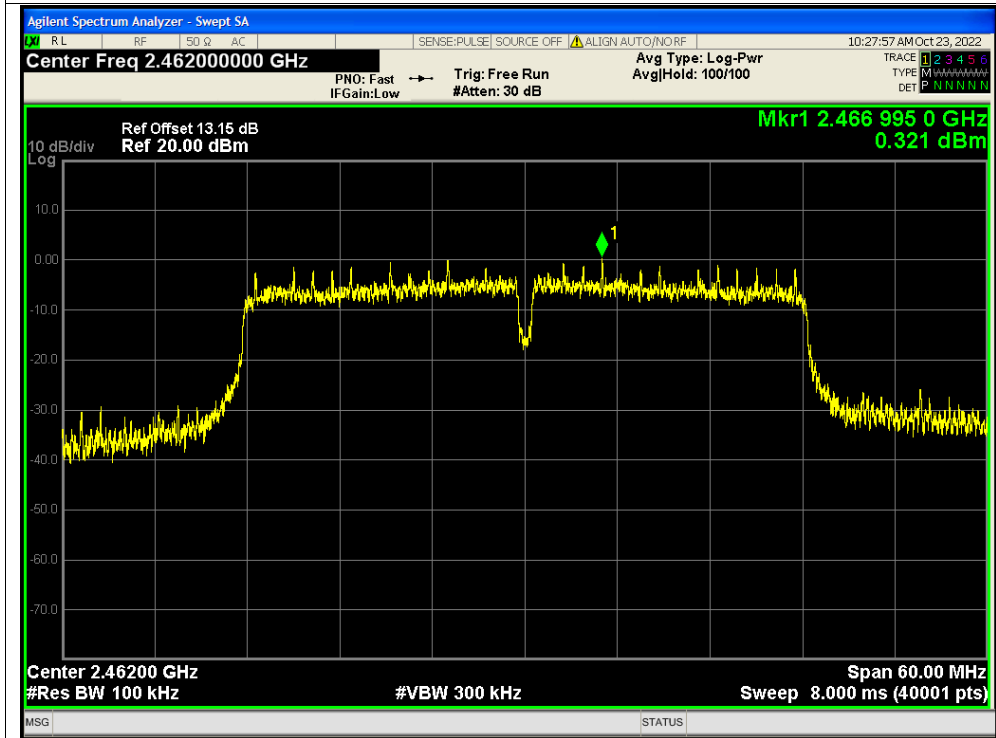


Tx. Spurious NVNT n40 2442MHz Ant1 Emission

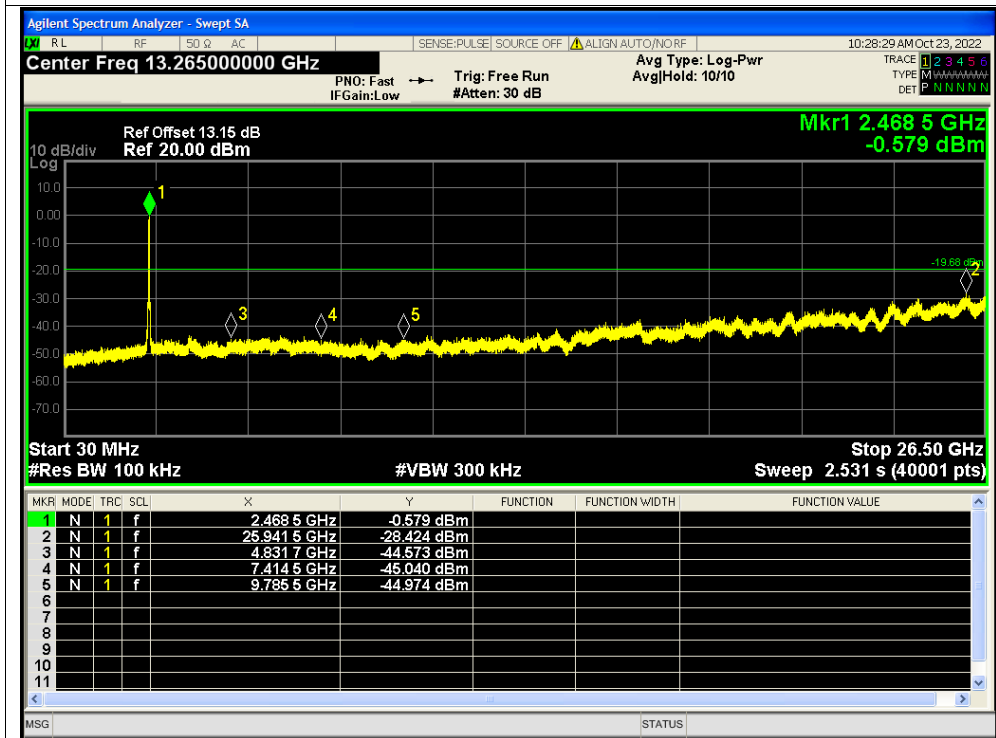




Tx. Spurious NVNT n40 2462MHz Ant1 Ref



Tx. Spurious NVNT n40 2462MHz Ant1 Emission



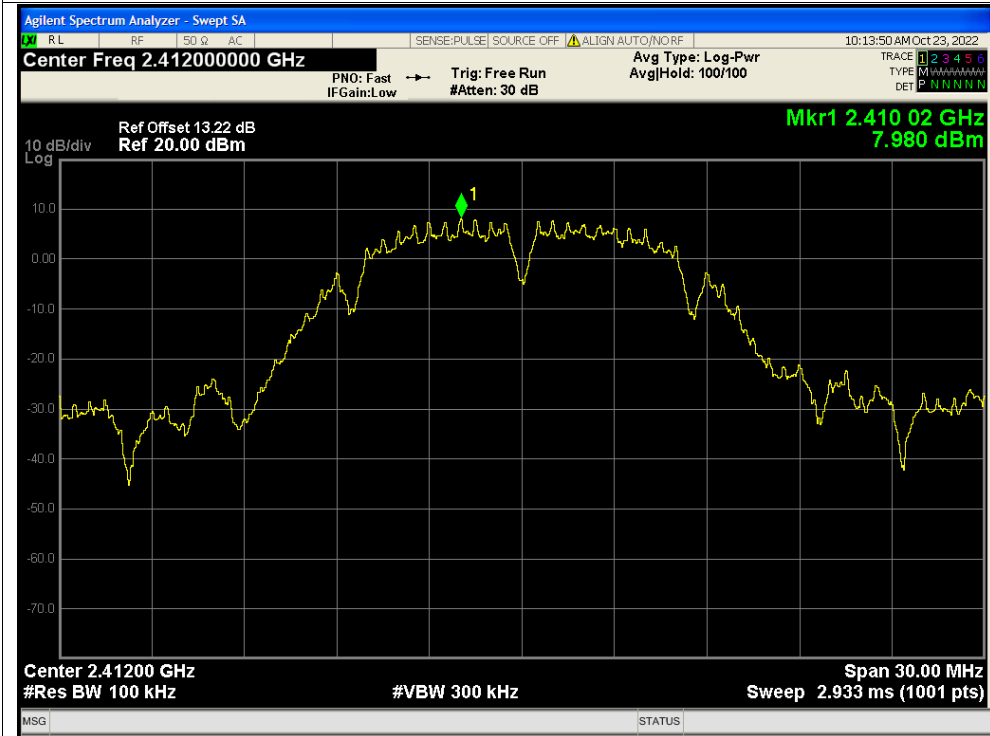
**A.6. Band Edge**

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	b	2412	Ant1	-34.66	-20	Pass
NVNT	b	2472	Ant1	-33.25	-20	Pass
NVNT	g	2412	Ant1	-29.22	-20	Pass
NVNT	g	2472	Ant1	-28.27	-20	Pass
NVNT	n20	2412	Ant1	-31.67	-20	Pass
NVNT	n20	2472	Ant1	-29.06	-20	Pass
NVNT	n40	2422	Ant1	-29.00	-20	Pass
NVNT	n40	2462	Ant1	-25.99	-20	Pass

