RF TEST REPORT

For

Shenzhen Xinyifang International Trade Co., LTD
Product Name: Wireless K-song Bluetooth speaker
Test Model(s).: BG-K13, AB4063, AB4051, AB4057

Report Reference No.	:	**POCE231023005EC001**
FCC ID	:	**2BDPJ-BG-K13**
Applicant's Name	:	Shenzhen Xinyifang International Trade Co., LTD
Address	:	Unit 701A, Building 7, Building 7, Dafapu Community, Dafapu Community, Bantian Street, Longgang District, Shenzhen
Testing Laboratory	:	Shenzhen POCE Technology Co., Ltd.
Address	:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Test Specification Standard	:	**47 CFR Part 15.247** **ANSI C63.10-2013 & KDB 558074 D01 Meas Guidance v05r02**
Date of Receipt	:	October 23, 2023
Date of Test	:	October 23, 2023 to November 25, 2023
Data of Issue	:	November 25, 2023
Result	:	**Pass**

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Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE231023005EC001	November 25, 2023

NOTE1:

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

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

1.2 Summary of Test Result

Item	Standard	Method	Requirement	Result
Antenna requirement	47 CFR Part 15.247		47 CFR 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	ANSI C63.10-2013 section 6.2	47 CFR 15.207(a)	Pass
Occupied Bandwidth	47 CFR Part 15.247	ANSI C63.10-2013, section 7.8.7	47 CFR 15.215(c)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	ANSI C63.10-2013, section 7.8.5	47 CFR 15.247(b)(1)	Pass
Channel Separation	47 CFR Part 15.247	ANSI C63.10-2013, section 7.8.2	47 CFR 15.247(a)(1)	Pass
Number of Hopping Frequencies	47 CFR Part 15.247	ANSI C63.10-2013, section 7.8.3	47 CFR 15.247(a)(1)(iii)	Pass
Dwell Time	47 CFR Part 15.247	ANSI C63.10-2013, section 7.8.4	47 CFR 15.247(a)(1)(iii)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	ANSI C63.10-2013 section 7.8.8	47 CFR 15.247(d), 15.209, 15.205	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	ANSI C63.10-2013 section 6.10	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.247	ANSI C63.10-2013 section 6.6.4	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.247	ANSI C63.10-2013 section 6.6.4	47 CFR 15.247(d), 15.209, 15.205	Pass

Note: 1.N/A -this device(EUT) is not applicable to this testing item
2. RF-conducted test results including cable loss.

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name : Shenzhen Xinyifang International Trade Co., LTD
Address : Unit 701A, Building 7, Building 7, Dafapu Community, Dafapu Community, Bantian Street, Longgang District, Shenzhen

Manufacturer : Shenzhen Boguangweiye Investment Development Co., Ltd
Address : 401, Building 2, Longxin Factory, No. 6, Lingnan Road, Opposite Longxi Community, Longgang Street, Longgang District, Shenzhen

2.2 Description of Device (EUT)

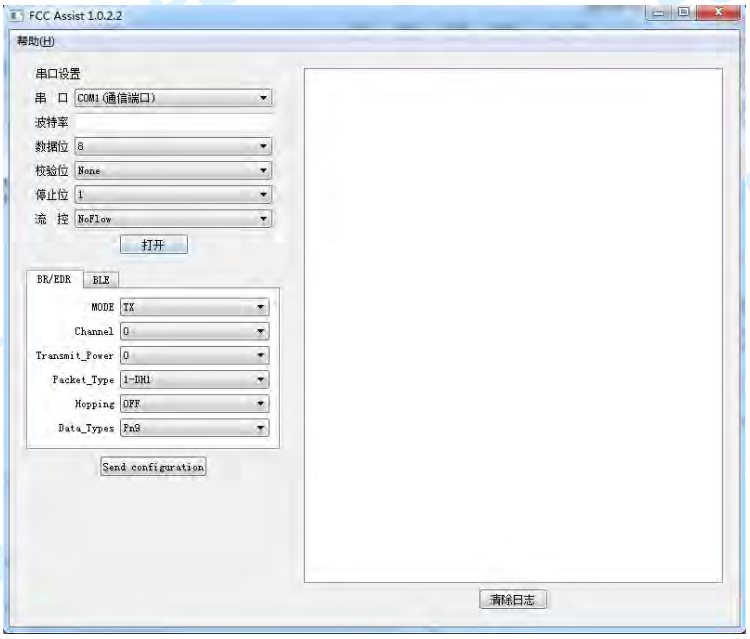
Product Name:	Wireless K-song Bluetooth speaker
sample number:	231021011-1
Model/Type reference:	BG-K13
Series model:	AB4063, AB4051, AB4057
Trade Mark:	蓝小叠，迪亚戈，绿箭侠
Product Description:	Bluetooth speaker
Power Supply:	DC3.7V from battery
Operation Frequency:	2402-2480MHz
Number of Channels:	79
Modulation Type:	GFSK, π/4 DQPSK
Antenna Type:	PCB ANT
Antenna Gain:	ANT1:-0.58dBi ANT2:-0.58dBi
Hardware Version:	V1.0
Software Version:	V1.0.2.2

2.3 Description of Test Modes

No	Title	Description
TM1	ANT1-TX-GFSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.
TM2	ANT1TX-Pi/4DQPSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with Pi/4DQPSK modulation.
TM3	ANT1-TX-GFSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation,.
TM4	ANT1-TX-Pi/4DQPSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with Pi/4DQPSK modulation.
TM5	ANT2-TX-GFSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.
TM6	ANT2-TX-Pi/4DQPSK (Non-Hopping)	Keep the EUT in continuously transmitting mode (non-hopping) with Pi/4DQPSK modulation.
TM7	ANT2-TX-GFSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation,.
TM8	ANT2-TX-Pi/4DQPSK (Hopping)	Keep the EUT in continuously transmitting mode (hopping) with Pi/4DQPSK modulation.
Description		
The product has two identical Bluetooth transmission chips, with the same design for the Bluetooth part and the same transmission antenna, which cannot be sent simultaneously.		
☒Special software is used.		

☐Through engineering command into the engineering mode.
engineering command: *#*#3646633#*#*
☐Other method:

Special software:



2.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Description	Manufacturer	Model No.	Remark	Certification
1	ADAPTER	PHOTON	ATXC-069AC65B	Provide by lab	SDOC
2					

2.5 Equipments Used During The Test

Conducted Emission at AC power line					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal. Due Date**
Shielding room	CY	8*4*3	20160102	2023/1/26	2025/1/25
Pulse Limiter	Schwarzbeck	VTSD 9561	561-G071	2023/2/27	2024/2/26
Cable	Schwarzbeck	/	/	2023/2/27	2024/2/26
Test Receiver	Rohde & Schwarz	ESPI	1164.6607K03-102109-MH	2023/6/13	2024/6/12
L.I.S.N	R&S	ESH3-Z5	831.5518.52	2022/12/29	2023/12/28
L.I.S.N	Schwarzbeck	NSLK 8126	NSLK 8126	2023/8/8	2024/8/7
50ΩCoaxial Switch	Anritsu	MP59B	M20531	/	/
EMI Testsoftware	Farad	EZ -EMC	V1.1.42	/	/

Emissions in restricted frequency bands and RF					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**

Test Receiver	R&S	ESCI	102109	2023/6/13	2024/6/12
Spectrum Analyzer	R&S	FSP30	1321.3008K40-101729-jR	2023/6/14	2024/6/13
966 Chamber	CY	9*6*6	20160101	2023/1/26	2025/1/25
Bore-sighting Antenna rack	PBB	1308503	16033	/	/
Loop antenna	ZHINAN	ZN30900C	ZN30900C	2021/7/5	2024/7/4
Broadband Antenna	Sunol Sciences	JB6 Antenna	A090414	2023/5-21	2025/5-20
Horn Antenna	Sunol Sciences	DRH-118	A091114	2023/5/13	2025/5/12
Horn antenna	COM-POWER	AH-1840(40G)	10100008	2023/4/5	2025/4/4
Power APM(LF)	Schwarzbeck	BBV9743	9743-151	2023/6/13	2024/6/12
Power APM(HF)	Schwarzbeck	BBV9718	9718-282	2023/6/13	2024/6/12
Cable(LF)#2	Schwarzbeck	/	/	2023/2/27	2024/2/26
Cable(LF)#1	Schwarzbeck	/	/	2023/2/27	2024/2/26
Cable(HF)#2	Schwarzbeck	AK9515E	96250	2023/2/28	2024/2/27
Cable(HF)#1	Schwarzbeck	SYV-50-3-1	/	2023/2/27	2024/2/26
Power divider	MIDEWEST	PWD-2533	SMA-79	2023/5/11	2026/5/10
signal generator	Keysight	N5181A	MY48180415	2022/12/10	2023/12/9
signal generator	Keysight	N5182A	MY50143455	2022/12/29	2023/12/28
Spectrum Analyzer	Keysight	N9020A	MY53420323	2022/12/29	2023/12/28
RF Sensor Unit	TACHOY	TR1029-2	000001	/	/
RF Control Unit	TACHOY	TR1029-1	000001	/	/
Position Controller	MF	MF-7802	/	/	/
EMI Testsoftware	Farad	EZ -EMC	V1.1.42	/	/
RF TestSoftware	TACHOY	RTS-01	V2.0.0.0	/	/

2.6 Statement Of The Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Disturbance (0.15~30MHz)	±3.41dB
Occupied Bandwidth	±3.63%
RF conducted power	±0.733dB
Duty cycle	±3.1%
Conducted Spurious emissions	±1.98dB
Radiated Emission (Above 1GHz)	±5.46dB
Radiated Emission (Below 1GHz)	±5.79dB
Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

2.7 Authorizations

Company Name:	Shenzhen POCE Technology Co., Ltd.
Address:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252

Identification of the Responsible Testing Location

Company Name:	Shenzhen POCE Technology Co., Ltd.
Address:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252
FCC Registration Number:	0032847402
Designation Number:	CN1342
Test Firm Registration No.:	778666
A2LA Certificate Number:	6270.01

2.8 Announcement

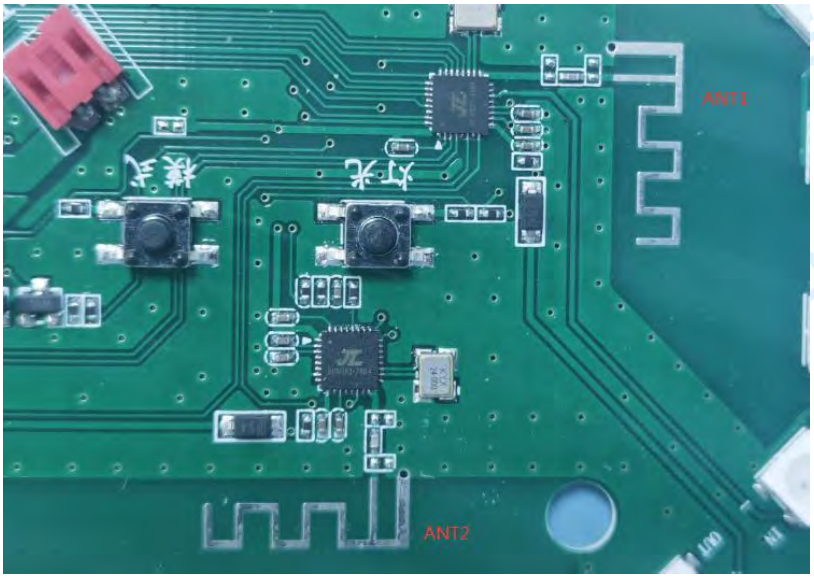
(1) The test report reference to the report template version v0.
(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
(3) The test report is invalid if there is any evidence and/or falsification.
(4) This document may not be altered or revised in any way unless done so by POCE and all revisions are duly noted in the revisions section.
(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
(6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant. the laboratory is not responsible for the accuracy of the information provided by the client. When the information provided by the customer may affect the effectiveness of the results, the responsibility lies with the customer, and the laboratory does not assume any responsibility.

3 Evaluation Results (Evaluation)

3.1 Antenna requirement

Test Requirement:	Refer to 47 CFR Part 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.

3.1.1 Conclusion:



4 Radio Spectrum Matter Test Results (RF)

4.1 Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), 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

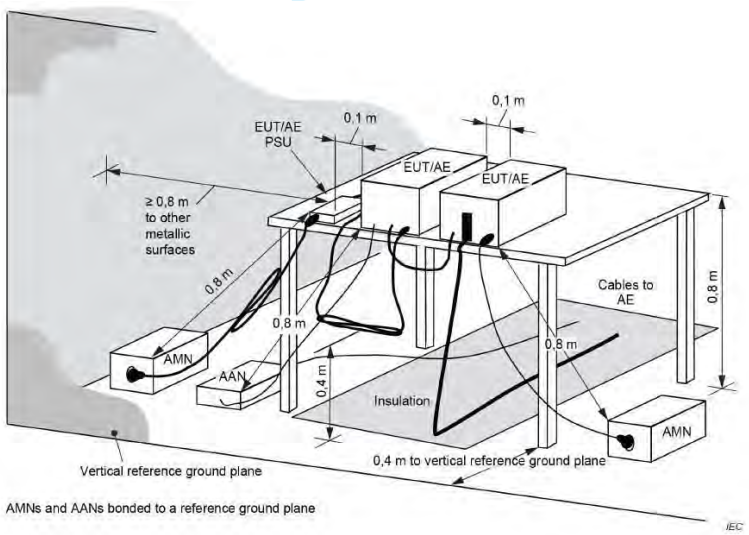
*Decreases with the logarithm of the frequency.

Test Method:	ANSI C63.10-2013 section 6.2
Procedure:	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:

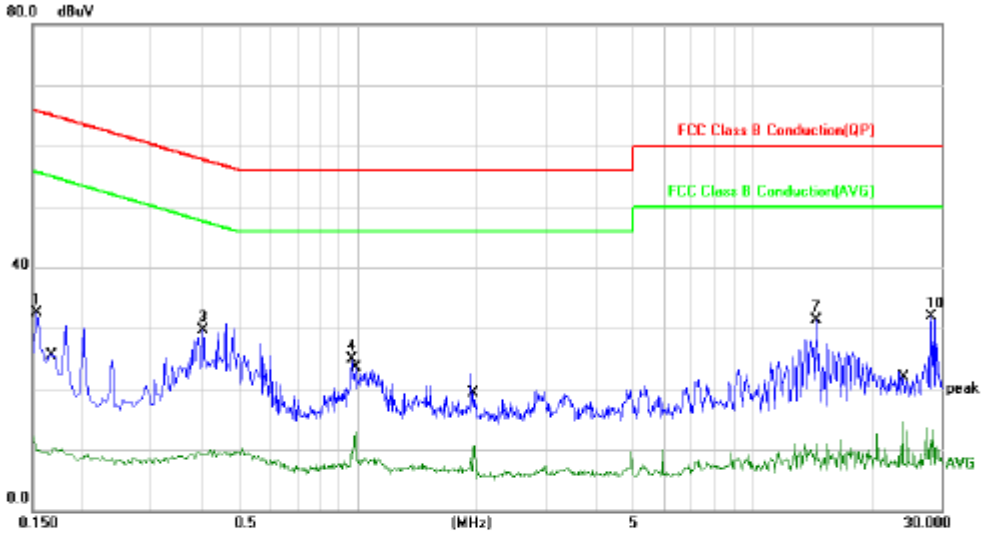
Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM5, TM6				
Final test mode:	TM6(worse case)				

4.1.2 Test Setup Diagram:



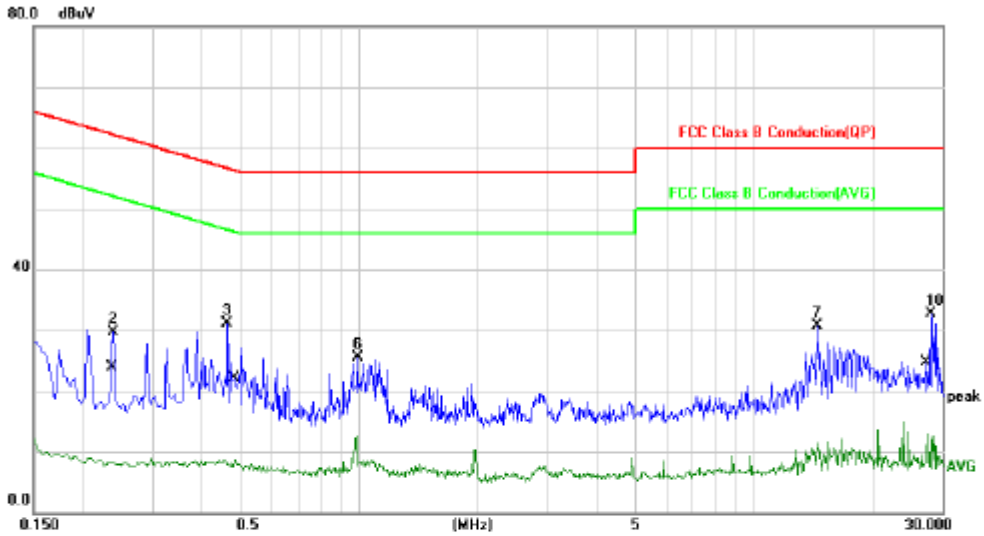
4.1.3 Test Data:

TM6 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1539	22.43	10.05	32.48	65.78	-33.30	peak	
2		0.1700	0.31	10.03	10.34	54.96	-44.62	AVG	
3	*	0.4060	19.64	10.00	29.64	57.73	-28.09	peak	
4		0.9660	14.93	9.91	24.84	56.00	-31.16	peak	
5		0.9860	2.94	9.90	12.84	46.00	-33.16	AVG	
6		1.9700	0.67	9.96	10.63	46.00	-35.37	AVG	
7		14.4939	20.79	10.44	31.23	60.00	-28.77	peak	
8		14.4939	0.55	10.44	10.99	50.00	-39.01	AVG	
9		24.0020	3.97	10.52	14.49	50.00	-35.51	AVG	
10		28.2620	21.25	10.58	31.83	60.00	-28.17	peak	

TM6 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2340	-1.74	10.03	8.29	52.30	-44.01	AVG	
2		0.2380	19.68	10.03	29.71	62.16	-32.45	peak	
3	*	0.4660	21.14	9.98	31.12	56.58	-25.46	peak	
4		0.4860	-1.22	9.98	8.76	46.24	-37.48	AVG	
5		0.9860	2.55	10.22	12.77	46.00	-33.23	AVG	
6		0.9900	15.26	10.26	25.52	56.00	-30.48	peak	
7		14.4939	20.31	10.46	30.77	60.00	-29.23	peak	
8		14.4939	1.11	10.46	11.57	50.00	-38.43	AVG	
9		27.5500	2.18	10.64	12.82	50.00	-37.18	AVG	
10		28.0140	21.97	10.65	32.62	60.00	-27.38	peak	

NOTE:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor, Over=Limit- Mesurement
4. The test results only show the worst mode or worst channel.

4.2 Occupied Bandwidth

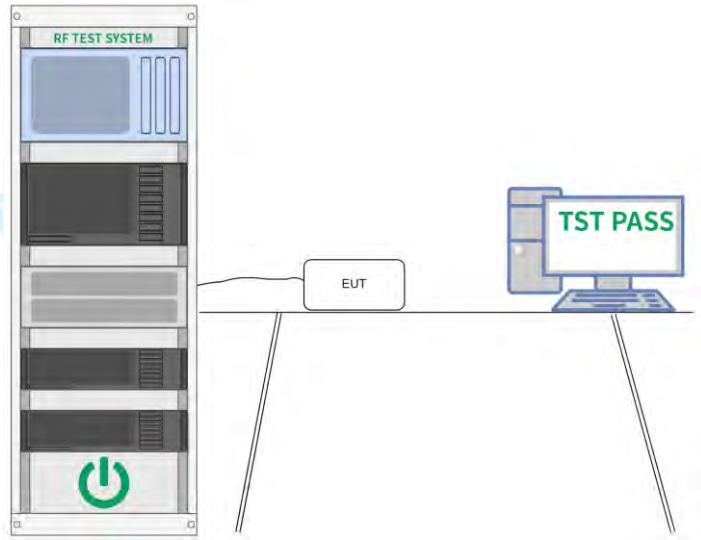
Test Requirement:	47 CFR 15.215(c)
Test Limit:	Refer to 47 CFR 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Method:	ANSI C63.10-2013, section 7.8.7, For occupied bandwidth measurements, use the procedure in 6.9.2.
Procedure:	a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j). j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "-xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth. k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM5, TM6				

Final test mode:	TM1, TM2, TM5, TM6

4.2.2 Test Setup Diagram:



4.2.3 Test Data:

Please Refer to Appendix for Details.

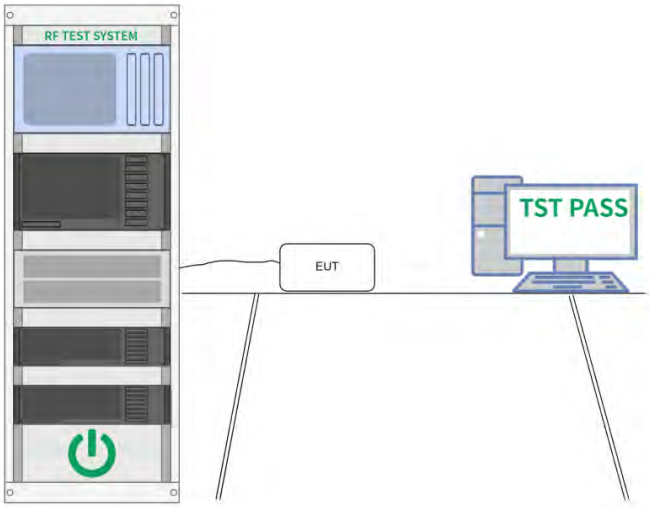
4.3 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(1)
Test Limit:	Refer to 47 CFR 15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Test Method:	ANSI C63.10-2013, section 7.8.5
Procedure:	This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test: a) Use the following spectrum analyzer settings: 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel. 2) RBW > 20 dB bandwidth of the emission being measured. 3) VBW >= RBW. 4) Sweep: Auto. 5) Detector function: Peak. 6) Trace: Max hold. b) Allow trace to stabilize. c) Use the marker-to-peak function to set the marker to the peak of the emission. d) The indicated level is the peak output power, after any corrections for external attenuators and cables. e) A plot of the test results and setup description shall be included in the test report. NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM5, TM6				
Final test mode:	TM1, TM2, TM5, TM6				

4.3.2 Test Setup Diagram:



4.3.3 Test Data:

Please Refer to Appendix for Details.

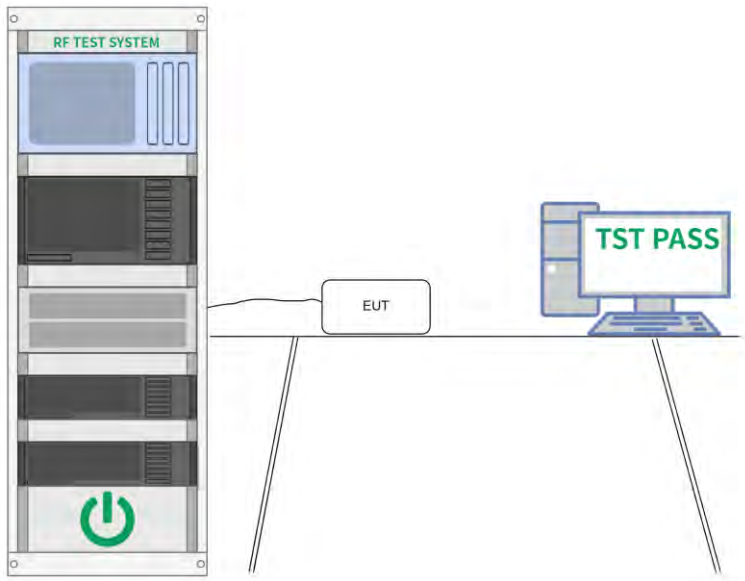
4.4 Channel Separation

Test Requirement:	47 CFR 15.247(a)(1)
Test Limit:	Refer to 47 CFR 15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
Test Method:	ANSI C63.10-2013, section 7.8.2
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Wide enough to capture the peaks of two adjacent channels. b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. c) Video (or average) bandwidth (VBW) ≥ RBW. d) Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

4.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM3, TM4, TM7, TM8				
Final test mode:	TM3, TM4, TM7, TM8				

4.4.2 Test Setup Diagram:



4.4.3 Test Data:

Please Refer to Appendix for Details.

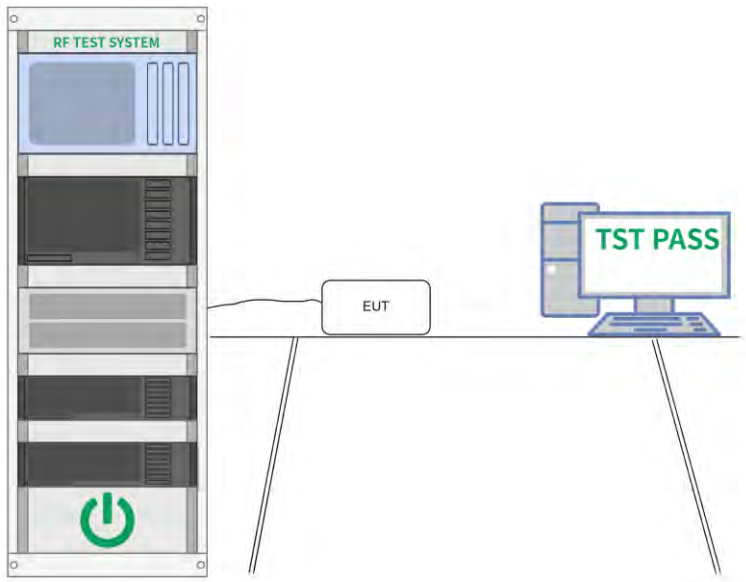
4.5 Number of Hopping Frequencies

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Limit:	Refer to 47 CFR 15.247(a)(1)(iii), Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Method:	ANSI C63.10-2013, section 7.8.3
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen. b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. c) VBW ≥ RBW. d) Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize. It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

4.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM3, TM4, TM7, TM8				
Final test mode:	TM3, TM4, TM7, TM8				

4.5.2 Test Setup Diagram:



4.5.3 Test Data:

Please Refer to Appendix for Details.

