ACCREDITED
Certificate #4312.01

TEST REPORT

Product Name:	Compact Hotel Phone
Trade Mark:	GRANDSTREAM
Model No. / HVIN:	GHP621W / GHP621WM1
Add. Model No. / HVIN:	GHP620W / GHP620WM1
Report Number:	24072512886RFC-1
Test Standards:	FCC 47 CFR Part 15 Subpart C RSS-247 Issue 3 RSS-Gen Issue 5
FCC ID:	YZZGHP62XWM1
IC:	11964A-GHP62XWM1
Test Result:	PASS
Date of Issue:	November 15, 2024

Prepared for:

Grandstream Networks, Inc.
126 Brookline Ave., 3rd Floor, Boston, MA 02215, USA

Prepared by:

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Date: November 15, 2024

UnionTrust Labs Laboratories *Certified*

Version

Version No.	Date	Description
V1.0	November 15, 2024	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Grandstream Networks, Inc.
Address of Applicant:	126 Brookline Ave., 3rd Floor, Boston, MA 02215, USA
Manufacturer:	Grandstream Networks, Inc.
Address of Manufacturer:	126 Brookline Ave., 3rd Floor, Boston, MA 02215, USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Compact Hotel Phone		
Model No. / HVIN:	GHP621W / GHP621WM1		
Add. Model No. / HVIN:	GHP620W / GHP620WM1		
Trade Mark:	GRANDSTREAM		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	2.4 GHz ISM Band:	IEEE 802.11b/g/n/ax	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac/ax
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac/ax
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac/ax
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac/ax
Sample Received Date:	July 25, 2024		
Sample Tested Date:	August 6, 2024 to October 12, 2024		

Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.

1.2.2 Description of Accessories

Adapter (1)	
Model No.:	DCT06W120050US-D0
Input:	100-240V~50/60Hz 200mA
Output:	12.0V⎓0.5A
DC Cable	1.8 Meter, Unshielded without ferrite
Manufacture:	Zhuzhou Dachuan Electronic Technology Co., Ltd.
SN:	00997US240327502519

Adapter (2)	
Model No.:	RD1200500-C55-123MGD
Input:	100-240V~50/60Hz 250mA Max
Output:	12.0V⎓0.5A
DC Cable	1.8 Meter, Unshielded without ferrite
Manufacture:	SHENZHEN RUIDE ELECTRONIC INDUSTRIAL CO., LTD
SN:	N/A

Adapter (3)	
Model No.:	GQ06-120050-ZU
Input:	100-240V~50/60Hz 0.3 A Max
Output:	12.0V⎓0.5A

DC Cable	1.8 Meter, Unshielded without ferrite
Manufacture:	Dong Guan City GangQi Electronic Co., Ltd
SN:	N/A

Cable	
Description:	Phone Cord
Cable Type:	Unshielded without ferrite
Length:	2.5 Meter

Others
1x Handset, 1x Base Stand

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2412 MHz to 2462 MHz
Support Standards:	IEEE 802.11b/g/n-HT20/n-HT40/ax-HE20/ax-HE40
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT40: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11ax:OFDM/ OFDMA Note 1 (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK)
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS7 IEEE 802.11n-HT40: Up to MCS7 IEEE 802.11ax-HE20/ HE40: Up to MCS11
Number of Channels:	IEEE 802.11b: 11 IEEE 802.11g: 11 IEEE 802.11n-HT20/ax-HE20: 11 IEEE 802.11n-HT40/ax-HE40: 7
Channel Separation:	5 MHz
Antenna Type:	Dipole Antenna
Antenna Gain:	3.99 dBi
Maximum Peak Power:	IEEE 802.11b: 19.92 dBm IEEE 802.11g: 22.61 dBm IEEE 802.11n-HT20: 22.89 dBm IEEE 802.11n-HT40: 22.91 dBm IEEE 802.11ax-HE20: 22.92 dBm IEEE 802.11ax-HE40: 22.88 dBm
Maximum e.i.r.p	IEEE 802.11b: 23.91 dBm IEEE 802.11g: 26.60 dBm IEEE 802.11n-HT20: 26.88 dBm IEEE 802.11n-HT40: 26.90 dBm IEEE 802.11ax-HE20: 26.91 dBm IEEE 802.11ax-HE40: 26.87 dBm
Normal Test Voltage:	12Vdc
Note 1: For IEEE 802.11ax, the device not support partial RU mode.	

1.4 OTHER INFORMATION

Operation Frequency Each of Channel	
IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20 IEEE 802.11ax-HE20	**f = 2407 + 5k MHz, k = 1,…,11**
IEEE 802.11n-HT40 IEEE 802.11ax-HE40	**f = 2407 + 5k MHz, k = 3,…,9**
Note: **f** is the operating frequency (MHz); **k** is the operating channel.	

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	DELL	Latitude 3400	16238087894	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.1 Meter	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6th, Baoneng Science and Technology Park, Longhua Street, Longhua District, Shenzhen, China
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB
8	Conducted spurious emissions	± 2.7 dB
9	RF Power, Conducted	± 0.68 dB
10	Occupied Bandwidth	± 1.86 %
11	Radio Frequency	± 6.5 x 10^{-8}
12	Transmission Time	± 0.19 %

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart C Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203/15.247 (b)(4) RSS-Gen Issue 5, Section 6.8	N/A	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207 RSS-Gen Issue 5, Section 8.8	ANSI C63.10-2013 Clause 6.2	PASS
Conducted Peak Output Power	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3) RSS-247 Issue 3, Section 5.4(d)	ANSI C63.10-2013 Clause 11.9.1.3	PASS
6dB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2) RSS-247 Issue 3, Section 5.2(a)	ANSI C63.10-2013 Clause 11.8.1	PASS
Occupied Bandwidth	RSS-Gen Issue 5, Section 6.7	RSS-Gen Issue 5, Section 6.7	PASS
Power Spectral Density	FCC 47 CFR Part 15 Subpart C Section 15.247 (e) RSS-247 Issue 3, Section 5.2(b)	ANSI C63.10-2013 Clause 11.10.2	PASS
Conducted Out of Band Emission	FCC 47 CFR Part 15 Subpart C Section 15.247(d) RSS-247 Issue 3, Section 5.5	ANSI C63.10-2013 Clause 11.11	PASS
Radiated Spurious Emissions	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209 RSS-Gen Issue 5, Section 6.13/8.9/8.10	ANSI C63.10-2013 Clause 11.11 & Clause 11.12	PASS
Band Edge Measurements (Radiated)	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209 RSS-247 Issue 3, Section 5.5	ANSI C63.10-2013 Clause 11.13	PASS
Disclaimer and Explanations: The declared of product specification and data (e.g. antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.			

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☑	3m SAC	ETS-LINDGREN	3m	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
☑	Receiver	R&S	ESIB26	100114	27-Oct-2023	26-Oct-2024
☑	Loop Antenna	ETS-LINDGREN	6502	00202525	30-Oct-2023	29-Oct-2024
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	30-Oct-2023	29-Oct-2024
☑	6dB Attenuator	Talent	RA6A5-N-18	18103001	30-Oct-2023	29-Oct-2024
☑	Preamplifier	HP	8447F	2805A02960	31-Oct-2023	30-Oct-2024
☑	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G590	17-Jan-2024	16-Jan-2025
☑	Double-Ridged Waveguide Horn Antenna	ETS-LINDGREN	3117-PA	00201541	01-Apr-2024	31-Mar-2025
☑	Pre-amplifier	ETS-Lindgren	00118385	00201874	31-Oct-2023	30-Oct-2024
☑	Double-Ridged Waveguide Horn Antenna	ETS-LINDGREN	3116C-PA	00202652	30-Oct-2023	29-Oct-2024
☑	Pre-amplifier	ETS-Lindgren	00118384	00202652	30-Oct-2023	29-Oct-2024
☑	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☑	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☑	Receiver	R&S	ESR7	1316.3003K07-101181-K3	27-Oct-2023	26-Oct-2024
☑	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	27-Oct-2023	26-Oct-2024
☑	LISN	R&S	ESH2-Z5	860014/024	27-Oct-2023	26-Oct-2024
☑	LISN	ETS-Lindgren	3816/2SH	00201088	27-Oct-2023	26-Oct-2024
☑	Test Software	EZ-EMC	EZ-CON	Software Version: EMC-CON 3A1.1		

Conducted RF test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☑	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	27-Oct-2023	26-Oct-2024
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	27-Oct-2023	26-Oct-2024
☐	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	27-Oct-2023	26-Oct-2024

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35	12	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment and Test Sample

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
AC Power Line Conducted Emission	23.0	48.9	100.2	S202407253994-ZJA01/4	Linson Xie
Conducted Peak Output Power	22.6	48.8	100.2	S202407253994-ZJA02/4	Allen Zhou
6dB Bandwidth & Occupied Bandwidth					
Power Spectral Density					
Conducted Out of Band Emission					
Radiated Spurious Emissions	25.6	55.7	100.4	S202407253994-ZJA03/4	Frie Huo
Band Edge Measurements (Radiated)					

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11b	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11g	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT20 IEEE 802.11ax-HE20	2412 MHz to 2462 MHz	Channel 1	Channel 6	Channel 11
		2412 MHz	2437 MHz	2462 MHz
Mode	**Tx/Rx Frequency**	**Test RF Channel Lists**		
		Lowest(L)	**Middle(M)**	**Highest(H)**
IEEE 802.11n-HT40 IEEE 802.11ax-HE40	2422 MHz to 2452 MHz	Channel 3	Channel 6	Channel 9
		2422 MHz	2437 MHz	2452 MHz

4.3 EUT TEST STATUS

Mode	Tx Function	Description
IEEE 802.11b IEEE 802.11g IEEE 802.11n-HT20 IEEE 802.11n-HT40 IEEE 802.11ax-HE20 IEEE 802.11ax-HE40	1Tx	1. Keep the EUT in continuously transmitting with modulation test single.

Power Setting			
Mode	**Lowest(L)**	**Middle(M)**	**Highest(H)**
IEEE 802.11b	16	16	16
IEEE 802.11g	16	16	16
IEEE 802.11n-HT20	16	16	16
IEEE 802.11n-HT40	16	16	16
IEEE 802.11ax-HE20	16	16	16
IEEE 802.11ax-HE40	16	16	16

Test Software
Test software name: Commands

4.4 PRE-SCAN

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

Mode	Worst-case data rates
IEEE 802.11b	1 Mbps
IEEE 802.11g	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0
IEEE 802.11ax-HE20	MCS0
IEEE 802.11ax-HE40	MCS0

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

Figure 1. Below 30MHz

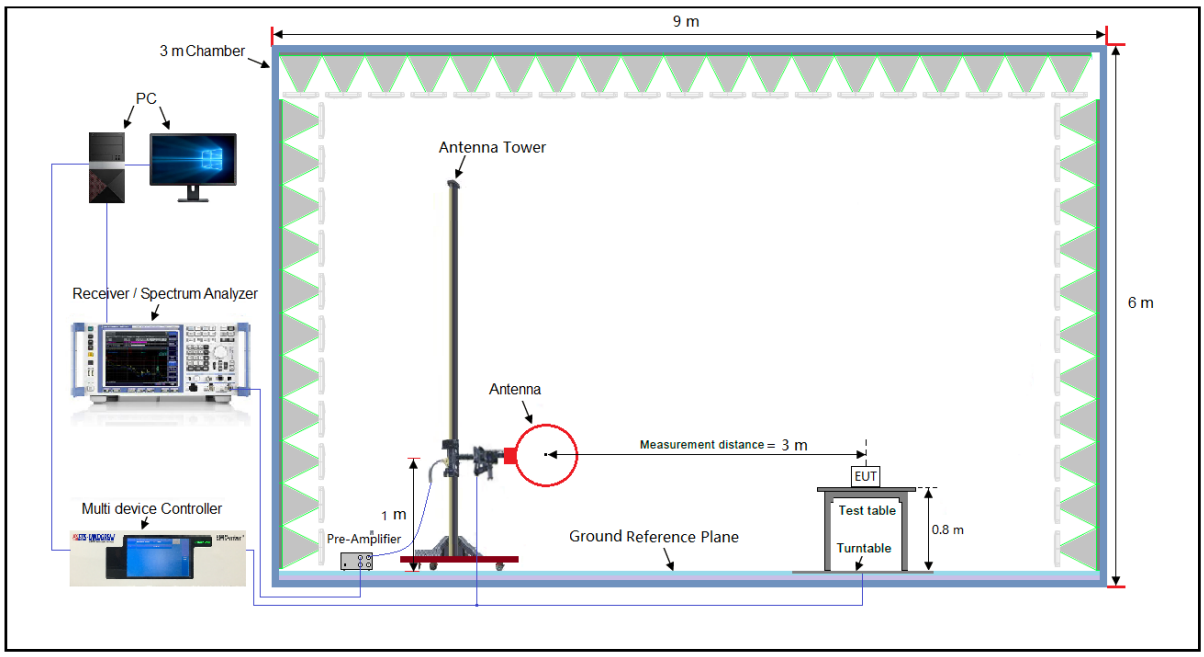


Figure 2. 30MHz to 1GHz

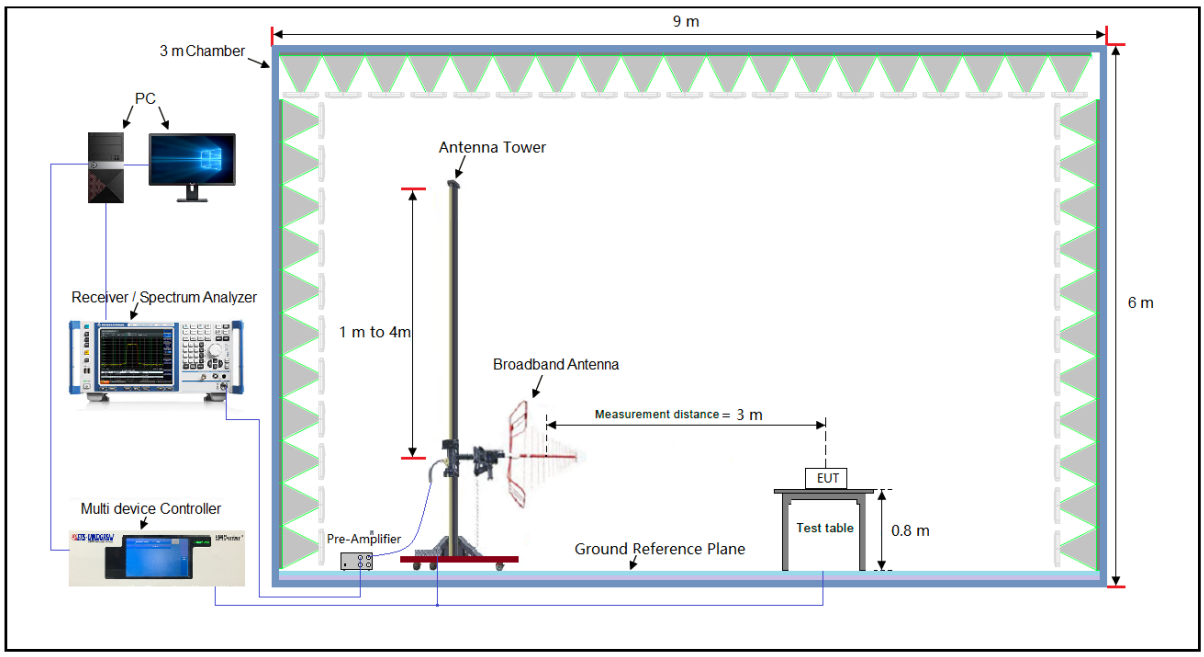
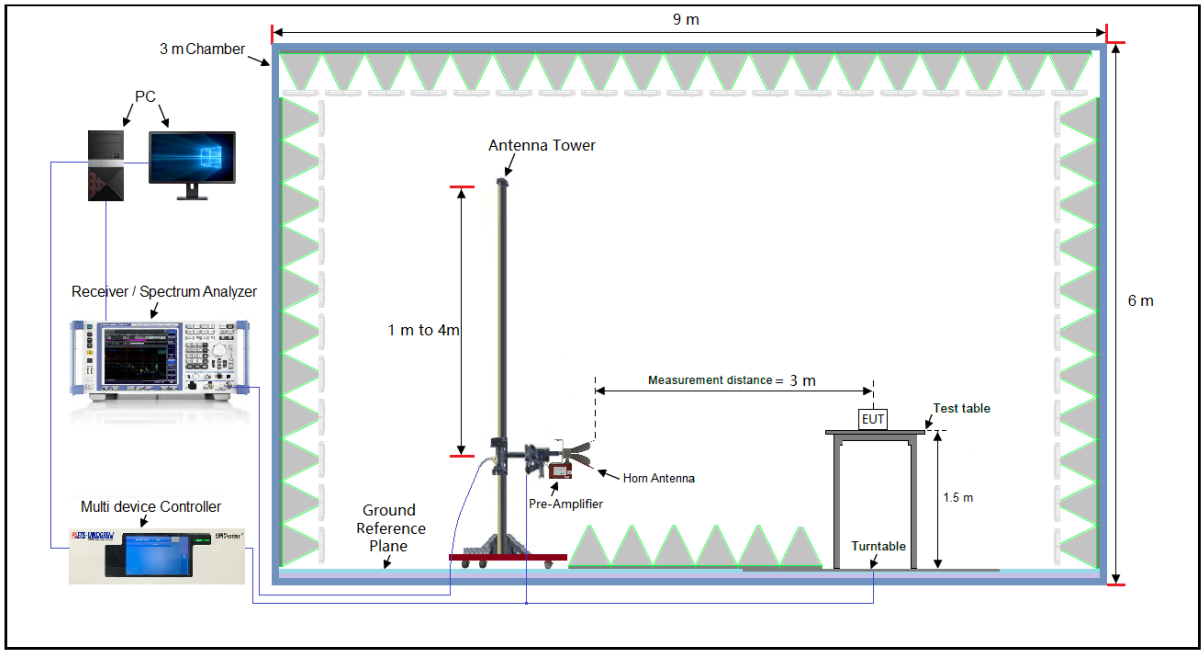
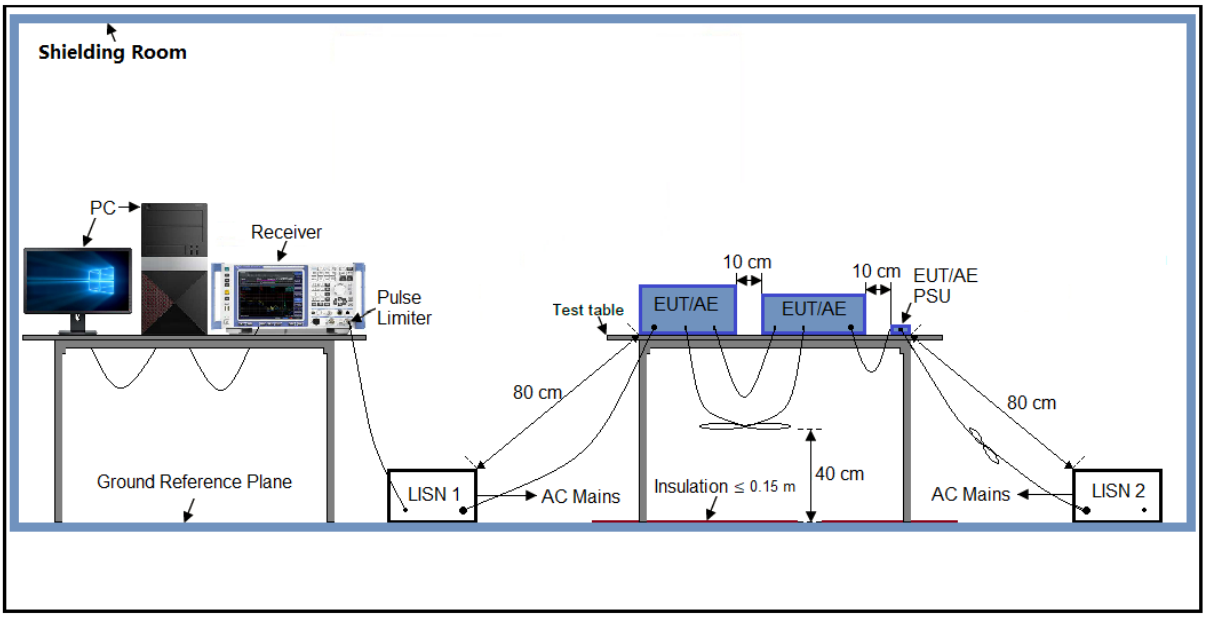


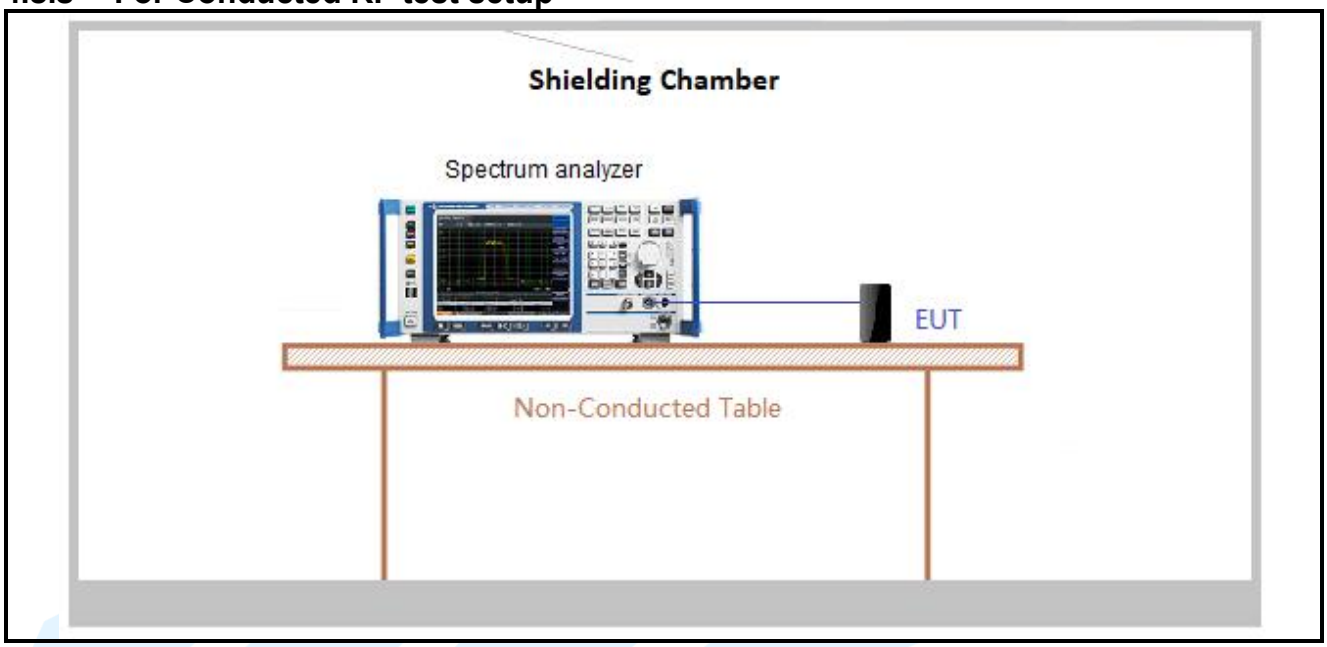
Figure 3. Above 1GHz



4.5.2 For Conducted Emissions test setup



4.5.3 For Conducted RF test setup



4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.7 DUTY CYCLE

Test Procedure: ANSI C63.10-2013 Clause 11.6.

