



RF TEST REPORT

For

HTF ELECTRONIC CO.,LTD

Product Name: Wireless USB Dongle

Model(s): HT-WR818

Report Reference No. : POCE230825502KRW

FCC ID : 2BCOI-HT-WR818

Applicant's Name : HTF ELECTRONIC CO.,LTD

Address : 4 Floor F Building Heng ChangRong Industrial Zone PingHu Street
Longgang District Shenzhen City China 518000

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 : August 25, 2023

Date of Test : August 25, 2023 to September 14, 2023

Data of Issue : September 14, 2023

Result : Pass

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Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE230825502KRW	September 14, 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.

Compiled by:

Amy Zhu / File administrators

Supervised by:

Stone Yin / Technique principal

Approved by:

Machael Mo / Manager

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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	47 CFR 15.247(a)(2)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	ANSI C63.10-2013, section 11.9.1	47 CFR 15.247(b)(3)	Pass
Power Spectral Density	47 CFR Part 15.247	ANSI C63.10-2013, section 11.10	47 CFR 15.247(e)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	ANSI C63.10-2013 section 11.11	47 CFR 15.247(d)	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	ANSI C63.10-2013 section 6.10	47 CFR 15.247(d)	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)	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)	Pass

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name : HTF ELECTRONIC CO.,LTD
Address : 4 Floor F Building Heng ChangRong Industrial Zone PingHu Street
Longgang District Shenzhen City China 518000

Manufacturer : HTF ELECTRONIC CO.,LTD
Address : 4 Floor F Building Heng ChangRong Industrial Zone PingHu Street
Longgang District Shenzhen City China 518000

2.2 Description of Device (EUT)

Product Name:	Wireless USB Dongle
Model/Type reference:	HT-WR818
Series Model:	HT-WR1200F,HT-WR1200E,HT-WR812, HT-WR813,HT-WR701,HTWR70E, HT-WR818,HT-WR818N, HT-WR818E, HT-WR701F, HT-WR810AC, HT-WR810AF, HT-WR821AC, HT-WR822AC,HT-WR820E,HT-WR150F, HT-WR300F,HT-WR600F
Model Difference:	The product has many models, only the model name is different, and the other parts such as the circuit principle, pcb and electrical structure are the same.
Trade Mark:	N/A
Power Supply:	DC:5V
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:	PCB Antenna
Antenna Gain:	0dBi

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		

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

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(she n zhen) 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

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)	$\pm 3.41\text{dB}$
Occupied Bandwidth	$\pm 3.63\%$
RF conducted power	$\pm 0.733\text{dB}$
RF power density	$\pm 0.234\%$
Conducted Spurious emissions	$\pm 1.98\text{dB}$
Radiated Emission (Above 1GHz)	$\pm 5.46\text{dB}$
Radiated Emission (Below 1GHz)	$\pm 5.79\text{dB}$
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, Shiyao, 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, Shiyao, 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

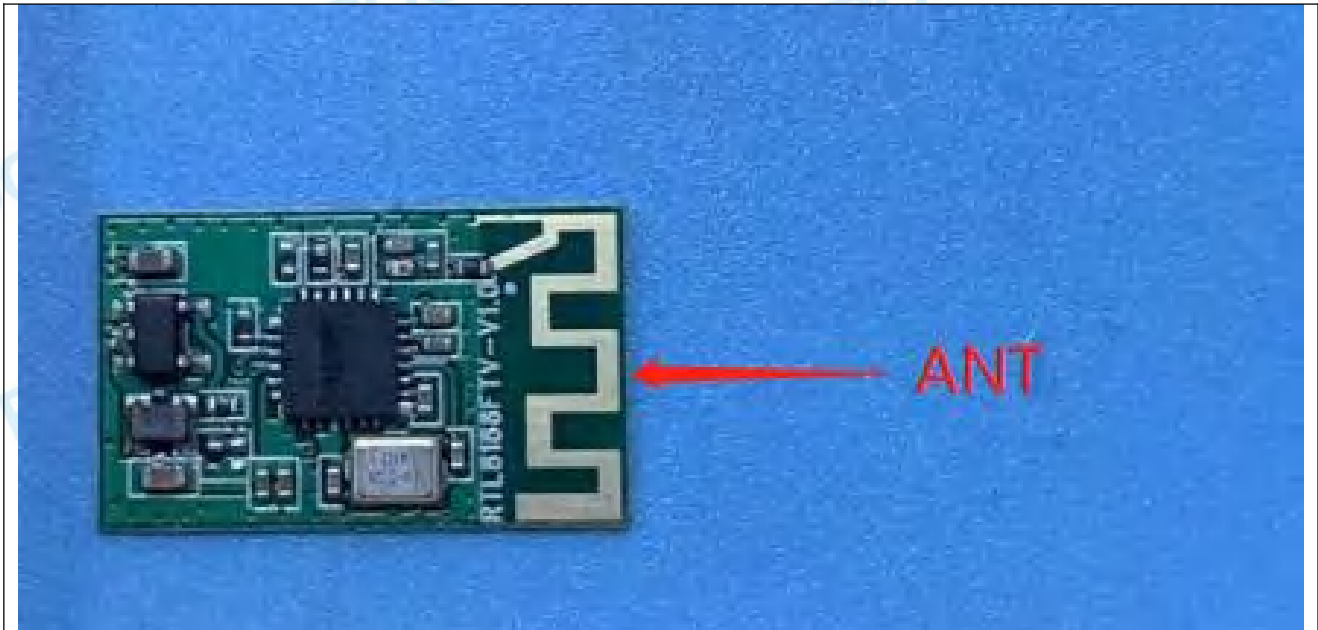
- (1) The test report reference to the report template version v0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) 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

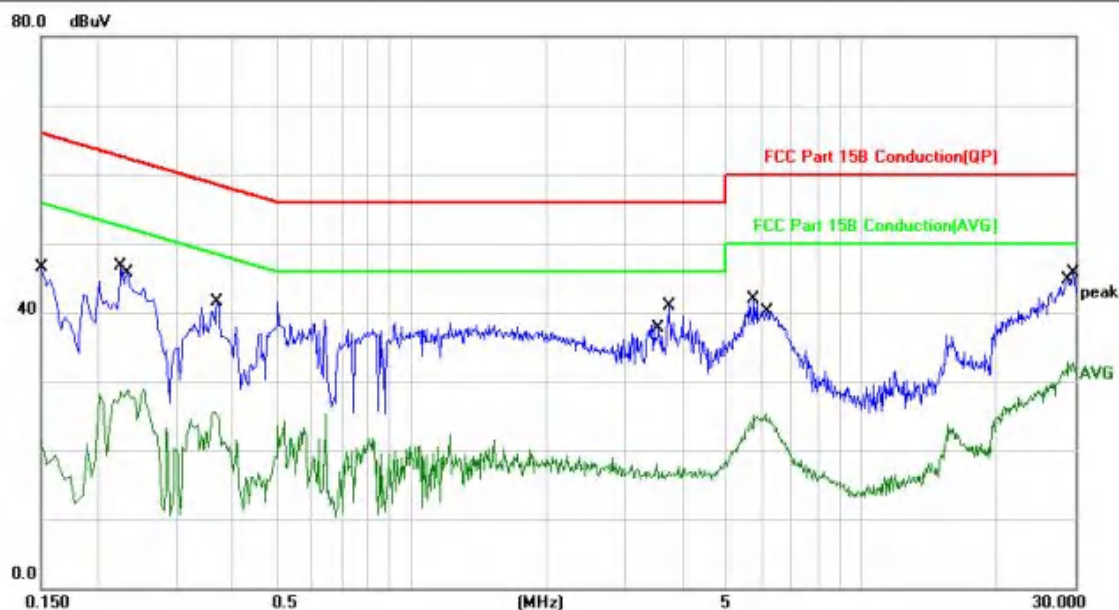
Test Requirement:	Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.
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3.1.1 Conclusion:



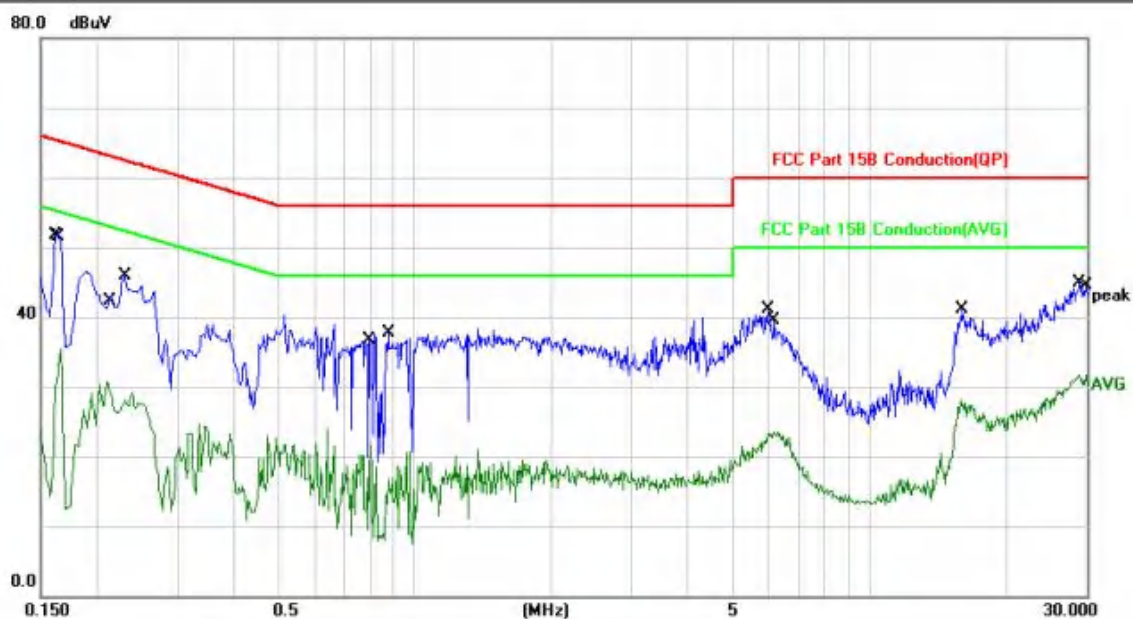
4.1.3 Test Data:

TM1 / Line: Line / Band: 2.4G / BW: 20 / CH: L



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	36.34	10.20	46.54	65.99	-19.45	QP	
2		0.1500	11.37	10.20	21.57	55.99	-34.42	AVG	
3		0.2260	36.58	10.19	46.77	62.59	-15.82	QP	
4		0.2340	18.50	10.19	28.69	52.30	-23.61	AVG	
5		0.3660	15.36	10.16	25.52	48.59	-23.07	AVG	
6		0.3700	31.37	10.16	41.53	58.50	-16.97	QP	
7		3.5140	7.83	10.25	18.08	46.00	-27.92	AVG	
8		3.7420	30.56	10.27	40.83	56.00	-15.17	QP	
9		5.7900	31.28	10.60	41.88	60.00	-18.12	QP	
10		6.1220	14.59	10.66	25.25	50.00	-24.75	AVG	
11		29.0460	18.80	14.11	32.91	50.00	-17.09	AVG	
12	*	29.8100	31.49	14.19	45.68	60.00	-14.32	QP	

TM1 / Line: Line / Band: 2.4G / BW: 20 / CH: N



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1620	41.60	10.19	51.79	65.36	-13.57	QP	
2		0.1660	25.31	10.19	35.50	55.15	-19.65	AVG	
3		0.2100	20.60	10.19	30.79	53.20	-22.41	AVG	
4		0.2300	35.76	10.19	45.95	62.45	-16.50	QP	
5		0.7980	11.34	10.10	21.44	46.00	-24.56	AVG	
6		0.8740	27.68	10.08	37.76	56.00	-18.24	QP	
7		5.9860	30.47	10.63	41.10	60.00	-18.90	QP	
8		6.1779	12.86	10.67	23.53	50.00	-26.47	AVG	
9		15.8380	15.57	12.46	28.03	50.00	-21.97	AVG	
10		16.0140	28.53	12.49	41.02	60.00	-18.98	QP	
11		29.0260	30.84	14.10	44.94	60.00	-15.06	QP	
12		29.8740	17.53	14.20	31.73	50.00	-18.27	AVG	

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. Measurement Level = Reading level + Correct Factor, Over=Limit- Measurement
4. The test data shows only the worst case(802.11n(HT20) mode)

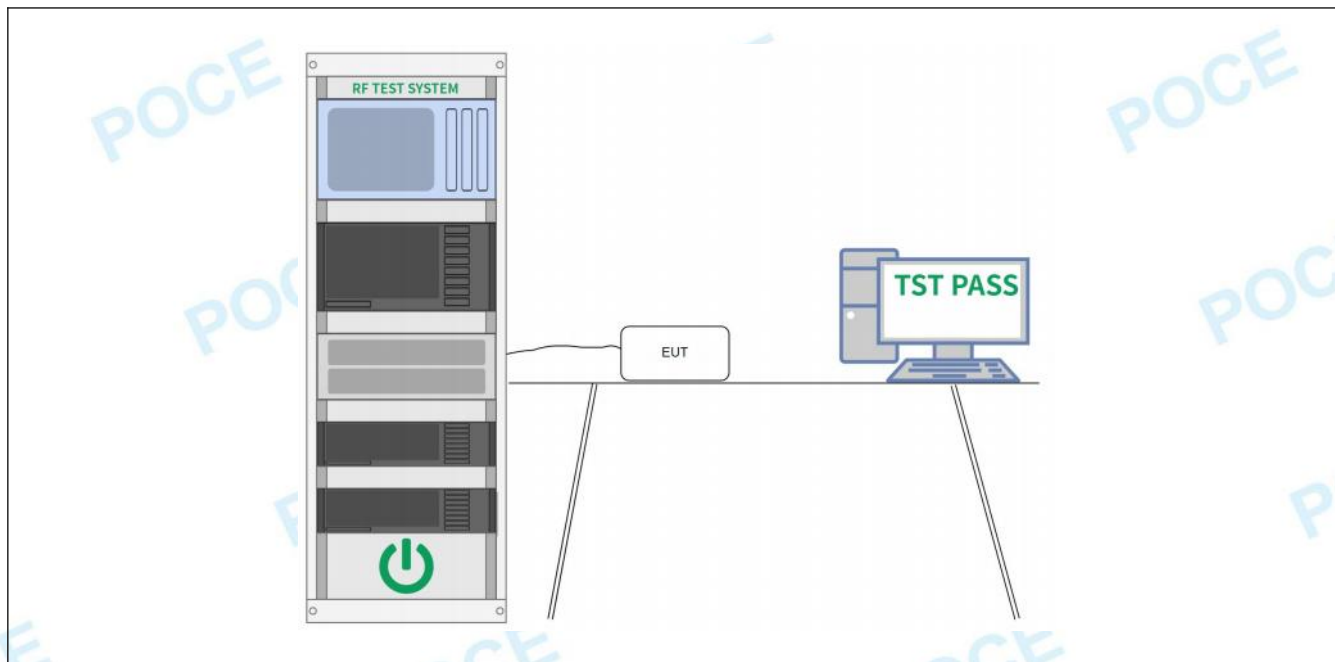
4.2 Occupied Bandwidth

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
Procedure:	a) Set RBW = 100 kHz. b) Set the VBW $\geq [3 \times \text{RBW}]$. 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:	23.3 °C	Humidity:	56 %	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.

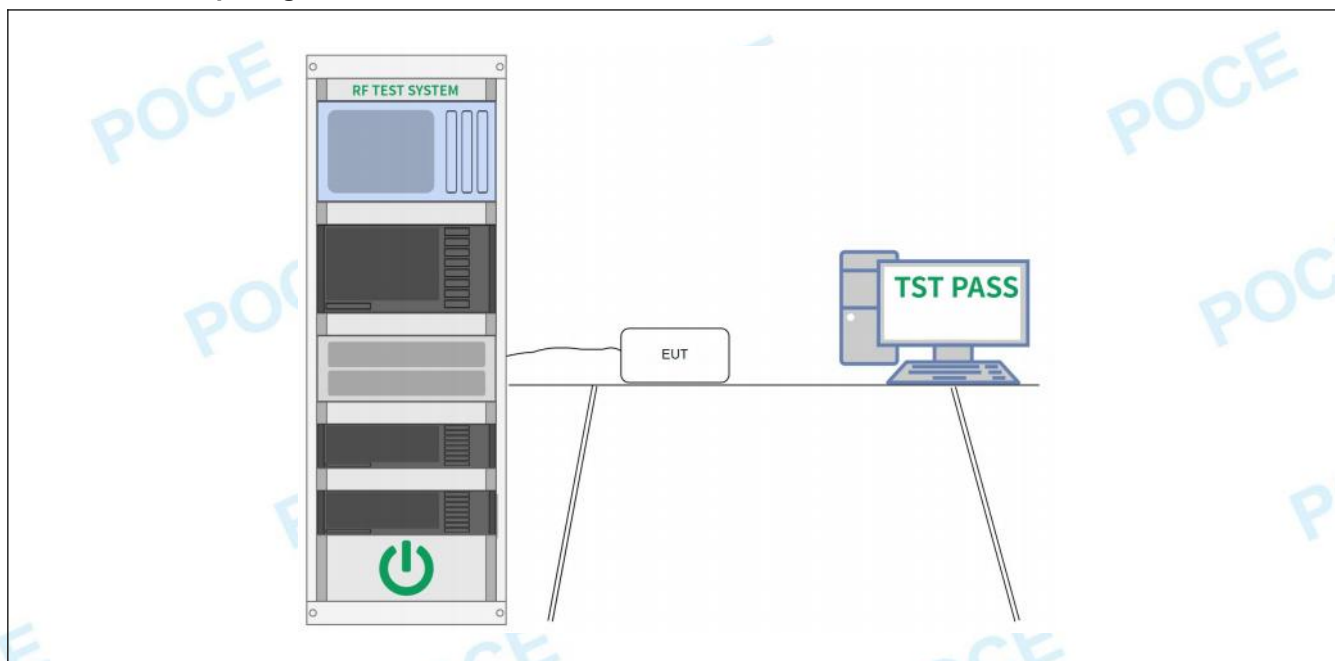
4.3 Maximum Conducted Output Power

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
Procedure:	ANSI C63.10-2013, section 11.9.1 Maximum peak conducted output power

4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.3 °C	Humidity:	56 %	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.

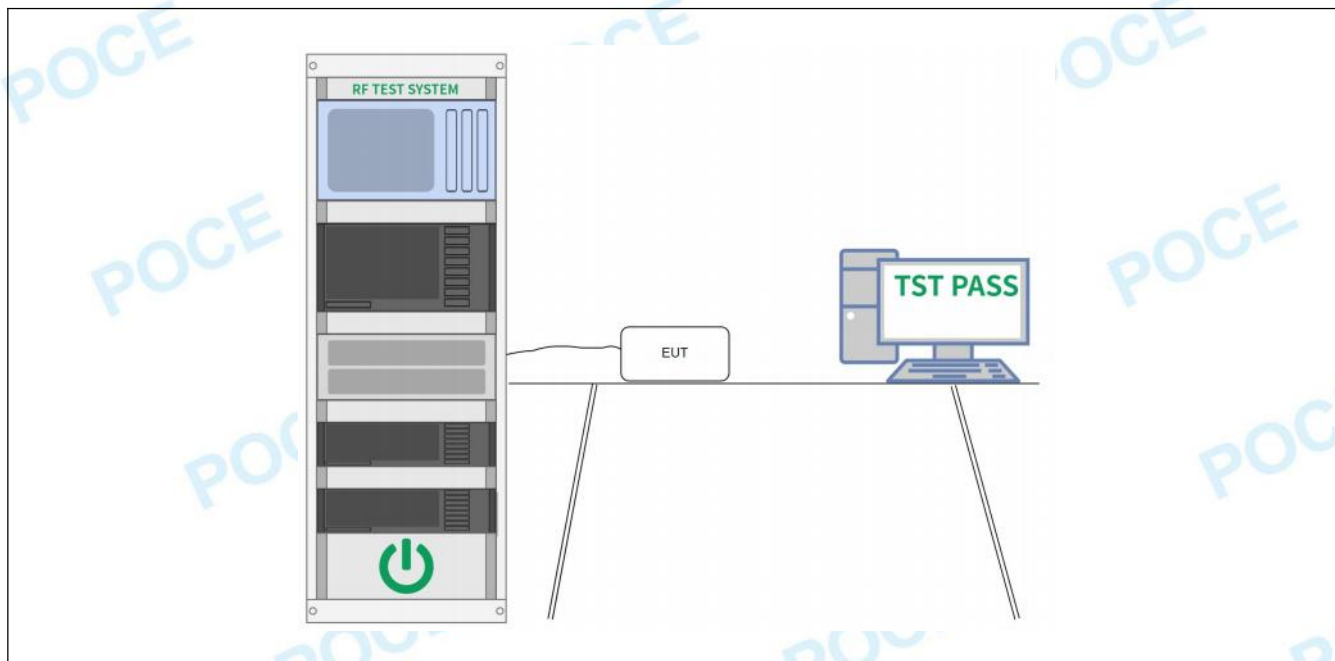
4.4 Power Spectral Density

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
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:	23.3 °C	Humidity:	56 %	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.

