

# PCTEST

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## MEASUREMENT REPORT FCC PART 15.407 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: 9/28/2020-11/25/2020 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M2009280154-09.A3L

## FCC ID:

## A3LSMG998B

# **APPLICANT:**

# Samsung Electronics Co., Ltd.

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

Certification SM-G998B/DS SM-G998B Portable Handset 5180 – 5825MHz OFDM Unlicensed National Information Infrastructure (UNII) Part 15 Subpart E (15.407) 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.

Randy Ortanez President



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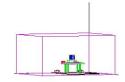


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# **MEASUREMENT REPORT**



	Channel		MIMO			
UNII Band	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Max. Power (mW)	Max. Power (dBm)		
1		5180 - 5240	121.619	20.85		
2A	20	5260 - 5320	121.619	20.85		
2C	20	5500 - 5720	118.850	20.75		
3		5745 - 5825	99.541	19.98		
1	40	5190 - 5230	97.499	19.89		
2A		5270 - 5310	92.897	19.68		
2C		5510 - 5710	94.842	19.77		
3		5755 - 5795	79.068	18.98		
1		5210	42.560	16.29		
2A	80	5290	39.355	15.95		
2C	00	5530 - 5690	72.111	18.58		
3		5775	75.509	18.78		
1/2A	160	5250	55.208	17.42		
2C	160	5570	54.828	17.39		

**EUT Overview** 

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## 1.0 INTRODUCTION

## 1.1 Scope

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

## 1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

#### 1.3 Test Facility / Accreditations

Measurements were performed at PCTEST located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG998B**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter.

Test Device Serial No.: 0198M, 0209M, 0102M, 0197M

#### 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n5, n66), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax(6E) UNII, Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB

	Band 1		Band 2A		Band 2C			Band 3
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	C	Ch.	Frequency (MHz)
36	5180	52	5260	100	5500	1	49	5745
:	:	:	:	:	:		:	:
42	5210	56	5280	120	5600	1	57	5785
:	:	:	:	:	:		:	:
48	5240	64	5320	144	5720	1	65	5825

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

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

	Band 2A
h.	Frequency (MHz)
4	5270
	:
2	5310

**C** 

Ch.

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

Band 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)		Ch.	Frequency (MHz)		Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
42	5210		58	5290		106	5530	155	5775
						:	:		

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

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Ch.

Band 1	2A
Frequency	(MHz)

Band 2C	
Frequency (MHz	)

5690

50 5250 114 5570

Table 2-4. 802.11ax (160MHz BW) Frequency / Channel Operations

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#### Notes:

 5GHz NII operation is possible in 20MHz, and 40MHz 80MHz, and 160MHz 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						
802.11 M	802.11 Mode/Band					
	а	98.8				
	n (HT20)	98.7				
	ac (VHT20)	97.5				
	ax (HE20)	97.0				
5GHz	n (HT40)	97.3				
	ac (VHT40)	95.0				
	ax (HE40)	94.6				
	ac (VHT80)	91.2				
	ax (HE80)	90.8				
Table 2-5	. Measured Du	ty Cycles				

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

WiFi Configurations		SDM		CDD	
		ANT1	ANT2	ANT1	ANT2
	11a	×	×	~	~
5GHz	11n/ac/ax (20 MHz)	~	~	~	~
	11n/ac/ax (40 MHz)	~	~	~	~
	11n/ac/ax (80 MHz)	~	~	~	~
	11n/ac/ax (160 MHz)	~	~	~	×

Table 2-6. Frequency / Channel Operations

 $\checkmark$  = Support ; \* = NOT Support **MIMO** = 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 MIMO channels to operate independent of one another in the 2.4GHz (WLAN & BT), 5GHz and 6GHz 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 and ANT2 both transmitting in 2.4GHz and 5GHz modes simultaneously

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

Table 2-7. Config-1 (ANT1 MIMO & ANT2 MIMO)

Configuration 2: ANT1 and ANT2 both transmitting in 2.4GHz and 6GHz modes simultaneously

Description	2.4 GHz Emission	6 GHz Emission
Antenna	1, 2	1, 2
Channel	6	2
Operating Frequency (MHz)	2437	5935
Data Rate (Mbps)	6Mbps	6Mbps
Mode	g	а

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

## 2.3 Antenna Description

Following antenna was used for the testing.

	Antenna Gain (dBi)			
Frequency [GHz]	Ant1	Ant2		
5.20	-1.6	-4.1		
5.30	-1.7	-5.0		
5.50	-1.9	-5.1		
5.80	-1.7	-5.9		

Table 2-9. Antenna Peak Gain

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## 2.4 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 Sections AC Line Conducted Emissions for AC line conducted emissions test setups, 3.3 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 lying flat on an authorized wireless charging pad (WCP) 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.

#### 2.5 Software and Firmware

The test was conducted with firmware version G998BXXE0ATKA installed on the EUT.

## 2.6 EMI Suppression Device(s)/Modifications

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

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# 3.0 DESCRIPTION OF TESTS

#### 3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 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)	9/16/2020	Annual	9/16/2021	WL25-1
-	WL40-1	WLAN Cable Set (40GHz)	9/16/2020	Annual	9/16/2021	WL40-1
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Anritsu	MA2411B	Pulse Power Sensor	12/4/2019	Annual	12/4/2020	846215
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	8/7/2018	Triennial	8/7/2021	9203-2178
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Biennial	8/27/2022	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	1-18 GHz DRG Horn (Medium) 2/14/2019 Biennial 2		2/14/2021	125518
ETS-Lindgren	3816/2NM	LISN 7/9/2020 Biennial		7/9/2022	114451	
ETS-Lindgren	3115	Double Ridged Guide Horn 750MHz - 18GHz	3/12/2020	Biennial	3/12/2022	150693
Keysight Technologies	N9020A	MXA Signal Analyzer	8/14/2020	Annual	8/14/2021	US46470561
Keysight Technologies	N9038A	MXE EMI Receiver	8/11/2020	Annual	8/11/2021	MY51210133
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	8/17/2020	Annual	8/17/2021	MY52350166
Keysight Technologies	N9020A	MXA Signal Analyzer	9/22/2020	Annual	9/22/2021	MY54500644
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	1/9/2020	Annual	1/9/2021	NMLC-2
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/9/2020	Annual	9/9/2021	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/10/2020	Annual	8/10/2021	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit 2/10/2020 Annual		Annual	2/10/2021	102134
Solar Electronics	8012-50-R-24-BNC			10/1/2021	310233	
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol Science	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	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:	A3LSMG998B
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	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
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 4.7.
- 5) For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.3.1.

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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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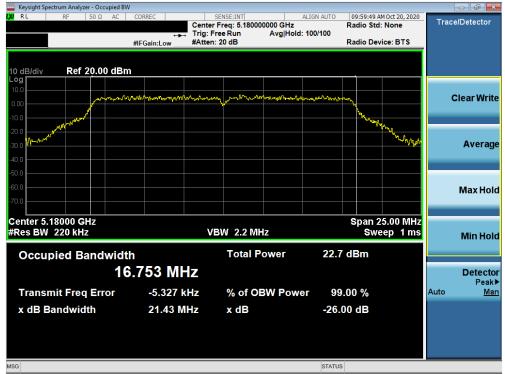
	Frequency	Channel			Antenna 1	Antenna 2
	[MHz]	No.	802.11 Mode	Data Rate [Mbps]	Measured 26dB Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]
	5180	36	а	6	21.43	21.41
	5200	40	а	6	21.09	21.23
	5240	48	а	6	20.96	21.40
	5180	36	n (20MHz)	6.5/7.2 (MCS0)	21.65	25.47
	5200	40	n (20MHz)	6.5/7.2 (MCS0)	21.60	25.27
	5240	48	n (20MHz)	6.5/7.2 (MCS0)	21.40	22.27
-	5180	36	ax (20MHz)	8.6/7.3 (MCS0)	21.54	21.49
Band .	5200	40	ax (20MHz)	8.6/7.3 (MCS0)	21.46	21.35
ä	5240	48	ax (20MHz)	8.6/7.3 (MCS0)	21.53	20.99
	5190	38	n (40MHz)	13.5/15 (MCS0)	39.95	52.98
	5230	46	n (40MHz)	13.5/15 (MCS0)	39.64	40.10
	5190	38	ax (40MHz)	17.2/14.6 (MCS0)	39.83	39.83
	5230	46	ax (40MHz)	17.2/14.6 (MCS0)	39.56	39.60
	5210	42	ac (80MHz)	29.3/32.5 (MCS0)	81.80	81.53
	5210	42	ax (80MHz)	36/30.6 (MCS0)	80.89	81.17
Band 1/2A	5250	50	ac (160MHz)	58.5/65 (MCS0)	164.40	164.20
₿ ,	5250	50	ax (160MHz)	72.1/61.3 (MCS0)	166.80	165.20
	5260	52	а	6	21.42	21.56
	5280	56	а	6	21.15	21.41
	5320	64	а	6	21.18	21.04
	5260	52	n (20MHz)	6.5/7.2 (MCS0)	21.34	23.01
	5280	56	n (20MHz)	6.5/7.2 (MCS0)	21.40	22.47
	5320	64	n (20MHz)	6.5/7.2 (MCS0)	21.58	21.51
Band 2A	5260	52	ax (20MHz)	6.5/7.2 (MCS0)	22.08	21.62
	5280	56	ax (20MHz)	6.5/7.2 (MCS0)	21.36	21.31
	5320	64	ax (20MHz)	6.5/7.2 (MCS0)	21.40	21.40
	5270	54	n (40MHz)	13.5/15 (MCS0)	39.92	64.81
	5310	62	n (40MHz)	13.5/15 (MCS0)	39.95	71.46
	5270	54	ax (40MHz)	13.5/15 (MCS0)	39.59	39.67
	5310	62	ax (40MHz)	13.5/15 (MCS0)	39.67	39.75
	5290	58	ac (80MHz)	29.3/32.5 (MCS0)	81.07	81.14
	5290	58	ax (80MHz)	29.3/32.5 (MCS0)	81.20	81.45
	5500 5600	100 120	a	6 6	21.23 21.46	21.34 21.21
	5720	120	a a	6	21.40	21.21
	5500	144	a n (20MHz)	6.5/7.2 (MCS0)	21.49	21.36
	5600	120	n (20MHz)	6.5/7.2 (MCS0)	21.33	23.18
	5720	144	n (20MHz)	6.5/7.2 (MCS0)	21.33	21.56
	5500	100	ax (20MHz)	8.6/7.3 (MCS0)	21.55	21.30
	5600	120	ax (20MHz)	8.6/7.3 (MCS0)	23.35	21.30
	5720	144	ax (20MHz)	8.6/7.3 (MCS0)	24.75	21.31
	5510	102	n (40MHz)	13.5/15 (MCS0)	39.52	71.02
ပ္ပ	5590	118	n (40MHz)	13.5/15 (MCS0)	40.04	53.17
Band 2C	5710	142	n (40MHz)	13.5/15 (MCS0)	39.90	40.18
Bar	5510	102	ax (40MHz)	17.2/14.6 (MCS0)	39.78	39.71
	5590	118	ax (40MHz)	17.2/14.6 (MCS0)	39.71	39.81
	5710	142	ax (40MHz)	17.2/14.6 (MCS0)	39.73	39.44
	5530	106	ac (80MHz)	29.3/32.5 (MCS0)	81.42	81.67
	5610	122	ac (80MHz)	29.3/32.5 (MCS0)	81.44	81.41
	5690	138	ac (80MHz)	29.3/32.5 (MCS0)	81.43	81.28
	5530	106	ax (80MHz)	36/30.6 (MCS0)	81.04	81.07
	5610	122	ax (80MHz)	36/30.6 (MCS0)	80.65	80.59
	5690	138	ax (80MHz)	36/30.6 (MCS0)	81.21	80.93
	5570	114	ac (160MHz)	58.5/65 (MCS0)	165.50	167.60
	5570	114	ax (160MHz)	72.1/61.3 (MCS0)	165.60	163.60
				th Moscurom		

