TEST REPORT

Report Number. : R15110020-E7

Applicant	:	Sony Corporation 1-7-1 Konan Minato-Ku Tokyo, 108-0075, Japan
FCC ID	:	PY7-13187R
EUT Description	:	GSM/WCDMA/LTE/5G Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C: 2024

Date Of Issue:
2024-03-25

Prepared by:
UL LLC
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ilac-MRA

A2LA
ACCREDITED
CERT #0751.06

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-03-19	Initial Issue	Charles Moody
V2	2024-03-25	Revised antenna type in section 6.3	B. Kiewra

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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: GSM/WCDMA/LTE/5G Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, WPT & NFC

SERIAL NUMBER: QV77005FL3, QV7700NWLQ

SAMPLE RECEIPT DATE: 2023-12-26 TO 2024-01-29

DATE TESTED: 2024-02-20 TO 2024-03-12

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C: 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 By:

Mike Antola
Staff Engineer
Consumer Technology Division
UL LLC

Prepared By:

Charles Moody
Engineer
Consumer Technology Division
UL LLC

2. TEST RESULTS 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 6.3)
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 11.6.
15.247 (a) (2)	6dB BW	Compliant	None
15.247 (b) (3)	Output Power		
See Comment	Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	PSD	Compliant	None
15.247 (d)	Conducted Spurious Emissions		
15.209, 15.205	Radiated Emissions		
15.207	AC Mains Conducted Emissions		

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01.

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
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%.

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

6. EQUIPMENT UNDER TEST

6.1.   EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE/5G Phone with BT, DTS,/UNII a/b/g/n/ac/ax, GPS, WPT & NFC. This report covers the full emissions testing of the 2.4 WLAN radio.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

2.4GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2Tx			
2412 - 2462	802.11b	19.04	80.17
2412 - 2462	802.11g	22.57	180.72
2412 - 2462	802.11n HT20	22.59	181.55
2412 - 2462	802.11ax HE20 26T	19.97	99.31
2412 - 2462	802.11ax HE20 52T	22.55	179.89
2412 - 2462	802.11ax HE20 106T	24.57	286.42
2412 - 2462	802.11ax HE20 242T	24.95	312.61

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

Chain	Designation in Documentation	Type	Frequency Range (MHz)	Maximum Gain (dBi)
0	WLAN Main/Bluetooth#1	Loop	2402-2480	-1.02
1	WLAN Sub/Bluetooth#2	Monopole	2402-2480	-2.69

6.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was 0.220.

6.5. 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/mode with highest power spectral density as worst-case scenario.

Band edge was performed with the EUT set to transmit at the highest power on low, high, and any power stepped channels. Additionally 106T bandedge testing covers the 26 and 52T modes, as these modes are a narrower bandwidth and have equal or less power. Radiated spurious and harmonic emissions between 1GHz and 18GHz were performed with the EUT set to transmit on low, mid, and high channels at the worst-case modes based on average power and PSD, which was 802.11g and 802.11ax HE20 52T. Since both of these are OFDMA modulation, radiated emissions was also performed on 802.11b since it uses CCK modulation.

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.

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

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20 mode: MCS0 (Nss=1)
802.11ax HE20 mode: MCS0 (Nss=1)

PSD was performed on 11b, in order to cover CCK modulation. Additionally, PSD was only performed on HE20 26, 52, and 106T as these were the narrowest and highest powered OFDMA modes. Therefore these modes are representative of the remaining 20MHz modes.

For conducted testing, 11b was tested at each individual chain's power setting in order to meet the client declared, per chain tuneup. However, for the radiated testing, 11b was tested in a 2Tx mode with the power setting set to the higher of the per-chain settings found by conducted.

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

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

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Power Adapter	Sony	Type: AC-0540-JP	3223W09206247	--
Headphones	Sony	--	--	--
Support Laptop	Lenovo	Yoga 7 16IAP7	PF49WDF9	--

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB-C	USB	<3M	Connects EUT to Power Adapter
2	3.5mm	1	AUX	Non-Shielded	<3M	Connected to Headphones

TEST SETUP

The EUT is connected to a support laptop prior to testing to configure the radio. Test software exercised the radio card. For testing, the EUT was connected to the power adapter.

SETUP DIAGRAMS

Please refer to R15110020-EP3 for setup diagrams

7. MEASUREMENT METHOD

<u>On Time and Duty Cycle:</u> ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

<u>6 dB BW:</u> ANSI C63.10 Subclause -11.8.1

<u>Output Power:</u> ANSI C63.10 Subclause -11.9.2.3.1 Method PKPM1 Peak-reading power meter
ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

<u>PSD:</u> ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

<u>Radiated emissions non-restricted frequency bands:</u> ANSI C63.10 Subclause -11.11 and 6.10.4

<u>Radiated emissions restricted frequency bands:</u> ANSI C63.10 Subclause -11.12.1 and 6.10.5

<u>General Radiated Spurious Emissions:</u> ANSI C63.10-2013 Section 6.3 to 6.6

<u>AC Power-line conducted emissions:</u> ANSI C63.10-2013, Section 6.2.

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 1					
90411	Spectrum Analyzer	Keysight Technologies	N9030A	2023-08-02	2024-08-02
179892	Environmental Meter	Fisher Scientific	15-077-963	2023-07-26	2024-06-31
211055	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
76022	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
Power Software	Boonton Power Analyzer	Boonton	Version 3.0.13.0	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
Additional Equipment					
CBL028	SMA Cable	Sucoflex	104PEA	2024-02-16	2025-02-16
CBL029	SMA Cable	Sucoflex	104PEA	2024-02-16	2025-02-16
226563	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2024-02-29	2025-02-29
226559	SMA Coaxial 10dB Attenuator 25MHz-18GHz	CentricRF	C18S2-10	2024-02-29	2025-02-29

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 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-01-24	2025-01-24
30-1000 MHz					
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-30	2026-01-30
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
Receiver & Software					
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-07-19	2024-07-19
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

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
18-40 GHz					
204704	Horn Antenna, 18-26.5GHz	Com-Power	AH-826	2023-07-20	2025-07-20
Gain-Loss Chains					
207640	Gain-loss string: 1-18GHz	Various	Various	2023-05-17	2024-05-17
225795	Gain-loss string: 18-40GHz	Various	Various	2023-05-17	2024-05-17
Receiver & Software					
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2023-04-10	2024-04-10
81018	Spectrum Analyzer	Agilent	E4446A	2023-08-01	2024-08-01
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

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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				
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				
200540	Environmental Meter	Fisher Scientific	15-077-963	2023-07-19	2025-07-19

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
2.4 GHz Band					
802.11b 2TX	12.390	12.410	0.998	99.84	0.00
802.11g 2TX	5.426	5.447	0.996	99.61	0.00
802.11n HT20 2TX	5.426	5.447	0.996	99.61	0.00
802.11ax HE20 26T	5.087	5.112	0.995	99.51	0.00
802.11ax HE20 52T	5.077	5.102	0.995	99.51	0.00
802.11ax HE20 106T	3.896	3.921	0.994	99.36	0.00
802.11ax HE20 242T	1.740	1.765	0.986	98.58	0.00

802.11b MODE, 2TX
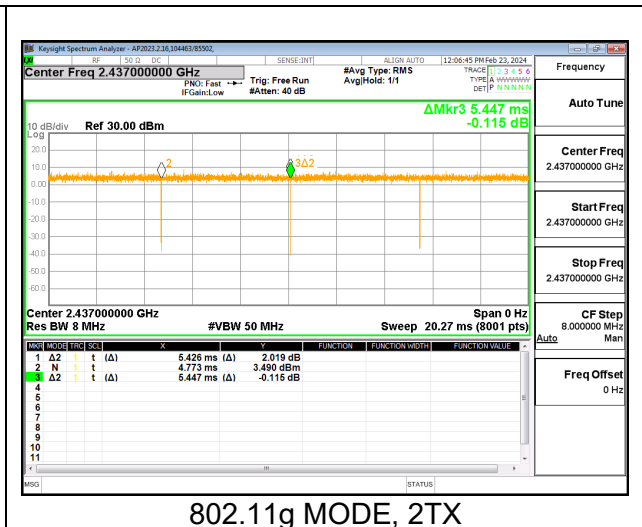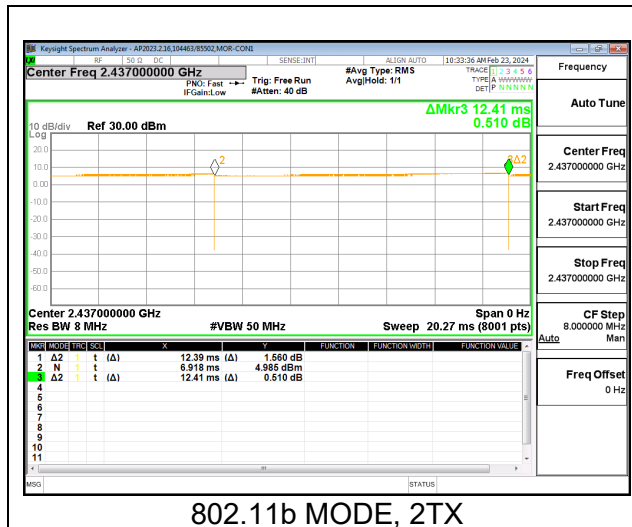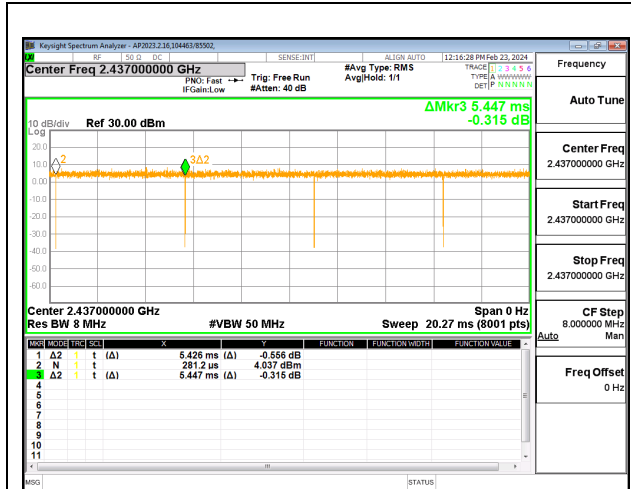
802.11g MODE, 2TX

802.11n HT20 MODE, 2TX
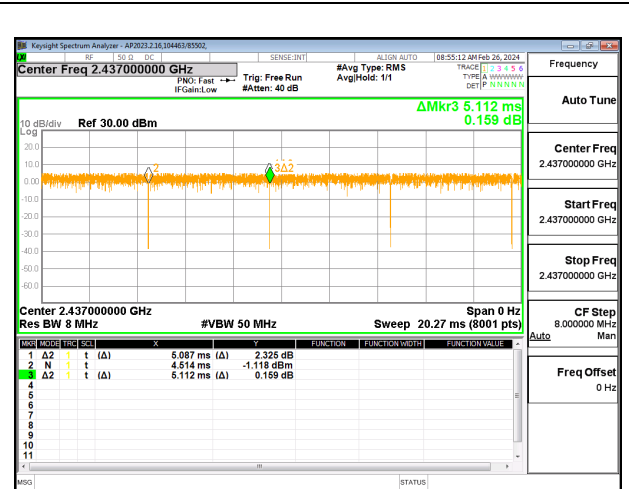
802.11ax HE20 26T MODE, 2TX

802.11ax HE20 52T MODE,2TX

802.11ax HE20 106T MODE,2TX
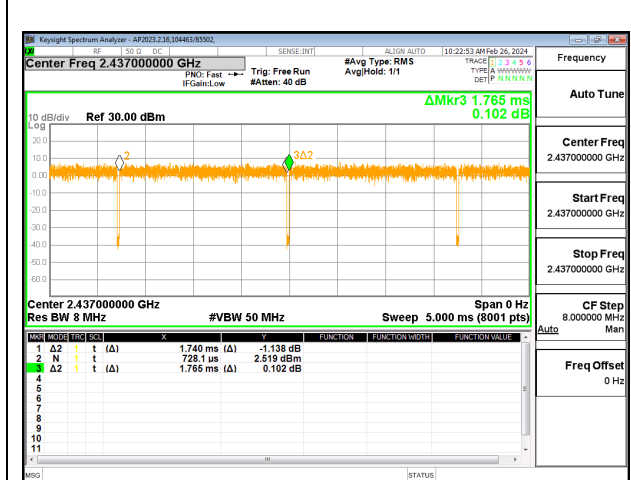
802.11ax HE20 242T MODE,2TX

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9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

9.2.1. 802.11b MODE

2TX Chain 0 + Chain 1 MODE

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low 1	2412	7.68	7.68	0.5
Mid 6	2437	8.08	8.16	0.5
High 11	2462	7.68	7.12	0.5

