RF TEST REPORT

For

FIBRAIN sp. z o.o.
Product Name: GPON ONT
Model(s).: HL-4GMVR

Report Reference No.	:	**POCE230921003RL001**
FCC ID	:	**2AWIZHL4GMVR**
Applicant's Name	:	FIBRAIN sp. z o.o.
Address	:	Poland, Zaczernie 190F, 36-062
Testing Laboratory	:	Shenzhen POCE Technology Co., Ltd.
Address	:	102 Building H1 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Test Specification Standard	:	**47 CFR Part 15.247**
Date of Receipt	:	September 21, 2023
Date of Test	:	September 21, 2023 to October 8, 2023
Data of Issue	:	October 8, 2023
Result	:	**Pass**

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Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE230921003RL001	October 8, 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 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	ANSI C63.10-2013, section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	47 CFR Part 15.247	ANSI C63.10-2013, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	ANSI C63.10-2013 section 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02	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 KDB 558074 D01 15.247 Meas Guidance v05r02	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 KDB 558074 D01 15.247 Meas Guidance v05r02	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 KDB 558074 D01 15.247 Meas Guidance v05r02	47 CFR 15.247(d), 15.209, 15.205	Pass

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name : FIBRAIN sp. z o.o.
Address : Poland, Zaczernie 190F, 36-062

Manufacturer : FIBRAIN sp. z o.o.
Address : Poland, Zaczernie 190F, 36-062

2.2 Description of Device (EUT)

Product Name:	GPON ONT
Model/Type reference:	HL-4GMVR
Series Model:	N/A
Trade Mark:	HALNY
Power Supply:	DC 12V/1.5A from adapter
Power Adaptor:	Adaptor1: MODEL:GS-P120150E664 INPOU:100-240V-50/60Hz 0.6A OUTPUT:DC12V/1.5A Adaptor2: MODEL:MAUS-1201501802 INPOU:100-240V-50/60Hz 0.5A OUTPUT:DC12V/1.5A
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz; 802.11n(HT40): 2422MHz to 2452MHz
Number of Channels:	802.11b/g/n(HT20): 11 Channels; 802.11n(HT40): 7 Channels
Modulation Type:	802.11b: DSSS(CCK, DQPSK, DBPSK); 802.11g: OFDM(BPSK, QPSK, 16QAM, 64QAM); 802.11n(HT20 and HT40): OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type:	External
Antenna Gain:	Antenna1:2dBi;Antenna2:2dBi MIMO Gain:5.01dBi
Hardware Version:	V1.0
Software Version:	V1.0

Note: MIMO Gain=10*log[$(10^{G1/20}+10^{G2/20}+\ldots)^2$ /N_{ant}] , so MIMO Gain: 5.01 dBi < 6dBi
(Remark:The Antenna Gain is supplied by the customer.POCE is not responsible for this data and the related calculations associated with it)

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)
	802.11b/802.11g/802.11n(HT20)
Lowest channel	2412MHz
Middle channel	2437MHz
Highest channel	2462MHz
Test channel	802.11n(HT40)
Lowest channel	2422MHz
Middle channel	2437MHz
Highest channel	2452MHz

2.3 Description of Test Modes

No	Title	Description
TM1	802.11b mode	Keep the EUT in 802.11b transmitting mode.
TM2	802.11g mode	Keep the EUT in 802.11g transmitting mode.
TM3	802.11n(HT20) mode	Keep the EUT in 802.11n(HT20) transmitting mode.
TM4	802.11n(HT40) mode	Keep the EUT in 802.11n(HT40) transmitting mode.
Remark:Only the data of the worst mode would be recorded in this report.		

2.4 Description of Support Units

Title	Manufacturer	Model No.	Serial No.
PC	Lenovo	Air 14 Plus	

2.5 Equipments Used During The Test

Conducted Emission at AC power line					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
loop antenna	EVERFINE	LLA-2	80900L-C	2023-02-27	2024-02-26
Power absorbing clamp	SCHWARZ BECK	MESS-ELEKTRONIK	/	2023-02-28	2024-02-27
Electric Network	SCHWARZ BECK	CAT5 8158	CAT5 8158#207	/	/
Cable	SCHWARZ BECK	/	/	2022-12-27	2023-12-27
Pulse Limiter	SCHWARZ BECK	VTSD 9561-F Pulse limiter 10dB Ateennator	561-G071	2023-02-27	2024-02-26
50ΩCoaxial Switch	Anritsu	MP59B	M20531	/	/
Test Receiver	Rohde & Schwarz	ESPI TEST RECEIVER	ID:1164.6607K 03-102109-MH	2023-06-13	2024-06-12
L.I.S.N	R&S	ESH3-Z5	831.5518.52	2022-12-29	2023-12-28

Occupied Bandwidth **Maximum Conducted Output Power** **Power Spectral Density** **Emissions in non-restricted frequency bands**					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
RF Test Software	TACHOY	RTS-01	V2.0.0.0	/	/
High Pass filter	ZHINAN	OQHPF1-M1.5-18G-224	6210075	/	/
Power divider	MIDEWEST	PWD-2533	SMA-79	2023-05-11	2026-05-10
DC power	HP	66311B	38444359	/	/
RF Sensor Unit	Tachoy Information Technology(shenzhen) Co.,Ltd.	TR1029-2	000001	/	/
Wideband radio communication tester	R&S	CMW500	113410	2023-06-13	2024-06-12
Vector signal generator	Keysight	N5181A	MY48180415	2022-12-10	2023-12-09
Signal generator	Keysight	N5182A	MY50143455	2022-12-29	2023-12-28
Spectrum Analyzer	Keysight	N9020A	MY53420323	2022-12-29	2023-12-28

Band edge emissions (Radiated) Emissions in frequency bands (below 1GHz) Emissions in frequency bands (above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test software	Farad	EZ -EMC	V1.1.42	/	/
Positioning Controller	/	MF-7802	/	/	/
High Pass filter	ZHINAN	OQHPF1-M1.5-18G-224	6210075	/	/
Amplifier(18-40G)	COM-POWER	AH-1840	10100008-1	2022-04-05	2025-04-04
Horn antenna	COM-POWER	AH-1840 (18-40G)	10100008	2023-04-05	2025-04-04
Loop antenna	ZHINAN	ZN30900C	ZN30900C	2021-07-05	2024-07-04
Cable(LF)#2	Schwarzbeck	/	/	2023-02-27	2024-02-26
Cable(LF)#1	Schwarzbeck	/	/	2023-02-27	2024-02-26
Cable(HF)#2	Schwarzbeck	AK9515E	96250	2023-02-28	2024-02-27
Cable(HF)#1	Schwarzbeck	SYV-50-3-1	/	2023-02-27	2024-02-26
Power amplifier(LF)	Schwarzbeck	BBV9743	9743-151	2023-06-13	2024-06-12
Power amplifier(HF)	Schwarzbeck	BBV9718	9718-282	2023-06-13	2024-06-12
Wideband radio communication tester	R&S	CMW500	113410	2023-06-13	2024-06-12
Spectrum Analyzer	R&S	FSP30	1321.3008K40-101729-jR	2023-06-14	2024-06-13
Horn Antenna	Sunol Sciences	DRH-118	A091114	2023-05-13	2025-05-12
Broadband Antenna	Sunol Sciences	JB6 Antenna	A090414	2023-05-21	2025-05-20
Test Receiver	R&S	ESCI	102109	2023-06-13	2024-06-12

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
RF power density	±0.234%
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 Identification of Testing Laboratory

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 Number:	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) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

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

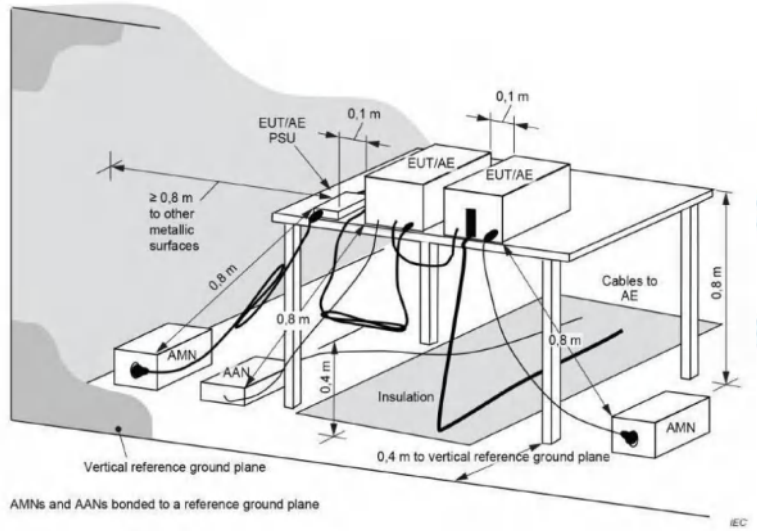
*Decreases with the logarithm of the frequency.

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:

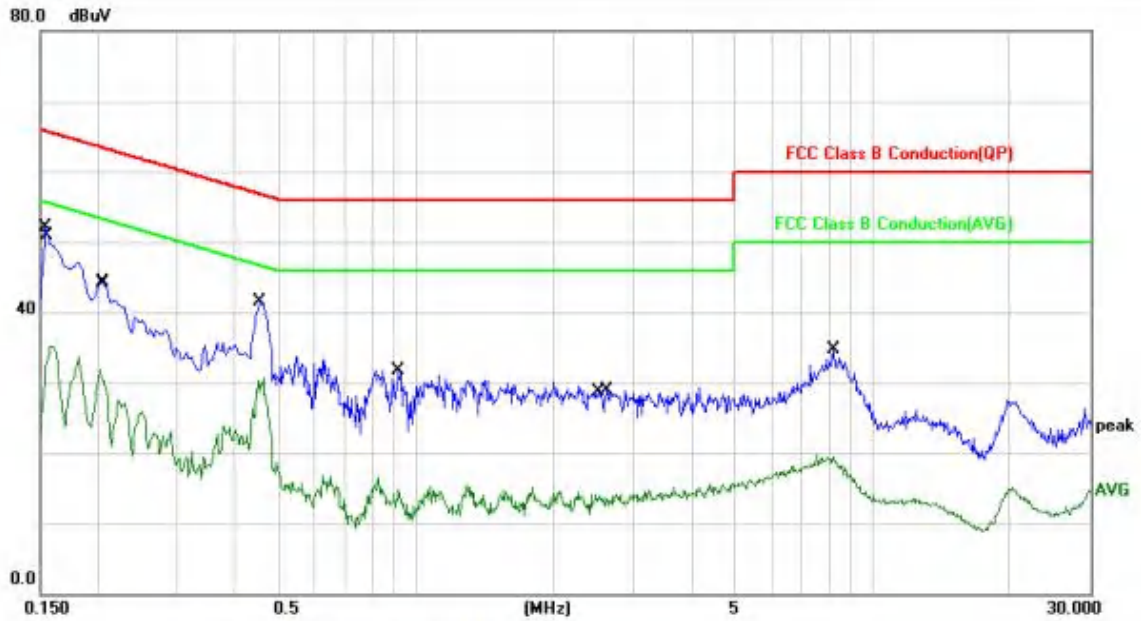
Operating Environment:					
Temperature:	23.1 °C	Humidity:	53.1 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.1.2 Test Setup Diagram:



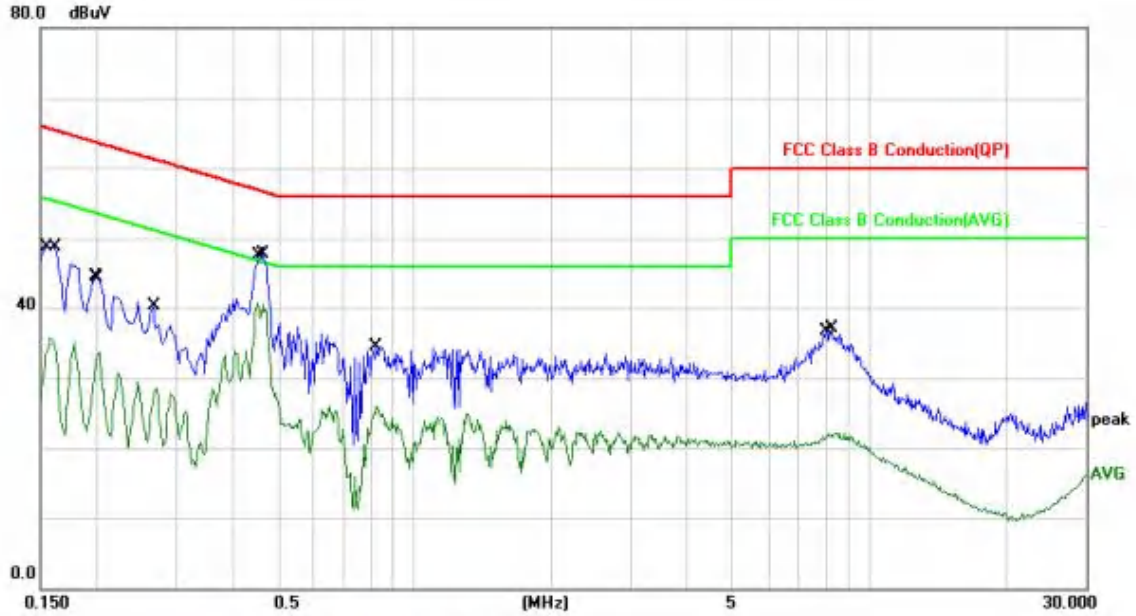
4.1.3 Test Data:

TM1 / Line: Line / Band: 2400-2483.5 MHz / BW: 20 / CH: L
Power:AC120V60Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1539	42.13	10.05	52.18	65.78	-13.60	QP	
2		0.1580	25.15	10.03	35.18	55.56	-20.38	AVG	
3		0.2020	21.82	10.04	31.86	53.52	-21.66	AVG	
4		0.2060	34.16	10.04	44.20	63.36	-19.16	QP	
5		0.4540	31.48	9.99	41.47	56.80	-15.33	QP	
6		0.4620	20.76	9.99	30.75	46.66	-15.91	AVG	
7		0.9140	21.73	9.92	31.65	56.00	-24.35	QP	
8		0.9140	5.06	9.92	14.98	46.00	-31.02	AVG	
9		2.4780	4.05	10.00	14.05	46.00	-31.95	AVG	
10		2.6180	18.85	10.01	28.86	56.00	-27.14	QP	
11		8.2140	24.39	10.31	34.70	60.00	-25.30	QP	
12		8.2140	9.15	10.31	19.46	50.00	-30.54	AVG	

TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 20 / CH: L
Power:AC120V60Hz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1580	25.70	10.03	35.73	55.56	-19.83	AVG	
2		0.1620	38.75	10.03	48.78	65.36	-16.58	QP	
3		0.1986	34.34	10.03	44.37	63.66	-19.29	QP	
4		0.2020	23.76	10.04	33.80	53.52	-19.72	AVG	
5		0.2672	28.77	10.02	38.79	61.20	-22.41	QP	
6		0.2700	18.55	10.02	28.57	51.12	-22.55	AVG	
7	*	0.4500	30.65	9.99	40.64	46.87	-6.23	AVG	
8		0.4620	37.76	9.99	47.75	56.66	-8.91	QP	
9		0.8260	24.31	10.17	34.48	56.00	-21.52	QP	
10		0.8260	15.77	10.17	25.94	46.00	-20.06	AVG	
11		8.0460	26.37	10.31	36.68	60.00	-23.32	QP	
12		8.1780	11.88	10.31	22.19	50.00	-27.81	AVG	

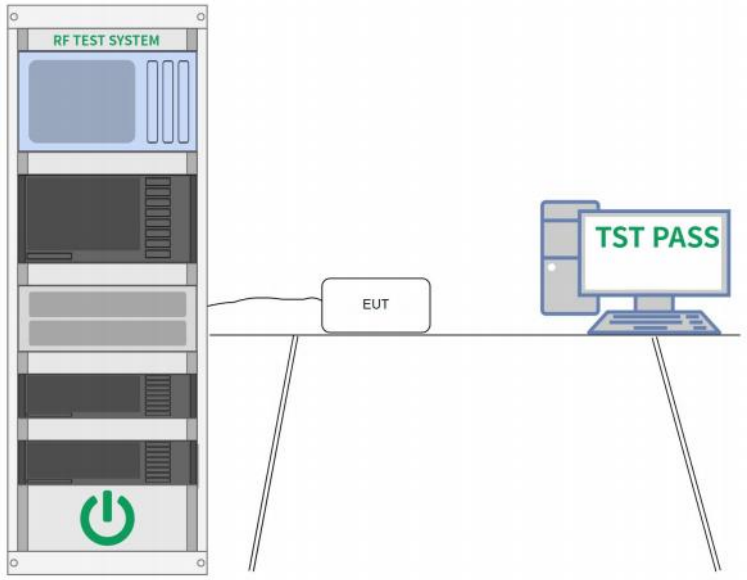
4.2 Occupied Bandwidth

Test Requirement:	47 CFR 15.247(a)(2)
Test Limit:	Refer to 47 CFR 15.247(a)(2), Systems using digital modulation techniques may operate in the 902-928 MHz, and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
Test Method:	ANSI C63.10-2013, section 11.8 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	a) Set RBW = 100 kHz. b) Set the VBW >= [3 × RBW]. c) Detector = peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.1 °C	Humidity:	53.1 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

4.2.2 Test Setup Diagram:



4.2.3 Test Data:

Please Refer to Appendix for Details.

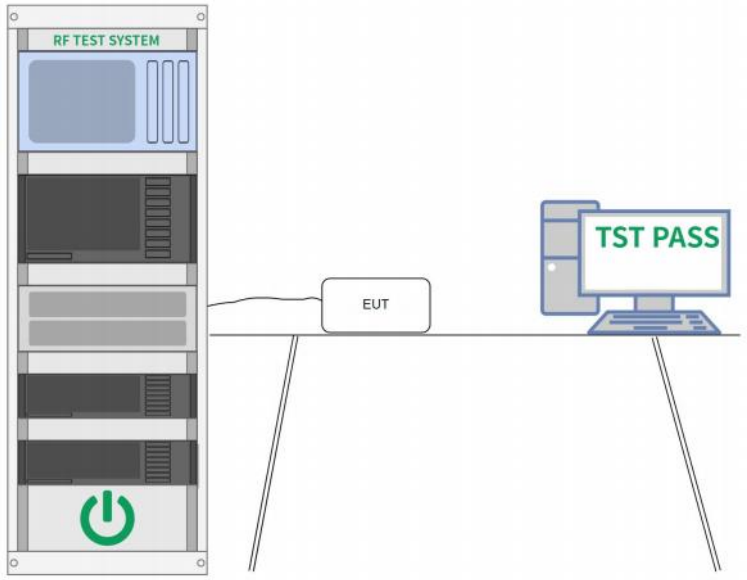
4.3 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(3)
Test Limit:	Refer to 47 CFR 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Test Method:	ANSI C63.10-2013, section 11.9.1 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power

4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.1 °C	Humidity:	53.1 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

4.3.2 Test Setup Diagram:



4.3.3 Test Data:

Please Refer to Appendix for Details.

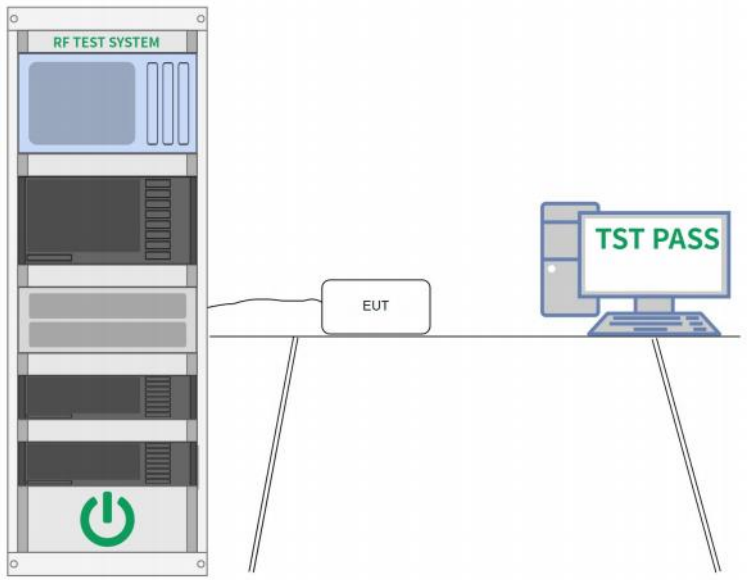
4.4 Power Spectral Density

Test Requirement:	47 CFR 15.247(e)
Test Limit:	Refer to 47 CFR 15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
Test Method:	ANSI C63.10-2013, section 11.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013, section 11.10, Maximum power spectral density level in the fundamental emission

4.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.1 °C	Humidity:	53.1 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

4.4.2 Test Setup Diagram:



4.4.3 Test Data:

Please Refer to Appendix for Details.

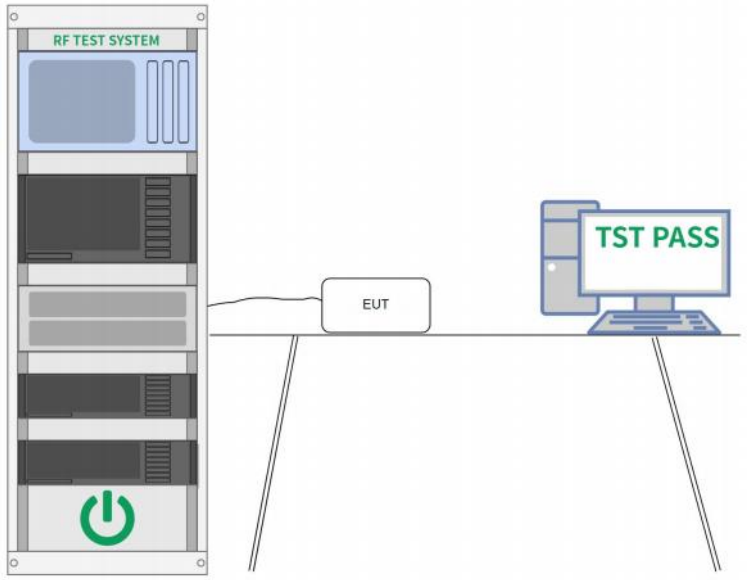
4.5 Emissions in non-restricted frequency bands

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 11.11 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 Section 11.11.1, Section 11.11.2, Section 11.11.3

4.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.1 °C	Humidity:	53.1 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

4.5.2 Test Setup Diagram:



4.5.3 Test Data:

Please Refer to Appendix for Details.