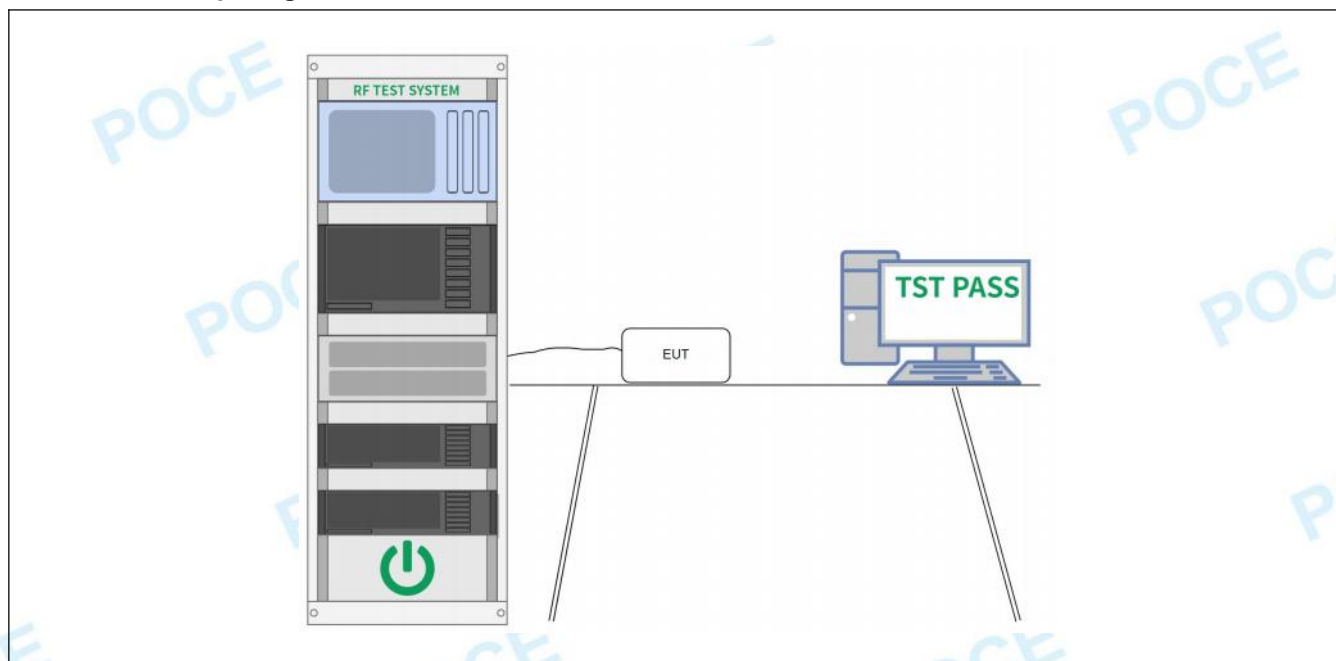
4.5 Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d)
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
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:	23.3 °C	Humidity:	56 %	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.

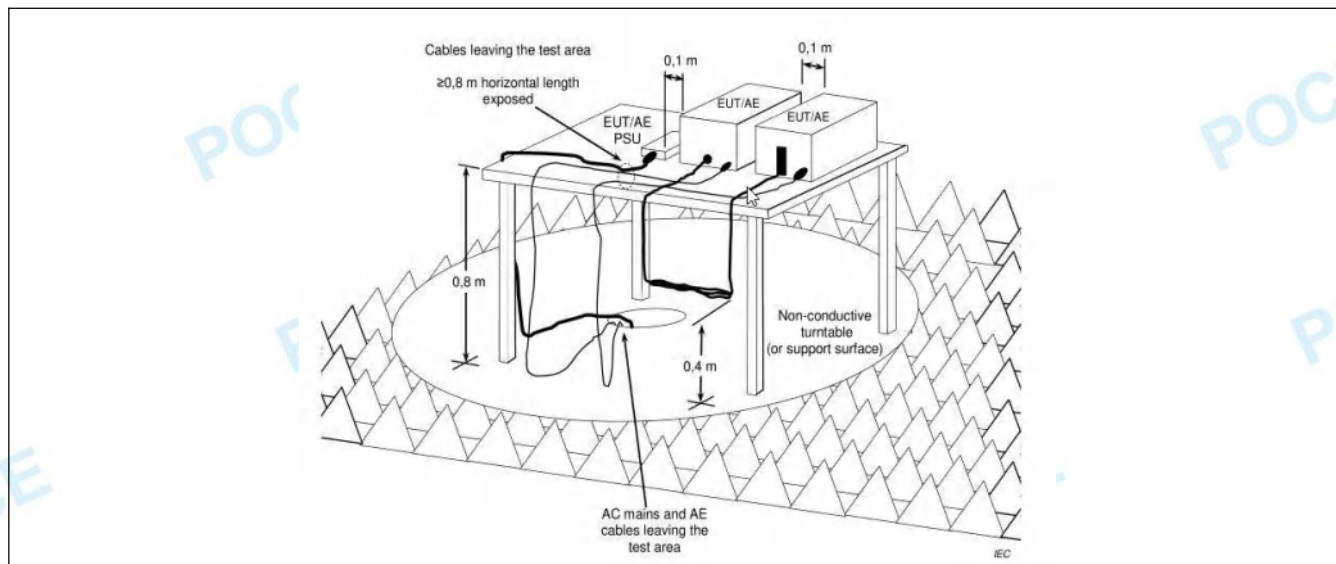
4.6 Band edge emissions (Radiated)

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		
Procedure:	ANSI C63.10-2013 section 6.10.5.2		

4.6.1 E.U.T. Operation:

Operating Environment:			
Temperature:	23.3 °C	Humidity:	56 %
		Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM3, TM4		
Final test mode:	TM2		

4.6.2 Test Setup Diagram:



4.6.3 Test Data:

TM2 / Polarization:Band: 2400-2483.5 MHz / BW: 20 / CH: L							
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
2310	57.78	-6.93	50.85	74	-23.15	peak	H
2310	45.23	-6.93	38.30	54	-15.70	AVG	H
2390	61.72	-6.72	55.00	74	-19.00	peak	H
2390	49.40	-6.72	42.68	54	-11.32	AVG	H
2310	58.27	-6.93	51.34	74	-22.66	peak	V
2310	45.10	-6.93	38.17	54	-15.83	AVG	V
2390	63.55	-6.72	56.83	74	-17.17	peak	V
2390	47.27	-6.72	40.55	54	-13.45	AVG	V
TM2 / Polarization:Band: 2400-2483.5 MHz / BW: 20 / CH: H							
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
2483.5	57.27	-6.47	50.80	74	-23.20	peak	H
2483.5	45.15	-6.47	38.68	54	-15.32	AVG	H
2500	64.11	-6.43	57.68	74	-16.32	peak	H
2500	48.36	-6.43	41.93	54	-12.07	AVG	H
2483.5	57.35	-6.47	50.88	74	-23.12	peak	V
2483.5	45.38	-6.47	38.91	54	-15.09	AVG	V
2500	62.18	-6.43	55.75	74	-18.25	peak	V
2500	49.46	-6.43	43.03	54	-10.97	AVG	V

Remark: Over= Measurement Level - Limit

Measurement Level=Test receiver reading + correction factor

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

4.7 Emissions in frequency bands (below 1GHz)

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 6.6.4		
Procedure:	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.
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4.7.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.3 °C	Humidity:	56 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1, TM2, TM3, TM4				
Final test mode:	TM2				

4.7.2 Test Data:

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	167.8243	39.06	-3.37	35.69	43.50	-7.81	QP	100	145	P	
2 !	208.5803	40.67	-2.80	37.87	43.50	-5.63	QP	100	234	P	
3	249.4250	40.36	-2.13	38.23	46.00	-7.77	QP	100	167	P	
4	283.9791	38.29	-0.21	38.08	46.00	-7.92	QP	100	249	P	
5	329.0390	37.71	1.31	39.02	46.00	-6.98	QP	100	341	P	
6 *	362.9844	39.33	1.67	41.00	46.00	-5.00	QP	100	58	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	158.6677	37.00	-3.56	33.44	43.50	-10.06	QP	100	156	P	
2 *	209.3129	39.50	-2.79	36.71	43.50	-6.79	QP	100	249	P	
3	261.9753	35.45	-1.64	33.81	46.00	-12.19	QP	100	167	P	
4	379.9141	34.70	1.13	35.83	46.00	-10.17	QP	100	264	P	
5	627.2738	30.36	4.36	34.72	46.00	-11.28	QP	100	354	P	
6	958.7943	25.25	9.30	34.55	46.00	-11.45	QP	100	38	P	

4.8 Emissions in frequency bands (above 1GHz)

Test Requirement:	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 6.6.4		
Procedure:	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.

4.8.1 E.U.T. Operation:

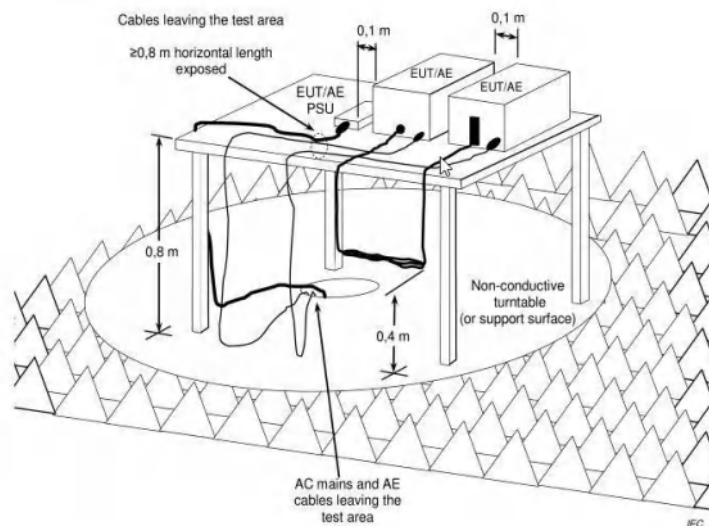
Operating Environment:

Temperature: 23.3 °C Humidity: 56 % Atmospheric Pressure: 102 kPa

Pre test mode: TM1, TM2, TM3, TM4

Final test mode: TM2

4.8.2 Test Setup Diagram:



4.8.3 Test Data:

Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4804	52.87	-0.9	51.97	74	-22.03	peak	H
4804	39.72	-0.9	38.82	54	-15.18	AVG	H
7206	54.43	4.13	58.56	74	-15.44	peak	H
7206	40.44	4.13	44.57	54	-9.43	AVG	H
9608	54.28	8.09	62.37	74	-11.63	peak	H
9608	39.94	8.09	48.03	54	-5.97	AVG	H
4804	52.62	-0.9	51.72	74	-22.28	peak	V
4804	39.02	-0.9	38.12	54	-15.88	AVG	V
7206	51.70	4.13	55.83	74	-18.17	peak	V
7206	38.05	4.13	42.18	54	-11.82	AVG	V
9608	52.93	8.09	61.02	74	-12.98	peak	V
9608	37.32	8.09	45.41	54	-8.59	AVG	V

Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4882	52.49	-0.64	51.85	74	-22.15	peak	H
4882	38.79	-0.64	38.15	54	-15.85	AVG	H
7323	51.99	4.31	56.30	74	-17.70	peak	H
7323	38.39	4.31	42.70	54	-11.30	AVG	H
9764	54.48	8.09	62.57	74	-11.43	peak	H
9764	40.32	8.09	48.41	54	-5.59	AVG	H
4882	52.18	-0.64	51.54	74	-22.46	peak	V
4882	39.05	-0.64	38.41	54	-15.59	AVG	V
7323	52.92	4.31	57.23	74	-16.77	peak	V
7323	39.08	4.31	43.39	54	-10.61	AVG	V
9764	52.32	8.09	60.41	74	-13.59	peak	V
9764	37.49	8.09	45.58	54	-8.42	AVG	V

Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4960	52.10	-0.37	51.73	74	-22.27	peak	H
4960	38.99	-0.37	38.62	54	-15.38	AVG	H
7440	54.18	4.49	58.67	74	-15.33	peak	H
7440	40.22	4.49	44.71	54	-9.29	AVG	H
9920	52.63	8.08	60.71	74	-13.29	peak	H
9920	38.43	8.08	46.51	54	-7.49	AVG	H
4960	51.71	-0.37	51.34	74	-22.66	peak	V
4960	39.54	-0.37	39.17	54	-14.83	AVG	V



7440	53.52	4.49	58.01	74	-15.99	peak	V
7440	38.02	4.49	42.51	54	-11.49	AVG	V
9920	52.95	8.08	61.03	74	-12.97	peak	V
9920	38.62	8.08	46.70	54	-7.30	AVG	V

Remark: Over= Measurement Level - Limit

Measurement Level=Test receiver reading + correction factor

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier



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

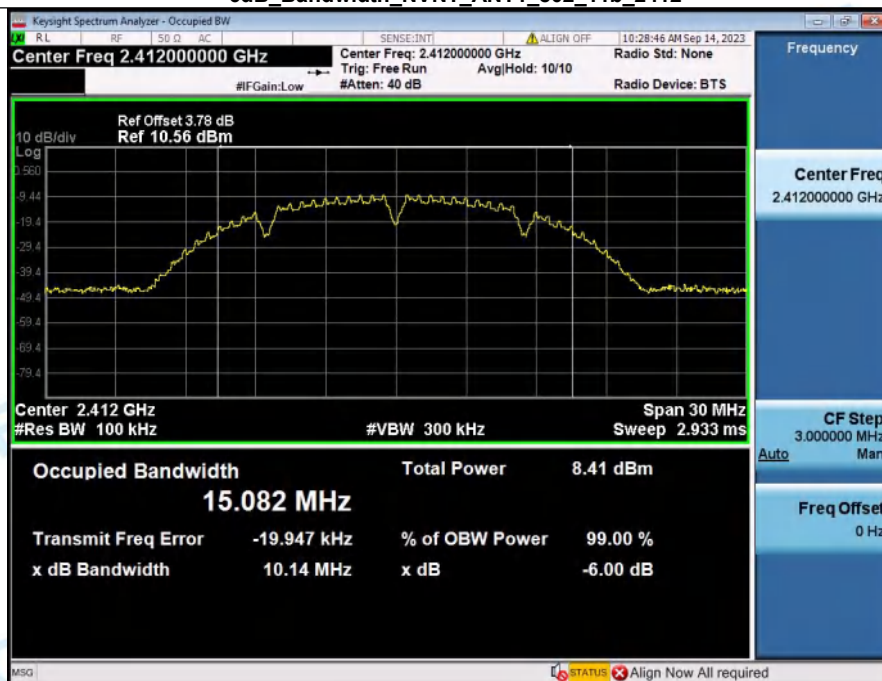


Appendix

1. -6dB Bandwidth

Condition	Antenna	Modulation	Frequency (MHz)	-6dB BW(MHz)	limit(kHz)	Result
NVNT	ANT1	802.11b	2412.00	10.14	500	Pass
NVNT	ANT1	802.11b	2437.00	10.14	500	Pass
NVNT	ANT1	802.11b	2462.00	10.14	500	Pass
NVNT	ANT1	802.11g	2412.00	16.58	500	Pass
NVNT	ANT1	802.11g	2437.00	16.57	500	Pass
NVNT	ANT1	802.11g	2462.00	16.58	500	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	17.69	500	Pass
NVNT	ANT1	802.11n(HT20)	2437.00	17.76	500	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	17.77	500	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	36.50	500	Pass
NVNT	ANT1	802.11n(HT40)	2437.00	36.51	500	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	36.51	500	Pass

-6dB_Bandwidth_NVNT_ANT1_802_11b_2412



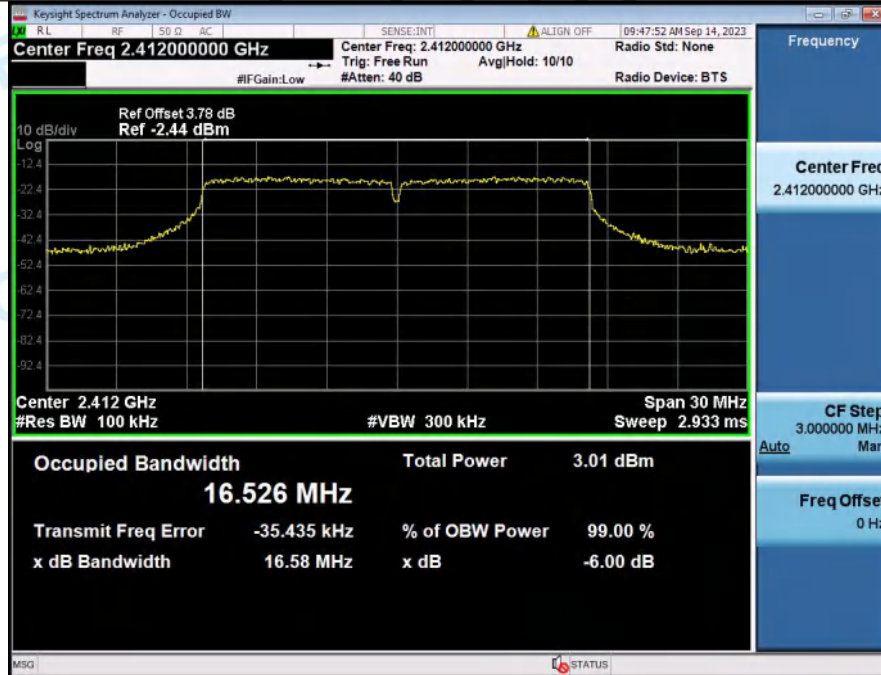
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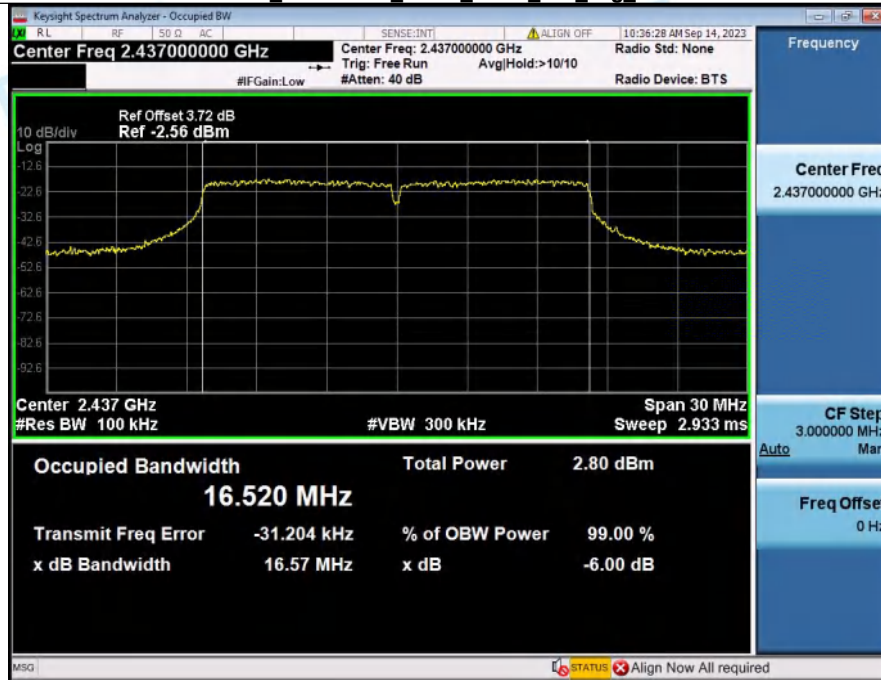
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-6dB_Bandwidth_NVNT_ANT1_802_11g_2412



-6dB_Bandwidth_NVNT_ANT1_802_11g_2437



-6dB_Bandwidth_NVNT_ANT1_802_11g_2462



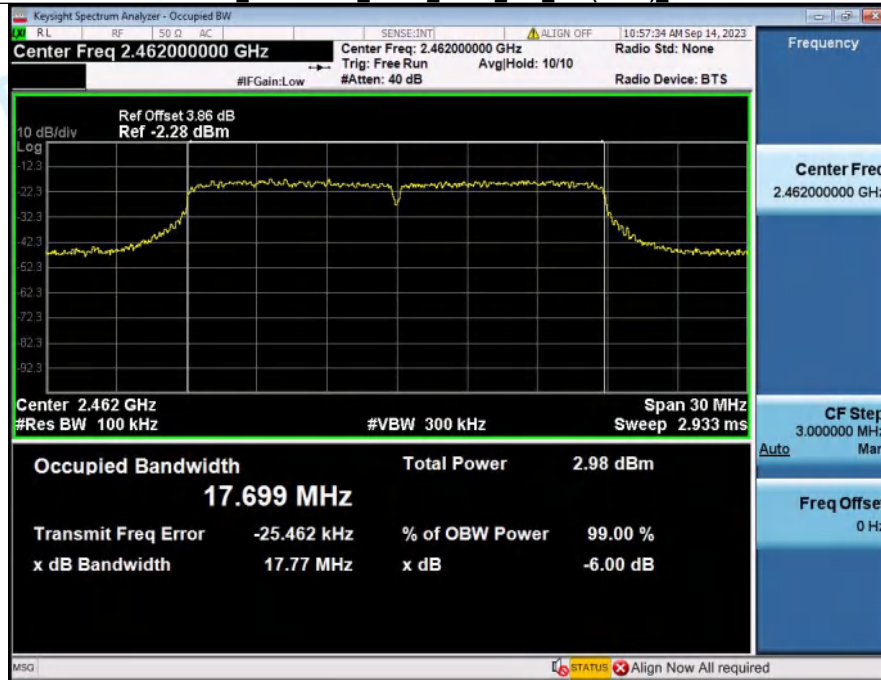
-6dB Bandwidth NVNT_ANT1_802_11n(HT20)_2412



