

TEST REPORT

Report Number: 14982436-E8V3

Applicant : APPLE INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

Model : A3083 (Parent Model)
A3292, A3293, A3294 (Variant Models)

Brand : APPLE

FCC ID : BCG-E8666A (Parent Model)
BCG-E8667A, BCG-E8668A, BCG-E8683A (Variant Models)

EUT Description : SMARTPHONE

Test Standard(s) : FCC 47 CFR PART 15 SUBPART E

Date Of Issue:
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Prepared by:
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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024/06/24	Initial Review	Tony Li
V2	2024/07/11	Addressed TCB Questions on Section 6, 8, and 9	Tony Li
V3	2024/07/11	Addressed TCB Question on Section 9.5.14	Tony Li

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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A3083 (Parent Model) A3292, A3293, A3294 (Variant Models)
Brand	APPLE
FCC ID	BCG-E8666A (Parent Model) BCG-E8667A, BCG-E8668A, BCG-E8683A (Variant Models)
EUT Description	Smartphone
Serial Number	C07GYF0008T0000FDV, C07H4F0015B0000FDT, QKPYHGJC7L, XK3DWHQHQQW.
Sample Receipt Date	2023/12/19
Date Tested	2023/12/20 to 2024/06/22
Applicable Standards	CFR 47 Part 15 Subpart E
Test Results	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 A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.	
Approved & Released By:	Prepared & Reviewed By:
	
Chin Pang Senior Lab Engineer UL Verification Services, Inc.	Tony Li Lead Test Engineer UL Verification Services, Inc.

2. TEST RESULT 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.

Below is a list of the data provided by the customer:

1. Antenna gain and type (see section 6.2)
2. Cable loss (see section 6.2)

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 12.2.
See Comment	26dB BW/99% OBW	Reporting purposes only	Per ANSI C63.10 Sections 6.9.2 and 6.9.3
15.407 (e)	6 dB BW	Complies	None.
15.407 (a) (1-4), (h) (1)	Output Power	Complies	None.
15.407 (a) (1-3, 5)	PSD	Complies	None.
15.209, 15.205, 15.407 (b)	Radiated Emissions	Complies	None.
15.207	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
- FCC KDB 662911 D01 v02r01
- FCC KDB 789033 D02 v02r01
- ANSI C63.10-2013
- KDB 414788 D01 Radiated Test Site v01r01

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, 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, USA	US0104	2324A	550739
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☐	Building 3: 843 Auburn Court, Fremont, CA 94538 USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538 USA			
☒	Building 5: 47670 Kato Rd, Fremont, CA 94538 USA			

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}
Conducted Antenna Port Emission Measurement	1.94
Power Spectral Density	2.466
Time Domain Measurements Using SA	3.39
RF Power Measurement Direct Method Using Power Meter	0.450 (Peak), 1.3 (Ave)
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.2%
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB

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

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

$36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The Apple iPhone is a smartphone with cellular GSM, GPRS, EGPRS, WCDMA, LTE, 5G NR1, 5G NR2, IEEE 802.11a/b/g/n/ac/ax/be, Bluetooth (BT), Ultra-Wideband (UWB), Global Positioning System (GPS), Near-Field Communication (NFC), Narrow-Band (NB) UNII, 802.15.4, 802.15.4ab-Narrow Band (NB), Wireless Power Transfer (WPT) and Mobile Satellite Service (MSS) technologies. The rechargeable battery is not user accessible. This device is not user-serviceable and requires special tools to disassemble.

6.2. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna Type is IFA.

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

Frequency Range (MHz)	Antenna 6 (dBi)	Antenna 5 (dBi)	Uncorrelated Chains (dBi)	Correlated Chains (dBi)
5150 - 5250 UNII - 1	-0.40	-4.00	-1.84	1.00
5250 - 5350 UNII - 2a	0.00	-1.50	-0.69	2.29
5500 - 5700 UNII - 2c	-1.10	-1.60	-1.34	1.66
5725 - 5825 UNII 3	-1.20	-1.00	-1.10	1.91

Frequency Range (MHz)	Cable Loss	
	Antenna 6 (dB)	Antenna 5 (dB)
5150 - 5250 UNII - 1	2.70	2.88
5250 - 5350 UNII - 2a	2.70	2.88
5500 - 5700 UNII - 2c	2.70	2.88
5725 - 5825 UNII 3	2.70	2.88

The cables were used for RF antenna port tests that had been offset to the test equipment during testing.

6.3. SOFTWARE AND FIRMWARE

The EUT firmware and software installed during testing was 27_20_111_38.

6.4. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

5.2 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.2 GHz band, 1TX			
5180-5240	802.11a	Covered by 802.11n HT20 1TX	
5180-5240	802.11n HT20	19.97	99.31
5190-5230	802.11n HT40	20.95	124.45
5180-5240	802.11ac VHT20	Covered by 802.11n HT20 1TX	
5190-5230	802.11ac VHT40	Covered by 802.11n HT40 1TX	
5210	802.11ac VHT80	17.44	55.46
5250	802.11ac VHT160	16.46	44.26
5180-5240	802.11ax HE20	Covered by 802.11be EHT20 1TX	
5180-5240	802.11be EHT20	19.96	99.08
5190-5230	802.11ax HE40	Covered by 802.11be EHT40 1TX	
5190-5230	802.11be EHT40	20.95	124.45
5210	802.11ax HE80	Covered by 802.11be EHT80 1TX	
5210	802.11be EHT80	17.97	62.66
5250	802.11ax HE160	Covered by 802.11be EHT160 1TX	
5250	802.11be EHT160	17.98	62.81
5.2 GHz band, 2TX			
5180-5240	802.11n HT20 CDD	19.98	99.54
5180-5240	802.11n HT20 SDM/STBC	Covered by 802.11n HT20 2TX CDD	
5190-5230	802.11n HT40 CDD	22.91	195.43
5190-5230	802.11n HT40 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5180-5240	802.11ac VHT20 SDM/STBC/CDD	Covered by 802.11n HT20 2TX CDD	
5190-5230	802.11ac VHT40 SDM/STBC/CDD	Covered by 802.11n HT40 2TX CDD	
5210	802.11ac VHT80 CDD	19.46	88.31
5210	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5250	802.11ac VHT160 CDD	18.43	69.66
5250	802.11ac VHT160 SDM/STBC	Covered by 802.11ac VHT160 2TX CDD	
5180-5240	802.11ax HE20 OFDMA	Covered by 802.11be EHT20 2TX CDD	
5180-5240	802.11be EHT20 CDD	19.97	99.31
5180-5240	802.11ax HE20 SDM	Covered by 802.11be EHT20 SDM	
5180-5240	802.11be EHT20 SDM	Covered by 802.11be EHT20 2TX CDD	
5190-5230	802.11ax HE40 OFDMA	Covered by 802.11be EHT40 2TX CDD	
5190-5230	802.11be EHT40 CDD	22.96	197.70
5190-5230	802.11ax HE40 SDM	Covered by 802.11be EHT40 SDM	
5190-5230	802.11be EHT40 SDM	Covered by 802.11be EHT40 2TX CDD	
5210	802.11ax HE80 OFDMA	Covered by 802.11be EHT80 2TX CDD	
5210	802.11be EHT80 CDD	19.96	99.08
5210	802.11ax HE80 SDM	Covered by 802.11be EHT80 SDM	
5210	802.11be EHT80 SDM	Covered by 802.11be EHT80 2TX CDD	
5250	802.11ax HE160 OFDMA	Covered by 802.11be EHT160 2TX CDD	
5250	802.11be EHT160 CDD	19.97	99.31
5250	802.11ax HE160 SDM	Covered by 802.11be EHT160 SDM	
5250	802.11be EHT160 SDM	Covered by 802.11be EHT160 2TX CDD	

5.3 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.3 GHz band, 1TX			
5260 - 5320	802.11a	Covered by 802.11n HT20 1TX	
5260 - 5320	802.11n HT20	19.98	99.54
5270 - 5310	802.11n HT40	20.91	123.31
5260 - 5320	802.11ac VHT20	Covered by 802.11n HT20 1TX	
5270 - 5310	802.11ac VHT40	Covered by 802.11n HT40 1TX	
5290	802.11ac VHT80	16.93	49.32
5250	802.11ac VHT160	16.46	44.26
5260 - 5320	802.11ax HE20	Covered by 802.11be EHT20 1TX	
5260 - 5320	802.11be EHT20	19.98	99.54
5270 - 5310	802.11ax HE40	Covered by 802.11be EHT40 1TX	
5270 - 5310	802.11be EHT40	20.95	124.45
5290	802.11ax HE80	Covered by 802.11be EHT80 1TX	
5290	802.11be EHT80	17.98	62.81
5250	802.11ax HE160	Covered by 802.11be EHT160 1TX	
5250	802.11be EHT160	17.98	62.81
5.3 GHz band, 2TX			
5260 - 5320	802.11n HT20 CDD	19.95	98.86
5260 - 5320	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5270 - 5310	802.11n HT40 CDD	22.97	198.15
5270 - 5310	802.11n HT40 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5260 - 5320	802.11ac VHT20 SDM/STBC/CDD	Covered by 802.11n HT20 2TX CDD	
5270 - 5310	802.11ac VHT40 SDM/STBC/CDD	Covered by 802.11n HT40 2TX CDD	
5290	802.11ac VHT80 CDD	18.41	69.34
5290	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5250	802.11ac VHT160 CDD	18.43	69.66
5250	802.11ac VHT160 SDM/STBC	Covered by 802.11ac VHT160 2TX CDD	
5260 - 5320	802.11ax HE20 OFDMA	Covered by 802.11be EHT20 2TX CDD	
5260 - 5320	802.11be EHT20 CDD	19.98	99.54
5260 - 5320	802.11ax HE20 SDM	Covered by 802.11be EHT20 SDM	
5260 - 5320	802.11be EHT20 SDM	Covered by 802.11be EHT20 2TX CDD	
5270 - 5310	802.11ax HE40 OFDMA	Covered by 802.11be EHT40 2TX CDD	
5270 - 5310	802.11be EHT40 CDD	22.95	197.24
5270 - 5310	802.11ax HE40 SDM	Covered by 802.11be EHT40 SDM	
5270 - 5310	802.11be EHT40 SDM	Covered by 802.11be EHT40 2TX CDD	
5290	802.11ax HE80 OFDMA	Covered by 802.11be EHT80 2TX CDD	
5290	802.11be EHT80 CDD	19.96	99.08
5290	802.11ax HE80 SDM	Covered by 802.11be EHT80 SDM	
5290	802.11be EHT80 SDM	Covered by 802.11be EHT80 2TX CDD	
5250	802.11ax HE160 OFDMA	Covered by 802.11be EHT160 2TX CDD	
5250	802.11be EHT160 CDD	19.97	99.31
5250	802.11ax HE160 SDM	Covered by 802.11be EHT160 SDM	
5250	802.11be EHT160 SDM	Covered by 802.11be EHT160 2TX CDD	

5.6 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.6 GHz band, 1TX			
5500-5720	802.11a	Covered by 802.11n HT20 1TX	
5500-5720	802.11n HT20	19.97	99.31
5510-5710	802.11n HT40	20.97	125.03
5500-5720	802.11ac VHT20	Covered by 802.11n HT20 1TX	
5510-5710	802.11ac VHT40	Covered by 802.11n HT40 1TX	
5530-5690	802.11ac VHT80	20.44	110.66
5570	802.11ac VHT160	16.45	44.16
5500-5720	802.11ax HE20	Covered by 802.11be EHT20 1TX	
5500-5720	802.11be EHT20	19.96	99.08
5510-5710	802.11ax HE40	Covered by 802.11be EHT40 1TX	
5510-5710	802.11be EHT40	20.96	124.74
5530-5690	802.11ax HE80	Covered by 802.11be EHT80 1TX	
5530-5690	802.11be EHT80	20.98	125.31
5570	802.11ax HE160	Covered by 802.11be EHT160 1TX	
5570	802.11be EHT160	17.98	62.81
5.6 GHz band, 2TX			
5500-5720	802.11n HT20 CDD	19.95	98.86
5500-5720	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11n HT40 CDD	22.95	197.24
5510-5710	802.11n HT40 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5500-5720	802.11ac VHT20 SDM/STBC/CDD	Covered by 802.11n HT20 2TX CDD	
5510-5710	802.11ac VHT40 SDM/STBC/CDD	Covered by 802.11n HT40 2TX CDD	
5530-5690	802.11ac VHT80 CDD	22.97	198.15
5530-5690	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5570	802.11ac VHT160 CDD	18.44	69.82
5570	802.11ac VHT160 SDM/STBC	Covered by 802.11ac VHT160 2TX CDD	
5500-5720	802.11ax HE20 OFDMA	Covered by 802.11be EHT20 2TX CDD	
5500-5720	802.11be EHT20 CDD	19.98	99.54
5500-5720	802.11ax HE20 SDM	Covered by 802.11be EHT20 SDM	
5500-5720	802.11be EHT20 SDM	Covered by 802.11be EHT20 2TX CDD	
5510-5710	802.11ax HE40 OFDMA	Covered by 802.11be EHT40 2TX CDD	
5510-5710	802.11be EHT40 CDD	22.97	198.15
5510-5710	802.11ax HE40 SDM	Covered by 802.11be EHT40 SDM	
5510-5710	802.11be EHT40 SDM	Covered by 802.11be EHT40 2TX CDD	
5530-5690	802.11ax HE80 OFDMA	Covered by 802.11be EHT80 2TX CDD	
5530-5690	802.11be EHT80 CDD	22.99	199.07
5530-5690	802.11ax HE80 SDM	Covered by 802.11be EHT80 SDM	
5530-5690	802.11ax HE80 SDM	Covered by 802.11be EHT80 2TX CDD	
5570	802.11ax HE160 OFDMA	Covered by 802.11be EHT160 2TX CDD	
5570	802.11be EHT160 CDD	19.99	99.77
5570	802.11ax HE160 SDM	Covered by 802.11be EHT160 SDM	
5570	802.11be EHT160 SDM	Covered by 802.11be EHT160 2TX CDD	

5.8 GHz BAND (FCC)

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.8 GHz band, 1TX			
5745-5825	802.11a	Covered by 802.11n HT20 1TX	
5745-5825	802.11n HT20	20.98	125.31
5755-5795	802.11n HT40	20.98	125.31
5745-5825	802.11ac VHT20	Covered by 802.11n HT20 1TX	
5755-5795	802.11ac VHT40	Covered by 802.11n HT40 1TX	
5775	802.11ac VHT80	20.95	124.45
5745-5825	802.11ax HE20	Covered by 802.11be EHT20 1TX	
5745-5825	802.11be EHT20	20.95	124.45
5755-5795	802.11ax HE40	Covered by 802.11be EHT40 1TX	
5755-5795	802.11be EHT40	20.97	125.03
5775	802.11ax HE80	Covered by 802.11be EHT80 1TX	
5775	802.11be EHT80	20.96	124.74
5.8 GHz band, 2TX			
5745-5825	802.11n HT20 CDD	23.99	250.61
5745-5825	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5755-5795	802.11n HT40 CDD	23.96	248.89
5755-5795	802.11n HT40 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5745-5825	802.11ac VHT20 STM/STBC/CDD	Covered by 802.11n HT20 2TX CDD	
5755-5795	802.11ac VHT40 STM/STBC/CDD	Covered by 802.11n HT40 2TX CDD	
5775	802.11ac VHT80 CDD	23.95	248.31
5775	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5745-5825	802.11ax HE20 OFDMA	Covered by 802.11be EHT20 2TX CDD	
5745-5825	802.11be EHT20 CDD	23.96	248.89
5745-5825	802.11ax HE20 SDM	Covered by 802.11be EHT20 SDM	
5745-5825	802.11be EHT20 SDM	Covered by 802.11be EHT20 2TX CDD	
5755-5795	802.11ax HE40 OFDMA	Covered by 802.11be EHT40 2TX CDD	
5755-5795	802.11be EHT40 CDD	23.95	248.31
5755-5795	802.11ax HE40 SDM	Covered by 802.11be EHT40 SDM	
5755-5795	802.11be EHT40 SDM	Covered by 802.11be EHT40 2TX CDD	
5775	802.11ax HE80 OFDMA	Covered by 802.11be EHT80 2TX CDD	
5775	802.11be EHT80 CDD	23.95	248.31
5775	802.11ax HE80 SDM	Covered by 802.11be EHT80 SDM	
5775	802.11be EHT80 SDM	Covered by 802.11be EHT80 2TX CDD	

6.5. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z on ANT 6, ANT 5 and 2TX. It was determined that X (Flatbed) orientation was the worst-case orientation for ANT 6, 2TX, and Z (Portrait) for ANT 5.

802.11n 2TX and 802.11be 2TX modes were used to perform on radiated harmonic spurious final test to cover all SISO modes. Max power was tuned to maximum based on among all the modes. For testing purposes, radiated harmonics spurious below 1GHz, 1-18GHz L/M/H channels, 18-40GHz, and power line conducted emissions were performed with the EUT set at the 2TX CDD mode among the CDD/SDM modes with power setting equal or higher than FCC conducted SISO modes as worst-case scenario.

For Radiated band edge test all test modes have been investigated with power setting equal or higher than FCC conducted SISO modes as worst-case scenario.

Below 1GHz tests were performed with EUT connected to AC power adapter as the worst case; and for above 1GHz, the worst-case configuration reported was tested with EUT only. For AC line conducted emission, test was investigated with AC power adapter and with laptop. There were no emissions found below 30MHz within 20dB of the limit.

Simultaneous transmission with the bluetooth was investigated, and no noticeable emission was found.

With same power on Full RU and SU higher data rate, investigation was performed on both band edge to determine the worst case, and SU mode was determined to be the worst case.

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 band edge, the following are the worst-case data rates set for test:

802.11n HT20 mode : MCS7

802.11n HT40 mode : MCS7

802.11ac VHT80 mode: MCS9

802.11ac VHT160 mode MCS9

802.11be (5.2G & 5.8G bands): EHT20/EHT40/EHT80 Partial Tones and SU mode: MCS11

802.11be (5.3G & 5.6G bands): EHT20/EHT40/EHT80/Partial Tones and SU mode: MCS11.

Note: ANT1 and ANT2 indicated in the test result sections are representative of AN6 and ANT5, respectively.

The modulation and bandwidth of 802.11ax and 802.11be modes are similar at 20 MHz (40 MHz, 80 MHz, 160 MHz), and the target power of 802.11ax mode is equal to or lower than that of 802.11be mode, and the data rate of 802.11be mode is higher than 802.11ax mode, so 802.11be mode is performed in the test to represent worst-case reporting.

The modulation and bandwidth of 802.11a and 802.11n modes are similar at 20 MHz and the target power of 802.11a mode is equal to or lower than that of 802.11n mode. The data rate of 802.11n mode is higher than 802.11a mode, so 802.11n mode is performed in the test to represent worst-case reporting.

The target power of SDM mode is equal to or lower than that of CDD mode. CDD correlated antenna gain is also worst-case, so CDD mode is performed in the test to represent worst-case reporting.

After the investigation, we found that the worst case of power and PSD modes for full testing as table shown below, in addition we were also spot-check for Full RU and the rest of Partial RU modes on radiated bandedge and radiated spurious emissions.

