TEST REPORT

Report Number: 15107858-E9V3

Applicant	:	Google LLC 1600 Amphitheatre Parkway Mountain View, CA 94043 U.S.A.
Model	:	GGX8B
FCC ID	:	A4RGGX8B
EUT Description	:	Phone
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
2024-05-07

Prepared by:
UL VERIFICATION SERVICES INC.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
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ACCREDITED
CERT #0751.05

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2024-04-19	Initial Issue	---
V2	2024-04-25	Revised report to address TCB's questions	Tina Chu
V3	2024-05-07	Revised report to address TCB's questions	Tina Chu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Google LLC
1600 Amphitheater pkwy
Mountain View, CA 94043 U.S.A.

EUT DESCRIPTION: Phone

MODEL: GGX8B

SERIAL NUMBER: 3B041FDAS0004K, 3B041FDAS000E0(Radiated), 41121FDAS000BS

SAMPLE RECEIPT DATE: 2023-11-25

DATE TESTED: 2023-12-27 to 2024-05-07

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

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

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

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.

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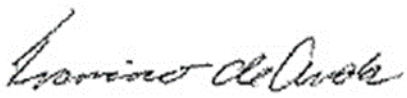
Approved & Released For
UL Verification Services Inc. By:



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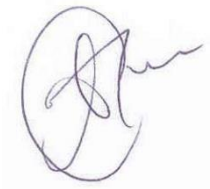

Tina Chu
Senior Project Engineer
Consumer Technology Division
UL Verification Services Inc.

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2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for correctly integrating customer-provided data with measurements performed by UL Verification Services Inc.

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

1) Antenna gain and type (see section 6.3)

FCC Clause	Requirement	Result	Comment
See Comment	Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	6dB BW	Complies	None.
15.247 (b) (3)	Output Power	Complies	None.
See Comment	Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	PSD	Complies	None.
15.247 (d)	Conducted Spurious Emissions	Complies	None.
15.209, 15.205	Radiated Emissions	Complies	None.
15.207	AC Mains Conducted Emissions	Complies	None.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with;

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- FCC KDB 558074 D01 v05r02 15.247 Meas Guidance
- ANSI C63.10-2013
- KDB 662911 Measurement of Transmitters with Multiple Output, MIMO
- KDB 414788 D01 Radiated Test Site

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☐	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☐	Building 3: 843 Auburn Court, Fremont, CA 94538, USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA			
☒	Building 5: 47670 Kato Rd, Fremont, CA 94538, USA			

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5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

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

5.2. DECISION RULES

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

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U_{Lab}
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
Power Spectral Density	2.47 dB
RF Power Measurement Direct Method Using Power Meter	1.3 dB (PK) / 0.45 dB (AV)
RF Power Measurement Using Spectrum Analyzer	0.33dB
Unwanted Emissions, Conducted	1.94 dB
Worst Case Conducted Disturbance, 9kHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9kHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB
Time Domain Measurements	3.39%
Temperature	0.57˚C
Humidity	3.39%
DC Supply Voltages	0.57%

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

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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

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a phone.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum average conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
1Tx			
2412 - 2472 (Tx0)	802.11b	20.82	120.78
2412 - 2472 (Tx1)	802.11b	21.93	155.96

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2Tx			
2412 - 2472	802.11g	23.08	203.24
	802.11n HT20 CDD	21.53	142.35
	802.11be EHT20 CDD	23.88	244.34

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna(s) gain and type as provided by the manufacturer' are as follows:

The radio utilizes one IFA antenna (Ant3) and one ILA antenna (Ant4) for unlicensed radios.

Band	Antenna Peak Gain	
	Tx0 (Ant3) (dBi)	Tx1 (Ant4) (dBi)
2.4G	-3.30	-0.5

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6.4. WORST-CASE CONFIGURATION AND MODE

802.11b mode only supports SISO diversity antennas.

Other modes (802.11g, n, ac, ax, be) supports MIMO only.

802.11be supports MRU 52T+26T / 106T+26T.

802.11ac VHT20 has the same power as 802.11n HT20, so 802.11n HT20 was test as worst case.

For 802.11ax and 802.11be investigation was performed on SU and Full tone, and it was determined that 802.11be Full tone mode is the worst case. The modulation and bandwidth of 802.11ax and 802.11be modes are similar at 20 MHz and the target power of 802.11ax mode is equal to 802.11be mode, so 802.11be mode is performed in the test to represent worst-case reporting.

Investigation has been performed on power and PSD, partial RU/MRU are lower than Full tone. Also, investigation performed on bandedge and spurious emissions on Full tone and 26 Tone, 802.11be Full tone is the worse case and set for all testing with additional spot check on partial RU/MRU power/PSD combinations.

Radiated emissions below 1GHz, 1GHz to 18GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. There were no emissions found with less than 20dB of margin from 9kHz to 30MHz and above 18GHz.

Investigation was performed with/without adapter. Also, the fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, the following is the worst-case orientation:

- For 2Tx: X (Flatbed) orientation was worst-case orientation with adapter
- For 1Tx:
  - Tx0: X (Flatbed) orientation was worst-case orientation with adapter
  - Tx1: Y (Landscape) orientation was worst case orientation with adapter

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
802.11ac VHT20 mode: MCS0
802.11ax HE20 mode: MCS0
802.11be EHT20 mode: MCS0

Plots included in the report are representative of the method and settings parameters used for the test.

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7. MEASUREMENT METHOD

Test Item	Test Method
On Time and Duty Cycle	ANSI C63.10 Section 11.6
6 dB BW	ANSI C63.10 Subclause -11.8.1 RBW ≥ DTS BW
99% BW	ANSI C63.10-2013, Subclause 6.9.3.
Output Power	ANSI C63.10 Subclause -11.9.2.2.4 (Measurement using a spectrum analyzer (SA)
PSD	ANSI C63.10 Subclause -11.10.5 Method AVGPSD-2
Radiated emissions non-restricted frequency bands	ANSI C63.10 Subclause -11.11 & Clause 13
Radiated emissions restricted frequency bands	ANSI C63.10 Subclause -11.12.1 & Clause 13
Conducted emissions in restricted frequency bands	ANSI C63.10 Subclause -11.12.2
Band-edge	ANSI C63.10 Subclause -11.13.3.2 & Clause 13: Integration method -Peak detection
Band-edge	ANSI C63.10 Subclause -11.13.3.4 & Clause 13: Integration method -Trace averaging across ON and OFF times DC correction
Radiated Spurious Emissions Below 30MHz	ANSI C63.10-2013 Subclause 6.4 & Clause 13
AC Power Line Conducted Emissions	ANSI C63.10-2013, Subclause 6.2

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8. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	219908	2024-09-30	2023-09-13
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	219910	2024-05-31	2023-05-31
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	80293	*2024-04-30	2023-04-11
Amplifier,9KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	213877	2024-12-31	2023-12-27
Antenna, Horn 1-18GHz (Chamber T)	ETS-Lindgren	3117	80430	2024-08-31	2022-08-08
Antenna, Horn 1-18GHz (Chamber I)	ETS-Lindgren	3117	84797	2024-09-30	2023-09-25
Antenna, Horn 1-18GHz (Chamber J)	ETS-Lindgren	3117	222741	2024-08-31	2022-08-22
RF Filter Box, 1-18GHz (Chamber T)	UL-FR1	RATS 2	226781	2024-09-30	2023-09-30
RF Filter Box, 1-18GHz (Chamber I)	UL-FR1	NA	171389	2024-05-31	2023-05-15
RF Filter Box, 1-18GHz (Chamber J)	UL-FR1	NA	171875	2024-05-31	2023-05-30
EMI TEST RECEIVER (Chamber T)	Rohde & Schwarz	ESW44	169935	2025-02-28	2024-02-11
EMI TEST RECEIVER (Chamber I)	Rohde & Schwarz	ESW44	201497	2025-02-28	2024-02-11
EMI TEST RECEIVER (Chamber J)	Rohde & Schwarz	ESW44	171875	2024-05-31	2023-05-30
EMI TEST RECEIVER (Chamber K)	Rohde & Schwarz	ESW44	225688	2025-02-11	2024-02-11
Antenna, Horn 18 to 26.5GHz	A.R.A.	MWH-1826/B	199659	2024-12-31	2022-12-06
Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	234683	*2024-03-31	2023-03-18
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030B	222074	2024-08-31	2023-08-14
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight Technologies Inc	N9030B	222073	2024-08-31	2023-08-14
10dB Fixed Attenuator, up to 26GHz	Pasternack Enterprises	PE7087-10	236189	Verified/characterized before use	
PXA Signal Analyzer	Keysight Technologies Inc	N9030B	222073	2024-08-31	2023-08-14
PXA Signal Analyzer	Keysight Technologies Inc	N9030B	222074	2024-08-31	2023-08-14
AC Line Conducted					
LISN	Fischer Custom Communications, Inc	FCC-LISN-50/250-25-2-01-480V	175765	2025-01-31	2024-01-26
EMI TEST RECEIVER	Rohde & Schwarz	ESR	171646	2025-02-28	2024-02-27
Transient Limiter	TE	TBFL1	127455	2025-02-28	2024-02-27
UL TEST SOFTWARE LIST					
Radiated Software	UL	UL EMC	Ver 2023-01-18, 2023-03-03, 2023-05-01		
Antenna Port Software	UL	UL RF	Ver 2022-08-16		
AC Line Conducted Software	UL	UL EMC	Rev 9.5, 2022-02-17		

*Test was performed before calibration due date.

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9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

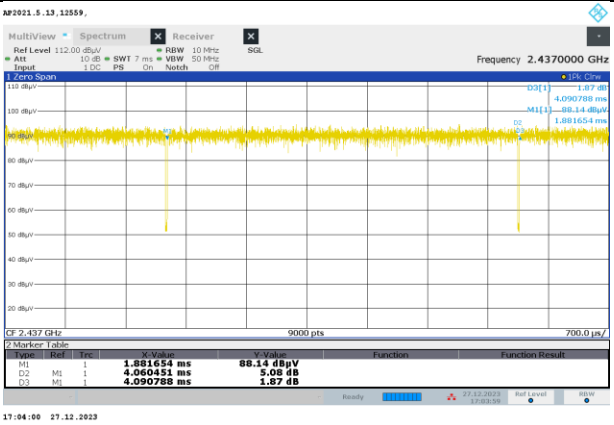
None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time T (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	DCCF (dB)	1/T Minimum VBW (kHz)
802.11b	24.40938	24.43338	1.00	99.90	0.00	0.01
802.11g	4.060451	4.090788	0.99	99.26	0.00	0.01
802.11n HT20	3.767196	3.792088	0.99	99.34	0.00	0.01
802.11be EHT20 OFDMA, RU 242T	1.10679	1.154573	0.96	95.86	0.18	0.90
802.11be EHT20 OFDMA, RU 106	1.349483	1.397778	0.97	96.54	0.15	0.74
802.11be EHT20 OFDMA, RU 52T	1.460829	1.508449	0.97	96.84	0.14	0.68
802.11be EHT20 OFDMA, RU 26T	1.61818	1.667113	0.97	97.06	0.13	0.62
802.11be EHT20 OFDMA, RU 52T + 26T	3.4479	3.4985	0.99	98.55	0.00	0.01
802.11be EHT20 OFDMA, RU 106T + 26T	1.999	2.048	0.98	97.61	0.11	0.50



802.11g MODE

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9.2. 99% BANDWIDTH & 6dB BANDWIDTH

99% BANDWIDTH LIMITS

None; for reporting purposes only.

