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MEASUREMENT REPORT WLAN OFDMA

Applicant Name:

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

Date of Testing: 9/14/2021 - 12/20/2021 Test Report Issue Date: 12/30/2021 Test Site/Location: PCTEST Lab. Columbia, MD USA Test Report Serial No.: 1M2112100159-06.A3L

FCC ID:

A3LSMS908JPN

Certification

APPLICANT:

Samsung Electronics Co., Ltd.

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

SC-52C SCG14 Portable Handset 2412 – 2472MHz CCK/DSSS/OFDMA Digital Transmission System (DTS) Part 15 Subpart C (15.247) ANSI C63.10-2013, KDB 558074 D01 v05r02, KDB 662911 D01 v02r01, KDB 648474 D03 v01r04

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 558074 D01 v05r02. 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.

Randy Ortanez President



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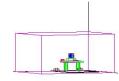


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MEASUREMENT REPORT



				MI	MO	
		T. F	Avg Conducted		Peak Conducted	
Mode	Tones	Tx Frequency [MHz]	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
802.11ax OFDMA	26T	2412 - 2472	77.948	18.92	978.694	29.91
802.11ax OFDMA	52T	2412 - 2472	79.104	18.98	990.408	29.96
802.11ax OFDMA	106T	2412 - 2472	95.947	19.82	941.649	29.74
802.11ax OFDMA	242T	2412 - 2472	140.486	21.48	903.538	29.56

EUT Overview

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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 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility 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 PCTEST located in Columbia, MD 21046, U.S.A.

- PCTEST 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.
- PCTEST 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).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 **PRODUCT INFORMATION**

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS908JPN**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN (DTS) transmitter.

Test Device Serial No.: 0501M, 0958M, 0545M

2.2 Device Capabilities

This device contains the following capabilities:

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

Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442		

Table 2-1. Frequency/ Channel Operations

Note: 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 6.0 b) of ANSI C63.10-2013 and KDB 558074 D01 v05r02. 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:

Mode	Antenna	Tones	Duty Cycle (%)
		26T	98.5
802.11ax		52T	97.9
DTS RU	MIMO	106T	97.2
		242T	91.7

Table 2-2. Measured Duty Cycles

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

WiFi Configurations		SIS	SO	SE	DM	C	DD
		ANT1	ANT2	ANT1	ANT2	ANT1	ANT2
2.4GHz 11ax		×	×	\checkmark	✓	\checkmark	✓

Table 2-3. Frequency / Channel Operations

 \checkmark = Support ; ***** = NOT Support SISO = Single Input Single Output SDM = Spatial Diversity Multiplexing – MIMO function CDD = Cyclic Delay Diversity - 2Tx Function

This device supports simultaneous transmission operation, which allows for two SISO channels to operate independent of one another in the 2.4GHz and 5GHz bands simultaneously on each antenna. The following tables show the worst case configurations determined during testing. The data for these configurations is contained in the UNII test report.

Configuration 1: ANT1 and ANT2 both transmitting in 2.4GHz and 5GHz modes simultaneously

Description	2.4 GHz Emission	5 GHz Emission
Antenna	1, 2	1, 2
Channel	6	100
Operating Frequency (MHz)	2437	5500
Data Rate (Mbps)	1	6
Mode	802.11b	802.11a

Table 2-4. Config-3 (ANT1 MIMO & ANT2 MIMO)

2.3 Test Configuration

The EUT was tested per the guidance of KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing. See Sections 3.2 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 supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) EP-NG930 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 Antenna Description

Following antenna was used for the testing.

Frequency [GHz]	Antenna Gain 1 [dBi]	Antenna Gain 2 [dBi]
2.4	-6.23	-5.76

Table 2-5. Antenna Peak Gain

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2.5 Software and Firmware

The test was conducted with firmware version N/A 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 558074 D01 v05r02 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 Radiated Emissions

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

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

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

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

3.3 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 connections to an external antenna.

Conclusion:

The EUT unit complies with the requirement of §15.203.

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5.0 MEASUREMENT UNCERTAINTY

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

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

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6.0 **TEST EQUIPMENT CALIBRATION DATA**

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	WL25-1	Conducted Cable Set (25GHz)	9/7/2021	Annual	9/7/2022	WL25-1
-	WL25-2	Conducted Cable Set (25GHz)	9/7/2021	Annual	9/7/2022	WL25-2
-	WL25-3	Conducted Cable Set (25GHz)	9/7/2021	Annual	9/7/2022	WL25-3
-	WL40-1	Conducted Cable Set (40GHz)	9/10/2021	Annual	9/10/2022	WL40-1
Agilent	N9038A	MXE EMI Receiver	8/11/2020	Annual	12/1/2021	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	7/21/2021	Annual	7/21/2022	MY49430494
Anritsu	ML2495A	Power Meter	1/18/2021	Annual	1/18/2022	941001
Anritsu	MA2411B	Pulse Power Sensor	3/8/2021	Annual	3/8/2022	1339007
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Emco	3116C	Horn Antenna (18 - 40GHz)	5/112021	Biennial	5/11/2023	218893
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	7/9/2020	Biennial	7/9/2022	114451
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	8/17/2020	Annual	12/17/2021	MY52350166
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	9/10/2021	Annual	9/10/2022	NMLC-2
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	7/21/2021	Annual	7/12/2022	MY49430494
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/3/2021	Annual	8/3/2022	100342
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44GHz	1/21/2021	Annual	1/21/2022	101716
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/25/2021	Annual	8/25/2022	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	9/3/2021	Annual	9/3/2022	102138
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	9/21/2021	Biennial	9/21/2023	310233
Schwarzbeck	VULB9162	Bilog Antenna	4/17/2020	Biennial	4/17/2022	00301

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:	A3LSMS908JPN
FCC Classification:	Digital Transmission System (DTS)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	> 500kHz		PASS	Section 7.2
15.247(b)(3)	RSS-247 [5.4]	Transmitter Output Power	< 1 Watt		PASS	Sections 7.3
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz Band	CONDUCTED	PASS	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	≥ 20dBc		PASS	Sections 7.5, 7.6
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])	RADIATED	PASS	Sections 7.7

Table 7-1. Summary of Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "WLAN Automation," Version 3.5.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.3.1.
- 802.11ax OFDMA testing was performed for all signal tone configurations as specified by the 802.11ax standard. Worst case results are determined and reported per the guidance provided at the October 2018 TCB Workshop.

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7.2 6dB Bandwidth Measurement

§15.247(a.2); RSS-247 [5.2]

Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the transmitter antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated and the worst case configuration results are reported in this section.

The minimum permissible 6dB bandwidth is 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 11.8.2 Option 2 KDB 558074 D01 v05r02 – Section 8.2

Test Settings

- The signal analyzer's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 100kHz
- 3. VBW \geq 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize

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

- 1. Based on preliminary measurements, it was determined that, of all the tone configurations, the 26T configuration produced the worst case 6dB Bandwidth measurement. Only the worst case data is included in this section.
- 2. The 6dB bandwidth for each channel was measured with the RU index showing the highest conducted power.

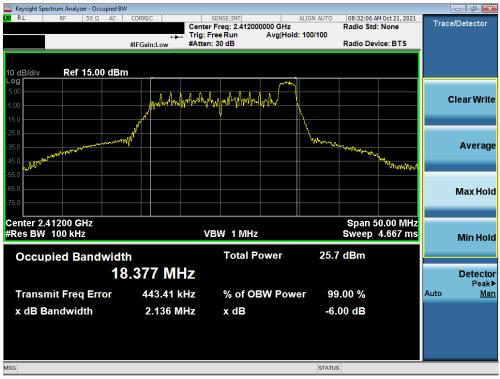
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MIMO Antenna-1 6 dB Bandwidth Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
2412	1	ax	26T	MCS0	2.136	0.500
2437	6	ax	26T	MCS0	2.118	0.500
2462	11	ax	26T	MCS0	2.088	0.500
2412	1	ax	242T	MCS0	19.07	0.500
2437	6	ax	242T	MCS0	19.08	0.500
2462	11	ax	242T	MCS0	19.03	0.500

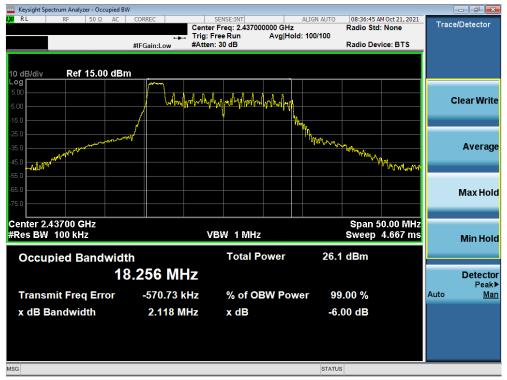
Table 7-2. Conducted Bandwidth Measurements MIMO ANT1



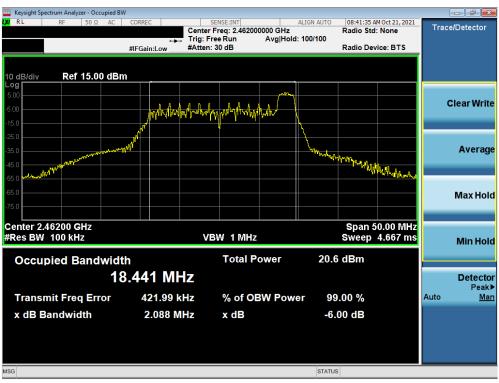
Plot 7-1. 6dB Bandwidth Plot MIMO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

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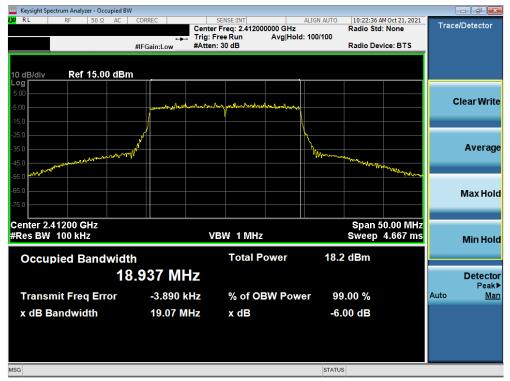
Plot 7-2. 6dB Bandwidth Plot MIMO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 6)



Plot 7-3. 6dB Bandwidth Plot MIMO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 11)

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Test Report S/N:	Test Dates:	EUT Type:	Dage 15 of 70
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Plot 7-4. 6dB Bandwidth Plot MIMO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)



Plot 7-5. 6dB Bandwidth Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 6)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dara 40 at 70
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www.www.www.www.www.www.www.www.www.ww	BW				
<mark>.,X/</mark> RL RF 50Ω AC		SENSE:INT Freq: 2.462000000 GHz	ALIGN AUTO	10:32:40 AM Oct 21, 2021 Radio Std: None	Trace/Detector
	+++ Trig:	Free Run Avg Hold	d:>100/100		
	#IFGain:Low #Atte	n: 30 dB		Radio Device: BTS	
10 dB/div Ref 15.00 dE	3m				
5.00					
-5.00	an mounter have me	along many makes and makes and a source of the			Clear Write
-15.0					
-25.0			λ		
-35.0	/		$\left \right\rangle$		Average
			Mu ann a		J
-45.0 -55.0			i a çarışı	man and and and and and and and and and a	
-65.0					
-75.0					Max Hold
-73.0					
Center 2.46200 GHz				Span 50.00 MHz	
#Res BW 100 kHz		/BW 1 MHz		Sweep 4.667 ms	Min Hold
Occupied Bandwig	ith	Total Power	20.4	dBm	
			20.4		
1	8.926 MHz				Detector Peak►
Transmit Freq Error	-31.351 kHz	% of OBW Pow	er 99	.00 %	Auto <u>Man</u>
x dB Bandwidth	19.03 MHz	x dB	-6 (00 dB	
	13.03 1112	X UD	-0.0		
100			074-715		
MSG			STATUS		

