

**ELEMENT WASHINGTON DC LLC** 

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# MEASUREMENT REPORT FCC PART 15.407 802.11a/n/ac/ax (OFDM)

#### **Applicant Name:**

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing: 6/5/2024 – 7/10/2024 Test Report Issue Date: 7/29/2024 Test Site/Location: Element lab., Columbia, MD, USA Test Report Serial No.: 1M2405140039-12.A3L

# FCC ID:

#### A3LSMX828U

APPLICANT:

# Samsung Electronics Co., Ltd.

Application Type: Model: EUT Type: Frequency Range: Modulation Type: FCC Equipment Class: FCC Rule Part(s): Test Procedure(s):

Certification SM-X828U Portable Tablet 5180 – 5885MHz OFDM Unlicensed National Information Infrastructure TX (NII) Part 15 Subpart E (15.407) ANSI C63.10-2013, KDB 662911 D01 v02r01, KDB 648474 D03 v01r04

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez Executive Vice President



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Channel		UNII Band [MHz]	Ar	nt1	Ant2		МІМО	
Bandwidth [MHz]	UNII Band		Max. Power [mW]	Max. Power [dBm]	Max. Power [mW]	Max. Power [dBm]	Max. Power [mW]	Max. Power [dBm]
	1	5180 - 5240	49.77	16.97	49.55	16.95	95.50	19.80
	2A	5260 - 5320	45.50	16.58	47.32	16.75	97.72	19.90
20	2C	5500 - 5720	49.66	16.96	50.00	16.99	99.32	19.97
	3	5745 - 5825	50.00	16.99	47.86	16.80	96.09	19.83
	4	5845 - 5885	12.02	10.80	7.16	8.55	41.30	16.16
	1	5190 - 5230	48.08	16.82	46.03	16.63	94.41	19.75
	2A	5270 - 5310	44.16	16.45	45.29	16.56	95.06	19.78
40	2C	5510 - 5710	48.75	16.88	48.31	16.84	95.94	19.82
	3	5755 - 5795	45.50	16.58	47.86	16.80	93.54	19.71
	4	5835 - 5875	13.03	11.15	7.55	8.78	41.71	16.20
	1	5210	35.89	15.55	31.62	15.00	73.28	18.65
	2A	5290	35.32	15.48	34.67	15.40	72.61	18.61
80	2C	5530 - 5690	36.14	15.58	34.86	15.42	73.45	18.66
	3	5775	38.82	15.89	38.90	15.90	76.21	18.82
	4	5855	9.46	9.76	5.36	7.29	32.36	15.10
	1/2A	5250	30.90	14.90	26.24	14.19	55.98	17.48
160	2C	5570	26.30	14.20	25.64	14.09	54.58	17.37
	3/4	5815	7.41	8.70	4.26	6.29	24.32	13.86
EUT Overview								

# **MEASUREMENT REPORT**

Note: The UNII Band 4 max power values shown in the above table are e.i.r.p values.

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# **1.0 INTRODUCTION**

## 1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

## **1.2 Element Test Location**

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

#### 1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreements (MRAs).

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# 2.0 PRODUCT INFORMATION

#### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Tablet FCC ID: A3LSMX828U**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

Test Device Serial No.: 17720, 17670, 18108, 25483, 17936

#### 2.2 Device Capabilities

This device contains the following capabilities:

850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1 and FR2), 802.11b/g/n/ac/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), Wireless Power Transfer

Band 1		Band 2A		Band 2C		Band 3		Band 3/4
Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
5180	52	5260	100	5500	149	5745	169	5845
:	:	:	:	:	:	:	:	:
5200	56	5280	120	5600	157	5785	173	5865
:	:	:	:	:	:	:	:	•
5240	64	5320	144	5720	165	5825	177	5885
	(MHz) 5180 : 5200 :	(MHz)         Ch.           5180         52           :         :           5200         56           :         :           5240         64	(MHz)         Ch.         (MHz)           5180         52         5260           :         :         :           5200         56         5280           :         :         :           5240         64         5320	(MHz)         Ch.         (MHz)         Ch.           5180         52         5260         100           :         :         :         :         :           5200         56         5280         120           :         :         :         :         :           5240         64         5320         144	(MHz)         Ch.         (MHz)         Ch.         (MHz)           5180         52         5260         100         5500           :	(MHz)         Ch.         (MHz)         Image: Ch.         149         Image: Ch.         149         Image: Ch.         Image: Ch. <t< td=""><td>(MHz)         Ch.         (MHz)         Image: Ch.         (Image: Ch.         (</td><td>(MHz)         Ch.         (MHz)         Instruction         Instruction</td></t<>	(MHz)         Ch.         (MHz)         Image: Ch.         (Image: Ch.         (	(MHz)         Ch.         (MHz)         Instruction         Instruction

Table 2-1. 802.11a/n/ac/ax (20MHz) Frequency / Channel Operations

	Band 1
Ch.	Frequency (MHz)
38	5190
:	:
46	5230

	Band 2A
Ch.	Frequency (MHz)
54	5270
:	:
62	5310

	Band 2C
Ch.	Frequency (MHz)
102	5510
:	•••
118	5590
:	:
142	5710

	Band 3
Ch.	Frequency (MHz)
151	5755
:	•••
159	5795

	Band 3/4
Ch.	Frequency (MHz)
167	5835
:	:
175	5875

Table 2-2. 802.11/n/ac/ax (40MHz BW) Frequency / Channel Operations

	Band 1		Band 2A		Band 2C		Band 3			Band 3/4		
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)		Ch.	Frequency (MHz)		
42	5210	58	5290	106	5530	155	5775		167	5835		
				:	:			_				
				122	5610							
				:	:							
				138	5690							
	Table 2-3. 802.11ac/ax (80MHz BW) Frequency / Channel Operations											

Band 1/2A				Band 2C	Band 3/4			
Ch.	Frequency (MHz)		Ch.	Frequency (MHz)		Ch.	Frequency (MHz)	
50	5250		114	5570		163	5815	
Table 2-4. 802.11/ac/ax (160MHz BW) Frequency / Channel Operations								

#### Notes:

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5GHz NII operation is possible in 20MHz, 40MHz, 80MHz, and 160MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section B)2)b) of ANSI C63.10-2013. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

		AN	T1	AN	Т2	МІМО	(1+2)
802.11	Mode/Band	Duty Cycle [%]	Radiated DCCF [dB]	Duty Cycle [%]	Radiated DCCF [dB]	Duty Cycle [%]	Radiated DCCF [dB]
	а	97.41	0.11	97.62	0.10	97.55	0.11
	n (HT20)	94.94	0.23	95.21	0.21	95.08	0.22
	ac (VHT20)	97.32	0.12	97.26	0.12	95.10	0.22
	ax (HE20)	96.48	0.16	96.93	0.14	94.25	0.26
	n (HT40)	91.34	0.39	94.68	0.24	90.86	0.42
5GHz	ac (VHT40)	95.04	0.22	95.46	0.20	90.96	0.41
	ax (HE40)	94.34	0.25	94.18	0.26	90.22	0.45
	ac (VHT80)	94.43	0.25	94.75	0.23	90.46	0.44
	ax (HE80)	93.68	0.28	94.23	0.26	90.00	0.46
	ac (HT160)	94.27	0.26	94.72	0.24	91.13	0.40
	ax (HE160)	94.19	0.26	94.20	0.26	93.08	0.31

Table 2-5. Measured Duty Cycles

2. The device employs MIMO technology. Below are the possible configurations.

	WiFi Configurations			SE	DM	CDD		
VIFI CO				ANT1	ANT2	ANT1	ANT2	
	11a	✓	~	×	×	✓	✓	
	11n	✓	~	✓	✓	✓	✓	
5GHz	11ac	✓	✓	✓	✓	✓	✓	
	11ax	✓	✓	✓	✓	✓	✓	

Table 2-6. Antenna / Technology Configuration

 $\checkmark$  = Support ;  $\varkappa$  = NOT Support

**SISO** = Single Input Single Output

**SDM** = Spatial Diversity Multiplexing – MIMO function

**CDD** = Cyclic Delay Diversity – 2Tx Function

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#### 3. The device supports the following data rates (shown in Mbps):

												-			-									
802.11a	N	VICS Inde	x	Spatial	OF	DM (802.1	.1n/802.11a	ac)		OFDM (8	302.11ac)		OFDM (802.11ax)											
20MHz				Stream	20N	ИHz	40N	ЛHz	801	ИHz	160	MHz		20MHz			40MHz			80MHz			160MHz	
ZUIVIHZ	HT	VHT	HE		0.8µs GI	0.4µs GI	0.8µs GI	0.4µs GI	0.8µs GI	0.4µs GI	0.8µs Gl	0.4µs GI	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs Gl	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI
6	0	0	0	1	6.5	7.2	13.5	15	29.3	32.5	58.5	65	8.6	8.1	7.3	17.2	16.3	14.6	36	34	30.6	72.1	68.1	61.3
9	1	1	1	1	13	14.4	27	30	58.5	65	117	130	17.2	16.3	14.6	34.4	32.5	29.3	72.1	68.1	61.3	144.1	136.1	122.5
12	2	2	2	1	19.5	21.7	40.5	45	87.8	97.5	175.5	195	25.8	24.4	21.9	51.6	48.8	43.9	108.1	102.1	91.9	216.2	204.2	183.8
18	3	3	3	1	26	28.9	54	60	117	130	234	260	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245
24	4	4	4	1	39	43.3	81	90	175.5	195	351	390	51.6	48.8	43.9	103.2	97.5	87.8	216.2	204.2	183.8	432.4	408.3	367.5
36	5	5	5	1	52	57.8	108	120	234	260	468	520	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490
48	6	6	6	1	58.5	65	121.5	135	263.3	292.5	526.5	585	77.4	73.1	65.8	154.9	146.3	131.6	324.3	306.3	275.6	648.5	612.5	551.3
54	7	7	7	1	65	72.2	135	150	292.5	325	585	650	86	81.3	73.1	172.1	162.5	146.3	360.3	340.3	306.3	720.6	680.6	612.5
		8	8	1	78	86.7	162	180	351	390	702	780	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735
	`	9	9	1	N/A	N/A	180	200	390	433.3	780	866.7	114.7	108.3	97.5	229.4	216.7	195	480.4	453.7	408.3	960.8	907.4	816.7
			10	1									129	121.9	109.7	258.1	243.8	219.4	540.4	510.4	459.4	1080.9	1020.8	918.8
			11	1									143.4	135.4	121.9	286.8	270.8	243.8	600.5	567.1	510.4	1201	1134.3	1020.8
6	8	0	0	2	13	14.4	27	30	58.5	65	117	130	17.2	16.3	14.6	34.4	32.5	29.3	72.1	68.1	61.3	144.1	136.1	122.5
9	9	1	1	2	26	28.9	54	60	117	130	234	260	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245
12	10	2	2	2	39	43.3	81	90	175.5	195	351	390	51.6	48.8	43.9	103.2	97.5	87.8	216.2	204.2	183.8	432.4	408.3	367.5
18	11	3	3	2	52	57.8	108	120	234	260	468	520	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490
24	12	4	4	2	78	86.7	162	180	351	390	702	780	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735
36	13	5	5	2	104	115.6	216	240	468	520	936	1040	137.6	130	117	275.3	260	234	576.5	544.4	490	1152.9	1088.9	980
48	14	6	6	2	117	130	243	270	526.5	585	1053	1170	154.9	146.3	131.6	309.7	292.5	263.3	648.5	612.5	551.3	1297.1	1225	1102.5
54	15	7	7	2	130	144.4	270	300	585	650	1170	1300	172.1	162.5	146.3	344.1	325	292.5	720.6	680.6	612.5	1441.2	1361.1	1225
		8	8	2	156	173.3	324	360	702	780	1404	1560	206.5	195	175.5	412.9	390	351	864.7	816.7	735	1729.4	1633.3	1470
		9	9	2	N/A	N/A	360	400	780	866.7	1560	1733.3	229.4	216.7	195	458.8	433.3	390	960.8	907.4	816.7	1921.6	1814.8	1633.3
			10	2									258.1	243.8	219.4	516.2	487.5	438.8	1080.9	1020.8	918.8	2161.8	2041.7	1837.5
			11	2									286.8	270.8	243.8	573.5	541.7	487.5	1201	1134.3	1020.8	2402	2268.5	2041.7

Table 2-7. Supported Data Rates

## 2.3 Antenna Description

The following antenna gains were used for the testing.

Frequency [MHz]	Antenna 1 Gain (dBi)	Antenna 2 Gain (dBi)	Directional Gain (dBi)
5150	-4.9	-7.2	-2.96
5350	-5.0	-7.7	-3.24
5500	-4.9	-8.0	-3.30
5700	-5.2	-8.2	-3.56
5795	-5.3	-8.1	-3.58
5815	-5.5	-7.8	-3.56
5825	-5.5	-8.2	-3.74
5850	-5.6	-8.1	-3.75
5885	-5.7	-7.9	-3.72

Table 2-8. Antenna Peak Gain

## 2.4 Test Configuration

ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 7.6 for radiated emissions test setups, and 7.2, 7.3, 7.4, and 7.5 for antenna port conducted emissions test setups.

## 2.5 Software and Firmware

The test was conducted with software/firmware version X828USQU0AXF7 installed on the EUT.

## 2.6 EMI Suppression Device(s) / Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

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# 3.0 DESCRIPTION OF TESTS

## 3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) was used in the measurement of the EUT.

# Deviation from procedure......None

measurement

# 3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz,  $50\Omega/50\mu$ H Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.7. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

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## 3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

## 3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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# 4.0 ANTENNA REQUIREMENTS

#### Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antennas of the EUT are permanently attached.
- There are no provisions for connection to an external antenna.

#### **Conclusion:**

The EUT complies with the requirement of §15.203.

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# 5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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# 6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	WL25-1	Conducted Cable Set (25GHz)	4/2/2024	Annual	4/2/2025	WL25-1
-	WL25-2	Conducted Cable Set (25GHz)	4/2/2024	Annual	4/2/2025	WL25-2
-	WL40-1	Conducted Cable Set (40GHz)	4/2/2024	Annual	4/2/2025	WL40-1
	AP1-002	EMC Cable and Switch System	4/2/2024	Annual	4/2/2025	AP1-002
-	ETS-001	EMC Cable and Switch System	4/2/2024	Annual	4/2/2025	ETS-001
-	ETS-002	EMC Cable and Switch System	4/2/2024	Annual	4/2/2025	ETS-002
	MD 1M 18-40	EMC Cable and Switch System	4/2/2024	Annual	4/2/2025	MD 1M 18-40
Anritsu	MA24406A	Microwave Peak Power Sensor	9/7/2023	Annual	9/7/2024	11240
Emco	3116	Horn Antenna (18 - 40GHz)	8/8/2022	Biennial	8/8/2024	9203-2178
Rohde & Schwarz	TC-TA18	Vivaldi Antenna	2/23/2023	Biennial	2/23/2025	26040036
Rohde & Schwarz	FSW26	Signal and spectrum analyzer	3/8/2024	Annual	3/8/2025	103187
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	4/2/2024	Annual	4/2/2025	NMLC-2
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	8/11/2022	Biennial	8/11/2024	114451
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	4/9/2024	Annual	4/9/2025	MY52350166
Keysight Technologies	N9020A	MXA Signal Analyzer	4/11/2024	Annual	4/11/2025	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer	2/29/2024	Annual	3/1/2025	MY55410501
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/7/2023	Annual	9/7/2024	MY57141001
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	9/25/2023	Annual	9/25/2024	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/11/2023	Annual	9/11/2024	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	4/5/2024	Annual	4/5/2025	101716
Rohde & Schwarz	FSW26	Signal and spectrum analyze (26.5GHz)	3/8/2024	Annual	3/8/2025	103187
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	2/15/2024	Annual	2/15/2025	103200
Sunol	JB6	JB6 Antenna	3/2/2023	Biennial	3/2/2025	A082816
Sunol	JB5	Bi-Log Antenna (30M-5GHz)	8/30/2022	Biennial	8/30/2024	A051107

Table 6-1. Annual Test Equipment Calibration Schedule

#### Note:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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# 7.0 TEST RESULTS

## 7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	<u>A3LSMX828U</u>
FCC Classification:	Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
N/A	26dB Bandwidth	N/A		PASS	Section 7.2
15.407(e)	6dB Bandwidth	>500kHz(5725-5850MHz and 5850 – 5895MHz)		PASS	Section 7.3
15.407 (a)(1)(iv), (a)(2), (a)(3)	Maximum Conducted Output Power	Maximum conducted powers must meet the limits detailed in 15.407 (a)	CONDUCTED	PASS	Section 7.4
15.407 (a)(1)(iv), (a)(2), (a)(3)	Maximum Power Spectral Density	Maximum power spectral density must meet the limits detailed in 15.407 (a)		PASS	Section 7.5
15.407(h)	Dynamic Frequency Selection	See DFS Test Report		PASS	See DFS Test Report
15.407(b)(1), (b)(2), (b)(3), (b)(4)	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b)		PASS	Section 7.6
15.205, 15.407(b)(1), (b)(4), (b)(5), (b)(6)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED	PASS	Section 7.6
15.407	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 7.7

Table 7-1. Summary of Test Results

#### Notes:

- 1) All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst-case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is Element "EMC Software Tool," Version 2.3.0.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is Element "Chamber Automation," Version 1.5.0.

