

PCTEST ENGINEERING LABORATORY, INC.

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MEASUREMENT REPORT FCC PART 15.407 UNII 802.11a/n/ac/ax

Applicant Name:

FCC ID:

APPLICANT:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea Date of Testing: 01/22/2019 - 03/25/2019 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1901100003-09.A3L

A3LSMG977U

Samsung Electronics Co., Ltd.

Application Type:	Certification
Model:	SM-G977U
EUT Type:	Portable Handset
Frequency Range:	5180 – 5825MHz
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15 Subpart E (15.407)
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02 v02r01,
	KDB 648474 D03 v01r04, KDB 662911 D01 v02r01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 789033 D02 v02r01. 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.





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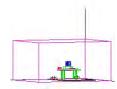


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MEASUREMENT REPORT



	Oleannal		AN	JT1	AN	IT2	MI	NO
UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
1		5180 - 5240	62.951	17.99	62.806	17.98	125.026	20.97
2A	20	5260 - 5320	62.951	17.99	61.660	17.90	122.462	20.88
2C	20	5500 - 5720	62.806	17.98	61.376	17.88	123.595	20.92
3		5745 - 5825	62.951	17.99	61.518	17.89	120.226	20.80
1		5190 - 5230	49.431	16.94	49.659	16.96	99.083	19.96
2A	40	5270 - 5310	46.238	16.65	47.534	16.77	93.756	19.72
2C	40	5510 - 5710	50.003	16.99	48.084	16.82	97.949	19.91
3		5755 - 5795	47.424	16.76	49.431	16.94	96.383	19.84
1		5210	19.907	12.99	18.836	12.75	19.187	12.83
2A	00	5290	19.011	12.79	19.409	12.88	18.323	12.63
2C	80	5530 - 5690	36.644	15.64	37.670	15.76	73.282	18.65
3		5775	37.584	15.75	39.628	15.98	77.268	18.88

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST 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.

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PRODUCT INFORMATION 2.0

2.1 **Equipment Description**

The Equipment Under Test (EUT) is the Samsung Portable Handset FCC ID: A3LSMG977U. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

Test Device Serial No.: 2554B, 9877B, 3773B, 2474B, 8970B, 9728B

2.2 **Device Capabilities**

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1), 850/1900 GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, ANT+, Wireless Power Transfer, n261 5G NR

_	Band 1		Band 2A		Band 2C		Band 3
Ch.	Frequency (MHz)						
36	5180	52	5260	100	5500	149	5745
:	:	:	:	:	:	:	:
42	5210	56	5280	120	5600	157	5785
:	:	:		:	:	:	:
48	5240	64	5320	144	5720	165	5825

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

		-	_	_
Band 1	1	d.	Rai	E

Danal 0A

Band 3

	Danu
Ch.	Frequency (MHz)
38	5190
:	:
46	5230

	Band ZA
Ch.	Frequency (MHz)
54	5270
:	:
62	5310

	Band 2C
Ch.	Frequency (MHz)
102	5510
:	:
118	5590
:	:
142	5710

	Dana 3
Ch.	Frequency (MHz)
151	5755
	:
159	5795

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

	Band 1		Band 2A		Band 2C	_	Band 3
Ch.	Frequency (MHz)						
42	5210	58	5290	106	5530	155	5775
				:	:		
				138	5690		

Table 2-3. 802.11ac / 802.11ax (80MHz BW) Frequency / Channel Operations

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5GHz NII operation is possible in 20MHz, and 40MHz, and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section B)2)b) of ANSI C63.10-2013 and KDB 789033 D02 v02r01. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

	Maximum Achievable Duty Cycles						
902 11 M	802.11 Mode/Band		Duty Cycle [%]				
802.11 1	oue/Ballu	ANT1	ANT2	MIMO/CDD			
	а	99.3	99.7	99.3			
	n (HT20)	99.3	99.6	99.3			
	ac (HT20)	99.3	99.6	98.6			
	ax (HT20)	99.1	99.1	99.1			
5GHz	n (HT40)	98.5	98.5	98.7			
	ac (HT40)	98.6	98.5	98.4			
	ax (HT40)	98.3	98.2	98.2			
	ac (HT80)	95.2	97.1	94.4			
	ax (HT80)	94.6	96.8	94.3			

Table 2-4. Measured Duty Cycles

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

WiFi Configurations		S	ISO	SE	DM	CDD/	MIMO
		ANT1	ANT2	ANT1	ANT2	ANT1	ANT2
	11a	✓	✓	×	×	✓	✓
5GHz	11n/ac/ax (20MHz)	✓	✓	✓	✓	✓	✓
	11n/ac/ax (40MHz)	✓	✓	✓	✓	✓	✓
	11ac/ax (80MHz)	✓	\checkmark	✓	~	✓	✓

Table 2-5. Frequency / Channel Operations

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

3. This device supports simultaneous transmission operation, which allows for two SISO channels to operate independent of one another in the 2.4GHz (WLAN & BT) and 5GHz bands simultaneously on each antenna. The following tables show the worst case configurations determined during testing. The data for these configurations is contained in this test report. The BT + 5GHz case is not considered as worst case since the BT power is lower than the 2.4GHz WLAN power.

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Configuration 1: ANT1 transmitting in 2.4GHz mode and ANT2 in 5GHz mode

Description	2.4 GHz Emission	5 GHz Emission
Antenna	1	2
Channel	6	157
Operating Frequency (MHz)	2437	5785
Data Rate (Mbps)	1	6
Mode	802.11b	802.11a

Table 2-6. Config-1 (ANT1 2.4GHz & ANT2 5GHz)

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

Description	2.4 GHz Emission	5 GHz Emission
Antenna	2	1
Channel	1	120
Operating Frequency (MHz)	2412	5600
Data Rate (Mbps)	1	6
Mode	802.11b	802.11a

Table 2-7. Config-2 (ANT1 5GHz & ANT2 2.4GHz)

Configuration 3: ANT1 and ANT2 both transmitting in 2.4GHz and 5GHz modes simultaneously

Description	2.4 GHz Emission	5 GHz Emission
Antenna	1, 2	1, 2
Channel	11	120
Operating Frequency (MHz)	2462	5600
Data Rate (Mbps)	6	6
Mode	802.11g	802.11a

Table 2-8. Config-3 (ANT1 MIMO & ANT2 MIMO)

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2.3 Test Configuration

The EUT was tested per the guidance of KDB 789033 D02 v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See section 3.2 for AC line conducted emissions test setups, section 7.6 and 7.7 for radiated emissions test setups, and section 7.2, 7.3, 7.4 and 7.5 for antenna port conducted emissions test setups.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT placed 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.

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 789033 D02 v02r01 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, $50\Omega/50\mu$ H Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.8. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

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3.3 Radiated Emissions

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

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed 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.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antennas of the EUT are permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

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5.0 MEASUREMENT UNCERTAINTY

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

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

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6.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	WL25-1	Conducted Cable Set (25GHz)	10/31/2018	Annual	10/31/2019	WL25-1
Agilent	N9030A	PXA Signal Analyzer (44GHz)	5/25/2018	Annual	5/25/2019	MY52350166
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	846215
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2017	Biennial	10/10/2019	121034
COM-Power	PAM-103	Pre-Amplifier (1-1000MHz)	9/17/2018	Annual	9/17/2019	441119
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
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	12/27/2016	Biennial	12/27/2018	114451
Huber + Suhner	Sucoflex 102A	40GHz Radiated Cable Set	8/23/2018	Annual	8/23/2019	251425001
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	8/23/2018	Annual	8/23/2019	NMLC-2
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	5/21/2018	Annual	5/21/2019	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/9/2018	Annual	8/9/2019	100348
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/18/2018	Annual	6/18/2019	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	6/25/2018	Annual	6/25/2019	102133
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	9/19/2018	Annual	9/19/2019	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	9/19/2018	Annual	9/19/2019	100037
Seekonk	NC-100	Torque Wrench 8in-lb	5/9/2018	Biennial	5/9/2020	N/A
Sunol	DRH-118	Horn Antenna (1-18GHz)	8/11/2017	Biennial	8/11/2019	A050307
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.

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7.0 TEST RESULTS

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	A3LSMG977U
FCC Classification:	Unlicensed National Information Infrastructure (UNII)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
N/A	RSS-Gen [6.6]	26dB Bandwidth	N/A		PASS	Section 7.2
15.407(e)	RSS-Gen [6.6]	6dB Bandwidth	>500kHz(5725-5850MHz)		PASS	Section 7.3
15.407 (a.1.iv), (a.2), (a.3)	RSS-247 [6.2]	Maximum Conducted Output Power	Maximum conducted powers must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])	CONDUCTED	PASS	Section 7.4
15.407 (a.1.iv), (a.2), (a.3)	RSS-247 [6.2]	Maximum Power Spectral Density	meet the limits detailed in $15/(1)/(2)$		PASS	Section 7.5
15.407(h)	RSS-247 [6.3]	Dynamic Frequency Selection	See DFS Test Report		PASS	See DFS Test Report
15.407(b.1), (2), (3), (4)	RSS-247 [6.2]	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 15.407(b) (RSS-247 [6.2])		PASS	Section 7.6
15.205, 15.407(b.1), (4), (5), (6)	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])	RADIATED	PASS	Section 7.6, 7.7
15.407	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 (RSS-Gen [8.8]) limits	LINE CONDUCTED	PASS	Section 7.8

Table 7-1. Summary of Test Results

Notes:

- 1) All channels, modes, and modulations/data rates were investigated among all UNII bands. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "UNII Automation," Version 4.6.
- 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 0.2.16.