Plot 7-6. 6dB Bandwidth Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 11)

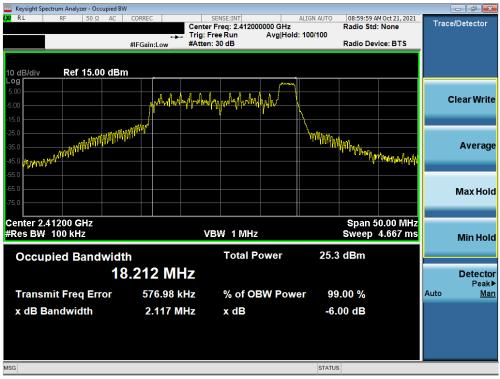
FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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MIMO Antenna-2 6 dB Bandwidth Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
2412	1	ax	26T	MCS0	2.117	0.500
2437	6	ax	26T	MCS0	2.126	0.500
2462	11	ax	26T	MCS0	2.120	0.500
2412	1	ax	242T	MCS0	19.05	0.500
2437	6	ax	242T	MCS0	18.99	0.500
2462	11	ax	242T	MCS0	19.10	0.500

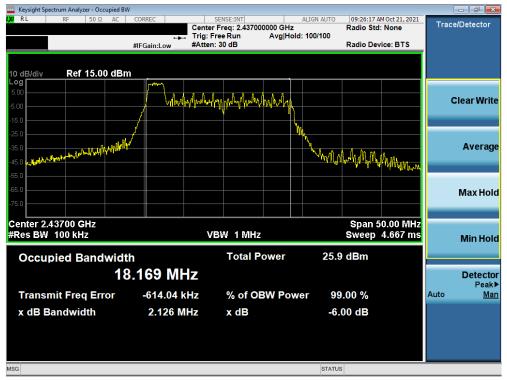
Table 7-3. Conducted Bandwidth Measurements SISO ANT2



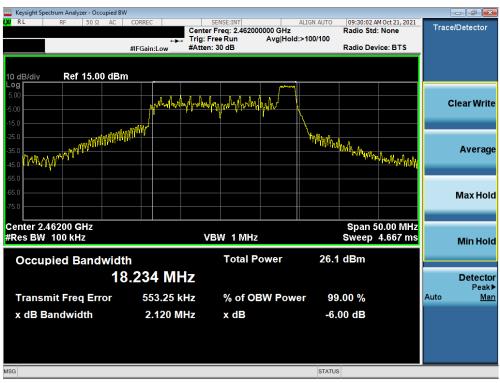
Plot 7-7. 6dB Bandwidth Plot MIMO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 1)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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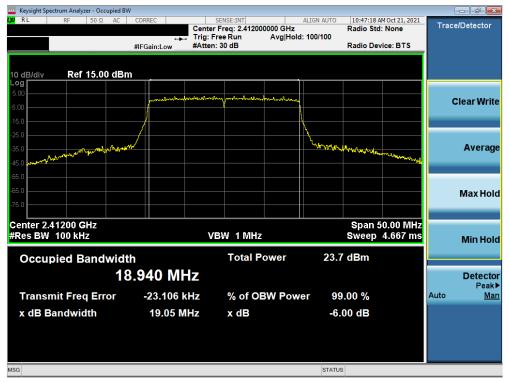
Plot 7-8. 6dB Bandwidth Plot MIMO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 6)



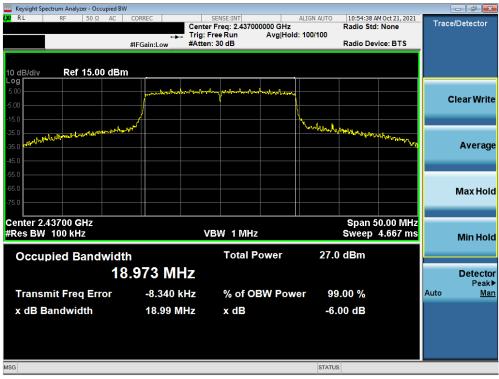
Plot 7-9. 6dB Bandwidth Plot MIMO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dava 40 of 70		
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Plot 7-10. 6dB Bandwidth lot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 1)



Plot 7-11. 6dB Bandwidth Plot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 6)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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www. Keysight Spectrum Analyzer - Occupied BV	V				
KI RF 50Ω AC	CORREC	SENSE:INT nter Freg: 2.462000	ALIGN AUTO	11:00:18 AM Oct 21, 2021 Radio Std: None	Trace/Detector
	tri	g: Free Run	Avg Hold: 100/100	Radio Stu. None	
	#IFGain:Low #A	tten: 30 dB		Radio Device: BTS	
10 dB/div Ref 15.00 dBn	n				
5.00					
	malententen	money marine	- Auglann		Clear Write
-5.00					
-15.0					
-25.0			— <u> </u>		
-35.0	00		william	h	Average
-35.0 -45.0			الملايية		
-55.0				The should be	
-65.0					Max Hold
-75.0					Maxitola
Center 2.46200 GHz				Span 50.00 MHz	
#Res BW 100 kHz		VBW 1 MHz		Sweep 4.667 ms	Min Hold
Occupied Bandwidt	h	Total Po	wer 20.2	2 dBm	
		i otari i o	2012		
18	3.947 MHz				Detector Peak►
Transmit Freq Error	-36.188 kHz	% of OB	W Power 99	.00 %	Auto Man
•					
x dB Bandwidth	19.10 MHz	x dB	-0.	00 dB	
MSG			STATUS	3	

Plot 7-12. 6dB Bandwidth Plot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 11)

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Test Report S/N:	Test Dates:	EUT Type:	Dage 21 of 70	
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7.3 Output Power Measurement §15.247(b.3); RSS-247 [5.4]

Test Overview and Limits

A transmitter antenna terminal of EUT is connected to the input of an RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

Test Procedure Used

ANSI C63.10-2013 – Section 11.9.1.3 PKPM1 Peak Power Method KDB 558074 D01 v05r02 – Section 8.3.1.3 PKPM1 Peak-reading Power Meter Method ANSI C63.10-2013 – Section 11.9.2.3.2 Method AVGPM-G KDB 558074 D01 v05r02 – Section 8.3.2.3 Measurement using a Power Meter (PM) ANSI C63.10-2013 – Section 14.2 Measure-and-Sum Technique KDB 662911 D01 v02r01 – Section E)1) Measure-and-Sum Technique

Test Settings

Method PKPM1 (Peak Power Measurement)

Peak 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 pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Method AVGPM-G (Average Power Measurement)

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 diagrams below.



Figure 7-2. Test Instrument & Measurement Setup for Power Meter Measurements

Test Notes

None

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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	Freq [MHz]	Channel	Tones	RU Index	Detector				Conducted Power Limit	Conducted Power		
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]		
				0	AVG	15.60	15.72	18.67	30.00	-11.33		
				0	PEAK	25.53	24.37	28.00	30.00	-2.00		
	2412	1	26T	4	AVG	16.07	15.73	18.92	30.00	-11.08		
	2412	•	201	7	PEAK	26.99	24.26	28.85	30.00	-1.15		
					8	AVG	16.08	15.31	18.72	30.00	-11.28	
				0	PEAK	27.17	25.79	29.54	30.00	-0.46		
				0	AVG	16.06	15.75	18.92	30.00	-11.08		
			26T			0	PEAK	27.05	24.87	29.11	30.00	-0.89
	2437	6		4	AVG	15.30	15.38	18.35	30.00	-11.65		
	2407	0	201	-	PEAK	26.49	25.43	29.00	30.00	-1.00		
N					8	AVG	15.13	15.01	18.08	30.00	-11.92	
Î				0	PEAK	26.29	25.73	29.03	30.00	-0.97		
2.4GHz				0	AVG	15.33	15.35	18.35	30.00	-11.65		
4				0	PEAK	27.51	26.04	29.85	30.00	-0.15		
N N	2462	11	26T	4	AVG	15.32	15.07	18.21	30.00	-11.79		
	2402		201		PEAK	27.37	25.71	29.63	30.00	-0.37		
					AVG	15.68	15.68	18.69	30.00	-11.31		
				Ŭ	PEAK	27.54	26.14	29.91	30.00	-0.09		
				0	AVG	5.26	5.31	8.30	30.00	-21.70		
					PEAK	12.92	13.09	16.02	30.00	-13.98		
	2467	12	26T	4	AVG	6.04	5.72	8.89	30.00	-21.11		
	2101		201		PEAK	14.31	13.68	17.02	30.00	-12.98		
				8	AVG	5.78	5.77	8.79	30.00	-21.21		
				Ŭ	PEAK	14.03	13.51	16.79	30.00	-13.21		
				0	AVG	-0.47	-0.97	2.30	30.00	-27.70		
				PEAK	7.57	6.78	10.20	30.00	-19.80			
	2472	72 13	26T	4	AVG	0.09	-0.27	2.92	30.00	-27.08		
	22		201		PEAK	8.13	8.16	11.16	30.00	-18.84		
				8	AVG	-0.29	0.04	2.89	30.00	-27.11		
					PEAK	7.68	7.63	10.67	30.00	-19.33		

Table 7-4. Conducted Output Power Measurements MIMO (26 Tones)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	Freq [MHz]	Channel	Tones	RU Index	Detector	Cond	lucted Power [dBm]	Conducted Power Limit	Conducted Power		
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]		
				37	AVG	16.09	15.85	18.98	30.00	-11.02		
				37	PEAK	27.24	25.87	29.62	30.00	-0.38		
	2412	1	52T	38	AVG	15.98	15.26	18.65	30.00	-11.35		
	2412	1		50	PEAK	27.07	25.86	29.52	30.00	-0.48		
				40	AVG	15.68	15.01	18.37	30.00	-11.63		
					PEAK	27.91	25.71	29.96	30.00	-0.04		
				37	AVG	15.69	15.03	18.38	30.00	-11.62		
				57	PEAK	26.51	25.51	29.05	30.00	-0.95		
	2437	6	52T	38	AVG	16.05	15.77	18.92	30.00	-11.08		
	2437	0	521	50	PEAK	27.06	26.03	29.59	30.00	-0.41		
						40	AVG	15.57	15.13	18.37	30.00	-11.63
N				40	PEAK	27.14	25.96	29.60	30.00	-0.40		
2.4GHz				37	AVG	15.89	15.71	18.81	30.00	-11.19		
Q				57	PEAK	27.54	26.03	29.86	30.00	-0.14		
7	2462	11	52T	38	AVG	15.31	15.45	18.39	30.00	-11.61		
N	2402				PEAK	26.99	25.45	29.30	30.00	-0.70		
						40	AVG	15.93	15.85	18.90	30.00	-11.10
				-10	PEAK	27.33	26.19	29.81	30.00	-0.19		
				37	AVG	5.90	5.44	8.69	30.00	-21.31		
					PEAK	14.82	14.21	17.54	30.00	-12.46		
	2467	12	52T	38	AVG	6.02	5.92	8.98	30.00	-21.02		
	2407	12	021		PEAK	14.15	14.19	17.18	30.00	-12.82		
				40	AVG	6.04	5.91	8.99	30.00	-21.01		
				10	PEAK	14.51	14.56	17.55	30.00	-12.45		
				37	AVG	-0.44	-1.03	2.29	30.00	-27.71		
		2472 13			PEAK	7.89	7.31	10.62	30.00	-19.38		
	2472		52T	52T 38	AVG	0.16	-0.62	2.80	30.00	-27.20		
	22		13 521		PEAK	8.11	7.24	10.71	30.00	-19.29		
				40	AVG	-0.56	-0.22	2.62	30.00	-27.38		
					PEAK	7.89	8.11	11.01	30.00	-18.99		