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## 7.2 26dB Bandwidth Measurement

#### **Test Overview and Limit**

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

#### The 26dB bandwidth is used to determine the conducted power limits.

#### **Test Procedure Used**

ANSI C63.10-2013 - Section 12.4

#### **Test Settings**

- The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = approximately 1% of the emission bandwidth
- 3. VBW <u>≥</u> 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold

#### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-1. Test Instrument & Measurement Setup

#### Test Notes

None.

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# MIMO 26dB Bandwidth Measurements

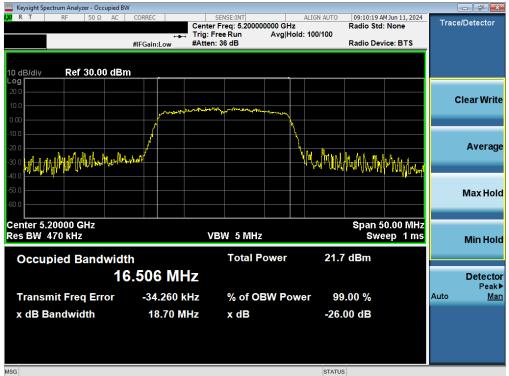
				Antenna-1	Antenna-2
	Frequency		802.11	26dB	26dB
	[MHz]	Channel	MODE	Bandwidth	Bandwidth
	[10112]		WIODE	[MHz]	[MHz]
	5180	36	а	18.80	18.57
-	5200	40	а	18.70	18.43
	5240	48	а	18.85	18.43
	5180	36	n	19.29	19.05
-	5200	40	n	19.23	19.06
	5240	48	n	19.25	19.19
-	5180	36	ax SU	20.02	20.15
Band 1	5200	40	ax SU	20.06	20.03
Ba	5240	48	ax SU	20.01	20.15
	5190	38	n	39.12	38.88
	5230	46	n	39.07	38.80
	5190	38	ax SU	41.19	43.88
	5230	46	ax SU	42.90	47.86
	5210	42	ac	80.00	80.10
	5210	42	ax SU	81.58	81.46
P Q	5250	50	ac	162.76	162.23
Band 1/2A	5250	50	ax SU	168.73	163.82
	5260	52	a	18.75	18.46
	5280	56	a	18.77	18.46
	5320	64	a	18.62	18.52
-	5260	52	n	19.25	19.12
	5280	56	n	19.25	19.07
	5320	64	n	19.27	19.14
٩	5260	52	ax SU	20.10	20.18
Band 2A	5280	56	ax SU	20.08	20.12
Ban	5320	64	ax SU	20.10	20.11
	5270	54	n	39.09	38.85
	5310	62	n	39.00	38.82
	5270	54	ax SU	44.52	44.89
	5310	62	ax SU	45.36	44.09
	5290	58	ас	80.27	80.19
	5290	58	ax SU	81.69	81.46
	5500	100	а	18.69	18.49
	5600	120	а	18.87	18.45
	5720	144	а	18.85	18.41
	5500	100	n	19.38	19.15
	5600	120	n	19.20	19.18
	5720	144	n	19.20	19.10
	5500	100	ax SU	20.08	20.15
	5600	120	ax SU	20.09	20.10
	5720	144	ax SU	20.09	20.06
	5510	102	n	39.08	38.71
2C	5590	118	n	39.28	38.73
Band 2C	5710	142	n	38.82	38.73
Ba	5510	102	ax SU	42.63	45.06
	5500	118	ax SU	42.94	44.03
	5590	110			
	5710	142	ax SU	42.45	43.68
			ax SU ac	42.45 80.22	43.68 80.24
	5710	142			
	5710 5530	142 106	ас	80.22	80.24
	5710 5530 5610	142 106 122	ac ac	80.22 80.26	80.24 80.07
	5710 5530 5610 5690	142 106 122 138	ac ac ac	80.22 80.26 80.32	80.24 80.07 80.18
	5710 5530 5610 5690 5530	142 106 122 138 106	ac ac ac ax SU	80.22 80.26 80.32 81.59	80.24 80.07 80.18 81.71
	5710 5530 5610 5690 5530 5610	142 106 122 138 106 122	ac ac ac ax SU ax SU	80.22 80.26 80.32 81.59 81.60	80.24 80.07 80.18 81.71 81.59

#### Table 7-2. Bands 1, 2A, 2C Conducted 26dB Bandwidth Measurements MIMO

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## 7.2.1 MIMO Antenna-1 26dB Bandwidth Measurements



Plot 7-1. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 1) - Ch. 40)



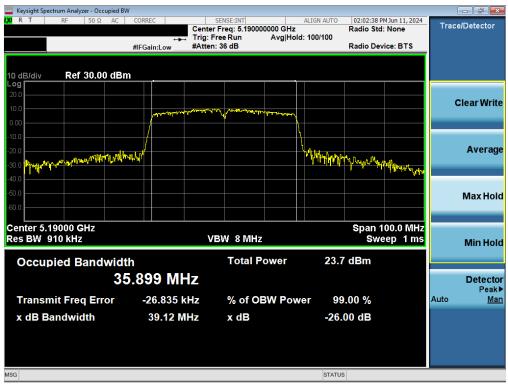
Plot 7-2. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)

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Plot 7-3. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 1) – Ch. 40)



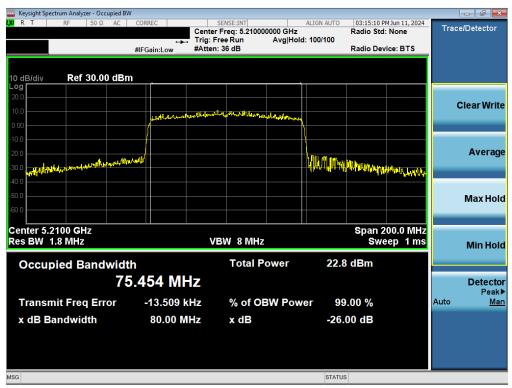
Plot 7-4. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

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Plot 7-5. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)



Plot 7-6. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

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Keysight Spectrum Analyzer - Occupied BW					
LX/R T RF 50Ω AC		SENSE:INT Freq: 5.210000000 GHz	Radio S	9 PM Jun 11, 2024 td: None	Trace/Detector
		FreeRun Avg∣Hol n:36 dB	d: 100/100 Radio D	evice: BTS	
·	dameon and				
10 dB/div Ref 20.00 dBm					
Log					
0.00	www.www.www.www.www.	were and			Clear Write
-10.0					
-20.0					
-30.0	<u> </u>				Average
-30.0 40.0	~		weeder while is in the set	water	
-50.0					
-60.0					Max Hold
-70.0					
Center 5.2100 GHz			Span	200.0 MHz	
Res BW 1.8 MHz	\	/BW 8 MHz		weep 1ms	Min Hold
Occupied Bandwidth		Total Power	18.8 dBm		
	993 MHz				Detector
/0.	333 WINZ				Peak
Transmit Freq Error	1.596 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	81.58 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-7. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



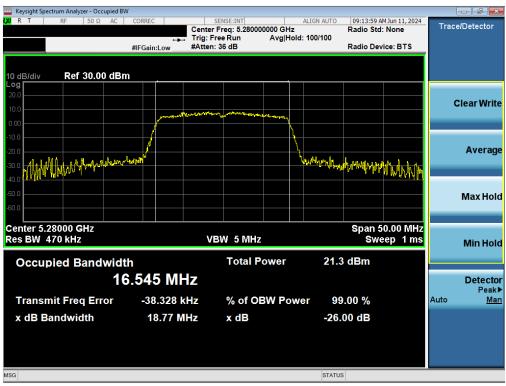
Plot 7-8. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ac (UNII Band 1/2A) - Ch. 50)

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M         RL T         RF         50 Ω         AC         CORREC         SENSE:INT         ALIGN AUTO         08:44:26 AM Jun 12, 2024         Trace/Detecto           Center Freq: 5.250000000 GHz         Radio Std: None           → Trig: Free Run         Avg Hold: 100/100           #/FGain:Low         #Atten: 36 dB         Radio Device: BTS	
terrer reg. 3.3000000 GH2 Radio Std. None	
	or
#EGain: Low #Atten: 36 dB Radio Device: BTS	
#FGail.Low #Refit to up Refit Device. Dio	
10 dB/div Ref 20.00 dBm	
ClearW	rite
0.00 harmon harm	· ····
300 Aver	age
60.0 Max H	
Max n	ola
Center 5.2500 GHz Span 400.0 MHz	
Res BW 3 MHz VBW 50 MHz Sweep 1 ms Min H	old
Occupied Bandwidth Total Power 17.0 dBm	
155.61 MHz Detection	
	ak►
Transmit Freq Error 37.879 kHz % of OBW Power 99.00 % Auto	Man
x dB Bandwidth 168.7 MHz x dB -26.00 dB	
	_

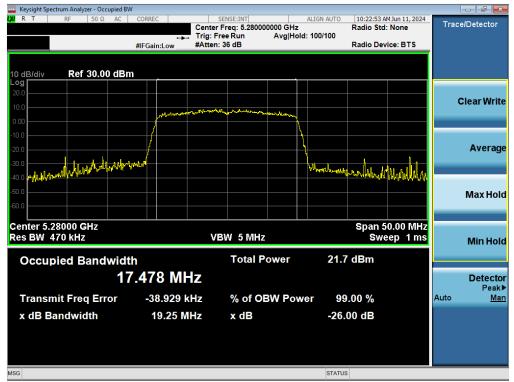
Plot 7-9. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 1/2A) - Ch. 50)



Plot 7-10. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2A) - Ch. 56)

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Plot 7-11. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)



Plot 7-12. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)

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Plot 7-13. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



Plot 7-14. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)

FCC ID: A3LSMX828U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 145
1M2405140039-12.A3L	6/5/2024 - 7/10/2024	Portable Tablet	Page 22 of 145
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Keysight Spectrum Analyzer - Occupied E					
XVIRT RF 50Ω AC	Center	Freq: 5.290000000 GHz	Radio Std	M Jun 11, 2024 None	Trace/Detector
		ree Run Avg Hold :: 36 dB	: 100/100 Radio Dev	ice: BTS	
10 dB/div Ref 30.00 dB	m		1		
20.0					01
10.0	modellesterlesterly and all hilders	and a marticle and shall and the			Clear Write
0.00					
-10.0					Average
-30.0	. All All All All All All All All All Al				Average
-40.0			allation, beer first of a mitting of the second states of the second sta	and the property and the property of the prope	
-50.0					Max Hold
-60.0					
Center 5.2900 GHz			Span 2	00.0 MHz	
Res BW 1.8 MHz	V	BW 8 MHz	Swe	ep 1 ms	Min Hold
Occupied Bandwid	th	Total Power	22.6 dBm		
7	5.479 MHz				Detector
Transmit Freq Error	-24.007 kHz	% of OBW Powe	er 99.00 %		Peak≯ Auto Man
x dB Bandwidth	80.27 MHz	x dB	-26.00 dB		
	00.27 11112		-20.00 dB		
ISG			STATUS		

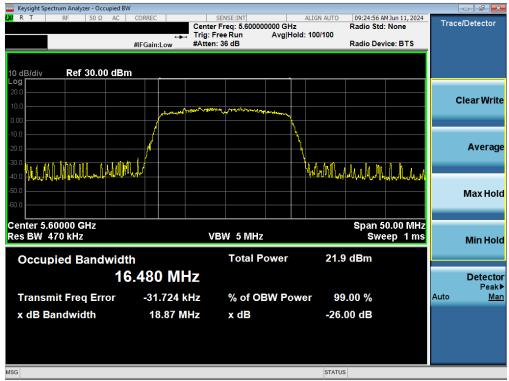
Plot 7-15. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



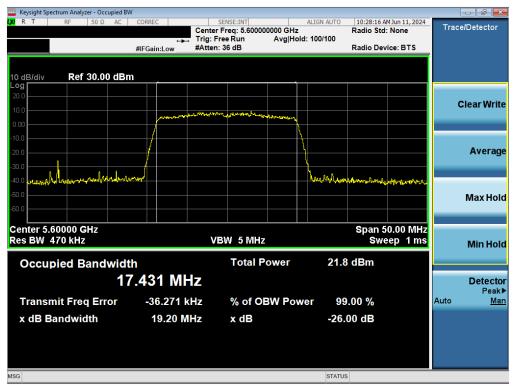
Plot 7-16. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMX828U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 145
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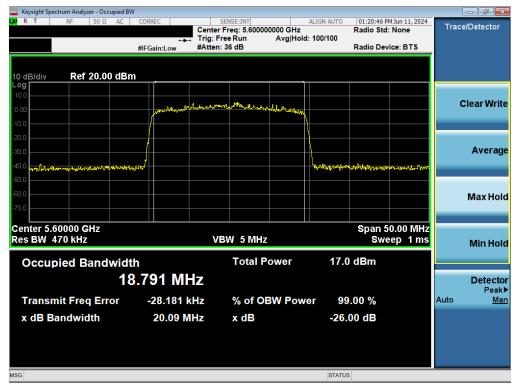
Plot 7-17. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2C) - Ch. 120)



Plot 7-18. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMX828U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 04 at 445
1M2405140039-12.A3L	6/5/2024 - 7/10/2024	Portable Tablet	Page 24 of 145
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Plot 7-19. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)



Plot 7-20. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMX828U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	
1M2405140039-12.A3L	6/5/2024 - 7/10/2024	Portable Tablet	Page 25 of 145
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Plot 7-21. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)



Plot 7-22. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMX828U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	
1M2405140039-12.A3L	6/5/2024 - 7/10/2024	Portable Tablet	Page 26 of 145
© 2024 ELEMENT	V11.1 08/28/2023		



🔤 Ke	/sight Spectrum Analyzer - Occup	ied BW								
L <mark>XI</mark> R	T RF 50 Ω	AC CORREC		ENSE:INT		ALIGN AUTO		M Jun 11, 2024	Trac	e/Detector
				Freq: 5.61000		4. 400/400	Radio Std	: None	mac	erDelector
		+ #IEGain:Low	#Atten:		Avginoid	d: 100/100	Radio Dev	vice: BTS		
	,	#IFGall.LOW					rtaalo Bet			
10 d	B/div Ref 30.00	dBm								
Log										
20.0										<b>O</b> I
10.0										Clear Write
0.00		Martana	monophely	where the growing	Memorial a					
		1				N				
-10.0										
-20.0										Average
-30.0		<mark>.</mark>								
	marghetylester	and the state of t				manner	manymaphing	herenander		
-40.0										
-50.0										Max Hold
-60.0										
Cen	ter 5.6100 GHz						Span 2	00.0 MHz		
	BW 1.8 MHz		VE	W 8 MHz				eep 1 ms		Min Hold
										MITHOID
0	ccupied Bandw	vidth		Total P	ower	18.6	i dBm			
Ĭ	Coupied Ballow									
		77.105 N	Hz							Detector
										Peak►
Т	ransmit Freq Erro	r -57.516	kHz	% of O	BW Pow	er 99	0.00 %		Auto	<u>Man</u>
	dB Bandwidth	81.60	MHz	x dB		-26	00 dB			
^		01.00	WIT 12	A UD		-20.				
MSG						STATUS	5			

Plot 7-23. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 122)