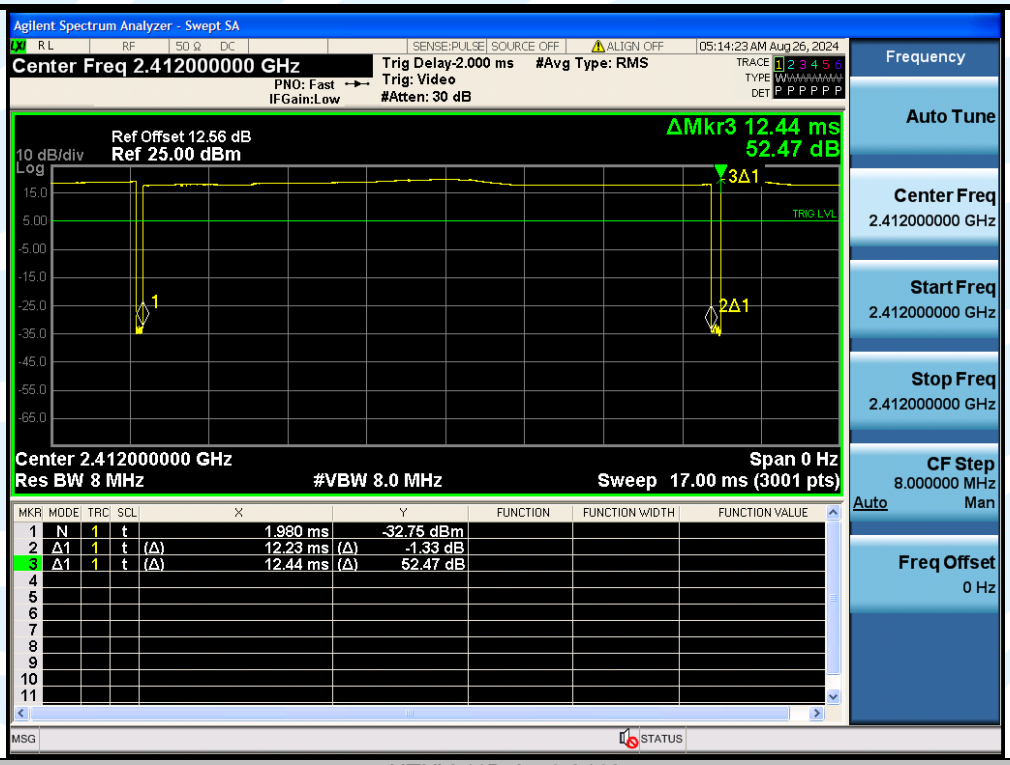
Test Results

Mode	Data Rates	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/T Minimum VBW (kHz)
IEEE 802.11b	1 Mbps	12.23	12.44	0.98	98.31	0.00	0.01
IEEE 802.11g	6 Mbps	2.040	2.590	0.79	78.76	1.04	0.49
IEEE 802.11n-HT20	MCS 0	5.090	5.220	0.98	97.51	0.11	0.20
IEEE 802.11n-HT40	MCS 0	4.890	5.090	0.96	96.07	0.17	0.20
IEEE 802.11ax-HE20	MCS 0	3.880	4.090	0.95	94.87	0.23	0.26
IEEE 802.11ax-HE40	MCS 0	3.870	4.110	0.94	94.16	0.26	0.26

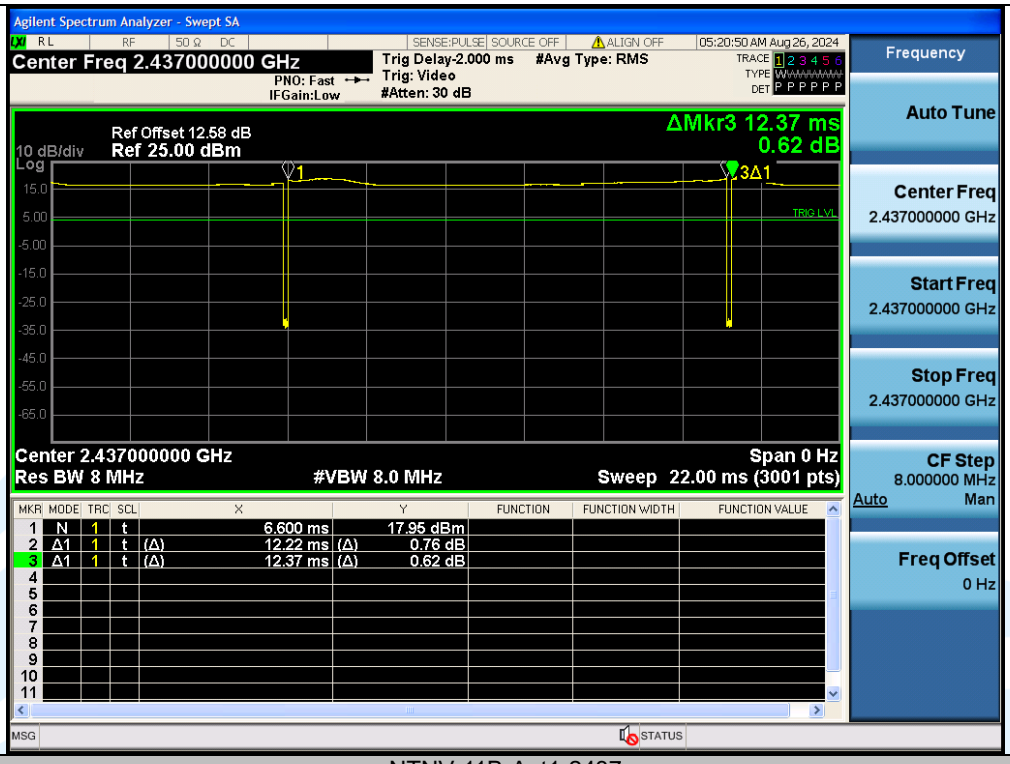
Remark:

1) Duty cycle= On Time/ Period;
2) Duty Cycle factor = 10 * log(1/ Duty cycle);
3) Average factor = 20 $\log_{10}$ Duty Cycle.

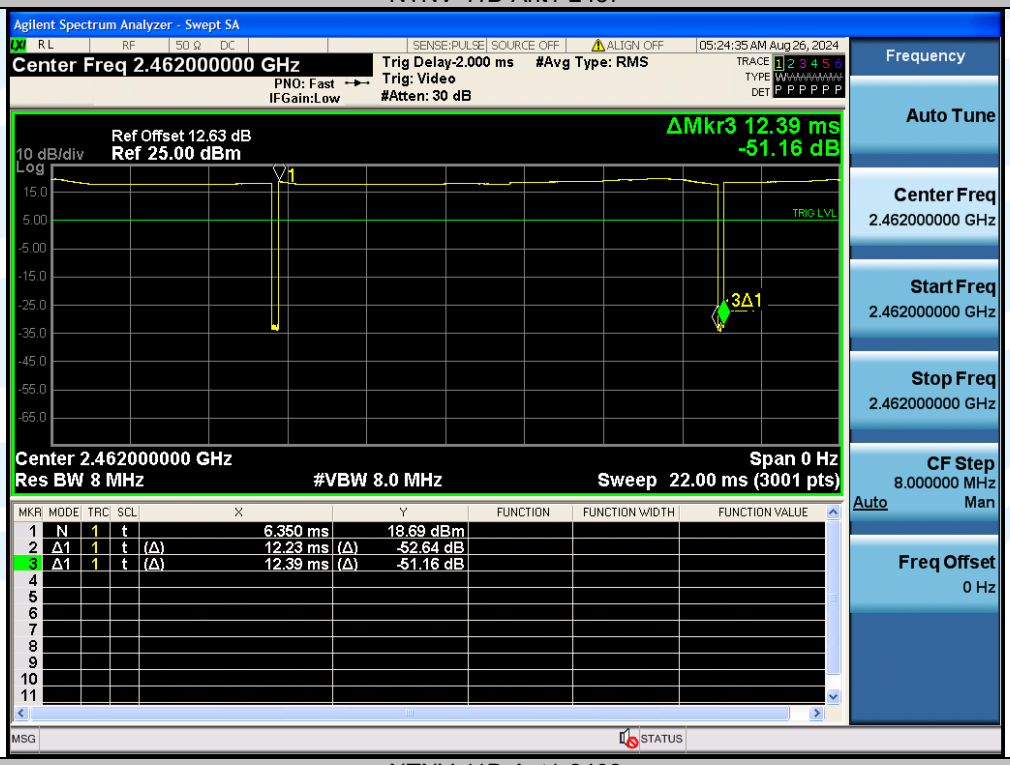
The test plots as follows



NTNV-11B-Ant1-2412



NTNV-11B-Ant1-2437



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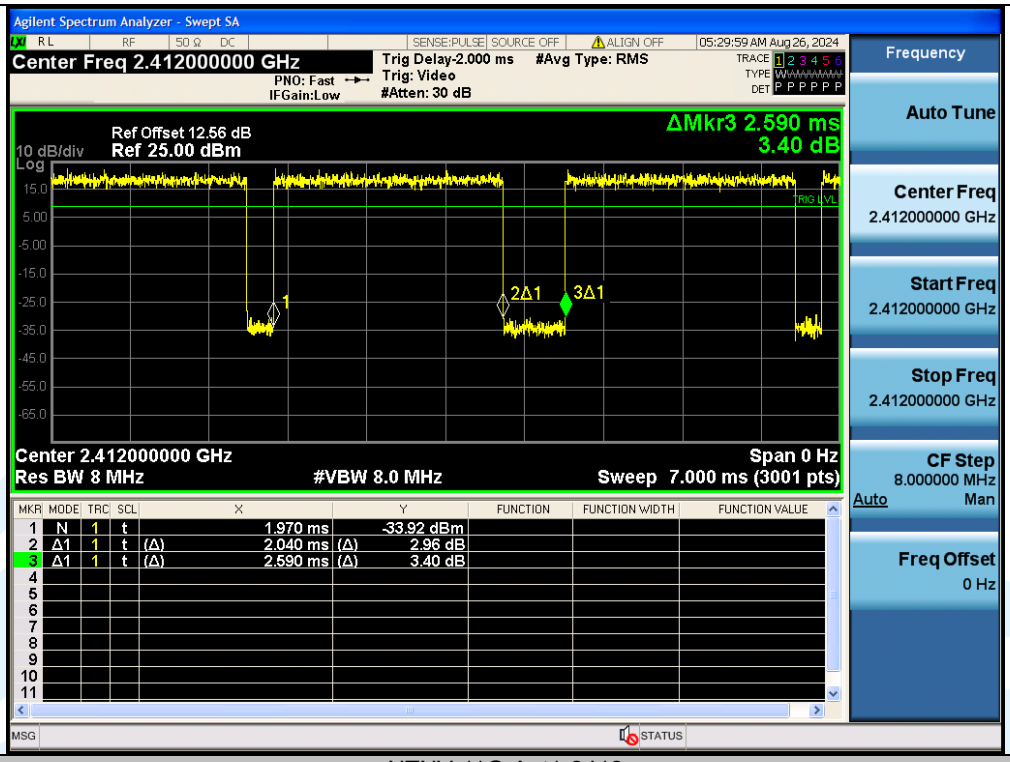
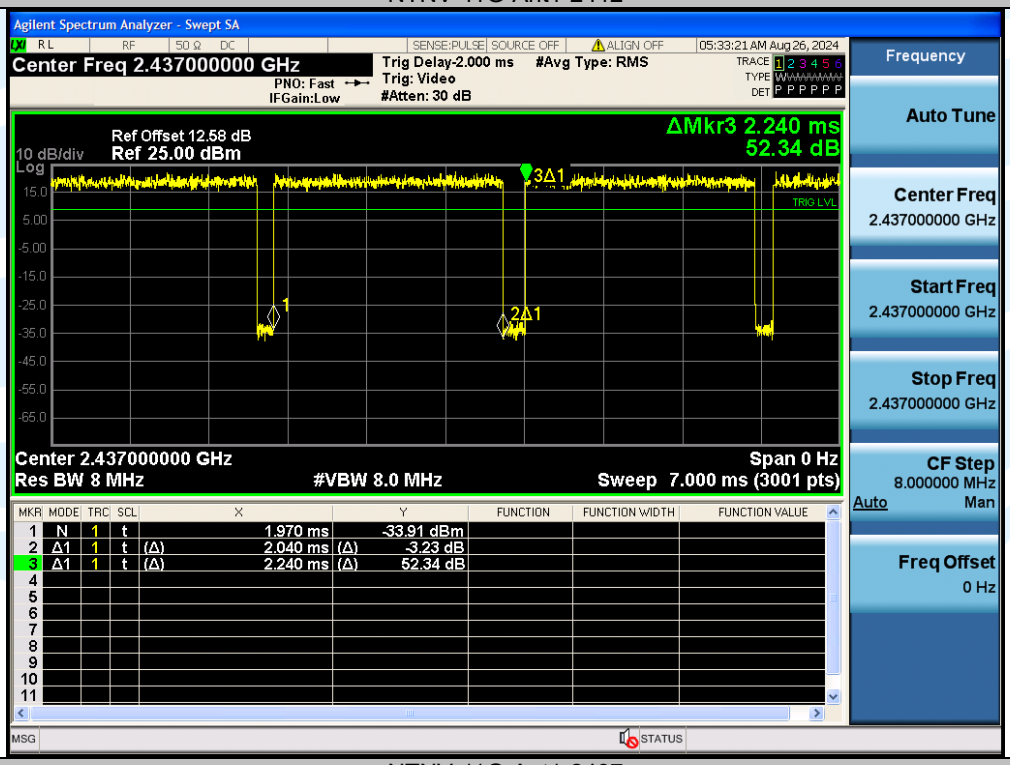
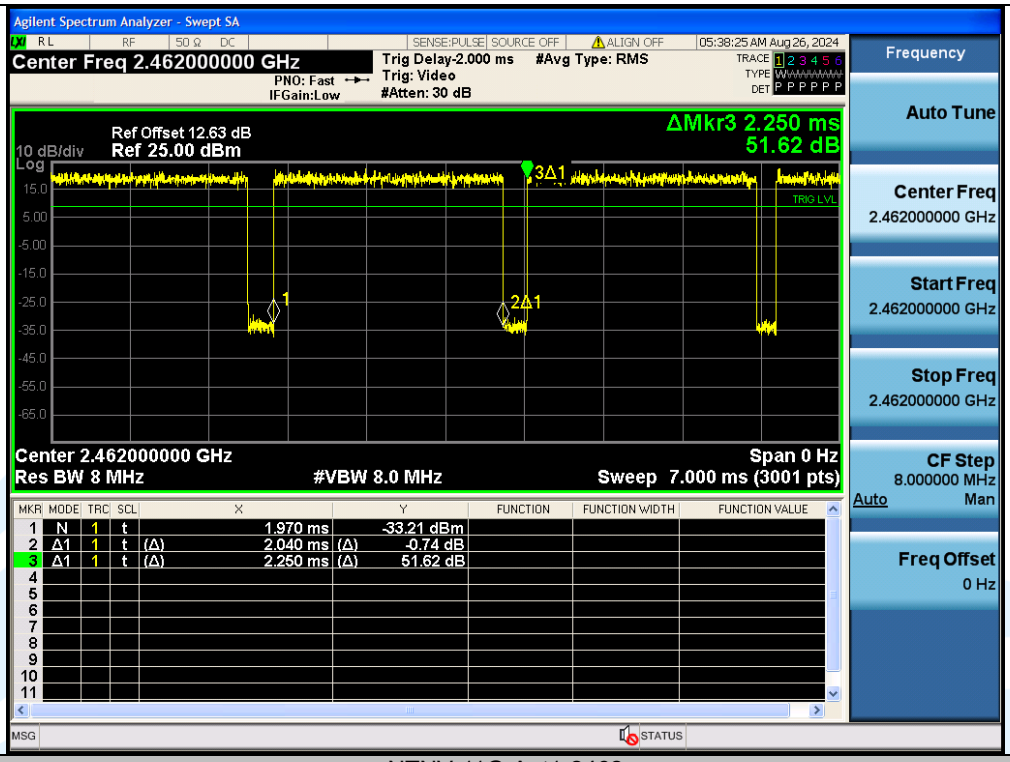


