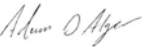


Test Report 3768-166-5G-UNII2C

Equipment Under Test:	Module, SONA NX 611 M.2 2230, 1 MHF
Requirement(s):	eCFR 47 Part 15.407 RSS-247
Test Date(s):	02/12/2024-07/10/2024
Prepared for:	Ezurio Attn: Brian Petted W66 N220 Commerce Ct. Cedarburg, WI 53012

Report Issued by: Adam Hauke, EMC Engineer	
Signature: 	Date: 08/08/2024
Report Reviewed by: Adam Alger, Manager EMC Laboratory	
Signature: 	Date: 8/08/2024
Report Constructed by: Adam Hauke, EMC Engineer	
Signature: 	Date: 08/07/2024

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Company: Ezurio	Page 1 of 52	Name: Module, SONA NX611 M.2 2230, 1 MHF
Report: TR3768-166-5G-UNII2C		Model: SONA NX611M
Quote: C-3768		Serial: 00047

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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

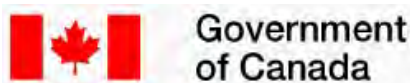
Scope of accreditation includes all test methods listed herein unless otherwise noted



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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Report: TR3768-166-5G-UNII2C		Model: SONA NX611M
Quote: C-3768		Serial: 00047

1 TEST REPORT SUMMARY

During **02/15/2024-07/10/2024** the Equipment Under Test (EUT), **Module, SONA NX611 M.2 2230, 2 MHF**, as provided by **Ezurio** was tested to the following requirements:

Operation in the 5.47-5.725 GHz bands

Requirements	Description	Method	Compliant
15.407(b)(3) & (10) 15.209 RSS-247 Clause 6.2.3 RSS-GEN	Spurious Radiated Emissions in Restricted Bands 30-40000 MHz	ANSI C63.10 12.7	Yes
15.407(a)(2) RSS-247 Clause 6.2.3	26dB and 99% Occupied Bandwidth	ANSI C63.10 12.5	Yes
15.407(a)(2) RSS-247 Clause 6.2.3	RF Output Power	ANSI C63.10 12.4	Yes
15.407(b)(3) RSS-247 Clause 6.2.3	Conducted Out-of-band Emissions	ANSI C63.10 12.7	Yes
15.407(a)(2) RSS-247 Claus 6.2.3	Power Spectral Density	ANSI C63.10 12.6	Yes
15.407(b)(9) 15.207 RSS-GEN	AC Conducted Emissions	ANSI C63.10 6.2	Yes
15.407(g)	Frequency Stability	ANSI C63.10 6.8	Reported

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	Module, SONA NX611 M.2 2230, 2 MHF
Part Number	453-00166
Serial Number	00047
FCC ID	SQG-SONANX611M
IC ID	3147A-SONANX611M

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

Company: Ezurio	Page 5 of 52	Name:Module, SONA NX611 M.2 2230, 1 MHF
Report: TR3768-166-5G-UNII2C		Model:SONA NX611M
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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)	
					2400-2500 MHz	4900-5925 MHz
Laird Connectivity	FlexMIMO 6E	EFD2471A3S-10MH4L	39.5mm X 39.5mm X 4.7mm	PIFA	2.2	3.8
Laird Connectivity	FlexPIFA 6E	EFB2471A3S-10MH4L	16mm X 36mm X 2.5mm	PIFA	2.2	3.9
Laird Connectivity	Mini NanoBlade Flex 6E	EMF2471A3S-10MH4L	36mm X 12mm X 0.3mm	PCB Dipole	2.4	4.4
Joymax Electronics	N/A	TWX-100BR53B	137mm X 13mm	Dipole	2.0	4.0
Laird Connectivity	FlexPIFA	EFB2455A3S-16MHF1	38.5mm X 12.7 mm X 2.5mm	PIFA	2.5	3.0

2.8 Test Channels

Channel	Frequency (MHz)	Bandwidth (MHz)	Data Rates
100	5500	20	802.11a – 6 and 54 Mbps 802.11n – MCS0 and MCS7 802.11ac – MCS0 and MCS9 802.11ax – MCS0 and MCS11
FCC – 120	5600	20	
ISED - 116	5580	20	
144	5720	20	
102	5510	40	
118	5590	40	
142	5710	40	
106	5530	80	
138	5690	80	

2.9 Power Table and Reduced Video Bandwidth for Average Measurements

802.11	Channel BW (MHz)	Data Rate	Minimum Average VBW (Hz)	Power Setting
a	20	6 Mbps	698	16
a	20	54 Mbps	5565	16
n	20	MCS0	746	14
n	20	MCS7	5959	14
ac	20	MCS0	742	14
ac	20	MCS8	6361	14
ax	20	MCS0	956	11
ax	20	MCS11	8628	10
n	40	MCS0	1506	13
n	40	MCS7	9980	13
ac	40	MCS0	1489	13
ac	40	MCS9	10870	12
ax	40	MCS0	1815	11
ax	40	MCS11	11737	10
ac	80	MCS0	3013	11
ac	80	MCS9	15601	11
ax	80	MCS0	3414	9
ax	80	MCS11	13280	9

3 WORST CASE TEST RESULTS SUMMARY

UNII-1

Requirement	Radio	Channel and Data Rate	Frequency (MHz)	Measurement	Limit	Margin
15.407(a)(2) RSS-247 Clause 6.2.3 26dB Bandwidth	802.11a	100 54 Mbps	-	18.9 MHz	at least 500 kHz	-
15.407(a)(2) RSS-247 Clause 6.2.3 Output Power	802.11a	116 6 Mbps	-	15.9 dBm	24.0 dBm	8.1 dB
15.407(a)(2) RSS-247 Clause 6.2.3 PSD	802.11a	116 54 Mbps	-	6.4 dBm/1 MHz	11.0 dBm/1 MHz	4.6 dB
15.407(b)(3) RSS-247 Clause 6.2.3 Restricted Band	802.11ac	100 54 Mbps	5467.2	-27.9 dBm	-27.0 dBm	0.9 dB
15.407(b)(9) RSS-GEN Spurious Below 1 GHz	802.11a	100 6 Mbps	66.2	38.6 dBμV/m	40.0 dBμV/m	1.4 dB
15.407(b)(9) RSS-GEN AC Conducted	802.11a	100 1 Mbps	0.150	59.1 dBμV	66.0 dBμV	6.9 dB

4 REFERENCES

Publication	Edition	Date
FCC eCFR 47 Part 15	-	2023
ANSI C63.10	-	2020
RSS-247	3	2023
RSS-GEN	5	2019
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 %

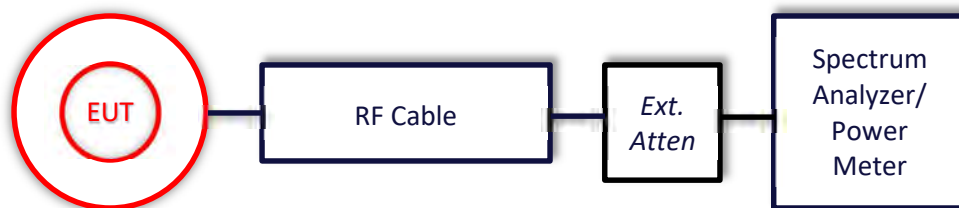
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Quote: C-3768		Serial: 00047

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



6.1.1.1 26dB and 99% Occupied Bandwidth

Operator	Dylan Rosenfeldt Anthony Smith	QA	Anthony Smith Adam Hauke
Temperature	21.8°C 22.1°C	R.H. %	30.30% 25.70%
Test Date	02/21/2024 03/28/2024	Location	Conducted RF Bench
Requirement	15.407 (a)(2) RSS-247 Clause 6.2.3	Method	ANSI C63.10 12.5

Limits: The minimum 26 dB bandwidth shall be at least 500 kHz

Test Parameters

Frequency	5470-5725 MHz		
RBW	20 MHz BW – 200 kHz 40 MHz BW – 420 kHz 80 MHz BW – 1 MHz	VBW	20 MHz BW – 620 kHz 40 MHz BW – 1.5 MHz 80 MHz BW – 3 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	6/13/2023	6/12/2024	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	5 GHz WLAN Tx
Frequency	5500-5720 MHz	Channel	See 2.8

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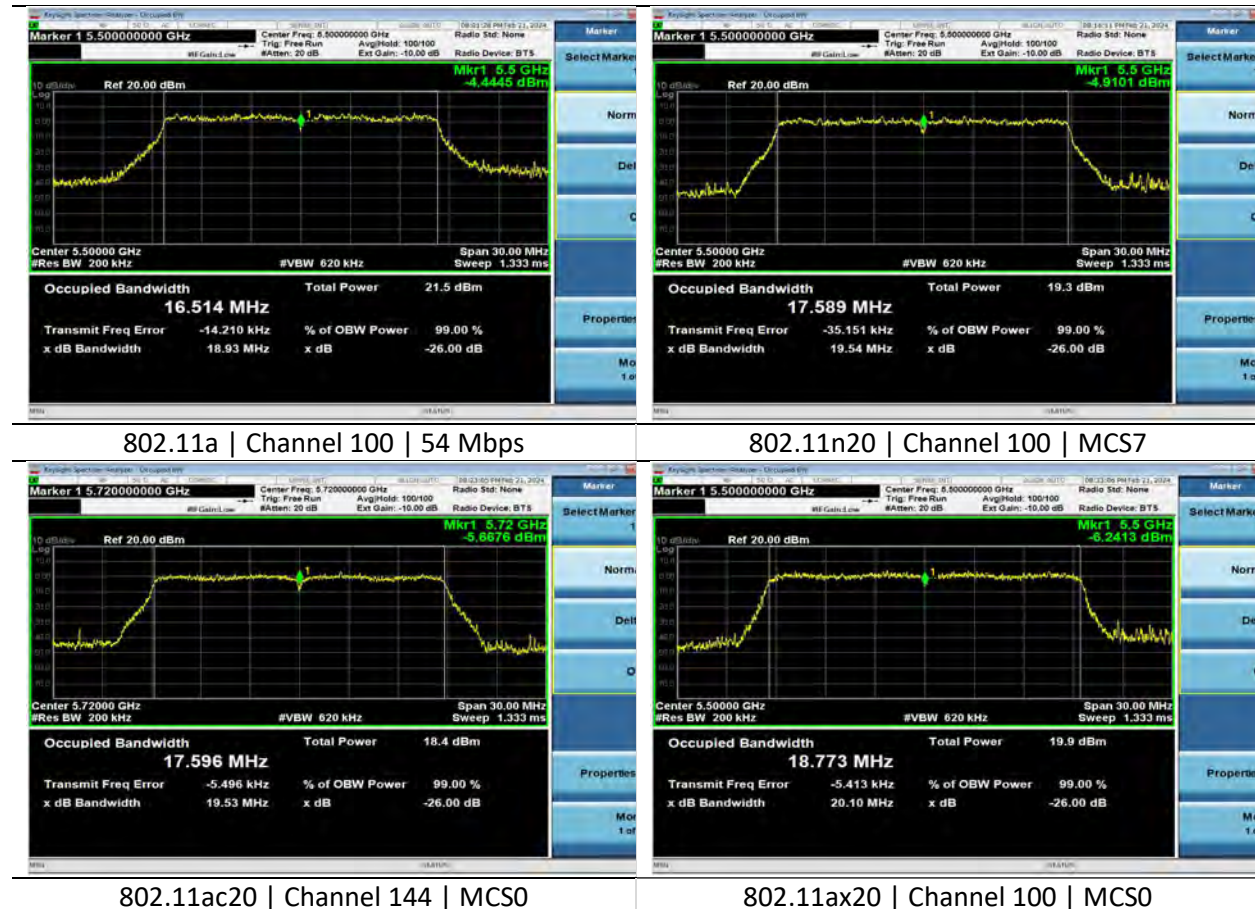
Measurements

