TEST REPORT

Report Number: R15103618-E7

Applicant	:	Sony Corporation 1-7-1 Konan Minato-Ku Tokyo, 108-0075, Japan
FCC ID	:	PY7-46195Y
EUT Description	:	LTE/5G Portable Data Transmitter with BT, DTS/UNII a/b/g/n/ac/ax and GPS
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART E: 2024

Date Of Issue:
2024-04-25

Prepared by:
UL LLC
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CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-02-29	Initial Issue	Charles Moody
V2	2024-03-05	Added to 26dB Section to Show Compliance to Lower and Upper Band Limits	Charles Moody
V3	2024-03-25	Updated Antenna Gains, 26dB, Masks, and Power/PSD Sections.	Charles Moody
V4	2024-04-25	Revised Section 9.2 Limits	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Sony Corporation
1-7-1 Konan Minato-ku
Tokyo, 108-0075, Japan

EUT DESCRIPTION: LTE/5G Portable Data Transmitter with BT, DTS/UNII a/b/g/n/ac/ax and GPS

SERIAL NUMBER: QV77000LJP, QV77006NLY, QV77009KLY, QV77002FLY

SAMPLE RECEIPT DATE: 2023-12-01 TO 2023-12-26

DATE TESTED: 2024-01-20 TO 2024-02-17, 2024-03-05, 2024-03-14

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart : 2024	See Section 2

UL LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released For
UL LLC

Michael Antola
Staff Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:

Charles Moody
Electrical Engineer
Consumer, Medical and IT Segment
UL LLC

2. TEST RESULT SUMMARY

This report contains data provided by the applicant which can impact the validity of results. UL LLC 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 6.4)
2) Cable loss (see sections 9.3 and 9.4)

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	ANSI C63.10 Section 12.2
§15.407 (a) (10)	26dB BW	Compliant	None.
§15.407 (a) (8)	Output Power e.i.r.p.	Compliant	Indoor Client.
§15.407 (a) (8)	Power Spectral Density	Compliant	Indoor Client.
§15.407 (b) (6)	Emissions outside 5.925-7.125 GHz band	Compliant	None
§15.407 (b) (7)	Emissions within 5.925-7.125 GHz Band (Emissions Mask)	Compliant	None
§15.407 (d) (6)	Contention-based protocol	Not Tested	See Separate Report
§15.205, §15.209	Radiated Spurious Emissions	Compliant	None
§15.207	AC Mains Conducted Emissions	Compliant	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
- FCC KDB 987594 D01 v02r02
- FCC KDB 987594 D02 v02r01
- ANSI C63.10-2020

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 0751.06, 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: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

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}
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Mains Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%

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

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

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a LTE/5G Portable Data Transmitter with BT, DTS/UNII a/b/g/n/ac/ax and GPS. This report covers the full emissions testing of the 6GHz WLAN radio.

6.2. EUT DEVICE CLASS

EUT is of the following device class:

	U-NII Bands of Operation			
	5	6	7	8
Indoor Client (6XD)	☒	☒	☒	☒

6.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum e.i.r.p. output power as follows:

U-NII 5 (5.925-6.425 GHz) BAND

Frequency Range (MHz)	Mode	e.i.r.p. Power (dBm)	Output Power (mW)
LPI			
5955-6415	802.11a	6.15	4.12
	802.11ax HE20 OFDMA, 26T	-2.28	0.59
	802.11ax HE20 OFDMA, 52T	0.31	1.07
	802.11ax HE20 OFDMA, 106T	3.11	2.05
	802.11ax HE20 OFDMA, 242T	5.88	3.87
5965-6405	802.11ax HE40 OFDMA, 484T	8.64	7.31
5985-6385	802.11ax HE80 OFDMA, 996T	8.56	7.18
6025-6345	802.11ax HE160 OFDMA, 2x996T	8.46	7.01

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U-NII-6 (6.425-6.525 GHz) BAND

Frequency Range (MHz)	Mode	e.i.r.p. Power (dBm)	Output Power (mW)
LPI			
6435-6515	802.11a	6.18	4.15
	802.11ax HE20 OFDMA, 26T	-3.10	0.49
	802.11ax HE20 OFDMA, 52T	0.08	1.02
	802.11ax HE20 OFDMA, 106T	3.18	2.08
	802.11ax HE20 OFDMA, 242T	6.03	4.01
6445-6525	802.11ax HE40 OFDMA, 484T	8.56	7.18
6465	802.11ax HE80 OFDMA, 996T	8.45	7.00
6505	802.11ax HE160 OFDMA, 2x996T	8.12	6.49

U-NII-7 (6.525-6.875 GHz) BAND

Frequency Range (MHz)	Mode	e.i.r.p. Power (dBm)	Output Power (mW)
LPI			
6535-6855	802.11a	5.56	3.60
	802.11ax HE20 OFDMA, 26T	-2.90	0.51
	802.11ax HE20 OFDMA, 52T	0.07	1.02
	802.11ax HE20 OFDMA, 106T	3.25	2.11
	802.11ax HE20 OFDMA, 242T	5.50	3.55
6565-6845	802.11ax HE40 OFDMA, 484T	8.55	7.16
6625-6785	802.11ax HE80 OFDMA, 996T	8.53	7.13
6665	802.11ax HE160 OFDMA, 2x996T	8.13	6.50

U-NII 8 (6.875-7.125 GHz) BAND

Frequency Range (MHz)	Mode	e.i.r.p. Power (dBm)	Output Power (mW)
LPI			
6875-7115	802.11a	5.34	3.42
	802.11ax HE20 OFDMA, 26T	3.40	2.19
	802.11ax HE20 OFDMA, 52T	-0.34	0.92
	802.11ax HE20 OFDMA, 106T	2.52	1.79
	802.11ax HE20 OFDMA, 242T	6.17	4.14
6885-7085	802.11ax HE40 OFDMA, 484T	7.32	5.40
6865-7025	802.11ax HE80 OFDMA, 996T	7.55	5.69
6825-6985	802.11ax HE160 OFDMA, 2x996T	7.74	5.94

6.4. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type, as provided by the manufacturer' are as follows:
The radio utilizes two antennas for diversity, with the following types and maximum gains:

Chain	Designation in Documentation	Type	Frequency Range (MHz)	Maximum Gain (dBi)
0	WLAN Main/Bluetooth#1	Monopole	5955-6415	-1.72
			6425-6515	-1.53
			6535-6875	-1.63
			6895-7115	-2.23
1	WLAN Sub/Bluetooth#2	Monopole	5955-6415	-2.34
			6425-6515	-1.78
			6535-6875	-1.84
			6895-7115	-2.89

6.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was 0.162.

6.6. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest power spectral density as worst-case scenario.

Radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low and high channels for bandedge and low, middle and high channels on modes with worst-case average power/psd per band for harmonics and spurious. Band edge was tested on the widest bandwidth and highest power modes. This included 242T, 484T, 996T, 2x996T for the low bandedge side of the UNII-5 band, and the same modes for the upper bandedge side of the UNII-8 band.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

All testing performed in 2Tx mode (NSS=1), where power per chain is equivalent to the 1Tx power on each chain. Based on preliminary testing, this allows 2Tx testing to cover all 1Tx testing.

Based on pretesting, full tone was worst-case over SU mode.

Worst-case data rates as provided by the client were:

802.11a mode: 6 Mbps
802.11ax HE20mode: MCS0 (Nss = 1)
802.11ax HE40mode: MCS0 (Nss = 1)
802.11ax HE80mode: MCS0 (Nss = 1)
802.11ax HE160mode: MCS0 (Nss = 1)

PSD was performed 26T, 52T, 106T, 242T, and 484T in the place of all other modes as the highest power and narrowest bandwidth of these other modes, making these the worst-case mode.

For 26dB and PSD plots, only the worst-case plot per mode, and any straddle channel plots were included. All of the tabular data is located in their respective tables.

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6.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Support Laptop	Lenovo	T14 Gen3	PF4FKVWW	N/A
Support Laptop	Lenovo	T14 Gen3	PF4FKVZE	N/A
Support Laptop	Lenovo	Yoga 7	PF49WDF9	PD9AX211NG
Support Laptop	Dell	Inspiron 15	2SFMJP3	N/A
AC Adapter	Sony	XQZ-UC1	3223W09206247	N/A
AC Adapter	Sony	XQZ-UC1	1821W34209802	N/A
Laptop AC Adapter	Lenovo	ADLX65YDC2D	8SSA10R16970D1SG35A13LV	N/A
Laptop AC Adapter	Dell	DA65NM191	CN-0KPVMF-DES00-22N-A4N0-A00	N/A
RJ45 Adapter	Best Buy	BE-PA3U6E	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB-C	1	USB	Shielded	<1m	Used to Connect EUT to AC Mains.
2	RJ-45	1	RJ-45	Shielded	<3m	Connected from EUT to support laptop
3	HDMI	1	HDMI	Shielded	<3m	Connected from EUT to support laptop
4	USB-C	1	USB-C	Shielded	<3m	Connected from EUT to support laptop

TEST SETUP

The EUT is connected to a support laptop during testing. Test software exercised the radio card.

SETUP DIAGRAMS

Please refer to R15103618-EP3 for setup diagrams

7. MEASUREMENT METHOD

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

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

Conducted Output Power: KDB 789033 D02 v02r01, Section II E.3.b (Method PM-G).

Power Spectral Density (PSD): KDB 789033 D02 v02r01, Section F

Spurious emissions within 5.925-7.125 GHz Band (Emissions Mask): KDB 987594 D02 EMC Measurement Section II-J

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 C63.10-2020, Section 6.2.

Radiated Spurious Emissions Below 30MHz: ANSI C63.10-2020 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 Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 2				
90410	Spectrum Analyzer	Keysight Technologies	N9030A	2023-06-14	2024-06-14
238710	Environmental Meter	Fisher Scientific	15-077-963	2023-06-27	2024-06-27
211056	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2023-08-01	2024-08-01
211057	Real-Time Peak Power Sensor 50MHz to 8GHz	Boonton	RTP5000	2023-08-01	2024-08-01
245262	Conducted Switch Box	UL	CSB	2024-02-20	2025-02-20
SOFTEMI	Antenna Port Software	UL	Version 2023.02.16	NA	NA
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
	Attenuators				
**226561	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2023-02-16	2024-02-29
**226563	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2023-02-16	2024-02-29
	Cables				
**CBL091	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2023-02-17	2024-02-29
**CBL092	Micro-Coax UTiFLEX Cable Assembly, Low Loss,40Ghz	Carlisle Interconnect Technologies	UFA147A-2-0360-200200	2023-02-17	2024-02-29

**NOTE: At the time of testing, all equipment was in calibration.

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2023-04-04	2024-04-04
179892	Environmental Meter	Fisher Scientific	15-077-963	2023-07-26	2024-06-31
80391	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2023-07-31	2024-07-31
75141	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2023-08-01	2024-08-01
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2023-04-04	2024-04-04
PS214	AC Power Source	Elgar	CW2501M	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Miscellaneous (if needed)				
84681	ANSI C63.4 1m extension cable.	UL	Per Annex B of ANSI C63.4	2023-09-18	2024-09-18

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
89509	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-05-23	2025-05-23
	Gain-Loss Chains				
207640	Gain-loss string: 1-18GHz	Various	Various	2023-05-17	2024-05-17
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-04-10	2024-04-10
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241204	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05
**216159 (HPF019)	7GHz high-pass filter, 2W, Fhigh =18GHz	Micro-Tronics	HPM50107	2023-02-15	2024-02-29

**NOTE: At the time of testing, all equipment was in calibration.

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	1-18 GHz				
86408	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-06-19	2025-06-19
	Gain-Loss Chains				
91977	Gain-loss string: 1-18GHz	Various	Various	2023-06-06	2024-06-06
	Receiver & Software				
**197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-02-02	2024-02-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
239540	Environmental Meter	Fisher Scientific	15-077-963	2023-07-19	2025-07-19

**NOTE: At the time of testing, all equipment was in calibration.

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
65682	Active Loop Antenna	ETS-Lindgren	6502	2023-10-03	2024-10-03
	30-1000 MHz				
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-30	2026-01-30
	1-18 GHz				
206211	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-04-06	2024-04-06
	18-40 GHz				
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
204705	Horn Antenna, 26-40GHz	Com-Power	AH-640	2023-07-20	2025-07-20
	Gain-Loss Chains				
91974	Gain-loss string: 0.009-30MHz	Various	Various	2023-05-16	2024-05-16
91976	Gain-loss string: 25-1000MHz	Various	Various	2023-05-16	2024-05-16
91979	Gain-loss string: 1-18GHz	Various	Various	2023-05-16	2024-05-16
135999	Gain-loss string: 18-40GHz	Various	Various	2023-05-16	2024-05-16
	Receiver & Software				
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-03-24	2024-03-24
81018	Spectrum Analyzer	Agilent	E4446A	2023-08-01	2024-08-01
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241205	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05
**216159 (HPF019)	7GHz high-pass filter, 2W, Fhigh =18GHz	Micro-Tronics	HPM50107	2023-02-15	2024-02-29

**NOTE: At the time of testing, all equipment was in calibration.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

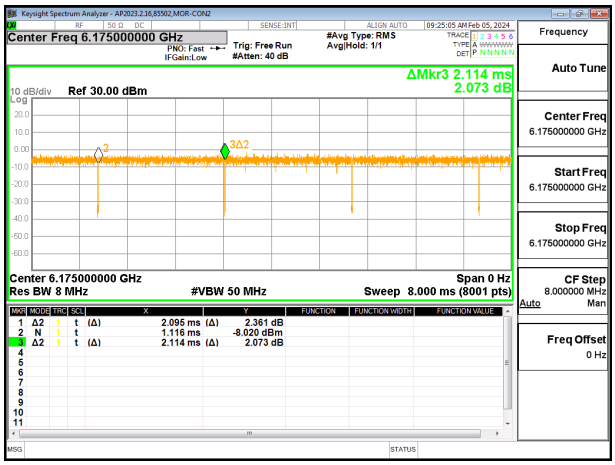
None; for reporting purposes only.

TEST PROCEDURE

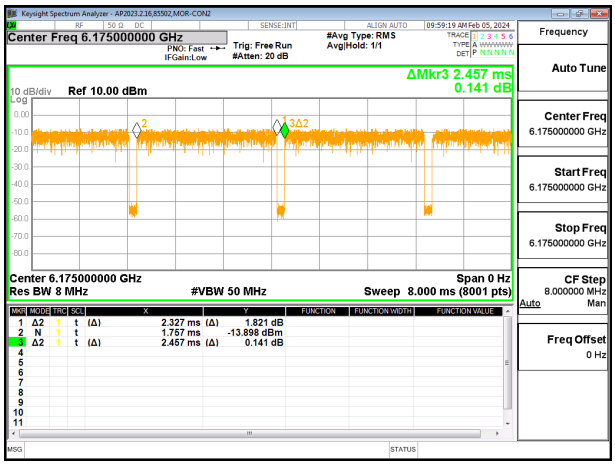
KDB 789033 Zero-Span Spectrum Analyzer Method.

RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a	2.095	2.114	0.991	99.10%	0.00	0.010
802.11ax HE20 OFDMA, RU size 242T	0.924	0.979	0.944	94.37%	0.25	1.082
802.11ax HE20 OFDMA, RU size 106T	0.640	0.680	0.940	94.00%	0.27	1.564
802.11ax HE20 OFDMA, RU size 52T	1.269	1.343	0.945	94.49%	0.25	0.788
802.11ax HE20 OFDMA, RU size 26T	2.327	2.457	0.947	94.71%	0.24	0.430
802.11ax HE40 OFDMA, RU size 484T	0.507	0.543	0.935	93.51%	0.29	1.971
802.11ax HE80 OFDMA, RU size 996T	0.387	0.423	0.916	91.58%	0.38	2.583
802.11ax HE160 OFDMA, RU size 2x996T	0.381	0.419	0.910	90.96%	0.41	2.623



802.11a MODE



802.11ax HE20 OFDMA, RU size 26 MODE

802.11ax HE20 OFDMA, RU size 52T MODE

802.11ax HE20 OFDMA, RU size 106T MODE

802.11ax HE20 OFDMA, RU size 242T MODE

802.11ax HE40 OFDMA, RU size 484T MODE

802.11ax HE80 OFDMA, RU size 996T MODE

802.11ax HE160 OFDMA, RU size 2x996 MODE

9.2. 26 dB BANDWIDTH

LIMITS

47 CFR 15.407(a)(10) The maximum transmitter channel bandwidth for U–NII devices in the 5.925–7.125 GHz band is 320 megahertz

RESULTS

The allocated band is 5925 – 7125 MHz. Based on measured bandwidths for lowest and highest channels for each bandwidth, the lower edge of the 26dB bandwidth is above 5925 MHz and the upper edge of the highest channel is below 7125 MHz:

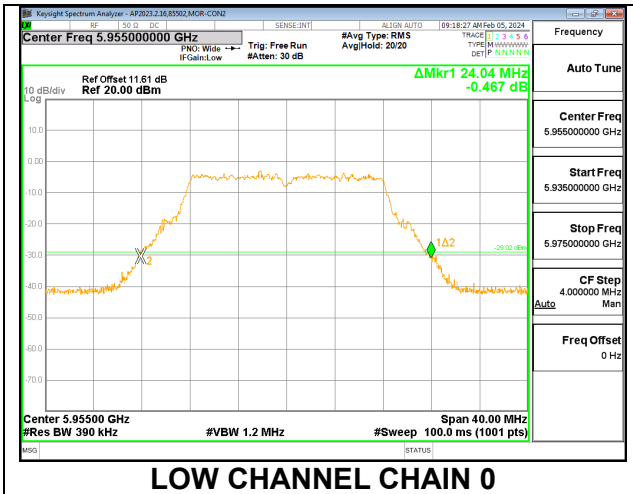
- 20MHz: 5955, 26dB BW 24.04W MHz, 5955 - (24.04/2) = 5942.98 MHz > 5925 MHz
- 40 MHz: 5965, 26dB BW = 45.92 MHz, 5965 - (45.92/2) = 5942.04 MHz > 5925 MHz
- 80 MHz: 5985, 26dB BW = 93.76 MHz, 5985 – (93.76/2) = 5938.12 MHz > 5925 MHz
- 160 MHz: 6025, 26dB BW = 184.64 MHz, 6025 – (184.64/2) = 5932.68 MHz > 5925 MHz
- 20MHz: 7115, Refer to OBW in section 9.2.17 to show that signal operates fully below 7125 MHz
- 40 MHz: 7085, 26dB BW = 46.2 MHz, 7085 + (46.2/2) = 7108.1 MHz < 7125 MHz
- 80 MHz: 7025, 26dB BW = 94.1 MHz, 7025 + (94.1/2) = 7072.05 MHz < 7125 MHz
- 160 MHz: 6985, 26dB BW = 185.3 MHz, 6985 + (185.3/2) = 7077.65 MHz < 7125 MHz

Note: All measured 26dB bandwidth complies with the 320 megahertz limit.

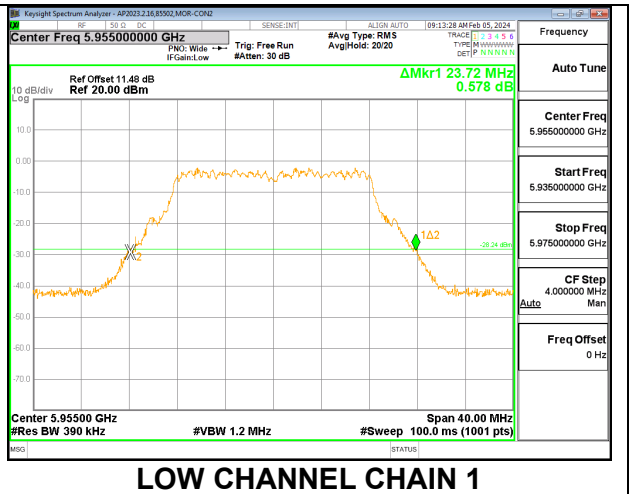
9.2.1. 802.11a MODE 2TX IN THE UNII-5 BAND

2TX CDD MODE

Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
5955	24.04	23.72
6175	24.04	23.72
6415	24.00	23.00



LOW CHANNEL CHAIN 0

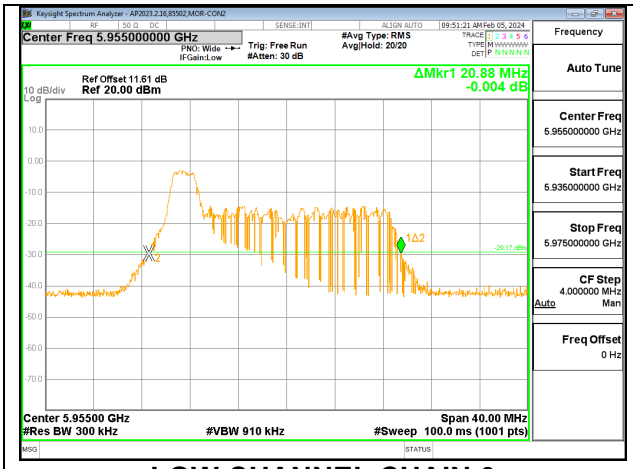


LOW CHANNEL CHAIN 1

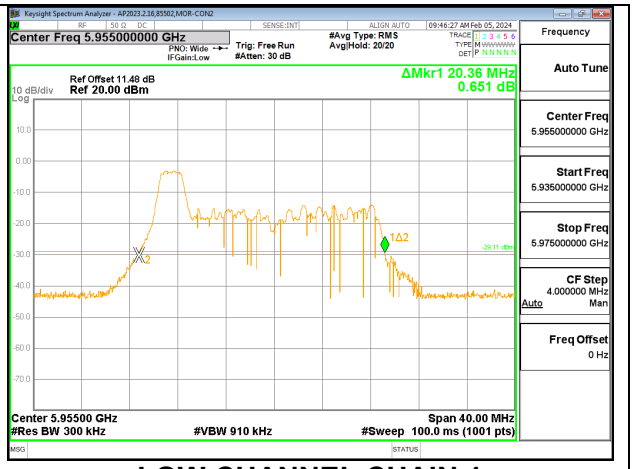
9.2.2. 802.11ax HE20 MODE 2TX IN THE UNII-5 BAND

2TX CDD MODE 26T

Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
5955	20.88	20.36
6175	18.96	18.40
6415	20.68	20.20



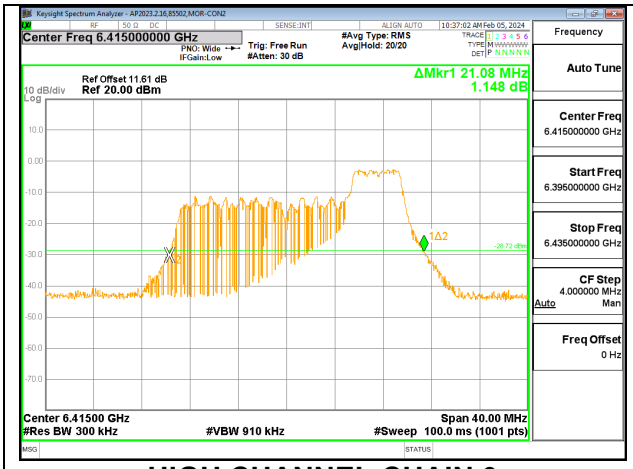
LOW CHANNEL CHAIN 0



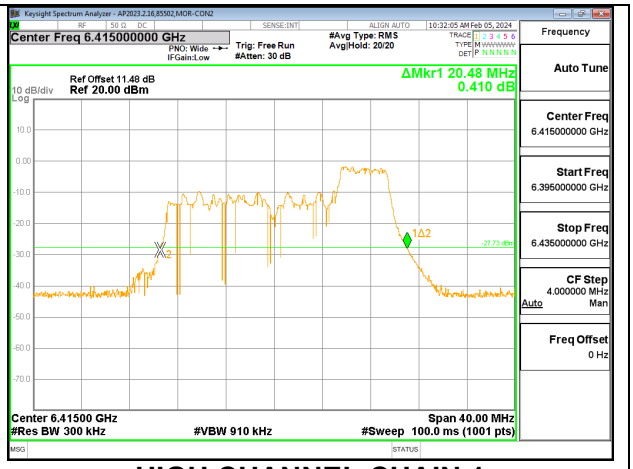
LOW CHANNEL CHAIN 1

2TX CDD MODE: 52T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5955	20.96	20.44
Mid	6175	19.56	18.88
High	6415	21.08	20.48



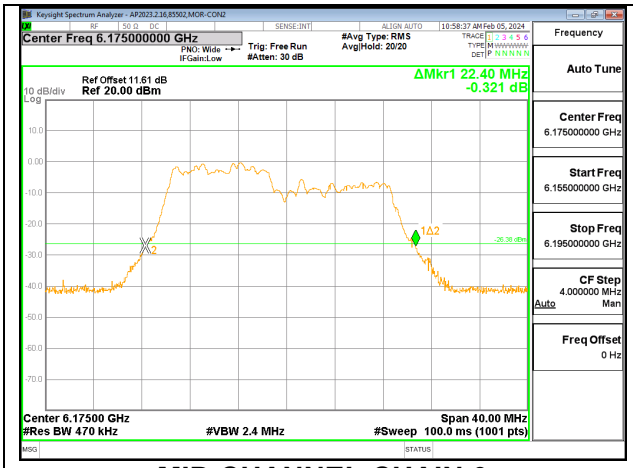
HIGH CHANNEL CHAIN 0



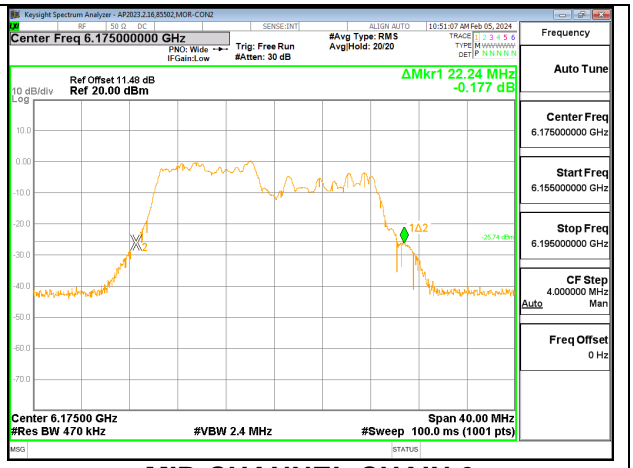
HIGH CHANNEL CHAIN 1

2TX CDD MODE: 106T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5955	22.40	21.88
Mid	6175	22.40	22.24
High	6415	21.32	21.20



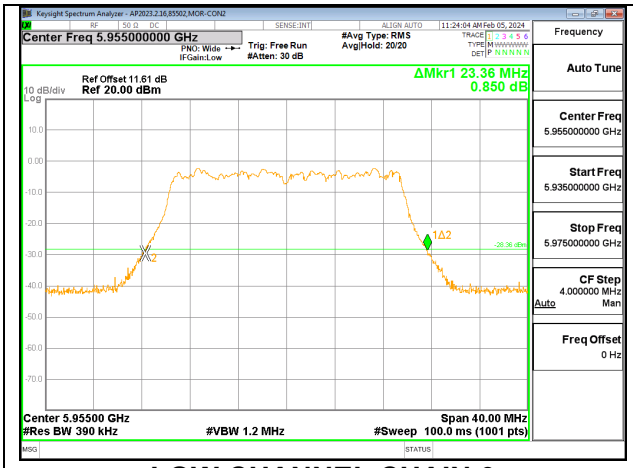
MID CHANNEL CHAIN 0



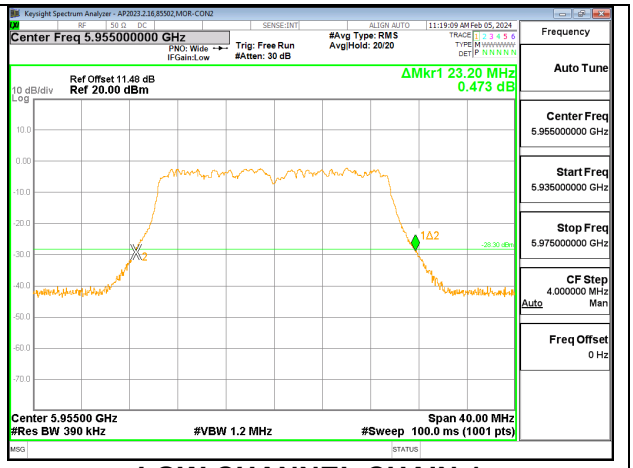
MID CHANNEL CHAIN 0

2TX CDD MODE: 242T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5955	23.36	23.20
Mid	6175	23.32	23.12
High	6415	23.32	23.12



