

**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:**

9/14 – 11/17/2020

Test Site/Location:

PCTEST Lab. Columbia, MD, USA

Test Report Serial No.:

1M2009140143-06.A3L

FCC ID:**A3LSMG996U****APPLICANT:****Samsung Electronics Co., Ltd.****Application Type:**

Certification

Model:

SM-G996U

Additional Models:

SM-G996U1

EUT Type:

Portable Handset

FCC Classification:

Part 30 Mobile Transmitter (5GM)

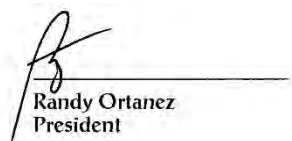
FCC Rule Part(s):

30

Test Procedure(s):ANSI C63.26-2015, KDB 971168 D01 v03r01,
KDB 842590 D01 v01r01

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.

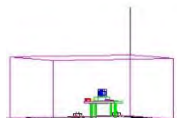

Randy Ortanez
President

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

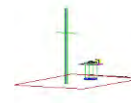
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Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n261	L Patch	100	27550 - 28300	1	SISO	QPSK	0.768	28.85	93M7G7D
					2Tx	QPSK	0.983	29.92	93M7G7D
					2Tx	$\pi/2$ BPSK	0.954	29.79	90M8G7D
				2	2Tx	16QAM	0.606	27.82	93M6W7D
					2Tx	64QAM	0.315	24.98	94M6W7D
					2Tx	QPSK	0.479	26.80	192MG7D
		50	27525 - 28325	1	2Tx	$\pi/2$ BPSK	0.482	26.83	192MG7D
					2Tx	16QAM	0.311	24.92	192MW7D
					2Tx	64QAM	0.194	22.88	193MW7D
				2	SISO	QPSK	0.740	28.69	45M6G7D
					2Tx	QPSK	1.046	30.19	45M6G7D
					2Tx	$\pi/2$ BPSK	1.017	30.07	45M4G7D
					2Tx	16QAM	0.664	28.22	45M4W7D
					2Tx	64QAM	0.388	25.89	45M5W7D
n261	K Patch	100	27550 - 28300	1	2Tx	QPSK	0.420	26.23	95M4G7D
					2Tx	$\pi/2$ BPSK	0.417	26.20	94M6G7D
					2Tx	16QAM	0.284	24.54	95M5W7D
		50	27525 - 28325	1	2Tx	64QAM	0.182	22.61	95M9W7D
					SISO	QPSK	0.425	26.28	-
					2Tx	QPSK	0.956	29.80	-
					2Tx	$\pi/2$ BPSK	0.707	28.49	-
					2Tx	16QAM	0.471	26.73	-
					2Tx	64QAM	0.306	24.85	-
				2	2Tx	QPSK	0.403	26.05	-
					2Tx	$\pi/2$ BPSK	0.405	26.07	-
					2Tx	16QAM	0.278	24.44	-
				1	2Tx	64QAM	0.168	22.25	-
					SISO	QPSK	0.451	26.55	-
					2Tx	QPSK	0.987	29.95	-
					2Tx	$\pi/2$ BPSK	0.753	28.77	-
					2Tx	16QAM	0.532	27.26	-
					2Tx	64QAM	0.268	24.28	-
				2	2Tx	QPSK	0.250	23.97	-
					2Tx	$\pi/2$ BPSK	0.250	23.98	-
					2Tx	16QAM	0.170	22.29	-
					2Tx	64QAM	0.108	20.34	-

EUT Overview (Band n261)

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Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n260	L Patch	100	37050 - 39950	1	SISO	QPSK	0.653	28.15	94M4G7D
					2Tx	QPSK	1.054	30.23	94M4G7D
					2Tx	$\pi/2$ BPSK	1.032	30.14	91M2G7D
					2Tx	16QAM	0.837	29.23	95M0W7D
					2Tx	64QAM	0.561	27.49	94M6W7D
				2	2Tx	QPSK	0.276	24.41	193MG7D
					2Tx	$\pi/2$ BPSK	0.275	24.39	193MG7D
					2Tx	16QAM	0.197	22.94	193MW7D
					2Tx	64QAM	0.125	20.98	197MW7D
		50	37025 - 39975	1	SISO	QPSK	0.534	27.28	49M7G7D
					2Tx	QPSK	1.054	30.23	49M7G7D
					2Tx	$\pi/2$ BPSK	0.911	29.60	48M8G7D
					2Tx	16QAM	0.737	28.68	48M6W7D
					2Tx	64QAM	0.491	26.91	51M3W7D
				2	2Tx	QPSK	0.255	24.07	95M0G7D
					2Tx	$\pi/2$ BPSK	0.260	24.15	95M1G7D
n260	K Patch	100	37050 - 39950	1	2Tx	16QAM	0.179	22.53	94M5W7D
					2Tx	64QAM	0.119	20.75	98M5W7D
				2	2Tx	QPSK	0.471	26.73	-
					2Tx	QPSK	0.731	28.64	-
					2Tx	$\pi/2$ BPSK	0.704	28.48	-
					2Tx	16QAM	0.404	26.07	-
					2Tx	64QAM	0.310	24.92	-
		50	37025 - 39975	1	2Tx	QPSK	0.165	22.18	-
					2Tx	$\pi/2$ BPSK	0.172	22.35	-
					2Tx	16QAM	0.109	20.37	-
					2Tx	64QAM	0.068	18.34	-
				2	SISO	QPSK	0.457	26.60	-
					2Tx	QPSK	0.772	28.88	-
		50	37025 - 39975	1	2Tx	$\pi/2$ BPSK	0.756	28.79	-
					2Tx	16QAM	0.484	26.85	-
					2Tx	64QAM	0.323	25.09	-
					2Tx	QPSK	0.123	20.89	-
				2	2Tx	$\pi/2$ BPSK	0.118	20.74	-
					2Tx	16QAM	0.076	18.81	-
					2Tx	64QAM	0.046	16.67	-

EUT Overview (Band n260)

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

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1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

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

1.3 Test Facility / Accreditations

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

- PCTEST is an ISO 17025-2017 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.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG996U**. The test data contained in this report pertains only to the emissions due to the EUT's 5G mmWave function.

