

Test Report TR3768-180-2.4G

Equipment Under Test:	SONA NX611
Requirement(s):	eCFR 47 Part 15.247 RSS-247
Test Date(s):	01/22/2024-04/30/2024, 12/04/2024-01/17/2025
Prepared for:	Ezurio Attn: Brian Petted W66 N220 Commerce Ct. Cedarburg, WI 53012

Report Issued by: Dylan Rosenfeldt, EMC Engineer	
Signature: 	Date: 02/14/2025
Report Reviewed by: Adam Alger, Manager EMC Laboratory	
Signature: 	Date: 02/12/2025
Report Constructed by: Dylan Rosenfeldt, EMC Engineer	
Signature: 	Date: 02/12/2025

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Company: Ezurio	Page 1 of 41	Name: SONA NX611
Report: TR3768-180-2.4G		Model: SONA NX611C
Job: C-3768		Serial: 00026 00028 00042

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Ezurio Test Services in Review

The Ezurio laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025:2017 with Electrical (EMC) Scope

A2LA Certificate Number: 1255.01

Scope of accreditation includes all test methods listed herein unless otherwise noted



Federal Communications Commission (FCC) – USA

Accredited Test Firm Registration Number: 953492

Recognition of two 3 meter Semi-Anechoic Chambers



Innovation, Science and Economic Development Canada

Accredited U.S. Identification Number: US0218

Recognition of two 3 meter Semi-Anechoic Chambers

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Job: C-3768		Serial: 00026 00028 00042

1 TEST REPORT SUMMARY

During **02/12/2024-04/30/2024, 12/04/2024-01/17/2025** the Equipment Under Test (EUT), **SONA NX611**, as provided by Ezurio was tested to the following requirements:

FCC 15.247 | RSS-247 – DTS 2.4 GHz WLAN

Requirements	Description	Method	Compliant
15.247(d) 15.209 RSS-247 Clause 5.5 RSS-GEN Clause 8.10	Spurious Radiated Emissions in Restricted Bands 30-40000 MHz	ANSI C63.10	Yes
15.247(a)(2) RSS-247 Clause 5.2 (a)	6dB and 99% Occupied Bandwidth	ANSI C63.10	Yes
15.247(b)(3) RSS-247 Clause 5.4 (d)	RF Output Power	ANSI C63.10	Yes
15.247(d) RSS-247 Clause 5.5 RSS-GEN A1 Clause 8.9	Out-of-band Emissions	ANSI C63.10	Yes
15.247(e) RSS-247 Clause 5.2 (b)	Power Spectral Density	ANSI C63.10	Yes
2.1055(d) RSS-GEN 6.11	Frequency Stability	ANSI C63.10	Reported
15.207 RSS-GEN 8.8	AC Conducted Emissions	ANSI C63.10	Yes

Notice:

The results relate only to the item tested as configured and described in this report. Any additional configurations, modes of operation, or modifications made to the equipment under test after the specified test date(s) are at the decision of the client and may not apply to the data seen in this test report.

The decision rule for Pass / Fail assessment to the specification or standard listed in this test report has been agreed upon by the client and laboratory to be as follows:

Measurement Type	Rule
Emissions – Amplitude	0.5 dB below specified limit
Emissions – Frequency	1% less than the specification
Immunity	Tested at specified level

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2 CLIENT INFORMATION

Company Name	Ezurio
Contact Person	Brian Petted
Address	W66 N220 Commerce Ct. Cedarburg, WI 53012

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	SONA NX611
Part Number	453-00180
Serial Number	00026 00028 00042
FCC ID	SQG-SONANX611C
IC ID	3147A-SONANX611C

2.2 Product Description

The NX611 is based upon NXP IW611 Wi-Fi 6 chipset. Feature-set includes 802.11 a/b/g/n/ac/ax Wi-Fi 6 and Dual-Mode Bluetooth v5.3 (BDR + EDR + BLE).

2.3 Modifications Incorporated for Compliance

None noted at time of test

2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

2.5 EUT Information

Power Supply – INPUT:100-240VAC 50/60 Hz 0.3A

OUTPUT: 5VDC 2A

Firmware - sduart_nw61x_v1.bin.se

Sduart_nw61x_v1_mfg.bin.se

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2.6 Ancillary Equipment

Equipment used for EUT programming (not part of the EUT)

Development Kit, SU60-SOMC 6.0

P/N: 463-00138-K1 Rev 1

Power Supply: INPUT: 100-240 VAC 50/60Hz 0.7A

OUTPUT: 12VDC 2A

HP Elitebook 840G1

Labtool Version: 1.0.0.45.6

2.7 Antenna Information

Manufacturer	Model	Part Number	Dimension	Type	Peak Gain (dBi)	
					2400-2480 MHz	5150-5850 MHz
TDK	Multilayer Antenna	ANT162442DT-2001A2	1.6mm x 0.8mm x 0.4mm	Chip	3.3	4.2

2.8 Test Channels

Channel	Frequency (MHz)	Bandwidth (MHz)	Data Rates
1	2402	20	802.11b – 1 and 11 Mbps 802.11g – 6 and 54 Mbps 802.11n – MCS0 and MCS7 802.11ax – MCS0 and MCS11
6	2437	20	
11	2462	20	
3	2422	40	
6	2437	40	
9	2452	40	

2.9 Power Table and Reduced Video Bandwidth for Average Measurements

802.11	Channel BW (MHz)	Data Rate	Minimum Average VBW (Hz)	Power Setting
b	20	1 Mbps	116	16
b	20	11 Mbps	1044	16
g	20	6 Mbps	698	13
g	20	54 Mbps	5565	13
n	20	MCS0	746	13
n	20	MCS7	5959	13
ax	20	MCS0	956	11
ax	20	MCS11	8628	11
n	40	MCS0	1506	8
n	40	MCS7	9980	8
ax	40	MCS0	1815	8
ax	40	MCS11	11737	8
ax RU26	20	MCS0	736	12
ax RU52	20	MCS0	736	12
ax RU106	20	MCS0	736	13
ax RU26	40	MCS0	736	12
ax RU52	40	MCS0	736	12
ax RU106	40	MCS0	736	14
ax RU242	40	MCS0	736	10

3 WORST CASE TEST RESULTS SUMMARY

Requirement	Radio	Channel and Data Rate	Frequency (MHz)	Measurement	Limit	Margin
15.247 (a)(2) RSS-247 Clause 5.2(a)	802.11b	6 11 Mbps	-	9757 kHz	at least 500 kHz	-
15.247 (b)(3) RSS-247 Clause 5.4 (d)	802.11b	11 11 Mbps	-	19.6 dBm	30 dBm	10.4 dB
15.247 (e) RSS-247 Clause 5.2 (b)	802.11ax20	6 MCS0 RU26	-	2.2 dBm/100 kHz	8.0 dBm/3 kHz	5.8 dB
15.247 (d) RSS-247 Clause 5.5 Conducted	802.11n40	3 MCS0	2386.9	52.8 dBμV/m	54.0 dBμV/m	1.2 dB
	802.11ax40	9 MCS0 RU26	2484.1	73.5 dBμV/m	74.0 dBμV/m	0.5 dB
15.247(d) RSS-247 Clause 5.5	802.11n20	11 MCS0- MCS7	2484.4 2483.7	54.4 dBμV/m	54.0 dBμV/m	0.6 dB
RSS-GEN Clause 8.10 Radiated	802.11ax20	11 MCS11	2485.4	73.4 dBμV/m	74.0 dBμV/m	0.6 dB
15.207 RSS-GEN Clause 8.8	802.11b	6 1 Mbps	0.150	50.2 dBμV	66.0 dBμV	15.8 dB

4 REFERENCES

Publication	Edition	Date	AMD 1	AMD 2
FCC eCFR 47 Part 15	-	2025	-	-
ANSI C63.10	-	2020	2024	-
RSS-247	3	2023	-	-
RSS-GEN	5	2018	2019	2021
KDB 558074 D01	-	2019	-	-

5 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k = 2$.

References

CISPR 16-4-1

CISPR 16-4-2

CISPR 32

ANSI C63.23

A2LA P103

A2LA P103c

ETSI TR 100-028

Measurement Type	Configuration	Uncertainty $\pm$
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

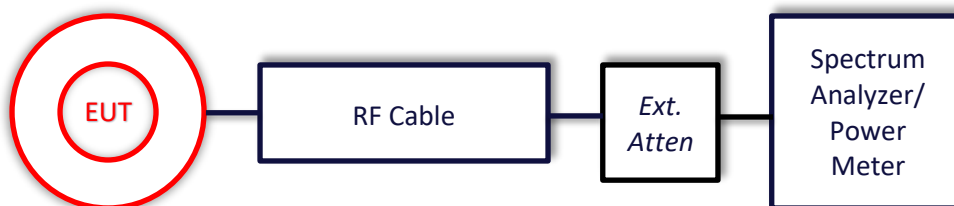
Parameter	ETSI U.C. $\pm$	U.C. $\pm$
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

6 TEST DATA

6.1 Antenna Port Conducted Emissions

Description of Measurement	The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter. The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.
Example Calculations	Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm) Margin (dB) = Limit (dBm) – Corrected Reading (dBm)

Block Diagram



6.1.1 6dB and 99% Occupied Bandwidth

Operator	Anthony Smith	QA	Adam Hauke
Temperature	20.8°C-22.2°C	R.H. %	24.30%-33.90%
Test Date	02/12/2024-02/14/2024	Location	Conducted RF Bench
Requirement	15.247 (a)(2) RSS-247 Clause 5.2 (a)	Method	ANSI C63.10 6.9

Limits: The minimum 6 dB bandwidth shall be at least 500 kHz

Test Parameters

Frequency	2400-2483.5 MHz	Setup	Antenna Port
RBW	200 kHz	VBW	620 kHz
Detector(s)	Peak	Settings	Max Hold

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960172	Cable	A.H. Systems, Inc.	SAC-26G-1	387	06/13/2023	06/12/2024	Active Verification
EE 960087	Analyzer – Spectrum	Agilent	N9010A	MY53400296	04/11/2023	04/11/2024	Active Calibration

EUT Parameters

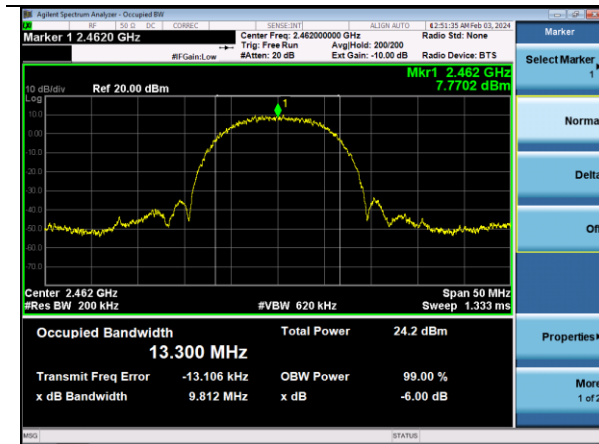
Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.8