LOW CHANNEL CHAIN 0

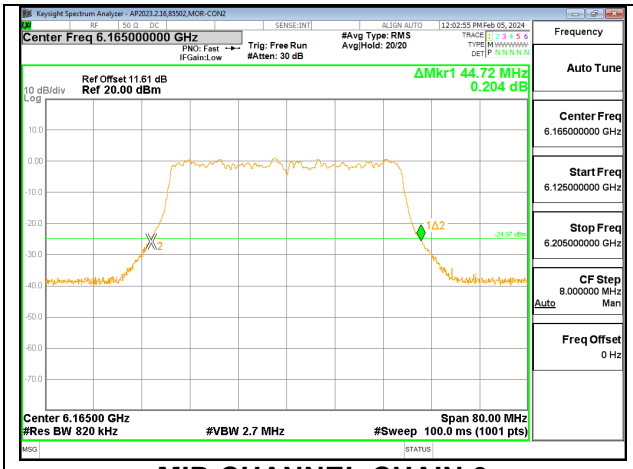


LOW CHANNEL CHAIN 1

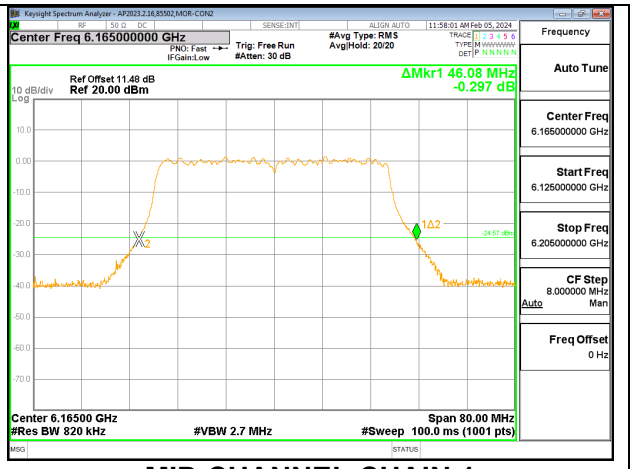
9.2.3. 802.11ax HE40 MODE 2TX IN THE UNII-5 BAND

2TX CDD MODE: 484T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5965	44.56	45.92
Mid	6165	44.72	46.08
High	6405	44.40	45.76



MID CHANNEL CHAIN 0

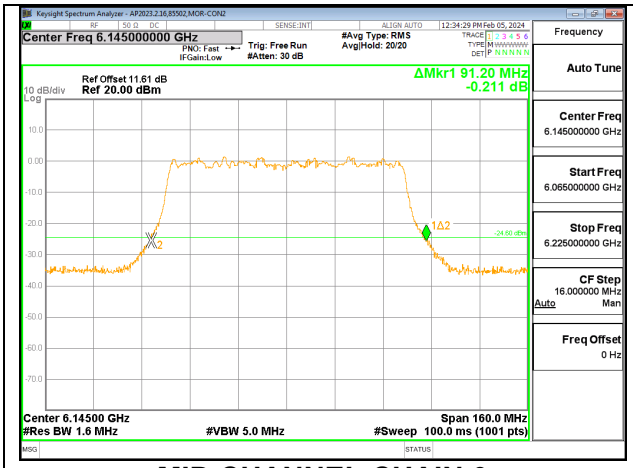


MID CHANNEL CHAIN 1

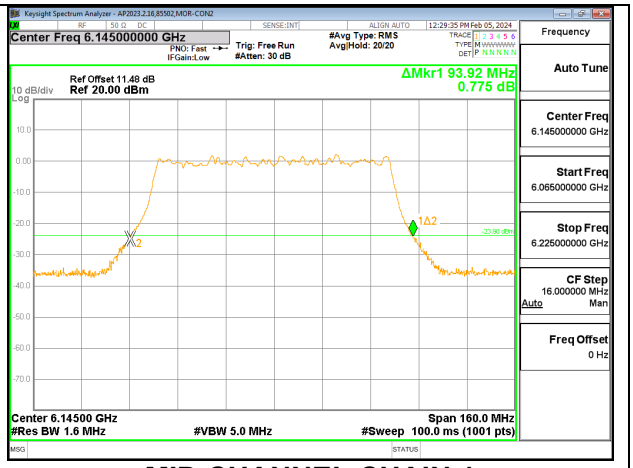
9.2.4. 802.11ax HE80 MODE 2TX IN THE UNII-5 BAND

2TX CDD MODE: 996T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	5985	89.28	93.76
Mid	6145	91.20	93.92
High	6385	90.40	93.60



MID CHANNEL CHAIN 0

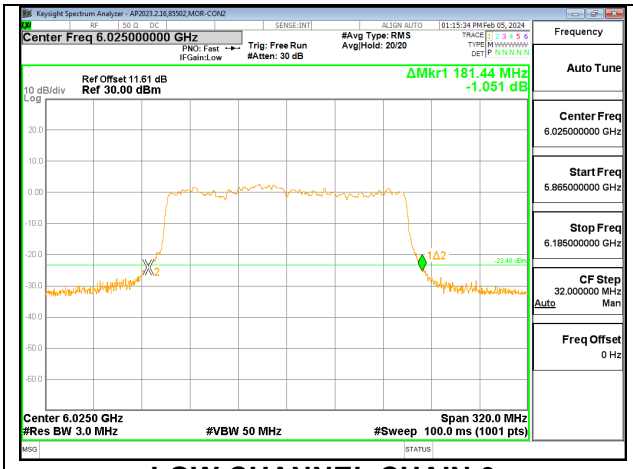


MID CHANNEL CHAIN 1

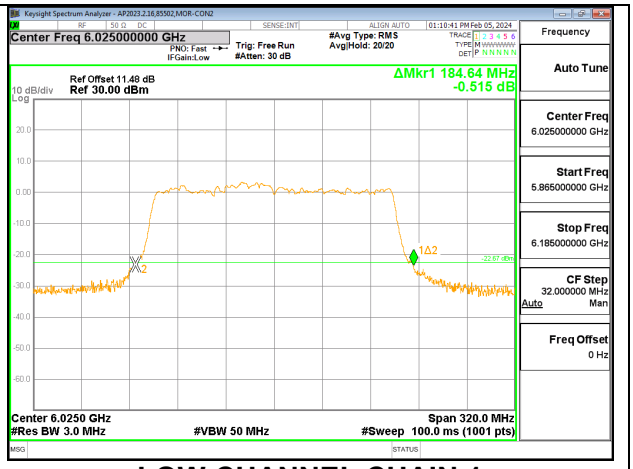
9.2.5. 802.11ax HE160 MODE 2TX IN THE UNII-5 BAND

2TX CDD MODE: 2x996T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6025	181.44	184.64
Mid	6185	180.80	184.32
High	6345	181.12	183.68



LOW CHANNEL CHAIN 0

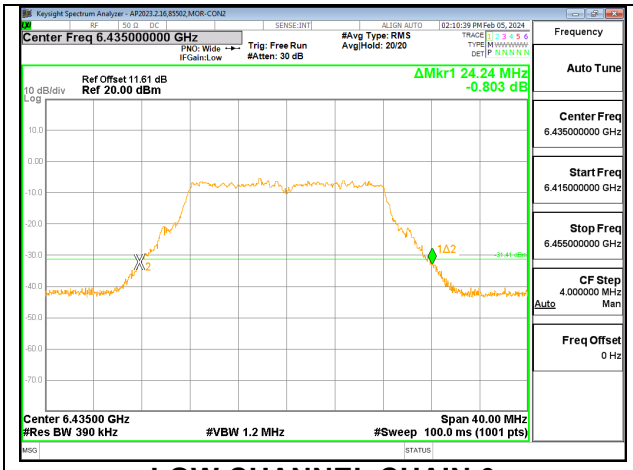


LOW CHANNEL CHAIN 1

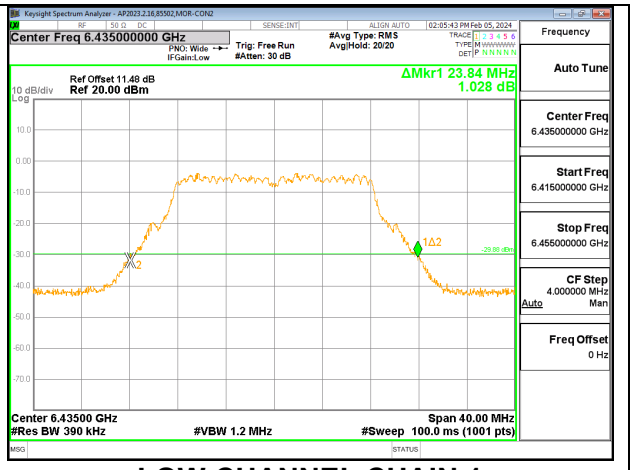
9.2.6. 802.11a MODE 2TX IN THE UNII-6 BAND

2TX CDD MODE:

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6435	24.24	23.84
Mid	6475	23.92	23.92
High	6515	24.08	24.04



LOW CHANNEL CHAIN 0

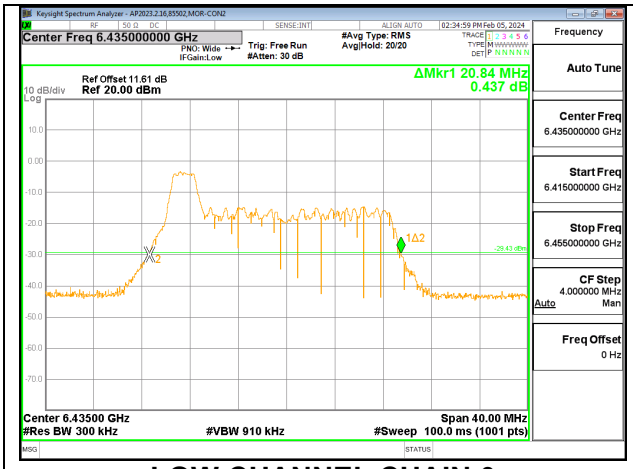


LOW CHANNEL CHAIN 1

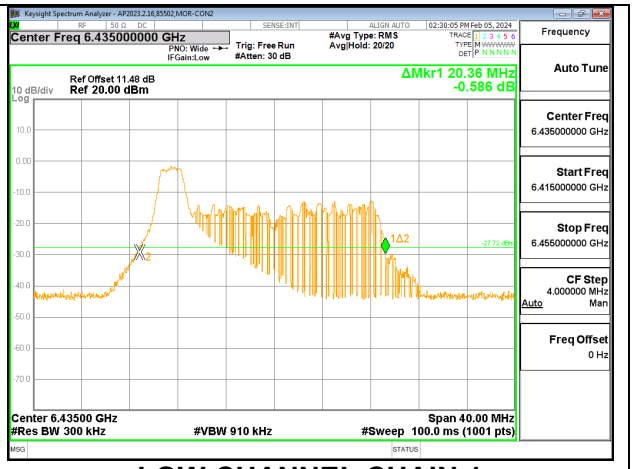
9.2.7. 802.11ax HE20 MODE 2TX IN THE UNII-6 BAND

2TX CDD MODE: 26T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6435	20.84	20.36
Mid	6475	19.20	18.40
High	6515	20.72	20.20



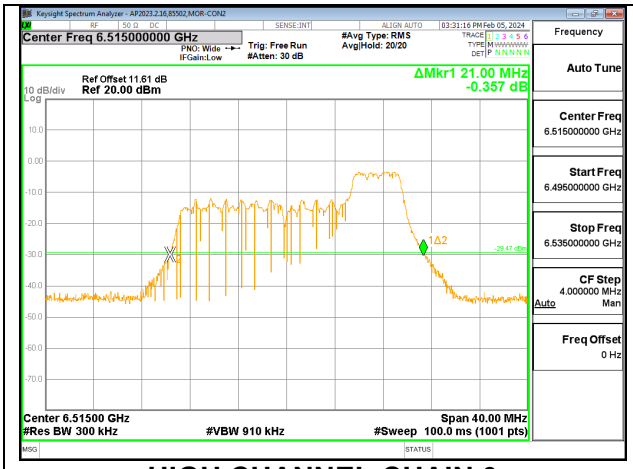
LOW CHANNEL CHAIN 0



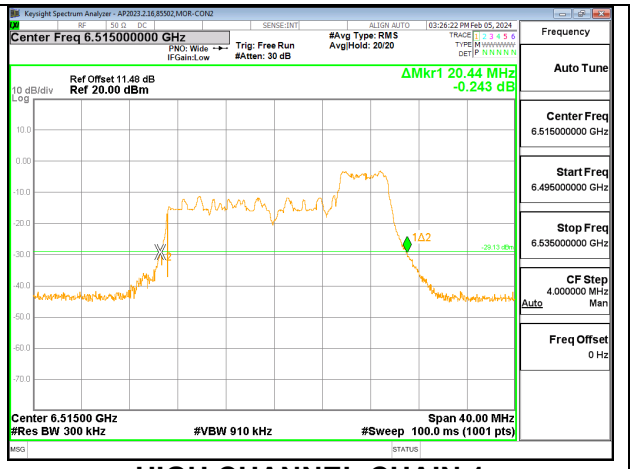
LOW CHANNEL CHAIN 1

2TX CDD MODE: 52T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6435	20.92	20.44
Mid	6475	19.40	18.84
High	6515	21.00	20.44



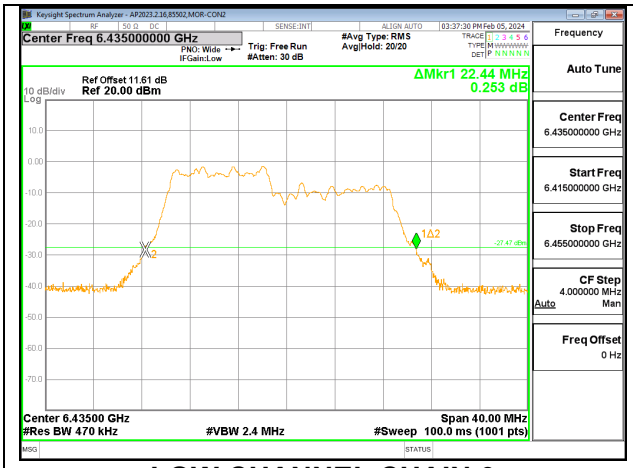
HIGH CHANNEL CHAIN 0



HIGH CHANNEL CHAIN 1

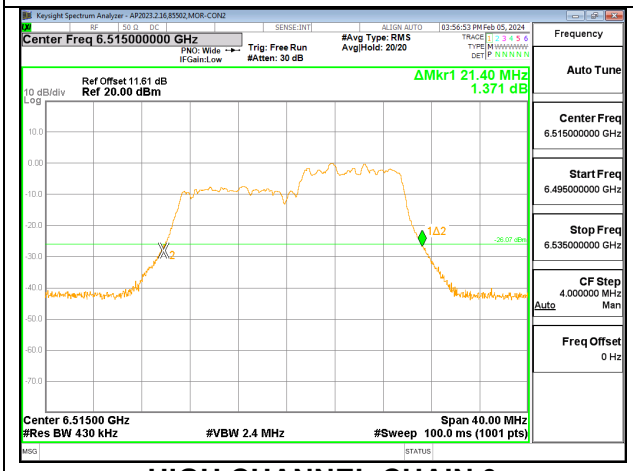
2TX CDD MODE: 106T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6435	22.44	21.84
Mid	6475	22.44	21.76
High	6515	21.40	21.28