The EUT contains two patch antennas, referred to herein as Ant1 (L-Patch) and Ant2 (K-Patch). Each of the 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.

Antenna	Name
Ant1	L-Patch
Ant2	K-Patch

Test Device Serial No.: 0418M, 0415M

2.2 Device Capabilities

This device contains the following capabilities:

800/850/1900 CDMA/EVDO Rev. 0/A (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (FR1/FR2), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, UWB, Wireless Power Transfer

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.

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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.

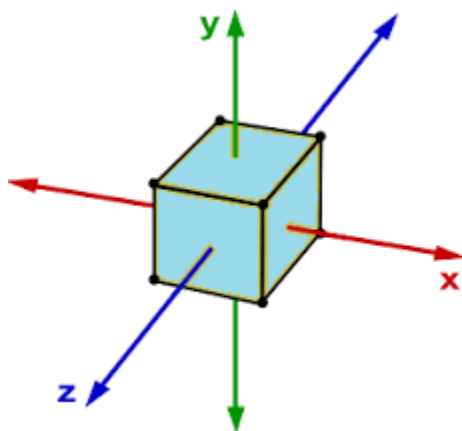


Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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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.

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

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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

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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

Notes:

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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6.0 SAMPLE CALCULATIONS

Emission Designator

$\pi/2$ BPSK/ 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

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7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.
 FCC ID: A3LSMG996U
 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.

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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.

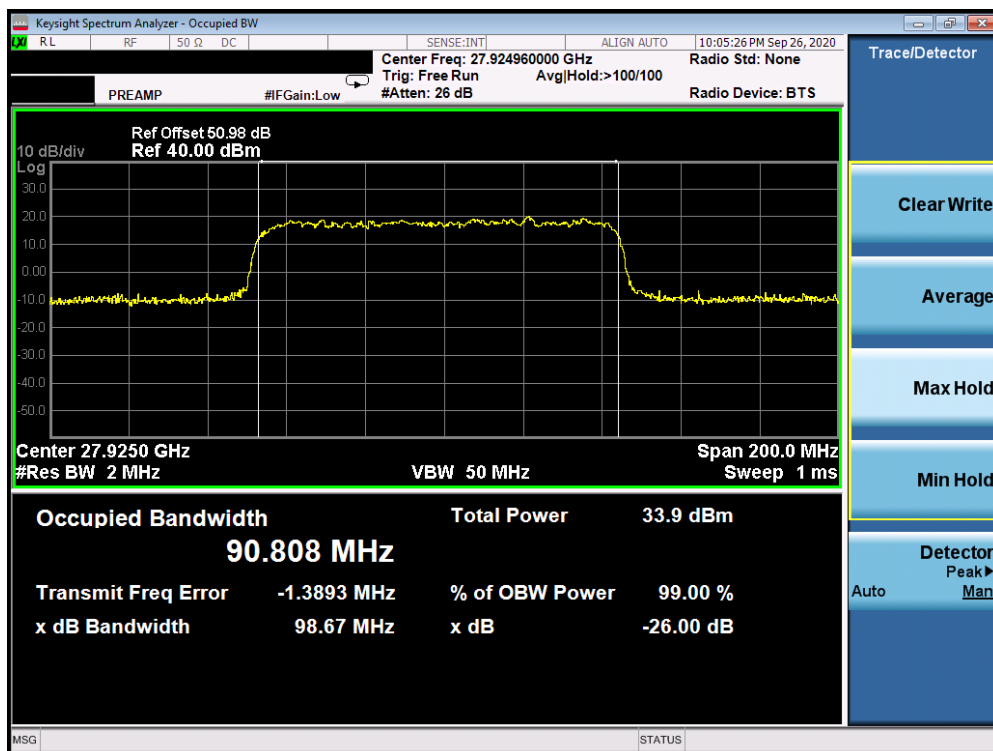
FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 13 of 77

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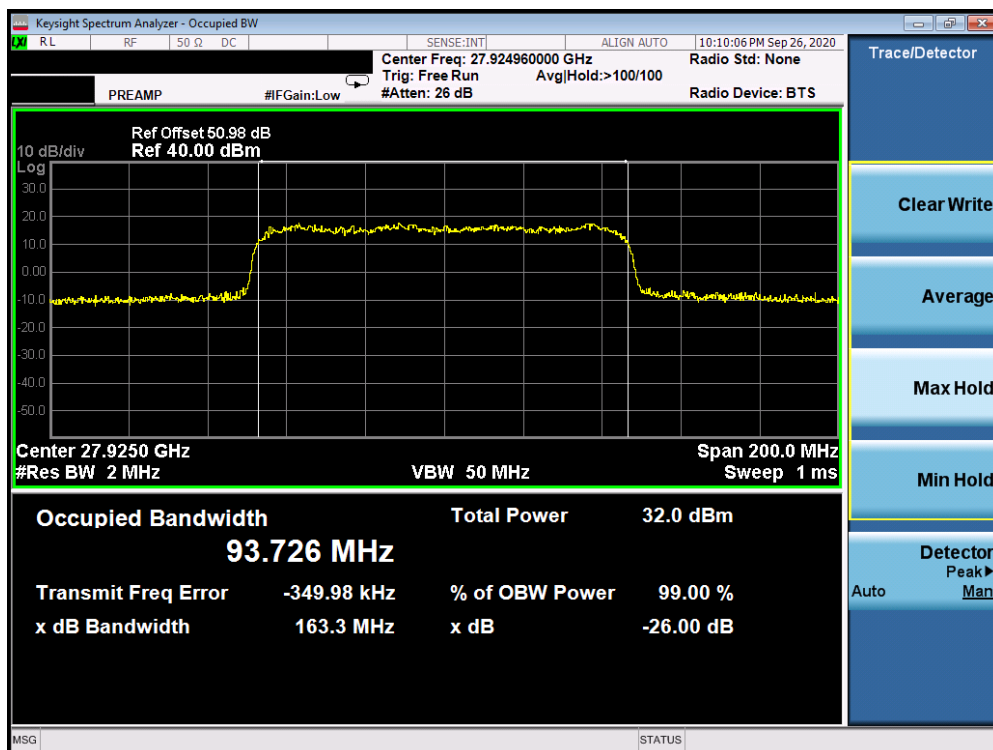
V1.0