4.6 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

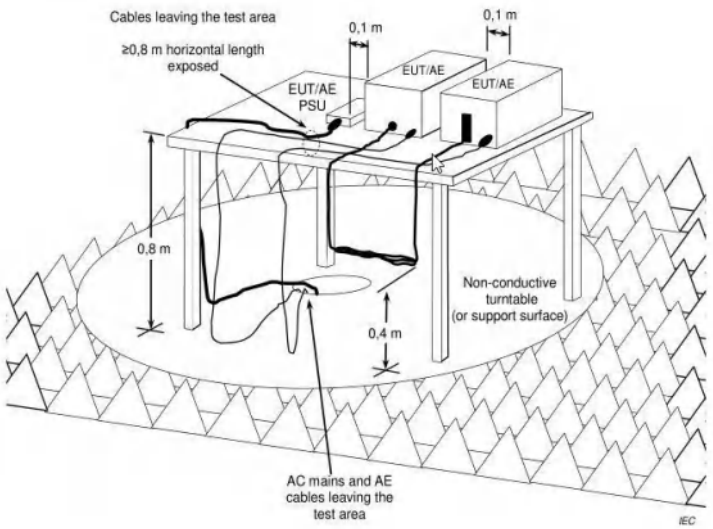
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

Test Method:	ANSI C63.10-2013 section 6.10 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	ANSI C63.10-2013 section 6.10.5.2

4.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.1 °C	Humidity:	53.1 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM1, TM2, TM3, TM4				

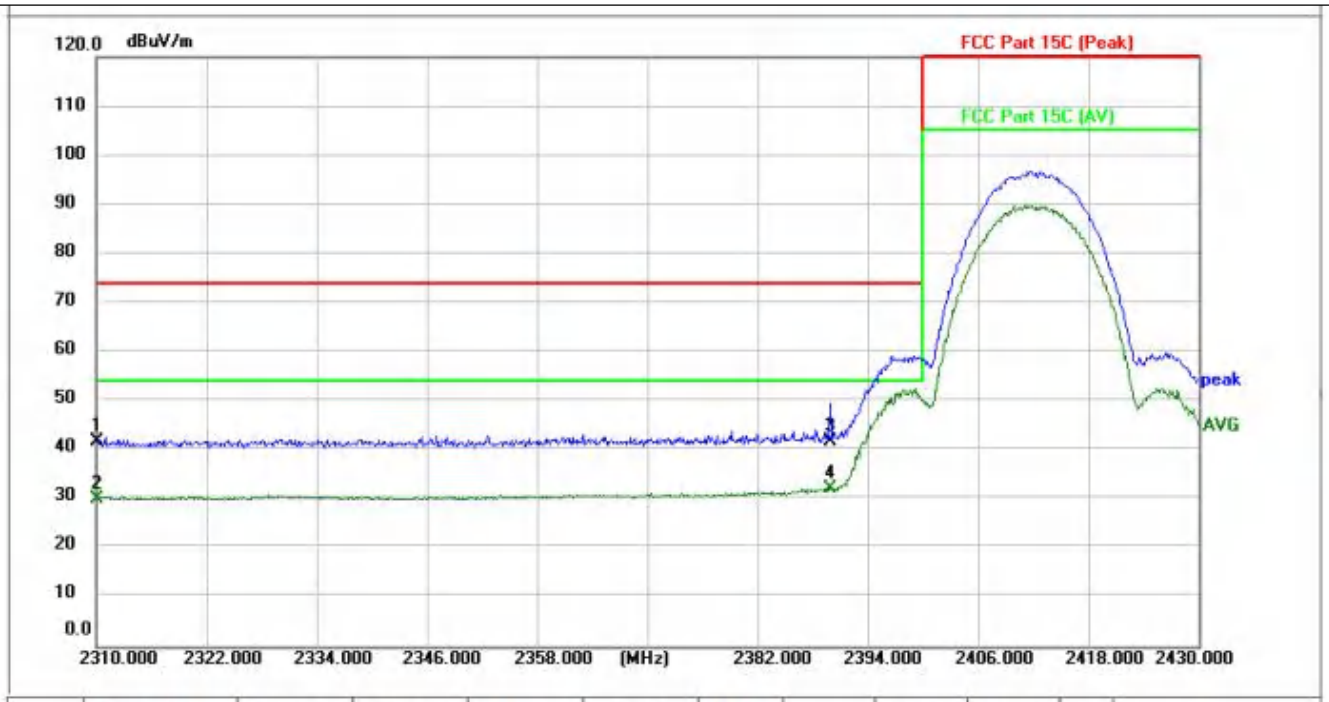
4.6.2 Test Setup Diagram:



4.6.3 Test Data:

ANT1

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L

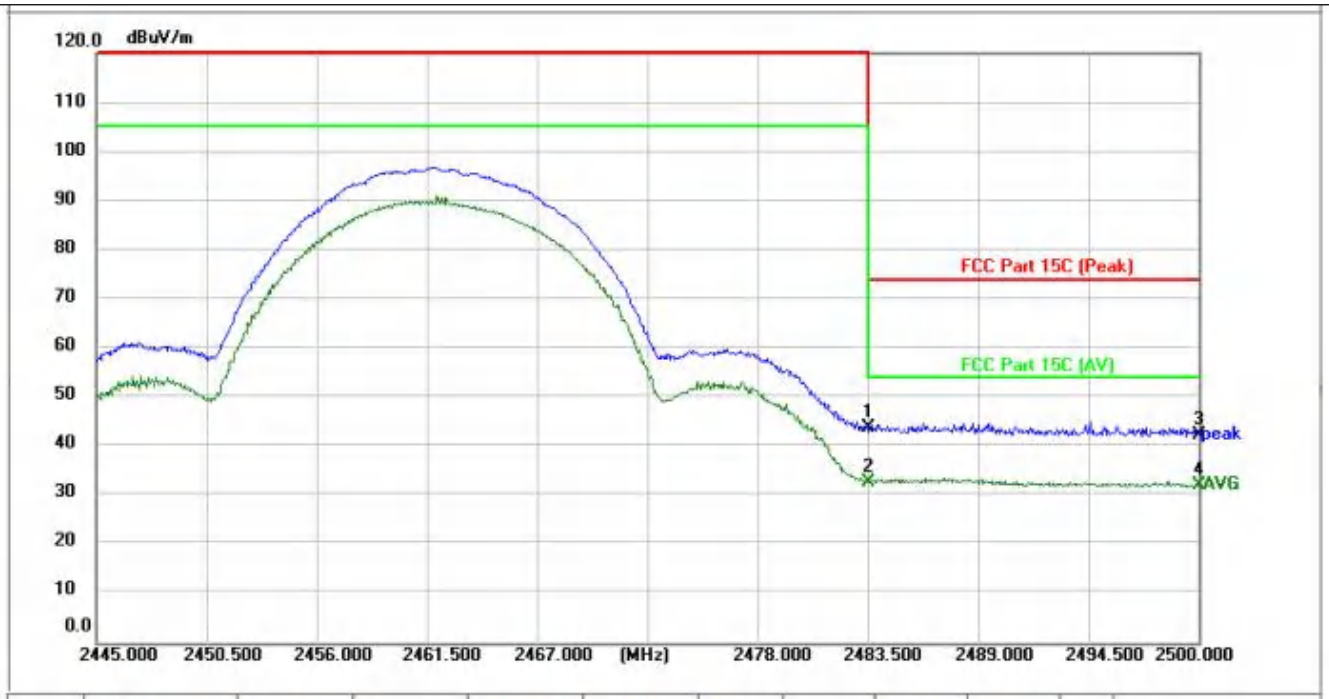


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	45.67	-3.93	41.74	74.00	-32.26	peak	150		P	
2	2310.000	34.22	-3.93	30.29	54.00	-23.71	AVG	150		P	
3	2390.000	45.67	-3.72	41.95	74.00	-32.05	peak	150		P	
4 *	2390.000	35.99	-3.72	32.27	54.00	-21.73	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L

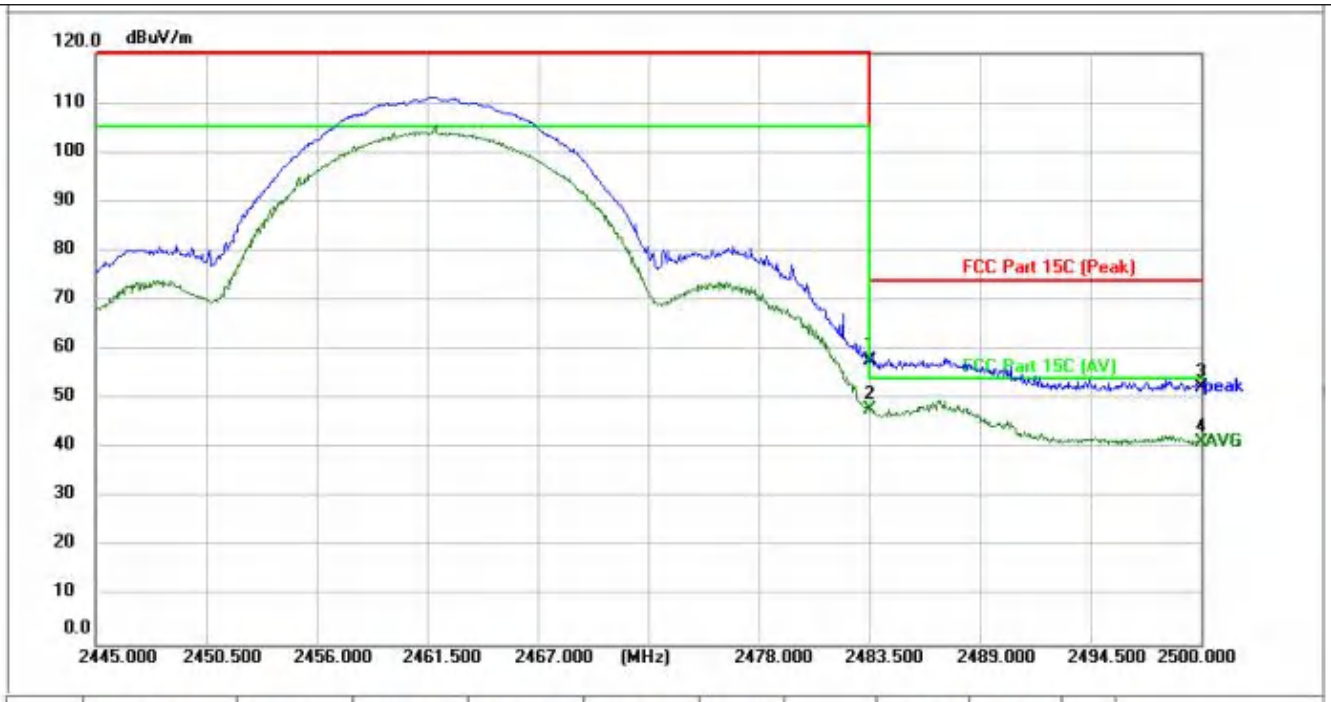
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	47.34	-5.23	42.11	74.00	-31.89	peak	150		P	
2	2310.000	37.15	-5.23	31.92	54.00	-22.08	AVG	150		P	
3	2390.000	62.07	-4.91	57.16	74.00	-16.84	peak	150		P	
4 *	2390.000	53.10	-4.91	48.19	54.00	-5.81	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H



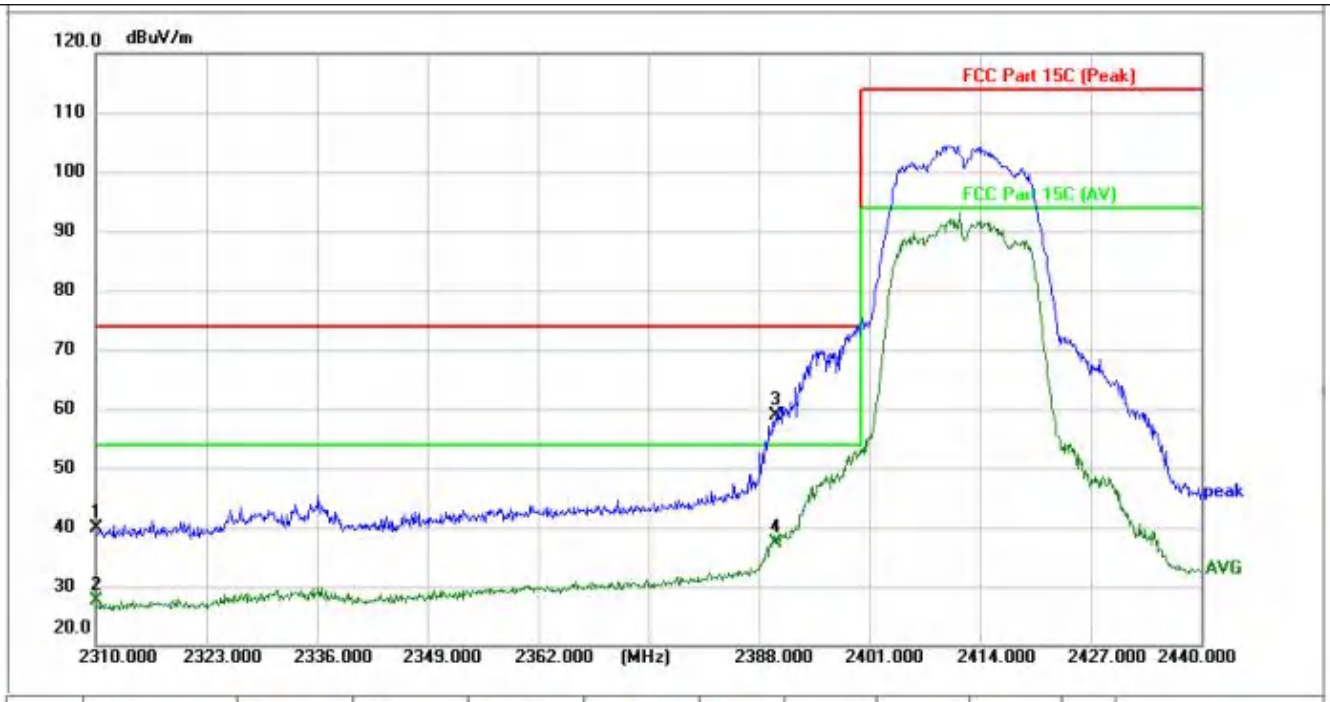
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	47.30	-3.47	43.83	74.00	-30.17	peak	150		P	
2 *	2483.500	36.45	-3.47	32.98	54.00	-21.02	AVG	150		P	
3	2500.000	45.90	-3.43	42.47	74.00	-31.53	peak	150		P	
4	2500.000	35.78	-3.43	32.35	54.00	-21.65	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H



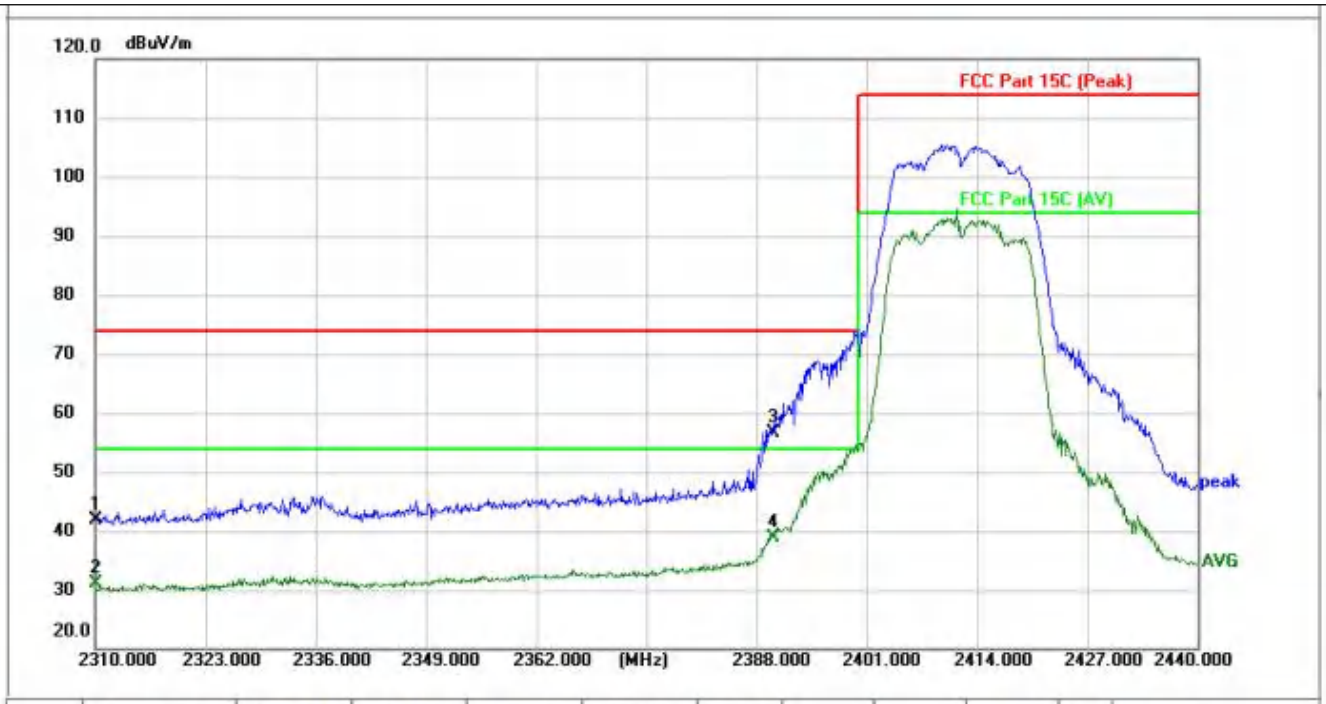
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	62.28	-4.54	57.74	74.00	-16.26	peak	150		P	
2 *	2483.500	52.25	-4.54	47.71	54.00	-6.29	AVG	150		P	
3	2500.000	56.88	-4.48	52.40	74.00	-21.60	peak	150		P	
4	2500.000	45.88	-4.48	41.40	54.00	-12.60	AVG	150		P	

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L



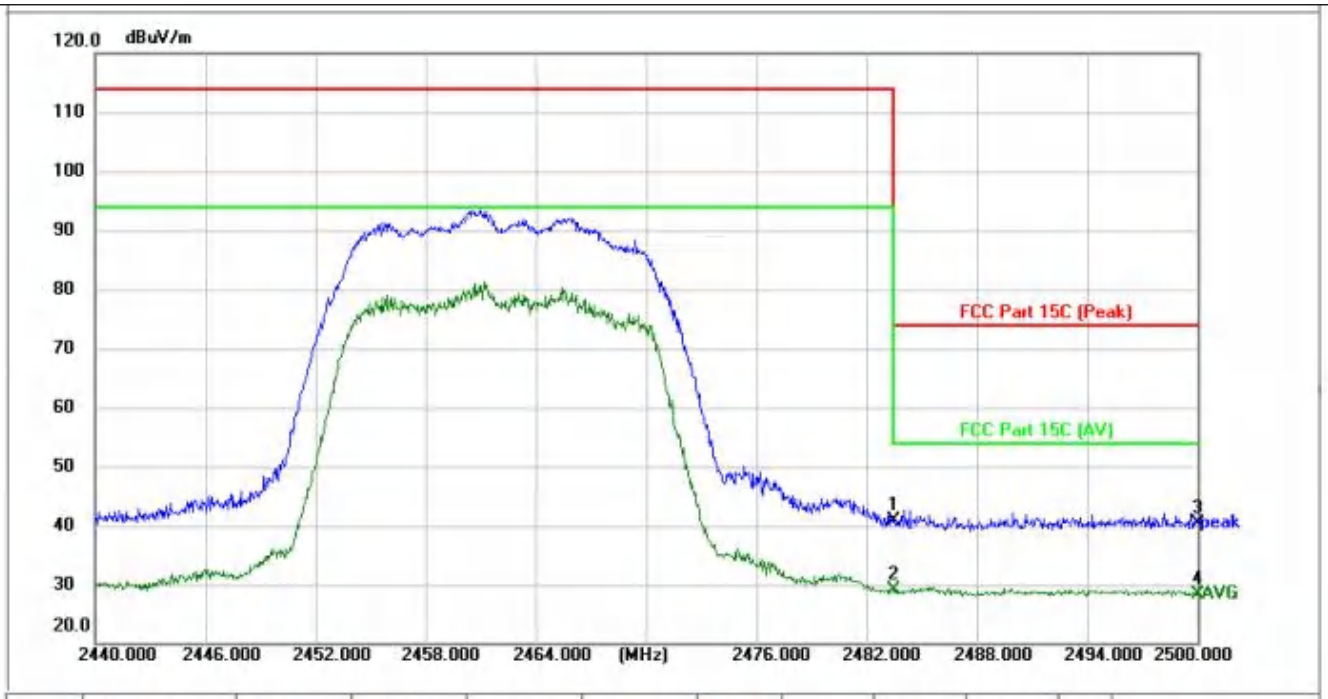
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	47.99	-8.23	39.76	74.00	-34.24	peak	100	0	P	
2	2310.000	35.81	-8.23	27.58	54.00	-26.42	AVG	100	0	P	
3 *	2390.000	66.79	-7.91	58.88	74.00	-15.12	peak	100	0	P	
4	2390.000	45.31	-7.91	37.40	54.00	-16.60	AVG	100	0	P	

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L



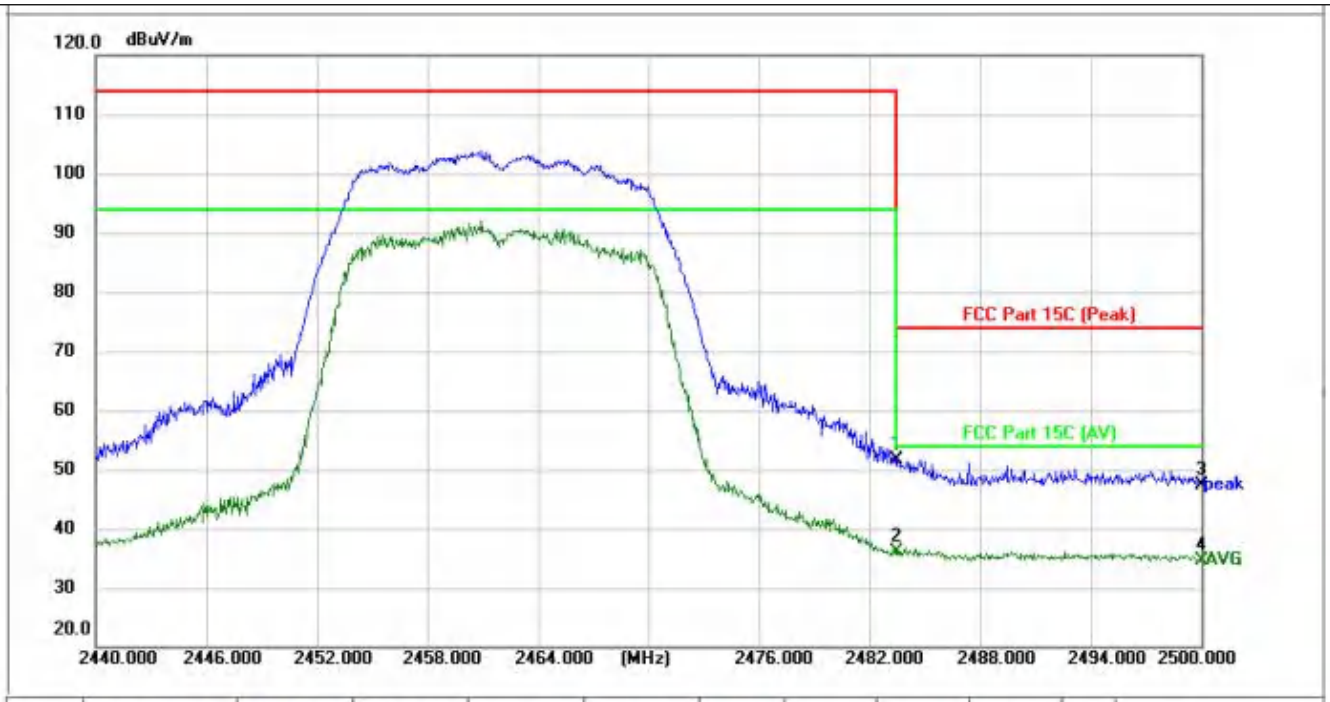
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	50.10	-8.23	41.87	74.00	-32.13	peak	100	0	P	
2	2310.000	39.39	-8.23	31.16	54.00	-22.84	AVG	100	0	P	
3	2390.000	64.49	-7.91	56.58	74.00	-17.42	peak	100	0	P	
4 *	2390.000	46.79	-7.91	38.88	54.00	-15.12	AVG	100	0	P	

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / 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	47.26	-6.47	40.79	74.00	-33.21	peak	100	0	P	
2 *	2483.500	35.50	-6.47	29.03	54.00	-24.97	AVG	100	0	P	
3	2500.000	46.74	-6.43	40.31	74.00	-33.69	peak	100	0	P	
4	2500.000	34.90	-6.43	28.47	54.00	-25.53	AVG	100	0	P	

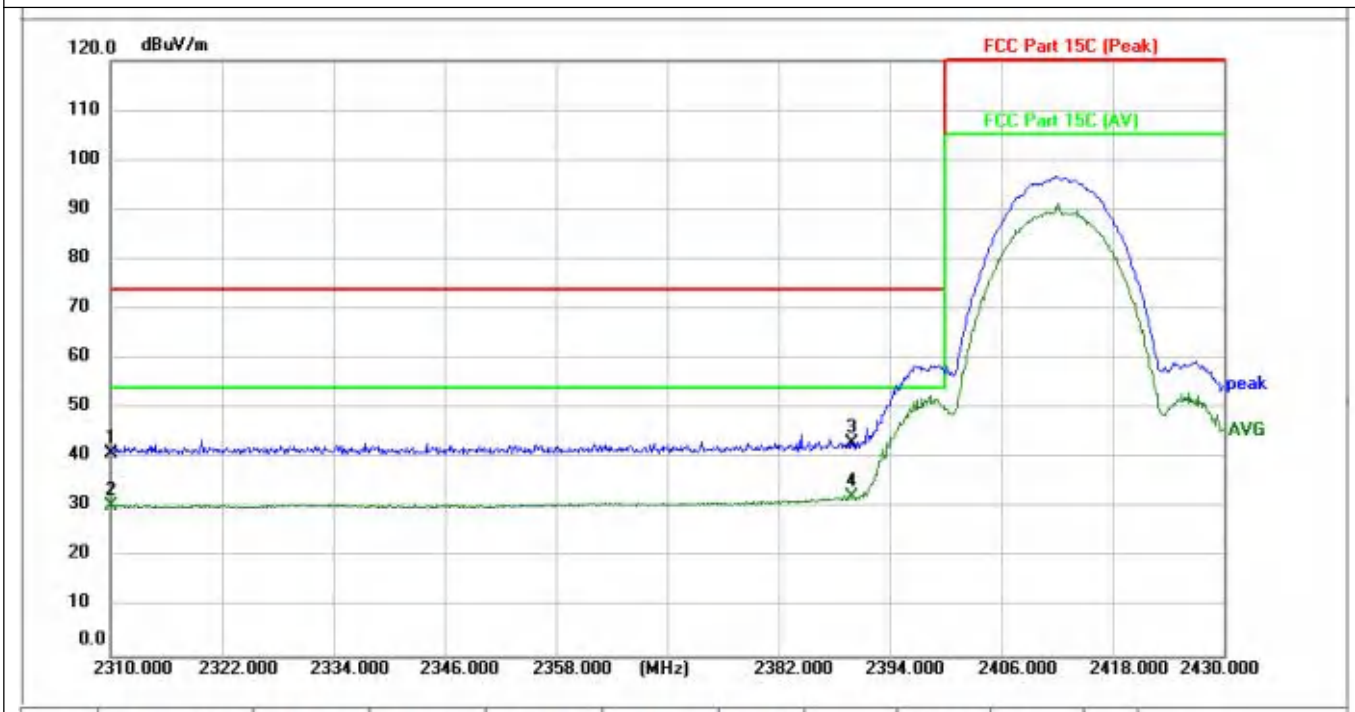
TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H



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	59.08	-7.54	51.54	74.00	-22.46	peak	100	0	P	
2 *	2483.500	43.72	-7.54	36.18	54.00	-17.82	AVG	100	0	P	
3	2500.000	54.84	-7.48	47.36	74.00	-26.64	peak	100	0	P	
4	2500.000	42.21	-7.48	34.73	54.00	-19.27	AVG	100	0	P	

