TEST REPORT

Report Number: 14982490-E9V2

Applicant	:	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A3289 A3290, A3291
Brand	:	APPLE
FCC ID	:	BCG-E8693A BCG-E8694A, BCG-E8495A
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E

Date Of Issue:
2024/08/19

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

ACCREDITED
CERT #0751.05

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024/08/08	Initial Review	Everardo Torres
V2	2024/08/19	Address TCB's questions	Chin Pang

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

TABLE OF CONTENTS

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A3289, A3290, A3291
Brand	APPLE
FCC ID	BCG-E8693A, BCG-E8694A, BCG-E8695A
EUT Description	Smartphone
Serial Number	MX7M3Y4LT0, KJ4Q5YK19J, CP4DJL2P7M MKG56TXQ5H, 3SS2K26PW, C7HH6N000B70000HBT
Sample Receipt Date	2024/03/04
Date Tested	2024/03/22 to 2024/08/12
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.	Everardo H. Torres Senior Test Engineer UL Verification Services, Inc.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:
- FCC 47 CFR Part 2
- FCC 47 CFR 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			

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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 dB
Power Spectral Density	2.47 dB
Time Domain Measurements Using SA	3.39 %
RF Power Measurement Direct Method Using Power Meter	1.3 (PK), 0.450 (AV)
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
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%.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 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 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The Apple iPhone is a smartphone with cellular GSM, GPRS, EGPRS, WCDMA, LTE, 5GNR1, 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	-1.10	-4.70	-2.54	0.30
5250 - 5350 UNII - 2a	-1.80	-3.70	-2.65	0.31
5500 - 5700 UNII - 2c	-0.70	-3.40	-1.84	1.06
5725 - 5825 UNII 3	-0.40	-3.30	-1.61	1.28

Frequency Range (MHz)	Cable Loss	
	Antenna 6 (dB)	Antenna 5 (dB)
5150 - 5250 UNII - 1	2.70	3.10
5250 - 5350 UNII - 2a	2.80	3.10
5500 - 5700 UNII - 2c	2.90	3.30
5725 - 5825 UNII 3	3.00	3.40

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 installed during testing was 27_20_111_38.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	19.95	98.86
5190-5230	802.11n HT40	20.44	110.66
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	16.42	43.85
5250	802.11ac VHT160	14.42	27.67
5180-5240	802.11ax HE20	Covered by 802.11be EHT20 1TX	
5180-5240	802.11be EHT20	19.92	98.17
5190-5230	802.11ax HE40	Covered by 802.11be EHT40 1TX	
5190-5230	802.11be EHT40	20.45	110.92
5210	802.11ax HE80	Covered by 802.11be EHT80 1TX	
5210	802.11be EHT80	16.42	43.85
5250	802.11ax HE160	Covered by 802.11be EHT160 1TX	
5250	802.11be EHT160	17.91	61.80
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	22.93	196.34
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	18.43	69.66
5210	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5250	802.11ac VHT160 CDD	16.92	49.20
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	19.89	97.50
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	22.87	193.64
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	18.38	68.87
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	19.88	97.27
5250	802.11ax HE160 SDM	Covered by 802.11be EHT160 SDM	
5250	802.11be EHT160 SDM	Covered by 802.11be EHT160 2TX CDD	

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	19.94	98.63
5270 - 5310	802.11n HT40	20.44	110.66
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	14.42	27.67
5260 - 5320	802.11ax HE20	Covered by 802.11be EHT20 1TX	
5260 - 5320	802.11be EHT20	19.89	97.50
5270 - 5310	802.11ax HE40	Covered by 802.11be EHT40 1TX	
5270 - 5310	802.11be EHT40	20.39	109.40
5290	802.11ax HE80	Covered by 802.11be EHT80 1TX	
5290	802.11be EHT80	17.88	61.38
5250	802.11ax HE160	Covered by 802.11be EHT160 1TX	
5250	802.11be EHT160	17.91	61.80
5.3 GHz band, 2TX			
5260 - 5320	802.11n HT20 CDD	19.92	98.17
5260 - 5320	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5270 - 5310	802.11n HT40 CDD	22.86	193.20
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	19.42	87.50
5290	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5250	802.11ac VHT160 CDD	16.92	49.20
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	19.88	97.27
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	22.85	192.75
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	19.95	98.86
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	19.88	97.27
5250	802.11ax HE160 SDM	Covered by 802.11be EHT160 SDM	
5250	802.11be EHT160 SDM	Covered by 802.11be EHT160 2TX CDD	

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	19.92	98.17
5510-5710	802.11n HT40	20.44	110.66
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	20.46	111.17
5570	802.11ac VHT160	15.45	35.08
5500-5720	802.11ax HE20	Covered by 802.11be EHT20 1TX	
5500-5720	802.11be EHT20	19.91	97.95
5510-5710	802.11ax HE40	Covered by 802.11be EHT40 1TX	
5510-5710	802.11be EHT40	20.43	110.41
5530-5690	802.11ax HE80	Covered by 802.11be EHT80 1TX	
5530-5690	802.11be EHT80	20.42	110.15
5570	802.11ax HE160	Covered by 802.11be EHT160 1TX	
5570	802.11be EHT160	17.97	62.66
5.6 GHz band, 2TX			
5500-5720	802.11n HT20 CDD	19.90	97.72
5500-5720	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5510-5710	802.11n HT40 CDD	22.87	193.64
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	22.93	196.34
5530-5690	802.11ac VHT80 SDM/STBC	Covered by 802.11ac VHT80 2TX CDD	
5570	802.11ac VHT160 CDD	17.89	61.52
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	19.96	99.08
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	22.86	193.20
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	22.85	192.75
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	19.87	97.05
5570	802.11ax HE160 SDM	Covered by 802.11be EHT160 SDM	
5570	802.11be EHT160 SDM	Covered by 802.11be EHT160 2TX CDD	

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	20.46	111.17
5755-5795	802.11n HT40	20.44	110.66
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	20.46	111.17
5745-5825	802.11ax HE20	Covered by 802.11be EHT20 1TX	
5745-5825	802.11be EHT20	20.39	109.40
5755-5795	802.11ax HE40	Covered by 802.11be EHT40 1TX	
5755-5795	802.11be EHT40	20.41	109.90
5775	802.11ax HE80	Covered by 802.11be EHT80 1TX	
5775	802.11be EHT80	20.48	111.69
5.8 GHz band, 2TX			
5745-5825	802.11n HT20 CDD	23.45	221.31
5745-5825	802.11n HT20 SDM/STBC	Covered by 802.11n HT40 2TX CDD	
5755-5795	802.11n HT40 CDD	23.45	221.31
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	23.43	220.29
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	23.36	216.77
5745-5825	802.11ax HE20 SDM	Covered by 802.11ax HE20 OFDMA	
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	23.46	221.82
5755-5795	802.11ax HE40 SDM	Covered by 802.11ax HE40 OFDMA	
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	23.33	215.28
5775	802.11ax HE80 SDM	Covered by 802.11be EHT80 SDM	
5775	802.11be EHT80 SDM	Covered by 802.11be EHT80 2TX CDD	

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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 Y (Landscape) was the worst-case orientation for ANT 6, Z (Portrait) for ANT 5 and 2TX.

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 spurious emissions tests were performed with EUT connected to AC power adapter and set at X orientation 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 ANT6 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.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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.

Due to the ANT6 antenna gain increased, all antenna port test results on ANT5 and ANT 6 and radiated test data on ANT5 are reused based on reference model, A3082, FCC ID: BCG-E8692A to cover variant models: A3289, FCC ID: BCG-E8693A; A3290, FCC ID: BCG-E8694A; and A3291, FCC ID: BCG-E8695A per manufacturer KDB inquiry approved by FCC except the following radiated test items related to ANT 6 are retested:

- 2TX radiated harmonic spurious for below 1GHz, 1-18GHz and 18-40GHz.
- ANT 6 SISO mode band edge and 2TX MIMO mode band-edge tests.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

WIFI UNII 5G - 802.11be										
BW (MHz)	Tone (T)	RU Index	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								
	52	37 ~ 40		x		x		x		x
	52 + 26	70 ~ 81								
	106	53 ~ 54								
	106 + 26	82 ~ 89								
	242	61								
	SU	--	x		x		x		x	
40	26	0 ~ 17								
	52	37 ~ 44		x		x		x		
	52 + 26	70 ~ 81								
	106	53 ~ 56								
	106 + 26	82 ~ 89								
	242	61 ~ 62		x						x
	484	65								
	SU	--	x		x		x		x	
80	26	0 ~ 36								
	52	37 ~ 52								
	52 + 26	70 ~ 81		x						x
	106	53 ~ 60								
	106 + 26	82 ~ 89								
	242	61 ~ 64				x		x		x
	484	65 ~ 66		x						
	484 + 242	90 ~ 93								
	996	67								
	SU	--	x		x		x		x	
160	26	0 ~ S36							Not Supported	
	52	37 ~ S52								
	52 + 26	70 ~ S81								
	106	53 ~ S60								
	106 + 26	82 ~ S89								
	242	61 ~ S64		x		x		x		
	484	65 ~ S66								
	484 + 242	90 ~ S93								
	996	67 ~ S67		x		x		x		
	996 + 484	94+sb0=0 95+sb0=0 94+sb0=1 95+sb0=1								
	996 + 484 + 242	96+sb0-0 97+sb0-0 98+sb0-0 99+sb0-0 96+sb0-1 97+sb0-1 98+sb0-1 99+sb0-1								
	996x2	S68								
	SU	--	x		x		x			

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

6.6. DESCRIPTION OF TEST SETUP

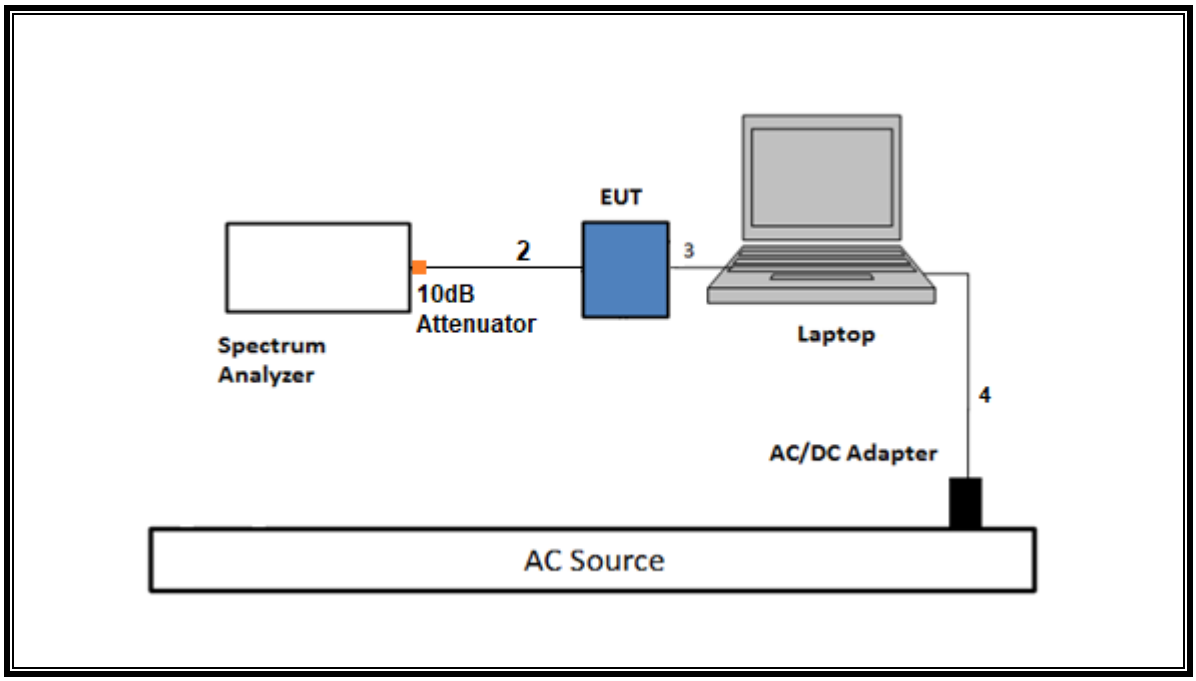
SUPPORT TEST EQUIPMENT						
Description		**Manufacturer**	**Model**	**Serial Number**		**FCC ID/ DoC**
Laptop		Apple	Macbook Pro	C02VD7SAHV22		BCGA1708
Laptop AC/DC adapter		Liteon Technology	A1424	NSW25679		DoC
EUT AC/DC adapter		Apple	A1720	C3D8417A7R93KVPA8		DoC
I/O CABLES (RF CONDUCTED TEST)						
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

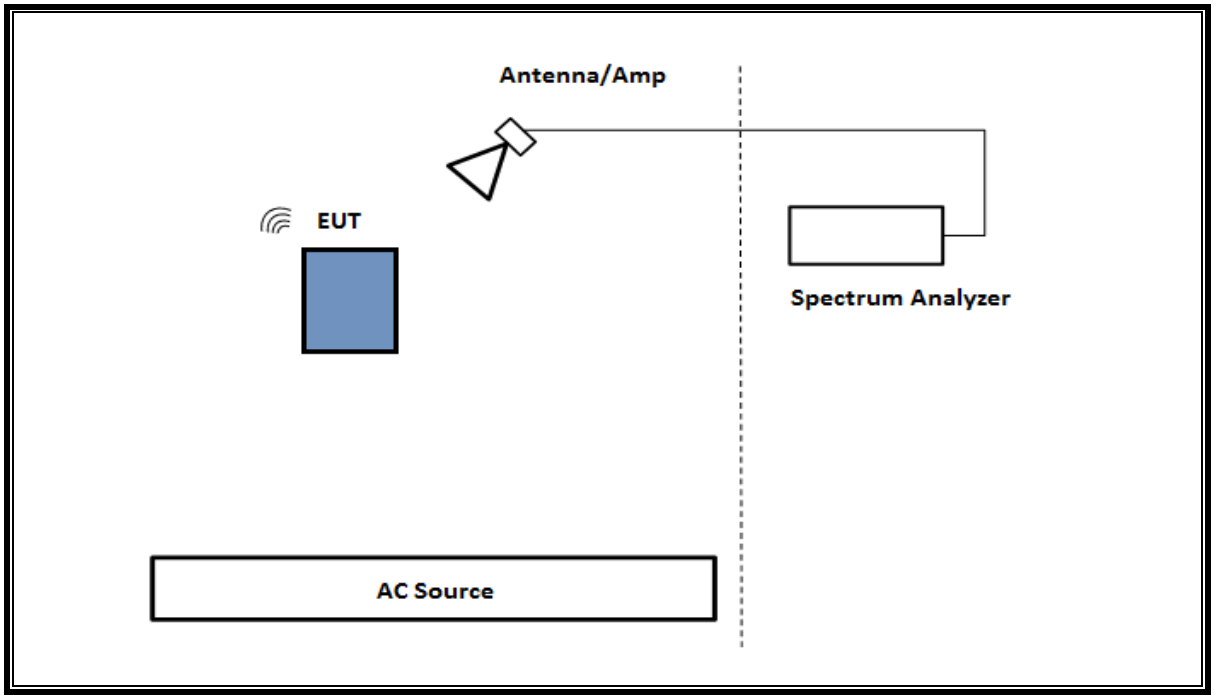
The EUT setup is shown as below. Test software exercised the radio card.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR CONDUCTED TESTS