Table 7-2. Conducted Bandwidth Measurements MIMO ANT1 and ANT2

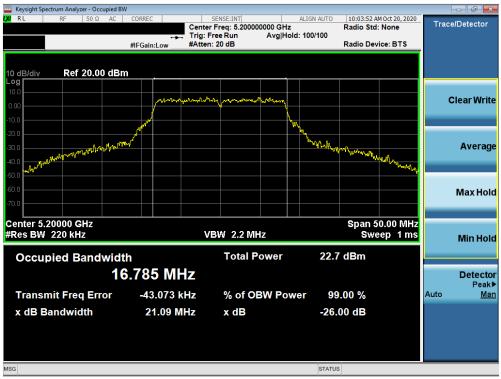
FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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#### MIMO Antenna-1 26 dB Bandwidth Measurements







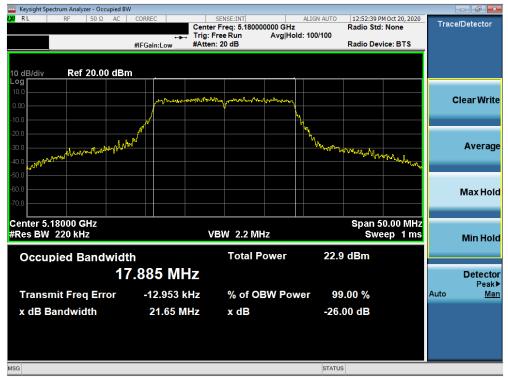
Plot 7-2. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 1) - Ch. 40)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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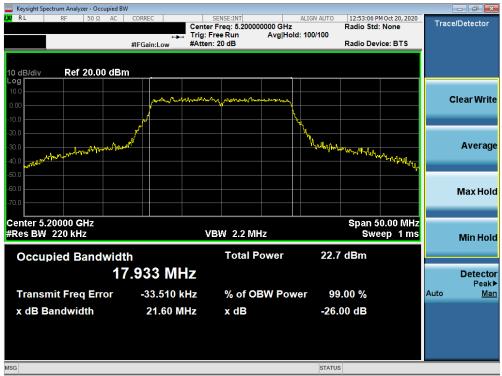




Plot 7-4. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 36)

FCC ID: A3LSMG998B	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-5. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)



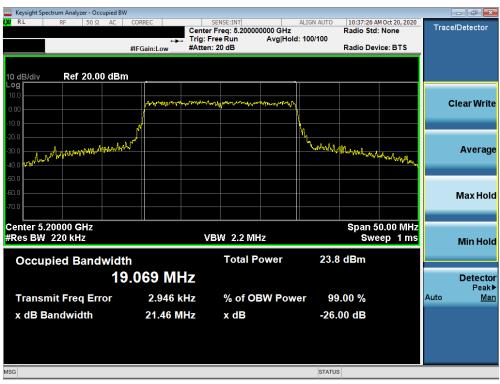
Plot 7-6. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied E	3W				- ē 💌
X RL RF 50Ω AC	CORREC	SENSE:INT		AM Oct 20, 2020	Trace/Detector
		ter Freq: 5.180000000 GHz : Free Run Avg Hol	Radio Sto d: 100/100	d: None	11400120100101
		en: 20 dB		vice: BTS	
	in ounieou				
10 dB/div Ref 20.00 dB	m				
Log					
10.0	entren how marine	MARIN / PARAMANA AND AND AND AND AND AND AND AND AND			Clear Write
0.00			N		Cical Write
-10.0			\		
-20.0	<u></u>		4		
and a second all secon	n half		My Conference		Average
N N N N N N N N N N N N N N N N N N N			A A A A A A A A A A A A A A A A A A A	Murring	Average
-40.0					
-50.0					
-60.0					
					Max Hold
-70.0					
Center 5.18000 GHz				50.00 MHz	
#Res BW 220 kHz		VBW 2.2 MHz		eep 1 ms	
#Res BW 220 KH2			Sw	eep mis	Min Hold
Occurried Denducied	41.	Total Power	23.9 dBm		
Occupied Bandwid		TOTALEOWEI	23.9 ubiii		
1	9.058 MHz				Detector
					Peak▶
Transmit Freq Error	-25.848 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	21.54 MHz	x dB	-26.00 dB		
	21.34 MITZ	X UD	-20.00 UB		
MSG			STATUS		

Plot 7-7. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 36)



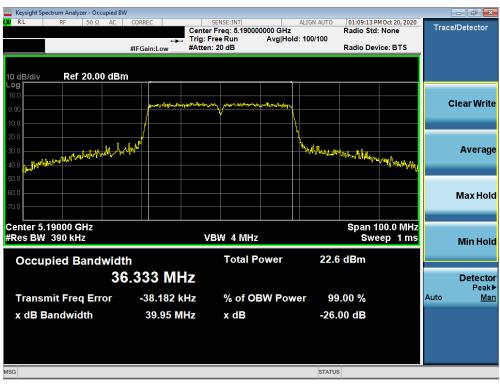
Plot 7-8. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dama 00 at 000	
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🔤 Keysight Spectrum Analyzer - Occupied BW	
X RL RF 50 Ω AC CORREC SENSE:INT ALIGN AUTO 10:41:02 AM Oct 2	
Center Freq: 5.24000000 GHz Radio Std: None Trig: Free Run Avg Hold: 100/100	e
Trig: Free Run Avg Hold: 100/100 #FGain: امب #Atten: 20 dB Radio Device: B	STS
mi Gaintew within Dub	
10 dB/div Ref 20.00 dBm	
10.0	
	Clear Write
-10.0	
200	
	Average
-40.0	*****(M
50.0	
-60.0	Max Hold
-70.0	
Center 5.24000 GHz Span 50.00	MHz
#Res BW 240 kHz VBW 2.4 MHz Sweep	1 ms Min Hold
	- Millin Hold
Occupied Bandwidth Total Power 25.5 dBm	
19.080 MHz	Detector
	Peak▶ Auto Man
Transmit Freq Error -9.629 kHz % of OBW Power 99.00 %	Auto <u>Man</u>
x dB Bandwidth 21.53 MHz x dB -26.00 dB	
MSG STATUS	

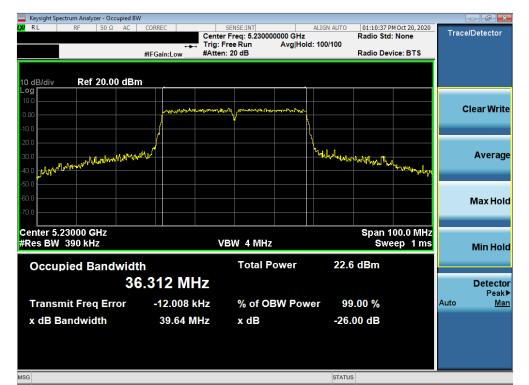
Plot 7-9. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 1) - Ch. 48)



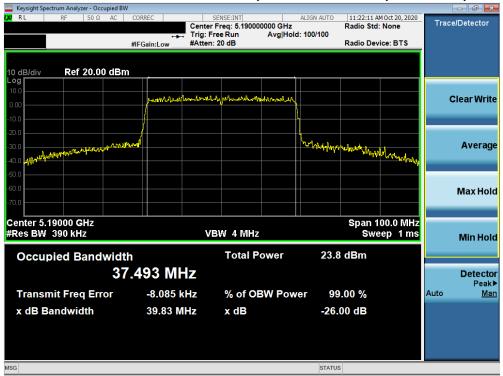
Plot 7-10. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-11. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 1) - Ch. 46)



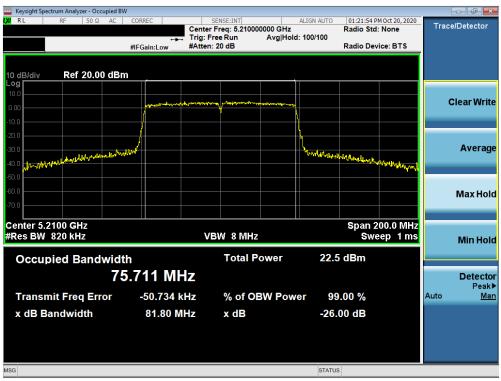
Plot 7-12. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 1) – Ch. 38)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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Keysight Spectrur	m Analyzer - Oc	cupied BW									
LXI RL	RF 50 Ω	AC COR	REC		VSE:INT		ALIGN AUTO		M Oct 20, 2020	Trac	e/Detector
					eq: 5.23000 Run		d: 100/100	Radio Std	: None		
		#IFG	ain:Low	#Atten: 2		/ trainers		Radio Dev	ice: BTS		
,			_								
10 dB/div Log	Ref 20.0	0 dBm	,								
10.0											
			manyour	www.	munknow	Withward				0	Clear Write
0.00											
-10.0											
-20.0		ļ,					\				
-30.0		protections					martinelitera				Average
and the second second	walne war						1	white working the	MARINE MARINE		<b>g</b> .
-50.0											
-60.0											Max Hold
-70.0											Maxilolu
10.0											
Center 5.230	000 GHz							Span 1	00.0 MHz		
#Res BW 39				VB	V 4 MHz				eep 1 ms		Min Hold
									·		MIT HOIL
Occupie	d Band	width			Total P	ower	24.0	dBm			
				-							
		37.5	89 MI	1Z							Detector
Transmit	Erog En		0 650 1	-LI-	0/ of O		00	.00 %		Auto	Peak▶ Man
Transmit	Freq Eri	IOT	-8.650		% of O	SW POW	er 99	.00 %		Auto	ivian
x dB Ban	dwidth		39.56 M	IHz	x dB		-26.	00 dB			
MSG							STATUS	5			

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



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

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied BW								
LXI RL RF 50Ω AC	CORREC	SENSE:INT		ALIGN AUTO		M Oct 20, 2020	Trace	e/Detector
		Center Freq: 5.21000 Trig: Free Run	Avg Hold:	100/100	Radio Std	: None		
	#IFGain:Low	#Atten: 20 dB	Anginola.	100/100	Radio Dev	ice: BTS		
10 dB/div Ref 20.00 dBm Log								
10.0								
	an met flant on	الديه الارديان المريد المريدة المريدة	hold mark mark				0	Clear Write
0.00			Ì					
-10.0			1					
-20.0								
-30.0	m.4			New March				Average
-30.0 -40.0 wether market and the set of the				HAR PARTY AND	Madul Madul Billion	Address to a state		3
-40.0								
-50.0								
-60.0								Max Hold
-70.0								
Center 5.2100 GHz					Span 2	00.0 MHz		
#Res BW 820 kHz		VBW 8 MHz			Swe	ep 1 ms		Min Hold
								iiiiiiiiiiii
Occupied Bandwidt	า	Total P	ower	23.4	dBm			
76	.949 MH	-						Detector
/ 0	.949 MIN	2						Detector Peak▶
Transmit Freq Error	34.692 kH	z % of O	BW Powe	er 99	.00 %		Auto	Man
x dB Bandwidth	80.89 MH	z x dB		-26 (	00 dB			
	00.05 MI			-20.0				
MSG				STATUS				

