

ELEMENT WASHINGTON DC LLC

7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.381.1520 http://www.element.com

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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:

3/4 - 5/30/2023 **Test Report Issue Date:** 8/7/2023 **Test Site/Location:** Element lab., Columbia, MD, USA **Test Report Serial No.:** 1M2304260059-12-R3.A3L

FCC ID:

A3LSMF731JPN

Certification SC-54D

APPLICANT:

Samsung Electronics Co., Ltd.

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

SCG23 Portable Handset 5180 – 5925MHz OFDM Unlicensed National Information Infrastructure TX (NII) Part 15 Subpart E (15.407) ANSI C63.10-2013, KDB 789033 D02 v02r01, KDB 291074 D02 v01, KDB 648474 D03 v01r04, KDB 662911 D01 v02r01

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.

Note: This revised Test Report (S/N: 1M2304260059-12-R3.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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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	Ohannal		MI	MO
UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Max. Power (mW)	Max. Power (dBm)
1		5180 - 5240	78.343	18.94
2A		5260 - 5320	76.913	18.86
2C	20	5500 - 5720	79.433	19.00
3		5745 - 5825	76.913	18.86
4		5845 - 5885	35.318	15.48
1		5190 - 5230	62.661	17.97
2A		5270 - 5310	62.661	17.97
2C	40	5510 - 5710	62.951	17.99
3		5755 - 5795	62.373	17.95
4		5835 - 5875	28.774	14.59
1		5210	47.534	16.77
2A		5290	46.881	16.71
2C	80	5530 - 5690	48.641	16.87
3		5775	48.641	16.87
4		5855	21.330	13.29
1		5250	38.459	15.85
2C	160	5570	38.459	15.85
4		5815	16.749	12.24
		EUT Overview		

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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PRODUCT INFORMATION 2.0

2.1 **Equipment Description**

The Equipment Under Test (EUT) is the Samsung Portable Handset FCC ID: A3LSMF731JPN. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

Test Device Serial No.: 0084M, 0097M, 0091M, 0032M, 0096M

2.2 Device Capabilities

This device contains the following capabilities:

Ch.

54

.

62

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

	Band 1		Band 2A		Band 2C		Band 3		Band 3/4
Ch.	Frequency (MHz)								
36	5180	52	5260	100	5500	149	5745	169	5845
:	:	:	:	:	:	:	:	:	:
40	5200	56	5280	120	5600	157	5785	173	5865
:	:	:	:	:	:	:	:	:	:
48	5240	64	5320	144	5720	165	5825	177	5885
48	5240	_			5720			177	5885

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

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

Band 2A		
Frequency (MHz)		Ch.
5270		102
:		•
5310		118
	-	

	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

5875

175

Table 2-2. 802.11ax (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	171	5855
	·			:	:	•		•	
				122	5610				
				:	:				
				138	5690				

	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 11ax (160MHz BW) Frequency / Channel Operations								

ble 2-4. 802.11ax (160MHz BW) Frequency / Channel Operations

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Notes:

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:

Maximum Achievable Duty Cycles									
		MIMO							
802.11 N	/lode/Band	Duty	DCCF						
		Cycle [%]	[dB]						
	а	96.68	0.15						
	n (HT20)	98.11	N/A						
	ac (HT20)	98.16	N/A						
	ax (HE20)	99.74	N/A						
	n (HT40)	98.09	N/A						
5GHz	ac (HT40)	96.21	0.17						
	ax (HE40)	99.78	N/A						
	ac (HT80)	92.59	0.33						
	ax (HE80)	99.78	N/A						
	ac (HT160)	92.61	0.33						
	ax (HE160)	99.78	N/A						

Table 2-5. Measured Duty Cycles

A duty cycle correction factor was applied to RMS measurements for transmission modes with <98% duty cycle.

Example DCCF Calculation: DCCF = $10\log(1/DC) = 10\log(1/0.9668) = 0.1464$

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

	nfigurations	SI	SO	SE	DM	CDD		
	ANT1	ANT2	ANT1	ANT2	ANT1	ANT2		
	11a	×	×	×	×	~	✓	
	11n	×	×	✓	✓	✓	✓	
5GHz	11ac	×	×	✓	✓	~	√	
	11ax	×	×	✓	✓	✓	✓	

Table 2-6. Antenna / Technology Configuration

 \checkmark = Support ; * = 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	ACS Inde	x	Spatial	Spatial OFDM (802.11n/802.11ac)					OFDM (8	302.11ac)		OFDM (802.11ax)											
20MHz	1			Stream	20N	ИHz	401	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 GI	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

2.3 Antenna Description

The following antenna gains were used for the testing.

Frequency [GHz]	Antenna 1 Gain (dBi)	Antenna 2 Gain (dBi)	Directional Gain (dBi)
5.20	-4.49	-6.34	-2.36
5.30	-4.51	-5.72	-2.08
5.50	-5.66	-6.74	-3.17
5.80	-5.92	-7.38	-3.61
5.85	-5.78	-6.96	-3.34

Table 2-7. Supported Data Rates

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.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

This device supports three configurations: one is with screen open; one is where the screen is half open (90 degrees), and one is with the screen closed. All configurations are tested, and the worst case radiated emissions data is shown in this report.

2.5 Software and Firmware

The test was conducted with software/firmware version F731USQU0AWD7 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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Table 2-8. Antenna Peak Gain



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 measurement procedure......None

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
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	NMLC-2	Line Conducted Emissions Cable (NM)	1/11/2023	Annual	1/11/2024	NMLC-2
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9203-2178
EMCO	3116	Horn Antenna (18-40GHz)	7/20/2021	Biennial	7/20/2023	9704-5182
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	8/18/2022	Annual	8/18/2023	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer	9/6/2022	Annual	9/6/2023	MY55410501
Keysight Technologies	N9038A	MXE EMI Receiver	1/21/2022	Annual	6/21/2023	MY51210133
Sunol Sciences	DRH-118	Horn (Small)	2/14/2022	Biennial	2/14/2024	A102416-2
Sunol Sciences	JB5	Bi-Log Antenna (30M-5GHz)	8/30/2022	Biennial	8/30/2024	A102416-1
Sunol Sciences	DRH-118	Horn Antenna (1-18GHz)	7/14/2021	Biennial	7/14/2023	A051107
Rohde & Schwarz	ESW26	ESW26 EMI Test Receiver	5/19/2022	Annual	5/19/2023	161675
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	9/21/2021	Annual	9/21/2023	310233

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:	A3LSMF731JPN
FCC Classification:	Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
N/A	RSS-Gen [6.6]	26dB Bandwidth	N/A		PASS	Section 7.2
15.407(e)	RSS-Gen [6.6]	6dB Bandwidth	>500kHz(5725-5850MHz and 5850 – 5895MHz)		PASS	Section 7.3
15.407 (a)(1)(iv), (a)(2), (a)(3)	RSS-247 [6.2]	Maximum Conducted Output Power	Maximum conducted powers must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])	CONDUCTED	PASS	Section 7.4
15.407 (a)(1)(iv), (a)(2), (a)(3)	RSS-247 [6.2]	Maximum Power Spectral Density	Maximum power spectral density must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		PASS	Section 7.5
15.407(h)	RSS-247 [6.3]	Dynamic Frequency Selection	See DFS Test Report		PASS	See DFS Test Report
15.407(b)(1), (b)(2), (b)(3), (b)(4)	RSS-247 [6.2]	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b) (RSS-247 [6.2])		PASS	Section 7.6
15.205, 15.407(b)(1), (b)(4), (b)(5), (b)(6)	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])	RADIATED	PASS	Section 7.6
15.407	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 (RSS-Gen [8.8]) 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 "UNII Automation," Version 4.7.
- 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

	Frequency	Channel	802.11 Mode	Data Rate [Mbps]	Antenna-1 26dB Bandwidth	Antenna-2 26dB Bandwidth
	[MHz]	No.			[MHz]	[MHz]
	5180	36	а	6	18.79	19.18
	5200	40	а	6	18.59	18.57
	5240	48	а	6	19.67	18.87
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	19.89	20.08
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	20.18	19.64
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	20.25	19.94
	5180	36	ax (20MHz)	6.5/7.2 (MCS0)	20.54	20.64
Band	5200	40	ax (20MHz)	6.5/7.2 (MCS0)	20.29	20.30
Ва	5240	48	ax (20MHz)	6.5/7.2 (MCS0)	20.99	20.26
	5190	38	n (40MHz)	13.5/15 (MCS0)	39.53	39.27
	5230	46	n (40MHz)	13.5/15 (MCS0)	40.33	39.34
	5190	38	ax (40MHz)	13.5/15 (MCS0)	39.81	39.61
	5230	46	ax (40MHz)	. ,	39.97	39.76
	5230	40	. ,	13.5/15 (MCS0)	80.89	80.64
			ac (80MHz)	29.3/32.5 (MCS0)		
7 <	5210	42	ax (80MHz)	29.3/32.5 (MCS0)	80.25	80.46
Band 1/2A	5250	50	ac (160MHz)	58.5/65 (MCS0)	163.50	162.40
<u> </u>	5250	50	ax (160MHz)	58.5/65 (MCS0)	163.60	162.40
	5260	52	а	6	18.34	18.84
	5280	56	а	6	18.45	19.16
	5320	64	а	6	19.43	18.73
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	20.14	19.18
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	20.04	19.93
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	20.21	19.72
2A	5260	52	ax (20MHz)	6.5/7.2 (MCS0)	20.56	20.20
3and 2A	5280	56	ax (20MHz)	6.5/7.2 (MCS0)	20.38	20.72
Bar	5320	64	ax (20MHz)	6.5/7.2 (MCS0)	20.65	20.29
	5270	54	n (40MHz)	13.5/15 (MCS0)	39.39	39.40
-	5310	62	n (40MHz)	13.5/15 (MCS0)	39.94	39.46
	5270	54	ax (40MHz)	13.5/15 (MCS0)	39.95	40.00
	5310	62	ax (40MHz)	13.5/15 (MCS0)	39.87	39.47
5290	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	80.50	80.90
	5290	58	ax (80MHz)	29.3/32.5 (MCS0)	80.70	80.99
	5500	100	a	6	18.64	18.64
	5600	120	a	6	18.82	18.94
	5720	144	a	6	18.37	18.76
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	19.53	19.87
	5600	120	n (20MHz)	6.5/7.2 (MCS0)	20.14	19.60
	5720	120	n (20MHz)	6.5/7.2 (MCS0)	19.94	19.90
	5500	144	ax (20MHz)	6.5/7.2 (MCS0)	20.37	20.47
	5600		. ,	. ,		-
		120	ax (20MHz)	6.5/7.2 (MCS0)	20.52	20.66
	5720	144	ax (20MHz)	6.5/7.2 (MCS0)	20.40	20.53
~	5510	102	n (40MHz)	13.5/15 (MCS0)	39.35	38.93
Band 2C	5590	118	n (40MHz)	13.5/15 (MCS0)	39.56	39.22
anc	5710	142	n (40MHz)	13.5/15 (MCS0)	39.66	39.16
8	5510	102	ax (40MHz)	13.5/15 (MCS0)	39.74	39.86
	5590	118	ax (40MHz)	13.5/15 (MCS0)	40.18	39.73
	5710	142	ax (40MHz)	13.5/15 (MCS0)	39.72	39.76
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	81.43	80.61
	5610	122	ac (80MHz)	29.3/32.5 (MCS0)	80.93	80.76
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	81.04	80.62
	5530	106	ax (80MHz)	29.3/32.5 (MCS0)	80.80	80.83
	5610	122	ax (80MHz)	29.3/32.5 (MCS0)	81.55	81.19
	5690	138	ax (80MHz)	29.3/32.5 (MCS0)	81.29	81.15
	5570	114	ax (160MHz)	29.3/32.5 (MCS0)	163.30	162.70
	5570	114	ax (160MHz)	29.3/32.5 (MCS0)	163.30	162.80
7.0				ted 26dB Bar		

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)



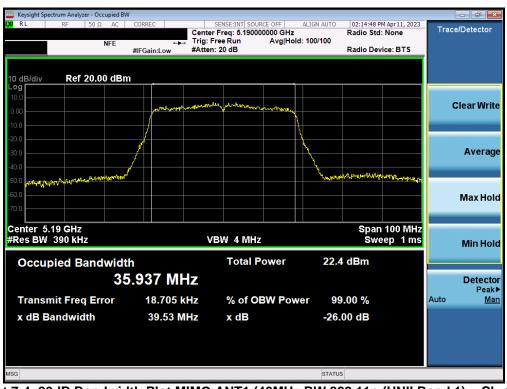
Plot 7-2. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)

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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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Keysight Spectrum Analyzer - Occupied B\	N				
LXX RL RF 50Ω AC		Freq: 5.190000000 GHz ee Run Avg Hold:	Radio Std		Trace/Detector
10 dB/div Ref 20.00 dBr	n				
10.0 0.00	martellanatorumilita	y turn and hall have			Clear Write
-20.0					Average
-50.0 -60.0 -70.0			have the second	ala papila babanan	Max Hold
Center 5.19 GHz #Res BW 390 kHz		W 4 MHz	Swe	100 MHz eep 1 ms	Min Hold
Occupied Bandwidt	th 7.562 MHz	Total Power	22.4 dBm		Detector Peak▶
Transmit Freq Error	27.706 kHz	% of OBW Powe	r 99.00 %		Auto <u>Man</u>
x dB Bandwidth	39.81 MHz	x dB	-26.00 dB		
MSG			STATUS		

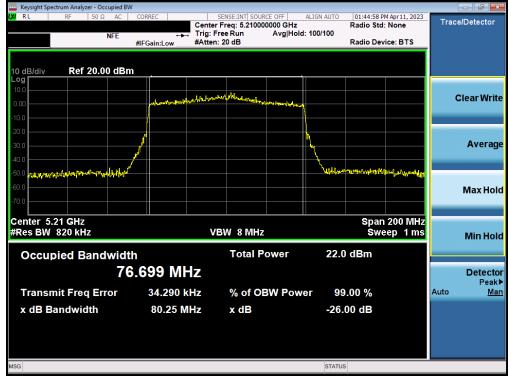
Plot 7-5. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)