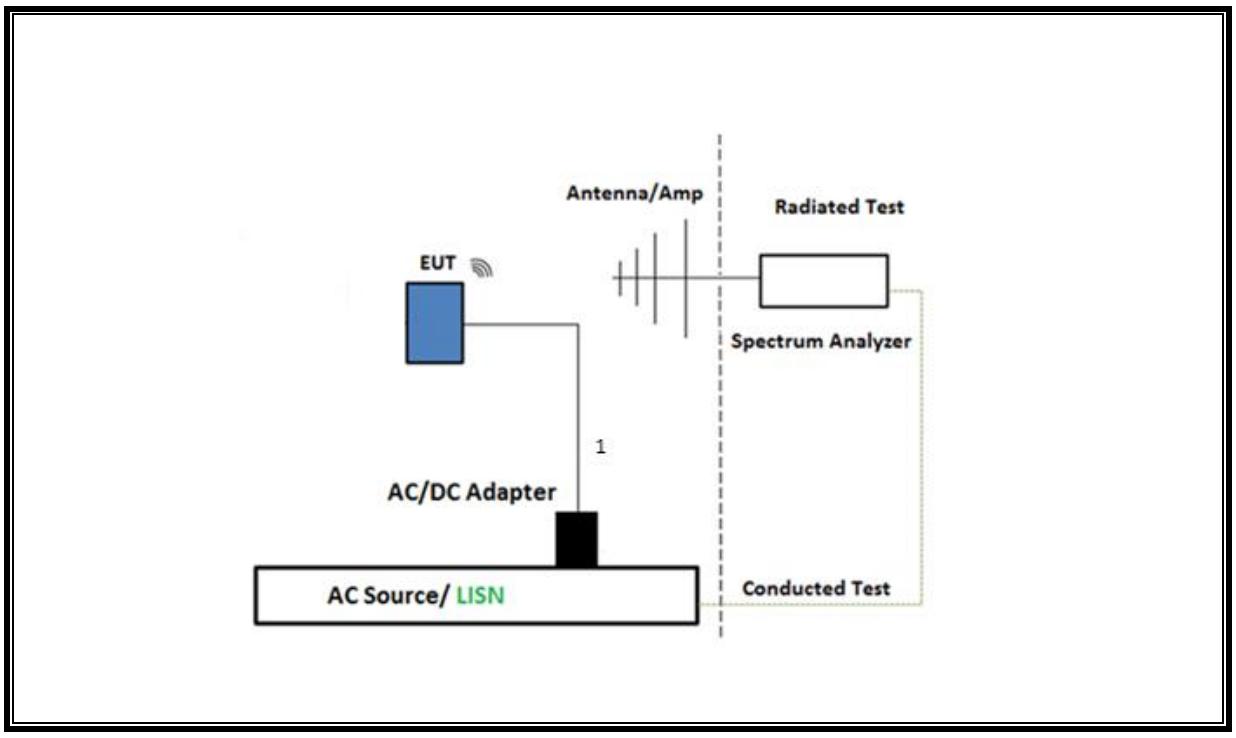


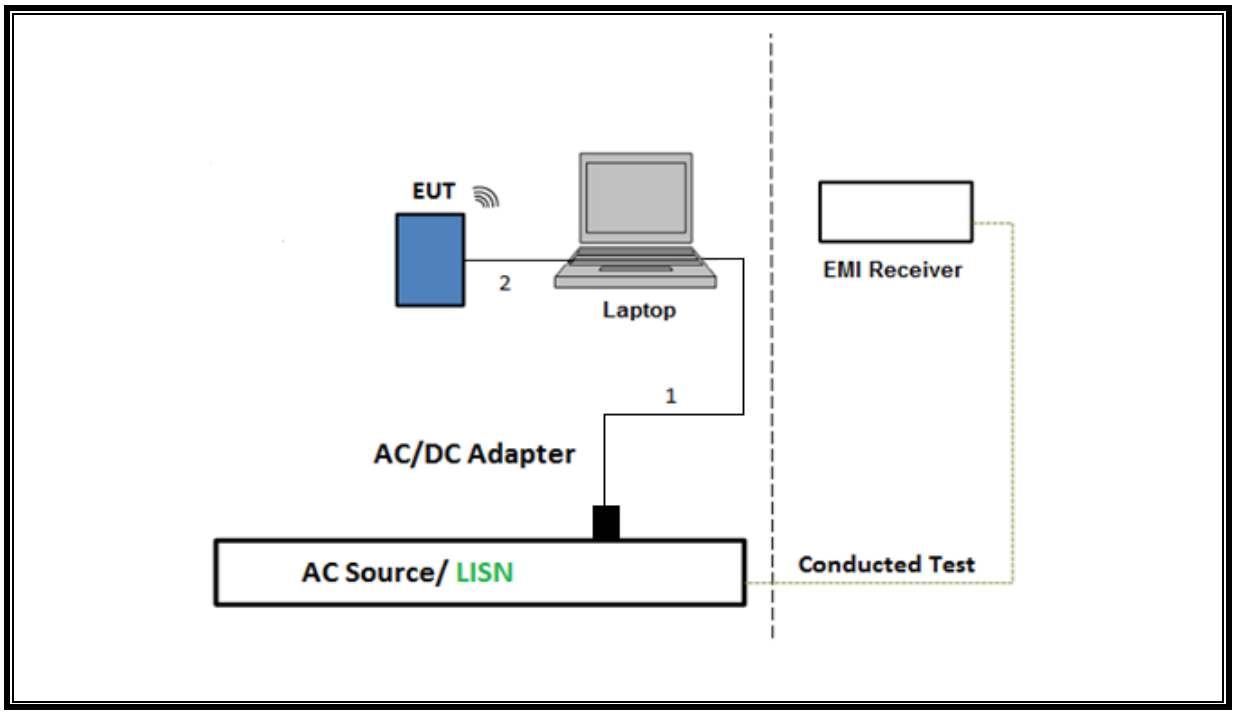
SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz (1 to 40GHz)



UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST





UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

8. TEST AND MEASUREMENT EQUIPMENT

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

Description	Manufacturer	Model	ID Num	Cal Due
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	226673	2025/02/28
RF Filter Box, 1-18GHz, 12 Port.	UL-FR1	Frankenstein	231874	2024/08/30
ESW, EMI TEST RECEIVER	Rohde & Schwarz	ESW44	179372	2025/02/28
Horn Antenna 1-18GHz	ETS-Lindgren	3117	223084	2024/10/31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	235670	2025/02/28
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	225079	2025/05/31
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	84797	2024/09/30
ESW, EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201497	2025/02/28
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	224478	2025/01/31
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	223083	2024/10/31
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	F3A	243707	2025/02/28
ESW, EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169927	2025/02/28
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	80402	2024/07/31
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	Frankenstein-	216812	2025/01/30
ESW, EMI TEST RECEIVER	Rohde & Schwarz	ESW44	230548	2025/02/28
*Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	79834	2024/06/30
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	-Frankenstein	217255	2024/10/31
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	80430	2024/08/31
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	F2A	237597	2024/09/30
ESW, EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169935	2025/02/28
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	230299	2025/02/28
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	226781	2025/03/31
ESW, EMI TEST RECEIVER	Rohde & Schwarz	ESW44	226078	2025/02/28
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	222740	2024/08/31
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	226780	2025/04/30
ESW, EMI TEST RECEIVER	Rohde & Schwarz	ESW44	226079	2025/02/28

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

TEST EQUIPMENT LIST (cont.)				
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**
*Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	80707	2024/05/31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201501	2024/11/30
RF Filter Box, 1-18GHz, 12 Ports	UL-FR1	Frankenstein	217521	2024/08/31
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	226674	2025/01/09
EMI Test Receiver	Rohde & Schwarz	ESW44	201500	2025/02/28
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	225474	2025/04/30
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90719	2025/01/31
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	80396	2025/02/28
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	81188	2025/01/31
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030A	125178	2025/01/31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90389	2025/01/31
Antenna, Passive Loop 30Hz to 1MHz	Electro-Metrics	EM-6871	170014	2024/08/31
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO-METRICS	EM-6872	170016	2024/08/31
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	178557	Verified Before Use
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	178558	Verified Before Use
Antenna, Horn 18 to 26.5GHz	A.R.A	MWH-1826/B	81139	2024/08/31
RF Amplifier Assembly, 18-26.5GHz, 60dB Gain	AMPLICAL	AMP18G26.5-60	215705	2024/11/30
*Antenna, Horn 26.5 to 40GHz	A.R.A	MWH-2640/B	172367	2024/06/30
Link File, RF Amplifier Assembly, 26-40GHz, 65dB Gain	AMPLICAL	AMP26G40-65	172346	2025/03/14
Hybrid Antenna 30MHz-1GHz	Sunol Sciences Corp.	JB3	80714	2024/10/06
Link File, @3m, 9kHz-1000MHz Hybrid Path Loss	UL-FR1	Port 0 Factors	232001	2025/02/28

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	200897	2024/10/31
EMI Test Receiver	Rohde & Schwarz	ESW44	169927	2025/02/28
RF Filter Box, 1-18GHz	Miteq	UL-FR1	171013	2025/02/28
Horn Antenna 1-18GHz	ETS-Lindgren	3117	206807	2024/10/31
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201499	2025/02/11
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	225575	2025/04/27
Horn Antenna 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	230300	2024/08/31
RF Filter Box, 1-18GHz, 17 Ports	UL-FR1	RATS 2	225575	2025/04/27
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	223461	08/29/2024

AC Line Conducted				
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	93091	2025/02/28
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01-480V	175765	2025/01/31
Transient Limiter	TE	TBFL1	207996	2024/08/31
UL AUTOMATION SOFTWARE				
Radiated Software	UL	UL EMC	Ver 9.5, May 1, 2023	
Conducted Software	UL	UL EMC	2023.2.23	
AC Line Conducted Software	UL	UL EMC	Ver 9.5, Mar 3, 2023	

*Testing was completed before equipment calibration date

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

ON TIME AND DUTY CYCLE RESULTS

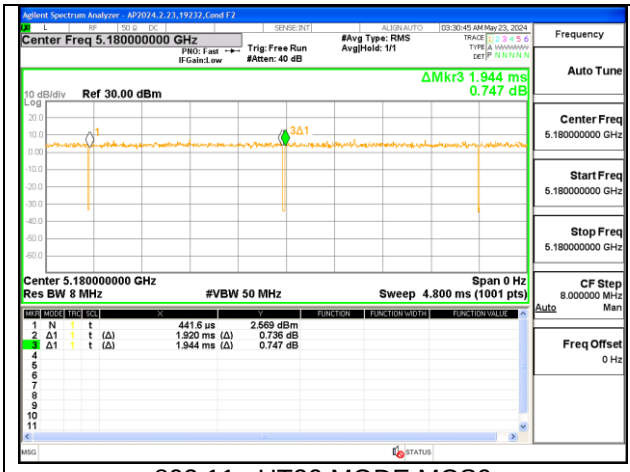
Mode	Tone (T)	Data Rate (Mbps)	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
HT20	--	MCS0	1.920	1.944	0.9877	98.77%	0.00	0.010
	--	MCS7	0.228	0.249	0.9145	91.45%	0.39	4.392
HT40	--	MCS0	0.943	0.965	0.9776	97.76%	0.10	1.060
	--	MCS7	0.127	0.149	0.8535	85.35%	0.69	7.874
VHT80	--	MCS0	0.4598	0.4823	0.9533	95.33%	0.21	2.175
	--	MCS9	0.07193	0.09394	0.7657	76.57%	1.16	13.902
VHT160	--	MCS0	0.2516	0.2726	0.9230	92.30%	0.35	3.975
	--	MCS11	0.05588	0.0766	0.7295	72.95%	1.37	17.895
EHT20	SU	MCS0	1.58	1.6	0.9875	98.75%	0.00	0.010
		MCS11	0.1608	0.1822	0.8825	88.25%	0.54	6.219
	RU52	MCS0	3.82	3.85	0.9922	99.22%	0.00	0.010
		MCS11	0.2783	0.3174	0.8768	87.68%	0.57	3.593
EHT40	SU	MCS0	1.545	1.582	0.9766	97.66%	0.10	0.647
		MCS11	0.1563	0.1776	0.8801	88.01%	0.55	6.398
	RU242	MCS0	3.026	3.059	0.9892	98.92%	0.00	0.010
		MCS11	0.2353	0.2567	0.9166	91.66%	0.38	4.250
	RU52	MCS0	3.787	3.871	0.9783	97.83%	0.10	0.264
		MCS11	0.277	0.316	0.8766	87.66%	0.57	3.610
EHT80	SU	MCS0	1.489	1.512	0.9848	98.48%	0.00	0.010
		MCS11	0.154	0.1764	0.8730	87.30%	0.59	6.494
	RU484	MCS0	4.007	4.029	0.9945	99.45%	0.00	0.010
		MCS11	0.2919	0.3139	0.9299	92.99%	0.32	3.426
	RU242	MCS0	3.034	3.082	0.9844	98.44%	0.00	0.010
		MCS11	0.2354	0.2739	0.8594	85.94%	0.66	4.248
	MRU 52 + 26	MCS0	3.772	3.835	0.9836	98.36%	0.00	0.010
		MCS11	0.2782	0.3163	0.8795	87.95%	0.56	3.595
EHT160	SU	MCS0	1.012	1.035	0.9778	97.78%	0.10	0.988
		MCS11	0.1251	0.1463	0.8551	85.51%	0.68	7.994
	RU996	MCS0	1.949	1.971	0.9888	98.88%	0.00	0.010
		MCS11	0.1628	0.1842	0.8838	88.38%	0.54	6.143
	RU242	MCS0	3.046	3.089	0.9861	98.61%	0.00	0.010
		MCS11	0.234	0.273	0.8571	85.71%	0.67	4.274

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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 SDM	--	MCS0	0.992	1.014	0.9785	97.85%	0.09	1.008
HT40 SDM	--	MCS0	0.500	0.522	0.9580	95.80%	0.19	2.000
VHT80 SDM	--	MCS0	0.2539	0.2763	0.9189	91.89%	0.37	3.939
VHT160 SDM	--	MCS0	0.596	0.6173	0.9655	96.55%	0.15	1.678
EHT20 SDM	SU	MCS0	0.7789	0.801	0.9724	97.24%	0.12	1.284
	RU52	MCS0	3.821	3.86	0.9899	98.99%	0.00	0.010
EHT40 SDM	SU	MCS0	0.7733	0.795	0.9727	97.27%	0.12	1.293
	RU242	MCS0	3.043	3.064	0.9931	99.31%	0.00	0.010
	RU52	MCS0	3.821	3.86	0.9899	98.99%	0.00	0.010
EHT80 SDM	SU	MCS0	0.7335	0.7579	0.9678	96.78%	0.14	1.363
	RU484	MCS0	4.007	4.031	0.9940	99.40%	0.00	0.010
	RU242	MCS0	3.043	3.065	0.9928	99.28%	0.00	0.010
	MRU 52 + 26	MCS0	3.778	3.817	0.9898	98.98%	0.00	0.010
EHT160 SDM	SU	MCS0	0.5148	0.5363	0.9599	95.99%	0.18	1.943
	RU996	MCS0	1.949	1.971	0.9888	98.88%	0.00	0.010
	RU242	MCS0	3.043	3.081	0.9877	98.77%	0.00	0.010

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

DUTY CYCLE PLOTS



802.11n HT20 MODE MCS0

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2. 26 dB AND 99% BANDWIDTH

LIMITS

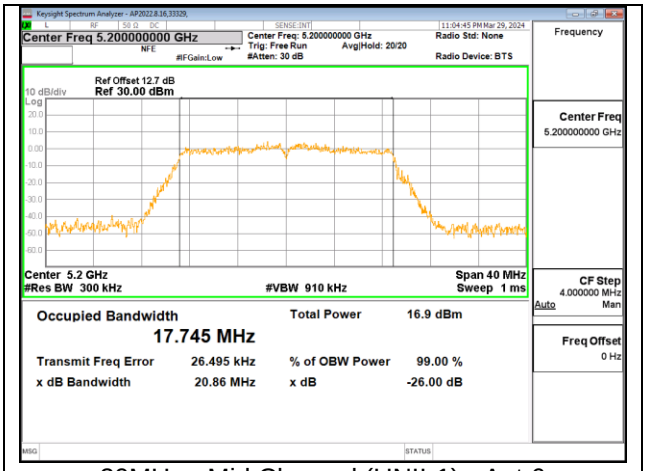
None; for reporting purposes only.

RESULTS

ID:	33329	Date:	03/29/2024

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	21.40	21.31	17.9290	17.8360
	5200	40	20.86	20.97	17.7450	17.7770
	5240	48	20.91	20.72	17.7710	17.7450
HT40 (FCC)	5190	38	43.72	42.23	36.4580	36.4140
	5230	46	40.67	40.30	36.2480	36.2970
VHT80 (FCC)	5210	42	85.50	86.41	75.8260	75.8680
VHT160 (FCC)	5250 (Straddle)	50	163.90	163.90	154.8500	154.7800

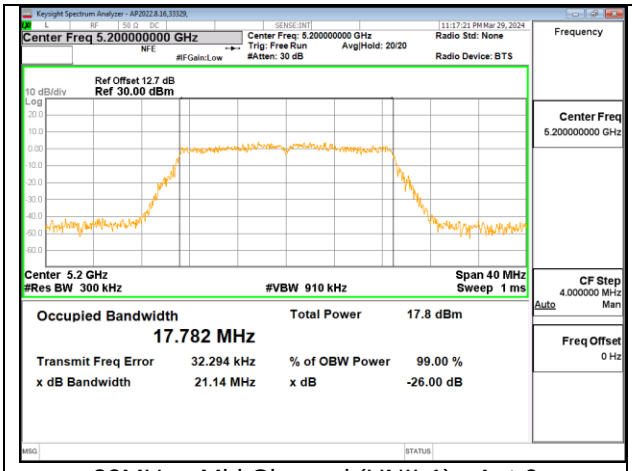


20MHz - Mid Channel (UNII-1) - Ant 6

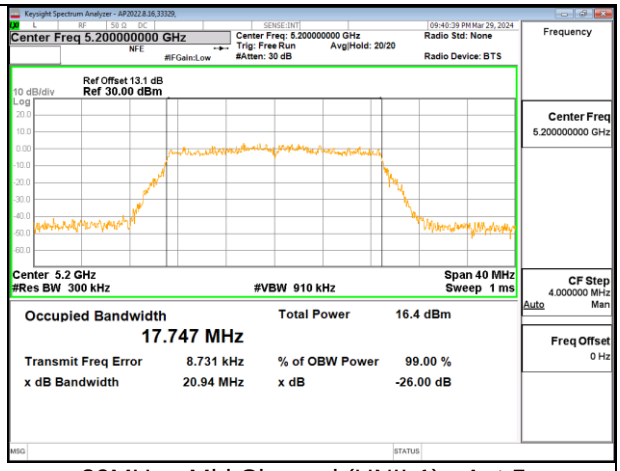
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	21.79	20.79	--	17.880	17.870	--
	5200	40	21.14	20.94	--	17.782	17.747	--
	5240	48	20.84	20.42	--	17.785	17.798	--
HT40 (FCC)	5190	38	46.12	43.17	--	36.587	36.337	--
	5230	46	40.52	40.20	--	36.231	36.295	--
VHT80 (FCC)	5210	42	83.83	84.62	--	75.748	75.857	--
VHT160 (FCC)	5250 (Straddle)	50	165.00	163.10	--	154.860	154.940	--