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



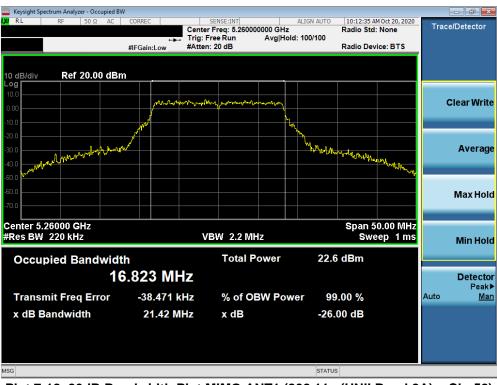
Plot 7-16. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ac (UNII Band 1) - Ch. 50)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied BW								
LXI RE 50Ω AC	CORREC	SENSE:INT		ALIGN AUTO	04:54:07 P	M Nov 25, 2020	Trac	e/Detector
		ter Freq: 5.25000 : Free Run	Avg Hold:	: 100/100	Radio Std	None		
		ten: 20 dB			Radio Dev	rice: BTS		
10 dB/div Ref 20.00 dBm								
Log								
10.0								
0.00	- work with marker	miller frankrisertale	waller benger				(	Clear Write
-10.0								
				h,				
-20.0 -30.0	n M <sup>rd</sup>			Mr. M	han Nu <sub>as</sub> A	n		_
-30.0	-v				er a stad	Mayne M		Average
-40.0						ሞላለም	_	
-50.0								
-60.0								Max Hold
-70.0								
-70.0								
Center 5.2500 GHz					Span 4	00.0 MHz		
#Res BW 1.6 MHz		VBW 8 MHz				ep 1ms		Min Hold
								Millinoid
Occupied Bandwidt	า	Total P	ower	23.5	dBm			
15	6.67 MHz							Detector
13								Peak►
Transmit Freq Error	-115.38 kHz	% of OE	<b>SW Powe</b>	er 99	.00 %		Auto	Man
x dB Bandwidth	166.8 MHz	x dB		-26 (	00 dB			
		X UD		-20.0	JU UB			
MSG				STATUS				

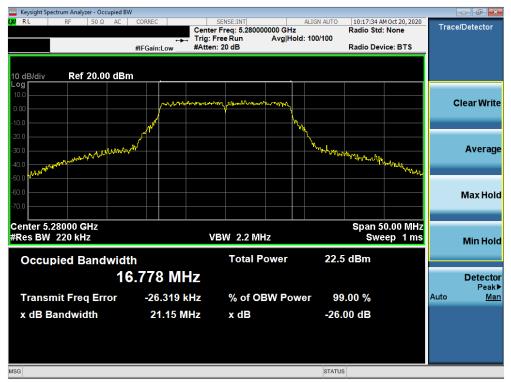
Plot 7-17. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 1) - Ch. 50)



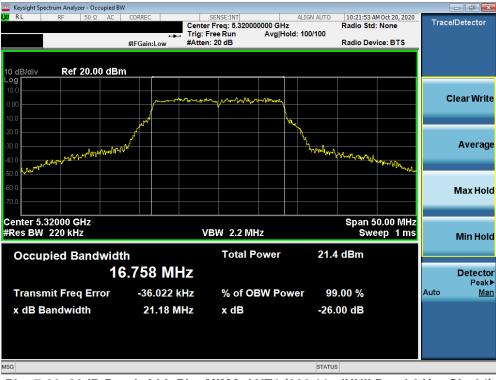
Plot 7-18. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2A) - Ch. 52)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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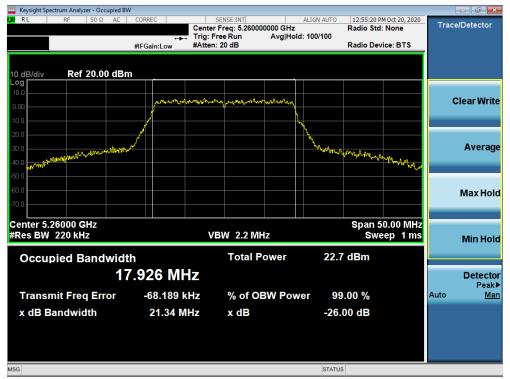
Plot 7-19. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2A) - Ch. 56)



Plot 7-20. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2A) – Ch. 64)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Baga 26 of 200	
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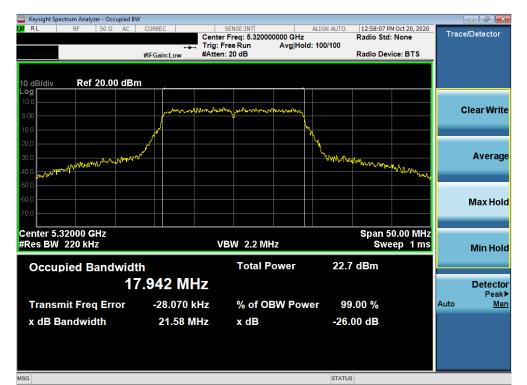
Plot 7-21. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



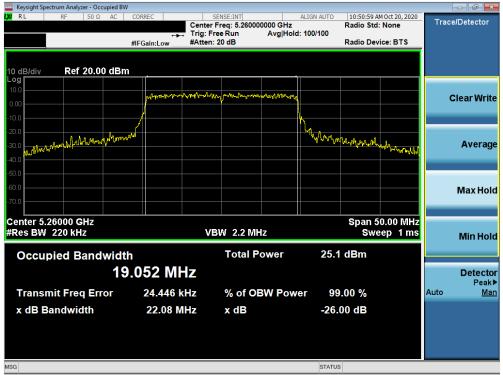
Plot 7-22. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 27 of 200
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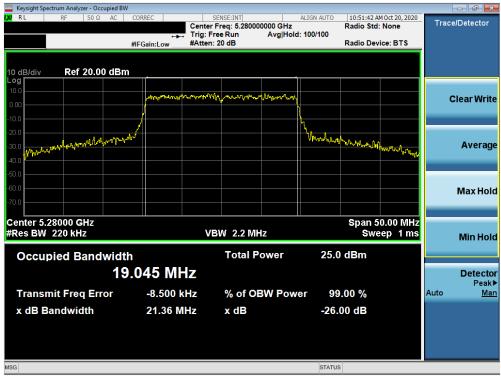
Plot 7-23. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2A) - Ch. 64)



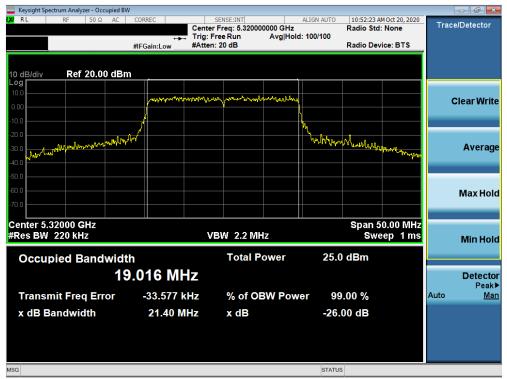
Plot 7-24. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2A) – Ch. 52)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 28 of 200
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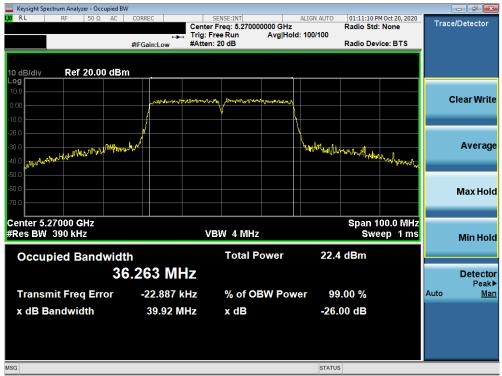
Plot 7-25. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)



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

FCC ID: A3LSMG998B	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dogo 20 of 200		
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Plot 7-27. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



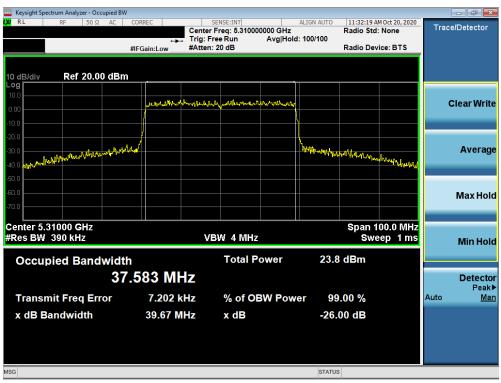
Plot 7-28. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dogo 30 of 200
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Keysight Spectrum Analyzer - Occup	pied BW				
LX/ R L RF 50 Ω	AC CORREC	SENSE:INT	ALIGN AUTO	11:31:07 AM Oct 2	
		Center Freq: 5.27000 Trig: Free Run	00000 GHz Avg Hold: 100/100	Radio Std: Non	e
	↔ #IFGain:Low	#Atten: 20 dB	Avginoid. 100/100	Radio Device: B	TS
	#IF Galil.Low			Induite Devices D	
10 dB/div Ref 20.00	dBm				
Log					
10.0		when burn when the other			Clear Write
0.00	what can when		An		Clear write
-10.0			<u> </u>		
-20.0	A				
-30.0	Monthow		Virasharhlar	March - 1	Average
-40.0 make land when when the second				the marger all and the	-4lux, Je
-50.0					
-50.0					
-60.0					Max Hold
-70.0					
Center 5.27000 GHz				Span 100.0	MHz
#Res BW 390 kHz		VBW 4 MHz		Sweep	
					WITHOUT
Occupied Bandw	vidth	Total P	ower 23.	7 dBm	
Coccupied Ballan					
	37.520 MH	Z			Detector
					Peak▶
Transmit Freq Erro	or 835	Hz % of O	BW Power 9	9.00 %	Auto <u>Man</u>
x dB Bandwidth	39,59 M	Hz xdB	-26	.00 dB	
X ub Balluwidth	39.39 Wi		-20	.00 uB	
MSG			STATU	JS	

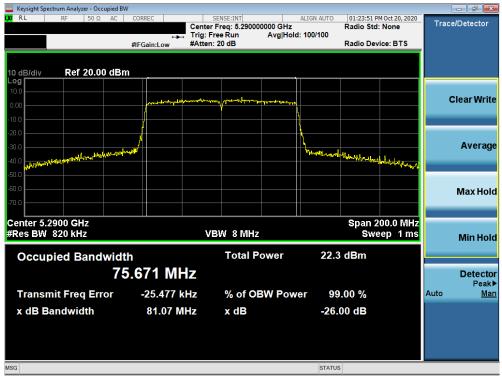
Plot 7-29. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)



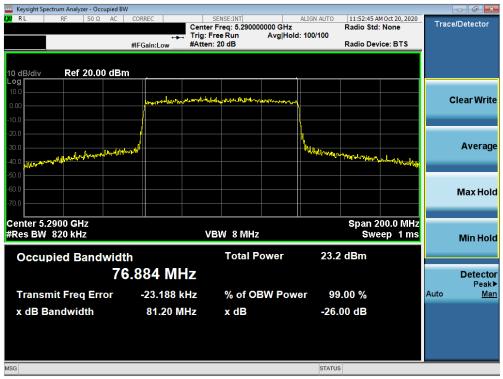
Plot 7-30. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 62)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMBUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Deve 04 of 000	
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset		Page 31 of 209	
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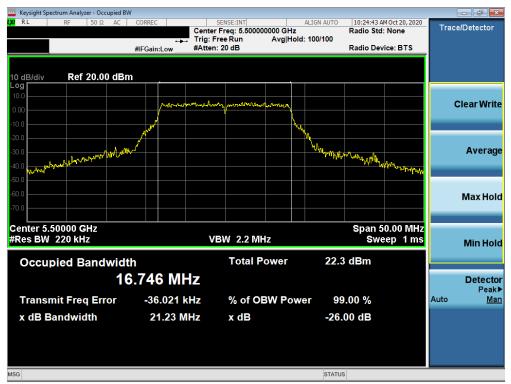
Plot 7-31. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