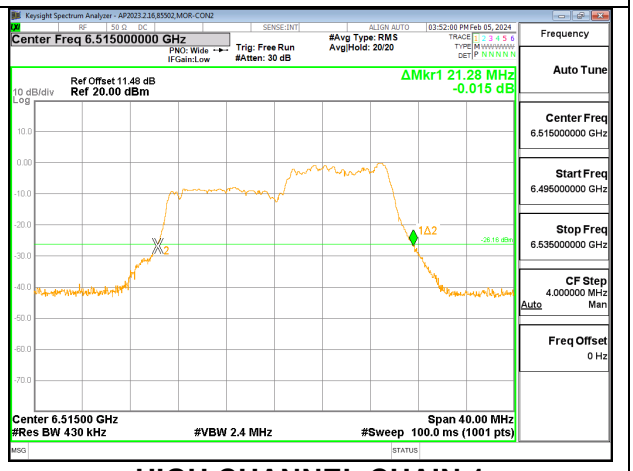


LOW CHANNEL CHAIN 0

LOW CHANNEL CHAIN 1



HIGH CHANNEL CHAIN 0

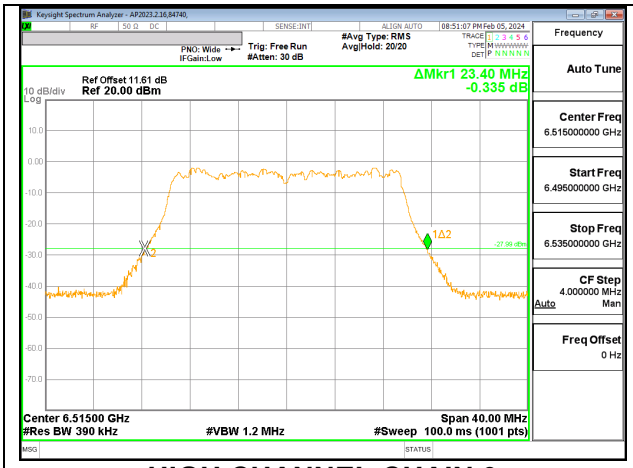


HIGH CHANNEL CHAIN 1

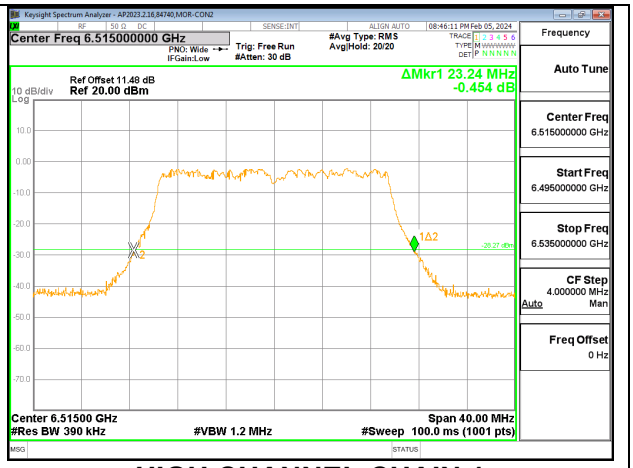
Note: High channel plots have been added for reference to show that Mask scans followed proper testing procedures by using the same RBW as was used for 26dB.

2TX CDD MODE: 242T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6435	23.40	23.04
Mid	6475	23.32	23.24
High	6515	23.40	23.24



HIGH CHANNEL CHAIN 0

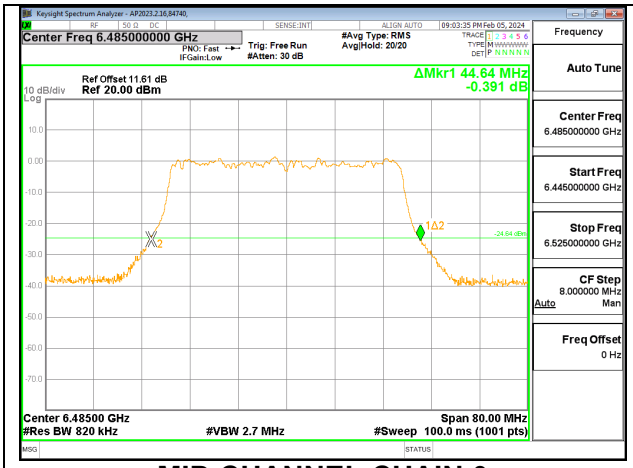


HIGH CHANNEL CHAIN 1

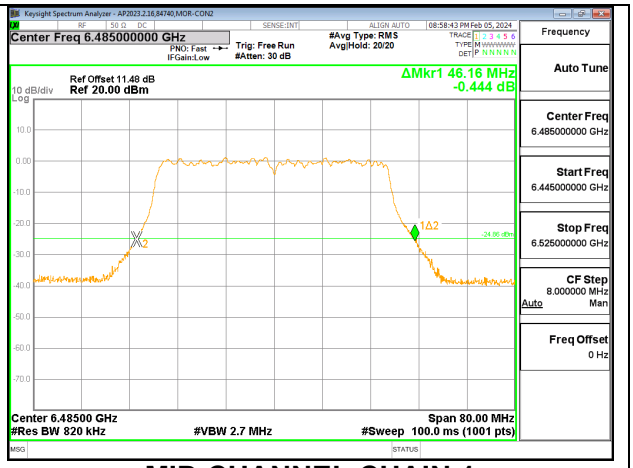
9.2.8. 802.11ax HE40 MODE 2TX IN THE UNII-6 BAND

2TX CDD MODE: 484T

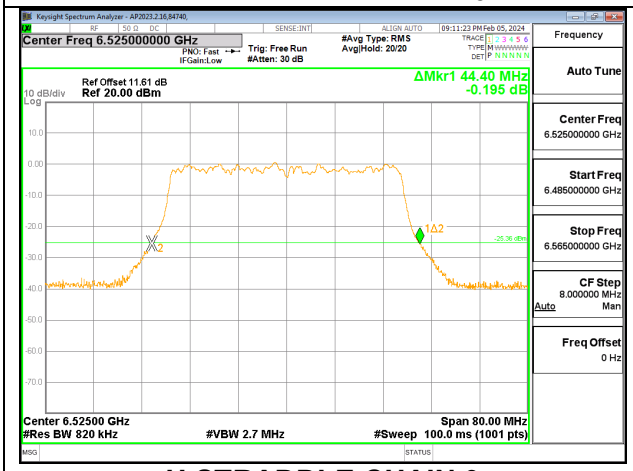
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6445	44.56	45.84
Mid	6485	44.64	46.16
Straddle/High	6525	44.40	46.08



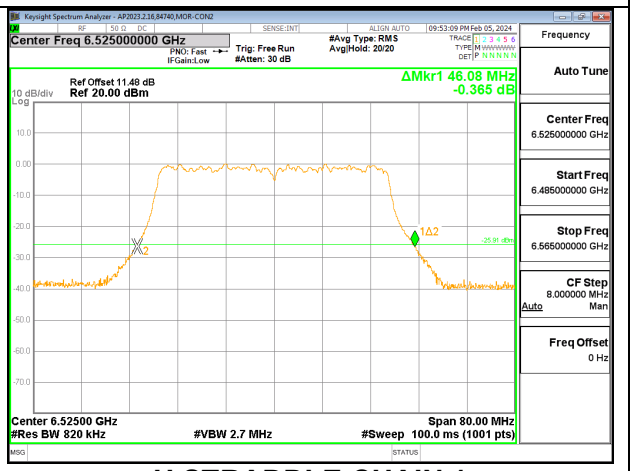
MID CHANNEL CHAIN 0



MID CHANNEL CHAIN 1



H STRADDLE CHAIN 0

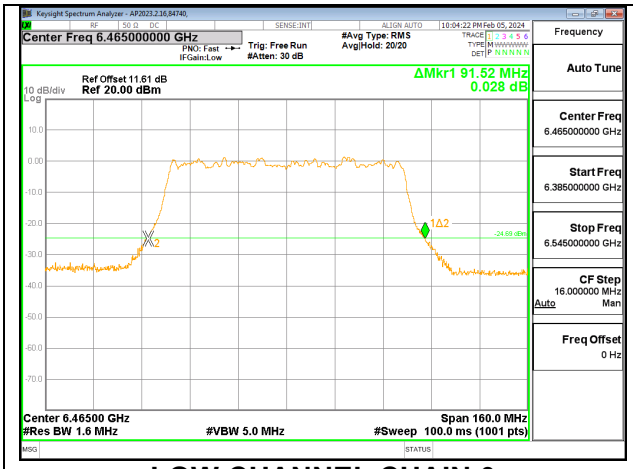


H STRADDLE CHAIN 1

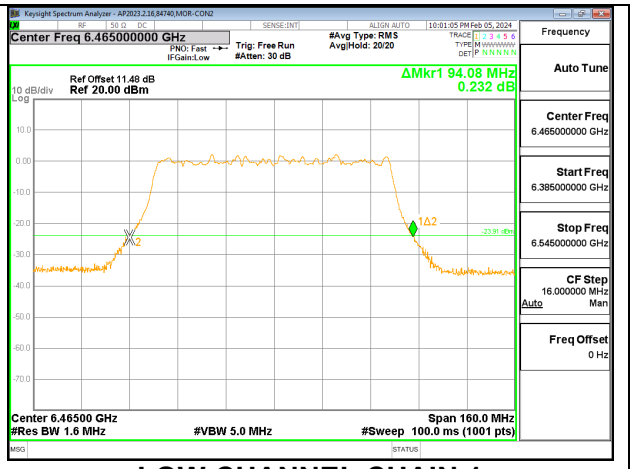
9.2.9. 802.11ax HE80 MODE 2TX IN THE UNII-6 BAND

2TX CDD MODE: 996T

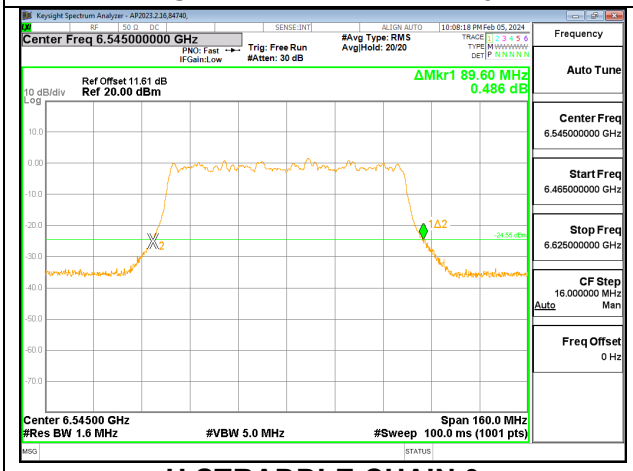
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6465	91.52	94.08
Straddle/High	6545	89.60	93.76



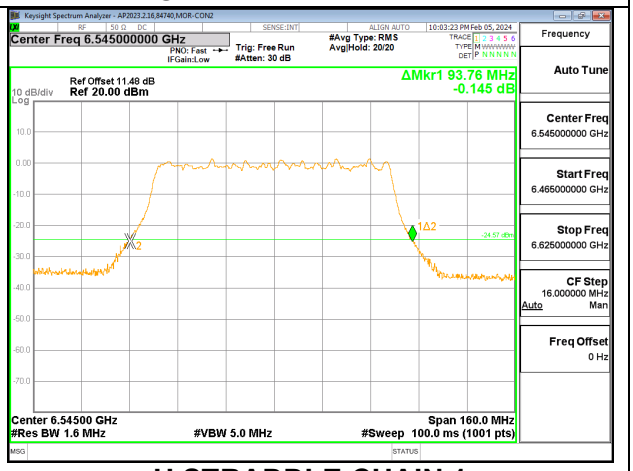
LOW CHANNEL CHAIN 0



LOW CHANNEL CHAIN 1



H STRADDLE CHAIN 0

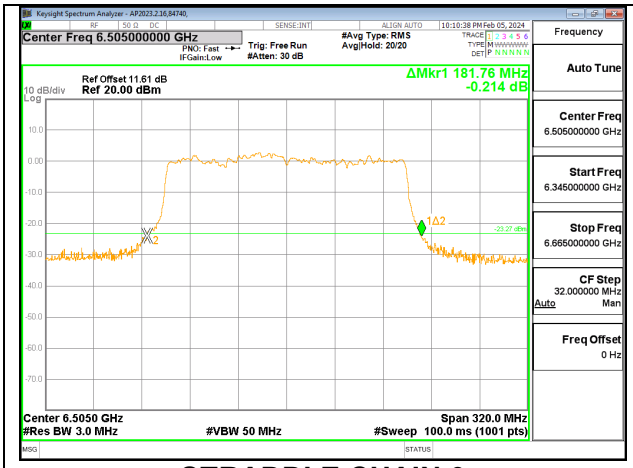


H STRADDLE CHAIN 1

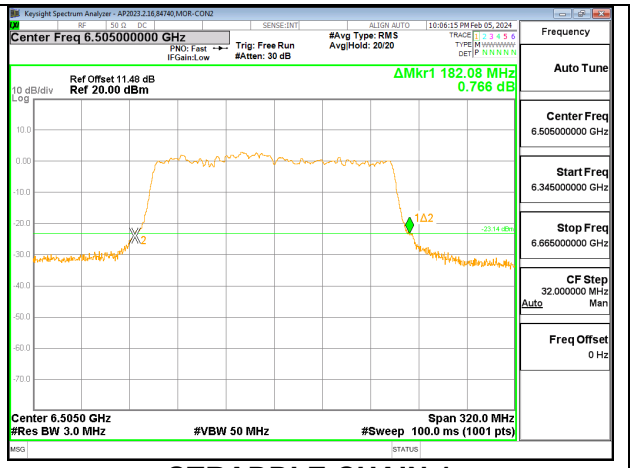
9.2.10. 802.11ax HE160 MODE 2TX IN THE UNII-6 BAND

2TX CDD MODE: 2x996T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Straddle/Mid	6505	181.76	182.08