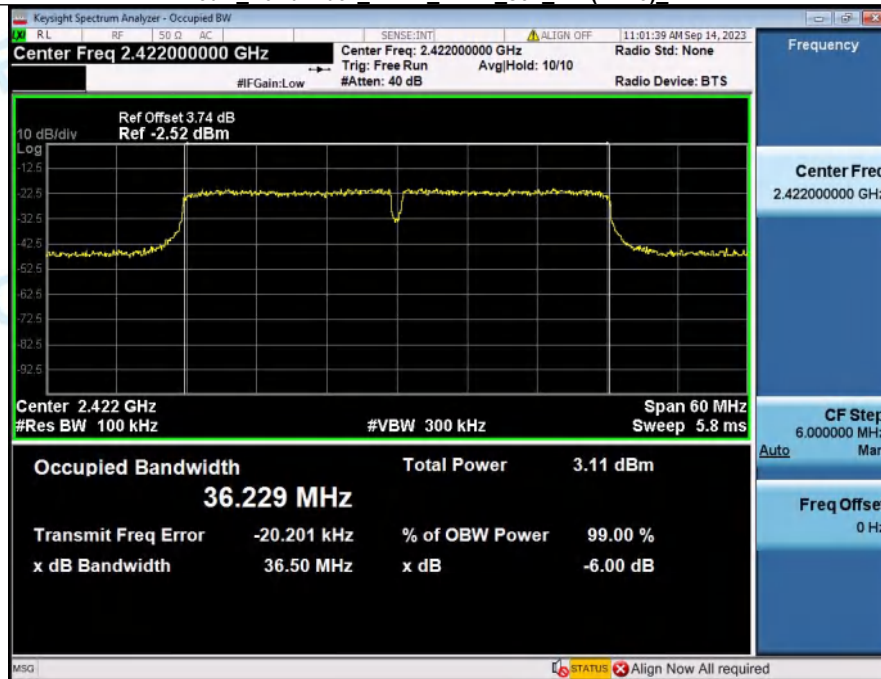
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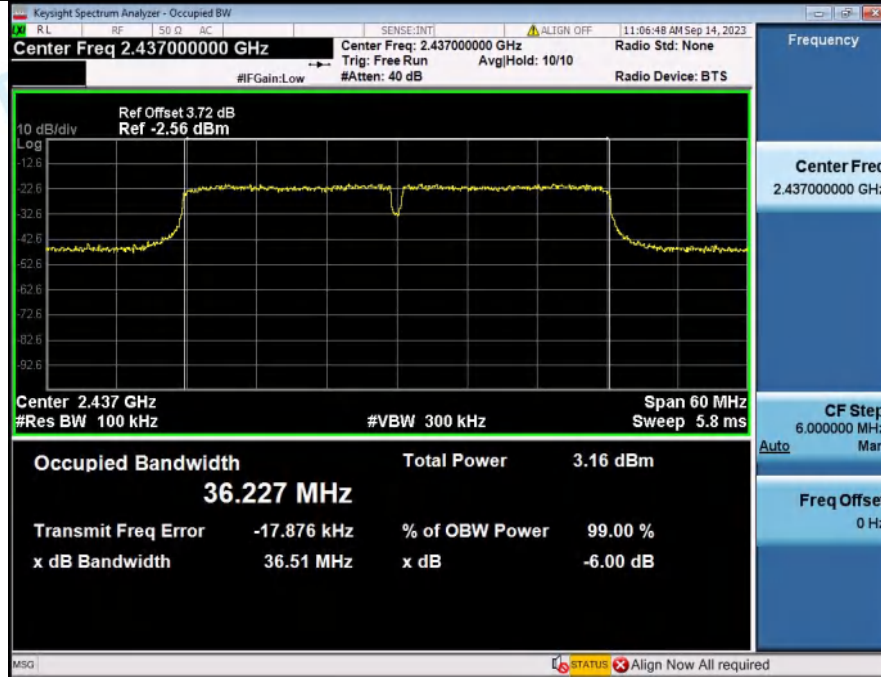
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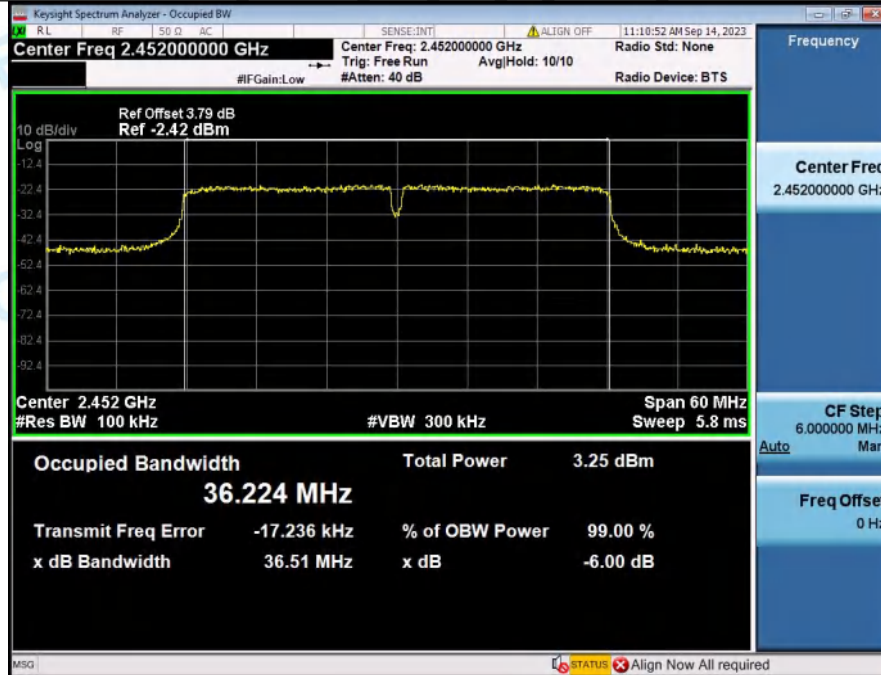
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-6dB_Bandwidth_NVNT_ANT1_802_11n(HT40)_2437



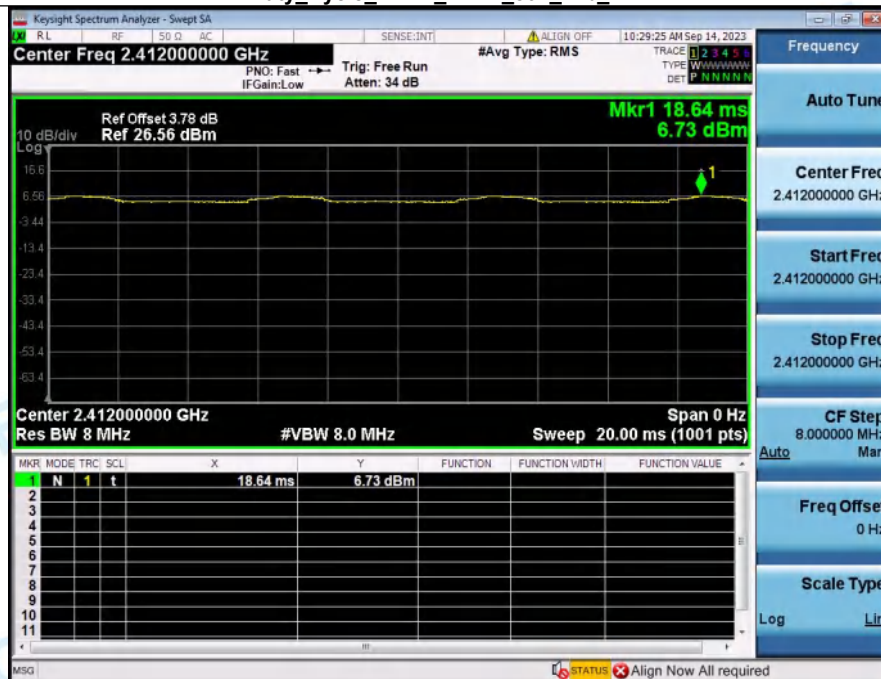
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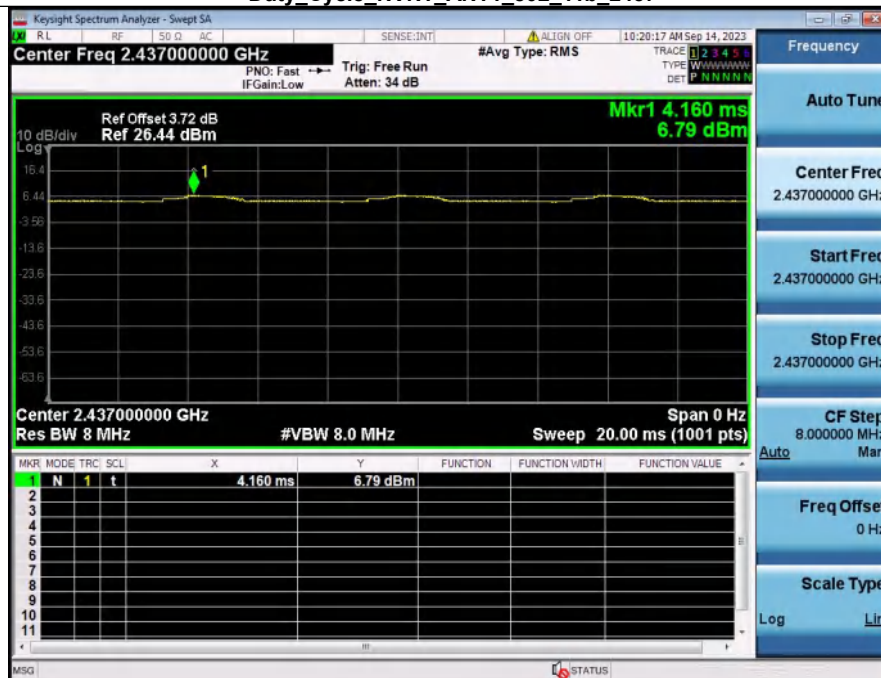
2. Duty Cycle

Condition	Antenna	Modulation	Frequency (MHz)	Dutycycle(%)	Duty_factor
NVNT	ANT1	802.11b	2412.00	100	0.00
NVNT	ANT1	802.11b	2437.00	100	0.00
NVNT	ANT1	802.11b	2462.00	100	0.00
NVNT	ANT1	802.11g	2412.00	100	0.00
NVNT	ANT1	802.11g	2437.00	100	0.00
NVNT	ANT1	802.11g	2462.00	100	0.00
NVNT	ANT1	802.11n(HT20)	2412.00	100	0.00
NVNT	ANT1	802.11n(HT20)	2437.00	100	0.00
NVNT	ANT1	802.11n(HT20)	2462.00	100	0.00
NVNT	ANT1	802.11n(HT40)	2422.00	100	0.00
NVNT	ANT1	802.11n(HT40)	2437.00	100	0.00
NVNT	ANT1	802.11n(HT40)	2452.00	100	0.00

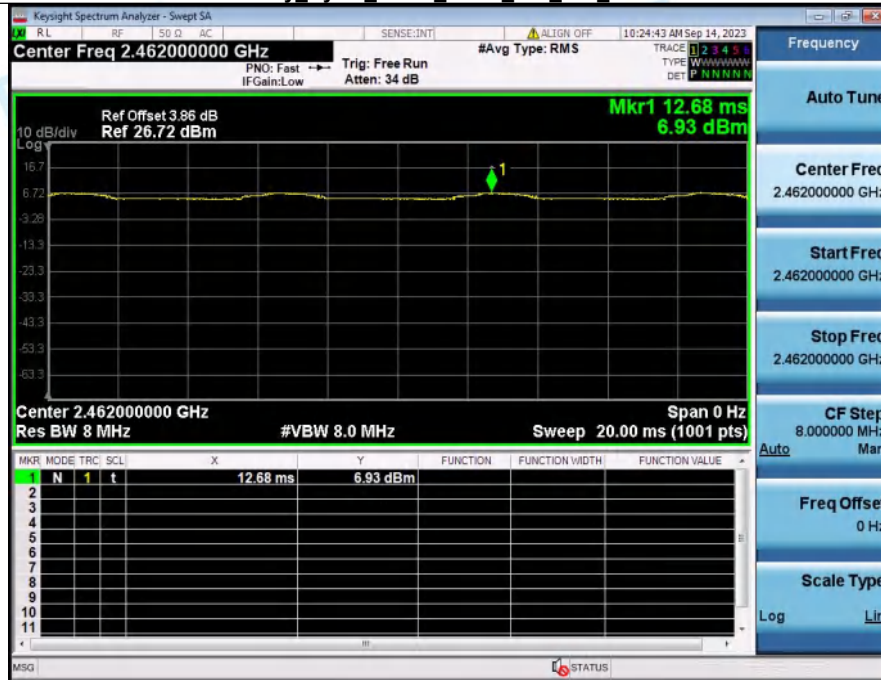
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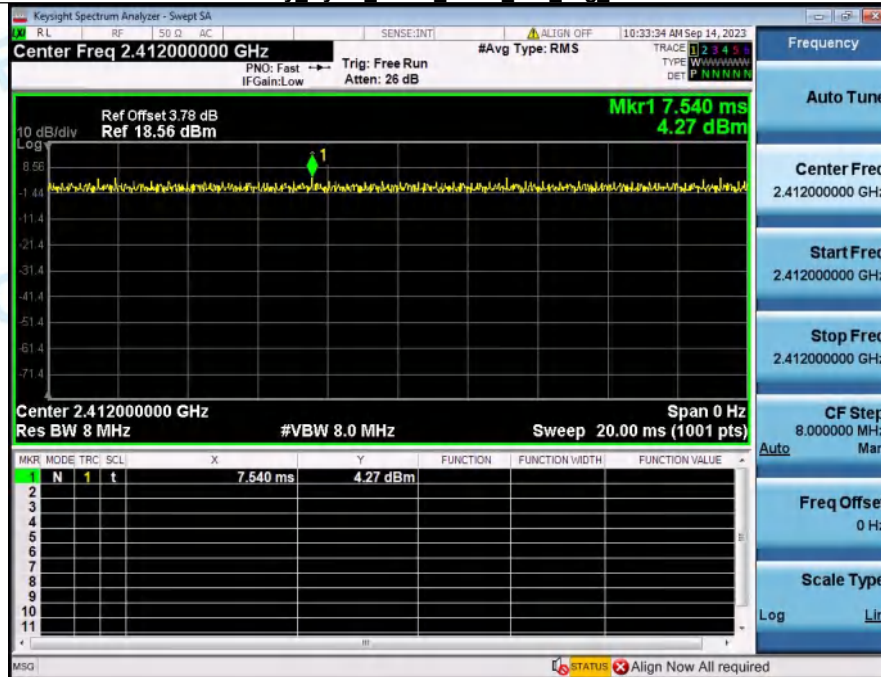
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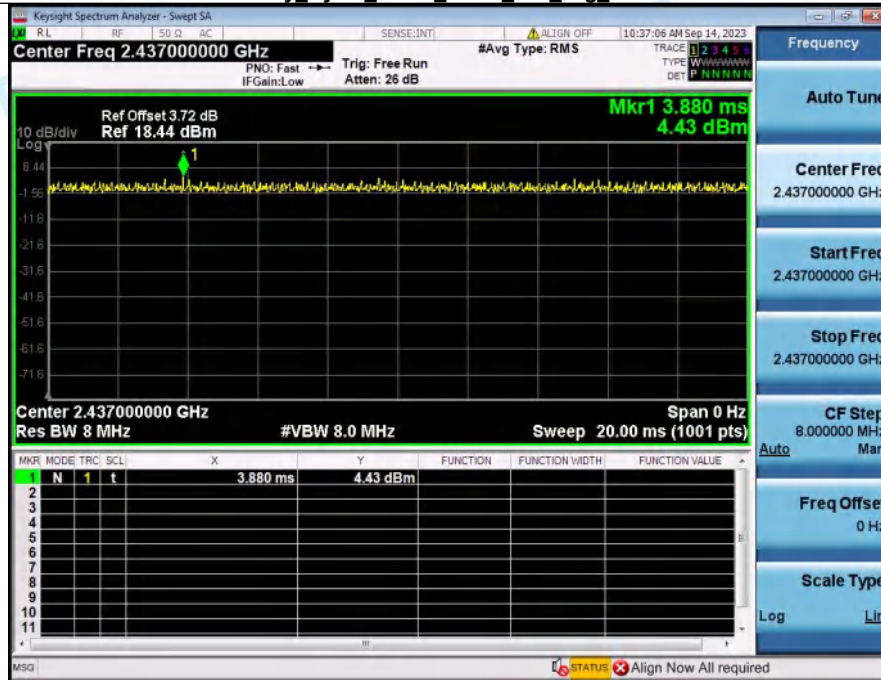
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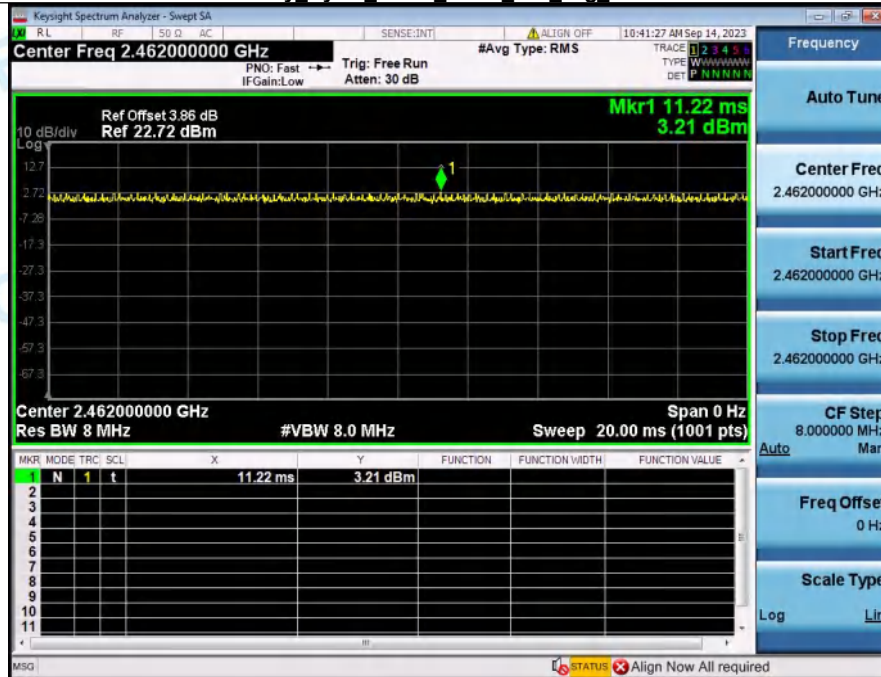
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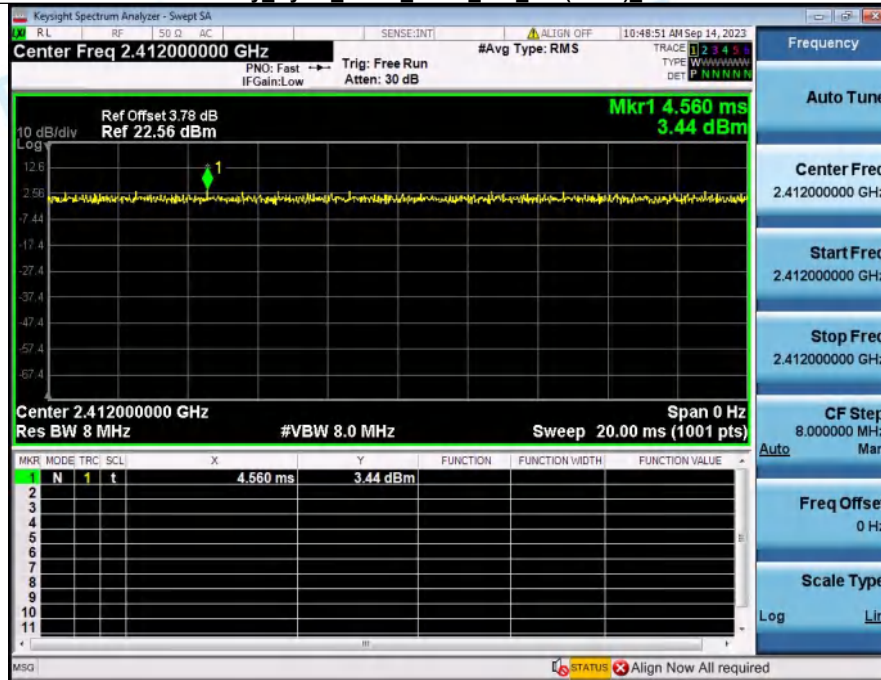
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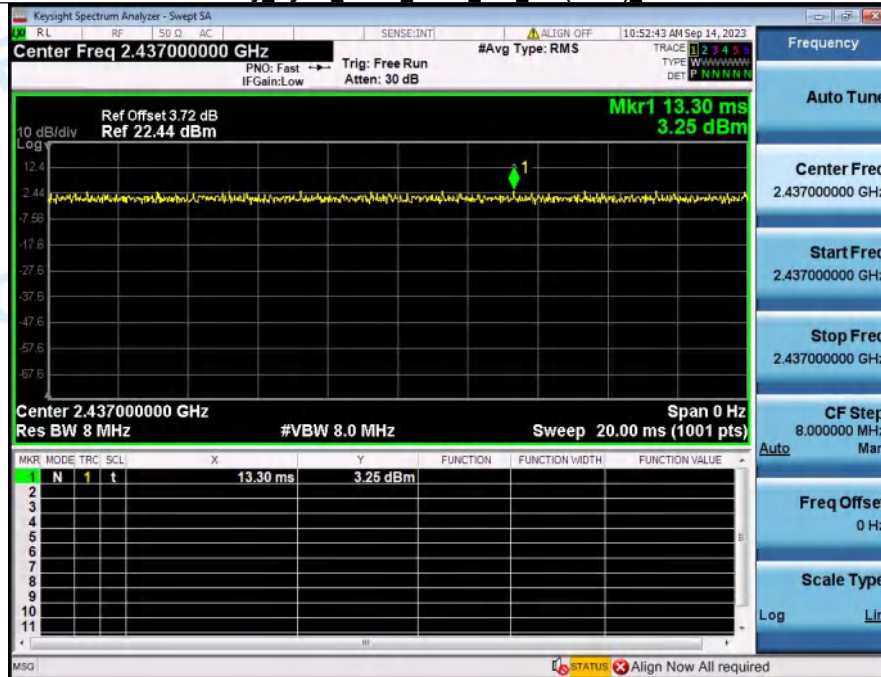
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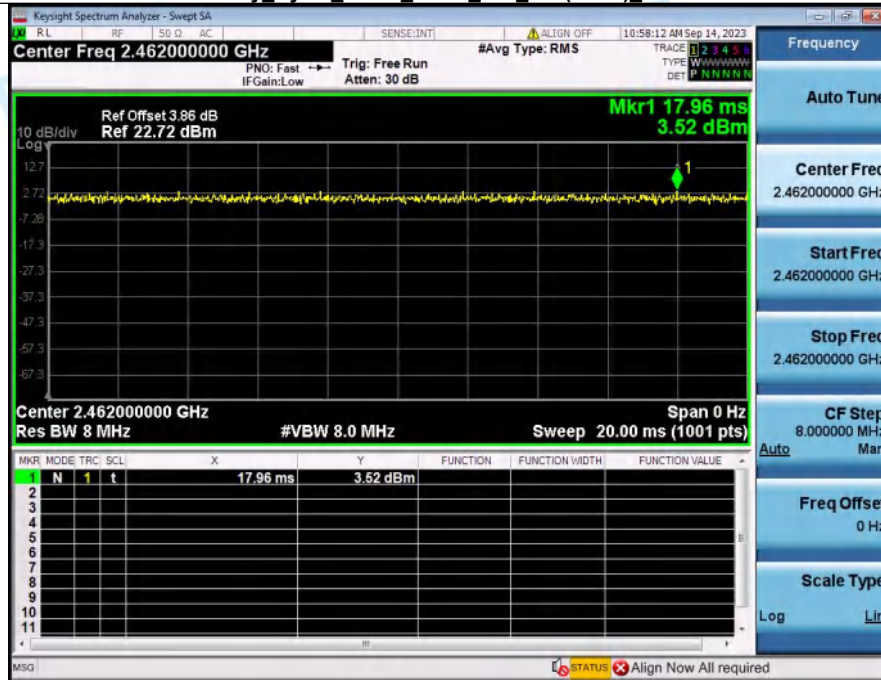
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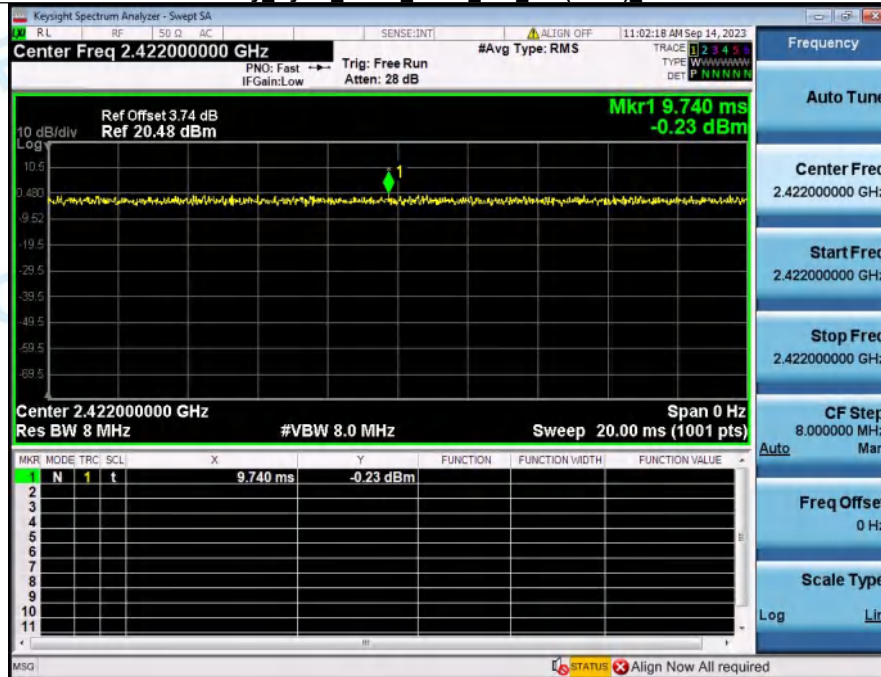
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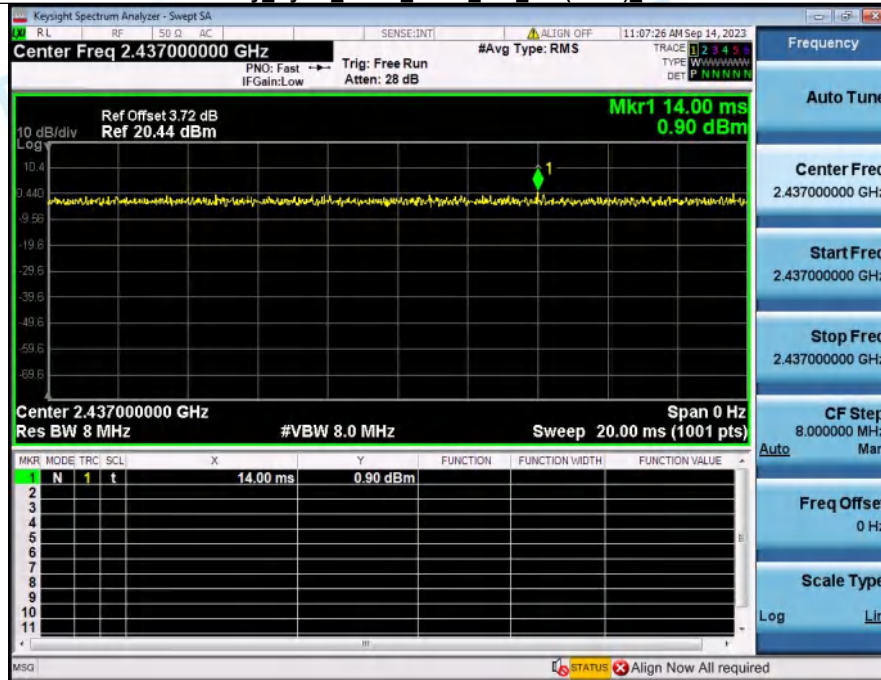
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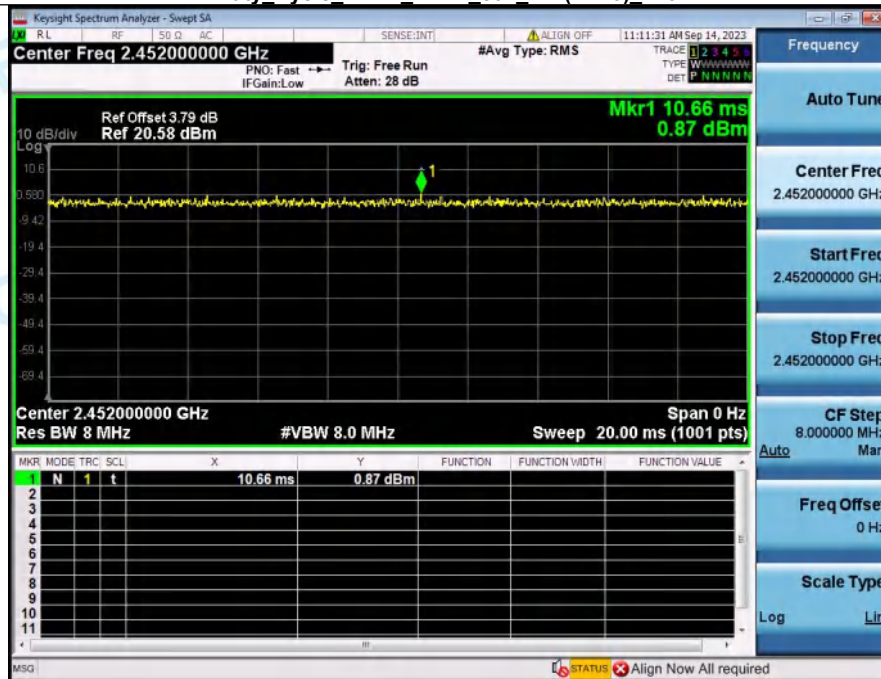
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Duty Cycle NVNT_ANT1_802_11n(HT40)_2437



