

TR3818-2.4G

Equipment Under Test:	SONA TI351
Requirement(s):	eCFR 47 Part 15.247 RSS-247
Test Date(s):	06/27/2024 - 10/01/2024
Prepared for:	Ezurio Attn: Brian Petted W66 N220 Commerce Ct. Cedarburg, WI 53012

Report Issued by: Dylan Rosenfeldt, EMC Engineer	
Signature: 	Date: 10/22/2024
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Signature: 	Date: 10/22/2024
Report Constructed by: Dylan Rosenfeldt, EMC Engineer	
Signature: 	Date: 10/22/2024

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Company: Ezurio	Page 1 of 61	Name: SONA TI351
Report: TR3818-2.4G		Model: SONA TI351
Job: C-3818		Serial: 00013 00008

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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

Company: Ezurio	Page 3 of 61	Name: SONA TI351
Report: TR3818-2.4G		Model: SONA TI351
Job: C-3818		Serial: 00013 00008

1 TEST REPORT SUMMARY

During **06/27/2024-10/01/2024** the Equipment Under Test (EUT), **SONA TI351**, 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

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 TI351
Model Number	SONA TI351
Serial Number	00013 00008
FCC ID	SQG-SONATI351
IC ID	3147A-SONATI351

2.2 Product Description

The TI351 is based upon TI CC3351 Wi-Fi 6 chipset. Feature-set includes 802.11 a/b/g/n/ac/ax Wi-Fi 6 and Bluetooth Low Energy v5.4.

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 - image-imx8mp-evk-rdvk 1.0.0.5

Ancillary Equipment

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

Development Kit, NXP 8MPLUS-BB

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

OUTPUT: USB Type C 45W, 5V/3A; 9V/3A; 15V/3 A; 20V/2.25 A

HP Elitebook 840G1

TeraTerm Version: 5.1

2.6 Antenna Information

Manufacturer	Model	Part Number	Dimension	Type	Peak Gain (dBi)	
					2400-2500 MHz	4900-5925 MHz
Ezurio	FlexPIFA 6E	EFB2471A3S-10MH4L	16mm X 36mm X 2.5mm	PIFA	2.2	3.9
Ezurio	Mini NanoBlade Flex 6E	EMF2471A3S-10MH4L	36mm X 12mm X 0.3mm	PCB Dipole	2.4	4.4
Ezurio	FlexPIFA	001-0021	38.5mm X 12.7mm X 2.5mm	PIFA	2.5	3.0
Joymax Electronics	N/A	TWX-100BRS3B	137mm X 13mm	Dipole	2.0	4.0
Ezurio	FlexPIFA	EFB2455A3S-15MH4L	2.5mm X 38.6mm X 12.7mm	PIFA	2.5	3.0
Ezurio	Mini NanoBlade Flex	EMF2449A1-10MH4L	36mm x 12mm x 0.1mm	PIFA	2.8	3.4
Ezurio	NanoBlade	ENB2449A1-10MH4L	50.8mm x 16.5mm	PCB Dipole	3.2	4.1

2.7 Test Channels

Channel	Frequency (MHz)	Bandwidth (MHz)	Data Rates
1	2412	20	802.11b – 1 and 11 Mbps
6	2437	20	802.11g – 6 and 54 Mbps
11	2462	20	802.11n – MCS0 and MCS7 802.11ax – MCS0 and MCS7

2.8 Power Table and Reduced Video Bandwidth for Average Measurements

Mode	Channel BW (MHz)	Data Rate	Minimum Average VBW (Hz)
802.11b	20	1 Mbps	36
802.11b	20	11 Mbps	363
802.11g	20	6 Mbps	212
802.11g	20	54 Mbps	1839
802.11n	20	MCS0	216
802.11n	20	MCS7	545
802.11ax	20	MCS0	217
802.11ax	20	MCS7	545
802.11ax RU26	20	MCS0	241
802.11ax RU26	20	MCS7	2097
802.11ax RU52	20	MCS0	475
802.11ax RU52	20	MCS7	3664
802.11ax RU106	20	MCS0	968
802.11ax RU106	20	MCS7	6098
802.11ax RU242	20	MCS0	2101
802.11ax RU242	20	MCS7	9175

3 WORST CASE TEST RESULTS SUMMARY

Requirement	Mode	Channel and Data Rate	Frequency (MHz)	Measurement	Limit	Margin
15.247 (a)(2) RSS-247 Clause 5.2(a)	802.11b	11 11Mbps	2462	12.34MHz	500kHz	11.86MHz
15.247 (b)(3) RSS-247 Clause 5.4 (d)	802.11b	6 1Mbps	2437	15.4dBm	330dBm	14.6dB
15.247 (e) RSS-247 Clause 5.2 (b)	802.11ax	6 MCS0 RU26	2437	0.6dBm	8dBm/3kHz	7.4dB
15.247 (d) RSS-247 Clause 5.5 Conducted	802.11ax	1 MCS0 RU26	2399.1	-22.2dBm	-20.6dBm	1.6dB
	802.11ax	1 MCS7	2389.7	52.5dBuV/m	54.0dBuV/m	1.5dB
15.247(d) RSS-247 Clause 5.5 RSS-GEN Clause 8.10 Radiated	802.11b	1 1Mbps	17849.7	45.6dBuV/m	54dBuV/m	8.4dB
15.207 RSS-GEN Clause 8.8	802.11b	6 1Mbps	0.177	49.2dBuV	64.6dBuV	15.4dB

4 REFERENCES

Publication	Edition	Date	AMD 1	AMD 2
FCC eCFR 47 Part 15	-	2024	-	-
ANSI C63.10	-	2020	-	-
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

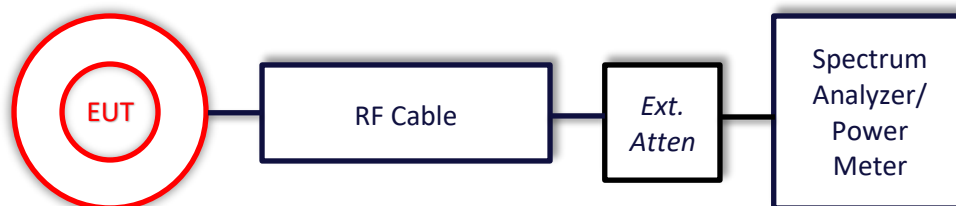
Parameter	ETSI U.C. $\pm$	U.C. $\pm$
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
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	Dylan Rosenfeldt	QA	Anthony Smith
Temperature	23.0°C 22.2°C	R.H. %	25.6% 24.7%
Test Date	06/27/2024-06/28/2024	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	510 kHz	VBW	5 MHz
Detector(s)	Peak	Settings	Max Hold

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 960088	Analyzer - EMI Receiver	Agilent	N9038A	MY51210138	4/10/2023	4/10/2024	Active Calibration

EUT Parameters

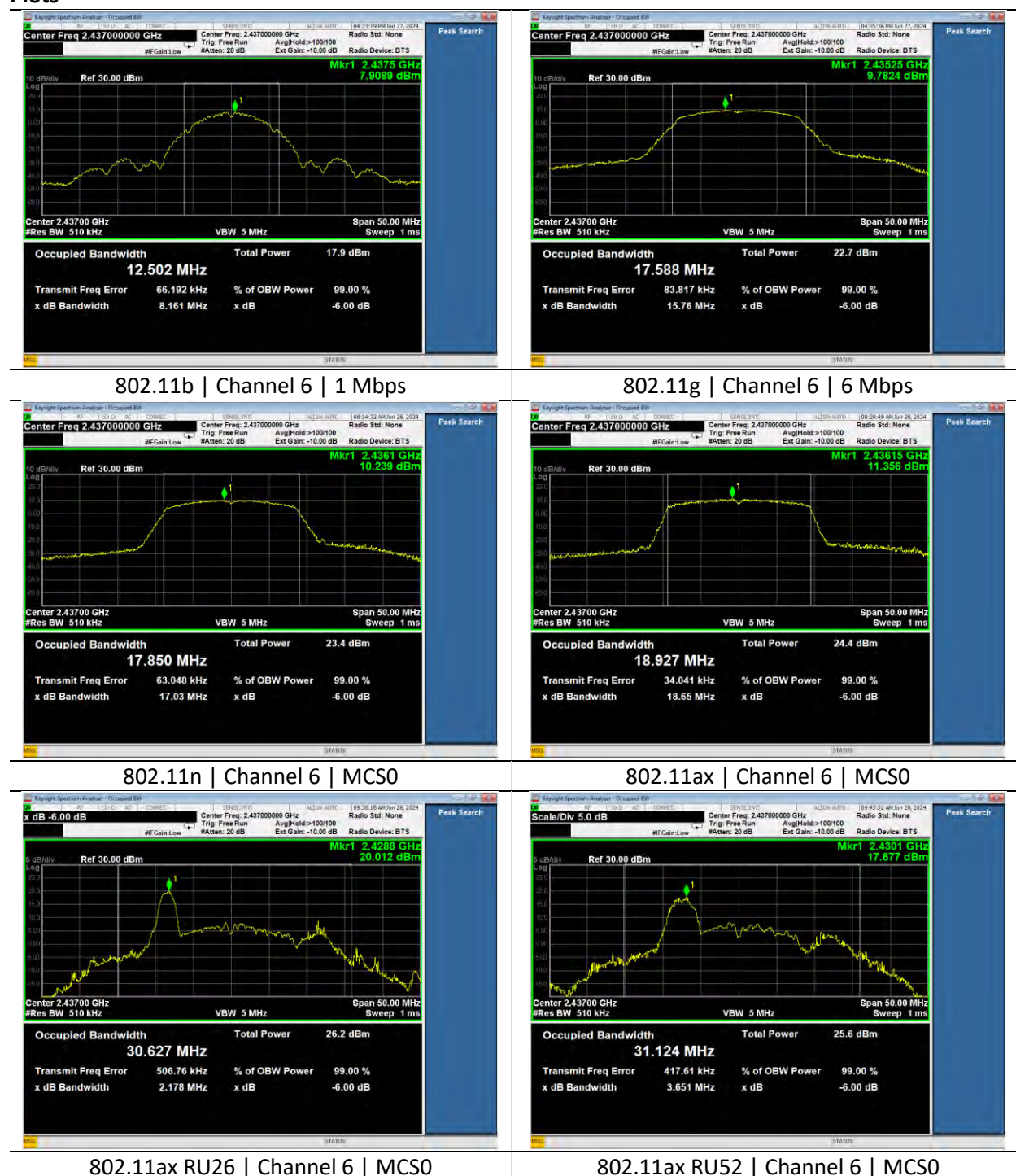
Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.10

Table

Mode	Rate	Channel	99% BW (MHz)	6 dB BW (MHz)
802.11b	1 Mbps	1	12.47	8.16
		6	12.50	8.16
		11	12.53	8.17
	11 Mbps	1	12.34	8.03
		6	12.37	7.96
		11	12.34	7.86
802.11g	6 Mbps	1	17.37	15.76
		6	17.59	15.76
		11	17.42	15.58
	54 Mbps	1	18.66	14.82
		6	18.95	14.63
		11	18.80	15.45
802.11n	MCS0	1	17.82	16.92
		6	17.85	17.03
		11	17.81	16.48
	MCS7	1	18.83	16.04
		6	18.83	16.51
		11	18.97	15.54
802.11ax	MCS0	1	18.93	18.25
		6	18.93	18.65
		11	18.91	18.60
	MCS7	1	19.64	18.42
		6	19.56	18.45
		11	19.64	18.37

Mode	Rate	Channel	99% BW (MHz)	6 dB BW (MHz)
802.11ax RU26	MCS0	1	29.32	2.04
		6	30.63	2.18
		11	29.04	2.14
	MCS7	1	31.52	1.98
		6	32.49	2.06
		11	32.73	1.99
802.11ax RU52	MCS0	1	30.66	3.67
		6	31.12	3.65
		11	31.33	3.65
	MCS7	1	32.53	3.74
		6	32.44	3.67
		11	32.88	3.76
802.11ax RU106	MCS0	1	32.29	7.91
		6	33.07	7.94
		11	33.03	7.84
	MCS7	1	34.16	8.14
		6	33.91	8.14
		11	34.30	8.13
802.11ax RU242	MCS0	1	35.42	18.74
		6	35.66	18.73
		11	35.74	18.31
	MCS7	1	36.77	18.73
		6	36.87	18.63
		11	36.88	18.60

Plots





802.11ax RU106 | Channel 6 | MCS0



802.11ax RU242 | Channel 6 | MCS0

6.1.2 RF Output Power

Operator	Dylan Rosenfeldt	QA	Anthony Smith
Temperature	22.7°C 22.6°C	R.H. %	65.4% 42.5%
Test Date	06/28/2024 – 07/01/2024	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	390 kHz	VBW	1.2 MHz
Detector(s)	RMS	Settings	Trace Average Span: 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	04/11/2024	04/11/2025	Active Calibration

EUT Parameters

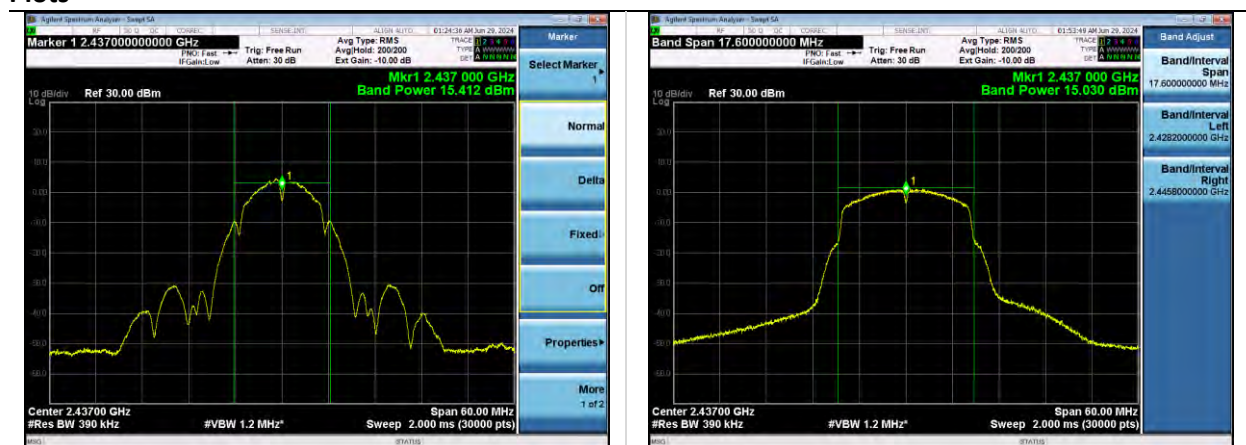
Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.10

Tables

Mode	Rate	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
802.11b	1 Mbps	1	14.7	0.0	14.7	30.0	15.3	30
		6	15.4	0.0	15.4	30.0	14.6	30
		11	15.1	0.0	15.1	30.0	14.9	30
	11 Mbps	1	15.1	0.2	15.3	30.0	14.7	30
		6	15.2	0.2	15.4	30.0	14.6	30
		11	15.2	0.2	15.4	30.0	14.6	30
802.11g	6 Mbps	1	12.1	0.1	12.2	30.0	17.8	27
		6	15.0	0.1	15.1	30.0	14.9	30
		11	11.3	0.1	11.4	30.0	18.6	26
	54 Mbps	1	11.6	0.8	12.4	30.0	17.6	27
		6	13.3	0.8	14.1	30.0	15.9	30
		11	10.5	0.8	11.3	30.0	18.7	26
802.11n	MCS0	1	11.4	0.1	11.5	30.0	18.5	27
		6	14.8	0.1	14.9	30.0	15.1	30
		11	12.1	0.1	12.2	30.0	17.8	27
	MCS7	1	11.9	0.2	12.1	30.0	17.9	27
		6	13.5	0.2	13.7	30.0	16.3	30
		11	11.6	0.2	11.8	30.0	18.2	27
802.11ax	MCS0	1	11.8	0.1	11.9	30.0	18.1	27
		6	14.6	0.1	14.7	30.0	15.3	30
		11	10.9	0.1	11.0	30.0	19.0	26
	MCS7	1	11.6	0.2	11.8	30.0	18.2	27
		6	13.4	0.2	13.6	30.0	16.4	30
		11	10.8	0.2	11.0	30.0	19.0	26