STRADDLE CHAIN 0

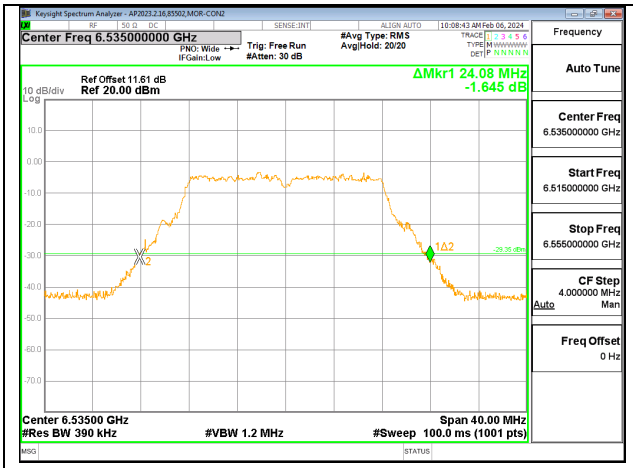


STRADDLE CHAIN 1

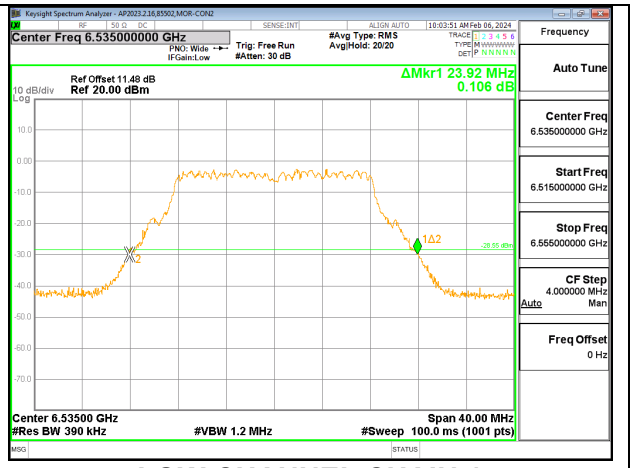
9.2.11. 802.11a MODE 2TX IN THE UNII-7 BAND

2TX CDD MODE:

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6535	24.08	23.92
Mid	6695	23.96	23.40
High	6855	24.04	23.92



LOW CHANNEL CHAIN 0

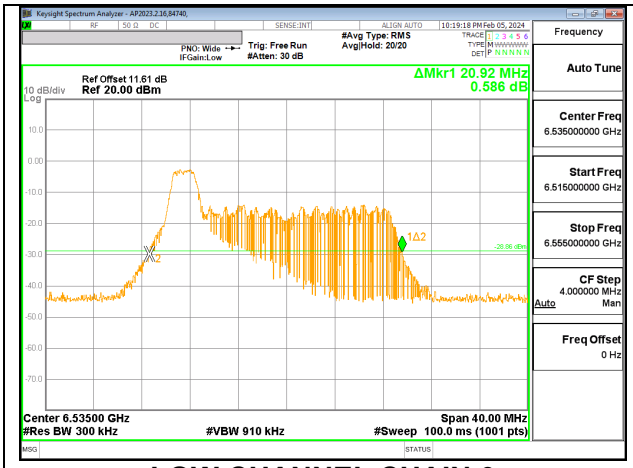


LOW CHANNEL CHAIN 1

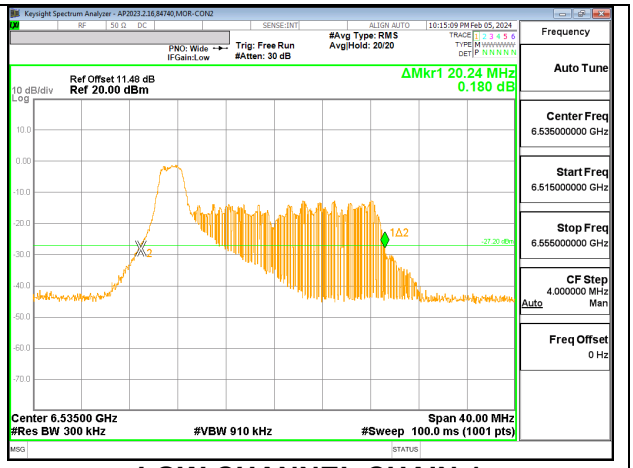
9.2.12. 802.11ax HE20 MODE 2TX IN THE UNII-7 BAND

2TX CDD MODE: 26T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6535	20.92	20.24
Mid	6695	19.08	18.40
High	6855	20.84	20.20



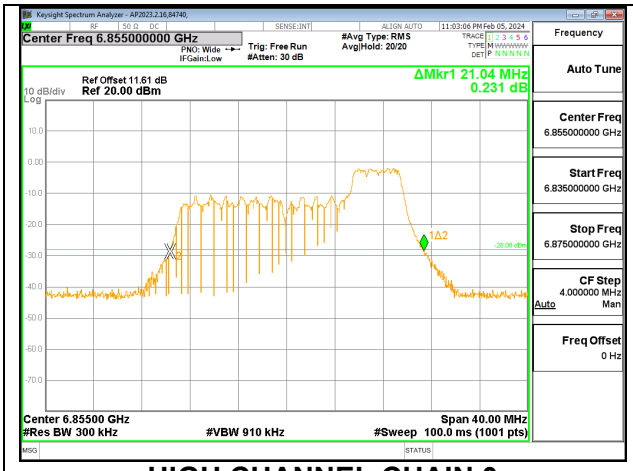
LOW CHANNEL CHAIN 0



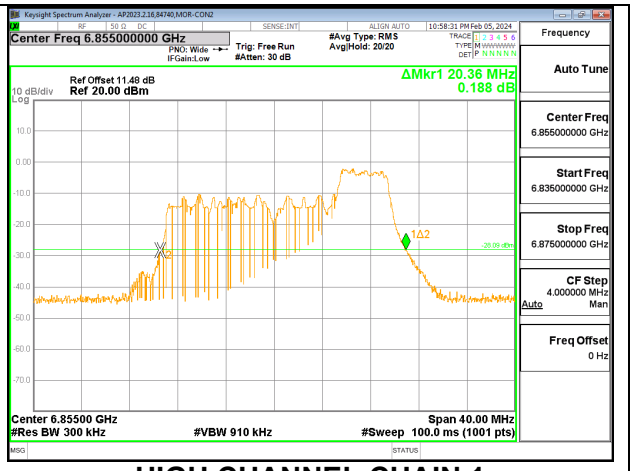
LOW CHANNEL CHAIN 1

2TX CDD MODE: 52T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6535	20.96	20.44
Mid	6695	19.48	18.80
High	6855	21.04	20.36



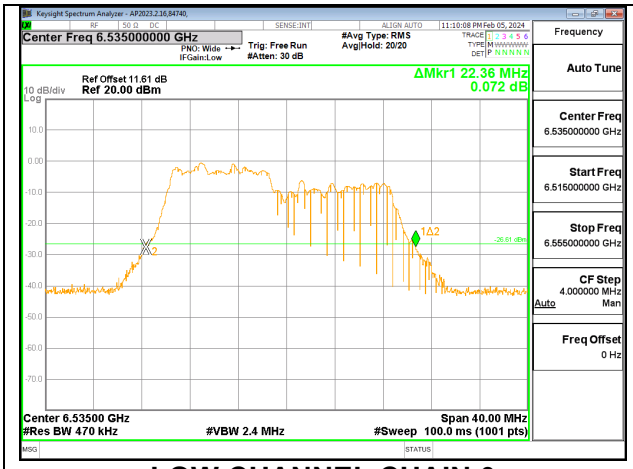
HIGH CHANNEL CHAIN 0



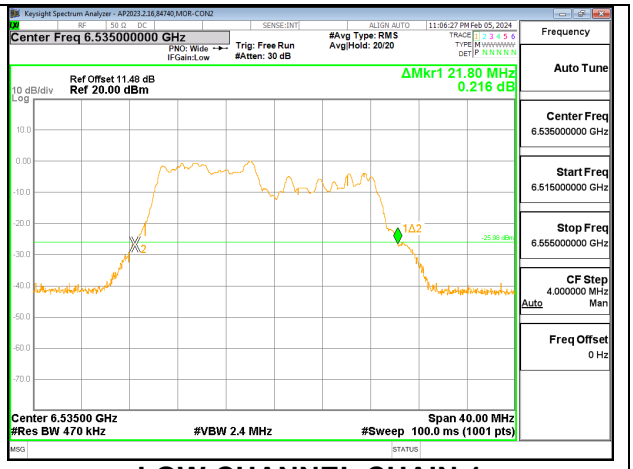
HIGH CHANNEL CHAIN 1

2TX CDD MODE: 106T

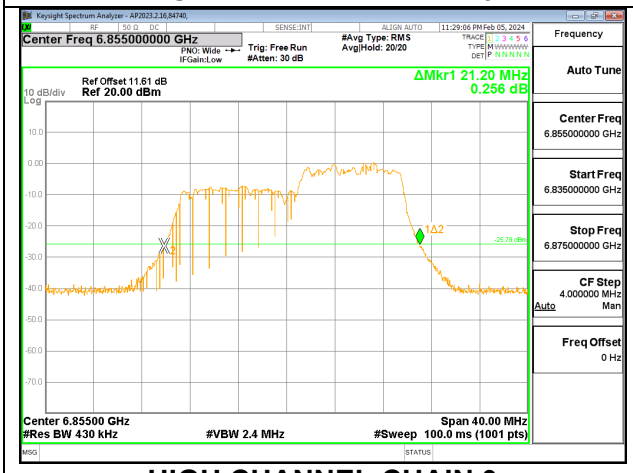
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6535	22.36	21.80
Mid	6695	22.32	21.68
High	6855	21.20	21.24



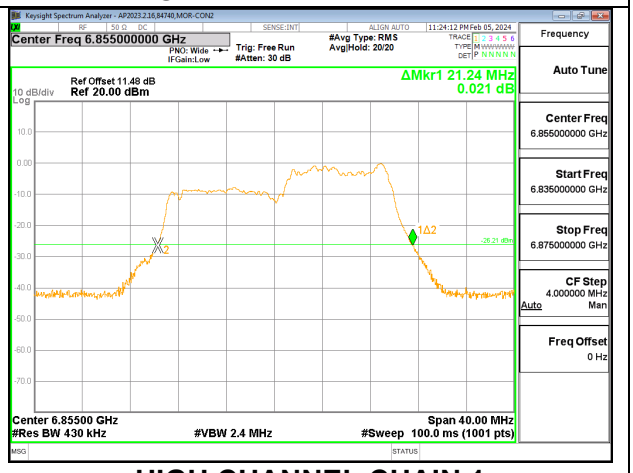
LOW CHANNEL CHAIN 0



LOW CHANNEL CHAIN 1



HIGH CHANNEL CHAIN 0

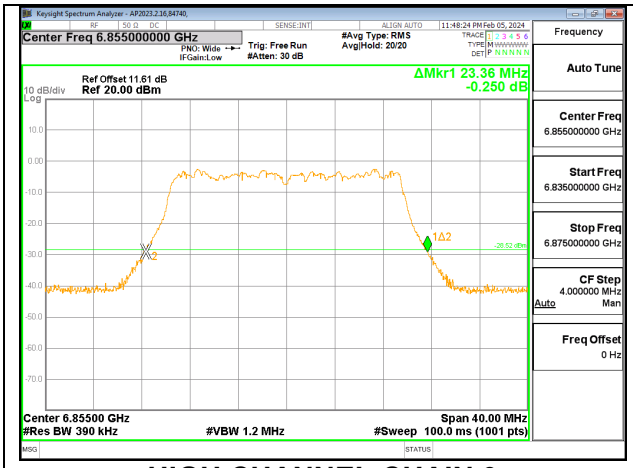


HIGH CHANNEL CHAIN 1

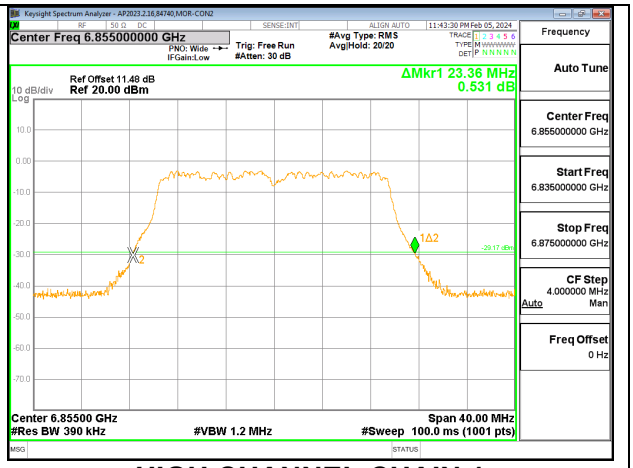
Note: High channel plots have been added for reference to show that Mask scans followed proper testing procedures by using the same RBW as was used for 26dB.

