

PCTEST ENGINEERING LABORATORY, INC.

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# MEASUREMENT REPORT FCC PART 15.407 / ISED RSS-247 UNII 802.11a/n/ac/ax

#### Applicant Name:

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

Date of Testing: 12/14/2018 - 1/14/2019 **Test Site/Location:** PCTEST Lab. Columbia, MD, USA **Test Report Serial No.:** 1M1811230206-06.A3L

# FCC ID:

## A3LSMG9730

Certification

**APPLICANT:** 

# Samsung Electronics Co., Ltd.

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

SM-G9730 SM-G9738 Portable Handset 5180 - 5825MHz Unlicensed National Information Infrastructure (UNII) Part 15 Subpart E (15.407) RSS-247 Issue 2 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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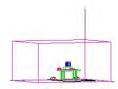


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# **MEASUREMENT REPORT**



	Ohannal		AN	JT1	AN	IT2	CDD/	MIMO
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	70.632	18.49	70.469	18.48	139.970	21.46
2A	20	5260 - 5320	70.632	18.49	69.024	18.39	134.941	21.30
2C	20	5500 - 5720	67.608	18.30	69.343	18.41	124.182	20.94
3		5745 - 5825	70.632	18.49	70.632	18.49	132.750	21.23
1		5190 - 5230	55.590	17.45	53.703	17.30	105.345	20.23
2A	40	5270 - 5310	53.827	17.31	52.966	17.24	106.177	20.26
2C	40	5510 - 5710	54.828	17.39	55.976	17.48	108.699	20.36
3		5755 - 5795	55.976	17.48	53.580	17.29	55.976	17.48
1		5210	17.660	12.47	19.815	12.97	19.346	12.87
2A	80	5290	17.458	12.42	19.187	12.83	18.987	12.78
2C	00	5530 - 5690	41.495	16.18	44.463	16.48	88.316	19.46
3		5775	42.170	16.25	42.954	16.33	83.952	19.24

**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: A3LSMG9730. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

Test Device Serial No.: 0050M, 0162M, 1236M, 0160M, 0218M, 1222M

#### 2.2 **Device Capabilities**

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA, Multi-band LTE, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, ANT+

	Band 1		Band 2A		Band 2C		Band 3
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	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 2.4.90	$\frac{110}{2}$	02 11m / 802 11aa /		requeres / Chenn	al Onara	tiono

el Operations Table 2-1. 802.11a / 802.11n / 802.11ac (20M

	Band 1
Ch.	Frequency (MHz)
38	5190
:	:
46	5230

	Band 2A
Ch.	Frequency (MHz)
54	5270
:	:
62	5310

С

Hz) Frequency / Chann				
	Band 2C			
Ch.	Frequency (MHz)			
102	5510			
:	:			
118	5590			
:	:			

5710

Band 3	
Frequency	

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

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

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	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 (80MHz BW) Frequency / Channel Operations

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#### Notes:

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 IVI			ANT2	CDD/MIMO		
	а	98.6	98.8	98.8		
	n (HT20)	98.6	98.6	98.6		
	ac (HT20)	98.6	98.6	98.6		
	ax(HT20)	99.1	99.1	98.3		
5GHz	n (HT40)	98.5	98.5	98.5		
	ac (HT40)	98.5	98.5	98.5		
	ax(HT40)	98.3	98.3	99.6		
	ac(HT80)	98.4	98.4	98.8		
	ax (HT80)	99.5	99.5	98.7		

#### Table 2-4. Measured Duty Cycles

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

V			SO	SDM		CDD	
WiFi Configurations		ANT1	ANT2	ANT1	ANT2	ANT1	ANT2
	11a	✓	✓	×	×	✓	✓
FOU-	11n/ac/ax (20MHz)	✓	✓	✓	✓	✓	✓
5GHz	11n/ac/ax (40MHz)	✓	✓	✓	✓	✓	✓
	11ac/ax (80MHz)	✓	✓	✓	✓	✓	✓

Table 2-5. Frequency / Channel Operations

 $\checkmark$  = Support ; \* = NOT Support

**SISO** = Single Input Single Output

**SDM** = Spatial Diversity Multiplexing – MIMO function

**CDD** = Cyclic Delay Diversity - 2Tx Function

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3. 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.

Description	2.4 GHz Emission	5 GHz Emission
Antenna	1	2
Channel	11	157
Operating Frequency (MHz)	2462	5785
Data Rate (Mbps)	1	6
Mode	802.11b	802.11a

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

## 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	11	157
Operating Frequency (MHz)	2462	5785
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	157
Operating Frequency (MHz)	2462	5785
Data Rate (Mbps)	1	6
Mode	802.11b	802.11a

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

## 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 0 for AC line conducted emissions test setups, 7.6 and 7.7 for radiated emissions test setups, and 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 flush against the flat surface of authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The WCP is designed with the flat charging surface angled 45 degrees relative to a horizontal surface on which the WCP rests. The worst case radiated emissions data is shown in this report.

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# 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 Line-Conducted Test Data. 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)	1/23/2018	Annual	1/23/2019	WL25-1
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
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	3117	1-18 GHz DRG Horn (Medium)	12/1/2016	Biennial	12/1/2018	125518
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	12/27/2016	Biennial	12/27/2018	114451
Huber + Suhner	Sucoflex 102A	40GHz Radiated Cable Set	1/23/2018	Annual	1/23/2019	251425001
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	1/23/2018	Annual	1/23/2019	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	1/24/2018	Annual	1/24/2019	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	1/24/2018	Annual	1/24/2019	100037
Seekonk	NC-100	Torque Wrench	12/28/2017	Annual	12/28/2018	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.

FCC ID: A3LSMG9730	HEWELANNE LALENA THAT	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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# 7.0 TEST RESULTS

## 7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	A3LSMG9730
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)	CONDUCTED	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])		PASS	Section 7.4
15.407 (a.1.iv), (a.2), (a.3)	RSS-247 [6.2]	Maximum Power Spectral Density	Maximum power spectral density must meet the limits detailed in 15.407 (a) (RSS-247 [6.2])		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, 7.7
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
15.407	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 (RSS-Gen [8.8]) limits	LINE CONDUCTED	PASS	Section 0

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.
- 6) Per RSS-247 Section 6.2.3, transmission on channels which overlap the 5600-5650 MHz is prohibited. This device operates under these frequencies only under the control of a certified master device and does not support active scanning on these channels. This device does not transmit any beacons or initiate any transmissions in UNII Bands 2A or 2C.