6dB BANDWIDTH LIMITS

FCC §15.247 (a) (2)

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

RESULTS

99% bandwidth was measured for the b, g, n modes, and the widest bandwidth in be mode as worse case.

The 6dB bandwidth was measured for the b, g, n modes, and the narrowest bandwidth mode, 26-Tones in be mode as worst case to demonstrate compliance with the minimum required bandwidth of 500 kHz to cover all OFDMA modes.

Mode	No. of Tx	Channel	Freq (MHz)	Tones	RU Index	99% Bandwidth (MHz)		6dB Bandwidth (MHz)		6dB Minimum Limit (MHz)
						Tx0	Tx1	Tx0	Tx1	
b	1	1	2412	[redacted]		12.94	12.92	7.96	7.92	0.5
		6	2437			**12.94**	12.90	7.28	7.76	0.5
		11	2462			12.93	12.86	7.84	7.72	0.5
		12	2467			12.91	12.82	7.36	9.04	0.5
		13	2472			12.93	12.90	9.16	7.64	0.5
g	2	1	2412			16.50	16.42	16.00	15.76	0.5
		6	2437			**16.55**	16.53	16.00	16.36	0.5
		11	2462			16.50	16.40	15.72	15.84	0.5
		12	2467			16.43	16.42	15.08	15.72	0.5
		13	2472			16.47	16.46	15.28	15.12	0.5
HT20	2	1	2412			17.65	17.60	16.64	17.00	0.5
		6	2437			17.66	17.62	17.00	17.04	0.5
		11	2462			**17.68**	17.54	16.00	17.04	0.5
		12	2467			17.61	17.57	16.76	16.00	0.5
		13	2472			17.62	17.66	16.36	16.64	0.5
EHT20	2	1	2412	242T	61	18.09	18.93	[redacted]		0.5
		2	2417			18.95	18.95			0.5
		6	2437			18.97	18.94			0.5
		9	2452			**18.98**	18.98			0.5
		10	2457			18.91	18.94			0.5
		11	2462			18.93	18.88			0.5
		12	2467			18.93	18.89			0.5
		13	2472			18.87	18.90			0.5
	2	1	2412	26T	0	[redacted]		2.12	2.08	0.5
		6	2437		4			2.68	2.72	0.5
		11	2462		8			2.08	2.08	0.5
		12	2467		8			2.04	2.12	0.5
		13	2472		8			2.12	2.08	0.5

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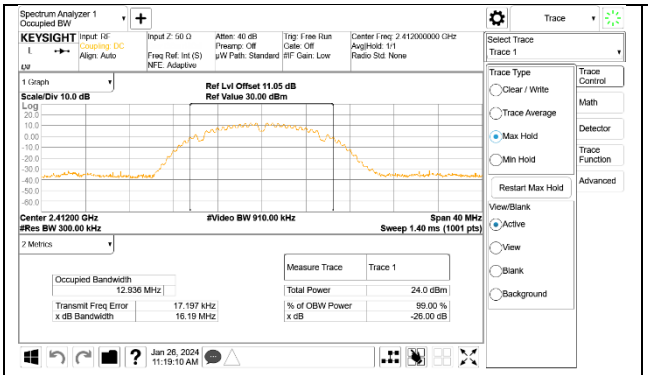
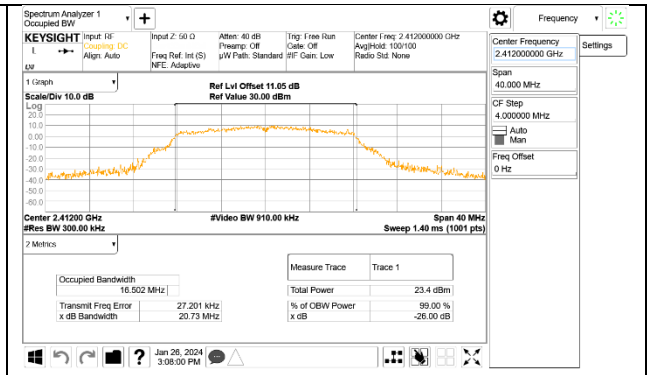
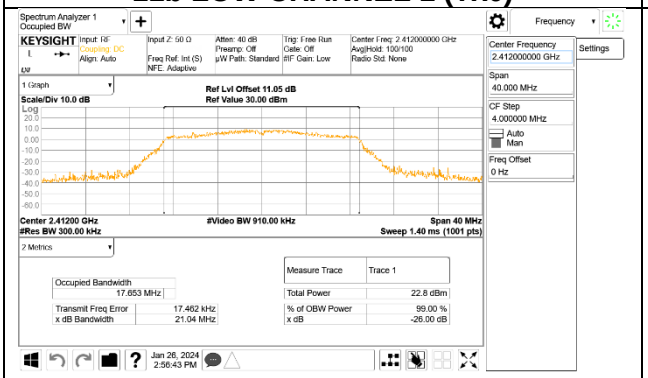
99% BANDWIDTH



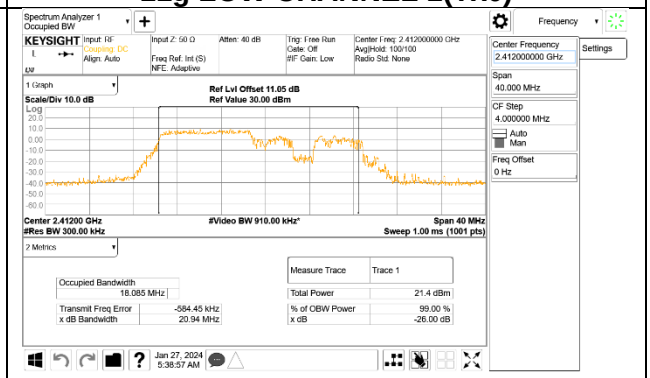
11b LOW CHANNEL 1 (Tx0)



11g LOW CHANNEL 1(Tx0)

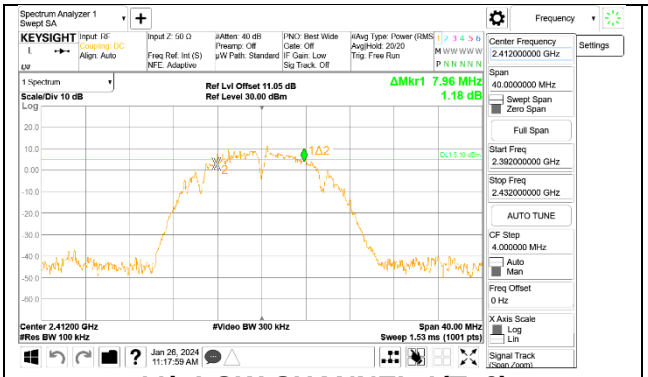


11n HT20 LOW CHANNEL 1(Tx0)

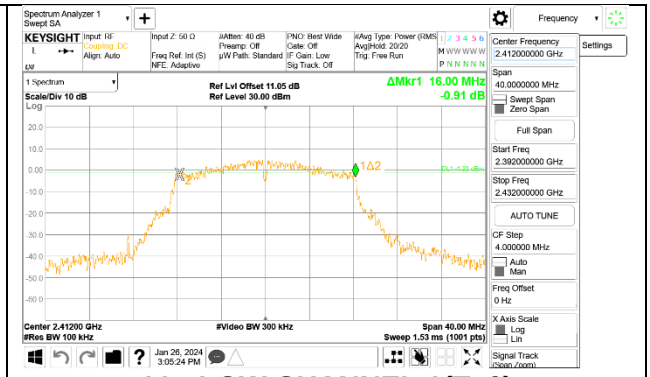


11be EHT20 LOW CHANNEL 1(Tx0)

6dB BANDWIDTH



11b LOW CHANNEL 1(Tx0)



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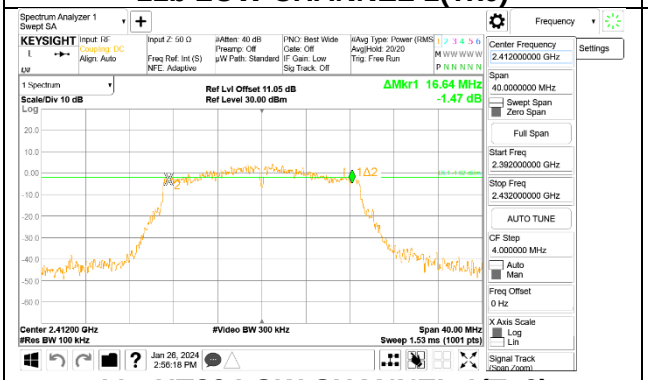
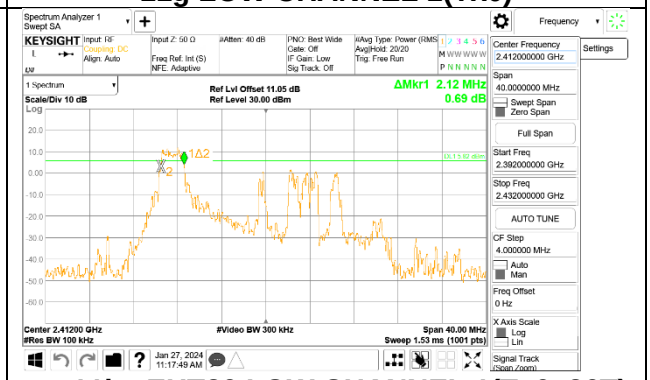


11n HT20 LOW CHANNEL 1(Tx0)



11be EHT20 LOW CHANNEL 1(Tx0, 26T)

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9.3. OUTPUT POWER & POWER SPECTRAL DENSITY

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

ANSI 63.10-2013, Section 11.9.2.2.4 Method AVGSA-2

POWER 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.