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7.2 26dB Bandwidth Measurement – 802.11a/n/ac/ax RSS-Gen [6.2]

Test Overview and Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

The 26dB bandwidth is used to determine the conducted power limits.

Test Procedure Used

ANSI C63.10-2013 – Section 12.4 KDB 789033 D02 v02r01 – Section C

Test Settings

- The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = approximately 1% of the emission bandwidth
- 3. VBW <u>></u> 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold

Test Setup

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



Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

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SISO Antenna-1 26 dB Bandwidth Measurements

	Frequency	Channel			Measured 26dB
	[MHz]	No.	802.11 Mode	Data Rate [Mbps]	Bandwidth [MHz]
	5180	36	а	6	21.00
	5200	40	a	6	21.65
	5240	48	a	6	21.21
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	23.92
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	23.18
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	24.13
-	5180	36	ax (20MHz)	6.5/7.2 (MCS0)	21.37
Band 1	5200	40	ax (20MHz)	6.5/7.2 (MCS0)	20.90
Ba	5240	48	ax (20MHz)	6.5/7.2 (MCS0)	21.62
	5190	38	n (40MHz)	13.5/15 (MCS0)	36.27
	5230	46	n (40MHz)	13.5/15 (MCS0)	36.60
	5190	38	ax (40MHz)	13.5/15 (MCS0)	37.73
	5230	46	ax (40MHz)	13.5/15 (MCS0)	37.76
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	75.51
	5210	42	ax (80MHz)	29.3/32.5 (MCS0)	77.05
	5260	52	а	6	21.65
	5280	56	а	6	21.40
	5320	64	а	6	21.32
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	22.00
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	21.96
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	21.59
2A	5260	52	ax (20MHz)	6.5/7.2 (MCS0)	21.66
Band 2A	5280	56	ax (20MHz)	6.5/7.2 (MCS0)	21.51
ä	5320	64	ax (20MHz)	6.5/7.2 (MCS0)	21.18
	5270	54	n (40MHz)	13.5/15 (MCS0)	36.40
	5310	62	n (40MHz)	13.5/15 (MCS0)	36.19
	5270	54	ax (40MHz)	13.5/15 (MCS0)	37.74
	5310	62	ax (40MHz)	13.5/15 (MCS0)	37.74
	5290 5290	58 58	ac (80MHz)	29.3/32.5 (MCS0)	75.81
	5500	100	ax (80MHz)	29.3/32.5 (MCS0) 6	77.27
	5600	120	a	6	21.14
	5720	120	a	6	21.35 30.21
	5500	144	a n (20MHz)	6.5/7.2 (MCS0)	25.58
	5600	120	n (20MHz)	6.5/7.2 (MCS0)	26.32
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	31.86
	5500	100	ax (20MHz)	6.5/7.2 (MCS0)	21.40
	5600	120	ax (20MHz)	6.5/7.2 (MCS0)	21.32
	5720	144	ax (20MHz)	6.5/7.2 (MCS0)	21.15
Ŋ	5510	102	n (40MHz)	13.5/15 (MCS0)	36.03
Band 2C	5590	118	n (40MHz)	13.5/15 (MCS0)	36.25
Ba	5710	142	n (40MHz)	13.5/15 (MCS0)	36.38
	5510	102	ax (40MHz)	13.5/15 (MCS0)	37.80
	5590	118	ax (40MHz)	13.5/15 (MCS0)	37.52
	5710	142	ax (40MHz)	13.5/15 (MCS0)	37.73
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	75.93
	5610	122	ac (80MHz)	29.3/32.5 (MCS0)	81.74
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	76.32
	5530	106	ax (80MHz)	29.3/32.5 (MCS0)	77.44
	5610	122	ax (80MHz)	29.3/32.5 (MCS0)	81.29
Tali	5690	138	ax (80MHz)	29.3/32.5 (MCS0)	76.87
гаріе	1-2 UON	ICHICTEC.	Dandwidth	n Measuremer	us didu ant

Table 7-2. Conducted Bandwidth Measurements SISO ANT1

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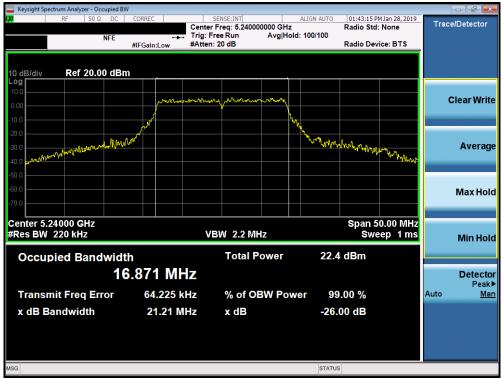
Plot 7-1. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 1) - Ch. 36)



Plot 7-2. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 1) – Ch. 40)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-4. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 36)

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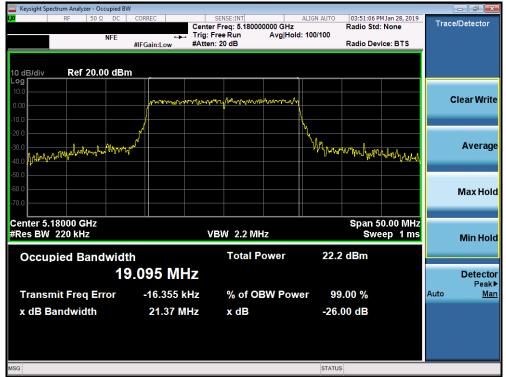
Plot 7-5. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)



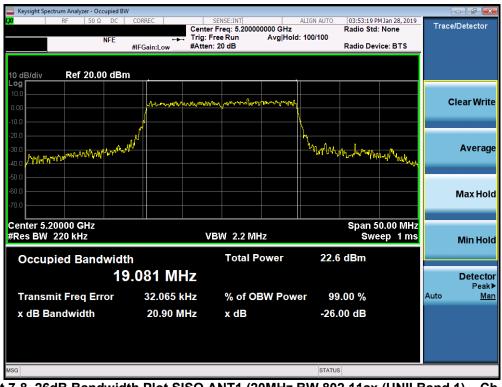
Plot 7-6. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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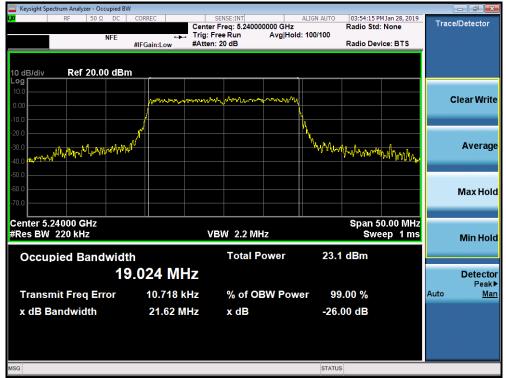
Plot 7-7. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 36)



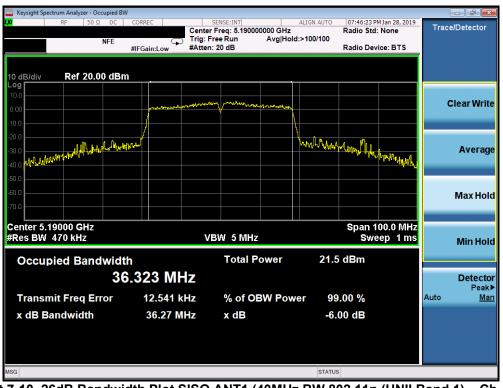
Plot 7-8. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-9. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 48)



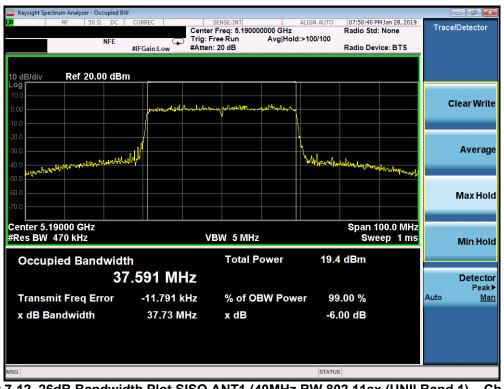
Plot 7-10. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Occupied E	W					×
LXI RF 50 Ω DC	CORREC	SENSE:INT er Freg: 5.230000000 GH		:47:16 PM Jan 28, 2019	Trace/Detec	tor
NFE	Trig:	Free Run Avg H	lold:>100/100			
	#IFGain:Low #Atte	en: 20 dB	Rac	dio Device: BTS		
10 dB/div Ref 20.00 dB	m		-			
Log 10.0						
0.00	mergeneration	my monoraling men	-4		ClearV	Vrite
-10.0						
20.0			Ν.			
ь і и. М.Лья	wently		hard phyraently	while .	Δνε	rage
-30.0				w man white white		ruge
-50.0						
-60.0					Мах	Hold
-70.0						_
Center 5.23000 GHz			S	pan 100.0 MHz		
#Res BW 470 kHz		VBW 5 MHz		Sweep 1 ms	Min	Hold
			04 7 15			
Occupied Bandwid		Total Power	21.7 dB	sm		
3	6.512 MHz					ector
Transmit Franc	42 040 644		00.00	0/	P Auto	eak▶ Man
Transmit Freq Error	42.819 kHz	% of OBW Po			Auto	Wart
x dB Bandwidth	36.60 MHz	x dB	-6.00 c	IB		
MSG			STATUS			

Plot 7-11. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 1) - Ch. 46)