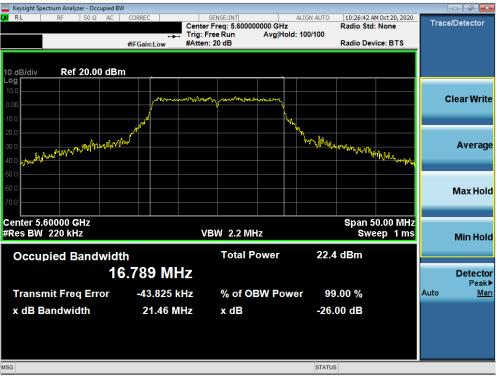
Plot 7-32. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-33. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2C) - Ch. 100)



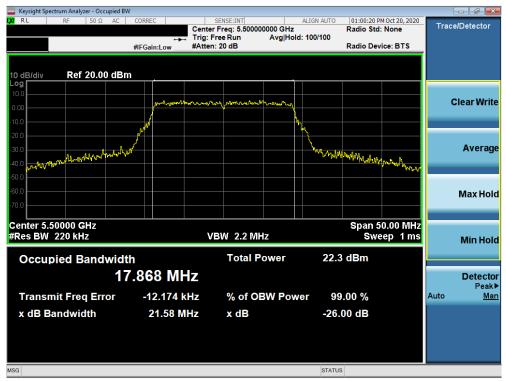
Plot 7-34. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 200
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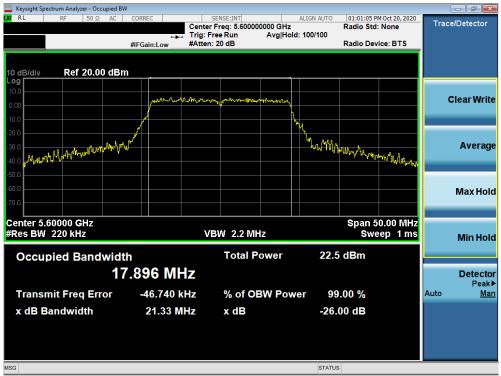
Plot 7-35. 26dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 2C) - Ch. 144)



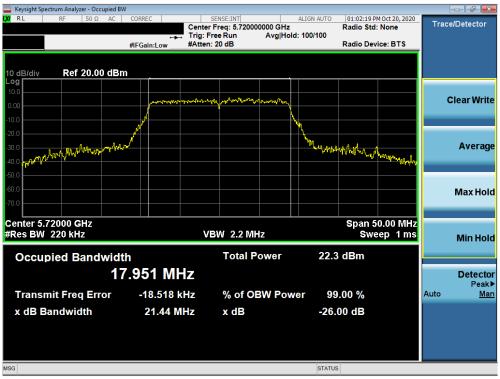
Plot 7-36. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 24 of 200
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Plot 7-37. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 120)



Plot 7-38. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 2C) - Ch. 144)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 25 of 200
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Keysight Spectrum Analyzer - Occupied B\	N				
LXI RL RF 50Ω AC	CORREC	SENSE:INT		AM Oct 20, 2020	Trace/Detector
		ter Freq: 5.50000000 GHz	Radio Sto	l: None	Trace/Delector
		j:FreeRun Avg∣Ho ten:20 dB	ld: 100/100 Radio De	vice: BTS	
	#IFGain:Low #At	ten. 20 dB	Radio De	VICE. B13	
10 dB/div Ref 20.00 dBr	n				
Log					
10.0					
0.00	March 14 to 10 to 10 to 10	warpen por what we have a second and			Clear Write
			N		
-10.0					
-20.0	V		W		
-30.0 1. martin Martin Martin	M0~		My provident freehold when	n	Average
1 March 1 and				man polymond	
-40.0					
-50.0					
-60.0					
					Max Hold
-70.0					
			<b>0</b>		
Center 5.50000 GHz				50.00 MHz	
#Res BW 220 kHz		VBW 2.2 MHz	SW	eep 1 ms	Min Hold
Occupied Bandwidt	th	Total Power	24.5 dBm		
- 10	9.020 MHz				Detector
					Detector Peak►
Transmit Freq Error	-8.902 kHz	% of OBW Pov	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	21.55 MHz	x dB	-26.00 dB		
X dB Bandwidth	Z1.55 MINZ	хав	-20.00 dB		
MSG			STATUS		

Plot 7-39. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 100)



Plot 7-40. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dama 00 of 000	
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Keysight Spectrum Analyzer - Occupied BW					
LX/ RL RF 50Ω AC	CORREC	SENSE:INT		AM Oct 20, 2020	Trace/Detector
		ter Freq: 5.720000000 GHz	Radio Sto	: None	Trace/Delector
		:FreeRun Avg Hol en:20dB	d: 100/100 Radio De	deel BTS	
	#IFGain:Low #Atte	en: 20 db	Radio De	vice: DTS	
10 dB/div Ref 20.00 dBm	1				
Log					
10.0					
0.00	C. And a start of the start of	way allow was prearing and			Clear Write
	/				
-10.0			1		
-20.0	₩/		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
-30.0 - Amerikan AN Works and and a				mal marine	Average
				1 1 1 1 1	
-40.0					
-50.0					
-60.0					Manufiata
					Max Hold
-70.0					
Center 5.72000 GHz			Onend		
		VBW 2.4 MHz		50.00 MHz	
#Res BW 240 kHz			5W	eep 1 ms	Min Hold
		T-4-L D	04.0 10		
Occupied Bandwidt	h	Total Power	24.8 dBm		
19	.103 MHz				Detector
15					Peak►
Transmit Freq Error	-28.078 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	24.75 MHz	x dB	-26.00 dB		
	24.75 MITZ	X UB	-20.00 uB		
MSG			STATUS		

Plot 7-41. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 144)



Plot 7-42. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 102)

FCC ID: A3LSMG998B	PCTEST <sup>®</sup> Proud to be part of <b>®</b> element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dara 07 of 000	
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Keysight Spectrum Analyzer - Occupie	ed BW					
LX/ R.L RF 50 Ω A		SENSE:INT	ALIGN AUTO			Frace/Detector
		Center Freq: 5.59000		Radio Std: Nor	ne	race/Delector
		Frig: Free Run Atten: 20 dB	Avg Hold: 100/100	Radio Device:	<b>DTC</b>	
	#IFGain:Low #	Atten: 20 dB		Radio Device:		
10 dB/div Ref 20.00 d	ID no.					
Log						
10.0						
	mil-Marghellerhile.	with men wormany were	-tor Protonumb.			Clear Write
0.00			h			
-10.0			<u>\</u>			
-20.0			1.1			
-30.0	villi #v.		- Pitter	rwww.rath.have.w	n.	Average
100 Land W W W				a san sa kanading	have h.	
					CANAL M	
-50.0						
-60.0						Max Hold
70.0						Max Holu
-70.0						
				0		
Center 5.59000 GHz				Span 100.		
#Res BW 430 kHz		VBW 4 MHz		Sweep	1 ms	Min Hold
Occupied Bandwi	idth	Total P	ower 22.	.6 dBm		
	36.348 MHz					Detector
						Peak►
Transmit Freq Error	-32.376 kH	z % of OE	3W Power 9	9.00 %	Au	to <u>Man</u>
x dB Bandwidth	40.04 MH	z x dB	26	6.00 dB		
	40.04 MIN	2 X U D	-20	0.00 UB		
MSG			STAT	US		

Plot 7-43. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)



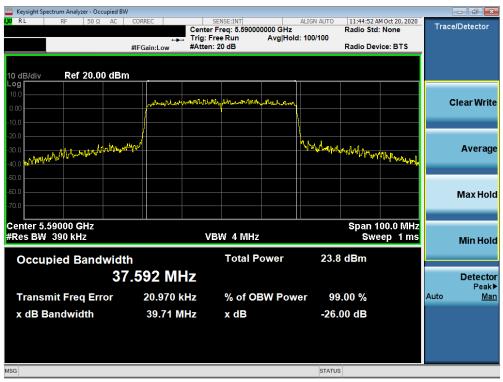
Plot 7-44. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11n (UNII Band 2C) - Ch. 142)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied	BW				
LXI RL RF 50Ω AC		SENSE:INT		42:52 AM Oct 20, 2020	Trace/Detector
		enter Freq: 5.5100000		io Std: None	Tace/Delector
		rig:FreeRun A Atten:20dB	vg Hold: 100/100 Rad	io Device: BTS	
	#IFGdIII.LOW #	Atten: 20 ab	Ruu	o Bettice: B10	
10 dB/div Ref 20.00 dE	3m				
Log					
10.0	Mary Mary market	AMAMA MANA			01
0.00	al and a second and	Martin marken his with	าพการ		Clear Write
-10.0	{				
			N N		
-20.0					
-30.0	whether		Land with marked and	<b>.</b>	Average
-40.0 backs that have we wanted and and the			- Nu	Mar Mar Mar	
				- <b>* x</b>	
-50.0					
-60.0					Max Hold
-70.0					maxitora
10.0					
Center 5.51000 GHz			Sr	an 100.0 MHz	
#Res BW 390 kHz		VBW 4 MHz		Sweep 1 ms	Min Hold
					Min Hold
Occupied Bandwig	dth	Total Pow	ver 23.6 dB	m	
			2010 42		
3	37.577 MHz				Detector
					Peak▶
Transmit Freq Error	-38.474 kH	z % of OBW	Power 99.00	%	Auto <u>Man</u>
x dB Bandwidth	39.78 MH	z x dB	-26.00 d	P	
	39.70 MIT		-20.00 u	B	
MSG			STATUS		

Plot 7-45. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 102)



Plot 7-46. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Keysight Spectrum Analyzer - Occupied BW								- •
LXX RL RF 50Ω AC	CORREC	SENSE:IN		ALIGN AUTO		M Oct 20, 2020	Trac	e/Detector
			71000000 GHz AvalHo	ld: 100/100	Radio Std	: None		
	#IFGain:Low	#Atten: 20 dB			Radio Dev	vice: BTS		
,								
10 dB/div Ref 20.00 dBm								
10.0								
0.00	monthermand	webser the person	withintherry	<b>`</b>			•	Clear Write
-10.0								
	/							
-20.0 -30.0 -40.0	n a. 11 <sup>7</sup>			durlan .				
				- Mark Provide	walionariy way	nA. Ma a		Average
-40.0					· · ·	And Mailed March		
-50.0								
-60.0								
								Max Hold
-70.0								
Center 5.71000 GHz					Snan 1	00.0 MHz	_	
#Res BW 390 kHz		VBW 4	MHz			eep 1 ms		Min Hold
Occupied Bandwidt	า	To	al Power	23.6	i dBm			
		I						
37	.620 MF	12						Detector Peak▶
Transmit Freq Error	4.930 k	Hz % d	of OBW Pov	ver 99	.00 %		Auto	Man
x dB Bandwidth	39.73 M	Hz x d	B	-26	00 dB			
	59.75 W		B	-20.	UU UB			
MSG				STATUS	6			

Plot 7-47. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (UNII Band 2C) – Ch. 142)



Plot 7-48. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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🔤 Kej	ysight Spectrum	n Analyzer - Occ	upied BW									- • •
L <mark>XI</mark> R	L F	RF 50 Ω	AC COR	REC		NSE:INT		ALIGN AUTO		M Oct 20, 2020	Trac	e/Detector
						req: 5.61000		d: 100/100	Radio Std	: None	mac	
			#IEG	⊶⊷ Gain:Low	#Atten: 2		Avginoid	4. 100/100	Radio Dev	rice: BTS		
			mi c									
	B/div	Ref 20.0	0 dBm	_								
Log												
10.0							-					Clear Write
0.00						Y						
-10.0								<b>\</b>				
-20.0												
												A
-30.0	Li M.	Mahahahan	and the second second					- Marthallin	www.	Adda to a		Average
-40.0	and the particular line								to the rule	a whole where where		
-50.0												
-60.0												
												Max Hold
-70.0												
Con	ter 5.610	0 00-							Enon 1			
	s BW 82				VB	N 8 MHz				ep 1 ms		
#RC	5 DVV 02	V NHZ			VDV				SWG	ep mis		Min Hold
		d Dand				Total P	ower	23 /	dBm			
U U	occupie	a bana				TOtal I	OWEI	20.4	ubiii			
			75.6	00 MH	-IZ							Detector
												Peak▶
Т	ransmit	Freq Err	or -	101.09 k	(Hz	% of O	BW Pow	ver 99	.00 %		Auto	<u>Man</u>
<b>v</b>	dB Band	dwidth		81.44 M	IH7	x dB		-26	00 dB			
^				01.44 1	1112	A UD		-20.				
MSG								STATUS				