Table

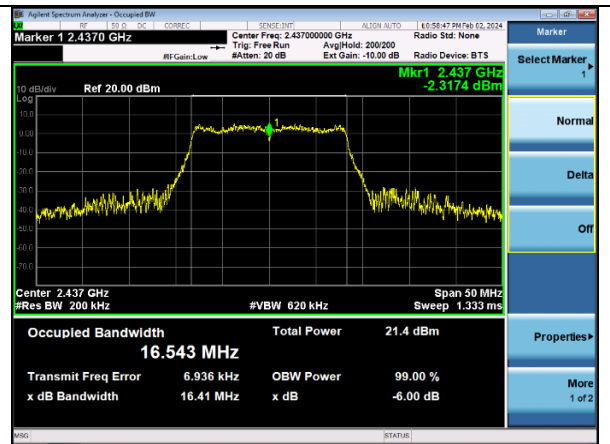
Mode	Rate	Channel	6 dB BW (kHz)	99% BW (MHz)
802.11b	1 Mbps	1	10150	13.4
		6	10150	13.3
		11	10150	13.3
	11 Mbps	1	9819	13.3
		6	9757	13.2
		11	9812	13.3
802.11g	6 Mbps	1	16420	16.5
		6	16410	16.5
		11	16420	16.6
	54 Mbps	1	16540	16.5
		6	16540	16.5
		11	16490	16.5
802.11n20	MCS0	1	17610	17.6
		6	17560	17.6
		11	17560	17.6
	MCS7	1	17730	17.6
		6	17700	17.6
		11	17730	17.7
802.11n40	MCS0	3	36130	36.1
		6	36320	36.2
		9	36270	36.2
	MCS7	3	35820	36.2
		6	36150	36.2
		9	36040	36.2

Mode	Rate	Channel	6 dB BW (kHz)	99% BW (MHz)
802.11ax20	MCS0	1	18680	18.8
		6	18340	18.8
		11	18500	18.8
	MCS11	1	18890	18.7
		6	18930	18.8
		11	18750	18.8
802.11ax40	MCS0	3	37680	37.6
		6	37630	37.6
		9	37460	37.5
	MCS11	3	37390	37.5
		6	37430	37.5
		9	37390	37.5

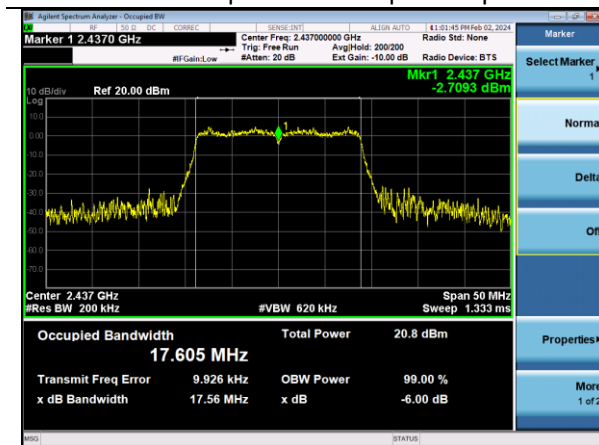
Plots



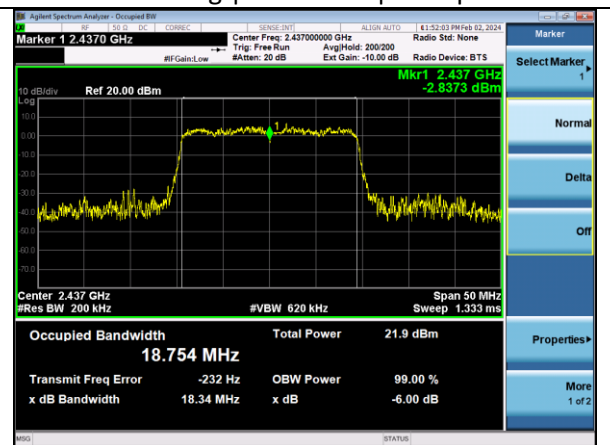
802.11b | Channel 11 | 11 Mbps



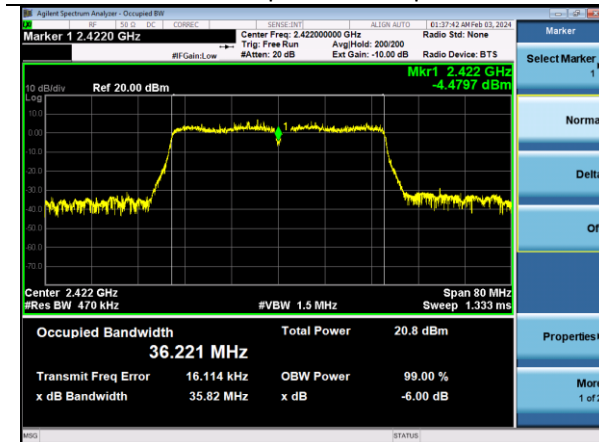
802.11g | Channel 6 | 6 Mbps



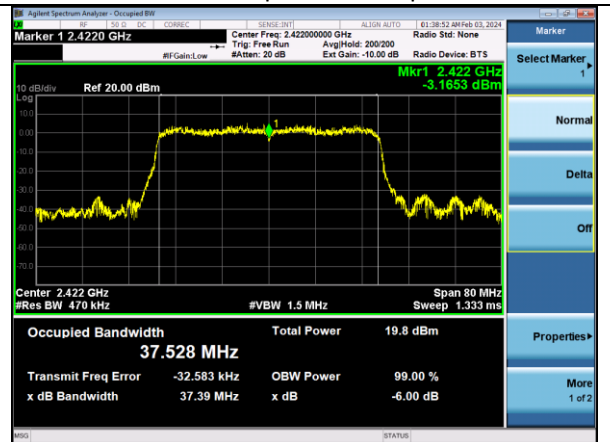
802.11n20 | Channel 6 | MCS0



802.11ax20 | Channel 6 | MCS0



802.11n40 | Channel 3 | MCS7



802.11ax40 | Channel 3 | MCS11

6.1.2 RF Output Power

Operator	Dylan Rosenfeldt	QA	Mitchell Freund
Temperature	21.9°C	R.H. %	24.70%
Test Date	01/17/2025	Location	Conducted RF Bench
Requirement	15.247 (b)(3) RSS-247 Clause 5.4 (d)	Method	ANSI C63.10 11.9.2.2.4 AVGSA-2

Limit: The maximum peak conducted output power of the intentional radiator shall not exceed 1 Watt.

Test Parameters

Frequency	2400-2483.5 MHz	Setup	Antenna Port
RBW	510 kHz	VBW	1.6 MHz
Detector(s)	Average - RMS	Settings	Trace Average Span: 40 MHz 60 MHz
Example Calculations	Average Output Power = Measured Power + 10*log(1/D) where D is the duty cycle.		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960173	Cable	A.H. Systems, Inc.	SAC-26G-1	388	6/13/2024	6/12/2025	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	4/10/2024	4/10/2025	Active Calibration

EUT Parameters

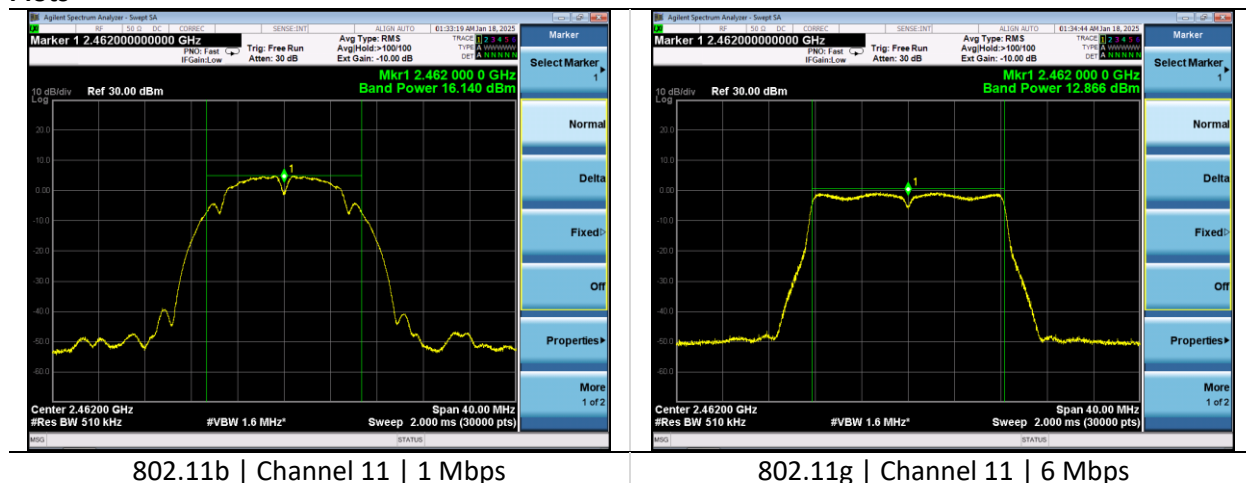
Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.8