Plot 7-12. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 250
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🔤 Keysight Spectrum Analyzer - C									_	
RF 50	Ω DC COI	RREC		NSE:INT reg: 5.23000	0000 GHz	ALIGN AUTO	07:51:23 P	M Jan 28, 2019	Trac	e/Detector
	NFE	_	Trig: Fre	e Run		d:>100/100				
	#IF	Gain:Low	#Atten: 2	0 dB			Radio Dev	ice: BTS		
	00 dBm									
Log 10.0										
0.00		month	Muniha	Marganon	Milal mar all				(Clear Write
-10.0		1								
-10.0										
										Average
-30.0	mushment					Why to	Merkydaytons			Average
-30.0							William How Awylows	a march the		
-50.0										
-60.0										Max Hold
-70.0										
Center 5.23000 GHz							Snan 1	00.0 MHz		
#Res BW 470 kHz			VB۱	N/5 MHz				ep 1 ms		Min Hold
										WIIII HOIU
Occupied Ban	dwidth			Total P	ower	19.7	′ dBm			
	37 5	83 MI	7							Detector
										Peak▶
Transmit Freq E	rror	5.138 k	Hz	% of O	BW Pow	er 99	.00 %		Auto	Man
x dB Bandwidth		37.76 M	IHz	x dB		-6.	00 dB			
MSG						STATUS				
mod						STATUS	, 			

Plot 7-13. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 1) – Ch. 46)



Plot 7-14. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-15. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



Plot 7-16. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2A) - Ch. 52)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)		SAMSUNE		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 250		
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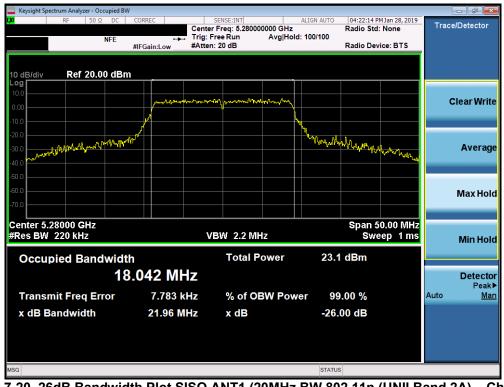
Plot 7-18. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2A) - Ch. 64)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 250	
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Plot 7-19. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



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

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-21. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)



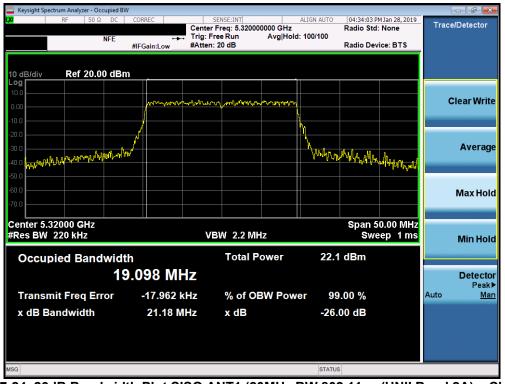
Plot 7-22. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 52)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-23. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)



Plot 7-24. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 64)

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Plot 7-25. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



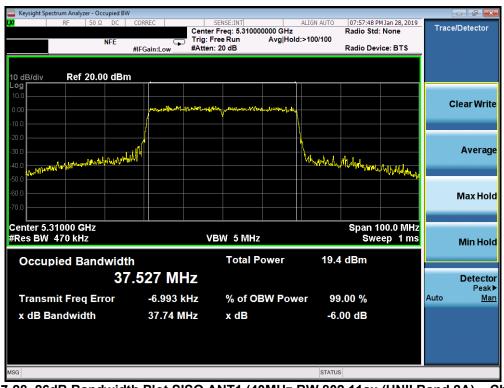
Plot 7-26. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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🔤 Keysight Spectrum Analyzer - Occupied	BW				- # *
LXI RF 50 Ω DC	CORREC	SENSE:INT Freq: 5.270000000 GHz	ALIGN AUTO 07:57:09 F Radio Std	M Jan 28, 2019	Trace/Detector
NFE	Trig:	Free Run Avg Hol	d:>100/100		
	#IFGain:Low #Atte	n: 20 dB	Radio De	vice: BTS	
10 dB/div Ref 20.00 dE	3m				
10.0					
0.00		when and plant and the pass of the week			Clear Write
-10.0	/				
-20.0					
-30.0	. d/				Average
-30.0 -40.0	Juli		Understanding of the	4. J .	Ű
-50.0 multur 4			, yela	WWW WWW	
-60.0					
-70.0					Max Hold
-70.0					
Center 5.27000 GHz				100.0 MHz	
#Res BW 470 kHz	1	/BW 5 MHz	Sw	eep 1 ms	Min Hold
Occupied Bandwid	ith	Total Power	19.7 dBm		
3	7.608 MHz				Detector Peak▶
Transmit Freq Error	-7.838 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	37.74 MHz	x dB	-6.00 dB		
	37.74 WITZ	хub	-0.00 UB		
			1		
MSG			STATUS		

Plot 7-27. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)



Plot 7-28. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 62)

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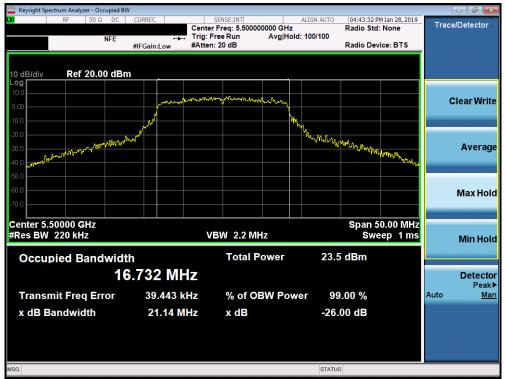
Plot 7-29. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



Plot 7-30. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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1M1901100003-09.A3L	01/22/2019 - 03/25/2019	Portable Handset		Page 31 of 259
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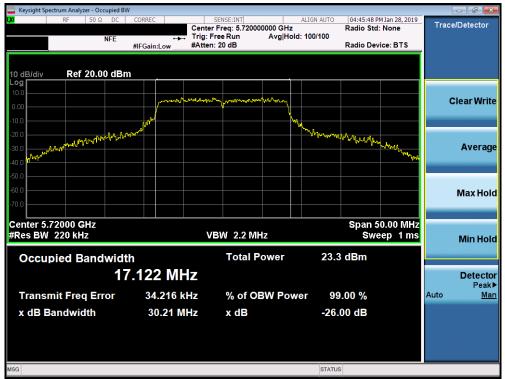
Plot 7-31. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2C) - Ch. 100)



Plot 7-32. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 22 of 250
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Plot 7-33. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2C) - Ch. 144)



Plot 7-34. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 22 of 250
1M1901100003-09.A3L	01/22/2019 - 03/25/2019	Portable Handset		Page 33 of 259
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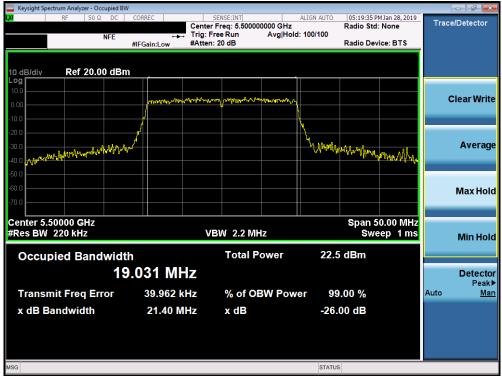
Plot 7-35. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 120)



Plot 7-36. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 144)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 24 of 250	
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Plot 7-37. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 100)



Plot 7-38. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 250
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Keysight Spectrum Analyzer - Oc										- 0
LXI RF 50 Ω	DC COR	REC		NSE:INT reg: 5.72000	0000 GHz	ALIGN AUTO	05:21:47 P Radio Std	M Jan 28, 2019 : None	Trace	e/Detector
	NFE	֥		e Run		d: 100/100				
	#IFC	Gain:Low	#Atten: 2	0 dB			Radio Dev	rice: BTS		
10 dB/div Ref 20.0	0 dBm									
10.0										
0.00		wwww	waylyn Wrthard	NING THE PARTY NEW YORK	anter how				C	Clear Write
-10.0										
-20.0	N					N,				
-30.0	hand and a start of the					mr. M. Marker	home has	Masa		Average
-30.0 -40.0								My Www.		Ű
-50.0										
-60.0										
-70.0										Max Hold
-70.0										
Center 5.72000 GHz								0.00 MHz		
#Res BW 220 kHz			VB	N 2.2 MI	lz		Swe	eep 1 ms		Min Hold
Occupied Band	width			Total P	ower	22.1	dBm			
Band										
	19.0	76 MI	12							Detector Peak▶
Transmit Freq Er	ror	9.731	(Hz	% of O	BW Pow	er 99	.00 %		Auto	Man
x dB Bandwidth		21.15 N	IHz	x dB		-26.	00 dB			
MSG						STATUS	;			

Plot 7-39. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 2C) – Ch. 144)



Plot 7-40. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 102)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 250
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Keysight Spectrum Analyzer - Occupied							- d ×
LXI RF 50 Ω DC		SENSE:INT Center Freg: 5.5900		GN AUTO 08:00:05 Radio Sto	PM Jan 28, 2019	Trace	/Detector
NFE		Trig: Free Run	Avg Hold:>1	00/100			
	#IFGain:Low	#Atten: 20 dB		Radio De	vice: BTS		
10 dB/div Ref 20.00 dE	3m						
Log 10.0							
0.00	Robertalington	malanta managlam	and making			C	lear Write
-10.0		V					
	. /		N N				
-20.0 -30.0	A Kulwe		W-1	M. M. M. M. Mary M. J.			Average
					A HANN PARA		Average
-40.0							
-50.0							
-60.0							Max Hold
-70.0							
Center 5.59000 GHz		I		Span '	100.0 MHz		
#Res BW 470 kHz		VBW 5 MHz	2		eep 1 ms		Min Hold
							Millinoid
Occupied Bandwid	dth	Total F	ower	20.6 dBm			
3	36.524 MH	Z					Detector
	47 507 11			00 00 0/		a	Peak▶
Transmit Freq Error	17.507 kH	z % of O	BW Power	99.00 %		Auto	Man
x dB Bandwidth	36.25 MH	lz xdB		-6.00 dB			
MSG				STATUS			

