

## **PCTEST**

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## MEASUREMENT REPORT FCC Part 15.407 802.11ax WiFi 6E

#### **Applicant Name:**

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

### Date of Testing: 9/28/2020-12/14/2020 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M2009230154-27-R1.A3L

## FCC ID:

#### A3LSMG998B

## APPLICANT:

# Samsung Electronics Co., Ltd.

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

Certification SM-G998B/DS SM-G998B Portable Handset 5935 – 7115MHz OFDMA 15E 6 GHz Low Power Indoor Client (6XD) ANSI C63.10-2013, KDB 789033 D02 v02r01, KDB 648474 D03 v01r04, KDB 662911 D01 v02r01, KDB 987594 D02

Note: This revised Test Report (S/N: 1M2009230154-27-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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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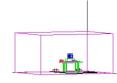


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	Channel		MIMO		
UNII Band	Bandwidth (MHz)	Tx Frequency (MHz)	Max. Power (mW)	Max. Power (dBm)	
5		5935 - 6415	8.492	9.29	
6	20	6435 - 6515	8.892	9.49	
7	20	6535 - 6875	15.346	11.86	
8		6895 - 7115	15.346	11.86	
5		5965 - 6405	15.812	11.99	
6	40	6445 - 6525	15.812	11.99	
7	40	6565 - 6845	15.547	11.92	
8		5985 - 6385	15.812	11.99	
5		5985 - 6385	15.776	11.98	
6	80	6465	15.101	11.79	
7	00	6545 - 6865	15.776	11.98	
8		6945 - 7025	14.928	11.74	
5		6025 - 6345	15.740	11.97	
6	160	6505	15.453	11.89	
7	100	6665 - 6825	15.812	11.99	
8		6985	15.631	11.94	

**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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#### **PRODUCT INFORMATION** 2.0

#### 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 while operating in the 6GHz band.

Test Device Serial No.: 0805M, 0779M, 0793M, 0814M

#### 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 UNII, Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB

	Band 5		Band 6		Band 7		Band 8
Ch.	Frequency (MHz)						
2	5935	97	6435	117	6535	189	6895
:	:	:	:	:	:	:	:
45	6175	105	6475	149	6695	209	6995
:	:	:	:	:	:	:	:
93	6415	113	6515	185	6875	233	7115

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

	Band 5		Band 6		Band 7		Band 8
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
3	5695	99	6445	123	6565	187	6885
:	:	:	:	:	:		:
43	6165	107	6485	155	6725	211	7005
:	:		:	:	:	:	:
91	6405	115	6525	179	6845	227	7085
<b>I</b>	Tab	ole 2-2. 802	.11ax (40MHz B	W) Frequenc	y / Channel Operation	ations	

ч

Ch.

119

:

151

: 183

	Band 5
Ch.	Frequency (MHz)
7	5985
•••	:
39	6145
•••	:
87	6385

	Band 6
Ch.	Frequency (MHz)
103	6465

Band 7
Frequency (MHz)

6545

6705

6865

Band 8
--------

Ch.	Frequency (MHz)
199	6945
•••	:
215	7025

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

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	Band 5		Band 6		Band 7	_	Band 8
Ch.	Frequency (MHz)						
15	6025	111	6505	143	6665	207	6985
:	:			:	:		
47	6185			175	6825		
:	:						
79	6345						

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

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#### Notes:

6GHz NII operation is possible in 20MHz, and 40MHz, and 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:

Mode	Antenna	Bandwidth [MHz]	Channel	Tone	Duty Cycle
				26T	99.6
802.11ax		20	2	52T	99.3
NII RU 6E	MIMO CDD	20	Z	106T	98.5
				242T	96.8
	MIMO CDD	40		26T	99.6
902 11av			3	52T	99.3
802.11ax				106T	98.4
NII RU 6E				242T	96.8
				484T	94.4
			_	26T	99.6
				52T	99.2
802.11ax				106T	98.4
NII RU 6E	MIMO CDD	80	7	242T	96.9
				484T	94.3
				996T	91.0

Table 2-5. Measured Duty Cycles

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

WiEi Configurations	CDD		SDM	
WiFi Configurations	ANT1	ANT2	ANT1	ANT2
11ax (20MHz)	✓	✓	$\checkmark$	✓
11ax (40MHz)	✓	✓	$\checkmark$	✓
11ax (80MHz)	✓	✓	$\checkmark$	✓
11ax (160MHz)	✓	✓	$\checkmark$	✓

 $\checkmark$  = Support; = NOT Support

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

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

3. This device supports simultaneous transmission operation, which allows for two SISO channels to operate independent of one another in the 2.4GHz (WLAN & BT), 5GHz, and 6GHz bands simultaneously on each antenna.

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## 2.3 Antenna Description

Following antenna was used for the testing.

Frequency Band	Antenna 1 Gain (dBi)	Antenna 2 Gain (dBi)
5	-5.9	-5.7
6	-6.4	-7.2
7	-6.4	-7.0
8	-6.5	-7.1

Table 2-7. Antenna Peak Gain

## 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, 7.5 and 7.6 for antenna port conducted emissions test setups.

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

## 2.5 Software and Firmware

The test was conducted with firmware version G998USQU0ATJ7 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 7.9. 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  $U_{\text{CISPR}}$  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
-	LTx2	Licensed Transmitter Cable Set	9/16/2020	Annual	9/16/2021	LTx2
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Anritsu	MA2411B	Pulse Power Sensor	9/22/2020	Annual	9/22/2021	1315051
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)	2/14/2019	Biennial	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	U\$46470561
Keysight Technologies	N9038A	MXE EMI Receiver	8/11/2020	Annual	8/11/2021	MY51210133
<b>Keysight Technologies</b>	N9030A	PXA Signal Analyzer (44GHz)	8/17/2020	Annual	8/17/2021	MY52350166
<b>Keysight Technologies</b>	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	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	F\$W67	Signal / Spectrum Analyzer	8/10/2020	Annual	8/10/2021	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
Rohde & Schwarz	SMW200A	Vector Signal Generator	N/A		103672	
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2/4/2020	Annual	2/4/2021	162125
Rohde & Schwarz	CMW-2800A	Up/Down Converter	N/A		100034	
Solar Electronics	8012-50-R-24-BNC	Line Impedance Stabilization Network	10/1/2019	Biennial	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:	15E 6 GHz Low Power Indoor Client (6XD)