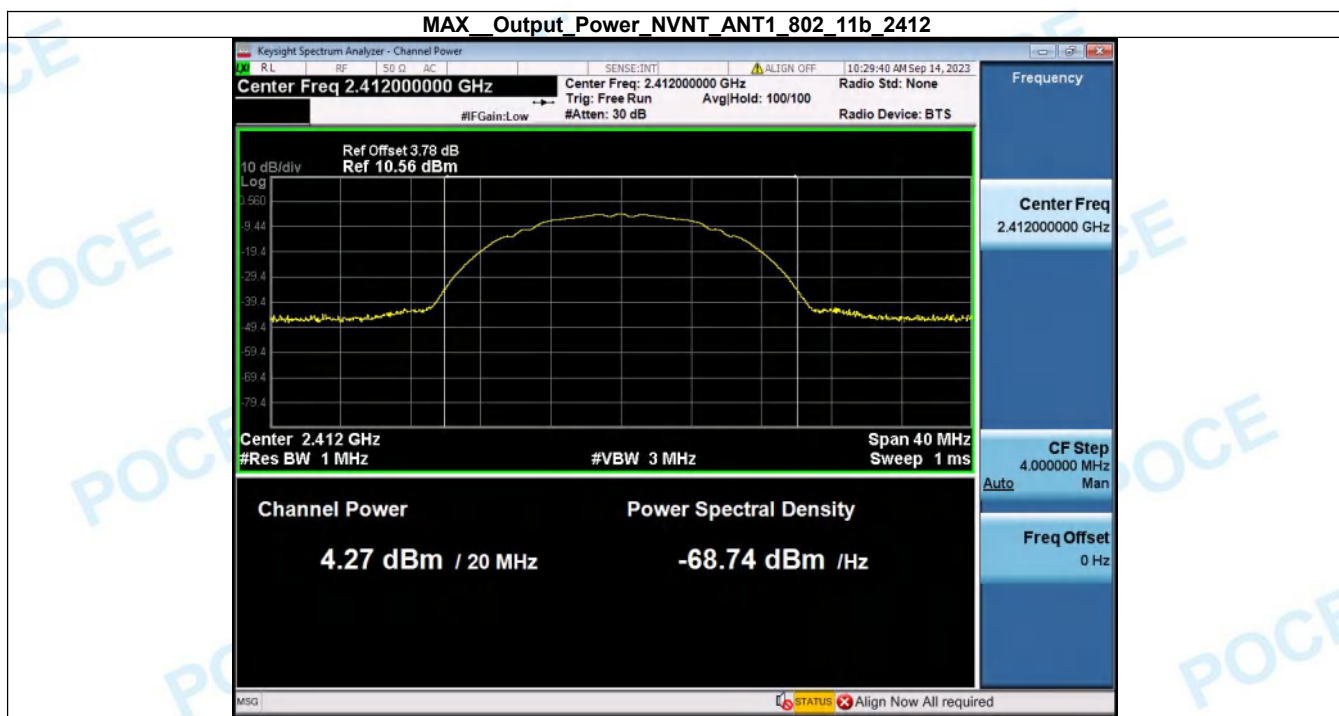
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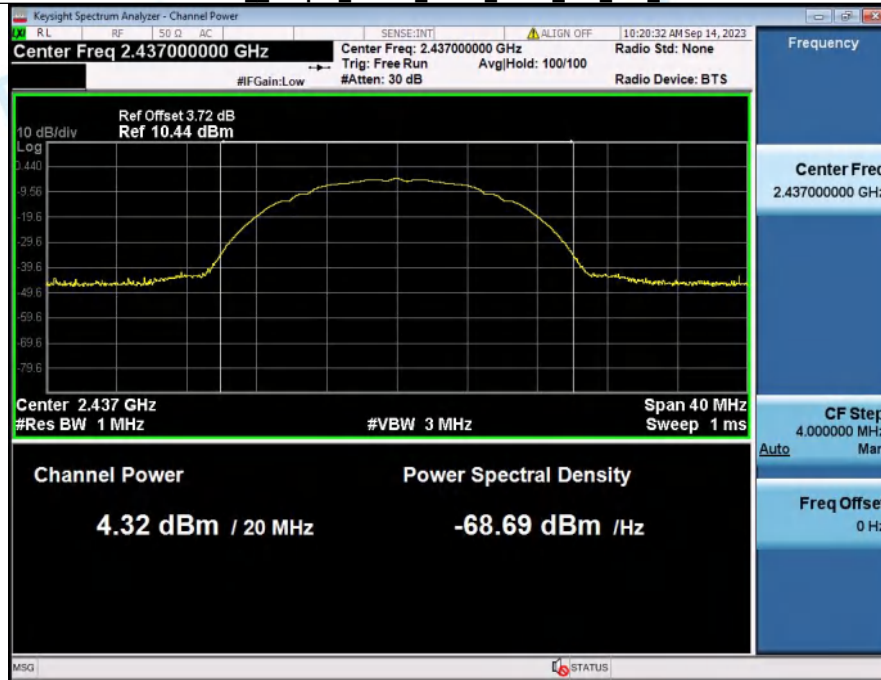
3. MAX. Output Power

Condition	Antenna	Modulation	Frequency (MHz)	Detector	Conducted Power(dBm)	Duty factor(dB)	Total Power(dBm)	limit(dBm)	Result
NVNT	ANT1	802.11b	2412.00	Peak	4.27	N/A	4.27	30	Pass
NVNT	ANT1	802.11b	2437.00	Peak	4.32	N/A	4.32	30	Pass
NVNT	ANT1	802.11b	2462.00	Peak	4.45	N/A	4.45	30	Pass
NVNT	ANT1	802.11g	2412.00	Peak	4.11	N/A	4.11	30	Pass
NVNT	ANT1	802.11g	2437.00	Peak	3.97	N/A	3.97	30	Pass
NVNT	ANT1	802.11g	2462.00	Peak	4.36	N/A	4.36	30	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	Peak	4.15	N/A	4.15	30	Pass
NVNT	ANT1	802.11n(HT20)	2437.00	Peak	4.09	N/A	4.09	30	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	Peak	4.33	N/A	4.33	30	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	Peak	4.26	N/A	4.26	30	Pass
NVNT	ANT1	802.11n(HT40)	2437.00	Peak	4.20	N/A	4.20	30	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	Peak	4.35	N/A	4.35	30	Pass

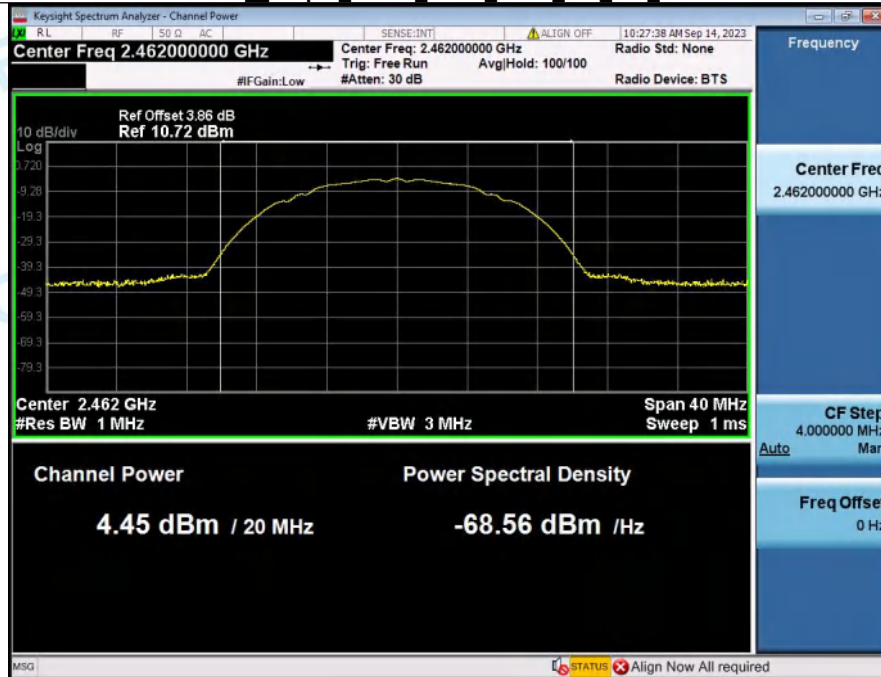
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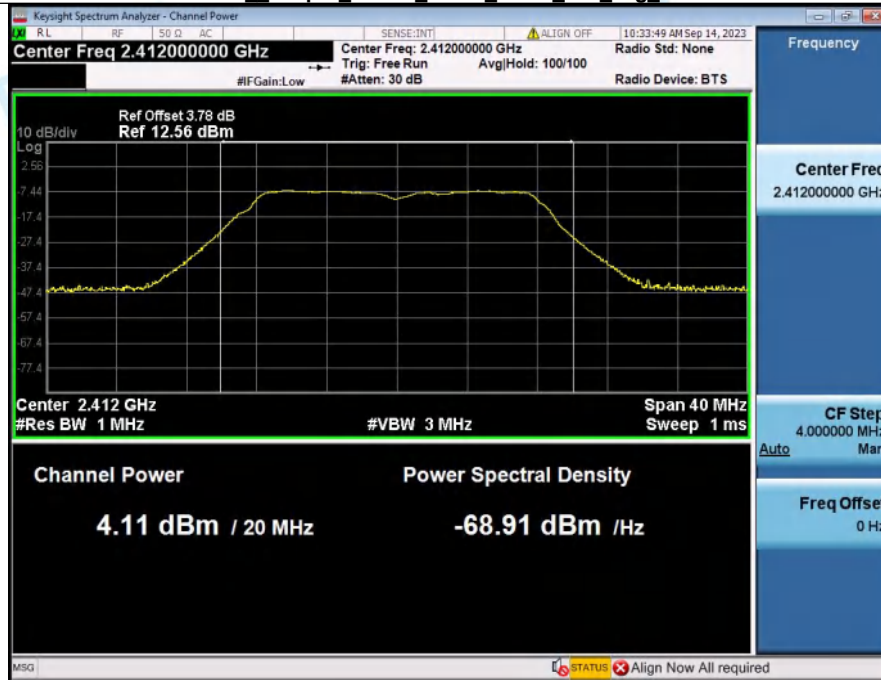
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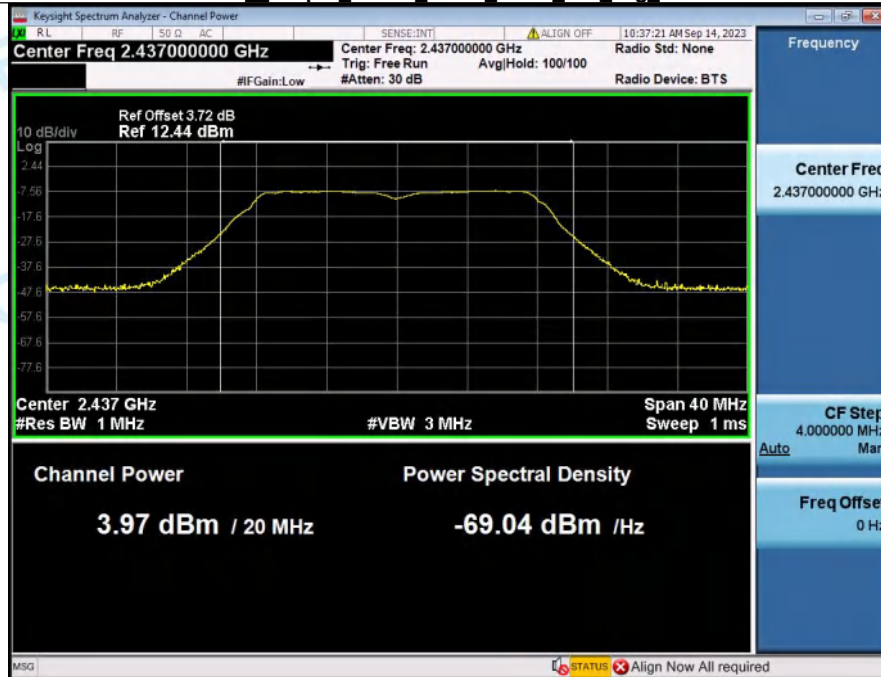
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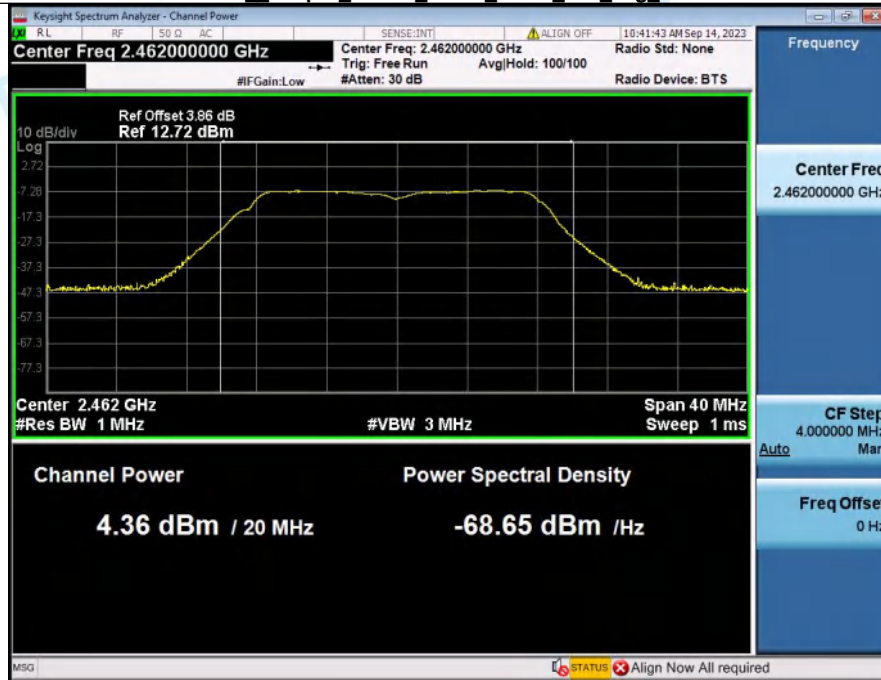
MAX Output Power_NVNT_ANT1_802_11g_2412