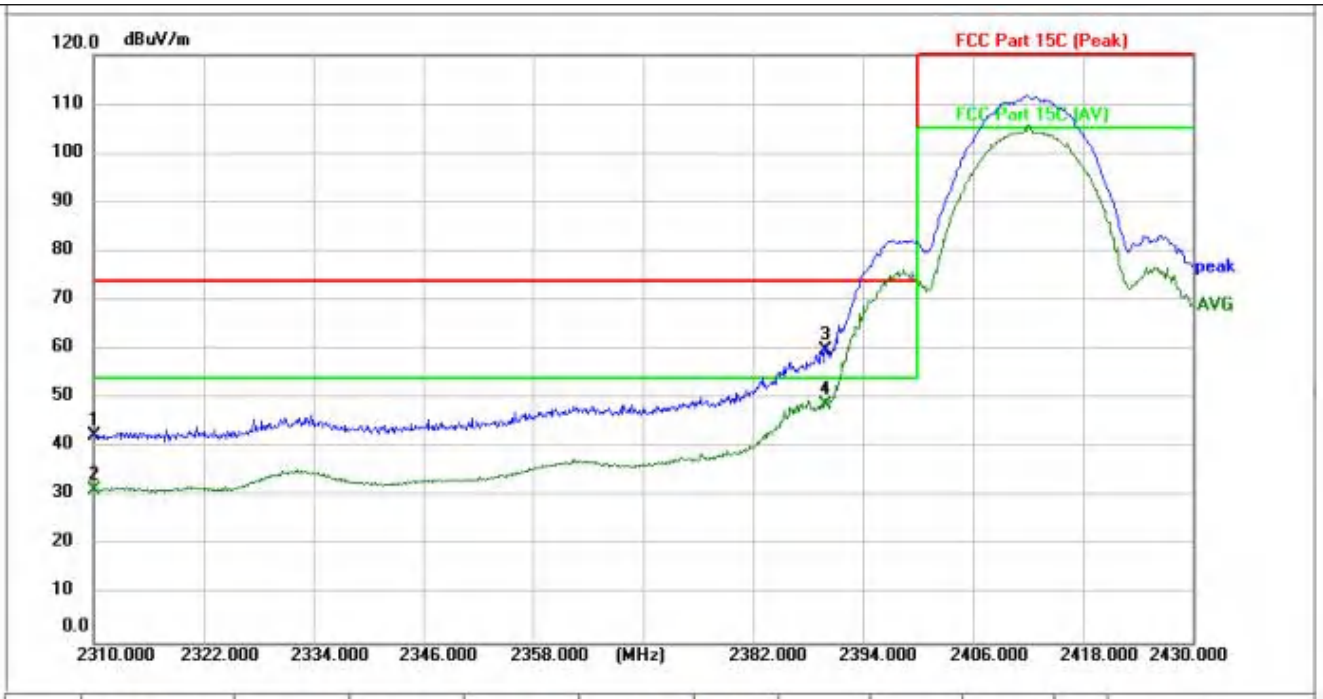
ANT2

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L



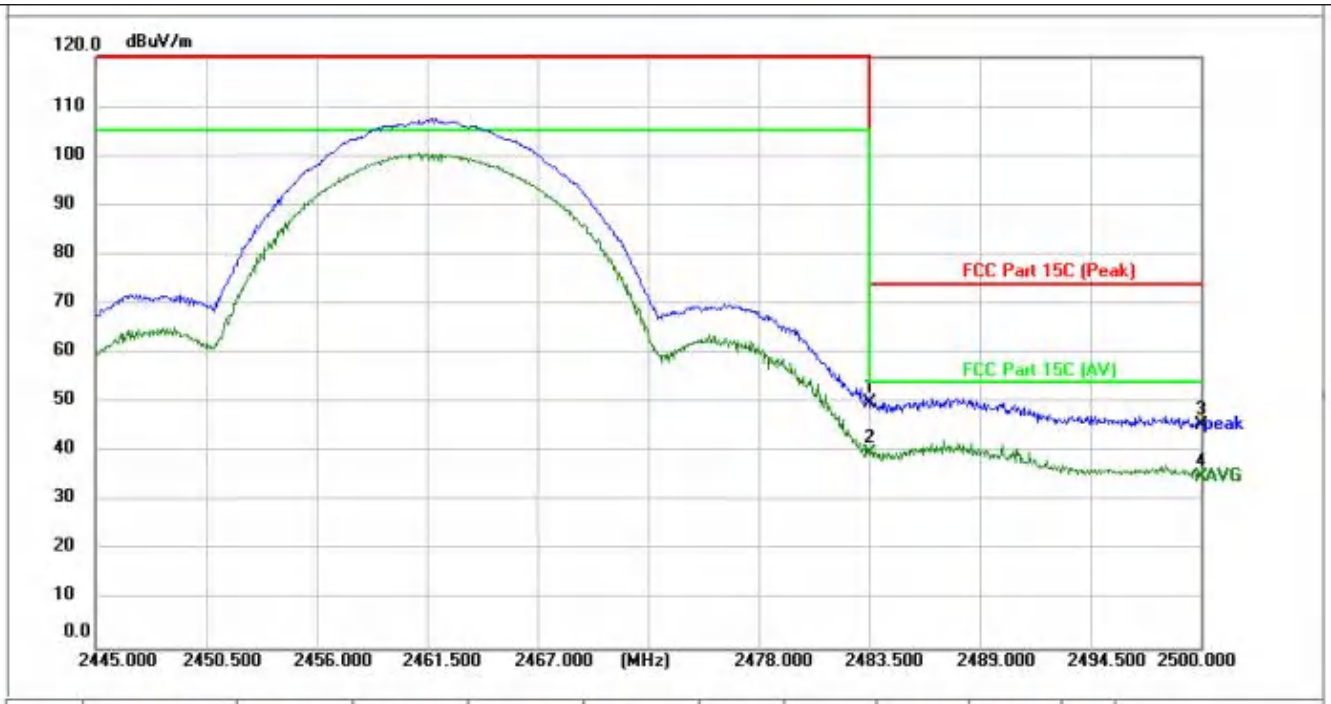
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	45.03	-3.93	41.10	74.00	-32.90	peak	150		P	
2	2310.000	34.35	-3.93	30.42	54.00	-23.58	AVG	150		P	
3	2390.000	46.75	-3.72	43.03	74.00	-30.97	peak	150		P	
4 *	2390.000	35.94	-3.72	32.22	54.00	-21.78	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L



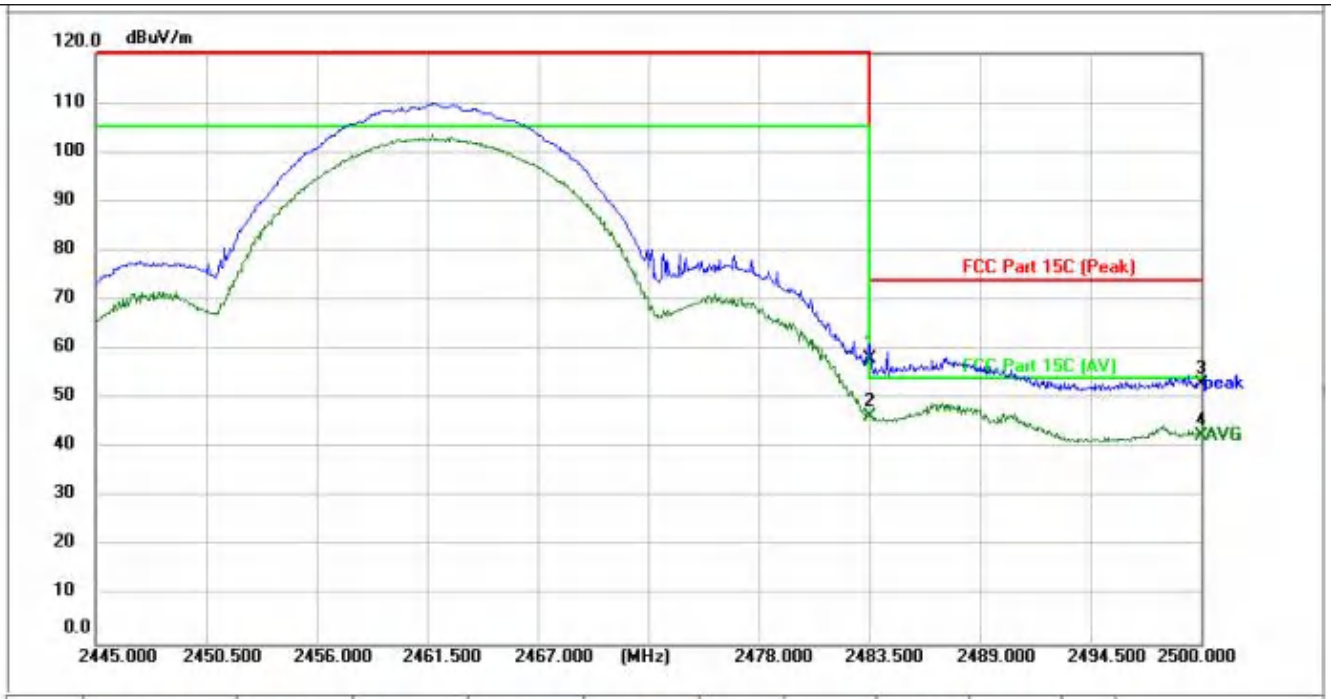
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	47.72	-5.23	42.49	74.00	-31.51	peak	150		P	
2	2310.000	36.54	-5.23	31.31	54.00	-22.69	AVG	150		P	
3	2390.000	64.79	-4.91	59.88	74.00	-14.12	peak	150		P	
4 *	2390.000	53.72	-4.91	48.81	54.00	-5.19	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H



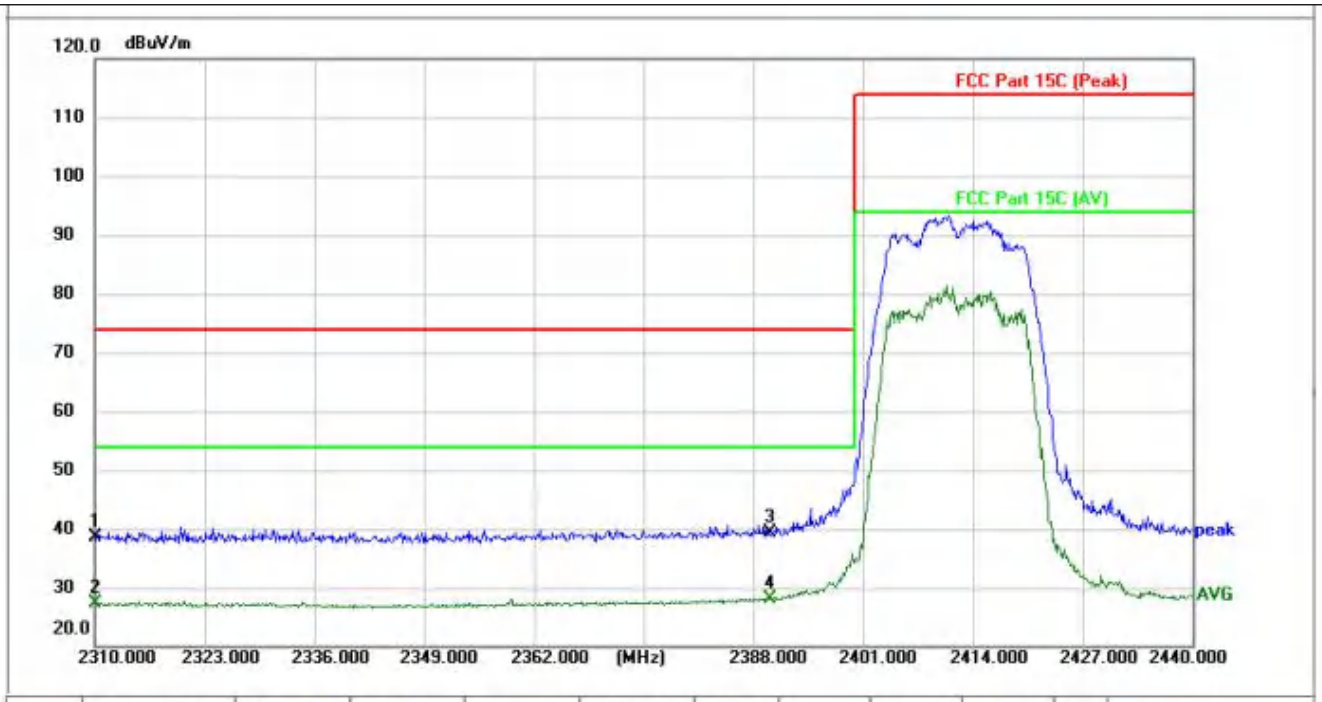
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	53.48	-3.47	50.01	74.00	-23.99	peak	150		P	
2 *	2483.500	43.29	-3.47	39.82	54.00	-14.18	AVG	150		P	
3	2500.000	48.88	-3.43	45.45	74.00	-28.55	peak	150		P	
4	2500.000	38.52	-3.43	35.09	54.00	-18.91	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / 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	62.54	-4.54	58.00	74.00	-16.00	peak	150		P	
2 *	2483.500	50.92	-4.54	46.38	54.00	-7.62	AVG	150		P	
3	2500.000	57.47	-4.48	52.99	74.00	-21.01	peak	150		P	
4	2500.000	47.01	-4.48	42.53	54.00	-11.47	AVG	150		P	

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L

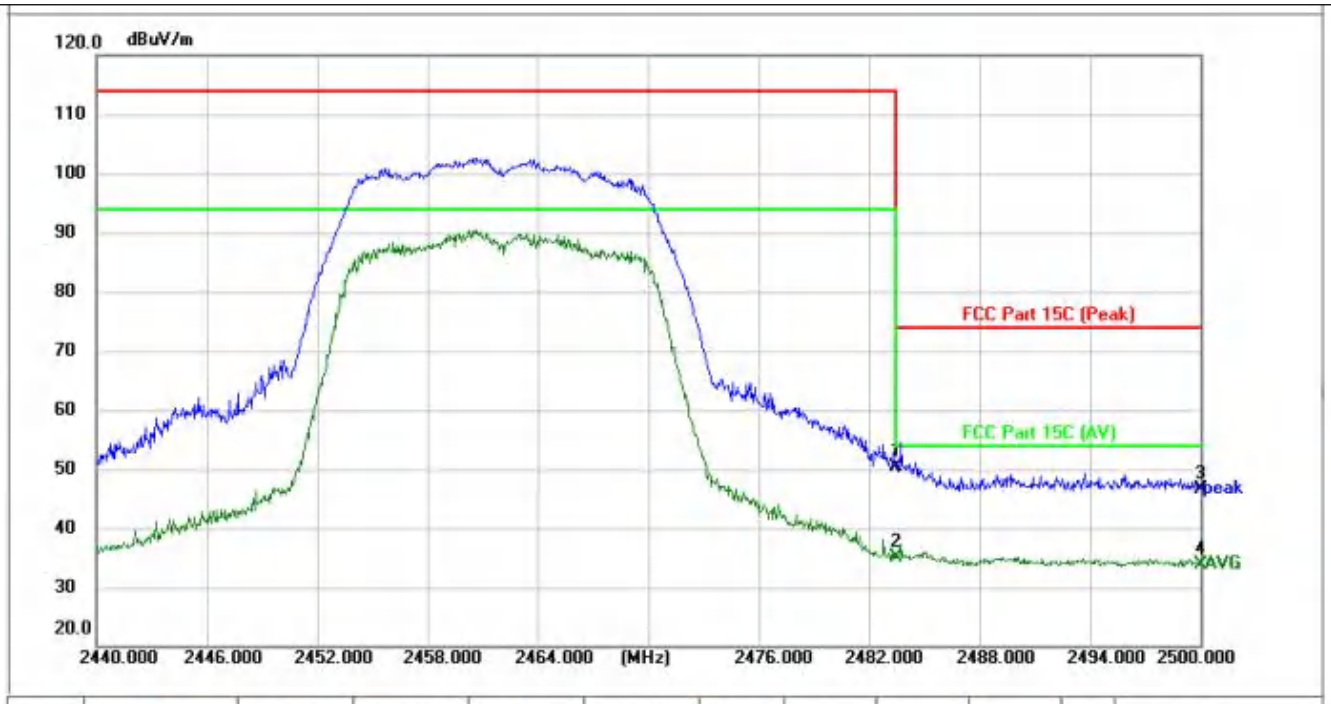


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	45.52	-6.93	38.59	74.00	-35.41	peak	100	0	P	
2	2310.000	34.39	-6.93	27.46	54.00	-26.54	AVG	100	0	P	
3	2390.000	46.17	-6.72	39.45	74.00	-34.55	peak	100	0	P	
4 *	2390.000	34.80	-6.72	28.08	54.00	-25.92	AVG	100	0	P	

TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L

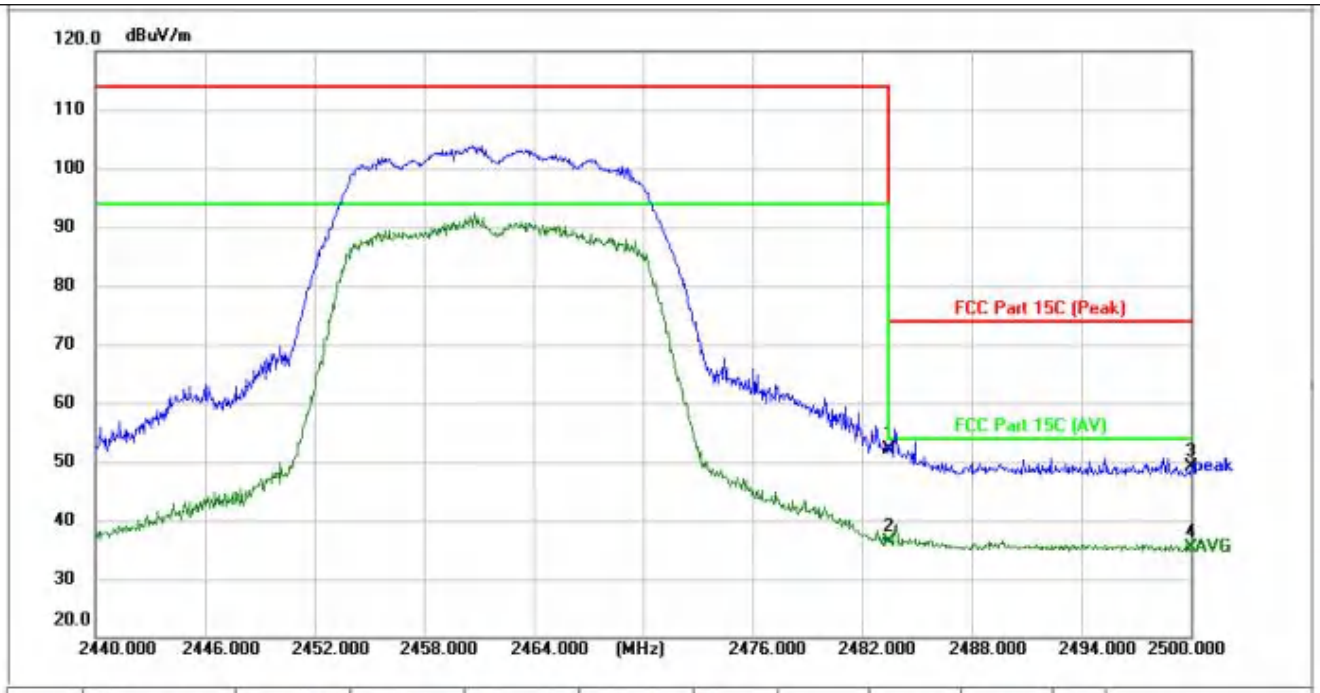
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	46.19	-8.23	37.96	74.00	-36.04	peak	100	0	P	
2	2310.000	39.38	-8.23	31.15	54.00	-22.85	AVG	100	0	P	
3	2390.000	62.51	-7.91	54.60	74.00	-19.40	peak	100	0	P	
4 *	2390.000	52.72	-7.91	44.81	54.00	-9.19	AVG	100	0	P	

TM2 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / 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	57.92	-7.54	50.38	74.00	-23.62	peak	100	0	P	
2 *	2483.500	42.56	-7.54	35.02	54.00	-18.98	AVG	100	0	P	
3	2500.000	54.10	-7.48	46.62	74.00	-27.38	peak	100	0	P	
4	2500.000	41.38	-7.48	33.90	54.00	-20.10	AVG	100	0	P	

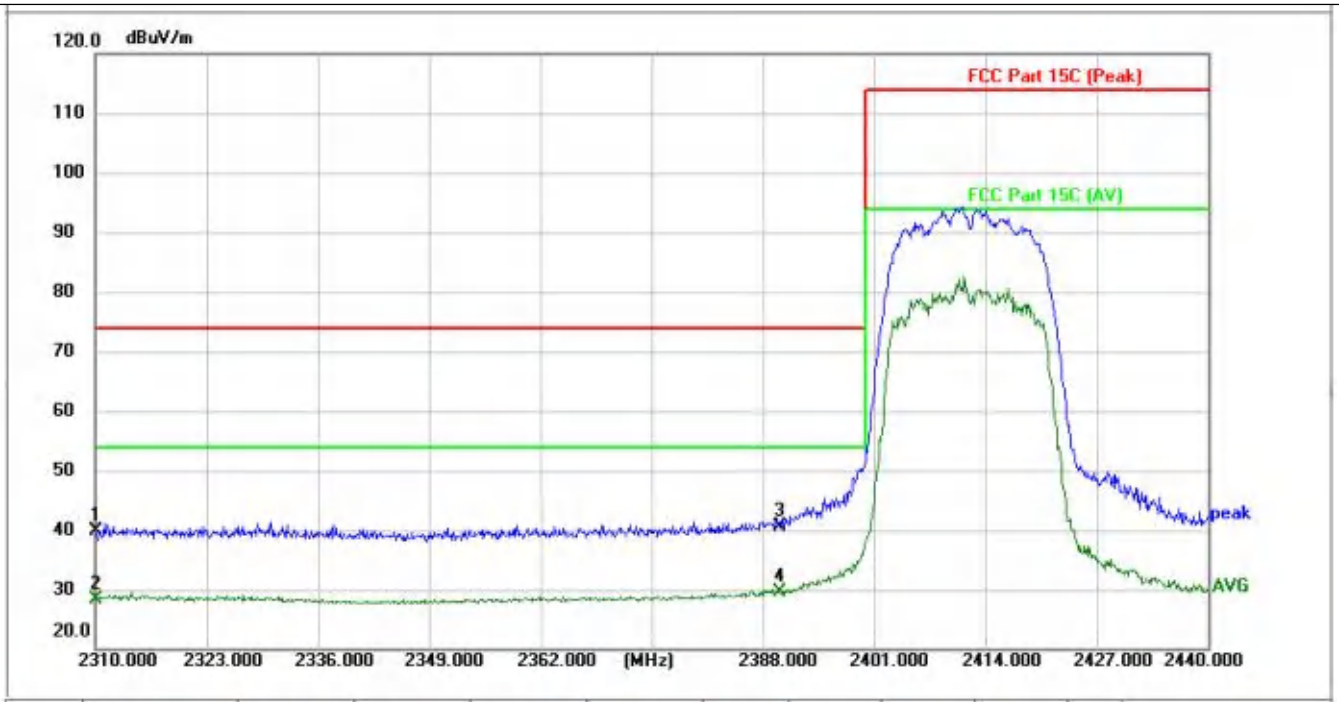
TM2 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H



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	59.63	-7.54	52.09	74.00	-21.91	peak	100	0	P	
2 *	2483.500	43.91	-7.54	36.37	54.00	-17.63	AVG	100	0	P	
3	2500.000	56.52	-7.48	49.04	74.00	-24.96	peak	100	0	P	
4	2500.000	42.92	-7.48	35.44	54.00	-18.56	AVG	100	0	P	