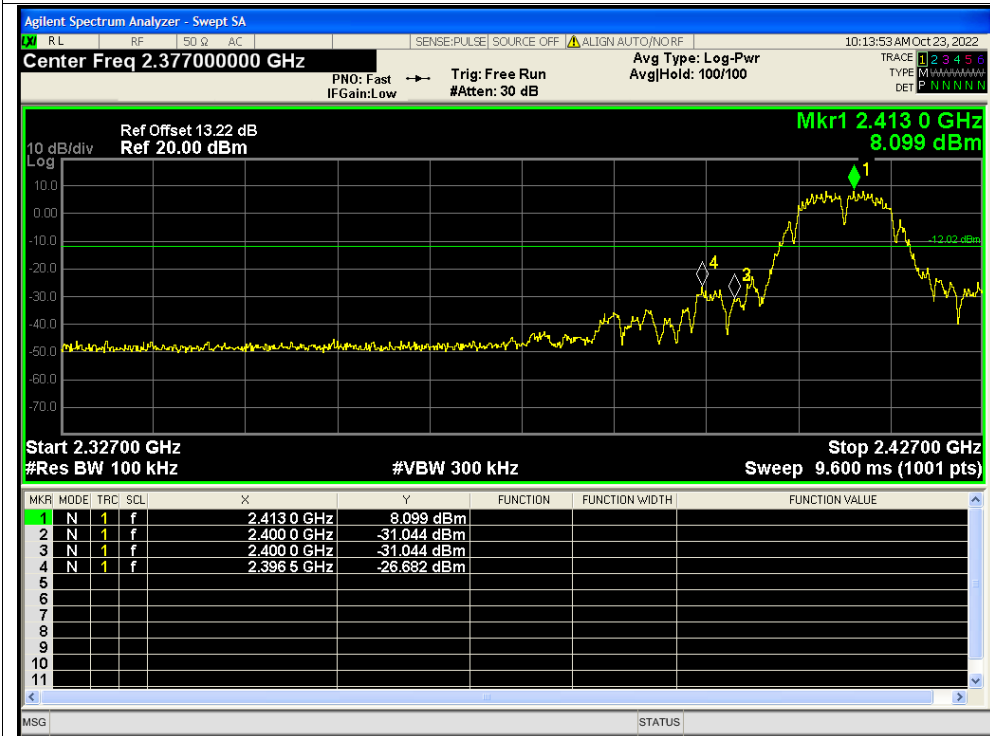


Test Graphs

Band Edge NVNT b 2412MHz Ant1 Ref

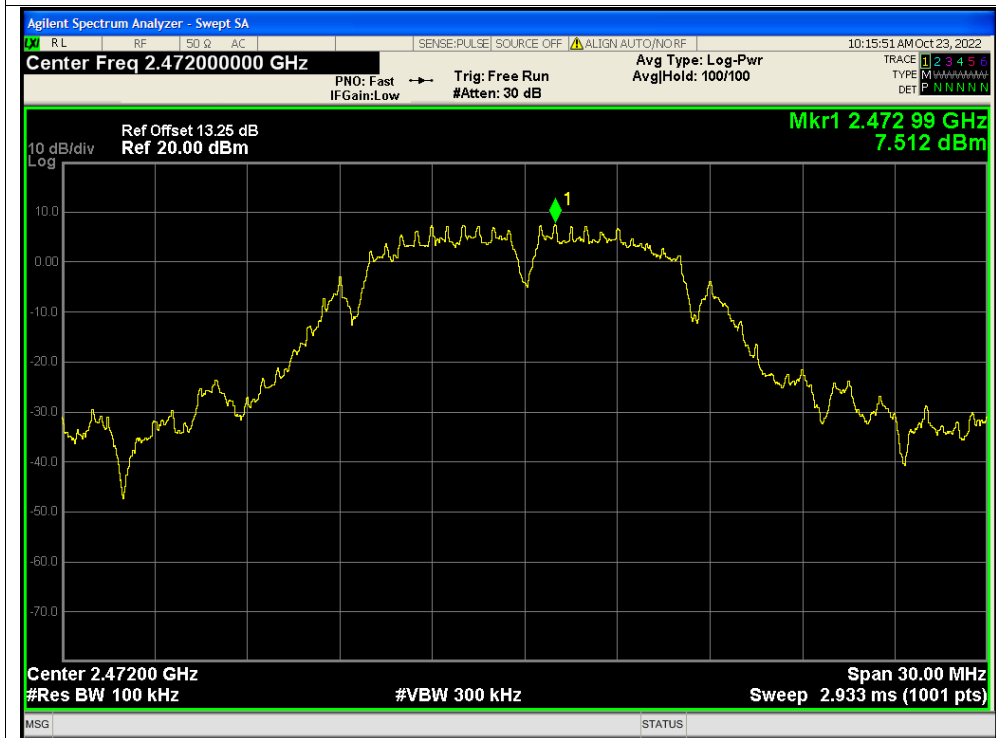


Band Edge NVNT b 2412MHz Ant1 Emission

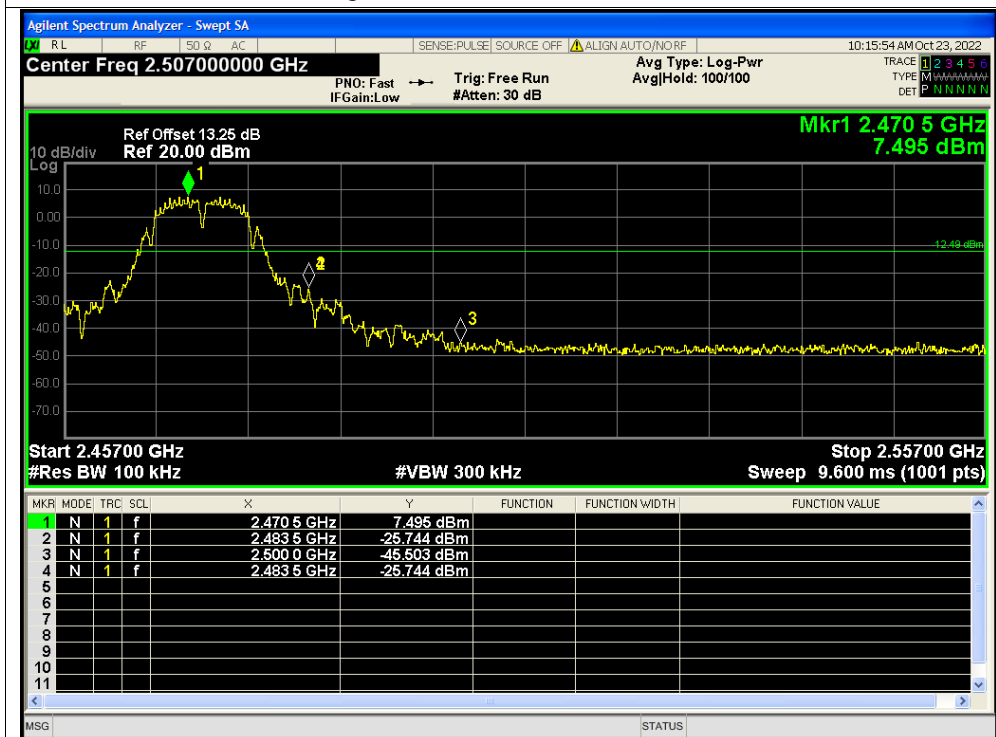




Band Edge NVNT b 2472MHz Ant1 Ref

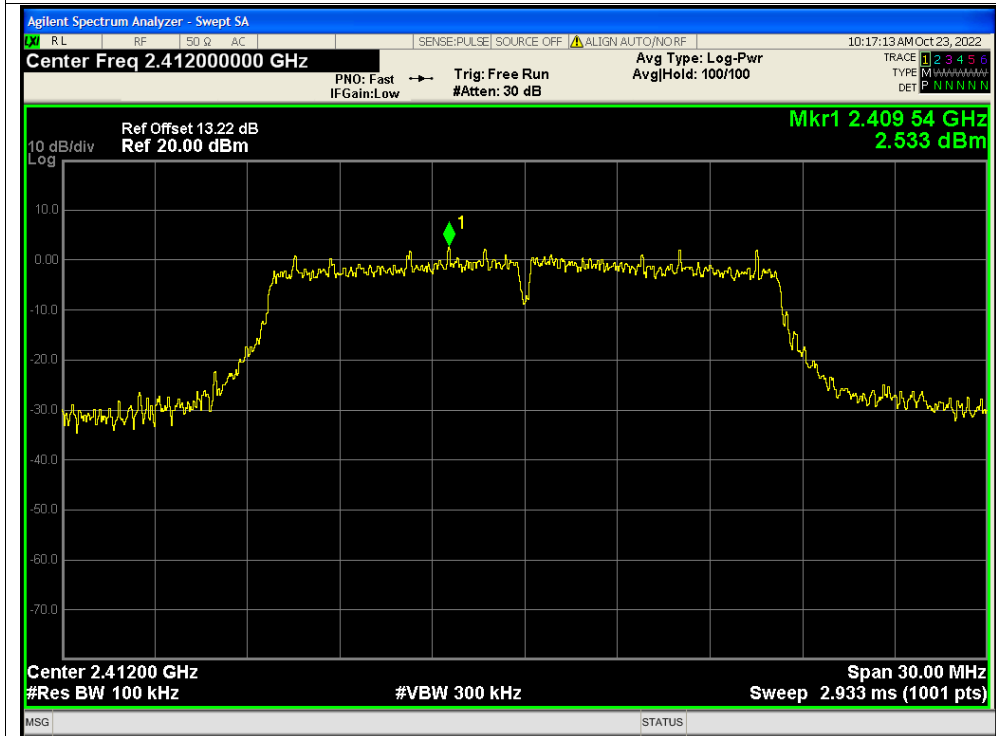


Band Edge NVNT b 2472MHz Ant1 Emission

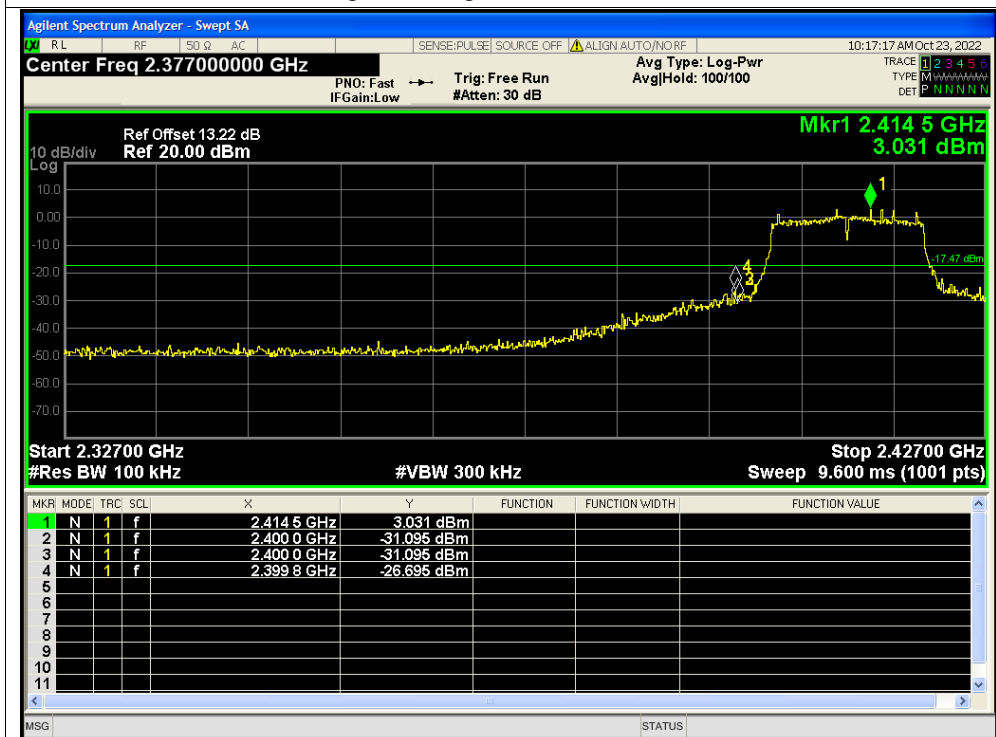




Band Edge NVNT g 2412MHz Ant1 Ref

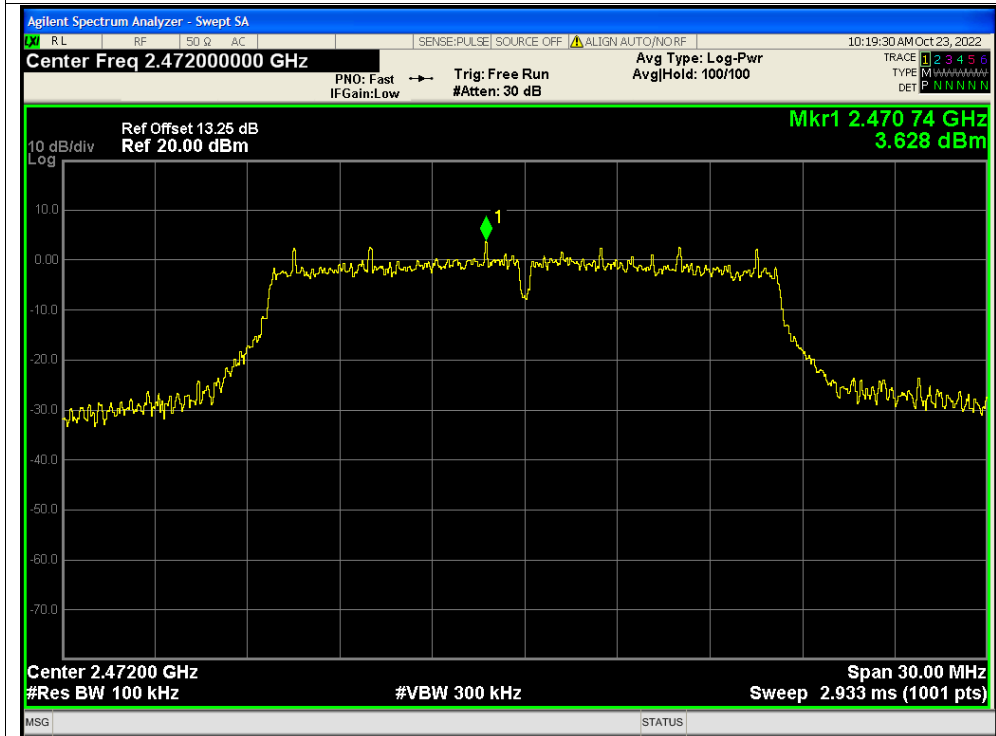


Band Edge NVNT g 2412MHz Ant1 Emission

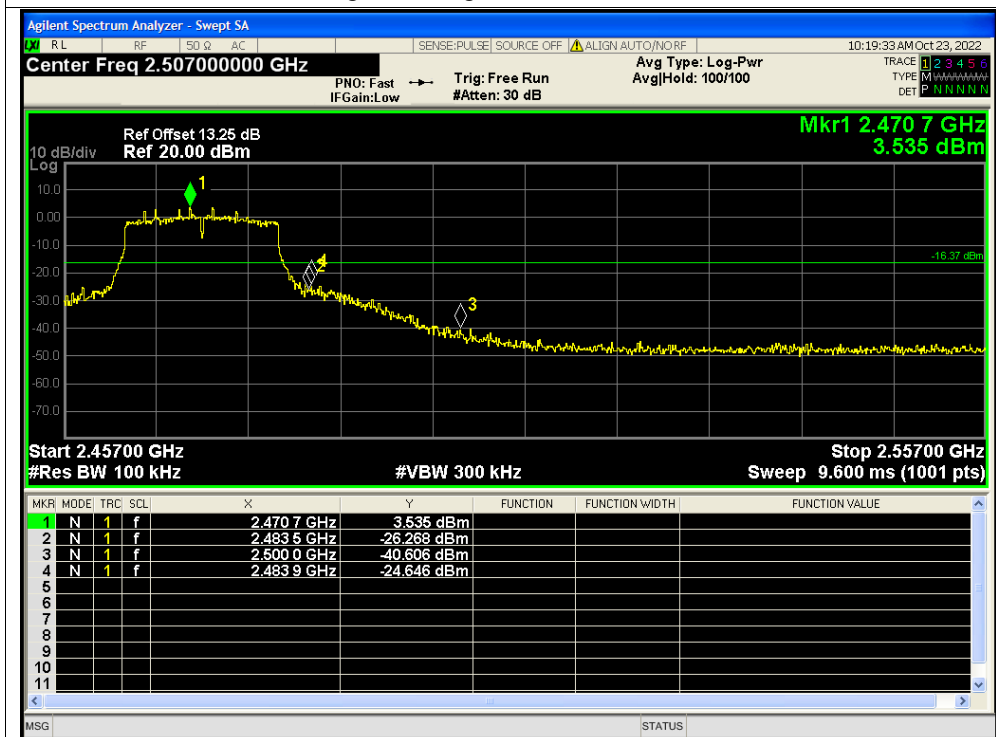




Band Edge NVNT g 2472MHz Ant1 Ref

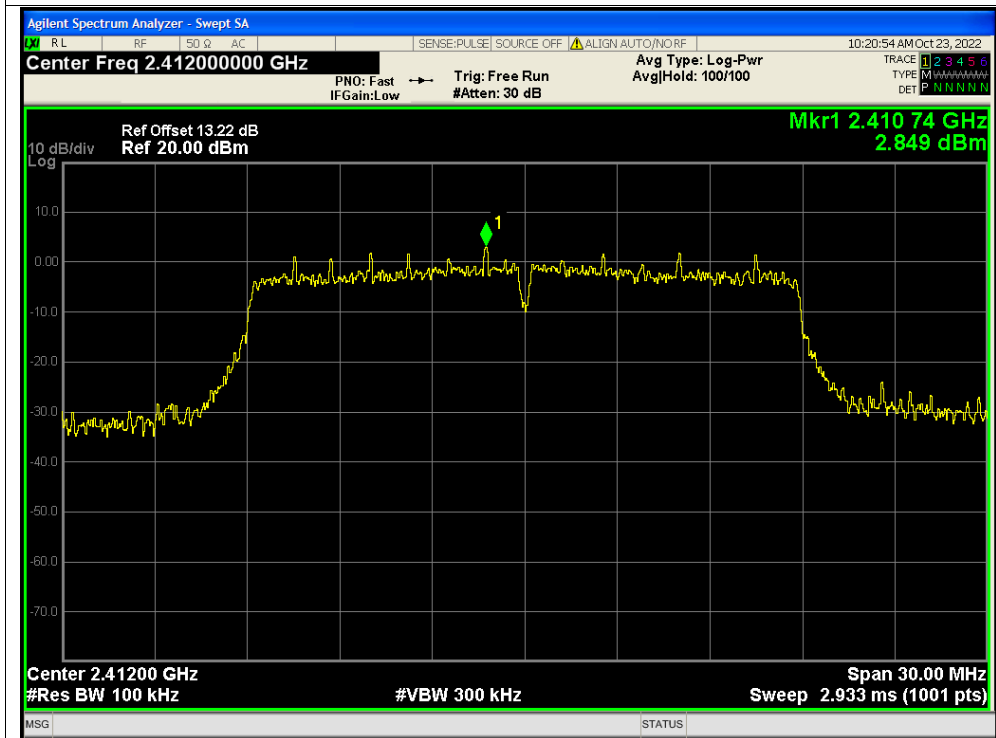


Band Edge NVNT g 2472MHz Ant1 Emission

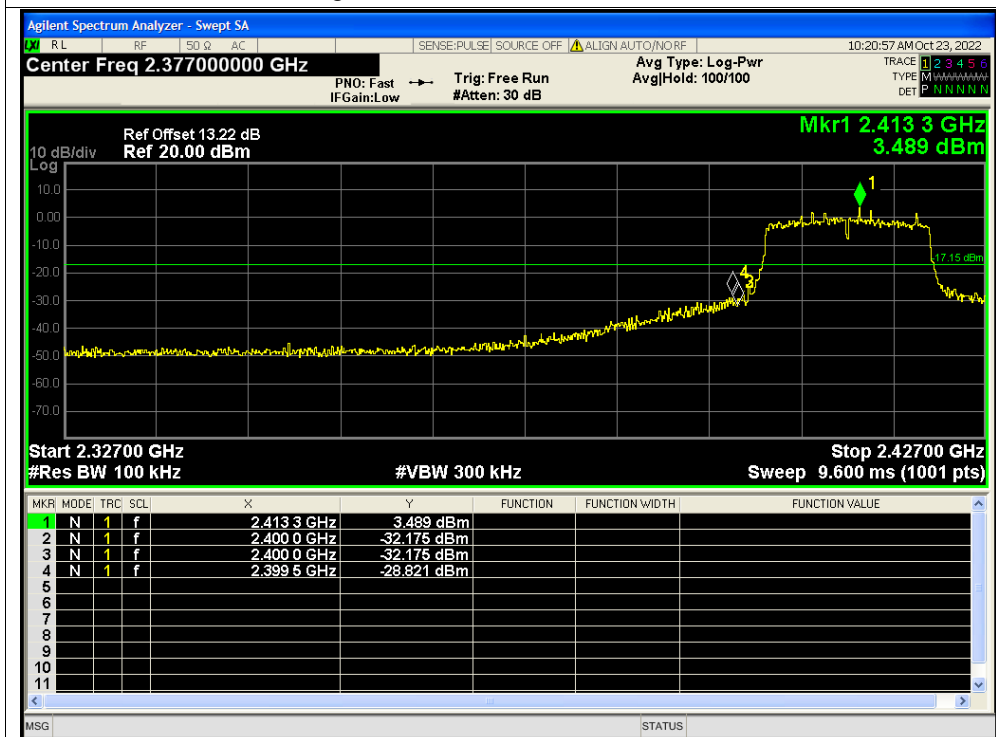




Band Edge NVNT n20 2412MHz Ant1 Ref

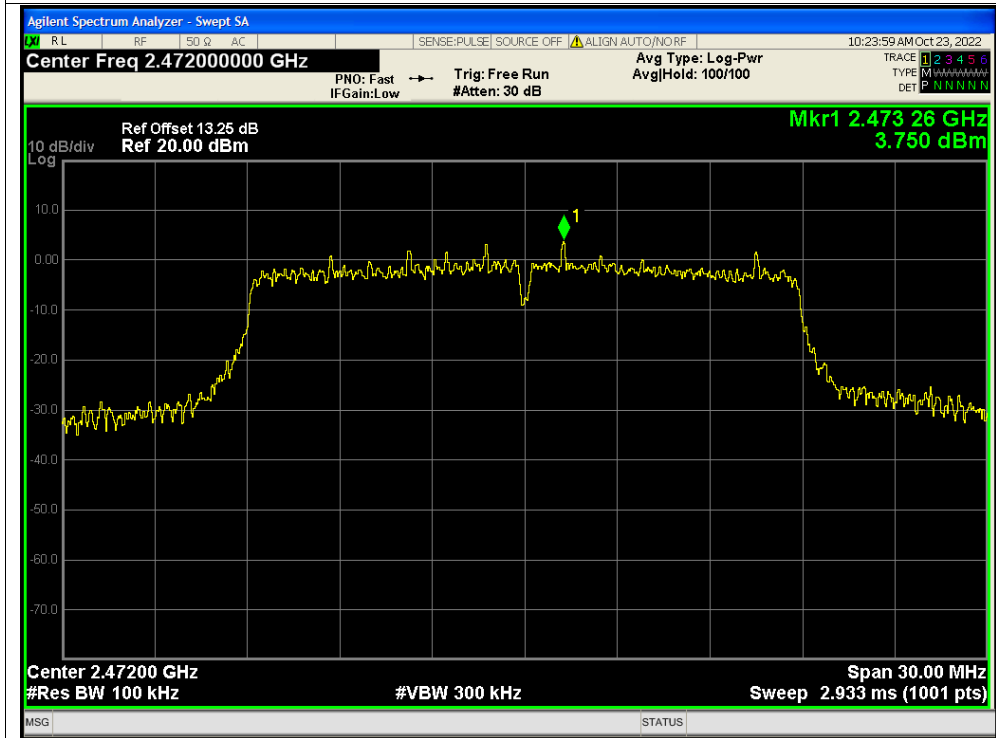


Band Edge NVNT n20 2412MHz Ant1 Emission

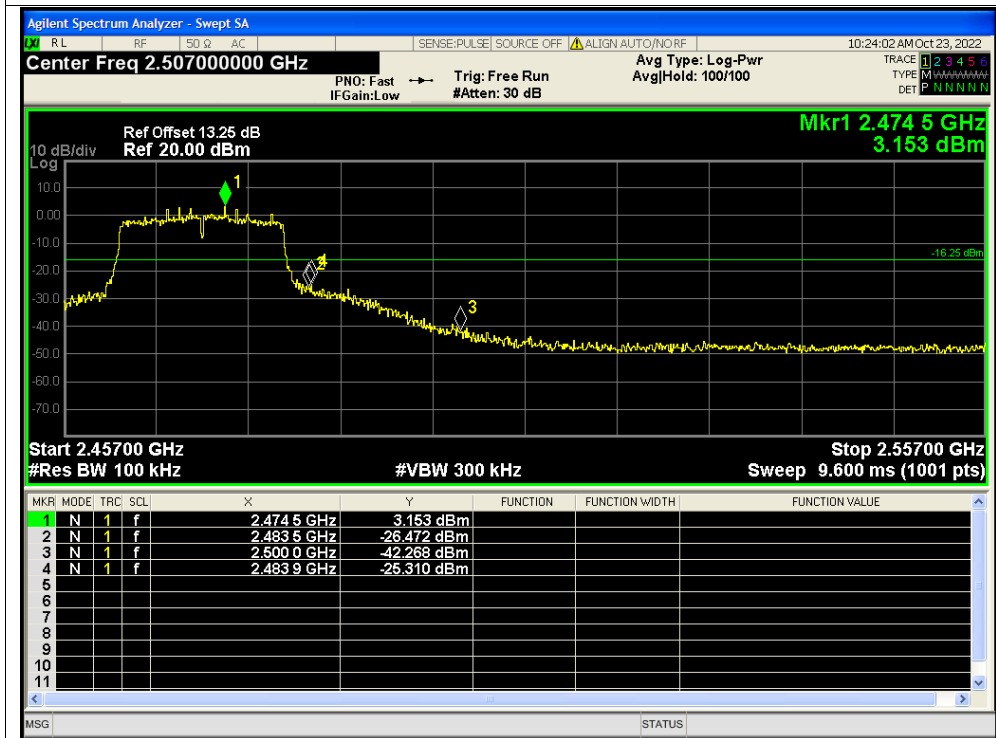




Band Edge NVNT n20 2472MHz Ant1 Ref

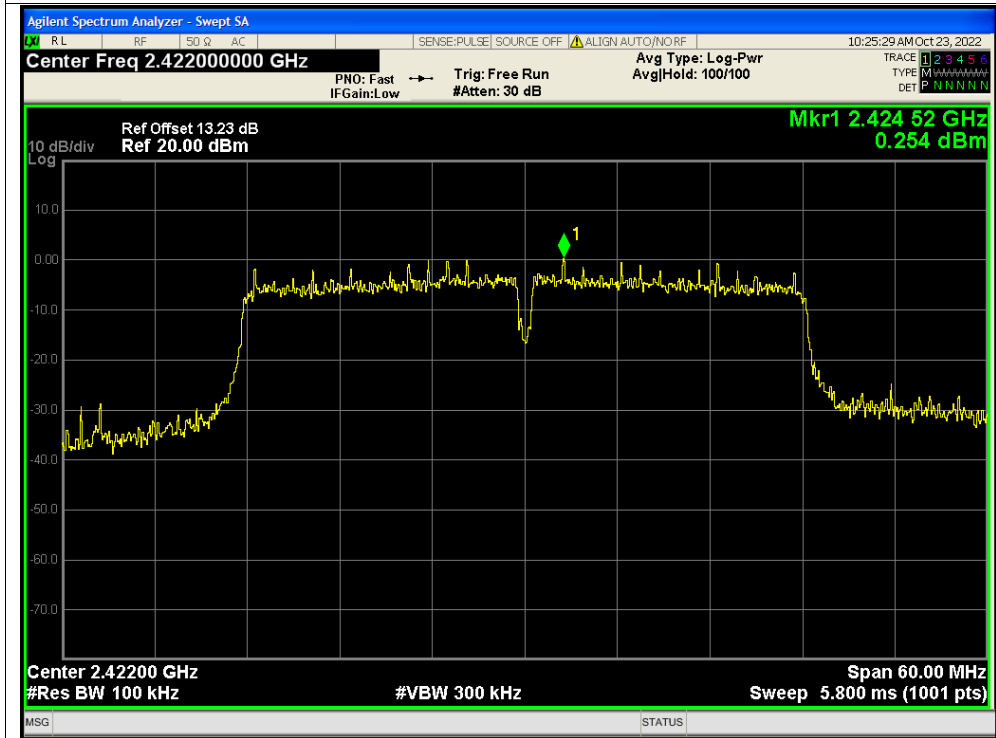


Band Edge NVNT n20 2472MHz Ant1 Emission

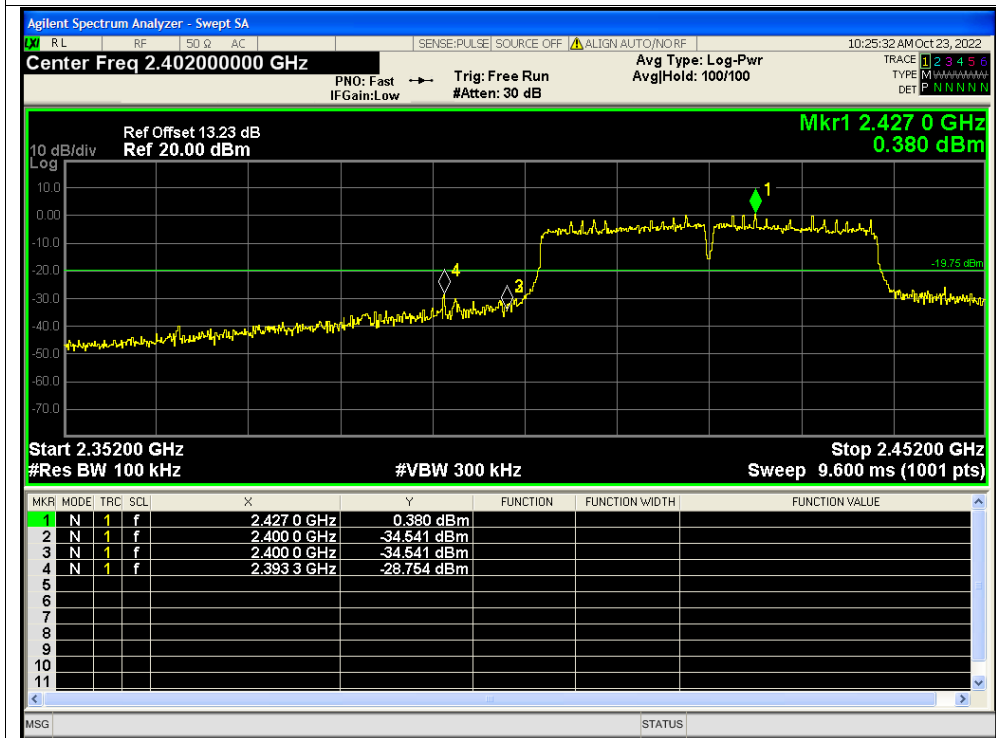




Band Edge NVNT n40 2422MHz Ant1 Ref

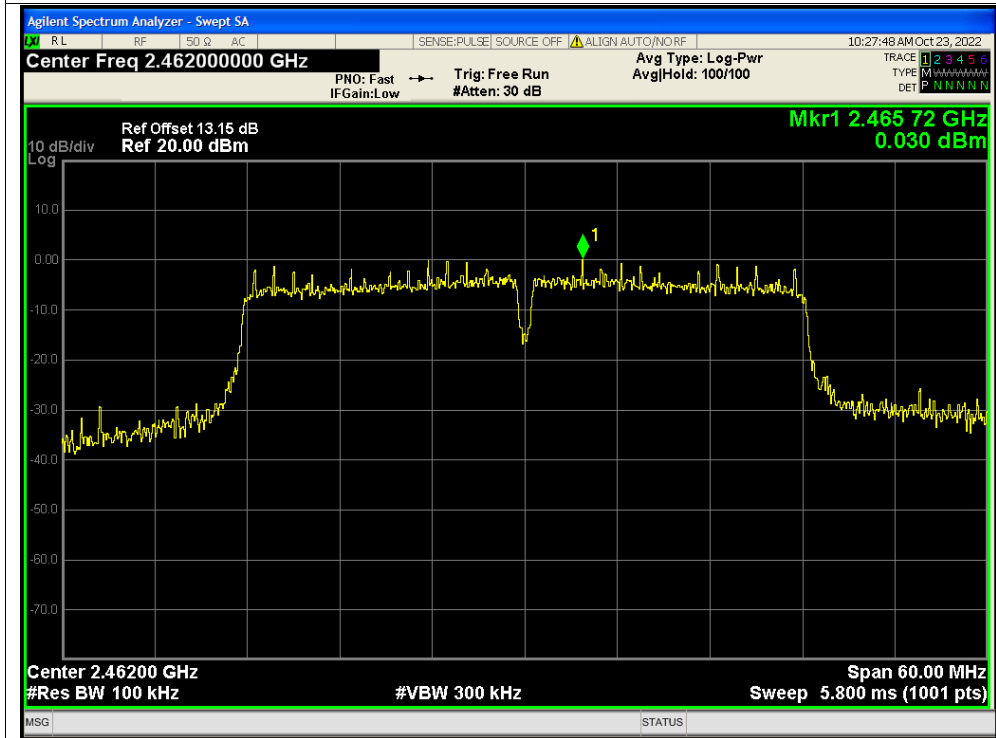


Band Edge NVNT n40 2422MHz Ant1 Emission





Band Edge NVNT n40 2462MHz Ant1 Ref



Band Edge NVNT n40 2462MHz Ant1 Emission





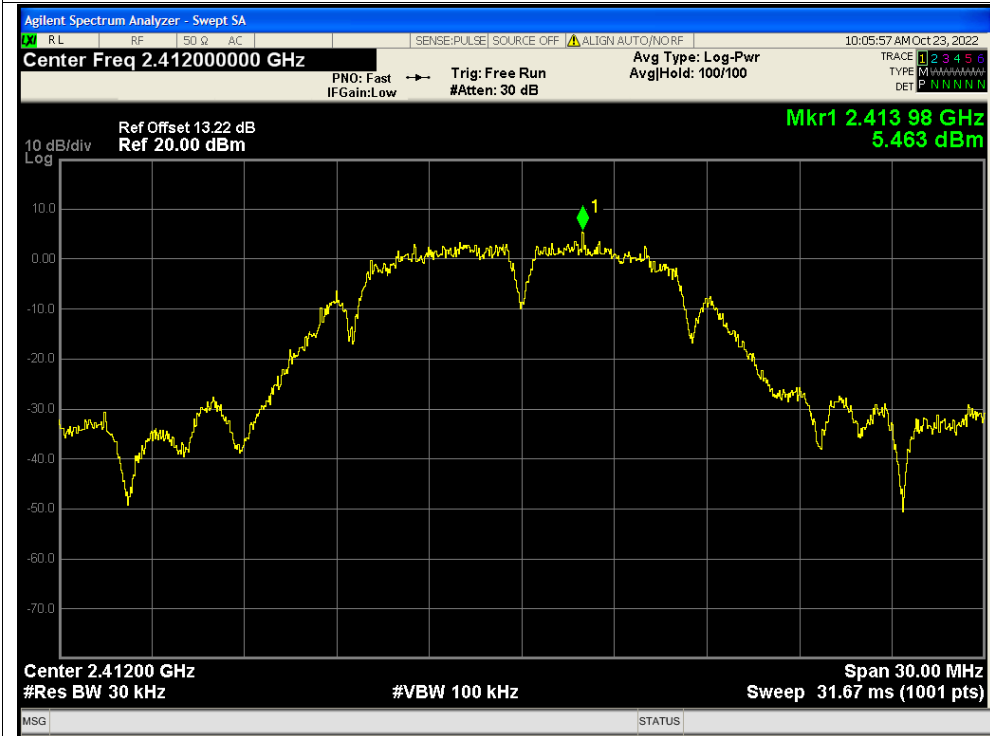
A.7. Power Spectral Density

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm/3kHz)	Duty Factor (dB)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	b	2412	Ant1	-4.54	0	-4.54	8	Pass
NVNT	b	2442	Ant1	-5.22	0	-5.22	8	Pass
NVNT	b	2472	Ant1	-6.81	0	-6.81	8	Pass
NVNT	b	2412	Ant2	-5.35	0	-5.35	8	Pass
NVNT	b	2442	Ant2	-3.98	0	-3.98	8	Pass
NVNT	b	2472	Ant2	-5.58	0	-5.58	8	Pass
NVNT	g	2412	Ant1	-10.43	0	-10.43	8	Pass
NVNT	g	2442	Ant1	-11.23	0	-11.23	8	Pass
NVNT	g	2472	Ant1	-10.56	0	-10.56	8	Pass
NVNT	g	2412	Ant2	-10.51	0	-10.51	8	Pass
NVNT	g	2442	Ant2	-10.05	0	-10.05	8	Pass
NVNT	g	2472	Ant2	-10.38	0	-10.38	8	Pass
NVNT	n20	2412	Ant1	-11.62	0	-11.62	8	Pass
NVNT	n20	2442	Ant1	-11.73	0	-11.73	8	Pass
NVNT	n20	2472	Ant1	-11.87	0	-11.87	8	Pass
NVNT	n20	2412	Ant2	-11.95	0	-11.95	8	Pass
NVNT	n20	2442	Ant2	-12.04	0	-12.04	8	Pass
NVNT	n20	2472	Ant2	-12.32	0	-12.32	8	Pass
NVNT	n20	2412	Ant1+2	-	0	-8.77	8	Pass
NVNT	n20	2442	Ant1+2	-	0	-8.87	8	Pass
NVNT	n20	2472	Ant1+2	-	0	-9.08	8	Pass
NVNT	n40	2422	Ant1	-14.27	0	-14.27	8	Pass
NVNT	n40	2442	Ant1	-14.39	0	-14.39	8	Pass
NVNT	n40	2462	Ant1	-14.61	0	-14.61	8	Pass
NVNT	n40	2422	Ant2	-13.66	0	-13.66	8	Pass
NVNT	n40	2442	Ant2	-14.21	0	-14.21	8	Pass
NVNT	n40	2462	Ant2	-13.91	0	-13.91	8	Pass
NVNT	n40	2422	Ant1+2	-	0	-10.94	8	Pass
NVNT	n40	2442	Ant1+2	-	0	-11.29	8	Pass
NVNT	n40	2462	Ant1+2	-	0	-11.24	8	Pass