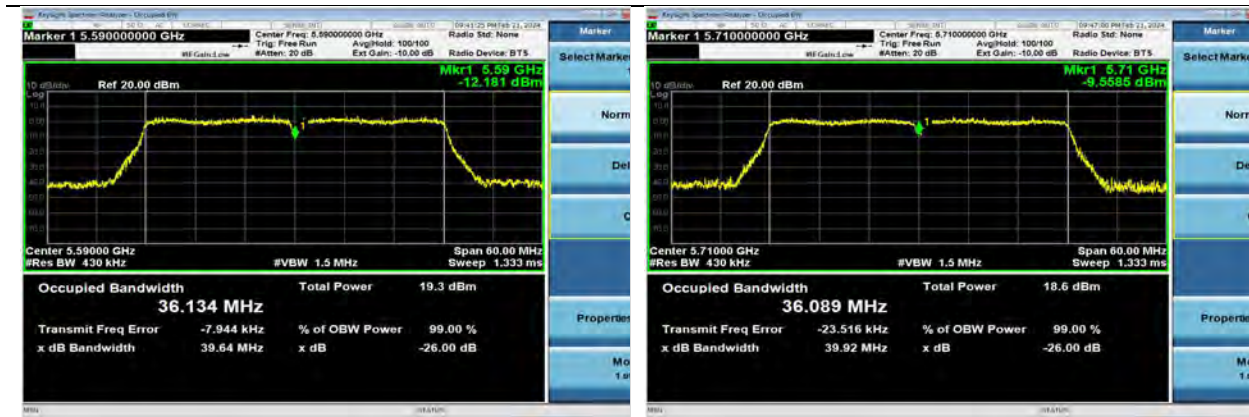
Mode	Rate	Channel	OBW (MHz)	26 dB BW (MHz)
802.11a	6 Mbps	100	16.5	19.5
		116	16.5	19.5
		120	16.5	19.4
		144	16.5	19.1
	54 Mbps	100	16.5	18.9
		116	16.5	19.2
		120	16.5	19.2
		144	16.5	19.0
802.11n20	MCS0	100	17.6	19.7
		116	17.6	19.8
		120	17.6	19.6
		144	17.6	19.8
	MCS7	100	17.6	19.5
		116	17.6	19.6
		120	17.6	19.5
		144	17.6	19.8
802.11ac20	MCS0	100	17.6	19.7
		116	17.6	19.6
		120	17.6	19.6
		144	17.6	19.5
	MCS8	100	17.6	19.7
		116	17.6	19.6
		120	17.6	19.5
		144	17.6	19.5
802.11ax20	MCS0	100	18.8	20.1
		116	18.8	20.2
		120	18.8	20.1
		144	18.7	20.2
	MCS11	100	18.8	20.2
		116	18.8	20.4
		120	18.7	20.1
		144	18.7	20.3

Mode	Rate	Channel	26 dB BW (MHz)	99% BW (MHz)
802.11n40	6 Mbps	102	36.1	40.5
		110	36.1	40.0
		118	36.1	40.3
		142	36.1	40.3
	54 Mbps	102	36.2	39.8
		110	36.2	39.9
		118	36.1	39.6
		142	36.2	39.6
802.11ac40	MCS0	102	36.1	40.4
		110	36.1	40.3
		118	36.1	40.0
		142	36.1	39.9
	MCS9	102	36.2	40.3
		110	36.1	40.3
		118	36.2	40.2
		142	36.2	40.3
802.11ax40	MCS0	102	37.6	39.8
		110	37.5	40.5
		118	37.5	40.2
		142	37.5	40.4
	MCS8	102	37.5	40.3
		110	37.5	40.2
		118	37.5	40.3
		142	37.5	40.2
802.11ac80	MCS0	106	76.1	81.7
		138	76.0	81.6
	MCS9	106	76.3	81.8
		138	76.3	81.8
802.11ax80	MCS0	106	77.6	80.7
		138	77.7	80.5
	MCS9	106	77.6	80.6
		138	77.5	80.7

Mode	Rate	Channel	RU Tone / Index	26 dB BW (kHz)	99% BW (MHz)
802.11ax20	MCS0	100	26 / 0	19020.0	18.0
			52 / 37	19130.0	17.8
			106 / 63	19170.0	17.9
		144	26 / 8	19100.0	18.1
			52 / 40	19160.0	18.0
			106 / 54	19230.0	18.1
802.11ax40	MCS0	102	242 / 61	36700.0	20.2
		142	242 / 62	36620.0	20.2
802.11ax80	MCS0	106	484 / 65	80310.0	52.6
		138	484 / 66	80350.0	50.7

Plots





802.11n40 | Channel 118 | MCS7

802.11ac40 | Channel 142 | MCS0



802.11ax40 | Channel 102 | MCS0

802.11ac80 | Channel 138 | MCS0



802.11ax80 | Channel 138 | MCS0

802.11ax20 | Channel 100 | MCS0 | RU Tone 26
Index 0

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802.11ax40 | Channel 142 | MCS0 | RU Tone 242
Index 62

802.11ax80 | Channel 106 | MCS0 | RU Tone 484
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6.1.2 RF Output Power

Operator	Dylan Rosenfeldt	QA	Anthony Smith
Temperature	21.6°C 22.1°C 21.8°C 21.6°C	R.H. %	25.90% 29.30% 53.50% 44.40%
Test Date	02/26/2024-02/27/2024 04/29/2024-04/30/2024	Location	Conducted RF Bench
Requirement	15.407 (a)(2) RSS-247 Clause 6.2.3	Method	ANSI C63.10 12.4 AVGSA-2

Limit: The maximum peak conducted output power of the intentional radiator shall not exceed 250 mW.

Test Parameters

Frequency	5470-5725 MHz	Setup	
RBW	1 MHz	VBW	3 MHz
Detector(s)	Peak	Settings	Max Hold Span: 30 MHz 60 MHz 120 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 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	5 GHz WLAN Tx
Frequency	5500-5720 MHz	Channel	See 2.9

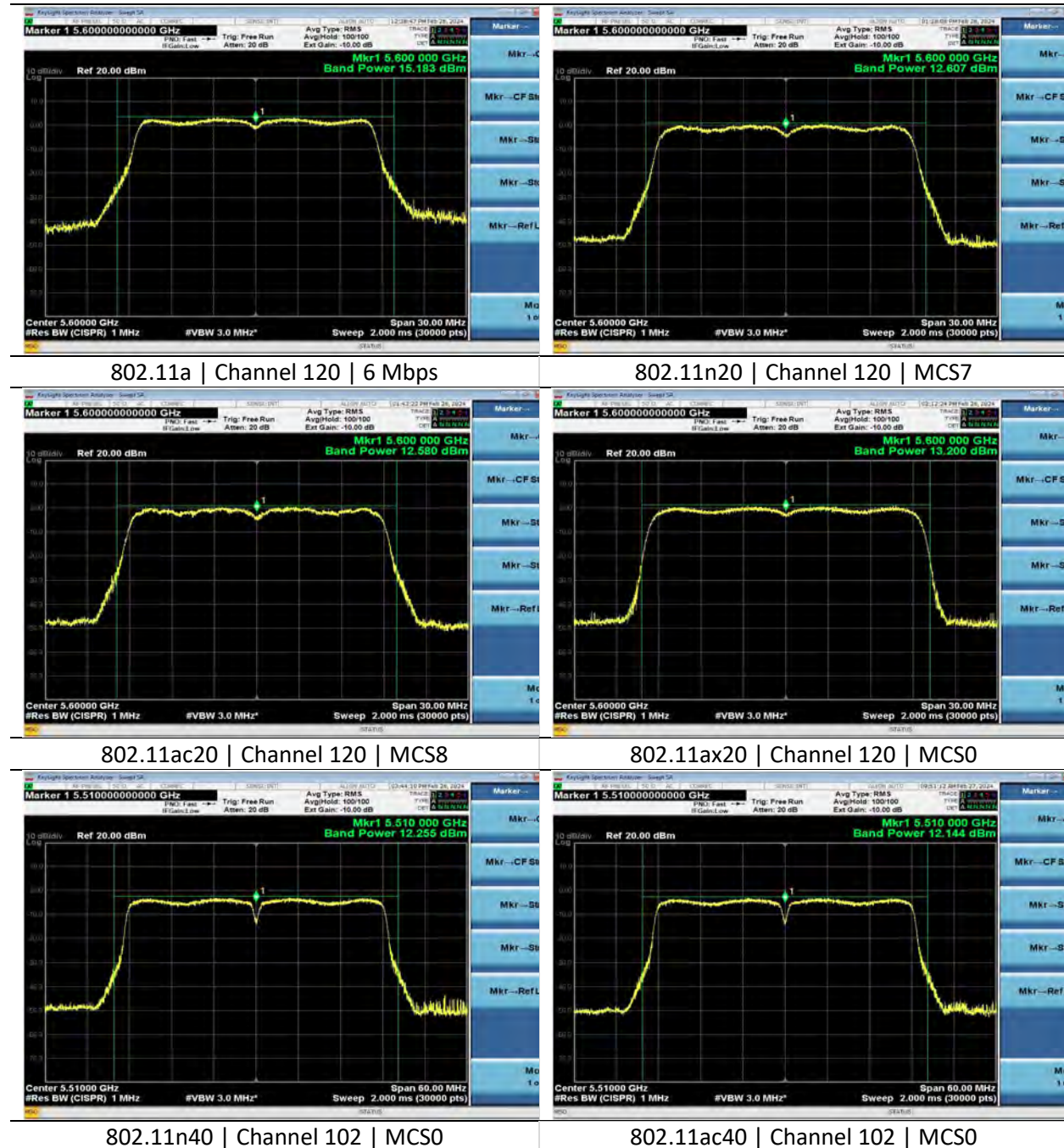
Measurements

Mode	Rate	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	6 Mbps	100	14.4	-	14.4	24.0	9.6
		116	15.9	-	15.9	24.0	8.1
		120	15.2	-	15.2	24.0	8.8
		144	15.8	-	15.8	24.0	8.2
	54 Mbps	100	13.9	0.4	14.3	24.0	9.7
		116	15.5	0.4	15.9	24.0	8.1
		120	14.5	0.4	14.9	24.0	9.1
		144	15.2	0.4	15.6	24.0	8.4
802.11n20	MCS0	100	12.2	-	12.2	24.0	11.8
		116	14.9	-	14.9	24.0	9.1
		120	12.9	-	12.9	24.0	11.1
		144	13.5	-	13.5	24.0	10.6
	MCS7	100	11.9	0.4	12.3	24.0	11.7
		116	14.6	0.4	15.0	24.0	9.0
		120	12.6	0.4	13.0	24.0	11.0
		144	13.2	0.4	13.6	24.0	10.4
802.11ac20	MCS0	100	12.4	-	12.4	24.0	11.6
		116	14.9	-	14.9	24.0	9.1
		120	12.9	-	12.9	24.0	11.1
		144	13.5	-	13.5	24.0	10.5
	MCS8	100	11.9	0.4	12.3	24.0	11.7
		116	14.5	0.4	14.9	24.0	9.1
		120	12.6	0.4	13.0	24.0	11.0
		144	13.2	0.4	13.6	24.0	10.5
802.11ax20	MCS0	100	12.4	-	12.4	24.0	11.6
		116	11	-	11.0	24.0	13.0
		120	13.2	-	13.2	24.0	10.8
		144	13.8	-	13.8	24.0	10.2
	MCS11	100	7.8	0.5	8.3	24.0	15.7
		116	10.4	0.5	10.9	24.0	13.1
		120	8.8	0.5	9.3	24.0	14.7
		144	9.5	0.5	10.0	24.0	14.0