MID CHANNEL 6 CHAIN 0

MID CHANNEL 6 CHAIN 1
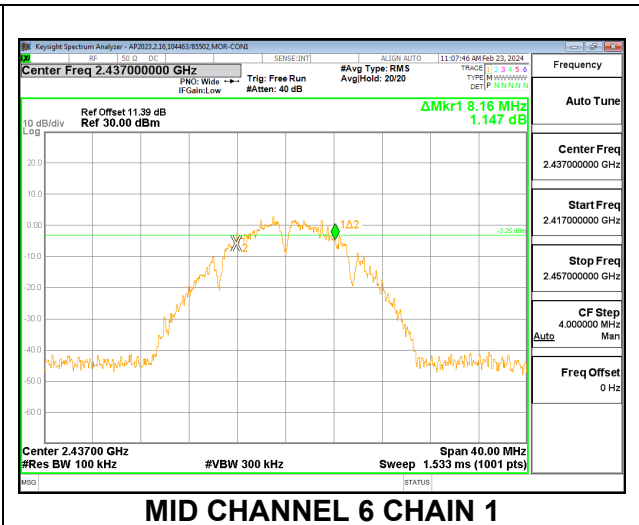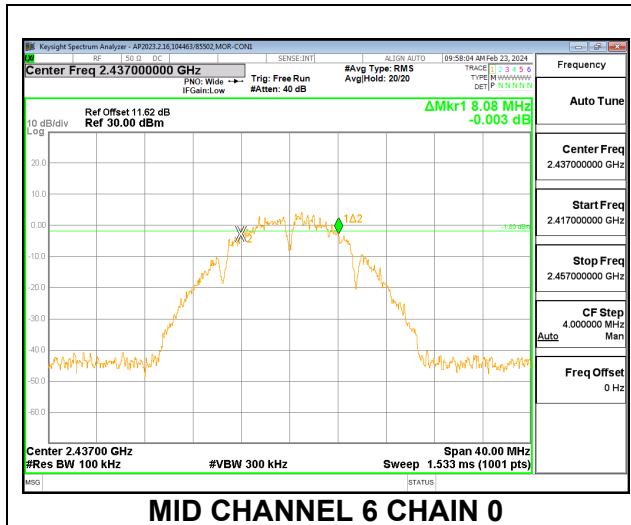
9.2.2. 802.11g MODE

2TX Chain 0 + Chain 1 CDD MODE

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low 1	2412	16.20	16.56	0.5
Mid 6	2437	16.48	16.36	0.5
High 11	2462	16.68	16.48	0.5

HIGH CHANNEL 11

HIGH CHANNEL 11 CHAIN 0

HIGH CHANNEL 11 CHAIN 1

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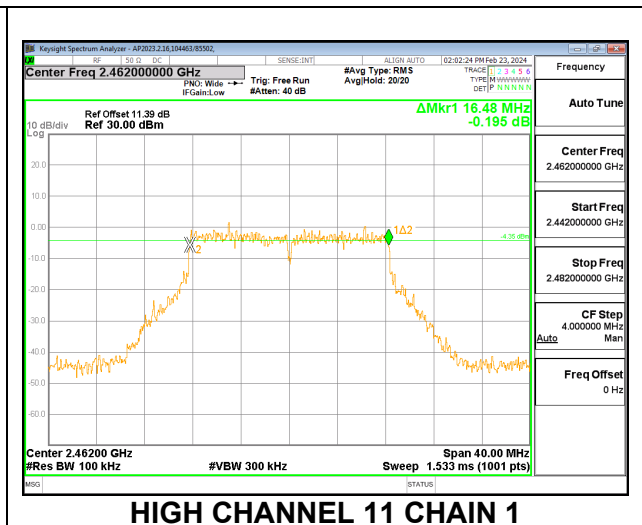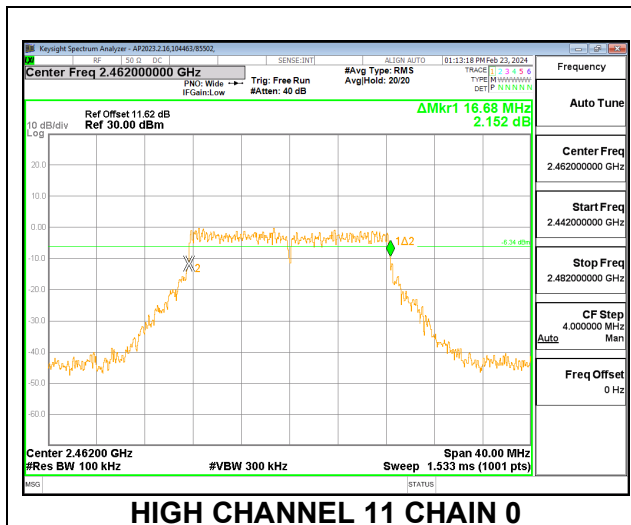
9.2.3. 802.11n HT20 MODE

2TX Chain 0 + Chain 1 CDD MODE

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low 1	2412	17.64	17.84	0.5
Mid 6	2437	17.92	17.80	0.5
High 11	2462	17.68	17.84	0.5

MID CHANNEL 6

MID CHANNEL 6 CHAIN 0

MID CHANNEL 6 CHAIN 1
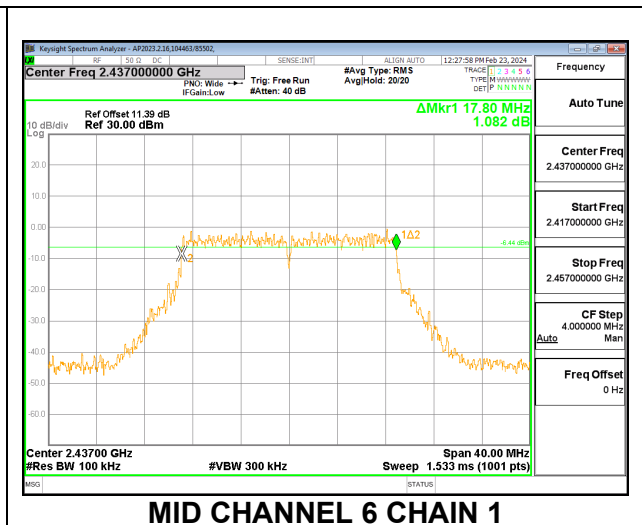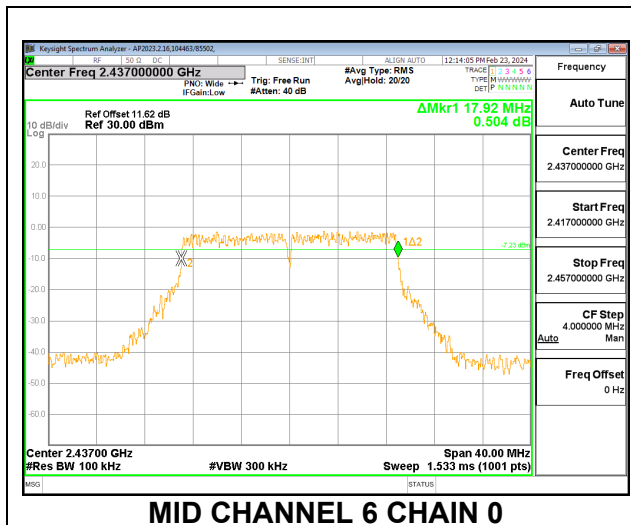
9.2.1. 802.11ax HE20 MODE 2TX

2TX CHAIN 0 + CHAIN 1 CDD OFDMA MODE: 26T

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low 1 (RU0)	2412	2.16	2.16	0.5
Mid 6 (RU4)	2437	2.64	2.80	0.5
High 11 (RU8)	2462	2.12	2.12	0.5

MID CHANNEL 6

MID CHANNEL 6 CHAIN 0

MID CHANNEL 6 CHAIN 1
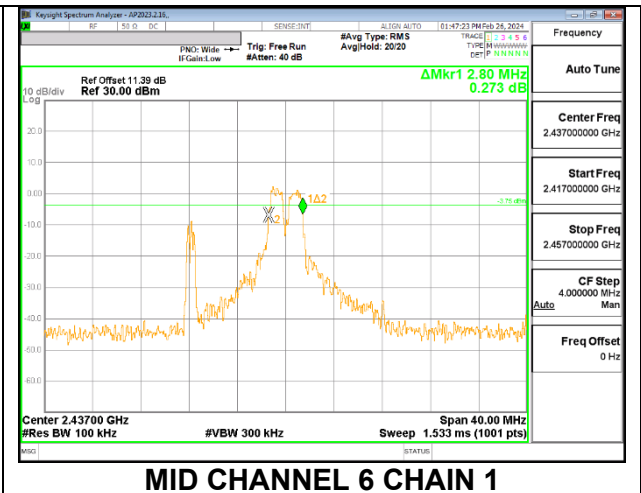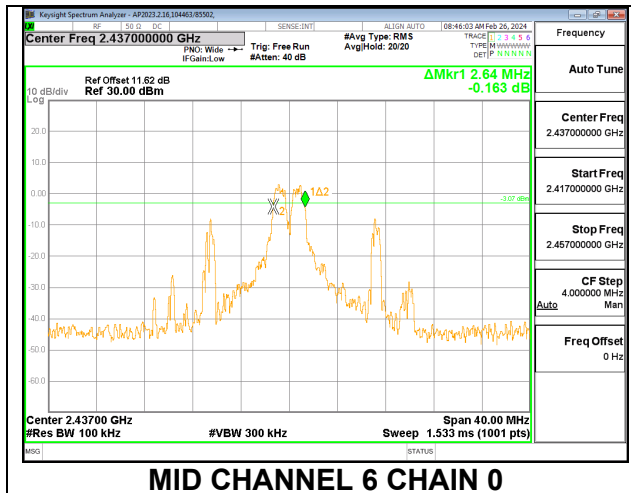
2TX CHAIN 0 + CHAIN 1 CDD OFDMA MODE: 52T

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low 1 (RU37)	2412	4.16	4.16	0.5
Mid 6 (RU38)	2437	4.16	4.16	0.5
High 11 (RU40)	2462	4.12	4.16	0.5

MID CHANNEL 6

MID CHANNEL 6 CHAIN 0   **MID CHANNEL 6 CHAIN 1**
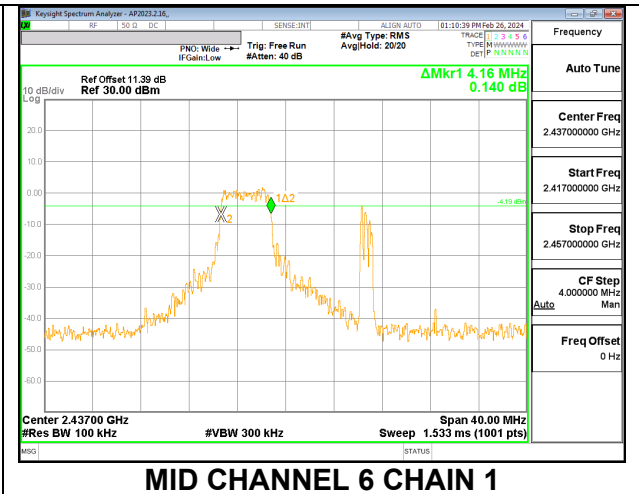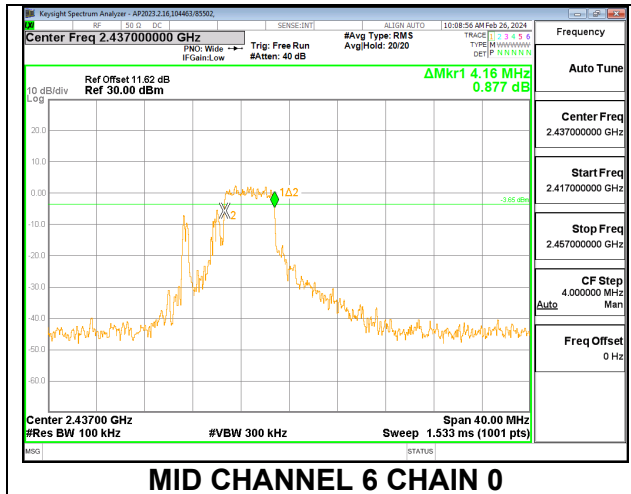
2TX CHAIN 0 + CHAIN 1 CDD OFDMA MODE: 106T

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low 1 (RU53)	2412	8.32	8.32	0.5
Mid 6 (RU53)	2437	8.32	8.48	0.5
High 11 (RU54)	2462	8.36	8.32	0.5

MID CHANNEL 6

MID CHANNEL 6 CHAIN 0

MID CHANNEL 6 CHAIN 1
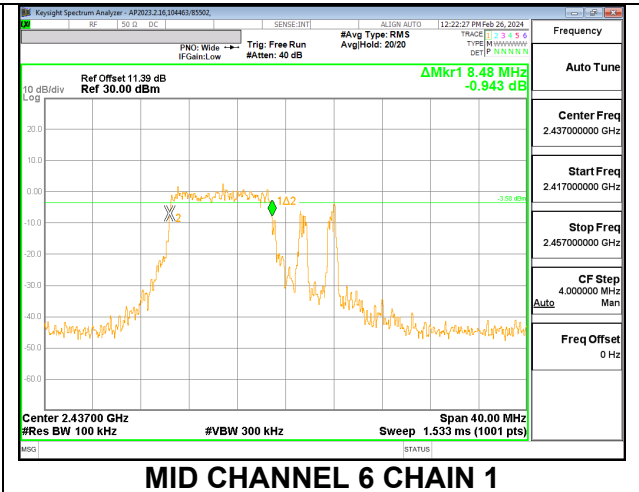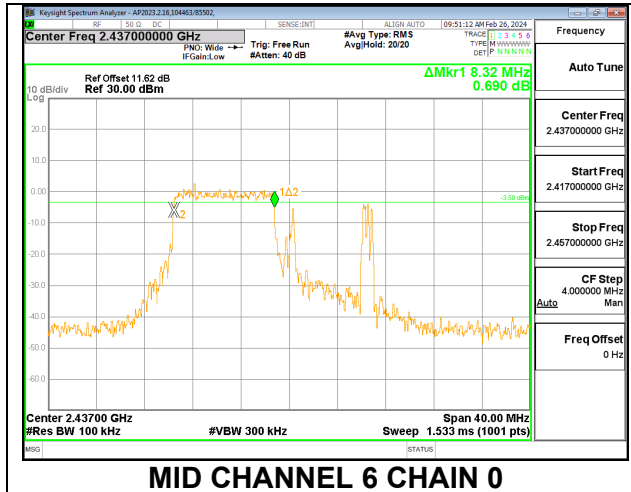
2TX CHAIN 0 + CHAIN 1 CDD OFDMA MODE: 242T

