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MEASUREMENT REPORT FCC PART 15.247 WLAN OFDMA

Applicant Name:

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

Date of Testing:

4/26 - 07/16/2020 **Test Site/Location:** PCTEST Lab. Columbia, MD USA **Test Report Serial No.:** 1M2004230075-07.A3L

FCC ID:

A3LSMT978U

APPLICANT:

Samsung Electronics Co., Ltd.

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

Certification SM-T978U Portable Tablet 2412 – 2462MHz OFDMA Digital Transmission System (DTS) Part 15 Subpart C (15.247) ANSI C63.10-2013, KDB 558074 D01 v05r02, KDB 662911 D01 v02r01,

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 558074 D01 v05r02r01. 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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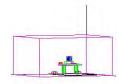


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MEASUREMENT REPORT



				ANT1			ANT2			MIMO				
		Tx Frequency	Avg Co	nducted	Peak Co	onducted	Avg Co	nducted	Peak Co	onducted	Avg Co	nducted	Peak Co	onducted
Mode	Tones	[MHz]	Max. Power (mW)	Max. Power (dBm)										
802.11ax OFDMA	26T	2412 - 2462	31.550	14.99	162.181	22.10	31.550	14.99	152.055	21.82	60.716	17.83	440.502	26.44
802.11ax OFDMA	52T	2412 - 2462	31.405	14.97	197.697	22.96	31.405	14.97	193.642	22.87	60.643	17.83	368.946	25.67
802.11ax OFDMA	106T	2412 - 2462	30.549	14.85	169.824	22.30	31.550	14.99	159.956	22.04	62.893	17.99	301.821	24.80
802.11ax OFDMA	242T	2412 - 2462	28.774	14.59	149.279	21.74	26.485	14.23	135.207	21.31	54.442	17.36	237.428	23.76

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 17025-2005 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 Tablet FCC ID: A3LSMT978U**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN (DTS) transmitter.

Test Device Serial No.: 35240, 35158, 1725M, 1746M, 1755M

2.2 Device Capabilities

This device contains the following capabilities:

850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n71, n5, n66, n25, n2, n41), 802.11b/g/n/ac/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE)

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

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 v05r02r01. 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	Tone	Duty Cycle
		26T	98.5
	1	52T	97.7
	T	106T	95.8
		242T	95.1
	2	26T	99.5
802.11ax		52T	99.4
DTS RU		106T	99.6
		242T	99.6
		26T	99.4
	MIMO CDD	52T	99.4
		106T	99.4
		242T	99.3

Table 2-2. Measured Duty Cycles

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

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WiFi Configurations		SISO		SDM		CDD	
WIFI COII	igurations	ANT1	ANT2	ANT1	ANT2	ANT1	ANT2
	11g	✓	✓	×	×	\checkmark	✓
2.4 GHz	11n	✓	✓	✓	✓	✓	✓
	11ax	✓	✓	✓	\checkmark	\checkmark	\checkmark

Table 2-3. Frequency / Channel Operations

✓ = 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 transmitting in 2.4GHz mode and ANT2 in 5GHz mode

Description	2.4 GHz Emission	5 GHz Emission
Antenna	1	2
Channel	11	64
Operating Frequency (MHz)	2462	5320
Data Rate (Mbps)	1M	MCS0
Mode	802.111b	802.11n

Table 2-4. Config-1 (ANT12.4GHz & ANT2 5GHz)

Configuration 2: ANT1 transmitting in 5GHz mode and ANT2 in 2.4GHz mode

Description	2.4 GHz Emission	5 GHz Emission
Antenna	2	1
Channel	64	10
Operating Frequency (MHz)	5320	2457
Data Rate (Mbps)	6M	1M
Mode	802.11a	802.11b

Table 2-5. Config-2 (ANT1 5GHz & ANT2 2.4GHz)

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Configuration 3: 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	2	56
Operating Frequency (MHz)	2417	5280
Data Rate (Mbps)	MCS8	MCS8
Mode	802.11n	802.11n

Table 2-6. Config-3 (ANT1 MIMO & ANT2 MIMO)

2.3 Antenna Description

Following antenna was used for the testing.

Frequency [GHz]	Antenna Gain (dBi)
2.4	-5.71

Table 2-7. Antenna Peak Gain

2.4 Software and Firmware

The test was conducted with software version T978USQE0ATFA installed on the EUT.

2.5 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, 0, 7.4, 7.5, and 7.6 for antenna port conducted emissions test setups.

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 v05r02r01 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 474788 D01.

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)	10/30/2019	Annual	10/30/2020	WL25-1
-	WL40-1	Conducted Cable Set (40GHz)	10/30/2019	Annual	10/30/2020	WL40-1
Agilent	N9038A	MXE EMI Receiver	7/17/2019	Annual	7/17/2020	MY51210133
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	ML2496A	Power Meter	11/6/2019	Annual	11/6/2020	1405003
Emco	3116	Horn Antenna (18 - 40GHz)	6/7/2018	Triennial	6/7/2021	9203-2178
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	7/18/2018	Biennial	7/18/2020	114451
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	7/16/2018	Biennial	7/16/2020	101073
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	4/3/2020	Annual	4/3/2021	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/5/2019	Annual	8/5/2020	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	10/1/2019	Biennial	10/1/2021	310233
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/19/2018	Biennial	7/19/2020	A051107
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	135427
EMCO	3160-10	Small Horn (26.5 - 40GHz)	8/9/2018	Biennial	8/9/2020	130993
Anritsu	MS46322A	Vector Network Analyzer	8/19/2019	Annual	8/19/2020	1521001
Anritsu	36585K-2F	Precision Autocal 2-Port	7/16/2019	Annual	7/16/2020	1628014

Table 6-1. Annual Test Equipment Calibration Schedule

Note:

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

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7.0 **TEST RESULTS**

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.		
FCC ID:	<u>A3LSMT978U</u>		
FCC Classification:	Digital Transmission System (DTS)		

FCC Part Test Test RSS Section(s) **Test Description** Test Limit Reference Condition Result Section(s) PASS RSS-247 [5.2] 6dB Bandwidth > 500kHz Section 7.2 15.247(a)(2) PASS 15.247(b)(3) RSS-247 [5.4] Transmitter Output Power Sections 7.3 < 1 Watt CONDUCTED Transmitter Power 15.247(e) RSS-247 [5.2] PASS Section 7.4 < 8dBm / 3kHz Band Spectral Density Band Edge / Sections 7.5. 15.247(d) RSS-247 [5.5] ≥ 20dBc PASS Out-of-Band Emissions 76 General Field Strength Emissions in restricted 15.205 Limits (Restricted Bands bands must meet the Sections 7.7, RADIATED RSS-Gen [8.9] PASS and Radiated Emission radiated limits detailed in 15.209 78 Limits) 15.209 (RSS-Gen [8.9])

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.

Francisco and		18	
C. C. A.			
411. 28 21			 EUT

Figure 7-1. Test Instrument & Measurement Setup

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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.

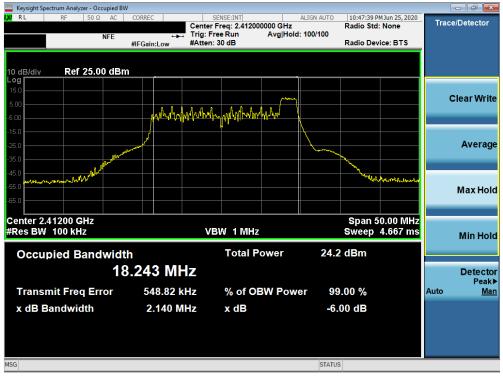
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SISO Antenna-1 6 dB Bandwidth Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
2412	1	ax	26T	MCS0	2.140	0.500
2437	6	ax	26T	MCS0	2.156	0.500
2462	11	ax	26T	MCS0	2.127	0.500
2412	1	ax	242T	MCS0	19.09	0.500
2437	6	ax	242T	MCS0	19.10	0.500
2462	11	ax	242T	MCS0	18.94	0.500

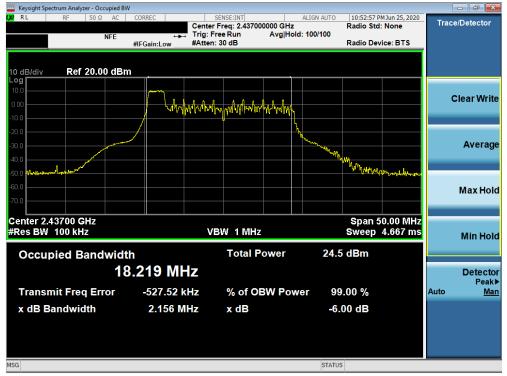
Table 7-2. Conducted Bandwidth Measurements SISO ANT1



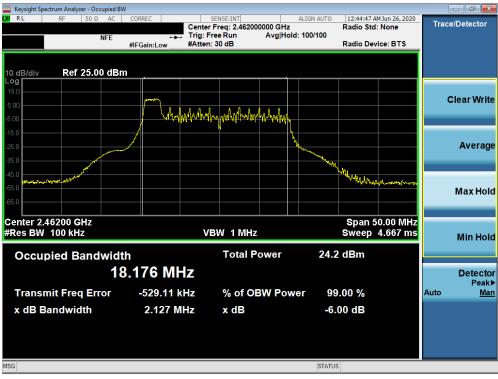
Plot 7-1. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

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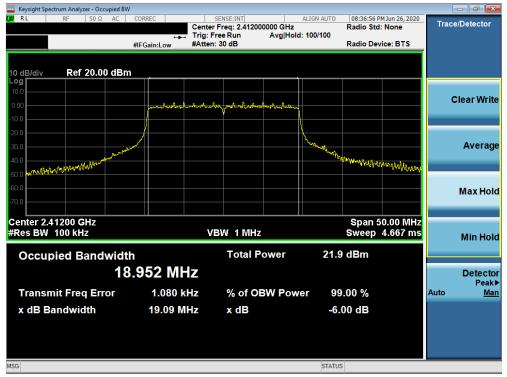
Plot 7-2. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)



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

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	IF.	Approved by: Quality Manager
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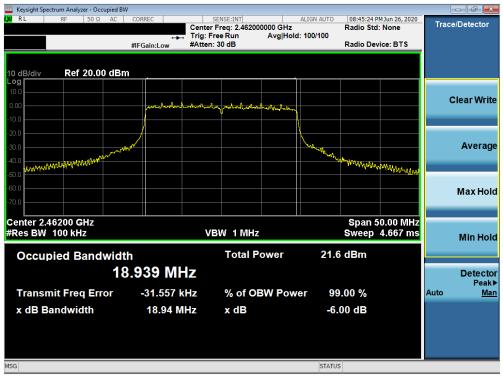
Plot 7-4. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)



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

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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Plot 7-6. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)

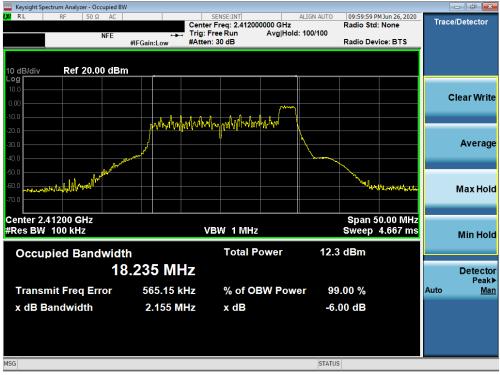
FCC ID: A3LSMT978U	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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SISO Antenna-2 6 dB Bandwidth Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
2412	1	ax	26T	MCS0	2.155	0.500
2437	6	ах	26T	MCS0	2.690	0.500
2462	11	ах	26T	MCS0	17.070	0.500
2412	1	ах	242T	MCS0	19.02	0.500
2437	6	ax	242T	MCS0	19.09	0.500
2462	11	ax	242T	MCS0	18.97	0.500

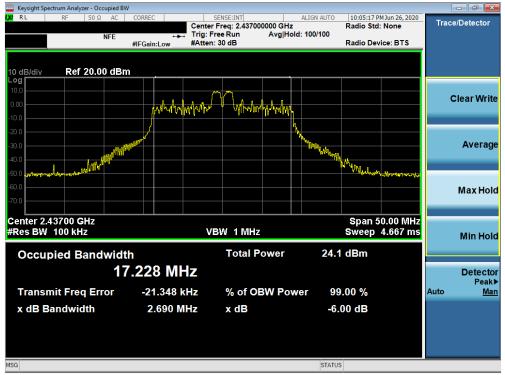
Table 7-3. Conducted Bandwidth Measurements SISO ANT2



