

PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctest.com



MEASUREMENT REPORT FCC PART 15.247 / ISED RSS-247 WLAN 802.11ax OFDMA

Applicant Name:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing: 10/22 - 1/04/2020 Test Site/Location: PCTEST Lab. Columbia, MD USA Test Report Serial No.: 1M1910220165-05.A3L

FCC ID: IC:

A3LSMG981U

649E-SMG981U

APPLICANT:

Certification SM-G981U SM-G981U1, SM-G981W, SM-G981XU SM-G981W Portable Handset 2412 – 2462MHz Digital Transmission System (DTS)

Samsung Electronics Co., Ltd.

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

Portable Handset 2412 – 2462MHz Digital Transmission System (DTS) Part 15 Subpart C (15.247) RSS-247 Issue 2 ANSI C63.10-2013, KDB 558074 D01 v05r02, KDB 662911 D01 v02r01, KDB 648474 D03 v01r04

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 558074 D01 v05r02. Test results reported herein relate only to the item(s) tested.

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

Randy Ortanez President



FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 1 of 89	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 1 of 88	
© 2020 PCTEST Engineering Labora	atory Inc			V 9 0 02/01/2019	

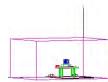


TABLE OF CONTENTS

1.0	INTRO	ODUC	TION	4
	1.1	Scope	3	4
	1.2	PCTE	ST Test Location	4
	1.3	Test F	Facility / Accreditations	4
2.0	PROD	UCT I	NFORMATION	5
	2.1	Equip	ment Description	5
	2.2	Devic	e Capabilities	5
	2.3	Test (Configuration	6
	2.4	EMI S	Suppression Device(s)/Modifications	6
3.0	DESC	RIPTI	ON OF TESTS	7
	3.1	Evalu	ation Procedure	7
	3.2	Radia	ted Emissions	7
	3.3	Enviro	onmental Conditions	7
4.0	ANTE	NNA F	REQUIREMENTS	8
5.0	MEAS	SUREN	IENT UNCERTAINTY	9
6.0	TEST	EQUI	PMENT CALIBRATION DATA	.10
7.0	TEST	RESL	ILTS	.11
	7.1	Sumn	nary	. 11
	7.2	6dB E	Bandwidth Measurement	. 12
	7.3	Outpu	It Power Measurement	. 22
	7.4	Powe	r Spectral Density	. 29
	7.5	Cond	ucted Emissions at the Band Edge	. 40
	7.6	Cond	ucted Spurious Emissions	. 43
	7.7	Radia	ted Spurious Emission Measurements – Above 1 GHz	.57
		7.7.1	SISO Antenna-1 Radiated Spurious Emission Measurements	. 60
		7.7.2	SISO Antenna-2 Radiated Spurious Emission Measurements	. 66
		7.7.3	MIMO Radiated Spurious Emission Measurements	.72
		7.7.4	SISO Antenna-1 Radiated Restricted Band Edge Measurements	. 78
		7.7.5	SISO Antenna-2 Radiated Restricted Band Edge Measurements	. 80
		7.7.6	MIMO Radiated Restricted Band Edge Measurements	. 82
	7.8	Radia	ted Spurious Emissions Measurements – Below 1GHz	.84
8.0	CONC	CLUSI	ON	88

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Page 2 of 88	
1M1910220165-05.A3L	10/22 - 1/04/2020				
© 2020 PCTEST Engineering Laborat	V 9.0 02/01/2019				





MEASUREMENT REPORT



				ANT1			ANT2			MIMO				
		T. Commence	Avg Co	nducted	Peak Conducted Av		Avg Co	Avg Conducted Peak Conducted		Avg Conducted		Peak Conducted		
Mode	Tones	Tx Frequency [MHz]	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
802.11ax OFDMA	26T	2412 - 2462	22.233	13.47	189.234	22.77	22.182	13.46	135.519	21.32	20.949	13.21	119.346	20.77
802.11ax OFDMA	52T	2412 - 2462	39.264	15.94	233.884	23.69	39.264	15.94	241.546	23.83	39.592	15.98	233.950	23.69
802.11ax OFDMA	106T	2412 - 2462	37.670	15.76	223.357	23.49	38.194	15.82	201.372	23.04	35.646	15.52	210.861	23.24
802.11ax OFDMA	242T	2412 - 2462	38.637	15.87	221.820	23.46	34.514	15.38	207.970	23.18	33.967	15.31	194.912	22.90

EUT Overview

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 2 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 3 of 88
© 2020 PCTEST Engineering Labors	tony Inc			V 0 0 02/01/2010



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 Engineering Laboratory, Inc. 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 Engineering Lab 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.

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dega 4 of 99	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 4 of 88	
© 2020 PCTEST Engineering Labo	ratory. Inc.			V 9.0 02/01/2019	



2.0 **PRODUCT INFORMATION**

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG981U**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN (DTS) transmitter.

Test Device Serial No.: 0962M, 1651M, 1080M, 0802M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n71, n5, n66, n2, n41), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, ANT+, Wireless Power Transfer

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 v05r02. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Mode	Antenna	Tone	duty cycle
		26T	99.3
802.11ax	1	52T	99.6
DTS RU	1	106T	98.1
		242T	98.6
		26T	99.4
802.11ax	2	52T	99.7
DTS RU		106T	98.6
		242T	98.4
		26T	99.6
802.11ax RU	MIMO SDM	52T	98.9
DTS	IVITIVIO SDIVI	106T	98.1
		242T	98.5

Table 2-2. Measured Duty Cycles

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 5 of 90
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset	Page 5 of 88	
© 2020 PCTEST Engineering Lab	oratory. Inc.			V 9.0 02/01/2019



WiFi Configurations		SISO		SDM		CDD	
		ANT1	ANT2	ANT1	ANT2	ANT1	ANT2
2.4GHz	11ax	\checkmark	\checkmark	✓	\checkmark	×	×

Table 2-3. Frequency / Channel Operations

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

2.3 Test Configuration

The EUT was tested per the guidance of KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing. See Sections 3.2 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5, and 7.6 for antenna port conducted emissions test setups.

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

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage C of 89	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 6 of 88	
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019				



3.0 **DESCRIPTION OF TESTS**

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 558074 D01 v05r02 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 Radiated Emissions

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

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

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

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 7 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 7 of 88
© 2020 PCTEST Engineering Lab	V 9.0 02/01/2019			



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.

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 0 of 00	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 8 of 88	
© 2020 PCTEST Engineering Labor	2020 PCTEST Engineering Laboratory, Inc.				



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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 0 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 9 of 88
© 2020 PCTEST Engineering Labora	tory Inc			V 9 0 02/01/2019



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)	Conducted Cable Set (25GHz) 6/5/2019 Annual 6/5/2020		6/5/2020	WL25-1
-	WL25-2	Conducted Cable Set (25GHz)	6/3/2019	Annual	6/3/2020	WL25-2
Agilent	N9038A	MXE EMI Receiver	7/17/2019	Annual	7/17/2020	MY51210133
Agilent	N9020A	MXA Signal Analyzer 4/20/2019		Annual	4/20/2020	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	6/12/2019	Annual	6/12/2020	MY52350166
Com-Power	PAM-103	Pre-Amplifier (1-1000MHz)	5/10/2019	Annual	5/10/2020	441112
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	6/7/2018	Triennial	6/7/2021	9203-2178
Emco	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	00135427
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	6/18/2018	Biennial	6/18/2020	114451
Keysight Technologies	N9020A	MXA Signal Analyzer	4/29/2019	Annual	4/29/2020	MY54500644
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	6/3/2019	Annual	6/3/2020	NMLC-2
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

 Table 6-1. Annual Test Equipment Calibration Schedule

Note:

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 00	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 10 of 88	
© 2020 PCTEST Engineering Labo	2020 PCTEST Engineering Laboratory, Inc.				



7.0 **TEST RESULTS**

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	A3LSMG981U

FCC Classification: Digital Transmission System (DTS)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	> 500kHz		PASS	Section 7.2
15.247(b)(3)	RSS-247 [5.4]	Transmitter Output Power	< 1 Watt		PASS	Sections 7.3
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz Band	CONDUCTED	PASS	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	≥ 20dBc		PASS	Sections 7.5, 7.6
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])	RADIATED	PASS	Sections 7.7, 7.8

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.

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 11 of 00	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 11 of 88	
© 2020 PCTEST Engineering Lab	2020 PCTEST Engineering Laboratory. Inc.				



7.2 6dB Bandwidth Measurement §15.247(a.2); RSS-247 [5.2]

Test Overview and Limit

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

The minimum permissible 6dB bandwidth is 500 kHz.

Test Procedure Used

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

Test Settings

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

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 12 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 12 of 88
© 2020 PCTEST Engineering Labo	ratory Inc			V 9 0 02/01/2019

All rights report or assembly of contents thereof, please contact INFO@PCTEST.COM.



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.

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 12 of 00
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 13 of 88
© 2020 PCTEST Engineering Labor	V 9 0 02/01/2019			



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	2.750	0.500
2437	6	ax	26T	MCS0	2.726	0.500
2462	11	ax	26T	MCS0	2.636	0.500
2412	1	ax	242T	MCS0	19.03	0.500
2437	6	ax	242T	MCS0	19.05	0.500
2462	11	ax	242T	MCS0	19.05	0.500

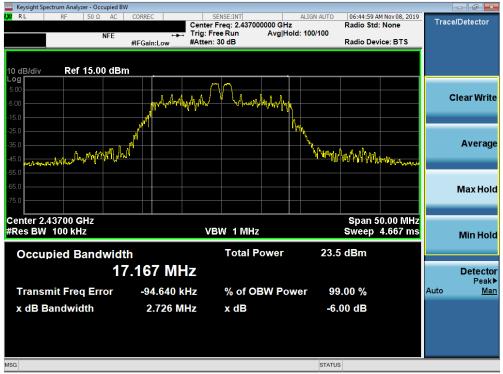
Table 7-2. Conducted Bandwidth Measurements SISO ANT1



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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:			
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 14 of 88	
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019				





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



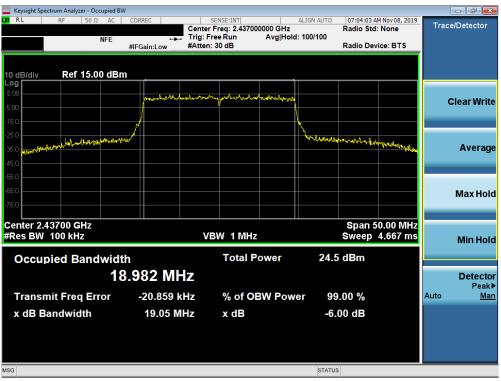
Plot 7-3. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 15 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 15 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			





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: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 16 of 88
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		
© 2020 PCTEST Engineering Labo	V 9.0 02/01/2019			



🔤 Keysight Spectrum Analyzer - Occupied BW						_	
LX RL RF 50 Ω AC CO		Freq: 2.462000000 GHz	ALIGN AUTO	07:04:51 A Radio Std	M Nov 08, 2019 : None	Trac	e/Detector
NFE #1	←→ Trig: Fr EGain:Low #Atten:		d: 100/100	Radio Dev	rice: BTS		
π	FGam.Low In the			rtudio Dei			
10 dB/div Ref 15.00 dBm							
Log							
5.00	mon hand and and and and and and and and and	- Janly bardest our loss					Clear Write
-5.00			l I				
	/		N				
25.0 March March March March 4/100			"munorly	-man aberrated	bu at		Average
-35.0 -45.0					How Ally and		Average
-55.0							
-65.0							
-75.0							Max Hold
Center 2.46200 GHz		110/ d Ball-			0.00 MHz		
#Res BW 100 kHz	VE	3W 1 MHz		sweep	4.667 ms		Min Hold
Occupied Bandwidth		Total Power	24.5	dBm			
	937 MHz						Detector
							Peak▶
Transmit Freq Error	-32.969 kHz	% of OBW Pow	ver 99	.00 %		Auto	<u>Man</u>
x dB Bandwidth	19.05 MHz	x dB	-6.	00 dB			
MSG			STATUS	5			

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 17 of 99	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 17 of 88	
© 2020 PCTEST Engineering Laboratory Inc.				V 9 0 02/01/2019	



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	2.720	0.500
2437	6	ax	26T	MCS0	2.715	0.500
2462	11	ax	26T	MCS0	2.690	0.500
2412	1	ax	242T	MCS0	19.06	0.500
2437	6	ax	242T	MCS0	18.96	0.500
2462	11	ax	242T	MCS0	19.09	0.500

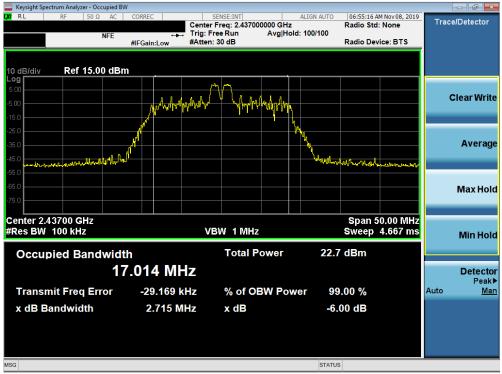
Table 7-3. Conducted Bandwidth Measurements SISO ANT2



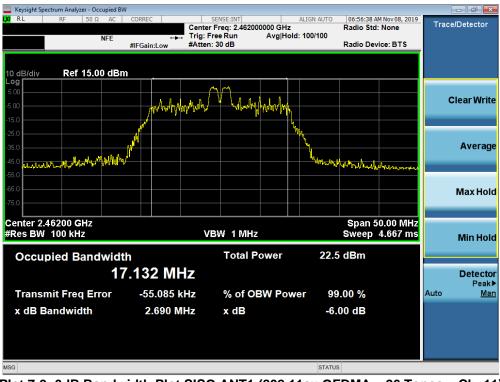
Plot 7-7. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 00	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 18 of 88	
© 2020 PCTEST Engineering Labor	V 9.0 02/01/2019				





Plot 7-8. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)



