

**ELEMENT WASHINGTON DC LLC** 

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## MEASUREMENT REPORT FCC Part 15.407 802.11a/ax WiFi 6E (OFDM)

#### **Applicant Name:**

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea

#### Date of Testing:

5/24-8/1/2023 **Test Report Issue Date:** 8/1/2023 **Test Site/Location:** Element lab., Columbia, MD, USA **Test Report Serial No.:** 1M2304260060-19.A3L

## FCC ID:

### A3LSMS711U

### APPLICANT:

# Samsung Electronics Co., Ltd.

Application Type:	Certification
Model:	SM-S711U
Additional Model(s):	SM-S711U1
EUT Type:	Portable Handset
Frequency Range:	5935 – 7115MHz
Modulation Type:	OFDM
FCC Classification:	15E 6GHz Low Power Dual Client (6CD)
FCC Rule Part(s):	Part 15 Subpart E (15.407)
Test Procedure(s):	ANSI C63.10-2013, KDB 987594 D02 v01r01
	KDB 648474 D03 v01r04

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

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

RJ Ortanez Executive Vice President



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# **MEASUREMENT REPORT**

Channel		Tx Frequency MI		мо
Bandwidth [MHz]	UNII Band	[MHz]	Max. Power [mW]	Max. Power [dBm]
	5	5935 - 6415	19.23	12.84
20	6	6435 - 6515	19.19	12.83
20	7	6535 - 6875	19.05	12.80
	8	6895 - 7115	19.45	12.89
	5	5965 - 6405	23.82	13.77
40	6	6445 - 6525	24.15	13.83
40	7	6565 - 6845	22.49	13.52
	8	6885 - 7085	24.21	13.84
	5	5985 - 6385	24.15	13.83
80	6	6465	23.44	13.70
00	7	6545 - 6865	23.23	13.66
	8	6945 - 7025	21.93	13.41
	5	6025 - 6345	23.07	13.63
160	6	6505	24.95	13.97
100	7	6665 - 6825	24.38	13.87
	8	6985	22.44	13.51

EUT Overview

Note: Data above are max conducted power values.

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## **1.0 INTRODUCTION**

### 1.1 Scope

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

### **1.2 Element Test Location**

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

### 1.3 Test Facility / Accreditations

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

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

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Electronics Co., Ltd. Portable Handset FCC: A3LSMS711U**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter while operating in the 6GHz band.

Test Device Serial No.: 0128M, 0543M, 0441M, 0429M

### 2.2 Device Capabilities

This device contains the following capabilities:

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

	Band 5		Band 6		Band 7		Band 8
Ch.	Frequency (MHz)						
2	5935	97	6435	117	6535	189	6895
:	:	:	:	:	:	:	:
45	6175	105	6475	149	6695	209	6995
:	:	:	:	:	:	:	:
93	6415	113	6515	185	6875	233	7115

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

	Band 5		Band 6		Band 7		Band 8
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
3	5965	99	6445	123	6565	187	6885
:	:	:		:	:	:	:
43	6165	107	6485	155	6725	211	7005
:	:	:	:	:	:	:	:
91	6405	115	6525	179	6845	227	7085

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

Band	5
Danu	J

Band 6

	Band 8
Ch.	Frequency (MHz)
199	6945
	•
215	7025

	Band 5
Ch.	Frequency (MHz)
7	5985
:	:
39	6145
:	:
87	6385

Ch.	Frequency (MHz)
103	6465

Ch.	Frequency (MHz)
119	6545
:	:
151	6705
:	:
183	6865

Band 7

Table 2-3. 802.11ax (80MHz BW)	Frequency / C	hannel Operations

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	Band 5		Band 6 Band 7				Band 8
Ch.	Frequency (MHz)						
15	6025	111	6505	143	6665	207	6985
47	6185			175	6825		
79	6345				·	-	

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

### Notes:

6GHz 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:

802.11 Mode/Band		
а	96.65	
ax (HE20)	99.67	
ax (HE40)	99.69	
ax (HE80)	99.69	
ax (HE160)	99.71	
	a ax (HE20) ax (HE40) ax (HE80)	

Table 2-5. Measured Duty Cycles

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

MiEi Configurationa		SISO		CDD		SDM	
VVIFIC	WiFi Configurations		ANT2	ANT1	ANT2	ANT1	ANT2
6GHz 11a 11ax		×	×	✓	✓	×	×
		×	×	$\checkmark$	$\checkmark$	✓	✓

Table 2-6. Antenna / Technology Configurations

✓ = 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	MCS	Spatial		OFDM (802.11ax)										
	Index	Stream		20MHz			40MHz			80MHz			160MHz	
20MHz	HE		0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI	0.8µs GI	1.6µs GI	3.2µs GI
6	0	1	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	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	1	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	1	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245
24	4	1	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	1	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490
48	6	1	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	1	86	81.3	73.1	172.1	162.5	146.3	360.3	340.3	306.3	720.6	680.6	612.5
	8	1	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735
	9	1	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	0	2	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	1	2	34.4	32.5	29.3	68.8	65	58.5	144.1	136.1	122.5	288.2	272.2	245
12	2	2	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	3	2	68.8	65	58.5	137.6	130	117	288.2	272.2	245	576.5	544.4	490
24	4	2	103.2	97.5	87.8	206.5	195	175.5	432.4	408.3	367.5	864.7	816.7	735
36	5	2	137.6	130	117	275.3	260	234	576.5	544.4	490	1152.9	1088.9	980
48	6	2	154.9	146.3	131.6	309.7	292.5	263.3	648.5	612.5	551.3	1297.1	1225	1102.5
54	7	2	172.1	162.5	146.3	344.1	325	292.5	720.6	680.6	612.5	1441.2	1361.1	1225
	8	2	206.5	195	175.5	412.9	390	351	864.7	816.7	735	1729.4	1633.3	1470
	9	2	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

Table 2-7. Supported Data Rates

The following antenna gains are used in this device per the "Unlicensed Band Antenna Gain" document provided by the client. This document is also included in the filing as a public exhibit.

Frequency	Ant1 Peak Gain [dBi]	Ant2 Peak Gain [dBi]	Directional Gain [dBi]
5925 MHz	-4.58	-7.23	-2.79
6025 MHz	-5.23	-6.51	-2.84
6125 MHz	-5.35	-6.88	-3.07
6225 MHz	-4.88	-7.17	-2.94
6325 MHz	-4.76	-7.85	-3.16
6425 MHz	-4.37	-7.88	-2.94
6525 MHz	-4.26	-7.75	-2.82
6625MHz	-4.83	-7.42	-3.02
6725MHz	-5.11	-7.35	-3.15
6825MHz	-5.26	-7.64	-3.36
6925MHz	-4.86	-7.28	-2.98
7025MHz	-4.74	-7.15	-2.85
7125MHz	-4.99	-6.83	-2.85

**Table 2-8 Antenna Peak Gain per Frequency** 

	Ant1 Peak Gain [dBi]	Ant2 Peak Gain [dBi]	Directional Gain [dBi]
5925 – 6425 MHz	-4.58	-7.23	-2.79
6425 – 6525 MHz	-4.37	-7.88	-2.94
6525 – 6875 MHz	-4.26	-7.75	-2.82
6875 – 7125 MHz	-4.74	-7.15	-2.85

### Table 2-9. Antenna Peak Gain

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## 2.4 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013 and KDB 987594 D02 v01r01. 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, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5 and 7.6 for antenna port conducted emissions test setups.

This device operates in the 5.925-7.125 GHz band when under control of a low power indoor access point. Additionally, the device may operate in the 5.925-6.425 GHz and 6.525-6.875 GHz bands when under control of a standard power access point.

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) Model: 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.

### 2.5 Software and Firmware

The test was conducted with firmware version S711USQU0AWG7 installed on the EUT.

### 2.6 EMI Suppression Device(s) / Modifications

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

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## 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 987594 D02 v01r01 were 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 7.8. 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 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 precautions were 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 were 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)
Contention Based Protocol Conducted Measurements	0.86
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
-	WL25-1	Conducted Cable Set (25GHz)	1/12/2023	Annual	1/12/2024	WL25-1
-	WL40-1	Conducted Cable Set (40GHz)	1/12/2023	Annual	1/12/2024	WL40-1
Anritsu	MA24408A	Microwave Peak Power Sensor	6/1/2022	Annual	8/30/2023	11675
Anritsu	MA24408A	Microwave Peak Power Sensor	4/12022	Annual	8/30/2023	11676
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
EMCO	3116	Horn Antenna (18-40GHz)	7/20/2021	Biennial	8/30/2023	9203-2178
Keysight Technologies	N9030A	PXA Signal Analyzer (3Hz-26.5GHz)	9/6/2022	Annual	9/6/2023	MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Keysight Technologies	N9038A	MXE EMI Receiver	1/21/2022	Annual	7/31/2023	MY51210133
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	1/11/203	Annual	1/11/2024	NMLC-2
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	9/28/2022	Biennial	9/28/2024	101058
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	100342
Rohde & Schwarz	ESW44	EMI Test Receiver (2Hz-44GHz)	3/1/2023	Annual	3/1/2024	101716
Rohde & Schwarz	VULB9162	Bi-Log Antenna	2/21/2023	Biennial	2/21/2025	00301
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	9/21/2021	Biennial	9/21/2023	310233
Sunol	DRH-118	Horn Antenna (1-18GHz)	2/14/2022	Biennial	2/14/2024	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	8/30/2022	Biennial	8/30/2024	A051107
Sunol	JB6	JB6 Antenna	3/2/2023	Biennial	3/2/2025	A082816

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:A3LSMS711UFCC Classification:15E 6GHz Low Power Dual Client (6CD)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1046, 15.407(a)(11)	Maximum Conducted Output Power	N/A		PASS	Section 7.3
15.407(a)(8)	Maximum Radiated Output Power	< 24dBm over the frequency band of operation		PASS	Section 7.3
2.1049, 15.407(a)(10)	Occupied Bandwidth/ 26dB Bandwidth	99% of the occupied bandwidth of any channel must be contained within each of its respective U-NII sub bands. The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz.	CONDUCTED	PASS	Section 7.2
15.407(a)(8)	Maximum Power Spectral Density	< -1dBm/MHz e.i.r.p.		PASS	Section 7.4
15.407(b)(7)	In-Band Emissions	EUT must meet the limits detailed in 15.407(b)(7)		PASS	Section 7.5
15.407(d)(6)	Contention Based Protocol	EUT must detect AWGN signal with 90% (or better) certainty		PASS	Section 7.6
15.407(b)(6)	Undesirable Emissions	< -27dBm/MHz e.i.r.p. outside of the 5.925 – 7.125GHz band		PASS	Section 7.7
15.205, 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED	PASS	Section 7.7
15.407(b)(9)	AC Conducted Emissions (150kHz – 30MHz)	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 7.8

Table 7-1. Summary of Test Results

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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#### 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) Per 15.407(a)(7), a device operating under the control of a standard power access point in 5.925-6.425 GHz and 6.525-6.875 GHz bands must not have the maximum power spectral density exceed 17 dBm/MHz e.i.r.p., must limit the maximum e.i.r.p. over the frequency band of operation does not exceed 30 dBm, and must limit its power to no more than 6 dB below its associated standard power access point's authorized transmit power. Compliance to this clause is addressed via submission of an attestation following Appendix B of KDB 987594 D01 v01r03.
- 5) 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.
- 6) 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 1.3.1.

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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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				Antenna-1	Antenna-1
	Frequency	Channel	802.11	Occupied	Occupied
	[MHz]	Charmer	MODE	Bandwidth	Bandwidth
				[MHz]	[MHz]
	5935	2	а	19.02	19.05
	6175	45	а	16.63	16.58
	6415	93	а	16.62	16.59
	5935	2	ax (20MHz)	19.10	19.06
	6175	45	ax (20MHz)	19.06	19.00
	6415	93	ax (20MHz)	19.01	19.05
15	5965	3	ax (40MHz)	37.91	37.79
Band 5	6165	43	ax (40MHz)	37.89	37.96
ä	6405	91	ax (40MHz)	37.95	37.92
	5985	7	ax (80MHz)	77.52	77.54
	6145	39	ax (80MHz)	77.68	77.44
	6385	87	ax (80MHz)	77.53	77.44
	6025	15	ax (160MHz)	156.48	156.24
	6185	47	ax (160MHz)	156.40	156.63
	6345	79	ax (160MHz)	156.51	156.27
	6435	97	а	16.63	16.61
	6475	105	а	16.61	16.55
	6515	113	а	16.67	16.53
	6435	97	ax (20MHz)	19.00	19.02
4 G	6475	105	ax (20MHz)	19.03	19.04
Band 6	6515	113	ax (20MHz)	19.07	19.05
•	6445	99	ax (40MHz)	37.89	37.83
	6485	107	ax (40MHz)	37.88	37.85
	6525	115	ax (40MHz)	37.84	37.83
	6465	103	ax (80MHz)	77.52	77.42
	6505	111	ax (160MHz)	156.65	156.40
	6535	117	а	16.64	16.56
	6695	149	а	16.60	16.58
	6875	185	a (2014)	16.70	16.59
	6535	117	ax (20MHz)	19.06	19.03
	6695	149	ax (20MHz)	19.04	18.98
2	6875	185	ax (20MHz)	19.06	19.08
Band 7	6565	123	ax (40MHz)	37.85	37.86
Ba	6725	155	ax (40MHz)	37.97	37.87
	6845	179	ax (40MHz)	37.88	37.86
	6545	119	ax (80MHz)	77.38	77.49
	6705	151	ax (80MHz)	77.49	77.59
	6865	183	ax (80MHz)	77.50	77.48
	6665	143	ax (160MHz)	156.41	156.45
	6825 6895	175 189	ax (160MHz)	156.34 16.70	156.49 16.59
			a		
	6995	209	a	16.64 16.68	16.58 16.58
	7115 6895	233 189	a ax (20MHz)	19.08	
	6995	209	ax (20MHz)	19.08	19.07 19.06
8	7115	209	ax (20MHz)	19.08	19.00
Band 8	6885	187	ax (40MHz)	37.88	37.95
8	7005	211	ax (40MHz)	37.88	37.95
	7085	211	ax (40MHz)	37.81	37.85
	6945	199	ax (80MHz)	77.62	77.69
	7025	215	ax (80MHz)	77.39	77.39
	6985	213	ax (160MHz)	156.44	156.38
				vidth Test Resu	

### Table 7-2. Occupied Bandwidth Test Results

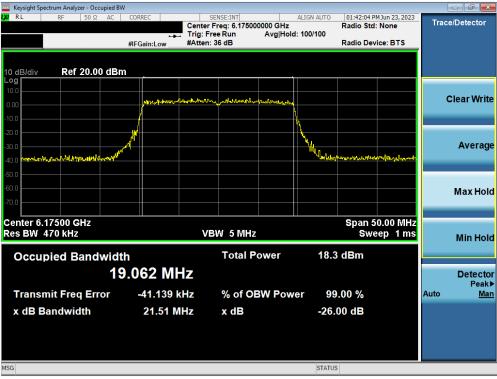
FCC ID: A3LSMS711U		MEASUREMENT REPORT			
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			N/ 0 0 00/01/0010		



## 7.2.1 MIMO Antenna-1 26 dB Bandwidth Measurements - (UNII Band 5)

🔤 Keysight Spectrum Analyzer - Occupied BW RI ALIGN AUTO 10:40:05 AM Jun 23, 2023 Trace/Detector Center Freq: 6.175000000 GHz Radio Std: None Avg|Hold: 100/100 Trig: Free Run #Atten: 36 dB Radio Device: BTS #IFGain:Low Ref 20.00 dBm l0 dB/div og **Clear Write** Average Max Hold Center 6.17500 GHz Span 50.00 MHz Res BW 470 kHz VBW 5 MHz Sweep 1 ms Min Hold **Occupied Bandwidth** Total Power 17.4 dBm 16.628 MHz Detector **Peak**▶ Transmit Freq Error -47.109 kHz % of OBW Power Man 99.00 % Auto x dB Bandwidth 20.05 MHz -26.00 dB x dB MSG STATUS





Plot 7-2. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11ax (UNII Band 5) - Ch. 45)