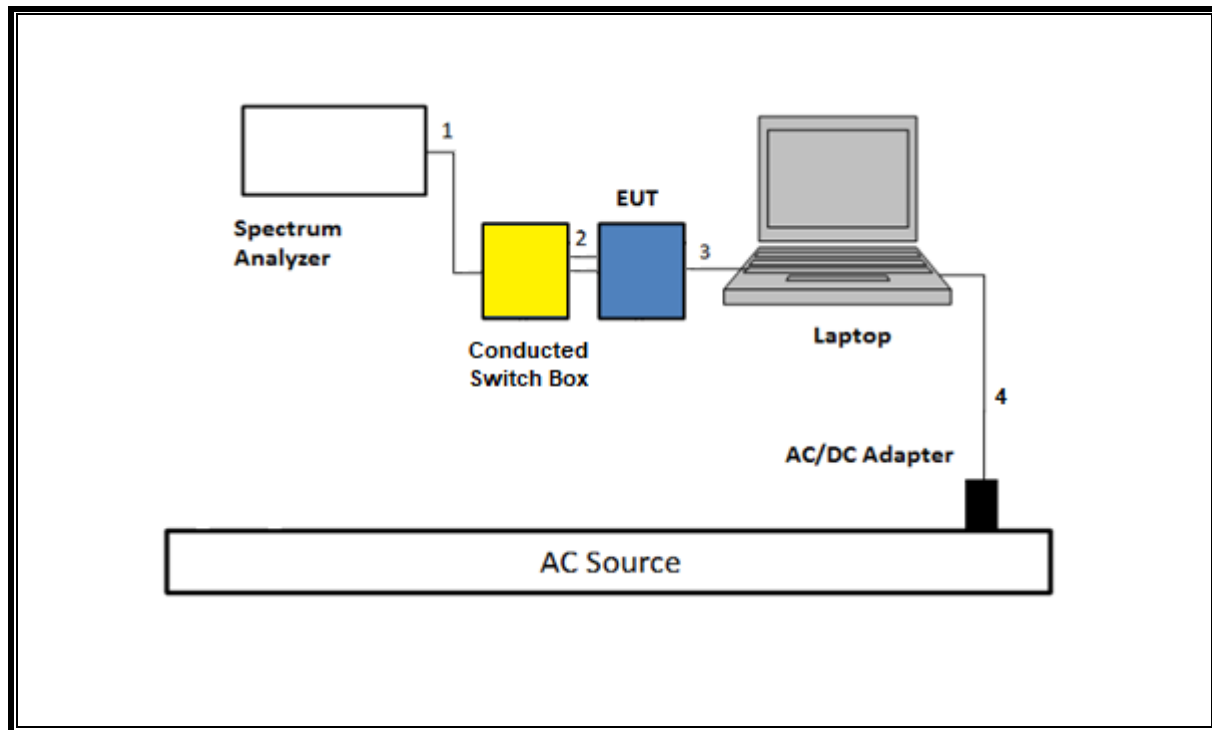
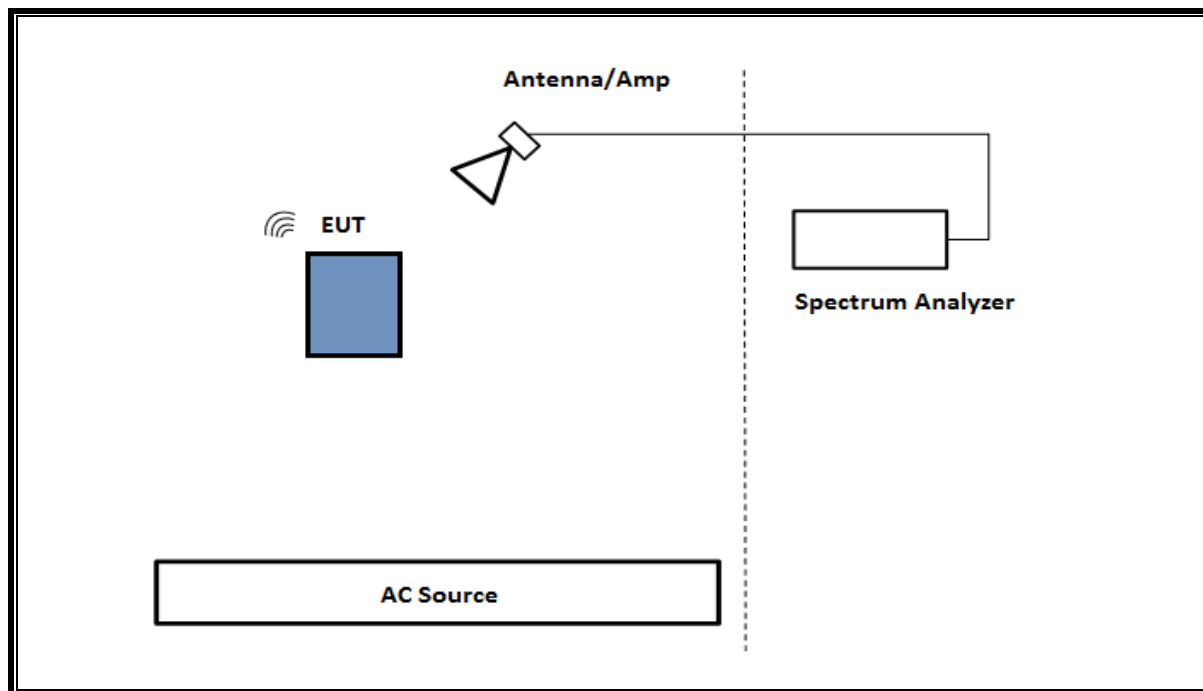
BW (MHz)	Tone (T)	RU Index	RU Index from Chipset support	Worst Case Tone (UNII-1)		Worst Case Tone (UNII-2a)		Worst Case Tone (UNII-2c)		Worst Case Tone (UNII-3)	
				Power	PSD	Power	PSD	Power	PSD	Power	PSD
20	26	0 ~ 8	0 ~ 8								
	52	37 ~ 40	37 ~ 40								
	52 + 26	70 ~ 81	70, 71, 72								
	106	53 ~ 54	53 ~ 54		X		X		X		X
	106 + 26	82 ~ 89	82, 83								
	242	61	61								
	SU	--	--	X		X		X		X	
40	26	0 ~ 17	0 ~ 17								
	52	37 ~ 44	37 ~ 44								
	52 + 26	70 ~ 81	70, 72, 72, 73, 74, 75								
	106	53 ~ 56	53 ~ 56		X		X		X		X
	106 + 26	82 ~ 89	82, 83, 84, 85								
	242	61 ~ 61	61 ~ 62	X		X		X			
	484	65	65								
80	SU	--	--	X		X		X		X	
	26	0 ~ 36	0 ~ 36								
	52	37 ~ 52	37 ~ 52								
	52 + 26	70 ~ 81	71, 72, 73, 74, 77, 78, 79, 80		X		X				X
	106	53 ~ 60	53 ~ 60								
	106 + 26	82 ~ 89	82, 85, 86, 89								
	242	61 ~ 64	61 ~ 64	X		X			X		
160	484	65 ~ 66	65 ~ 66								
	484 + 242	90, 91, 92, 93	90, 91, 92, 93								
	996	67	67								
	SU	--	--	X		X		X		X	
	26	0 ~ S36	0 ~ S36								
	52	37 ~ S52	37 ~ S52								
	52 + 26	70 ~ S81	sb0: 71, 72, 73, 74, 77, 78, 79, 80 sb1: 71, 72, 73, 74, 77, 78, 79, 80								
160	106	53 ~ S60	53 ~ S60								
	106 + 26	82 ~ 89	82, 85, 86, 89								
	242	61 ~ S64	61 ~ S64		X		X		X		
	484	65 ~ S66	65 ~ S66								
	484 + 242	sb0: 90, 91, 92, 93 sb1: 90, 91, 92, 93	sb0: 90, 91, 92, 93 sb1: 90, 91, 92, 93								
	996	67 ~ S67	67 ~ S67								
	996 + 484	sb0: 94, 95 sb1: 94, 95	sb0: 94, 95 sb1: 94, 95								
160	996 + 484 + 242	sb0: 96, 97, 98, 99 sb1: 96, 97, 98, 99	sb0: 96, 97, 98, 99 sb1: 96, 97, 98, 99								
	996x2	S68	S68								
	SU	--	--	X		X		X			

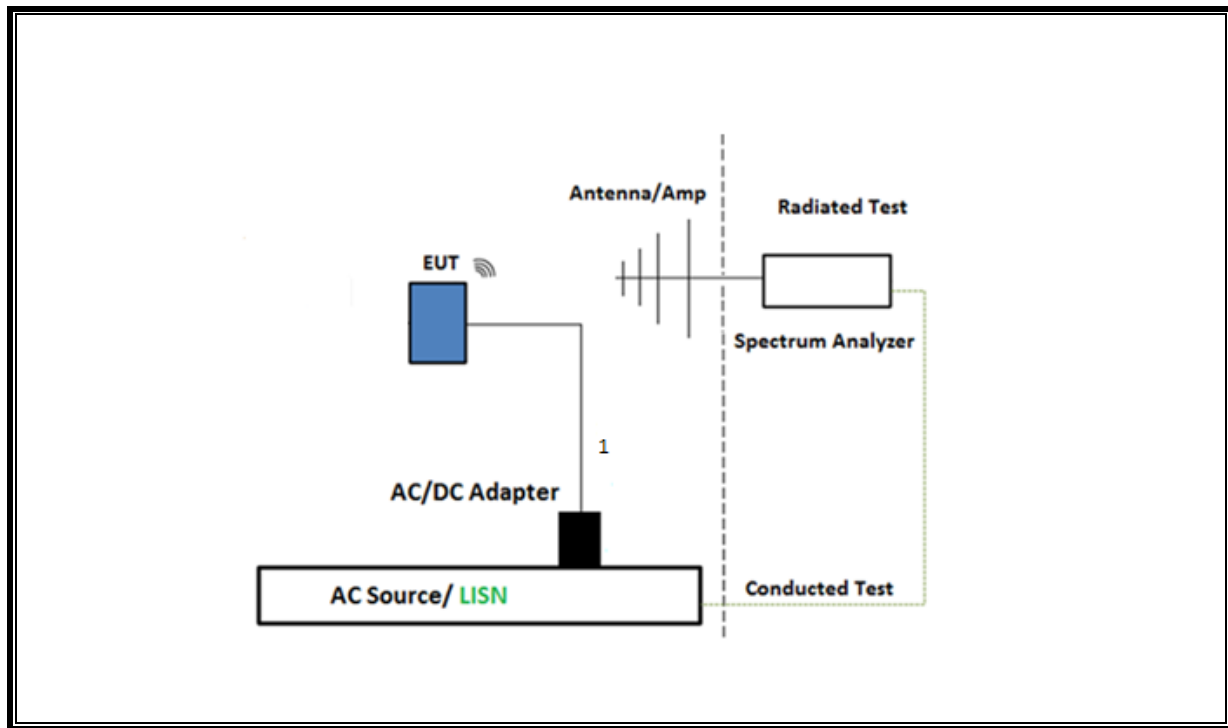
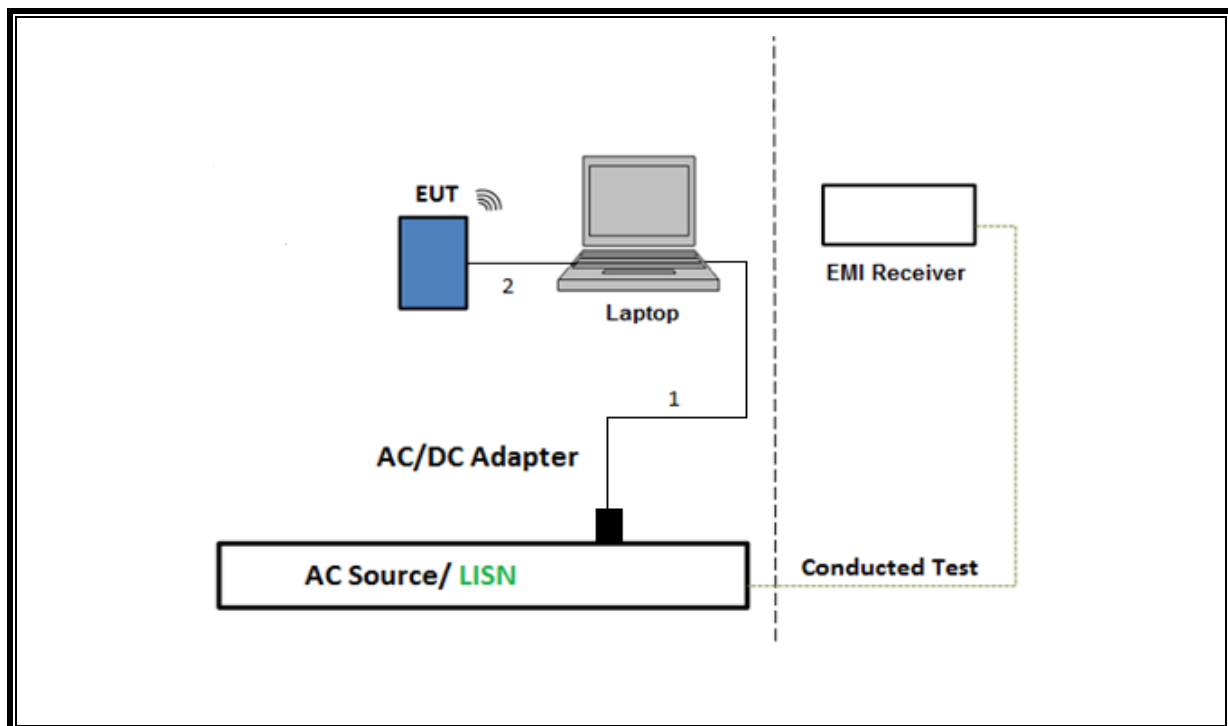
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT						
Description		Manufacturer	Model	Serial Number	FCC ID/ DoC	
Laptop		Apple	Macbook Pro	C02VD7SAHV22	BCGA1708	
Laptop AC/DC adapter		Liteon Technology	A1424	NSW25679	DoC	
EUT AC/DC adapter		Apple	A1720	C3D8417A7R93KVPA8	DoC	
Conducted Switch Box		UL	n/a	208281	N/A	
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	SMA	1	SMA	Shielded	0.75	To spectrum Analyzer
2	Antenna	2	SMA	Un-shielded	0.2	To Conducted Switch Box
3	USB-C	1	USB-C	Shielded	1.0	N/A
4	AC	1	AC	Un-shielded	2	N/A
I/O CABLES (RF RADIATED AND AC LINE 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	N/A

TEST SETUP

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

SETUP DIAGRAM FOR CONDUCTED TESTS**SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz (1-40GHZ)**

SETUP DIAGRAM FOR 30-1000MHz and AC LINE CONDUCTED TEST**TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION**

7. MEASUREMENT METHOD

On Time and Duty Cycle: KDB 789033 D02 v02r01, Section B.

6 dB Emission BW: KDB 789033 D02 v02r01, Section C.2

26 dB Emission BW: KDB 789033 D02 v02r01, Section C.1

99% Occupied BW: KDB 789033 D02 v02r01, Section D.

Conducted Output Power: KDB 789033 D02 v02r01

Power Spectral Density: KDB 789033 D02 v02r01, Section F

Unwanted emissions in restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v02r01, Sections G.3, G.4, and G.5.

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2013 Section 6.4

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
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	79834	2024/06/30	2023/06/30
RF Filter Box, 1-18GHz	Miteq	UL-FR1	217521	2024/08/31	2023/08/31
EMI Test Receiver	Rohde & Schwarz	ESW44	169936	2025/02/28	2024/02/28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	230299	2025/01/31	2024/01/31
EMI Test Receiver	Rohde & Schwarz	ESW44	223461	2025/02/28	2024/02/28
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	226780	2025/04/30	2024/04/30
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	200896	2025/02/28	2024/02/28
RF Filter Box, 1-18GHz, 12 Ports	UL-FR1	Frankenstein	231874	2024/08/31	2023/08/31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201501	2024/11/30	2023/11/30
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	41112	2024/10/31	2023/10/31
RF Filter Box, 1-18GHz	UL-FR1	NA	171389	2025/03/31	2024/03/31
EMI Test Receiver	Rohde & Schwarz	ESW44	225683	2025/02/28	2024/02/28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	226671	2025/02/28	2024/02/28
*EMI Test Receiver	Rohde & Schwarz	ESW44	226079	2024/05/01	2023/05/01
*RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	225079	2025/04/30	2024/04/30
Antenna, BroadBand Hybrid 30 MHz - 3 GHz	SUNOL SCIENCES CORP.	JB3	230634	2025/01/31	2024/01/31
Link File, @3m, 9kHz-1000MHz Hybrid Path Loss	UL-FR1	Port 0 Factors	232001	2025/02/28	2024/02/28
Antenna, Horn 18 to 26.5GHz	A.R.A	MWH-1826/B	81139	2024/08/31	2023/08/31
Link File, RF Amplifier Assembly, 18-26.5GHz, 60dB Gain	AMPLICAL	AMP18G26.5-60	220194	2024/08/31	2023/08/31
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90731	2025/01/31	2024/01/31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	80120	2025/01/31	2024/01/31
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90719	2025/01/31	2024/01/31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90389	2025/01/31	2024/01/31
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	178557	Verified Before Use	
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	178558	Verified Before Use	
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	80397	2025/01/31	2024/01/31
Spectrum Analyzer, PXA, 3Hz to 50GHz w/Ext. Mixer	Keysight Technologies Inc	N9030A	80400	2025/02/02	2024/02/02
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	125178	2025/01/31	2024/01/31
*Conducted Switch Box	N/A	CSB	208281	2024/04/30	2023/04/30
Conducted Switch Box	N/A	CSB	208281	2025/05/08	2024/05/08

TEST EQUIPMENT LIST (cont.)					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	80430	2024/08/31	2023/08/31
RF Filter Box, 1-18GHz, 12 Ports	UL-FR1	Frankenstein	217255	2024/10/31	2023/10/31
EMI Test Receiver	Rohde & Schwarz	ESW44	230548	2025/02/28	2024/02/28
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	222741	2024/08/31	2023/08/31
RF Filter Box, 1-18GHz, 12 Ports	UL-FR1	Frankenstein	216812	2025/01/30	2024/01/30
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201497	2025/02/28	2024/02/28
Antenna, Horn 26.5 to 40GHz	A.R.A	MWH-2640/B	172369	2024/10/31	2023/10/31
Link File, RF Amplifier Assembly, 26-40GHz, 65dB Gain	AMPLICAL	AMP26G40-65	221834	2024/03/31	2023/03/31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	170063	2024/11/30	2023/11/30
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO-METRICS	EM-6871	170014	2024/08/31	2023/08/31
Antenna, Passive Loop 100kHz to 30MHz	ELECTRO-METRICS	EM-6872	170016	2024/08/31	2023/08/31

AC Line Conducted					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	93091	2025/02/28	2024/02/28
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01-480V	175765	2025/01/31	2024/01/31
Transient Limiter	TE	TBFL1	207996	2024/08/31	2023/08/31
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, 2023, May 1		
Conducted Software	UL	UL EMC	2020.8.16		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, 2023, Mar 3		

*Testing was completed before calibration due date and/or after calibration was completed.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE LIMITS

None; for reporting purposes only.

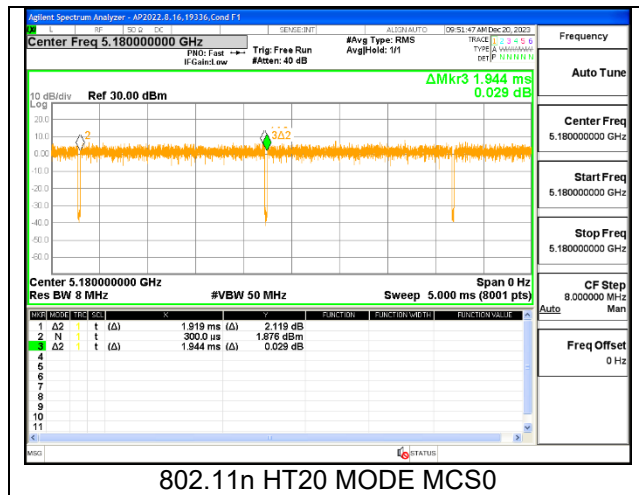
PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	Tone (T)	Data Rate (Mbps)	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
HT20	--	MCS0	1.919	1.944	0.9871	98.71%	0.00	0.010
	--	MCS7	227.900	257.400	0.8854	88.54%	0.53	0.004
HT40	--	MCS0	943.900	969.000	0.9741	97.41%	0.11	0.001
	--	MCS7	127.400	157.800	0.8074	80.74%	0.93	0.008
VHT80	--	MCS0	460.000	485.000	0.9485	94.85%	0.23	0.002
	--	MCS9	71.800	97.400	0.7372	73.72%	1.32	0.014
VHT160	--	MCS0	251.000	276.600	0.9074	90.74%	0.42	0.004
	--	MCS9	55.200	85.700	0.6441	64.41%	1.91	0.018
EHT20	SU	MCS0	3.055	3.091	0.9885	98.85%	0.00	0.010
		MCS11	0.127	0.127	0.9969	99.69%	0.00	0.010
	106T	MCS0	3.519	3.556	0.9897	98.97%	0.00	0.010
		MCS11	0.262	0.300	0.8733	87.33%	0.59	3.817
EHT40	SU	MCS0	1.561	1.597	0.9776	97.76%	0.10	0.641
		MCS11	0.156	0.192	0.8127	81.27%	0.90	6.402
	106T	MCS0	3.497	3.543	0.9871	98.71%	0.00	0.010
		MCS11	0.263	0.300	0.8767	87.67%	0.57	3.802
	242T	MCS0	3.043	3.079	0.9880	98.80%	0.00	0.010
		MCS11	0.234	0.272	0.8603	86.03%	0.65	4.274
EHT80	SU	MCS0	1.560	1.597	0.9769	97.69%	0.10	0.641
		MCS11	0.156	0.193	0.8083	80.83%	0.92	6.410
	242T	MCS0	3.043	3.079	0.9880	98.80%	0.00	0.010
		MCS11	0.235	0.273	0.8608	86.08%	0.65	4.255
	MRU52+26T	MCS0	3.780	3.810	0.9921	99.21%	0.00	0.010
		MCS11	0.278	0.316	0.8797	87.97%	0.56	3.597
EHT160	SU	MCS0	0.780	0.831	0.9386	93.86%	0.28	1.282
		MCS11	0.111	0.158	0.7016	70.16%	1.54	9.050
	242T	MCS0	9.180	9.270	0.9903	99.03%	0.00	0.010
		MCS11	0.232	0.272	0.8529	85.29%	0.69	4.310
HT20 SDM	--	MCS0	17.180	17.220	0.9977	99.77%	0.00	0.010
HT40 SDM	--	MCS0	0.500	0.522	0.9579	95.79%	0.19	2.000
VHT80 SDM	--	MCS0	0.255	0.277	0.9206	92.06%	0.36	3.922
VHT160 SDM	--	MCS0	0.088	0.108	0.8116	81.16%	0.91	11.377
EHT20 SDM	SU	MCS0	0.770	0.810	0.9506	95.06%	0.22	1.299
	106T		3.515	3.555	0.9887	98.87%	0.00	0.010
EHT40 SDM	SU	MCS0	0.768	0.810	0.9481	94.81%	0.23	1.302
	242T		3.040	3.080	0.9870	98.70%	0.00	0.010
	106T		3.512	3.553	0.9885	98.85%	0.00	0.010
EHT80 SDM	SU	MCS0	0.732	0.792	0.9242	92.42%	0.34	1.366
	242T		9.180	9.240	0.9935	99.35%	0.00	0.010
	MRU52+26T		3.750	3.810	0.9843	98.43%	0.00	0.010
EHT160 SDM	SU	MCS0	0.514	0.552	0.9312	93.12%	0.31	1.946
	242T		3.040	3.080	0.9870	98.70%	0.00	0.010

Note: There is same duty cycle factor on 1TX and 2TX

DUTY CYCLE PLOTS

9.2. 26 dB AND 99% BANDWIDTH**LIMITS**

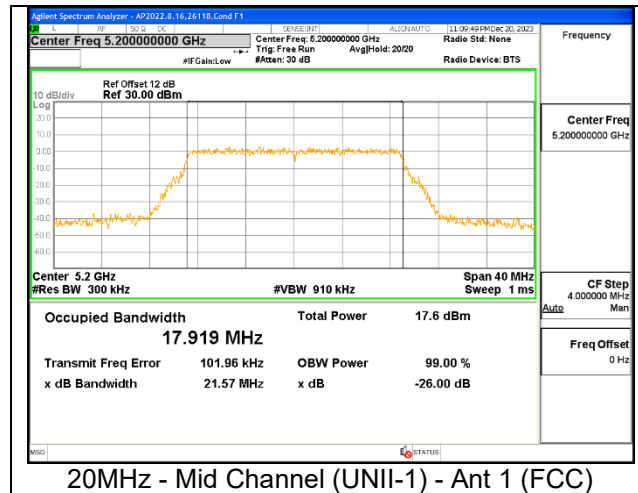
None; for reporting purposes only.