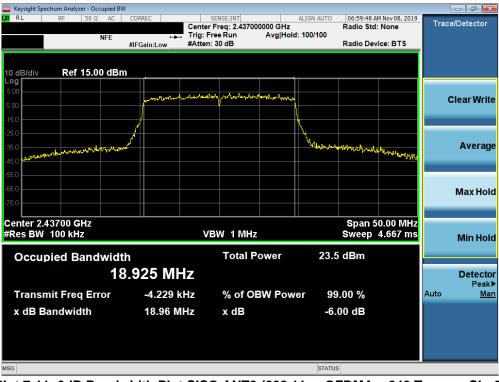
Plot 7-9. 6dB Bandwidth Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 19 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			



Keysight Spectrum Analyzer -					0.0000			
RL RF 5	0Ω AC	CORREC	SENSE:INT Center Freg: 2.412	ALIGN AUTO	06:58:58 A Radio Std	M Nov 08, 2019	Trace/E)etector
	NFE	↔ #IFGain:Low		Avg Hold: 100/100	Radio Dev			
	i.00 dBn	۱						
og .00 .00		emperent	hundred from the second second	with lake here			Cle	ear Writ
5.0		/						
5.0 phylander and any and	And Same and			Northeast A	t-logthen prage	J. Water Colorador M		Averaç
5.0							N	/lax Ho
5.0								παχτιο
enter 2.41200 GH: Res BW 100 kHz	Z		VBW 1 MH	z		0.00 MHz 4.667 ms	I	Min Ho
Occupied Bar	ndwidt	h	Total	Power 23.	9 dBm			
	18	8.962 M	Hz					Detect Peal
Transmit Freq I	Error	-18.188	kHz % of C	OBW Power 9	9.00 %		Auto	<u>M</u>
x dB Bandwidth	ı	19.06 N	MHz x dB	-6	.00 dB			
G				STATU	IS			

Plot 7-10. 6dB Bandwidth Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 1)



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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 89
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 20 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			



X RL RF 50 Ω AC CORREC SENSE:INT ALIGN AUTO 07:00:33 AM Nov 08, 2019 . Center Freq: 2.462000000 GHz Radio Std: None	Trace/Detector
NFE Trig: Free Run Avg Hold: 100/100	
#FGain:Low #Atten: 30 dB Radio Device: BTS	
10 dB/div Ref 15.00 dBm	
5.00	
-5.00	Clear Write
-15.0	
-25.0	
35.0 denerous manufacture and a second	Average
-45.0	
	Max Hold
-75.0	
Center 2.46200 GHz Span 50.00 MHz	
#Res BW 100 kHz VBW 1 MHz Sweep 4.667 ms	Min Hold
Occupied Bandwidth Total Power 23.7 dBm	
18.987 MHz	Detector
Transmit Freg Error -5.902 kHz % of OBW Power 99.00 %	Peak▶ Ito Man
x dB Bandwidth 19.09 MHz x dB -6.00 dB	
MSG	

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 21 of 88
© 2020 PCTEST Engineering Labora	V 9 0 02/01/2019			



7.3 Output Power Measurement §15.247(b.3); RSS-247 [5.4]

Test Overview and Limits

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

The maximum permissible conducted output power is 1 Watt.

Test Procedure Used

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

Test Settings

Method PKPM1 (Peak Power Measurement)

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

Method AVGPM-G (Average Power Measurement)

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

Test Setup

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



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

Test Notes

None

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 22 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			



	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]																
				0	AVG	13.47	30.00	-16.53	-6.10	7.37	36.02	-28.65																
				0	PEAK	22.77	30.00	-7.23	-6.10	16.67	36.02	-19.35																
	2412	1	26T	4	AVG	13.46	30.00	-16.54	-6.10	7.36	36.02	-28.66																
	2412	'	201	-	PEAK	20.86	30.00	-9.14	-6.10	14.76	36.02	-21.26																
N				8	AVG	12.76	30.00	-17.24	-6.10	6.66	36.02	-29.36																
Ϊ					0	PEAK	20.07	30.00	-9.93	-6.10	13.97	36.02	-22.05															
5					0	AVG	13.26	30.00	-16.74	-6.30	6.96	36.02	-29.06															
.4G				0	PEAK	20.78	30.00	-9.22	-6.30	14.48	36.02	-21.54																
N N	2437	6	26T	26T	26T	26T	4	AVG	13.34	30.00	-16.66	-6.30	7.04	36.02	-28.98													
	2407	Ū	201	-	PEAK	20.80	30.00	-9.20	-6.30	14.50	36.02	-21.52																
				8	AVG	12.99	30.00	-17.01	-6.30	6.69	36.02	-29.33																
																0	PEAK	20.40	30.00	-9.60	-6.30	14.10	36.02	-21.92				
																				0	AVG	13.47	30.00	-16.53	-6.00	7.47	36.02	-28.55
				0	PEAK	20.89	30.00	-9.11	-6.00	14.89	36.02	-21.13																
	2462 11	11 26T	4	AVG	12.77	30.00	-17.23	-6.00	6.77	36.02	-29.25																	
			26T 4	PEAK	19.88	30.00	-10.12	-6.00	13.88	36.02	-22.14																	
				8	AVG	12.62	30.00	-17.38	-6.00	6.62	36.02	-29.40																
					0	PEAK	20.06	30.00	-9.94	-6.00	14.06	36.02	-21.96															

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

	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Power Limit	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]													
				37	AVG	15.94	30.00	-14.06	-6.10	9.84	36.02	-26.18													
				57	PEAK	23.69	30.00	-6.31	-6.10	17.59	36.02	-18.43													
	2412	1	52T	38	AVG	15.62	30.00	-14.38	-6.10	9.52	36.02	-26.50													
	2412	'	521	50	PEAK	23.13	30.00	-6.87	-6.10	17.03	36.02	-18.99													
				40	AVG	15.54	30.00	-14.46	-6.10	9.44	36.02	-26.58													
N				40	PEAK	23.40	30.00	-6.60	-6.10	17.30	36.02	-18.72													
I.			52T	37	AVG	15.25	30.00	-14.75	-6.30	8.95	36.02	-27.07													
4 6				- 57	PEAK	23.08	30.00	-6.92	-6.30	16.78	36.02	-19.24													
	2437	6		52T 38	AVG	15.68	30.00	-14.32	-6.30	9.38	36.02	-26.64													
N	2407	U	021	50	PEAK	23.26	30.00	-6.74	-6.30	16.96	36.02	-19.06													
				40	AVG	15.71	30.00	-14.29	-6.30	9.41	36.02	-26.61													
				-10	PEAK	23.59	30.00	-6.41	-6.30	17.29	36.02	-18.73													
																	37	AVG	15.72	30.00	-14.28	-6.00	9.72	36.02	-26.30
				37	PEAK	23.54	30.00	-6.46	-6.00	17.54	36.02	-18.48													
	2462 11	11 52T	38	AVG	15.07	30.00	-14.93	-6.00	9.07	36.02	-26.95														
			52T 38	PEAK	22.46	30.00	-7.54	-6.00	16.46	36.02	-19.56														
			40	AVG	15.61	30.00	-14.39	-6.00	9.61	36.02	-26.41														
				40	PEAK	22.99	30.00	-7.01	-6.00	16.99	36.02	-19.03													

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 23 of 88
© 2020 PCTEST Engineering Labora	atory Inc			V 9 0 02/01/2019



	Freq [MHz]	Channel	Tones	RU Index		Conducted Powers (dBm)	Power Limit	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]															
				53	AVG	15.27	30.00	-14.73	-6.10	9.17	36.02	-26.85															
	2412	1	106T	55	PEAK	23.10	30.00	-6.90	-6.10	17.00	36.02	-19.02															
Ł	2412	1	1001	54	AVG	15.76	30.00	-14.24	-6.10	9.66	36.02	-26.36															
I				54	PEAK	23.39	30.00	-6.61	-6.10	17.29	36.02	-18.73															
4G			106T	53	AVG	15.72	30.00	-14.28	-6.30	9.42	36.02	-26.60															
-	2437	6		106T 53	PEAK	23.48	30.00	-6.52	-6.30	17.18	36.02	-18.84															
2	2437	0	1001	061 54	AVG	15.72	30.00	-14.28	-6.30	9.42	36.02	-26.60															
				34	PEAK	23.49	30.00	-6.51	-6.30	17.19	36.02	-18.83															
																			53	AVG	15.01	30.00	-14.99	-6.00	9.01	36.02	-27.01
	2462 11	11 10CT	55	PEAK	22.42	30.00	-7.58	-6.00	16.42	36.02	-19.60																
			11 1061	106T 54	AVG	15.72	30.00	-14.28	-6.00	9.72	36.02	-26.30															
										54	PEAK	23.07	30.00	-6.93	-6.00	17.07	36.02	-18.95									

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

Freq [MHz]	Channel	Tones	RU Index		Conducted Powers (dBm)	Power Limit	Power	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]		
2/12	1	242T	61	AVG	15.31	30.00	-14.69	-6.10	9.21	36.02	-26.81		
2412	1	2421	01	PEAK	23.46	30.00	-6.54	-6.10	17.36	36.02	-18.66		
2427	6	242T	T 61	AVG	15.87	30.00	-14.13	-6.30	9.57	36.02	-26.45		
2437	0	2421		PEAK	23.31	30.00	-6.69	-6.30	17.01	36.02	-19.01		
2462	11	242T	242T	242T 61	61	AVG	12.75	30.00	-17.25	-6.00	6.75	36.02	-29.27
2462	11		61	PEAK	20.46	30.00	-9.54	-6.00	14.46	36.02	-21.56		
	2412 2437 2462	2437 6 2462 11	2412 1 242T 2437 6 242T 2462 11 242T	2412 1 242T 61 2437 6 242T 61 2462 11 242T 61	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	2412 1 242T 61 AVG 15.31 2437 6 242T 61 PEAK 23.46 2437 6 242T 61 AVG 15.87 2462 11 242T 61 AVG 12.75 PEAK 20.46 20.46 20.46 20.46	2412 1 242T 61 AVG 15.31 30.00 2437 6 242T 61 AVG 15.87 30.00 2437 6 242T 61 AVG 15.87 30.00 2462 11 242T 61 AVG 12.75 30.00	AVG (dBm) [dBm] Margin [dB] 2412 1 242T 61 AVG 15.31 30.00 -14.69 2437 6 242T 61 AVG 15.87 30.00 -6.54 2437 6 242T 61 AVG 15.87 30.00 -14.13 2462 11 242T 61 AVG 12.75 30.00 -17.25 2462 11 242T 61 AVG 12.75 30.00 -9.54	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	req [MHz] Channel lones RU index Detector Powers (dBm) Power Limit [dBm] Power Margin [dB] [dBi] [dBm] [dBm] Limit [dBm] 2412 1 242T 61 AVG 15.31 30.00 -14.69 -6.10 9.21 36.02 2437 6 242T 61 AVG 15.87 30.00 -6.54 -6.10 17.36 36.02 2437 6 242T 61 AVG 15.87 30.00 -14.13 -6.30 9.57 36.02 2462 11 242T 61 AVG 12.75 30.00 -17.25 -6.00 6.75 36.02 2462 11 242T 61 AVG 12.75 30.00 -17.25 -6.00 6.75 36.02		

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]	[dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]															
				0	AVG	12.72	30.00	-17.28	-5.80	6.92	36.02	-29.10															
				0	PEAK	20.08	30.00	-9.92	-5.80	14.28	36.02	-21.74															
	2412	1	26T	4	AVG	12.56	30.00	-17.44	-5.80	6.76	36.02	-29.26															
	2412		201	7	PEAK	20.35	30.00	-9.65	-5.80	14.55	36.02	-21.47															
N				8	AVG	12.68	30.00	-17.32	-5.80	6.88	36.02	-29.14															
Ϊ					0	PEAK	20.18	30.00	-9.82	-5.80	14.38	36.02	-21.64														
			26T		0	AVG	12.85	30.00	-17.15	-6.30	6.55	36.02	-29.47														
4				0	PEAK	20.02	30.00	-9.98	-6.30	13.72	36.02	-22.30															
2.4GI	2437	6		26T	26T	. 4	AVG	12.81	30.00	-17.19	-6.30	6.51	36.02	-29.51													
	2437	0	201	7	PEAK	21.29	30.00	-8.71	-6.30	14.99	36.02	-21.03															
				8	AVG	13.46	30.00	-16.54	-6.30	7.16	36.02	-28.86															
																0	PEAK	21.32	30.00	-8.68	-6.30	15.02	36.02	-21.00			
																		0	0	AVG	13.15	30.00	-16.85	-6.50	6.65	36.02	-29.37
				0	PEAK	21.01	30.00	-8.99	-6.50	14.51	36.02	-21.51															
	2462 11 26	26T	4	AVG	13.23	30.00	-16.77	-6.50	6.73	36.02	-29.29																
	2402	2462 11 26T	26T 4	PEAK	20.61	30.00	-9.39	-6.50	14.11	36.02	-21.91																
					8	AVG	13.42	30.00	-16.58	-6.50	6.92	36.02	-29.10														
												0	PEAK	20.98	30.00	-9.02	-6.50	14.48	36.02	-21.54							

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 24 of 88
© 2020 PCTEST Engineering Labo	ratory. Inc.			V 9.0 02/01/2019



	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]												
				37	AVG	15.77	30.00	-14.23	-5.80	9.97	36.02	-26.05												
				57	PEAK	23.21	30.00	-6.79	-5.80	17.41	36.02	-18.61												
	2412	1	52T	38	AVG	15.69	30.00	-14.31	-5.80	9.89	36.02	-26.13												
	2412		JZT	30	PEAK	23.28	30.00	-6.72	-5.80	17.48	36.02	-18.54												
				40	AVG	15.66	30.00	-14.34	-5.80	9.86	36.02	-26.16												
<u>N</u>				40	PEAK	23.38	30.00	-6.62	-5.80	17.58	36.02	-18.44												
I			52T	37	AVG	15.94	30.00	-14.06	-6.30	9.64	36.02	-26.38												
-4G					57	PEAK	23.83	30.00	-6.17	-6.30	17.53	36.02	-18.49											
<u> </u>	2437	6		52T	52T	52T	52T	52T	52T	52T	52T	52T	52T	38	AVG	15.28	30.00	-14.72	-6.30	8.98	36.02	-27.04		
2	2437	0					50	PEAK	22.85	30.00	-7.15	-6.30	16.55	36.02	-19.47									
				40	AVG	15.71	30.00	-14.29	-6.30	9.41	36.02	-26.61												
															40	PEAK	23.43	30.00	-6.57	-6.30	17.13	36.02	-18.89	
																37	AVG	15.13	30.00	-14.87	-6.50	8.63	36.02	-27.39
																		PEAK	22.86	30.00	-7.14	-6.50	16.36	36.02
	2462	2462 11 52	52T	38	AVG	15.12	30.00	-14.88	-6.50	8.62	36.02	-27.40												
	2-702		11 52T	30	PEAK	22.78	30.00	-7.22	-6.50	16.28	36.02	-19.74												
				40	40	AVG	15.44	30.00	-14.56	-6.50	8.94	36.02	-27.08											
								40	PEAK	22.98	30.00	-7.02	-6.50	16.48	36.02	-19.54								