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1046, 15.407(a)(11)	Maximum Conducted Output Power	N/A		PASS	Section 7.3
2.1049, 15.407(a)(10)	Occupied Bandwidth/ 26dB Bandwidth	99% of the occupied bandwidth of any channel must be contained within each of its respective U-NII sub bands The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 megahertz.	CONDUCTED	PASS	Section 7.2
15.407(a)(8)	Maximum Power Spectral Density	< -1dBm/MHz e.i.r.p.		PASS	Section 7.4
15.407(a)(8)	Maximum Radiated Output Power	< 24dBm over the frequency band of operation		PASS	Section 7.3
15.407(b)(6)	In-Band Emissions	EUT must meet the limits detailed in 15.407(b)(6)		PASS	Section 7.5
15.407(d)(6)	Contention Based Protocol	EUT must detect AWGN signal with 90% (or better) certainty		PASS	Section 7.6
15.407(b)(5)	Undesirable Emissions	< -27dBm/MHz e.i.r.p. outside of the 5.925 – 7.125GHz band	RADIATED	PASS	Section 7.7
15.205, 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS	Section 7.7, 7.8
15.407(b)(8)	AC Conducted Emissions (150kHz – 30MHz)	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 7.9

Table 7-1. Summary of Test Result
-----------------------------------

#### 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.

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

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
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### 7.2 26dB Bandwidth Measurement – 802.11ax

<u>2.1049, 15.407(a)(10)</u>

#### **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 KDB 987594 D02

#### **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 > 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.

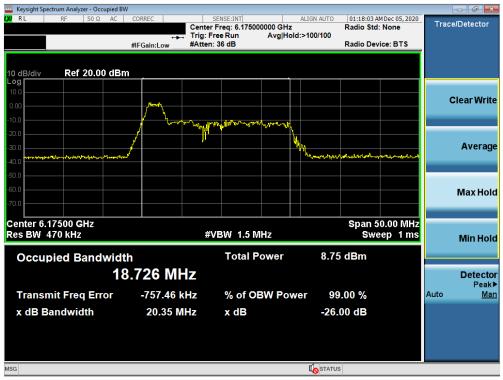
FCC ID: A3LSMG998B	PCTEST Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dama 40 of 070		
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## MIMO Antenna-1 26dB Bandwidth Measurements (26 Tones)



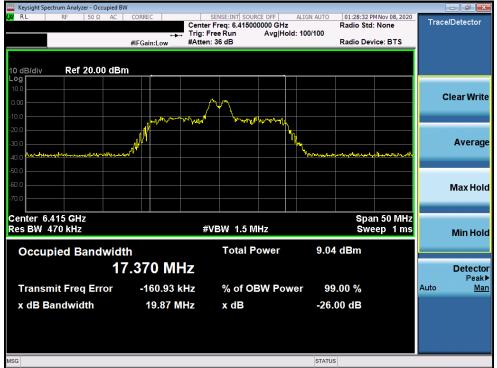
Plot 7-1. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) UNII Band 5) - Ch. 2)



Plot 7-2. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 45)

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 17 of 276	
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Plot 7-3. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) UNII Band 5) - Ch. 93)



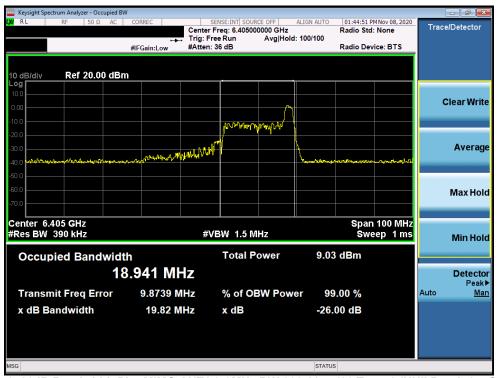
Plot 7-4. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 3)

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 19 of 076
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Plot 7-5. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 5) – Ch. 43)



Plot 7-6. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 91)

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 40 af 070	
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Keysight Spectrum Analyzer - Occupied B\	V				
<b>LX/</b> RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF	ALIGN AUTO 01:59:23 Radio Sto	PM Nov 08, 2020	Trace/Detector
	🛶 Trig:	Free Run Avg Hold:	100/100		
	#IFGain:Low #Atte	en: 36 dB	Radio De	vice: BTS	
10 dB/div Ref 20.00 dBr Log	n				
10.0					
0.00					Clear Write
-10.0					
-20.0	Merch March				
-30.0					Average
-40.0 Northerhoopsharenderselder	when With half	humpon who have my	downwork alonguages the	Wingman	<b>g</b> .
-50.0					
-60.0					
-70.0					Max Hold
-70.0					
Center 5.985 GHz				n 200 MHz	
#Res BW 470 kHz		#VBW 1.5 MHz	Sw	eep 1 ms	Min Hold
Occupied Bandwidt	b	Total Power	8.83 dBm		
			0.00 0.011		
3	5.235 MHz				Detector Peak►
Transmit Freq Error	-22.264 MHz	% of OBW Powe	r 99.00 %		Auto <u>Man</u>
x dB Bandwidth	19.63 MHz	x dB	-26.00 dB		
	19.03 MHZ	X UB	-20.00 dB		
MSG			STATUS		

Plot 7-7. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 7)



Plot 7-8. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 5) – Ch. 39)

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 20 of 276	
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Plot 7-9. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 5) – Ch. 87)



Plot 7-10. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 6) – Ch. 97)

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 04 of 070
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Plot 7-11. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 6) - Ch. 105)