Plot 7-24. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ac (UNII Band 2C) - Ch. 114)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Dana 07 -6445	
1M2405140039-12.A3L	6/5/2024 - 7/10/2024	Portable Tablet	Page 27 of 145	
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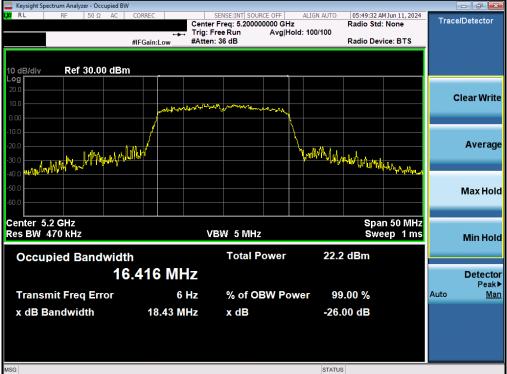
Keysight Spectrum Analyzer - Occupied BW									
XIRLT RF 50Ω AC	CORREC		NSE:INT eq: 5.57000	0000 011-	ALIGN AUTO	08:45:33 A Radio Std	M Jun 12, 2024	Trac	e/Detector
		The Property of the Property o			d: 100/100	Radio Sta	None		
	#IFGain:Low	#Atten: 3				Radio Dev	rice: BTS		
to JD/JE. Dof 20.00 dBm									
10 dB/div Ref 20.00 dBm				1					
10.0									
0.00	hunna	~~~~~	~~~~						Clear Write
-10.0	1 www			Vand Vord					
	1								
-20.0	1				h				_
-30.0 manual al Mitcheles and Monor also det 1					- IPH MARKA	Henry marken and	workender		Average
-40.0	_								
-50.0									
-60.0									
-70.0									Max Hold
-70.0								_	
Center 5.5700 GHz			1	1	10	Span 4	00.0 MHz		
Res BW 3 MHz		VBV	N 50 MH	z			ep 1 ms		Min Hold
							<u> </u>		MITHOL
Occupied Bandwidth			Total P	ower	16.5	dBm			
	5.62 M⊦								Detector
15		12							Detector Peak▶
Transmit Freq Error	77.906 k	Hz	% of O	<b>BW Pow</b>	er 99	.00 %		Auto	Man
x dB Bandwidth	168.9 M	LI	x dB		26	00 dB			
X dB Bandwidth	108.9 M	ΠZ	хав		-20.	00 aB			
MSG					STATUS				

Plot 7-25. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 2C) – Ch. 114)

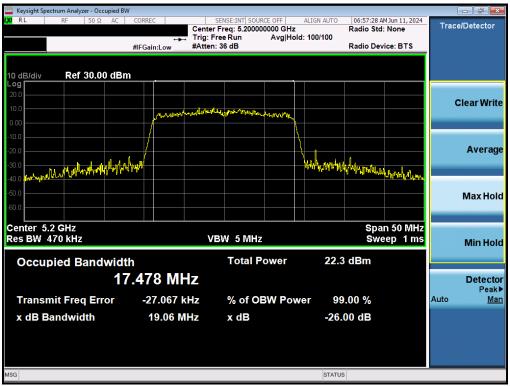
FCC ID: A3LSMX828U		MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 20 of 145
1M2405140039-12.A3L	6/5/2024 - 7/10/2024	Portable Tablet	Page 28 of 145
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## 7.2.2 MIMO Antenna-2 26dB Bandwidth Measurements



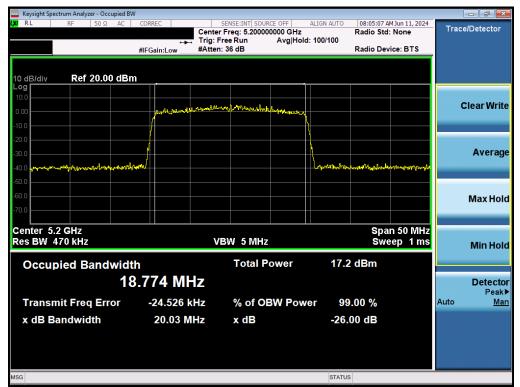
Plot 7-26. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 1) – Ch. 40)



Plot 7-27. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
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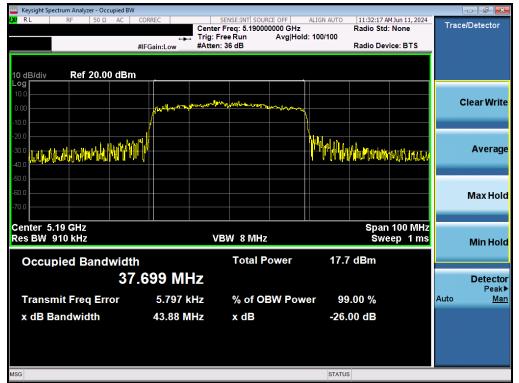
Plot 7-28. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)



Plot 7-29. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

FCC ID: A3LSMX828U		MEASUREMENT REPORT	Approved by: Technical Manager
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Plot 7-30. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)



Plot 7-31. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

FCC ID: A3LSMX828U		MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	EUT Type:	Daga 21 of 145		
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Keysight Spectrum Analyzer - Occupied BV	٧				
<b>LX </b> RL RF 50 Ω AC	CORREC	SENSE:INT SOURCE OFF	ALIGN AUTO 12:07:31 Radio Sto	MJun 11, 2024	Trace/Detector
			d: 100/100	. None	
	#IFGain:Low #Atter	:: 36 dB	Radio De	vice: BTS	
10 dB/div Ref 20.00 dBn	n				
Log					
10.0	want ward war have	March March 100			Clear Write
0.00	And the second s		4		orear write
-10.0					
-20.0					
-30.0			Marchill - Antonio - Annalysia	No. d. B	Average
-40.0			and the stand of the design of the stand stands		
-50.0					
-60.0					
-70.0					Max Hold
-70.0					
Center 5.21 GHz			Spar	1 200 MHz	
Res BW 1.8 MHz	v	BW 8 MHz	Św	eep 1 ms	Min Hold
	_		40.0.15		
Occupied Bandwidt	h	Total Power	18.8 dBm		
77	7.254 MHz				Detector
					Peak►
Transmit Freq Error	-78.299 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	81.46 MHz	x dB	-26.00 dB		
MSG			STATUS		
Mod			314103		

Plot 7-32. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



Plot 7-33. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ac (UNII Band 1/2A) - Ch. 50)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 145	
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🔤 Keysight Spectrum Analyzer - Occupied BW					- đ <mark></mark>
<b>(X)</b> RL RF 50 Ω AC	++- Trig:	SENSE:INT SOURCE OFF er Freq: 5.250000000 GHz Free Run Avg Holo n: 36 dB	Radio Ste d: 100/100		Trace/Detector
	#IFGain:Low #Atte	n: 36 dB	Radio De	evice: BTS	
10 dB/div Ref 20.00 dBm			•		
10.0					
0.00	mm	mm	^		Clear Write
-10.0					
-20.0					
-30.0 manus metric the hadress and all and and a strategies			Reproduction	Mathematica	Average
-40.0					
-50.0					
-60.0					Max Hold
-70.0					
Center 5.25 GHz				n 400 MHz	
Res BW 3 MHz		/BW 50 MHz	Sw	reep 1 ms	Min Hold
Occupied Bandwidt	h	Total Power	19.1 dBm		
	5.54 MHz				Detector
					Peak▶
Transmit Freq Error	86.493 kHz	% of OBW Pow			Auto <u>Man</u>
x dB Bandwidth	163.8 MHz	x dB	-26.00 dB		
NGO			CTATIC		
MSG			STATUS		

Plot 7-34. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax (UNII Band 1/2A) - Ch. 50)



Plot 7-35. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMX828U		MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 22 of 145
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Plot 7-36. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)



Plot 7-37. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Daga 24 of 145	
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Plot 7-38. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



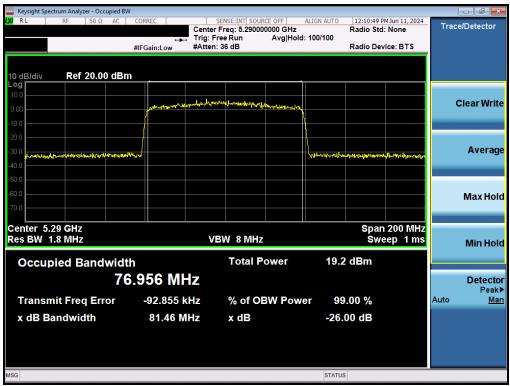
Plot 7-39. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)

FCC ID: A3LSMX828U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:		
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© 2024 ELEMENT			V11.1 08/28/2023	



Keysight Spectrum Analyzer - Occupied B\	N				
ίχα RL   RF   50 Ω AC	Trig:	SENSE:INT SOURCE OFF er Freq: 5.290000000 GHz Free Run Avg Hol n: 36 dB	ALIGN AUTO 111:56:22 A Radio Std: d: 100/100 Radio Dev		Trace/Detector
10 dB/div Ref 30.00 dBr	n				
20.0 10.0					Clear Write
0.00	- Prilling Marchen	Line Marshan James and the Marshan			
-10.0 -20.0 -30.0	within		MARTIN AND AND AND AND AND AND AND AND AND AN	WHE HUNDRED	Average
-40.0					Max Hold
Center 5.29 GHz Res BW 1.8 MHz	 	/BW 8 MHz		200 MHz ep 1 ms	Min Hold
Occupied Bandwid	th	Total Power	22.7 dBm		
7		Detector Peak▶			
Transmit Freq Error	-43.519 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	80.19 MHz	x dB	-26.00 dB		
MSG			STATUS		

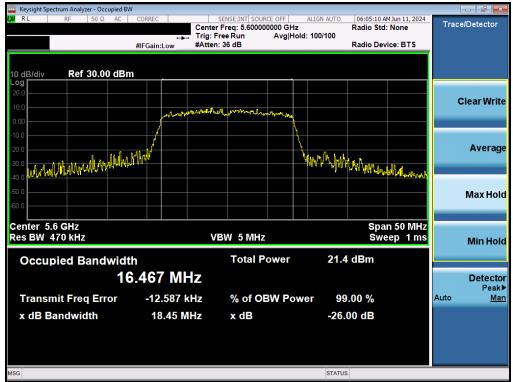
Plot 7-40. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



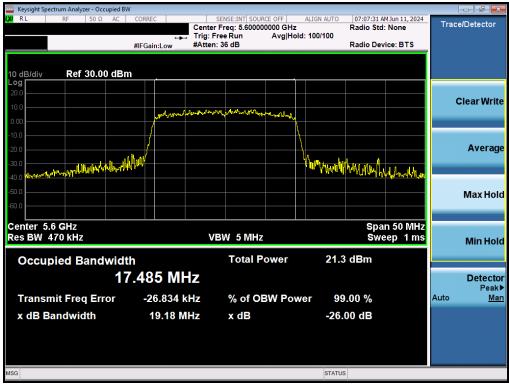
Plot 7-41. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMX828U		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:		
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Plot 7-42. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2C) - Ch. 120)



Plot 7-43. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	De 22 07 of 145	
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Plot 7-44. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)



Plot 7-45. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Dage 20 of 145	
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Keysight Spectrum Analyzer - Occupied BW						(	
			ALIGN AUTO	11:40:00 A Radio Std: Radio Dev		Trace	e/Detector
10 dB/div <b>Ref 20.00 dBm</b>			•				
-10.0	Mythe margarent	in fullowing the charge of the second				c	lear Write
-20.0 -30.0 -40.0				the the state	<b>WANT</b>		Average
-50.0 -60.0 -70.0							Max Hold
Center 5.59 GHz Res BW 910 kHz	VE	BW 8 MHz			100 MHz ep 1 ms		Min Hold
Occupied Bandwidth	60 MHz	Total Power	17.2	dBm			Detector
Transmit Freq Error	4.532 kHz	% of OBW Pow	ver 99	.00 %		Auto	Peak► <u>Man</u>
x dB Bandwidth	44.03 MHz	x dB	-26.0	00 dB			
MSG			STATUS				

Plot 7-46. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)



Plot 7-47. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
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🔤 Keysight Spectrum Analyzer - Occupied BW									
LXX RL RF 50Ω AC CO	RREC		NSE:INT SOUR		ALIGN AUTO	12:14:05 P Radio Std	M Jun 11, 2024	Trac	e/Detector
					l: 100/100	Radio Stu	. None		
#IF	Gain:Low	#Atten: 3	6 dB			Radio Dev	rice: BTS		
10 dB/div Ref 20.00 dBm									
Log									
10.0									Clear Write
0.00	production	hand	Marther and A front	Went how when the	3				
-10.0	[								
-20.0									
-30.0									Average
-30.0 www.egh.com////////////////////////////////////					San of the second states	and the second states of the s	mandapheres		
-50.0									
-60.0									Max Hold
-70.0									
						0			
Center 5.61 GHz Res BW 1.8 MHz		VPI	N 8 MHz				200 MHz ep 1 ms		
Res Buy 1:8 Williz		401				300	ep mis		Min Hold
Occupied Bandwidth			Total P	ower	18.1	dBm			
	00 14								
//.0	32 MI	ΠZ							Detector Peak▶
Transmit Freq Error	-57.914	kHz	% of O	3W Pow	er 99	.00 %		Auto	Man
x dB Bandwidth	81.59 N	ЛНz	x dB		-26.	00 dB			
MSG					STATUS	5			

Plot 7-48. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 2C) -



Plot 7-49. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ac (UNII Band 2C) - Ch. 114)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Dama 40 -6445	
1M2405140039-12.A3L	6/5/2024 - 7/10/2024	Portable Tablet	Page 40 of 145	
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Keysight Spectrum Analyzer - Occupied I	BW				- d <u>×</u>
<b>ιχμ RL</b> RF 50Ω AC	Trig: I	SENSE:INT SOURCE OFF r Freq: 5.570000000 GHz Free Run Avg Holo n: 36 dB	ALIGN AUTO 05:25:12 / Radio Sto d: 100/100 Radio De		Trace/Detector
10 dB/div Ref 20.00 dB	WI Guilleow		Kadio De		
Log 10.0 0.00	mana	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			Clear Write
-20.0 -30.0 <b>hartagan-adu-ta<sup>ma</sup>layah<sub>i</sub>tiran adu-ta<sup>ma</sup>layah<sub>i</sub>tiran adu-ta<sup>ma</sup>layahitiran adu-tambu</b>	ulewit		Minerantuckerspetitestrategy	bhadanay sa Alan	Average
-60.0 -60.0 -70.0					Max Hold
Center 5.57 GHz Res BW 3 MHz	V	/BW 50 MHz		n 400 MHz eep 1 ms	Min Hold
Occupied Bandwid	<sup>ith</sup> 55.71 MHz	Total Power	18.7 dBm		Detector Peak▶
Transmit Freq Error x dB Bandwidth	5.130 kHz 163.9 MHz	% of OBW Pow x dB	ver 99.00 % -26.00 dB		Auto <u>Man</u>
MSG			STATUS		

Plot 7-50. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax (UNII Band 2C) - Ch. 114)

FCC ID: A3LSMX828U		Approved by: Technical Manager	
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# 7.3 6dB Bandwidth Measurement

## **Test Overview and Limit**

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 6dB bandwidth.

## In the 5.725 – 5.850GHz band and 5.850 – 5.895GHz band, the 6dB bandwidth must be ≥ 500 kHz.

### **Test Procedure Used**

ANSI C63.10-2013 - Section 6.9.2

### **Test Settings**

- The signal analyzers' automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 100 kHz
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-2. Test Instrument & Measurement Setup

### **Test Notes**

None.

