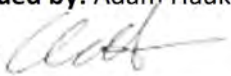




Test Report 3768-165-5G-UNII3

Equipment Under Test:	Module, SONA NX 611 M.2 2230, 2 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: 8/07/2024

Report Constructed by: Adam Hauke, EMC Engineer	
Signature: 	Date: 08/08/2024

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Company: Ezurio	Page 1 of 45	Name: Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		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

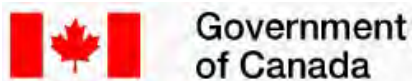
Scope of accreditation includes all test methods listed herein unless otherwise noted



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: TR3768-165-5G-UNII3		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 SIP, 2 RF Trace Pin**, as provided by **Ezurio** was tested to the following requirements:

Operation in the 5.725-5.85 GHz bands

Requirements	Description	Method	Compliant
15.407(b)(4) & (9) 15.209 RSS-247 Clause 6.2.4 RSS-GEN	Spurious Radiated Emissions in Restricted Bands 30-40000 MHz	ANSI C63.10 12.7	Yes
15.407(e) RSS-247 Clause 6.2.4	6dB Bandwidth	ANSI C63.10 12.5	Yes
15.407(a)(3) RSS-247 Clause 6.2.4	RF Output Power	ANSI C63.10 12.4	Yes
15.407(b)(4) RSS-247 Clause 6.2.4	Conducted Out-of-band Emissions	ANSI C63.10 12.7	Yes
15.407(a)(3) RSS-247 Clause 6.2.4	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

Company: Ezurio	Page 4 of 45	Name:Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model:SONA NX611M
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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	453-00165
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

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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-100BRS3B	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
149	5745	20	802.11a – 6 and 54 Mbps 802.11n – MCS0 and MCS7 802.11ac – MCS0 and MCS9 802.11ax – MCS0 and MCS11
157	5785	20	
165	5825	20	
151	5755	40	
159	5795	40	
155	5775	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-3

Requirement	Radio	Channel and Data Rate	Frequency	Measurement	Limit	Margin
15.407(e) RSS-247 Clause 6.2.4 6dB Bandwidth	802.11a	149 6 Mbps	-	16.3 MHz	at least 500 kHz	-
15.407(a)(3) RSS-247 Clause 6.2.4 Output Power	802.11ax20	165 MCS0 RU26	-	12.2 dBm	24.0 dBm	11.8 dB
15.407(a)(3) RSS-247 Clause 6.2.4 PSD	80211ax20	165 MCS0 RU26	-	13.9 dBm/500 kHz	30.0 dBm/500 kHz	16.7 dB
15.407(b)(4) RSS-247 Clause 6.2.4 Restricted Band	802.11ax80	155 MCS0 RU26	5660.1 MHz	-21.2 dBm	-19.5 dBm	1.7 dB
15.407(b)(9) RSS-GEN Spurious Below 1 GHz	802.11a	149 6 Mbps	66.2 MHz	38.6 dBμV/m	40.0 dBμV/m	1.4 dB
15.407(b)(9) RSS-GEN AC Conducted	802.11a	149 6 Mbps	0.159 MHz	64.5 dBμV	65.5 dBμV	1.0 dB

4 REFERENCES

Publication	Edition	Date	AMD 1	AMD 2
FCC eCFR 47 Part 15	-	2023	-	-
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 %

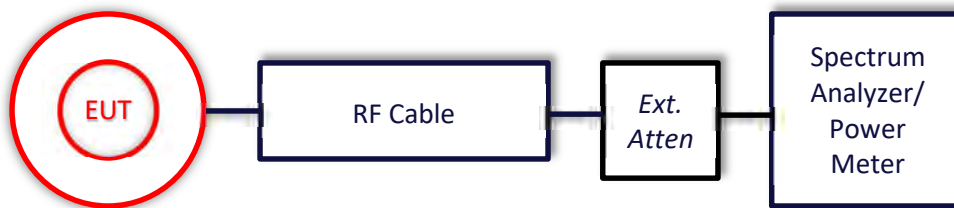
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6 TEST DATA

6.1 Antenna Port Conducted Emissions

Description of Measurement	<p>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.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p>
Example Calculations	<p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>

Block Diagram



6.1.1 6dB and 99% Occupied Bandwidth

Operator	Anthony Smith	QA	Adam Hauke
Temperature	21.9°C 22.4°C	R.H. %	27.50% 25.70%
Test Date	02/15/2024 03/28/2024	Location	Conducted RF Bench
Requirement	15.407 (e) RSS-247 Clause 6.2.4	Method	ANSI C63.10 12.5

Limits: For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

Test Parameters

Frequency	5725-5850 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	5745-5825 MHz	Channel	See 2.8

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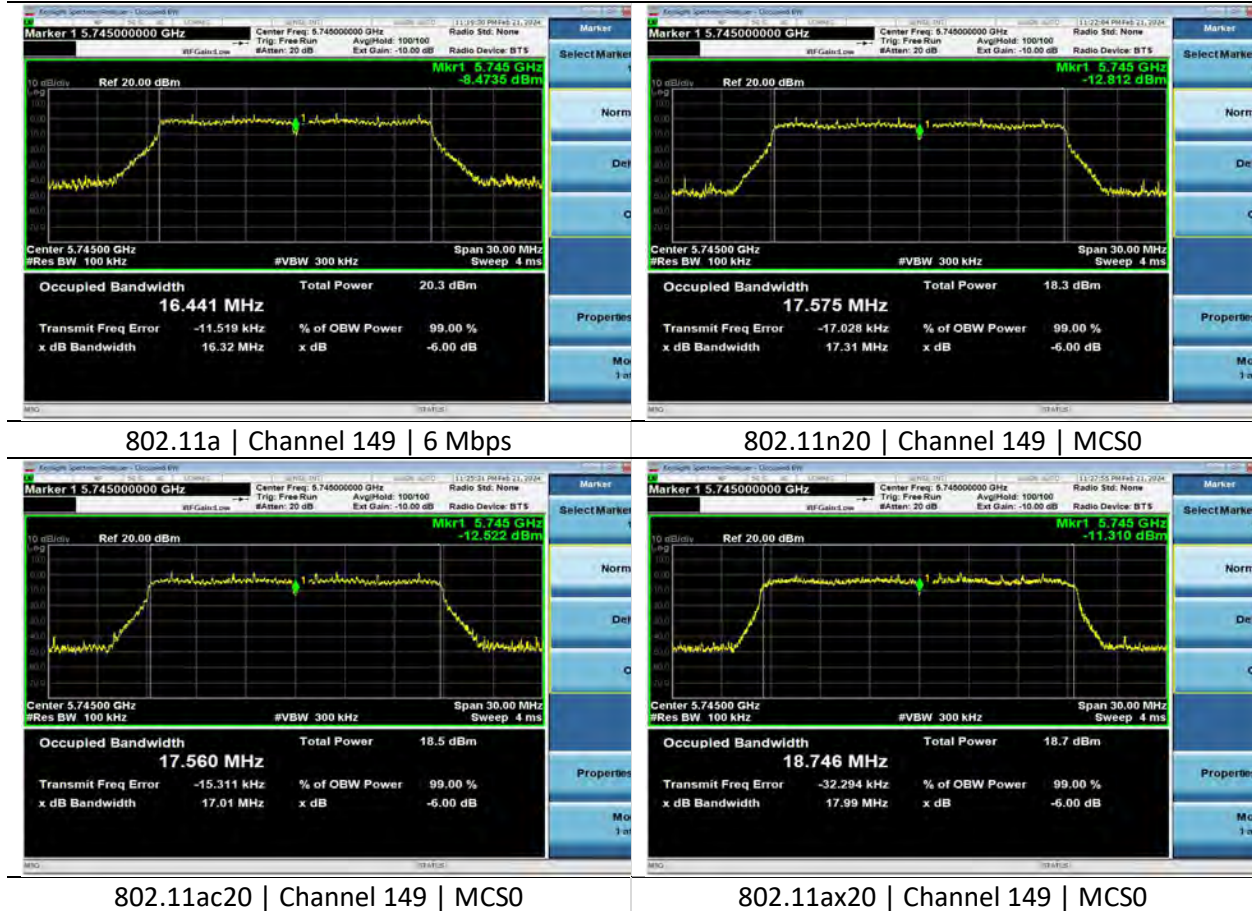
Measurements

Mode	Rate	Channel	6 dB BW (MHz)	99% BW (MHz)
802.11a	6 Mbps	149	16.3	16.4
		157	16.4	16.4
		165	16.3	16.4
	54 Mbps	149	16.4	16.4
		157	16.5	16.4
		165	16.5	16.4
802.11n20	MCS0	149	17.3	17.6
		157	17.3	17.6
		165	17.5	17.6
	MCS7	149	17.6	17.6
		157	17.7	17.6
		165	17.6	17.6
802.11ac20	MCS0	149	17.0	17.6
		157	17.5	17.6
		165	17.5	17.6
	MCS8	149	17.5	17.6
		157	17.6	17.6
		165	17.7	17.6
802.11ax20	MCS0	149	18.0	18.7
		157	18.1	18.7
		165	18.2	18.7
	MCS11	149	18.0	18.7
		157	18.2	18.7
		165	18.2	18.7