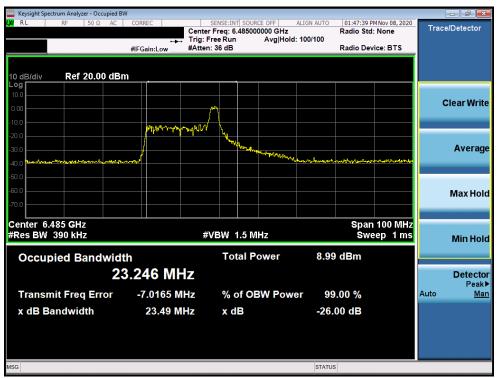
Plot 7-12. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 6) - Ch. 113)

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 070
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Keysight Spectrum Analyzer - Occupied B	W				
LXI RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF A	ALIGN AUTO 01:46:26 P Radio Std	MNov 08, 2020	Trace/Detector
	+++ Trig:	Free Run Avg Hold:	100/100		
	#IFGain:Low #Atter	n: 36 dB	Radio Dev	vice: BTS	
10 dB/div Ref 20.00 dBr	n				
Log 10.0					
0.00					Clear Write
-10.0					
-20.0	polon and all proved he	'nĄ			
					Avorado
-30.0		Will furt more many and the second second			Average
-40.0 Repaired and the second second second			and the state of the	and a fragment of the stands	
-50.0					
-60.0					Max Hold
-70.0					
Center 6.445 GHz			Snar	100 MHz	
#Res BW 390 kHz	#	VBW 1.5 MHz		eep 1 ms	
					Min Hold
Occupied Bandwidt	th	Total Power	9.32 dBm		
19	8.379 MHz				Detector
					Peak►
Transmit Freq Error	-10.124 MHz	% of OBW Powe	r 99.00 %		Auto <u>Man</u>
x dB Bandwidth	19.22 MHz	x dB	-26.00 dB		
MSG			074710		
MSG			STATUS		

Plot 7-13. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 6) - Ch. 99)



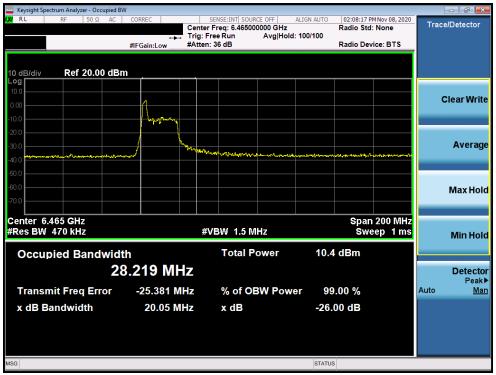
Plot 7-14. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 6) - Ch. 107)

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:		
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Plot 7-15. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 6) - Ch. 115)



Plot 7-16. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 6) - Ch. 103)

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:	D	
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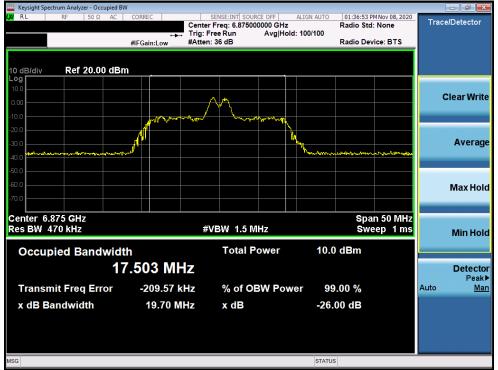
Plot 7-17. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 117)



Plot 7-18. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 149)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Daga 25 of 276	
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Plot 7-19. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 185)



Plot 7-20. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 123)

FCC ID: A3LSMG998B	PCTEST <sup>•</sup> Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dega 06 of 076	
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Keysight Spectrum Analyzer - Occupied BV	V				
<b>μα RL</b> RF 50Ω AC			ALIGN AUTO 01:51:44 F Radio Sto d: 100/100 Radio De		Trace/Detector
10 dB/div Ref 20.00 dBn	n				
					Clear Write
-100 -20.0 -30.0 -40.0		And a state of the	maken manuna	WARHER-PLANA	Average
-50.0 -60.0 -70.0					Max Hold
Center 6.725 GHz #Res BW 390 kHz		VBW 1.5 MHz	Sw	n 100 MHz eep 1 ms	Min Hold
Occupied Bandwidt	<sup>h</sup> 3.730 MHz	Total Power	9.97 dBm		Detector Peak▶
Transmit Freq Error x dB Bandwidth	9.9687 MHz 20.35 MHz	% of OBW Pow x dB	ver 99.00 % -26.00 dB		Auto <u>Man</u>
MSG			STATUS		

Plot 7-21. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 155)



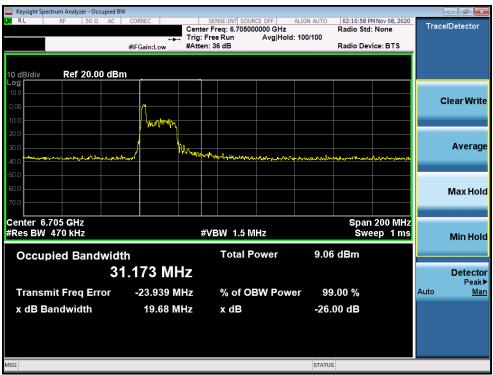
Plot 7-22. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 179)

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 07 of 070
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Keysight Spectrum Analyzer - Occupied BV	V				
<b>LX/ R L</b> RF 50 Ω AC	Trig:	SENSE:INT SOURCE OFF er Freq: 6.545000000 GHz Free Run Avg Hol n: 36 dB	F d: 100/100	02:10:16 PM Nov 08 Radio Std: None Radio Device: B	Trace/Detector
10 dB/div Ref 20.00 dBr	n				
10.0					Clear Write
-10.0 -20.0 -30.0 -40.0	Level With Markey	Martin the and the and the stand and the sta	an	และกระสิมคริปะกรุรรณ	Average
-50.0 -60.0 -70.0					Max Hold
Center 6.545 GHz #Res BW 470 kHz	#	¢VBW 1.5 MHz		Span 200 Sweep	
Occupied Bandwidt	<sup>h</sup> 3.162 MHz	Total Power	10.3 c	IBm	Detector
Transmit Freq Error	-25.409 MHz	% of OBW Pow			Peak▶ Auto <u>Man</u>
x dB Bandwidth	20.07 MHz	x dB	-26.00	) dB	
MSG			STATUS		