20MHz - Mid Channel (UNII-1) - Ant 6

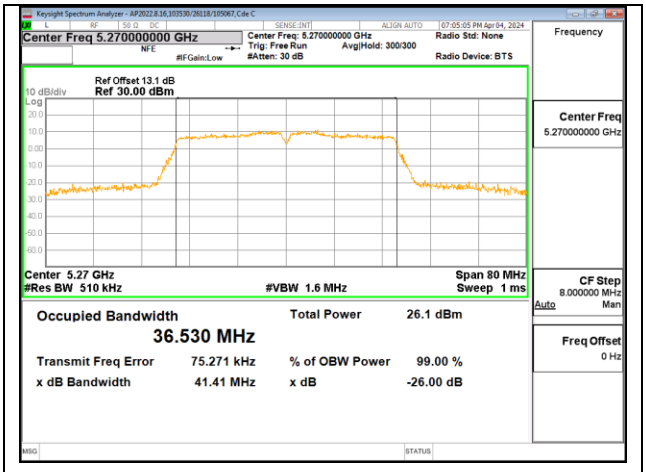


20MHz - Mid Channel (UNII-1) - Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	20.70	21.28	17.8210	17.8650
	5300	60	20.92	21.04	17.7610	17.9230
	5320	64	21.73	23.93	17.8710	18.0480
HT40	5270	54	41.21	41.41	36.2940	36.5300
	5310	62	45.00	43.41	36.3690	36.5140
VHT80	5290	58	83.20	85.63	75.7940	75.8250
VHT160	5250 (Straddle)	50	163.90	163.90	154.8500	154.7800

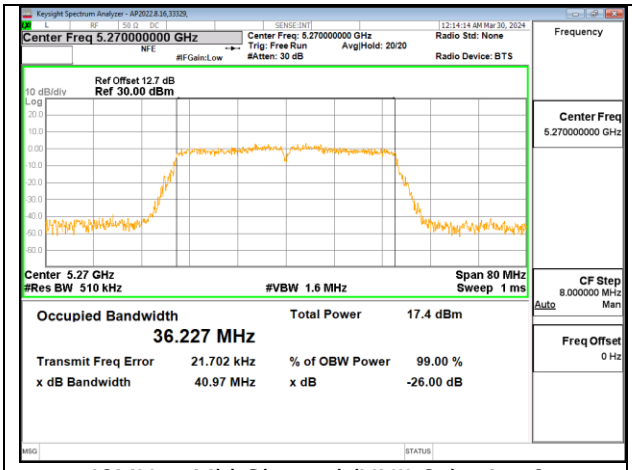


40MHz - Mid Channel (UNII-2a) - Ant 5

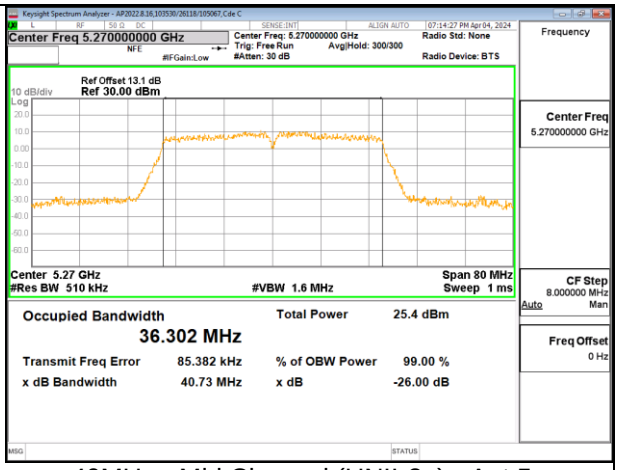
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2.4. 802.11n/ac MIMO CDD MODE IN THE UNII-2A BAND

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	20.88	21.04	20.88	17.7560	17.8000	17.76
	5300	60	21.02	21.05	21.02	17.7460	17.7900	17.75
	5320	64	21.29	22.09	21.29	17.8240	17.9580	17.82
HT40	5270	54	40.97	40.73	40.73	36.2270	36.3020	36.2270
	5310	62	44.25	42.85	42.85	36.3590	36.4560	36.3590
VHT80	5290	58	85.81	83.60	83.60	75.7510	75.9570	75.7510
VHT160	5250 (Straddle)	50	165.00	163.10	163.10	154.8600	154.9400	154.8600



40MHz - Mid Channel (UNII-2a) - Ant 6

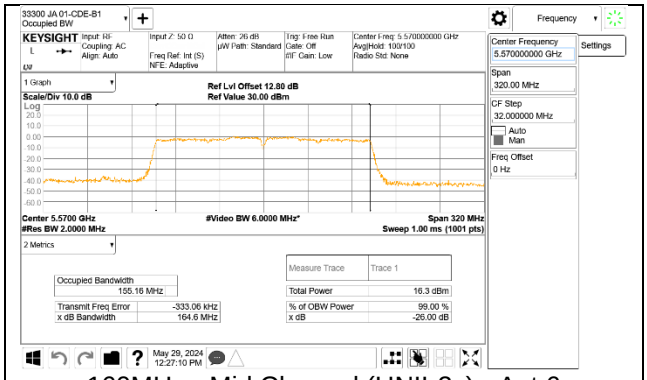


40MHz - Mid Channel (UNII-2a) - Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	21.89	22.17	17.9590	17.9540
	5580	116	21.07	20.80	17.8790	17.8040
	5700	140	22.74	23.26	17.9350	17.9720
	5720 (Straddle)	144	21.10	20.96	17.8960	17.8860
HT40	5510	102	45.92	44.73	36.4930	36.5490
	5550	110	41.15	41.15	36.3810	36.4750
	5670	134	45.99	45.86	36.6690	36.5530
	5710 (Straddle)	142	41.10	40.99	36.3980	36.3980
VHT80	5530	106	85.04	82.31	75.8520	75.7410
	5610	122	86.43	84.85	75.9140	75.8740
	5690 (Straddle)	138	81.25	81.06	75.7380	75.8200
UNII-2c	5570	114	164.60	164.60	155.1600	154.8600

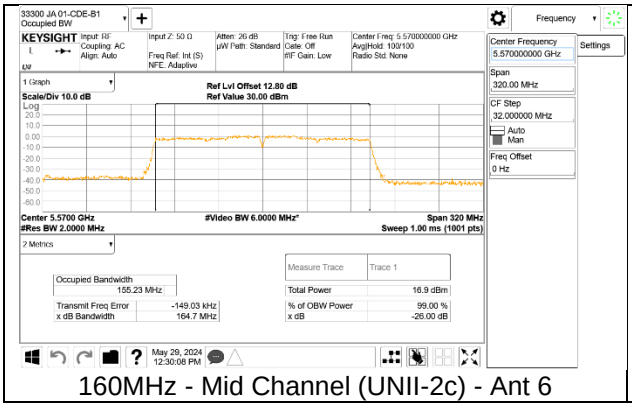


160MHz - Mid Channel (UNII-2c) - Ant 6

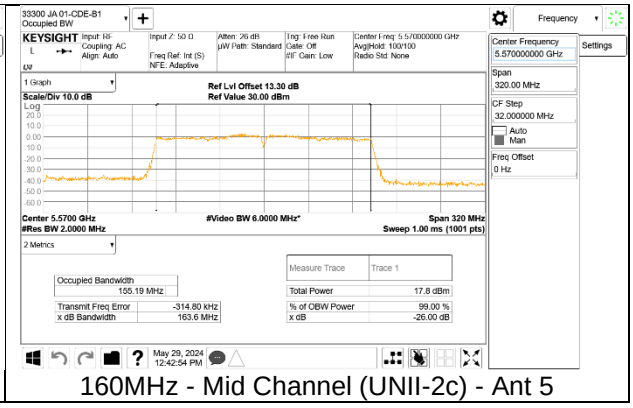
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.2.6. 802.11n/ac MIMO CDD MODE IN THE UNII-2C BAND

UNII-2c (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	5500	100	22.12	22.02	22.02	18.0010	17.9120	17.91
	5580	116	20.95	21.20	20.95	17.8430	17.7820	17.78
	5700	140	22.21	22.00	22.00	17.9330	17.9030	17.90
	5720 (Straddle)	144	21.19	20.91	20.91	17.8730	17.8030	17.80
HT40	5510	102	47.41	41.25	41.25	36.6260	36.4290	36.4290
	5550	110	41.03	40.46	40.46	36.4000	36.3350	36.3350
	5670	134	45.63	42.54	42.54	36.5020	36.4130	36.4130
	5710 (Straddle)	142	41.20	40.62	40.62	36.3580	36.3380	36.3380
VHT80	5530	106	85.22	82.31	82.31	75.8490	75.7410	75.7410
	5610	122	85.22	83.53	83.53	75.8490	75.9670	75.8490
	5690 (Straddle)	138	80.97	80.96	80.96	75.7840	75.7030	75.7030
VHT160	5570	114	164.70	163.60	163.60	155.2300	155.1900	155.1900



160MHz - Mid Channel (UNII-2c) - Ant 6

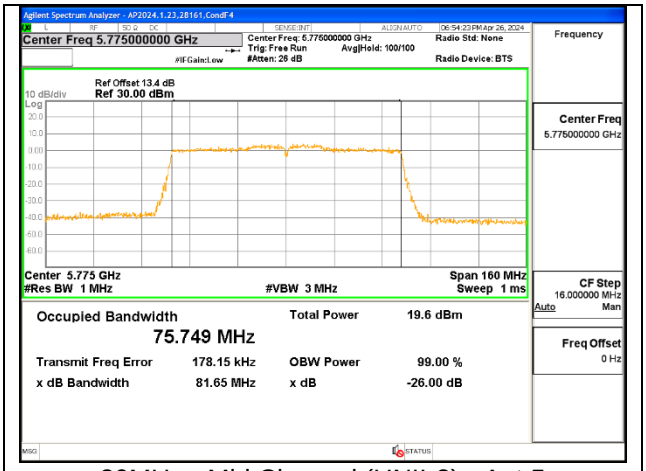


160MHz - Mid Channel (UNII-2c) - Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	21.05	21.18	17.9110	17.8460
	5785	157	21.15	20.96	17.8990	17.8770
	5825	165	21.15	21.24	17.8190	17.8880
HT40	5755	151	41.28	41.14	36.3600	36.4080
	5795	159	40.98	41.14	36.3800	36.3890
VHT80	5775	155	81.16	81.65	75.8090	75.7490
VHT160	5570	106	164.30	164.60	155.0100	154.8600

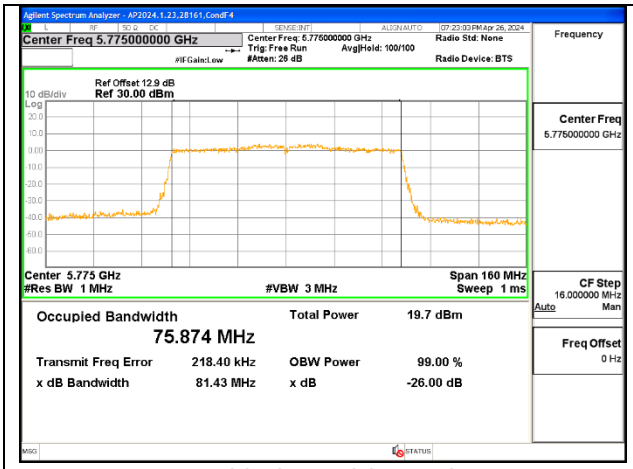


80MHz - Mid Channel (UNII-3) - Ant 5

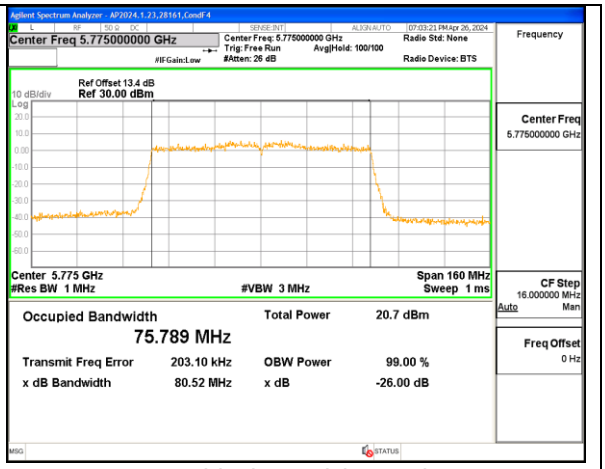
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	21.07	20.92	17.8690	17.8700
	5785	157	21.14	21.04	17.8900	17.7940
	5825	165	21.09	20.92	17.8250	17.8320
HT40	5755	151	41.49	41.31	36.368	36.285
	5795	159	41.26	41.23	36.372	36.340
VHT80	5775	155	81.43	80.52	75.874	75.789
VHT160	5570	106	164.70	163.60	155.230	155.190



80MHz - Mid Channel (UNII-3) - Ant 6



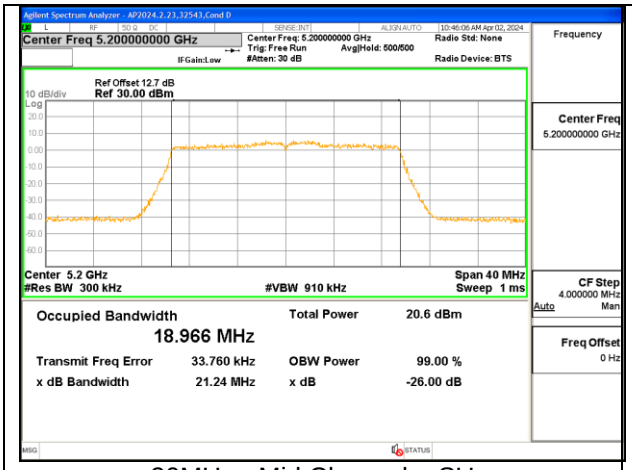
80MHz - Mid Channel (UNII-3) - Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

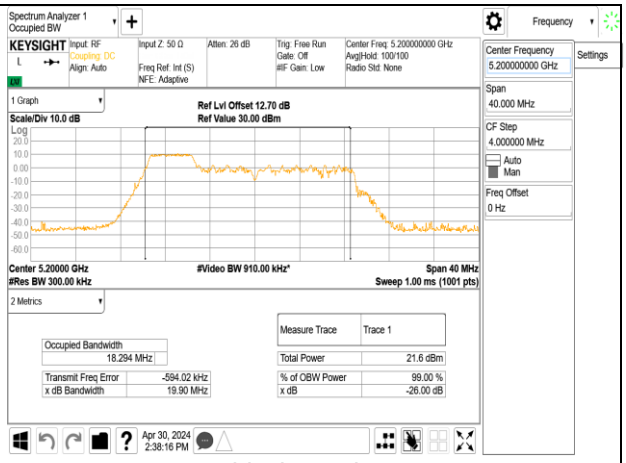
9.2.9. 802.11be SISO MODE IN THE UNII-1 BAND

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	--	21.97	22.00	18.9840	19.0270
			52T	37	19.74	19.75	18.2680	18.2720
				38	19.31	19.47	17.1850	17.2130
				40	20.65	20.70	18.2360	18.2750
	5200	40	SU	--	21.24	20.95	18.9660	18.9340
			52T	37	19.90	19.73	18.2940	18.2130
				38	19.07	19.50	17.2210	17.2100
				40	20.68	20.65	18.3050	18.3640
	5240	48	SU	--	21.11	21.17	18.9890	19.0010
			52T	37	19.82	19.98	18.2370	18.2290
				38	19.37	19.48	17.1570	17.1950
				40	20.74	20.55	18.3050	18.2200
EHT40 (FCC)	5190	38	SU	--	43.73	42.58	37.9200	37.9560
			242T	61	30.93	37.22	19.7520	19.8560
				62	29.13	29.11	19.5130	19.6190
			52T	37	20.05	20.80	18.2430	18.3160
				41	24.58	25.13	21.1050	20.8750
				44	22.07	21.34	18.3840	18.4520
	5230	46	SU	--	41.35	41.11	37.8620	37.8290
			242T	61	32.54	35.41	19.8290	19.6190
				62	27.55	28.18	19.5700	19.6470
			52T	37	20.79	20.43	18.2390	18.1910
				41	26.83	24.78	21.2660	21.0250
				44	22.33	21.02	18.5180	18.4600
EHT80 (FCC)	5210	42	SU	--	80.73	82.18	77.2330	77.3110
			484T	65	47.92	44.66	38.0650	37.3710
				66	46.93	47.49	37.7760	37.3920
			52+26T	71	18.84	18.69	17.2550	17.2980
				74	21.43	19.39	17.1820	17.4260
				80	20.41	21.68	17.4320	17.4850
EHT160 (FCC)	5250 (Straddle)	50	SU	--	164.30	164.40	156.4700	156.4400
			996T	67	97.16	92.86	78.3370	78.0540
				S67	93.65	92.69	77.9830	78.1020
			242T	61	29.61	27.00	20.0340	19.3770
				62	32.16	32.90	20.6880	20.4060
				S64	26.28	27.95	19.3600	20.0370