2TX CDD MODE: 242T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6535	23.28	23.32
Mid	6695	23.32	23.20
High	6855	23.36	23.36



HIGH CHANNEL CHAIN 0

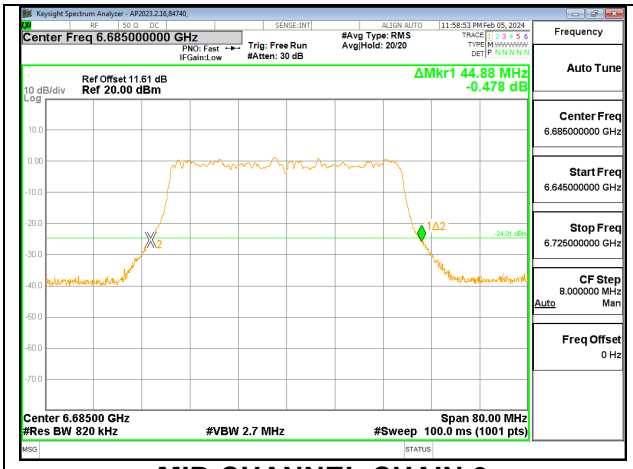


HIGH CHANNEL CHAIN 1

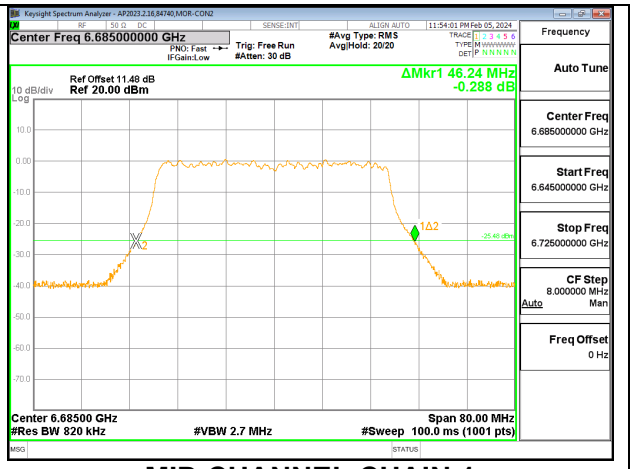
9.2.13. 802.11ax HE40 MODE 2TX IN THE UNII-7 BAND

2TX CDD MODE: 484T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6565	44.48	45.76
Mid	6685	44.88	46.24
High	6845	44.64	46.08



MID CHANNEL CHAIN 0

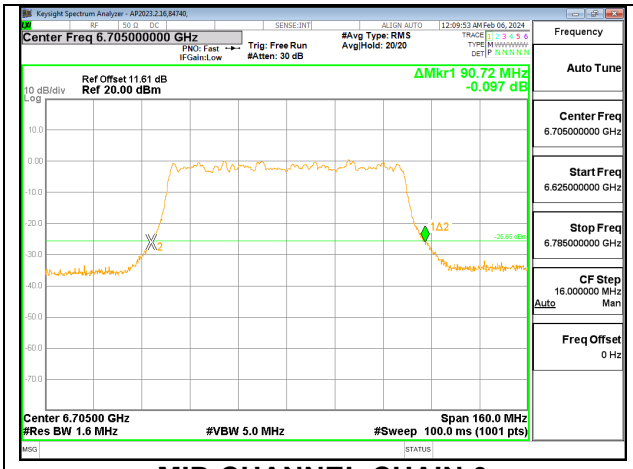


MID CHANNEL CHAIN 1

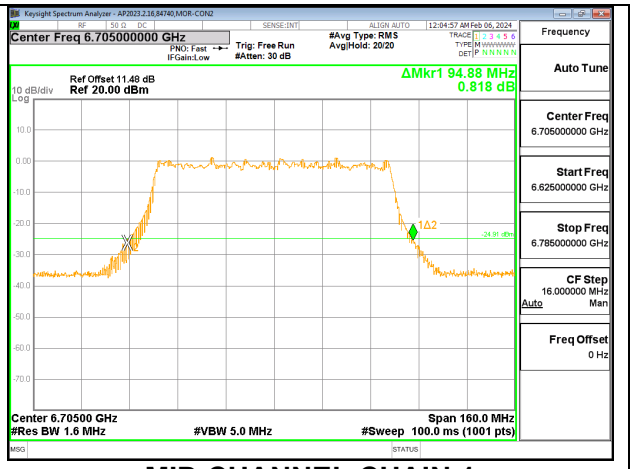
9.2.14. 802.11ax HE80 MODE 2TX IN THE UNII-7 BAND

2TX CDD MODE: 996T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low	6625	91.36	93.44
Mid	6705	90.72	94.88
High	6785	91.04	94.24



MID CHANNEL CHAIN 0

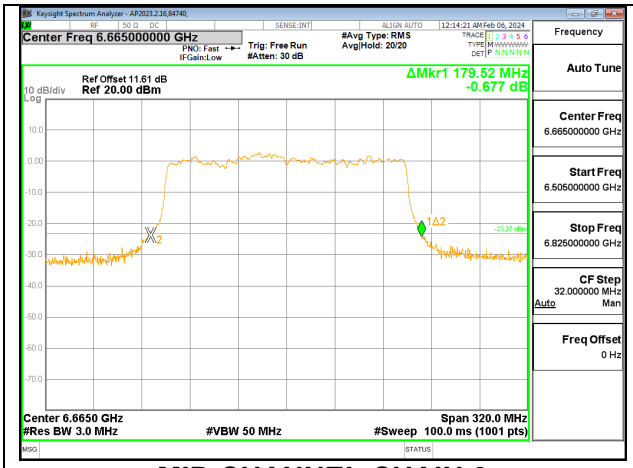


MID CHANNEL CHAIN 1

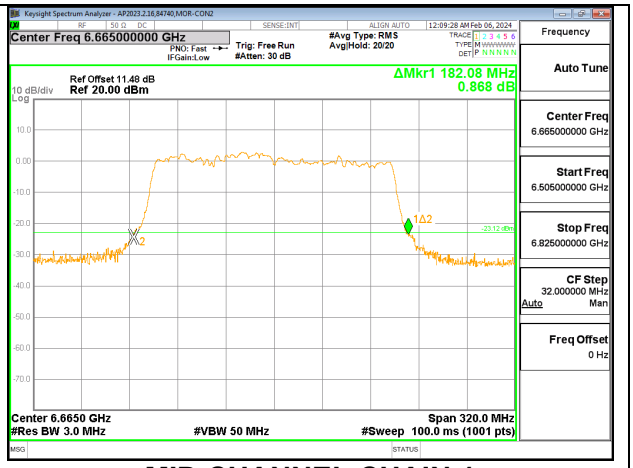
9.2.15. 802.11ax HE160 MODE 2TX IN THE UNII-7 BAND

2TXCDD MODE: 2x996T

Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Mid	6665	179.52	182.08



MID CHANNEL CHAIN 0

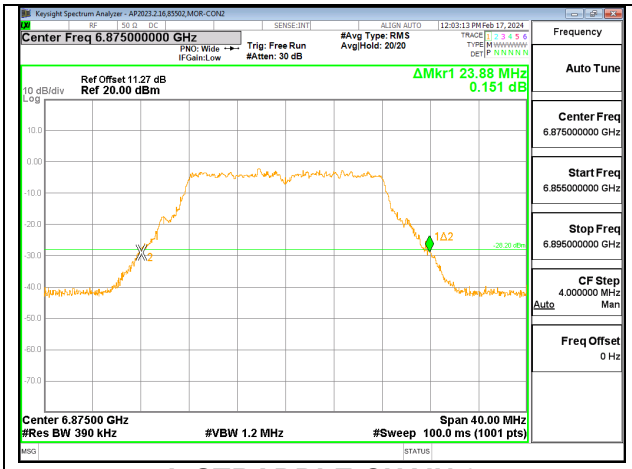


MID CHANNEL CHAIN 1

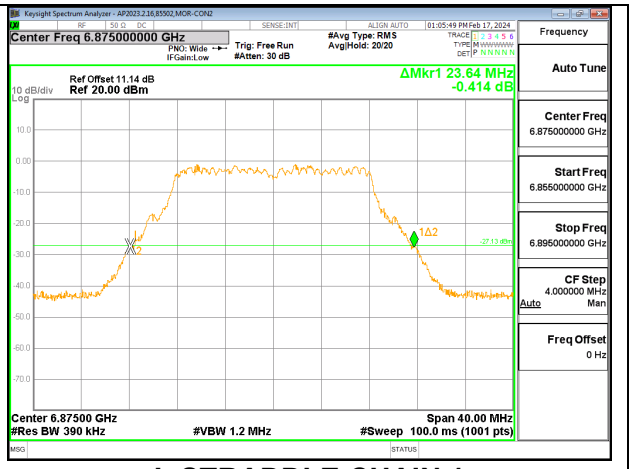
9.2.16. 802.11a MODE 2TX IN THE UNII-8 BAND

2TX CDD MODE:

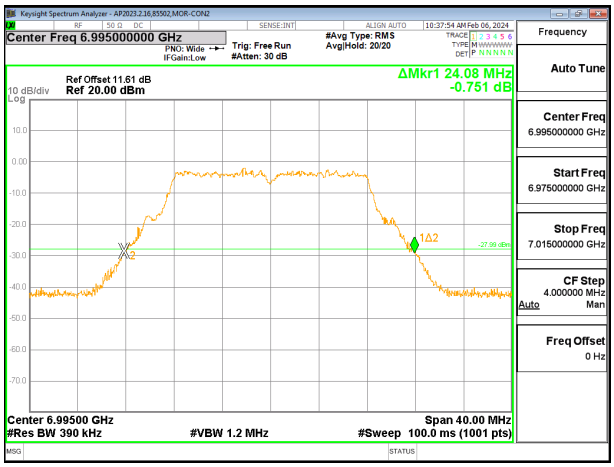
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Straddle/Low	6875	23.88	23.64
Mid	6995	24.08	23.72
High	7115	24.04	23.84



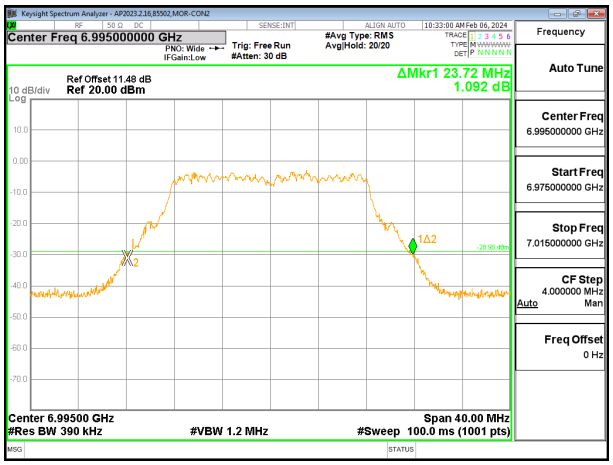
L STRADDLE CHAIN 0



L STRADDLE CHAIN 1



MID CHANNEL CHAIN 0

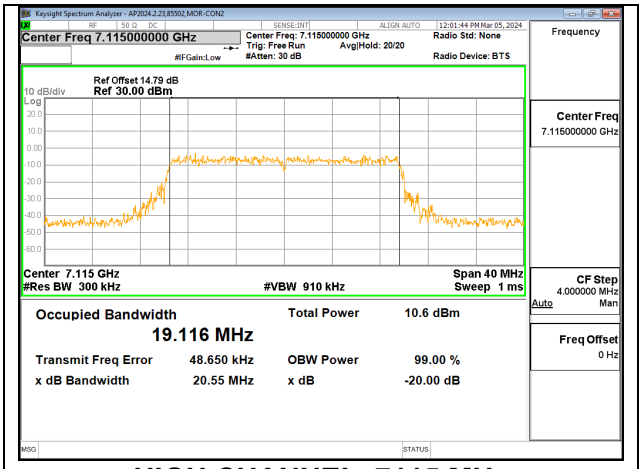


MID CHANNEL CHAIN 1

9.2.17. 802.11ax HE20 MODE 2TX IN THE UNII-8 BAND

Note: OBW was performed across all 20 MHz modes on channel 7115 MHz to show that the signal operates below 7125 MHz. The worst case mode, 242T, has been included for reference below. With the frequency being centered at 7115 MHz, and having a maximum occupied channel bandwidth of 19.116 MHz, the maximum operating frequency = 7115 + (19.116/2) = 7124.56 MHz < 7125 MHz.

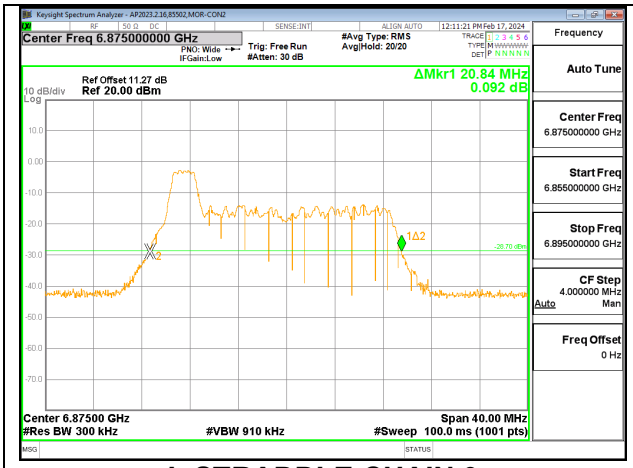
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Max Frequency (MHz)
High	7115	19.116	7124.56



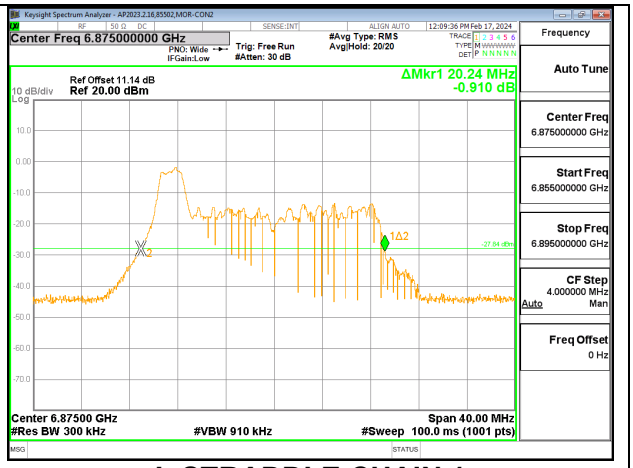
HIGH CHANNEL, 7115 MHz

2TX CDD MODE: 26T

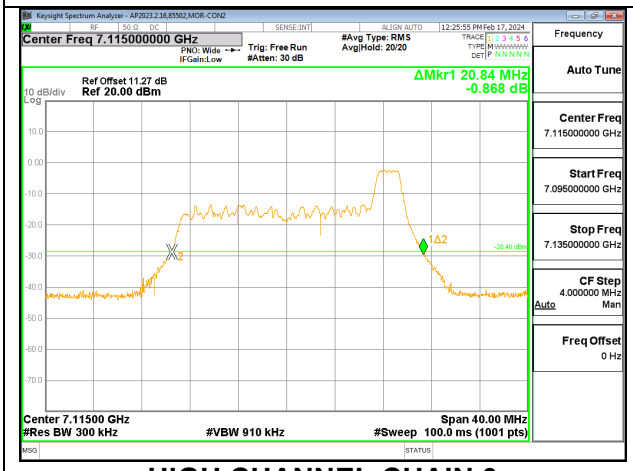
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Straddle/Low	6875	20.84	20.24
Mid	6995	19.08	18.44
High	7115	20.84	20.16