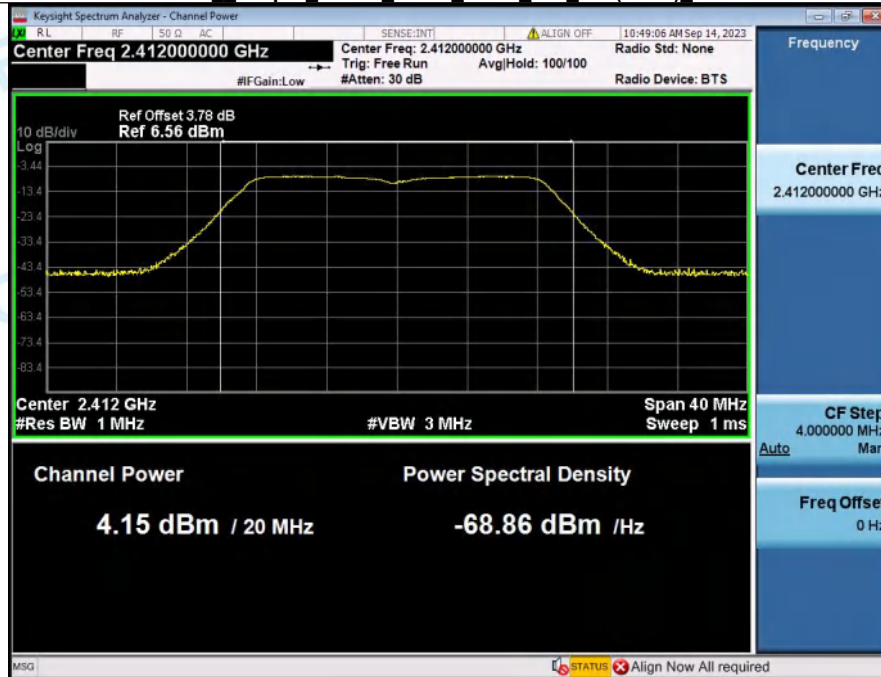
MAX Output Power_NVNT_ANT1_802_11g_2437



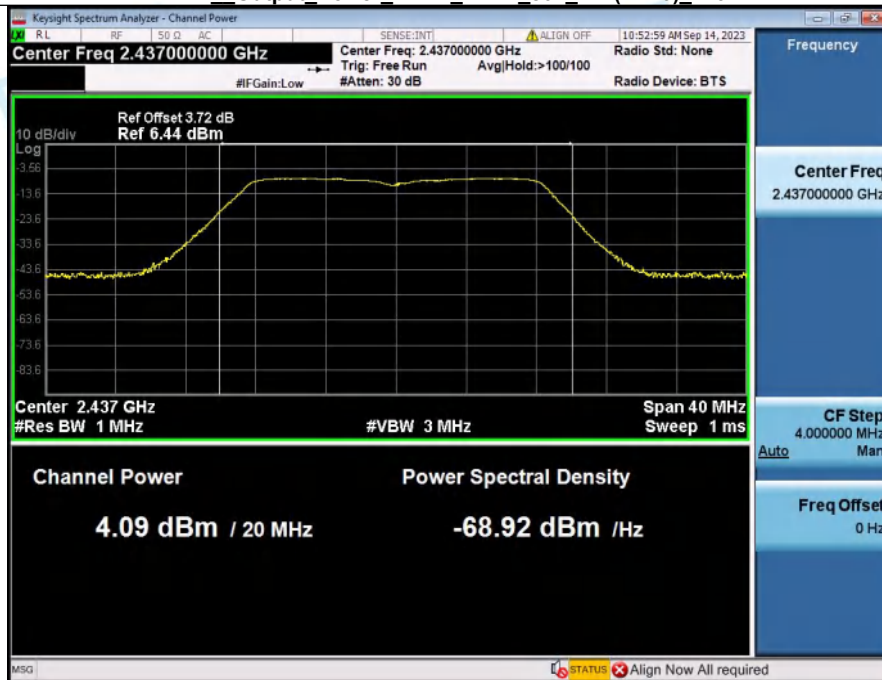
MAX Output Power_NVNT_ANT1_802_11g_2462



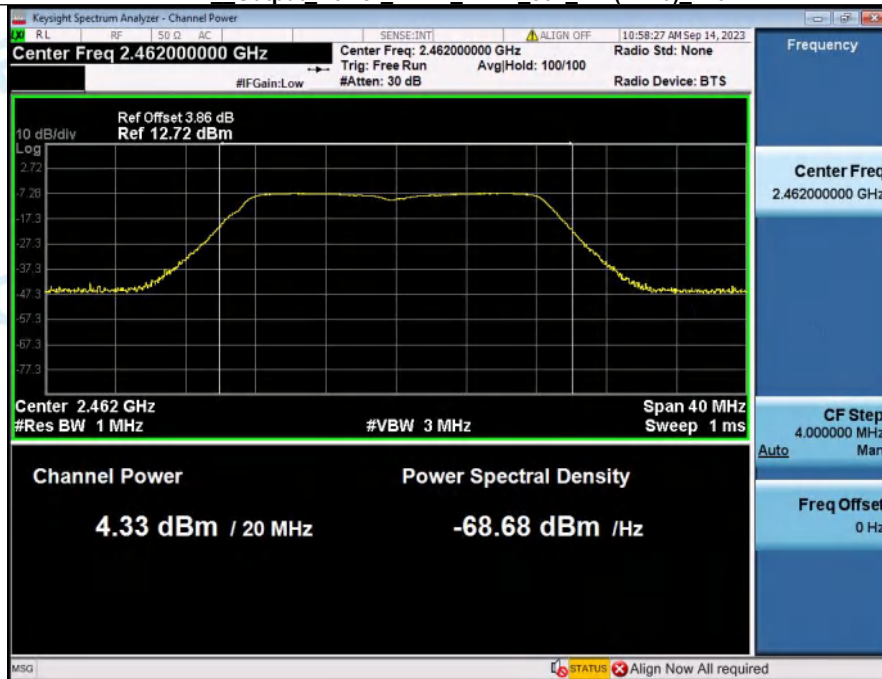
MAX Output Power_NVNT_ANT1_802_11n(HT20)_2412



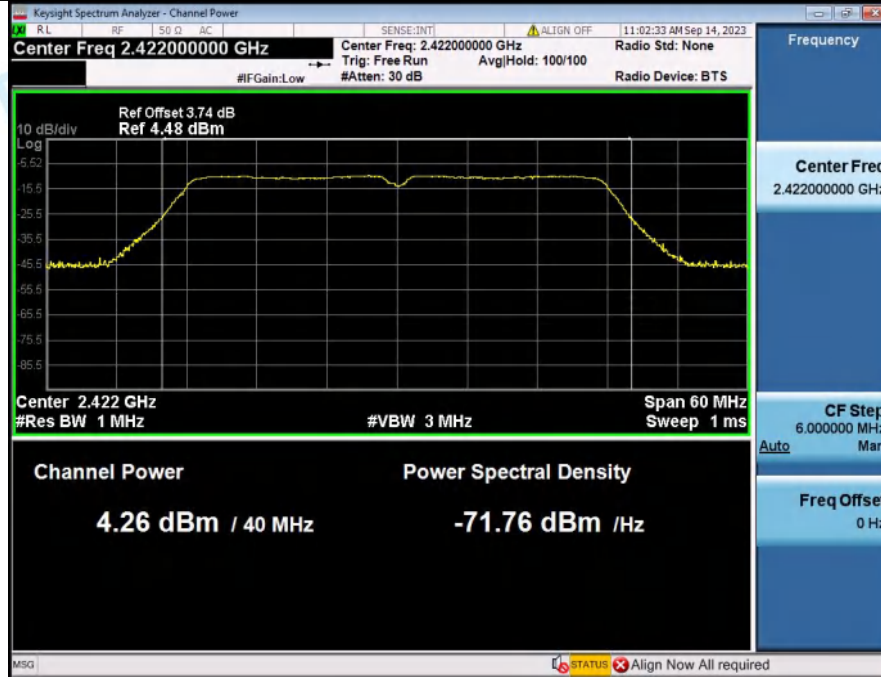
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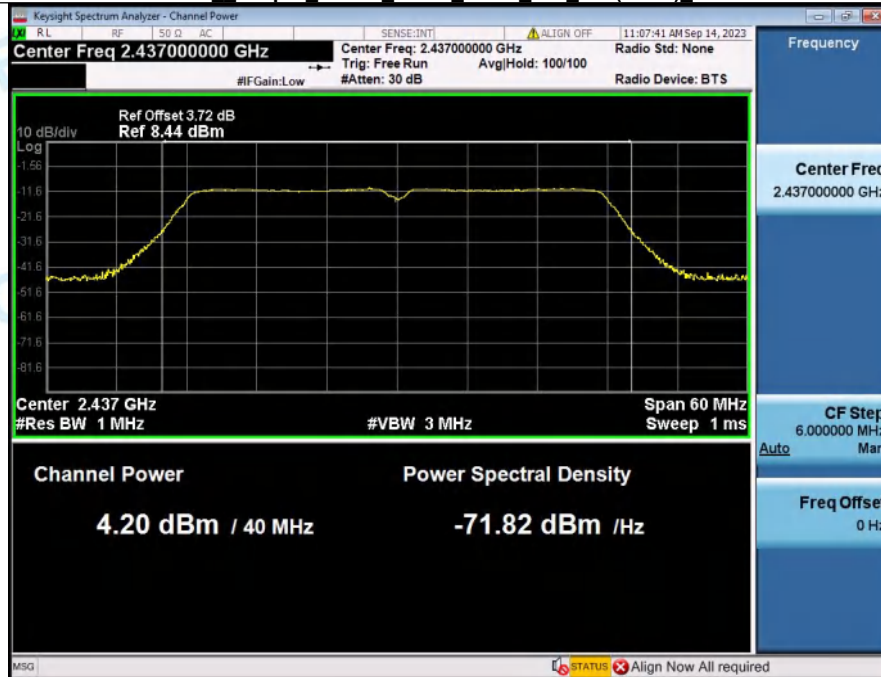
MAX Output Power_NVNT_ANT1_802_11n(HT20)_2462



MAX Output Power_NVNT_ANT1_802_11n(HT40)_2422



MAX Output Power_NVNT_ANT1_802_11n(HT40)_2437





4. Power Spectral Density

Condition	Antenna	Modulation	Frequency (MHz)	PSD(dBm/3kHz)	limit(dBm/3kHz)	Result
NVNT	ANT1	802.11b	2412.00	-29.11	8	Pass
NVNT	ANT1	802.11b	2437.00	-29.13	8	Pass
NVNT	ANT1	802.11b	2462.00	-28.79	8	Pass
NVNT	ANT1	802.11g	2412.00	-31.80	8	Pass
NVNT	ANT1	802.11g	2437.00	-31.92	8	Pass
NVNT	ANT1	802.11g	2462.00	-31.91	8	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	-31.83	8	Pass
NVNT	ANT1	802.11n(HT20)	2437.00	-30.98	8	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	-30.83	8	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	-32.03	8	Pass
NVNT	ANT1	802.11n(HT40)	2437.00	-33.14	8	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	-32.30	8	Pass

Power Spectral Density NVNT_ANT1_802_11b_2412



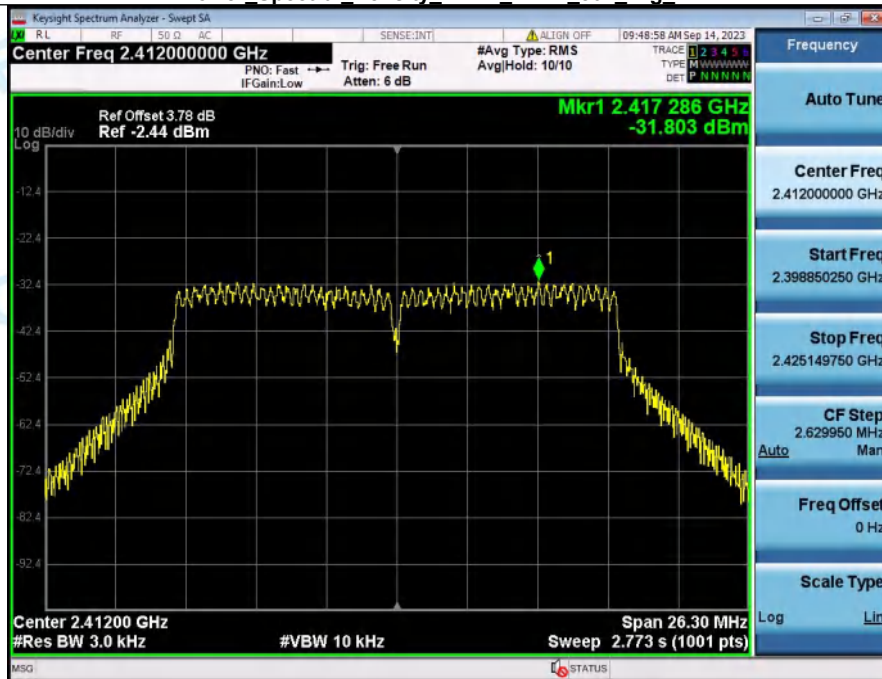
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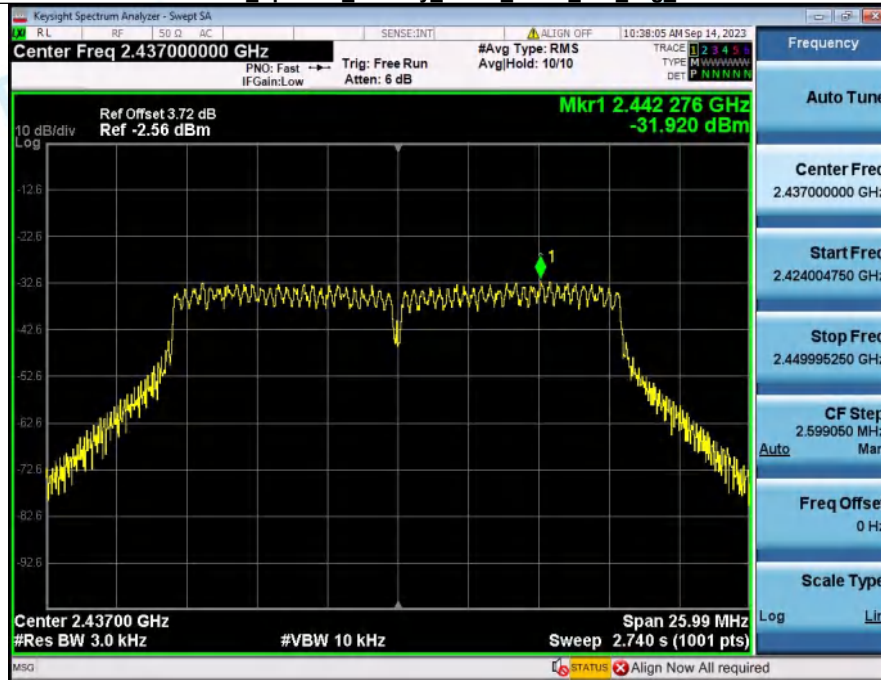
Power Spectral Density NVNT ANT1 802 11b 2462



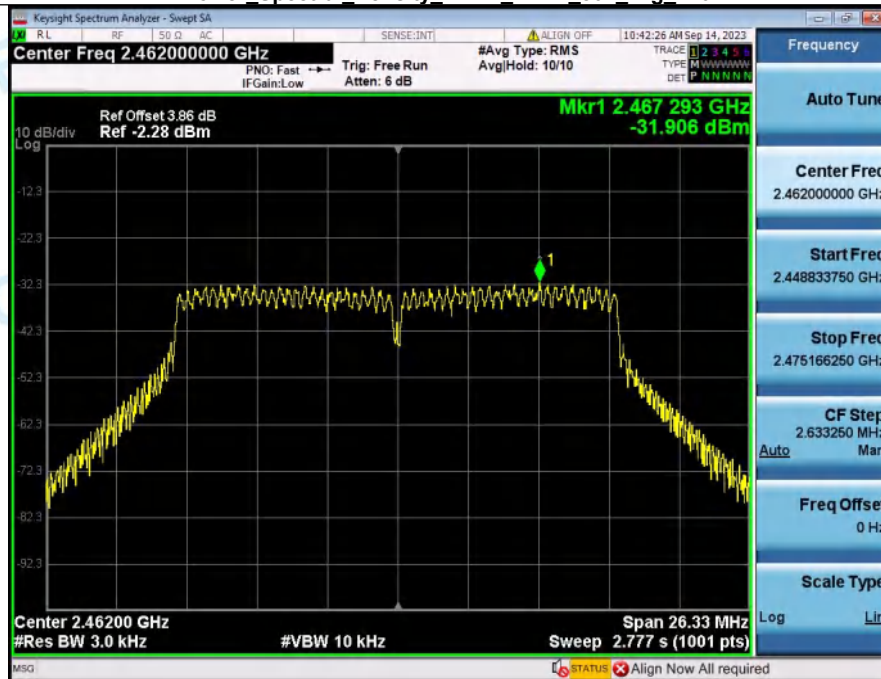
Power Spectral Density NVNT ANT1 802 11g 2412



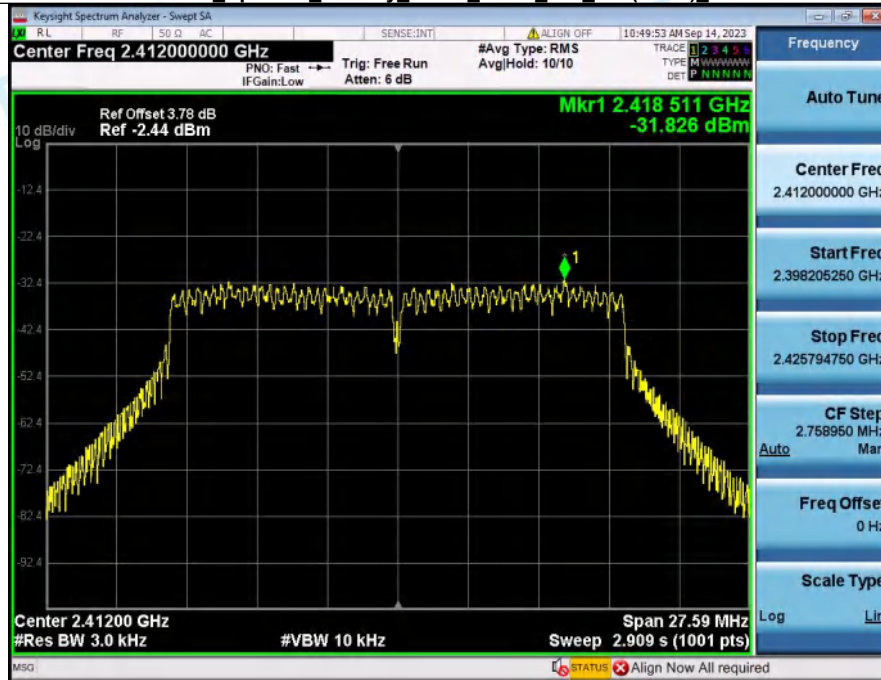
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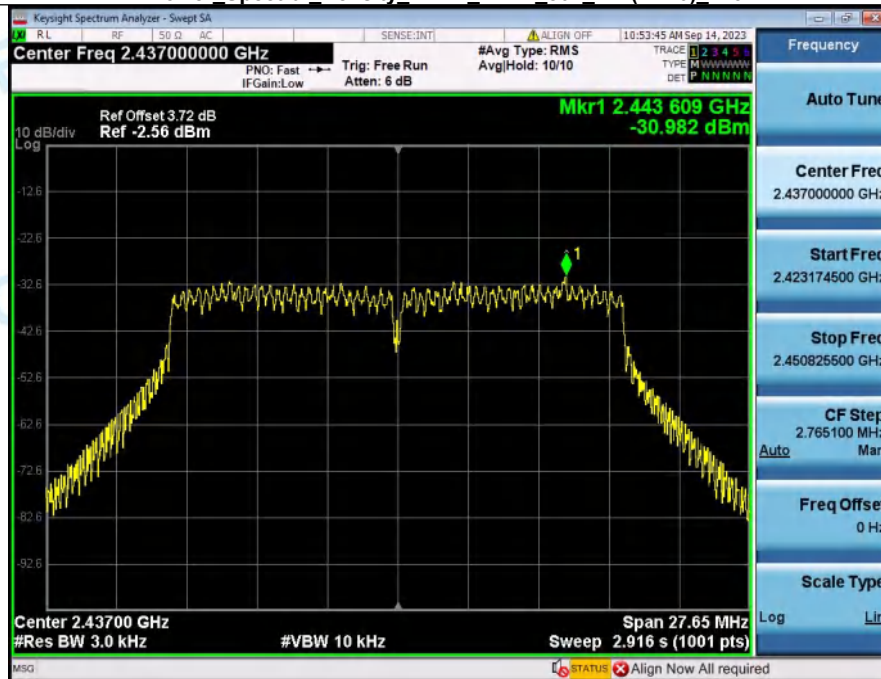
Power Spectral Density NVNT ANT1 802 11g 2462