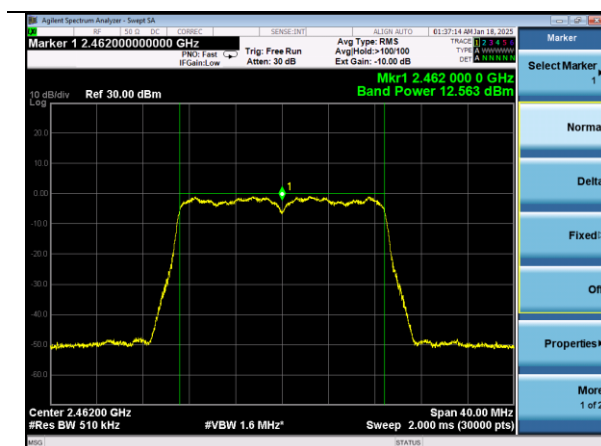
Tables

Mode	Rate	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11b	1 Mbps	1	15.8	-	15.8	30.0	14.2
		6	16.0	-	16.0	30.0	14.0
		11	16.1	-	16.1	30.0	13.9
	11 Mbps	1	15.7	-	15.7	30.0	14.3
		6	15.9	-	15.9	30.0	14.1
		11	16.0	-	16.0	30.0	14.0
802.11g	6 Mbps	1	12.7	-	12.7	30.0	17.3
		6	12.9	-	12.9	30.0	17.1
		11	12.9	-	12.9	30.0	17.1
	54 Mbps	1	12.3	0.4	12.7	30.0	17.3
		6	12.6	0.4	13.0	30.0	17.0
		11	12.5	0.4	12.9	30.0	17.1
802.11n20	MCS0	1	12.8	-	12.8	30.0	17.2
		6	12.9	-	12.9	30.0	17.1
		11	12.9	-	12.9	30.0	17.1
	MCS7	1	12.4	0.4	12.8	30.0	17.2
		6	12.6	0.4	13.0	30.0	17.0
		11	12.6	0.4	13.0	30.0	17.0
802.11n40	MCS0	3	7.8	0.1	7.9	30.0	22.1
		6	8.0	0.1	8.1	30.0	21.9
		9	7.9	0.1	8.0	30.0	22.0
	MCS7	3	7.4	0.6	8.0	30.0	22.0
		6	7.4	0.6	8.0	30.0	22.0
		9	7.5	0.6	8.1	30.0	21.9
802.11ax20	MCS0	1	11.1	-	11.1	30.0	18.9
		6	11.3	-	11.3	30.0	18.7
		11	11.4	-	11.4	30.0	18.6
	MCS11	1	10.6	0.5	11.1	30.0	18.9
		6	10.7	0.5	11.2	30.0	18.8
		11	10.9	0.5	11.4	30.0	18.6
802.11ax40	MCS0	3	8.1	0.1	8.2	30.0	21.8
		6	8.3	0.1	8.4	30.0	21.6
		9	8.3	0.1	8.4	30.0	21.6
	MCS11	3	7.5	0.7	8.2	30.0	21.8
		6	7.6	0.7	8.3	30.0	21.7
		9	7.6	0.7	8.3	30.0	21.7

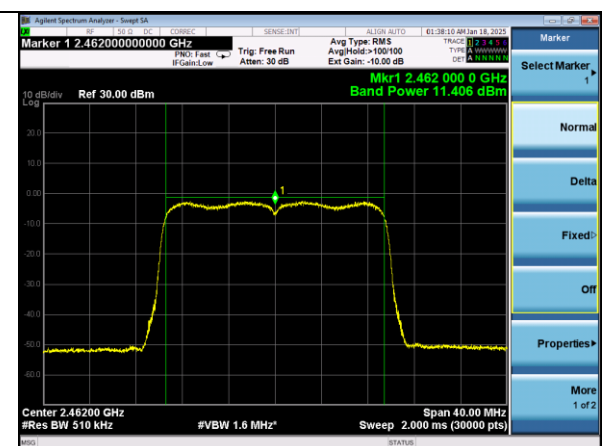
Mode	Rate and RU	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11ax20	MCS0 RU26	1	12.9	0.2	13.1	30.0	16.9
		6	13.1	0.2	13.3	30.0	16.7
		11	13.3	0.2	13.5	30.0	16.5
	MCS0 RU52	1	12.5	0.2	12.7	30.0	17.3
		6	12.6	0.2	12.8	30.0	17.2
		11	12.7	0.2	12.9	30.0	17.1
	MCS0 RU106	1	13.1	0.2	13.3	30.0	16.7
		6	13.2	0.2	13.4	30.0	16.6
		11	13.2	0.2	13.4	30.0	16.6
802.11ax40	MCS0 RU26	3	12.1	0.2	12.3	30.0	17.7
		6	12.3	0.2	12.5	30.0	17.5
		9	12.3	0.2	12.5	30.0	17.5
	MCS0 RU52	3	12.5	0.2	12.7	30.0	17.3
		6	12.7	0.2	12.9	30.0	17.1
		9	12.6	0.2	12.8	30.0	17.2
	MCS0 RU106	3	14.5	0.2	14.7	30.0	15.3
		6	14.6	0.2	14.8	30.0	15.2
		9	14.6	0.2	14.8	30.0	15.2
	MCS0 RU242	3	10.3	0.2	10.5	30.0	19.5
		6	10.4	0.2	10.6	30.0	19.4
		9	10.5	0.2	10.7	30.0	19.3

Plots

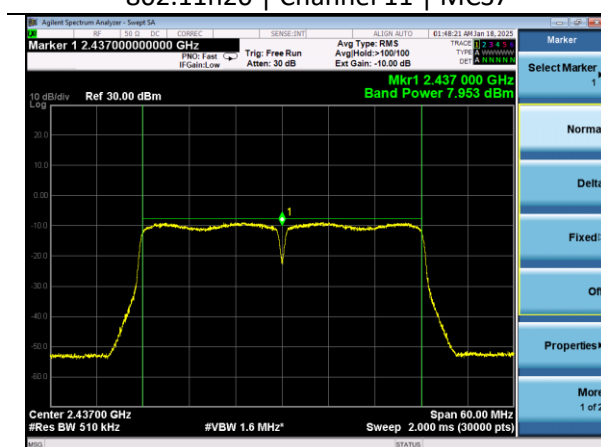




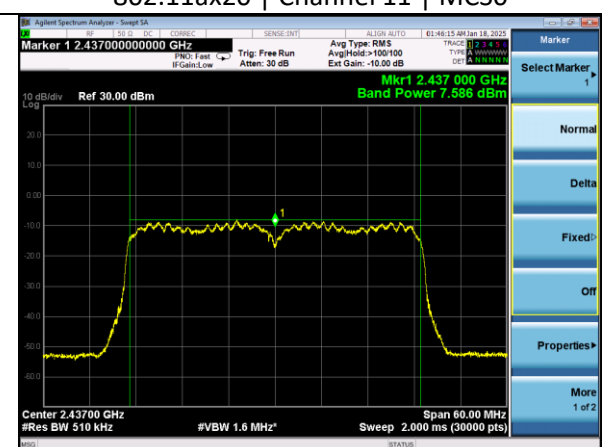
802.11n20 | Channel 11 | MCS7



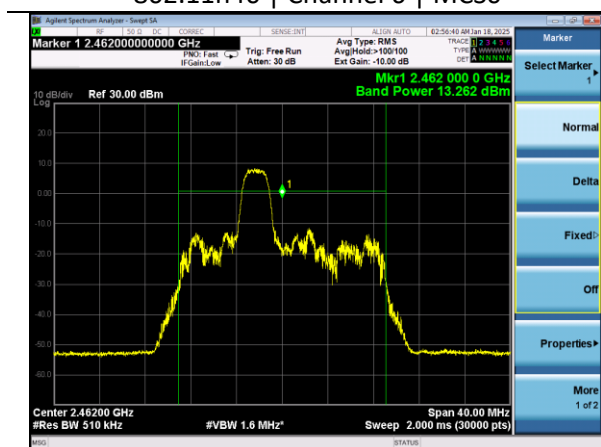
802.11ax20 | Channel 11 | MCS0



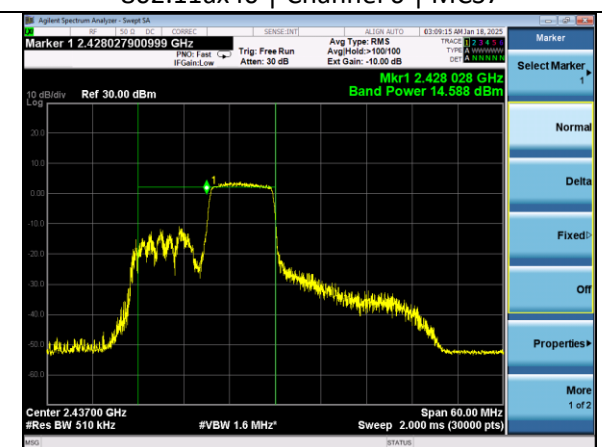
802.11n40 | Channel 6 | MCS0



802.11ax40 | Channel 6 | MCS7



802.11ax20 | RU26 | Channel 11 | MCS0



802.11ax40 | RU106 | Channel 6 | MCS0

6.1.3 Power Spectral Density

Operator	Dylan Rosenfeldt	QA	Mitchell Freund
Temperature	21.9°C	R.H. %	24.70%
Test Date	01/17/2025	Location	Conducted RF Bench
Requirement	15.247 (e) RSS-247 Clause 5.2 (b)	Method	ANSI C63.10 11.10.5 AVGPSD-2

Limits: Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

Test Parameters

Frequency	2400-2483.5 MHz	Detector(s)	Average - RMS
RBW	100 kHz	VBW	300 kHz
Setup	Antenna Port	Settings	Trace Average Span: 40MHz 60 MHz
Example Calculations	Average PSD = Measured PSD + 10*log(1/D) where D is the duty cycle.		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960173	Cable	A.H. Systems, Inc.	SAC-26G-1	388	6/13/2024	6/12/2025	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	4/10/2024	4/10/2025	Active Calibration

EUT Parameters

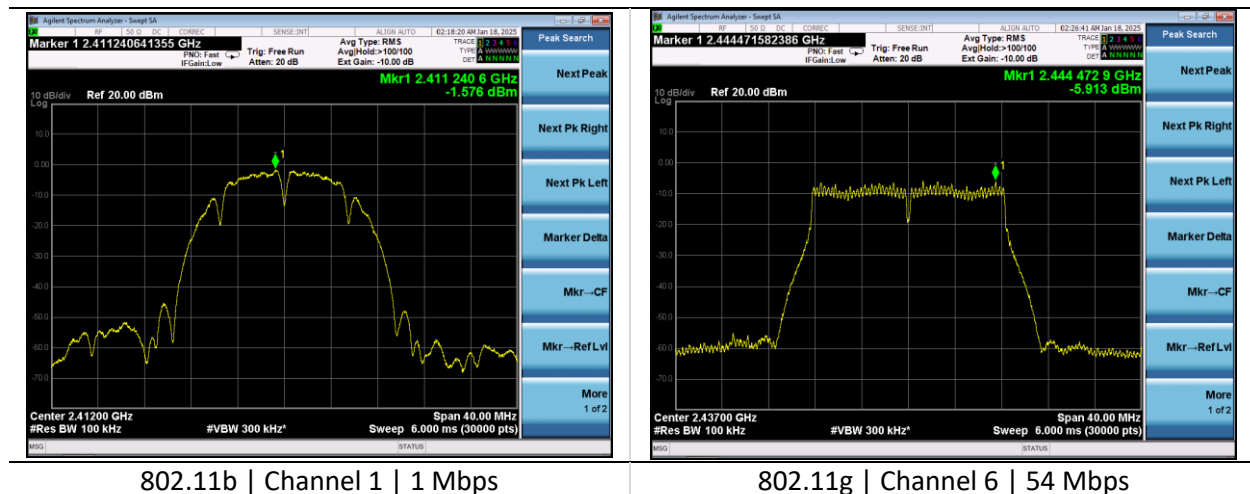
Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.8