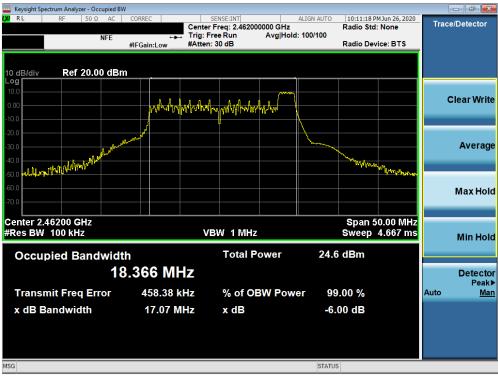
Plot 7-7. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-8. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)



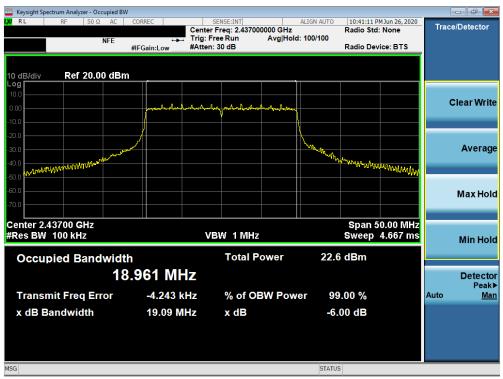
Plot 7-9. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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🔤 Keysight Spectrum Analyzer - Occupied BW					
XVIRL RF 50Ω AC	Trig:		ALIGN AUTO 10:38:05 Radio St Id: 100/100	PM Jun 26, 2020 d: None	Trace/Detector
	#IFGain:Low #Atte	en: 30 dB	Radio De	vice: BTS	
10 dB/div Ref 20.00 dBm					
Log 10.0	persentingly and and	alon mater Anaberghow March			Clear Write
-10.0 -20.0 -30.0 -40.0			handlen and and a set		Average
-40.0 -50.0 mahlynswertywydywarawar			Manhan Marine	age the second	Max Hold
Center 2.41200 GHz #Res BW 100 kHz	I	VBW 1 MHz		50.00 MHz 4.667 ms	Min Hold
Occupied Bandwidt	ո .954 MHz	Total Power	21.5 dBm		Detector Peak▶
Transmit Freq Error	28.404 kHz	% of OBW Pov	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	19.02 MHz	x dB	-6.00 dB		
MSG			STATUS		

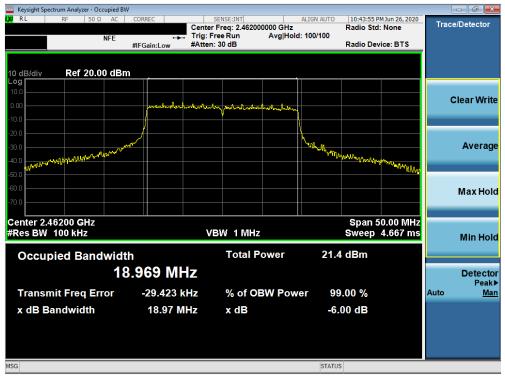
Plot 7-10. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)



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

FCC ID: A3LSMT978U	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Plot 7-12. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 11)

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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

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	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				0	AVG	14.64	30.00	-15.36
2412 N					PEAK	21.06	30.00	-8.94
	1	26T	4	AVG	14.82	30.00	-15.18	
	I	201	4	PEAK	21.48	30.00	-8.52	
			8	AVG	14.88	30.00	-15.12	
Î				0	PEAK	21.99	30.00	-8.01
2.4GHz		6	26T	0	AVG	14.99	30.00	-15.01
4					PEAK	21.34	30.00	-8.66
Ň	2437			4	AVG	14.83	30.00	-15.17
	2407				PEAK	22.10	30.00	-7.90
				8	AVG	14.42	30.00	-15.58
				0	PEAK	22.01	30.00	-7.99
				0	AVG	14.98	30.00	-15.02
				0	PEAK	20.79	30.00	-9.21
	2462	11	26T	4	AVG	14.70	30.00	-15.30
	2702		201	4	PEAK	21.29	30.00	-8.71
				8	AVG	14.76	30.00	-15.24
					PEAK	21.80	30.00	-8.20

Table 7-4. Conducted Output Power Measurements SISO ANT1 (26 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				27	AVG	14.43	30.00	-15.57
				37	PEAK	22.45	30.00	-7.55
	2412	1	52T	38	AVG	14.69	30.00	-15.31
	2412	1	521	30	PEAK	22.90	30.00	-7.10
				40	AVG	14.81	30.00	-15.19
N N					PEAK	22.89	30.00	-7.11
六	H54. 2437 6			37	AVG	14.55	30.00	-15.45
4					PEAK	22.29	30.00	-7.71
	2437	6	52T	38	AVG	14.97	30.00	-15.03
	2407	0			PEAK	22.68	30.00	-7.32
				40	AVG	14.70	30.00	-15.30
				40	PEAK	22.66	30.00	-7.34
				37	AVG	14.73	30.00	-15.27
				51	PEAK	22.96	30.00	-7.04
	2462 11	11	52T	38	AVG	14.89	30.00	-15.11
			JZT	50	PEAK	22.92	30.00	-7.08
			40	AVG	14.53	30.00	-15.47	
				40	PEAK	22.47	30.00	-7.53

Table 7-5. Conducted Output Power Measurements SISO ANT1 (52 Tones)

	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				53	AVG	14.67	30.00	-15.33
	2412	1	106T	55	PEAK	22.26	30.00	-7.74
<u>N</u>	N	I	1001	54	AVG	14.85	30.00	-15.15
ZHGHZ				- 34	PEAK	22.30	30.00	-7.70
<u>U</u>		6	106T	53 54	AVG	14.85	30.00	-15.15
7	2437				PEAK	22.19	30.00	-7.81
N	2437				AVG	14.54	30.00	-15.46
					PEAK	21.84	30.00	-8.16
				53	AVG	14.78	30.00	-15.22
	2462	11	106T	55	PEAK	22.25	30.00	-7.75
	2702	11		54	AVG	14.57	30.00	-15.43
					PEAK	21.37	30.00	-8.63

Table 7-6. Conducted Output Power Measurements SISO ANT1 (106 Tones)

FCC ID: A3LSMT978U	Provid to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]		
2.4GHz	2412	1	242T	242T	242T	242T 61	AVG	12.96	30.00	-17.04
Ū.	2412	I		01	PEAK	20.84	30.00	-9.16		
4	2437	6	242T	242T 61	AVG	14.59	30.00	-15.41		
N	2437	0	2421		PEAK	21.74	30.00	-8.26		
	2462 11	242T	61	AVG	13.12	30.00	-16.88			
	2402	11	2421	01	PEAK	20.45	30.00	-9.55		

Table 7-7. Conducted Output Power Measurements SISO ANT1 (242 Tones)

	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				0	AVG	14.51	30.00	-15.49
					PEAK	20.78	30.00	-9.22
2412	1	26T	4	AVG	14.63	30.00	-15.37	
	I	201	4	PEAK	21.07	30.00	-8.93	
N	2437			8	AVG	14.81	30.00	-15.19
Ϊ				0	PEAK	21.82	30.00	-8.18
			6 26T	0	AVG	14.78	30.00	-15.22
4		6			PEAK	21.07	30.00	-8.93
Ň	2437			4	AVG	14.87	30.00	-15.13
	2437				PEAK	21.42	30.00	-8.58
				8	AVG	14.73	30.00	-15.27
				0	PEAK	21.74	30.00	-8.26
				0	AVG	14.98	30.00	-15.02
				0	PEAK	21.18	30.00	-8.82
	2462	11	26T	4	AVG	14.85	30.00	-15.15
	2402	2402 11	261	4	PEAK	21.13	30.00	-8.87
				8	AVG	14.99	30.00	-15.01
					PEAK	21.67	30.00	-8.33

Table 7-8. Conducted Output Power Measurements SISO ANT2 (26 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				37	AVG	14.64	30.00	-15.36
			57	PEAK	22.38	30.00	-7.62	
	2412	1	52T	38	AVG	14.96	30.00	-15.04
2412	I	JZT	30	PEAK	22.58	30.00	-7.42	
				40	AVG	14.74	30.00	-15.26
N				40	PEAK	22.54	30.00	-7.46
I	24 37	6	52T	37	AVG	14.93	30.00	-15.07
Q					PEAK	22.80	30.00	-7.20
7	2437			38	AVG	14.97	30.00	-15.03
2	2407				PEAK	22.87	30.00	-7.13
				40	AVG	14.70	30.00	-15.30
					PEAK	22.65	30.00	-7.35
				37	AVG	14.54	30.00	-15.46
				57	PEAK	22.20	30.00	-7.80
	2462	11	52T	38	AVG	14.65	30.00	-15.35
240	2702	02 11	521	30	PEAK	22.23	30.00	-7.77
				40	AVG	14.42	30.00	-15.58
					PEAK	21.90	30.00	-8.10

Table 7-9. Conducted Output Power Measurements SISO ANT2 (52 Tones)

	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
				53	AVG	14.45	30.00	-15.55
	2412	1	106T	- 55	PEAK	20.77	30.00	-9.23
N	2412	1	1001	54	AVG	14.67	30.00	-15.33
I				54	PEAK	21.31	30.00	-8.69
2.4GHz	9		106T	53 54	AVG	14.99	30.00	-15.01
4	2437	6			PEAK	22.04	30.00	-7.96
N	2437	0			AVG	14.82	30.00	-15.18
				- 34	PEAK	21.71	30.00	-8.29
				53	AVG	14.92	30.00	-15.08
	2462	11	106T	- 55	PEAK	21.06	30.00	-8.94
		11	1001	54	AVG	14.93	30.00	-15.07
				04	PEAK	20.75	30.00	-9.25

Table 7-10. Conducted Output Power Measurements SISO ANT2 (106 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Hz	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]
I	2412	1	242T	61	AVG	12.72	30.00	-17.28
4GI	2412	I			PEAK	20.09	30.00	-9.91
4	2437	6	242T	61	AVG	14.23	30.00	-15.77
N	2437	0	2421	01	PEAK	21.31	30.00	-8.69
	2462	11	242T	61	AVG	13.33	30.00	-16.67
	2402	11	2421	01	PEAK	20.75	30.00	-9.25

Table 7-11. Conducted Output Power Measurements SISO ANT2 (242 Tones)

	Freq [MHz]	Channel	Tones	RU Index	Detector	Cond	Conducted Power [dBm]			Conducted Power
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]
				0	AVG	14.44	14.62	17.54	30.00	-12.46
				0	PEAK	24.16	22.55	26.44	30.00	-3.56
	2412	1	26T	4	AVG	14.28	15.11	17.73	30.00	-12.27
	2412	I	201	4	PEAK	21.89	22.86	25.41	30.00	-4.59
N				8	AVG	14.13	15.42	17.83	30.00	-12.17
Î					PEAK	21.71	22.09	24.91	30.00	-5.09
5			26T	0	AVG	14.14	15.06	17.63	30.00	-12.37
4					PEAK	22.12	23.74	26.02	30.00	-3.98
2.4GI	2437	6		4	AVG	14.28	14.10	17.20	30.00	-12.80
	2407	U	201	т —	PEAK	21.68	22.29	25.01	30.00	-4.99
				8	AVG	14.42	14.65	17.55	30.00	-12.45
				0	PEAK	22.02	21.47	24.76	30.00	-5.24
				0	AVG	14.20	14.83	17.54	30.00	-12.46
				0	PEAK	23.40	22.57	26.02	30.00	-3.98
	2462 11	11	26T	4	AVG	13.62	14.52	17.10	30.00	-12.90
			201	4	PEAK	21.09	21.98	24.57	30.00	-5.43
				8	AVG	14.05	15.39	17.78	30.00	-12.22
				0	PEAK	21.79	22.50	25.17	30.00	-4.83

Table 7-12. Conducted Output Power Measurements MIMO (26 Tones)

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Power [dBm]		dBm]	Conducted Power Limit	Conducted Power
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]
				37	AVG	14.63	14.65	17.65	30.00	-12.35
				57	PEAK	21.98	23.16	25.62	30.00	-4.38
	2412	1	52T	38	AVG	14.41	15.19	17.83	30.00	-12.17
	2412	1	521	50	PEAK	23.05	22.23	25.67	30.00	-4.33
				40	AVG	14.59	14.93	17.77	30.00	-12.23
N				-10	PEAK	21.67	22.01	24.85	30.00	-5.15
I			52T	37	AVG	14.98	14.51	17.76	30.00	-12.24
2.4G					PEAK	21.98	22.92	25.49	30.00	-4.51
T .	2437	6		38	AVG	14.36	14.97	17.69	30.00	-12.31
2	2407	U			PEAK	22.57	22.37	25.48	30.00	-4.52
				40	AVG	14.80	13.72	17.30	30.00	-12.70
				-10	PEAK	21.86	20.96	24.44	30.00	-5.56
				37	AVG	14.99	14.21	17.63	30.00	-12.37
	2462 11			01	PEAK	22.98	21.30	25.23	30.00	-4.77
		11	52T	38	AVG	13.64	15.11	17.45	30.00	-12.55
			521	30	PEAK	22.06	22.04	25.06	30.00	-4.94
				40	AVG	14.69	14.57	17.64	30.00	-12.36
				.0	PEAK	21.78	21.70	24.75	30.00	-5.25