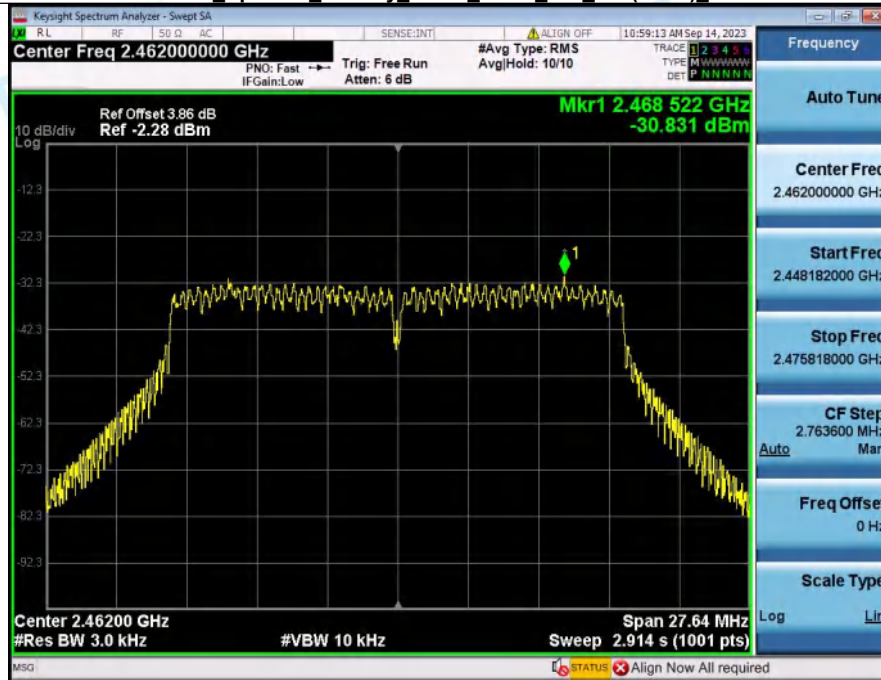
Power Spectral Density NVNT_ANT1_802_11n(HT20)_2412



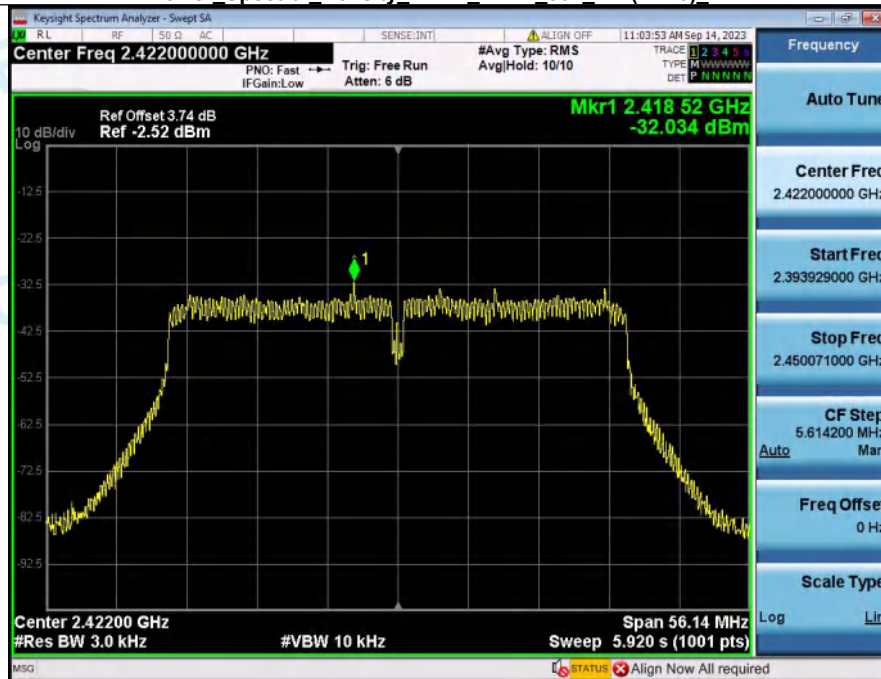
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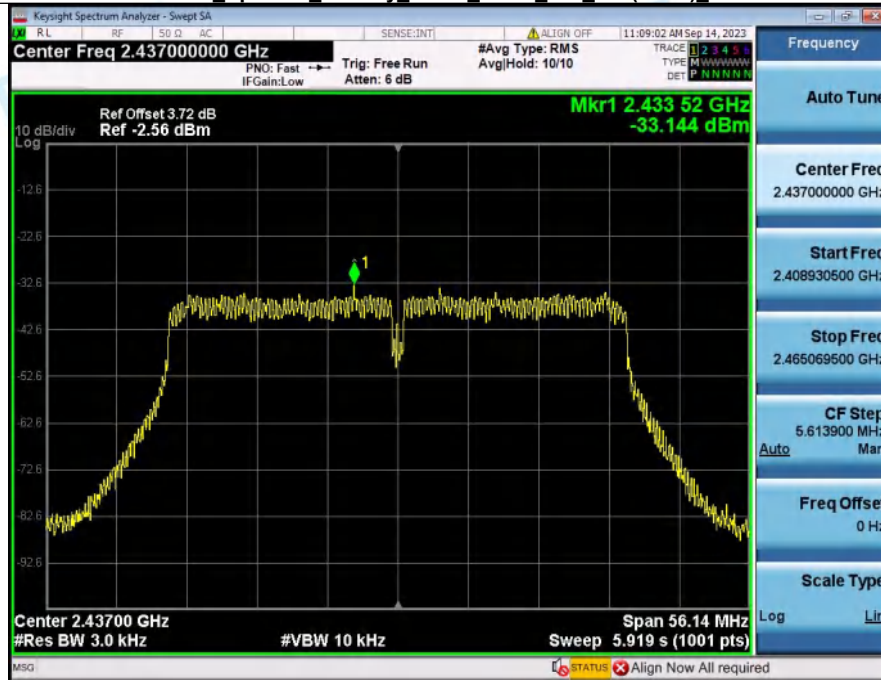
Power Spectral Density NVNT_ANT1_802_11n(HT20)_2462



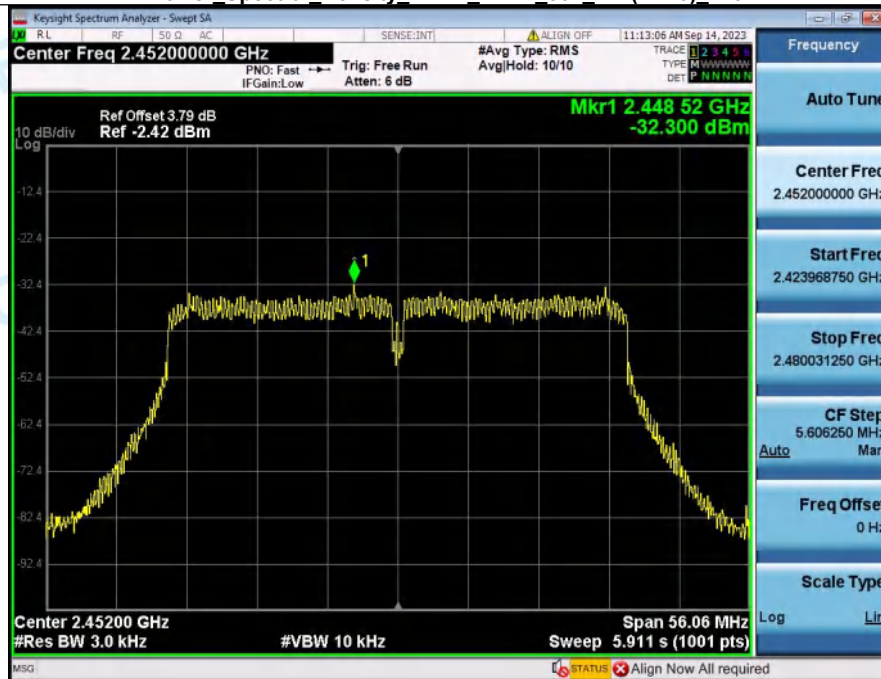
Power Spectral Density NVNT_ANT1_802_11n(HT40)_2422



Power Spectral Density NVNT_ANT1_802_11n(HT40)_2437



Power Spectral Density NVNT_ANT1_802_11n(HT40)_2452



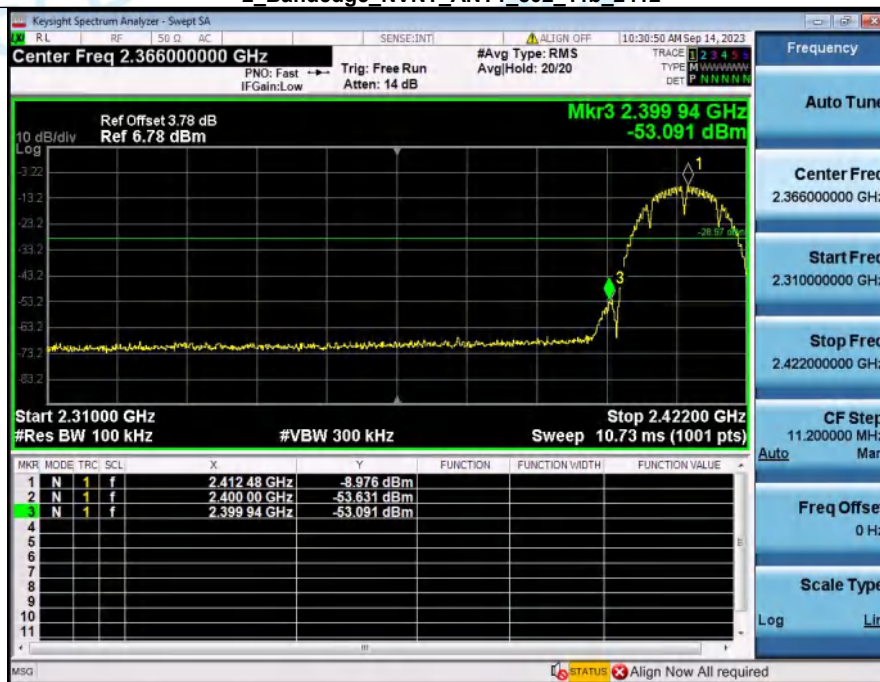
5. Bandedge

Condition	Antenna	Modulation	TX_Frequency (MHz)	Max. Mark frequency(MHz)	Spurious level(dBm)	limit(dBm)	Result
NVNT	ANT1	802.11b	2412.00	2399.936	-53.091	-28.965	Pass
NVNT	ANT1	802.11b	2462.00	2488.816	-66.377	-28.608	Pass
NVNT	ANT1	802.11g	2412.00	2399.936	-54.852	-37.471	Pass
NVNT	ANT1	802.11g	2462.00	2486.800	-71.045	-37.474	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	2399.824	-53.923	-37.730	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	2483.776	-70.792	-37.494	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	2399.892	-55.626	-41.061	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	2483.544	-68.234	-40.567	Pass

1_Reference_Level_NVNT_ANT1_802_11b_2412



2_Bandedge_NVNT_ANT1_802_11b_2412



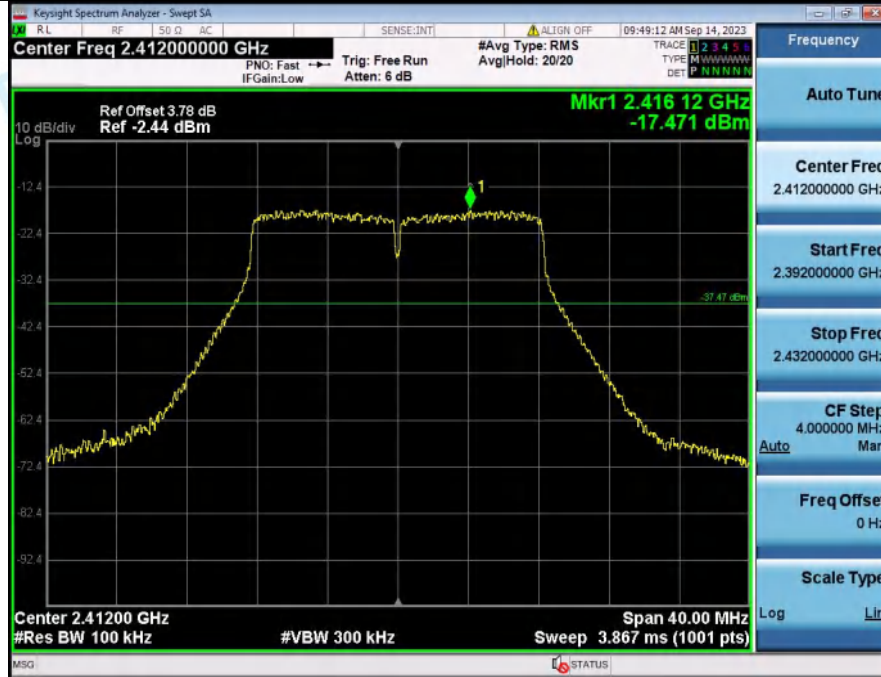
1 Reference Level NVNT_ANT1_802_11b_2462



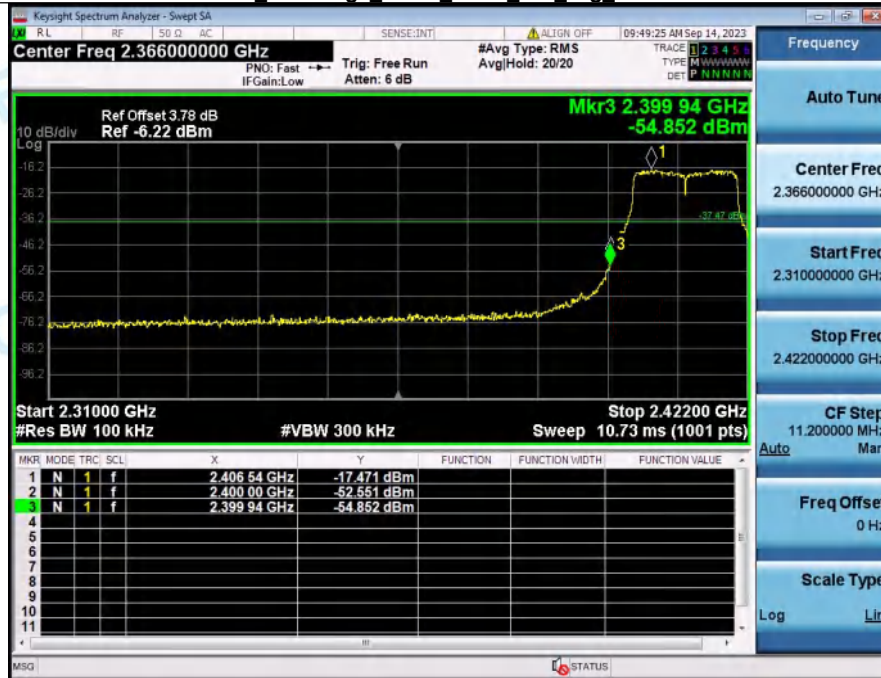
2 Bandedge NVNT ANT1_802_11b 2462



1 Reference Level NVNT_ANT1_802_11g_2412



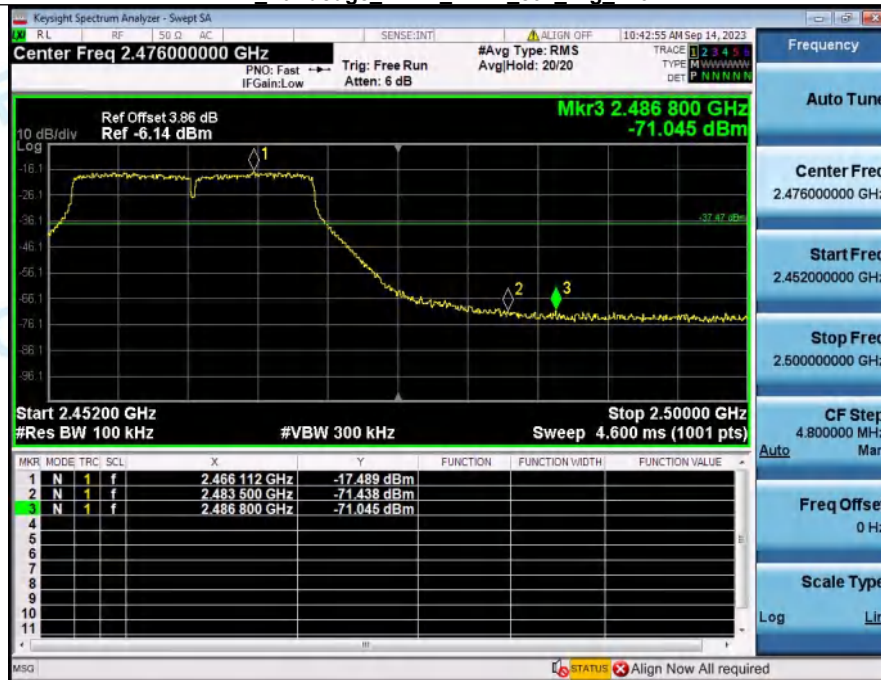
2 Bandedge NVNT_ANT1_802_11g_2412



1 Reference Level NVNT ANT1 802 11g 2462



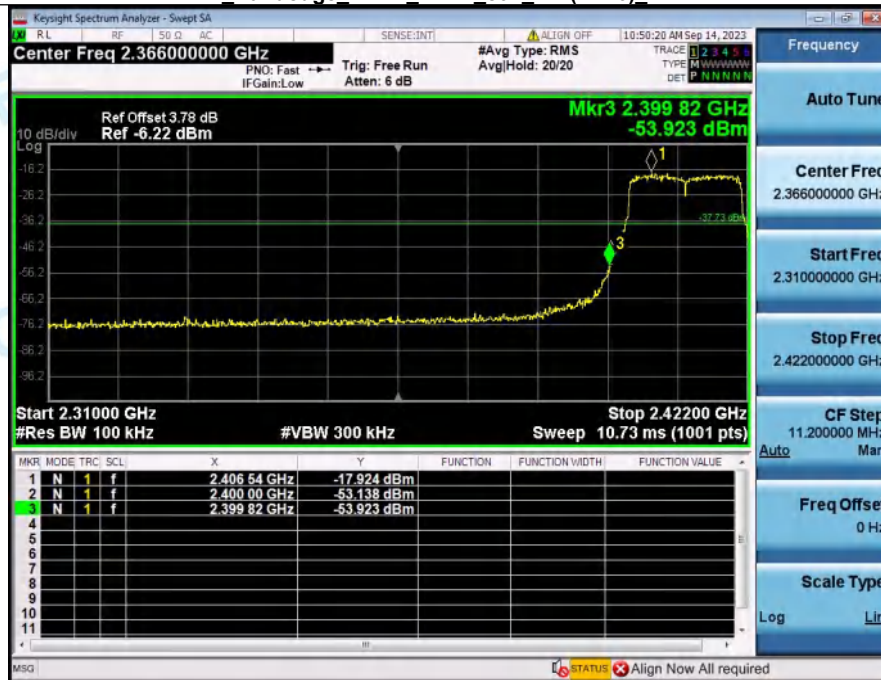
2 Bandedge NVNT ANT1 802 11g 2462



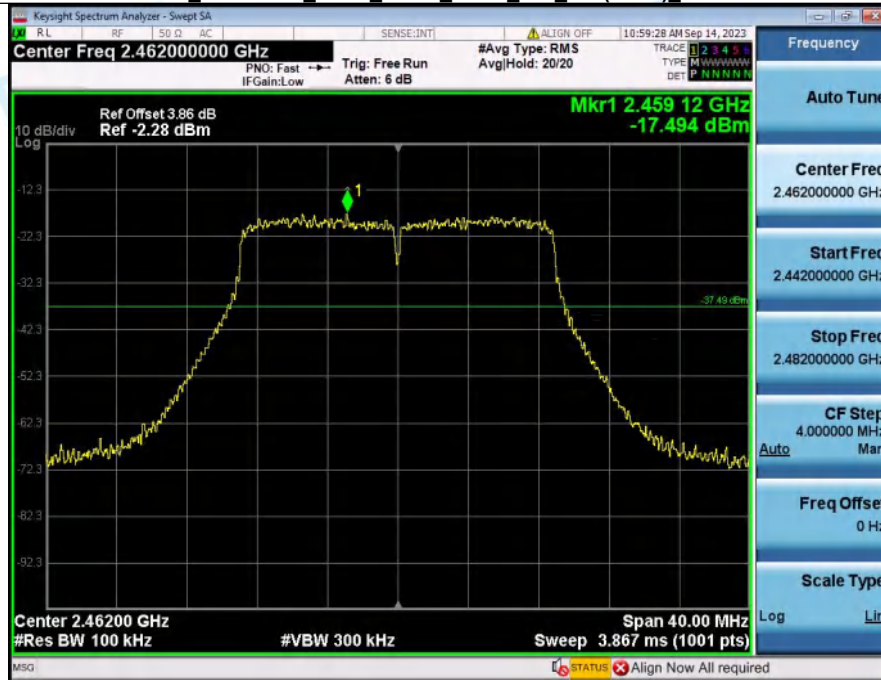
1 Reference_Level_NVNT_ANT1_802_11n(HT20)_2412