TEST PROCEDURE

ANSI 63.10-2013, Section 11.10.5 Method AVGPSD-2

DIRECTIONAL GAIN CALCULATION:

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

Band (GHz)	Tx0 Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/3kHz)
2.4 WLAN	-3.30	30.00	30.00	30.00	8.00

Band (GHz)	Tx1 Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	FCC/ISED Power Limit (dBm)	FCC/ISED PSD Limit (dBm/3kHz)
2.4 WLAN	-0.50	30.00	30.00	30.00	8.00

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For 2 TX:
Tx chains are uncorrelated for power. The directional gains are as follows:

Band	Tx0	Tx1	Uncorrelated Directional	Correlated Directional	FCC Power	ISED Power	FCC/ISED Power	FCC/ISED PSD
(GHz)	Gain (dBi)	Gain (dBi)	Gain (dBi)	Gain (dBi)	Limit (dBm)	Limit (dBm)	Limit (dBm)	Limit (dBm/3kHz)
2.4 WLAN	-3.30	-0.50	-1.68	1.22	30.00	30.00	30.00	8.00

DIRECTIONAL GAIN CALCULATION:

ANSI C63.10-2013 section 14.4.3

Uncorrelated directional gain=10*LOG((10^(Ant1/10)+10^(Ant2/10))/2)
Correlated directional Gain=10*LOG(((10^(Ant1/20)+10^(Ant2/20))^2)/2)

Sample Calculation:

Tx0= -3.30dBi,Tx1= -0.50dBi

Uncorrelated Directional Gain dBi = 10log[(10^(-3.30/10) + 10^(-0.50/10))/2]=-1.68dBi

Correlated Antenna gain = 10log[((10^(-3.30/20) + 10^(0.50/20))^2)/2]=1.22dBi

POWER CALCULATION:
P= measured conducted Avg Power (including cable loss + 10dB attenuator)
DCCF= duty cycle correction factor in dB
1Tx Measured conducted Avg Power w/DCCF (dBm)=P + DCCF
2Tx Total MIMO Measured conducted Avg Power w/DCCF (dBm)=10log[10^((P1+DCCF)/10) + 10^((P2+DCCF)/10)]

Sample Calculation EHT20 242T MIMO:
2Tx Total MIMO Measured conducted Avg Power w/DCCF (dBm)=
10log[10^((14.78+0.18)/10) + 10^((15.10+0.18)/10)] = 18.14dBm

PSD CALCULATION:
PSD= measured PSD (including cable loss + 10dB attenuator)
DCCF= duty cycle correction factor in dB
1Tx Corrected PSD with DCCF (dBm/30kHz)= PSD + DCCF
2Tx Corrected PSD with DCCF (dBm/30kHz)=10log[10^((PSD1+DCCF)/10) + 10^((PSD2+DCCF)/10)]

Sample Calculation EHT20 242T MIMO:
2Tx Corrected PSD with DCCF (dBm/30kHz) =
10log[10^((-9.673+0.18)/10) + 10^((-9.569+0.18)/10)] = -6.43dBm/30kHz

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RESULTS

Plots included in the Power/PSD are representative of the method and settings parameters used for the test.

Test Engineer:	NM 19232 & HN 27979
Test Date:	2024-01-25 TO 2024-04-24

9.3.1. 802.11b,11g,11n HT20 MODE

Mode	No. of Tx	Channel	Freq (MHz)	Measured Conducted Avg Power (dBm)	Measured Conducted Avg Power w/DCCF (dBm)	Power Limit (dBm)	Power Margin (dB)	PSD (dBm/30kHz)	Corrected PSD with DCCF (dBm/30kHz)	PSD Limit (dBm/3kHz)	PSD Margin (dB)
b	1 (Tx0)	1	2412	20.46	20.46	30.00	-9.54	-1.305	-1.31	8	-9.31
		6	2437	20.82	**20.82**	30.00	-9.18	-1.029	-1.03	8	-9.03
		11	2462	20.41	20.41	30.00	-9.59	-0.928	-0.93	8	-8.93
		12	2467	20.73	20.73	30.00	-9.27	-1	-1.00	8	-9.00
		13	2472	17.54	17.54	30.00	-12.46	-3.985	-3.99	8	-11.99
b	1 (Tx1)	1	2412	21.26	21.26	30.00	-8.74	-0.428	-0.43	8	-8.43
		6	2437	21.93	**21.93**	30.00	-8.07	-0.459	-0.46	8	-8.46
		11	2462	21.90	21.90	30.00	-8.10	-0.945	-0.95	8	-8.95
		12	2467	21.83	21.83	30.00	-8.17	0.525	0.53	8	-7.48
		13	2472	19.50	19.50	30.00	-10.50	-2.049	-2.05	8	-10.05

Mode	No. of Tx	Channel	Freq (MHz)	Measured Conducted Avg Power (dBm) Tx0	Measured Conducted Avg Power (dBm) Tx1	Total MIMO Measured Conducted Avg Power w/ DCCF(dBm)	Power Limit (dBm)	Power Margin (dB)	Measured PSD (dBm/30kHz) Tx0	Measured PSD (dBm/30kHz) Tx1	Corrected PSD with DCCF (dBm/30kHz)	PSD Limit (dBm/3kHz)	PSD Margin (dB)
g	2	1	2412	18.03	18.54	21.30	30.00	-8.70	-4.29	-3.953	-1.11	8	-9.11
		6	2437	20.01	20.13	**23.08**	30.00	-6.92	-3.49	-2.521	0.03	8	-7.97
		10	2457	19.69	19.93	22.82	30.00	-7.18	-2.49	-2.679	0.43	8	-7.57
		11	2462	16.43	16.32	19.39	30.00	-10.61	-5.943	-6.091	-3.01	8	-11.01
		12	2467	14.07	14.35	17.22	30.00	-12.78	-8.432	-7.834	-5.11	8	-13.11
		13	2472	9.33	9.20	12.28	30.00	-17.72	-13.265	-13.42	-10.33	8	-18.33
HT20	2	1	2412	17.29	17.30	20.31	30.00	-9.69	-5.416	-5.514	-2.45	8	-10.45
		6	2437	18.17	18.85	**21.53**	30.00	-8.47	-4.646	-4.159	-1.39	8	-9.39
		11	2462	17.06	16.62	19.86	30.00	-10.14	-5.979	-6.221	-3.09	8	-11.09
		12	2467	14.10	14.38	17.25	30.00	-12.75	-8.735	-8.24	-5.47	8	-13.47
		13	2472	9.85	9.51	12.69	30.00	-17.31	-12.98	-13.095	-10.03	8	-18.03

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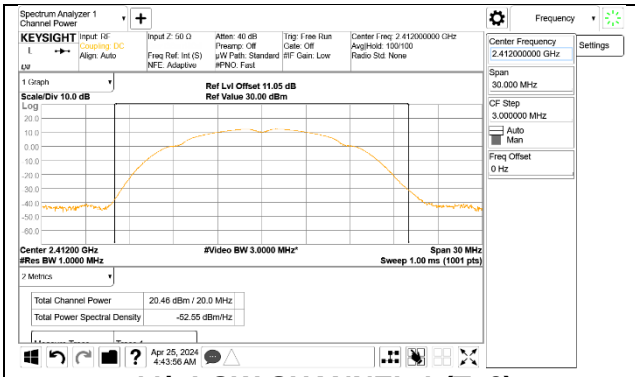
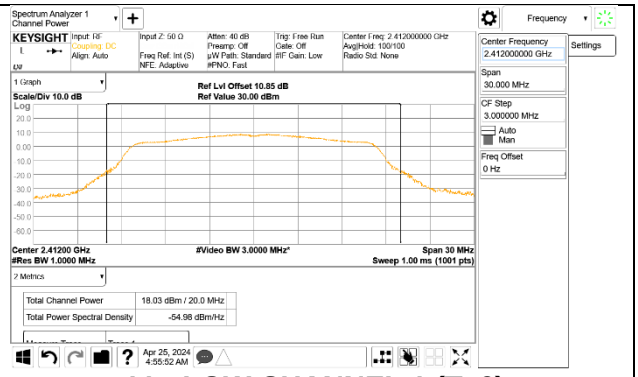
POWER



11b LOW CHANNEL 1 (Tx0)



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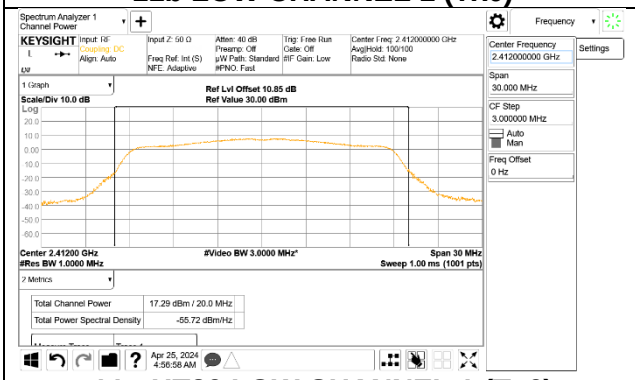

11n HT20 LOW CHANNEL 1 (Tx0)

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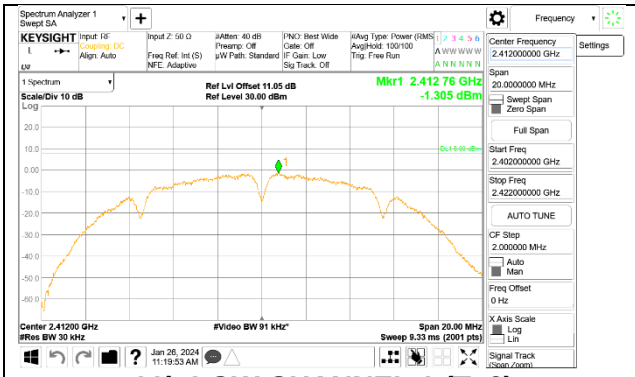
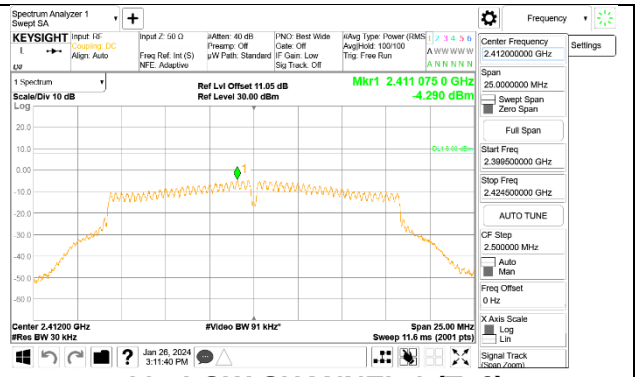
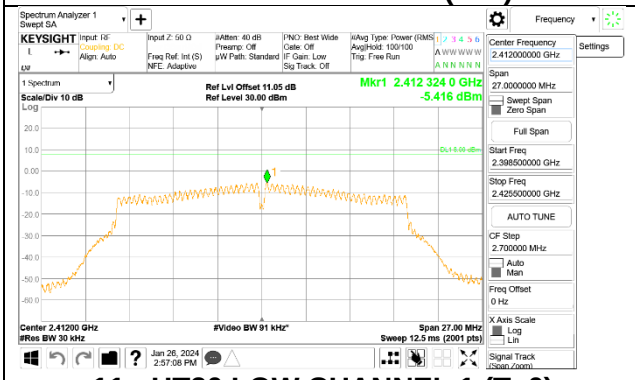
PSD