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Band n261

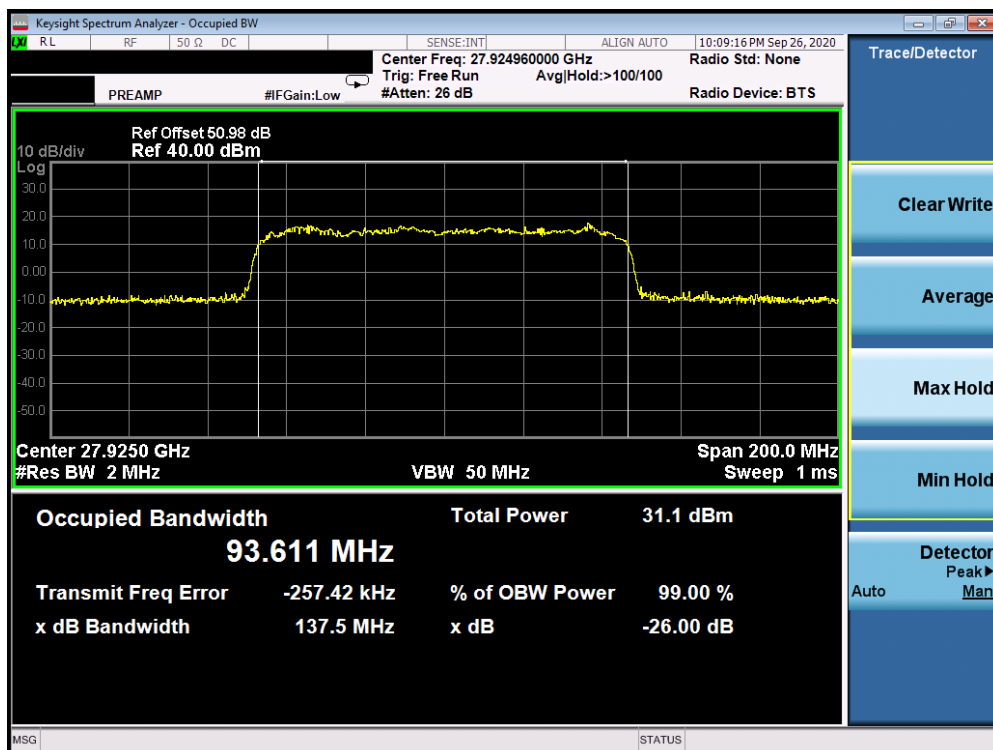


Plot 7-1. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)