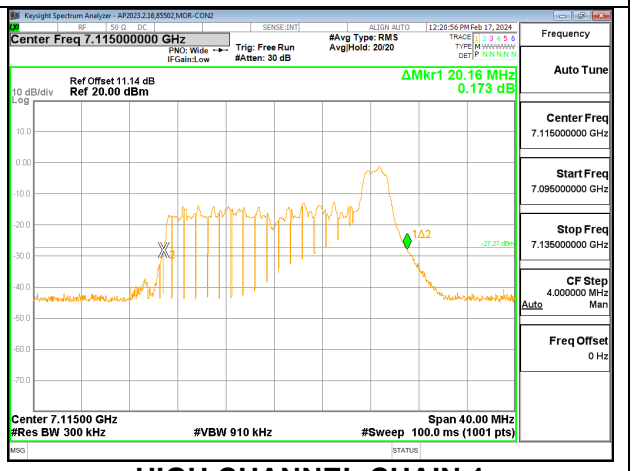
L STRADDLE CHAIN 0



L STRADDLE CHAIN 1



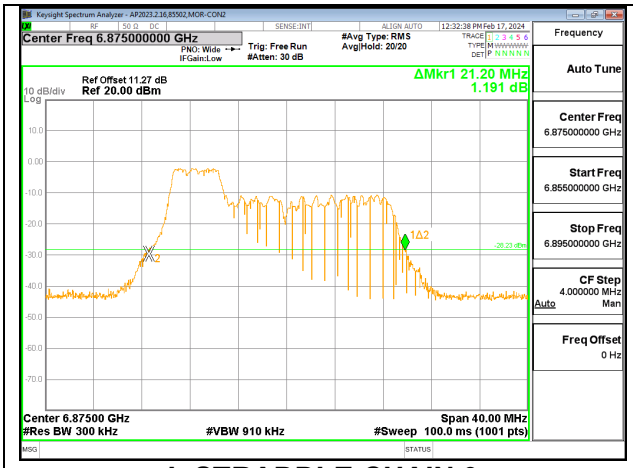
HIGH CHANNEL CHAIN 0



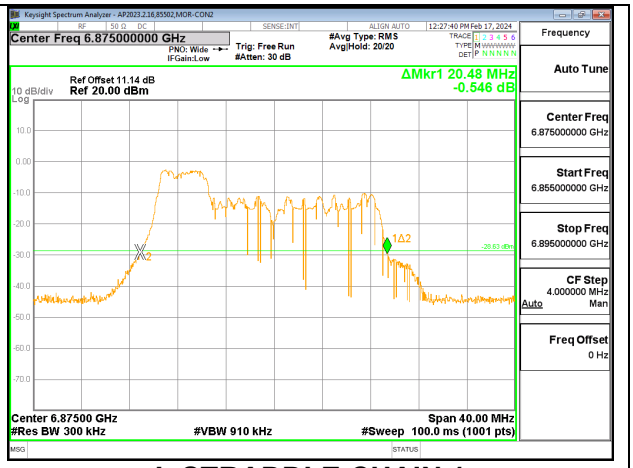
HIGH CHANNEL CHAIN 1

2TX CDD MODE: 52T

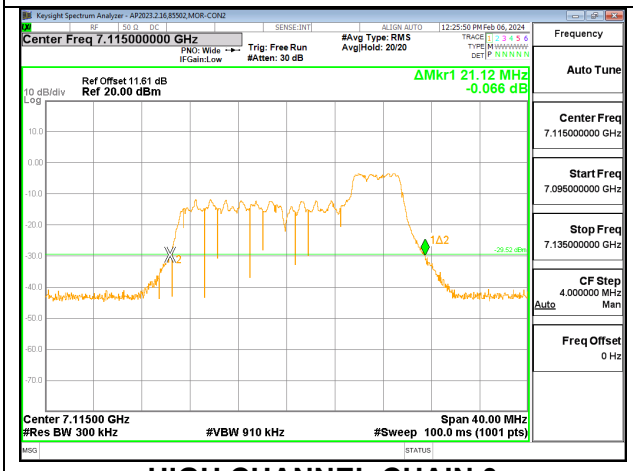
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Straddle/Low	6875	21.20	20.48
Mid	6995	19.44	18.80
High	7115	21.12	20.48



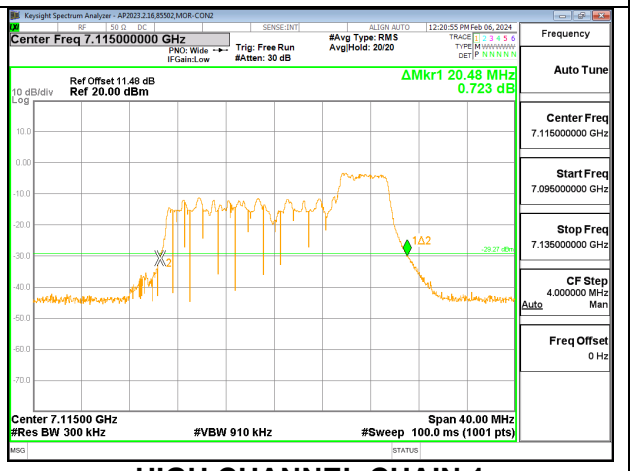
L STRADDLE CHAIN 0



L STRADDLE CHAIN 1



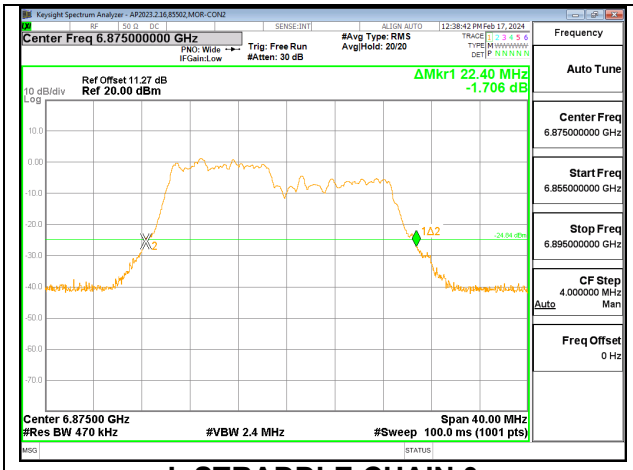
HIGH CHANNEL CHAIN 0



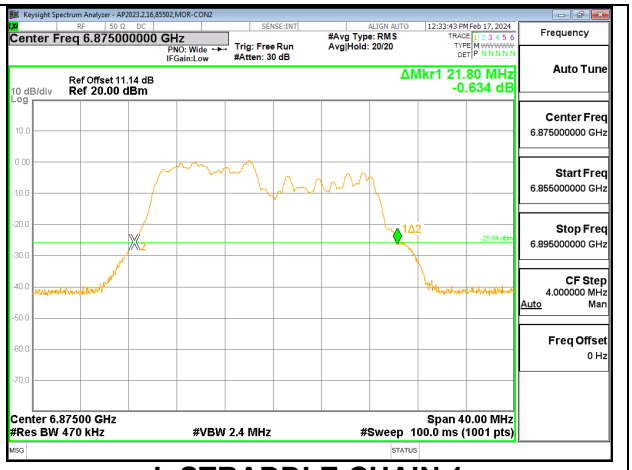
HIGH CHANNEL CHAIN 1

2TX CDD MODE: 106T

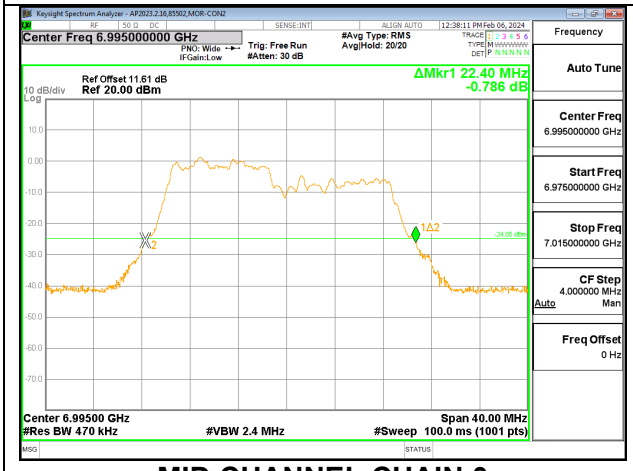
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Straddle/Low	6875	22.40	21.80
Mid	6995	22.40	21.80
High	7115	21.48	21.24



L STRADDLE CHAIN 0

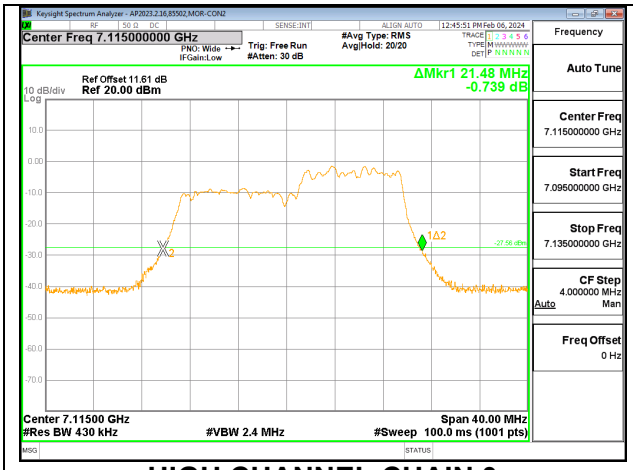


L STRADDLE CHAIN 1

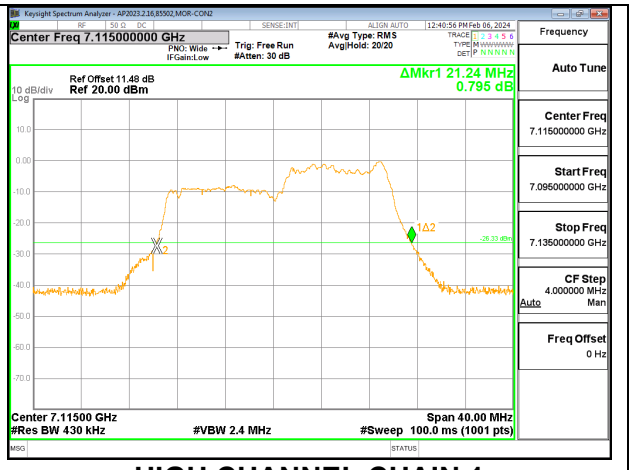


MID CHANNEL CHAIN 0

MID CHANNEL CHAIN 1



HIGH CHANNEL CHAIN 0

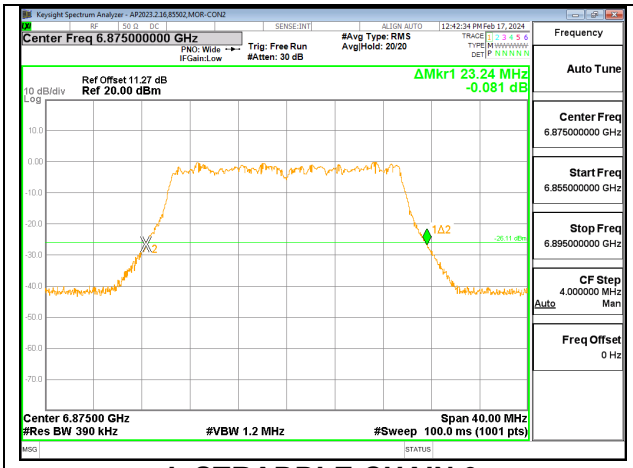


HIGH CHANNEL CHAIN 1

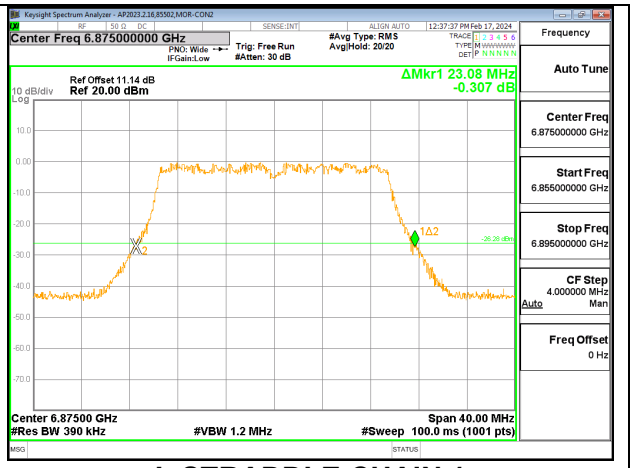
Note: High channel plots have been added for reference to show that Mask scans followed proper testing procedures by using the same RBW as was used for 26dB.

2TX CDD MODE: 242T

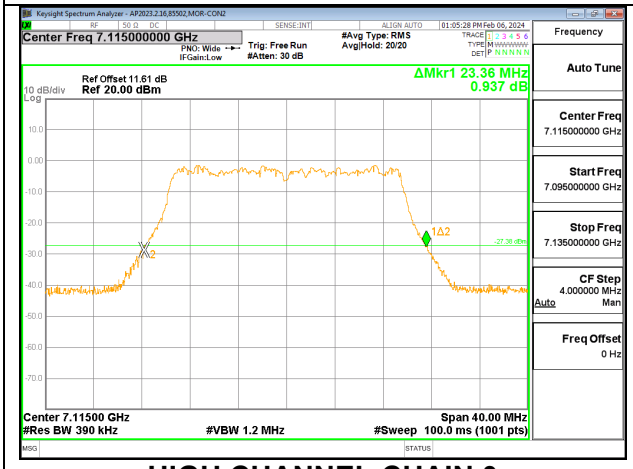
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Straddle/Low	6875	23.24	23.08
Mid	6995	23.36	23.16
High	7115	23.36	23.36



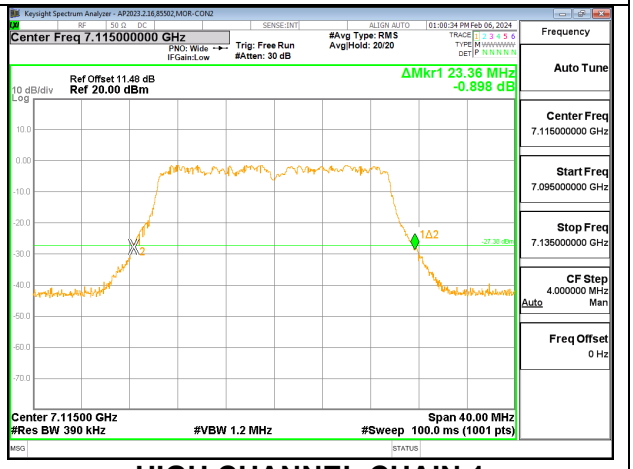
L STRADDLE CHAIN 0



L STRADDLE CHAIN 1



HIGH CHANNEL CHAIN 0

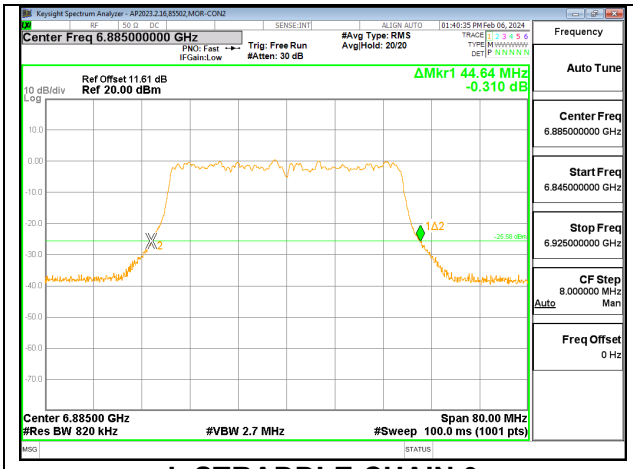


HIGH CHANNEL CHAIN 1

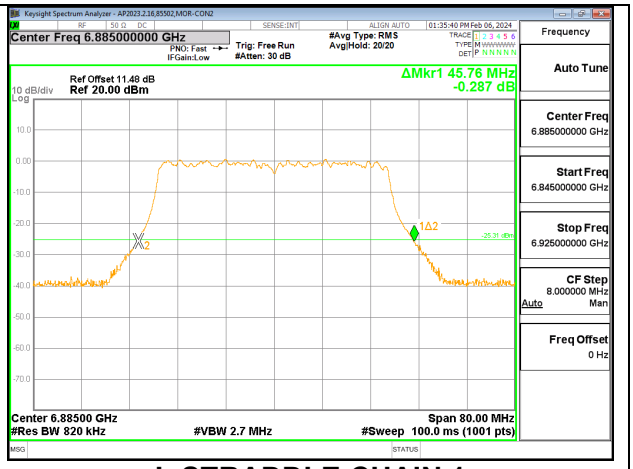
9.2.18. 802.11ax HE40 MODE 2TX IN THE UNII-8 BAND