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
Low 1 (RU61)	2412	19.12	19.16	0.5
Mid 6 (RU61)	2437	19.20	19.20	0.5
High 11 (RU61)	2462	19.20	19.12	0.5

MID CHANNEL 6

MID CHANNEL 6 CHAIN 0   **MID CHANNEL 6 CHAIN 1**
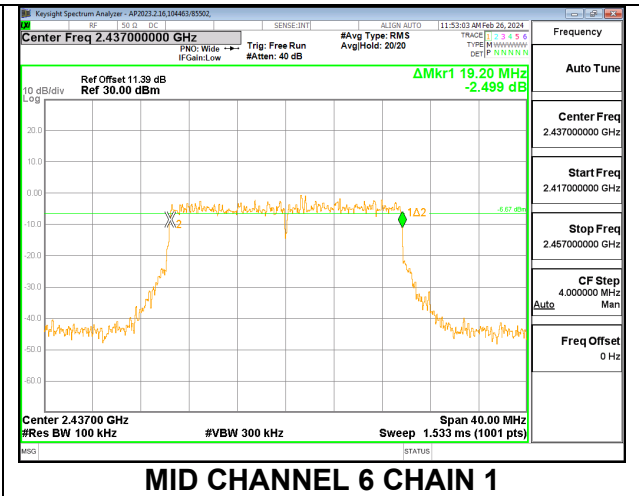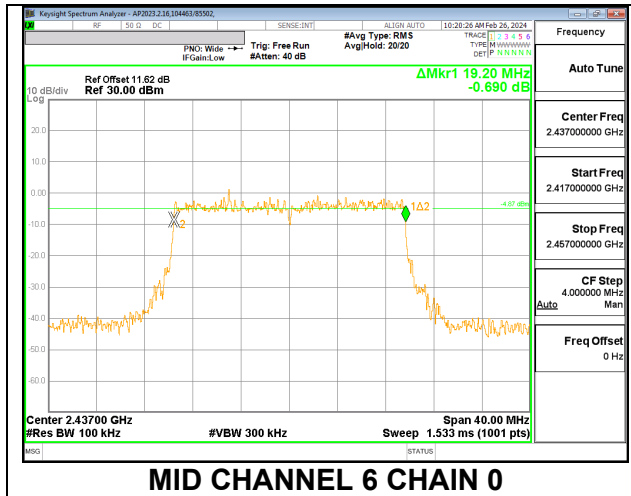
9.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

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

TEST PROCEDURE

The transmitter output is connected to a peak power meter.

The cable assembly insertion loss for testing of 11.35 dB (including 9.71B pad and 1.64dB cable) for Chain 0 and 11.4dB (including 9.68dB pad and 1.72 dB cable) for Chain 1 was entered as an offset in the power meter to allow for a peak reading of power.

DIRECTIONAL ANTENNA GAIN

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

Band (GHz)	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)	Correlated Chains Directional Gain (dBi)
2.4	-1.02	-2.69	-1.78	1.20

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 = $10\log(10^{-1.02/20} + 10^{-2.69/20})^2/2) = 1.20$dBi
Uncorrelated gain = $10\log(10^{-1.02/10} + 10^{-2.69/10})/2) = -1.78$dBi

RESULTS

9.3.1. 802.11b MODE

2TX CHAIN 0 + CHAIN 1 CDD MODE

Test Engineer:	104463/85503
Test Date:	2024-02-20

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	Max Power (dBm)
Low 1	2412	-1.78	30.00	30.00
Mid 6	2437	-1.78	30.00	30.00
High 11	2462	-1.78	30.00	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	16.60	15.36	19.04	30.00	-10.96
Mid 6	2437	16.51	15.32	18.97	30.00	-11.03
High 11	2462	16.32	15.30	18.85	30.00	-11.15

9.3.2. 802.11g MODE

2TX CHAIN 0 + CHAIN 1 CDD MODE

Test Engineer:	104463/85503
Test Date:	2024-02-20

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	Max Power (dBm)
Low 1	2412	-1.78	30.00	30.00
Mid 6	2437	-1.78	30.00	30.00
High 11	2462	-1.78	30.00	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	19.52	19.05	22.30	30.00	-7.70
Mid 6	2437	19.52	19.05	22.30	30.00	-7.70
High 11	2462	19.70	19.42	22.57	30.00	-7.43

9.3.3. 802.11n HT20 MODE

2TX CHAIN 0 + CHAIN 1 CDD MODE

Test Engineer:	104463/85503
Test Date:	2024-02-20

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	Max Power (dBm)
Low 1	2412	-1.78	30.00	30.00
Low 2	2417	-1.78	30.00	30.00
Mid 6	2437	-1.78	30.00	30.00
High 9	2452	-1.78	30.00	30.00
High 10	2457	-1.78	30.00	30.00
High 11	2462	-1.78	30.00	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	14.20	14.20	17.21	30.00	-12.79
Low 2	2417	19.85	19.30	22.59	30.00	-7.41
Mid 6	2437	19.66	19.07	22.38	30.00	-7.62
High 9	2452	19.82	19.33	22.59	30.00	-7.41
High 10	2457	17.56	16.80	20.20	30.00	-9.80
High 11	2462	15.03	8.62	15.92	30.00	-14.08

9.3.4. 802.11ax HE20 MODE 2TX

2TX CHAIN 0 + CHAIN 1 CDD MODE: 26T

Test Engineer:	104463/85503
Test Date:	2024-02-20

Limits

Channel	Frequency	Directional Gain	FCC Power Limit	Max Power
	(MHz)	(dBi)	(dBm)	(dBm)
Low 1 (RU0)	2412	-1.78	30.00	30.00
Mid 6 (RU4)	2437	-1.78	30.00	30.00
High 11 (RU8)	2462	-1.78	30.00	30.00

Results

Channel	Frequency	Chain 0 Meas Power	Chain 1 Meas Power	Total Corr'd Power	Power Limit	Margin
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low 1 (RU0)	2412	16.61	16.01	19.33	30.00	-10.67
Mid 6 (RU4)	2437	17.18	16.72	19.97	30.00	-10.03
High 11 (RU8)	2462	17.19	16.53	19.89	30.00	-10.11

2TX CHAIN 0 + CHAIN 1 CDD MODE: 52T

Test Engineer:	104463/85503
Test Date:	2024-02-20

Limits

Channel	Frequency	Directional Gain	FCC Power Limit	Max Power
	(MHz)	(dBi)	(dBm)	(dBm)
Low 1 (RU37)	2412	-1.78	30.00	30.00
Low 2 (RU37)	2417	-1.78	30.00	30.00
Mid 6 (RU38)	2437	-1.78	30.00	30.00
High 11 (RU40)	2462	-1.78	30.00	30.00

Results

Channel	Frequency	Chain 0 Meas Power	Chain 1 Meas Power	Total Corr'd Power	Power Limit	Margin
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
Low 1 (RU37)	2412	16.22	15.71	18.98	30.00	-11.02
Low 2 (RU37)	2417	19.50	19.58	22.55	30.00	-7.45
Mid 6 (RU38)	2437	19.10	18.45	21.80	30.00	-8.20
High 11 (RU40)	2462	19.77	19.12	22.47	30.00	-7.53

2TX CHAIN 0 + CHAIN 1 CDD MODE: 106T

Test Engineer:	104463/85503
Test Date:	2024-02-20

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	Max Power (dBm)
Low 1 (RU53)	2412	-1.78	30.00	30.00
Mid 6 (RU53)	2437	-1.78	30.00	30.00
High 10 (RU54)	2457	-1.78	30.00	30.00
High 11 (RU54)	2462	-1.78	30.00	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1 (RU53)	2412	21.46	21.11	24.30	30.00	-5.70
Mid 6 (RU53)	2437	21.59	20.67	24.16	30.00	-5.84
High 10 (RU54)	2457	21.93	21.16	24.57	30.00	-5.43
High 11 (RU54)	2462	21.16	20.39	23.80	30.00	-6.20

2TX CHAIN 0 + CHAIN 1 CDD MODE: 242T

Test Engineer:	104463/85503
Test Date:	2024-02-20

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	Max Power (dBm)
Low 1 (RU61)	2412	-1.78	30.00	30.00
Low 2 (RU61)	2417	-1.78	30.00	30.00
Low 3 (RU61)	2422	-1.78	30.00	30.00
Mid 6 (RU61)	2437	-1.78	30.00	30.00
High 9 (RU61)	2452	-1.78	30.00	30.00
High 10 (RU61)	2457	-1.78	30.00	30.00
High 11 (RU61)	2462	-1.78	30.00	30.00

Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1 (RU61)	2412	17.29	16.53	19.93	30.00	-10.07
Low 2 (RU61)	2417	20.84	20.75	23.81	30.00	-6.19
Low 3 (RU61)	2422	22.29	21.57	24.95	30.00	-5.05
Mid 6 (RU61)	2437	22.02	21.36	24.71	30.00	-5.29
High 9 (RU61)	2452	22.09	21.75	24.93	30.00	-5.07
High 10 (RU61)	2457	10.48	17.76	18.50	30.00	-11.50
High 11 (RU61)	2462	17.37	16.96	20.18	30.00	-9.82

9.4. AVERAGE POWER

LIMITS

None; for reporting purposes only

TEST PROCEDURE

The transmitter output is connected to a gated average power meter.

The cable assembly insertion loss for testing of 11.35 dB (including 9.71B pad and 1.64dB cable) for Chain 0 and 11.4dB (including 9.68dB pad and 1.72 dB cable) for Chain 1 was entered as an offset in the power meter to allow for a gated average reading of power.

9.4.1. 802.11b MODE

2TX CHAIN 0 + CHAIN 1 CDD MODE

Test Engineer:	104463/85503
Test Date:	2024-02-20

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low 1	2412	13.71	12.49	16.15
Mid 6	2437	13.68	12.46	16.12
High 11	2462	13.52	12.47	16.04

9.4.2. 802.11g MODE

2TX CHAIN 0 + CHAIN 1 CDD MODE

Test Engineer:	104463/85503
Test Date:	2024-02-20

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low 1	2412	13.75	13.36	16.57
Mid 6	2437	13.75	13.36	16.57
High 11	2462	13.85	13.48	16.68

9.4.3. 802.11n HT20 MODE

2TX CHAIN 0 + CHAIN 1 CDD MODE

Test Engineer:	104463/85503
Test Date:	2024-02-20

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low 1	2412	8.73	8.28	11.52
Low 2	2417	13.74	13.30	16.54
Mid 6	2437	13.63	12.87	16.27
High 9	2452	13.81	13.34	16.59
High 10	2457	11.38	10.73	14.08
High 11	2462	8.92	8.35	11.65

9.4.4. 802.11ax HE20 MODE

2TX CHAIN 0 + CHAIN 1 CDD MODE: 26T

Test Engineer:	104463/85503
Test Date:	2024-02-20

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low 1 (RU0)	2412	9.05	8.45	11.77
Mid 6 (RU4)	2437	9.19	8.68	11.95
High 11 (RU8)	2462	9.30	8.58	11.97

2TX CHAIN 0 + CHAIN 1 CDD MODE: 52T

Test Engineer:	104463/85503
Test Date:	2024-02-20

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low 1 (RU37)	2412	8.72	8.14	11.45
Low 2 (RU37)	2417	12.13	12.21	15.18
Mid 6 (RU38)	2437	11.51	10.82	14.19
High 11 (RU40)	2462	12.36	11.56	14.99

2TX CHAIN 0 + CHAIN 1 CDD MODE: 106T

Test Engineer:	104463/85503
Test Date:	2024-02-20

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low 1 (RU53)	2412	13.65	13.19	16.44
Mid 6 (RU53)	2437	13.59	12.77	16.21
High 10 (RU54)	2457	13.77	12.98	16.40
High 11 (RU54)	2462	13.07	12.31	15.72

2TX CHAIN 0 + CHAIN 1 CDD MODE: 242T

Test Engineer:	104463/85503
Test Date:	2024-02-20

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low 1 (RU61)	2412	8.79	8.14	11.48
Low 2 (RU61)	2417	12.40	12.28	15.35
Low 3 (RU61)	2422	13.92	13.15	16.56
Mid 6 (RU61)	2437	13.65	12.90	16.30
High 9 (RU61)	2452	13.69	13.21	16.47
High 10 (RU61)	2457	9.91	9.39	12.66
High 11 (RU61)	2462	8.97	8.48	11.74

9.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

9.5.1. 802.11b MODE

2TX Chain 0 + Chain 1 CDD MODE

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

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Chain 1 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1	2412	-9.448	-11.236	-7.240	8.0	-15.2
Mid 6	2437	-10.130	-9.353	-6.714	8.0	-14.7
High 11	2462	-9.319	-10.728	-6.956	8.0	-15.0