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# **MIMO 6dB Bandwidth Measurements**

	Frequency [MHz]	Channel	802.11 MODE	Antenna-1 6dB Bandwidth [MHz]	Antenna-2 6dB Bandwidth [MHz]
	5745	149	а	15.34	15.31
	5785	157	а	15.30	15.33
	5825	165	а	15.06	15.38
	5745	149	n	15.48	15.95
	5785	157	n	16.15	16.29
	5825	165	n	15.12	16.80
m	5745	149	ax SU	18.33	16.57
Band	5785	157	ax SU	16.56	17.94
ä	5825	165	ax SU	18.17	18.27
	5755	151	n	35.21	35.19
	5795	159	n	35.21	35.17
	5755	151	ax SU	35.20	35.18
	5795	159	ax SU	35.21	35.18
	5775	155	ас	75.29	75.36
	5775	155	ax SU	75.38	75.40

Table 7-3. Band 3 Conducted 6dB Bandwidth Measurements MIMO

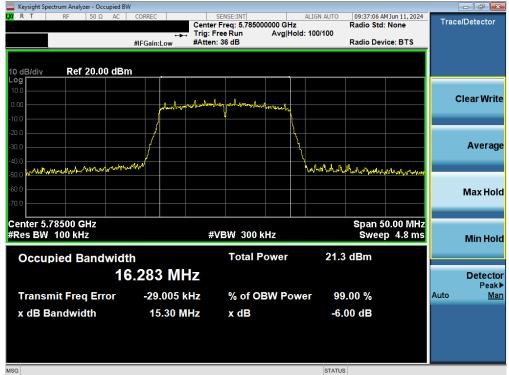
	Frequency [MHz]	Channel	802.11 MODE	Antenna-1 6dB Bandwidth [MHz]	Antenna-2 6dB Bandwidth [MHz]
Band 3/4	5845	169	а	15.06	15.76
Band 4	5865	173	а	16.29	15.97
Daliu 4	5885	177	а	15.83	15.96
Band 3/4	5845	169	n	15.74	16.54
Band 4	5865	173	n	15.74	15.74
Danu 4	5885	177	n	15.16	15.73
Band 3/4	5845	169	ax SU	16.58	16.98
Band 4	5865	173	ax SU	17.73	16.64
Danu 4	5885	177	ax SU	17.31	18.45
Band 3/4	5835	167	n	35.19	35.19
Band 4	5875	175	n	35.19	35.19
Band 3/4	5835	167	ax SU	35.18	35.18
Band 4	5875	175	ax SU	35.20	35.17
	5855	171	ac	75.45	75.25
Band 3/4	5855	171	ax SU	75.60	76.28
Danu 5/4	5815	163	ac	151.54	155.38
	5815	163	ax SU	155.49	155.34

 Table 7-4. Bands 3/4 Conducted 6dB Bandwidth Measurements MIMO

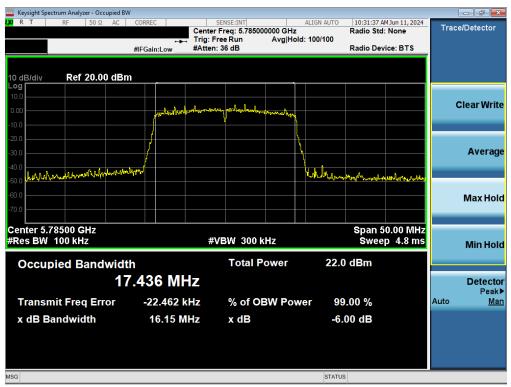
FCC ID: A3LSMX828U		MEASUREMENT REPORT		
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# 7.3.1 MIMO Antenna-1 6dB Bandwidth Measurements



Plot 7-51. 6dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 3) - Ch. 157)



Plot 7-52. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

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🔤 Keysight Spectrum Analyzer - Occupied BW						d ×
LXIRT RF 50Ω AC		SENSE:INT Freq: 5.785000000 GHz		26 PM Jun 11, 2024 Std: None	Trace/Det	ector
	Trig: F	ree Run Avg Hol	d: 100/100			
	#IFGain:Low #Atten	: 36 dB	Radio	Device: BTS		
10 dB/div Ref 10.00 dBm						
Log						
0.00	- Internetion	A Mahammmmmmmmmm			Clea	r Write
-10.0	A A A A A A A A A A A A A A A A A A A	a server in the way filled by			0.00	
-20.0						
-30.0						
-40.0					A	verage
-50.0 Dr. Alexandry Marsh Marsh - marsh - marsh	And		here the hearing march	And Mohan non		
-60.0						
-70.0						
					Ma	x Hold
-80.0						_
Center 5.78500 GHz			Spa	n 50.00 MHz		
#Res BW 100 kHz	#	VBW 300 kHz	Sw	eep 4.8 ms	Мі	n Hold
						molu
Occupied Bandwidth	า	Total Power	15.9 dBm			
18	.777 MHz				De	etector
						Peak▶
Transmit Freq Error	-26.530 kHz	% of OBW Pow	ver 99.00 %		Auto	<u>Man</u>
x dB Bandwidth	16.56 MHz	x dB	-6.00 dB			
		X GB	0.00 ab			
MSG			STATUS			

Plot 7-53. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 3) - Ch. 157)



Plot 7-54. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 3) - Ch. 151)

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Keysight Spectrum Analyzer - Occupied BV	V				_	
💢 R T RF 50Ω AC		SENSE:INT		PM Jun 11, 2024	Tracel	Detector
		Freq: 5.755000000 GHz Free Run Avg Hol	Radio S d: 100/100	td: None	i i acci	Detector
		: 36 dB		evice: BTS		
10 dB/div Ref 10.00 dBr	n					
0.00						
	المالية المحيين	la which had been			С	ear Write
-10.0	A Dave for the product of the second second		l IIII			
-20.0						
-30.0	<mark>/</mark>					
-40.0	Marine and		Bulka Laura			Average
stude site of condition loss with the state of the state			Martha Walk Walk	4 hoursel		····
-60.0						
-70.0						Max Hold
-80.0						Maxinoia
Center 5.75500 GHz			Span	100.0 MHz		
#Res BW 100 kHz	#	VBW 300 kHz		ep 9.6 ms		Min Hold
						Minitiona
Occupied Bandwidt	h	Total Power	17.1 dBm			
						Detector
31	7.528 MHz					Detector Peak▶
Transmit Freq Error	-39.539 kHz	% of OBW Pow	ver 99.00 %		Auto	Man
					riaco	man
x dB Bandwidth	35.20 MHz	x dB	-6.00 dB			
MSG			STATUS			

Plot 7-55. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 3) - Ch. 151)



Plot 7-56. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 3) - Ch. 155)

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Keysight Spectrum Analyzer - Occupied BV		asues wat			
<mark>X R T</mark> RF 50Ω AC		SENSE:INT r Freq: 5.775000000 GHz	Radio St	PM Jun 11, 2024 d: None	Trace/Detector
		Free Run Avg Holo 1: 36 dB	d: 100/100 Radio De	evice: BTS	
10 dB/div Ref 10.00 dBn	n				
Log					
-10.0	MALLANGUL	Lang- Marina Maria and Marina Marina			Clear Write
-20.0	A MARKAN COMPANY	- Construction of the second s			
-30.0					
-40.0					Average
-50.0 พางไม่สามมีถายการสามาร์การการการการการการการการการการการการการก	//m_/[P_		hauselest in granation the second	ender weren die	
-60.0					
-70.0					Max Hold
-80.0					
Center 5.7750 GHz			Span	200.0 MHz	
#Res BW 100 kHz	#	VBW 300 kHz	Sweep	19.13 ms	Min Hold
Occupied Bandwidt	h	Total Power	18.1 dBm		
	6.550 MHz				Detecto
					Peak
Transmit Freq Error	-54.591 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Mar</u>
x dB Bandwidth	75.38 MHz	x dB	-6.00 dB		
ASG			STATUS		

Plot 7-57. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 3) - Ch. 155)



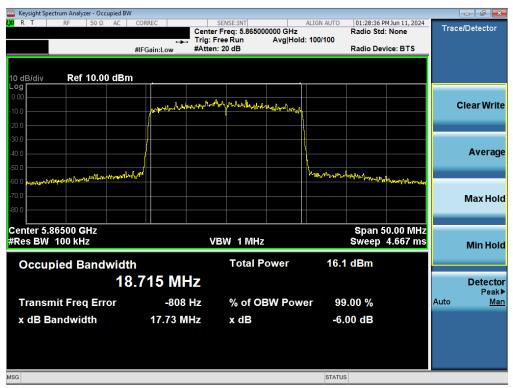
Plot 7-58. 6dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 4) - Ch. 173)

FCC ID: A3LSMX828U		MEASUREMENT REPORT		
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Keysight Spectrum Analyzer - Occupied B						x
LX/R T RF 50Ω AC		SENSE:INT r Freq: 5.865000000 GHz	R	10:35:50 AM Jun 11, 2024 adio Std: None	Trace/Detecto	or
		Free Run Avg Ho n: 28 dB	ld: 100/100 R	adio Device: BTS		
10 dB/div Ref 20.00 dB	m					
10.0						
0.00	لمطبيط و	La phone in the state			Clear Wr	rite
10.0	Withour July and a loss	and an extendential program of the				
20.0						
30.0	/				Avera	age
40.0 <b>b</b>	1					
50.0 - hand many man hall	-10-0-11-		VUIImahhhland	al Day Marchalon and the		
60.0				and the state of the state	Max H	olo
-70.0					maxm	010
Center 5.86500 GHz				Span 50.00 MHz		
#Res BW 100 kHz	v	'BW 1 MHz		weep 4.667 ms	Min H	
				-	Willing	
Occupied Bandwid		Total Power	21.6 d	BM		
1	7.445 MHz				Detec	
Transmit Freq Error	-28.191 kHz	% of OBW Pov	ver 99.0	0 %		ak ⊧ Man
x dB Bandwidth	15.74 MHz	x dB	-6.00	dB		
	15.7 4 WIT12		-0.00			
SG			STATUS			
						_

Plot 7-59. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 4) - Ch. 173)



Plot 7-60. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 4) - Ch. 173)

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Keysight Spectrum Analyzer - Occupied BW	/					
XIR T RF 50Ω AC	CORREC	SENSE:INT		PM Jun 11, 2024	Trace/De	tector
		er Freq: 5.835000000 GHz Free Run Avg Hol	Radio Sto d: 100/100	l: None	ITACCIDE	lector
		n: 26 dB	Radio De	vice: BTS		
	#IFGalli.LOW #VILLO		110000			
10 dB/div Ref 20.00 dBm	า					
Log						
10.0					01	
0.00		and probability and a set of a set			Clea	r Write
-10.0	And the first strategies and					_
		Y (				
-20.0						
-30.0			\		A	verage
-40.0	1. Loulle		Million of La on			
-40.0 -50.0 Million Mar	<u> </u>		Mar Market Market	NAD AND AND A ROLL		
-2010 44144444				AND A CANADA TAN		_
-60.0					Ma	ax Hold
-70.0						
Center 5.83500 GHz			Span '	100.0 MHz		
#Res BW 100 kHz	١	/BW 1 MHz		9.267 ms		in Hold
					IVI	ΠΠΟΙά
Occupied Bandwidt	h	Total Power	22.7 dBm			
35	5.815 MHz				D	etector
						Peak▶
Transmit Freq Error	-36.196 kHz	% of OBW Pow	/er 99.00 %		Auto	<u>Man</u>
x dB Bandwidth	35.19 MHz	x dB	-6.00 dB			
	55.19 WINZ	X UD	-0.00 uB			
MSG			STATUS			

Plot 7-61. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 3/4) - Ch. 167)



Plot 7-62. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 3/4) - Ch. 167)

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Keysight Spectrum Analyzer - Occupied BW								
L <mark>XI</mark> RT RF 50Ω AC (	CORREC	SENSE:INT Center Freg: 5.855000		ALIGN AUTO	03:25:37 P Radio Std	MJun 11, 2024	Trac	e/Detector
	- <b>-</b>	Trig: Free Run	Avg Hold	I: 100/100				
#	IFGain:Low	#Atten: 20 dB			Radio Dev	vice: BTS		
10 dB/div Ref 20.00 dBm	_							
10.0								
0.00								Clear Write
	MULMUM	والطليلا بالكلام سعالي المسلول	մնաստ					
-10.0								
-20.0								A
-30.0								Average
-40.0								
-50.0	~			WANK HANN	Manaka L			
-60.0						Mishinkung		Max Hold
-70.0								
Center 5.8550 GHz					Enon 2	00.0 MHz		
#Res BW 100 kHz		VBW 1 MHz				18.47 ms		
					encop			Min Hold
Occupied Bandwidth		Total Po	ower	21.9	dBm			
	236 MH	7						Detector
10.	200 1011	L						Peak▶
Transmit Freq Error	-23.816 kH	Hz % of OE	W Pow	er 99	.00 %		Auto	<u>Man</u>
x dB Bandwidth	75.45 M⊦	lz xdB		-6.0	00 dB			
MSG				STATUS				

Plot 7-63. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 3/4) – Ch. 171)

Keysight Spectrum Analyzer - Occupied B\ X R T RF 50 Ω AC	CORREC Cen	SENSE:INT Iter Freq: 5.855000000 GH J: Free Run Avg H ten: 6 dB	ALIGN AUTO z old: 100/100	03:38:27 Pr Radio Std: Radio Dev		Trace/Detector
10 dB/div Ref 10.00 dBr		ALHAR WHIGH WHIGH AND A MAN AND	Jul			Clear Wri
30.0 40.0 50.0						Avera
60.0	Alvand		<mark>()</mark>	Alfredderedd yn ddaraeth yn	ninne-applerheiden	Max Ho
Center 5.8550 GHz Res BW 100 kHz Occupied Bandwidt	th	VBW 1 MHz Total Power	17.8	Span 2 Sweep dBm	00.0 MHz 18.47 ms	Min Ho
	5.667 MHz -62.992 kHz 75.60 MHz	% of OBW Po x dB	wer 99	.00 % 00 dB		Detect Pea Auto <u>M</u>
sg			STATUS			

Plot 7-64. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 3/4) - Ch. 171)

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20       RLT       RF       50.0       AC       CORREC       SENSE:INT       ALION AUTO       108-4134, AMJ0n 12, 2024         30.0       Trig: Free Run       Avg Hold: 100/100       Radio Std: None       Radio Std: None       Radio Std: None         10       dB/div       Ref 10.00 dBm       Image: Ref 10.	Keysight Spectrum Analyzer - Occupied BW									
Clear Write         Image: State of the	X RLT RF 50 Ω AC CORF	REC				ALIGN AUTO			Trac	e/Detector
##FGain:Low       #Atten: 16 dB       Radio Device: BTS         10 dB/div       Ref 10.00 dBm       Image: Clear Write         000       Image: Clear Write       Image: Clear Write         200       Image: Clear Write       Image: Clear Write <t< td=""><td></td><td></td><td></td><td></td><td></td><td>1. 100/100</td><td>Radio Std</td><td>: None</td><td>1100</td><td>01000001</td></t<>						1. 100/100	Radio Std	: None	1100	01000001
10 dB/div       Ref 10.00 dBm         Log	#IEG				Avginoid	1. 100/100	Radio Dev	vice: BTS		
Log       Image: Mild Mild Mild Mild Mild Mild Mild Mild		unicow	_							
Log       Image: Mild Mild Mild Mild Mild Mild Mild Mild										
000       0										
100       100										
100       100			an a star of set that	latite as						Clear Write
300       400	-10.0	NUM IN	MILING MADE		, hau dha an					
300       400	-20.0								_	
40.0       40.0       Average         50.0       Min.Min.Min.Min.Min.Min.Min.Min.Min.Min.										
50.0       Mutual										_
600       1	-40.0						44 D000 04 4			Average
600       70.0	-50.0 Apost Law - M					In a feature of the Alfred	YIVIII YYYYA			
70.0       20.0	en n							the and the state		
8000       Image: Context 5.8150 GHz       Span 400.0 MHz       Min Hold         Center 5.8150 GHz       VBW 1 MHz       Sweep 36.93 ms       Min Hold         #Res BW 100 kHz       VBW 1 MHz       Sweep 36.93 ms       Min Hold         Occupied Bandwidth       Total Power       22.6 dBm       Detector         153.19 MHz       Image: Context for the state of the										
Center 5.8150 GHz #Res BW 100 kHz       Span 400.0 MHz Sweep 36.93 ms       Min Hold         Occupied Bandwidth       Total Power       22.6 dBm         153.19 MHz       Detector         Transmit Freq Error       -65.747 kHz       % of OBW Power       99.00 %	-70.0									Max Hold
#Res BW     100 kHz     VBW     1 MHz     Sweep     36.93 ms       Occupied Bandwidth     Total Power     22.6 dBm       153.19 MHz     Detector       Transmit Freq Error     -65.747 kHz     % of OBW Power     99.00 %	-80.0									
#Res BW     100 kHz     VBW     1 MHz     Sweep     36.93 ms       Occupied Bandwidth     Total Power     22.6 dBm       153.19 MHz     Detector       Transmit Freq Error     -65.747 kHz     % of OBW Power     99.00 %										
Occupied Bandwidth     Total Power     22.6 dBm       153.19 MHz     Detector       Transmit Freq Error     -65.747 kHz     % of OBW Power     99.00 %										
Occupied Bandwidth       Total Power       22.6 dBm         153.19 MHz       Detector         Transmit Freq Error       -65.747 kHz       % of OBW Power       99.00 %	#Res BW 100 kHz		VBV	N 1 MHz			Sweep	36.93 ms		Min Hold
153.19 MHz     Detector       Transmit Freq Error     -65.747 kHz     % of OBW Power     99.00 %	,									minnena
153.19 MHz Transmit Freq Error -65.747 kHz % of OBW Power 99.00 % Auto Man	Occupied Bandwidth			Total P	ower	22.6	dBm			
Transmit Freq Error -65.747 kHz % of OBW Power 99.00 %										
Transmit Freq Error -65.747 kHz % of OBW Power 99.00 %	153.1	19 MI	ΠZ							
	Troponit From Freez	CE 747		0/ af OF		00	00.0/		Auto	
x dB Bandwidth 151.5 MHz x dB -6.00 dB	Transmit Freq Error -	05./4/	KHZ	% OF UE	SVV POW	er 99	.00 %		Auto	<u>ivian</u>
	x dB Bandwidth	151.5 N	/Hz	x dB		-6.	00 dB			
MSG STATUS	MSG					STATUS				