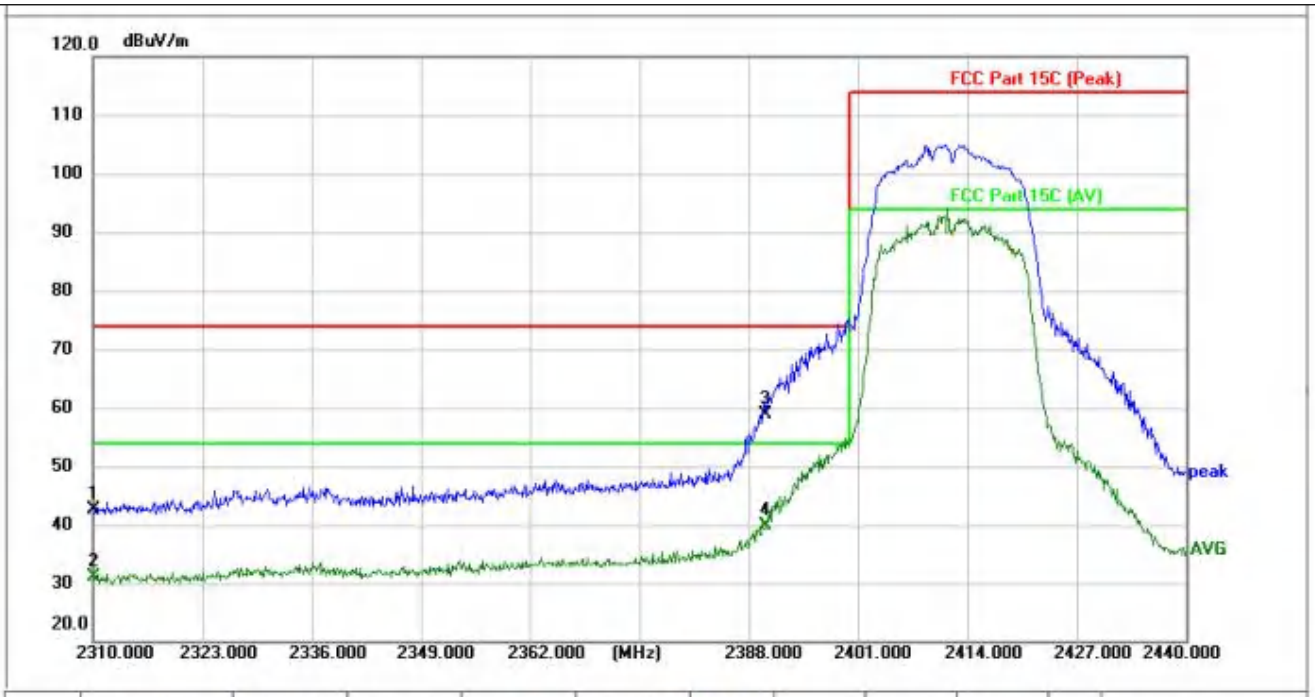
MIMO

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: L



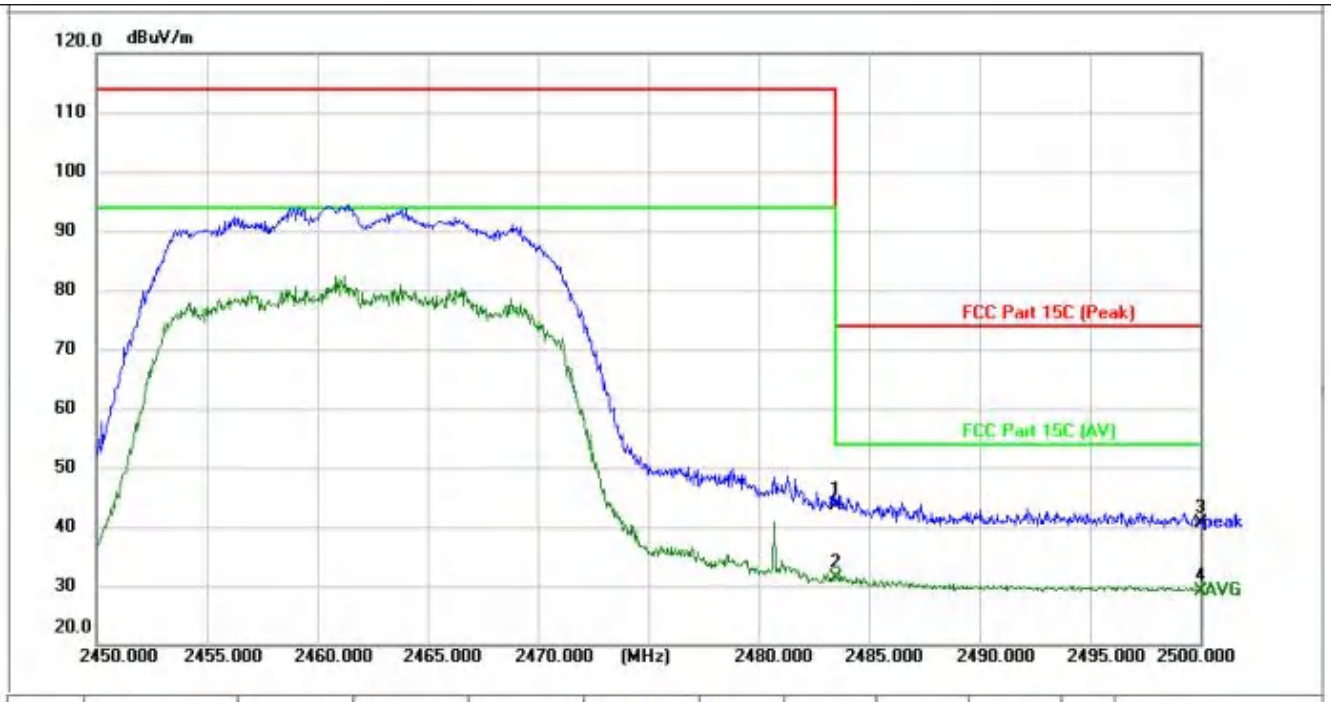
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	46.82	-6.93	39.89	74.00	-34.11	peak	100	0	P	
2	2310.000	35.41	-6.93	28.48	54.00	-25.52	AVG	100	0	P	
3	2390.000	47.27	-6.72	40.55	74.00	-33.45	peak	100	0	P	
4 *	2390.000	36.38	-6.72	29.66	54.00	-24.34	AVG	100	0	P	

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: L



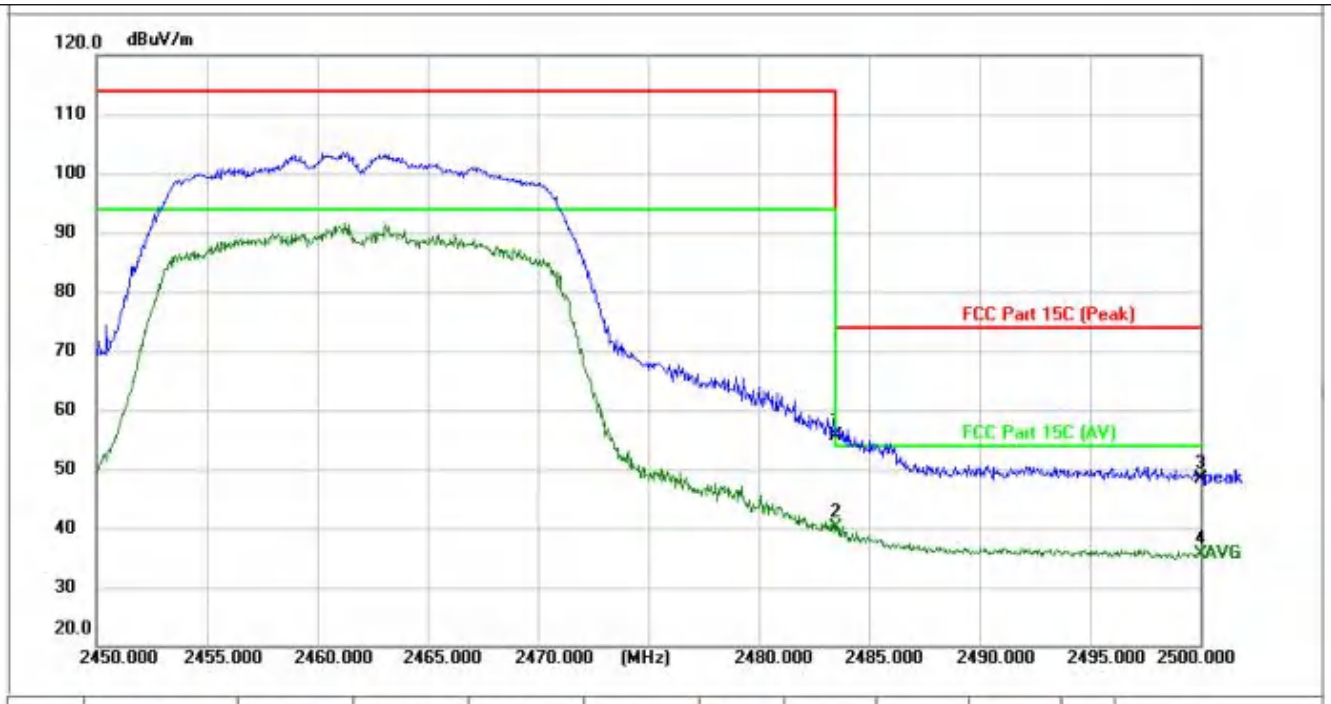
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	50.76	-8.23	42.53	74.00	-31.47	peak	100	0	P	
2	2310.000	39.26	-8.23	31.03	54.00	-22.97	AVG	100	0	P	
3	2390.000	66.76	-7.91	58.85	74.00	-15.15	peak	100	0	P	
4 *	2390.000	47.83	-7.91	39.92	54.00	-14.08	AVG	100	0	P	

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / CH: H



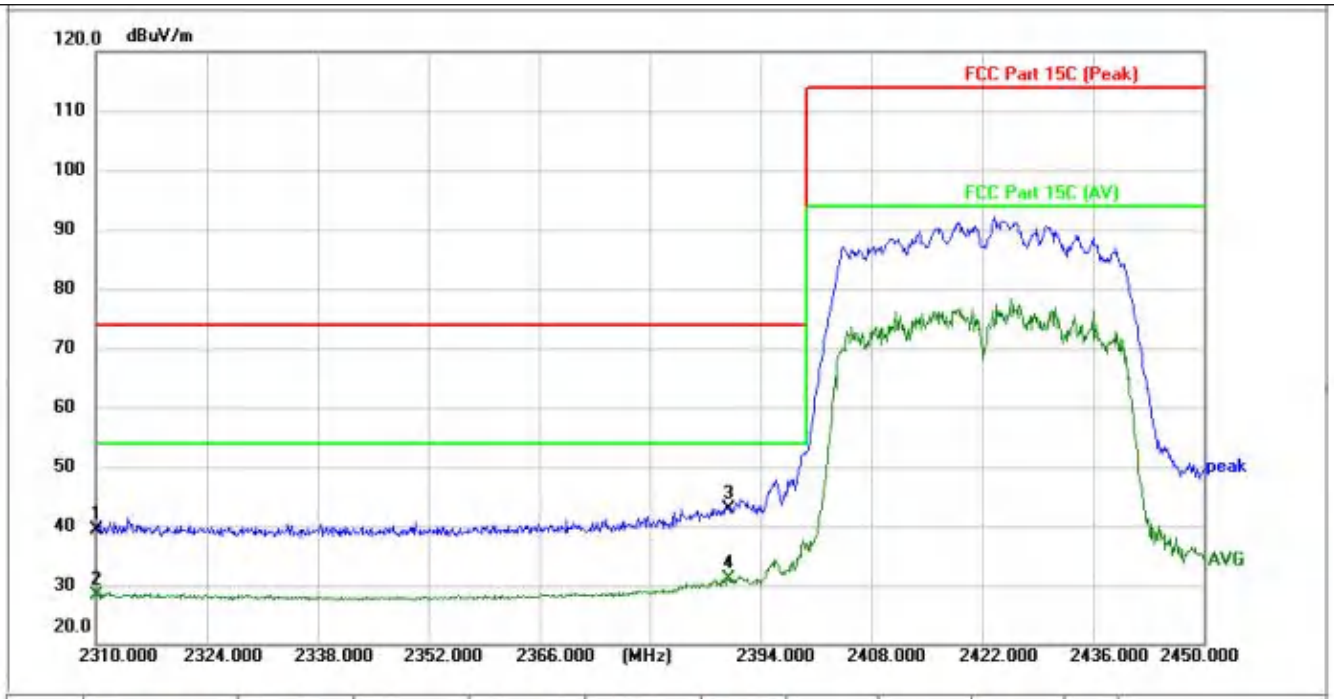
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	50.18	-6.47	43.71	74.00	-30.29	peak	100	0	P	
2 *	2483.500	37.79	-6.47	31.32	54.00	-22.68	AVG	100	0	P	
3	2500.000	47.01	-6.43	40.58	74.00	-33.42	peak	100	0	P	
4	2500.000	35.64	-6.43	29.21	54.00	-24.79	AVG	100	0	P	

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / CH: H



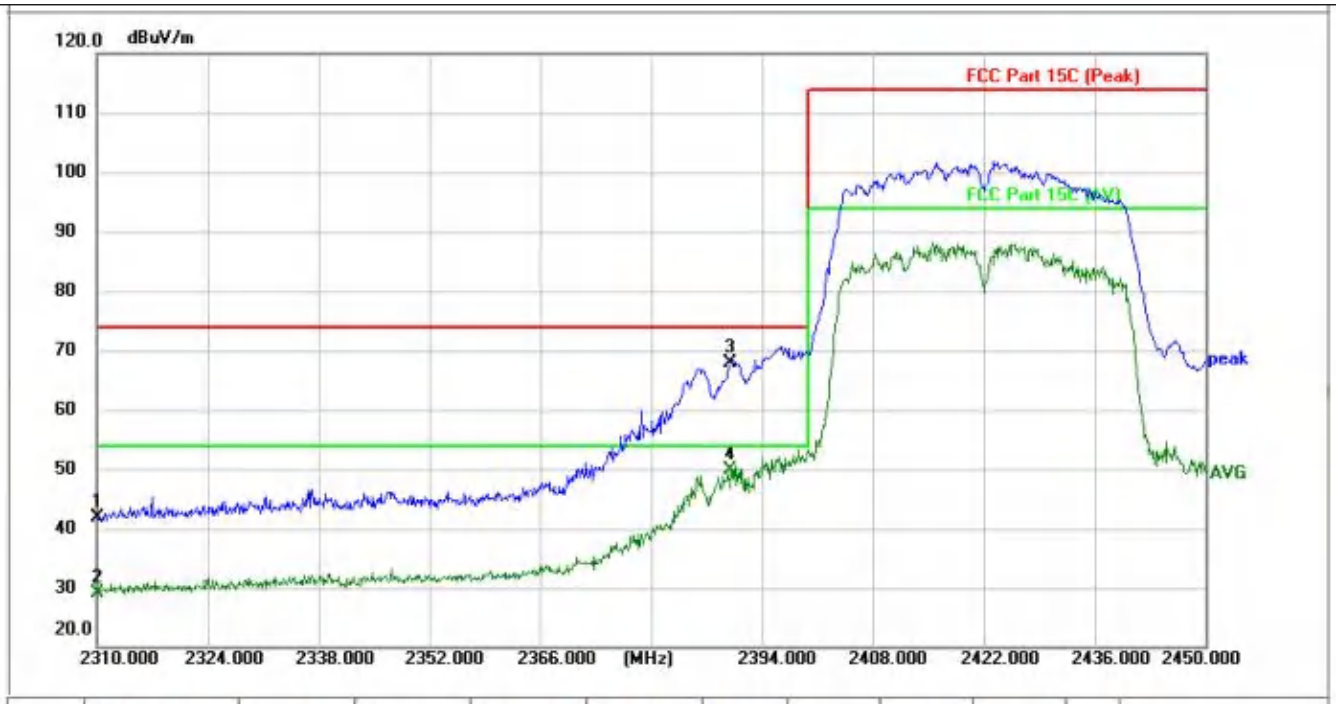
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.500	63.27	-7.54	55.73	74.00	-18.27	peak	100	0	P	
2 *	2483.500	47.66	-7.54	40.12	54.00	-13.88	AVG	100	0	P	
3	2500.000	55.76	-7.48	48.28	74.00	-25.72	peak	100	0	P	
4	2500.000	43.06	-7.48	35.58	54.00	-18.42	AVG	100	0	P	

TM4 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 40 / CH: L



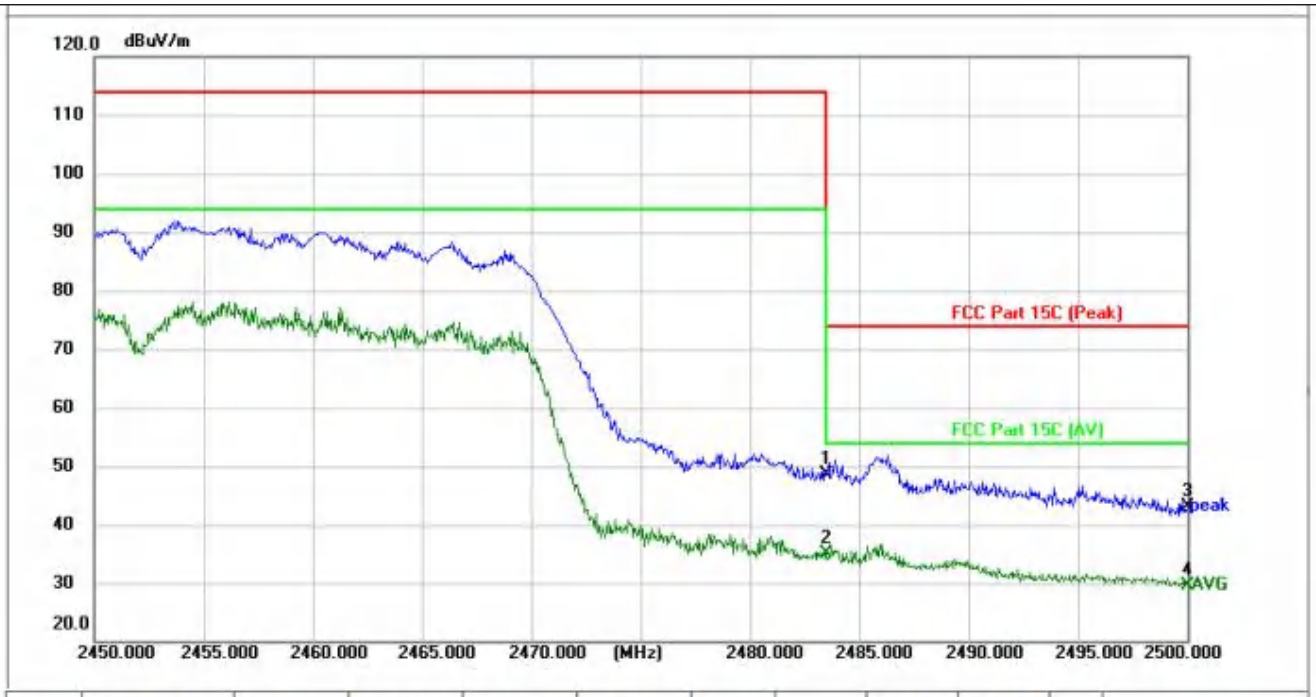
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	46.21	-6.93	39.28	74.00	-34.72	peak	100	0	P	
2	2310.000	35.28	-6.93	28.35	54.00	-25.65	AVG	100	0	P	
3	2390.000	49.63	-6.72	42.91	74.00	-31.09	peak	100	0	P	
4 *	2390.000	37.74	-6.72	31.02	54.00	-22.98	AVG	100	0	P	

TM4 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 40 / 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	50.14	-8.23	41.91	74.00	-32.09	peak	100	0	P	
2	2310.000	37.41	-8.23	29.18	54.00	-24.82	AVG	100	0	P	
3	2390.000	75.82	-7.91	67.91	74.00	-6.09	peak	100	0	P	
4 *	2390.000	57.71	-7.91	49.80	54.00	-4.20	AVG	100	0	P	

TM4 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 40 / 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	55.21	-6.47	48.74	74.00	-25.26	peak	100	0	P	
2 *	2483.500	41.61	-6.47	35.14	54.00	-18.86	AVG	100	0	P	
3	2500.000	49.59	-6.43	43.16	74.00	-30.84	peak	100	0	P	
4	2500.000	36.07	-6.43	29.64	54.00	-24.36	AVG	100	0	P	

TM4 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 40 / 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	68.81	-7.54	61.27	74.00	-12.73	peak	100	0	P	
2 *	2483.500	53.27	-7.54	45.73	54.00	-8.27	AVG	100	0	P	
3	2500.000	60.58	-7.48	53.10	74.00	-20.90	peak	100	0	P	
4	2500.000	43.73	-7.48	36.25	54.00	-17.75	AVG	100	0	P	

4.7 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
KDB 558074 D01 15.247 Meas Guidance v05r02</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</td></tr>
</table>

	the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

4.7.1 E.U.T. Operation:

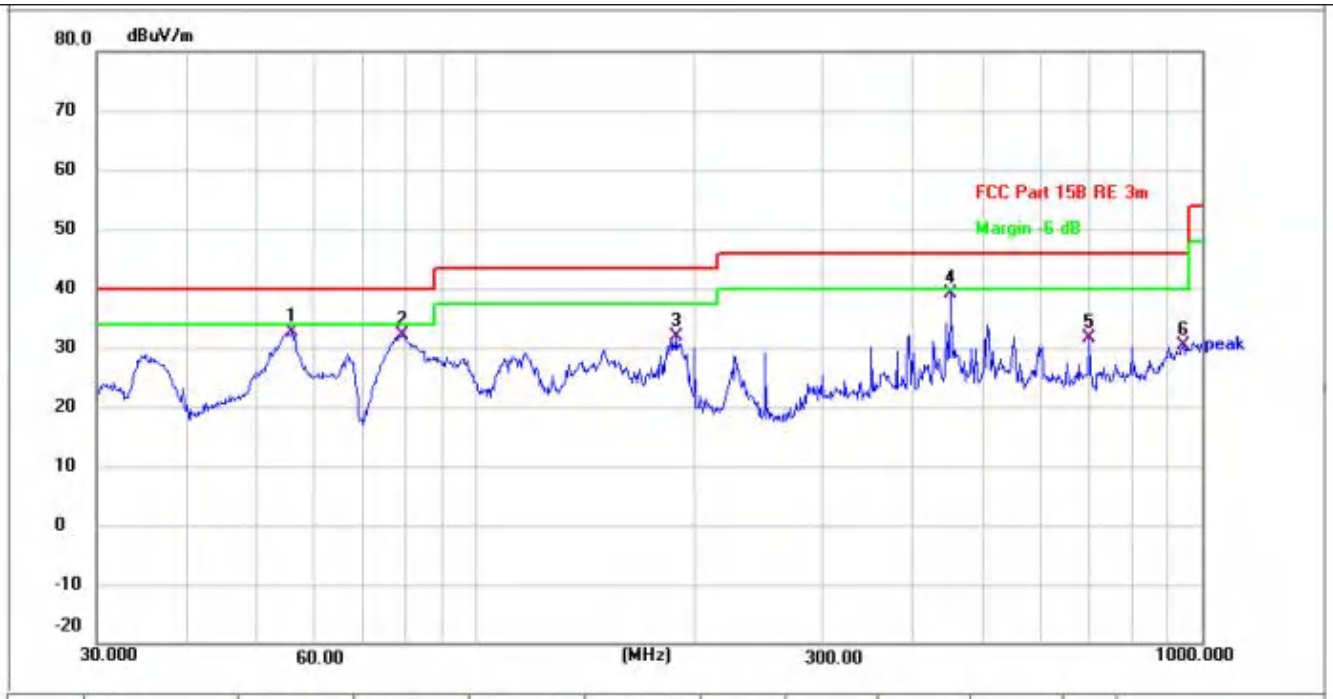
Operating Environment:					
Temperature:	23.1 °C	Humidity:	53.1 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM3				
Final test mode:	TM3				

4.7.2 Test Data:

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / 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	78.1389	31.49	-7.89	23.60	40.00	-16.40	QP	100	124	P	
2	115.7256	28.83	-5.01	23.82	43.50	-19.68	QP	100	254	P	
3	189.7385	35.63	-3.03	32.60	43.50	-10.90	QP	100	321	P	
4	227.6906	35.89	-2.49	33.40	46.00	-12.60	QP	100	145	P	
5 !	350.4768	38.52	1.76	40.28	46.00	-5.72	QP	100	52	P	
6 *	451.1350	42.41	1.15	43.56	46.00	-2.44	QP	100	48	P	

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / 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	55.8047	41.92	-9.37	32.55	40.00	-7.45	QP	100	24	P	
2	78.9652	39.93	-7.81	32.12	40.00	-7.88	QP	100	156	P	
3	188.4125	34.88	-3.05	31.83	43.50	-11.67	QP	100	321	P	
4 *	451.1350	37.87	1.15	39.02	46.00	-6.98	QP	100	145	P	
5	699.3045	26.60	5.12	31.72	46.00	-14.28	QP	100	256	P	
6	942.1304	21.63	8.85	30.48	46.00	-15.52	QP	100	241	P	

4.8 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
KDB 558074 D01 15.247 Meas Guidance v05r02</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</td></tr>
</table>

	the limit need not be reported. Fundamental frequency is blocked by filter, and only spurious emission is shown.

