TEST REPORT

Report Number: 13573777-E4V3

Applicant	:	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A
Model	:	A2481 (Parent Model, Full Test) A2626, A2628, A2629, A2630 (Variant Models)
FCC ID	:	BCG-E3994A (Parent Model, Full Test) BCG-E3996A, BCG-E4029A, BCG-E4030A (Variant Models)
IC	:	579C-E3994A (Parent Model, Full Test) 579C-E3996A, 579C-E4029A, 579C-E4030A (Variant Models)
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5

Date of Issue:
August 16, 2021

Prepared by:
UL Verification Services Inc.
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ACCREDITED
CERT #0751.05

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	7/26/2021	Initial Issue	Frank Ibrahim
V2	8/4/2021	Addressed TCB feedback	Chris Xiong
V3	8/16/2021	Address TCB's question on n mode Channel 1 power	Chin Pang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A
EUT DESCRIPTION:	SMARTPHONE
MODEL:	A2481 (Parent Model, Full Test) A2626, A2628, A2629, A2630 (Variant Models)
BRAND:	APPLE
FCC ID:	BCG-E3994A (Parent Model, Full Test) BCG-E3996A, BCG-E4029A, BCG-E4030A (Variant Models)
IC ID:	579C-E3994A (Parent Model, Full Test) 579C-E3996A, 579C-E4029A, 579C-E4030A (Variant Models)
SERIAL NUMBER:	US1H9; C7CF300D10Y2; G0HFYT6X7Q
SAMPLE RECEIPT DATE:	03/25/2021; 02/09/2021; 06/28/2021
DATE TESTED:	3/16/2021 to 8/16/2021

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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Approved & Released For
UL Verification Services Inc. By:

Frank Ibrahim
Staff Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:

Chris Xiong
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

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2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
N/A	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Complies	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Complies	None.
15.247 (e)	RSS-247 5.2 (b)	PSD	Complies	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Complies	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	Complies	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:
- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- ANSI C63.10-2013
- KDB 558074 D01 15.247 Meas Guidance v05r02
- KDB 414788 D01 Radiated Test Site v01r01
- RSS-GEN Issue 5 + A1 + A2
- RSS-247 Issue 2

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building 1: 47173 Benicia Street, Fremont, CA 94538	US0104	2324A	208313
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538	US0104	22541	208313
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538	US0104	2324B	208313

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5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{LAB}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

Uncertainty figures are valid to a confidence level of 95%.

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and MSS. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible.

Testing was performed on the parent model and is used to support the application for the parent and variants identified in this report based on the test plan submitted and approved via KDB inquiry by the FCC and by ISED-Canada.

The Models and FCC and IC ID covered by this report include:

Parent Model: A2481; FCC ID: BCG-E3994A; IC ID: 579C-E3994A

Variant Models: A2626; FCC ID: BCG-E3996A; IC ID: 579C-E3996A
A2628; FCC ID: BCG-E4029A; IC ID: 579C-E4029A
A2629; FCC ID: BCG-E4030A; IC ID: 579C-E4030A
A2630; FCC ID: BCG-E4030A; IC ID: 579C-E4030A

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
1Tx			
2412 - 2472	802.11b	21.24	133.05
	802.11g	Covered by 802.11n HT20 1TX	
	802.11n HT20	21.23	132.74
	802.11ax HE20	21.23	132.74

2Tx			
2412 - 2472	802.11n HT20 CDD	24.24	265.46
	802.11g SDM/STBC	Covered by 802.11n HT20 2TX CDD	
	802.11ax HE20	24.22	264.24

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6.3. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna Type is IFA.

The antennas' gains, as provided by the manufacturer, are as follows:

Frequency Range (GHz)	ANT 4 (dBi)	ANT 3 (dBi)
2.4	-3.0	-0.7

6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was WiFi FW Version: 20_10_745_15.

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6.5. WORST-CASE CONFIGURATION AND MODE

EUT was investigated in three orthogonal orientations X, Y and Z on ANT 4, ANT 3 and 2TX. It was determined that Y (Portrait) orientation was worst-case orientation for ANT 4 and 2TX and X (Flatbed) was worst-case orientation for ANT 3.

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT set to transmit at highest power on Low/Middle/High channels.

Radiated emissions below 1GHz, 18-26GHz and power line conducted emissions were performed with the EUT transmits at the channel with the highest output power as worst-case scenario. There were no emissions found below 30MHz within 20dB of the limit.

For radiated harmonics spurious below 1GHz, 1-18GHz L/M/H channels, 18-26GHz, and power line conducted emissions were performed with the EUT set at the 2TX CDD mode among the CDD/SDM modes and 2TX HE mode with power setting equal or higher than SISO modes as worst-case scenario. G mode covered by HT20 mode since it has the same power as HT20.

Below 1GHz tests were performed with EUT connected to AC power adapter as the worst case; and for above 1GHz tests, the worst-case configuration reported was with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop.

The output power and psd for the 802.11 ax mode were investigated between all different tones, and we found that SU mode had the highest output power and the lowest tone had the highest PSD readings. And after investigation, antenna port conducted tests were performed on both SU and lowest tones; radiated spurious emission and radiated band edge tests were performed on full RU and lowest tones.

Low data rate was used to test on antenna port conducted tests and radiated spurious emissions since it has the highest maximum power. For radiated bandedge, following are the worst-case data rates set for test:

802.11b mode: 1 Mbps
802.11n HT20 mode: MCS7
802.11ax HE20 mode: MCS9
802.11ax HE20 FULL RU & RU26: MCS9

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.

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6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/ DoC**
Laptop	Apple	Macbook Pro	C02YL3ZMJHC8	BCGA1989
Laptop AC/DC adapter	Liteon Technology	A1424	NSW25679	DoC
EUT AC/DC adapter	Apple	A1720	C3D8417A7R93KVPA8	DoC

I/O CABLES (RF CONDUCTED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Un-shielded	2	N/A
2	USB	1	USB	Shielded	1.0	N/A
3	Antenna	1	SMA	Un-shielded	0.2	To spectrum Analyzer

I/O CABLES (RF RADIATED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Un-shielded	2	N/A
2	USB	1	USB	Un-shielded	1	N/A

TEST SETUP

The EUT setup is shown as below. Test software exercised the radio card.

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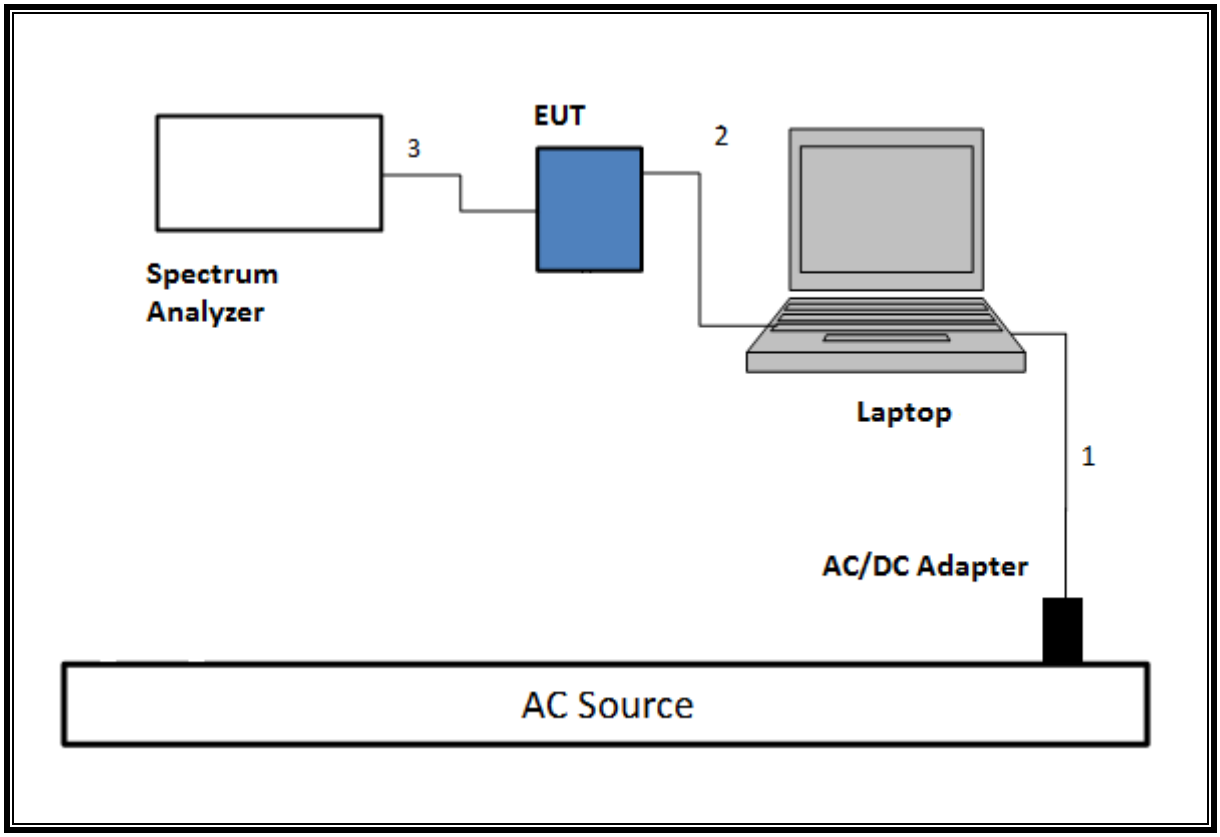
SETUP DIAGRAM FOR CONDUCTED TESTS



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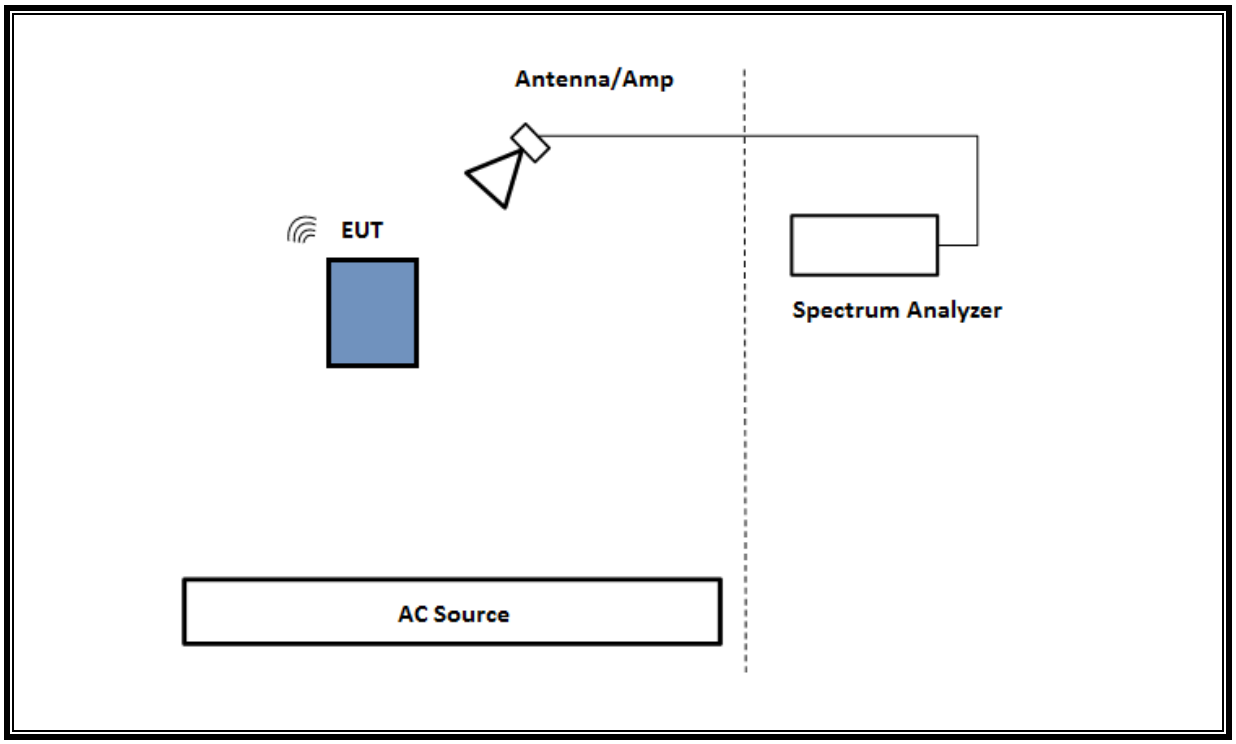
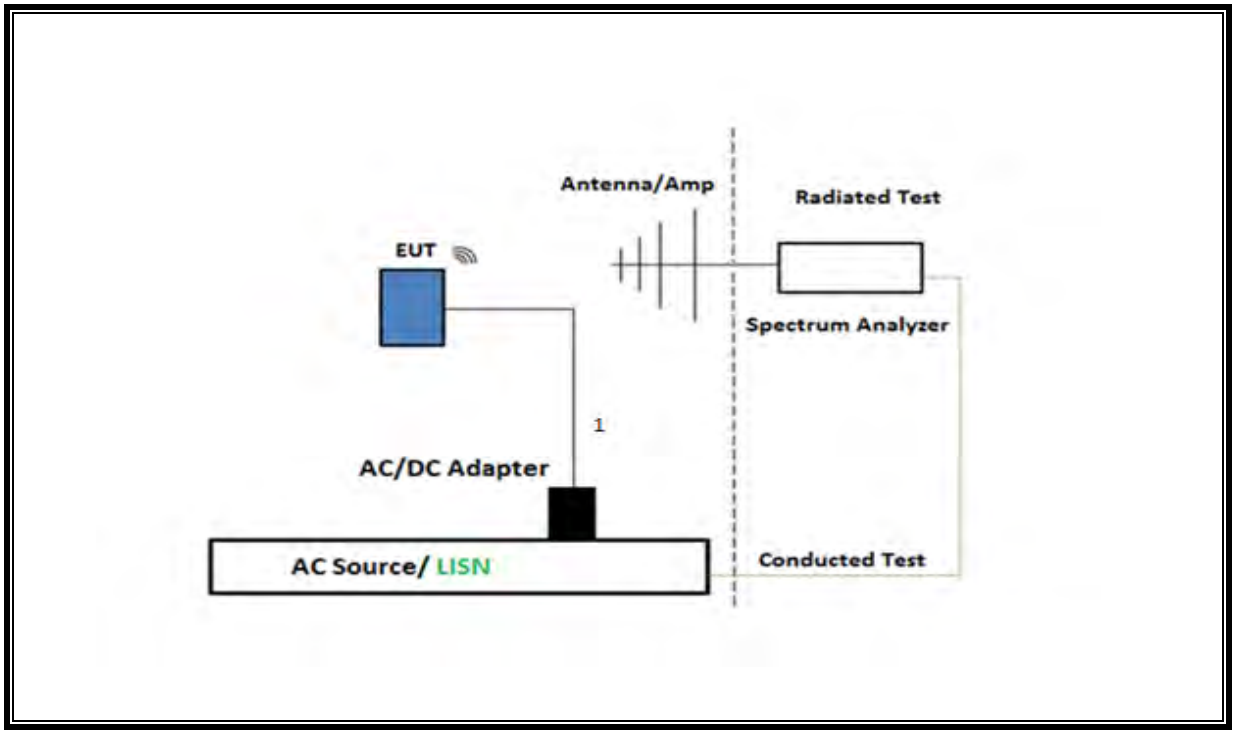
SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz



SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST



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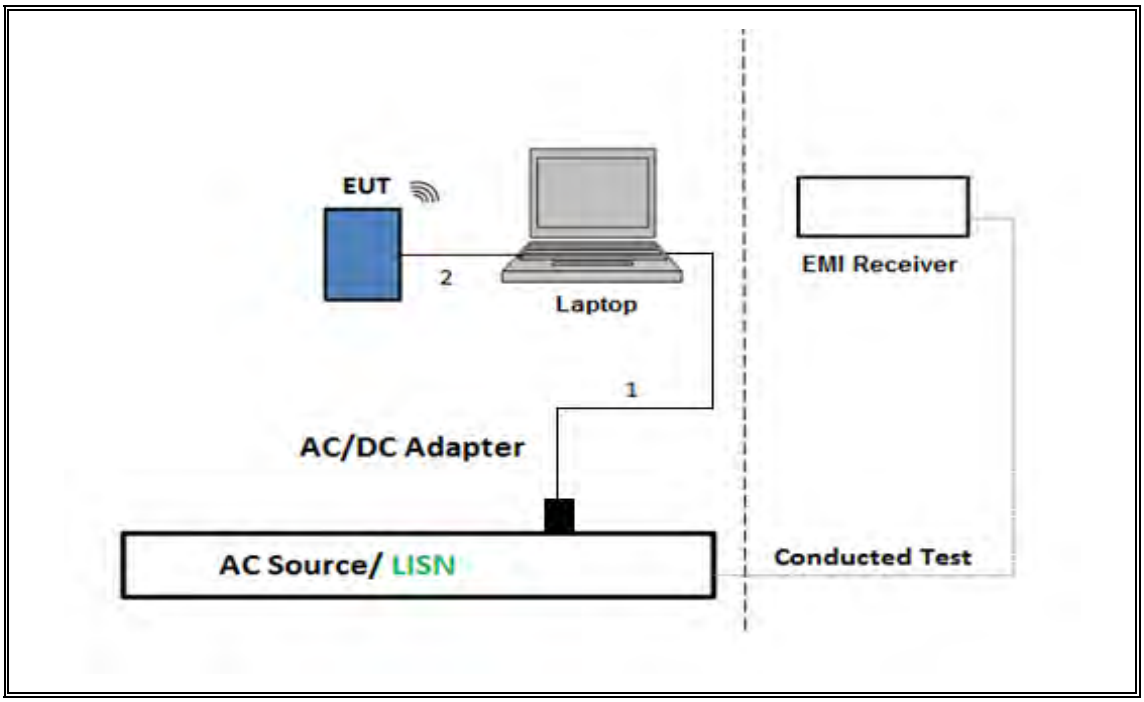
TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



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7. MEASUREMENT METHOD

Test Item	Test Method
6 dB BW	ANSI C63.10-2013, Subclause 11.8.1 Option 1
99% BW	ANSI C63.10-2013, Subclause 6.9.3.
Output Power	ANSI C63.10-2013, Subclause 11.9.2.3.1 Method AVGPM
PSD	• ANSI C63.10-2013, Subclause, 11.10.3 Method AVGPSD-1 • ANSI C63.10-2013, Subclause, 11.10.5 Method AVGPSD-2
Radiated emissions non-restricted frequency bands	ANSI C63.10-2013, Subclause 11.11 & Clause 13
Radiated emissions restricted frequency bands	ANSI C63.10-2013, Subclause 11.12.1 & Clause 13
Conducted emissions in restricted frequency bands	ANSI C63.10-2013, Subclause 11.12.2
Band-edge	• ANSI C63.10-2013, Subclause 11.13.3.2 Peak Detection • ANSI C63.10-2013, Subclause 11.13.3.3 Trace averaging with continuous EUT transmission at full power • ANSI C63.10-2013, Subclause 11.13.3.4 Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction
Radiated Spurious Emissions Below 30MHz	ANSI C63.10-2013, Subclause 6.4 & Clause 13
AC Power Line Conducted Emissions	ANSI C63.10-2013, Subclause 6.2

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8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	T906	1/27/2022	1/27/2021
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T900	2/24/2022	2/24/2021
Amplifier, 9KHz to 1GHz, 32dB	Sonoma Instrument	310	T173	7/22/2021	7/22/2020
EMI Test Receiver	Rohde & Schwarz	ESW44	201500	2/26/2022	2/26/2021
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	PRE0213833	2/16/2022	2/16/2021
RF Filter Box, 6 port, 1-18GHz	UL	SAC 6 port rf box	207182	3/14/2022	3/14/2021
Switch Driver	Keysight Technologies Inc	11713E	207147	-	-
EMI Test Receiver	Rohde & Schwarz	ESW44	201499	2/26/2022	2/26/2021
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	PRE0213833	2/16/2022	2/16/2021
RF Filter Box, 6 port, 1-18GHz	UL	SAC 6 port rf box	206359	5/13/2022	5/13/2021
Switch Driver	Keysight Technologies Inc	11713E	207146	-	-
EMI Test Receiver	Rohde & Schwarz	ESW44	201501	2/23/2022	2/23/2021
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	200785	9/25/2021	9/25/2020
RF Filter Box, 6 port, 1-18GHz	UL	SAC 6 port rf box	203372	12/09/2021	12/09/2020
EMI Test Receiver	Rohde & Schwarz	ESW44	201502	2/24/2022	2/24/2021
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	PRE0213971	9/25/2021	9/25/2020
RF Filter Box, 6 port, 1-18GHz	UL	SAC 6 port rf box	202843	12/03/2021	12/03/2020
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	T1454	01/27/2022	01/27/2021
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1271	01/20/2022	01/20/2021
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90392	01/28/2022	01/28//2021
*Antenna Horn, 18 to 26GHz	ARA	SWH-28	T125	04/17/2021	04/17/2020
*Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	04/08/2021	04/08/2020
Antenna, Active Loop 9KHz to 30MHz	EMCO	6502	T35	11/23/2021	11/23/2020

AC Line Conducted					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	T1436	02/19/2022	02/19/2021
Power Cable, Line Conducted Emissions	UL	PR1	T861	10/27/2021	10/27/2020
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01	PRE0186446	01/20/2022	01/20/2021
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, Mar 6, 2020		
Conducted Software	UL	UL EMC	2020.2.26		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, February 21, 2020		

*Testing is completed before equipment expiration date.