Plot 7-65. 6dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ac (UNII Band 3/4) - Ch. 163)

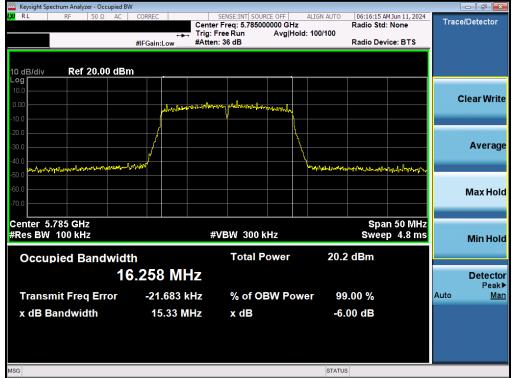


Plot 7-66. 6dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 3/4) - Ch. 163)

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# 7.3.2 MIMO Antenna-2 6dB Bandwidth Measurements



Plot 7-67. 6dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 3) – Ch. 157)



Plot 7-68. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

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Keysight Spectrum Analyzer - Occupied BW							
XIRL RF 50 Ω AC CO		ENSE:INT SOURCE OFF	ALIGN AUTO	10:04:26 A	MJun 11, 2024	Trac	e/Detector
	Trig: Fr	ee Run Avg Hol	d: 100/100	Radio Dev			
#IF	Gain:Low #Atten:	30 dB		Radio Dev	ICE. DT3		
10 dB/div Ref 10.00 dBm							
0.00							
-10.0	plant haterbuch	4 water town with the work	h				Clear Write
-20.0	<b></b>						
-30.0	,						
-40.0	<i>[</i>		Manual and	the old the	and the states		Average
-30.0			111 In Alton	NII MANA ANA	de Managel de la		
-60.0							
-70.0							Max Hold
-80.0						_	
Center 5.785 GHz					n 50 MHz		
#Res BW 100 kHz	#V	'BW 300 kHz		Swee	p 4.8 ms		Min Hold
Occupied Bandwidth		Total Power	14.8	dBm			
18.7	'31 MHz						Detector
Transmit Freq Error	-47.203 kHz	% of OBW Pow	ver 99	.00 %		Auto	Peak▶ Man
x dB Bandwidth	17.94 MHz	x dB		00 dB			
	17.94 WITZ	хuв	-0.0	JU UB			
MSG			STATUS				

Plot 7-69. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 3) - Ch. 157)

Keysight Spectrum Analyzer - Occupied B RL RF 50 Ω AC	CORREC	SENSE:INT SOURCE OFF	ALIGN AUTO Hz Hold: 100/100	10:53:07 AM Radio Std:	1 Jun 11, 2024 None	Trace/Detec	
		n: 36 dB		Radio Devi	ice: BTS		
dB/div Ref 20.00 dB	m						
g 0						ClearV	
0	Mahala Inder and a start of the	in production of the second of	4			Clearv	Vri
0		V					
0	hara					Ave	ra
0 Aphlypphylaelunder Walnahlig Marting Los 0			14. ALL MARKED	rtaling	holpeditation		
0						Max	Ho
enter 5.755 GHz				Enon			
tes BW 100 kHz	#	VBW 300 kHz			100 MHz 5 9.6 ms	Minl	Но
Occupied Bandwid	th	Total Power	22.	5 dBm			
3	5.892 MHz					Dete	ect Pea
Transmit Freq Error	-46.994 kHz	% of OBW P	ower 99	9.00 %	P	luto	M
x dB Bandwidth	35.19 MHz	x dB	-6.	00 dB			

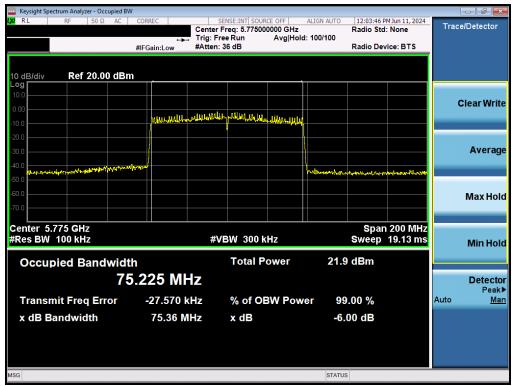
Plot 7-70. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 3) - Ch. 151)

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Keysight Spectrum Analyzer - Occupied BV	٧				_	- 6 💌
LXI RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF	ALIGN AUTO 11:42:32 Radio St	AM Jun 11, 2024	Tracel	Detector
	Trig: F	Free Run Avg Hold	d: 100/100	u. None		
	#IFGain:Low #Atter	n: 36 dB	Radio D	evice: BTS		
10 dB/div Ref 20.00 dBn	n _					
Log						
					CI	ear Write
0.00		hory and all dely log dely of the				
-10.0	and the for the for the second s	and the stand have the for the				
-20.0						_
-30.0			\ <u>.</u>			Average
-40.0	Laipent		The property from why have	and the second		
-50.0				a de antenir		
-60.0						Max Hold
-70.0				_		
Center 5.755 GHz #Res BW 100 kHz	#	VBW 300 kHz		n 100 MHz ep 9.6 ms		
#Res BW TOO KH2	#	VEW JOUKHZ	Swe	ep a.o ms		Min Hold
Occupied Bandwidt	h	Total Power	16.4 dBm			
-	7.495 MHz					Detector
3/	.495 MINZ					Detector Peak▶
Transmit Freq Error	-17.132 kHz	% of OBW Pow	ver 99.00 %		Auto	Man
x dB Bandwidth	35.18 MHz	x dB	-6.00 dB			
	55.10 MILZ	A UD	-0.00 ub			
MSG			STATUS			

Plot 7-71. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 3) – Ch. 151)



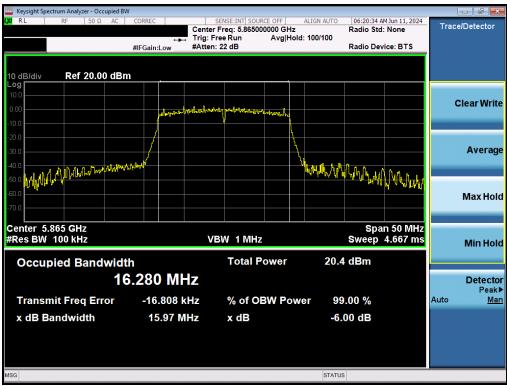
Plot 7-72. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 3) - Ch. 155)

FCC ID: A3LSMX828U		MEASUREMENT REPORT	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied BV	٧					×
LXI RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF	ALIGN AUTO 12:16:39 Radio Sto	PM Jun 11, 2024	Trace/Detecto	or
	Trig:	Free Run Avg Hold		. None		
,	#IFGain:Low #Atte	n: 36 dB	Radio De	vice: BTS		
10 dB/div Ref 10.00 dBn	n					
Log						
0.00		11			Clear Wr	rite
-10.0	all her with the set of the set o	alaloga Walan Martin and a Martin and a fair				
-20.0						
-30.0						
-40.0					Avera	age
-50.0	weiter		Mart Marin Marin Marin Marin Marin Marin Marin Marina Marina Marina Marina Marina Marina Marina Marina Marina M	ull-compression		
-60.0						
-70.0					MaxIII	
-80.0					Max He	oia
-00.0						
Center 5.775 GHz			Spar	1 200 MHz		
#Res BW 100 kHz	#	VBW 300 kHz	Sweep	19.13 ms	Min He	old
		T-4-1 Damag				
Occupied Bandwidt		Total Power	17.7 dBm			
76	6.599 MHz				Detec	
	07.057.111		00.00 %			ak▶
Transmit Freq Error	-97.257 kHz	% of OBW Pow	er 99.00 %		Auto <u>N</u>	Man
x dB Bandwidth	75.40 MHz	x dB	-6.00 dB			
MSG			STATUS			
			5			

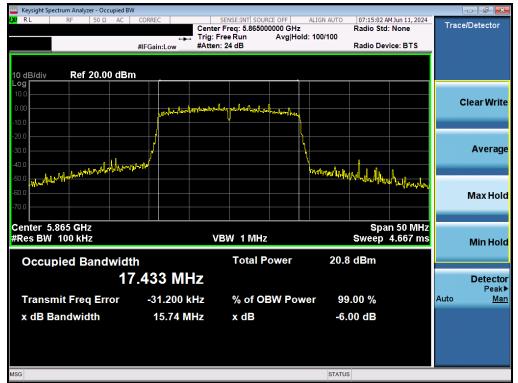
Plot 7-73. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 3) - Ch. 155)



Plot 7-74. 6dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 4) - Ch. 173)

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Plot 7-75. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 3/4) - Ch. 173)



Plot 7-76. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 3/4) - Ch. 173)

FCC ID: A3LSMX828U		MEASUREMENT REPORT					
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Keysight Spectrum Analyzer - Occupied E	BW				
LXI RL RF 50 Ω AC	CORREC	SENSE:INT SOURCE OFF ter Freg: 5.835000000 GH		M Jun 11, 2024	Trace/Detector
	🛶 Trig	: Free Run Avg H	old: 100/100		
	#IFGain:Low #Att	ten: 20 dB	Radio Dev	vice: BTS	
10 dB/div Ref 20.00 dB	m		-		
Log 10.0					
0.00					Clear Write
-10.0	J. J. Jaka and a start of the	water produlated when and all of the	4		
		V			
-20.0					Avorago
-30.0	Akaa		Ν.		Average
-40.0 -50.0 AANA Annu Mark Mind Why John Marca	- with a last		Marrison Marriel	A	
			and a first of a first		
-60.0					Max Hold
-70.0					
Center 5.835 GHz			Spar	100 MHz	
#Res BW 100 kHz		VBW 1 MHz		9.267 ms	Min Hold
					WIIII HOID
Occupied Bandwid	lth	Total Power	22.2 dBm		
3	5.785 MHz				Detector
					Peak►
Transmit Freq Error	-41.188 kHz	% of OBW Po	ower 99.00 %		Auto <u>Man</u>
x dB Bandwidth	35.19 MHz	x dB	-6.00 dB		
MSG			STATUS		

Plot 7-77. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 3/4) - Ch. 167)



Plot 7-78. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 3/4) - Ch. 167)

FCC ID: A3LSMX828U		MEASUREMENT REPORT	Approved by: Technical Manager
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	ight Spectrum	n Analyzer	- Occi	upied BW											
IXI RL	R	F S	50 Ω	AC	CORF	REC			NSE:INT SOUR		ALIGN AUTO	12:05:49 F	MJun 11, 2024	Trac	ce/Detector
						•	- T	rig: Free	Run		d: 100/100				
					#IFG	ain:Low	#/	Atten: 1	6 dB			Radio Dev	vice: BTS		
10 dB	/div	Ref 2	0.00	) dBm			_								
Log 10.0															
0.00															Clear Write
-10.0						Munna	لللسال	J.M.							
-20.0															
-30.0															Average
-40.0															Average
		Albert		h.h/mm~	, deal										
	NHANGARANA AN										Hall Hallwork - has	ا بدانیا بیان			
-60.0													all and the poly the second		Max Hold
-70.0 -															
Cent	er 5.855	6 GHz										Spar	200 MHz		
#Res	BW 10	0 kHz						VBV	N/1 MHz				18.47 ms		Min Hold
									<b>T</b> ( ) D		04.0				
	ccupie	d Ba	nd						Total P	ower	21.2	dBm			
				75	.18	82 M	Hz								Detector
Tr	ansmit	Frod	Err	or		51.242			% of OE		or 00	.00 %		Auto	Peak▶ Man
				UI										Auto	Man
x	dB Band	dwidt	h			75.25	MHz		x dB		-6.	00 dB			
MSG											STATUS	6			

Plot 7-79. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 3/4) – Ch. 171)

	Center Fr	ise:INT SOURCE OFF   eq: 5.855000000 GHz ∍ Run Avg Hold 2 dB	: 100/100	12:18:37 Pi Radio Std: Radio Dev		_	)etector
10 dB/div Ref 10.00 dBm	relinguistinguistinguisting	Million Marting Dewinger Jag				CI	ear Write
-30.0			Annu of Live				Average
500 600 <b>11 11 11 11 11 11 11 11 11 11 11 11 11</b>			Haagewoordenlining,	<u>╊╼╍</u> ┺╔┉╱┠╡ <u>┠</u> ╍╋╍ <sub>┲</sub> ╝	adinda alida dalar	ŗ	Max Hol
Center 5.855 GHz Res BW 100 kHz Occupied Bandwidth	VBV	V 1 MHz Total Power	16.9	Sweep	200 MHz 18.47 ms		Min Hol
76. Transmit Freq Error	761 MHz -15.082 kHz	% of OBW Powe	er 99.	00 %		Auto	Detecto Peak <u>Ma</u>
x dB Bandwidth	76.28 MHz	x dB	-6.0	0 dB			
6G			STATUS				

Plot 7-80. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 3/4) - Ch. 171)

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🔤 Keysight Spectrum Analyzer - Occu	upied BW									
(X) RL RF 50 Ω						ALIGN AUTO	05:21:23 A Radio Std Radio Dev		Trac	e/Detector
10 dB/div Ref 20.00	dBm									
Log 10.0										Clear Write
-10.0	p	ujuk.dujim	ATTENDED AND AND AND AND AND AND AND AND AND AN	hukutik, ing ging	Allandushan					
-20.0	AnDAma									Average
-40.0	ANIQ MARAPONY					and divide and	ANNIN MAR	հես		
-60.0										Max Hold
Center 5.815 GHz #Res BW 100 kHz			VBV	N 1 MHz				400 MHz 36.93 ms		Min Hold
Occupied Bandy	width			Total P	ower	24.6	dBm			
	153.8	33 MI	ΗZ							Detector Peak▶
Transmit Freq Erro	or -2	264.19	kHz	% of OE	BW Pow	er 99	.00 %		Auto	<u>Man</u>
x dB Bandwidth		155.4 N	lHz	x dB		-6.1	00 dB			
MSG						STATUS				

Plot 7-81. 6dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ac (UNII Band 3/4) - Ch. 163)



Plot 7-82. 6dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax (UNII Band 3/4) - Ch. 163)

FCC ID: A3LSMX828U		MEASUREMENT REPORT					
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## 7.4 UNII Output Power Measurement

## Test Overview and Limits

A transmitter antenna terminal of the EUT is connected to the input of an RF pulse power sensor. Measurement is made using a broadband average power meter while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013, and at the appropriate frequencies.

### The output power limits are as specified in the tables below.

UNII	Frequency Range	Maximum Conducted Power Limit	Maximum e.i.r.p
Band	Frequency Range	FCC	FCC
UNII 1	5.15 – 5.25GHz	23.98dBm (250mW)	N/A
UNII 2A	5.25 – 5.35GHz		
UNII 2C	5.47 – 5.725GHz	The lesser of 23.98dBm (250mW) <b>or</b> 11dBm + 10log₁₀B	N/A
UNII 3	5.725 – 5.850GHz	30dBm (1W)	N/A
UNII 4	5.850 – 5.895GHz	N/A	30dBm (1W)

### Test Procedure Used

ANSI C63.10-2013 – Section 12.3.3.2 Method PM-G ANSI C63.10-2013 – Section 14.2 Measure-and-Sum Technique

### Test Settings

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-3. Test Instrument & Measurement Setup

#### Test Notes

None.