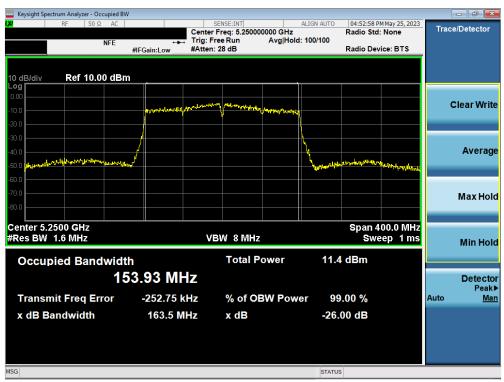
Plot 7-6. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

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



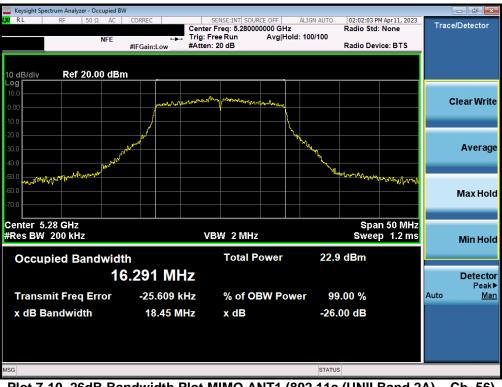
Plot 7-8. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ac (UNII Band 1/2A) - Ch. 50)

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Keysight Spectrum Analyzer - Occupied BV	V				
LXI T RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF		PM Apr 12, 2023	Trace/Detector
		r Freq: 5.250000000 GHz	Radio Sto	l: None	Trace/Delector
NFE		Free Run Avg Hold			
	#IFGain:Low #Atter	n: 26 dB	Radio De	vice: BTS	
10 dB/div Ref 30.00 dBn Log					
20.0					
20.0					Clear Write
10.0					
0.00	and a second and a second and a second	all monor and a shall make			
-10.0					
-20.0	{				Average
					-
-30.0	1		1		
-40.0 Hard wydliwerydwalphereter yn adader	w		Jamesinkal frink frank		
-50.0			and of the state of the	www.www.www.www.	
					Max Hold
-60.0					
Center 5.25 GHz				n 400 MHz	
#Res BW 1.6 MHz	٧	BW 8 MHz	Sw	eep 1 ms	Min Hold
				_	WIIITIOIG
Occupied Bandwidt	h	Total Power	21.9 dBm		
15	55.37 MHz				Detector
					Peak▶
Transmit Freq Error	-163.32 kHz	% of OBW Pow	er 99.00 %		Auto <u>Man</u>
x dB Bandwidth	163.6 MHz	x dB	-26.00 dB		
X dB Bandwidth	103.0 MINZ	XUB	-20.00 dB		
MSG			STATUS		

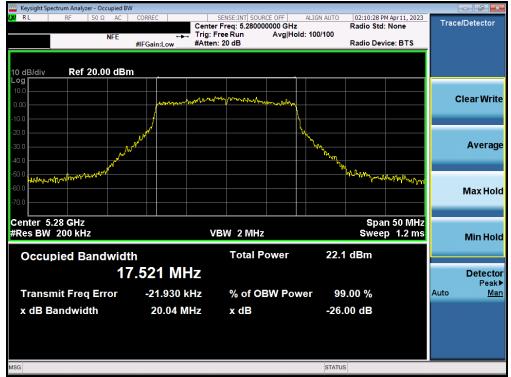
Plot 7-9. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 1/2A) - Ch. 50)



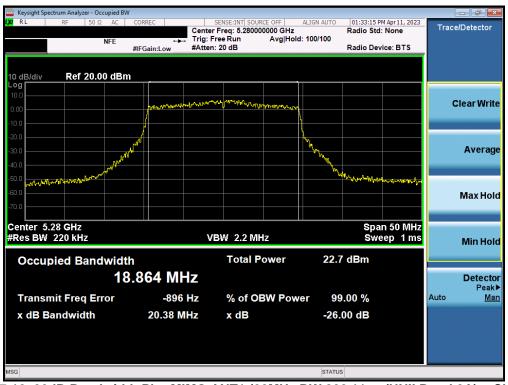
Plot 7-10. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2A) - Ch. 56)

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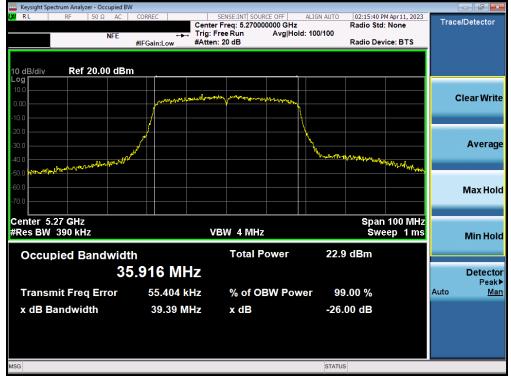
Plot 7-11. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)



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)

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Keysight Spectrum Analyzer - Occupied B\	N					
LXV RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF		02:22:21 PM Apr 1 Radio Std: None		Trace/Detector
NFE	Trig: F	ree Run Avg Hol	ld: 100/100			
	#IFGain:Low #Atten	:: 20 dB	R	Radio Device: B	TS	
10 dB/div Ref 20.00 dBr	n					
Log 10.0						
0.00	and the second for the second second	way when a when the start				Clear Write
			N			
-10.0			N			
-20.0	1		1			
-30.0			\parallel			Average
-40.0			Maria	algorithe the states of the		
-50.0 potential and man provide the second and the			VILT STATE	solated at the second	nen yezhoù	
-60.0						Max Hold
-70.0					_	
Center 5.29 GHz				Onen 200	Dal In	
#Res BW 820 kHz	v	BW 8 MHz		Span 200 Sweep		
	•			onoop		Min Hold
Occupied Bandwidt	th	Total Power	22.4 d	lBm		
	5.186 MHz					Detector
						Peak►
Transmit Freq Error	1.662 kHz	% of OBW Pow	ver 99.0	0 %	AL	ito <u>Man</u>
x dB Bandwidth	80.50 MHz	x dB	-26.00) dB		
			074710			
MSG			STATUS			

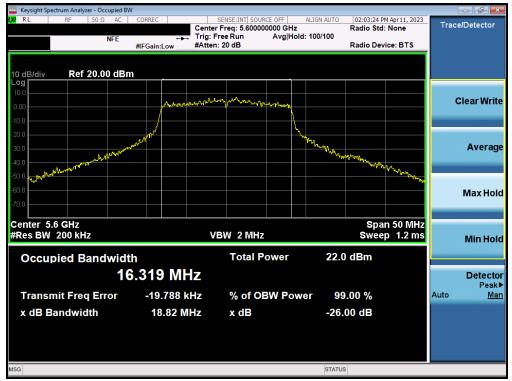
Plot 7-15. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



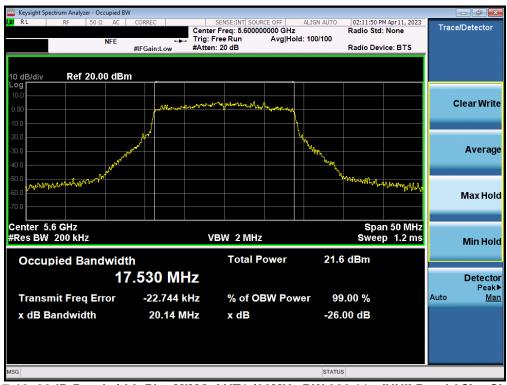
Plot 7-16. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		MEASUREMENT REPORT		Approved by: Technical Manager
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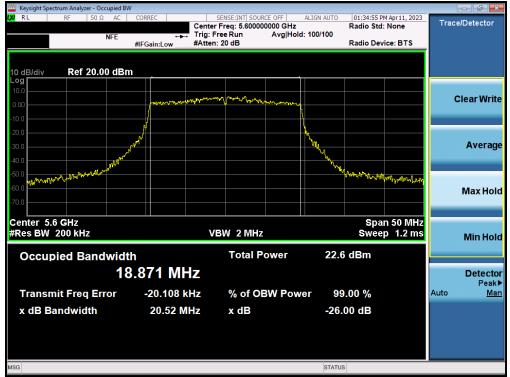
Plot 7-17. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2C) - Ch. 120)



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

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 24 of 152
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Plot 7-19. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)



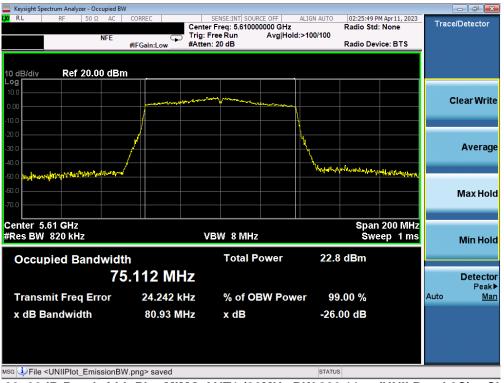
Plot 7-20. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 25 of 152		
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🔤 Keysight Spectrum Analyzer - O								- ē 🔀
LXIRL RF 50 S	Ω AC CORREC		NSE:INT SOURCE OFF	ALIGN AUTO	01:42:39 PM Radio Std:	1 Apr 11, 2023	Trace	/Detector
	NEE			lold: 100/100	Raulo Stu.	None		
	#IFGain	:Low #Atten: 2	20 dB		Radio Devi	ce: BTS		
10 dB/div Ref 20.0	00 dBm							
Log							_	
10.0		un canon Mar Mar	man and the second				c	lear Write
0.00		BYVE WEIGHT	M. augusteration	4 m			Ŭ	
-10.0	<u>/</u>							
-20.0								
-30.0	k			h,				Average
-40.0				\ <u>\</u> .				
50.0 1 . 01. A male	and a start and			Mr. Alle	Mydelen	In Net .		
MIL PARAMAN						. III I YYY WARA		
-60.0								Max Hold
-70.0								
					0			
Center 5.59 GHz #Res BW 390 kHz		VB	W 4 MHz			100 MHz ep 1 ms		
#Res DW 390 RHZ			¥¥ 4 I¥II12		3000	ep mis		Min Hold
Occupied Ban	dwidth		Total Power	22.3	dBm			
Becapica Dan								
	37.663	3 MHZ						Detector Peak▶
Transmit Freg Er	rror 42	.714 kHz	% of OBW Po	wer 99	.00 %		Auto	Peak ► Man
x dB Bandwidth	40	0.18 MHz	x dB	-26.	00 dB			
MSG				STATUS	5			

Plot 7-21. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)



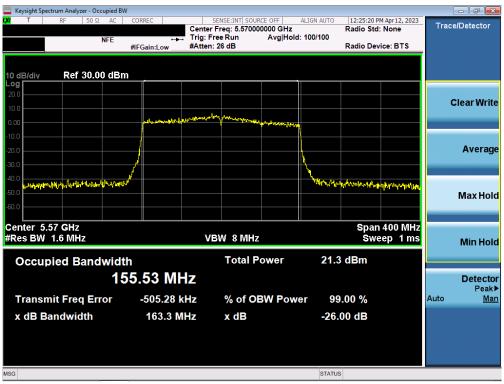
Plot 7-22. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMF731JPN		Approved by: Technical Manager	
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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: A3LSMF731JPN		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dega 27 of 152
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🔤 Keysi	ight Spectru	um Analyz	er - Occi	upied BW										
L <mark>XI</mark> 1	Г	RF	50 Ω	AC	CORREC			NSE:INT SOUP		ALIGN AUTO		M Apr 12, 2023	Tree	e/Detector
								req: 5.57000			Radio Std	: None	Irac	cerDetector
			1	NFE		+	Trig: Free #Atten: 2	e Run	Avg Hold	1: 100/100	Radio Dev	DTC		
					#IFGain:Lo	w	#Atten: 2	6 aB			Radio Dev	ICE: BIS		
10 dB/	diu	Dof	30.00) dBm										
	ul v		30.00											
20.0														
10.0														Clear Write
10.0						_	Manham	phononenon						
0.00					pal privile	an al h	MAN MARCHINE T	1 march and the	um will the second					
-10.0										1				
										l				Average
-20.0 —					1					Ì.				Average
-30.0					-{					, 1				
-40.0					1									
. da	Harrison H	-maighally	MARIA	and an and the	r					Marte Marte	http://www.	Her William Bhat younger		
-50.0														Max Hold
-60.0														
Cente	er 5.57	' GHz									Span	400 MHz		
#Res	BW 1	.6 MH:	z				VB1	N 8 MHz			Swe	ep 1ms		Min Hold
_														Millinoid
00	cupi	ed Ba	and	widt	h			Total P	ower	21.5	dBm			
				15	3.77	MF	IZ							Detector
														Peak►
Tra	ansmi	t Freq	i Erre	or	-500.	.15 k	Hz	% of O	BW Pow	er 99	.00 %		Auto	<u>Man</u>
v d	IB Bar	dwid	lth		162	.3 M	U -7	x dB		-26	00 dB			
~ ~ ~		luwiu			105	.5 1	INZ	X UD		-20.				
MSG										STATUS	5			

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

FCC ID: A3LSMF731JPN		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 20 of 152
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7.2.2 MIMO Antenna-2 26dB Bandwidth Measurements

Keysight Spectrum Analyzer - Occupied BW RI 11:43:59 AM Apr 12, 2023 ALIGN AUTO Trace/Detector Center Freq: 5.20000000 GHz Radio Std: None Avg|Hold: 100/100 Trig: Free Run #Atten: 20 dB Radio Device: BTS #IFGain:Low Ref 20.00 dBm 10 dB/div Log **Clear Write** Average May and the for www. where าเการให้ Max Hold Center 5.2 GHz Span 50 MHz #Res BW 200 kHz VBW 2 MHz Sweep 1.2 ms Min Hold **Occupied Bandwidth** Total Power 21.3 dBm 16.318 MHz Detector Peak Transmit Freq Error -65.043 kHz % of OBW Power 99.00 % Auto Man x dB Bandwidth 18.57 MHz x dB -26.00 dB STATUS