FCC ID: A3LSMS711U		MEASUREMENT REPORT			
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Mark       RF       SO G       AC       CORREC       Estession       Mark and To       1222/05 PM Jun 23, 2023       Trace/Detector         Image: Conter Freq: 16500000 GHz       Trig: Free Run       Avg Hold: 100/100       Radio Std: None       None       Non	Keysight Spectrum Analyzer - Occupied BW					_ • • •
Trig: Free Run       Avg Hold: 100/100         #FGain:Low       Trig: Free Run       Avg Hold: 100/100         Radio Device: BTS       Clear Write         Log       Average         Log       Max Hold         Log       Span 100.0 MHz         Center 6.16500 GHz       VBW 8 MHz       Span 100.0 MHz         Ccupied Bandwidth       Total Power       20.8 dBm         Occupied Bandwidth       Total Power       20.8 dBm         Detector       Peak>         Auto       Max Hold	LXI RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO	12:22:05 PM Jun 23, 2023 Radio Std: None	Trace/Detector
Image: Strategy of the strategy			Trig: Free Run			
Log 200 200 200 200 200 200 200 20		#IFGain:Low	#Atten: 36 dB		Radio Device: BTS	-
Log 200 200 200 200 200 200 200 20						
200       Image: Standard and index out of the standard						
000						
0.00       100 <td< td=""><td>10.0</td><td></td><td></td><td></td><td></td><td>Clear Write</td></td<>	10.0					Clear Write
20.0       Average         20.0       Max Hold         20.0       Average         20.0       Average         20.0       Average         20.0       Average         20.0       Average         20.0       Average         20.0       Average </td <td>0.00</td> <td>mahandarita</td> <td>whentownergelabersonichet</td> <td>an and the parts</td> <td></td> <td></td>	0.00	mahandarita	whentownergelabersonichet	an and the parts		
30.0       and	-10.0					
40.0 60.0 60.0 60.0 60.0 60.0 Center 6.16500 GHz Res BW 910 kHz VBW 8 MHz Span 100.0 MHz Sweep 1 ms Occupied Bandwidth 37.892 MHz Transmit Freq Error 5.408 kHz % of OBW Power 99.00 % Max Hold Detector Peak≻ Auto Max	-20.0	_ <u>/</u>		<u> </u>		Average
400       400	-30.0	1		<u> </u>		
Center 6.16500 GHz Res BW 910 kHz       VBW 8 MHz       Span 100.0 MHz Sweep 1 ms       Min Hold         Occupied Bandwidth 37.892 MHz       Total Power       20.8 dBm       Detector Peak≻ Auto       Detector Peak≻         Transmit Freq Error       5.408 kHz       % of OBW Power       99.00 %       Min Hold	-40.0	<b>*</b>		"lefter and	mannann	
Image: Second conditions of the second conditis of the second conditions of the second co	-50.0					Max Hold
Center 6.16500 GHz Res BW 910 kHz       Span 100.0 MHz Sweep 1 ms       Min Hold         Occupied Bandwidth 37.892 MHz       Total Power       20.8 dBm         Transmit Freq Error       5.408 kHz       % of OBW Power       99.00 %	-60.0					
Res BW     910 kHz     VBW     8 MHz     Sweep     1 ms       Occupied Bandwidth     Total Power     20.8 dBm       37.892 MHz     Detector       Transmit Freq Error     5.408 kHz     % of OBW Power     99.00 %						
Occupied Bandwidth     Total Power     20.8 dBm       37.892 MHz     Detector       Transmit Freq Error     5.408 kHz     % of OBW Power     99.00 %						
37.892 MHz     Detector       Transmit Freq Error     5.408 kHz     % of OBW Power     99.00 %	Res BW 910 KHz				Sweep 1 m	Min Hold
37.892 MHz     Detector       Transmit Freq Error     5.408 kHz     % of OBW Power     99.00 %     Auto     Man	Occupied Bandwidt	n	Total P	ower 20.8	3 dBm	
Transmit Freq Error 5.408 kHz % of OBW Power 99.00 %			1-			Detecto
	57	.092 1015	12			
x dB Bandwidth 40.94 MHz x dB -26.00 dB	Transmit Freq Error	5.408 k	Hz % of O	BW Power 99	0.00 %	
	x dB Bandwidth	40.94 M	Hz xdB	-26	00 dB	
MSG STATUS	MSG				S	

Plot 7-3. 26dB Bandwidth Plot MIMO ANT1 (40MHz 802.11ax (UNII Band 5) - Ch. 43)



Plot 7-4. 26dB Bandwidth Plot MIMO ANT1 (80MHz 802.11ax (UNII Band 5) - Ch. 39)

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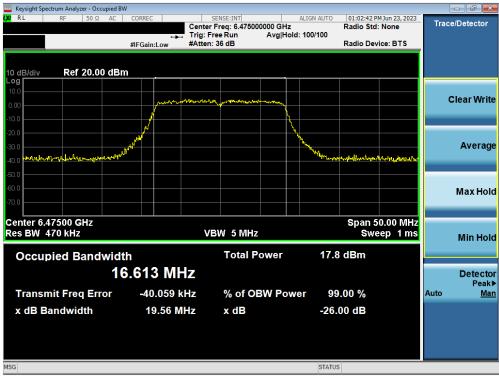
Keysight Spectrum Analyzer - Occupied E						
LX/ RL RF 50Ω AC	CORREC	SENSE:INT Center Freq: 6.1850	00000 GHz	11:02:08 AM Ju Radio Std: No		Trace/Detector
	+ #IFGain:Low	Trig: Free Run #Atten: 36 dB	Avg Hold: 100/100	Radio Device	BTS	
	#IFGain:Low	#Atten: 36 dB		Radio Device	. 813	
10 dB/div Ref 30.00 dB Log	m					
20.0						Clear Write
10.0	a second distance	a portal parties the generation	Konnelinture			Clear write
0.00						
-10.0						
-20.0						Average
-30,0 pertendependent of the second s	ahr.		Harlen	Manula Haribada artista.	wannut	
-40.0						
-50.0						Max Hold
-60.0						
Center 6.1850 GHz				Span 400		
Res BW 3 MHz		<b>VBW 50 MI</b>	Ηz		5 1 ms	Min Hold
Occupied Bandwid	th	Total F	Power 22	.6 dBm		
1	56.40 MI	Hz				Detector
Tranamit Frag Freer	-35.077		BW Power 9	9.00 %		Peak▶ Nuto Man
Transmit Freq Error					<i>^</i>	tuto <u>iman</u>
x dB Bandwidth	167.5 N	MHz xdB	-26	5.00 dB		
MSG			STAT	US		

Plot 7-5. 26dB Bandwidth Plot MIMO ANT1 (160MHz 802.11ax (UNII Band 5) – Ch. 47)

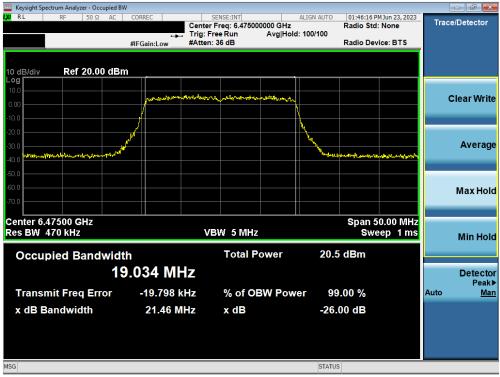
FCC ID: A3LSMS711U		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Dega 20 of 120	
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## MIMO Antenna-1 26 dB Bandwidth Measurements - (UNII Band 6)



Plot 7-6. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11a (UNII Band 6) - Ch. 105)



Plot 7-7. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11ax (UNII Band 6) - Ch. 105)

FCC ID: A3LSMS711U		MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	EUT Type:	Page 21 of 138		
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🔤 Keysight Spectrum Analyzer - Occupied	BW				
IX RL RF 50Ω AC	+++ Trig:		Radio Ste 1: 100/100		Trace/Detector
	#IFGain:Low #Atte	n: 36 dB	Radio De	vice: BTS	
10 dB/div Ref 30.00 dB	m				
20.0					
10.0					Clear Write
0.00	at mark little the second	aller and aller and all a should be should be should be a should be a should b			
-10.0					
-20.0			<u>\</u>		Average
-30.0 www.whitemations			the shellow have been and	AND MARCHINE COMMON	
-40.0					
-50.0					Max Hold
-60.0					
Center 6.48500 GHz				100.0 MHz	
Res BW 910 kHz		VBW 8MHz	Sw	eep 1 ms	Min Hold
Occupied Bandwid	lth	Total Power	20.7 dBm		
	7.883 MHz				Detector Peak▶
Transmit Freq Error	-45.283 kHz	% of OBW Pow	er 99.00 %		Auto <u>Man</u>
x dB Bandwidth	41.00 MHz	x dB	-26.00 dB		
MSG			STATUS		
mod			STATUS		

Plot 7-8. 26dB Bandwidth Plot MIMO ANT1 (40MHz 802.11ax (UNII Band 6) - Ch. 107)



Plot 7-9. 26dB Bandwidth Plot MIMO ANT1 (80MHz 802.11ax (UNII Band 6) - Ch. 103)

FCC ID: A3LSMS711U		MEASUREMENT REPORT		
Test Report S/N:	Test Dates:	EUT Type:	Daga 22 of 129	
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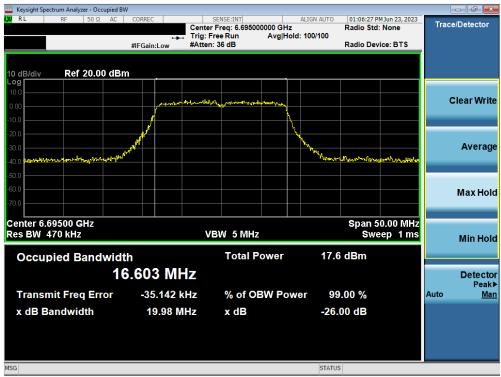
Keysight Spectrum Analyzer - Occupied BW						
LXURL RF 50Ω AC	CORREC	SENSE:INT Center Freg: 6.50500	ALIGN AUT	0 11:08:10 AM Radio Std:	1 Jun 23, 2023	Trace/Detector
	+	Trig: Free Run	Avg Hold: 100/100			
	#IFGain:Low	#Atten: 36 dB		Radio Devi	ce: BTS	
10 dB/div Ref 20.00 dBm Log	<u> </u>		· · · · ·			
10.0						
0.00	mound	war other muchan	warming and marries			Clear Write
-10.0						
-20.0						
30 0 minun number and an and a second			hugen	Where the section of the section	and hild and and	Average
-40.0						, tronugo
-50.0						
-60.0						
						Max Hold
-70.0						
Center 6.5050 GHz				Span 4	00.0 MHz	
Res BW 3 MHz		VBW 50 MH	z	Swe	ep 1 ms	Min Hold
		Total P	ower 24	.8 dBm		
Occupied Bandwidt			Ower Z			
15	6.65 MI	HZ				Detector
Transmit Freq Error	-141.28	kHz % of O	BW Power	99.00 %		Peak▶ Auto Man
· · · · ·						<u>man</u>
x dB Bandwidth	168.8 N	MHz x dB	-2	6.00 dB		
MSG			STA	TUS		

Plot 7-10. 26dB Bandwidth Plot MIMO ANT1 (160MHz 802.11ax (UNII Band 6) - Ch. 111)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	Test Dates: EUT Type:	
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## MIMO Antenna-1 26 dB Bandwidth Measurements - (UNII Band 7)



Plot 7-11. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11a (UNII Band 7) - Ch. 149)



Plot 7-12. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11ax (UNII Band 7) - Ch. 149)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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Keysight Spectrum Analyzer - Occupied B					
<b>LX/</b> RL RF 50Ω AC	CORREC	SENSE:INT Center Freq: 6.7250		12:30:55 PM Jun 23, 2 Radio Std: None	Trace/Detector
	+ #IFGain:Low	<ul> <li>Trig: Free Run #Atten: 36 dB</li> </ul>	Avg Hold: 100/100	Radio Device: BT	s
	WI Gam. Low				
10 dB/div Ref 30.00 dB	m				
Log					
20.0					Clear Write
0.00	Lanna and	workstrawner warden warden war	when when a		
-10.0	/				
-20.0	/				Average
-30.0			<u> </u>		Ū.
-40.0	W.		Krahanta	Ventlemod (Libergrenod (Libergreno	
-50.0					Max Hold
-60.0					MaxHold
				0	
Center 6.72500 GHz Res BW 910 kHz		VBW 8 MHz		Span 100.0 N Sweep 1	m 0
					Min Hold
Occupied Bandwid	th	Total F	ower 20.	3 dBm	
3	7.972 MI	lz			Detector
Transmit Freg Error	-23.970	Hz % of O	BW Power 9	9.00 %	Peak► Auto Man
· · · ·					
x dB Bandwidth	41.31 M	lHz x dB	-26	.00 dB	
MSG			STATU	15	
100			SIAIC		

Plot 7-13. 26dB Bandwidth Plot MIMO ANT1 (40MHz 802.11ax (UNII Band 7) - Ch. 155)



Plot 7-14. 26dB Bandwidth Plot MIMO ANT1 (80MHz 802.11ax (UNII Band 7) – Ch. 151)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	Test Dates: EUT Type:	
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🔤 Keysight Spectrum Analyzer - Occupied					- ē <b>×</b>
LX RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO	11:10:31 AM Jun 23, 20 Radio Std: None	Trace/Detector
	••	Trig: Free Run #Atten: 36 dB	Avg Hold: 100/100	Radio Device: BTS	
	#IFGain:Low	#Atten: 36 dB		Radio Device: B13	-
10 dB/div Ref 30.00 dl	3m				
20.0					
10.0		Land mar and the lat			Clear Write
0.00	hermente	angen (alle and a second s			
-10.0					
-20.0					Average
-30.0 same land a share when the	and and a second s		Wyward	- martels, glogener ben horester.	<u>44</u>
-40.0					
-50.0					Max Hold
-60.0					Maxilola
Center 6.6650 GHz Res BW 3 MHz		VBW 50 MH	_	Span 400.0 Mi Sweep 1 n	
Res DW J WINZ			2	Sweep II	Min Hold
Occupied Bandwi	dth	Total P	ower 21.6	6 dBm	
	56.41 M	47			Detector
		12			Peak►
Transmit Freq Error	-131.13	kHz % of O	BW Power 99	9.00 %	Auto <u>Man</u>
x dB Bandwidth	167.2 M	/Hz xdB	-26.	00 dB	
MSG			STATU	s	
			0 ATO		

Plot 7-15. 26dB Bandwidth Plot MIMO ANT1 (160MHz 802.11ax (UNII Band 7) - Ch. 143)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	Test Dates: EUT Type:	
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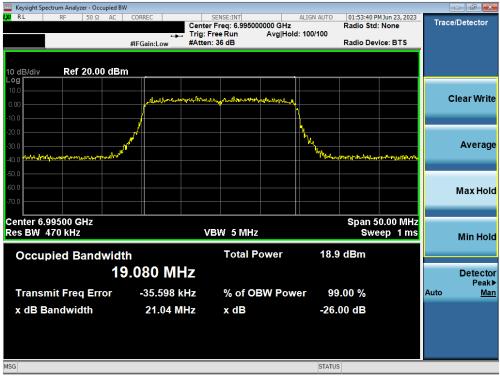
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## MIMO Antenna-1 26 dB Bandwidth Measurements - (UNII Band 8)



Plot 7-16. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11a (UNII Band 8) - Ch. 209)



Plot 7-17. 26dB Bandwidth Plot MIMO ANT1 (20MHz 802.11ax (UNII Band 8) - Ch. 209)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dega 27 of 129
1M2304260060-19.A3L	5/24-8/1/2023	Portable Handset	Page 27 of 138
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Keysight Spectrum Analyzer - Occupied E	W				
IXI RL RF 50Ω AC		SENSE:INT enter Freq: 7.0050000 rig: Free Run	ALIGN AUTO 00 GHz Avg Hold: 100/100	12:54:05 PM Jun 23, 202 Radio Std: None	Trace/Detector
		Atten: 36 dB		Radio Device: BTS	_
10 dB/div Ref 20.00 dB	m				
10.0		Juration of the section of the			
0.00	and the second s	∼°.,4√k,, <sub>2</sub> ,0 <sup>00</sup> U, <sub>4</sub> ,8,9~964,8,8048,949,940	Mundan		Clear Write
-10.0	<mark>/</mark>				
-20.0					
-30.0	N			Ano and the second second	Average
-40.0				@~1/19F~a_P^9~}////////////////////////////////////	40 <del>4</del>
-50.0					
-60.0					Max Hold
-70.0					
Center 7.00500 GHz				Span 100.0 MH	
Res BW 910 kHz		VBW 8 MHz		Sweep 1 m	
Occupied Bandwid		Total Pov	wer 20.9	∂ dBm	
3	7.925 MHz				Detector
Transmit Freg Error	-23.247 kHz	% of OBV		9.00 %	Peak▶ Auto Man
					Hato <u>man</u>
x dB Bandwidth	41.09 MHz	x dB	-26.	00 dB	
				-	
MSG			STATU	S	

Plot 7-18. 26dB Bandwidth Plot MIMO ANT1 (40MHz 802.11ax (UNII Band 8) - Ch. 211)



Plot 7-19. 26dB Bandwidth Plot MIMO ANT1 (80MHz 802.11ax (UNII Band 8) - Ch. 199)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dage 20 of 120
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Keysight Spectrum Analyzer - Occupied B					- # <b>X</b>
LXI RL RF 50Ω AC	CORREC	SENSE:INT Center Freg: 6.98500	ALIGN AUTO	11:14:35 AM Jun 23, 2023 Radio Std: None	Trace/Detector
			Avg Hold: 100/100		
	#IFGain:Low	#Atten: 36 dB		Radio Device: BTS	-
10 dB/div Ref 30.00 dB Log	m				
20.0					
10.0					Clear Write
0.00	monorman	and the second	word was		
-10.0					
-20.0					Average
-30.0 mathaligner.com/manunalsolation	week		Honorbook	makerenant	, tronugo
-40.0					
-50.0					
					Max Hold
-60.0					
Center 6.9850 GHz				Span 400.0 MHz	
Res BW 3 MHz		VBW 50 MH	z	Sweep 1 ms	Min Hold
		Total P	24	3 dBm	
Occupied Bandwid			ower 21.	завт	
1	56.44 M	Hz			Detector
Transmit Freq Error	-107.03		BW Power 99	9.00 %	Peak▶ Auto Man
					Auto <u>mun</u>
x dB Bandwidth	168.5 M	MHz xdB	-26	.00 dB	
MSG			STATU	IS	