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# **MIMO Maximum Conducted Output Power Measurements**

		5GHz WIFI	(20MHz 802.11	a MIMO)		Conducted	Conducted	Directional			
Band	Freq	Channel	Avg. Conducted Powers [dBm]		s [dBm]		Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	[MHz]		ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
	0	36	16.36	16.95	19.68	23.98	-4.30	-2.96	16.72	30.00	-13.28
UNII-1	0	40	16.35	16.97	19.68	23.98	-4.30	-2.96	16.72	30.00	-13.28
UNII-1	0	44	16.33	16.92	19.65	23.98	-4.33	-2.96	16.69	30.00	-13.31
	0	48	16.67	16.90	19.80	23.98	-4.18	-2.96	16.84	30.00	-13.16
	0	52	16.75	16.87	19.82	23.98	-4.16	-3.24	16.58	30.00	-13.42
UNII-2A	0	56	16.72	16.86	19.80	23.98	-4.18	-3.24	16.56	30.00	-13.44
UNII-ZA	0	60	16.46	16.35	19.42	23.98	-4.56	-3.24	16.18	30.00	-13.82
	0	64	16.88	16.90	19.90	23.98	-4.08	-3.24	16.66	30.00	-13.34
	0	100	16.40	16.68	19.55	23.98	-4.43	-3.30	16.25	30.00	-13.75
UNII-2C	0	120	16.70	16.92	19.82	23.98	-4.16	-3.30	16.52	30.00	-13.48
UNII-20	0	124	16.78	16.91	19.86	23.98	-4.12	-3.30	16.55	30.00	-13.45
	0	144	16.76	16.64	19.71	23.98	-4.27	-3.30	16.41	30.00	-13.59
	5	149	16.42	16.70	19.57	30.00	-10.43	-3.45	16.12	36.00	-19.88
UNII-3	5	157	16.07	16.51	19.31	30.00	-10.69	-3.45	15.86	36.00	-20.14
	5	165	16.38	16.60	19.50	30.00	-10.50	-3.45	16.05	36.00	-19.95
	5	169	16.64	16.98	19.82	-	-	-3.66	16.16	30.00	-13.84
UNII-4	5	173	16.55	16.89	19.73	-	-	-3.66	16.07	30.00	-13.93
	5	177	16.69	16.80	19.76	-	-	-3.66	16.09	30.00	-13.91

Table 7-5. MIMO 20MHz BW 802.11a (UNII) Maximum Conducted Output Power

		5GHz WIFI	(20MHz 802.11	n MIMO)		Conducted	Conducted	Directional			
Band	Freq [MHz]	Channel	Avg. Conducted Powers [dBm]			Power Limit	Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
			ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
	0	36	16.27	16.56	19.43	23.98	-4.55	-2.96	16.47	30.00	-13.53
UNII-1	0	40	16.38	16.62	19.51	23.98	-4.47	-2.96	16.55	30.00	-13.45
UNII-1	0	44	16.28	16.91	19.62	23.98	-4.36	-2.96	16.66	30.00	-13.34
	0	48	16.35	16.90	19.64	23.98	-4.34	-2.96	16.68	30.00	-13.32
	0	52	15.95	16.46	19.22	23.98	-4.76	-3.24	15.98	30.00	-14.02
UNII-2A	0	56	16.37	16.27	19.33	23.98	-4.65	-3.24	16.09	30.00	-13.91
UNII-ZA	0	60	16.84	16.72	19.79	23.98	-4.19	-3.24	16.55	30.00	-13.45
	0	64	16.62	16.79	19.72	23.98	-4.26	-3.24	16.48	30.00	-13.52
	0	100	16.25	16.76	19.52	23.98	-4.46	-3.30	16.22	30.00	-13.78
UNII-2C	0	124	16.51	16.70	19.62	23.98	-4.36	-3.30	16.31	30.00	-13.69
	0	144	16.94	16.98	19.97	23.98	-4.01	-3.30	16.67	30.00	-13.33
	5	149	16.20	16.56	19.39	30.00	-10.61	-3.45	15.94	36.00	-20.06
UNII-3	5	157	16.61	16.92	19.78	30.00	-10.22	-3.45	16.33	36.00	-19.67
	5	165	16.69	16.88	19.80	30.00	-10.20	-3.45	16.35	36.00	-19.65
	5	169	16.42	16.77	19.61	-	-	-3.66	15.95	30.00	-14.05
UNII-4	5	173	16.63	16.75	19.70	-	-	-3.66	16.04	30.00	-13.96
	5	177	16.53	16.66	19.61	-	-	-3.66	15.94	30.00	-14.06

Table 7-6. MIMO 20MHz BW 802.11n (UNII) Maximum Conducted Output Power

	5	GHz WIFI (	20MHz 802.11	ac MIMO)		Conducted	Conducted	Directional			
Band	Freq [MHz]	Channel	Avg. Co	nducted Power	s [dBm]	Power Limit	Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
			ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
	0	36	16.85	16.73	19.80	23.98	-4.18	-2.96	16.84	30.00	-13.16
UNII-1	0	40	16.49	16.70	19.61	23.98	-4.37	-2.96	16.65	30.00	-13.35
UNII-1	0	44	16.38	16.58	19.49	23.98	-4.49	-2.96	16.53	30.00	-13.47
	0	48	16.42	16.81	19.63	23.98	-4.35	-2.96	16.67	30.00	-13.33
	0	52	16.56	16.73	19.66	23.98	-4.32	-3.24	16.42	30.00	-13.58
UNII-2A	0	56	16.65	16.75	19.71	23.98	-4.27	-3.24	16.47	30.00	-13.53
UNII-ZA	0	60	16.67	16.76	19.73	23.98	-4.25	-3.24	16.49	30.00	-13.51
	0	64	16.76	16.85	19.82	23.98	-4.16	-3.24	16.58	30.00	-13.42
	0	100	16.27	16.80	19.55	23.98	-4.43	-3.30	16.25	30.00	-13.75
UNII-2C	0	120	16.50	16.77	19.65	23.98	-4.33	-3.30	16.35	30.00	-13.65
UNII-2C	0	124	16.36	16.58	19.48	23.98	-4.50	-3.30	16.18	30.00	-13.82
	0	144	16.52	16.66	19.60	23.98	-4.38	-3.30	16.30	30.00	-13.70
	5	149	16.26	16.61	19.45	30.00	-10.55	-3.45	16.00	36.00	-20.00
UNII-3	5	157	16.24	16.51	19.39	30.00	-10.61	-3.45	15.94	36.00	-20.06
	5	165	16.70	16.93	19.83	30.00	-10.17	-3.45	16.38	36.00	-19.62
	5	169	16.67	16.90	19.80	-	-	-3.66	16.13	30.00	-13.87
UNII-4	5	173	16.63	16.50	19.58	-	-	-3.66	15.91	30.00	-14.09
	5	177	16.59	16.74	19.68	-	-	-3.66	16.01	30.00	-13.99

Table 7-7. MIMO 20MHz BW 802.11ac (UNII) Maximum Conducted Output Power

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	Ę	5GHz WIFI (	20MHz 802.11a	ax MIMO)		Conducted	Conducted	Directional			
Band	Freq [MHz]	Channel	Avg. Co	nducted Power	s [dBm]	Power Limit	Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
			ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
	0	36	10.78	10.39	13.60	23.98	-10.38	-2.96	10.64	30.00	-19.36
UNII-1	0	40	10.46	10.74	13.61	23.98	-10.37	-2.96	10.65	30.00	-19.35
ONIFI	0	44	10.11	10.80	13.48	23.98	-10.50	-2.96	10.52	30.00	-19.48
	0	48	10.17	10.86	13.54	23.98	-10.44	-2.96	10.58	30.00	-19.42
	0	52	10.48	10.86	13.68	23.98	-10.30	-3.24	10.44	30.00	-19.56
UNII-2A	0	56	10.80	10.84	13.83	23.98	-10.15	-3.24	10.59	30.00	-19.41
UNII-ZA	0	60	10.63	10.92	13.79	23.98	-10.19	-3.24	10.55	30.00	-19.45
	0	64	10.96	10.97	13.98	23.98	-10.00	-3.24	10.74	30.00	-19.26
	0	100	10.26	10.67	13.48	23.98	-10.50	-3.30	10.18	30.00	-19.82
UNII-2C	0	120	10.45	10.59	13.53	23.98	-10.45	-3.30	10.23	30.00	-19.77
0111-20	0	124	10.19	10.51	13.36	23.98	-10.62	-3.30	10.06	30.00	-19.94
	0	144	10.64	10.32	13.49	23.98	-10.49	-3.30	10.19	30.00	-19.81
	5	149	10.33	10.48	13.42	30.00	-16.58	-3.45	9.97	36.00	-26.03
UNII-3	5	157	10.35	10.48	13.43	30.00	-16.57	-3.45	9.98	36.00	-26.02
	5	165	10.47	10.89	13.70	30.00	-16.30	-3.45	10.25	36.00	-25.75
	5	169	10.49	10.73	13.62	-	-	-3.66	9.96	30.00	-20.04
UNII-4	5	173	10.40	10.65	13.54	-	-	-3.66	9.87	30.00	-20.13
	5	177	10.33	10.56	13.46	-	-	-3.66	9.79	30.00	-20.21

Table 7-8. MIMO 20MHz BW 802.11ax (UNII) Maximum Conducted Output Power

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		5GHz WIFI	40MHz 802.11	n MIMO)		Conducted	Conducted	Directional			
Band	Freq	Channel	Avg. Co	nducted Power	s [dBm]	Power Limit	Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	[MHz]		ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
UNII-1	5190	38	16.77	16.70	19.75	23.98	-4.23	-2.96	16.79	30.00	-13.21
UNII-1	5230	46	16.37	16.75	19.57	23.98	-4.41	-2.96	16.61	30.00	-13.39
UNII-2A	5270	54	16.79	16.75	19.78	23.98	-4.20	-3.24	16.54	30.00	-13.46
UNII-ZA	5310	62	16.82	16.66	19.75	23.98	-4.23	-3.24	16.51	30.00	-13.49
	5510	102	16.15	16.61	19.40	23.98	-4.58	-3.30	16.10	30.00	-13.90
UNII-2C	5590	118	16.53	16.76	19.66	23.98	-4.32	-3.30	16.36	30.00	-13.64
0111-20	5630	126	16.38	16.47	19.44	23.98	-4.54	-3.30	16.14	30.00	-13.86
	5710	142	16.82	16.62	19.73	23.98	-4.25	-3.30	16.43	30.00	-13.57
UNII-3	5755	151	16.49	16.77	19.64	30.00	-10.36	-3.45	16.19	36.00	-19.81
UNII-5	5795	159	16.38	16.61	19.51	30.00	-10.49	-3.45	16.06	36.00	-19.94
UNII-4	5835	167	16.45	16.62	19.55	-	-	-3.45	16.10	30.00	-13.90
UNII-4	5875	175	16.78	16.93	19.87	-	-	-3.66	16.20	30.00	-13.80

Table 7-9. MIMO 40MHz BW 802.11n (UNII) Maximum Conducted Output Power

	5	GHz WIFI (	40MHz 802.11a	ac MIMO)		Conducted	Conducted	Directional			
Band	Freq	Channel	Avg. Co	nducted Power	s [dBm]	Power Limit	Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	[MHz]		ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
UNII-1	5190	38	16.67	16.71	19.70	23.98	-4.28	-2.96	16.74	30.00	-13.26
UNII-1	5230	46	16.22	16.85	19.56	23.98	-4.42	-2.96	16.60	30.00	-13.40
UNII-2A	5270	54	16.61	16.83	19.73	23.98	-4.25	-3.24	16.49	30.00	-13.51
UNIFZA	5310	62	16.60	16.91	19.77	23.98	-4.21	-3.24	16.53	30.00	-13.47
	5510	102	16.08	16.60	19.36	23.98	-4.62	-3.30	16.06	30.00	-13.94
UNII-2C	5590	118	16.75	16.80	19.79	23.98	-4.19	-3.30	16.49	30.00	-13.51
0111-20	5630	126	16.54	16.59	19.58	23.98	-4.40	-3.30	16.28	30.00	-13.72
	5710	142	16.98	16.63	19.82	23.98	-4.16	-3.30	16.52	30.00	-13.48
UNII-3	5755	151	16.54	16.85	19.71	30.00	-10.29	-3.45	16.26	36.00	-19.74
UNII-5	5795	159	16.45	16.65	19.56	30.00	-10.44	-3.45	16.11	36.00	-19.89
UNII-4	5835	167	16.37	16.55	19.47	-	-	-3.45	16.02	30.00	-13.98
UNII-4	5875	175	16.75	16.91	19.84	-	-	-3.66	16.18	30.00	-13.82

Table 7-10. MIMO 40MHz BW 802.11ac (UNII) Maximum Conducted Output Power

	5	GHz WIFI (	40MHz 802.11a	ax MIMO)		Conducted	Conducted	Directional			
Band	Freq	Channel	Avg. Co	nducted Power	s [dBm]	Power Limit	Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	[MHz]		ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
UNII-1	5190	38	10.55	10.87	13.72	23.98	-10.26	-2.96	10.76	30.00	-19.24
UNII-1	5230	46	10.07	10.70	13.41	23.98	-10.57	-2.96	10.45	30.00	-19.55
UNII-2A	5270	54	10.37	10.51	13.45	23.98	-10.53	-3.24	10.21	30.00	-19.79
UNII-ZA	5310	62	10.63	10.85	13.75	23.98	-10.23	-3.24	10.51	30.00	-19.49
	5510	102	10.24	10.41	13.34	23.98	-10.64	-3.30	10.04	30.00	-19.96
UNII-2C	5590	118	10.76	10.81	13.80	23.98	-10.18	-3.30	10.50	30.00	-19.50
0111-20	5630	126	10.41	10.66	13.55	23.98	-10.43	-3.30	10.25	30.00	-19.75
	5710	142	10.98	10.73	13.87	23.98	-10.11	-3.30	10.57	30.00	-19.43
UNII-3	5755	151	10.45	10.84	13.66	30.00	-16.34	-3.45	10.21	36.00	-25.79
UNII-5	5795	159	10.31	10.70	13.52	30.00	-16.48	-3.45	10.07	36.00	-25.93
UNII-4	5835	167	10.34	10.65	13.51	-	-	-3.45	10.06	30.00	-19.94
0111-4	5875	175	10.22	10.53	13.39	-	-	-3.66	9.72	30.00	-20.28

Table 7-11. MIMO 40MHz BW 802.11ax (UNII) Maximum Conducted Output Power

	Ę	GHz WIFI (	80MHz 802.11a	ac MIMO)		Conducted	Conducted	Directional			
Band	Band Freq Channel		Avg. Co	nducted Power	s [dBm]	Power Limit	Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	IMHZ		ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
UNII-1	5210	42	15.39	15.87	18.65	23.98	-5.33	-2.96	15.69	30.00	-14.31
UNII-2A	5290	58	15.49	15.70	18.61	23.98	-5.37	-3.24	15.37	30.00	-14.63
	5530	106	15.07	15.57	18.34	23.98	-5.64	-3.30	15.04	30.00	-14.96
UNII-2C	5610	122	15.49	15.80	18.66	23.98	-5.32	-3.30	15.36	30.00	-14.64
	5690	138	15.47	15.30	18.40	23.98	-5.58	-3.30	15.10	30.00	-14.90
UNII-3	5775	155	15.68	15.94	18.82	30.00	-11.18	-3.45	15.37	36.00	-20.63
UNII-4	5885	171	15.44	15.64	18.55	-	-	-3.45	15.10	30.00	-14.90

Table 7-12. MIMO 80MHz BW 802.11ac (UNII) Maximum Conducted Output Power

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	5GHz WIFI (80MHz 802.11ax MIMO)					Conducted	Conducted	Directional			
Band Freq [MHz]		Channel	Avg. Co	nducted Power	s [dBm]		Power Margin	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	IMHZ		ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
UNII-1	5210	42	10.41	10.59	13.51	23.98	-10.47	-2.96	10.55	30.00	-19.45
UNII-2A	5290	58	10.46	10.78	13.63	23.98	-10.35	-3.24	10.39	30.00	-19.61
	5530	106	10.25	10.56	13.42	23.98	-10.56	-3.30	10.12	30.00	-19.88
UNII-2C	5610	122	10.41	10.20	13.32	23.98	-10.66	-3.30	10.02	30.00	-19.98
	5690	138	10.61	10.45	13.54	23.98	-10.44	-3.30	10.24	30.00	-19.76
UNII-3	5775	155	10.78	10.96	13.88	30.00	-16.12	-3.45	10.43	36.00	-25.57
UNII-4	5885	171	10.31	10.40	13.37	-	-	-3.45	9.92	30.00	-20.08

## Table 7-13. MIMO 80MHz BW 802.11ax (UNII) Maximum Conducted Output Power

	5	GHz WIFI (*	160MHz 802.11	ac MIMO)		Conducted	Conducted	Directional			
Band	Freq [MHz]	Channel	Avg. Co	Avg. Conducted Powers [dBm]		Power Limit	Power Margin		Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	livitizi		ANT1	ANT2	MIMO	[dBm]	[dB]	[dBi]			
	5250	50	14.89	14.01	17.48	23.98	-6.50	-2.96	14.52	30.00	-15.48
	5570	114	14.62	14.08	17.37	23.98	-6.61	-3.30	14.07	30.00	-15.93
	5815	163	14.85	13.67	17.31	30.00	-12.69	-3.45	13.86	30.00	-16.14

# Table 7-14. MIMO 160MHz BW 802.11ac (UNII) Maximum Conducted Output Power

	50	GHz WIFI (*	160MHz 802.11	ax MIMO)		Conducted	Conducted	Directional			
Band	Freq [MHz]	Channel	Avg. Co	Avg. Conducted Powers [dBm]			Power Margin [dB]	Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
	[IVIHZ]		ANT1	ANT2	MIMO	[dBm]	[aB]	[dBi]			
	5250	50	10.98	10.08	13.56	23.98	-10.42	-2.96	10.60	30.00	-19.40
	5570	114	10.99	10.40	13.72	23.98	-10.26	-3.30	10.42	30.00	-19.58
	5815	163	10.99	10.01	13.54	30.00	-16.46	-3.45	10.09	30.00	-19.91

Table 7-15. MIMO 160MHz BW 802.11ax (UNII) Maximum Conducted Output Power

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#### Note:

Per ANSI C63.10-2013 and KDB 662911 v02r01 Section E)1), the conducted powers at Antenna 1 and Antenna 2 were first measured separately during MIMO transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Per ANSI C63.10-2013 Section 14.4.3, the directional gain is calculated using the following formula, where  $G_N$  is the gain of the nth antenna and  $N_{ANT}$ , the total number of antennas used.