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9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz						
802.11b 1TX	12.416	12.432	0.999	99.87%	0.00	0.010
802.11n HT20 1TX, MCS 0	0.6640	0.6858	0.968	96.82%	0.14	1.506
802.11n HT20 2TX, MCS 0	0.6639	0.6856	0.968	96.83%	0.14	1.506
802.11n HT20 1TX, MCS 7	0.2280	0.2495	0.914	91.39%	0.39	4.386
802.11n HT20 2TX, MCS 7	0.2280	0.2495	0.914	91.39%	0.39	4.387
802.11ax HE20 26T 1TX, MCS0	3.933	4.058	0.969	96.92%	0.14	0.254
802.11ax HE20 26T 2TX, MCS0	3.924	4.041	0.971	97.10%	0.13	0.255
802.11ax HE20 26T 1TX, MCS9	3.9974	4.0434	0.989	98.86%	0.00	0.010
802.11ax HE20 26T 2TX, MCS9	3.978	4.046	0.983	98.32%	0.00	0.010
802.11ax HE20 SU Mode 1TX, MCS0	1.558	1.586	0.982	98.23%	0.00	0.010
802.11ax HE20 SU Mode 2TX, MCS0	1.560	1.585	0.984	98.42%	0.00	0.010
802.11ax HE20 SU Mode 1TX, MCS9	1.560	1.584	0.985	98.48%	0.00	0.010
802.11ax HE20 SU Mode 2TX, MCS9	1.560	1.584	0.985	98.48%	0.00	0.010

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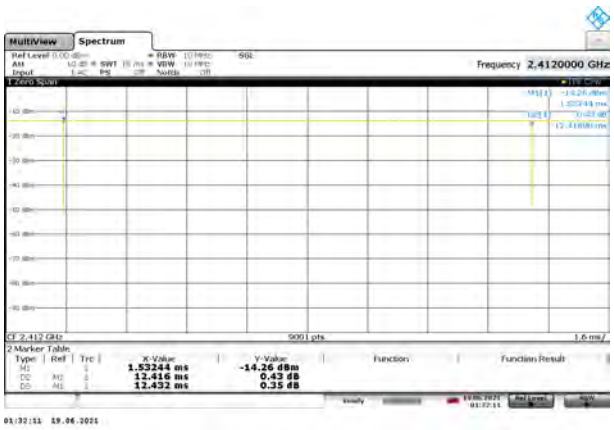
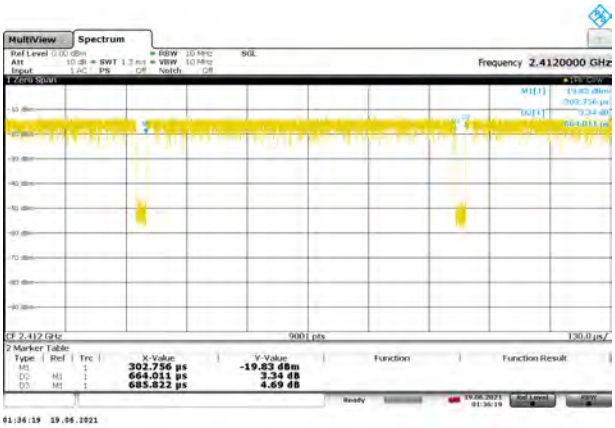
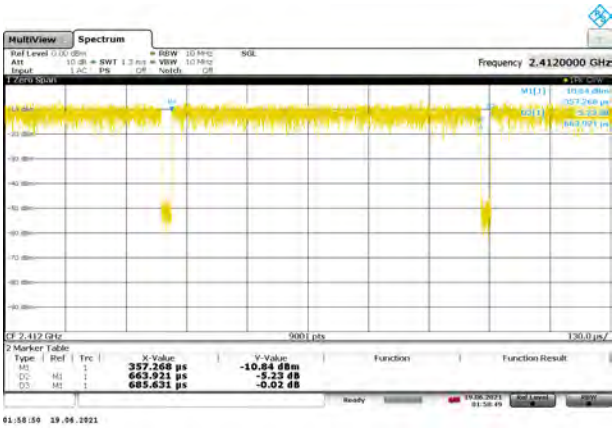
DUTY CYCLE PLOTS



DUTY CYCLE 802.11b MODE



11n HT20, 1TX MCS 0



11n HT20, 2TX MCS 0

11n HT20 1TX MCS 7

11n HT20 2TX, MCS 7

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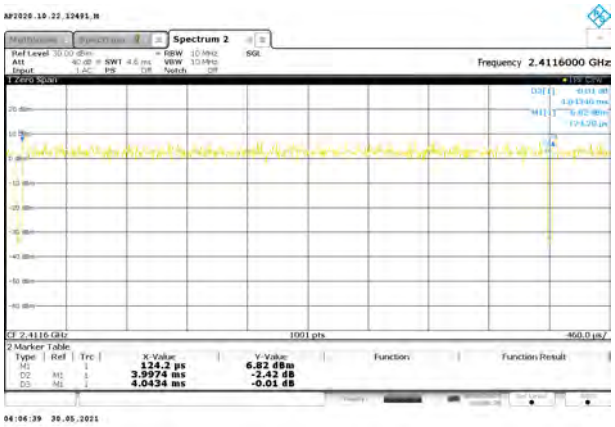
11ax HE20 26T 1TX, MCS0

11ax HE20 26T 2TX, MCS0



11ax HE20 26T 1TX, MCS9

11ax HE20 26T 2TX, MCS9

11ax HE20 SU Mode 1TX, MCS0

11ax HE20 SU Mode 2TX, MCS0

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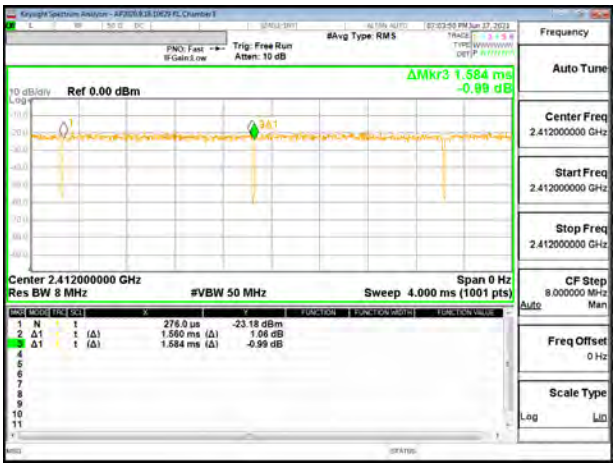

11ax HE20 SU Mode 1TX, MCS9

11ax HE20 SU Mode 2TX, MCS9

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9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

ID:	19232 MN	**Date:**	3/29/2021 to 4/3/2021

Only Mid channel plot is reported to show analyzer settings.

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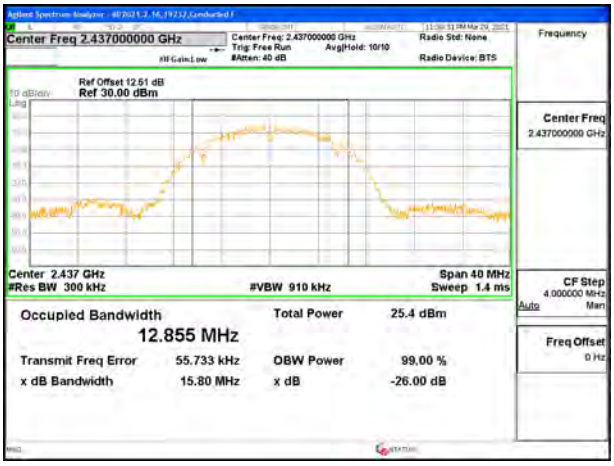
9.2.1. **802.11b MODE 1TX**

ANT 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	12.776
Mid 6	2437	12.855
High 11	2462	12.764
High 12	2467	12.917
High 13	2472	12.895



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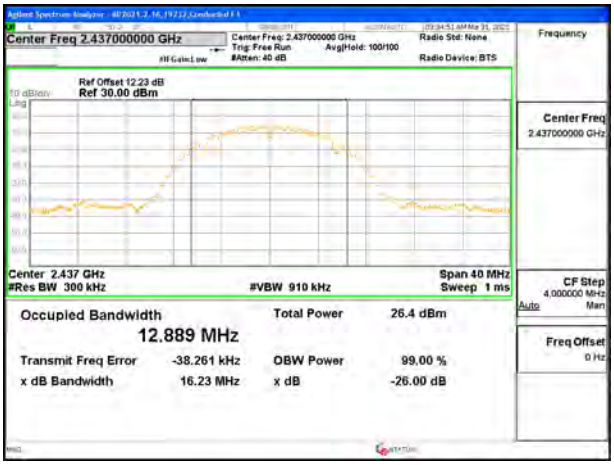
ANT 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	13.014
Mid 6	2437	12.889
High 11	2462	12.878
High 12	2467	12.912
High 13	2472	12.739



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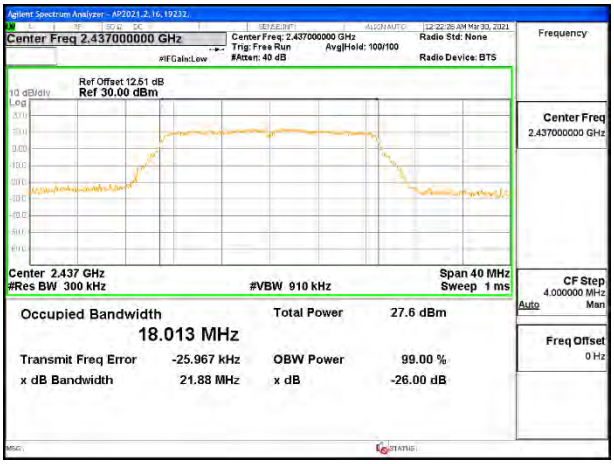
9.2.2. **802.11n HT20 MODE 1TX**

ANT 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.877
Low 2	2417	17.776
Low 3	2422	17.81
Mid 6	2437	18.013
High 9	2452	17.759
High 10	2457	17.761
High 11	2462	17.803
High 12	2467	17.965
High 13	2472	17.669



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ANT 3

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.860
Low 2	2417	17.819
Low 3	2422	17.817
Mid 6	2437	17.803
High 9	2452	17.851
High 10	2457	17.810
High 11	2462	17.729
High 12	2467	17.720
High 13	2472	17.552

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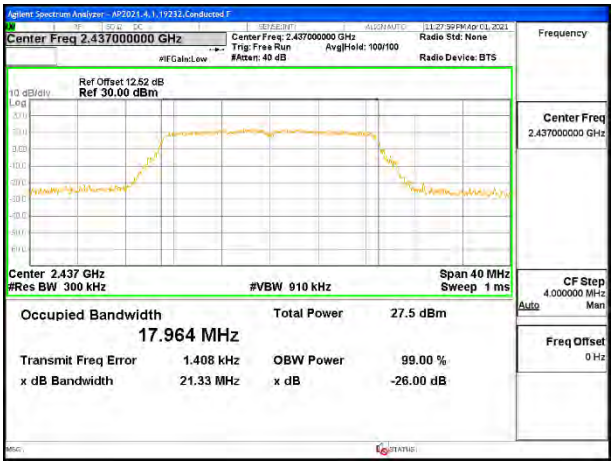
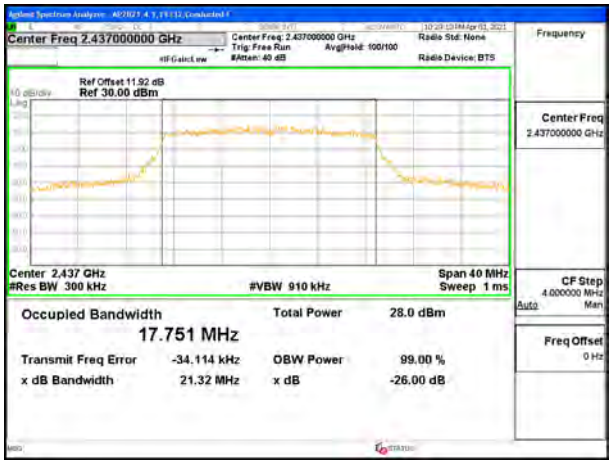
9.2.3. **802.11n HT20 CDD MODE 2TX**

ANT 4 + ANT 3

Channel	Frequency (MHz)	99% Bandwidth Antenna 4 (MHz)	99% Bandwidth Antenna 3 (MHz)
Low 1	2412	17.817	17.882
Low 2	2417	17.749	17.816
Low 3	2422	17.888	17.830
Low 4	2427	17.960	17.819
Mid 6	2437	17.964	17.751
High 8	2447	17.866	17.958
High 9	2452	17.770	17.809
High 10	2457	17.791	17.779
High 11	2462	17.811	17.765
High 12	2467	17.905	17.729
High 13	2472	17.710	17.485



MID CHANNEL 6 ANT 4



MID CHANNEL 6 ANT 3

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9.2.4. **802.11ax HE20 MODE 1TX**

ANT 4: 26-Tone, RU Index 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.488
Low 2	2417	18.401
Low 3	2422	18.340
Mid 6	2437	18.606
High 9	2452	18.508
High 10	2457	18.322
High 11	2462	18.277
High 12	2467	18.301
High 13	2472	18.477

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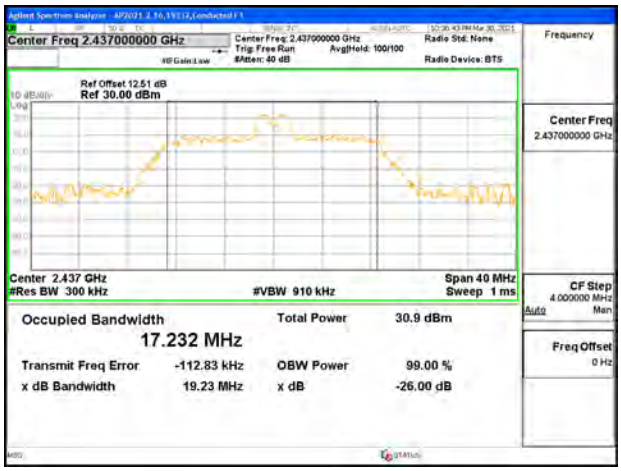
ANT 4: 26-Tone, RU Index 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.046
Low 2	2417	17.135
Low 3	2422	17.208
Mid 6	2437	17.232
High 9	2452	17.107
High 10	2457	16.976
High 11	2462	17.067
High 12	2467	17.279
High 13	2472	17.371



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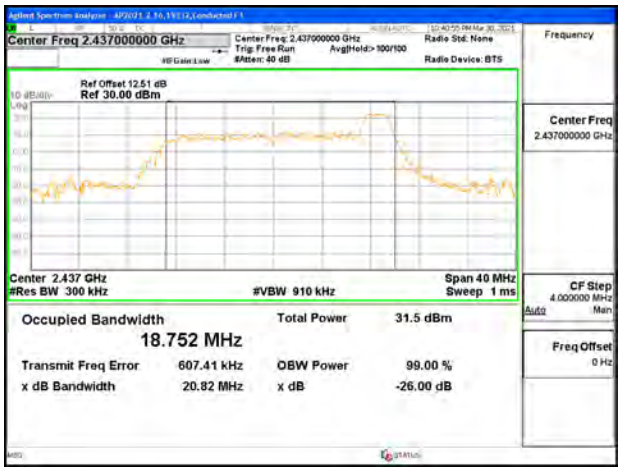
ANT 4: 26-Tone, RU Index 8

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.780
Low 2	2417	18.766
Low 3	2422	18.926
Mid 6	2437	18.752
High 9	2452	18.691
High 10	2457	18.786
High 11	2462	18.958
High 12	2467	19.015
High 13	2472	19.041



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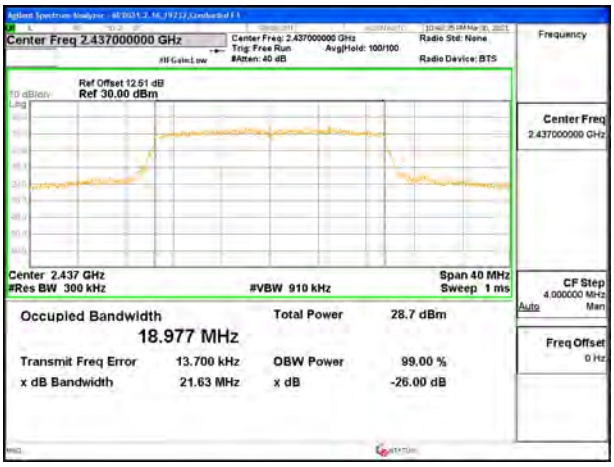
ANT 4: SU Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.940
Low 2	2417	18.885
Low 3	2422	18.963
Mid 6	2437	18.977
High 9	2452	18.923
High 10	2457	18.932
High 11	2462	18.897
High 12	2467	18.971
High 13	2472	19.054



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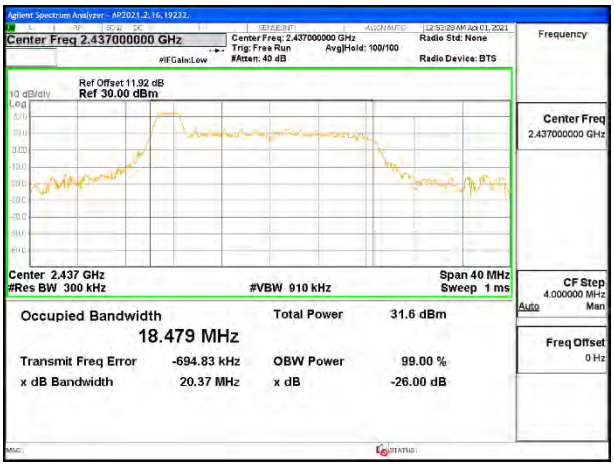
ANT 3: 26-Tone, RU Index 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.542
Low 2	2417	18.551
Low 3	2422	18.704
Mid 6	2437	18.479
High 9	2452	18.587
High 10	2457	18.499
High 11	2462	18.496
High 12	2467	18.453
High 13	2472	18.385