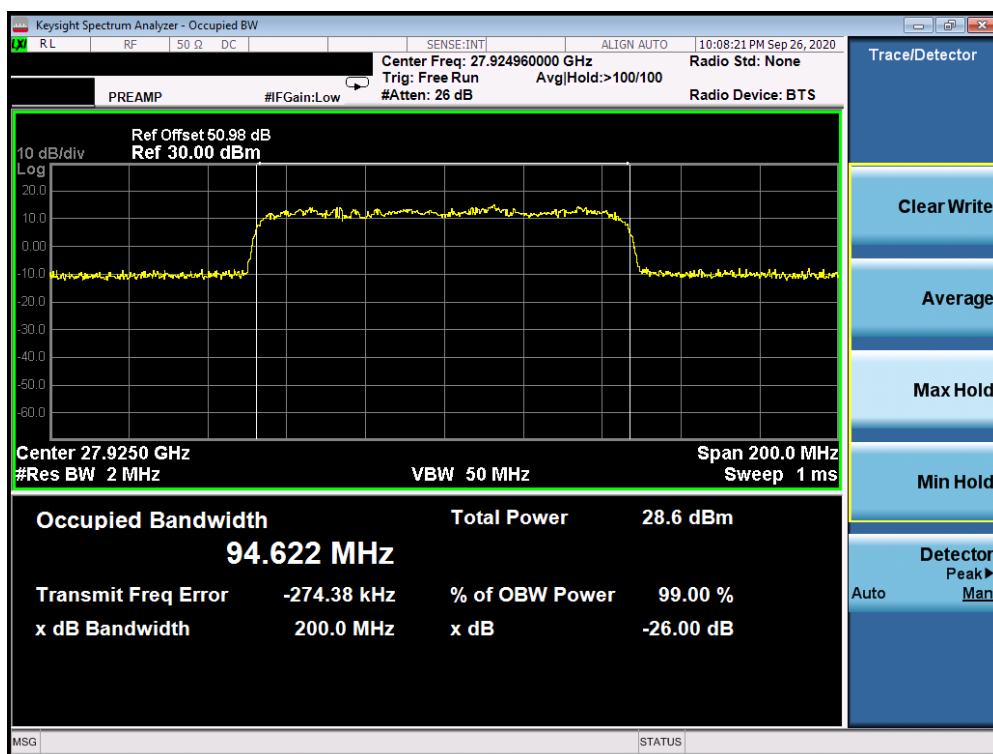


Plot 7-2. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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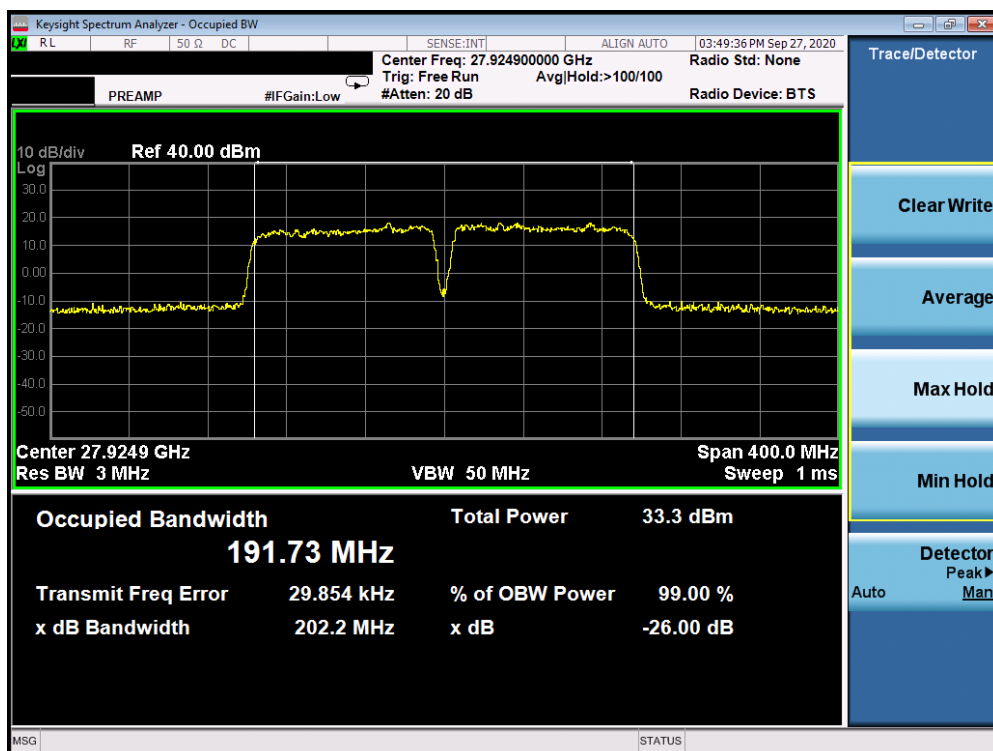


Plot 7-3. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)