Mode	Rate	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11n40	MCS0	102	12.3	0.1	12.4	24.0	11.6
		110	14.5	0.1	14.6	24.0	9.4
		142	13.6	0.1	13.7	24.0	10.3
	MCS7	102	11.6	0.6	12.2	24.0	11.8
		110	14.4	0.6	15.0	24.0	9.0
		142	12.9	0.6	13.5	24.0	10.5
802.11ac40	MCS0	102	12.1	0.1	12.2	24.0	11.8
		110	14.8	0.1	14.9	24.0	9.1
		142	13.5	0.1	13.6	24.0	10.4
	MCS9	102	9.5	0.7	10.2	24.0	13.8
		110	12.0	0.7	12.7	24.0	11.3
		142	11.2	0.7	11.9	24.0	12.1
802.11ax40	MCS0	102	12.6	0.1	12.7	24.0	11.3
		110	10.8	0.1	10.9	24.0	13.1
		142	14.0	0.1	14.1	24.0	9.9
	MCS11	102	7.6	0.7	8.3	24.0	15.7
		110	10.1	0.7	10.8	24.0	13.2
		142	9.3	0.7	10.0	24.0	14.0
802.11ac80	MCS0	106	12.3	0.2	12.5	24.0	11.5
		122	13.1	0.2	13.3	24.0	10.7
		138	13.9	0.2	14.1	24.0	9.9
	MCS9	106	9.7	1.0	10.7	24.0	13.4
		122	10.4	1.0	11.4	24.0	12.6
		138	11.2	1.0	12.2	24.0	11.8
802.11ax80	MCS0	106	12.9	0.2	13.1	24.0	11.0
		122	13.4	0.2	13.6	24.0	10.4
		138	14.2	0.2	14.4	24.0	9.6
	MCS11	106	7.9	0.8	8.7	24.0	15.3
		122	8.7	0.8	9.5	24.0	14.5
		138	9.5	0.8	10.3	24.0	13.7

Mode	Rate RU	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11ax20	MCS0 RU26	100	7.9	0.8	8.7	24.0	15.3
		120	8.7	0.8	9.5	24.0	14.5
		144	9.5	0.8	10.3	24.0	13.7
	MCS0 RU52	100	7.9	0.8	8.7	24.0	15.3
		120	8.7	0.8	9.5	24.0	14.5
		144	9.5	0.8	10.3	24.0	13.7
	MCS0 RU106	100	7.9	0.8	8.7	24.0	15.3
		120	8.7	0.8	9.5	24.0	14.5
		144	9.5	0.8	10.3	24.0	13.7
802.11ax40	MCS0 RU26	102	7.9	0.8	8.7	24.0	15.3
		118	8.7	0.8	9.5	24.0	14.5
		142	9.5	0.8	10.3	24.0	13.7
	MCS0 RU52	102	7.9	0.8	8.7	24.0	15.3
		118	8.7	0.8	9.5	24.0	14.5
		142	9.5	0.8	10.3	24.0	13.7
	MCS0 RU106	102	7.9	0.8	8.7	24.0	15.3
		118	8.7	0.8	9.5	24.0	14.5
		142	9.5	0.8	10.3	24.0	13.7
	MCS0 RU242	102	7.9	0.8	8.7	24.0	15.3
		118	8.7	0.8	9.5	24.0	14.5
		142	9.5	0.8	10.3	24.0	13.7
802.11ax80	MCS0 RU26	106	7.9	0.8	8.7	24.0	15.3
		122	8.7	0.8	9.5	24.0	14.5
		138	9.5	0.8	10.3	24.0	13.7
	MCS0 RU52	106	7.9	0.8	8.7	24.0	15.3
		122	8.7	0.8	9.5	24.0	14.5
		138	9.5	0.8	10.3	24.0	13.7
	MCS0 RU106	106	7.9	0.8	8.7	24.0	15.3
		122	8.7	0.8	9.5	24.0	14.5
		138	9.5	0.8	10.3	24.0	13.7
	MCS0 RU242	106	7.9	0.8	8.7	24.0	15.3
		122	8.7	0.8	9.5	24.0	14.5
		138	9.5	0.8	10.3	24.0	13.7
	MCS0 RU484	106	7.9	0.8	8.7	24.0	15.3
		122	8.7	0.8	9.5	24.0	14.5
		138	9.5	0.8	10.3	24.0	13.7

Plots



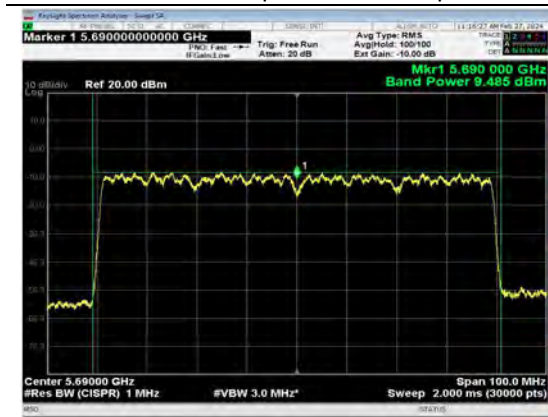
Company: Ezurio	Page 22 of 52	Name: Module, SONA NX611 M.2 2230, 1 MHF
Report: TR3768-166-5G-UNII2C		Model: SONA NX611M
Quote: C-3768		Serial: 00047



802.11ax40 | Channel 102 | MCS0



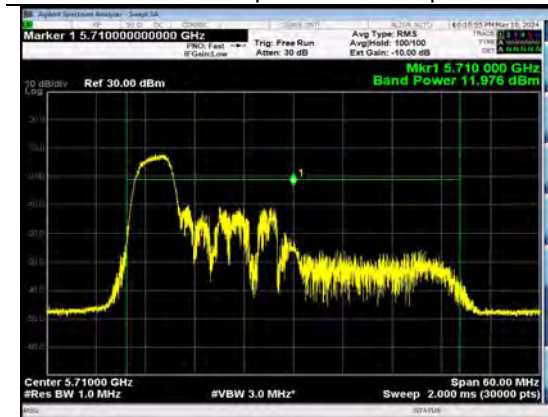
802.11ac80 | Channel 138 | MCS9



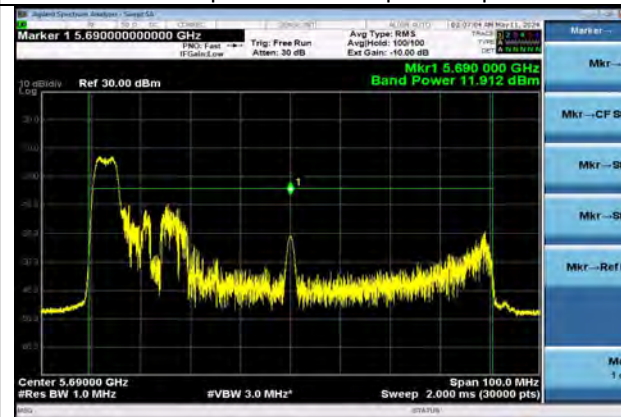
802.11ax80 | Channel 138 | MCS11



802.11ax20 | Channel 120 | MCS0 | RU52



802.11ax40 | Channel 142 | MCS0 | RU52



802.11ax80 | Channel 138 | MCS0 | RU52

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Quote: C-3768		Serial: 00047

6.1.3 Power Spectral Density

Operator	Dylan Rosenfeldt Anthony Smith	QA	Adam Hauke
Temperature	22.0°C 21.1°C 22.0°C 21.9°C	R.H. %	26.60% 20.20% 30.50% 52.90%
Test Date	02/28/2024-02/29/2024 04/25/2024-04/29/2024	Location	Conducted RF Bench
Requirement	15.407 (a)(2) RSS-247 Clause 6.2.3	Method	ANSI C63.10 12.6 AVGPSD-2

Limits: Power spectral density shall not be greater than 11 dBm in any 1 MHz band.

Test Parameters

Frequency	5470-5725 MHz	Detector(s)	Avg (RMS)
RBW	1 MHz	VBW	3 MHz
Notes	The same method of determining the conducted output power shall be used to determine the power spectral density		
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 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	5 GHz WLAN Tx
Frequency	5500-5720 MHz	Channel	See 2.9

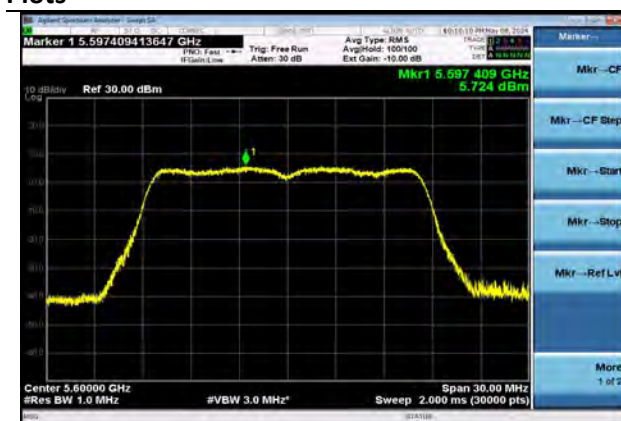
Measurements

Mode	Rate	Channel	Maximum Average PSD (dBm/1 MHz)	Duty Cycle Correction (dB)	Corrected Output Value (dBm/1 MHz)	Limit (dBm/1 MHz)	Margin (dB)
802.11a	6 Mbps	100	5.2		5.2	11.0	5.8
		116	6.3	0.0	6.3	11.0	4.7
		144	5.9		5.9	11.0	5.1
	54 Mbps	100	5.1	0.4	5.5	11.0	5.5
		116	6.0	0.4	6.4	11.0	4.6
		144	5.8	0.4	6.2	11.0	4.8
802.11n20	MCS0	100	3.8		3.8	11.0	7.2
		116	4.9	0.0	4.9	11.0	6.1
		144	4.5		4.5	11.0	6.5
	MCS7	100	3.9	0.4	4.3	11.0	6.7
		116	4.9	0.4	5.3	11.0	5.7
		144	4.6	0.4	5.0	11.0	6.0
802.11ac20	MCS0	100	4.0		4.0	11.0	7.0
		116	4.9	0.0	4.9	11.0	6.1
		144	4.8		4.8	11.0	6.2
	MCS8	100	3.8	0.4	4.2	11.0	6.8
		116	5.1	0.4	5.5	11.0	5.5
		144	4.5	0.4	4.9	11.0	6.1
802.11ax20	MCS0	100	4.4		4.4	11.0	6.7
		116	0.8	0.0	0.8	11.0	10.2
		144	5.1		5.1	11.0	5.9
	MCS11	100	-0.4	0.5	0.1	11.0	10.9
		116	0.8	0.5	1.3	11.0	9.7
		144	0.4	0.5	0.9	11.0	10.1
802.11n40	MCS0	102	-1.1	0.1	-1.0	11.0	12.0
		142	0.4	0.1	0.5	11.0	10.5
	MCS7	102	-1.1	0.6	-0.5	11.0	11.5
		142	0.2	0.6	0.8	11.0	10.2
802.11ac40	MCS0	102	1.2	0.1	1.3	11.0	9.7
		142	2.3	0.1	2.4	11.0	8.6
	MCS9	102	-1.0	0.7	-0.3	11.0	11.3
		142	0.1	0.7	0.8	11.0	10.2
802.11ax40	MCS0	102	-1.3	0.1	-1.2	11.0	12.2
		142	0.4	0.1	0.5	11.0	10.5
	MCS11	102	-3.0	0.7	-2.3	11.0	13.3
		142	-2.1	0.7	-1.4	11.0	12.4