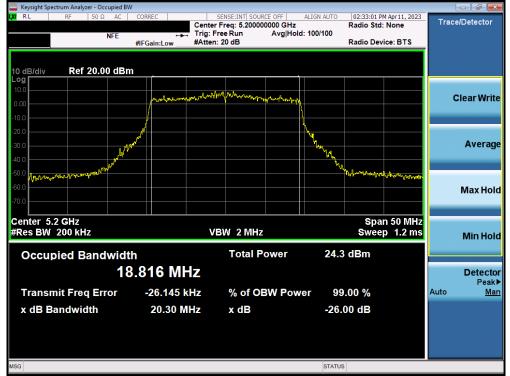




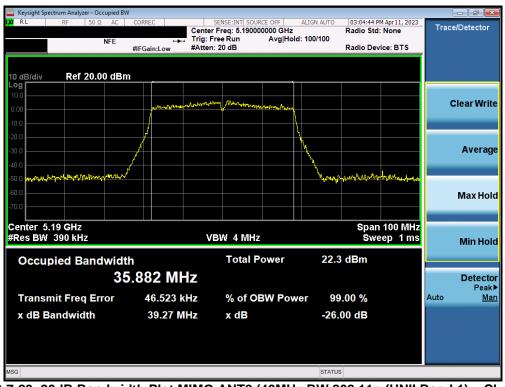
Plot 7-27. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT		
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Plot 7-28. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)



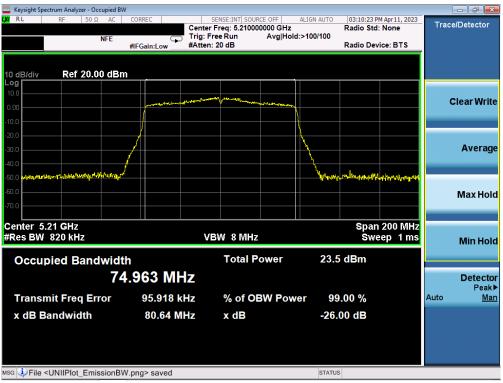
Plot 7-29. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

FCC ID: A3LSMF731JPN		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 20 of 152
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Keysight Spectrum Analyzer - Occupied B	W					×
LXX RL RF 50Ω AC		SENSE:INT SOURCE OFF		8 PM Apr 11, 2023	Trace/Detect	or
NFE		r Freq: 5.190000000 GHz Free Run Avg Hold	Radio St d: 100/100	a: None		
NFE		: 20 dB		evice: BTS		
10 dB/div Ref 20.00 dB	m					
Log						
10.0					01	
0.00	Rysta by Manual gand down	the with an and the book and			Clear W	rite
-10.0						
-20.0						
-30.0			L		Aver	ade
			V		Atti	uge
-40.0			<u>کر</u>			
-50.0 mil			Collor of May any alt lo	latel กลางการใช้ White		
-60.0					Max H	lold
-70.0						
Center 5.19 GHz #Res BW 390 kHz		BW 4 MHz		n 100 MHz		
#Res BW 390 KHZ	v	BW 4 MINZ	51	veep 1 ms	Min H	lold
Occupied Bandwid	th	Total Power	22.4 dBm			
3	7.684 MHz				Dete	
Transmit Freq Error	25.118 kHz	% of OBW Pow	ver 99.00 %			eak▶ Man
					Auto	man
x dB Bandwidth	39.61 MHz	x dB	-26.00 dB			
MSG			STATUS			
mod			514105			

Plot 7-30. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)



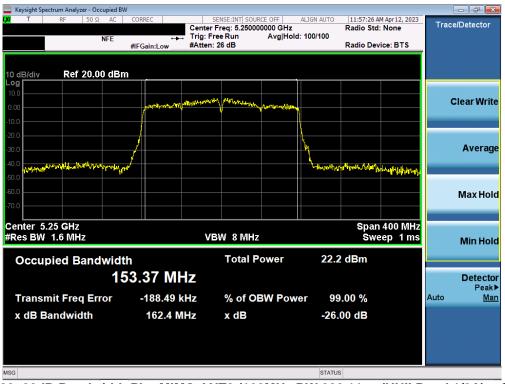
Plot 7-31. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

FCC ID: A3LSMF731JPN		Approved by: Technical Manager	
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Keysight Spectrum Analyzer - Occupied BW					
L RF 50Ω AC		SENSE:INT SOURCE OFF		PM Apr 11, 2023	Trace/Detector
		Freq: 5.210000000 GHz ree Run Avg Hold	Radio Sto d: 100/100	d: None	The one of other
NFE	#IFGain:Low #Atten:			vice: BTS	
	an ounicou				
10 dB/div Ref 20.00 dBm					
Log 10.0					
	a Dama alak	www. that when have been a se			Clear Write
0.00	A State of the second s	and the state of t			
-10.0					
-20.0					
-30.0			N .		Average
	<mark>/</mark> *		14 14		
-40.0			had of the had to the address of the		
-50.0 Manufacture and a second s				a his and a second second	
-60.0					Max Hold
-70.0					Maxilola
10.0					
Center 5.21 GHz			Spar	n 200 MHz	
#Res BW 820 kHz	V	BW 8 MHz		eep 1 ms	Min Hold
,					Mintiola
Occupied Bandwidt	h	Total Power	22.0 dBm		
					Detector
10	6.667 MHz				Detector Peak▶
Transmit Freq Error	135.29 kHz	% of OBW Pow	er 99.00 %		Auto <u>Man</u>
x dB Bandwidth	80.46 MHz	x dB	-26.00 dB		
	00.40 WI12	xub	-20.00-010		
MSG			SUTATS		

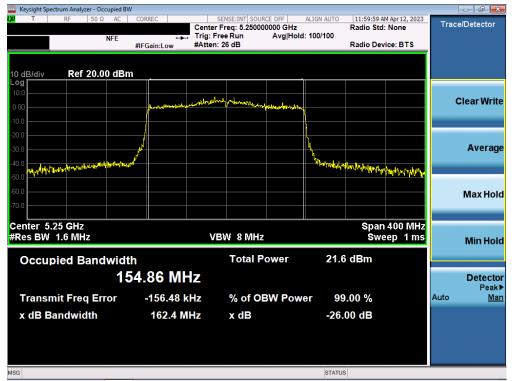
Plot 7-32. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



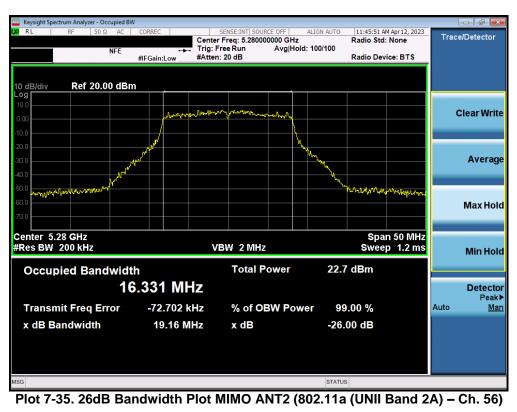
Plot 7-33. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ac (UNII Band 1/2A) - Ch. 50)

FCC ID: A3LSMF731JPN		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 152
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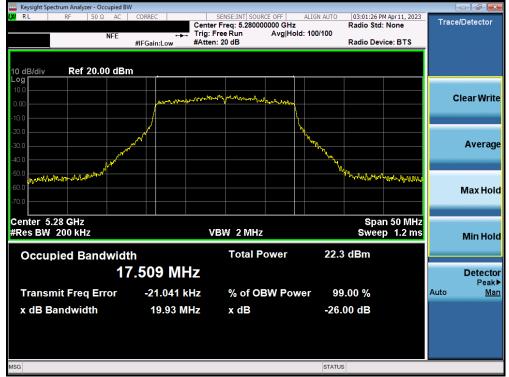


Plot 7-34. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax (UNII Band 1/2A) - Ch. 50)

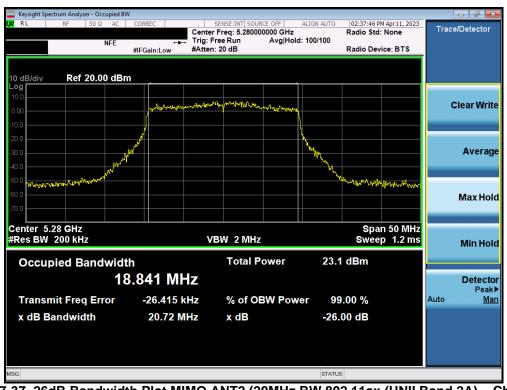


FCC ID: A3LSMF731JPN		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 152
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Plot 7-36. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)



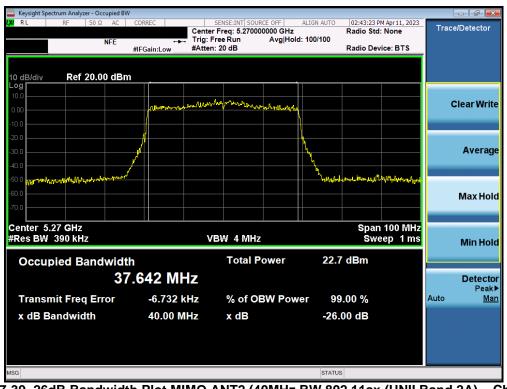
Plot 7-37. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		Approved by: Technical Manager	
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Plot 7-38. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



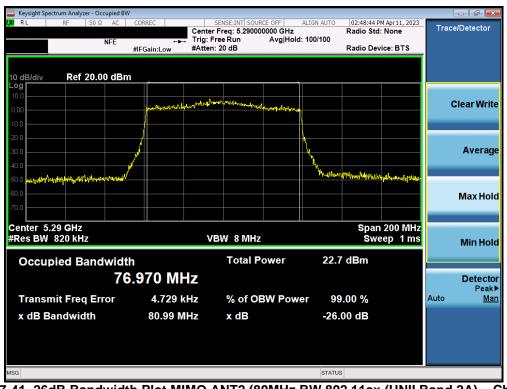
Plot 7-39. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 25 of 152	
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Keysight Spectrum Analyzer - Occupied BW						
KM RL RF 50Ω AC		SENSE:INT SOURCE OFF		PM Apr 11, 2023 d: None	Trace/Detector	
NFE		: 20 dB		vice: BTS		
,						
10 dB/div Ref 20.00 dBm	<u> </u>					
Log 10.0						
0.00	- Jack garman light and	what in the ship has many more			Clear Writ	
-10.0						
-20.0	_/					
-30.0	<u> </u>				Averag	
-40.0						
-50.0 martinesish manakaryaharan hull			mataryphiluma	Maryan		
-60.0					Max Hol	
-70.0						
Center 5.29 GHz			Sna	n 200 MHz		
#Res BW 820 kHz	v	BW 8 MHz		eep 1 ms	Min Hol	
Occupied Bandwidt	h	Total Power	23.0 dBm			
	75.149 MHz					
Transmit Freq Error	72.232 kHz	% of OBW Pow	ver 99.00 %		Peak Auto Ma	
					<u>ind</u>	
x dB Bandwidth	80.90 MHz	x dB	-26.00 dB			
MSG			STATUS			
mod			514105			

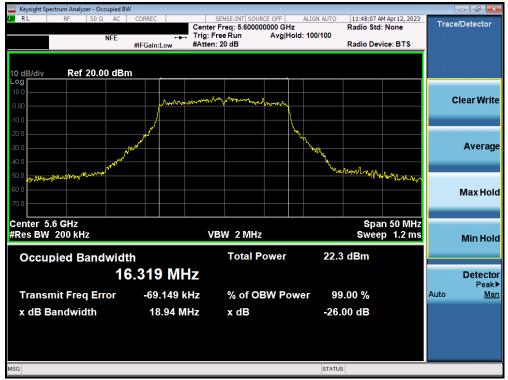
Plot 7-40. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



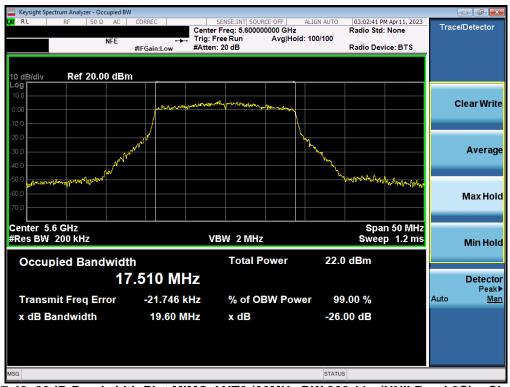
Plot 7-41. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		Approved by: Technical Manager	
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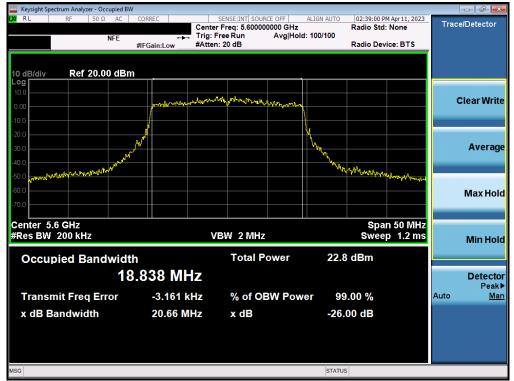
Plot 7-42. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2C) - Ch. 120)



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

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	Approved by: Technical Manager
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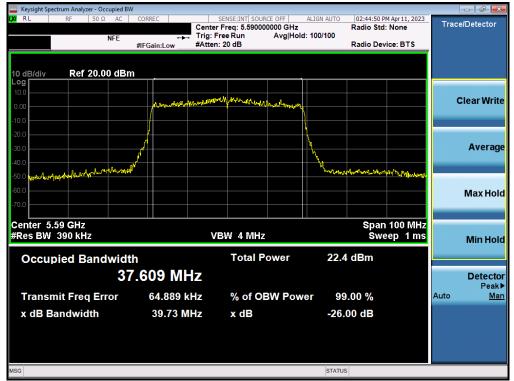
Plot 7-44. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)