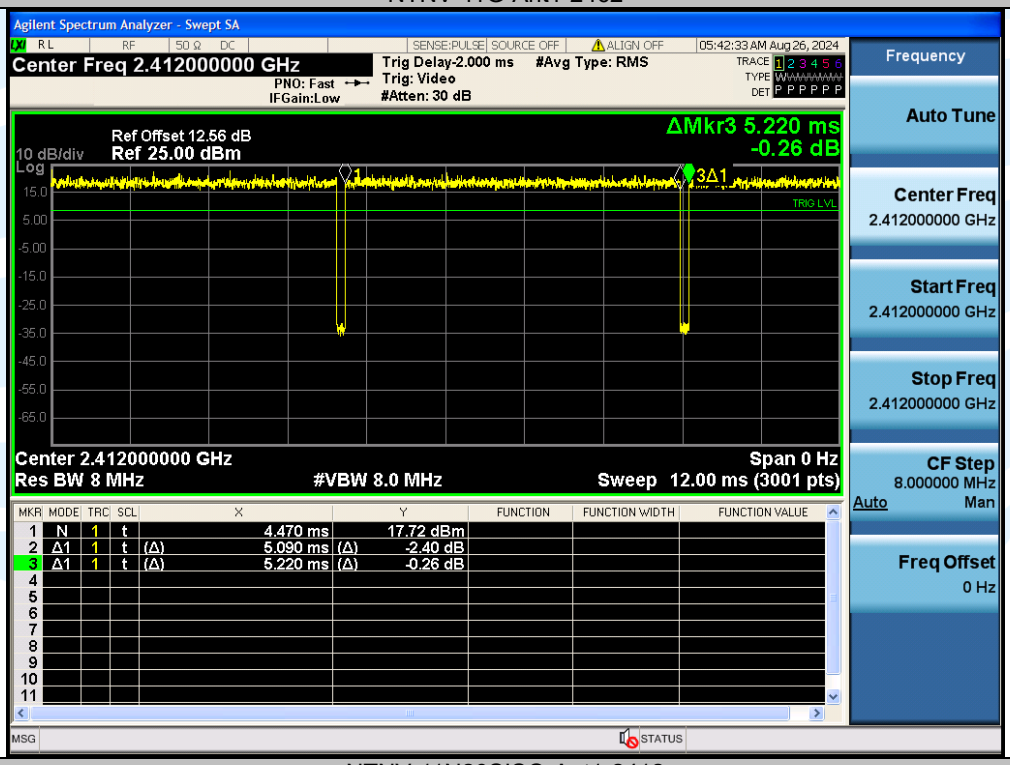
NTNV-11G-Ant1-2412



NTNV-11G-Ant1-2437



NTNV-11G-Ant1-2462



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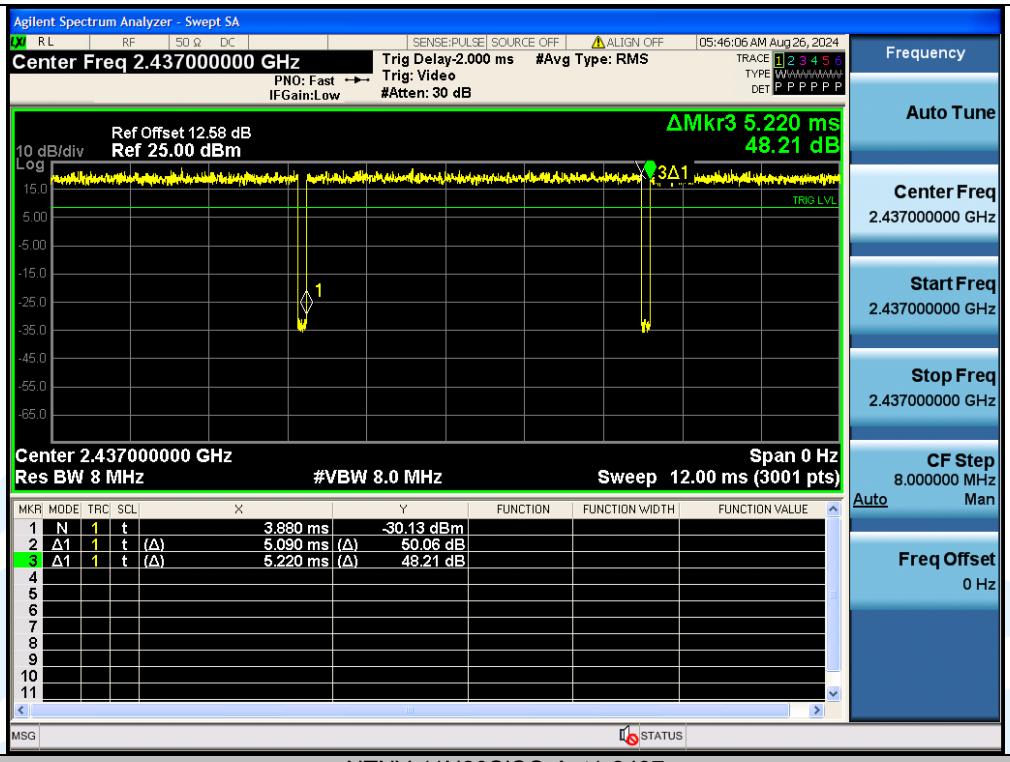

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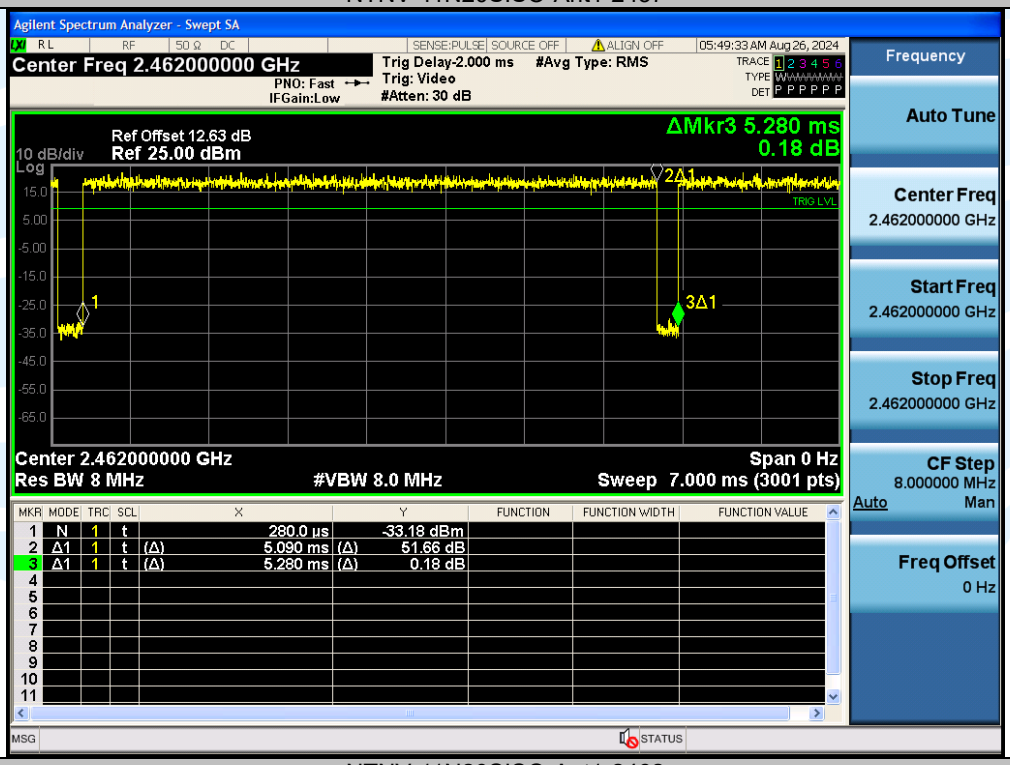

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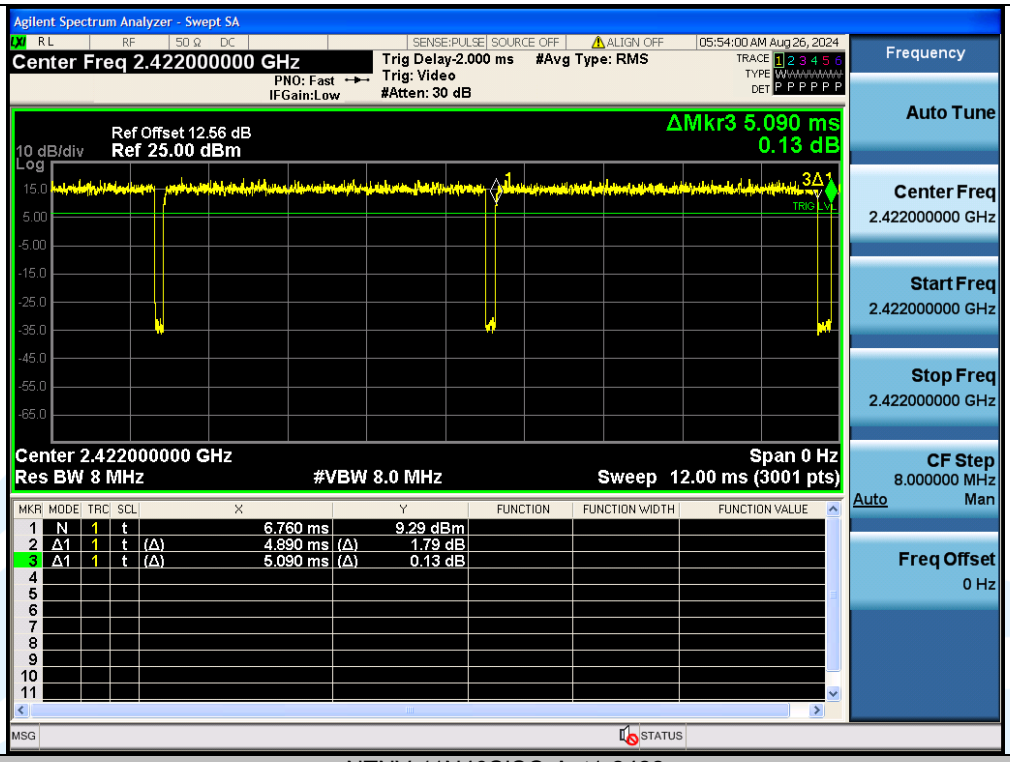

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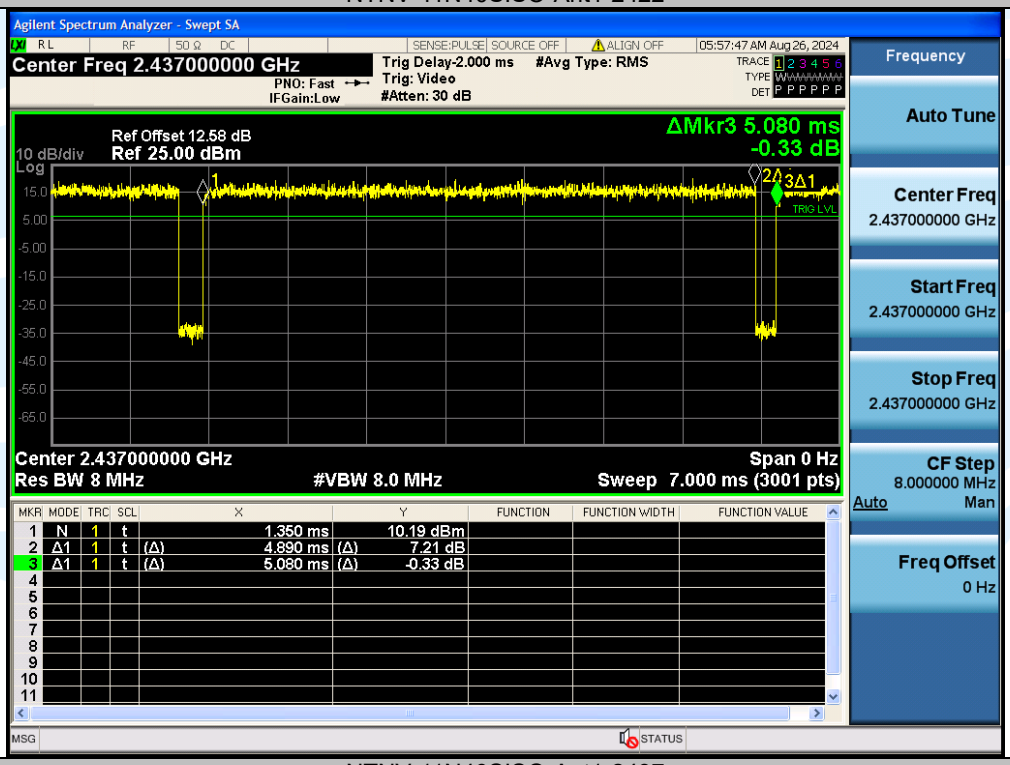

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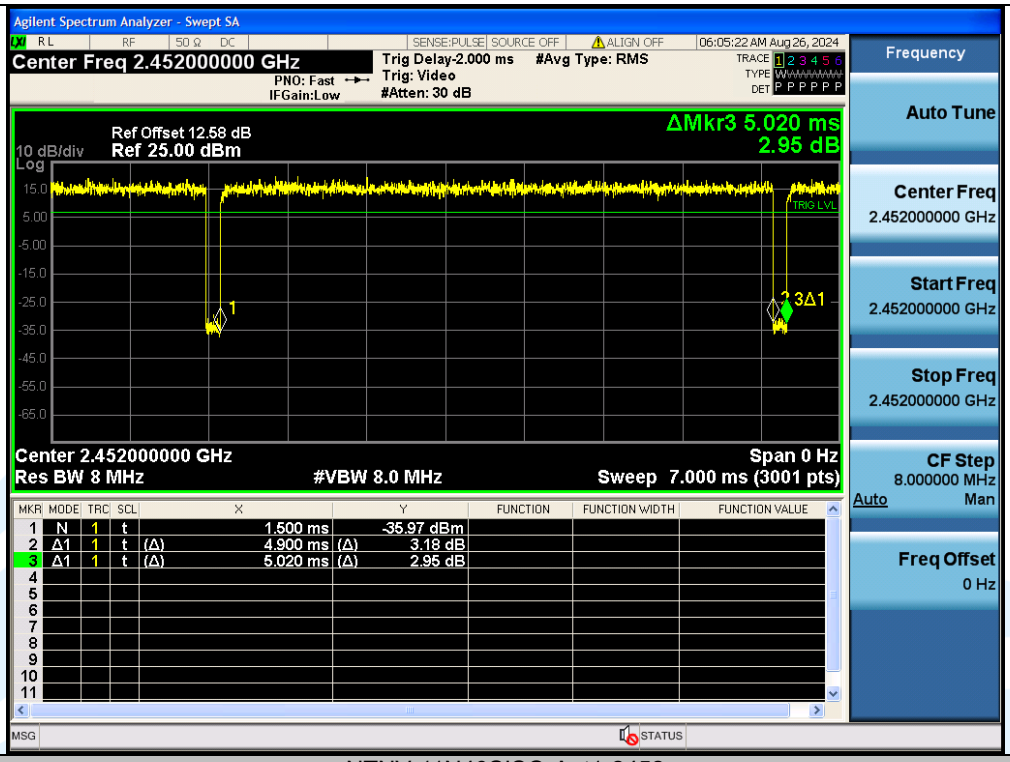

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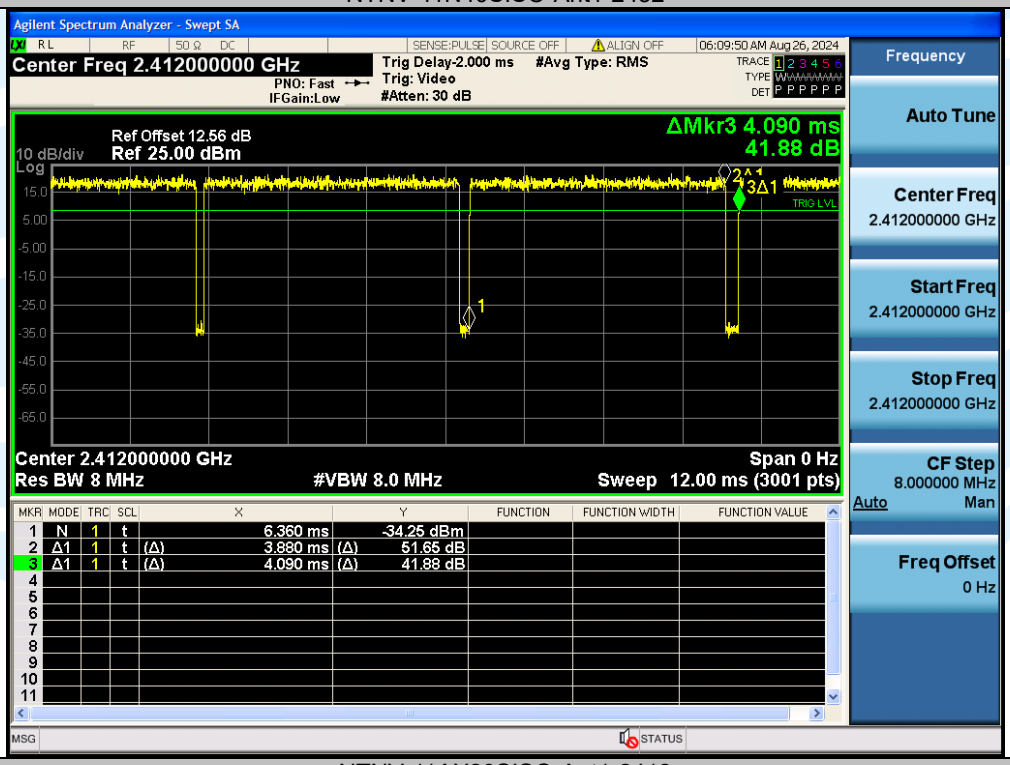

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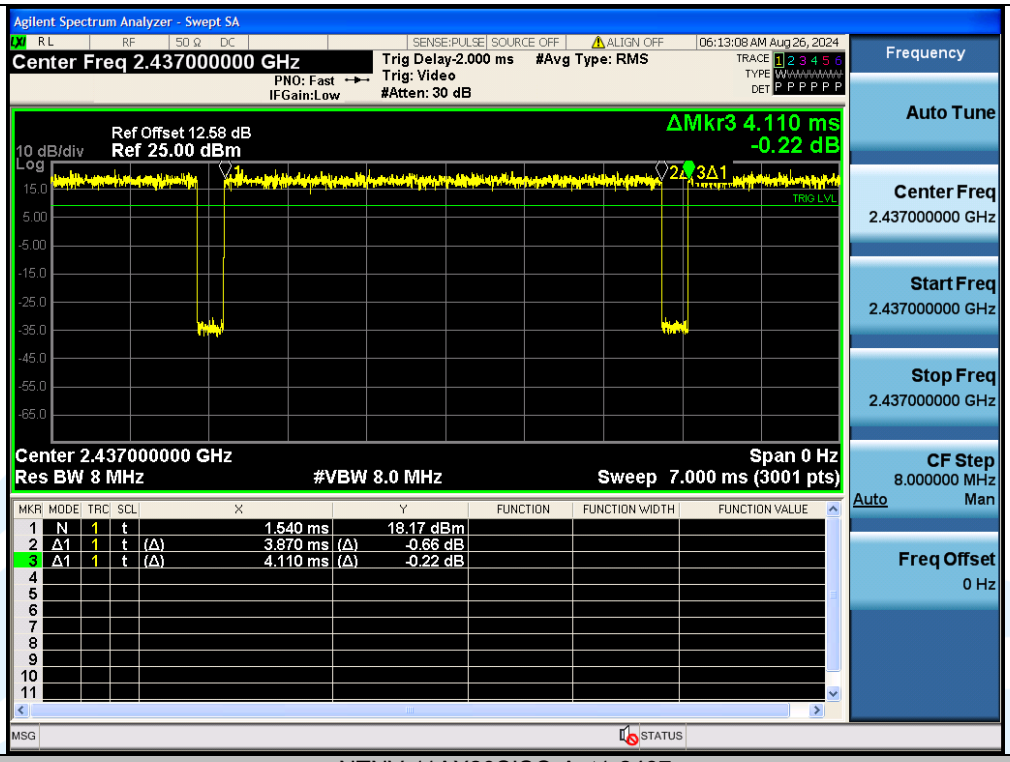

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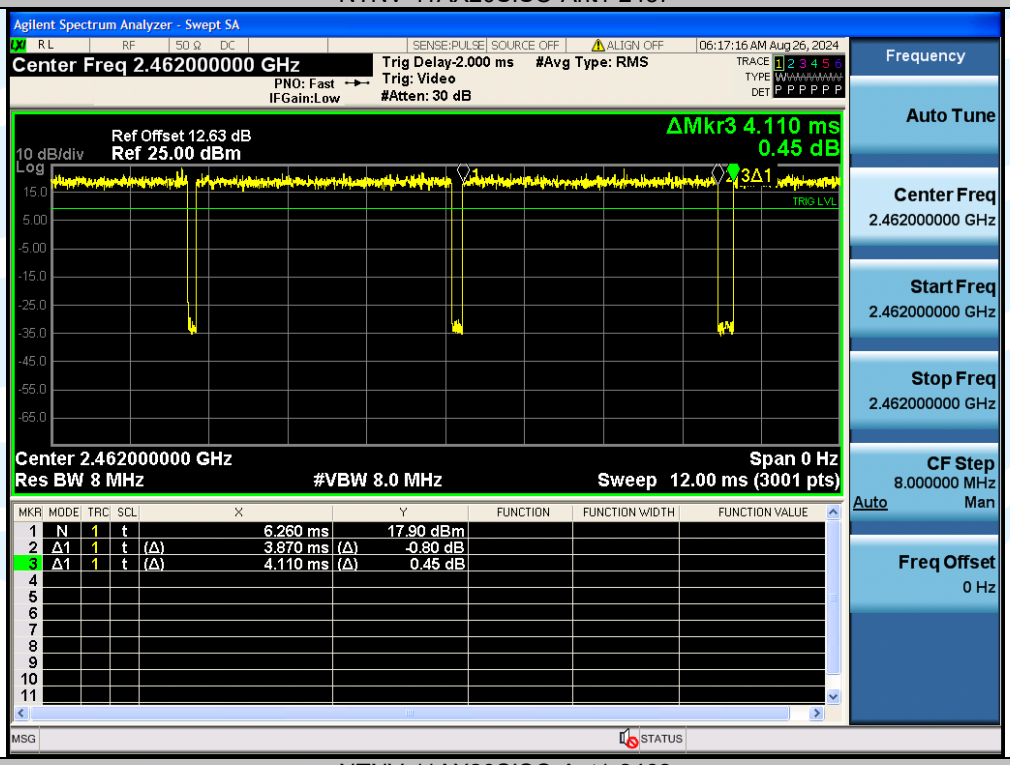