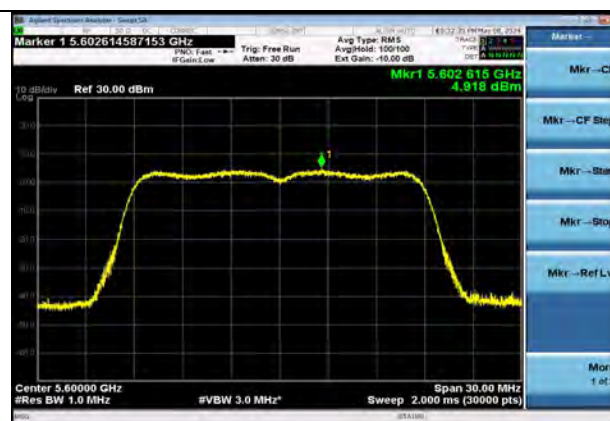
Mode	Rate	Channel	Maximum Average PSD (dBm/1 MHz)	Duty Cycle Correction (dB)	Corrected Output Value (dBm/1 MHz)	Limit (dBm/1 MHz)	Margin (dB)
802.11ac80	MCS0	106	-3.8	0.2	-3.6	11.0	14.6
		122	-3.8	0.2	-3.6	11.0	14.6
		138	-2.8	0.2	-2.6	11.0	13.6
	MCS9	106	-5.0	1.0	-4.0	11.0	15.0
		122	-4.8	1.0	-3.8	11.0	14.8
		138	-4.1	1.0	-3.1	11.0	14.1
802.11ax80	MCS0	106	-6.2	0.2	-6.0	11.0	17.0
		122	-6.1	0.2	-5.9	11.0	16.9
		138	-4.8	0.2	-4.6	11.0	15.6
	MCS11	106	-6.9	0.8	-6.1	11.0	17.1
		122	-6.3	0.8	-5.5	11.0	16.5
		138	-5.2	0.8	-4.4	11.0	15.4

Mode	Rate RU	Channel	Maximum Average PSD (dBm/1 MHz)	Duty Cycle Correction (dB)	Corrected Output Value (dBm/1 MHz)	Limit (dBm/1 MHz)	Margin (dB)
802.11ax20	MCS0 RU26	100	9.6	0.2	9.8	23.9	14.1
		120	9.7	0.2	9.9	23.9	14.1
		144	10.1	0.2	10.3	23.9	13.6
	MCS0 RU52	100	5.8	0.2	6.0	23.9	17.9
		120	7.1	0.2	7.3	23.9	16.6
		144	7.3	0.2	7.5	23.9	16.4
	MCS0 RU106	100	3.1	0.2	3.3	24.0	20.7
		120	4.1	0.2	4.3	24.0	19.7
		144	4.5	0.2	4.7	24.0	19.3
802.11ax40	MCS0 RU26	102	10.1	0.2	10.3	23.9	13.6
		118	9.8	0.2	10.0	23.9	13.9
		142	9.3	0.2	9.5	23.9	14.4
	MCS0 RU52	102	6.3	0.2	6.5	23.9	17.4
		118	7.0	0.2	7.2	23.9	16.7
		142	8.1	0.2	8.3	23.9	15.6
	MCS0 RU106	102	3.5	0.2	3.7	24.0	20.3
		118	4.1	0.2	4.3	24.0	19.8
		142	5.3	0.2	5.5	24.0	18.5
	MCS0 RU242	102	0.3	0.2	0.5	24.0	23.5
		118	0.8	0.2	1.0	24.0	23.0
		142	1.5	0.2	1.7	24.0	22.3
802.11ax80	MCS0 RU26	106	7.5	0.2	7.7	23.9	16.2
		122	8.8	0.2	9.0	23.9	15.0
		138	9.8	0.2	10.0	23.9	13.9
	MCS0 RU52	106	4.6	0.2	4.8	23.9	19.1
		122	6.0	0.2	6.2	23.9	17.7
		138	7.1	0.2	7.3	23.9	16.6
	MCS0 RU106	106	2.3	0.2	2.5	24.0	21.5
		122	3.2	0.2	3.4	24.0	20.6
		138	4.5	0.2	4.7	24.0	19.3
	MCS0 RU242	106	-0.8	0.2	-0.6	24.0	24.6
		122	0.2	0.2	0.4	24.0	23.6
		138	1.0	0.2	1.2	24.0	22.9
	MCS0 RU484	106	-3.6	0.2	-3.4	24.0	27.4
		122	-2.9	0.2	-2.7	24.0	26.7
		138	-1.6	0.2	-1.4	24.0	25.4

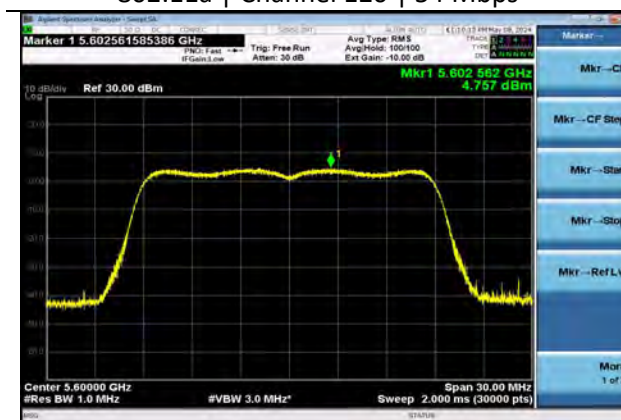
Plots



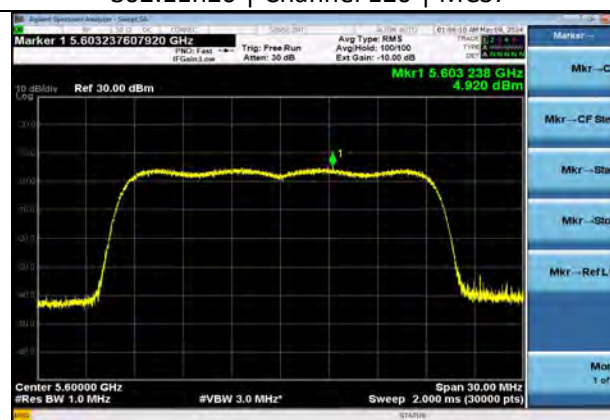
802.11a | Channel 120 | 54 Mbps



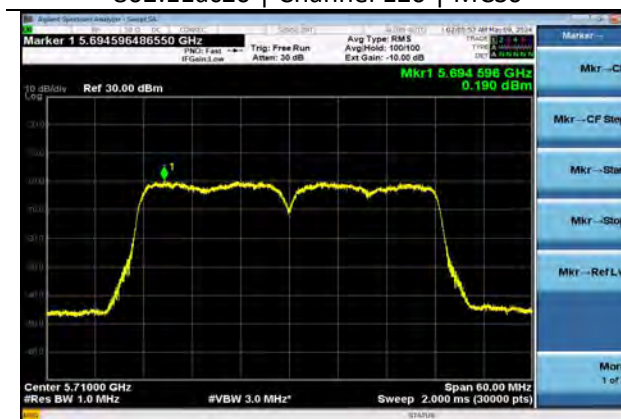
802.11n20 | Channel 120 | MCS7



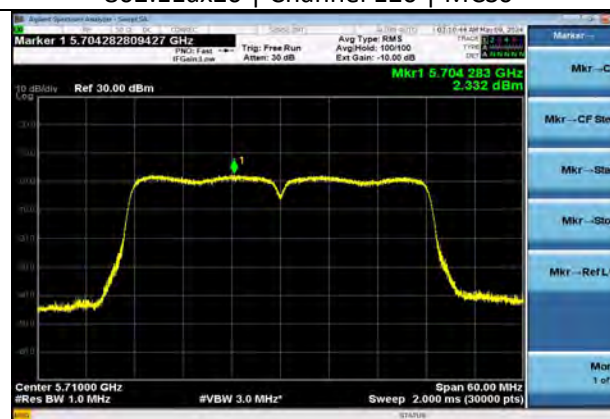
802.11ac20 | Channel 120 | MCS0



802.11ax20 | Channel 120 | MCS0

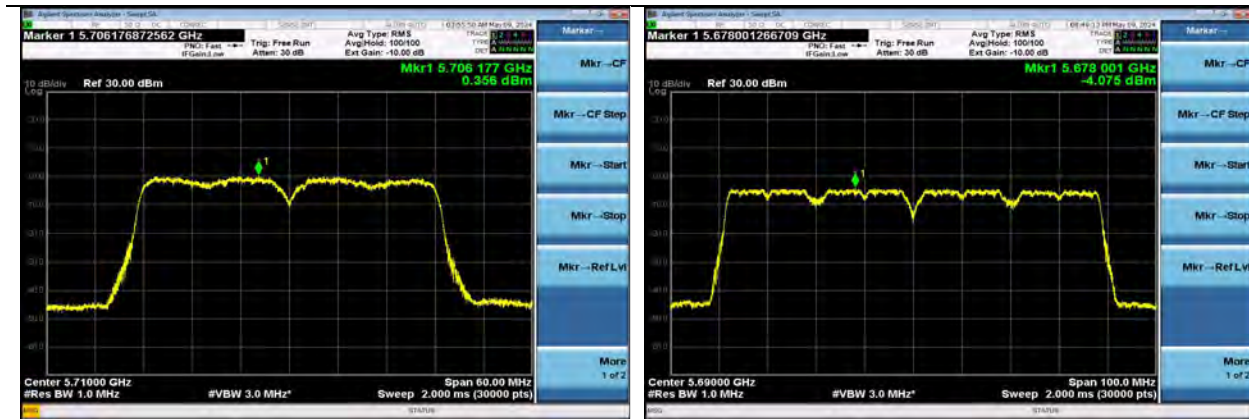


802.11n40 | Channel 142 | MCS7



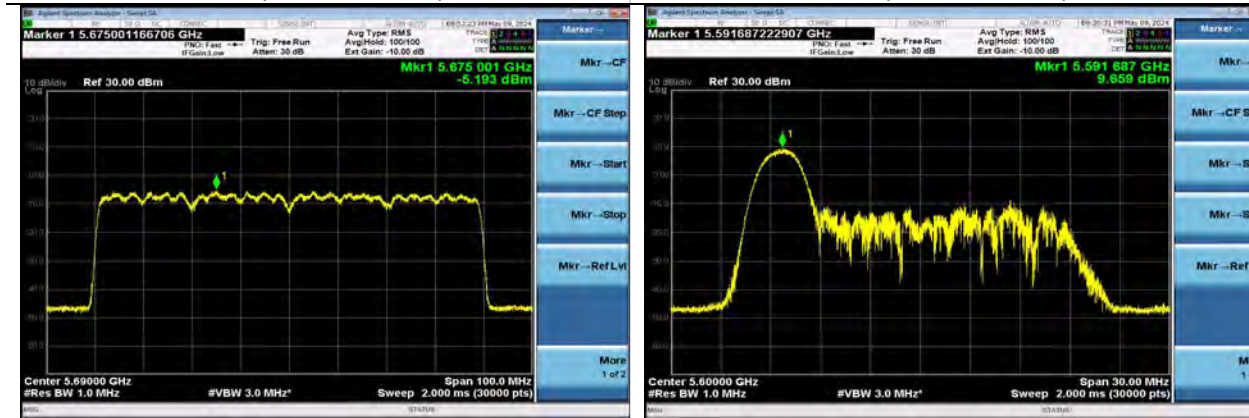
802.11ac40 | Channel 142 | MCS0

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Quote: C-3768		Serial: 00047