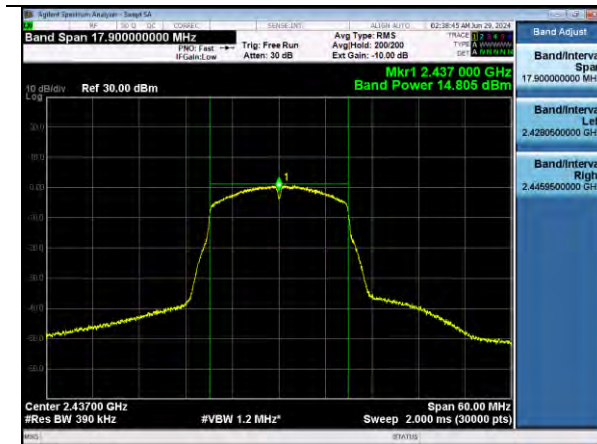
Mode	Rate and RU	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)	Power Setting
802.11ax	MCS0 RU26	1	2.1	0.3	2.4	30	27.6	18
		6	11.9	0.3	12.2	30	17.8	27
		11	0.5	0.3	0.8	30	29.2	15
	MCS7 RU26	1	1.4	1.7	3.1	30	26.9	18
		6	10.8	1.7	12.5	30	17.5	27
		11	-1.0	1.7	0.7	30	29.3	15
	MCS0 RU52	1	2.5	0.5	3.0	30	27.0	18
		6	12.7	0.5	13.2	30	16.8	28
		11	-0.6	0.5	-0.1	30	30.1	14
	MCS7 RU52	1	0.6	2.7	3.3	30	26.7	18
		6	11.1	2.7	13.8	30	16.2	28
		11	-2.5	2.7	0.2	30	29.8	14
	MCS0 RU106	1	-1.2	0.9	-0.3	30	30.3	14
		6	12.9	0.9	13.8	30	16.2	28
		11	-2.8	0.9	-1.9	30	31.9	13
	MCS7 RU106	1	-4.0	3.9	-0.1	30	30.1	14
		6	9.7	3.9	13.6	30	16.4	28
		11	-5.7	3.9	-1.8	30	31.8	13
	MCS0 RU242	1	-1.1	1.7	0.6	30	29.4	15
		6	12.6	1.7	14.3	30	15.7	30
		11	-4.5	1.7	-2.8	30	32.8	12
	MCS7 RU242	1	-4.0	5.0	1.0	30	29.0	15
		6	8.9	5.0	13.9	30	16.1	30
		11	-7.6	5.0	-2.6	30	32.6	12

Plots

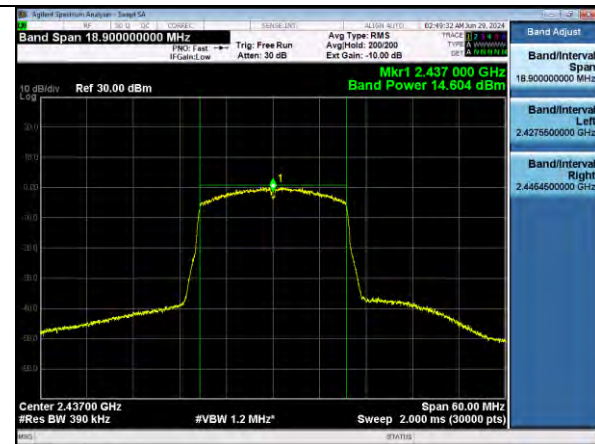


802.11b | Channel 6 | 1 Mbps

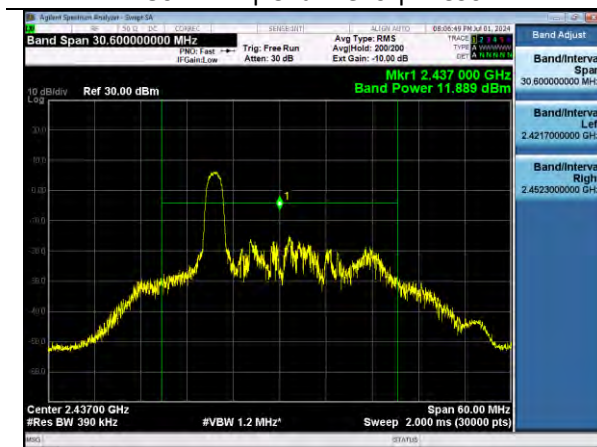
802.11g | Channel 6 | 54 Mbps



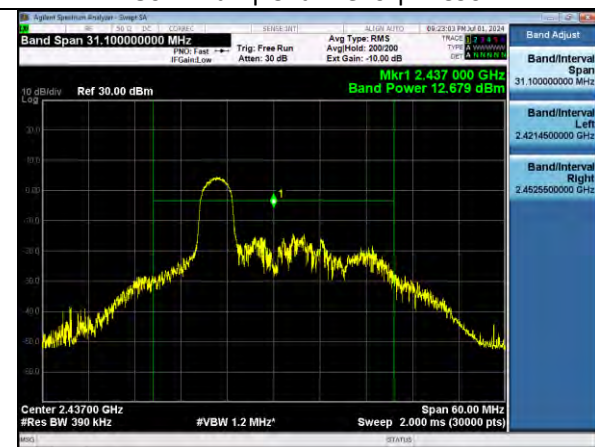
802.11n | Channel 6 | MCS0



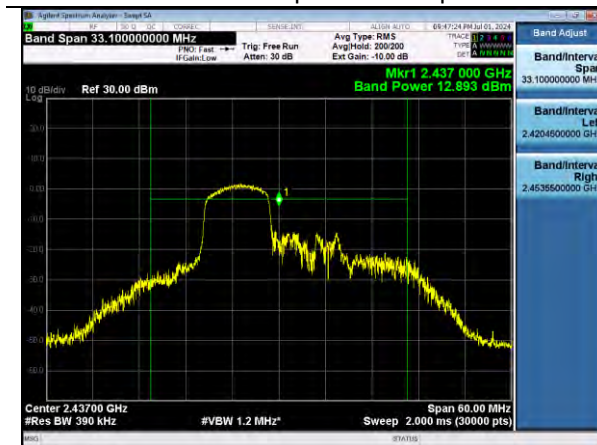
802.11ax | Channel 6 | MCS0



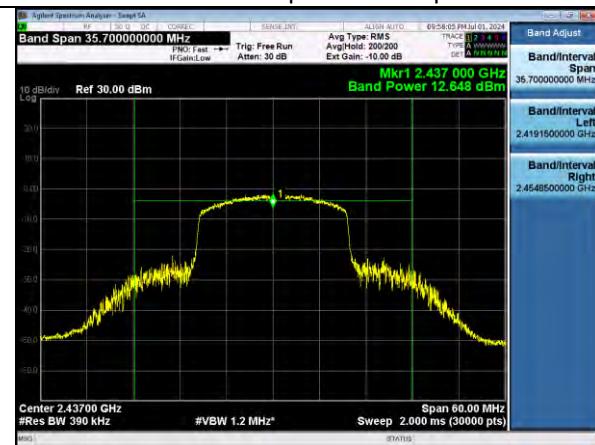
802.11ax RU26 | Channel 6 | MCS0



802.11ax RU52 | Channel 6 | MCS0



802.11ax RU106 | Channel 6 | MCS0



802.11ax RU242 | Channel 6 | MCS0

6.1.3 Power Spectral Density

Operator	Dylan Rosenfeldt	QA	Anthony Smith
Temperature	22.7°C 22.6°C	R.H. %	65.4% 42.5%
Test Date	06/28/2024 – 07/01/2024	Location	Conducted RF Bench
Requirement	15.247 (e) RSS-247 Clause 5.2 (b)	Method	ANSI C63.10 11.10.5 AVGPS-2

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

Test Parameters

Frequency	2400-2483.5 MHz	Setup	Antenna Port
RBW	100 kHz	VBW	300 kHz
Detector(s)	RMS	Settings	Trace Average Span: 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	04/11/2024	04/11/2025	Active Calibration

EUT Parameters

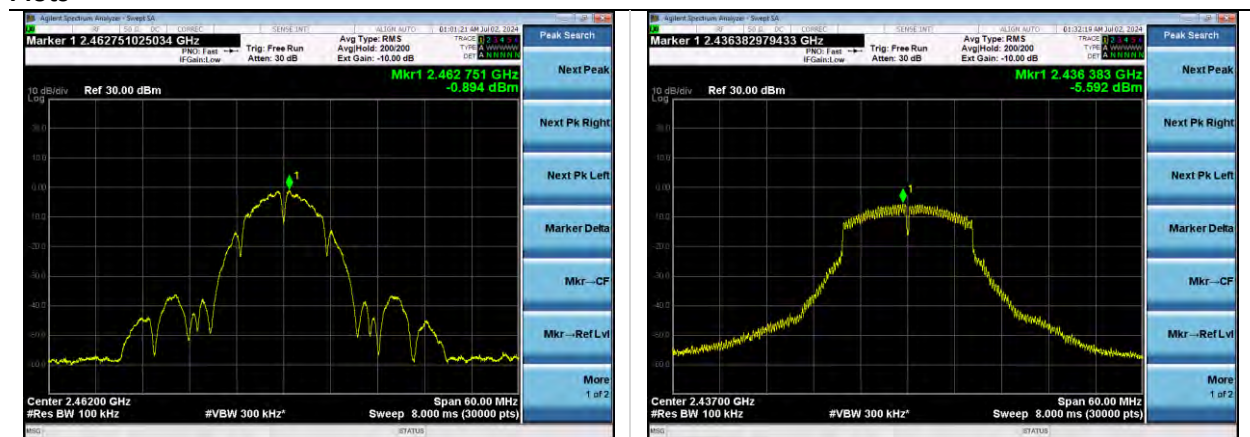
Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.10

Table

Mode	Rate	Channel	Average PSD (dBm)	Duty Cycle Correction (dB)	Corrected PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)	Power Setting
802.11b	1 Mbps	1	-1.0	0.0	-1.0	8	9.0	30
		6	-0.9	0.0	-0.9	8	8.9	30
		11	-0.9	0.0	-0.9	8	8.9	30
	11 Mbps	1	-1.8	0.2	-1.6	8	9.6	30
		6	-1.9	0.2	-1.7	8	9.7	30
		11	-1.7	0.2	-1.5	8	9.5	30
802.11g	6 Mbps	1	-7.2	0.1	-7.1	8	15.1	27
		6	-4.0	0.1	-3.9	8	11.9	30
		11	-7.5	0.1	-7.4	8	15.4	26
	54 Mbps	1	-7.2	0.8	-6.4	8	14.4	27
		6	-5.6	0.8	-4.8	8	12.8	30
		11	-8.2	0.8	-7.4	8	15.4	26
802.11n	MCS0	1	-7.4	0.1	-7.3	8	15.3	27
		6	-4.4	0.1	-4.3	8	12.3	30
		11	-7.2	0.1	-7.1	8	15.1	27
	MCS7	1	-7.3	0.2	-7.1	8	15.1	27
		6	-5.7	0.2	-5.5	8	13.5	30
		11	-8.2	0.2	-8.0	8	16.0	27
802.11ax	MCS0	1	-8.6	0.1	-8.5	8	16.5	27
		6	-5.5	0.1	-5.4	8	13.4	30
		11	-9.6	0.1	-9.5	8	17.5	26
	MCS7	1	-8.5	0.2	-8.3	8	16.3	27
		6	-6.9	0.2	-6.7	8	14.7	30
		11	-9.7	0.2	-9.5	8	17.5	26

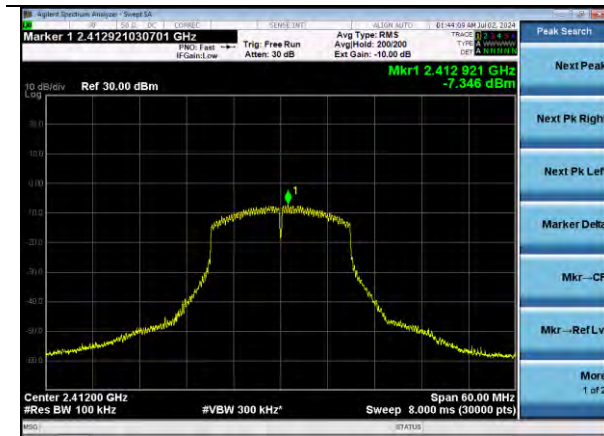
Mode	Rate and RU	Channel	Average PSD (dBm)	Duty Cycle Correction (dB)	Corrected PSD (dBm)	Limit (dBm/3kHz)	Margin (dB)	Power Setting
802.11ax	MCS0 RU26	1	-8.7	0.3	-8.4	8	16.4	18
		6	0.3	0.3	0.6	8	7.4	27
		11	-11.1	0.3	-10.8	8	18.8	15
	MCS7 RU26	1	-10.3	1.7	-8.6	8	16.6	18
		6	-0.2	1.7	1.5	8	6.5	27
		11	-12.4	1.7	-10.7	8	18.7	15
	MCS0 RU52	1	-11.6	0.5	-11.1	8	19.1	18
		6	-1.6	0.5	-1.1	8	9.1	28
		11	-14.5	0.5	-14.0	8	22.0	14
	MCS7 RU52	1	-13.2	2.7	-10.5	8	18.5	18
		6	-4.0	2.7	-1.3	8	9.3	28
		11	-17.1	2.7	-14.4	8	22.4	14
	MCS0 RU106	1	-18.6	0.9	-17.7	8	25.7	14
		6	-4.3	0.9	-3.4	8	11.4	28
		11	-20.0	0.9	-19.1	8	27.1	13
	MCS7 RU106	1	-20.8	3.9	-16.9	8	24.9	14
		6	-7.2	3.9	-3.3	8	11.3	28
		11	-22.0	3.9	-18.1	8	26.1	13
	MCS0 RU242	1	-21.3	1.7	-19.6	8	27.6	15
		6	-6.4	1.7	-4.7	8	12.7	30
		11	-24.7	1.7	-23.0	8	31.0	12
	MCS7 RU242	1	-21.5	5.0	-16.5	8	24.5	15
		6	-8.2	5.0	-3.2	8	11.2	30
		11	-25.7	5.0	-20.7	8	28.7	12