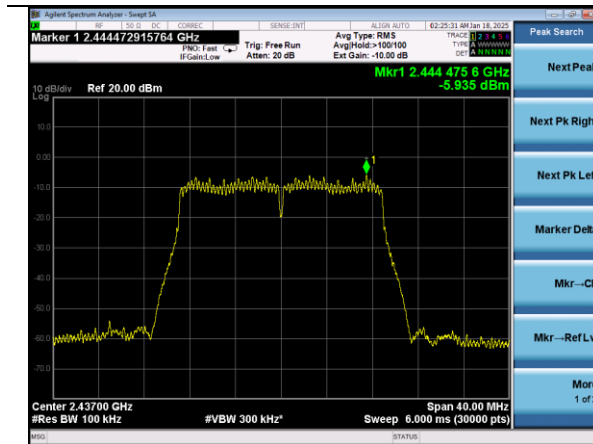
Table

Mode	Rate	Channel	Maximum Average PSD (dBm/100 kHz)	Duty Cycle Correction (dB)	Corrected Output Value (dBm/100 kHz)	Limit (dBm/3 kHz)	Margin (dB)
802.11b	1 Mbps	1	-1.6	-	-1.6	8.0	9.6
		6	-1.8	-	-1.8	8.0	9.8
		11	-1.7	-	-1.7	8.0	9.7
	11 Mbps	1	-2.1	-	-2.1	8.0	10.1
		6	-2.1	-	-2.1	8.0	10.1
		11	-1.8	-	-1.8	8.0	9.8
802.11g	6 Mbps	1	-6.7	-	-6.7	8.0	14.7
		6	-6.7	-	-6.7	8.0	14.7
		11	-7.1	-	-7.1	8.0	15.1
	54 Mbps	1	-6.0	0.4	-5.6	8.0	13.6
		6	-5.9	0.4	-5.5	8.0	13.5
		11	-6.1	0.4	-5.7	8.0	13.7
802.11n20	MCS0	1	-7.1	-	-7.1	8.0	15.1
		6	-6.9	-	-6.9	8.0	14.9
		11	-7.2	-	-7.2	8.0	15.2
	MCS7	1	-5.7	0.4	-5.3	8.0	13.3
		6	-5.9	0.4	-5.5	8.0	13.5
		11	-5.7	0.4	-5.3	8.0	13.3
802.11n40	MCS0	3	-14.7	0.1	-14.6	8.0	22.6
		6	-14.5	0.1	-14.4	8.0	22.4
		9	-14.5	0.1	-14.4	8.0	22.4
	MCS7	3	-12.7	0.6	-12.1	8.0	20.1
		6	-12.7	0.6	-12.1	8.0	20.1
		9	-12.7	0.6	-12.1	8.0	20.1
802.11ax20	MCS0	1	-9.3	-	-9.3	8.0	17.3
		6	-9.5	-	-9.5	8.0	17.5
		11	-9.0	-	-9.0	8.0	17.0
	MCS11	1	-7.4	0.5	-6.9	8.0	14.9
		6	-7.7	0.5	-7.2	8.0	15.2
		11	-7.4	0.5	-6.9	8.0	14.9
802.11ax40	MCS0	3	-15.1	0.1	-15.0	8.0	23.0
		6	-14.9	0.1	-14.8	8.0	22.8
		9	-15.1	0.1	-15.0	8.0	23.0
	MCS11	3	-12.1	0.7	-11.4	8.0	19.4
		6	-11.7	0.7	-11.0	8.0	19.0
		9	-12.0	0.7	-11.3	8.0	19.3

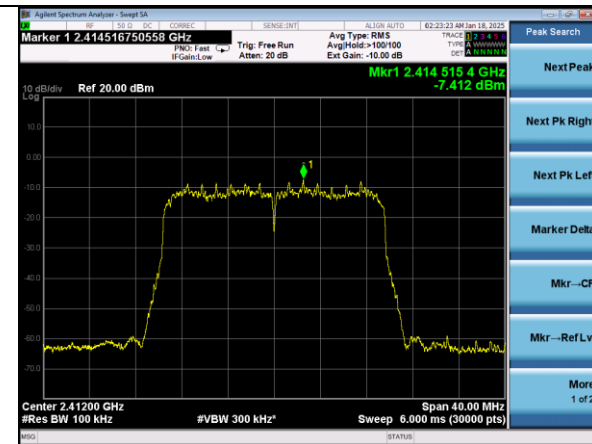
Mode	Rate and RU	Channel	Maximum Average PSD (dBm/100 kHz)	Duty Cycle Correction (dB)	Corrected Output Value (dBm/100 kHz)	Limit (dBm/3 kHz)	Margin (dB)
802.11ax20	MCS0 RU26	1	0.7	0.2	0.9	8.0	7.1
		6	0.8	0.2	1.0	8.0	7.0
		11	1.0	0.2	1.2	8.0	6.8
	MCS0 RU52	1	-2.1	0.2	-1.9	8.0	9.9
		6	-2.1	0.2	-1.9	8.0	9.9
		11	-2.0	0.2	-1.8	8.0	9.8
	MCS0 RU106	1	-4.6	0.2	-4.4	8.0	12.4
		6	-4.5	0.2	-4.3	8.0	12.3
		11	-4.4	0.2	-4.2	8.0	12.2
802.11ax40	MCS0 RU26	3	0.1	0.2	0.3	8.0	7.7
		6	0.0	0.2	0.2	8.0	7.8
		9	0.2	0.2	0.4	8.0	7.6
	MCS0 RU52	3	-2.2	0.2	-2.0	8.0	10.0
		6	-2.1	0.2	-1.9	8.0	9.9
		9	-2.4	0.2	-2.2	8.0	10.2
	MCS0 RU106	3	-3.3	0.2	-3.1	8.0	11.1
		6	-3.3	0.2	-3.1	8.0	11.1
		9	-3.4	0.2	-3.2	8.0	11.2
	MCS0 RU242	3	-10.7	0.2	-10.5	8.0	18.5
		6	-10.6	0.2	-10.4	8.0	18.4
		9	-10.7	0.2	-10.5	8.0	18.5

Plots

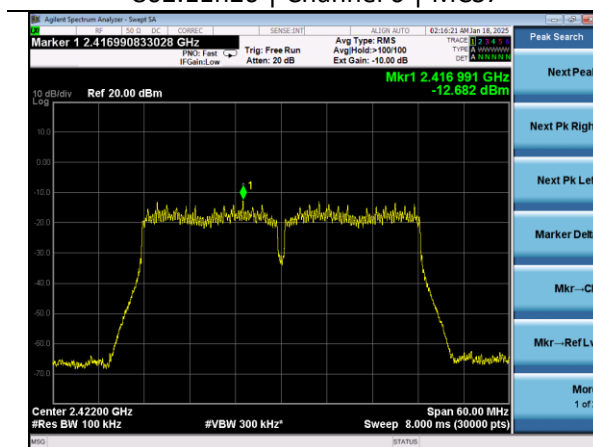




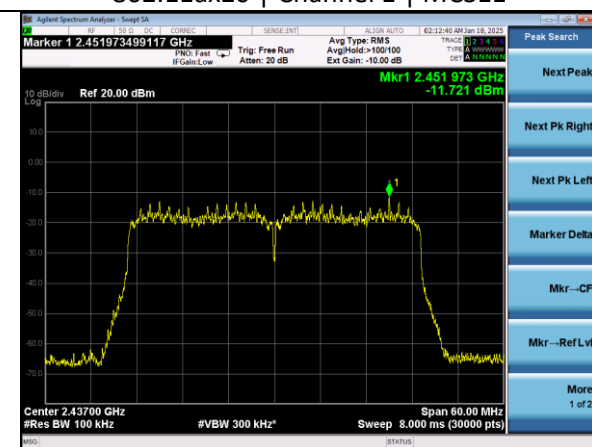
802.11n20 | Channel 6 | MCS7



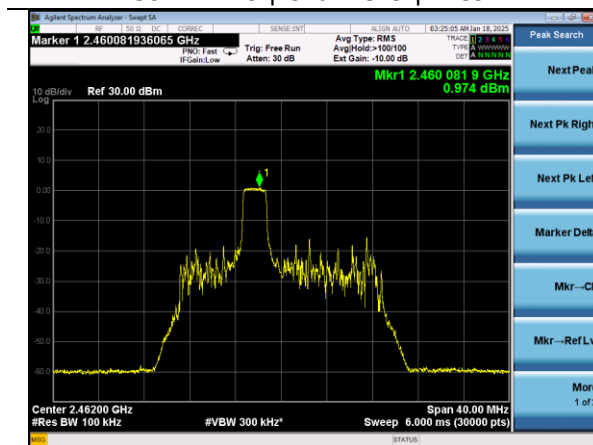
802.11ax20 | Channel 1 | MCS11



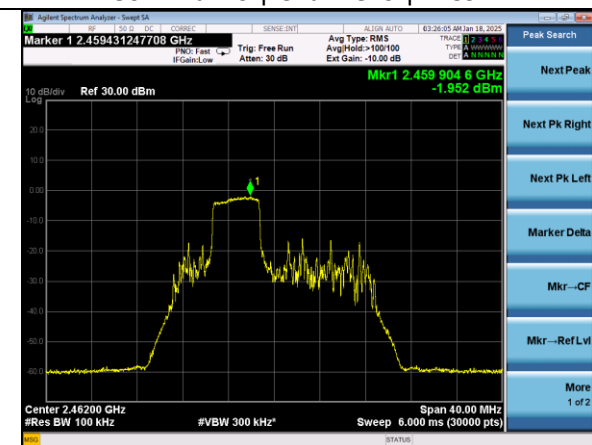
802.11n40 | Channel 3 | MCS7



802.11ax40 | Channel 6 | MCS11



802.11ax20 | RU26 | Channel 11 | MCS0



802.11ax20 | RU52 | Channel 11 | MCS0

6.1.4 Out-of-band Emissions

Operator	Anthony Smith	QA	Adam Hauke
Temperature	22.1°C-22.3°C	R.H. %	23.40%-26.00%
Test Date	2/12/2024-2/14/2024	Location	Conducted RF Bench
Requirement	15.247(d) RSS-247 Clause 5.5	Method	ANSI C63.10 11.12.2.5.2

Limits: 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.