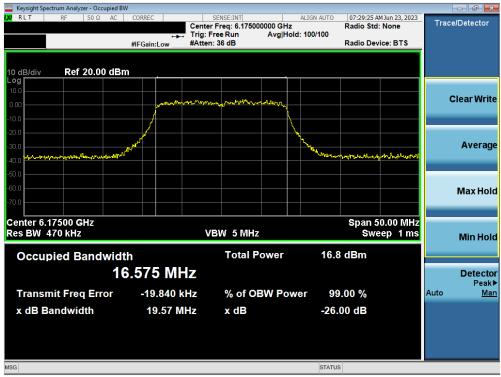
Plot 7-20. 26dB Bandwidth Plot MIMO ANT1 (160MHz 802.11ax (UNII Band 8) - Ch. 207)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dage 20 of 128
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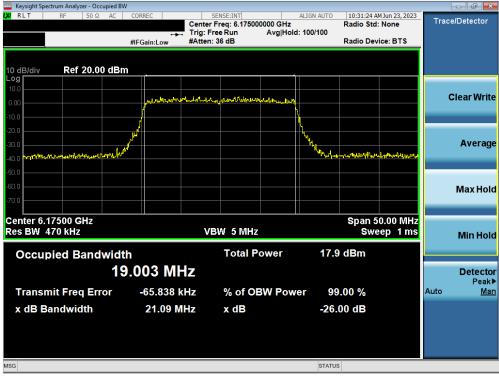
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## 7.2.2 MIMO Antenna-2 26 dB Bandwidth Measurements - (UNII Band 5)



Plot 7-21. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11a (UNII Band 5) - Ch. 45)



Plot 7-22. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11ax (UNII Band 5) - Ch. 45)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dama 00 at 100
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Keysight Spectrum Analyzer - Occupi						- # <b>X</b>
<b>LX/</b> RLT RF 50Ω A		SENSE:INT Center Freq: 6.1650	ALIGN AUTO	09:11:28 AM Ju Radio Std: N		Trace/Detector
		Trig: Free Run #Atten: 36 dB	Avg Hold: 100/100	Radio Device	DIE	
	#IFGain:Low	#Atten: 36 dB		Radio Device	e: B15	
	_					
10 dB/div Ref 20.00 c	IBm					
10.0						
0.00	regard shat when a	mound	tory the level beau			Clear Write
-10.0	/					
-20.0	/		N			
-30.0	۴		i,			Average
-40.0	Nutre		Hybridge	and the second	www.califier.ca	-
-50.0						
-60.0						
-70.0						Max Hold
-70.0						
Center 6.16500 GHz				Span 100		
Res BW 910 kHz		VBW 8 MHz	2	Swee	p 1 ms	Min Hold
Occupied Bandw	idth	Total F	Power 19	.8 dBm		
	37.955 MH	Ζ				Detector Peak▶
Transmit Freq Error	-15.528 kH	z % of O	BW Power 9	9.00 %	A	uto <u>Man</u>
x dB Bandwidth	41.02 MH	z x dB	26	5.00 dB		
	41.02 MI		-20			
MSG			STAT	US		

Plot 7-23. 26dB Bandwidth Plot MIMO ANT2 (40MHz 802.11ax (UNII Band 5) - Ch. 43)



Plot 7-24. 26dB Bandwidth Plot MIMO ANT2 (80MHz 802.11ax (UNII Band 5) - Ch. 39)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dogo 24 of 129
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Keysight Spectrum Analyzer - Occupied			T			- d <b>X</b>
LX RLT RF 50Ω AC	CORREC	SENSE:INT Center Freq: 6.18500		Radio Std:	1Jun 23, 2023 None	Trace/Detector
		Trig: Free Run #Atten: 36 dB	Avg Hold: 100/	100 Radio Devi	DTC	
	#IFGain:Low	#Atten: 36 dB		Radio Devi	ce: DTS	
10 dB/div Ref 20.00 dl	3m					
10.0						
0.00	restorester	and and a the second	al more have a			Clear Write
-10.0	<b> </b>		l			
-20.0	(		↓I\			
-30.0 and margh make margh the	wat		Yer.	Anton the second state of the s	hoge how all here a	Average
-40.0						
-50.0						
-60.0						Max Hold
-70.0						wiax noiu
Center 6.1850 GHz			_		00.0 MHz	
Res BW 3 MHz		VBW 50 MH	Z	swe	ep 1 ms	Min Hold
Occupied Bandwi	dth	Total P	ower	20.8 dBm		
	156.63 MH	1-				Detector
	190.03 101	12				Detector Peak►
Transmit Freq Error	-273.01	Hz % of Ol	3W Power	99.00 %		Auto <u>Man</u>
x dB Bandwidth	167.2 M	Hz x dB		-26.00 dB		
MSG				STATUS		
mod				314103		

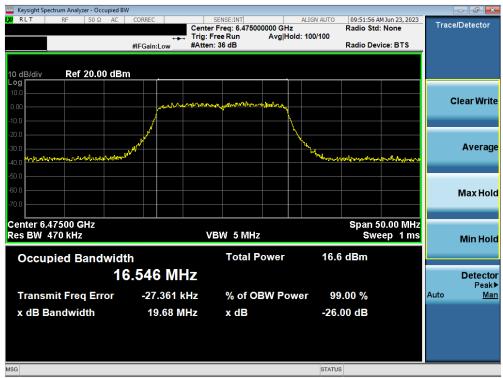
Plot 7-25. 26dB Bandwidth Plot MIMO ANT2 (160MHz 802.11ax (UNII Band 5) - Ch. 47)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 120
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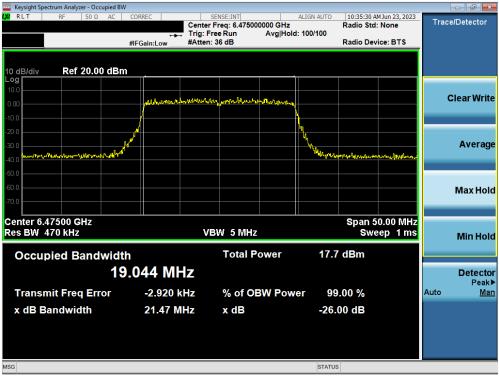
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## MIMO Antenna-2 26 dB Bandwidth Measurements - (UNII Band 6)



Plot 7-26. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11a (UNII Band 6) - Ch. 105)



Plot 7-27. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11ax (UNII Band 6) - Ch. 105)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	Test Dates: EUT Type:	
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Plot 7-28. 26dB Bandwidth Plot MIMO ANT2 (40MHz 802.11ax (UNII Band 6) - Ch. 107)



Plot 7-29. 26dB Bandwidth Plot MIMO ANT2 (80MHz 802.11ax (UNII Band 6) - Ch. 103)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 24 of 120
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Keysight Spectrum Analyzer - Occupied B					
100 RLT RF 50 Ω AC	Trig:	SENSE:INT Freq: 6.505000000 GHz Free Run Avg Holo n: 36 dB	ALIGN AUTO 07:57:59 / Radio Sto d: 100/100 Radio De		Trace/Detector
10 dB/div Ref 20.00 dBr	n				
0.00	Linnthemaniller	very the anone for the second			Clear Write
-10.0 -20.0 -30.0 <mark>daughtypypelypelypelypelypelypelypelypelypelyp</mark>	Alexand and a second and a se		July Mary Lange Concerned Market	up an en angela ta finda	Average
-40.0					
-70.0					Max Hold
Center 6.5050 GHz Res BW 3 MHz	\	/BW 50 MHz		00.0 MHz eep 1 ms	Min Hold
Occupied Bandwidt	<sup>th</sup> 56.40 MHz	Total Power	20.1 dBm		Detector
Transmit Freq Error	-12.841 kHz	% of OBW Pow			Peak▶ Auto <u>Man</u>
x dB Bandwidth	167.2 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-30. 26dB Bandwidth Plot MIMO ANT2 (160MHz 802.11ax (UNII Band 6) - Ch. 111)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 25 of 120
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## MIMO Antenna-2 26 dB Bandwidth Measurements - (UNII Band 7)



Plot 7-31. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11a (UNII Band 7) - Ch. 149)



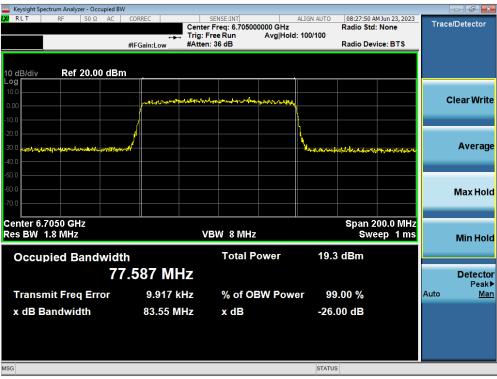
Plot 7-32. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11ax (UNII Band 7) - Ch. 149)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
Test Report S/N:	Test Dates:	EUT Type:	Dage 26 of 129
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Keysight Spectrum Analyzer - Occupied						
LXU RLT RF 50Ω AC		SENSE:INT nter Freg: 6.72500	ALIGN AUTO	09:20:09 AM Jui Radio Std: No		Trace/Detector
	+++ Tri	g: Free Run tten: 36 dB	Avg Hold: 100/100	Deallin Dealers	DTO	
	#IFGain:Low#A	tten: 36 dB		Radio Device:	BIS	
10 dB/div Ref 20.00 dE	3m					
10.0						
0.00	whitemaker wat	un ang an have a start and	walgedry			Clear Write
-10.0			<u> </u>			
-20.0			<b>k</b>			
-30.0			N			Average
-40.0	and Very		Wingoor	he was an	anolum	Ű
-50.0						
-60.0						
-70.0						Max Hold
70.0						
Center 6.72500 GHz				Span 100		
Res BW 910 kHz		VBW 8 MHz		Sweep	o 1 ms	Min Hold
Occupied Bandwid	ith	Total P	ower 18	9 dBm		
		Total I				
3	7.872 MHz					Detector Peak▶
Transmit Freg Error	-21.722 kHz	% of OF	3W Power 9	9.00 %	A	uto <u>Man</u>
x dB Bandwidth	40.94 MHz	x dB		.00 dB		
X dB Bandwidth	40.94 MHZ	хав	-20	.00 aB		
MSG			STATU	JS		

Plot 7-33. 26dB Bandwidth Plot MIMO ANT2 (40MHz 802.11ax (UNII Band 7) - Ch. 155)



Plot 7-34. 26dB Bandwidth Plot MIMO ANT2 (80MHz 802.11ax (UNII Band 7) – Ch. 151)

FCC ID: A3LSMS711U		MEASUREMENT REPORT				
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Keysight Spectrum Analyzer - Occupied						
LXIRLT RF 50Ω AC	CORREC	SENSE:INT	ALIGN A	UTO 08:00:16 A Radio Std	M Jun 23, 2023	Trace/Detector
		Trig: Free Run #Atten: 36 dB	Avg Hold: 100/1	00 Radio Dev	In DTC	
	#IFGain:Low	#Atten: 36 dB		Radio Dev	ICE: BIS	
10 dB/div Ref 20.00 df	3m					
10.0						
0.00	war have	unationally simulation	and marked way			Clear Write
-10.0			k			
-20.0	<u> </u>		k			
-30.0 - augusta marana and an	Server and the server		Hune	Myterfilingsflagerstlationerst	manna	Average
-40.0						
-50.0						
-60.0						Max Hold
-70.0						Maxinon
Center 6.6650 GHz Res BW 3 MHz		VBW 50 MH	-		00.0 MHz ep 1 ms	
Kes DW J WHZ			2	500	ep mis	Min Hold
Occupied Bandwig	dth	Total P	ower	20.8 dBm		
1	56.45 M	-17				Detecto
	100. <del>1</del> 0 Mil	12				Peakl
Transmit Freq Error	512	Hz % of O	3W Power	99.00 %		Auto <u>Mar</u>
x dB Bandwidth	168.2 N	IHz x dB		-26.00 dB		
MSG			5	STATUS		

Plot 7-35. 26dB Bandwidth Plot MIMO ANT2 (160MHz 802.11ax (UNII Band 7) - Ch. 143)

FCC ID: A3LSMS711U		MEASUREMENT REPORT				
Test Report S/N:	Test Dates:	EUT Type:	Dega 20 of 120			
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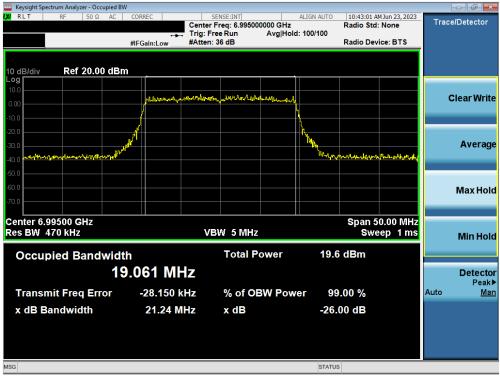
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# MIMO Antenna-2 26 dB Bandwidth Measurements - (UNII Band 8)



Plot 7-36. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11a (UNII Band 8) - Ch. 209)



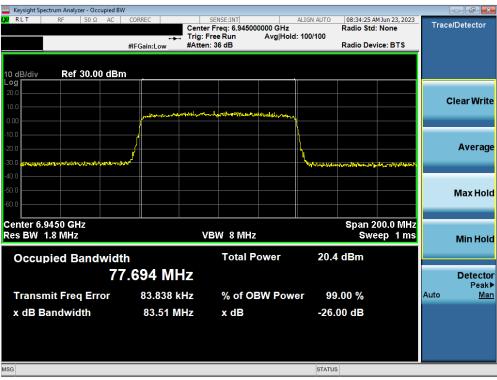
Plot 7-37. 26dB Bandwidth Plot MIMO ANT2 (20MHz 802.11ax (UNII Band 8) - Ch. 209)

FCC ID: A3LSMS711U		MEASUREMENT REPORT				
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Keysight Spectrum Analyzer - Occupied B  Keysight Spectrum Analyzer - Occupi					
LX RLT RF 50Ω AC	CORREC	SENSE:INT Center Freq: 7.0050		09:43:44 AM Jun 23, 20 Radio Std: None	Trace/Detector
	++ #IFGain:Low	<ul> <li>Trig: Free Run #Atten: 36 dB</li> </ul>	Avg Hold: 100/100	Radio Device: BTS	
10 dB/div Ref 30.00 dB	n				
Log 20.0					
10.0					Clear Write
0.00	remotivite	manuhalitelynameserike	un Muharlon		
-10.0	/				
-20.0	1		L.		Average
	1		\		
-30.0 Mayner Munner - mark and Minny have	and a second		Mandaley	helmen han the stand of the last of	
-50.0					Max Hold
-60.0					Max Hold
Center 7.00500 GHz Res BW 910 kHz		VBW 8 MH	-	Span 100.0 MI Sweep 1 n	
Kes DW 910 KH2			2	Sweep III	Min Hold
Occupied Bandwid	th	Total F	Power 21	.7 dBm	
3	7.838 MI	47			Detector
					Peak►
Transmit Freq Error	-290	Hz % of O	BW Power 9	9.00 %	Auto <u>Man</u>
x dB Bandwidth	41.20 N	IHz x dB	-26	5.00 dB	
MSG			STAT	US	

Plot 7-38. 26dB Bandwidth Plot MIMO ANT2 (40MHz 802.11ax (UNII Band 8) - Ch. 211)



Plot 7-39. 26dB Bandwidth Plot MIMO ANT2 (80MHz 802.11ax (UNII Band 8) – Ch. 199)

FCC ID: A3LSMS711U		MEASUREMENT REPORT				
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	AM Jun 23, 2023	
	td: None	Trace/Detector
Trig: Free Run Avg Hold: 100/100 #IEGain:Low #Atten: 36 dB Radio D	evice: BTS	
10 dB/diy Ref 30.00 dBm		
Log		
20.0		Clear Write
10.0		
		Average
	ورود بالجام مع الأسرام	Average
-30.0 between the development of the second se		
80.0		Max Hold
-00.0		
	400.0 MHz	
Res BW 3 MHz VBW 50 MHz Sv	veep 1 ms	Min Hold
Occupied Bandwidth Total Power 22.1 dBm		
156.38 MHz		Detector
130.38 MITZ		Peak►
Transmit Freq Error -91.795 kHz % of OBW Power 99.00 %		Auto <u>Man</u>
x dB Bandwidth 167.1 MHz x dB -26.00 dB		
MSG STATUS		

Plot 7-40. 26dB Bandwidth Plot MIMO ANT2 (160MHz 802.11ax (UNII Band 8) - Ch. 207)

FCC ID: A3LSMS711U		MEASUREMENT REPORT				
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### 7.3 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 KDB 789033 D02 v02r01, and at the appropriate frequencies.

For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm. For client devices operating under the control of a standard power access point, the maximum e.i.r.p. over the frequency band of operation must not exceed 30 dBm and the device must limit its power to no more than 6 dB below its associated standard power access point's authorized transmit power.

#### 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 7-2. Test Instrument & Measurement Setup

#### Test Notes

Compliance for this device while operating under the control of either an indoor low power access point or a standard power access point is demonstrated by applying the tighter low power indoor access point limit of 24dBm e.i.r.p. for both cases.