Plots

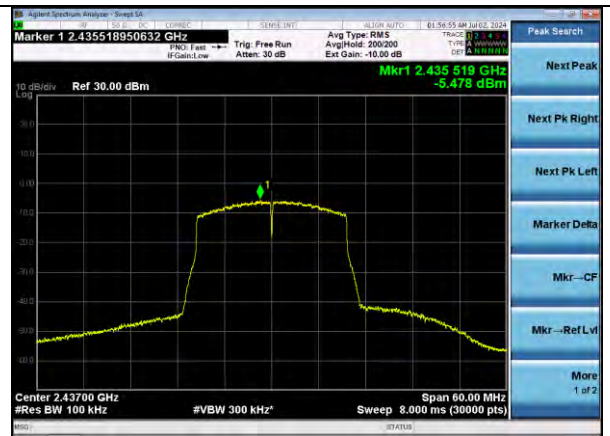


802.11b | Channel 11 | 1 Mbps

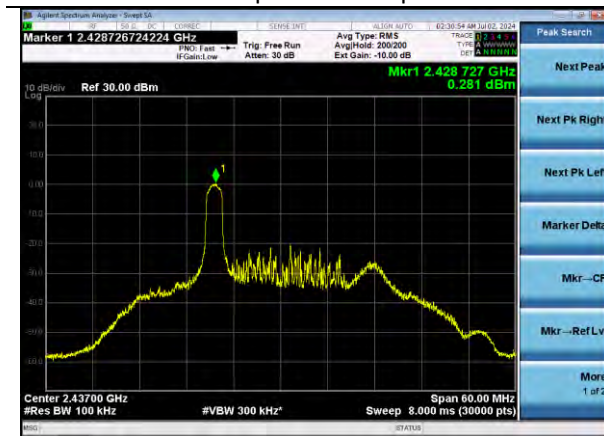
802.11g | Channel 6 | 54 Mbps



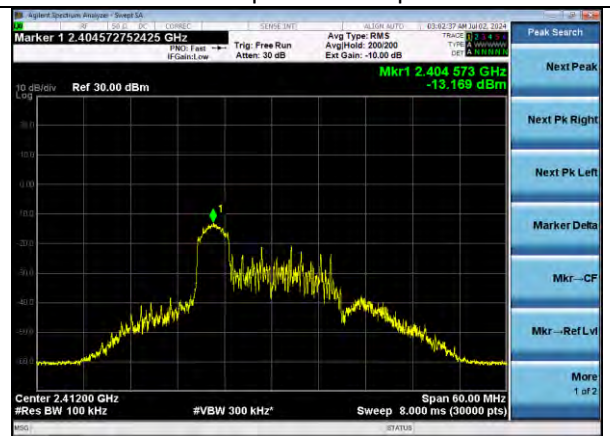
802.11n | Channel 1 | MCS7



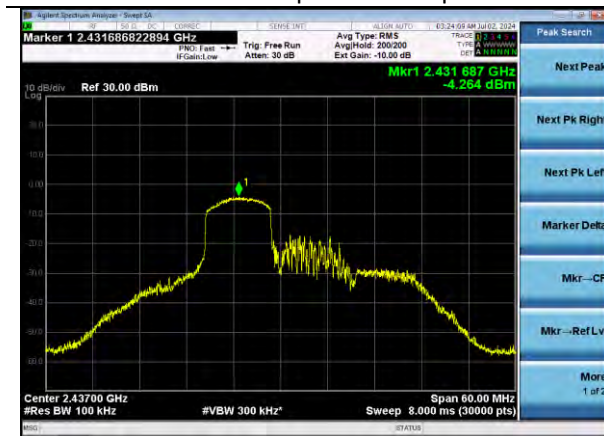
802.11ax | Channel 6 | MCS0



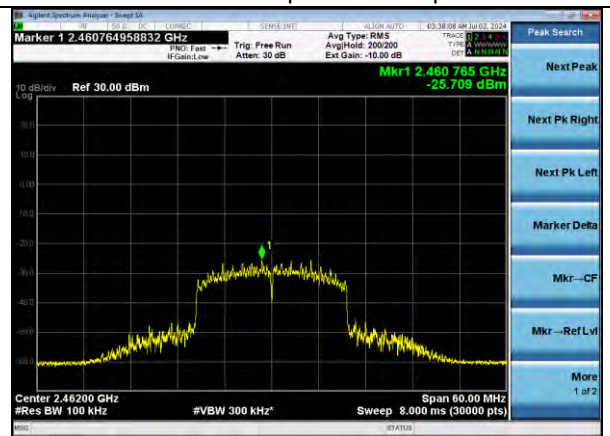
802.11ax RU26 | Channel 6 | MCS0



802.11ax RU52 | Channel 1 | MCS7



802.11ax RU106 | Channel 6 | MCS0



802.11ax RU242 | Channel 11 | MCS7

6.1.4 Emissions in Non-Restricted Frequency Bands

Operator	Dylan Rosenfeldt	QA	Anthony Smith
Temperature	22.4°C-22.8°C	R.H. %	44.7%-47.9%
Test Date	07/17/2024, 08/06/2024, 08/19/2024	Location	Conducted RF Bench
Requirement	15.247(d) RSS-247 Clause 5.5	Method	ANSI C63.10 11.12.2.5.2

Limits: -30dBc

Reference Level (Worst Case PSD)

Channel 6 – 1 Mbps – 7.3 dBm/100 kHz

7.3 dBm-30 dB = -22.3 dBm Limit

Test Parameters

Frequency	30-25000 MHz	Setup	Antenna Port
RBW	100 kHz	VBW	300 kHz
Detector(s)	Peak and Average (RMS)		

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	04/11/2024	04/11/2025	Active Calibration
AA 960153	Filter - High Pass 2.4 GHz	KWM	HPF-L-14186	7272-04	4/11/2024	4/11/2025	Active Calibration

EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.10

Measurements

Mode	Rate	Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Margin (dB)
802.11b	1 Mbps	1	2398.0	-28.1	-22.7	5.4
	11 Mbps	1	2397.9	-27.0	-22.7	4.3
802.11g	6 Mbps	1	2399.8	-34.0	-22.7	11.3
	54 Mbps	1	2399.5	-28.0	-22.7	5.3
802.11n	MCS0	1	2399.8	-30.9	-22.7	8.2
	MCS7	1	2399.8	-28.5	-22.7	5.8
802.11ax	MCS0	1	2400.0	-29.9	-22.7	7.2
	MCS7	1	2399.4	-29.4	-22.7	6.7
802.11b	1 Mbps	1	3216.0	-51.0	-22.7	28.3
		6	3249.3	-49.9	-22.7	27.2
		11	3282.7	-52.3	-22.7	29.6
	11 Mbps	1	3216.0	-51.5	-22.7	28.8
		6	3249.3	-49.9	-22.7	27.2

Mode	Rate	Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Margin (dB)
802.11ax	MCS0	1	2399.1	-22.2	-20.6	1.6
RU26	MCS7	1	2399.1	-22.4	-20.6	1.8
802.11ax	MCS0	1	2399.0	-22.7	-20.6	2.1
RU52	MCS7	1	2397.9	-23.4	-20.6	2.8
802.11ax	MCS0	1	2398.8	-26.4	-20.6	5.8
RU106	MCS7	1	2399.2	-27.6	-20.6	7.0
802.11ax	MCS0	1	2399.3	-25.9	-20.6	5.3
RU242	MCS7	1	2398.1	-25.0	-20.6	4.4

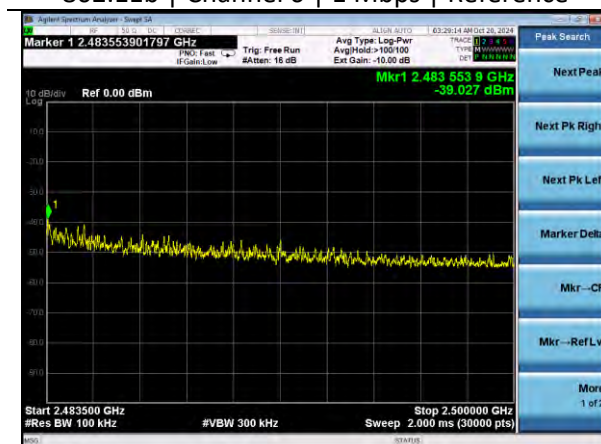
Worst Case Plots



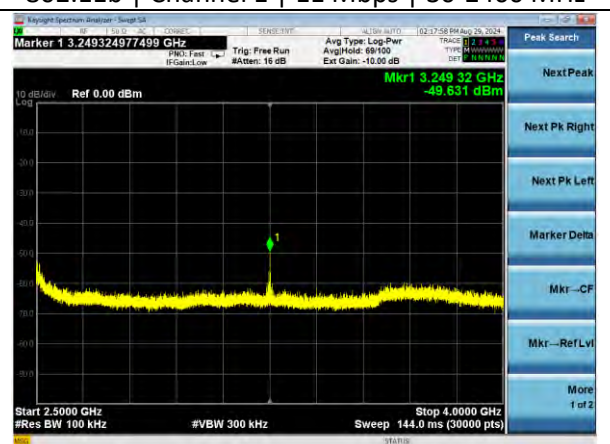
802.11b | Channel 6 | 1 Mbps | Reference



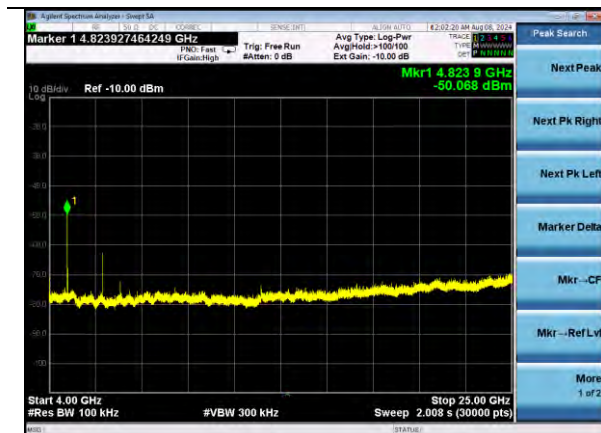
802.11b | Channel 1 | 11 Mbps | 30-2400 MHz



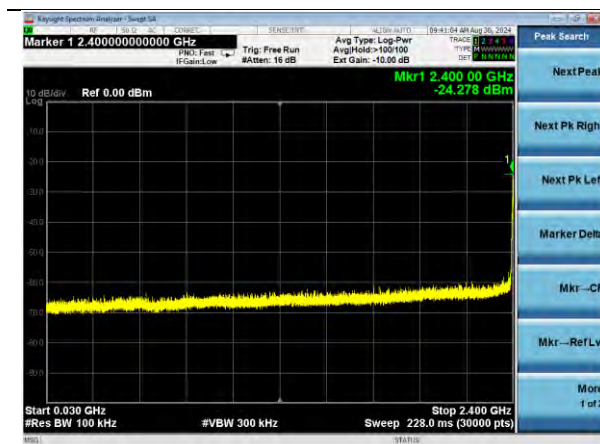
802.11n | Channel 11 | MCS0 | 2483.5-4000 MHz



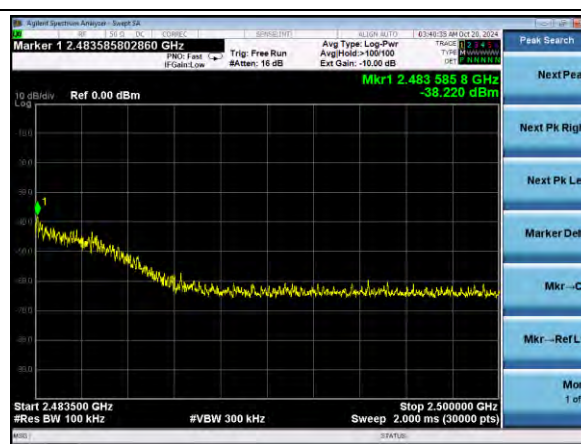
802.11b | Channel 6 | 1 Mbps | 2500-4000 MHz



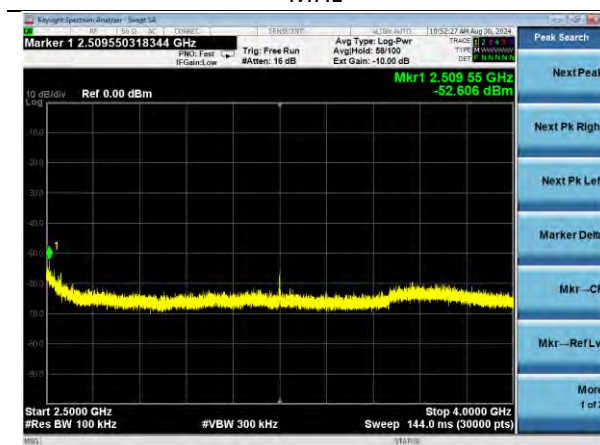
802.11b | Channel 1 | 1 Mbps | 4000-25000 MHz



802.11ax RU26 | Channel 1 | MCS0 | 30-2400 MHz



802.11ax RU106 | Channel 11 | MCS7 | 2483.5-2500 MHz



802.11ax RU26 | Channel 6 | MCS0 | 2500-4000 MHz

6.1.5 Spurious Emissions in Restricted Bands

Operator	Dylan Rosenfeldt	QA	Anthony Smith, Jon Dille
Temperature	22.0°C-22.9°C	R.H. %	41.3%-51.0%
Test Date	06/20/2024-06/27/2024	Location	Conducted RF Bench
Requirement	15.247(d) RSS-247 Clause 5.5	Method	ANSI C63.10 11.12.2.5.2

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	30-25000 MHz	Setup	Antenna Port
RBW	1 MHz	VBW	3 MHz
Detector(s)	Peak	Settings	Terminated
Notes	Declared antenna gain 3.2 dBi		
Example Calculations	Correction Factor = $20 \log (1/D)$, where D is the duty cycle EIRP = Measurement + Antenna Gain + Correction Factor E-Field = $EIRP - 20 \log 3 + 104.8$		

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	04/11/2024	04/11/2025	Active Calibration
AA 960153	Filter - High Pass 2.4 GHz	KWM	HPF-L-14186	7272-04	4/11/2024	4/11/2025	Active Calibration

EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
Frequency	2400-2483.5 MHz	Channel	See 2.10

Measurements – Lower Band Edge

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	EIRP (dBm)	E-Field (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11b	1 Mbps	1	Peak	2383.9	-41.4	-38.2	57.1	74.0	16.9	30
		1	Average	2379.6	-52.1	-48.9	46.4	54.0	7.6	30
	11 Mbps	1	Peak	2389.3	-40.3	-37.1	58.2	74.0	15.8	30
		1	Average	2390.0	-54.6	-51.4	43.9	54.0	10.1	30
802.11g	6 Mbps	1	Peak	2387.3	-28.4	-25.2	70.1	74.0	3.9	27
		1	Average	2389.9	-47.4	-44.2	51.1	54.0	2.9	27
	54 Mbps	1	Peak	2387.9	-28.4	-25.2	70.1	74.0	3.9	27
		1	Average	2389.9	-48.8	-45.6	49.7	54.0	4.3	27
802.11g	6 Mbps	2	Peak	2385.6	-26.4	-23.2	72.1	74.0	1.9	28
		2	Average	2390.0	-50.2	-47.0	48.3	54.0	5.7	28
	54 Mbps	2	Peak	2387.0	-27.4	-24.2	71.1	74.0	2.9	28
		2	Average	2390.0	-52.6	-49.4	45.9	54.0	8.1	28
802.11g	6 Mbps	3	Peak	2386.3	-35.0	-31.8	63.5	74.0	10.5	30
		3	Average	2389.9	-51.8	-48.6	46.7	54.0	7.3	30
	54 Mbps	3	Peak	2389.9	-28.0	-24.8	70.5	74.0	3.5	30
		3	Average	2389.7	-52.0	-48.8	46.5	54.0	7.5	30
802.11n	MCS0	1	Peak	2387.3	-29.4	-26.2	69.1	74.0	4.9	27
		1	Average	2390.0	-47.9	-44.7	50.6	54.0	3.4	27
	MCS7	1	Peak	2389.3	-33.7	-30.5	64.8	74.0	9.2	27
		1	Average	2390.0	-47.4	-44.2	51.1	54.0	2.9	27
802.11n	MCS0	2	Peak	2388.7	-31.0	-27.8	67.5	74.0	6.5	30
		2	Average	2389.9	-47.3	-44.1	51.2	54.0	2.8	30
	MCS7	2	Peak	2388.2	-27.7	-24.5	70.8	74.0	3.2	30
		2	Average	2390.0	-49.2	-46.0	49.3	54.0	4.7	30
802.11ax	MCS0	1	Peak	2387.7	-30.7	-27.5	67.8	74.0	6.2	27
		1	Average	2390.0	-46.1	-42.9	52.4	54.0	1.6	27
	MCS7	1	Peak	2388.3	-27.2	-24.0	71.3	74.0	2.7	27
		1	Average	2389.7	-46.0	-42.8	52.5	54.0	1.5	27
802.11ax	MCS0	2	Peak	2389.0	-26.3	-23.1	72.2	74.0	1.8	28
		2	Average	2389.8	-48.4	-45.2	50.1	54.0	3.9	28
	MCS7	2	Peak	2389.8	-26.1	-22.9	72.4	74.0	1.6	28
		2	Average	2390.0	-48.2	-45.0	50.3	54.0	3.7	28
802.11ax	MCS0	3	Peak	2387.2	-32.9	-29.7	65.6	74.0	8.4	30
		3	Average	2389.9	-48.5	-45.3	50.0	54.0	4.0	30
	MCS7	3	Peak	2387.3	-27.4	-24.2	71.1	74.0	2.9	30
		3	Average	2389.9	-50.3	-47.1	48.2	54.0	5.8	30