11b LOW CHANNEL 1 (Tx0)



11g LOW CHANNEL 1 (Tx0)



11n HT20 LOW CHANNEL 1 (Tx0)

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9.3.2. 802.11be EHT20 MODE

Mode	No. of Tx	Channel	Freq (MHz)	Tones	RU Index	Measured Conducted Avg Power (dBm) Tx0	Measured Conducted Avg Power (dBm) Tx1	Total MIMO Measured Conducted Avg Power w/ DCCF(dBm)	Power Limit (dBm)	Power Margin (dB)	Measured PSD (dBm/30kHz) Tx0	Measured PSD (dBm/30kHz) Tx1	Corrected PSD with DCCF (dBm/30kHz)	PSD Limit (dBm/3kHz)	PSD Margin (dB)
EHT20	2	1	2412	242T	61	14.78	15.10	18.14	30.00	-11.86	-9.673	-9.569	-6.43	8	-14.43
		2	2417			19.58	20.47	23.24	30.00	-6.76	-3.484	-3.531	-0.31	8	-8.31
		6	2437			20.44	20.92	**23.88**	30.00	-6.12	-6.106	-5.393	-2.54	8	-10.54
		9	2452			20.47	19.54	23.22	30.00	-6.78	-4.058	-5.106	-1.36	8	-9.36
		10	2457			16.64	16.30	19.67	30.00	-10.33	-7.913	-8.605	-5.05	8	-13.05
		11	2462			12.96	12.35	15.86	30.00	-14.14	-11.61	-12.234	-8.72	8	-16.72
		12	2467			11.20	11.02	14.30	30.00	-15.70	-13.062	-13.088	-9.88	8	-17.88
		13	2472			10.38	9.81	13.30	30.00	-16.70	-13.978	-15.063	-11.29	8	-19.29
		1	2412	106T	53	12.10	11.58	15.01	30.00	-14.99	-10.565	-10.94	-7.59	8	-15.59
		6	2437			16.35	15.84	19.27	30.00	-10.73	-6.485	-6.916	-3.53	8	-11.53
		10	2457		54	14.28	13.22	16.95	30.00	-13.05	-8.428	-9.362	-5.71	8	-13.71
		11	2462			9.70	8.72	12.40	30.00	-17.60	-12.523	-13.731	-9.92	8	-17.92
		12	2467			8.40	7.94	11.34	30.00	-18.66	-14.38	-14.107	-11.08	8	-19.08
		13	2472			-0.37	-0.41	2.77	30.00	-27.23	-22.081	-23.163	-19.43	8	-27.43
		1	2412	52T	37	9.10	8.92	12.16	30.00	-17.84	-10.54	-10.934	-7.58	8	-15.58
		6	2437		38	13.66	13.42	16.69	30.00	-13.31	-6.123	-6.253	-3.04	8	-11.04
		10	2457		40	11.12	10.18	13.82	30.00	-16.18	-8.8	-9.767	-6.11	8	-14.11
		11	2462			6.34	4.93	8.84	30.00	-21.16	-13.693	-14.583	-10.97	8	-18.97
		12	2467			5.60	5.53	8.71	30.00	-21.29	-14.138	-14.615	-11.22	8	-19.22
		13	2472			-3.58	-3.23	-0.25	30.00	-30.25	-23.781	-23.206	-20.33	8	-28.33
		1	2412	26T	0	5.88	4.67	8.46	30.00	-21.54	-10.81	-12.386	-8.39	8	-16.39
		6	2437		4	10.48	10.33	13.55	30.00	-16.45	-6.673	-6.983	-3.69	8	-11.69
		10	2457		8	8.12	7.21	10.83	30.00	-19.17	-9.007	-9.796	-6.24	8	-14.24
		11	2462			3.19	2.39	5.95	30.00	-24.05	-14.068	-14.516	-11.15	8	-19.15
		12	2467			2.52	2.23	5.52	30.00	-24.48	-14.657	-14.881	-11.63	8	-19.63
		13	2472			-6.31	-6.27	-3.15	30.00	-33.15	-23.416	-23.148	-20.14	8	-28.14
		1	2412	52T + 26T	70	11.00	10.27	13.66	30.00	-16.34	-10.526	-10.911	-7.70	8	-15.70
		6	2437		71	15.56	15.20	18.39	30.00	-11.61	-6.297	-6.323	-3.30	8	-11.30
		10	2457		72	13.23	12.41	15.85	30.00	-14.15	-8.252	-9.297	-5.73	8	-13.73
		11	2462			8.54	7.56	11.09	30.00	-18.91	-12.972	-14.093	-10.49	8	-18.49
		12	2467			7.52	6.23	9.93	30.00	-20.07	-14.236	-15.208	-11.68	8	-19.68
		13	2472			-1.42	-1.82	1.39	30.00	-28.61	-22.968	-22.891	-19.92	8	-27.92
		1	2412	106T + 52T	82	13.11	12.07	15.74	30.00	-14.26	-10.14	-11.189	-7.52	8	-15.52
		6	2437		83	17.88	17.47	20.80	30.00	-9.20	-5.755	-6.186	-2.85	8	-10.85
		10	2457		83	15.61	14.85	18.36	30.00	-11.64	-8.163	-8.755	-5.33	8	-13.33
		11	2462			10.84	9.53	13.35	30.00	-16.65	-12.65	-13.345	-9.87	8	-17.87
		12	2467			9.83	8.44	12.31	30.00	-17.69	-13.917	-14.457	-11.06	8	-19.06
		13	2472			2.37	2.23	5.42	30.00	-24.58	-21.012	-21.327	-18.05	8	-26.05

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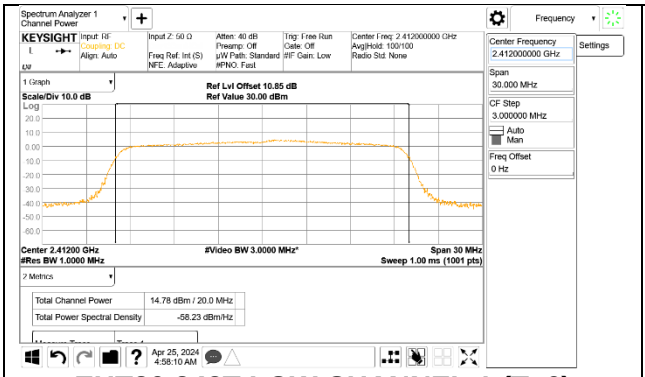
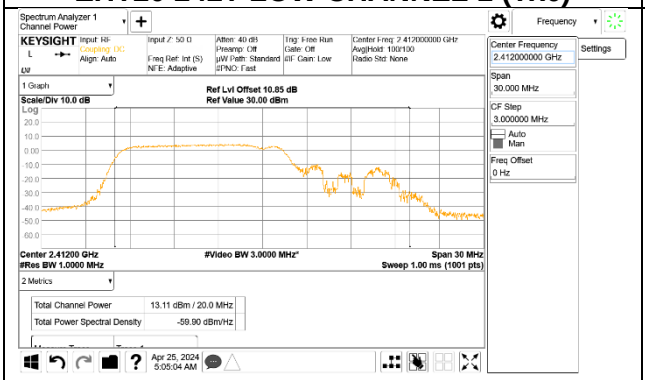
POWER



EHT20 242T LOW CHANNEL 1 (Tx0)

EHT20 52T+26T LOW CHANNEL 1 (Tx0)



EHT20 106T+26T LOW CHANNEL 1 (Tx0

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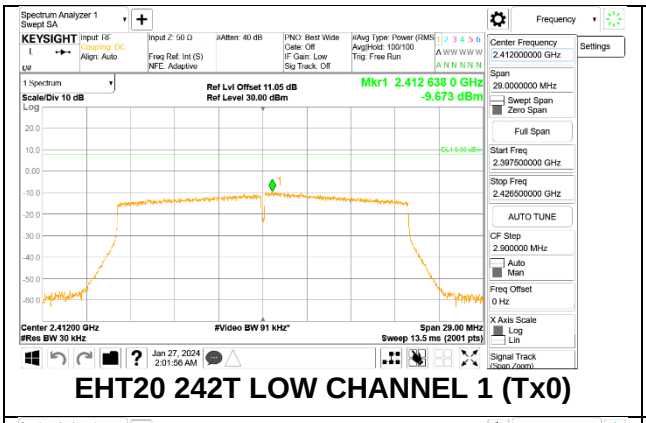
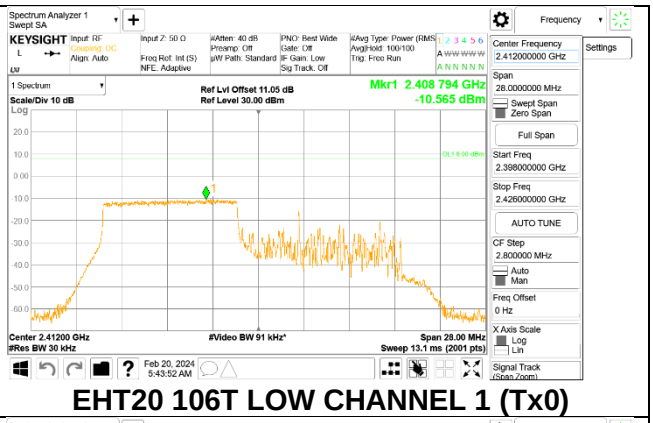
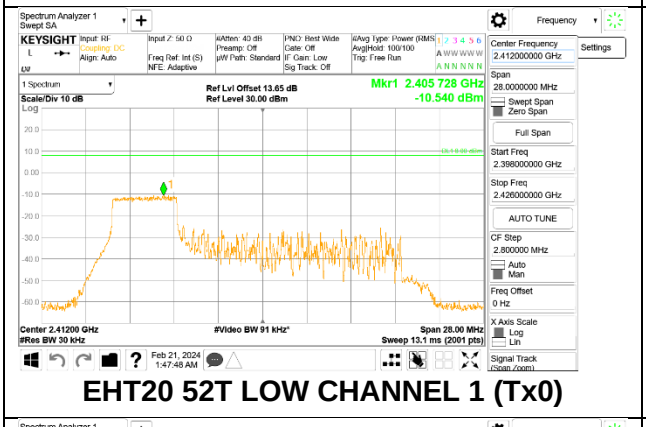
PSD



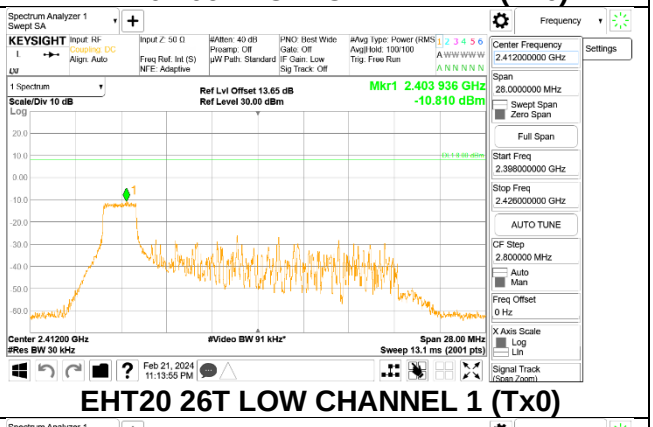
EHT20 242T LOW CHANNEL 1 (Tx0)