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# **MIMO Maximum Conducted Output Power Measurements**

		6GHz WIFI (20MHz 802.11a MIMO)								
	Band	Freq [MHz]	Channel	Avg. C	onducted Powers	s [dBm]	Directional Ant. Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
				ANT1	ANT2	MIMO	[dBi]			
g		5935	2	8.86	9.46	12.18	-2.79	9.39	24.00	-14.61
<u> </u>		6075	25	9.83	9.82	12.84	-2.79	10.05	24.00	-13.95
_	UNII-5	6175	45	9.41	9.11	12.27	-2.79	9.48	24.00	-14.52
i		6275	65	9.28	9.85	12.58	-2.79	9.79	24.00	-14.21
		6415	93	8.89	9.47	12.20	-2.79	9.41	24.00	-14.59
		6435	97	9.93	9.71	12.83	-2.94	9.89	24.00	-14.11
	UNII-6	6475	105	9.53	9.72	12.64	-2.94	9.70	24.00	-14.30
		6515	113	9.71	9.63	12.68	-2.94	9.74	24.00	-14.26
		6535	117	9.52	9.44	12.49	-2.82	9.67	24.00	-14.33
	UNII-7	6675	145	9.54	9.43	12.50	-2.82	9.68	24.00	-14.32
	UNII-7	6695	149	9.77	9.21	12.51	-2.82	9.69	24.00	-14.31
		6875	185	9.02	9.61	12.34	-2.82	9.52	24.00	-14.48
		6895	189	9.38	9.99	12.71	-2.85	9.86	24.00	-14.14
	UNII-8	6995	209	9.99	9.04	12.55	-2.85	9.70	24.00	-14.30
		7115	233	9.80	9.44	12.63	-2.85	9.78	24.00	-14.22

### Table 7-3. MIMO 20MHz BW 802.11a (UNII) Maximum Conducted Output Power

			6GHz WIFI	(20MHz 802.11a	x MIMO)		Directional Ant.			
_	Band	Freq [MHz]	Channel	Avg. C	onducted Powers	s [dBm]	Gain	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
<u>ب</u>				ANT1	ANT2	MIMO	[dBi]			
S		5935	2	9.08	9.61	12.36	-2.79	9.57	24.00	-14.43
×		6075	25	9.68	9.66	12.68	-2.79	9.89	24.00	-14.11
ах	UNII-5	6175	45	9.61	9.36	12.50	-2.79	9.71	24.00	-14.29
<b>—</b>		6275	65	9.46	9.99	12.74	-2.79	9.95	24.00	-14.05
<b>—</b>		6415	93	9.13	9.91	12.55	-2.79	9.76	24.00	-14.24
2.		6435	97	9.66	9.65	12.67	-2.94	9.73	24.00	-14.27
07	UNII-6	6475	105	9.32	9.64	12.49	-2.94	9.55	24.00	-14.45
80		6515	113	9.46	9.08	12.28	-2.94	9.34	24.00	-14.66
		6535	117	9.76	9.81	12.80	-2.82	9.98	24.00	-14.02
Щ	UNII-7	6675	145	9.73	9.72	12.74	-2.82	9.92	24.00	-14.08
Щ	UNII-7	6695	149	9.96	9.41	12.70	-2.82	9.88	24.00	-14.12
Ш	ш	6875	185	9.19	9.90	12.57	-2.82	9.75	24.00	-14.25
		6895	189	9.16	9.74	12.47	-2.85	9.62	24.00	-14.38
	UNII-8	6995	209	9.41	8.88	12.16	-2.85	9.31	24.00	-14.69
		7115	233	9.99	9.76	12.89	-2.85	10.04	24.00	-13.96

Table 7-4. MIMO 20MHz BW 802.11ax (UNII) Maximum Conducted Output Power

			6GHz WIFI	(40MHz 802.11a	x MIMO)		Directional Ant.			
	Band	Band Freq [MHz]	req [MHz] Channel	Avg. C	onducted Powers	[dBm]	Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]
S				ANT1	ANT2	MIMO	Гаріј			
-		5965	3	10.98	10.42	13.72	-2.79	10.93	24.00	-13.07
ах	UNII-5	6165	43	10.72	10.23	13.49	-2.79	10.70	24.00	-13.30
(0	UNII-3	6285	67	10.63	10.88	13.77	-2.79	10.98	24.00	-13.02
<u> </u>		6405	91	10.36	10.76	13.57	-2.79	10.78	24.00	-13.22
		6445	99	10.67	10.73	13.71	-2.94	10.77	24.00	-13.23
2	UNII-6	6485	107	10.87	10.76	13.83	-2.94	10.89	24.00	-13.11
0		6525	115	10.47	10.61	13.55	-2.94	10.61	24.00	-13.39
8		6565	123	10.59	10.41	13.51	-2.82	10.69	24.00	-13.31
ш	UNII-7	6685	147	10.98	9.85	13.46	-2.82	10.64	24.00	-13.36
Ш	UNII-7	6725	155	10.74	10.03	13.41	-2.82	10.59	24.00	-13.41
<u> </u>		6845	179	10.50	10.52	13.52	-2.82	10.70	24.00	-13.30
	UNII-8	6885	187	10.96	10.70	13.84	-2.85	10.99	24.00	-13.01
		7005	211	10.99	9.77	13.43	-2.85	10.58	24.00	-13.42
		7085	227	10.97	10.01	13.53	-2.85	10.68	24.00	-13.32

Table 7-5. MIMO 40MHz BW 802.11ax (UNII) Maximum Conducted Output Power

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			6GHz WIFI	(80MHz 802.11a)	x MIMO)		Directional Ant.			
SI	Band F	Freq [MHz]	Channel	Avg. Conducted Powers [dBm] Gain		Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]		
×				ANT1	ANT2	MIMO	lapi			
a		5985	7	10.71	9.33	13.08	-2.79	10.29	24.00	-13.71
<b>—</b>	UNII-5	6145	39	10.58	10.24	13.42	-2.79	10.63	24.00	-13.37
<u> </u>	UNII-3	6305	71	10.38	10.89	13.65	-2.79	10.86	24.00	-13.14
2.		6385	87	10.79	10.84	13.83	-2.79	11.04	24.00	-12.96
), 2	UNII-6	6465	103	10.87	10.50	13.70	-2.94	10.76	24.00	-13.24
80		6545	119	10.68	10.61	13.66	-2.82	10.84	24.00	-13.16
	UNII-7	6705	151	10.87	10.01	13.47	-2.82	10.65	24.00	-13.35
Ш	UNII-7	6785	167	10.77	10.48	13.64	-2.82	10.82	24.00	-13.18
ш		6865	183	10.27	10.50	13.40	-2.82	10.58	24.00	-13.42
Ш	UNII-8	6945	199	10.84	9.62	13.28	-2.85	10.43	24.00	-13.57
		7025	215	10.77	9.99	13.41	-2.85	10.56	24.00	-13.44

Table 7-6. MIMO 80MHz BW 802.11ax (UNII) Maximum Conducted Output Power

			6GHz WIFI (	160MHz 802.11a	ax MIMO)		Directional Ant.			
SI	Band	Freq [MHz]	reg [MHz] Channel Avg. Conducted Powers [dBm]	[dBm]	Gain [dBi]	Max e.i.r.p [dBm]	e.i.r.p Limit [dBm]	e.i.r.p Margin [dB]		
×				ANT1	ANT2	MIMO	[αΒΙ]			
а ЭЩ		6025	15	10.25	10.57	13.42	-2.79	10.63	24.00	-13.37
Ш÷	UNII-5	6185	47	10.34	10.88	13.63	-2.79	10.84	24.00	-13.16
<u> </u>		6345	79	10.18	10.88	13.55	-2.79	10.76	24.00	-13.24
5	UNII-6	6505	111	10.94	10.97	13.97	-2.94	11.03	24.00	-12.97
07	UNII-7	6665	143	10.84	10.87	13.87	-2.82	11.05	24.00	-12.95
80	UNII-7	6825	175	10.78	10.45	13.63	-2.82	10.81	24.00	-13.19
$\sim$	UNII-8	6985	207	10.82	10.15	13.51	-2.85	10.66	24.00	-13.34

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

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#### Sample MIMO Calculation:

At 5935MHz in 802.11a (20MHz BW) mode, the average conducted output power was measured to be 8.86 dBm for Antenna-1 and 9.46 dBm for Antenna-2.

(8.86 dBm + 9.46 dBm) = (7.69 mW + 8.83 mW) = 16.52 mW = 12.18 dBm

#### Sample Directional Gain Calculation:

Per ANSI C63.10-2013 Section 14.4.3, the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and NANT, the total number of antennas used.

Directional gain = 10 log[(10<sup>G1/20</sup> + 10<sup>G2/20</sup> + ... + 10<sup>GN/20</sup>)<sup>2</sup> / N<sub>ANT</sub>] dBi

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

At 5935MHz in 802.11a (20MHz BW) mode, the average MIMO conducted power was calculated to be dBm with directional gain of -2.48 dBi.

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

12.18 dBm + -2.48 dBi = 9.70 dBm

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## 7.4 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 for 802.11a/ax.

In the 5.925-7.125 GHz bands, the maximum power spectral density must not exceed -1 dBm e.i.r.p. in any 1-megahertz band. For client devices, except for fixed client devices as defined in this subpart, operating under the control of a standard power access point in 5.925-6.425 GHz and 6.525-6.875 GHz bands, the maximum power spectral density must not exceed 17 dBm/MHz e.i.r.p.

#### **Test Procedure Used**

ANSI C63.10-2013 – Section 12.3.2.2 ANSI C63.10-2013 – Section 14.3.2.2 Measure-and-Sum Technique

#### **Test Settings**

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

#### Test Setup

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



Figure 7-3. Test Instrument & Measurement Setup

#### Test Notes

Compliance for this device while operating under the control of either an indoor low power access point or a standard power access point is demonstrated by applying the tighter low power indoor access point limit of -1dBm/MHz e.i.r.p. for both cases.

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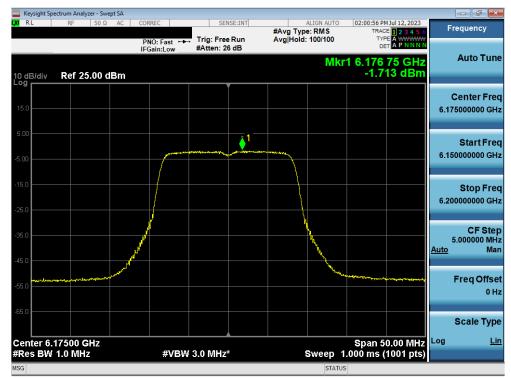
# **MIMO Power Spectral Density Measurements**

	Frequency [MHz]	Channel	802.11 MODE	Antenna-1 Power Density [dBm]	Antenna-2 Power Density [dBm]	Antenna-1 Gain [dBi]	Antenna-2 Gain [dBi]	Summed MIMO Power Density [dBm/MHz]	Directional Gain [dBi]	Duty Cycle Corretion Factor [dB]	e.i.r.p Density [dBm/MHz]	Max EIRP Density [dBm/MHz]	Margin [dB]
	5935	2	а	-2.29	-1.72	-4.58	-7.23	1.01	-2.79	0.15	-1.63	-1	-0.63
	6175	45	a	-2.29	-1.72	-4.58	-7.23	1.14	-2.79	0.15	-1.63	-1 -1	-0.63
	6415	45 93	a	-1.71 -2.18	-2.04	-4.58	-7.23	1.14	-2.79	0.15	-1.51	-1	-0.51
	5935	2	ax (20MHz)	-2.61	-1.87	-4.58	-7.23	0.78	-2.79	N/A	-2.01	-1	-0.55
	6175	45	ax (20MHz)	-2.10	-2.09	-4.58	-7.23	0.91	-2.79	N/A	-1.88	-1	-1.01
	6415	45 93	ax (20MHz)	-2.10	-2.09	-4.58	-7.23	0.91	-2.79	N/A N/A	-1.88	-1	-0.88
	5965	3	ax (2010HZ) ax (40MHz)	-1.61	-3.34	-4.58	-7.23	0.62	-2.79	N/A	-1.84	-1	-0.84
- P	6165	43	ax (40MHz)	-1.51	-3.34	-4.58	-7.23	0.82	-2.79	N/A N/A	-2.17	-1 -1	-0.98
Band 5	6405	43 91	ax (40MHz)	-1.55	-2.96	-4.58	-7.23	1.37	-2.79	N/A N/A	-1.98	-1	-0.98
	5985	7	ax (40101HZ) ax (80MHz)	-4.45	-5.41	-4.58	-7.23	-1.89	-2.79	N/A	-1.42	-1	-0.42
	6145	39		-4.45	-5.41	-4.58	-7.23	-1.89	-2.79	N/A N/A	-4.69	-1 -1	-3.69
	6385	39	ax (80MHz) ax (80MHz)	-4.90	-5.98	-4.58	-7.23	-2.63	-2.79	N/A N/A	-4.91	-1	-3.91
	6025	15	. ,	-5.34 -7.59	-5.98	-4.58	-7.23	-2.63	-2.79	N/A N/A	-5.43	-1 -1	-4.43
		47	ax (160MHz)		-8.38	-4.58	-7.23	-4.95	-2.79		-7.15	-1	-6.15
	6185		ax (160MHz)	-6.57						N/A			
	6345	79	ax (160MHz)	-6.51	-8.36	-4.58	-7.23	-4.33	-2.79	N/A	-7.12	-1	-6.12
	6435 6475	97 105	а	-1.26	-1.47	-4.37	-7.88 -7.88	1.65	-2.94	0.15	-1.14	-1	-0.14
			а		-1.52	-4.37		1.54	-2.94	0.15	-1.25	-1	-0.25
	6515	113	a	-1.30	-1.54	-4.37	-7.88	1.59	-2.94	0.15	-1.20	-1	-0.20
	6435	97	ax (20MHz)	-1.90	-1.94	-4.37	-7.88	1.09	-2.94	N/A	-1.85	-1	-0.85
9 P	6475	105	ax (20MHz)	-2.24	-1.81	-4.37	-7.88	0.99	-2.94	N/A	-1.95	-1	-0.95
Band	6515	113	ax (20MHz)	-2.19	-2.39	-4.37	-7.88	0.72	-2.94	N/A	-2.22	-1	-1.22
-	6445	99	ax (40MHz)	-1.24	-4.15	-4.37	-7.88	0.56	-2.94	N/A	-2.38	-1	-1.38
	6485	107	ax (40MHz)	-1.77	-3.89	-4.37	-7.88	0.31	-2.94	N/A	-2.63	-1	-1.63
	6525	115	ax (40MHz)	-2.17	-3.52	-4.37	-7.88	0.22	-2.94	N/A	-2.72	-1	-1.72
	6465	103	ax (80MHz)	-4.46	-7.13	-4.37	-7.88	-2.59	-2.94	N/A	-5.52	-1	-4.52
	6505	111	ax (160MHz)	-7.44	-9.26	-4.37	-7.88	-5.24	-2.94	N/A	-8.18	-1	-7.18
	6535	117	а	-1.39	-1.50	-4.26	-7.75	1.56	-2.82	0.15	-1.11	-1	-0.11
	6695	149	а	-1.45	-1.96	-4.26	-7.75	1.31	-2.82	0.15	-1.36	-1	-0.36
	6875	185	a	-1.92	-1.63	-4.26	-7.75	1.24	-2.82	0.15	-1.43	-1	-0.43
	6535	117	ax (20MHz)	-1.85	-1.72	-4.26	-7.75	1.22	-2.82	N/A	-1.60	-1	-0.60
	6695	149	ax (20MHz)	-1.51	-1.93	-4.26	-7.75	1.30	-2.82	N/A	-1.52	-1	-0.52
~	6875	185	ax (20MHz)	-2.42	-1.72	-4.26	-7.75	0.95	-2.82	N/A	-1.87	-1	-0.87
Band 7	6565	123	ax (40MHz)	-2.40	-3.07	-4.26	-7.75	0.29	-2.82	N/A	-2.53	-1	-1.53
Ba	6725	155	ax (40MHz)	-2.06	-3.85	-4.26	-7.75	0.15	-2.82	N/A	-2.67	-1	-1.67
	6845	179	ax (40MHz)	-3.51	-2.61	-4.26	-7.75	-0.03	-2.82	N/A	-2.85	-1	-1.85
	6545	119	ax (80MHz)	-5.54	-5.90	-4.26	-7.75 -7.75	-2.70	-2.82	N/A	-5.52	-1	-4.52
	6705	151	ax (80MHz)	-4.93	-6.44	-4.26		-2.61	-2.82	N/A	-5.43	-1	-4.43
	6865 6665	183	ax (80MHz)	-7.08 -7.43	-5.63 -8.33	-4.26	-7.75 -7.75	-3.28 -4.85	-2.82	N/A N/A	-6.10 -7.67	-1	-5.10 -6.67
		143	ax (160MHz)				-7.75	-4.85				-1 -1	
	6825 6895	175 189	ax (160MHz)	-8.09	-9.17 -1.10	-4.26 -4.74	-7.15	-5.58	-2.82	N/A 0.15	-8.41	-1	-7.41 -0.02
	6995	209	a	-1.56	-1.10	-4.74	-7.15	1.69	-2.85	0.15	-1.02	-1	-0.02
	7115	209	a	-1.37	-1.71	-4.74	-7.15	1.48	-2.85	0.15	-1.22	-1	-0.22
	6895	189	ax (20MHz)	-2.27	-1.71	-4.74	-7.15	1.48	-2.85	N/A	-1.23	-1	-0.23
	6995	209	ax (20MHz) ax (20MHz)	-2.27	-1.47	-4.74	-7.15	0.80	-2.85	N/A N/A	-1.69 -2.05	-1	-0.69
∞	7115	209	ax (20MHz)	-2.01	-2.41 -1.64	-4.74	-7.15	1.50	-2.85	N/A N/A	-2.05	-1 -1	-0.35
Band			. ,		-1.64 -2.01	-4.74	-7.15	0.22	-2.85	N/A N/A		-1	
ä	6885 7005	187 211	ax (40MHz) ax (40MHz)	-3.74 -2.77	-2.01	-4.74	-7.15	0.22	-2.85	N/A N/A	-2.63 -2.25	-1	-1.63
	7005	211 227	. ,	-2.17	-2.08	-4.74	-7.15	0.60	-2.85	N/A N/A	-2.25	-1	-1.25
	7085 6945	199	ax (40MHz) ax (80MHz)	-2.18 -6.90	-3.67 -5.33	-4.74	-7.15	-3.04	-2.85	N/A N/A	-2.70	-1 -1	-1.70
	7025	215	. ,	-6.90	-5.33	-4.74	-7.15	-3.04 -1.88	-2.85		-5.89 -4.74		-4.89
			ax (80MHz)	-4.33	-5.55	-4.74	-7.15	-1.88 -4.50	-2.85	N/A	-4.74	-1	-3.74
	6985	207	ax (160MHz)		-7.36		-7.15			N/A	-7.35	-1	-0.35