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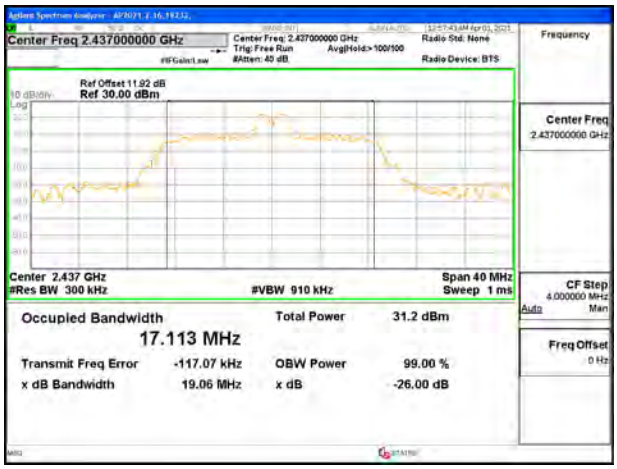
ANT 3: 26-Tone, RU Index 4

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.247
Low 2	2417	17.203
Low 3	2422	17.285
Mid 6	2437	17.113
High 9	2452	17.336
High 10	2457	17.202
High 11	2462	17.161
High 12	2467	17.025
High 13	2472	17.152



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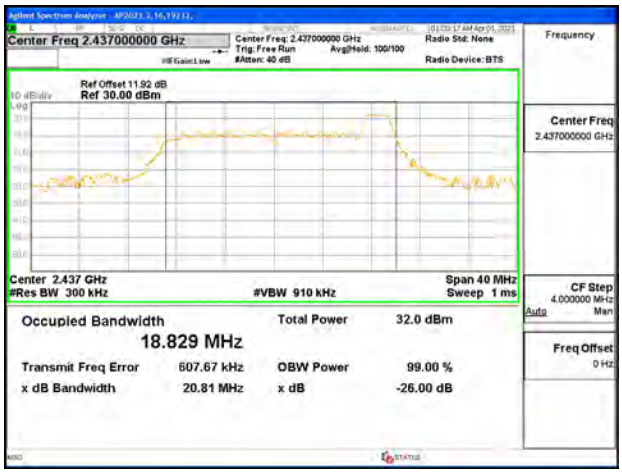
ANT 3: 26-Tone, RU Index 8

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	18.700
Low 2	2417	18.724
Low 3	2422	18.740
Mid 6	2437	18.829
High 9	2452	18.828
High 10	2457	18.728
High 11	2462	18.746
High 12	2467	18.768
High 13	2472	18.938



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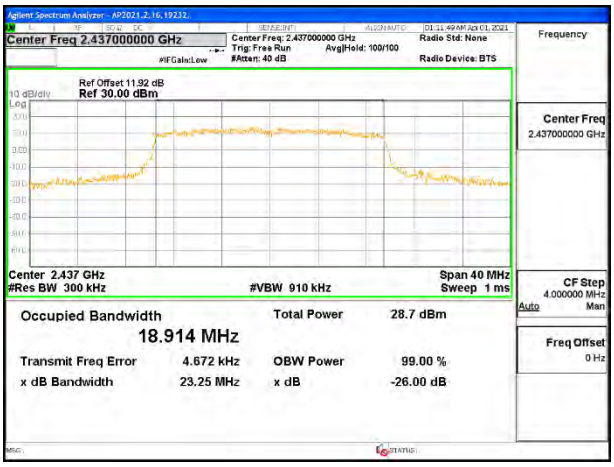
ANT 3: SU Mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	19.020
Low 2	2417	18.888
Low 3	2422	19.055
Mid 6	2437	18.914
High 9	2452	19.075
High 10	2457	18.933
High 11	2462	18.950
High 12	2467	18.934
High 13	2472	18.953



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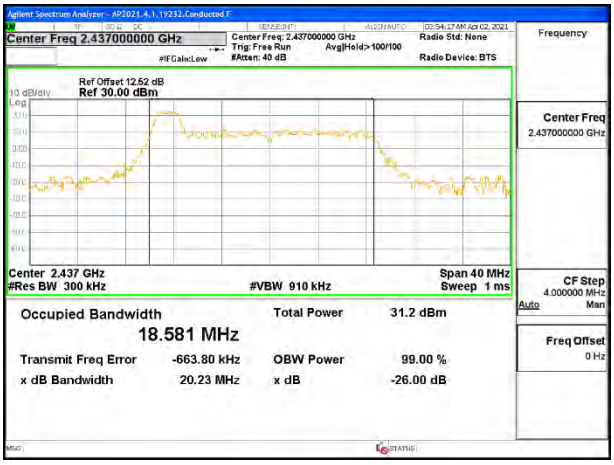
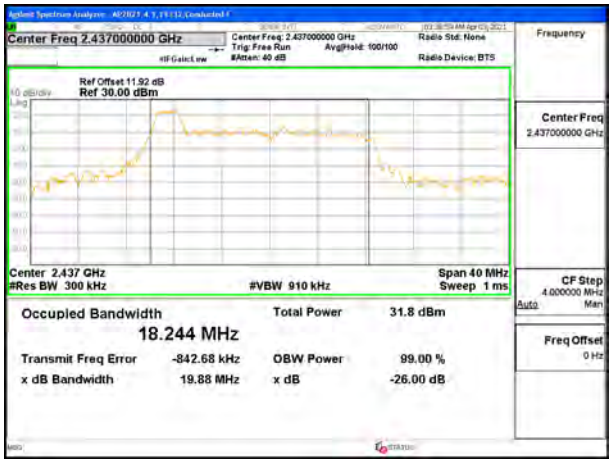
9.2.5. **802.11ax HE20 OFDMA MODE 2TX**

ANT 4 + ANT 3: 26-Tone, RU Index 0

Channel	Frequency (MHz)	99% Bandwidth Antenna 4 (MHz)	99% Bandwidth Antenna 3 (MHz)
Low 1	2412	18.424	18.388
Low 2	2417	18.432	18.373
Low 3	2422	18.341	18.425
Low 4	2427	18.405	18.566
Mid 6	2437	18.581	18.244
High 8	2447	18.588	18.801
High 9	2452	18.497	18.381
High 10	2457	18.351	18.335
High 11	2462	18.347	18.372
High 12	2467	18.369	18.272
High 13	2472	18.514	18.365



MID CHANNEL 6 ANT 4



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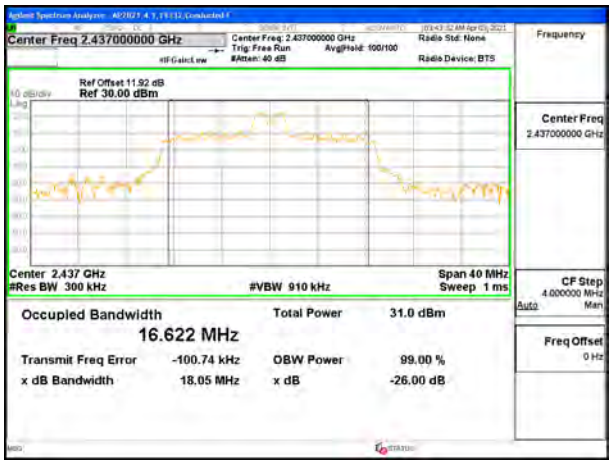
ANT 4 + ANT 3: 26-Tone, RU Index 4

Channel	Frequency (MHz)	99% Bandwidth Antenna 4 (MHz)	99% Bandwidth Antenna 3 (MHz)
Low 1	2412	17.095	16.810
Low 2	2417	17.037	16.852
Low 3	2422	17.185	16.791
Low 4	2427	17.170	16.789
Mid 6	2437	17.305	16.622
High 8	2447	17.194	17.056
High 9	2452	17.088	16.917
High 10	2457	17.011	16.855
High 11	2462	17.134	16.694
High 12	2467	17.364	16.662
High 13	2472	17.459	16.752

MID CHANNEL 6 ANT 4



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ANT 4 + ANT 3: 26-Tone, RU Index 8

Channel	Frequency (MHz)	99% Bandwidth Antenna 4 (MHz)	99% Bandwidth Antenna 3 (MHz)
Low 1	2412	18.720	18.381
Low 2	2417	18.855	18.390
Low 3	2422	18.905	18.353
Low 4	2427	18.883	18.350
Mid 6	2437	18.735	18.567
High 8	2447	18.618	19.012
High 9	2452	18.728	18.486
High 10	2457	18.847	18.492
High 11	2462	18.904	18.421
High 12	2467	18.950	18.425
High 13	2472	18.961	18.572

MID CHANNEL 6 ANT 4

MID CHANNEL 6 ANT 3

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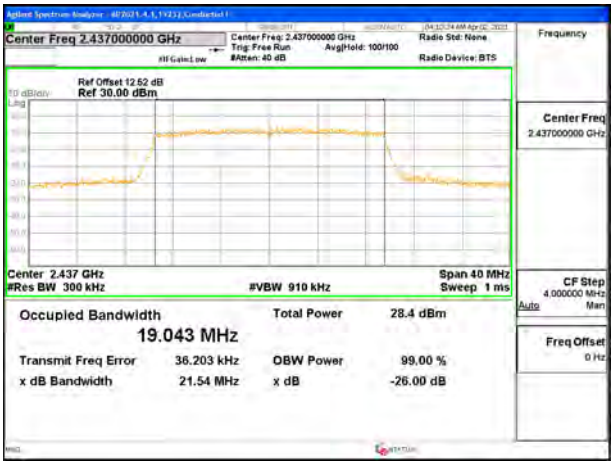
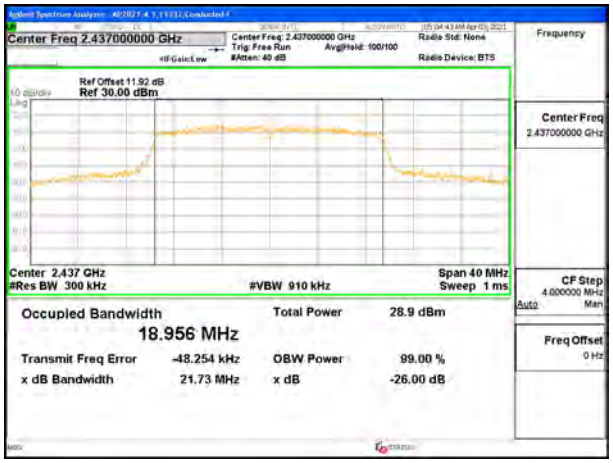
ANT 4 + ANT 3 2TX MODE: SU Mode

Channel	Frequency (MHz)	99% Bandwidth Antenna 4 (MHz)	99% Bandwidth Antenna 3 (MHz)
Low 1	2412	18.949	19.001
Low 2	2417	18.876	18.945
Low 3	2422	18.901	18.929
Low 4	2427	19.110	19.065
Mid 6	2437	19.043	18.956
High 8	2447	18.984	20.295
High 9	2452	18.929	19.980
High 10	2457	18.894	18.977
High 11	2462	18.918	18.880
High 12	2467	18.982	18.898
High 13	2472	18.990	18.954



MID CHANNEL 6 ANT 4



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9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

RSS-247 5.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

The 6dB bandwidth was measured for the narrowest bandwidth mode, b Mode and ax HE20 Mode 26-Tone as worst case to demonstrate compliance with the minimum required bandwidth of 500 kHz to cover all OFDMA modes.

Only Mid channel plot is reported to show analyzer settings.

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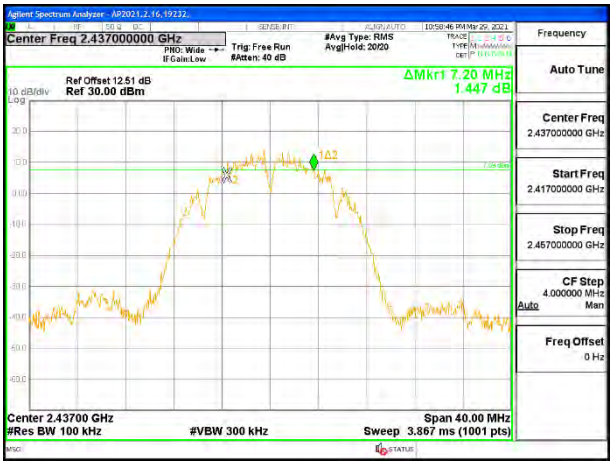
9.3.1. **802.11b MODE 1TX**

ANT 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	7.76	0.5
Mid 6	2437	7.20	0.5
High 11	2462	8.20	0.5
High 12	2467	8.64	0.5
High 13	2472	8.52	0.5



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ANT 3

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	7.72	0.5
Mid 6	2437	6.68	0.5
High 11	2462	8.16	0.5
High 12	2467	8.08	0.5
High 13	2472	8.60	0.5

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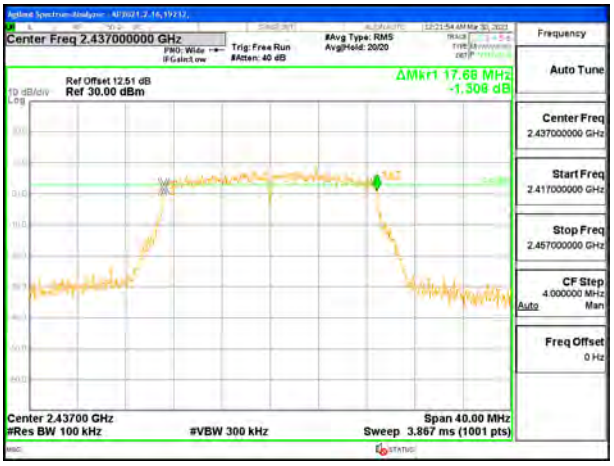
9.3.2. **802.11n HT20 MODE 1TX**

ANT 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	17.40	0.5
Low 2	2417	17.28	0.5
Low 3	2422	17.36	0.5
Mid 6	2437	17.68	0.5
High 9	2452	17.64	0.5
High 10	2457	17.04	0.5
High 11	2462	17.68	0.5
High 12	2467	17.48	0.5
High 13	2472	17.40	0.5



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ANT 3

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	17.76	0.5
Low 2	2417	17.64	0.5
Low 3	2422	17.68	0.5
Mid 6	2437	17.44	0.5
High 9	2452	17.64	0.5
High 10	2457	17.04	0.5
High 11	2462	17.64	0.5
High 12	2467	17.68	0.5
High 13	2472	16.12	0.5

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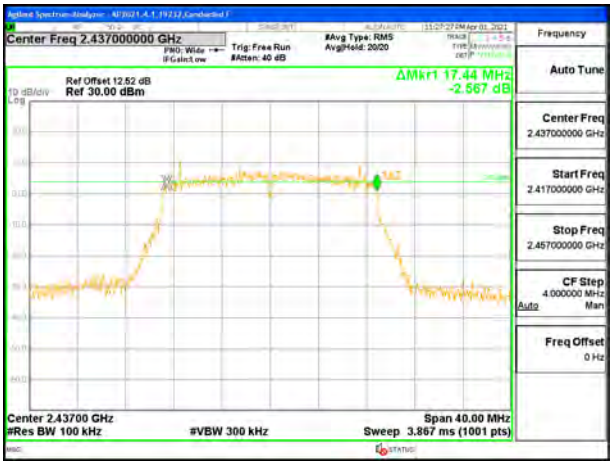
9.3.3. **802.11n HT20 CDD MODE 2TX**

ANT 4 + ANT 3

Channel	Frequency (MHz)	6 dB BW Antenna 4 (MHz)	6 dB BW Antenna 3 (MHz)	Minimum Limit (MHz)
Low 1	2412	17.72	17.68	0.5
Low 2	2417	17.20	17.64	0.5
Low 3	2422	17.04	17.68	0.5
Low 4	2427	17.28	17.68	0.5
Mid 6	2437	17.44	17.40	0.5
High 8	2447	17.24	17.64	0.5
High 9	2452	17.40	17.68	0.5
High 10	2457	17.00	17.36	0.5
High 11	2462	17.40	17.6	0.5
High 12	2467	17.76	17.2	0.5
High 13	2472	17.00	16.64	0.5



MID CHANNEL 6 ANT 4

MID CHANNEL 6 ANT 3

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9.3.4. **802.11ax HE20 MODE 1TX**

ANT 4: 26-Tone, RU Index 0

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	2.12	0.5
Low 2	2417	2.12	0.5
Low 3	2422	2.12	0.5
Mid 6	2437	2.08	0.5
High 9	2452	2.16	0.5
High 10	2457	2.08	0.5
High 11	2462	2.12	0.5
High 12	2467	2.16	0.5
High 13	2472	2.16	0.5

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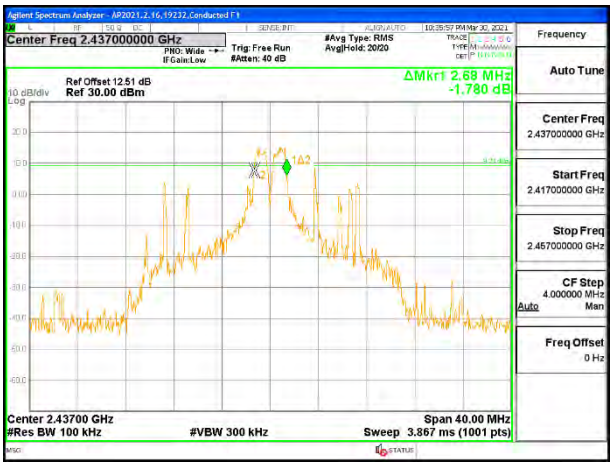
ANT 4: 26-Tone, RU Index 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	2.72	0.5
Low 2	2417	2.68	0.5
Low 3	2422	2.64	0.5
Mid 6	2437	2.68	0.5
High 9	2452	2.68	0.5
High 10	2457	2.64	0.5
High 11	2462	2.64	0.5
High 12	2467	2.64	0.5
High 13	2472	2.64	0.5



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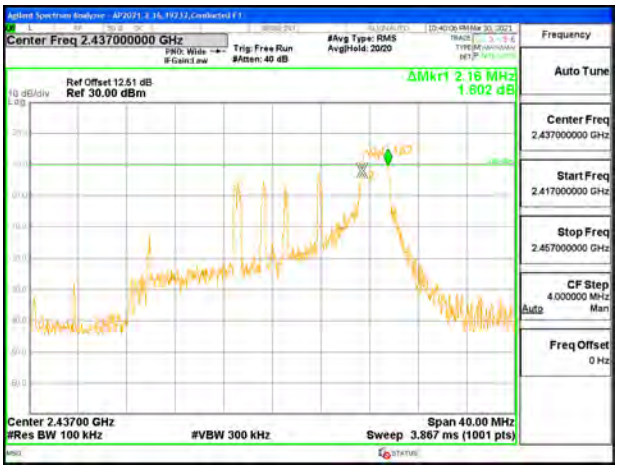
ANT 4: 26-Tone, RU Index 8

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	2.16	0.5
Low 2	2417	2.12	0.5
Low 3	2422	2.08	0.5
Mid 6	2437	2.16	0.5
High 9	2452	2.12	0.5
High 10	2457	2.04	0.5
High 11	2462	2.16	0.5
High 12	2467	2.08	0.5
High 13	2472	2.12	0.5



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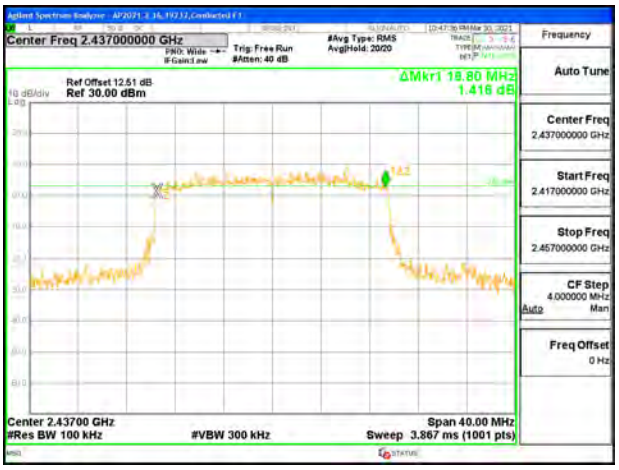
ANT 4: SU Mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	18.72	0.5
Low 2	2417	18.60	0.5
Low 3	2422	18.96	0.5
Mid 6	2437	18.80	0.5
High 9	2452	18.84	0.5
High 10	2457	18.76	0.5
High 11	2462	18.72	0.5
High 12	2467	18.52	0.5
High 13	2472	18.92	0.5