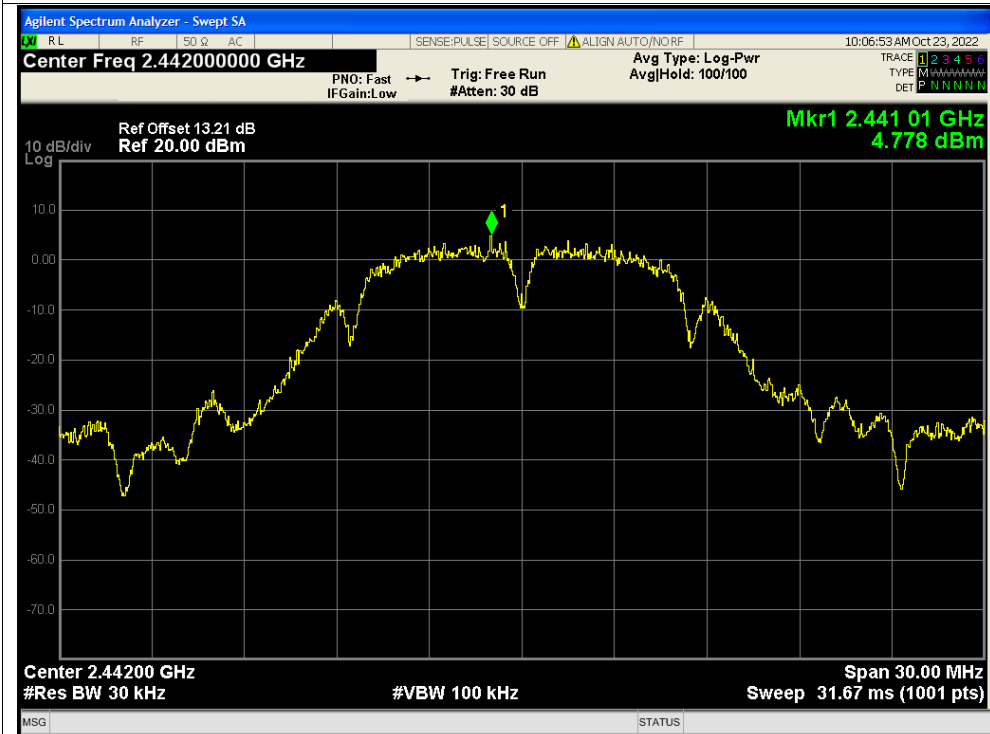


Test Graphs

PSD NVNT b 2412MHz Ant1

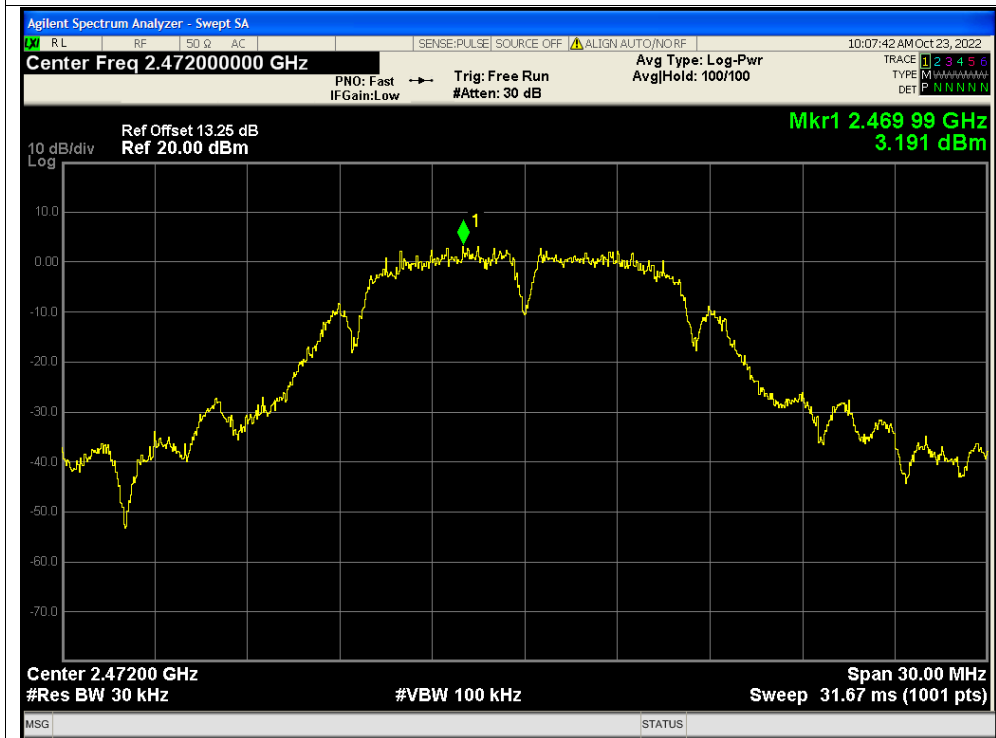


PSD NVNT b 2442MHz Ant1

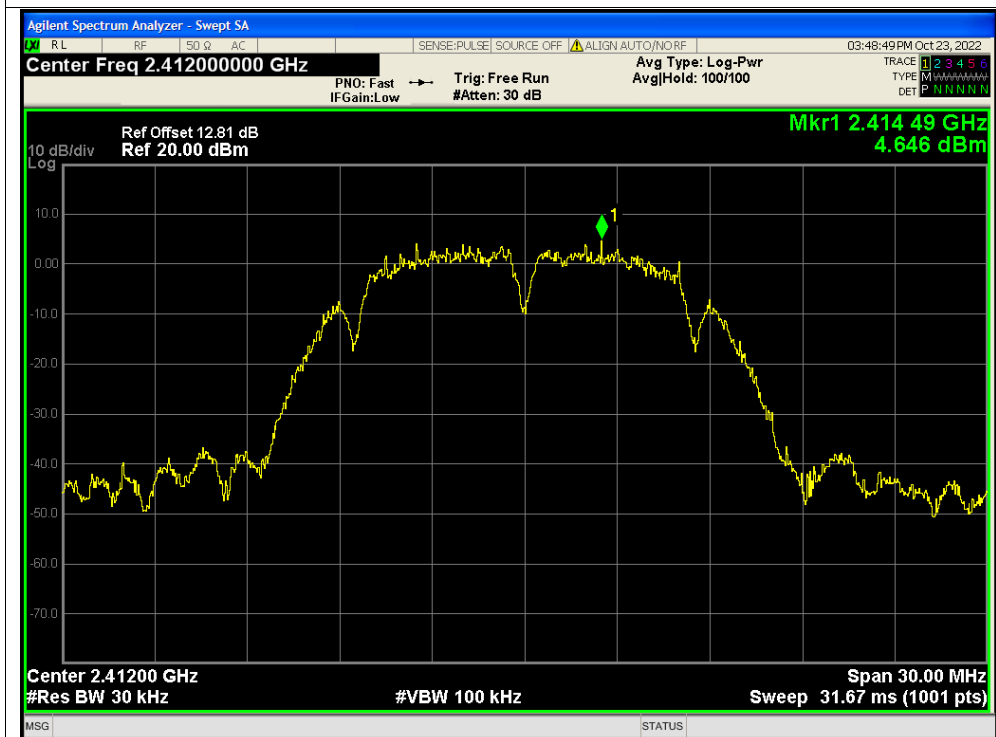




PSD NVNT b 2472MHz Ant1



PSD NVNT b 2412MHz Ant2





PSD NVNT b 2442MHz Ant2

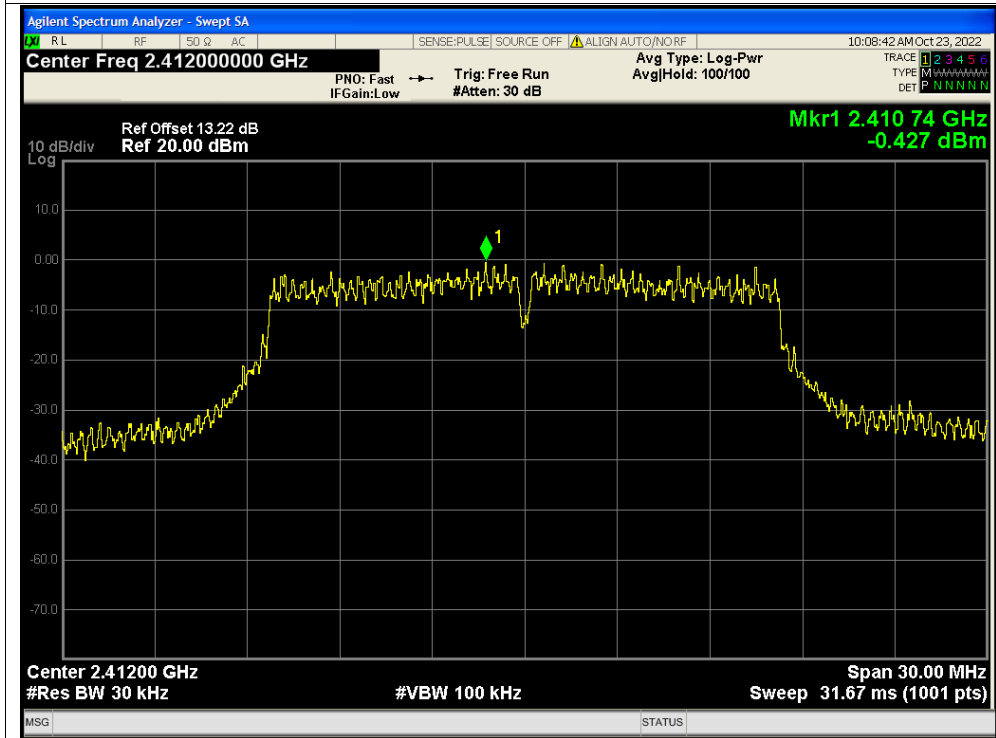


PSD NVNT b 2472MHz Ant2

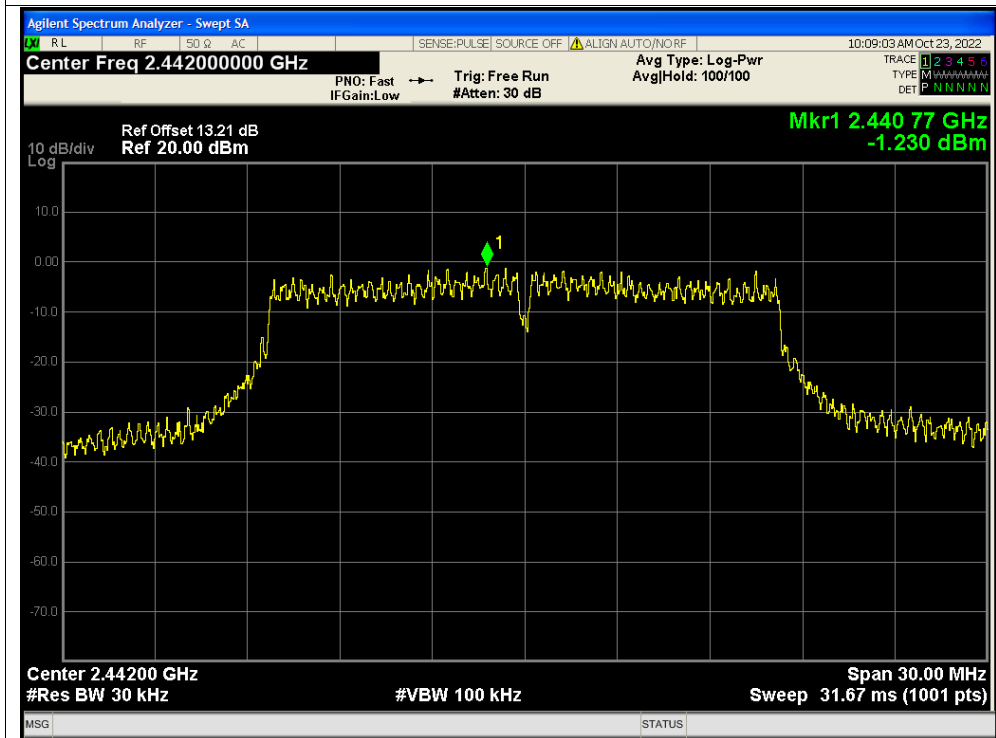




PSD NVNT g 2412MHz Ant1

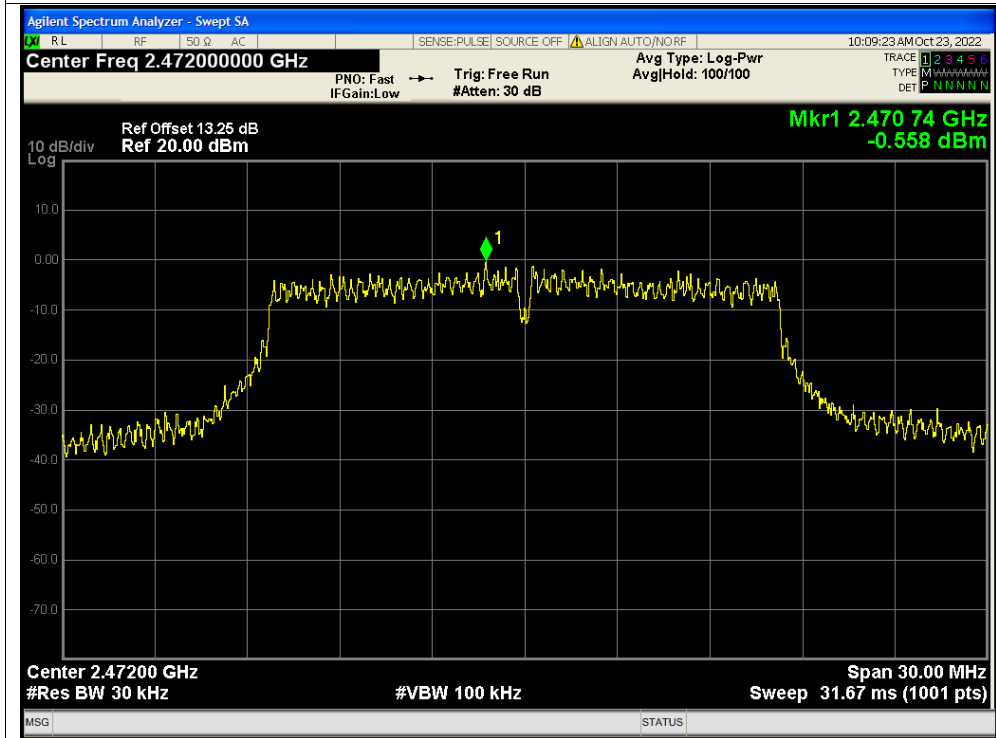


PSD NVNT g 2442MHz Ant1

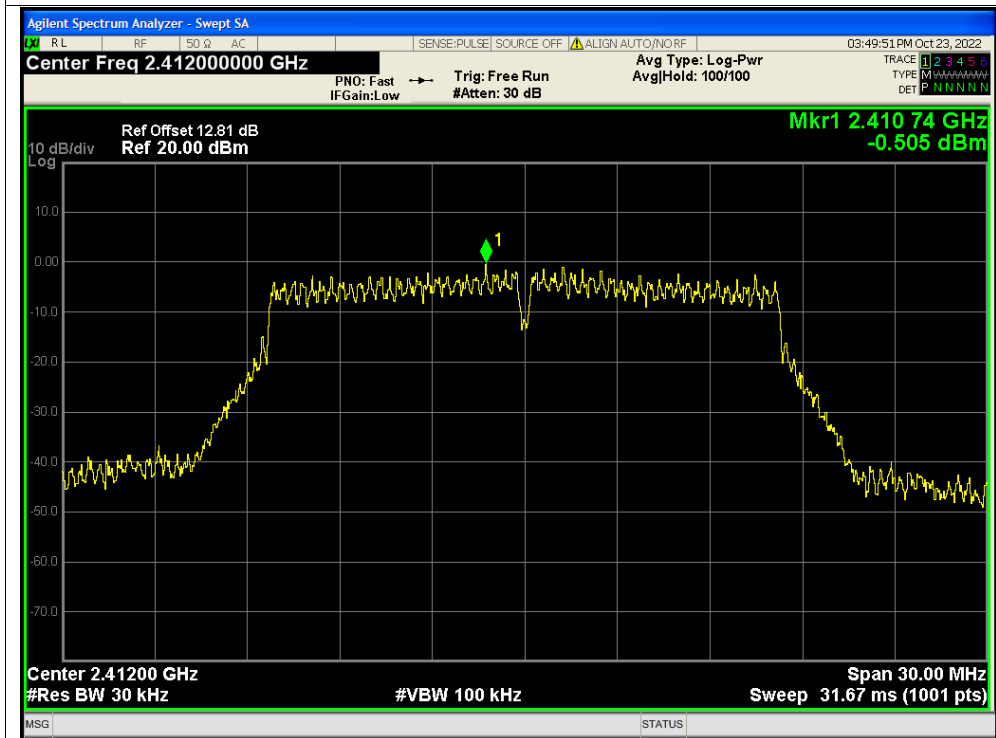




PSD NVNT g 2472MHz Ant1

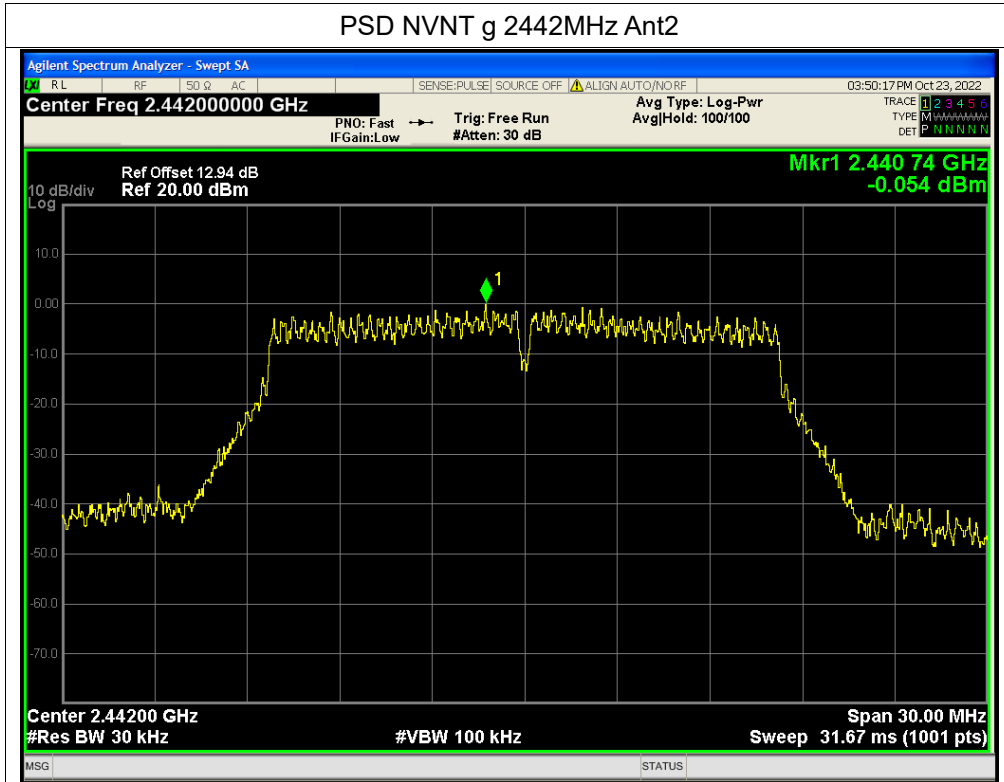


PSD NVNT g 2412MHz Ant2

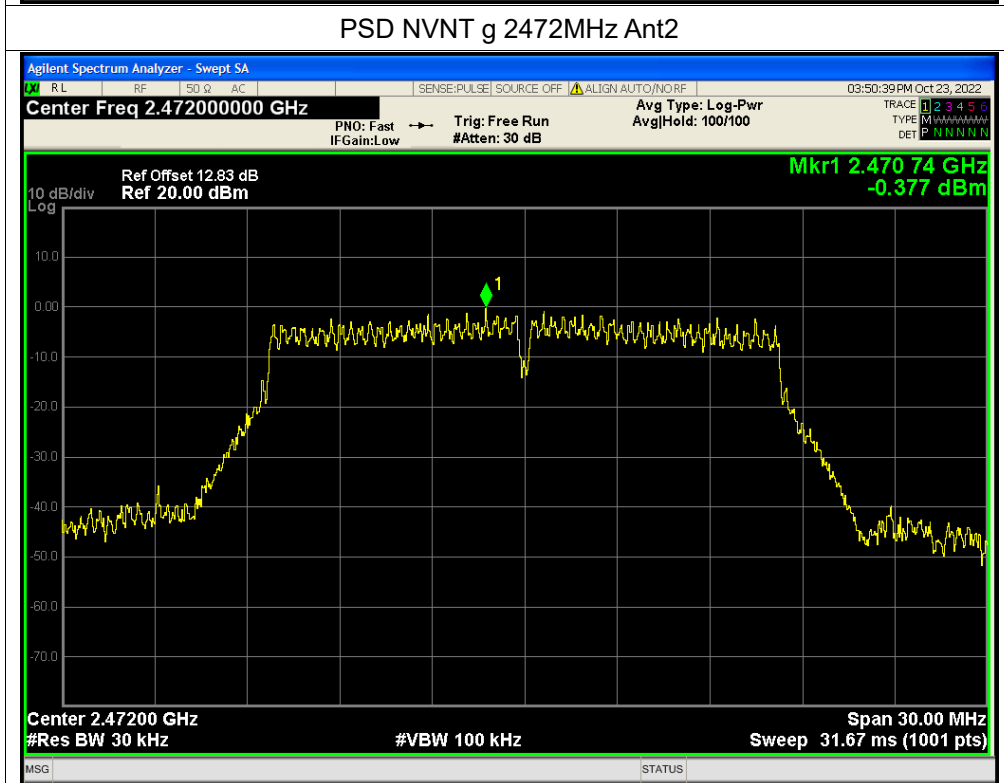




PSD NVNT g 2442MHz Ant2

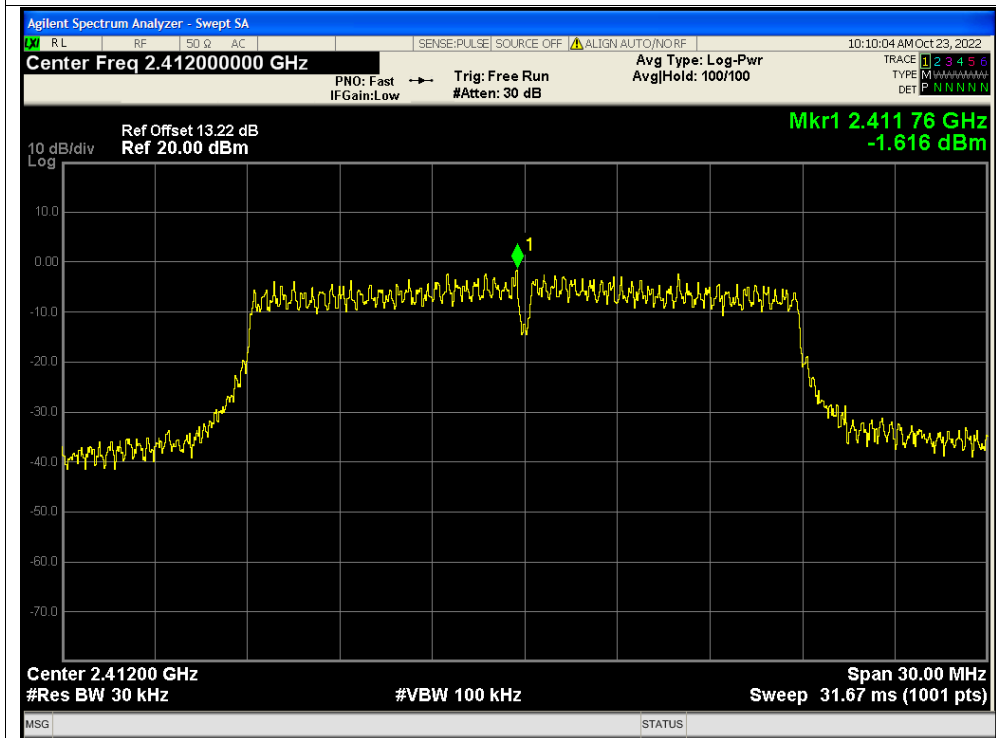


PSD NVNT g 2472MHz Ant2

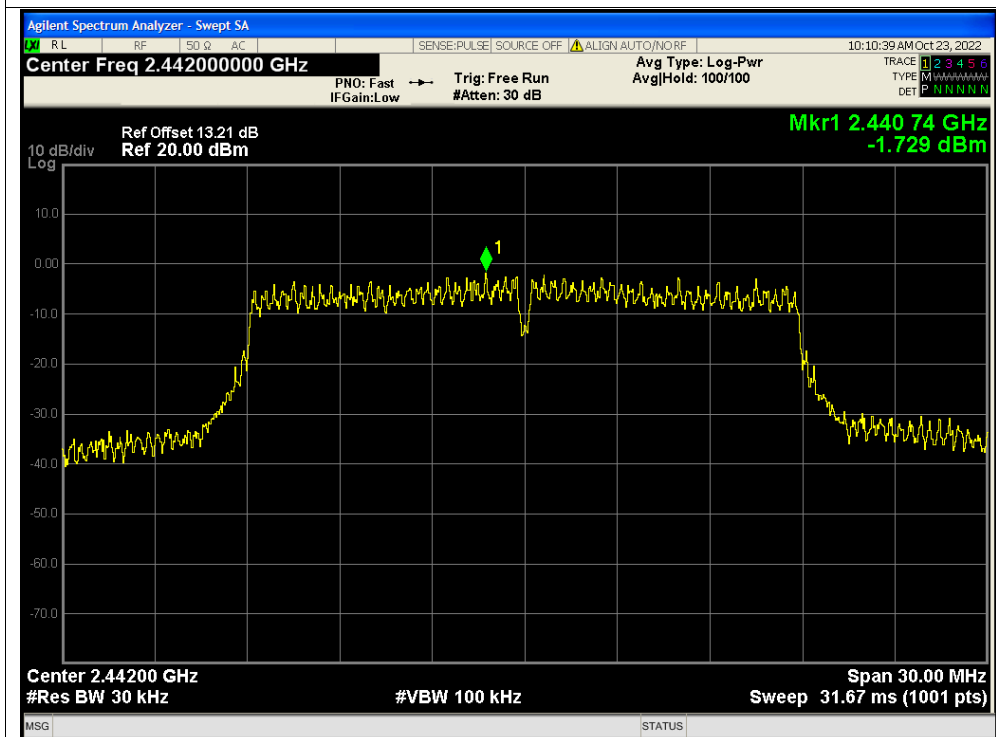




PSD NVNT n20 2412MHz Ant1

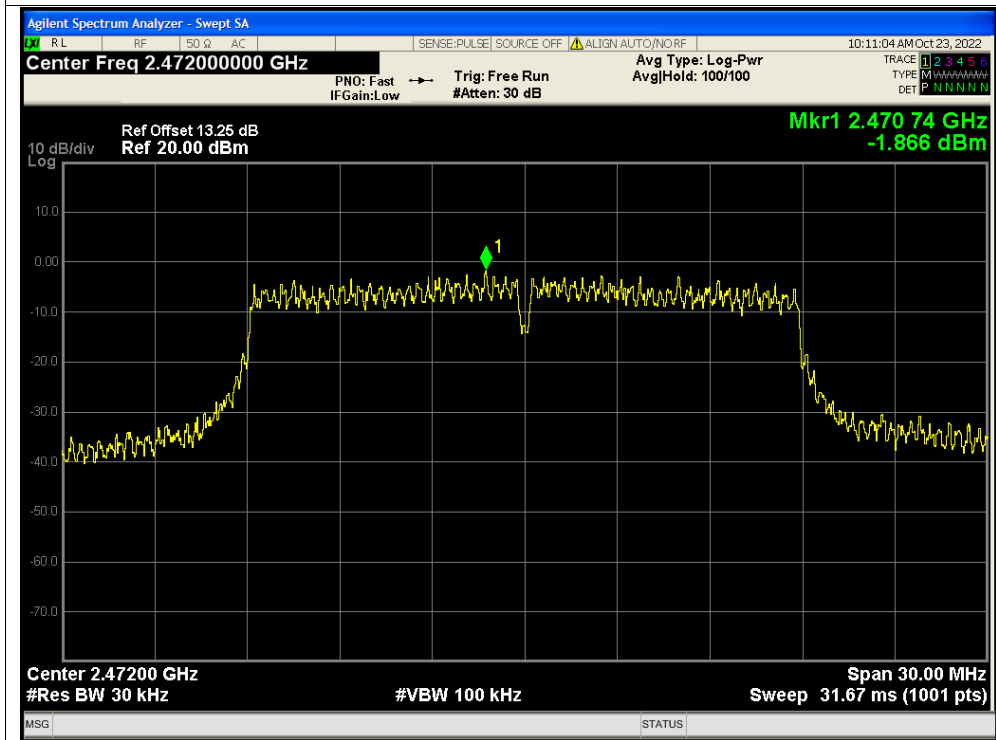


PSD NVNT n20 2442MHz Ant1

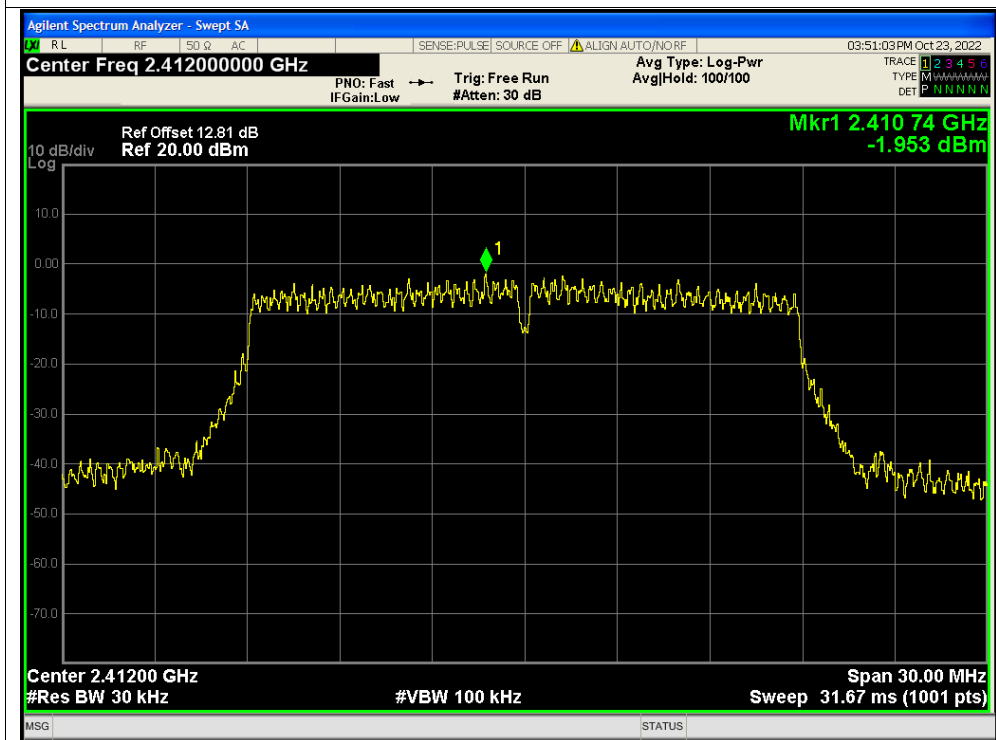




PSD NVNT n20 2472MHz Ant1

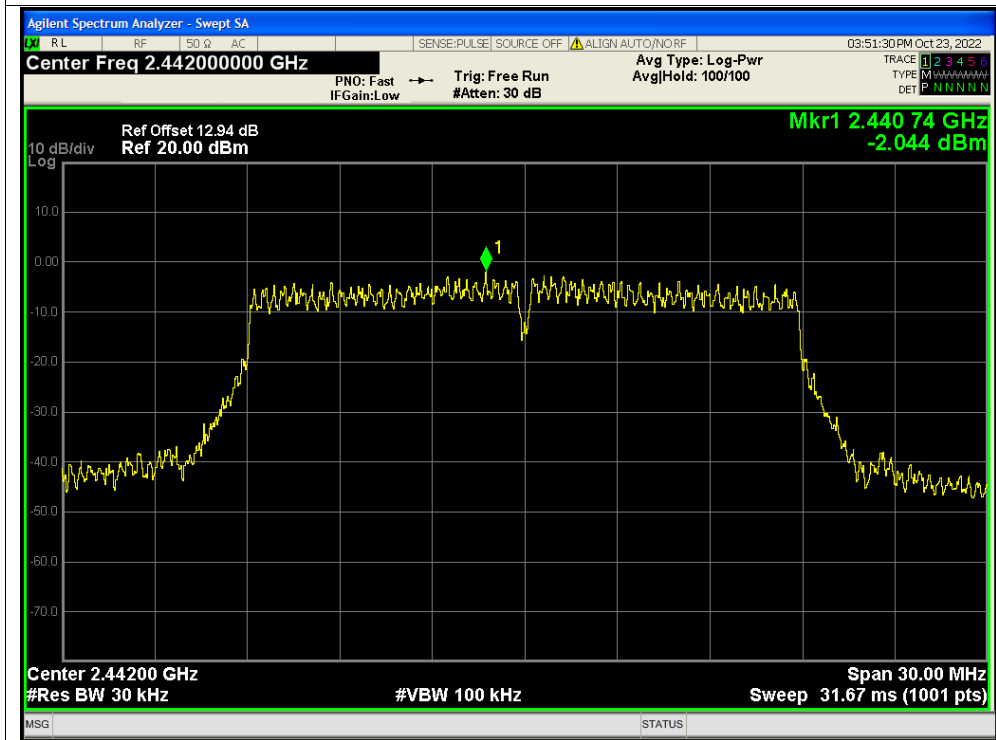


PSD NVNT n20 2412MHz Ant2

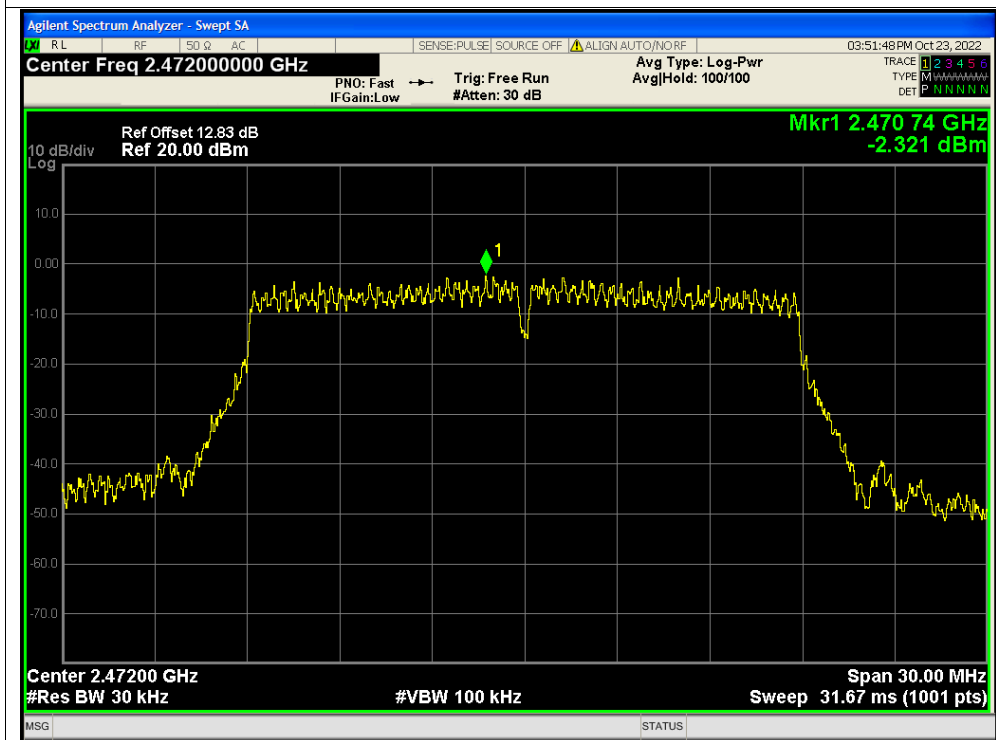




PSD NVNT n20 2442MHz Ant2

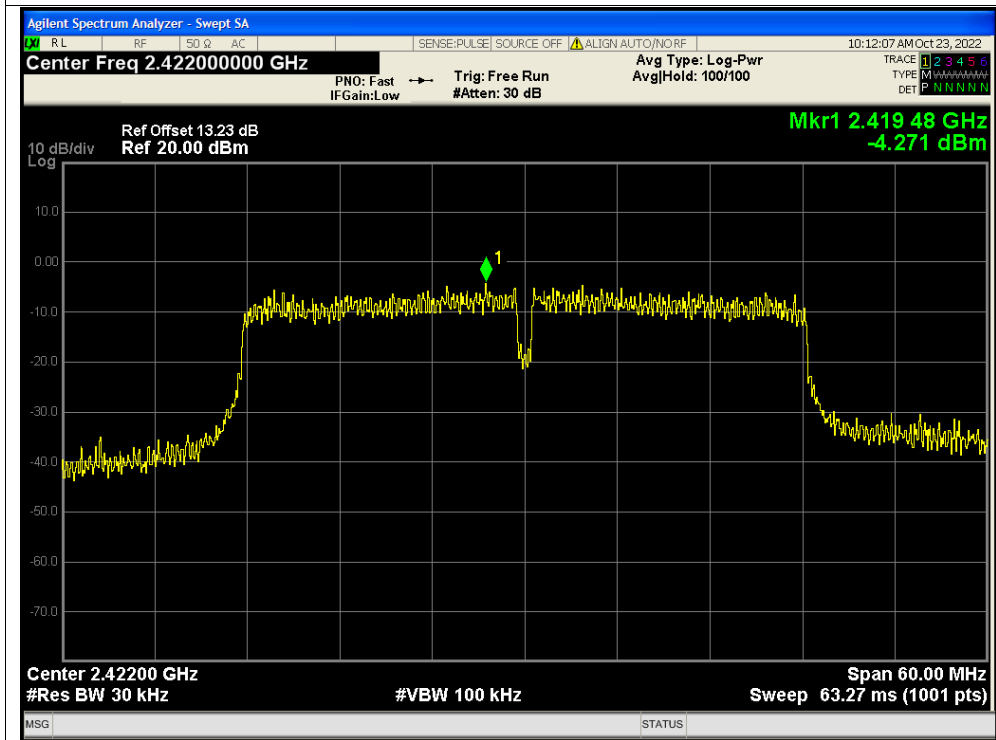


PSD NVNT n20 2472MHz Ant2

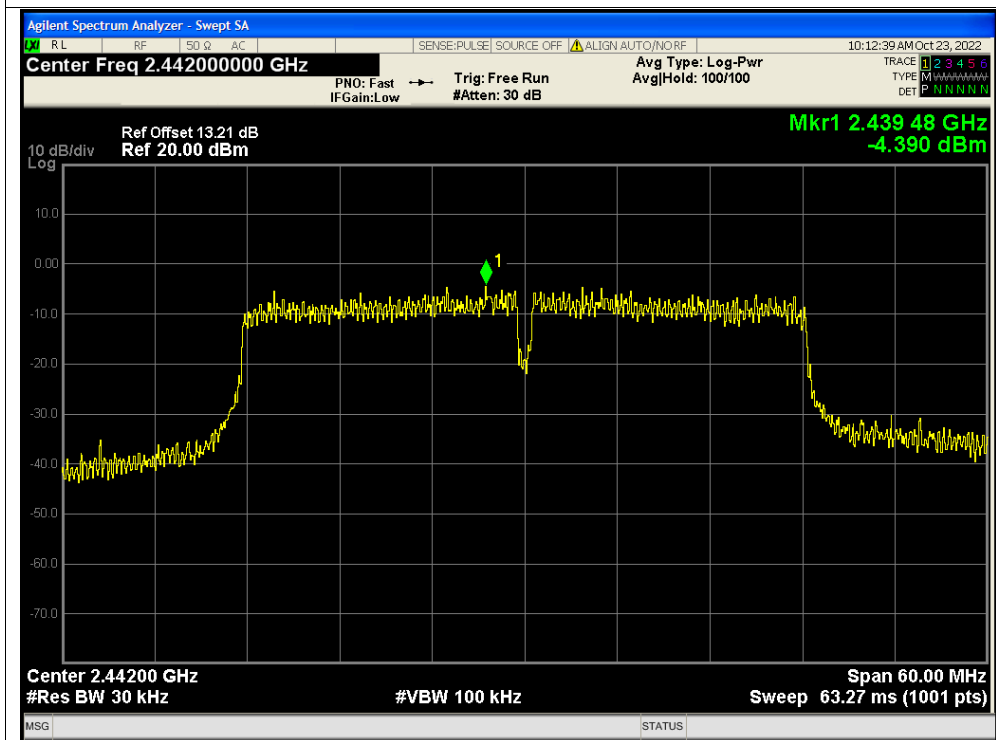




PSD NVNT n40 2422MHz Ant1

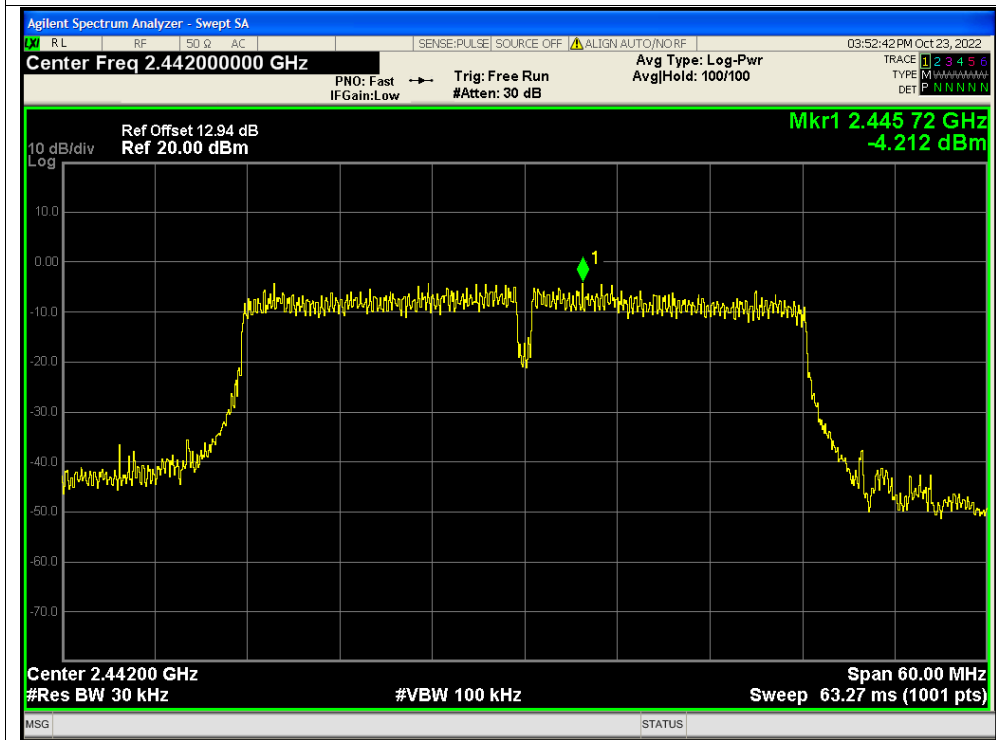


PSD NVNT n40 2442MHz Ant1

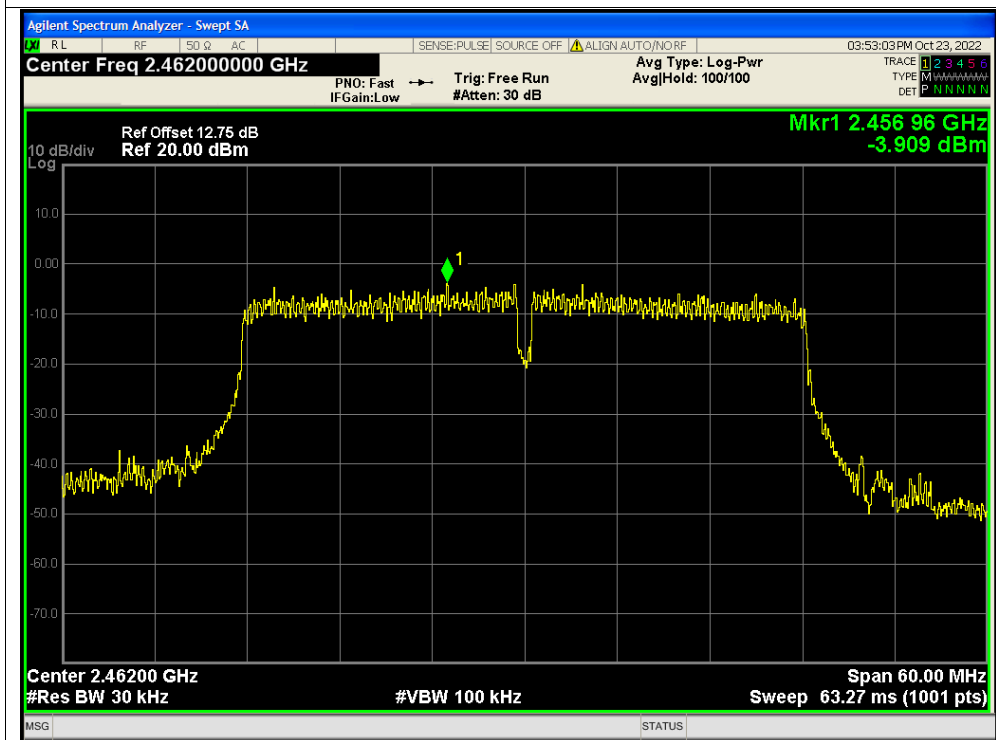




PSD NVNT n40 2442MHz Ant2



PSD NVNT n40 2462MHz Ant2





A.8. Conducted Emission

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT+ Adapter + Computer + WIFI TX