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	EIRP (dBm)	E-Field (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax RU26	MCS0	1	Peak	2389.6	-27.8	-24.6	70.7	74.0	3.3	18
		1	Average	2389.9	-62.2	-59.0	36.3	54.0	17.7	18
	MCS7	1	Peak	2388.8	-27.4	-24.2	71.1	74.0	2.9	18
		1	Average	2389.9	-60.5	-57.3	38.0	54.0	16.0	18
802.11ax RU26	MCS0	2	Peak	2388.2	-30.1	-26.9	68.4	74.0	5.6	26
		2	Average	2390.0	-57.4	-54.2	41.1	54.0	12.9	26
	MCS7	2	Peak	2382.2	-30.1	-26.9	68.4	74.0	5.6	26
		2	Average	2390.0	-55.9	-52.7	42.6	54.0	11.4	26
802.11ax RU26	MCS0	3	Peak	2386.7	-27.1	-23.9	71.4	74.0	2.6	27
		3	Average	2382.0	-57.1	-53.9	41.4	54.0	12.6	27
	MCS7	3	Peak	2381.4	-27.7	-24.5	70.8	74.0	3.2	27
		3	Average	2382.1	-55.4	-52.2	43.1	54.0	10.9	27
802.11ax RU26	MCS0	4	Peak	2389.2	-29.7	-26.5	68.8	74.0	5.2	27
		4	Average	2387.0	-57.4	-54.2	41.1	54.0	12.9	27
	MCS7	4	Peak	2381.7	-30.5	-27.3	68.0	74.0	6.0	27
		4	Average	2387.1	-56.1	-52.9	42.4	54.0	11.6	27
802.11ax RU26	MCS0	5	Peak	2383.9	-28.4	-25.2	70.1	74.0	3.9	27
		5	Average	2388.7	-58.7	-55.5	39.8	54.0	14.2	27
	MCS7	5	Peak	2389.8	-27.7	-24.5	70.8	74.0	3.2	27
		5	Average	2389.6	-57.1	-53.9	41.4	54.0	12.6	27
802.11ax RU26	MCS0	6	Peak	2388.1	-26.9	-23.7	71.6	74.0	2.4	28
		6	Average	2326.9	-57.5	-54.3	41.0	54.0	13.0	28
	MCS7	6	Peak	2377.2	-31.2	-28.0	67.3	74.0	6.7	28
		6	Average	2326.7	-57.5	-54.3	41.0	54.0	13.0	28
802.11ax RU52	MCS0	1	Peak	2389.5	-26.5	-23.3	72.0	74.0	2.0	18
		1	Average	2390.0	-59.3	-56.1	39.2	54.0	14.8	18
	MCS7	1	Peak	2389.2	-26.2	-23.0	72.3	74.0	1.7	18
		1	Average	2390.0	-56.8	-53.6	41.7	54.0	12.3	18
802.11ax RU52	MCS0	2	Peak	2388.3	-30.6	-27.4	67.9	74.0	6.1	26
		2	Average	2390.0	-55.1	-51.9	43.4	54.0	10.6	26
	MCS7	2	Peak	2387.6	-31.3	-28.1	67.2	74.0	6.8	26
		2	Average	2389.8	-53.2	-50.0	45.3	54.0	8.7	26
802.11ax RU52	MCS0	3	Peak	2377.5	-33.2	-30.0	65.3	74.0	8.7	26
		3	Average	2382.0	-57.6	-54.4	40.9	54.0	13.1	26
	MCS7	3	Peak	2388.7	-33.1	-29.9	65.4	74.0	8.6	26
		3	Average	2382.1	-56.0	-52.8	42.5	54.0	11.5	26
802.11ax RU52	MCS0	4	Peak	2384.8	-26.8	-23.6	71.7	74.0	2.3	27
		4	Average	2386.9	-57.4	-54.2	41.1	54.0	12.9	27
	MCS7	4	Peak	2385.3	-29.8	-26.6	68.7	74.0	5.3	27
		4	Average	2387.0	-55.8	-52.6	42.7	54.0	11.3	27
802.11ax RU52	MCS0	5	Peak	2388.1	-26.4	-23.2	72.1	74.0	1.9	28
		5	Average	2387.3	-56.7	-53.5	41.8	54.0	12.2	28
	MCS7	5	Peak	2389.9	-30.2	-27.0	68.3	74.0	5.7	28
		5	Average	2389.9	-56.5	-53.3	42.0	54.0	12.0	28
802.11ax RU52	MCS0	6	Peak	2386.0	-26.1	-22.9	72.4	74.0	1.6	30
		6	Average	2389.9	-56.9	-53.7	41.6	54.0	12.4	30
	MCS7	6	Peak	2389.9	-30.8	-27.6	67.7	74.0	6.3	30
		6	Average	2389.8	-56.6	-53.4	41.9	54.0	12.1	30

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	EIRP (dBm)	E-Field (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax RU106	MCS0	1	Peak	2389.4	-27.9	-24.7	70.6	74.0	3.4	14
		1	Average	2390.0	-60.7	-57.5	37.8	54.0	16.2	14
	MCS7	1	Peak	2388.8	-26.6	-23.4	71.9	74.0	2.1	14
		1	Average	2389.8	-56.3	-53.1	42.2	54.0	11.8	14
802.11ax RU106	MCS0	2	Peak	2389.5	-30.1	-26.9	68.4	74.0	5.6	26
		2	Average	2389.8	-55.5	-52.3	43.0	54.0	11.0	26
	MCS7	2	Peak	2386.8	-31.2	-28.0	67.3	74.0	6.7	26
		2	Average	2390.0	-53.0	-49.8	45.5	54.0	8.5	26
802.11ax RU106	MCS0	3	Peak	2383.6	-27.4	-24.2	71.1	74.0	2.9	27
		3	Average	2389.9	-56.3	-53.1	42.2	54.0	11.8	27
	MCS7	3	Peak	2385.5	-26.3	-23.1	72.2	74.0	1.8	27
		3	Average	2390.0	-52.0	-48.8	46.5	54.0	7.5	27
802.11ax RU106	MCS0	4	Peak	2388.8	-26.7	-23.5	71.8	74.0	2.2	28
		4	Average	2386.9	-55.6	-52.4	42.9	54.0	11.1	28
	MCS7	4	Peak	2387.9	-29.4	-26.2	69.1	74.0	4.9	28
		4	Average	2388.4	-53.0	-49.8	45.5	54.0	8.5	28
802.11ax RU106	MCS0	5	Peak	2387.9	-29.1	-25.9	69.4	74.0	4.6	28
		5	Average	2389.1	-56.9	-53.7	41.6	54.0	12.4	28
	MCS7	5	Peak	2384.9	-29.8	-26.6	68.7	74.0	5.3	28
		5	Average	2389.7	-54.7	-51.5	43.8	54.0	10.2	28
802.11ax RU106	MCS0	6	Peak	2389.9	-27.2	-24.0	71.3	74.0	2.7	30
		6	Average	2389.8	-56.5	-53.3	42.0	54.0	12.0	30
	MCS7	6	Peak	2389.9	-31.2	-28.0	67.3	74.0	6.7	30
		6	Average	2389.2	-55.3	-52.1	43.2	54.0	10.8	30
802.11ax RU242	MCS0	1	Peak	2389.6	-26.3	-23.1	72.2	74.0	1.8	15
		1	Average	2389.9	-59.6	-56.4	38.9	54.0	15.1	15
	MCS7	1	Peak	2389.1	-26.2	-23.0	72.3	74.0	1.7	15
		1	Average	2389.9	-51.7	-48.5	46.8	54.0	7.2	15
802.11ax RU242	MCS0	2	Peak	2387.3	-27.4	-24.2	71.1	74.0	2.9	26
		2	Average	2389.8	-50.0	-46.8	48.5	54.0	5.5	26
	MCS7	2	Peak	2387.8	-26.6	-23.4	71.9	74.0	2.1	26
		2	Average	2389.8	-46.7	-43.5	51.8	54.0	2.2	26
802.11ax RU242	MCS0	3	Peak	2389.2	-32.7	-29.5	65.8	74.0	8.2	30
		3	Average	2389.8	-49.4	-46.2	49.1	54.0	4.9	30
	MCS7	3	Peak	2379.3	-28.0	-24.8	70.5	74.0	3.5	30
		3	Average	2389.3	-46.7	-43.5	51.8	54.0	2.2	30

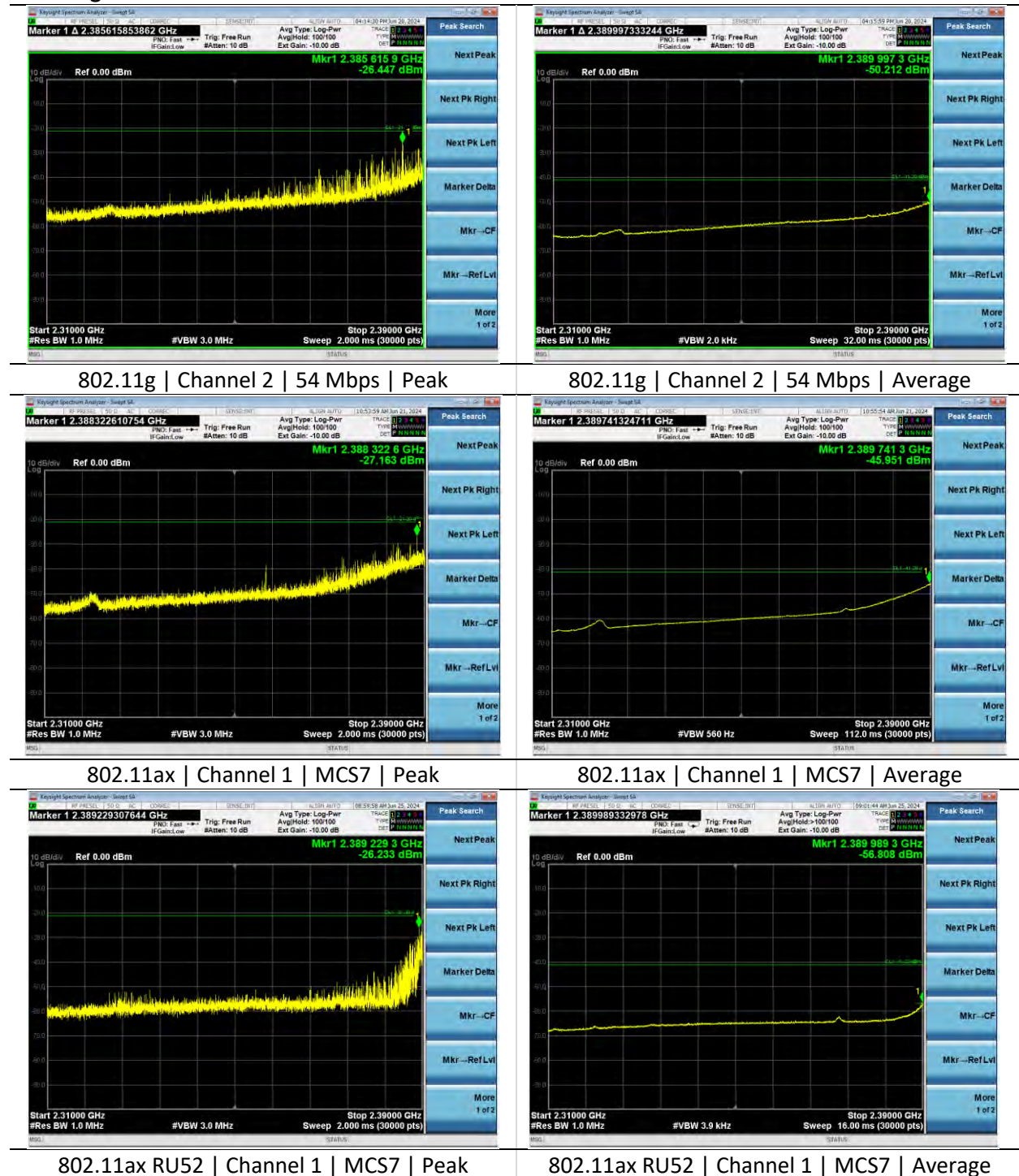
Measurements – Upper Band Edge

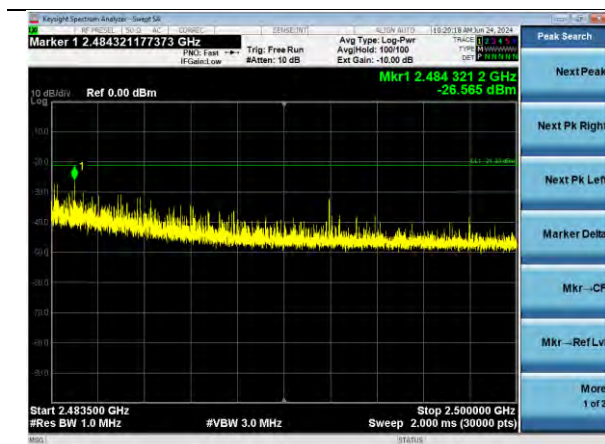
Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	EIRP (dBm)	E-Field (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11b	MCS0	11	Peak	2483.5	-40.1	-36.9	58.4	74.0	15.6	30
		11	Average	2490.2	-51.8	-48.6	46.7	54.0	7.3	30
	MCS7	11	Peak	2484.5	-39.0	-35.8	59.5	74.0	14.5	30
		11	Average	2490.3	-53.5	-50.3	45.0	54.0	9.0	30
802.11g	MCS0	11	Peak	2485.7	-32.8	-29.6	65.7	74.0	8.3	26
		11	Average	2483.5	-51.3	-48.1	47.2	54.0	6.8	26
	MCS7	11	Peak	2487.0	-31.0	-27.8	67.5	74.0	6.5	26
		11	Average	2483.5	-50.5	-47.3	48.0	54.0	6.0	26
802.11g	MCS0	10	Peak	2485.3	-27.5	-24.3	71.0	74.0	3.0	28
		10	Average	2483.5	-53.9	-50.7	44.6	54.0	9.4	28
	MCS7	10	Peak	2484.5	-27.1	-23.9	71.4	74.0	2.6	28
		10	Average	2484.2	-52.6	-49.4	45.9	54.0	8.1	28
802.11g	MCS0	9	Peak	2489.3	-35.8	-32.6	62.7	74.0	11.3	30
		9	Average	2483.8	-53.5	-50.3	45.0	54.0	9.0	30
	MCS7	9	Peak	2485.8	-28.4	-25.2	70.1	74.0	3.9	30
		9	Average	2484.7	-52.6	-49.4	45.9	54.0	8.1	30
802.11n	MCS0	11	Peak	2485.3	-27.5	-24.3	71.0	74.0	3.0	27
		11	Average	2483.5	-49.3	-46.1	49.2	54.0	4.8	27
	MCS7	11	Peak	2484.0	-28.0	-24.8	70.5	74.0	3.5	27
		11	Average	2483.6	-48.9	-45.7	49.6	54.0	4.4	27
802.11n	MCS0	10	Peak	2483.6	-33.7	-30.5	64.8	74.0	9.2	30
		10	Average	2483.5	-50.6	-47.4	47.9	54.0	6.1	30
	MCS7	10	Peak	2483.6	-26.9	-23.7	71.6	74.0	2.4	30
		10	Average	2483.8	-51.9	-48.7	46.6	54.0	7.4	30
802.11ax	MCS0	11	Peak	2484.3	-26.6	-23.4	71.9	74.0	2.1	26
		11	Average	2483.5	-49.1	-45.9	49.4	54.0	4.6	26
	MCS7	11	Peak	2483.5	-31.6	-28.4	66.9	74.0	7.1	26
		11	Average	2483.5	-48.7	-45.5	49.8	54.0	4.2	26
802.11ax	MCS0	10	Peak	2484.9	-27.5	-24.3	71.0	74.0	3.0	27
		10	Average	2483.6	-53.6	-50.4	44.9	54.0	9.1	27
	MCS7	10	Peak	2483.8	-30.2	-27.0	68.3	74.0	5.7	27
		10	Average	2483.5	-53.2	-50.0	45.3	54.0	8.7	27
802.11ax	MCS0	9	Peak	2486.1	-35.7	-32.5	62.8	74.0	11.2	30
		9	Average	2483.5	-52.2	-49.0	46.3	54.0	7.7	30
	MCS7	9	Peak	2483.8	-27.2	-24.0	71.3	74.0	2.7	30
		9	Average	2483.7	-52.7	-49.5	45.8	54.0	8.2	30