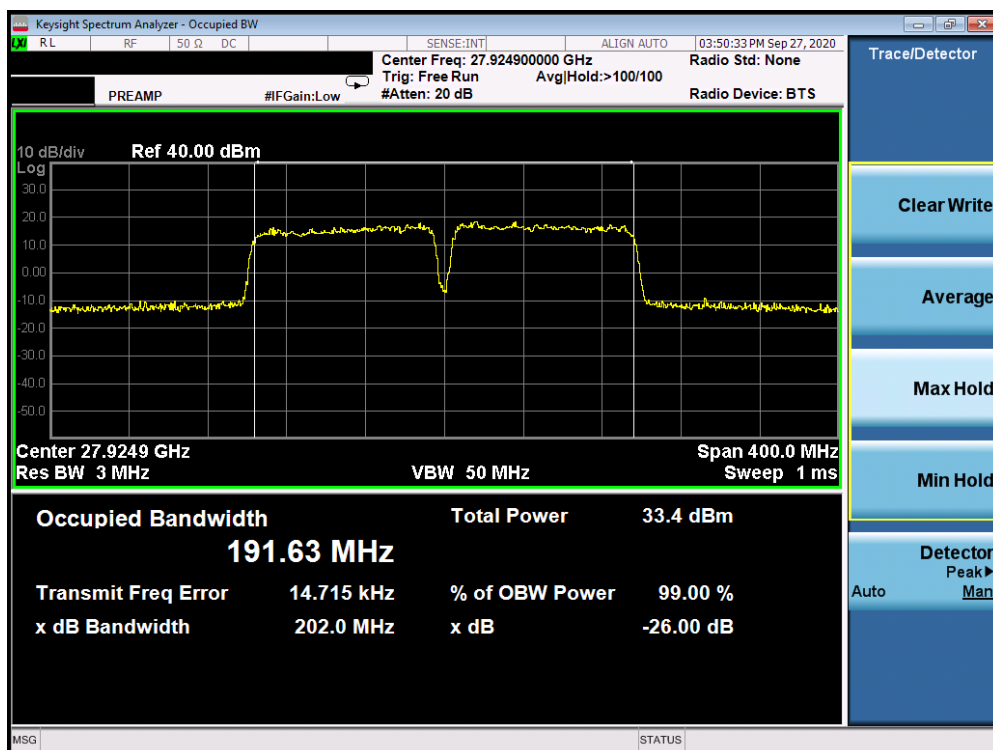


Plot 7-4. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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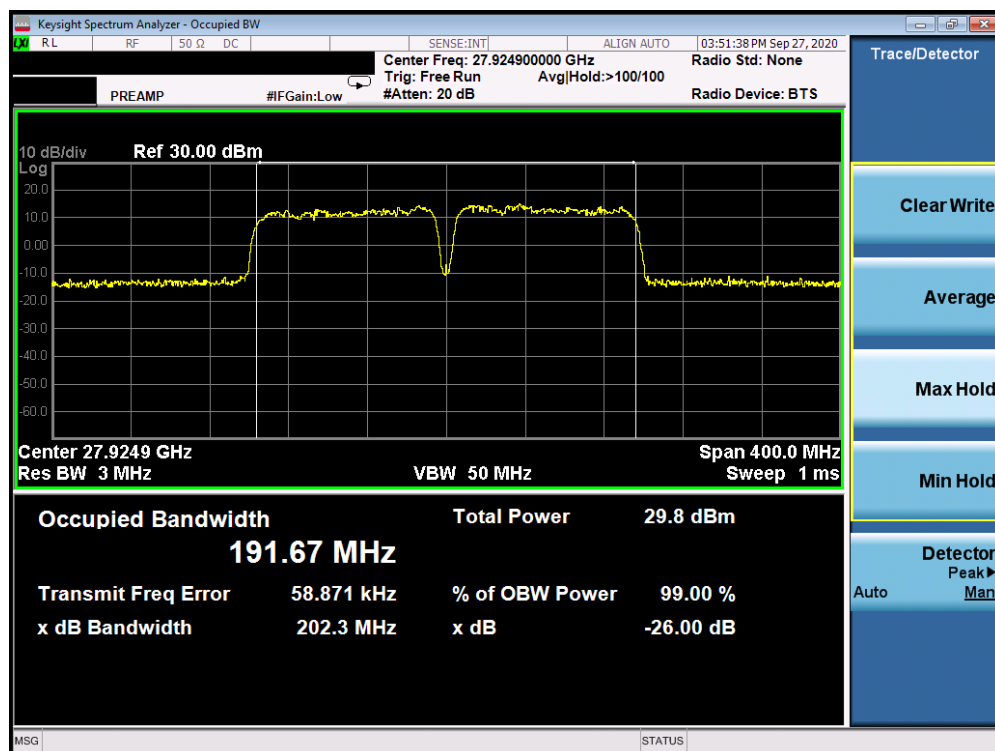


Plot 7-5. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – pi/2-BPSK – Mid Channel)

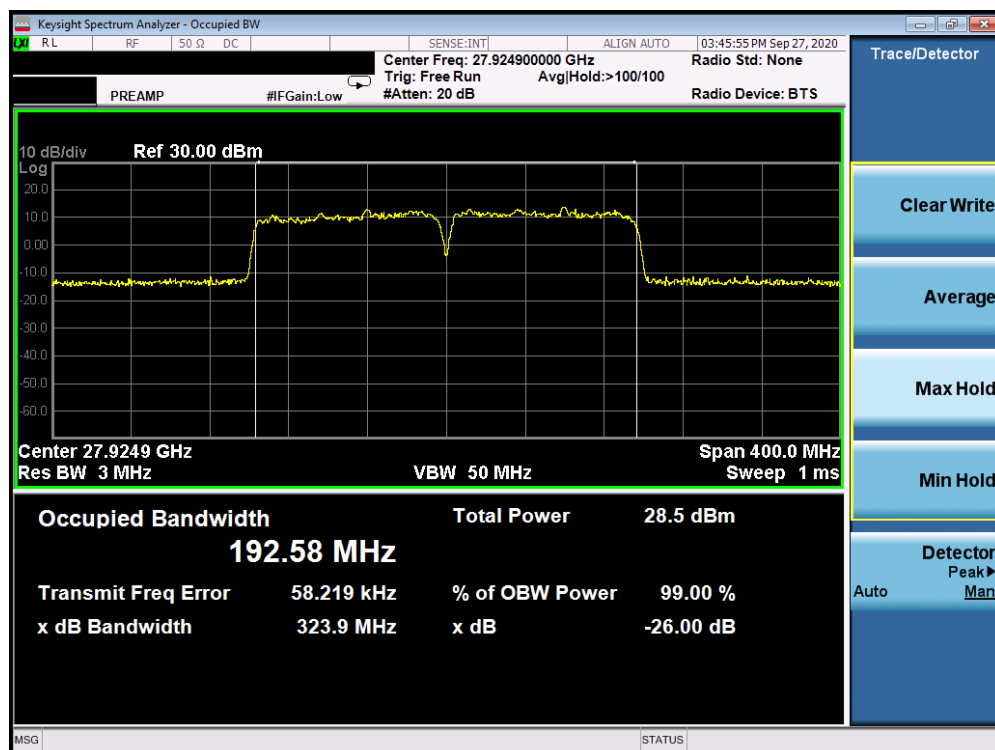


Plot 7-6. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 16 of 77

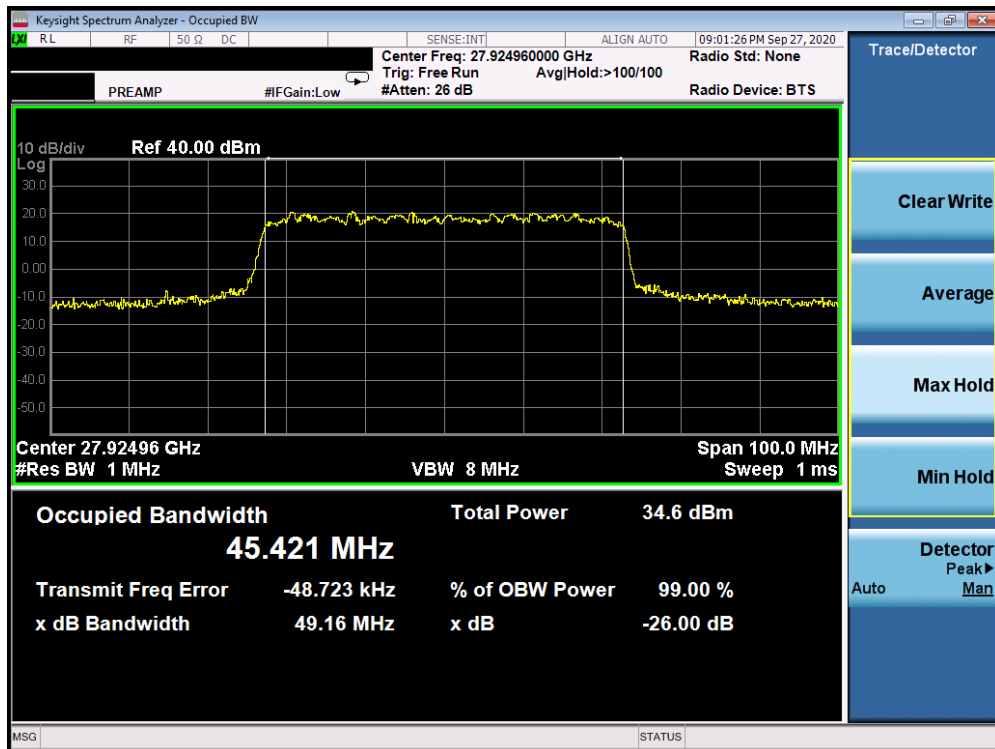


Plot 7-7. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)