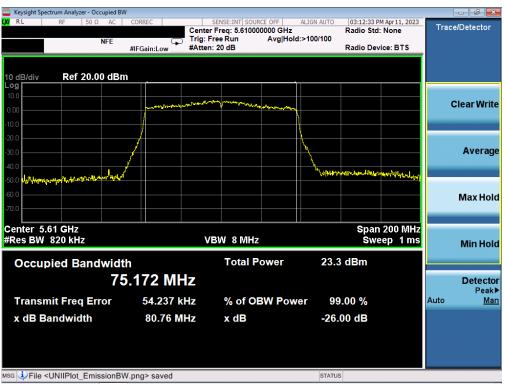
Plot 7-45. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-46. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)



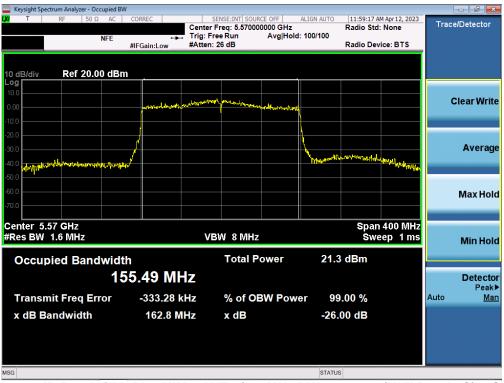
Plot 7-47. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Daga 20 of 152
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🔤 Keys	ight Spectr	um Analyz	er - Occu	ipied BW									
LXI RL		RF	50 Ω	AC COF	RREC		NSE:INT SOUR		ALIGN AUTO		M Apr 11, 2023	Trac	e/Detector
						Tains France	req: 5.61000			Radio Std	None	TTac	erDelector
			N	IFE #IE	Gain:Low	⇒ Trig: Free #Atten: 2		Avginoid	d:>100/100	Radio Dev	ice: BTS		
				#1171	Galifictow	#/tten. 2	0 00			Rudio Der	ICC. DTO		
10 dB	/div	Ref :	20.00	dBm									
Log													
10.0 -							A-1+1						
0.00					manned			- marine and the	4				Clear Write
-10.0]				
									l				
-20.0 -									11t				
-30.0									<u>ا</u> ا				Average
-40.0				/`					Marcha Toyonto	and Million and			
-50.0 4	i and	Number	profilmed	N. Maria						4	margare Miner		
-60.0													Max Hold
-70.0													
Cent	er 5.6	1 GHz								Span	200 MHz		
#Res	BW 8	20 kH;	Z			VBV	N 8 MHz			Śwe	ep 1 ms		Min Hold
													Minifiord
0	ccupi	ed Ba	and	width			Total P	ower	23.7	dBm		_	
					74 84	-							
				16.9	71 M	ĦΖ							Detector
					447.00		0/ -10			00.0/		Auto	Peak►
	ansmi	t Freq	Erro		117.32	KHZ	% of U	BW Pow	er 99	.00 %		Auto	<u>Man</u>
x	B Ba	ndwid	lth		81.19	/Hz	x dB		-26.	00 dB			
MSG 🚺)File <u< td=""><td>NIIPlot</td><td>Emiss</td><td>ionBW.pn</td><td>a> saved</td><td></td><td></td><td></td><td>STATUS</td><td></td><td></td><td></td><td></td></u<>	NIIPlot	Emiss	ionBW.pn	a> saved				STATUS				

Plot 7-48. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 2C) – Ch. 122)



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

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dama 40 af 450
1M2304260059-12-R3.A3L	3/4 - 5/30/2023	Portable Handset	Page 40 of 152
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Plot 7-50. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax (UNII Band 2C) - Ch. 114)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Dage 41 of 150	
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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.

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 42 of 152
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MIMO 6dB Bandwidth Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Antenna-1 6dB Bandwidth [MHz]	Antenna-2 6dB Bandwidth [MHz]
	5745	149	а	6	10.22	14.45
	5785	157	а	6	15.95	13.87
	5825	165	а	6	13.88	14.45
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	13.00	15.91
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	14.46	15.10
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	11.38	11.32
e	5745	149	ax (20MHz)	6.5/7.2 (MCS0)	18.25	18.16
Band	5785	157	ax (20MHz)	6.5/7.2 (MCS0)	14.53	18.32
ä	5825	165	ax (20MHz)	6.5/7.2 (MCS0)	18.72	18.48
	5755	151	n (40MHz)	13.5/15 (MCS0)	34.56	24.12
	5775	155	n (40MHz)	13.5/15 (MCS0)	34.66	35.09
	5755	151	ax (40MHz)	13.5/15 (MCS0)	37.31	37.44
	5775	155	ax (40MHz)	13.5/15 (MCS0)	35.12	31.35
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	75.16	74.02
	5775	155	ax (80MHz)	29.3/32.5 (MCS0)	50.53	71.47

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

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Antenna-1 6dB Bandwidth [MHz]	Antenna-2 6dB Bandwidth [MHz]
Band 3/4	5845	169	а	6	15.56	16.36
Band 4	5865	173	а	6	16.36	16.29
band 4	5885	177	а	6	12.20	15.08
Band 3/4	5845	169	n (20MHz)	6.5/7.2 (MCS0)	14.75	11.70
Band 4	5865	173	n (20MHz)	6.5/7.2 (MCS0)	13.87	15.13
band 4	5885	177	n (20MHz)	6.5/7.2 (MCS0)	13.92	8.54
Band 3/4	5845	169	ax (20MHz)	6.5/7.2 (MCS0)	17.96	18.52
Band 4	5865	173	ax (20MHz)	6.5/7.2 (MCS0)	18.72	17.83
band 4	5885	177	ax (20MHz)	6.5/7.2 (MCS0)	15.42	18.76
Band 3/4	5835	167	n (40MHz)	13.5/15 (MCS0)	35.22	35.06
Band 4	5875	175	n (40MHz)	13.5/15 (MCS0)	33.82	35.24
Band 3/4	5835	167	ax (40MHz)	13.5/15 (MCS0)	31.49	33.90
Band 4	5875	175	ax (40MHz)	13.5/15 (MCS0)	35.14	36.59
	5855	171	ac (80MHz)	29.3/32.5 (MCS0)	51.58	72.68
Dand 2/4	5855	171	ax (80MHz)	29.3/32.5 (MCS0)	71.56	75.18
Band 3/4	5815	163	ac (160MHz)	58.5/65 (MCS0)	150.20	150.30
	5815	163	ax (160MHz)	58.5/65 (MCS0)	124.70	154.10

Table 7-4. Bands 3/4 Conducted 6dB Bandwidth Measurements MIMO ANT1

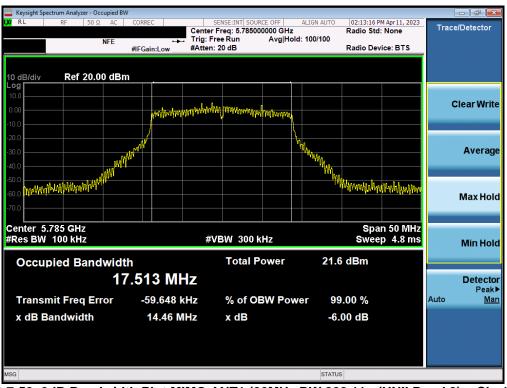
FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dage 42 of 152
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7.3.1 MIMO Antenna-1 6dB Bandwidth Measurements

Keysight Spectrum Analyzer - Occupied BW RI 02:04:46 PM Apr 11, 2023 ALIGN AUTO Trace/Detector Center Freq: 5.785000000 GHz Radio Std: None Avg|Hold: 100/100 Trig: Free Run #Atten: 20 dB Radio Device: BTS #IFGain:Low Ref 20.00 dBm 10 dB/div og **Clear Write** Average datu. ֈ ֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈֈ AL ROOM Max Hold Center 5.785 GHz #Res BW 100 kHz Span 50 MHz Sweep 4.8 ms #VBW 300 kHz Min Hold Total Power 22.4 dBm **Occupied Bandwidth** 16.286 MHz Detector Peak▶ -61.649 kHz **Transmit Freq Error** % of OBW Power 99.00 % Auto Man -6.00 dB x dB Bandwidth 15.95 MHz x dB

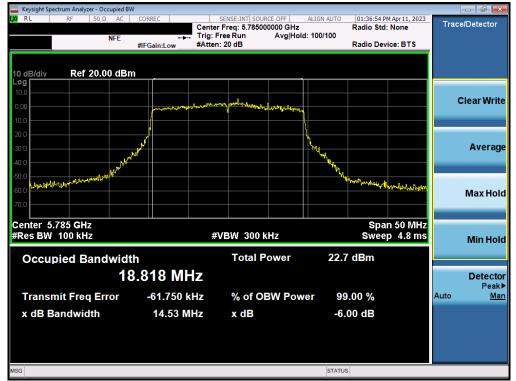




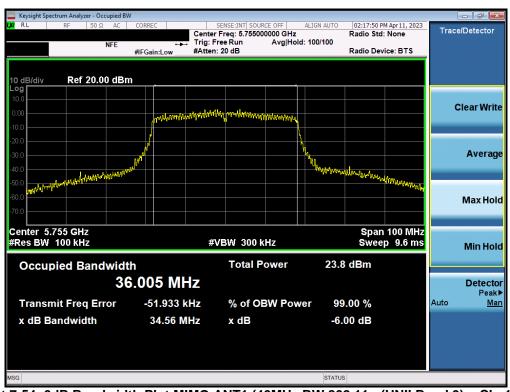
Plot 7-52. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 44 of 152
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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)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dage 45 of 450
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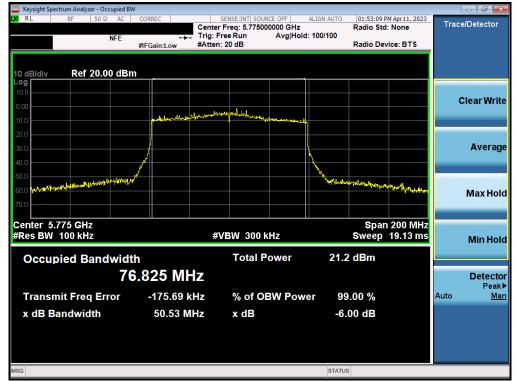
Plot 7-55. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 3) - Ch. 151)



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

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dage 46 of 150
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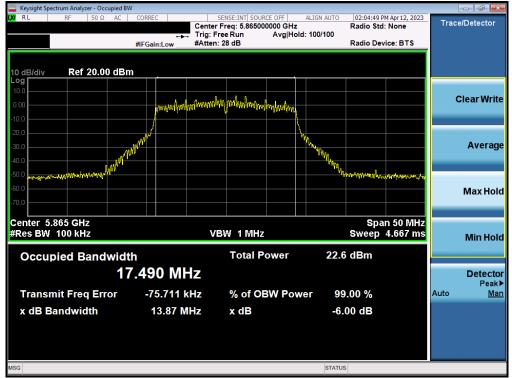
Plot 7-57. 6dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 3) - Ch. 155)



Plot 7-58. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11a (UNII Band 4) - Ch. 173)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dega 47 of 150
1M2304260059-12-R3.A3L	3/4 - 5/30/2023	Portable Handset	Page 47 of 152
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Plot 7-59. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 4) - Ch. 173)



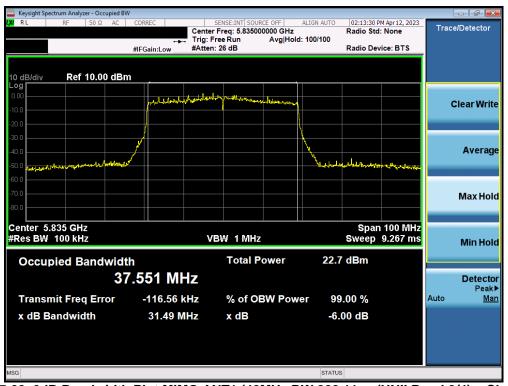
Plot 7-60. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 4) - Ch. 173)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dage 40 of 150
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Plot 7-61. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 3/4) – Ch. 167)



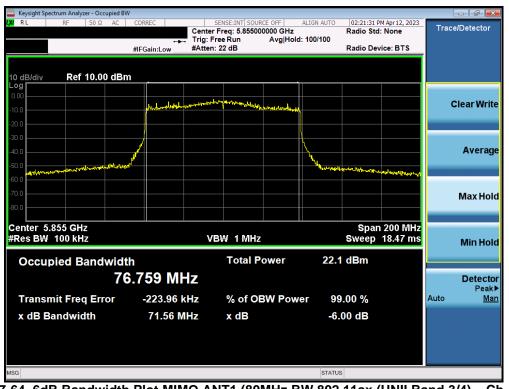
Plot 7-62. 6dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 3/4) - Ch. 167)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dage 40 of 150
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Keysight Spectrum Analyzer - Occupied BW							
LXX RL RF 50Ω AC	CORREC	SENSE:INT SOUR enter Freg: 5.85500		UTO 02:19:00 P Radio Std	M Apr 12, 2023	Trace	/Detector
		rig: Free Run			: None		
	#IFGain:Low #	Atten: 22 dB		Radio Dev	/ice: BTS		
10 dB/div Ref 10.00 dBm							
Log							
0.00		allelah presenting					loon Write
-10.0	Mallowilliam	the second s	maker merely			C	lear Write
-20.0							
-30.0			\\				
-40.0	<u>,</u>		I N				Average
	/						Average
-50.0 related the manufacture and the second				a. P.A. Martin Marta Million	and the states and the		
-60.0							
-70.0							Max Hold
-80.0							
Center 5.855 GHz					200 MHz		
#Res BW 100 kHz		VBW 1 MHz		Sweep	18.47 ms		Min Hold
Occurried Bandwidth		Total P	ower	22.9 dBm			
Occupied Bandwidt			ower 1	22.9 ubiii			
74	.956 MHz						Detector
	005 65 111			00.00.00		A	Peak►
Transmit Freq Error	-225.65 kHz	% of O	3W Power	99.00 %		Auto	<u>Man</u>
x dB Bandwidth	51.58 MHz	x dB		-6.00 dB			
MSG			S	STATUS			