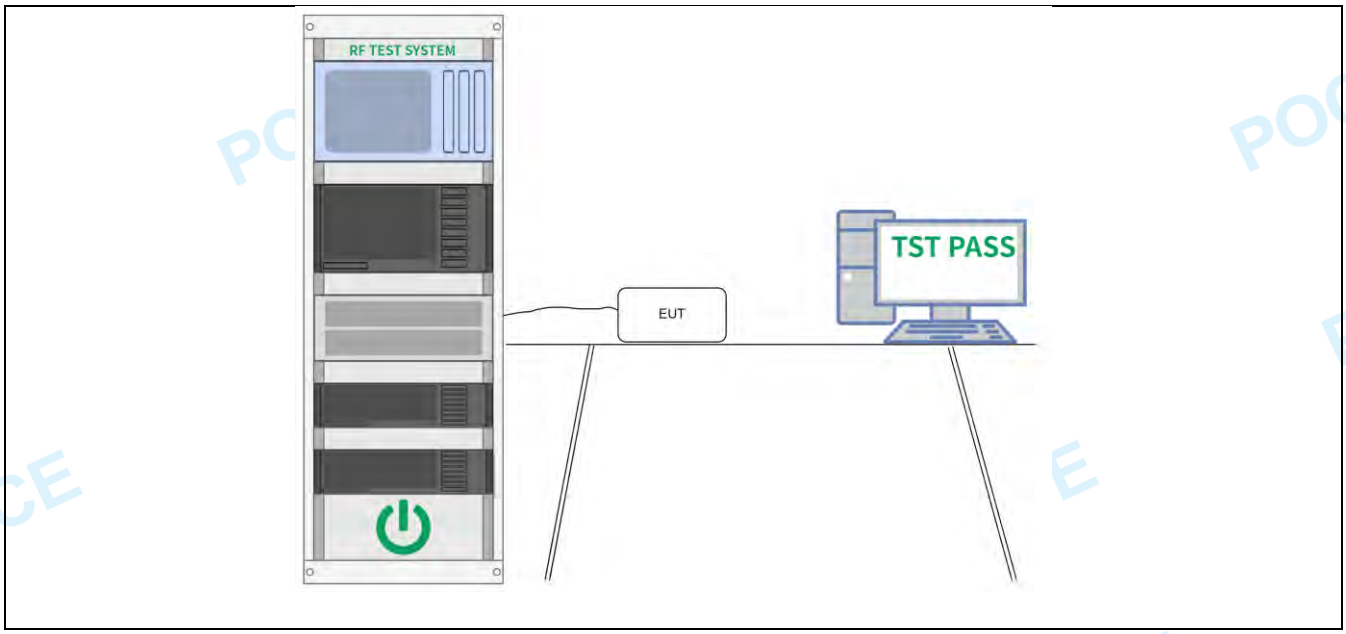
4.6 Dwell Time

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Limit:	Refer to 47 CFR 15.247(a)(1)(iii), Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Method:	ANSI C63.10-2013, section 7.8.4
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Zero span, centered on a hopping channel. b) RBW shall be <= channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel. c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel. d) Detector function: Peak. e) Trace: Max hold. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation: (Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time) The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation. The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

4.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM3, TM4, TM7, TM8				
Final test mode:	TM3, TM4, TM7, TM8				

4.6.2 Test Setup Diagram:



4.6.3 Test Data:

Please Refer to Appendix for Details.

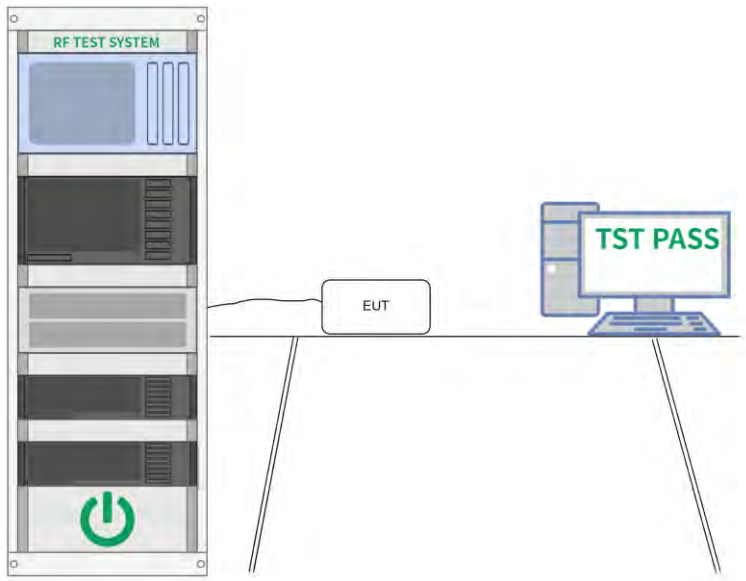
4.7 Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Limit:	Refer to 47 CFR 15.247(d), 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:	ANSI C63.10-2013 section 7.8.8
Procedure:	Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the maximum transmit powers. Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.

4.7.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM5, TM6				
Final test mode:	TM1, TM2, TM5, TM6				

4.7.2 Test Setup Diagram:



4.7.3 Test Data:

Please Refer to Appendix for Details.

4.8 Band edge emissions (Radiated)

Test Requirement:	Refer to 47 CFR 15.247(d), 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)).`
Test Limit:	

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
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

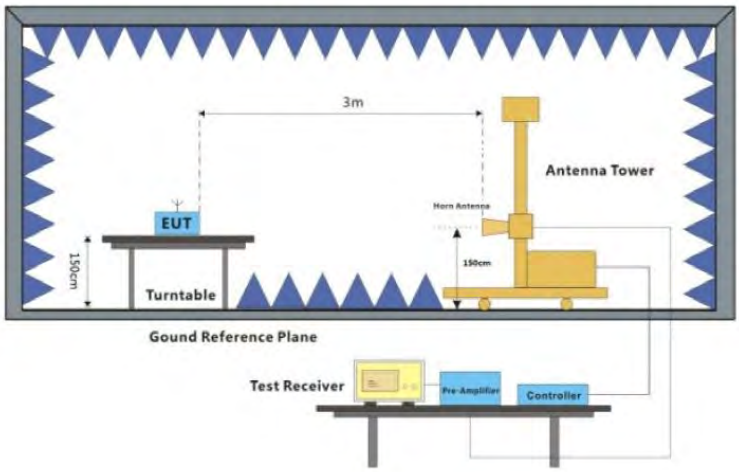
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

Test Method:	ANSI C63.10-2013 section 6.10
Procedure:	ANSI C63.10-2013 section 6.10.5.2

4.8.1 E.U.T. Operation:

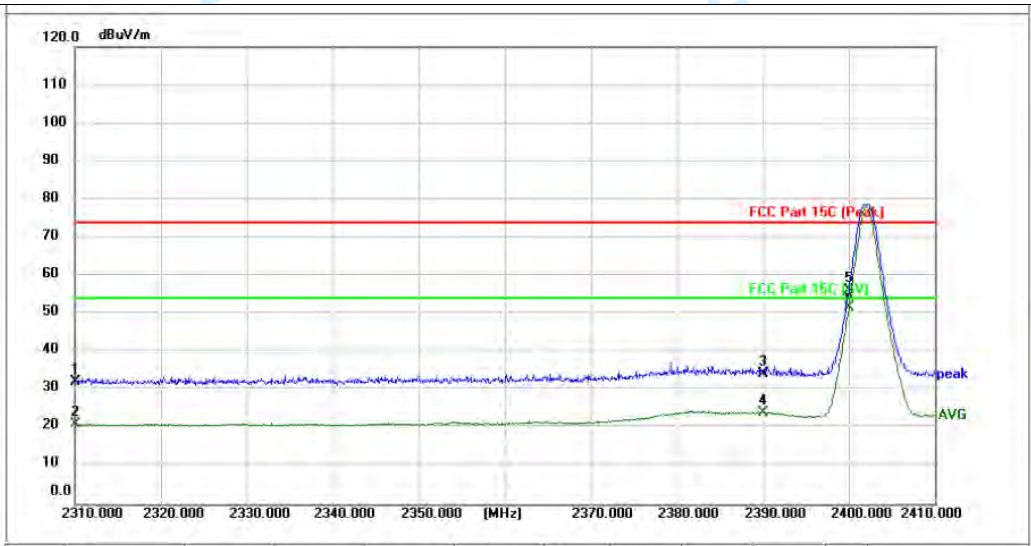
Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM5, TM6				
Final test mode:	TM2, TM6(worse case)				

4.8.2 Test Setup Diagram:



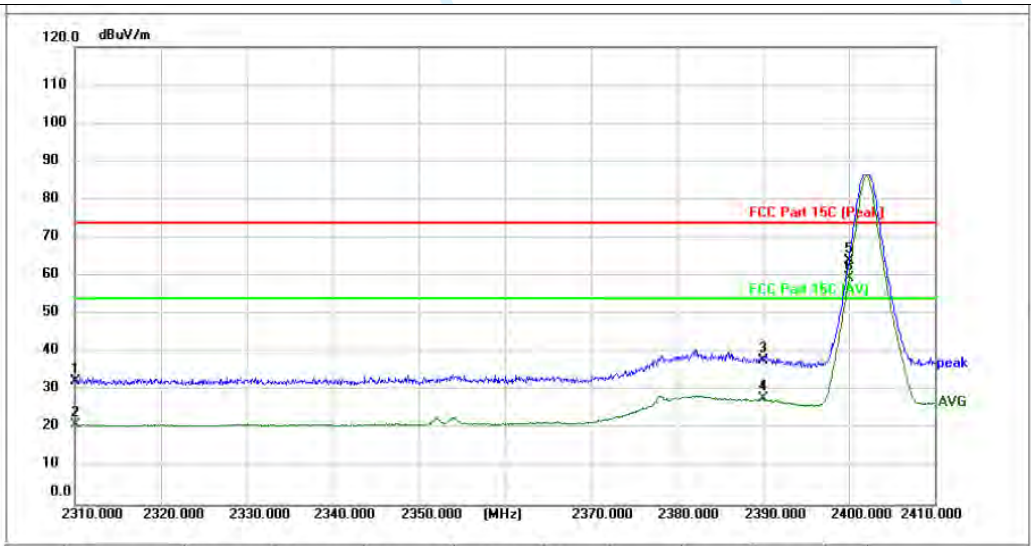
4.8.3 Test Data:

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



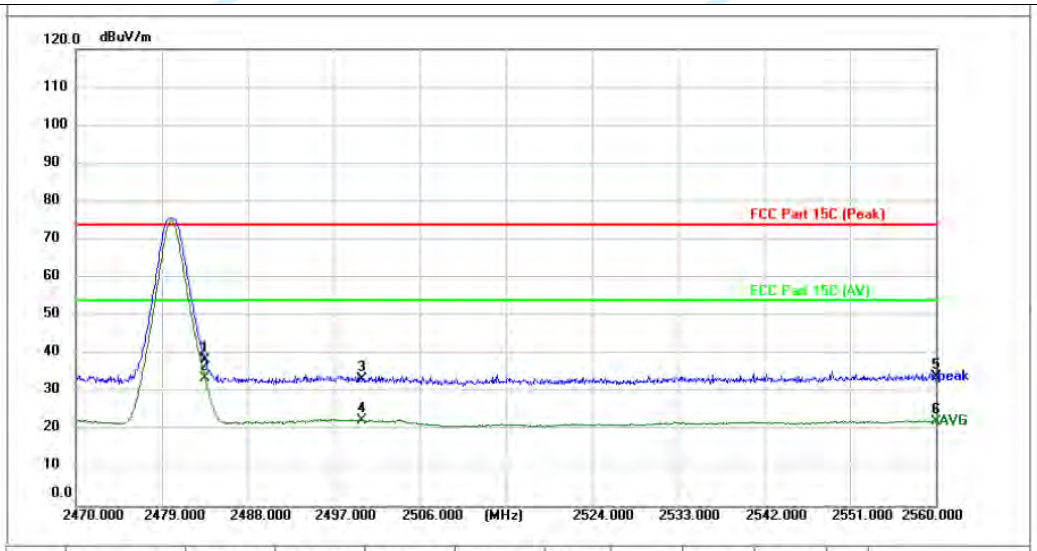
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	40.44	-8.23	32.21	74.00	-41.79	peak	150		P	
2	2310.000	29.34	-8.23	21.11	54.00	-32.89	AVG	150		P	
3	2390.000	42.39	-7.91	34.48	74.00	-39.52	peak	150		P	
4	2390.000	32.18	-7.91	24.27	54.00	-29.73	AVG	150		P	
5	2400.000	64.19	-7.87	56.32	74.00	-17.68	peak	150		P	
6 *	2400.000	59.71	-7.87	51.84	54.00	-2.16	AVG	150		P	

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



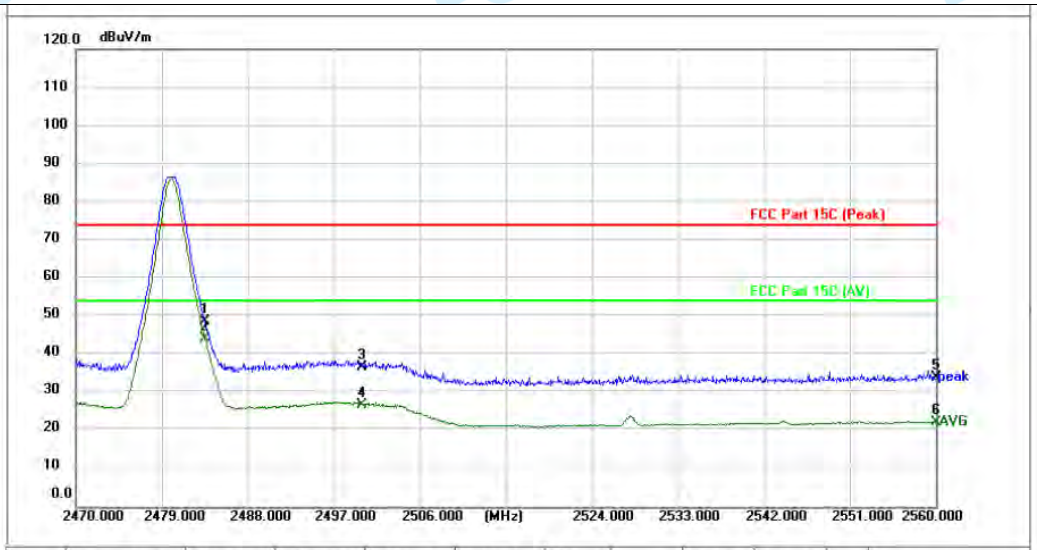
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	39.36	-6.93	32.43	74.00	-41.57	peak	150		P	
2	2310.000	27.96	-6.93	21.03	54.00	-32.97	AVG	150		P	
3	2390.000	44.73	-6.72	38.01	74.00	-35.99	peak	150		P	
4	2390.000	34.66	-6.72	27.94	54.00	-26.06	AVG	150		P	
5	2400.000	70.77	-6.69	64.08	74.00	-9.92	peak	150		P	
6 *	2400.000	66.35	-6.69	59.66	54.00	5.66	AVG	150		F	

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



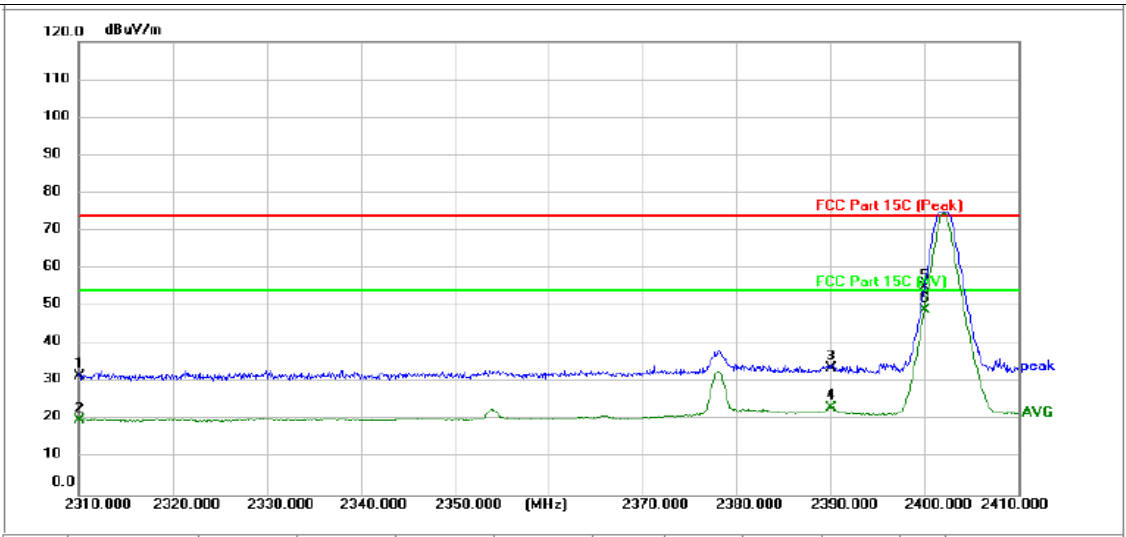
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	46.17	-7.54	38.63	74.00	-35.37	peak	150		P	
2 *	2483.500	41.22	-7.54	33.68	54.00	-20.32	AVG	150		P	
3	2500.000	40.98	-7.48	33.50	74.00	-40.50	peak	150		P	
4	2500.000	30.06	-7.48	22.58	54.00	-31.42	AVG	150		P	
5	2560.000	41.26	-7.24	34.02	74.00	-39.98	peak	150		P	
6	2560.000	29.67	-7.24	22.43	54.00	-31.57	AVG	150		P	

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



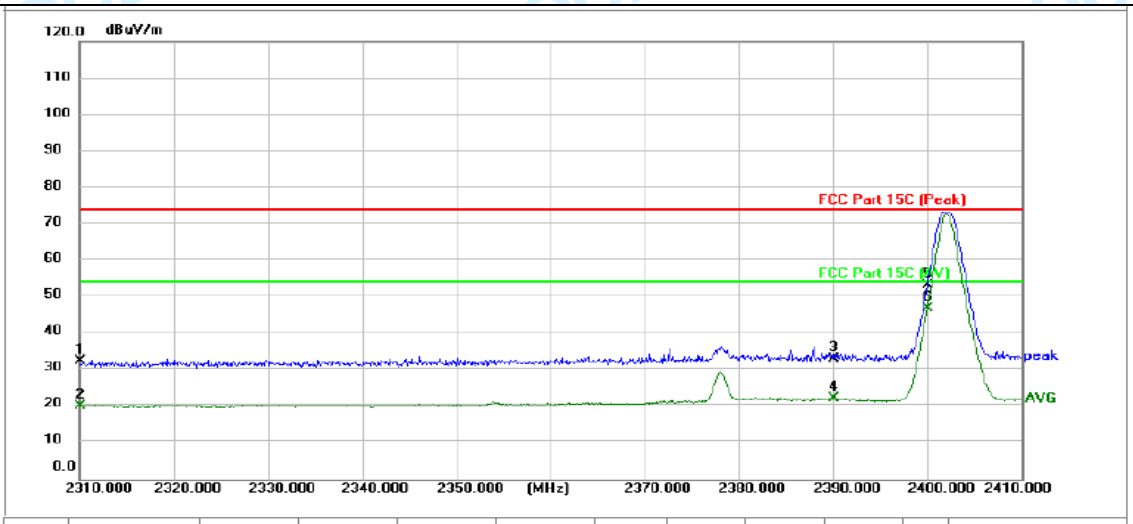
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	55.14	-6.47	48.67	74.00	-25.33	peak	150		P	
2 *	2483.500	50.83	-6.47	44.36	54.00	-9.64	AVG	150		P	
3	2500.000	43.27	-6.43	36.84	74.00	-37.16	peak	150		P	
4	2500.000	33.41	-6.43	26.98	54.00	-27.02	AVG	150		P	
5	2560.000	40.51	-6.33	34.18	74.00	-39.82	peak	150		P	
6	2560.000	28.78	-6.33	22.45	54.00	-31.55	AVG	150		P	

TM6 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



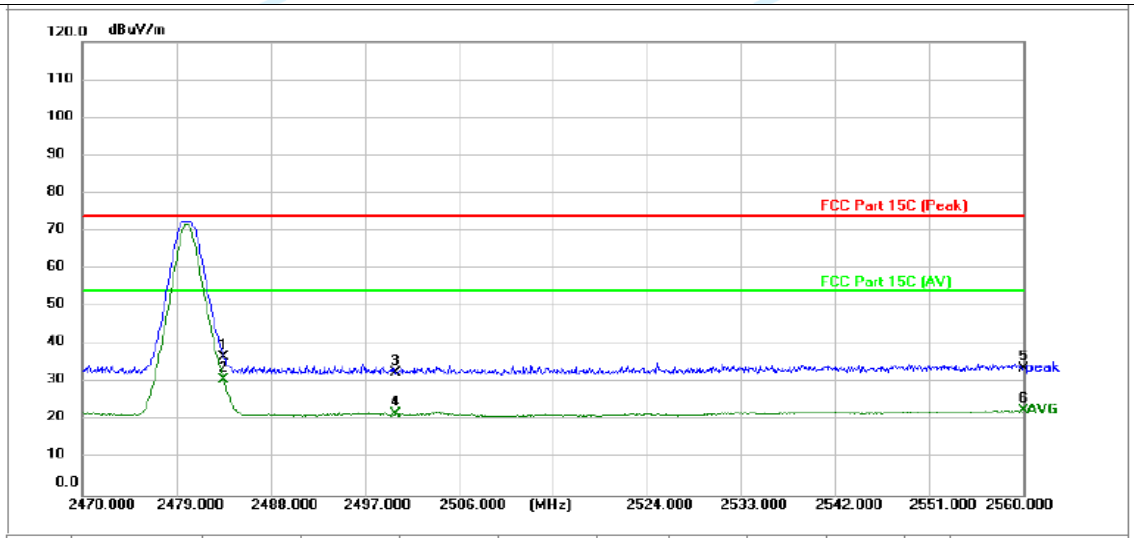
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	38.59	-6.93	31.66	74.00	-42.34	peak	150		P	
2	2310.000	26.96	-6.93	20.03	54.00	-33.97	AVG	150		P	
3	2390.000	40.61	-6.72	33.89	74.00	-40.11	peak	150		P	
4	2390.000	29.96	-6.72	23.24	54.00	-30.76	AVG	150		P	
5	2400.000	61.87	-6.69	55.18	74.00	-18.82	peak	150		P	
6 *	2400.000	55.65	-6.69	48.96	54.00	-5.04	AVG	150		P	

TM6 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



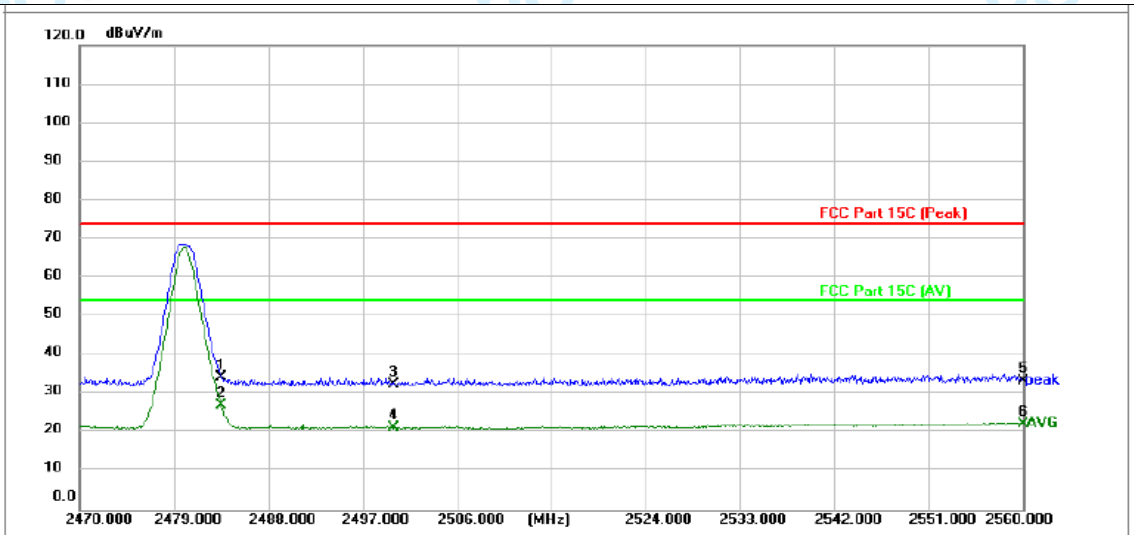
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	40.78	-8.23	32.55	74.00	-41.45	peak	150		P	
2	2310.000	28.55	-8.23	20.32	54.00	-33.68	AVG	150		P	
3	2390.000	41.13	-7.91	33.22	74.00	-40.78	peak	150		P	
4	2390.000	30.38	-7.91	22.47	54.00	-31.53	AVG	150		P	
5	2400.000	61.18	-7.87	53.31	74.00	-20.69	peak	150		P	
6 *	2400.000	54.89	-7.87	47.02	54.00	-6.98	AVG	150		P	

TM6 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	43.23	-6.47	36.76	74.00	-37.24	peak	150		P	
2 *	2483.500	37.09	-6.47	30.62	54.00	-23.38	AVG	150		P	
3	2500.000	39.11	-6.43	32.68	74.00	-41.32	peak	150		P	
4	2500.000	28.12	-6.43	21.69	54.00	-32.31	AVG	150		P	
5	2560.000	40.02	-6.33	33.69	74.00	-40.31	peak	150		P	
6	2560.000	28.85	-6.33	22.52	54.00	-31.48	AVG	150		P	

TM6 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	41.74	-7.54	34.20	74.00	-39.80	peak	150		P	
2 *	2483.500	34.59	-7.54	27.05	54.00	-26.95	AVG	150		P	
3	2500.000	40.00	-7.48	32.52	74.00	-41.48	peak	150		P	
4	2500.000	28.79	-7.48	21.31	54.00	-32.69	AVG	150		P	
5	2560.000	40.83	-7.24	33.59	74.00	-40.41	peak	150		P	
6	2560.000	29.69	-7.24	22.45	54.00	-31.55	AVG	150		P	

Mesurement Level = Reading level + Correct Factor, Margin=Limit- Mesurement

Note:
Per ANSI C63.10-2013, if there are two or more antnnas, the conducted powers at Core 0, Core 1,…, Core i were first measured separately, as shown in the section above(this product olny have one antenna). The measured values were then summed in linear power units then converted back to dBm.