MID CHANNEL 6 CHAIN 0

MID CHANNEL 6 CHAIN 1
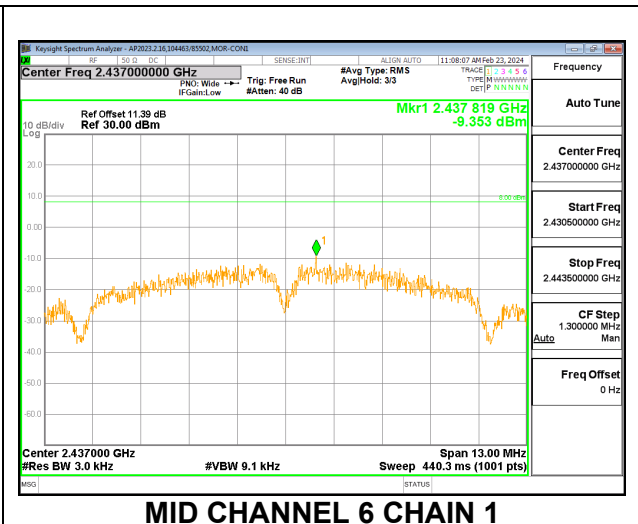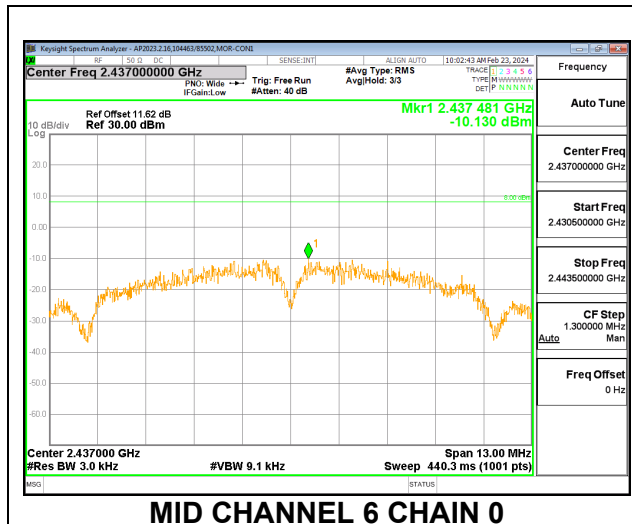
9.5.1. 802.11ax HE20 MODE 2TX

2TX CHAIN 0 + CHAIN 1 CDD MODE: 26T

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

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Chain 1 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1 (RU0)	2412	-7.966	-9.302	-5.573	8.0	-13.6
Mid 6 (RU4)	2437	-9.818	-8.229	-5.941	8.0	-13.9
High 11 (RU8)	2462	-9.153	-10.094	-6.588	8.0	-14.6

LOW CHANNEL 1

LOW CHANNEL 1 CHAIN 0   **LOW CHANNEL 1 CHAIN 1**
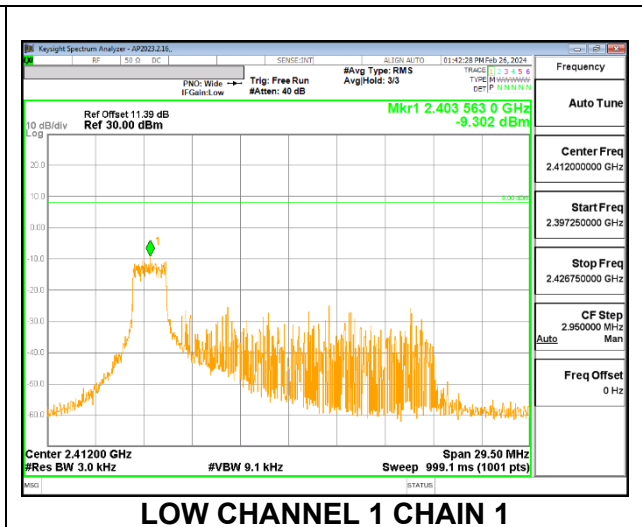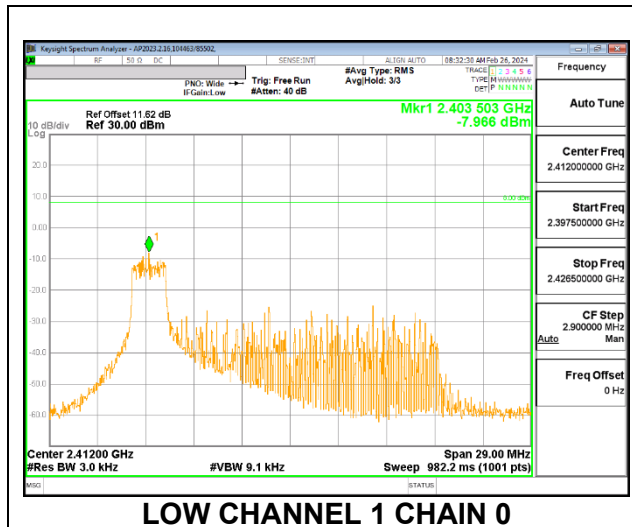
2TX CHAIN 0 + CHAIN 1 CDD MODE: 52T

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

Channel	Frequency (MHz)	Chain 0 Meas (dBm/3kHz)	Chain 1 Meas (dBm/3kHz)	Total Corr'd PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low 1 (RU37)	2412	-8.486	-8.452	-5.459	8.0	-13.5
Mid 6 (RU38)	2437	-9.310	-10.265	-6.751	8.0	-14.8
High 11 (RU40)	2462	-7.897	-8.923	-5.369	8.0	-13.4

HIGH CHANNEL 11

| HIGH CHANNEL 11 CHAIN 0 | HIGH CHANNEL 11 CHAIN 1 |
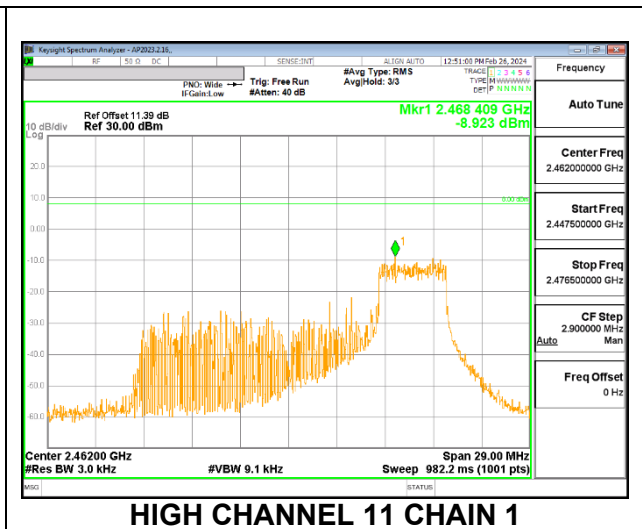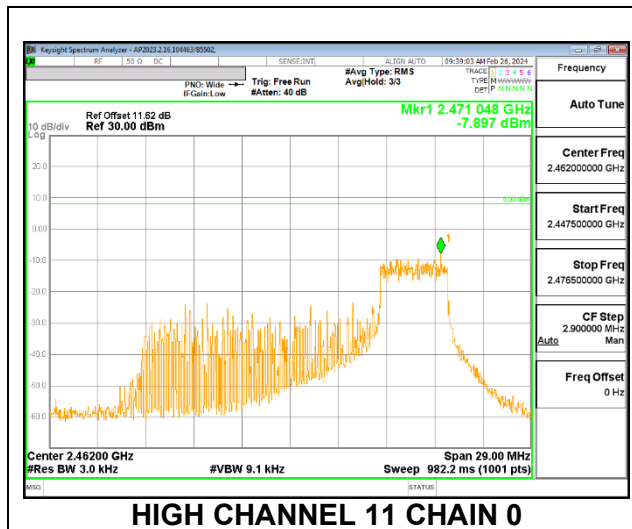
2TX CHAIN 0 + CHAIN 1 CDD OFDMA MODE: 106T

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

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 3kHz)	Chain 1 Meas (dBm/ 3kHz)	Total Corr'd PSD (dBm/ 3kHz)	Limit (dBm/ 3kHz)	Margin (dB)
Low 1 (RU53)	2412	-9.337	-10.023	-6.656	8.0	-14.7
Mid 6 (RU53)	2437	-9.937	-11.329	-7.567	8.0	-15.6
High 11 (RU54)	2462	-10.271	-9.537	-6.878	8.0	-14.9

LOW CHANNEL 6
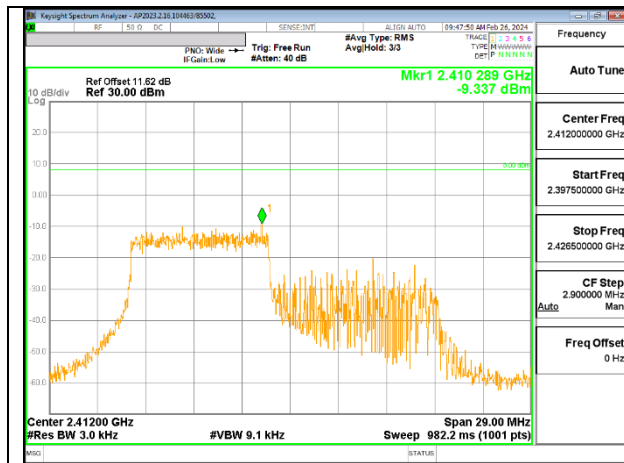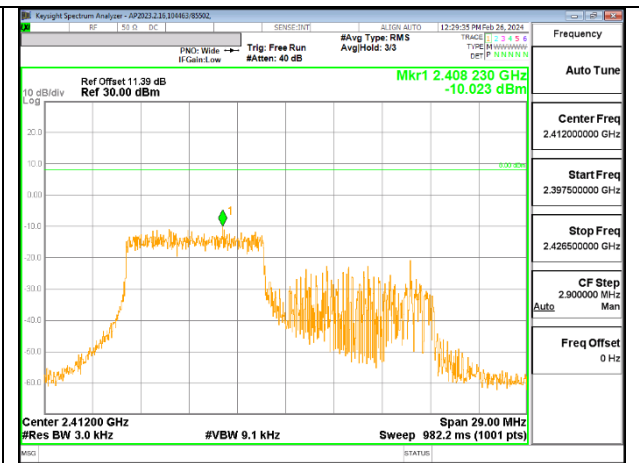
LOW CHANNEL 1 CHAIN 0   LOW CHANNEL 1 CHAIN 1

9.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)
Output power was measured based on the use of peak measurement, therefore the required attenuation is -20 dBc.

RESULTS
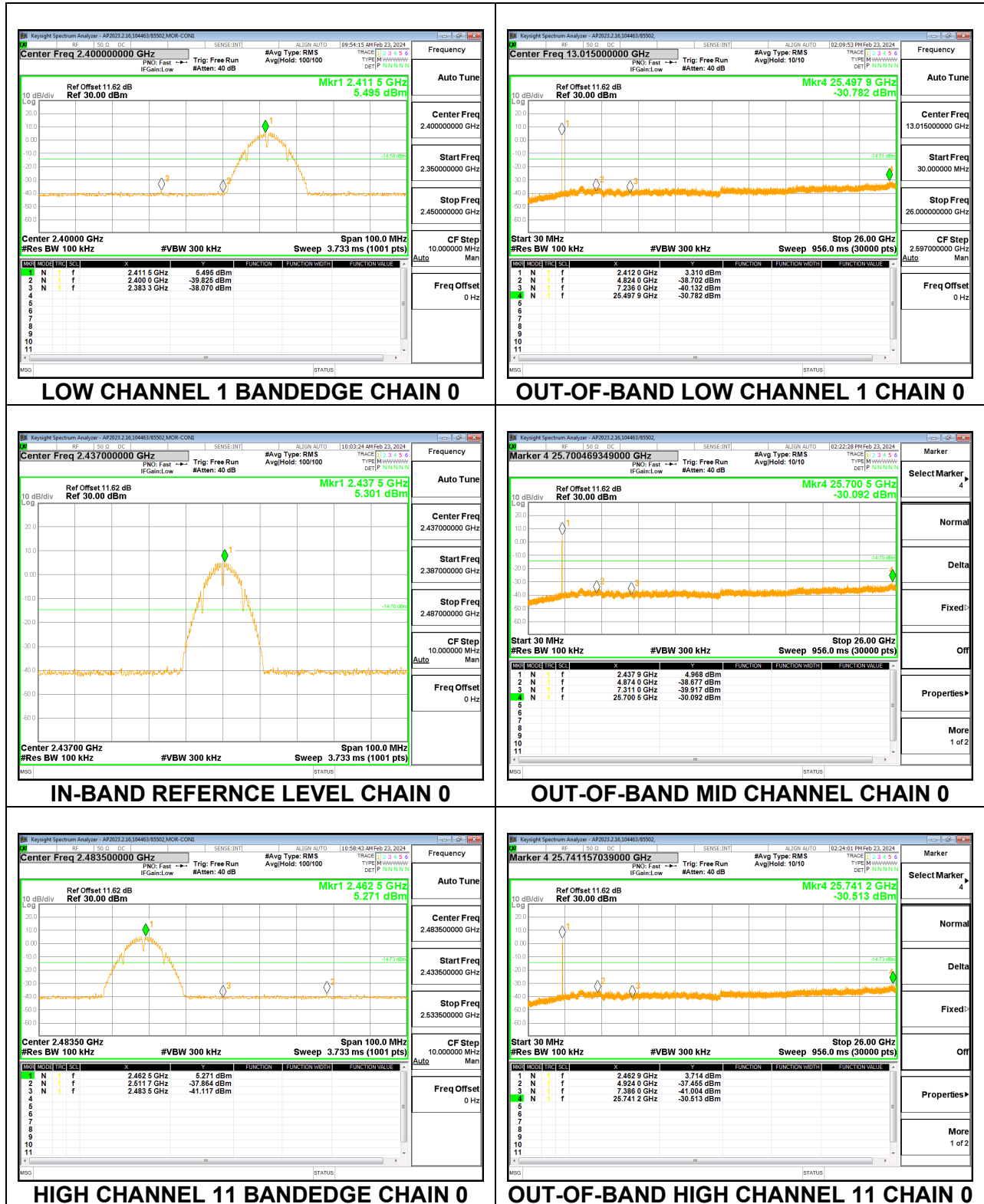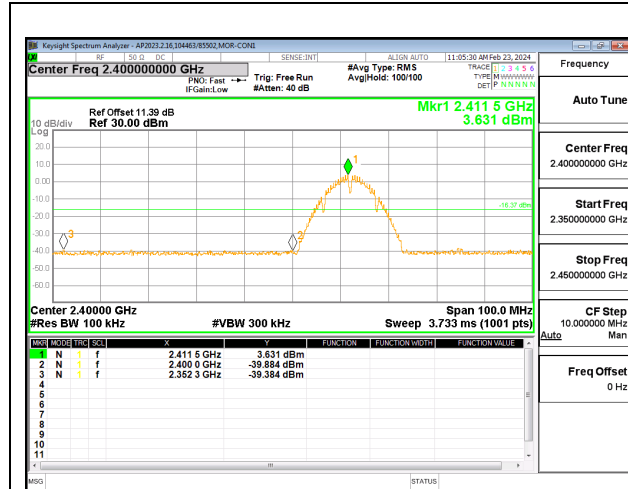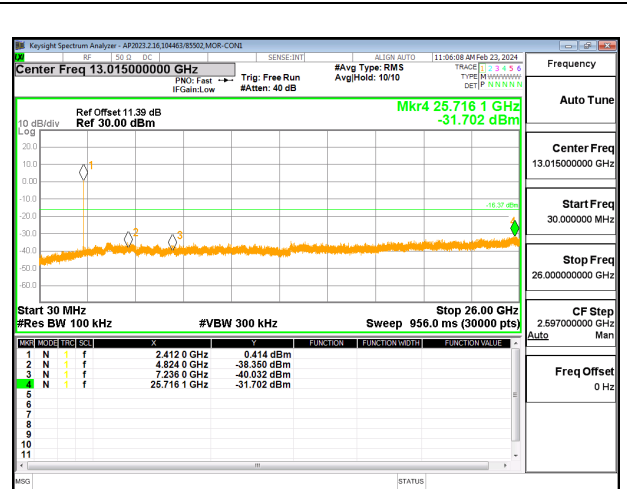
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9.6.1. 802.11b MODE