4.8.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.1 °C	Humidity:	53.1 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM3				
Final test mode:	TM3				

4.8.2 Test Data:

TM3 is worse case and only reported

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / 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	4824.000	39.08	-0.84	38.24	74.00	-35.76	peak	100	0	P	
2	4824.000	27.79	-0.84	26.95	54.00	-27.05	AVG	100	0	P	
3	7236.000	35.97	4.17	40.14	74.00	-33.86	peak	100	0	P	
4	7236.000	24.66	4.17	28.83	54.00	-25.17	AVG	100	0	P	
5	9648.000	35.04	8.10	43.14	74.00	-30.86	peak	100	0	P	
6 *	9648.000	24.13	8.10	32.23	54.00	-21.77	AVG	100	0	P	

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / 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	4824.000	43.22	-0.22	43.00	74.00	-31.00	peak	100	0	P	
2	4824.000	30.62	-0.22	30.40	54.00	-23.60	AVG	100	0	P	
3	7236.000	35.74	4.16	39.90	74.00	-34.10	peak	100	0	P	
4	7236.000	24.61	4.16	28.77	54.00	-25.23	AVG	100	0	P	
5	9648.000	35.32	8.05	43.37	74.00	-30.63	peak	100	0	P	
6 *	9648.000	23.81	8.05	31.86	54.00	-22.14	AVG	100	0	P	

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / 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	4872.000	38.58	-0.67	37.91	74.00	-36.09	peak	100	0	P	
2	4872.000	27.84	-0.67	27.17	54.00	-26.83	AVG	100	0	P	
3	7311.000	36.13	4.29	40.42	74.00	-33.58	peak	100	0	P	
4	7311.000	24.87	4.29	29.16	54.00	-24.84	AVG	100	0	P	
5	9748.000	35.50	8.10	43.60	74.00	-30.40	peak	100	0	P	
6 *	9748.000	24.39	8.10	32.49	54.00	-21.51	AVG	100	0	P	

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / 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	4872.000	45.64	-0.06	45.58	74.00	-28.42	peak	100	0	P	
2 *	4872.000	32.86	-0.06	32.80	54.00	-21.20	AVG	100	0	P	
3	7311.000	35.83	4.34	40.17	74.00	-33.83	peak	100	0	P	
4	7311.000	24.75	4.34	29.09	54.00	-24.91	AVG	100	0	P	
5	9748.000	35.38	8.12	43.50	74.00	-30.50	peak	100	0	P	
6	9748.000	24.29	8.12	32.41	54.00	-21.59	AVG	100	0	P	

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 20 / 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	4924.000	38.11	-0.50	37.61	74.00	-36.39	peak	100	0	P	
2	4924.000	27.33	-0.50	26.83	54.00	-27.17	AVG	100	0	P	
3	7386.000	36.46	4.41	40.87	74.00	-33.13	peak	100	0	P	
4	7386.000	24.87	4.41	29.28	54.00	-24.72	AVG	100	0	P	
5	9848.000	35.14	8.10	43.24	74.00	-30.76	peak	100	0	P	
6 *	9848.000	24.56	8.10	32.66	54.00	-21.34	AVG	100	0	P	

TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 20 / 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	4924.000	43.20	0.11	43.31	74.00	-30.69	peak	100	0	P	
2	4924.000	29.95	0.11	30.06	54.00	-23.94	AVG	100	0	P	
3	7386.000	36.89	4.52	41.41	74.00	-32.59	peak	100	0	P	
4	7386.000	24.72	4.52	29.24	54.00	-24.76	AVG	100	0	P	
5	9848.000	36.08	8.19	44.27	74.00	-29.73	peak	100	0	P	
6 *	9848.000	24.38	8.19	32.57	54.00	-21.43	AVG	100	0	P	

5 TEST SETUP PHOTOS

Please refer to Setup Photo file

6 PHOTOS OF THE EUT

Please refer to external photos file and internal photos file

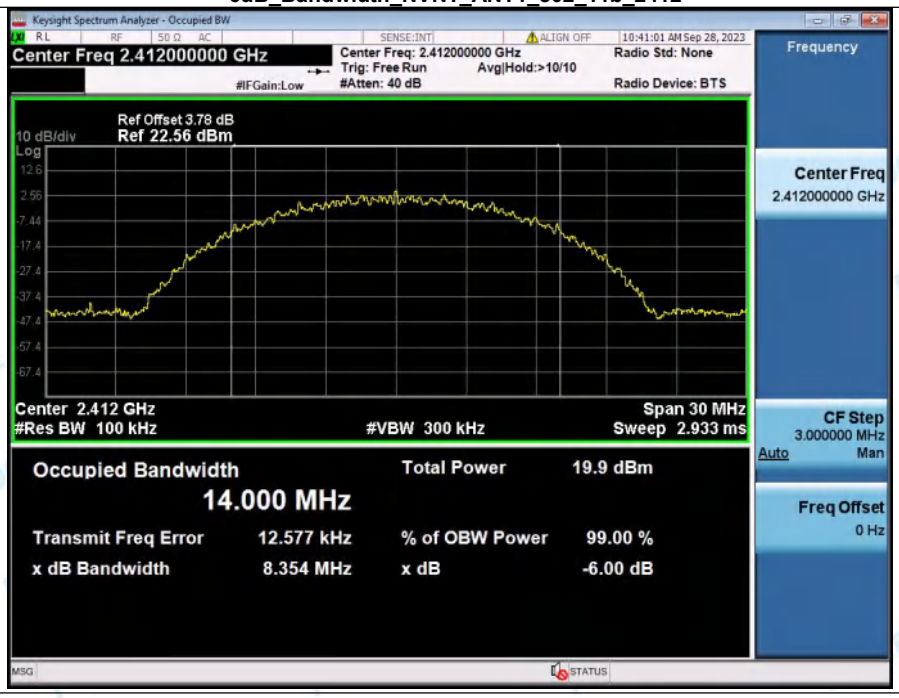
Appendix

GPON ONT--HL-4GMVR
FCC_2.4G_WIFI (Part15.247) Test Data

1. -6dB Bandwidth

Condition	Antenna	Modulation	Frequency (MHz)	-6dB BW(MHz)	limit(kHz)	Result
NVNT	ANT1	802.11b	2412.00	8.35	500	Pass
NVNT	ANT2	802.11b	2412.00	8.35	500	Pass
NVNT	ANT1	802.11b	2437.00	8.36	500	Pass
NVNT	ANT2	802.11b	2437.00	8.35	500	Pass
NVNT	ANT1	802.11b	2462.00	8.35	500	Pass
NVNT	ANT2	802.11b	2462.00	8.35	500	Pass
NVNT	ANT1	802.11g	2412.00	15.13	500	Pass
NVNT	ANT2	802.11g	2412.00	15.17	500	Pass
NVNT	ANT1	802.11g	2437.00	15.15	500	Pass
NVNT	ANT2	802.11g	2437.00	15.41	500	Pass
NVNT	ANT1	802.11g	2462.00	15.14	500	Pass
NVNT	ANT2	802.11g	2462.00	15.16	500	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	16.02	500	Pass
NVNT	ANT2	802.11n(HT20)	2412.00	15.76	500	Pass
NVNT	ANT1	802.11n(HT20)	2437.00	16.05	500	Pass
NVNT	ANT2	802.11n(HT20)	2437.00	15.76	500	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	16.04	500	Pass
NVNT	ANT2	802.11n(HT20)	2462.00	15.14	500	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	35.12	500	Pass
NVNT	ANT2	802.11n(HT40)	2422.00	35.11	500	Pass
NVNT	ANT1	802.11n(HT40)	2437.00	35.13	500	Pass
NVNT	ANT2	802.11n(HT40)	2437.00	35.11	500	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	35.11	500	Pass
NVNT	ANT2	802.11n(HT40)	2452.00	35.11	500	Pass

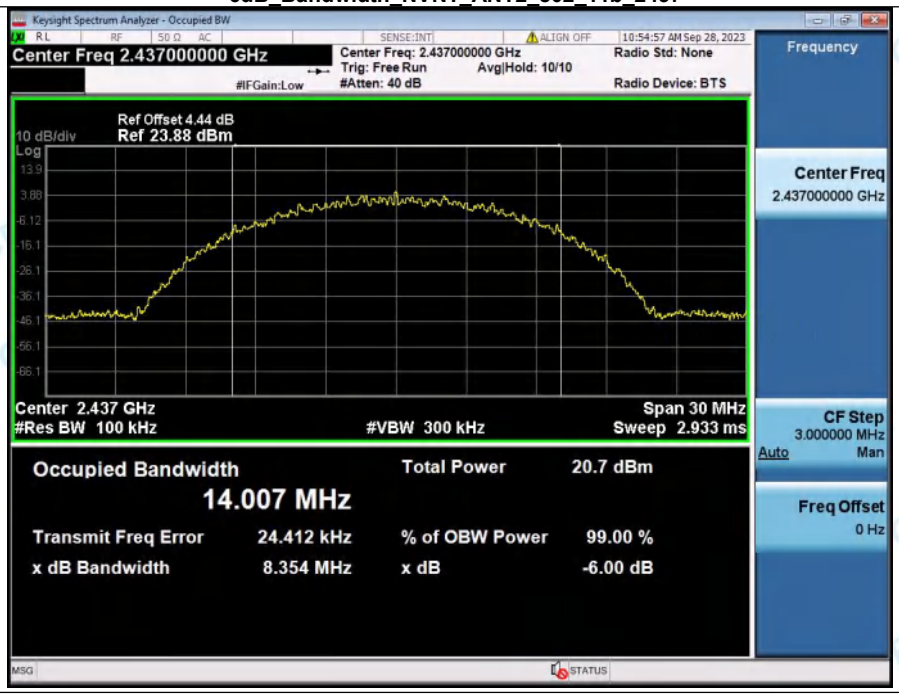
-6dB_Bandwidth_NVNT_ANT1_802_11b_2412



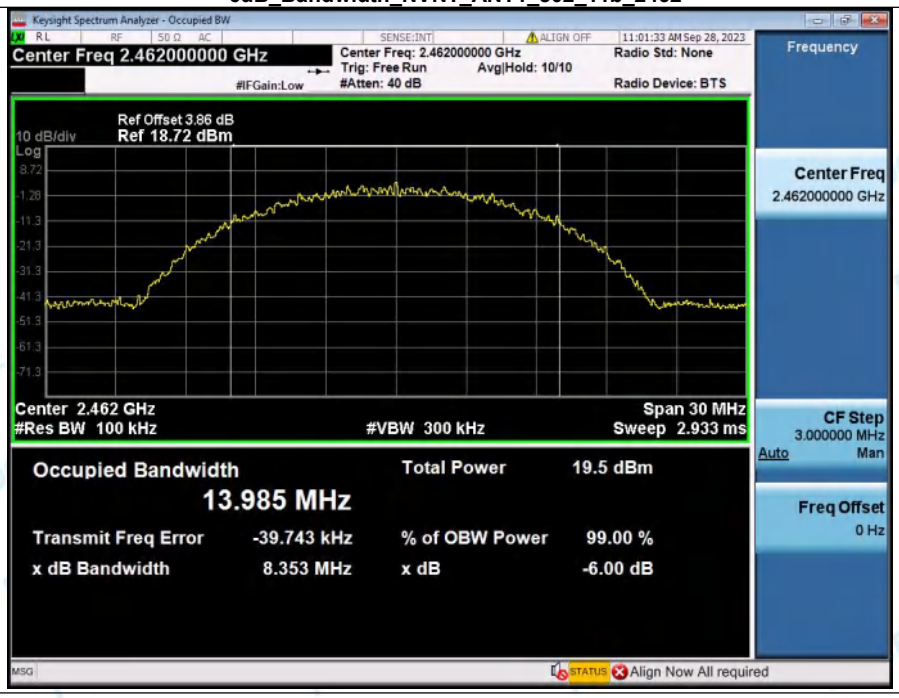
-6dB_Bandwidth_NVNT_ANT2_802_11b_2412

-6dB_Bandwidth_NVNT_ANT1_802_11b_2437

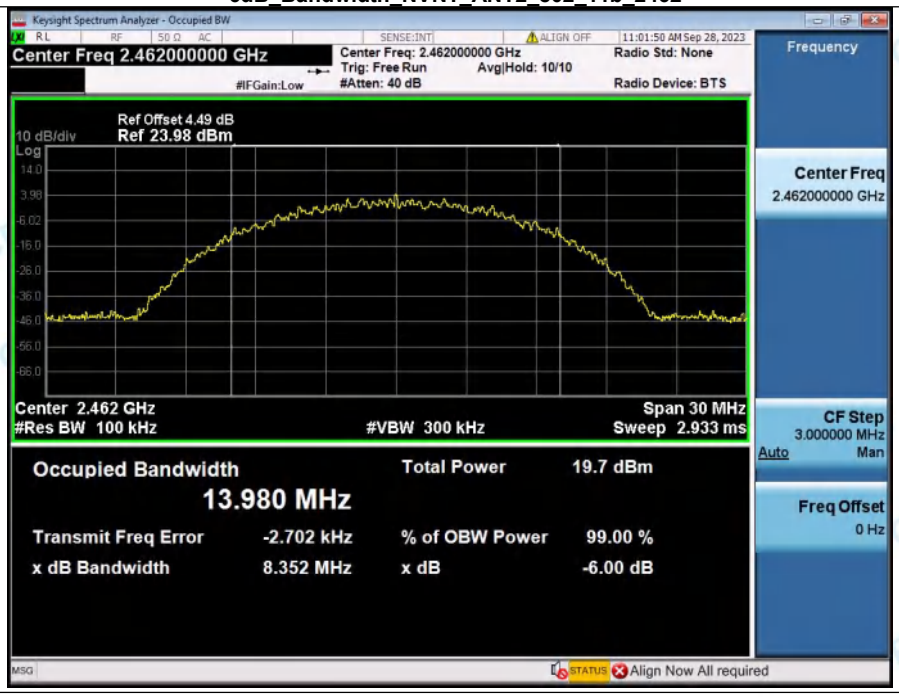
-6dB_Bandwidth_NVNT_ANT2_802_11b_2437



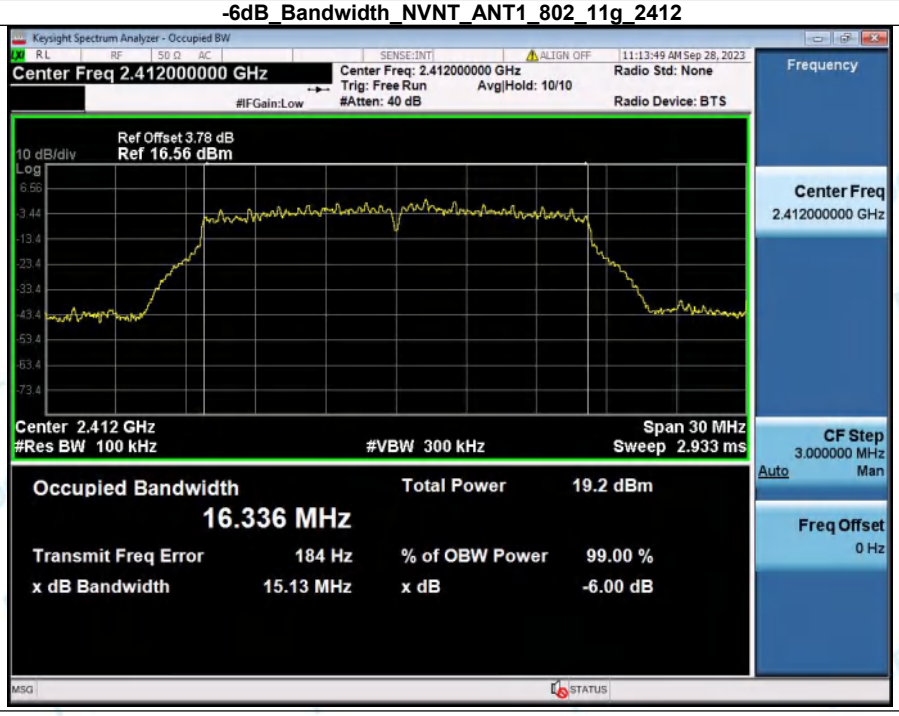
-6dB_Bandwidth_NVNT_ANT1_802_11b_2462



-6dB_Bandwidth_NVNT_ANT2_802_11b_2462



-6dB_Bandwidth_NVNT_ANT1_802_11g_2412



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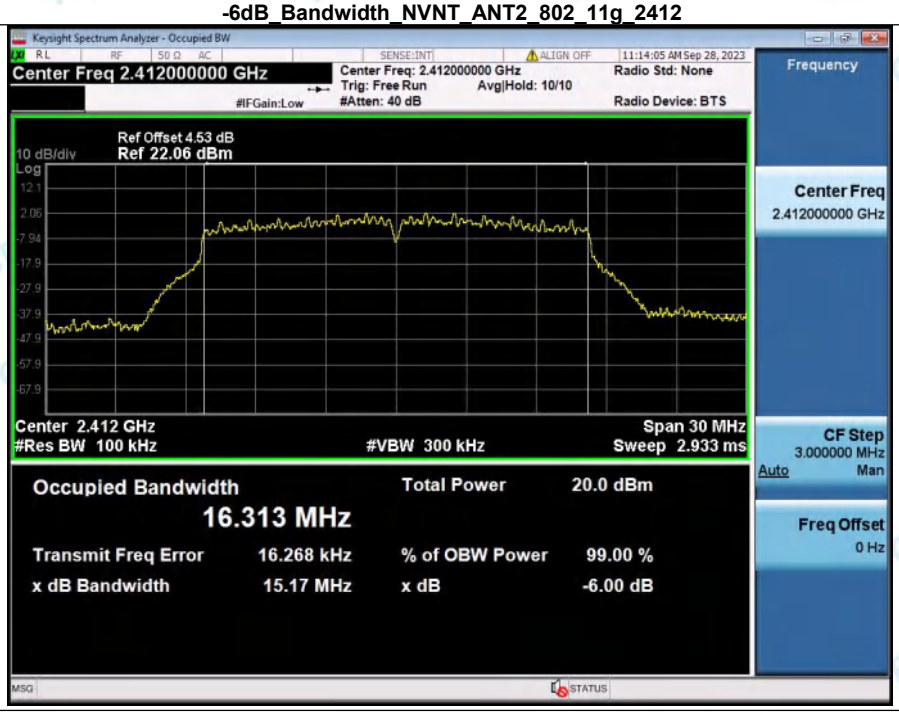

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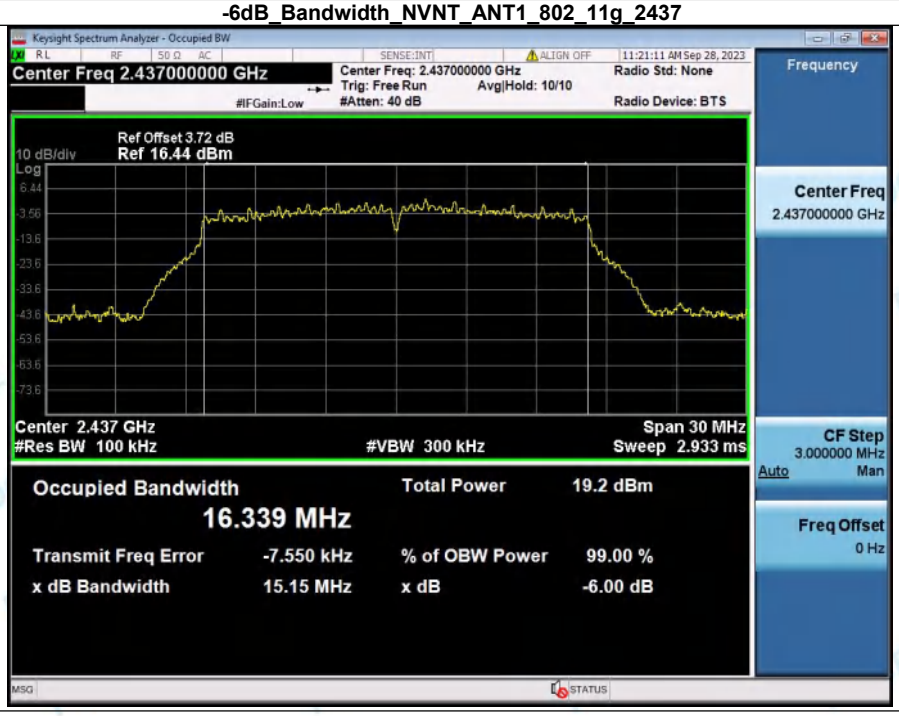

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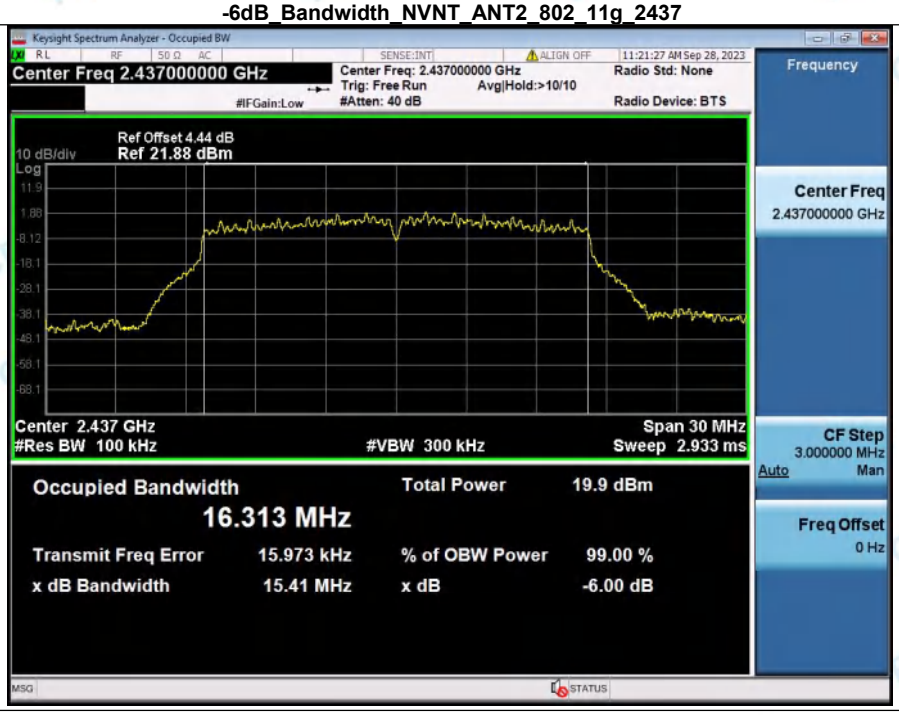

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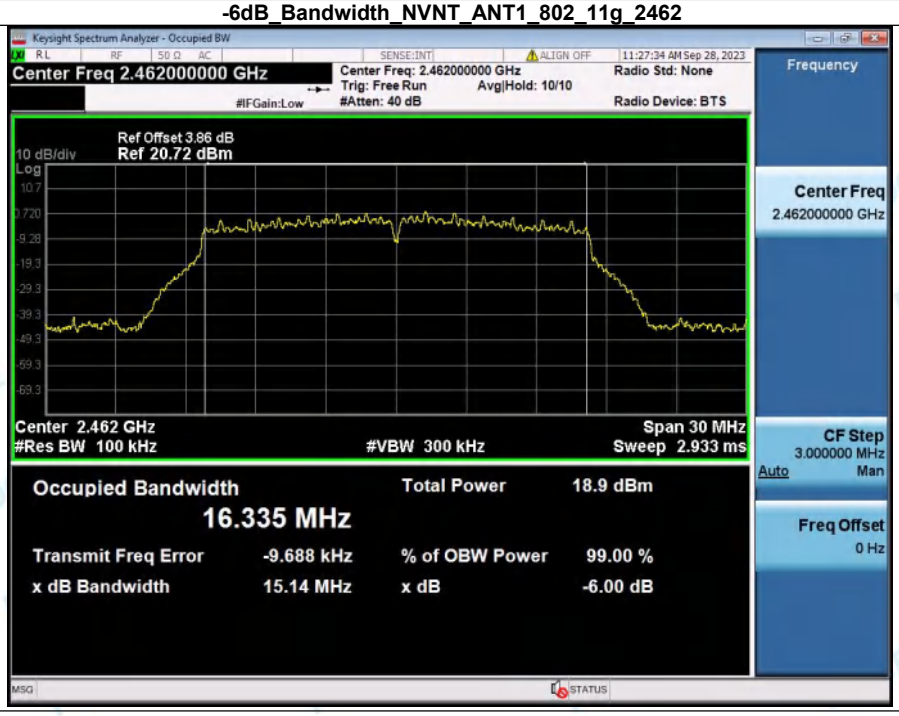

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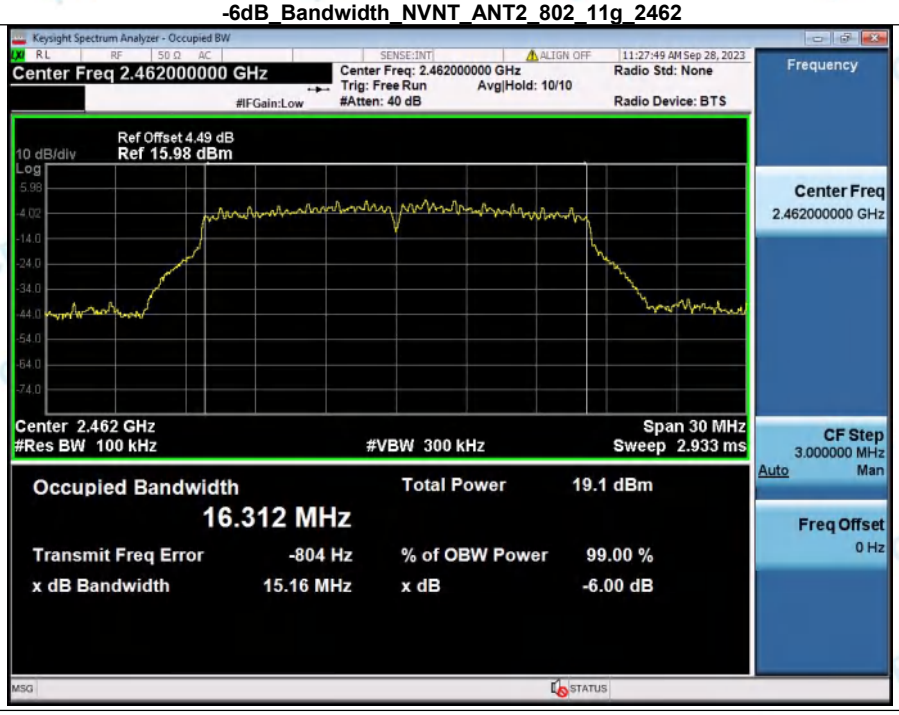
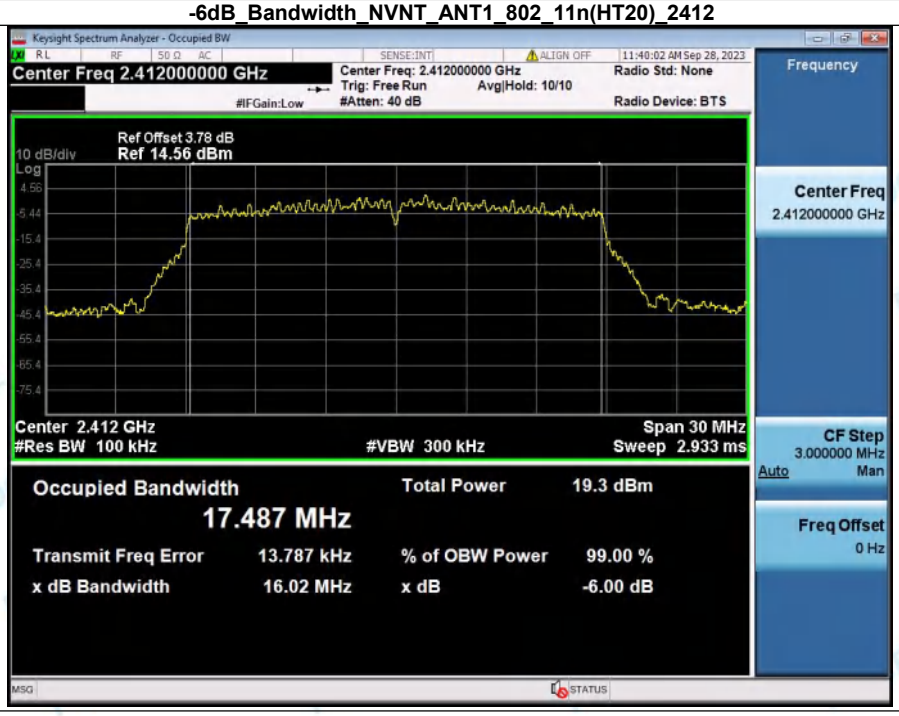


