



MEASUREMENT REPORT

FCC Part 30 5G mmWave

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

Date of Testing:
10/5/2020 – 11/20/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2009230152-06-R1.A3L

FCC ID:	A3LSMG998U
APPLICANT:	Samsung Electronics Co., Ltd.

Application Type: Certification
Model: SM-G998U
Additional Model(s): SM-G998U1
EUT Type: Portable Handset
FCC Classification: Part 30 Mobile Transmitter (5GM)
FCC Rule Part(s): 30
Test Procedure(s): ANSI C63.26-2015, KDB 971168 D01 v03r01,
KDB 842590 D01 v01r01

Note: This revised Test Report (S/N: 1M2009230152-06-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 §2.947. Test results reported herein relate only to the item(s) tested.

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


Randy Ortanez
President

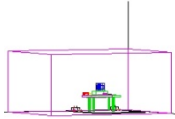


FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 1 of 97

T A B L E O F C O N T E N T S

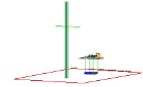
1.0	INTRODUCTION	5
1.1	Scope	5
1.2	PCTEST Test Location.....	5
1.3	Test Facility / Accreditations.....	5
2.0	PRODUCT INFORMATION.....	6
2.1	Equipment Description	6
2.2	Device Capabilities.....	6
2.3	Test Configuration	6
2.4	EMI Suppression Device(s)/Modifications	6
3.0	DESCRIPTION OF TESTS	7
3.1	Measurement Procedure.....	7
3.2	Radiated Power and Radiated Spurious Emissions	7
4.0	MEASUREMENT UNCERTAINTY	9
5.0	TEST EQUIPMENT CALIBRATION DATA	10
6.0	SAMPLE CALCULATIONS	11
7.0	TEST RESULTS	12
7.1	Summary	12
7.2	Occupied Bandwidth	13
7.3	Equivalent Isotropic Radiated Power.....	32
7.4	Radiated Spurious and Harmonic Emissions	40
7.5	Band Edge Emissions	72
7.6	Frequency Stability / Temperature Variation	90
8.0	CONCLUSION.....	95
9.0	APPENDIX A	96
9.1	VDI Mixer Verification Certificate.....	96

FCC ID: A3LSMG998U	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset	Page 2 of 97



MEASUREMENT REPORT

FCC Part 30



Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n261	L Patch	50	27525 - 28325	1	SISO	QPSK	0.977	29.90	45M6G7D
					2Tx	QPSK	0.788	28.97	45M6G7D
					SISO	$\pi/2$ BPSK	0.968	29.86	45M4G7D
					SISO	16QAM	0.711	28.52	45M5W7D
					SISO	64QAM	0.503	27.02	45M8W7D
		100	27550 - 28300	2	SISO	QPSK	0.547	27.38	95M6G7D
					SISO	$\pi/2$ BPSK	0.544	27.36	95M1G7D
					SISO	16QAM	0.382	25.82	95M7W7D
					SISO	64QAM	0.236	23.74	97M3W7D
					SISO	QPSK	0.993	29.97	93M5G7D
	K Patch	50	27525 - 28325	1	2Tx	QPSK	0.696	28.43	93M5G7D
					SISO	$\pi/2$ BPSK	0.986	29.94	90M6G7D
					SISO	16QAM	0.769	28.86	93M8W7D
					SISO	64QAM	0.525	27.20	94M8W7D
		100	27550 - 28300	2	SISO	QPSK	0.477	26.79	196MG7D
					SISO	$\pi/2$ BPSK	0.491	26.91	194MG7D
					SISO	16QAM	0.335	25.25	191MW7D
					SISO	64QAM	0.222	23.47	192MW7D
		50	27525 - 28325	1	SISO	QPSK	0.608	27.84	-
					2Tx	QPSK	0.918	29.63	-
					2Tx	$\pi/2$ BPSK	0.855	29.32	-
					2Tx	16QAM	0.523	27.19	-
					2Tx	64QAM	0.318	25.03	-
n261	K Patch	50	27525 - 28325	2	2Tx	QPSK	0.351	25.46	-
					2Tx	$\pi/2$ BPSK	0.334	25.24	-
					2Tx	16QAM	0.234	23.70	-
					2Tx	64QAM	0.147	21.67	-
		100	27550 - 28300	1	SISO	QPSK	0.679	28.32	-
					2Tx	QPSK	0.986	29.94	-
					2Tx	$\pi/2$ BPSK	0.918	29.63	-
					2Tx	16QAM	0.506	27.04	-
					2Tx	64QAM	0.355	25.50	-
	K Patch	100	27550 - 28300	2	2Tx	QPSK	0.341	25.33	-
					2Tx	$\pi/2$ BPSK	0.332	25.21	-
					2Tx	16QAM	0.228	23.59	-
					2Tx	64QAM	0.142	21.52	-

EUT Overview (Band n261)

FCC ID: A3LSMG998U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)			Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 3 of 97	

Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n260	L Patch	50	37025 - 39975	1	SISO	QPSK	0.374	25.73	45M8G7D
					2Tx	QPSK	0.806	29.06	45M8G7D
					2Tx	$\pi/2$ BPSK	0.804	29.05	45M6G7D
					2Tx	16QAM	0.567	27.53	45M9W7D
					2Tx	64QAM	0.302	24.79	47M8W7D
				2	2Tx	QPSK	0.402	26.04	95M9G7D
					2Tx	$\pi/2$ BPSK	0.399	26.01	96M0G7D
					2Tx	16QAM	0.266	24.24	103MW7D
					2Tx	64QAM	0.159	22.01	103MW7D
		100	37050 - 39950	1	SISO	QPSK	0.371	25.70	94M6G7D
					2Tx	QPSK	0.822	29.15	94M6G7D
					2Tx	$\pi/2$ BPSK	0.810	29.09	91M5G7D
					2Tx	16QAM	0.553	27.43	95M1W7D
					2Tx	64QAM	0.303	24.82	93M3W7D
				2	2Tx	QPSK	0.351	25.46	193MG7D
					2Tx	$\pi/2$ BPSK	0.355	25.51	193MG7D
					2Tx	16QAM	0.234	23.69	196MW7D
					2Tx	64QAM	0.144	21.59	200MW7D
n260	K Patch	50	37025 - 39975	1	SISO	QPSK	0.273	24.36	-
					2Tx	QPSK	0.605	27.82	-
					2Tx	$\pi/2$ BPSK	0.577	27.61	-
					2Tx	16QAM	0.359	25.55	-
					2Tx	64QAM	0.212	23.26	-
				2	2Tx	QPSK	0.235	23.72	-
					2Tx	$\pi/2$ BPSK	0.232	23.66	-
					2Tx	16QAM	0.160	22.04	-
					2Tx	64QAM	0.103	20.12	-
		100	37050 - 39950	1	SISO	QPSK	0.305	24.84	-
					2Tx	QPSK	0.561	27.49	-
					2Tx	$\pi/2$ BPSK	0.573	27.58	-
					2Tx	16QAM	0.321	25.07	-
					2Tx	64QAM	0.193	22.85	-
				2	2Tx	QPSK	0.356	25.52	-
					2Tx	$\pi/2$ BPSK	0.351	25.46	-
					2Tx	16QAM	0.240	23.81	-
					2Tx	64QAM	0.156	21.92	-

EUT Overview (Band n260)

Note: Due to similar antenna performance from both patch antennas, the Occupied Bandwidth was only measured on one antenna for each band.

FCC ID: A3LSMG998U	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset	Page 4 of 97

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 Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO/IEC 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 ISSED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISSED.

FCC ID: A3LSMG998U	 Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 5 of 97

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG998U**. The test data contained in this report pertains only to the emissions due to the EUT's 5G mmWave function.

The EUT contains two antennas, referred to herein as Ant1 (L Patch) and Ant2 (K Patch). Each of the patch antennas is comprised of two separate antenna feeds - one for horizontal and one for vertical polarization. Only one array antenna can be active at a time.

The EUT supports up to 8CC for DL, and 2CC for UL. For each CC, the EUT supports both 50MHz bandwidth and 100MHz bandwidth. The EUT supports a subcarrier spacing (SCS) of 120kHz with two transmission schemes, CP-OFDM and DFT-s-OFDM, with pi/2-BPSK, QPSK, 16-QAM, and 64-QAM modulations. Different Beam IDs are supported, each corresponding to a different position in space for each antenna. During testing, FTM (Factory Test Mode) was used to operate the transmitter. MIMO operation was achieved by enabling two Beam IDs at the same time: one is from the list of H Beam IDs and other is from the list of V Beam IDs.

Test Device Serial No.: 0059M, 0069M

2.2 Device Capabilities

This device contains the following capabilities:

800/850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n5, n12, n71, n41, n66, n2, n25, n30, n77, n260, n261), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax(6E) UNII, Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB

2.3 Test Configuration

The EUT was tested per the guidance of KDB 842590 D01 v01r01 and ANSI C63.26-2015. See Section 7.0 of this test report for a description of the radiated tests.

EIRP Simulation data for all Beam IDs was used to determine the worst case Beam ID for SISO operation and Beam ID pair for MIMO operation. These Beam ID's were used for final measurements.

All testing was performed using FTM (Factory Test Mode) software at continuous Tx operation. When implemented out in the field, the EUT will operate with a maximum uplink configuration. The FTM software was also used for the EUT operation in the EN-DC mode.

2.4 EMI Suppression Device(s)/Modifications

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

FCC ID: A3LSMG998U	 Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 6 of 97

3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26-2015) and the guidance provided in KDB 842590 D01 v01r01 were used in the measurement of the EUT.

3.2 Radiated Power and Radiated Spurious Emissions

§30.202, §30.203

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary for radiated emissions measurements in the spurious domain. 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. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m for measurements above 1GHz.

Radiated power (EIRP) measurements were performed in a full anechoic chamber (FAC) conforming to the site validation requirements of CISPR 16-1-4. Radiated spurious emission measurements from 30MHz - 18GHz were performed in a semi anechoic chamber (SAC) conforming to the site validation requirements of CISPR 16-1-4. A positioner was used to manipulate the EUT through several positions in space by rotating about the roll axis as shown in the figure below. The positioner was mounted on top of a turntable bringing the total EUT height to 1.5m.

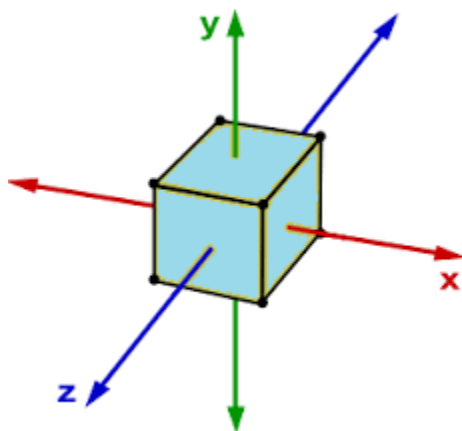


Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 7 of 97

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable. The measurement antenna is in the far field of the EUT per formula $2D^2/\lambda$ where D is the larger between the dimension of the measurement antenna and the transmitting antenna of the EUT. In this case, "D" is the largest dimension of the measurement antenna. The EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

Frequency Range (GHz)	Wavelength(cm)	Far Field Distance (m)	Measurement Distance (m)
18-40	0.749	0.54	1.00
40-60	0.500	1.39	1.50
60-90	0.333	0.91	1.00
90-140	0.214	0.58	1.00
140-200	0.150	0.39	1.00

Table 3-1. Far-Field Distance & Measurement Distance per Frequency Range

Radiated power levels are investigated while the receive antenna was rotated through all angles to determine the worst case polarization/positioning. It was determined that H=0 degree and V=90 degree are the worst case positions when the EUT was transmitting horizontally and vertically polarized beams, respectively.

The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration bandwidth set to the emissions' occupied bandwidth. The EIRP is calculated from the raw power level measured with the spectrum analyzer using the formulas shown below.

Effective Isotropic Radiated Power Sample Calculation

The measured e.i.r.p is converted to E-field in V/m. Then, the distance correction is applied before converting back to calculated e.i.r.p, as explained in KDB 971168 D01.

$$\begin{aligned}
 \text{Field Strength [dB}\mu\text{V/m]} &= \text{Measured Value [dBm]} + \text{AFCL [dB/m]} + 107 \\
 &= -32.74 \text{ dBm} + (40.7 \text{ dB/m} + 8.78 \text{ dB}) + 107 = 123.74 \text{ dB}\mu\text{V/m} \\
 &= 10^{(123.74/20)/1000000} = 1.54 \text{ V/m} \\
 \text{e.i.r.p. [dBm]} &= 10 * \log((\text{E-Field} * D_m)^2/30) + 30 \text{ dB} \\
 &= 10 * \log((1.54 \text{ V/m} * 1.00 \text{ m})^2/30) + 30 \text{ dB} \\
 &= 18.98 \text{ dBm e.i.r.p.}
 \end{aligned}$$

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 8 of 97

4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. 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 ($\pm$ dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: A3LSMG998U	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset	Page 9 of 97

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to an accredited ISO/IEC 17025 calibration facility. 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
Agilent	N9030A	PXA Signal Analyzer (44GHz)	8/17/2020	Annual	8/17/2021	MY52350166
Agilent	N9030A	50GHz PXA Signal Analyzer	11/22/2019	Annual	11/22/2020	US51350301
ETS-Lindgren	3116C	DRG Horn Antenna	3/11/2019	Biennial	3/11/2021	218893
OML Inc.	M19RH	WR-19 Horn Antenna, 24dBi, 40 - 60GHz	7/30/2018	Biennial	11/30/2020	18073001
OML Inc.	M12RH	WR-12 Horn Antenna, 24dBi, 60 - 90GHz	7/30/2018	Biennial	11/30/2020	18073001
OML Inc.	M08RH	WR-08 Horn Antenna, 24dBi, 90 - 140GHz	7/30/2018	Biennial	11/30/2020	18073001
OML Inc.	M05RH	WR-05 Horn Antenna, 24dBi, 140 - 220GHz	7/30/2018	Biennial	11/30/2020	18073001
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/10/2020	Annual	8/10/2021	103200
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107
Virginia Diodes Inc	SAX254	SAX Module (140 - 220GHz)	9/30/2019	Annual	11/30/2020	SAX254
Virginia Diodes Inc	SAX253	SAX Module (90 - 140GHz)	9/30/2019	Annual	11/30/2020	SAX253
Virginia Diodes Inc	SAX252	SAX Module (60 - 90GHz)	9/30/2019	Annual	11/30/2020	SAX252
Virginia Diodes Inc	SAX411	SAX Module (40 - 60GHz)	10/2/2019	Annual	12/2/2020	SAX411

Table 5-1. Test Equipment

FCC ID: A3LSMG998U	 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset	Page 10 of 97

6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 800MG7D

BW = 800 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 802MW7D

BW = 802 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

FCC ID: A3LSMG998U	 Proud to be part of  element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 11 of 97

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
FCC ID: A3LSMG998U
FCC Classification: Part 30 Mobile Transmitter (5GM)
Mode(s): TDD

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	RADIATED	PASS	Section 7.2
2.1046, 30.202	Equivalent Isotropic Radiated Power	43dBm		PASS	Section 7.3
2.1051, 30.203	Spurious Emissions	-13dBm/MHz for all out-of-band emissions		PASS	Section 7.4
2.1051, 30.203	Out-of-Band Emissions at the Band Edge	-13dBm/MHz for all out-of-band emissions, -5dBm/MHz from the band edge up to 10% of the channel BW		PASS	Section 7.5
2.1055	Frequency Stability	Fundamental emissions stay within authorized frequency block		PASS	Section 7.6

Table 7-1. Summary of Radiated Test Results

Notes:

- 1) All modes of operation and modulations were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) Per 2.1057(a)(2), spurious emissions were investigated up to 100GHz for n261 and up to 200GHz for n260.
- 3) The radiated RF output power and all out-of-band emissions in the spurious domain are evaluated to the EIRP limits.
- 4) "CC" refers to "Component Carriers".
- 5) Beam IDs were chosen based on which Beam ID produces the highest EIRP during EIRP simulation.
- 6) All testing was performed using FTM (Factory Test Mode) software at continuous Tx operation (100% duty cycle).
- 7) The CP-OFDM and DFT-s-OFDM transmission schemes were investigated fully for each test type and only the worst case data is included.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 12 of 97

7.2 Occupied Bandwidth

\$2.1049

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 Section 5.4.3
 KDB 842590 D01 v01r01 Section 4.3

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Notes

1. The EUT supports CP-OFDM and DFT-s-OFDM. OBW was measured for both waveforms and the worst case has been included in the report.
2. Due to similar antenna performance from both patch antennas, the Occupied Bandwidth was only measured on one antenna for each band.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 13 of 97

© 2020 PCTEST

V1.0

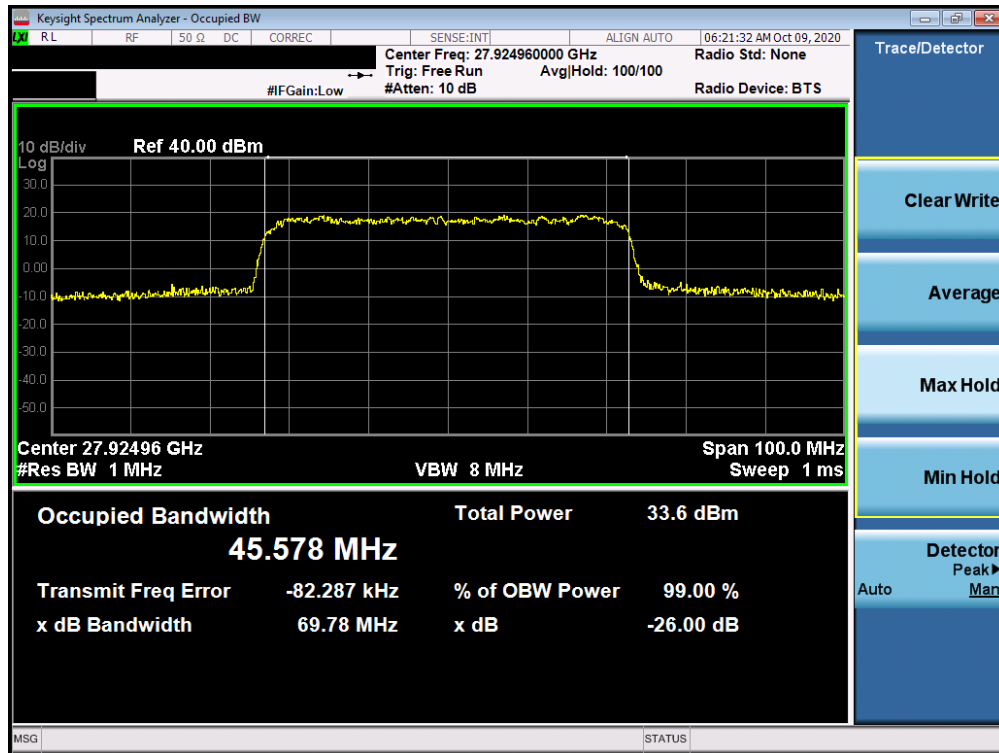
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Band n261

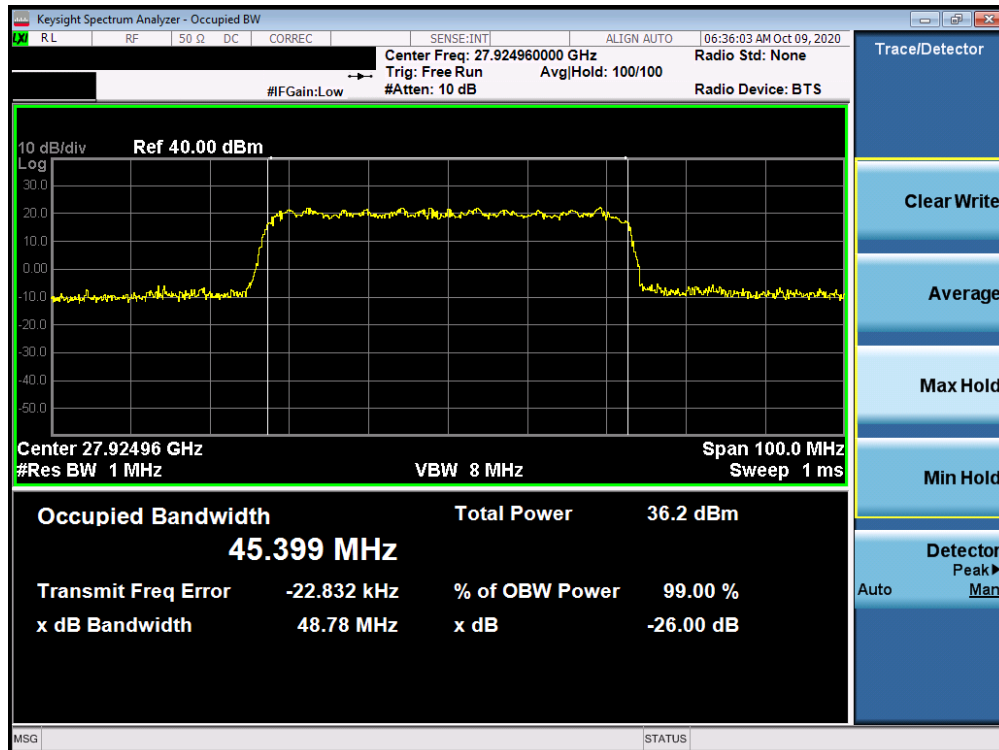
Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	50	1	CP-OFDM	QPSK	45.58
			DFT-s-OFDM	pi/2-BPSK	45.40
			CP-OFDM	16QAM	45.50
			CP-OFDM	64QAM	45.85
		2	CP-OFDM	QPSK	95.57
			DFT-s-OFDM	pi/2-BPSK	95.10
			CP-OFDM	16QAM	95.66
			CP-OFDM	64QAM	97.32
	100	1	CP-OFDM	QPSK	93.48
			DFT-s-OFDM	pi/2-BPSK	90.58
			CP-OFDM	16QAM	93.83
			CP-OFDM	64QAM	94.83
		2	CP-OFDM	QPSK	195.86
			DFT-s-OFDM	pi/2-BPSK	193.87
			CP-OFDM	16QAM	190.85
			CP-OFDM	64QAM	191.71