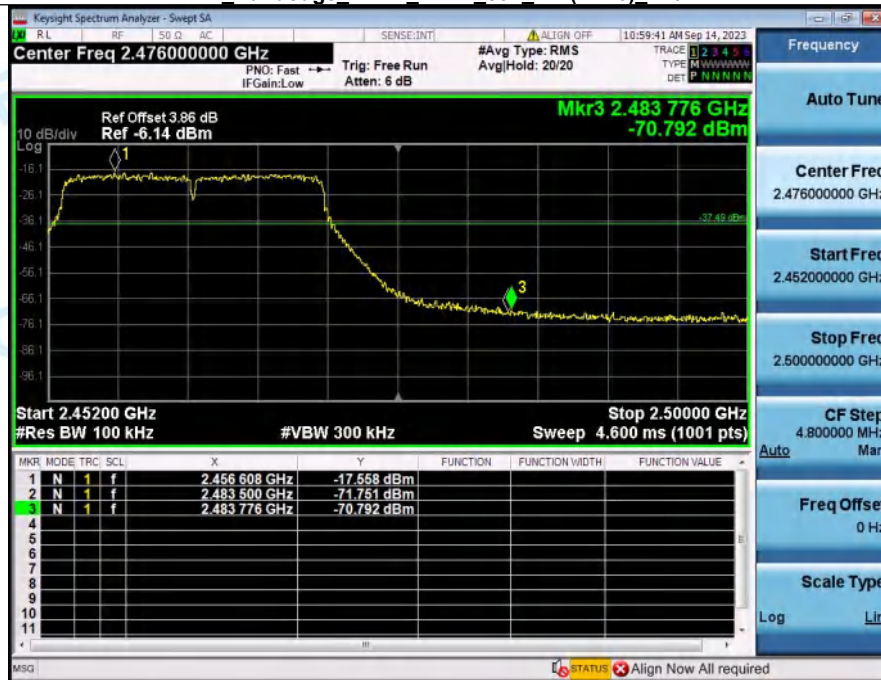
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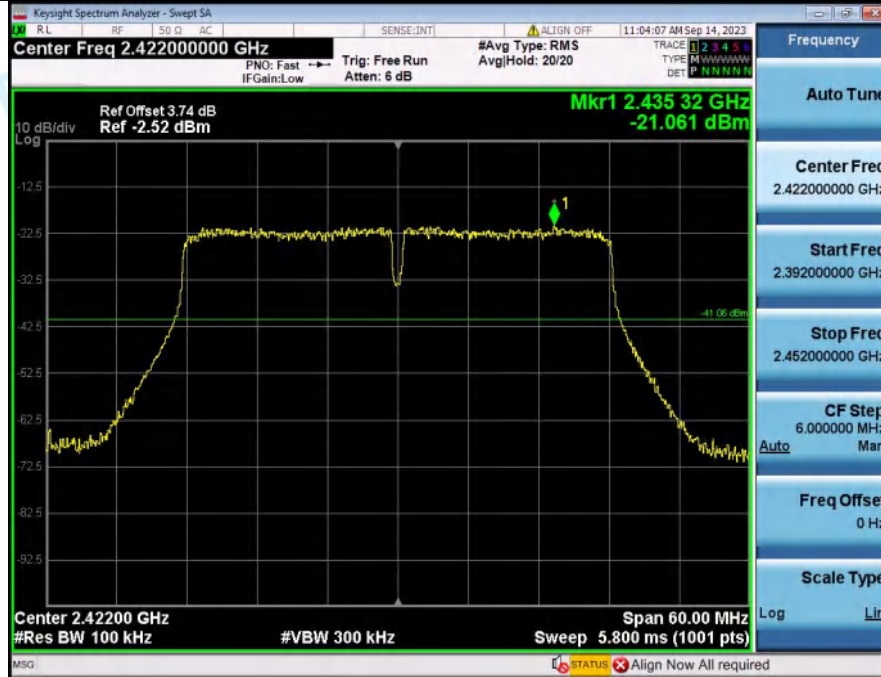
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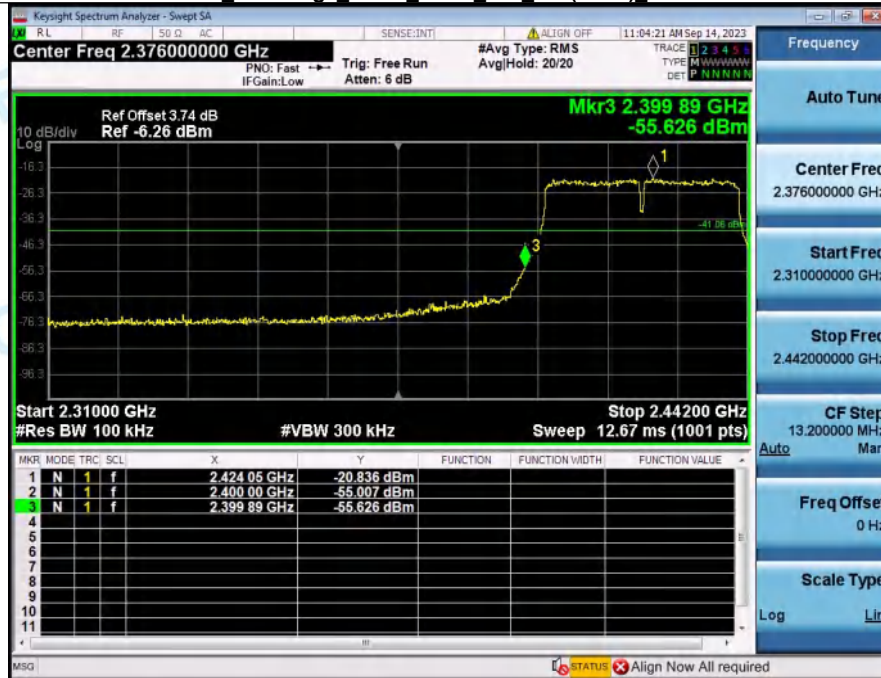
2 Bandedge_NVNT_ANT1_802_11n(HT20)_2462



1 Reference_Level_NVNT_ANT1_802_11n(HT40)_2422



2 Bandedge_NVNT_ANT1_802_11n(HT40)_2422



1 Reference_Level_NVNT_ANT1_802_11n(HT40)_2452



2 Bandedge_NVNT_ANT1_802_11n(HT40)_2452



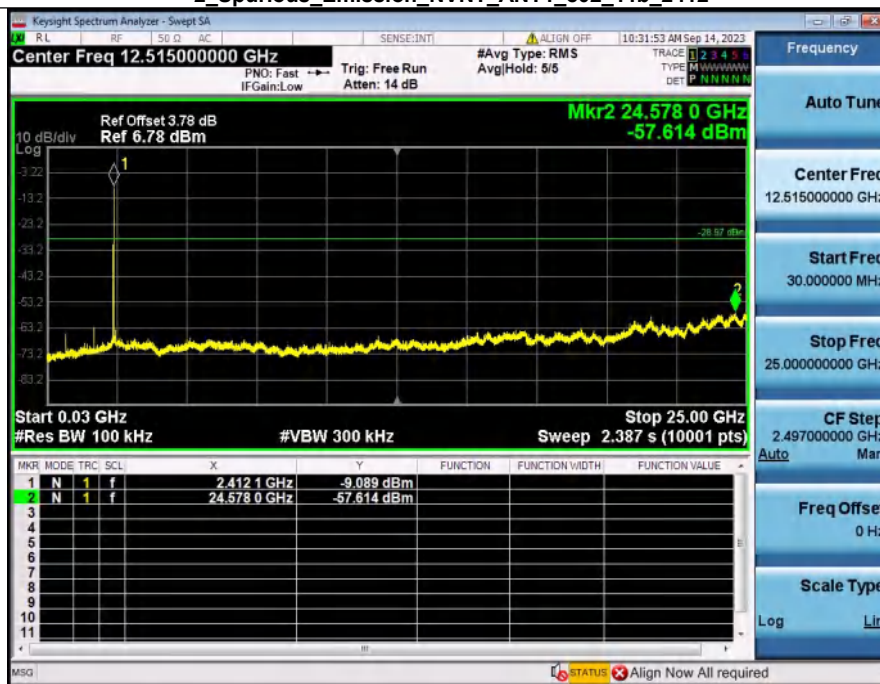
6. Spurious Emission

Condition	Antenna	Modulation	TX_Frequency (MHz)	Max. Mark_frequency(MHz)	Spurious level(dBm)	limit(dBm)	Result
NVNT	ANT1	802.11b	2412.00	24578.007	-57.614	-28.965	Pass
NVNT	ANT1	802.11b	2437.00	24533.061	-56.043	-28.965	Pass
NVNT	ANT1	802.11b	2462.00	1727.960	-53.953	-28.608	Pass
NVNT	ANT1	802.11g	2412.00	1710.481	-63.404	-37.471	Pass
NVNT	ANT1	802.11g	2437.00	1710.481	-57.995	-37.822	Pass
NVNT	ANT1	802.11g	2462.00	24011.188	-64.036	-37.474	Pass
NVNT	ANT1	802.11n(HT20)	2412.00	1727.960	-53.549	-37.730	Pass
NVNT	ANT1	802.11n(HT20)	2437.00	24967.539	-65.125	-37.595	Pass
NVNT	ANT1	802.11n(HT20)	2462.00	1727.960	-48.768	-37.494	Pass
NVNT	ANT1	802.11n(HT40)	2422.00	1727.960	-44.109	-41.061	Pass
NVNT	ANT1	802.11n(HT40)	2437.00	1727.960	-54.467	-41.066	Pass
NVNT	ANT1	802.11n(HT40)	2452.00	1717.972	-52.220	-40.567	Pass

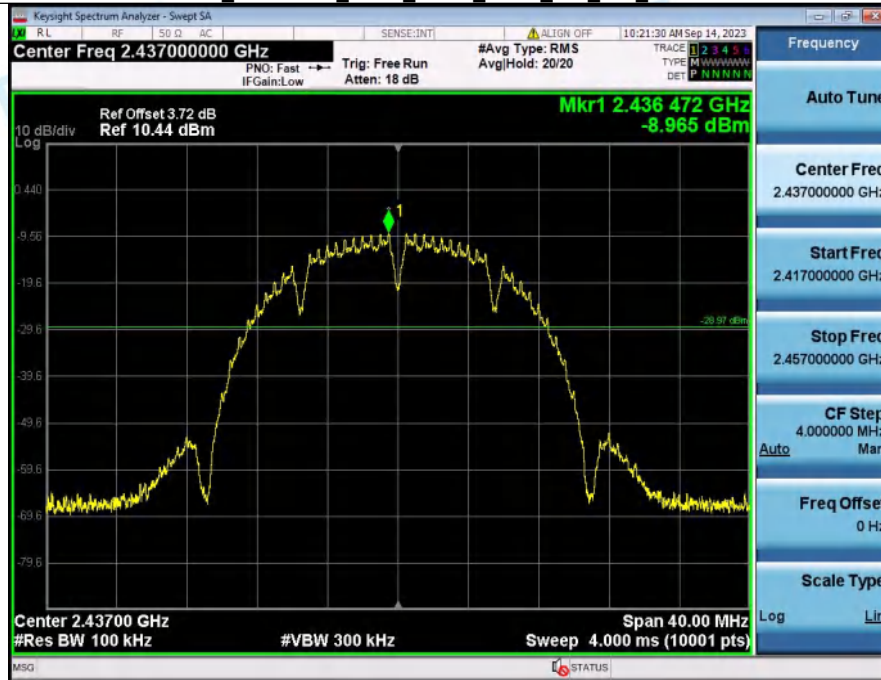
1_Reference_Level_NVNT_ANT1_802_11b_2412



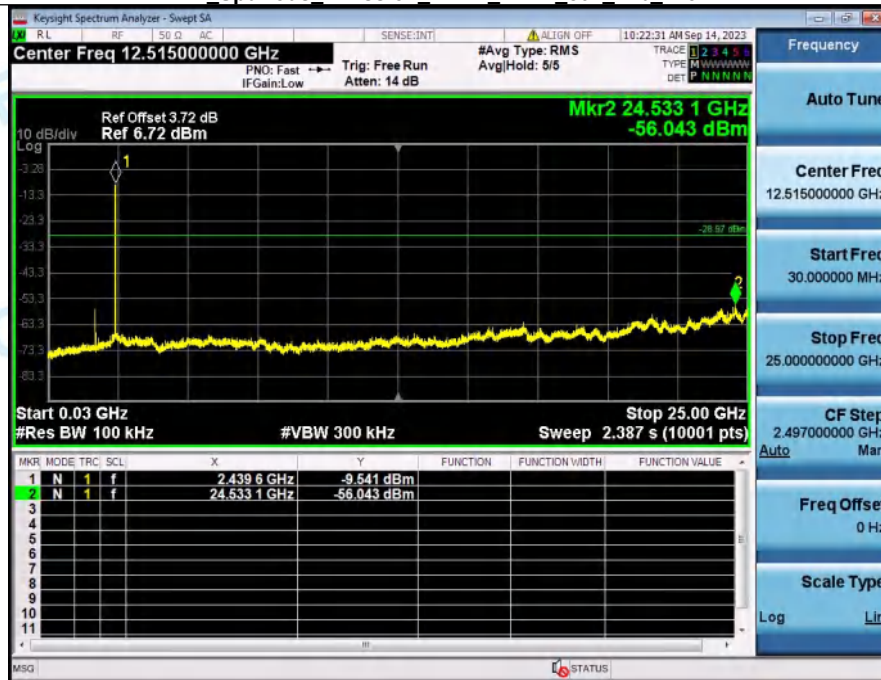
2_Spurious_Emission_NVNT_ANT1_802_11b_2412



1 Reference Level NVNT ANT1 802 11b 2437



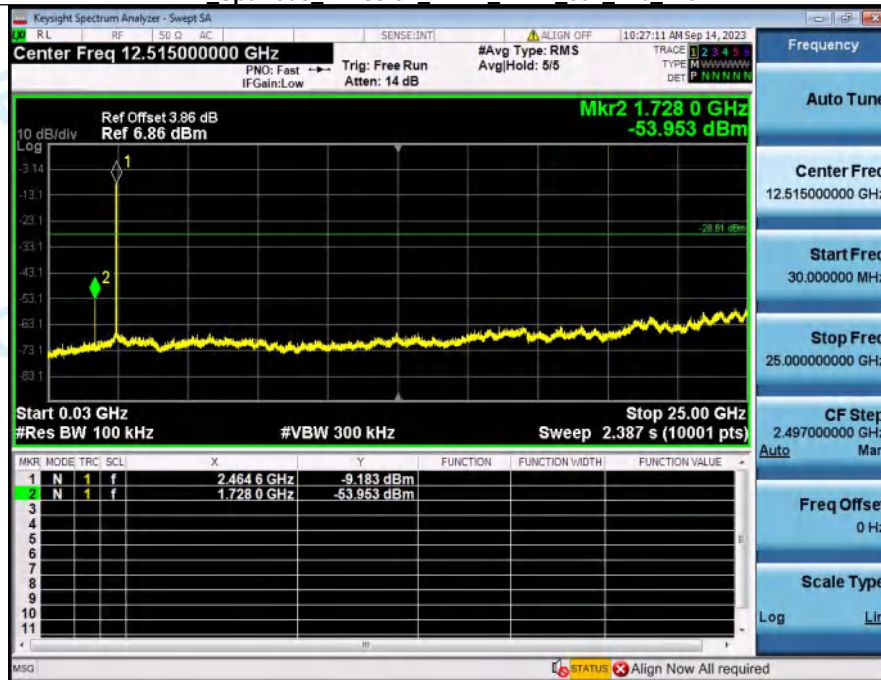
2 Spurious Emission NVNT ANT1 802 11b 2437



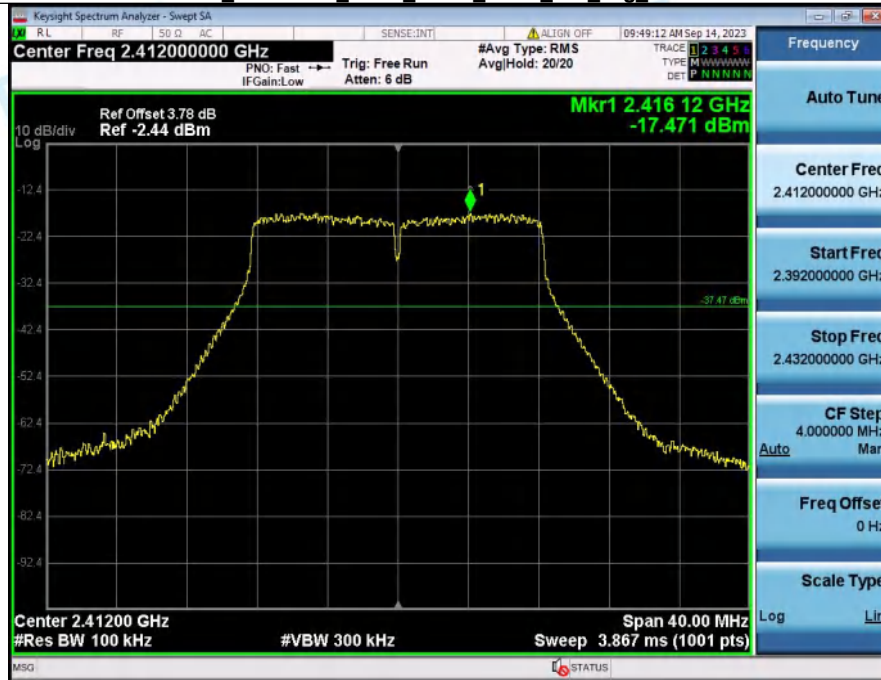
1 Reference Level NVNT_ANT1_802_11b_2462



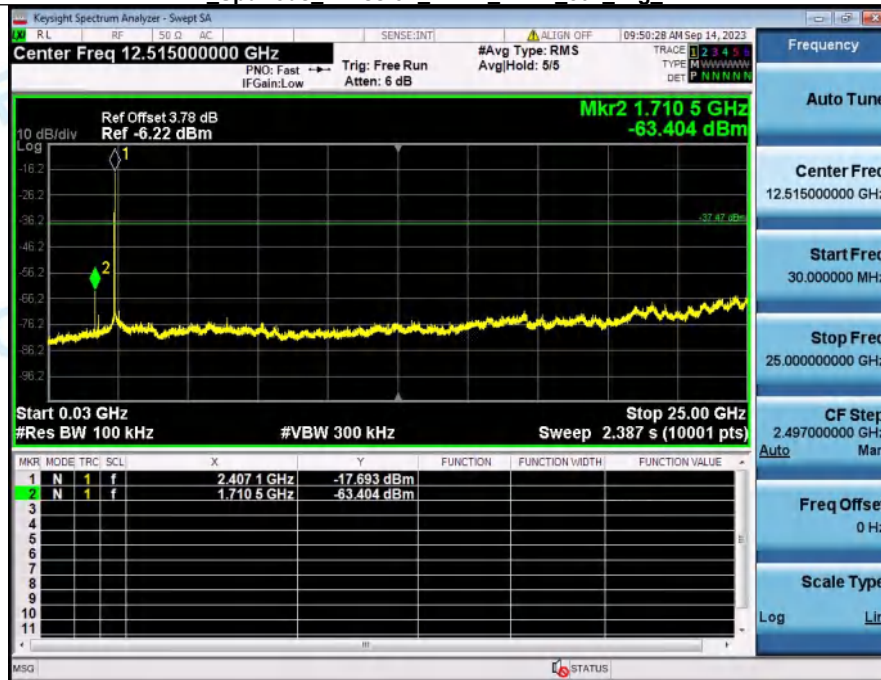
2 Spurious Emission NVNT_ANT1_802_11b_2462



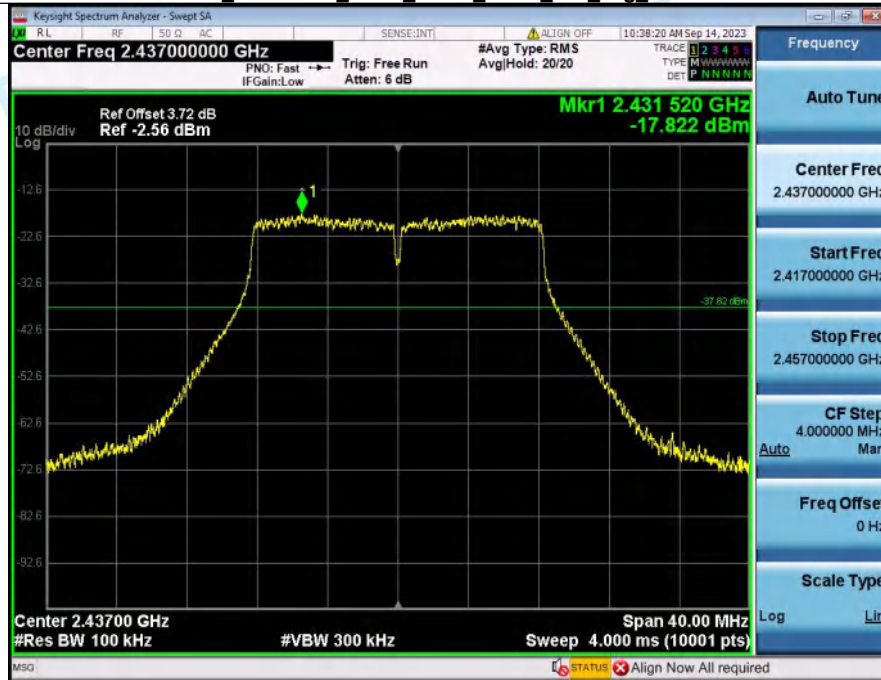
1 Reference Level NVNT ANT1 802 11g 2412