-6dB_Bandwidth_NVNT_ANT1_802_11n(HT20)_2412



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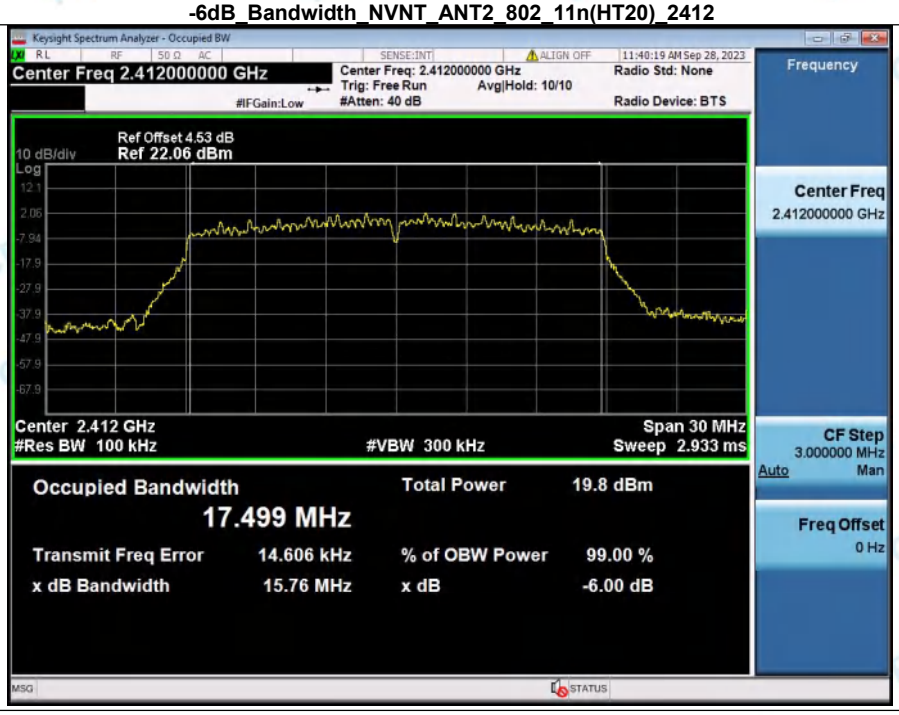

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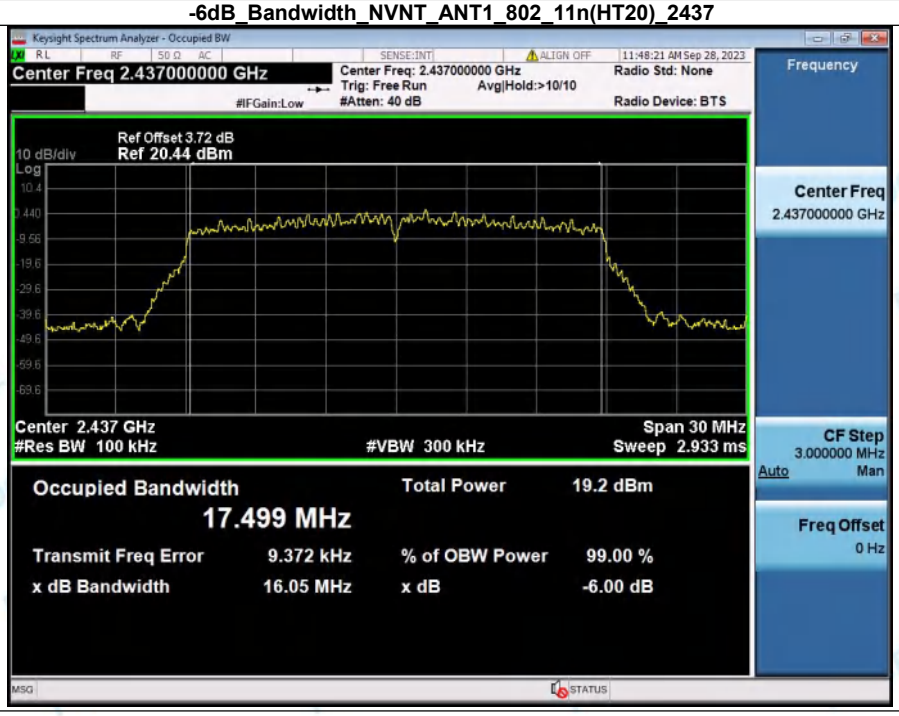

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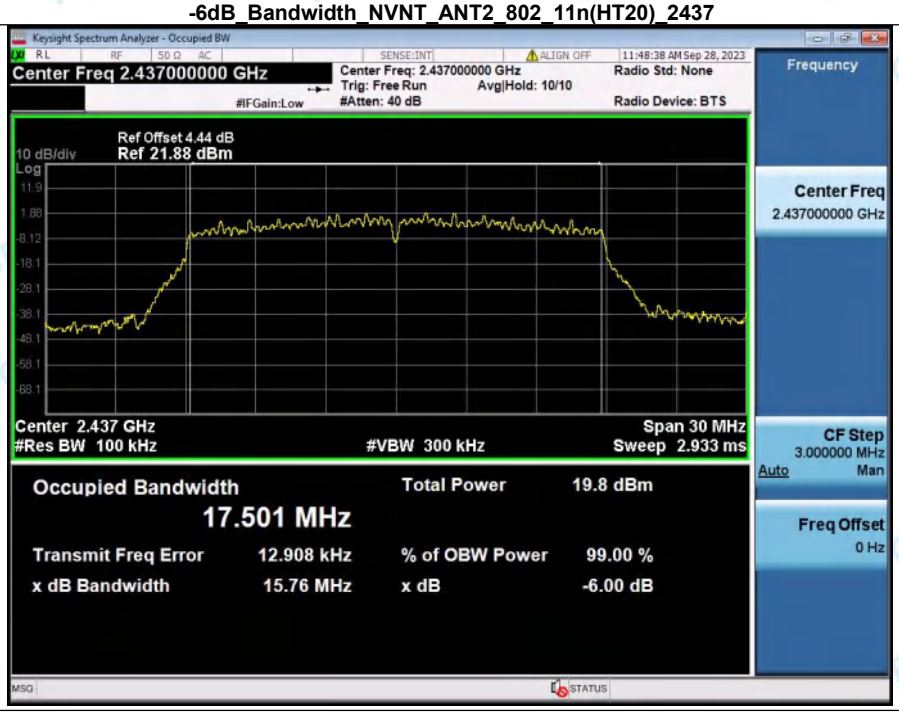

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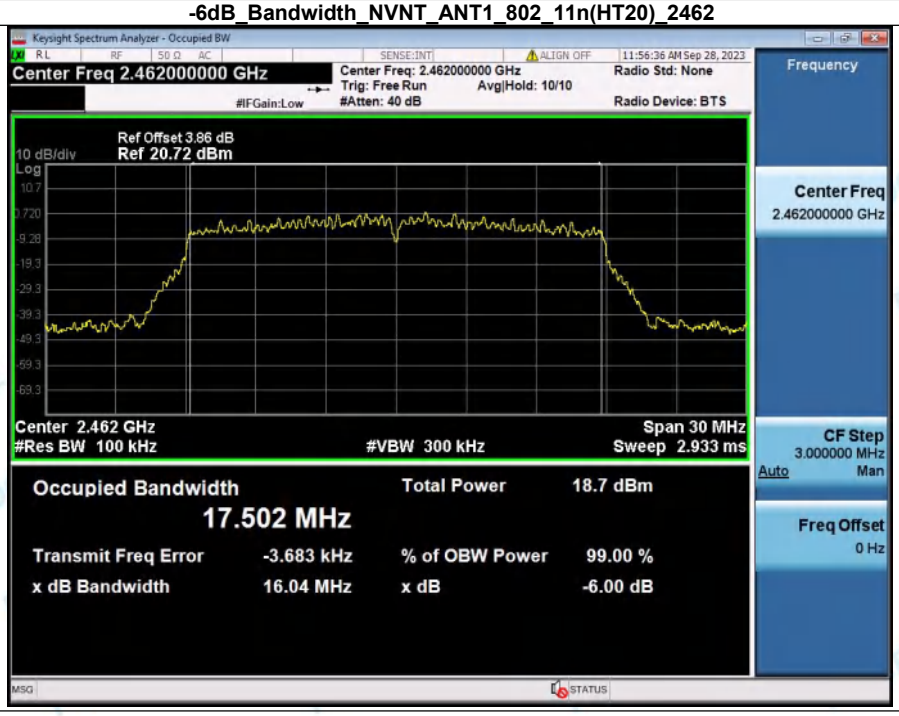

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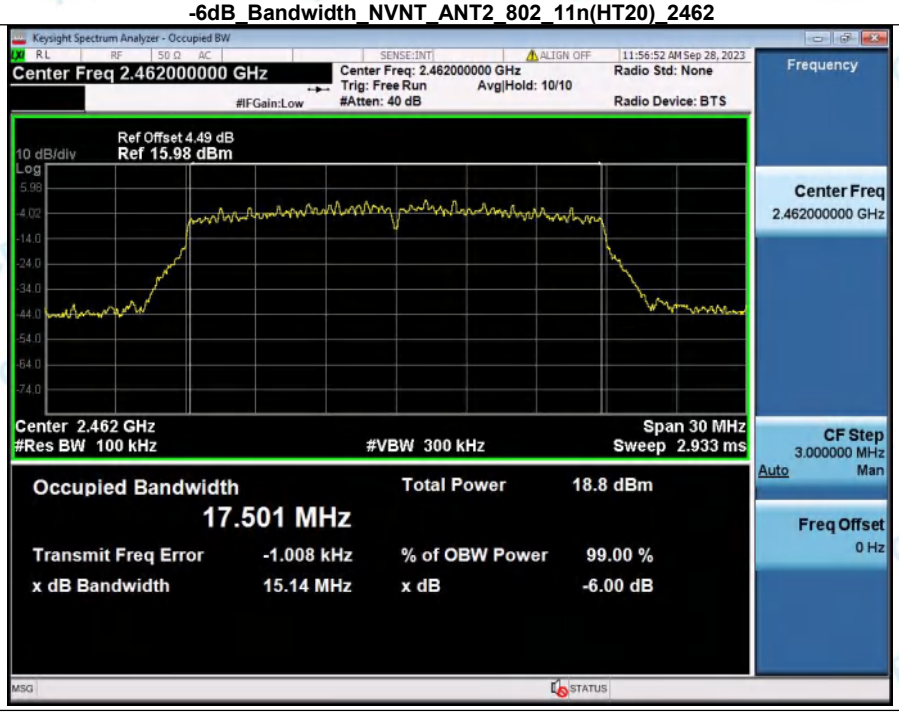

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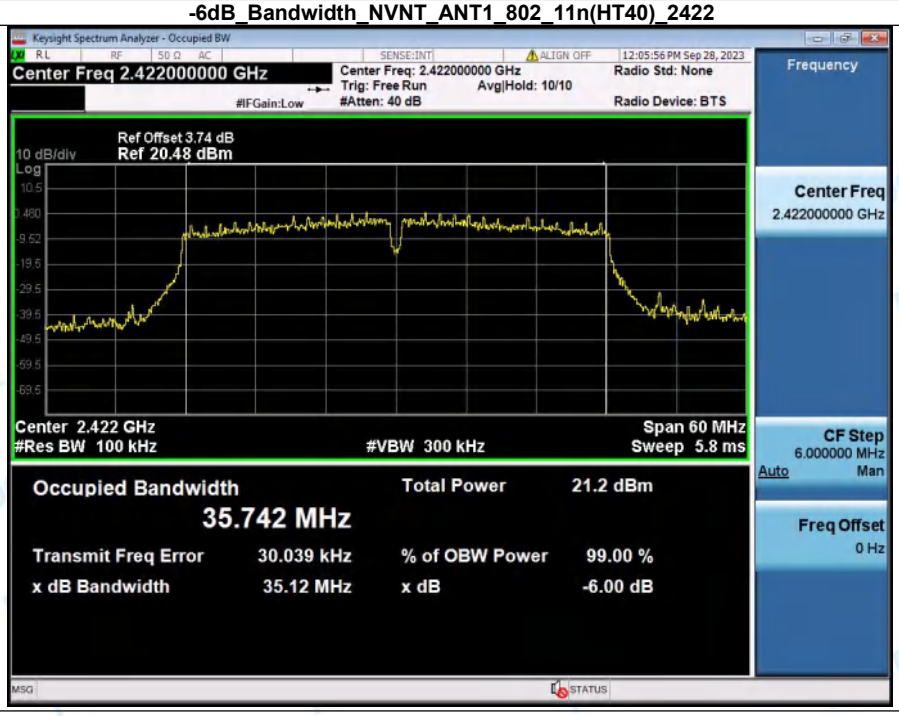
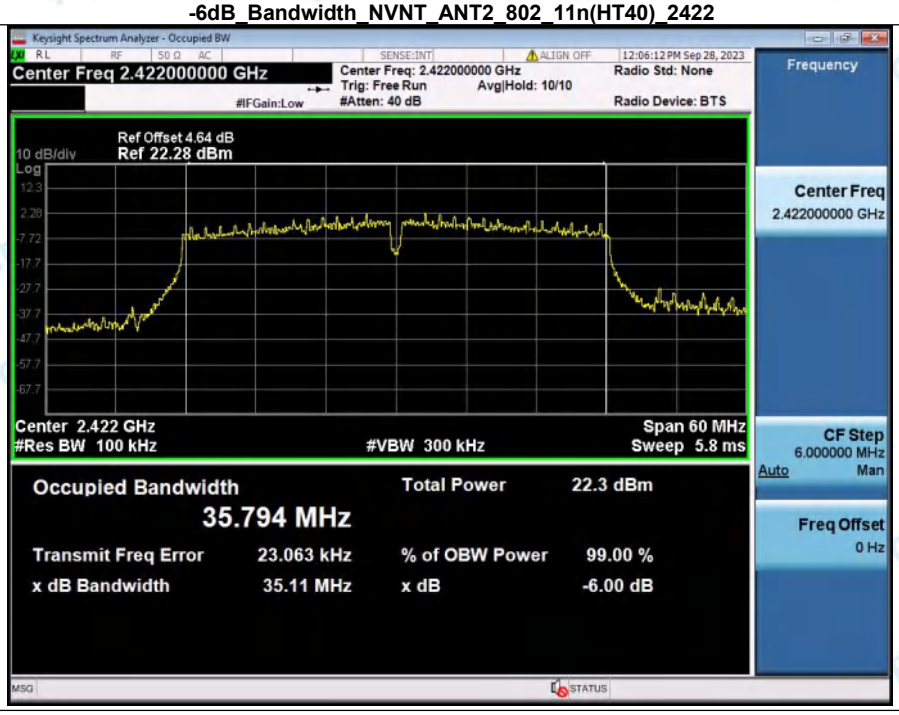


-6dB_Bandwidth_NVNT_ANT2_802_11n(HT40)_2422



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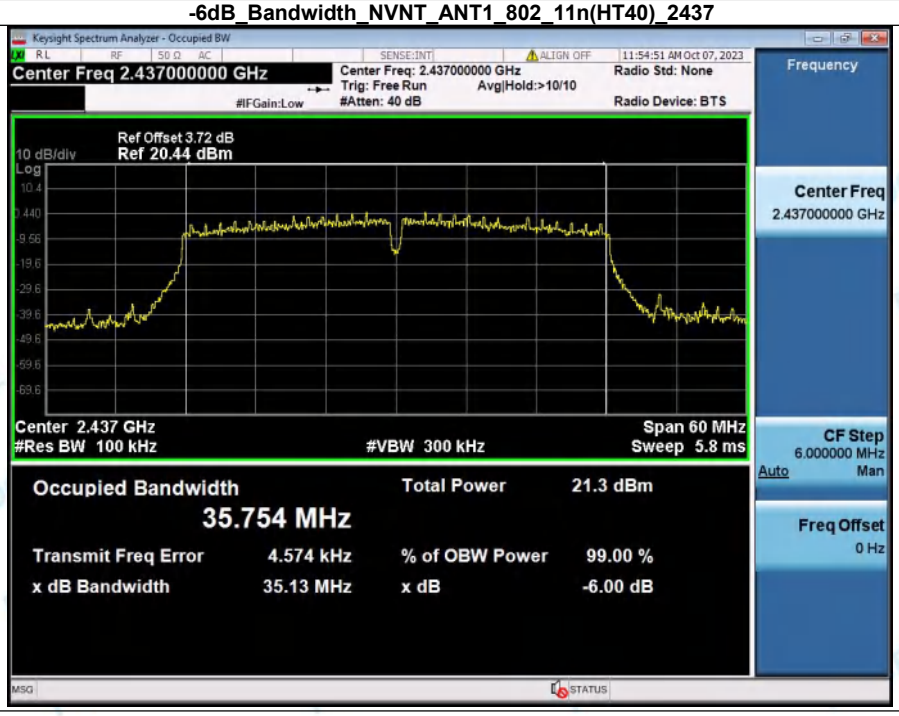

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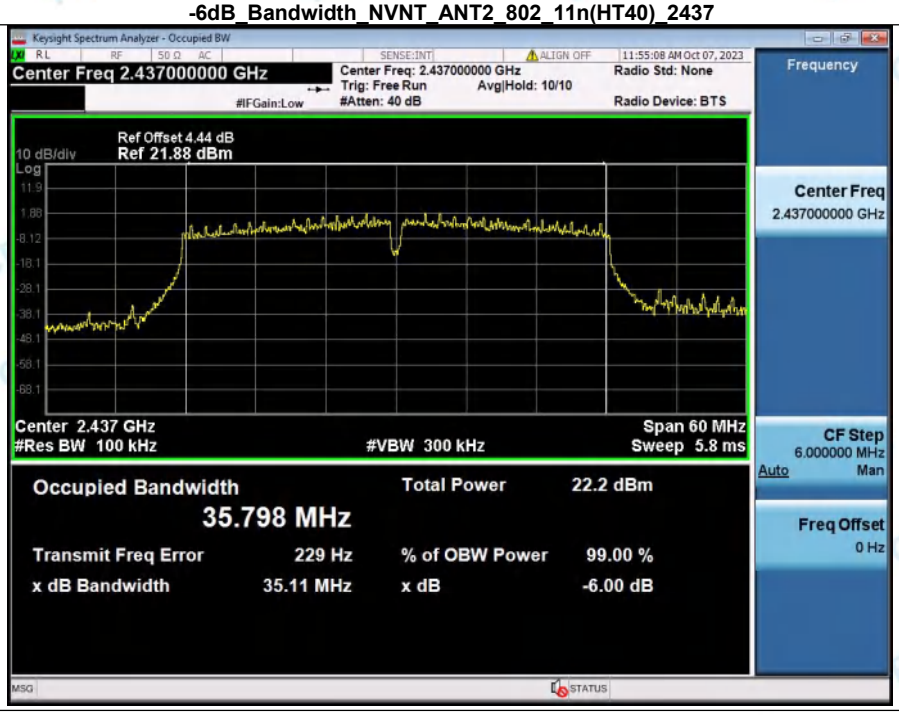

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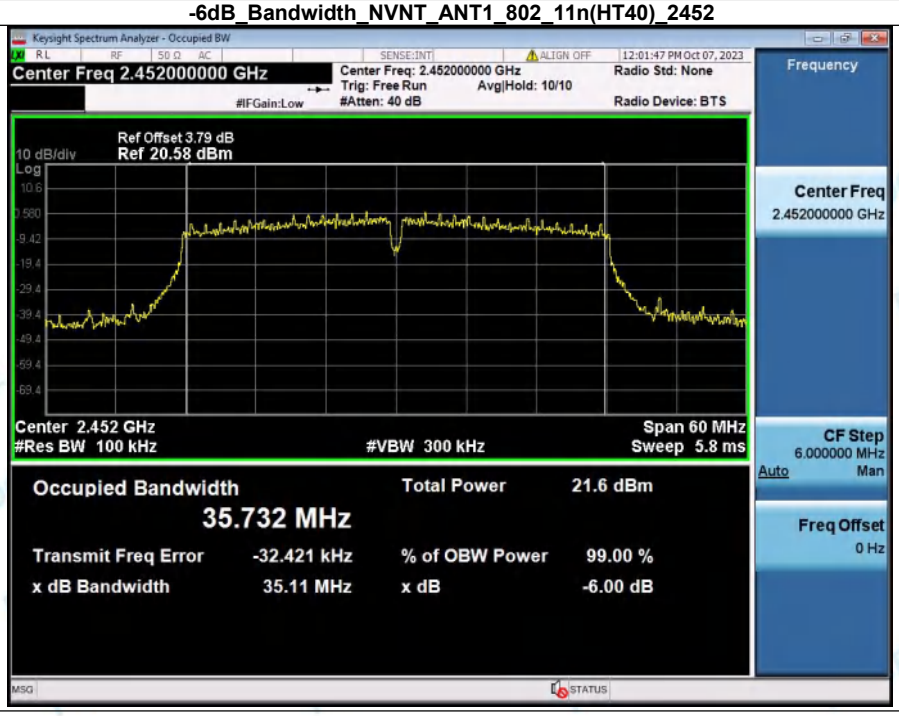
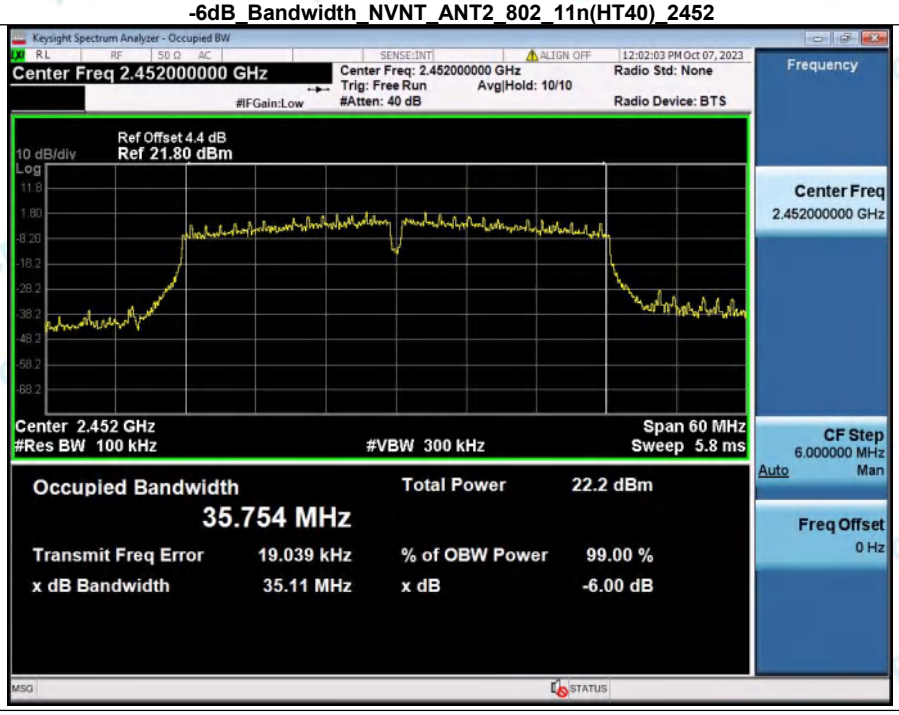


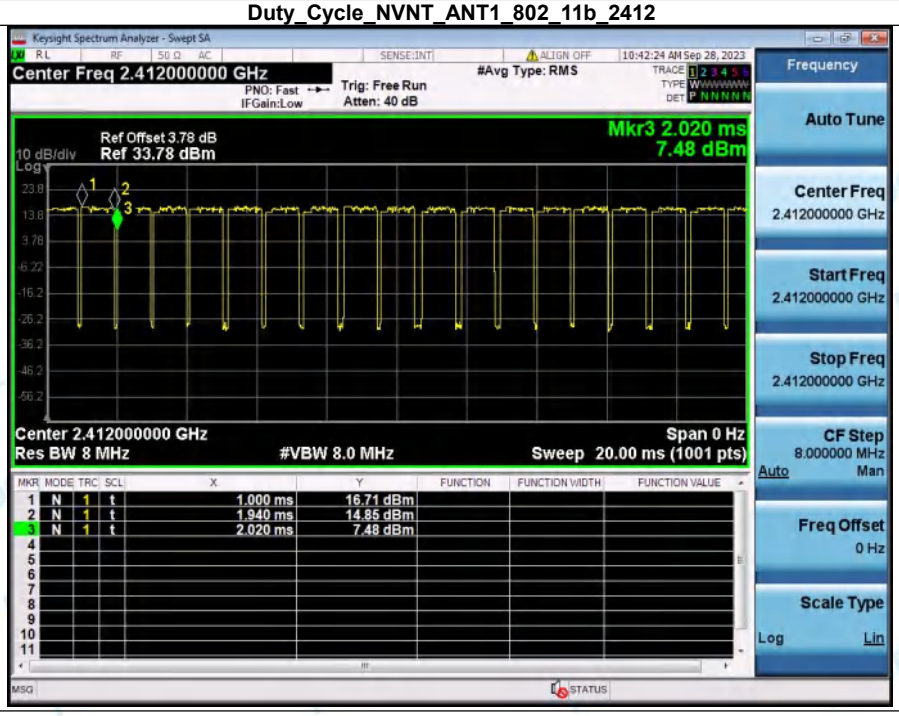
-6dB_Bandwidth_NVNT_ANT2_802_11n(HT40)_2452