2TX Chain 0 + Chain 1 CDD MODE

LOW CHANNEL 1 BANDEDGE CHAIN 0

OUT-OF-BAND LOW CHANNEL 1 CHAIN 0

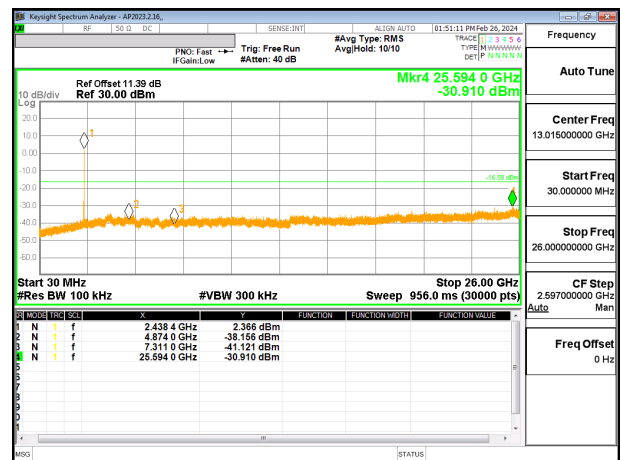**IN-BAND REFERNCE LEVEL CHAIN 0**

OUT-OF-BAND MID CHANNEL CHAIN 0

HIGH CHANNEL 11 BANDEDGE CHAIN 0

OUT-OF-BAND HIGH CHANNEL 11 CHAIN 0

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LOW CHANNEL 1 BANDEDGE CHAIN 1
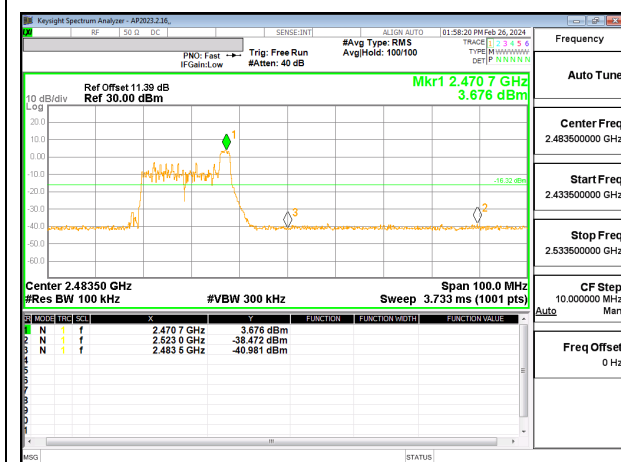

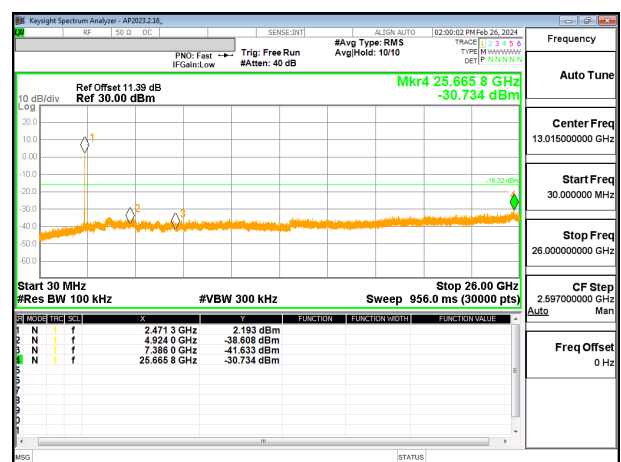**OUT-OF-BAND LOW CHANNEL 1 CHAIN 1**
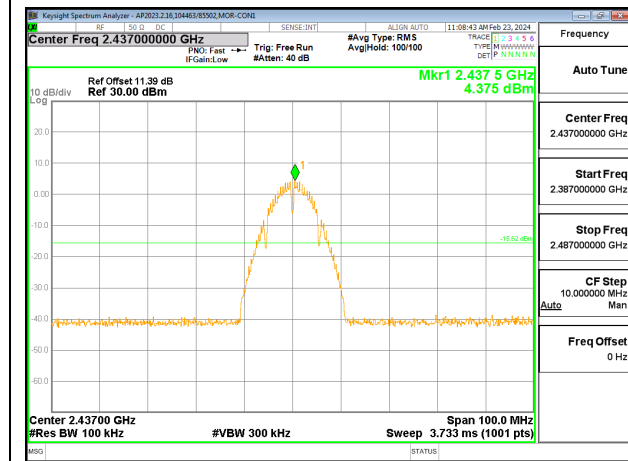
IN-BAND REFERNCE LEVEL CHAIN 1
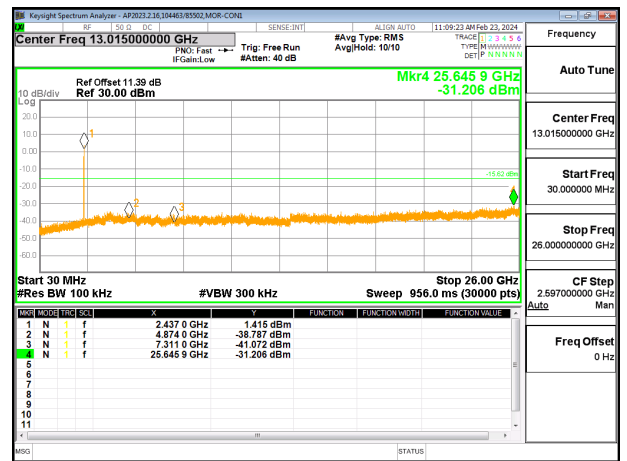
OUT-OF-BAND MID CHANNEL CHAIN 1
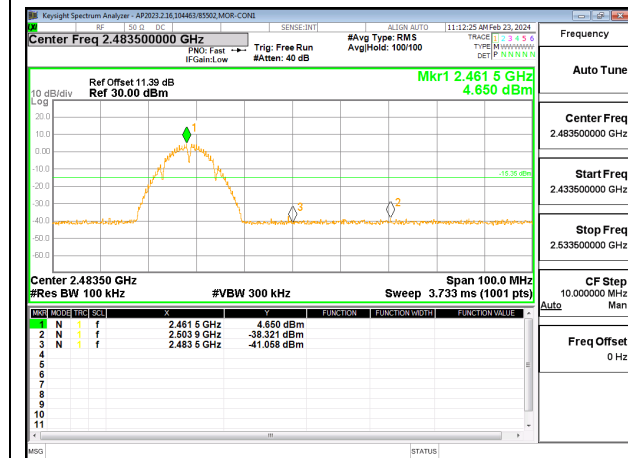
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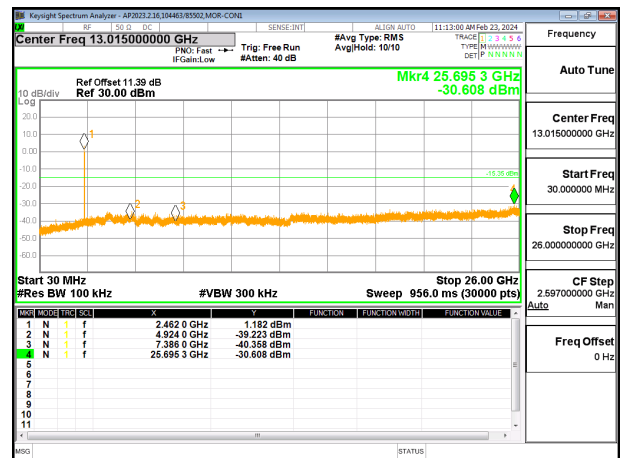
OUT-OF-BAND HIGH CHANNEL 11 CHAIN 1

9.6.2. 802.11g MODE

2TX Chain 0 + Chain 1 CDD MODE
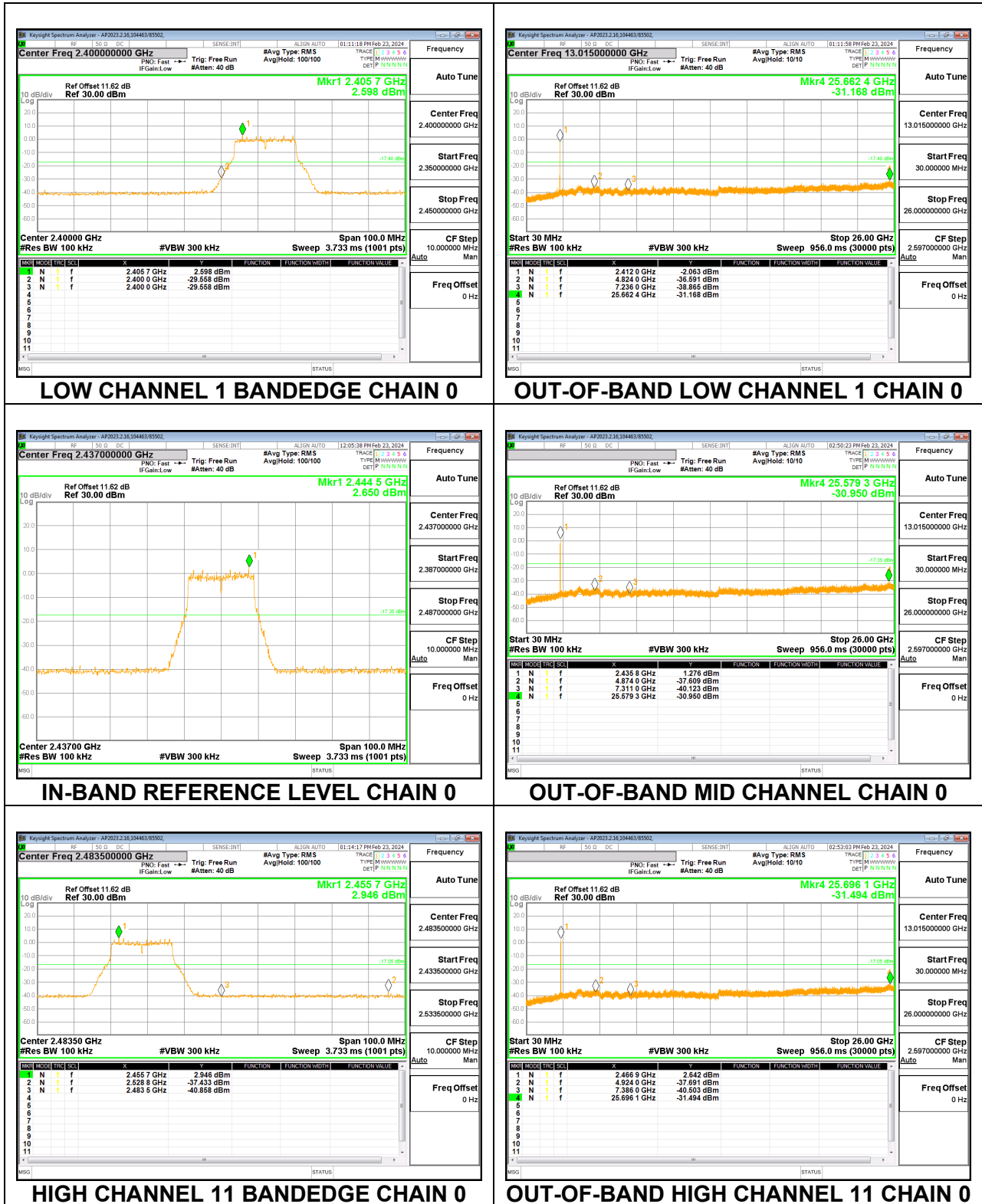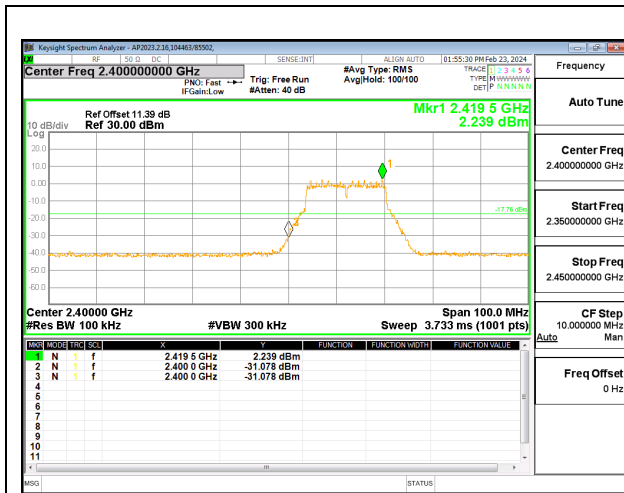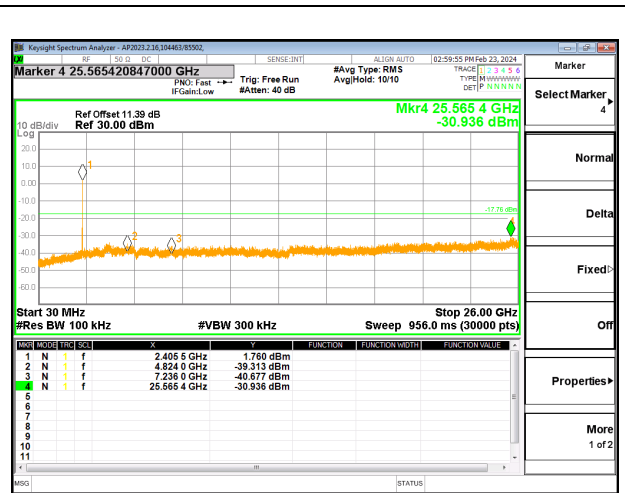
LOW CHANNEL 1 BANDEDGE CHAIN 0