Plot 7-49. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)



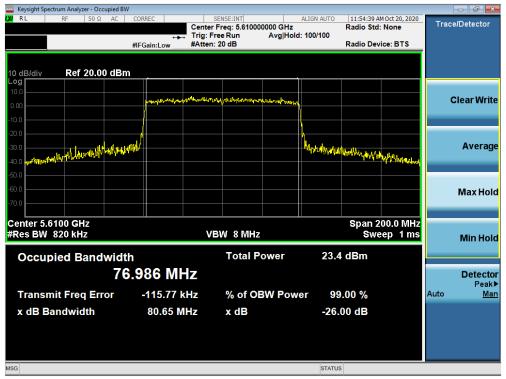
Plot 7-50. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 138)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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		n Analyzer - Occ										
L <mark>XI</mark> R	L   F	RF 50 Ω	AC COR	REC		NSE:INT req: 5.53000	0000 GHz	ALIGN AUTO	11:53:35 A	M Oct 20, 2020	Trac	e/Detector
				+		e Run		d: 100/100	Radio Dev			
			#IFC	Gain:Low	#Atten: 2				Radio Dev	ICE: BIS		
10 dl Log	B/div	Ref 20.00	0 dBm	1								
10.0												
0.00				mangenetellenfi	worm, Instale	here where the	the march the					Clear Write
-10.0				<u> </u>								
-20.0												
-30.0			الد معد الم					ik Visilask ka sa				Average
-40.0	al rand Mapping	hampen Mitter Mil	P. P. Horning A.					Mit inplant with	Whitelynew	www.		
-50.0												
-60.0												Max Hold
-70.0												Muxitolu
	ter 5.530 s BW 82				)/P)	W 8 MHz				00.0 MHz ep 1 ms		
#Re	S DVV 82	V KHZ			VDI				SWE	ep mis		Min Hold
o	occupie	d Band	width			Total P	ower	22.8	dBm			
				36 MI	7							Detector
			11.1		12							Peak ►
Т	ransmit	Freq Err	or -	135.93	кНz	% of O	BW Pow	ver 99	.00 %		Auto	<u>Man</u>
x	dB Band	dwidth		81.04 N	IHz	x dB		-26.	00 dB			
MSG								STATUS				

Plot 7-51. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 106)



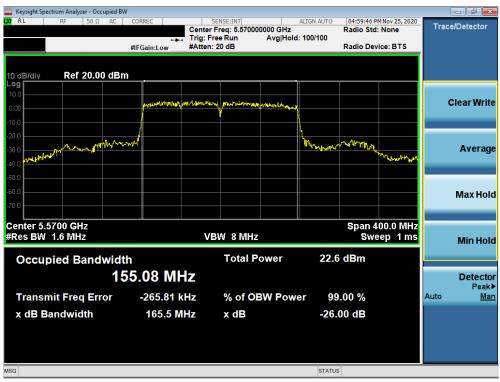
Plot 7-52. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 42 of 200
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Keysight Spectrum Analyzer - Occupied BW	1				
KA RL RF 50Ω AC		SENSE:INT Freq: 5.69000000 GHz	ALIGN AUTO 11:56:02 A Radio Std	M Oct 20, 2020	Trace/Detector
			d: 100/100	: None	
	#IFGain:Low #Atten	: 20 dB	Radio Dev	vice: BTS	
10 dB/div Ref 20.00 dBm	n				
Log 10.0					
	mannesharrowshile	mpanalonaloun			Clear Write
0.00					
-10.0					
-20.0					
-30.0 -40.0 Menertolahorary without of your start	with the second s		Ward with me former		Average
-40.0 Manual parties and a second	· .		Alternation of the Antheory	White tegling have	
-50.0					
-60.0					
					Max Hold
-70.0					
Center 5.6900 GHz			Span 2	200.0 MHz	
#Res BW 820 kHz	V	BW 8 MHz		eep 1 ms	Min Hold
					WIITTIOIG
Occupied Bandwidt	h	Total Power	23.3 dBm		
76	6.948 MHz				Detector
					Peak►
Transmit Freq Error	-25.614 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	81.21 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-53. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 138)



Plot 7-54. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ac (UNII Band 2C) - Ch. 114)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dage 42 of 200		
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset	Page 43 of 209		
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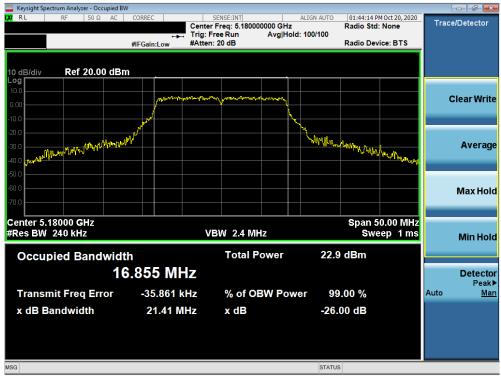


Plot 7-55. 26dB Bandwidth Plot MIMO ANT1 (160MHz BW 802.11ax (UNII Band 2C) - Ch. 114)

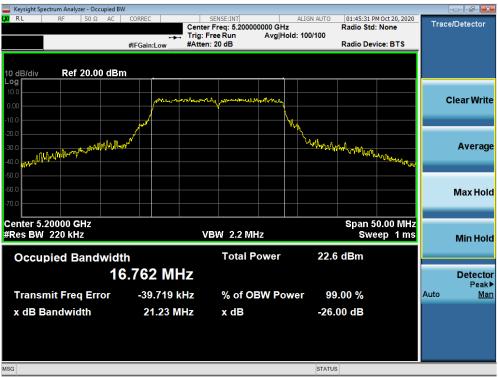
FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: Test Dates:		EUT Type:		Dage 14 of 200
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# MIMO Antenna-2 26dB Bandwidth Measurements



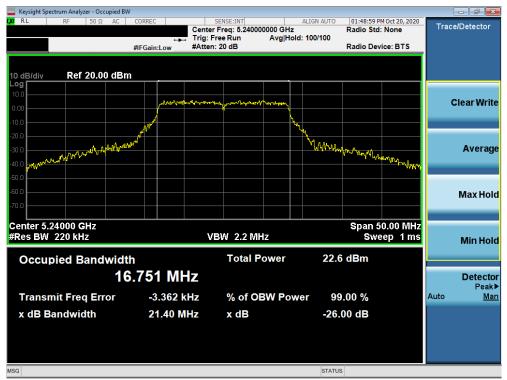




Plot 7-57. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 1) - Ch. 40)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dage 45 of 200		
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset	Page 45 of 209		
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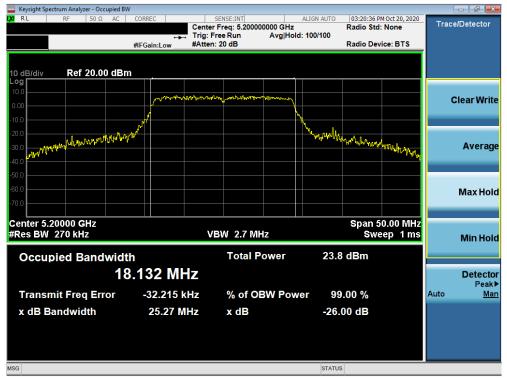




Plot 7-59. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 36)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N: Test Dates:		EUT Type:	Dage 46 of 200		
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Plot 7-60. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 40)



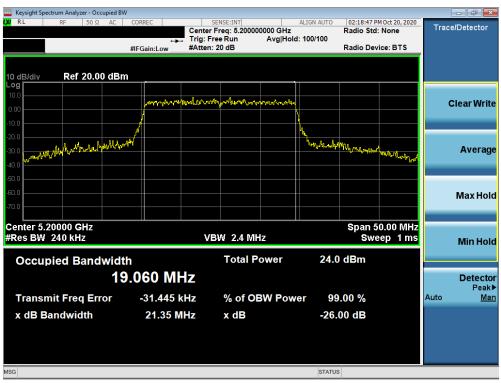
Plot 7-61. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 1) - Ch. 48)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dage 47 of 200		
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset	Page 47 of 209		
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Keysight Spectrum Analyzer - Occupied BW							- •
KL RF 50Ω AC	CORREC	SENSE:INT			1 Oct 20, 2020	Trace	/Detector
		enter Freq: 5.18000 rig: Free Run	Avg Hold: 100/	Radio Std: /100	None		Bottootoi
		Atten: 20 dB	Aughtera. 100/	Radio Dev	ice: BTS		
10 dB/div Ref 20.00 dBm							
Log 10.0							
	when wer wer for the or	m www. when was well	mon work water			c	lear Write
0.00			h h				
-10.0			<u> </u>				
-20.0	1		1 N.				
. I. I. A. Autobat	ľ I		'V.	mar hanglingen good			Average
-30.0				Haradaner Der Ch	MAN WAR		Average
-40.0						_	
-50.0							
-60.0							
							Max Hold
-70.0							
Center 5.18000 GHz				Cnon F			
#Res BW 220 kHz		VBW 2.2 M	1-		0.00 MHz ep 1 ms		
#Res BW 220 KH2		VOW 2.2 IVI	12	SWE	ep i ms		Min Hold
		Total P	ower	24.0 dBm			
Occupied Bandwidth			OWEI	24.0 UBIII			
19.	042 MHz						Detector
							Peak▶
Transmit Freq Error	-18.770 kHz	z % of O	BW Power	99.00 %		Auto	<u>Man</u>
x dB Bandwidth	21.49 MHz	x dB		-26.00 dB			
	21.45 10112			-20.00 uB			
MSG				STATUS			
MSG				STATUS			

Plot 7-62. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 36)



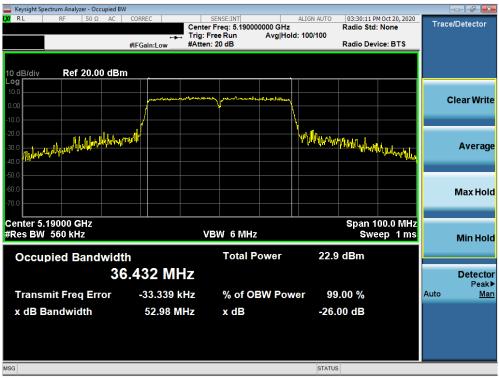
Plot 7-63. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 40)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Baga 48 of 200		
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset	Page 48 of 209		
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Keysight Spectrum Analyzer - Occupied BV	V				
💢 RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO 02:21:54 Radio Sto	PM Oct 20, 2020	Trace/Detector
		er Freq: 5.240000000 GHz Free Run Avg Hol	d: 100/100	1: None	
		n: 20 dB	Radio De	vice: BTS	
10 dB/div Ref 20.00 dBn	n				
Log 10.0					
	mmhhannan	Ver politication of the second			Clear Write
0.00					
-10.0	1				
-20.0			N.M. L.		
-30.0 Amerilan March And			Whylevenany	the second a shall	Average
-40.0 A HAVAY 1 4				ATA AND A AND A	
-50.0					
-60.0					
-70.0					Max Hold
-70.0					
Center 5.24000 GHz			Span :	50.00 MHz	
#Res BW 220 kHz		VBW 2.2 MHz		eep 1 ms	Min Hold
Occurried Developide		Total Power	23.7 dBm		
Occupied Bandwidt		TOtal Fower	23.7 UBIII		
19	9.033 MHz				Detector
Transmit Freg Error	-30.023 kHz	% of OBW Pow	ver 99.00 %		Peak▶ Auto <u>Man</u>
· · · · ·	20.99 MHz	w dD	26.00 40		
x dB Bandwidth	20.99 MHZ	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-64. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 1) - Ch. 48)