Table 7-5. Conducted Output Power Measurements MIMO (52 Tones)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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	Freq [MHz]	Channel	Tones	RU Index	Detector	Conc	lucted Power [dBm]	Conducted Power Limit	Conducted Power
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]
				53	AVG	16.28	16.02	19.16	30.00	-10.84
	2412	1	106T	- 55	PEAK	27.41	25.92	29.74	30.00	-0.26
	2712	'	1001	54	AVG	16.90	16.14	19.55	30.00	-10.45
				54	PEAK	26.04	24.81	28.48	30.00	-1.52
				53	AVG	16.66	16.46	19.57	30.00	-10.43
	2437	6	106T	- 55	PEAK	26.59	25.18	28.95	30.00	-1.05
N	2437	0	1001	54	AVG	16.72	16.40	19.57	30.00	-10.43
I				54	PEAK	26.29	25.21	28.79	30.00	-1.21
2.4GI				53	AVG	16.81	16.81	19.82	30.00	-10.18
4	2462	11	106T	- 55	PEAK	26.52	25.10	28.88	30.00	-1.12
2	2402		1001	54	AVG	16.85	16.64	19.76	30.00	-10.24
					PEAK	26.03	25.16	28.63	30.00	-1.37
				53	AVG	6.13	5.72	8.94	30.00	-21.06
	2467	12	106T	- 55	PEAK	14.69	14.15	17.44	30.00	-12.56
	2407	12	1001	54	AVG	5.21	5.22	8.23	30.00	-21.77
				- 34	PEAK	14.03	13.88	16.97	30.00	-13.03
				53	AVG	-0.07	-0.79	2.60	30.00	-27.40
	2472	13	106T	53	PEAK	8.27	7.61	10.96	30.00	-19.04
	2472	13	1001	54	AVG	-0.19	-0.26	2.79	30.00	-27.21
				- 34	PEAK	8.77	8.43	11.61	30.00	-18.39

Table 7-6. Conducted Output Power Measurements MIMO (106 Tones)

	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Power [dBm]			Conducted Power Limit	Conducted Power	
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]	
	2412	1	242T	61	AVG	15.29	14.71	18.02	30.00	-11.98	
	2412	I		01	PEAK	27.40	25.49	29.56	30.00	-0.44	
	2417	2	242T	61	AVG	17.48	16.97	20.24	30.00	-9.76	
N	2417	2		01	PEAK	28.01	25.13	29.81	30.00	-0.19	
I	2422	3	040T	242T	61	AVG	18.60	18.28	21.45	30.00	-8.55
2.4G	2422	5	2421	01	PEAK	26.87	25.68	29.33	30.00	-0.67	
4	2437	6	242T	61	AVG	18.47	18.31	21.40	30.00	-8.60	
2	2437	0	2421	01	PEAK	26.87	25.26	29.10	30.00	-0.90	
	2462	11	242T	61	AVG	15.37	15.58	18.49	30.00	-11.51	
	2402	11	2421	01	PEAK	26.58	25.13	28.98	30.00	-1.02	
	2467	12	242T	61	AVG	5.63	5.61	8.63	30.00	-21.37	
	2407	12		01	PEAK	14.63	14.41	17.53	30.00	-12.47	
	2472	13	242T	61	AVG	-0.61	-0.86	2.28	30.00	-27.72	
	2472	13		01	PEAK	8.33	7.81	11.09	30.00	-18.91	
		Table 7-	7. Cond	ucted Ou	utput Pov	wer Measur	ements MIN	IO (242 Ton	es)		

Note:

Per ANSI C63.10-2013 and KDB 662911 D01 v02r01 Section E)1), the conducted powers at Antenna 1 and Antenna 2 were first measured separately during MIMO transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Sample MIMO Calculation:

At 2412MHz the average conducted output power was measured to be 18.17 dBm for Antenna-1 and 18.42 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(18.17 dBm + 18.42 dBm) = (65.5871 mW + 69.4178 mW) = 134.99 mW = 21.30 dBm

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7.4 Power Spectral Density

§15.247(e); RSS-247 [5.2]

Test Overview and Limit

The peak power density is measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates, tones configurations, and RU indices were investigated and the worst case configuration results are reported in this section.

The maximum permissible power spectral density is 8 dBm in any 3 kHz band.

Test Procedure Used

ANSI C63.10-2013 – Section 11.10.2 Method PKPSD KDB 558074 D01 v05r02 – Section 8.4 DTS Maximum Power Spectral Density level in the fundamental emission ANSI C63.10-2013 – Section 14.3.2.2 Measure-and-Sum Technique KDB 662911 D01 v02r01 – Section E)2) Measure-and-Sum Technique

Test Settings

- 1. Analyzer was set to the center frequency of the DTS channel under investigation
- 2. Span = 1.5 times the DTS channel bandwidth
- 3. RBW = 10kHz
- 4. VBW = 3kHz
- 5. Detector = peak
- 6. Sweep time = auto couple
- 7. Trace mode = max hold
- 8. Trace was allowed to stabilize

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

- 1. Based on preliminary measurements, it was determined that, of all of the tone configurations, the 26T configuration produced the worst case power spectral density measurement for partial loaded case. Therefore, only the 26 Tone configuration and 242 Tone data is included in this section.
- 2. The power spectral density for each channel was measured with the RU index showing the highest conducted power.

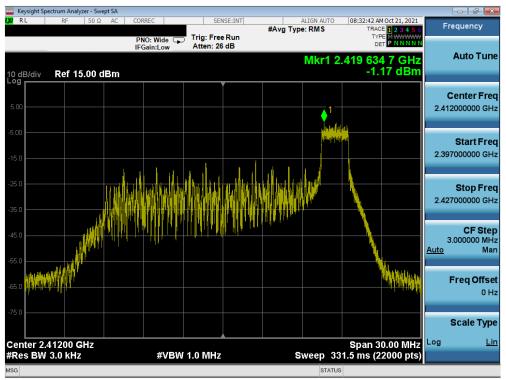
FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager				
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MIMO Power Spectral Density Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	ANT 1 Power Spectral Density [dBm]	ANT 2 Power Spectral Density [dBm]	Summed MIMO Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	ax	26T	MCS0	-1.17	-1.05	1.90	8.00	-6.10	Pass
2437	6	ax	26T	MCS0	-1.76	-0.15	2.13	8.00	-5.87	Pass
2462	11	ax	26T	MCS0	-0.09	-0.56	2.69	8.00	-5.31	Pass
2412	1	ax	242T	MCS0	-10.37	-10.08	-7.21	8.00	-15.21	Pass
2437	6	ax	242T	MCS0	-6.74	-6.83	-3.78	8.00	-11.78	Pass
2462	11	ax	242T	MCS0	-13.87	-12.98	-10.39	8.00	-18.39	Pass

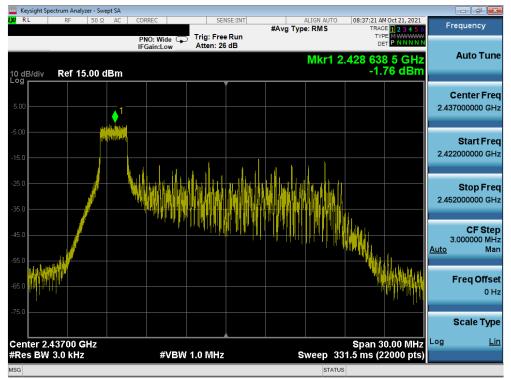
Table 7-8.MIMO Conducted Power Density Measurements



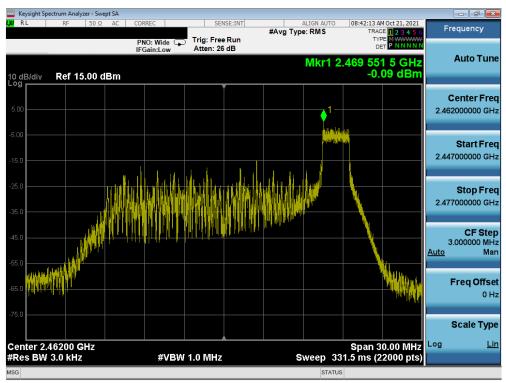
Plot 7-13. Power Spectral Density Plot MIMO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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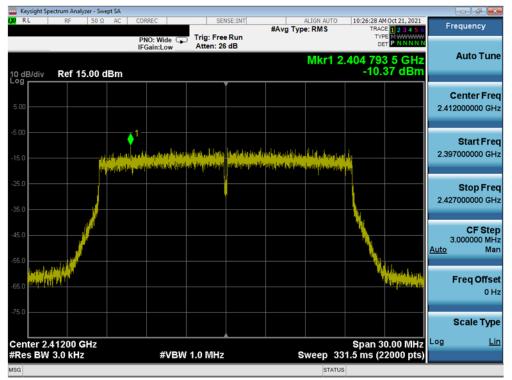
Plot 7-14. Power Spectral Density Plot MIMO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 6)



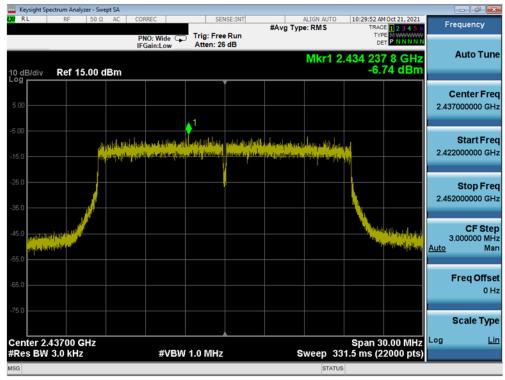
Plot 7-15. Power Spectral Density Plot MIMO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 11)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 29 of 76
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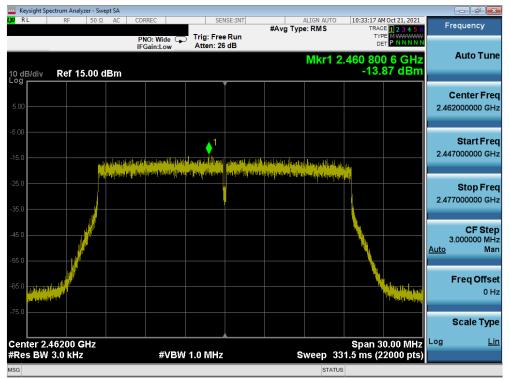
Plot 7-16. Power Spectral Density Plot MIMO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)



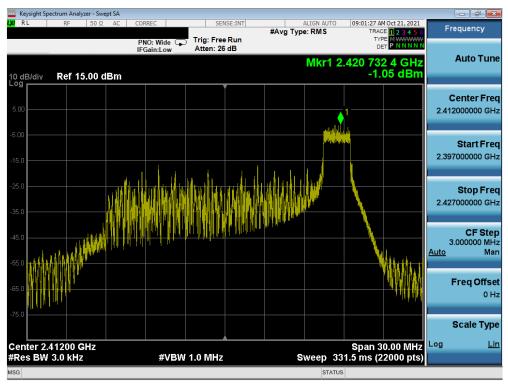
Plot 7-17. Power Spectral Density Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 6)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	De:	
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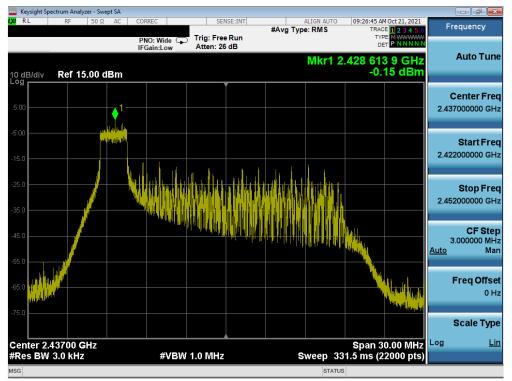
Plot 7-18. Power Spectral Density Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 11)