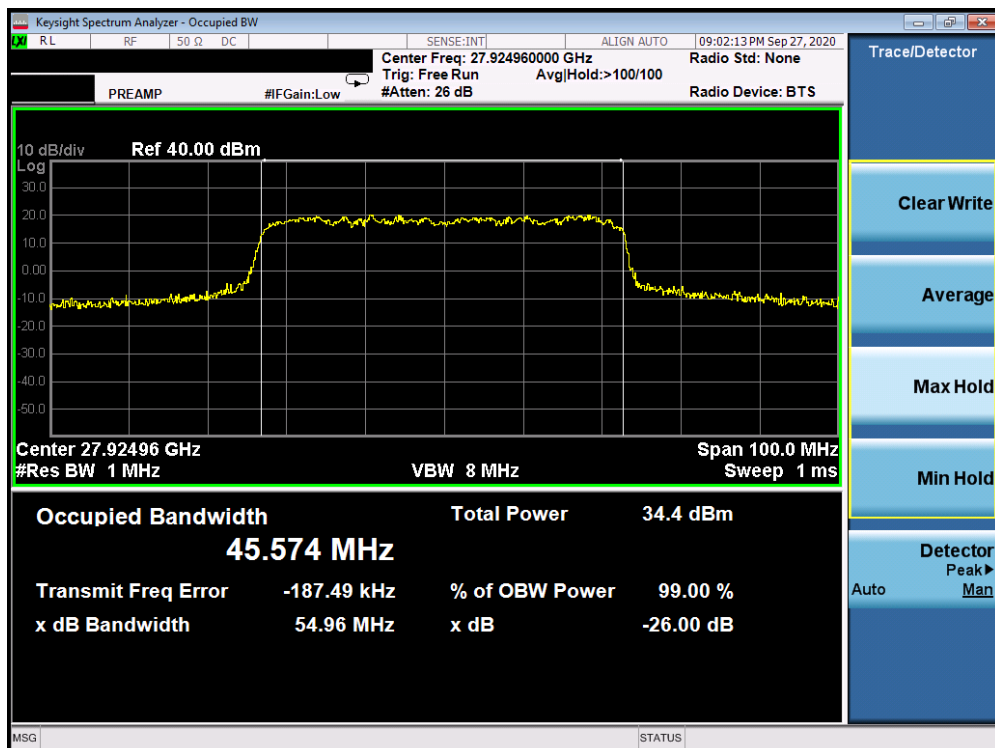


Plot 7-8. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 17 of 77

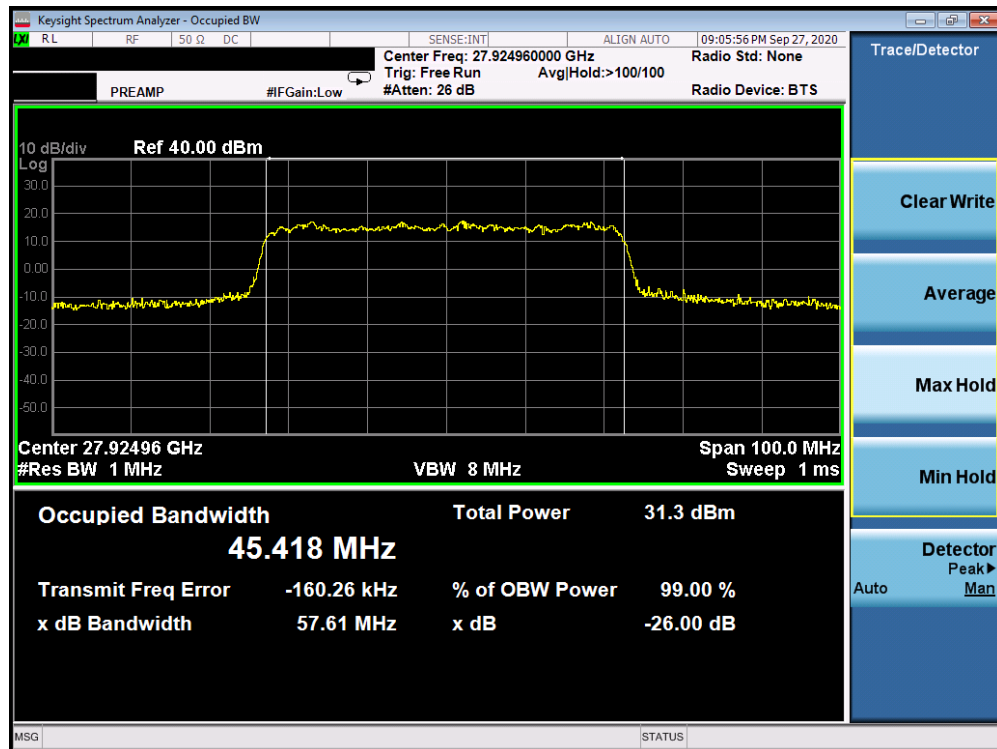


Plot 7-9. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)