Plot 7-65. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 1) - Ch. 38)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dogo 40 of 200		
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Keysight Spectrum Analyzer - Occupied BW							
LX RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO		M Oct 20, 2020	Trace	e/Detector
		er Freq: 5.230000000		Radio Std	: None	TTAC	erbelector
		Free Run Avg en: 20 dB	Hold: 100/100	Radio Dev	ine: BTS		
	#IFGain:Low #Atte	in. 20 ub		Radio Dev	ice. B13		
10 dB/div Ref 20.00 dBm							
Log							
10.0							
0.00	pension declarger	man pharman	men			C	Clear Write
		i i i i i i i i i i i i i i i i i i i	h.				
-10.0							
-20.0							
-20.0 -30.0 -40.0	r 🔨		halfedaya	warm. like			Average
a halver ways				and Ad. Ad.	WW A. H. In.		monugo
-40.0					• • • •		
-50.0							
-60.0							
							Max Hold
-70.0							
Center 5.23000 GHz					00.0 MHz		
#Res BW 560 kHz		VBW 6 MHz		Swe	eep 1 ms		Min Hold
Occupied Bandwidth	<b>)</b>	Total Power	22.6	i dBm			
26	.451 MHz						Detector
36	.431 10182						Detector Peak▶
Transmit Frag Frag	-5.435 kHz	% of OBW F	00	.00 %		Auto	Peak⊫ Man
Transmit Freq Error	-3.433 KHZ	% OF OBW P	ower 98	.00 %		Auto	IVIAII
x dB Bandwidth	40.10 MHz	x dB	-26.	00 dB			
MSG			STATUS	2		·	
mod			STATUS				

Plot 7-66. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 1) - Ch. 46)



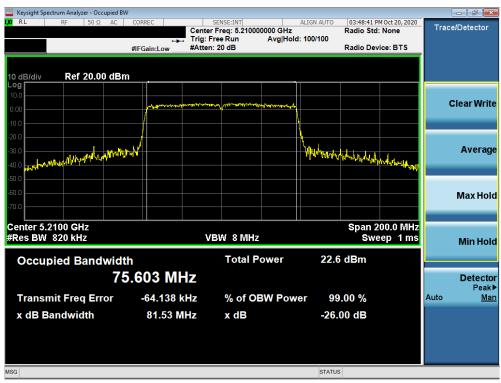
Plot 7-67. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 1) - Ch. 38)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 50 of 200	
1M2009280154-09.A3L 9/28/2020-11/25/2020		Portable Handset		Page 50 of 209	
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Keysight Spectrum Analyzer - Occupied BV	V						×
LXI RE 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO	02:47:43 PM O		Trace/Detect	tor
	- <b></b>	Center Freq: 5.23000 Trig: Free Run	Avg Hold: 100/100	Radio Std: No	one		
	#IFGain:Low	#Atten: 20 dB		Radio Device	BTS		
	-						
10 dB/div Ref 20.00 dBr	n						
10.0							
0.00	Anna anna anna anna anna anna anna anna	Winner which see the	herrough			Clear W	Vrite
-10.0							
-20.0			l lead in				
-20.0 -30.0 -40.0 and proliminal grand and provided and p	WAY		NW YANK	Warman Aller Mars		Aver	rage
-40.0 mm/10/10/10/10/10/10/10				. A DIMENT	Mr Way A		-
-50.0							
-60.0						Max	Hold
-70.0							
Center 5.23000 GHz				Span 100			
#Res BW 390 kHz		VBW 4 MHz		Sweep	o 1 ms	Min H	Hold
Occupied Bandwidt	h	Total P	ower 23.	9 dBm			
37	7.590 MH	7				Dete	octor
	.000 MI	14					eak▶
Transmit Freq Error	-45.365 k	Hz % of O	BW Power 99	9.00 %			Man
x dB Bandwidth	39.60 M	Hz xdB	-26	.00 dB			
	00.00 11		-20				
MSG			STATU	IS			

Plot 7-68. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 1) - Ch. 46)



Plot 7-69. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 1) - Ch. 42)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 51 of 200
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Keysight Spectrum Analyzer - Occupied BW								
XX RL RF 50Ω AC CC	RREC	SENSE:INT enter Freg: 5.2100		ALIGN AUTO	02:59:43 P	M Oct 20, 2020	Trac	e/Detector
		rig: Free Run	Avg Hold	: 100/100				
#1	Gain:Low #/	Atten: 20 dB			Radio Dev	ice: BTS		
10 dB/div Ref 20.00 dBm								
10.0								
0.00	have broken with the pro	mlodingradiana	the second and a second				(	Clear Write
-10.0	1						_	
-20.0				t clurs				
				WTW <sub>We</sub>	W.	and bu		Average
				.,,	den in Padan	WINT LANN		J
-50.0								
-60.0								
-70.0								Max Hold
70.0								
Center 5.2100 GHz						00.0 MHz		
#Res BW 910 kHz		VBW 8 MHz			Swe	ep 1 ms		Min Hold
Occupied Bandwidth		Total P	ower	23.7	dBm			
				20.1	abiii			
11.0	)79 MHz							Detector Peak▶
Transmit Freq Error	-68.678 kHz	% of O	BW Powe	er 99	.00 %		Auto	Peak► <u>Man</u>
x dB Bandwidth	81.17 MHz	x dB		-26.0	00 dB			
MSG				STATUS				

Plot 7-70. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 1) - Ch. 42)



Plot 7-71. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ac (UNII Band 1) - Ch. 50)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dago 52 of 200
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www.www.com/www.cow/ww							
LXIRL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO		M Nov 25, 2020	Trac	e/Detector
		r Freq: 5.250000000 G Free Run Avg	Hz Hold:>100/100	Radio Std	: None	mac	
		n: 20 dB		Radio Dev	rice: BTS		
	in Gam. Edw						
10 dB/div Ref 20.00 dBm							
Log							
10.0	and and many reading to	and prophymen and an an ad sales					Clear Write
0.00						``	Sical Wille
-10.0							
L MAR A	ــــــــــــــــــــــــــــــــــــــ		ho Map	w v r			
-30.0				·	Whater		Average
-40.0							
-50.0							
-60.0							Max Hold
-70.0							
Center 5.2500 GHz					00.0 MHz		
#Res BW 1.6 MHz	V	/BW 8 MHz		SWe	eep 1 ms		Min Hold
Occupied Bandwidth	ו	Total Power	24.2	dBm			
15	6.60 MHz						Detector
15							Peak
Transmit Freq Error	104.08 kHz	% of OBW P	ower 99	.00 %		Auto	Man
x dB Bandwidth	165.2 MHz	x dB	-26 (	00 dB			
	103.2 1012	A GD	-2010				
MSG			STATUS				
			CTATIO				

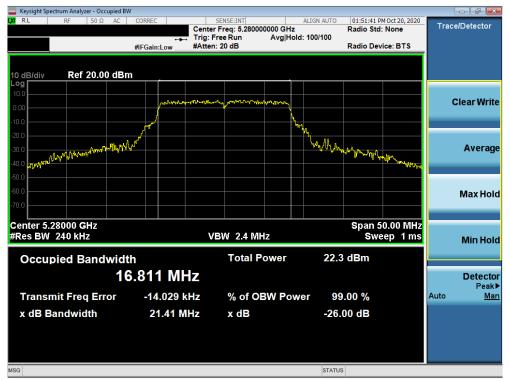
Plot 7-72. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax (UNII Band 1) - Ch. 50)



Plot 7-73. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2A) - Ch. 52)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 52 of 200
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Plot 7-74. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2A) - Ch. 56)



Plot 7-75. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2A) – Ch. 64)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: Test Dates:		EUT Type:	Dage 54 of 200
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset	Page 54 of 209
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Keysight Spectrum Analyzer - Occupied BV	v				
LX/ RL RF 50Ω AC	CORREC	SENSE:INT		:03 PM Oct 20, 2020	Trace/Detector
		er Freq: 5.260000000 GH		Std: None	Trace/Detector
		FreeRun Avg∣H n:20 dB	old: 100/100 Radio	Device: BTS	
	#IFGalli:LOW #/ttte	1. 20 GD	Rudio	Device: D 10	
10 dB/div Ref 20.00 dBn	n				
Log					
10.0		has herefundered and			
0.00	and a second sec				Clear Write
-10.0	l di .		<b>N</b> .		
			N.		
-20.0 -30.0			home have a first a fi	-4.	
-30.0			كليبه يعرف بالمنا	"I" Lat Baden to a	Average
-40.0				- Waltow	
-50.0					
-60.0					Max Hold
-70.0					maxitora
Center 5.26000 GHz			Spa	n 50.00 MHz	
#Res BW 270 kHz	1	/BW 2.7 MHz		Sweep 1 ms	Min Llald
					Min Hold
Occupied Bandwidt	h	Total Power	23.6 dBm		
18	3.188 MHz				Detector
					Peak▶
Transmit Freq Error	-54.109 kHz	% of OBW Po	wer 99.00 %	)	Auto <u>Man</u>
x dB Bandwidth	23.01 MHz	x dB	-26.00 dE	2	
	23.01 MITZ	A UD	-20.00 uE		
MSG			STATUS		

Plot 7-76. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 52)



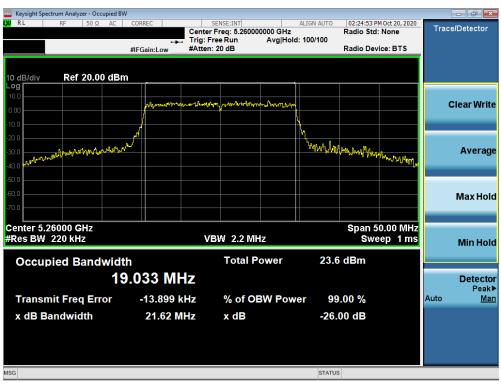
Plot 7-77. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 56)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege EE of 200
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset		Page 55 of 209
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Keysight Spectrum Analyzer - Occupied	BW						
LX/ RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO	03:23:41 PM 0		Trace/D	ataatar
		ter Freq: 5.32000000		Radio Std: N	lone	Traceibi	elector
			g Hold: 100/100				
	#IFGain:Low #At	ten: 20 dB		Radio Devic	e: BTS		
10 dB/div Ref 20.00 dE	sm						
Log 10.0							
10.0	- mon mon	bulgh on hand margare	Anna			Cia	ar Write
0.00		- v - · ·				CIE	
-10.0	J.		<b>L</b>				
	J. A Contraction of the second		٦.				
-20.0 -30.0	Marin		MM La	woodung			
-30.0 - A Mand And Mand Market			, aidi Aal A	Well Course	<b>W</b>		Average
Mul Mul Mul Mul Mul					M ANT AND		g.
-40.0							
-50.0							
-60.0						M	ax Hold
-70.0							
						_	
Center 5.32000 GHz		· · ·		Span 50.	.00 MHz		
#Res BW 270 kHz		VBW 2.7 MHz			p 1 ms		
				Once	-p i ma	N	lin Hold
		Total Davis		dBm			
Occupied Bandwic	ath	Total Powe	23.3	abm			
1	8.090 MHz						Detector
	0.030 WINZ					-	Peak ►
Tronomit From France	E2 620 kH-	0/ -f ODW		.00 %		Auto	Peak ► Man
Transmit Freq Error	-53.638 kHz	% of OBW I	ower 99	.00 %		Auto	wan
x dB Bandwidth	21.51 MHz	x dB	-26 (	00 dB			
	21.31 1112	A UD	-201				
MSG			STATUS				