Plot 7-23. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 119)



Plot 7-24. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 151)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dega 00 of 076	
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Plot 7-25. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 7) - Ch. 183)



Plot 7-26. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 8) - Ch. 189)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMBUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		D 00 -f 070
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Plot 7-27. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 8) - Ch. 209)



Plot 7-28. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (26 Tones) (UNII Band 8) - Ch. 233)

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 20 of 276	
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Keysight Spectrum Analyzer - Occupied B	W				- 6 <b>-</b>
LXX RL RF 50Ω AC	Center	Freq: 6.885000000 GHz	Radio Sto 100/100	PM Nov 08, 2020 d: None vice: BTS	Trace/Detector
10 dB/div Ref 20.00 dB	m				
10.0					Clear Writ
-20.0	hand hand had had had had had had had had had ha	Vy MMMAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	مد بر مراجع المراجع الم		Averag
-40.0					Max Hol
Center 6.885 GHz #Res BW 390 kHz	#	VBW 1.5 MHz	Spai Sw	n 100 MHz eep 1 ms	Min Hol
Occupied Bandwid	<sup>th</sup> 8.8 <b>92 MHz</b>	Total Power	8.57 dBm		Detecto
Transmit Freq Error x dB Bandwidth	-9.9129 MHz 20.24 MHz	% of OBW Powe x dB	er 99.00 % -26.00 dB		Peak Auto <u>Ma</u>
MSG			STATUS		

Plot 7-29. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 8) - Ch. 187)



Plot 7-30. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 8) - Ch. 211)

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 21 of 276	
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Plot 7-31. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (26 Tones) (UNII Band 8) - Ch. 227)



Plot 7-32. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 8) - Ch. 199)

FCC ID: A3LSMG998B	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dama 20 of 070	
1M2009230154-27-R1.A3L	9/28/2020-12/14/2020	Portable Handset	Page 32 of 276	
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Keysight Spectrum Analyzer - Occupied E					- 6 🛃
RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF A er Freq: 7.025000000 GHz	ALIGN AUTO 02:14:20 Radio St	PM Nov 08, 2020 d: None	Trace/Detector
	+++ Trig:	Free Run Avg Hold:			
	#IFGain:Low #Atte	en: 36 dB	Radio De	evice: BTS	
0 dB/div Ref 20.00 dB	m				
0.0					
.00					Clear Writ
		չ-Մալ, հայ այս ան			
10					Averac
	wasthe date of the form of the public of	where the strate of the state o	Mary Mary and Mary Mary	and the second second	
).0					
0.0					Max Hol
enter 7.025 GHz				n 200 MHz	
Res BW 470 kHz		#VBW 1.5 MHz	Sw	veep 1 ms	Min Ho
Occupied Bandwid	th	Total Power	8.44 dBm		
			o.Hr dBill		
3	9.109 MHz				Detecto
Transmit Freq Error	20.419 MHz	% of OBW Powe	r 99.00 %	A	uto <u>Ma</u>
x dB Bandwidth	20.40 MHz	x dB	-26.00 dB		
	20.40 10112	A UD	-20.00 uB		
			07.1710		
3			STATUS		

Plot 7-33. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (26 Tones) (UNII Band 8) - Ch. 215)

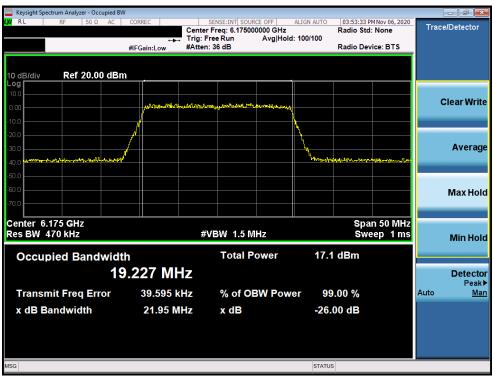
FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dage 22 of 276
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#### MIMO Antenna-1 26dB Bandwidth Measurements (Full Tones)



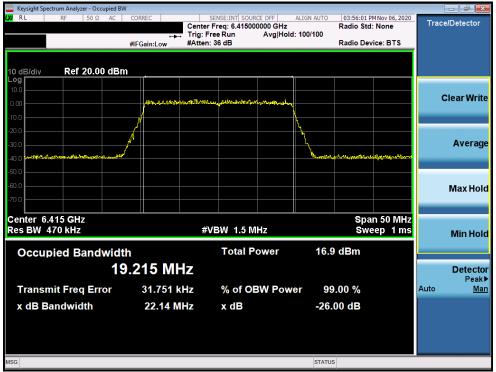
Plot 7-34. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) UNII Band 5) - Ch. 2)



Plot 7-35. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 5) – Ch. 45)

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:		Dawa 04 -6 070
1M2009230154-27-R1.A3L	9/28/2020-12/14/2020	Portable Handset		Page 34 of 276
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Plot 7-36. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) UNII Band 5) - Ch. 93)



Plot 7-37. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 5) - Ch. 3)

FCC ID: A3LSMG998B	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:		Da 25
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Keysight Spectrum Analyzer - Occupied BW	/					
KL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF	ALIGN AUTO 04:29:42 I Radio Sto	M Nov 06, 2020	Trace/Detector	
	Trig	: Free Run Avg Hol	d: 100/100			
	#IFGain:Low #Att	en: 36 dB	Radio De	vice: BTS		
10 dB/div Ref 20.00 dBm	า					
Log						
10.0					Clear Write	
0.00	mandmannth	Manny Hannestonen Hannes Marine				
-10.0						
-20.0						
-30.0					Average	
-40,0 Mary marga methylation of the margine	md		1 month who was	panahanan		
-50.0						
-60.0					Max Hold	
-70.0					wax noid	
Center 6.165 GHz	n 100 MHz					
#Res BW 390 kHz		#VBW 1.5 MHz	Sw	eep 1 ms	Min Hold	
	•	Total Bauvar	16.5 dBm			
Coupled Balleman						
37.658 MHz						
	404 70 64		00.00		Peak▶ Auto Man	
Transmit Freq Error	101.72 kHz	% of OBW Pow	/er 99.00 %		Auto <u>Man</u>	
x dB Bandwidth	40.11 MHz	x dB	-26.00 dB			
MSG						
MSG STATUS						