Table 7-8. MIMO e.i.r.p. Conducted Power Spectral Density Measurements

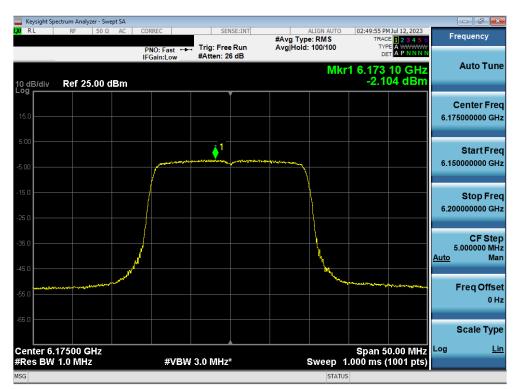
FCC ID: A3LSMS711U		MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	Test Dates: EUT Type:			
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### 7.4.1 MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 5)

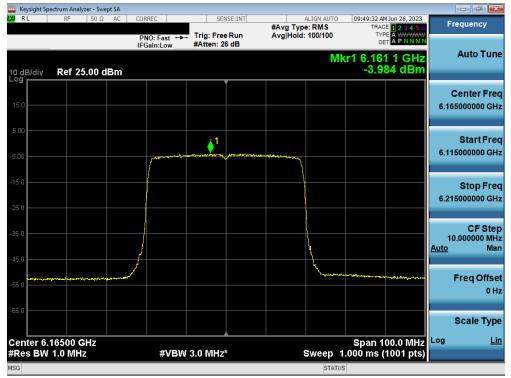
Plot 7-41. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 5) - Ch. 45)



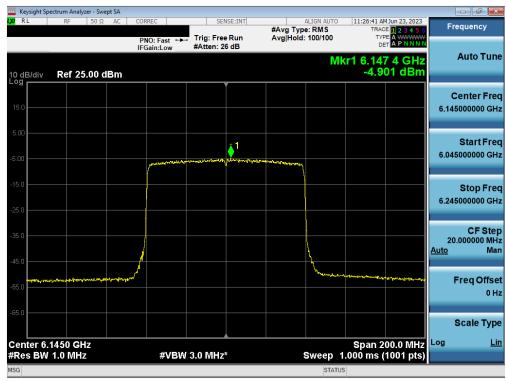
Plot 7-42. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 5) – Ch. 45)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	Approved by: Technical Manager		
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Plot 7-43. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 5) - Ch. 43)



Plot 7-44. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 5) - Ch. 39)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 40 of 128
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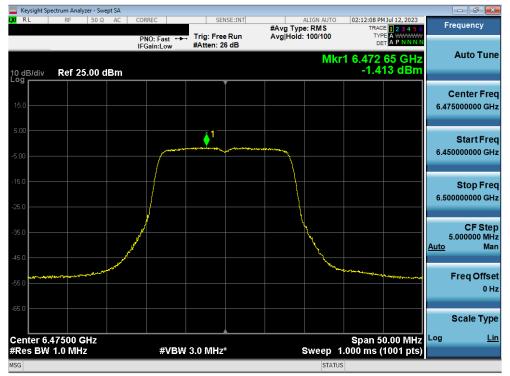
Plot 7-45. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 5) - Ch. 47)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	Test Dates: EUT Type:			
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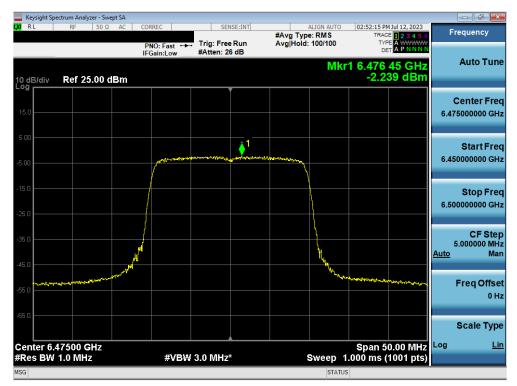
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## MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 6)



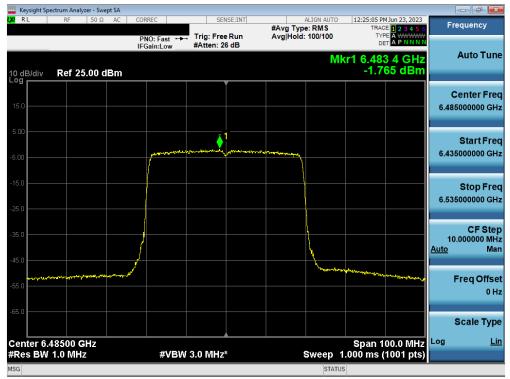
Plot 7-46. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 6) - Ch. 105)



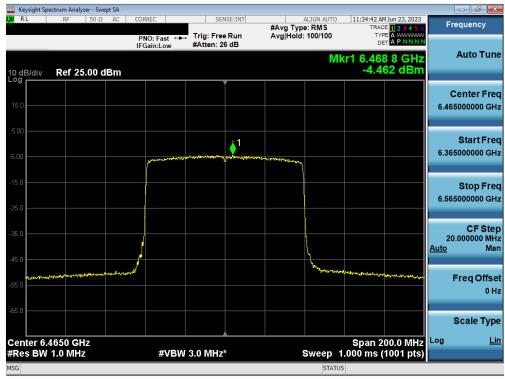
Plot 7-47. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 6) – Ch. 105)

FCC ID: A3LSMS711U		MEASUREMENT REPORT		
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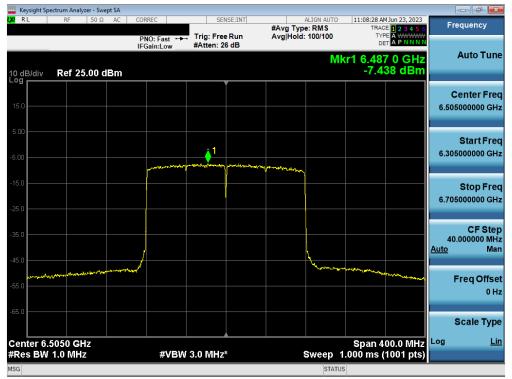
Plot 7-48. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 6) - Ch. 107)



Plot 7-49. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 6) - Ch. 103)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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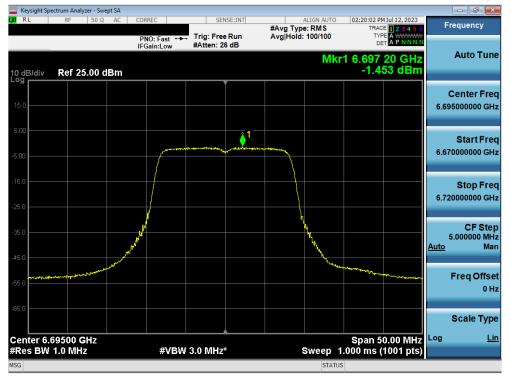
Plot 7-50. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 6) - Ch. 111)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
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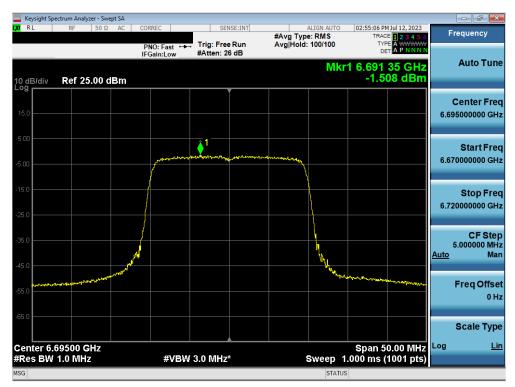
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## MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 7)



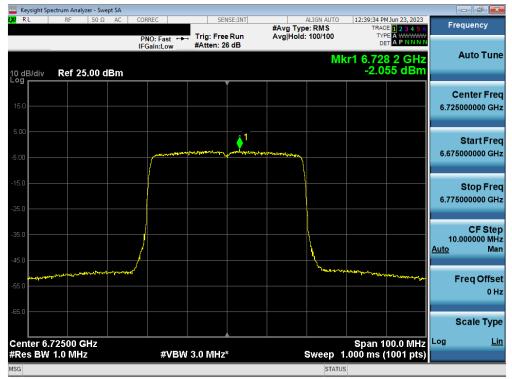
Plot 7-51. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 7) - Ch. 149)



Plot 7-52. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 7) – Ch. 149)

FCC ID: A3LSMS711U		MEASUREMENT REPORT		
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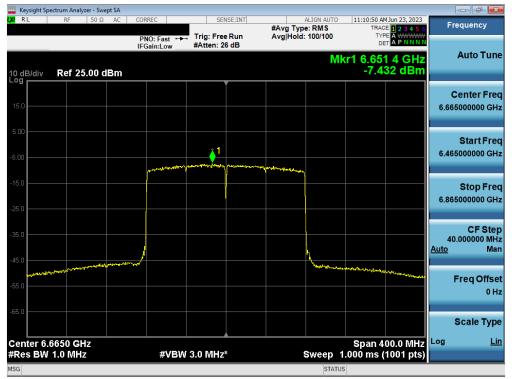
Plot 7-53. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 7) - Ch. 155)



Plot 7-54. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 7) - Ch. 151)

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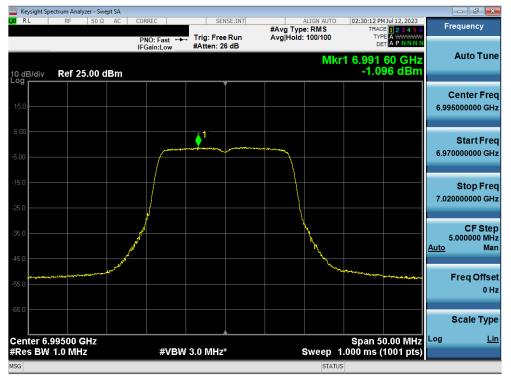
Plot 7-55. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 7) - Ch. 143)

FCC ID: A3LSMS711U		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage FC of 120
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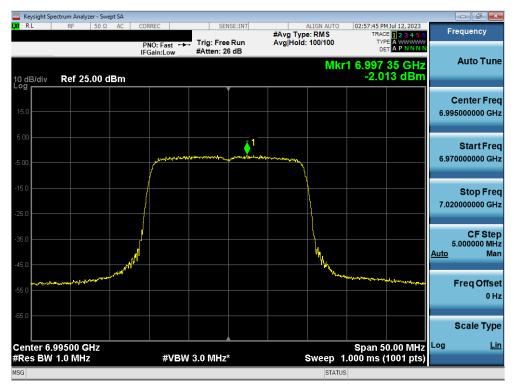
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## MIMO Antenna-1 Power Spectral Density Measurement - (UNII Band 8)



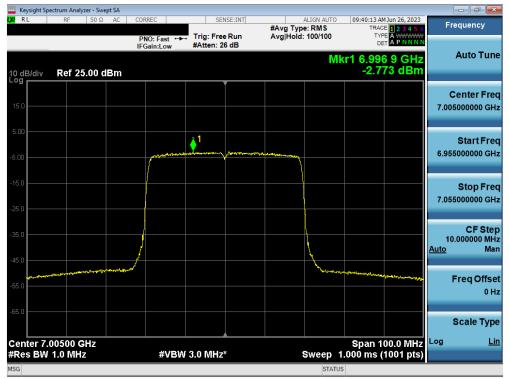
Plot 7-56. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 8) - Ch. 209)



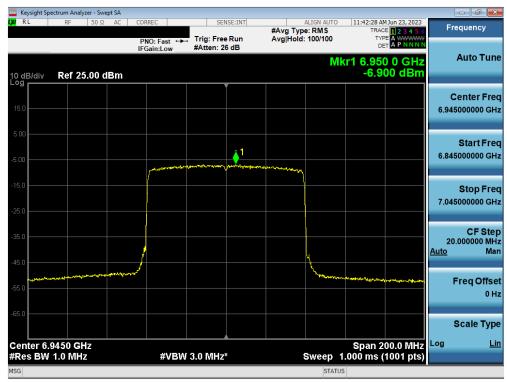
Plot 7-57. Power Spectral Density Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 8) - Ch. 209)

FCC ID: A3LSMS711U		MEASUREMENT REPORT		
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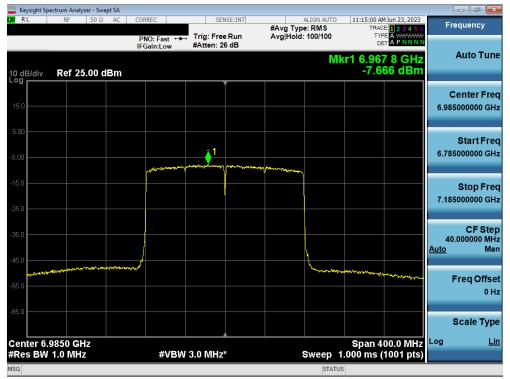
Plot 7-58. Power Spectral Density Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 8) - Ch. 211)



Plot 7-59. Power Spectral Density Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 8) - Ch. 199)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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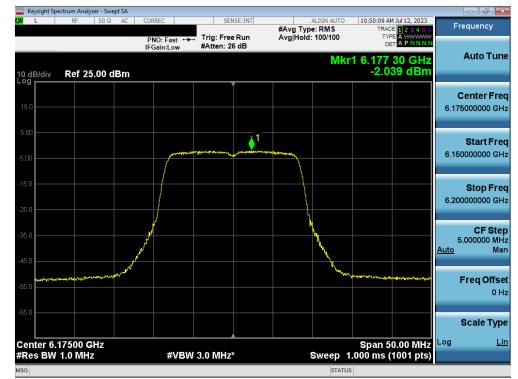


Plot 7-60. Power Spectral Density Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 8) - Ch. 207)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 50 of 120
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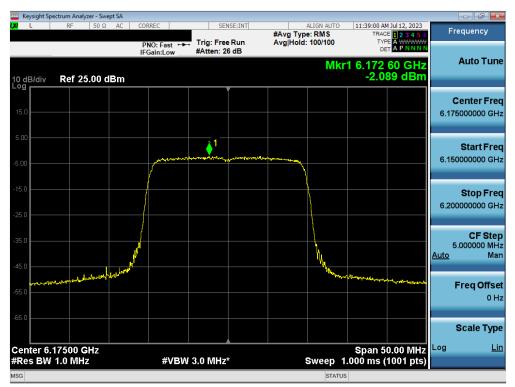
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### 7.4.2 MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 5)

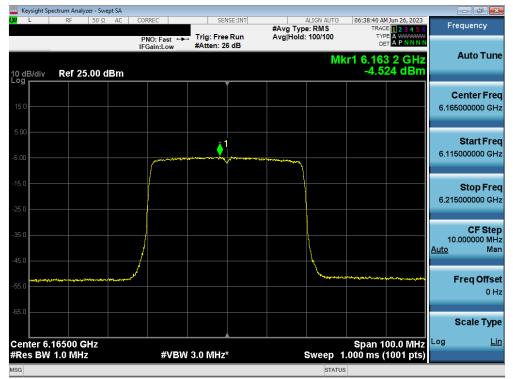




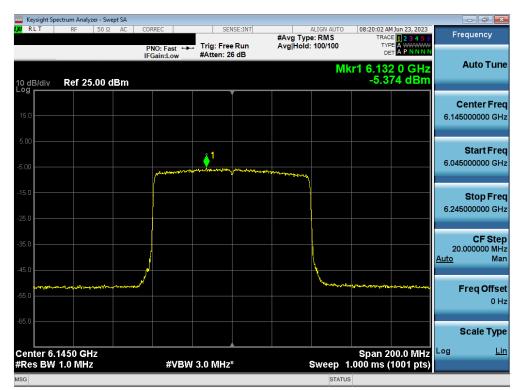
Plot 7-62. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 5) – Ch. 45)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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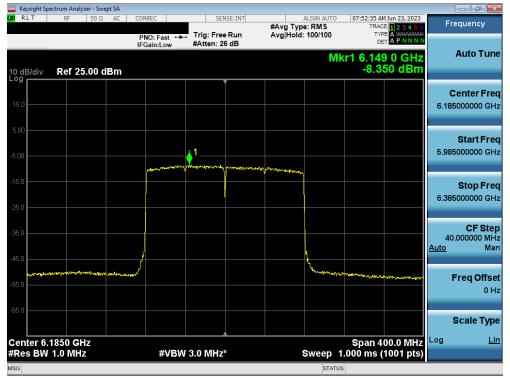
Plot 7-63. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 5) - Ch. 43)



Plot 7-64. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 5) - Ch. 39)

FCC ID: A3LSMS711U		MEASUREMENT REPORT			
Test Report S/N:	Test Dates:	EUT Type:	Page 61 of 138		
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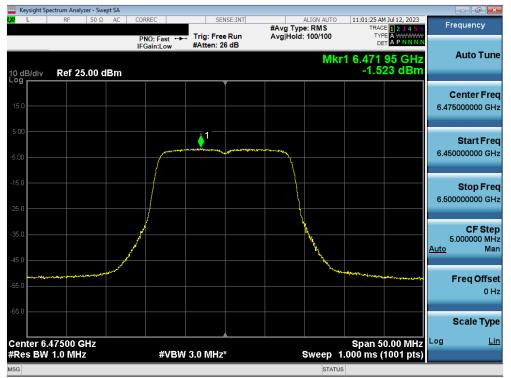


Plot 7-65. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 5) - Ch. 47)

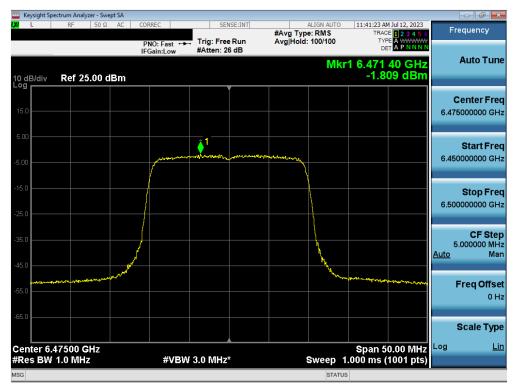
FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 62 of 120
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# MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 6)