Plot 7-78. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2A) - Ch. 64)



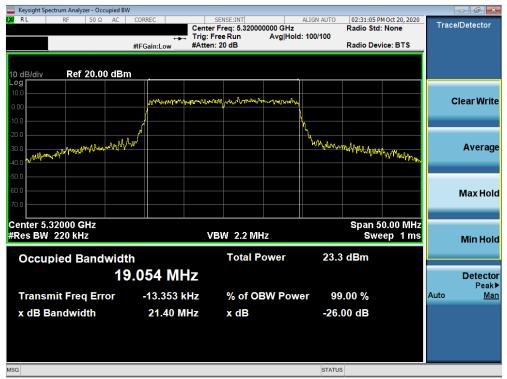
Plot 7-79. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 52)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMBUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega EC of 200
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Plot 7-80. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 56)



Plot 7-81. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2A) - Ch. 64)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 57 of 200
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Plot 7-82. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2A) - Ch. 54)



Plot 7-83. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2A) - Ch. 62)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage E9 of 200	
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset		Page 58 of 209	
© 2020 PCTEST				V 9.0 02/01/2019	



Keysight Spectrum Analyzer - Occupied BW									- • •
LXI RE 50Ω AC	CORREC		NSE:INT	0000 011-	ALIGN AUTO		M Oct 20, 2020	Trac	e/Detector
			req: 5.27000 e Run		d: 100/100	Radio Std	: None		
	#IFGain:Low	#Atten: 2		, trainere		Radio Dev	vice: BTS		
10 dB/div Ref 20.00 dBm					1				
10.0									
0.00	manne	wilver mil	Monthone	Aluantibulitan				(	Clear Write
	/								
-10.0					\				
-20.0					1				
-30.0	мł —				1/4/ Arin Jun	-			Average
-20.0 -30.0 -40.0					han and the second	YY W YY	1 way wanted		Ũ
-50.0									
-60.0									Max Hold
-70.0									
Center 5.27000 GHz							00.0 MHz		
#Res BW 390 kHz		VB	N 4 MHz			Swe	ep 1 ms		Min Hold
Occupied Bandwidth			Total P	ower	23.6	dBm			
37	545 MI	7							Detector
57	343 IVII								Peak ►
Transmit Freq Error	-7.101	(Hz	% of O	<b>BW Pow</b>	er 99	.00 %		Auto	Man
x dB Bandwidth	39.67 M	H7	x dB		-26	00 dB			
	33.07 W	1112	A UD		-20.				
MSG					STATUS				

Plot 7-84. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 54)



Plot 7-85. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2A) - Ch. 62)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege E0 of 200
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset		Page 59 of 209
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Plot 7-86. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 2A) - Ch. 58)



Plot 7-87. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 2A) - Ch. 58)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 60 of 200
1M2009280154-09.A3L	9/28/2020-11/25/2020	ortable Handset		Page 60 of 209
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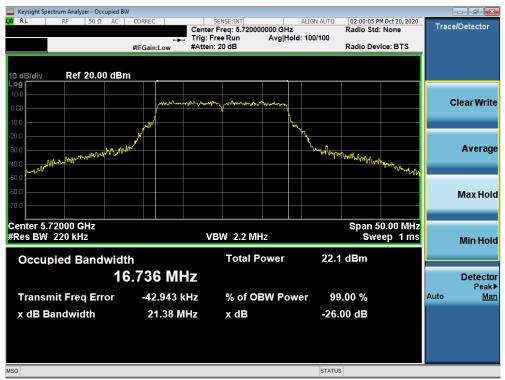
Plot 7-88. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2C) - Ch. 100)



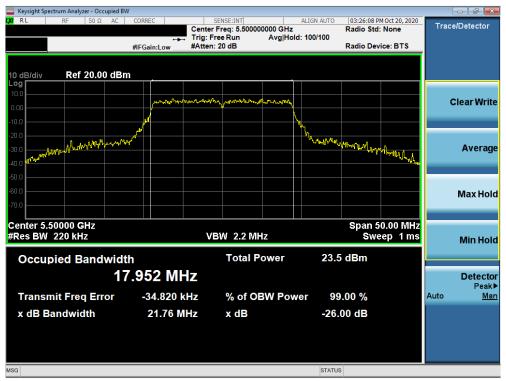
Plot 7-89. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMG998B	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dage 61 of 200	
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset	Page 61 of 209	
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Plot 7-90. 26dB Bandwidth Plot MIMO ANT2 (802.11a (UNII Band 2C) - Ch. 144)



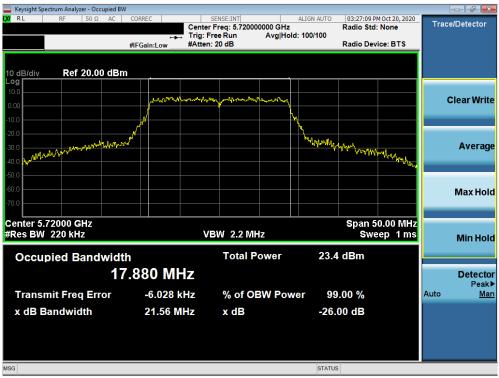
Plot 7-91. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2C) - Ch. 100)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 62 of 200
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset	Page 62 of 209
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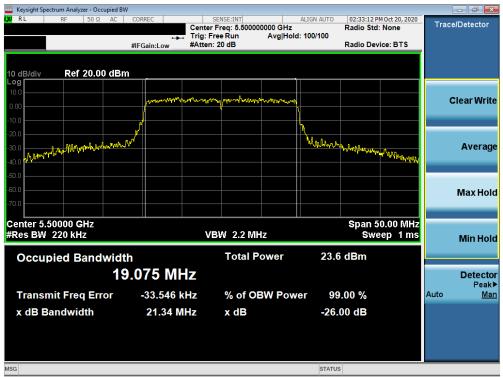
Plot 7-92. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2C) - Ch. 120)



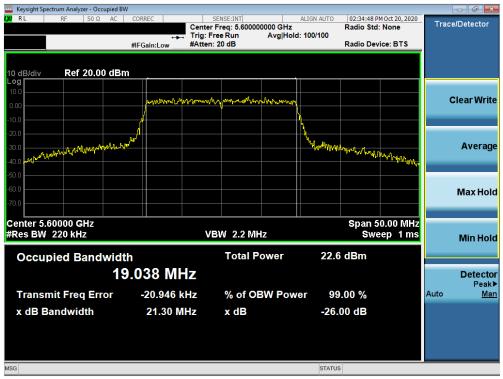
Plot 7-93. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11n (UNII Band 2C) - Ch. 144)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 62 ef 200	
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset		Page 63 of 209	
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Plot 7-94. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 100)



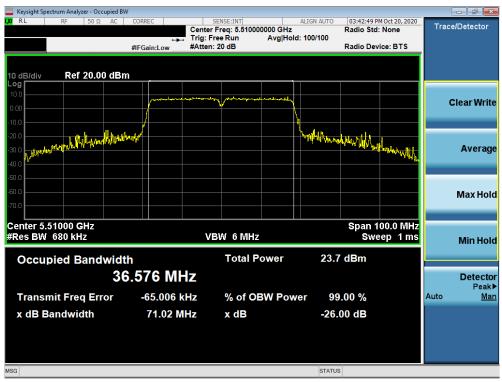
Plot 7-95. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 120)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 64 of 200
1M2009280154-09.A3L	9/28/2020-11/25/2020	Portable Handset	Page 64 of 209
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Keysight Spectrum Analyzer - Occupied BW					
LXI RL RF 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO	02:35:24 PM Oct 20	
		nter Freq: 5.720000 ig: Free Run	000 GHz Avg Hold: 100/100	Radio Std: None	Theoreticetor
		tten: 20 dB	Avginoid. 100/100	Radio Device: B	TS
	#IFGaIII.LOW #/			Italio Bornool B	
10 dB/div Ref 20.00 dBm					
Log					
10.0					
0.00	warmara	manyamhan	so many and		Clear Write
-10.0	· .		L.		
	, p		h		
-20.0	1 <sup>0</sup>				
-30.0 -40.0 ppmintmlntmlwinnunduhant	<u>ل</u> ے		Mulatural	www.	Average
10 0 A AMONT WALLINGTON				an adamanan hulan	has
-50.0					
-60.0					Max Hold
-70.0					
10.0					
Center 5.72000 GHz				Span 50.00	MHz
#Res BW 220 kHz		VBW 2.2 MH;	z	Sweep	1 mo
					Min Hold
Occupied Bandwidt	h	Total Po	wer 23.	4 dBm	
		i otari i o	LO.	T GBIII	
19	.005 MHz				Detector
					Peak►
Transmit Freq Error	-24.980 kHz	% of OB	W Power 99	9.00 %	Auto <u>Man</u>
x dB Bandwidth	21.31 MHz	x dB	26	.00 dB	
		хив	-20.	.00 aB	
MSG			STATU	S	

Plot 7-96. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (UNII Band 2C) - Ch. 144)



Plot 7-97. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2C) - Ch. 102)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 65 of 200
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🔤 Кеу	sight Spectrum Analyzer	Occupied BW										
L <mark>XI</mark> RI	- RF 5	0Ω AC CO	RREC		NSE:INT		ALIGN A			M Oct 20, 2020	Trac	e/Detector
					eq: 5.59000				Radio Std	: None	TTAC	erDelector
				Trig: Free #Atten: 2		Avg Hol	a: 100/1		Radio Dev	ion BTS		
		#IF	Gain:Low	#Atten: 2					Radio Dev	ICE: DIS		
10 dE	Idio Def 20	).00 dBm										
Log												
10.0												
			forman	Lance Mary	moundate	worming						Clear Write
0.00							1					
-10.0			J				<b>\</b>					
-20.0		1.0	/				Υ.					
		hand	-				1 VUL	MA AL	hunnaha			_
-30.0	A developed and the second second	lefter a c c						1.1.61.1.62	www.hmt.h	montan in		Average
-40.0	Martin											
-50.0												
-60.0												Max Hold
-70.0												Maxilolu
-70.0											_	
0	ter 5.59000 GH	_							Omen 4			
		2								00.0 MHz		
#Re	sBW 560 kHz			VBV	N 6 MHz				SWe	ep 1 ms		Min Hold
0	ccupied Bar	ndwidth			Total P	ower		23.5	dBm			
				-								
		36.5	03 MI	1Z								Detector
												Peak►
	ransmit Freq I	Error	-8.688 k	(Hz	% of O	<b>3W Pow</b>	/er	99.	00 %		Auto	Man
	dB Bandwidt		53.17 M	LL-	x dB			26.0	0 dB			
×	ub banuwiuu		55.17 W	ΠΖ				-20.0				
											_	
MSG							1	STATUS				

Plot 7-98. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2C) - Ch. 118)



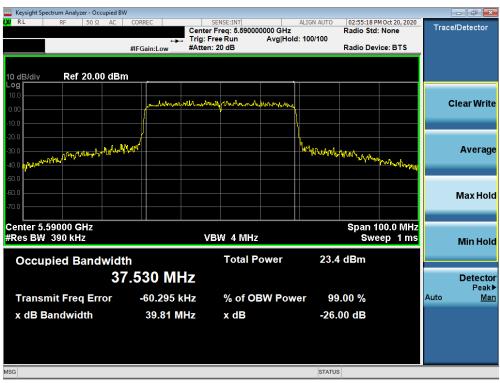
Plot 7-99. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11n (UNII Band 2C) - Ch. 142)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 66 of 200
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© 2020 PCTEST		·	V 9.0 02/01/2019