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]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]																
				53	AVG	15.63	30.00	-14.37	-5.80	9.83	36.02	-26.19																
	2412	1	106T	55	PEAK	22.87	30.00	-7.13	-5.80	17.07	36.02	-18.95																
N	2412	I.	1001	54	AVG	15.27	30.00	-14.73	-5.80	9.47	36.02	-26.55																
I				54	PEAK	22.98	30.00	-7.02	-5.80	17.18	36.02	-18.84																
Ģ			6 106T	53 106T	53	AVG	15.09	30.00	-14.91	-6.30	8.79	36.02	-27.23															
4	2437	6			55	PEAK	23.04	30.00	-6.96	-6.30	16.74	36.02	-19.28															
2	2437	0	1001	ST 54	AVG	15.41	30.00	-14.59	-6.30	9.11	36.02	-26.91																
				34	PEAK	22.91	30.00	-7.09	-6.30	16.61	36.02	-19.41																
		2462 11 106																	53	53	AVG	15.11	30.00	-14.89	-6.50	8.61	36.02	-27.41
	2462		106T	55	PEAK	22.68	30.00	-7.32	-6.50	16.18	36.02	-19.84																
			11 106T -	54	AVG	15.82	30.00	-14.18	-6.50	9.32	36.02	-26.70																
				54	PEAK	23.03	30.00	-6.97	-6.50	16.53	36.02	-19.49																

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

N	Freq [MHz]	Channel	Tones	RU Index	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]	
I	2412	1	242T	61	AVG	15.38	30.00	-14.62	-5.80	9.58	36.02	-26.44	
Ū (2412	I	242T	61	PEAK	22.78	30.00	-7.22	-5.80	16.98	36.02	-19.04	
4	2437	6	242T	242T	61	AVG	15.31	30.00	-14.69	-6.30	9.01	36.02	-27.01
2	2437	0	2421	42T 61	PEAK	23.18	30.00	-6.82	-6.30	16.88	36.02	-19.14	
	2462	11	11 242T	242T 6	42T 61	AVG	12.72	30.00	-17.28	-6.50	6.22	36.02	-29.80
	2402	2462 11 242T	2421 61	PEAK	20.34	30.00	-9.66	-6.50	13.84	36.02	-22.18		

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 25 of 88
© 2020 PCTEST Engineering Labo	ratory Inc			V 9 0 02/01/2019



	Freq [MHz]	Channel	Tones	RU Index	Detector	Cond	lucted Power [dBm]	Conducted Power Limit		Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]			
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]			····· J ··· [····]			
				0	AVG	9.52	9.72	12.63	30.00	-17.37	-2.94	9.69	36.02	-26.33			
				0	PEAK	16.85	17.70	20.31	30.00	-9.69	-2.94	17.37	36.02	-18.65			
	2412	1	26T	267	26T	4	AVG	10.54	9.54	13.08	30.00	-16.92	-2.94	10.14	36.02	-25.88	
	2412			4	PEAK	17.89	17.08	20.51	30.00	-9.49	-2.94	17.58	36.02	-18.44			
N				8	AVG	10.43	9.96	13.21	30.00	-16.79	-2.94	10.27	36.02	-25.75			
Ϊ				0	PEAK	17.93	17.25	20.61	30.00	-9.39	-2.94	17.68	36.02	-18.35			
0	0			0	AVG	10.26	8.60	12.52	30.00	-17.48	-3.29	9.23	36.02	-26.79			
4 0			Ű	0	PEAK	17.76	16.65	20.25	30.00	-9.75	-3.29	16.96	36.02	-19.06			
Ň	2437	6	26T	26T	26T	4	AVG	10.49	9.51	13.04	30.00	-16.96	-3.29	9.75	36.02	-26.27	
	2437	0	201	-	PEAK	18.03	17.20	20.65	30.00	-9.35	-3.29	17.36	36.02	-18.67			
							8	AVG	10.72	9.46	13.15	30.00	-16.85	-3.29	9.86	36.02	-26.16
				0	PEAK	17.95	17.08	20.55	30.00	-9.45	-3.29	17.26	36.02	-18.76			
				0	AVG	9.73	9.93	12.84	30.00	-17.16	-3.24	9.61	36.02	-26.42			
					PEAK	17.30	17.37	20.35	30.00	-9.65	-3.24	17.11	36.02	-18.91			
	2462	11	26T	4	AVG	10.22	9.52	12.89	30.00	-17.11	-3.24	9.66	36.02	-26.36			
	2-102		201	7	PEAK	17.66	17.17	20.43	30.00	-9.57	-3.24	17.20	36.02	-18.82			
				8	AVG	10.04	10.33	13.20	30.00	-16.80	-3.24	9.96	36.02	-26.06			
				, s	PEAK	17.60	17.91	20.77	30.00	-9.23	-3.24	17.53	36.02	-18.49			

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

	Freq [MHz] Channe		Tones	RU Index	Detector	Conc	ducted Power [dBm]	Conducted Power Limit		Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	[ubiii]	Linii [abiii]	Margin [CD]
				37	AVG	12.83	12.49	15.67	30.00	-14.33	-2.94	12.74	36.02	-23.29
				57	PEAK	19.11	18.87	22.00	30.00	-8.00	-2.94	19.06	36.02	-16.96
	2412 1	1	52T	38	AVG	12.34	12.74	15.55	30.00	-14.45	-2.94	12.62	36.02	-23.40
		521	50	PEAK	19.63	19.06	22.36	30.00	-7.64	-2.94	19.43	36.02	-16.59	
			40	AVG	12.66	12.69	15.69	30.00	-14.31	-2.94	12.75	36.02	-23.27	
N				40	PEAK	20.23	20.47	23.36	30.00	-6.64	-2.94	20.42	36.02	-15.60
I				37	AVG	13.11	12.81	15.97	30.00	-14.03	-3.29	12.68	36.02	-23.34
40				37	PEAK	20.77	20.59	23.69	30.00	-6.31	-3.29	20.40	36.02	-15.62
	2437	6	6 52T	52T 38	AVG	12.53	11.59	15.10	30.00	-14.90	-3.29	11.81	36.02	-24.21
2	2407	Ŭ		50	PEAK	20.26	19.38	22.85	30.00	-7.15	-3.29	19.56	36.02	-16.46
				40	AVG	12.75	12.42	15.60	30.00	-14.40	-3.29	12.31	36.02	-23.71
				40	PEAK	20.44	20.18	23.32	30.00	-6.68	-3.29	20.03	36.02	-15.99
				37	AVG	12.04	13.51	15.85	30.00	-14.15	-3.24	12.61	36.02	-23.41
				57	PEAK	19.88	18.88	22.42	30.00	-7.58	-3.24	19.18	36.02	-16.84
	2462	11	52T	38	AVG	12.88	11.32	15.18	30.00	-14.82	-3.24	11.94	36.02	-24.08
	2402		521	30	PEAK	20.46	18.88	22.75	30.00	-7.25	-3.24	19.52	36.02	-16.50
				40	AVG	12.52	13.37	15.98	30.00	-14.02	-3.24	12.74	36.02	-23.28
			-0	PEAK	20.15	19.04	22.64	30.00	-7.36	-3.24	19.40	36.02	-16.62	

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

	Freq [MHz]	Channel	Tones	RU Index	Detector	Conc	lucted Power	[dBm]	Conducted Power Limit		Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]			
						ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	[ubiii]	Cinii (abiii)	Margin [ub]			
				53	AVG	12.49	11.78	15.16	30.00	-14.84	-2.94	12.22	36.02	-23.80			
	2412	1	106T	- 55	PEAK	19.86	19.17	22.54	30.00	-7.46	-2.94	19.60	36.02	-16.42			
N	2712	1001	54	AVG	12.75	11.27	15.08	30.00	-14.92	-2.94	12.14	36.02	-23.88				
Ξ				54	PEAK	20.31	19.00	22.71	30.00	-7.29	-2.94	19.78	36.02	-16.24			
Ģ			106T	53 T	AVG	12.94	11.19	15.16	30.00	-14.84	-3.29	11.87	36.02	-24.15			
4	2437	6			PEAK	20.54	19.17	22.92	30.00	-7.08	-3.29	19.63	36.02	-16.39			
2	2437	0		54	AVG	13.10	11.44	15.36	30.00	-14.64	-3.29	12.07	36.02	-23.95			
				37	PEAK	20.67	19.17	22.99	30.00	-7.01	-3.29	19.71	36.02	-16.32			
				53	AVG	13.20	11.45	15.42	30.00	-14.58	-3.24	12.19	36.02	-23.83			
	2462	11	106T	33	PEAK	20.93	19.06	23.11	30.00	-6.89	-3.24	19.87	36.02	-16.15			
	2402		1001	54	AVG	13.09	11.84	15.52	30.00	-14.48	-3.24	12.28	36.02	-23.74			
							34	PEAK	20.94	19.38	23.24	30.00	-6.76	-3.24	20.00	36.02	-16.02

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 20
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 26 of 88
© 2020 PCTEST Engineering Labor	V 9.0 02/01/2019			



	Freq [MHz] Channel		el Tones	RU Index	Detector	Conc	lucted Power [dBm]	Conducted Power Limit	Conducted Power	Directional Ant. Gain	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
N	N					ANT1	ANT2	MIMO	[dBm]	Margin [dB]	[dBi]	Lapui	Chine [GBnij	inci giri [ub]
I	2412	4	242T	61	AVG	12.64	11.27	15.02	30.00	-14.98	-2.94	12.08	36.02	-23.94
G	2412	1	2421	01	PEAK	20.25	18.94	22.65	30.00	-7.35	-2.94	19.72	36.02	-16.30
4	2437	e	242T	61	AVG	13.19	11.18	15.31	30.00	-14.69	-3.29	12.02	36.02	-24.00
2	2437	0	2421	01	PEAK	20.82	18.70	22.90	30.00	-7.10	-3.29	19.61	36.02	-16.41
	2462	11	242T	T 61	AVG	9.98	9.41	12.71	30.00	-17.29	-3.24	9.48	36.02	-26.54
	2402		2421		PEAK	17.67	17.10	20.40	30.00	-9.60	-3.24	17.17	36.02	-18.85

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 07 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 27 of 88
© 2020 PCTEST Engineering Labor	V 9 0 02/01/2019			



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.

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

Directional gain = 10 log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})² / N_{ANT}] dBi

Sample MIMO Calculation:

At 2412MHz the average conducted output power was measured to be 18.33 dBm for Antenna-1 and 18.28 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(18.33 dBm + 18.28 dBm) = (68.08 mW + 67.30 mW) = 135.37 mW = 21.32 dBm

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 28 of 88
© 2020 PCTEST Engineering Labo	V 9.0 02/01/2019			



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

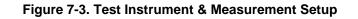
Test Settings

- 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.

		4F	
Carland I			1 <u>1</u>
Contraction of the local division of the		-	



FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 29 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			



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.

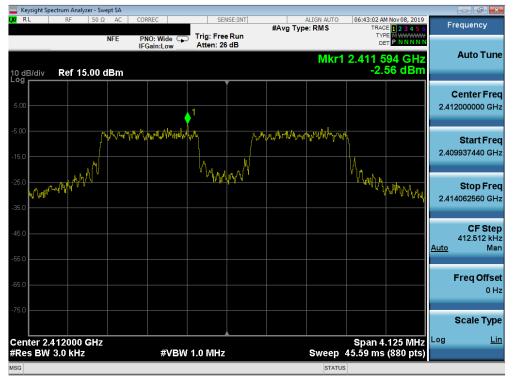
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 20 of 00
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 30 of 88
© 2020 PCTEST Engineering Labor	V 9 0 02/01/2019			



Frequency [MHz]	Channel No.	802.11 Mode	Tones	Data Rate	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	ax	26T	MCS0	-2.56	8.00	-10.56	Pass
2437	6	ax	26T	MCS0	-2.78	8.00	-10.78	Pass
2462	11	ax	26T	MCS0	-2.51	8.00	-10.51	Pass
2412	1	ax	242T	MCS0	-9.31	8.00	-17.31	Pass
2437	6	ax	242T	MCS0	-9.41	8.00	-17.41	Pass
2462	11	ax	242T	MCS0	-7.84	8.00	-15.84	Pass

SISO Antenna-1 Power Spectral Density Measurements

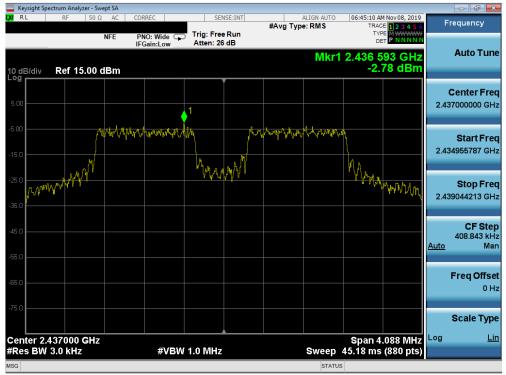
Table 7-16. Conducted Power Density Measurements SISO ANT1



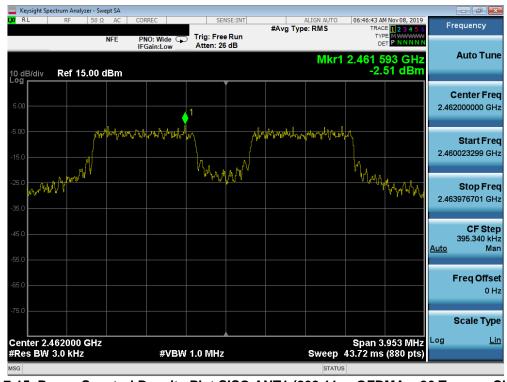
Plot 7-13. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 31 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			