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



20MHz - Mid Channel – SU (UNII-1) – Ant 6

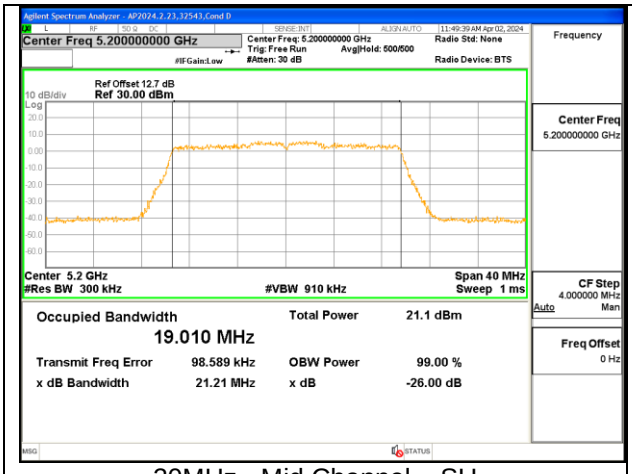


20MHz - Mid Channel – 52T RU37 (UNII-1) – Ant 6

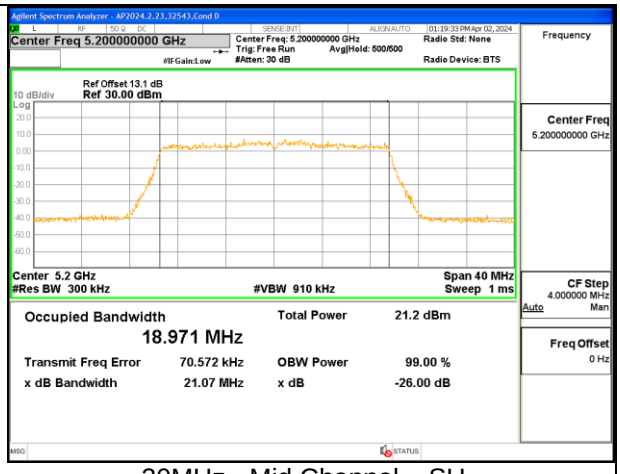
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	--	23.43	24.25	--	19.0340	19.0100	--
			52T	37	19.61	19.62	--	18.1170	18.1080	--
				38	19.40	18.33	--	17.1310	16.8640	--
				40	19.75	19.63	--	18.0930	18.2040	--
	5200	40	SU	--	21.21	21.07	--	19.0100	18.9710	--
			52T	37	19.64	19.82	--	18.1560	18.1120	--
				38	18.40	18.20	--	16.8570	16.8100	--
				40	19.72	19.64	--	18.1120	18.2140	--
	5240	48	SU	--	21.34	21.09	--	18.9670	18.9490	--
			52T	37	19.66	19.64	--	18.0520	18.0560	--
				38	18.31	18.35	--	16.8030	16.9310	--
				40	19.73	19.74	--	17.9530	18.2400	--
EHT40 (FCC)	5190	38	SU	--	41.95	41.79	--	37.9250	37.9820	--
			242T	61	31.03	31.35	--	19.8460	19.9240	--
				62	28.17	29.46	--	19.6310	19.3900	--
			52T	37	20.35	20.01	--	18.2570	18.0740	--
				41	25.55	24.56	--	21.1400	20.4480	--
				44	21.65	20.27	--	18.3730	18.1220	--
	5230	46	SU	--	40.65	40.47	--	37.8120	37.8800	--
			242T	61	29.92	27.81	--	19.7800	19.3770	--
				62	28.87	29.57	--	19.6840	19.4270	--
			52T	37	19.95	20.09	--	18.1650	18.1210	--
				41	25.20	24.22	--	21.1510	20.3420	--
				44	22.23	20.24	--	18.3120	18.1340	--
EHT80 (FCC)	5210	42	SU	--	82.25	82.86	--	77.2990	77.2600	--
			484T	65	48.35	46.46	--	37.9040	37.8180	--
				66	48.34	46.99	--	37.8510	37.7450	--
			52+26T	71	18.76	18.49	--	17.2940	16.9960	--
				74	21.02	18.58	--	17.6630	17.2050	--
				80	20.45	18.25	--	17.3680	17.0740	--
EHT160 (FCC)	5250 (Straddle)	50	SU	--	165.1	164.2	--	156.65	156.6	--
			996T	67	95.86	93.42	--	78.227	78.12	--
				S67	94.53	97.09	--	78.164	77.987	--
			242T	61	26.66	25.67	--	19.976	19.466	--
				62	31.78	32.81	--	20.38	20.148	--
				S64	27.93	26.91	--	19.445	19.734	--

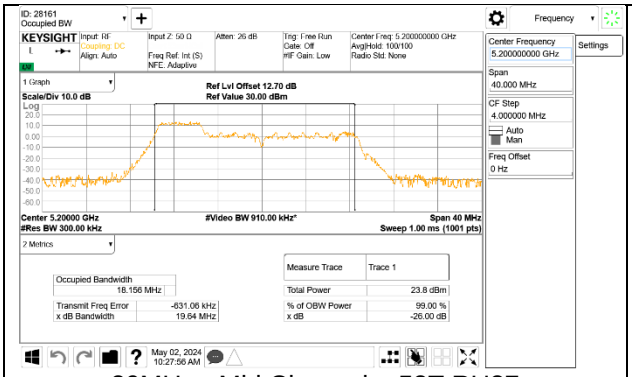


20MHz - Mid Channel – SU (UNII-1) – Ant 6

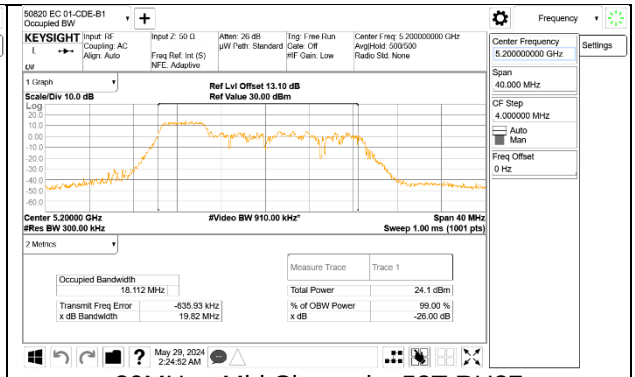


20MHz - Mid Channel – SU (UNII-1) – Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



20MHz - Mid Channel – 52T RU37 (UNII-1) – Ant 6

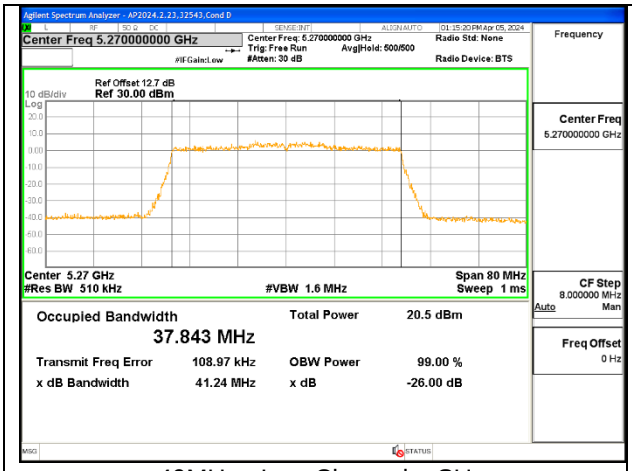


20MHz - Mid Channel – 52T RU37 (UNII-1) – Ant 5

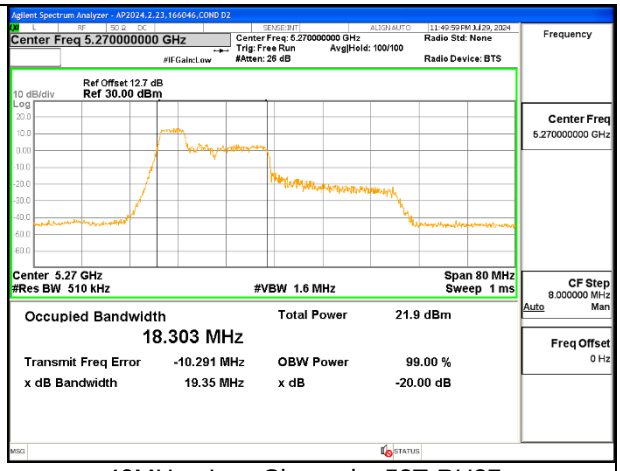
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	--	20.83	20.97	18.9800	19.0110
			52T	37	20.02	19.76	18.2600	18.0160
				38	19.39	19.43	17.0460	16.9140
				40	20.58	20.42	18.2080	18.1240
	5300	60	SU	--	21.00	21.25	18.9600	19.0000
			52T	37	19.74	19.75	18.1270	18.2860
				38	19.09	19.39	17.0840	17.0330
				40	20.79	20.62	18.3000	18.2560
	5320	64	SU	--	21.93	23.28	19.0520	19.0240
			52T	37	20.05	19.67	18.2550	18.2450
				38	19.24	19.42	17.2000	17.1290
				40	20.56	20.21	18.3260	18.2750
EHT40	5270	54	SU	--	41.24	41.07	37.8430	37.8980
			52T	37	19.35	20.54	18.3030	18.1240
				41	23.91	24.63	19.7660	20.4010
				44	21.88	22.01	18.2680	18.4870
	5310	62	SU	--	43.71	43.63	37.9820	37.9320
			52T	37	20.31	20.35	18.2550	18.1980
				41	24.19	25.63	19.7910	20.7390
				44	21.62	20.58	18.2990	18.2630
EHT80	5290	58	SU	--	85.69	84.83	77.2160	77.2070
			242T	61	30.44	29.02	19.5750	19.4770
				62	31.26	35.79	19.5390	20.4000
				64	28.78	29.80	19.8230	19.3730
EHT160	5250 (Straddle)	50	SU	--	164.30	164.40	156.4700	156.4400
			996T	67	97.16	92.86	78.3370	78.0540
				S67	93.65	92.69	77.9830	78.1020
			242T	61	29.61	27.00	20.0340	19.3770
				62	32.16	32.90	20.6880	20.4060
				S64	26.28	27.95	19.3600	20.0370



40MHz - Low Channel – SU (UNII-2a) – Ant 6

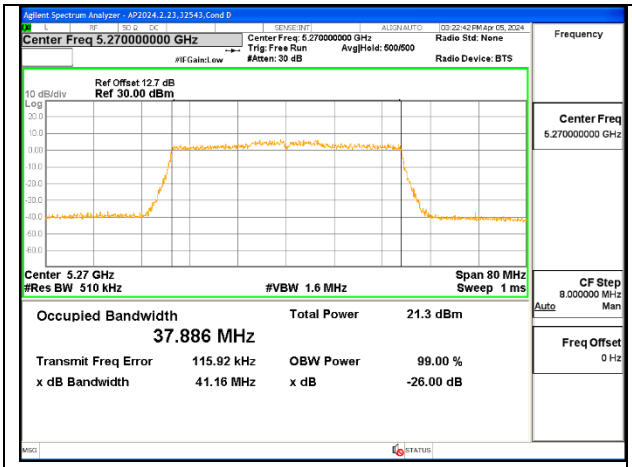


40MHz - Low Channel – 52T-RU37 (UNII-1) – Ant 6

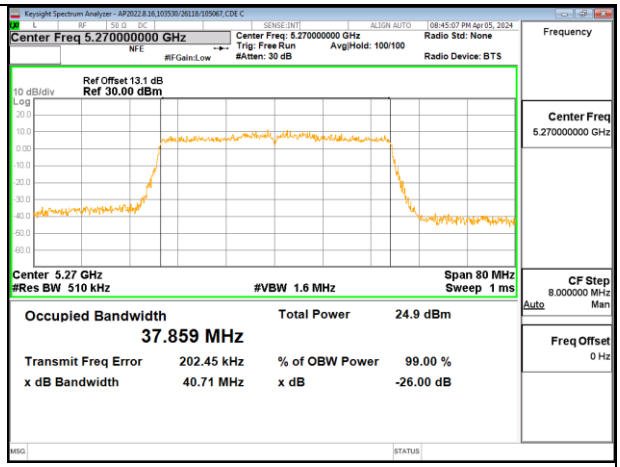
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	--	20.91	21.07	20.91	18.9600	18.9760	18.9600
			52T	37	19.90	19.66	19.66	18.3020	18.0890	18.0890
				38	19.41	18.73	18.73	17.1790	16.6930	16.6930
				40	20.48	19.54	19.54	18.3010	17.8830	17.8830
	5300	60	SU	--	20.71	21.16	20.71	18.9860	18.9880	18.9860
			52T	37	20.03	19.64	19.64	18.2880	18.1290	18.1290
				38	19.38	18.00	18.00	17.1270	16.7250	16.7250
				40	20.71	19.59	19.59	18.3150	18.1580	18.1580
	5320	64	SU	--	21.40	22.94	21.40	19.0050	19.0610	19.0050
			52T	37	19.82	19.72	19.72	18.2980	18.0560	18.0560
				38	19.28	18.57	18.57	17.1960	16.9050	16.9050
				40	20.60	19.68	19.68	18.3620	17.9910	17.9910
EHT40	5270	54	SU	--	41.16	40.71	40.71	37.8860	37.8590	37.8590
			52T	37	20.76	19.77	19.77	18.2210	18.0180	18.0180
				41	23.65	22.76	22.76	19.7580	20.0700	19.7580
				44	21.54	19.87	19.87	18.2250	18.0780	18.0780
	5310	62	SU	--	43.06	42.30	42.30	37.9610	37.9120	37.9120
			52T	37	20.73	19.42	19.42	18.2410	17.8700	17.8700
				41	23.65	24.03	23.65	19.8760	20.2730	19.8760
				44	21.77	19.83	19.83	18.3630	17.9970	17.9970
EHT80	5290	58	SU	--	82.55	82.12	82.12	77.3190	77.3790	77.3190
			242T	61	28.78	26.63	26.63	20.1580	19.4130	19.4130
				62	26.48	26.81	26.48	19.2290	20.1850	19.2290
				64	28.98	26.96	26.96	20.1410	19.4840	19.4840
EHT160	5250 (Straddle)	50	SU	--	165.1	164.2	164.2	156.65	156.6	156.6
			996T	67	95.86	93.42	93.42	78.227	78.12	78.12
				S67	94.53	97.09	94.53	78.164	77.987	77.987
			242T	61	26.66	25.67	25.67	19.976	19.466	19.466
				62	31.78	32.81	31.78	20.38	20.148	20.148
				S64	27.93	26.91	26.91	19.445	19.734	19.445

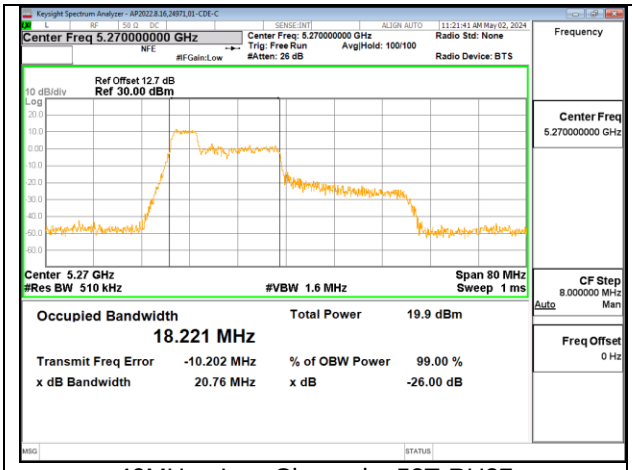


40MHz - Low Channel – SU (UNII-2a) – Ant 6

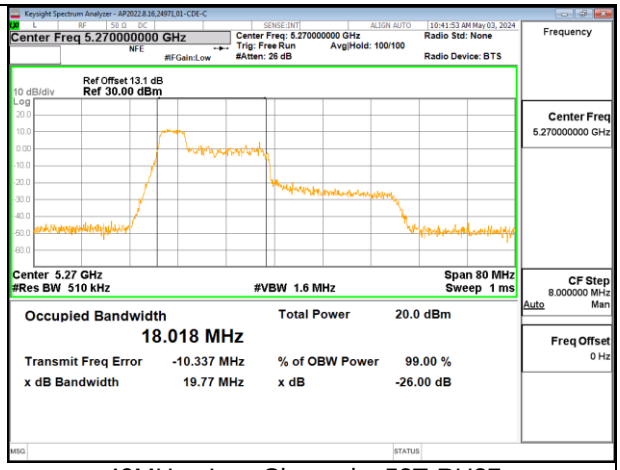


40MHz - Low Channel – SU (UNII-2a) – Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



40MHz - Low Channel – 52T-RU37
(UNII-1) – Ant 6



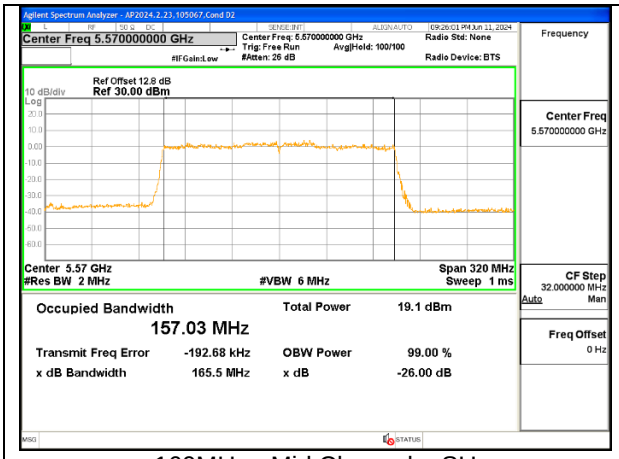
40MHz - Low Channel – 52T-RU37
(UNII-1) – Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