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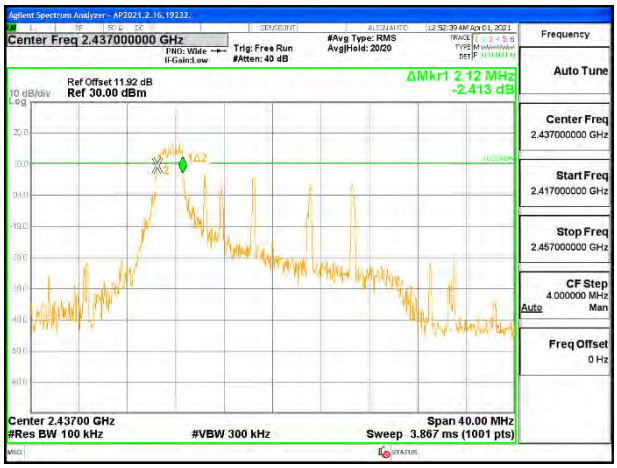
ANT 3: 26-Tone, RU Index 0

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	2.04	0.5
Low 2	2417	2.12	0.5
Low 3	2422	2.12	0.5
Mid 6	2437	2.12	0.5
High 9	2452	2.12	0.5
High 10	2457	2.12	0.5
High 11	2462	2.12	0.5
High 12	2467	2.08	0.5
High 13	2472	2.16	0.5



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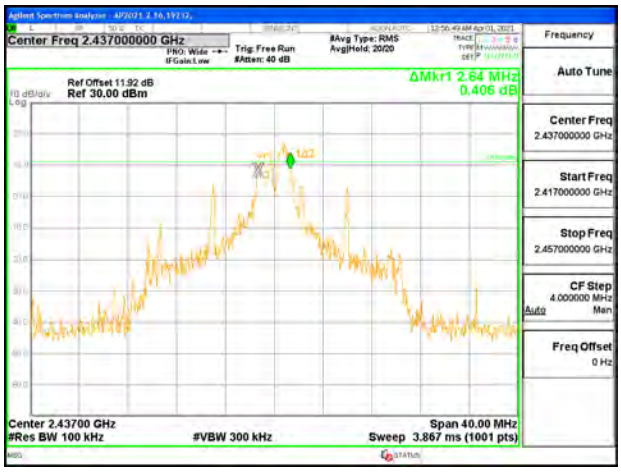
ANT 3: 26-Tone, RU Index 4

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	2.68	0.5
Low 2	2417	2.64	0.5
Low 3	2422	2.68	0.5
Mid 6	2437	2.64	0.5
High 9	2452	2.68	0.5
High 10	2457	2.68	0.5
High 11	2462	2.68	0.5
High 12	2467	2.76	0.5
High 13	2472	2.72	0.5



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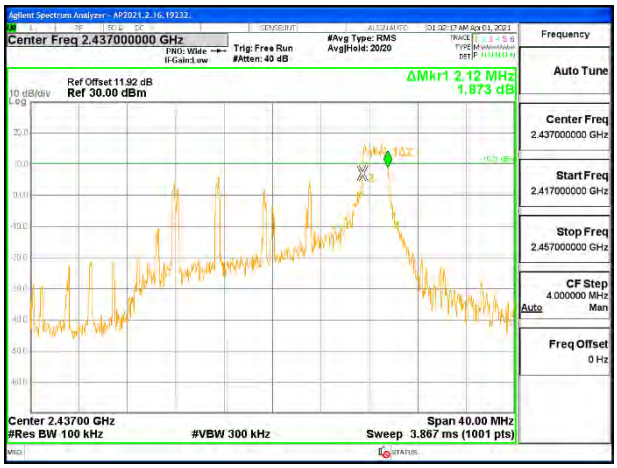
ANT 3: 26-Tone, RU Index 8

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	2.08	0.5
Low 2	2417	2.08	0.5
Low 3	2422	2.08	0.5
Mid 6	2437	2.12	0.5
High 9	2452	2.12	0.5
High 10	2457	2.08	0.5
High 11	2462	2.16	0.5
High 12	2467	2.12	0.5
High 13	2472	2.16	0.5



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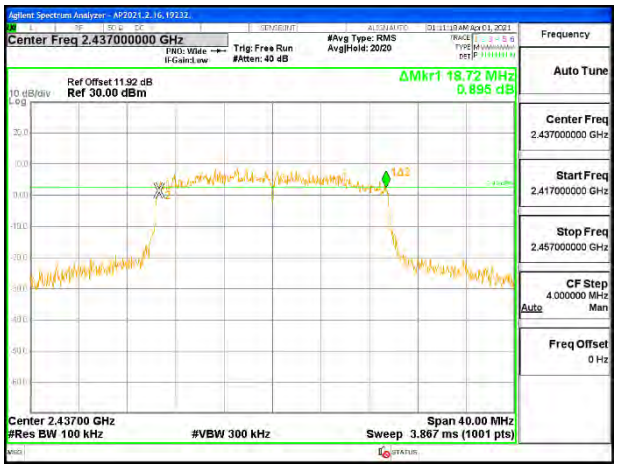
ANT 3: SU Mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	18.60	0.5
Low 2	2417	18.28	0.5
Low 3	2422	18.76	0.5
Mid 6	2437	18.72	0.5
High 9	2452	18.52	0.5
High 10	2457	18.56	0.5
High 11	2462	18.56	0.5
High 12	2467	18.96	0.5
High 13	2472	19.00	0.5



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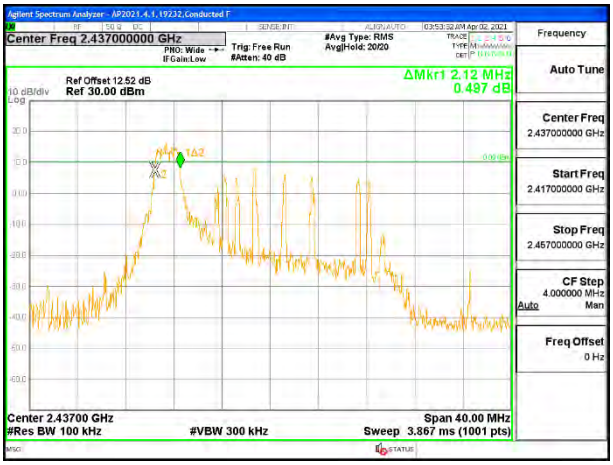
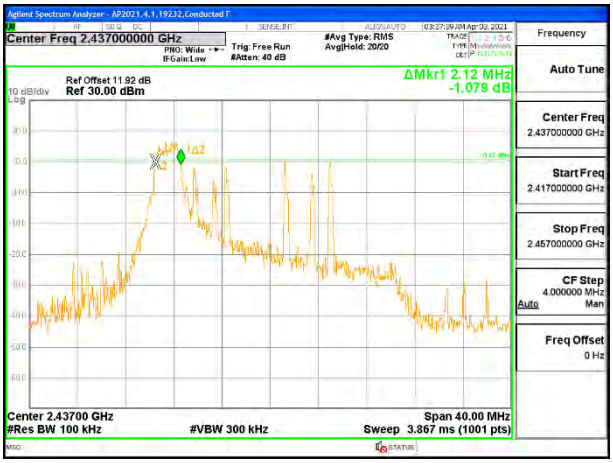
9.3.5. 802.11ax HE20 OFDMA MODE 2TX

ANT 4 + ANT 3: 26-Tone, RU Index 0

Channel	Frequency (MHz)	6 dB BW Antenna 4 (MHz)	6 dB BW Antenna 3 (MHz)	Minimum Limit (MHz)
Low 1	2412	2.04	2.12	0.5
Low 2	2417	2.12	2.16	0.5
Low 3	2422	2.08	2.08	0.5
Low 4	2427	2.08	2.16	0.5
Mid 6	2437	2.12	2.12	0.5
High 8	2447	2.12	2.16	0.5
High 9	2452	2.04	2.12	0.5
High 10	2457	2.12	2.08	0.5
High 11	2462	2.12	2.08	0.5
High 12	2467	2.08	2.08	0.5
High 13	2472	2.16	2.12	0.5



MID CHANNEL 6 ANT 4



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ANT 4 + ANT 3: 26-Tone, RU Index 4

Channel	Frequency (MHz)	6 dB BW Antenna 4 (MHz)	6 dB BW Antenna 3 (MHz)	Minimum Limit (MHz)
Low 1	2412	2.68	2.68	0.5
Low 2	2417	2.68	2.68	0.5
Low 3	2422	2.68	2.64	0.5
Low 4	2427	2.64	2.68	0.5
Mid 6	2437	2.64	2.68	0.5
High 8	2447	2.64	2.64	0.5
High 9	2452	2.68	2.68	0.5
High 10	2457	2.68	2.68	0.5
High 11	2462	2.72	2.64	0.5
High 12	2467	2.72	2.68	0.5
High 13	2472	2.68	2.64	0.5

MID CHANNEL 6 ANT 4

MID CHANNEL 6 ANT 3

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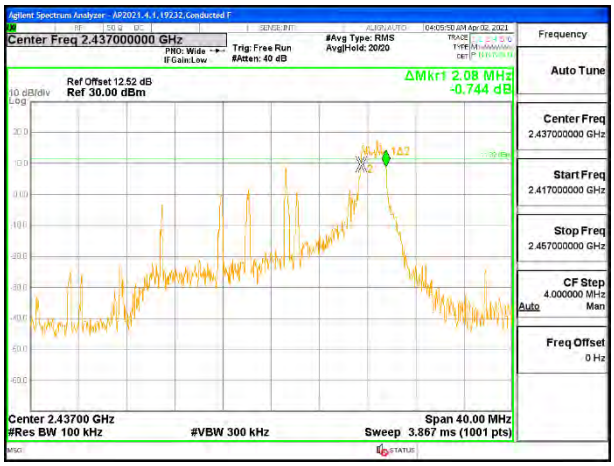
ANT 4 + ANT 3: 26-Tone, RU Index 8

Channel	Frequency (MHz)	6 dB BW Antenna 4 (MHz)	6 dB BW Antenna 3 (MHz)	Minimum Limit (MHz)
Low 1	2412	2.08	2.04	0.5
Low 2	2417	2.12	2.12	0.5
Low 3	2422	2.08	2.12	0.5
Low 4	2427	2.08	2.12	0.5
Mid 6	2437	2.08	2.08	0.5
High 8	2447	2.12	2.12	0.5
High 9	2452	2.12	2.12	0.5
High 10	2457	2.04	2.16	0.5
High 11	2462	2.12	2.12	0.5
High 12	2467	2.08	2.12	0.5
High 13	2472	2.16	2.08	0.5



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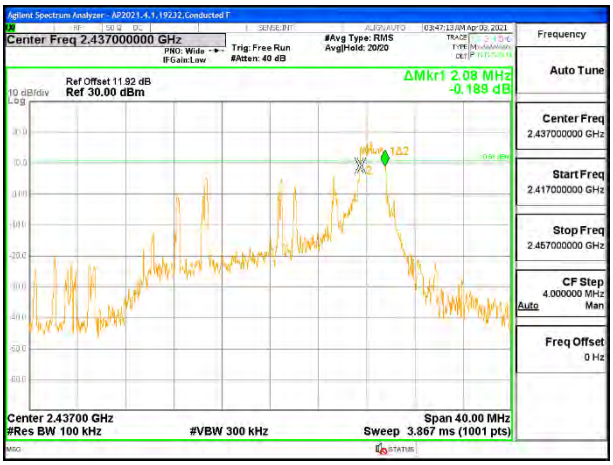

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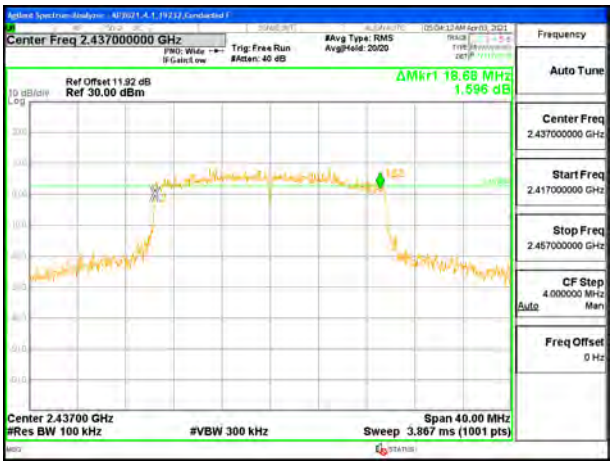
ANT 4 + ANT 3: SU Mode

Channel	Frequency (MHz)	6 dB BW Antenna 4 (MHz)	6 dB BW Antenna 3 (MHz)	Minimum Limit (MHz)
Low 1	2412	18.96	18.80	0.5
Low 2	2417	18.40	18.88	0.5
Low 3	2422	18.52	19.04	0.5
Low 4	2427	18.92	18.48	0.5
Mid 6	2437	18.60	18.68	0.5
High 8	2447	18.80	18.52	0.5
High 9	2452	18.44	18.44	0.5
High 10	2457	18.40	19.04	0.5
High 11	2462	18.36	18.72	0.5
High 12	2467	18.92	18.92	0.5
High 13	2472	19.04	18.92	0.5

MID CHANNEL 6 ANT 4



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9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss of 10.5 dB (including 10 dB pad and 0.5 dB cable) was entered as an offset in the power meter to allow for a gated average reading of power.

DIRECTIONAL ANTENNA GAIN

For 1 TX:
There is only one transmitter output therefore the directional gain is equal to the antenna gain.

For 2 TX:
Tx chains are uncorrelated for power and correlated for PSD due to the device supporting CDD in all MIMO modes. The directional gains are as follows:

Band (GHz)	ANT 4 Antenna Gain (dBi)	ANT 3 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.4	-3.00	-0.70	-1.70	1.24

RESULTS

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9.4.1. **802.11b MODE 1TX**

ANT 4

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.00	30.00	30	36	30.00
Mid 6	2437	-3.00	30.00	30	36	30.00
High 11	2462	-3.00	30.00	30	36	30.00
High 12	2467	-3.00	30.00	30	36	30.00
High 13	2472	-3.00	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	21.19	21.19	30.00	-8.81
Mid 6	2437	21.21	21.21	30.00	-8.79
High 11	2462	21.20	21.20	30.00	-8.80
High 12	2467	21.18	21.18	30.00	-8.82
High 13	2472	17.23	17.23	30.00	-12.77

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ANT 3

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-0.70	30.00	30	36	30.00
Mid 6	2437	-0.70	30.00	30	36	30.00
High 11	2462	-0.70	30.00	30	36	30.00
High 12	2467	-0.70	30.00	30	36	30.00
High 13	2472	-0.70	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	21.23	21.23	30.00	-8.77
Mid 6	2437	21.24	21.24	30.00	-8.76
High 11	2462	21.19	21.19	30.00	-8.81
High 12	2467	21.20	21.20	30.00	-8.80
High 13	2472	17.20	17.20	30.00	-12.80

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9.4.2. 802.11n HT20 MODE 1TX

ANT 4

Test Engineer:	23560
Test Date:	7/23/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.00	30.00	30	36	30.00
Low 2	2417	-3.00	30.00	30	36	30.00
Low 3	2422	-3.00	30.00	30	36	30.00
Mid 6	2437	-3.00	30.00	30	36	30.00
High 9	2452	-3.00	30.00	30	36	30.00
High 10	2457	-3.00	30.00	30	36	30.00
High 11	2462	-3.00	30.00	30	36	30.00
High 12	2467	-3.00	30.00	30	36	30.00
High 13	2472	-3.00	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	17.42	17.42	30.00	-12.58
Low 2	2417	19.18	19.18	30.00	-10.82
Low 3	2422	21.20	21.20	30.00	-8.80
Mid 6	2437	21.23	21.23	30.00	-8.77
High 9	2452	20.70	20.70	30.00	-9.30
High 10	2457	19.23	19.23	30.00	-10.77
High 11	2462	17.19	17.19	30.00	-12.81
High 12	2467	16.18	16.18	30.00	-13.82
High 13	2472	13.21	13.21	30.00	-16.79

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ANT 3

Test Engineer:	23560
Test Date:	7/23/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-0.70	30.00	30	36	30.00
Low 2	2417	-0.70	30.00	30	36	30.00
Low 3	2422	-0.70	30.00	30	36	30.00
Mid 6	2437	-0.70	30.00	30	36	30.00
High 9	2452	-0.70	30.00	30	36	30.00
High 10	2457	-0.70	30.00	30	36	30.00
High 11	2462	-0.70	30.00	30	36	30.00
High 12	2467	-0.70	30.00	30	36	30.00
High 13	2472	-0.70	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	17.35	17.35	30.00	-12.65
Low 2	2417	19.21	19.21	30.00	-10.79
Low 3	2422	21.19	21.19	30.00	-8.81
Mid 6	2437	21.23	21.23	30.00	-8.77
High 9	2452	20.73	20.73	30.00	-9.27
High 10	2457	19.20	19.20	30.00	-10.80
High 11	2462	17.18	17.18	30.00	-12.82
High 12	2467	16.23	16.23	30.00	-13.77
High 13	2472	13.24	13.24	30.00	-16.76

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9.4.3. 802.11n HT20 CDD MODE 2TX

ANT 4+ ANT 3

Test Engineer:	23560
Test Date:	7/23/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-1.70	30.00	36	30.00
Low 2	2417	-1.70	30.00	36	30.00
Low 3	2422	-1.70	30.00	36	30.00
Low 4	2427	-1.70	30.00	36	30.00
Mid 6	2437	-1.70	30.00	36	30.00
High 8	2447	-1.70	30.00	36	30.00
High 9	2452	-1.70	30.00	36	30.00
High 10	2457	-1.70	30.00	36	30.00
High 11	2462	-1.70	30.00	36	30.00
High 12	2467	-1.70	30.00	36	30.00
High 13	2472	-1.70	30.00	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	17.02	17.00	20.02	30.00	-9.98
Low 2	2417	18.23	18.24	21.25	30.00	-8.75
Low 3	2422	19.70	19.71	22.72	30.00	-7.28
Low 4	2427	21.20	21.18	24.20	30.00	-5.80
Mid 6	2437	21.24	21.22	24.24	30.00	-5.76
High 8	2447	21.19	21.18	24.20	30.00	-5.80
High 9	2452	19.19	19.22	22.22	30.00	-7.78
High 10	2457	18.22	18.20	21.22	30.00	-8.78
High 11	2462	17.01	17.03	20.03	30.00	-9.97
High 12	2467	14.75	14.71	17.74	30.00	-12.26
High 13	2472	11.70	11.21	14.47	30.00	-15.53

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9.4.4. 802.11ax HE20 MODE 1TX

ANT 4: 26-Tone, RU Index 0

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.00	30.00	30	36	30.00
Low 2	2417	-3.00	30.00	30	36	30.00
Low 3	2422	-3.00	30.00	30	36	30.00
Mid 6	2437	-3.00	30.00	30	36	30.00
High 9	2452	-3.00	30.00	30	36	30.00
High 10	2457	-3.00	30.00	30	36	30.00
High 11	2462	-3.00	30.00	30	36	30.00
High 12	2467	-3.00	30.00	30	36	30.00
High 13	2472	-3.00	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.70	11.70	30.00	-18.30
Low 2	2417	11.72	11.72	30.00	-18.28
Low 3	2422	11.69	11.69	30.00	-18.31
Mid 6	2437	11.73	11.73	30.00	-18.27
High 9	2452	11.68	11.68	30.00	-18.32
High 10	2457	11.70	11.70	30.00	-18.30
High 11	2462	11.71	11.71	30.00	-18.29
High 12	2467	11.66	11.66	30.00	-18.34
High 13	2472	-0.26	-0.26	30.00	-30.26