Plot 7-38. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 5) - Ch. 43)



Plot 7-39. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 5) - Ch. 91)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dama 20 of 270	
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Keysight Spectrum Analyzer - Occupied BW								
LXX RL RF 50Ω AC CO	T	SENSE:INT SOUR enter Freq: 5.98500 rig: Free Run	0000 GHz	LIGN AUTO	Radio Std:		Trace	Detector
#IF	Gain:Low #	Atten: 36 dB			Radio Dev	ice: BTS		
10 dB/div Ref 20.00 dBm								
Log								_
10.0							c	lear Write
-10.0	and the second second second	nterreturn touthan	handhalaca					
-20.0								
-30.0	[							Average
-40.0 Annandan march and the march the			<u> </u>	-	manterestimes	montenta		
-50.0								
-60.0								Maylald
-70.0								Max Hold
Center 5.985 GHz		40 (1514) 4 5 54				200 MHz		
#Res BW 470 kHz		#VBW 1.5 M	п2		Swe	ep 1ms		Min Hold
Occupied Bandwidth		Total P	ower	17.4	dBm			
	23 MHz	,						Detector
	23 10112	-						Peak▶
Transmit Freq Error	199.90 kHz	2 % of OE	BW Power	r 99	.00 %		Auto	<u>Man</u>
x dB Bandwidth	81.03 MHz	x dB		-26.0	00 dB			
MSG				STATUS				

Plot 7-40. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 5) - Ch. 7)



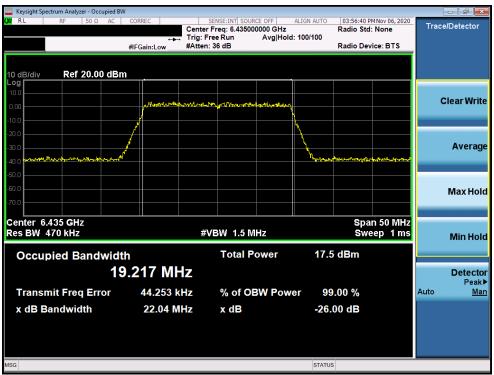
Plot 7-41. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 5) - Ch. 39)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Daga 27 of 276		
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Keysight Spectrum Analyzer - Occupied BW					
LXX RL RF 50 Ω AC	Trig:	SENSE:INT SOURCE OFF er Freq: 6.385000000 GHz Free Run Avg Holo en: 36 dB	Radio S d: 100/100	B PM Nov 06, 2020 td: None evice: BTS	Trace/Detector
10 dB/div Ref 20.00 dBm					
0.00	M. M. Bill Mar. non Prof. A	have all water of the series a series			Clear Write
-10.0					
-20.0 -30.0 -40.0	,		handleinsterstation weighter	~h~~hapenteftelijete	Average
-50.0 -60.0 -70.0					Max Hold
Center 6.385 GHz #Res BW 470 kHz	#	≇VBW 1.5 MHz	Spa St	an 200 MHz veep 1 ms	Min Hold
Occupied Bandwidth	1	Total Power	17.7 dBm		
77	.186 MHz				Detector Peak▶
Transmit Freq Error	179.81 kHz	% of OBW Pow			Auto <u>Man</u>
x dB Bandwidth	80.87 MHz	x dB	-26.00 dB		
MSG			STATUS		

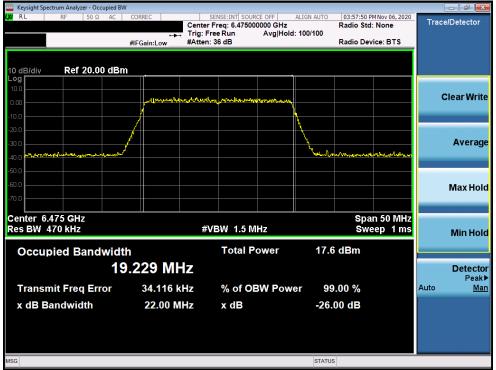
Plot 7-42. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 5) - Ch. 87)



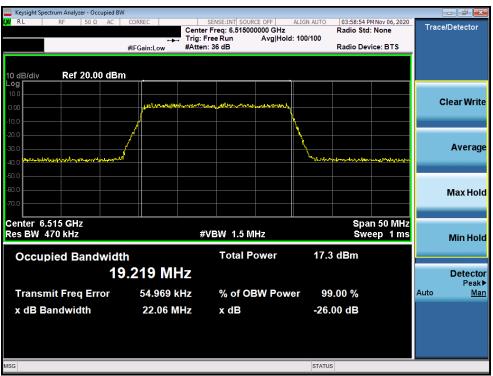
Plot 7-43. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 6) - Ch. 97)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager		
Test Report S/N:	Test Dates:	EUT Type:	Dega 20 of 276		
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Plot 7-44. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 6) - Ch. 105)



Plot 7-45. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 6) - Ch. 113)