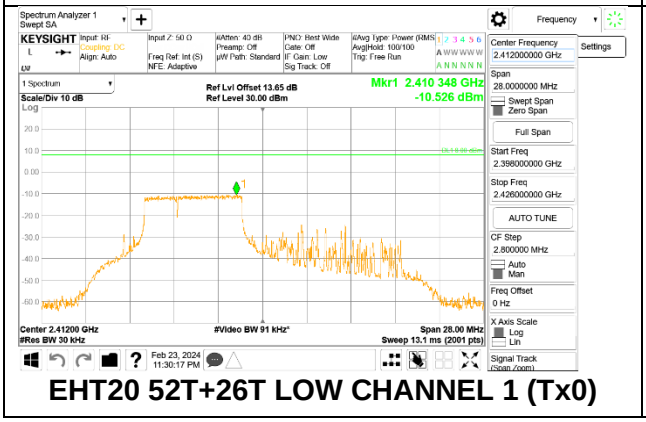
EHT20 106T LOW CHANNEL 1 (Tx0)



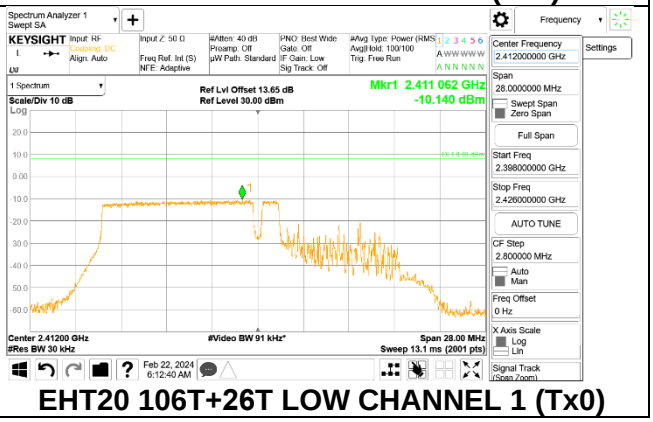
EHT20 52T LOW CHANNEL 1 (Tx0)



EHT20 26T LOW CHANNEL 1 (Tx0)



EHT20 52T+26T LOW CHANNEL 1 (Tx0)



EHT20 106T+26T LOW CHANNEL 1 (Tx0)

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9.4. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

PROCEDURE

Output power was measured based on the use of average measurement; therefore, the required attenuation is 30 dBc.

RESULTS

Test Engineer:	NM 19232 & HN 27979
Test Date:	2023-12-26 to 2024-04-05

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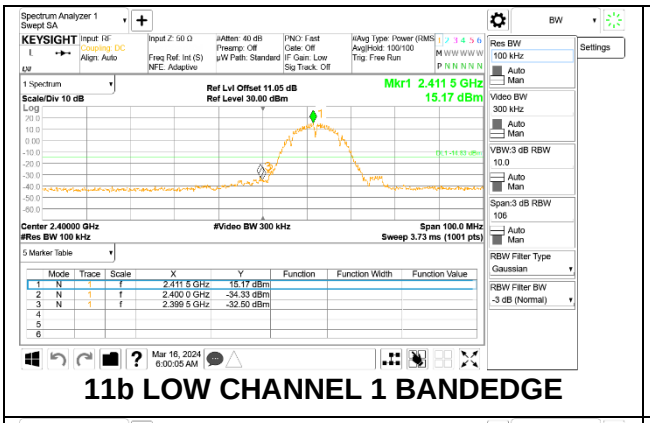
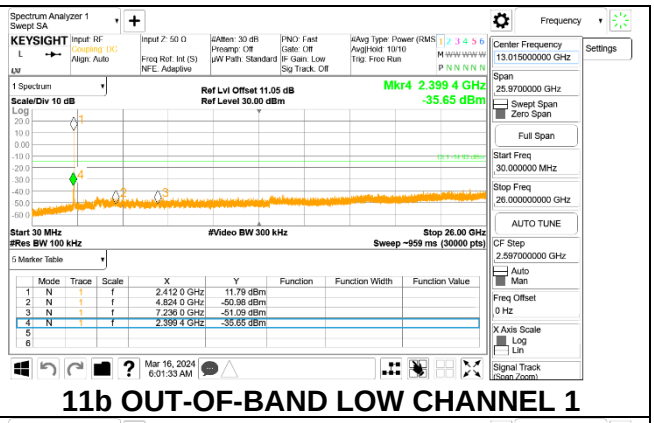
9.4.1. 802.11b