RESULTS

ID:	19336	Date:	12/29/2023
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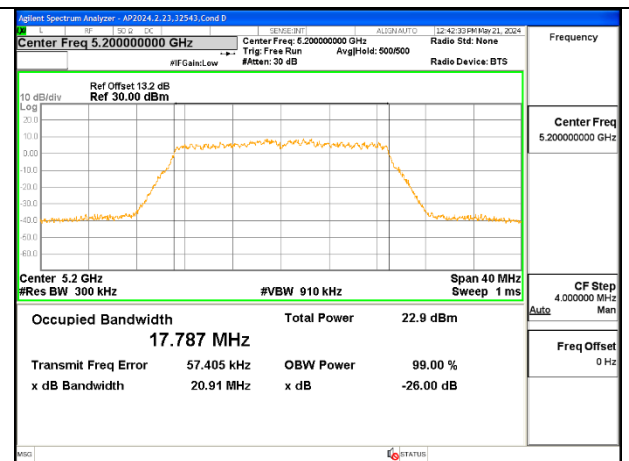
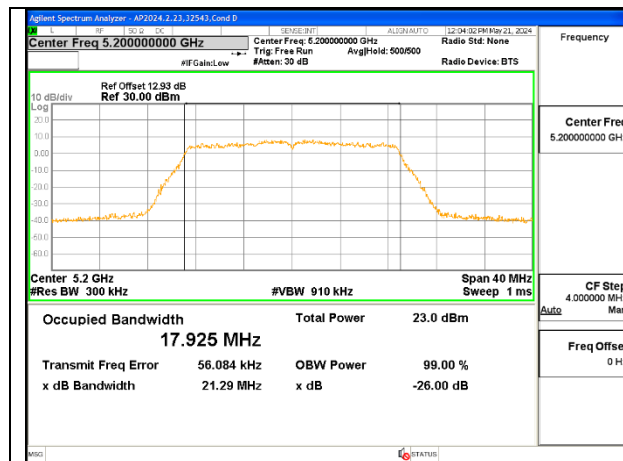
9.2.1. 802.11n/ac SISO MODE IN THE UNII-1 BAND

UNII-1 (SISO)	Frequency (MHz)	Channel Number	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
			Ant 1	Ant 2	Ant 1	Ant 2
HT20 (FCC)	5180	36	21.38	21.49	17.9750	17.9380
	5200	40	21.57	21.30	17.9190	17.9580
	5240	48	21.66	21.45	17.9510	17.9080
HT40 (FCC)	5190	38	38.89	39.54	36.2910	36.3040
	5230	46	39.66	39.55	36.3170	36.2900
VHT80 (FCC)	5210	42	81.21	80.78	75.8100	75.9460
VHT160 (FCC)	5250 (Straddle)	50	165.90	164.70	155.6700	155.6100



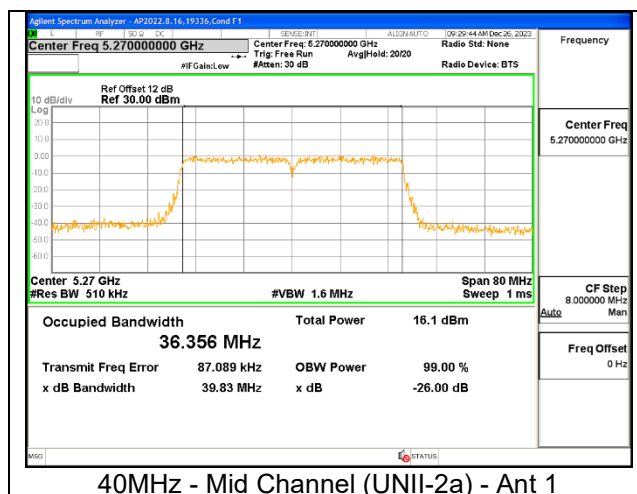
9.2.2. 802.11n/ac MIMO CDD MODE IN THE UNII-1 BAND

UNII-1 (MIMO CDD)	Frequency (MHz)	Channel Number	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
			Ant 1	Ant 2	Min BW	Ant 1	Ant 2	Min BW
HT20 (FCC)	5180	36	21.64	22.68	--	18.0390	17.9150	--
	5200	40	21.29	20.91	--	17.9250	17.7870	--
	5240	48	21.48	20.85	--	17.9380	17.7800	--
HT40 (FCC)	5190	38	39.82	39.38	--	36.3170	36.3860	--
	5230	46	39.28	39.25	--	36.3300	36.3140	--
VHT80 (FCC)	5210	42	80.96	80.41	--	75.9460	75.8590	--
VHT160 (FCC)	5250 (Straddle)	50	164.90	163.80	--	155.4900	155.5800	--

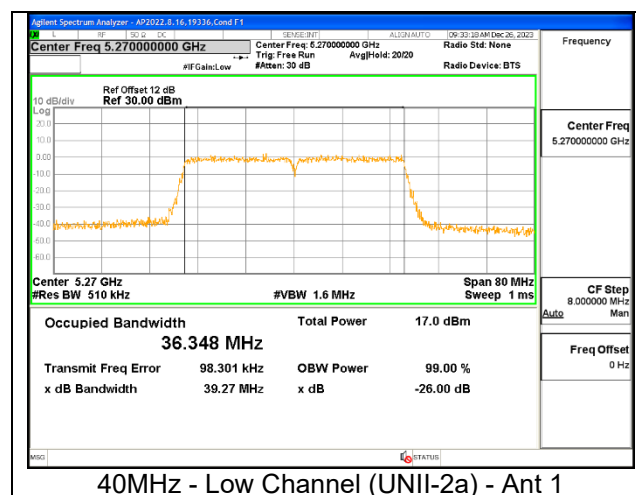


9.2.3. 802.11n/ac SISO MODE IN THE UNII-2A BAND

UNII-2a (SISO)	Frequency (MHz)	Channel Number	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
			Ant 1	Ant 2	Ant 1	Ant 2
HT20	5260	52	21.76	21.44	17.9060	17.9480
	5300	60	21.20	21.69	17.9100	17.8970
	5320	64	21.12	21.25	18.0180	17.9480
HT40	5270	54	39.83	39.92	36.3560	36.3160
	5310	62	39.86	39.47	36.3350	36.3130
VHT80	5290	58	80.72	81.78	76.0360	75.9810
VHT160	5250 (Straddle)	50	165.90	164.70	155.6700	155.6100

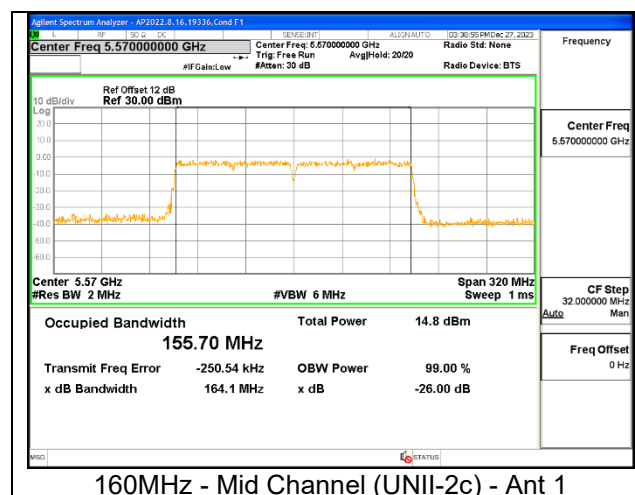


UNII-2a (MIMO CDD)	Frequency (MHz)	Channel Number	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
			Ant 1	Ant 2	Min BW	Ant 1	Ant 2	Min BW
HT20	5260	52	21.57	21.20	21.20	17.8700	17.8910	17.8700
	5300	60	21.32	21.15	21.15	17.9290	17.9200	17.9200
	5320	64	21.48	21.26	21.26	17.9270	17.9040	17.9040
HT40	5270	54	39.27	38.99	38.99	36.3480	36.2990	36.2990
	5310	62	39.65	39.51	39.51	36.2700	36.3150	36.2700
VHT80	5290	58	81.64	80.75	80.75	76.0070	75.9530	75.9530
VHT160	5250 (Straddle)	50	164.90	163.80	163.80	155.4900	155.5800	155.4900



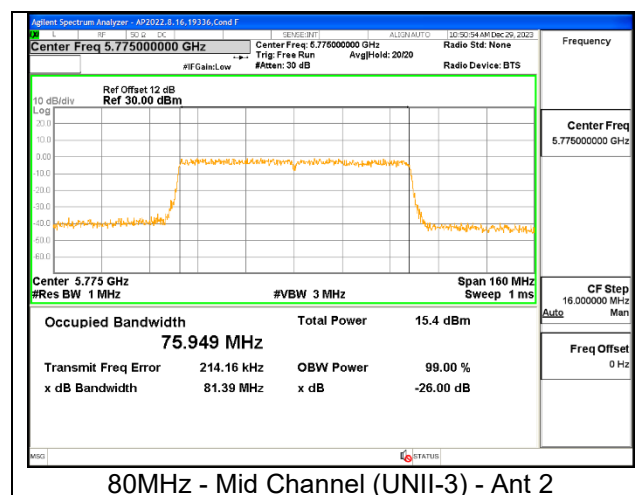
9.2.5. 802.11n/ac SISO MODE IN THE UNII-2C BAND

UNII-2c (SISO)	Frequency (MHz)	Channel Number	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
			Ant 1	Ant 2	Ant 1	Ant 2
HT20	5500	100	21.39	21.72	17.9550	17.9440
	5580	116	21.48	21.49	17.9530	18.0080
	5700	140	22.20	21.60	17.9650	17.9530
	5720 (Straddle)	144	21.32	21.62	17.9410	17.9640
HT40	5510	102	39.47	39.61	36.3440	36.2270
	5550	110	39.53	39.85	36.2960	36.3410
	5670	134	39.37	39.75	36.3670	36.2730
	5710 (Straddle)	142	39.68	39.07	36.3640	36.3800
VHT80	5530	106	81.30	80.94	75.9520	76.1540
	5610	122	81.96	81.47	75.9300	76.0570
	5690 (Straddle)	138	81.29	80.63	75.9480	75.9350
VHT160	5570	114	164.10	164.80	155.7000	155.6000



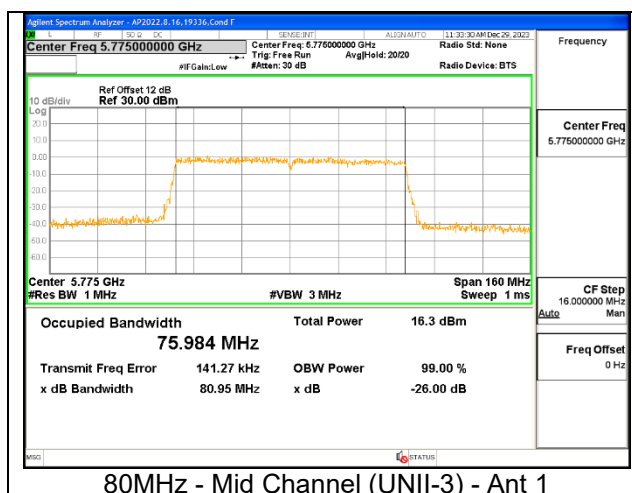
9.2.7. 802.11n/ac SISO MODE IN THE UNII-3 BAND

UNII-3 (SISO)	Frequency (MHz)	Channel Number	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
			Ant 1	Ant 2	Ant 1	Ant 2
HT20	5745	149	21.55	21.37	17.9730	17.9840
	5785	157	21.35	21.11	17.8220	17.9570
	5825	165	21.54	21.47	17.8950	18.0180
HT40	5755	151	39.74	39.89	36.3400	36.2780
	5795	159	39.34	39.88	36.3020	36.2790
VHT80	5775	155	81.34	81.39	76.0000	75.9490



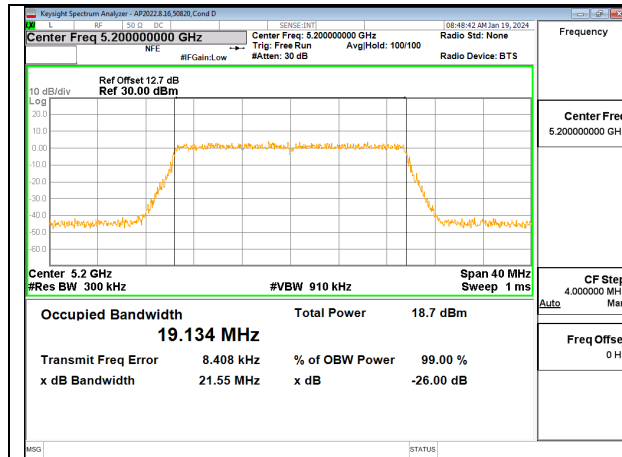
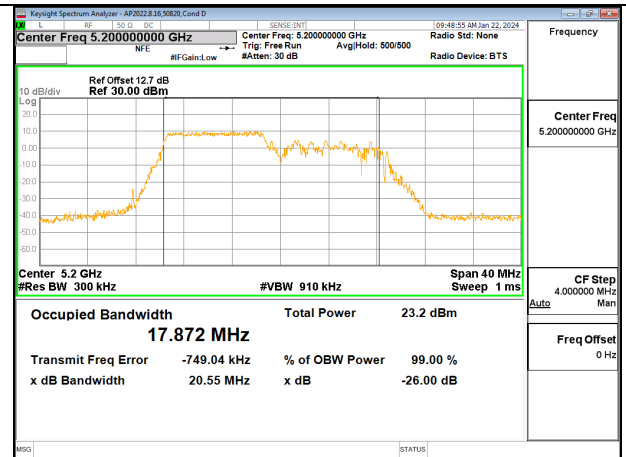
9.2.8. 802.11n/ac MIMO CDD MODE IN THE UNII-3 BAND

UNII-3 (MIMO CDD)	Frequency (MHz)	Channel Number	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
			Ant 1	Ant 2	Ant 1	Ant 2
HT20	5745	149	21.59	21.39	17.9400	17.8940
	5785	157	21.46	21.50	17.9140	17.9430
	5825	165	21.65	21.73	17.9450	18.0060
HT40	5755	151	39.86	39.44	36.3530	36.3070
	5795	159	39.20	39.00	36.3600	36.3100
VHT80	5775	155	80.95	80.79	75.9840	75.9690



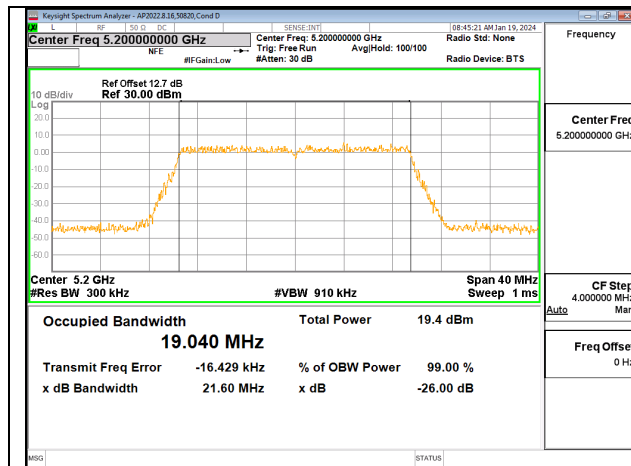
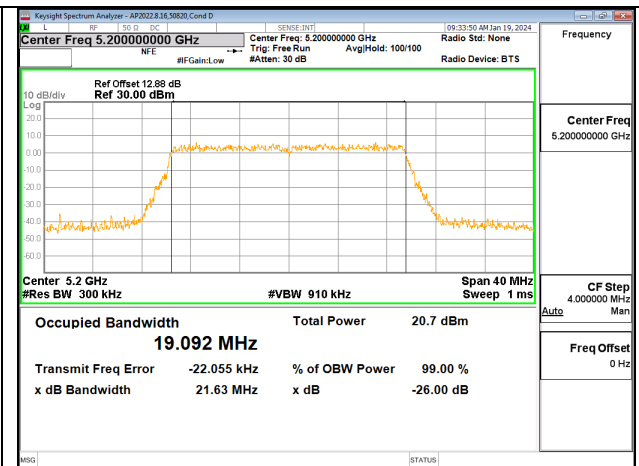
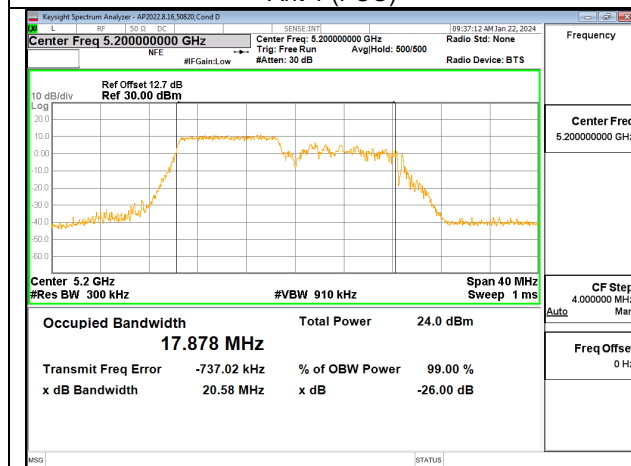
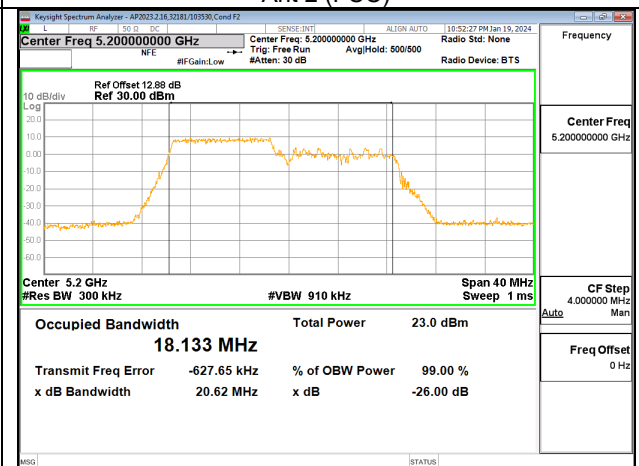
9.2.9. 802.11be SISO MODE IN THE UNII-1 BAND