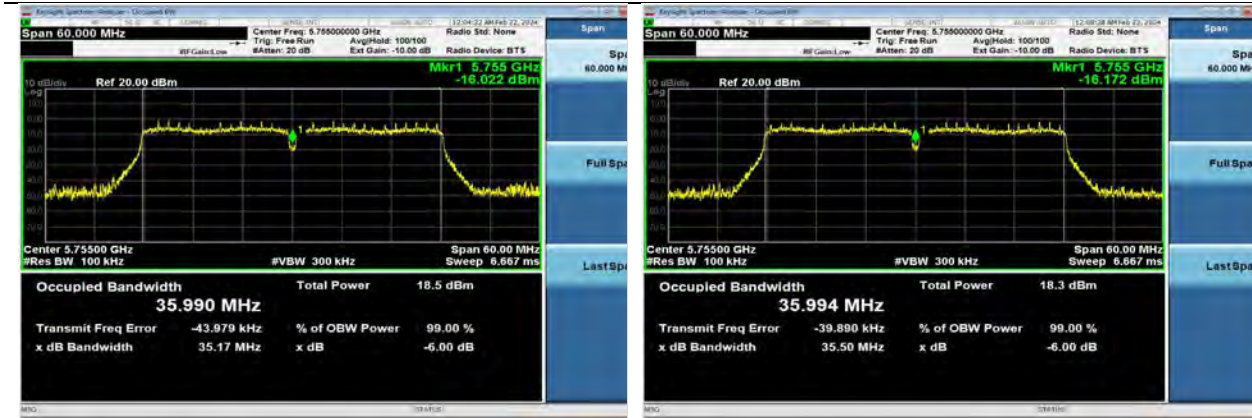
Mode	Rate	Channel	6 dB BW (MHz)	99% BW (MHz)
802.11n40	MCS0	151	35.2	36.0
		159	35.7	36.0
	MCS7	151	35.7	36.0
		159	36.3	36.0
802.11ac40	MCS0	151	35.5	36.0
		159	35.7	36.0
	MCS9	151	35.9	36.1
		159	36.0	36.0
802.11ax40	MCS0	151	36.5	37.5
		159	36.8	37.5
	MCS11	151	36.2	37.4
		159	37.0	37.5
802.11ac80	MCS0	155	76.3	75.8
	MCS9	155	76.4	75.8
802.11ax80	MCS0	155	77.9	77.5
	MCS11	155	77.9	77.4

Mode	Rate	Channel	RU Tone / Index	6 dB BW (MHz)	99% BW (MHz)
802.11ax20	MCS0	149	26 / 0	19.0	18.0
			52 / 37	19.1	17.9
			106 / 63	19.1	17.9
802.11ax40	MCS0	151	242 / 61	36.1	20.0
		159	242 / 62	38.1	20.4
802.11ax80	MCS0	155	484 / 65	80.3	43.0
		155	484 / 66	80.1	55.2

U-NII-3 Plots

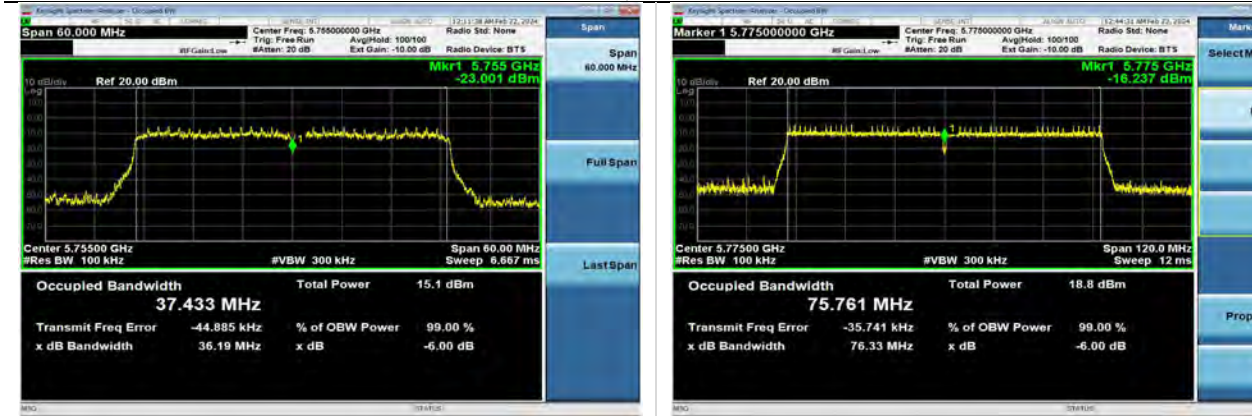


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802.11n40 | Channel 151 | MCS0

802.11ac40 | Channel 151 | MCS0



802.11ax40 | Channel 151 | MCS11

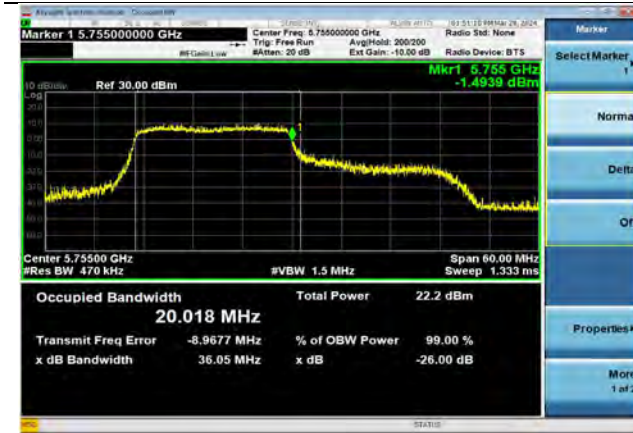
802.11ac80 | Channel 155 | MCS0



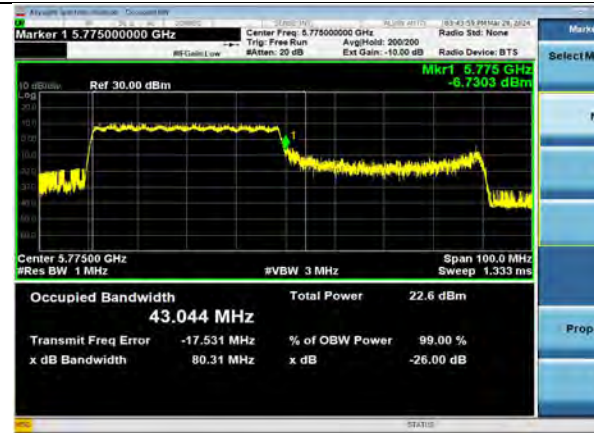
802.11ax80 | Channel 155 | MCS0

802.11ax20 | Channel 149 | MCS0 | RU Tone
26 Index 0

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802.11ax40 | Channel 151 | MCS0 | RU Tone 242
Index 61



802.11ax80 | Channel 155 | MCS0 | RU Tone 484
Index 65

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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)(3) RSS-247 Clause6.2.4	Method	ANSI C63.10 12.4 AVGSA-2

Limit: For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

Test Parameters

Frequency	5725-5850 MHz	Setup	Antenna Port
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	5745-5825 MHz	Channel	See 2.9

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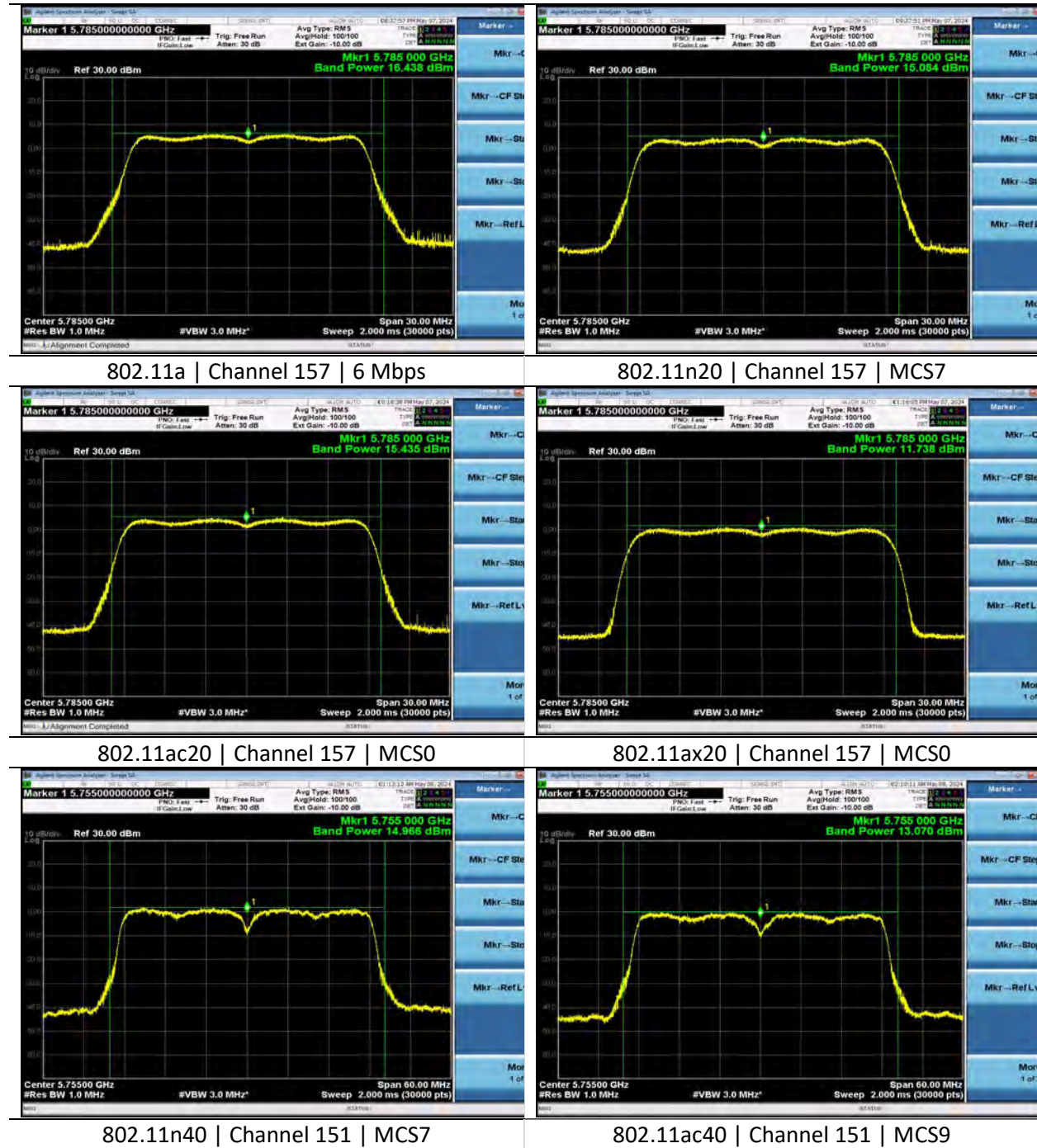
Measurements