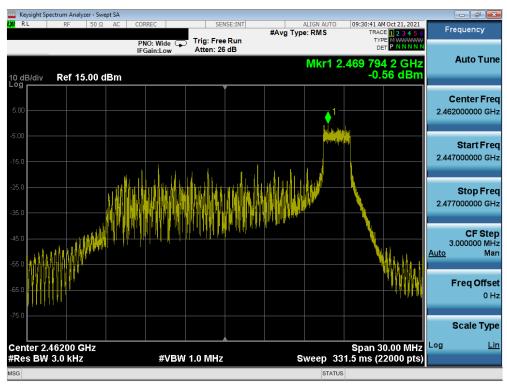
Plot 7-19. Power Spectral Density Plot MIMO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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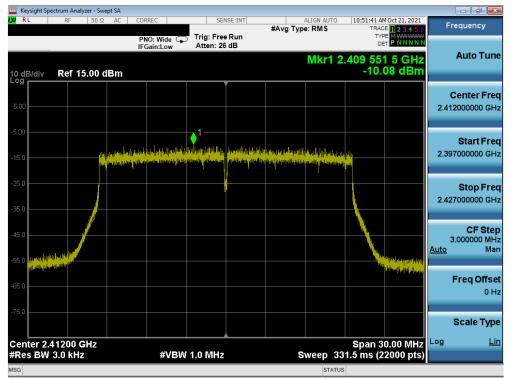
Plot 7-20. Power Spectral Density Plot MIMO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 6)



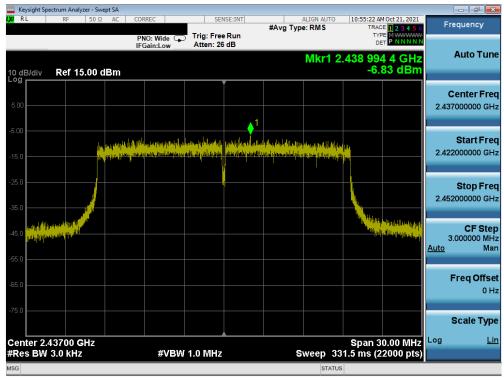
Plot 7-21. Power Spectral Density Plot MIMO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 11)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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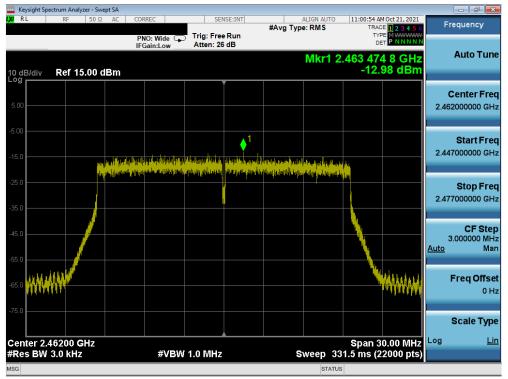
Plot 7-22. Power Spectral Density Plot MIMO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 1)



Plot 7-23. Power Spectral Density Plot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 6)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-24. Power Spectral Density Plot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 11)

Note:

Per ANSI C63.10-2013 Section 14.3.2.2 and KDB 662911 D01 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.

Sample MIMO Calculation:

At 2412MHz the average conducted power spectral density was measured to be -2.27 dBm for Antenna-1 and -1.36 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(-2.27 dBm + -1.36 dBm) = (0.59 mW + 0.73 mW) = 1.32 mW = 1.22 dBm

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7.5 Conducted Emissions at the Band Edge §15.247(d); RSS-247 [5.5]

Test Overview and Limit

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates, tone configurations, and RU indices were investigated to determine the worst case configuration. For the following out of band conducted emissions plots at the band edge, the EUT was set to a data rate of MCS0 in 802.11ax mode as this setting produced the worst-case emissions.

The limit for out-of-band spurious emissions at the band edge is N/AdB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure (Section 7.4).

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.7.2

Test Settings

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW = 100kHz
- 4. VBW = 1MHz
- 5. Detector = Peak
- 6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = max hold
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize

Test Setup

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



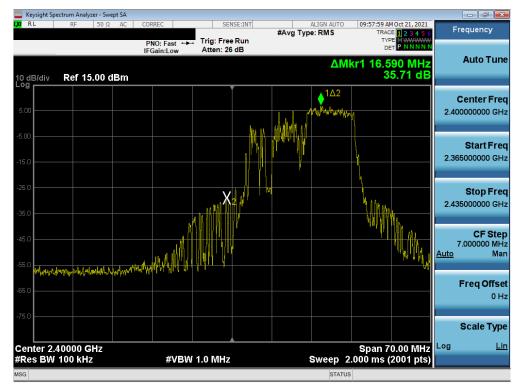
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

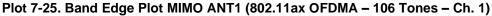
None

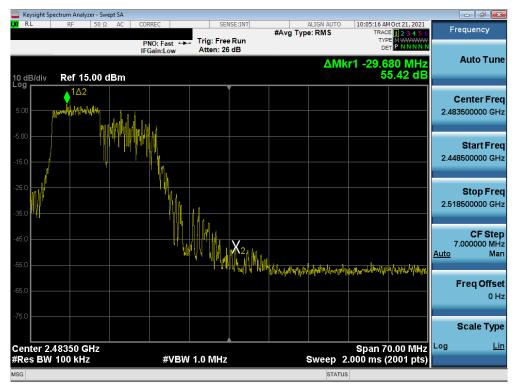
FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager			
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MIMO Antenna-1 Conducted Emissions at the Band Edge



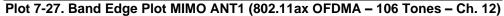


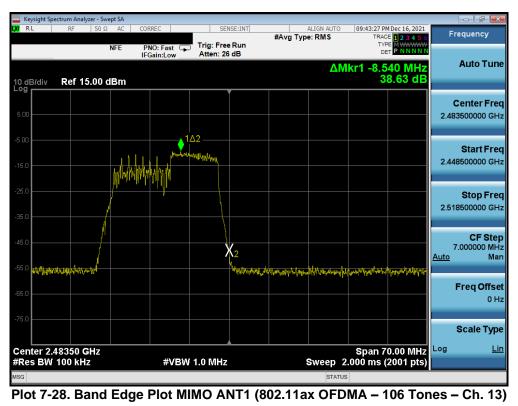
Plot 7-26. Band Edge Plot MIMO ANT1 (802.11ax OFDMA – 106 Tones – Ch. 11)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	rum Analyzer - S										
LXI RL	RF 50	Ω AC	CORREC	SE	NSE:INT	#Avg Typ	ALIGN AUTO		M Dec 16, 2021	F	requency
		NFE	PNO: Fast G IFGain:Low	Trig: Free Atten: 26		#Avg 1y		tyr be kr1 -25.4			Auto Tune
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-75.0											Scale Type
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MSG							STAT	US			

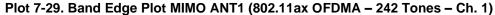


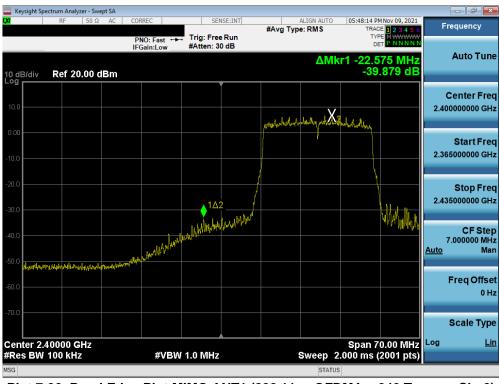


FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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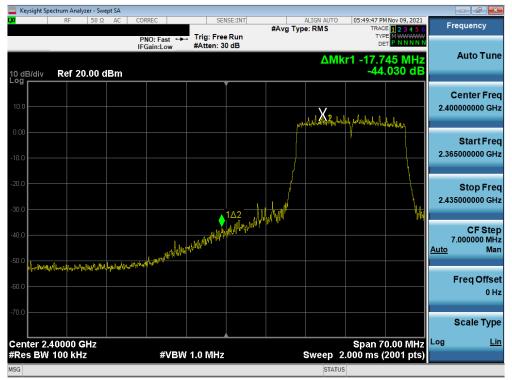


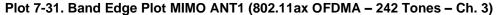


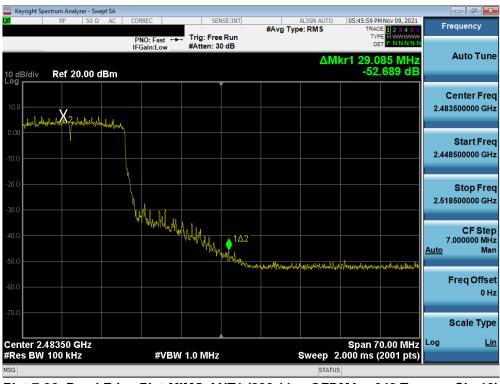
Plot 7-30. Band Edge Plot MIMO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 2)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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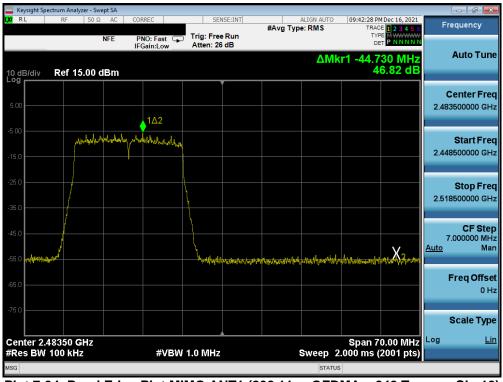
Plot 7-32. Band Edge Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 10)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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MSG					STATUS				

Plot 7-33. Band Edge Plot MIMO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)



Plot 7-34. Band Edge Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 12)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager	
Test Report S/N:	t S/N: Test Dates: EUT Type:			Dage 20 of 76	
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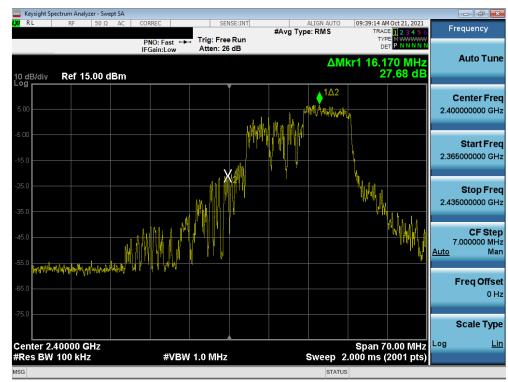


	ight Spectrum Analyzer -	Swept SA									
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-25.0 -										2.51	Stop Freq 3500000 GHz
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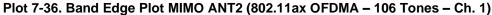
Plot 7-35. Band Edge Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 13)

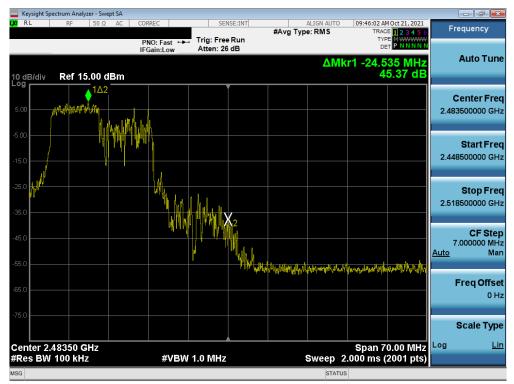
FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 40 of 76
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MIMO Antenna-2 Conducted Emissions at the Band Edge





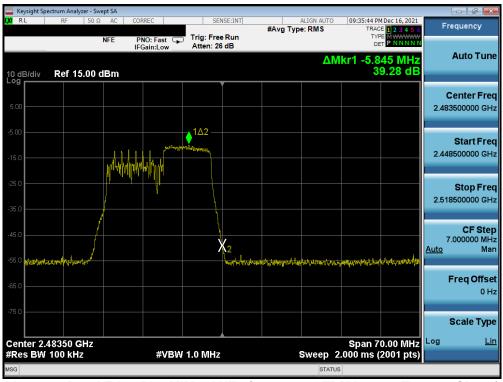
Plot 7-37. Band Edge Plot MIMO ANT2 (802.11ax OFDMA – 106 Tones – Ch. 11)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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	ctrum Analyzer - Swej	pt SA									
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-35.0										2.51	8500000 GHz
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-75.0											Scale Type
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#Res BW	100 kHz		#VBW	1.0 MHz				2.000 ms (2001 pts)		
MSG							STATU	S			