Per ANSI C63.10-2013 Section 14.4.3.2.3, the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and NANT, the total number of antennas used.
For correlated unequal antenna gain
Directional gain = 10*log[(10G1/20 + 10G2/20 + … + 10GN/20)2 / NANT] dBi

For completely uncorrelated unequal antenna gain
Directional gain = 10*log[(10G1/10 + 10G2/10 + … + 10GN/10)/ NANT] dBi

Sample Multiple antennas Calculation: Core 0 + Core 1 +…Core i. = MIMO/CDD
(i is the number of antennas)
(#VALUE! mW + mW) = #VALUE! mW = dBm

Sample e.i.r.p. Calculation:
e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi)

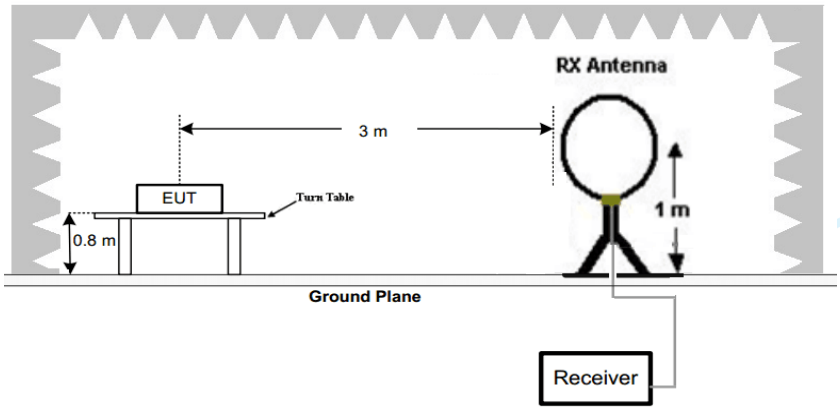
4.9 Emissions in frequency bands (below 1GHz)

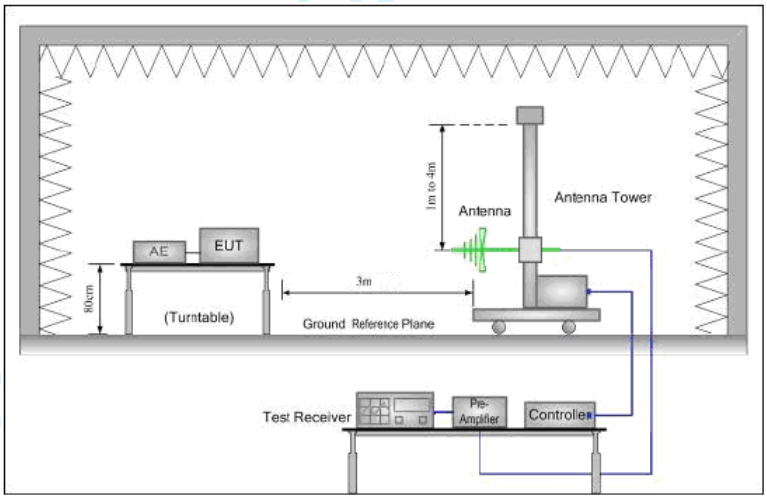
<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<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>ANSI C63.10-2013 section 6.6.4</td></tr>
<tr><td>Procedure:</td><td>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
j. Repeat above procedures until all frequencies measured was complete.
Remark:
1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor
3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.</td></tr>
</table>

4.9.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM5, TM6				
Final test mode:	TM6(worse case)				

4.9.2 Test Setup Diagram:





4.9.3 Test Data:

Between 9KHz – 30MHz
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

NOTE: The test results only show the worst mode or worst channel.

Between 30MHz – 1000MHz

TM6 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	30.9619	29.30	-3.12	26.18	40.00	-13.82	QP	100		P	
2	63.5356	36.88	-8.87	28.01	40.00	-11.99	QP	100		P	
3	125.0066	32.91	-4.67	28.24	43.50	-15.26	QP	100		P	
4	167.8243	36.08	-3.37	32.71	43.50	-10.79	QP	100		P	
5 *	287.9904	40.54	0.01	40.55	46.00	-5.45	QP	100		P	
6	768.7481	33.32	5.86	39.18	46.00	-6.82	QP	100		P	

TM6 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 !	30.5306	39.42	-3.00	36.42	40.00	-3.58	QP	100		P	
2 !	36.3814	39.26	-4.58	34.68	40.00	-5.32	QP	100		P	
3 !	53.3179	45.30	-9.58	35.72	40.00	-4.28	QP	100		P	
4 *	79.2426	44.56	-7.79	36.77	40.00	-3.23	QP	100		P	
5	165.4866	37.84	-3.42	34.42	43.50	-9.08	QP	100		P	
6	287.9904	39.23	-0.60	38.63	46.00	-7.37	QP	100		P	

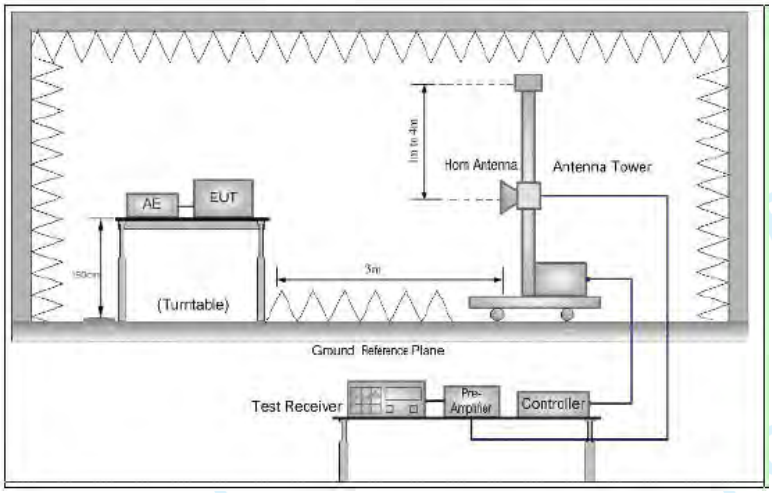
4.10 Emissions in frequency bands (above 1GHz)

<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>
<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>ANSI C63.10-2013 section 6.6.4</td></tr>
<tr><td>Procedure:</td><td>a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
j. Repeat above procedures until all frequencies measured was complete.
Remark:
1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor ¨C Preamplifier Factor
3) Scan from 9kHz to 25GHz, the disturbance above 12.75GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.</td></tr>
</table>

4.10.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	48.2 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM5, TM6				
Final test mode:	TM2, TM6(worse case)				

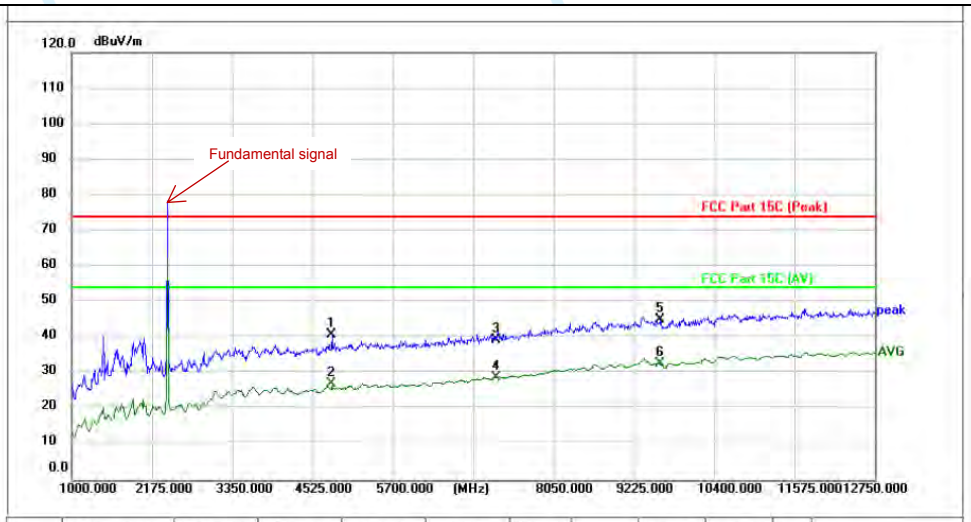
4.10.2 Test Setup Diagram:



4.10.3 Test Data:

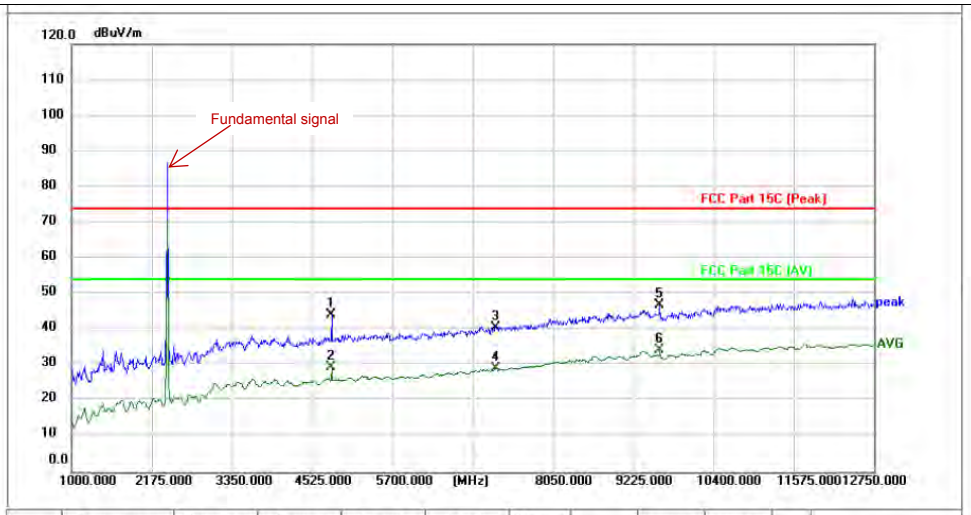
Only the worst mode and channel are recorded, The testing frequency reach up to 25GHz, but 13GHz-25GHz has no waveform except for background noise, so it was not recorded in the report.

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



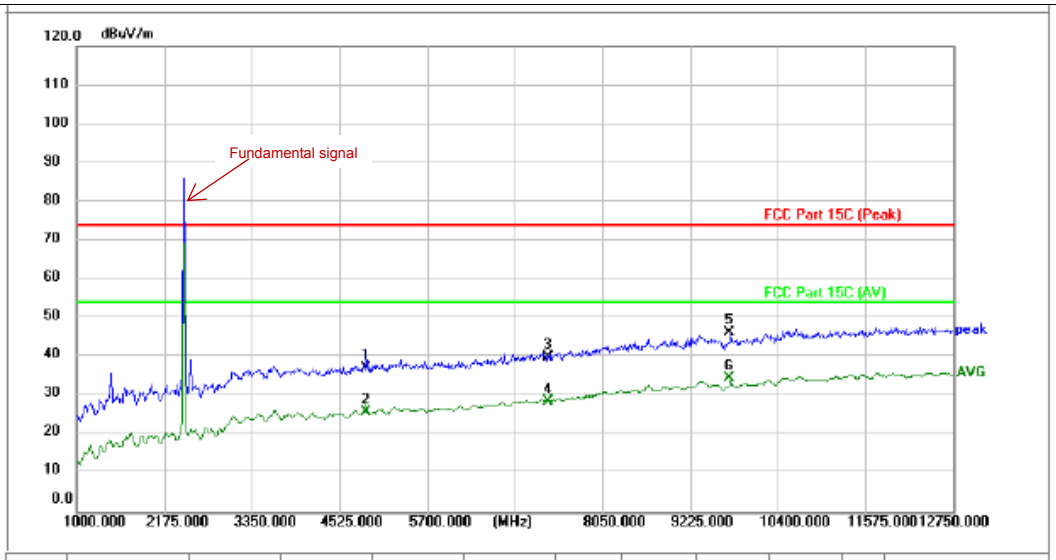
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4804.000	41.12	-0.28	40.84	74.00	-33.16	peak	150		P	
2	4804.000	27.39	-0.28	27.11	54.00	-26.89	AVG	150		P	
3	7206.000	35.44	4.09	39.53	74.00	-34.47	peak	150		P	
4	7206.000	24.89	4.09	28.98	54.00	-25.02	AVG	150		P	
5	9608.000	37.15	8.02	45.17	74.00	-28.83	peak	150		P	
6 *	9608.000	24.86	8.02	32.88	54.00	-21.12	AVG	150		P	

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



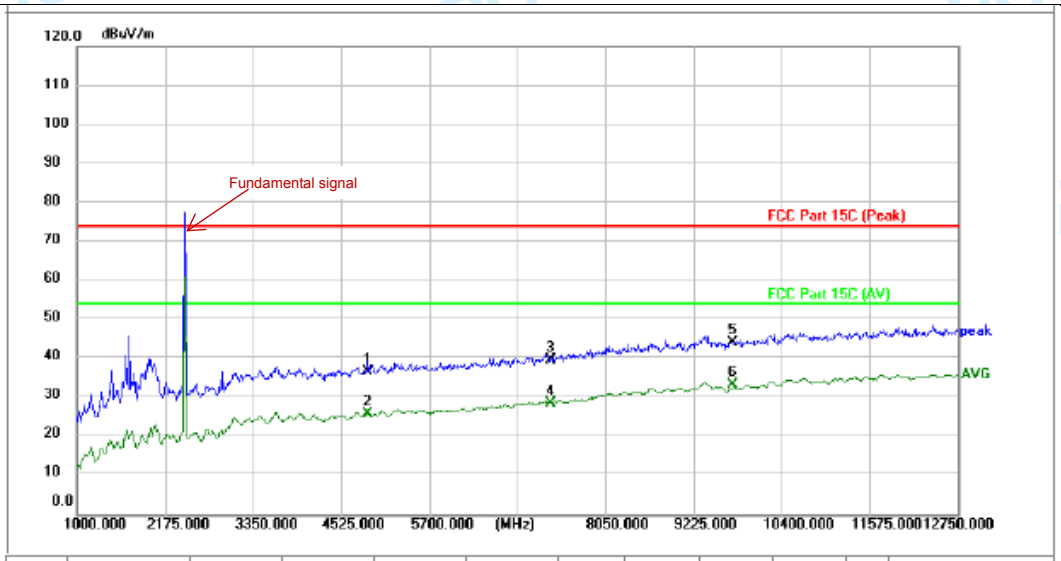
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4804.000	45.20	-0.90	44.30	74.00	-29.70	peak			P	
2	4804.000	30.49	-0.90	29.59	54.00	-24.41	AVG			P	
3	7206.000	36.53	4.13	40.66	74.00	-33.34	peak			P	
4	7206.000	24.99	4.13	29.12	54.00	-24.88	AVG			P	
5	9608.000	38.87	8.09	46.96	74.00	-27.04	peak			P	
6 *	9608.000	26.19	8.09	34.28	54.00	-19.72	AVG			P	

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: M



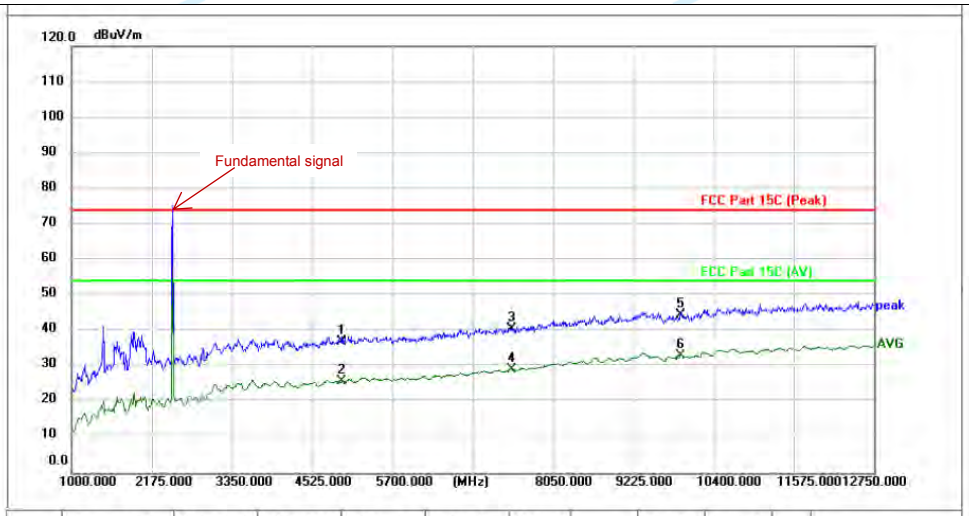
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4882.000	38.05	-0.64	37.41	74.00	-36.59	peak	150		P	
2	4882.000	26.60	-0.64	25.96	54.00	-28.04	AVG	150		P	
3	7323.000	35.74	4.31	40.05	74.00	-33.95	peak	150		P	
4	7323.000	24.39	4.31	28.70	54.00	-25.30	AVG	150		P	
5	9764.000	38.22	8.09	46.31	74.00	-27.69	peak	150		P	
6 *	9764.000	26.67	8.09	34.76	54.00	-19.24	AVG	150		P	

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: M



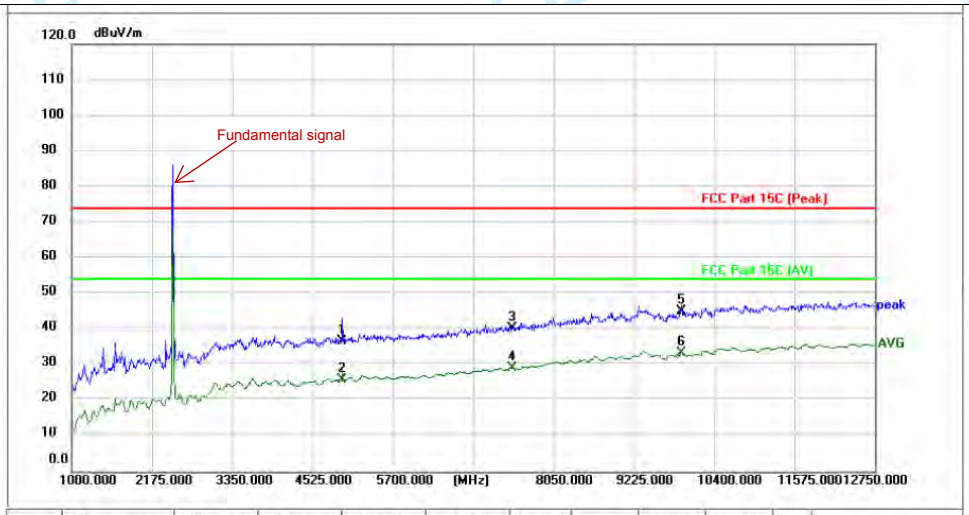
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4882.000	36.65	-0.03	36.62	74.00	-37.38	peak	150		P	
2	4882.000	25.88	-0.03	25.85	54.00	-28.15	AVG	150		P	
3	7323.000	35.26	4.36	39.62	74.00	-34.38	peak	150		P	
4	7323.000	24.35	4.36	28.71	54.00	-25.29	AVG	150		P	
5	9764.000	36.14	8.13	44.27	74.00	-29.73	peak	150		P	
6 *	9764.000	25.25	8.13	33.38	54.00	-20.62	AVG	150		P	

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



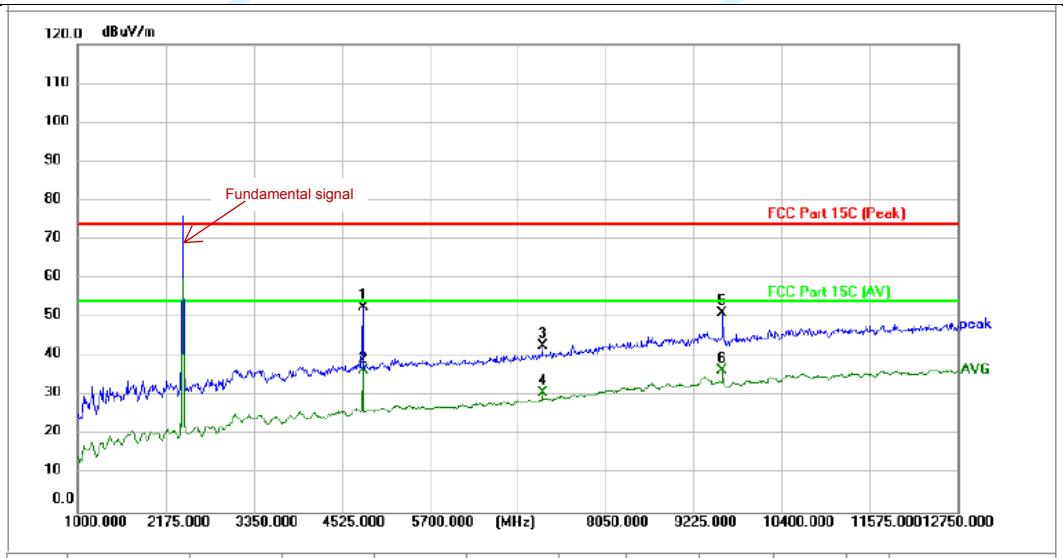
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4960.000	36.75	0.23	36.98	74.00	-37.02	peak	150		P	
2	4960.000	25.66	0.23	25.89	54.00	-28.11	AVG	150		P	
3	7440.000	36.12	4.64	40.76	74.00	-33.24	peak	150		P	
4	7440.000	24.62	4.64	29.26	54.00	-24.74	AVG	150		P	
5	9920.000	36.45	8.23	44.68	74.00	-29.32	peak	150		P	
6 *	9920.000	24.94	8.23	33.17	54.00	-20.83	AVG	150		P	

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



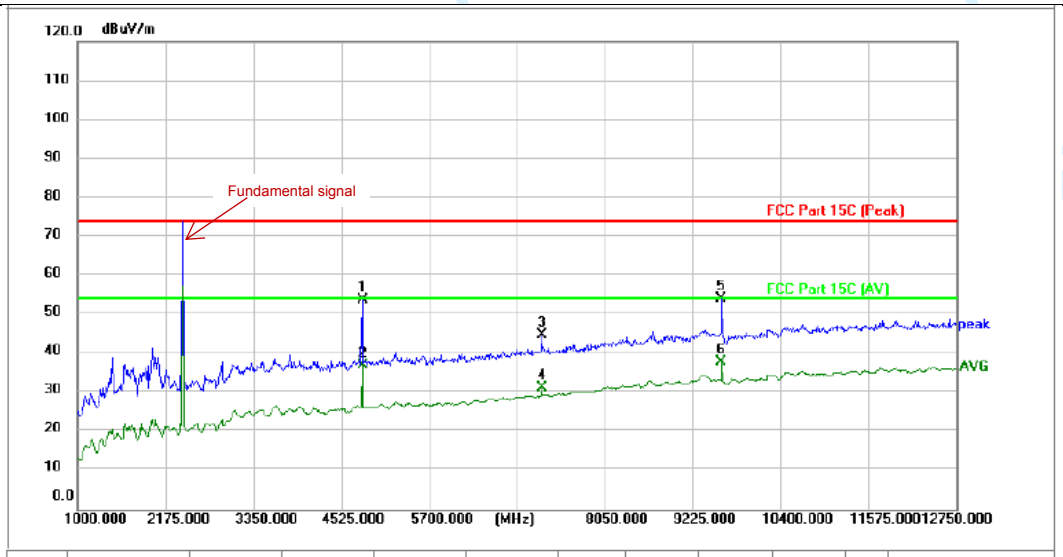
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4960.000	37.06	-0.37	36.69	74.00	-37.31	peak	150		P	
2	4960.000	26.39	-0.37	26.02	54.00	-27.98	AVG	150		P	
3	7440.000	35.71	4.49	40.20	74.00	-33.80	peak	150		P	
4	7440.000	24.77	4.49	29.26	54.00	-24.74	AVG	150		P	
5	9920.000	37.03	8.08	45.11	74.00	-28.89	peak	150		P	
6 *	9920.000	25.47	8.08	33.55	54.00	-20.45	AVG	150		P	

TM6 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



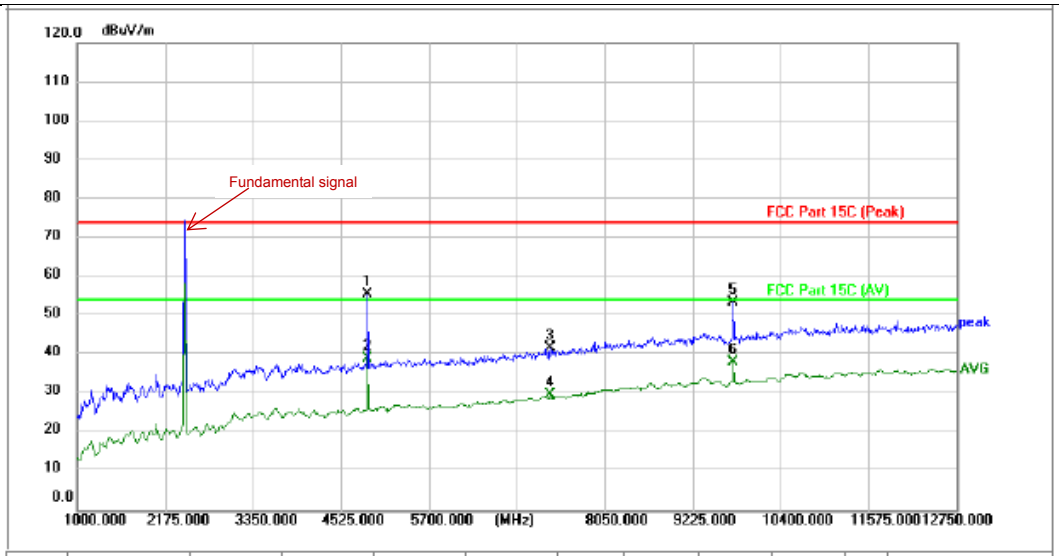
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4807.000	53.65	-0.89	52.76	74.00	-21.24	peak			P	
2	4807.000	37.25	-0.89	36.36	54.00	-17.64	AVG			P	
3	7204.000	38.51	4.13	42.64	74.00	-31.36	peak			P	
4	7204.000	26.67	4.13	30.80	54.00	-23.20	AVG			P	
5	9612.750	43.13	8.10	51.23	74.00	-22.77	peak			P	
6 *	9612.750	28.39	8.10	36.49	54.00	-17.51	AVG			P	