Table 7-2. Summary of Ant 1 Occupied Bandwidths (n261 L Patch)

FCC ID: A3LSMG998U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 14 of 97

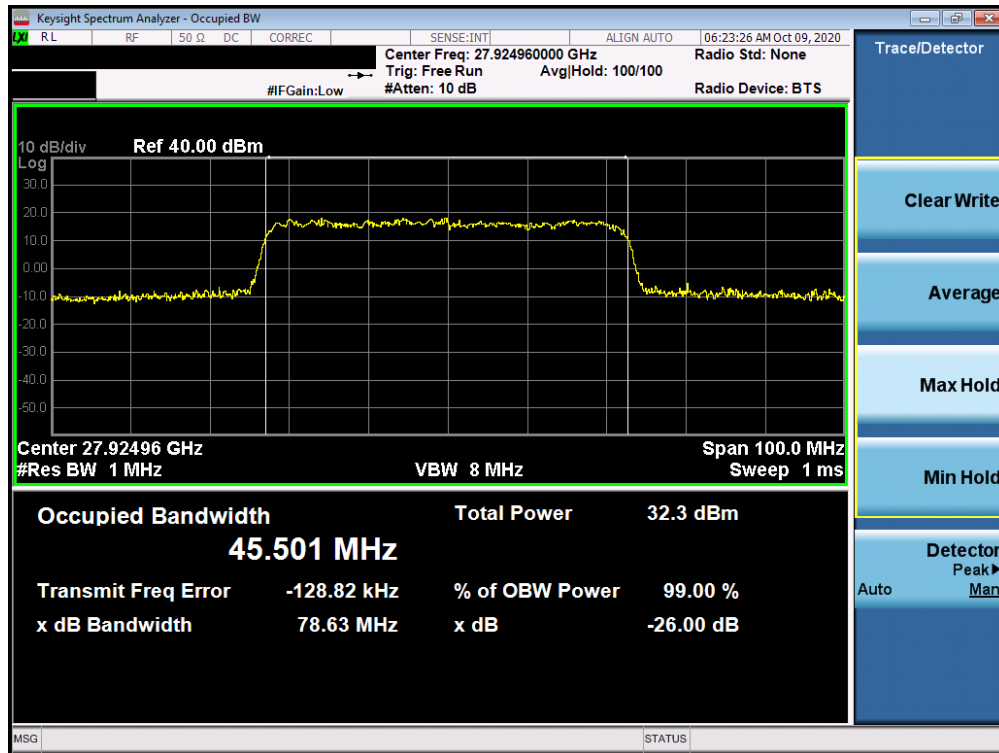


Plot 7-1. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)

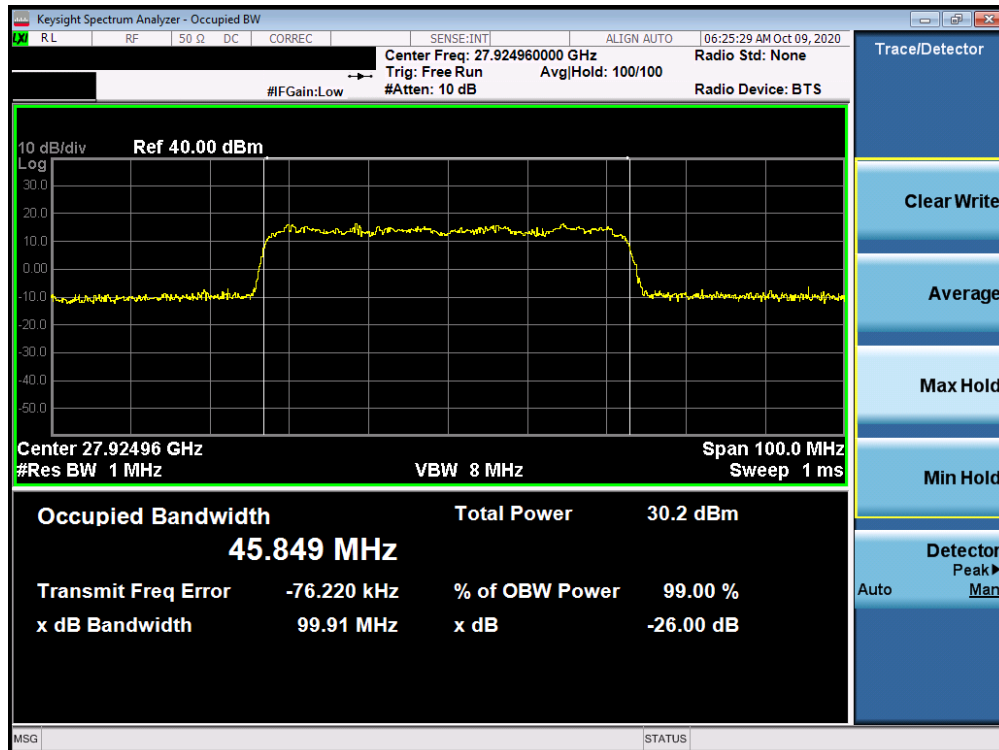


Plot 7-2. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 15 of 97

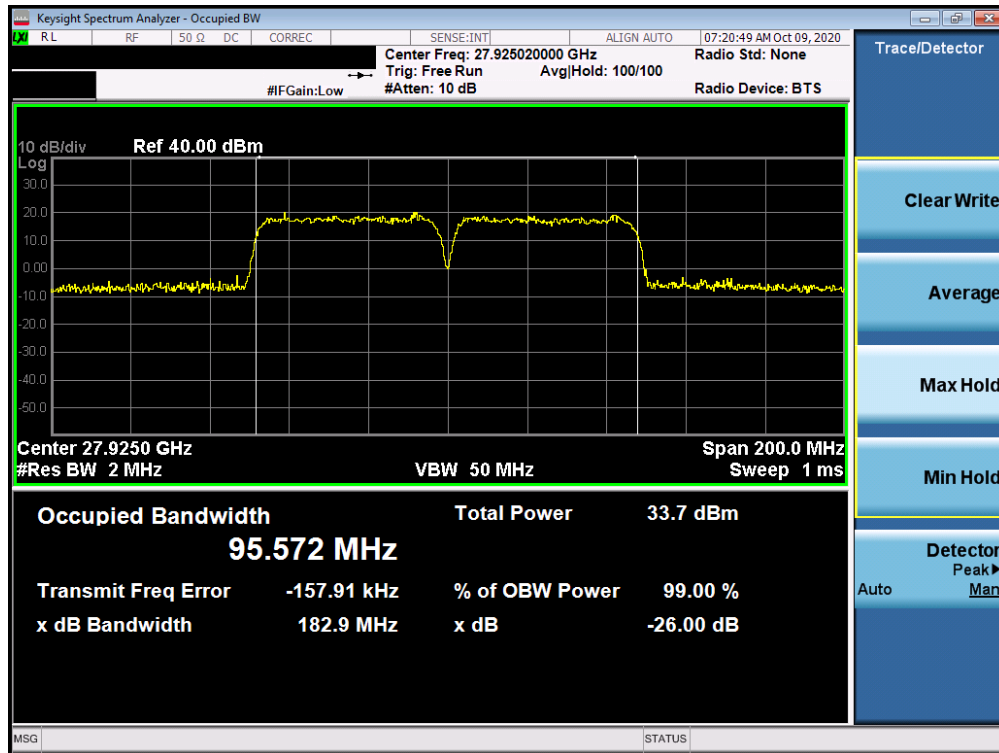


Plot 7-3. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)

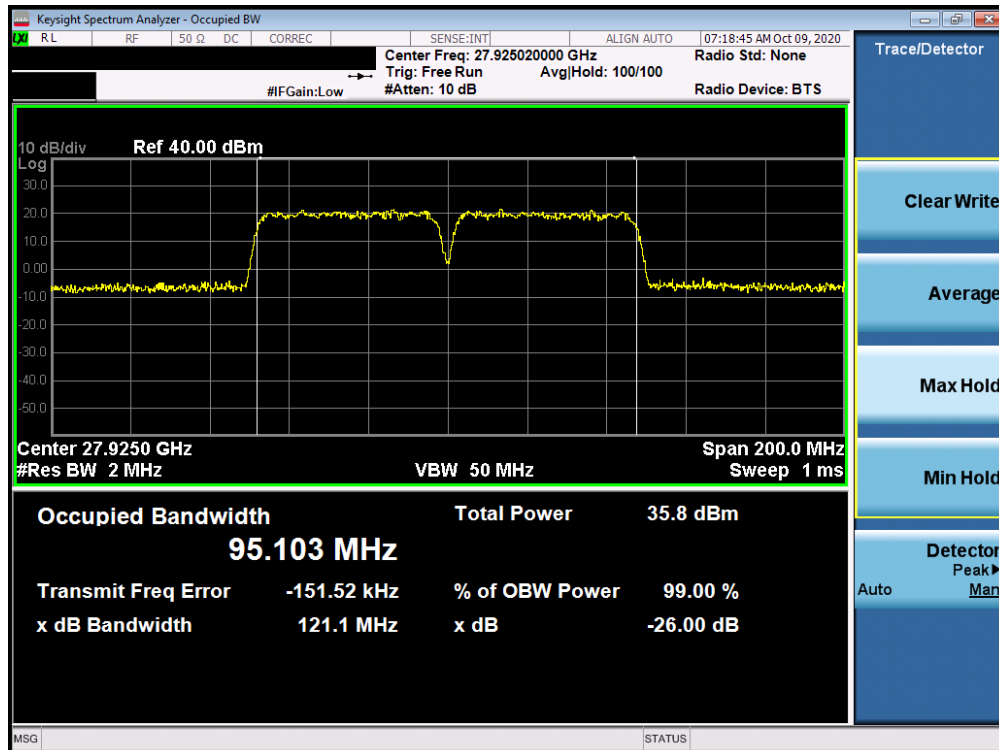


Plot 7-4. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)

FCC ID: A3LSMG998U	 Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 16 of 97

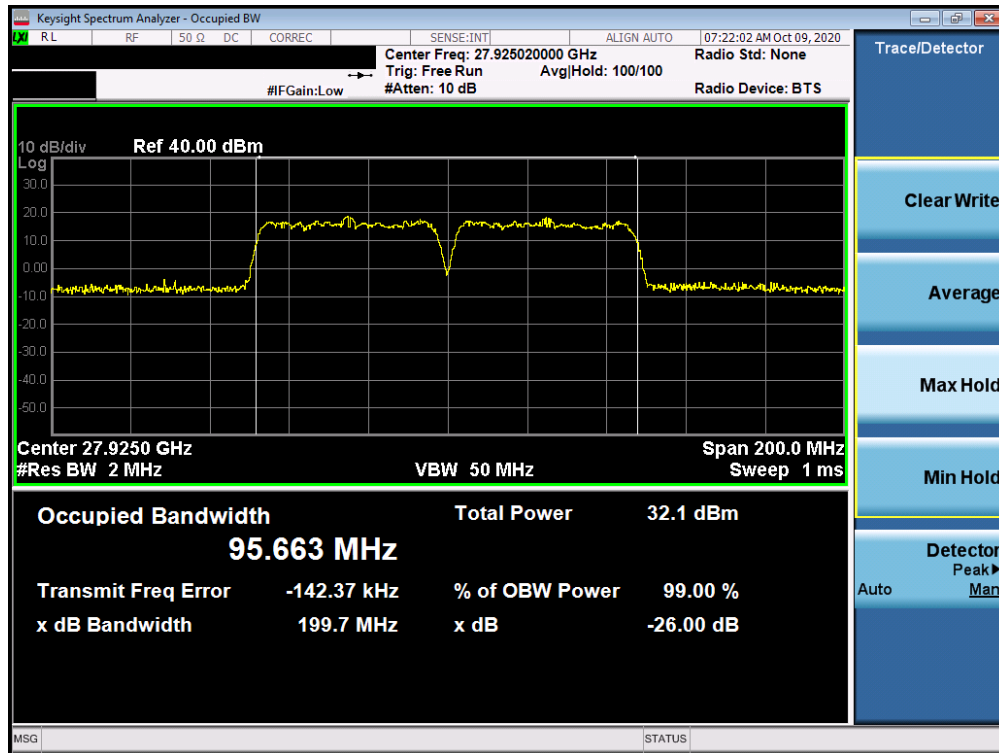


Plot 7-5. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)

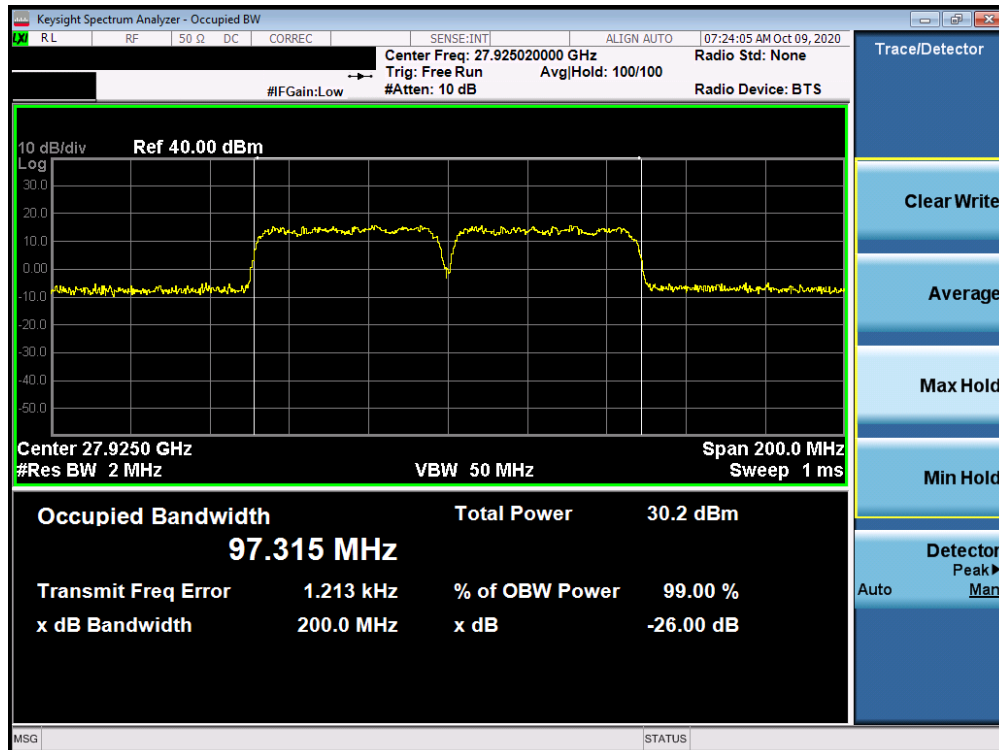


Plot 7-6. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 17 of 97

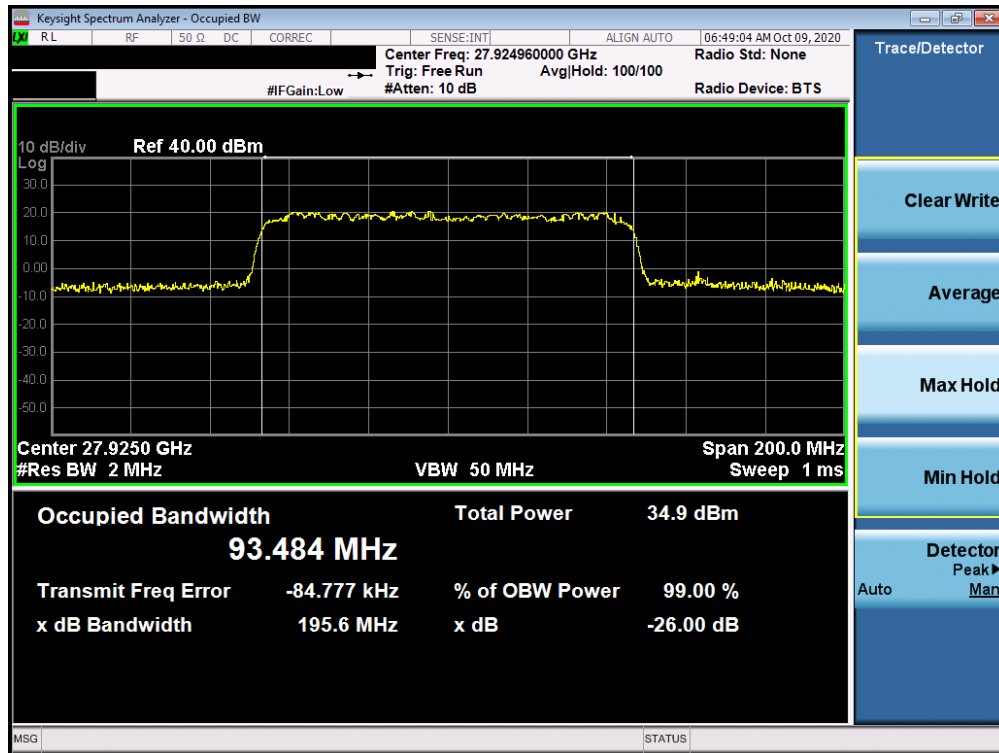


Plot 7-7. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)