Mode	Rate	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)	
802.11a	6 Mbps	149	16.6	-	16.6	30.0	13.4	
		157	16.4	-	16.4	30.0	13.6	
		165	16.7	-	16.7	30.0	13.3	
	54 Mbps	149	16.4	0.4	16.8	30.0	13.2	
		157	16.0	0.4	16.4	30.0	13.6	
		165	16.2	0.4	16.6	30.0	13.4	
802.11n20	MCS0	149	15.7	-	15.7	30.0	14.3	
		157	15.4	-	15.4	30.0	14.6	
		165	15.7	-	15.7	30.0	14.3	
	MCS7	149	15.4	0.4	15.8	30.0	14.2	
		157	15.1	0.4	15.5	30.0	14.5	
		165	15.2	0.4	15.6	30.0	14.4	
802.11ac20	MCS0	149	15.6	-	15.6	30.0	14.4	
		157	15.4	-	15.4	30.0	14.6	
		165	15.8	-	15.8	30.0	14.2	
	MCS8	149	15.2	0.4	15.6	30.0	14.4	
		157	15.1	0.4	15.5	30.0	14.5	
		165	15.3	0.4	15.7	30.0	14.3	
802.11ax20	MCS0	149	11.8	-	11.8	30.0	18.2	
		157	11.7	-	11.7	30.0	18.3	
		165	12.0	-	12.0	30.0	18.1	
	MCS11	149	11.3	0.5	11.8	30.0	18.2	
		157	11.2	0.5	11.7	30.0	18.3	
		165	11.4	0.5	11.9	30.0	18.1	
802.11n40	MCS0	151	15.5	0.1	15.6	30.0	14.4	
		159	15.4	0.1	15.5	30.0	14.5	
	MCS7	151	15.0	0.6	15.6	30.0	14.4	
		159	14.9	0.6	15.5	30.0	14.5	
	802.11ac40	MCS0	151	15.4	0.1	15.5	30.0	14.5
			159	15.4	0.1	15.5	30.0	14.5
MCS9		151	13.1	0.7	13.8	30.0	16.2	
		159	13.2	0.7	13.9	30.0	16.1	
802.11ax40	MCS0	151	11.9	0.1	12.0	30.0	18.0	
		159	11.9	0.1	12.0	30.0	18.0	
	MCS11	151	11.4	0.7	12.1	30.0	18.0	
		159	11.3	0.7	12.0	30.0	18.0	
802.11ac80	MCS0	155	14.3	0.2	14.5	30.0	15.5	
	MCS9	155	13.7	1.0	14.7	30.0	15.4	
802.11ax80	MCS0	155	11.5	0.2	11.7	30.0	18.3	
	MCS11	155	10.8	0.8	11.6	30.0	18.4	

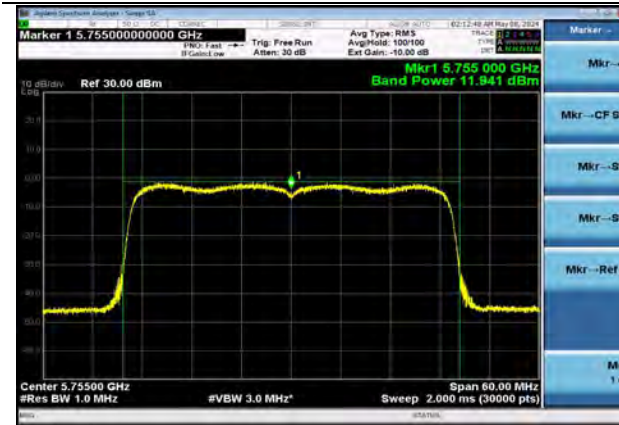
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Report: TR3768-165-5G-UNII3		Model: SONA NX611M
Quote: C-3768		Serial: 00047

Mode	Rate RU	Channel	Average Output Power (dBm)	Duty Cycle Correction (dB)	Corrected Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11ax20	MCS0 RU26	149	11.8	0.2	12.0	24.0	12.0
		157	11.2	0.2	11.4	24.0	12.6
		165	12.0	0.2	12.2	24.0	11.8
	MCS0 RU52	149	11.8	0.2	12.0	24.0	12.0
		157	11.5	0.2	11.7	24.0	12.3
		165	11.9	0.2	12.1	24.0	11.9
	MCS0 RU106	149	11.9	0.2	12.1	24.0	11.9
		157	11.5	0.2	11.7	24.0	12.3
		165	11.9	0.2	12.1	24.0	11.9
802.11ax40	MCS0 RU26	151	11.4	0.2	11.6	24.0	12.4
		159	11.0	0.2	11.2	24.0	12.8
	MCS0 RU52	151	11.9	0.2	12.1	24.0	11.9
		159	11.8	0.2	12.0	24.0	12.0
	MCS0 RU106	151	12.0	0.2	12.2	24.0	11.8
		159	11.7	0.2	11.9	24.0	12.1
	MCS0 RU242	151	12.0	0.2	12.2	24.0	11.8
159		11.7	0.2	11.9	24.0	12.1	
802.11ax80	MCS0 RU26	155	11.7	0.2	11.9	24.0	12.1
		155	11.9	0.2	12.1	24.0	11.9
	MCS0 RU106	155	11.6	0.2	11.8	24.0	12.2
		155	11.6	0.2	11.8	24.0	12.3
	MCS0 RU484	155	11.5	0.2	11.7	24.0	12.3

Plots



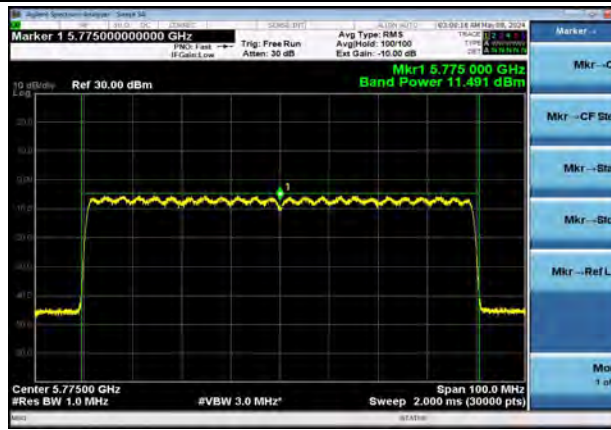
Company: Ezurio	Page 20 of 45	Name: Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model: SONA NX611M
Quote: C-3768		Serial: 00047



802.11ax40 | Channel 151 | MCS0



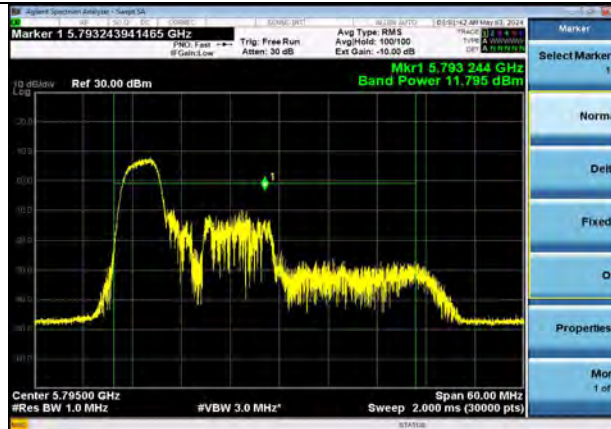
802.11ac80 | Channel 155 | MCS9



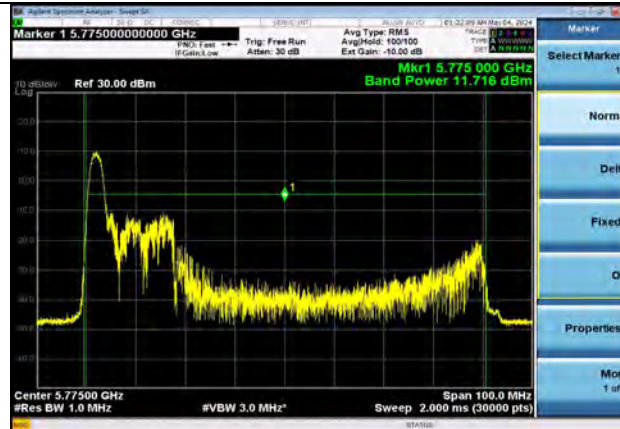
802.11ax80 | Channel 155 | MCS0



802.11ax20 | Channel 157 | MCS0 | RU106



802.11ax40 | Channel 159 | MCS0 | RU 52



802.11ax80 | Channel 155 | MCS0 | RU26

Company: Ezurio	Page 21 of 45	Name: Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model: SONA NX611M
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)(3) RSS-247 Clause 6.2.4	Method	ANSI C63.10 12.6 AVGPSD-2