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	EIRP (dBm)	E-Field (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax RU26	MCS0	11	Peak	2483.7	-26.7	-23.5	71.8	74.0	2.2	15
		11	Average	2483.5	-62.5	-59.3	36.0	54.0	18.0	15
	MCS7	11	Peak	2483.7	-26.6	-23.4	71.9	74.0	2.1	15
		11	Average	2483.5	-61.5	-58.3	37.0	54.0	17.0	15
802.11ax RU26	MCS0	10	Peak	2483.9	-26.8	-23.6	71.7	74.0	2.3	25
		10	Average	2497.0	-56.3	-53.1	42.2	54.0	11.8	25
	MCS7	10	Peak	2484.3	-27.0	-23.8	71.5	74.0	2.5	25
		10	Average	2497.0	-54.8	-51.6	43.7	54.0	10.3	25
802.11ax RU26	MCS0	9	Peak	2496.4	-30.1	-26.9	68.4	74.0	5.6	25
		9	Average	2492.2	-56.3	-53.1	42.2	54.0	11.8	25
	MCS7	9	Peak	2490.6	-26.8	-23.6	71.7	74.0	2.3	25
		9	Average	2491.8	-54.8	-51.6	43.7	54.0	10.3	25
802.11ax RU26	MCS0	8	Peak	2491.1	-31.6	-28.4	66.9	74.0	7.1	25
		8	Average	2487.2	-56.4	-53.2	42.1	54.0	11.9	25
	MCS7	8	Peak	2490.2	-27.6	-24.4	70.9	74.0	3.1	25
		8	Average	2489.9	-54.5	-51.3	44.0	54.0	10.0	25
802.11ax RU26	MCS0	7	Peak	2484.9	-30.2	-27.0	68.3	74.0	5.7	25
		7	Average	2484.8	-56.3	-53.1	42.2	54.0	11.8	25
	MCS7	7	Peak	2483.8	-29.8	-26.6	68.7	74.0	5.3	25
		7	Average	2484.5	-54.9	-51.7	43.6	54.0	10.4	25
802.11ax RU26	MCS0	6	Peak	2485.1	-28.3	-25.1	70.2	74.0	3.8	27
		6	Average	2483.7	-56.1	-52.9	42.4	54.0	11.6	27
	MCS7	6	Peak	2483.8	-26.1	-22.9	72.4	74.0	1.6	27
		6	Average	2483.8	-54.9	-51.7	43.6	54.0	10.4	27
802.11ax RU52	MCS0	11	Peak	2483.9	-26.2	-23.0	72.3	74.0	1.7	14
		11	Average	2483.5	-60.5	-57.3	38.0	54.0	16.0	14
	MCS7	11	Peak	2483.9	-26.1	-22.9	72.4	74.0	1.6	14
		11	Average	2483.7	-58.7	-55.5	39.8	54.0	14.2	14
802.11ax RU52	MCS0	10	Peak	2484.3	-28.8	-25.6	69.7	74.0	4.3	24
		10	Average	2483.5	-56.0	-52.8	42.5	54.0	11.5	24
	MCS7	10	Peak	2485.9	-29.5	-26.3	69.0	74.0	5.0	24
		10	Average	2483.6	-54.3	-51.1	44.2	54.0	9.8	24
802.11ax RU52	MCS0	9	Peak	2484.1	-26.9	-23.7	71.6	74.0	2.4	26
		9	Average	2491.9	-56.3	-53.1	42.2	54.0	11.8	26
	MCS7	9	Peak	2492.1	-27.6	-24.4	70.9	74.0	3.1	26
		9	Average	2483.8	-54.0	-50.8	44.5	54.0	9.5	26
802.11ax RU52	MCS0	8	Peak	2485.0	-27.8	-24.6	70.7	74.0	3.3	26
		8	Average	2487.0	-56.1	-52.9	42.4	54.0	11.6	26
	MCS7	8	Peak	2487.7	-27.5	-24.3	71.0	74.0	3.0	26
		8	Average	2487.2	-54.1	-50.9	44.4	54.0	9.6	26
802.11ax RU52	MCS0	7	Peak	2486.9	-26.7	-23.5	71.8	74.0	2.2	27
		7	Average	2483.5	-56.0	-52.8	42.5	54.0	11.5	27
	MCS7	7	Peak	2488.1	-28.3	-25.1	70.2	74.0	3.8	27
		7	Average	2483.6	-53.9	-50.7	44.6	54.0	9.4	27
802.11ax RU52	MCS0	6	Peak	2483.8	-27.3	-24.1	71.2	74.0	2.8	28
		6	Average	2483.6	-55.5	-52.3	43.0	54.0	11.0	28
	MCS7	6	Peak	2486.0	-29.1	-25.9	69.4	74.0	4.6	28
		6	Average	2487.1	-54.4	-51.2	44.1	54.0	9.9	28

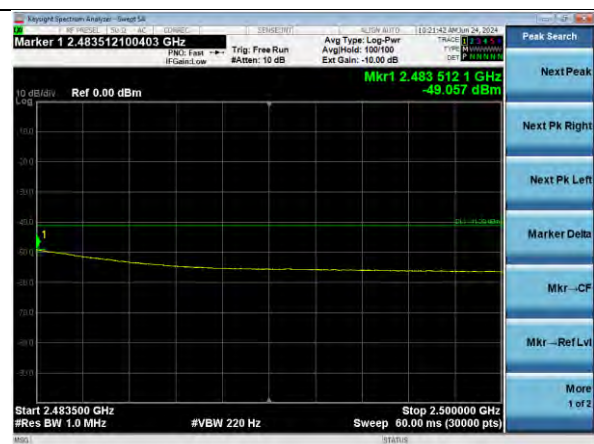
Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	EIRP (dBm)	E-Field (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax RU106	MCS0	11	Peak	2484.3	-26.3	-23.1	72.2	74.0	1.8	13
		11	Average	2483.5	-62.5	-59.3	36.0	54.0	18.0	13
	MCS7	11	Peak	2483.8	-26.2	-23.0	72.3	74.0	1.7	13
		11	Average	2483.8	-58.4	-55.2	40.1	54.0	13.9	13
802.11ax RU106	MCS0	10	Peak	2485.9	-28.6	-25.4	69.9	74.0	4.1	25
		10	Average	2483.6	-55.4	-52.2	43.1	54.0	10.9	25
	MCS7	10	Peak	2485.9	-30.8	-27.6	67.7	74.0	6.3	25
		10	Average	2484.2	-52.9	-49.7	45.6	54.0	8.4	25
802.11ax RU106	MCS0	9	Peak	2483.8	-26.8	-23.6	71.7	74.0	2.3	25
		9	Average	2483.7	-54.9	-51.7	43.6	54.0	10.4	25
	MCS7	9	Peak	2489.3	-26.5	-23.3	72.0	74.0	2.0	25
		9	Average	2485.3	-52.7	-49.5	45.8	54.0	8.2	25
802.11ax RU106	MCS0	8	Peak	2489.9	-26.4	-23.2	72.1	74.0	1.9	27
		8	Average	2487.1	-55.0	-51.8	43.5	54.0	10.5	27
	MCS7	8	Peak	2485.7	-26.4	-23.2	72.1	74.0	1.9	27
		8	Average	2483.6	-52.1	-48.9	46.4	54.0	7.6	27
802.11ax RU106	MCS0	7	Peak	2483.9	-27.9	-24.7	70.6	74.0	3.4	27
		7	Average	2484.1	-55.5	-52.3	43.0	54.0	11.0	27
	MCS7	7	Peak	2485.0	-29.8	-26.6	68.7	74.0	5.3	27
		7	Average	2485.1	-52.9	-49.7	45.6	54.0	8.4	27
802.11ax RU106	MCS0	6	Peak	2484.5	-28.1	-24.9	70.4	74.0	3.6	28
		6	Average	2483.6	-55.3	-52.1	43.2	54.0	10.8	28
	MCS7	6	Peak	2484.0	-36.3	-33.1	62.2	74.0	11.8	28
		6	Average	2483.9	-54.0	-50.8	44.5	54.0	9.5	28
802.11ax RU242	MCS0	11	Peak	2483.5	-27.0	-23.8	71.5	74.0	2.5	12
		11	Average	2483.5	-62.2	-59.0	36.3	54.0	17.7	12
	MCS7	11	Peak	2483.6	-27.3	-24.1	71.2	74.0	2.8	12
		11	Average	2483.7	-54.5	-51.3	44.0	54.0	10.0	12
802.11ax RU242	MCS0	10	Peak	2494.5	-32.8	-29.6	65.7	74.0	8.3	25
		10	Average	2483.6	-53.2	-50.0	45.3	54.0	8.7	25
	MCS7	10	Peak	2486.3	-28.7	-25.5	69.8	74.0	4.2	25
		10	Average	2483.6	-50.1	-46.9	48.4	54.0	5.6	25
802.11ax RU242	MCS0	9	Peak	2483.9	-32.8	-29.6	65.7	74.0	8.3	26
		9	Average	2483.7	-53.6	-50.4	44.9	54.0	9.1	26
	MCS7	9	Peak	2486.2	-28.9	-25.7	69.6	74.0	4.4	26
		9	Average	2483.7	-50.5	-47.3	48.0	54.0	6.0	26
802.11ax RU242	MCS0	8	Peak	2484.5	-27.1	-23.9	71.4	74.0	2.6	26
		8	Average	2486.7	-54.0	-50.8	44.5	54.0	9.5	26
	MCS7	8	Peak	2483.7	-31.1	-27.9	67.4	74.0	6.6	26
		8	Average	2484.0	-51.3	-48.1	47.2	54.0	6.8	26
802.11ax RU242	MCS0	7	Peak	2486.6	-30.4	-27.2	68.1	74.0	5.9	30
		7	Average	2483.6	-53.2	-50.0	45.3	54.0	8.7	30
	MCS7	7	Peak	2484.6	-26.7	-23.5	71.8	74.0	2.2	30
		7	Average	2483.6	-50.7	-47.5	47.8	54.0	6.2	30

Band Edge Worst Case Plots

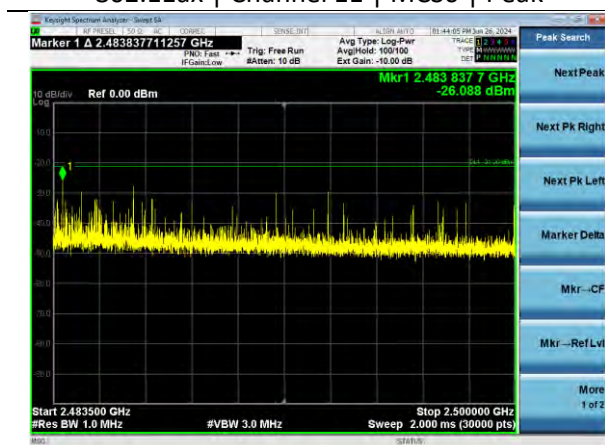




802.11ax | Channel 11 | MCS0 | Peak



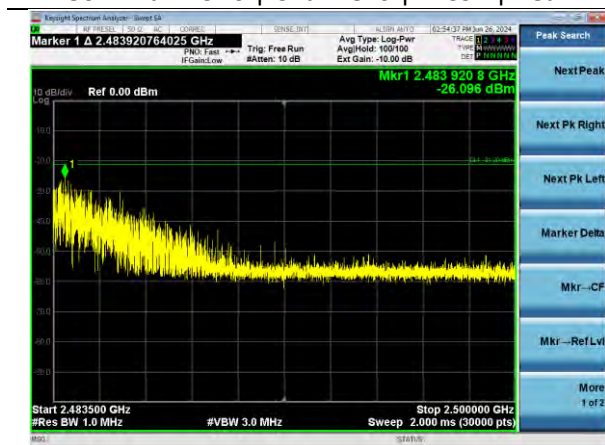
802.11ax | Channel 11 | MCS0 | Average



802.11ax RU26 | Channel 6 | MCS7 | Peak



802.11ax RU26 | Channel 6 | MCS7 | Average



802.11ax RU52 | Channel 11 | MCS7 | Peak



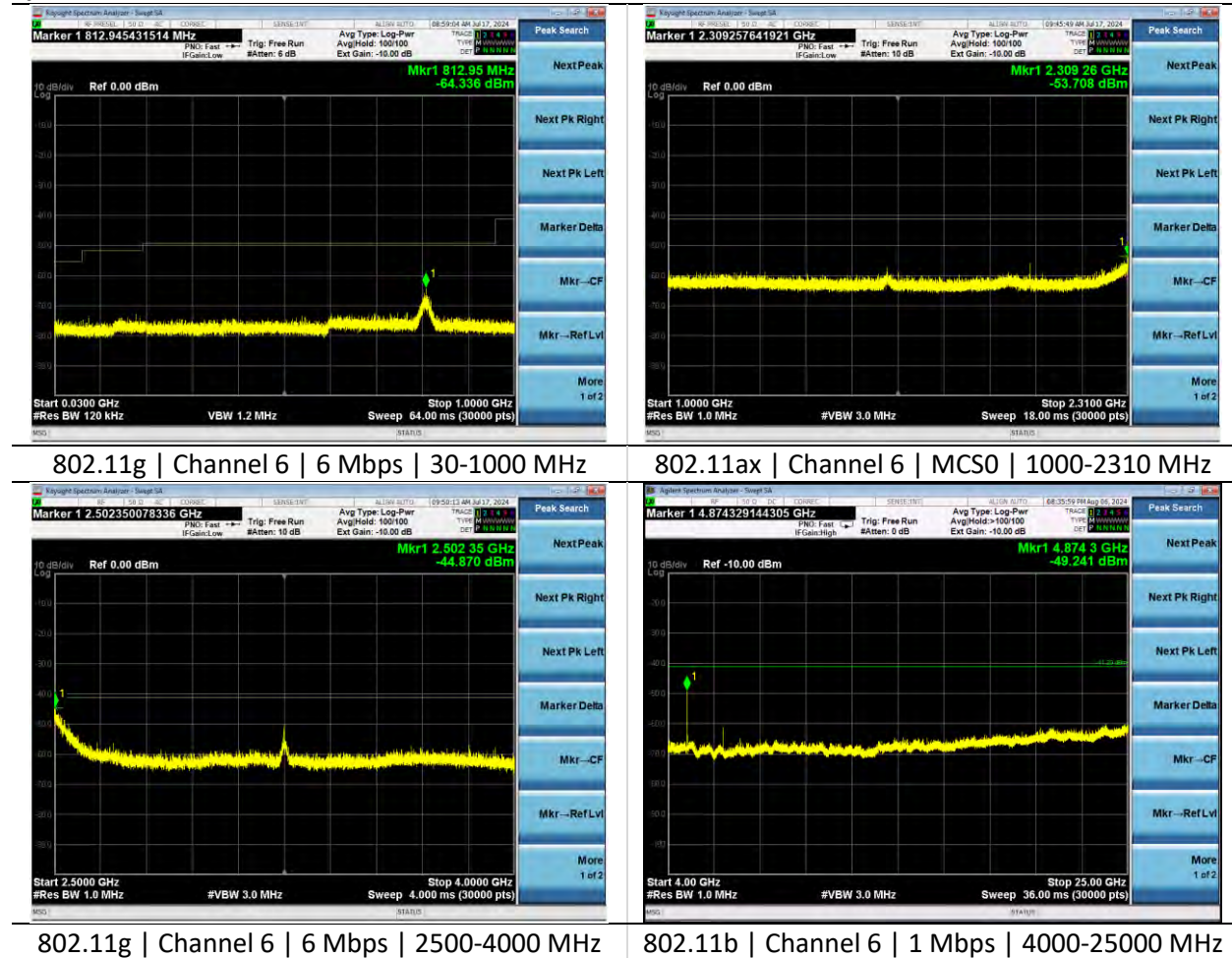
802.11ax RU52 | Channel 11 | MCS7 | Average