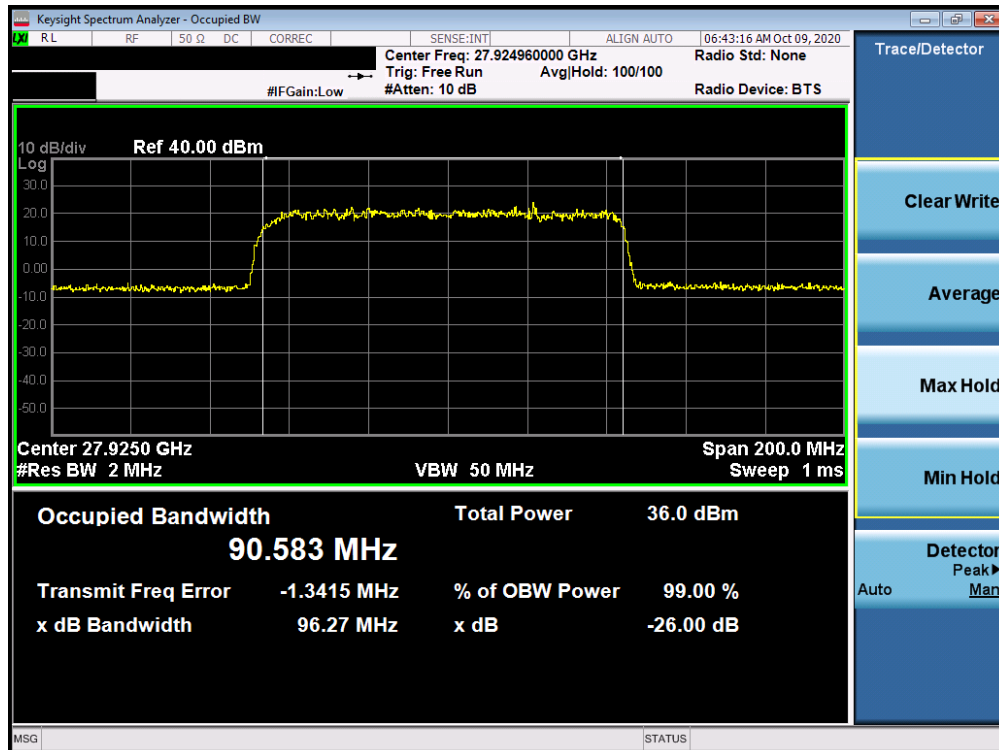


Plot 7-8. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 18 of 97

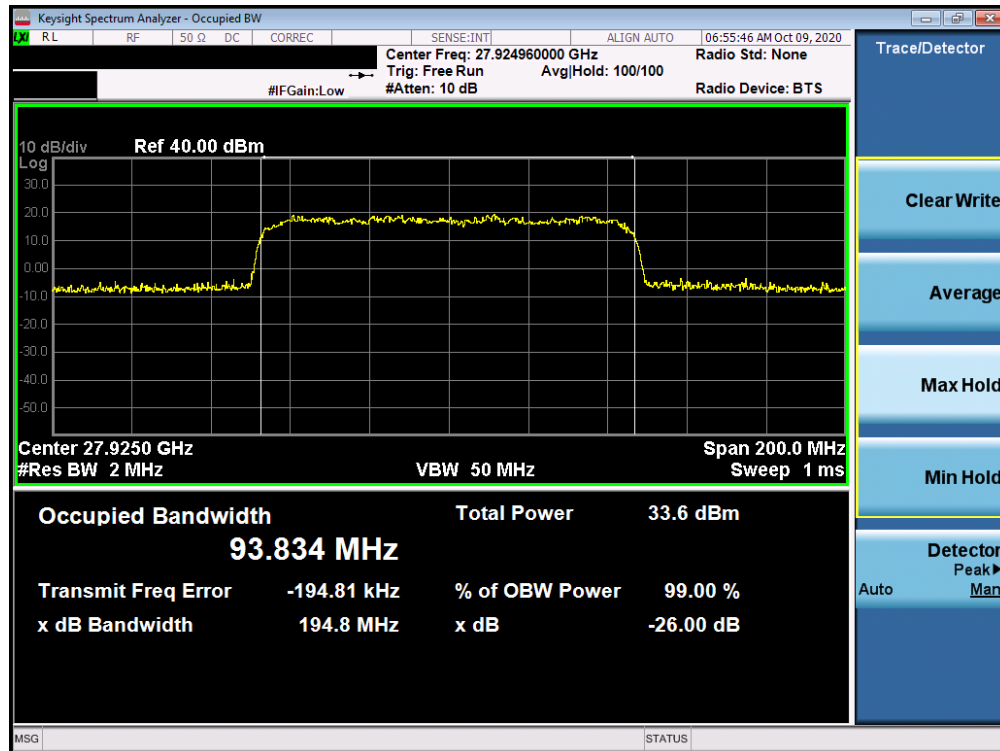


Plot 7-9. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)

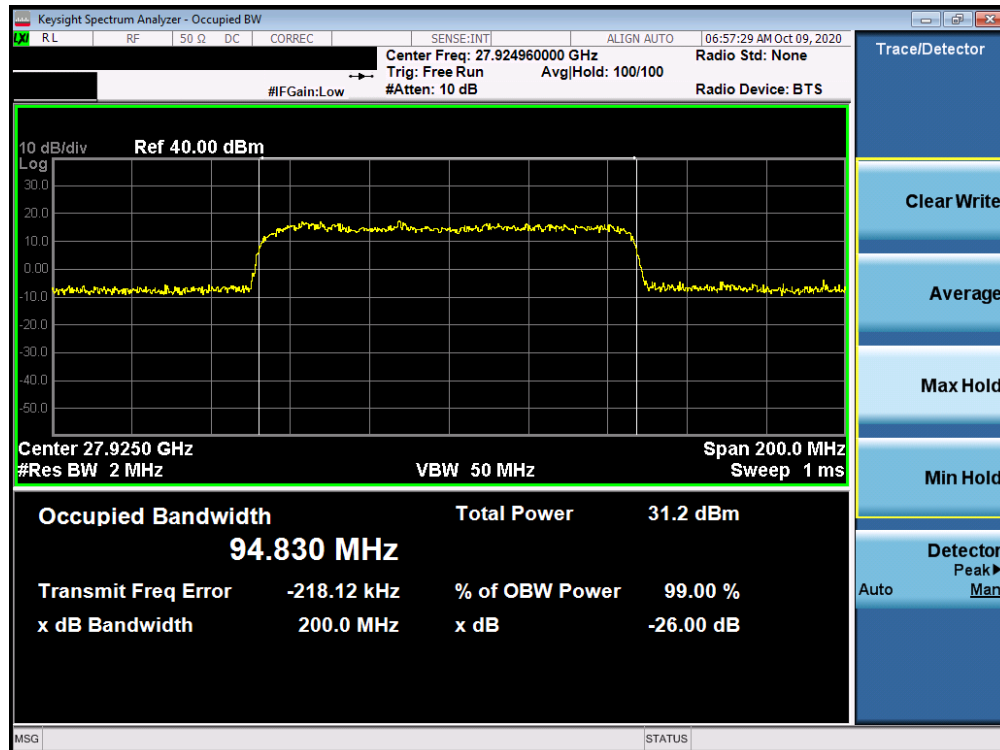


Plot 7-10. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 19 of 97

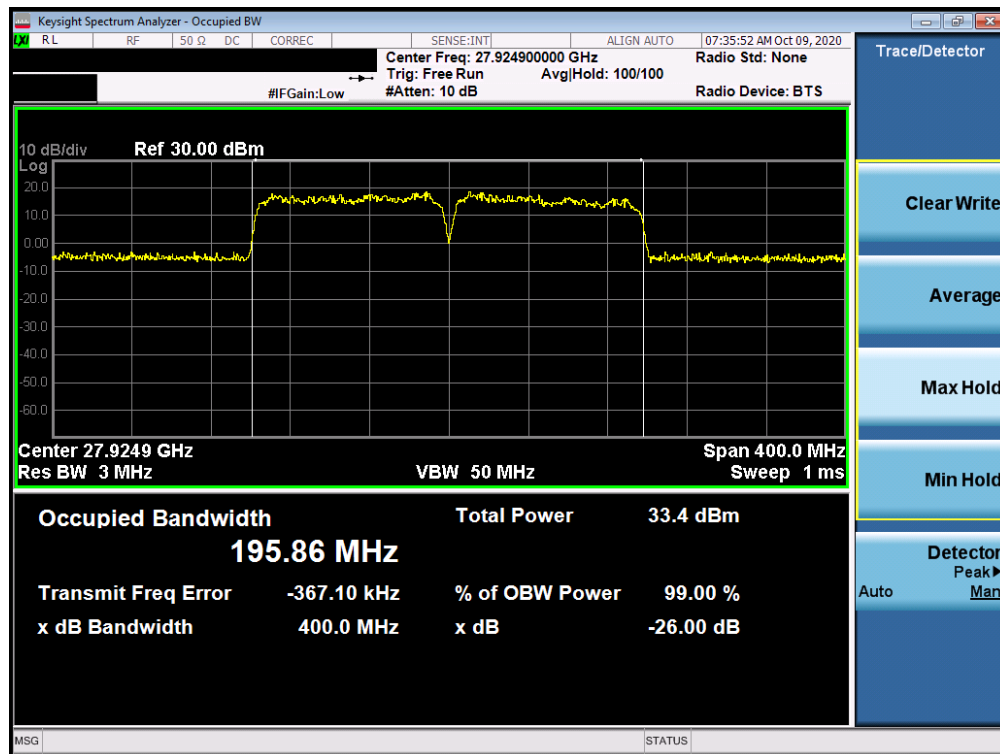


Plot 7-11. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)

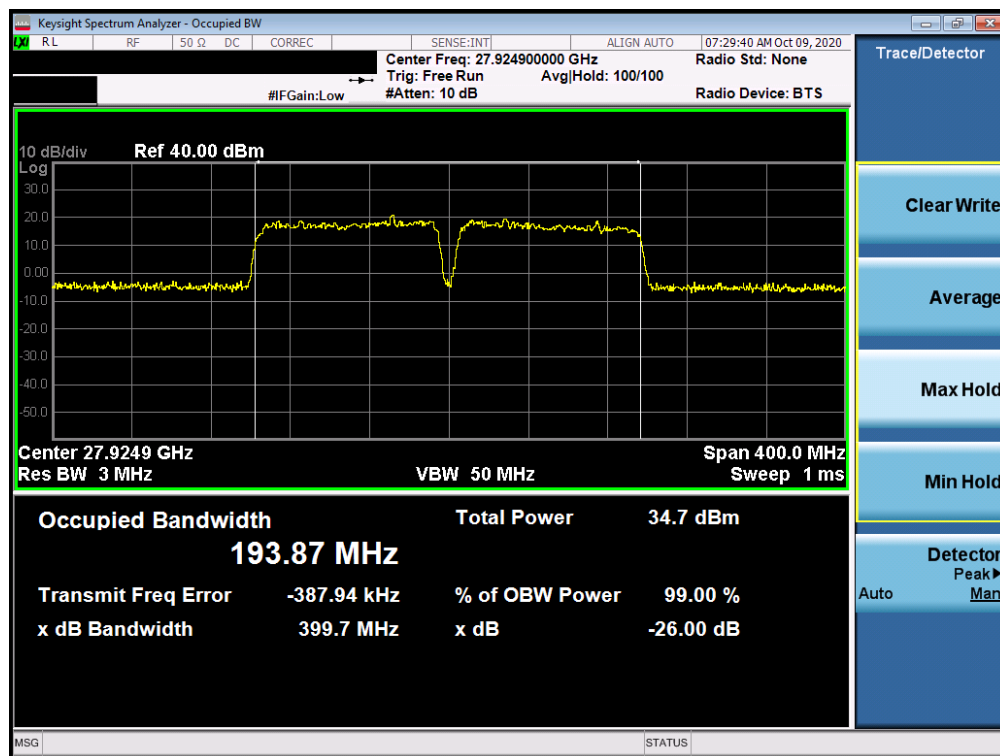


Plot 7-12. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 20 of 97

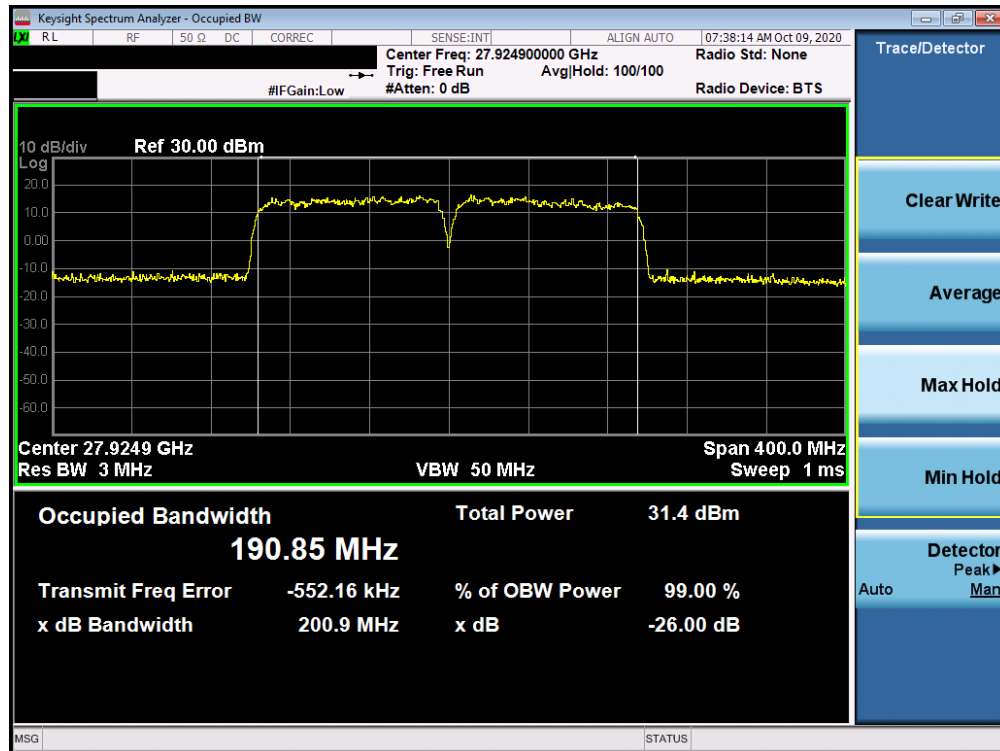


Plot 7-13. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)

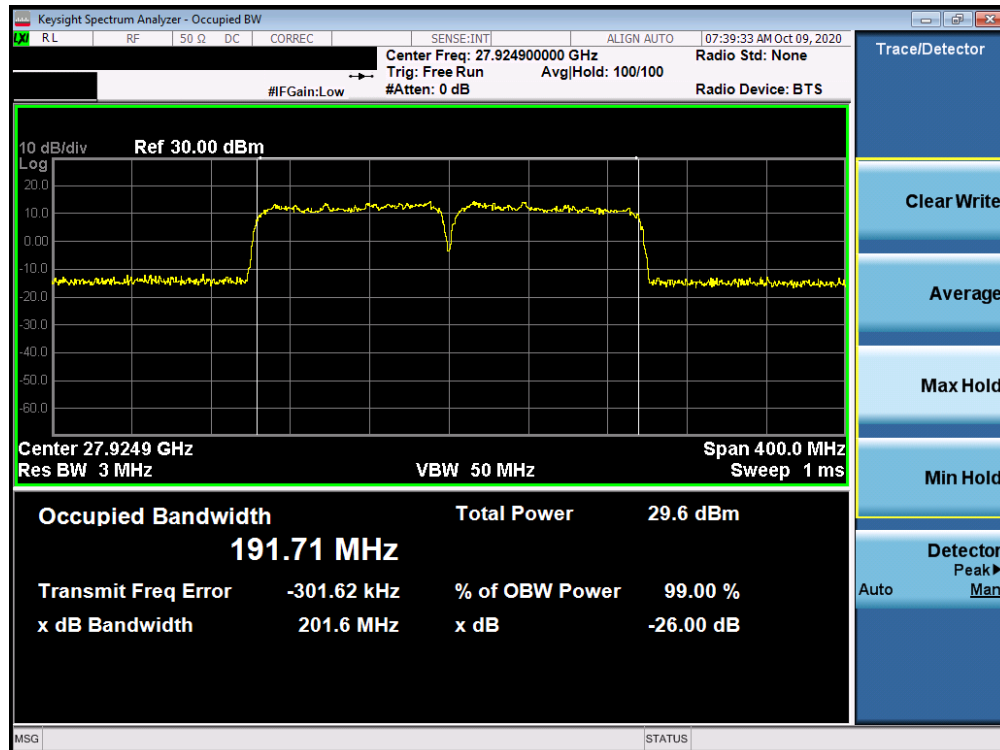


Plot 7-14. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – pi/2-BPSK – Mid Channel)

FCC ID: A3LSMG998U	 Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 21 of 97



Plot 7-15. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)



Plot 7-16. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

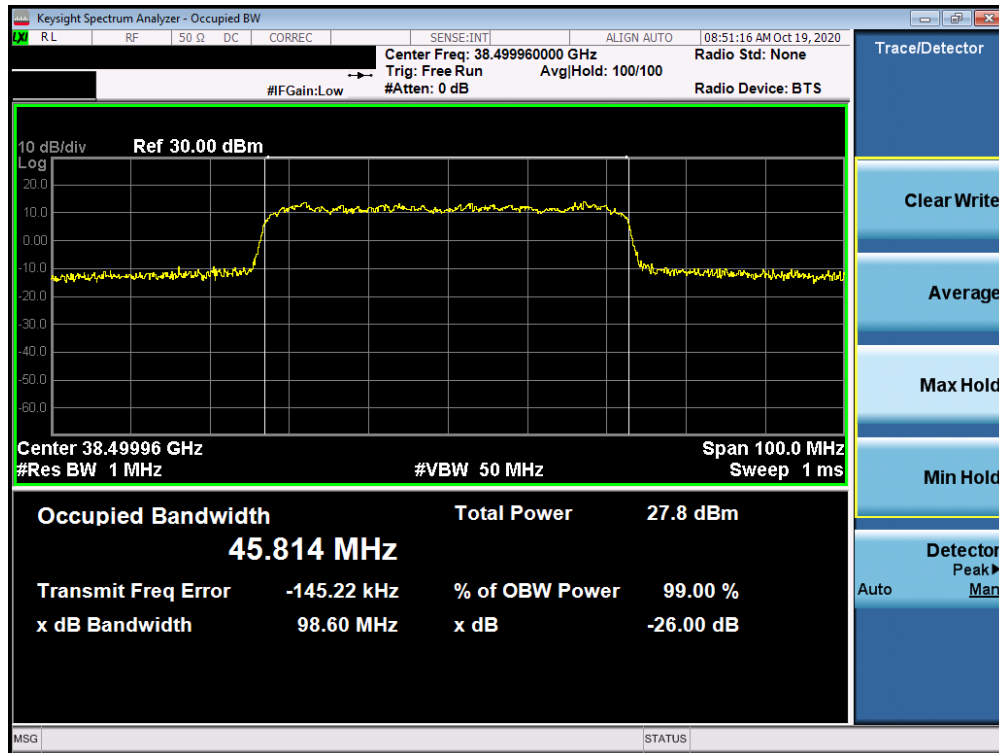
FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 22 of 97

Band n260

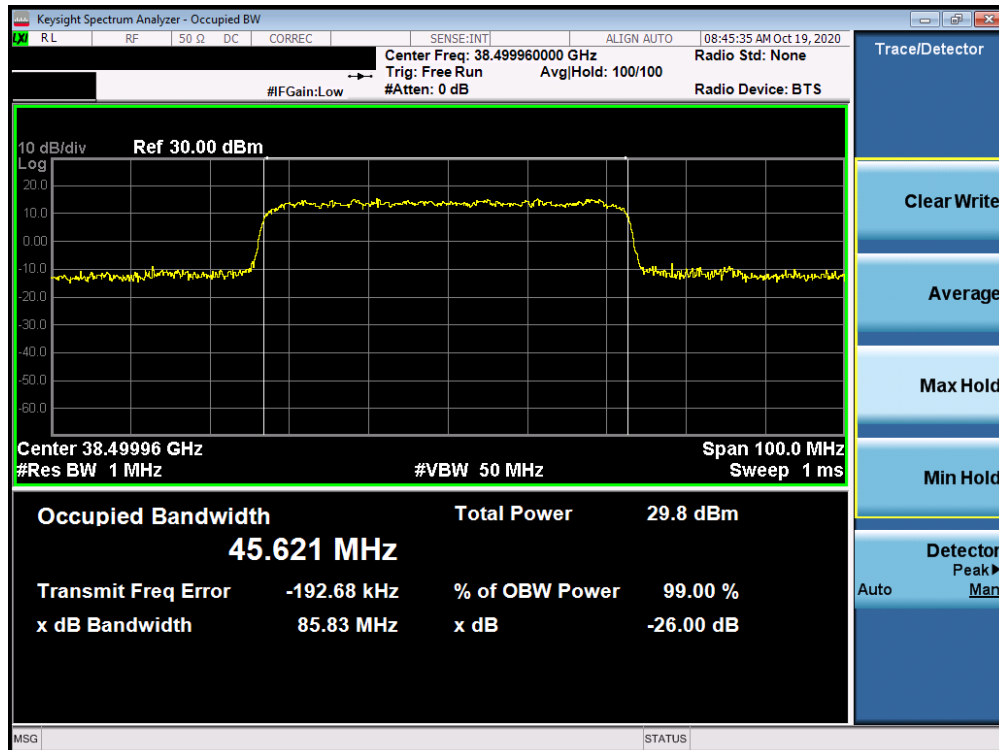
Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	50	1	CP-OFDM	QPSK	45.81
			DFT-s-OFDM	pi/2-BPSK	45.62
			CP-OFDM	16QAM	45.88
			CP-OFDM	64QAM	47.84
		2	CP-OFDM	QPSK	95.85
			DFT-s-OFDM	pi/2-BPSK	96.00
			CP-OFDM	16QAM	102.66
			CP-OFDM	64QAM	103.18
	100	1	CP-OFDM	QPSK	94.64
			DFT-s-OFDM	pi/2-BPSK	91.49
			CP-OFDM	16QAM	95.09
			CP-OFDM	64QAM	93.30
		2	CP-OFDM	QPSK	193.28
			DFT-s-OFDM	pi/2-BPSK	193.10
			CP-OFDM	16QAM	196.22
			CP-OFDM	64QAM	200.00

Table 7-3. Summary of Ant 1 Occupied Bandwidths (n260 L Patch)