Plot 7-41. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)



Plot 7-42. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 142)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 27 of 250	
1M1901100003-09.A3L	01/22/2019 - 03/25/2019	Portable Handset		Page 37 of 259	
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🔤 Keysight Spectrum Analyzer - Occupie					
LXI RF 50 Ω D		SENSE:INT	ALIGN AUTO	08:13:18 PM Jan 28, 2019 Radio Std: None	Trace/Detector
NFE	Ξ Γ	ig: Free Run Av	g Hold:>100/100		
	#IFGain:Low #A	tten: 20 dB		Radio Device: BTS	_
10 dB/div Ref 20.00 d	IBm				
Log 10.0					
0.00	المتأطلة تصبيبا تدويه	water a with black atom	مال ال ما		Clear Write
-10.0					
-20.0	4				A
-30.0	M.M.M.		"hillow how a	When we had had the star	Average
Will you way a second				- TAN OPANT WITHER TO ALL STORE	4
-50.0					
-60.0					Max Hold
-70.0					
				0	
Center 5.51000 GHz #Res BW 470 kHz		VBW 5 MHz		Span 100.0 MH Sweep 1 ms	
THES BY TO KILZ		4044 0 10112		омеер тіп	Min Hold
Occupied Bandw	idth	Total Powe	er 19.6	6 dBm	
	37.603 MHz				Detector
					Peak►
Transmit Freq Error	17.739 kHz	% of OBW	Power 99	.00 %	Auto <u>Man</u>
x dB Bandwidth	37.80 MHz	x dB	-6	00 dB	
	57.00 MHZ	X UD	-0.		
MSG			STATUS	3	

Plot 7-43. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 102)



Plot 7-44. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 29 of 250
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🔤 Keysight Spectrum Analyzer - Occ							[
ιχι RF 50 Ω	DC CORREC	SENSE:INT		ALIGN AUTO	08:14:51 Pf Radio Std:	M Jan 28, 2019	Trace	Detector
	NFE G	Trig: Free Run	Avg Hold:	>100/100				
	#IFGain:Low	#Atten: 20 dB			Radio Dev	ice: BTS		
10 dB/div Ref 20.00	0 dBm							
Log 10.0								
		Marshan Lalm_ Marsh					c	lear Write
0.00	- Marking	and the second	hand the second se					
-10.0								
-20.0								
-30.0	Marth Marth			Windowstan	WANNY AND W			Average
-40.0 -40.0						water a fille	_	
-50.0								
-60.0								Max Hold
-70.0								maxinoia
Center 5.71000 GHz						00.0 MHz		
#Res BW 470 kHz		VBW 5 M	HZ		Swe	ep 1 ms		Min Hold
Occupied Band	width	Total	Power	19 1	dBm			
	37.583 M	HZ						Detector Peak►
Transmit Freq Err	or -15.804	kHz % of	OBW Powe	er 99.	.00 %		Auto	Peak ► <u>Man</u>
x dB Bandwidth	37.73	MHz xdB		-6 ()0 dB			
	01.101			0.0				
)			
MSG				STATUS				

Plot 7-45. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 142)



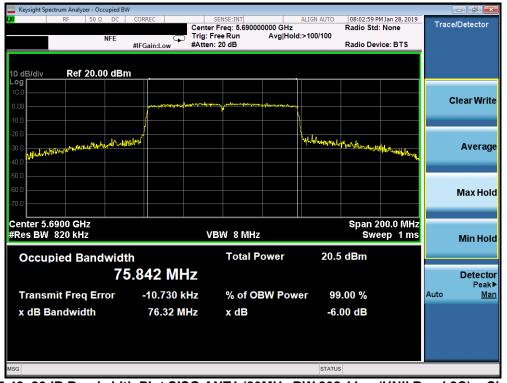
Plot 7-46. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-47. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)



Plot 7-48. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 138)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 250
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Plot 7-49. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 106)



Plot 7-50. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 41 of 250	
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Keysight Spectrum Analyzer - Occupied BW					
RF 50 Ω DC	Trig: I	SENSE:INT r Freq: 5.690000000 GHz Free Run Avg Hol 1: 20 dB	ALIGN AUTO	08:11:15 PM Jan 28, 2019 Radio Std: None Radio Device: BTS	Trace/Detector
0 dB/div Ref 20.00 dBm	June				ClearWrite
0.0 0.0 0.0 100 100 100 100 100 100 100	und -		how with the	Minighally March March 19	Averag
0.0					Max Hol
enter 5.6900 GHz Res BW 820 kHz		/BW 8 MHz		Span 200.0 MHz Sweep 1 ms	Min Hol
Occupied Bandwidtl 77	າ .079 MHz	Total Power	19.2	dBm	Detecto Peak
Transmit Freq Error x dB Bandwidth	6.967 kHz 76.87 MHz	% of OBW Pow x dB		.00 % 00 dB	Auto <u>Ma</u>
G			STATUS		

Plot 7-51. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 138)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 12 of 250
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SISO Antenna-2 26dB Bandwidth Measurements

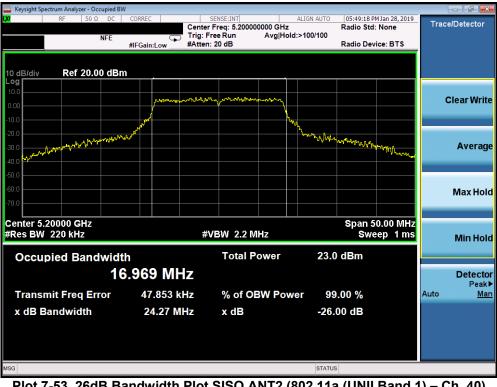
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
	5180	36	а	6	24.27
	5200	40	а	6	24.27
	5240	48	а	6	23.74
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	25.28
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	29.05
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	26.68
.	5180	36	ax (20MHz)	6.5/7.2 (MCS0)	21.35
Band 1	5200	40	ax (20MHz)	6.5/7.2 (MCS0)	21.72
Ba	5240	48	ax (20MHz)	6.5/7.2 (MCS0)	21.48
	5190	38	n (40MHz)	13.5/15 (MCS0)	36.21
·	5230	46	n (40MHz)	13.5/15 (MCS0)	36.49
·	5190	38	ax (40MHz)	13.5/15 (MCS0)	37.91
·	5230	46	ax (40MHz)	13.5/15 (MCS0)	37.45
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	75.74
	5210	42	ax (80MHz)	29.3/32.5 (MCS0)	77.41
	5260	52	a (convirie)	6	23.34
	5280	56	a	6	22.65
	5320	64	a	6	21.17
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	27.07
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	25.09
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	21.58
٨	5260	52	ax (20MHz)	6.5/7.2 (MCS0)	21.57
d 2	5280	56	ax (20MHz)	6.5/7.2 (MCS0)	21.62
Band 2A	5320	64	ax (20MHz)	6.5/7.2 (MCS0)	21.52
-	5270	54	n (40MHz)	13.5/15 (MCS0)	36.56
·	5310	62	n (40MHz)	13.5/15 (MCS0)	36.03
·	5270	54	ax (40MHz)	13.5/15 (MCS0)	37.59
	5310	62	ax (40MHz)	13.5/15 (MCS0)	37.85
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	75.72
	5290	58	ac (00MHz) ax (80MHz)	29.3/32.5 (MCS0)	77.51
	5500	100	ax (oolvii iz) a	29.3/32.3 (NC30) 6	22.07
	5600	120	a	6	27.17
	5720	120	a	6	32.44
			a n (20MHz)	-	25.16
	5500	100 120	()	6.5/7.2 (MCS0)	
	5600 5720	120	n (20MHz) n (20MHz)	6.5/7.2 (MCS0)	36.53 39.18
		144	ax (20MHz)	6.5/7.2 (MCS0) 6.5/7.2 (MCS0)	21.59
	5500 5600	120	ax (20MHz) ax (20MHz)	6.5/7.2 (MCS0)	26.51
		120			
0	5720		ax (20MHz)	6.5/7.2 (MCS0)	27.16
Band 2C	5510	102	n (40MHz)	13.5/15 (MCS0)	36.13
ano	5590	118	n (40MHz)	13.5/15 (MCS0)	36.49
ш	5710	142	n (40MHz)	13.5/15 (MCS0)	36.60
	5510	102	ax (40MHz)	13.5/15 (MCS0)	37.63
	5590	118	ax (40MHz)	13.5/15 (MCS0)	37.60
	5710	142	ax (40MHz)	13.5/15 (MCS0)	37.73
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	75.60
	5610	122	ac (80MHz)	29.3/32.5 (MCS0)	94.54
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	76.47
	5530	106	ax (80MHz)	29.3/32.5 (MCS0)	77.47
	5610	122	ax (80MHz)	29.3/32.5 (MCS0)	81.88
	5690	138	ax (80MHz)	29.3/32.5 (MCS0)	77.38

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Plot 7-52. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 1) - Ch. 36)