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



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

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Daga 50 of 150
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Keysight Spectrum Analyzer - Occupied BW									
LX/ RL RF 50Ω AC COR	REC		ISE:INT SOUR eq: 5.81500		ALIGN AUTO	02:20:36 P Radio Std	M Apr 12, 2023	Trac	e/Detector
		Trig: Free	Run		l: 100/100				
#IFG	ain:Low	#Atten: 16	6 dB			Radio Dev	/ice: BTS		
10 dB/div Ref 0.00 dBm									
Log	a un ditati	ta nia, alia, Mili	and an although						
-10.0				ANUM AND				(Clear Write
-20.0									
-30.0					N N				
-40.0					H				
-50.0					mundelford	aught the shall be	11.00.0		Average
-60.0							Marriel Marriel Marriel		
-70.0									
-80.0									Max Hold
-90.0									Μάλ Πυία
Center 5.815 GHz							400 MHz		
#Res BW 100 kHz		VBV	V 1 MHz			Sweep	36.93 ms		Min Hold
Occurried Devidualdh			Total P	owor	22.6	5 dBm			
Occupied Bandwidth			Total P	ower	22.0	авт			
154.	20 MH	Z							Detector
Tronomit From France	424 00 14		% -f OF			00.0/		Auto	Peak▶ Man
	124.88 k		% of OE	SW FOW		9.00 %		Auto	ivian
x dB Bandwidth	150.2 M	Hz	x dB		-6.	00 dB			
MSG					STATU	S			

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)

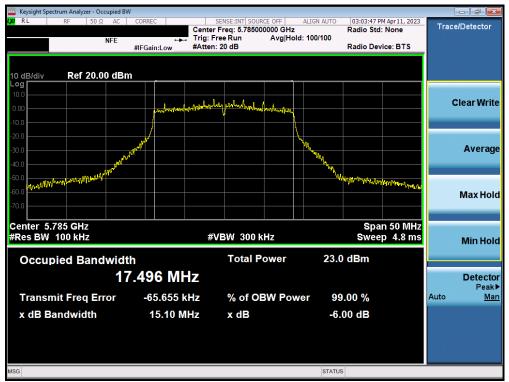
FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Daga 51 of 150
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7.3.2 MIMO Antenna-2 6dB Bandwidth Measurements

Keysight Spectrum Analyzer - Occupied BW RI 11:52:17 AM Apr 12, 2023 ALIGN AUTO Trace/Detector Center Freq: 5.785000000 GHz Radio Std: None Avg|Hold: 100/100 Trig: Free Run #Atten: 20 dB Radio Device: BTS #IFGain:Low Ref 20.00 dBm 10 dB/div Log amphy mound **Clear Write** Average shows. Max Hold Center 5.785 GHz Span 50 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 4.8 ms **Min Hold Occupied Bandwidth Total Power** 23.1 dBm 16.306 MHz Detector Peak Transmit Freq Error -77.547 kHz % of OBW Power 99.00 % Auto <u>Man</u> x dB Bandwidth 13.87 MHz x dB -6.00 dB STATUS

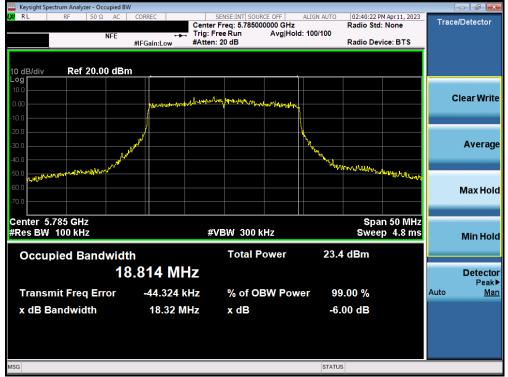
Plot 7-67. 6dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 3) - Ch. 157)



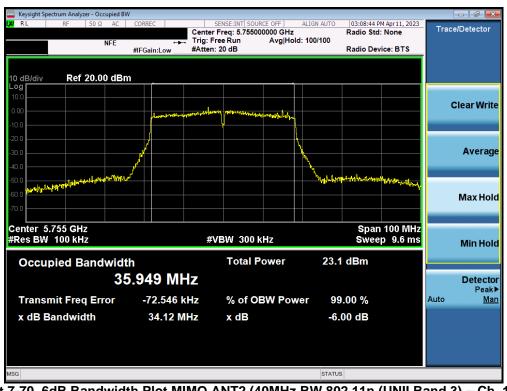
Plot 7-68. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 50 of 150
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Plot 7-69. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 3) - Ch. 157)



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

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Daga 52 of 152
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Plot 7-71. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 3) - Ch. 151)



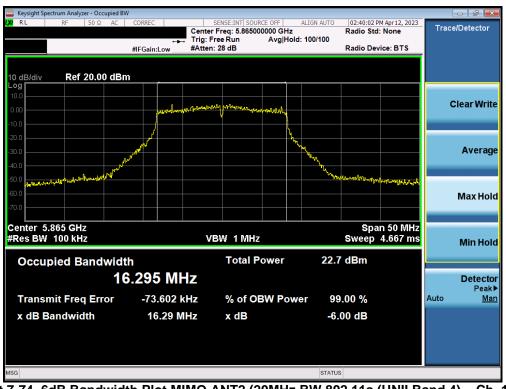
Plot 7-72. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 3) - Ch. 155)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Daga 54 of 150
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Keysight Spectrum Analyzer - Occupied BW	1					×
LXI RL RF 50Ω AC		SENSE:INT SOURCE OFF Freq: 5.775000000 GHz		M Apr 11, 2023	Trace/Detecto	or
NFE	Trig: Fi	ree Run Avg Hold	1: 100/100			
	#IFGain:Low #Atten:	: 20 dB	Radio De	vice: BTS		
10 dB/div Ref 20.00 dBn	n					
Log						
10.0					Clear W	rite
0.00	a benerged the amount of	montenant				
-10.0	of Asyons Art Press	and the second s				
-20.0						
-30.0					Avera	age
-40.0			<u>∧</u>			
-50.0	<u>/</u>		we water and the states of	Marris Married		
-50.0				and the second of the	Max H	
-70.0					махн	010
-70.0						
Center 5.775 GHz				n 200 MHz		
#Res BW 100 kHz	#\	/BW 300 kHz	Sweep	19.13 ms	Min H	old
		Total Power	22.2 dBm			
Occupied Bandwidt		lotal Power	22.2 dBm			
76	6.740 MHz				Detec	
						ak▶
Transmit Freq Error	-103.67 kHz	% of OBW Pow	er 99.00 %			Man
x dB Bandwidth	71.47 MHz	x dB	-6.00 dB			
MSG			STATUS			
mod			014100			

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



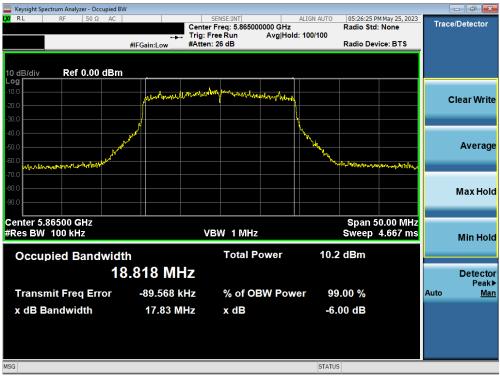
Plot 7-74. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11a (UNII Band 4) - Ch. 173)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT				
Test Report S/N:	Test Dates:	EUT Type:	Dogo 55 of 152			
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Plot 7-75. 6dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 4) - Ch. 173)



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

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga EC of 150
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Keysight Spectrum Analyzer - Occupied B ¹	W					×
LXX RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF		35 PM Apr 12, 2023	Trace/Detecto	or
			Hold: 100/100	sta: None		
		en: 24 dB	Radio I	Device: BTS		
10 dB/div Ref 10.00 dBr	n					
Log						
0.00	will week with	hthey alwahila have been all	tal.		ClearWh	rito
-10.0		1	*ru		Clear Wi	rite
-20.0	/					_
-30.0						
-40.0	. d ^a		₩.		Avera	ane
	J		Marken ale and a line	h	Aven	uge
-50.0 Mal-mondali-months and states			20 March 10 March 20	- Martin Martine		
-60.0						
-70.0					Max H	old
-80.0						
Center 5.835 GHz				an 100 MHz		
#Res BW 100 kHz		VBW 1 MHz	Swee	p 9.267 ms	Min H	old
	41-	Total Power	23.3 dBm			
Occupied Bandwid		Total Fower	23.3 UDIII			
3	6.028 MHz				Detec	
						ak▶
Transmit Freq Error	-105.95 kHz	% of OBW P	ower 99.00 %		Auto <u>N</u>	<u>Man</u>
x dB Bandwidth	35.06 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)



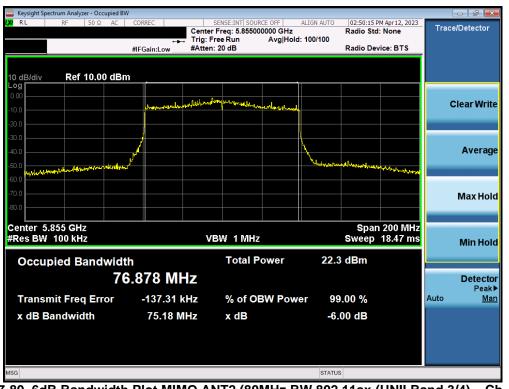
Plot 7-78. 6dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 3/4) - Ch. 167)

FCC ID: A3LSMF731JPN		MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 57 of 150
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Keysight Spectrum Analyzer - Occupied	BW				
ιχα RL RF 50Ω AC	Cen Trig	SENSE:INT SOURCE OFF ter Freq: 5.855000000 G g: Free Run Avg ten: 10 dB	Hz R Hold: 100/100	02:48:22 PM Apr 12, 2023 adio Std: None	Trace/Detector
,	#IFGain:Low #At	ten: 10 dB	K	adio Device: B I S	
10 dB/div Ref 15.00 dE	sm				
5.00					
-5.00	Malada and an and the	al alle wert up a to day and and			Clear Write
-15.0					
-25.0					
-35.0			- M.		Average
-45.0	1		had in the Ber	hoperendes and some stand	
-55.0	,			www.www.geo.get.com/www.hatility	
-75.0					Max Hold
Center 5.855 GHz #Res BW 100 kHz		VBW 1 MHz	s	Span 200 MHz weep 18.47 ms	
					Min Hold
Occupied Bandwic		Total Power	22.5 d	Bm	
7	4.944 MHz				Detector
Transmit Freq Error	-176.71 kHz	% of OBW P	ower 99.0	0 %	Peak▶ Auto <u>Man</u>
x dB Bandwidth	72.68 MHz	x dB	-6.00	dB	
MSG			STATUS		

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



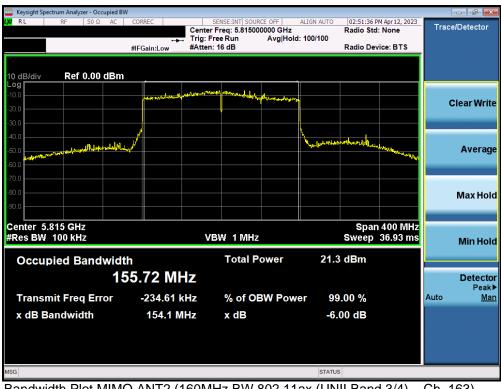
Plot 7-80. 6dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 3/4) - Ch. 171)

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Keysight Spectrum Analyzer - Occupied BW									
LX/ RL RF 50 Ω AC COF	RREC		ISE:INT SOUR		ALIGN AUTO	02:49:17 P Radio Std	M Apr 12, 2023	Trac	e/Detector
	÷	. Trig: Free	Run		d: 100/100	Raulo Stu	. None		
#IF0	Gain:Low	#Atten: 1	8 dB			Radio Dev	rice: BTS		
10 dB/div Ref 0.00 dBm									
Log		إلاالعالمه العمالا	مان الدان والخار الحالم	aba . La					
-10.0	aller i directione aller			Phillippinik					Clear Write
-20.0									
-30.0					u.				
-40.0					l h	handali	Han .		
-50.0 When the second weather the second sec					() () () () () () () () () () () () () (and the state of t		Average
-60.0									
-70.0									
-80.0									Max Hold
-90.0									Max Holu
Center 5.815 GHz							400 MHz		
#Res BW 100 kHz		VBV	V 1 MHz			Sweep	36.93 ms		Min Hold
Occurried Bondwidth			Total P	ower	22.0	dBm			
Occupied Bandwidth			Total I	ower	22.0	ubiii			
154.	14 MI	Z							Detector
Transmit Freq Error	-214.47	/U	% of OE		or 00	.00 %		Auto	Peak▶ Man
								Auto	man
x dB Bandwidth	150.3 N	IHz	x dB		-6.	00 dB			
MSG					STATUS	5			

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)

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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 Pov	wer Limit	Maximum e.i.r.p			
Band		FCC ISED		FCC	ISED		
UNII 1	5.15 – 5.25GHz	23.98dBm (250mW) N/A		N/A	The lesser of 23.01dBm (200mW) or 10dBm + 10log ₁₀ B		
UNII 2A	5.25 – 5.35GHz		50 1 40		The lesser of 30dBm (1W) or 17dBm + 10log ₁₀ BW		
UNII 2C	5.47 – 5.725GHz	The lesser of 23.98dBm (2 11dBm + 10log ₁₀ B		N/A			
UNII 3	5.725 – 5.850GHz	30dBm (1W)		N/A	N/A		
UNII 4	5.850 – 5.895GHz	N/A		30dBm (1W)	N/A		