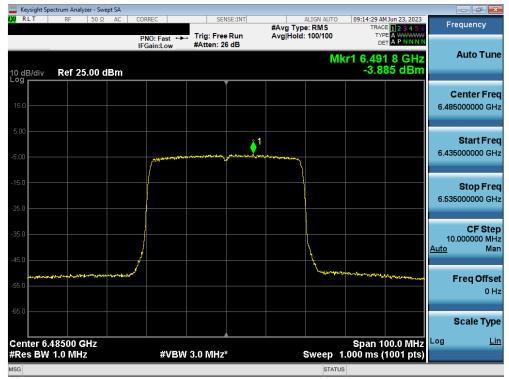
Plot 7-66. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 6) - Ch. 105)



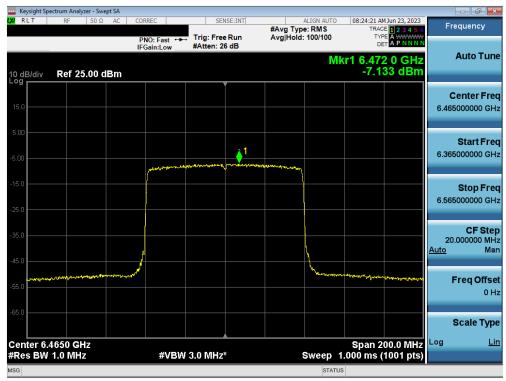
Plot 7-67. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 6) – Ch. 105)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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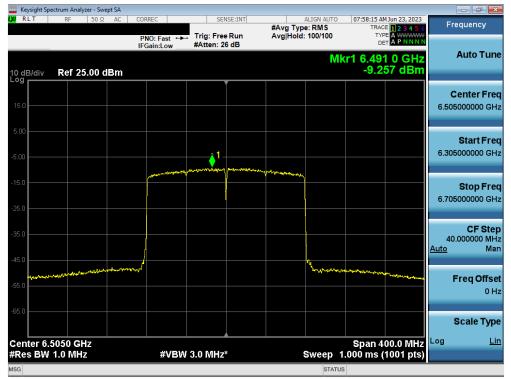
Plot 7-68. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 6) - Ch. 107)



Plot 7-69. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 6) - Ch. 103)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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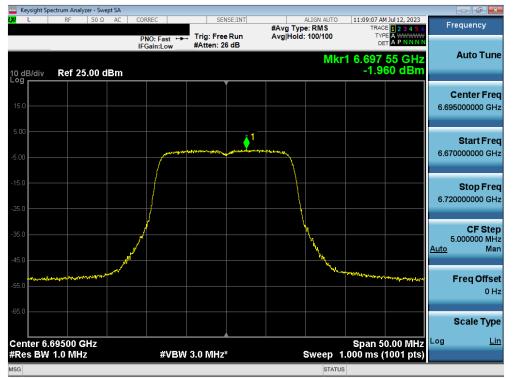
Plot 7-70. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 6) - Ch. 111)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
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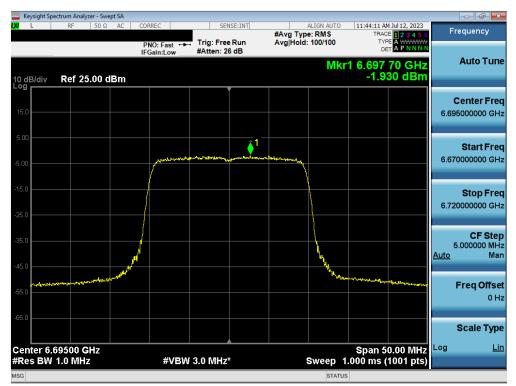
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## MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 7)



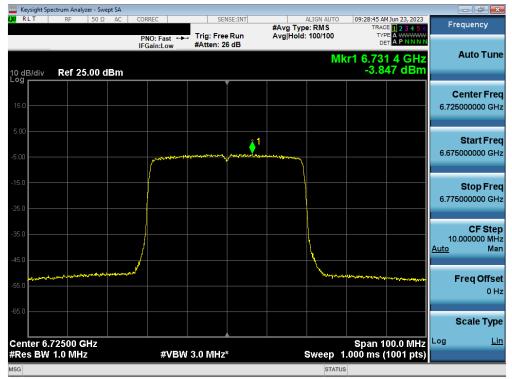
Plot 7-71. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 7) - Ch. 149)



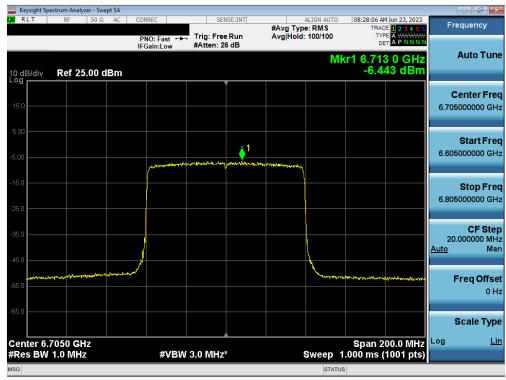
Plot 7-72. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 7) – Ch. 149)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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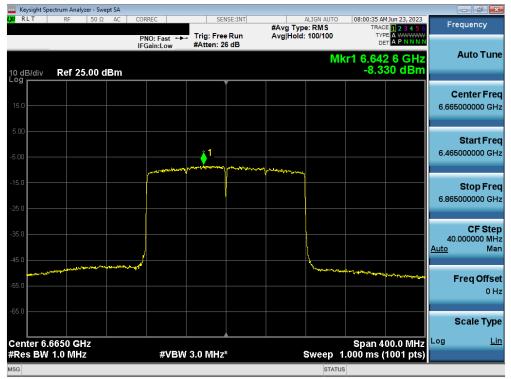
Plot 7-73. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 7) - Ch. 155)



Plot 7-74. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 7) - Ch. 151)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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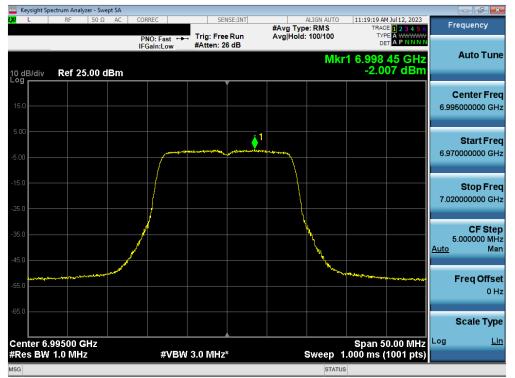
Plot 7-75. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 7) - Ch. 143)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
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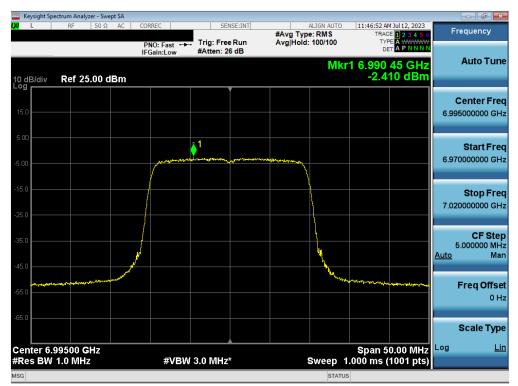
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## MIMO Antenna-2 Power Spectral Density Measurement - (UNII Band 8)



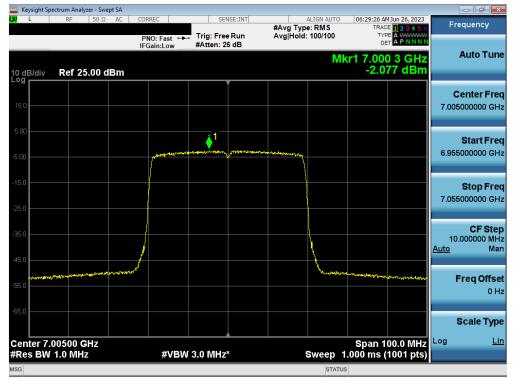
Plot 7-76. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 8) - Ch. 209)



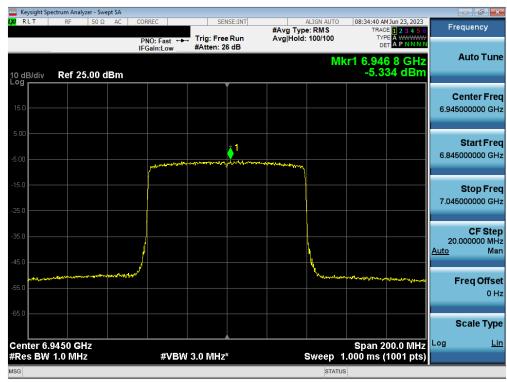
Plot 7-77. Power Spectral Density Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 8) - Ch. 209)

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Plot 7-78. Power Spectral Density Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 8) - Ch. 211)



Plot 7-79. Power Spectral Density Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 8) - Ch. 199)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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Plot 7-80. Power Spectral Density Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 8) - Ch. 207)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
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Note:

Per ANSI C63.10-2013 Section 14.3.2.2 and KDB 662911 v02r01 Section E)2), the power spectral density at Antenna 1 and Antenna 2 were first measured separately 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 GN is the gain of the nth antenna and NANT, the total number of antennas used.

Directional gain = 10 log[(10<sup>G1/20</sup> + 10<sup>G2/20</sup> + ... + 10<sup>GN/20</sup>)<sup>2</sup> / N<sub>ANT</sub>] dBi

### Sample MIMO Calculation:

At 5935MHz in 802.11a (20MHz BW) mode, the average conducted power spectral density was measured to be -2.29 dBm for Antenna-1 and -1.72 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(-2.29 dBm + -1.72 dBm) = (0.59 mW + 0.67 mW) = 1.26 mW = 1.01 dBm

### Sample e.i.r.p Power Spectral Density Calculation:

At 5935 MHz in 802.11a (20MHz BW) mode, the average MIMO power density was calculated to be 1.01 dBm with directional gain of -2.48 dBi.

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

1.01 dBm + -2.48 dBi = -1.47 dBm

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### 7.5 In-Band Emissions

#### **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.

For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.

#### Test Procedure Used

KDB 987594 D02 v01r01

#### Test Settings

- 1. Connect output of the antenna port to a spectrum analyzer or EMI receiver, with appropriate attenuation, as to not damage the instrumentation.
- 2. Set the reference level of the measuring equipment in accordance with procedure 4.1.5.2 of ANSI C63.10-2013.
- 3. Measure the 26 dB EBW using the test procedure 12.4.1 of ANSI C63.10-2013. (This will be used to determine the channel edge.)
- 4. Measure the power spectral density (which will be used for emissions mask reference) using the following procedure:
  - a) Set the span to encompass the entire 26 dB EBW of the signal.
    - b) Set RBW = same RBW used for 26 dB EBW measurement.
    - c) Set VBW ≥ 3 X RBW
    - d) Number of points in sweep  $\geq$  [2 X span / RBW].
    - e) Sweep time = auto.
    - f) Detector = RMS (i.e., power averaging)
    - g) Trace average at least 100 traces in power averaging (rms) mode.
    - h) Use the peak search function on the instrument to find the peak of the spectrum.
- 5. For the purposes of developing the emission mask, the channel bandwidth is defined as the 26 dB EBW.
- 6. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
  - i) Suppressed by 20 dB at 1 MHz outside of the channel edge. (The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)
  - i) Suppressed by 28 dB at one channel bandwidth from the channel center.
  - k) Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.
- 7. Adjust the span to encompass the entire mask as necessary.
- 8. Clear trace.
- 9. Trace average at least 100 traces in power averaging (rms) mode.
- 10. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask.

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



Figure 7-4. Test Instrument & Measurement Setup

### Test Notes

None.

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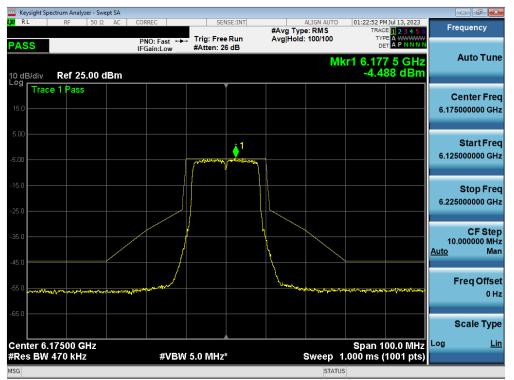
				Antenna-1	Antenna-2
	Frequency	Channel	802.11	Emission	Emission
	[MHz]		MODE	Mask	Mask
	5935	2	а	Pass	Pass
	6175	45	а	Pass	Pass
	6415	93	а	Pass	Pass
	5935	2	ax (20MHz)	Pass	Pass
	6175	45	ax (20MHz)	Pass	Pass
	6415	93	ax (20MHz)	Pass	Pass
15	5965	3	ax (40MHz)	Pass	Pass
Band 5	6165	43	ax (40MHz)	Pass	Pass
В	6405	91	ax (40MHz)	Pass	Pass
	5985	7	ax (80MHz)	Pass	Pass
	6145	39	ax (80MHz)	Pass	Pass
	6385	87	ax (80MHz)	Pass	Pass
	6025	15	ax (160MHz)	Pass	Pass
	6185	47	ax (160MHz)	Pass	Pass
	6345	79	ax (160MHz)	Pass	Pass
	6435	97	а	Pass	Pass
	6475	105	а	Pass	Pass
	6515	113	а	Pass	Pass
	6435	97	ax (20MHz)	Pass	Pass
9	6475	105	ax (20MHz)	Pass	Pass
Band 6	6515	113	ax (20MHz)	Pass	Pass
Ba	6445	99	ax (40MHz)	Pass	Pass
	6485	107	ax (40MHz)	Pass	Pass
	6525	115	ax (40MHz)	Pass	Pass
	6465	103	ax (80MHz)	Pass	Pass
	6505	111	ax (160MHz)	Pass	Pass
	6535	117	а	Pass	Pass
	6695	149	а	Pass	Pass
	6875	185	а	Pass	Pass
	6535	117	ax (20MHz)	Pass	Pass
	6695	149	ax (20MHz)	Pass	Pass
	6875	185	ax (20MHz)	Pass	Pass
d 7	6565	123	ax (40MHz)	Pass	Pass
Band 7	6725	155	ax (40MHz)	Pass	Pass
-	6845	179	ax (40MHz)	Pass	Pass
	6545	119	ax (80MHz)	Pass	Pass
	6705	151	ax (80MHz)	Pass	Pass
	6865	183	ax (80MHz)	Pass	Pass
	6665	143	ax (160MHz)	Pass	Pass
	6825	175	ax (160MHz)	Pass	Pass
	6895	189	a	Pass	Pass
	6995	209	a	Pass	Pass
	7115	233	a	Pass	Pass
	6895	189	ax (20MHz)	Pass	Pass
	6995	209	ax (20MHz)	Pass	Pass
8 9	7115	233	ax (20MHz)	Pass	Pass
Band 8	6885	187	ax (40MHz)	Pass	Pass
8	7005	211	ax (40MHz)	Pass	Pass
	7085	227	ax (40MHz)	Pass	Pass
	6945	199	ax (80MHz)	Pass	Pass
	7025	215	ax (80MHz)	Pass	Pass
	6985	207	ax (160MHz)	Pass	Pass

Table 7-9. In Band Emission Test Result

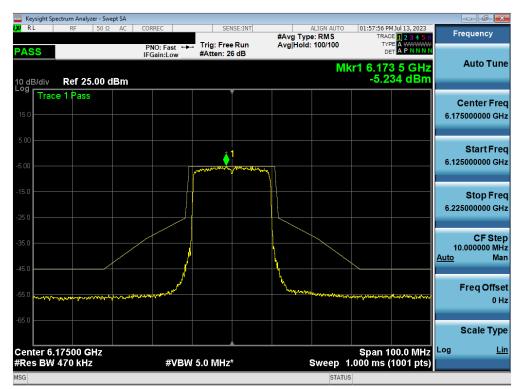
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# 7.5.1 MIMO Antenna-1 In-Band Emission Plot Measurement - (UNII Band 5)



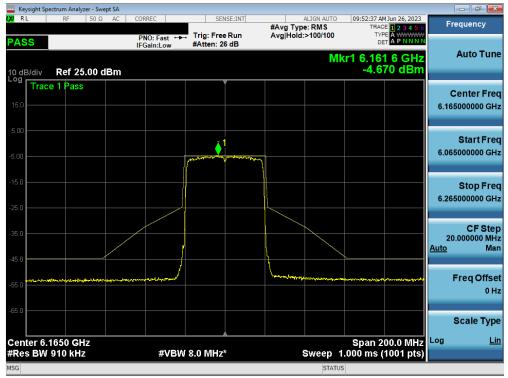
Plot 7-81. In-Band Emission Plot Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 5) - Ch. 45)



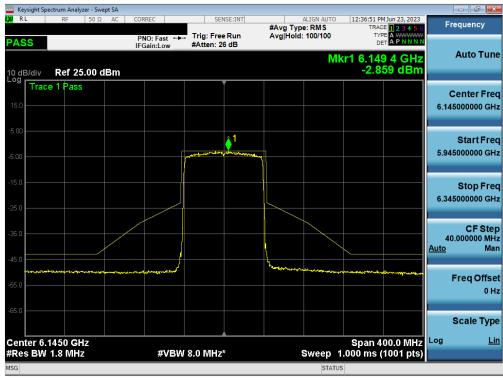
Plot 7-82. In-Band Emission Plot Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 5) – Ch. 45)