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ANT 4: 26-Tone, RU Index 4

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.00	30.00	30	36	30.00
Low 2	2417	-3.00	30.00	30	36	30.00
Low 3	2422	-3.00	30.00	30	36	30.00
Mid 6	2437	-3.00	30.00	30	36	30.00
High 9	2452	-3.00	30.00	30	36	30.00
High 10	2457	-3.00	30.00	30	36	30.00
High 11	2462	-3.00	30.00	30	36	30.00
High 12	2467	-3.00	30.00	30	36	30.00
High 13	2472	-3.00	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.68	11.68	30.00	-18.32
Low 2	2417	11.71	11.71	30.00	-18.29
Low 3	2422	11.70	11.70	30.00	-18.30
Mid 6	2437	11.73	11.73	30.00	-18.27
High 9	2452	11.69	11.69	30.00	-18.31
High 10	2457	11.72	11.72	30.00	-18.28
High 11	2462	11.72	11.72	30.00	-18.28
High 12	2467	11.70	11.70	30.00	-18.30
High 13	2472	-0.29	-0.29	30.00	-30.29

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ANT 4: 26-Tone, RU Index 8

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.00	30.00	30	36	30.00
Low 2	2417	-3.00	30.00	30	36	30.00
Low 3	2422	-3.00	30.00	30	36	30.00
Mid 6	2437	-3.00	30.00	30	36	30.00
High 9	2452	-3.00	30.00	30	36	30.00
High 10	2457	-3.00	30.00	30	36	30.00
High 11	2462	-3.00	30.00	30	36	30.00
High 12	2467	-3.00	30.00	30	36	30.00
High 13	2472	-3.00	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.71	11.71	30.00	-18.29
Low 2	2417	11.69	11.69	30.00	-18.31
Low 3	2422	11.70	11.70	30.00	-18.30
Mid 6	2437	11.74	11.74	30.00	-18.26
High 9	2452	11.68	11.68	30.00	-18.32
High 10	2457	11.66	11.66	30.00	-18.34
High 11	2462	11.73	11.73	30.00	-18.27
High 12	2467	11.70	11.70	30.00	-18.30
High 13	2472	-0.31	-0.31	30.00	-30.31

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ANT 4: SU Mode

Test Engineer:	23560
Test Date:	7/23/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-3.00	30.00	30	36	30.00
Low 2	2417	-3.00	30.00	30	36	30.00
Low 3	2422	-3.00	30.00	30	36	30.00
Mid 6	2437	-3.00	30.00	30	36	30.00
High 9	2452	-3.00	30.00	30	36	30.00
High 10	2457	-3.00	30.00	30	36	30.00
High 11	2462	-3.00	30.00	30	36	30.00
High 12	2467	-3.00	30.00	30	36	30.00
High 13	2472	-3.00	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	15.22	15.22	30.00	-14.78
Low 2	2417	17.69	17.69	30.00	-12.31
Low 3	2422	21.20	21.20	30.00	-8.80
Mid 6	2437	21.22	21.22	30.00	-8.78
High 9	2452	21.19	21.19	30.00	-8.81
High 10	2457	17.69	17.69	30.00	-12.31
High 11	2462	16.70	16.70	30.00	-13.30
High 12	2467	14.68	14.68	30.00	-15.32
High 13	2472	7.66	7.66	30.00	-22.34

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ANT 3: 26-Tone, RU Index 0

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-0.70	30.00	30	36	30.00
Low 2	2417	-0.70	30.00	30	36	30.00
Low 3	2422	-0.70	30.00	30	36	30.00
Mid 6	2437	-0.70	30.00	30	36	30.00
High 9	2452	-0.70	30.00	30	36	30.00
High 10	2457	-0.70	30.00	30	36	30.00
High 11	2462	-0.70	30.00	30	36	30.00
High 12	2467	-0.70	30.00	30	36	30.00
High 13	2472	-0.70	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.69	11.69	30.00	-18.31
Low 2	2417	11.71	11.71	30.00	-18.29
Low 3	2422	11.73	11.73	30.00	-18.27
Mid 6	2437	11.72	11.72	30.00	-18.28
High 9	2452	11.68	11.68	30.00	-18.32
High 10	2457	11.70	11.70	30.00	-18.30
High 11	2462	11.72	11.72	30.00	-18.28
High 12	2467	11.67	11.67	30.00	-18.33
High 13	2472	-0.27	-0.27	30.00	-30.27

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ANT 3: 26-Tone, RU Index 4

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-0.70	30.00	30	36	30.00
Low 2	2417	-0.70	30.00	30	36	30.00
Low 3	2422	-0.70	30.00	30	36	30.00
Mid 6	2437	-0.70	30.00	30	36	30.00
High 9	2452	-0.70	30.00	30	36	30.00
High 10	2457	-0.70	30.00	30	36	30.00
High 11	2462	-0.70	30.00	30	36	30.00
High 12	2467	-0.70	30.00	30	36	30.00
High 13	2472	-0.70	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.67	11.67	30.00	-18.33
Low 2	2417	11.70	11.70	30.00	-18.30
Low 3	2422	11.73	11.73	30.00	-18.27
Mid 6	2437	11.71	11.71	30.00	-18.29
High 9	2452	11.69	11.69	30.00	-18.31
High 10	2457	11.70	11.70	30.00	-18.30
High 11	2462	11.73	11.73	30.00	-18.27
High 12	2467	11.67	11.67	30.00	-18.33
High 13	2472	-0.28	-0.28	30.00	-30.28

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ANT 3: 26-Tone, RU Index 8

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-0.70	30.00	30	36	30.00
Low 2	2417	-0.70	30.00	30	36	30.00
Low 3	2422	-0.70	30.00	30	36	30.00
Mid 6	2437	-0.70	30.00	30	36	30.00
High 9	2452	-0.70	30.00	30	36	30.00
High 10	2457	-0.70	30.00	30	36	30.00
High 11	2462	-0.70	30.00	30	36	30.00
High 12	2467	-0.70	30.00	30	36	30.00
High 13	2472	-0.70	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.71	11.71	30.00	-18.29
Low 2	2417	11.70	11.70	30.00	-18.30
Low 3	2422	11.69	11.69	30.00	-18.31
Mid 6	2437	11.73	11.73	30.00	-18.27
High 9	2452	11.68	11.68	30.00	-18.32
High 10	2457	11.72	11.72	30.00	-18.28
High 11	2462	11.70	11.70	30.00	-18.30
High 12	2467	11.73	11.73	30.00	-18.27
High 13	2472	-0.25	-0.25	30.00	-30.25

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ANT 3: SU Mode

Test Engineer:	23560
Test Date:	7/23/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-0.70	30.00	30	36	30.00
Low 2	2417	-0.70	30.00	30	36	30.00
Low 3	2422	-0.70	30.00	30	36	30.00
Mid 6	2437	-0.70	30.00	30	36	30.00
High 9	2452	-0.70	30.00	30	36	30.00
High 10	2457	-0.70	30.00	30	36	30.00
High 11	2462	-0.70	30.00	30	36	30.00
High 12	2467	-0.70	30.00	30	36	30.00
High 13	2472	-0.70	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	15.18	15.18	30.00	-14.82
Low 2	2417	17.71	17.71	30.00	-12.29
Low 3	2422	21.20	21.20	30.00	-8.80
Mid 6	2437	21.23	21.23	30.00	-8.77
High 9	2452	21.19	21.19	30.00	-8.81
High 10	2457	17.68	17.68	30.00	-12.32
High 11	2462	16.71	16.71	30.00	-13.29
High 12	2467	14.72	14.72	30.00	-15.28
High 13	2472	7.73	7.73	30.00	-22.27

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9.4.5. 802.11ax HE20 OFDMA MODE 2TX

Test Engineer:	23560
Test Date:	7/20/21

ANT 4 + ANT 3: 26-Tone, RU Index 0

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-1.70	30.00	36	30.00
Low 2	2417	-1.70	30.00	36	30.00
Low 3	2422	-1.70	30.00	36	30.00
Low 4	2427	-1.70	30.00	36	30.00
Mid 6	2437	-1.70	30.00	36	30.00
High 8	2447	-1.70	30.00	36	30.00
High 9	2452	-1.70	30.00	36	30.00
High 10	2457	-1.70	30.00	36	30.00
High 11	2462	-1.70	30.00	36	30.00
High 12	2467	-1.70	30.00	36	30.00
High 13	2472	-1.70	30.00	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.70	11.71	14.72	30.00	-15.28
Low 2	2417	11.73	11.72	14.74	30.00	-15.26
Low 3	2422	11.69	11.70	14.71	30.00	-15.29
Low 4	2427	11.66	11.70	14.69	30.00	-15.31
Mid 6	2437	11.71	11.73	14.73	30.00	-15.27
High 8	2447	11.70	11.68	14.70	30.00	-15.30
High 9	2452	11.72	11.70	14.72	30.00	-15.28
High 10	2457	11.65	11.68	14.68	30.00	-15.32
High 11	2462	11.69	11.71	14.71	30.00	-15.29
High 12	2467	11.72	11.69	14.72	30.00	-15.28
High 13	2472	-0.30	-0.27	2.73	30.00	-27.27

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ANT 4 + ANT 3: 26-Tone, RU Index 4

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-1.70	30.00	36	30.00
Low 2	2417	-1.70	30.00	36	30.00
Low 3	2422	-1.70	30.00	36	30.00
Low 4	2427	-1.70	30.00	36	30.00
Mid 6	2437	-1.70	30.00	36	30.00
High 8	2447	-1.70	30.00	36	30.00
High 9	2452	-1.70	30.00	36	30.00
High 10	2457	-1.70	30.00	36	30.00
High 11	2462	-1.70	30.00	36	30.00
High 12	2467	-1.70	30.00	36	30.00
High 13	2472	-1.70	30.00	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.68	11.70	14.70	30.00	-15.30
Low 2	2417	11.70	11.71	14.72	30.00	-15.28
Low 3	2422	11.69	11.72	14.72	30.00	-15.28
Low 4	2427	11.72	11.70	14.72	30.00	-15.28
Mid 6	2437	11.70	11.66	14.69	30.00	-15.31
High 8	2447	11.71	11.68	14.71	30.00	-15.29
High 9	2452	11.66	11.71	14.70	30.00	-15.30
High 10	2457	11.73	11.74	14.75	30.00	-15.25
High 11	2462	11.73	11.72	14.74	30.00	-15.26
High 12	2467	11.71	11.67	14.70	30.00	-15.30
High 13	2472	-0.31	-0.29	2.71	30.00	-27.29

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ANT 4 + ANT 3: 26-Tone, RU Index 8

Test Engineer:	23560
Test Date:	7/20/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-1.70	30.00	36	30.00
Low 2	2417	-1.70	30.00	36	30.00
Low 3	2422	-1.70	30.00	36	30.00
Low 4	2427	-1.70	30.00	36	30.00
Mid 6	2437	-1.70	30.00	36	30.00
High 8	2447	-1.70	30.00	36	30.00
High 9	2452	-1.70	30.00	36	30.00
High 10	2457	-1.70	30.00	36	30.00
High 11	2462	-1.70	30.00	36	30.00
High 12	2467	-1.70	30.00	36	30.00
High 13	2472	-1.70	30.00	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	11.70	11.71	14.72	30.00	-15.28
Low 2	2417	11.68	11.70	14.70	30.00	-15.30
Low 3	2422	11.71	11.72	14.73	30.00	-15.27
Low 4	2427	11.72	11.73	14.74	30.00	-15.26
Mid 6	2437	11.75	11.69	14.73	30.00	-15.27
High 8	2447	11.65	11.69	14.68	30.00	-15.32
High 9	2452	11.68	11.71	14.71	30.00	-15.29
High 10	2457	11.73	11.68	14.72	30.00	-15.28
High 11	2462	11.72	11.70	14.72	30.00	-15.28
High 12	2467	11.69	11.71	14.71	30.00	-15.29
High 13	2472	-0.26	-0.31	2.73	30.00	-27.27

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ANT 4 + ANT 3: SU Mode

Test Engineer:	23560
Test Date:	7/23/21

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC/ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	-1.70	30.00	36	30.00
Low 2	2417	-1.70	30.00	36	30.00
Low 3	2422	-1.70	30.00	36	30.00
Low 4	2427	-1.70	30.00	36	30.00
Mid 6	2437	-1.70	30.00	36	30.00
High 8	2447	-1.70	30.00	36	30.00
High 9	2452	-1.70	30.00	36	30.00
High 10	2457	-1.70	30.00	36	30.00
High 11	2462	-1.70	30.00	36	30.00
High 12	2467	-1.70	30.00	36	30.00
High 13	2472	-1.70	30.00	36	30.00

Results

Channel	Frequency (MHz)	Antenna 4 Meas Power (dBm)	Antenna 3 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	15.03	15.00	18.03	30.00	-11.97
Low 2	2417	16.70	16.71	19.72	30.00	-10.28
Low 3	2422	18.72	18.69	21.72	30.00	-8.28
Low 4	2427	21.19	21.21	24.21	30.00	-5.79
Mid 6	2437	21.23	21.19	24.22	30.00	-5.78
High 8	2447	21.17	21.23	24.21	30.00	-5.79
High 9	2452	18.23	18.20	21.23	30.00	-8.77
High 10	2457	16.70	16.72	19.72	30.00	-10.28
High 11	2462	15.67	15.70	18.70	30.00	-11.30
High 12	2467	13.71	13.67	16.70	30.00	-13.30
High 13	2472	7.53	7.51	10.53	30.00	-19.47

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9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

Only Mid channel plot is reported to show analyzer settings.

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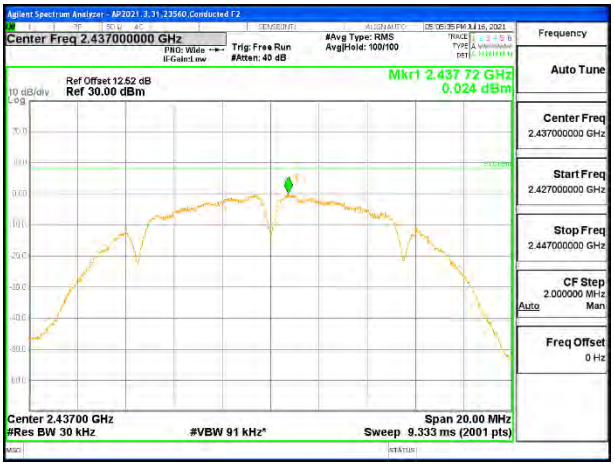
9.5.1. **802.11b MODE 1TX**

ANT 4

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-0.059	-0.059	8.0	-8.1
Mid 6	2437	0.024	0.024	8.0	-8.0
High 11	2462	0.117	0.117	8.0	-7.9
High 12	2467	-0.147	-0.147	8.0	-8.1
High 13	2472	-3.878	-3.878	8.0	-11.9



MID CHANNEL 6

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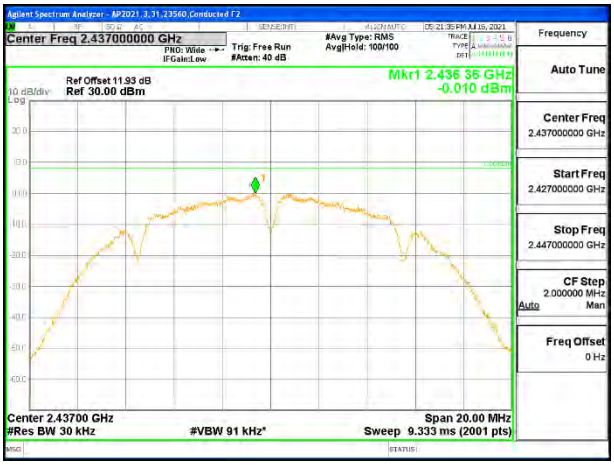
ANT 3

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-0.094	-0.094	8	-8.094
Mid 6	2437	-0.010	-0.010	8	-8.010
High 11	2462	0.209	0.209	8	-7.791
High 12	2467	-0.268	-0.268	8	-8.268
High 13	2472	-3.525	-3.525	8	-11.525



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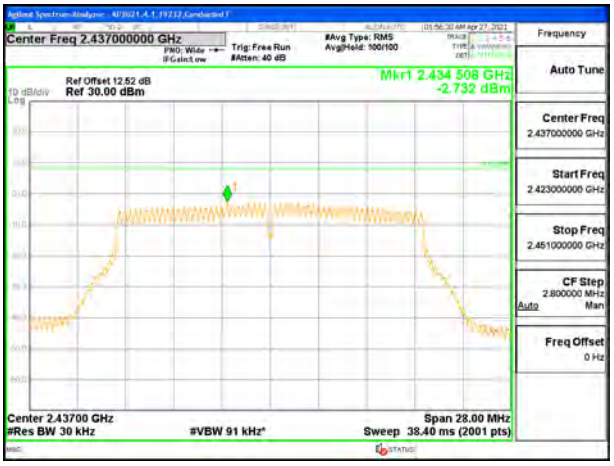
9.5.2. **802.11n HT20 MODE 1TX**

ANT 4

Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-6.564	-6.424	8.0	-14.424
Low 2	2417	-4.624	-4.484	8.0	-12.484
Low 3	2422	-2.417	-2.277	8.0	-10.277
Mid 6	2437	-2.732	-2.592	8.0	-10.592
High 9	2452	-3.007	-2.867	8.0	-10.867
High 10	2457	-4.281	-4.141	8.0	-12.141
High 11	2462	-5.328	-5.188	8.0	-13.188
High 12	2467	-7.871	-7.731	8.0	-15.731
High 13	2472	-7.101	-6.961	8.0	-14.961



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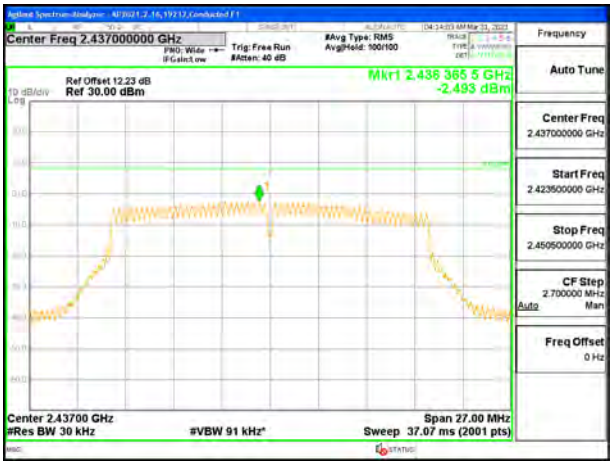
ANT 3

Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-6.738	-6.598	8.0	-14.598
Low 2	2417	-4.689	-4.549	8.0	-12.549
Low 3	2422	-2.549	-2.409	8.0	-10.409
Mid 6	2437	-2.493	-2.353	8.0	-10.353
High 9	2452	-3.289	-3.149	8.0	-11.149
High 10	2457	-4.456	-4.316	8.0	-12.316
High 11	2462	-6.538	-6.398	8.0	-14.398
High 12	2467	-8.716	-8.576	8.0	-16.576
High 13	2472	-6.894	-6.754	8.0	-14.754



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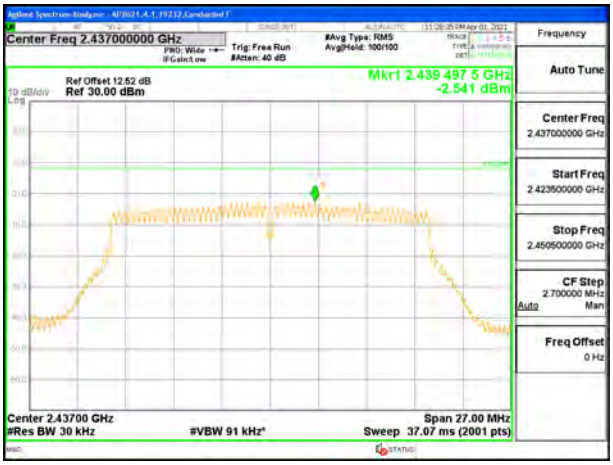
9.5.3. **802.11n HT20 CDD MODE 2TX**