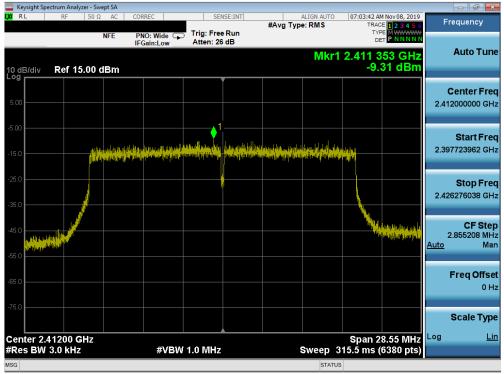
Plot 7-14. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 6)



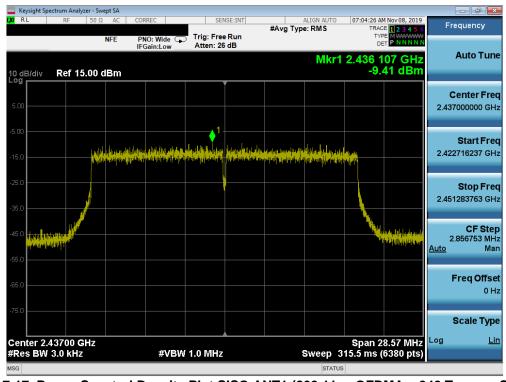
Plot 7-15. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 22 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 32 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			





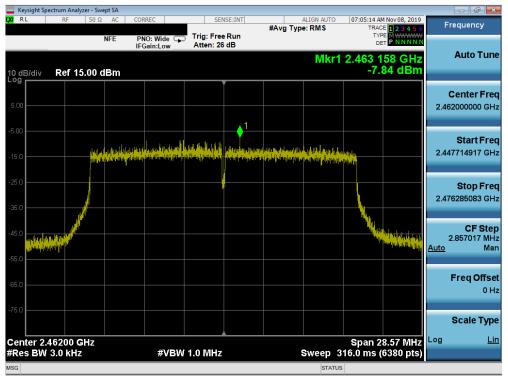
Plot 7-16. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)



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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 33 of 88
© 2020 PCTEST Engineering Laboratory. Inc.				V 9.0 02/01/2019





Plot 7-18. Power Spectral Density Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 34 of 88
© 2020 PCTEST Engineering Labor	V 9 0 02/01/2019			



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	-3.38	8.00	-11.38	Pass
2437	6	ax	26T	MCS0	-3.91	8.00	-11.91	Pass
2462	11	ax	26T	MCS0	-4.08	8.00	-12.08	Pass
2412	1	ax	242T	MCS0	-9.91	8.00	-17.91	Pass
2437	6	ax	242T	MCS0	-11.14	8.00	-19.14	Pass
2462	11	ax	242T	MCS0	-10.12	8.00	-18.12	Pass

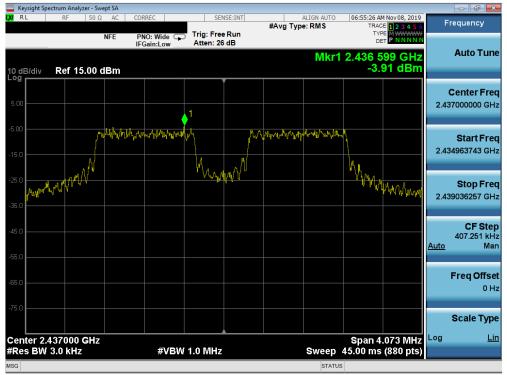
Table 7-17. Conducted Power Density Measurements SISO ANT2



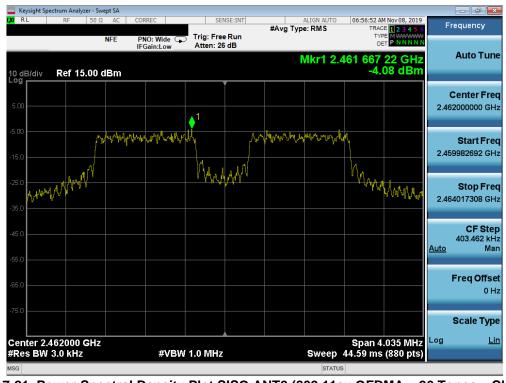
Plot 7-19. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 35 of 88
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			





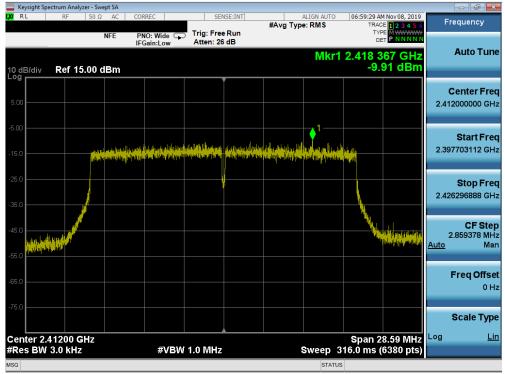
Plot 7-20. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 6)



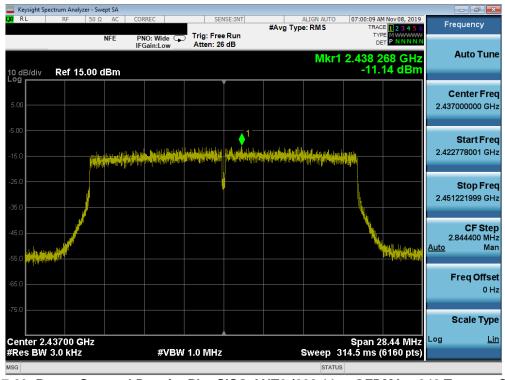
Plot 7-21. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 99	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 36 of 88	
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019				





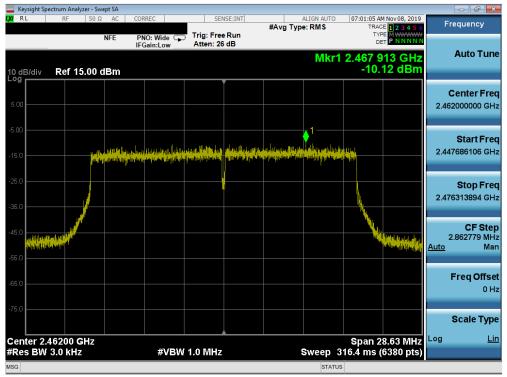
Plot 7-22. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 1)



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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 27 of 99	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 37 of 88	
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019				





Plot 7-24. Power Spectral Density Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 38 of 88
© 2020 PCTEST Engineering Labo	V 9 0 02/01/2019			



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]		Pass / Fail
2412	1	ax	26T	MCS0	-2.56	-3.38	0.06	8.00	-7.94	Pass
2437	6	ax	26T	MCS0	-2.78	-3.91	-0.30	8.00	-8.30	Pass
2462	11	ax	26T	MCS0	-2.51	-4.08	-0.21	8.00	-8.21	Pass
2412	1	ax	242T	MCS0	-9.31	-9.91	-6.59	8.00	-14.59	Pass
2437	6	ax	242T	MCS0	-9.41	-11.14	-7.18	8.00	-15.18	Pass
2462	11	ax	242T	MCS0	-7.84	-10.12	-5.82	8.00	-13.82	Pass

Table 7-18.MIMO Conducted Power Density Measurements

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 -0.22 dBm for Antenna-1 and 0.34 dBm for Antenna-2.

Antenna 1 + Antenna 2 = MIMO

(-0.22 dBm + 0.34 dBm) = (0.95 mW + 1.08 mW) = 2.03 mW = 3.08 dBm

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 90	
1M1910220165-05.A3L	10/22 - 1/04/2020	/2020 Portable Handset		Page 39 of 88	
© 2020 PCTEST Engineering Laborat	V 9.0 02/01/2019				



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 ≥ 2 x Span/RBW
- 7. Trace mode = max hold
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize

Test Setup

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



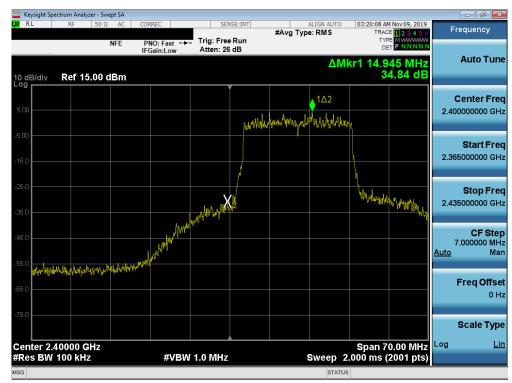
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

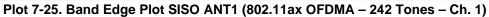
None

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 99	
1M1910220165-05.A3L	10/22 - 1/04/2020	- 1/04/2020 Portable Handset		Page 40 of 88	
© 2020 PCTEST Engineering Laborat	V 9.0 02/01/2019				





SISO Antenna-1 Conducted Emissions at the Band Edge



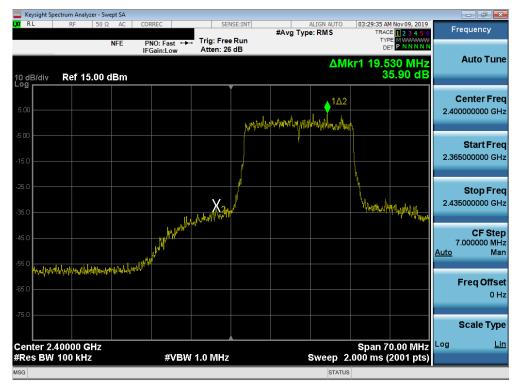


Plot 7-26. Band Edge Plot SISO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 11)

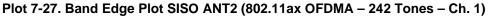
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 41 of 99
1M1910220165-05.A3L	65-05.A3L 10/22 - 1/04/2020 Portable Handset			Page 41 of 88
© 2020 PCTEST Engineering Laboration	V 9.0 02/01/2019			

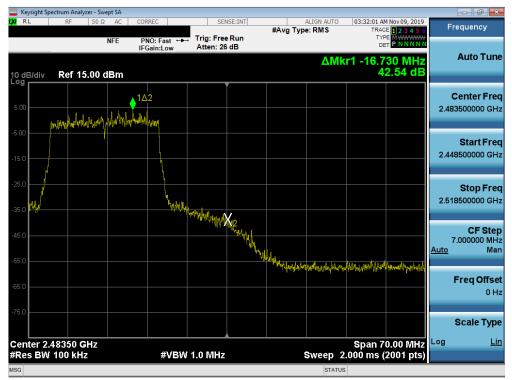
© 2020 PCTEST Engineering Laboratory, Inc.





SISO Antenna-2 Conducted Emissions at the Band Edge





Plot 7-28. Band Edge Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 42 of 88
© 2020 PCTEST Engineering Labo	V 9.0 02/01/2019			



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 v05r02.

Test Procedure Used

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

Test Settings

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

Test Setup

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



Figure 7-5. Test Instrument & Measurement Setup

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 43 of 88
© 2020 PCTEST Engineering Laborat	V 9 0 02/01/2019			

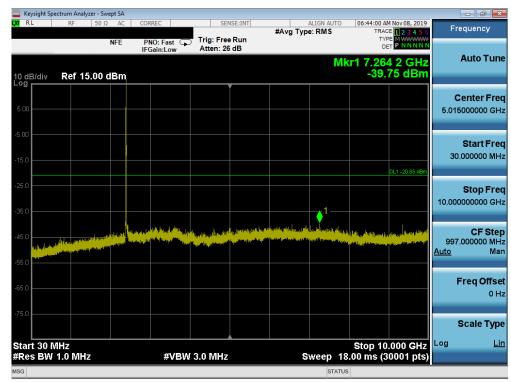


Test Notes

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

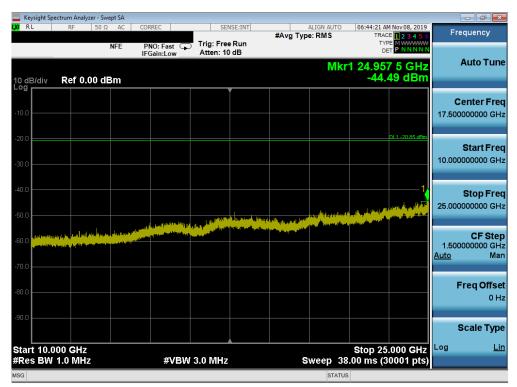
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 44 of 89
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 44 of 88
© 2020 PCTEST Engineering Labor	V 9 0 02/01/2019			





SISO Antenna-1 Conducted Spurious Emission





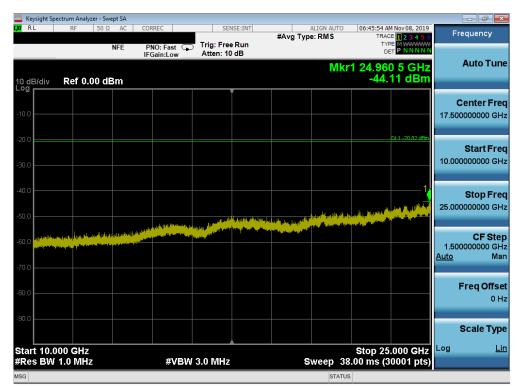
Plot 7-30. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 45 of 99	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 45 of 88	
© 2020 PCTEST Engineering Laborat	V 9.0 02/01/2019				



	pectrum Analyzer - Sw										×
L <mark>XI</mark> RL	RF 50 Ω	AC	CORREC	SEN	NSE:INT	#Avg Typ	ALIGN AUTO e: RMS		M Nov 08, 2019	Frequency	
		NFE	PNO: Fast G	Trig: Free Atten: 26		• •		TY			
			IFGain:Low	Atten. 20	, ab		M	cr1 6 60	7 9 CH7	Auto Tu	une
10 dB/div	Ref 15.00 (dBm						-40.	7 9 GHz 02 dBm		
					Ĭ						
5.00										Center F 5.015000000 0	
0.00										5.015000000	GΠZ
-5.00											
										Start F 30.000000 M	
-15.0										30.000000 M	VIHZ
-25.0									DL1 -20.82 dBm		
-25.0										Stop F	
-35.0						 1 -				10.000000000	GHz
			ى المناقد ،		ورواني الم	يوارد الديمة مالديمة	a dag bik. a				
-45.0	A STATISTICS OF STATISTICS	and the second second	nggyp i drawn han		 Providence of providence 	Contraction of the second second	and the second second second	ale S _{eg} alitis and s Name	and all the block of the state	CF S 997.000000 M	
Print of the	ter and the second second distance of the	M 1								Auto M	Man
-55.0											
-65.0										Freq Off	fset
00.0										C	0 Hz
-75.0											
										Scale Ty	уре
Start 30	MHz							Stop 10	.000 GHz		<u>Lin</u>
	V 1.0 MHz		#VBV	/ 3.0 MHz		S	weep 18	3.00 ms (3	0001 pts)		
MSG							STATU	s			