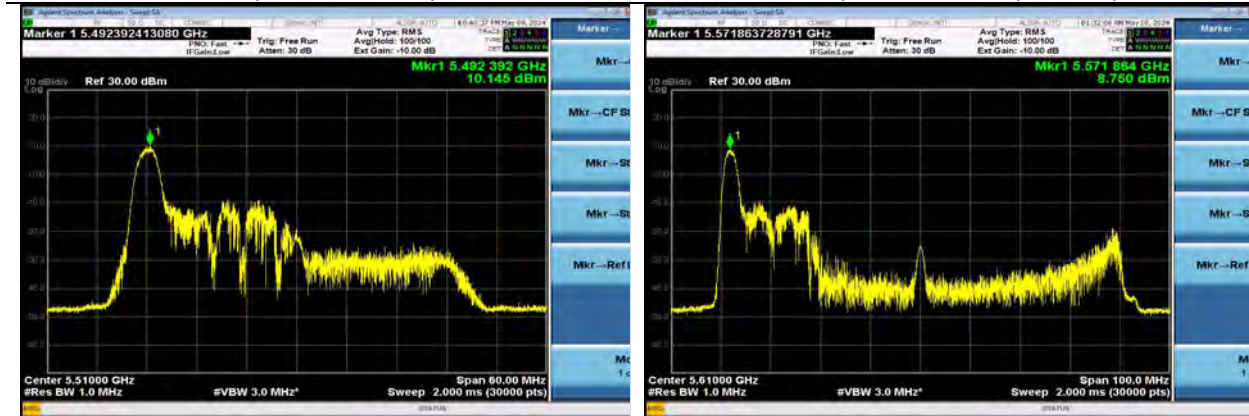
802.11ax40 | Channel 142 | MCS0

802.11ac80 | Channel 138 | MCS9



802.11ax80 | Channel 138 | MCS11

802.11ax20 | Channel 120 | MCS0 | RU26



802.11ax40 | Channel 102 | MCS0 | RU26

802.11ax80 | Channel 122 | MCS0 | RU26

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Quote: C-3768		Serial: 00047

6.1.4 Out-of-band Emissions

Operator	Anthony Smith Dylan Rosenfeldt	QA	Adam Hauke
Temperature	21.6°C-21.9°C 21.8°C-22.2°C	R.H. %	19.90%-41.10% 29.70%-38.0%
Test Date	02/29/2024-03/05/2024 04/05/2024-04/08/2024	Location	Conducted RF Bench
Requirement	15.407(b)(3) RSS-247 Clause 6.2.3	Method	ANSI C63.10 12.7

Limits: For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

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	5350-5470 MHz	Setup	
RBW	1 MHz	VBW	3 MHz
Detector(s)	Peak and Average (RMS)	Settings	
Notes	Declared antenna gain for band edge – 4.4 dBi		
Example Calculations	Correction Factor = 20 log (1/D), where D is the duty cycle		

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

Company: Ezurio	Page 30 of 52	Name:Module, SONA NX611 M.2 2230, 1 MHF
Report: TR3768-166-5G-UNII2C		Model:SONA NX611M
Quote: C-3768		Serial:00047

Input Power	120 VAC @ 60 Hz	Mode	5 GHz WLAN Tx
Frequency	5180-5530 MHz	Channel	See 2.9

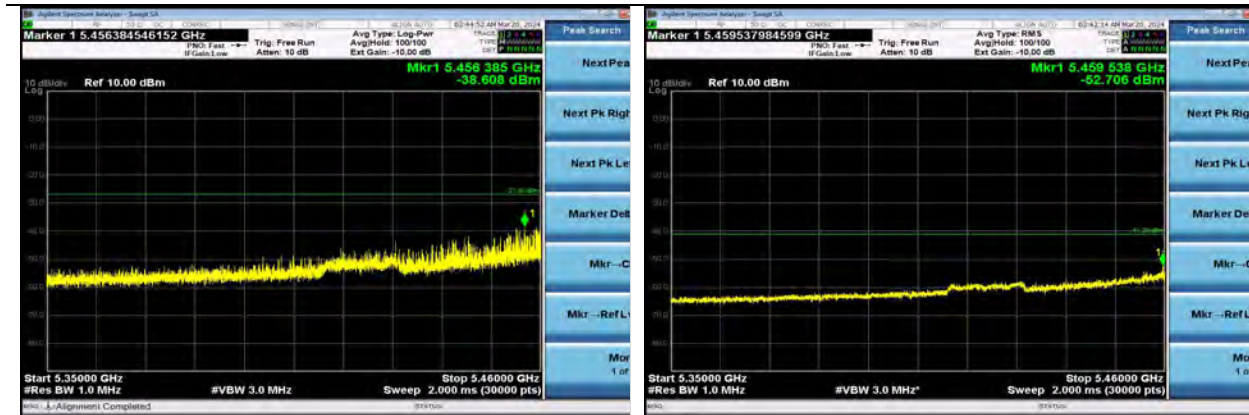
Measurements – Lower Band Edge

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	Antenna Gain (dBi)	Duty Cycle Correction (dB)	Limit (dBm)	Margin (dB)
802.11a	6 Mbps	100	Peak	5465.4	-33.0	4.4		-27.0	1.6
		100	Average	5458.5	-52.8	4.4		-41.2	7.2
	54 Mbps	100	Peak	5467.2	-32.3	4.4		-27.0	0.9
		100	Average	5459.5	-52.7	4.4	0.4	-41.2	6.7
802.11n20	MCS0	100	Peak	5469.4	-35.5	4.4		-27.0	4.1
		100	Average	5459.4	-54.6	4.4		-41.2	9.0
	MCS7	100	Peak	5470.0	-35.4	4.4		-27.0	4.0
		100	Average	5459.6	-55.9	4.4	0.4	-41.2	9.9
802.11ac20	MCS0	100	Peak	5466.9	-36.1	4.4		-27.0	4.7
		100	Average	5459.8	-54.2	4.4		-41.2	8.6
	MCS8	100	Peak	5469.0	-35.6	4.4		-27.0	4.2
		100	Average	5459.7	-56.0	4.4	0.4	-41.2	10.0
802.11ax20	MCS0	100	Peak	5463.5	-33.6	4.4		-27.0	2.2
		100	Average	5459.9	-53.4	4.4		-41.2	7.8
	MCS11	100	Peak	5469.7	-38.3	4.4		-27.0	6.9
		100	Average	5459.9	-59.4	4.4	0.5	-41.2	13.3
802.11n40	MCS0	102	Peak	5467.6	-33.5	4.4		-27.0	2.1
		102	Average	5455.4	-55.4	4.4	0.1	-41.2	9.7
	MCS7	102	Peak	5466.1	-40.2	4.4		-27.0	8.8
		102	Average	5457.5	-56.4	4.4	0.6	-41.2	10.2
802.11ac40	MCS0	102	Peak	5463.6	-34.5	4.4		-27.0	3.1
		102	Average	5460.0	-51.2	4.4	0.1	-41.2	5.5
	MCS9	102	Peak	5461.8	-41.1	4.4		-27.0	9.7
		102	Average	5456.0	-54.9	4.4	0.7	-41.2	8.6
802.11ax40	MCS0	102	Peak	5465.7	-33.7	4.4		-27.0	2.3
		102	Average	5459.5	-50.7	4.4	0.1	-41.2	5.0
	MCS11	102	Peak	5470.0	-40.3	4.4		-27.0	8.9
		102	Average	5460.0	-57.8	4.4	0.7	-41.2	11.5
802.11ac80	MCS0	106	Peak	5465.8	-32.7	4.4		-27.0	1.3
		106	Average	5443.7	-48.0	4.4	0.2	-41.2	2.2
	MCS9	106	Peak	5465.2	-35.3	4.4		-27.0	3.9
		106	Average	5456.4	-49.1	4.4	1.0	-41.2	2.5
802.11ax80	MCS0	106	Peak	5467.9	-32.3	4.4		-27.0	0.9
		106	Average	5435.5	-46.8	4.4	0.2	-41.2	1.0
	MCS11	106	Peak	5467.6	-37.9	4.4		-27.0	6.5
		106	Average	5458.2	-50.5	4.4	0.8	-41.2	4.1

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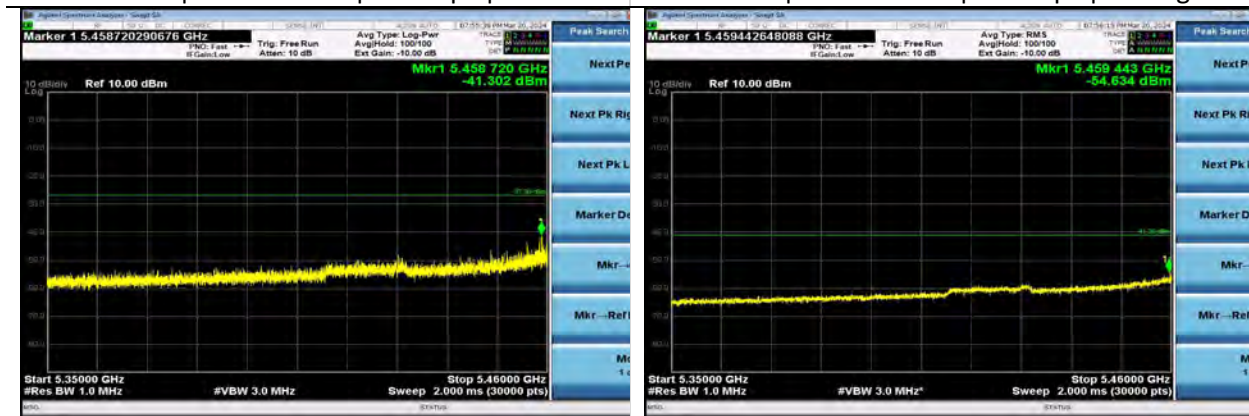
Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	Antenna Gain (dBi)	Duty Cycle Correction (dB)	Limit (dBm)	Margin (dB)
802.11ax20	MCS0	100	Peak	5457.1	-34.2	4.4		-27.0	2.8
	RU26	100	Average	5457.8	-55.5	4.4		-41.2	9.9
	MCS0	100	Peak	5453.3	-41.8	4.4		-27.0	10.4
	RU52	100	Average	5459.0	-55.2	4.4		-41.2	9.6
	MCS0	100	Peak	5459.8	-40.6	4.4		-27.0	9.2
	RU106	100	Average	5459.3	-55.1	4.4		-41.2	9.5
802.11ax40	MCS0	102	Peak	5457.4	-36.1	4.4		-27.0	4.7
	RU26	102	Average	5456.1	-47.1	4.4	0.1	-41.2	1.4
	MCS0	102	Peak	5458.8	-38.3	4.4		-27.0	6.9
	RU52	102	Average	5459.4	-49.6	4.4	0.1	-41.2	3.9
	MCS0	102	Peak	5456.0	-39.1	4.4		-27.0	7.7
	RU106	102	Average	5459.9	-53.3	4.4	0.1	-41.2	7.6
	MCS0	102	Peak	5451.7	-39.0	4.4		-27.0	7.6
	RU242	102	Average	5459.7	-54.6	4.4	0.1	-41.2	8.9
802.11ax80	MCS0	106	Peak	5413.5	-33.2	4.4		-27.0	1.8
	RU26	106	Average	5415.7	-50.4	4.4	0.2	-41.2	4.6
	MCS0	106	Peak	5457.5	-38.5	4.4		-27.0	7.1
	RU52	106	Average	5419.0	-55.0	4.4	0.2	-41.2	9.2
	MCS0	106	Peak	5420.6	-39.3	4.4		-27.0	7.9
	RU106	106	Average	5423.0	-56.1	4.4	0.2	-41.2	10.3
	MCS0	106	Peak	5415.8	-34.6	4.4		-27.0	3.2
	RU242	106	Average	5415.6	-51.3	4.4	0.8	-41.2	4.9
	MCS0	106	Peak	5459.1	-39.4	4.4		-27.0	8.0
	RU484	106	Average	5459.2	-56.5	4.4	0.2	-41.2	10.7