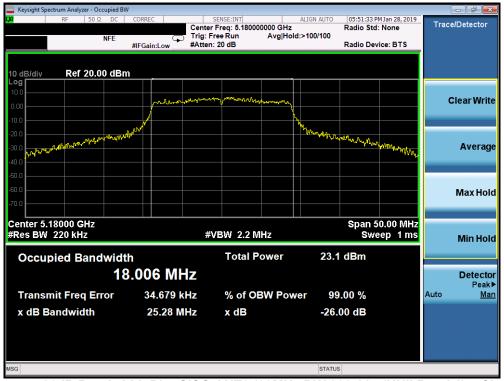
Plot 7-53. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 1) – Ch. 40)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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Plot 7-54. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 1) - Ch. 48)



Plot 7-55. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 36)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-56. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)



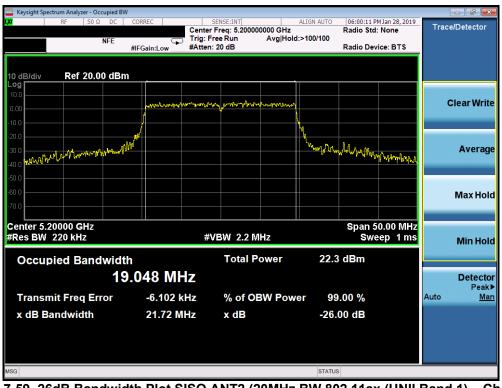
Plot 7-57. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 46 of 250	
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Keysight Spectrum Analyzer - O										- d -
LXI RF 50 9	Ω DC COF	REC		NSE:INT eq: 5.18000	0000 GHz	ALIGN AUTO	05:59:21 P Radio Std	M Jan 28, 2019	Trac	e/Detector
	NFE	Ģ	Trig: Free	Run		d:>100/100				
	#IFC	Gain:Low	#Atten: 2	0 dB			Radio Dev	ice: BTS		
10 dB/div Ref 20.	00 dBm									
Log 10.0										
0.00		monthma	wanter	<u>แหน่วามหรือคณ</u> า	Alar Jana Mini				(Clear Write
-10.0										
-20.0	,					١,				
	a mell of					Who ho h	MANANA PARA			Average
-30.0	NA Paratra					1	^ĸ ᠇᠇ᢛᡅᡙ᠉ᡁᠾ _ᡆ ᡢ	hul Man h		Average
-40.0										
-50.0										
-60.0										Max Hold
-70.0										
Center 5.18000 GHz							Snan 5	0.00 MHz		
#Res BW 220 kHz			#VE	SW 2.2 M	Hz			ep 1 ms		Min Hold
										WITH HOTA
Occupied Ban	dwidth			Total P	ower	22.1	dBm			
	19.0	89 MH	17							Detector
										Peak►
Transmit Freq E	rror	19.897 k	Hz	% of O	3W Pow	ver 99	.00 %		Auto	<u>Man</u>
x dB Bandwidth		21.35 M	IHz	x dB		-26.	00 dB			
1400						074710				
MSG						STATUS				

Plot 7-58. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 36)



Plot 7-59. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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🤤 Keysight Spectrum Analyzer - Occupied BW					
LXU RF 50Ω DC	Center	Freq: 5.240000000 GHz ree Run Avg Hold		9 PM Jan 28, 2019 td: None	Export Data
NFE	#IFGain:Low #Atten			evice: BTS	Amplitude
10 dB/div Ref 20.00 dBm					Correction Correction 1
Log 10.0 0.00 -10.0					Trace
-20.0 -30.0 -40.0			1. When white a way of the second	whow when he had	Limit 1⊳
-50.0					Meas Results
Center 5.24000 GHz #Res BW 220 kHz	#1	VBW 2.2 MHz		50.00 MHz weep 1 ms	
Occupied Bandwidth 19	.042 MHz	Total Power	23.2 dBm		
Transmit Freq Error	503 Hz	% of OBW Pow	ver 99.00 %		
x dB Bandwidth	21.48 MHz	x dB	-26.00 dB		
					Save As
MSG			STATUS		

Plot 7-60. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 48)



Plot 7-61. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

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Keysight Spectrum Analyzer - Occupied BW					- d -
LXI RF 50 Ω DC	CORREC	SENSE:INT Center Freg: 5.2300	ALIGN AUTO	07:17:17 PM Jan 28, 20: Radio Std: None	9 Trace/Detector
NFE		Trig: Free Run	Avg Hold:>100/100		
	#IFGain:Low	#Atten: 20 dB		Radio Device: BTS	
10 dB/div Ref 20.00 dBm	1				
Log					
	Martin Marth	and the second	wm marker and		Clear Write
0.00		Y			
-10.0					
-20.0	- American -		- Դս¶եղոյ	Hernor Munthe	
-30.0 a date the start of the s				The second se	Average
-40.0					
-50.0					
-60.0					Max Hold
-70.0					Wax Holu
Center 5.23000 GHz				Span 100.0 MH	
#Res BW 470 kHz		#VBW 5 MH	z	Sweep 1 m	S Min Hold
Occurried Bandwidt		Total F	Power 23	.8 dBm	
Occupied Bandwidt			- Uwei 23		
36	.543 MHz	Ζ			Detector
Transmit Freg Error	63.642 kH	- % of O	BW Power	99.00 %	Peak► Auto Man
					Auto
x dB Bandwidth	36.49 MH	z xdB	-	6.00 dB	
MSG			STAT	TUS	

Plot 7-62. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 1) - Ch. 46)



Plot 7-63. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 250			
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🔤 Keysight Spectrum Analyzer - C					
LXI RF 50	Ω DC CORREC	SENSE:INT Center Freg: 5.2300	ALIGN AUTO	07:22:50 PM Jan 28, 2019 Radio Std: None	Trace/Detector
	NFE	Trig: Free Run	Avg Hold:>100/100		
	#IFGain:Low	#Atten: 20 dB		Radio Device: BTS	
	00 dBm				
Log					
		mandetroughten with	the open and the Real		Clear Write
0.00					
-10.0					
-20.0					
-30.0	1.0. 14		deale i		Average
-40.0	withunder		- Although a second	Mul month antipation	
-50.0					
-60.0					
-70.0					Max Hold
-70.0					
Center 5.23000 GHz				Span 100.0 MHz	
#Res BW 470 kHz		VBW 5 MH:	Z	Sweep 1 ms	Min Hold
Occupied Ban	dwidth	Total F	ower 21.7	/ dBm	
	37.516 N	Hz			Detector
					Peak▶
Transmit Freq E	rror 13.364	kHz % of O	BW Power 99	0.00 %	Auto <u>Man</u>
x dB Bandwidth	37,45	MHz x dB	-6.	00 dB	
MSG			STATUS	5	

Plot 7-64. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax (UNII Band 1) – Ch. 46)



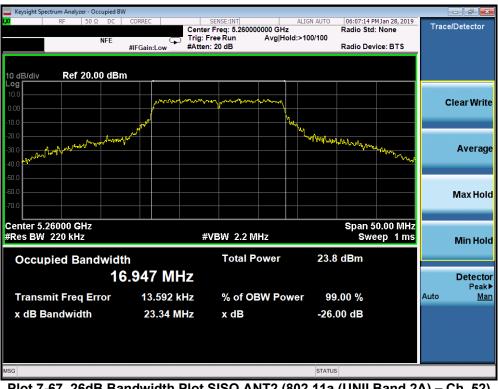
Plot 7-65. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager			
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 250			
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Keysight Spectrum Analyzer - Occupie					
LXI RF 50 Ω D	DC CORREC	SENSE:INT Center Freg: 5.21000	ALIGN AUTO	07:23:59 PM Jan 28, 2019 Radio Std: None	Trace/Detector
NFI		Trig: Free Run	Avg Hold:>100/100		
	#IFGain:Low	#Atten: 20 dB		Radio Device: BTS	
10 dB/div Ref 20.00 c	dBm				
Log 10.0					
0.00	mber sur ling	almondun mound	and		Clear Write
-10.0					
-20.0					
-30.0	1				Average
	Lin and		La na ha	Marghand and an and a start	Average
hat have any have been				W-allander allander and	
-50.0					
-60.0					Max Hold
-70.0					
Center 5.2100 GHz				Span 200.0 MHz	
#Res BW 820 kHz		VBW 8 MHz		Sweep 1 ms	Min Hold
					Wintflord
Occupied Bandw	idth	Total P	ower 20.8	dBm	
	76.959 MI	z			Detector
					Peak►
Transmit Freq Error	-33.237 k	(Hz % of O	3W Power 99	.00 %	Auto <u>Man</u>
x dB Bandwidth	77.41 M	lHz x dB	-6.	00 dB	
MSG			STATUS	3	

Plot 7-66. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



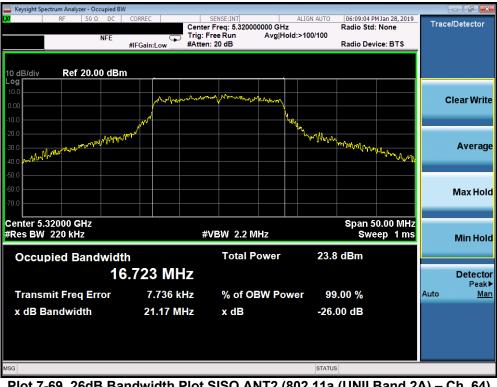
Plot 7-67. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2A) - Ch. 52)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 51 of 250
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Plot 7-68. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2A) - Ch. 56)