Test voltage: AC 120V/60Hz

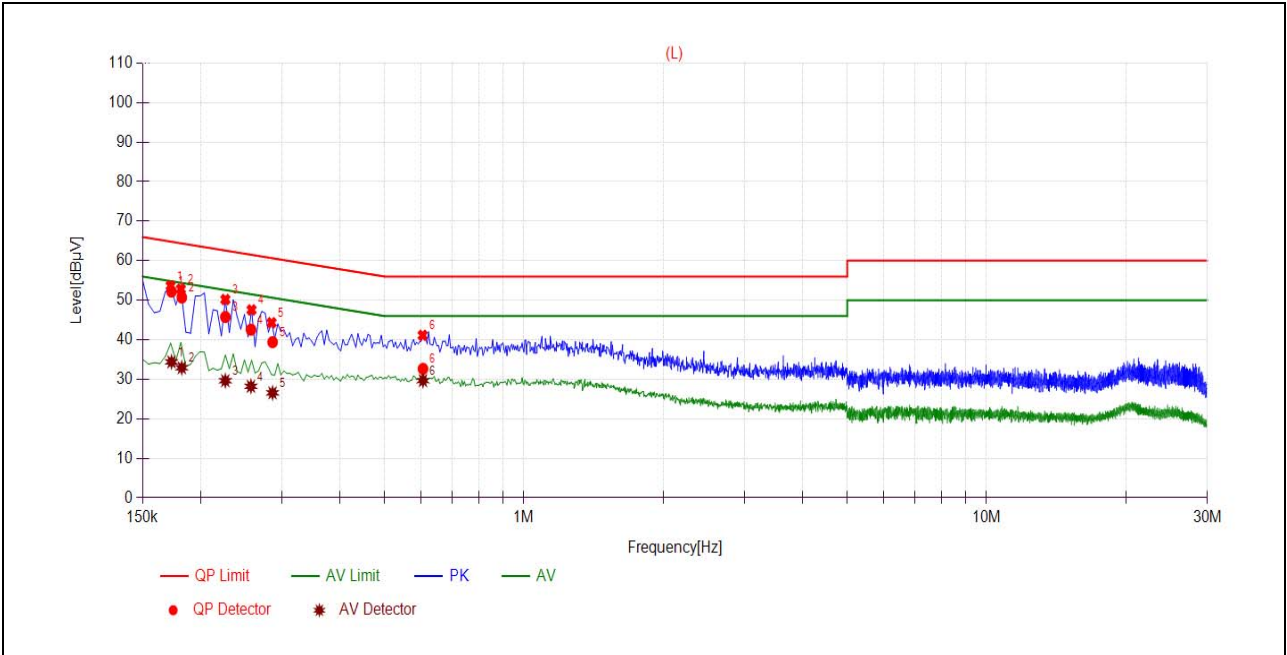
The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V]} = U_R + L_{\text{Cable loss}} \text{ [dB]} + A_{\text{Factor}}$$

U_R : Receiver Reading

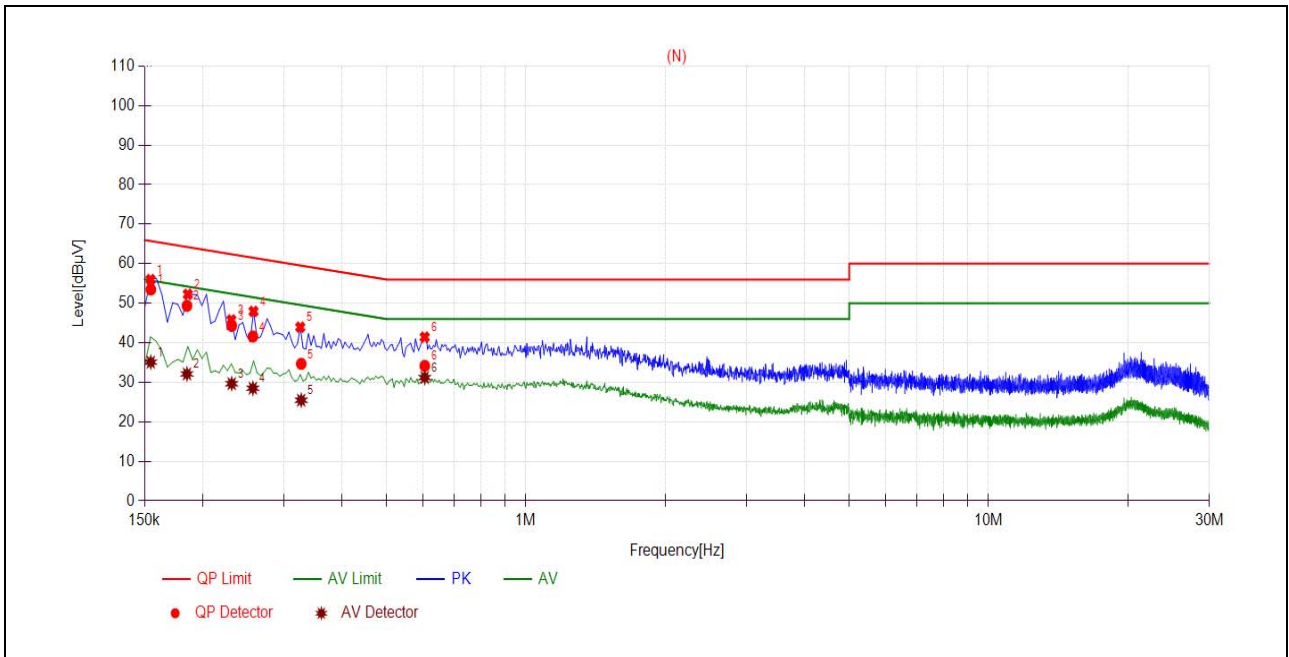
A_{Factor} : Voltage division factor of LISN

B. Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1732	52.19	34.40	64.81	54.81	Line	PASS
2	0.1823	50.70	32.91	64.38	54.38		PASS
3	0.2264	45.77	29.64	62.58	52.58		PASS
4	0.2572	42.56	28.21	61.52	51.52		PASS
5	0.2864	39.41	26.56	60.63	50.63		PASS
6	0.6054	32.65	29.66	56.00	46.00		PASS



(N Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1547	53.49	35.09	65.75	55.75	Neutral	PASS
2	0.1852	49.36	32.11	64.25	54.25		PASS
3	0.2314	44.28	29.65	62.40	52.40		PASS
4	0.2571	41.59	28.50	61.52	51.52		PASS
5	0.3270	34.67	25.46	59.53	49.53		PASS
6	0.6046	34.16	31.20	56.00	46.00		PASS

**A.9. Restricted Frequency Bands**

The lowest and highest channels are tested to verify the Restricted Frequency Bands.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

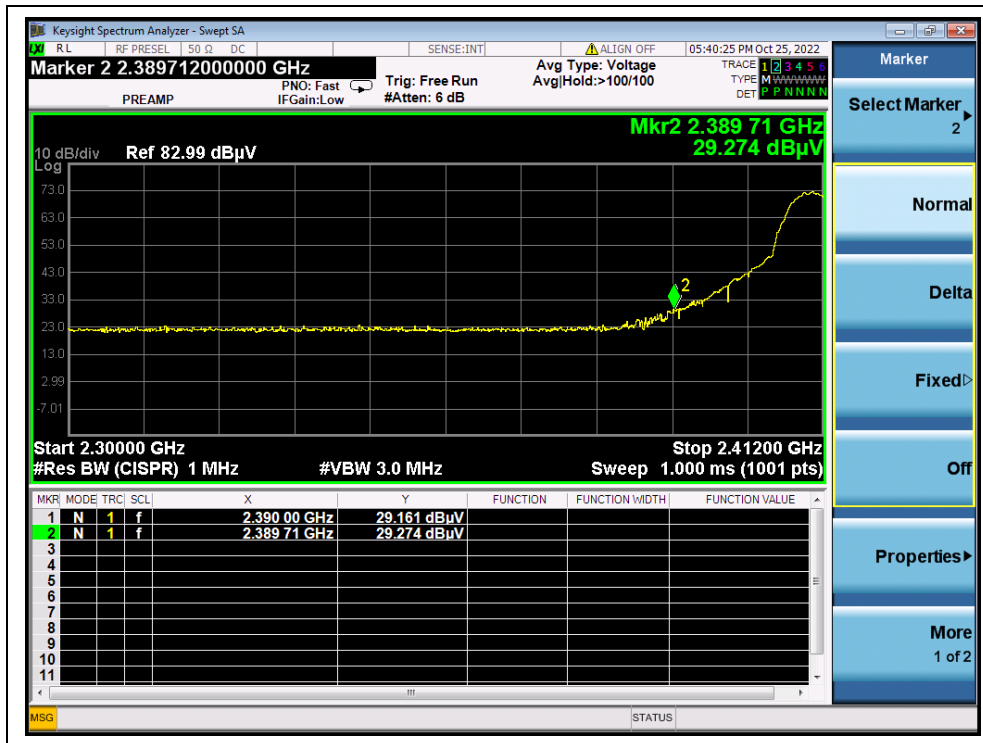
G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

802.11b Mode

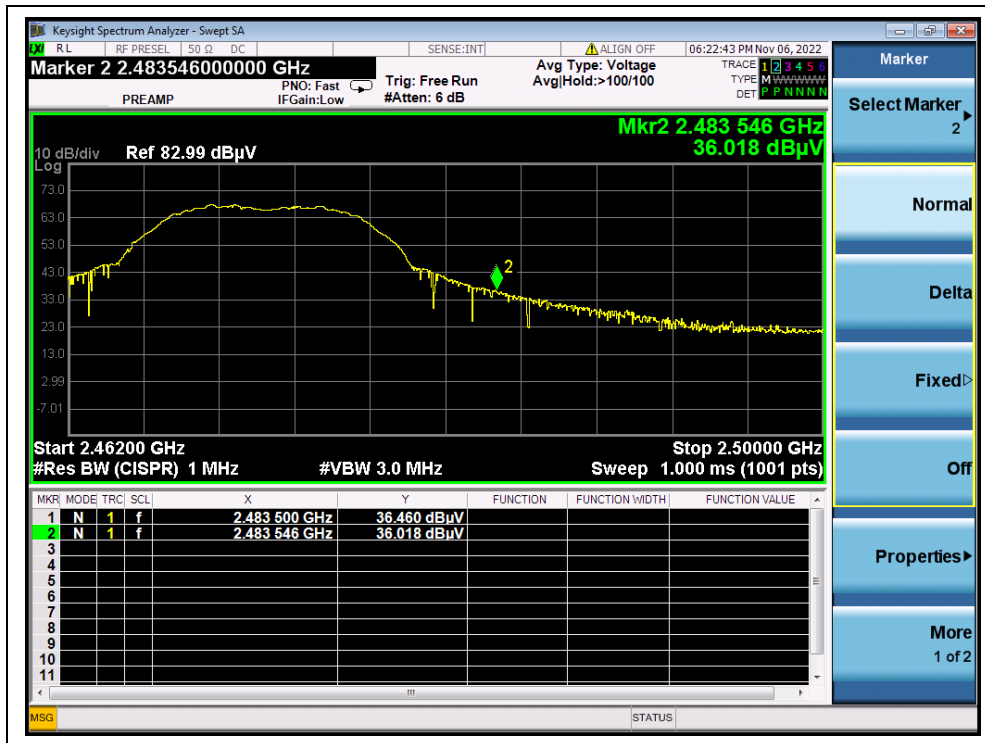
Channel	Frequency (MHz)	Detector	Receiver Reading	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV	U_R (dB μ V)					
0	2389.71	PK	29.27	6.74	27.20	63.21	74	PASS
0	2387.14	AV	14.30	6.74	27.20	48.24	54	PASS
39	2483.50	PK	36.46	6.74	27.20	70.40	74	PASS
39	2483.70	AV	16.53	6.74	27.20	50.47	54	PASS