ANT 4 + ANT 3

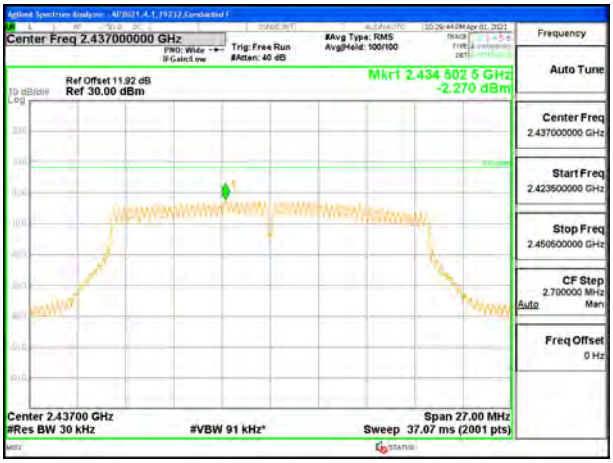
Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-6.338	-7.028	-3.519	8.0	-11.519
Low 2	2417	-5.135	-5.576	-2.200	8.0	-10.200
Low 3	2422	-3.945	-3.796	-0.720	8.0	-8.720
Low 4	2427	-2.587	-2.492	0.611	8.0	-7.389
Mid 6	2437	-2.541	-2.270	0.747	8.0	-7.253
High 8	2447	-2.702	-2.590	0.505	8.0	-7.495
High 9	2452	-4.248	-4.176	-1.062	8.0	-9.062
High 10	2457	-5.435	-5.405	-2.270	8.0	-10.270
High 11	2462	-6.424	-5.909	-3.009	8.0	-11.009
High 12	2467	-8.998	-9.269	-5.981	8.0	-13.981
High 13	2472	-8.927	-8.552	-5.585	8.0	-13.585



MID CHANNEL 6 ANT 4



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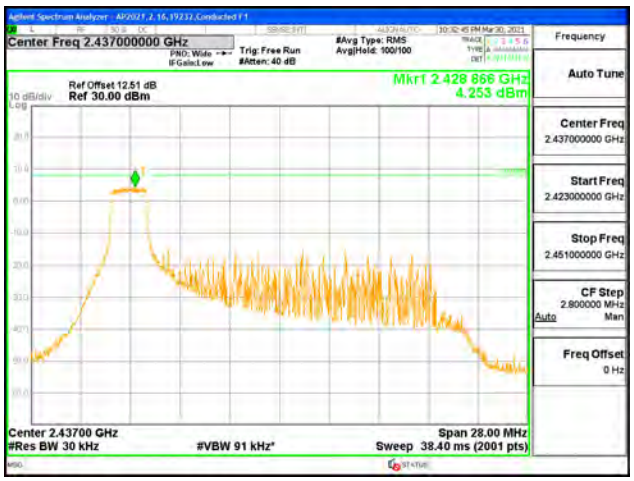
9.5.4. **802.11ax HE20 MODE 1TX**

ANT 4: 26-Tone, RU Index 0

Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-1.091	-0.951	8.0	-8.951
Low 2	2417	1.028	1.168	8.0	-6.832
Low 3	2422	4.330	4.470	8.0	-3.530
Mid 6	2437	4.253	4.393	8.0	-3.607
High 9	2452	4.453	4.593	8.0	-3.407
High 10	2457	1.000	1.140	8.0	-6.860
High 11	2462	-1.056	-0.916	8.0	-8.916
High 12	2467	-2.810	-2.670	8.0	-10.670
High 13	2472	-16.385	-16.245	8.0	-24.245



MID CHANNEL 6

NOTE: PSD tested at higher power

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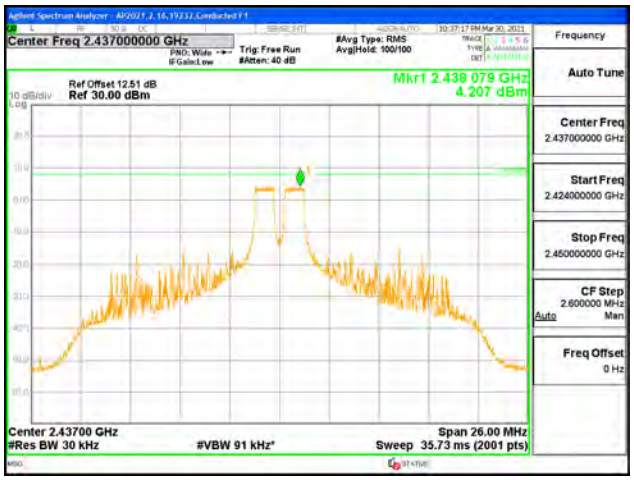
ANT 4: 26-Tone, RU Index 4

Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-1.039	-0.899	8.0	-8.899
Low 2	2417	1.072	1.212	8.0	-6.788
Low 3	2422	4.407	4.547	8.0	-3.453
Mid 6	2437	4.207	4.347	8.0	-3.653
High 9	2452	4.576	4.716	8.0	-3.284
High 10	2457	0.846	0.986	8.0	-7.014
High 11	2462	-1.115	-0.975	8.0	-8.975
High 12	2467	-3.064	-2.924	8.0	-10.924
High 13	2472	-16.075	-15.935	8.0	-23.935



MID CHANNEL 6

NOTE: PSD tested at higher power

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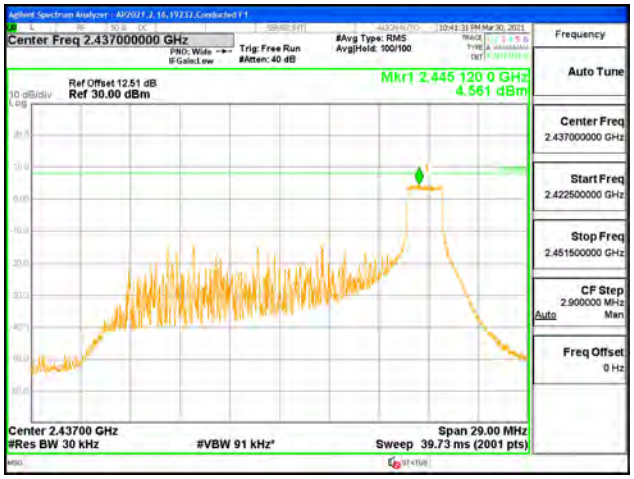
ANT 4: 26-Tone, RU Index 8

Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-1.063	-0.923	8.0	-8.923
Low 2	2417	1.048	1.188	8.0	-6.812
Low 3	2422	4.280	4.420	8.0	-3.580
Mid 6	2437	4.561	4.701	8.0	-3.299
High 9	2452	4.569	4.709	8.0	-3.291
High 10	2457	1.383	1.523	8.0	-6.477
High 11	2462	-1.057	-0.917	8.0	-8.917
High 12	2467	-3.446	-3.306	8.0	-11.306
High 13	2472	-15.979	-15.839	8.0	-23.839



MID CHANNEL 6

NOTE: PSD tested at higher power

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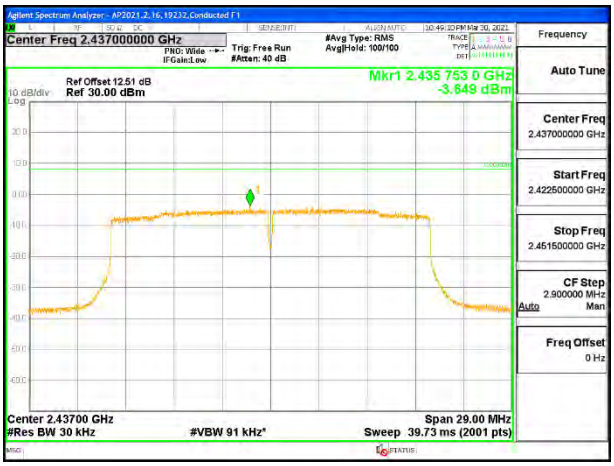
ANT 4: SU Mode

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-9.802	-9.802	8.0	-17.802
Low 2	2417	-6.795	-6.795	8.0	-14.795
Low 3	2422	-3.733	-3.733	8.0	-11.733
Mid 6	2437	-3.649	-3.649	8.0	-11.649
High 9	2452	-4.022	-4.022	8.0	-12.022
High 10	2457	-4.325	-4.325	8.0	-12.325
High 11	2462	-7.180	-7.180	8.0	-15.180
High 12	2467	-11.654	-11.654	8.0	-19.654
High 13	2472	-16.096	-16.096	8.0	-24.096



MID CHANNEL 6

NOTE: Channels 1,9-13 tested at higher power

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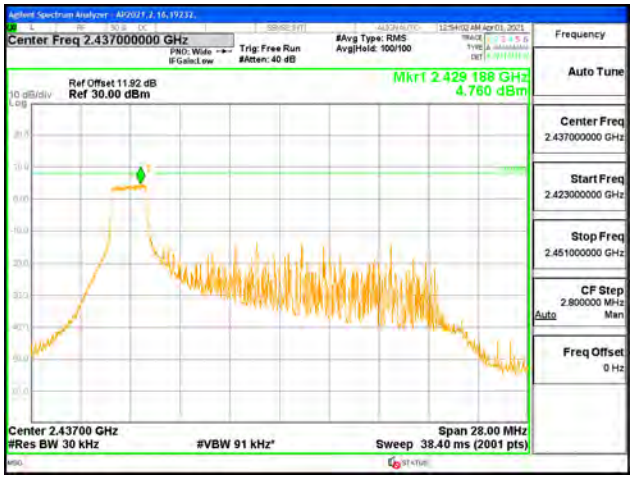
ANT 3: 26-Tone, RU Index 0

Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-1.079	-0.939	8.0	-8.939
Low 2	2417	0.949	1.089	8.0	-6.911
Low 3	2422	4.450	4.590	8.0	-3.410
Mid 6	2437	4.760	4.900	8.0	-3.100
High 9	2452	4.334	4.474	8.0	-3.526
High 10	2457	0.935	1.075	8.0	-6.925
High 11	2462	-1.425	-1.285	8.0	-9.285
High 12	2467	-2.925	-2.785	8.0	-10.785
High 13	2472	-16.067	-15.927	8.0	-23.927



MID CHANNEL 6

NOTE: PSD tested at higher power

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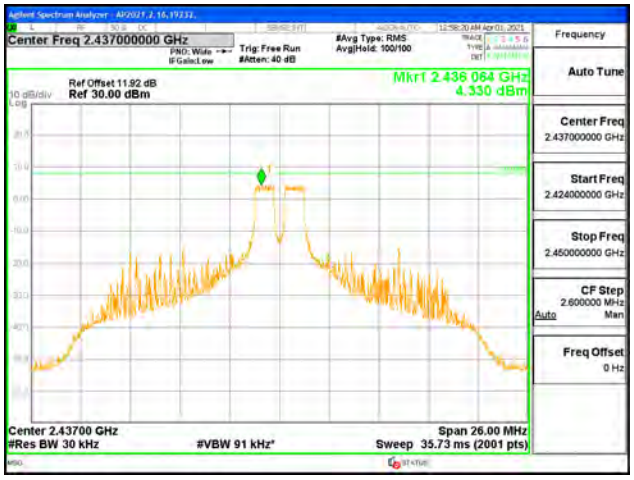
ANT 3: 26-Tone, RU Index 4

Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-1.044	-0.904	8.0	-8.904
Low 2	2417	0.673	0.813	8.0	-7.187
Low 3	2422	4.196	4.336	8.0	-3.664
Mid 6	2437	4.330	4.470	8.0	-3.530
High 9	2452	4.094	4.234	8.0	-3.766
High 10	2457	0.991	1.131	8.0	-6.869
High 11	2462	-1.161	-1.021	8.0	-9.021
High 12	2467	-3.226	-3.086	8.0	-11.086
High 13	2472	-16.157	-16.017	8.0	-24.017



MID CHANNEL 6

NOTE: PSD tested at higher power

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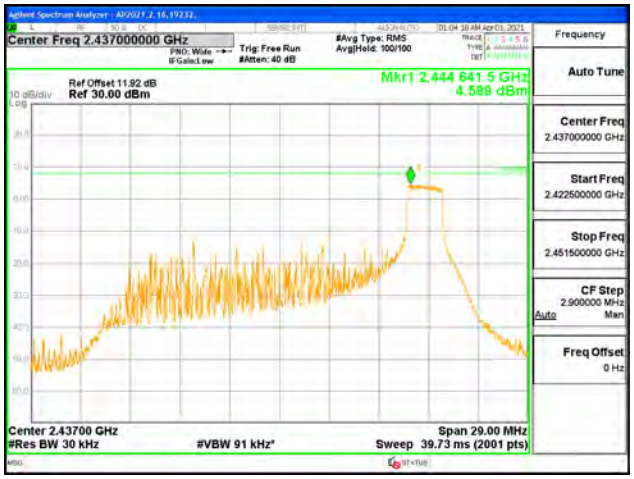
ANT 3: 26-Tone, RU Index 8

Duty Cycle CF (dB)	0.14	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-1.315	-1.175	8.0	-9.175
Low 2	2417	1.010	1.150	8.0	-6.850
Low 3	2422	4.266	4.406	8.0	-3.594
Mid 6	2437	4.589	4.729	8.0	-3.271
High 9	2452	4.415	4.555	8.0	-3.445
High 10	2457	0.955	1.095	8.0	-6.905
High 11	2462	-1.113	-0.973	8.0	-8.973
High 12	2467	-2.885	-2.745	8.0	-10.745
High 13	2472	-15.685	-15.545	8.0	-23.545



MID CHANNEL 6

NOTE: PSD tested at higher power

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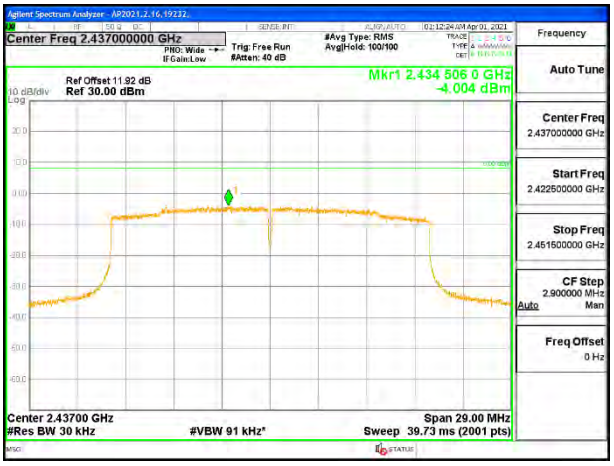
ANT 3: SU Mode

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-9.559	-9.559	8.0	-17.559
Low 2	2417	-7.674	-7.674	8.0	-15.674
Low 3	2422	-3.967	-3.967	8.0	-11.967
Mid 6	2437	-4.004	-4.004	8.0	-12.004
High 9	2452	-4.358	-4.358	8.0	-12.358
High 10	2457	-8.038	-8.038	8.0	-16.038
High 11	2462	-8.282	-8.282	8.0	-16.282
High 12	2467	-10.838	-10.838	8.0	-18.838
High 13	2472	-16.041	-16.041	8.0	-24.041



MID CHANNEL 6

NOTE: Channels 1,9-13 tested at higher power

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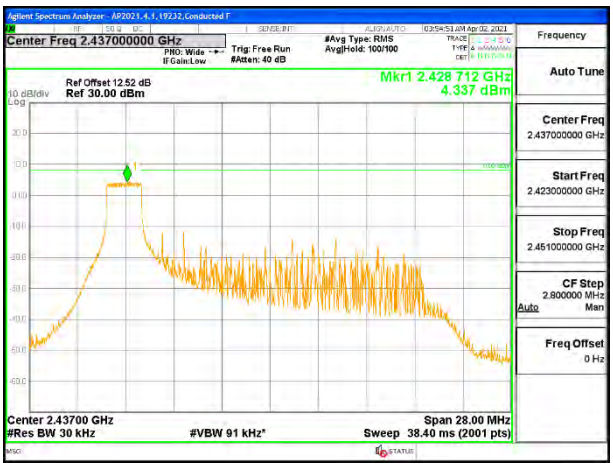
9.5.5. **802.11ax HE20 OFDMA MODE 2TX**

ANT 4 + ANT 3: 26-Tone, RU Index 0

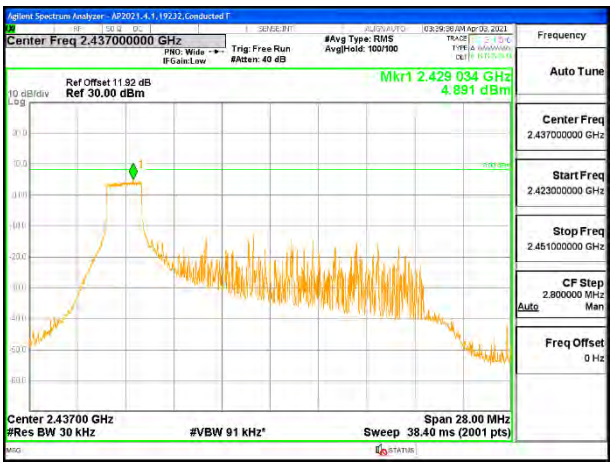
Duty Cycle CF (dB)	0.13	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-2.103	-2.030	1.074	8.0	-6.926
Low 2	2417	-0.408	-0.217	2.829	8.0	-5.171
Low 3	2422	2.097	2.078	5.228	8.0	-2.772
Low 4	2427	4.078	4.365	7.364	8.0	-0.636
Mid 6	2437	4.337	4.891	7.763	8.0	-0.237
High 8	2447	4.331	4.365	7.488	8.0	-0.512
High 9	2452	1.636	1.199	4.563	8.0	-3.437
High 10	2457	-0.194	-0.268	2.909	8.0	-5.091
High 11	2462	-2.247	-2.122	0.956	8.0	-7.044
High 12	2467	-4.068	-4.027	-0.907	8.0	-8.907
High 13	2472	-17.112	-17.156	-13.994	8.0	-21.994



MID CHANNEL 6 ANT 4



MID CHANNEL 6 ANT 3

NOTE: All PSD except Channel 13 tested at higher power

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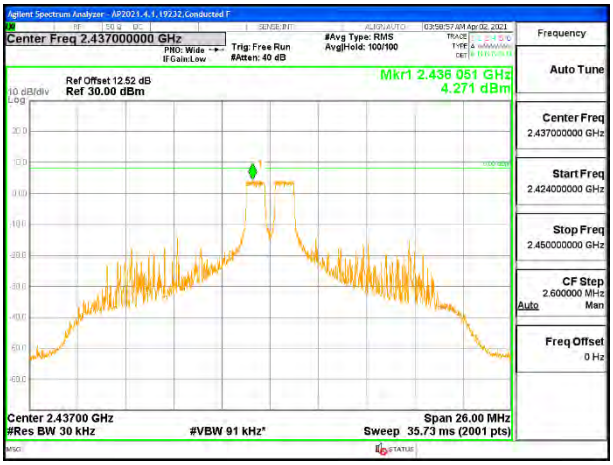
ANT 4 + ANT 3: 26-Tone, RU Index 4

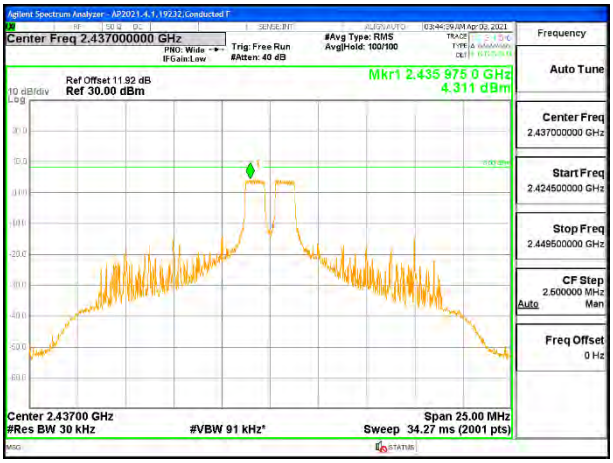
Duty Cycle CF (dB)	0.13	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-2.244	-2.347	0.845	8.0	-7.155
Low 2	2417	-0.165	-0.377	2.871	8.0	-5.129
Low 3	2422	1.653	1.780	4.857	8.0	-3.143
Low 4	2427	4.238	4.200	7.359	8.0	-0.641
Mid 6	2437	4.271	4.311	7.431	8.0	-0.569
High 8	2447	4.265	4.271	7.408	8.0	-0.592
High 9	2452	1.489	1.262	4.517	8.0	-3.483
High 10	2457	-0.079	-0.384	2.911	8.0	-5.089
High 11	2462	-1.566	-2.301	1.222	8.0	-6.778
High 12	2467	-4.072	-4.253	-1.021	8.0	-9.021
High 13	2472	-17.292	-17.268	-14.140	8.0	-22.140