TM6 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



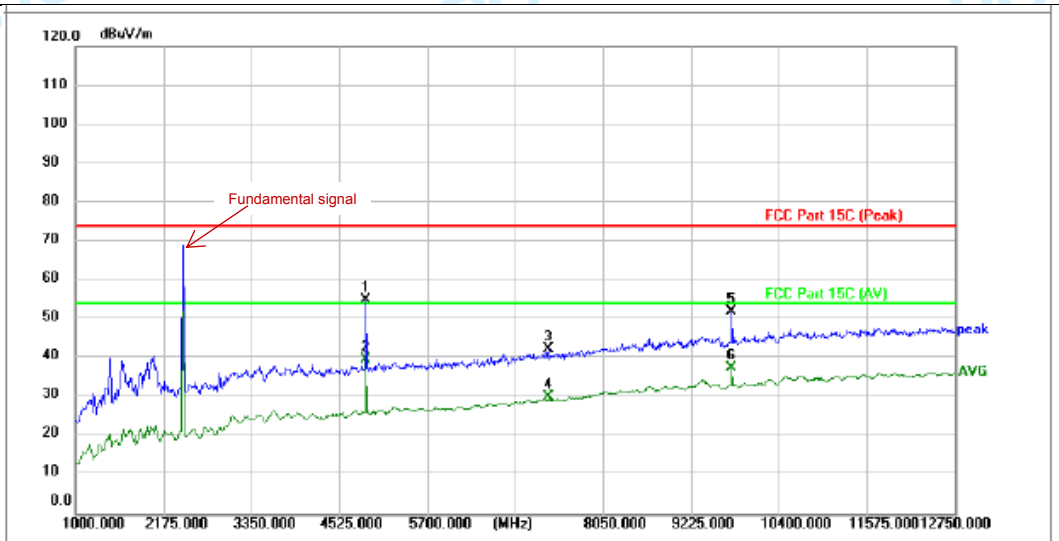
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4807.000	54.25	-0.27	53.98	74.00	-20.02	peak	150		P	
2	4807.000	37.24	-0.27	36.97	54.00	-17.03	AVG	150		P	
3	7204.000	40.79	4.09	44.88	74.00	-29.12	peak	150		P	
4	7204.000	27.41	4.09	31.50	54.00	-22.50	AVG	150		P	
5	9612.750	46.17	8.03	54.20	74.00	-19.80	peak	150		P	
6 *	9612.750	29.93	8.03	37.96	54.00	-16.04	AVG	150		P	

TM6 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: M



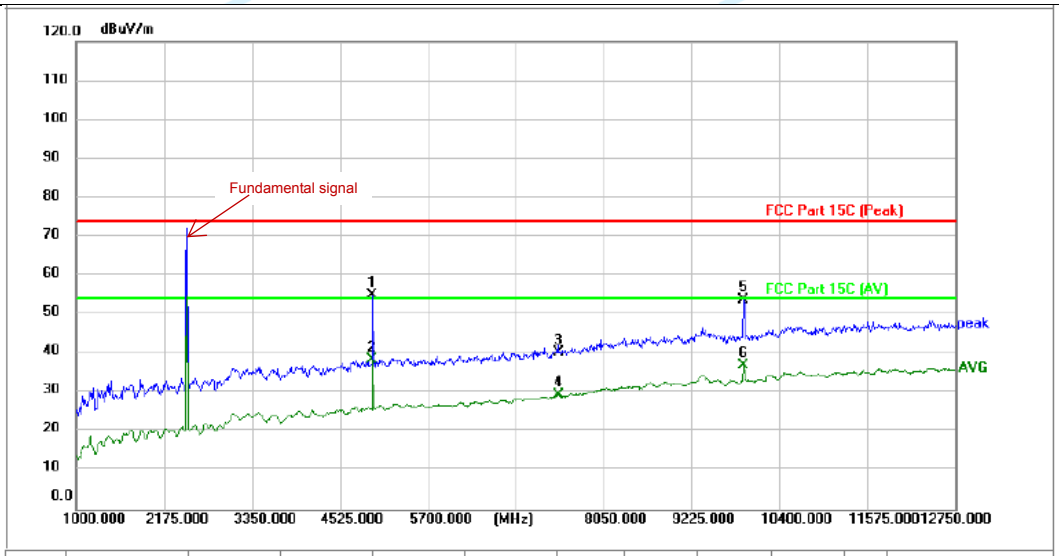
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4877.500	56.43	-0.65	55.78	74.00	-18.22	peak	150		P	
2 *	4877.500	39.92	-0.65	39.27	54.00	-14.73	AVG	150		P	
3	7321.500	37.66	4.31	41.97	74.00	-32.03	peak	150		P	
4	7321.500	25.47	4.31	29.78	54.00	-24.22	AVG	150		P	
5	9765.500	45.42	8.09	53.51	74.00	-20.49	peak	150		P	
6	9765.500	30.16	8.09	38.25	54.00	-15.75	AVG	150		P	

TM6 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: M



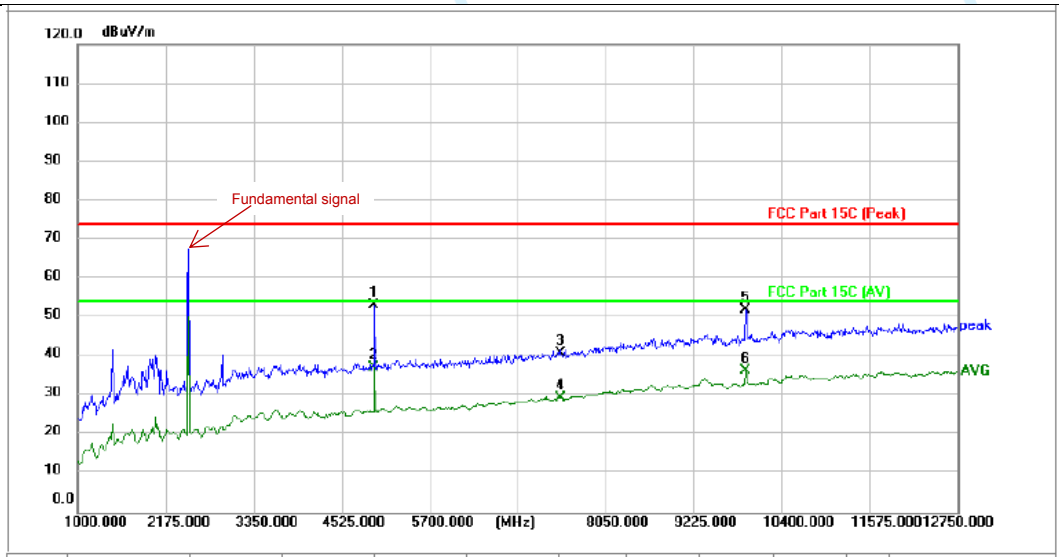
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4877.500	55.06	-0.04	55.02	74.00	-18.98	peak			P	
2 *	4877.500	39.79	-0.04	39.75	54.00	-14.25	AVG			P	
3	7321.500	38.20	4.36	42.56	74.00	-31.44	peak			P	
4	7321.500	25.84	4.36	30.20	54.00	-23.80	AVG			P	
5	9765.500	43.83	8.13	51.96	74.00	-22.04	peak			P	
6	9765.500	29.64	8.13	37.77	54.00	-16.23	AVG			P	

TM6 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4959.750	55.52	-0.37	55.15	74.00	-18.85	peak	150		P	
2 *	4959.750	38.96	-0.37	38.59	54.00	-15.41	AVG	150		P	
3	7440.000	35.96	4.49	40.45	74.00	-33.55	peak	150		P	
4	7440.000	24.96	4.49	29.45	54.00	-24.55	AVG	150		P	
5	9918.250	45.79	8.08	53.87	74.00	-20.13	peak	150		P	
6	9918.250	28.92	8.08	37.00	54.00	-17.00	AVG	150		P	

TM6 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4959.750	53.15	0.23	53.38	74.00	-20.62	peak	150		P	
2 *	4959.750	37.24	0.23	37.47	54.00	-16.53	AVG	150		P	
3	7440.000	36.41	4.64	41.05	74.00	-32.95	peak	150		P	
4	7440.000	24.96	4.64	29.60	54.00	-24.40	AVG	150		P	
5	9918.250	43.88	8.23	52.11	74.00	-21.89	peak	150		P	
6	9918.250	28.21	8.23	36.44	54.00	-17.56	AVG	150		P	

Remark: Margin = Limit – Level
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
Level=Test receiver reading + correction factor

Note:
Per ANSI C63.10-2013, if there are two or more antnnas, the conducted powers at Core 0, Core 1,…, Core i were first measured separately, as shown in the section above(this product olny have one antenna). The measured values were then summed in linear power units then converted back to dBm.

Sample Multiple antennas Calculation: Core 0 + Core 1 +…Core i. = MIMO/CDD
(i is the number of antennas)

(#VALUE! mW + XX mW) = #VALUE! mW = XX dBm
Sample e.i.r.p. Calculation:
XX dBm= Conducted Power (dBm) + Ant gain (dBi)

5 TEST SETUP PHOTOS

Please Refer to test setup for Details.

6 PHOTOS OF THE EUT

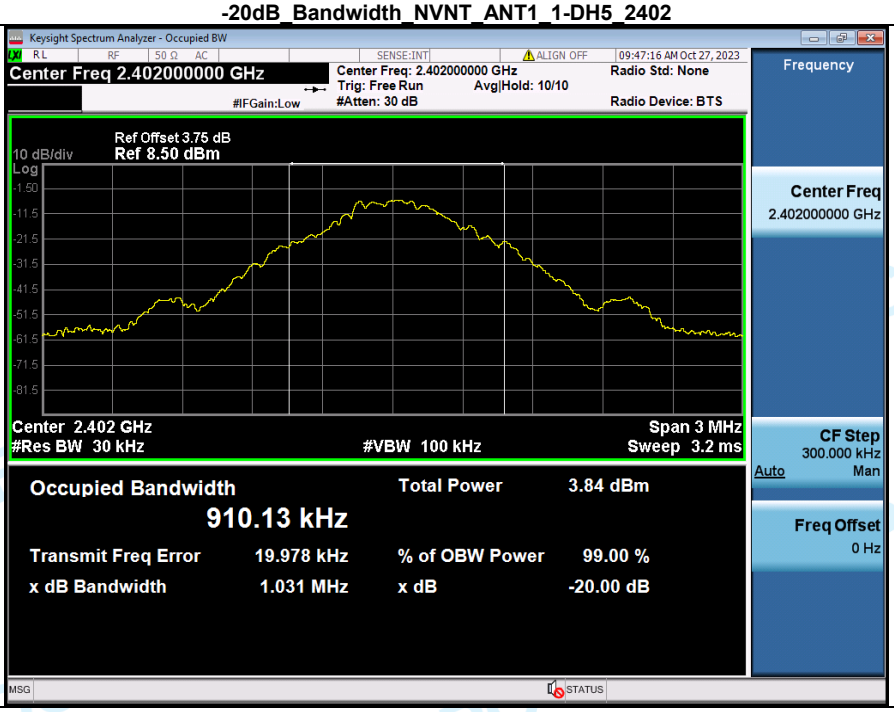
Please Refer to external photos file and internal photos file for Details.

Appendix-ANT1

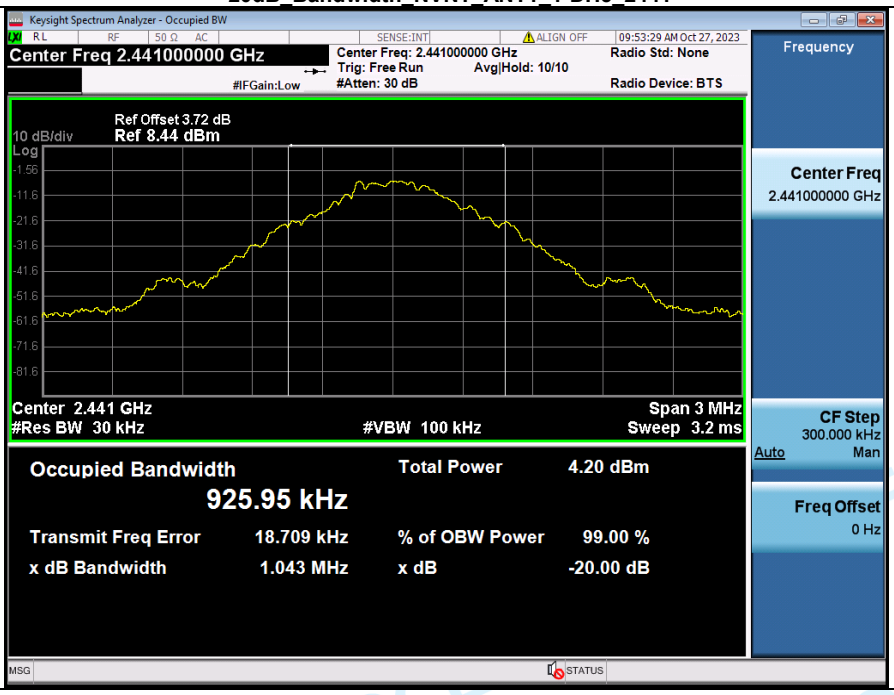
1. -20dB Bandwidth

Condition	Antenna	Modulation	Frequency (MHz)	-20dB BW(MHz)	if larger than CFS
NVNT	ANT1	1-DH5	2402.00	1.031	Yes
NVNT	ANT1	1-DH5	2441.00	1.043	Yes
NVNT	ANT1	1-DH5	2480.00	1.041	Yes
NVNT	ANT1	2-DH5	2402.00	1.318	Yes
NVNT	ANT1	2-DH5	2441.00	1.325	Yes
NVNT	ANT1	2-DH5	2480.00	1.332	Yes

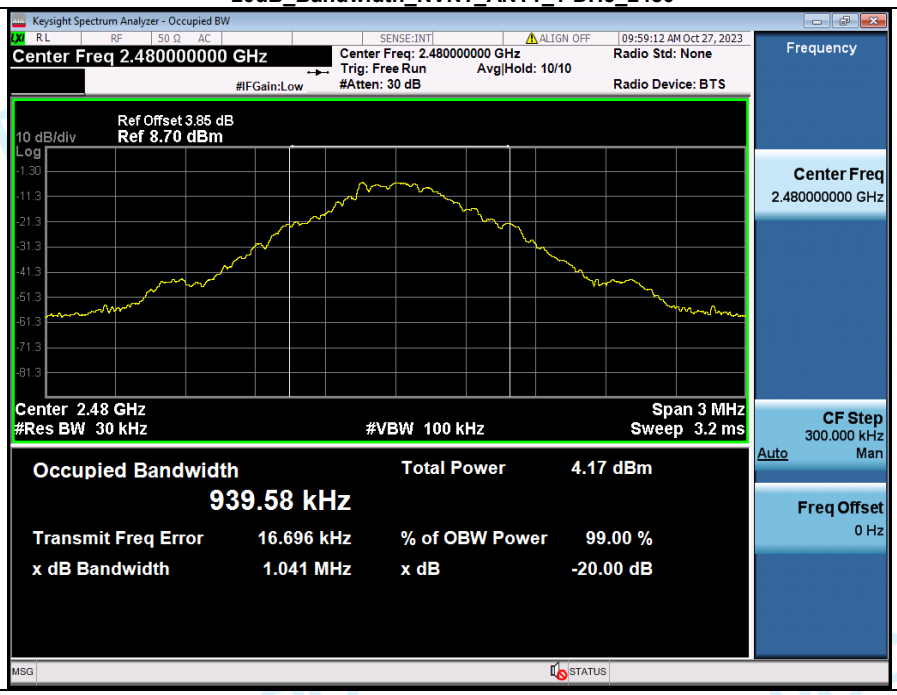
-20dB_Bandwidth_NVNT_ANT1_1-DH5_2402



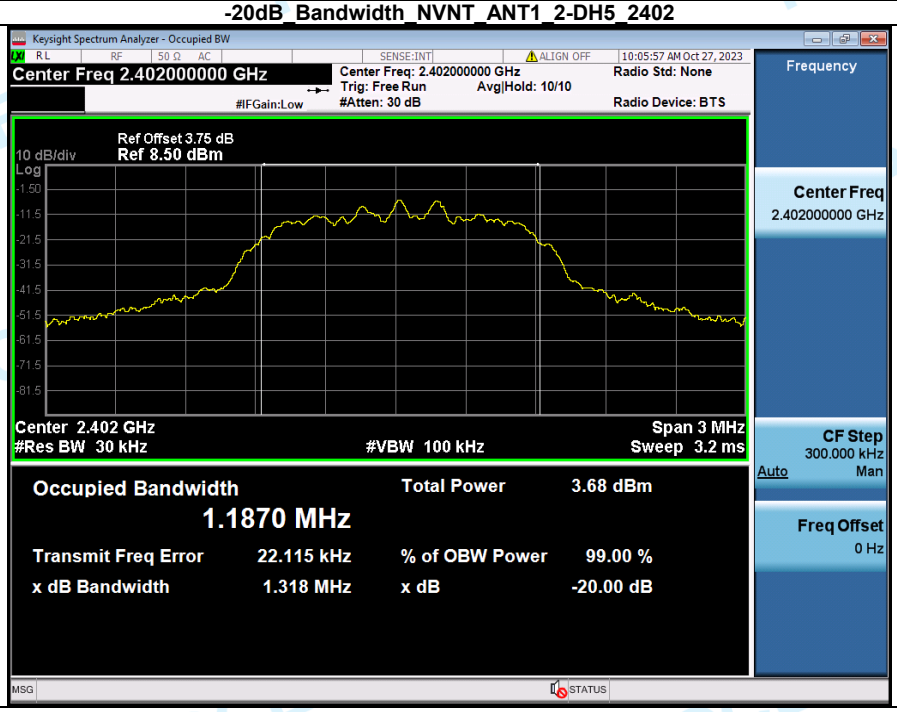
-20dB_Bandwidth_NVNT_ANT1_1-DH5_2441



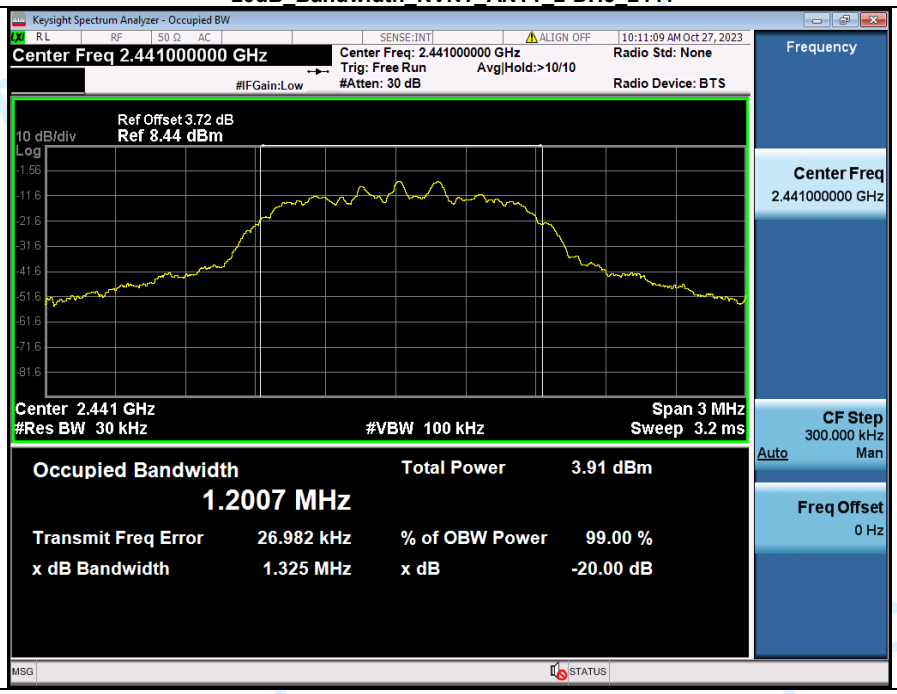
-20dB_Bandwidth_NVNT_ANT1_1-DH5_2480



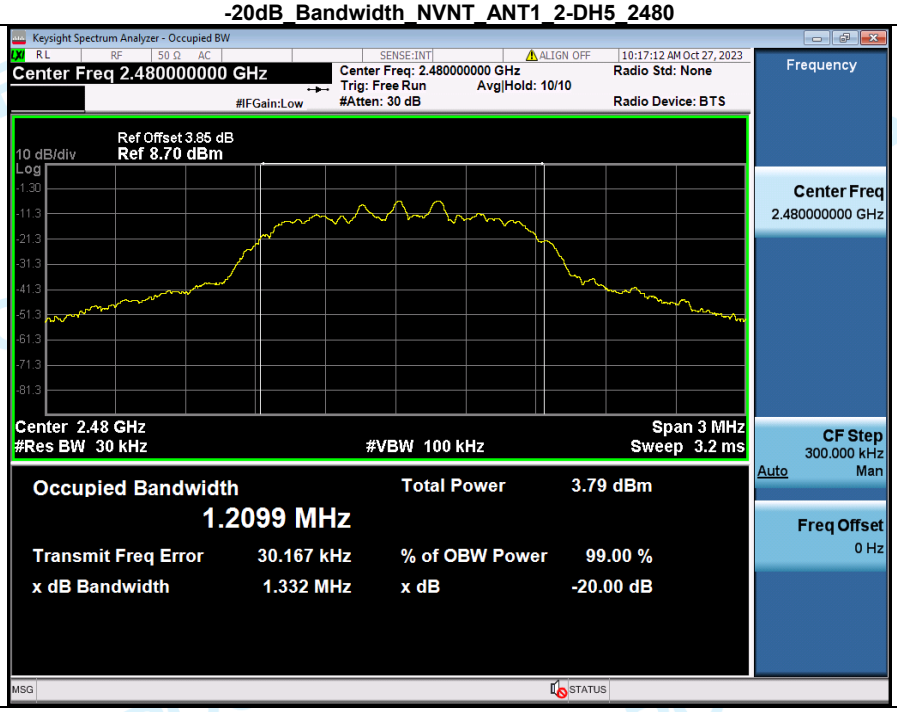
-20dB_Bandwidth_NVNT_ANT1_2-DH5_2402



-20dB_Bandwidth_NVNT_ANT1_2-DH5_2441



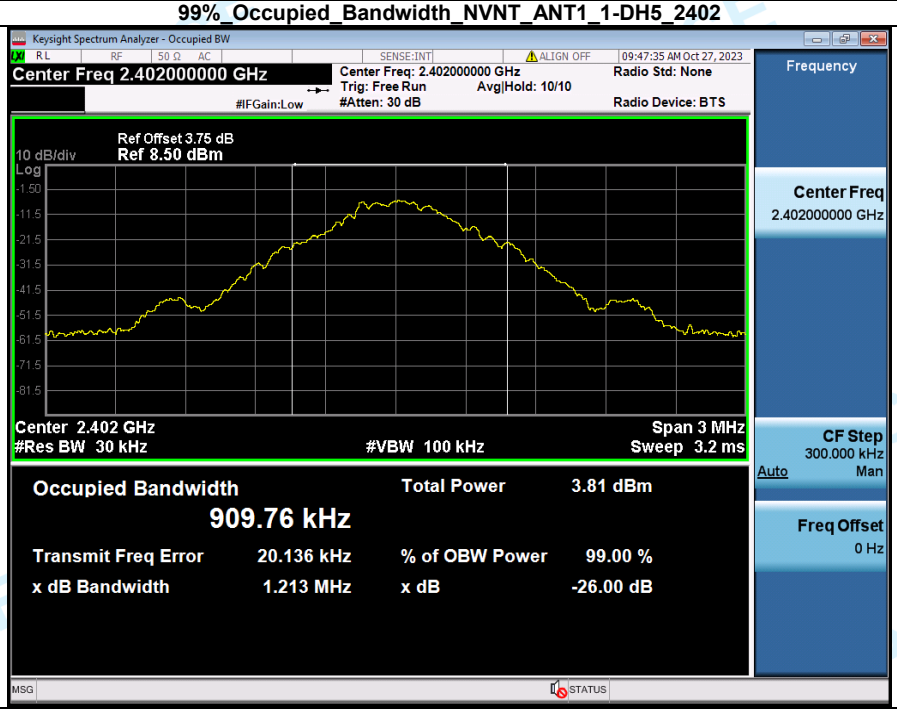
-20dB_Bandwidth_NVNT_ANT1_2-DH5_2480



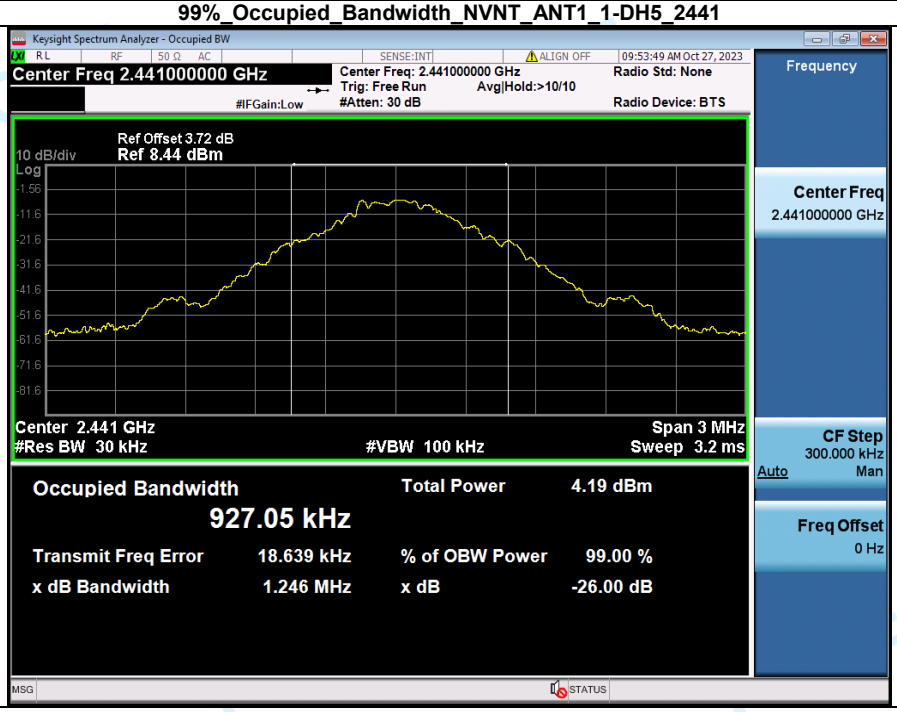
2. 99% Occupied Bandwidth

Condition	Antenna	Modulation	Frequency (MHz)	99%%BW(MHz)
NVNT	ANT1	1-DH5	2402.00	0.910
NVNT	ANT1	1-DH5	2441.00	0.927
NVNT	ANT1	1-DH5	2480.00	0.939
NVNT	ANT1	2-DH5	2402.00	1.190
NVNT	ANT1	2-DH5	2441.00	1.202
NVNT	ANT1	2-DH5	2480.00	1.210