Limits: For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

Test Parameters

Frequency	5725-5850 MHz	Detector(s)	Avg (RMS)
RBW	100 kHz	VBW	300 kHz
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	5745-5825 MHz	Channel	See 2.9

Company: Ezurio	Page 22 of 45	Name:Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model:SONA NX611M
Quote: C-3768		Serial:00047

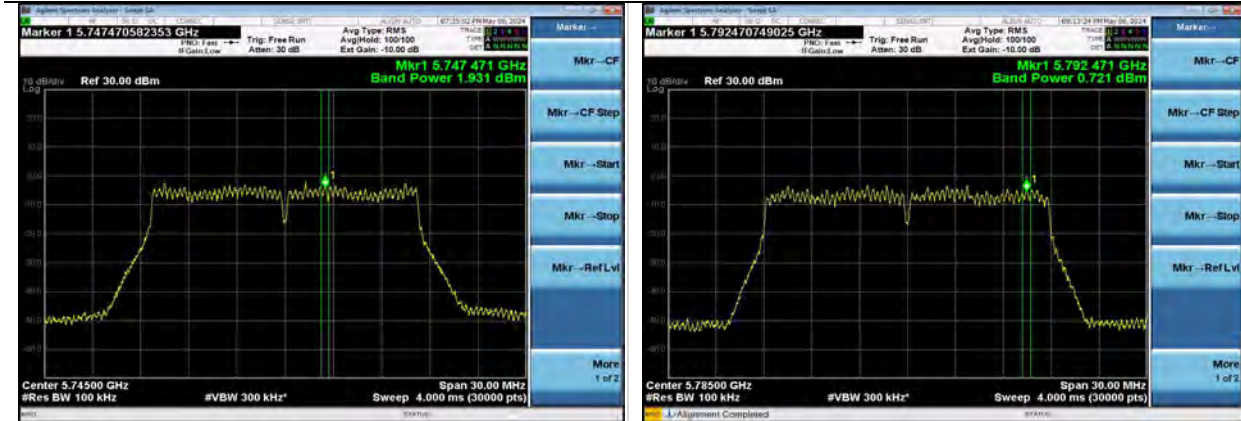
Measurements

Mode	Rate	Channel	Maximum Average PSD (dBm/500 kHz)	Duty Cycle and RBW Correction (dB)	Corrected Output Value (dBm/500 kHz)	Limit (dBm/500 kHz)	Margin (dB)
802.11a	6 Mbps	149	1.3	7.0	8.3	30.0	21.7
		157	2.1	7.0	9.1	30.0	20.9
		165	2.1	7.0	9.1	30.0	20.9
	54 Mbps	149	1.9	7.4	9.3	30.0	20.7
		157	1.4	7.4	8.8	30.0	21.2
		165	1.4	7.4	8.8	30.0	21.2
802.11n20	MCS0	149	1.0	7.0	8.0	30.0	22.1
		157	0.7	7.0	7.7	30.0	22.3
		165	1.1	7.0	8.1	30.0	21.9
	MCS7	149	0.9	7.4	8.3	30.0	21.7
		157	0.7	7.4	8.1	30.0	21.9
		165	0.9	7.4	8.3	30.0	21.7
802.11ac20	MCS0	149	0.6	7.0	7.6	30.0	22.4
		157	0.6	7.0	7.6	30.0	22.4
		165	0.9	7.0	7.9	30.0	22.1
	MCS8	149	0.8	7.4	8.2	30.0	21.8
		157	0.9	7.4	8.3	30.0	21.7
		165	0.5	7.4	7.9	30.0	22.1
802.11ax20	MCS0	149	-3.1	7.0	3.9	30.0	26.1
		157	-3.5	7.0	3.5	30.0	26.5
		165	-3.0	7.0	4.0	30.0	26.0
	MCS11	149	-2.9	7.5	4.6	30.0	25.4
		157	-3.3	7.5	4.2	30.0	25.8
		165	-2.5	7.5	5.0	30.0	25.0
802.11n40	MCS0	151	-2.4	7.1	4.7	30.0	25.3
		159	-2.3	7.1	4.8	30.0	25.2
	MCS7	151	-1.9	7.6	5.7	30.0	24.3
		159	-2.3	7.6	5.4	30.0	24.7
802.11ac40	MCS0	151	-2.1	7.1	5.0	30.0	25.0
		159	-2.1	7.1	5.0	30.0	25.0
	MCS9	151	-4.1	7.7	3.7	30.0	26.4
		159	-3.7	7.7	4.1	30.0	26.0
802.11ax40	MCS0	151	-6.3	7.1	0.8	30.0	29.2
		159	-5.8	7.1	1.4	30.0	28.7
	MCS11	151	-5.6	7.7	2.1	30.0	27.9
		159	-5.9	0.7	-5.2	30.0	35.2
802.11ac80	MCS0	155	-7.9	7.2	-0.7	30.0	30.7
	MCS9	155	-7.5	8.0	0.5	30.0	29.5
802.11ax80	MCS0	155	-9.7	7.2	-2.5	30.0	32.5
	MCS11	155	-9.3	7.8	-1.5	30.0	31.5

Company: Ezurio	Page 23 of 45	Name: Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model: SONA NX611M
Quote: C-3768		Serial: 00047

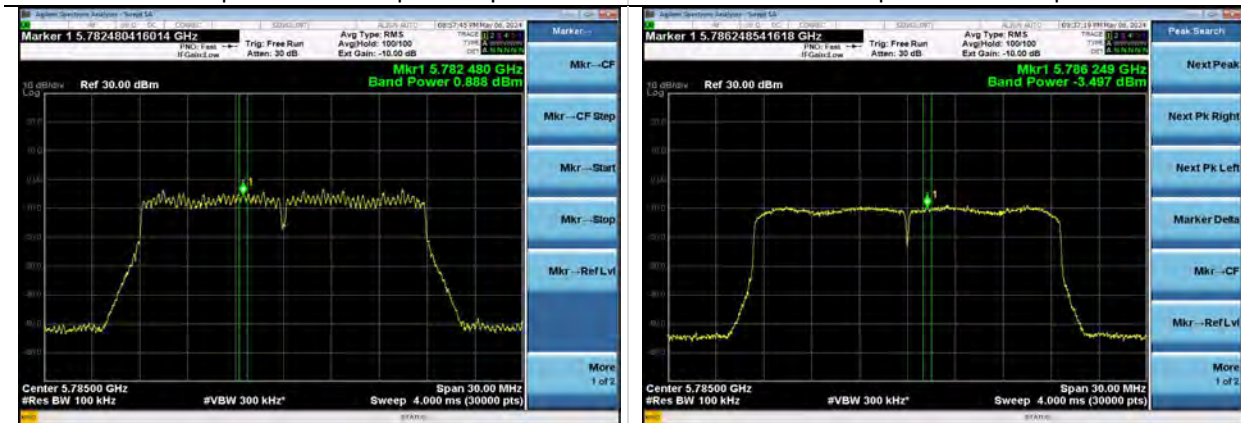
Mode	Rate RU	Channel	Maximum Average PSD (dBm/500 kHz)	Duty Cycle and RBW Correction (dB)	Corrected Output Value (dBm/1 MHz)	Limit (dBm/500 kHz)	Margin (dB)
802.11ax20	MCS0 RU26	149	4.7	7.2	11.9	30.0	18.1
		157	5.9	7.2	13.1	30.0	16.9
		165	6.7	7.2	13.9	30.0	16.1
	MCS0 RU52	149	3.6	7.2	10.8	30.0	19.2
		157	3.2	7.2	10.4	30.0	19.6
		165	3.7	7.2	10.9	30.0	19.1
	MCS0 RU106	149	0.4	7.2	7.6	30.0	22.4
		157	0.2	7.2	7.4	30.0	22.6
		165	0.6	7.2	7.8	30.0	22.2
802.11ax40	MCS0 RU26	151	5.4	7.2	12.6	30.0	17.4
		159	5.2	7.2	12.4	30.0	17.6
	MCS0 RU52	151	3.3	7.2	10.5	30.0	19.5
		159	3.3	7.2	10.5	30.0	19.6
	MCS0 RU106	151	0.2	7.2	7.4	30.0	22.6
		159	0.3	7.2	7.5	30.0	22.5
	MCS0 RU242	151	-3.5	7.2	3.7	30.0	26.3
159		-3.2	7.2	4.0	30.0	26.0	
802.11ax80	MCS0 RU26	155	5.6	7.2	12.8	30.0	17.2
		155	2.7	7.2	9.9	30.0	20.1
	MCS0 RU106	155	-0.4	7.2	6.8	30.0	23.2
		155	-3.9	7.2	3.3	30.0	26.7
	MCS0 RU484	155	-6.8	7.2	0.4	30.0	29.6