Worst Case Plots



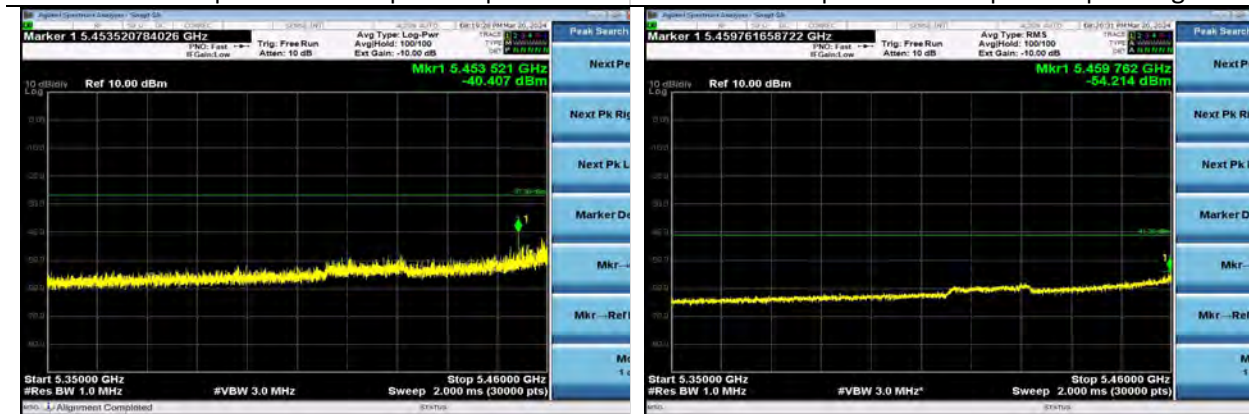
802.11a | Channel 100 | 54 Mbps | Peak

802.11a | Channel 100 | 54 Mbps | Average



802.11n20 | Channel 100 | MCS0 | Peak

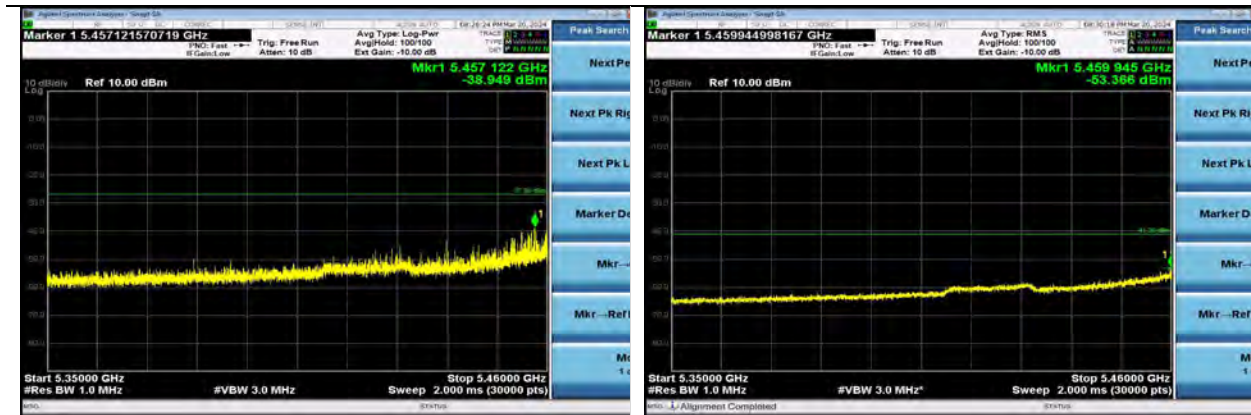
802.11n20 | Channel 100 | MCS0 | Average



802.11ac20 | Channel 100 | MCS0 | Peak

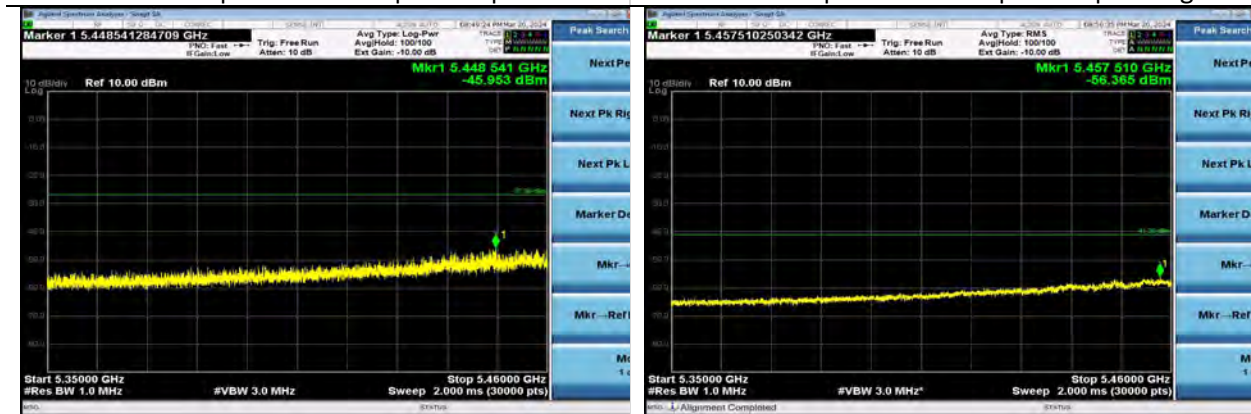
802.11ac20 | Channel 100 | MCS0 | Average

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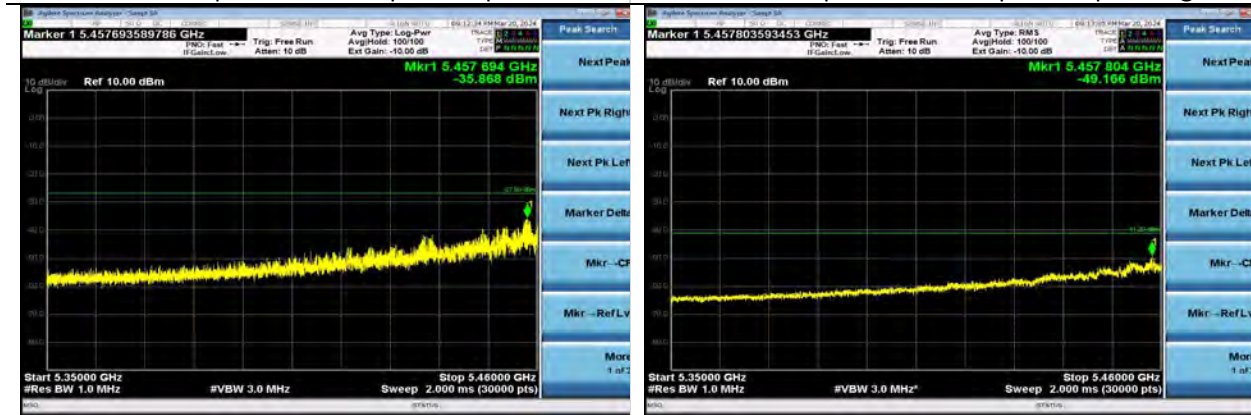
802.11ax20 | Channel 100 | MCS0 | Peak

802.11ax20 | Channel 100 | MCS0 | Average



802.11n40 | Channel 102 | MCS7 | Peak

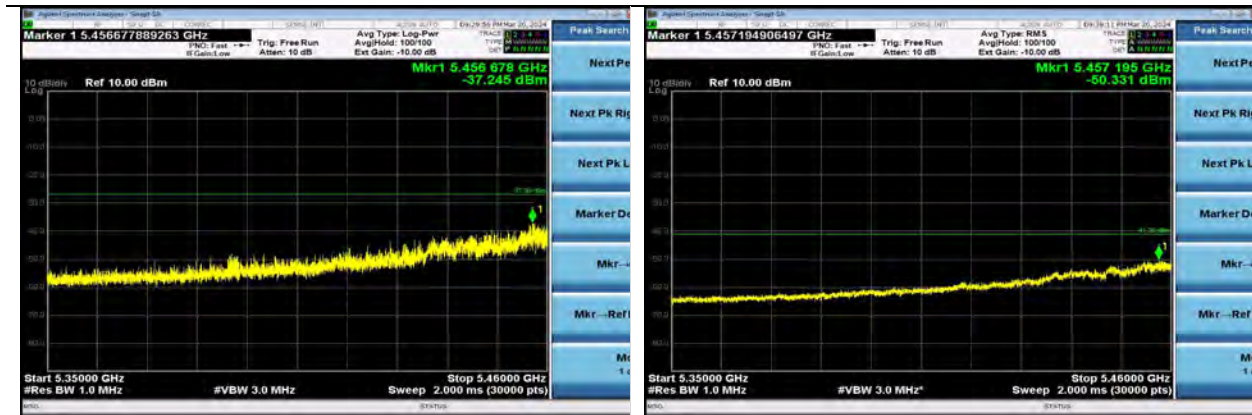
802.11ax20 | Channel 102 | MCS7 | Average



802.11ac40 | Channel 102 | MCS7 | Peak

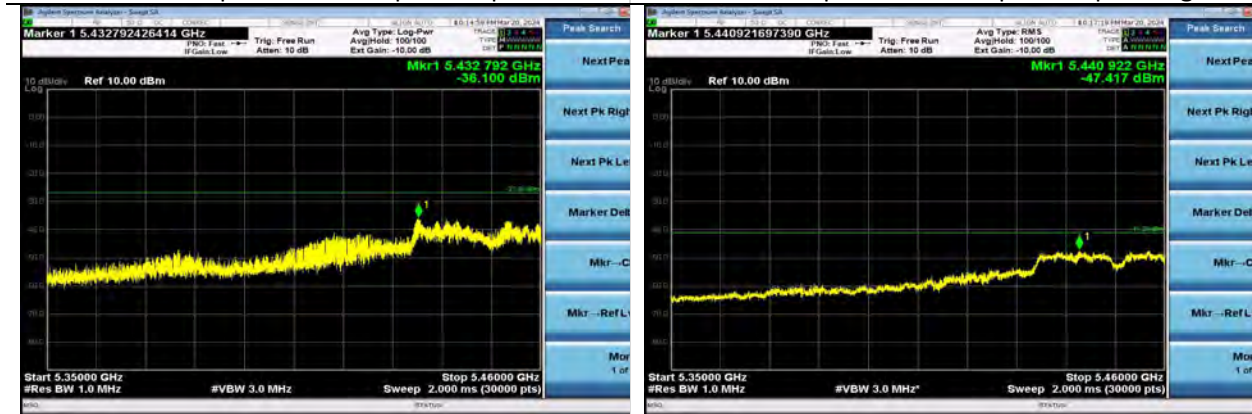
802.11ac40 | Channel 102 | MCS7 | Average