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset	Page 23 of 97	

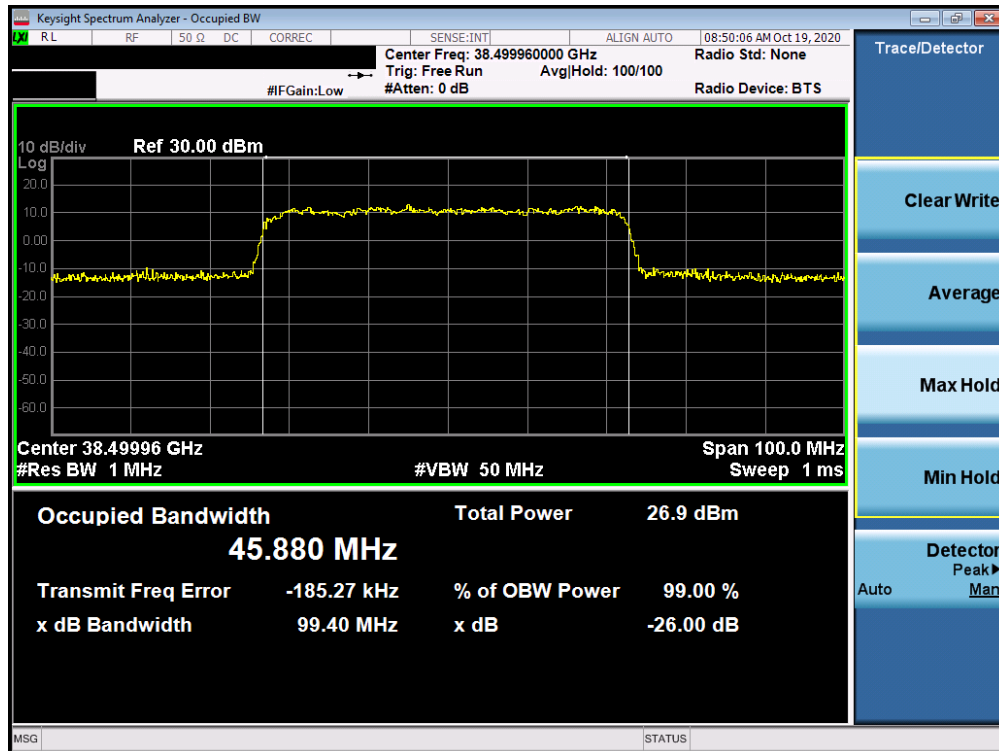


Plot 7-17. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)

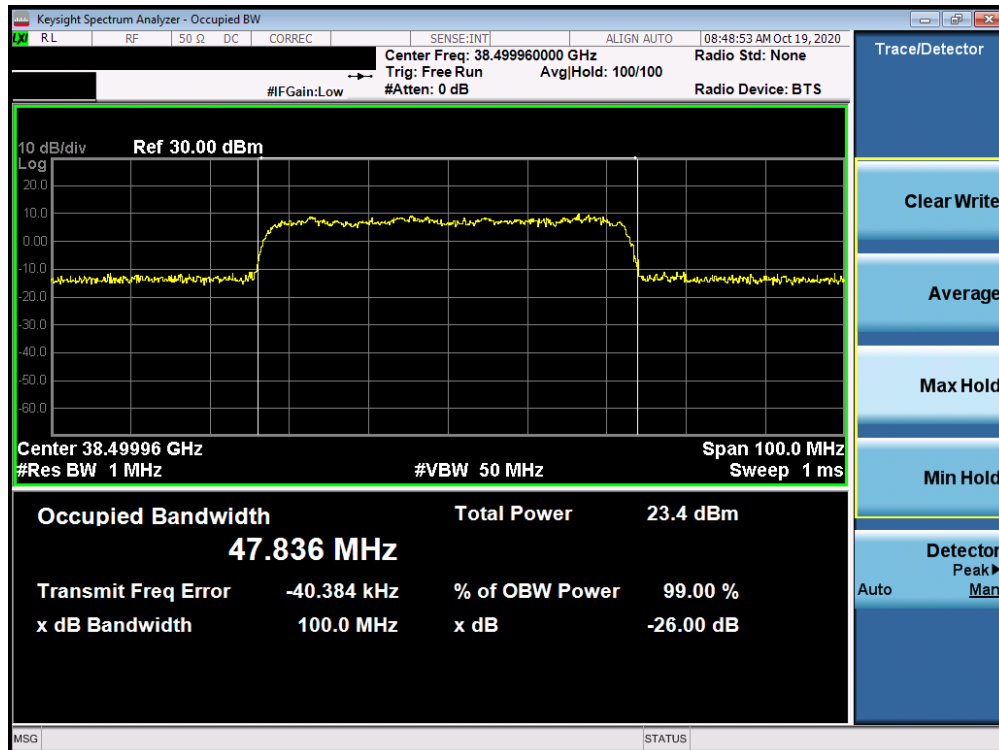


Plot 7-18. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 24 of 97

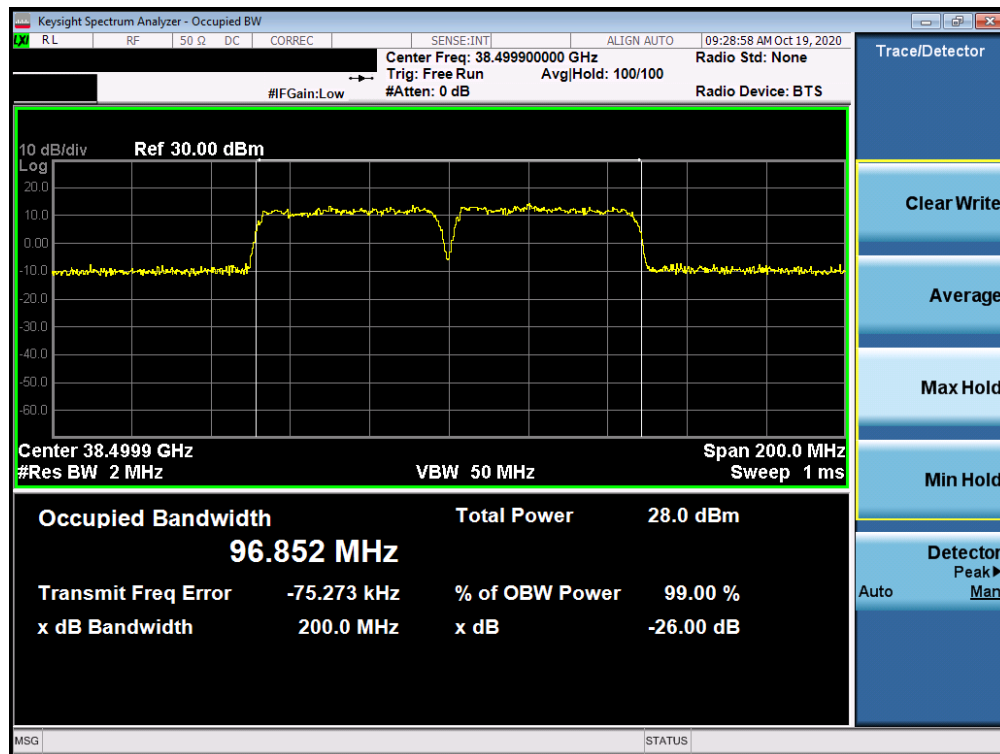


Plot 7-19. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)

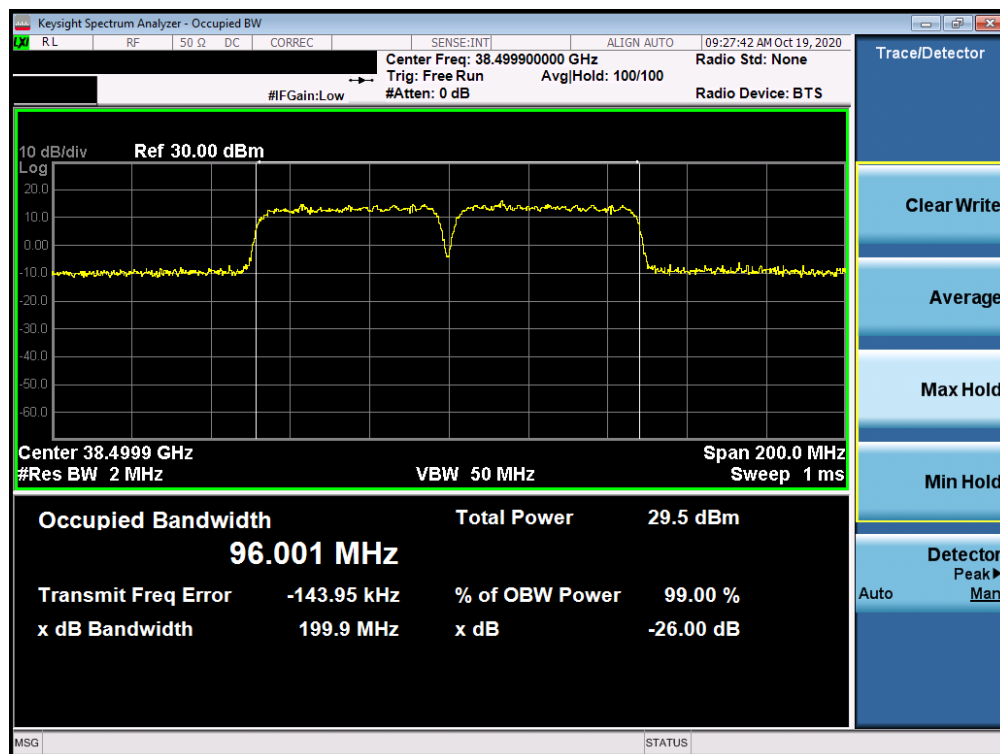


Plot 7-20. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 25 of 97

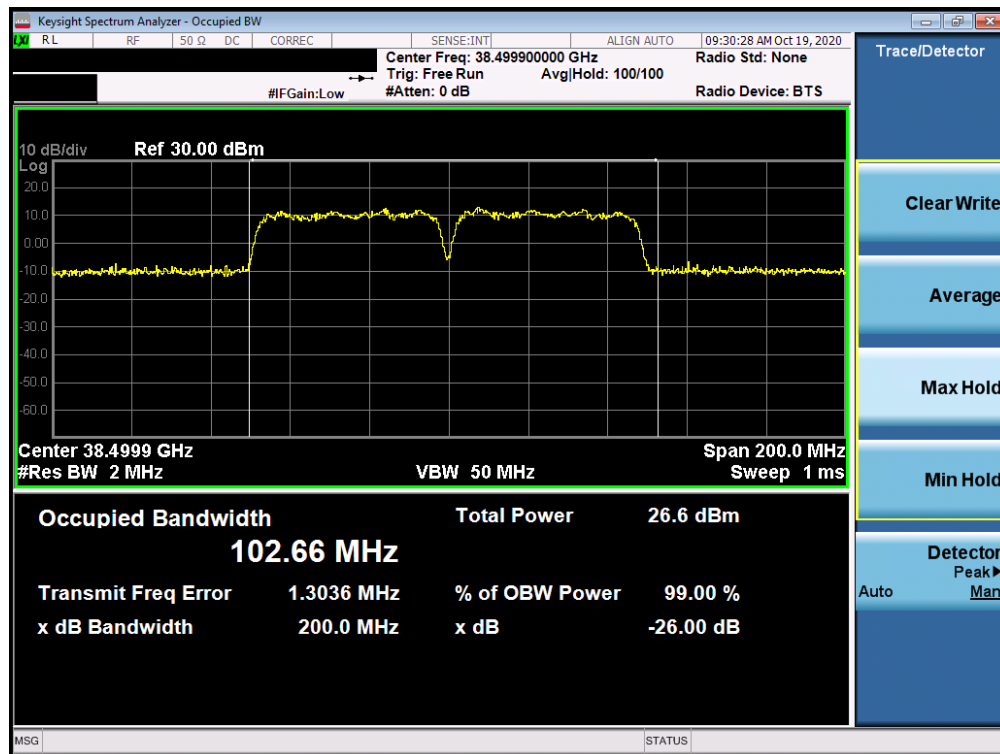


Plot 7-21. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)

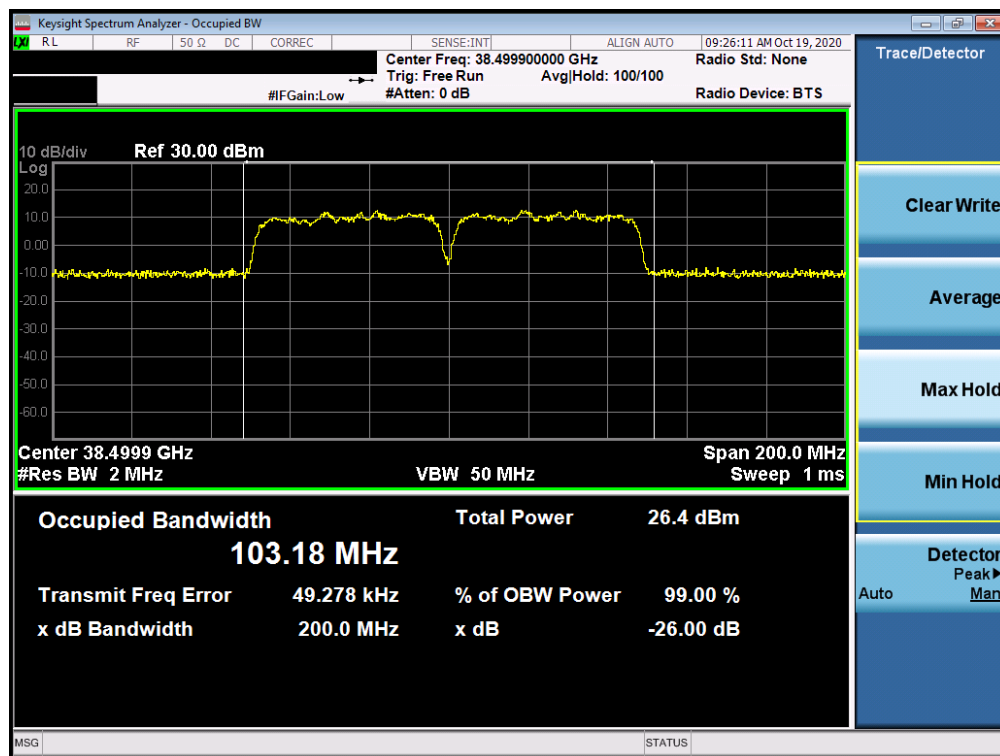


Plot 7-22. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)

FCC ID: A3LSMG998U	 Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 26 of 97

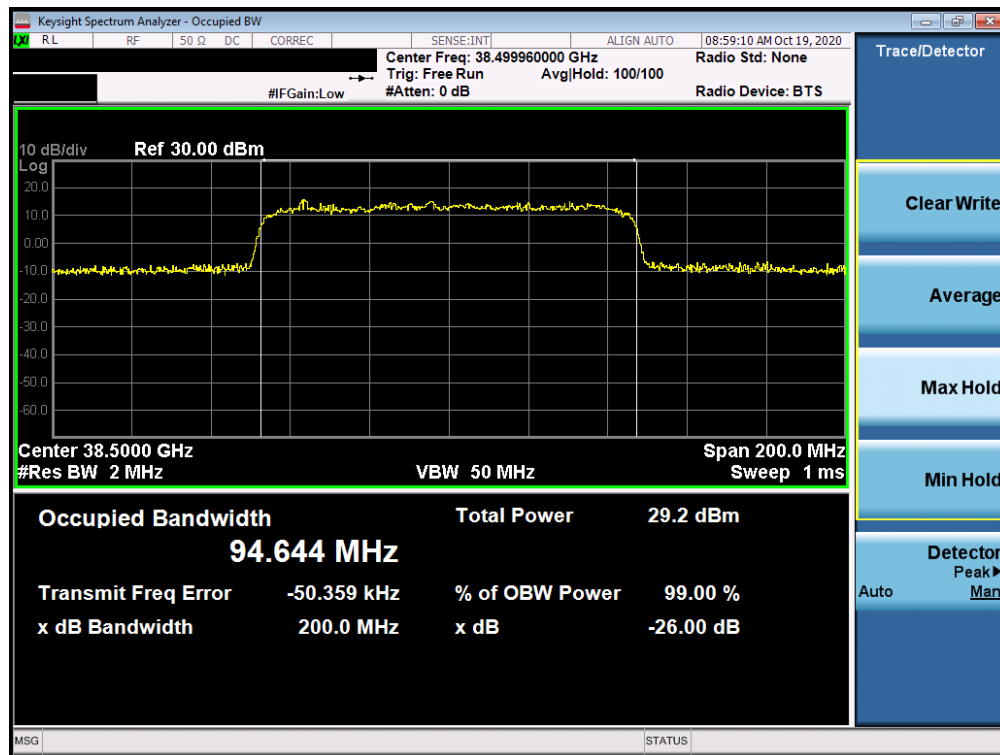


Plot 7-23. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)

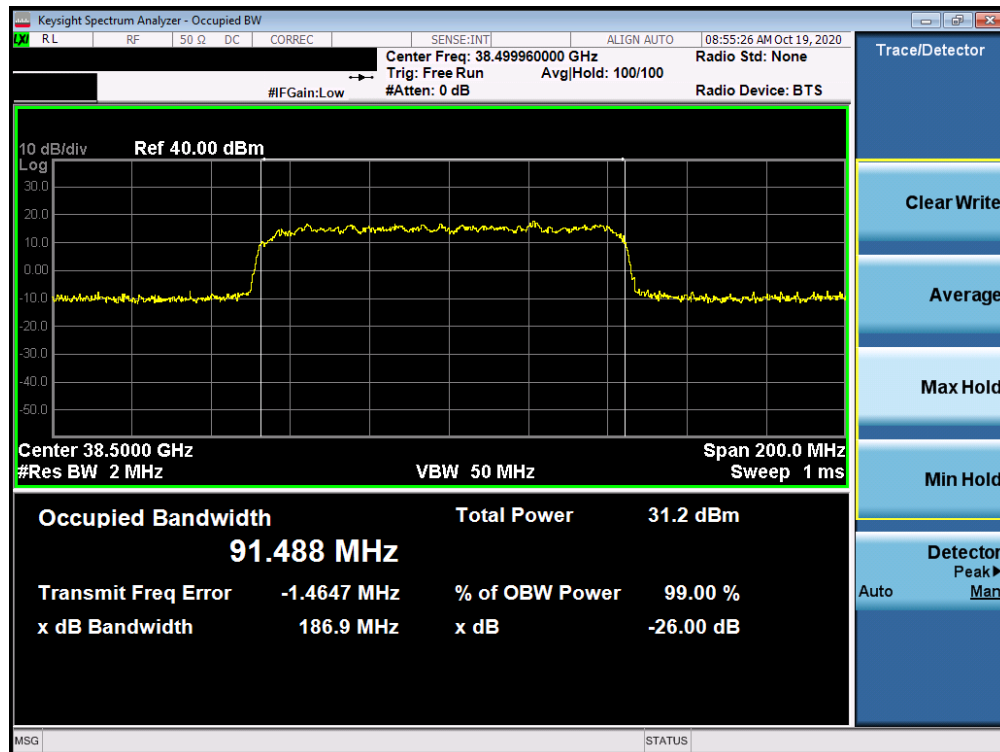


Plot 7-24. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 27 of 97

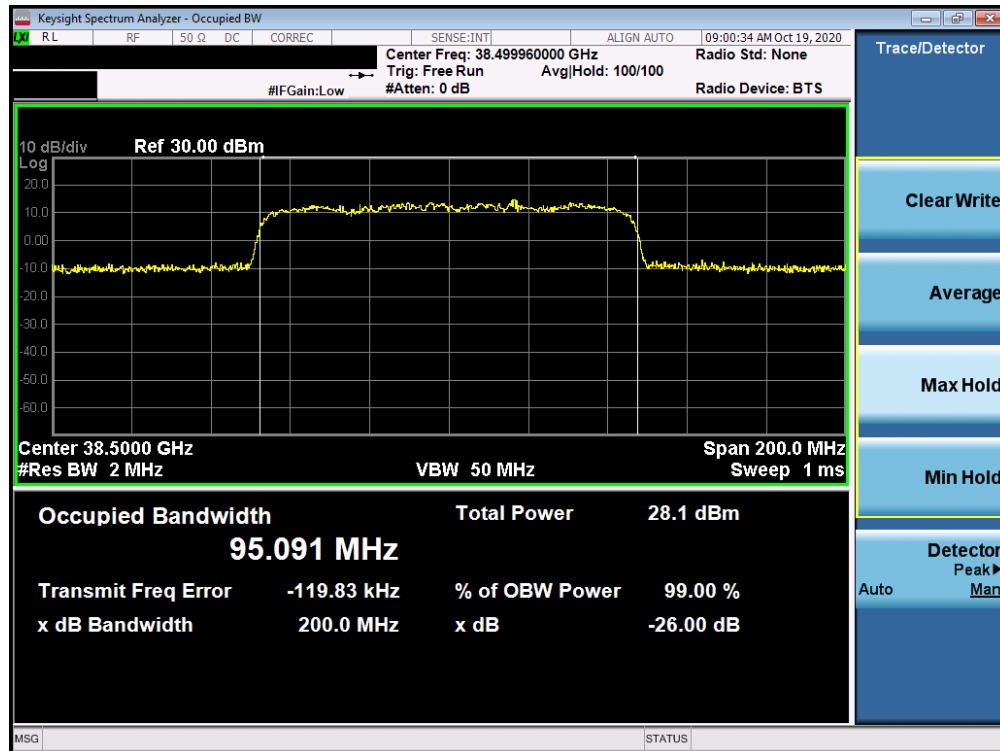


Plot 7-25. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)