MID CHANNEL 6 ANT 4



MID CHANNEL 6 ANT 3

NOTE: All PSD except Channel 13 tested at higher power

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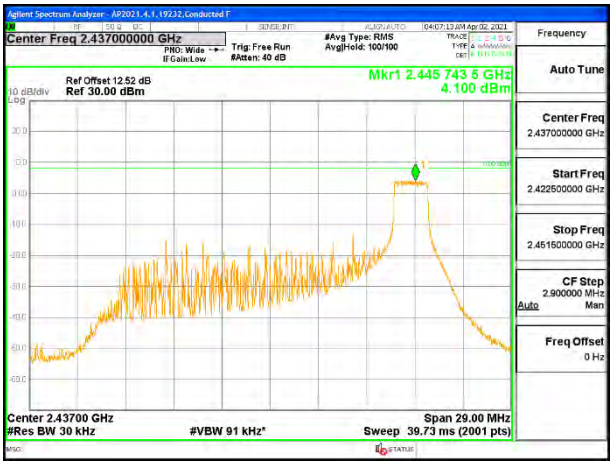
ANT 4 + ANT 3: 26-Tone, RU Index 8

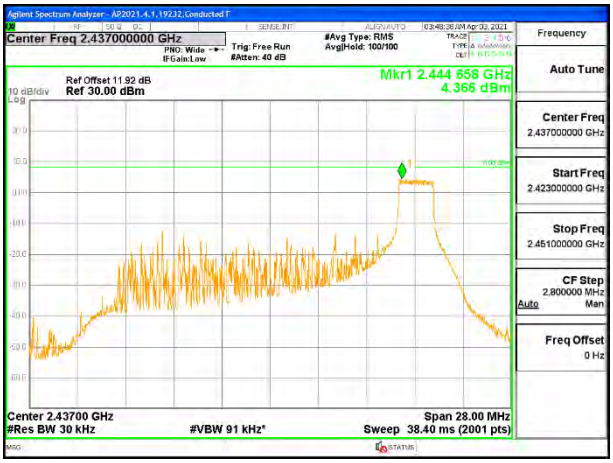
Duty Cycle CF (dB)	0.13	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-2.308	-2.045	0.966	8.0	-7.034
Low 2	2417	-0.073	-0.129	3.039	8.0	-4.961
Low 3	2422	2.090	1.847	5.110	8.0	-2.890
Low 4	2427	4.052	4.647	7.500	8.0	-0.500
Mid 6	2437	4.100	4.366	7.375	8.0	-0.625
High 8	2447	4.606	4.360	7.625	8.0	-0.375
High 9	2452	1.800	1.388	4.739	8.0	-3.261
High 10	2457	0.082	0.056	3.209	8.0	-4.791
High 11	2462	-2.457	-1.176	1.371	8.0	-6.629
High 12	2467	-3.981	-4.146	-0.922	8.0	-8.922
High 13	2472	-17.067	-17.044	-13.915	8.0	-21.915



MID CHANNEL 6 ANT 4



MID CHANNEL 6 ANT 3

NOTE: All PSD except Channel 13 tested at higher power

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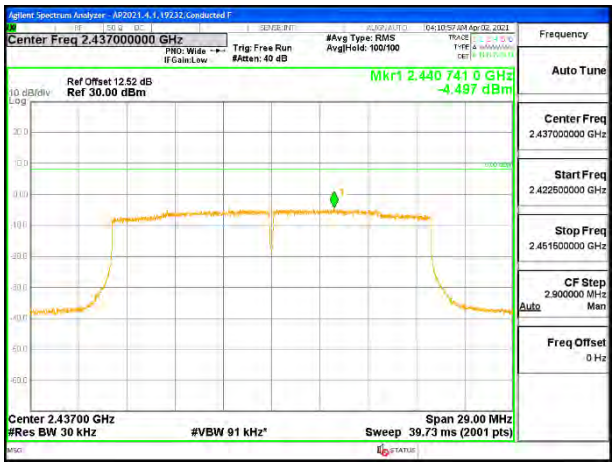
ANT 4 + ANT 3 2TX: SU Mode

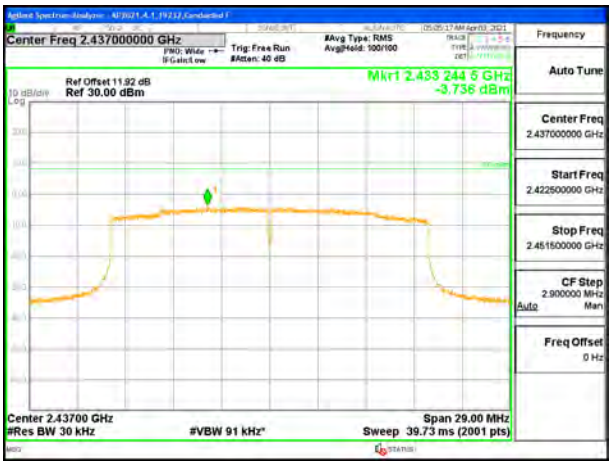
Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD

PSD Results

Channel	Frequency (MHz)	Antenna 4 Meas (dBm/ 3kHz)	Antenna 3 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-9.565	-9.908	-6.723	8.0	-14.723
Low 2	2417	-8.504	-8.868	-5.672	8.0	-13.672
Low 3	2422	-6.859	-6.685	-3.761	8.0	-11.761
Low 4	2427	-4.393	-4.365	-1.369	8.0	-9.369
Mid 6	2437	-4.497	-3.736	-1.090	8.0	-9.090
High 8	2447	-3.991	-3.969	-0.970	8.0	-8.970
High 9	2452	-4.009	-7.102	-2.275	8.0	-10.275
High 10	2457	-6.839	-8.776	-4.690	8.0	-12.690
High 11	2462	-9.344	-10.679	-6.950	8.0	-14.950
High 12	2467	-11.523	-11.441	-8.472	8.0	-16.472
High 13	2472	-17.563	-16.966	-14.244	8.0	-22.244



MID CHANNEL 6 ANT 4



MID CHANNEL 6 ANT 3

NOTE: Channels 1, 11-13 tested at higher power

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9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

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. 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)).

Attenuated by 30dB since average power was measured

RESULTS

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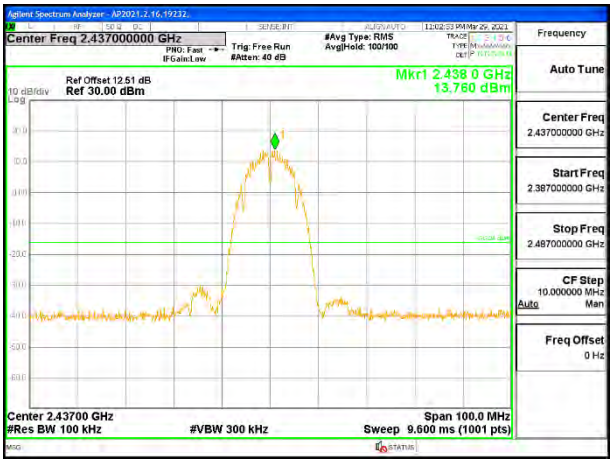
9.6.1. **802.11b MODE**

1TX Antenna 4 MODE

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1



IN-BAND REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL

HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

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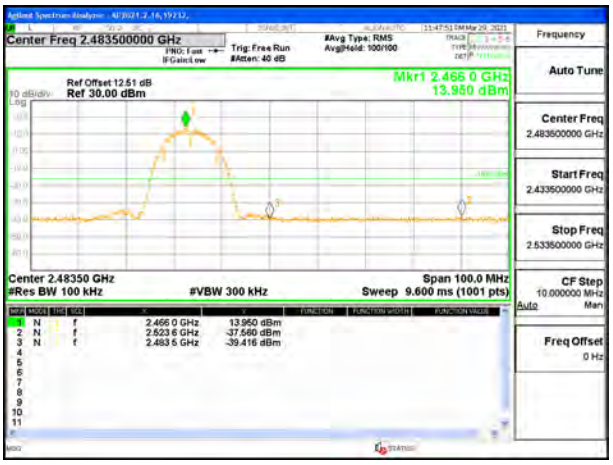
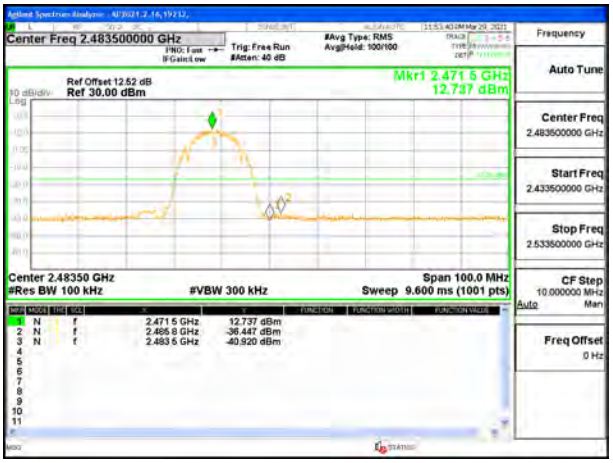


HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12



HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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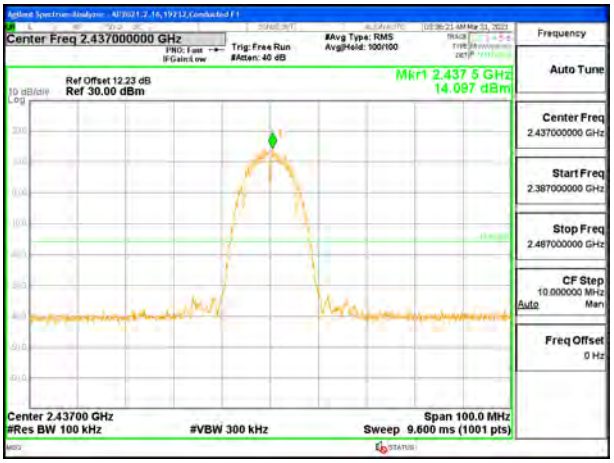
1TX Antenna 3 MODE

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1



IN-BAND REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL

HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

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HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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9.6.2. **802.11n HT20 MODE**

1TX Antenna 4 MODE

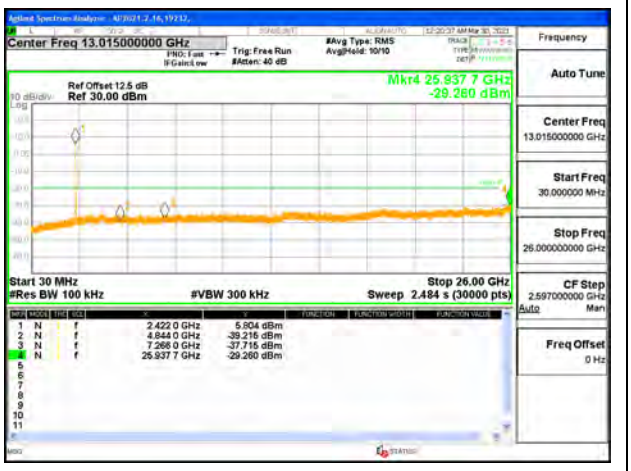
LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1

LOW CHANNEL 2 BANDEDGE

OUT-OF-BAND LOW CHANNEL 2

LOW CHANNEL 3 BANDEDGE



OUT-OF-BAND LOW CHANNEL 3

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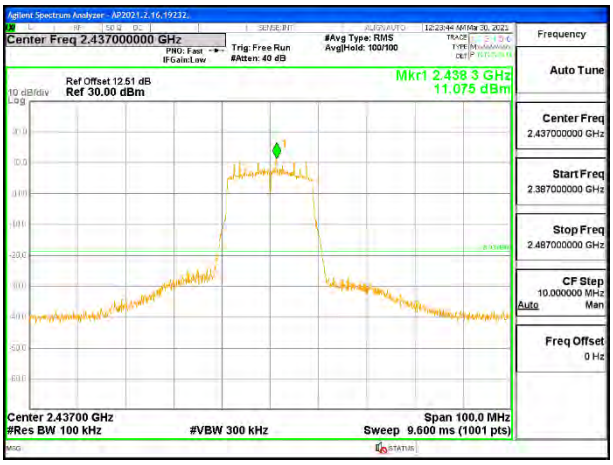
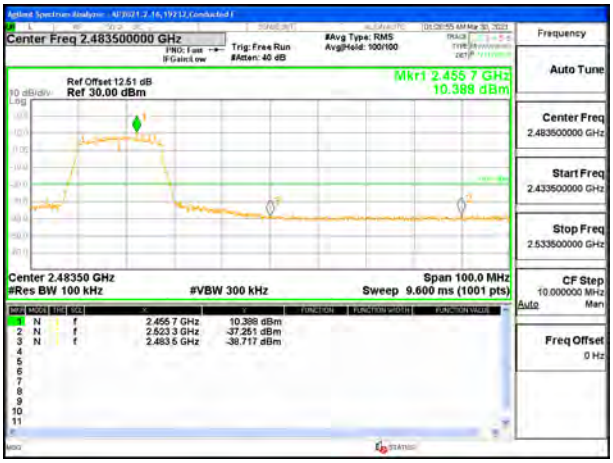


IN-BAND REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 9 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 9

HIGH CHANNEL 10 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 10

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HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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1TX Antenna 3 MODE

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1

LOW CHANNEL 2 BANDEDGE

OUT-OF-BAND LOW CHANNEL 2

LOW CHANNEL 3 BANDEDGE

OUT-OF-BAND LOW CHANNEL 3

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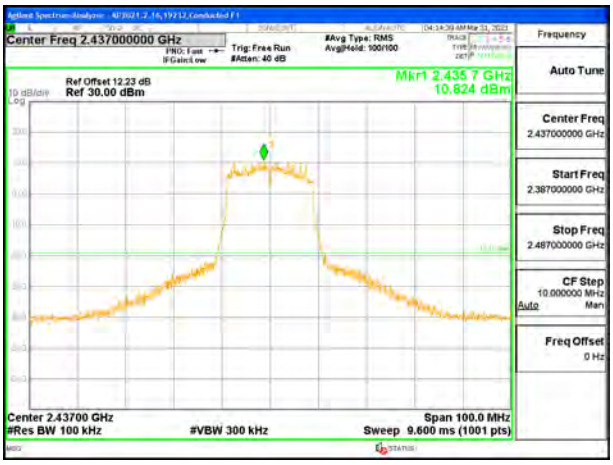
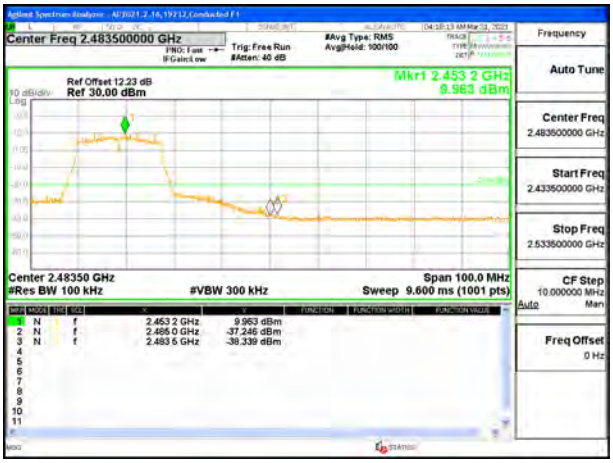


IN-BAND REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 9 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 9

HIGH CHANNEL 10 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 10

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HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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9.6.3. **802.11n HT20 CDD MODE 2TX**

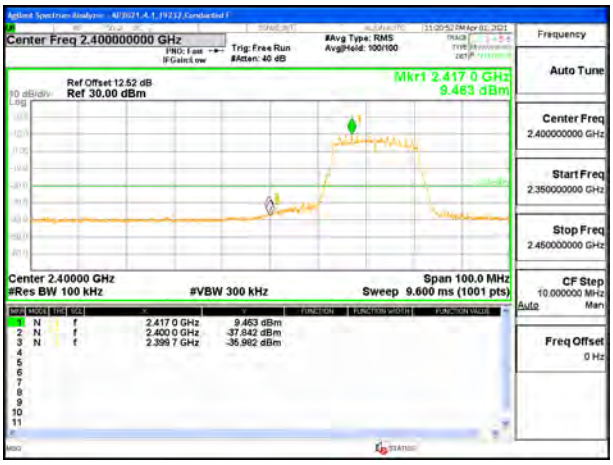
2TX Antenna 4 + Antenna 3 CDD MODE

LOW CHANNEL 1 BANDEDGE ANT 4

OUT-OF-BAND LOW CHANNEL 1 ANT 4

LOW CHANNEL 2 BANDEDGE ANT 4

OUT-OF-BAND LOW CHANNEL 2 ANT 4



LOW CHANNEL 3 BANDEDGE ANT 4

OUT-OF-BAND LOW CHANNEL 3 ANT 4

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LOW CHANNEL 4 BANDEDGE ANT 4

OUT-OF-BAND LOW CHANNEL 4 ANT 4

IN-BAND REFERENCE LEVEL ANT 4

OUT-OF-BAND MID CHANNEL ANT 4

HIGH CHANNEL 8 BANDEDGE ANT 4

OUT-OF-BAND HIGH CHANNEL 8 ANT 4

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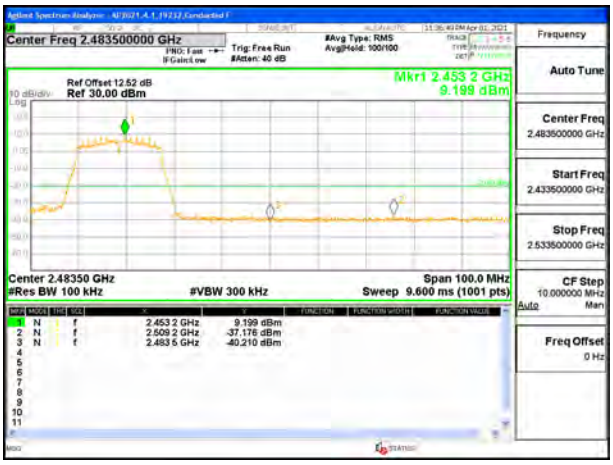

HIGH CHANNEL 9 BANDEDGE ANT 4

OUT-OF-BAND HIGH CHANNEL 9 ANT 4

HIGH CHANNEL 10 BANDEDGE ANT 4

OUT-OF-BAND HIGH CHANNEL 10 ANT 4

HIGH CHANNEL 11 BANDEDGE ANT 4

OUT-OF-BAND HIGH CHANNEL 11 ANT 4

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HIGH CHANNEL 12 BANDEDGE ANT 4

OUT-OF-BAND HIGH CHANNEL 12 ANT 4

HIGH CHANNEL 13 BANDEDGE ANT 4

OUT-OF-BAND HIGH CHANNEL 13 ANT 4

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LOW CHANNEL 1 BANDEDGE ANT 3