Reference Level (Worst Case PSD)

Channel 6 – 11 Mbps – -8.5 dBm/100 kHz

8.5 dBm-30 dB = -21.5 dBm Limit

Test Parameters

Frequency	30-40000 MHz	Setup	Antenna Port
RBW	100 kHz	VBW	300 kHz
Detector(s)	Peak		

Instrumentation

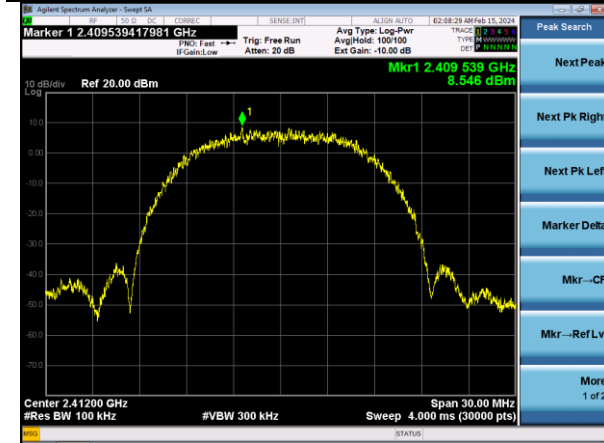
Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960172	Cable	A.H. Systems, Inc.	SAC-26G-1	387	06/13/2023	06/12/2024	Active Verification
EE 960087	Analyzer – Spectrum	Agilent	N9010A	MY53400296	04/11/2023	04/11/2024	Active Calibration

Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.8

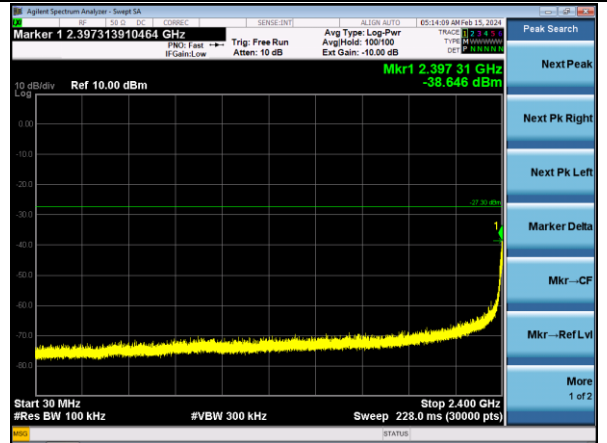
Measurements

Mode	Rate	Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Margin (dB)
802.11b	1 Mbps	1	2398.5	-42.2	-21.5	20.7
		11	2388.0	-45.3	-21.5	23.8
	11 Mbps	1	2399.1	-40.7	-21.5	19.2
		11	2488.0	-46.1	-21.5	24.6
802.11g	6 Mbps	1	2397.3	-38.6	-21.5	17.1
		11	2485.2	-41.4	-21.5	19.9
	54 Mbps	1	2398.2	-41.6	-21.5	20.1
		11	2483.6	-46.4	-21.5	24.9
802.11n20	MCS0	1	2398.5	-38.8	-21.5	17.3
		11	2485.2	-48.0	-21.5	26.5
	MCS7	1	2397.2	-41.6	-21.5	20.1
		11	2485.4	-44.4	-21.5	22.9
802.11n40	MCS0	3	2399.8	-45.4	-21.5	23.9
		9	2488.2	-46.5	-21.5	25.0
	MCS7	3	2397.0	-46.1	-21.5	24.6
		9	2489.5	-47.8	-21.5	26.3
802.11ax20	MCS0	1	2397.0	-42.3	-21.5	20.8
		11	2484.5	-47.2	-21.5	25.7
	MCS11	1	2397.3	-42.4	-21.5	20.9
		11	2484.0	-47.5	-21.5	26.0
802.11ax40	MCS0	3	2385.8	-44.3	-21.5	22.8
		9	2486.0	-42.6	-21.5	21.1
	MCS11	3	2400.0	-45.2	-21.5	23.7
		9	2488.2	-47.7	-21.5	26.2

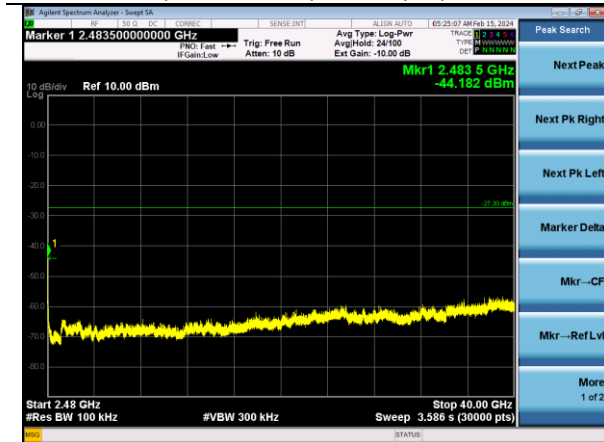
Worst Case Plots



802.11b | Channel 6 | 11 Mbps | Reference



802.11g | Channel 1 | 6 Mbps | 30-2400 MHz



802.11g | Channel 11 | 6 Mbps | 2483.5-40000

6.1.5 Frequency Stability

Operator	Dylan Rosenfeldt	QA	Anthony Smith
Temperature	21.8°C	R.H. %	31.40%
Test Date	04/25/2024	Location	Conducted RF Bench
Requirement	2.1055(d) RSS-GEN Clause 6.11	Method	ANSI C63.10 6.8

Test Parameters

Frequency	2402-2480 MHz	Voltage	4.3 VDC, 5 VDC, and 5.8 VDC
Detector(s)	Peak	Settings	Max Hold
Notes	DC power supply used for voltage variation.		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960173	Cable	A.H. Systems, Inc.	SAC-26G-1	387	06/13/2023	06/12/2024	Active Verification
EE 960088	Analyzer - EMI Receiver	Agilent	N9038A	MY51210138	4/10/2023	4/10/2024	Active Calibration

Table

Channel	Voltage (VDC)	Center Frequency (Hz)
1	5	2411988438
	4.3	2411987753
	5.8	2411987771
6	5	2436987836
	4.3	2463988041
	5.8	2436987758
11	5	2461988107
	4.3	2461987742
	5.8	2461989684

6.2 Radiated Emissions

Description of Measurement	The frequency spectrum is investigated for intentional and / or unintentional signals emanating from the EUT by use of a standardized test site and measurement antenna. The antenna, cable, pre-amp, and other necessary measurement system correction factors are loaded onto the EMI receiver / spectrum analyzer when the measurements are performed allowing the data to be gathered and reported as corrected values. The maximum emissions from the EUT are determined by turn-table azimuth rotation (360°) and scanning of the measurement antenna. Maximized levels are noted at degree values of azimuth, measurement antenna height, and measurement antenna polarity.
Example Calculations	Measurement (dBμV) + Cable factor (dB) + Other (dB) + Antenna Factor (dB/m) = Corrected Reading (dBμV/m) Margin (dB) = Limit (dBμV/m) - Corrected Reading (dBμV/m) Example at 4000 MHz: Reading = 40 dBμV + 3.4 dB + 0.9 dB + 6.5 dB/m = 50.8 dBμV/m Average Limit = 20 log (500) = 54 dBμV/m Margin = 54 dBμV/m - 50.8 dBμV/m = 3.2 dB

Block Diagram



6.2.1 Spurious Radiated Emissions in the Restricted Bands

Operator	Dylan Rosenfeldt	QA	Mitchell Freund Jon Dilley
Temperature	21.7°C-23.6°C	R.H. %	19.00%-21.10%
Test Date	12/04/2024-01/03/2025	Location	Chamber 3 Chamber 5
Requirement	15.247 (d) 15.209 RSS-247 Clause 5.5 RSS-GEN Clause 8.10	Method	ANSI C63.10 11.12.2.4, 11.12.2.5.2.3

15.209 Limits:

Frequency (MHz)	Quasi-Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Peak Limit (dBμV/m)
30-88	40.0	-	-
88-216	43.5	-	-
216-960	46.0	-	-
960-1000	54.0	-	-
1000-40000	-	54.0	74.0

Test Parameters

Frequency	30-40000 MHz	Distance	3 m
Detector(s)	Peak Trace Peak and Average Final	Table height	150 cm
RBW	<1000 MHz – 120 kHz >1000 MHz – 1 MHz	VBW	<1000 MHz – 1.2 MHz >1000 MHz – 3MHz
Example Calculation	Measurement (dBμV/m) + Duty Cycle Correction (dB) = Corrected Measurement (dBμV/m)		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960158	Antenna - Double Ridge Horn	ETS Lindgren	3117	109300	2/7/2024	2/7/2025	Active Calibration
EE 960203	Analyzer - EMI Receiver	Keysight	N9038A	MY56400072	4/10/2024	4/10/2025	Active Calibration
LSC-300	Cable	Chamber 3 Emissions	-	-	1/5/2024	1/5/2025	Active Verification
AA 960007	Antenna - Double Ridge Horn	EMCO	3115	9311-4138	11/19/2024	11/19/2025	Active Calibration
AA 960209	Antenna - Low Noise Amplifier	Mini-Circuits	ZVA-213X-S+	037101808	11/19/2024	11/19/2025	Active Calibration
AA 960154	Filter - High Pass 2.4 GHz	KWM	HPF-L-14186	7272-02	4/10/2024	4/10/2025	Active Calibration

Company: Ezurio	Page 28 of 41	Name: SONA NX611
Report: TR3768-180-2.4G		Model: SONA NX611C
Job: C-3768		Serial: 00026 00028 00042

AA 960174	Antenna - Small Horn	ETS Lindgren	3116C-PA	00206880	12/2/2024	12/2/2025	Active Calibration
AA 960220	Cable	A.H. Systems, Inc.	SAC-26G-6	552	2/16/2024	2/16/2025	Active Verification
AA 960194	Antenna - Biconical	A.H. Systems, Inc.	SAS-540	780	12/9/2024	12/9/2025	Active Calibration
AA 960195	Antenna - Log Periodic	A.H. Systems, Inc.	SAS-512-2	557	11/22/2024	11/23/2025	Active Calibration

EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
EUT	X, Y, Z Plane Orientations	AE	HP Elitebook 840G1 Ezurio – SOM60 Development Kit
Notes	6000 MHz Emission from auxiliary equipment. Not a function of the EUT.		