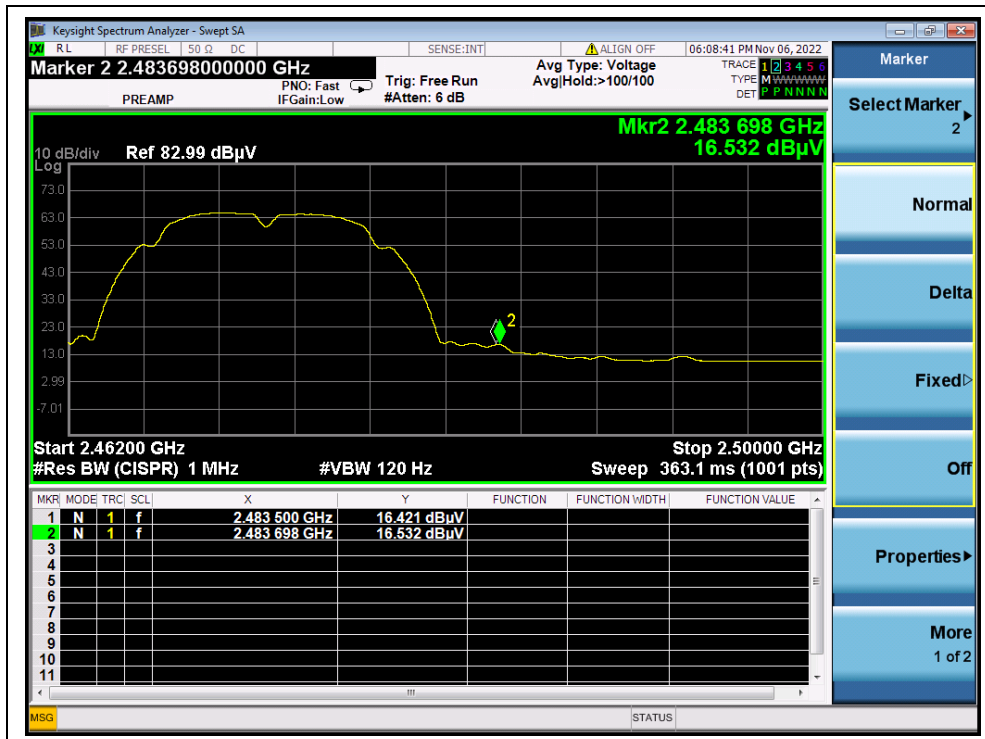
(PEAK, Channel 1, 802.11b)



(AVERAGE, Channel 1, 802.11b)



(PEAK, Channel 13, 802.11b)



(AVERAGE, Channel 13, 802.11b)

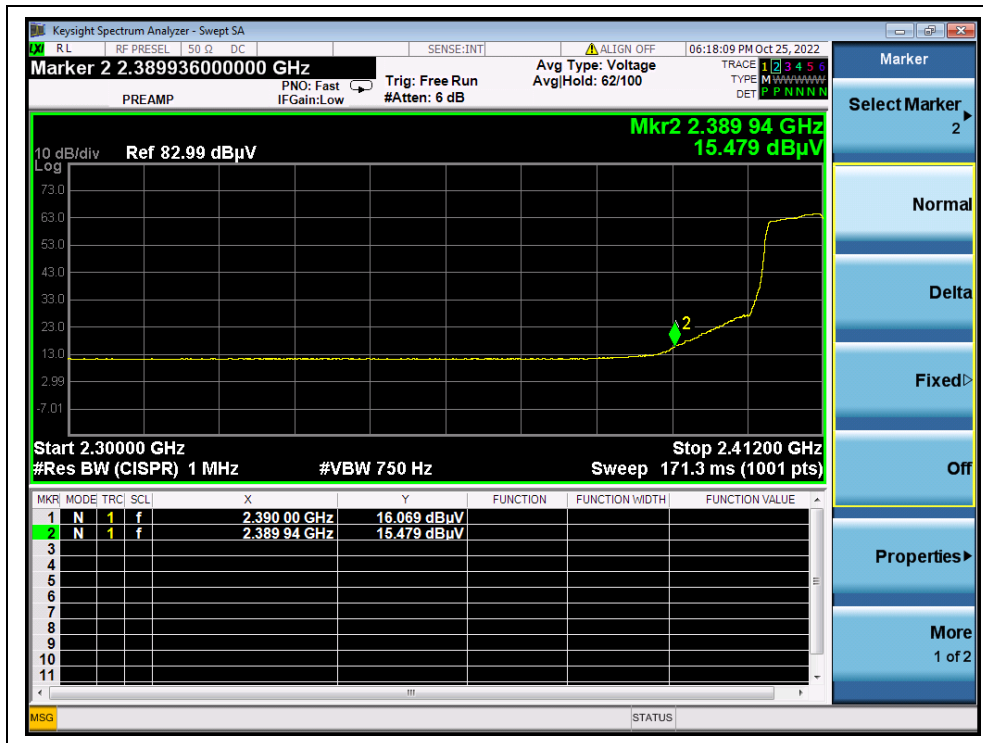


802.11g Mode

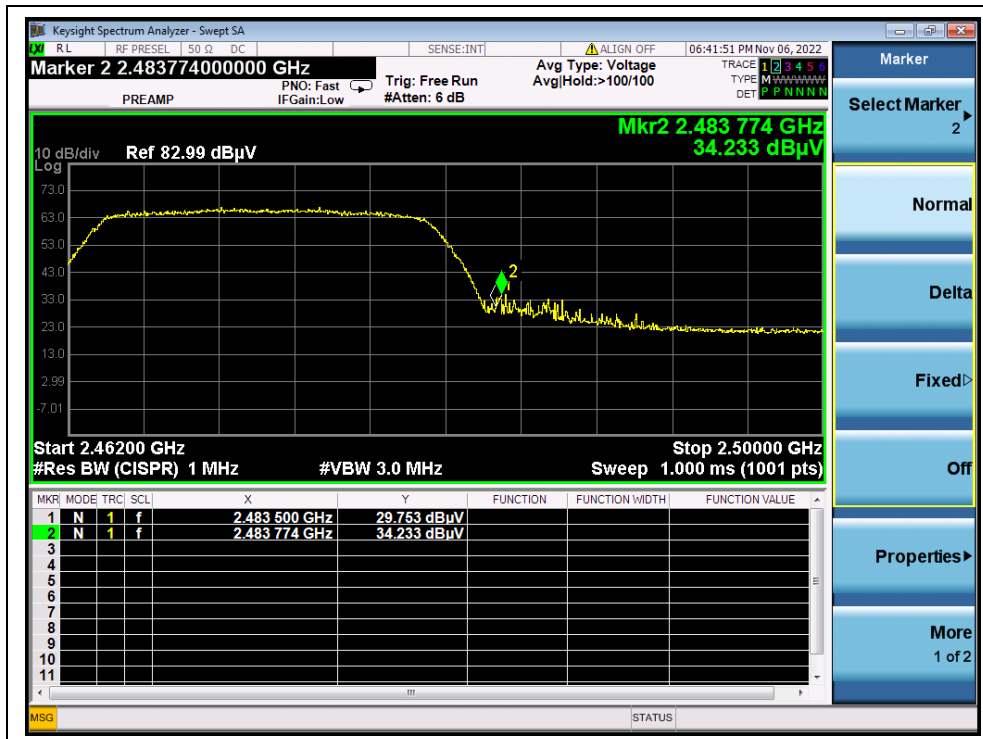
Channel	Frequency (MHz)	Detector	Receiver Reading U _R (dBμV)	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
0	2389.26	PK	30.30	6.74	27.20	64.24	74	PASS
0	2390.00	AV	16.07	6.74	27.20	50.01	54	PASS
39	2483.77	PK	34.23	6.74	27.20	68.17	74	PASS
39	2483.81	AV	17.02	6.74	27.20	50.96	54	PASS



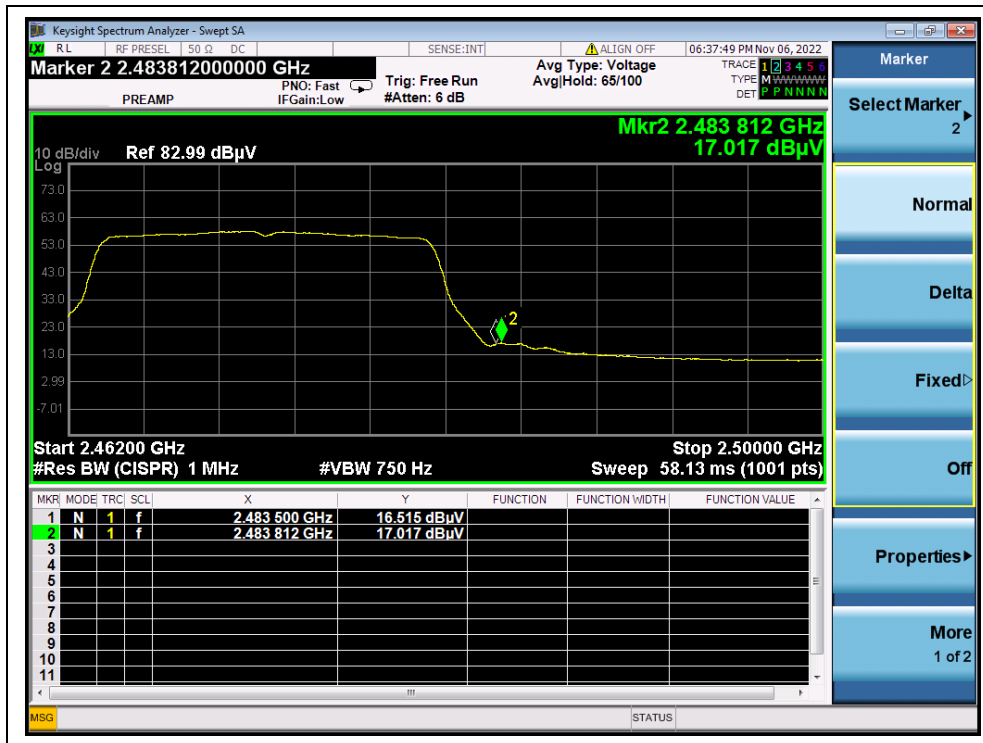
(PEAK, Channel 1, 802.11g)



(AVERAGE, Channel 1, 802.11g)



(PEAK, Channel 13, 802.11g)

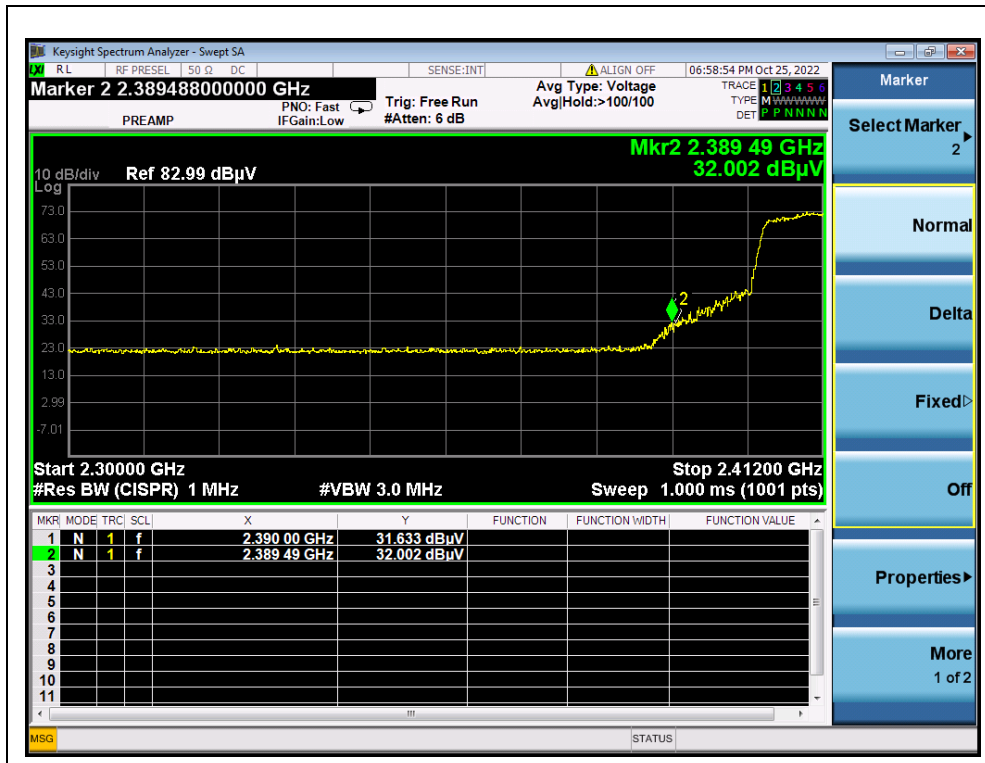


(AVERAGE, Channel 13, 802.11g)

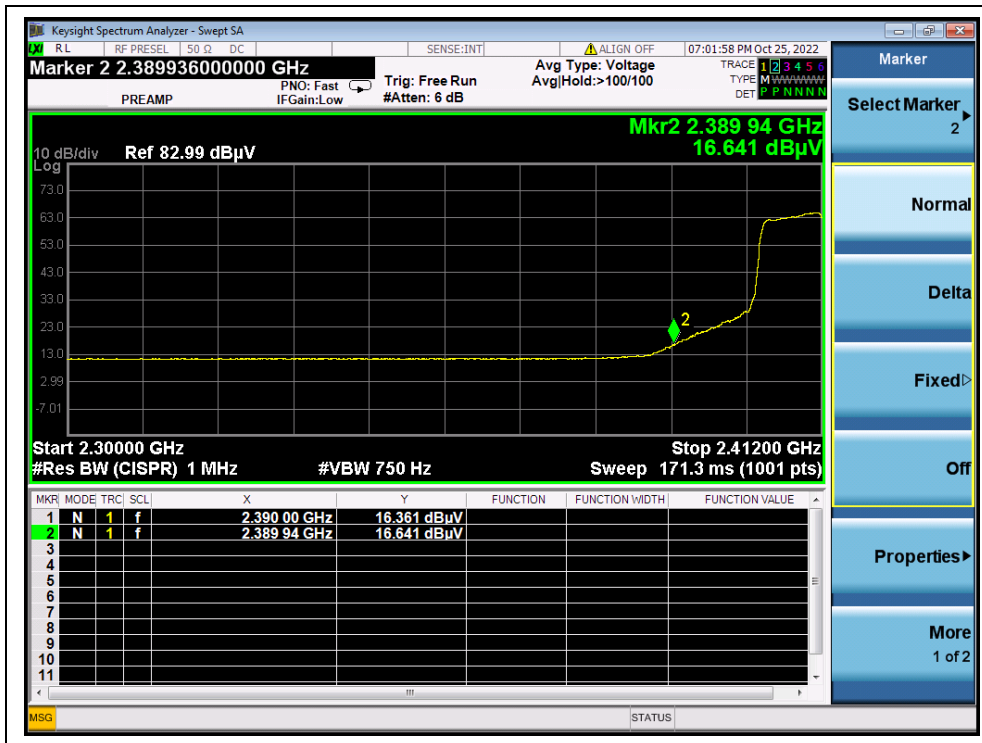


802.11 n (HT20) Mode

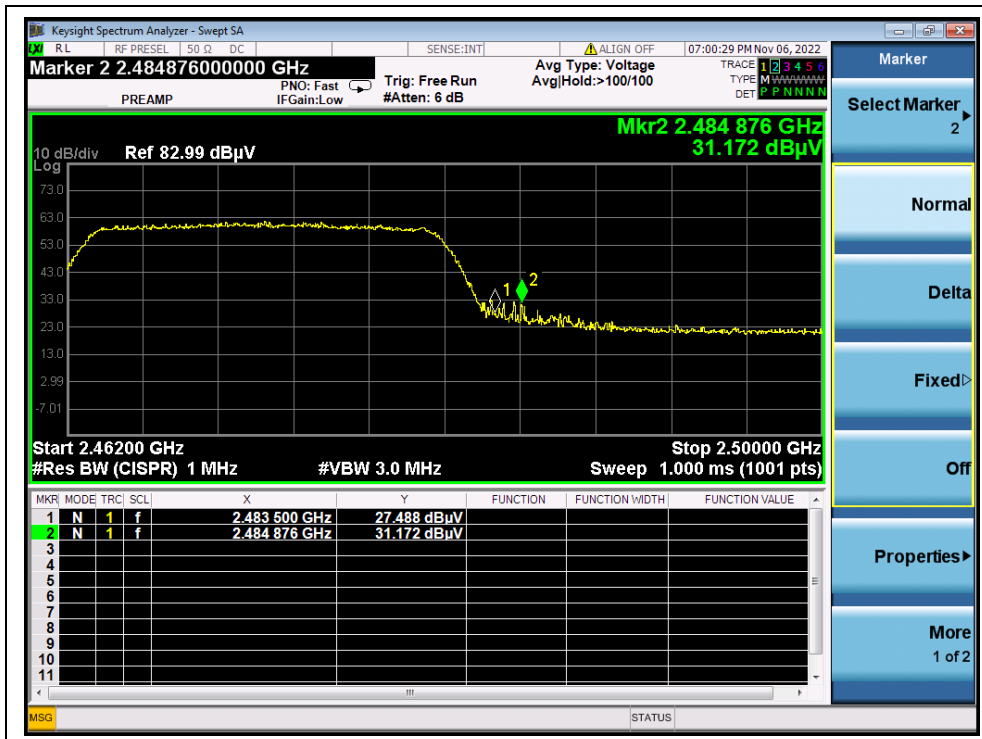
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dB μ V)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV						
1	2389.49	PK	32.00	6.74	27.20	65.94	74	PASS
1	2389.94	AV	16.64	6.74	27.20	50.58	54	PASS
13	2484.88	PK	31.17	6.74	27.20	65.11	74	PASS
13	2483.50	AV	16.94	6.74	27.20	50.88	54	PASS



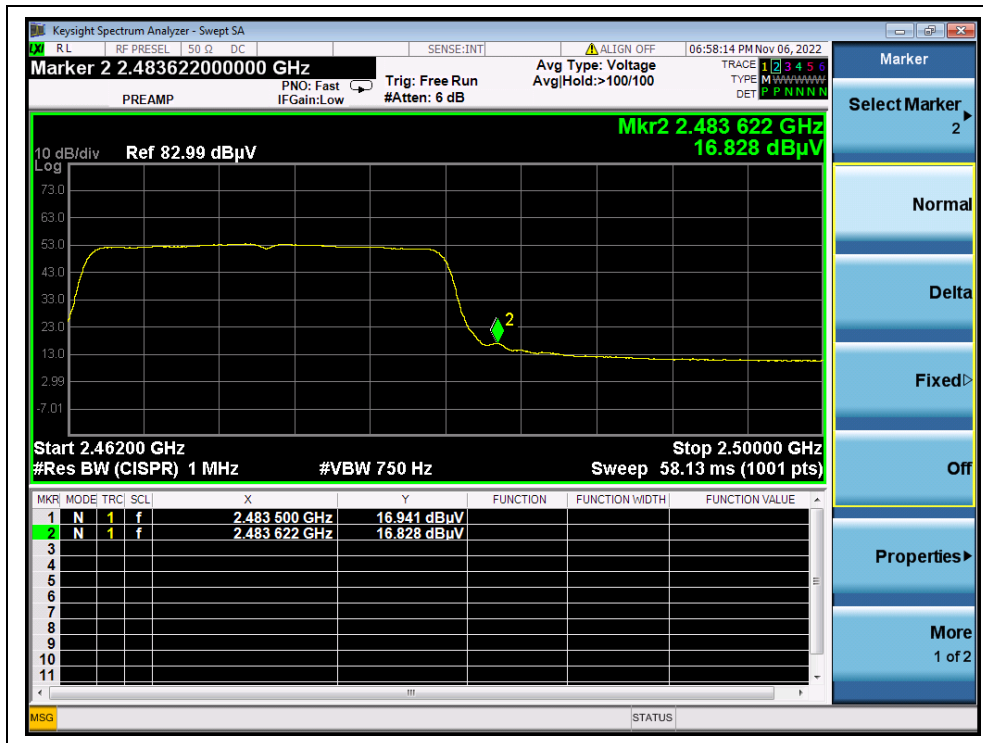
(PEAK, Channel 1, 802.11n (HT20))



(AVERAGE, Channel 1, 802.11n (HT20))



(PEAK, Channel 13, 802.11n (HT20))



(AVERAGE, Channel 13, 802.11n (HT20))

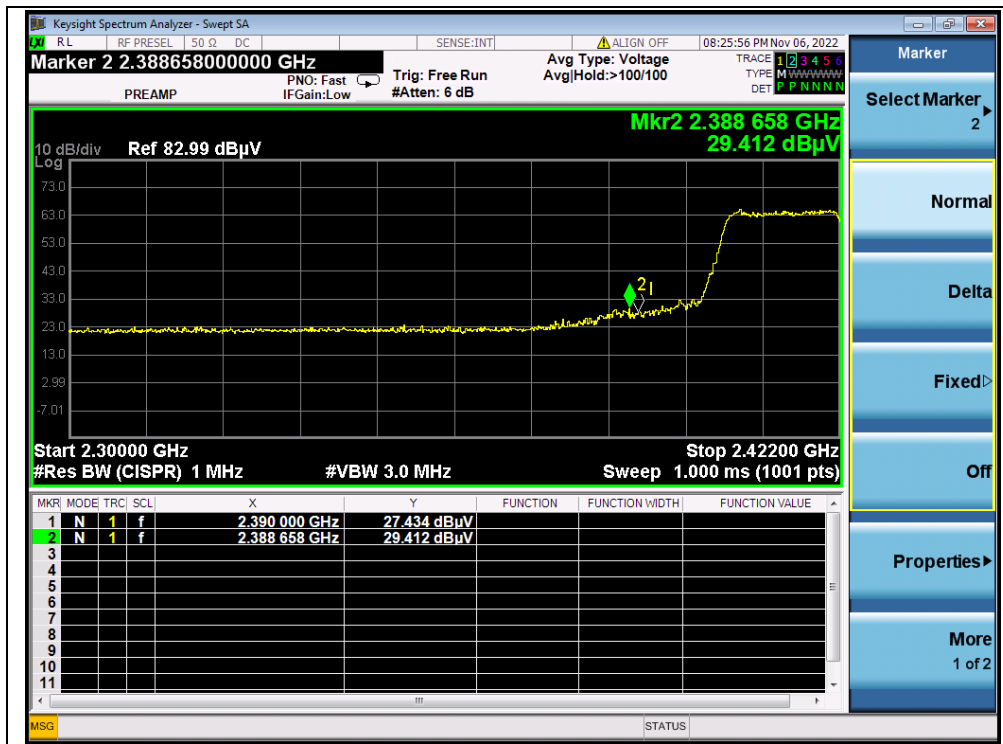


802.11n (HT40) Mode

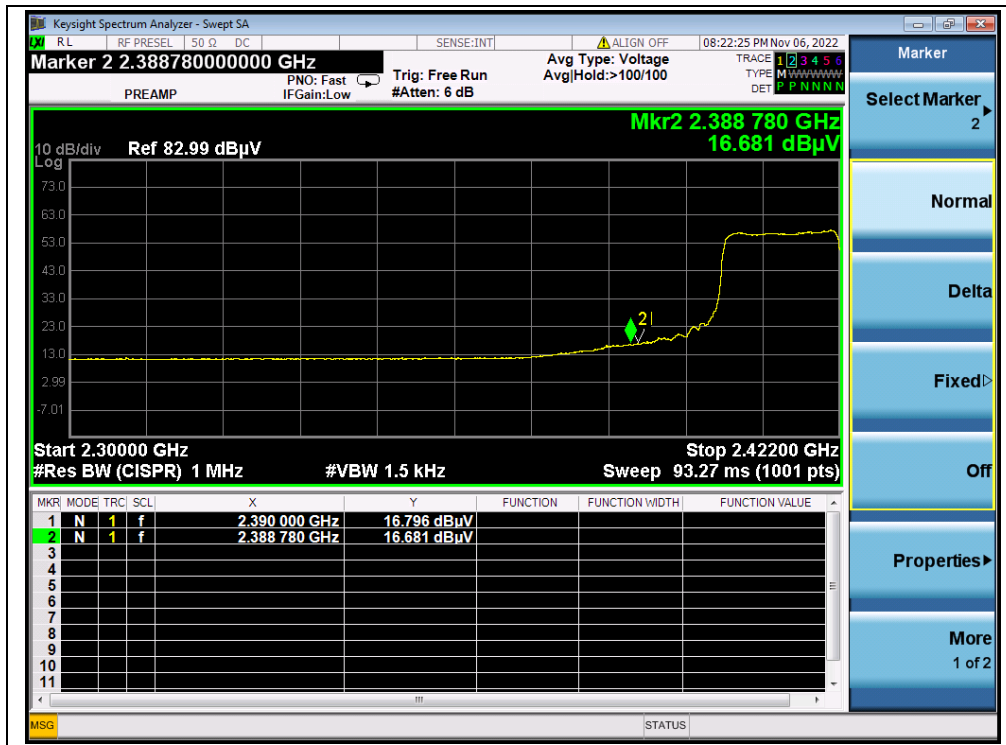
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dB μ V)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV						
3	2388.66	PK	29.41	6.74	27.20	63.35	74	PASS
3	2390.00	AV	16.80	6.74	27.20	50.74	54	PASS
11	2483.50	PK	29.26	6.74	27.20	63.20	74	PASS
11	2483.81	AV	16.94	6.74	27.20	50.88	54	PASS