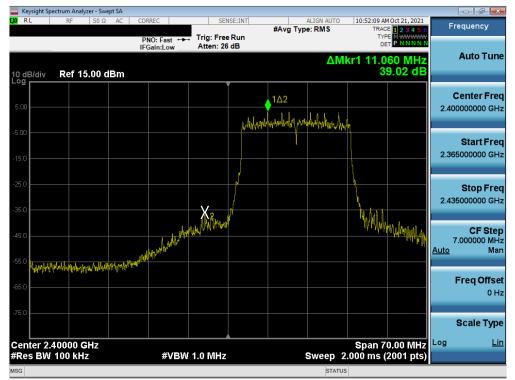
Plot 7-38. Band Edge Plot MIMO ANT2 (802.11ax OFDMA – 106 Tones – Ch. 12)

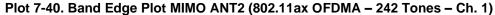


Plot 7-39. Band Edge Plot MIMO ANT2 (802.11ax OFDMA - 106 Tones - Ch. 13)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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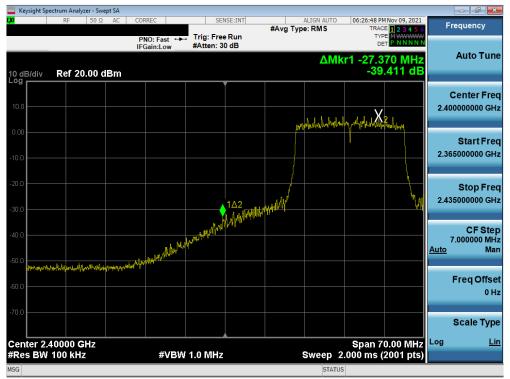


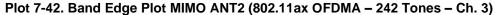


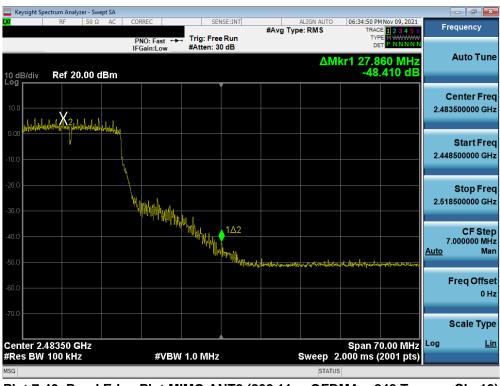
Plot 7-41. Band Edge Plot MIMO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 2)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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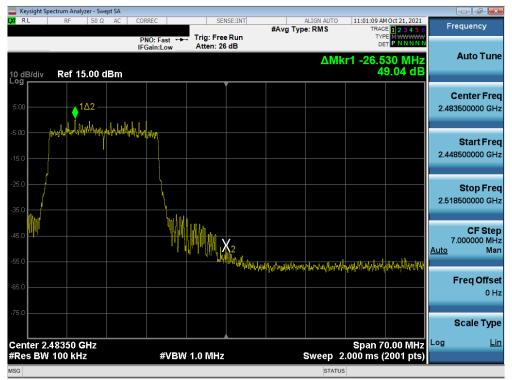




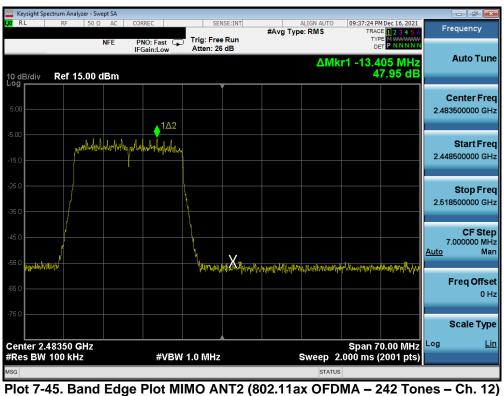
Plot 7-43. Band Edge Plot MIMO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 10)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-44. Band Edge Plot MIMO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)



Plot 7-45. Band Edge Plot MIMO ANTZ (802.11ax OFDMA – 242 Tones – Cn. 12)

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	sight Spectrum An	alyzer - Sw	ept SA										
LXI RL	. RF	50 Ω	AC	CORREC		SEN	SE:INT	#Avg Typ	ALIGN AUTO		PM Dec 16, 2021 ACE 1 2 3 4 5 6	F	requency
			NFE	PNO: Fast IFGain:Lov		rig: Free Atten: 26		"a)¤		т			Auto Tune
10 dB Log r	//div Ref	15.00 (dBm						Δ	Mkr1 -6.	580 MHz 40.38 dB		Auto Tune
5.00 -													Center Freq 83500000 GHz
-5.00 -			- Andrew	extra with party	11 Alterhalter	∆2 ••••••••						2.4	Start Freq 48500000 GHz
-25.0 - -35.0 -												2.5	Stop Freq 18500000 GHz
-45.0 -	harder 100 street from	, esta						م المحالية حاط الرو	alle . In due	nan, kiraika an	เป็นไฟฟ์คุณเชินไดยใน	<u>Auto</u>	CF Step 7.000000 MHz Man
-65.0 -	աներակություն որ	¥αΓ*™					and the form	antarka kuli a Dad	1.44×444	lanan oo faaraa ah Ma	Alm Made India 2012 and		Freq Offset 0 Hz
-75.0													Scale Type
	er 2.48350 BW 100 k			#V	BW 1.0	0 MHz			Sweep	Span 2.000 ms	70.00 MHz (2001 pts)	Log	Lin
MSG									STAT	rus			

Plot 7-46. Band Edge Plot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 13)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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7.6 Conducted Spurious Emissions §15.247(d); RSS-247 [5.5]

Test Overview and Limit

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates, tone configurations, and RU indices were investigated to determine the worst case configuration. For the following out of band conducted emissions plots, the EUT was set to a data rate of MCS0 in 802.11ax mode as this setting produced the worst-case emissions.

The limit for out-of-band spurious emissions at the band edge is N/AdB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the procedure in Section 11.1 of ANSI C63.10-2013 and KDB 558074 D01 v05r02.

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.5 ANSI C63.10-2013 – Section 14.3.3 KDB 662911 D01 v02r01 – Section E)3)b)

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 25GHz (separated into two plots per channel)
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

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



Figure 7-5. Test Instrument & Measurement Setup

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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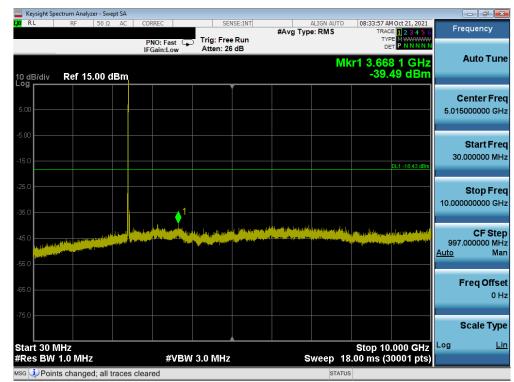


Test Notes

- 1. RBW was set to 1MHz rather than 100kHz in order to increase the measurement speed.
- The display line shown in the following plots denotes the limit at N/AdB below the fundamental emission level measured in a 100kHz bandwidth. However, since the traces in the following plots are measured with a 1MHz RBW, the display line may not necessarily appear to be N/AdB below the level of the fundamental in a 1MHz bandwidth.
- 3. For plots showing conducted spurious emissions near the limit, the frequencies were investigated with a reduced RBW to ensure that no emissions were present.
- 4. The conducted spurious emissions were measured to relative limits. Therefore, in accordance with ANSI C63.10-2013 and KDB 662911 D01 v02r01 Section E)3)b), it was unnecessary to show compliance through the summation of test results of the individual outputs.

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MIMO Antenna-1 Conducted Spurious Emission





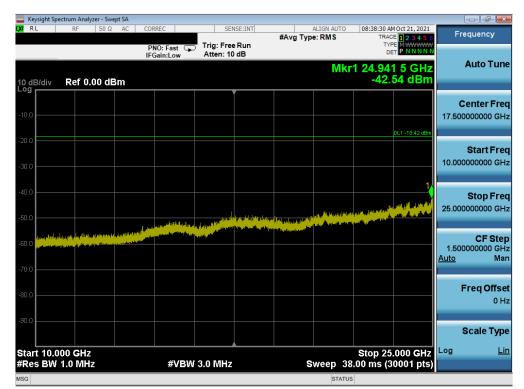
Plot 7-48. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMS908JPN	PCTEST [®] Proud to be part of [®] element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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🚾 Keysight Spectrum Analyzer - Swept SA					
IXIRL RF 50Ω AC	CORREC S	ENSE:INT #Avg Ty		M Oct 21, 2021 CE 1 2 3 4 5 6	Frequency
	PNO: Fast Trig: Fr IFGain:Low Atten: 2	ee Run	۳ Mkr1 3.04		Auto Tune
10 dB/div Ref 15.00 dBm			-39	.44 dBm	
5.00					Center Freq 5.015000000 GHz
-5.00				DL1 -18.42 dBm	Start Freq 30.000000 MHz
-25.0	1				Stop Freq 10.00000000 GHz
-45.0		la ja tura ena esta esta la tura tura da arra da	the second se		CF Step 997.000000 MHz <u>Auto</u> Man
-65.0					Freq Offset 0 Hz
-75.0					Scale Type
Start 30 MHz #Res BW 1.0 MHz	#VBW 3.0 MH	z	Stop 10 Sweep 18.00 ms (3	7.000 GHZ I	_og <u>Lin</u>
MSG 🗼 Points changed; all traces c	leared		STATUS		

Plot 7-49. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)



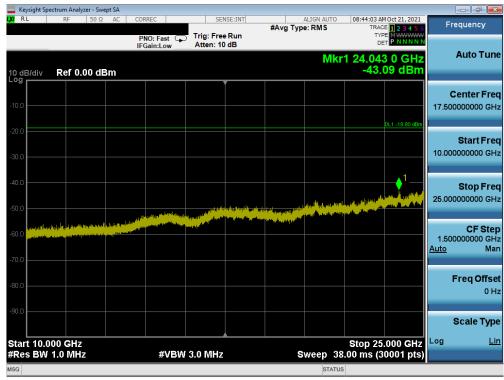
Plot 7-50. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Daga 50 of 70
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	ectrum Analyzer - Swep									
LX/IRL	RF 50 Ω		RREC		NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	4 Oct 21, 2021 E 1 2 3 4 5 6 E M WWWW	Frequency
10 dB/div Log	Ref 15.00 dl	IF	NO: Fast 🕞 Gain:Low	Atten: 26			М	DE kr1 6.48		Auto Tune
5.00										Center Freq 5.015000000 GHz
-5.00									DL1 -18.80 dBm	Start Freq 30.000000 MHz
-25.0						1				Stop Freq 10.000000000 GHz
-45.0						in an	Manifest Information	halan daring selah bilan gang Manana Maganana Marianga		CF Step 997.000000 MHz <u>Auto</u> Man
-65.0										Freq Offset 0 Hz
-75.0 Start 30 M								Stop 10	OVO GITZ	Scale Type Log <u>Lin</u>
#Res BW	1.0 MHz		#VBW	3.0 MHz		S	weep 1	8.00 ms (3	0001 pts)	
MSG							STATU	JS		

Plot 7-51. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 11)