OUT-OF-BAND LOW CHANNEL 1 ANT 3

LOW CHANNEL 2 BANDEDGE ANT 3

OUT-OF-BAND LOW CHANNEL 2 ANT 3

LOW CHANNEL 3 BANDEDGE ANT 3

OUT-OF-BAND LOW CHANNEL 3 ANT 3

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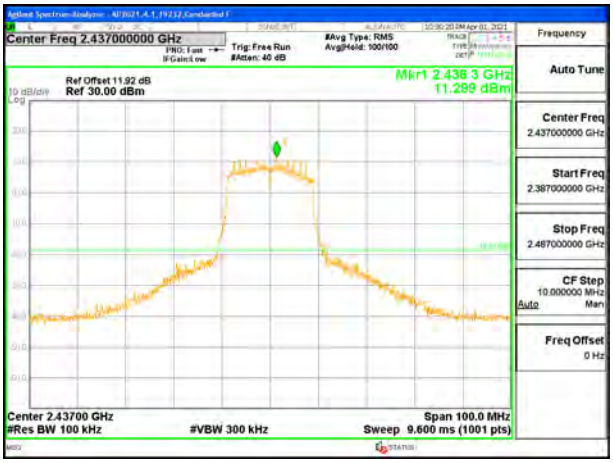
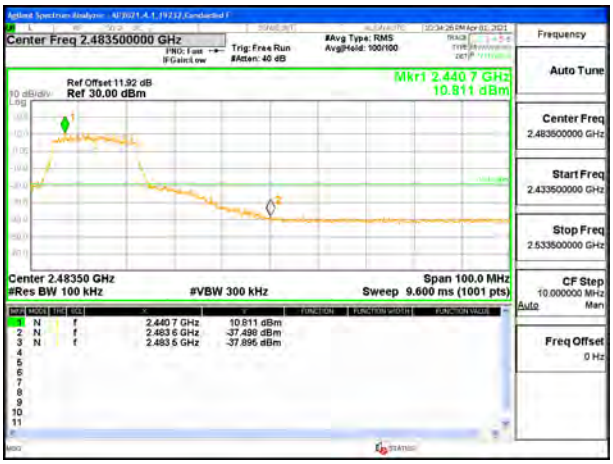
LOW CHANNEL 4 BANDEDGE ANT 3

OUT-OF-BAND LOW CHANNEL 4 ANT 3



IN-BAND REFERENCE LEVEL ANT 3

OUT-OF-BAND MID CHANNEL ANT 3



HIGH CHANNEL 8 BANDEDGE ANT 3

OUT-OF-BAND HIGH CHANNEL 8 ANT 3

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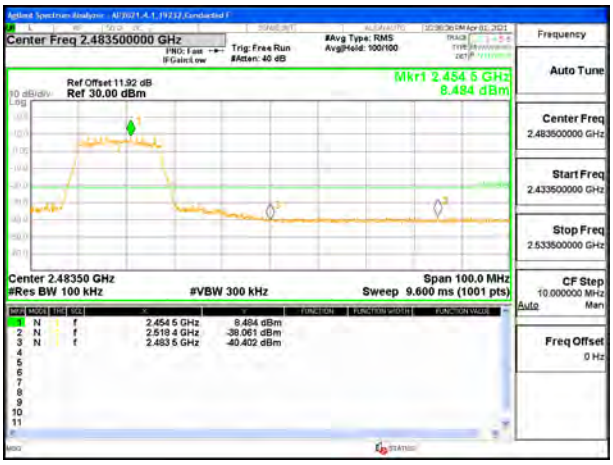
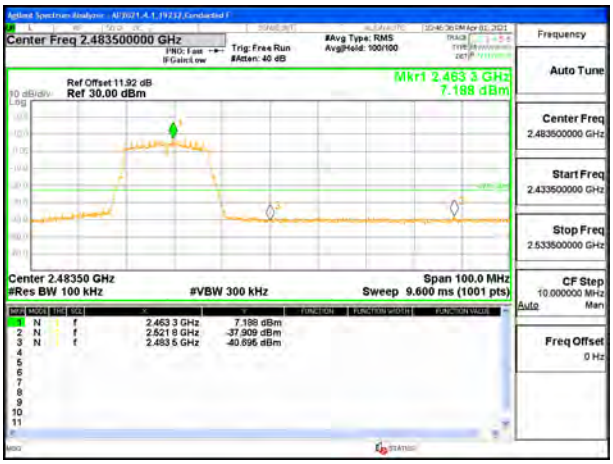


HIGH CHANNEL 9 BANDEDGE ANT 3

OUT-OF-BAND HIGH CHANNEL 9 ANT 3

HIGH CHANNEL 10 BANDEDGE ANT 3

OUT-OF-BAND HIGH CHANNEL 10 ANT 3



HIGH CHANNEL 11 BANDEDGE ANT 3

OUT-OF-BAND HIGH CHANNEL 11 ANT 3

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HIGH CHANNEL 12 BANDEDGE ANT 3

OUT-OF-BAND HIGH CHANNEL 12 ANT 3

HIGH CHANNEL 13 BANDEDGE ANT 3

OUT-OF-BAND HIGH CHANNEL 13 ANT 3

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9.6.4. **802.11ax HE20 MODE 1TX**

ANT 4: 26-Tone, RU Index 0

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1

LOW CHANNEL 2 BANDEDGE

OUT-OF-BAND LOW CHANNEL 2

LOW CHANNEL 3 BANDEDGE

OUT-OF-BAND LOW CHANNEL 3

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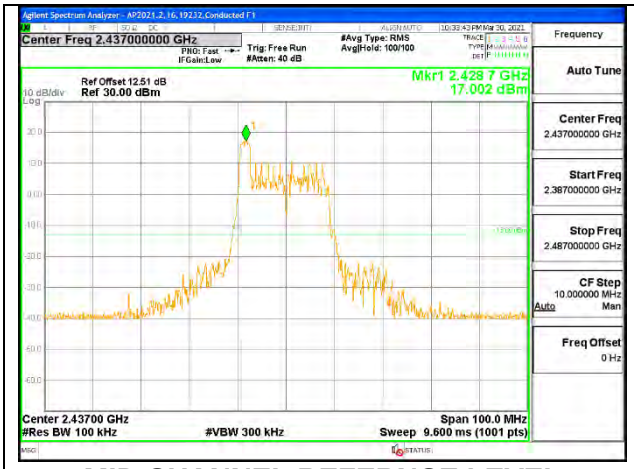

MID CHANNEL REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL

HIGH CHANNEL 9 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 9

HIGH CHANNEL 10 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 10

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HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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ANT 4: 26-Tone, RU Index 4

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1

LOW CHANNEL 2 BANDEDGE

OUT-OF-BAND LOW CHANNEL 2

LOW CHANNEL 3 BANDEDGE

OUT-OF-BAND LOW CHANNEL 3

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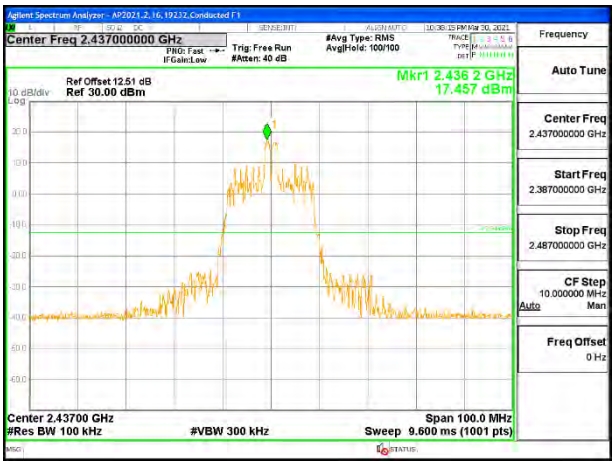

MID CHANNEL REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL

HIGH CHANNEL 9 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 9

HIGH CHANNEL 10 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 10

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HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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ANT 4: 26-Tone, RU Index 8

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1

LOW CHANNEL 2 BANDEDGE

OUT-OF-BAND LOW CHANNEL 2

LOW CHANNEL 3 BANDEDGE

OUT-OF-BAND LOW CHANNEL 3

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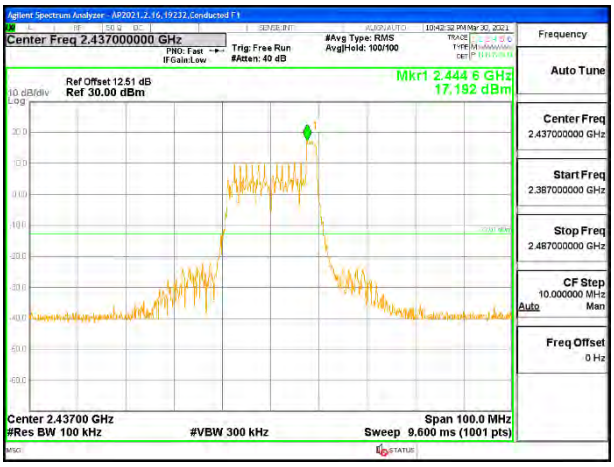
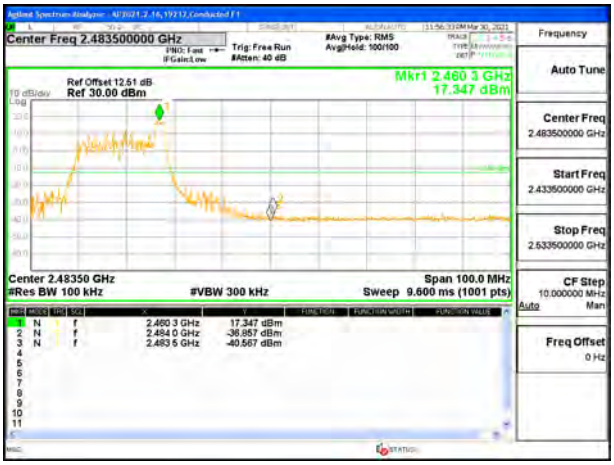


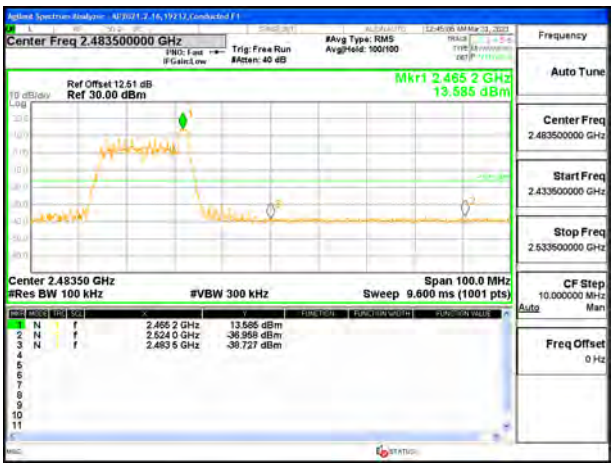
MID CHANNEL REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 9 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 9



HIGH CHANNEL 10 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 10

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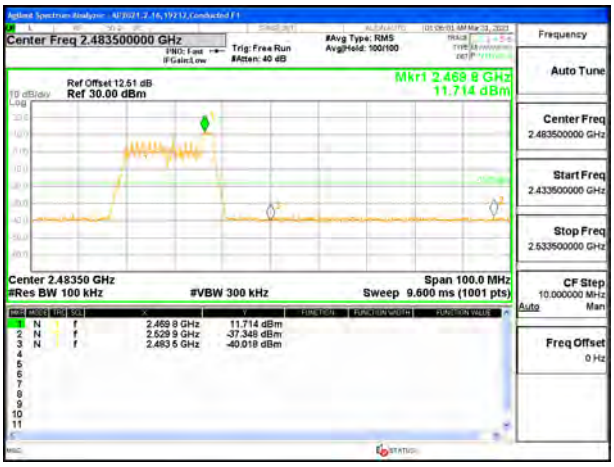

HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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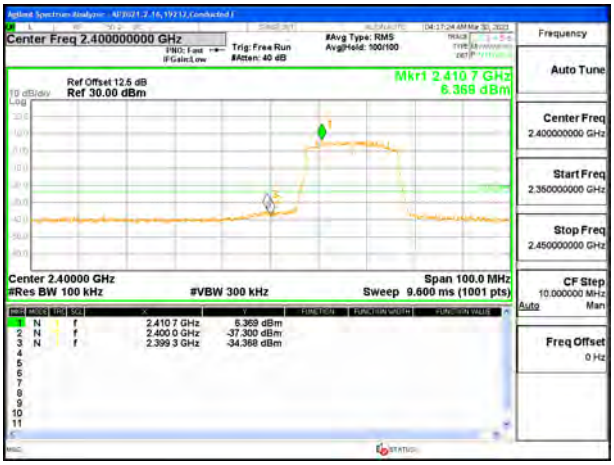
ANT 4: SU Mode

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1



LOW CHANNEL 2 BANDEDGE

OUT-OF-BAND LOW CHANNEL 2

LOW CHANNEL 3 BANDEDGE

OUT-OF-BAND LOW CHANNEL 3

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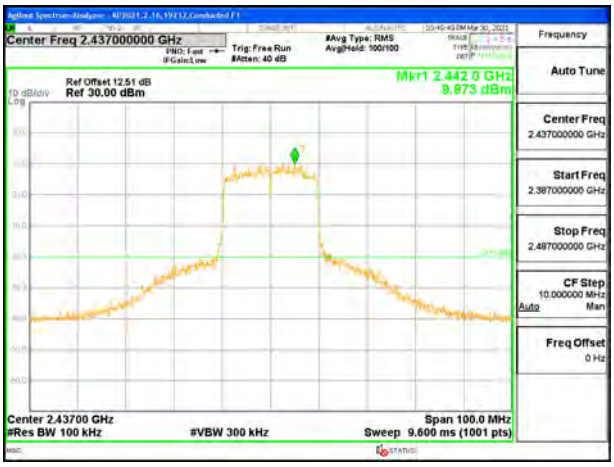
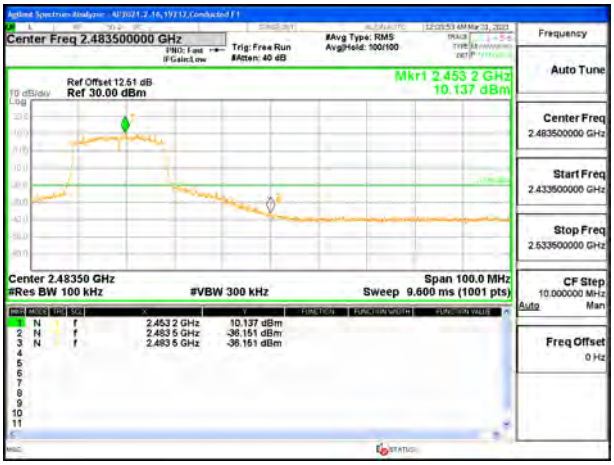


MID CHANNEL REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 9 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 9

HIGH CHANNEL 10 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 10

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HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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ANT 3: 26-Tone, RU Index 0

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1

LOW CHANNEL 2 BANDEDGE

OUT-OF-BAND LOW CHANNEL 2

LOW CHANNEL 3 BANDEDGE

OUT-OF-BAND LOW CHANNEL 3

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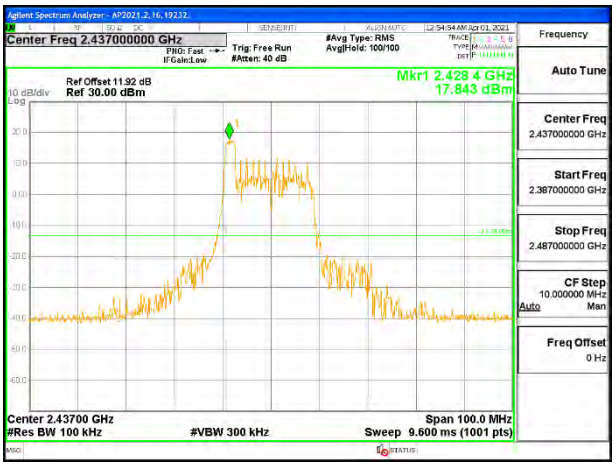

MID CHANNEL REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL

HIGH CHANNEL 9 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 9

HIGH CHANNEL 10 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 10

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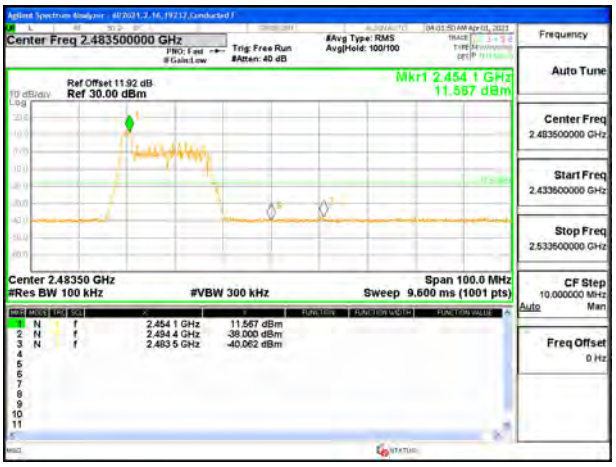

HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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ANT 3: 26-Tone, RU Index 4

LOW CHANNEL 1 BANDEDGE

OUT-OF-BAND LOW CHANNEL 1

LOW CHANNEL 2 BANDEDGE

OUT-OF-BAND LOW CHANNEL 2

LOW CHANNEL 3 BANDEDGE

OUT-OF-BAND LOW CHANNEL 3

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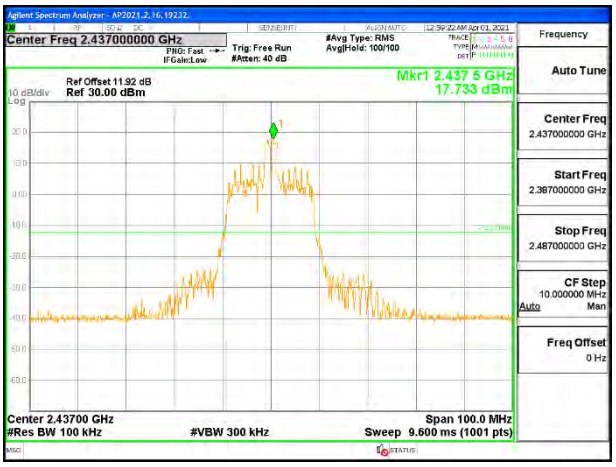
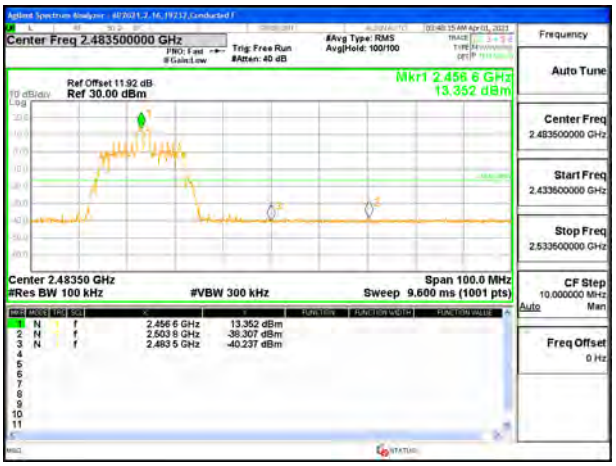


MID CHANNEL REFERNCE LEVEL

OUT-OF-BAND MID CHANNEL

HIGH CHANNEL 9 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 9



HIGH CHANNEL 10 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 10

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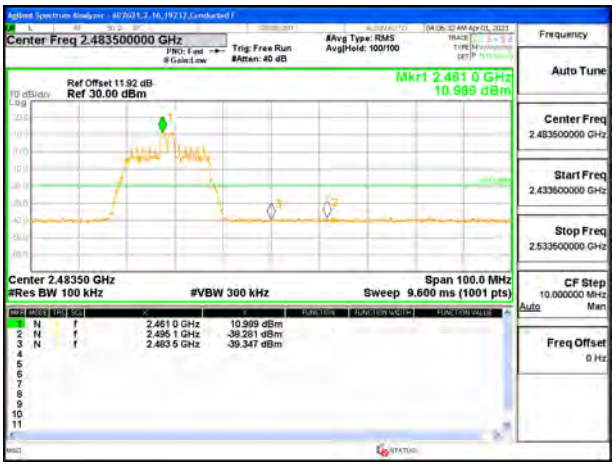

HIGH CHANNEL 11 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 11

HIGH CHANNEL 12 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 12

HIGH CHANNEL 13 BANDEDGE

OUT-OF-BAND HIGH CHANNEL 13

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