Spurious Measurements – 30-1000 MHz

Frequency (MHz)	Antenna Polarity	Height (cm)	Azimuth (degree)	Quasi-Peak Reading (dBμV/m)	Quasi-Peak Limit (dBμV/m)	Margin (dB)
197.8	Vertical	100	0	23.2	43.5	20.3
199.6	Horizontal	100	0	29.9	43.5	13.6
893.0	Vertical	100	0	27.9	46.0	18.1
902.8	Horizontal	100	0	27.8	46.0	18.2

*The spurious signals detected do not depend on either the operating channel or the modulation mode

Measurements – Lower Band Edge

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Corrected Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11b	1	1	Peak	2380.0	59.7	74.0	14.3	16
	Mbps	1	Average	2375.6	49.1	54.0	4.9	16
	11	1	Peak	2362.6	59.1	74.0	14.9	16
	Mbps	1	Average	2389.4	49.5	54.0	4.5	16
802.11g	6	1	Peak	2379.7	59.6	74.0	14.4	13
	Mbps	1	Average	2388.2	49.6	54.0	4.4	13
	54	1	Peak	2388.2	60.6	74.0	13.4	13
	Mbps	1	Average	2388.0	49.9	54.0	4.1	13
802.11n20	MCS0	1	Peak	2389.6	60.6	74.0	13.4	13
		1	Average	2389.7	49.6	54.0	4.4	13
	MCS7	1	Peak	2385.9	62.3	74.0	11.7	13
		1	Average	2389.8	49.8	54.0	4.2	13
802.11ax20	MCS0	1	Peak	2355.4	59.7	74.0	14.3	11
		1	Average	2385.7	49.0	54.0	5.0	11
	MCS1	1	Peak	2388.1	61.9	74.0	12.1	11
		1	Average	2389.2	49.7	54.0	4.3	11
802.11n40	MCS0	3	Peak	2388.7	61.0	74.0	13.0	8
		3	Average	2389.2	49.0	54.0	5.0	8
	MCS7	3	Peak	2327.1	59.4	74.0	14.6	8
		3	Average	2390.0	49.5	54.0	4.5	8
802.11ax40	MCS0	3	Peak	2377.9	59.6	74.0	14.4	8
		3	Average	2384.4	49.0	54.0	5.0	8
	MCS1	3	Peak	2389.9	59.8	74.0	14.2	8
		3	Average	2388.6	50.0	54.0	4.0	8

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Corrected Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax20 RU26	MCS0	1	Peak	2387.2	63.2	74.0	10.8	12
		1	Average	2386.7	49.3	54.0	4.7	12
	MCS11	1	Peak	2388.1	62.4	74.0	11.6	12
		1	Average	2388.2	49.9	54.0	4.1	12
802.11ax20 RU52	MCS0	1	Peak	2389.3	64.6	74.0	9.4	12
		1	Average	2387.8	49.2	54.0	4.8	12
	MCS11	1	Peak	2389.5	65.7	74.0	8.3	12
		1	Average	2383.2	49.6	54.0	4.4	12
802.11ax20 RU106	MCS0	1	Peak	2385.2	65.8	74.0	8.2	13
		1	Average	2387.7	49.9	54.0	4.1	13
	MCS11	1	Peak	2389.6	65.6	74.0	8.4	13
		1	Average	2389.3	50.7	54.0	3.3	13
802.11ax40 RU26	MCS0	3	Peak	2374.0	64.8	74.0	9.2	12
		3	Average	2388.2	49.8	54.0	4.2	12
	MCS11	3	Peak	2372.5	65.9	74.0	8.1	12
		3	Average	2389.7	50.3	54.0	3.7	12
802.11ax40 RU52	MCS0	3	Peak	2387.5	67.8	74.0	6.2	12
		3	Average	2389.9	49.3	54.0	4.7	12
	MCS7	3	Peak	2376.7	68.2	74.0	5.8	12
		3	Average	2389.8	50.0	54.0	4.0	12
802.11ax40 RU106	MCS0	3	Peak	2389.5	72.0	74.0	2.0	14
		3	Average	2389.4	51.1	54.0	2.9	14
	MCS11	3	Peak	2389.6	71.8	74.0	2.2	14
		3	Average	2388.1	52.2	54.0	1.8	14
802.11ax40 RU242	MCS0	3	Peak	2385.7	60.4	74.0	13.6	10
		3	Average	2378.8	49.2	54.0	4.8	10
	MCS11	3	Peak	2388.3	60.1	74.0	13.9	10
		3	Average	2388.5	49.8	54.0	4.2	10

Measurements – Upper Band Edge

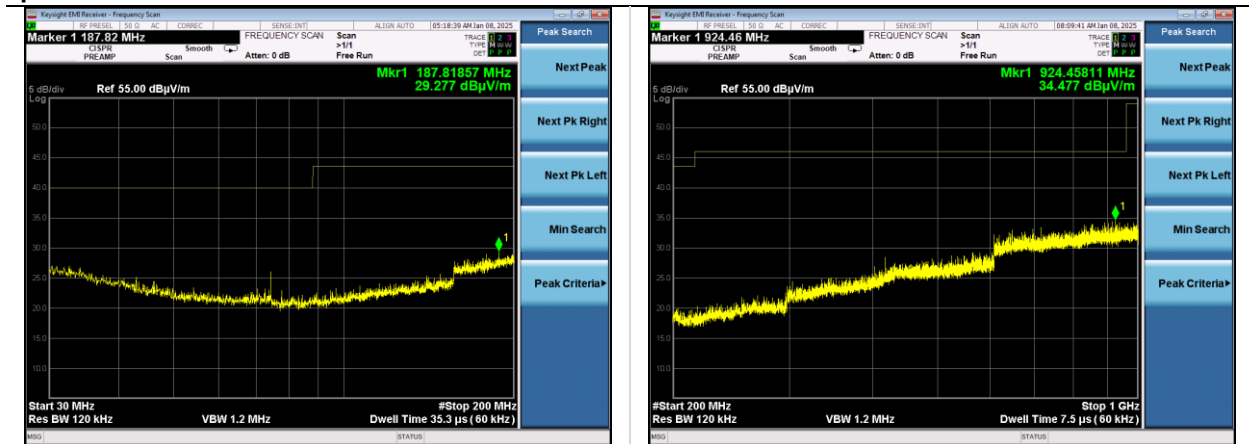
Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Corrected Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11b	1	11	Peak	2488.5	60.5	74.0	13.5	16
	Mbps	11	Average	2487.4	51.8	54.0	2.2	16
	11	11	Peak	2484.6	61.1	74.0	12.9	16
	Mbps	11	Average	2486.9	51.2	54.0	2.8	16
802.11g	6	11	Peak	2484.2	68.8	74.0	5.2	13
	Mbps	11	Average	2484.2	52.7	54.0	1.3	13
	54	11	Peak	2483.7	68.2	74.0	5.8	13
	Mbps	11	Average	2483.7	52.7	54.0	1.3	13
802.11n20	MCS0	11	Peak	2484.8	71.0	74.0	3.0	13
		11	Average	2484.4	53.4	54.0	0.6	13
	MCS7	11	Peak	2484.1	70.4	74.0	3.6	13
		11	Average	2483.7	53.4	54.0	0.6	13
802.11ax20	MCS0	11	Peak	2484.0	66.7	74.0	7.3	11
		11	Average	2483.8	52.1	54.0	1.9	11
	MCS11	11	Peak	2485.7	63.7	74.0	10.3	11
		11	Average	2483.6	52.0	54.0	2.0	11
802.11n40	MCS0	9	Peak	2487.4	66.3	74.0	7.7	8
		9	Average	2488.7	51.7	54.0	2.3	8
	MCS7	9	Peak	2486.8	63.7	74.0	10.3	8
		9	Average	2489.7	51.9	54.0	2.1	8
802.11ax40	MCS0	9	Peak	2486.4	64.5	74.0	9.5	8
		9	Average	2484.0	51.5	54.0	2.5	8
	MCS11	9	Peak	2487.7	65.6	74.0	8.4	8
		9	Average	2488.4	52.7	54.0	1.3	8

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Corrected Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax20 RU26	MCS0	11	Peak	2485.8	70.4	74.0	3.6	12
		11	Average	2486.6	50.7	54.0	3.3	12
	MCS11	11	Peak	2483.5	70.5	74.0	3.5	12
		11	Average	2484.4	52.2	54.0	1.8	12
802.11ax20 RU52	MCS0	11	Peak	2484.4	72.1	74.0	1.9	12
		11	Average	2483.9	51.4	54.0	2.6	12
	MCS11	11	Peak	2485.4	73.4	74.0	0.6	12
		11	Average	2484.5	52.9	54.0	1.1	12
802.11ax20 RU106	MCS0	11	Peak	2485.4	70.4	74.0	3.6	13
		11	Average	2483.8	52.1	54.0	1.9	13
	MCS11	11	Peak	2484.8	70.0	74.0	4.0	13
		11	Average	2484.5	52.6	54.0	1.4	13
802.11ax40 RU26	MCS0	9	Peak	2488.2	72.8	74.0	1.2	12
		9	Average	2485.0	51.8	54.0	2.2	12
	MCS11	9	Peak	2484.0	73.1	74.0	0.9	12
		9	Average	2483.7	50.9	54.0	3.1	12
802.11ax40 RU52	MCS0	9	Peak	2484.7	72.8	74.0	1.2	12
		9	Average	2483.6	51.0	54.0	3.0	12
	MCS7	9	Peak	2484.1	72.9	74.0	1.1	12
		9	Average	2486.5	52.0	54.0	2.0	12
802.11ax40 RU106	MCS0	9	Peak	2484.2	72.3	74.0	1.7	14
		9	Average	2484.1	53.1	54.0	0.9	14
	MCS11	9	Peak	2483.8	72.6	74.0	1.4	14
		9	Average	2483.6	52.6	54.0	1.4	14
802.11ax40 RU242	MCS0	9	Peak	2483.6	66.3	74.0	7.7	10
		9	Average	2483.9	52.8	54.0	1.2	10
	MCS11	9	Peak	2484.2	66.9	74.0	7.1	10
		9	Average	2483.6	53.1	54.0	0.9	10

Spurious Measurements – 1000-40000 MHz

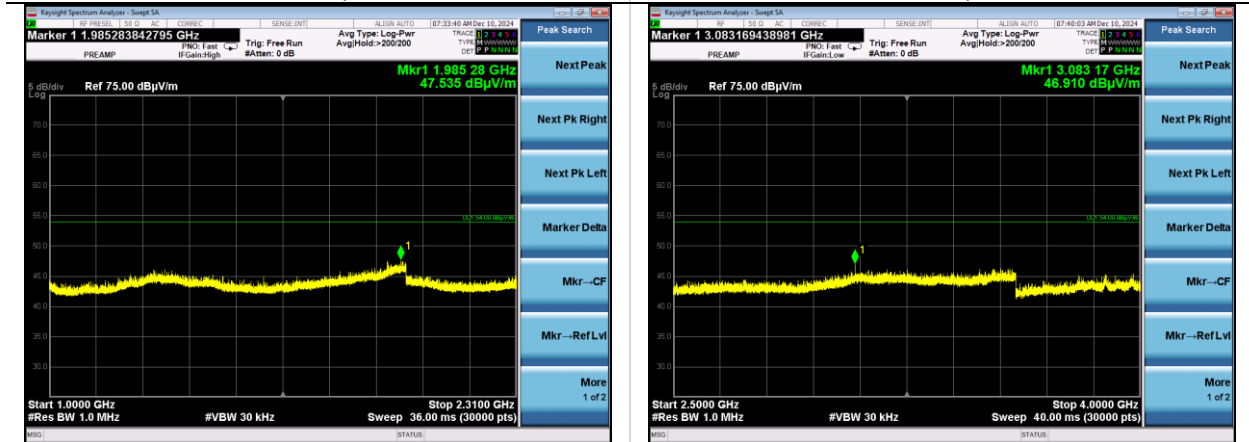
Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Corrected Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11b	1 Mbps	6	Peak	23983.5	58.5	74.0	15.5	16
		6	Average	23983.5	44.8	54.0	9.2	16
		6	Peak	39253.3	58.3	74.0	15.7	16
		6	Average	39253.3	45.7	54.0	8.3	16