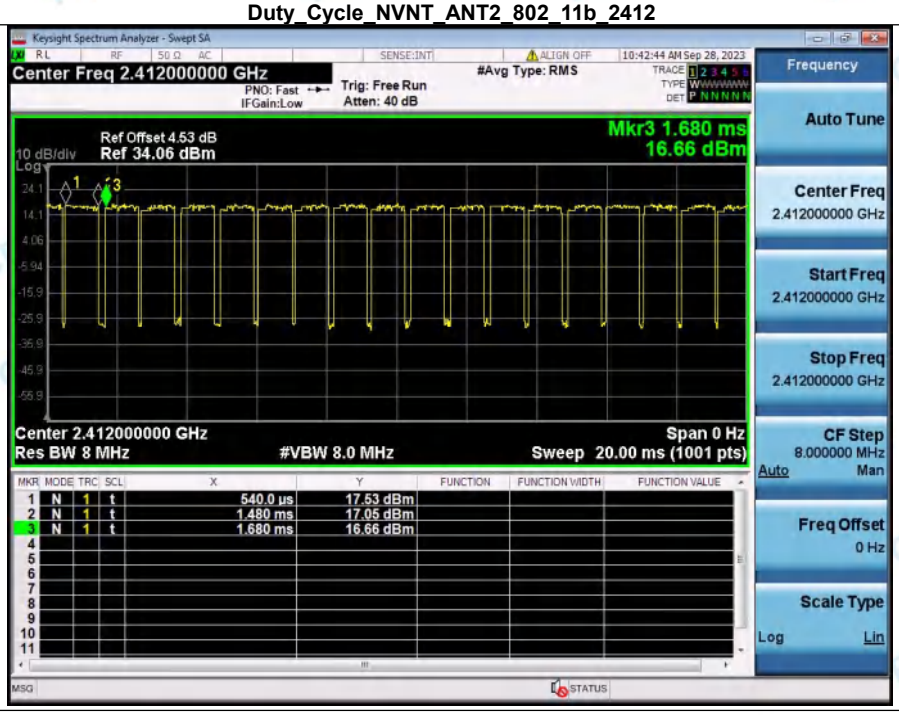
2. Duty Cycle

Condition	Antenna	Modulation	Frequency (MHz)	Duty cycle(%)	Duty factor(dB)
NVNT	ANT1	802.11b	2412.00	94.12	0.26
NVNT	ANT2	802.11b	2412.00	84.21	0.75
NVNT	ANT1	802.11b	2437.00	88.89	0.51
NVNT	ANT2	802.11b	2437.00	87.27	0.59
NVNT	ANT1	802.11b	2462.00	87.27	0.59
NVNT	ANT2	802.11b	2462.00	88.89	0.51
NVNT	ANT1	802.11g	2412.00	62.50	2.04
NVNT	ANT2	802.11g	2412.00	47.37	3.25
NVNT	ANT1	802.11g	2437.00	64.29	1.92
NVNT	ANT2	802.11g	2437.00	56.25	2.50
NVNT	ANT1	802.11g	2462.00	58.82	2.30
NVNT	ANT2	802.11g	2462.00	53.33	2.73
NVNT	ANT1	802.11n(HT20)	2412.00	58.82	2.30
NVNT	ANT2	802.11n(HT20)	2412.00	60.00	2.22
NVNT	ANT1	802.11n(HT20)	2437.00	44.44	3.52
NVNT	ANT2	802.11n(HT20)	2437.00	60.00	2.22
NVNT	ANT1	802.11n(HT20)	2462.00	75.00	1.25
NVNT	ANT2	802.11n(HT20)	2462.00	50.00	3.01
NVNT	ANT1	802.11n(HT40)	2422.00	42.86	3.68
NVNT	ANT2	802.11n(HT40)	2422.00	60.00	2.22
NVNT	ANT1	802.11n(HT40)	2437.00	40.00	3.98
NVNT	ANT2	802.11n(HT40)	2437.00	54.55	2.63
NVNT	ANT1	802.11n(HT40)	2452.00	33.33	4.77
NVNT	ANT2	802.11n(HT40)	2452.00	50.00	3.01