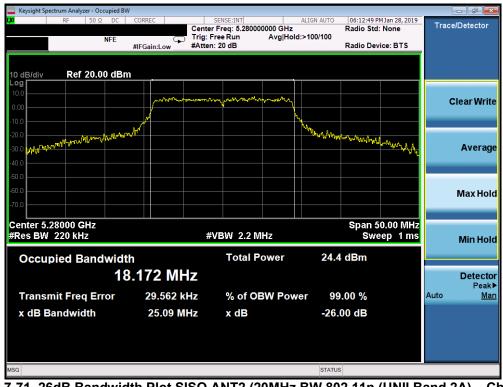
Plot 7-69. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2A) – Ch. 64)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 52 of 250
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Plot 7-70. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



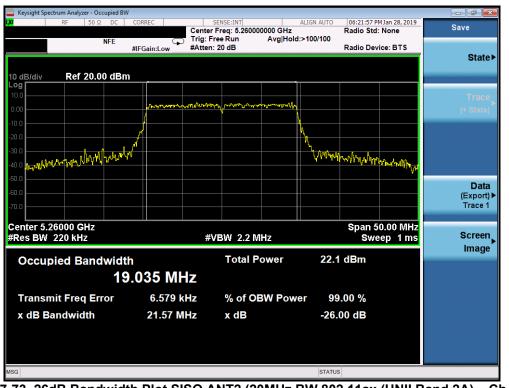
Plot 7-71. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 52 of 250
1M1901100003-09.A3L	01/22/2019 - 03/25/2019	Portable Handset		Page 53 of 259
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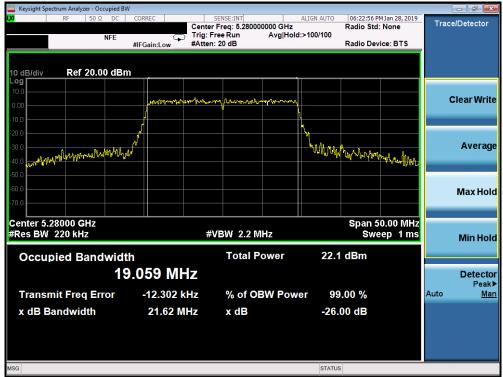
Plot 7-72. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) – Ch. 64)



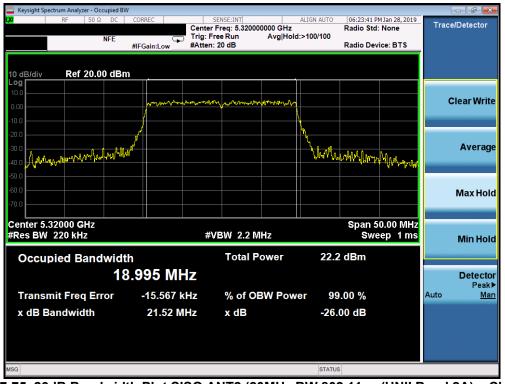
Plot 7-73. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 52)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 54 of 250
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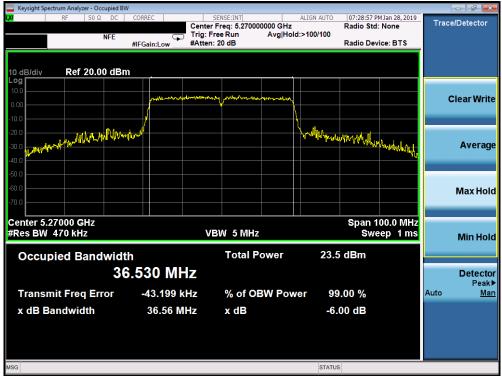
Plot 7-74. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)



Plot 7-75. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 64)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage FE of 250
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Plot 7-76. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



Plot 7-77. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)

FCC ID: A3LSMG977U	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage FC of 250
1M1901100003-09.A3L	01/22/2019 - 03/25/2019	Portable Handset		Page 56 of 259
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🔤 Keysight Spectrum Analyzer - Occupied					
<mark>ι XI</mark> RF 50 Ω DC		SENSE:INT r Freg: 5.270000000 GHz	ALIGN AUTO 07:26:50 P Radio Std	M Jan 28, 2019	Trace/Detector
NFE	Trig: F	ree Run Avg Hol	d:>100/100		
	#IFGain:Low #Atter	1: 20 dB	Radio Dev	/ice: BTS	
10 dB/div Ref 20.00 dl	Bm				
Log					
0.00	Margh Lang Margh and	wellower how man and the second			Clear Write
-10.0					
-20.0	*				
-30.0	torte. M		Uner Hermet Loop Carthyles		Average
-40.0			an advance and and and a state of the states	May My March 2	
-50.0					
-60.0					Max Hold
-70.0					
Center 5.27000 GHz #Res BW 470 kHz		BW 5 MHz		l00.0 MHz eep 1 ms	
#RES DW 470 KHZ	v		Swe	eep mis	Min Hold
Occupied Bandwi	dth	Total Power	21.4 dBm		
	37.530 MHz				Detector
	57.550 WIEZ				Detector Peak►
Transmit Freq Error	-29.673 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	37.59 MHz	x dB	-6.00 dB		
MSG			STATUS		
MSG			STATUS		

Plot 7-78. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)



Plot 7-79. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 62)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 57 of 050
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Plot 7-80. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



Plot 7-81. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 59 of 250
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Plot 7-82. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2C) - Ch. 100)



Plot 7-83. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2C) - Ch. 120)

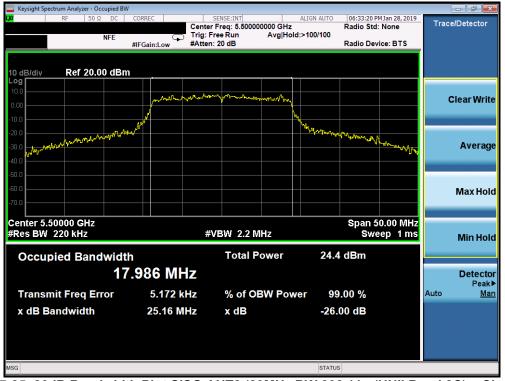
FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 250
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Plot 7-84. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2C) - Ch. 144)



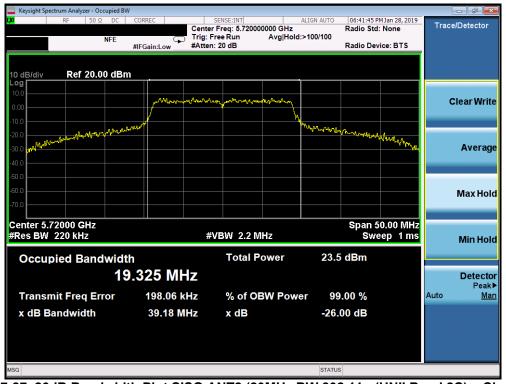
Plot 7-85. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 60 of 250
1M1901100003-09.A3L	01/22/2019 - 03/25/2019	Portable Handset		Page 60 of 259
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Plot 7-86. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2C) - Ch. 120)



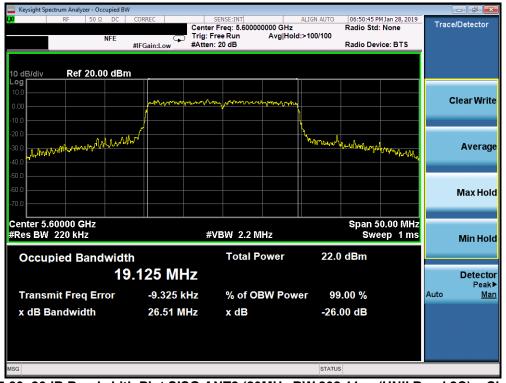
Plot 7-87. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2C) - Ch. 144)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 61 of 250
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Plot 7-88. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 100)



Plot 7-89. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager						
Test Report S/N:	Test Dates:	EUT Type:		Dage 62 of 250						
1M1901100003-09.A3L	01/22/2019 - 03/25/2019		Page 62 of 259							
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Keysight Spectrum Analyzer - Oe	ccupied BW									- # X
ιχι RF 50 Ω	2 DC COF	REC		ISE:INT eq: 5.72000	0000 GHz	ALIGN AUTO	06:51:44 P Radio Std	M Jan 28, 2019	Trac	e/Detector
	NFE	G	Trig: Free	Run		d:>100/100				
	#IFC	Gain:Low	#Atten: 2	0 dB			Radio Dev	rice: BTS		
10 dB/div Ref 20.0	00 dBm									
Log 10.0										
0.00		mann	wpshipson hay	๛๛๛	mont				(Clear Write
-10.0										
	and a					h,				
-20.0 -30.0///////////////////////////	hand the second					Mr. What with a contract of the second secon	workland	Mur.		Average
-30.0 JANW HAW								and the bound		Average
-40.0										
-50.0										
-60.0										Max Hold
-70.0										
Center 5.72000 GHz							Span 5	0.00 MHz		
#Res BW 220 kHz			#VE	W 2.2 M	Hz			ep 1 ms		Min Hold
										Milling
Occupied Band	dwidth			Total P	ower	22.4	dBm			
	19.1	22 MI	z							Detector
Transmit From Fr		44.077		0/ -6 0	DIA/ D		00.0/		Auto	Peak▶ Man
Transmit Freq Er	ror ·	14.977			3W Pow		.00 %		Auto	Ivian
x dB Bandwidth		27.16 N	IHz	x dB		-26.	00 dB			
MSG						STATUS				

Plot 7-90. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 144)