B. Test Plot:



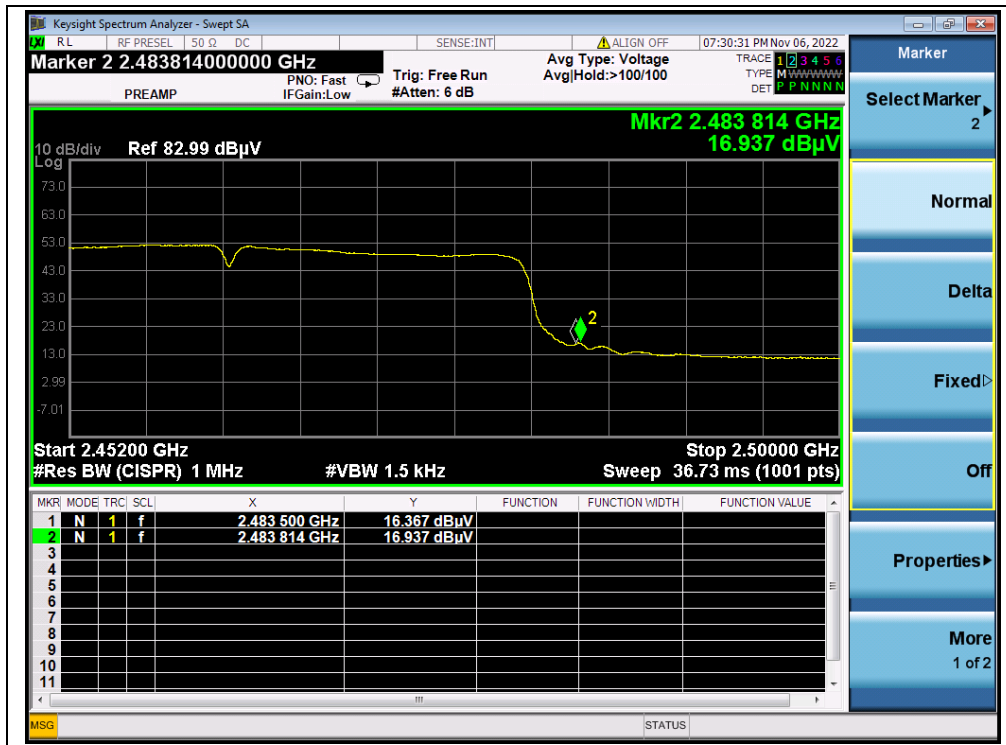
(PEAK, Channel 3, 802.11n (HT40))



(AVERAGE, Channel 3, 802.11n (HT40))



(PEAK, Channel 11, 802.11n (HT40))



(AVERAGE, Channel 11, 802.11n (HT40))



A.10. Radiated Emission

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

A_T : Total correction Factor except Antenna

U_R : Receiver Reading

G_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

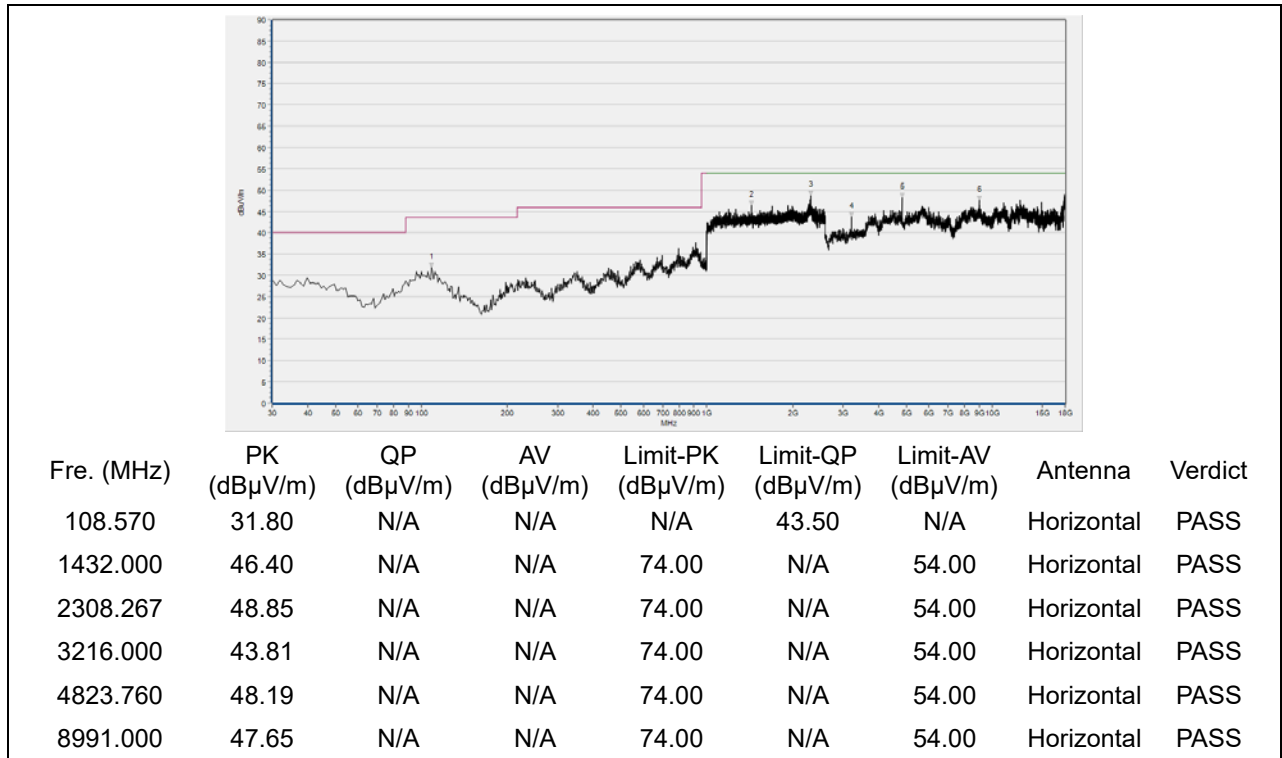
Note2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

Note3: For the frequency, which started from 18GHz to 10th harmonic of the highest frequency, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

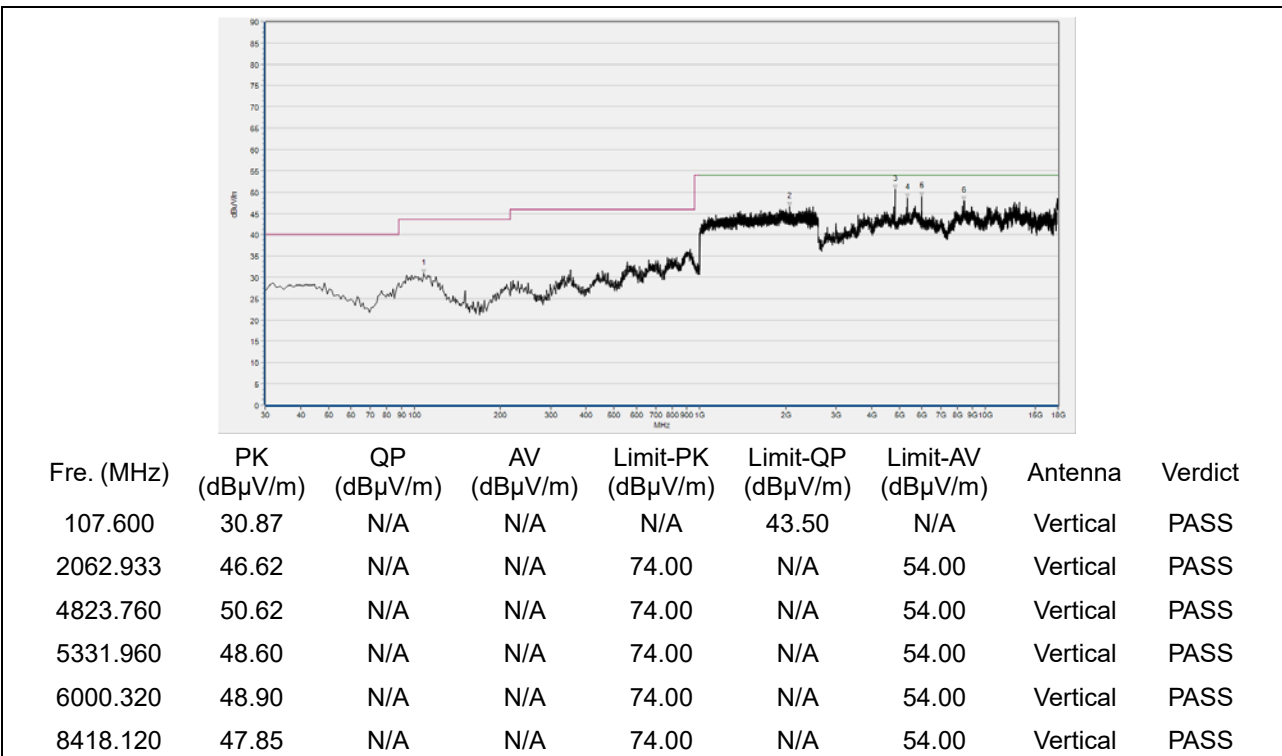


802.11b Mode

Plot for Channel 1

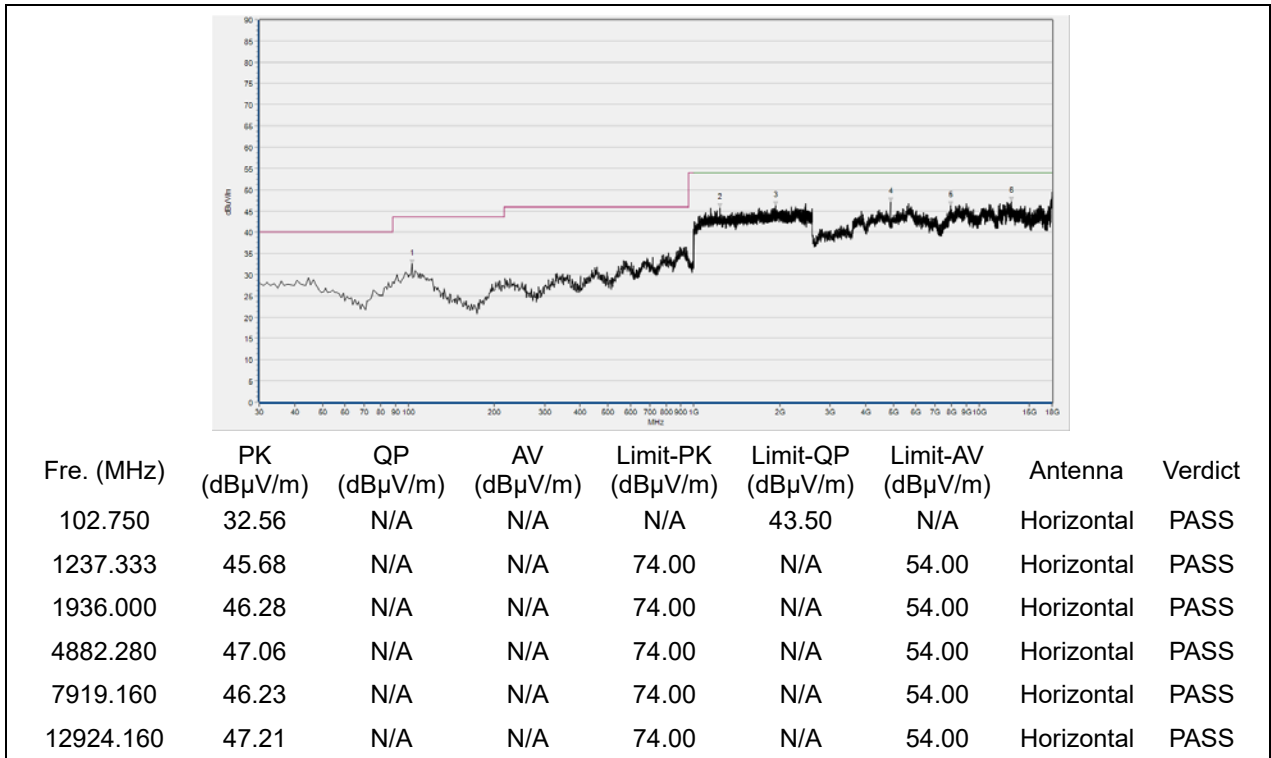


(Antenna Horizontal, 30MHz to 18GHz)

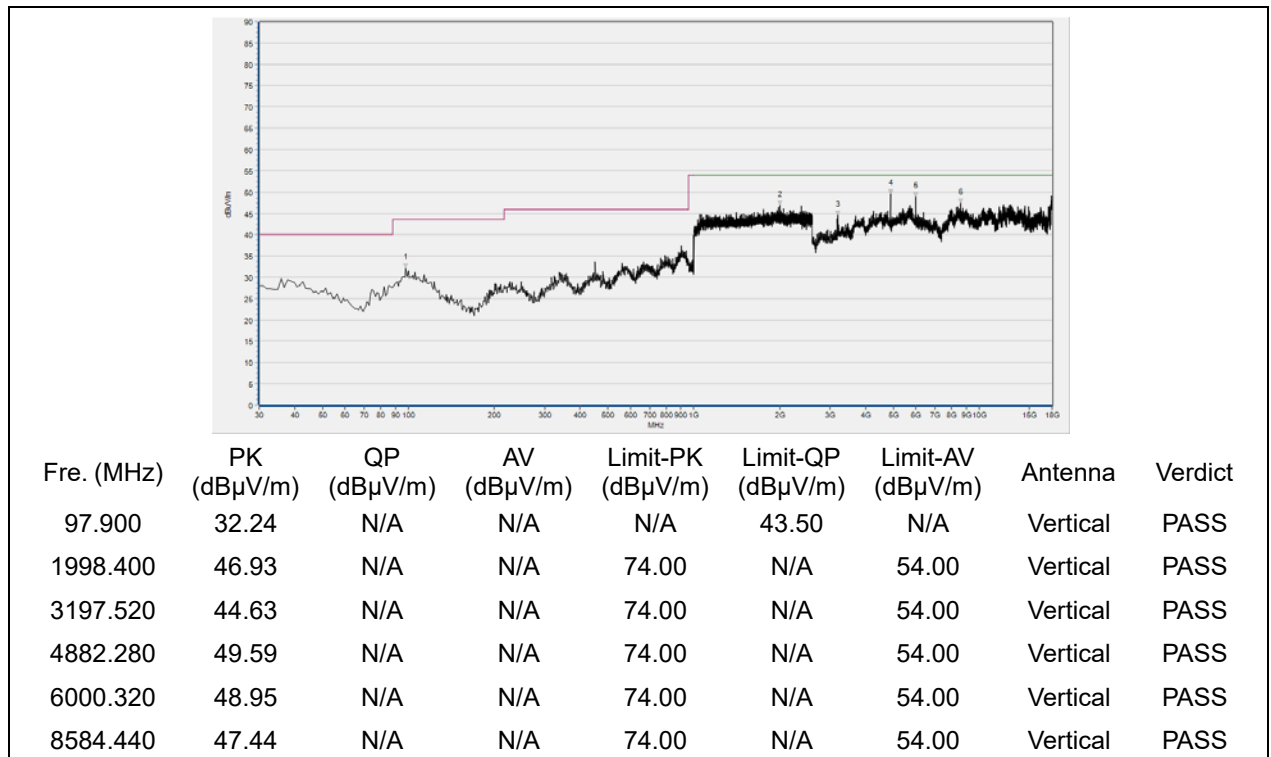


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 7

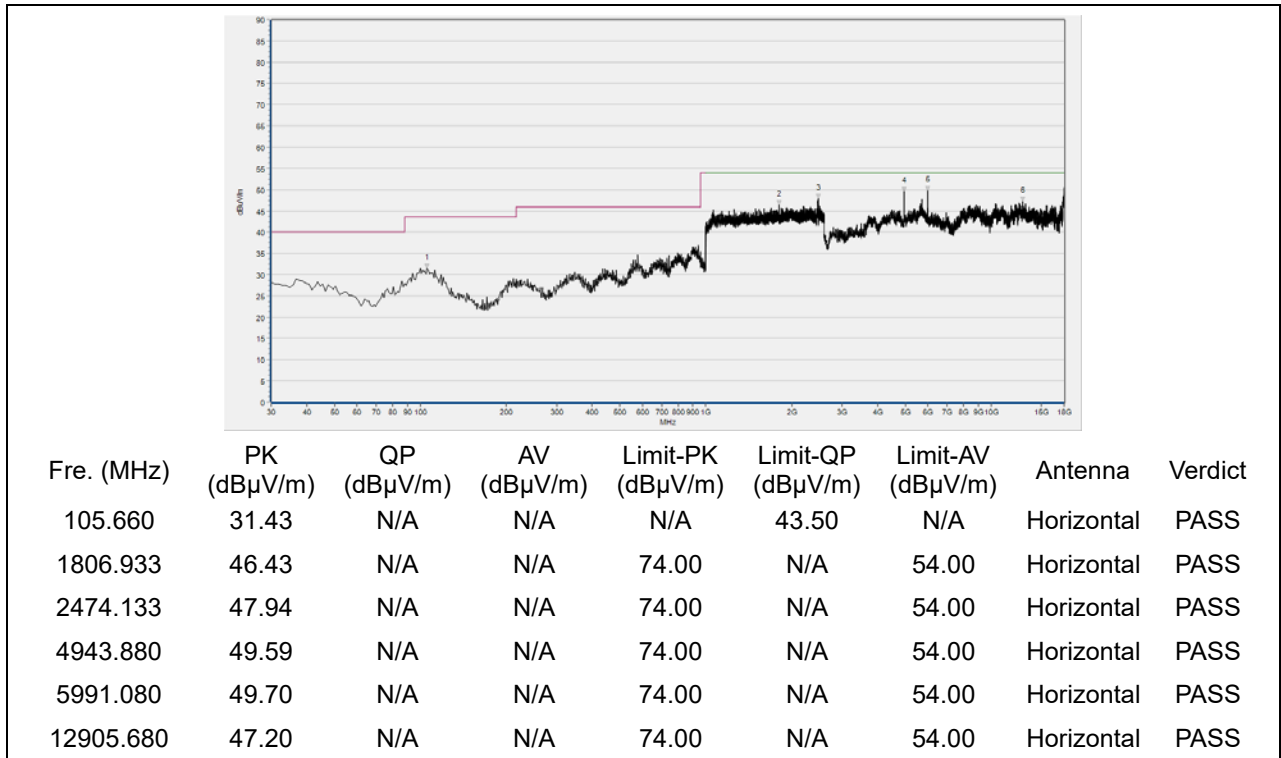


(Antenna Horizontal, 30MHz to 18GHz)

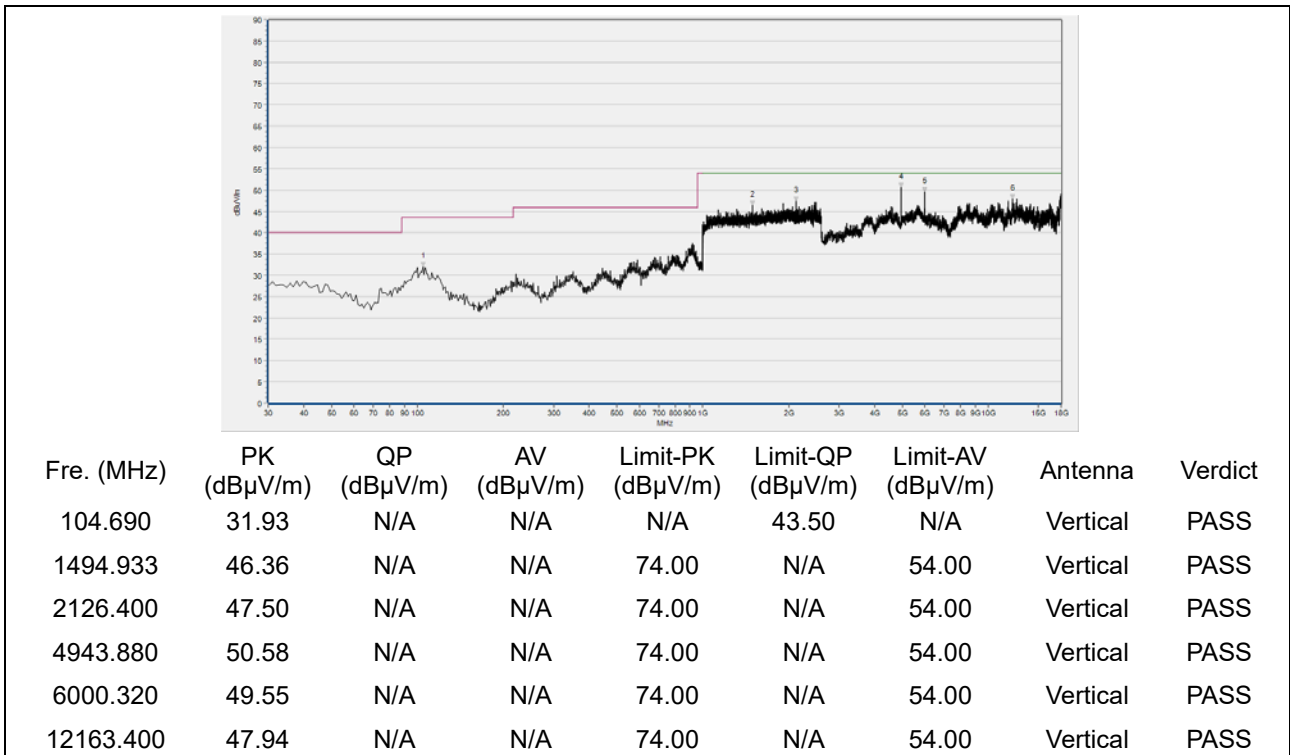


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 13



(Antenna Horizontal, 30MHz to 18GHz)

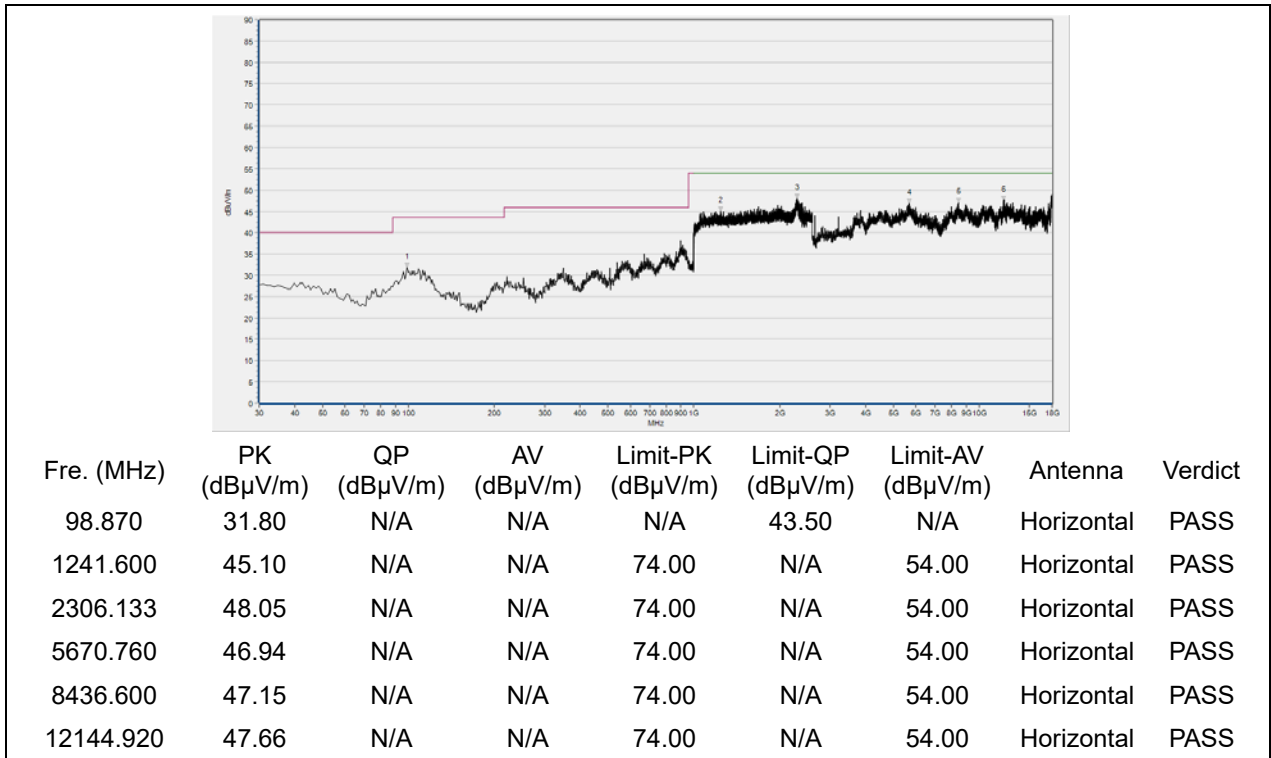


(Antenna Vertical, 30MHz to 18GHz)