Plot 7-31. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)



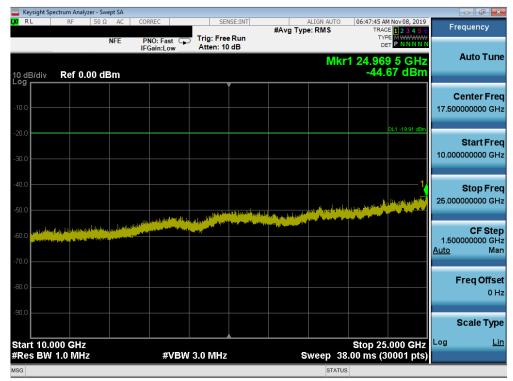
Plot 7-32. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 6)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 46 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			



Keysight Spectrum Analyzer - S						
LX RL RF 50	Ω AC	CORREC	SENSE:INT	ALIGN AU #Avg Type: RMS	TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 15.00	NFE dBm	PNO: Fast IFGain:Low	Trig: Free Run Atten: 26 dB		TYPE MWWWW DET P NNNN Mkr1 5.951 2 GHz -40.40 dBm	
5.00						Center Freq 5.015000000 GHz
-15.0					DL1 -19.91 dBm	Start Freq 30.000000 MHz
-25.0				1		Stop Freq 10.000000000 GHz
-45.0				paranta (sell sell del post del post de la sella del post de la sella del post de la sella del post de la sella Stangene d'Informatione del post de la sella del	Ang San J. Hali ng tani katang sa Juan Yuang tang sa Katang sa Katang sa Katang sa Katang sa Katang sa Katang s Ang Sang Sang Sang sa Katang sa	CF Step 997.000000 MHz <u>Auto</u> Man
-65.0						Freq Offset 0 Hz
-75.0						Scale Type
Start 30 MHz #Res BW 1.0 MHz		#VBW	3.0 MHz	Sweep	Stop 10.000 GHz 18.00 ms (30001 pts)	
MSG					ATUS	

Plot 7-33. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 11)



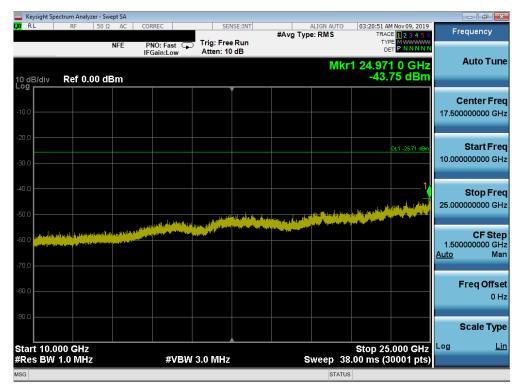
Plot 7-34. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 26 Tones - Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 47 of 99				
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 47 of 88				
© 2020 PCTEST Engineering Laborat	2020 PCTEST Engineering Laboratory, Inc.							



NFE PNO: Fast Trig: Free Run Atten: 26 dB 10 dB/div Ref 15.00 dBm 5 00 5 00 5 00 5 00 5 00 5 00 5 00 5 0	requency Auto Tune
MPE PRO: Past Atten: 26 dB Der P NNNNN 10 dB/div Ref 15.00 dBm -39.94 dBm -39.94 dBm 5.00	Auto Tune
5.00	
	Center Freq 5000000 GHz
-5.0	Start Freq 0.000000 MHz
-25 0 11 - 25 7 Lifen -35 0 13 - 10 - 10 - 10 - 25 7 Lifen -35 0 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	Stop Freq 0000000 GHz
-45.0 and a state pot black some at the based of the state of the stat	CF Step 7.000000 MHz Man
-65.0	Freq Offsel 0 Hz
Start 30 MHz Stop 10.000 GHz	Scale Type Lin
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 18.00 ms (30001 pts)	

Plot 7-35. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)



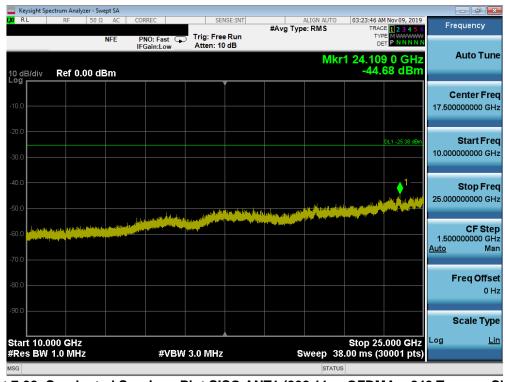
Plot 7-36. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 1)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager				
Test Report S/N:	Test Dates:	EUT Type:		Dage 48 of 99				
1M1910220165-05.A3L 10/22 - 1/04/2020		Portable Handset		Page 48 of 88				
© 2020 PCTEST Engineering Labo	2020 PCTEST Engineering Laboratory, Inc.							



	ectrum Analyzer - Sw							
LX/ RL	RF 50 S	2 AC	CORREC	SENSE:INT	#Avg Type:		3:23:25 AM Nov 09, 2019 TRACE 1 2 3 4 5 6	Frequency
10 dB/div	Ref 15.00	NFE dBm	PNO: Fast IFGain:Low	Trig: Free Run Atten: 26 dB		Mkr1	5.941 9 GHz -39.63 dBm	Auto Tune
5.00								Center Freq 5.015000000 GHz
-5.00								Start Freq 30.000000 MHz
-25.0					1		DL1 -25.38 dBm	Stop Freq 10.000000000 GHz
-45.0	Dig and the state of the state			a the second	paga di ana ang ang ang ang ang ang ang ang ang	pelist filles, and the states	an III A ha pang sa manahang Apamén na na n	CF Step 997.000000 MHz <u>Auto</u> Man
-65.0								Freq Offset 0 Hz
-75.0 Start 30 M						S		Scale Type
#Res BW	1.0 MHz		#VBW	/ 3.0 MHz	Sv		ms (30001 pts)	
MSG						STATUS		

Plot 7-37. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 6)



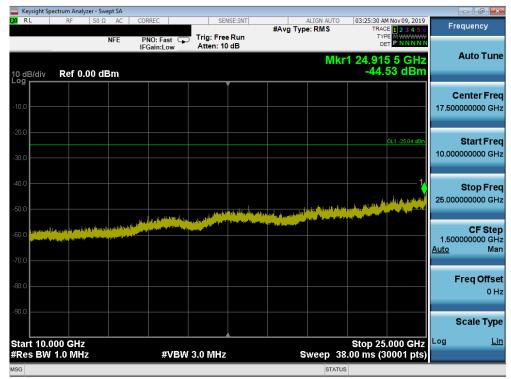
Plot 7-38. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 6)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Daga 40 of 99			
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 49 of 88			
© 2020 PCTEST Engineering Laborat	© 2020 PCTEST Engineering Laboratory. Inc.						



	trum Analyzer - Swept S									-0	
LXIRL	RF 50 Ω A	C COR	REC		NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRA	AM Nov 09, 2019 CE 1 2 3 4 5 6	Frequ	ency
	NFE		IO: Fast 🖵 Gain:Low	Trig: Free Atten: 26	e Run 8 dB			T) E		Διι	to Tune
10 dB/div Log	Ref 15.00 dBr	n						/lkr1 3.33 -40	1 1 GHz .51 dBm		to rune
5.00											ter Freq
										5.015000	0000 GHz
-5.00											art Freq
-15.0										30.000	0000 MHz
-25.0									DL1 -25.04 dBm		op Freq
-35.0			1							10.00000	0000 GHz
-45.0	(trying) and the start from the start of the start		artes algebras Mission and A	and the second state		Real and provide particular	- <mark>Matematications</mark> The state of the second second	will physical paras	n hand for and the		CF Step
-55.0	a des a la desta de la dest				<u></u>					<u>Auto</u>	Man
-65.0										Fre	q Offset
											0 Hz
-75.0										Sca	ale Type
Start 30 M #Res BW 1			#\/RW	3.0 MHz	·		ween	Stop 10 18.00 ms (3	0.000 GHz	Log	Lin
#RES DW	NULL		#VDVV	5.0 10112		3	stat		5000 F pts)		

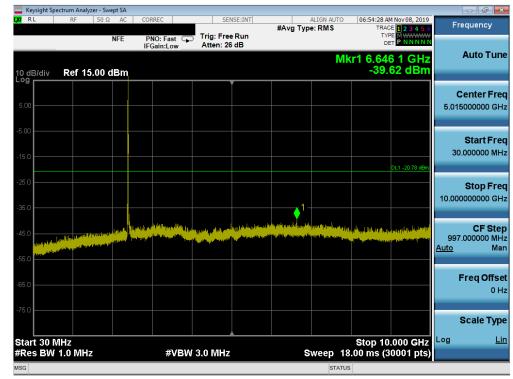
Plot 7-39. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)



Plot 7-40. Conducted Spurious Plot SISO ANT1 (802.11ax OFDMA – 242 Tones – Ch. 11)

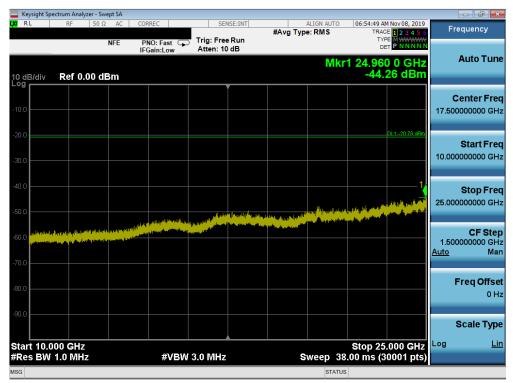
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 90
1M1910220165-05.A3L	-05.A3L 10/22 - 1/04/2020 Portable Handset			Page 50 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			





SISO Antenna-2 Conducted Spurious Emissions





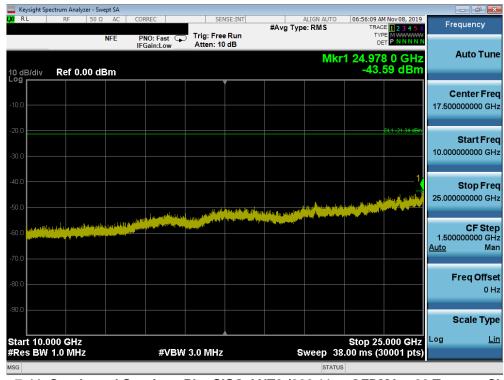
Plot 7-42. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA – 26 Tones – Ch. 1)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 51 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 51 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			



	pectrum Analyzer - S									- đ ×
L XI RL	RF 50	Ω AC	CORREC		NSE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	1 Nov 08, 2019 E 1 2 3 4 5 6	Frequency
10 dB/div	Ref 15.00	NFE	PNO: Fast (IFGain:Low	Trig: Fre Atten: 2			M	or 1 6.90	2 3 GHz 18 dBm	Auto Tune
5.00	Rei 15.00									Center Freq 5.015000000 GHz
-5.00									DL1 -21.34 dBm	Start Freq 30.000000 MHz
-25.0							1			Stop Freq 10.000000000 GHz
-45.0	ng daga katif (s) kata ya katika ya kata ka		Alabara ang ^{Ba} ttin da analin Manjara					n pelingan theathgan Interneting	ng bagagan baga (tel baga) garang dinang garapan dinang	CF Step 997.000000 MHz <u>Auto</u> Man
-65.0										Freq Offset 0 Hz
-75.0 Start 30	MHz							Stop 10	.000 GHz	Scale Type Log <u>Lin</u>
	/ 1.0 MHz		#VB	W 3.0 MHz		s	weep 18	3.00 ms (3	0001 pts)	
MSG							STATU	5		

Plot 7-43. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 6)



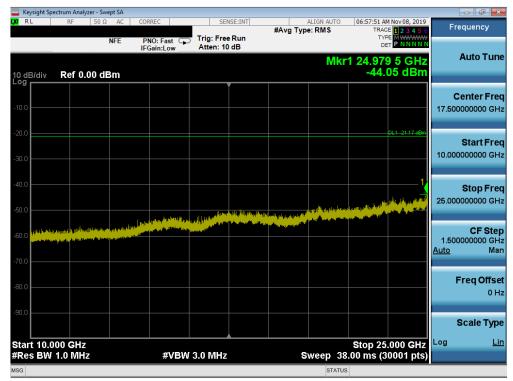
Plot 7-44. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 6)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 52 of 99	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 52 of 88	
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019				



	ectrum Analyzer - Sw								- ē ×
L <mark>XI</mark> RL	RF 50 Ω		CORREC	SENS	#A\	ALIGN AUTO	TRAC	M Nov 08, 2019 E 1 2 3 4 5 6	Frequency
10 dB/div Log	Ref 15.00 (NFE	PNO: Fast G	○ Trig: Free F Atten: 26 c		N	1kr1 6.93 -40.	7 9 GHz 00 dBm	Auto Tune
5.00									Center Freq 5.015000000 GHz
-5.00								DL1 -21.17 dBm	Start Freq 30.000000 MHz
-25.0						1			Stop Freq 10.000000000 GHz
-45.0			Ang set Differing (set) and General ^{Ind} enses and ^{Ind} ense		an de la gradie de la constant de la La seconda de la constant de la const		da ya afa ya sa da aya ka aya ka aya ka aya ka aya aya ay		CF Step 997.000000 MHz <u>Auto</u> Man
-65.0									Freq Offset 0 Hz
-75.0 Start 30 M	лHz						Stop_10	.000 GHz	Scale Type
#Res BW			#VBV	/ 3.0 MHz		Sweep	18.00 ms (3	0001 pts)	
MSG						STAT	rus		

Plot 7-45. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 11)



Plot 7-46. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 26 Tones - Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:				
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 53 of 88		
© 2020 PCTEST Engineering Laborat	V 9.0 02/01/2019					