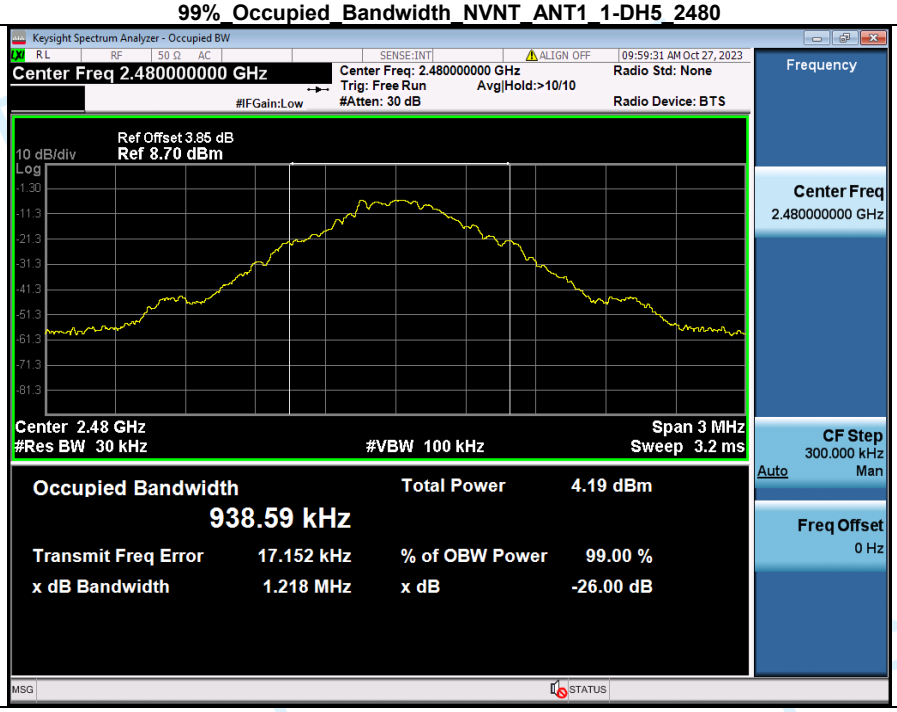
99%_Occupied_Bandwidth_NVNT_ANT1_1-DH5_2402



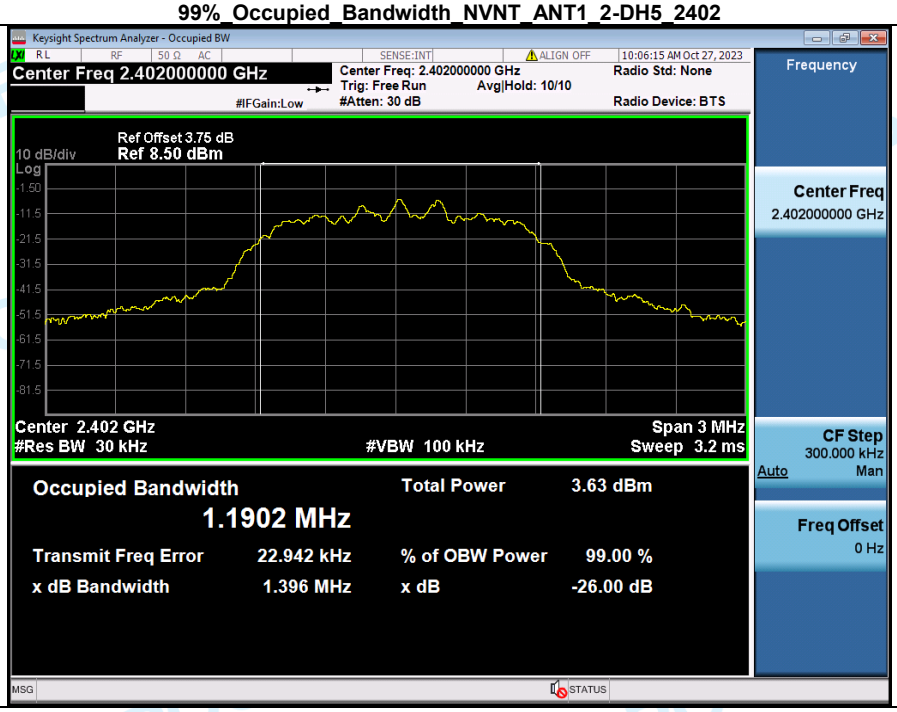
99%_Occupied_Bandwidth_NVNT_ANT1_1-DH5_2441



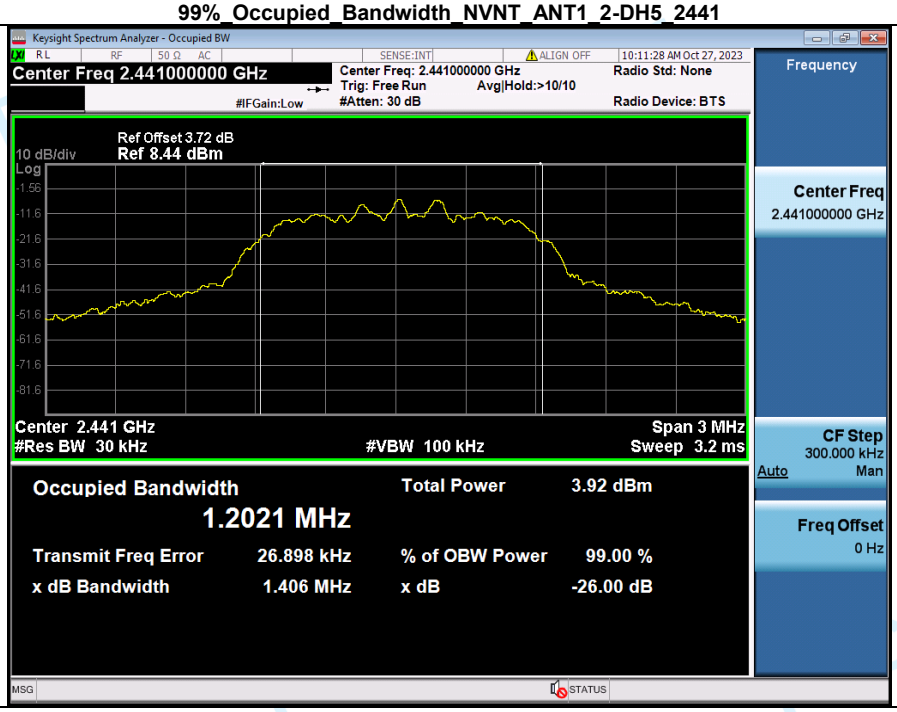
99%_Occupied_Bandwidth_NVNT_ANT1_1-DH5_2480



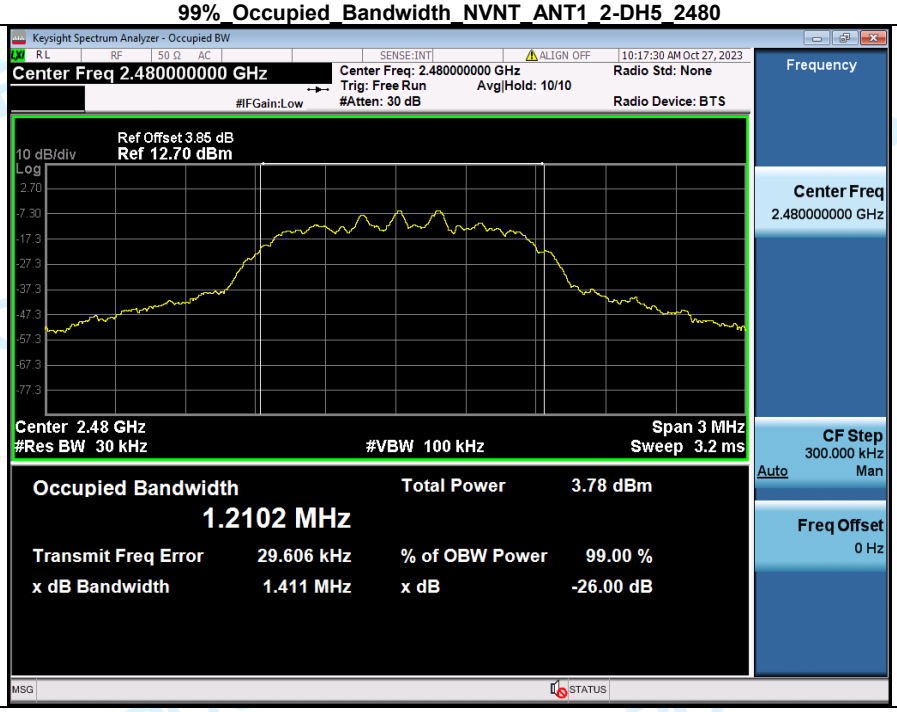
99%_Occupied_Bandwidth_NVNT_ANT1_2-DH5_2402



99%_Occupied_Bandwidth_NVNT_ANT1_2-DH5_2441



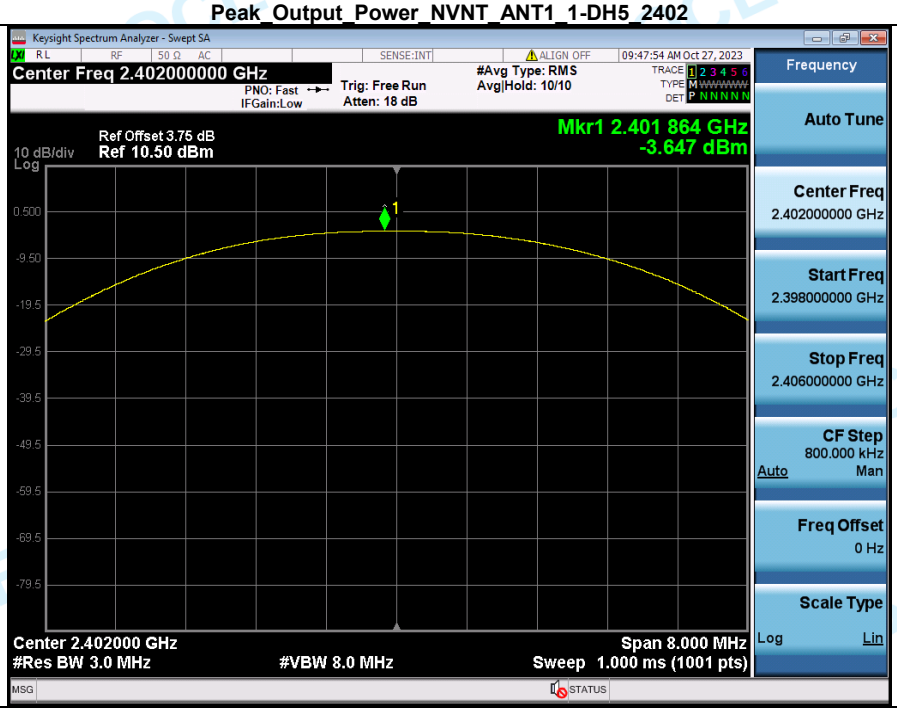
99%_Occupied_Bandwidth_NVNT_ANT1_2-DH5_2480



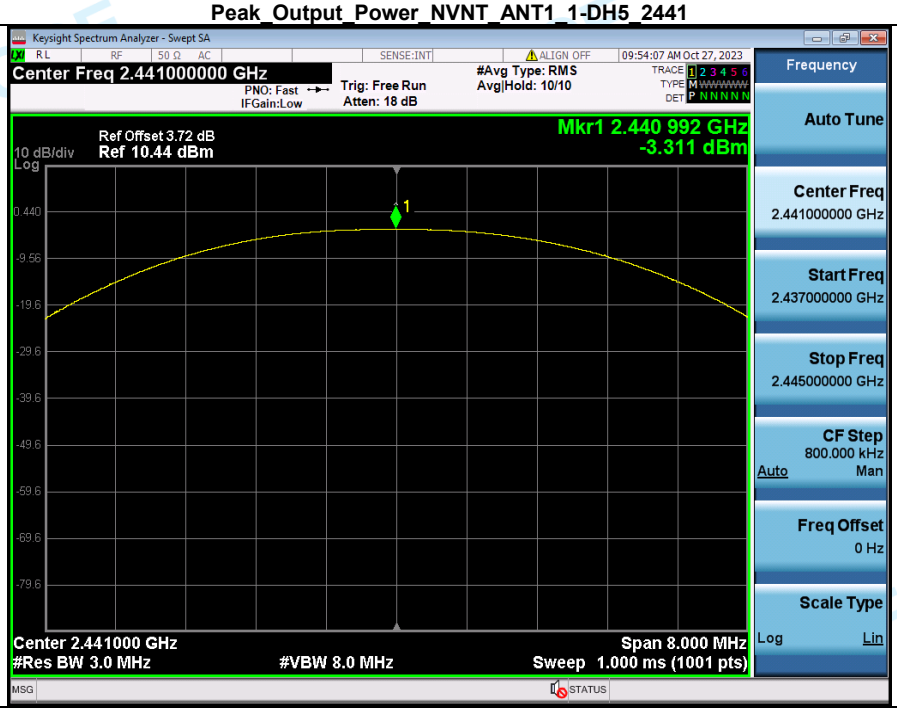
3. Peak Output Power

Condition	Antenna	Modulation	Frequency (MHz)	Max. Conducted Power(dBm)	Max. Conducted Power(mW)	Limit(mW)	Result
NVNT	ANT1	1-DH5	2402.00	-3.65	0.43	125	Pass
NVNT	ANT1	1-DH5	2441.00	-3.31	0.47	125	Pass
NVNT	ANT1	1-DH5	2480.00	-3.34	0.46	125	Pass
NVNT	ANT1	2-DH5	2402.00	-2.64	0.54	125	Pass
NVNT	ANT1	2-DH5	2441.00	-2.35	0.58	125	Pass
NVNT	ANT1	2-DH5	2480.00	-2.39	0.58	125	Pass

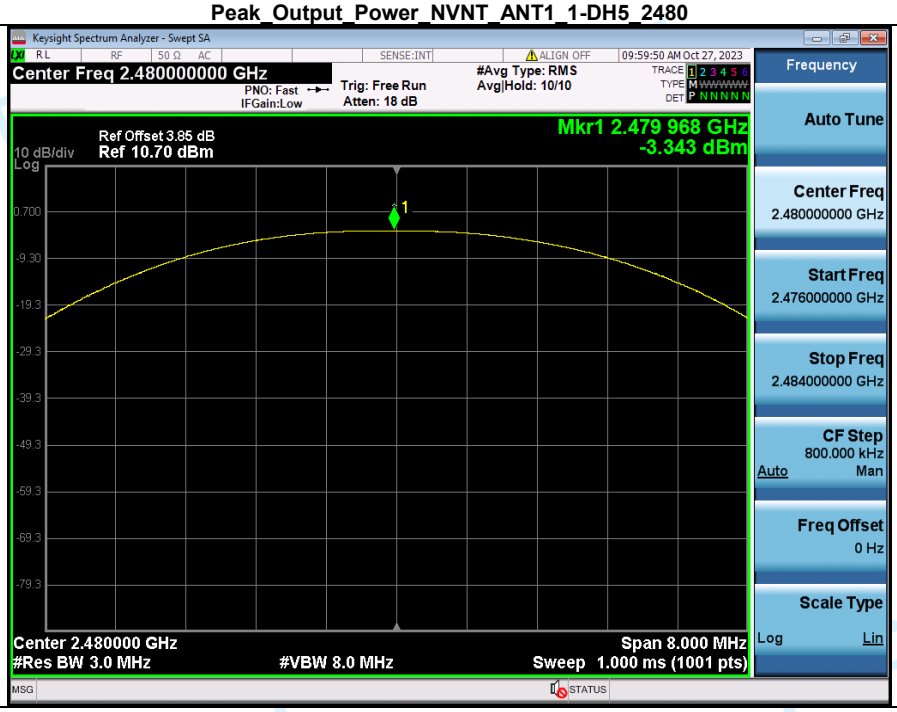
Peak_Output_Power_NVNT_ANT1_1-DH5_2402



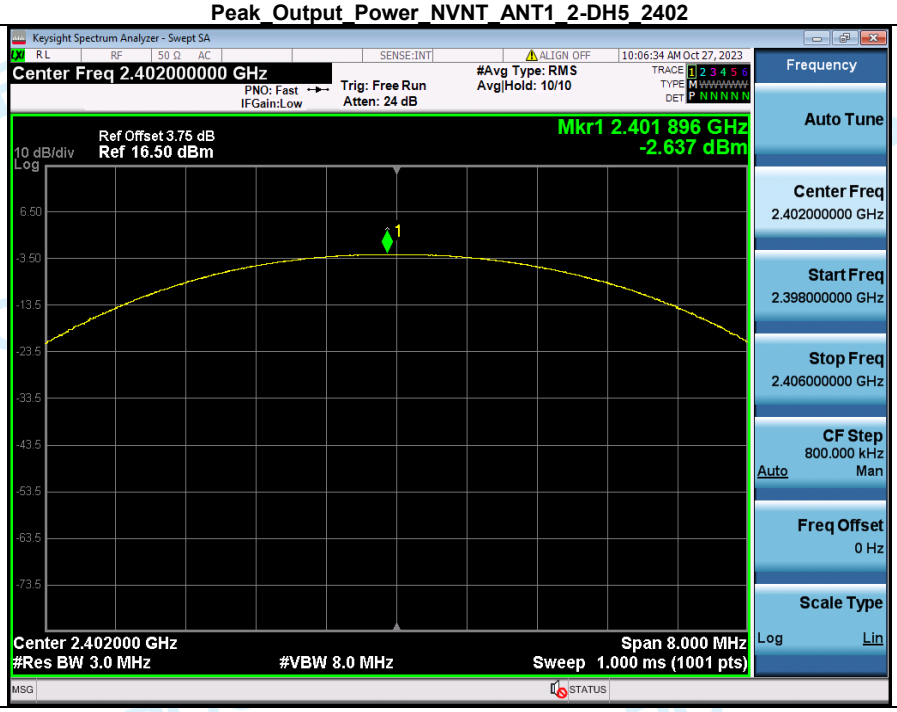
Peak_Output_Power_NVNT_ANT1_1-DH5_2441



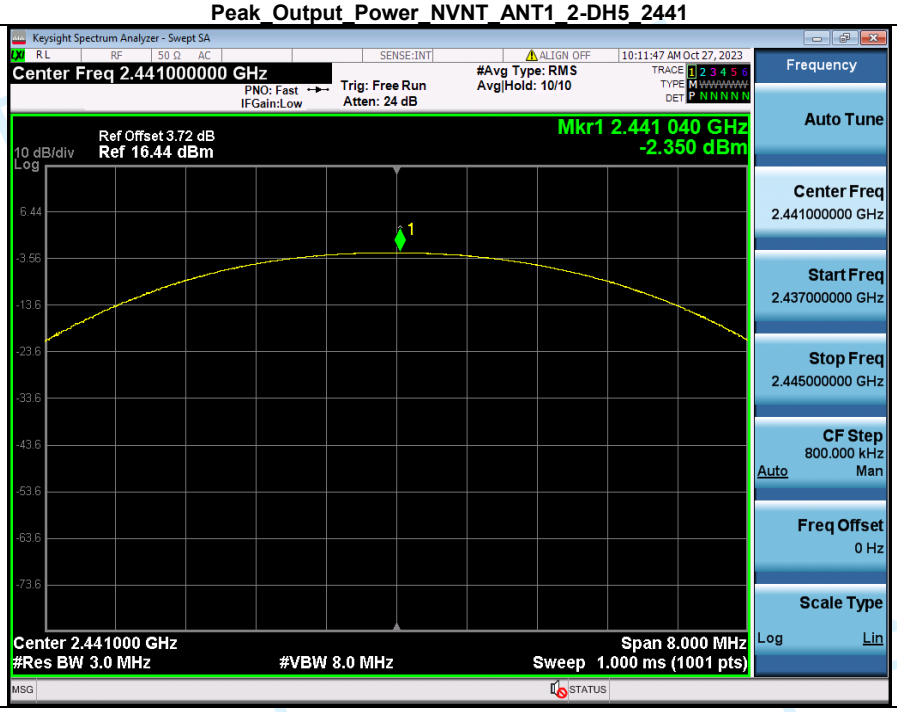
Peak_Output_Power_NVNT_ANT1_1-DH5_2480



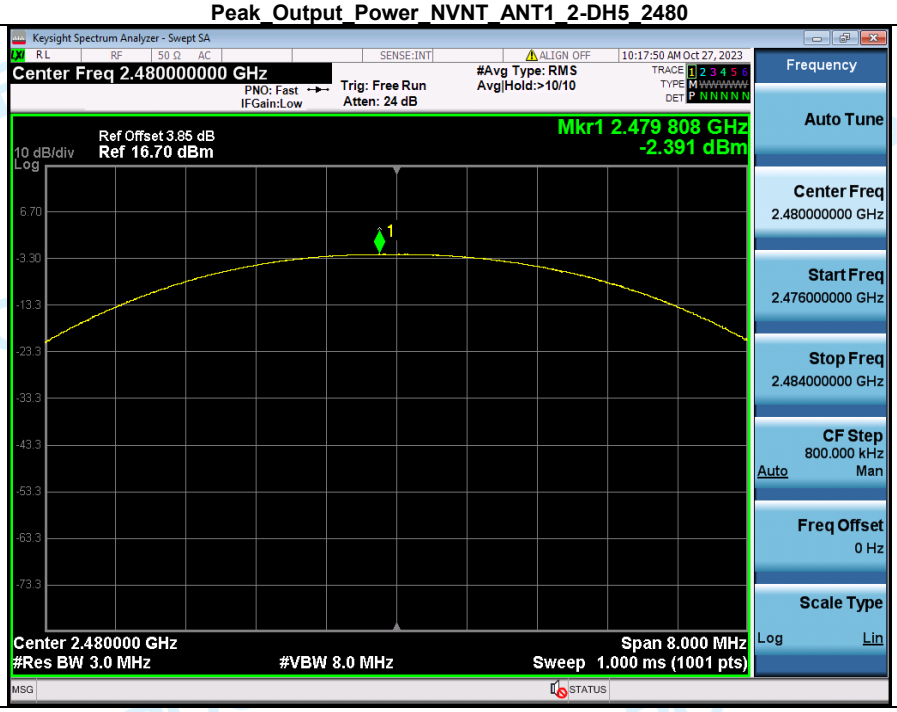
Peak_Output_Power_NVNT_ANT1_2-DH5_2402



Peak_Output_Power_NVNT_ANT1_2-DH5_2441



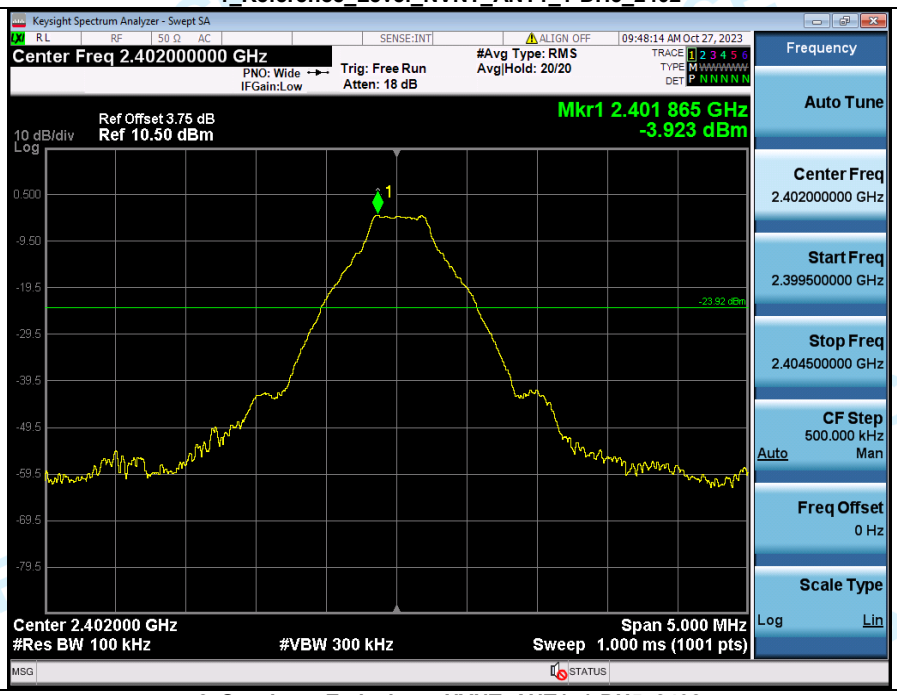
Peak_Output_Power_NVNT_ANT1_2-DH5_2480



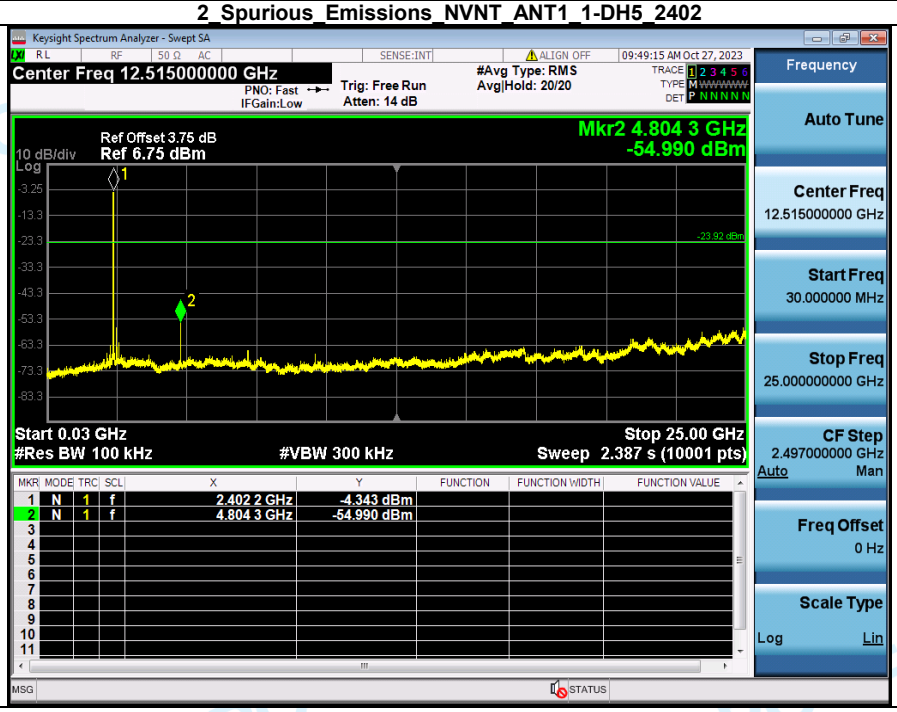
4. Spurious Emissions

Condition	Antenna	Modulation	TX Mode	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1-DH5	2402.00	-54.990	-23.923	Pass
NVNT	ANT1	1-DH5	2441.00	-57.027	-23.599	Pass
NVNT	ANT1	1-DH5	2480.00	-56.915	-23.647	Pass
NVNT	ANT1	2-DH5	2402.00	-57.004	-23.842	Pass
NVNT	ANT1	2-DH5	2441.00	-57.309	-23.617	Pass
NVNT	ANT1	2-DH5	2480.00	-57.754	-23.691	Pass