FCC ID: A3LSMS711U		MEASUREMENT REPORT		
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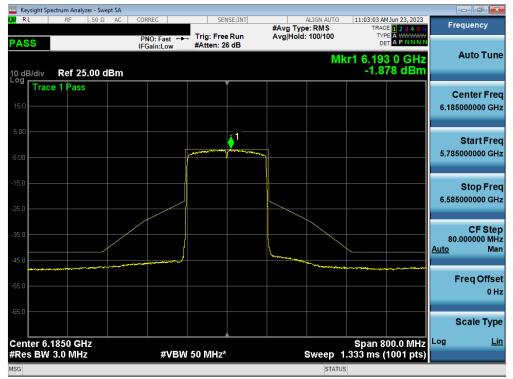
Plot 7-83. In-Band Emission Plot Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 5) - Ch. 43)



Plot 7-84. In-Band Emission Plot Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 5) - Ch. 39)

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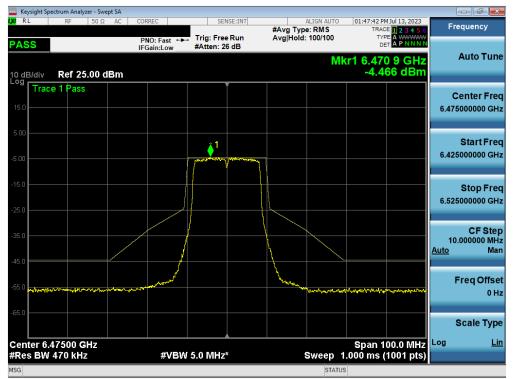


Plot 7-85. In-Band Emission Plot Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 5) - Ch. 47)

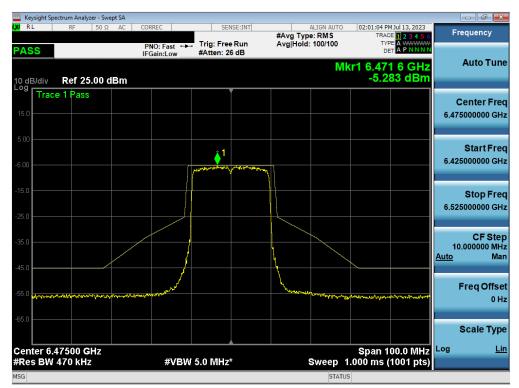
FCC ID: A3LSMS711U		MEASUREMENT REPORT		
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# MIMO Antenna-1 In-Band Emission Plot Measurement - (UNII Band 6)



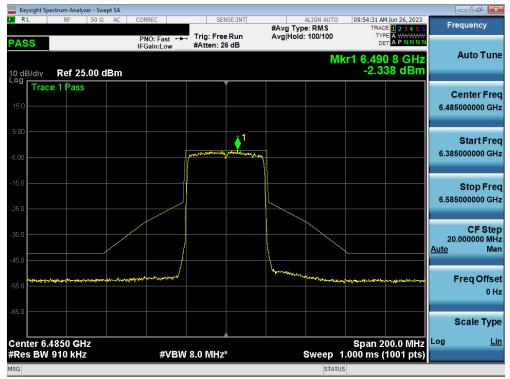
Plot 7-86. In-Band Emission Plot Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 6) - Ch. 105)



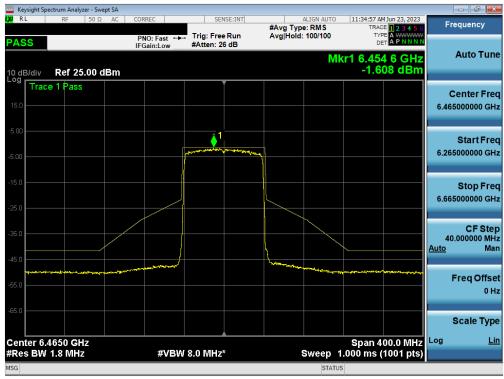
Plot 7-87. In-Band Emission Plot Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 6) - Ch. 105)

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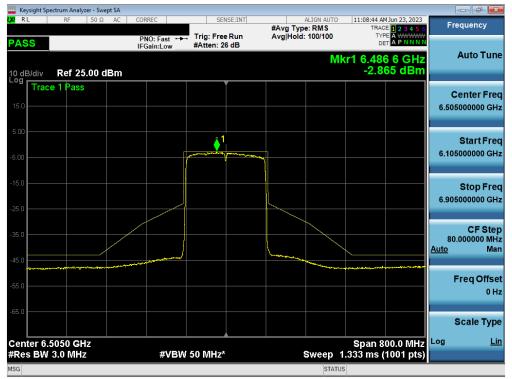
Plot 7-88. In-Band Emission Plot Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 6) - Ch. 107)



Plot 7-89. In-Band Emission Plot Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 6) - Ch. 103)

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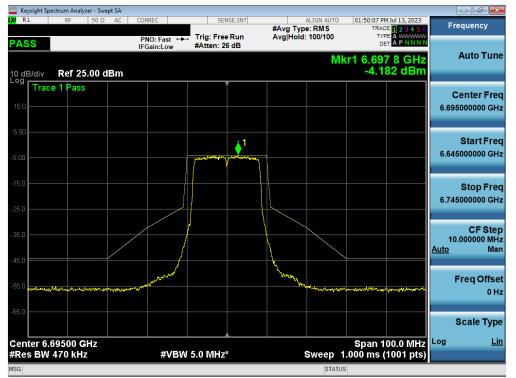


Plot 7-90. In-Band Emission Plot Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 6) - Ch. 111)

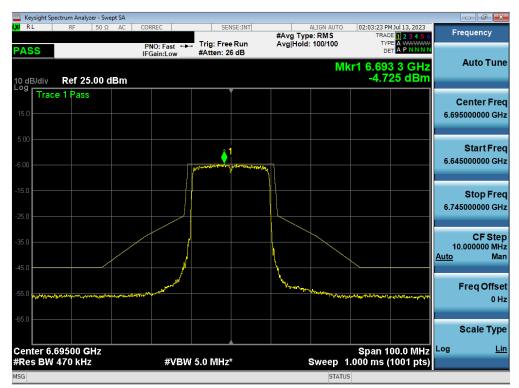
FCC ID: A3LSMS711U		Approved by: Technical Manager	
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# MIMO Antenna-1 In-Band Emission Plot Measurement - (UNII Band 7)



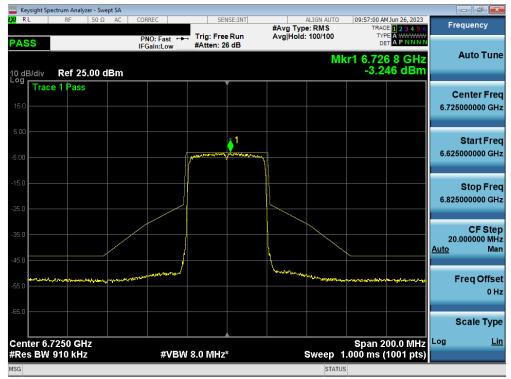
Plot 7-91. In-Band Emission Plot Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 7) - Ch. 149)



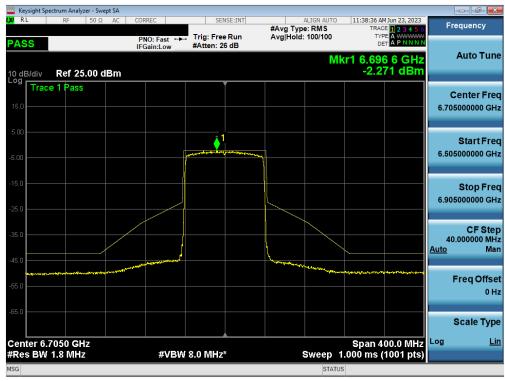
Plot 7-92. In-Band Emission Plot Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 7) - Ch. 149)

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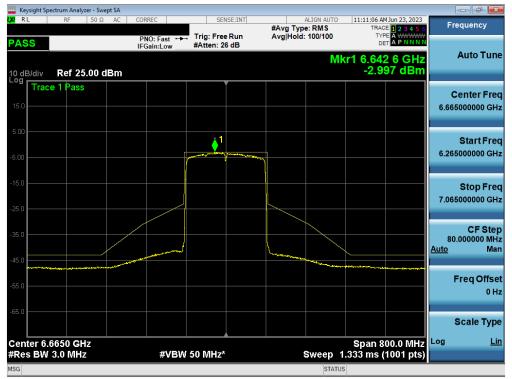
Plot 7-93. In-Band Emission Plot Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 7) - Ch. 155)



Plot 7-94. In-Band Emission Plot Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 7) - Ch. 151)

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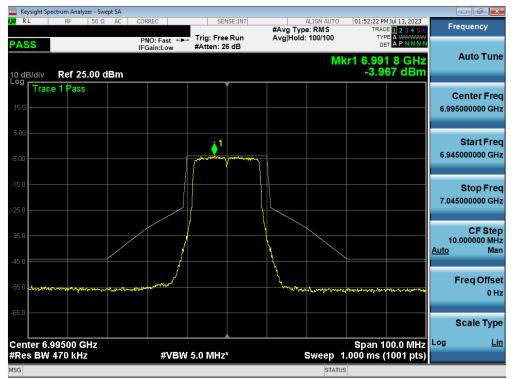
Plot 7-95. In-Band Emission Plot Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 7) - Ch. 143)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
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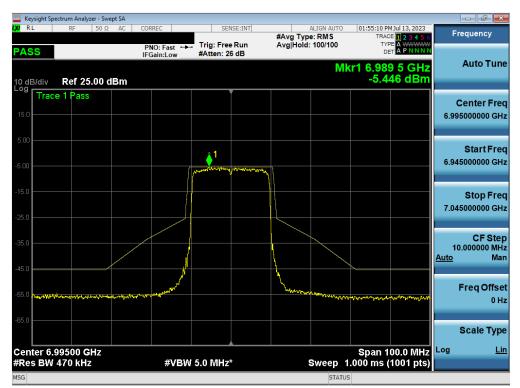
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# MIMO Antenna-1 In-Band Emission Plot Measurement - (UNII Band 8)



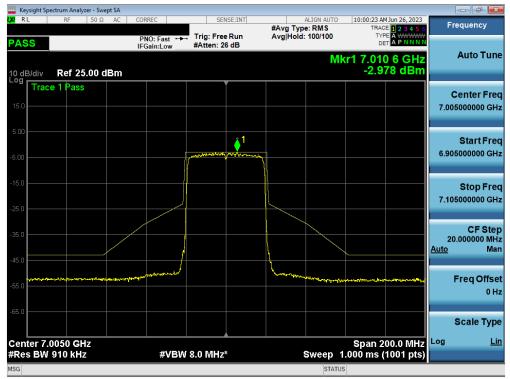
Plot 7-96. In-Band Emission Plot Measurement MIMO ANT1 (20MHz 802.11a (UNII Band 8) - Ch. 209)



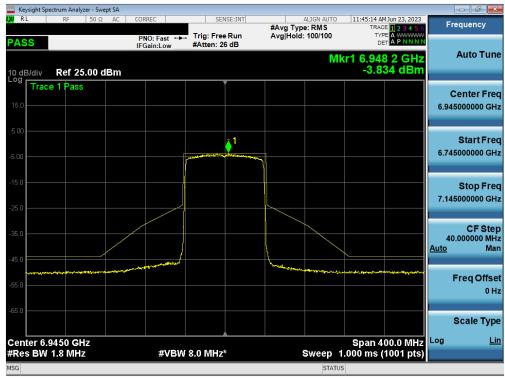
Plot 7-97. In-Band Emission Plot Measurement MIMO ANT1 (20MHz 802.11ax (UNII Band 8) - Ch. 209)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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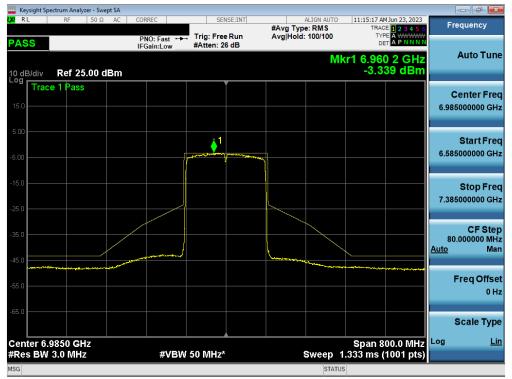
Plot 7-98. In-Band Emission Plot Measurement MIMO ANT1 (40MHz 802.11ax (UNII Band 8) - Ch. 211)



Plot 7-99. In-Band Emission Plot Measurement MIMO ANT1 (80MHz 802.11ax (UNII Band 8) - Ch. 199)

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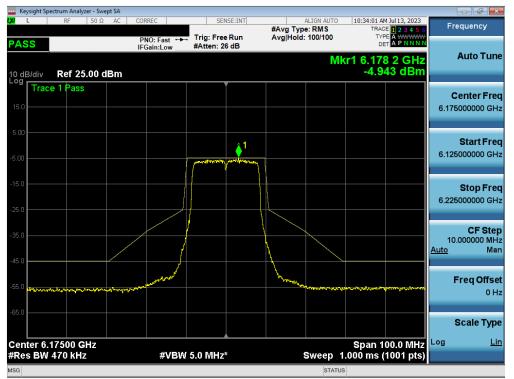
Plot 7-100. In-Band Emission Plot Measurement MIMO ANT1 (160MHz 802.11ax (UNII Band 8) - Ch. 207)

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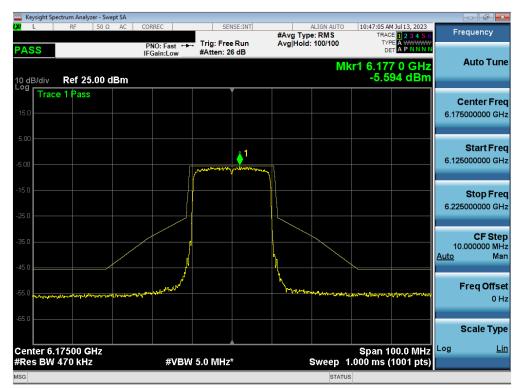
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# 7.5.2 MIMO Antenna-2 In-Band Emission Plot Measurement - (UNII Band 5)



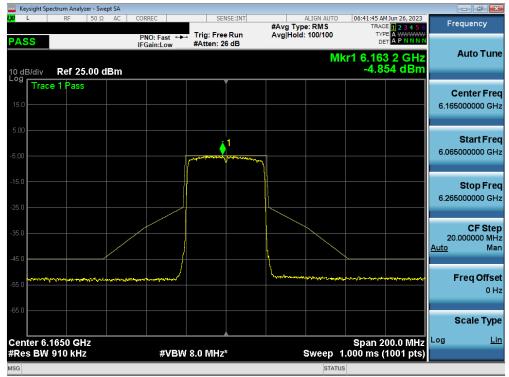
Plot 7-101. In-Band Emission Plot Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 5) - Ch. 45)



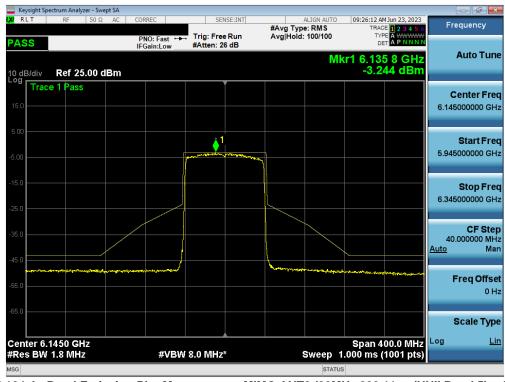
Plot 7-102. In-Band Emission Plot Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 5) – Ch. 45)

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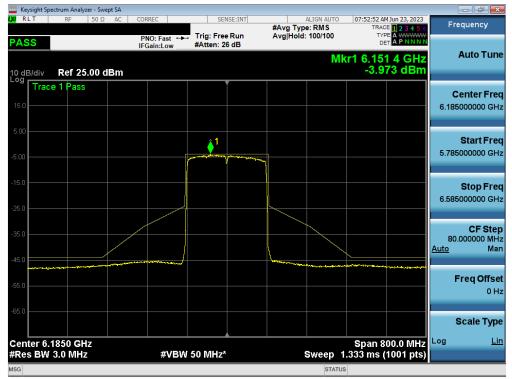
Plot 7-103. In-Band Emission Plot Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 5) - Ch. 43)



Plot 7-104. In-Band Emission Plot Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 5) - Ch. 39)

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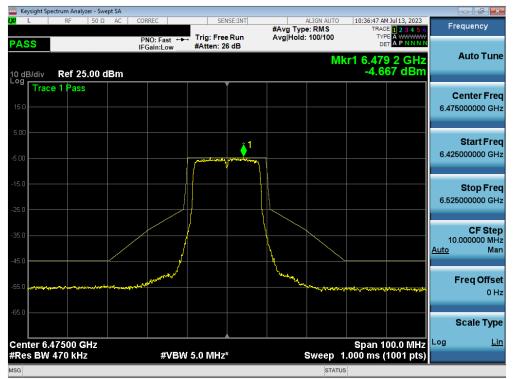
Plot 7-105. In-Band Emission Plot Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 5) - Ch. 47)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
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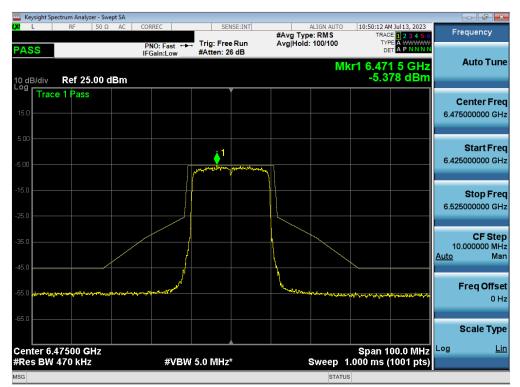
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# MIMO Antenna-2 In-Band Emission Plot Measurement - (UNII Band 6)