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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  $\geq$  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 [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
	5180	36	а	6	30.12
	5200	40	a	6	31.11
	5240	48	a	6	33.38
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	36.07
Band 1	5200	40	n (20MHz)	6.5/7.2 (MCS0)	37.55
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	36.62
	5180	36	ax (20MHz)	8.6 (MCS0)	21.72
pu	5200	40	ax (20MHz)	8.6 (MCS0)	39.07
Ba	5240	48	ax (20MHz)	8.6 (MCS0)	32.57
	5190	38	n (40MHz)	13.5/15 (MCS0)	74.94
	5230	46	n (40MHz)	13.5/15 (MCS0)	74.27
	5190	38	ax (40MHz)	17.2 (MCS0)	42.32
	5230	46	ax (40MHz)	17.2 (MCS0)	51.91
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	98.87
	5210	42	ax (80MHz)	36 (MCS0)	81.48
	5260	52	a	6	30.54
	5280	56	a	6	31.96
	5320	64	a	6	30.67
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	40.30
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	34.95
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	34.97
₹	5260	52	ax (20MHz)	8.6 (MCS0)	35.37
Band 2A	5280	56	ax (20MHz)	8.6 (MCS0)	32.71
Ban	5320	64	ax (20MHz)	8.6 (MCS0)	32.80
_	5270	54	n (40MHz)	13.5/15 (MCS0)	73.74
	5310	62	n (40MHz)	13.5/15 (MCS0)	74.40
	5270	54	ax (40MHz)	17.2 (MCS0)	50.00
	5310	62	ax (40MHz)	17.2 (MCS0)	44.89
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	123.50
	5210	58	ax (80MHz)	36 (MCS0)	81.30
	5500	100	a (conviria)	6	30.23
	5600	120	a	6	32.14
	5720	144	a	6	32.63
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	36.20
	5600	120	n (20MHz)	6.5/7.2 (MCS0)	37.31
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	35.32
	5500	100	ax (20MHz)	8.6 (MCS0)	35.69
	5600	120	ax (20MHz)	8.6 (MCS0)	31.07
	5720	144	ax (20MHz)	8.6 (MCS0)	27.85
N.	5510	102	n (40MHz)	13.5/15 (MCS0)	76.94
Band 2C	5590	118	n (40MHz)	13.5/15 (MCS0)	74.50
Bar	5710	142	n (40MHz)	13.5/15 (MCS0)	75.11
	5510	102	ax (40MHz)	17.2 (MCS0)	45.68
	5590	118	ax (40MHz)	17.2 (MCS0)	48.24
	5710	142	ax (40MHz)	17.2 (MCS0)	40.14
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	117.00
	5610	122	ac (80MHz)	29.3/32.5 (MCS0)	131.90
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	127.50
	5530	106	ax (80MHz)	36 (MCS0)	81.04
	5610	122	ax (80MHz)	36 (MCS0)	82.04
	5690	138	ax (80MHz)	36 (MCS0)	81.11
Tahl				Measuremen	
	TEST		IEASUREMENT	REPORT	SAMSUNG
A LEFTRE	NEW LABORATION INC.		(CERTIFICA	HON)	
Date	s:	EUT Typ	e:		

FUU ID: A3LSMG9730	THE WEATHY LABORATION, INC.	(CERTIFICATION)	SAMSUNG	Quality Manager
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by:

FCC ID: A3LSMG9730





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

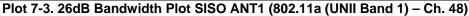


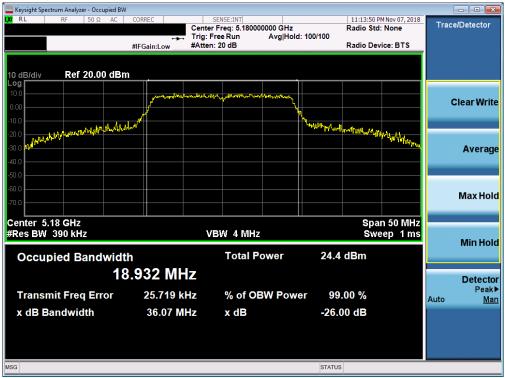
Plot 7-2. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 1) – Ch. 40)

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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)



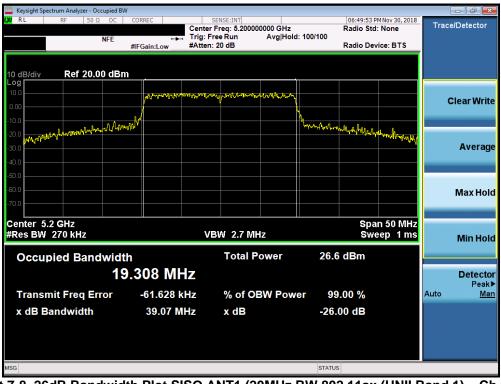
Plot 7-6. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Occupied BV	V					
LX/RL RF 50Ω AC	CORREC	SENSE:INT enter Freg: 5.180000000 GHz	04:41:14 P Radio Std	1 Dec 24, 2018	Trace/Detector	
	tipe Tr	ig: Free Run Avg Hol	d: 100/100			
	#IFGain:Low #A	tten: 20 dB	Radio Dev	ice: BTS		
10 dB/div Ref 20.00 dBn	n					
10.0						
0.00		nder manuscher	¥		Clear Write	
-10.0						
-20.0	1		\ <u>\</u>			
-30.0 Martin Martin	พ		mannalynamic		Average	
-30.0				Martin	J	
-50.0						
-60.0						
-70.0					Max Hold	
-70.0						
Center 5.18 GHz				n 50 MHz		
#Res BW 220 kHz		VBW 2.2 MHz	Swe	ep 1 ms	Min Hold	
Occurried Bondwidt	<b>L</b>	Total Power	23.3 dBm			
Occupied Bandwidt			23.3 ubiii			
19	19.086 MHz					
Transmit Freq Error	-34.870 kHz	% of OBW Pov	ver 99.00 %		Peak▶ Auto <u>Man</u>	
x dB Bandwidth	21.72 MHz	x dB	-26.00 dB			
	21.72 MINZ	X UD	20.00 aB			
MSG			STATUS			

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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Keysight Spectrum Analyzer - Occupied B R RL RF 50 Ω DC	CORREC	SENSE:INT		3:46 PM Nov 30, 2018	Trace/Detector
NFE	Trig:	er Freq: 5.240000000 GHz Free Run Avg Hold n: 20 dB	d: 100/100	o Std: None Device: BTS	Hacebelector
10 dB/div Ref 20.00 dBr					
0.00	and the second s	when more than the second of t			Clear Writ
0.0	w		h. Your Martine and		
0.0 0.0 1.411/1.4.441/1.4.441/1.4.441/1.4.141/1.4.141/1.			Warder Man In Man	What I was a state of the second	Avera
10.0					Avera
50.0					
70.0					Max Ho
enter 5.24 GHz Res BW 360 kHz	١	/BW 4 MHz		Span 50 MHz Sweep 1 ms	Min Ho
Occupied Bandwid	th	Total Power	26.3 dBn	n l	
19	9.426 MHz				Detect
Transmit Freq Error	-160.96 kHz	% of OBW Pow	ver 99.00 %	6	Peak Auto <u>Ma</u>
x dB Bandwidth	32.57 MHz	x dB	-26.00 di	3	
SG			STATUS		

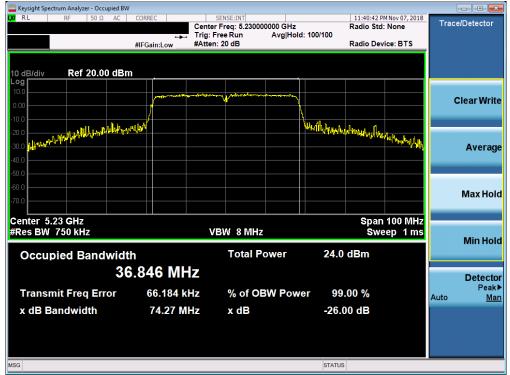
Plot 7-9. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 48)



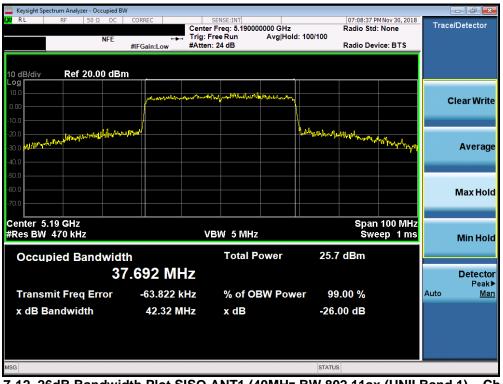
Plot 7-10. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Image: Solution of the solution
NFE      Trig: Free Run      Avg Hold: 100/100      Radio Device: BTS        10 dB/div      Ref 20.00 dBm      Image: Clear Write      Image: Clear Write        10 dB/div      Ref 20.00 dBm      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Write      Image: Clear Write      Image: Clear Write        10 dB/div      Image: Clear Wri
In common      Clear Write        10      dB/div      Ref 20.00 dBm        100
Log Clear Write 100 Cl
Log Clear Write 100 Cl
100  Image: Sector of the sec
0.00  Improvide an Analytic function of the provide and the provide a
-100
20.0
40.0 40.0
40.0 40.0
-50.0
60.0 Max Ho
Max Ho
Center 5.23 GHz Span 100 MHz
#Res BW 470 kHz VBW 5 MHz Sweep 1 ms Min Ho
Occupied Bandwidth Total Power 25.4 dBm
37.804 MHz Detect
Transmit Freg Error -46.026 kHz % of OBW Power 99.00 %
x dB Bandwidth 51.91 MHz x dB -26.00 dB
MSG