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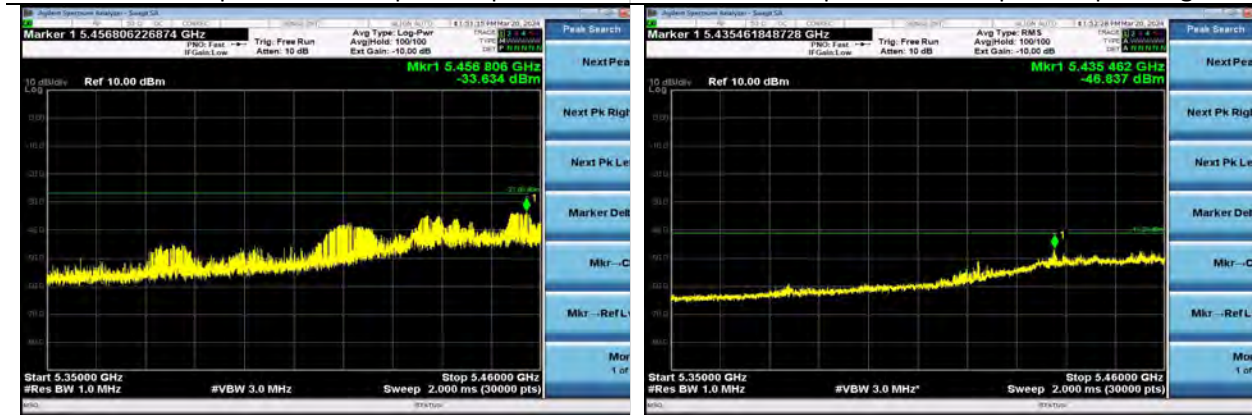
802.11ax40 | Channel 102 | MCS7 | Peak

802.11ax40 | Channel 102 | MCS7 | Average



802.11ac80 | Channel 106 | MCS7 | Peak

802.11ac80 | Channel 106 | MCS7 | Average



802.11ax80 | Channel 106 | MCS0 | Peak

802.11ax80 | Channel 106 | MCS0 | Average

802.11ax80 Channel 106 MCS0 RU26 Peak	802.11ax80 Channel 106 MCS0 RU26 Average
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6.1.5 Spurious Emissions

Operator	Anthony Smith	QA	Anthony Smith
Temperature	21.8°C	R.H. %	35.90%
Test Date	03/04/2024	Location	Conducted RF Bench
Requirement	15.407(b)(1),(2),(9), & 10 RSS-247 Clause 6.2.1 & 6.2.2 RSS-GEN	Method	ANSI C63.10 12.7

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	62.8

Test Parameters

Frequency	30-40000 MHz	Setup	
RBW	1 MHz	VBW	3 MHz
Detector(s)	Peak	Settings	
Notes	Declared antenna gain– 4.4 dBi		
Example Calculations	Correction Factor = 20 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	387	06/13/2023	06/12/2024	Active Verification
EE 960085	Analyzer – Spectrum	Agilent	N9010A	MY53400296	04/11/2023	04/11/2024	Active Calibration
AA 960161	Filter - Highpass 5 GHz	K&L Microwave	11SH10-8000	2	4/11/2023	4/11/2024	Active Calibration

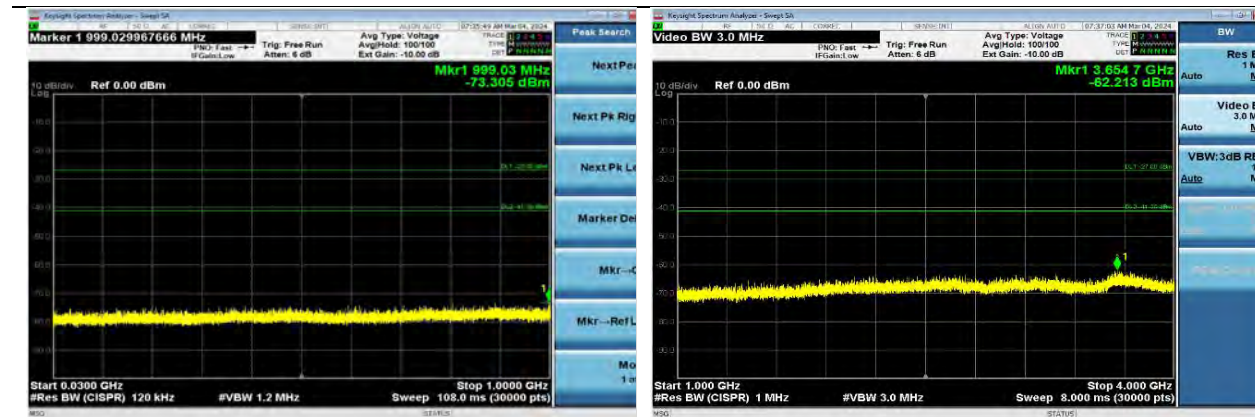
EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	5 GHz WLAN Tx
Frequency	5500-5720 MHz	Channel	

Table

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	Antenna Gain (dBi)	Limit (dBm)	Margin (dB)
802.11a	6 Mbps	144	Peak	11440.5	-58.3	4.4	-27.0	26.9
		144	Average	11439.7	-69.0	4.4	-41.2	23.4
802.11n	MCS0	144	Peak	11439.4	-60.6	4.4	-27.0	29.2
		144	Average	11441.1	-70.8	4.4	-41.2	25.2
802.11ac20	MCS0	144	Peak	11446.7	-61.3	4.4	-27.0	29.9
		144	Average	11440.4	-70.8	4.4	-41.2	25.2
802.11ax20	MCS0	144	Peak	11438.1	-60.2	4.4	-27.0	28.8
		144	Average	11439.1	-70.9	4.4	-41.2	25.3
802.11n40	MCS0	144	Peak	11440.5	-58.3	4.4	-27.0	26.9
		144	Average	11439.7	-69.0	4.4	-41.2	23.4

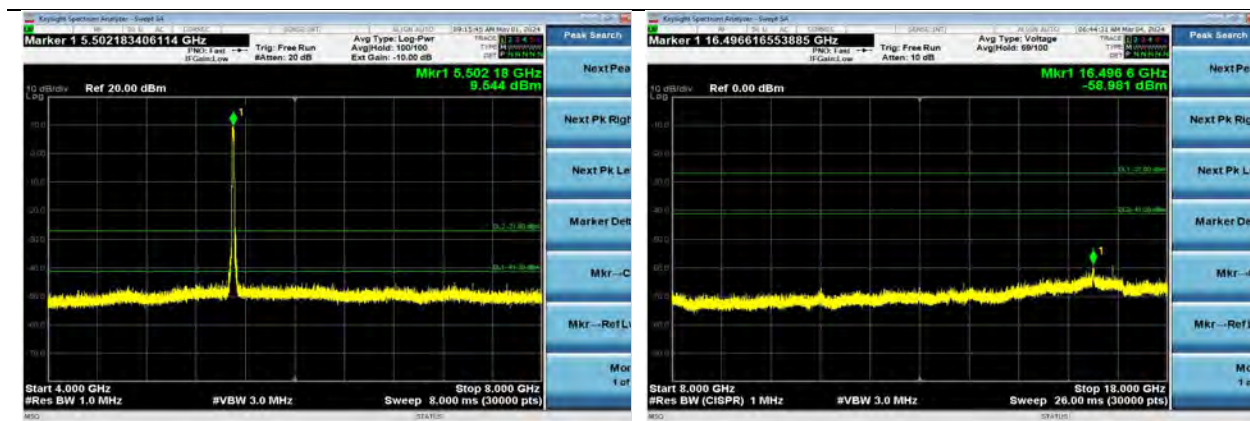
Worst Case Plots



802.11a | Channel 100 | 6 Mbps | 30-1000 MHz

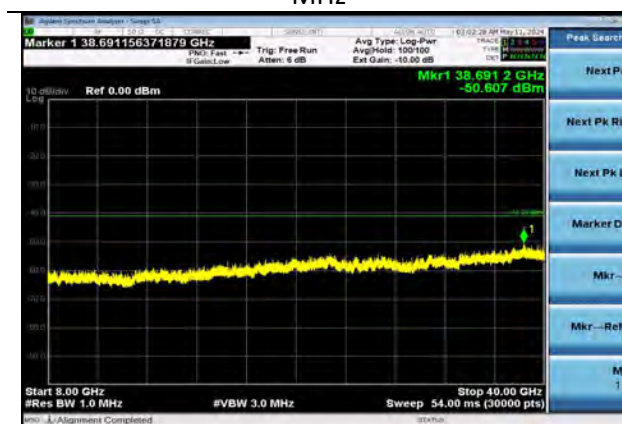
802.11a | Channel 100 | 6 Mbps | 1000-4000 MHz

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802.11a | Channel 100 | 6 Mbps | 4000-8000 MHz

802.11a | Channel 144 | 6 Mbps | 8000-18000 MHz



802.11a | Channel 100 | 6 Mbps | 8000-40000 MHz

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Report: TR3768-166-5G-UNII2C		Model: SONA NX611M
Quote: C-3768		Serial: 00047

6.1.6 Frequency Stability

Operator	Dylan Rosenfeldt	QA	Anthony Smith
Temperature	21.8°C	R.H. %	31.90%
Test Date	04/25/2024	Location	Conducted RF Bench
Requirement	15.407(g) RSS-GEN Clause 6.11	Method	ANSI C63.10 6.8

Test Parameters

Frequency	5550-5720 MHz	Voltage	4.3 VDC, 5 VDC, and 5.8 VDC
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	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	Center Frequency (Hz)
100	5	5499998613
	4.3	5499998652
	5.8	5499998644
120	5	5599998809
	4.3	5599998787
	5.8	5599998773
140	5	5699998936
	4.3	5699998986
	5.8	5699998827

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	Mitchell Freund Nicole Sedmak Jon Dilley Zachary Brown	QA	Anthony Smith Adam Alger Adam Hauke Dylan Rosenfeldt
Temperature	23.2°C-25.1°C	R.H. %	21.30%-25.90%
Test Date	02/12/2024-03/27/2024	Location	Chamber 3 Chamber 5
Requirement	15.247 (b)(1),(2),(9) & (10) RSS-247 Clause 6.2.1 & 6.2.2 RSS-GEN Clause 8.9	Method	ANSI C63.10 12.7

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	68.2

Test Parameters

Frequency	30-40000 MHz	Distance	3 m
Detector(s)	Peak Trac Peak and Average Final	Table height	150 cm
RBW	<1000 MHz – 120 kHz >1000 – 1 MHz	VBW	<1000 – 1.2 MHz >1000 – 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 960081	Antenna - Double Ridge Horn	EMCO	3115	6907	1/11/2024	1/11/2025	Active Calibration
AA 960158	Antenna - Double Ridge Horn	ETS Lindgren	3117	109300	2/7/2024	2/7/2025	Active Calibration
AA 960161	Filter - Highpass 5 GHz	K&L Microwave	11SH10-8000	2	4/11/2023	4/11/2024	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

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AA 960220	Cable	A.H. Systems, Inc.	SAC-26G-6	552	2/16/2023	2/16/2025	Active Verification
AA 960221	Cable	A.H. Systems, Inc.	SAC-26G-6	524	6/13/2023	6/13/2024	Active Verification
EE 960085	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/27/2023	4/27/2024	Active Calibration
EE 960203	Analyzer - EMI Receiver	Keysight	N9038A	MY56400072	4/11/2023	4/11/2024	Active Calibration
LSC-300	Cable	Chamber 3 Emissions	-	-	1/5/2024	1/5/2025	Active Verification
LSC-500	Cable	Chamber 5 Emissions	-	-	1/8/2024	1/8/2025	Active Verification

EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	5 GHz WLAN Tx
EUT	X, Y, Z Plane Orientations Antenna ports terminated with 50 Ω SMA terminators	AE	HP Elitebook 840G1 Ezurio – SOM60 Development Kit
Notes	6000 MHz Emission from auxiliary equipment. Not a function of the EUT. No Spurious emissions observed 1000-40000 MHz. Only worst case EUT orientation reported.		