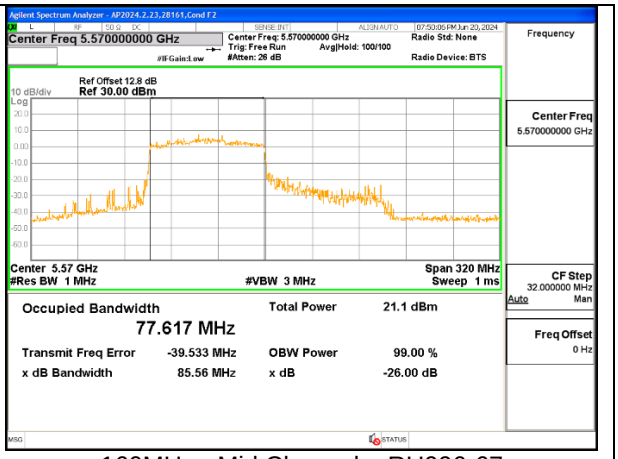
9.2.13. 802.11be SISO MODE IN THE UNII-2C BAND

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	--	22.68	21.40	19.0030	19.0180
			52T	37	19.67	19.67	18.2860	18.1170
				38	19.32	18.93	17.1500	17.0930
				40	20.58	20.05	18.2760	18.2350
	5580	116	SU	--	21.06	21.17	18.9710	18.9730
			52T	37	19.90	19.92	18.3150	18.3010
				38	19.41	19.16	17.2890	17.1310
				40	20.60	20.62	18.3340	18.3240
	5700	140	SU	--	21.80	23.22	19.0110	19.0050
			52T	37	19.76	19.93	18.1350	18.2790
				38	19.07	19.14	16.8830	17.1560
				40	20.29	20.65	18.2150	18.2200
	5720 (Straddle)	144	SU	--	21.02	21.38	18.9640	19.0180
			52T	37	19.59	19.87	17.9750	18.2770
				38	19.26	19.28	17.0120	17.1350
				40	20.54	20.62	18.3490	18.2490
EHT40	5510	102	SU	--	44.01	42.98	37.9980	37.9520
			52T	37	20.97	19.81	18.3020	18.2450
				41	24.39	25.37	21.1010	21.2040
				44	22.31	21.98	18.2870	18.4580
	5550	110	SU	--	41.21	41.08	37.8280	37.8140
			52T	37	19.92	20.13	18.1200	18.2830
				41	25.59	24.99	20.9540	21.2840
				44	22.45	21.95	18.4110	17.7440
	5670	134	SU	--	41.52	41.40	37.9620	37.9290
			52T	37	20.51	20.47	18.1440	18.2940
				41	25.95	25.41	21.0990	21.1260
				44	21.46	20.80	18.2490	18.2080
	5710 (Straddle)	142	SU	--	40.78	41.08	37.8390	37.8640
			52T	37	20.72	20.68	18.3110	18.3140
				41	27.27	25.28	21.0550	21.1770
				44	20.96	21.99	18.2300	18.2660
EHT80	5530	106	SU	--	84.60	83.02	77.2790	77.1870
			242T	61	30.21	32.46	20.6790	20.9670
				62	32.88	28.20	19.4940	19.4880
				64	30.57	30.73	21.3080	19.9120
	5610	122	SU	--	83.28	84.61	77.4580	77.2080
			242T	61	28.92	26.88	19.2180	19.2540
				62	30.78	33.85	19.4450	19.7640
				64	29.48	29.93	20.3540	19.9260
	5690 (Straddle)	138	SU	--	82.23	81.18	77.2310	77.2430
			242T	61	29.87	30.16	20.8560	20.9270
				62	36.57	38.16	19.6820	19.6800
				64	30.65	31.77	21.0710	20.4650
EHT160	5570	106	SU	--	165.50	163.20	157.0300	156.7200
			996T	67	85.56	84.82	77.2160	77.0900
				S67	86.89	85.44	77.4460	77.3870
			242T	61	27.85	28.45	20.0070	19.5090
				62	32.19	31.67	19.9470	20.0820
				S64	30.54	27.76	19.5420	19.9410

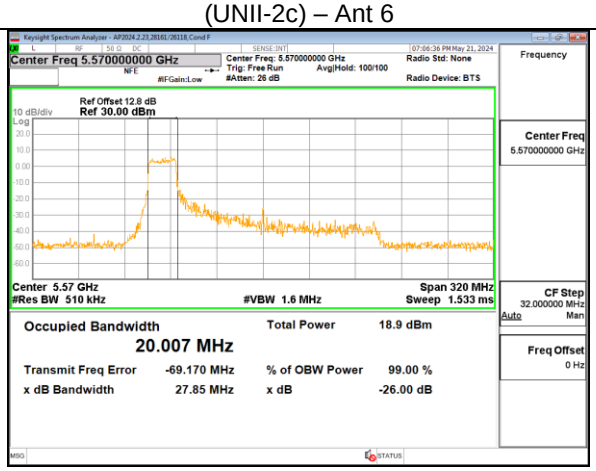
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



160MHz - Mid Channel – SU (UNII-2c) – Ant 6



160MHz - Mid Channel – RU996-67 (UNII-2c) – Ant 6



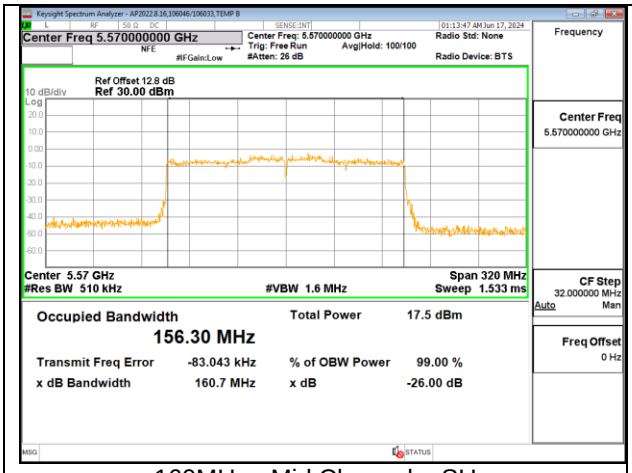
160MHz - Mid Channel – RU242-61 (UNII-2c) – Ant 6

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

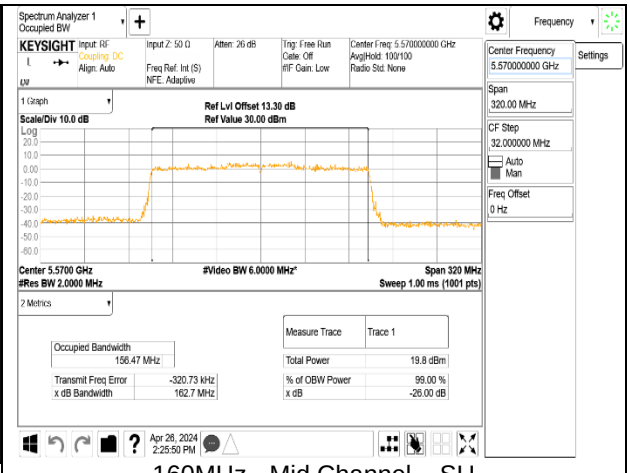
9.2.14. 802.11be MIMO CDD MODE IN THE UNII-2C BAND

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	--	23.96	21.30	21.30	19.0120	19.0040	19.0040
			52T	37	19.68	19.70	19.68	18.0990	18.0960	18.0960
				38	19.43	18.32	18.32	17.1150	16.7060	16.7060
				40	20.29	19.75	19.75	18.2170	18.0560	18.0560
	5580	116	SU	--	21.06	20.97	20.97	18.9920	18.9760	18.9760
			52T	37	19.84	19.68	19.68	18.2860	18.1210	18.1210
				38	19.51	18.40	18.40	17.3210	16.8300	16.8300
				40	20.51	19.61	19.61	18.2110	18.1560	18.1560
	5700	140	SU	--	22.02	23.15	22.02	18.9980	19.0030	18.9980
			52T	37	19.70	19.57	19.57	18.2090	18.0820	18.0820
				38	19.51	18.60	18.60	17.2470	16.8440	16.8440
				40	20.23	19.84	19.84	18.1270	18.1090	18.1090
	5720 (Straddle)	144	SU	--	20.93	21.00	20.93	18.9810	18.9430	18.9430
			52T	37	19.94	19.79	19.79	18.2980	18.1030	18.1030
				38	19.39	18.52	18.52	17.1040	16.5770	16.5770
				40	20.10	19.85	19.85	18.1720	18.1430	18.1430
EHT40	5510	102	SU	--	43.38	41.37	41.37	37.9030	37.8380	37.8380
			52T	37	20.21	19.80	19.80	18.2080	18.0480	18.0480
				41	25.21	23.82	23.82	20.9560	20.4700	20.4700
				44	21.72	19.86	19.86	18.3550	18.0170	18.0170
	5550	110	SU	--	41.10	40.79	40.79	37.8530	37.7540	37.7540
			52T	37	20.29	19.85	19.85	17.9840	18.0090	17.9840
				41	25.54	25.36	25.36	21.3050	20.3260	20.3260
				44	21.84	19.91	19.91	18.3860	18.0170	18.0170
	5670	134	SU	--	41.42	42.81	41.42	37.8620	37.9120	37.8620
			52T	37	20.39	19.79	19.79	18.2210	18.0020	18.0020
				41	24.32	23.42	23.42	20.8870	20.4140	20.4140
				44	22.47	19.90	19.90	18.3240	18.0270	18.0270
	5710 (Straddle)	142	SU	--	40.92	41.07	40.92	37.8250	37.7990	37.7990
			52T	37	20.29	19.94	19.94	18.2420	17.9560	17.9560
				41	23.62	24.28	23.62	20.4340	20.6900	20.4340
				44	21.48	19.67	19.67	18.1850	17.9620	17.9620
EHT80	5530	106	SU	--	81.56	85.05	81.56	77.2050	77.0630	77.0630
			242T	61	30.38	27.26	27.26	20.9360	19.6410	19.6410
				62	35.01	32.04	32.04	20.2470	19.7340	19.7340
				64	27.81	27.44	27.44	19.5110	19.3160	19.3160
	5610	122	SU	--	84.69	83.42	83.42	77.2790	77.2140	77.2140
			242T	61	30.16	27.54	27.54	21.0530	19.6000	19.6000
				62	36.47	34.26	34.26	20.0370	19.8820	19.8820
				64	29.33	26.95	26.95	20.3170	19.7790	19.7790
	5690 (Straddle)	138	SU	--	80.82	80.25	80.25	77.2080	77.2180	77.2080
			242T	61	29.41	27.47	27.47	20.3330	19.7760	19.7760
				62	36.81	34.68	34.68	20.4930	19.9520	19.9520
				64	27.71	27.19	27.19	19.5530	19.2970	19.2970
EHT160	5570	106	SU	--	160.7	162.7	160.7	156.3	156.47	156.3
			996T	67	90.69	89.48	89.48	77.886	77.535	77.535
				S67	85.49	86.37	85.49	77.83	77.514	77.514
			242T	61	25.24	24.28	24.28	19.478	19.238	19.238
				62	29.21	29.46	29.21	19.536	19.716	19.536
				S64	28.38	25.47	25.47	19.671	19.222	19.222

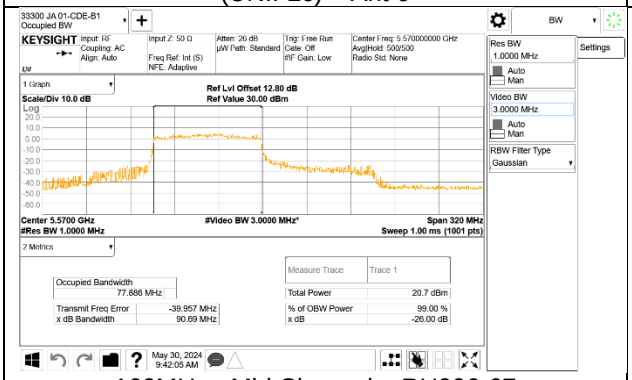
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



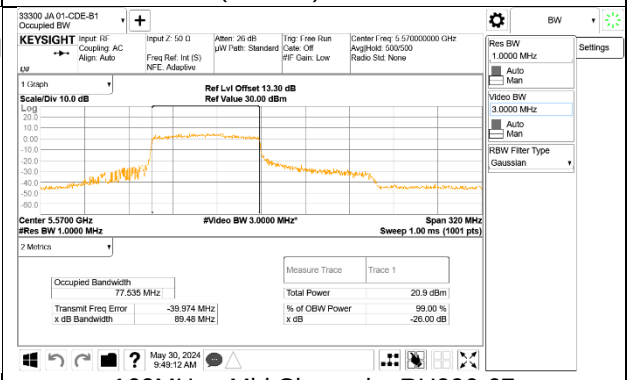
160MHz - Mid Channel – SU
(UNII-2c) – Ant 6



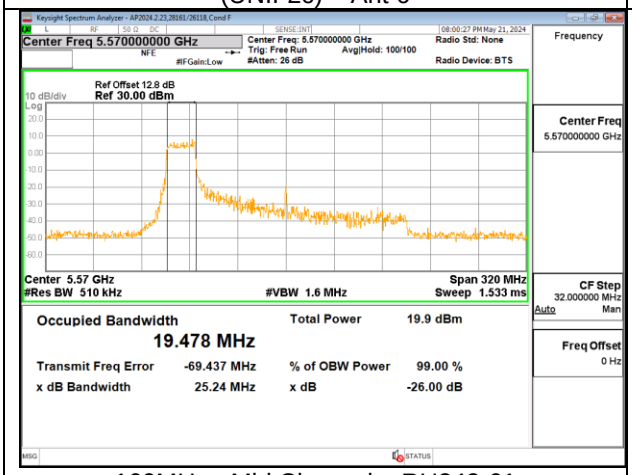
160MHz - Mid Channel – SU
(UNII-2c) – Ant 5



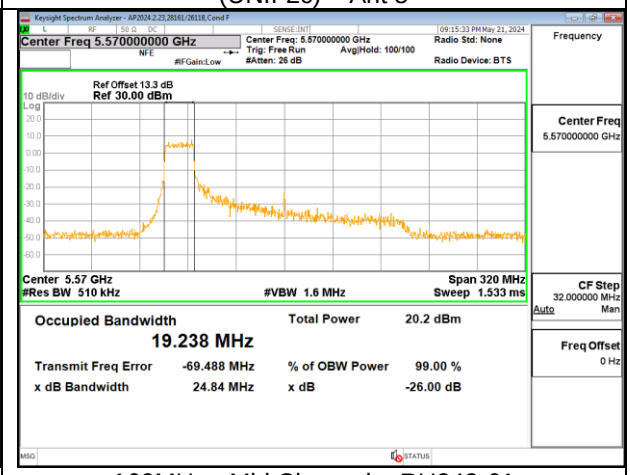
160MHz - Mid Channel – RU996-67
(UNII-2c) – Ant 6



160MHz - Mid Channel – RU996-67
(UNII-2c) – Ant 5



160MHz - Mid Channel – RU242-61
(UNII-2c) – Ant 6



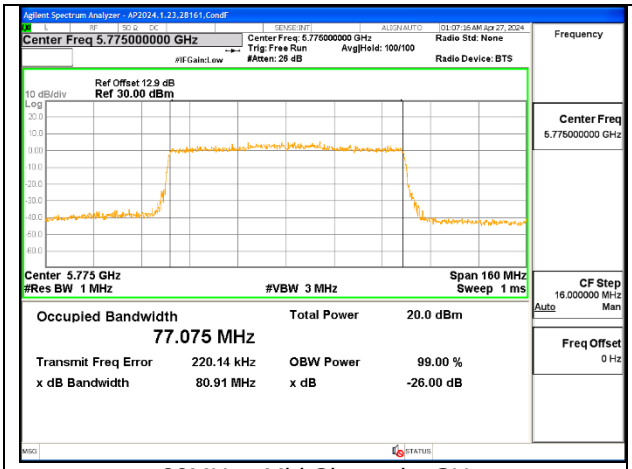
160MHz - Mid Channel – RU242-61
(UNII-2c) – Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

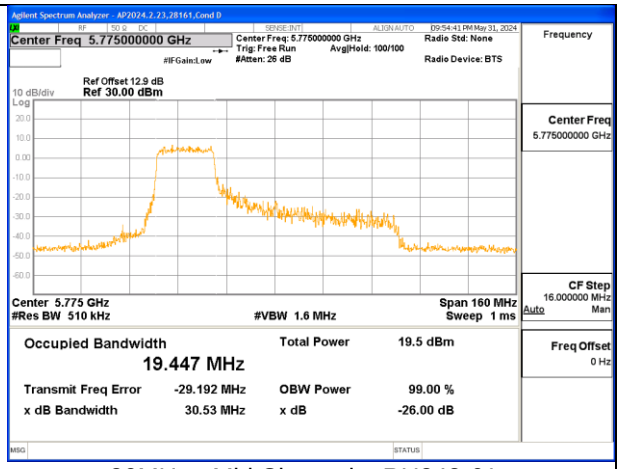
9.2.15. 802.11be SISO MODE IN THE UNII-3 BAND