Spurious Table

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	EIRP (dBm)	E-Field (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11b	1 Mbps	6	Peak	1624.9	-55.6	-52.4	42.9	74.0	31.1	30
		6	Average	1624.6	-58.7	-55.5	39.8	54.0	14.2	30
		6	Peak	4874.4	-46.9	-43.7	51.6	74.0	22.4	30
		6	Average	4873.9	-50.2	-47.0	48.3	54.0	5.7	30
		1	Peak	4823.9	-49.0	-45.8	49.5	74.0	24.5	30
		1	Average	4823.9	-50.4	-47.2	48.1	54.0	5.9	30
		11	Peak	4924.0	-46.8	-43.6	51.7	74.0	22.3	30
		11	Average	4923.9	-49.2	-46.0	49.3	54.0	4.7	30
	11 Mbps	6	Peak	4873.8	-48.0	-44.8	50.5	74.0	23.5	30
		6	Average	4873.9	-60.9	-57.7	37.6	54.0	16.4	30
		1	Peak	4824.1	-45.8	-42.6	52.7	74.0	21.3	30
		1	Average	4823.6	-59.2	-56.0	39.3	54.0	14.7	30
		11	Peak	4924.0	-56.4	-53.2	42.1	74.0	31.9	30
		11	Average	4923.9	-68.5	-65.3	30.0	54.0	24.0	30

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	EIRP (dBm)	E-Field (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax RU26	MCS0	6	Peak	4875.1	-41.6	-38.4	56.9	74.0	17.1	27
		6	Average	4873.9	-59.1	-55.9	39.4	54.0	14.6	27
	MCS7	6	Peak	4875.6	-50.2	-47.0	48.3	74.0	25.7	27
		6	Average	4874.1	-63.6	-60.4	34.9	54.0	19.1	27
802.11ax RU52	MCS0	6	Peak	4868.6	-48.3	-45.1	50.2	74.0	23.8	28
		6	Average	4867.4	-63.2	-60.0	35.3	54.0	18.7	28
	MCS7	6	Peak	4866.7	-49.5	-46.3	49.0	74.0	25.0	28
		6	Average	4867.3	-62.6	-59.4	35.9	54.0	18.1	28
802.11ax RU106	MCS0	6	Peak	4865.1	-47.3	-44.1	51.2	74.0	22.8	28
		6	Average	4863.3	-62.0	-58.8	36.5	54.0	17.5	28
802.11ax RU242	MCS0	6	Peak	4877.6	-51.0	-47.8	47.5	74.0	26.5	30
		6	Average	4873.4	-63.3	-60.1	35.2	54.0	18.8	30

Spurious Worst Case Plots



802.11g | Channel 6 | 6 Mbps | 30-1000 MHz 802.11ax | Channel 6 | MCS0 | 1000-2310 MHz
802.11g | Channel 6 | 6 Mbps | 2500-4000 MHz 802.11b | Channel 6 | 1 Mbps | 4000-25000 MHz

6.1.6 Frequency Stability

Operator	Dylan Rosenfeldt	QA	Anthony Smith
Temperature	22.9°C	R.H. %	46.4%
Test Date	8/28/2024	Location	Conducted RF Bench
Requirement	2.1055(d) RSS-GEN Clause 6.11	Method	ANSI C63.10 6.8

Test Parameters

Frequency	2400-2483.5 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	06/13/2024	06/12/2025	Active Verification
EE 960088	Analyzer - EMI Receiver	Agilent	N9038A	MY51210138	4/10/2024	4/10/2025	Active Calibration

Table

Channel	Voltage (VDC)	Center Frequency (Hz)
1	5	2411995377
	4.3	2411995560
	5.8	2411993720
6	5	2436990618
	4.3	2436992583
	5.8	2436989894
11	5	2461989632
	4.3	2461989412
	5.8	2461990107

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 – Cabinet Radiation

Operator	Zachary Brown Jon Dilley Mitchell Freund	QA	Nicole Sedmak Adam Hauke Dylan Rosenfeldt
Temperature	19.8°C-25.6°C	R.H. %	40.9%-50.0%
Test Date	06/19/2024-07/02/2024	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

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	30-25000 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 – 1.2 MHz >1000 MHz – 3MHz See 2.9

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960007	Antenna - Double Ridge Horn	EMCO	3115	9311-4138	8/10/2023	8/10/2024	Active Calibration
AA 960174	Antenna - Small Horn	ETS Lindgren	3116C-PA	00206880	8/30/2023	8/30/2024	Active Calibration
AA 960153	Filter - High Pass 2.4 GHz	KWM	HPF-L-14186	7272-04	4/11/2024	4/11/2025	Active Calibration
AA 960163	Antenna - Log Periodic	A.H. Systems, Inc.	SAS-512-2	500	8/10/2023	8/10/2024	Active Calibration
AA 960217	Antenna - Biconical	A.H. Systems, Inc.	SAS-540	852	7/17/2023	7/17/2024	Active Calibration
AA 960220	Cable	A.H. Systems, Inc.	SAC-26G-6	552	2/16/2024	2/16/2025	Active Verification
EE 960203	Analyzer - EMI Receiver	Keysight	N9038A	MY56400072	4/11/2024	4/11/2025	Active Calibration
LSC-300	Cable	Chamber 3 Emissions	-	-	1/5/2024	1/5/2025	Active Verification

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Job: C-3818		Serial: 00013 00008

LSC-500	Cable	Chamber 5 Emissions	-	-	1/8/2024	1/8/2025	Active Verification
AA 960209	Antenna - Low Noise Amplifier	Mini-Circuits	ZVA-213X-S+	037101808	8/10/2023	8/10/2024	Active Calibration

EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	2.4 GHz WLAN Tx
EUT	X, Y, Z Plane Orientations Antenna ports terminated with 50 Ω SMA terminators	AE	HP Elitebook 840G1 Development Kit, NXP 8MPLUS-BB
Notes	<1000 MHz Emissions from auxiliary equipment. Not a function of the EUT. Emission at 4GHz is not a function of the transmitter.		

Radiated Spurious – 30-1000 MHz – All Modes

Frequency (MHz)	Antenna Polarity	Height (cm)	Azimuth (degree)	Quasi-Peak Reading (dB μ V/m)	Quasi-Peak Limit (dB μ V/m)	Margin (dB)
107.3	H	305.0	198.0	25.6	43.5	17.9

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

1000-25000 MHz – 802.11b

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 Mbps	1	Y Plane	Peak	2365.7	H	47.5	74.0	26.5
			Average	2365.7	H	34.4	54.0	19.6
	11		Peak	2495.9	H	47.5	74.0	26.5
			Average	2495.9	H	34.6	54.0	19.4
11 Mbps	1	Y Plane	Peak	2389.9	H	46.9	74.0	27.1
			Average	2389.9	H	34.8	54.0	19.2
	11		Peak	2484.4	H	47.2	74.0	26.8
			Average	2484.4	H	35.1	54.0	18.9

Spurious

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 Mbps	1	X Plane	Peak	17870.7	H	56.6	74.0	17.4
			Average	17870.7	H	45.2	54.0	8.8
		Y Plane	Peak	17849.7	H	55.7	74.0	18.3
			Average	17849.7	H	45.6	54.0	8.4
		Z Plane	Peak	17874.0	V	55.7	74.0	18.3
			Average	17874.0	V	45.6	54.0	8.4

1000-25000 MHz – 802.11g

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
6 Mbps	1	Y Plane	Peak	2388.7	H	47.1	74.0	26.9
			Average	2388.7	H	34.8	54.0	19.2
	11	X Plane	Peak	2497.8	H	47.7	74.0	26.3
			Average	2497.8	H	35.0	54.0	19.0
54 Mbps	1	Y Plane	Peak	2381.1	H	46.9	74.0	27.1
			Average	2381.1	H	35.9	54.0	18.1
	11	X Plane	Peak	2490.4	H	48.4	74.0	25.6
			Average	2490.4	H	36.0	54.0	18.0

1000-25000 MHz – 802.11n

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	1	Y Plane	Peak	2387.9	H	47.6	74.0	26.4
			Average	2387.9	H	34.8	54.0	19.2
	11	X Plane	Peak	2490.3	H	47.4	74.0	26.6
			Average	2490.3	H	34.8	54.0	19.2
MCS7	1	Y Plane	Peak	2352.2	H	47.2	74.0	26.8
			Average	2352.2	H	35.1	54.0	18.9
	11	X Plane	Peak	2498.8	H	48.2	74.0	25.8
			Average	2498.8	H	35.1	54.0	18.9

1000-25000 MHz – 802.11ax

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	1	Y Plane	Peak	2380.1	H	47.2	74.0	26.8
			Average	2380.1	H	34.8	54.0	19.2
	11	X Plane	Peak	2489.0	H	47.4	74.0	26.6
			Average	2489.0	H	34.5	54.0	19.5
MCS11	1	Y Plane	Peak	2385.9	H	47.3	74.0	26.7
			Average	2385.9	H	35.0	54.0	19.0
	11	X Plane	Peak	2484.7	H	47.2	74.0	26.8
			Average	2484.7	H	34.9	54.0	19.1

1000-25000 MHz – 802.11ax20 – MU-RU – MCS0

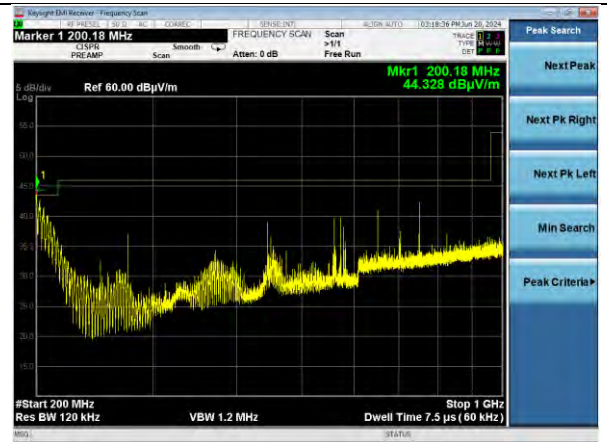
Band Edge

EUT Orientation	Channel	RU	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Y Plane	1	26-0	Peak	2368.4	H	54.6	74.0	19.4
			Average	2368.4	H	42.4	54.0	11.6
		52-37	Peak	2343.4	H	53.3	74.0	20.7
			Average	2343.4	H	42.7	54.0	11.3
		106-53	Peak	2382.7	H	54.2	74.0	19.8
			Average	2382.7	H	43.0	54.0	11.0
		242-61	Peak	2338.1	H	54.2	74.0	19.8
			Average	2338.1	H	43.6	54.0	10.4
Y Plane	11	26-8	Peak	2486.3	H	54.4	74.0	19.6
			Average	2486.3	H	42.6	54.0	11.4
		52-40	Peak	2488.7	H	54.8	74.0	19.2
			Average	2488.7	H	42.9	54.0	11.1
		106-54	Peak	2489.9	H	54.4	74.0	19.6
			Average	2489.9	H	43.1	54.0	10.9
		242-61	Peak	2494.7	H	54.2	74.0	19.8
			Average	2494.7	H	43.5	54.0	10.5

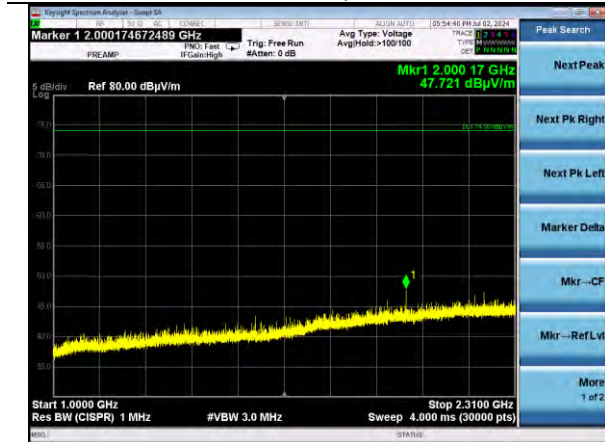
Worst Case Plots



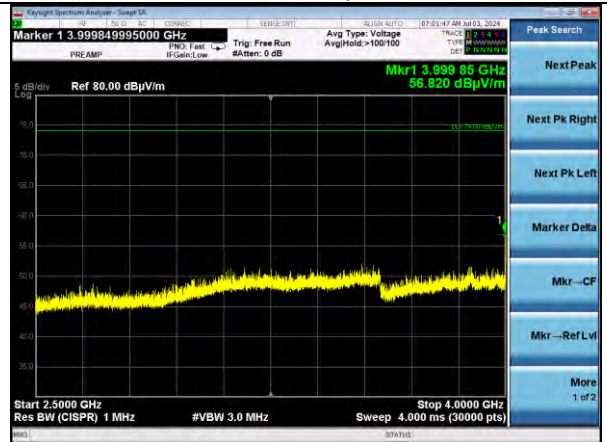
802.11b | Channel 6 | 1 Mbps |
30-200 MHz | Vertical



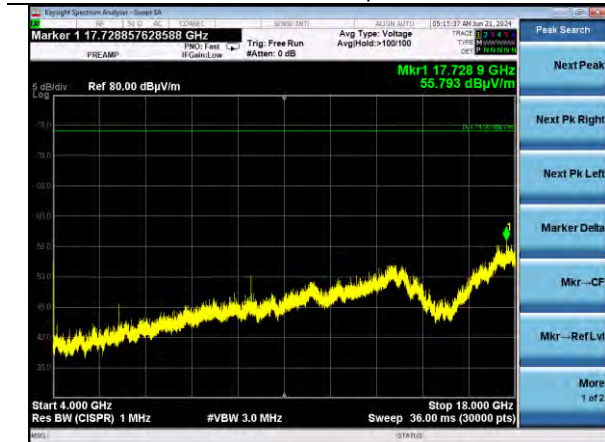
802.11b | Channel 6 | 1 Mbps |
200-1000 MHz | Vertical