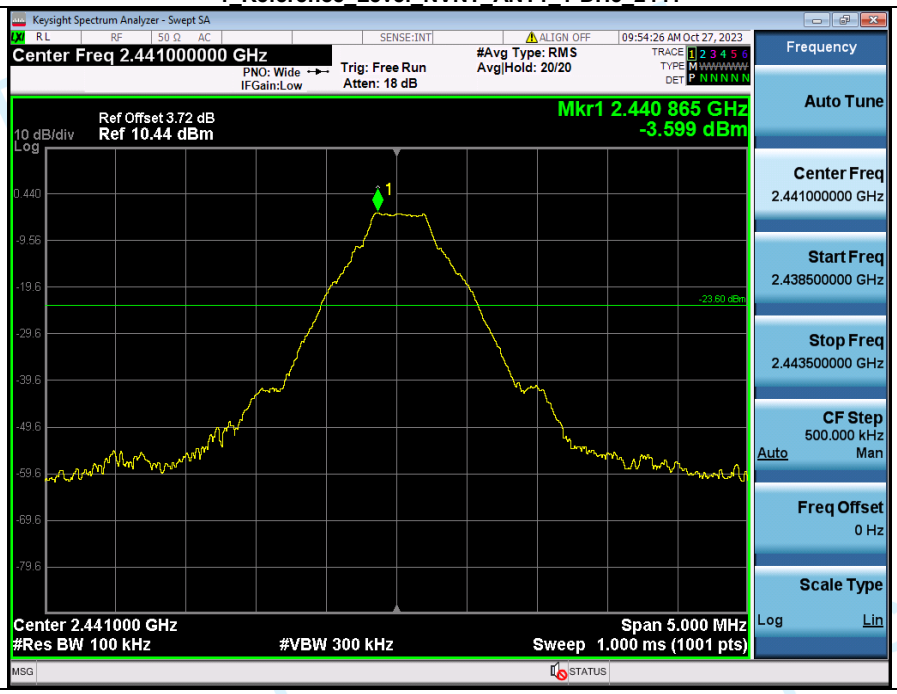
1_Reference_Level_NVNT_ANT1_1-DH5_2402



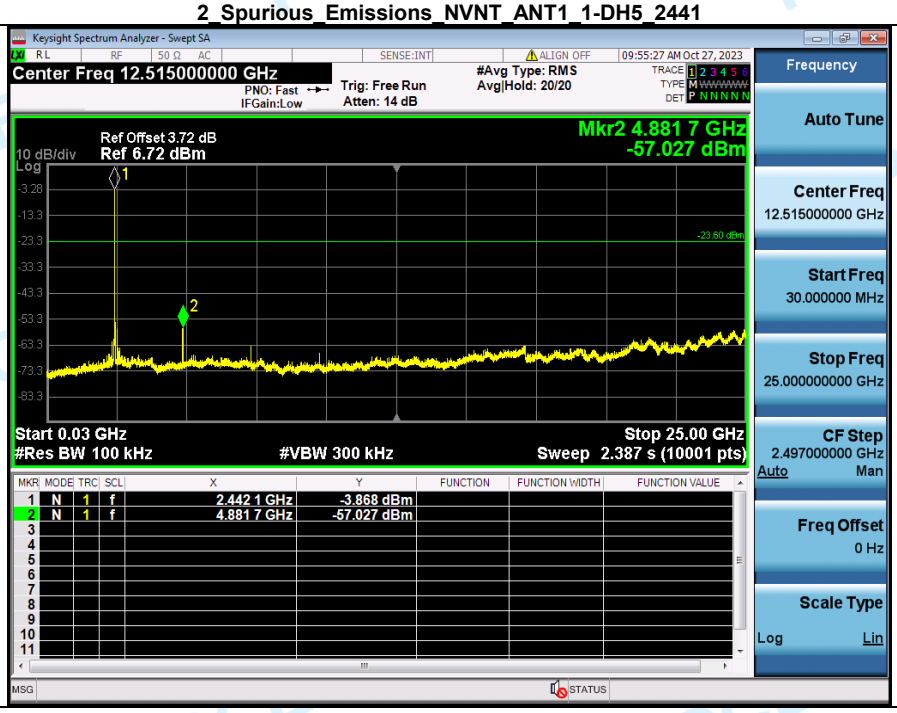
2_Spurious_Emissions_NVNT_ANT1_1-DH5_2402



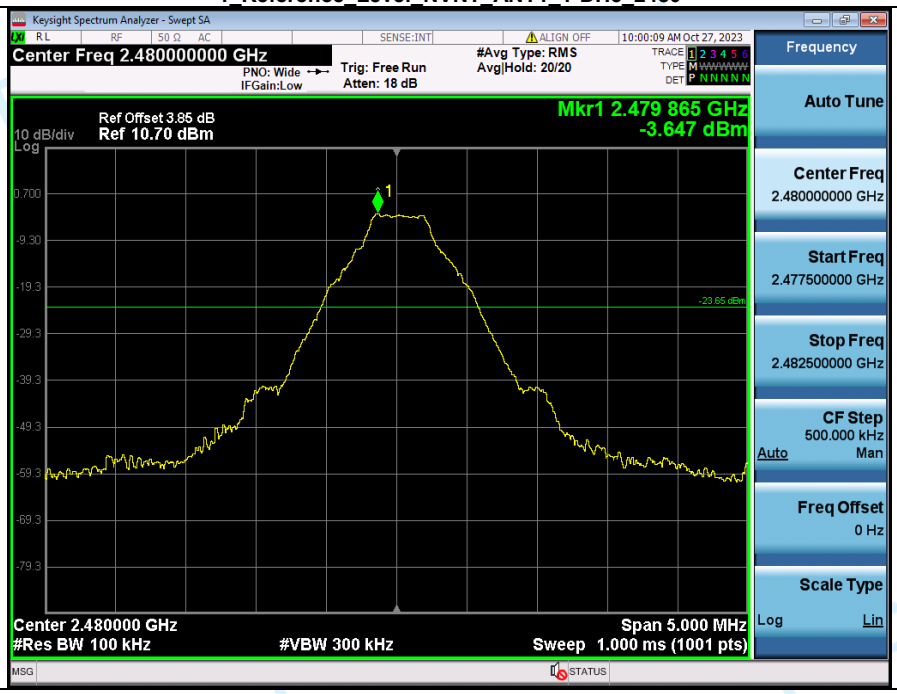
1_Reference_Level_NVNT_ANT1_1-DH5_2441



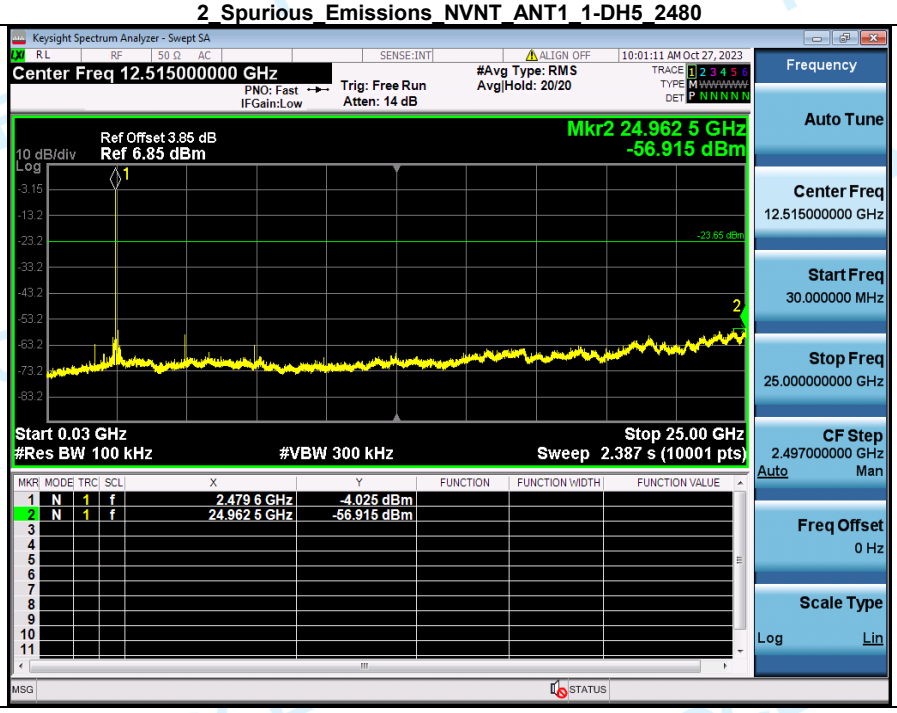
2_Spurious_Emissions_NVNT_ANT1_1-DH5_2441



1_Reference_Level_NVNT_ANT1_1-DH5_2480

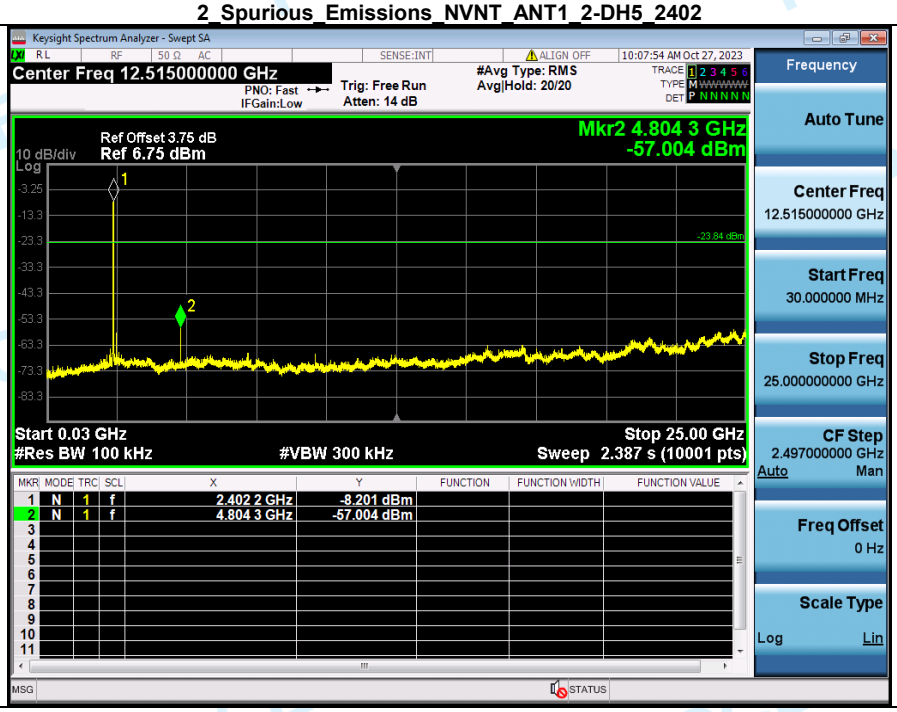


2_Spurious_Emissions_NVNT_ANT1_1-DH5_2480



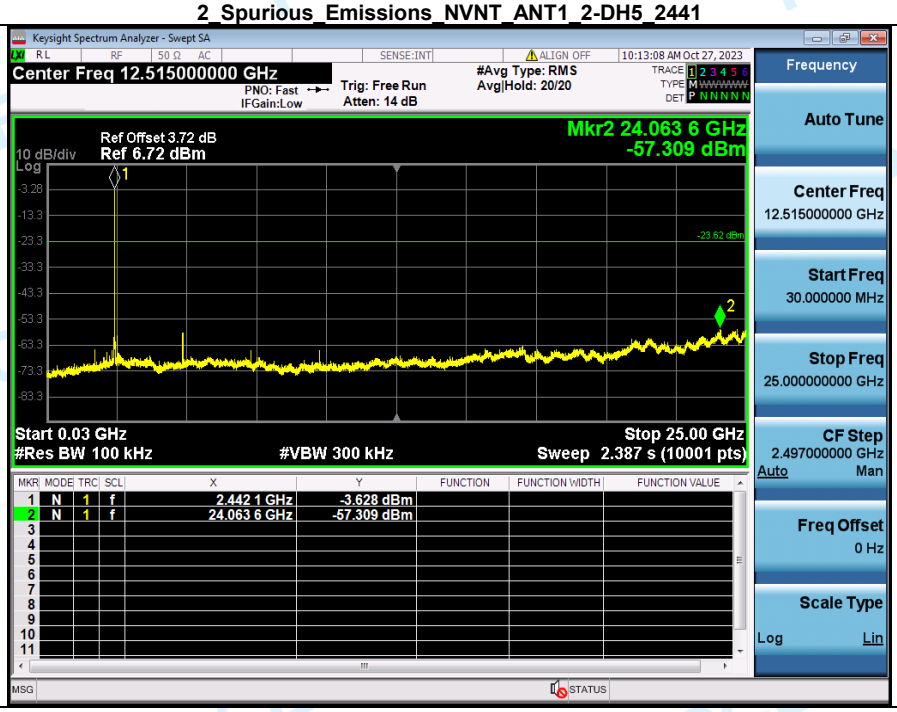
1_Reference_Level_NVNT_ANT1_2-DH5_2402

2_Spurious_Emissions_NVNT_ANT1_2-DH5_2402



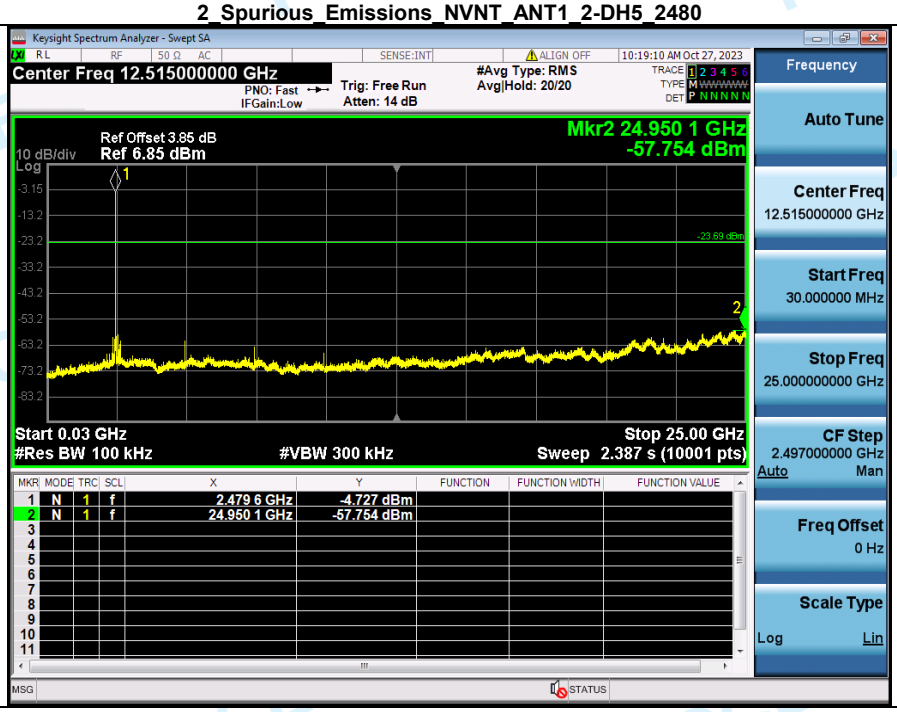
1_Reference_Level_NVNT_ANT1_2-DH5_2441

2_Spurious_Emissions_NVNT_ANT1_2-DH5_2441



1_Reference_Level_NVNT_ANT1_2-DH5_2480

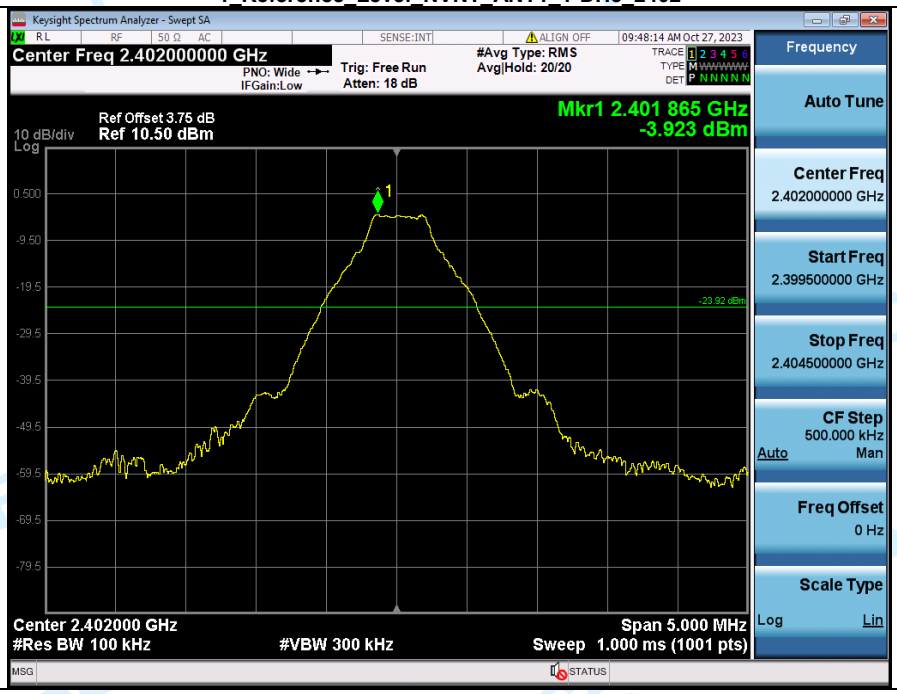
2_Spurious_Emissions_NVNT_ANT1_2-DH5_2480



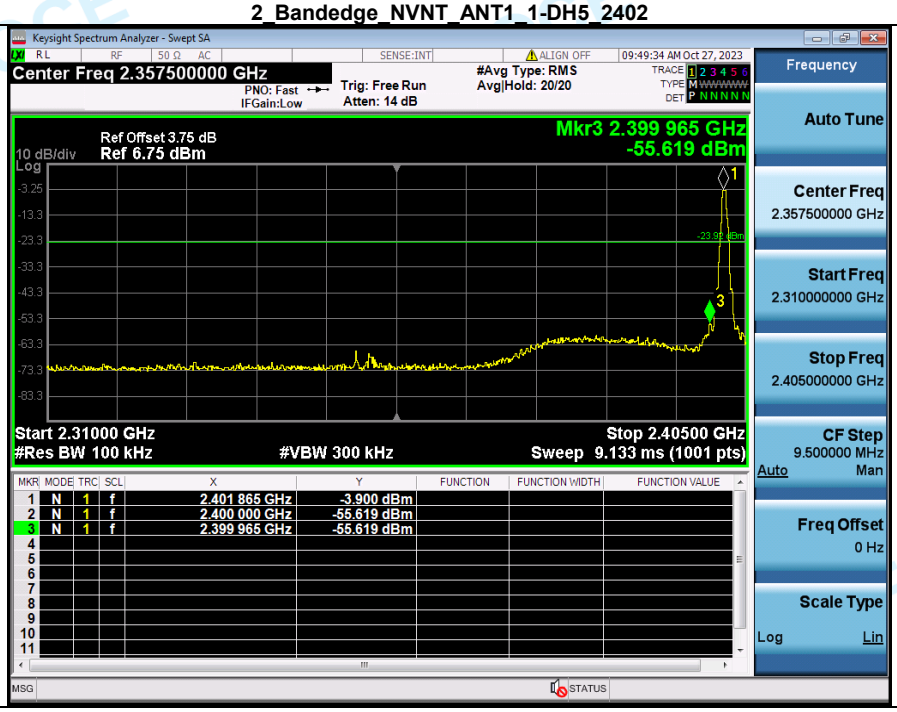
5. Bandedge

Condition	Antenna	Modulation	TX Mode	Bandedge MAX.Value	Limit	Result
NVNT	ANT1	1-DH5	2402.00	-55.619	-23.923	Pass
NVNT	ANT1	1-DH5	Hopping_LCH	-55.811	-23.562	Pass
NVNT	ANT1	1-DH5	2480.00	-59.161	-23.647	Pass
NVNT	ANT1	1-DH5	Hopping_HCH	-56.976	-23.429	Pass
NVNT	ANT1	2-DH5	2402.00	-54.133	-23.842	Pass
NVNT	ANT1	2-DH5	Hopping_LCH	-58.897	-23.642	Pass
NVNT	ANT1	2-DH5	2480.00	-58.516	-23.691	Pass
NVNT	ANT1	2-DH5	Hopping_HCH	-59.078	-23.489	Pass

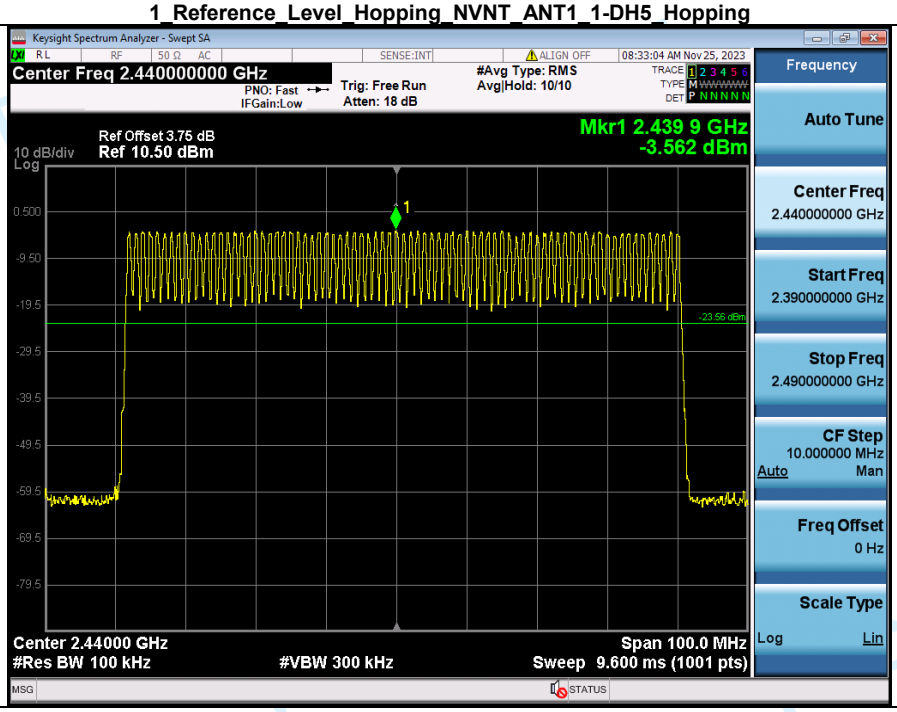
1_Reference_Level_NVNT_ANT1_1-DH5_2402



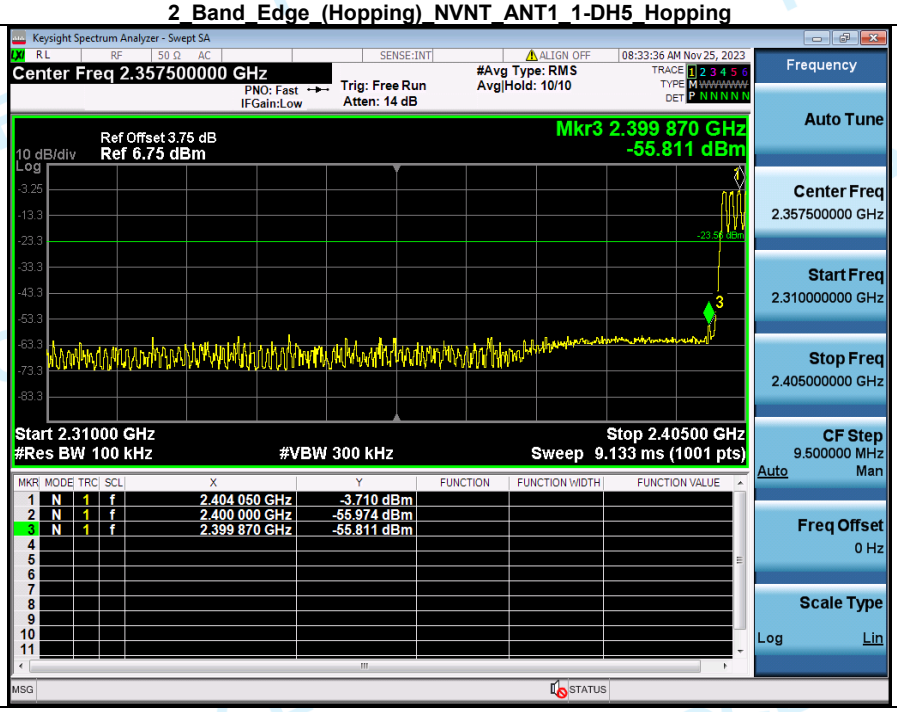
2_Bandedge_NVNT_ANT1_1-DH5_2402



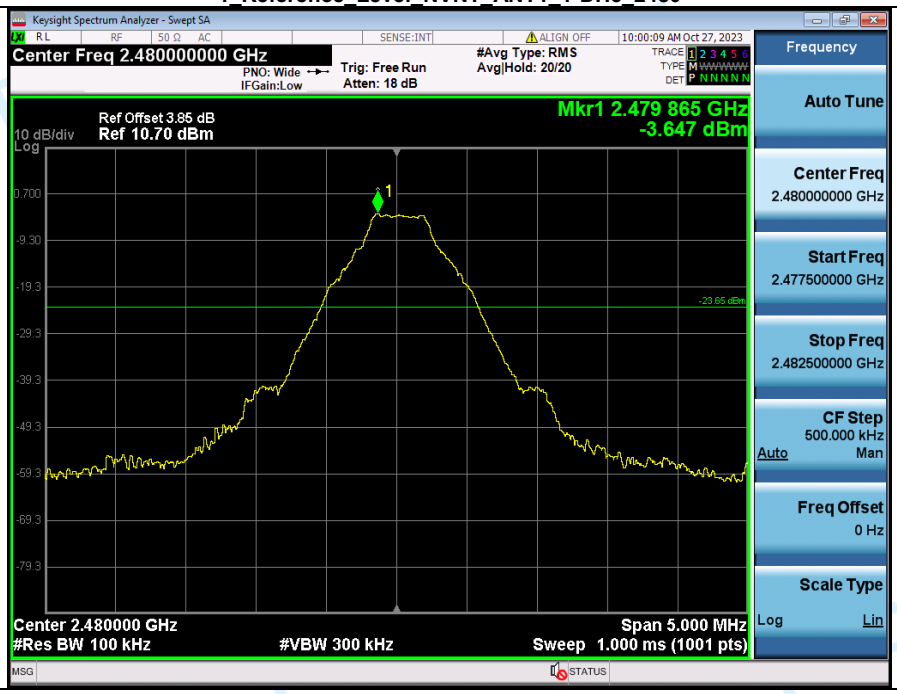
1_Reference_Level_Hopping_NVNT_ANT1_1-DH5_Hopping