Directional gain = 
$$10 \log[(10^{G_{1/20}} + 10^{G_{2/20}} + ... + 10^{G_{N/20}})^2 / N_{ANT}] dBi$$

## Sample MIMO Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average conducted output power was measured to be 16.27 dBm for Antenna 1 and 16.56 dBm for Antenna 2.

Antenna 1 + Antenna 2 = MIMO

(16.27dBm + 16.56 dBm) = (42.36 mW + 45.29 mW) = 87.65 mW = 19.43 dBm

### Sample e.i.r.p Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average MIMO conducted power was calculated to be 19.43 dBm with directional gain of -2.96 dBi.

e.i.r.p. (dBm) = Conducted Power (dBm) + Ant gain (dBi)

19.43 dBm + -2.96 dBi = 16.47 dBm

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# 7.5 Maximum Power Spectral Density

## Test Overview and Limit

The spectrum analyzer was connected to the antenna terminal while the EUT was operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013, and at the appropriate frequencies. Method SA-2, as defined in ANSI C63.10-2013, was used to measure the power spectral density.

### The output power density limits are as specified in the tables below.

UNII	Frequency Range	Maximum Conducted Power Limit
Band	Thequency Range	FCC
UNII 1	5.15 – 5.25GHz	
UNII 2A	5.25 – 5.35GHz	11dBm/MHz
UNII 2C	5.47 – 5.725GHz	
UNII 3	5.725 – 5.850GHz	30dBm/500kHz
UNII 4	5.850 – 5.895GHz	14dBm/MHz e.i.r.p

### Test Procedure Used

ANSI C63.10-2013 – Section 12.3.2.3 (Method SA-2) ANSI C63.10-2013 – Section 14.3.2.2 Measure-and-Sum Technique

### **Test Settings**

- 1. Analyzer was set to the center frequency of the UNII channel under investigation
- 2. Span was set to encompass the entire emission bandwidth of the signal
- 3. RBW = 1MHz
- 4. VBW = 3MHz
- 5. Number of sweep points  $\geq 2 \times (\text{span/RBW})$
- 6. Sweep time = auto
- 7. Detector = power averaging (RMS)
- 8. Trigger was set to free run for all modes
- 9. Trace was averaged over 100 sweeps
- 10. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

#### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-4. Test Instrument & Measurement Setup

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# Summed MIMO Power Spectral Density Measurements

				Antenna 1	Antenna 2		MIMO		
	Frequency [MHz]	Channel	802.11 MODE	PSD	PSD		Summed PSD	Max PSD [dBm]	Margin [dB]
			IVIODE	[dBm]	[dBm]		[dBm]		
	5180	36	а	6.21	5.42	0.11	8.95	11.00	-2.05
	5200 5240	40 48	a	5.56 5.11	5.43 5.39	0.11	8.62 8.37	11.00	-2.38 -2.63
	5180	36	n	5.64	5.00	0.22	8.56	11.00	-2.44
	5200	40	n	5.40	5.18	0.22	8.52	11.00	-2.48
	5240	48	n	5.11	5.40	0.22	8.49	11.00	-2.51
	5180	36	ас	5.98	5.66	0.22	9.05	11.00	-1.95
	5200	40	ac	5.77	5.62	0.22	8.93	11.00	-2.07
1	5240	48	ac	5.31	5.36	0.22	8.56	11.00	-2.44 -8.16
Band 1	5180 5200	36 40	ax SU ax SU	0.20 -0.78	-1.16 -0.77	0.26	2.84 2.50	11.00 11.00	-8.50
-	5240	48	ax SU	-1.27	-0.55	0.26	2.38	11.00	-8.62
	5190	38	n	2.38	2.17	0.42	5.70	11.00	-5.30
	5230	46	n	1.34	2.01	0.42	5.12	11.00	-5.88
	5190	38	ас	2.35	2.41	0.41	5.80	11.00	-5.20
	5230	46	ac	1.42	2.34	0.41	5.33	11.00	-5.67
	5190	38	ax SU	-4.15	-4.08	0.45	-0.65	11.00	-11.65
	5230 5210	46 42	ax SU ac	-4.78 -2.57	-3.93 -2.69	0.45	-0.87 0.82	11.00 11.00	-11.87 -10.18
	5210	42	ac ax SU	-2.57	-2.69	0.44	-3.24	11.00	-10.18
PL	5250	50	ac	-5.58	-3.76	0.40	-3.24	11.00	-14.24
Band 1/2 A	5250	50	ax SU	-10.43	-8.00	0.31	-5.73	11.00	-16.73
	5260	52	а	5.23	5.51	0.11	8.49	11.00	-2.51
	5280	56	а	5.36	5.38	0.11	8.49	11.00	-2.51
	5320	64	а	5.40	5.62	0.11	8.63	11.00	-2.37
	5260	52	n	5.01	5.02	0.22	8.25	11.00	-2.75
	5280 5320	56 64	n	4.81 5.57	5.26 5.85	0.22	8.27 8.94	11.00 11.00	-2.73 -2.06
	5260	52	ac	5.78	5.69	0.22	8.94	11.00	-2.00
	5280	56	ac	5.46	5.57	0.22	8.75	11.00	-2.25
	5320	64	ac	5.42	5.90	0.22	8.89	11.00	-2.11
Band 2 A	5260	52	ax SU	-0.95	-0.84	0.26	2.38	11.00	-8.62
Ban	5280	56	ax SU	-1.02	-0.95	0.26	2.29	11.00	-8.71
_	5320	64	ax SU	-0.97	-0.76	0.26	2.41	11.00	-8.59
	5270	54	n	1.82	1.96	0.42	5.32	11.00	-5.68
	5310	62	n	1.67	2.55	0.42	5.56	11.00	-5.44
	5270 5310	54 62	ac	2.02 1.70	2.50 2.49	0.41	5.69 5.53	11.00 11.00	-5.31 -5.47
	5270	54	ax SU	-4.79	-4.16	0.41	-1.00	11.00	-12.00
	5310	62	ax SU	-4.03	-3.64	0.45	-0.37	11.00	-11.37
	5290	58	ас	-2.50	-2.79	0.44	0.80	11.00	-10.20
	5290	58	ax SU	-6.83	-6.93	0.46	-3.41	11.00	-14.41
	5500	100	а	4.80	5.37	0.11	8.21	11.00	-2.79
	5600	120	a	5.46	4.61	0.11	8.18	11.00	-2.82
	5720 5500	144 100	a n	5.16 4.92	4.25 5.29	0.11 0.22	7.85 8.34	11.00 11.00	-3.15 -2.66
	5600	100	n	5.03	4.13	0.22	7.83	11.00	-2.00
	5720	144	n	5.31	4.08	0.22	7.83	11.00	-3.03
	5500	100	ас	5.14	5.74	0.22	8.68	11.00	-2.32
	5600	120	ac	4.99	4.30	0.22	7.89	11.00	-3.11
	5720	144	ас	4.80	3.60	0.22	7.47	11.00	-3.53
	5500	100	ax SU	-1.12	-1.36	0.26	2.03	11.00	-8.97
	5600	120	ax SU	-1.07	-2.48	0.26	1.55	11.00	-9.45
	5720 5510	144 102	ax SU n	-1.42 1.34	-3.06 2.27	0.26	1.11 5.26	11.00 11.00	-9.89 -5.74
SC	5590	102	n	1.93	1.31	0.42	5.06	11.00	-5.94
Band 2C	5710	142	n	2.33	1.39	0.42	5.32	11.00	-5.68
Ba	5510	102	ac	1.16	1.95	0.41	4.99	11.00	-6.01
	5590	118	ас	2.49	1.49	0.41	5.44	11.00	-5.56
	5710	142	ac	2.36	1.53	0.41	5.38	11.00	-5.62
	5510	102	ax SU	-4.02	-3.46	0.45	-0.27	11.00	-11.27
	5590 5710	118	ax SU	-4.34	-3.92	0.45	-0.66	11.00	-11.66
	5710 5530	142 106	ax SU ac	-3.61 -3.33	-4.15 -3.40	0.45	-0.41 0.09	11.00 11.00	-11.41 -10.91
	5610	100	ac	-3.14	-3.40	0.44	0.09	11.00	-10.91
	5690	138	ac	-2.61	-4.19	0.44	0.11	11.00	-10.88
	5530	106	ax SU	-7.58	-6.99	0.46	-3.81	11.00	-14.81
		122	ax SU	-7.34	-7.81	0.46	-4.10	11.00	-15.10
	5610	122	ux 50						
	5690	138	ax SU	-6.78	-8.67	0.46	-4.15	11.00	-15.15
						0.46 0.40 0.31	-4.15 -1.36 -5.99	11.00 11.00 11.00	-15.15 -12.36 -16.99

## Table 7-16. Bands 1, 2A, 2C MIMO Conducted Power Spectral Density Measurements

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	Frequency [MHz]	Channel	802.11 MODE	Antenna 1 PSD [dBm]	Antenna 2 PSD [dBm]		MIMO Summed PSD [dBm]	Max PSD [dBm]	Margin [dB]
	5745	149	а	1.85	1.36	0.11	4.73	28.28	-23.55
	5785	157	а	2.18	1.21	0.11	4.84	28.28	-23.44
	5825	165	а	2.04	1.16	0.11	4.74	28.28	-23.54
	5745	149	n	1.39	0.82	0.22	4.34	28.28	-23.94
	5785	157	n	2.35	1.20	0.22	5.04	28.28	-23.24
	5825	165	n	1.82	0.73	0.22	4.54	28.28	-23.74
	5745	149	ac	1.57	1.27	0.22	4.66	28.28	-23.62
	5785	157	ac	1.48	0.75	0.22	4.36	28.28	-23.92
	5825	165	ac	2.12	1.18	0.22	4.91	28.28	-23.37
Band 3	5745	149	ax SU	-4.32	-5.42	0.26	-1.56	28.28	-29.84
Bar	5785	157	ax SU	-4.44	-5.36	0.26	-1.61	28.28	-29.89
	5825	165	ax SU	-3.86	-5.18	0.26	-1.20	28.28	-29.48
	5755	151	n	-1.17	-1.40	0.42	2.15	28.28	-26.13
	5795	159	n	-0.80	-1.82	0.42	2.15	28.28	-26.13
	5755	151	ас	-0.69	-1.32	0.41	2.43	28.28	-25.85
	5795	159	ас	-0.95	-1.63	0.41	2.14	28.28	-26.14
	5755	151	ax SU	-6.64	-6.51	0.45	-3.11	28.28	-31.39
	5795	159	ax SU	-6.05	-6.78	0.45	-2.94	28.28	-31.22
	5775	155	ac	-5.41	-6.53	0.44	-2.48	28.28	-30.76
	5775	155	ax SU	-10.57	-10.93	0.46	-7.28	28.28	-35.56

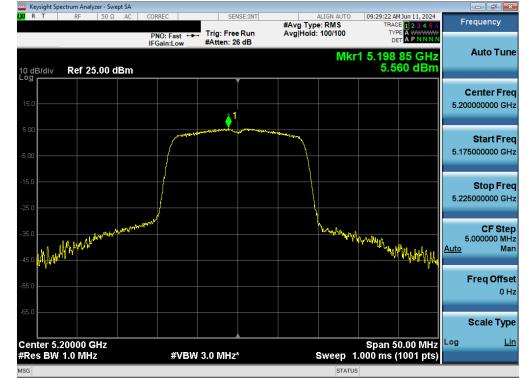
Table 7-17. Band 3 MIMO Conducted Power Spectral Density Measurements

	Frequency [MHz]	Channel	802.11 MODE	Antenna 1 PSD [dBm]	Antenna 2 PSD [dBm]	MIMO Summed PSD [dBm]	Directional Antenna Gain [dBi]	DCCF [dB]	EIRP PSD [dBm]	Max EIRP PSD [dBm]	Margin [dB]
and 3/4	5845	169	а	4.72	4.13	7.45	-3.75	0.11	3.81	14.00	-10.19
Band 4	5865	173	а	5.06	4.07	7.60	-3.75	0.11	3.96	14.00	-10.04
Danu 4	5885	177	а	5.21	3.61	7.50	-3.75	0.11	3.86	14.00	-10.14
and 3/4	5845	169	n	4.59	3.75	7.20	-3.75	0.22	3.67	14.00	-10.33
Band 4	5865	173	n	4.84	3.56	7.26	-3.75	0.22	3.73	14.00	-10.27
Danu 4	5885	177	n	4.93	3.24	7.18	-3.75	0.22	3.65	14.00	-10.35
and 3/4	5845	169	ас	4.58	3.65	7.15	-3.75	0.22	3.62	14.00	-10.38
Band 4	5865	173	ас	4.79	3.65	7.27	-3.75	0.22	3.74	14.00	-10.26
Danu 4	5885	177	ас	4.81	3.64	7.27	-3.75	0.22	3.74	14.00	-10.26
and 3/4	5845	169	ax SU	-1.75	-2.93	0.71	-3.75	0.26	-2.78	14.00	-16.78
Band 4	5865	173	ax SU	-1.44	-2.62	1.02	-3.75	0.26	-2.47	14.00	-16.47
Danu 4	5885	177	ax SU	-1.63	-2.77	0.85	-3.75	0.26	-2.64	14.00	-16.64
and 3/4	5835	167	n	1.54	0.66	4.13	-3.75	0.42	0.80	14.00	-13.20
Band 4	5875	175	n	2.20	0.86	4.59	-3.75	0.42	1.26	14.00	-12.74
and 3/4	5835	167	ac	1.39	1.09	4.25	-3.75	0.41	0.91	14.00	-13.09
Band 4	5875	175	ac	2.16	1.41	4.81	-3.75	0.41	1.47	14.00	-12.53
and 3/4	5835	167	ax SU	-4.52	-5.25	-1.86	-3.75	0.45	-5.16	14.00	-19.16
Band 4	5875	175	ax SU	-4.11	-5.59	-1.77	-3.75	0.45	-5.08	14.00	-19.08
	5855	171	ас	-3.81	-4.35	-1.07	-3.75	0.44	-4.38	14.00	-18.38
Band 3/4	5855	171	ax SU	-7.47	-9.14	-5.22	-3.75	0.46	-8.51	14.00	-22.51
band 3/4	5815	163	ас	-6.16	-4.24	-2.09	-3.75	0.44	-5.40	14.00	-19.40
	5815	163	ax SU	-10.15	-7.06	-5.33	-3.75	0.46	-8.62	14.00	-22.62