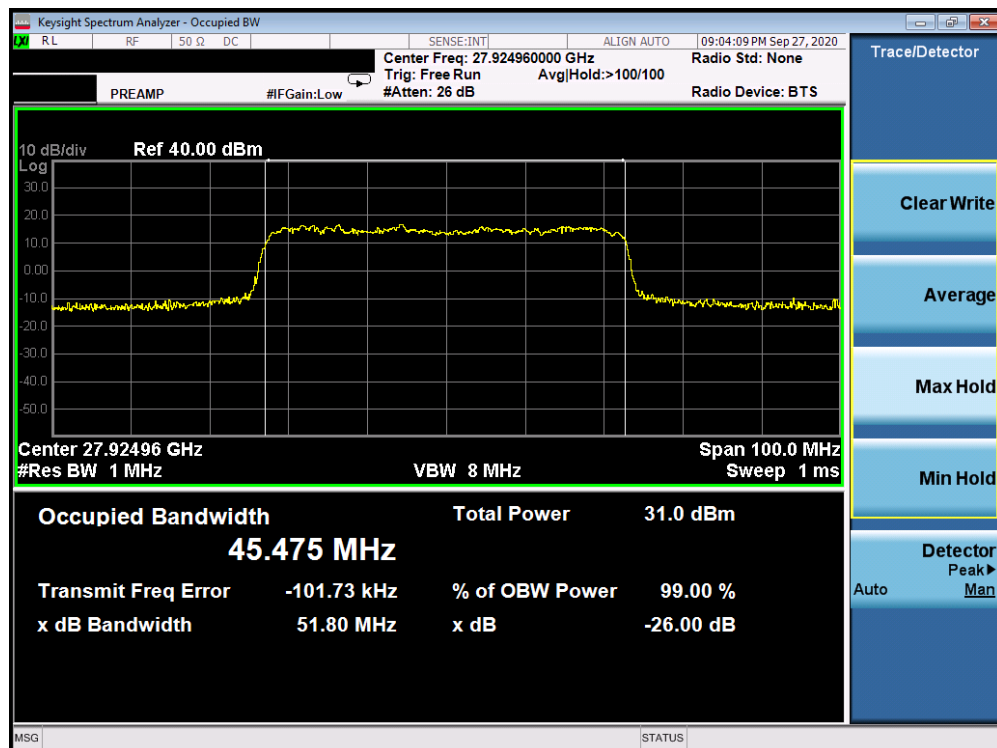


Plot 7-10. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 18 of 77

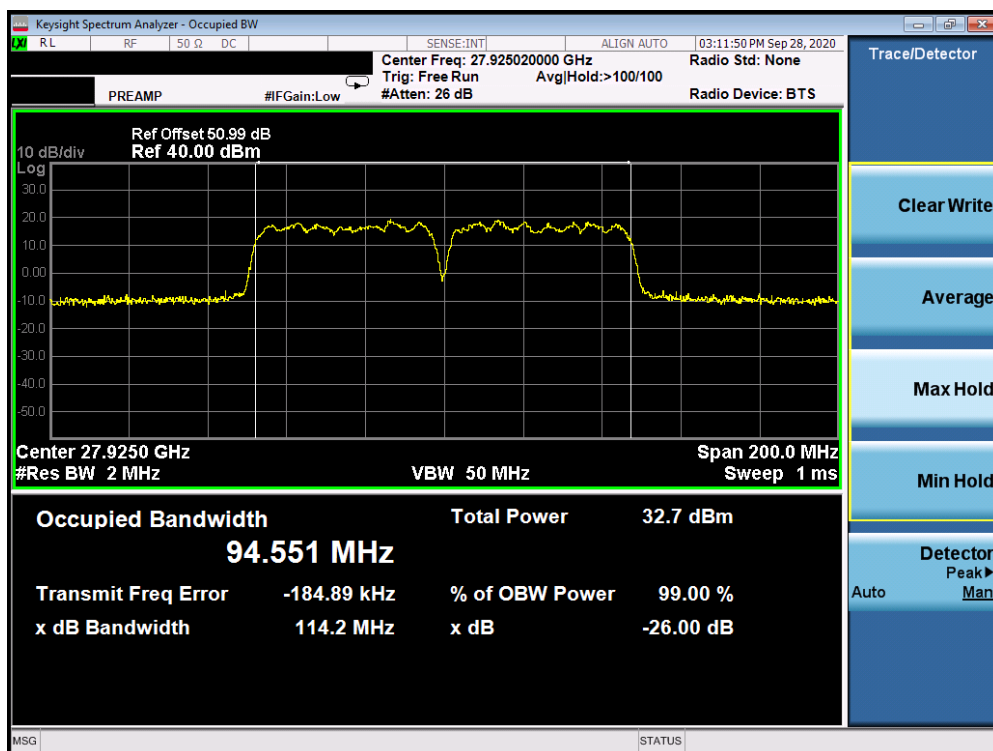


Plot 7-11. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)