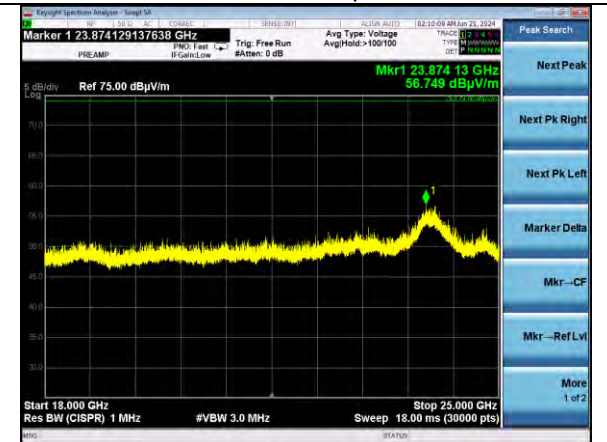
802.11b | Channel 11 | 1Mbps |
1000-2310 MHz | Vertical



802.11b | Channel 1 | MCS11
2500-4000 MHz | Vertical



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



802.11b | Channel 11 | 1 Mbps
18000-25000 MHz | Horizontal

802.11b Channel 6 1 Mbps 25000-40000 MHz Horizontal
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6.2.2 Spurious Radiated Emissions in the Restricted Bands – Chip Antenna

Operator	Mitchell Freund Nicole Sedmak Jon Dilley Zachary Brown	QA	Anthony Smith Adam Alger Adam Hauke Dylan Rosenfeldt
Temperature	19.2°C-24.7°C	R.H. %	47.1%-63.2%
Test Date	07/08/2024-07/24/2024	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

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	30-25000 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 – 1.2 MHz >1000 MHz – 3MHz See 2.9

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960007	Antenna - Double Ridge Horn	EMCO	3115	9311-4138	8/10/2024	8/10/2025	Active Calibration
AA 960174	Antenna - Small Horn	ETS Lindgren	3116C-PA	00206880	8/30/2024	8/30/2025	Active Calibration
AA 960153	Filter - High Pass 2.4 GHz	KWM	HPF-L-14186	7272-04	4/11/2024	4/11/2025	Active Calibration
AA 960163	Antenna - Log Periodic	A.H. Systems, Inc.	SAS-512-2	500	8/10/2024	8/10/2025	Active Calibration
AA 960217	Antenna - Biconical	A.H. Systems, Inc.	SAS-540	852	7/17/2024	7/17/2025	Active Calibration
AA 960220	Cable	A.H. Systems, Inc.	SAC-26G-6	552	2/16/2024	2/16/2025	Active Verification
EE 960203	Analyzer - EMI Receiver	Keysight	N9038A	MY56400072	4/11/2024	4/11/2025	Active Calibration
LSC-300	Cable	Chamber 3 Emissions	-	-	1/5/2024	1/5/2025	Active Verification

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Job: C-3818		Serial: 00013 00008

LSC-500	Cable	Chamber 5 Emissions	-	-	1/8/2024	1/8/2025	Active Verification
AA 960209	Antenna - Low Noise Amplifier	Mini-Circuits	ZVA-213X-S+	037101808	8/10/2024	8/10/2025	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 Development Kit, NXP 8MPLUS-BB
Notes	<1000 MHz Emissions from auxiliary equipment. Not a function of the EUT. Emission at 4GHz is not a function of the transmitter.		

Radiated Spurious – 30-1000 MHz – All Modes

Frequency (MHz)	Antenna Polarity	Height (cm)	Azimuth (degree)	Quasi-Peak Reading (dBμV/m)	Quasi-Peak Limit (dBμV/m)	Margin (dB)
275.0	H	100	289	40.2	46.0	5.8
164.6	H	197	216	30.5	43.5	13.0

*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	Antenna Polarity	Frequency (MHz)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11b	1	1	Peak	H	2383.7	52.9	74.0	21.1	30
	Mbps	1	Average	H	2383.7	45.0	54.0	9.0	30
	11	1	Peak	H	2387.6	52.6	74.0	21.4	30
	Mbps	1	Average	H	2387.6	43.4	54.0	10.6	30
802.11g	6	1	Peak	H	2383.2	51.5	74.0	22.5	30
	Mbps	1	Average	H	2383.2	43.5	54.0	10.5	30
	54	1	Peak	H	2387.6	51.3	74.0	22.7	30
	Mbps	1	Average	H	2387.6	43.7	54.0	10.3	30
802.11n	MCS0	1	Peak	H	2389.9	68.9	74.0	5.1	29
		1	Average	H	2389.8	51.1	54.0	2.9	29
	MCS7	1	Peak	H	2389.2	67.4	74.0	6.6	26
		1	Average	H	2390.0	48.6	54.0	5.4	26
802.11n	MCS0	2	Peak	H	2389.9	68.7	74.0	5.3	30
		2	Average	H	2390.0	51.1	54.0	2.9	30
	MCS7	2	Peak	H	2389.9	71.0	74.0	3.0	27
		2	Average	H	2390.0	47.0	54.0	7.0	27
802.11n	MCS7	3	Peak	H	2389.4	71.1	74.0	2.9	28
		3	Average	H	2389.8	45.9	54.0	8.1	28
802.11n	MCS7	4	Peak	H	2389.9	65.3	74.0	8.7	30
		4	Average	H	2389.9	41.2	54.0	12.8	30
802.11ax	MCS0	1	Peak	H	2389.5	67.4	74.0	6.6	30
		1	Average	H	2389.5	52.3	54.0	1.7	30
	MCS7	1	Peak	H	2388.5	70.0	74.0	4.0	30
		1	Average	H	2388.5	48.7	54.0	5.3	30

Mode	Rate	Channel	Measurement Type	Antenna Polarity	Frequency (MHz)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax RU26	MCS0	1	Peak	V	2390.0	71.7	74.0	2.3	16
		1	Average	V	2389.9	38.7	54.0	15.3	16
802.11ax RU26	MCS0	2	Peak	V	2389.3	67.6	74.0	6.4	23
		2	Average	V	2377.0	40.9	54.0	13.1	23
802.11ax RU26	MCS0	3	Peak	V	2384.7	70.9	74.0	3.1	24
		3	Average	V	2382.1	41.5	54.0	12.5	24
802.11ax RU26	MCS0	4	Peak	H	2389.6	67.6	74.0	6.4	30
		4	Average	H	2386.9	40.9	54.0	13.1	30
802.11ax RU52	MCS0	1	Peak	V	2389.9	71.4	74.0	2.6	14
		1	Average	V	2390.0	39.4	54.0	14.6	14
802.11ax RU52	MCS0	2	Peak	V	2380.9	68.6	74.0	5.4	25
		2	Average	V	2390.0	43.6	54.0	10.4	25
802.11ax RU52	MCS0	3	Peak	V	2387.5	70.5	74.0	3.5	25
		3	Average	V	2389.7	40.5	54.0	13.5	25
802.11ax RU52	MCS0	4	Peak	H	2389.9	65.4	74.0	8.6	25
		4	Average	H	2387.0	40.5	54.0	13.5	25
802.11ax RU52	MCS0	5	Peak	H	2383.2	66.5	74.0	7.5	26
		5	Average	H	2389.7	40.7	54.0	13.3	26
802.11ax RU52	MCS0	6	Peak	H	2364.7	54.9	74.0	19.1	30
		6	Average	H	2350.2	35.3	54.0	18.7	30

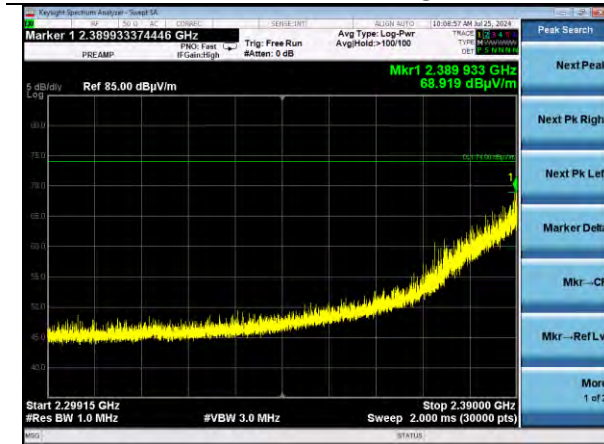
Mode	Rate	Channel	Measurement Type	Antenna Polarity	Frequency (MHz)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax RU106	MCS0	1	Peak	V	2389.9	71.6	74.0	2.4	11
		1	Average	V	2389.9	37.8	54.0	16.2	11
802.11ax RU106	MCS0	2	Peak	V	2385.9	72.3	74.0	1.7	25
		2	Average	V	2390.0	45.2	54.0	8.8	25
802.11ax RU106	MCS0	3	Peak	V	2389.6	70.9	74.0	3.1	25
		3	Average	V	2390.0	41.8	54.0	12.2	25
802.11ax RU106	MCS0	4	Peak	H	2390.0	68.5	74.0	5.5	26
		4	Average	H	2387.0	40.9	54.0	13.1	26
802.11ax RU106	MCS0	5	Peak	H	2379.6	71.5	74.0	2.6	27
		5	Average	H	2389.5	41.9	54.0	12.1	27
802.11ax RU106	MCS0	6	Peak	H	2359.0	53.0	74.0	21.0	30
		6	Average	H	2352.3	35.7	54.0	18.3	30
802.11ax RU242	MCS0	1	Peak	V	2389.8	71.3	74.0	2.7	14
		1	Average	V	2390.0	41.0	54.0	13.0	14
802.11ax RU242	MCS0	2	Peak	V	2384.1	72.5	74.0	1.5	26
		2	Average	V	2390.0	47.9	54.0	6.1	26
802.11ax RU242	MCS0	3	Peak	V	2389.5	70.4	74.0	3.6	26
		3	Average	V	2389.7	45.0	54.0	9.0	26
802.11ax RU242	MCS0	4	Peak	H	2389.3	67.1	74.0	6.9	29
		4	Average	H	2390.0	43.5	54.0	10.5	29
802.11ax RU242	MCS0	5	Peak	H	2387.1	66.5	74.0	7.5	30
		5	Average	H	2390.0	45.7	54.0	8.3	30

Measurements – Upper Band Edge

Mode	Rate	Channel	Measurement Type	Antenna Polarity	Frequency (MHz)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11b	1 Mbps	11	Peak	H	2484.8	55.7	74.0	18.3	30
		11	Average	H	2484.8	43.7	54.0	10.3	30
	11 Mbps	11	Peak	H	2489.5	55.0	74.0	19.0	30
		11	Average	H	2489.5	44.1	54.0	9.9	30
802.11g	6 Mbps	11	Peak	H	2484.4	50.2	74.0	23.8	30
		11	Average	H	2484.4	43.9	54.0	10.1	30
	54 Mbps	11	Peak	H	2484.9	54.7	74.0	19.3	30
		11	Average	H	2484.9	44.6	54.0	9.4	30
802.11n	MCS0	11	Peak	H	2483.6	67.7	74.0	6.3	30
		11	Average	H	2483.6	51.3	54.0	2.7	30
	MCS7	11	Peak	H	2485.5	72.3	74.0	1.7	30
		11	Average	H	2485.5	47.9	54.0	6.1	30
802.11ax	MCS0	11	Peak	H	2484.0	69.1	74.0	4.9	30
		11	Average	H	2484.0	51.4	54.0	2.6	30
	MCS7	11	Peak	H	2484.9	70.5	74.0	3.5	30
		11	Average	H	2484.9	48.0	54.0	6.0	30

Mode	Rate	Channel	Measurement Type	Antenna Polarity	Frequency (MHz)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Power Setting
802.11ax RU26	MCS0	11	Peak	H	2483.5	71.7	74.0	2.3	15
		11	Average	H	2483.5	38.8	54.0	15.2	15
802.11ax RU26	MCS0	10	Peak	H	2483.7	66.8	74.0	7.2	23
		10	Average	H	2483.7	40.3	54.0	13.7	23
802.11ax RU26	MCS0	9	Peak	H	2493.5	68.1	74.0	5.9	23
		9	Average	H	2494.1	40.7	54.0	13.3	23
802.11ax RU26	MCS0	8	Peak	H	2489.2	68.1	74.0	5.9	23
		8	Average	H	2489.2	42.6	54.0	11.4	23
802.11ax RU26	MCS0	7	Peak	H	2484.0	68.0	74.0	6.0	23
		7	Average	H	2484.4	40.3	54.0	13.7	23
802.11ax RU26	MCS0	6	Peak	H	2484.6	54.6	74.0	19.4	30
		6	Average	H	2483.7	36.6	54.0	17.4	30
802.11ax RU52	MCS0	11	Peak	H	2483.6	72.1	74.0	1.9	14
		11	Average	H	2483.6	39.5	54.0	14.5	14
802.11ax RU52	MCS0	10	Peak	H	2484.3	67.6	74.0	6.4	24
		10	Average	H	2483.7	40.9	54.0	13.1	24
802.11ax RU52	MCS0	9	Peak	H	2488.7	68.5	74.0	5.5	26
		9	Average	H	2489.5	40.9	54.0	13.1	26
802.11ax RU52	MCS0	8	Peak	H	2483.6	72.5	74.0	1.5	26
		8	Average	H	2487.0	42.9	54.0	11.1	26
802.11ax RU52	MCS0	7	Peak	H	2486.2	71.4	74.0	2.6	27
		7	Average	H	2483.6	42.1	54.0	11.9	27
802.11ax RU52	MCS0	6	Peak	H	2485.4	66.7	74.0	7.3	30
		6	Average	H	2487.7	37.0	54.0	17.0	30
802.11ax RU106	MCS0	11	Peak	H	2483.6	72.1	74.0	1.9	13
		11	Average	H	2483.7	39.1	54.0	14.9	13
802.11ax RU106	MCS0	10	Peak	H	2484.7	71.8	74.0	2.2	25
		10	Average	H	2484.1	41.6	54.0	12.4	25
802.11ax RU106	MCS0	9	Peak	H	2483.7	70.6	74.0	3.4	26
		9	Average	H	2484.0	41.3	54.0	12.7	26
802.11ax RU106	MCS0	8	Peak	H	2483.6	72.5	74.0	1.5	26
		8	Average	H	2487.0	42.9	54.0	11.1	26
802.11ax RU106	MCS0	7	Peak	H	2483.7	72.3	74.0	1.7	27
		7	Average	H	2484.9	43.0	54.0	11.0	27
802.11ax RU106	MCS0	6	Peak	H	2486.8	63.9	74.0	10.1	30
		6	Average	H	2483.6	37.4	54.0	16.6	30
802.11ax RU242	MCS0	11	Peak	H	2483.6	71.5	74.0	2.5	12
		11	Average	H	2483.8	39.6	54.0	14.4	12
802.11ax RU242	MCS0	10	Peak	H	2483.6	71.8	74.0	2.2	26
		10	Average	H	2483.5	44.0	54.0	10.0	26
802.11ax RU242	MCS0	9	Peak	H	2484.4	72.1	74.0	1.9	27
		9	Average	H	2483.7	43.7	54.0	10.3	27
802.11ax RU242	MCS0	8	Peak	H	2483.5	70.7	74.0	3.3	26
		8	Average	H	2483.6	44.1	54.0	9.9	26
802.11ax RU242	MCS0	7	Peak	H	2484.0	68.0	74.0	6.0	30
		7	Average	H	2483.8	44.5	54.0	9.5	30