Plots



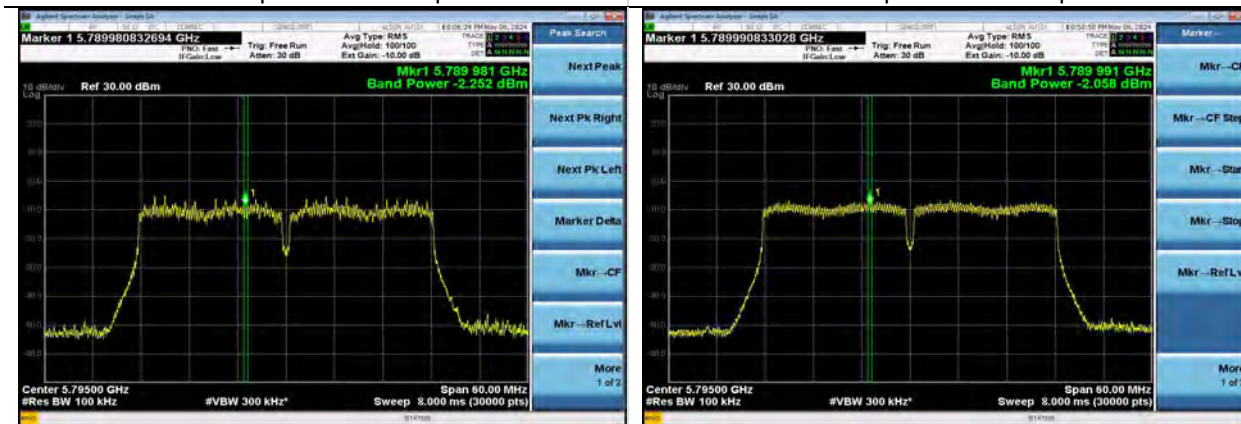
802.11a | Channel 149 | 54 Mbps

802.11n20 | Channel 157 | MCS7



802.11ac20 | Channel 157 | MCS8

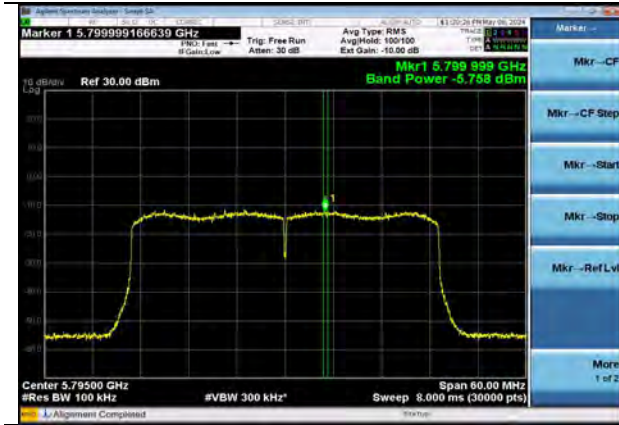
802.11ax20 | Channel 157 | MCS0



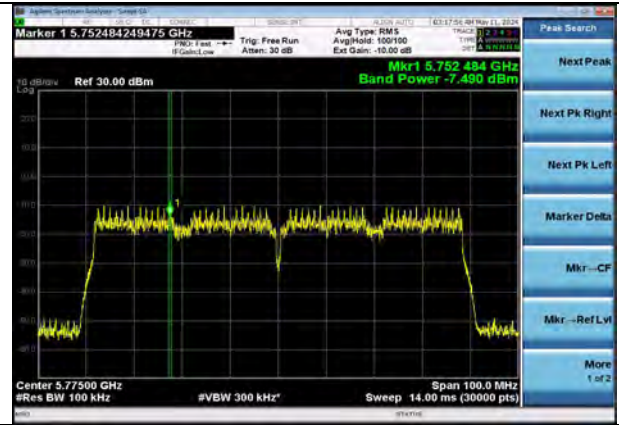
802.11n40 | Channel 159 | MCS7

802.11ac40 | Channel 159 | MCS0

Company: Ezurio	Page 25 of 45	Name: Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model: SONA NX611M
Quote: C-3768		Serial: 00047



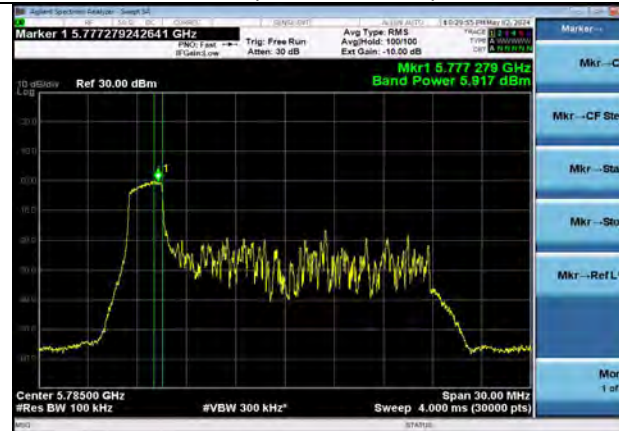
802.11ax40 | Channel 159 | MCS0



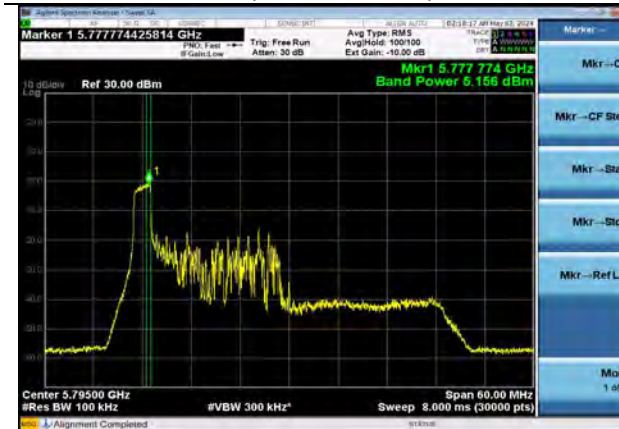
802.11ac80 | Channel 155 | MCS9



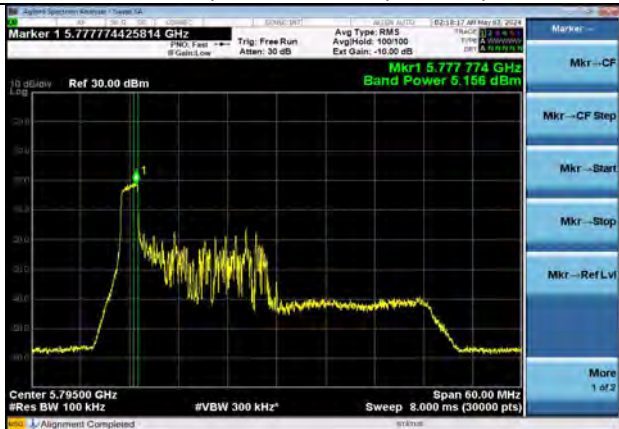
802.11ax80 | Channel 155 | MCS11



802.11ax20 | Channel 157 | MCS0 | RU26



802.11ax40 | Channel 159 | MCS0 | RU26



802.11ax80 | Channel 155 | MCS0 | RU26

Company: Ezurio	Page 26 of 45	Name: Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model: SONA NX611M
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)(4) RSS-247 Clause 6.2.4	Method	ANSI C63.10 12.7

Limits: For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Test Parameters

Frequency	30-40000 MHz	Setup	Antenna Port
RBW	1 MHz	VBW	3 MHz
Detector(s)	Peak and Average (RMS)		
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

Input Power	120 VAC @ 60 Hz	Mode	5 GHz WLAN Tx
Frequency	5745-5825 MHz	Channel	See 2.9

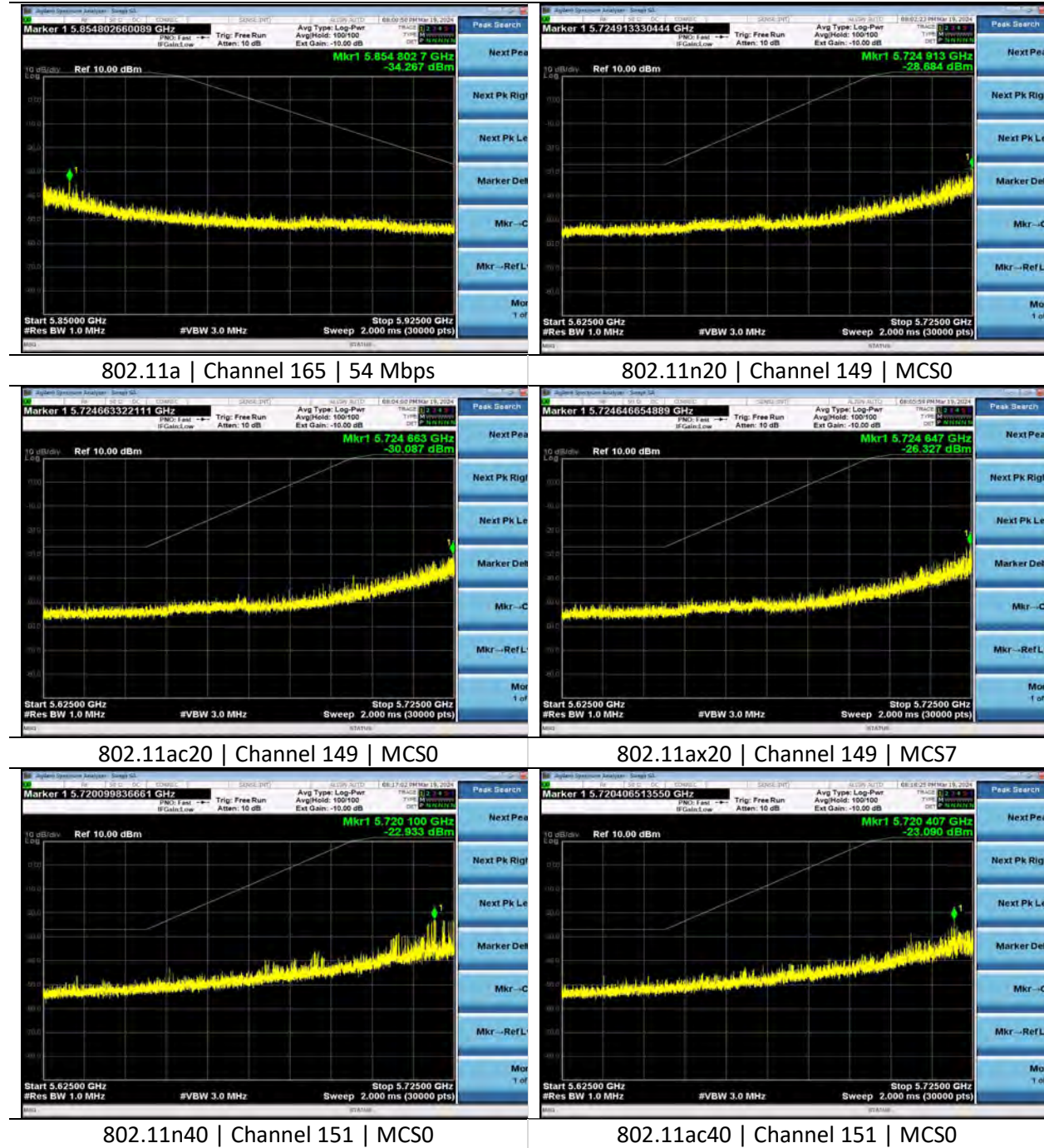
Company: Ezurio	Page 27 of 45	Name:Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model:SONA NX611M
Quote: C-3768		Serial:00047