Table 7-13. Conducted Output Power Measurements MIMO (52 Tones)

	Freq [MHz] Channel Tor		Tones	Tones RU Index	Detector	Cond	Conducted Power [dBm]			Conducted Power
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]
				53	AVG	14.68	15.03	17.87	30.00	-12.13
	2412	1	106T	55	PEAK	22.03	21.53	24.80	30.00	-5.20
N	2412	1	1001	54	AVG	14.26	15.59	17.99	30.00	-12.01
I				- 54	PEAK	21.23	21.35	24.30	30.00	-5.70
Ċ			106T	53	AVG	14.51	14.15	17.34	30.00	-12.66
4	2437	6			PEAK	21.43	21.16	24.31	30.00	-5.69
2	2437	0		54	AVG	14.69	14.61	17.66	30.00	-12.34
					PEAK	22.10	21.19	24.68	30.00	-5.32
				53	AVG	14.40	15.09	17.77	30.00	-12.23
	2462	11	106T		PEAK	21.60	20.40	24.05	30.00	-5.95
			1001	54	AVG	14.53	15.28	17.93	30.00	-12.07
					PEAK	21.96	21.21	24.61	30.00	-5.39

Table 7-14. Conducted Output Power Measurements MIMO (106 Tones)

	Freq [M	1Hz]	Channel	Tones	RU Index	Detector	Cond	Conducted Power [dBm]			Conducted Power
N							ANT1	ANT2	MIMO	[dBm]	Margin [dB]
I	2412	2	1	242T	61	AVG	12.37	13.19	15.81	30.00	-14.19
Ū	2412	2	I	2421	21 01	PEAK	19.85	20.94	23.44	30.00	-6.56
4	2437	7	6	242T	61	AVG	14.06	14.62	17.36	30.00	-12.64
2	2437	'	0	2421		PEAK	21.30	20.08	23.74	30.00	-6.26
	2460	2	11	242T	61	AVG	13.01	13.83	16.45	30.00	-13.55
	2402	2462 11	2421	01	PEAK	20.76	20.73	23.76	30.00	-6.24	

Table 7-15. Conducted Output Power Measurements MIMO (242 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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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 17.86 dBm for Antenna-1 and 17.60 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(17.86 dBm + 17.60 dBm) = (61.09 mW + 57.54 mW) = 118.64 mW = 20.74 dBm

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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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 = 1MHz
- 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.

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FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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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.

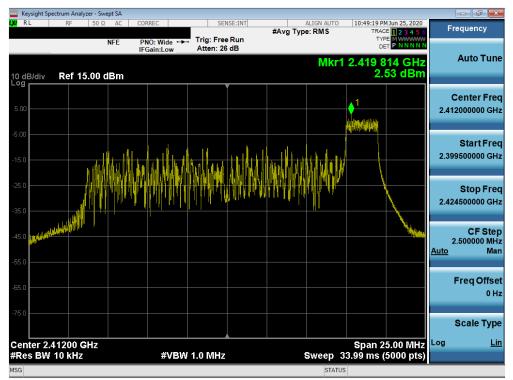
FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	AMSUNG	Approved by: Quality Manager
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SISO Antenna-1 Power Spectral Density Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	ax	26T	MCS0	2.53	8.00	-5.47	Pass
2437	6	ax	26T	MCS0	2.20	8.00	-5.80	Pass
2462	11	ax	26T	MCS0	2.36	8.00	-5.64	Pass
2412	1	ax	242T	MCS0	-7.03	8.00	-15.03	Pass
2437	6	ax	242T	MCS0	-6.16	8.00	-14.16	Pass
2462	11	ax	242T	MCS0	-7.63	8.00	-15.63	Pass

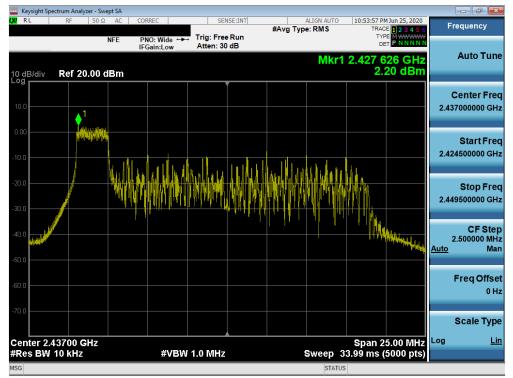
Table 7-16. Conducted Power Density Measurements SISO ANT1



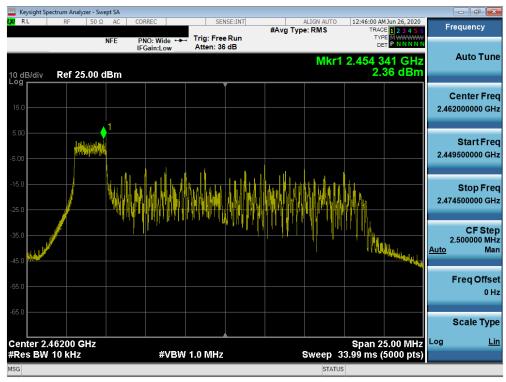
Plot 7-13. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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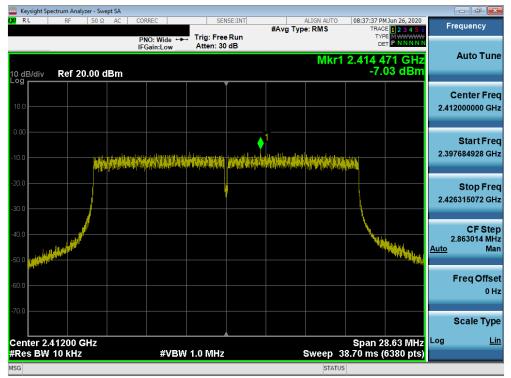
Plot 7-14. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 6)



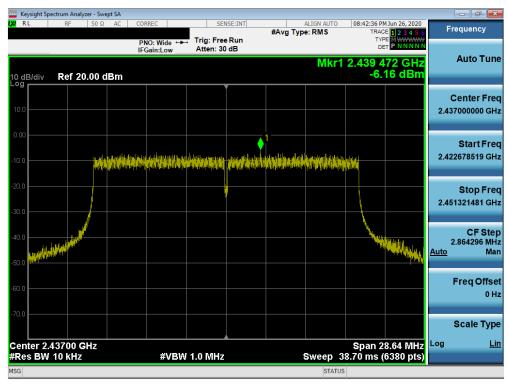
Plot 7-15. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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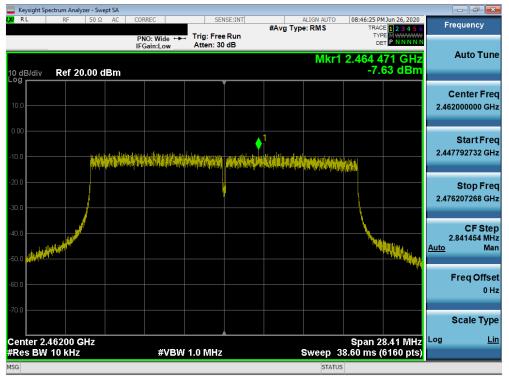
Plot 7-16. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)



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

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-18. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)

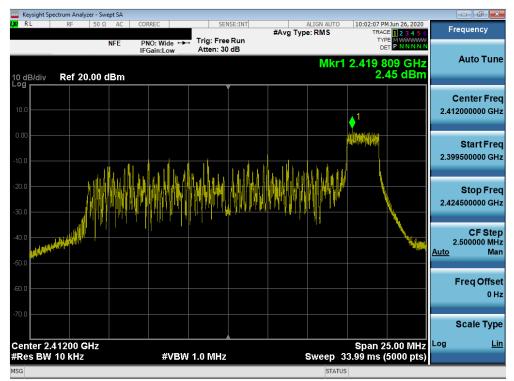
FCC ID: A3LSMT978U	POUL to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 36 of 95
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SISO Antenna-2 Power Spectral Density Measurements

Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate [Mbps]	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	ax	26T	MCS0	2.45	8.00	-5.55	Pass
2437	6	ax	26T	MCS0	2.11	8.00	-5.89	Pass
2462	11	ax	26T	MCS0	2.59	8.00	-5.41	Pass
2412	1	ax	242T	MCS0	-7.06	8.00	-15.06	Pass
2437	6	ax	242T	MCS0	-6.08	8.00	-14.08	Pass
2462	11	ax	242T	MCS0	-7.51	8.00	-15.51	Pass

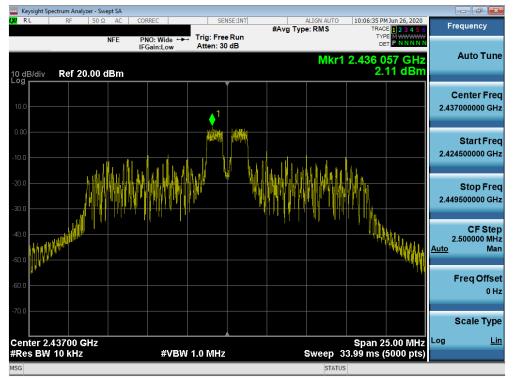
Table 7-17. Conducted Power Density Measurements SISO ANT2



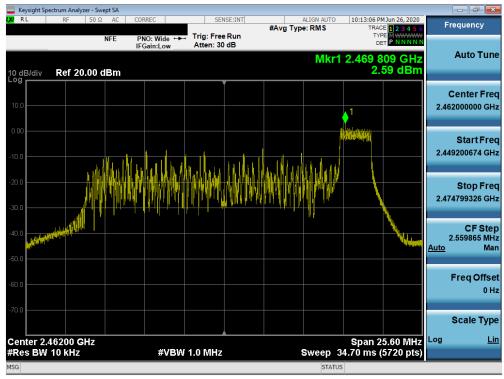
Plot 7-19. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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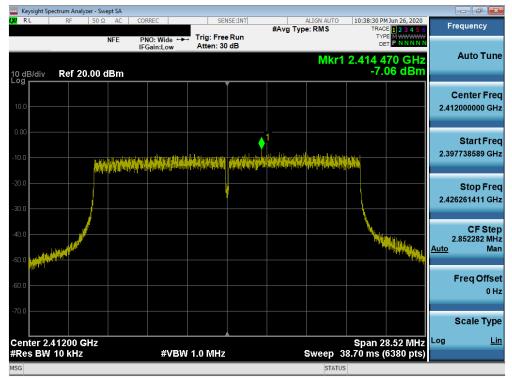
Plot 7-20. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 6)



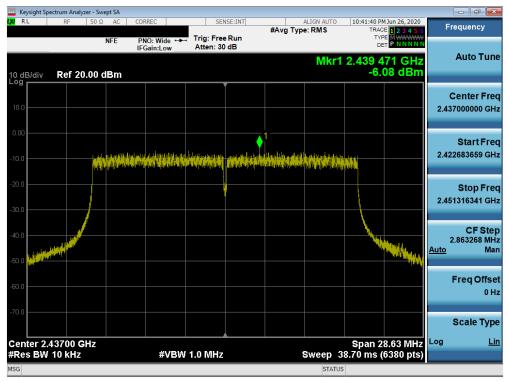
Plot 7-21. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMT978U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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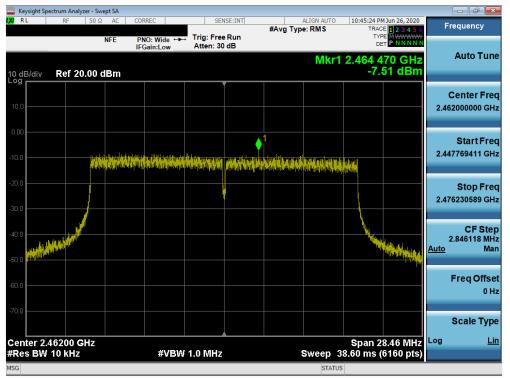
Plot 7-22. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 1)



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

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-24. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality 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	2.53	2.45	5.50	8.00	-2.50	Pass
2437	6	ax	26T	MCS0	2.20	2.11	5.17	8.00	-2.83	Pass
2462	11	ax	26T	MCS0	2.36	2.59	5.49	8.00	-2.51	Pass
2412	1	ax	242T	MCS0	-7.03	-7.06	-4.03	8.00	-12.03	Pass
2437	6	ax	242T	MCS0	-6.16	-6.08	-3.11	8.00	-11.11	Pass
2462	11	ax	242T	MCS0	-7.63	-7.51	-4.56	8.00	-12.56	Pass

Table 7-18.M	MIMO Con	ducted P	ower Dens	itv Measur	ements
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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 -2.65 dBm for Antenna-1 and - 2.26 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(-2.65 dBm + -2.26 dBm) = (0.54 mW + 0.59 mW) = 1.14 mW = 0.56 dBm

FCC ID: A3LSMT978U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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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 30dB 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.