OUT-OF-BAND LOW CHANNEL 1 CHAIN 0

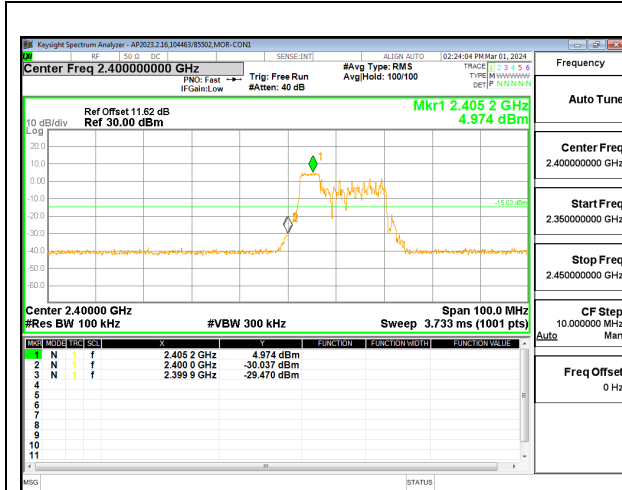**IN-BAND REFERENCE LEVEL CHAIN 0**

OUT-OF-BAND MID CHANNEL CHAIN 0

HIGH CHANNEL 11 BANDEDGE CHAIN 0

OUT-OF-BAND HIGH CHANNEL 11 CHAIN 0

LOW CHANNEL 1 BANDEDGE CHAIN 1

OUT-OF-BAND LOW CHANNEL 1 CHAIN 1
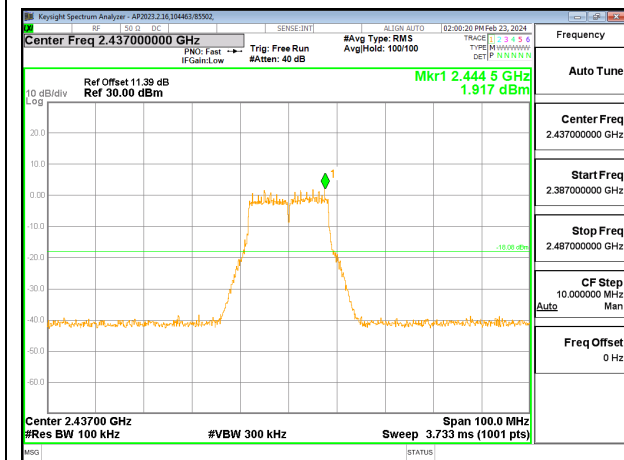
IN-BAND REFERENCE LEVEL CHAIN 1
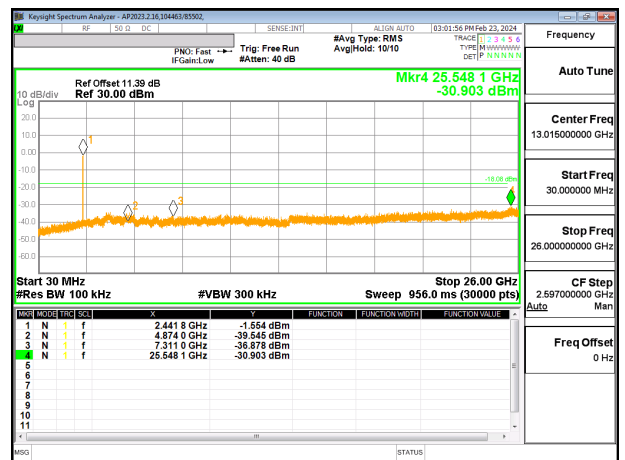
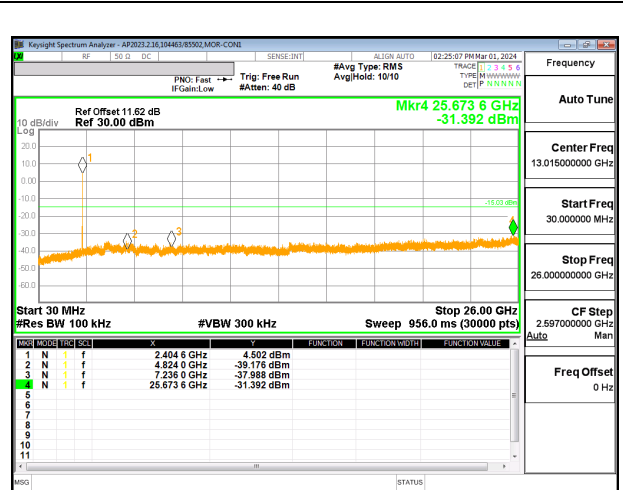**OUT-OF-BAND MID CHANNEL CHAIN 1**
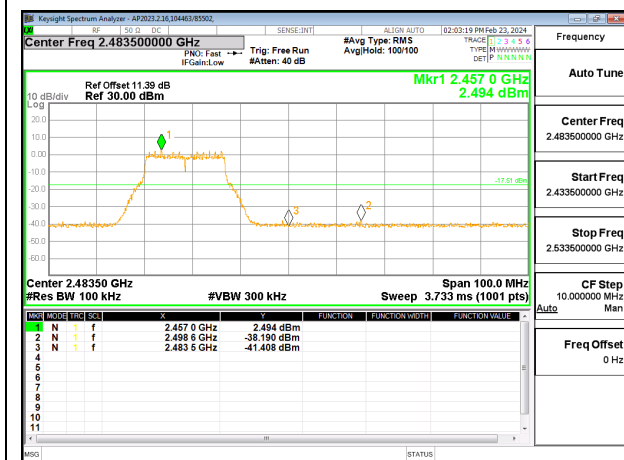
HIGH CHANNEL 11 BANDEDGE CHAIN 1
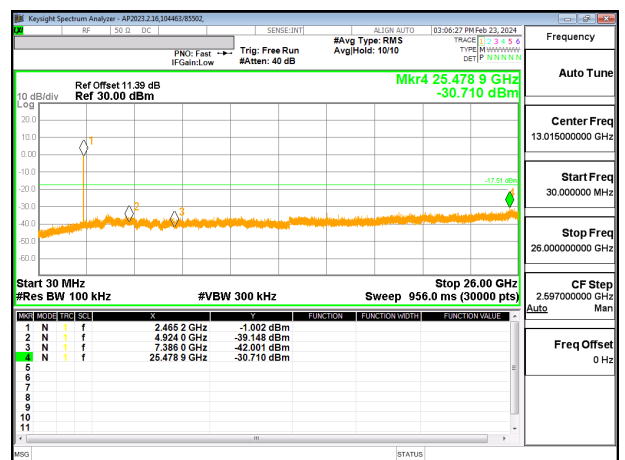
OUT-OF-BAND HIGH CHANNEL 11 CHAIN 1
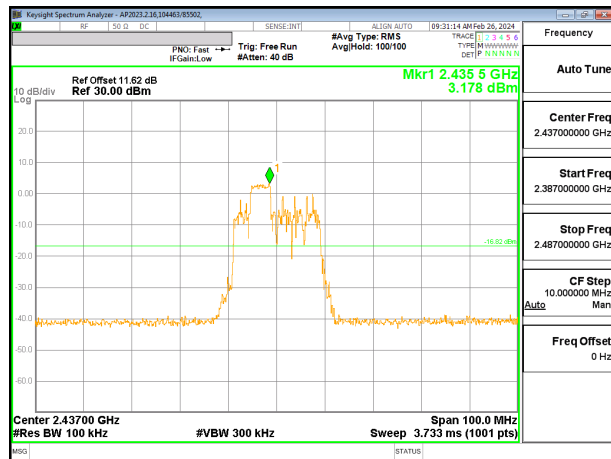
9.6.3. 802.11n HT20 MODE
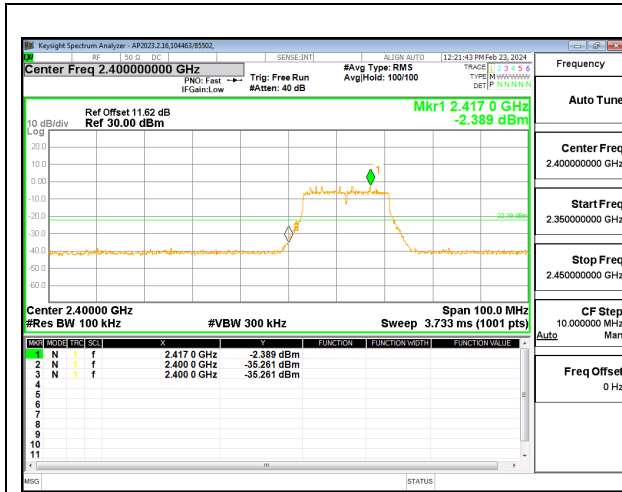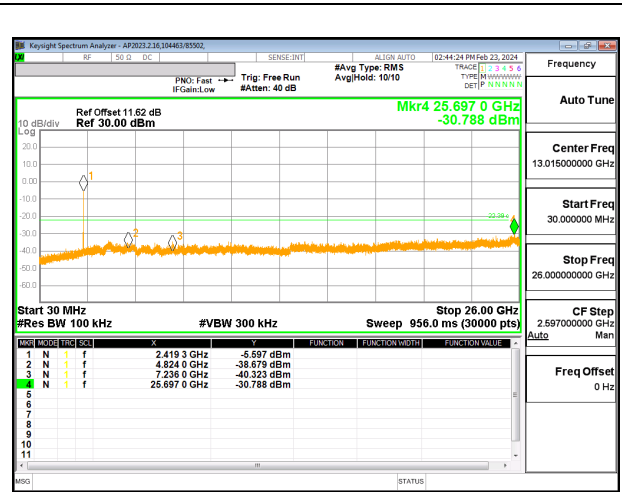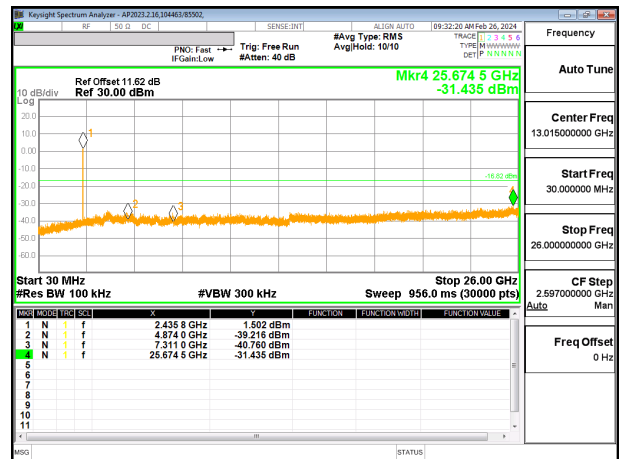
2TX Chain 0 + Chain 1 CDD MODE