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



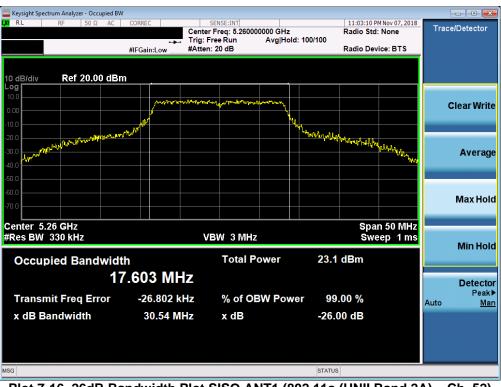
Plot 7-14. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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🔤 Keysight Spectrum Analyzer - Occ	upied BW						
L <mark>X/</mark> RL RF 50 Ω	DC CORREC	SENSE:INT Center Freq: 5.210	00000 GH-	07:24:18 P	MNov 30, 2018	Trace	Detector
	NEE	Trig: Free Run	Avg Hold: 100/100	Raulo Stu.	None		
	#IFGain:Lo	w #Atten: 20 dB		Radio Dev	ice: BTS		
10 dB/div Ref 20.00	0 dBm						
Log							
10.0	441.12	han when when a sould make the	The address of the			<u>د</u>	lear Write
0.00	1					Ľ	ical wille
-10.0							
-20.0							
-20.0 -30.0 atagination	All All and a		The state of the s	whenterman	Mth at out		Average
-40.0					ALL AND		·····j·
-50.0							
-60.0							Max Hold
-70.0							
Center 5.21 GHz			-		200 MHz		
#Res BW 820 kHz		VBW 8 MH	Z	Swe	ep 1 ms		Min Hold
Occupied Band	width	Total	Power 24	.9 dBm			
Occupied Ballu			21				
76.958 MHz						Detector	
Tronomit From Fro	447			0 00 %		Auto	Peak▶ Man
Transmit Freq Err	-14./	38 kHz % of C	OBW Power 9	9.00 %		Auto	INIGU
x dB Bandwidth	81.4	8 MHz x dB	-20	5.00 dB			
MSG			STAT	US			

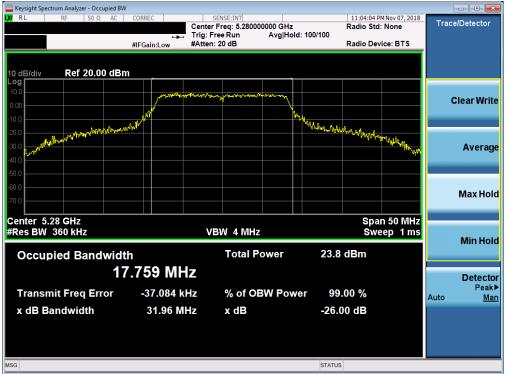
Plot 7-15. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



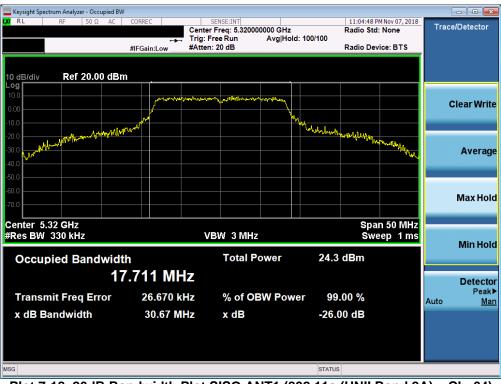
Plot 7-16. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2A) - Ch. 52)

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Plot 7-17. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2A) - Ch. 56)



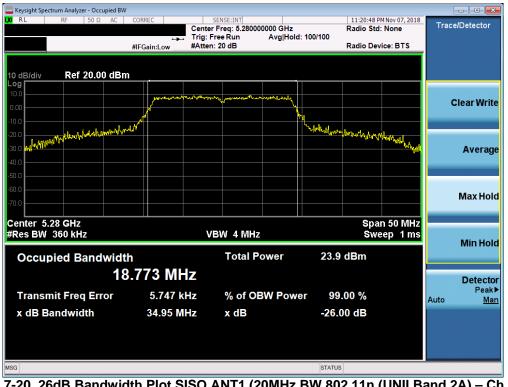
Plot 7-18. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2A) – Ch. 64)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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www.commercenter.com Keysight Spectrum Analyzer - Occupied BV	V				
LXIRL RF 50Ω AC	CORREC	SENSE:INT	0000 GHz	11:19:06 PM Nov 0 Radio Std: None	
	Ţ	rig: Free Run	Avg Hold: 100/100		
	#IFGain:Low #	Atten: 20 dB		Radio Device: B	TS
10 dB/div Ref 20.00 dBi	m				
10.0	مەتل <sup>م</sup> ەپە <sup>ر</sup> ىيەرىيەر	and a second and a s	undithan		
0.00			<u>_</u>		Clear Write
-10.0	17 July 19		Wh.		
-20.0 -20.0	· · ·		TAAL	Mailworkwood the	MM.
-30.0					Average
-40.0					
-50.0					
-60.0					Max Hold
-70.0					Widx Hold
Center 5.26 GHz				Span 50	MHz
#Res BW 390 kHz		VBW 4 MHz		Sweep	1 ms
					Min Hold
Occupied Bandwid		Total Po	ower 24.	7 dBm	
19	9.051 MHz				Detector
Transmit From Error	8.290 kHz	% of OP	W Power 9	9.00 %	Peak▶
Transmit Freq Error					Auto <u>Man</u>
x dB Bandwidth	40.30 MHz	x dB	-26	.00 dB	
MSG			STATU	JS	

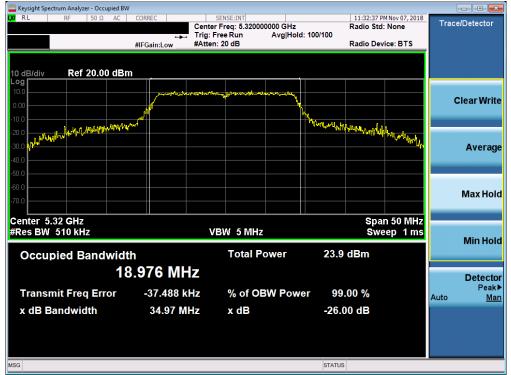
Plot 7-19. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



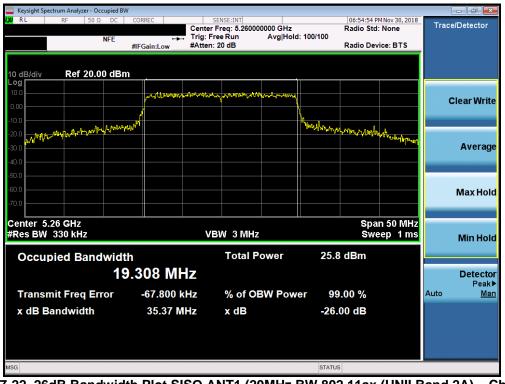
Plot 7-20. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 240
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 27 of 240
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Keysight Spectrum Analyzer - Occupied BW					
NFE	Trig:		Radio S Id: 100/100		Trace/Detector
	#IFGain:Low #Atte	en: 20 dB	Radio D	evice: BTS	
10 dB/div Ref 20.00 dBm					
	ph wash have a farmer	and have a have a start and the	1		Clear Write
-10.0 -20.0 -30.0	v <sup>r</sup>		Hu John Salling State	Manun n	
-30.0				and Harry Par	Average
-50.0					Max Hold
-70.0					Max Hold
Center 5.28 GHz #Res BW 270 kHz		VBW 2.7 MHz		an 50 MHz veep 1 ms	Min Hold
Occupied Bandwidth		Total Power	25.5 dBm		
	19.308 MHz				
Transmit Freq Error	-118.37 kHz	% of OBW Pov	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	32.71 MHz	x dB	-26.00 dB		
MSG			STATUS		