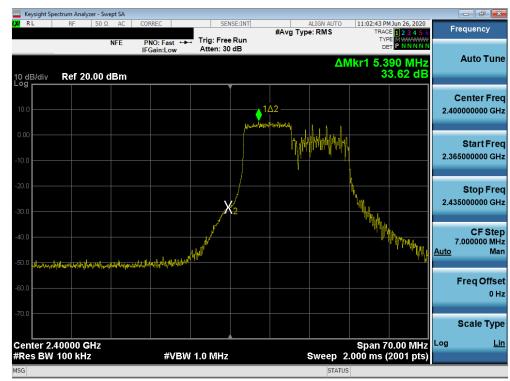
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

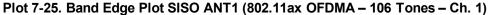
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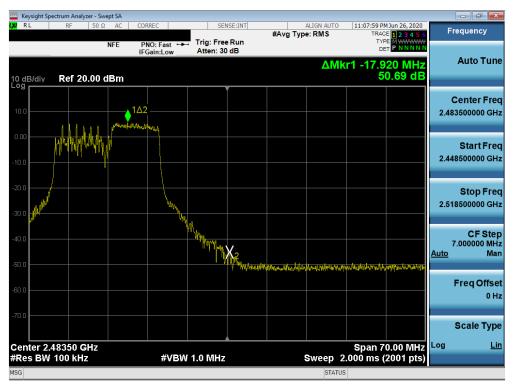
FCC ID: A3LSMT978U	Proved to be part of the element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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SISO Antenna-1 Conducted Emissions at the Band Edge



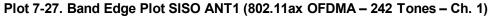


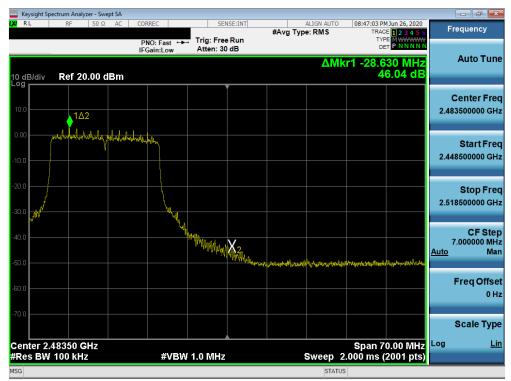
Plot 7-26. Band Edge Plot SISO ANT1 (802.11ax OFDMA – 106 Tones – Ch. 11)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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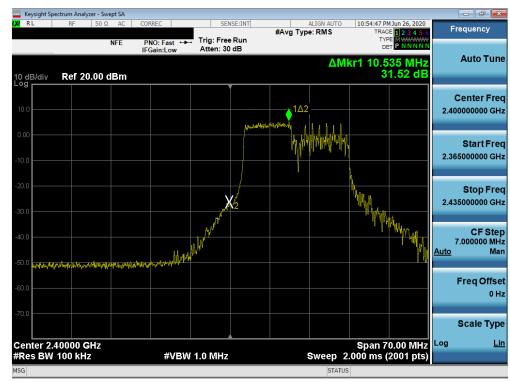




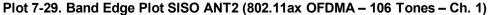
Plot 7-28. Band Edge Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)

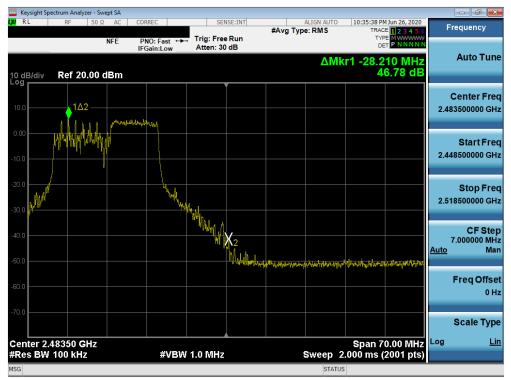
FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 44 of 95
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SISO Antenna-2 Conducted Emissions at the Band Edge

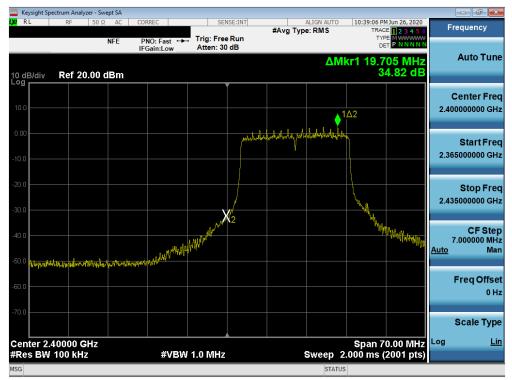


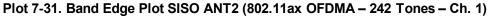


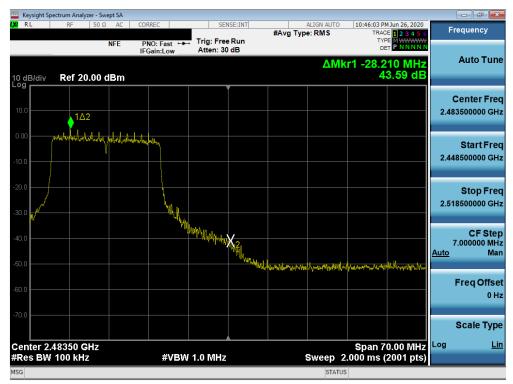
Plot 7-30. Band Edge Plot SISO ANT2 (802.11ax OFDMA - 106 Tones - Ch. 11)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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Plot 7-32. Band Edge Plot SISO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 11)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 46 of 95
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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 30dB 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 v05r02r01.

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: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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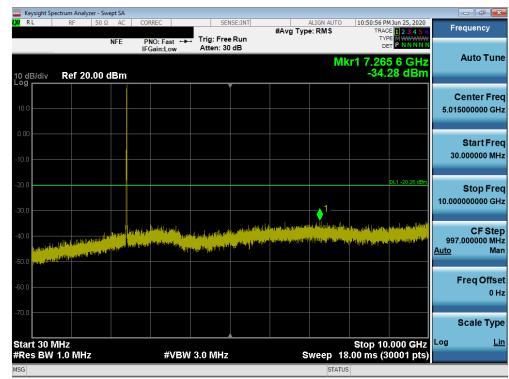


Test Notes

- 1. RBW was set to 1MHz rather than 100kHz in order to increase the measurement speed.
- 2. The display line shown in the following plots denotes the limit at 30dB 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 30dB 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.

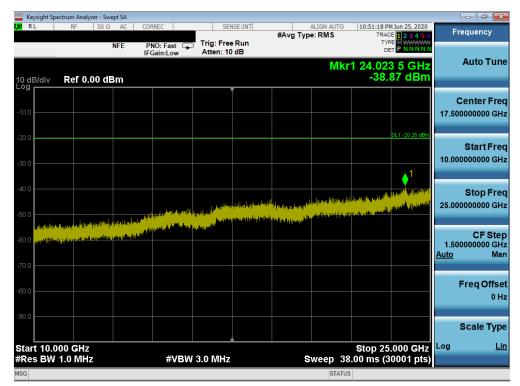
FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SUNG	Approved by: Quality Manager	
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SISO Antenna-1 Conducted Spurious Emission

Plot 7-33. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 1)



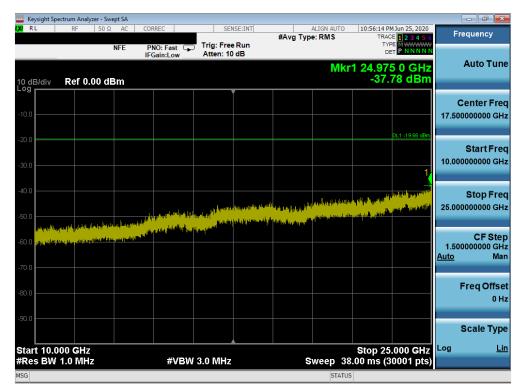
Plot 7-34. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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	pectrum Analy											×
L <mark>XI</mark> RL	RF	50 Ω AC		RREC		NSE:INT	#Avg Typ	ALIGN AUT e: RMS	TRA	M Jun 25, 2020 CE 1 2 3 4 5 6	Frequency	y
10 dB/div	Ref 25	NFE	IF	NO:Fast 🕞 Gain:Low	Trig: Free Atten: 36				⊡ Mkr1 9.76	5 0 GHz 83 dBm	Auto T	une
15.0											Center F 5.015000000	
-5.00											Start F 30.000000	
-15.0								dima salat e	Telen det in jereinnen	DL1 -19.66 dBm	Stop F 10.000000000	
-35.0 -45.0									Andreas Antonio California Angelera		CF \$ 997.000000 <u>Auto</u>	
-55.0											Freq Of	ffset 0 Hz
-65.0 Start 30									Stop 1	0.000 GHz	Scale T Log	Гуре <u>Lin</u>
#Res BW	/ 1.0 MH	Z		#VBW	/ 3.0 MHz		9	_	18.00 ms (30001 pts)		
MSG								STA	TUS			

Plot 7-35. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)



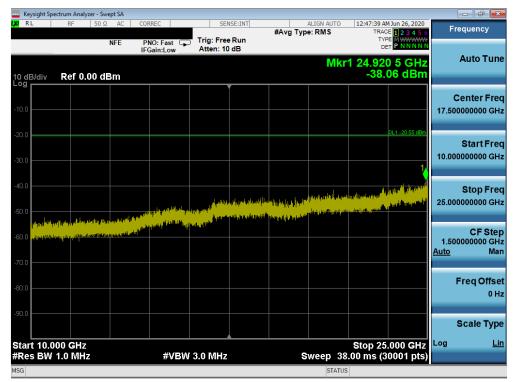
Plot 7-36. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 50 of 95	
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		Analyzer - Swe				 				
,X/RL	R			CORREC		#Avg Typ	ALIGN AUTO e: RMS	TRAC	4 Jun 26, 2020 E 1 2 3 4 5 6 E M WWWW	Frequency
10 dB/d	liv Re	f 25.00 d	NFE IBm	PNO: Fast IFGain:Low	Atten: 36		N	DE //kr1 7.83		Auto Tur
15.0 —										Center Fre 5.015000000 GH
-5.00										Start Fre 30.000000 MH
-15.0								♦	DL1 -20.55 dBm	Stop Fre 10.00000000 GH
35.0	an the second	<mark>, par 1 per la presidente de la presidente m Per la presidente de la presidente d</mark>	and par wate	n a stan i stan stan stan stan stan stan stan stan	alay tai pullocal Alay day dalah fi	alaan dagaga tayahdi Madalah majalay da da da	i și le constanți Il și le constanți	nikan filmanya ketapatén k	n fan fan fan fan fan fan fan fan fan fa	CF Ste 997.000000 MH <u>Auto</u> Ma
.55.0 —										Freq Offs 0 F
-65.0	30 MHz							Stop 10	.000 GHz	Scale Typ Log <u>L</u>
	3W 1.0	MHz		#VBV	/ 3.0 MHz	S	weep	18.00 ms (3		
1SG							STA	TUS		

Plot 7-37. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 11)



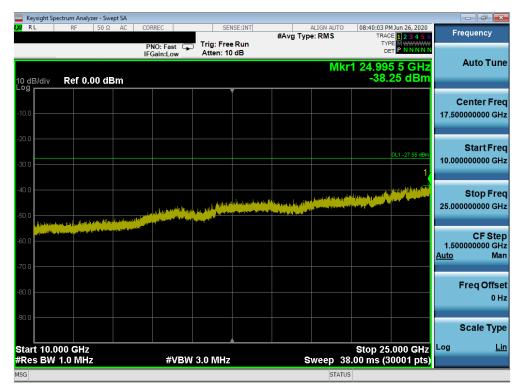
Plot 7-38. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 11)