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	--	20.98	21.07	19.0100	19.0090
			52T	37	20.34	19.82	18.2800	18.2320
				38	19.24	19.11	17.2000	17.0810
				40	21.75	19.94	18.5220	18.1930
	5785	157	SU	--	21.06	20.97	18.9990	18.9660
			52T	37	20.52	19.56	18.3430	18.1770
				38	19.16	19.07	17.1280	17.2410
				40	20.50	20.22	18.1640	18.1420
	5825	165	SU	--	21.18	21.25	18.9760	18.9540
			52T	37	19.85	19.29	18.2030	17.8800
				38	18.99	19.00	17.0180	17.1340
				40	20.38	19.92	18.3980	18.2180
EHT40	5755	151	SU	--	41.20	40.89	37.8660	37.8420
			242T	61	27.74	28.97	19.4430	19.2920
				62	29.02	29.25	19.3380	19.3430
	5795	159	SU	--	41.25	41.09	37.9140	37.8000
			242T	61	26.27	26.80	19.2510	19.2890
				62	28.28	29.02	19.3210	19.3530
EHT80	5775	155	SU	--	80.91	81.23	77.0750	77.0740
			242T	61	30.53	32.18	19.4470	19.3060
				62	34.16	36.50	19.7040	19.4830
				64	28.18	27.13	19.4990	19.4070
			52+26T	71	18.80	19.67	17.3480	17.4440
				74	24.02	24.37	18.5400	17.8880
				80	19.44	23.20	17.5370	17.8640

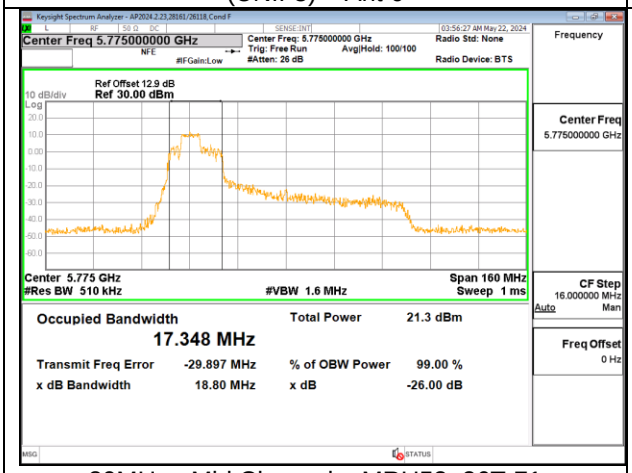
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



80MHz - Mid Channel – SU
(UNII-3) – Ant 6



80MHz - Mid Channel – RU242-61
(UNII-3) – Ant 6



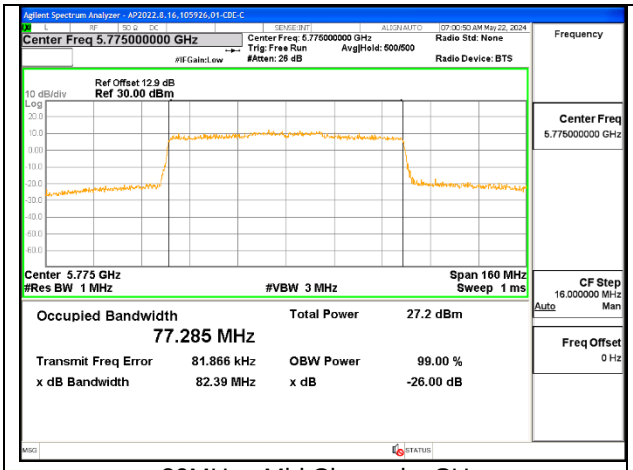
80MHz - Mid Channel – MRU52+26T-71
(UNII-3) – Ant 6

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

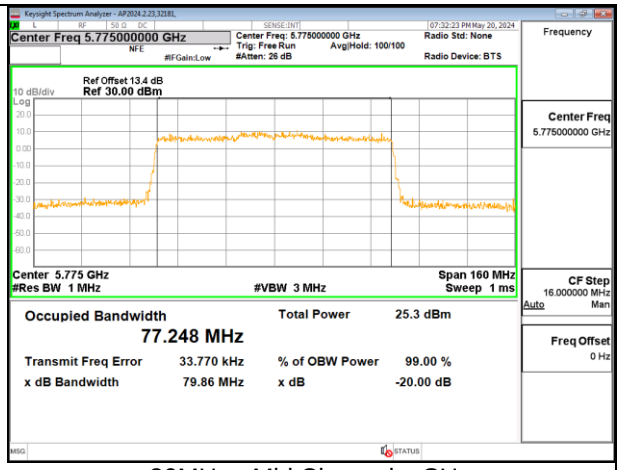
9.2.16. 802.11be MIMO CDD MODE IN THE UNII-3 BAND

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	--	21.32	20.70	18.9700	19.0160
			52	37	19.76	19.38	18.2050	18.0610
				38	19.37	18.41	17.2390	16.9160
				40	20.62	19.47	18.2420	18.0160
	5785	157	SU	--	20.84	21.16	18.9600	18.9600
			52	37	19.73	19.31	18.2580	17.9800
				38	19.14	18.35	17.0110	16.8770
				40	20.46	19.56	18.1750	17.9380
	5825	165	SU	--	21.07	21.02	18.9310	18.9750
			52	37	19.81	19.34	18.1250	18.0470
				38	19.43	18.40	17.1730	16.7620
				40	20.66	19.48	18.2460	18.0900
EHT40	5755	151	SU	--	40.87	40.72	37.8280	37.9370
			242T	61	29.67	28.25	19.3540	19.2610
				62	33.81	31.55	19.9530	19.3120
	5795	159	SU	--	41.06	41.10	37.9130	37.8670
			242T	61	25.60	25.60	19.4330	19.3160
				62	29.39	28.03	19.4340	19.3500
EHT80	5775	155	SU	--	82.39	79.86	77.2850	77.2480
			242T	61	26.26	28.59	19.5330	19.3960
				62	34.14	35.40	19.4440	19.4420
				64	33.03	30.39	19.6300	19.3310
			52+26	71	19.33	18.86	17.6250	17.1930
				74	24.45	20.46	17.0780	17.5140
				80	21.05	19.33	17.5930	17.0920

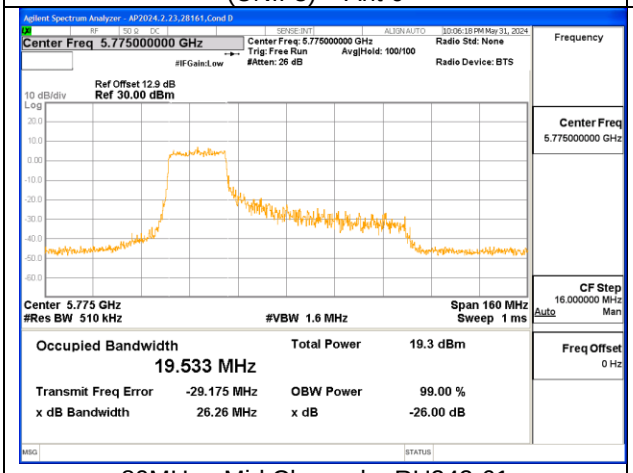
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



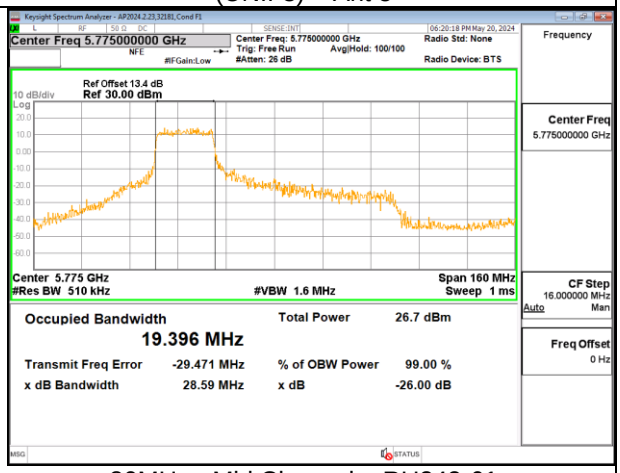
80MHz - Mid Channel – SU
(UNII-3) – Ant 6



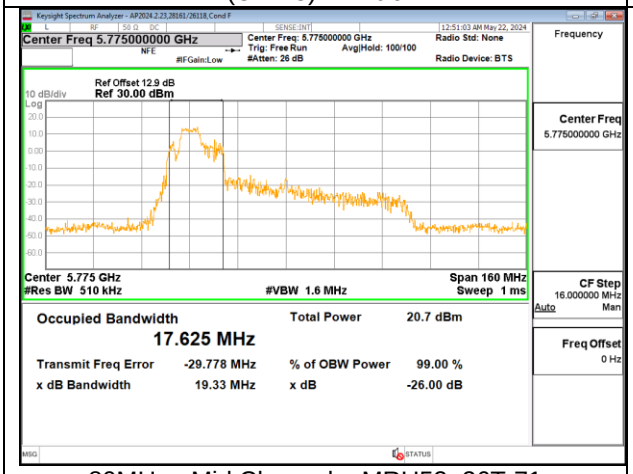
80MHz - Mid Channel – SU
(UNII-3) – Ant 5



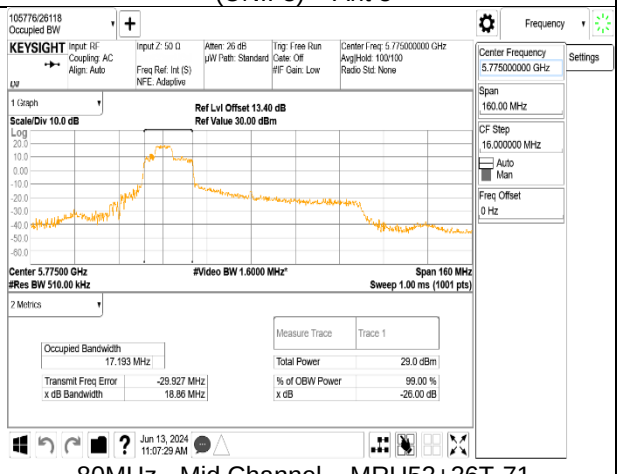
80MHz - Mid Channel – RU242-61
(UNII-3) – Ant 6



80MHz - Mid Channel – RU242-61
(UNII-3) – Ant 5



80MHz - Mid Channel – MRU52+26T-71
(UNII-3) – Ant 6



80MHz - Mid Channel – MRU52+26T-71
(UNII-3) – Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.3. BANDWIDTH VERIFICATION OF CHANNEL PUNCTUIRNG IN THE DFS BANDS

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

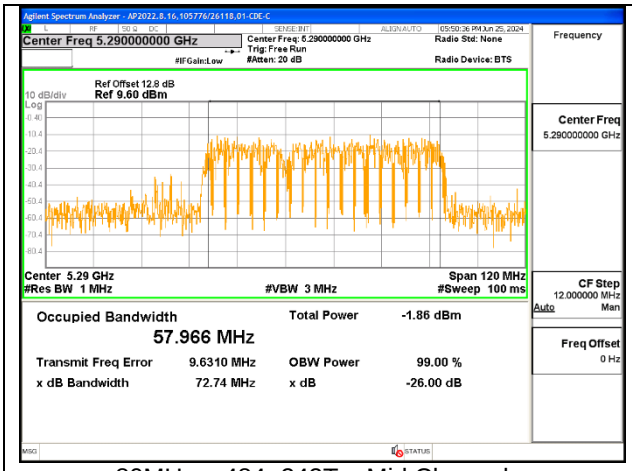
RESULTS

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

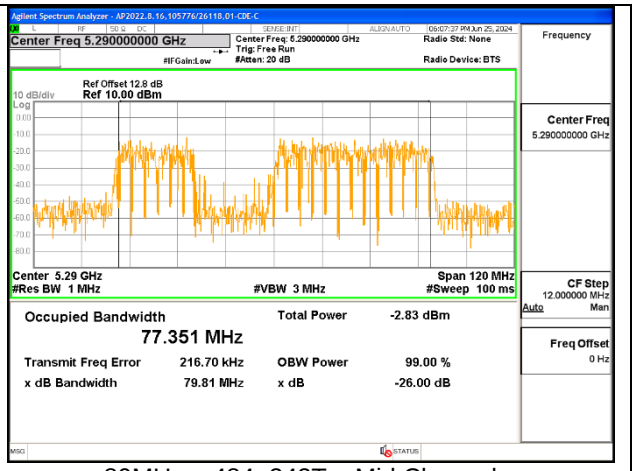
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.3.1. 802.11be EHT80 SISO MODE

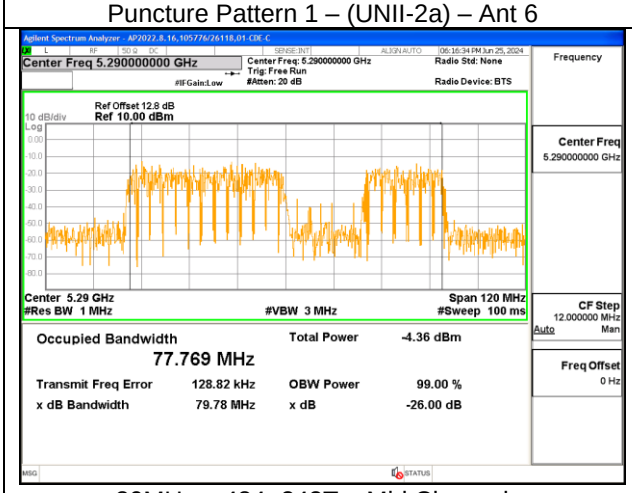
ID:	105776/28161	Date:	6/25/2024



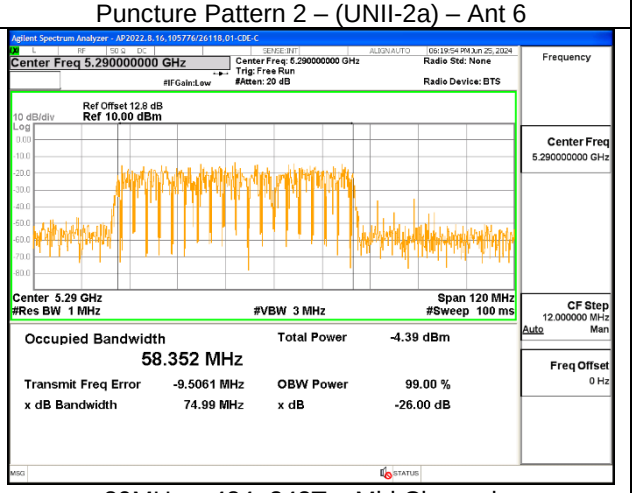
80MHz – 484+242T – Mid Channel – Puncture Pattern 1 – (UNII-2a) – Ant 6



80MHz – 484+242T – Mid Channel – Puncture Pattern 2 – (UNII-2a) – Ant 6



80MHz – 484+242T – Mid Channel – Puncture Pattern 4 – (UNII-2a) – Ant 6

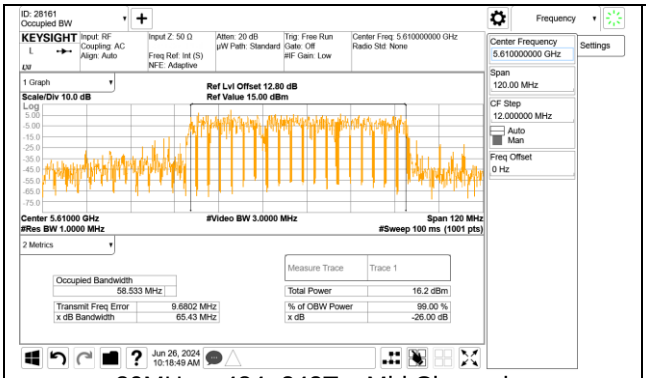


80MHz – 484+242T – Mid Channel – Puncture Pattern 8 – (UNII-2a) – Ant 6

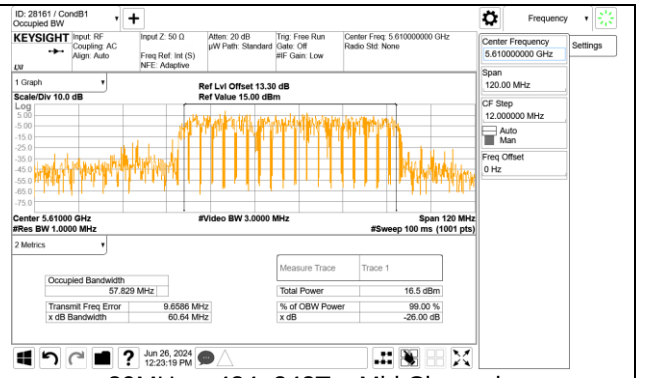
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.3.2. 802.11be EHT80 MIMO CDD MODE