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

	Freq [MHz] Channel Dete		Detector	Conducted Power [dBm]			Conducted Power Limit	Conducted Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]			J
_	5180	36	AVG	15.72	15.46	18.60	23.98	-5.38	-2.36	16.24	30.00	-13.76
<u> </u>	5200	40	AVG	15.32	15.40	18.37	23.98	-5.61	-2.36	16.01	30.00	-13.99
<u>d</u>	5220	44	AVG	15.46	15.44	18.46	23.98	-5.52	-2.36	16.10	30.00	-13.90
andwidth	5240	48	AVG	15.54	15.24	18.40	23.98	-5.58	-2.36	16.04	30.00	-13.96
p	5260	52	AVG	15.43	15.32	18.39	23.63	-5.24	-2.08	16.31	29.63	-13.32
ar	5280	56	AVG	15.68	15.90	18.80	23.63	-4.83	-2.08	16.72	29.63	-12.91
B	5300	60	AVG	15.79	15.57	18.69	23.63	-4.94	-2.08	16.61	29.63	-13.02
Hz	5320	64	AVG	15.84	15.70	18.78	23.63	-4.85	-2.08	16.70	29.63	-12.93
÷.	5500	100	AVG	15.90	15.52	18.72	23.64	-4.92	-3.17	15.55	29.64	-14.09
(20MI	5600	120	AVG	15.52	15.58	18.56	23.64	-5.08	-3.17	15.39	29.64	-14.25
5	5620	124	AVG	15.30	15.40	18.36	23.64	-5.28	-3.17	15.19	29.64	-14.45
Ł	5720	144	AVG	15.56	15.89	18.74	23.64	-4.90	-3.17	15.57	29.64	-14.07
<u>+</u>	5745	149	AVG	15.88	15.59	18.75	30.00	-11.25	-3.61	15.14	36.00	-20.86
5G	5785	157	AVG	15.90	15.29	18.62	30.00	-11.38	-3.61	15.01	36.00	-20.99
	5825	165	AVG	15.72	15.87	18.81	30.00	-11.19	-3.61	15.20	36.00	-20.80
	5845	169	AVG	15.78	15.67	18.74			-3.34	15.40	30.00	-14.60
	5865	173	AVG	15.69	15.53	18.62			-3.34	15.28	30.00	-14.72
	5885	177	AVG	15.69	15.68	18.70			-3.34	15.36	30.00	-14.64

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

	Freq [MHz] Channel Detector		Detector	Conducted Power [dBm]			Conducted Power Limit	Conducted Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	[abiii]		
_	5180	36	AVG	15.67	15.46	18.58	23.98	-5.40	-2.36	16.22	30.00	-13.78
Ē	5200	40	AVG	15.61	15.52	18.58	23.98	-5.40	-2.36	16.22	30.00	-13.78
<u>id</u>	5220	44	AVG	15.99	15.86	18.94	23.98	-5.04	-2.36	16.58	30.00	-13.42
ndwidth)	5240	48	AVG	15.98	15.78	18.89	23.98	-5.09	-2.36	16.53	30.00	-13.47
р	5260	52	AVG	15.73	15.97	18.86	23.98	-5.12	-2.08	16.78	30.00	-13.22
D	5280	56	AVG	15.69	15.87	18.79	23.98	-5.19	-2.08	16.71	30.00	-13.29
Ő	5300	60	AVG	15.77	15.72	18.76	23.98	-5.22	-2.08	16.68	30.00	-13.32
OMHz	5320	64	AVG	15.84	15.67	18.77	23.98	-5.21	-2.08	16.69	30.00	-13.31
5	5500	100	AVG	15.99	15.50	18.76	23.98	-5.22	-3.17	15.59	30.00	-14.41
ō	5600	120	AVG	15.96	15.94	18.96	23.98	-5.02	-3.17	15.79	30.00	-14.21
5	5620	124	AVG	16.02	15.96	19.00	23.98	-4.98	-3.17	15.83	30.00	-14.17
N	5720	144	AVG	15.76	15.94	18.86	23.98	-5.12	-3.17	15.69	30.00	-14.31
5GHz	5745	149	AVG	15.98	15.57	18.79	30.00	-11.21	-3.61	15.18	36.00	-20.82
20	5785	157	AVG	15.93	15.28	18.63	30.00	-11.37	-3.61	15.02	36.00	-20.98
	5825	165	AVG	15.95	15.78	18.88	30.00	-11.12	-3.61	15.27	36.00	-20.73
	5845	169	AVG	15.87	15.63	18.76			-3.34	15.42	30.00	-14.58
	5865	173	AVG	15.83	15.49	18.67			-3.34	15.33	30.00	-14.67
	5885	177	AVG	15.82	15.66	18.75			-3.34	15.41	30.00	-14.59

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

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	Freq [MHz]	Channel	Detector	Cond	lucted Power [dBm]	Conducted Power Limit	Conducted Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	[]		
~	5180	36	AVG	15.89	15.78	18.85	23.98	-5.13	-2.36	16.49	30.00	-13.51
Ē	5200	40	AVG	15.78	15.64	18.72	23.98	-5.26	-2.36	16.36	30.00	-13.64
<u>d</u>	5220	44	AVG	15.71	15.57	18.65	23.98	-5.33	-2.36	16.29	30.00	-13.71
ndwidth	5240	48	AVG	15.69	15.45	18.58	23.98	-5.40	-2.36	16.22	30.00	-13.78
p	5260	52	AVG	15.44	15.63	18.55	23.63	-5.08	-2.08	16.47	29.63	-13.16
D	5280	56	AVG	15.39	15.54	18.48	23.63	-5.15	-2.08	16.40	29.63	-13.23
Ő	5300	60	AVG	15.44	15.45	18.46	23.63	-5.17	-2.08	16.38	29.63	-13.25
Hz	5320	64	AVG	15.50	15.38	18.45	23.63	-5.18	-2.08	16.37	29.63	-13.26
⋚	5500	100	AVG	15.87	15.17	18.54	23.64	-5.10	-3.17	15.37	29.64	-14.27
Mo	5600	120	AVG	15.82	15.66	18.75	23.64	-4.89	-3.17	15.58	29.64	-14.06
5	5620	124	AVG	15.42	15.57	18.51	23.64	-5.13	-3.17	15.34	29.64	-14.30
N	5720	144	AVG	15.38	15.65	18.53	23.64	-5.11	-3.17	15.36	29.64	-14.28
Η̈́	5745	149	AVG	15.65	15.26	18.47	30.00	-11.53	-3.61	14.86	36.00	-21.14
5G	5785	157	AVG	15.81	14.97	18.42	30.00	-11.58	-3.61	14.81	36.00	-21.19
	5825	165	AVG	15.59	15.47	18.54	30.00	-11.46	-3.61	14.93	36.00	-21.07
	5845	169	AVG	15.57	15.33	18.46			-3.34	15.12	30.00	-14.88
	5865	173	AVG	15.89	15.72	18.82			-3.34	15.48	30.00	-14.52
	5885	177	AVG	15.86	15.86	18.87			-3.34	15.53	30.00	-14.47

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

	Freq [MHz]	req [MHz] Channel Detector		Conc	lucted Power [dBm]	Conducted Power Limit	Conducted Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	Lapuil	Ennic [GBin]	margin [ab]
	5180	36	AVG	15.57	14.98	18.30	23.98	-5.68	-2.36	15.94	30.00	-14.06
E .	5200	40	AVG	15.04	15.16	18.11	23.98	-5.87	-2.36	15.75	30.00	-14.25
<u>e</u>	5220	44	AVG	15.86	15.23	18.57	23.98	-5.41	-2.36	16.21	30.00	-13.79
Ξ	5240	48	AVG	15.31	15.23	18.28	23.98	-5.70	-2.36	15.92	30.00	-14.08
Bandwidth	5260	52	AVG	15.38	15.29	18.35	23.63	-5.28	-2.08	16.27	29.63	-13.36
ar	5280	56	AVG	15.32	15.30	18.32	23.63	-5.31	-2.08	16.24	29.63	-13.39
	5300	60	AVG	15.20	15.55	18.39	23.63	-5.24	-2.08	16.31	29.63	-13.32
Ηz	5320	64	AVG	15.21	15.60	18.42	23.63	-5.21	-2.08	16.34	29.63	-13.29
⇒	5500	100	AVG	15.67	15.56	18.63	23.64	-5.01	-3.17	15.46	29.64	-14.18
20M	5600	120	AVG	15.64	15.43	18.55	23.64	-5.09	-3.17	15.38	29.64	-14.26
2	5620	124	AVG	15.44	15.35	18.41	23.64	-5.23	-3.17	15.24	29.64	-14.40
Ł	5720	144	AVG	15.53	15.23	18.39	23.64	-5.25	-3.17	15.22	29.64	-14.42
T (D	5745	149	AVG	15.68	15.86	18.78	30.00	-11.22	-3.61	15.17	36.00	-20.83
56	5785	157	AVG	15.41	15.64	18.54	30.00	-11.46	-3.61	14.93	36.00	-21.07
	5825	165	AVG	15.55	15.28	18.43	30.00	-11.57	-3.61	14.82	36.00	-21.18
	5845	169	AVG	15.34	15.20	18.28			-3.34	14.94	30.00	-15.06
	5865	173	AVG	15.68	15.56	18.63			-3.34	15.29	30.00	-14.71
	5885	177	AVG	15.64	15.03	18.36			-3.34	15.02	30.00	-14.98
	Tal	blo 7-8	MIMO 201		802 112	v /I INIII)	Maximu	m Condi		tout Do	vor	

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

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dwidth)	Freq [MHz] C	Channel Detector					Conducted Power Limit	mit Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
÷				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	[]		
5	5190	38	AVG	14.59	14.50	17.56	23.98	-6.42	-2.36	15.20	30.00	-14.80
_	5230	46	AVG	14.89	14.83	17.87	23.98	-6.11	-2.36	15.51	30.00	-14.49
Ba	5270	54	AVG	14.81	14.82	17.83	23.63	-5.80	-2.08	15.75	29.63	-13.88
N	5310	62	AVG	14.65	14.73	17.70	23.63	-5.93	-2.08	15.62	29.63	-14.01
	5510	102	AVG	14.68	14.90	17.80	23.64	-5.84	-3.17	14.63	29.64	-15.01
(40M	5590	118	AVG	14.86	14.76	17.82	23.64	-5.82	-3.17	14.65	29.64	-14.99
40	5710	142	AVG	14.70	14.66	17.69	23.64	-5.95	-3.17	14.52	29.64	-15.12
	5755	151	AVG	14.59	14.99	17.80	30.00	-12.20	-3.61	14.19	36.00	-21.81
Ŧ	5795	159	AVG	14.35	14.92	17.65	30.00	-12.35	-3.61	14.04	36.00	-21.96
Ū	5670	134	AVG	14.58	14.59	17.60			-3.34	14.26	30.00	-15.74
2	5710	142	AVG	14.73	14.96	17.86			-3.34	14.52	30.00	-15.48

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

Freq [MHz]	Freq [MHz] Channel	Channel Detector		Conducted Power [dBm]			d Conducted hit Power Margin [dB]	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	Lapud	Ennie [GBIII]	margin [ab]
5190	38	AVG	14.65	14.84	17.76	23.98	-6.22	-2.36	15.40	30.00	-14.60
5230	46	AVG	14.94	14.98	17.97	23.98	-6.01	-2.36	15.61	30.00	-14.39
5270	54	AVG	14.98	14.94	17.97	23.63	-5.66	-2.08	15.89	29.63	-13.74
5310	62	AVG	14.94	14.74	17.85	23.63	-5.78	-2.08	15.77	29.63	-13.86
5510	102	AVG	14.75	14.97	17.87	23.64	-5.77	-3.17	14.70	29.64	-14.94
5590	118	AVG	14.72	14.75	17.75	23.64	-5.89	-3.17	14.58	29.64	-15.06
5710	142	AVG	14.71	14.77	17.75	23.64	-5.89	-3.17	14.58	29.64	-15.06
5755	151	AVG	14.51	14.98	17.76	30.00	-12.24	-3.61	14.15	36.00	-21.85
5795	159	AVG	14.37	14.99	17.70	30.00	-12.30	-3.61	14.09	36.00	-21.91
5670	134	AVG	14.58	14.60	17.60			-3.34	14.26	30.00	-15.74
5710	142	AVG	14.88	14.96	17.93			-3.34	14.59	30.00	-15.41

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

Freq [MHz]	Channel Detector	Detector	Detector Power [dBhi] P			Conducted Power Limit	Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
			ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	Lapud	Ennie [GBIII]	margin [ab]
5190	38	AVG	14.80	14.98	17.90	23.98	-6.08	-2.36	15.54	30.00	-14.46
5230	46	AVG	14.63	14.78	17.72	23.98	-6.26	-2.36	15.36	30.00	-14.64
5270	54	AVG	14.69	14.75	17.73	23.63	-5.90	-2.08	15.65	29.63	-13.98
5310	62	AVG	14.66	14.55	17.62	23.63	-6.01	-2.08	15.54	29.63	-14.09
5510	102	AVG	14.36	14.86	17.63	23.64	-6.01	-3.17	14.46	29.64	-15.18
5590	118	AVG	14.96	14.99	17.99	23.64	-5.65	-3.17	14.82	29.64	-14.82
5710	142	AVG	14.91	14.97	17.95	23.64	-5.69	-3.17	14.78	29.64	-14.86
5755	151	AVG	14.18	14.99	17.61	30.00	-12.39	-3.61	14.00	36.00	-22.00
5795	159	AVG	14.57	14.98	17.79	30.00	-12.21	-3.61	14.18	36.00	-21.82
5835	167	AVG	14.88	14.90	17.90			-3.34	14.56	30.00	-15.44
5875	175	AVG	14.81	14.91	17.87			-3.34	14.53	30.00	-15.47