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	ectrum Analyzer - Sv											r X
X/RL	RF 50 S	AC	COR	REC	S	ENSE:INT	#Avg T	ALIGN AUT ype: RMS	т	2 PM Jun 26, 2020 RACE 1 2 3 4 5 6	Freque	ency
				IO: Fast (Gain:Low	Trig: Fr Atten:						Aut	to Tune
10 dB/div Log	Ref 15.00	dBm							Mkr1 7.8 -3	358 8 GHz 6.29 dBm	Aut	lo rune
						Ĭ					Cent	ter Freq
5.00											5.015000	000 GHz
-5.00											Sta	art Freq
-15.0											30.000	000 MHz
-25.0										DL1 -27.55 dBm	Sto	op Freq
-35.0									♦ ¹		10.000000	
		للسغاء	et et Mile		han alayan an an tag	and the state of the state	lan septembre (beer setere en de tradese	aki dagitin Manangitin	Find D. Howay Design	Hardward of Alexandra Mandaland Analysis and Alexandra Mandaland		CF Step
-45.0			للغ <u>ر استين</u>		h ta f for a sub-to-solo to a sub-							000 MHz Man
-65.0											Free	Offset
-75.0												0 Hz
											Sca	Іе Туре
Start 30 M #Res BW				#VB	W 3.0 MH	z		Sweep	Stop 18.00 ms	10.000 GHz (30001 pts)	Log	<u>Lin</u>
MSG									ATUS			

Plot 7-39. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)



Plot 7-40. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Swept SA					
α RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO #Avg Type: RMS	08:43:40 PM Jun 26, 2020 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 15.00 dBm	PNO: Fast IFGain:Low	Trig: Free Run Atten: 26 dB	М	kr1 9.451 3 GHz -37.03 dBm	Auto Tune
5.00					Center Freq 5.015000000 GHz
15.0					Start Freq 30.000000 MHz
35.0				DL1 -20.59 dDm	Stop Freq 10.000000000 GHz
45.0		n politica and attacks of grand data and a second second states of the second	et opgandel an eigen stelle stelle stelle stelle stander ander begannte stelle stelle stander ander begannte st An eigen stelle stelle stelle stelle stelle stelle stelle stander ander stelle stelle stelle stelle stelle stelle	king and specific test in the series provided the district Confidence of the series of the series of the distribution	CF Step 997.000000 MHz <u>Auto</u> Man
65.0					Freq Offset 0 Hz
					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)	
ISG			STATU		

Plot 7-41. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 6)



Plot 7-42. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 6)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 53 of 95	
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	ectrum Analyzer - Sw									
X/RL	RF 50 Ω		ORREC		Run	#Avg Typ	ALIGN AUTO e: RMS	TRAC	1 Jun 26, 2020 E 1 2 3 4 5 6 E M WWWW	Frequency
10 dB/div	Ref 15.00 c	IF	PNO: Fast G	Atten: 26			М	DE kr1 9.97		Auto Tune
5.00										Center Freq 5.015000000 GHz
-5.00										Start Fred 30.000000 MHz
-25.0									DL1 -27.34 dBm 1	Stop Frec 10.000000000 GHz
-45.0	CHERT PARTY AND REAL AND REAL PROPERTY AND REAL							V Level water water and		CF Step 997.000000 MH <u>Auto</u> Mar
65.0										Freq Offse 0 Hz
-75.0	ИНТ							Stop 10	.000 GHz	Scale Type
#Res BW			#VBW	3.0 MHz		s	weep 1	8.00 ms (3	0001 pts)	
1SG							STATU	JS		

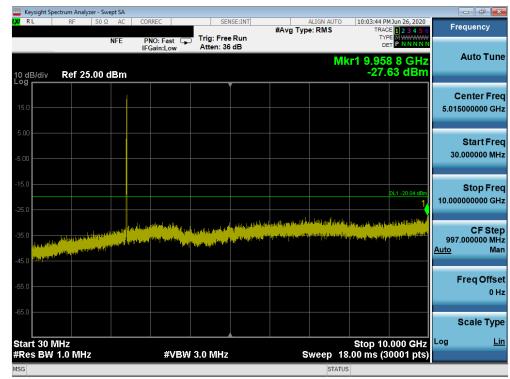
Plot 7-43. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)



Plot 7-44. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)

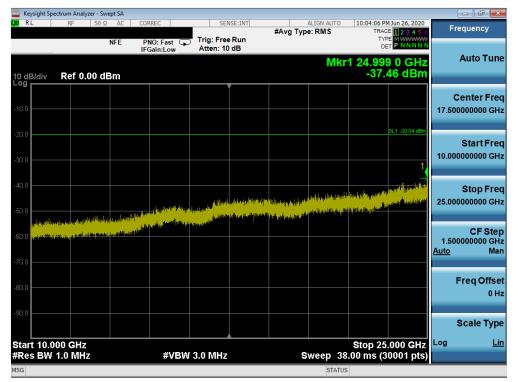
FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:		Page 54 of 95		
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SISO Antenna-2 Conducted Spurious Emissions





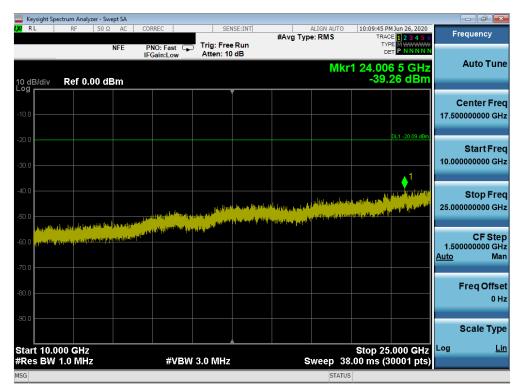
Plot 7-46. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 1)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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		yzer - Swept SA										×
X/RL	RF	50 Ω AC		REC		NSE:INT	#Avg Typ	ALIGN AUT e: RMS	TR	PM Jun 26, 2020 ACE 1 2 3 4 5 6 YPE M WWWW	Frequenc	У
10 dB/div Log	Ref 2	NFE 5.00 dBm	IFO	NO:Fast G Gain:Low	Atten: 36				/kr1 7.8	50 5 GHz .73 dBm	Auto 1	Гune
15.0											Center 5.015000000	
-5.00											Start 30.000000	
-15.0									↓1	DL1 -20.09 dBm	Stop 10.000000000	
-35.0 13.010 -45.0			tiner anger Annen anger		(Mara Jarda geologica) Al fossel state (Mara)		ا م الوالي ماهاي ويو القلم المنافقين مينيني مينيوني		i fil se providen provident provident All tracks and a providence providence providence providence providence providence providence providence providen	an an anna an Anna Anna Anna Anna Anna	CF 997.000000 <u>Auto</u>	
-55.0											Freq O	offse 0 Ha
-65.0	MHz								Stop 1	0.000 GHz	Scale ⁻ Log	Type <u>Lir</u>
#Res BW		z		#VB۱	N 3.0 MHz		s		18.00 ms (30001 pts)		
ISG								STA	TUS			

Plot 7-47. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 6)



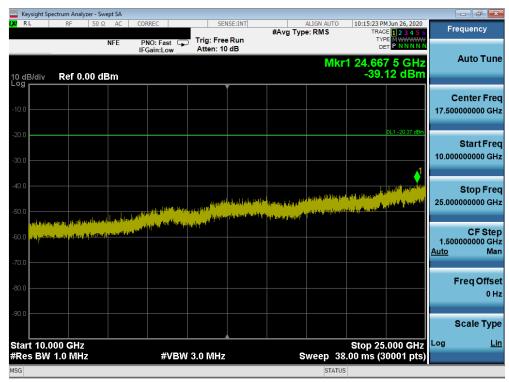
Plot 7-48. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 6)

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	ctrum Analyzer - Swept										d X
X/RL	RF 50 Ω		REC		Bun	#Avg Typ	ALIGN AUTO e: RMS	TRAC	4 Jun 26, 2020 E 1 2 3 4 5 6 E M WWWW	Freque	ency
10 dB/div	Ref 25.00 dE	IFO	NO: Fast ↔ Gain:Low	Atten: 36			MI	DE k r1 9.99		Aut	o Tune
15.0										Cent 5.015000	er Frec 000 GH2
-5.00											ntFred 000 MH
-15.0									DL1 -20.37 dBm 1	Sto 10.000000	op Free 000 GH
-35.0 .yeyyatta -45.0	n filling hyperson for the filling of the second		nan da karken op de Deren poor ferenden	h _{an} an kengelah tend Mulan kengelah tend	y fe <mark>lder (og sender og sender Hoge så den og sender og sender</mark>	a yysilyyf yn hynydd Llyfrae dylinae dd		n <mark>a fasta ang bina ang Pang bina ang bina ang</mark>	a Yeya ay a ta bayaya ya ay a A Yeya a ta a ta ay ang ta ta ay ang ta ta ay ang ta ta ang ta A ta ang ta ang ta ta	0 997.000 <u>Auto</u>	CF Stei 000 MH Mai
-55.0										Fred	l Offse 0 Ha
-65.0 Start 30 N	IHz							Stop <u>10</u>	.000 GHz	Sca Log	le Type <u>Lii</u>
#Res BW			#VBW	3.0 MHz		S	weep 18	3.00 ms (3			
ISG							STATU	s			

Plot 7-49. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 11)



Plot 7-50. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 11)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
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	pectrum An	nalyzer - Swept	SA									×
X/RL	RF	<u>50 Ω</u>	AC CO	ORREC		ISE:INT	#Avg Typ	ALIGN AUT e: RMS	TR	PM Jun 26, 2020 ACE 1 2 3 4 5 6	Frequency	
		NF		PNO: Fast ↔ FGain:Low	Atten: 26							
10 dB/div	Ref	15.00 dE	m					l	Mkr1 9.60 -37	66 7 GHz .80 dBm	Auto Tu	Ine
		15.00 02										
5.00											Center Fr 5.015000000 G	
-5.00											Start Fr	re
-15.0											30.000000 M	Π
-25.0										DL1 -27.48 dBm	Stop Fr	
-35.0			_							1	10.000000000 G	эH
		لفاهين وارا	يلمعال مل	ante al market al	A. S. Mary Mary	al factories and	adapation por station	a da de la calencia de seconde seconde se calencia de la calencia de la calencia de la calencia de la calencia Calencia de la calencia	un en de la constant	and a second second second	CF St	e
-45.0 10010 10	and the state of t	randa kanala ka	New York (M	a fillige a contact la	I CONTRACTOR OF STATE	والمتعافلية والطعاط والدواد	in la dimeterativa a sete		in alles and an an alles and a state	an) film can the addition of	997.000000 M Auto N	лн Ла
^{.55.0} 55.0												
.65.0											Freq Offs	
											0	н
-75.0											Scale Ty	m
Start 30 I ≉Res BW		Hz		#VBM	/ 3.0 MHz		s	weep	Stop 1 18.00 ms (0.000 GHz (30001 pts)	Log	<u>Li</u>
ISG									ATUS			-

Plot 7-51. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 1)

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CF St
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Freq Offs
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0
Scale Ty
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,

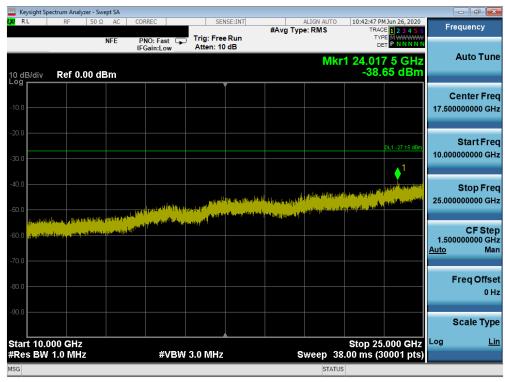
Plot 7-52. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 1)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Si								
RL RF 50 9	Ω ΑC CO	RREC	SENSE:INT	#Avg Type	ALIGN AUTO E: RMS	TRAC	1 Jun 26, 2020 E 1 2 3 4 5 6	Frequency
10 dB/div Ref 15.00	IF		g: Free Run ten: 26 dB		Mk	r1 9.980) 1 GHz 56 dBm	Auto Tune
5.00								Center Freq 5.015000000 GHz
-5.00								Start Freq 30.000000 MHz
-25.0							UL1 -27.15 dBm 1	Stop Freq 10.000000000 GHz
-45.0	erinterin erinterin Verinterin	an a tha tha tha tha tha an	light and the particular of the second s	al port i francisco de la constantio	and a second	hinggayar nganilikang ninggayar nganilikang	a gyan dalam da	CF Step 997.000000 MH2 <u>Auto</u> Mar
-65.0								Freq Offse 0 Hz
-75.0						Stop 10		Scale Type
Start 30 MHz #Res BW 1.0 MHz		#VBW 3.0	MHz	S	weep <u>18</u>		.000 GHz 0001 pts)	
MSG					STATUS			

Plot 7-53. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 6)



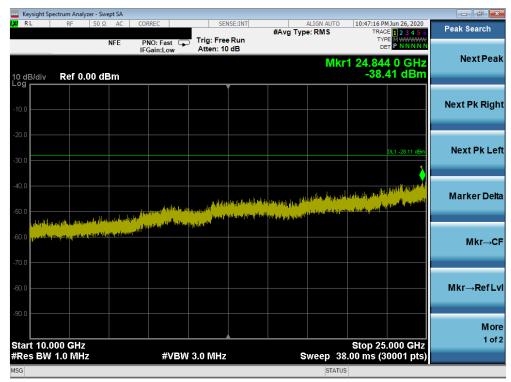
Plot 7-54. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 6)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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	ctrum Analyzer - S									
XU RL	RF 50	Ω AC	PNO: Fast	Trig: Fre		#Avg Typ	ALIGN AUTO e: RMS	TRAC	MJun 26, 2020 E 1 2 3 4 5 6 E MWWWWW	Peak Search
10 dB/div	Ref 15.00		IFGain:Low	Atten: 26	6 dB		Μ	kr1 7.68	6 3 GHz 82 dBm	NextPeak
5.00										Next Pk Righ
15.00										Next Pk Let
35.0									DL1 -28,11 dBm	Marker Delt
45.0 Novel 1	n vers prost Henric De anteres and an and a state Henric De anteres a state for a particular		a kapang di bahat internetang Mangang di bahat internetang di pang di pang di bahat internetang di pang di pang Mangang di pang	an haan taan taan taalaa		Lingung Toring Ciri	an a	na ana ang pana pana pa	nang kapat (lang ang kapat) pang ang diang ang diang kapat (kapat) pang ang diang kapat (kapat)	Mkr→Cl
65.0										Mkr→RefLv
75.0	IHz							Stop 10	.000 GHz	Mor 1 of
Res BW			#VB	N 3.0 MHz		s	weep 1	8.00 ms (3	0001 pts)	
ISG							STATU	JS		

Plot 7-55. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)



Plot 7-56. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)

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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 7-19 per Section 15.209 and RSS-Gen (8.9).