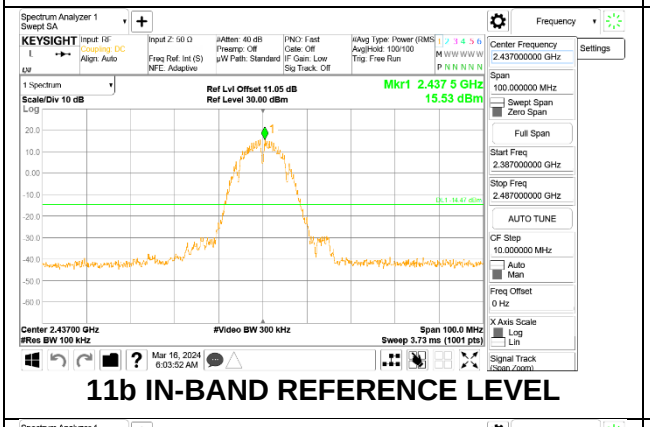
Tx0



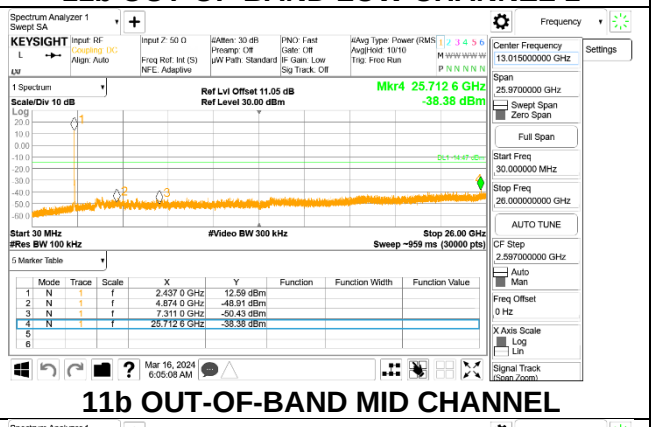
11b LOW CHANNEL 1 BANDEDGE



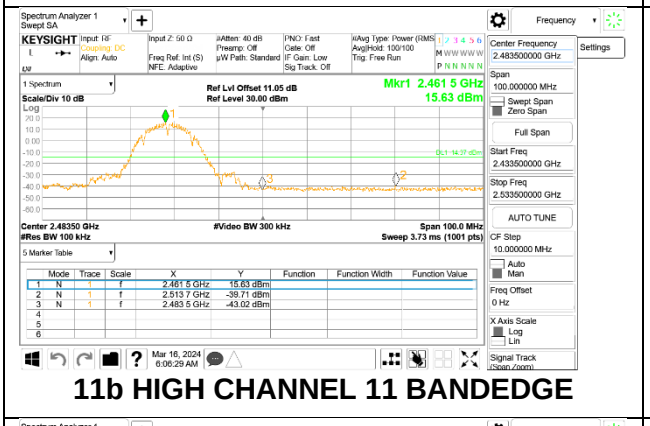
11b OUT-OF-BAND LOW CHANNEL 1



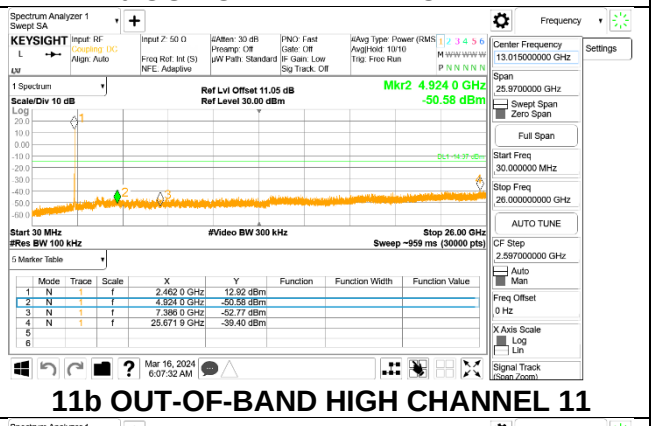
11b IN-BAND REFERENCE LEVEL



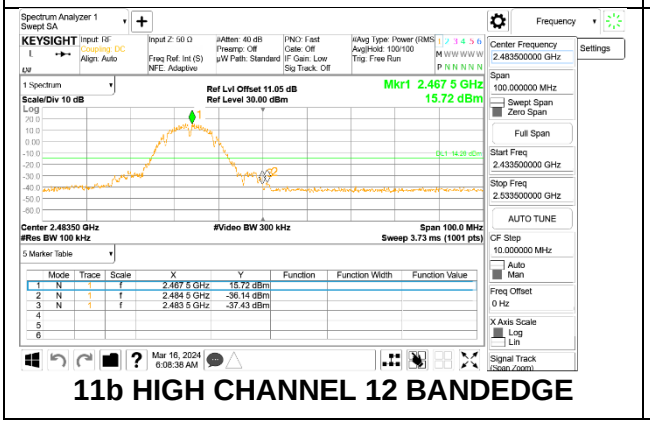
11b OUT-OF-BAND MID CHANNEL



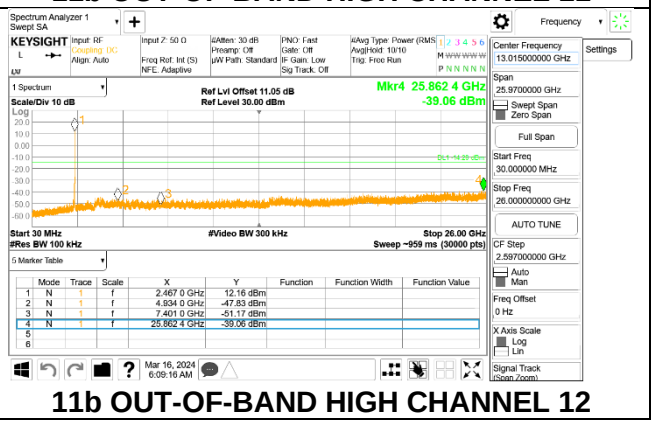
11b HIGH CHANNEL 11 BANDEDGE



11b OUT-OF-BAND HIGH CHANNEL 11



11b HIGH CHANNEL 12 BANDEDGE



11b OUT-OF-BAND HIGH CHANNEL 12

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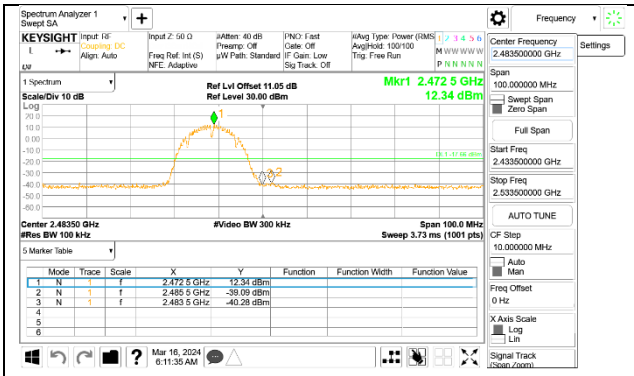
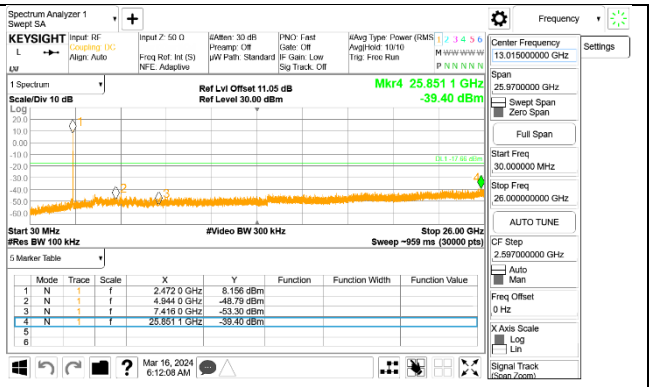


11b HIGH CHANNEL 13 BANDEDGE



11b OUT-OF-BAND HIGH CHANNEL 13

UL VERIFICATION SERVICES INC.
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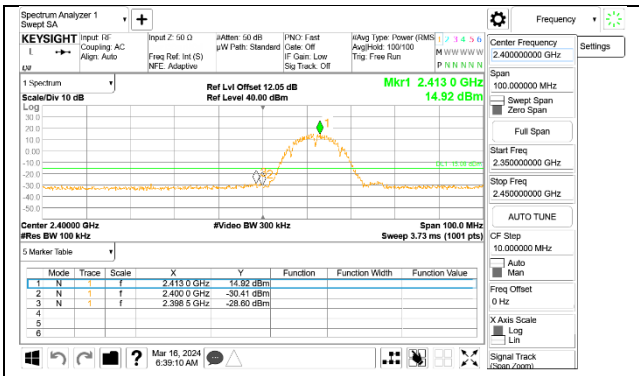
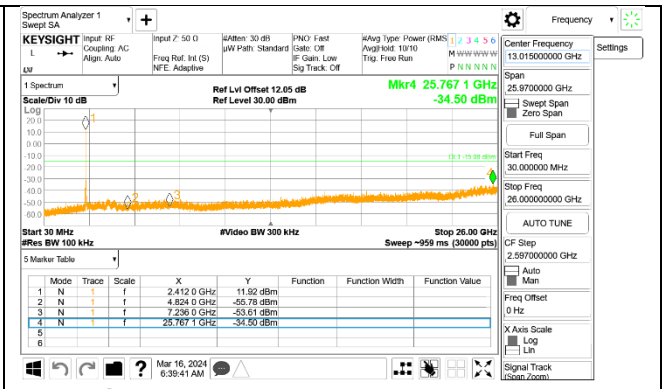
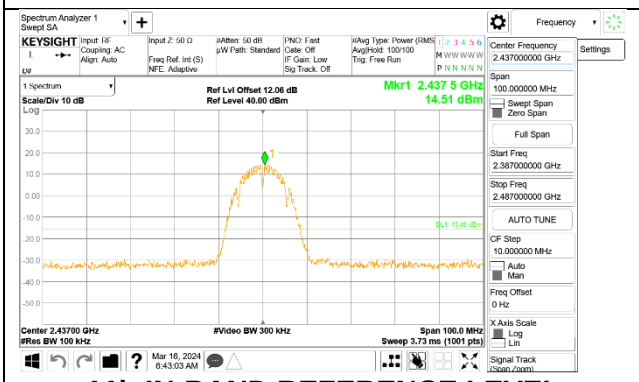
Tx1



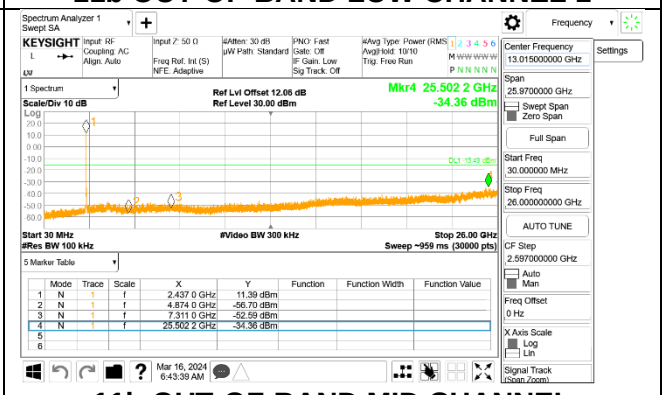
11b LOW CHANNEL 1 BANDEDGE



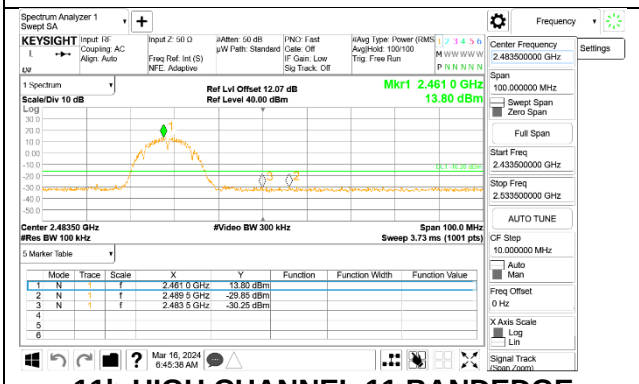
11b OUT-OF-BAND LOW CHANNEL 1



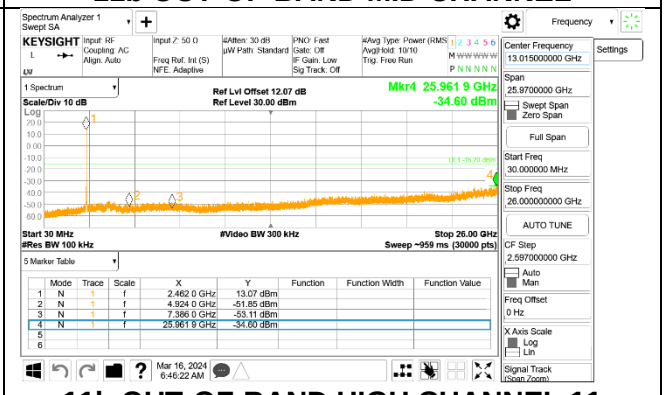
11b IN-BAND REFERENCE LEVEL



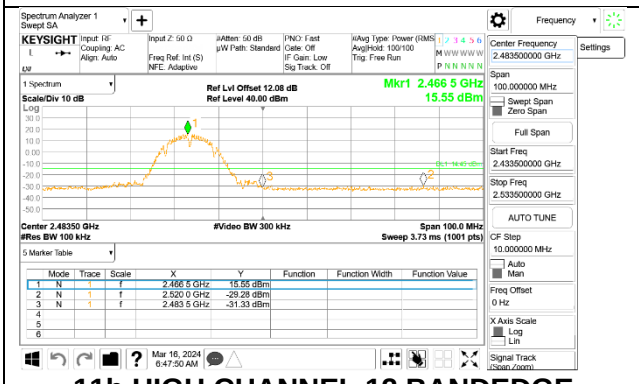
11b OUT-OF-BAND MID CHANNEL



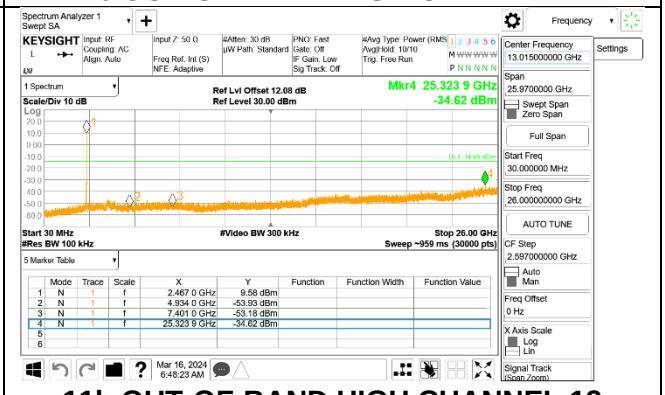
11b HIGH CHANNEL 11 BANDEDGE



11b OUT-OF-BAND HIGH CHANNEL 11



11b HIGH CHANNEL 12 BANDEDGE



11b OUT-OF-BAND HIGH CHANNEL 12

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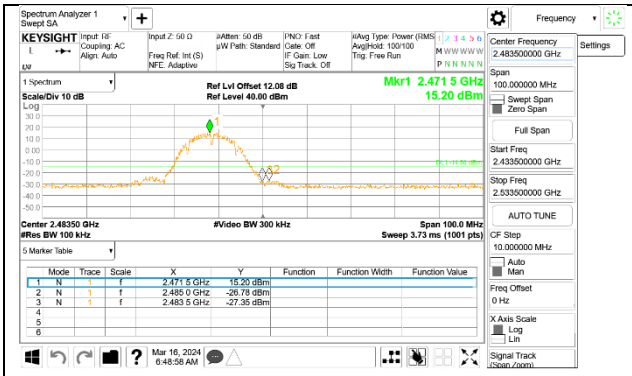
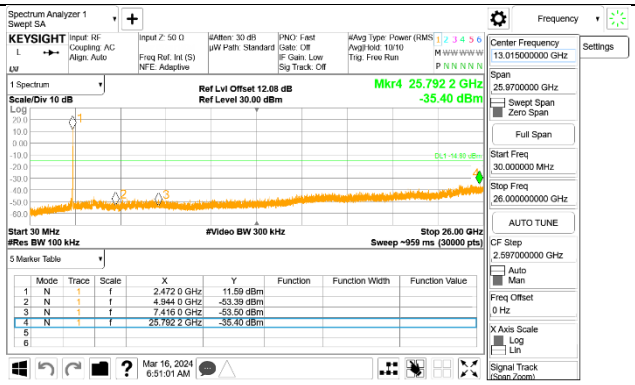