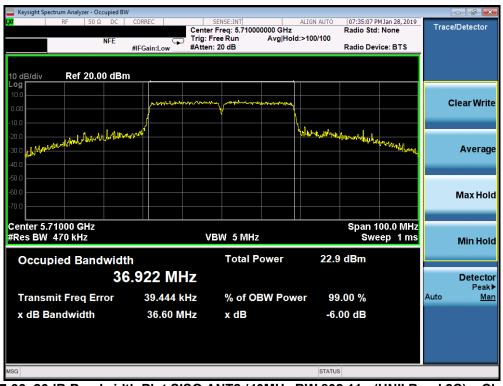
Plot 7-91. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2C) - Ch. 102)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager						
Test Report S/N:	Test Dates:	EUT Type:		Dogo 62 of 250						
1M1901100003-09.A3L	01/22/2019 - 03/25/2019	Portable Handset	Page 63 of 259							
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🔤 Keysight Spectrum Analyzer - Occupie	ed BW				
LXI RF 50 Ω D		SENSE:INT ter Freg: 5.590000000 G	ALIGN AUTO	07:34:00 PM Jan 28, Radio Std: None	2019 Trace/Detector
NEE	Trig	:Free Run Avg	Hold:>100/100	Radio Stu. None	
	#IFGain:Low #Att	ten: 20 dB		Radio Device: BT	S
10 dB/div Ref 20.00 d	IBm				
Log					
0.00	mound	my mound	ww		Clear Write
		Ŷ			
-10.0	1		Mala hand		
-20.0	Anothe India		V N W W	When the strength of the stren	
-30.0					<mark>Mn,</mark> Average
-40.0					
-50.0					
-60.0					Max Hold
-70.0					maxriora
Center 5.59000 GHz				Span 100.0 I	
#Res BW 470 kHz		VBW 5 MHz		Sweep 1	ms Min Hold
Occupied Bandwi	idth	Total Powe	r 23.0	0 dBm	
	36.713 MHz				Detector Peak►
Transmit Freq Error	-39.049 kHz	% of OBW F	ower 99	9.00 %	Auto <u>Man</u>
x dB Bandwidth	36.49 MHz	x dB	-6.	.00 dB	
MSG			STATU	S	

Plot 7-92. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)



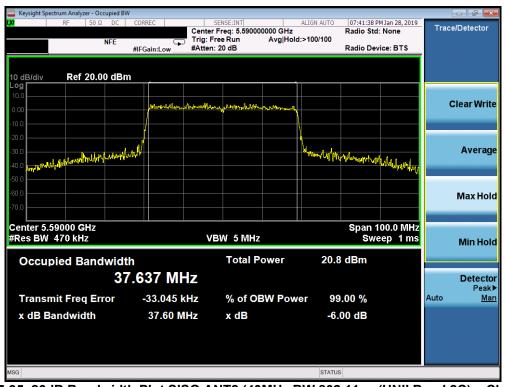
Plot 7-93. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 2C) - Ch. 142)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager						
Test Report S/N:	Test Dates:	EUT Type:		Dage 64 of 250						
1M1901100003-09.A3L	01/22/2019 - 03/25/2019	Portable Handset		Page 64 of 259						
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Keysight Spectrum Analyzer - Occupied BW								- 0 ×
LXI RF 50 Ω DC	CORREC	SENSE:INT enter Freg: 5.51000		ALIGN AUTO	07:40:47 P	M Jan 28, 2019	Trac	e/Detector
NEE		rig: Free Run	Avg Hold:	:>100/100	Raulo Stu.	None		
	#IFGain:Low 📕 #/	Atten: 20 dB			Radio Dev	ice: BTS		
10 dB/div Ref 20.00 dBm								
Log								
10.0	manumala	Mar mar Brandershall	nt.Martine sh					Clear Write
0.00								
-10.0								
-20.0								
-30.0	₩			"altrated and	allowed to a			Average
-40.0					A IN ALL ALL ALLA	Milly My Marcha		
-50.0								
-60.0								Max Hold
-70.0								Μάλ Πυίμ
10.0								
Center 5.51000 GHz						00.0 MHz		
#Res BW 470 kHz		VBW 5 MHz			Swe	ep 1 ms		Min Hold
		Total P	lawar	24.0	dBm			
Occupied Bandwidth			Ower	21.0	иыш			
37.	555 MHz							Detector
Tronomit Frog Free	22 456 644	% of O			00.9/		Auto	Peak▶ Man
Transmit Freq Error	-33.456 kHz		BW Powe	er 99	.00 %		Auto	Ivian
x dB Bandwidth	37.63 MHz	x dB		-6.	00 dB			
MSG				STATUS				

Plot 7-94. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 102)



Plot 7-95. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 65 of 250
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Keysight Spectrum Analyzer - O										- đ -
ιχι RF 50 Ω	2 DC COF	REC		NSE:INT reg: 5.71000	0000 GHz	ALIGN AUTO	07:42:26 P Radio Std	M Jan 28, 2019	Trac	e/Detector
	NFE	G	Trig: Free	e Run		d:>100/100				
,	#IFC	Gain:Low	#Atten: 2	0 dB			Radio Dev	ice: BTS		
10 dB/div Ref 20.0	00 dBm									
Log 10.0										
0.00		mound	mortion	milination	Abolish how					Clear Write
-10.0		1								
-20.0		}								
	- 1-MB 1 M					Minney Indiana				Average
A Prophylic Contract Contract	MAN ROUND A						MAL PAPERDAN	which have		Average
-50.0										
-60.0										Max Hold
-70.0										
Center 5.71000 GHz							Span 1	00.0 MHz		
#Res BW 470 kHz			VB1	N/5 MHz				ep 1 ms		Min Hold
										Milling
Occupied Band	dwidth			Total P	ower	21.2	dBm			
	37.7	51 Mł	z							Detector
Tronowit From Fr		42 005 1		%			00.0/		Auto	Peak▶ Man
Transmit Freq Er	ror ·	13.885			3W Pow		.00 %		Auto	Ivian
x dB Bandwidth		37.73 N	IHz	x dB		-6.	00 dB			
MSG						STATUS	3			

Plot 7-96. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11ax (UNII Band 2C) – Ch. 142)



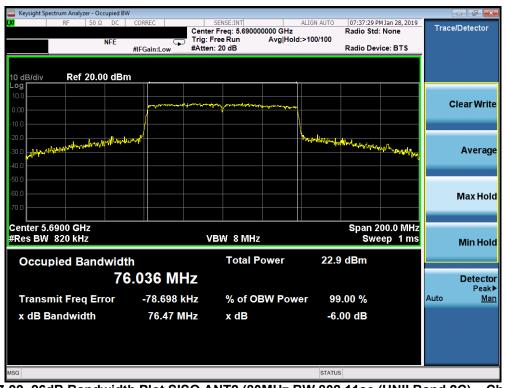
Plot 7-97. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager						
Test Report S/N:	Test Dates:	EUT Type:		Dage 66 of 250						
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Keysight Spectrum Analyzer - Oce										
L <mark>X/</mark> RL RF 50 Ω	DC COR	REC		NSE:INT eq: 5.61000	0000 GH7	ALIGN AUTO	06:05:01 P Radio Std	M Feb 25, 2019	Trac	e/Detector
	NFE		Trig: Free	e Run		d: 100/100	Radio Stu	. None		
	#IFG	ain:Low	#Atten: 2	0 dB			Radio Dev	rice: BTS		
10 dB/div Ref 20.0	0 dBm									
Log 10.0										
		water weather	alle all and a state	\.	moreneway					Clear Write
0.00										
-10.0										
-20.0	and Marinal					w/m/www.	na stationa			
							nar Andrithi	WWW WWWW		Average
-40.0										
-50.0										
-60.0										Max Hold
-70.0										Muxitolu
Center 5.6100 GHz								00.0 MHz		
#Res BW 1 MHz			VBV	/BW 8MHz Sweep 1ms						Min Hold
Occupied Band	width			Total P	ower	22.8	dBm			
				- otai -						
	75.8	88 MI	Z							Detector Peak▶
Transmit Freq Err	or -	156.17 k	Hz	% of O	3W Pow	ver 99	.00 %		Auto	Peak ► <u>Man</u>
x dB Bandwidth		94.54 M		x dB		26	00 dB			
		94.94 M	ΠΖ	хав		-20.	00 aB			
MSG						STATUS	5			

Plot 7-98. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)



Plot 7-99. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 138)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager						
Test Report S/N:	Test Dates:	EUT Type:		Page 67 of 259						
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Keysight Spectrum Analyzer - Occu										
LXI RF 50 Ω	DC COR	REC		NSE:INT eq: 5.53000	0000 GHz	ALIGN AUTO	07:38:31 P Radio Std	M Jan 28, 2019	Trac	e/Detector
N	NFE	L L	Trig: Free	Run		d:>100/100				
	#IFC	Gain:Low	#Atten: 2	0 dB			Radio Dev	rice: BTS		
10 dB/div Ref 20.00) dBm									
Log 10.0										
0.00		manner	Window Jose way	والمرادات المراقية والار	Allow the second					Clear Write
-10.0										
-20.0										
20.0	d all					4				Average
to the second second	wash the					What Hay and	hidely de se la			Average
Page 4 - F							and have been allowed have	www.www.		
-50.0										
-60.0										Max Hold
-70.0									_	
Center 5.5300 GHz							Span 2	00.0 MHz		
#Res BW 820 kHz			VBV	N 8 MHz				eep 1 ms		Min Hold
Occupied Bandy				Total P	ower	20.8	dBm			
	77.0	22 MI	Ηz							Detector
Tronomit Frog Fre		154.60		% of O	3W Pow	00	.00 %		Auto	Peak▶ Man
Transmit Freq Erro	-				SW POW				Auto	IVIAII
x dB Bandwidth		77.47 N	IHz	x dB		-6.	00 dB			
MSG						STATUS	6			

Plot 7-100. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 106)