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

Table 7-19. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Section 6.6.4.3 KDB 558074 D01 v05r02r01 – 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

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
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Test Setup

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

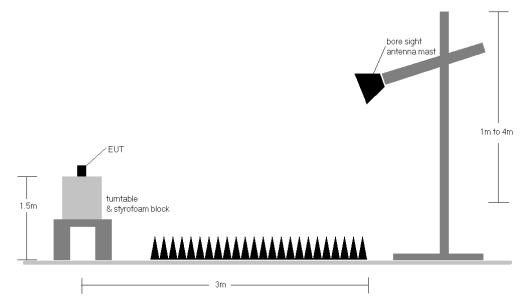


Figure 7-6. Test Instrument & Measurement Setup

Test Notes

- 1. The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02r01 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 7-19.
- 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 v05r02r01 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 [dB_μV/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 $[dB_{\mu}V/m]$

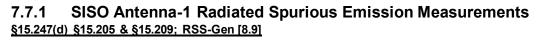
Radiated Band Edge Measurement Offset

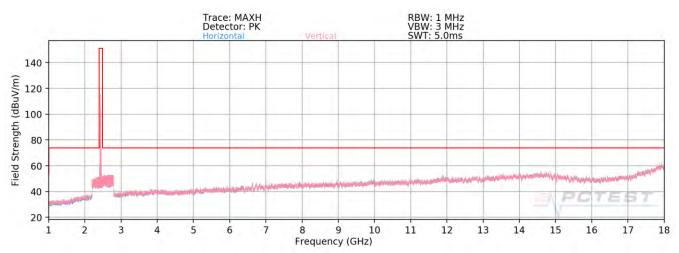
• The amplitude offset shown in the radiated restricted band edge plots in Section 7.7 was calculated using the formula:

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

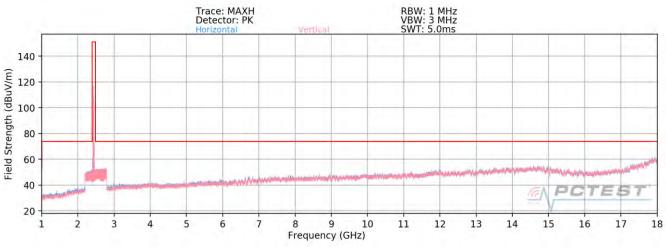
FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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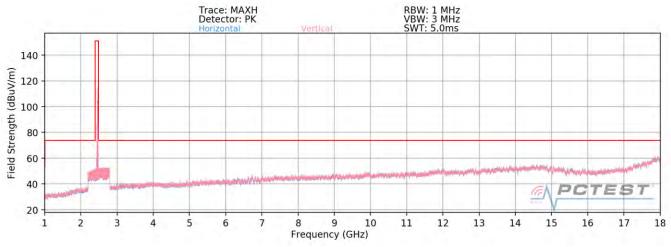
Plot 7-57. Radiated Spurious Plot above 1GHz SISO ANT1 (802.11ax OFDMA - 106 Tones - Ch. 1)



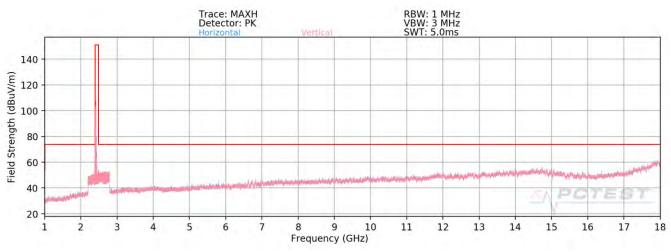
Plot 7-58. Radiated Spurious Plot above 1GHz SISO ANT1 (802.11ax OFDMA - 106 Tones - Ch. 6)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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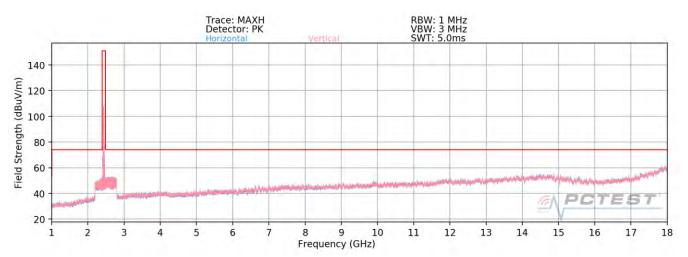








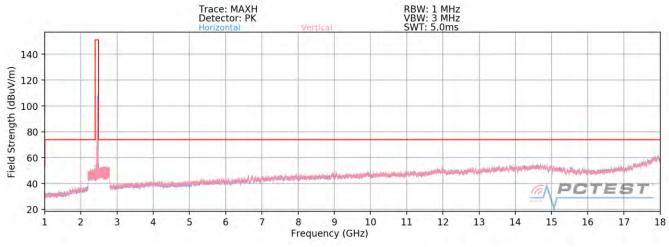




Plot 7-61. Radiated Spurious Plot above 1GHz SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 6)

FCC ID: A3LSMT978U	POUL to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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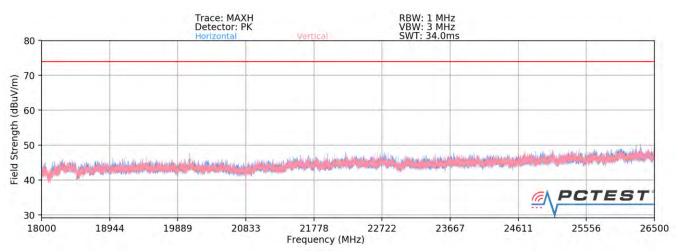


Plot 7-62. Radiated Spurious Plot above 1GHz SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)

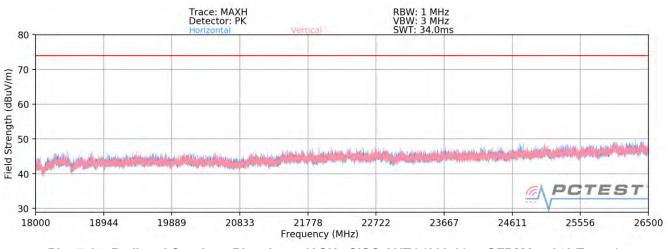
FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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SISO Antenna-1 Radiated Spurious Emissions Measurements (Above 18GHz) §15.209; RSS-Gen [8.9]







Plot 7-64. Radiated Spurious Plot above 18GHz SISO ANT1 (802.11ax OFDMA - 242 Tones)

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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SISO Antenna-1 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:	53
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	Н	-	-	-79.28	6.38	34.10	53.98	-19.88
4824.00	Peak	Н	-	-	-66.70	6.38	46.68	73.98	-27.30
12060.00	Avg	Н	-	-	-80.95	16.71	42.76	53.98	-11.22
12060.00	Peak	Н	-	-	-69.34	16.71	54.37	73.98	-19.61

Table 7-20. Radiated Measurements SISO ANT1 (106 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	53
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	Н	-	-	-79.03	6.97	34.94	53.98	-19.04
4874.00	Peak	Н	-	-	-67.27	6.97	46.70	73.98	-27.28
7311.00	Avg	Н	-	-	-80.15	11.80	38.65	53.98	-15.33
7311.00	Peak	Н	-	-	-68.24	11.80	50.56	73.98	-23.42
12185.00	Avg	Н	-	-	-80.95	17.41	43.46	53.98	-10.52
12185.00	Peak	Н	-	-	-68.98	17.41	55.43	73.98	-18.55

Table 7-21. Radiated Measurements SISO ANT1 (106 Tones)

FCC ID: A3LSMT978U	Provid to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality 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:	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	Н	-	-	-79.43	7.21	34.78	53.98	-19.20
4924.00	Peak	Н	-	-	-66.48	7.21	47.73	73.98	-26.25
7386.00	Avg	Н	-	-	-79.71	11.30	38.59	53.98	-15.39
7386.00	Peak	Н	-	-	-67.79	11.30	50.51	73.98	-23.47
12310.00	Avg	Н	-	-	-81.01	17.80	43.79	53.98	-10.18
12310.00	Peak	Н	-	-	-69.24	17.80	55.56	73.98	-18.41

Table 7-22. Radiated Measurements SISO ANT1 (106 Tones)

Worst Case Mode:

Channel:

Worst Case Transfer Rate: RU Index: Distance of Measurements: Operating Frequency: 802.11ax OFDMA MCS0 61 3 Meters 2412MHz 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	Н	-	-	-79.30	6.38	34.08	53.98	-19.90
4824.00	Peak	Н	-	-	-66.57	6.38	46.81	73.98	-27.17
12060.00	Avg	Н	-	-	-80.91	16.71	42.80	53.98	-11.18
12060.00	Peak	Н	-	-	-69.00	16.71	54.71	73.98	-19.27

Table 7-23. Radiated Measurements SISO ANT1 (242 Tones)

FCC ID: A3LSMT978U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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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:	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	н	-	-	-79.13	6.97	34.84	53.98	-19.14
4874.00	Peak	н	-	-	-66.90	6.97	47.07	73.98	-26.91
7311.00	Avg	н	-	-	-80.15	11.80	38.65	53.98	-15.33
7311.00	Peak	Н	-	-	-67.23	11.80	51.57	73.98	-22.41
12185.00	Avg	н	-	-	-81.05	17.41	43.36	53.98	-10.62
12185.00	Peak	Н	-	-	-69.12	17.41	55.29	73.98	-18.69

Table 7-24. Radiated Measurements SISO ANT1 (242 Tones)

Worst Case Mode: Worst Case Transfer Rate: RU Index: Distance of Measurements: **Operating Frequency:** Channel: -

802.11ax OFDMA
MCS0
61
3 Meters
2462MHz
11

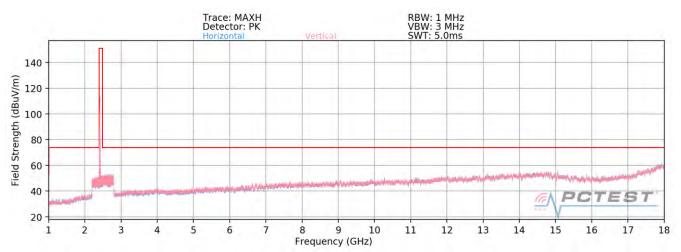
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4924.00	Avg	Н	-	-	-79.45	7.21	34.76	53.98	-19.22
4924.00	Peak	Н	-	-	-67.07	7.21	47.14	73.98	-26.84
7386.00	Avg	Н	-	-	-79.94	11.30	38.36	53.98	-15.62
7386.00	Peak	Н	-	-	-67.63	11.30	50.67	73.98	-23.31
12310.00	Avg	Н	-	-	-80.98	17.80	43.82	53.98	-10.15
12310.00	Peak	Н	-	-	-69.04	17.80	55.76	73.98	-18.21

Table 7-25. Radiated Measurements SISO ANT1 (242 Tones)

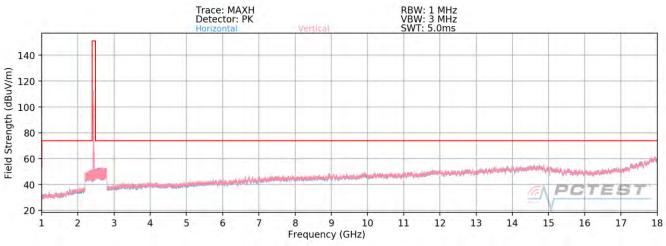
FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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7.7.2 SISO Antenna-2 Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