UNII-1 (SISO)	Frequency (MHz)	Channel Number	Tone	RU Index	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
					Ant 1	Ant 2	Ant 1	Ant 2
EHT20 (FCC)	5180	36	SU	--	22.36	21.51	19.1390	19.0920
			106T	53	20.54	20.66	18.2490	18.2370
				54	21.31	21.33	18.1920	18.2400
	5200	40	SU	--	21.55	21.47	19.1340	19.1300
			106T	53	20.55	20.54	17.8720	17.1900
				54	20.85	21.02	18.0220	18.2150
	5240	48	SU	--	21.48	21.57	19.1230	19.0670
			106T	53	20.57	20.84	18.2260	18.2190
				54	21.11	20.66	18.1920	18.2760
EHT40 (FCC)	5190	38	SU	--	39.94	39.61	37.5820	37.6560
			242T	61	31.46	32.40	19.6490	19.7360
				62	30.48	30.41	19.4660	19.5500
			106T	53	20.70	20.89	17.7790	17.9380
				54	26.78	29.77	19.8060	20.4450
				56	21.50	21.55	17.7630	17.9460
	5230	46	SU	--	39.59	39.88	37.7070	37.7030
			242T	61	30.04	30.14	19.6870	19.6690
				62	35.07	30.59	19.3990	19.5280
			106T	53	20.64	20.48	17.7730	17.8660
				54	26.37	27.45	19.5520	19.9360
				56	20.49	21.31	17.8540	17.9620
EHT80 (FCC)	5210	42	SU	--	81.02	81.66	77.2760	77.3670
			242T	61	22.74	22.52	21.1760	20.8370
				62	22.33	22.74	20.1240	20.2680
				64	21.71	22.08	19.7580	19.7330
			MRU52+26T	71	18.19	17.96	17.3020	17.2870
				74	18.75	18.26	17.6690	17.6400
				80	18.16	18.89	17.4260	17.5960
EHT160 (FCC)	5250 (Straddle)	50	SU	--	162.10	161.90	156.6600	156.5800
			242T	61	21.84	22.17	20.8910	20.7820
				62	23.20	22.19	20.9400	20.5490
				S64	23.19	22.06	20.1530	20.0900

20MHz - Mid Channel – SU (UNII-1) –
Ant 1 (FCC)20MHz - Mid Channel – 106T-RU53 (UNII-1) –
Ant 1 (FCC)

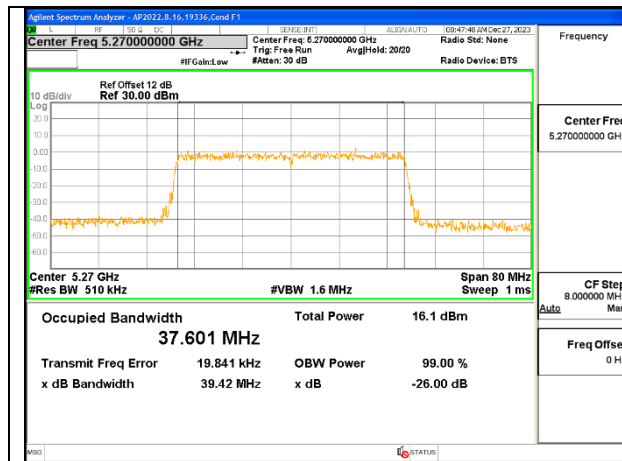
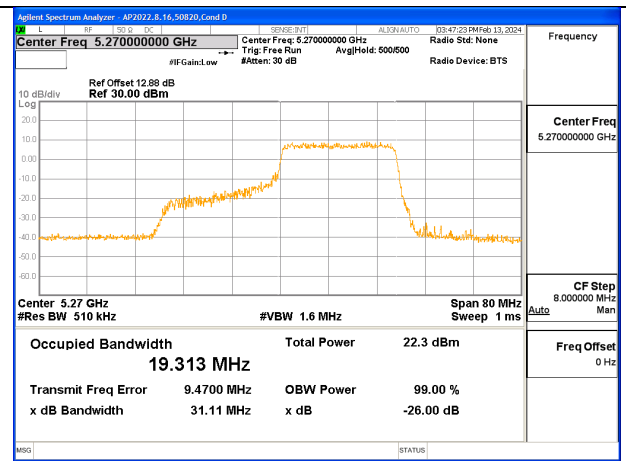
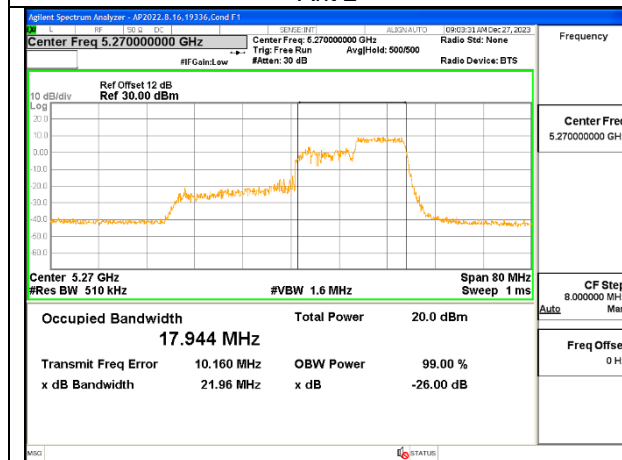
9.2.10. 802.11be MIMO CDD MODE IN THE UNII-1 BAND

UNII-1 (MIMO CDD)	Frequency (MHz)	Channel Number	Tone	RU Index	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
					Ant 1	Ant 2	Min BW	Ant 1	Ant 2	Min BW
EHT20 (FCC)	5180	36	SU	--	21.61	21.28	--	19.0290	19.1040	--
			106T	53	20.77	20.35	--	18.2180	18.1830	--
				54	21.20	19.43	--	18.1670	17.8860	--
	5200	40	SU	--	21.60	21.63	--	19.0400	19.0920	--
			106T	53	20.58	20.62	--	17.8780	18.1330	--
				54	20.98	19.88	--	18.3150	18.2400	--
	5240	48	SU	--	21.47	21.07	--	19.0510	19.0810	--
			106T	53	20.85	20.35	--	17.9770	18.0550	--
				54	21.14	20.01	--	17.8040	18.2080	--
EHT40 (FCC)	5190	38	SU	--	39.99	39.64	--	37.6690	37.6090	--
			242T	61	33.40	22.54	--	19.6800	19.7240	--
				62	30.95	21.61	--	19.4330	19.5390	--
			106T	53	20.43	20.11	--	17.6460	17.7740	--
				54	25.90	24.81	--	19.6040	19.4440	--
				56	20.66	19.16	--	17.8090	16.8630	--
	5230	46	SU	--	39.69	39.92	--	37.6900	37.6030	--
			242T	61	33.26	28.58	--	19.6250	19.2670	--
				62	27.26	26.65	--	19.3740	19.1930	--
			106T	53	20.21	19.61	--	17.7010	17.6680	--
				54	27.89	27.26	--	19.7950	19.1680	--
				56	21.18	19.49	--	17.6460	17.6380	--
EHT80 (FCC)	5210	42	SU	--	80.50	80.83	--	77.2200	77.2570	--
			242T	61	22.04	21.49	--	20.8330	20.0000	--
				62	222.20	21.61	--	20.3720	19.7780	--
				64	22.52	21.53	--	19.6750	19.4940	--
				71	18.39	17.96	--	17.4560	16.9730	--
			MRU52+26T	74	17.95	18.35	--	17.3390	17.3330	--
				80	18.28	17.79	--	17.6920	16.9290	--
			SU	--	162.00	161.50	--	157.0100	156.7900	--
			242T	61	22.81	22.26	--	21.4980	19.8150	--
				62	24.53	23.20	--	20.8780	19.9520	--
EHT160 (FCC)	5250 (Straddle)	50		S64	21.66	21.58	--	19.7610	19.8700	--

20MHz - Mid Channel – SU (UNII-1) –
Ant 1 (FCC)20MHz - Mid Channel – SU (UNII-1) –
Ant 2 (FCC)20MHz - Mid Channel – 106T-RU53 (UNII-1) –
Ant 1 (FCC)20MHz - Mid Channel – 106T-RU53 (UNII-1) –
Ant 2 (FCC)

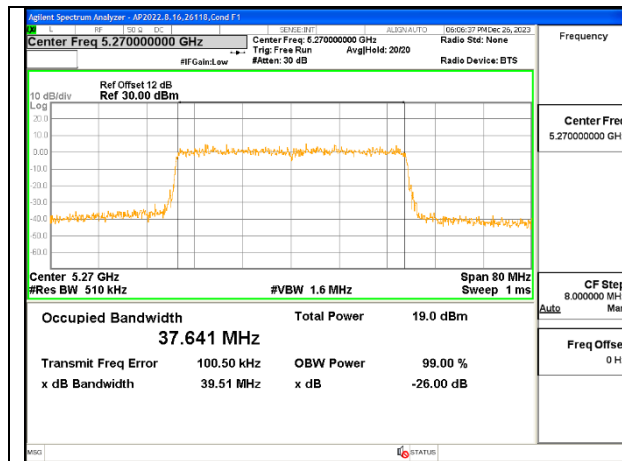
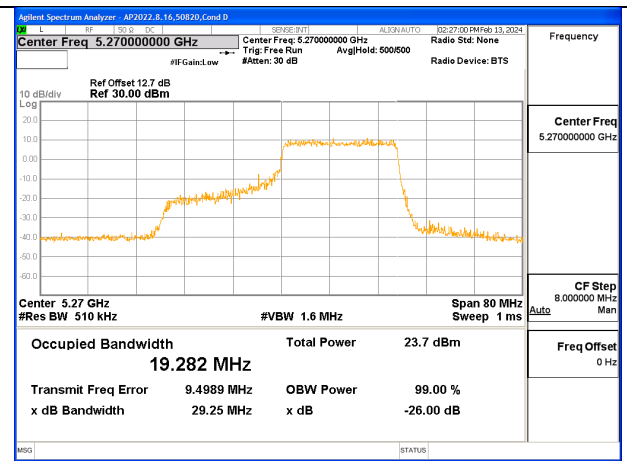
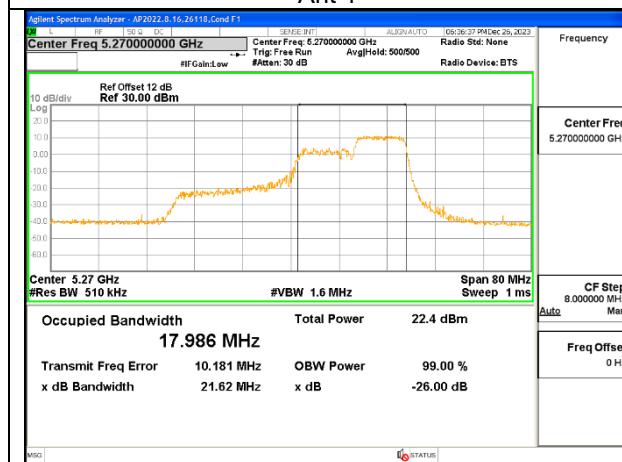
9.2.11. 802.11be SISO MODE IN THE UNII-2A BAND

UNII-2a (SISO)	Frequency (MHz)	Channel Number	Tone	RU Index	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
					Ant 1	Ant 2	Ant 1	Ant 2
EHT20	5260	52	SU	--	21.49	21.50	19.0040	19.0550
			106T	53	20.84	20.80	18.0250	18.2160
				53	20.91	21.18	18.0300	18.3220
	5300	60	SU	--	21.47	20.94	18.9650	19.0500
			106T	53	20.64	20.74	18.2220	18.2160
				53	20.84	21.12	18.2100	18.2520
	5320	64	SU	--	21.49	21.29	19.0350	19.0020
			106T	53	20.57	20.54	18.1910	18.2170
				53	21.16	21.29	18.1770	18.3550
EHT40	5270	54	SU	--	39.59	39.42	37.6250	37.6010
			242T	61	28.75	29.21	19.5680	19.4850
				62	27.66	31.11	19.3160	19.3130
			106T	53	20.28	20.64	17.6870	17.8860
				54	27.22	24.73	18.8350	18.9710
				56	20.95	21.96	17.4430	17.9440
	5310	62	SU	--	39.94	39.70	37.6760	37.6400
			242T	61	31.68	29.54	19.6880	19.5050
				62	28.10	30.55	19.4120	19.5450
			106T	53	20.06	19.95	17.5190	17.4910
				54	24.57	23.83	18.6430	18.4670
				56	19.83	20.63	17.7580	17.7190
EHT80	5290	58	SU	--	79.98	79.92	77.3030	77.2070
			242T	61	21.74	21.87	20.9050	20.2910
				62	22.55	24.39	20.4790	20.4560
				64	23.09	22.19	20.0370	20.2910
EHT160	5250 (Straddle)	50	SU	--	162.10	161.90	156.6600	156.5800
			242T	61	21.84	22.17	20.8910	20.7820
				62	23.20	22.19	20.9400	20.5490
				S64	23.19	22.06	20.1530	20.0900

40MHz - Low Channel – SU (UNII-2a) –
Ant 240MHz - Low Channel – 242T-RU62 (UNII-2a) –
Ant 240MHz - Low Channel – 106T-RU56 (UNII-2a) –
Ant 2

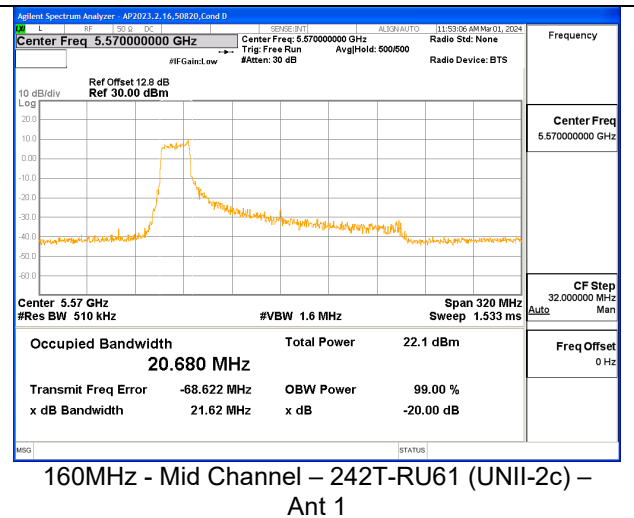
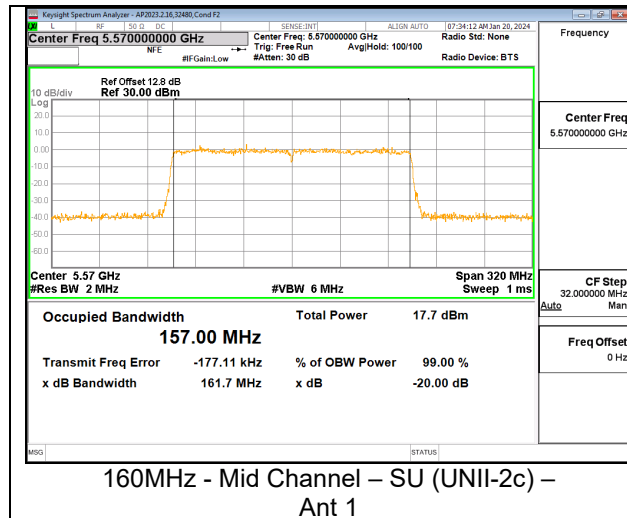
9.2.12. 802.11be MIMO CDD MODE IN THE UNII-2A BAND

UNII-2a (MIMO CDD)	Frequency (MHz)	Channel Number	Tone	RU Index	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
					Ant 1	Ant 2	Min BW	Ant 1	Ant 2	Min BW
EHT20	5260	52	SU	--	21.17	21.08	21.08	19.0360	18.9580	18.9580
			106T	53	20.75	20.17	20.17	17.8570	18.1460	17.8570
				54	20.99	19.91	19.91	18.0490	18.1800	18.0490
	5300	60	SU	--	21.59	21.39	21.39	19.0380	19.1260	19.0380
			106T	53	20.83	20.17	20.17	17.7570	18.1020	17.7570
				54	21.17	20.01	20.01	18.2410	18.1680	18.1680
	5320	64	SU	--	21.43	21.25	21.25	19.0750	18.0200	18.0200
			106T	53	20.63	20.53	20.53	18.0890	18.1460	18.0890
				54	21.32	19.96	19.96	18.0710	18.2290	18.0710
EHT40	5270	54	SU	--	39.51	39.61	39.51	37.6410	37.5600	37.5600
			242T	61	31.06	28.67	28.67	19.6510	19.2280	19.2280
				62	29.25	25.39	25.39	19.2820	19.3190	19.2820
			106T	53	20.90	18.27	18.27	17.8380	16.8670	16.8670
				54	26.35	23.10	23.10	20.0030	18.6060	18.6060
				56	21.62	19.41	19.41	17.9860	17.7120	17.7120
	5310	62	SU	--	39.39	39.48	39.39	37.6270	37.5990	37.5990
			242T	61	30.58	26.43	26.43	19.5620	19.2360	19.2360
				62	27.72	28.71	27.72	19.4740	19.1970	19.1970
			106T	53	20.37	19.65	19.65	17.8560	17.5830	17.5830
				54	27.84	20.97	20.97	20.0020	18.6050	18.6050
				56	21.51	19.70	19.70	17.9120	17.7260	17.7260
EHT80	5290	58	SU	--	79.74	79.96	79.74	77.1830	77.1270	77.1270
			242T	61	22.09	21.62	21.62	20.9470	19.5910	19.5910
				62	23.77	21.35	21.35	20.0710	19.8050	19.8050
				64	21.20	21.63	21.20	19.9290	19.4360	19.4360
EHT160	5250 (Straddle)	50	SU	--	162.00	161.50	161.50	157.0100	156.7900	156.7900
			242T	61	22.81	22.26	22.26	21.4980	19.8150	19.8150
				62	24.53	23.20	23.20	20.8780	19.9520	19.9520
				S64	21.66	21.58	21.58	19.7610	19.8700	19.7610

40MHz - Low Channel – SU (UNII-2a) –
Ant 140MHz - Low Channel – 242T-RU62 (UNII-2a) –
Ant 140MHz - Low Channel – 106T-RU56 (UNII-2a) –
Ant 1

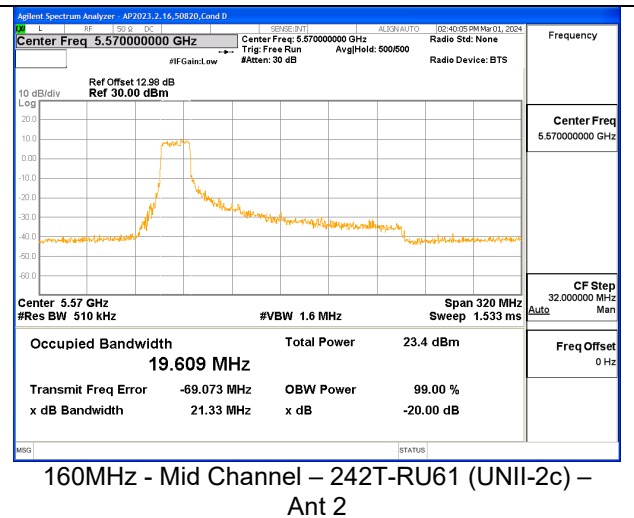
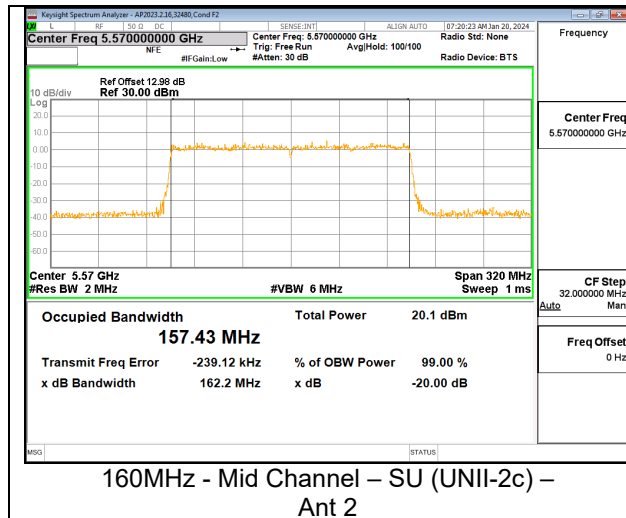
9.2.13. 802.11be SISO MODE IN THE UNII-2C BAND