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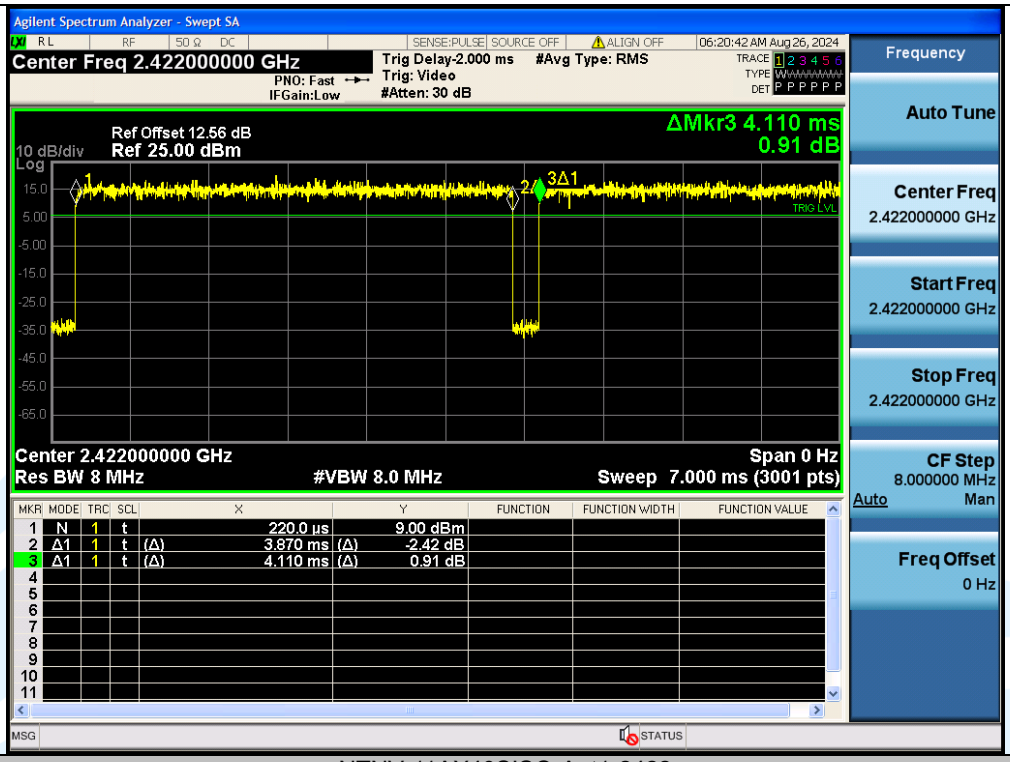

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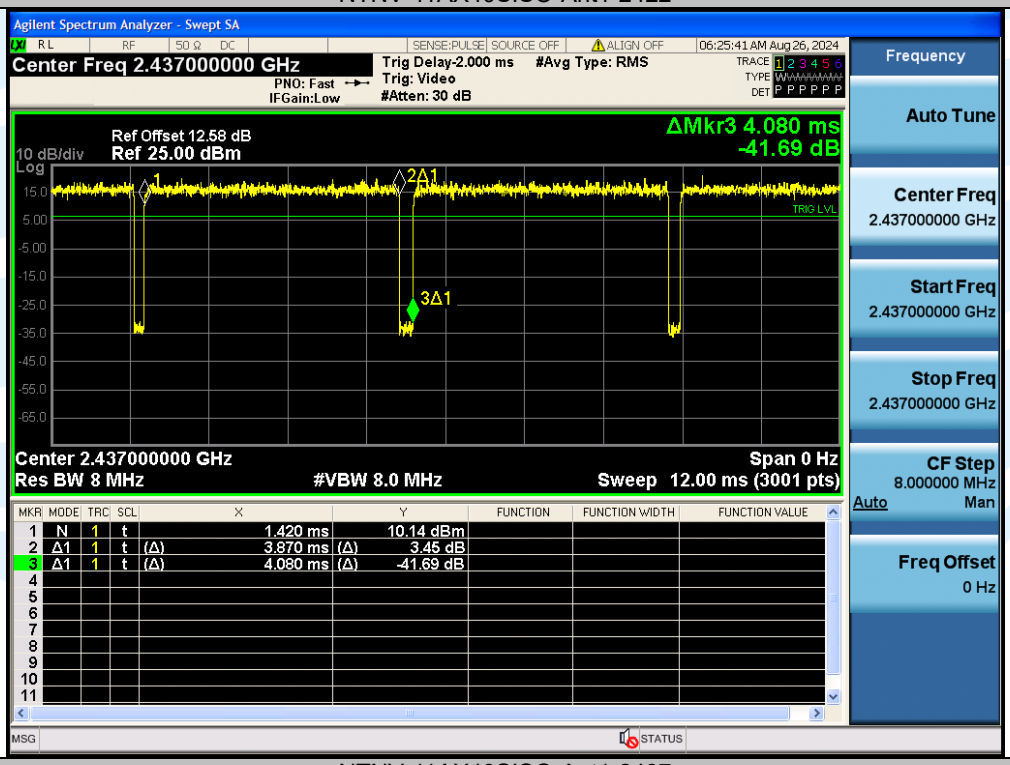

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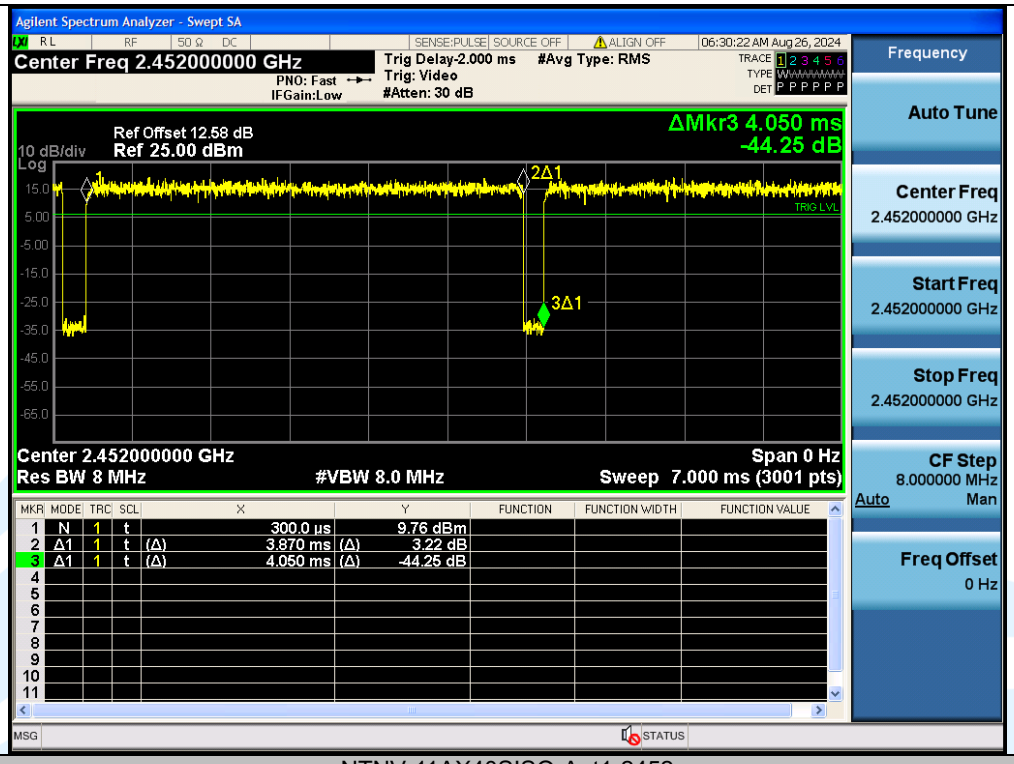


NTNV-11AX40SISO-Ant1-2452

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	RSS-247 Issue 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
4	RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus
5	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices
6	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum system, and Hybrid system devices operating under Section 15.247 of the FCC rules

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.247(b) (4) requirement:** The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi. **RSS-Gen Issue 5, Section 6.8 requirement:** According to RSS-Gen Issue 5, Section 6.8, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns.
EUT Antenna:
Antenna in the interior of the equipment and no consideration of replacement. The gain of the antenna is 3.99 dBi.

5.3 CONDUCTED PEAK OUTPUT POWER

Test Requirement: FCC 47 CFR Part 15 Subpart C Section15.247 (b)(3)
RSS-247 Issue 3, Section 5.4(d)

Test Method: ANSI C63.10-2013 Clause 11.9.1.3

Limit: For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Test Procedure:
1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
2. Measure out each test modes' peak or average output power, record the power level.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Results:

Mode	Frequency (MHz)	RU&Index	Max. Peak Power(dBm)	Limit (dBm)	ISED EIRP (dBm)	Limit (dBm)	Result
IEEE 802.11b	2412	N/A	19.88	30.00	23.87	36.02	Pass
	2437	N/A	18.74	30.00	22.73	36.02	Pass
	2462	N/A	19.92	30.00	23.91	36.02	Pass
IEEE 802.11g	2412	N/A	22.43	30.00	26.42	36.02	Pass
	2437	N/A	22.61	30.00	26.60	36.02	Pass
	2462	N/A	22.41	30.00	26.40	36.02	Pass
IEEE 802.11n-HT20	2412	N/A	22.45	30.00	26.44	36.02	Pass
	2437	N/A	22.73	30.00	26.72	36.02	Pass
	2462	N/A	22.89	30.00	26.88	36.02	Pass
IEEE 802.11n-HT40	2422	N/A	22.91	30.00	26.90	36.02	Pass
	2437	N/A	22.89	30.00	26.88	36.02	Pass
	2452	N/A	22.68	30.00	26.67	36.02	Pass
IEEE 802.11ax-HE20	2412	Ful RU	22.77	30.00	26.76	36.02	Pass
	2437	Ful RU	22.72	30.00	26.71	36.02	Pass
	2462	Ful RU	***22.92***	30.00	26.91	36.02	Pass
IEEE 802.11ax-HE40	2422	Ful RU	22.88	30.00	26.87	36.02	Pass
	2437	Ful RU	22.74	30.00	26.73	36.02	Pass
	2452	Ful RU	22.65	30.00	26.64	36.02	Pass

Note:
1. The antenna gain of 3.99 dBi less than 6dBi maximum permission antenna gain value based on 1 watt (30dBm) peak output power limit.
2. The maximum EIRP is calculated from max output power and antenna gain, the antenna gain provided by the customer, and the customer takes all the responsibilities for the accuracy of antenna gain.

5.46 DB BANDWIDTH & OCCUPIED BANDWIDTH

Test Requirement:	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2) RSS-247 Issue 3, Section 5.2(a) RSS-Gen Issue 5, Section 6.7
Test Method:	ANSI C63.10-2013 Clause 11.8.1 RSS-Gen Issue 5, Section 6.7
Limit:	For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz
Test Procedure:	Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. Use the following spectrum analyzer settings: **6dB Bandwidth** a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) ≥ 3 x 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. **Occupied Bandwidth** a) Set RBW = 1% to 5% of the occupied bandwidth b) Set the video bandwidth (VBW) ≥ 3 x RBW. c) Detector = Peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.
Test Setup:	Refer to section 4.5.3 for details.
Instruments Used:	Refer to section 3 for details
Test Mode:	Link mode
Test Results:	**Please refer to Appendix A**

5.5 POWER SPECTRAL DENSITY

Test Requirement:	FCC 47 CFR Part 15 Subpart C Section 15.247 (e) RSS-247 Issue 3, Section 5.2(b)
Test Method:	ANSI C63.10-2013 Clause 11.10.2
Limit:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.
Test Procedure:	Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. Use the following spectrum analyzer settings: a) Set analyzer center frequency to DTS channel center frequency. b) Set the span to 1.5 times the DTS bandwidth. c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz. d) Set the VBW ⩾ 3 x RBW. e) Detector = peak. f) Sweep time = auto couple. g) Trace mode = max hold. h) Allow trace to fully stabilize. i) Use the peak marker function to determine the maximum amplitude level within the RBW. j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat. Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.
Test Setup:	Refer to section 4.5.3 for details.
Instruments Used:	Refer to section 3 for details
Test Mode:	Link mode
Test Results:	**Please refer to Appendix A**

5.6 CONDUCTED OUT OF BAND EMISSION

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247(d)
RSS-247 Issue 2, Section 5.5

Test Method: ANSI C63.10-2013 Clause 11.11

Limit: In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

Step 1:Measurement Procedure REF

a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.
j) Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Step 2:Measurement Procedure OOBE

a) Set RBW = 100 kHz.
b) Set VBW ≥ 300 kHz.
c) Detector = peak.
d) Sweep = auto couple.
e) Trace Mode = max hold.
f) Allow trace to fully stabilize.
g) Use the peak marker function to determine the maximum amplitude level.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: **Please refer to Appendix A**

5.7 RADIATED SPURIOUS EMISSIONS

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209
RSS-Gen Issue 5, Section 6.13/8.9/8.10

Test Method: ANSI C63.10-2013 Clause 11.11 & Clause 11.12

Receiver Setup:

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

Limits:

Spurious Emissions

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

1. From 30 MHz to 1GHz test procedure as below:

1) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3) 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.
4) 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 rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6) 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.

2. Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).

2) Test the EUT in the lowest channel ,middle channel, the Highest channel
3) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the Z axis positioning which it is worse case.
4) Repeat above procedures until all frequencies measured was complete.

Equipment Used: Refer to section 3 for details.

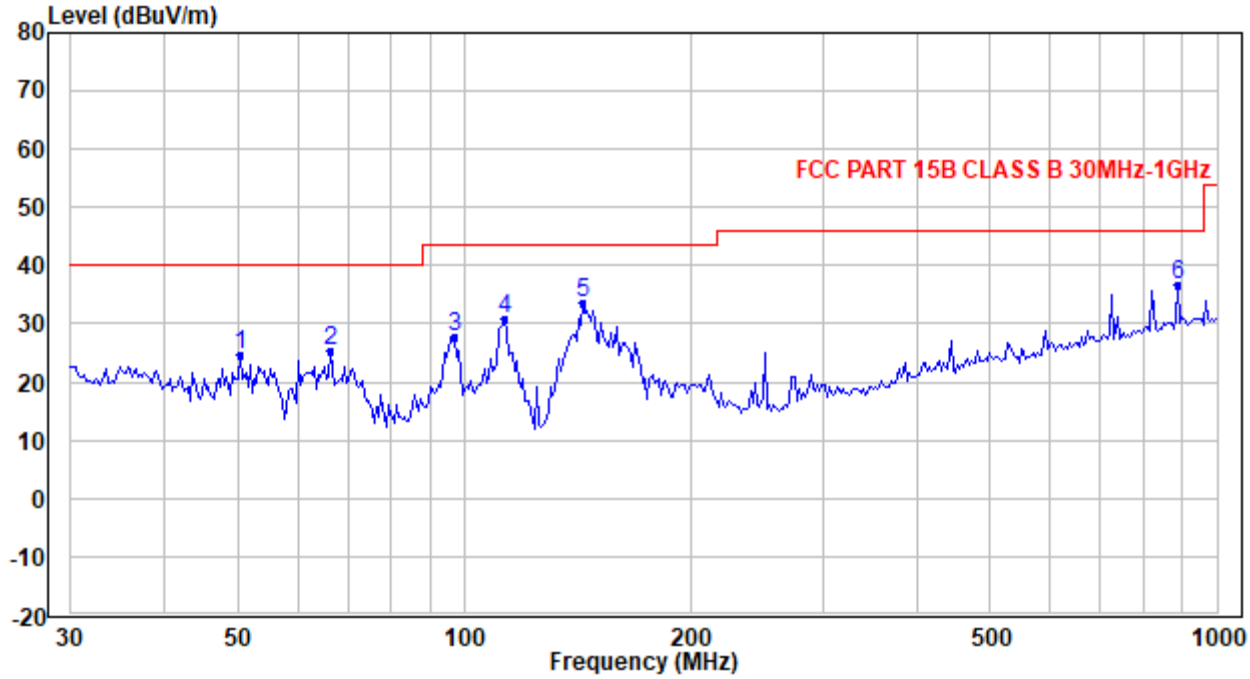
Test Result: Pass

The measurement data as follows:

Radiated Emission Test Data (9 KHz ~ 30 MHz):
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

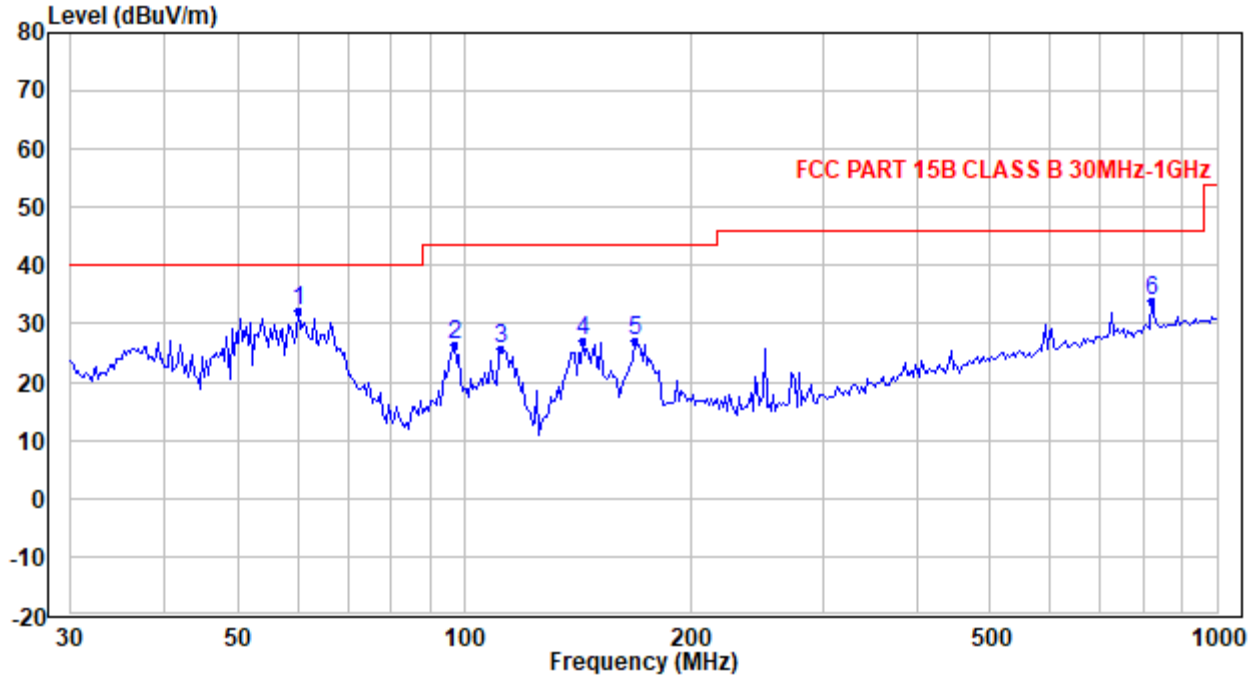
Radiated Emission Test Data (30 MHz ~ 1 GHz):
Worst-Case Configuration (IEEE 802.11ax-HE20_Channel 11)

Horizontal



No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	50.461	38.38	-13.75	24.63	40.00	-15.37	QP
2	66.371	43.13	-17.76	25.37	40.00	-14.63	QP
3	97.002	43.92	-16.07	27.85	43.50	-15.65	QP
4	113.220	46.43	-15.43	31.00	43.50	-12.50	QP
5	143.776	48.64	-14.94	33.70	43.50	-9.80	QP
6	887.398	32.15	4.58	36.73	46.00	-9.27	QP

Vertical



No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	60.153	48.97	-16.88	32.09	40.00	-7.91	QP
2	97.002	42.50	-16.07	26.43	43.50	-17.07	QP
3	111.640	40.91	-15.32	25.59	43.50	-17.91	QP
4	143.776	42.16	-14.94	27.22	43.50	-16.28	QP
5	168.997	39.30	-12.16	27.14	43.50	-16.36	QP
6	821.387	30.28	3.61	33.89	46.00	-12.11	QP