LOW CHANNEL 1 BANDEDGE CHAIN 0

OUT-OF-BAND LOW CHANNEL 1 CHAIN 0

IN-BAND REFERENCE LEVEL CHAIN 0

OUT-OF-BAND MID CHANNEL CHAIN 0

HIGH CHANNEL 11 BANDEDGE CHAIN 0

OUT-OF-BAND HIGH CHANNEL 11 CHAIN 0

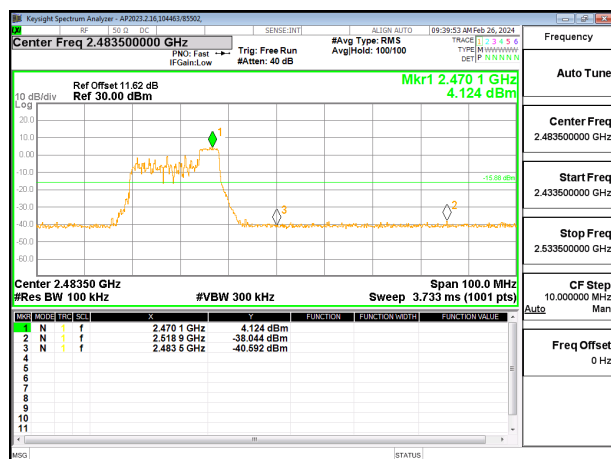**LOW CHANNEL 1 BANDEDGE CHAIN 1**

OUT-OF-BAND LOW CHANNEL 1 CHAIN 1

IN-BAND REFERENCE LEVEL CHAIN 1

OUT-OF-BAND MID CHANNEL CHAIN 1

HIGH CHANNEL 11 BANDEDGE CHAIN 1

OUT-OF-BAND HIGH CHANNEL 11 CHAIN 1

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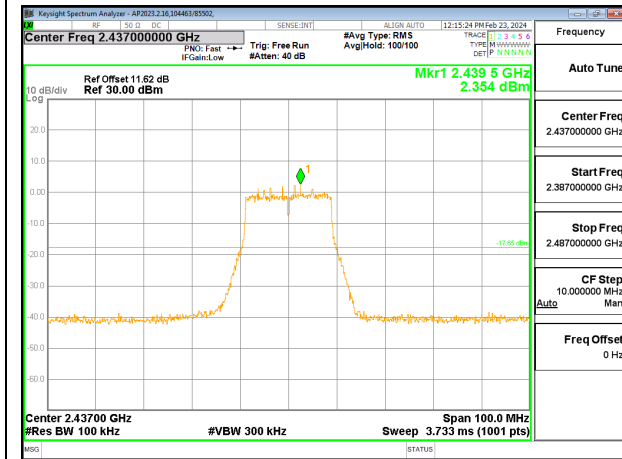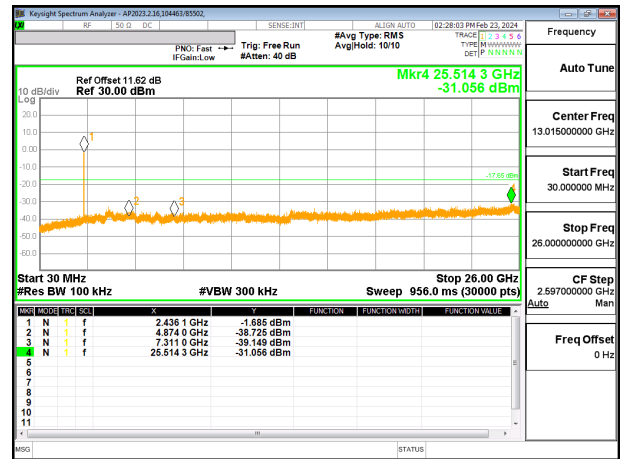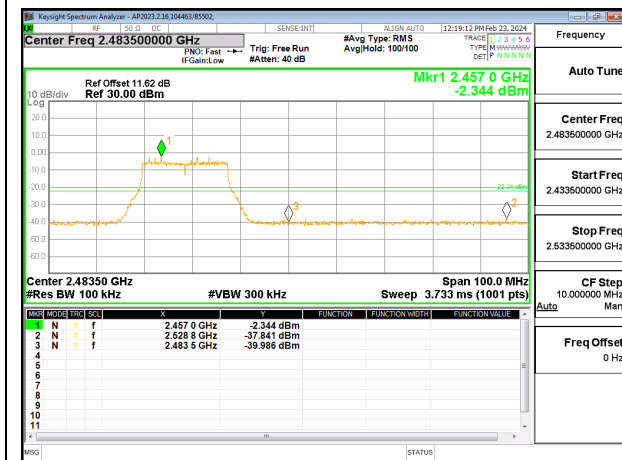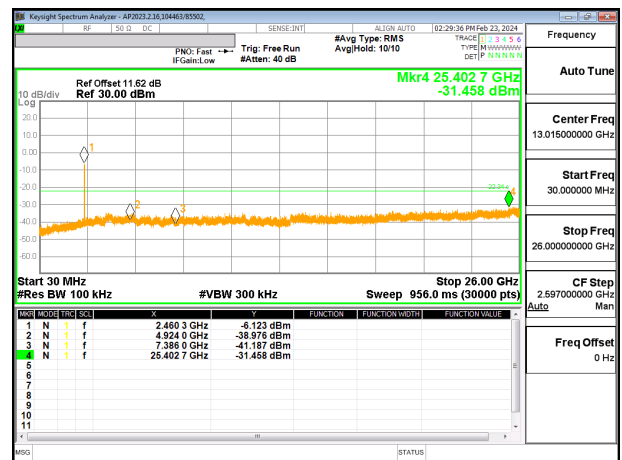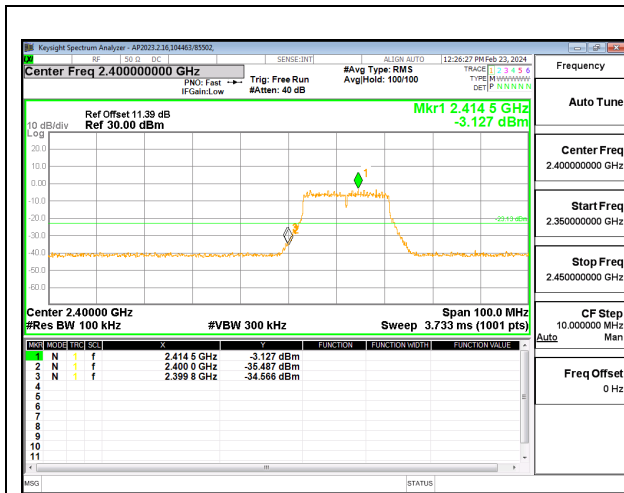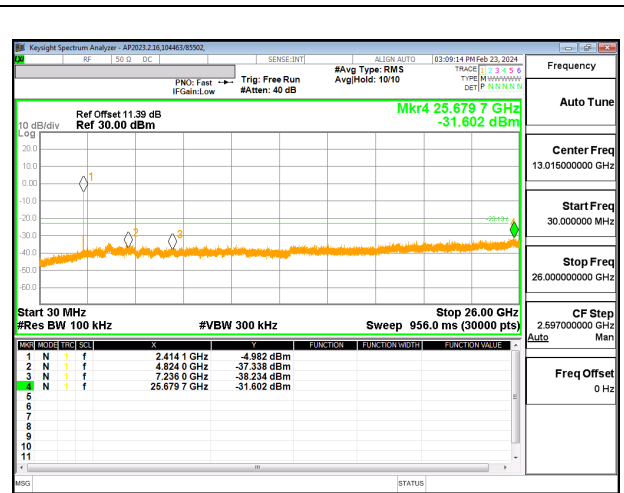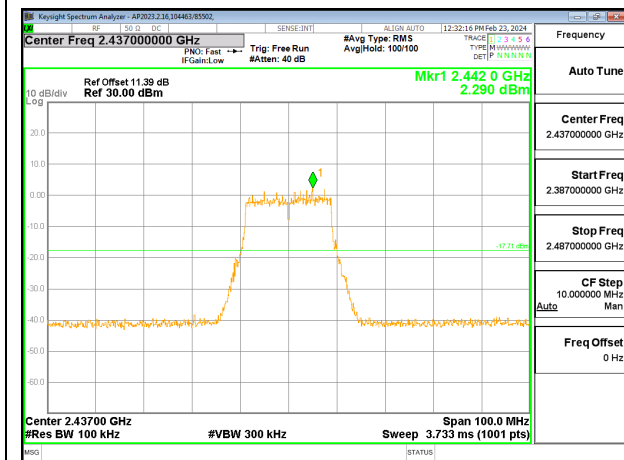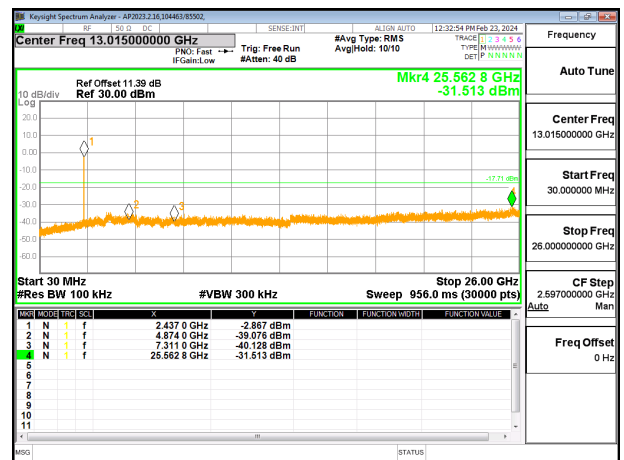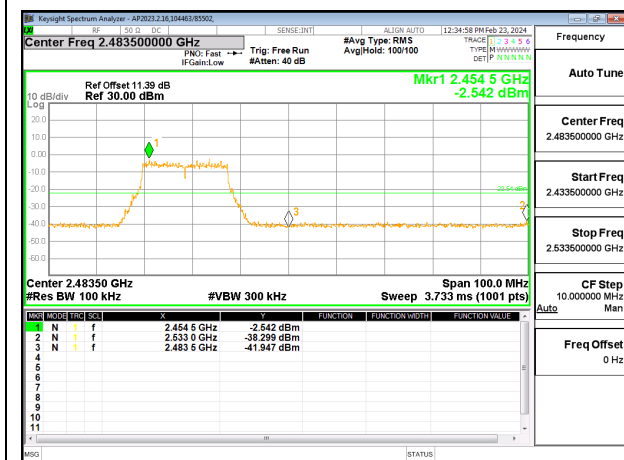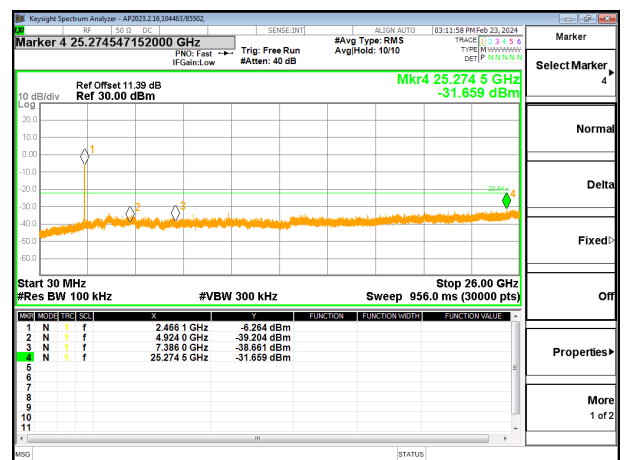
9.6.4. 802.11ax HE20 MODE 2TX

2TX CHAIN 0 + CHAIN 1 CDD MODE: 26T

LOW CHANNEL 1 BANDEDGE CHAIN 0
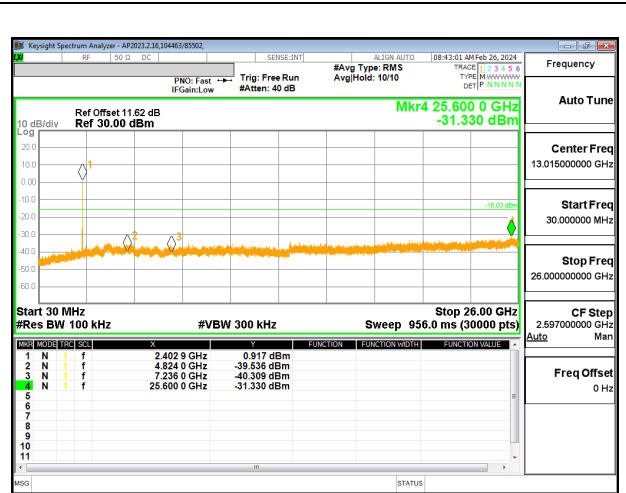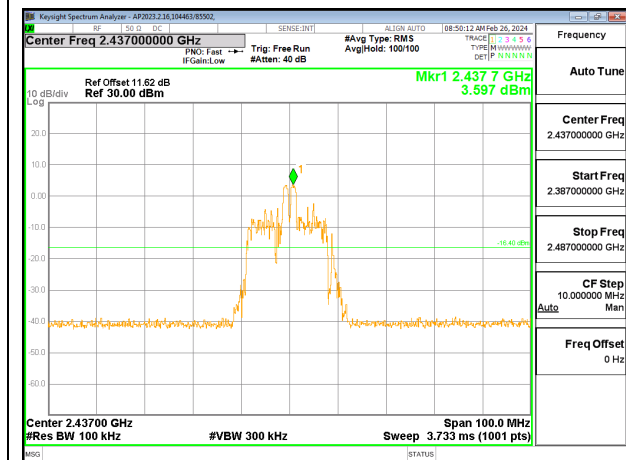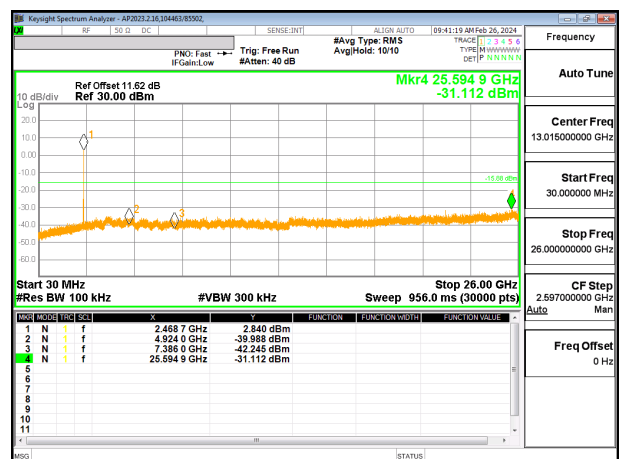