UNII-2c (SISO)	Frequency (MHz)	Channel Number	Tone	RU Index	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
					Ant 1	Ant 2	Ant 1	Ant 2
EHT20	5500	100	SU	--	21.17	21.29	19.0450	19.0330
			106T	53	20.81	19.69	18.2480	18.1580
				54	21.19	19.94	18.2490	18.1020
	5580	116	SU	--	21.35	21.09	19.0140	19.0110
			106T	53	20.63	19.89	18.1550	17.4400
				54	21.33	19.27	18.3010	17.5320
	5700	140	SU	--	21.50	21.08	19.0410	19.0370
			106T	53	20.81	20.16	18.2420	17.7840
				54	21.29	19.32	18.2970	17.7050
	5720 (Straddle)	144	SU	--	21.21	21.18	19.0190	19.0110
			106T	53	20.87	20.56	18.0720	18.0560
				54	21.17	19.91	18.2760	18.2280
EHT40	5510	102	SU	--	39.81	39.93	37.7040	37.6350
			242T	61	28.82	30.94	19.3580	19.4090
				62	28.80	32.58	19.4980	19.5020
				53	20.58	19.53	17.8130	17.6480
			106T	54	26.35	24.13	19.8930	18.9680
				56	22.03	20.47	17.9700	17.5820
	5550	110	SU	--	39.58	39.43	37.6120	37.6420
			242T	61	29.97	27.89	19.4720	19.3790
				62	29.89	30.08	19.5690	19.4210
				53	20.73	20.17	17.8830	17.6400
			106T	54	26.94	26.32	19.9950	18.9200
				56	20.90	20.96	17.9750	17.7850
	5670	134	SU	--	39.34	39.66	37.6130	37.5700
			242T	61	32.82	29.46	19.4910	19.7270
				62	28.48	29.31	19.4450	19.3990
				53	20.76	20.09	17.8690	17.6520
			106T	54	26.89	27.71	19.9360	18.9280
				56	21.54	20.93	18.0140	17.7380
	5710 (Straddle)	142	SU	--	39.65	39.55	37.6080	37.7000
			242T	61	32.83	37.39	19.5800	19.6410
				62	26.91	28.81	19.4010	19.4550
				53	20.85	20.10	17.8390	17.6450
			106T	54	25.82	23.79	20.1490	18.9430
				56	21.55	20.53	17.8530	17.6980
EHT80	5530	106	SU	--	80.08	80.42	77.2630	77.3290
			242T	61	21.95	22.93	20.3110	20.4270
				62	24.46	23.17	20.0460	20.2050
				64	21.62	21.93	20.3100	19.8620
	5610	122	SU	--	79.97	79.83	77.1660	77.3200
			242T	61	22.20	21.95	20.0050	19.8220
				62	22.04	23.77	19.8870	20.1900
				64	21.54	22.81	20.3660	19.9950
	5690 (Straddle)	138	SU	--	80.18	80.18	77.3450	77.2960
			242T	61	23.42	23.31	19.9580	20.8120
				62	22.66	22.02	20.1320	20.3260
				64	22.68	21.72	20.1300	19.8290
EHT160	5570	106	SU	--	161.70	162.00	157.0000	157.2100
			242T	61	21.62	23.01	20.6800	20.3470
				62	23.04	22.46	20.2530	20.4110
				S64	22.49	21.08	20.7060	20.0430



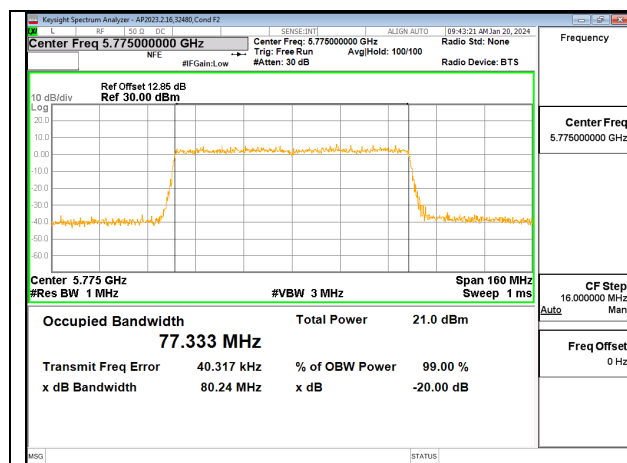
9.2.14. 802.11be MIMO CDD MODE IN THE UNII-2C BAND

UNII-2c (MIMO CDD)	Frequency (MHz)	Channel Number	Tone	RU Index	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
					Ant 1	Ant 2	Min BW	Ant 1	Ant 2	Min BW
EHT20	5500	100	SU	--	21.42	21.53	21.42	19.0820	19.0870	19.0820
			106T	53	20.30	20.02	20.02	18.1850	18.0440	18.0440
				54	20.95	19.63	19.63	18.3130	18.1370	18.1370
	5580	116	SU	--	21.41	21.39	21.39	19.1210	19.0140	19.0140
			106T	53	20.89	20.51	20.51	18.1600	18.1660	18.1600
				54	21.11	19.93	19.93	18.2780	18.0980	18.0980
	5700	140	SU	--	21.30	21.28	21.28	19.0400	19.0630	19.0400
			106T	53	20.64	20.25	20.25	18.1760	18.0260	18.0260
				54	21.14	20.05	20.05	18.3080	18.1310	18.1310
	5720 (Straddle)	144	SU	--	21.35	20.95	20.95	19.0070	18.9970	18.9970
			106T	53	20.78	20.47	20.47	18.2340	18.0110	18.0110
				54	21.12	20.00	20.00	18.1160	18.1060	18.1060
EHT40	5510	102	SU	--	40.03	39.34	39.34	37.6170	37.6420	37.6170
			242T	61	29.20	28.10	28.10	19.3160	19.2760	19.2760
				62	32.96	26.75	26.75	19.5830	19.2580	19.2580
			106T	53	20.98	19.59	19.59	17.9350	17.6360	17.6360
				54	25.85	24.16	24.16	19.7170	18.2440	18.2440
				56	21.71	18.99	18.99	17.8920	17.5440	17.5440
	5550	110	SU	--	39.87	39.58	39.58	37.7040	37.6190	37.6190
			242T	61	27.87	26.87	26.87	19.4730	19.2610	19.2610
				62	31.49	26.00	26.00	19.6490	19.3210	19.3210
			106T	53	19.87	19.36	19.36	17.6570	17.5910	17.5910
				54	23.89	22.45	22.45	18.7330	18.5730	18.5730
				56	20.76	19.15	19.15	17.6530	17.5120	17.5120
	5670	134	SU	--	39.83	39.32	39.32	37.6610	37.5790	37.5790
			242T	61	35.89	26.91	26.91	19.7150	19.2220	19.2220
				62	29.69	25.32	25.32	19.5420	19.2050	19.2050
			106T	53	20.97	19.52	19.52	17.8270	17.6010	17.6010
				54	27.48	23.15	23.15	19.7260	18.4840	18.4840
				56	21.17	19.31	19.31	18.0040	17.6790	17.6790
	5710 (Straddle)	142	SU	--	39.89	39.32	39.32	37.5500	37.6980	37.5500
			242T	61	28.68	26.89	26.89	19.5400	19.4040	19.4040
				62	28.95	28.15	28.15	19.4360	19.2080	19.2080
			106T	53	20.51	19.44	19.44	17.8460	17.6590	17.6590
				54	25.60	22.80	22.80	19.7490	18.5870	18.5870
				56	20.99	19.45	19.45	17.7690	17.6410	17.6410
EHT80	5530	106	SU	--	80.29	80.27	80.27	77.3340	77.1620	77.1620
			242T	61	21.37	21.97	21.37	20.0720	19.7850	19.7850
				62	23.92	21.52	21.52	20.1020	19.6920	19.6920
				64	21.71	21.19	21.19	20.2980	19.6160	19.6160
	5610	122	SU	--	80.13	79.65	79.65	77.3000	77.2140	77.2140
			242T	61	22.15	20.99	20.99	19.9590	19.3390	19.3390
				62	22.54	21.82	21.82	20.1260	19.7610	19.7610
				64	21.94	21.94	21.94	19.9880	19.4510	19.4510
	5690 (Straddle)	138	SU	--	79.86	80.24	79.86	77.2390	77.4270	77.2390
			242T	61	22.44	22.04	22.04	20.6290	19.6370	19.6370
				62	22.08	21.81	21.81	20.0990	19.7250	19.7250
				64	22.47	21.27	21.27	20.1520	19.3700	19.3700
EHT160	5570	106	SU	--	162.00	162.20	162.00	157.1900	157.4300	157.1900
			242T	61	21.79	21.33	21.33	20.2050	19.6090	19.6090
				62	22.94	22.05	22.05	20.4800	19.8010	19.8010
				564	22.58	21.93	21.93	20.1450	19.6600	19.6600

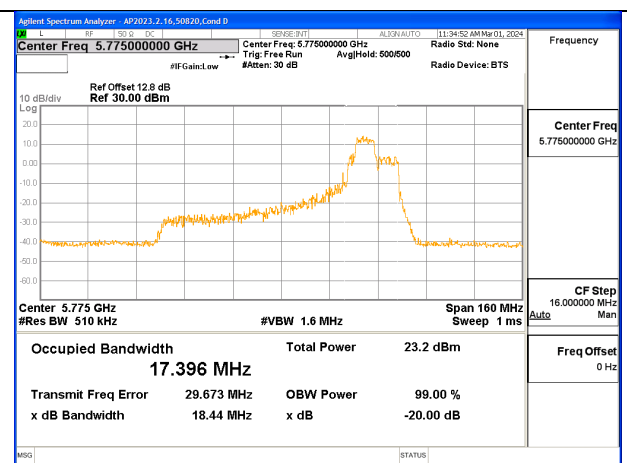


9.2.15. 802.11be SISO MODE IN THE UNII-3 BAND

UNII-3 (SISO)	Frequency (MHz)	Channel Number	Tone	RU Index	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
					Ant 1	Ant 2	Ant 1	Ant 2
EHT20	5745	149	SU	--	20.56	20.48	19.0630	19.0600
			106T	53	21.02	19.49	18.1000	18.2280
				54	20.67	19.84	18.2050	18.3220
	5785	157	SU	--	20.45	20.50	19.1040	19.0670
			106T	53	20.97	19.42	18.2360	18.2440
				54	21.17	19.83	17.6200	18.2320
EHT40	5755	151	SU	--	20.54	20.51	19.0920	19.0950
			106T	53	20.67	19.62	18.2130	18.2750
				54	21.20	21.33	18.2690	18.2710
	5795	159	SU	--	39.29	39.03	37.7090	37.7300
			242T	61	33.58	28.45	19.4590	19.5840
				62	28.12	31.48	19.4170	19.3260
EHT80	5775	155	SU	--	39.20	39.25	37.6870	37.6430
			242T	61	32.71	36.79	19.7000	19.5330
				62	30.49	27.93	19.4340	19.4770
	5775	155	MRU52+26T	--	80.24	80.11	77.3330	77.2080
				71	18.27	18.23	16.6860	17.2570
				74	19.15	16.05	17.7620	15.5160
				80	18.44	18.30	17.3960	17.6190



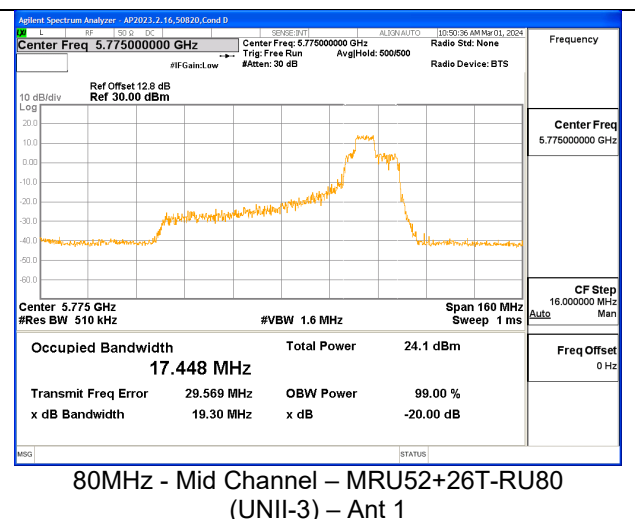
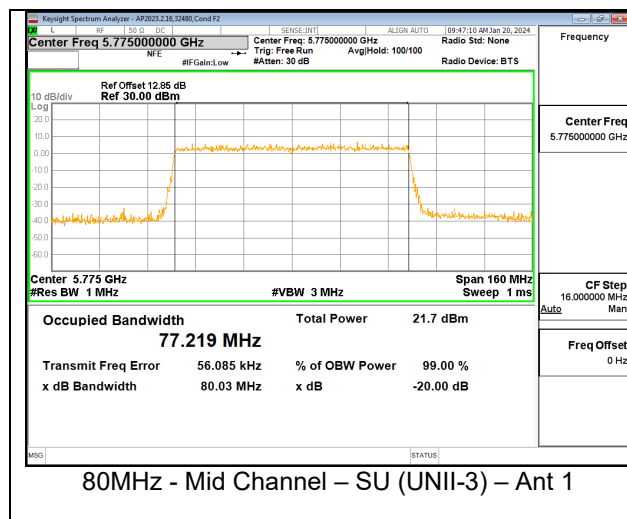
80MHz - Mid Channel – SU (UNII-3) – Ant 1



80MHz - Mid Channel – MRU52+26T-RU80 (UNII-3) – Ant 1

9.2.16. 802.11be MIMO CDD MODE IN THE UNII-3 BAND

UNII-3 (MIMO CDD)	Frequency (MHz)	Channel Number	Tone	RU Index	26 dB Bandwidth (MHz)		99% Bandwidth (MHz)	
					Ant 1	Ant 2	Ant 1	Ant 2
EHT20	5745	149	SU	--	20.33	20.56	19.1020	19.1270
			106T	53	20.91	20.15	18.2470	18.1470
				54	21.15	19.98	17.8530	17.8950
	5785	157	SU	--	20.56	20.82	19.0970	19.1440
			106T	53	21.07	19.82	17.9200	17.9870
				54	20.91	20.22	17.3710	18.0930
EHT40	5755	151	SU	--	20.52	20.38	19.0350	19.0940
			106T	53	21.10	20.25	18.2450	18.0060
				54	21.25	20.12	18.3040	18.0340
	5795	159	SU	--	39.14	39.01	37.7570	37.6320
			242T	61	29.41	28.15	19.5420	19.2880
				62	28.58	26.09	19.4110	19.1530
EHT80	5775	155	SU	--	39.23	39.17	37.6080	37.6010
			242T	61	33.67	26.99	19.5620	19.2740
				62	28.36	25.47	19.4910	19.2600
	5775	155	SU	--	80.03	79.64	77.2190	77.2380
			MRU52+26T	71	18.31	17.78	17.3700	16.6350
				84	18.25	18.11	17.6560	17.3760
				80	19.30	18.30	17.4480	16.8070



9.3. BANDWIDTH VERIFICATION OF CHANNEL PUNCTURING IN THE DFS BANDS

LIMITS

When a 20 MHz portion is punctured the remaining emissions do not bleed into the notched channel.

For Channel Puncturing, investigation was performed on the following :

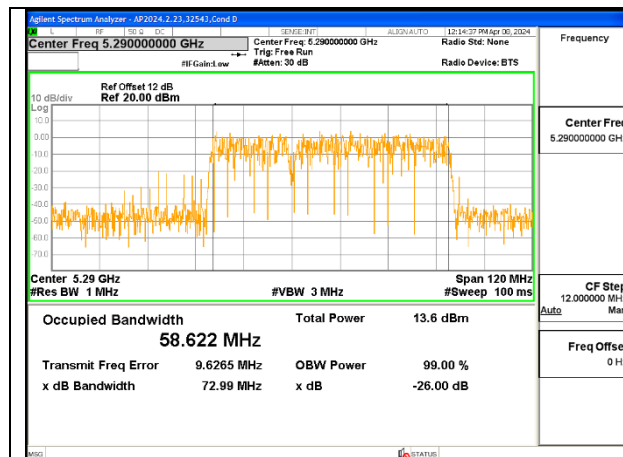
Bandwidth	RU Size
80MHz	484+242
160MHz	996+484
	996+484+242

RESULTS

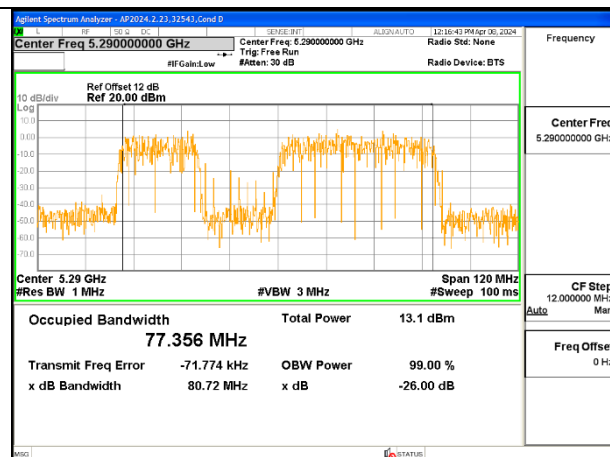
The 99% Occupied Bandwidth are contained outside of the notched band.

9.3.1. 802.11be EHT80 SISO MODE

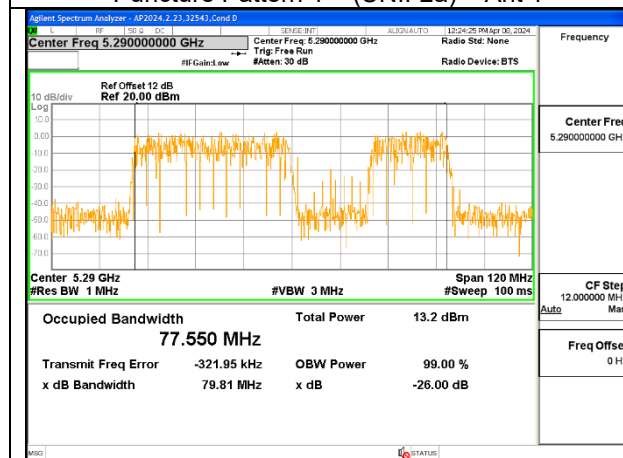
ID:	32543	Date:	4/10/2024
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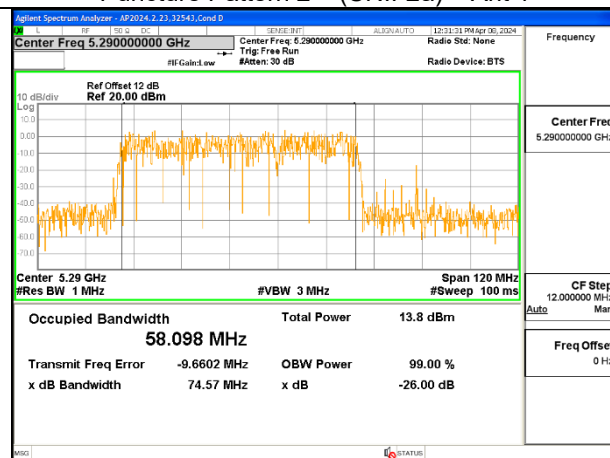
80MHz – 484+242T – Mid Channel –
Puncture Pattern 1 – (UNII-2a) – Ant 1



80MHz – 484+242T – Mid Channel –
Puncture Pattern 2 – (UNII-2a) – Ant 1



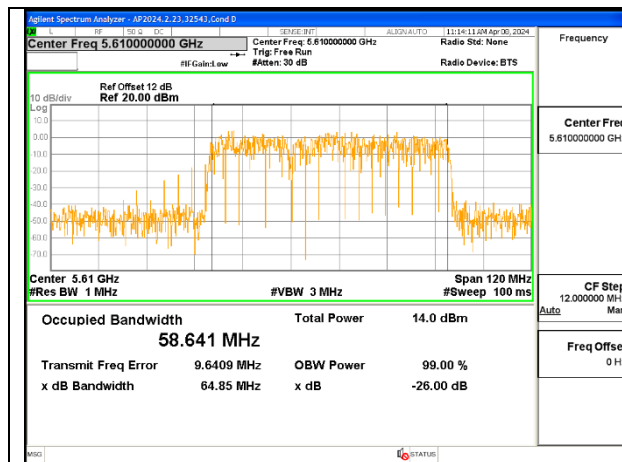
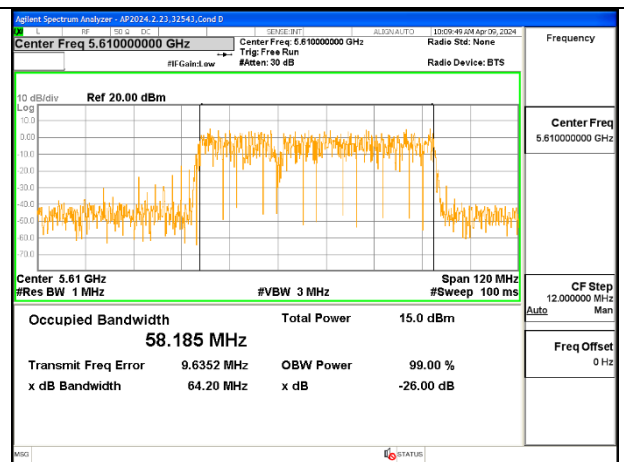
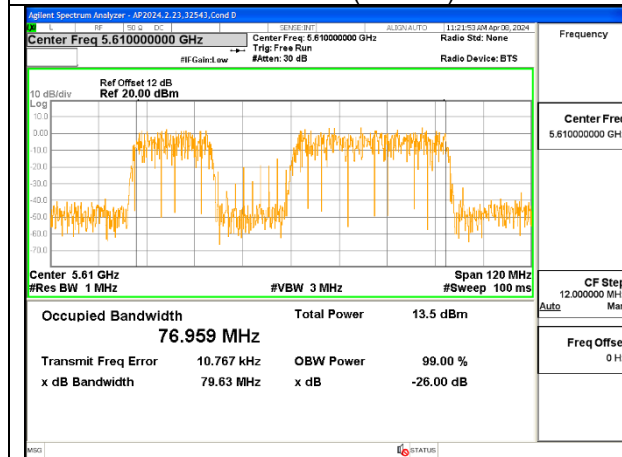
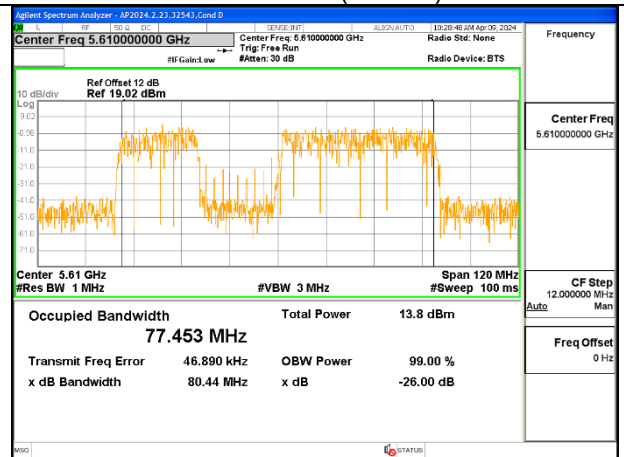
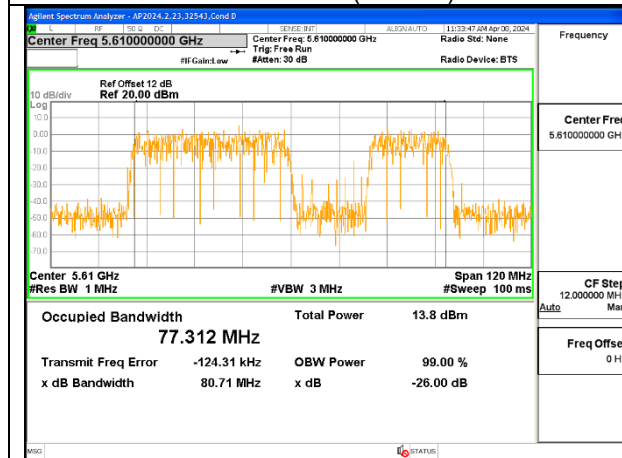
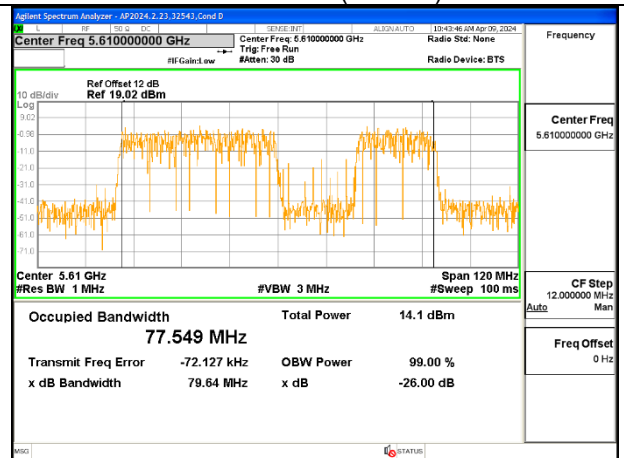
80MHz – 484+242T – Mid Channel –
Puncture Pattern 4 – (UNII-2a) – Ant 1