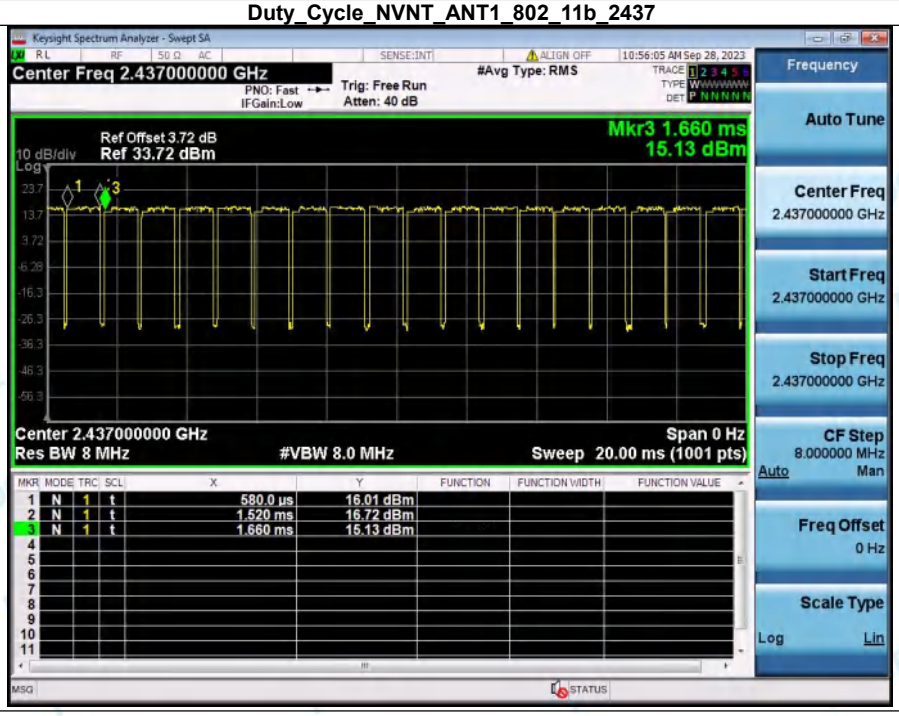
Duty_Cycle_NVNT_ANT1_802_11b_2412



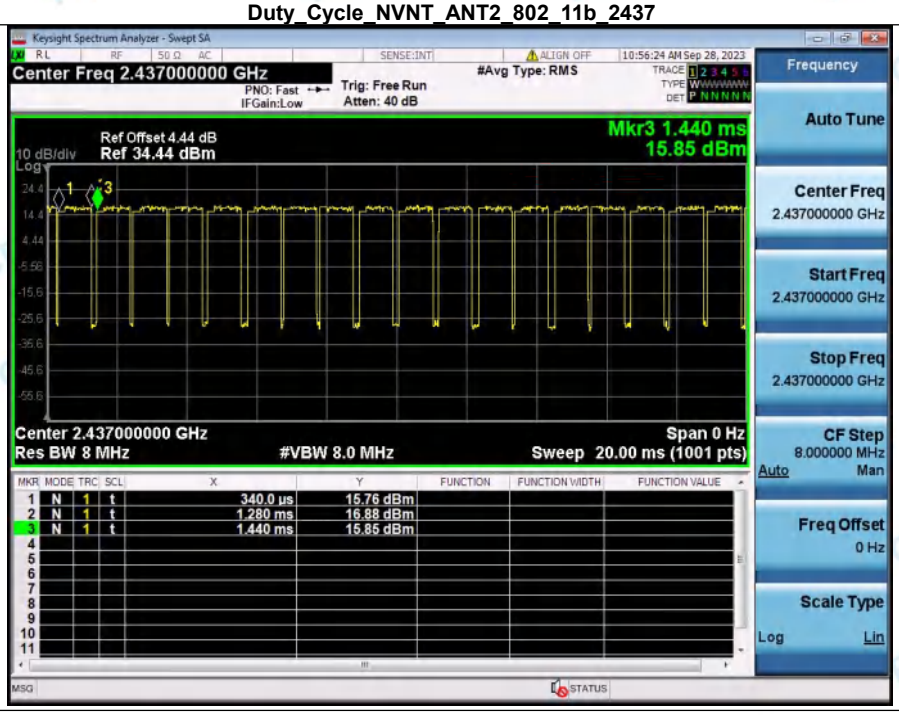
Duty_Cycle_NVNT_ANT2_802_11b_2412



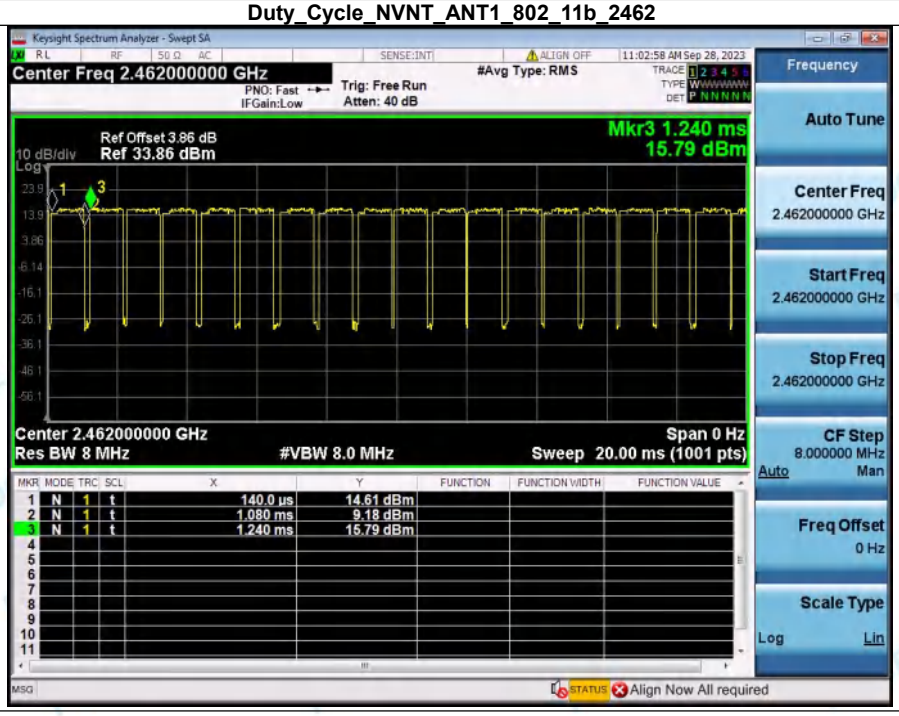
Duty_Cycle_NVNT_ANT1_802_11b_2437



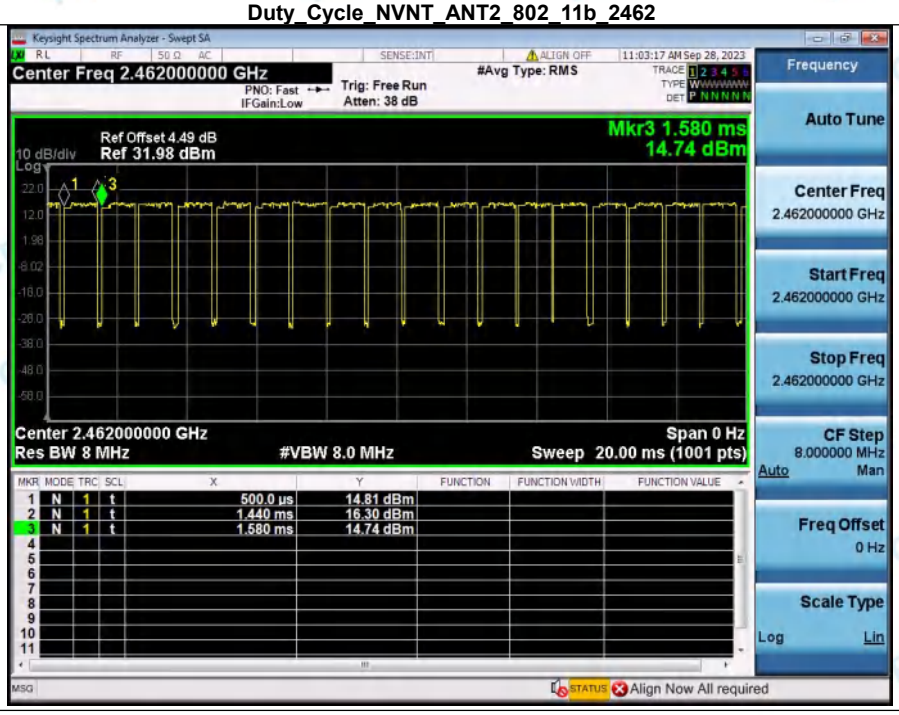
Duty_Cycle_NVNT_ANT2_802_11b_2437



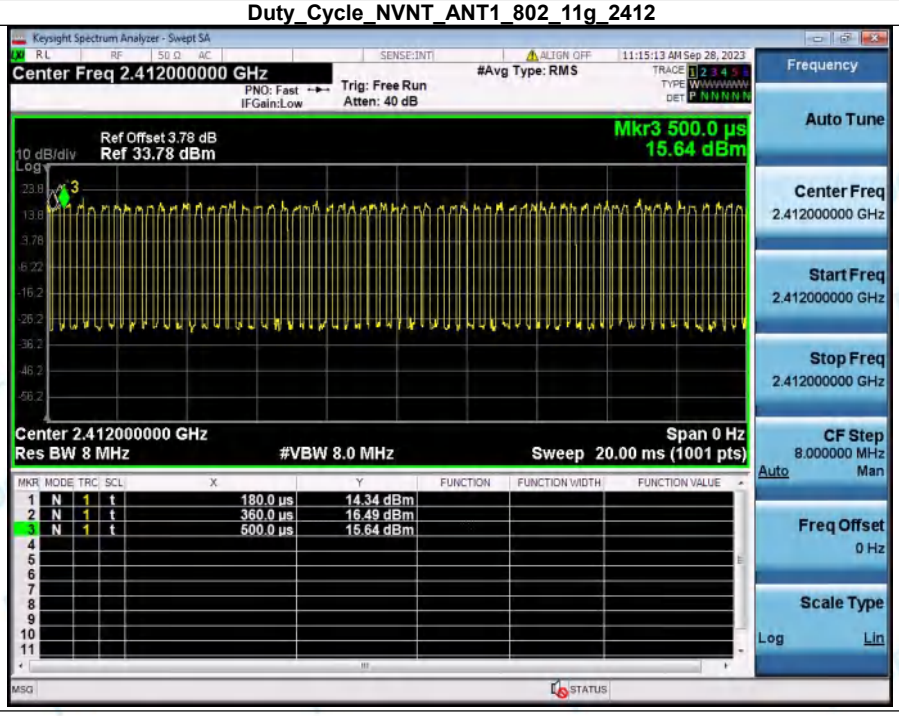
Duty_Cycle_NVNT_ANT1_802_11b_2462



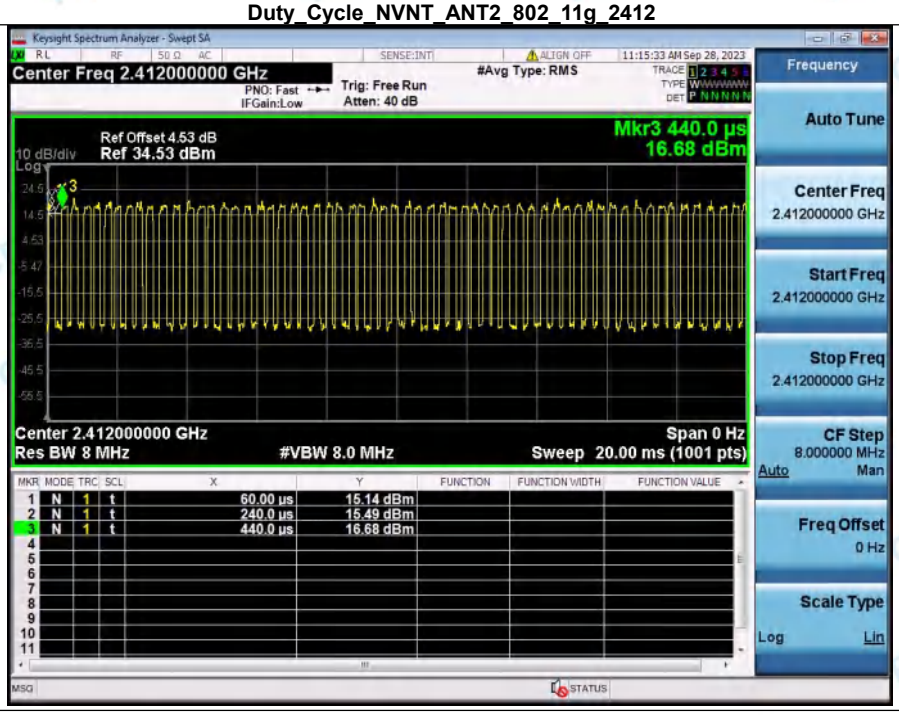
Duty_Cycle_NVNT_ANT2_802_11b_2462



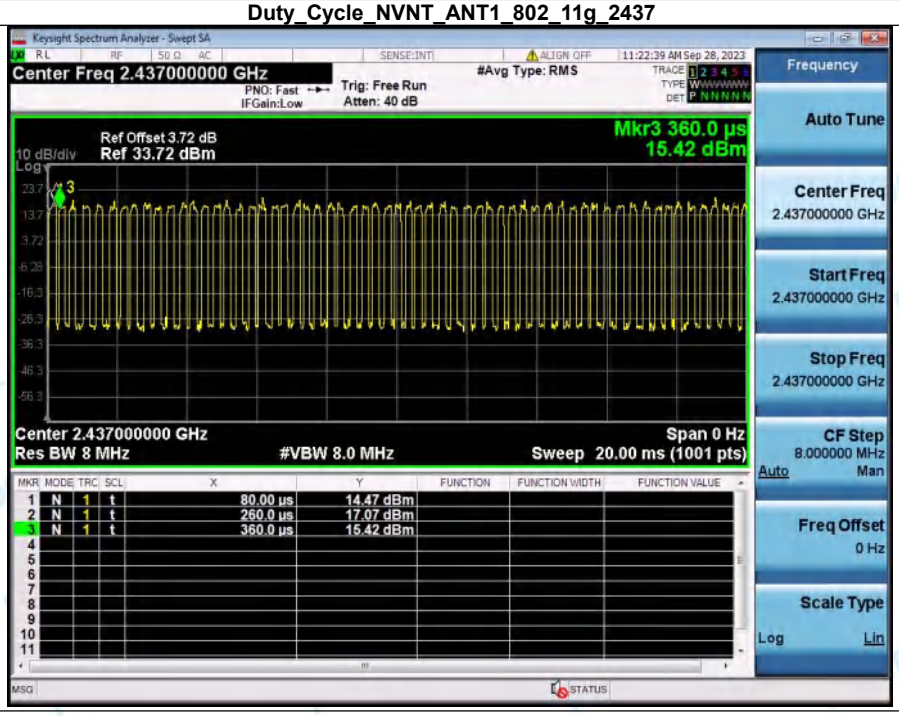
Duty_Cycle_NVNT_ANT1_802_11g_2412



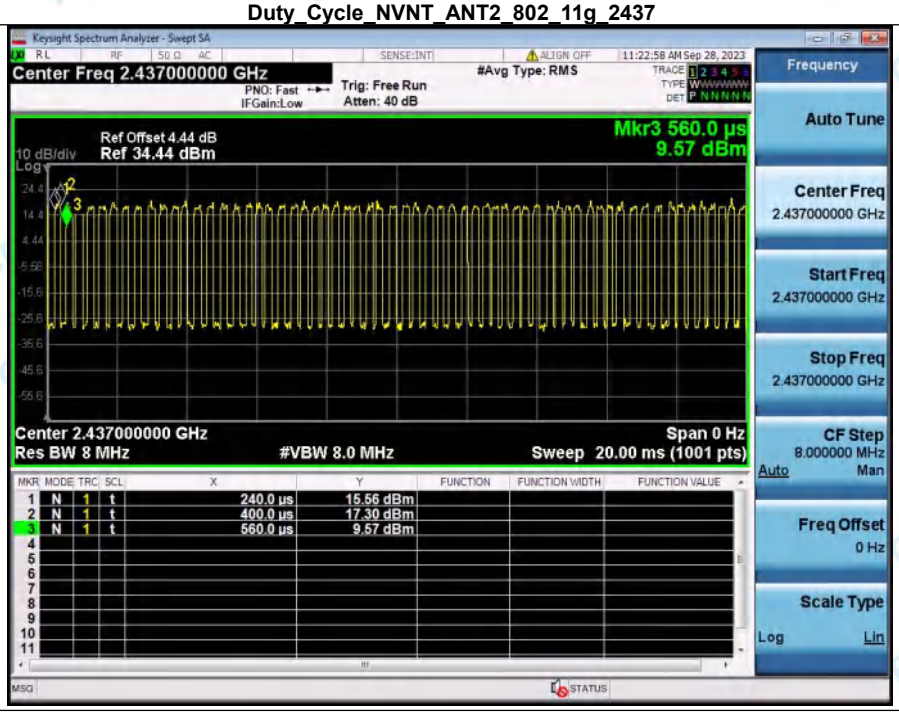
Duty_Cycle_NVNT_ANT2_802_11g_2412



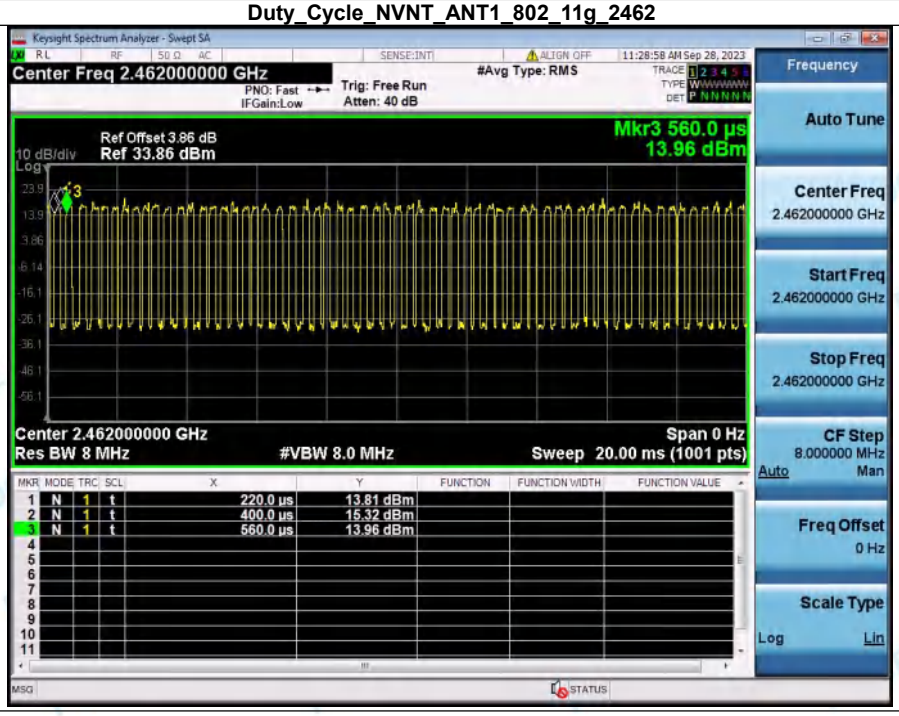
Duty_Cycle_NVNT_ANT1_802_11g_2437



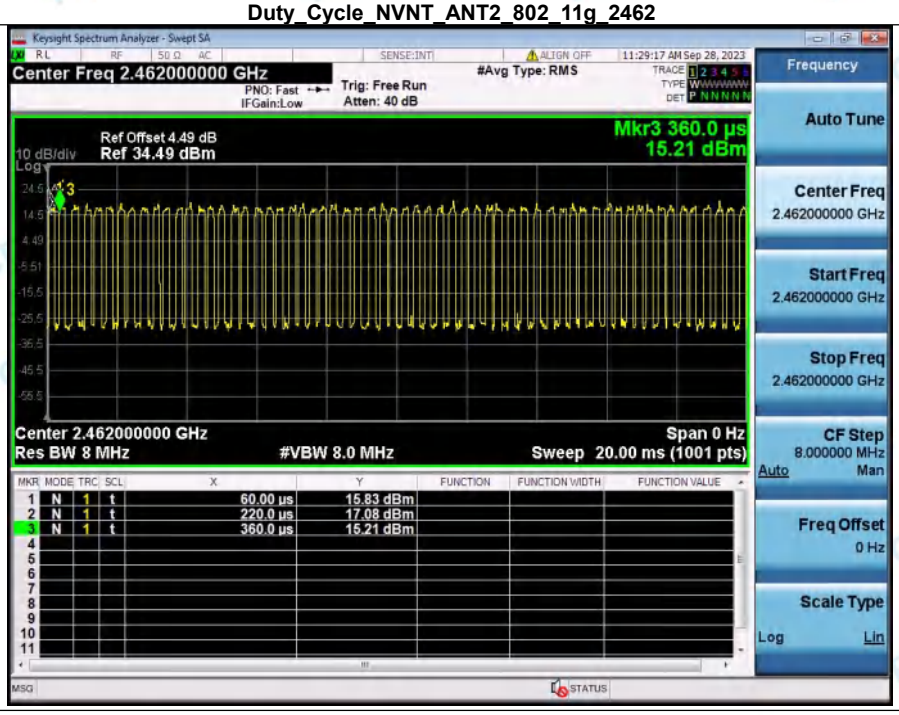
Duty_Cycle_NVNT_ANT2_802_11g_2437



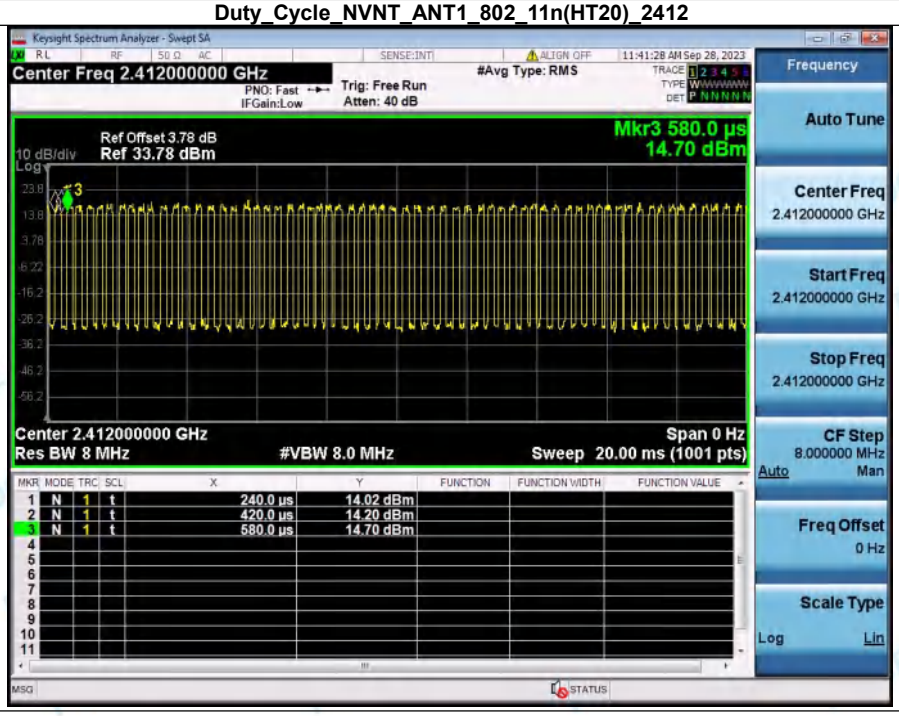
Duty_Cycle_NVNT_ANT1_802_11g_2462



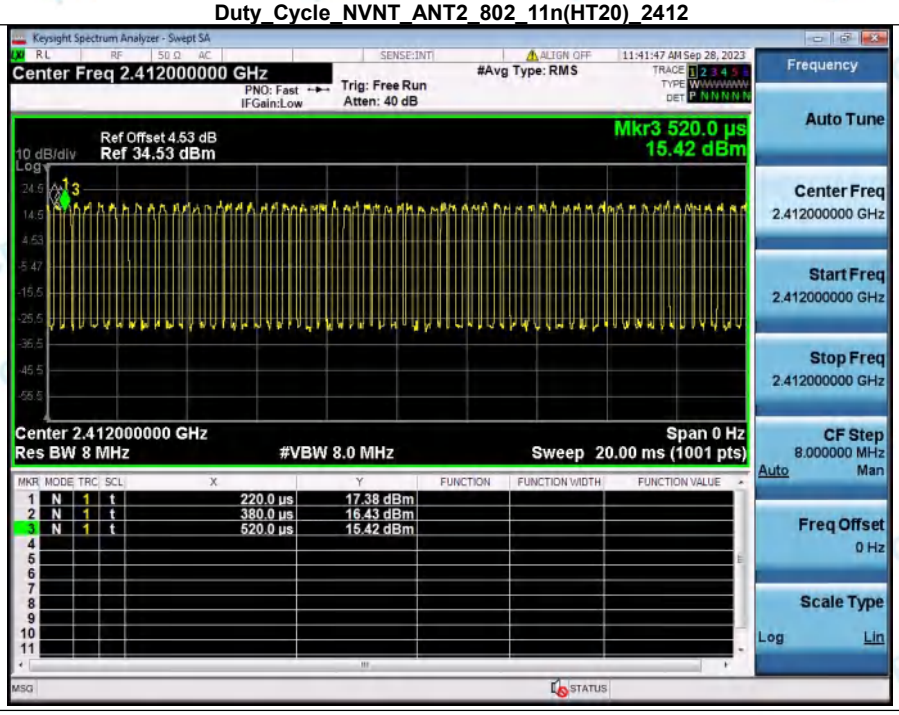
Duty_Cycle_NVNT_ANT2_802_11g_2462



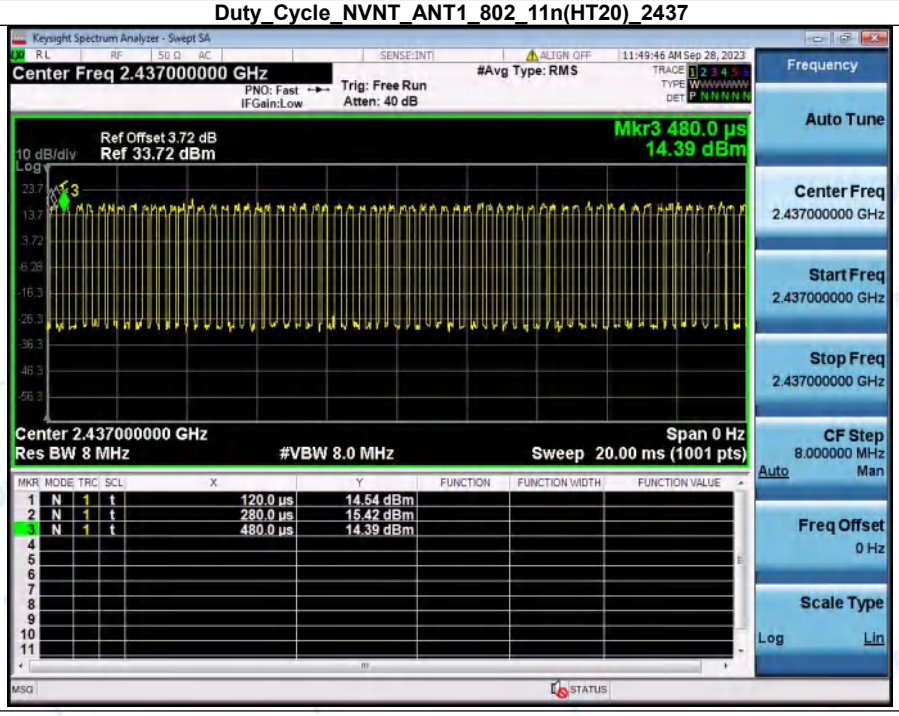
Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2412



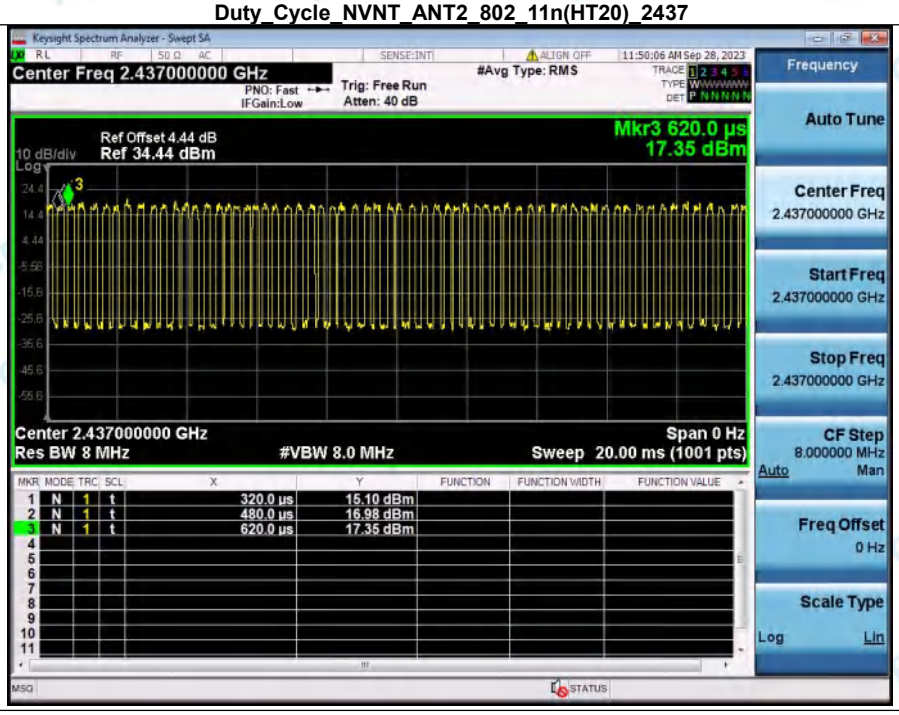
Duty_Cycle_NVNT_ANT2_802_11n(HT20)_2412



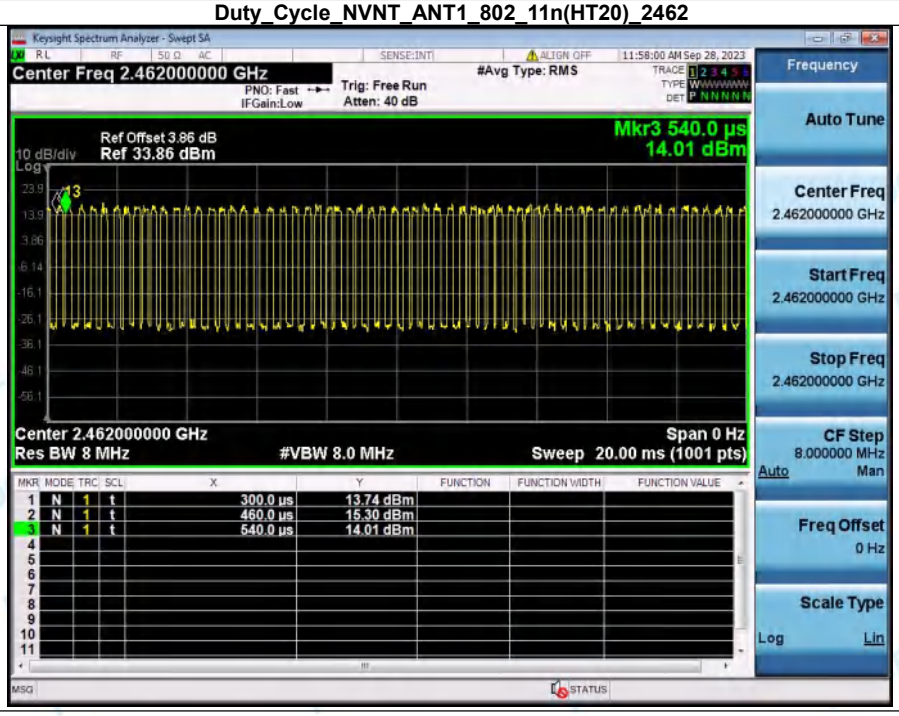
Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2437



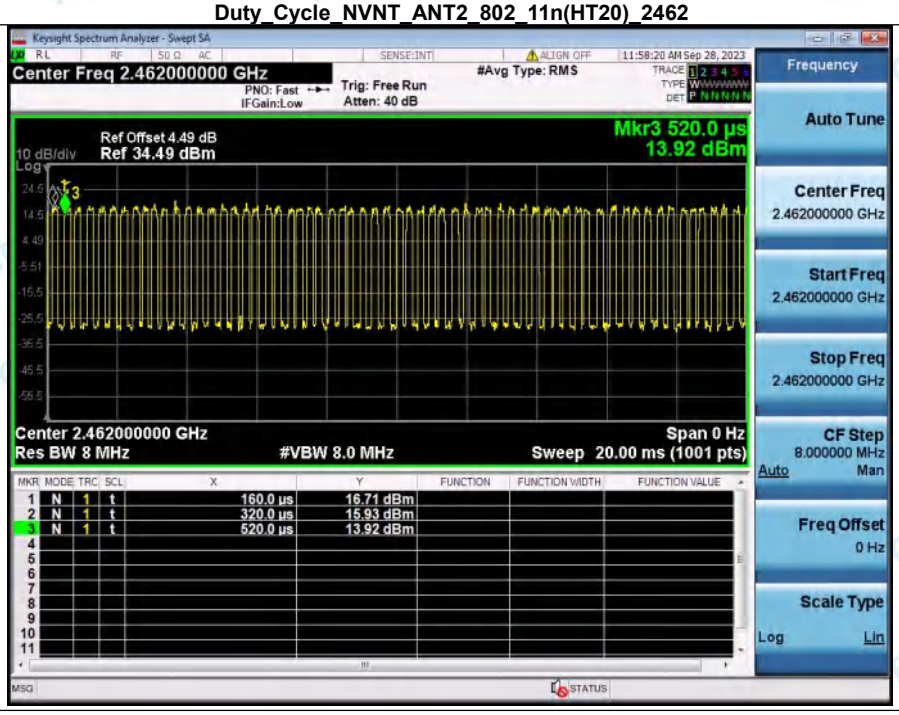
Duty_Cycle_NVNT_ANT2_802_11n(HT20)_2437



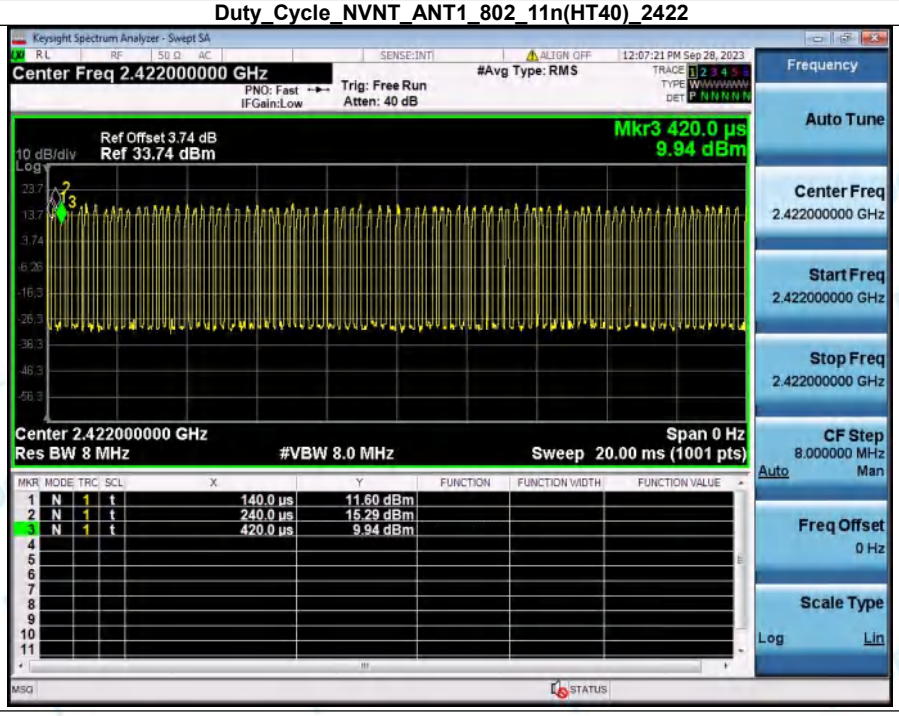
Duty_Cycle_NVNT_ANT1_802_11n(HT20)_2462



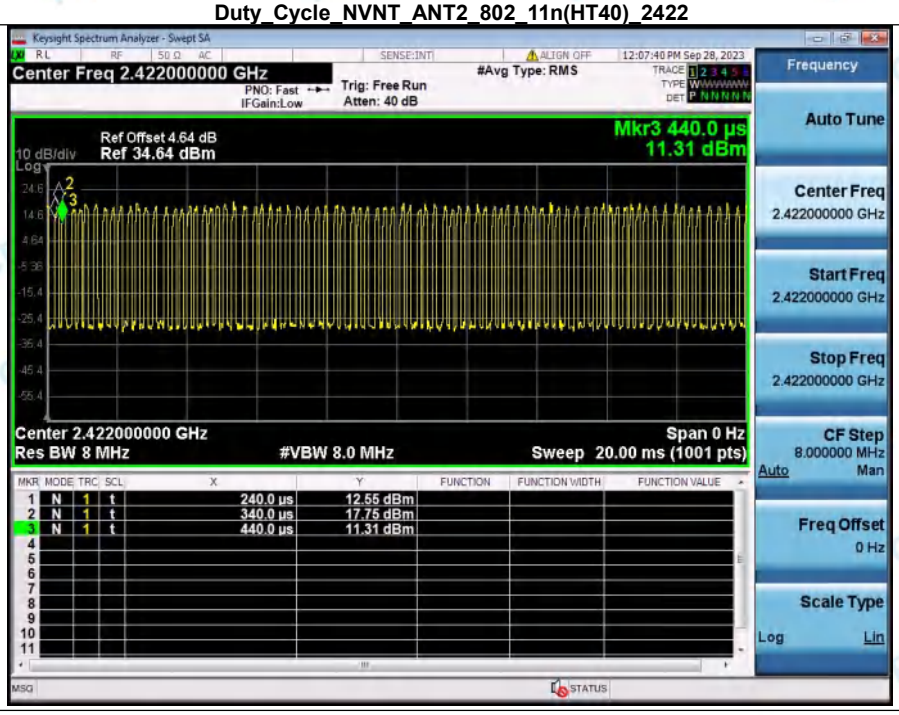
Duty_Cycle_NVNT_ANT2_802_11n(HT20)_2462



Duty_Cycle_NVNT_ANT1_802_11n(HT40)_2422



Duty_Cycle_NVNT_ANT2_802_11n(HT40)_2422



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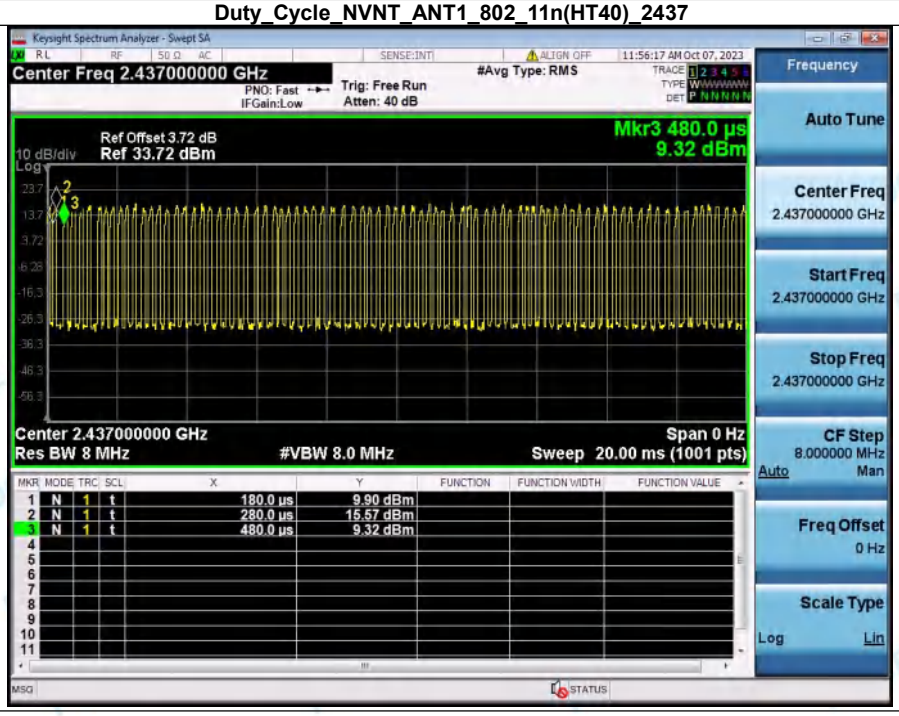

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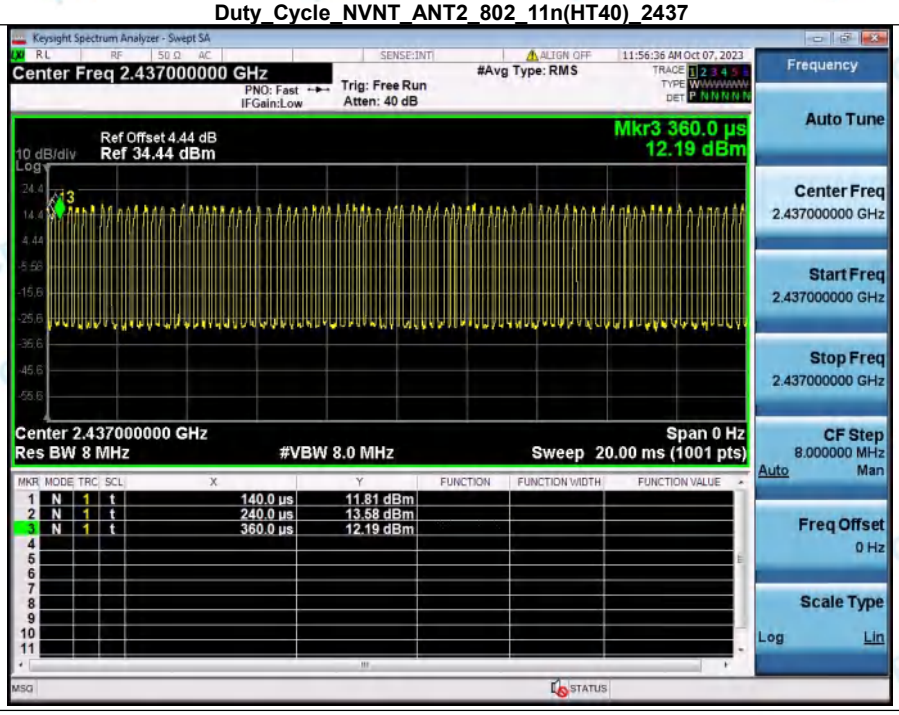
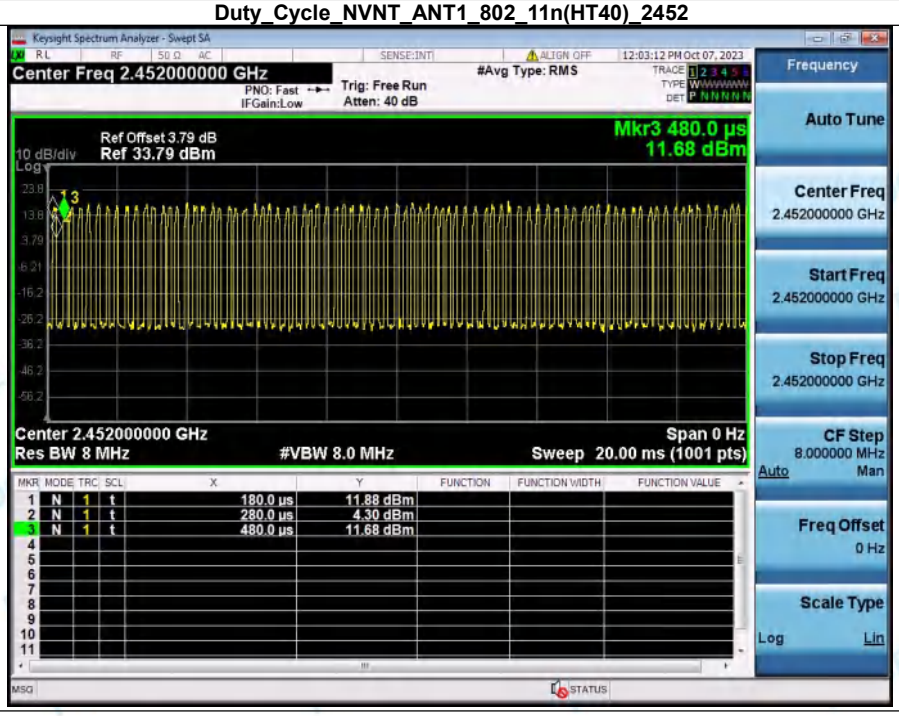
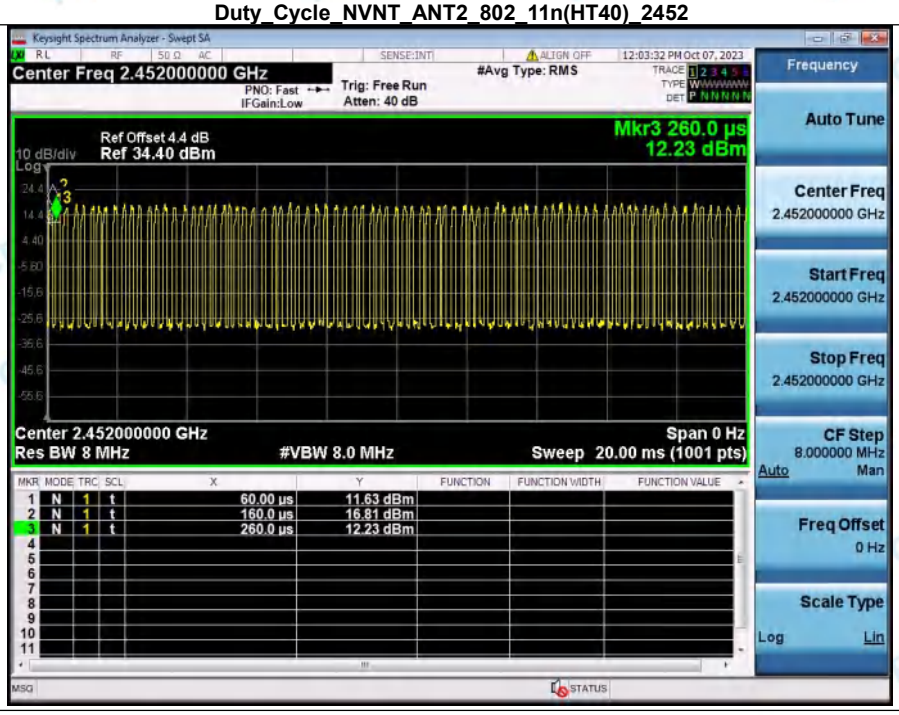


Duty_Cycle_NVNT_ANT1_802_11n(HT40)_2452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