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 20 of 270	
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Keysight Spectrum Analyzer - Occupied BW						e X
LXIRL RF 50Ω AC		Freq: 6.445000000 GHz	Radio	24 PM Nov 06, 2020 Std: None	Trace/De	etector
	IFGain:Low #Atten:	36 dB	Radio I	Device: BTS		
10 dB/div <b>Ref 20.00 dBm</b>						
10.0						
0.00	man maker with a fight	and and an all and a second			Clea	ar Write
-10.0						
-20.0						
-30.0					۴	verage
-40.0 however, and a second state of the secon			"Home and selection of the second	-		
-50.0						
-60.0					м	ax Hold
-70.0						
Center 6.445 GHz				an 100 MHz		
#Res BW 390 kHz	#V	/BW 1.5 MHz	\$	weep 1 ms	M	lin Hold
Occupied Bandwidth		Total Power	16.6 dBm			
	600 MHz				D	etector
Transmit Freq Error	86.367 kHz	% of OBW Powe	er 99.00 %		Auto	Peak▶ Man
						IIII
x dB Bandwidth	40.25 MHz	x dB	-26.00 dB			
MSG			STATUS			

Plot 7-46. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 6) - Ch. 99)



Plot 7-47. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 6) - Ch. 107)

FCC ID: A3LSMG998B	Proved to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager	
Test Report S/N: Test Dates:		EUT Type:		Dama 40 of 070	
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Keysight Spectrum Analyzer - Occupied B					
LX/ R L RF 50 Ω AC		SENSE:INT SOURCE OFF	ALIGN AUTO 04:35:55 F Radio Sto	MNov 06, 2020	Trace/Detector
	🛶 Trig: F	ree Run Avg Hold	: 100/100		
	#IFGain:Low #Atten	:: 36 dB	Radio De	vice: BTS	
10 dB/div Ref 20.00 dB Log	m				
10.0					
0.00		กลาง ภายเหาะที่ให้เราะการสารให้เราะการสา			Clear Write
-10.0	Add Alexandra and a second	hall high a show the share and			
-20.0	{				
-30.0					Average
-40.0 senter hyperman where where			how on many and	Another and the states	
-50.0					
-60.0					
-70.0					Max Hold
-70.0					
Center 6.525 GHz				n 100 MHz	
#Res BW 390 kHz	#	VBW 1.5 MHz	Sw	eep 1 ms	Min Hold
Occupied Bandwid	th	Total Power	16.7 dBm		
		Total Lower			
3	7.523 MHz				Detector Peak▶
Transmit Freq Error	103.65 kHz	% of OBW Powe	er 99.00 %		Auto <u>Man</u>
x dB Bandwidth	40.01 MHz	x dB	-26.00 dB		
	40.01 MHZ	A UB	-20.00 uB		
MSG			STATUS		

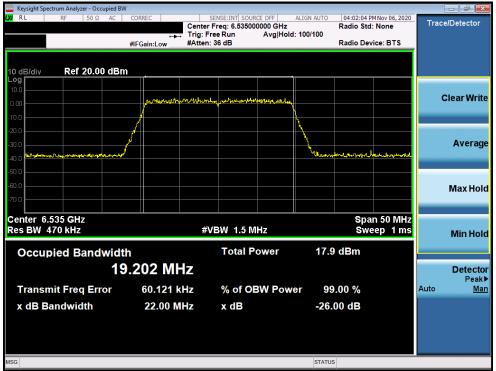
Plot 7-48. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 6) - Ch. 115)



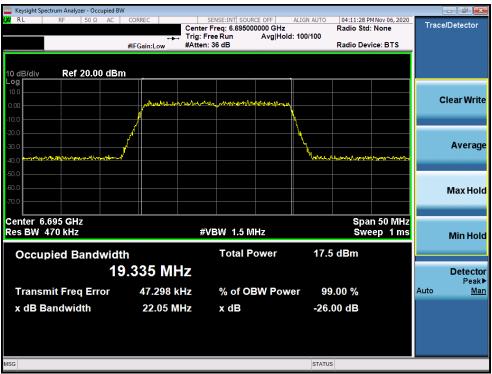
Plot 7-49. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 6) - Ch. 103)

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 44 af 070	
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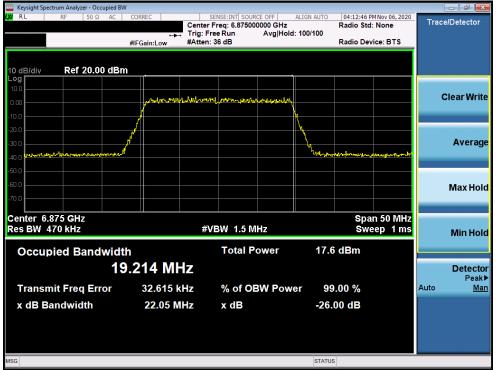
Plot 7-50. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 7) - Ch. 117)



Plot 7-51. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 7) – Ch. 149)

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 276		
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Plot 7-52. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 7) - Ch. 185)



Plot 7-53. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 7) – Ch. 123)

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 40 af 070
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Keysight Spectrum Analyzer - Occupied BW					
LXI RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF	ALIGN AUTO 04:37:38 Radio St	PM Nov 06, 2020	Trace/Detector
	Trig: I	Free Run Avg Hold	: 100/100		
	#IFGain:Low #Atter	n: 36 dB	Radio D	evice: BTS	
10 dB/div Ref 20.00 dBm	<u> </u>				
Log					
0.00					Clear Write
	mounterimber	and the second of the second sec			
-10.0					
-20.0					
-30.0					Average
-40.0	كې.		- waren deren gewarten ge	www.haban706khab	
-50.0					
-60.0					Max Hold
-70.0					
Center 6.725 GHz #Res BW 390 kHz		VBW 1.5 MHz		n 100 MHz	
#Res BW 390 KHZ	#		31	veep 1 ms	Min Hold
Occupied Bandwidt	h	Total Power	17.5 dBm		
	.573 MHz				Detector
37					Detector Peak►
Transmit Freq Error	161.44 kHz	% of OBW Powe	er 99.00 %		Auto <u>Man</u>
x dB Bandwidth	40.22 MHz	x dB	-26.00 dB		
MSG			STATUS		
mod			012100		

Plot 7-54. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 7) - Ch. 155)



Plot 7-55. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 7) - Ch. 179)