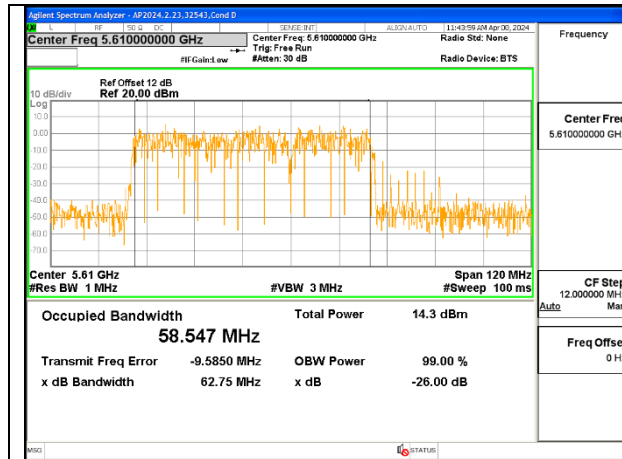
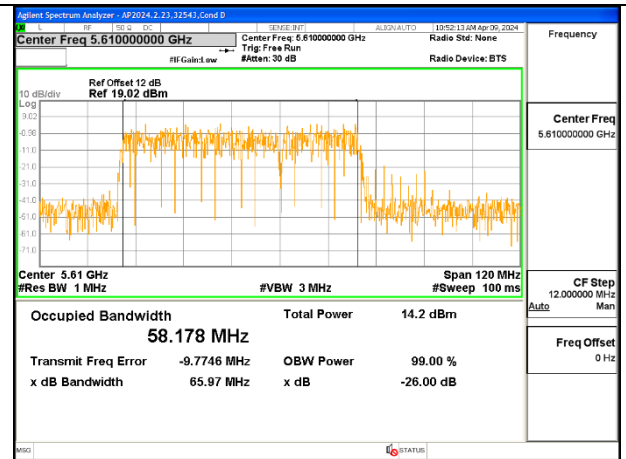


80MHz – 484+242T – Mid Channel –
Puncture Pattern 8 – (UNII-2a) – Ant 1

9.3.2. 802.11be EHT80 MIMO CDD MODE

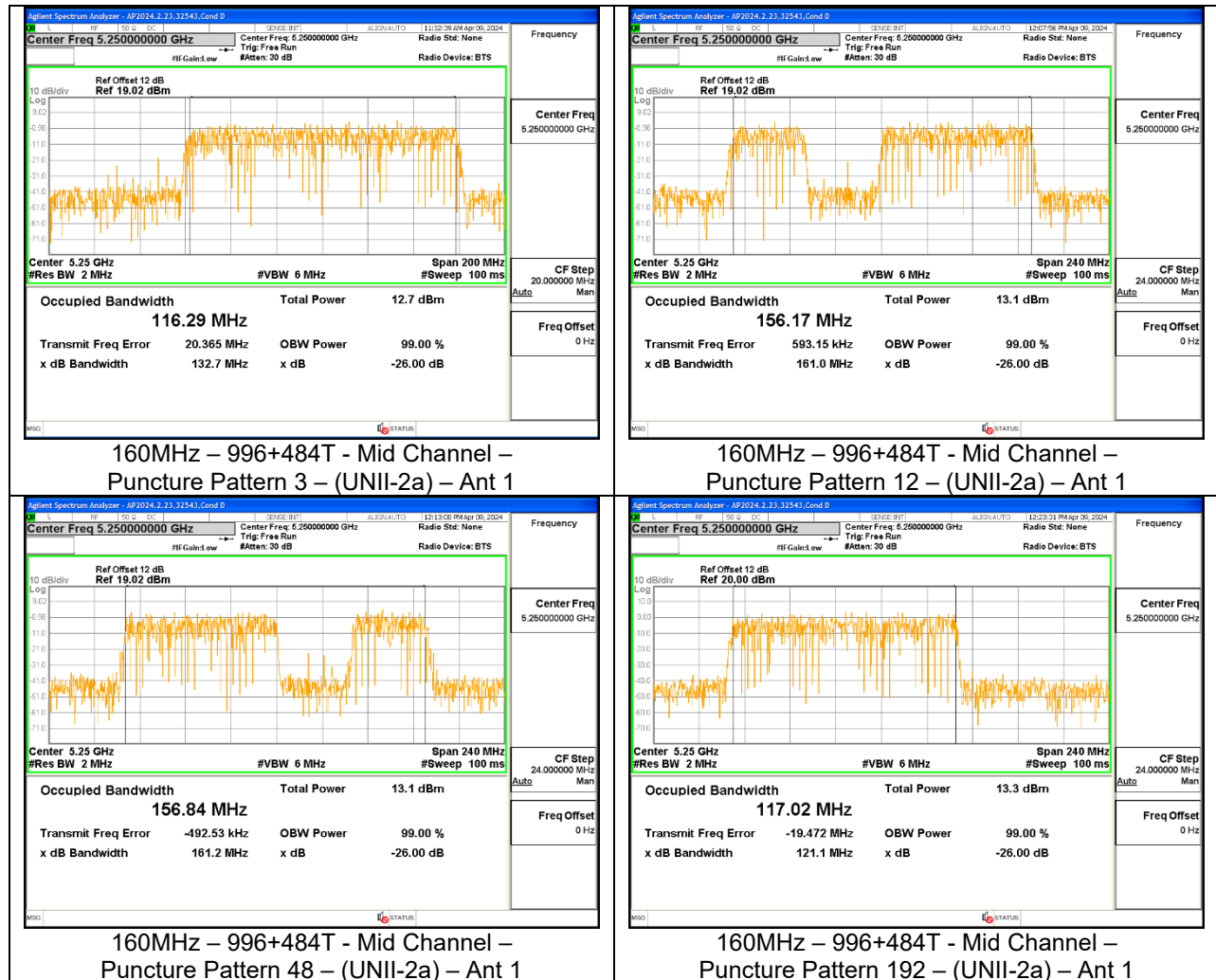
ID:	32543	Date:	4/10/2024
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80MHz – 484+242T – Mid Channel –
Puncture Pattern 1 – (UNII-2c) – Ant 180MHz – 484+242T – Mid Channel –
Puncture Pattern 1 – (UNII-2c) – Ant 280MHz – 484+242T – Mid Channel –
Puncture Pattern 2 – (UNII-2c) – Ant 180MHz – 484+242T – Mid Channel –
Puncture Pattern 2 – (UNII-2c) – Ant 280MHz – 484+242T – Mid Channel –
Puncture Pattern 4 – (UNII-2c) – Ant 180MHz – 484+242T – Mid Channel –
Puncture Pattern 4 – (UNII-2c) – Ant 2

80MHz – 484+242T – Mid Channel –
Puncture Pattern 8 – (UNII-2c) – Ant 180MHz – 484+242T – Mid Channel –
Puncture Pattern 8 – (UNII-2c) – Ant 2

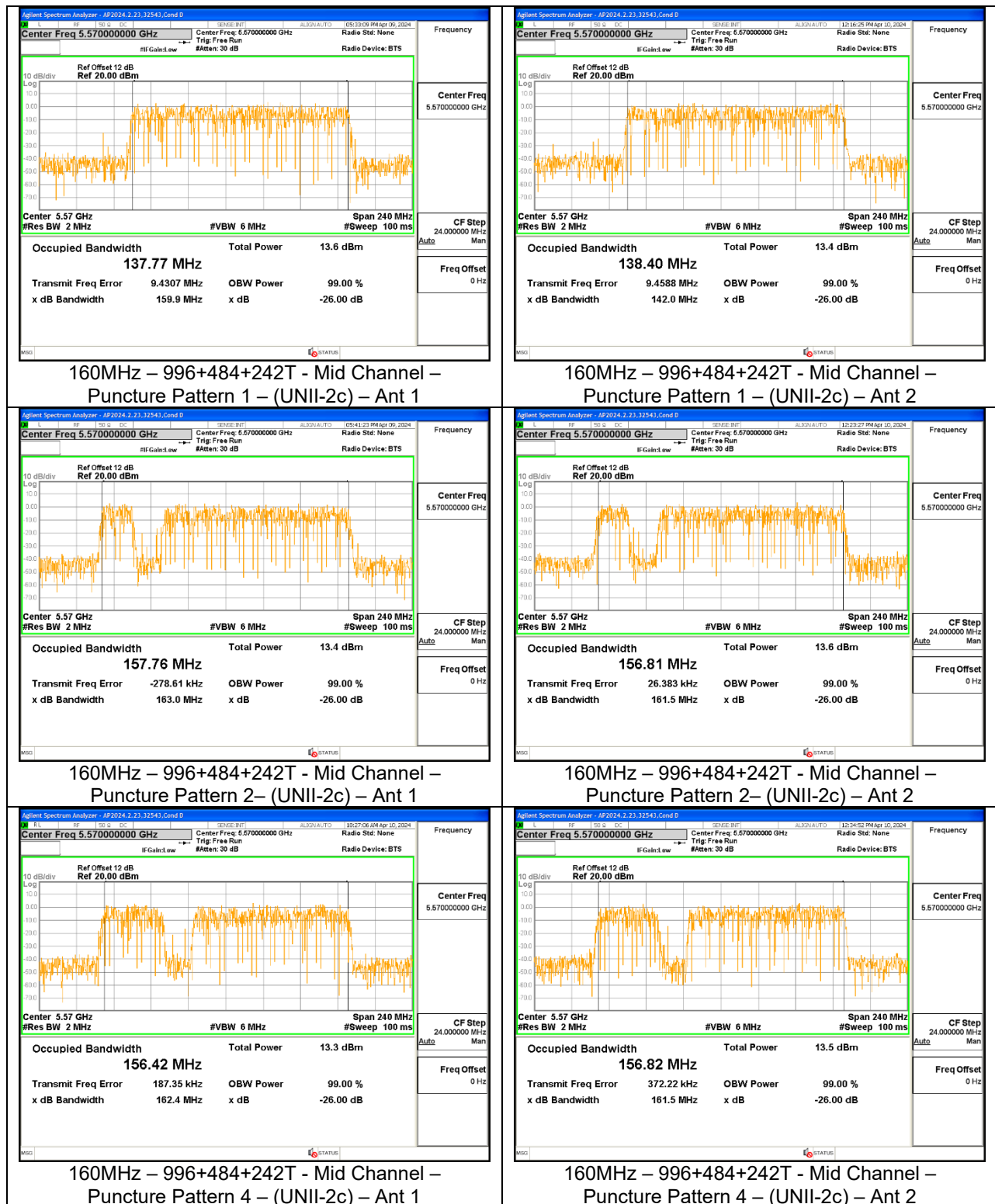
9.3.3. 802.11be EHT160 SISO MODE

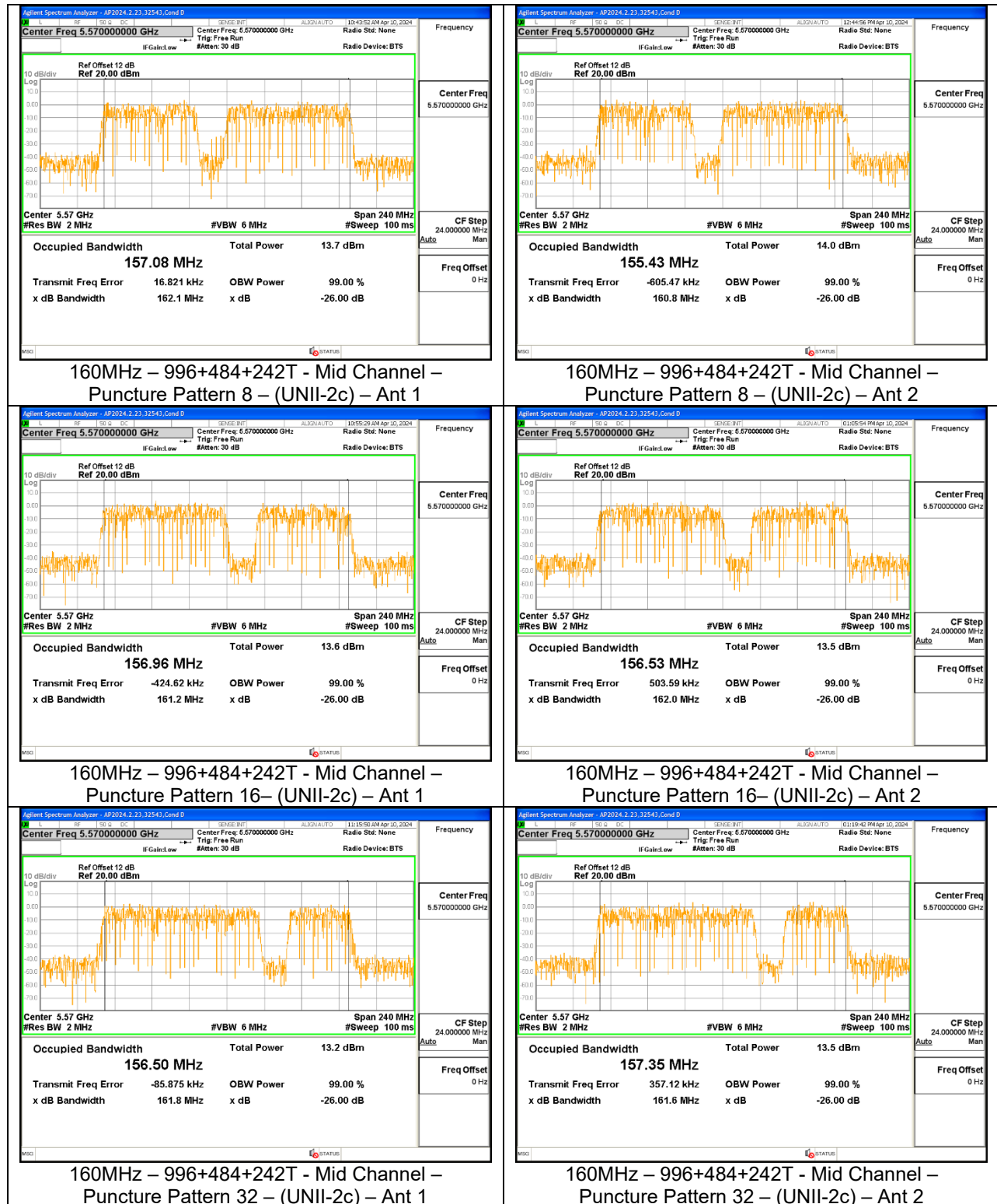
ID:	32543	Date:	4/10/2024
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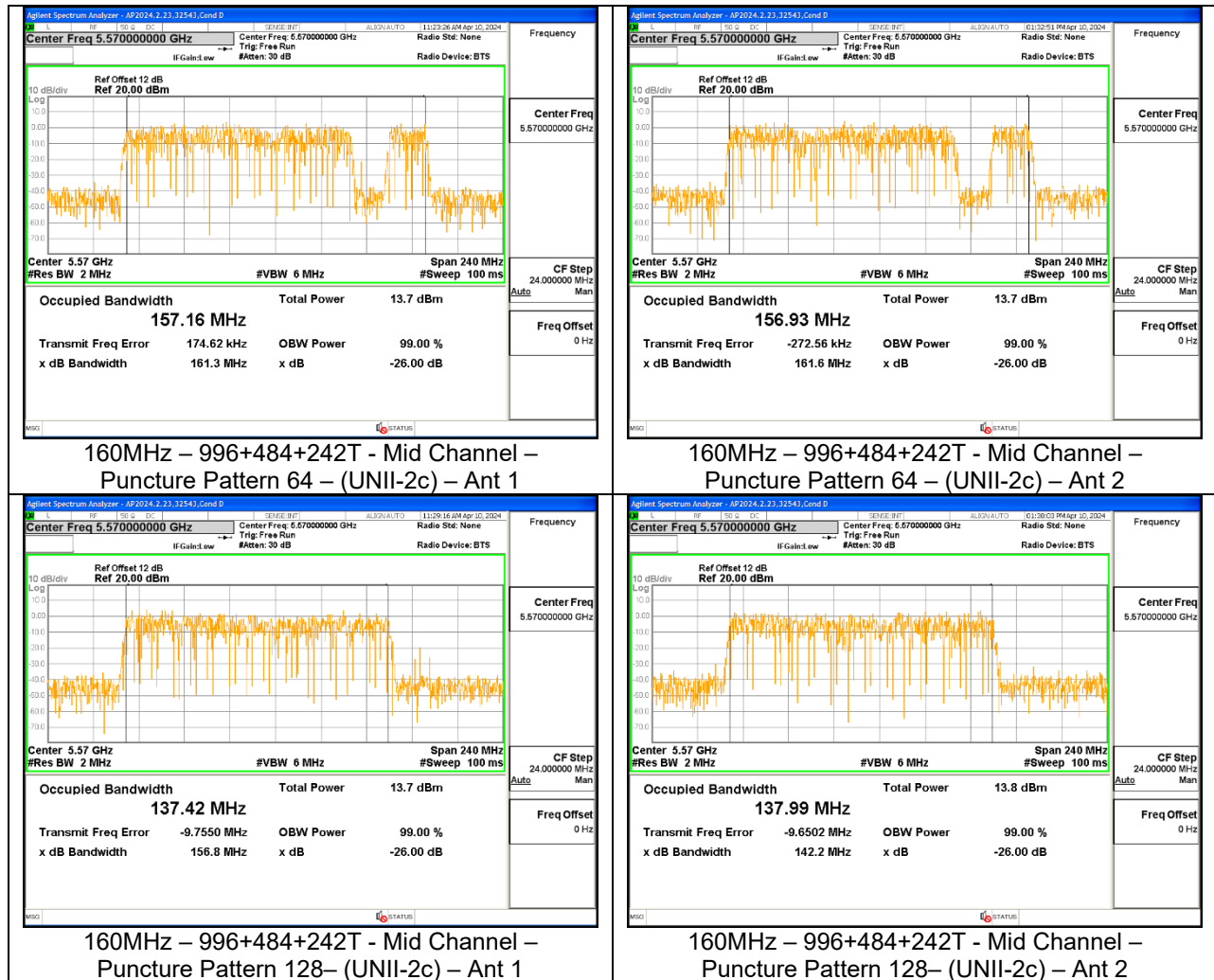


9.3.4. 802.11be EHT160 MIMO CDD MODE

ID:	32543	Date:	4/10/2024
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9.4. 6 dB BANDWIDTH

LIMITS

FCC §15.407 (e)

RSS-247 6.2.4.1

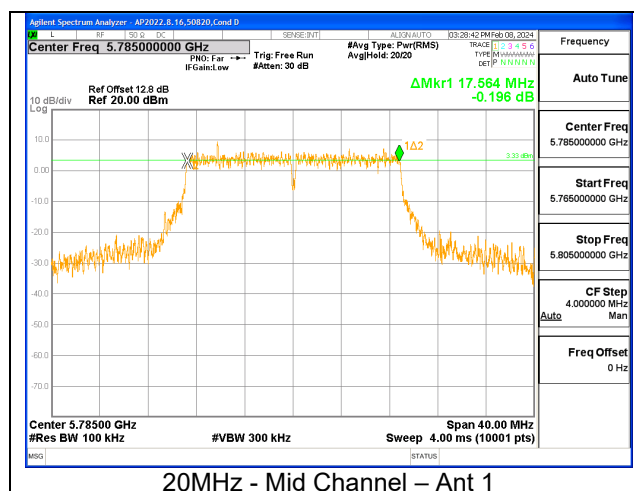
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

For 6dB bandwidth measurements, the 802.11be HT20 was tested at 26T as a worst-case scenario. For straddle channels, 52T was tested as worst-case as 26T is not supported.