Spurious Plots



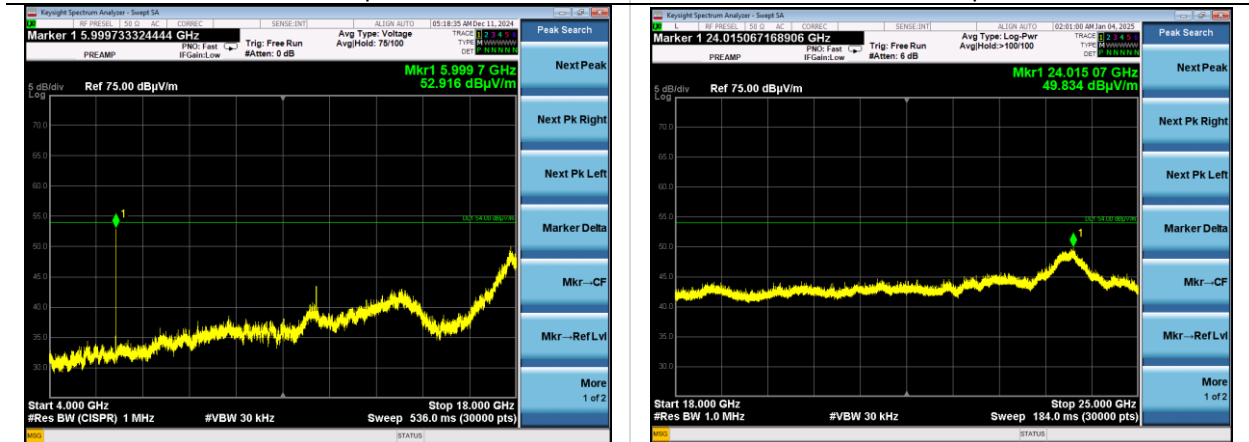
802.11b | Channel 6 | 1 Mbps |
30-200 MHz | Vertical

802.11b | Channel 6 | 1 Mbps |
200-1000 MHz | Horizontal



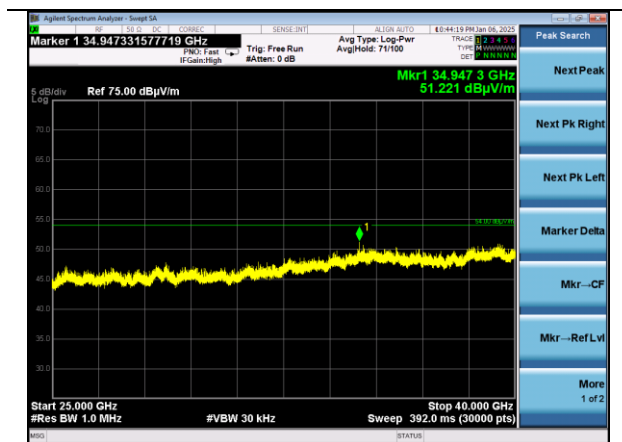
802.11b | Channel 1 | 1Mbps |
1000-2310 MHz | Vertical

802.11b | Channel 1 | 1Mbps |
2500-4000 MHz | Horizontal



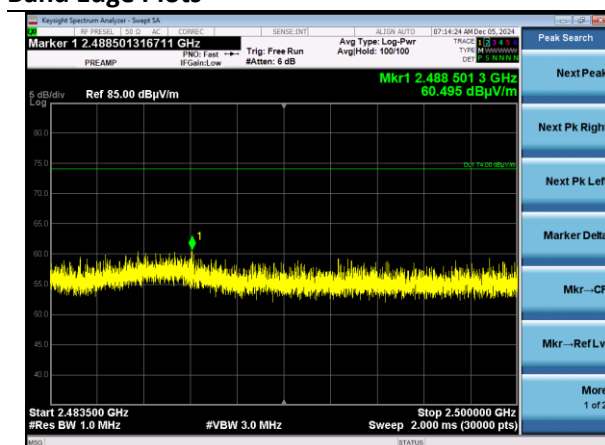
802.11b | Channel 6 | 1Mbps |
4000-18000 MHz | Vertical