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)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 29 of 240
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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: A3LSMG9730	TREMELATIVE LARMANTPAN, JAL	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 20 of 240
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Keysight Spectrum Analyzer - Occupied BV	V				
RL RF 50Ω DC	🛶 Trig: F	SENSE:INT r Freq: 5.270000000 GHz Free Run Avg Hold h: 20 dB	Radio Std d: 100/100		Trace/Detector
	#IFGain:Low #Atten	1: 20 dB	Radio Dev	VICE: BIS	
10 dB/div Ref 20.00 dBr	n				
	Moradowald	ing alle marine by former line			Clear Write
-10.0					
-20.0 -30.0 10000000000000000000000000000000000	ddrau <sup>by</sup>		With the shall	MULMAN BAAR	Average
-50.0					
-70.0					Max Hold
Center 5.27 GHz #Res BW 390 kHz	V	BW 4 MHz		n 100 MHz eep 1 ms	Min Hold
Occupied Bandwidt	h	Total Power	24.4 dBm		
	7.653 MHz				Detector Peak▶
Transmit Freq Error	-68.091 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	50.00 MHz	x dB	-26.00 dB		
MSG			STATUS		

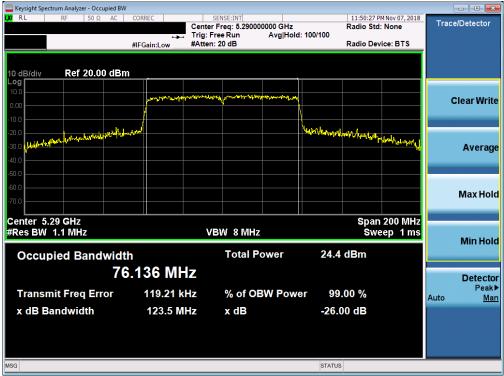
Plot 7-27. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)



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

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 20 of 240
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 30 of 249
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Plot 7-29. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



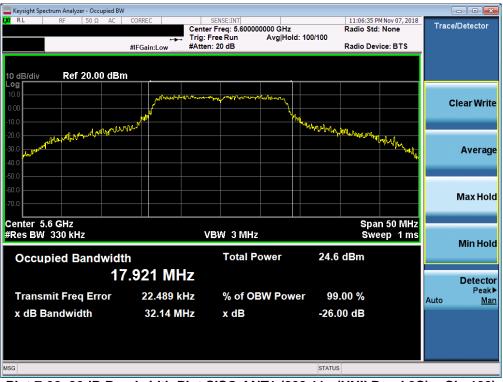
Plot 7-30. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 21 of 240
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 31 of 249
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Baga 22 of 240
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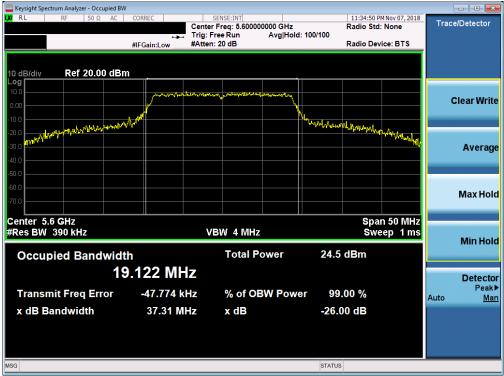
Plot 7-33. 26dB Bandwidth Plot SISO ANT1 (802.11a (UNII Band 2C) - Ch. 144)



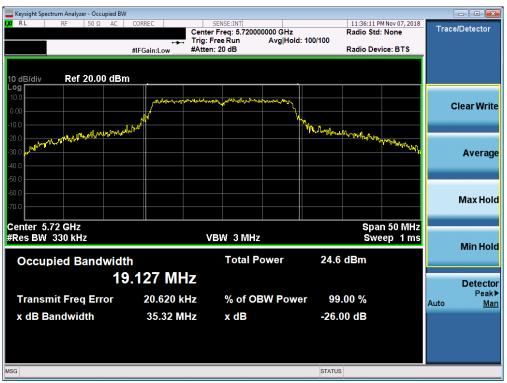
Plot 7-34. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 240
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 24 of 240
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 34 of 249
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Keysight Spectrum Analyzer - Occupied BW		
X      RL      RF      50 Ω      DC      CORREC      SENSE:INT      07:00:33        Center Freg:      5.500000000 GHz      Radio S	PM Nov 30, 2018	Trace/Detector
NEF Trig: Free Run Avg Hold: 100/100		
#IFGain:Low #Atten: 20 dB Radio D	evice: BTS	
10 dB/div Ref 20.00 dBm		
0.00 Allowability and a state of the state o		Clear Write
and the share been as		
-20.0 Antiple of the state of t	When miniled the grant and	Average
-30.0		Average
-40.0		
-50.0		
-60.0		Max Hold
-70.0		
Center 5.5 GHz Sp	an 50 MHz	
	veep 1 ms	Min Hold
	<u> </u>	MITHOU
Occupied Bandwidth Total Power 24.8 dBm		
19.241 MHz		Detector
		Peak►
Transmit Freq Error -90.996 kHz % of OBW Power 99.00 %	A	Auto <u>Man</u>
x dB Bandwidth 35.69 MHz x dB -26.00 dB		
MSG STATUS		

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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 240	
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Keysight Spectrum Analyzer - O										- 6 ×
<b>LXI</b> RL RF 50 9	Ω DC COF	RREC		NSE:INT reg: 5.72000	0000 GHz		07:03:22 P Radio Std	MNov 30, 2018	Trac	e/Detector
	NFE	<b>→</b>	, Trig: Fre	e Run		d: 100/100				
	#IF	Gain:Low	#Atten: 2	0 dB			Radio Dev	/ice: BTS		
10 dB/div Ref 20.	00 dBm									
Log 10.0										
0.00		monton	WM WWWWWW	monter	www.www.way				(	Clear Write
-10.0						l				
	and the second s					Monard R. C.				
-20.0	Walnut I Courts					Wannelson	all	www.malal		Average
30.0								Y		Average
-40.0										
-50.0										
-60.0										Max Hold
-70.0										
Center 5.72 GHz							Spa	n 50 MHz		
#Res BW 270 kHz			VBI	N 2.7 MH	łz			eep 1 ms		Min Hold
				_						Minifierd
Occupied Ban				Total P	ower	23.3	dBm			
19.209 MHz								Detector		
Tana a suit Fas a F		05 504		N/ - 6 OI			00.0/		Auto	Peak►
Transmit Freq E	rror	-95.524	KHZ	% of OI	3W Pow	er 99	.00 %		Auto	Man
x dB Bandwidth		27.85 N	IHz	x dB		-26.	00 dB			
MSG						STATUS	5			