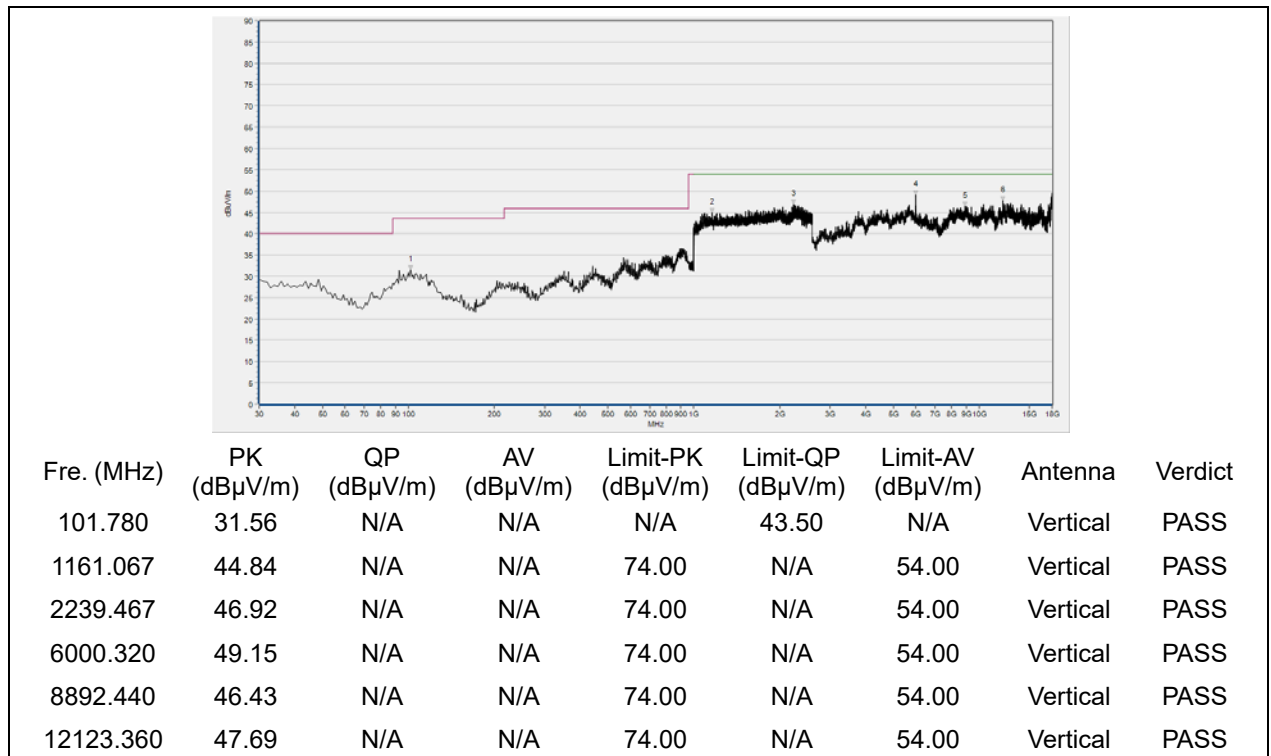


802.11g Mode

Plot for Channel 1

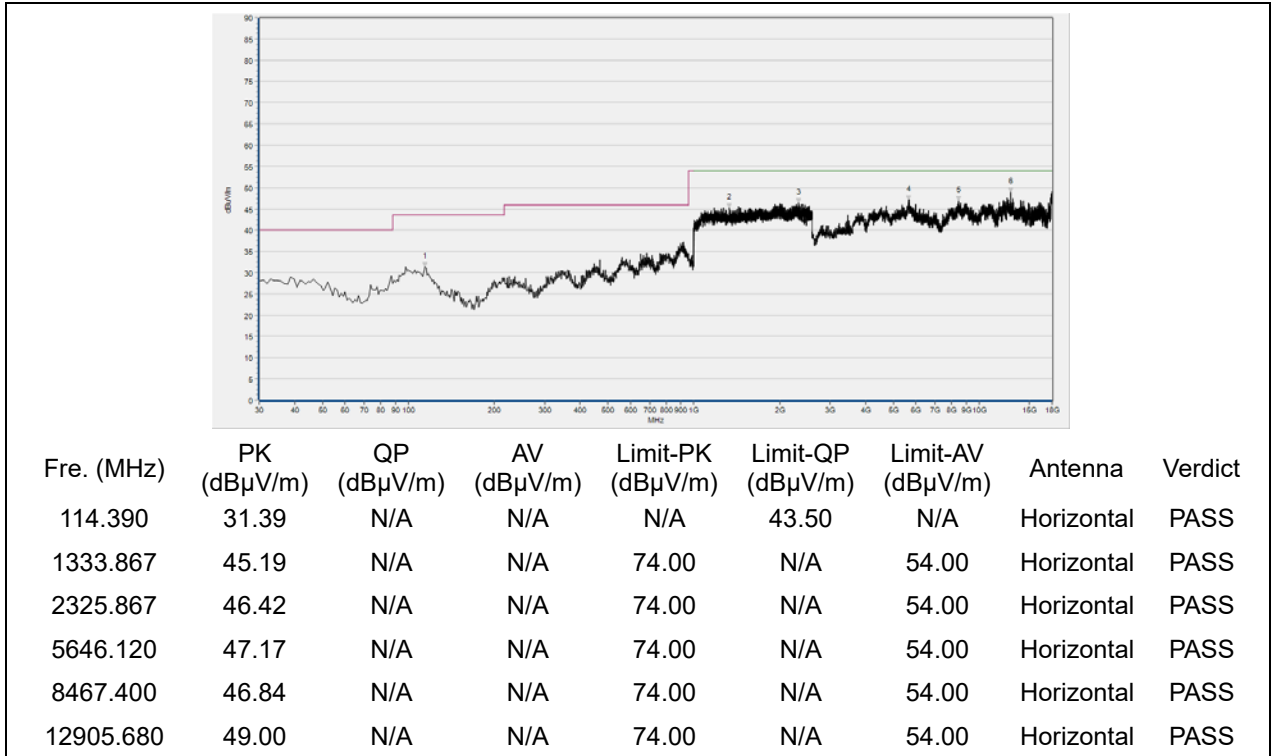


(Antenna Horizontal, 30MHz to 18GHz)

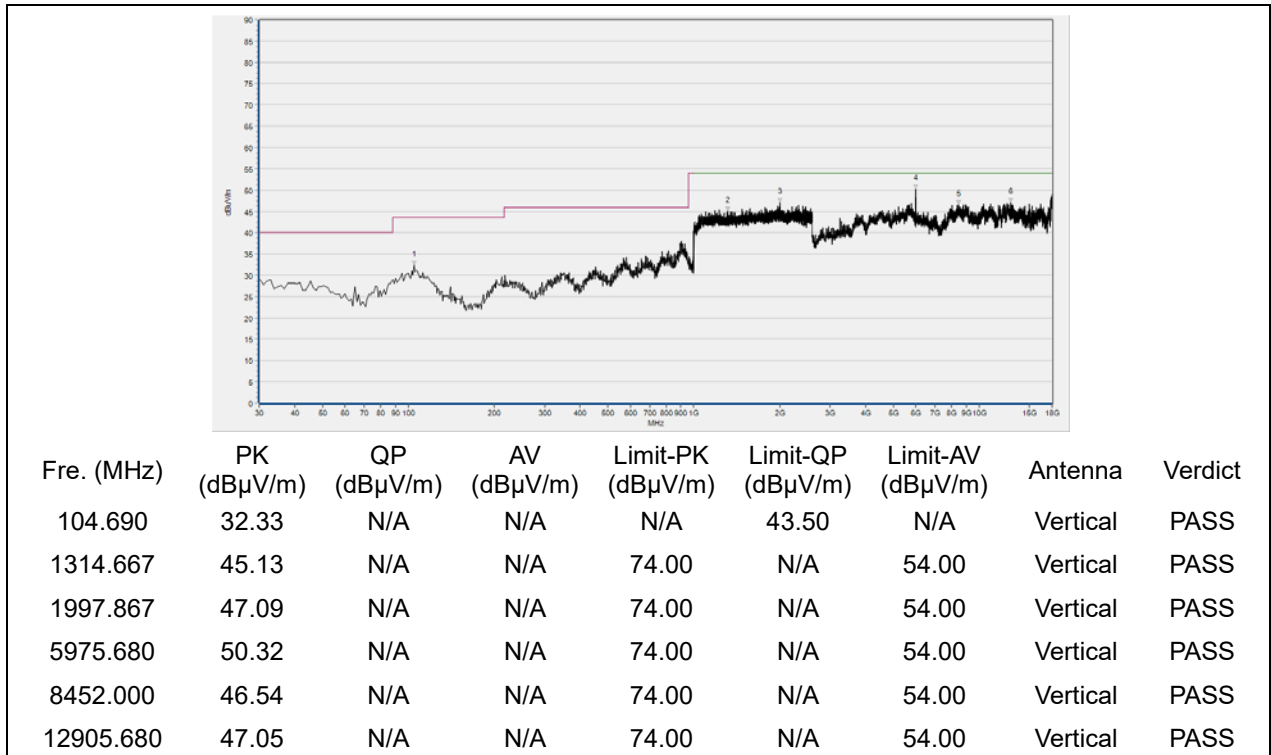


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 7

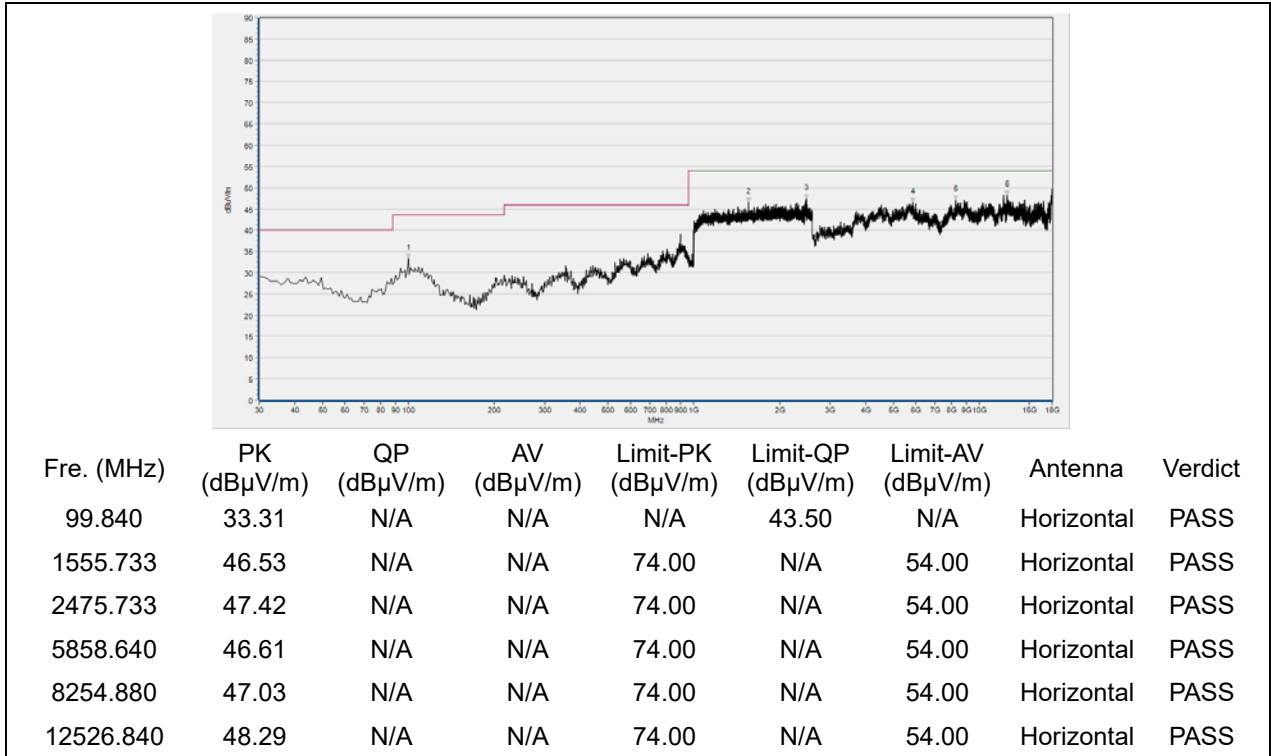


(Antenna Horizontal, 30MHz to 18GHz)

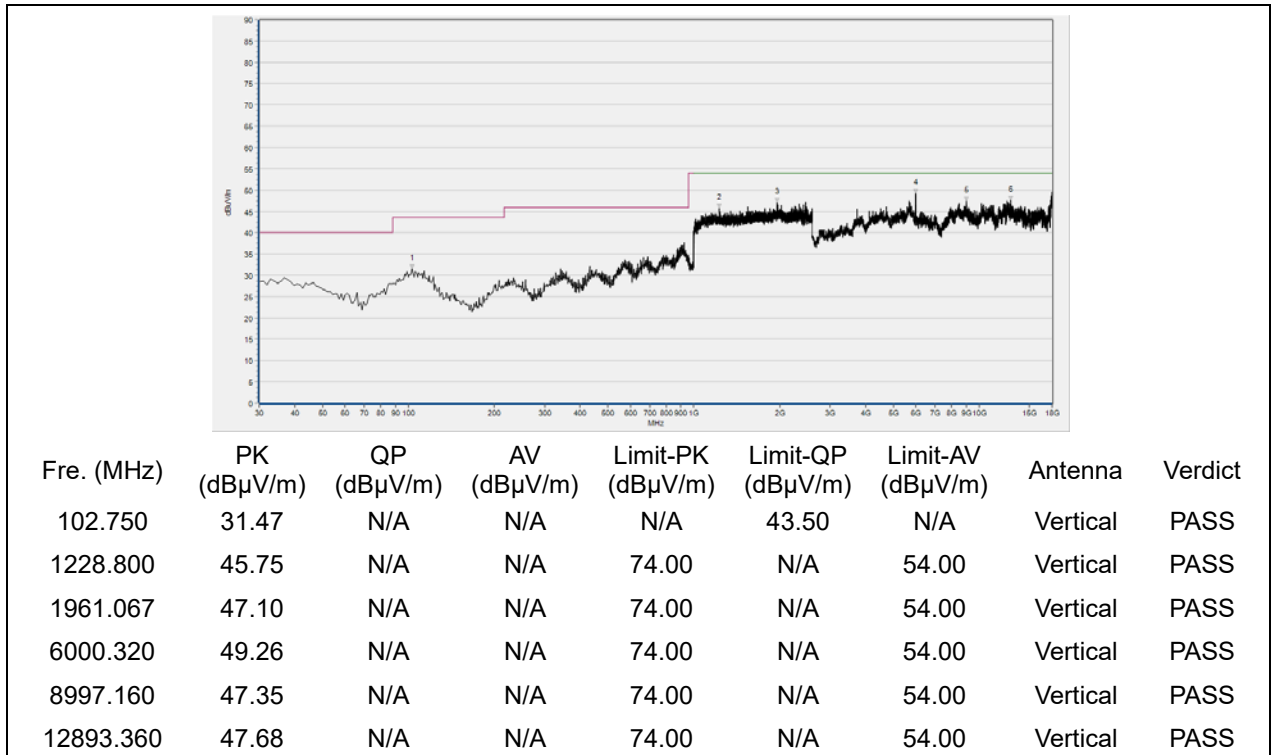


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 13



(Antenna Horizontal, 30MHz to 18GHz)

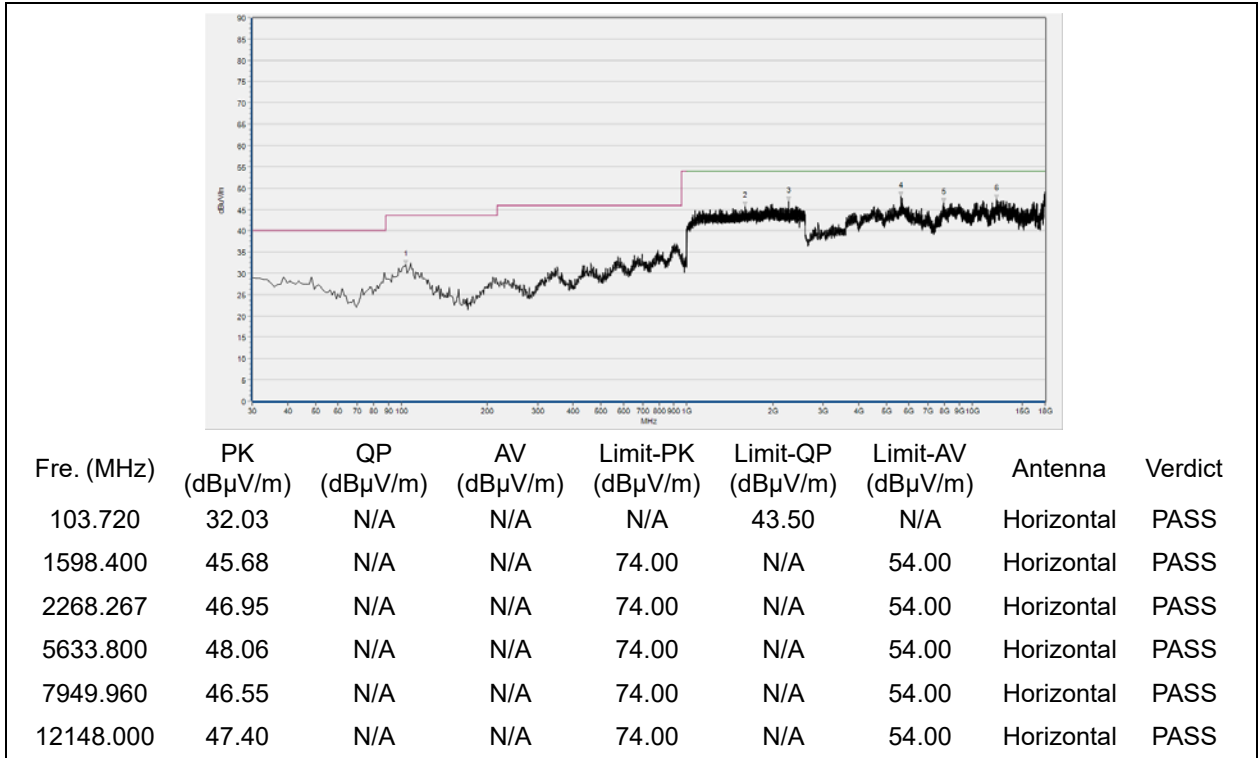


(Antenna Vertical, 30MHz to 18GHz)

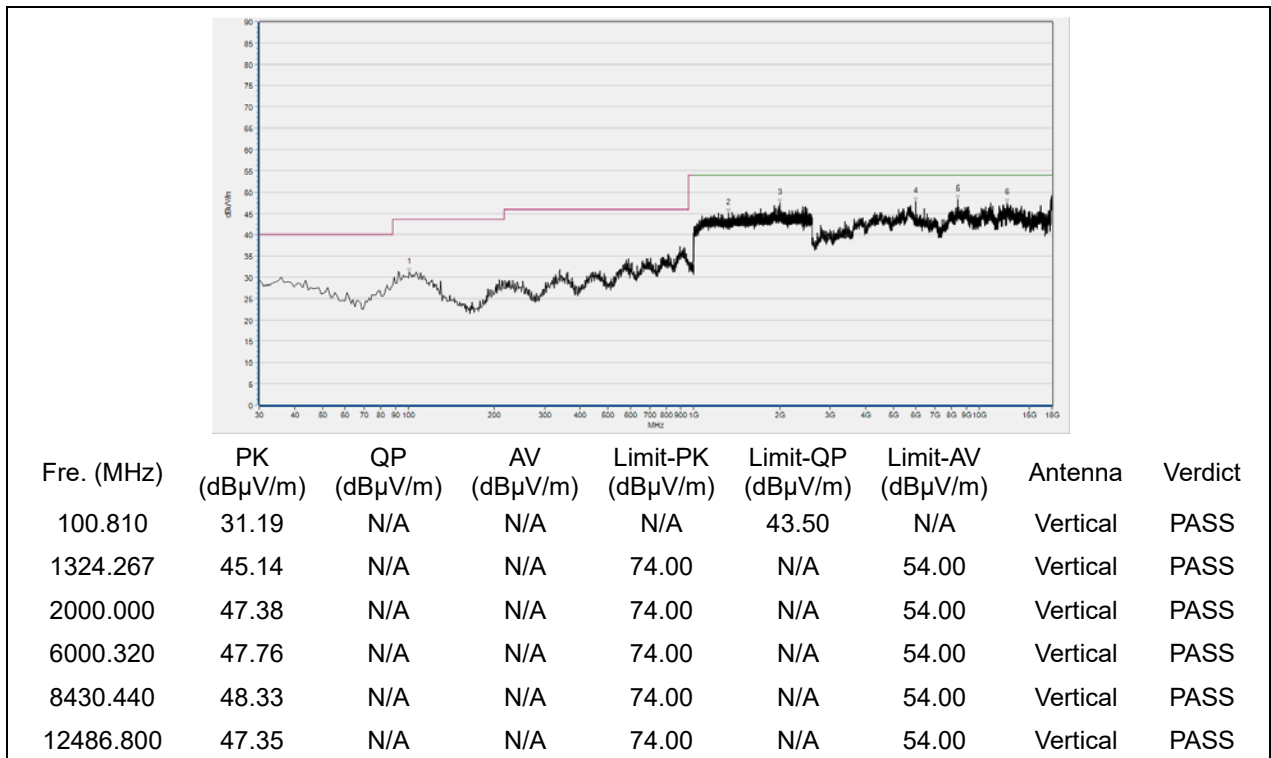


802.11n (HT20) Mode

Plot for Channel 1

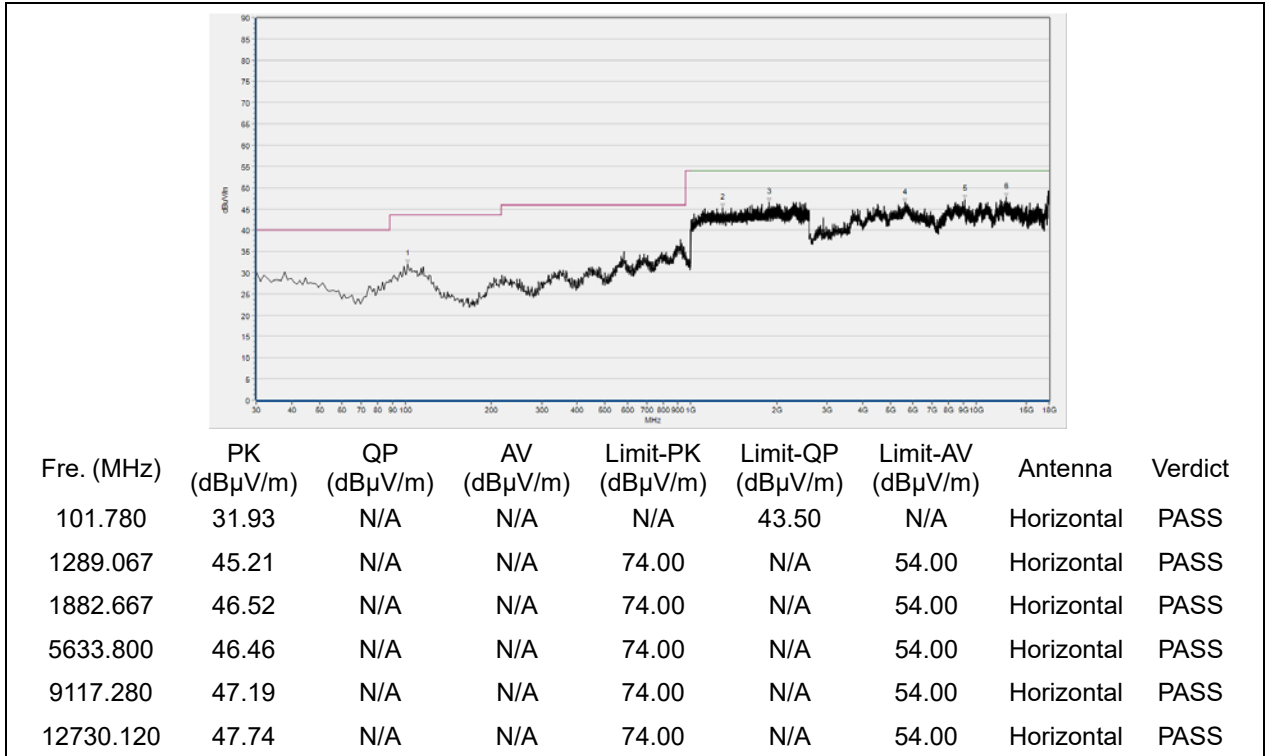


(Antenna Horizontal, 30MHz to 18GHz)