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

Bandwidth)	Freq [MHz]	Channel	Detector	Conducted Power [dBm]			Conducted Power Limit	Conducted Power Margin [dB]	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
1×				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	[]		
and	5210	42	AVG	13.26	13.73	16.51	23.98	-7.47	-2.36	14.15	30.00	-15.85
	5290	58	AVG	13.42	13.70	16.57	23.63	-7.06	-2.08	14.49	29.63	-15.14
Ŧ	5530	106	AVG	13.27	13.92	16.62	23.64	-7.02	-3.17	13.45	29.64	-16.19
(80MHz	5610	122	AVG	13.66	13.93	16.81	23.64	-6.83	-3.17	13.64	29.64	-16.00
8) Z	5690	138	AVG	13.78	13.93	16.87	23.64	-6.77	-3.17	13.70	29.64	-15.94
GHz	5775	155	AVG	13.48	13.92	16.72	30.00	-13.28	-3.61	13.11	36.00	-22.89
50	5855	171	AVG	13.50	13.73	16.63			-3.34	13.29	30.00	-16.71

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

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idth)	Freq [MHz] Channel De		Detector	Conducted Power [dBm]			Conducted Power Limit	Conducted Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
dvi				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	Lapud	Ennie [GB/1]	margin [ab]
and	5210	42	AVG	13.68	13.84	16.77	23.98	-7.21	-2.36	14.41	30.00	-15.59
Ш N	5290	58	AVG	13.52	13.88	16.71	23.63	-6.92	-2.08	14.63	29.63	-15.00
MHz	5530	106	AVG	13.41	13.87	16.66	23.64	-6.98	-3.17	13.49	29.64	-16.15
(80N	5610	122	AVG	13.67	13.88	16.79	23.64	-6.85	-3.17	13.62	29.64	-16.02
z (8	5690	138	AVG	13.43	13.73	16.59	23.64	-7.05	-3.17	13.42	29.64	-16.22
I. I.	5775	155	AVG	13.22	13.88	16.57	30.00	-13.43	-3.61	12.96	36.00	-23.04
5G	5855	171	AVG	13.43	13.73	16.59			-3.34	13.25	30.00	-16.75

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

0MHz dth)	Freq [MHz]	Channel Detecto					Conducted Power Limit	Conducted Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
160 wid				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]			
, , , , , , , , , , , , , , , , , , ,	5250	50	AVG	12.51	12.93	15.74	23.98	-8.24	-2.36	13.38	30.00	-16.62
Bai	5570	114	AVG	12.27	12.92	15.62	23.64	-8.02	-3.17	12.45	29.64	-17.19
2	5815	163	AVG	12.18	12.93	15.58			-3.34	12.24	30.00	-17.76

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

MHz tth)			Detector	Conc	lucted Power [dBm]	Conducted Power Limit	Conducted Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
160 wid				ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]			5 I I I
.) z	5250	50	AVG	12.80	12.88	15.85	23.98	-8.13	-2.36	13.49	30.00	-16.51
GH Ba	5570	114	AVG	11.91	12.86	15.42	23.64	-8.22	-3.17	12.25	29.64	-17.39
- 20	5815	163	AVG	12.02	12.83	15.45			-3.34	12.11	30.00	-17.89

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 15.67 dBm for Antenna 1 and 15.46 dBm for Antenna 2.

Antenna 1 + Antenna 2 = MIMO

(15.67 dBm + 15.46 dBm) = (36.90 mW + 35.16 mW) = 72.05 mW = 18.58 dBm

Sample e.i.r.p Calculation:

At 5180MHz in 802.11n (20MHz BW) mode, the average MIMO conducted power was calculated to be 18.58 dBm with directional gain of -2.36 dBi.

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

18.58dBm + -2.36 dBi = 16.22 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-1, 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		Maximum Power Spectral Density				
Band	Frequency Range	Frequency Range FCC				
UNII 1	5.15 – 5.25GHz	11dBm/MHz	10dBm/MHz e.i.r.p			
UNII 2A	5.25 – 5.35GHz					
UNII 2C	5.47 – 5.725GHz	11dBm/MHz				
UNII 3	5.725 – 5.850GHz	30dBm/500kHz				
UNII 4	5.850 – 5.895GHz	14dBm/MHz e.i.r.p	N/A			

Test Procedure Used

ANSI C63.10-2013 – Section 12.3.2.2 (Method SA-1) 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

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Summed MIMO Power Density [dBm]	DCCF [dB]	Max Power Density [dBm/MHz]	Margin [dB]
	5180	36	а	6	6.15	5.56	8.88	0.15	11.0	-1.97
	5200	40	а	6	5.68	5.45	8.58	0.15	11.0	-2.27
	5240	48	а	6	5.70	5.65	8.69	0.15	11.0	-2.16
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	5.59	5.19	8.40	0.00	11.0	-2.60
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	5.77	5.22	8.51	0.00	11.0	-2.49
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	5.63	5.81	8.73	0.00	11.0	-2.27
-	5180	36	ax (20MHz)	6.5/7.2 (MCS0)	5.91	5.56	8.75	0.00	11.0	-2.25
Band 1	5200	40	ax (20MHz)	6.5/7.2 (MCS0)	6.35	6.08	9.23	0.00	11.0	-1.77
ä	5240	48	ax (20MHz)	6.5/7.2 (MCS0)	5.74	6.20	8.99	0.00	11.0	-2.01
	5190	38	n (40MHz)	13.5/15 (MCS0)	2.87	2.84	5.87	0.00	11.0	-5.13
	5230	46	n (40MHz)	13.5/15 (MCS0)	2.70	3.25	5.99	0.00	11.0	-5.01
	5190	38	ax (40MHz)	13.5/15 (MCS0)	2.01	1.86	4.95	0.00	11.0	-6.05
	5230	46	ax (40MHz)	13.5/15 (MCS0)	1.50	1.40	4.46	0.00	11.0	-6.54
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	-1.52	-0.84	1.84	0.33	11.0	-8.83
	5210	42	ax (80MHz)	29.3/32.5 (MCS0)	-1.74	-1.66	1.31	0.00	11.0	-9.69
	5250	50	ac (160MHz)	58.5/65 (MCS0)	-4.93	-4.80	-1.85	0.33	11.0	-12.52
1/2A	5250	50	ax (160MHz)	58.5/65 (MCS0)	-5.02	-4.25	-1.61	0.00	11.0	-12.61
	5260	52	a	6	6.17	6.20	9.20	0.15	11.0	-1.65
	5280	56	а	6	7.10	6.69	9.91	0.15	11.0	-0.94
	5320	64	а	6	6.30	6.85	9.59	0.15	11.0	-1.26
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	5.69	6.33	9.03	0.00	11.0	-1.97
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	6.54	6.12	9.35	0.00	11.0	-1.65
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	5.79	6.36	9.09	0.00	11.0	-1.91
A	5260	52	ax (20MHz)	6.5/7.2 (MCS0)	5.83	5.92	8.89	0.00	11.0	-2.11
Band 2A	5280	56	ax (20MHz)	6.5/7.2 (MCS0)	5.70	5.91	8.82	0.00	11.0	-2.18
Bar	5320	64	ax (20MHz)	6.5/7.2 (MCS0)	5.75	6.51	9.16	0.00	11.0	-1.84
_	5270	54	n (40MHz)	13.5/15 (MCS0)	3.26	3.42	6.35	0.00	11.0	-4.65
	5310	62	n (40MHz)	13.5/15 (MCS0)	2.96	3.33	6.16	0.00	11.0	-4.84
	5270	54	ax (40MHz)	13.5/15 (MCS0)	2.23	2.34	5.30	0.00	11.0	-5.70
	5310	62	ax (40MHz)	13.5/15 (MCS0)	2.12	2.04	5.09	0.00	11.0	-5.91
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	-0.96	-0.69	2.19	0.33	11.0	-8.48
	5290	58	ax (80MHz)	29.3/32.5 (MCS0)	-1.10	-0.70	2.13	0.00	11.0	-8.89
	5500	100	a	6	6.59	6.25	9.43	0.00	11.0	-1.42
	5600	120	a	6	5.87	6.35	9.13	0.15	11.0	-1.72
	5720	144	a	6	6.86	6.72	9.80	0.15	11.0	-1.05
	5500	100	a n (20MHz)	6.5/7.2 (MCS0)	5.93	6.08	9.00	0.13	11.0	-1.99
	5600	120	n (20MHz)	6.5/7.2 (MCS0)	5.54	5.82	8.69	0.00	11.0	-2.31
	5720	120	n (20MHz)	6.5/7.2 (MCS0)	6.07	5.92	9.09	0.00	11.0	-1.99
	5500	100	ax (20MHz)	6.5/7.2 (MCS0)	6.09	6.14	9.01	0.00	11.0	-1.87
	5600	120	ax (20MHz)	6.5/7.2 (MCS0)	5.56	5.62	8.60	0.00	11.0	-2.40
			, ,	6.5/7.2 (MCS0)						
	5720	144	ax (20MHz)	()	5.88	5.70	8.80	0.00	11.0	-2.20
0	5510	102	n (40MHz)	13.5/15 (MCS0)	2.78	2.79	5.79	0.00	11.0	-5.21
1 2C	5590	118	n (40MHz)	13.5/15 (MCS0)	2.71	2.57	5.65	0.00	11.0	-5.35
Band	5710	142	n (40MHz)	13.5/15 (MCS0)	2.78	2.81	5.81	0.00	11.0	-5.19
•	5510	102	ax (40MHz)	13.5/15 (MCS0)	1.84	2.10	4.98	0.00	11.0	-6.02
	5590	118	ax (40MHz)	13.5/15 (MCS0)	2.09	2.12	5.12	0.00	11.0	-5.88
	5710	142	ax (40MHz)	13.5/15 (MCS0)	2.11	2.02	5.08	0.00	11.0	-5.92
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	-1.51	-0.81	1.86	0.33	11.0	-8.81
	5610	122	ac (80MHz)	29.3/32.5 (MCS0)	-0.90	-1.25	1.94	0.33	11.0	-8.73
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	-0.74	-0.46	2.41	0.33	11.0	-8.26
	5530	106	ax (80MHz)	29.3/32.5 (MCS0)	-1.63	-1.23	1.58	0.00	11.0	-9.42
	5610	122	ax (80MHz)	29.3/32.5 (MCS0)	-1.42	-1.22	1.69	0.00	11.0	-9.31
	5690	138	ax (80MHz)	29.3/32.5 (MCS0)	-1.59	-1.40	1.52	0.00	11.0	-9.48
	5570	114	ac (160MHz)	29.3/32.5 (MCS0)	-5.18	-4.80	-1.97	0.33	11.0	-12.64
	5570	114	ax (160MHz)	29.3/32.5 (MCS0)	-5.20	-4.17	-1.65	0.00	11.0	-12.65

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

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	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Antenn-1 Power Density [dBm]	Antenn-2 Power Density [dBm]	Summed MIMO Power Density [dBm]	DCCF [dB]	Max Permissible Power Density [dBm/500kHz]	Margin [dB]
	5745	149	а	6	4.15	4.29	7.23	0.15	30.0	-22.62
	5785	157	а	6	3.54	4.19	6.89	0.15	30.0	-22.96
	5825	165	а	6	4.01	3.88	6.95	0.15	30.0	-22.90
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	3.25	3.66	6.47	0.00	30.0	-23.53
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	3.02	3.69	6.38	0.00	30.0	-23.62
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	3.79	3.30	6.56	0.00	30.0	-23.44
e	5745	149	ax (20MHz)	6.5/7.2 (MCS0)	3.53	3.99	6.78	0.00	30.0	-23.22
Band	5785	157	ax (20MHz)	6.5/7.2 (MCS0)	3.18	3.83	6.53	0.00	30.0	-23.47
ä	5825	165	ax (20MHz)	6.5/7.2 (MCS0)	3.02	3.32	6.18	0.00	30.0	-23.82
	5755	151	n (40MHz)	13.5/15 (MCS0)	0.44	0.53	3.50	0.00	30.0	-26.50
	5775	155	n (40MHz)	13.5/15 (MCS0)	-0.20	0.81	3.34	0.00	30.0	-26.66
	5755	151	ax (40MHz)	13.5/15 (MCS0)	-0.98	-0.52	2.27	0.00	30.0	-27.73
	5775	155	ax (40MHz)	13.5/15 (MCS0)	-0.78	-0.47	2.39	0.00	30.0	-27.61
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	-3.46	-3.17	-0.30	0.33	30.0	-29.97
	5775	155	ax (80MHz)	29.3/32.5 (MCS0)	-4.36	-3.58	-0.94	0.00	30.0	-30.94