Plot 7-101. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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Keysight Spectrum Analyzer - Occupied B\	N				
LXI RF 50 Ω DC	CORREC	SENSE:INT ter Freg: 5.690000000 GHz	ALIGN AUTO	07:39:25 PM Jan 28, 2019 Radio Std: None	Trace/Detector
NFE	Trig:	:FreeRun Avg Ho	old:>100/100		
	#IFGain:Low #Atte	en: 20 dB		Radio Device: BTS	
10 dB/div Ref 20.00 dBr	n				
Log 10.0					
0.00	wahnamar gouthout	mm number almender			Clear Write
-10.0					
-20.0					
					Average
-30.0	n Nati		WITH MAY MAN	Murander por allowing a	Average
DOLAR A L				and and the second of the	
-50.0					
-60.0					Max Hold
-70.0					
Center 5.6900 GHz				Span 200.0 MHz	
#Res BW 820 kHz		VBW 8 MHz		Sweep 1 ms	Min Hold
					Wiin Hold
Occupied Bandwidt	th	Total Power	20.8	dBm	
77	7.006 MHz				Detector
	454 00 111		0.0	00.00	Peak►
Transmit Freq Error	-154.02 kHz	% of OBW Po	wer 99	.00 %	Auto <u>Man</u>
x dB Bandwidth	77.38 MHz	x dB	-6.	00 dB	
MSG			STATUS	3	

Plot 7-102. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ax (UNII Band 2C) – Ch. 138)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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7.3 6dB Bandwidth Measurement – 802.11a/n/ac/ax §15.407 (e); RSS-Gen [6.2]

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 antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 6dB bandwidth.

In the 5.725 – 5.850GHz band, the 6dB bandwidth must be \geq 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 6.9.2 KDB 789033 D02 v02r01 – Section C

Test Settings

- The signal analyzers' automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 100 kHz
- 3. VBW <u>></u> 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple

Test Setup

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



Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None.

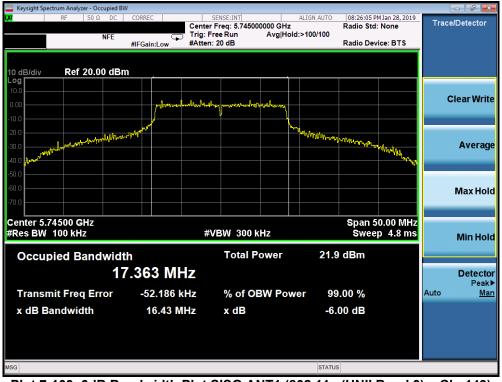
FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 70 of 250	
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SISO Antenna-1 6 dB Bandwidth Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 6dB Bandwidth [MHz]
	5745	149	а	6	16.43
	5785	157	а	6	16.39
	5825	165	а	6	16.41
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	17.64
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	17.63
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	17.62
e	5745	149	ax (20MHz)	6.5/7.2 (MCS0)	19.06
Band	5785	157	ax (20MHz)	6.5/7.2 (MCS0)	19.04
ä	5825	165	ax (20MHz)	6.5/7.2 (MCS0)	19.09
	5755	151	n (40MHz)	13.5/15 (MCS0)	36.41
	5795	159	n (40MHz)	13.5/15 (MCS0)	36.04
	5755	151	ax (40MHz)	13.5/15 (MCS0)	37.68
	5795	159	ax (40MHz)	13.5/15 (MCS0)	37.74
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	75.72
	5775	155	ax (80MHz)	29.3/32.5 (MCS0)	77.92

Table 7-4. Conducted Bandwidth Measurements SISO ANT1



Plot 7-103. 6dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 3) - Ch. 149)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
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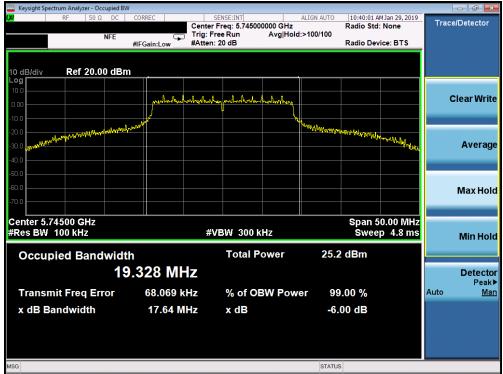




Plot 7-105. 6dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 3) - Ch. 165)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)		SAMS		Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 70 of 250		
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Plot 7-106. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 3) - Ch. 149)



Plot 7-107. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 3) - Ch. 157)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-108. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 3) - Ch. 165)



Plot 7-109. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 3) - Ch. 149)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Daga 74 of 250	
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🔤 Keysight Spectrum Analyzer - Oe	ccupied BW									- đ - X
ιχι RF 50 Ω	2 DC COF	REC		NSE:INT reg: 5.78500	0000 GHz	ALIGN AUTO	10:57:23 A Radio Std	M Jan 29, 2019	Trac	e/Detector
	NFE	<u> </u>	Trig: Fre	e Run		d:>100/100	Raulo Stu	. None		
	#IFC	Gain:Low	#Atten: 2	0 dB			Radio Dev	vice: BTS		
10 dB/div Ref 20.0)0 dBm									
Log										
10.0			montantantan	anti cha ultai						Clear Write
0.00		And a set of the set of the set	and we have a set of the	and a drive for the	- weeks at her of the					
-10.0		-								
-20.0	A DOWN OF ANY ANY					The second	withours			
-30.0	AMANMAN						NIP CONTRACTOR	www.oglanger		Average
-40.0								<u>т</u>		
-50.0										
-60.0										Maxilald
-70.0										Max Hold
-70.0										
Center 5.78500 GHz							Span 5	0.00 MHz		
#Res BW 100 kHz			#VE	300 k	Hz		Swee	p 4.8 ms		Min Hold
						0.0.1				
Occupied Band				Total P	ower	23.5	i dBm			
	19.0	66 MI	Ηz							Detector
										Peak▶
Transmit Freq Er	ror	-8.282	KHZ	% of O	BW Pow	/er 99	.00 %		Auto	<u>Man</u>
x dB Bandwidth		19.04 N	IHz	x dB		-6.	00 dB			
MSG						STATUS				
MoG						STATUS				

Plot 7-110. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 3) - Ch. 157)



Plot 7-111. 6dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 3) - Ch. 165)

FCC ID: A3LSMG977U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
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🔤 Keysight Spectrum Analyzer - Occu	ipied BW				- 6 -
LX RF 50 Ω		SENSE:INT enter Freg: 5.755000000 GH		AM Jan 29, 2019	Trace/Detector
N	FE 🖵 🗓		lold:>100/100	evice: BTS	
	#IFGain:Low ##	Atten: 20 dB	Radio Di	evice: DTS	
10 dB/div Ref 20.00	dBm				
10.0					
0.00	Ja Jala Ja Jaka Markey Ander	here have have here have here here here here here here here he	*		Clear Write
-10.0			•		
-20.0	1		anter and the second of the second of the		
-30.0	Vr-ghten and a		and the states of the second second	Willing a work of the second s	Average
-40.0 MM/M/				All all a second se	
-50.0					
-60.0					Max Hold
-70.0					
Center 5.75500 GHz			Snan	100.0 MHz	
#Res BW 100 kHz		#VBW 300 kHz		ep 9.6 ms	Min Hold
				_	WIIITHOID
Occupied Bandy	width	Total Power	23.7 dBm		
	36.413 MHz				Detector
Transmit Freq Erro	or 7.687 kHz	% of OBW Po	wer 99.00 %		Peak▶ Auto Man
x dB Bandwidth	36.41 MHz	x dB	-6.00 dB		
			, ,		
MSG			STATUS		

Plot 7-112. 6dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 3) - Ch. 151)



Plot 7-113. 6dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 3) - Ch. 159)

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RF SO 2 DC CORREC SEMENTING ALIGN AUTO 10:53:19 AUTA Trace/Detector NFE Trace/Detector NFE Trace/Detector MEE Trace/Detector NFE Trace/Detector ALIGN AUTO 10:53:19 AUTA Trace/Detector Radio Std: None Radio Device: BTS Radio Device: BTS Trace/Detector Trace/Detector Clear Write OC	🔤 Keysight Spectrum Analyzer - Occupied BW						
10 dB/div Ref 20.00 dBm 10 dB/div Ref 20.00 dBm		Center Trig: F	Freq: 5.755000000 GHz ree Run Avg Hold	Radio St d:>100/100	d: None	Trace/Detector	
100 1							
200 300	0.00	Muhamahadad	lite proballe hall a land a fralley leger fra			Clear Write	
60.0 70.0 Max Hold 70.0 Span 100.0 MHz Max Hold Center 5.75500 GHz #Res BW 100 kHz #VBW 300 kHz Span 100.0 MHz Sweep 9.6 ms Min Hold Occupied Bandwidth 37.531 MHz Total Power 21.9 dBm Detector Transmit Freq Error -31.263 kHz % of OBW Power 99.00 % Auto	-20.0 -30.0 -40.0			Vitemarrierarcherarch	and role that the state of the	Average	
#Res BW 100 kHz #VBW 300 kHz Sweep 9.6 ms Occupied Bandwidth Total Power 21.9 dBm 37.531 MHz Detector Transmit Freq Error -31.263 kHz % of OBW Power 99.00 %	-60.0					Max Hold	
37.531 MHz Detector Transmit Freq Error -31.263 kHz % of OBW Power 99.00 %	#Res BW 100 kHz			Swe		Min Hold	
	o o cupica Ballamaan						

Plot 7-114. 6dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 3) - Ch. 151)



Plot 7-115. 6dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 3) - Ch. 159)

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