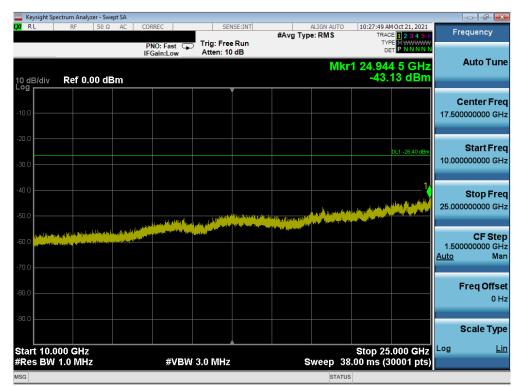
Plot 7-52. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:		Dana 54 -4 70		
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	ectrum Analy		t SA										- <i>•</i>
RL	RF	50 Ω	AC): Fast	Ģ	Trig: Free		#Avg Typ	ALIGN AUTO De: RMS	TF	AM Oct 21, 2021 RACE 1 2 3 4 5 6 TYPE M WWWWW DET P N N N N N	Frequency
0 dB/div	Ref 15	.00 dE	3m	IFGa	in:Low		Atten: 26	dB		N	lkr1 3.6	48 4 GHz 9.04 dBm	Auto Tun
5.00													Center Fre 5.015000000 GH
5.00													Start Fre 30.000000 MH
35.0						1						DL1 -26.40 dBm	Stop Fre 10.000000000 GH
15.0 55.0	an Difference and and							ang (May) asal a Mang ang ang ang ang ang ang ang ang ang			Alan yan ^d (_{berl} anan laya Dina di bu unkombu	n de cenergi erre e bibli bin reh Anne anne anne anne anne anne anne anne	CF Ste 997.000000 M⊦ <u>Auto</u> Ma
5.0													Freq Offs 0 F
15.0 tart 30 f											Stop '		Scale Typ
Res BW	1.0 MH	2			#VE	3W 3	0.0 MHz			Sweep 1	8.00 ms	(30001 pts)	

Plot 7-53. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 1)



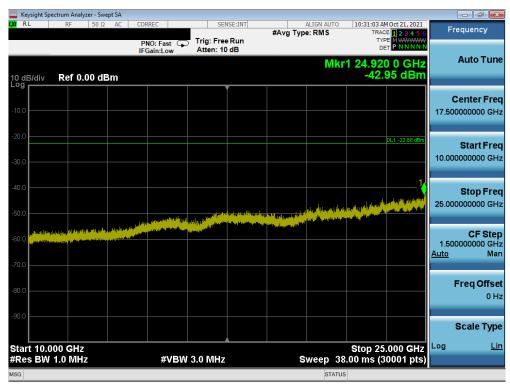
Plot 7-54. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 50 of 76	
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	ectrum Analyzer - Sw									
X/RL	RF 50 Ω		NO: Fast			#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Oct 21, 2021 DE 1 2 3 4 5 6 PE M WWWWW	Frequency
10 dB/div Log	Ref 15.00	IF	Gain:Low	Atten: 26			M	(r1 6.04	4 6 GHz 51 dBm	Auto Tune
5.00										Center Freq 5.015000000 GHz
-5.00										Start Freq 30.000000 MHz
-25.0						.1			DL1 -22.88 dBm	Stop Freq 10.000000000 GHz
-45.0		i telly have all			a an	allen og som	ana ang ang ang ang ang ang ang ang ang	lyn fellyn ffernan fry L. Yn ôffer oarte fferferen yn o	a di pogla posta di stata da posta di 19 den posta di stata	CF Step 997.000000 MHz <u>Auto</u> Man
-65.0										Freq Offset 0 Hz
-75.0 Start 30 N	1Hz							Stop <u>10</u>	.000 GHz	Scale Type
#Res BW	1.0 MHz		#VBW	3.0 MHz		s	weep 18	.00 ms (3	0001 pts)	
usg 칮 Poin	ts changed; all	traces clea	red				STATU	5		

Plot 7-55. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 6)



Plot 7-56. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 6)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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RL RF SO Q. AC CORREC SENSELINT ALION AUTO 10.3434 AMOG 23, 2021 Frequency MAY Type: RMS THACE D.3434 AMOG 23, 2021 THACE D.3434 AMOG 23, 2021 Frequency MAY Type: RMS THACE D.3434 AMOG 23, 2021 THACE D.3434 AMOG 23, 2021 Frequency MAY Type: RMS THACE D.3434 AMOG 23, 2021 THACE D.3434 AMOG 23, 2021 Frequency MAY Type: RMS THACE D.3434 AMOG 23, 2021 THACE D.3434 AMOG 23, 2021 Frequency MAY Type: RMS THACE D.3434 AMOG 23, 2021 THACE D.3434 AMOG 23, 2021 Auto Tune May Type: RMS THACE D.3434 AMOG 23, 2021 THACE D.3434 AMOG 23, 2021 Auto Tune May Type: RMS THACE D.3434 AMOG 23, 2021 THACE D.3434 AMOG 23, 2021 Auto Tune May Type: RMS THACE D.3434 AMOG 23, 2021 May Type: RMS THACE D.3434 AMOG 23, 2021 Auto Tune May Type: RMS The start Freq The start Freq D.3000000000000000000000000000000000000		ectrum Analyzer - Swep										
Independent of the second s	L <mark>XI</mark> RL	RF 50 Ω							TRAC	E 1 2 3 4 5 6	Frequen	су
500 Center Freq 500 Center Freq 500 Start Freq 500 Center Freq 500 Start Freq 160 Center Freq 250 Centet Freq 25	10 dB/div	Ref 15.00 d	IF					Mk	or 1 6.942	PNNNN PGHz	Auto	Tune
150 Start Freq 150 <t< td=""><td>5.00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	5.00											
-35.0 - <td></td>												
-450 -450 CF Step 997.000000 MHz Auto -500 -500 -500 -500 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td><td>DL1 -29,58 dBm</td><td>-</td><td></td></td<>								1		DL1 -29,58 dBm	-	
-650 -650 -650 -650 -650 -650 -650 -650 0 Hz -750 -750 -650 -650 -650 -650 -650 -650 Start 30 MHz Stop 10.000 GHz -650 -650 -650 -650 -650 Start 30 MHz #VBW 3.0 MHz Sweep 18.00 ms (30001 pts) -650 -650 -650	Martin Providence		a line of all its and		ala _{n H} ull _{an Anna Dan San Anna Ngantana Anna Anna Anna Ngantana Anna Anna Anna}	district distance on a					997.00000	0 MHz
Start 30 MHz Stop 10.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 18.00 ms (30001 pts)											Freq	
	Start 30 M			43 (5)(4)					Stop 10	UUU GIIZ		
					3.0 MHz		s			uuun pts)		

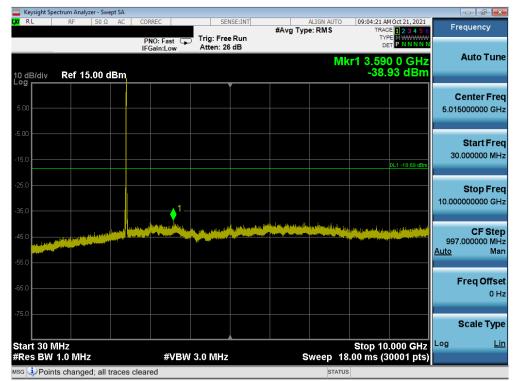
Plot 7-57. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 11)



Plot 7-58. Conducted Spurious Plot MIMO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 11)

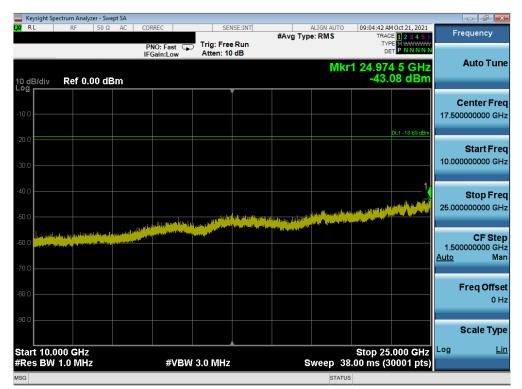
FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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MIMO Antenna-2 Conducted Spurious Emissions





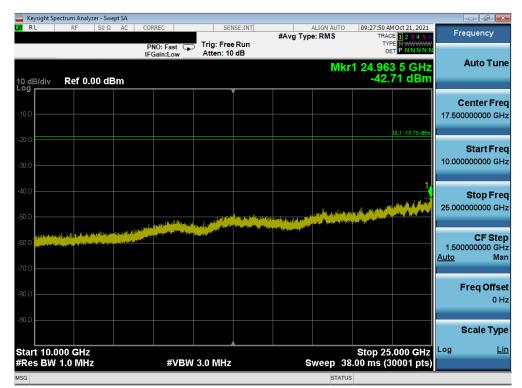
Plot 7-60. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 1)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege EE of 70
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Keysight Spectrum Analyzer - Swept SA					
X/RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	09:27:28 AM Oct 21, 2021 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 26 dB	• //	TYPE MWWWW DET PNNNNN	Auto Tune
10 dB/div Ref 15.00 dBm				kr1 3.154 9 GHz -39.19 dBm	Auto Tune
		ľ			Center Freq
5.00					5.015000000 GHz
-5.00					Start Freq
-15.0				DL1 -18.78 dBm	30.000000 MHz
25.0				DE1 -16.78 dBm	
-25.0					Stop Freq 10.00000000 GHz
-35.0	∮ 1				
-45.0	ang pang dalah Dadha perinsi pang dalah Dadha perinsi kang dalah Dadha perinsi kang dalah perinsi kang dalah p Penggan pengkan kang penggan penggan penggan penggan pengkan kang dalah penggan penggan penggan penggan penggan		and a provide the standard and the second standard standard standard standard standard standard standard stand A standard st	lite billing gentlet in page of glatic strate that	CF Step 997.000000 MHz
-55.0					<u>Auto</u> Man
-33.0					Freq Offset
-65.0					0 Hz
-75.0					
					Scale Type
Start 30 MHz #Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 1	Stop 10.000 GHz 8.00 ms (30001 pts)	Log <u>Lin</u>
MSG Doints changed; all traces c			STATU		

Plot 7-61. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 6)



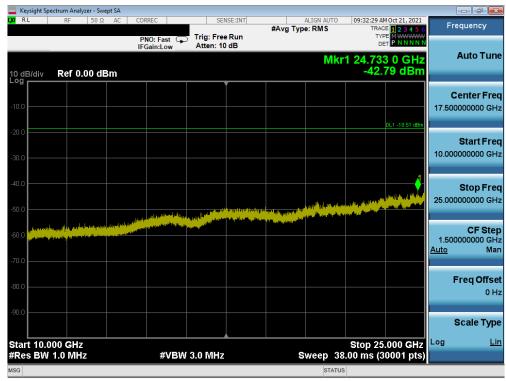
Plot 7-62. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 6)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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	pectrum Analyzer - Swep									
LXI RL	RF 50 Ω		RREC	Trig: Free		#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Oct 21, 2021 CE 1 2 3 4 5 6 DE M	Frequency
10 dB/div Log	Ref 15.00 dl	IF	Gain:Low	Atten: 26	dB		Mk		6 1 GHz 78 dBm	Auto Tune
5.00										Center Freq 5.015000000 GHz
-5.00									DL1 -18.51 dBm	Start Freq 30.000000 MHz
-25.0			1 -							Stop Freq 10.000000000 GHz
-45.0	n y stal (d) in spranging (ny stalo y stalo y st ny stalo (d) in spranging (ny stalo y st			P _{rocenting} polynym Synthesis (sentr	n beland bereiten. Neutropolen egent	lagh laint fair faige tha na an laig tha ann an lainte	nyyystäänyö Mansterpynä (yy maattiinine pääkyökyökyökyö		, Jahr, posta seri (n presidente participation	CF Step 997.000000 MHz <u>Auto</u> Man
-65.0										Freq Offset 0 Hz
-75.0 Start 30 I								Stop 10		Scale Type
#Res BW				3.0 MHz		S			0001 pts)	
MSG 🥹 Poir	nts changed; all tr	aces clear	ed				STATUS			

Plot 7-63. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 11)