Measurements – Band Edge

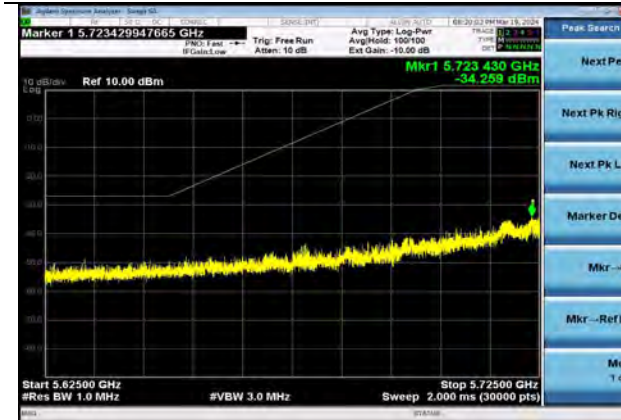
Mode	Rate	Channel	Frequency (MHz)	Measurement (dBm)	Antenna Gain (dBi)	Limit (dBm)	Margin (dB)
802.11a	6 Mbps	149	5723.3	-28.5	4.4	23.1	47.2
		165	5851.5	-34.8	4.4	23.7	54.1
	54 Mbps	149	5724.2	-28.2	4.4	25.2	48.9
		165	5854.8	-34.3	4.4	16.1	45.9
802.11n20	MCS0	149	5724.9	-28.7	4.4	26.8	51.1
		165	5851.8	-30.8	4.4	22.9	49.2
	MCS7	149	5724.8	-25.8	4.4	26.5	47.9
		165	5851.6	-34.4	4.4	23.5	53.5
802.11ac20	MCS0	149	5724.7	-30.1	4.4	26.2	51.9
		165	5850.8	-35.5	4.4	25.2	56.3
	MCS8	149	5724.8	-28.0	4.4	26.5	50.1
		165	5851.9	-34.4	4.4	22.7	52.7
802.11ax20	MCS0	149	5722.5	-24.4	4.4	21.3	41.3
		165	5850.7	-28.6	4.4	25.5	49.7
	MCS11	149	5714.7	-37.4	4.4	14.1	47.1
		165	5850.5	-37.4	4.4	25.9	58.9
802.11n40	MCS0	151	5720.1	-22.9	4.4	15.8	34.3
		159	5851.3	-33.3	4.4	24.0	52.9
	MCS7	151	5724.1	-29.8	4.4	24.9	50.3
		159	5850.5	-36.2	4.4	26.0	57.8
802.11ac40	MCS0	151	5720.4	-23.1	4.4	16.5	35.2
		159	5850.5	-35.7	4.4	25.9	57.1
	MCS9	151	5723.4	-34.3	4.4	23.4	53.2
		159	5851.6	-41.8	4.4	23.4	60.8
802.11ax40	MCS0	151	5721.1	-26.2	4.4	18.1	39.9
		159	5851.2	-33.8	4.4	24.3	53.6
	MCS11	151	5724.8	-33.8	4.4	26.5	55.9
		159	5851.2	-43.1	4.4	24.3	63.0
802.11ac80	MCS0	155	5678.3	-31.0	4.4	-6.1	20.5
		155	5857.4	-31.7	4.4	14.9	42.2
	MCS9	155	5686.0	-31.6	4.4	-0.4	26.8
		155	5850.4	-33.0	4.4	26.1	54.6
802.11ax80	MCS0	155	5722.3	-29.2	4.4	20.8	45.6
		155	5853.9	-33.4	4.4	18.2	47.2
	MCS11	155	5677.6	-35.6	4.4	-6.6	24.6
		155	5858.3	-36.6	4.4	14.7	46.8

Mode	Rate	Channel	Frequency (MHz)	Measurement (dBm)	Antenna Gain (dBi)	Limit (dBm)	Margin (dB)
802.11ax20	MCS0	149	5724.7	-24.9	4.4	26.3	46.8
	RU26	165	5850.2	-31.7	4.4	26.5	53.8
	MCS0	149	5723.7	-29.0	4.4	24.0	48.6
	RU52	165	5850.6	-34.3	4.4	25.7	55.6
	MCS0	149	5724.9	-29.0	4.4	26.8	51.4
	RU106	165	5850.5	-34.3	4.4	25.9	55.8
802.11ax40	MCS0	151	5720.4	-28.6	4.4	16.5	40.7
	RU26	159	5850.1	-36.1	4.4	26.8	58.5
	MCS0	151	5719.8	-29.8	4.4	15.5	40.9
	RU52	159	5879.1	-33.8	4.4	7.0	36.3
	MCS0	151	5724.6	-30.0	4.4	26.1	51.6
	RU106	159	5860.0	-42.0	4.4	14.2	51.8
802.11ax80	MCS0	155	5660.1	-25.6	4.4	-19.5	1.7
	RU26	155	5890.8	-27.8	4.4	-1.7	21.7
	MCS0	155	5659.8	-29.5	4.4	-19.7	5.3
	RU52	155	5882.8	-30.5	4.4	4.2	30.3
	MCS0	155	5659.5	-31.6	4.4	-20.0	7.2
	RU106	155	5889.1	-36.0	4.4	-0.4	31.1
	MCS0	155	5724.3	-33.2	4.4	25.4	54.2
	RU242	155	5867.5	-38.1	4.4	12.1	45.8
	MCS0	155	5723.4	-33.9	4.4	23.3	52.8
	RU484	155	5858.6	-35.9	4.4	14.6	46.1

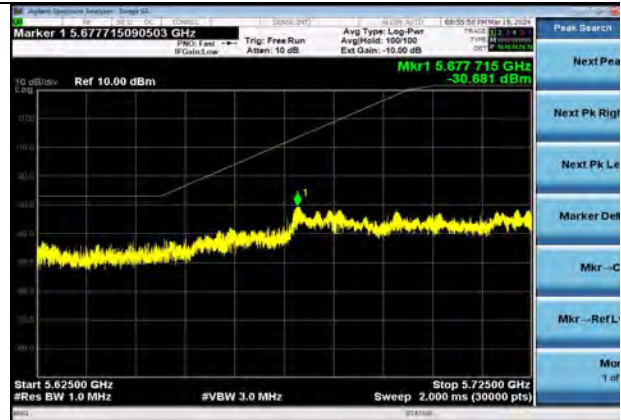
Worst Case Plots



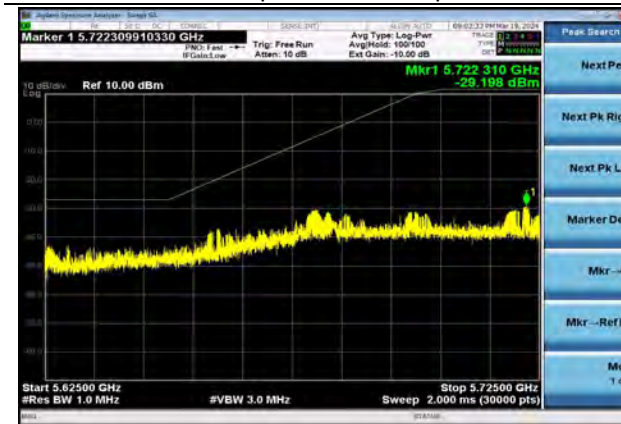
Company: Ezurio	Page 30 of 45	Name: Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model: SONA NX611M
Quote: C-3768		Serial: 00047