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 44 of 276
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Keysight Spectrum Analyzer - Occupied BW					
LXI RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF er Freg: 6.545000000 GHz	ALIGN AUTO 04:58:14 P Radio Std	MNov 06, 2020	Trace/Detector
	+++ Trig:	Free Run Avg Hold	1: 100/100		
	#IFGain:Low #Atte	n: 36 dB	Radio Dev	vice: BTS	
10 dB/div Ref 20.00 dBm					
10.0					
0.00					Clear Write
-10.0	A CLUBERT AND	una hand hand			
-20.0					
-30.0					Average
-40.0 web fra hours have mar and a state	الس		When have been and the marcan	been with the range	
-50.0					
-60.0					Max Hold
-70.0					IVIAX HOIU
Center 6.545 GHz				200 MHz	
#Res BW 470 kHz	7	≇VBW 1.5 MHz	SW	eep 1 ms	Min Hold
Occupied Bandwidth	n	Total Power	17.0 dBm		
	.132 MHz				Detector
					Detector Peak▶
Transmit Freq Error	216.70 kHz	% of OBW Pow	er 99.00 %		Auto <u>Man</u>
x dB Bandwidth	80.63 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-56. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 7) - Ch. 119)



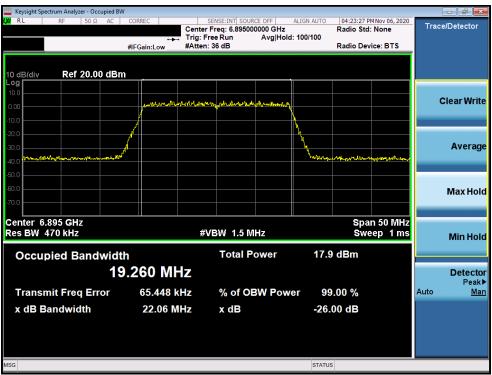
Plot 7-57. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 7) - Ch. 151)

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 45 af 070
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Keysight Spectrum Analyzer - Occupied BW					-	×
			Ra 1: 100/100	4:59:35 PM Nov 06, 2020 dio Std: None dio Device: BTS	Trace/Detect	tor
10 dB/div <b>Ref 10.00 dBm</b> Log						
-10.0	And an and a start and starter	malistation			Clear W	Irite
-20.0 -30.0 -40.0			Mand managements	when the strategy with the	Aver	rage
-50.0 -60.0						-3-
-70.0					MaxH	lold
Center 6.865 GHz #Res BW 470 kHz	#VI	BW 1.5 MHz		Span 200 MHz Sweep 1 ms	Min H	lold
Occupied Bandwidth	94 MHz	Total Power	17.4 dE	3m	Dete	ctor
Transmit Freq Error	178.48 kHz	% of OBW Pow	er 99.00	%	Pe	eak▶ <u>Man</u>
x dB Bandwidth	80.69 MHz	x dB	-26.00	dB		
MSG			STATUS			

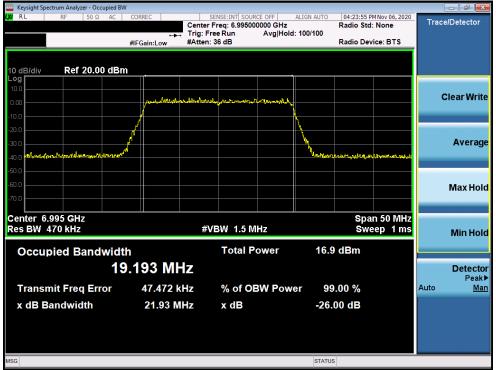
Plot 7-58. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 7) - Ch. 183)



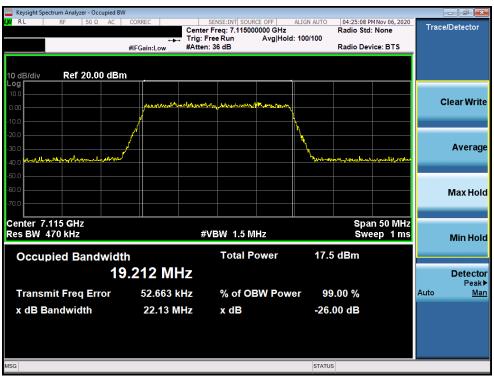
Plot 7-59. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 8) - Ch. 189)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-60. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 8) - Ch. 209)



Plot 7-61. 26dB Bandwidth Plot MIMO ANT1 (20MHz BW 802.11ax (Full Tones) (UNII Band 8) - Ch. 233)

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 47 of 070	
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Keysight Spectrum Analyzer - Occupied BW					- ē 🗙
💢 RL RF 50Ω AC	CORREC	SENSE:INT SOURCE OFF		4:38:44 PM Nov 06, 2020 adio Std: None	Trace/Detector
			d: 100/100	adio Sta: None	
	#IFGain:Low #Atter	n: 36 dB	Ra	adio Device: BTS	
10 dB/div Ref 20.00 dBm					
Log					
10.0					Clear Write
0.00	Marcanteritation	way for the market a party sty the			Clear Write
-10.0					
-20.0			N		
-30.0					Average
-41 0 marsh mark more to be mark and a strate	کسی		manner	Monstration	J
-50.0					
-60.0					Max Hold
-70.0					
Center 6.885 GHz				Span 100 MHz	
#Res BW 390 kHz	#	VBW 1.5 MHz		Sweep 1 ms	Min Hald
				enresp into	Min Hold
Occupied Bandwidth	า	Total Power	17.0 dl	Bm	
	.662 MHz				Detector
51					Detector Peak▶
Transmit Freq Error	103.51 kHz	% of OBW Pow	ver 99.00	0 %	Auto <u>Man</u>
x dB Bandwidth	40.21 MHz	x dB	-26.00	dB	
MSG			STATUS		

Plot 7-62. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 8) - Ch. 187)