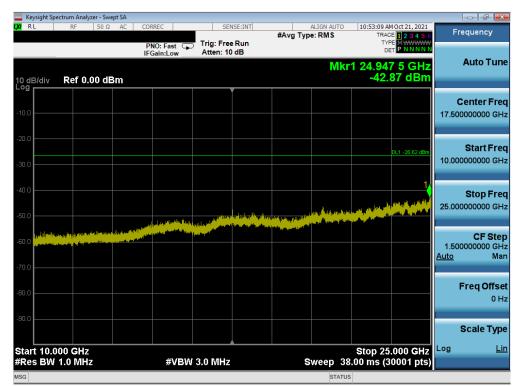
Plot 7-64. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Keysight Spectrum Ana								- • • •
RL RF	50 Ω AC	CORREC	Trig: Free R	#Avg T un	ALIGN AUTO	TRAC	I Oct 21, 2021 E 1 2 3 4 5 6 E M WWWWWW T P N N N N N	Frequency
0 dB/div Ref 1	5.00 dBm	IFGain:Low	Atten: 26 dE	3	М	kr1 3.134		Auto Tun
5.00								Center Free 5.015000000 GH
15.0								Start Fre 30.000000 MH
35.0		11					DL1 -28.82 dBm	Stop Fre 10.000000000 GH
			ten metalogi at billen (P den d Panan den ander ander den	Y Change of York Watching at the full	and a difficult of a local sector of the sec		<mark>t Agen Derset A</mark> ddreite Alle verset delse statistic	CF Ste 997.000000 M⊦ <u>Auto</u> Ma
55.0								Freq Offs 0 H
start 30 MHz					.	Stop 10.	VVV GITZ	Scale Typ
Res BW 1.0 MH			3.0 MHz		Sweep 1	8.00 ms (3	ooor prs)	

Plot 7-65. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 1)



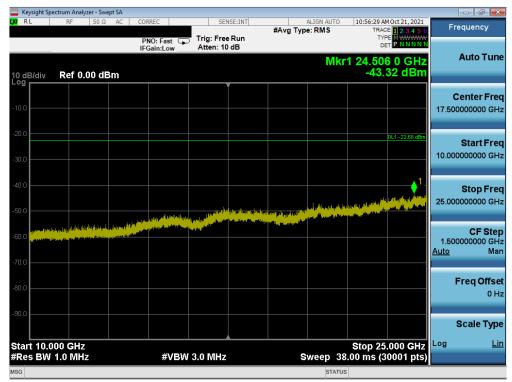
Plot 7-66. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 1)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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	ectrum Analy												×
X/RL	RF	50 Ω	AC (CORREC		.	ISE:INT	#Avg Typ	ALIGN AUT	TF	AM Oct 21, 2021	Frequenc	У
				PNO: Fas IFGain:Lo		Trig: Free Atten: 26							
10 dB/div	Ref 15	5.00 dE	sm							4 Wkr1 3.5 -38	92 3 GHz 3.45 dBm	Auto 1	rune
												Center	Free
5.00												5.01500000) GH:
-5.00													_
15.0												Start 30.00000	
-15.0											DL1 -22.68 dBm		
-25.0												Stop	
-35.0					▲ ¹ −							10.00000000) GH
			يلبده الري	and the second	Alas	الماطور وهو فا	Apadinas din	and a strategy of the second		and all the second	والفالعا والمراجع والمراجع	CE	Ster
-45.0			an <mark>énte</mark>		<u>، کالہ</u>		and a data		<u>in an in a 11 an an</u>	a faile and a grant a sure of the second secon		997.000000 <u>Auto</u>	
												Freq O	offse
-65.0												•	0 H:
-75.0												Decis.	
												Scale ⁻	
Start 30 N #Res BW		,		#	VBW	3.0 MHz			weep	Stop 1 18.00 ms	0.000 GHz (30001 pts)	Log	Lir
ISG 🕕 Poin			ices cle							TUS	100		

Plot 7-67. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 6)



Plot 7-68. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 6)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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PNO: Fast IFGain:Low Trig: Free Run Atten: 26 dB Mkr1 5.671 0 GHz Mkr1 5.671 0 GHz Auto Tune		ectrum Analyzer - Swep									- F
IFGain:Low Atten: 26 dB Mikr1 5.671 0 GHz -38.96 dBm Auto Tune 600	LXVI RL	RF 50 Ω			Trig: Free	Run			TRAC	E 1 2 3 4 5 6 E MWWWW	Frequency
500 Center Freq 500 Start Freq 500 Start Freq 500 Start Freq 150 Start Freq 250 Start Freq 250 Start Freq 350 Start Start Freq 350 Start Start Start Start Freq 350 Start Start Start Start Start Freq 350 Start S	10 dB/div	Ref 15.00 dl		Gain:Low	Atten: 26	dB		Mk			Auto Tun
150 Start Freq 250 Start Start Freq 250 Start	5.00										
-35.0 -36.0 -1 -37.0 -37.4 cm -37.4 cm <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>											
4400 4400						1.				DL1 -29.74 dBm	
-650 -75.0 Start 30 MHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 18.00 ms (30001 pts)	Hand on Hand		a da ante da a Ante da ante da				i ya Bina di Wildon ya Ala Danang pakatan ya Ala		a na ^d haon an Andrean an Angrain an Ang Angrain an Angrain an An		997.000000 MH
Start 30 MHz Stop 10.000 GHz #Res BW 1.0 MHz #VBW 3.0 MHz Sweep 18.00 ms (30001 pts)											•
	Start 30 N								Stop 10	VVV GITZ	Log <u>Li</u>
					3.0 MHz		s			0001 pts)	

Plot 7-69. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 11)



Plot 7-70. Conducted Spurious Plot MIMO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 11)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
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7.7 Radiated Spurious Emission Measurements – Above 1 GHz §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-9 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
Above 960.0 MHz	500	3

Table 7-9. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Section 6.6.4.3 KDB 558074 D01 v05r02 – Sections 8.6, 8.7

Test Settings

Average Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = power average (RMS)
- 5. Number of measurement points = 1001 (Number of points must be $\geq 2 \times \text{span/RBW}$)
- 6. Sweep time = auto
- 7. Trace (RMS) averaging was performed over at least 100 traces

Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

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Test Setup

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

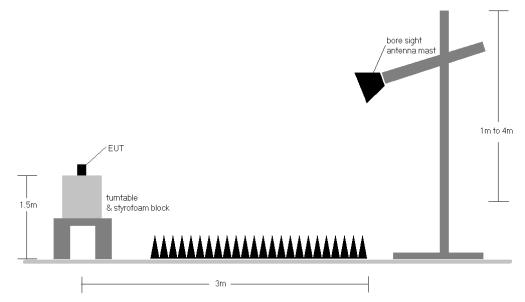


Figure 7-6. Test Instrument & Measurement Setup

Test Notes

- The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
- 2. All emissions lying in restricted bands specified in Section 15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-9.
- 3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
- 4. This unit was tested with its standard battery.
- 5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- 6. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 7. The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. Any emissions found to be within 20dB of the limit are fully investigated and the results are shown in this section.
- 8. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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- 9. Some band edge measurements were performed using a channel integration method to determine compliance with the out of band average radiated spurious emissions limit in the 2483.5 2500MHz band. Per KDB 558074 D01 v05r02 Section 13.3, a measurement was performed using a RBW of 100kHz at the frequency with highest emission outside of band edge. For integration that does not start at 2483.5MHz, consideration was taken to ensure the worst case emission is in the 1MHz spectrum. The results were integrated up to the 1MHz reference bandwidth to show compliance with the 15.209 radiated limit for emissions greater than 1GHz.
- 10. For radiated measurements, emissions were investigated for the fully-loaded RU configuration and for all the partially-loaded RU configurations. Among all of the available partially-loaded RU configurations, only the configuration with the worst case emissions is reported.

Sample Calculations

Determining Spurious Emissions Levels

- Field Strength Level [dBµV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- Margin [dB] = Field Strength Level $[dB\mu V/m]$ Limit $[dB\mu V/m]$

Radiated Band Edge Measurement Offset

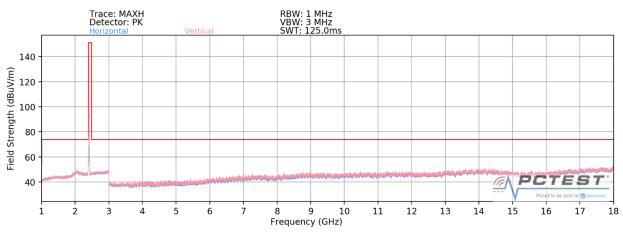
• The amplitude offset shown in the radiated restricted band edge plots in Section 7.7 was calculated using the formula:

Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

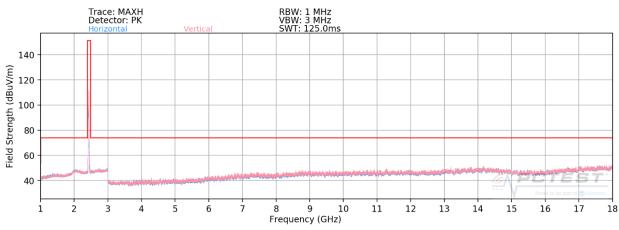
FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:			
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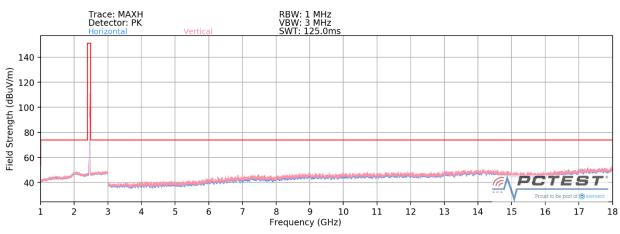
7.7.1 MIMO Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



Plot 7-71. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA – 26 Tones – Ch. 1)



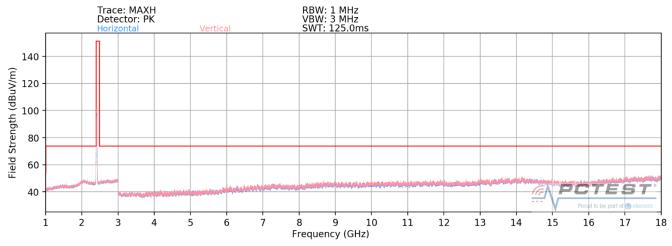
Plot 7-72. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA – 26 Tones – Ch. 6)



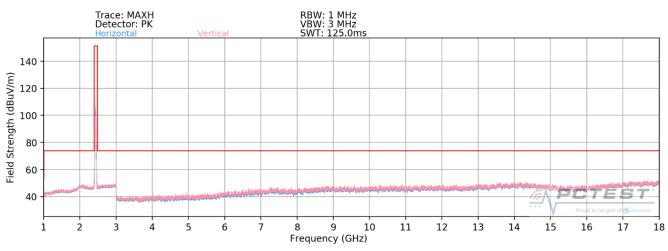
Plot 7-73. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA - 26 Tones - Ch. 11)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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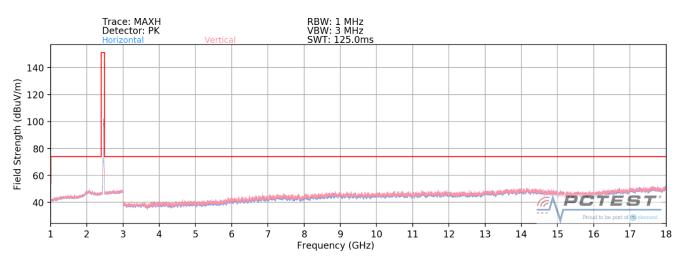