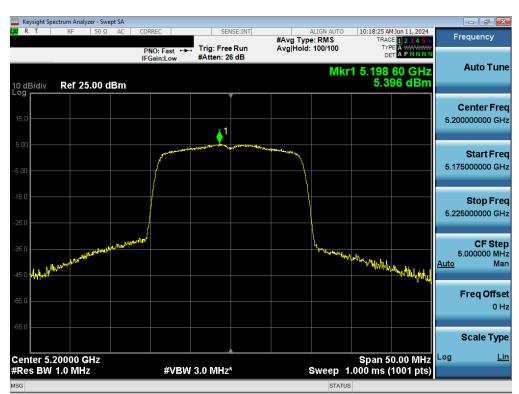
Table 7-18. Bands 3/4 MIMO Conducted Power Spectral Density Measurements

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# 7.5.1 MIMO Antenna-1 Power Spectral Density Measurements

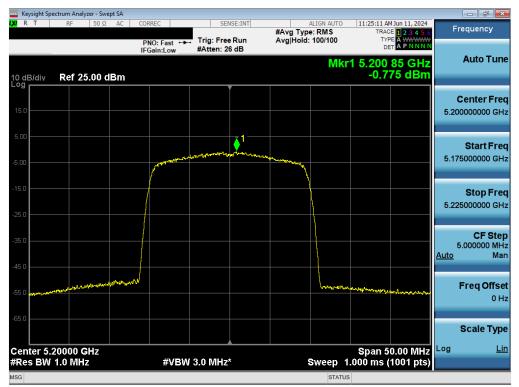


Plot 7-83. Power Spectral Density Plot MIMO ANT1 (802.11a (UNII Band 1) – Ch. 40)

Plot 7-84. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 1) – Ch. 40)

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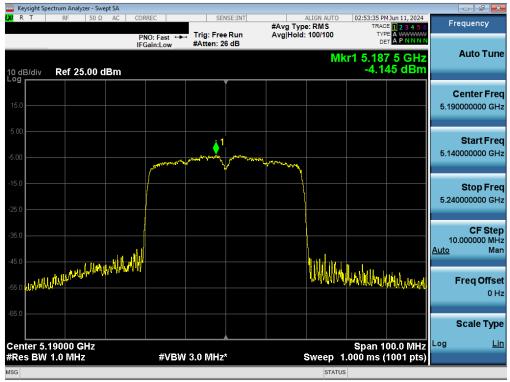
Plot 7-85. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)



Plot 7-86. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

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Plot 7-87. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)



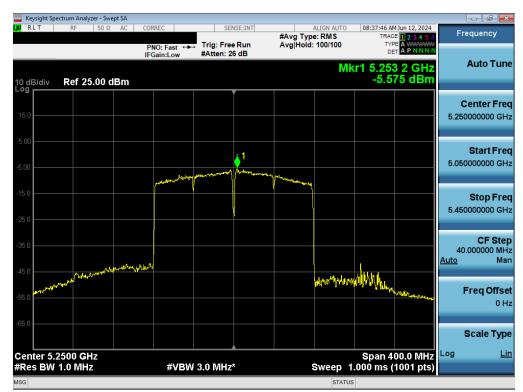
Plot 7-88. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

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Plot 7-89. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



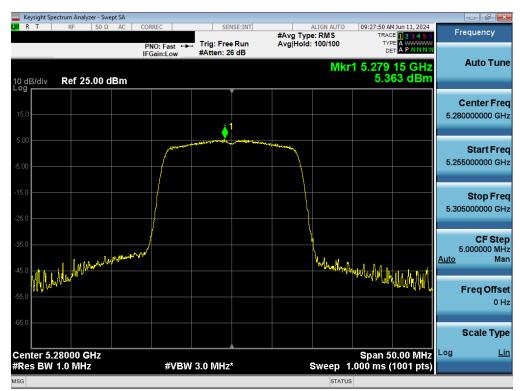
Plot 7-90. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ac (UNII Band 1/2A) - Ch. 50)

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Plot 7-91. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 1/2A) - Ch. 50)



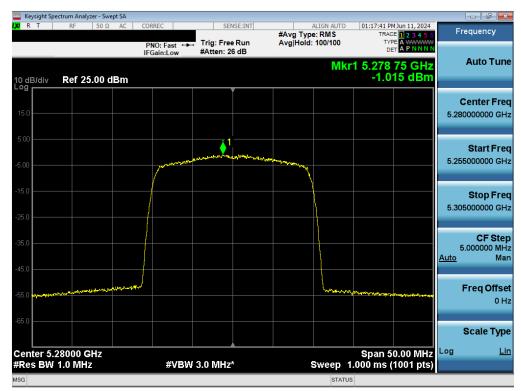
Plot 7-92. Power Spectral Density Plot MIMO ANT1 (802.11a (UNII Band 2A) - Ch. 56)

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Plot 7-93. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)



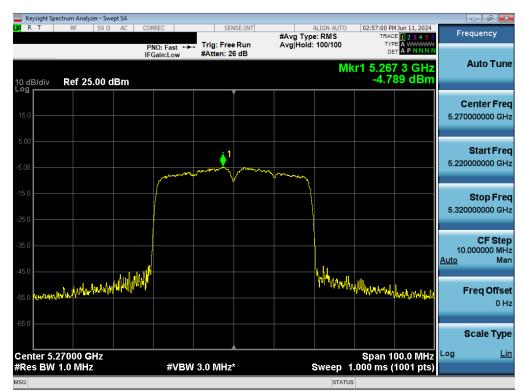
Plot 7-94. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)

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Plot 7-95. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



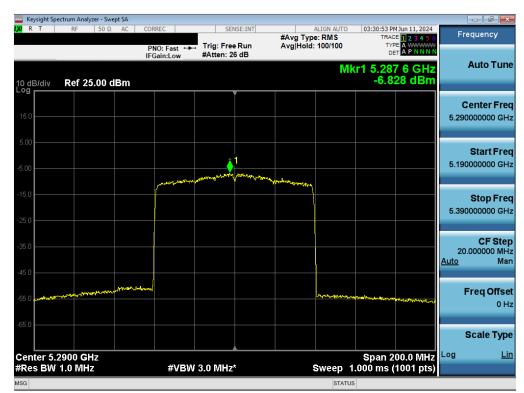
Plot 7-96. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)

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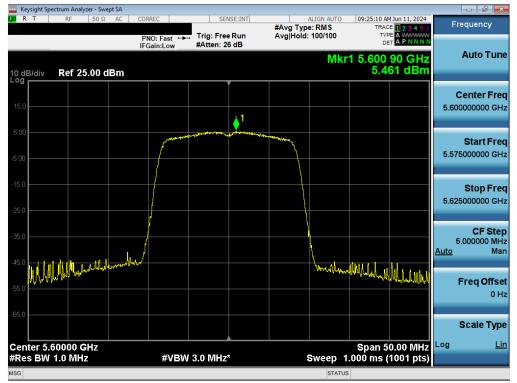
Plot 7-97. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



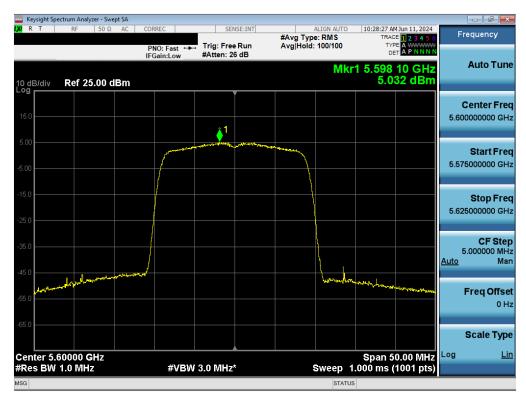
Plot 7-98. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

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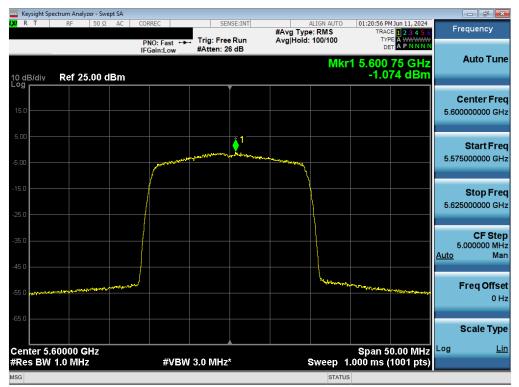
Plot 7-99. Power Spectral Density Plot MIMO ANT1 (802.11a (UNII Band 2C) - Ch. 120)



Plot 7-100. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 120)

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Plot 7-101. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)



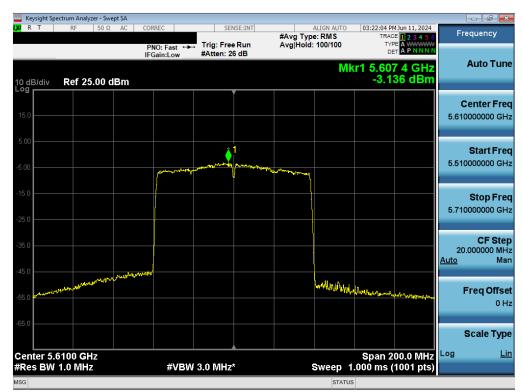
Plot 7-102. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)

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Plot 7-103. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)



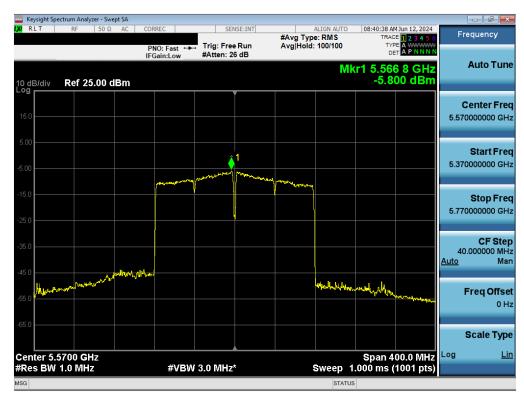
Plot 7-104. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMX828U	MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-105. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 122)



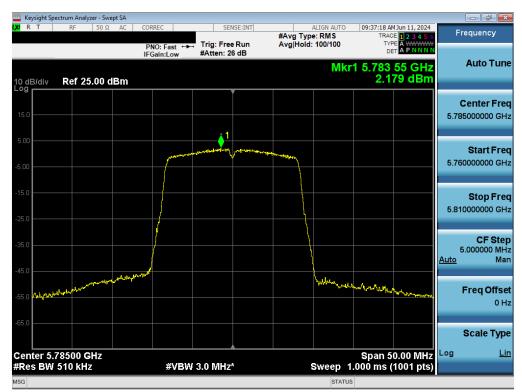
Plot 7-106. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ac (UNII Band 2C) - Ch. 114)

FCC ID: A3LSMX828U		MEASUREMENT REPORT	
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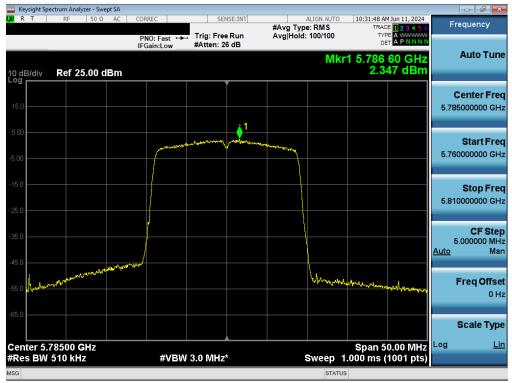
Plot 7-107. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 2C) - Ch. 114)



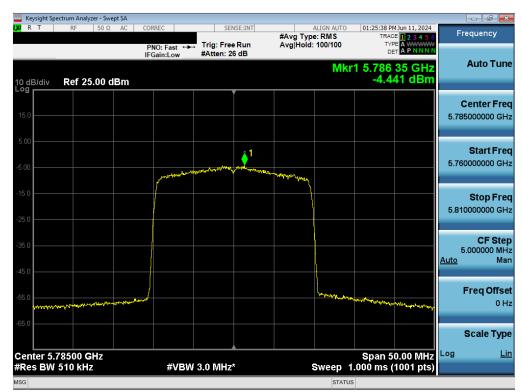
Plot 7-108. Power Spectral Density Plot MIMO ANT1 (802.11a (UNII Band 3) - Ch. 157)

FCC ID: A3LSMX828U	MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-109. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 3) - Ch. 157)



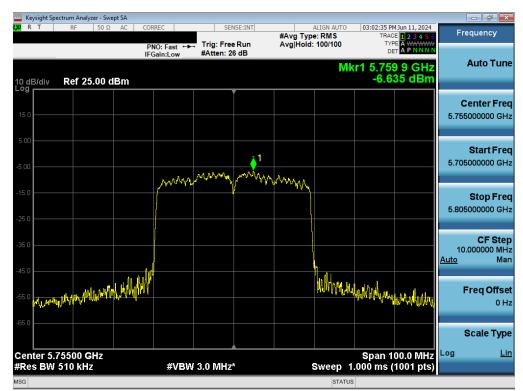
Plot 7-110. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 3) - Ch. 157)

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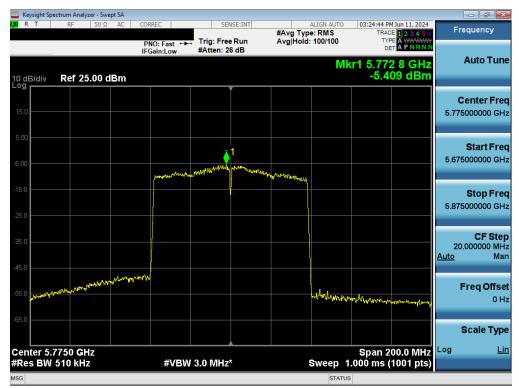
Plot 7-111. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 3) - Ch. 151)



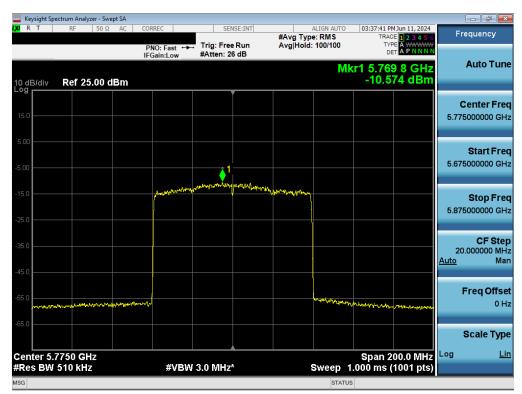
Plot 7-112. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 3) - Ch. 151)

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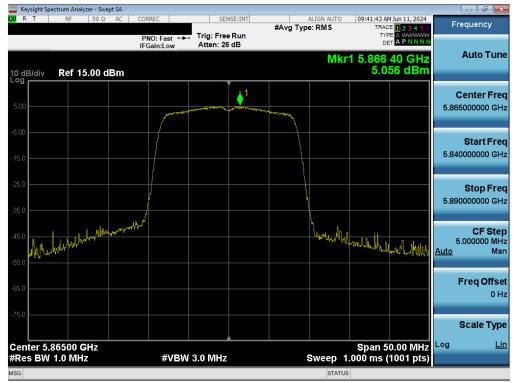
Plot 7-113. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 3) - Ch. 155)



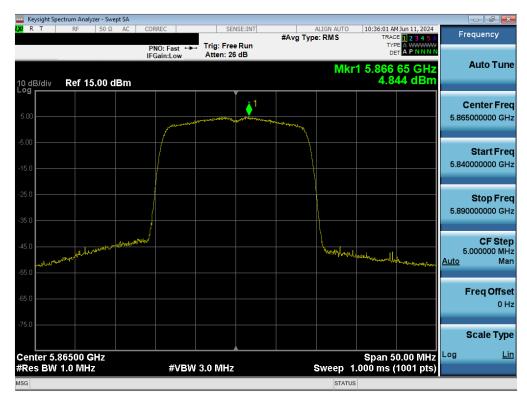
Plot 7-114. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 3) - Ch. 155)

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Plot 7-115. Power Spectral Density Plot MIMO ANT1 (802.11a (UNII Band 4) - Ch. 173)



Plot 7-116. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 4) - Ch. 173)

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