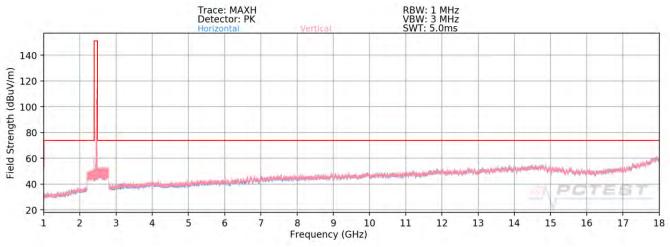
Plot 7-65. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11ax OFDMA - 106 Tones - Ch. 1)



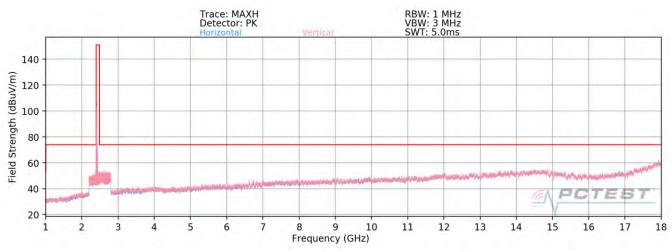
Plot 7-66. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11ax OFDMA - 106 Tones - Ch. 6)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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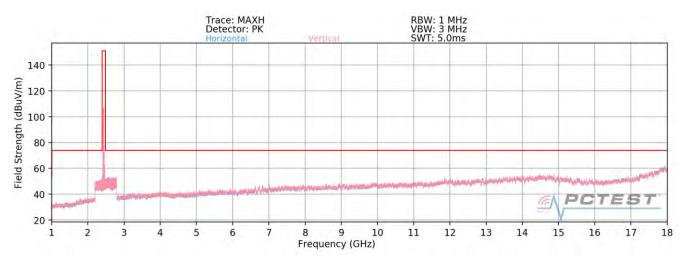








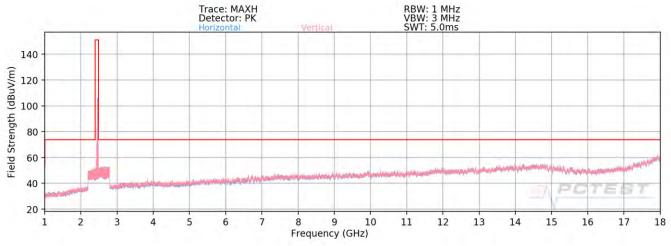




Plot 7-69. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 6)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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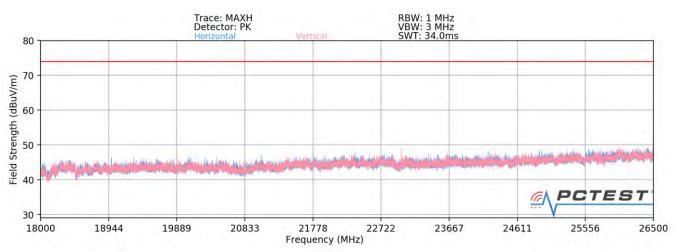


Plot 7-70. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)

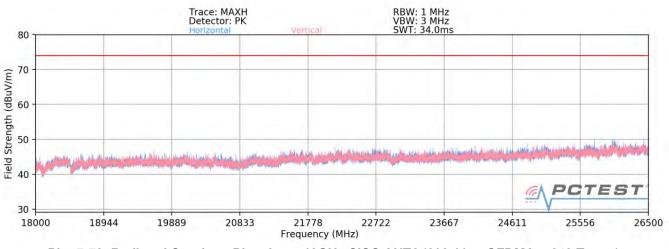
FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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SISO Antenna-2 Radiated Spurious Emissions Measurements (Above 18GHz) §15.209; RSS-Gen [8.9]







Plot 7-72. Radiated Spurious Plot above 18GHz SISO ANT2 (802.11ax OFDMA - 242 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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SISO Antenna-2 Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

802.11ax OFDMA
MCS0
53
3 Meters
2412MHz
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	Н	-	-	-79.31	6.38	34.07	53.98	-19.91
4824.00	Peak	Н	-	-	-67.09	6.38	46.29	73.98	-27.69
12060.00	Avg	Н	-	-	-80.79	16.71	42.92	53.98	-11.06
12060.00	Peak	Н	-	-	-68.26	16.71	55.45	73.98	-18.53

Table 7-26. Radiated Measurements SISO ANT2 (106 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	53
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	Н	-	-	-79.08	6.97	34.89	53.98	-19.09
4874.00	Peak	Н	-	-	-67.23	6.97	46.74	73.98	-27.24
7311.00	Avg	Н	-	-	-80.07	11.80	38.73	53.98	-15.25
7311.00	Peak	Н	-	-	-67.75	11.80	51.05	73.98	-22.93
12185.00	Avg	Н	-	-	-81.05	17.41	43.36	53.98	-10.62
12185.00	Peak	Н	-	-	-69.00	17.41	55.41	73.98	-18.57

Table 7-27. Radiated Measurements SISO ANT2 (106 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality 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:	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	Н	-	-	-79.43	7.21	34.78	53.98	-19.20
4924.00	Peak	Н	-	-	-67.12	7.21	47.09	73.98	-26.89
7386.00	Avg	Н	-	-	-79.88	11.30	38.42	53.98	-15.56
7386.00	Peak	Н	-	-	-67.85	11.30	50.45	73.98	-23.53
12310.00	Avg	Н	-	-	-81.03	17.80	43.77	53.98	-10.20
12310.00	Peak	Н	-	-	-69.04	17.80	55.76	73.98	-18.21

Table 7-28. Radiated Measurements SISO ANT2 (106 Tones)

Worst Case Mode:

Channel:

Worst Case Transfer Rate: RU Index: Distance of Measurements: Operating Frequency: 802.11ax OFDMA MCS0 61 3 Meters 2412MHz 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	н	-	-	-79.50	6.38	33.88	53.98	-20.10
4824.00	Peak	Н	-	-	-67.30	6.38	46.08	73.98	-27.90
12060.00	Avg	н	-	-	-80.90	16.71	42.81	53.98	-11.17
12060.00	Peak	н	-	-	-69.30	16.71	54.41	73.98	-19.57

Table 7-29. Radiated Measurements SISO ANT2 (242 Tones)

FCC ID: A3LSMT978U	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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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:	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	Н	-	-	-79.12	6.97	34.85	53.98	-19.13
4874.00	Peak	н	-	-	-67.27	6.97	46.70	73.98	-27.28
7311.00	Avg	н	-	-	-80.14	11.80	38.66	53.98	-15.32
7311.00	Peak	Н	-	-	-68.14	11.80	50.66	73.98	-23.32
12185.00	Avg	н	-	-	-80.97	17.41	43.44	53.98	-10.54
12185.00	Peak	Н	-	-	-68.91	17.41	55.50	73.98	-18.48

Table 7-30. Radiated Measurements SISO ANT2 (242 Tones)

Worst Case Mode: Worst Case Transfer Rate: RU Index: Distance of Measurements: **Operating Frequency:** Channel:

802.11ax OFDMA
MCS0
61
3 Meters
2462MHz
11

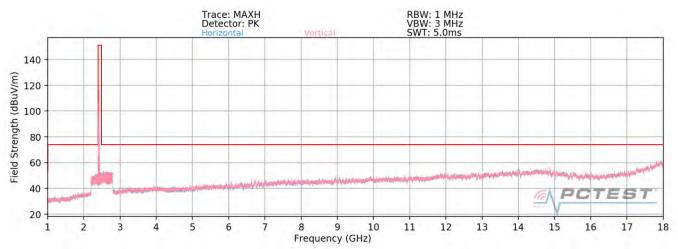
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4924.00	Avg	Н	-	-	-79.53	7.21	34.68	53.98	-19.30
4924.00	Peak	Н	-	-	-67.27	7.21	46.94	73.98	-27.04
7386.00	Avg	н	-	-	-79.91	11.30	38.39	53.98	-15.59
7386.00	Peak	н	-	-	-66.69	11.30	51.61	73.98	-22.37
12310.00	Avg	Н	-	-	-81.00	17.80	43.80	53.98	-10.17
12310.00	Peak	Н	-	-	-69.01	17.80	55.79	73.98	-18.18

Table 7-31. Radiated Measurements SISO ANT2 (242 Tones)

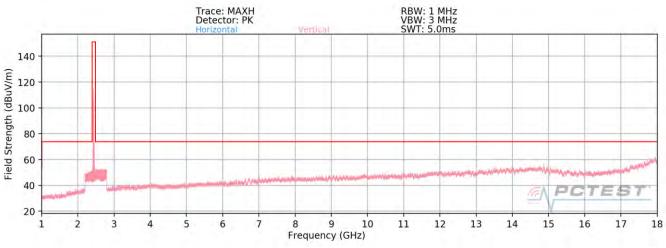
FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 77 of 95
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7.7.3 MIMO Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



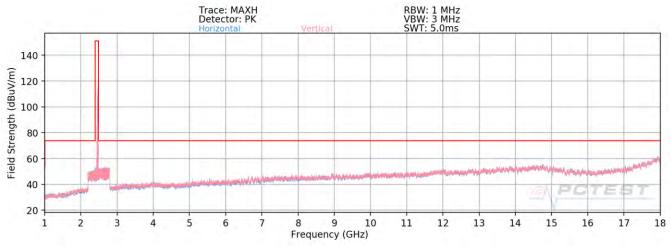
Plot 7-73. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA - 106 Tones - Ch. 1)



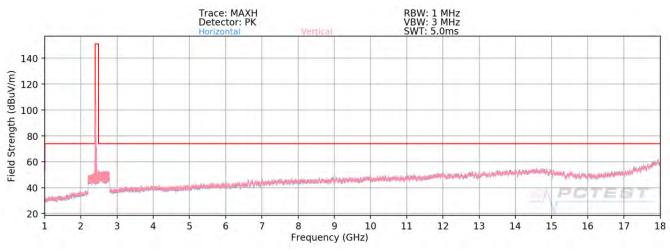
Plot 7-74. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA - 106 Tones - Ch. 6)

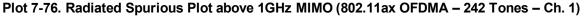
FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 78 of 95	
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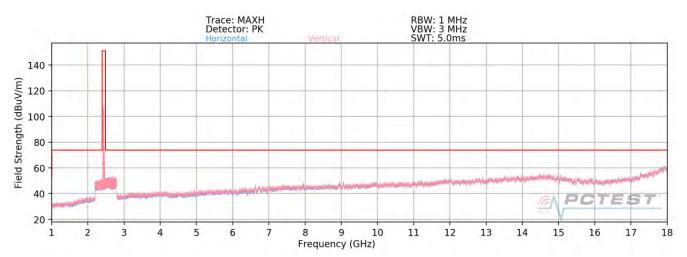








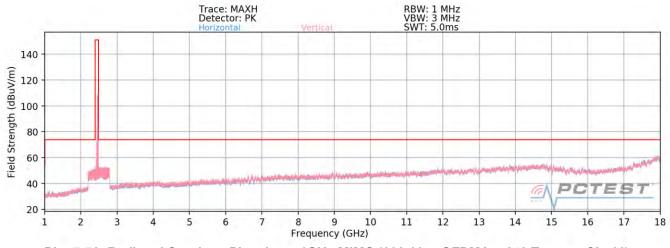




Plot 7-77. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA - 242 Tones - Ch. 6)

FCC ID: A3LSMT978U	Provid to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 79 of 95
1M2004230075-07.A3L	4/26 - 07/16/2020	Portable Tablet		Fage / 9 01 95
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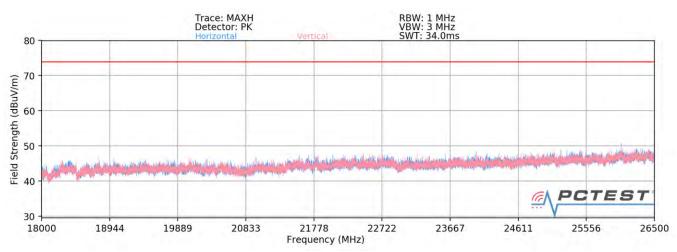


Plot 7-78. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA – 242 Tones – Ch. 11)