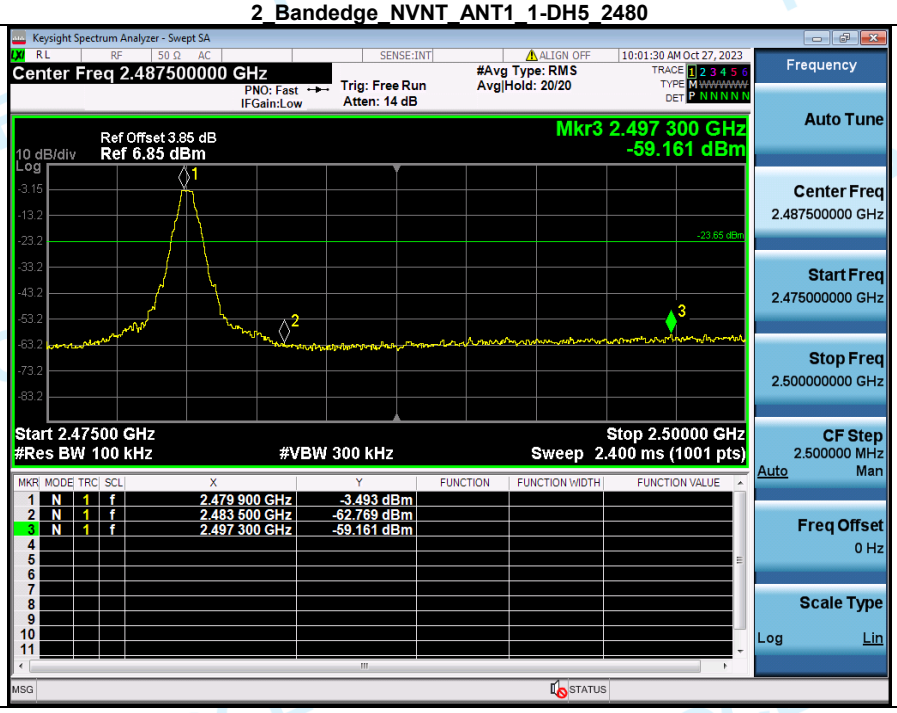
2_Band_Edge_(Hopping)_NVNT_ANT1_1-DH5_Hopping



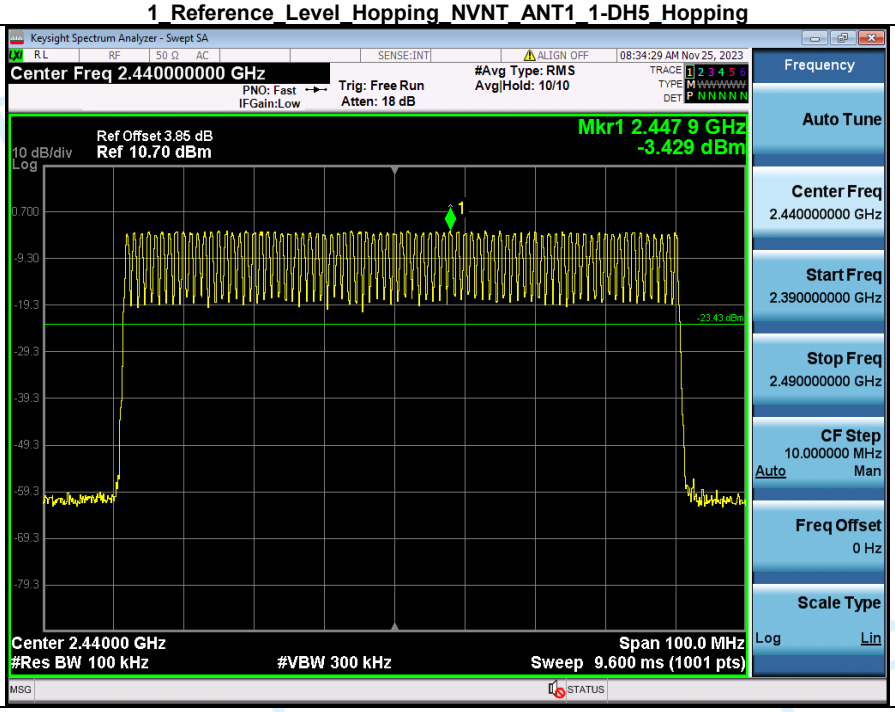
1_Reference_Level_NVNT_ANT1_1-DH5_2480



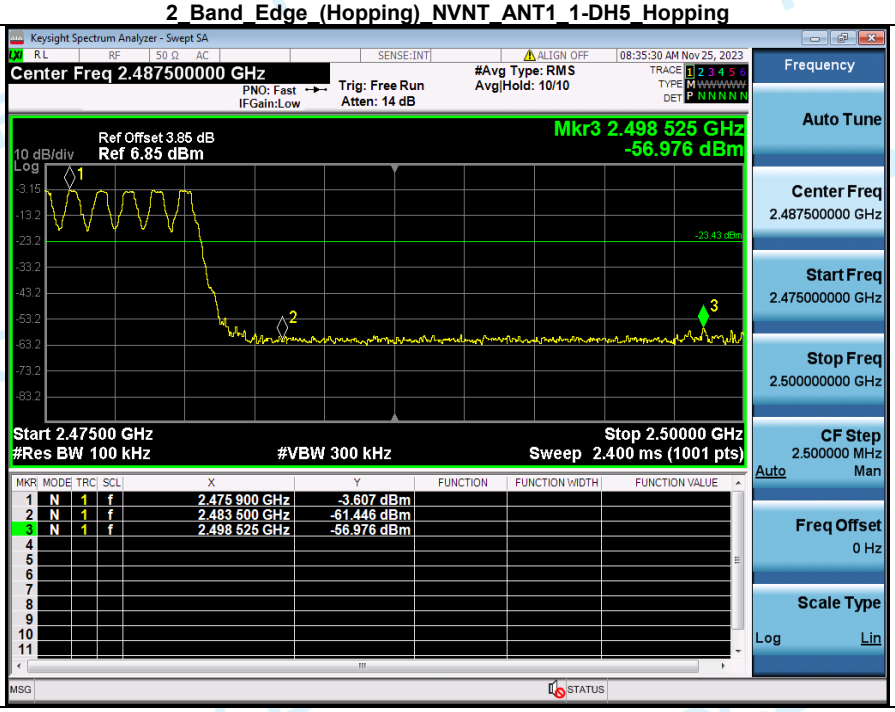
2_Bandedge_NVNT_ANT1_1-DH5_2480



1_Reference_Level_Hopping_NVNT_ANT1_1-DH5_Hopping

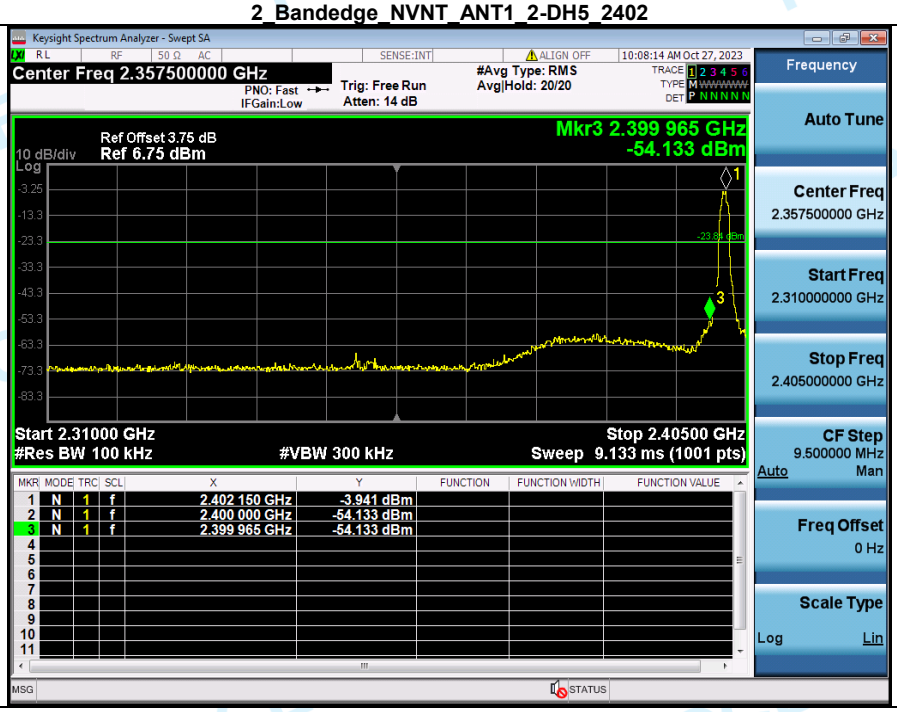


2_Band_Edge_(Hopping)_NVNT_ANT1_1-DH5_Hopping

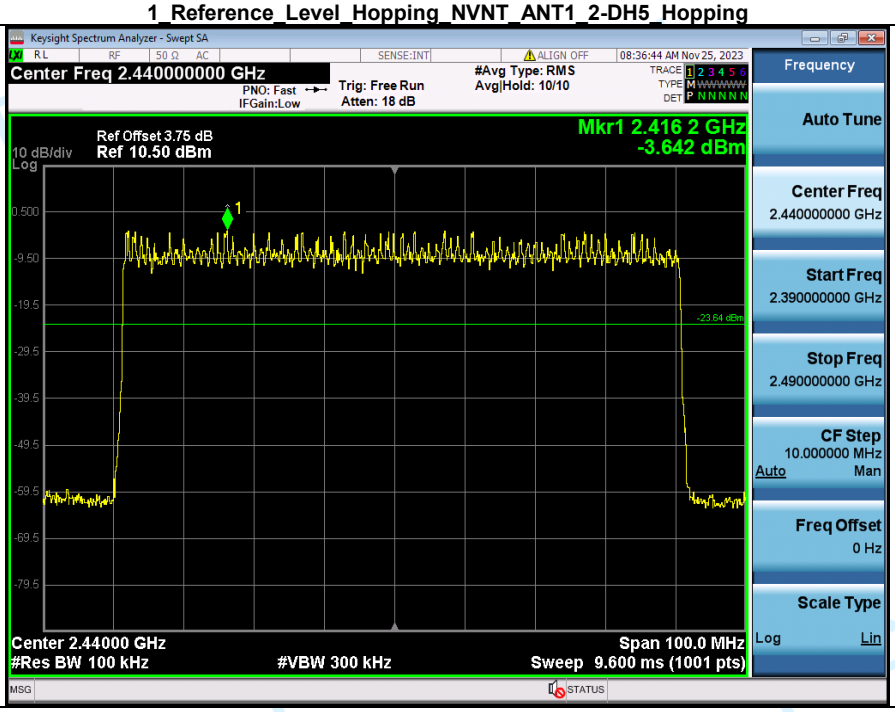


1_Reference_Level_NVNT_ANT1_2-DH5_2402

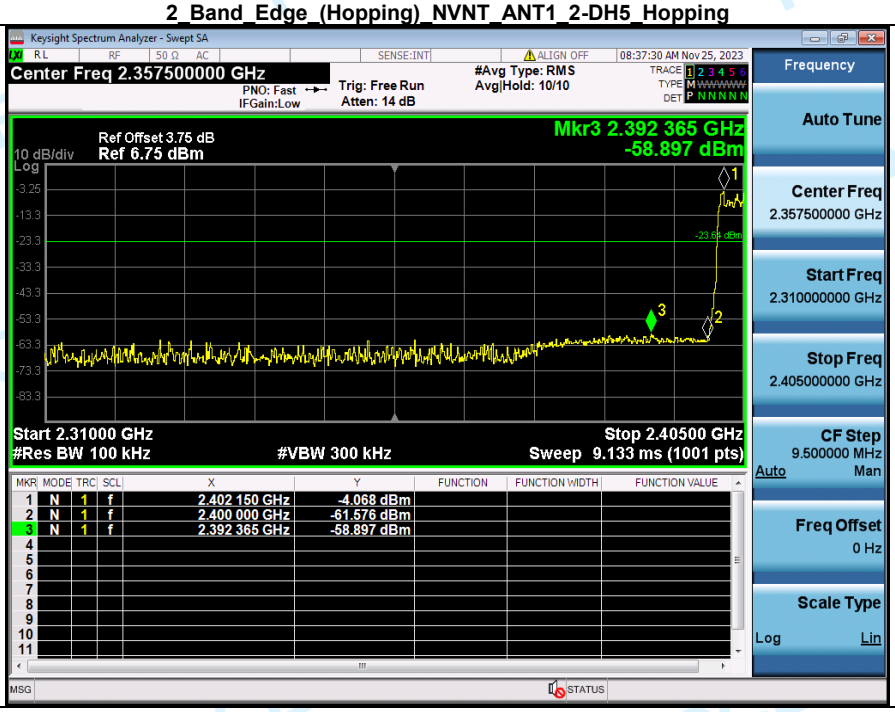
2_Bandedge_NVNT_ANT1_2-DH5_2402



1_Reference_Level_Hopping_NVNT_ANT1_2-DH5_Hopping

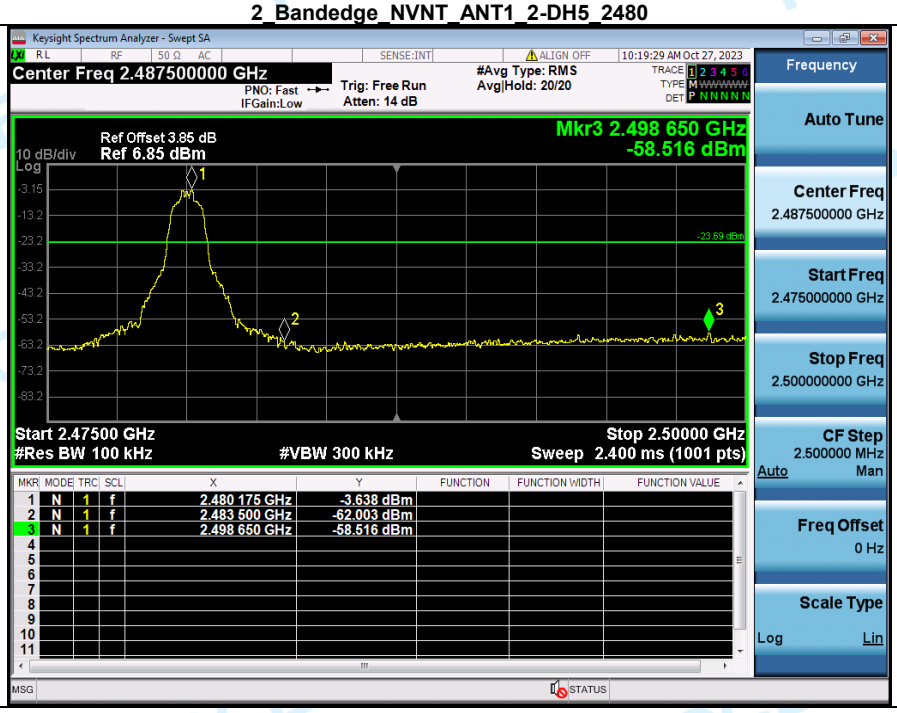


2_Band_Edge_(Hopping)_NVNT_ANT1_2-DH5_Hopping

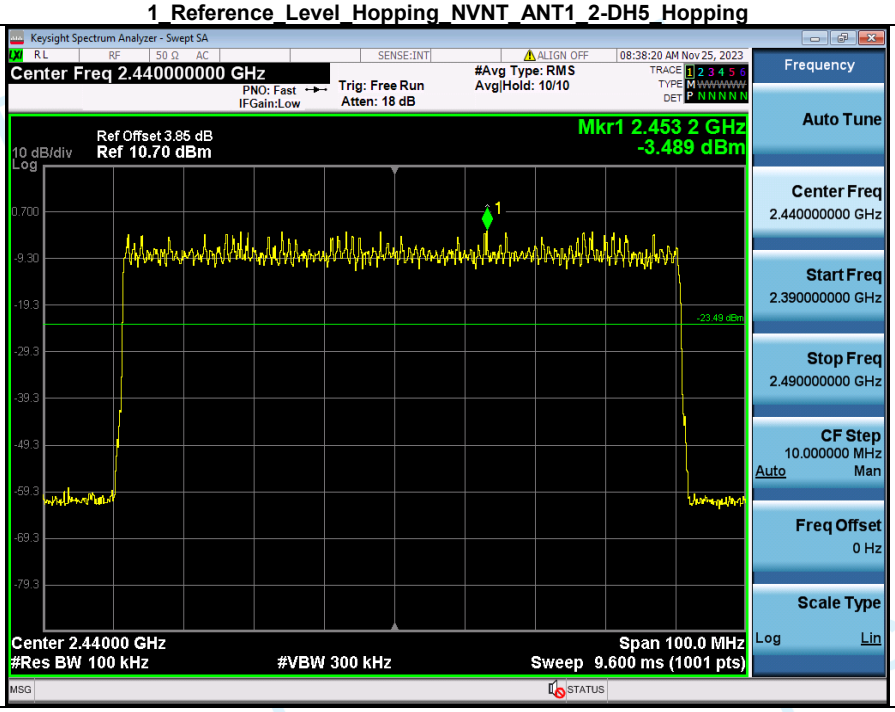


1_Reference_Level_NVNT_ANT1_2-DH5_2480

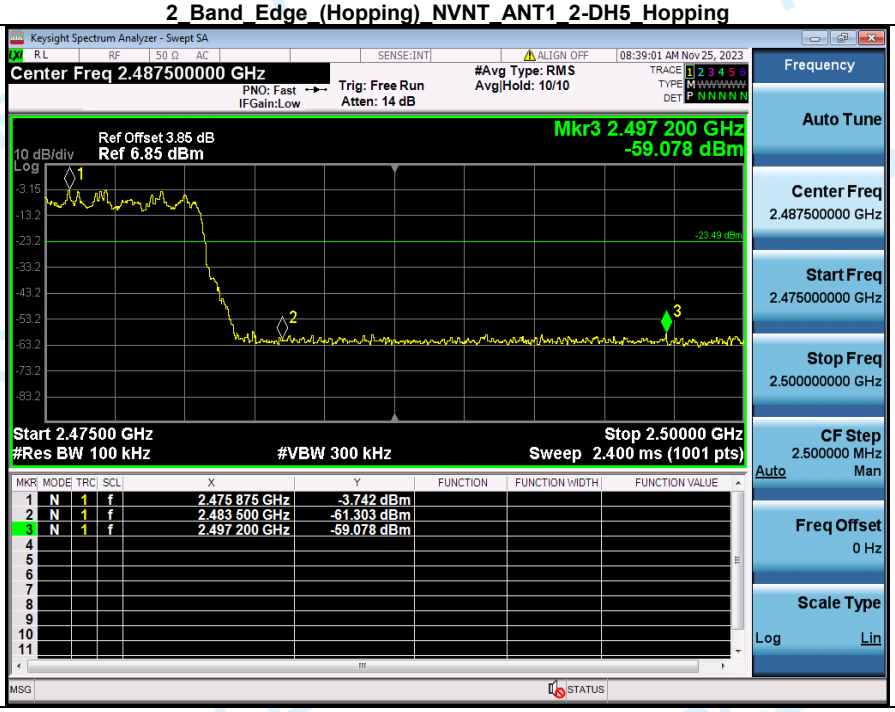
2_Bandedge_NVNT_ANT1_2-DH5_2480



1_Reference_Level_Hopping_NVNT_ANT1_2-DH5_Hopping



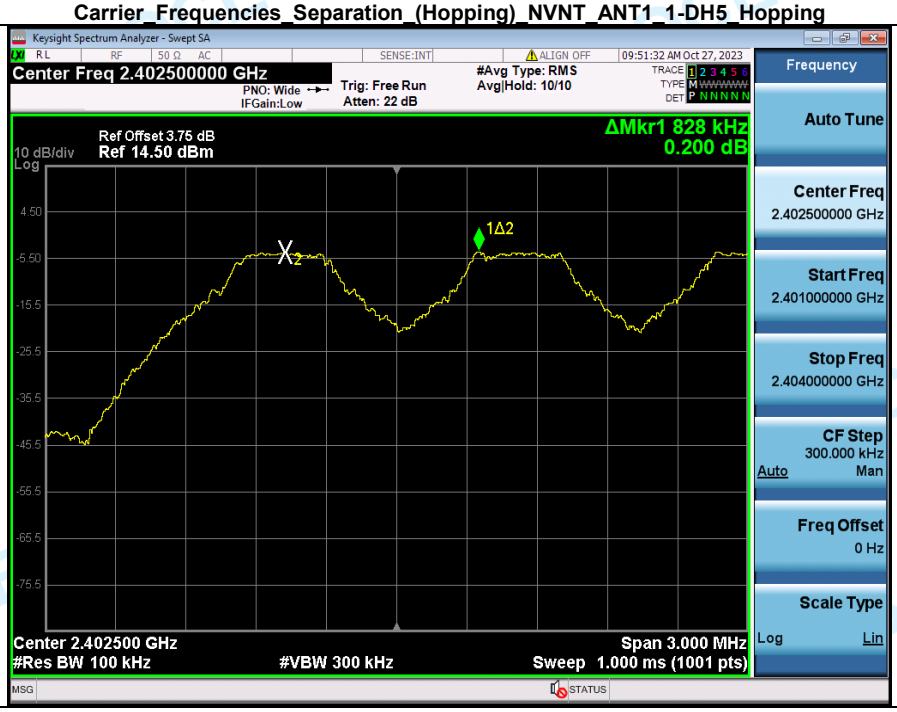
2_Band_Edge_(Hopping)_NVNT_ANT1_2-DH5_Hopping



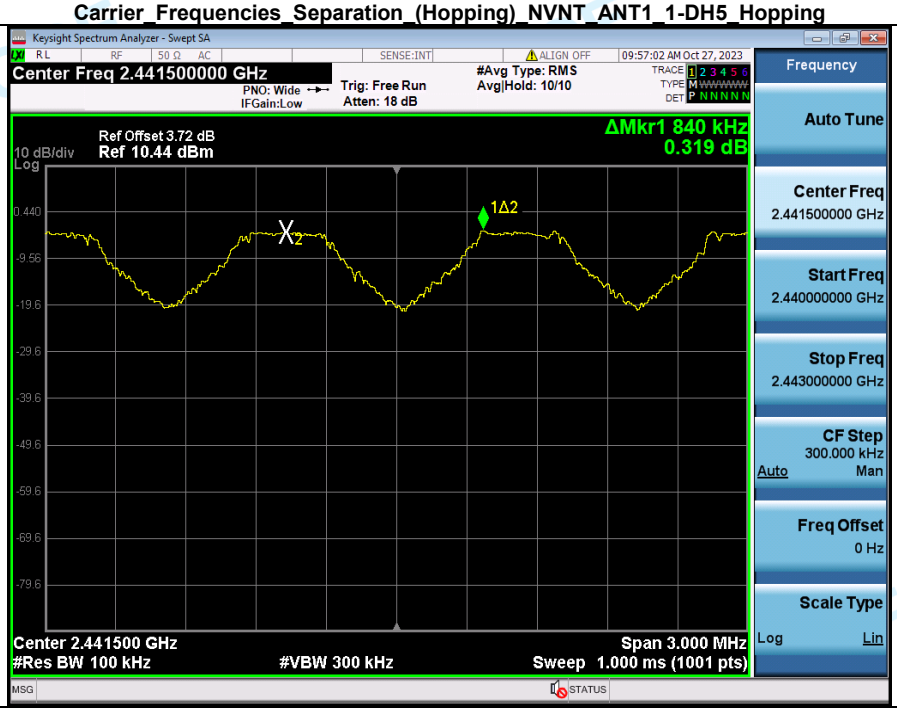
6. Carrier Frequencies Separation (Hopping)