Radiated Emission Test Data (Above 1GHz):								
IEEE 802.11b_ Channel 1:								
No.	**Frequency (MHz)**	**Reading (dBμV)**	**Correction factor (dB/m)**	**Result (dBμV/m)**	**Limit (dBμV/m)**	**Margin (dB)**	**Detector**	**Antenna Polaxis**
1	4824	54.01	-2.07	51.94	54.00	-2.06	Average	Horizontal
2	4824	57.77	-2.07	55.70	74.00	-18.30	Peak	Horizontal
3	7236	44.12	1.30	45.42	54.00	-8.58	Average	Horizontal
4	7236	51.08	1.30	52.38	74.00	-21.62	Peak	Horizontal
5	4824	49.08	-2.07	47.01	54.00	-6.99	Average	Vertical
6	4824	53.62	-2.07	51.55	74.00	-22.45	Peak	Vertical
7	7236	41.42	1.30	42.72	54.00	-11.28	Average	Vertical
8	7236	48.98	1.30	50.28	74.00	-23.72	Peak	Vertical
IEEE 802.11b_ Channel 6:								
1	4874	44.33	-2.05	42.28	54.00	-11.72	Average	Horizontal
2	4874	54.20	-2.05	52.15	74.00	-21.85	Peak	Horizontal
3	7311	38.67	1.31	39.98	54.00	-14.02	Average	Horizontal
4	7311	47.48	1.31	48.79	74.00	-25.21	Peak	Horizontal
5	4874	39.96	-2.05	37.91	54.00	-16.09	Average	Vertical
6	4874	50.33	-2.05	48.28	74.00	-25.72	Peak	Vertical
7	7311	37.34	1.31	38.65	54.00	-15.35	Average	Vertical
8	7311	46.68	1.31	47.99	74.00	-26.01	Peak	Vertical
IEEE 802.11b_ Channel 11:								
1	4923.992	53.51	-2.03	51.48	74.00	-22.52	Peak	Horizontal
2	4924	48.59	-2.03	46.56	54.00	-7.44	Average	Horizontal
3	7386	40.98	1.31	42.29	54.00	-11.71	Average	Horizontal
4	7386	49.24	1.31	50.55	74.00	-23.45	Peak	Horizontal
5	4924	44.71	-2.03	42.68	54.00	-11.32	Average	Vertical
6	4924	50.46	-2.03	48.43	74.00	-25.57	Peak	Vertical
7	7386	39.09	1.31	40.40	54.00	-13.60	Average	Vertical
8	7386	47.98	1.31	49.29	74.00	-24.71	Peak	Vertical

IEEE 802.11g_ Channel 1:								
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824	44.06	-2.07	41.99	54.00	-12.01	Average	Horizontal
2	4824	52.81	-2.07	50.74	74.00	-23.26	Peak	Horizontal
3	7236	37.11	1.30	38.41	54.00	-15.59	Average	Horizontal
4	7236	46.92	1.30	48.22	74.00	-25.78	Peak	Horizontal
5	4824	39.66	-2.07	37.59	54.00	-16.41	Average	Vertical
6	4824	49.29	-2.07	47.22	74.00	-26.78	Peak	Vertical
7	7236	37.46	1.30	38.76	54.00	-15.24	Average	Vertical
8	7236	46.64	1.30	47.94	74.00	-26.06	Peak	Vertical
IEEE 802.11g_ Channel 6:								
1	4874	46.63	-2.05	44.58	54.00	-9.42	Average	Horizontal
2	4874	53.30	-2.05	51.25	74.00	-22.75	Peak	Horizontal
3	7311	38.90	1.31	40.21	54.00	-13.79	Average	Horizontal
4	7311	47.86	1.31	49.17	74.00	-24.83	Peak	Horizontal
5	4874	41.48	-2.05	39.43	54.00	-14.57	Average	Vertical
6	4874	51.34	-2.05	49.29	74.00	-24.71	Peak	Vertical
7	7311	37.72	1.31	39.03	54.00	-14.97	Average	Vertical
8	7311	46.82	1.31	48.13	74.00	-25.87	Peak	Vertical
IEEE 802.11g_ Channel 11:								
1	4924	45.46	-2.03	43.43	54.00	-10.57	Average	Horizontal
2	4924	54.22	-2.03	52.19	74.00	-21.81	Peak	Horizontal
3	7386	39.05	1.31	40.36	54.00	-13.64	Average	Horizontal
4	7386	48.05	1.31	49.36	74.00	-24.64	Peak	Horizontal
5	4923.992	44.17	-2.03	42.14	54.00	-11.86	Average	Vertical
6	4924	52.17	-2.03	50.14	74.00	-23.86	Peak	Vertical
7	7386	37.96	1.31	39.27	54.00	-14.73	Average	Vertical
8	7386	47.77	1.31	49.08	74.00	-24.92	Peak	Vertical

IEEE 802.11n-HT20_ Channel 1:								
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824	47.64	-2.07	45.57	54.00	-8.43	Average	Horizontal
2	4824	54.75	-2.07	52.68	74.00	-21.32	Peak	Horizontal
3	7236	37.99	1.30	39.29	54.00	-14.71	Average	Horizontal
4	7236	47.66	1.30	48.96	74.00	-25.04	Peak	Horizontal
5	4824	41.96	-2.07	39.89	54.00	-14.11	Average	Vertical
6	4824	51.98	-2.07	49.91	74.00	-24.09	Peak	Vertical
7	7236	37.49	1.30	38.79	54.00	-15.21	Average	Vertical
8	7236	46.96	1.30	48.26	74.00	-25.74	Peak	Vertical
IEEE 802.11n-HT20_ Channel 6:								
1	4874	47.71	-2.05	45.66	54.00	-8.34	Average	Horizontal
2	4874	55.53	-2.05	53.48	74.00	-20.52	Peak	Horizontal
3	7311	41.78	1.31	43.09	54.00	-10.91	Average	Horizontal
4	7311	51.44	1.31	52.75	74.00	-21.25	Peak	Horizontal
5	4874	43.18	-2.05	41.13	54.00	-12.87	Average	Vertical
6	4874	50.87	-2.05	48.82	74.00	-25.18	Peak	Vertical
7	7311	38.79	1.31	40.10	54.00	-13.90	Average	Vertical
8	7311	48.46	1.31	49.77	74.00	-24.23	Peak	Vertical
IEEE 802.11n-HT20_ Channel 11:								
1	4924	47.09	-2.03	45.06	54.00	-8.94	Average	Horizontal
2	4924	56.32	-2.03	54.29	74.00	-19.71	Peak	Horizontal
3	7386	41.77	1.31	43.08	54.00	-10.92	Average	Horizontal
4	7386	53.68	1.31	54.99	74.00	-19.01	Peak	Horizontal
5	4924	44.17	-2.03	42.14	54.00	-11.86	Average	Vertical
6	4924	52.51	-2.03	50.48	74.00	-23.52	Peak	Vertical
7	7386	40.57	1.31	41.88	54.00	-12.12	Average	Vertical
8	7386	48.82	1.31	50.13	74.00	-23.87	Peak	Vertical

IEEE 802.11n-HT40_ Channel 3:								
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4844	44.15	-2.06	42.09	54.00	-11.91	Average	Horizontal
2	4844	52.30	-2.06	50.24	74.00	-23.76	Peak	Horizontal
3	7266	37.82	1.31	39.13	54.00	-14.87	Average	Horizontal
4	7266	47.71	1.31	49.02	74.00	-24.98	Peak	Horizontal
5	4844	40.41	-2.06	38.35	54.00	-15.65	Average	Vertical
6	4844	48.79	-2.06	46.73	74.00	-27.27	Peak	Vertical
7	7266	37.64	1.31	38.95	54.00	-15.05	Average	Vertical
8	7266	47.04	1.31	48.35	74.00	-25.65	Peak	Vertical
IEEE 802.11n-HT40_ Channel 6:								
1	4874	44.07	-2.05	42.02	54.00	-11.98	Average	Horizontal
2	4874	52.19	-2.05	50.14	74.00	-23.86	Peak	Horizontal
3	7311	39.80	1.31	41.11	54.00	-12.89	Average	Horizontal
4	7311	49.00	1.31	50.31	74.00	-23.69	Peak	Horizontal
5	4874	39.80	-2.05	37.75	54.00	-16.25	Average	Vertical
6	4874	47.72	-2.05	45.67	74.00	-28.33	Peak	Vertical
7	7311	38.04	1.31	39.35	54.00	-14.65	Average	Vertical
8	7311	47.17	1.31	48.48	74.00	-25.52	Peak	Vertical
IEEE 802.11n-HT40_ Channel 9:								
1	4904	45.02	-2.04	42.98	54.00	-11.02	Average	Horizontal
2	4904	53.17	-2.04	51.13	74.00	-22.87	Peak	Horizontal
3	7356	38.58	1.31	39.89	54.00	-14.11	Average	Horizontal
4	7356	47.99	1.31	49.30	74.00	-24.70	Peak	Horizontal
5	4904	40.37	-2.04	38.33	54.00	-15.67	Average	Vertical
6	4904	49.58	-2.04	47.54	74.00	-26.46	Peak	Vertical
7	7356	37.85	1.31	39.16	54.00	-14.84	Average	Vertical
8	7356	46.53	1.31	47.84	74.00	-26.16	Peak	Vertical

IEEE 802.11ax-HE20_ Channel 1:								
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824	46.30	-2.07	44.23	54.00	-9.77	Average	Horizontal
2	4824	54.52	-2.07	52.45	74.00	-21.55	Peak	Horizontal
3	7236	38.08	1.30	39.38	54.00	-14.62	Average	Horizontal
4	7236	48.08	1.30	49.38	74.00	-24.62	Peak	Horizontal
5	4824	41.13	-2.07	39.06	54.00	-14.94	Average	Vertical
6	4824	50.46	-2.07	48.39	74.00	-25.61	Peak	Vertical
7	7236	37.55	1.30	38.85	54.00	-15.15	Average	Vertical
8	7236	46.90	1.30	48.20	74.00	-25.80	Peak	Vertical
IEEE 802.11ax-HE20_ Channel 6:								
1	4874	46.39	-2.05	44.34	54.00	-9.66	Average	Horizontal
2	4874	55.23	-2.05	53.18	74.00	-20.82	Peak	Horizontal
3	7311	41.65	1.31	42.96	54.00	-11.04	Average	Horizontal
4	7311	50.60	1.31	51.91	74.00	-22.09	Peak	Horizontal
5	4874	41.83	-2.05	39.78	54.00	-14.22	Average	Vertical
6	4874	50.34	-2.05	48.29	74.00	-25.71	Peak	Vertical
7	7311	39.77	1.31	41.08	54.00	-12.92	Average	Vertical
8	7311	49.71	1.31	51.02	74.00	-22.98	Peak	Vertical
IEEE 802.11ax-HE20_ Channel 11:								
1	4924	46.12	-2.03	44.09	54.00	-9.91	Average	Horizontal
2	4924	53.95	-2.03	51.92	74.00	-22.08	Peak	Horizontal
3	7386	41.72	1.31	43.03	54.00	-10.97	Average	Horizontal
4	7386	49.60	1.31	50.91	74.00	-23.09	Peak	Horizontal
5	4924	42.82	-2.03	40.79	54.00	-13.21	Average	Vertical
6	4924	51.13	-2.03	49.10	74.00	-24.90	Peak	Vertical
7	7386	40.77	1.31	42.08	54.00	-11.92	Average	Vertical
8	7386	49.47	1.31	50.78	74.00	-23.22	Peak	Vertical

IEEE 802.11ax-HE40_ Channel 3:								
No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4844	44.06	-2.06	42.00	54.00	-12.00	Average	Horizontal
2	4844	52.50	-2.06	50.44	74.00	-23.56	Peak	Horizontal
3	7266	37.96	1.31	39.27	54.00	-14.73	Average	Horizontal
4	7266	47.05	1.31	48.36	74.00	-25.64	Peak	Horizontal
5	4844	39.51	-2.06	37.45	54.00	-16.55	Average	Vertical
6	4844	48.46	-2.06	46.40	74.00	-27.60	Peak	Vertical
7	7266	37.43	1.31	38.74	54.00	-15.26	Average	Vertical
8	7266	47.14	1.31	48.45	74.00	-25.55	Peak	Vertical
IEEE 802.11ax-HE40_ Channel 6:								
1	4874	43.34	-2.05	41.29	54.00	-12.71	Average	Horizontal
2	4874	52.78	-2.05	50.73	74.00	-23.27	Peak	Horizontal
3	7311	39.94	1.31	41.25	54.00	-12.75	Average	Horizontal
4	7311	48.41	1.31	49.72	74.00	-24.28	Peak	Horizontal
5	4874	40.51	-2.05	38.46	54.00	-15.54	Average	Vertical
6	4874	48.40	-2.05	46.35	74.00	-27.65	Peak	Vertical
7	7311	38.04	1.31	39.35	54.00	-14.65	Average	Vertical
8	7311	47.79	1.31	49.10	74.00	-24.90	Peak	Vertical
IEEE 802.11ax-HE40_ Channel 9:								
1	4904	44.80	-2.04	42.76	54.00	-11.24	Average	Horizontal
2	4904	52.73	-2.04	50.69	74.00	-23.31	Peak	Horizontal
3	7356	39.24	1.31	40.55	54.00	-13.45	Average	Horizontal
4	7356	47.76	1.31	49.07	74.00	-24.93	Peak	Horizontal
5	4904	41.20	-2.04	39.16	54.00	-14.84	Average	Vertical
6	4904	49.52	-2.04	47.48	74.00	-26.52	Peak	Vertical
7	7356	37.87	1.31	39.18	54.00	-14.82	Average	Vertical
8	7356	47.43	1.31	48.74	74.00	-25.26	Peak	Vertical

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

5.8 BAND EDGE MEASUREMENTS (RADIATED)

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209
RSS-247 Issue 3, Section 5.5

Test Method: ANSI C63.10-2013 Clause 11.13

Limits:

Radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a).

Frequency	Limit (dBμV/m @3m)	Remark
30 MHz-88 MHz	40.0	Quasi-peak Value
88 MHz-216 MHz	43.5	Quasi-peak Value
216 MHz-960 MHz	46.0	Quasi-peak Value
960 MHz-1 GHz	54.0	Quasi-peak Value
Above 1 GHz	54.0	Average Value
	74.0	Peak Value

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

Radiated band edge measurements at 2390 MHz and 2483.5 MHz were made with the unit transmitting in the low end of the channel range and the high end closest to the restricted bands respectively. The emissions were made on the 966 Semi-Chamber. Use (resolution bandwidth (RBW) = 1 MHz, video bandwidth (VBW) = 3 MHz for peak levels and RBW = 1 MHz and VBW = 10 Hz or 1/T for average levels).

1. Use radiated spurious emission test procedure described in clause 5.10. The transmitter output (antenna port) was connected to the test receiver.
2. Set the PK and AV limit line.
3. Record the fundamental emission and emissions out of the band-edge.
4. Determine band-edge compliance as required.

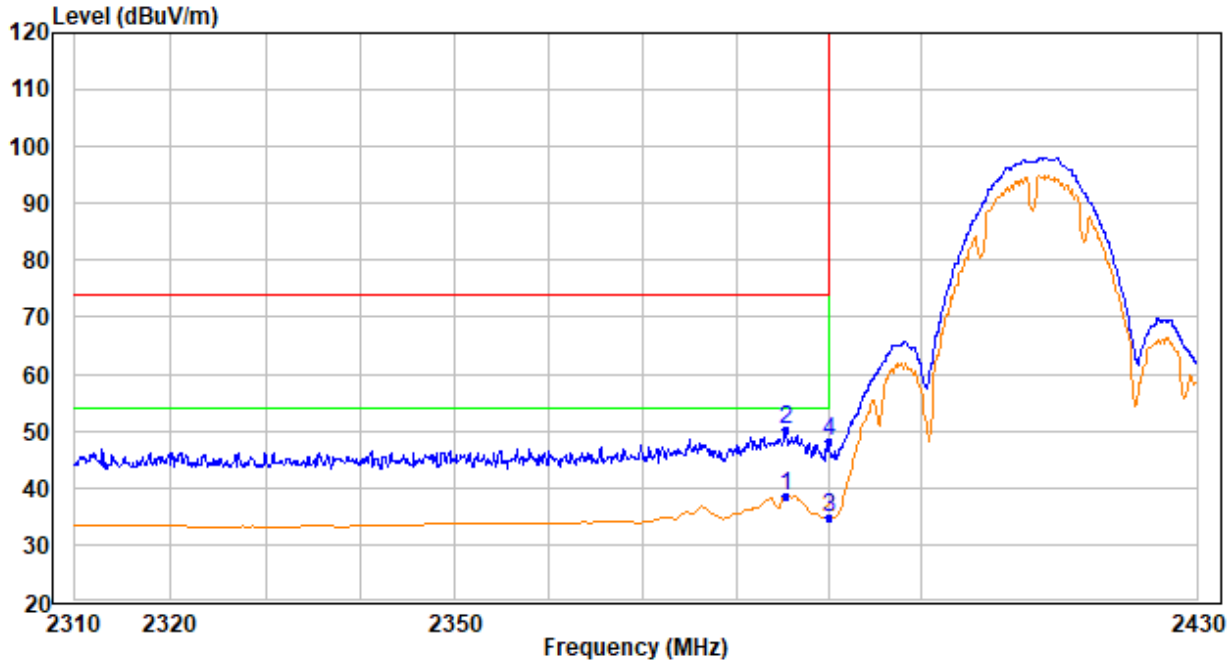
Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

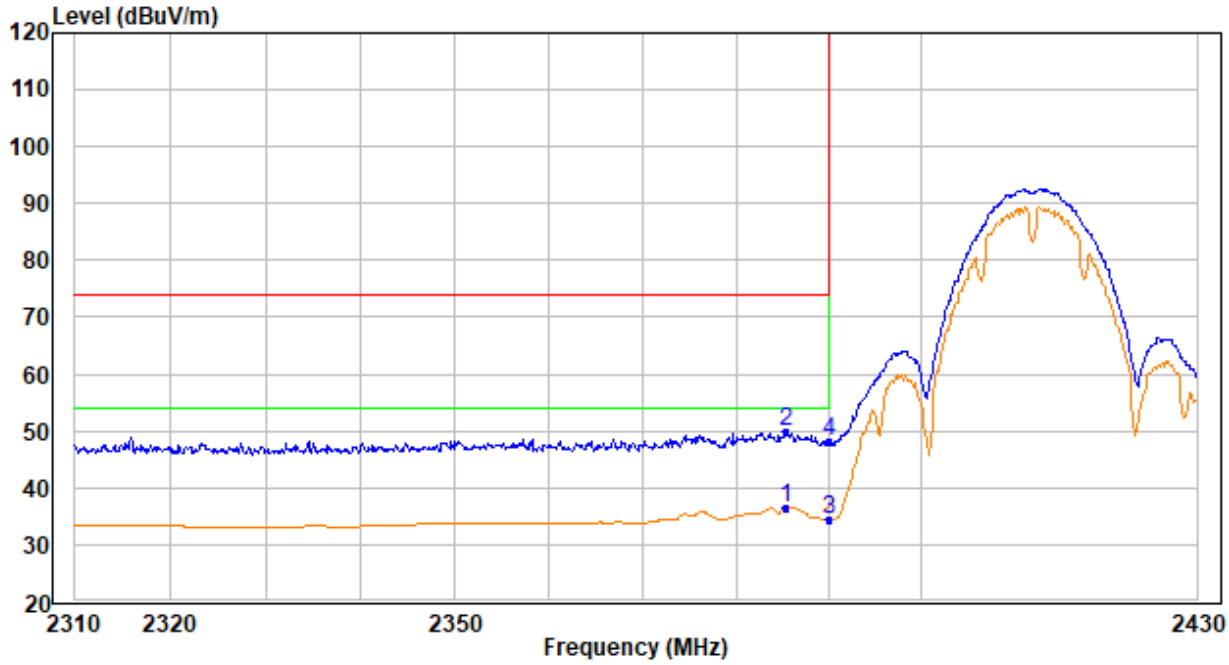
IEEE 802.11b

Test Channel:	Channel 1	Ant. Polar. :	Horizontal



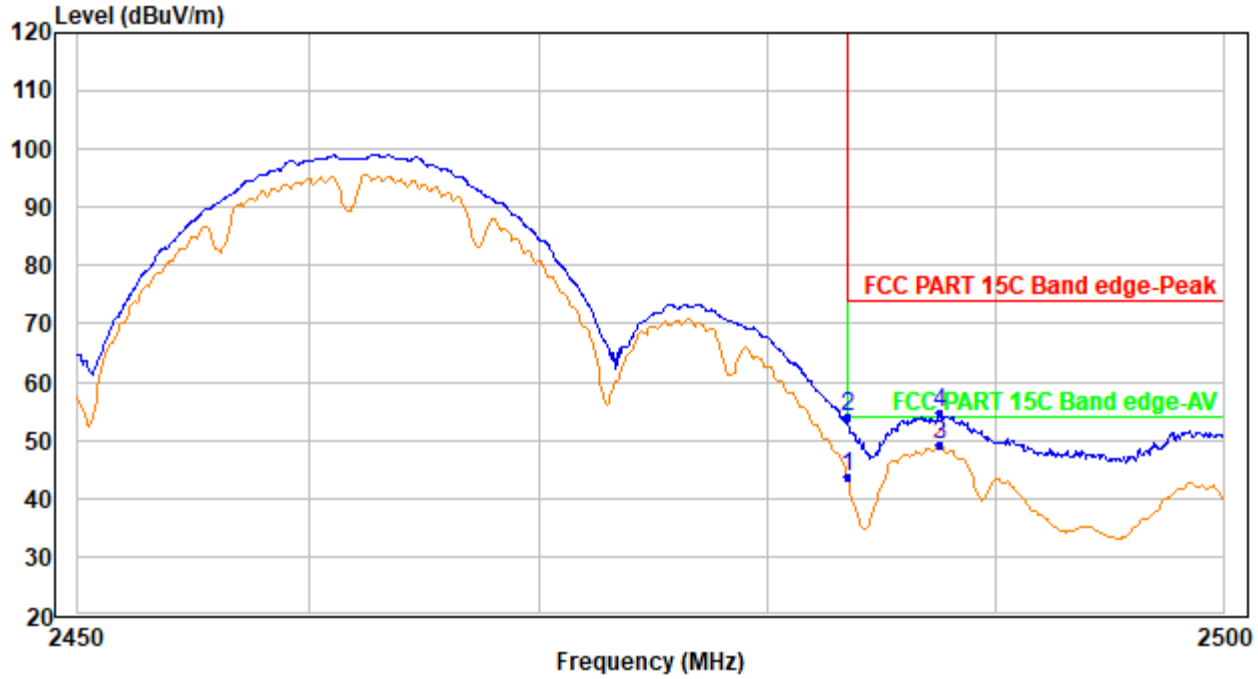
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2385.304	50.16	74.00	38.58	54.00	Pass
2390.000	48.10	74.00	34.67	54.00	Pass