🚾 Keysight Spectrum Analyzer - Swep									
LX/ RL RF 50 Ω	AC COF	RREC	SEN	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS		MNov 09, 2019	Frequency
	IF	NO: Fast 😱 Gain:Low	Trig: Free Atten: 26		•	M	TYF DE Kr1 3.16		Auto Tur
10 dB/div Ref 15.00 dl	Bm						-40.	35 dBm	
5.00									Center Fre 5.015000000 GH
-5.00									Start Fre 30.000000 M⊦
-25.0		- 1						DL1-26.15 dBm	Stop Fre 10.000000000 GH
-45.0				i postana in a stali		a para di kata ang katang para para para para para para para par		Landa Martin Martin and	CF Ste 997.000000 M⊦ <u>Auto</u> Ma
-65.0									Freq Offso 0 F
-75.0									Scale Typ
Start 30 MHz #Res BW 1.0 MHz		#VBW	3.0 MHz		s	weep 18	Stop 10 3.00 ms (3	.000 0112	Log <u>L</u>
MSG						STATU			

Plot 7-47. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 1)

RL	ectrum Analy RF	50 Ω	AC	CORREC		CEN	ISE:INT		ALIGN AUTO	02:20:26	AM Nov 09, 2019		- 6
KL	KF		IFE		ast ⊊ ₋ow		Run	#Avg Ty	/pe: RMS	TR/ T	ACE 1 2 3 4 5 6 ACE M 2 3 4 5 6 APE M WWWWW DET P N N N N N		equency
0 dB/div	Ref 0.	00 dB	m						M		9 0 GHz .17 dBm		Auto Tur
10.0													enter Fre 000000 Gi
30.0											DL1 -26.15 dBm		Start Fre
10.0							ىلى يىلى رىمى يىلىد. 1. يىلى رىمى يىلىكى يىلىكى يەركى	Lilden i sura h				25.000	Stop Fr 000000 G
	alada a da ada ada ing Inda ada ada ada ada ada ada ada ada ada						null, sterrife, plan					1.500 <u>Auto</u>	CF St 0000000 G M
0.0												F	F req Offs 0
										04		s Log	Scale Typ
	000 GHz			-	#\/B\M	3.0 MHz			Sween	Stop 2:	5.000 GHz 30001 pts)		

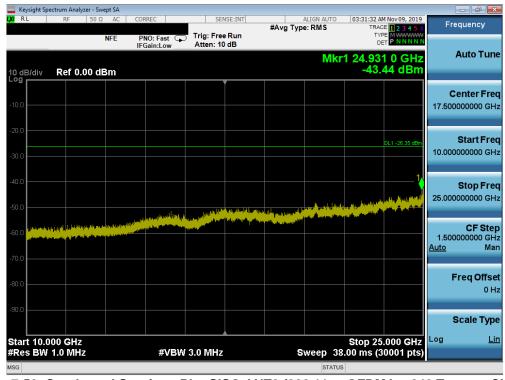
Plot 7-48. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 1)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:				
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 54 of 88		
© 2020 PCTEST Engineering Laboration	V 9.0 02/01/2019					



	pectrum Analyzer -										
L <mark>XI</mark> RL	RF 50	Ω AC	COR	REC		ISE:INT	#Avg Typ	ALIGN AUT e: RMS	TR	AM Nov 09, 2019 ACE 1 2 3 4 5 6	Frequency
	_	NFE	PN IFG	IO: Fast ⊊ iain:Low	Trig: Free Atten: 26				T		
10 dB/div Log	Ref 15.00) dBm						N	/lkr1 6.20 -39	00 1 GHz .85 dBm	Auto Tune
5.00											Center Freq 5.015000000 GHz
-5.00											Start Freq 30.000000 MHz
-25.0							1			DL1-26.35 dBm	Stop Freq 10.000000000 GHz
-45.0 4 Jost ⁽¹⁾ -55.0			n a li si a sa Na sa sa sa						Hellin Jangunakana fu	lychellycer ferdilycestat ministry families and feat	CF Step 997.000000 MHz <u>Auto</u> Man
-65.0											Freq Offset 0 Hz
-75.0 Start 30	BULL-2								Stop 1		Scale Type
	MHZ / 1.0 MHZ			#VBV	/ 3.0 MHz		s	weep	500 1 18.00 ms (0.000 GHz 30001 pts)	
MSG								STA	TUS		

Plot 7-49. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 6)



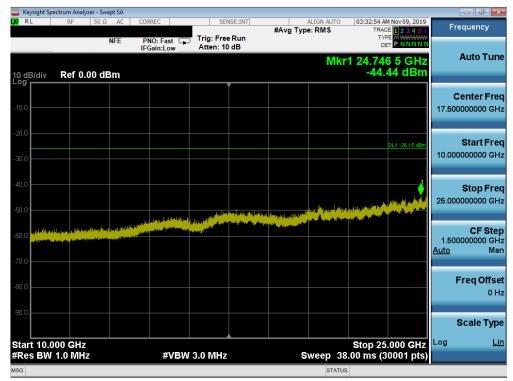
Plot 7-50. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 6)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager		
Test Report S/N:	Test Dates:	EUT Type:	Туре:			
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 55 of 88		
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019					



	ectrum Analyzer - S									
LX// RL	RF 50	Ω AC	CORREC		SE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	HNOV 09, 2019 E 1 2 3 4 5 6	Frequency
		NFE	PNO: Fast G	Trig: Free Atten: 26				TYF DE		
10 dB/div Log	Ref 15.00	dBm					M	(r1 3.15) -40.	6 9 GHz 40 dBm	Auto Tune
5.00										Center Freq 5.015000000 GHz
-5.00										Start Freq 30.000000 MHz
-25.0			1						DL1 26.15 dBm	Stop Freq 10.000000000 GHz
-45.0	a da d ^a poj a bana kontenentara A sentendar				an an the and stated and state	had particular International partic	telefelgenet (Proppe Gerffelgenet (Stroppel	n p ^{alan} in birdan sana sana sa In p ^{alan} in sa birdan sa sa	lana (tama) (tama) tama (tama) (tama)	CF Step 997.000000 MHz <u>Auto</u> Man
-65.0										Freq Offset 0 Hz
-75.0 Start 30 M	<u>ЛЫ</u> 2							Stop 10	.000 GHz	Scale Type
#Res BW			#VBV	/ 3.0 MHz		S	weep 18	3.00 ms (3	.000 GH2 0001 pts)	
MSG							STATU	5		

Plot 7-51. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)



Plot 7-52. Conducted Spurious Plot SISO ANT2 (802.11ax OFDMA – 242 Tones – Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Daga EC of 99		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 56 of 88	
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019				



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 v05r02 – Sections 8.6, 8.7

Test Settings

Average Field Strength Measurements

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

Peak Field Strength Measurements

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 57 of 00	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 57 of 88	
© 2020 PCTEST Engineering Labor	V 9 0 02/01/2019				



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

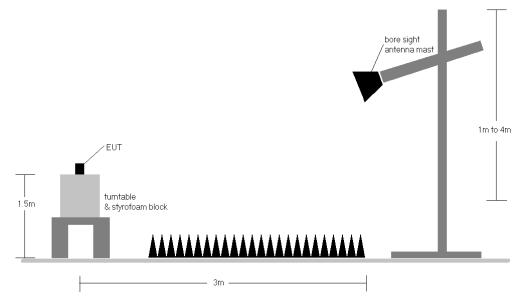


Figure 7-6. Test Instrument & Measurement Setup

Test Notes

- The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
- 2. All emissions lying in restricted bands specified in Section 15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-19.
- 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.

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 58 of 88	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		
© 2020 PCTEST Engineering Labora	V 9 0 02/01/2019			



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

Sample Calculations

Determining Spurious Emissions Levels

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

Radiated Band Edge Measurement Offset

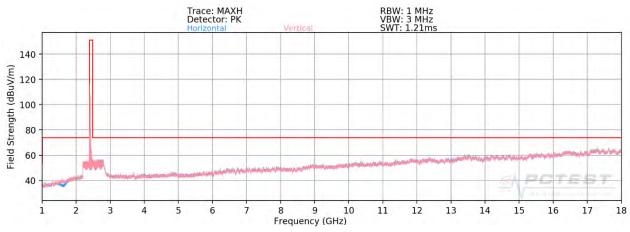
• The amplitude offset shown in the radiated restricted band edge plots in Section 7.7 was calculated using the formula:

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

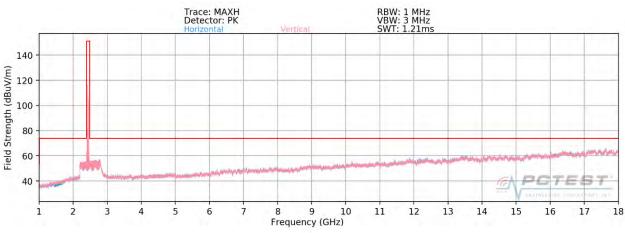
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dama 50 at 00		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 59 of 88	
© 2020 PCTEST Engineering Laboration	V 9.0 02/01/2019				



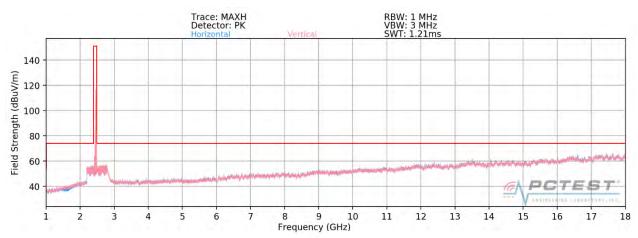
7.7.1 SISO Antenna-1 Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



Plot 7-53. Radiated Spurious Plot above 1GHz SISO ANT1 (802.11ax OFDMA – 106 Tones – Ch. 1)



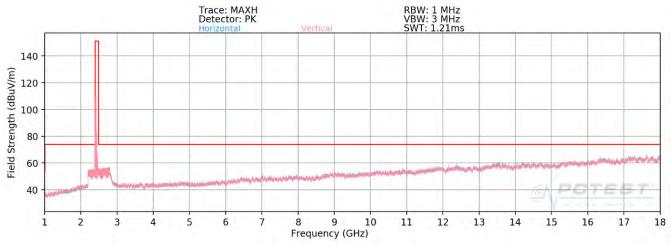
Plot 7-54. Radiated Spurious Plot above 1GHz SISO ANT1 (802.11ax OFDMA - 106 Tones - Ch. 6)



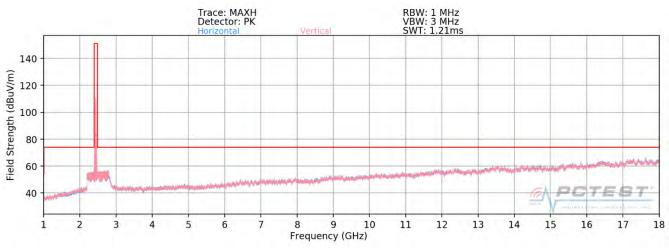
Plot 7-55. Radiated Spurious Plot above 1GHz SISO ANT1 (802.11ax OFDMA - 106 Tones - Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 60 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 60 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			

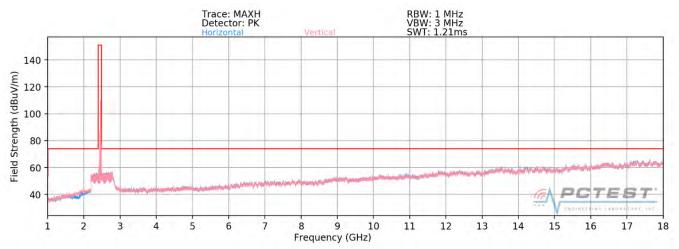










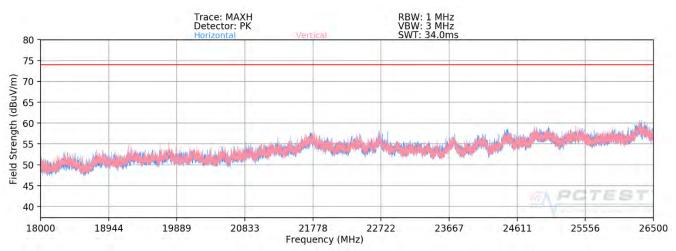


Plot 7-58. Radiated Spurious Plot above 1GHz SISO ANT1 (802.11ax OFDMA - 242 Tones - Ch. 11)

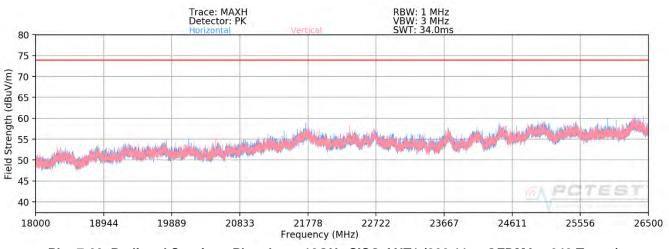
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 61 of 00
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset	Page 61 of 88	
© 2020 PCTEST Engineering Labor	V 9.0 02/01/2019			



SISO Antenna-1 Radiated Spurious Emissions Measurements (Above 18GHz) §15.209; RSS-Gen [8.9]







Plot 7-60. Radiated Spurious Plot above 18GHz SISO ANT1 (802.11ax OFDMA – 242 Tones)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020 Portable Handset			Page 62 of 88
© 2020 PCTEST Engineering Labor	V 9.0 02/01/2019			



SISO Antenna-1 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	V	281	58	-77.17	3.04	32.87	53.98	-21.11
4824.00	Peak	V	281	58	-66.02	3.04	44.02	73.98	-29.96
12060.00	Avg	V	-	-	-79.45	14.54	42.09	53.98	-11.89
12060.00	Peak	V	-	-	-67.88	14.54	53.66	73.98	-20.32

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	V	201	138	-77.50	3.68	33.18	53.98	-20.80
4874.00	Peak	V	201	138	-63.73	3.68	46.95	73.98	-27.03
7311.00	Avg	V	-	-	-79.22	8.53	36.31	53.98	-17.67
7311.00	Peak	V	-	-	-67.52	8.53	48.01	73.98	-25.97
12185.00	Avg	V	-	-	-79.87	13.96	41.09	53.98	-12.89
12185.00	Peak	V	-	-	-67.91	13.96	53.05	73.98	-20.93

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		SAMSUNG		SAMSUNE		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 62 of 90				
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 63 of 88				
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019							