11b HIGH CHANNEL 13 BANDEDGE



11b OUT-OF-BAND HIGH CHANNEL 13

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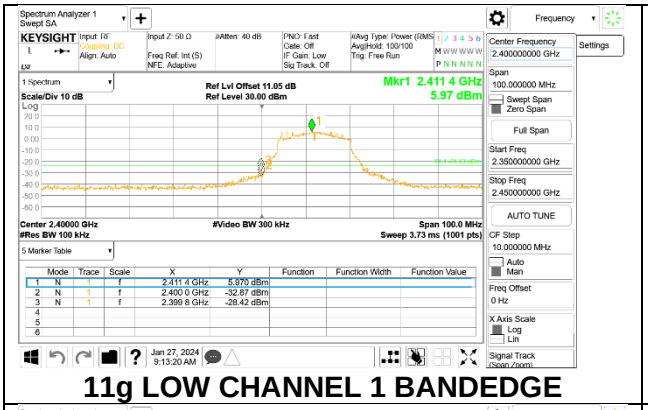
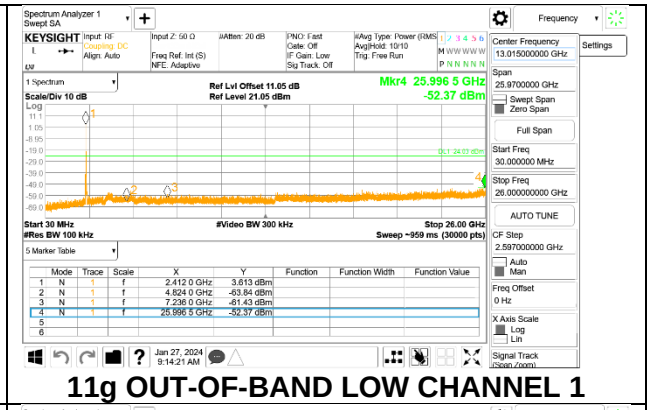
9.4.2. 802.11g MODE

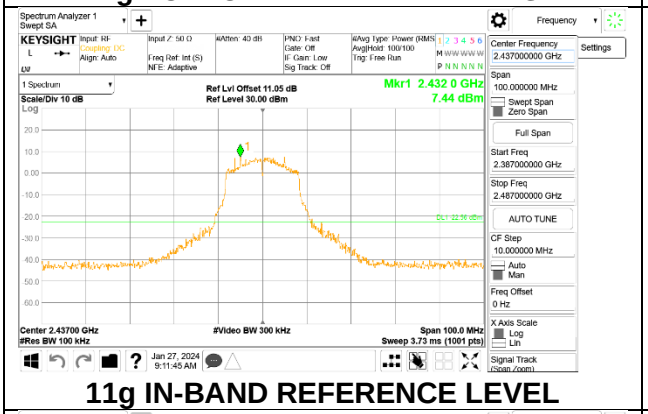
Tx0



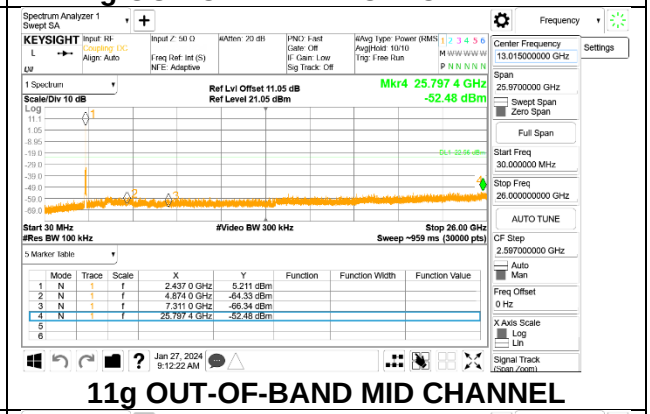
11g LOW CHANNEL 1 BANDEDGE



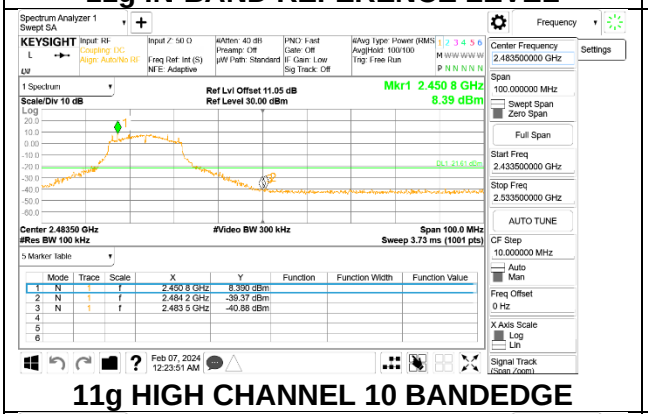
11g OUT-OF-BAND LOW CHANNEL 1



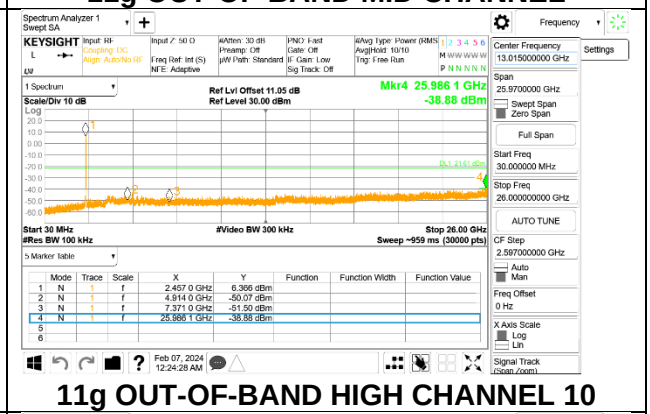
11g IN-BAND REFERENCE LEVEL



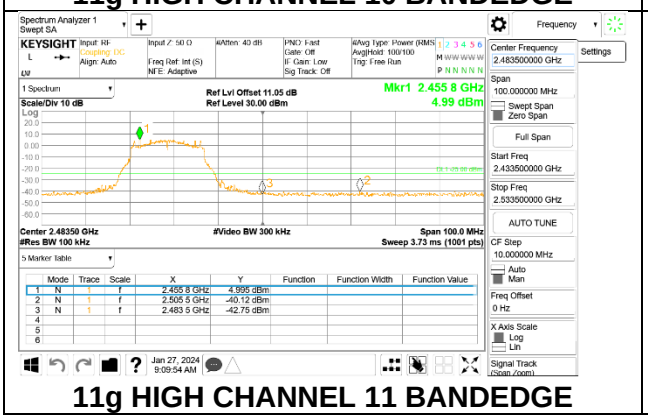
11g OUT-OF-BAND MID CHANNEL



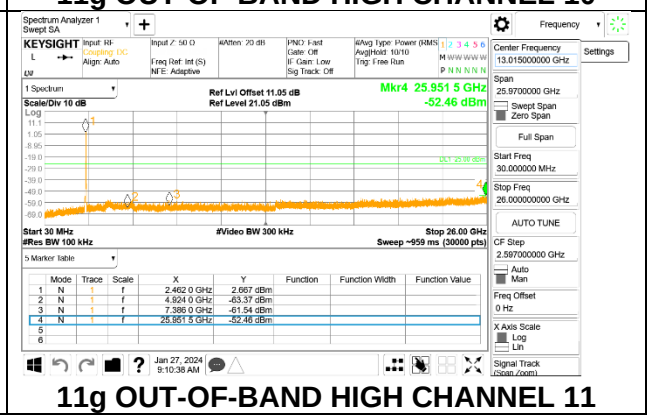
11g HIGH CHANNEL 10 BANDEDGE



11g OUT-OF-BAND HIGH CHANNEL 10



11g HIGH CHANNEL 11 BANDEDGE



11g OUT-OF-BAND HIGH CHANNEL 11

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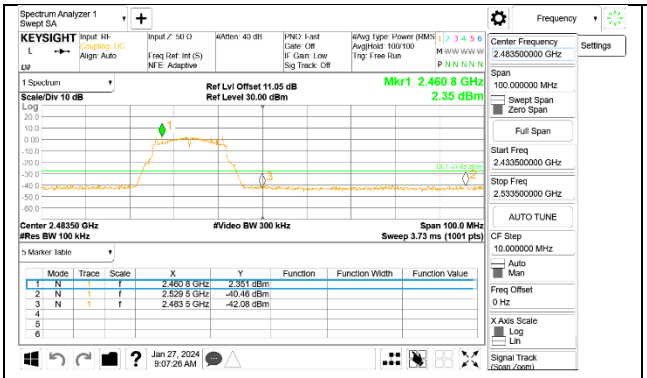
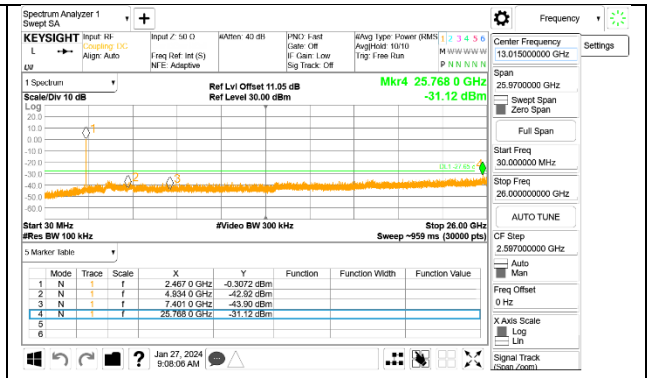
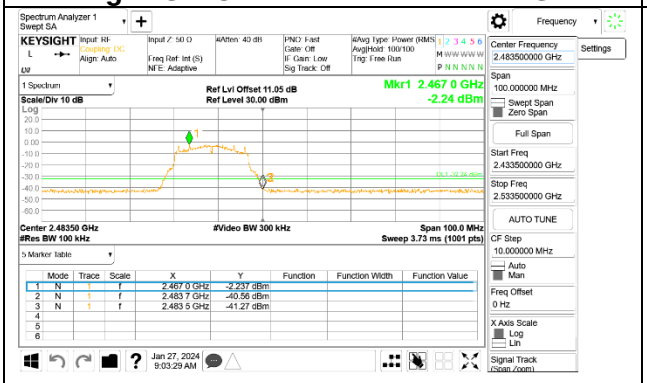