Test Channel:	Channel 1	Ant. Polar. :	Vertical



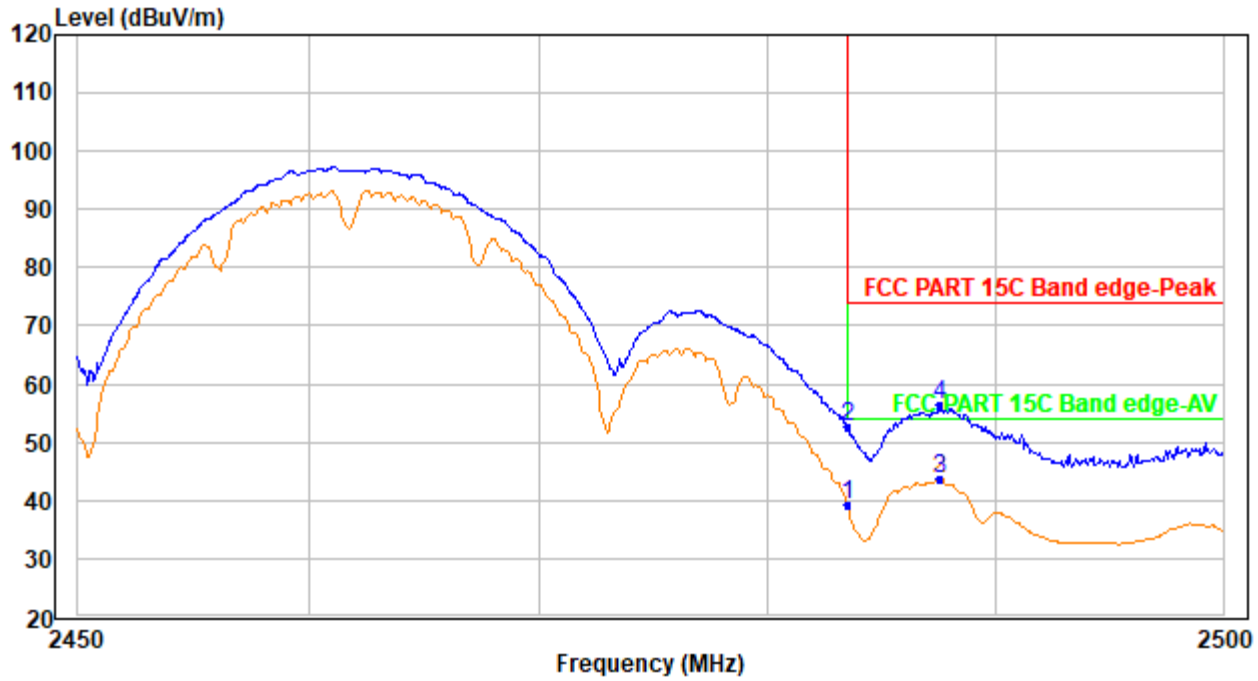
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2385.304	50.03	74.00	36.49	54.00	Pass
2390.000	48.04	74.00	34.34	54.00	Pass

Test Channel:	Channel 11	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	53.91	74.00	43.76	54.00	Pass
2487.536	54.87	74.00	49.38	54.00	Pass

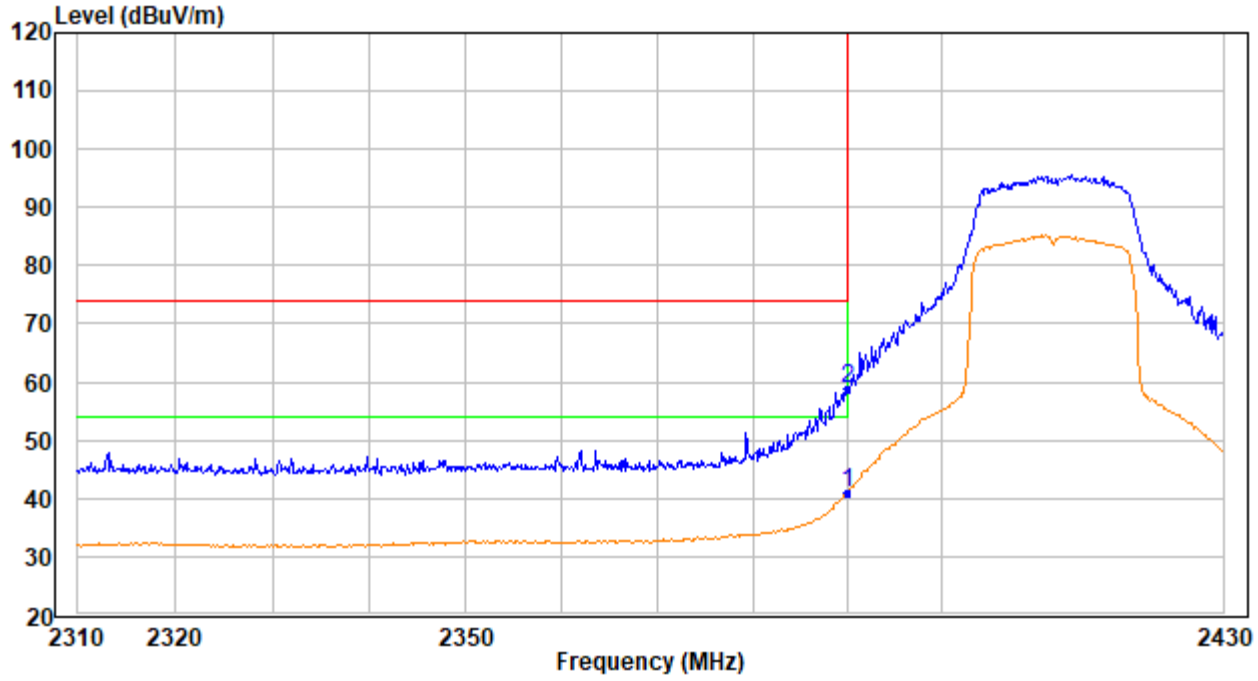
Test Channel:	Channel 11	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	52.52	74.00	39.27	54.00	Pass
2487.536	56.31	74.00	43.88	54.00	Pass

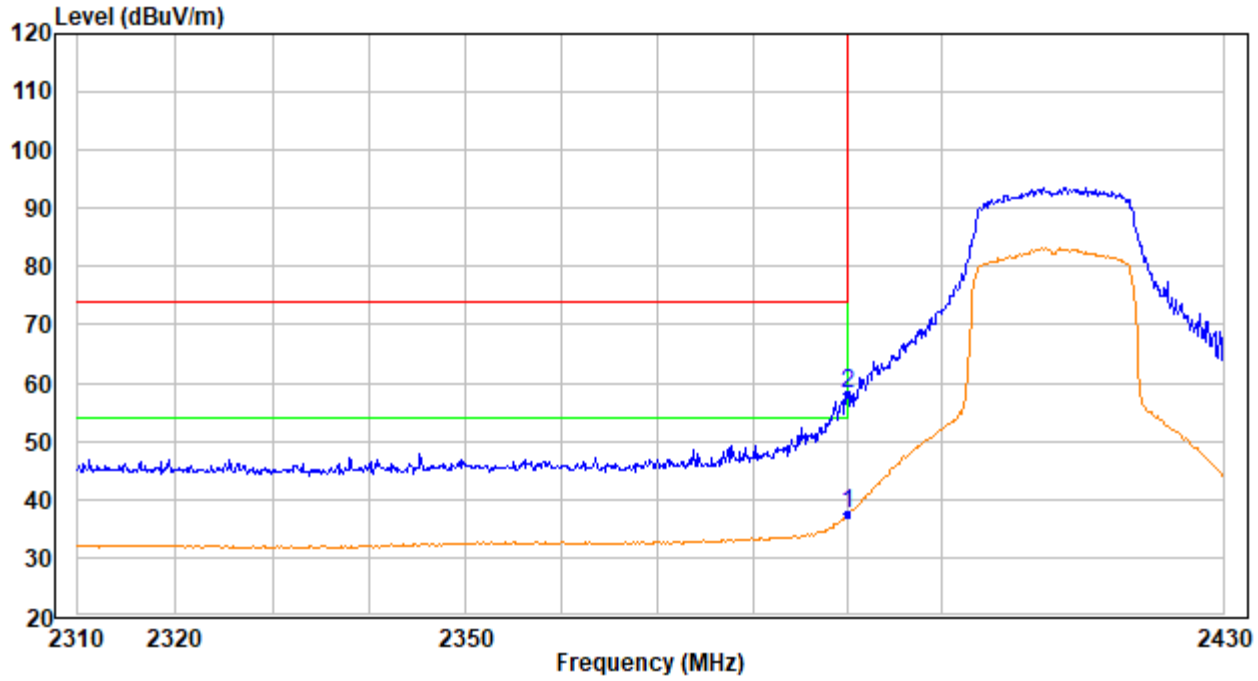
IEEE 802.11g

Test Channel:	Channel 1	Ant. Polar. :	Horizontal



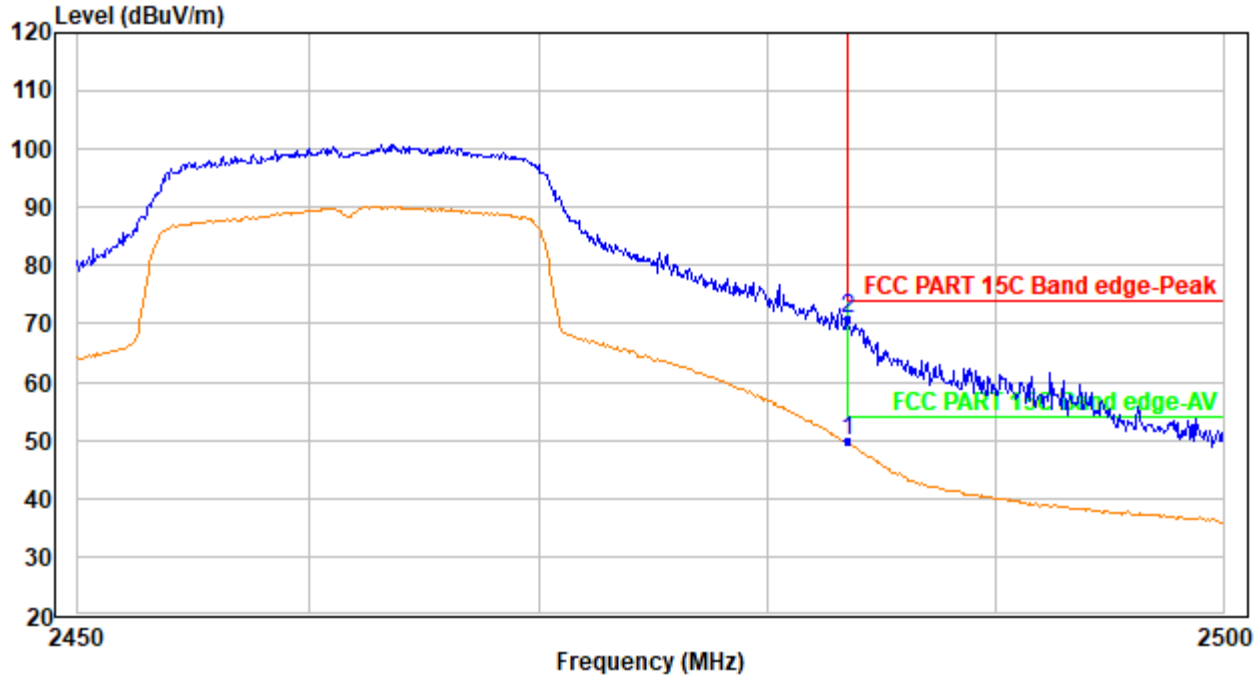
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	58.93	74.00	41.11	54.00	Pass

Test Channel:	Channel 1	Ant. Polar. :	Vertical



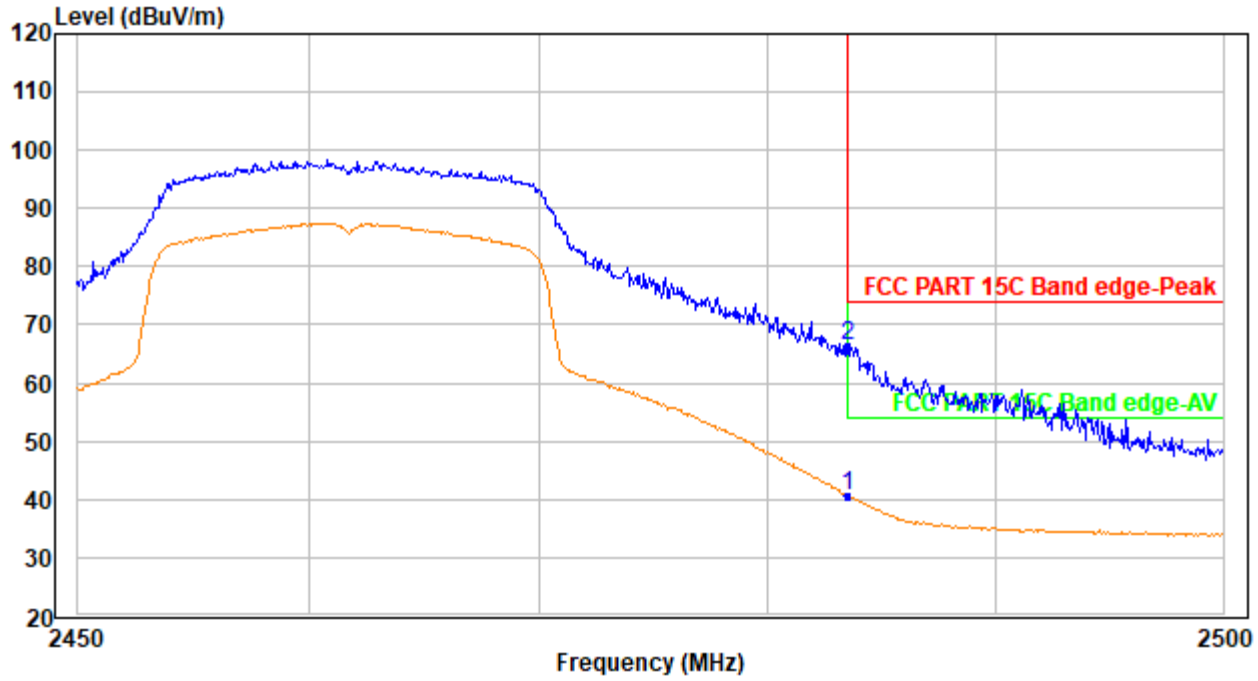
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	58.28	74.00	37.60	54.00	Pass

Test Channel:	Channel 11	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	71.00	74.00	49.84	54.00	Pass

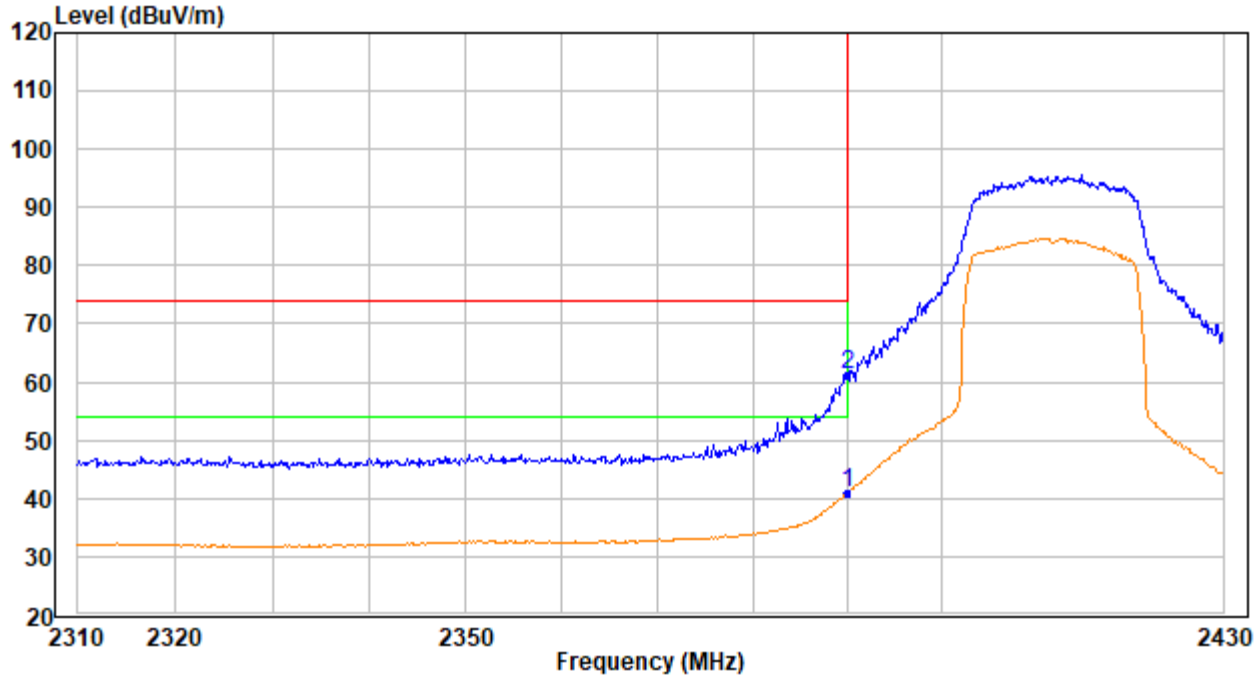
Test Channel:	Channel 11	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	66.34	74.00	40.72	54.00	Pass