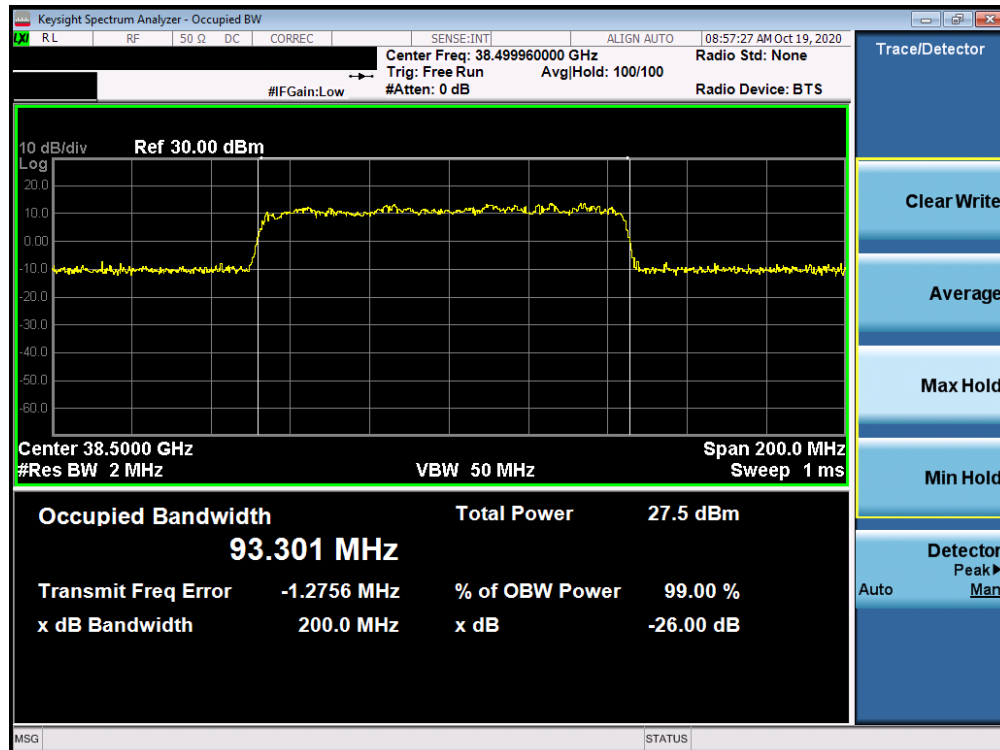


Plot 7-26. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 28 of 97

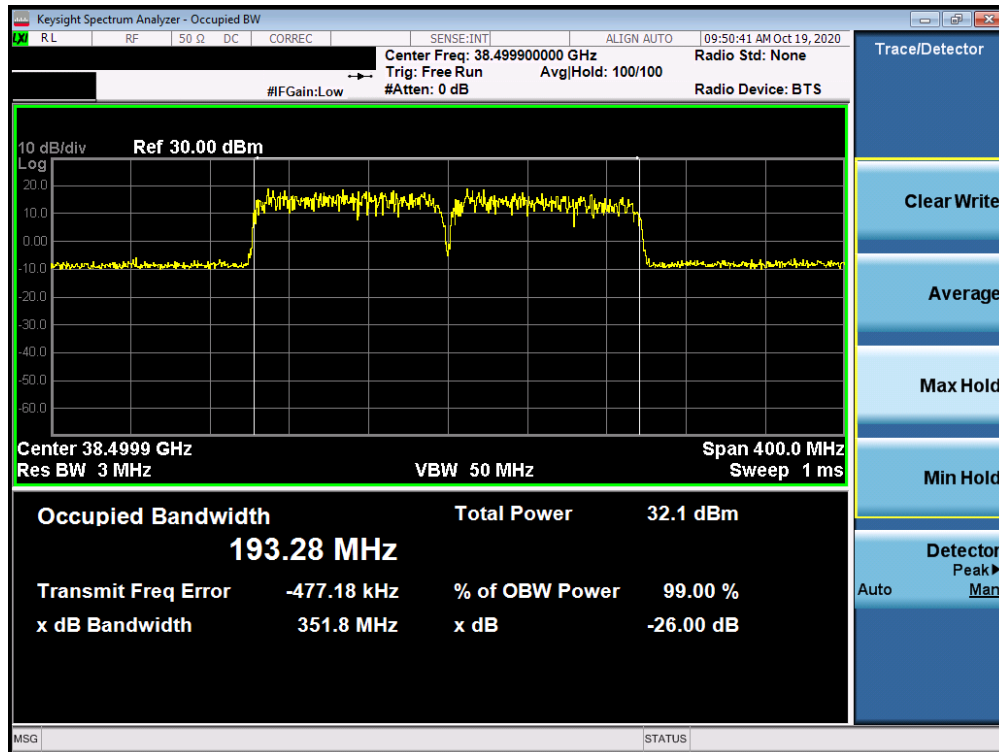


Plot 7-27. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)

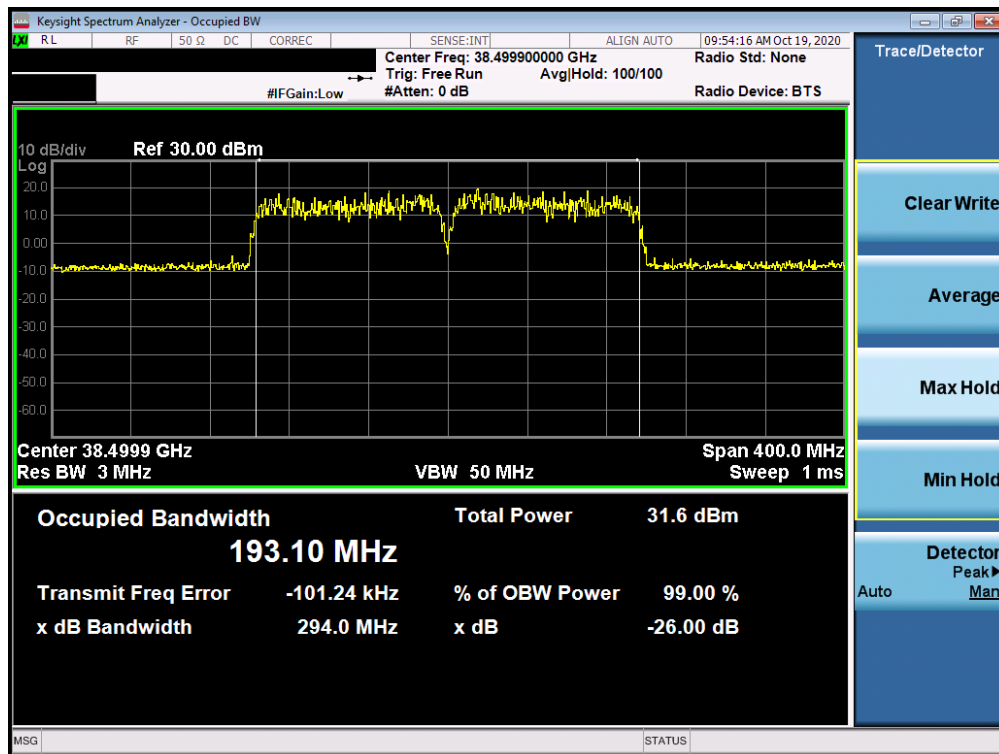


Plot 7-28. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 29 of 97

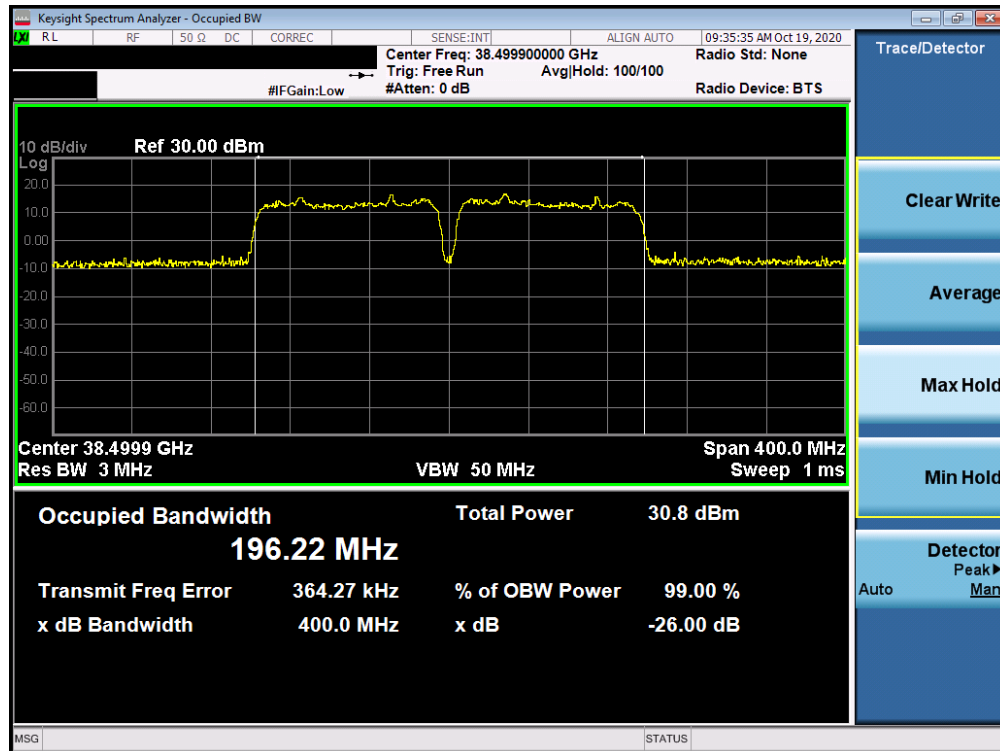


Plot 7-2. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)

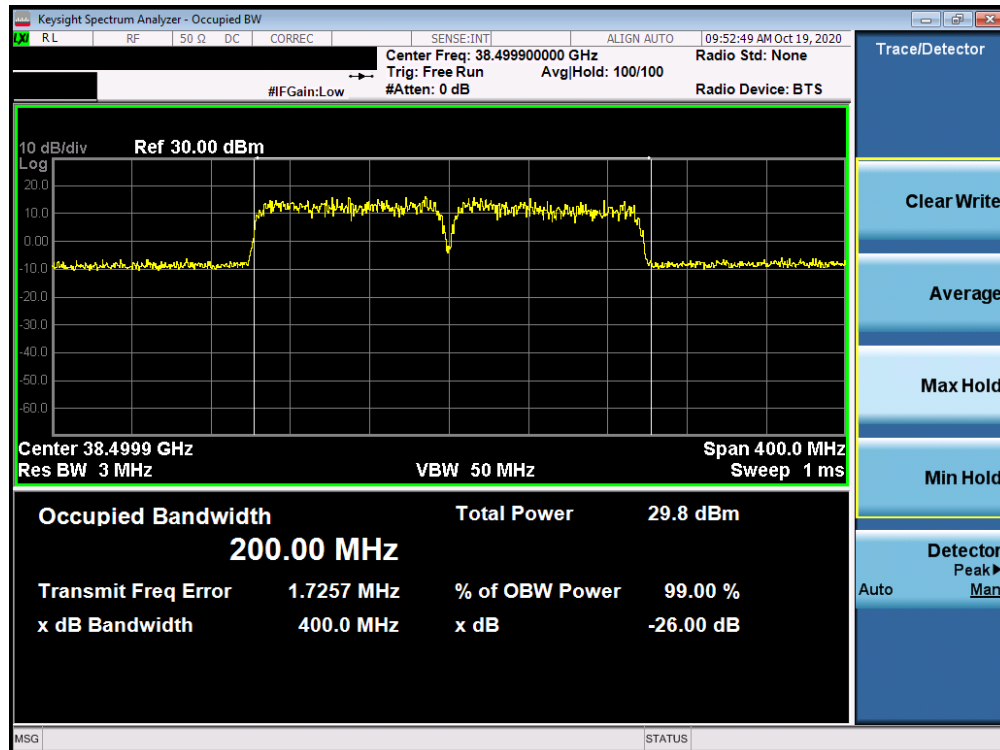


Plot 7-30. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – pi/2-BPSK – Mid Channel)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 30 of 97



Plot 7-31. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)



Plot 7-32. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

FCC ID: A3LSMG998U	 Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 31 of 97

7.3 Equivalent Isotropic Radiated Power

\$2.1046, \$30.202

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

The average power of the sum of all antenna elements is limited to a maximum EIRP of +43 dBm.

Test Procedures Used

ANSI C63.26-2015 Section 5.2.4.4.1
KDB 842590 D01 v01r01 Section 4.2

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW $\geq 3 \times$ RBW
4. Span = 2x to 3x the OBW
5. No. of sweep points $\geq 2 \times$ span / RBW
6. Detector = RMS
7. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
8. Trace mode = trace averaging (RMS) over 100 sweeps
9. The trace was allowed to stabilize

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 32 of 97

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below. Both H-Beam and V-Beam were investigated and the worst-case measurements were reported below.
- 2) Elements within the same antenna array are correlated to produce beamforming array gain. Antenna arrays cannot be correlated with another antenna array. During testing, only one antenna array was active.
- 3) EIRP measurements were taken at 1m test distance.
- 4) The average EIRP reported below is calculated per section 5.2.7 of ANSI C63.26-2015 which states: EIRP (dBm) = E (dBμV/m) + 20log(D) – 104.8; where D is the measurement distance (in the far field region) in m. The field strength E is calculated E (dBμV/m) = Spectrum Analyzer Channel Power Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 107.
- 5) Radiated power levels are investigated while the receive antenna was rotated through all angles to determine the worst case polarization/positioning.
- 6) This device supports transmission of H-polarized and V-polarized beams from the antenna array in both CP-OFDM and DFT-s-OFDM transmission schemes. SISO and MIMO operation is also supported for some configurations. As part of the testing, all modes are investigated fully on the channel showing the highest simulated EIRP using QPSK modulation. The configuration that shows the highest measured EIRP was then used to determine the EIRP for the low and high channels and for the additional modulations.

FCC ID: A3LSMG998U	 Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 33 of 97

Band n261 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	144	-
		V	26	-
	Mid	H	145	-
		V	26	-
	High	H	145	-
		V	26	-
MIMO	Low	MIMO	153	25
	Mid	MIMO	153	25
	High	MIMO	144	16

Table 7-4. Ant 1 (L Patch) Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	157	-
		V	23	-
	Mid	H	158	-
		V	21	-
	High	H	158	-
		V	29	-
MIMO	Low	MIMO	149	21
	Mid	MIMO	159	31
	High	MIMO	159	31

Table 7-5. Ant 2 (K Patch) Worst Case Beam ID

FCC ID: A3LSMG998U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 34 of 97

Band n261

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	Mid	27924.96	DFT-s-OFDM	QPSK	145	H	SISO	H	44.0	81.0	1 / 16	29.22
	Mid	27924.96	DFT-s-OFDM	QPSK	26	V	SISO	V	337.0	259.0	1 / 16	29.90
	Mid	27924.96	DFT-s-OFDM	QPSK	153+25	H + V	2Tx	V	328.0	311.0	1 / 16	28.97
	Mid	27924.96	CP-OFDM	QPSK	145	H	SISO	H	44.0	81.0	1 / 16	26.29
	Mid	27924.96	CP-OFDM	QPSK	26	V	SISO	V	337.0	259.0	1 / 16	26.82
	Mid	27924.96	CP-OFDM	QPSK	153+25	H + V	MIMO	V	328.0	311.0	1 / 16	25.22
	Low	27525.00	DFT-s-OFDM	QPSK	26	V	SISO	V	336.0	257.0	1 / 16	29.63
	High	28324.92	DFT-s-OFDM	QPSK	26	V	SISO	V	323.0	257.0	1 / 16	29.46
	Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	26	V	SISO	V	337.0	259.0	1 / 16	29.86
	Mid	27924.96	DFT-s-OFDM	16QAM	26	V	SISO	V	337.0	259.0	1 / 16	28.52
	Mid	27924.96	DFT-s-OFDM	64QAM	26	V	SISO	V	337.0	259.0	1 / 16	27.02

Table 7-6. Ant 1 EIRP Data (Band n261 - 50MHz-1CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	Mid	27924.96	DFT-s-OFDM	QPSK	26	V	SISO	V	335.0	257.0	32 / 0	27.38
	Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	26	V	SISO	V	335.0	257.0	32 / 0	27.36
	Mid	27924.96	DFT-s-OFDM	16QAM	26	V	SISO	V	335.0	257.0	32 / 0	25.82
	Mid	27924.96	DFT-s-OFDM	64QAM	26	V	SISO	V	335.0	257.0	32 / 0	23.74

Table 7-7. Ant 1 EIRP Data (Band n261 - 50MHz-2CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	Mid	27924.96	DFT-s-OFDM	QPSK	145	H	SISO	H	40.0	80.0	1 / 33	29.47
	Mid	27924.96	DFT-s-OFDM	QPSK	26	V	SISO	V	335.0	257.0	1 / 33	29.97
	Mid	27924.96	DFT-s-OFDM	QPSK	153+25	H + V	2Tx	V	323.0	308.0	1 / 33	28.43
	Mid	27924.96	CP-OFDM	QPSK	145	H	SISO	H	40.0	80.0	1 / 33	26.55
	Mid	27924.96	CP-OFDM	QPSK	26	V	SISO	V	335.0	257.0	1 / 33	26.96
	Mid	27924.96	CP-OFDM	QPSK	153+25	H + V	MIMO	V	323.0	308.0	1 / 33	25.66
	Low	27550.08	DFT-s-OFDM	QPSK	26	V	SISO	V	334.0	253.0	1 / 33	29.65
	High	28299.96	DFT-s-OFDM	QPSK	26	V	SISO	V	322.0	256.0	1 / 33	29.37
	Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	26	V	SISO	V	335.0	257.0	1 / 33	29.94
	Mid	27924.96	DFT-s-OFDM	16QAM	26	V	SISO	V	335.0	257.0	1 / 33	28.86
	Mid	27924.96	DFT-s-OFDM	64QAM	26	V	SISO	V	335.0	257.0	1 / 33	27.20

Table 7-8. Ant 1 EIRP Data (Band n261 - 100MHz-1CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	Mid	27924.96	DFT-s-OFDM	QPSK	26	V	SISO	V	335.0	257.0	64 / 0	26.79
	Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	26	V	SISO	V	335.0	257.0	64 / 0	26.91
	Mid	27924.96	DFT-s-OFDM	16QAM	26	V	SISO	V	335.0	257.0	64 / 0	25.25
	Mid	27924.96	DFT-s-OFDM	64QAM	26	V	SISO	V	335.0	257.0	64 / 0	23.47

Table 7-9. Ant 1 EIRP Data (Band n261 - 100MHz-2CC)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 35 of 97

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	Mid	27924.96	DFT-s-OFDM	QPSK	158	H	SISO	V	102.0	303.0	1 / 16	27.45
	Mid	27924.96	DFT-s-OFDM	QPSK	21	V	SISO	V	130.0	64.0	1 / 16	27.84
	Mid	27924.96	DFT-s-OFDM	QPSK	159+31	H + V	2Tx	V	339.0	36.0	1 / 16	29.63
	Mid	27924.96	CP-OFDM	QPSK	158	H	SISO	V	102.0	303.0	1 / 16	24.32
	Mid	27924.96	CP-OFDM	QPSK	21	V	SISO	V	130.0	64.0	1 / 16	24.64
	Mid	27924.96	CP-OFDM	QPSK	159+31	H + V	MIMO	V	339.0	36.0	1 / 16	26.28
	Low	27525.00	DFT-s-OFDM	QPSK	149+21	H + V	2Tx	H	29.0	324.0	1 / 16	29.53
	High	28324.92	DFT-s-OFDM	QPSK	159+31	H + V	2Tx	V	339.0	34.0	1 / 16	29.52
	Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	159+31	H + V	2Tx	V	339.0	36.0	1 / 16	29.32
	Mid	27924.96	DFT-s-OFDM	16QAM	159+31	H + V	2Tx	V	339.0	36.0	1 / 16	27.19
	Mid	27924.96	DFT-s-OFDM	64QAM	159+31	H + V	2Tx	V	339.0	36.0	1 / 16	25.03