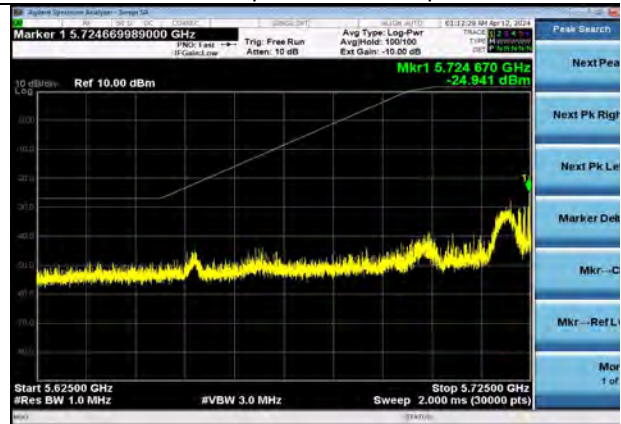
802.11ax40 | Channel 151 | MCS9



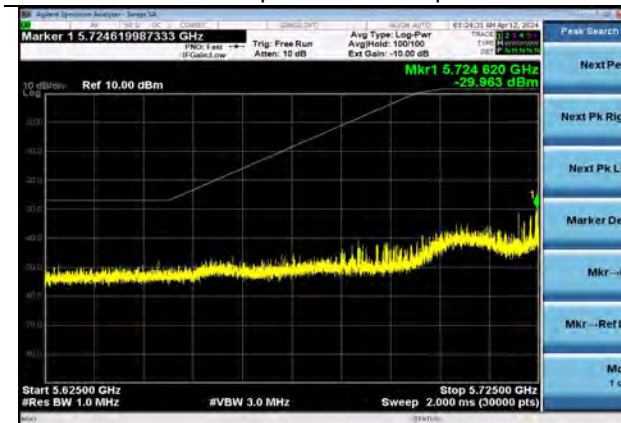
802.11ac80 | Channel 155 | MCS7



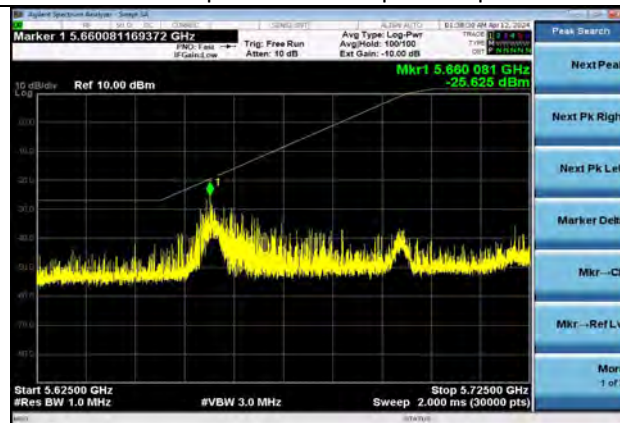
802.11ax80 | Channel 155 | MCS0



802.11ax20 | Channel 149 | MCS0 | RU26



802.11ax40 | Channel 151 | MCS0 | RU106



802.11ax80 | Channel 155 | MCS0 | RU26

Company: Ezurio	Page 31 of 45	Name: Module, SONA NX611 M.2 2230, 2 MHF
Report: TR3768-165-5G-UNII3		Model: SONA NX611M
Quote: C-3768		Serial: 00047



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)(4) RSS-247 Clause 6.2.4 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	Antenna Port
RBW	1 MHz	VBW	3 MHz
Detector(s)	Peak and Average (RMS)		
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

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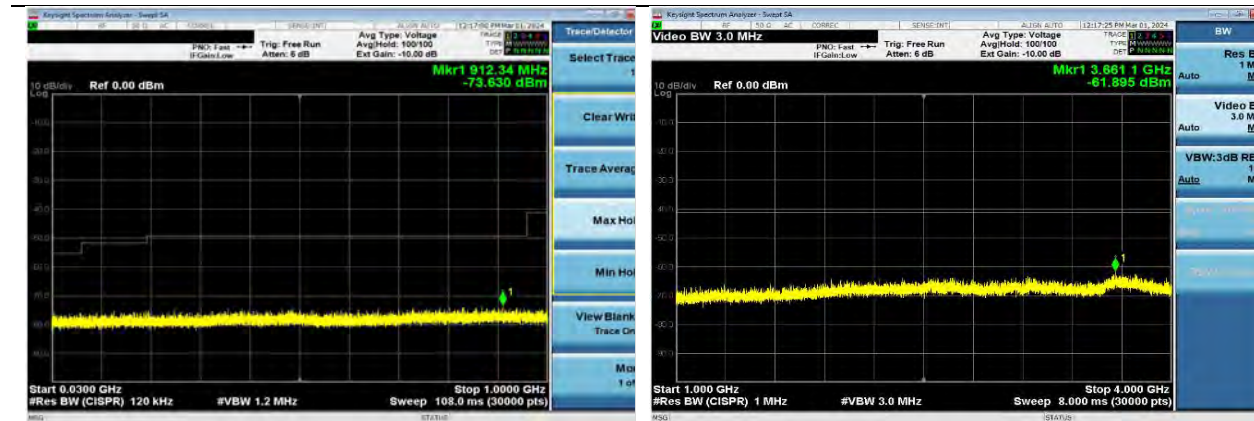
EUT Parameters

Input Power	120 VAC @ 60 Hz	Mode	5 GHz WLAN Tx
Frequency	5745-5825 MHz	Channel	149, 151

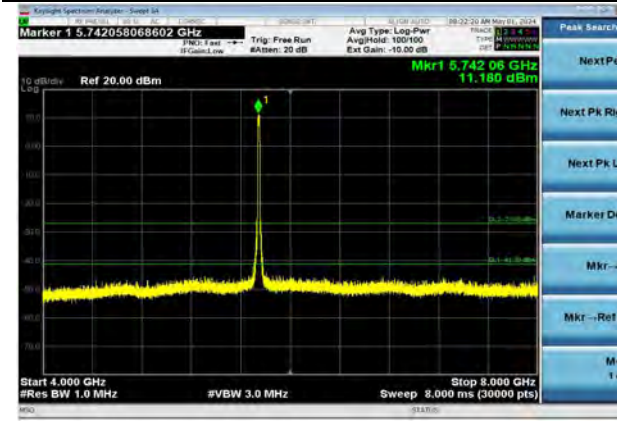
Table

Mode	Rate	Channel	Measurement Type	Frequency (MHz)	Measurement (dBm)	Antenna Gain (dBi)	Limit (dBm)	Margin (dB)
802.11a	6 Mbps	157	Peak	11570.4	-60.5	-56.1	-27.0	29.1
			Average	11569.4	-71.4	-67.0	-41.2	25.8
802.11n20	MCS0	157	Peak	11568.8	-62.6	-58.2	-27.0	31.2
			Average	11567.4	-73.8	-69.4	-41.2	28.2
802.11ac20	MCS0	157	Peak	11562.5	-63.6	-59.2	-27.0	32.2
			Average	11569.3	-73.8	-69.4	-41.2	28.2
802.11ax20	MCS0	157	Peak	11568.0	-63.6	-59.2	-27.0	32.2
			Average	11570.4	-74.1	-69.7	-41.2	28.5
802.11n40	MCS0	157	Peak	11570.4	-60.5	-56.1	-27.0	29.1
			Average	11569.4	-71.4	-67.0	-41.2	25.8

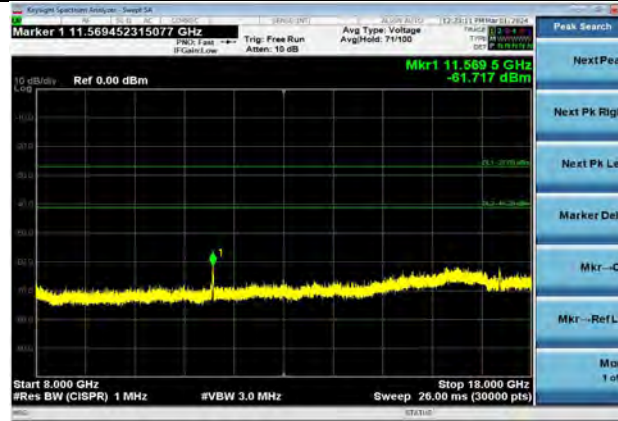
Worst Case Plots



802.11a Channel 149 6 Mbps 30-1000 MHz	802.11a Channel 149 6 Mbps 1000-4000 MHz
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802.11a | Channel 149 | 6 Mbps | 4000-8000 MHz



802.11a | Channel 157 | 6 Mbps | 8000-18000 MHz



802.11a | Channel 149 | 6 Mbps | 18000-40000 MHz

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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	5725-5850 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 (VDC)	Center Frequency (Hz)
149	5	5745003178
	4.3	5745003246
	5.8	5745003576
157	5	5785003645
	4.3	5785003580
	5.8	5785003447
165	5	5825004192
	4.3	5825004271
	5.8	5825004316

6.2 Radiated Emissions

<p>Description of Measurement</p>	<p>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.</p> <p>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.</p> <p>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.</p>
<p>Example Calculations</p>	<p>Measurement (dBμV) + Cable factor (dB) + Other (dB) + Antenna Factor (dB/m) = Corrected Reading (dBμV/m)</p> <p>Margin (dB) = Limit (dBμV/m) - Corrected Reading (dBμV/m)</p> <p>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</p>

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)(4) & (9) RSS-247 Clause 6.2.4 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 Trace and 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
AA 960220	Cable	A.H. Systems, Inc.	SAC-26G-6	552	2/16/2023	2/16/2025	Active Verification

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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
625.0	H	148	45	40.7	46.0	5.3