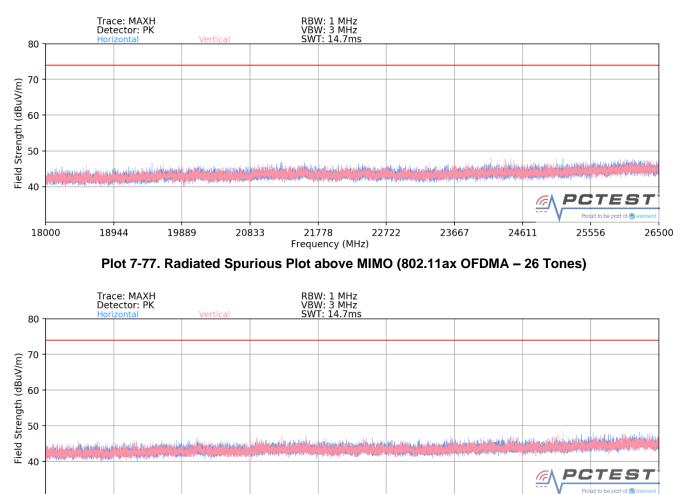


Plot 7-76. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA – 242 Tones – Ch. 11)

FCC ID: A3LSMS908JPN	PCTEST [®] Proud to be part of [®] element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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MIMO Radiated Spurious Emissions Measurements (Above 18GHz) §15.209; RSS-Gen [8.9]



Plot 7-78. Radiated Spurious Plot above 18GHz MIMO (802.11ax OFDMA – 242 Tones)

Frequency (MHz)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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MIMO Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	4
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	01

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4824.00	Avg	V	-	-	-77.80	-0.47	28.73	53.98	-25.25
4824.00	Peak	V	-	-	-64.59	-0.47	41.94	73.98	-32.04
12060.00	Avg	V	-	-	-81.90	10.37	35.47	53.98	-18.51
12060.00	Peak	V	-	-	-69.95	10.37	47.42	73.98	-26.56

Table 7-10. Radiated Measurements MIMO (26 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	0
Distance of Measurements:	3 Meters
Operating Frequency:	2437MHz
Channel:	06

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4874.00	Avg	V	-	-	-77.04	-0.27	29.69	53.98	-24.29
4874.00	Peak	V	-	-	-65.14	-0.27	41.59	73.98	-32.39
7311.00	Avg	V	-	-	-78.89	6.70	34.81	53.98	-19.17
7311.00	Peak	V	-	-	-67.37	6.70	46.33	73.98	-27.65
12185.00	Avg	V	-	-	-79.24	9.58	37.34	53.98	-16.64
12185.00	Peak	V	-	-	-69.10	9.58	47.48	73.98	-26.50

Table 7-11. Radiated Measurements MIMO (26 Tones)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	8
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4924.00	Avg	V	-	-	-76.87	-0.38	29.75	53.98	-24.23
4924.00	Peak	V	-	-	-65.00	-0.38	41.62	73.98	-32.36
7386.00	Avg	V	-	-	-77.92	6.00	35.08	53.98	-18.90
7386.00	Peak	V	-	-	-66.39	6.00	46.61	73.98	-27.37
12310.00	Avg	V	-	-	-80.26	9.77	36.51	53.98	-17.47
12310.00	Peak	V	-	-	-68.29	9.77	48.48	73.98	-25.50

Table 7-12. Radiated Measurements MIMO (26 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	01

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4824.00	Avg	V	-	-	-75.50	-0.47	31.03	53.98	-22.95
4824.00	Peak	V	-	-	-63.26	-0.47	43.27	73.98	-30.71
12060.00	Avg	V	-	-	-79.89	10.37	37.48	53.98	-16.50
12060.00	Peak	V	-	-	-67.86	10.37	49.51	73.98	-24.47

Table 7-13. Radiated Measurements MIMO (242 Tones)

FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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802.11ax OFDMA
MCS0
61
3 Meters
2437MHz
06

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4874.00	Avg	V	-	-	-77.94	-0.27	28.79	53.98	-25.19
4874.00	Peak	V	-	-	-65.82	-0.27	40.91	73.98	-33.07
7311.00	Avg	V	-	-	-79.64	6.70	34.06	53.98	-19.92
7311.00	Peak	V	-	-	-67.76	6.70	45.94	73.98	-28.04
12185.00	Avg	V	-	-	-81.53	9.58	35.05	53.98	-18.93
12185.00	Peak	V	-	-	-68.89	9.58	47.69	73.98	-26.29

Table 7-14. Radiated Measurements MIMO (242 Tones)

Worst Case Mode:802.Worst Case Transfer Rate:MCSRU Index:61Distance of Measurements:3 MaOperating Frequency:2462Channel:11

802.11ax OFDMA
MCS0
61
3 Meters
2462MHz
11

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4924.00	Avg	V	-	-	-76.96	-0.38	29.66	53.98	-24.32
4924.00	Peak	V	-	-	-64.19	-0.38	42.43	73.98	-31.55
7386.00	Avg	V	-	-	-79.31	6.00	33.69	53.98	-20.29
7386.00	Peak	V	-	-	-66.76	6.00	46.24	73.98	-27.74
12310.00	Avg	V	-	-	-80.53	9.77	36.24	53.98	-17.74
12310.00	Peak	V	-	-	-68.63	9.77	48.14	73.98	-25.84

Table 7-15. Radiated Measurements MIMO (242 Tones)

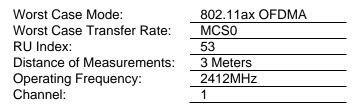
FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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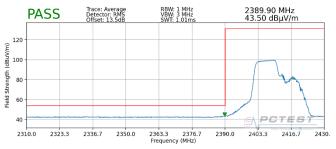


7.7.2 MIMO Radiated Restricted Band Edge Measurements

§15.205 §15.209; RSS-Gen [8.9]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

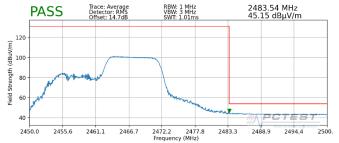




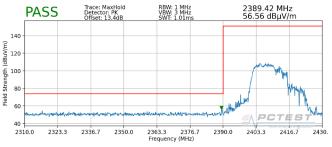
Plot 7-79. Radiated Restricted Lower Band Edge Measurement MIMO (Average – 106 Tones)

Worst Case Mode:80Worst Case Transfer Rate:MRU Index:53Distance of Measurements:3Operating Frequency:24Channel:12

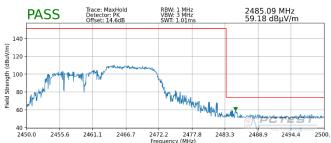
	802.11ax OFDMA
Rate:	MCS0
	53
ments:	3 Meters
:	2462MHz
	11



Plot 7-81. Radiated Restricted Upper Band Edge Measurement MIMO (Average – 106 Tones)



Plot 7-80. Radiated Restricted Lower Band Edge Measurement MIMO (Peak – 106 Tones)

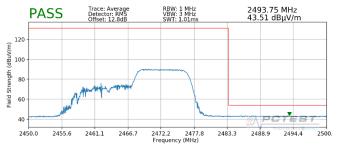


Plot 7-82. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 106 Tones)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	53
Distance of Measurements:	3 Meters
Operating Frequency:	2467MHz
Channel:	12

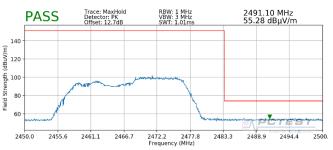


Plot 7-83. Radiated Restricted Upper Band Edge Measurement MIMO (Average – 106 Tones)

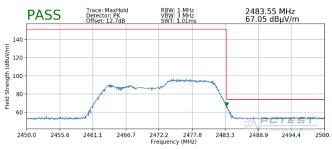
802.11ax OFDMA
MCS0
53
3 Meters
2472MHz
13



Plot 7-85. Radiated Restricted Upper Band Edge Measurement MIMO (Average – 106 Tones)



Plot 7-84. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 106 Tones)

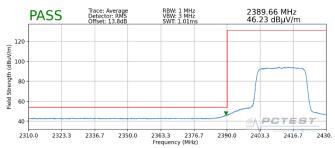


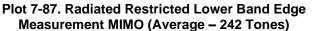
Plot 7-86. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 106 Tones)

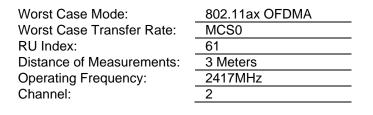
FCC ID: A3LSMS908JPN	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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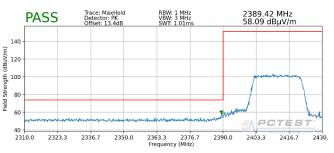


Worst Case Mode:802.11ax OFDMAWorst Case Transfer Rate:MCS0RU Index:61Distance of Measurements:3 MetersOperating Frequency:2412MHzChannel:1





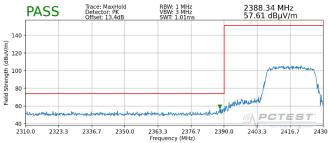




Plot 7-88. Radiated Restricted Lower Band Edge Measurement MIMO (Peak – 242 Tones)





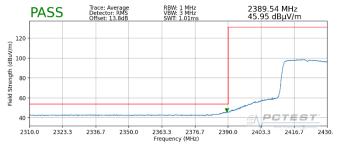


Plot 7-90. Radiated Restricted Lower Band Edge Measurement MIMO (Peak – 242 Tones)

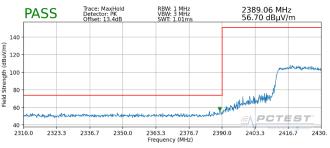
FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 72 of 76
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Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2422MHz
Channel:	3

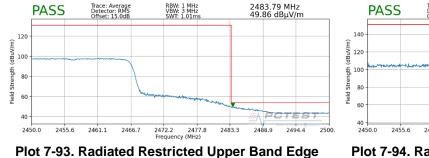


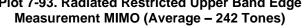


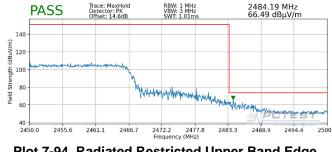


Plot 7-92. Radiated Restricted Lower Band Edge Measurement MIMO (Peak – 242 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2457MHz
Channel:	10





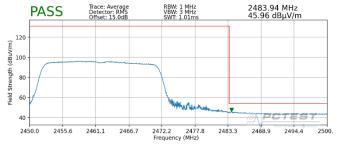


Plot 7-94. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 242 Tones)

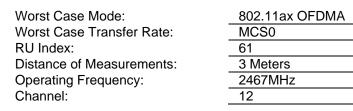
FCC ID: A3LSMS908JPN	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 72 of 76
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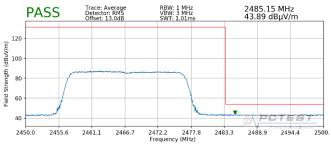


Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11

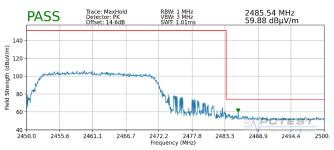


Plot 7-95. Radiated Restricted Upper Band Edge Measurement MIMO (Average – 242 Tones)

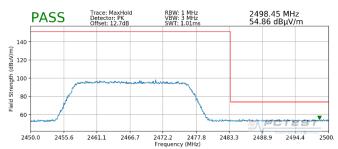




Plot 7-97. Radiated Restricted Upper Band Edge Measurement MIMO (Average – 242 Tones)



Plot 7-96. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 242 Tones)

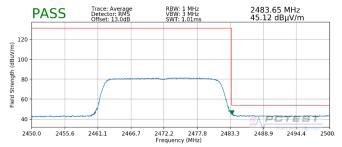


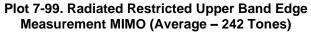
Plot 7-98. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 242 Tones)

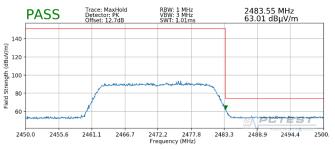
FCC ID: A3LSMS908JPN	PCTEST [®] Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dago 74 of 76
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Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2472MHz
Channel:	13







Plot 7-100. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 242 Tones)

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 75 of 76
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8.0 **CONCLUSION**

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMS908JPN** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.

FCC ID: A3LSMS908JPN	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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