Table 7-10. Ant 2 EIRP Data (Band n261 - 50MHz-1CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	Mid	27924.96	DFT-s-OFDM	QPSK	159+31	H + V	2Tx	V	339.0	36.0	32 / 0	25.46
	Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	159+31	H + V	2Tx	V	339.0	36.0	32 / 0	25.24
	Mid	27924.96	DFT-s-OFDM	16QAM	159+31	H + V	2Tx	V	339.0	36.0	32 / 0	23.70
	Mid	27924.96	DFT-s-OFDM	64QAM	159+31	H + V	2Tx	V	339.0	36.0	32 / 0	21.67

Table 7-11. Ant 2 EIRP Data (Band n261 - 50MHz-2CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	Mid	27924.96	DFT-s-OFDM	QPSK	158	H	SISO	V	103.0	304.0	1 / 33	27.64
	Mid	27924.96	DFT-s-OFDM	QPSK	21	V	SISO	V	128.0	65.0	1 / 33	28.32
	Mid	27924.96	DFT-s-OFDM	QPSK	159+31	H + V	2Tx	V	339.0	34.0	1 / 33	29.94
	Mid	27924.96	CP-OFDM	QPSK	158	H	SISO	V	103.0	304.0	1 / 33	24.53
	Mid	27924.96	CP-OFDM	QPSK	21	V	SISO	V	128.0	65.0	1 / 33	25.27
	Mid	27924.96	CP-OFDM	QPSK	159+31	H + V	MIMO	V	339.0	34.0	1 / 33	26.44
	Low	27550.08	DFT-s-OFDM	QPSK	149+21	H + V	2Tx	H	29.0	324.0	1 / 33	29.71
	High	28299.96	DFT-s-OFDM	QPSK	159+31	H + V	2Tx	V	339.0	33.0	1 / 33	29.85
	Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	159+31	H + V	2Tx	V	339.0	34.0	1 / 33	29.63
	Mid	27924.96	DFT-s-OFDM	16QAM	159+31	H + V	2Tx	V	339.0	34.0	1 / 33	27.04
	Mid	27924.96	DFT-s-OFDM	64QAM	159+31	H + V	2Tx	V	339.0	34.0	1 / 33	25.50

Table 7-12. Ant 2 EIRP Data (Band n261 - 100MHz-1CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	Mid	27924.96	DFT-s-OFDM	QPSK	159+31	H + V	2Tx	V	339.0	34.0	64 / 0	25.33
	Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	159+31	H + V	2Tx	V	339.0	34.0	64 / 0	25.21
	Mid	27924.96	DFT-s-OFDM	16QAM	159+31	H + V	2Tx	V	339.0	34.0	64 / 0	23.59
	Mid	27924.96	DFT-s-OFDM	64QAM	159+31	H + V	2Tx	V	339.0	34.0	64 / 0	21.52

Table 7-13. Ant 2 EIRP Data (Band n261 - 100MHz-2CC)

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 36 of 97

Band n260 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	158	-
		V	20	-
	Mid	H	158	-
		V	29	-
	High	H	147	-
		V	20	-
MIMO	Low	MIMO	147	19
	Mid	MIMO	148	20
	High	MIMO	148	20

Table 7-14. Ant 1 (L Patch) Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	152	-
		V	33	-
	Mid	H	161	-
		V	33	-
	High	H	154	-
		V	33	-
MIMO	Low	MIMO	152	24
	Mid	MIMO	161	33
	High	MIMO	160	32

Table 7-15. Ant 2 (K Patch) Worst Case Beam ID

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset	Page 37 of 97	

Band n260

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	High	39975.00	DFT-s-OFDM	QPSK	147	H	SISO	H	63.0	34.0	1 / 16	22.74
	High	39975.00	DFT-s-OFDM	QPSK	20	V	SISO	V	89.0	23.0	1 / 16	25.73
	High	39975.00	DFT-s-OFDM	QPSK	148+20	H + V	2Tx	H	336.0	259.0	1 / 16	29.06
	High	39975.00	CP-OFDM	QPSK	147	H	SISO	H	63.0	34.0	1 / 16	20.01
	High	39975.00	CP-OFDM	QPSK	20	V	SISO	V	89.0	23.0	1 / 16	22.40
	High	39975.00	CP-OFDM	QPSK	148+20	H + V	MIMO	H	336.0	259.0	1 / 16	26.36
	Low	37025.04	DFT-s-OFDM	QPSK	147+19	H + V	2Tx	H	325.0	308.0	1 / 16	26.61
	Mid	38499.96	DFT-s-OFDM	QPSK	148+20	H + V	2Tx	H	336.0	258.0	1 / 16	27.05
	High	39975.00	DFT-s-OFDM	$\pi/2$ BPSK	148+20	H + V	2Tx	H	336.0	259.0	1 / 16	29.05
	High	39975.00	DFT-s-OFDM	16QAM	148+20	H + V	2Tx	H	336.0	259.0	1 / 16	27.53
	High	39975.00	DFT-s-OFDM	64QAM	148+20	H + V	2Tx	H	336.0	259.0	1 / 16	24.79

Table 7-16. Ant 1 EIRP Data (Band n260 - 50MHz-1CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	High	39975.00	DFT-s-OFDM	QPSK	148+20	H + V	2Tx	H	336.0	259.0	32 / 0	26.04
	High	39975.00	DFT-s-OFDM	$\pi/2$ BPSK	148+20	H + V	2Tx	H	336.0	259.0	32 / 0	26.01
	High	39975.00	DFT-s-OFDM	16QAM	148+20	H + V	2Tx	H	336.0	259.0	32 / 0	24.24
	High	39975.00	DFT-s-OFDM	64QAM	148+20	H + V	2Tx	H	336.0	259.0	32 / 0	22.01

Table 7-17. Ant 1 EIRP Data (Band n260 - 50MHz-2CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	High	39949.92	DFT-s-OFDM	QPSK	147	H	SISO	H	60.0	18.0	1 / 33	21.79
	High	39949.92	DFT-s-OFDM	QPSK	20	V	SISO	V	89.0	22.0	1 / 33	25.70
	High	39949.92	DFT-s-OFDM	QPSK	148+20	H + V	2Tx	H	336.0	259.0	1 / 33	29.15
	High	39949.92	CP-OFDM	QPSK	147	H	SISO	H	66.0	18.0	1 / 33	18.64
	High	39949.92	CP-OFDM	QPSK	20	V	SISO	V	89.0	22.0	1 / 33	22.41
	High	39949.92	CP-OFDM	QPSK	148+20	H + V	MIMO	H	336.0	259.0	1 / 33	26.40
	Low	37050.00	DFT-s-OFDM	QPSK	147+19	H + V	2Tx	H	326.0	309.0	1 / 33	26.65
	Mid	38499.96	DFT-s-OFDM	QPSK	148+20	H + V	2Tx	H	336.0	257.0	1 / 33	27.49
	High	39949.92	DFT-s-OFDM	$\pi/2$ BPSK	148+20	H + V	2Tx	H	336.0	259.0	1 / 33	29.09
	High	39949.92	DFT-s-OFDM	16QAM	148+20	H + V	2Tx	H	336.0	259.0	1 / 33	27.43
	High	39949.92	DFT-s-OFDM	64QAM	148+20	H + V	2Tx	H	336.0	259.0	1 / 33	24.82

Table 7-18. Ant 1 EIRP Data (Band n260 - 100MHz-1CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	High	39949.92	DFT-s-OFDM	QPSK	148+20	H + V	2Tx	H	336.0	259.0	64 / 0	25.46
	High	39949.92	DFT-s-OFDM	$\pi/2$ BPSK	148+20	H + V	2Tx	H	336.0	259.0	64 / 0	25.51
	High	39949.92	DFT-s-OFDM	16QAM	148+20	H + V	2Tx	H	336.0	259.0	64 / 0	23.69
	High	39949.92	DFT-s-OFDM	64QAM	148+20	H + V	2Tx	H	336.0	259.0	64 / 0	21.59

Table 7-19. Ant 1 EIRP Data (Band n260 - 100MHz-2CC)

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset	Page 38 of 97	

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	High	39975.00	DFT-s-OFDM	QPSK	154	H	SISO	H	67.0	325.0	1 / 16	24.36
	High	39975.00	DFT-s-OFDM	QPSK	33	V	SISO	V	104.0	352.0	1 / 16	24.20
	High	39975.00	DFT-s-OFDM	QPSK	160+32	H + V	2Tx	H	47.0	328.0	1 / 16	27.82
	High	39975.00	CP-OFDM	QPSK	154	H	SISO	H	67.0	325.0	1 / 16	21.23
	High	39975.00	CP-OFDM	QPSK	33	V	SISO	V	104.0	352.0	1 / 16	20.84
	High	39975.00	CP-OFDM	QPSK	160+32	H + V	MIMO	H	47.0	328.0	1 / 16	24.11
	Low	37025.04	DFT-s-OFDM	QPSK	152+24	H + V	2Tx	H	47.0	310.0	1 / 16	25.23
	Mid	38499.96	DFT-s-OFDM	QPSK	161+33	H + V	2Tx	V	147.0	89.0	1 / 16	24.02
	High	39975.00	DFT-s-OFDM	$\pi/2$ BPSK	160+32	H + V	2Tx	H	47.0	328.0	1 / 16	27.61
	High	39975.00	DFT-s-OFDM	16QAM	160+32	H + V	2Tx	H	47.0	328.0	1 / 16	25.55
	High	39975.00	DFT-s-OFDM	64QAM	160+32	H + V	2Tx	H	47.0	328.0	1 / 16	23.26

Table 7-20. Ant 2 EIRP Data (Band n260 - 50MHz-1CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	High	39975.00	DFT-s-OFDM	QPSK	160+32	H + V	2Tx	H	56.0	326.0	32 / 0	23.72
	High	39975.00	DFT-s-OFDM	$\pi/2$ BPSK	160+32	H + V	2Tx	H	56.0	326.0	32 / 0	23.66
	High	39975.00	DFT-s-OFDM	16QAM	160+32	H + V	2Tx	H	56.0	326.0	32 / 0	22.04
	High	39975.00	DFT-s-OFDM	64QAM	160+32	H + V	2Tx	H	56.0	326.0	32 / 0	20.12

Table 7-21. Ant 2 EIRP Data (Band n260 - 50MHz-2CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	High	39949.92	DFT-s-OFDM	QPSK	154	H	SISO	H	67.0	324.0	1 / 33	24.84
	High	39949.92	DFT-s-OFDM	QPSK	33	V	SISO	V	106.0	359.0	1 / 33	24.11
	High	39949.92	DFT-s-OFDM	QPSK	162+30	H + V	2Tx	H	47.0	334.0	1 / 33	27.49
	High	39949.92	CP-OFDM	QPSK	154	H	SISO	H	67.0	324.0	1 / 33	21.56
	High	39949.92	CP-OFDM	QPSK	33	V	SISO	V	106.0	359.0	1 / 33	20.79
	High	39949.92	CP-OFDM	QPSK	162+30	H + V	MIMO	H	47.0	334.0	1 / 33	23.94
	Low	37050.00	DFT-s-OFDM	QPSK	152+24	H + V	2Tx	H	47.0	307.0	1 / 33	25.04
	Mid	38499.96	DFT-s-OFDM	QPSK	161+33	H + V	2Tx	H	147.0	88.0	1 / 33	24.89
	High	39949.92	DFT-s-OFDM	$\pi/2$ BPSK	162+30	H + V	2Tx	H	47.0	334.0	1 / 33	27.58
	High	39949.92	DFT-s-OFDM	16QAM	162+30	H + V	2Tx	H	47.0	334.0	1 / 33	25.07
	High	39949.92	DFT-s-OFDM	64QAM	162+30	H + V	2Tx	H	47.0	334.0	1 / 33	22.85

Table 7-22. Ant 2 EIRP Data (Band n260 - 100MHz-1CC)

CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	High	39949.92	DFT-s-OFDM	QPSK	162+30	H + V	2Tx	H	56.0	324.0	64 / 0	25.52
	High	39949.92	DFT-s-OFDM	$\pi/2$ BPSK	162+30	H + V	2Tx	H	56.0	324.0	64 / 0	25.46
	High	39949.92	DFT-s-OFDM	16QAM	162+30	H + V	2Tx	H	56.0	324.0	64 / 0	23.81
	High	39949.92	DFT-s-OFDM	64QAM	162+30	H + V	2Tx	H	56.0	324.0	64 / 0	21.92

Table 7-23. Ant 2 EIRP Data (Band n260 - 100MHz-2CC)

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset	Page 39 of 97	

7.4 Radiated Spurious and Harmonic Emissions

§2.1051, §30.203

Test Overview

The spectrum is scanned from 30MHz to 100GHz for n261 and from 30MHz to 200GHz for n260. All out of band emissions are measured in a radiated test setup while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All modulations were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The conductive power or total radiated power of any emissions outside a licensee's frequency block shall be -13dBm/1MHz.

Test Procedure Used

ANSI C63.26-2015 Section 5.7.4

KDB 842590 D01 v01r01 Section 4.4.2 and Section 4.4.3

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 100 GHz for n261 and 200GHz for n260. Several plots are used to show investigations in this entire span.
2. Detector = RMS
3. Trace mode = trace average
4. Sweep time = auto couple
5. Number of sweep points $\geq 2 \times \text{Span/RBW}$
6. The trace was allowed to stabilize
7. RBW = 1MHz, VBW = 3MHz

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) All radiated spurious emissions were measured as EIRP to compare with the §30.203 TRP limits.
- 3) Elements within the same antenna array are correlated to produce beamforming array gain. Antenna arrays cannot be correlated with another antenna array. During testing, only one antenna array was active.
- 4) The plots from 1-200GHz show corrected average EIRP levels. The average EIRP reported below is calculated per section 5.2.7 of ANSI C63.26-2015 which states: $\text{EIRP (dBm)} = E (\text{dB}\mu\text{V/m}) + 20\log(D) - 104.8$; where D is the measurement distance (in the far field region) in m. The field strength E is calculated $E (\text{dB}\mu\text{V/m}) = \text{Spectrum Analyzer Level (dBm)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + \text{Harmonic Mixer Conversion Loss (dB)} + 107$. All appropriate Antenna Factor and Cable Loss have been applied in the spectrum analyzer for each measurement. For measurements > 40GHz, Harmonic Mixer Conversion Loss was also applied to the spectrum analyzer.
- 5) Emissions below 18GHz were measured at a 3 meter test distance, while emissions above 18GHz were measured at the appropriate far field distance. The far field of the mmWave signal is based on formula: $R > 2D^2/\text{wavelength}$, where D is the larger between the dimension of the measurement antenna and the transmitting antenna of the EUT. In this case, D is the largest dimension of the measurement antenna.

FCC ID: A3LSMG998U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 40 of 97

© 2020 PCTEST

V1.0

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Frequency Range (GHz)	Wavelength(cm)	Far Field Distance (m)	Measurement Distance (m)
18-40	0.749	0.54	1.00
40-60	0.500	1.39	1.50
60-90	0.333	0.91	1.00
90-140	0.214	0.58	1.00
140-200	0.150	0.39	1.00

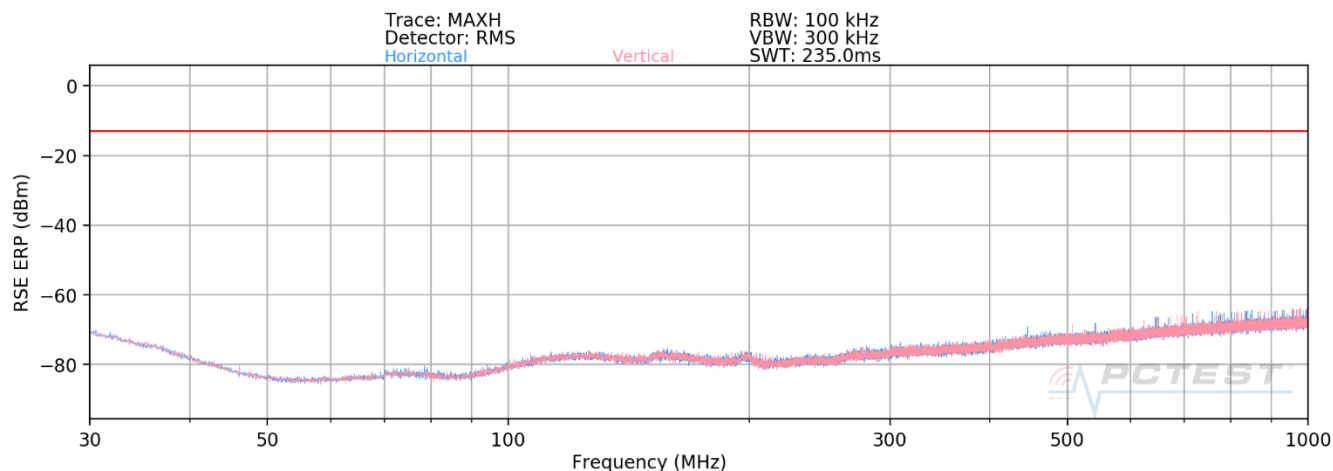
Table 7-24. Far-Field Distance & Measurement Distance per Frequency Range

- 6) All emissions from 30MHz - 40GHz were measured using a spectrum analyzer with an internal preamplifier. Emissions >40GHz were measured using a harmonic mixer with the spectrum analyzer.
- 7) All RSE's were measured with 1CC. It was determined that adding more CC's causes the overall amplitude of just 1CC to decrease, therefore, 1CC is the worst case for the purposes of spurious emissions measurements.
- 8) The "-" shown in the following RSE tables are used to denote a noise floor measurement.
- 9) All RSE's were investigated in EN-DC mode and with 802.11 chipset active. It was determined that there is no new emission introduced by EN-DC mode, or the 802.11 chipset. For EN-DC mode, n261 uses LTE B2, B5, B12, B13, B48 and B66, and n260 uses LTE B2, B5, B12, B13, B14, B30, B48 and B66.
- 10) There was no discernible difference in the spurious emission levels when using different LTE anchor bands. Thus, LTE Band 2 was used as a representative anchor band for EN-DC investigations.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 41 of 97

Band n261 – Ant 1

30MHz - 1GHz



Plot 7-33. Ant 1- n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor Band 2)

Spurious Emissions ERP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE ERP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

$$\text{RSE ERP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8 - 2.15 \text{ (dB)}$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
30.35	Mid	50	2Tx	QPSK	H	-	-	-70.12	-13.00	-57.12
885.80	Mid	50	2Tx	QPSK	H	-	-	-67.32	-13.00	-54.32
936.75	Mid	50	2Tx	QPSK	H	-	-	-66.75	-13.00	-53.75

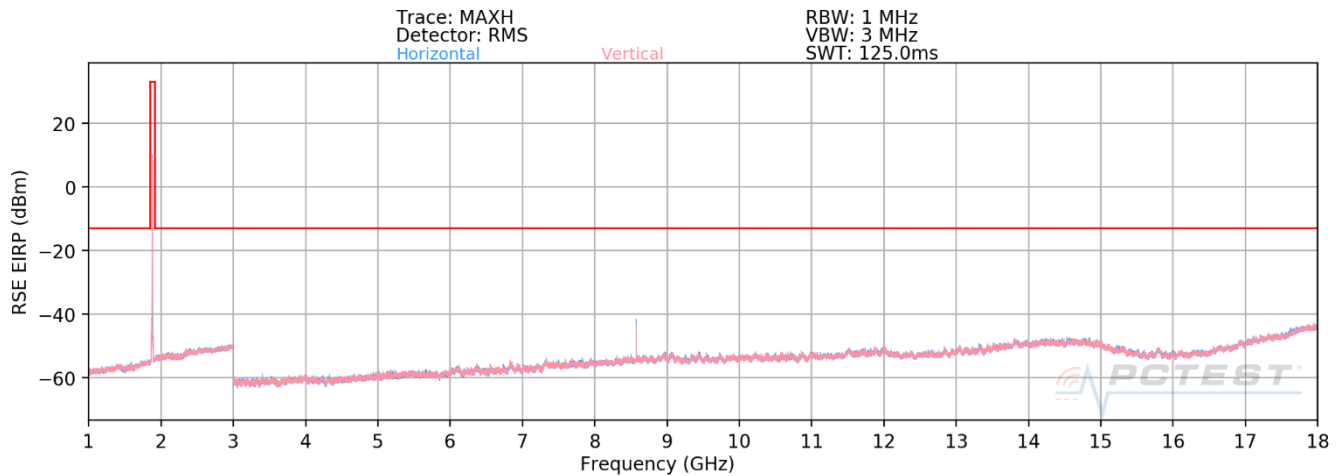
Table 7-25. Ant 1 – 2Tx -Spurious Emissions Table (30MHz - 1GHz)

Notes

The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 3 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 42 of 97

1GHz - 18GHz



Plot 7-34. Ant 1-n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8812.10	Low	50	2Tx	QPSK	H	58	184	-44.43	-13.00	-31.43
8572.10	Mid	50	2Tx	QPSK	H	60	186	-42.86	-13.00	-29.86
8972.05	High	50	2Tx	QPSK	H	294	195	-43.28	-13.00	-30.28