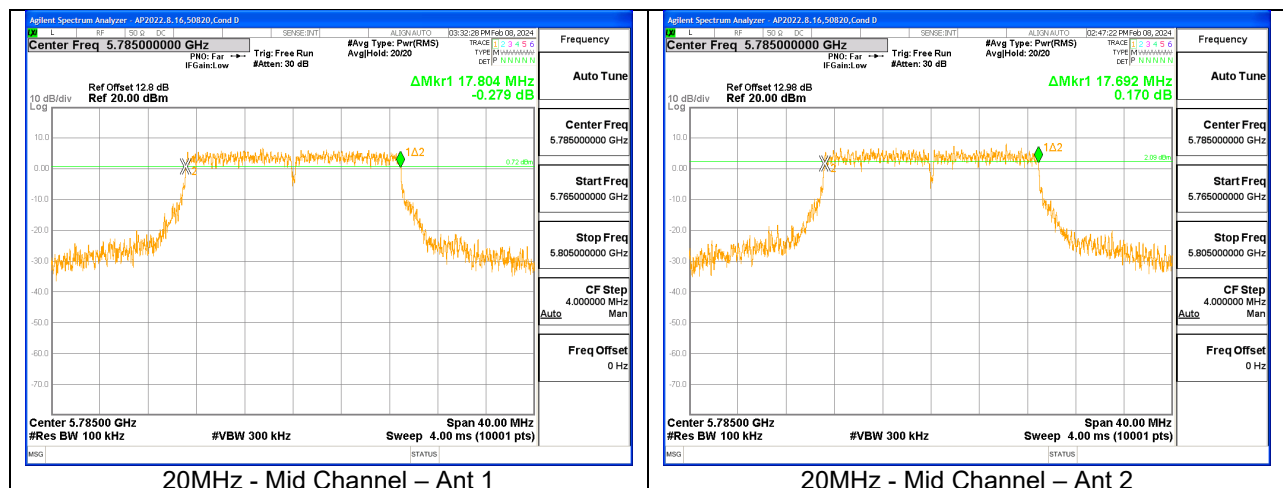
9.4.1. 802.11n/ac SISO MODE IN THE 5.8 GHz BAND

UNII-3 (SISO)	Frequency (MHz)	Channel Number	6 dB BW (MHz)	
			Ant 1	Ant 2
HT20	5720 (Straddle)	144	3.896	3.892
	5745	149	17.592	17.580
	5785	157	17.564	17.540
	5825	165	17.544	17.708
HT40	5710 (Straddle)	142	3.224	3.224
	5755	151	36.376	36.368
	5795	159	36.360	36.336
VHT80	5690 (Straddle)	138	3.192	3.208
	5775	155	75.728	74.880



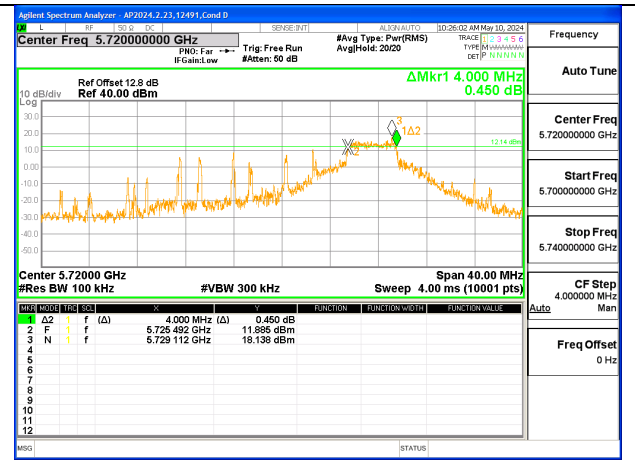
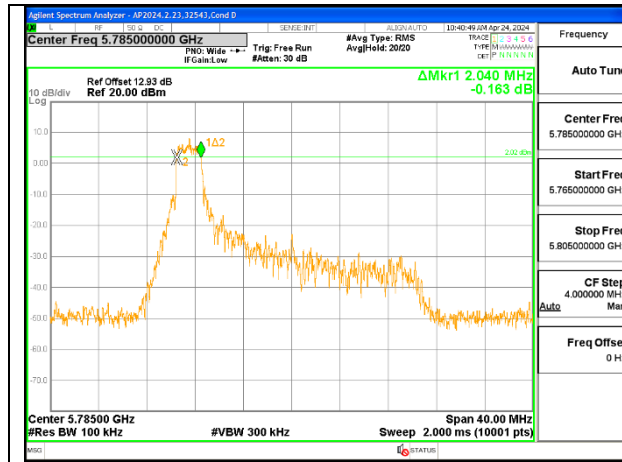
9.4.2. 802.11n/ac MIMO CDD MODE IN THE 5.8 GHz BAND

UNII-3 (MIMO CDD)	Frequency (MHz)	Channel Number	6 dB BW (MHz)	
			Ant 1	Ant 2
HT20	5720 (Straddle)	144	3.908	3.888
	5745	149	17.592	17.568
	5785	157	17.804	17.692
	5825	165	17.816	17.668
HT40	5710 (Straddle)	142	3.304	3.320
	5755	151	36.360	36.408
	5795	159	36.512	36.392
VHT80	5690 (Straddle)	138	3.176	3.192
	5775	155	76.096	75.936



9.4.3. 802.11be SISO MODE IN THE 5.8 GHz BAND

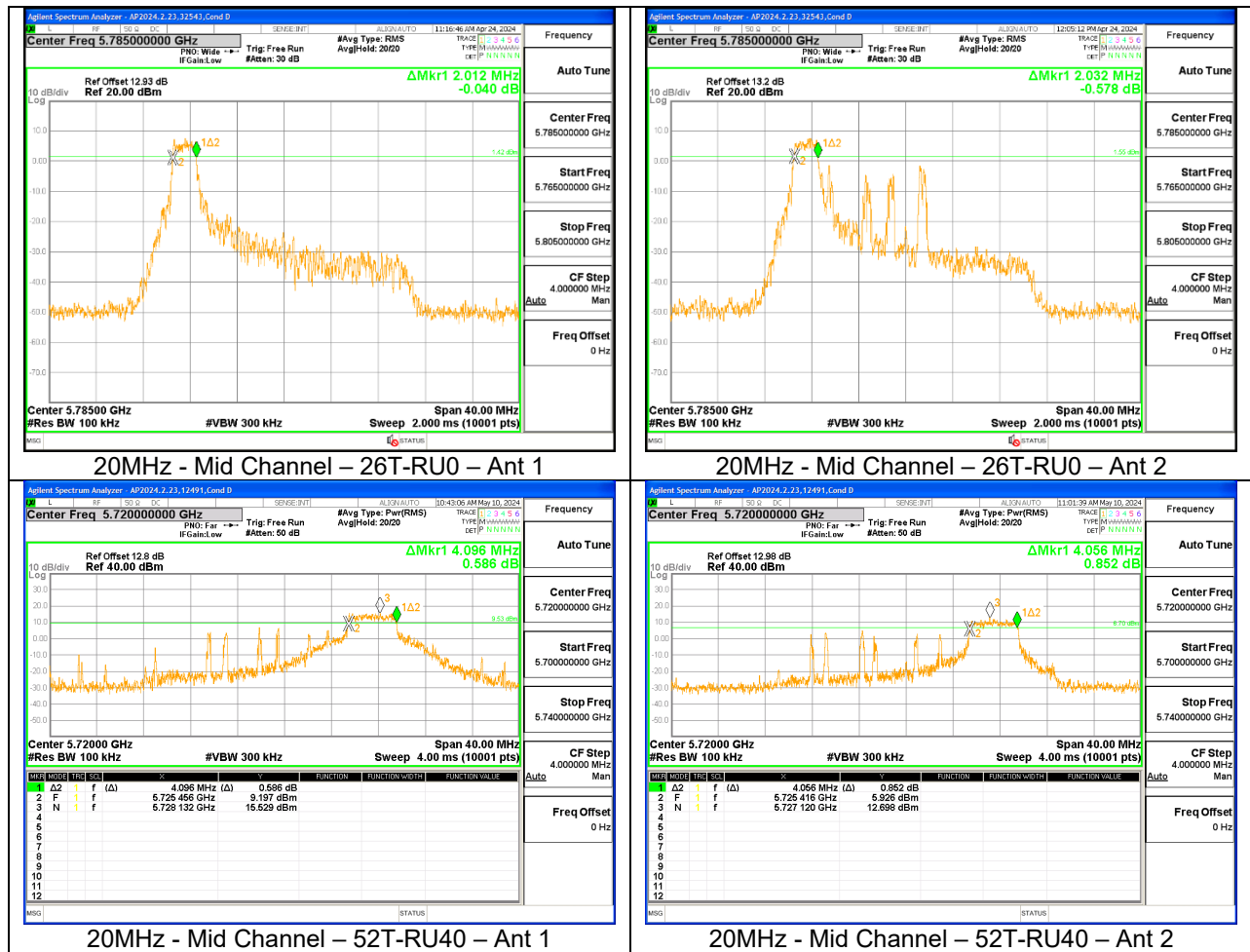
UNII-3 (SISO)	Frequency (MHz)	Channel Number	Tone	RU Index	6 dB BW (MHz)	
					Ant 1	Ant 2
EHT20	5720 (Straddle)	144	SU	--	--	--
			52T	40	4.000	4.012
	5745	149	SU	--	--	--
			26T	0	1.996	1.988
				4	2.552	2.544
				8	2.096	2.016
	5785	157	SU	--	--	--
			26T	0	2.040	1.980
				4	2.560	2.556
				8	2.040	2.116
	5825	165	SU	--	--	--
			26T	0	2.068	1.948
EHT40	5710 (Straddle)	142	SU	--	--	--
			52T	44	3.856	3.952
	5755	151	SU	--	--	--
			26T	0	1.968	1.896
				9	2.024	2.096
				17	2.040	1.968
	5795	159	SU	--	--	--
			26T	0	2.032	1.992
				9	2.048	2.088
				17	2.016	1.992
EHT80	5690 (Straddle)	138	SU	--	--	--
			52T	52	4.024	3.928
	5775	155	SU	--	--	--
			26T	0	2.048	1.968
				18	2.592	2.576
				36	1.984	2.064



Additional RU plots will be required if there are different Partial RU testing.

9.4.4. 802.11be MIMO CDD MODE IN THE 5.8 GHz BAND

UNII-3 (MIMO CDD)	Frequency (MHz)	Channel Number	Tone	RU Index	6 dB BW (MHz)	
					Ant 1	Ant 2
EHT20	5720 (Straddle)	144	SU	--	--	--
			52T	40	4.096	4.056
	5745	149	SU	--	--	--
			26T	0	1.996	1.980
				4	2.592	2.544
				8	2.028	2.060
	5785	157	SU	--	--	--
			26T	0	2.012	2.032
				4	2.576	2.544
				8	1.976	2.028
	5825	165	SU	--	--	--
			26T	0	2.080	2.072
				4	2.692	2.592
				8	2.024	2.052
EHT40	5710 (Straddle)	142	SU	--	--	--
			52T	44	3.880	3.928
	5755	151	SU	--	--	--
			26T	0	2.032	2.008
				9	2.032	2.000
				17	2.016	1.984
	5795	159	SU	--	--	--
			26T	0	2.016	1.912
				9	2.008	2.000
				17	2.040	2.048
EHT80	5690 (Straddle)	138	SU	--	--	--
			52T	52	3.968	4.024
	5775	155	SU	--	--	--
			26T	0	2.000	1.936
				18	2.592	2.624
				36	2.048	2.080



Additional RU plots will be required if there are different Partial RU testing.

9.5. OUTPUT POWER AND PSD

LIMITS

FCC §15.407

Band 5.15–5.25 GHz

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1-megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Bands 5.25-5.35 GHz and 5.47-5.725 GHz

The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Band 5.725-5.85 GHz

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

TEST PROCEDURE

The measurement method used for output power is KDB 789033 D02 v02r01, Section E.3.b (Method PM-G).

The measurement method used for power spectral density is KDB 789033 D02 v02r01, Section F.

For all straddle channels, full bandwidth power and PSD/MHz are reported in the 5.6GHz section because the combined 5.6GHz and 5.8GHz power and PSD/MHz already passed the worst-case 5.6GHz power and 5.8 GHz PSD/500kHz limits.

11n HT20 and 11be ETH20 straddle channel 26dB bandwidth= (26dB BW/2)+5

11n HT20 and 11be ETH20 straddle channel 99% bandwidth= (99% BW/2)+5

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:

Frequency Range (MHz)	Antenna 6 (dBi)	Antenna 5 (dBi)	Uncorrelated Chains (dBi)	Correlated Chains (dBi)
5150 - 5250 UNII - 1	-0.40	-4.00	-1.84	1.00
5250 - 5350 UNII - 2a	0.00	-1.50	-0.69	2.29
5500 - 5700 UNII - 2c	-1.10	-1.60	-1.34	1.66
5725 - 5825 UNII 3	-1.20	-1.00	-1.10	1.91

DIRECTIONAL GAIN CALCULATION:

ANSI C63.10-2013 section 14.4.3

Uncorrelated directional gain= $10 \cdot \log((10^{(\text{Ant6}/10)} + 10^{(\text{Ant5}/10)})/2)$ Correlated directional Gain= $10 \cdot \log(((10^{(\text{Ant6}/20)} + 10^{(\text{Ant5}/20)})^2)/2)$

Sample Calculation at 5.2GHz Band:

Ant1=-0.40, Ant2=-4.00

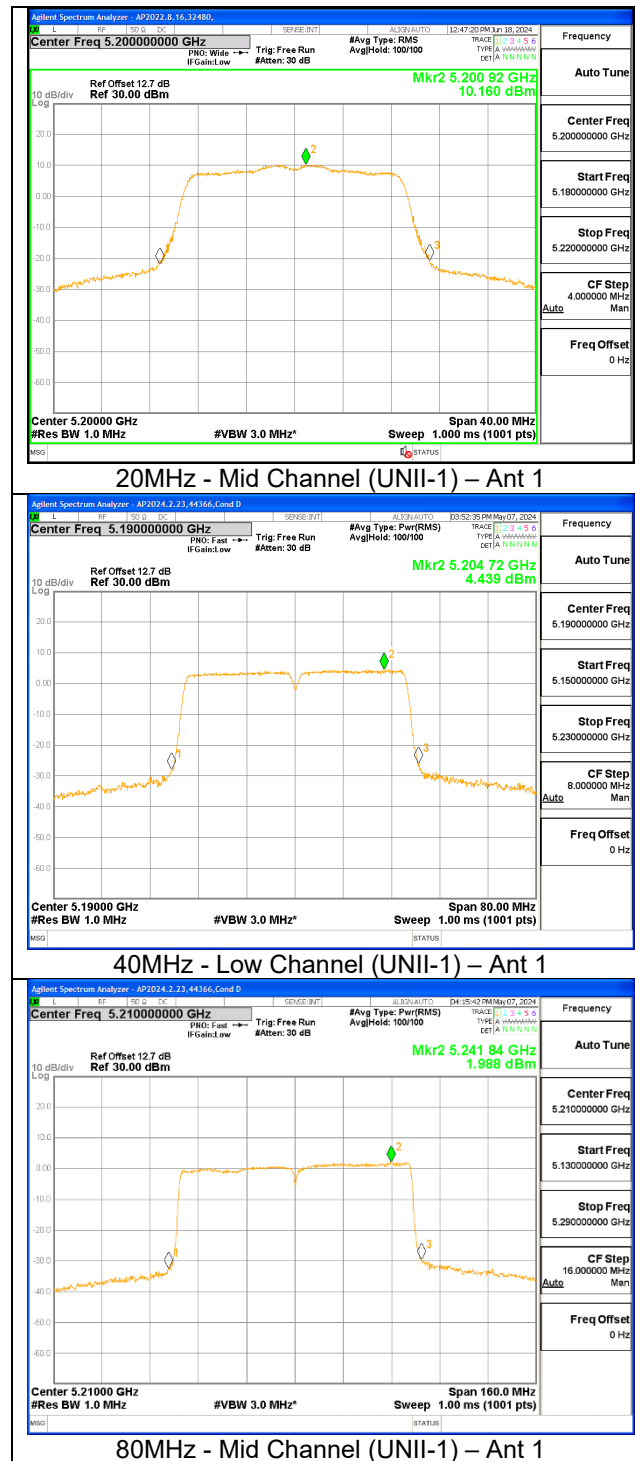
Uncorrelated Antenna gain= $10 \log[(10^{(-0.40/10)} + 10^{(-4.00/10)})/2] = -1.84 \text{ dBi}$ Correlated Antenna gain= $10 \log[(10^{(-0.40/20)} + 10^{(-4.00/20)})^2/2] = -1.00 \text{ dBi}$

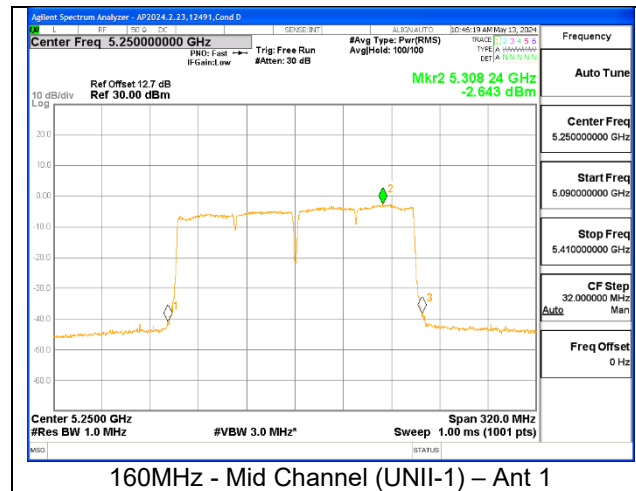
9.5.1. 802.11n/ac SISO MODE IN THE UNII-1 BAND

UNII-1 (SISO)	20MHz	40MHz	80MHz	160MHz
DCCF (MCS0) (dB)	0.00	0.11	0.23	0.42
Ant 1 (dBi)	-0.40			
Ant 2 (dBi)	-4.00			

UNII-2a (SISO)	
Straddle Channel	
Ant 1 (dBi)	0.00
Ant 2 (dBi)	-1.50

UNII-1 (SISO)	Freq (MHz)	Ch. #	Minimum Bandwidth (MHz)		Power Limit (dBm)		Output Power (Gated) (dBm)		Total Corrected Power (dBm)		PSD Limit (dBm/MHz)		PSD (dBm/MHz)		Total Corrected PSD (dBm/MHz)	
			Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
HT20 (FCC)	5180	36	--		24	24	18.95	18.95	18.95	18.95	11	11	8.813	8.769	8.813	8.769
	5200	40					19.93	19.93	19.93	19.93			10.160	10.174	10.160	10.174
	5240	48					19.90	19.97	19.90	19.97			10.079	10.054	10.079	10.054
HT40 (FCC)	5190	38	--		24	24	17.46	17.42	17.46	17.42	11	11	4.439	4.479	4.549	4.589
	5230	46					20.95	20.93	20.95	20.93			7.558	7.659	7.668	7.769
VHT80 (FCC)	5210	42	--		24	24	17.40	17.44	17.40	17.44	11	11	1.988	1.740	2.218	1.970
VHT160 (FCC)	5250 (Straddle)	50	--		24	24	16.40	16.46	16.40	16.46	11	11	-2.643	-2.622	-2.223	-2.202