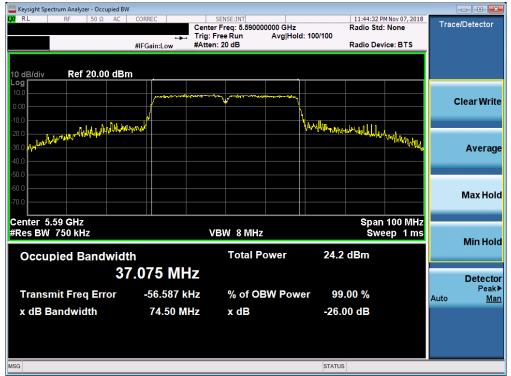
Plot 7-39. 26dB Bandwidth Plot SISO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 144)



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

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 240	
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 27 of 240
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Keysight Spectrum Analyzer - O										- # <b>X</b>
(X/RL RF 50 9	Ω DC COI	RREC		NSE:INT rea: 5.51000	0000 GHz		07:16:00 P Radio Std	MNov 30, 2018	Trac	e/Detector
	NFE	·→-	Trig: Free	Run		d: 100/100				
	#IF	Gain:Low	#Atten: 2	0 dB			Radio Dev	rice: BTS		
10 dB/div Ref 20.	00 dBm	_								
Log 10.0										
0.00		perman	. Ingle / West gor gor and	markense	moundly					Clear Write
-10.0										
	an a thought					at make				
-20.0 -30.0	Hologia N. alia					and fully why	the with the state of the state	WIMPORT I		Average
-40.0								- 1 · 149 W		Average
-50.0										
-60.0										Max Hold
-70.0										
Center 5.51 GHz							Span	100 MHz		
#Res BW 510 kHz			VBV	N 5 MHz				eep 1 ms		Min Hold
						00 (				
Occupied Ban				Total P	ower	23.6	i dBm			
	37.8	23 MF	z							Detector
Tronomit Ener Er	TO T	-85.250 k		% of O			.00 %		Auto	Peak▶ Man
Transmit Freq E					SW POW				Auto	ivian
x dB Bandwidth		45.68 M	Hz	x dB		-26.	00 dB			
MSG						STATU	3			

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



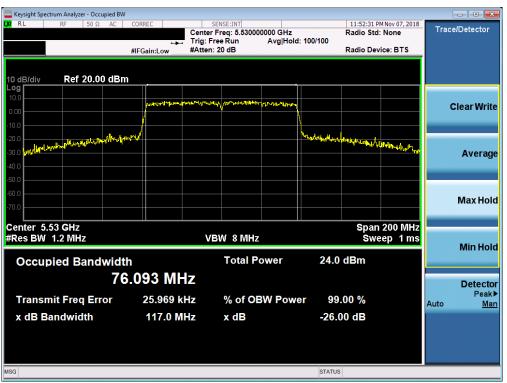
Plot 7-44. 26dB Bandwidth Plot SISO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 29 of 240
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🔤 Keysight Spectrum Analyzer - Occu	pied BW					_	
<mark>LX/</mark> RL RF 50 Ω	DC CORREC	SENSE:INT Center Freq: 5.71000	0000 GHz	07:20:39 Pf Radio Std:	Nov 30, 2018	Tracel	Detector
N	FE 🔸	, Trig: Free Run	Avg Hold: 100/100	)			
	#IFGain:Low	#Atten: 20 dB		Radio Dev	ice: BTS		
10 dB/div Ref 20.00	dBm						
Log 10.0							
0.00	mound	www.h.h.h.h.h.h.h.h.h.h.h.h.h.h.h.h.h.h	amentry.			C	ear Write
-10.0	/					_	
			l l				
-20.0 -30.0	www.www.		howale	-lawylowmangray	n.Jn .n		Average
-40.0					a a white a walk		Average
-50.0							
-60.0							Max Hold
-70.0							
Center 5.71 GHz				Span	100 MHz		
#Res BW 430 kHz		VBW 4 MHz	2		ep 1 ms		Min Hold
		<b>T</b> - 4 - 1 <b>F</b>		2.4 dBm			
Occupied Bandy		Total P	rower 2	2.4 aBM			
	37.712 M	Hz					Detector
Transmit Freq Erro	or -95.366	kHz % of O	BW Power	99.00 %		Auto	Peak▶ Man
						- alo	man
x dB Bandwidth	40.14 N	NHZ X dB	-2	26.00 dB			
MSG			ST	ATUS			

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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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wy Keysight Spectrum Analyzer - Occupied BW						
LXI RL RF 50Ω AC	CORREC	SENSE:INT Center Freg: 5.61000	00000 GHz	11:53:23 PM Radio Std:	Nov 07, 2018 None	Trace/Detector
		Trig: Free Run	Avg Hold: 100/100			
	#IFGain:Low	#Atten: 20 dB		Radio Devi	ce: BTS	
10 dB/div Ref 20.00 dBn	<u> </u>					
10.0						
0.00	and the second s	an Indered Allow Andrew Andrew	and the second se			Clear Write
-10.0						
-20.0	event .		Mary South and	water and the	1-8	
-20.0 -30.0 March					MINN-MM	Average
-40.0						
-50.0						
-60.0						Max Hold
-70.0						Max Hold
Center 5.61 GHz					200 MHz	
#Res BW 1.1 MHz		VBW 8 MHz			ep 1 ms	
						Min Hold
Occupied Bandwidt	h	Total P	ower 23.9	dBm		
76	6.127 MF	7				Detector
						Detector Peak▶
Transmit Freq Error	71.908 k	Hz % of O	3W Power 99	.00 %		Auto <u>Man</u>
x dB Bandwidth	131.9 M	Hz x dB	-26.	00 dB		
MSG			STATU	S		

Plot 7-47. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)



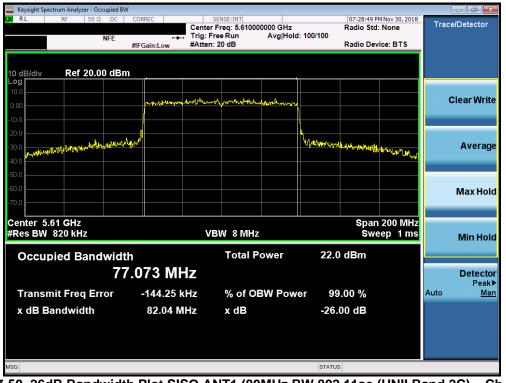
Plot 7-48. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 138)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 240
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🔤 Keysight Spectrum Analyzer - Occupied BW	
IX      RF      50 Ω      DC      CORREC      SENSE:INT      07:27:09 PM Nov 30, 2018        Center Freq: 5,530000000 GHz      Radio Std: None	Trace/Detector
NFE Trig: Free Run Avg Hold: 100/100	
#FGain:Low #Atten: 20 dB Radio Device: BTS	
10 dB/div Ref 20.00 dBm	
10.0	
0.00 multimeterine	Clear Write
-10.0	
-20.0	
000 Wildle Mark Mark Mark Mark Mark Mark Mark Mark	Average
-40.0	
-50.0	
-60.0	Max Hold
-70.0	Maxiloid
Center 5.53 GHz Span 200 MHz #Res BW 820 kHz VBW 8 MHz Sweep 1 ms	
#Res BW 820 kHz VBW 8 MHz Sweep 1 ms	Min Hold
Occupied Bandwidth Total Power 22.7 dBm	
77.067 MHz	Detector
17.007 WI12	Peak►
Transmit Freq Error -243.92 kHz % of OBW Power 99.00 %	Auto <u>Man</u>
x dB Bandwidth 81.04 MHz x dB -26.00 dB	
MSG STATUS	

Plot 7-49. 26dB Bandwidth Plot SISO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)