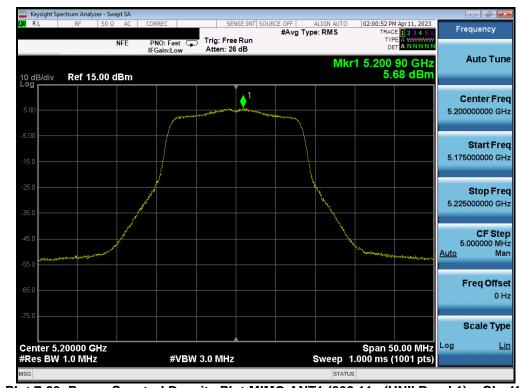
Table 7-17. Band 3 MIMO Conducted Power Spectral Density Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Antenna-1 Power Density [dBm/MHz]	Antenna-2 Power Density [dBm/MHz]	MIMO Summed Power Density [dBm/MHz]	Directional Antenna Gain [dBi]	DCCF [dB]	EIRP Power Density [dBm/MHz]	Max EIRP Power Density [dBm/MHz]	Margin [dB]
Band 3/4	5845	169	а	6	7.07	6.55	9.83	-3.34	0.15	6.64	14.00	-7.36
Band 4	5865	173	а	6	6.84	6.41	9.64	-3.34	0.15	6.45	14.00	-7.55
Danu 4	5885	177	а	6	6.26	5.61	8.96	-3.34	0.15	5.77	14.00	-8.23
Band 3/4	5845	169	n (20MHz)	6.5/7.2 (MCS0)	6.35	6.10	9.24	-3.34	0.00	5.90	14.00	-8.10
Band 4	5865	173	n (20MHz)	6.5/7.2 (MCS0)	6.32	6.11	9.23	-3.34	0.00	5.89	14.00	-8.11
Danu 4	5885	177	n (20MHz)	6.5/7.2 (MCS0)	5.78	5.31	8.56	-3.34	0.00	5.22	14.00	-8.78
Band 3/4	5845	169	ax (20MHz)	6.5/7.2 (MCS0)	6.34	4.85	8.67	-3.34	0.00	5.33	14.00	-8.67
Band 4	5865	173	ax (20MHz)	6.5/7.2 (MCS0)	6.33	5.09	8.76	-3.34	0.00	5.42	14.00	-8.58
Danu 4	5885	177	ax (20MHz)	6.5/7.2 (MCS0)	6.43	4.60	8.62	-3.34	0.00	5.28	14.00	-8.72
Band 3/4	5835	167	n (40MHz)	13.5/15 (MCS0)	3.22	1.85	5.60	-3.34	0.00	2.26	14.00	-11.74
Band 4	5875	175	n (40MHz)	13.5/15 (MCS0)	2.53	2.13	5.34	-3.34	0.00	2.00	14.00	-12.00
Band 3/4	5835	167	ax (40MHz)	13.5/15 (MCS0)	2.61	1.76	5.21	-3.34	0.00	1.87	14.00	-12.13
Band 4	5875	175	ax (40MHz)	13.5/15 (MCS0)	2.81	2.22	5.54	-3.34	0.00	2.20	14.00	-11.80
	5855	171	ac (80MHz)	29.3/32.5 (MCS0)	-0.26	-0.81	2.48	-3.34	0.33	-0.53	14.00	-14.53
Band 3/4	5855	171	ax (80MHz)	29.3/32.5 (MCS0)	-0.50	-1.18	2.18	-3.34	0.00	-1.16	14.00	-15.16
banu 5/4	5815	163	ac (160MHz)	58.5/65 (MCS0)	-5.10	-4.69	-1.88	-3.34	0.33	-4.89	14.00	-18.89
	5815	163	ax (160MHz)	58.5/65 (MCS0)	-5.66	-4.93	-2.27	-3.34	0.00	-5.61	14.00	-19.61

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

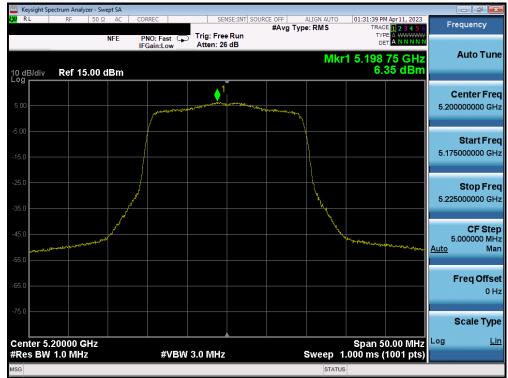




Plot 7-84. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)

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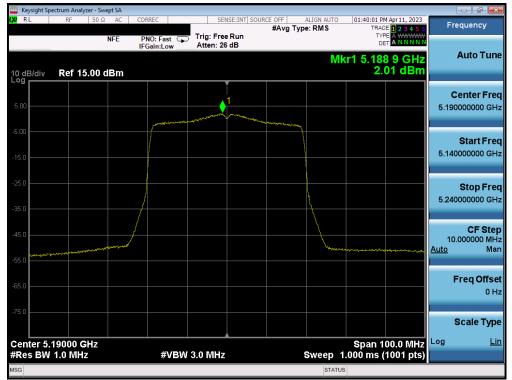
Plot 7-85. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)



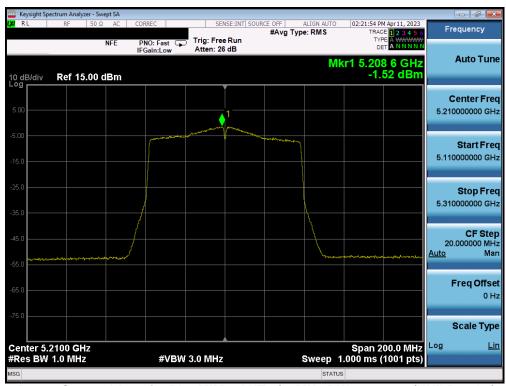
Plot 7-86. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

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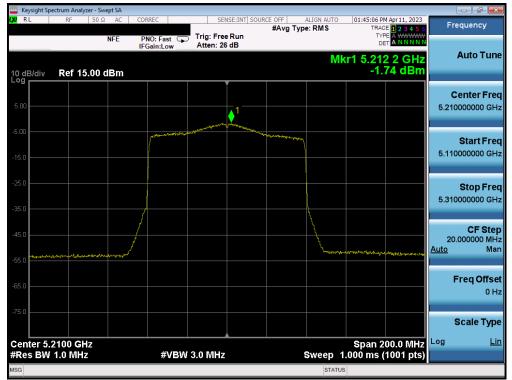
Plot 7-87. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)



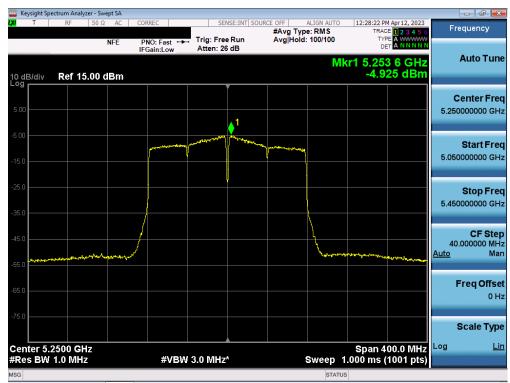
Plot 7-88. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

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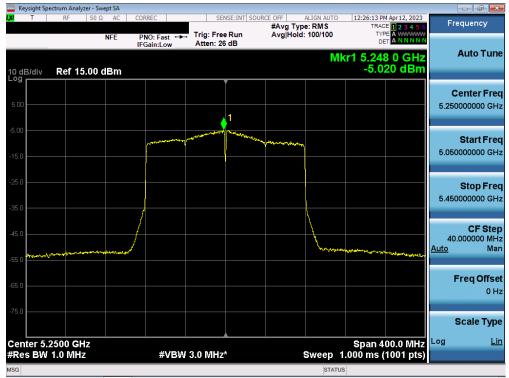
Plot 7-89. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



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

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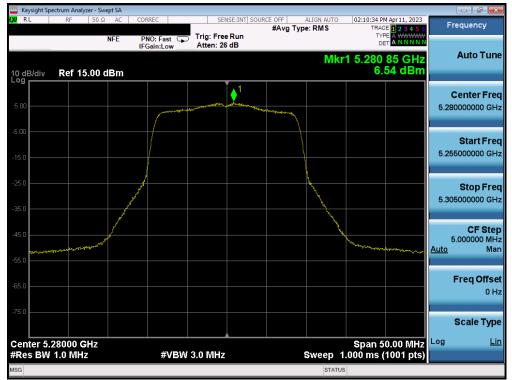
Plot 7-91. Power Spectral Density Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 1/2A) - Ch. 50)



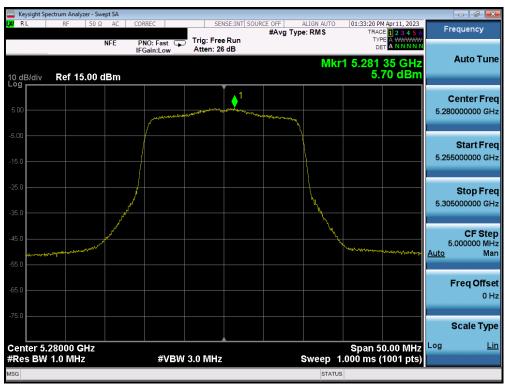
Plot 7-92. Power Spectral Density Plot MIMO ANT1 (802.11a (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		Approved by: Technical Manager
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Plot 7-93. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)



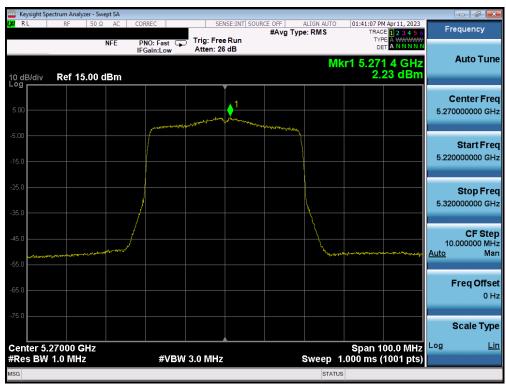
Plot 7-94. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)

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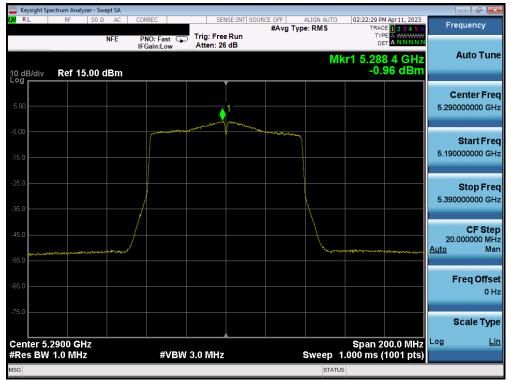
Plot 7-95. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



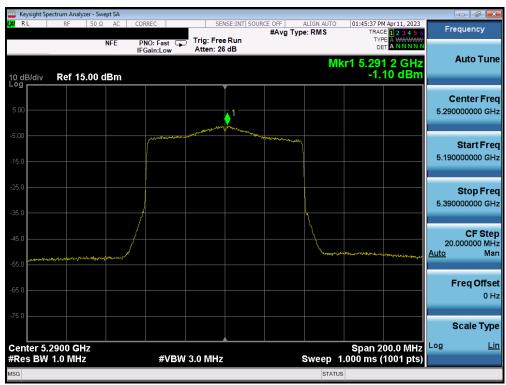
Plot 7-96. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)

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



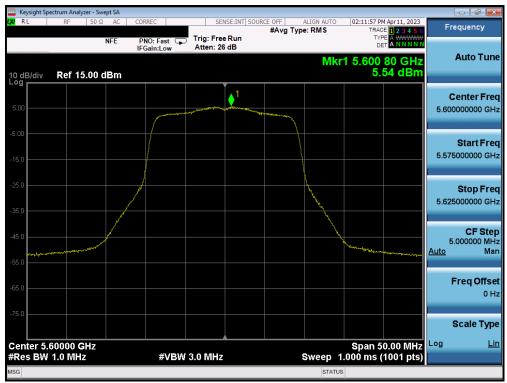
Plot 7-98. Power Spectral Density Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMF731JPN	MEASUREMENT REPORT		Approved by: Technical Manager
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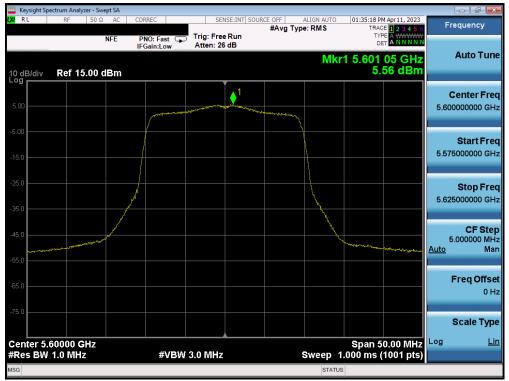
Plot 7-99. Power Spectral Density Plot MIMO ANT1 (802.11a (UNII Band 2C) - Ch. 120)



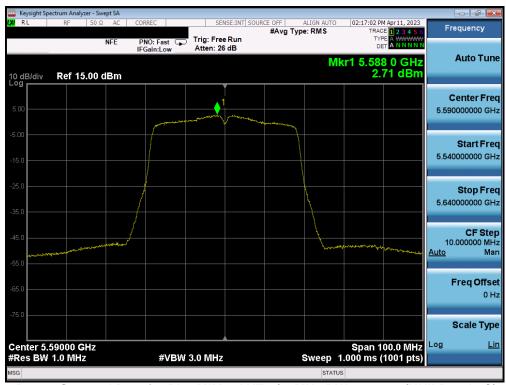
Plot 7-100. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 120)

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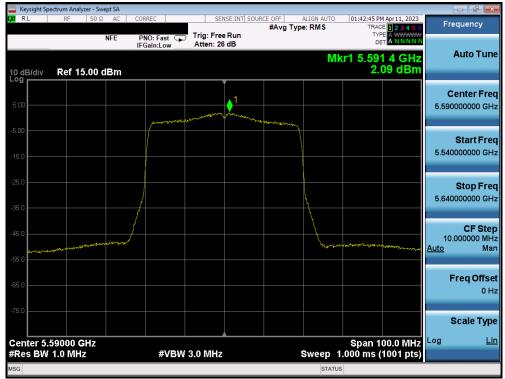
Plot 7-101. Power Spectral Density Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)



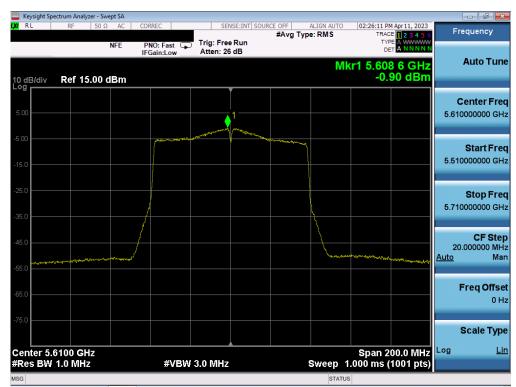
Plot 7-102. Power Spectral Density Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)

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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)

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