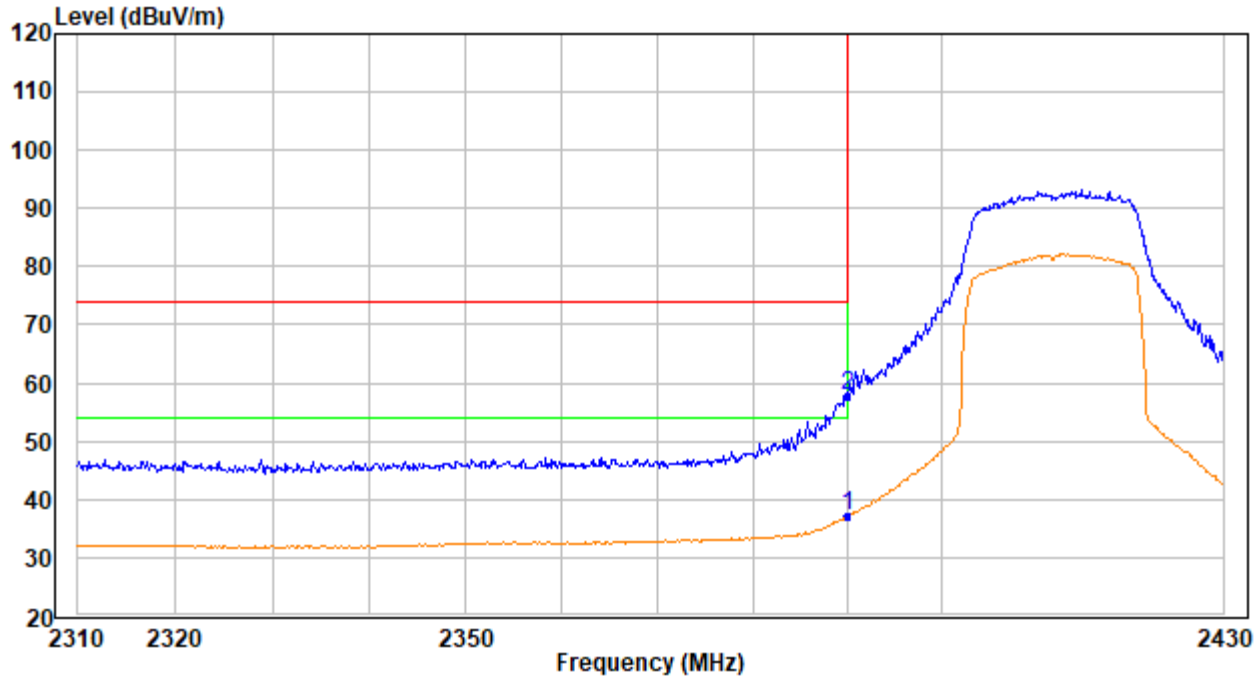
IEEE 802.11n-HT20

Test Channel:	Channel 1	Ant. Polar. :	Horizontal



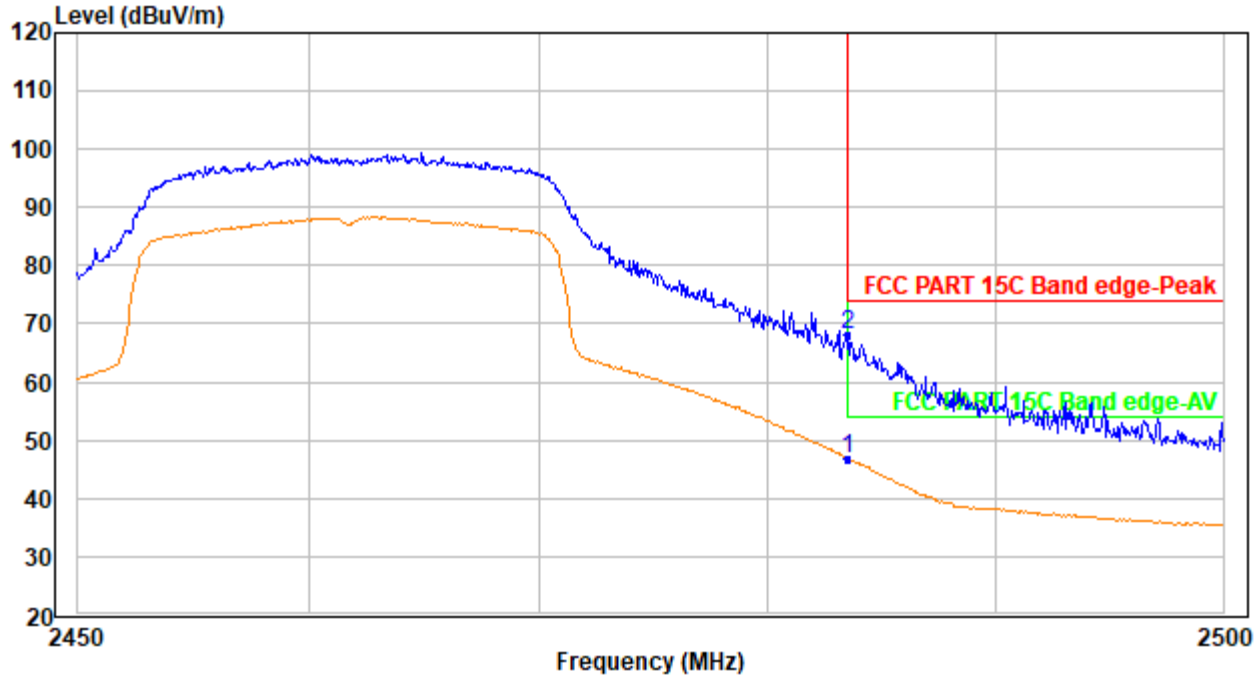
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	61.34	74.00	41.00	54.00	Pass

Test Channel:	Channel 1	Ant. Polar. :	Vertical



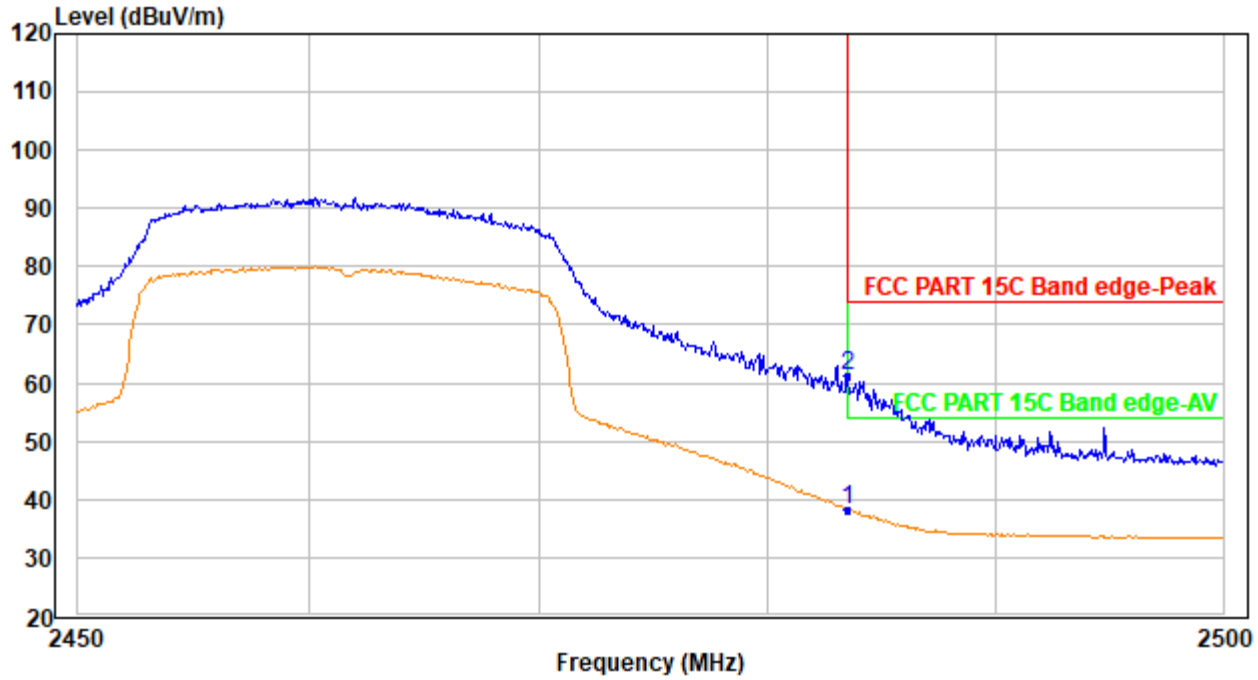
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	57.79	74.00	37.27	54.00	Pass

Test Channel:	Channel 11	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	68.06	74.00	46.90	54.00	Pass

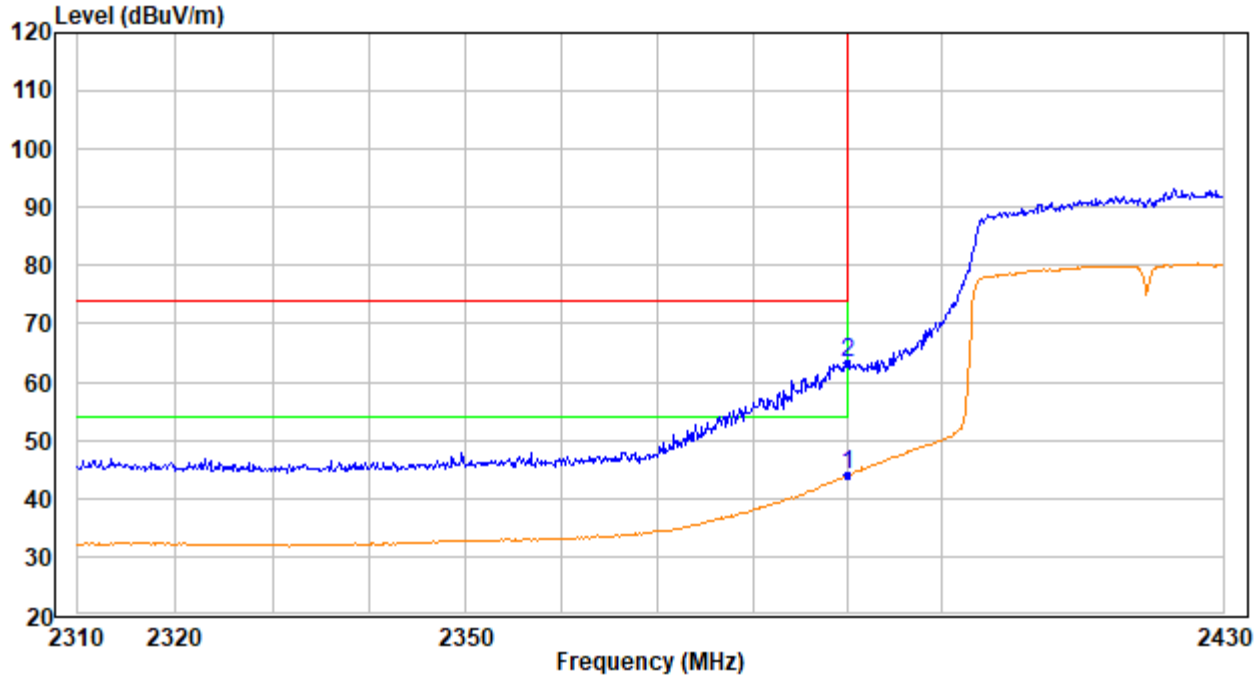
Test Channel:	Channel 11	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	61.13	74.00	38.34	54.00	Pass

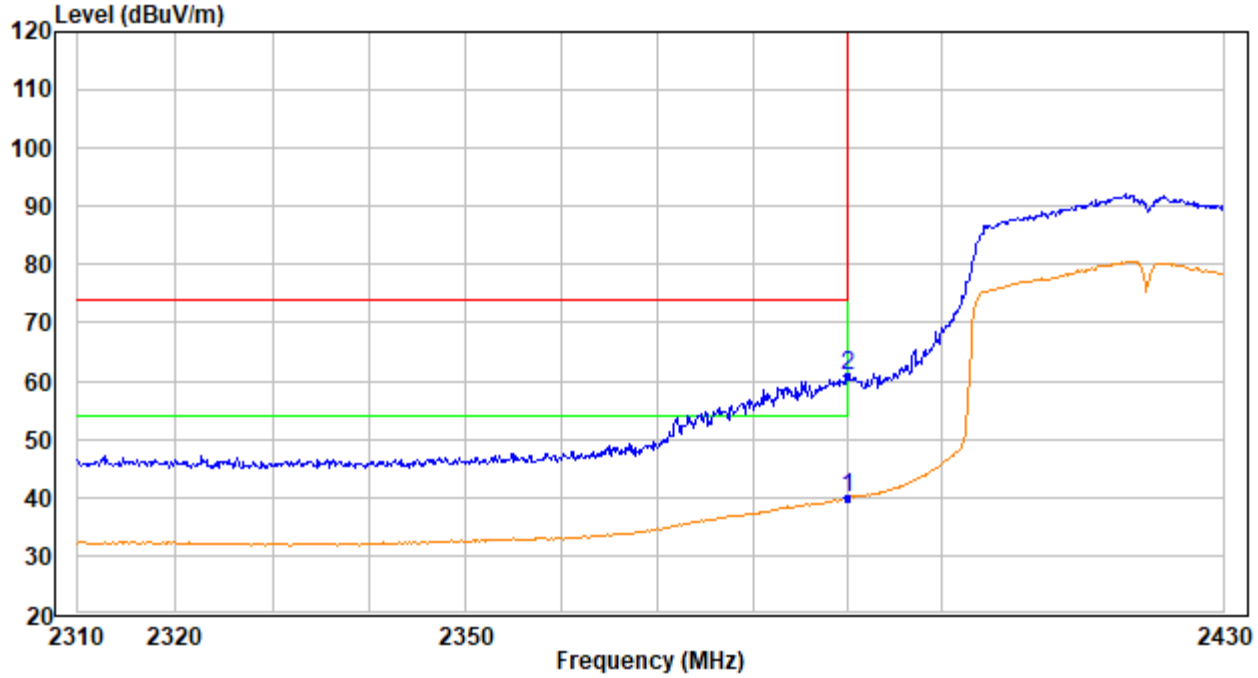
IEEE 802.11n-HT40

Test Channel:	Channel 3	Ant. Polar. :	Horizontal



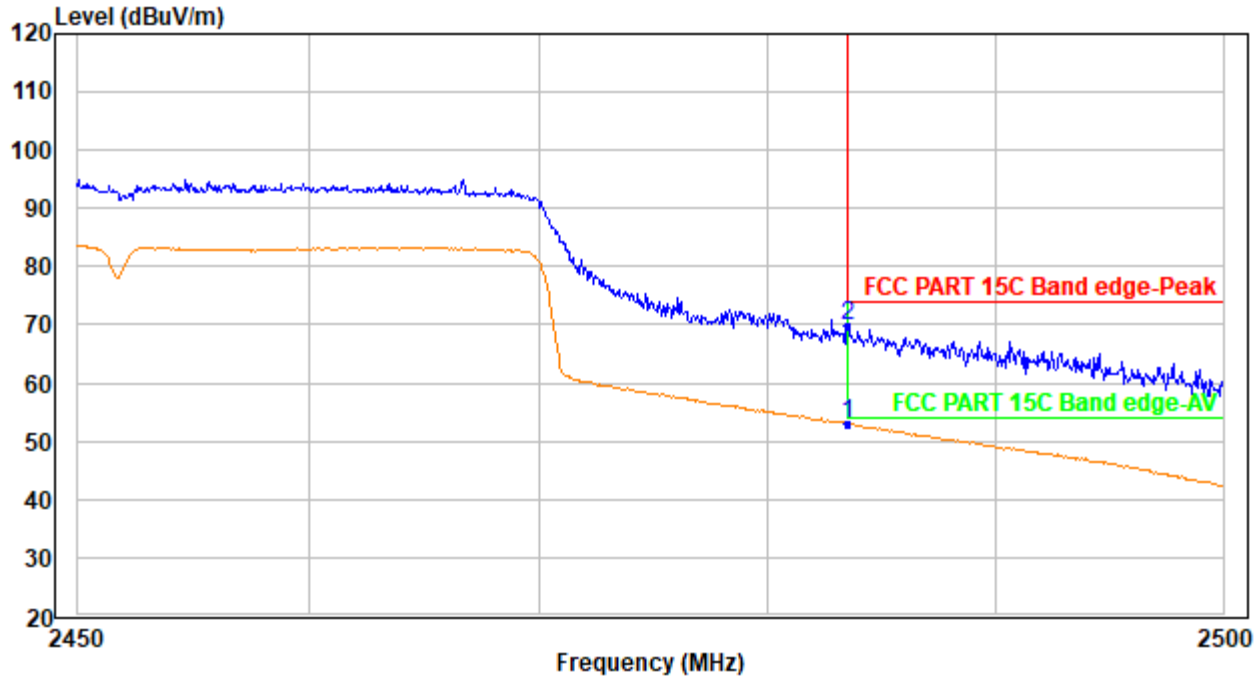
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	63.26	74.00	44.09	54.00	Pass

Test Channel:	Channel 3	Ant. Polar. :	Vertical



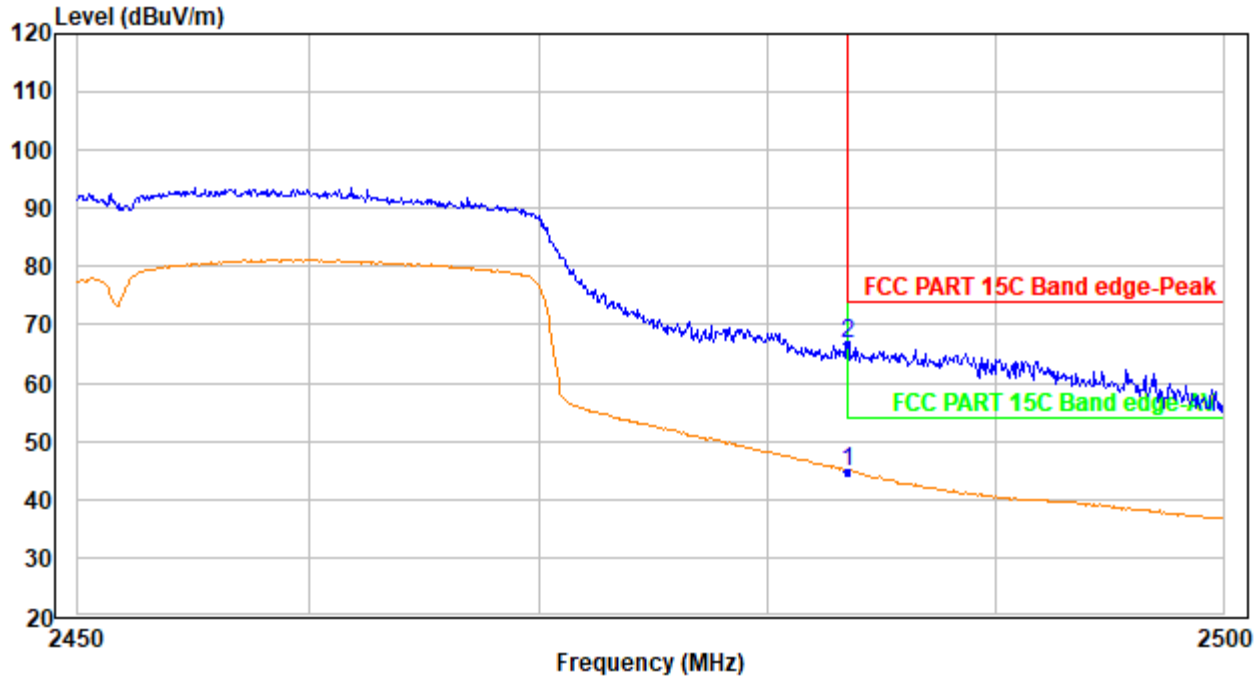
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	60.80	74.00	39.88	54.00	Pass

Test Channel:	Channel 9	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	69.99	74.00	52.91	54.00	Pass

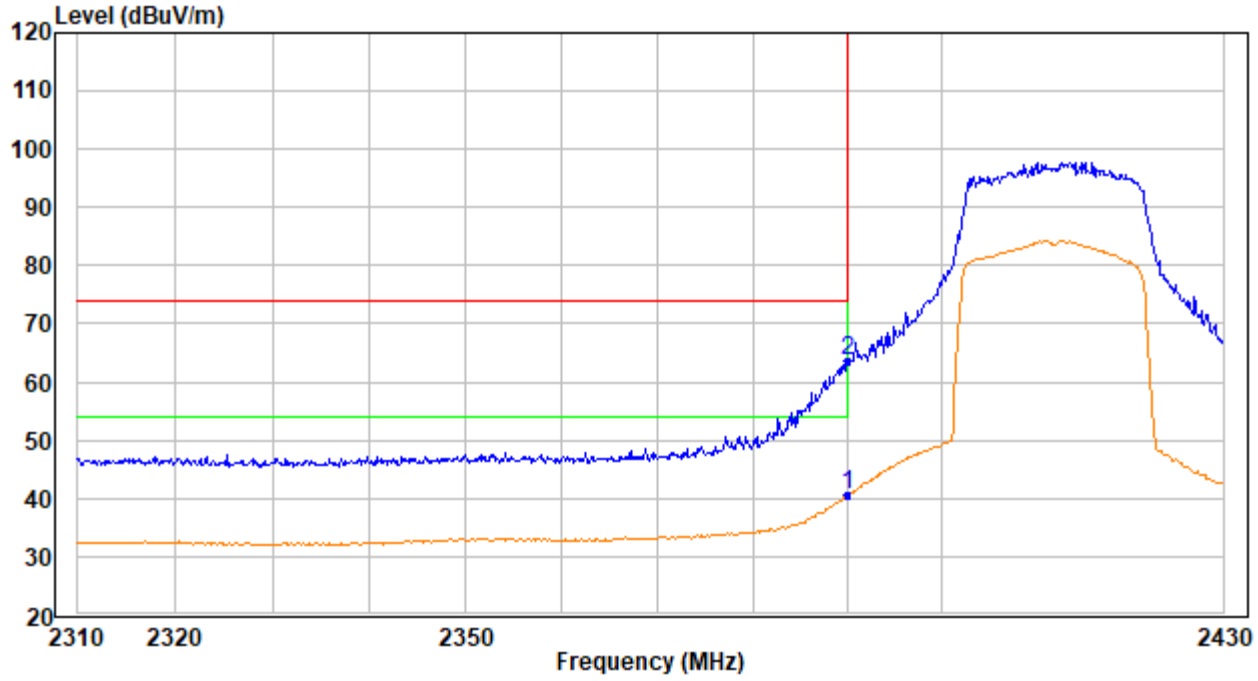
Test Channel:	Channel 9	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	66.84	74.00	44.88	54.00	Pass