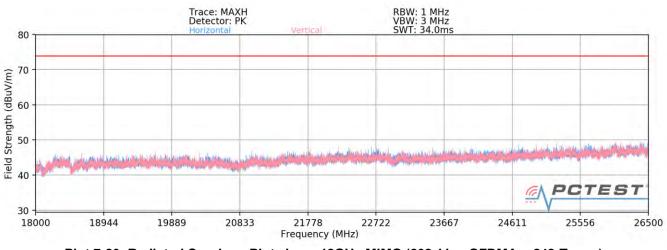
FCC ID: A3LSMT978U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 80 of 95
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MIMO Radiated Spurious Emissions Measurements (Above 18GHz) §15.209; RSS-Gen [8.9]







Plot 7-80. Radiated Spurious Plot above 18GHz MIMO (802.11ax OFDMA - 242 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 81 of 95
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MIMO Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

802.11ax OFDMA
MCS0
53
3 Meters
2412MHz
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	Н	-	-	-79.33	6.38	34.05	53.98	-19.93
4824.00	Peak	н	-	-	-66.98	6.38	46.40	73.98	-27.58
12060.00	Avg	Н	-	-	-80.83	16.71	42.88	53.98	-11.10
12060.00	Peak	Н	-	-	-69.24	16.71	54.47	73.98	-19.51

Table 7-32. Radiated Measurements MIMO (106 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	53
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	Н	-	-	-79.17	6.97	34.80	53.98	-19.18
4874.00	Peak	Н	-	-	-67.36	6.97	46.61	73.98	-27.37
7311.00	Avg	Н	-	-	-80.21	11.80	38.59	53.98	-15.39
7311.00	Peak	Н	-	-	-68.03	11.80	50.77	73.98	-23.21
12185.00	Avg	Н	-	-	-80.92	17.41	43.49	53.98	-10.49
12185.00	Peak	Н	-	-	-69.15	17.41	55.26	73.98	-18.72

Table 7-33. Radiated Measurements MIMO (106 Tones)

FCC ID: A3LSMT978U	Provid to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 82 of 95
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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:	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	Н	-	-	-79.35	7.21	34.86	53.98	-19.12
4924.00	Peak	Н	-	-	-67.13	7.21	47.08	73.98	-26.90
7386.00	Avg	Н	-	-	-79.84	11.30	38.46	53.98	-15.52
7386.00	Peak	Н	-	-	-68.10	11.30	50.20	73.98	-23.78
12310.00	Avg	Н	-	-	-80.98	17.80	43.82	53.98	-10.15
12310.00	Peak	Н	-	-	-69.11	17.80	55.69	73.98	-18.28

Table 7-34. Radiated Measurements MIMO (106 Tones)

Worst Case Mode:

Channel:

Worst Case Transfer Rate: RU Index: Distance of Measurements: Operating Frequency: 802.11ax OFDMA MCS0 61 3 Meters 2412MHz 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	Н	-	-	-79.36	6.38	34.02	53.98	-19.96
4824.00	Peak	Н	-	-	-65.78	6.38	47.60	73.98	-26.38
12060.00	Avg	Н	-	-	-80.83	16.71	42.88	53.98	-11.10
12060.00	Peak	Н	-	-	-69.24	16.71	54.47	73.98	-19.51

Table 7-35. Radiated Measurements MIMO (242 Tones)

FCC ID: A3LSMT978U	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 83 of 95
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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:	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	Н	-	-	-79.18	6.97	34.79	53.98	-19.19
4874.00	Peak	Н	-	-	-67.02	6.97	46.95	73.98	-27.03
7311.00	Avg	Н	-	-	-80.09	11.80	38.71	53.98	-15.27
7311.00	Peak	Н	-	-	-68.15	11.80	50.65	73.98	-23.33
12185.00	Avg	Н	-	-	-80.99	17.41	43.42	53.98	-10.56
12185.00	Peak	Н	-	-	-68.84	17.41	55.57	73.98	-18.41

Table 7-36. Radiated Measurements MIMO (242 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
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	Н	-	-	-79.49	7.21	34.72	53.98	-19.26
4924.00	Peak	н	-	-	-67.31	7.21	46.90	73.98	-27.08
7386.00	Avg	н	-	-	-79.85	11.30	38.45	53.98	-15.53
7386.00	Peak	н	-	-	-67.42	11.30	50.88	73.98	-23.10
12310.00	Avg	Н	-	-	-81.04	17.80	43.76	53.98	-10.21
12310.00	Peak	Н	-	-	-69.16	17.80	55.64	73.98	-18.33

Table 7-37. Radiated Measurements MIMO (242 Tones)

FCC ID: A3LSMT978U	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 84 of 95
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7.7.4 SISO Antenna-1 Radiated Restricted Band Edge Measurements §15.205 §15.209; RSS-Gen [8.9]

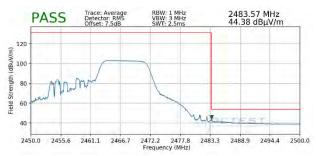
The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	53
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1

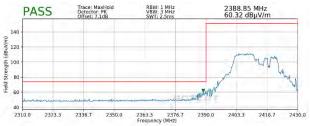


Plot 7-81. Radiated Restricted Lower Band Edge Measurement SISO ANT1 (Average – 106 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	54
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11



Plot 7-83. Radiated Restricted Upper Band Edge Measurement SISO ANT1 (Average – 106 Tones)



Plot 7-82. Radiated Restricted Lower Band Edge Measurement SISO ANT1 (Peak – 106 Tones)

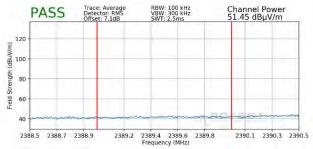


Plot 7-84. Radiated Restricted Upper Band Edge Measurement SISO ANT1 (Peak – 106 Tones)

FCC ID: A3LSMT978U	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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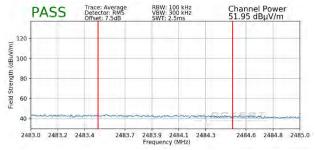


Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1



Plot 7-85. Radiated Restricted Lower Band Edge Measurement SISO ANT1 (Average – 242 Tones)

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 7-87. Radiated Restricted Upper Band Edge Measurement SISO ANT1 (Average – 242 Tones)



Plot 7-86. Radiated Restricted Lower Band Edge Measurement SISO ANT1 (Peak – 242 Tones)



Plot 7-88. Radiated Restricted Upper Band Edge Measurement SISO ANT1 (Peak – 242 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 86 of 95
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7.7.5 SISO Antenna-2 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.

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	53
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1



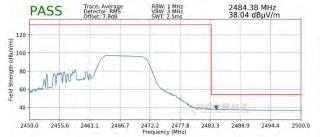
Plot 7-89. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Average – 106 Tones)

Worst Case Mode: Worst Case Transfer Rate: RU Index: Distance of Measurements: Operating Frequency: Channel:

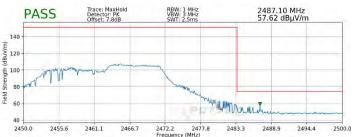
	802.11ax OFDMA
Rate:	MCS0
	54
ents:	3 Meters
	2462MHz
	11



Plot 7-90. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Peak – 106 Tones)



Plot 7-91. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Average – 106 Tones)



Plot 7-92. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Peak – 106 Tones)

FCC ID: A3LSMT978U	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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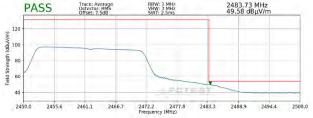
802.11ax OFDMA
MCS0
61
3 Meters
2412MHz
1

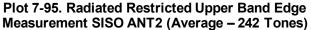


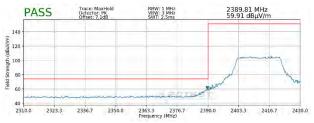
Plot 7-93. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Average – 242 Tones)

Worst Case Mode:	802.1
Worst Case Transfer Rate:	MCS
RU Index:	61
Distance of Measurements:	3 Met
Operating Frequency:	2462
Channel:	11

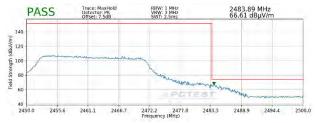
	802.11ax OFDMA
	MCS0
	61
:	3 Meters
	2462MHz
	11







Plot 7-94. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Peak – 242 Tones)



Plot 7-96. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Peak – 242 Tones)

FCC ID: A3LSMT978U	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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7.7.6 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.

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	53
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1

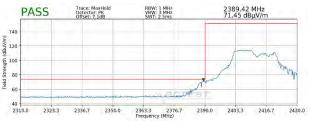


Plot 7-97. Radiated Restricted Lower Band Edge Measurement MIMO (Average – 106 Tones)

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	54
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11



Plot 7-99. Radiated Restricted Upper Band Edge Measurement MIMO (Average – 106 Tones)



Plot 7-98. Radiated Restricted Lower Band Edge Measurement MIMO (Peak – 106 Tones)



Plot 7-100. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 106 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 89 of 95
1M2004230075-07.A3L	4/26 - 07/16/2020	Portable Tablet		Fage 09 01 95
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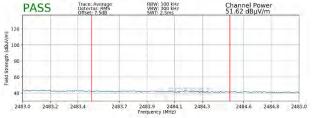


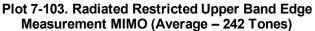
Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1



Plot 7-101. Radiated Restricted Lower Band Edge Measurement MIMO (Average – 242 Tones)

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 7-102. Radiated Restricted Lower Band Edge Measurement MIMO (Peak – 242 Tones)



Plot 7-104. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 242 Tones)

FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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7.8 Radiated Spurious Emissions Measurements – Below 1GHz §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 7-38 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-38. Radiated Limits

Test Procedures Used

ANSI C63.10-2013

Test Settings

Quasi-Peak Field Strength Measurements

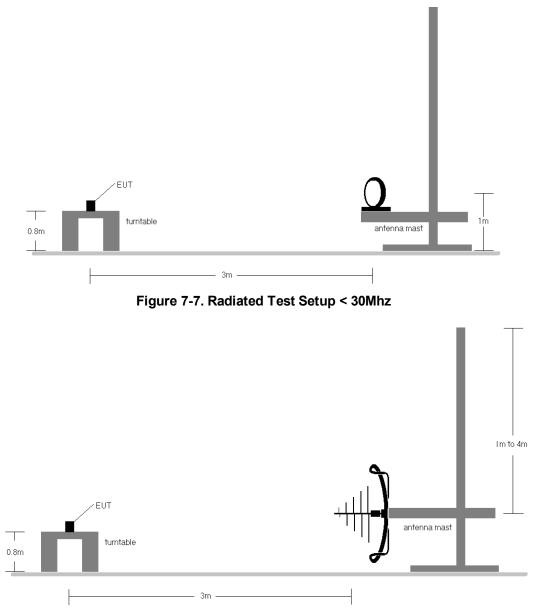
- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 120kHz (for emissions from 30MHz 1GHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

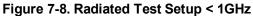
FCC ID: A3LSMT978U	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 91 of 95
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Test Setup

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





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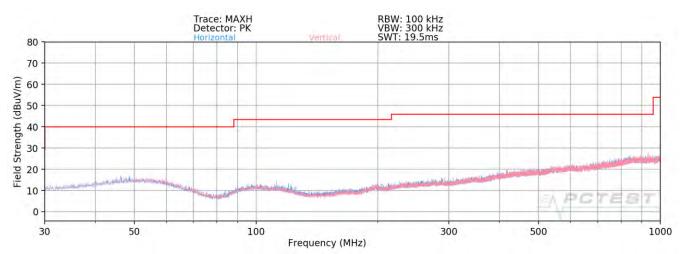
Test Notes

- 1. All emissions lying in restricted bands specified in §15.205 and RSS-Gen(8.10) are below the limit shown in Table 7-38.
- 2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes.
- 3. This unit was tested with its standard battery.
- 4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- 5. Emissions were measured at a 3 meter test distance.
- 6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
- 7. No spurious emissions were detected within 20dB of the limit below 30MHz.
- 8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
- The wide spectrum spurious emissions plots shown on the following pages are used only for the purpose of emission identification. There were no emissions detected in the 30MHz – 1GHz frequency range, as shown in the subsequent plots.

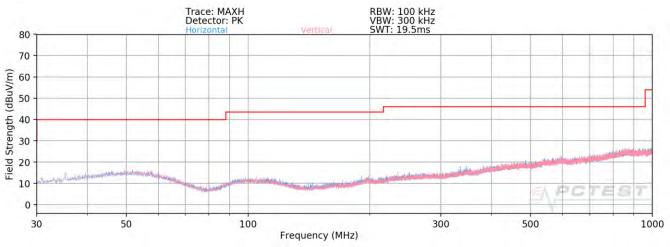
FCC ID: A3LSMT978U	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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MIMO Radiated Spurious Emissions Measurements (Below 1GHz) §15.209; RSS-Gen [8.9]







Plot 7-106. Radiated Spurious Plot below 1GHz MIMO (242 Tones)

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8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Tablet FCC ID: A3LSMT978U** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules.

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