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	V	129	218	-77.95	3.44	32.49	53.98	-21.49
4924.00	Peak	V	129	218	-63.39	3.44	47.05	73.98	-26.93
7386.00	Avg	V	-	-	-79.08	7.92	35.84	53.98	-18.14
7386.00	Peak	V	-	-	-67.02	7.92	47.90	73.98	-26.08
12310.00	Avg	V	-	-	-79.51	13.24	40.73	53.98	-13.25
12310.00	Peak	V	-	-	-68.14	13.24	52.10	73.98	-21.88

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

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

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4824.00	Avg	V	-	-	-78.22	3.04	31.82	53.98	-22.16
4824.00	Peak	V	-	-	-66.87	3.04	43.17	73.98	-30.81
12060.00	Avg	V	-	-	-79.11	14.54	42.43	53.98	-11.55
12060.00	Peak	V	-	-	-68.08	14.54	53.46	73.98	-20.52

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 64 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 64 of 88
© 2020 PCTEST Engineering Labo		V 9 0 02/01/2019		



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	V	-	-	-78.83	3.68	31.85	53.98	-22.13
4874.00	Peak	V	-	-	-67.05	3.68	43.63	73.98	-30.35
7311.00	Avg	V	-	-	-79.56	8.53	35.97	53.98	-18.01
7311.00	Peak	V	-	-	-68.79	8.53	46.74	73.98	-27.24
12185.00	Avg	V	-	-	-79.80	13.96	41.16	53.98	-12.82
12185.00	Peak	V	-	-	-67.82	13.96	53.14	73.98	-20.84

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

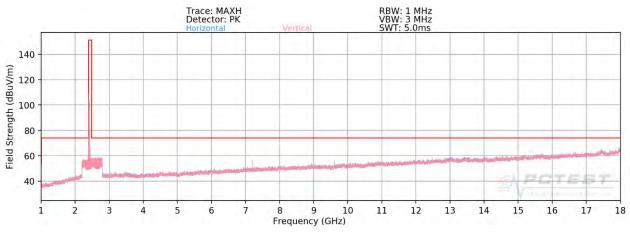
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4924.00	Avg	V	-	-	-78.77	3.44	31.67	53.98	-22.31
4924.00	Peak	V	-	-	-66.23	3.44	44.21	73.98	-29.77
7386.00	Avg	V	-	-	-78.80	7.92	36.12	53.98	-17.86
7386.00	Peak	V	-	-	-67.28	7.92	47.64	73.98	-26.34
12310.00	Avg	V	-	-	-79.51	13.24	40.73	53.98	-13.25
12310.00	Peak	V	-	-	-67.69	13.24	52.55	73.98	-21.43

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

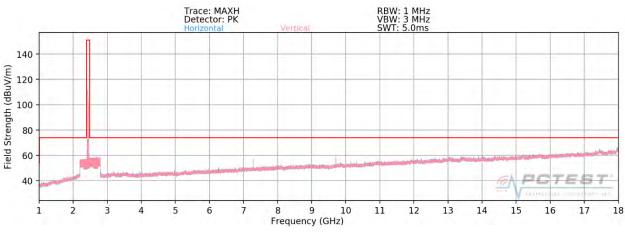
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Page 65 of 88	
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 65 01 88	
© 2020 PCTEST Engineering Laboration	V 9.0 02/01/2019				



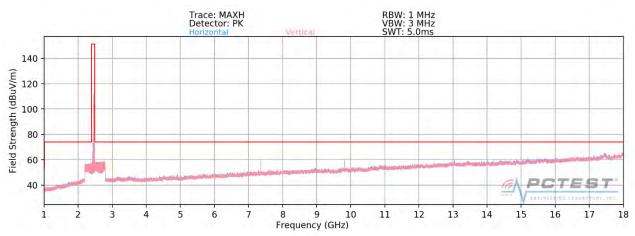
7.7.2 SISO Antenna-2 Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



Plot 7-61. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11ax OFDMA - 106 Tones - Ch. 1)



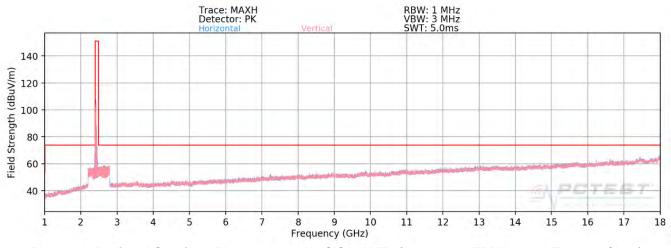




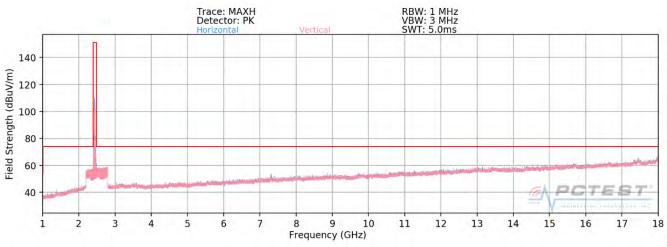
Plot 7-63. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11ax OFDMA – 106 Tones – Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 66 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 66 of 88
© 2020 PCTEST Engineering Labor	V 9.0 02/01/2019			

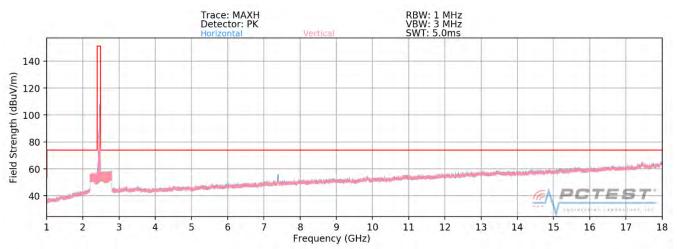










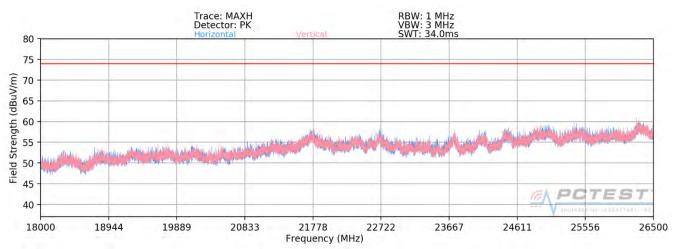


Plot 7-66. Radiated Spurious Plot above 1GHz SISO ANT2 (802.11ax OFDMA - 242 Tones - Ch. 11)

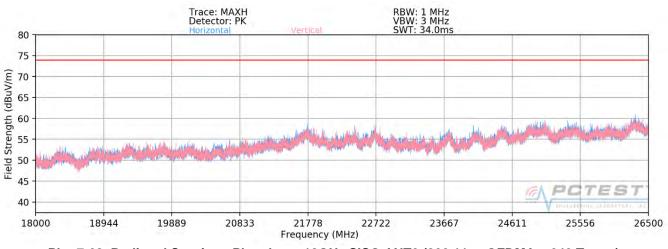
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 67 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 67 of 88
© 2020 PCTEST Engineering Labo	V 9.0 02/01/2019			



SISO Antenna-2 Radiated Spurious Emissions Measurements (Above 18GHz) §15.209; RSS-Gen [8.9]







Plot 7-68. Radiated Spurious Plot above 18GHz SISO ANT2 (802.11ax OFDMA – 242 Tones)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 60 of 90
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 68 of 88
© 2020 PCTEST Engineering Labor	V 9.0 02/01/2019			



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	159	57	-77.39	3.04	32.65	53.98	-21.33
4824.00	Peak	Н	159	57	-64.93	3.04	45.11	73.98	-28.87
12060.00	Avg	Н	-	-	-79.78	14.54	41.76	53.98	-12.22
12060.00	Peak	Н	-	-	-68.18	14.54	53.36	73.98	-20.62

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	151	28	-77.58	3.68	33.10	53.98	-20.88
4874.00	Peak	Н	151	28	-63.67	3.68	47.01	73.98	-26.97
7311.00	Avg	Н	160	34	-78.53	8.53	37.00	53.98	-16.98
7311.00	Peak	Н	160	34	-63.32	8.53	52.21	73.98	-21.77
12185.00	Avg	Н	-	-	-79.60	13.96	41.36	53.98	-12.62
12185.00	Peak	Н	-	-	-67.90	13.96	53.06	73.98	-20.92

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 60 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset	Page 69 of 88	
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			



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	125	25	-76.71	3.44	33.73	53.98	-20.25
4924.00	Peak	Н	125	25	-65.13	3.44	45.31	73.98	-28.67
7386.00	Avg	Н	116	35	-75.14	7.92	39.78	53.98	-14.20
7386.00	Peak	Н	116	35	-60.22	7.92	54.70	73.98	-19.28
12310.00	Avg	Н	-	-	-79.57	13.24	40.67	53.98	-13.31
12310.00	Peak	Н	-	-	-67.70	13.24	52.54	73.98	-21.44

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

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

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4824.00	Avg	Н	111	291	-77.43	3.04	32.61	53.98	-21.37
4824.00	Peak	Н	111	291	-65.69	3.04	44.35	73.98	-29.63
12060.00	Avg	н	-	-	-79.80	14.54	41.74	53.98	-12.24
12060.00	Peak	Н	-	-	-67.17	14.54	54.37	73.98	-19.61

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 70 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020		Page 70 of 88	
© 2020 PCTEST Engineering Labo	ratory Inc	•		V 9 0 02/01/2019



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	-	-	-78.07	3.68	32.61	53.98	-21.37
4874.00	Peak	н	-	-	-66.63	3.68	44.05	73.98	-29.93
7311.00	Avg	н	-	-	-79.18	8.53	36.35	53.98	-17.63
7311.00	Peak	Н	-	-	-66.95	8.53	48.58	73.98	-25.40
12185.00	Avg	Н	-	-	-79.49	13.96	41.47	53.98	-12.51
12185.00	Peak	Н	-	-	-67.65	13.96	53.31	73.98	-20.67

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

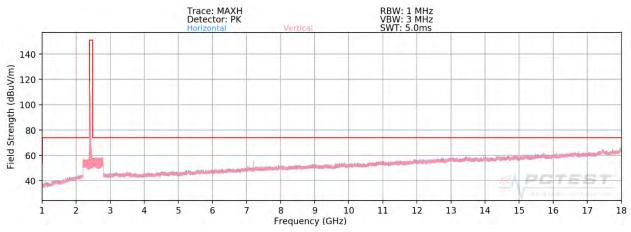
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4924.00	Avg	Н	-	-	-78.37	3.44	32.07	53.98	-21.91
4924.00	Peak	Н	-	-	-66.48	3.44	43.96	73.98	-30.02
7386.00	Avg	н	-	-	-79.25	7.92	35.67	53.98	-18.31
7386.00	Peak	Н	-	-	-67.39	7.92	47.53	73.98	-26.45
12310.00	Avg	Н	-	-	-79.44	13.24	40.80	53.98	-13.18
12310.00	Peak	Н	-	-	-67.12	13.24	53.12	73.98	-20.86

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

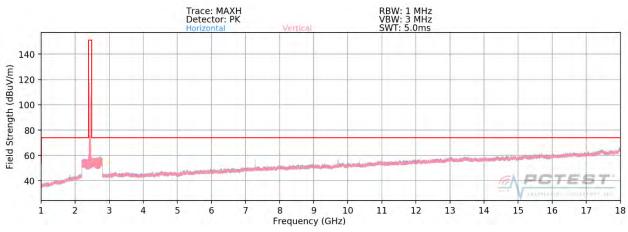
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	est Report S/N: Test Dates: EUT Type:				
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset	Page 71 of 88		
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019				



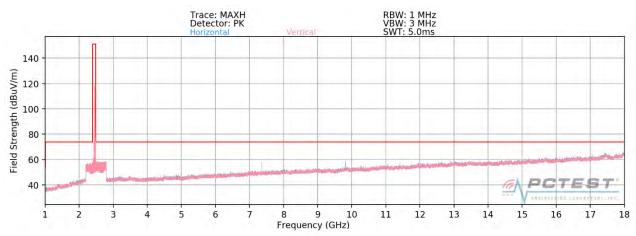
7.7.3 MIMO Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]



Plot 7-69. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA – 106 Tones – Ch. 1)



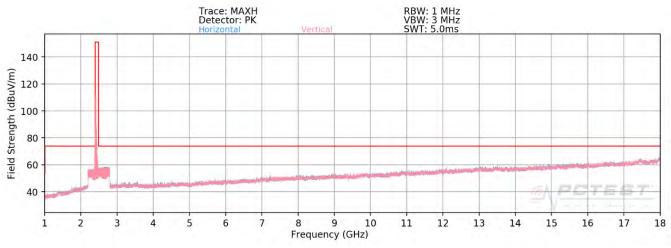
Plot 7-70. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA – 106 Tones – Ch. 6)



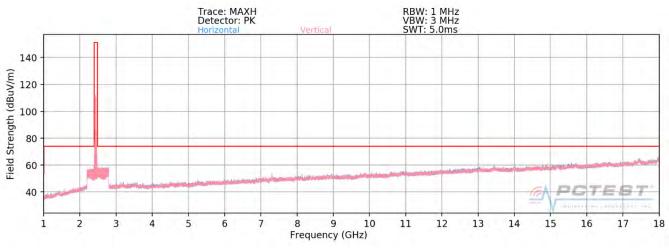
Plot 7-71. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA - 106 Tones - Ch. 11)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Page 72 of 88
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		
© 2020 PCTEST Engineering Laboratory Inc			V 9 0 02/01/2019	

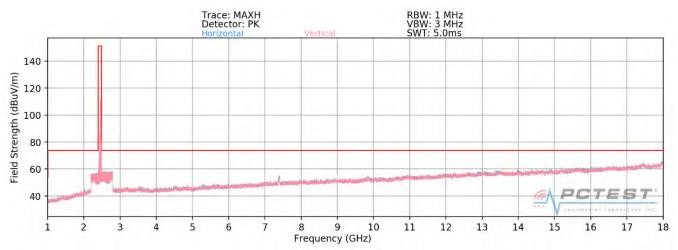










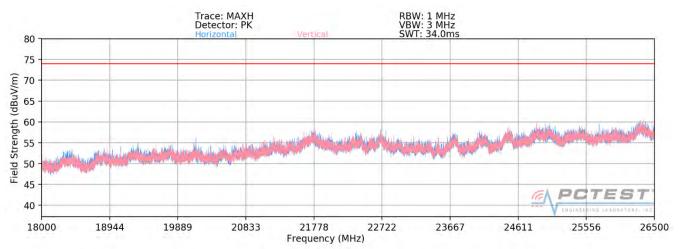


Plot 7-74. Radiated Spurious Plot above 1GHz MIMO (802.11ax OFDMA – 242 Tones – Ch. 11)