Keysight Spectrum Analyzer - Occupied BW									
KL RF 50Ω AC	CORREC		NSE:INT	0000 011-	ALIGN AUTO	02:52:43 P Radio Std	M Oct 20, 2020	Trac	e/Detector
			eq: 5.51000 Run		d: 100/100	Radio Std	: None		
	#IFGain:Low	#Atten: 2				Radio Dev	ice: BTS		
10 dB/div Ref 20.00 dBm								-	
10.0									
0.00	Marmon	Manne	Almandal	handmallan					Clear Write
	1		, 						
-10.0									
-20.0									
-20.0 -30.0 -40.0	41A				hat Wans willing	he Had a h			Average
-40.0 server al al a a a a a a a a a a a a a a a a						Y TOTAL MULLER	hour Manuala		_
-50.0									
-60.0									Max Hold
-70.0									
Center 5.51000 GHz							00.0 MHz		
#Res BW 390 kHz		VBV	N 4 MHz			Swe	eep 1 ms		Min Hold
			<b>T</b> - ( - 1 D		00.0				
Occupied Bandwidth	1		Total P	ower	23.3	dBm			
37	.556 MF	7							Detector
									Peak▶
Transmit Freq Error	-54.025 k	Hz	% of O	<b>3W Pow</b>	ver 99	.00 %		Auto	<u>Man</u>
x dB Bandwidth	39.71 M	<b>L</b> 17	x dB		-26	00 dB			
	55./ T W	п	X UD		-20.				
MSG					STATUS	3			

Plot 7-100. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 102)



Plot 7-101. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 118)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 67 of 200
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www.www.com/analyzer - Occupied BW					- ē 💌
<b>(X) RL</b> RF 50 Ω AC	Center	SENSE:INT Freq: 5.710000000 GHz Free Run Avg Hol I: 20 dB	Radio St d: 100/100	PM Oct 20, 2020 d: None evice: BTS	Trace/Detector
10 dB/div Ref 20.00 dBm					
0.00		May Marrie Ma			Clear Write
-10.0					
-30.0 -40.0 prosphylow to material and the	<b>N<sup>P</sup></b>		here and the second sec	Laplan for any the	Average
-50.0					Max Hold
-70.0 Center 5.71000 GHz			Span	100.0 MHz	
#Res BW 390 kHz Occupied Bandwidth		BW 4 MHz Total Power	23.6 dBm	/eep 1 ms	Min Hold
	.535 MHz		25.0 0011		Detector Peak▶
Transmit Freq Error	-29.581 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	39.44 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-102. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (UNII Band 2C) - Ch. 142)



Plot 7-103. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 106)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 68 of 200
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Keysight Spectrum Analyzer - Occupied B\	N						
LXI RE 50Ω AC	CORREC	SENSE:INT	ALIGN AUTO	03:50:00 PM		Trace	Detector
		nter Freq: 5.6100000 g: Free Run	00 GHz Avg Hold: 100/100	Radio Std:	None	mace	Detector
		tten: 20 dB	Avginola. 100/100	Radio Devid	e: BTS		
	WI Guill.EOW						
10 dB/div Ref 20.00 dBr	n						
Log 10.0							
		entress more marken and	-			С	lear Write
0.00			Land American States			Ŭ	
-10.0							
-20.0			<b>\</b>				
	the shafe		hiles the te				Average
I I I I I I I I I I I I I I I I I I I	10 <sup>1</sup>		A ALANA AND A A A A A A A A A A A A A A A A	11th another a happy	Ber .		Average
-40.0 W				,	y was all they have		
-50.0							
-60.0							Max Hold
-70.0							Max Hulu
-70.0							_
Center 5.6100 GHz				Span 20	0.0 MHz		
#Res BW 820 kHz		VBW 8 MHz			ep 1 ms		
							Min Hold
Occupied Bandwidt	th	Total Po	wer 23.1	dBm			
	5.681 MHz						Detector
Tana ana iti Fasar Fasar		0/ -f OD	N D	00.0/		Auto	Peak▶ Man
Transmit Freq Error	-109.19 kHz	% of OBV	v Power 99	.00 %		Auto	ivian
x dB Bandwidth	81.41 MHz	x dB	-26.	00 dB			
MSG			STATUS	;			

Plot 7-104. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 122)



Plot 7-105. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ac (UNII Band 2C) - Ch. 138)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dama 60 of 200
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LXX RL RF 50Ω AC CC		SENSE:INT		PM Oct 20, 2020	Trace/Detector
		Freq: 5.530000000 GHz ree Run Avg Hold	Radio St d: 100/100	d: None	ind on B of control
#11	FGain:Low #Atten			evice: BTS	
10 dB/div Ref 20.00 dBm					
10.0					
0.00	manstompourtheastling	and man water to be the second and	(		Clear Write
-10.0					
-20.0	<u></u>		հ		
-20.0 -30.0			MALLING CHARTER MARK		Average
-40.0			, , , , , , , , , , , , , , , , , , ,	mund salls Wra	
-50.0					
-60.0					Max Hold
-70.0					
Center 5.5300 GHz				200.0 MHz	
#Res BW/1 MHz	V	BW 8 MHz	Sw	veep 1ms	Min Hold
		Tetel Deven	24.0		
Occupied Bandwidth		Total Power	24.0 dBm		
77.0	DOO MHz				Detector
					Peak▶
Transmit Freq Error	-74.388 kHz	% of OBW Pow	ver 99.00 %		Auto <u>Man</u>
x dB Bandwidth	81.07 MHz	x dB	-26.00 dB		
		A GD	-20.00 uB		
MSG			STATUS		

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



Plot 7-107. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 122)

FCC ID: A3LSMG998B	PCTEST <sup>®</sup> Proud to be part of <b>®</b> element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:		Daga 70 of 200		
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	sight Spectrum Analyzer - Occupied BV	V								
L <mark>XI</mark> RI	- RF 50 Ω AC	CORREC		NSE:INT	0000 CH-	ALIGN AUTO	03:05:43 F	PM Oct 20, 2020	Trac	e/Detector
				eq: 5.69000 Run		i: 100/100	Radio Sto	: None		
		#IFGain:Low	#Atten: 2				Radio Dev	vice: BTS		
40	Bidiv Ref 20.00 dBn	•								
10 dl Log	Sialv Rei 20.00 abri									
10.0				and the states						
0.00		mulankohin	and models from	and the state of t	n.h. Markenaul				(	Clear Write
-10.0		1								
-20.0	Min and a start of the start of	Nam/				william.	- then			
-30.0	Ministry of the second					WWW.		se di		Average
-40.0	all offer and the						- ·· ·· ··	- WY WIII A WAY		
-50.0								· · · · ·		
-60.0										
										Max Hold
-70.0										
Cen	ter 5.6900 GHz						Snan 2	200.0 MHz		
	s BW 1 MHz		VBV	N 8 MHz				eep 1 ms		
<i>"</i> 105							CARA	oop Thio		Min Hold
0	ccupied Bandwidt	h		Total P	ower	24.3	dBm			
		7.030 MH	Z							Detector
Т	ransmit Freq Error	-131.21 k	Hz	% of O	3W Pow	er 99	.00 %		Auto	Peak► <u>Man</u>
	dB Bandwidth	80.93 M	LI-	x dB		26	00 dB			
×	u - Banawiatin	80.93 M	12	хав		-20.	00 aB			
MSG						STATUS	5			

Plot 7-108. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (UNII Band 2C) - Ch. 138)



Plot 7-109. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ac (UNII Band 2C) - Ch. 114)

FCC ID: A3LSMG998B	PCTEST° Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Dega 71 of 200
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Plot 7-110. 26dB Bandwidth Plot MIMO ANT2 (160MHz BW 802.11ax (UNII Band 2C) - Ch. 114)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 72 of 200
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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  $\geq$  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.

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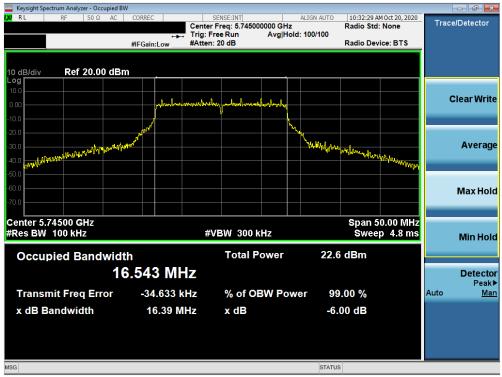
	Frequency [MHz]	Channel No.	802.11 Mode	Data Rate [Mbps]	Ant1 Measured 6dB Bandwidth [MHz]	Ant 2 Measured 6dB Bandwidth [MHz]
Band 3	5745	149	а	6	16.39	16.40
	5785	157	а	6	16.41	16.40
	5825	165	а	6	16.39	16.42
	5745	149	n (20MHz)	6.5/7.2 (MCS0)	17.62	17.60
	5785	157	n (20MHz)	6.5/7.2 (MCS0)	17.61	17.61
	5825	165	n (20MHz)	6.5/7.2 (MCS0)	17.60	17.60
	5745	149	ax (20MHz)	8.6/7.3 (MCS0)	18.99	18.93
	5785	157	ax (20MHz)	8.6/7.3 (MCS0)	18.83	18.91
	5825	165	ax (20MHz)	8.6/7.3 (MCS0)	19.00	18.88
	5755	151	n (40MHz)	13.5/15 (MCS0)	36.35	36.34
	5795	159	n (40MHz)	13.5/15 (MCS0)	36.35	36.35
	5755	151	ax (40MHz)	17.2/14.6 (MCS0)	37.54	37.31
	5795	159	ax (40MHz)	17.2/14.6 (MCS0)	37.67	37.31
	5775	155	ac (80MHz)	29.3/32.5 (MCS0)	75.80	75.57
	5775	155	ax (80MHz)	36/30.6 (MCS0)	77.16	76.60

Table 7-3. Conducted Bandwidth Measurements MIMO

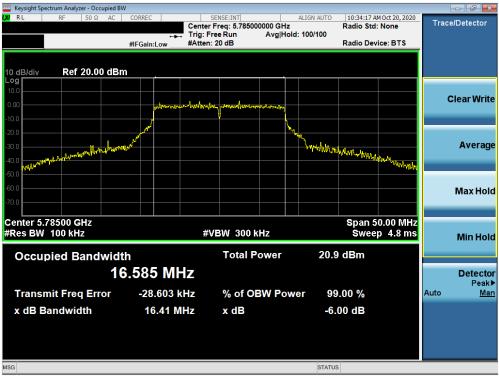
FCC ID: A3LSMG998B	Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
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# MIMO Antenna-1 6 dB Bandwidth Measurements







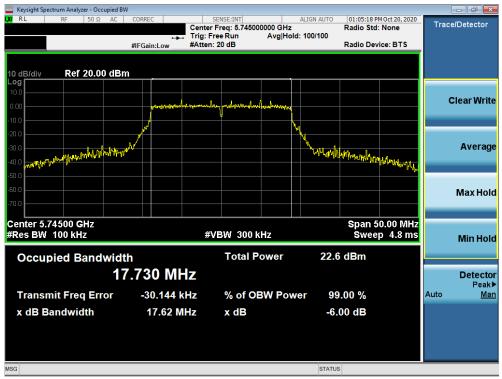
Plot 7-112. 6dB Bandwidth Plot MIMO ANT1 (802.11a (UNII Band 3) - Ch. 157)

FCC ID: A3LSMG998B	PCTEST* Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
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Plot 7-114. 6dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11n (UNII Band 3) - Ch. 149)

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Test Report S/N: Test Dates:		EUT Type:	Daga 76 at 200
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