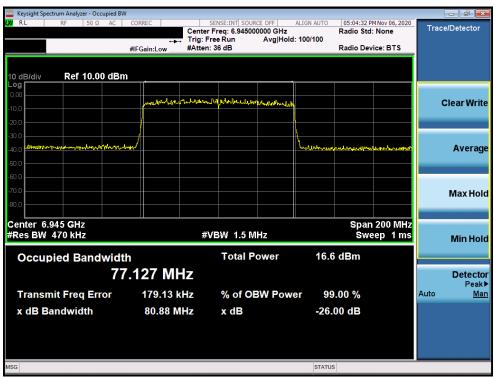
Plot 7-63. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 8) - Ch. 211)

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 49 of 276
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Keysight Spectrum Analyzer - Occupied BW					- ē 🔀
MARL RF 50Ω AC	+++ Trig:	SENSE:INT SOURCE OFF er Freq: 7.005000000 GHz Free Run Avg Hold n: 36 dB	Radio Sto		Trace/Detector
10 dB/div <b>Ref 20.00 dBm</b> Log					
					Clear Write
-10.0	Van Maria Maria	haven filmelan and a constraining			
-30.0 -40.0 ***********************************	and 1		hits and some build an at all		Average
-50.0					
-60.0					Max Hold
Center 7.005 GHz #Res BW 390 kHz	đ	≇VBW 1.5 MHz		n 100 MHz eep 1 ms	Min Hold
Occupied Bandwidt		Total Power	16.3 dBm		
37 Transmit Freq Error	.588 MHz	% of OBW Pow	er 99.00 %		Detector Peak► Auto Man
x dB Bandwidth	40.33 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-64. 26dB Bandwidth Plot MIMO ANT1 (40MHz BW 802.11ax (Full Tones) (UNII Band 8) - Ch. 227)



Plot 7-65. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 8) - Ch. 199)

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:	D 10 -f 070
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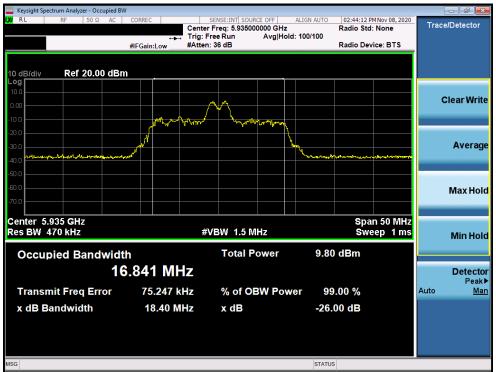
	ectrum Analyzer													_	- 6
RL	RF	50 Ω	AC	COR	REC			ENSE:INT S			LIGN AUTO		2 PM Nov 06, 2020	Trac	e/Detector
						↔	Trig: Fr	ee Run			100/100				
				#IFG	Gain:Lov	v	#Atten:	36 dB				Radio D	evice: BTS	-	
dB/div	Ref 1	0.00	dBm	1						<u> </u>					
.00															
).0					and with the second	Murth	w/WW/Mity	in when the	hormono	elon					Clear Writ
1.0															
1.0				/											
).0 <b>mm</b>	mannanda	www.e	al integration	he we have the							manne	n hurring sour			Avera
0.0															
0.0															
0.0															Max Ho
D.O															Μάλ Πυ
	.025 GHz 470 kHz						-#1	'BW 1.5	พมว				an 200 MHz weep 1 ms		
Kes BW	470 KHZ						#V	BW 1.5	IVINZ			3	weep rms		Min Ho
Occu	pied Ba	nd۱	widt	h				Total	Power		17.3	3 dBm			
					62	MH	7								Detect
															Peal
Transr	nit Freq	Erro	or		137.7	74 ki	z	% of	OBW P	owe	r 99	9.00 %		Auto	<u>M</u>
x dB B	andwidt	h			81.0	5 MI	Ιz	x dB			-26.	00 dB			
												_			

Plot 7-66. 26dB Bandwidth Plot MIMO ANT1 (80MHz BW 802.11ax (Full Tones) (UNII Band 8) - Ch. 215)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N:	Test Dates:	EUT Type:	Dege 50 of 276
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## MIMO Antenna-2 26dB Bandwidth Measurements (26 Tones)



Plot 7-67. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (26 Tones) UNII Band 5) – Ch. 2)



Plot 7-68. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 45)

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Plot 7-69. 26dB Bandwidth Plot MIMO ANT2 (20MHz BW 802.11ax (26 Tones) UNII Band 5) - Ch. 93)



Plot 7-70. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 3)

FCC ID: A3LSMG998B	Proud to be part of @ element	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager	
Test Report S/N:	Test Dates:	EUT Type:	Dama 50 af 070	
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Plot 7-71. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 43)



Plot 7-72. 26dB Bandwidth Plot MIMO ANT2 (40MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 91)

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 53 af 070	
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Keysight Spectrum Analyzer - Occupied B\	V				
<b>ΙΧΙ R</b> Ε 50 Ω AC	Center	SENSE:INT SOURCE OFF Freq: 5.985000000 GHz Free Run Avg Hold	Radio Ste	PM Nov 08, 2020 d: None	Trace/Detector
		: 36 dB		vice: BTS	
10 dB/div Ref 20.00 dBr	n				
Log					
0.00	h				Clear Write
-10.0					
	YWUY MAN				
-20.0					Average
-30.0	der Mahalle	Man All	and the second and the second s		Average
-4010			an the relation of the second s		
-50.0					
-60.0					Max Hold
-70.0					
Center 5.985 GHz			Snai	n 200 MHz	
#Res BW 470 kHz	#	VBW 1.5 MHz		eep 1 ms	Min Hold
					MITTOR
Occupied Bandwidt	h	Total Power	9.19 dBm		
23	3.038 MHz				Detector
	07.004.000		00.00.0/		Peak►
Transmit Freq Error	-27.961 MHz	% of OBW Powe	er 99.00 %		Auto <u>Man</u>
x dB Bandwidth	19.50 MHz	x dB	-26.00 dB		
MSG			STATUS		

Plot 7-73. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 7)



Plot 7-74. 26dB Bandwidth Plot MIMO ANT2 (80MHz BW 802.11ax (26 Tones) (UNII Band 5) - Ch. 39)

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:		De 22 54 af 070	
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