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

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 240
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Keysight Spectrum Analyzer - Occupied B				
XIRL RF 50Ω DC	Trig:	sense:INT ter Freq: 5.690000000 GHz : Free Run Avg Hol en: 20 dB	07:29:58 PM Nov 3 Radio Std: None Id: 100/100 Radio Device: B	Trace/Detector
10 dB/div Ref 20.00 dB og 		elanan - york kan fan yn fel allan geleran yn g		Clear Write
10.0 20.0 30.0 40.0 <b>11.0 11.0 11.0 11.0 11.0 11.0 11.0 </b>	when		harranderliniperaturenny	Average
50.0 60.0 70.0				Max Hold
enter 5.69 GHz Res BW 820 kHz Occupied Bandwid		VBW 8 MHz Total Power	Span 200 Sweep 21.8 dBm	
	7.053 MHz -82.829 kHz	% of OBW Pov		Detecto Peakl Auto <u>Mar</u>
x dB Bandwidth	81.11 MHz	x dB	-26.00 dB	
SG			STATUS	

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

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 12 of 240
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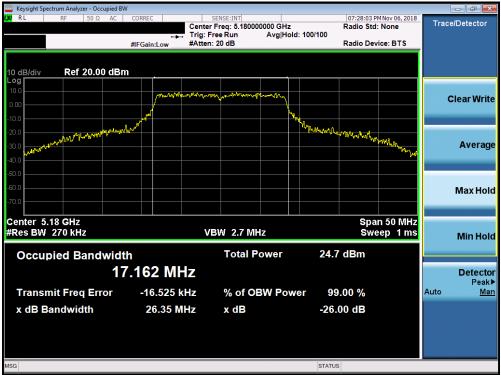
## SISO Antenna-2 26dB Bandwidth Measurements

	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]
	5180	36	а	6	26.35
	5200	40	а	6	26.34
	5240	48	а	6	25.15
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	32.52
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	33.74
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	29.31
Ξ	5180	36	ax (20MHz)	8.6 (MCS0)	29.65
Band 1	5200	40	ax (20MHz)	8.6 (MCS0)	36.20
ш	5240	48	ax (20MHz)	8.6 (MCS0)	32.28
	5190	38	n (40MHz)	13.5/15 (MCS0)	76.00
	5230	46	n (40MHz)	13.5/15 (MCS0)	73.26
	5190	38	ax (40MHz)	17.2 (MCS0)	43.95
	5230	46	ax (40MHz)	17.2 (MCS0)	46.33
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	101.10
	5210	42	ax (80MHz)	36 (MCS0)	80.88
	5260	52	а	6	25.18
	5280	56	а	6	25.28
	5320	64	а	6	29.40
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	30.05
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	33.96
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	34.01
Band 2A	5260	52	ax (20MHz)	8.6 (MCS0)	33.31
and	5280	56	ax (20MHz)	8.6 (MCS0)	33.38
ä	5320	64	ax (20MHz)	8.6 (MCS0)	34.79
	5270	54	n (40MHz)	13.5/15 (MCS0)	76.07
	5310	62	n (40MHz)	13.5/15 (MCS0)	75.41
	5270	54	ax (40MHz)	17.2 (MCS0)	40.87
	5310	62	ax (40MHz)	17.2 (MCS0)	47.59
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	100.50
	5210	58	ax (80MHz)	36 (MCS0)	81.48
	5500	100	а	6	23.62
	5600	120	а	6	24.40
	5720	144	a	6	28.08
	5500	100	n (20MHz)	6.5/7.2 (MCS0)	28.27
	5600	120	n (20MHz)	6.5/7.2 (MCS0)	30.47
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	32.09
	5500	100	ax (20MHz)	8.6 (MCS0)	32.79
	5600	120	ax (20MHz)	8.6 (MCS0)	36.70
0	5720	144	ax (20MHz)	8.6 (MCS0)	37.77
Band 2C	5510	102	n (40MHz)	13.5/15 (MCS0)	76.26
anc	5590	118	n (40MHz)	13.5/15 (MCS0)	73.50
8	5710	142	n (40MHz)	13.5/15 (MCS0)	75.99
	5510	102	ax (40MHz)	17.2 (MCS0)	51.61
	5590	118	ax (40MHz)	17.2 (MCS0)	54.50
	5710	142	ax (40MHz)	17.2 (MCS0)	44.91
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	107.60
	5610	122	ac (80MHz)	29.3/32.5 (MCS0)	94.89
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	106.60
	5530	106	ax (80MHz)	36 (MCS0)	81.09
	5610	122	ax (80MHz)	36 (MCS0)	81.48
	5690	138	ax (80MHz)	36 (MCS0)	81.21
				n Measuremen	its SISO AN
PC	TEST	N	MEASUREMENT (CERTIFICA)		SAMSUNG
Date	s:	EUT Typ			

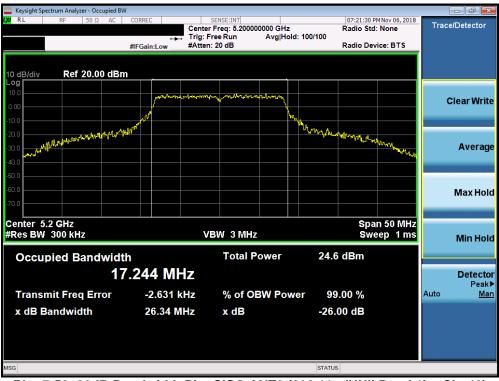
FCC ID: A3LSMG9730	THE WELSTERY LABORATION INL	(CERTIFICATION)	Quality Manager
Test Report S/N:	Test Dates:	EUT Type:	Page 43 of 249
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset	Fage 43 01 249
© 2010 DOTEST Engineering Labora	1/ 0 0 11/10/2010		

FCC ID: A3LSMG9730





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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 44 of 240	
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 44 of 249	
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 45 of 240	
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 45 of 249	
© 2019 PCTEST Engineering Lab	V 8.8 11/19/2018				





Plot 7-56. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)



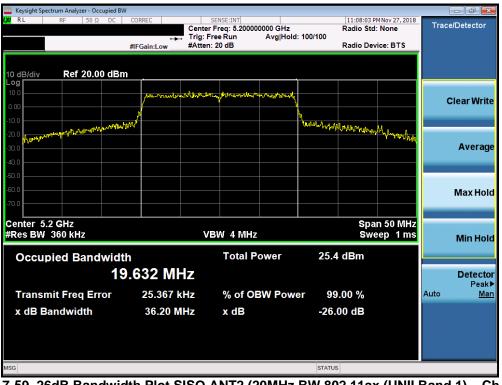
Plot 7-57. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 46 of 240	
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 46 of 249	
© 2019 PCTEST Engineering Labora	V 8.8 11/19/2018				



🔤 Keysight Spectrum Analyzer - Occupied BW						-	- 6 💌
<b>LXI</b> RL RF 50Ω DC (	CORREC	SENSE:INT Center Freg: 5.18000	0000 GHz	11:05:20 Pt Radio Std:	Nov 27, 2018	Tracel	Detector
	·••-	Trig: Free Run	Avg Hold: 100/1	100			
	FGain:Low	#Atten: 20 dB		Radio Dev	ice: BTS		
10 dB/div Ref 20.00 dBm							
10.0	h. http://www.com		and a hereine				
0.00	dealed and a state of	an that have a branche black a series				C	ear Write
-10.0			<u>\</u>				
-20.0 Which mentul propries and which have been and the second se	W.		w <sub>bul</sub>	untwingangergenger			
-30.0 WWww.							Average
-40.0							-
-50.0							
-60.0							
-70.0							Max Hold
Center 5.18 GHz					n 50 MHz		
#Res BW 330 kHz		VBW 3 MHz		Swe	ep 1 ms		Min Hold
Occupied Bandwidth		Total P	ower	24.6 dBm			
19.	280 MH	Z					Detector Peak▶
Transmit Freq Error	18.671 kH	z % of O	3W Power	99.00 %		Auto	Man
x dB Bandwidth	29.65 MI			-26.00 dB			
	29.03 WF			-20.00 uB			
MSG				STATUS			