802.11b | Channel 6 | 1 Mbps |
18000-25000 MHz | Vertical

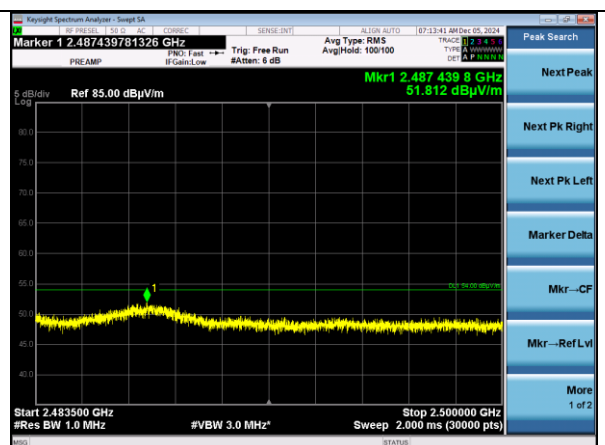


802.11b | Channel 6 | 1 Mbps |
 25000-40000 MHz | Horizontal

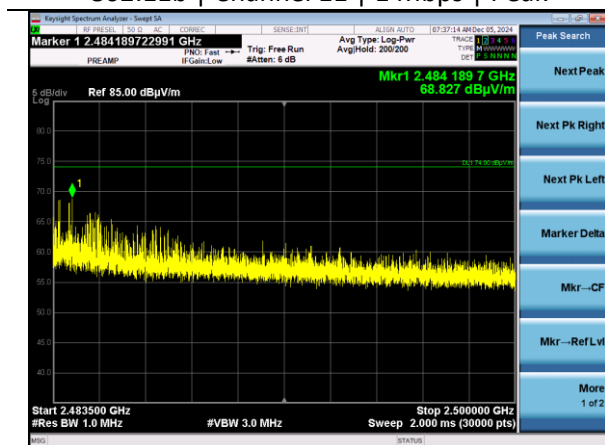
Band Edge Plots



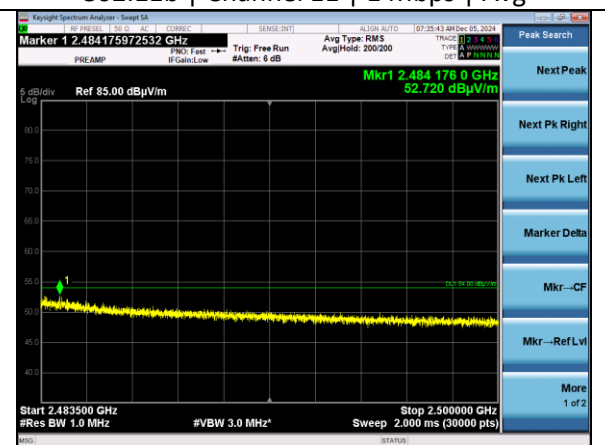
802.11b | Channel 11 | 1 Mbps | Peak



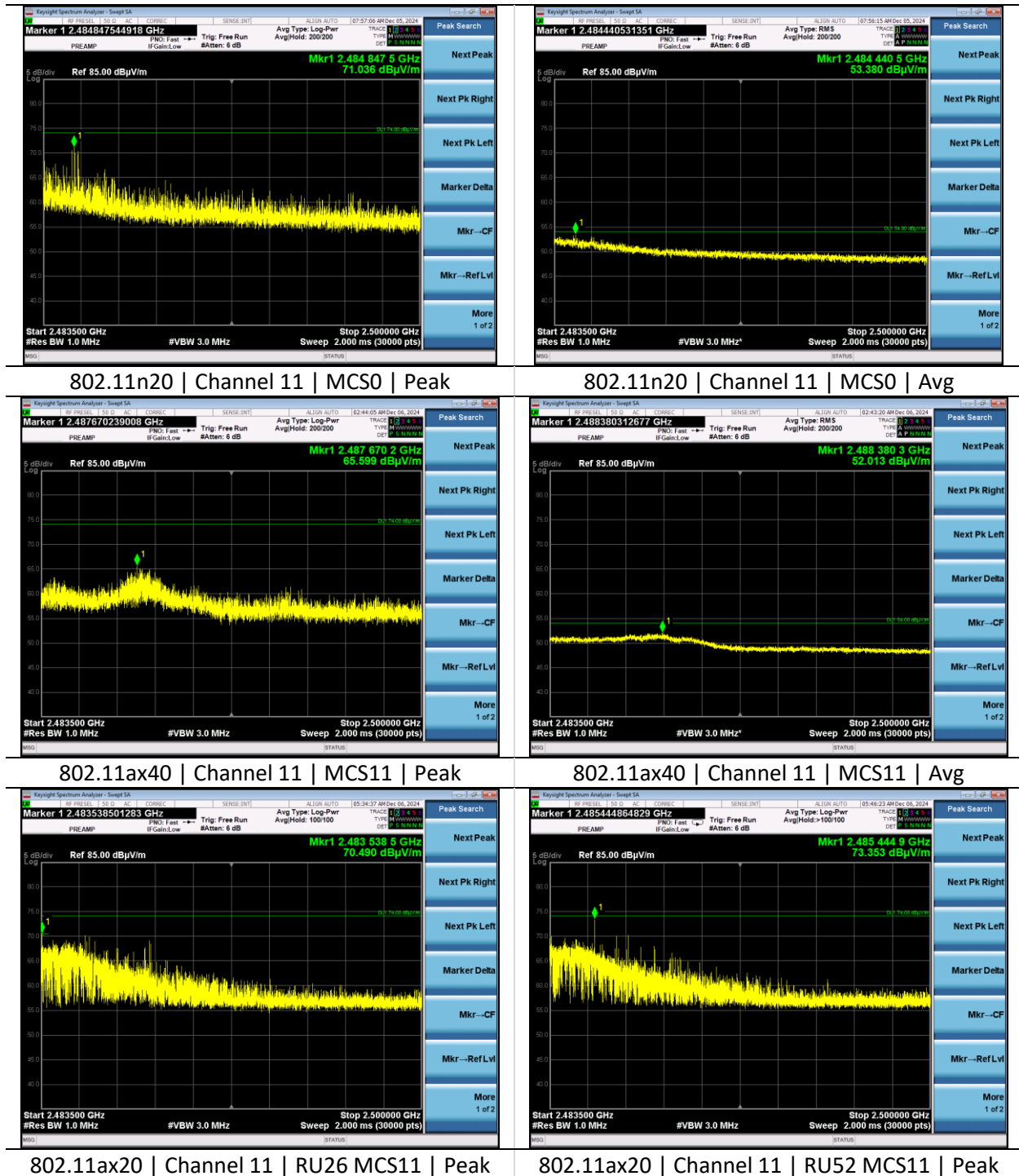
802.11b | Channel 11 | 1 Mbps | Avg

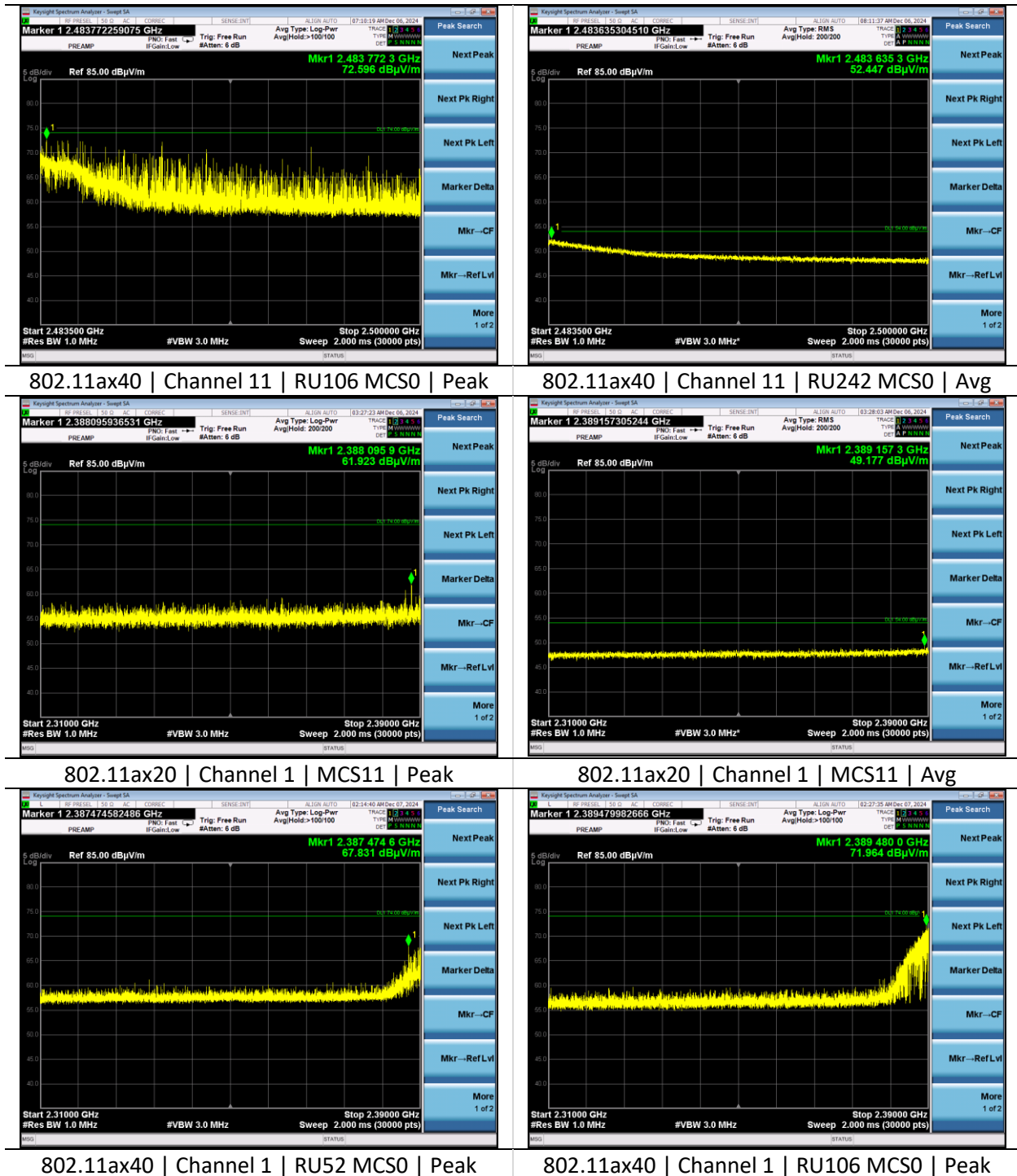


802.11g | Channel 11 | 6 Mbps | Peak



802.11g | Channel 11 | 6 Mbps | Avg





6.3 AC Mains Conducted Emissions

A line impedance stabilization network (LISN) or artificial mains network (AMN) allows the emissions of the power supply conductors to be measured while isolating the EUT from the supply mains.

Description of Measurement

The AMN, cable, and other necessary measurement system correction factors are loaded onto the EMI receiver when the measurements are performed. The data is gathered and reported as the corrected values.

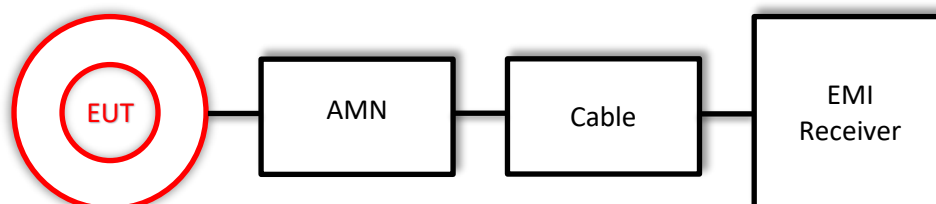
Maximum emissions are determined with a peak max hold trace then measurements at a selection of the highest points are made with quasi-peak and average detectors. Results are recorded and compared to limit for each line. (e.g. line and neutral)

Example Calculations

Measurement (dBμV) + Cable factor (dB) + Other (dB) = Corrected Reading (dBμV)

Margin (dB) = Limit (dBμV) - Corrected Reading (dBμV)

Block Diagram



6.3.1 AC Mains Conducted Emissions

Operator	Jon Dille	QA	Adam Hauke
Temperature	21.2°C	R.H. %	28.40%
Test Date	04/05/2024	Location	AC Conducted Bench
Requirement	15.207 RSS-GEN 8.8	Method	ANSI C63.10

Limits:

Frequency (MHz)	Quasi-Peak Limit (dBμV)	Average Limit (dBμV)
0.15-0.5	66.0-56.0*	56.0-46.0*
0.5-5	56.0	46.0
5-30	60.0	50.0

*Decreases with the logarithm of the frequency.

Test Parameters

Frequency	0.15-30 MHz	Distance	40 cm from wall 80 cm from LISN
Detector(s)	Peak Trace Quasi-Peak, Average Final	Table height	80 cm
RBW	9 kHz	VBW	62 kHz
Notes	Channel has no effect on emission		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
EE 960088	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/27/2023	4/27/2024	Active Calibration
EE 960089	LISN	COM-POWER	LI-215A	191943	4/10/2023	4/10/2024	Active Calibration
EE 960162	LISN	COM-POWER	LI-215A	191969	4/10/2023	4/10/2024	Active Calibration
LSC-212	Cable	Micro-Coax	UFB311A-0-1440-70U70U	64639 224071-001	1/8/2024	1/8/2025	Active Verification

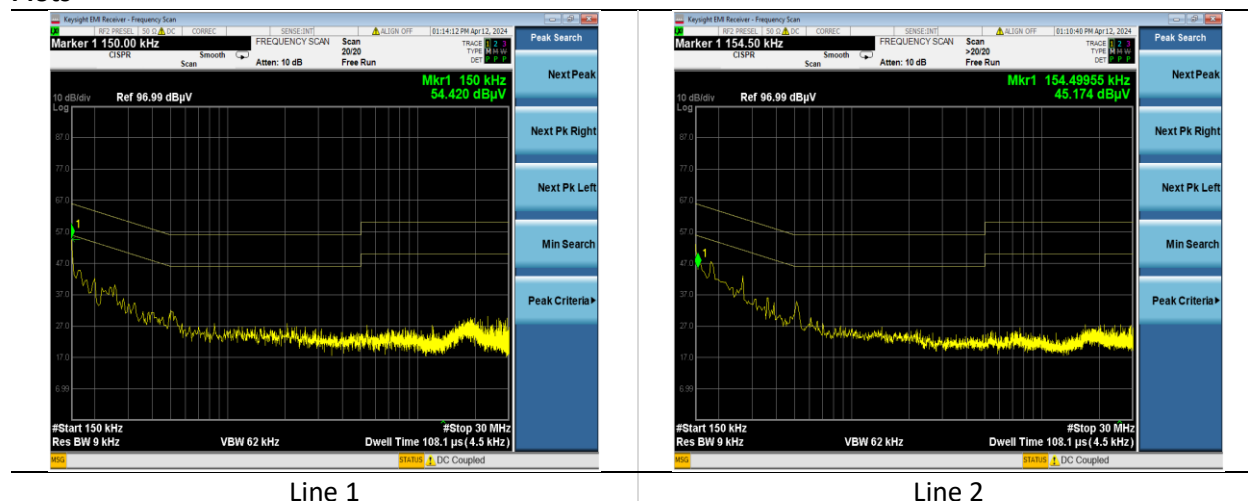
EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx Channel 6
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Measurements

Line	Frequency (MHz)	Quasi Peak Reading (dBμV)	Quasi-Peak Limit (dBμV)	Quasi Peak Margin (dB)	Average Reading (dBμV)	Average Limit (dBμV)	Average Margin (dB)
1	0.150	50.2	66.0	15.8	32.6	56.0	23.4
1	0.318	39.2	59.8	20.6	22.8	49.8	27.0
1	0.486	28.2	56.2	28.0	20.2	46.2	26.0
2	0.159	46.1	65.5	19.4	30.7	55.5	24.8
2	0.300	35.3	60.2	24.9	23.6	50.2	26.6
2	0.908	23.1	56.0	32.9	15.8	46.0	30.2

Plots



7 REVISION HISTORY

Version	Date	Notes	Person
0	01/21/2025	Initial Draft	Dylan Rosenfeldt
1	02/10/2025	Revised Draft	Dylan Rosenfeldt
2	02/12/2025	Final Draft	Dylan Rosenfeldt

END OF REPORT