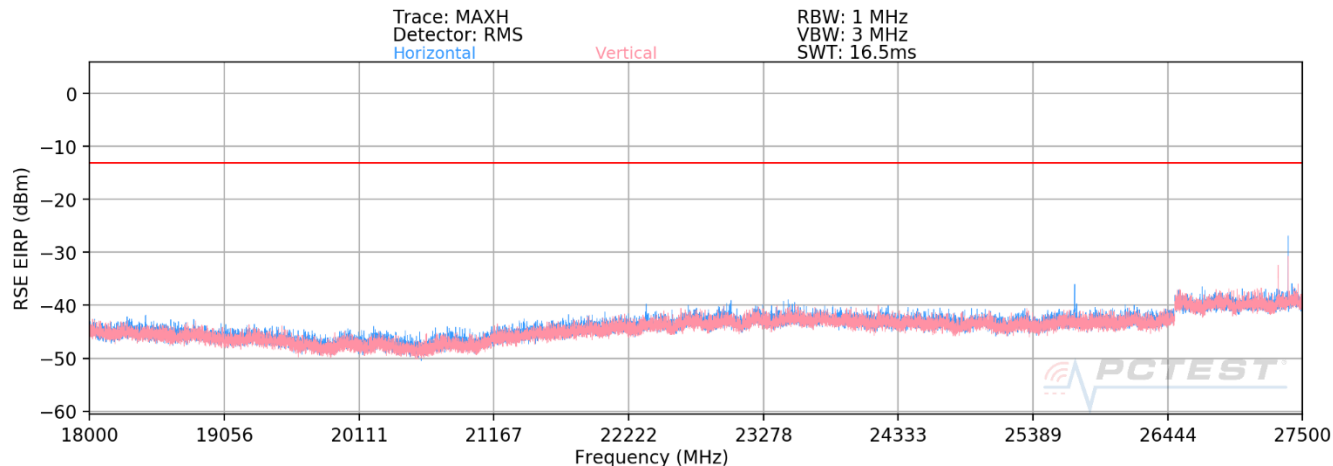
Table 7-26. Ant 1 - 2Tx -Spurious Emissions Table (1GHz - 18GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 3 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 43 of 97

18GHz - 27.5GHz



Plot 7-35. Ant 1-n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
26975.03	Low	50	2Tx	QPSK	H	295	48	-24.67	-13.00	-11.67
27387.82	Mid	50	2Tx	QPSK	H	295	52	-24.24	-13.00	-11.24
27327.09	High	50	2Tx	QPSK	H	289	51	-28.02	-13.00	-15.02

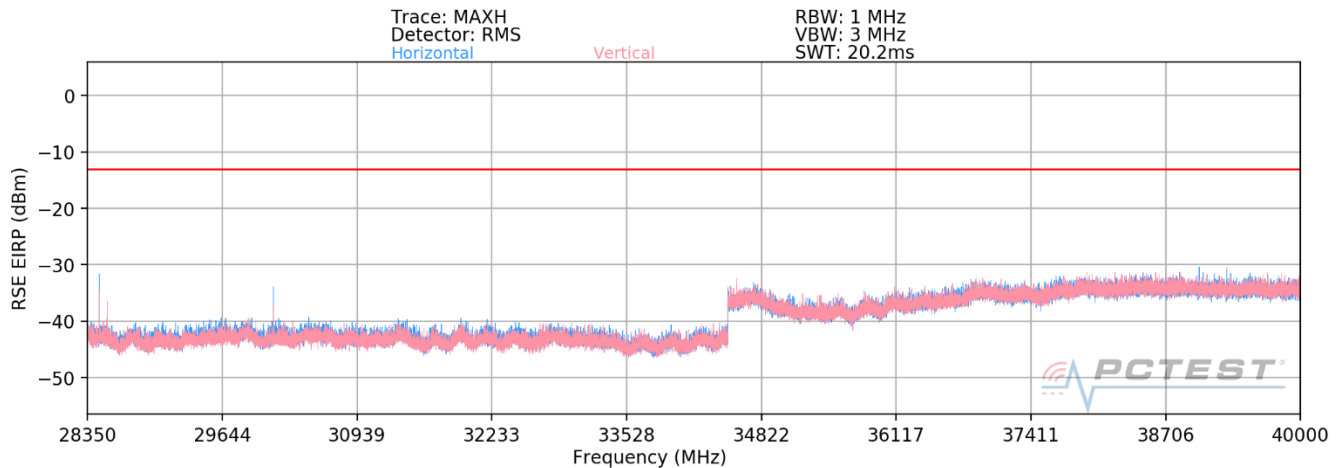
Table 7-27. Ant 1 - 2Tx -Spurious Emissions Table (18GHz - 27.5GHz)

Notes

1. The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.
2. All RSE were investigated, and only the worst case has been included in this report.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 44 of 97

28.35GHz - 40GHz



Plot 7-36. Ant 1-n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
28615.03	Low	50	2Tx	QPSK	H	288	63	-25.30	-13.00	-12.30
28462.88	Mid	50	2Tx	QPSK	H	290	57	-26.75	-13.00	-13.75
28863.05	High	50	2Tx	QPSK	H	285	51	-26.94	-13.00	-13.94

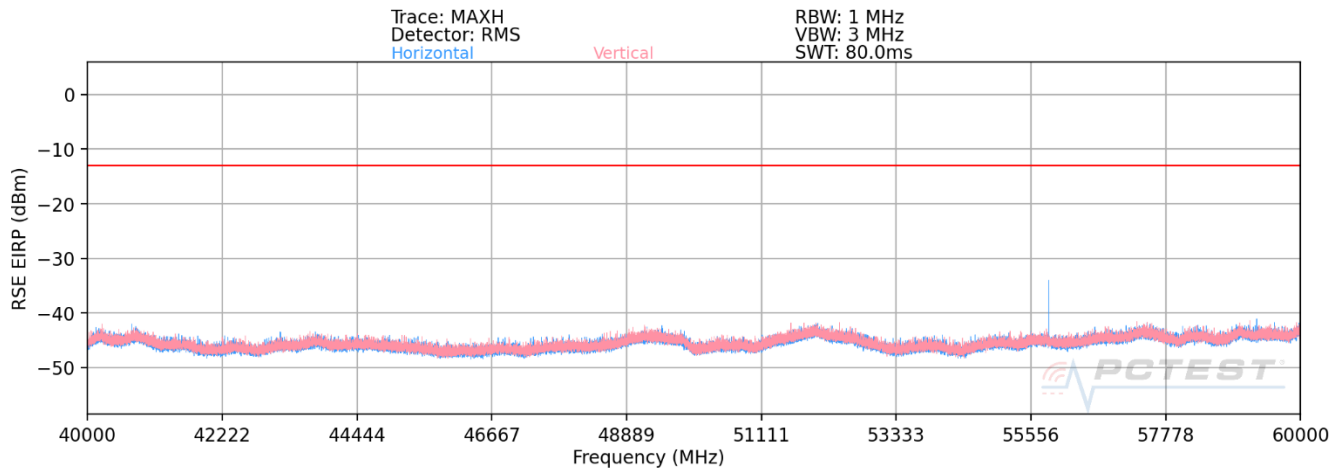
Table 7-28. Ant 1 - 2Tx -Spurious Emissions Table (28.35GHz - 40GHz)

Notes

- The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.
- All RSE were investigated, and only the worst case has been included in this report.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 45 of 97

40GHz - 60GHz



Plot 7-37. Ant 1-n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1.5 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55051.05	Low	50	2Tx	QPSK	H	301	339	-37.03	-13.00	-24.03
55850.88	Mid	50	2Tx	QPSK	H	300	355	-35.37	-13.00	-22.37
56650.77	High	50	2Tx	QPSK	H	300	359	-36.80	-13.00	-23.80

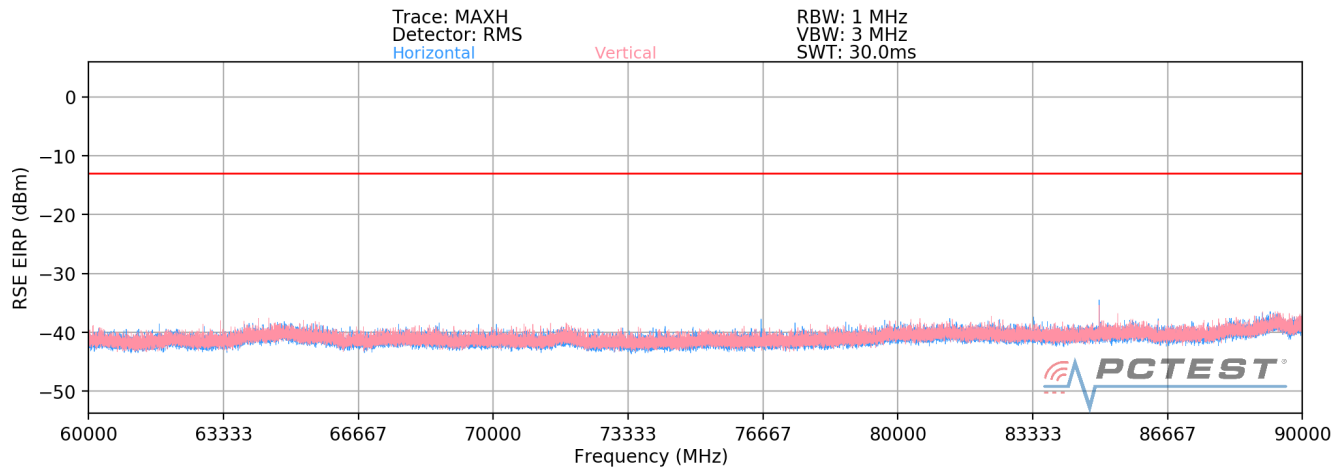
Table 7-29. Ant 1 - 2Tx -Spurious Emissions Table (40GHz - 60GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1.5 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 46 of 97

60GHz - 90GHz



Plot 7-38. Ant 1-n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82576.47	Low	50	2Tx	QPSK	H	324	326	-37.21	-13.00	-24.21
83776.37	Mid	50	2Tx	QPSK	H	325	320	-36.97	-13.00	-23.97
84975.81	High	50	2Tx	QPSK	H	297	9	-35.06	-13.00	-22.06

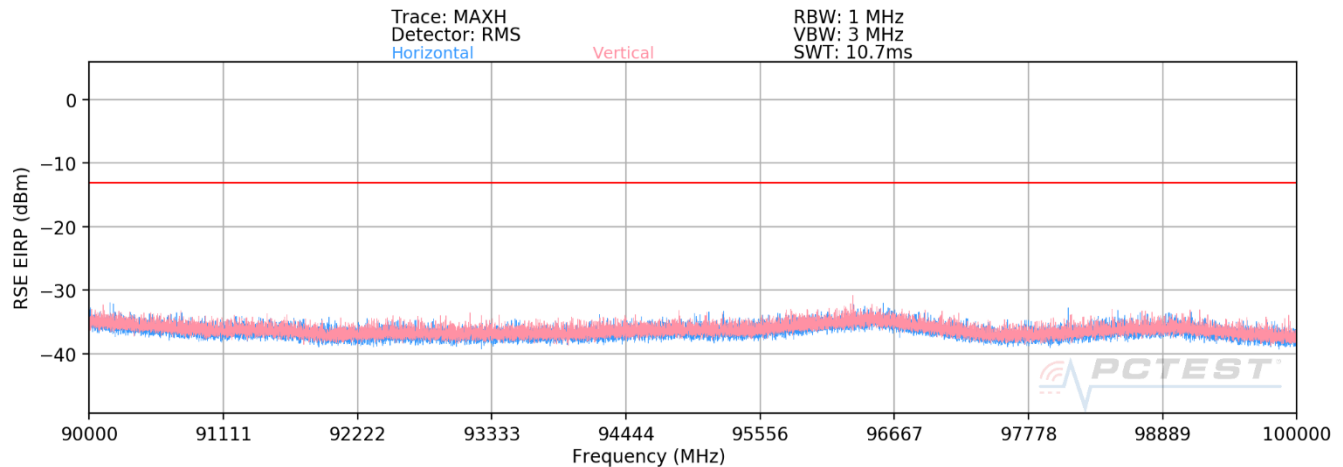
Table 7-30. Ant 1 - 2Tx -Spurious Emissions Table (60GHz - 90GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.

FCC ID: A3LSMG998U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 47 of 97

90GHz - 100GHz



Plot 7-39. Ant 1-n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
96395.90	Low	50	2Tx	QPSK	H	-	-	-40.62	-13.00	-27.62
96452.60	Mid	50	2Tx	QPSK	H	-	-	-40.50	-13.00	-27.50
96538.40	High	50	2Tx	QPSK	H	-	-	-40.48	-13.00	-27.48

Table 7-31. Ant 1 - 2Tx -Spurious Emissions Table (90GHz - 100GHz)

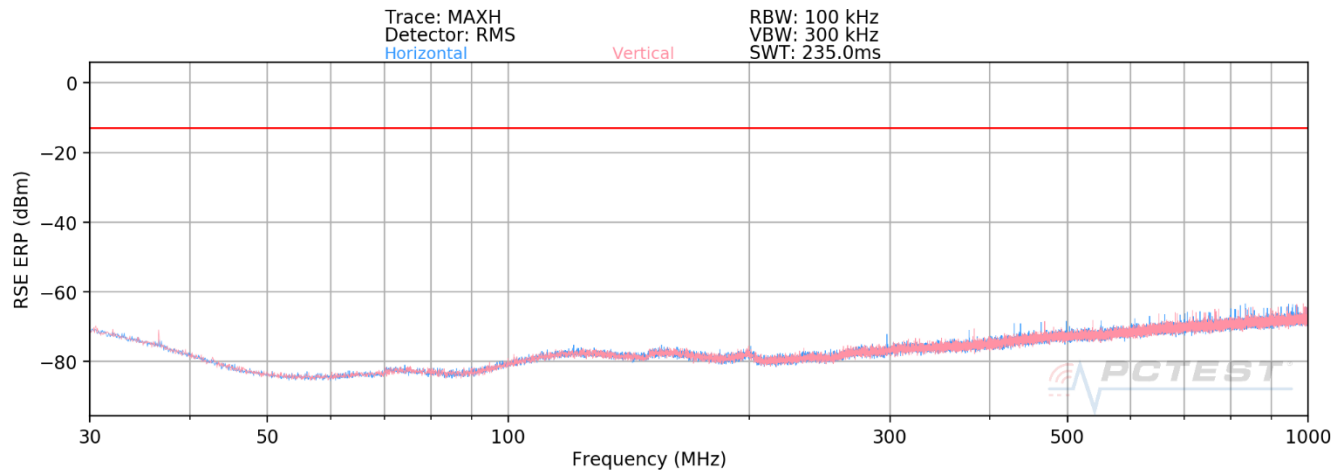
Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 48 of 97

Band n261 – Ant 2

30MHz - 1GHz



Plot 7-40. Ant 2-n261 Radiated Spurious Plot (1CC QPSK Mid Channel H Beam – EN-DC Anchor Band 2)

Spurious Emissions ERP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE ERP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

$$\text{RSE ERP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8 - 2.15 \text{ (dB)}$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
297.40	Mid	50	H	QPSK	H	-	-	-72.17	-13.00	-59.17
702.45	Mid	50	H	QPSK	H	-	-	-70.19	-13.00	-57.19
831.45	Mid	50	H	QPSK	H	-	-	-67.55	-13.00	-54.55

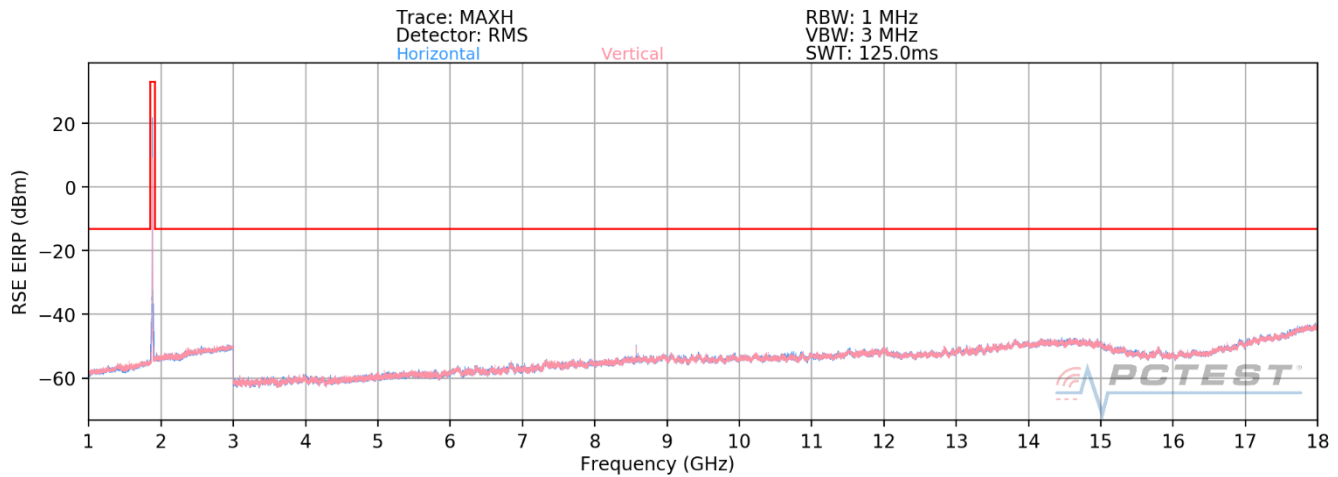
Table 7-32. Ant 2 - SISO -Spurious Emissions Table (30MHz - 1GHz)

Notes

The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 3 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 49 of 97

1GHz - 18GHz



Plot 7-41. Ant 2-n261 Radiated Spurious Plot (1CC QPSK Mid Channel H Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8811.90	Low	50	H	QPSK	H	297	149	-43.15	-13.00	-30.15
8571.95	Mid	50	H	QPSK	H	297	178	-48.89	-13.00	-35.89
8971.90	High	50	H	QPSK	H	337	121	-39.09	-13.00	-26.09

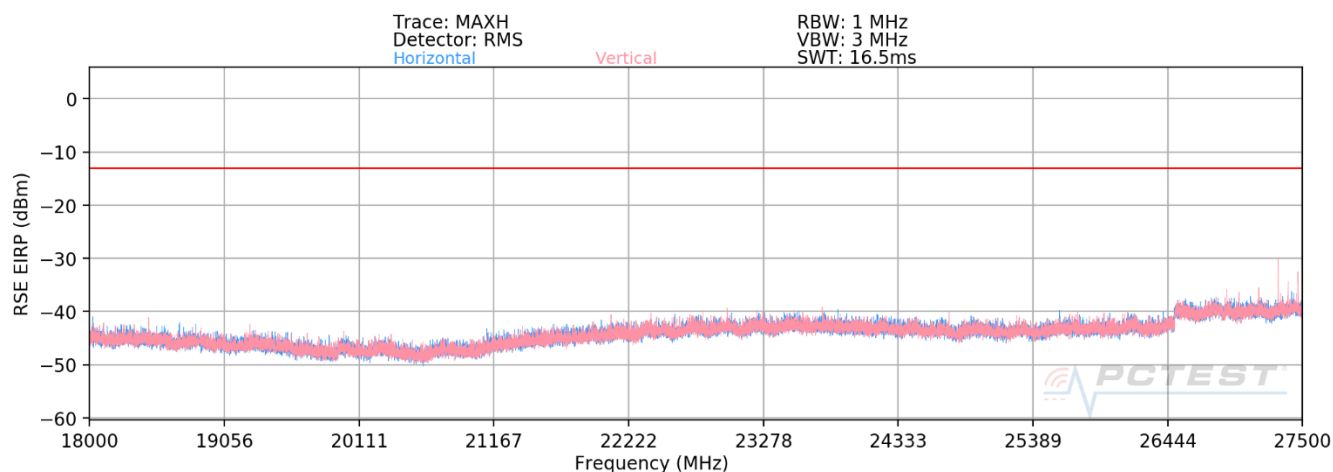
Table 7-33. Ant 2 - SISO -Spurious Emissions Table (1GHz - 18GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 3 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 50 of 97

18GHz - 27.5GHz



Plot 7-42. Ant 2-n261 Radiated Spurious Plot (1CC QPSK Mid Channel H Beam – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
27218.03	Low	50	H	QPSK	V	277	320	-26.58	-13.00	-13.58
27310.94	Mid	50	H	QPSK	V	257	301	-30.80	-13.00	-17.80
27403.45	High	50	H	QPSK	V	256	321	-30.03	-13.00	-17.03