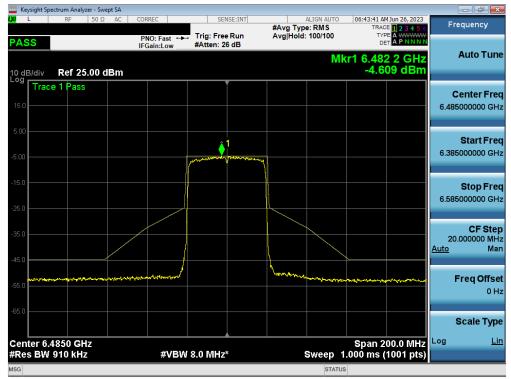
Plot 7-106. In-Band Emission Plot Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 6) - Ch. 105)



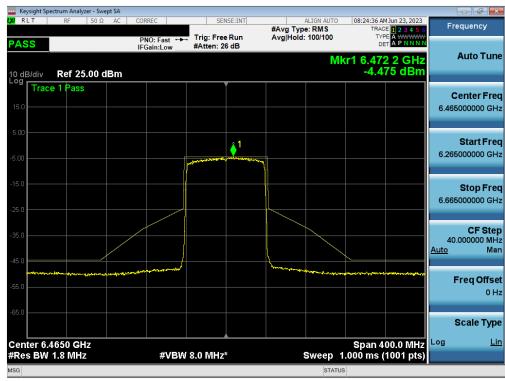
Plot 7-107. In-Band Emission Plot Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 6) - Ch. 105)

FCC ID: A3LSMS711U		MEASUREMENT REPORT	
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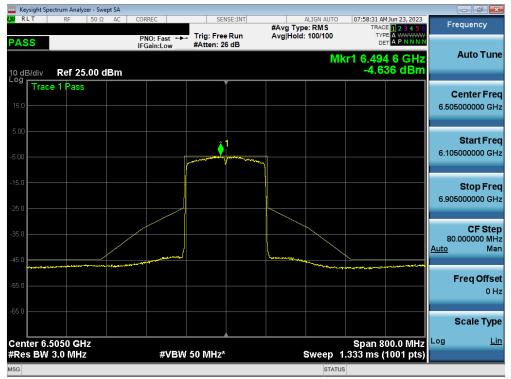
Plot 7-108. In-Band Emission Plot Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 6) - Ch. 107)



Plot 7-109. In-Band Emission Plot Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 6) - Ch. 103)

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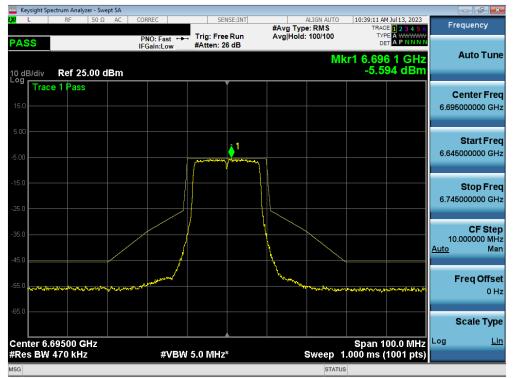
Plot 7-110. In-Band Emission Plot Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 6) - Ch. 111)

FCC ID: A3LSMS711U	MEASUREMENT REPORT		Approved by: Technical Manager
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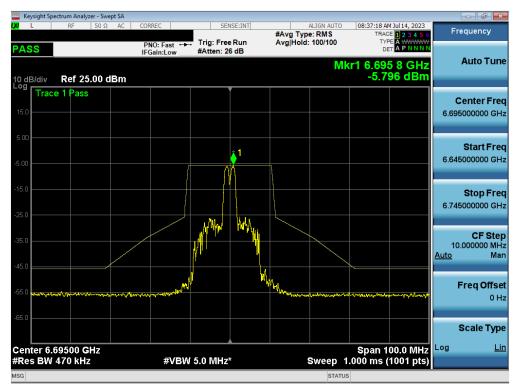
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# MIMO Antenna-2 In-Band Emission Plot Measurement - (UNII Band 7)



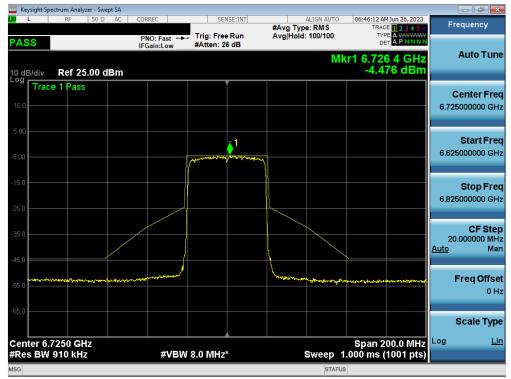
Plot 7-111. In-Band Emission Plot Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 7) - Ch. 149)



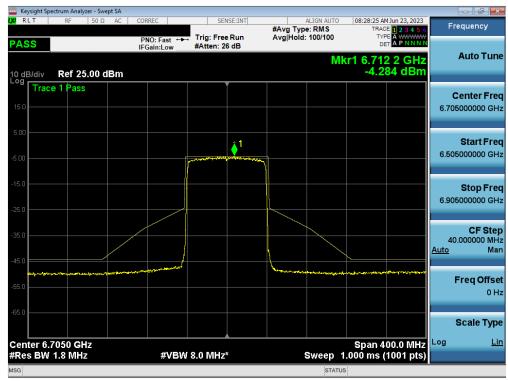
Plot 7-112. In-Band Emission Plot Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 7) - Ch. 149)

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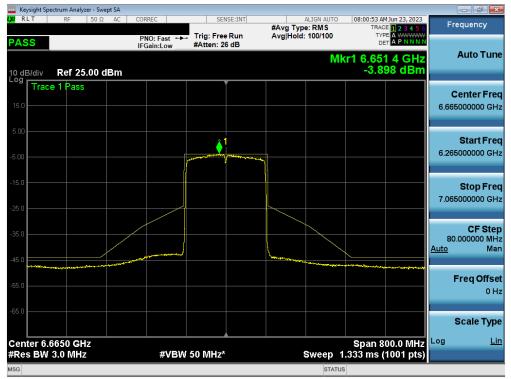
Plot 7-113. In-Band Emission Plot Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 7) - Ch. 155)



Plot 7-114. In-Band Emission Plot Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 7) - Ch. 151)

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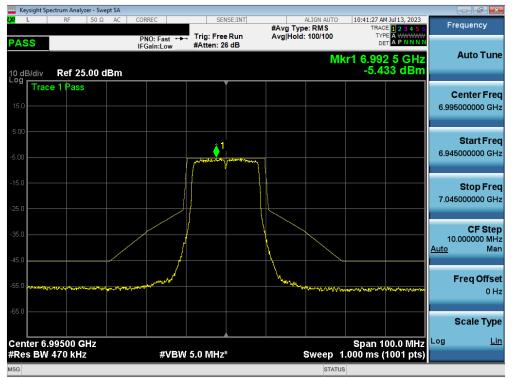
Plot 7-115. In-Band Emission Plot Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 7) - Ch. 143)

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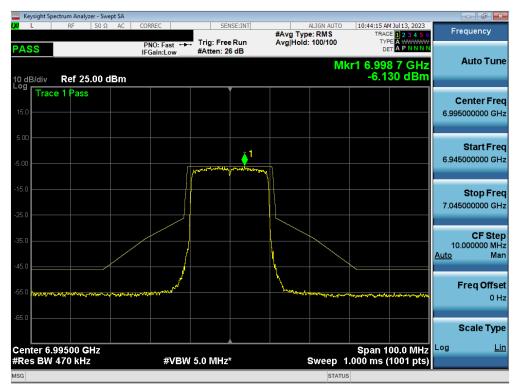
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# MIMO Antenna-2 In-Band Emission Plot Measurement - (UNII Band 8)



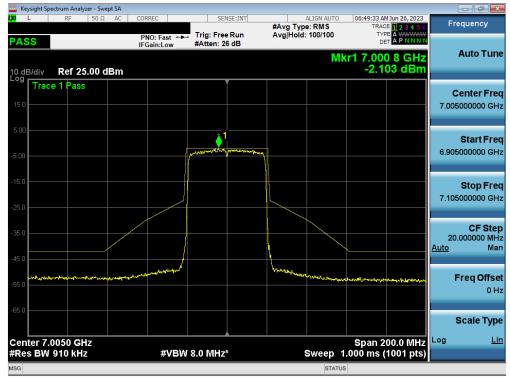
Plot 7-116. In-Band Emission Plot Measurement MIMO ANT2 (20MHz 802.11a (UNII Band 8) - Ch. 209)



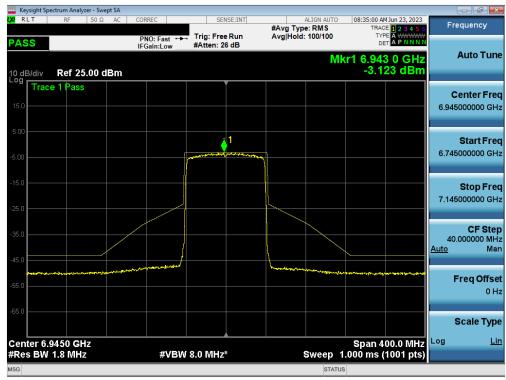
Plot 7-117. In-Band Emission Plot Measurement MIMO ANT2 (20MHz 802.11ax (UNII Band 8) - Ch. 209)

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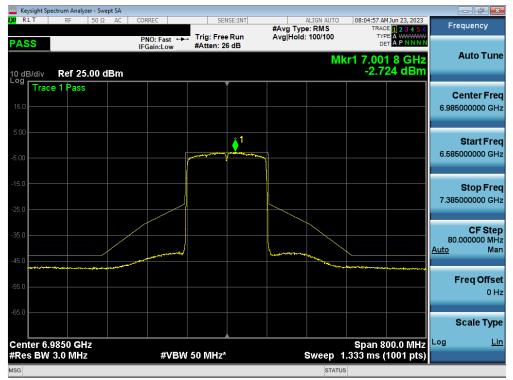
Plot 7-118. In-Band Emission Plot Measurement MIMO ANT2 (40MHz 802.11ax (UNII Band 8) - Ch. 211)



Plot 7-119. In-Band Emission Plot Measurement MIMO ANT2 (80MHz 802.11ax (UNII Band 8) - Ch. 199)

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Plot 7-120. In-Band Emission Plot Measurement MIMO ANT2 (160MHz 802.11ax (UNII Band 8) - Ch. 207)

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### 7.6 Contention Based Protocol

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

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band (herein referred to as unlicensed devices) are required to use technologies that include a contention-based protocol to avoid co-channel interference with incumbent devices sharing the band. To ensure incumbent co-channel operations are detected in a technology-agnostic manner, unlicensed devices are required to detect co-channel radio frequency energy (energy detect) and avoid simultaneous transmission.

Unlicensed indoor low-power devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel if detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain.

To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel.

#### Test Procedure Used

#### KDB 987594 D02 v01r01

#### Test Settings

- 1. Configure the EUT to transmit with a constant duty cycle.
- 2. Set the operating parameters of the EUT including power level, operating frequency, modulation, and bandwidth.
- 3. Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT. Connect the output port of the EUT to the signal analyzer 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.
- 4. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters set at step two.
- 5. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
- Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 dBm threshold). Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer 1 and the EUT as shown in Figure 2.
- 7. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.
- 8. Monitor the signal analyzer 2 to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
- (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
- 10. Refer to Table 1 of KDB 987594 D02 v01r01 to determine the number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 5, choose a different center frequency for the AWGN signal, and repeat the process.

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#### Test Setup

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

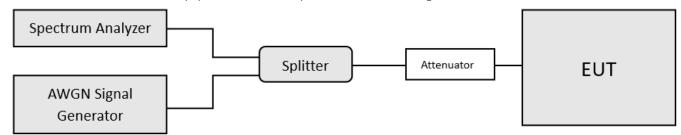


Figure 7-5. Contention-based protocol test setup conducted method.

#### Test Notes

- 1. Per guidance from KDB 987594 D02 v01r01, contention-based protocol was tested using an AWGN signal with a bandwidth of 10MHz (see Plot 7-121). The amplitude of the signal was increased until detected by the EUT, signaled by the ceasing of transmission (see Plot 7-122), M1 indicates the point at which the AWGN signal is introduced. D1 indicates where the AWGN signal is terminated, at least 10 seconds following M1.
- 2. 15 trials were run to assure that at least 90% of certainty was met.
- 3. Per Guidance from KDB 987594 D04 v01, contention-based protocol was tested with receiver with the lowest antenna gain.
- 4. All CBP Timing Plots shown are for the ceased condition. Some spikes that may be shown are from adjacent portions of the spectrum that are still transmitting.

Detection Level = In	jected AWGN Power	(dBm) – Antenna Ga	in (dB	i) + Path Loss (	dB)
Dotootion Eovor In				., aan <b>2000</b> (	<u><u> </u></u>

Band	Channel	Channel Freq [MHz]	Channel BW [MHz]	Incumbent Freq [MHz]	Injected (AWGN) [dBm]	Antenna Gain [dBi]	Adjusted Power Level [dBm]	Detection Limit [dBm]	Margin [dB]
	53	6215	20	6215	-73.99	-7.23	-66.76	-62.0	-4.76
UNII				6110	-76.69	-7.23	-69.46	-62.0	-7.46
Band 5	47	6185	160	6185	-72.92	-7.23	-65.69	-62.0	-3.69
				6260	-76.35	-7.23	-69.12	-62.0	-7.12
	101	6455	20	6455	-73.99	-7.88	-66.11	-62.0	-4.11
UNII				6430	-76.69	-7.88	-68.81	-62.0	-6.81
Band 6	111	6505	160	6505	-72.92	-7.88	-65.04	-62.0	-3.04
				6580	-76.35	-7.88	-68.47	-62.0	-6.47
	149	6695	20	6695	-75.45	-7.75	-67.70	-62.0	-5.70
UNII				6750	-79.91	-7.75	-72.16	-62.0	-10.16
Band 7	175	6825	160	6825	-75.68	-7.75	-67.93	-62.0	-5.93
				6900	-79.32	-7.75	-71.57	-62.0	-9.57
	197	6935	20	6935	-74.35	-7.28	-67.07	-62.0	-5.07
UNII				6910	-79.18	-7.28	-71.90	-62.0	-9.90
Band 8	207	6985	160	6985	-73.98	-7.28	-66.70	-62.0	-4.70
				7060	-79.46	-7.28	-72.18	-62.0	-10.18

#### **Equation 7-1. Detection Level Calculation**

Table 7-10. Contention Based Protocol – Incumbent Detection Results

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						EUT Transmission Status Adjusted AWGN Power (dBm)				
Band	Channel	Channel Freq [MHz]	Channel BW [MHz]	Incumbent Freq [MHz]	Antenna Gain [dBi]	Normal	Minimal	Ceased	Detection Limit [dBm]	Margin [dB]
	53	6215	20	6215	-7.23	-69.15	-67.89	-66.76	-62.0	-4.76
UNII				6110	-7.23	-71.77	-70.57	-69.46	-62.0	-7.46
Band 5	47	6185	160	6185	-7.23	-67.98	-66.85	-65.69	-62.0	-3.69
				6260	-7.23	-71.20	-70.12	-69.12	-62.0	-7.12
	101	6455	20	6455	-7.88	-67.98	-66.87	-66.11	-62.0	-4.11
UNII				6430	-7.88	-70.80	-69.03	-68.81	-62.0	-6.81
Band 6	111	6505	160	6505	-7.88	-67.91	-66.18	-65.04	-62.0	-3.04
				6580	-7.88	-71.25	-69.53	-68.47	-62.0	-6.47
	149	6695	20	6695	-7.75	-69.98	-68.82	-67.70	-62.0	-5.70
UNII				6750	-7.75	-74.29	-73.15	-72.16	-62.0	-10.16
Band 7	175	6825	160	6825	-7.75	-70.59	-69.41	-67.93	-62.0	-5.93
				6900	-7.75	-73.51	-72.34	-71.57	-62.0	-9.57
	197	6935	20	6935	-7.28	-69.36	-68.23	-67.07	-62.0	-5.07
UNII				6910	-7.28	-74.18	-73.04	-71.90	-62.0	-9.90
Band 8	207	6985	160	6985	-7.28	-69.07	-67.99	-66.70	-62.0	-4.70
				7060	-7.28	-74.61	-73.51	-72.18	-62.0	-10.18

Table 7-11. Contention Based Protocol – Detection Results – All Tx Cases

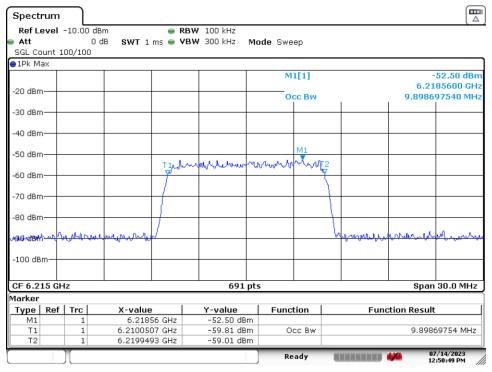
Band	Channel	Channel Freq [MHz]	Channel BW [MHz]	Incumbent Freq [MHz]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Detection Rate (%)
	53	6215	20	6215	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
UNII				6110	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
Band 5	47	6185	160	6185	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				6260	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
	101	6455	20	6455	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
UNII				6430	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
Band 6	111	6505	160	6505	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				6580	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
	149	6695	20	6695	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
UNII				6750	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
Band 7	175	6825	160	6825	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				6900	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
	197	6935	20	6935	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
UNII				6910	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
Band 8	207	6985	160	6985	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
				7060	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100

Table 7-12. Contention Based Protocol – Incumbent Detection Trial Results

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# 7.6.1 AWGN Plots



Date: 14.JUL.2023 12:50:49

Plot 7-121. AWGN Signal (Demonstration)

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