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



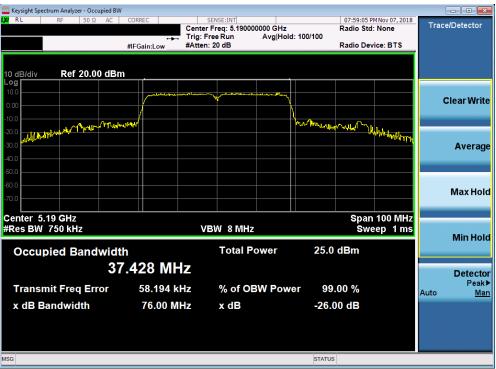
Plot 7-59. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 47 of 240
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 47 of 249
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Keysight Spectrum Analyzer - Occupied BW						×
<b>ΙΧ΄ RL</b> RF 50Ω DC C		SENSE:INT er Freq: 5.240000000 GHz Free Run Avg Hol	11:10:33 Radio Sto d: 100/100	PM Nov 27, 2018 d: None	Trace/Detecto	pr
#		en: 20 dB		vice: BTS		
10 dB/div Ref 20.00 dBm						
10.0	ዀኯዿኯኯኯ	willy warmaniparine			Clear Wi	rita
0.00					Clearwi	rite
-10.0	<b>M</b>		Ми д.			
-20.0 - and har hour property and har and			My Man Way well for a	Marked of a		
-30.0 VVVVVV					Avera	age
-40.0						
-50.0						
-60.0					Max H	old
-70.0						
Center 5.24 GHz			Sn/	an 50 MHz		
#Res BW 240 kHz		VBW 2.4 MHz		eep 1 ms	Min H	old
		T-4-1 D	05 0 JD			ona
Occupied Bandwidth		Total Power	25.3 dBm			
19.2	269 MHz				Detec	
Transmit Freq Error	-23.150 kHz	% of OBW Pow	ver 99.00 %			ak▶ <u>Man</u>
x dB Bandwidth	32.28 MHz	x dB	-26.00 dB			
MSG			STATUS			

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



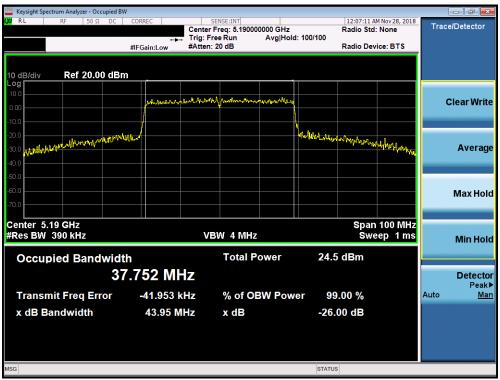
Plot 7-61. 26dB Bandwidth Plot SISO ANT2 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 48 of 240	
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 48 of 249	
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Keysight Spectrum Analyzer - Occupied BW RL RF 50 Ω AC	Trig	SENSE:INT nter Freq: 5.230000000 GH g: Free Run Avg H tten: 20 dB	lz Rad lold: 100/100	03:49 PM Nov 07, 2018 io Std: None io Device: BTS	Trace/Detector
0 dB/div Ref 20.00 dBm	prover and the	man aunanduranessa	$\sim$		ClearWrit
0.0 0.0 0.0 0.0 0.0 0.0 0.0			Murnadurau	Multiple of the start	Averag
0.0				Span 100 MHz	Max Hol
Res BW 680 kHz Occupied Bandwidtl	1	VBW 6 MHz Total Power	24.7 dBr	Sweep 1 ms	Min Hol
	.113 MHz				Detect
Transmit Freq Error x dB Bandwidth	18.305 kHz 73.26 MHz	% of OBW Po x dB	wer 99.00 ° -26.00 d	~	Auto <u>Ma</u>
			STATUS		

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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 40 of 240
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Keysight Spectrum Analyzer - Occupied BW						
LX/RL RF 50Ω DC	CORREC	SENSE:INT enter Freg: 5.230000	000 GHz	12:08:33 AM N Radio Std: N		Trace/Detector
	ter Tr	ig: Free Run	Avg Hold: 100/100			
	#IFGain:Low #A	tten: 20 dB		Radio Devic	e: BTS	
10 dB/div Ref 20.00 dBn	n					
10.0						
0.00	The Asherson British	philony for an address	winnertwood			Clear Write
-10.0						
	JUL AND		Whenthy	h		
-20.0 -20.0 -30.0				handown	holdingrates	Average
-40.0						g.
-50.0						
-60.0						
						Max Hold
-70.0						
Center 5.23 GHz				Span 1	00 MHz	
#Res BW 470 kHz		VBW 5MHz		Swee	p 1 ms	Min Hold
		Total Po		0 dBm		
Occupied Bandwidt			25.	V ИВШ		
37	7.680 MHz					Detector
Transmit Freq Error	-6.658 kHz	% of OB	W Power 9	9.00 %		Peak▶ Auto Man
-						
x dB Bandwidth	46.33 MHz	x dB	-26	.00 dB		
MSG			STATI	JS		

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



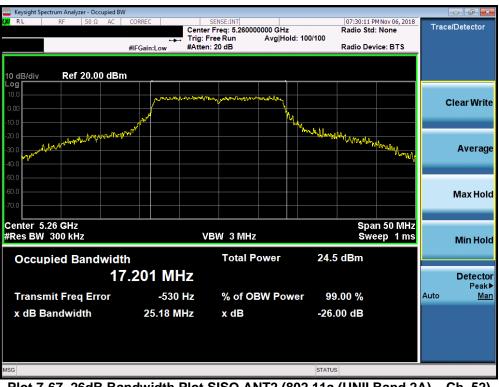
Plot 7-65. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 50 of 240
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Keysight Spectrum Analyzer - Occupied B	W				
LXIRL RF 50Ω DC	CORREC	SENSE:INT nter Freg: 5.210000000 GHz		M Nov 28, 2018	Trace/Detector
	Trig	g:FreeRun Avg Ho	old: 100/100		
	#IFGain:Low #At	tten: 20 dB	Radio De	vice: BTS	
10 dB/div Ref 20.00 dB	m		_		
Log 10.0					
0.00	paper another within	monor provide the how many	~		Clear Write
-10.0					
-20.0 -30.0 mms/lafellederManner-Julidanhoff	ever-op1		MANIA MANA MANA	M. William	Average
-40.0				A A MANUN	Arenuge
-40.0					
-60.0					Max Hold
-70.0					
Center 5.21 GHz			Spar	1 200 MHz	
#Res BW 820 kHz		VBW 8 MHz	Sw	eep 1 ms	Min Hold
	4	Total Power	24.7 dBm		
Occupied Bandwid		Total Power	24.7 dBm		
7	7.076 MHz				Detector
Transmit Freg Error	-62.181 kHz	% of OBW Po	wer 99.00 %		Peak▶ Auto Man
					Mato <u>man</u>
x dB Bandwidth	80.88 MHz	x dB	-26.00 dB		
MSG			STATUS		

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



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

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 51 of 240
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	ortable Handset		Page 51 of 249
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Plot 7-68. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2A) - Ch. 56)



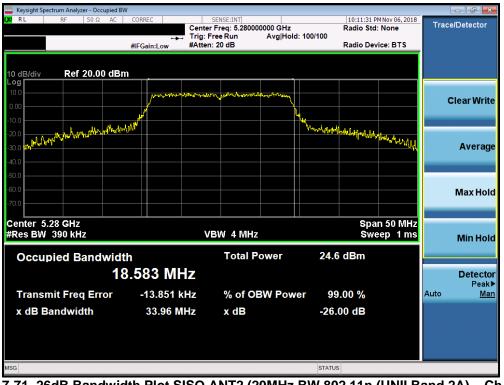
Plot 7-69. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2A) - Ch. 64)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Baga 52 of 240
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Plot 7-70. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