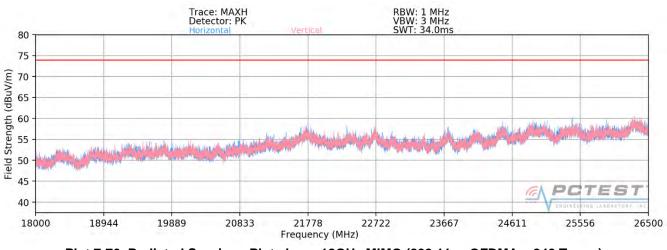
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 72 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 73 of 88
© 2020 PCTEST Engineering Labora	V 9 0 02/01/2019			



MIMO Radiated Spurious Emissions Measurements (Above 18GHz) §15.209; RSS-Gen [8.9]







Plot 7-76. Radiated Spurious Plot above 18GHz MIMO (802.11ax OFDMA – 242 Tones)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:			
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 74 of 88	
© 2020 PCTEST Engineering Laboration	V 9.0 02/01/2019				



MIMO Radiated Spurious Emission Measurements §15.247(d) §15.205 & §15.209; RSS-Gen [8.9]

Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	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	124	285	-77.32	3.04	32.72	53.98	-21.26
4824.00	Peak	Н	124	285	-65.62	3.04	44.42	73.98	-29.56
12060.00	Avg	Н	-	-	-79.76	14.54	41.78	53.98	-12.20
12060.00	Peak	Н	-	-	-67.81	14.54	53.73	73.98	-20.25

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	113	283	-76.46	3.68	34.22	53.98	-19.76
4874.00	Peak	Н	113	283	-63.87	3.68	46.81	73.98	-27.17
7311.00	Avg	Н	112	284	-73.82	8.53	41.71	53.98	-12.27
7311.00	Peak	Н	112	284	-58.80	8.53	56.73	73.98	-17.25
12185.00	Avg	Н	-	-	-79.57	13.96	41.39	53.98	-12.59
12185.00	Peak	Н	-	-	-67.45	13.96	53.51	73.98	-20.47

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 75 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 75 of 88
© 2020 PCTEST Engineering Labora	V 0 0 02/01/2010			



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	118	279	-76.63	3.44	33.81	53.98	-20.17
4924.00	Peak	Н	118	279	-64.54	3.44	45.90	73.98	-28.08
7386.00	Avg	н	132	221	-71.49	7.92	43.43	53.98	-10.55
7386.00	Peak	н	132	221	-56.20	7.92	58.72	73.98	-15.26
12310.00	Avg	Н	-	-	-79.56	13.24	40.68	53.98	-13.30
12310.00	Peak	Н	-	-	-67.54	13.24	52.70	73.98	-21.28

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

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

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4824.00	Avg	Н	-	-	-78.23	3.04	31.81	53.98	-22.17
4824.00	Peak	Н	-	-	-66.91	3.04	43.13	73.98	-30.85
12060.00	Avg	н	-	-	-79.64	14.54	41.90	53.98	-12.08
12060.00	Peak	Н	-	-	-67.14	14.54	54.40	73.98	-19.58

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

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 76 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 76 of 88
© 2020 PCTEST Engineering Labor	V 9 0 02/01/2019			



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	-	-	-78.00	3.68	32.68	53.98	-21.30
4874.00	Peak	н	-	-	-66.13	3.68	44.55	73.98	-29.43
7311.00	Avg	н	-	-	-79.31	8.53	36.22	53.98	-17.76
7311.00	Peak	н	-	-	-67.51	8.53	48.02	73.98	-25.96
12185.00	Avg	Н	-	-	-79.55	13.96	41.41	53.98	-12.57
12185.00	Peak	Н	-	-	-67.21	13.96	53.75	73.98	-20.23

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

Worst Case Mode:802.11aWorst Case Transfer Rate:MCS0RU Index:61Distance of Measurements:3 MeterOperating Frequency:2462MHChannel: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	-	-	-78.15	3.44	32.29	53.98	-21.69
4924.00	Peak	Н	-	-	-66.06	3.44	44.38	73.98	-29.60
7386.00	Avg	Н	-	-	-79.34	7.92	35.58	53.98	-18.40
7386.00	Peak	н	-	-	-67.18	7.92	47.74	73.98	-26.24
12310.00	Avg	Н	-	-	-79.53	13.24	40.71	53.98	-13.27
12310.00	Peak	Н	-	-	-67.58	13.24	52.66	73.98	-21.32

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

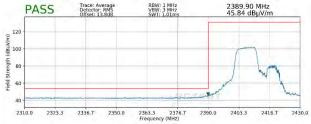
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 77 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 77 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			



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.

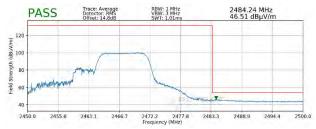
802.11ax OFDMA
MCS0
53
3 Meters
2412MHz
1



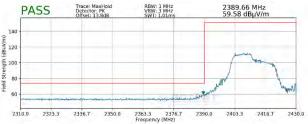
Plot 7-77. Radiated Restricted Lower Band Edge Measurement SISO ANT1 (Average – 106 Tones)

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

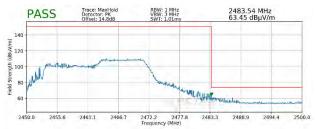
	802.11ax OFDMA
e:	MCS0
	54
s:	3 Meters
	2462MHz
	11



Plot 7-79. Radiated Restricted Upper Band Edge Measurement SISO ANT1 (Average – 106 Tones)



Plot 7-78. Radiated Restricted Lower Band Edge Measurement SISO ANT1 (Peak – 106Tones)



Plot 7-80. Radiated Restricted Upper Band Edge Measurement SISO ANT1 (Peak – 106 Tones)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 70 of 00
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 78 of 88
© 2020 PCTEST Engineering Labora	V 9.0 02/01/2019			

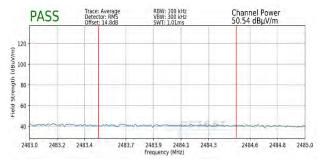


Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1

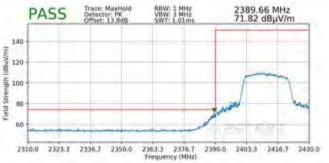


Plot 7-81. Radiated Restricted Lower Band Edge Measurement SISO ANT1 (Average – 242 Tones)

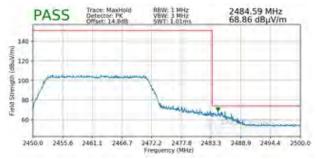
Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11



Plot 7-83. Radiated Restricted Upper Band Edge Measurement SISO ANT1 (Average – 242 Tones)



Plot 7-82. Radiated Restricted Lower Band Edge Measurement SISO ANT1 (Peak – 242 Tones)



Plot 7-84. Radiated Restricted Upper Band Edge Measurement SISO ANT1 (Peak – 242 Tones)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 70 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 79 of 88
© 2020 PCTEST Engineering Laboratory. Inc.				V 9.0 02/01/2019



7.7.5 SISO Antenna-2 Radiated Restricted Band Edge Measurements §15.205 §15.209; RSS-Gen [8.9]

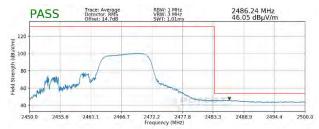
The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

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

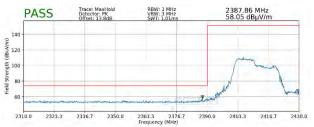


Plot 7-85. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Average – 106 Tones)

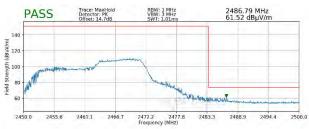
Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	54
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11



Plot 7-87. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Average – 106 Tones)



Plot 7-86. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Peak – 106 Tones)



Plot 7-88. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Peak – 106 Tones)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 90 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 80 of 88
© 2020 PCTEST Engineering Labora	tory Inc			V 9 0 02/01/2019



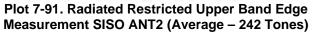
Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1



Plot 7-89. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Average – 242 Tones)

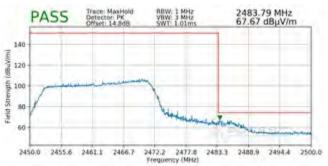
Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11







Plot 7-90. Radiated Restricted Lower Band Edge Measurement SISO ANT2 (Peak – 242 Tones)



Plot 7-92. Radiated Restricted Upper Band Edge Measurement SISO ANT2 (Peak – 242 Tones)

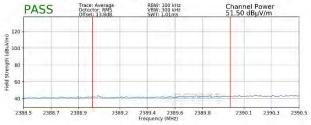
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 01 of 00
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 81 of 88
© 2020 PCTEST Engineering Labo	ratory. Inc.			V 9.0 02/01/2019



7.7.6 MIMO Radiated Restricted Band Edge Measurements §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.

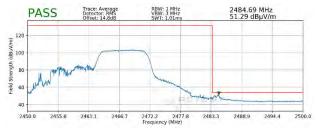
802.11ax OFDMA
MCS0
53
3 Meters
2412MHz
1



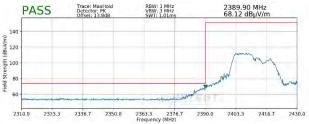
Plot 7-93. Radiated Restricted Lower Band Edge Measurement MIMO (Average – 106 Tones)

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

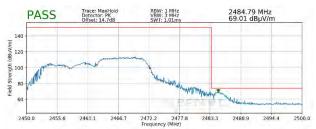
	802.11ax OFDMA
e:	MCS0
	54
s:	3 Meters
	2462MHz
	11



Plot 7-95. Radiated Restricted Upper Band Edge Measurement MIMO (Average – 106 Tones)



Plot 7-94. Radiated Restricted Lower Band Edge Measurement MIMO (Peak – 106 Tones)



Plot 7-96. Radiated Restricted Upper Band Edge Measurement MIMO (Peak – 106 Tones)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 92 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 82 of 88
© 2020 PCTEST Engineering Laborat	on/ Inc	•		V 0 0 02/01/2010

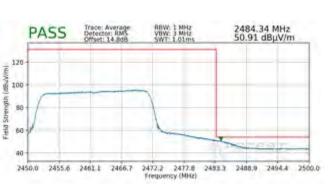


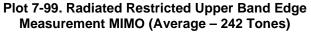
Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2412MHz
Channel:	1



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

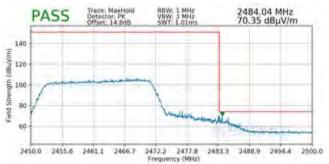
Worst Case Mode:	802.11ax OFDMA
Worst Case Transfer Rate:	MCS0
RU Index:	61
Distance of Measurements:	3 Meters
Operating Frequency:	2462MHz
Channel:	11

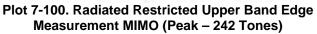






Plot 7-98. Radiated Restricted Lower Band Edge Measurement MIMO (Peak – 242 Tones)





FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 83 of 88
© 2020 PCTEST Engineering Laboratory Inc				V 9 0 02/01/2019



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

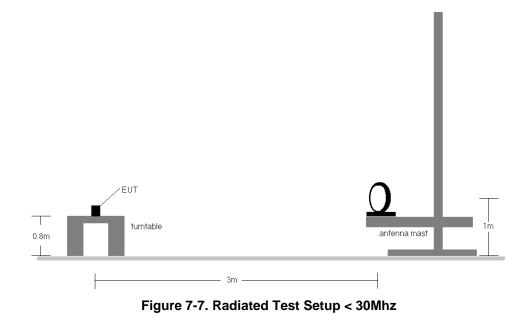
Quasi-Peak Field Strength Measurements

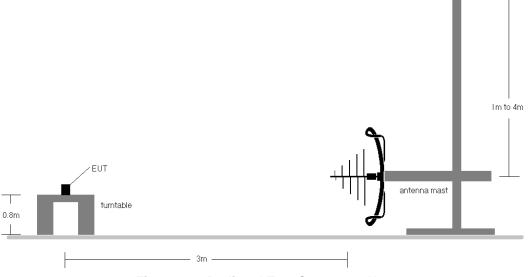
- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 120kHz (for emissions from 30MHz 1GHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

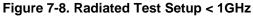
FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 04 of 00
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 84 of 88
© 2020 PCTEST Engineering Laboratory Inc				V 9 0 02/01/2019



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







FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 05 of 00
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 85 of 88
© 2020 PCTEST Engineering Laboratory. Inc.			V 9.0 02/01/2019	



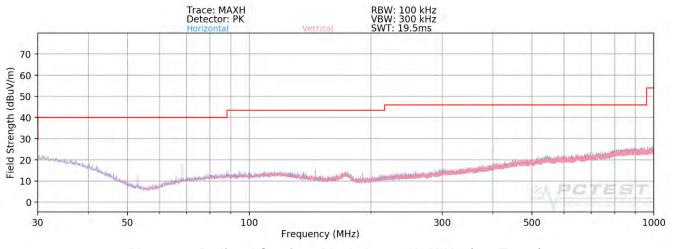
Test Notes

- 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: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 96 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 86 of 88
2020 PCTEST Engineering Laboratory. Inc.				V 9.0 02/01/2019



MIMO Radiated Spurious Emissions Measurements (Below 1GHz) §15.209; RSS-Gen [8.9]



Plot 7-101. Radiated Spurious Plot below 1GHz MIMO (106 Tones)

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 97 of 99
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 87 of 88
© 2020 PCTEST Engineering Laboratory Inc				V 9 0 02/01/2019



8.0 **CONCLUSION**

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG981U** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules and RSS-247 of the Innovation, Science and Economic Development Canada Rules.

FCC ID: A3LSMG981U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1910220165-05.A3L	10/22 - 1/04/2020	Portable Handset		Page 88 of 88
© 2020 PCTEST Engineering Laboratory Inc.			V 9 0 02/01/2019	