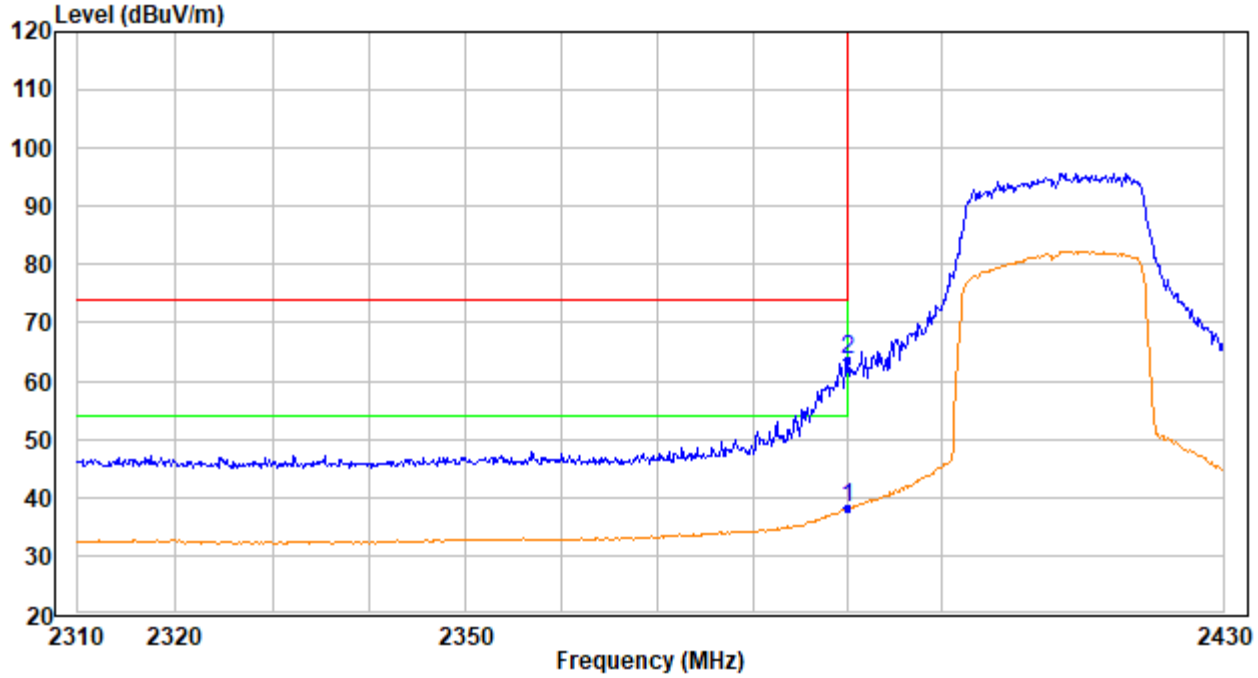
IEEE 802.11ax-HE20

Test Channel:	Channel 1	Ant. Polar. :	Horizontal



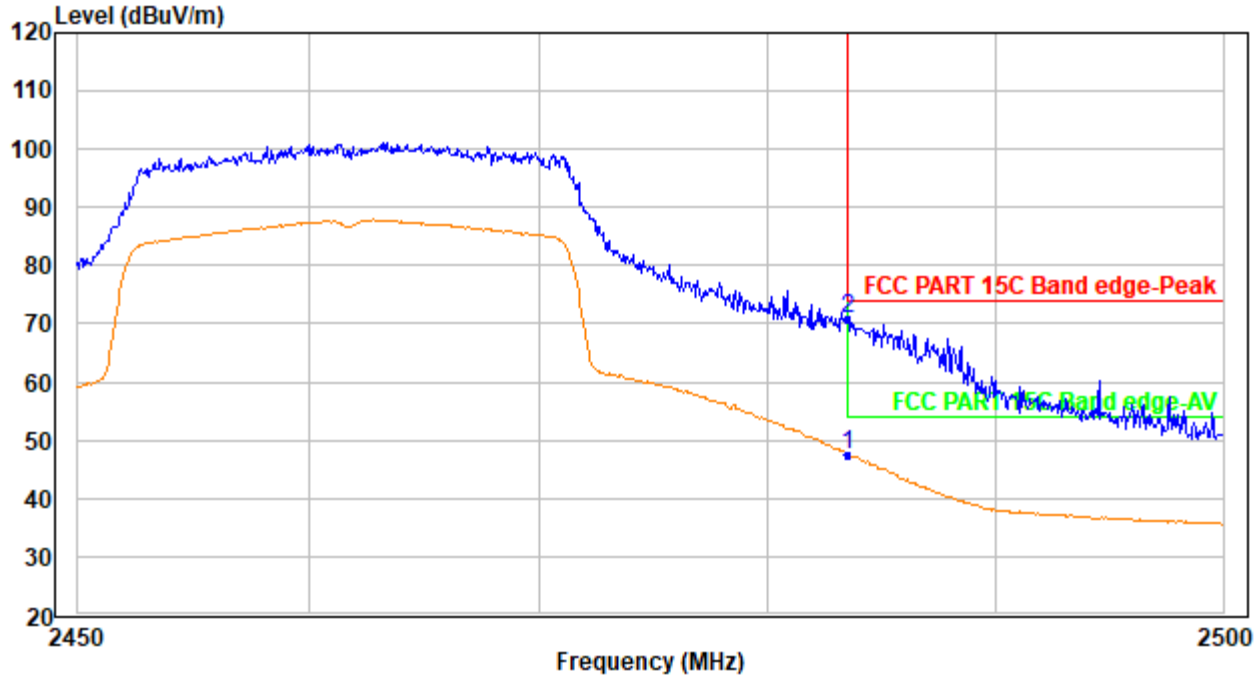
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	63.57	74.00	40.56	54.00	Pass

Test Channel:	Channel 1	Ant. Polar. :	Vertical



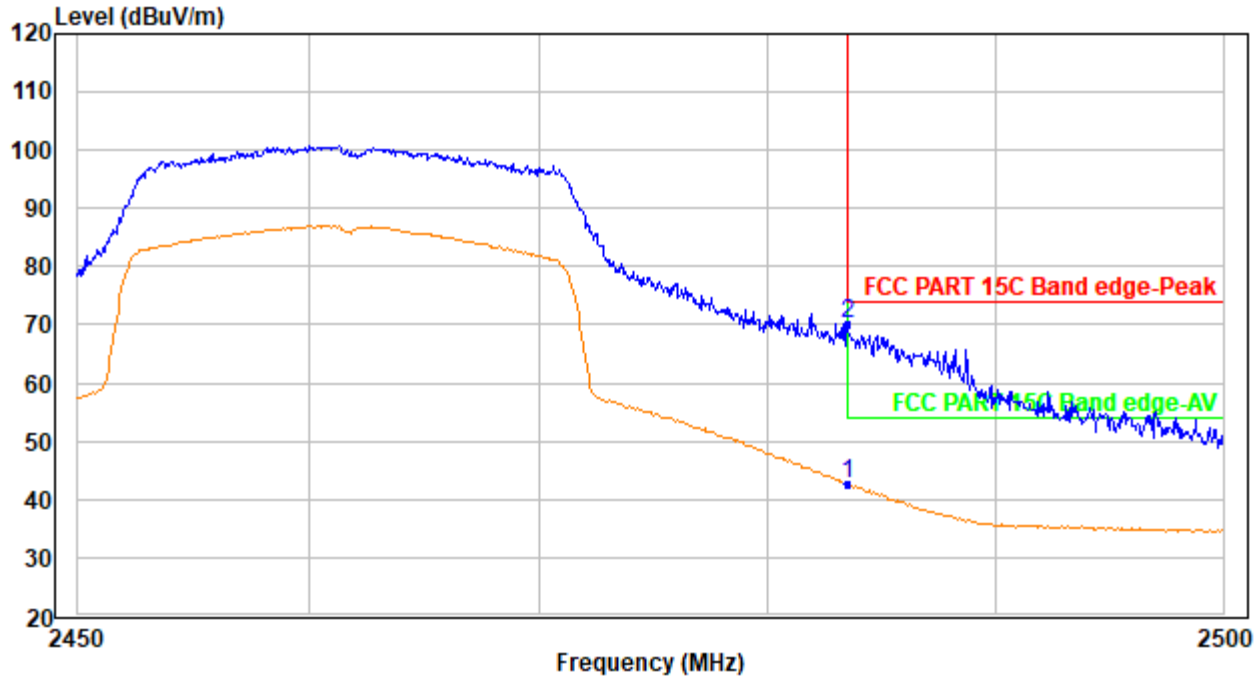
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	63.61	74.00	38.09	54.00	Pass

Test Channel:	Channel 11	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	71.01	74.00	47.64	54.00	Pass

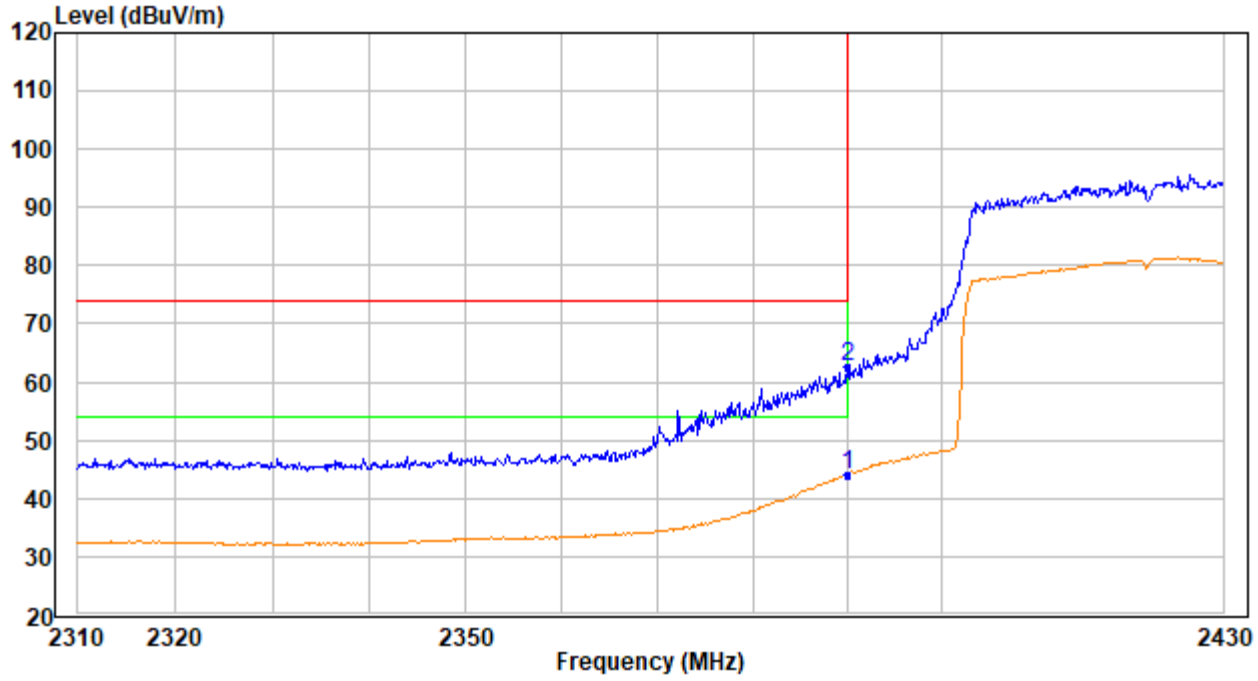
Test Channel:	Channel 11	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	70.09	74.00	42.76	54.00	Pass

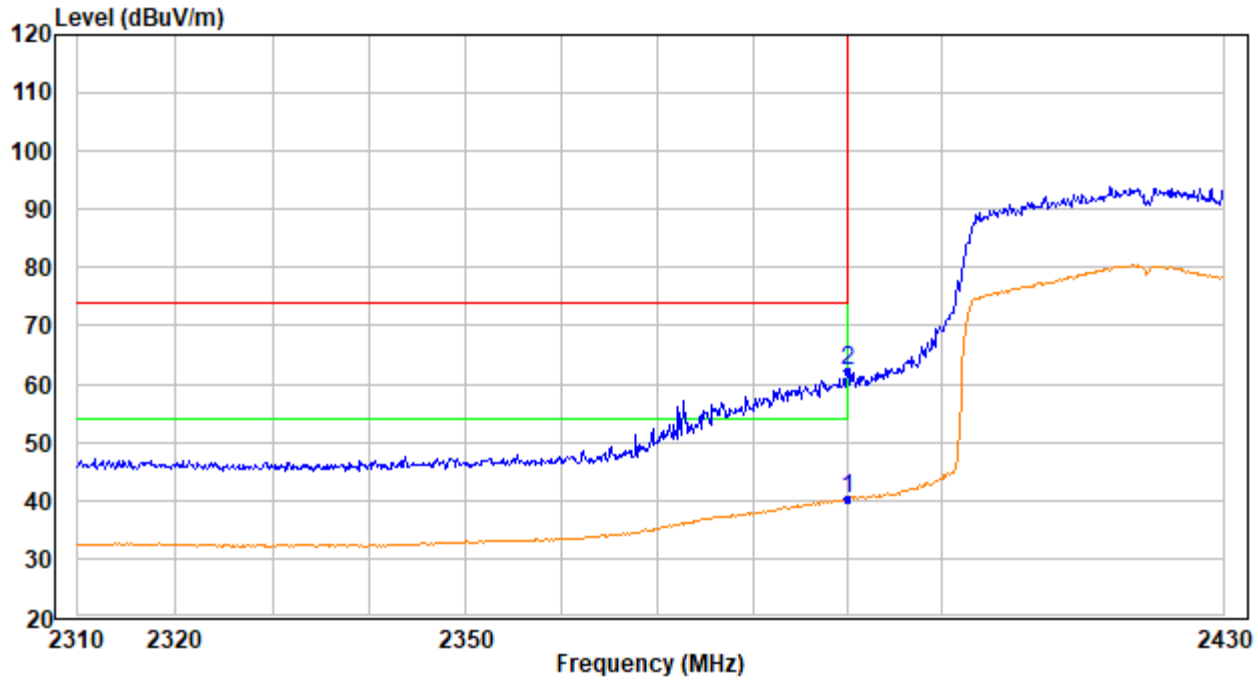
IEEE 802.11ax-HE40

Test Channel:	Channel 3	Ant. Polar. :	Horizontal



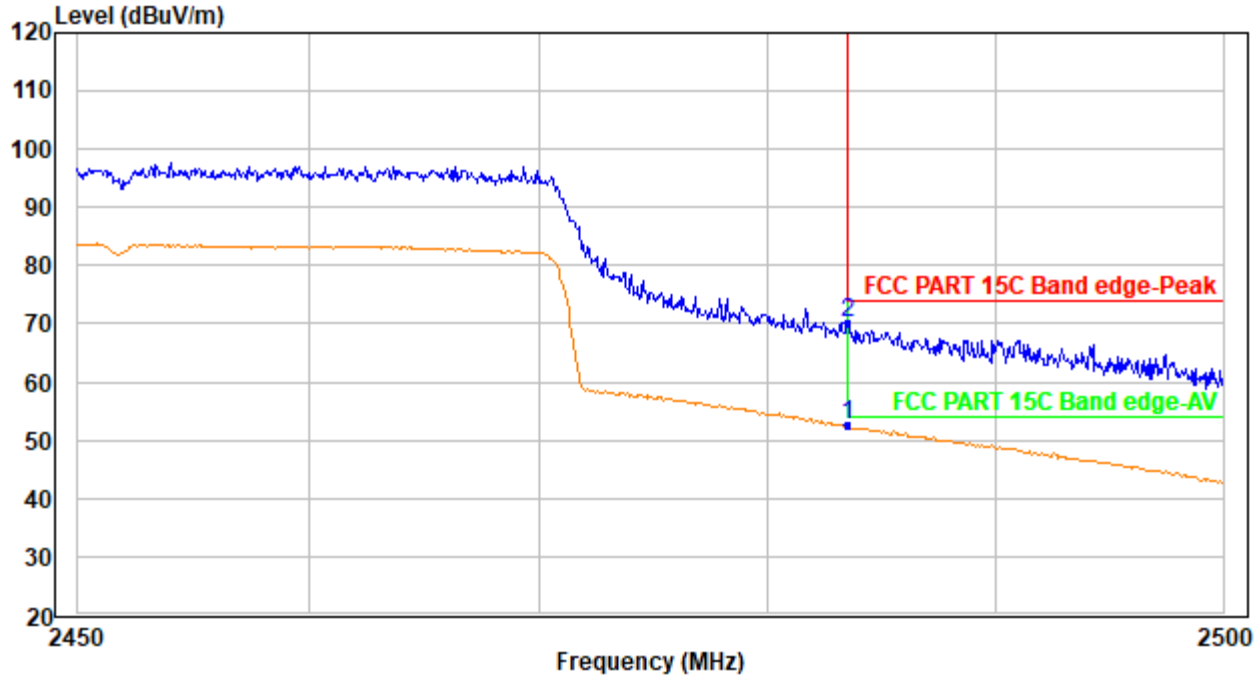
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	62.58	74.00	44.12	54.00	Pass

Test Channel:	Channel 3	Ant. Polar. :	Vertical



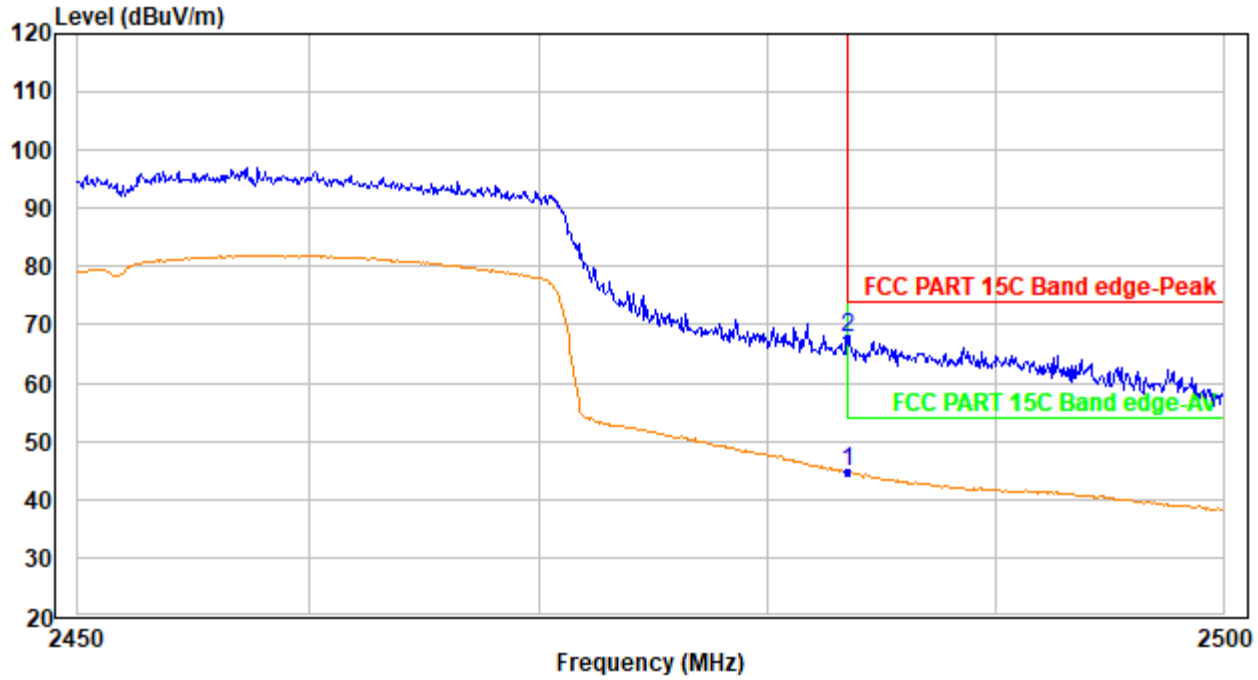
Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2390.000	62.23	74.00	40.38	54.00	Pass

Test Channel:	Channel 9	Ant. Polar. :	Horizontal



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	70.06	74.00	52.59	54.00	Pass

Test Channel:	Channel 9	Ant. Polar. :	Vertical



Frequency (MHz)	Peak level (dBμV/m)	Peak Limit (dBμV/m)	AV level (dBμV/m)	AV Limit (dBμV/m)	Conclusion
2483.500	67.85	74.00	44.70	54.00	Pass

5.9 CONDUCTED EMISSION

Test Requirement: 47 CFR Part 15C Section 15.207
RSS-Gen Issue 5, Section 8.8

Test Method: ANSI C63.10-2013 Section 6.2

Limits:

Frequency range (MHz)	Limits (dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.4.2 for details.

Test Procedures:

Test frequency range :150KHz-30MHz

1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Equipment Used: Refer to section 3 for details.

Test Result: Pass