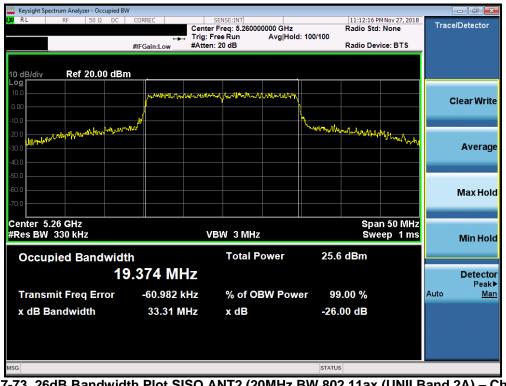
Plot 7-71. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 52 of 240
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Plot 7-72. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 64)



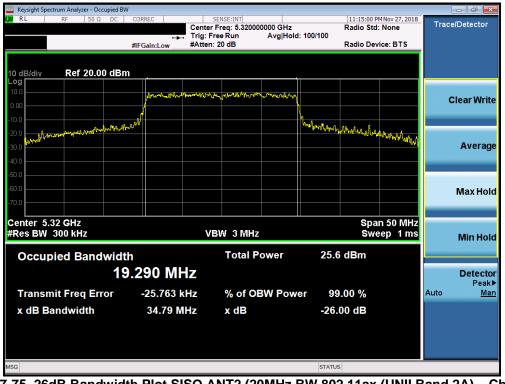
Plot 7-73. 26dB Bandwidth Plot SISO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 52)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 54 of 240
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Keysight Spectrum Analyzer - Occupied BV	V				
(X) RL RF 50Ω DC	Trig:		Radio Sto d: 100/100		Trace/Detector
	#IFGain:Low #Atte	en: 20 dB	Radio De	vice: BTS	
10 dB/div Ref 20.00 dBn	n				
0.00	proven lander and	Myney providente all some for and the			Clear Write
-10.0	م مراد الم		Million A. C.		
-10.0 -20.0 -30.0 -40.0			ฟิปูปมาญญาปีและกับปฏิบัติและ 	all and the second second	Average
-50.0					
-60.0					Max Hold
-70.0					
Center 5.28 GHz #Res BW 360 kHz	1	VBW 4 MHz		an 50 MHz eep 1 ms	Min Hold
Occupied Bandwidt	h	Total Power	25.5 dBm		
19	19.388 MHz				Detector Peak▶
Transmit Freq Error	-34.626 kHz	% of OBW Pov	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	33.38 MHz	x dB	-26.00 dB		
MSG			STATUS		

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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo EE of 240
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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: A3LSMG9730	POTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga EC of 240
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Keysight Spectrum Analyzer - Occupied BW					
LX/RL RF 50Ω DC CC		ENSE:INT Freg: 5.270000000 GHz	12:10:45 Radio Ste	AM Nov 28, 2018 d: None	Trace/Detector
	🛶 Trig: Fr	ee Run Avg Hol	d: 100/100	vice: BTS	
#1	Gain:Low #Atten:	24 00	Radio De	VICE: BTS	
10 dB/div Ref 20.00 dBm			T		
10.0	and alath and the	4 Cotra Marshallor			
0.00					Clear Write
-10.0	/				
-20.0	4		Heplinger for the strength of	<u>ل ۸</u>	
-30.0 phylaphon the Mary and the second				montherate	Average
-40.0					
-50.0					
-60.0					Max Hold
-70.0					
Center 5.27 GHz			Eno	n 100 MHz	
#Res BW 510 kHz	VE	SW 5 MHz		eep 1 ms	Min Hold
					WIN HOID
Occupied Bandwidth		Total Power	25.3 dBm		
37.6	632 MHz				Detector
					Peak►
· · · · · · · · · · · · · · · · · · ·	-46.063 kHz	% of OBW Pow			Auto <u>Man</u>
x dB Bandwidth	40.87 MHz	x dB	-26.00 dB		
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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 57 of 240
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 57 of 249
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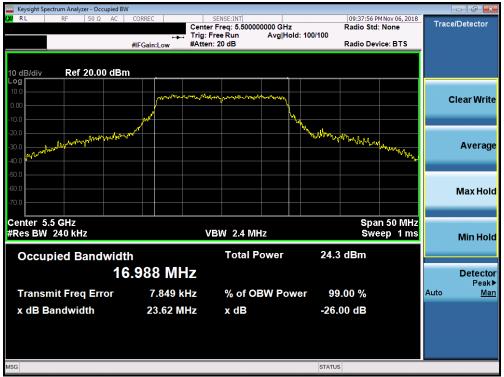
Plot 7-80. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



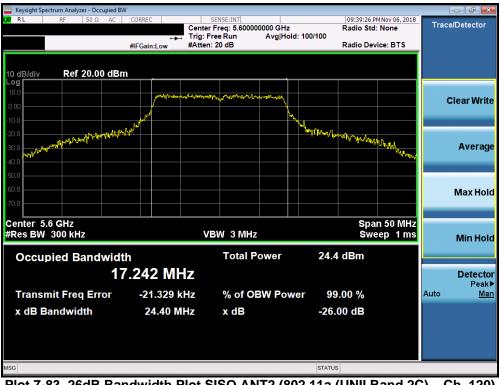
Plot 7-81. 26dB Bandwidth Plot SISO ANT2 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Degr. 59 of 240
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 58 of 249
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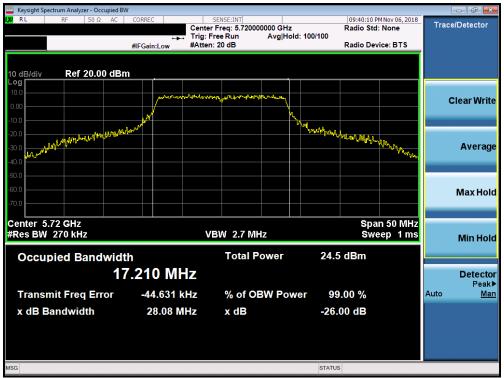
Plot 7-82. 26dB Bandwidth Plot SISO ANT2 (802.11a (UNII Band 2C) - Ch. 100)



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

FCC ID: A3LSMG9730	HE WEIATH & LALBRATHAN, JAL	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 50 of 240
1M1811230206-06.A3L	12/14/2018 - 1/14/2019	Portable Handset		Page 59 of 249
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 60 of 240
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 61 of 240
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 62 of 240
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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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 62 of 240
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E Keysight Spectrum Analyzer - Occupied B						
LXI RL RF 50Ω AC	CORREC	SENSE:INT Center Freg: 5.59000	0000 GHz	09:31:21 P Radio Std	MNov 07, 2018	Trace/Detector
		Trig: Free Run	Avg Hold: 100/100			
	#IFGain:Low	#Atten: 20 dB		Radio Dev	ice: BTS	
10 dB/div Ref 20.00 dB	m					
Log 10.0						
0.00			anner			Clear Write
	/		<u> </u>			
-20.0	Jugger .		WW MY	un man Mar		
-30.0 What Who have a					- Malerial may	Average
-40.0						Average
-50.0						
-60.0						
						Max Hold
-70.0						
Center 5.59 GHz		·		Span	100 MHz	
#Res BW 750 kHz		VBW 8 MHz	4		eep 1 ms	Min Hald
		Tatal D		.5 dBm		Min Hold
Occupied Bandwid		Total P	ower 24	.5 aBM		
3	7.249 MH	Z				Detector
Tranomit Frog France	0 000 14			9.00 %		Peak►
Transmit Freq Error	8.028 k					Auto <u>Man</u>
x dB Bandwidth	73.50 M	Hz xdB	-26	6.00 dB		
MSG			STAT	rus		

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: A3LSMG9730		MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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