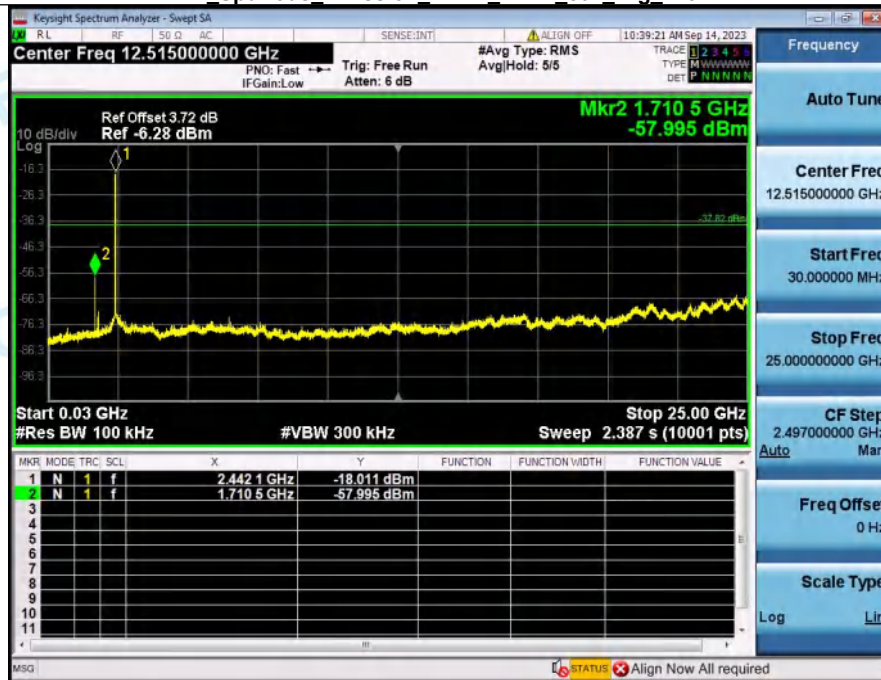
2 Spurious Emission NVNT ANT1 802 11g 2412



1 Reference Level NVNT ANT1 802 11g 2437



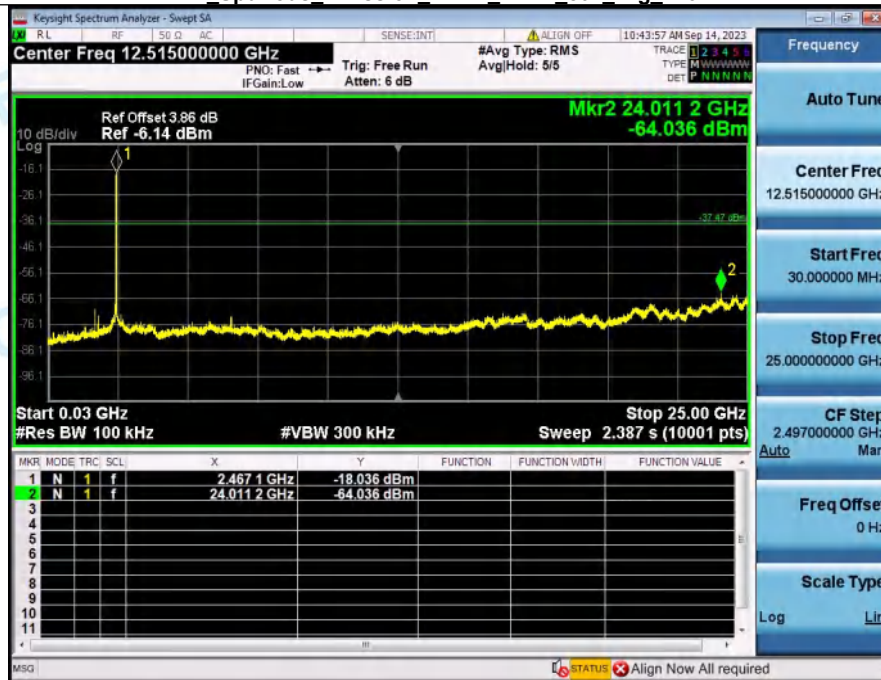
2 Spurious Emission NVNT ANT1 802 11g 2437



1 Reference Level NVNT ANT1 802 11g 2462



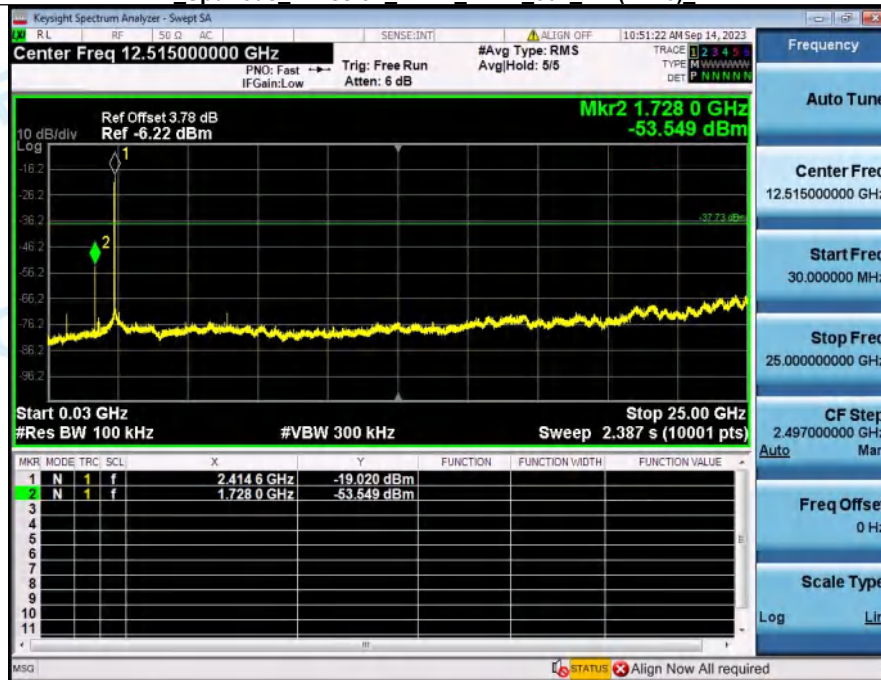
2 Spurious Emission NVNT ANT1 802 11g 2462



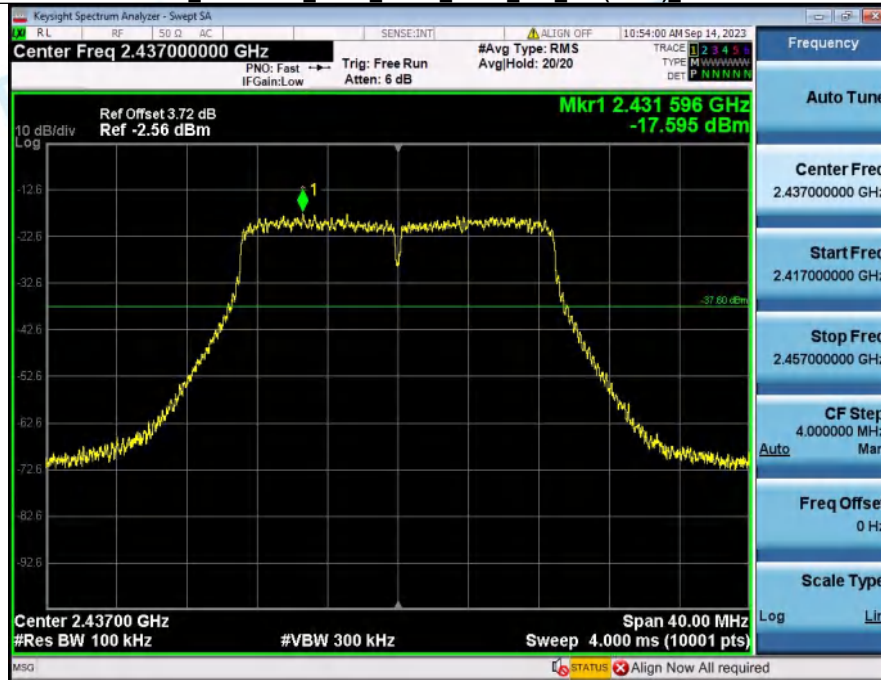
1 Reference_Level_NVNT_ANT1_802_11n(HT20)_2412



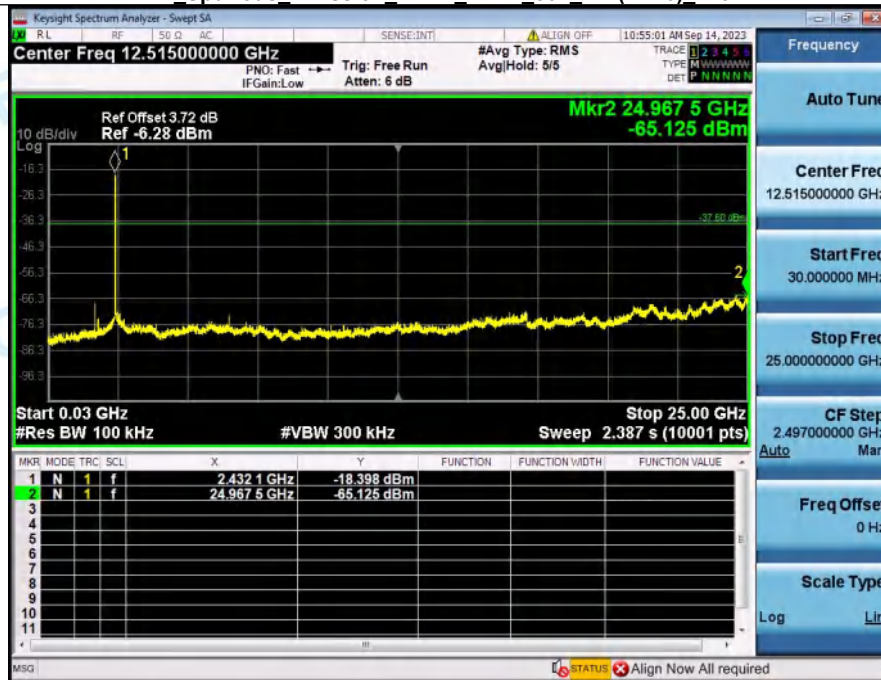
2 Spurious Emission_NVNT_ANT1_802_11n(HT20)_2412



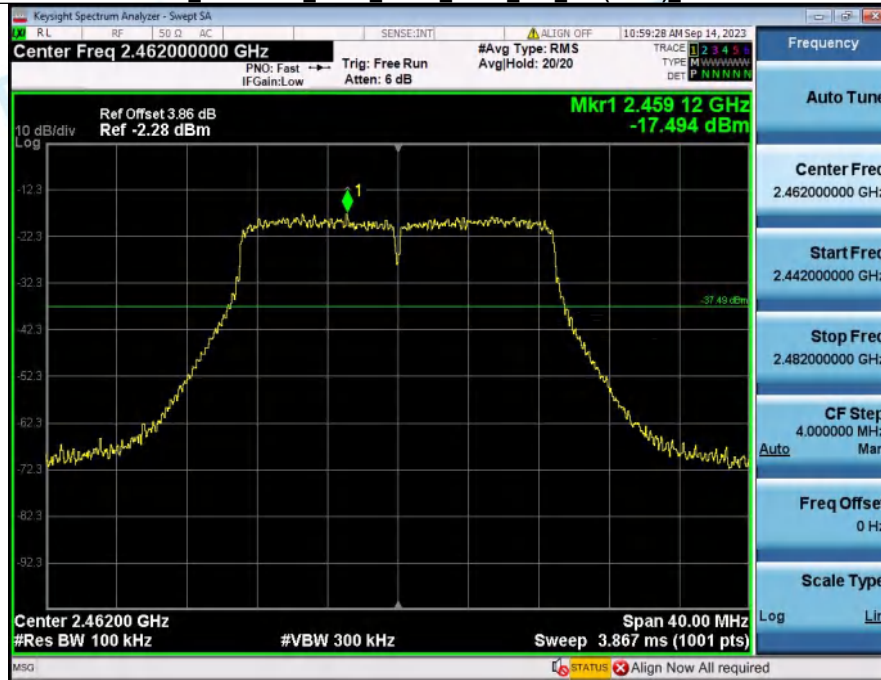
1 Reference_Level_NVNT_ANT1_802_11n(HT20)_2437



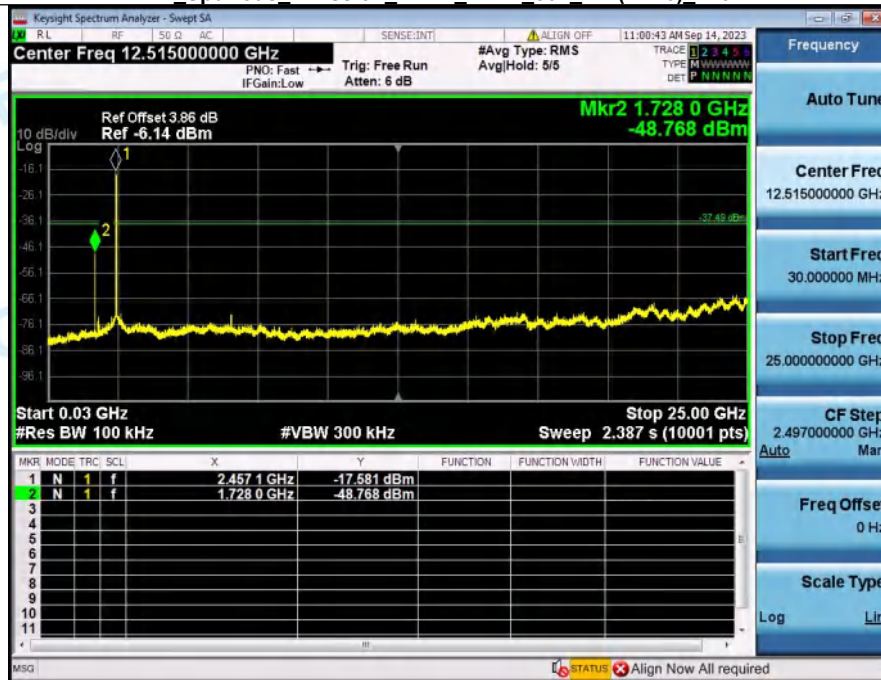
2 Spurious Emission_NVNT_ANT1_802_11n(HT20)_2437



1 Reference_Level_NVNT_ANT1_802_11n(HT20)_2462



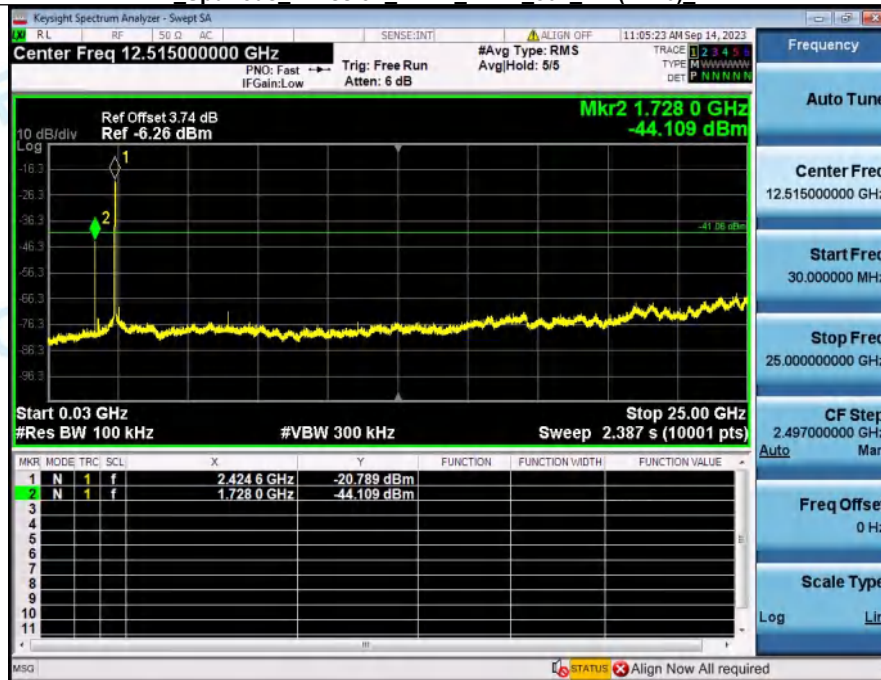
2 Spurious Emission_NVNT_ANT1_802_11n(HT20)_2462



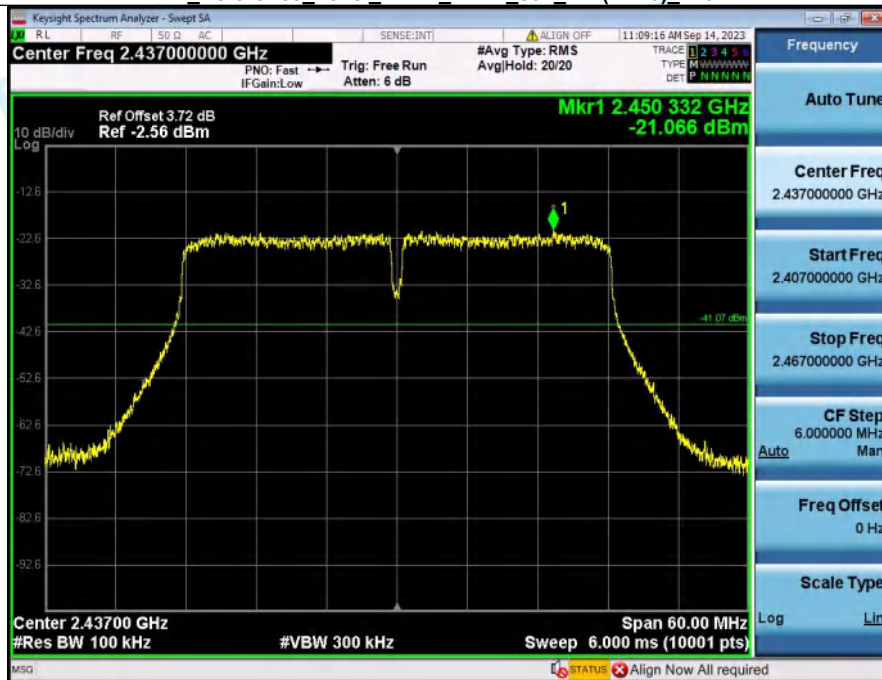
1 Reference_Level_NVNT_ANT1_802_11n(HT40)_2422



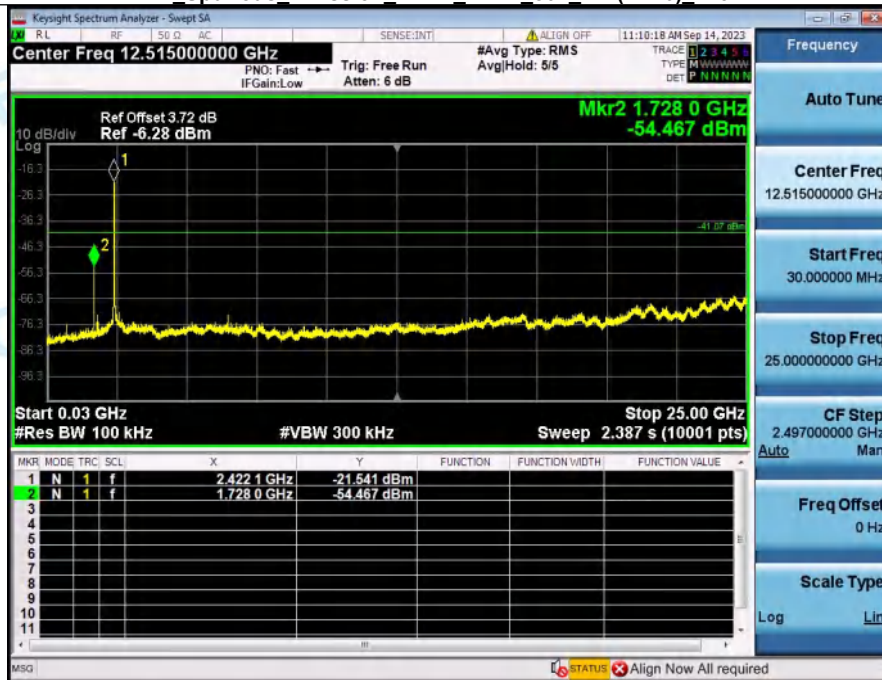
2 Spurious Emission_NVNT_ANT1_802_11n(HT40)_2422



1 Reference_Level_NVNT_ANT1_802_11n(HT40)_2437



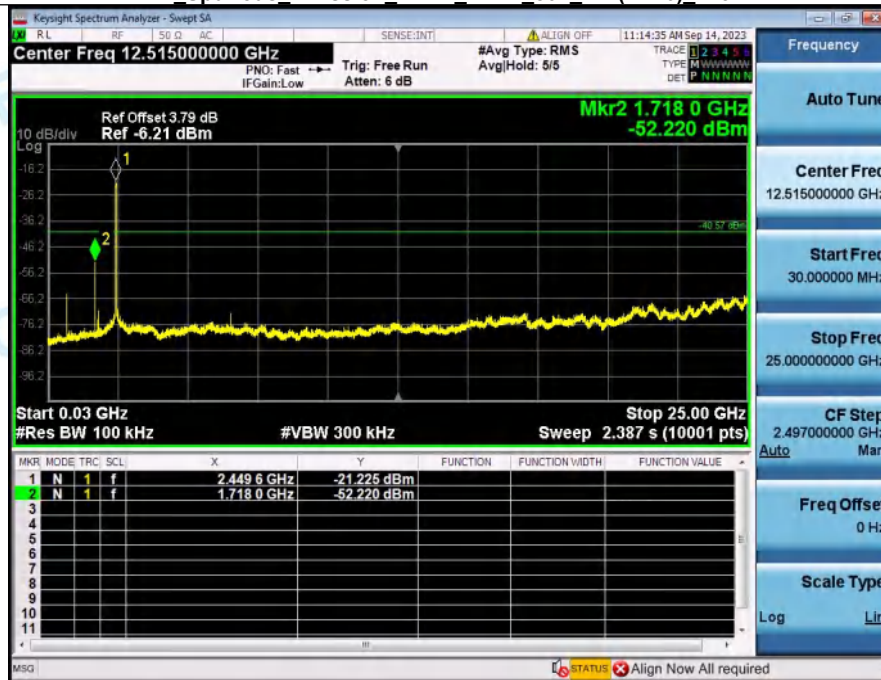
2 Spurious Emission_NVNT_ANT1_802_11n(HT40)_2437



1 Reference_Level_NVNT_ANT1_802_11n(HT40)_2452



2 Spurious Emission_NVNT_ANT1_802_11n(HT40)_2452



***** End of Report *****