2TX CDD MODE: 484T

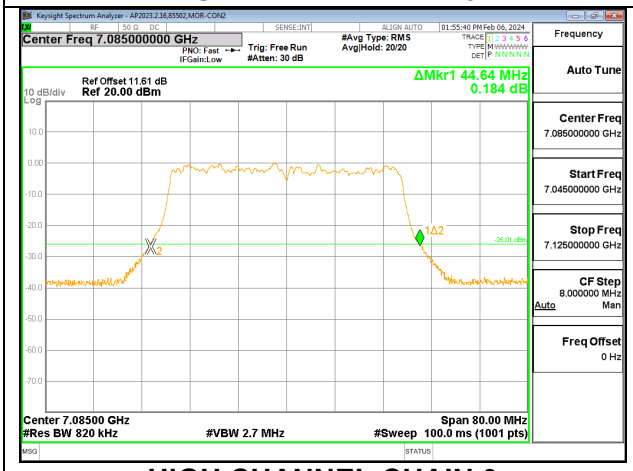
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Straddle/Low	6885	44.64	45.76
Mid	6965	44.88	45.92
High	7085	44.64	46.16



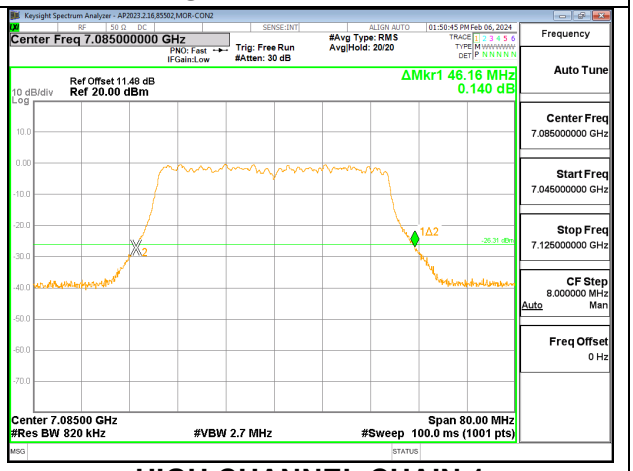
L STRADDLE CHAIN 0



L STRADDLE CHAIN 1



HIGH CHANNEL CHAIN 0

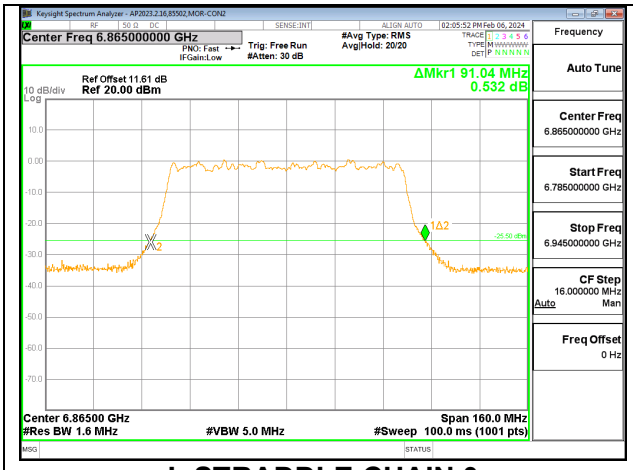


HIGH CHANNEL CHAIN 1

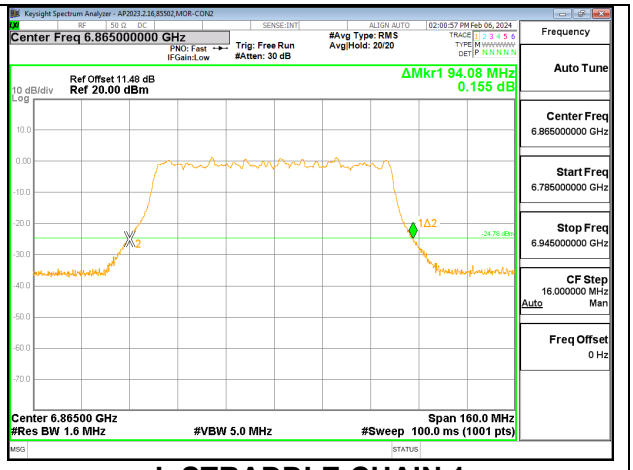
9.2.19. 802.11ax HE80 MODE 2TX IN THE UNII-8 BAND

2TX CDD MODE: 996T

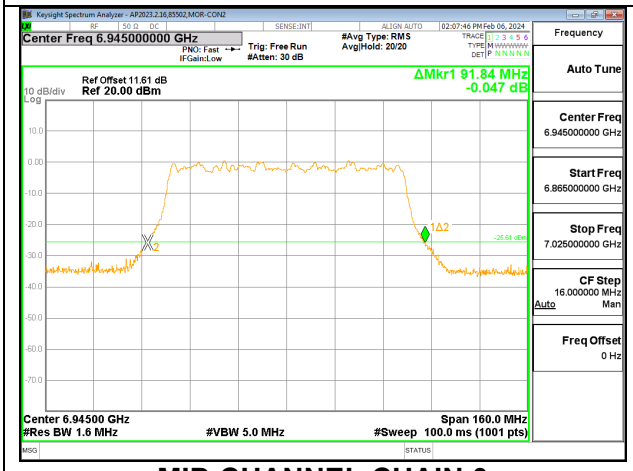
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Straddle/Low	6865	91.04	94.08
Mid	6945	91.84	94.08
High	7025	91.20	94.08



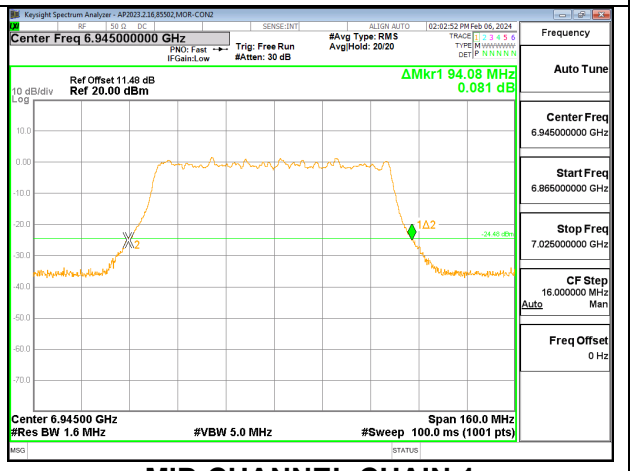
L STRADDLE CHAIN 0



L STRADDLE CHAIN 1



MID CHANNEL CHAIN 0

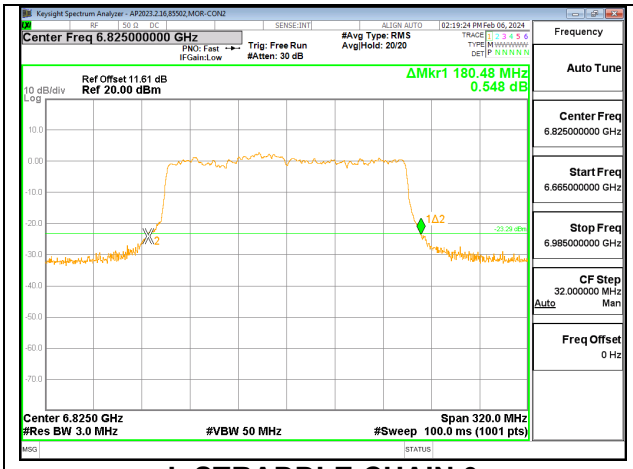


MID CHANNEL CHAIN 1

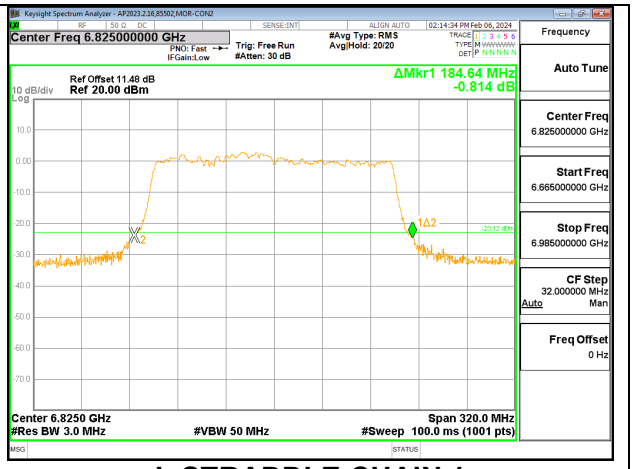
9.2.20. 802.11ax HE160 MODE 2TX IN THE UNII-8 BAND

2TX CDD MODE: 2x996T

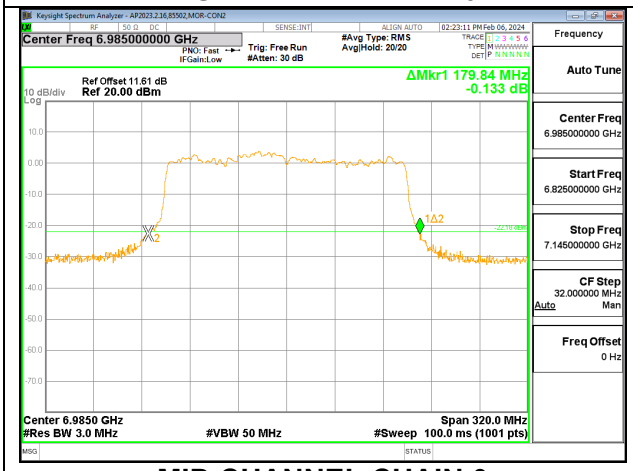
Channel	Frequency (MHz)	26 dB Bandwidth Chain 0 (MHz)	26 dB Bandwidth Chain 1 (MHz)
Low/Straddle	6825	180.48	184.64
High	6985	179.84	185.28



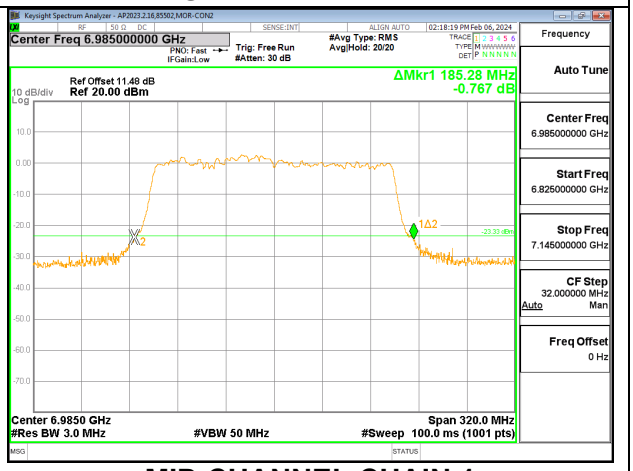
L STRADDLE CHAIN 0



L STRADDLE CHAIN 1



MID CHANNEL CHAIN 0



MID CHANNEL CHAIN 1

9.3. OUTPUT POWER AND PSD

LIMITS

FCC §15.407
Band 5.925-7.125 GHz

(8) For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum power spectral density must not exceed −1 dBm e.i.r.p. in any 1-megahertz band, and the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

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

The power output was measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter. For PSD, EUT was connected to a spectrum analyzer for measurement.

DIRECTIONAL ANTENNA GAIN

Tx chains are uncorrelated for power and correlated for PSD.The directional gains are as follows:

Band	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
UNII 5	-1.43	-2.11	-1.76	1.25
UNII 6	-1.43	-1.78	-1.60	1.41
UNII 7	-1.63	-1.84	-1.73	1.28
UNII 8	-2.23	-2.89	-2.55	0.46

Directional gains for MIMO operations were determined using KDB662911 D01 Section F (2)(d)(i) and (ii) for unequal antenna gains, with equal transmit powers. The directional gains are calculated using the formulas for uncorrelated and correlated transmissions across the two transmit antennas.

(i) Correlated gain = $10\log((10^{G1/20} + 10^{G2/20})^2 / N_{Ant})$

(ii) Uncorrelated gain = $10\log((10^{G1/10} + 10^{G2/10}) / N_{Ant})$

Sample calculation, using 2 antennas:
Correlated gain = $10\log(10^{-1.72/20} + 10^{-2.34/20})^2/2) = 0.99$dBi
Uncorrelated gain = $10\log(10^{-1.72/10} + 10^{-2.34/10})/2) = -2.02$dBi

RESULTS

9.3.1. 802.11a MODE 2TX IN THE UNII-5 BAND

2TX CDD MODE – LOW POWER INDOOR

Test Engineer:	85502
Test Date:	2024-02-05

Bandwidth, Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	e.i.r.p. Power Limit (dBm)
Low (RU0)	5955	-1.76	24.00
Mid (RU4)	6175	-1.76	24.00
High (RU8)	6415	-1.76	24.00

Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd EIRP (dBm)	Power Limit EIRP (dBm)	Power Margin (dB)
Low (RU0)	5955	4.50	4.32	5.66	24.00	-18.34
Mid (RU4)	6175	4.88	4.92	6.15	24.00	-17.85
High (RU8)	6415	4.71	4.76	5.99	24.00	-18.01

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