OUT-OF-BAND LOW CHANNEL 1 CHAIN 0
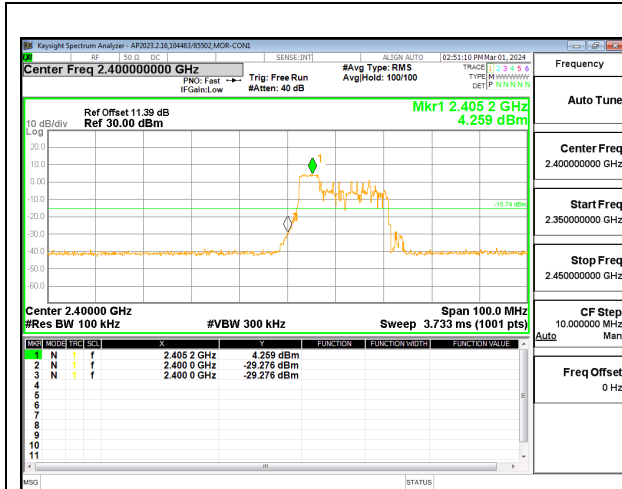

IN-BAND REFERENCE LEVEL CHAIN 0
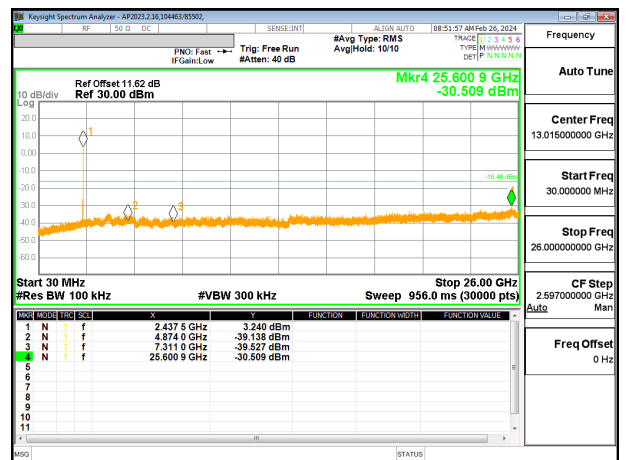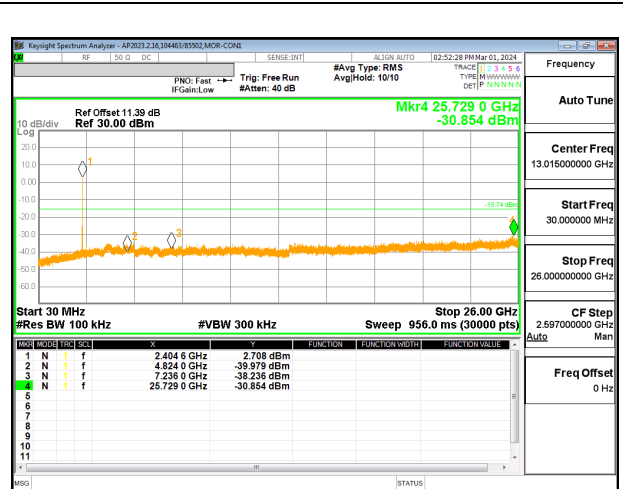

OUT-OF-BAND MID CHANNEL CHAIN 0
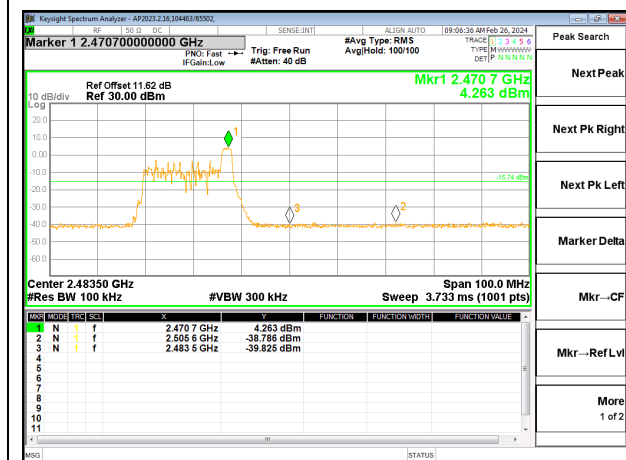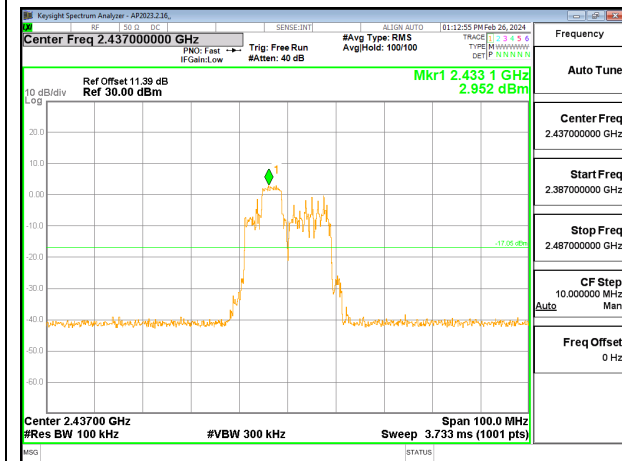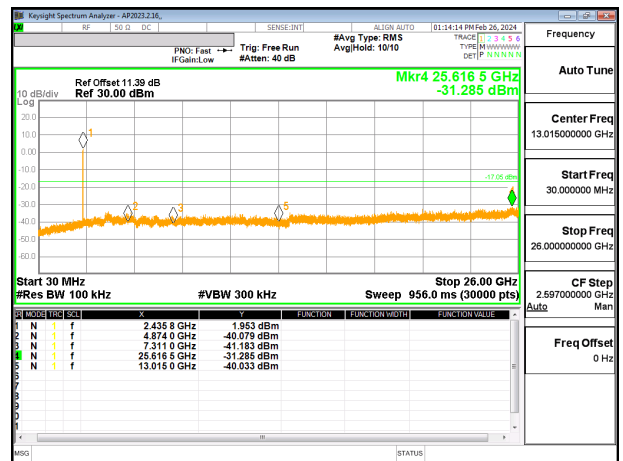

HIGH CHANNEL 11 BANDEDGE CHAIN 0
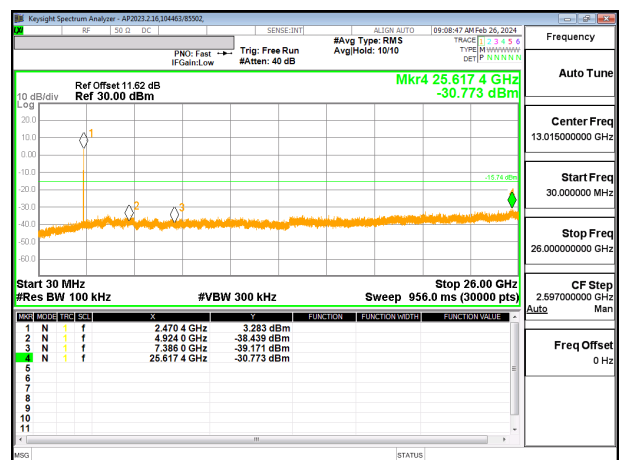
OUT-OF-BAND HIGH CHANNEL 11 CHAIN 0
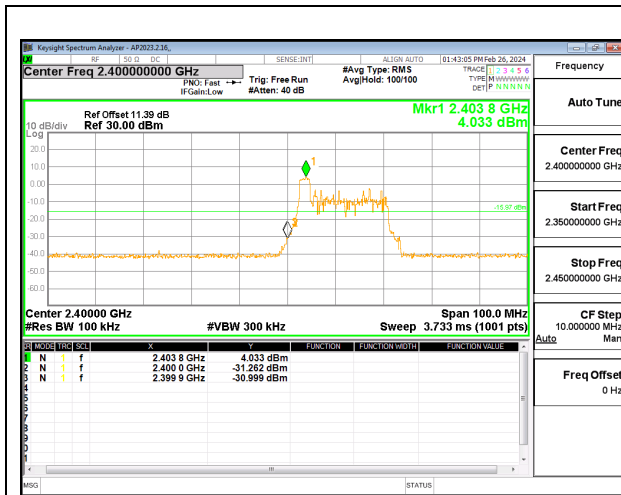
LOW CHANNEL 1 BANDEDGE CHAIN 1
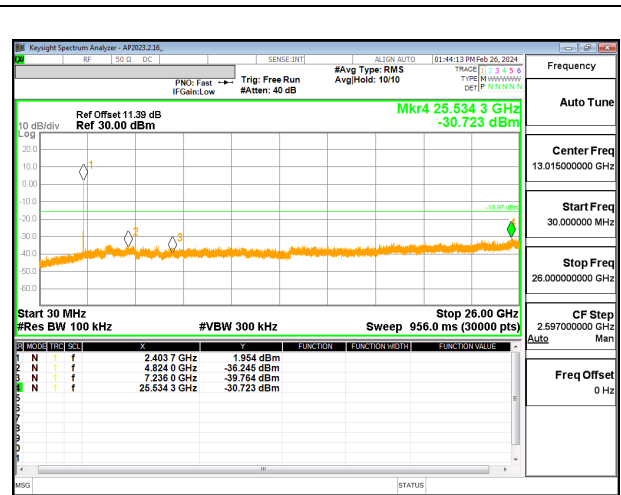
OUT-OF-BAND LOW CHANNEL 1 CHAIN 1
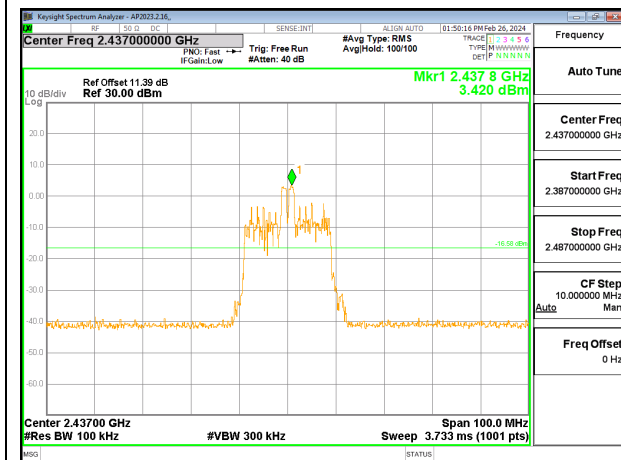
IN-BAND REFERENCE LEVEL CHAIN 1

OUT-OF-BAND MID CHANNEL CHAIN 1

HIGH CHANNEL 11 BANDEDGE CHAIN 1

OUT-OF-BAND HIGH CHANNEL 11 CHAIN 1

2TX CHAIN 0 + CHAIN 1 CDD MODE: 52T

LOW CHANNEL 1 BANDEDGE CHAIN 0

OUT-OF-BAND LOW CHANNEL 1 CHAIN 0

IN-BAND REFERENCE LEVEL CHAIN 0

OUT-OF-BAND MID CHANNEL CHAIN 0

HIGH CHANNEL 11 BANDEDGE CHAIN 0

OUT-OF-BAND HIGH CHANNEL 11 CHAIN 0

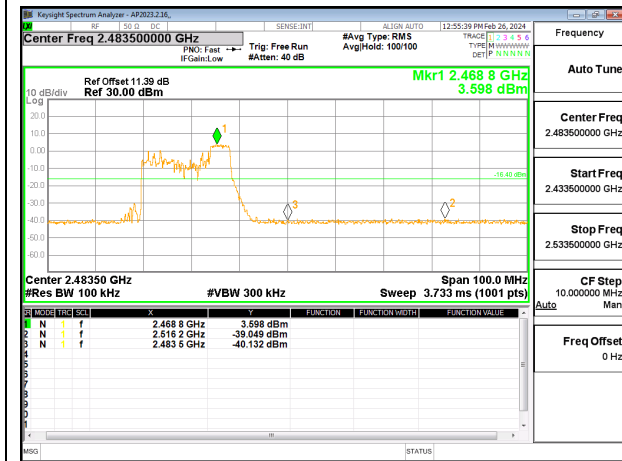**LOW CHANNEL 1 BANDEDGE CHAIN 1**

OUT-OF-BAND LOW CHANNEL 1 CHAIN 1

IN-BAND REFERENCE LEVEL CHAIN 1

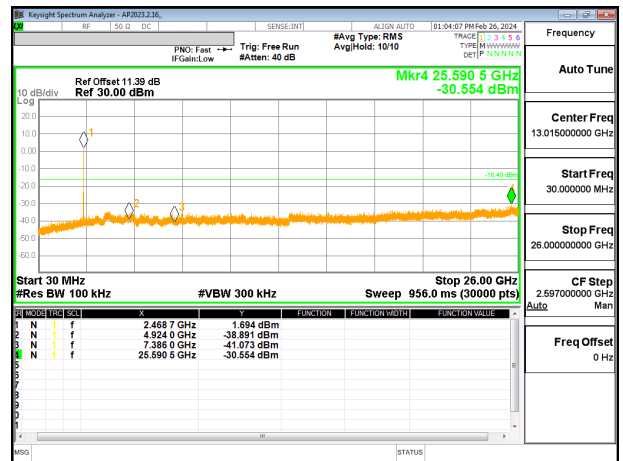**OUT-OF-BAND MID CHANNEL CHAIN 1**

HIGH CHANNEL 11 BANDEDGE CHAIN 1

OUT-OF-BAND HIGH CHANNEL 11 CHAIN 1