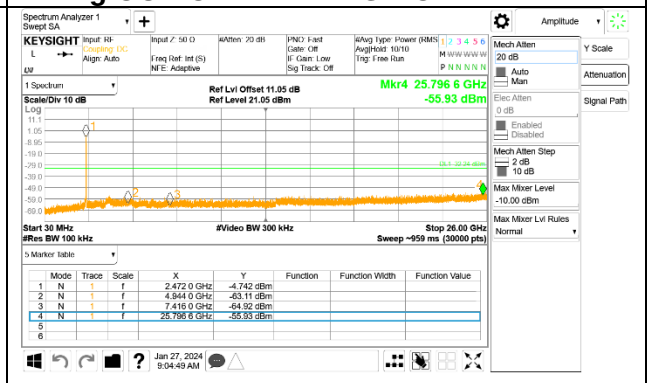
11g HIGH CHANNEL 12 BANDEDGE



11g OUT-OF-BAND HIGH CHANNEL 12



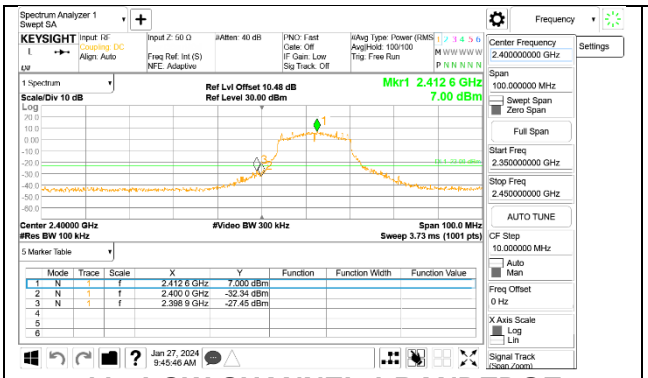
11g HIGH CHANNEL 13 BANDEDGE



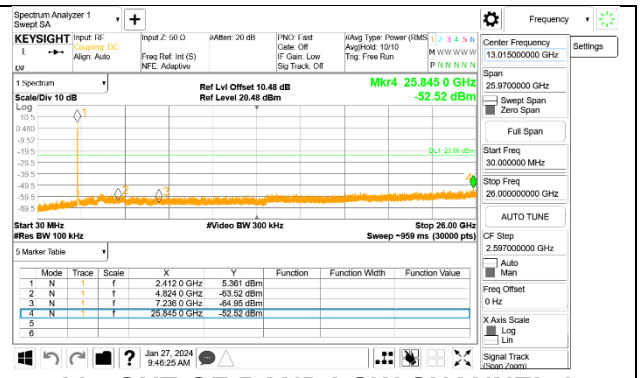
11g OUT-OF-BAND HIGH CHANNEL 13

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

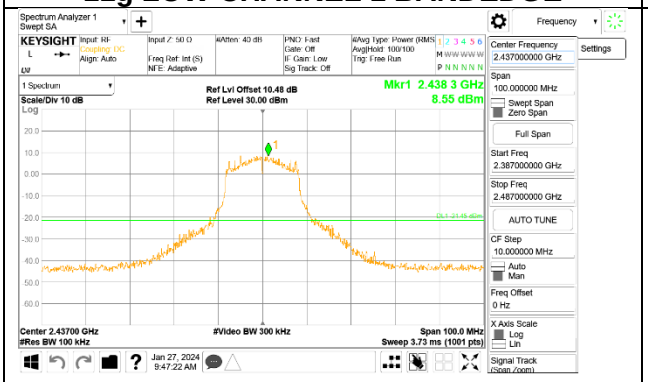
Tx1



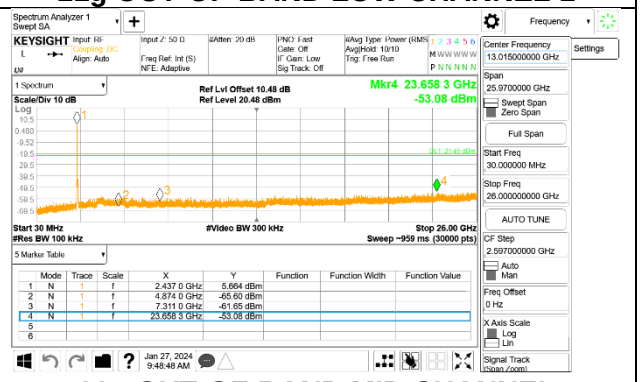
11g LOW CHANNEL 1 BANDEDGE



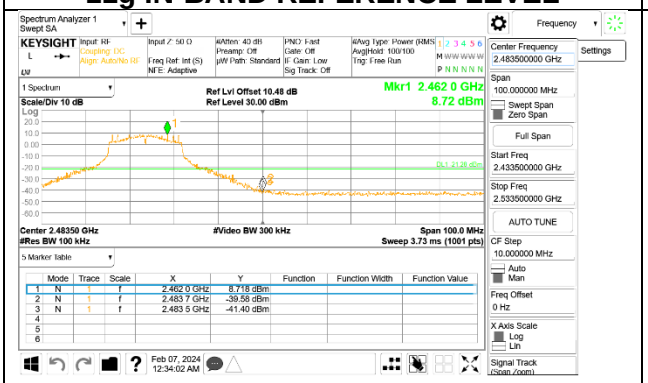
11g OUT-OF-BAND LOW CHANNEL 1



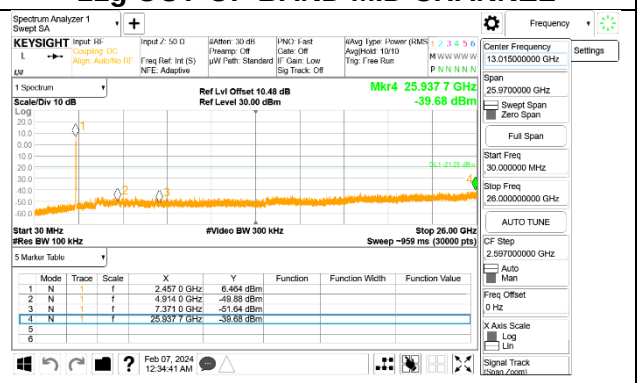
11g IN-BAND REFERENCE LEVEL



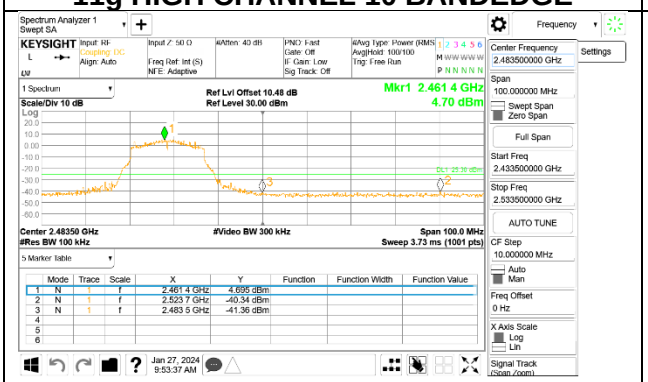
11g OUT-OF-BAND MID CHANNEL



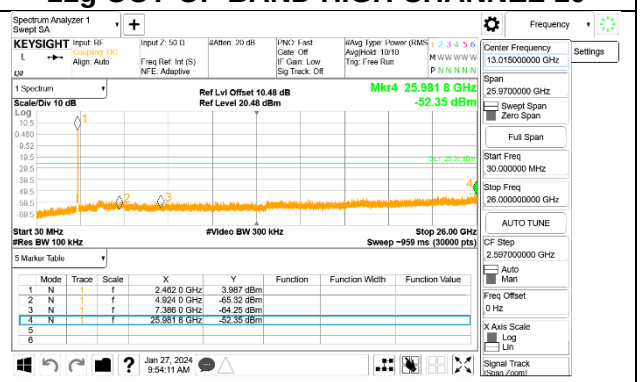
11g HIGH CHANNEL 10 BANDEDGE



11g OUT-OF-BAND HIGH CHANNEL 10



11g HIGH CHANNEL 11 BANDEDGE



11g OUT-OF-BAND HIGH CHANNEL 11

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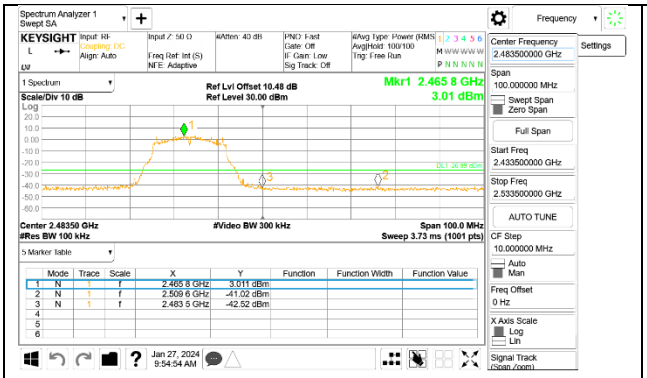
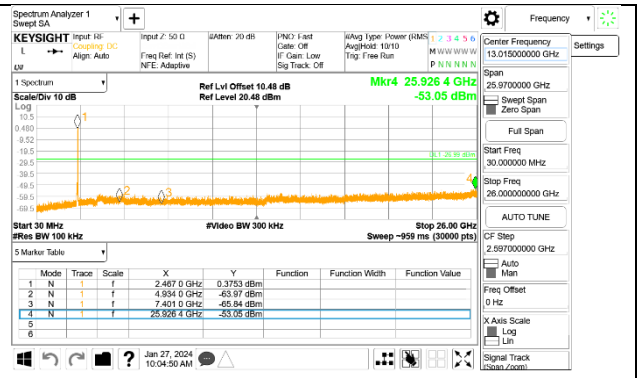
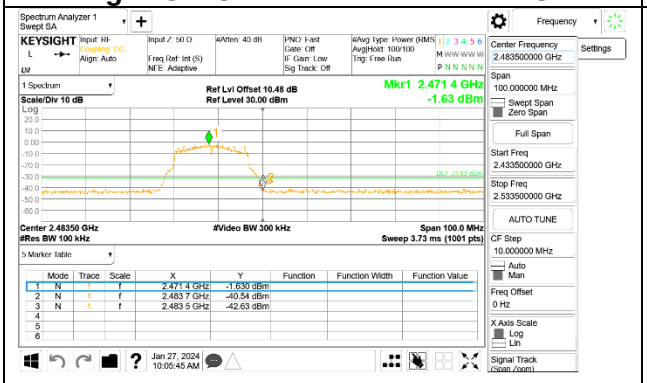


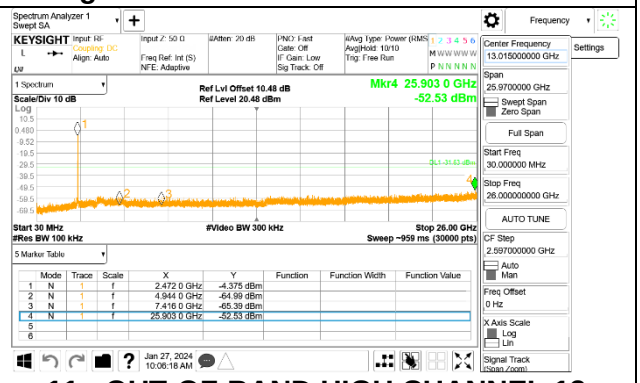
11g HIGH CHANNEL 12 BANDEDGE



11g OUT-OF-BAND HIGH CHANNEL 12



11g HIGH CHANNEL 13 BANDEDGE



11g OUT-OF-BAND HIGH CHANNEL 13

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