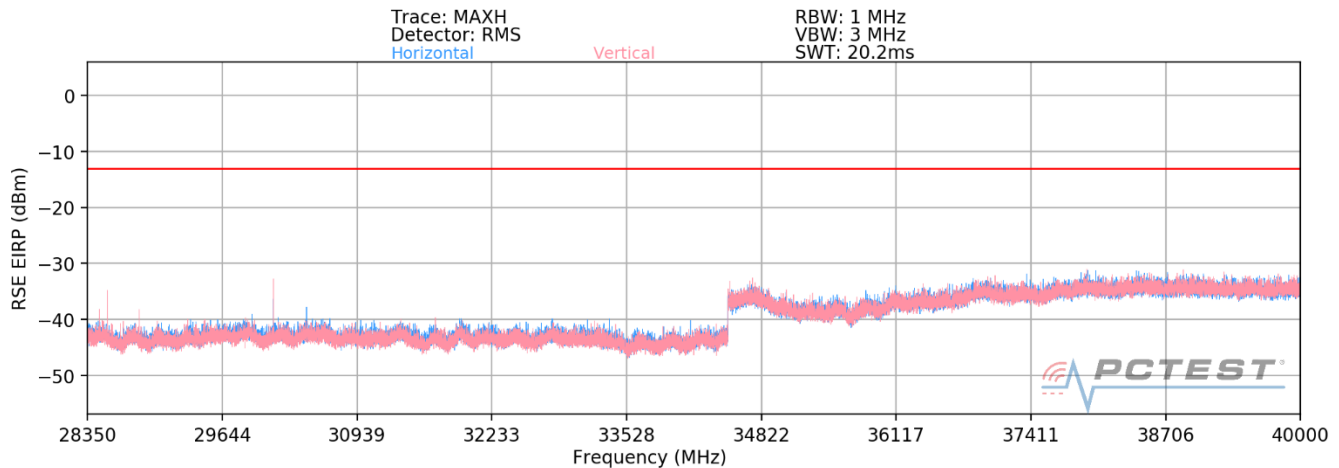
Table 7-34. Ant 2 - SISO -Spurious Emissions Table (18GHz - 27.5GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 51 of 97

28.35GHz - 40GHz



Plot 7-43. Ant 2-n261 Radiated Spurious Plot (1CC QPSK Mid Channel H Beam – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
28615.00	Low	50	H	QPSK	V	276	335	-25.64	-13.00	-12.64
30135.15	Mid	50	H	QPSK	V	251	331	-27.15	-13.00	-14.15
28632.60	High	50	H	QPSK	V	251	295	-26.75	-13.00	-13.75

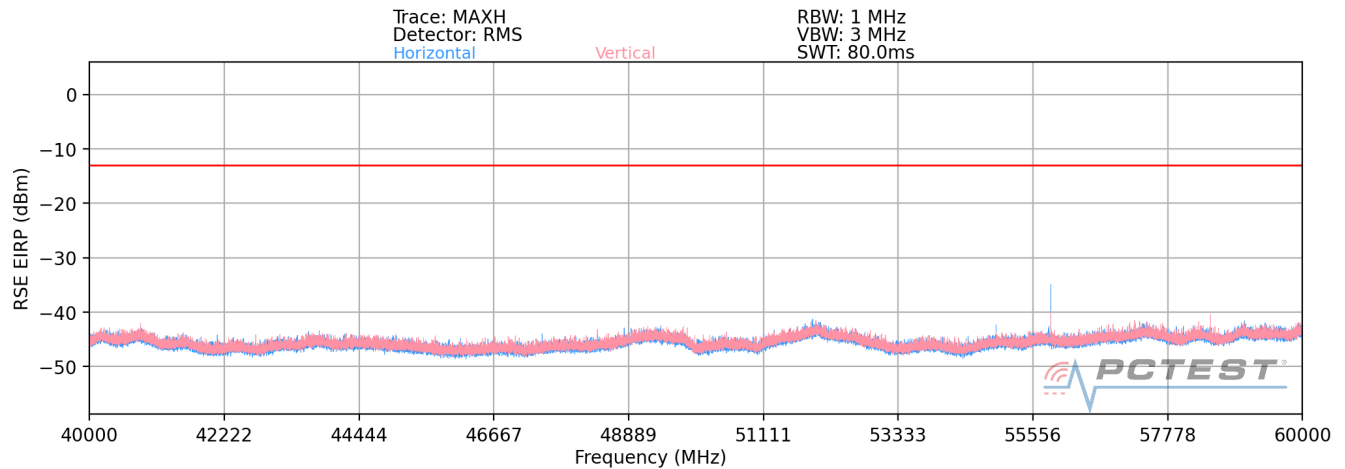
Table 7-35. Ant 2 - SISO -Spurious Emissions Table (28.35GHz - 40GHz)

Notes

- The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.
- All RSE were investigated, and only the worst case has been included in this report.

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 52 of 97

40GHz - 60GHz



Plot 7-44. Ant 2-n261 Radiated Spurious Plot (1CC QPSK Mid Channel H Beam – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1.5 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55050.87	Low	50	H	QPSK	H	302	250	-36.52	-13.00	-23.52
55851.06	Mid	50	H	QPSK	H	258	8	-35.49	-13.00	-22.49
56650.74	High	50	H	QPSK	H	257	8	-34.55	-13.00	-21.55

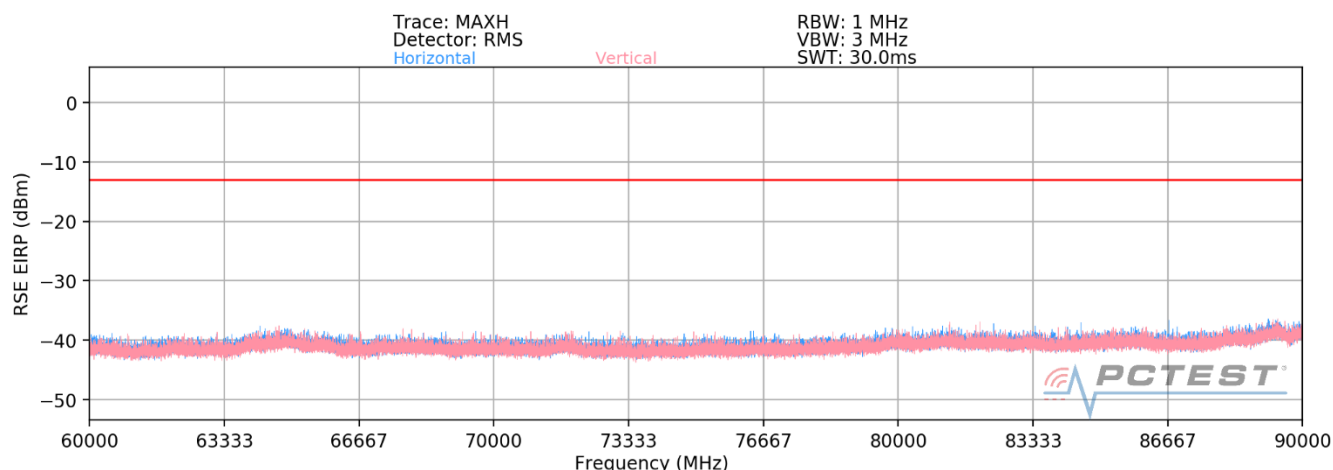
Table 7-36. Ant 2 - SISO -Spurious Emissions Table (40GHz - 60GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1.5 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 53 of 97

60GHz - 90GHz



Plot 7-45. Ant 2-n261 Radiated Spurious Plot (1CC QPSK Mid Channel H Beam – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8+ Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82576.41	Low	50	H	QPSK	H	307	273	-42.91	-13.00	-29.91
83776.04	Mid	50	H	QPSK	H	316	273	-40.93	-13.00	-27.93
84976.05	High	50	H	QPSK	H	250	27	-40.81	-13.00	-27.81

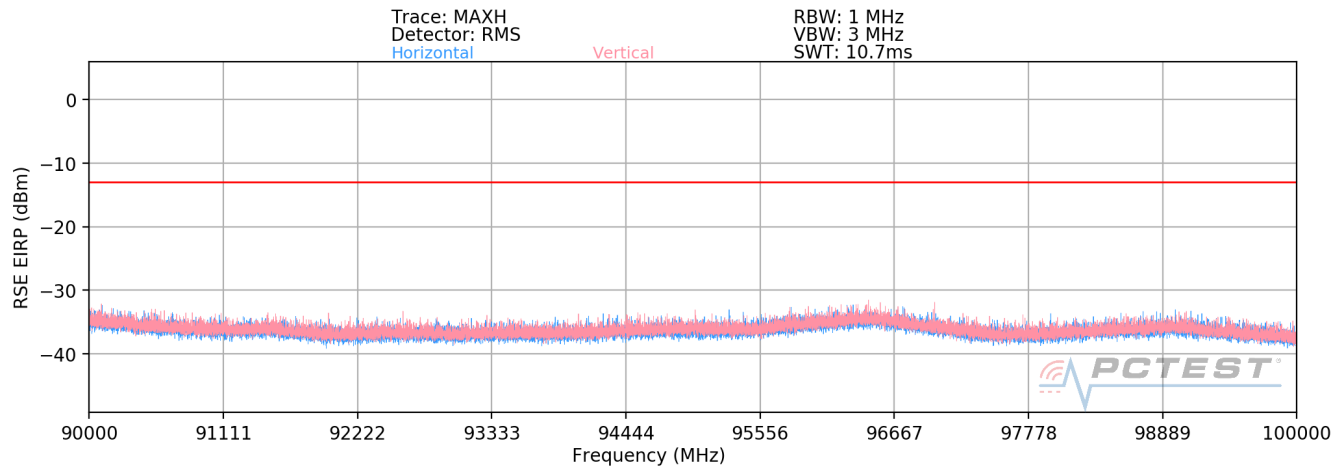
Table 7-37. Ant 2 - SISO -Spurious Emissions Table (60GHz - 90GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.

FCC ID: A3LSMG998U	 MEASUREMENT REPORT (CERTIFICATION) 	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset
Page 54 of 97		

90GHz - 100GHz



Plot 7-46. Ant 2-n261 Radiated Spurious Plot (1CC QPSK Mid Channel H Beam – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n261)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
96417.20	Low	50	H	QPSK	H	-	-	-40.53	-13.00	-27.53
96585.00	Mid	50	H	QPSK	H	-	-	-40.42	-13.00	-27.42
96562.10	High	50	H	QPSK	H	-	-	-40.49	-13.00	-27.49

Table 7-38. Ant 2 - SISO -Spurious Emissions Table (90GHz - 100GHz)

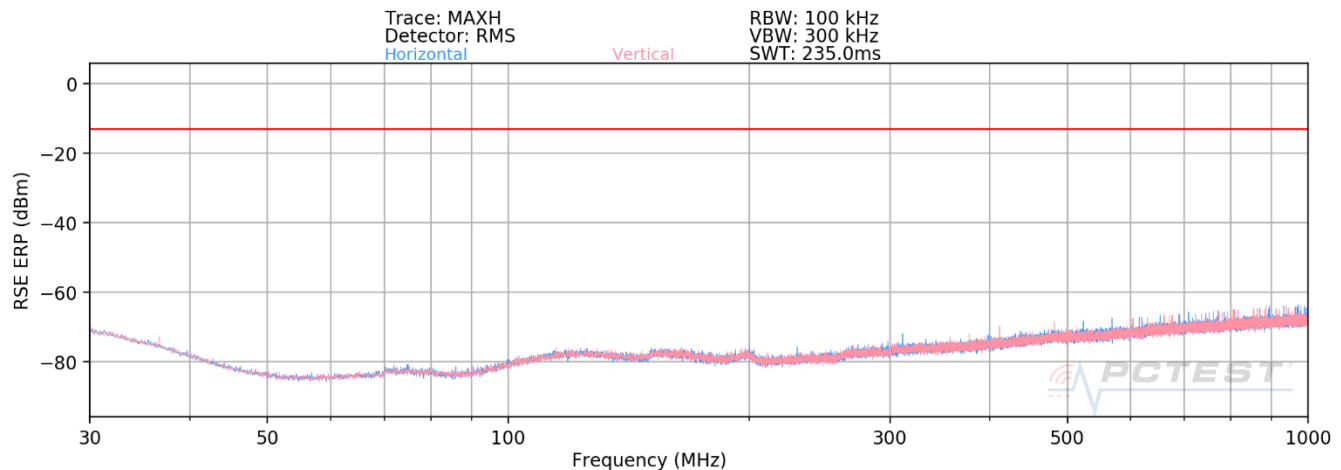
Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.

FCC ID: A3LSMG998U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 55 of 97

Band n260- Ant 1

30MHz - 1GHz



Plot 7-47. Ant 1-n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor Band 2)

Spurious Emissions ERP Sample Calculation (n260)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE ERP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

$$\text{RSE ERP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8 - 2.15 \text{ (dB)}$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
411.35	Mid	50	2Tx	QPSK	V	-	-	-69.61	-13.00	-56.61
565.50	Mid	50	2Tx	QPSK	V	-	-	-70.85	-13.00	-57.85
948.35	Mid	50	2Tx	QPSK	V	-	-	-65.73	-13.00	-52.73

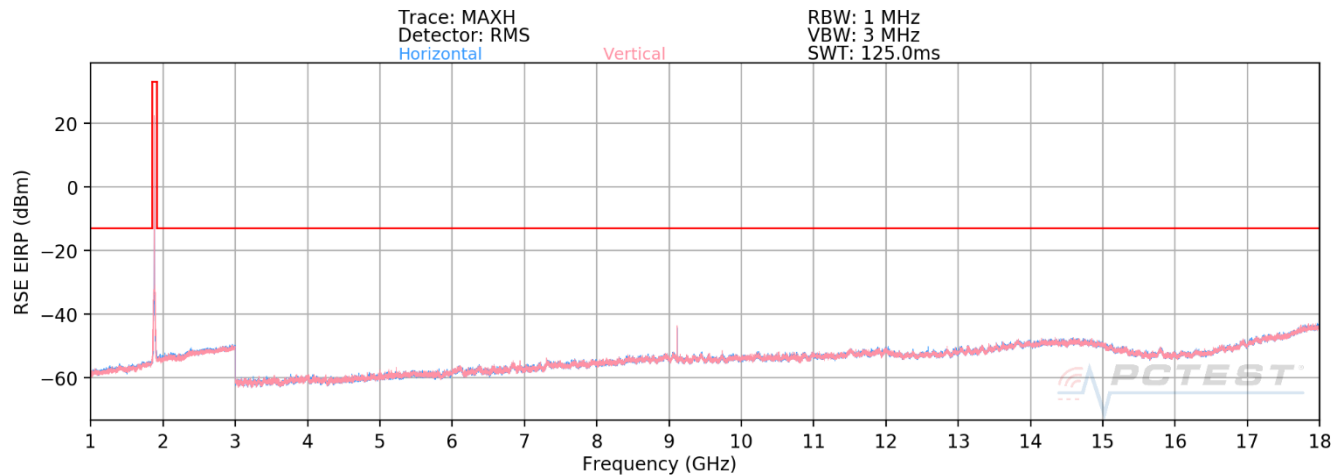
Table 7-39. Ant 1 - 2Tx -Spurious Emissions Table (30MHz - 1GHz)

Notes

The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 3 meter.

FCC ID: A3LSMG998U	 PCTEST® Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 56 of 97

1GHz - 18GHz



Plot 7-48. Ant 1-n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8404.75	Low	50	2Tx	QPSK	V	30	371	-41.12	-13.00	-28.12
9111.60	Mid	50	2Tx	QPSK	V	341	367	-41.78	-13.00	-28.78
9153.15	High	50	2Tx	QPSK	V	343	364	-38.79	-13.00	-25.79

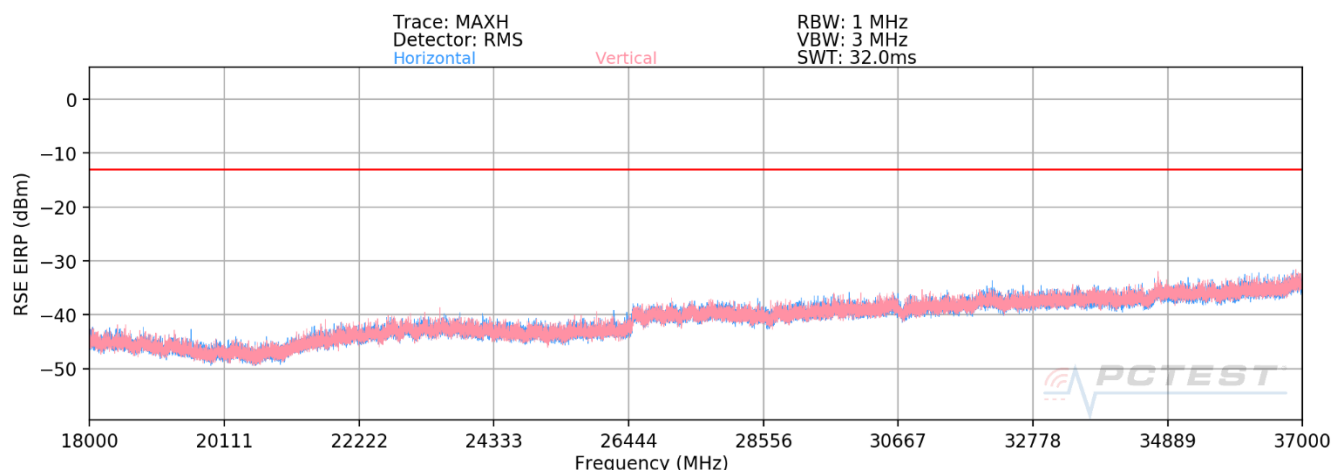
Table 7-40. Ant 1 - 2Tx -Spurious Emissions Table (1GHz - 18GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 3 meter.

FCC ID: A3LSMG998U	PCTEST Proud to be part of element	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 57 of 97

18GHz – 37GHz



Plot 7-49. Ant 1-n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
36850.60	Low	50	2Tx	QPSK	V	-	-	-39.03	-13.00	-26.03
36876.34	Mid	50	2Tx	QPSK	V	-	-	-39.83	-13.00	-26.83
36858.10	High	50	2Tx	QPSK	V	-	-	-39.05	-13.00	-26.05

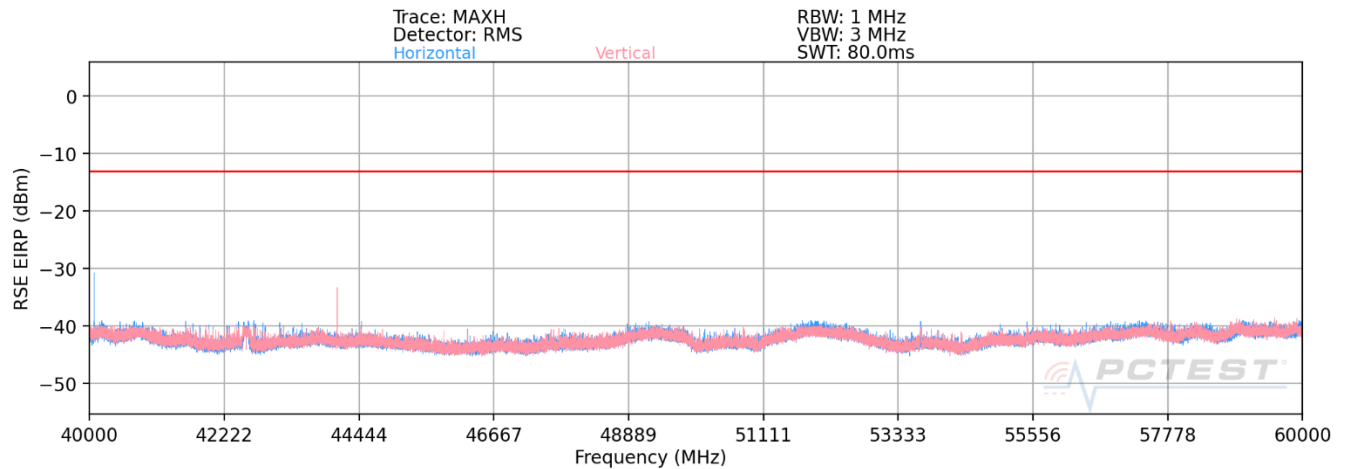
Table 7-41. Ant 1 - 2Tx -Spurious Emissions Table (18GHz – 37GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 58 of 97

40GHz - 60GHz



Plot 7-50. Ant 1-n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1.5 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
42930.91	Low	50	2Tx	QPSK	V	292	63	-38.08	-13.00	-25.08
44083.02	Mid	50	2Tx	QPSK	V	249	60	-37.40	-13.00	-24.40
46233.45	High	50	2Tx	QPSK	V	263	35	-40.78	-13.00	-27.78

Table 7-42. Ant 1 - 2Tx -Spurious Emissions Table (40GHz - 60GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1.5 meter.

FCC ID: A3LSMG998U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2009230152-06-R1.A3L	Test Dates: 10/5/2020-11/20/2020	EUT Type: Portable Handset		Page 59 of 97