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

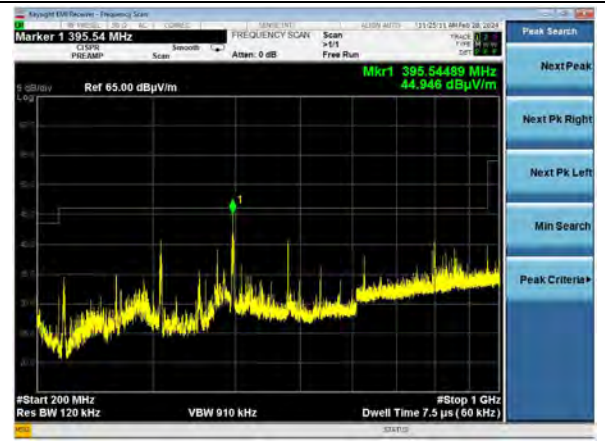
1000-40000 MHz

Mode	Rate	Channel	EUT Orientation	Frequency (MHz)	Antenna Polarity	Measurement (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
802.11a	6 Mbps	165	X Plane	5950.5	Vertical	51.3	68.2	16.9
	54 Mbps			5869.5	Vertical	51.2	106.7	55.5
802.11n20	MCS0	165	X Plane	5967.9	Vertical	51.8	68.2	16.4
	MCS7			5969.2	Vertical	51.0	68.2	17.2
802.11ac20	MCS0	165	X Plane	5950.9	Vertical	51.0	68.2	17.2
	MCS8			5903.4	Vertical	51.1	84.2	33.1
802.11ax20	MCS0	165	X Plane	5999.8	Vertical	51.1	68.2	17.1
	MCS11			5999.7	Vertical	51.8	68.2	16.4
802.11n40	MCS0	159	X Plane	5949.6	Vertical	50.9	68.2	17.3
	MCS7			5975.5	Vertical	51.1	68.2	17.1
802.11ac40	MCS0	159	X Plane	5954.6	Vertical	51.7	68.2	16.5
	MCS9			5887.2	Vertical	51.7	96.2	44.5
802.11ax40	MCS0	159	X Plane	5930.9	Vertical	51.0	68.2	17.2
	MCS11			5967.9	Vertical	51.5	68.2	16.7
802.11ac80	MCS0	155	Y Plane	5941.0	Vertical	52.2	68.2	16.0
	MCS9			5999.5	Vertical	51.1	68.2	17.1
802.11ax80	MCS0	155	Y Plane	5969.4	Vertical	51.4	68.2	16.8
	MCS11			5917.8	Vertical	51.9	73.5	21.6

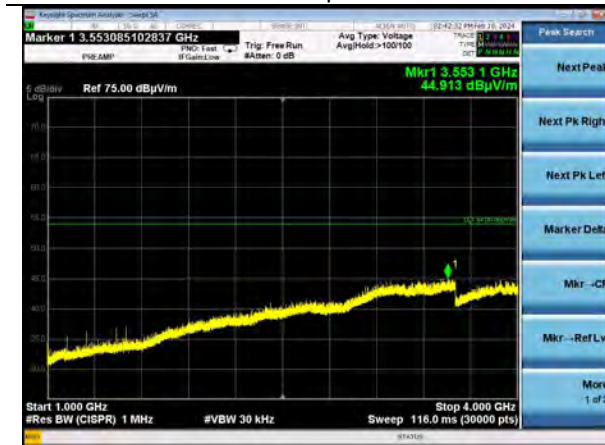
Worst Case Plots



802.11a | Channel 165 | 6 Mbps | Y Plane
30-200 MHz | Horizontal



802.11a | Channel 165 | 6 Mbps | Y Plane
200-1000 MHz | Horizontal

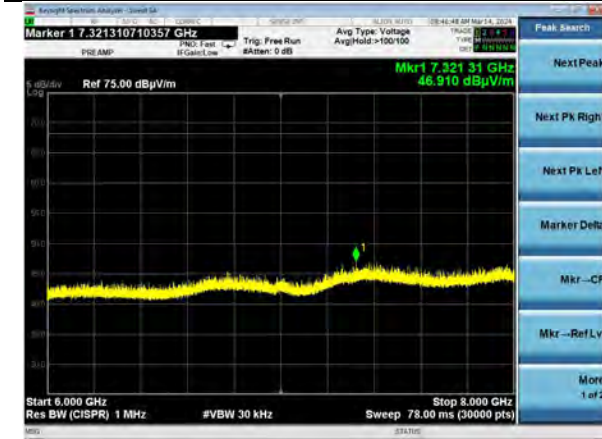


802.11a | Channel 157 | 6 Mbps
1000-4000 MHz | Horizontal

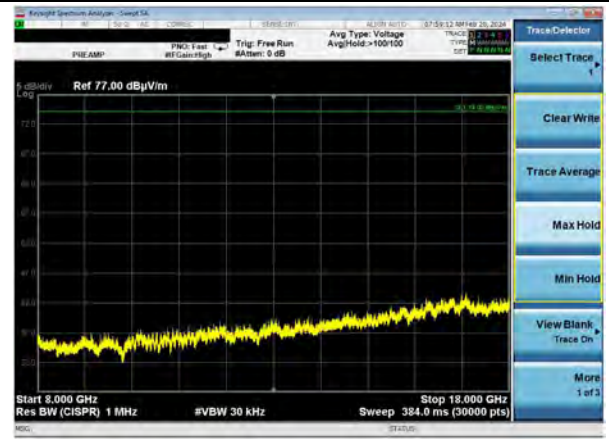


802.11a | Channel 144 | 6 Mbps | Y Plane
4000-5470 MHz | Horizontal

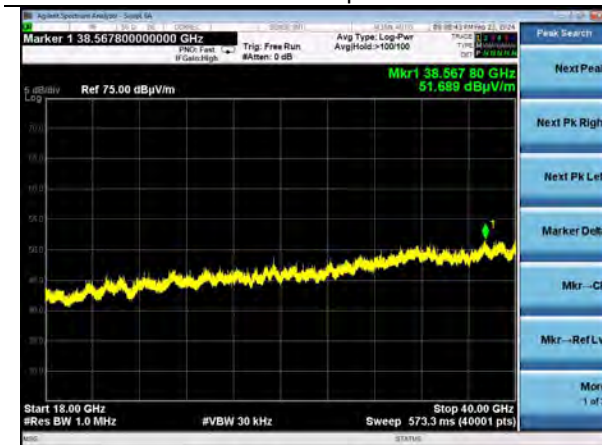
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802.11a | Channel 144 | 6 Mbps | Y Plane
6000-8000 MHz | Horizontal



802.11a | Channel 157 | 6 Mbps | X Plane
8000-18000 MHz | Vertical



802.11a | Channel 165 | 6 Mbps | Z Plane
18000-40000 MHz | Horizontal

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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.

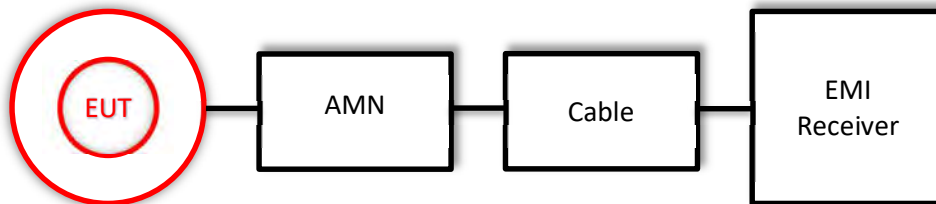
Maximum emissions are determined with a peak max hold trace then measurements at a selection of the highest points are made with quasi-peak and average detectors. Results are recorded and compared to limit for each line. (e.g. line and neutral)

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 Dillely	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

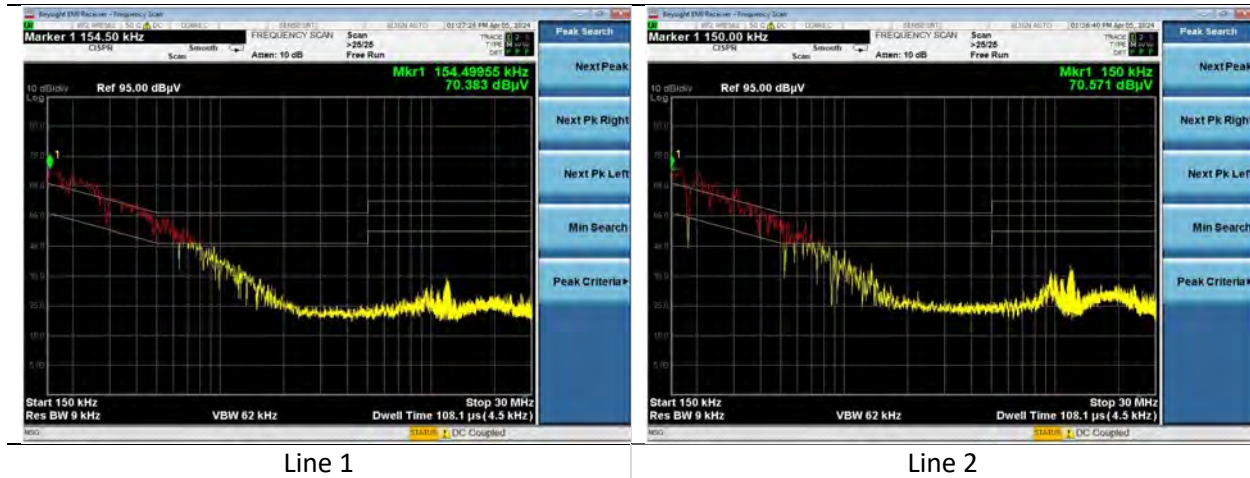
Input Power	120 VAC @ 60 Hz	Mode	5 GHz WLAN Tx Channel 64
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Measurements

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



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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

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