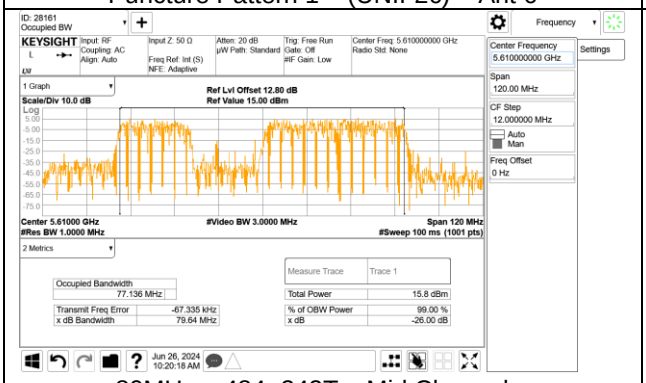
ID:	28161	Date:	6/25/2024



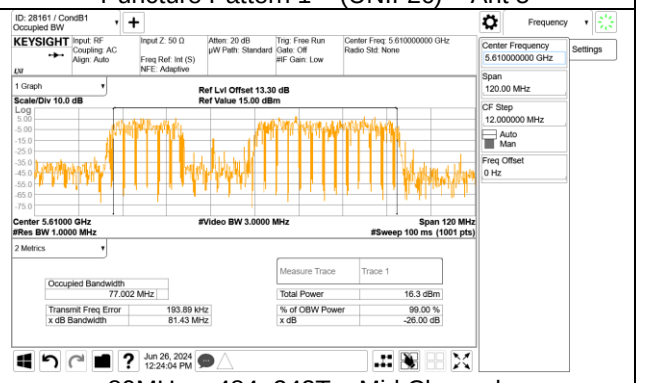
80MHz – 484+242T – Mid Channel – Puncture Pattern 1 – (UNII-2c) – Ant 6



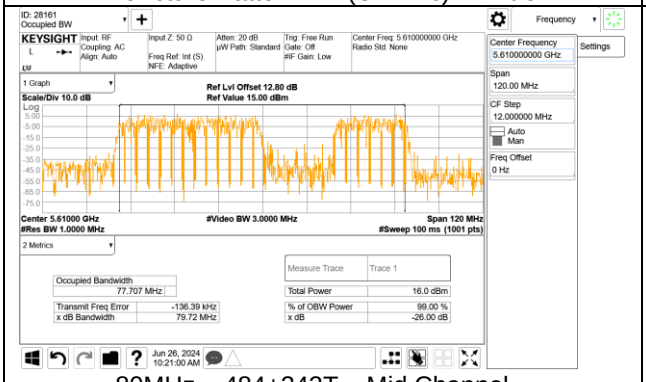
80MHz – 484+242T – Mid Channel – Puncture Pattern 1 – (UNII-2c) – Ant 5



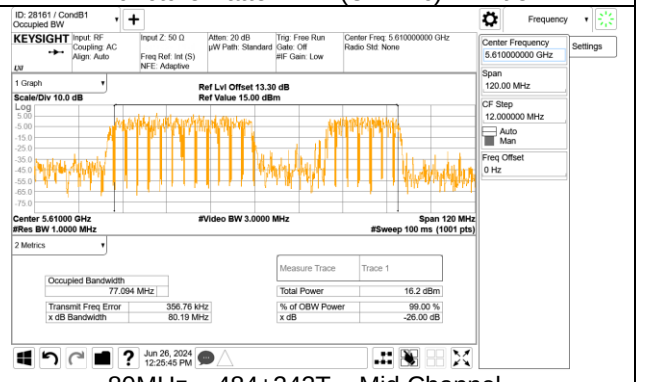
80MHz – 484+242T – Mid Channel – Puncture Pattern 2 – (UNII-2c) – Ant 6



80MHz – 484+242T – Mid Channel – Puncture Pattern 2 – (UNII-2c) – Ant 5

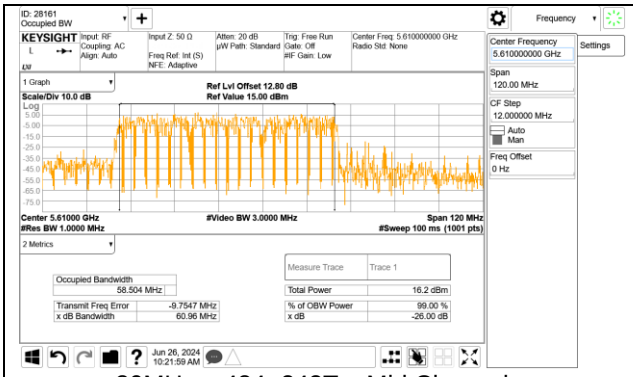


80MHz – 484+242T – Mid Channel – Puncture Pattern 4 – (UNII-2c) – Ant 6



80MHz – 484+242T – Mid Channel – Puncture Pattern 4 – (UNII-2c) – Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



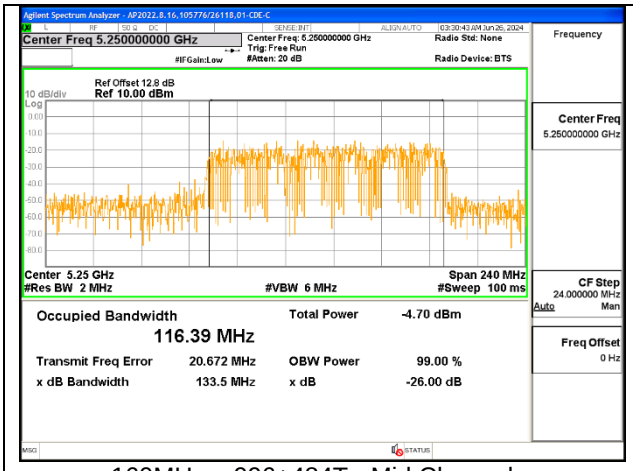
80MHz – 484+242T – Mid Channel – Puncture Pattern 8 – (UNII-2c) – Ant 6

80MHz – 484+242T – Mid Channel – Puncture Pattern 8 – (UNII-2c) – Ant 5

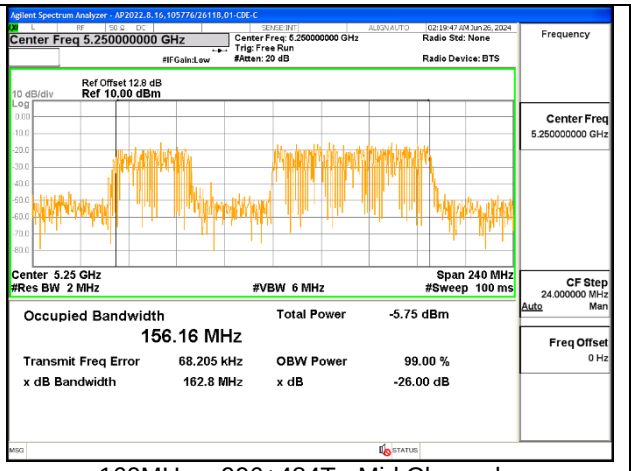
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.3.3. 802.11be EHT160 SISO MODE

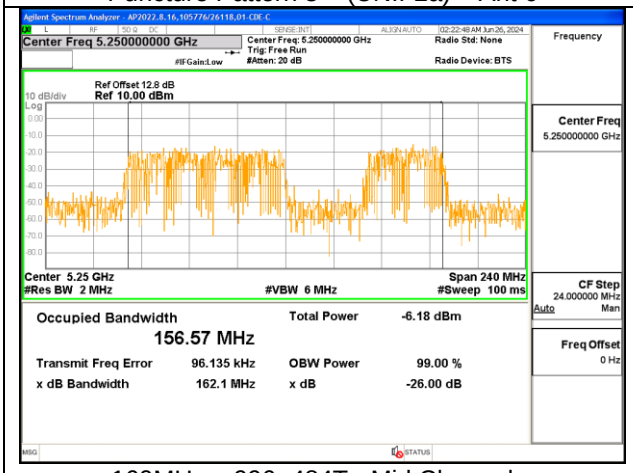
ID:	105776/26118	Date:	6/26/2024



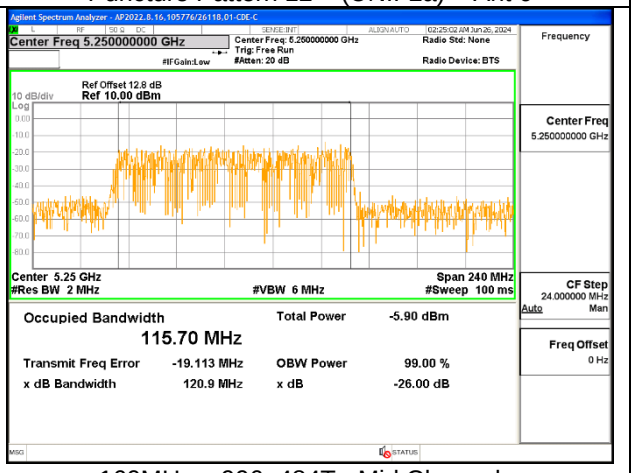
160MHz – 996+484T - Mid Channel – Puncture Pattern 3 – (UNII-2a) – Ant 6



160MHz – 996+484T - Mid Channel – Puncture Pattern 12 – (UNII-2a) – Ant 6



160MHz – 996+484T - Mid Channel – Puncture Pattern 48 – (UNII-2a) – Ant 6

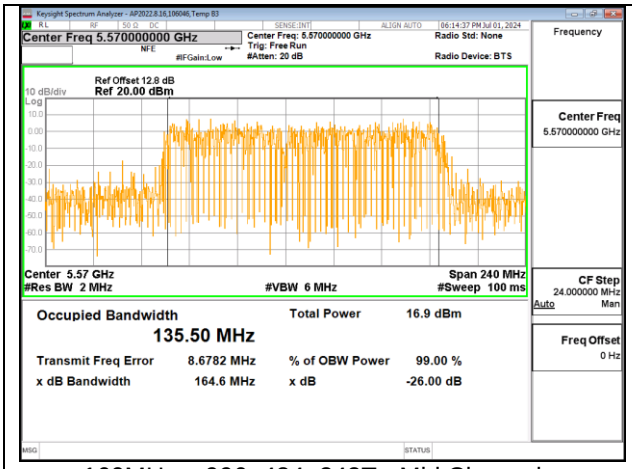


160MHz – 996+484T - Mid Channel – Puncture Pattern 192 – (UNII-2a) – Ant 6

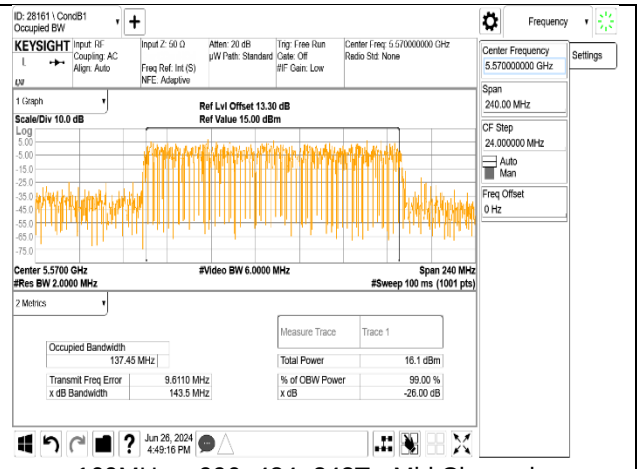
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

9.3.4. 802.11be EHT160 MIMO CDD MODE

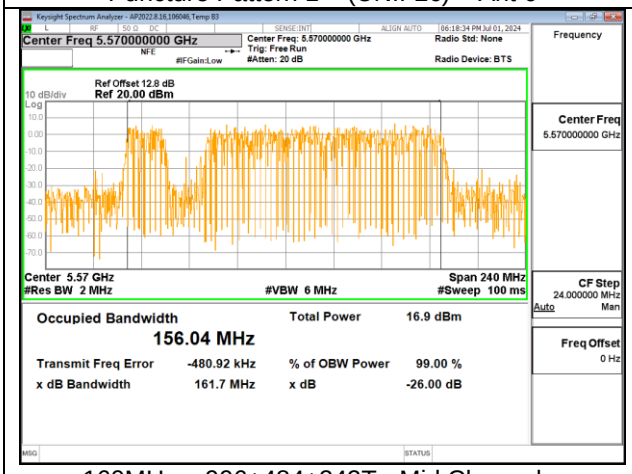
ID:	28161	Date:	6/26/2024



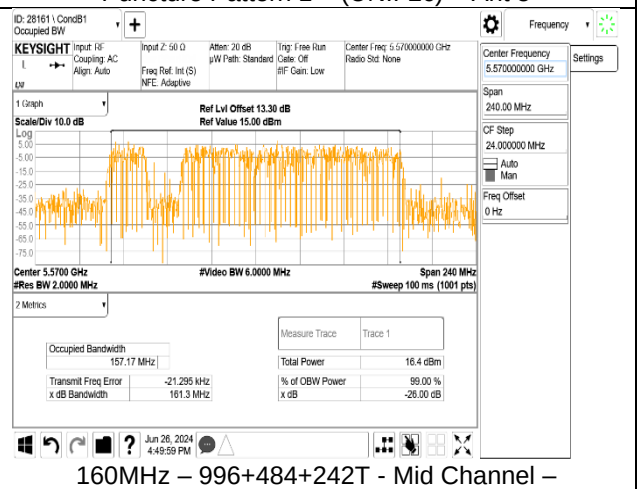
160MHz – 996+484+242T - Mid Channel – Puncture Pattern 1 – (UNII-2c) – Ant 6



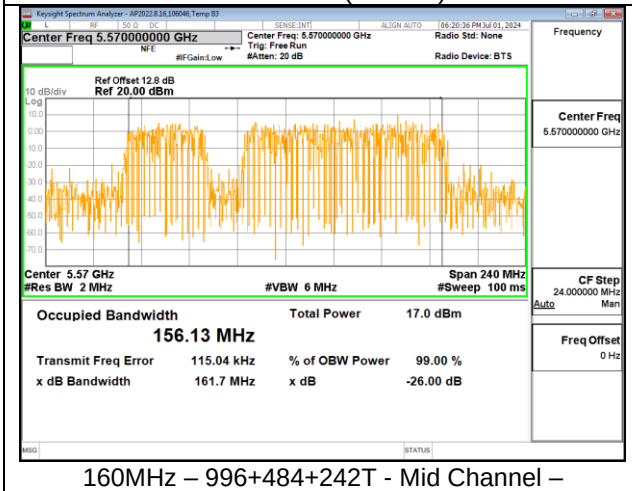
160MHz – 996+484+242T - Mid Channel – Puncture Pattern 1 – (UNII-2c) – Ant 5



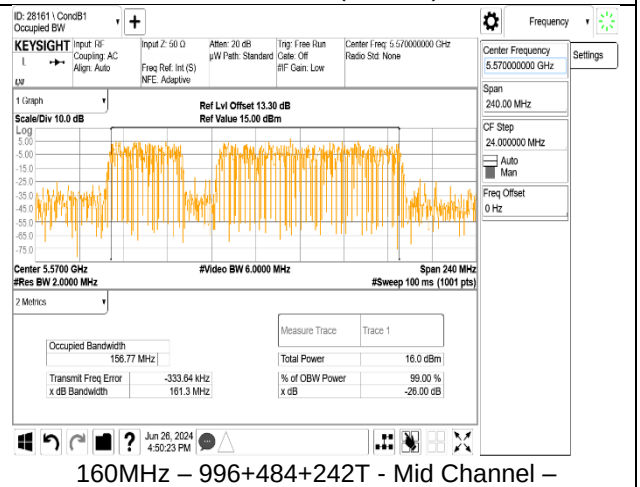
160MHz – 996+484+242T - Mid Channel – Puncture Pattern 2– (UNII-2c) – Ant 6



160MHz – 996+484+242T - Mid Channel – Puncture Pattern 2– (UNII-2c) – Ant 5

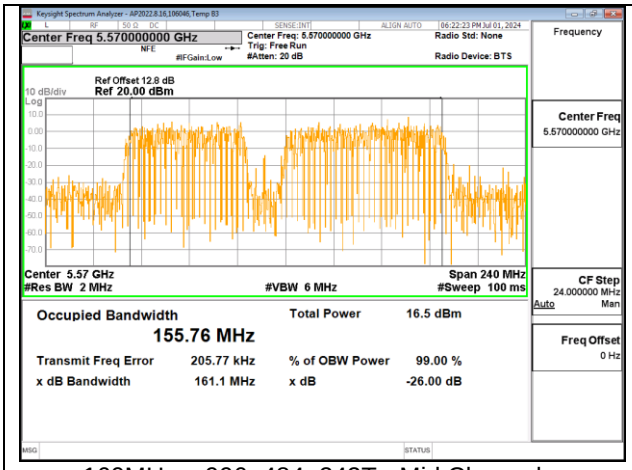


160MHz – 996+484+242T - Mid Channel – Puncture Pattern 4 – (UNII-2c) – Ant 6

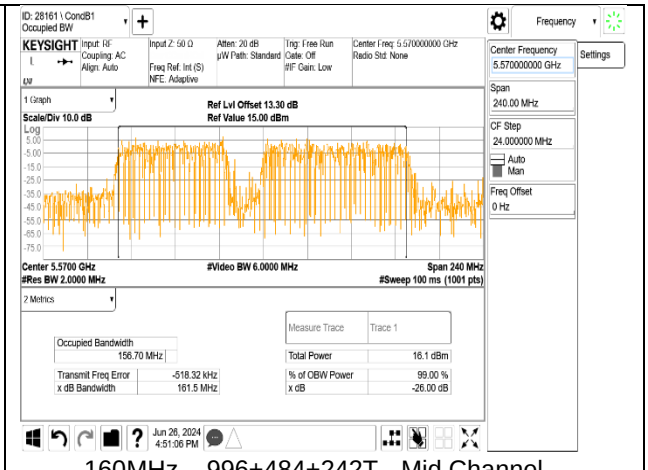


160MHz – 996+484+242T - Mid Channel – Puncture Pattern 4 – (UNII-2c) – Ant 5

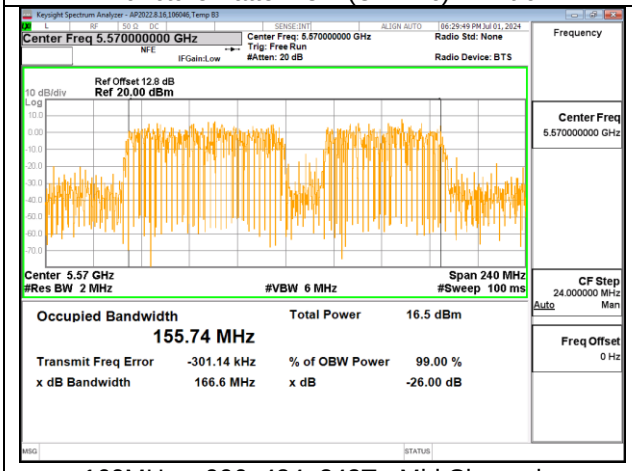
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