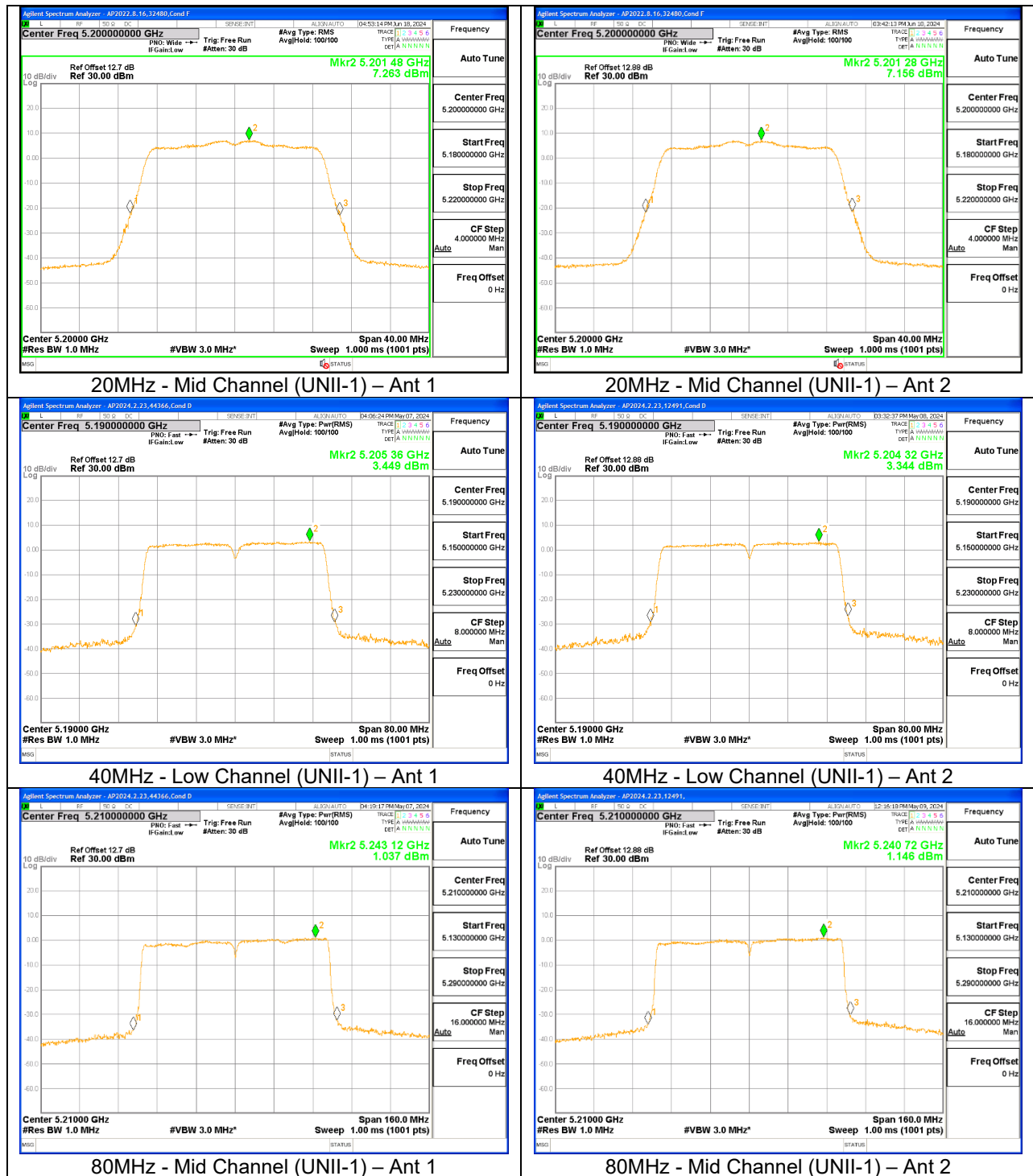


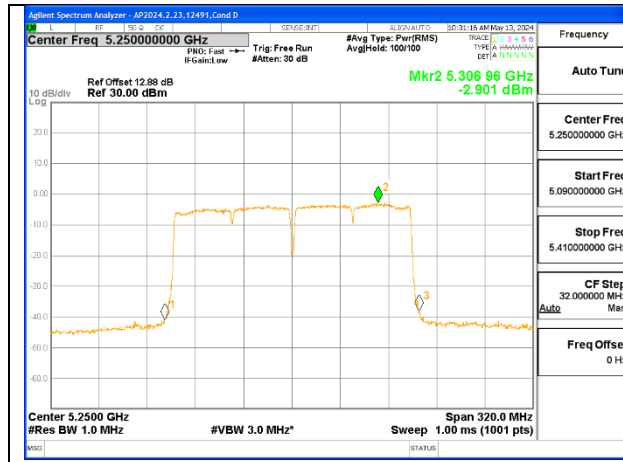
9.5.2. 802.11n/ac MIMO CDD MODE IN THE UNII-1 BAND

UNII-1 (MIMO CDD)	20MHz	40MHz	80MHz	160MHz
DCCF (MCS0) (dB)	0.00	0.11	0.23	0.42
Un-Correlated Gain (dBi)	-1.84			
Correlated Gain (dBi)	1.00			

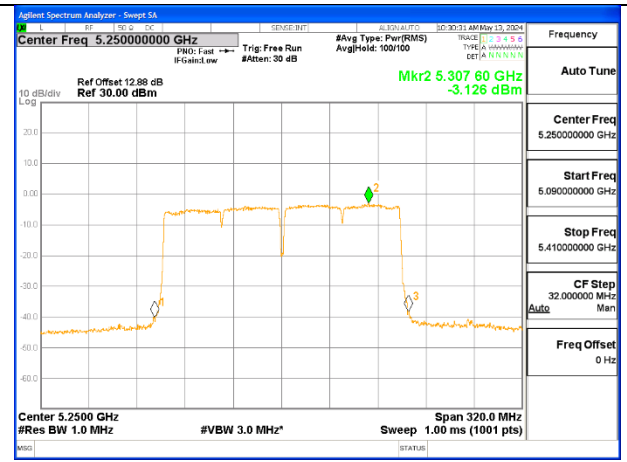
UNII-2a (MIMO CDD)	
Straddle Channel	
Un-Correlated Gain (dBi)	-0.69
Correlated Gain (dBi)	2.29

UNII-1 (MIMO CDD)	Freq (MHz)	Ch. #	Min BW (MHz)	Power Limit (dBm)	Output Power (Gated) (dBm)		Total MIMO Corrected Power (dBm)	PSD Limit (dBm/MHz)	PSD (dBm/MHz)		Total MIMO Corrected PSD (dBm/MHz)
					Ant 1	Ant 2			Ant 1	Ant 2	
HT20 (FCC)	5180	36	--	24	16.95	16.91	19.94	11	7.424	7.319	10.382
	5200	40			16.91	16.95	19.94		7.263	7.156	10.220
	5240	48			16.98	16.95	19.98		7.510	7.409	10.470
HT40 (FCC)	5190	38	--	24	15.90	15.93	18.93	11	3.449	3.344	6.517
	5230	46			19.91	19.89	22.91		6.777	7.062	10.042
VHT80 (FCC)	5210	42	--	24	16.46	16.43	19.46	11	1.037	1.146	4.332
VHT160 (FCC)	5250 (Straddle)	50	--	24	15.42	15.42	18.43	11	-2.901	-3.126	0.418





160MHz - Mid Channel (UNII-1) – Ant 1



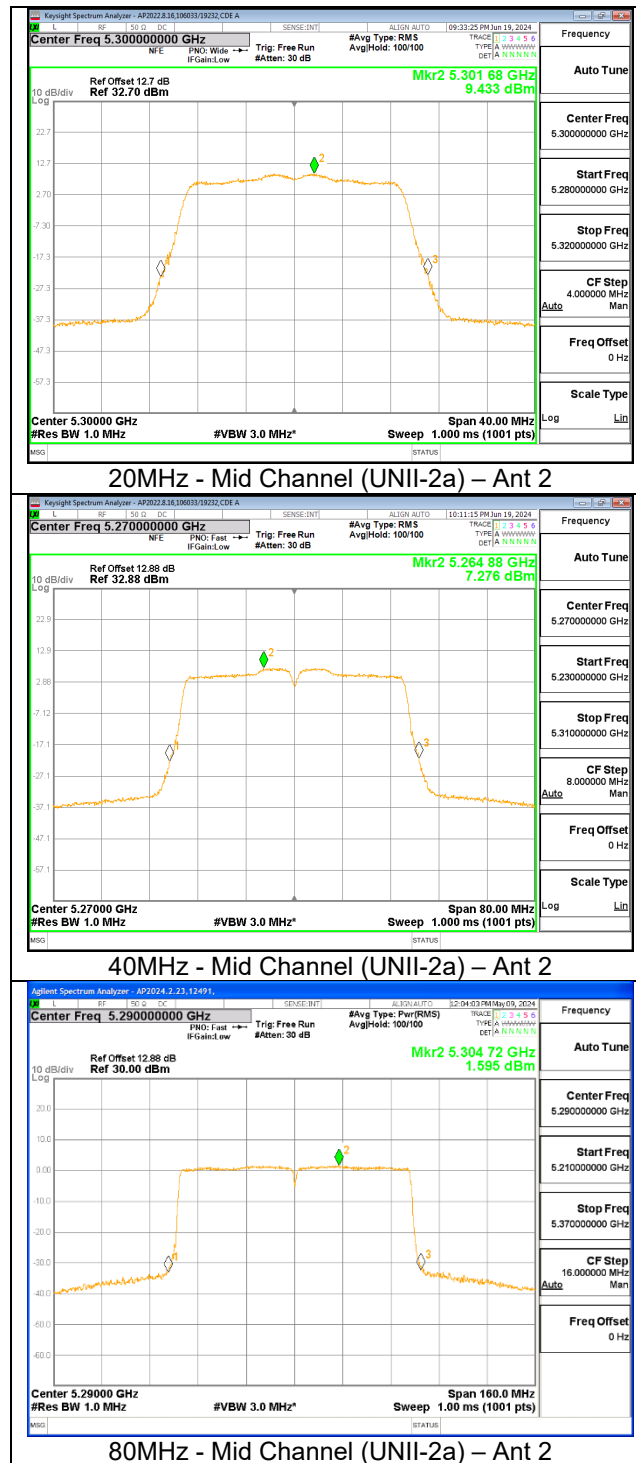
160MHz - Mid Channel (UNII-1) – Ant 2

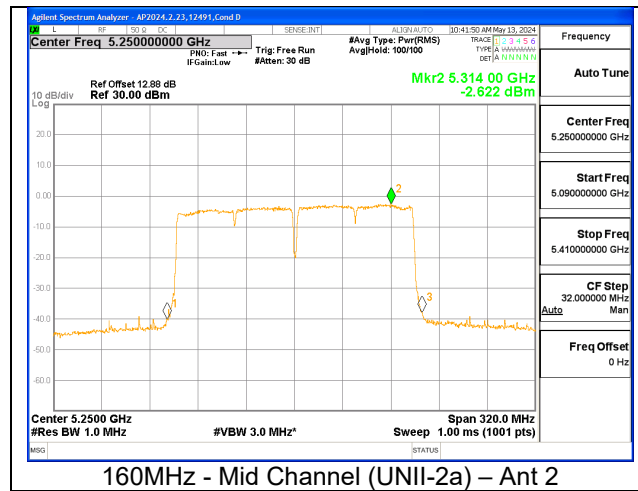
9.5.3. 802.11n/ac SISO MODE IN THE UNII-2A BAND

UNII-2a (SISO)	20MHz	40MHz	80MHz	160MHz
DCCF (MCS0) (dB)	0.00	0.11	0.23	0.42
Ant 1 (dBi)	0.00			
Ant 2 (dBi)	-1.50			

UNII-1 (SISO)	
Straddle Channel	
Ant 1 (dBi)	-0.40
Ant 2 (dBi)	-4.00

UNII-2a (SISO)	Freq (MHz)	Ch. #	Minimum Bandwidth (MHz)		Power Limit (dBm)		Output Power (Gated) (dBm)		Total Corrected Power (dBm)		PSD Limit (dBm/MHz)		PSD (dBm/MHz)		Total Corrected PSD (dBm/MHz)	
			Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
HT20 (FCC)	5260	52	21.76	21.44	24.00	24.00	19.98	19.95	19.98	19.95	11.00	11.00	9.859	9.515	9.859	9.515
	5300	60	21.20	21.69	24.00	24.00	19.89	19.95	19.89	19.95			9.696	9.433	9.696	9.433
	5320	64	21.12	21.25	24.00	24.00	18.91	18.20	18.91	18.20			8.873	8.705	8.873	8.705
HT40 (FCC)	5270	54	39.83	39.92	24.00	24.00	20.85	20.91	20.85	20.91	11.00	11.00	7.155	7.276	7.265	7.386
	5310	62	39.86	39.47	24.00	24.00	16.91	16.87	16.91	16.87			4.244	4.082	4.354	4.192
VHT80 (FCC)	5290	58	80.72	81.78	24.00	24.00	16.93	16.92	16.93	16.92	11.00	11.00	1.522	1.595	1.752	1.825
VHT160 (FCC)	5250 (Straddle)	50	165.90	164.70	24.00	24.00	16.40	16.46	16.40	16.46	11.00	11.00	-2.643	-2.622	-2.223	-2.202



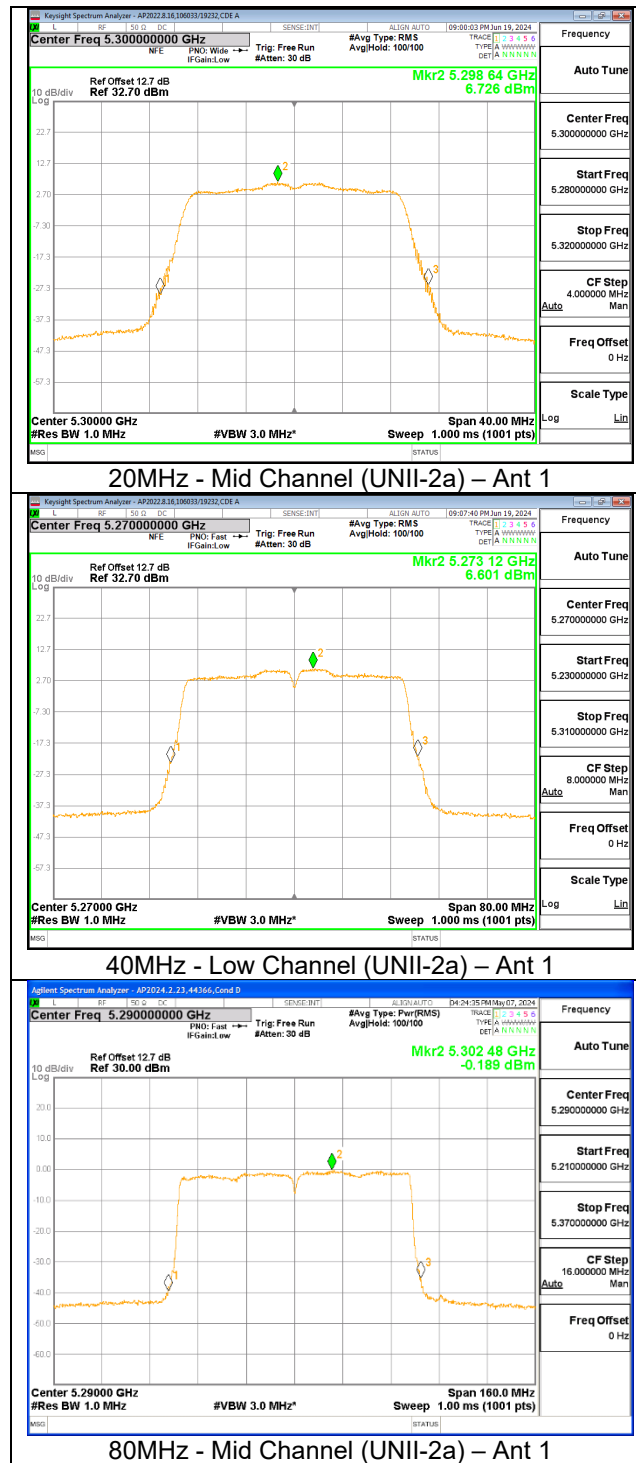


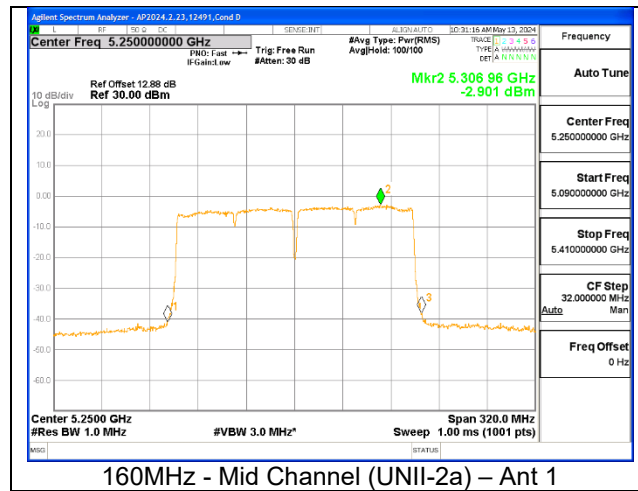
9.5.4. 802.11n/ac MIMO CDD MODE IN THE UNII-2A BAND

UNII-2a (MIMO CDD)	20MHz	40MHz	80MHz	160MHz
DCCF (MCS0) (dB)	0.00	0.11	0.23	0.42
Un-Correlated Gain (dBi)	-0.69			
Correlated Gain (dBi)	2.29			

UNII-1 (MIMO CDD)	
Straddle Channel	
Un-Correlated Gain (dBi)	-1.84
Correlated Gain (dBi)	1.00

UNII-2a (MIMO CDD)	Freq (MHz)	Ch. #	Min BW (MHz)	Power Limit (dBm)	Output Power (Gated) (dBm)		Total MIMO Corrected Power (dBm)	PSD Limit (dBm/MHz)	PSD (dBm/MHz)		Total MIMO Corrected PSD (dBm/MHz)
					Ant 1	Ant 2			Ant 1	Ant 2	
HT20 (FCC)	5260	52	21.20	24.00	16.92	16.95	19.95	11.00	7.036	6.750	9.906
	5300	60	21.15	24.00	16.95	16.93	19.95		6.726	6.794	9.770
	5320	64	21.26	24.00	16.91	16.92	19.93		6.774	6.781	9.788
HT40 (FCC)	5270	54	38.99	24.00	19.97	19.95	22.97	11.00	6.601	6.708	9.775
	5310	62	39.51	24.00	15.44	15.41	18.44		3.184	3.146	6.285
VHT80 (FCC)	5290	58	80.75	24.00	15.40	15.40	18.41	11.00	-0.189	-0.192	3.050
VHT160 (FCC)	5250 (Straddle)	50	163.80	24.00	15.42	15.42	18.43	11.00	-2.901	-3.126	0.418





9.5.5. 802.11n/ac SISO MODE IN THE UNII-2C BAND

UNII-2c (SISO)	20MHz	40MHz	80MHz	160MHz
DCCF (MCS0) (dB)	0.00	0.11	0.23	0.42
Ant 1 (dBi)	-1.10			
Ant 2 (dBi)	-1.60			

UNII-3 (SISO)	
Straddle Channel	
Ant 1 (dBi)	-1.20
Ant 2 (dBi)	-1.00

UNII-2c (SISO)	Freq (MHz)	Ch. #	Minimum Bandwidth (MHz)		Power Limit (dBm)		Output Power (Gated) (dBm)		Total Corrected Power (dBm)		PSD Limit (dBm/MHz)		PSD (dBm/MHz)		Total Corrected PSD (dBm/MHz)	
			Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
HT20 (FCC)	5500	100	21.39	21.72	24.00	24.00	18.65	18.71	18.65	18.71	11.00	11.00	8.665	8.760	8.665	8.760
	5580	116	21.48	21.49	24.00	24.00	19.94	19.91	19.94	19.91			10.235	10.153	10.235	10.153
	5700	140	22.20	21.60	24.00	24.00	18.97	18.91	18.97	18.91			8.821	8.867	8.821	8.867
	5720 (Straddle)	144	15.66	15.81	22.95	22.99	19.90	19.97	19.90	19.97			10.136	10.318	10.136	10.318
HT40 (FCC)	5510	102	39.47	39.61	24.00	24.00	16.87	16.91	16.87	16.91	11.00	11.00	4.093	4.178	4.203	4.288
	5550	110	39.53	39.85	24.00	24.00	20.92	20.96	20.92	20.96			7.756	7.849	7.866	7.959
	5670	134	39.37	39.75	24.00	24.00	19.43	19.41	19.43	19.41			7.093	7.144	7.203	7.254
	5710 (Straddle)	142	39.68	39.07	24.00	24.00	20.97	20.97	20.97	20.97			7.873	7.878	7.983	7.988
VHT80 (FCC)	5530	106	81.30	80.94	24.00	24.00	15.97	15.37	15.97	15.37	11.00	11.00	-1.170	-1.188	-0.940	-0.958
	5610	122	81.96	81.47	24.00	24.00	20.41	20.44	20.41	20.44			3.937	3.963	4.167	4.193
	5690 (Straddle)	138	81.29	80.63	24.00	24.00	20.43	20.42	20.43	20.42			4.247	4.111	4.477	4.341
VHT160 (FCC)	5570	106	164.10	164.80	24.00	24.00	16.45	16.40	16.45	16.40	11.00	11.00	-3.143	-3.343	-2.723	-2.923