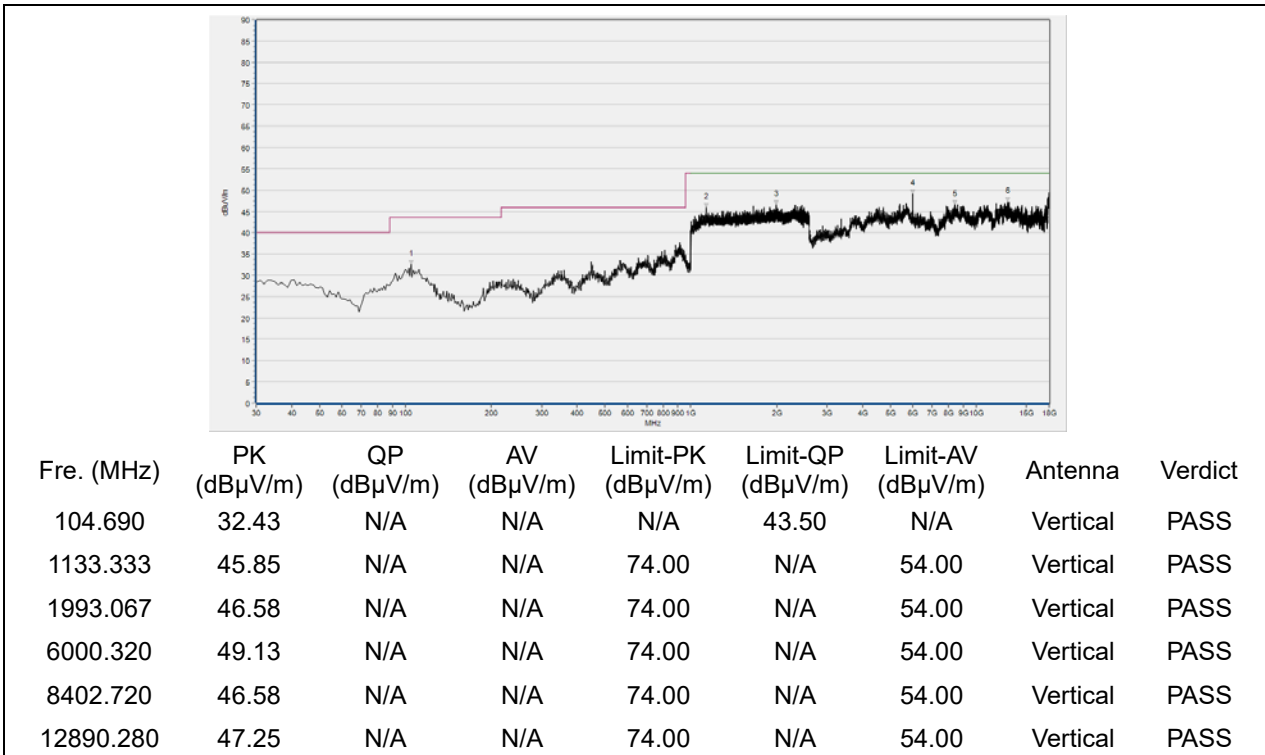


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 7

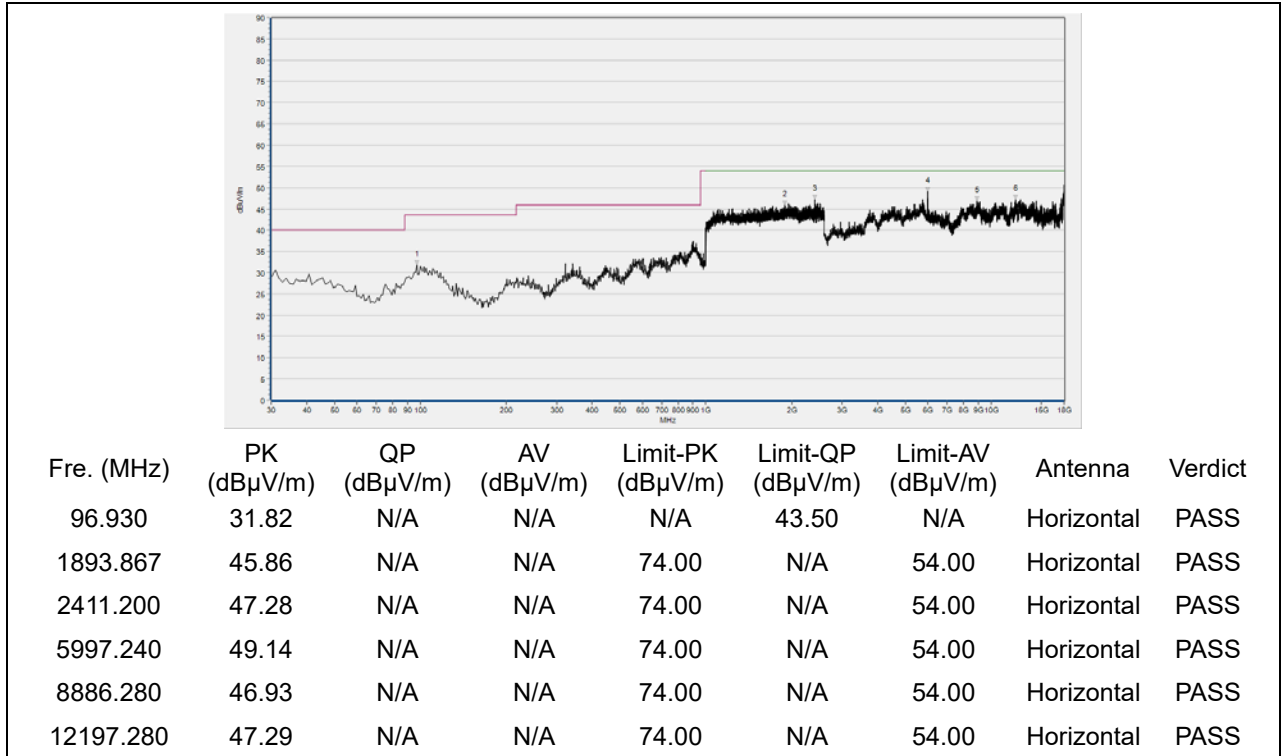


(Antenna Horizontal, 30MHz to 18GHz)

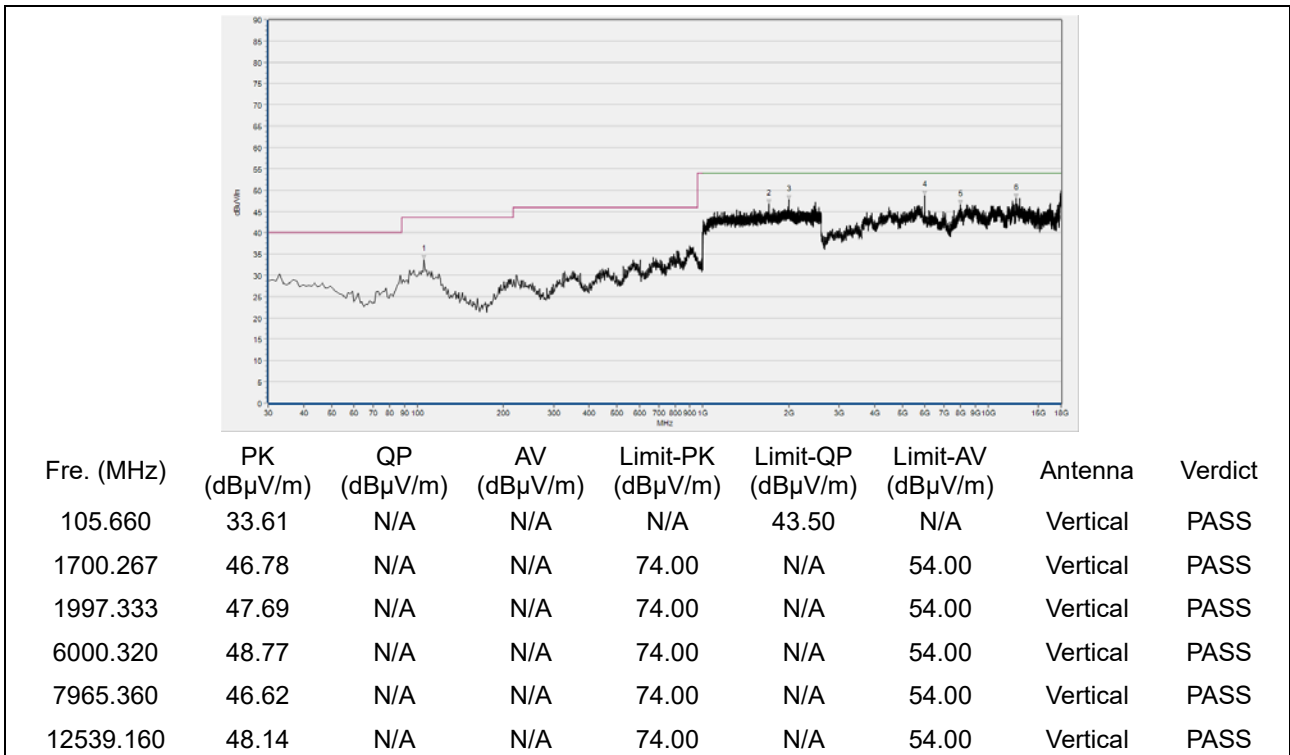


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 13



(Antenna Horizontal, 30MHz to 18GHz)

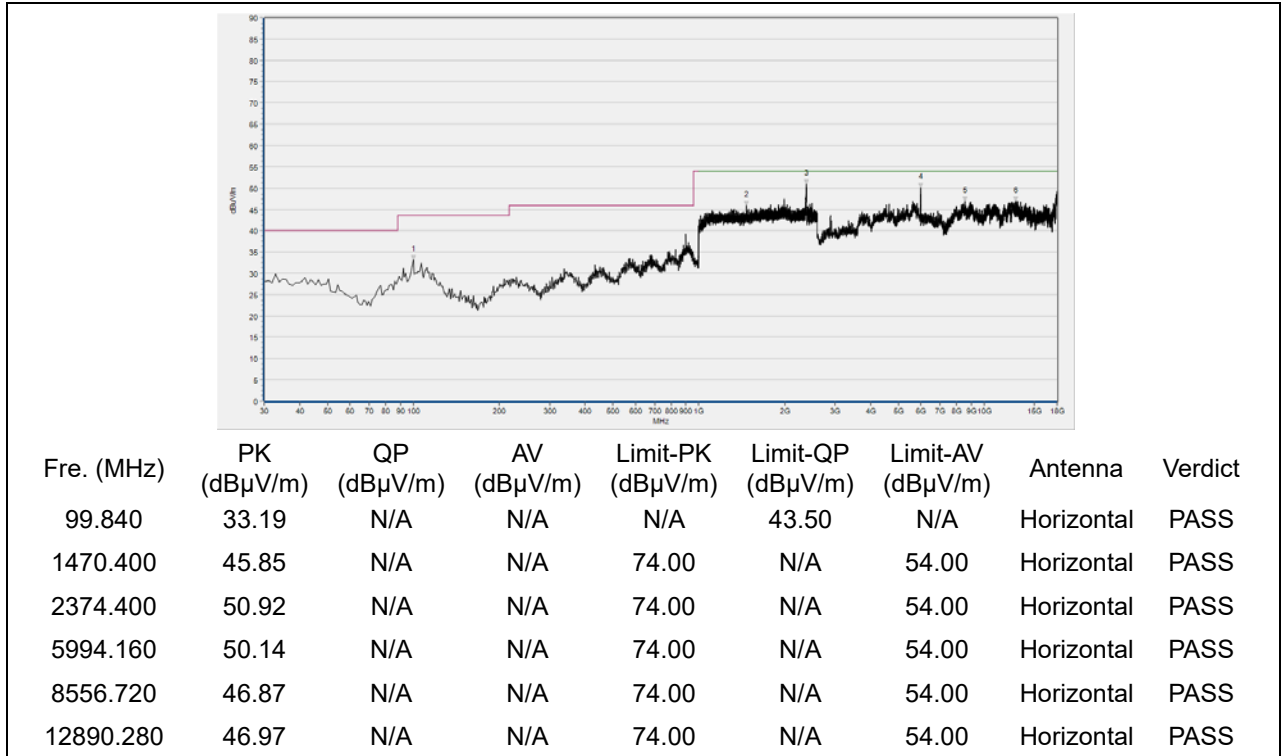


(Antenna Vertical, 30MHz to 18GHz)

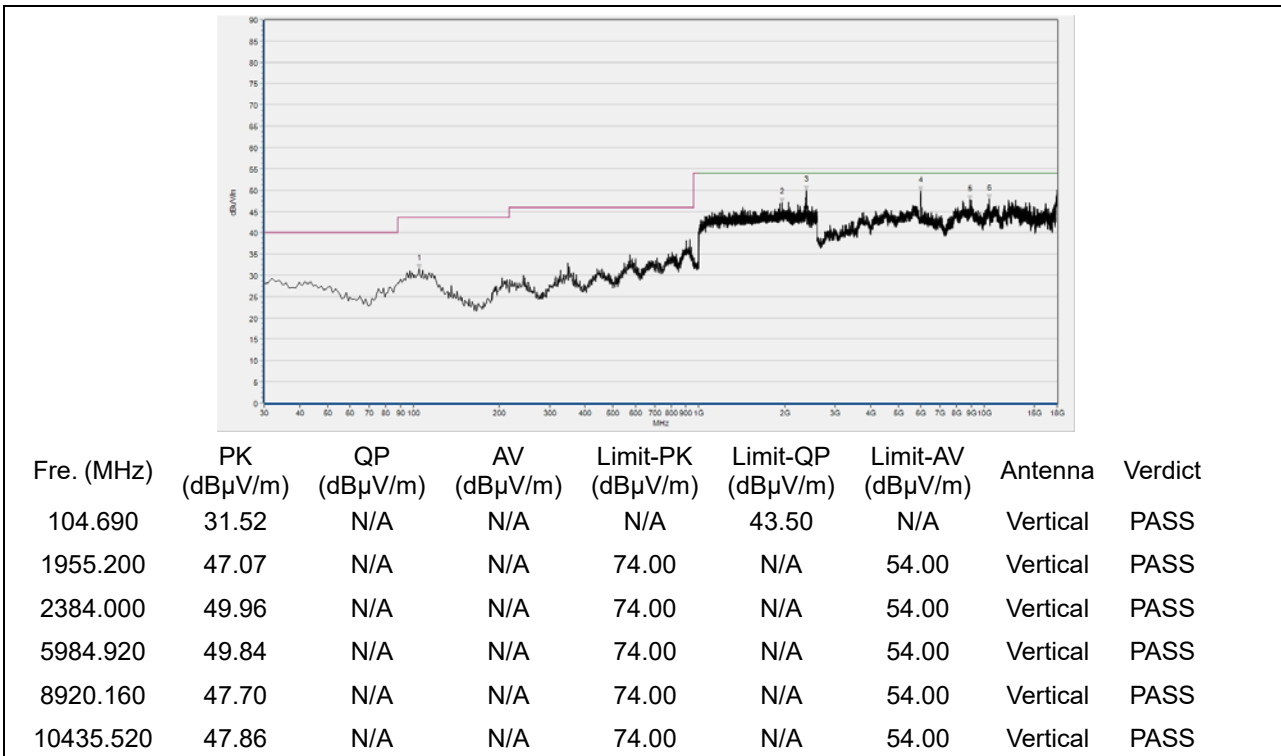


802.11n (HT40) Mode

Plot for Channel 3

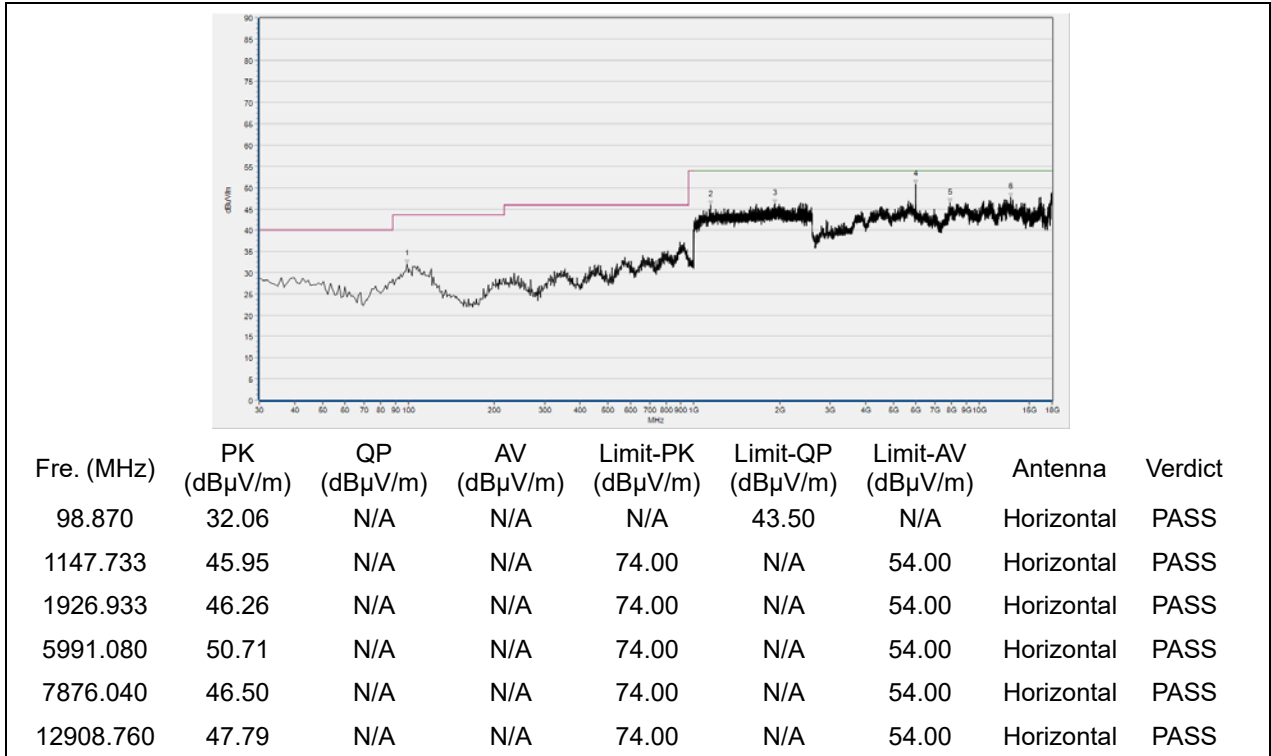


(Antenna Horizontal, 30MHz to 18GHz)

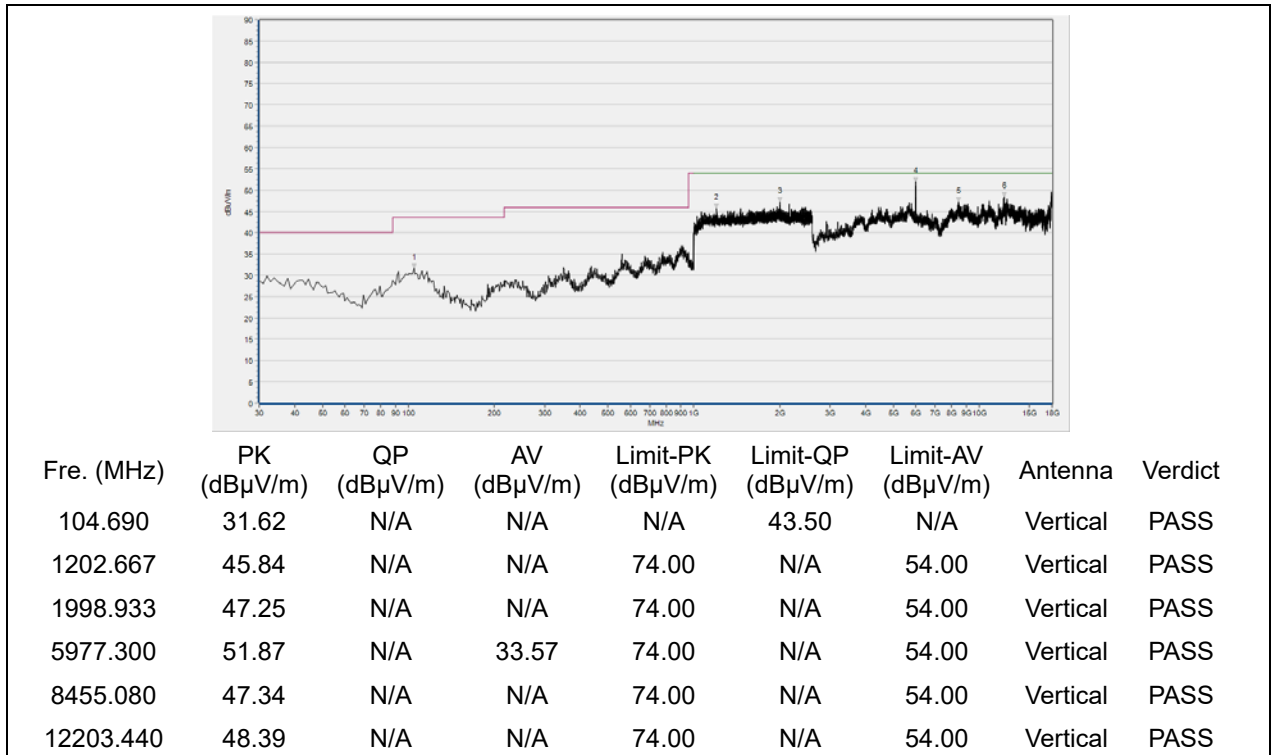


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 7

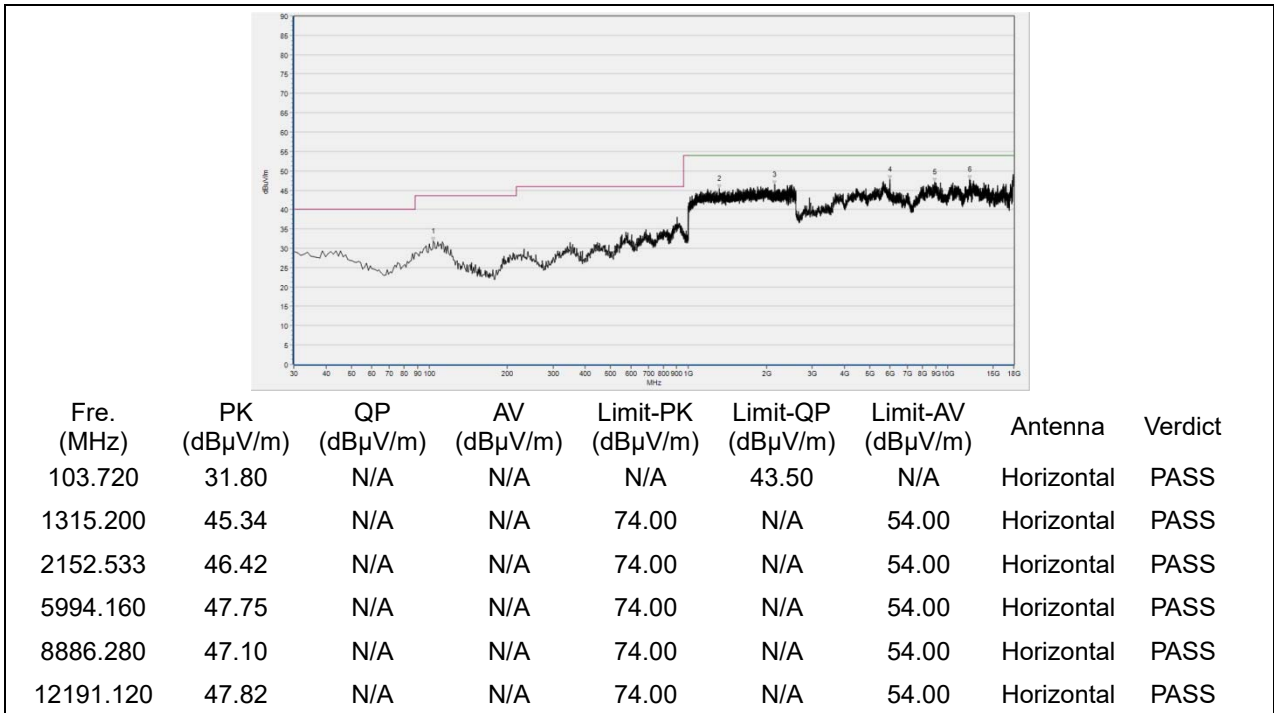


(Antenna Horizontal, 30MHz to 18GHz)

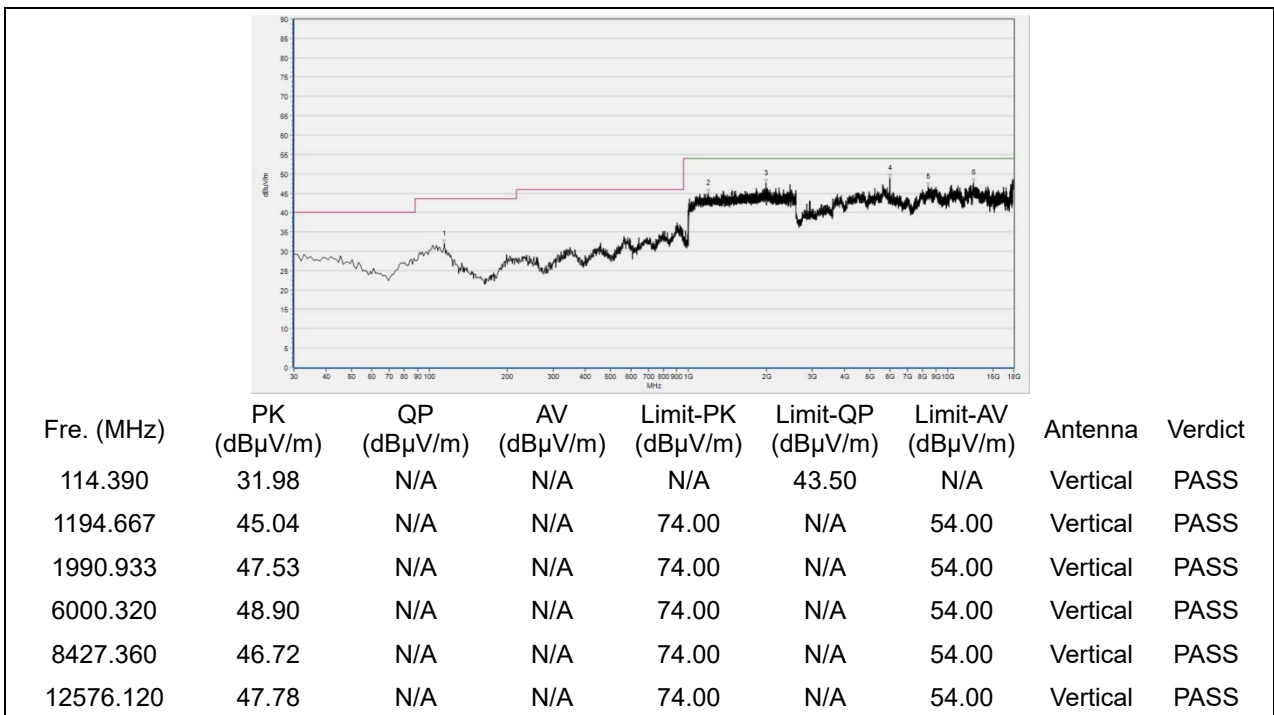


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 11



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)

————— END OF REPORT —————