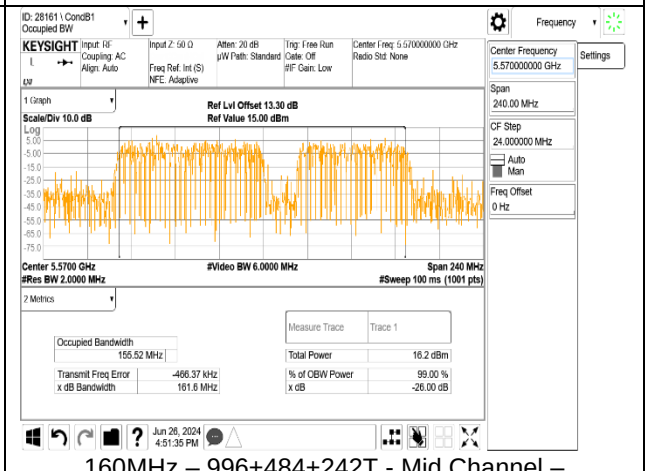
160MHz – 996+484+242T - Mid Channel – Puncture Pattern 8 – (UNII-2c) – Ant 6



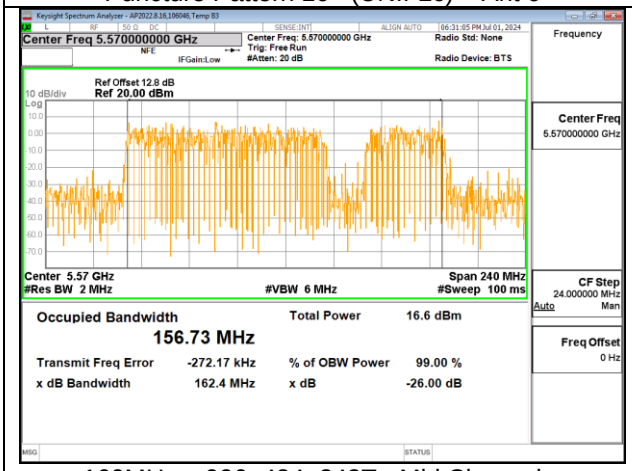
160MHz – 996+484+242T - Mid Channel – Puncture Pattern 8 – (UNII-2c) – Ant 5



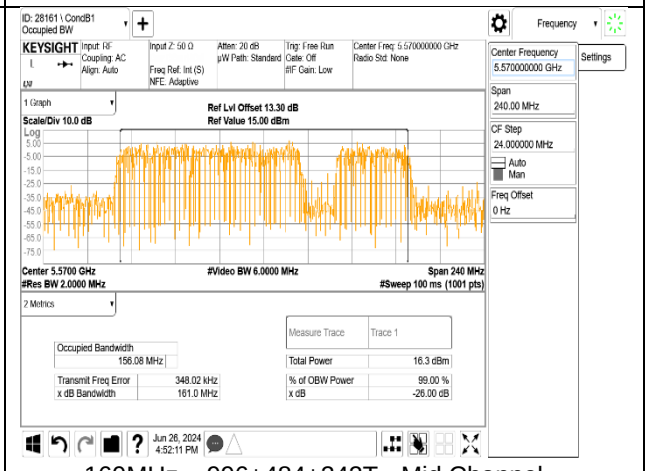
160MHz – 996+484+242T - Mid Channel – Puncture Pattern 16– (UNII-2c) – Ant 6



160MHz – 996+484+242T - Mid Channel – Puncture Pattern 16– (UNII-2c) – Ant 5

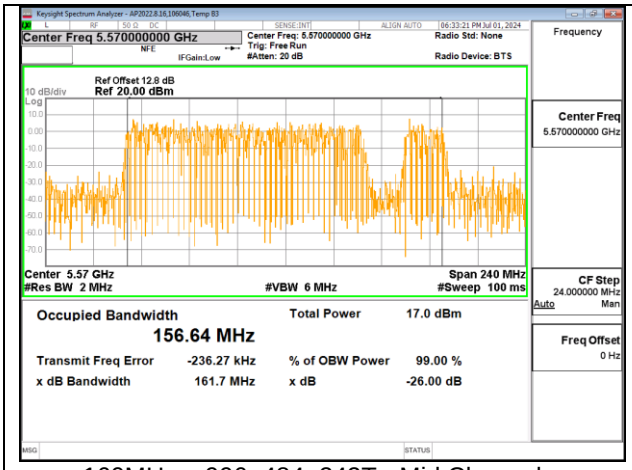


160MHz – 996+484+242T - Mid Channel – Puncture Pattern 32 – (UNII-2c) – Ant 6

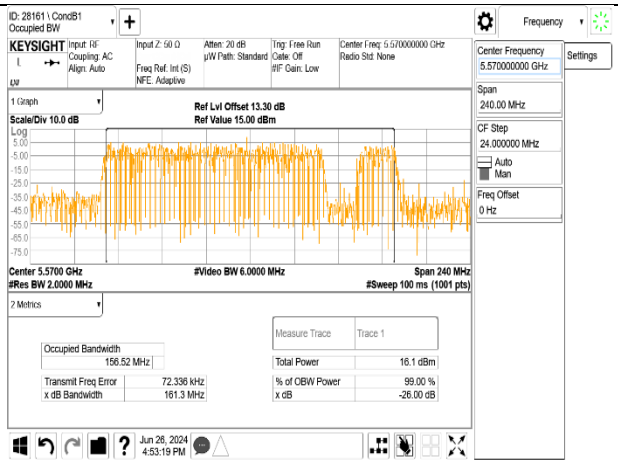


160MHz – 996+484+242T - Mid Channel – Puncture Pattern 32 – (UNII-2c) – Ant 5

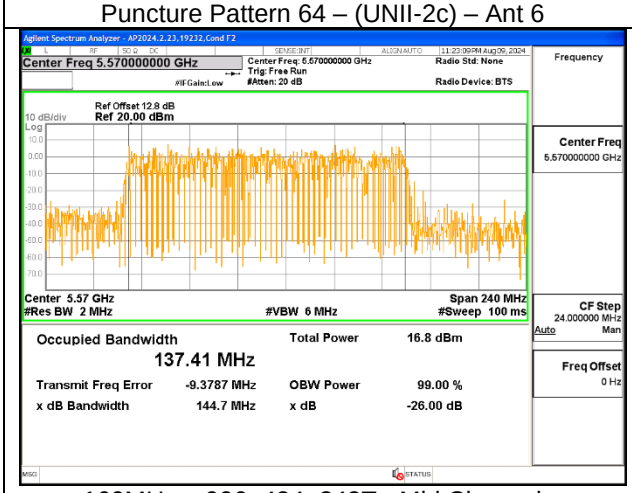
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888



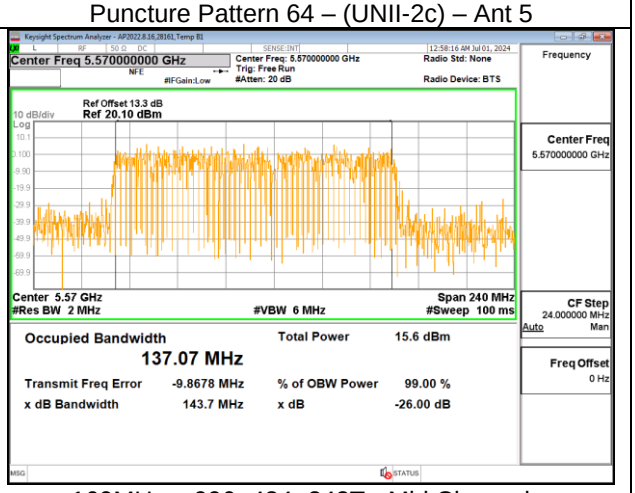
160MHz – 996+484+242T - Mid Channel – Puncture Pattern 64 – (UNII-2c) – Ant 6



160MHz – 996+484+242T - Mid Channel – Puncture Pattern 64 – (UNII-2c) – Ant 5



160MHz – 996+484+242T - Mid Channel – Puncture Pattern 128– (UNII-2c) – Ant 6



160MHz – 996+484+242T - Mid Channel – Puncture Pattern 128– (UNII-2c) – Ant 5

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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.

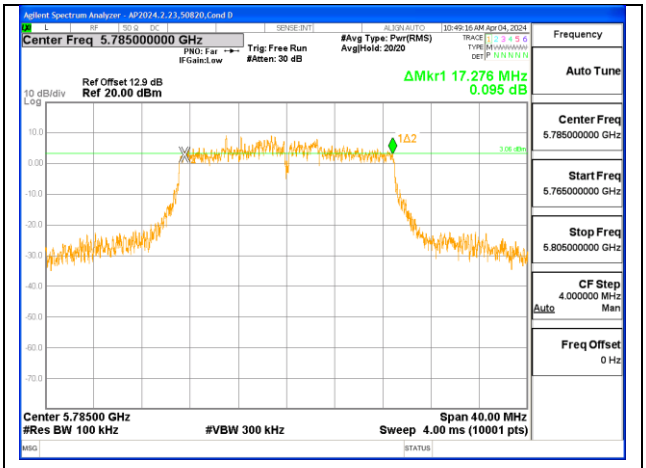
RESULTS

For 6dB bandwidth measurements, the 802.11be HT20 was tested at 26T as a worst-case scenario. For straddle channels, 106T was tested as worst-case as 26T is not supported.

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	3.812	3.884
	5745	149	17.580	17.660
	5785	157	17.276	17.516
	5825	165	17.680	17.572
HT40	5710 (Straddle)	142	2.784	2.792
	5755	151	36.336	32.264
	5795	159	35.184	35.304
VHT80	5690 (Straddle)	138	3.192	3.240
	5775	155	75.696	75.088

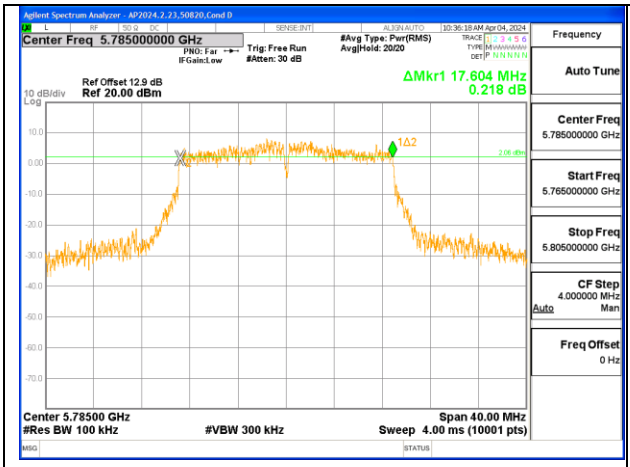


MID CHANNEL – Ant 6 – HT20

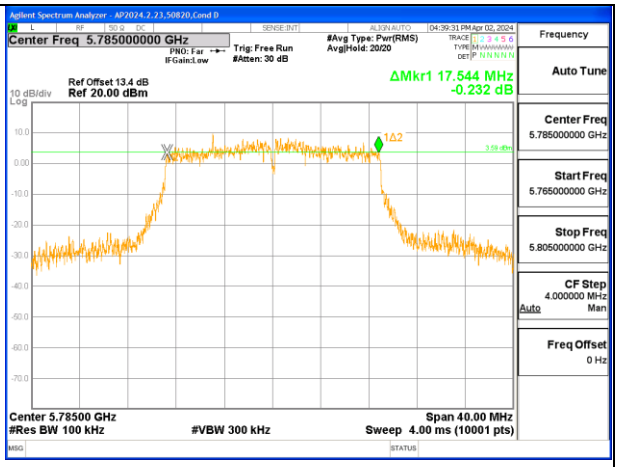
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	3.904	3.860
	5745	149	17.584	17.320
	5785	157	17.604	17.544
	5825	165	17.600	17.620
HT40	5710 (Straddle)	142	3.168	3.304
	5755	151	36.080	36.344
	5795	159	35.904	36.352
VHT80	5690 (Straddle)	138	3.304	3.224
	5775	155	75.376	75.776



MID CHANNEL – Ant 6 – HT20

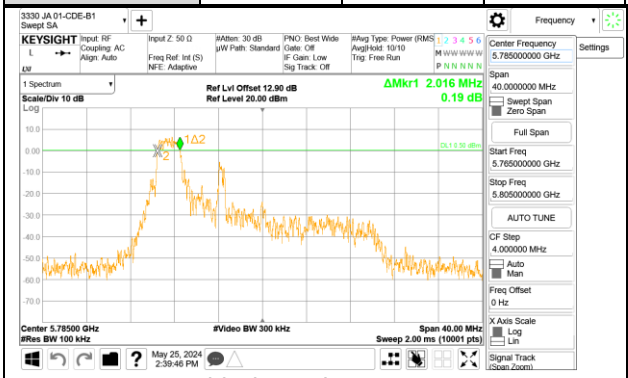


MID CHANNEL – Ant 5 – HT20

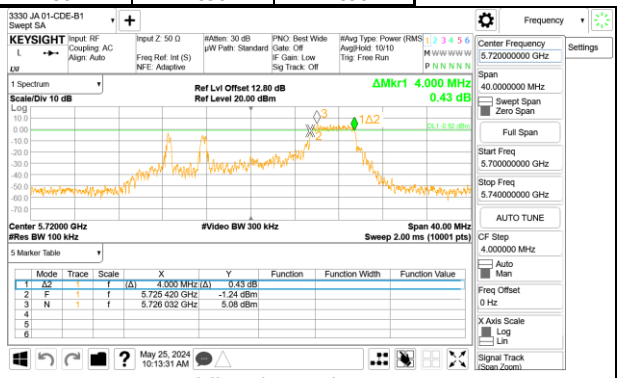
UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	2.068	1.996
				4	2.54	2.540
				8	1.98	1.956
	5785	157	SU	--	--	--
			26T	0	2.016	2.016
				4	2.596	2.580
				8	1.996	1.956
	5825	165	SU	--	--	--
			26T	0	2.068	1.952
				4	2.580	2.552
				8	1.996	1.972
EHT40	5710 (Straddle)	142	SU	--	--	--
			52T	44	4.008	3.976
	5755	151	SU	--	--	--
			26T	0	2.048	2.056
				9	2.032	1.920
				17	2.032	2.040
	5795	159	SU	--	--	--
			26T	0	1.984	2.104
				9	2.000	2.024
				17	2.048	2.024
EHT80	5690 (Straddle)	138	SU	--	--	--
			52T	52	3.992	3.944
	5775	155	SU	--	--	--
			26T	0	2.112	2.064
				18	2.608	2.624
				36	2.096	2.096



20MHz - Mid Channel – 26T-RU0 – Ant 6



20MHz - Straddle Channel – 52T-RU40 – Ant 6

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888

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	4.032	4.012
	5745	149	SU	--	--	--
			26T	0	1.992	1.996
				4	2.512	2.544
				8	2.004	1.980
	5785	157	SU	--	--	--
			26T	0	1.984	2.032
				4	2.536	2.532
				8	2.060	2.052
	5825	165	SU	--	--	--
			26T	0	1.992	2.036
				4	2.592	2.556
				8	2.000	1.980
EHT40	5710 (Straddle)	142	SU	--	--	--
			52T	44	4.024	3.976
	5755	151	SU	--	--	--
			26T	0	2.016	2.112
				9	2.112	1.976
				17	2.016	2.000
	5795	159	SU	--	--	--
			26T	0	1.976	2.120
				9	2.112	1.968
				17	2.000	2.088
EHT80	5690 (Straddle)	138	SU	--	--	--
			52T	52	3.912	3.960
	5775	155	SU	--	--	--
			26T	0	2.064	2.080
				18	2.592	2.624
				36	2.096	2.032

UL VERIFICATION SERVICES INC.
47173 Benicia Street, Fremont, CA 94538; USA TEL:(510) 319-4000 FAX:(510) 661-0888