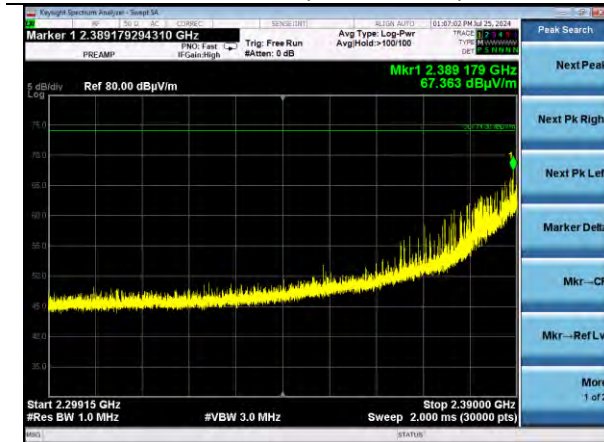
Worst Case Plots – Lower Band Edge



802.11n | Channel 1 | MCS0 |
2310-2390 MHz | Horizontal | Peak



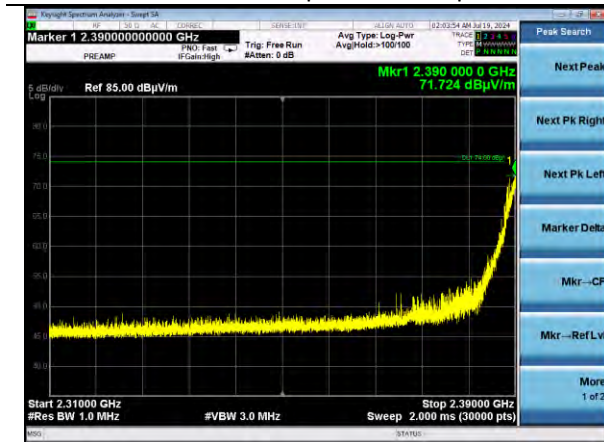
802.11n | Channel 1 | MCS0 |
2310-2390 MHz | Horizontal | Average



802.11n | Channel 1 | MCS7 |
2310-2390 MHz | Horizontal | Peak



802.11n | Channel 1 | MCS7 |
2310-2390 MHz | Horizontal | Average

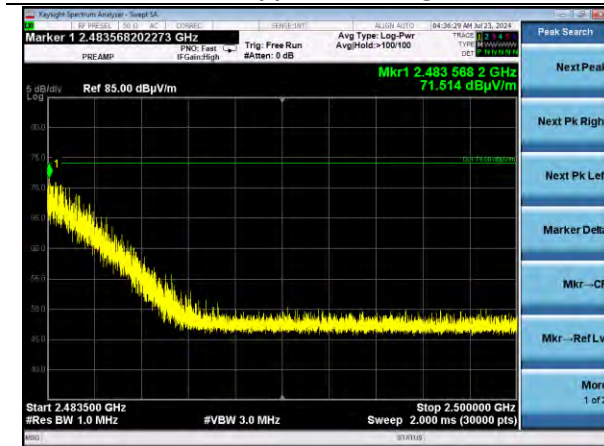


802.11ax | Channel 1 | MCS0 RU26 |
2310-2390 MHz | Vertical | Peak

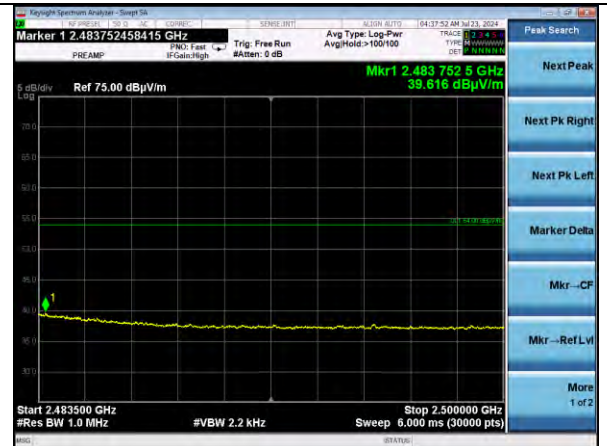


802.11ax | Channel 1 | MCS0 RU26 |
2310-2390 MHz | Vertical | Average

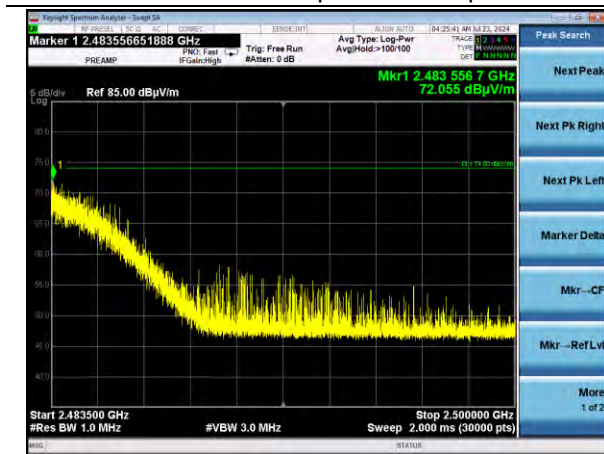
Worst Case Plots – Upper Band Edge



802.11ax | Channel 11 | MCS0 RU242 |
2483.5-2500 MHz | Horizontal | Peak



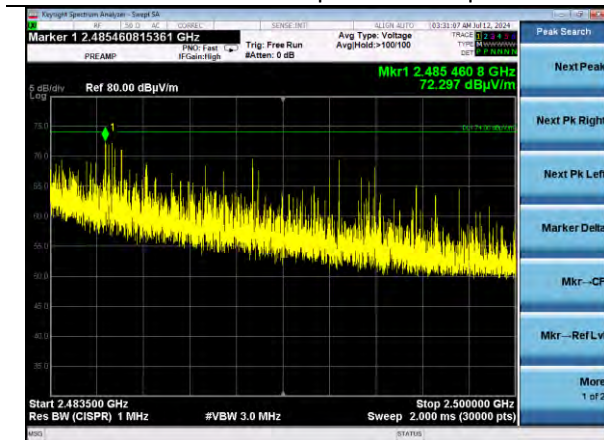
802.11ax | Channel 11 | MCS0 RU242 |
2483.5-2500 MHz | Horizontal | Average



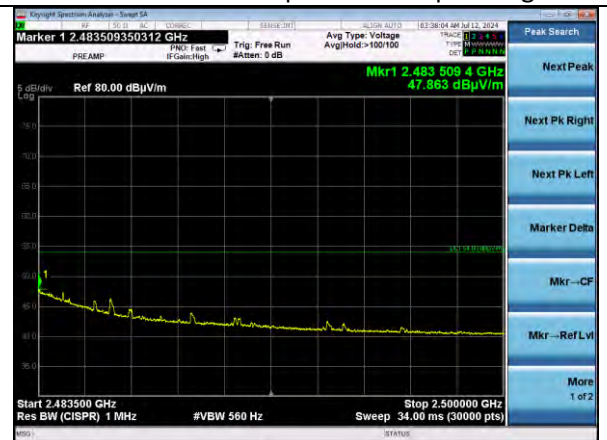
802.11ax | Channel 11 | MCS0 RU106 |
2483.5-2500 MHz | Horizontal | Peak



802.11ax | Channel 11 | MCS0 RU106 |
2483.5-2500 MHz | Horizontal | Average



802.11n | Channel 11 | MCS7 |
2483.5-2500 MHz | Horizontal | Peak

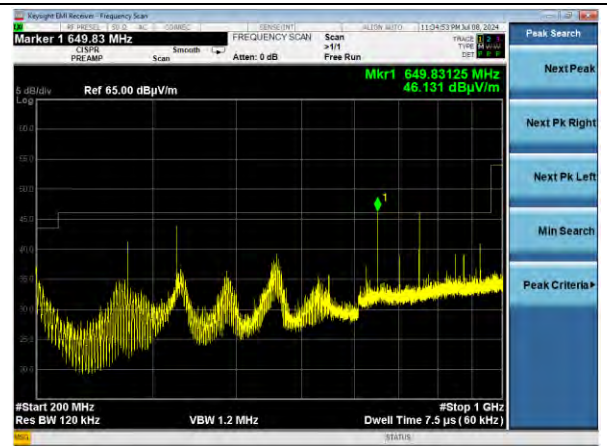


802.11n | Channel 11 | MCS7 |
2483.5-2500 MHz | Horizontal | Average

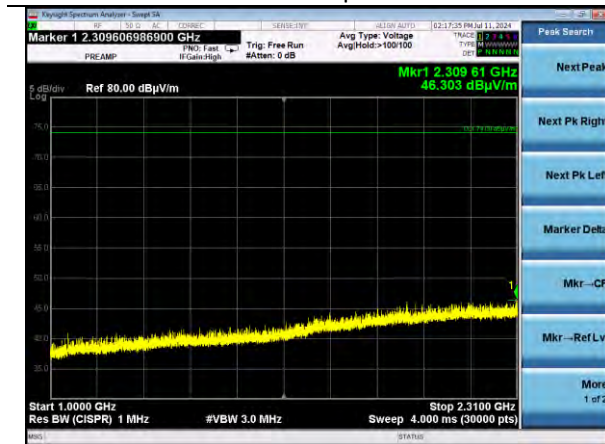
Worst Case Plots – Spurious Emissions



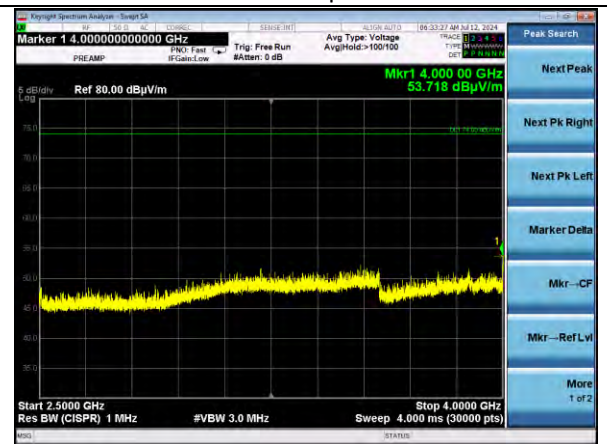
802.11b | Channel 1 | 1 Mbps | Z Plane
30-200 MHz | Vertical



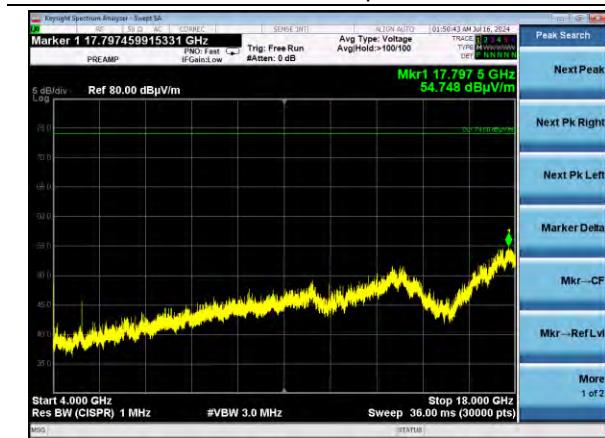
802.11b | Channel 1 | 1 Mbps | Z Plane
200-1000 MHz | Horizontal



802.11b | Channel 1 | 1 Mbps | Y Plane
1000-2390 MHz | Vertical



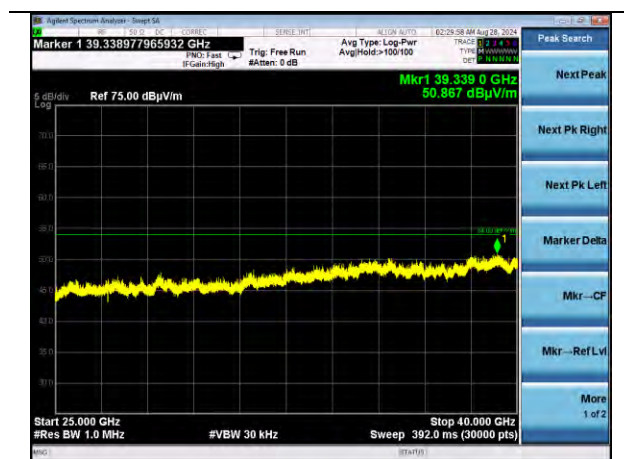
802.11b | Channel 1 | 1 Mbps | X Plane
2500-4000 MHz | Horizontal



802.11b | Channel 6 | 1 Mbps | X Plane
4000-18000 MHz | Horizontal



802.11b | Channel 6 | 1 Mbps | Y Plane
18000-25000 MHz | Horizontal



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

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.

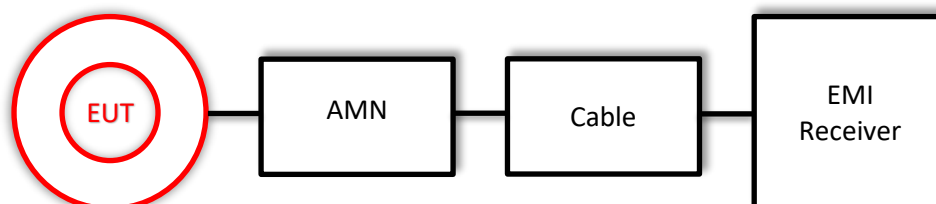
Maximum emissions are determined with a peak max hold trace then measurements at a selection of the highest points are made with quasi-peak and average detectors. Results are recorded and compared to limit for each line. (e.g. line and neutral)

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	Dylan Rosenfeldt	QA	Adam Alger
Temperature	22.8°C	R.H. %	41.8%
Test Date	10/01/2024	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	MY51210138	4/10/2024	4/10/2025	Active Calibration
EE 960089	LISN	COM-POWER	LI-215A	191943	4/10/2024	4/10/2025	Active Calibration
EE 960162	LISN	COM-POWER	LI-215A	191969	4/10/2024	4/10/2025	Active Calibration
LSC-203	Cable	Micro-Coax	UFB311A-0-1440-70U70U	64639 224071-005	1/8/2024	1/8/2025	Active Verification

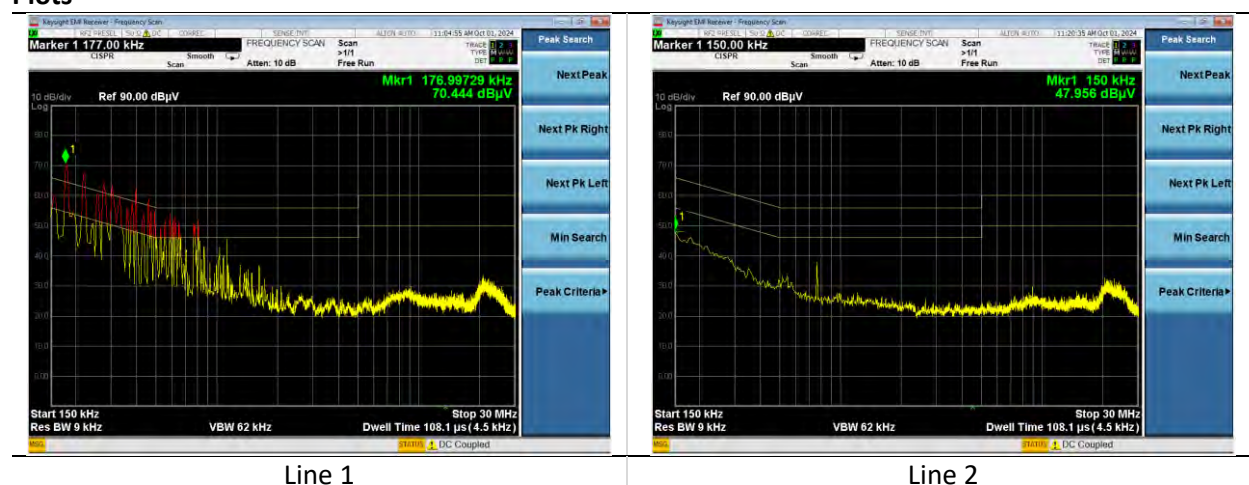
EUT Parameters

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	0.177	49.2	64.6	15.4	30.9	54.6	23.7
1	0.398	33.8	57.9	24.1	21.4	47.9	26.5
1	0.497	31.2	56.1	24.9	21.3	46.1	24.8
2	0.150	44.5	66.0	21.5	32.7	56.0	23.3
2	0.762	23.1	56.0	32.9	16.1	46.0	29.9
2	20.330	25.1	60.0	34.9	16.8	50.0	33.2

Plots



7 REVISION HISTORY

Version	Date	Notes	Person
0	10/02/2024	Initial Draft	Dylan Rosenfeldt
1	10/22/2024	Final Draft	Dylan Rosenfeldt

END OF REPORT