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)
66.3	H	122	200	34.4	40.0	5.6
111.1	V	224	171	39.9	43.5	13.6
113.2	H	145	120	28.7	43.5	14.8
395.6	H	100	212	38.8	46.0	7.2
479.2	H	176	203	35.7	46.0	10.3

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

1000-40000 MHz – 802.11a

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
6 Mbps	100	Z Plane	Peak	5469.4	H	51.1	68.2	17.1
			Average	5354.7	H	39.6	54.0	14.4
54 Mbps	100	Z Plane	Peak	5366.9	H	51.2	68.2	17.0
			Average	5431.7	H	41.2	54.0	12.8

1000-40000 MHz – 802.11n20

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	100	Z Plane	Peak	5375.3	H	51.0	68.2	17.2
			Average	5356.6	H	39.8	54.0	14.2
MCS7	100	Z Plane	Peak	5395.2	H	51.7	68.2	16.5
			Average	5395.5	H	41.4	54.0	12.6

1000-40000 MHz – 802.11ac20

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	100	Z Plane	Peak	5431.0	H	51.3	68.2	16.9
			Average	5446.2	H	39.5	54.0	14.5
MCS8	100	Z Plane	Peak	5461.5	H	51.0	68.2	17.2
			Average	5392.6	H	41.5	54.0	12.5

1000-40000 MHz – 802.11ax20

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	100	Z Plane	Peak	5463.6	H	51.5	68.2	16.7
			Average	5356.1	H	39.6	54.0	14.4
MCS11	100	Z Plane	Peak	5410.1	H	51.6	68.2	16.6
			Average	5389.8	H	42.5	54.0	11.5

1000-40000 MHz – 802.11n40

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	102	Y Plane	Peak	5391.4	H	52.0	68.2	16.2
			Average	5354.4	H	39.5	54.0	14.5
MCS7	102	Y Plane	Peak	5465.2	H	51.1	68.2	17.1
			Average	5425.7	H	41.4	54.0	12.6

1000-40000 MHz – 802.11ac40

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	102	Y Plane	Peak	5406.7	H	51.3	68.2	16.9
			Average	5369.4	H	39.4	54.0	14.6
MCS9	102	Y Plane	Peak	5463.5	H	51.3	68.2	16.9
			Average	5357.9	H	41.7	54.0	12.3

1000-40000 MHz – 802.11ax40

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	102	Y Plane	Peak	5365.4	H	50.8	68.2	17.4
			Average	5369.4	H	39.6	54.0	14.4
MCS11	102	Y Plane	Peak	5438.1	H	50.6	68.2	17.6
			Average	5432.2	H	41.9	54.0	12.1

1000-40000 MHz – 802.11ac80

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	106	Z Plane	Peak	5468.7	V	51.6	68.2	16.6
			Average	5447.1	V	39.6	54.0	14.4
MCS8	106	Z Plane	Peak	5376.2	V	51.3	68.2	16.9
			Average	5410.8	V	41.9	54.0	12.1

1000-40000 MHz – 802.11ax80

Band Edge

Rate	Channel	EUT Orientation	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
MCS0	106	Z Plane	Peak	5461.3	V	51.5	68.2	16.7
			Average	5445.1	V	39.6	54.0	14.4
MCS11	106	Z Plane	Peak	5355.2	V	51.5	68.2	16.7
			Average	5365.8	V	41.9	54.0	12.1

1000-40000 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)
Z Plane	100	0	Peak	5377.5	Horizontal	52.3	68.2	15.9
			Average	5368.3	Horizontal	39.3	54.0	14.7
		3	Peak	5360.0	Horizontal	52.4	68.2	15.8
			Average	5374.7	Horizontal	39.3	54.0	14.7
		8	Peak	5374.6	Horizontal	52.0	68.2	16.2
			Average	5438.9	Horizontal	39.2	54.0	14.8

1000-40000 MHz – 802.11ax40 – 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	102	0	Peak	5462.6	Horizontal	52.9	68.2	15.3
			Average	5452.7	Horizontal	39.9	54.0	14.1
		8	Peak	5354.7	Horizontal	52.7	68.2	15.5
			Average	5359.4	Horizontal	39.7	54.0	14.3
		17	Peak	5446.7	Horizontal	52.0	68.2	16.2
			Average	5372.2	Horizontal	39.8	54.0	14.2

1000-40000 MHz – 802.11ax80 – MU-RU – MCS0

Band Edge

EUT Orientation	Channel	RU	Measurement Type	Frequency (MHz)	Antenna Polarity	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Z Plane	106	0	Peak	5359.8	Vertical	52.6	68.2	15.6
			Average	5370.3	Vertical	40.2	54.0	13.8
		17	Peak	5464.2	Vertical	52.9	68.2	15.3
			Average	5436.7	Vertical	40.3	54.0	13.7
		36	Peak	5447.7	Vertical	52.4	68.2	15.8
			Average	5426.2	Vertical	40.3	54.0	13.7

Worst Case Plots



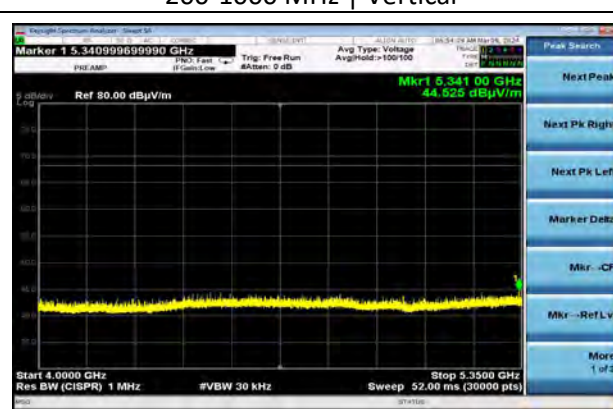
802.11a | Channel 120 | 6 Mbps | Y Plane
30-200 MHz | Horizontal



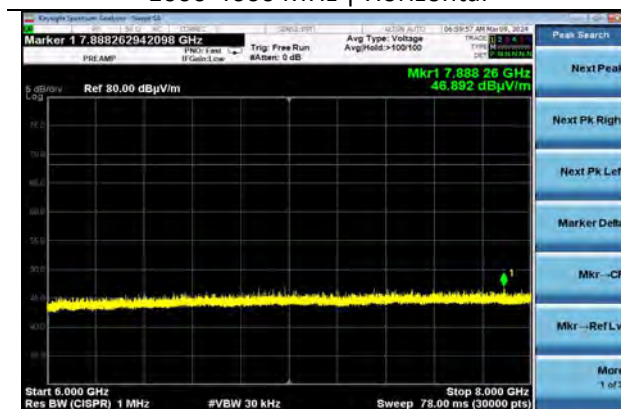
802.11a | Channel 120 | 6 Mbps | Y Plane
200-1000 MHz | Vertical



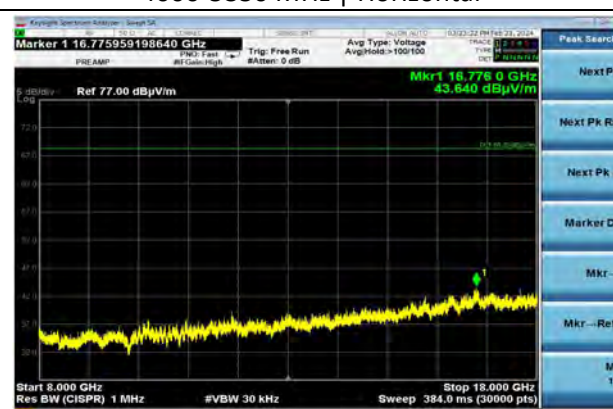
802.11a | Channel 100 | 6 Mbps | Y Plane
1000-4000 MHz | Horizontal



802.11a | Channel 100 | 6 Mbps | Z Plane
4000-5350 MHz | Horizontal



802.11a | Channel 100 | 6 Mbps | X Plane
6000-8000 MHz | Vertical



802.11a | Channel 100 | 6 Mbps | Y Plane
8000-18000 MHz | Horizontal

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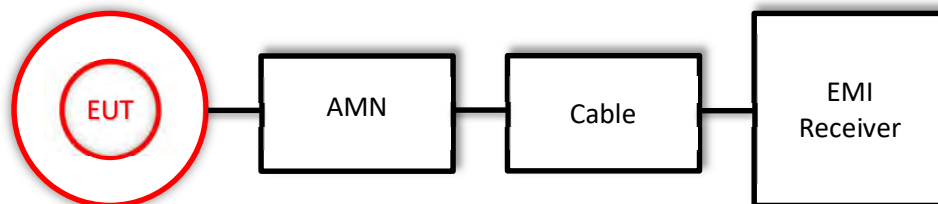
802.11a | Channel 120 | 6 Mbps | Y Plane
18000-40000 MHz | Vertical

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Quote: C-3768		Serial:00047

6.3 AC Mains Conducted Emissions

Description of Measurement	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. 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	15.407(b)(9) RSS-GEN	Method	ANSI C63.10 6.2

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

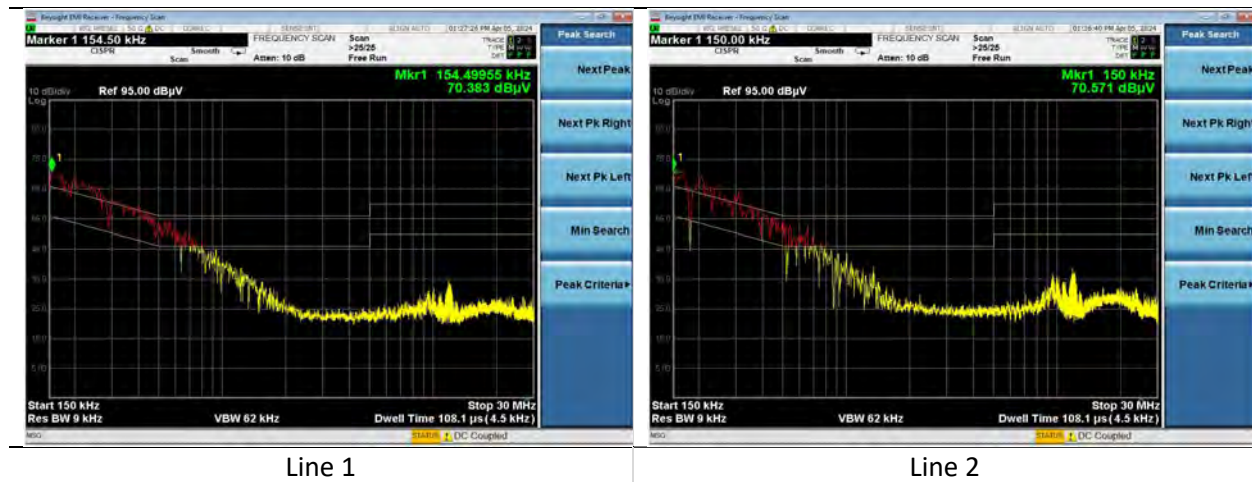
EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	5 GHz WLAN Tx Channel 100
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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	0.159	64.5	65.5	1.0	36.9	55.5	18.6
1	0.532	47.1	56.0	8.9	25.0	46.0	21.0
1	12.080	34.6	60.0	25.4	23.4	50.0	26.6
2	0.163	63.7	65.3	1.6	36.3	55.3	19.0
2	0.500	44.2	56.0	11.8	24.4	46.0	21.6
2	12.098	28.9	60.0	31.1	15.4	50.0	34.6

Plots



7 REVISION HISTORY

Version	Date	Notes	Person
0.0	08/05/2024	Initial Draft	Adam Hauke
1.0	08/08/2024	Final Draft	Adam Hauke

END OF REPORT