Condition	Antenna	Modulation	Frequency(MHz)	Hopping NO.0 (MHz)	Hopping NO.1 (MHz)	Carrier Frequencies Separation(MHz)	Limit(MHz)	Result
NVNT	ANT1	1-DH5	2402.00	2402.023	2402.851	0.83	0.687	Pass
NVNT	ANT1	1-DH5	2441.00	2441.029	2441.869	0.84	0.695	Pass
NVNT	ANT1	1-DH5	2480.00	2479.023	2479.860	0.84	0.694	Pass
NVNT	ANT1	2-DH5	2402.00	2402.017	2403.193	1.18	0.879	Pass
NVNT	ANT1	2-DH5	2441.00	2440.855	2442.025	1.17	0.883	Pass
NVNT	ANT1	2-DH5	2480.00	2478.873	2480.178	1.30	0.888	Pass

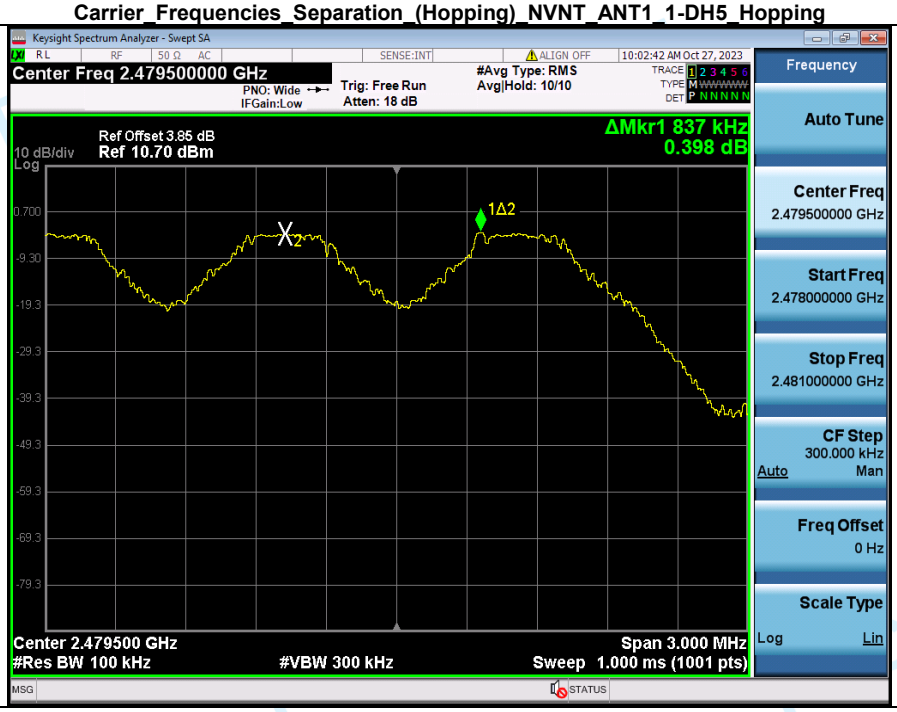
Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_1-DH5_Hopping



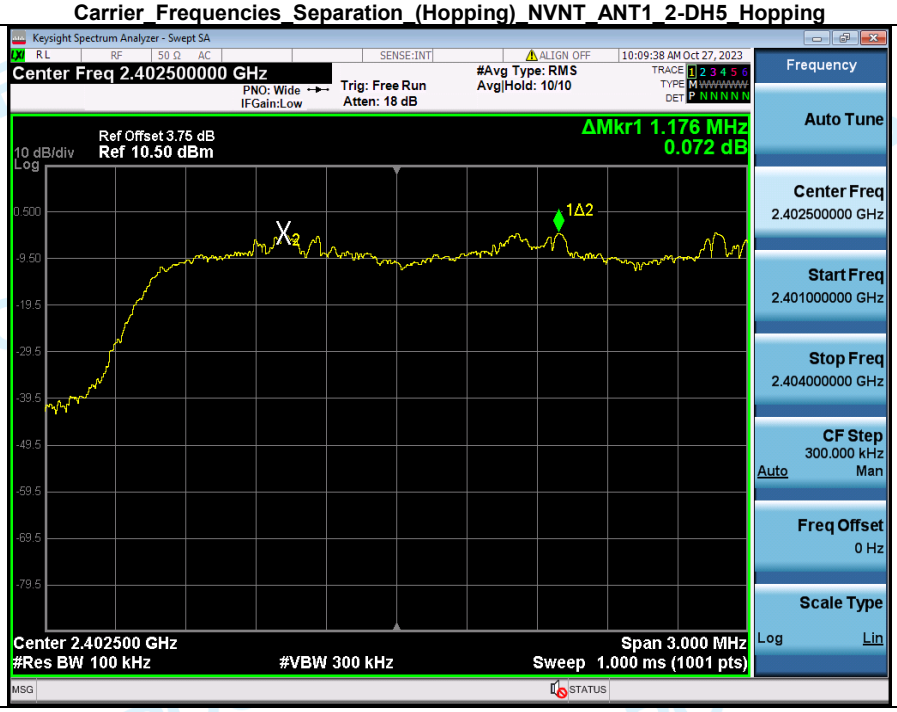
Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_1-DH5_Hopping



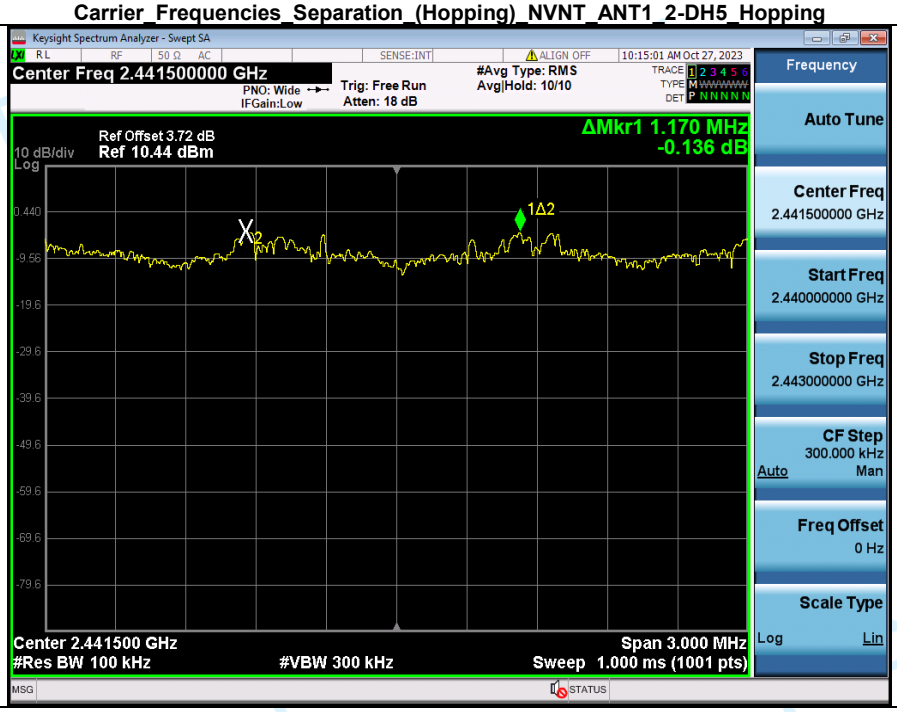
Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_1-DH5_Hopping



Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_2-DH5_Hopping



Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_2-DH5_Hopping

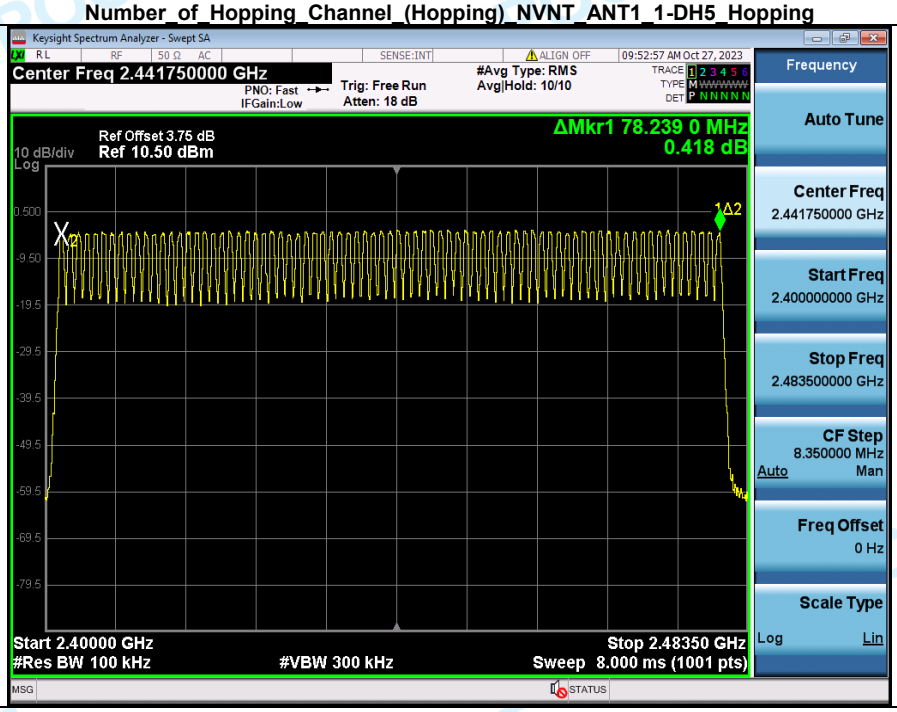


Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_2-DH5_Hopping

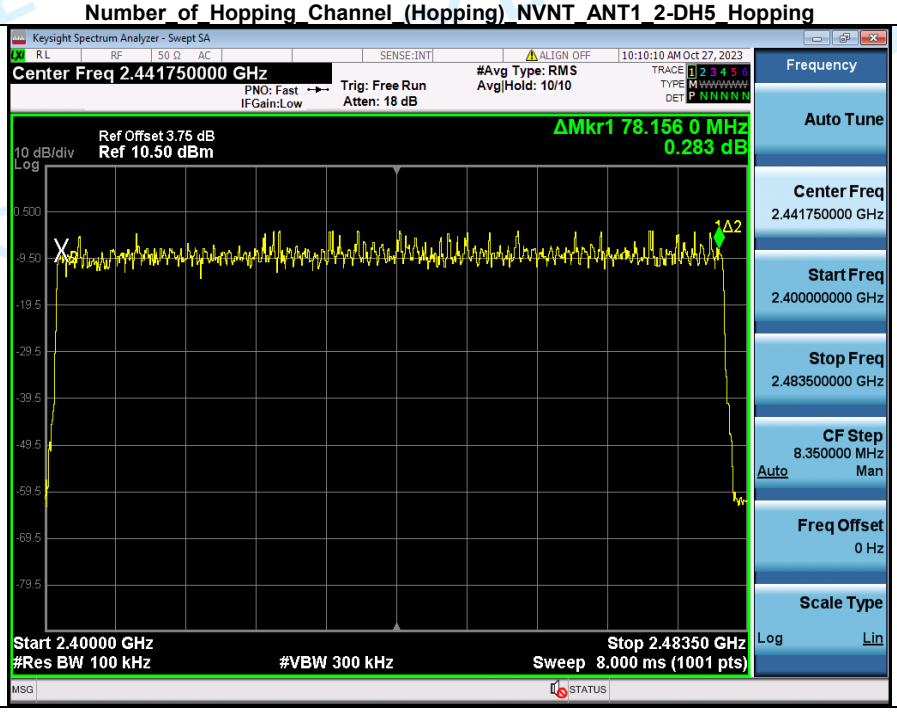
7. Number of Hopping Channel (Hopping)

Condition	Antenna	Modulation	Hopping Num	Limit	Result
NVNT	ANT1	1-DH5	79	15	Pass
NVNT	ANT1	2-DH5	79	15	Pass

Number_of_Hopping_Channel_(Hopping)_NVNT_ANT1_1-DH5_Hopping



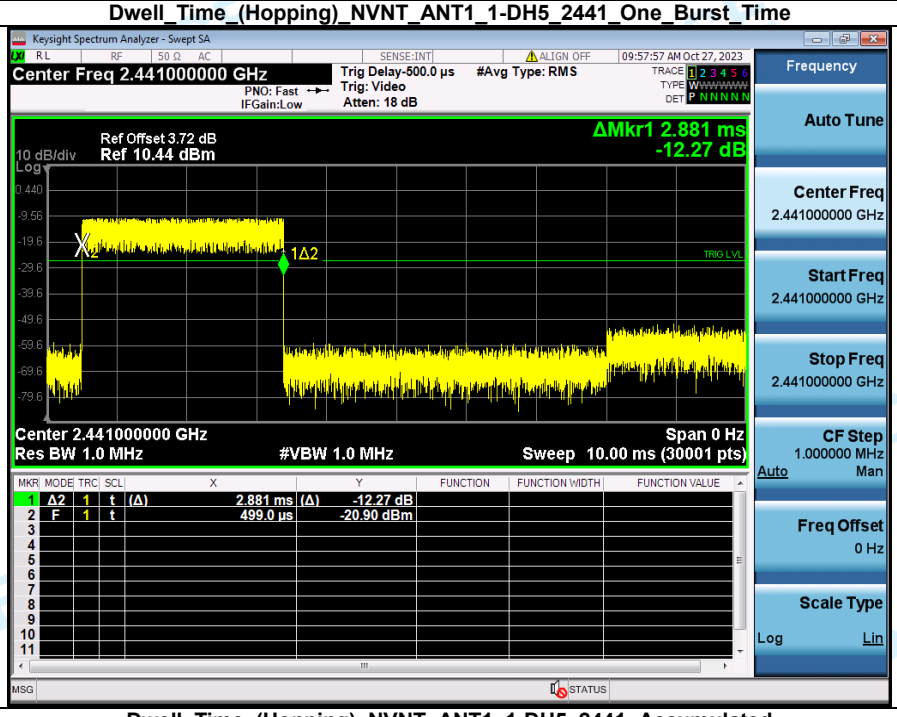
Number_of_Hopping_Channel_(Hopping)_NVNT_ANT1_2-DH5_Hopping



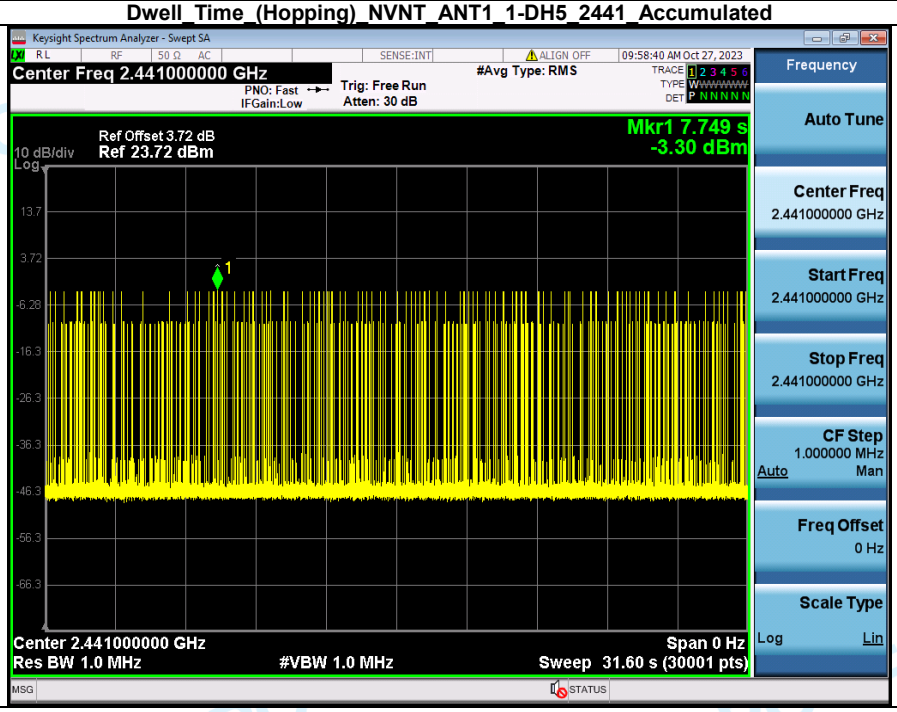
8. Dwell Time (Hopping)

Condition	Antenna	Packet Type	Pulse Time(ms)	Hops	Dwell Time(ms)	Limit(s)	Result
NVNT	ANT1	1-DH5	2.881	117.00	337.077	0.40	Pass
NVNT	ANT1	2-DH5	2.887	112.00	323.344	0.40	Pass
NVNT	ANT1	1-DH1	0.377	320.00	120.640	0.40	Pass
NVNT	ANT1	1-DH3	1.633	157.00	256.381	0.40	Pass
NVNT	ANT1	2-DH1	0.387	320.00	123.840	0.40	Pass
NVNT	ANT1	2-DH3	1.639	150.00	245.850	0.40	Pass

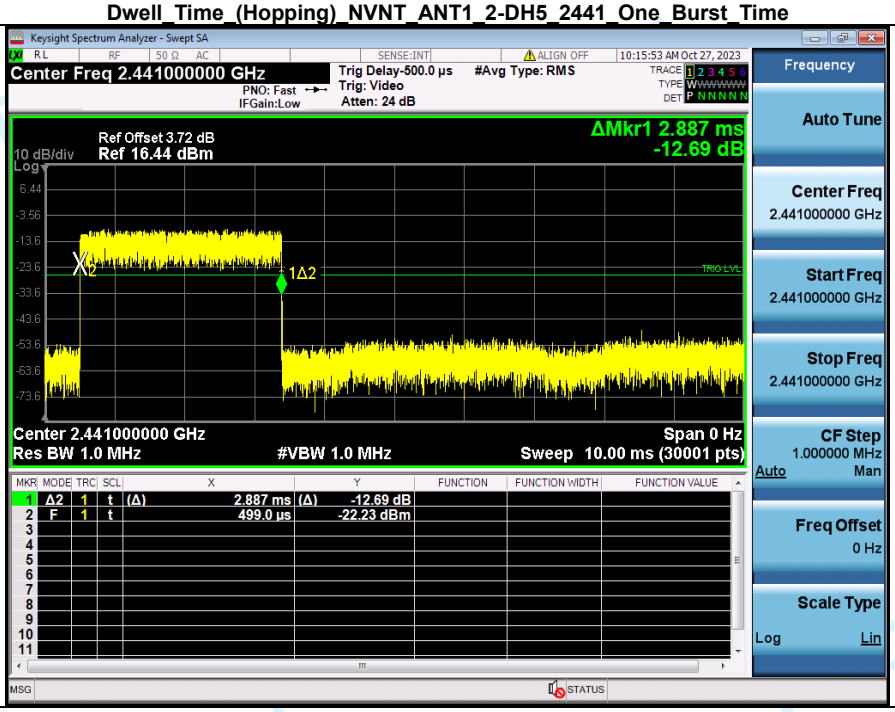
Dwell_Time_(Hopping)_NVNT_ANT1_1-DH5_2441_One_Burst_Time



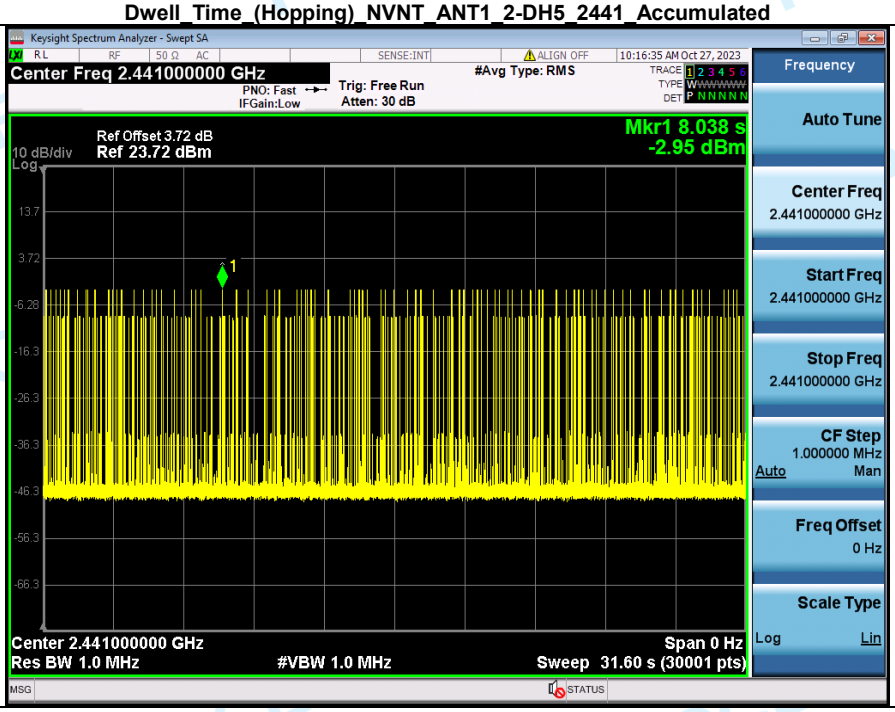
Dwell_Time_(Hopping)_NVNT_ANT1_1-DH5_2441_Accumulated



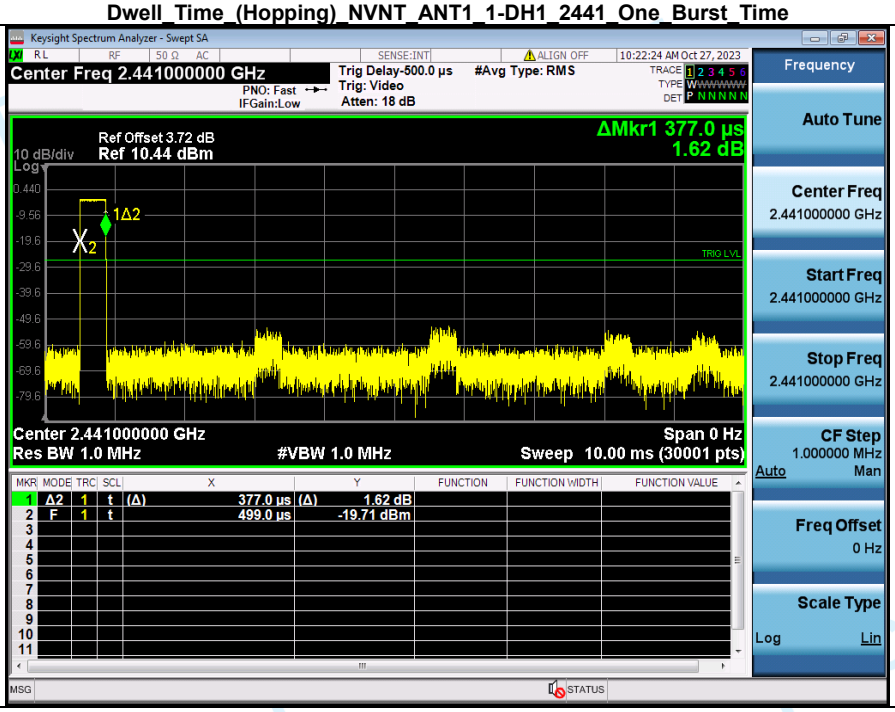
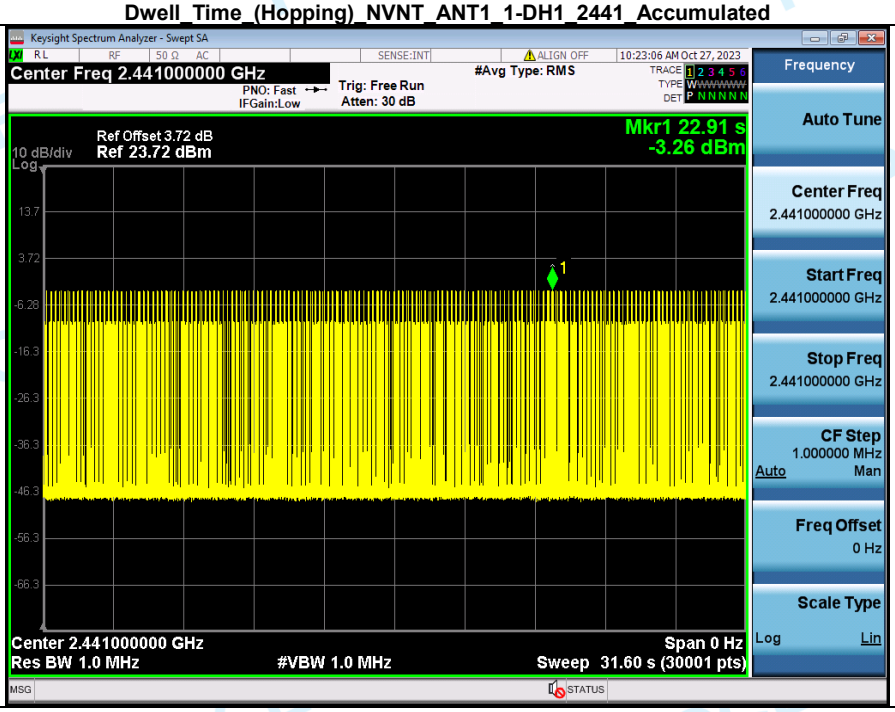
Dwell_Time_(Hopping)_NVNT_ANT1_2-DH5_2441_One_Burst_Time



Dwell_Time_(Hopping)_NVNT_ANT1_2-DH5_2441_Accumulated



Dwell_Time_(Hopping)_NVNT_ANT1_1-DH1_2441_One_Burst_Time



Dwell_Time_(Hopping)_NVNT_ANT1_1-DH1_2441_Accumulated