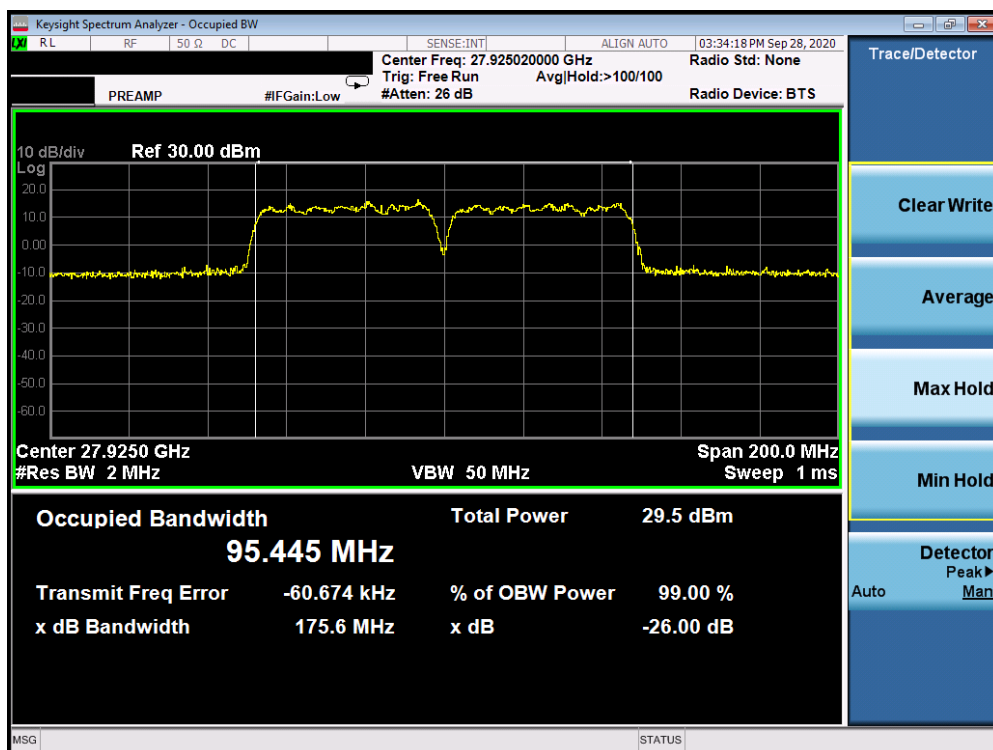


Plot 7-12. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 19 of 77

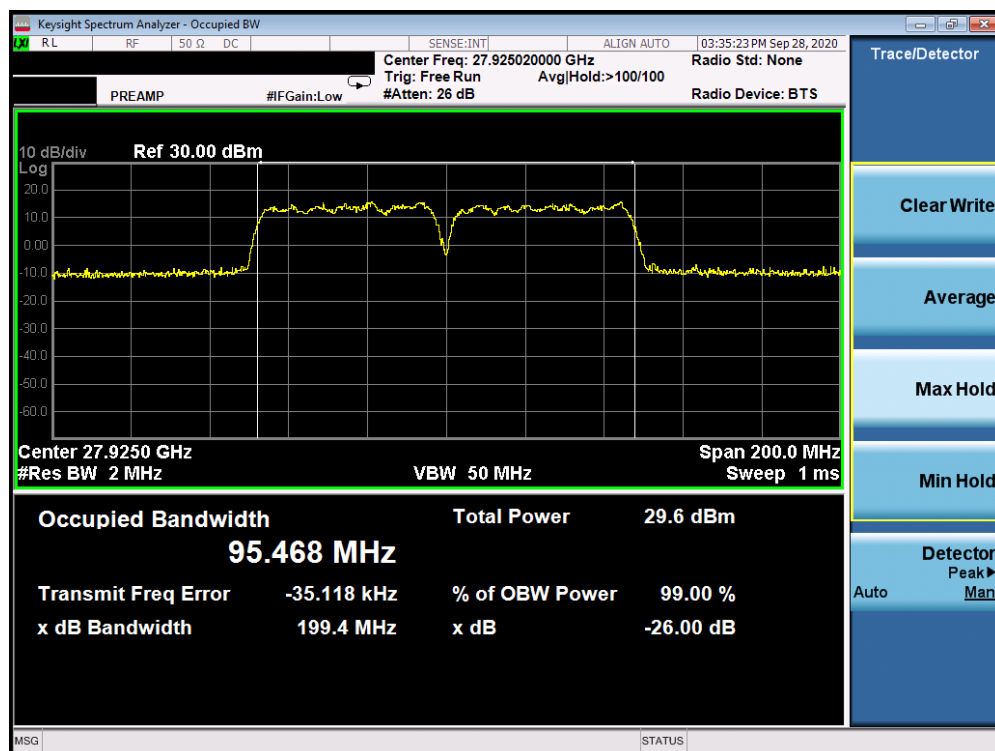


Plot 7-13. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)

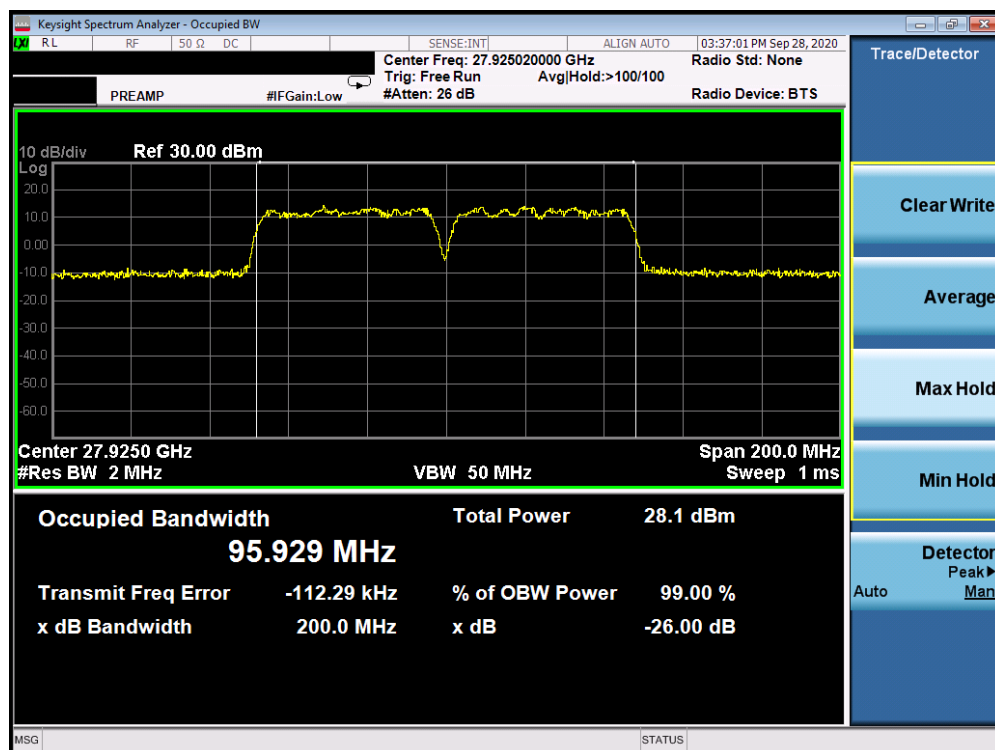


Plot 7-14. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 20 of 77



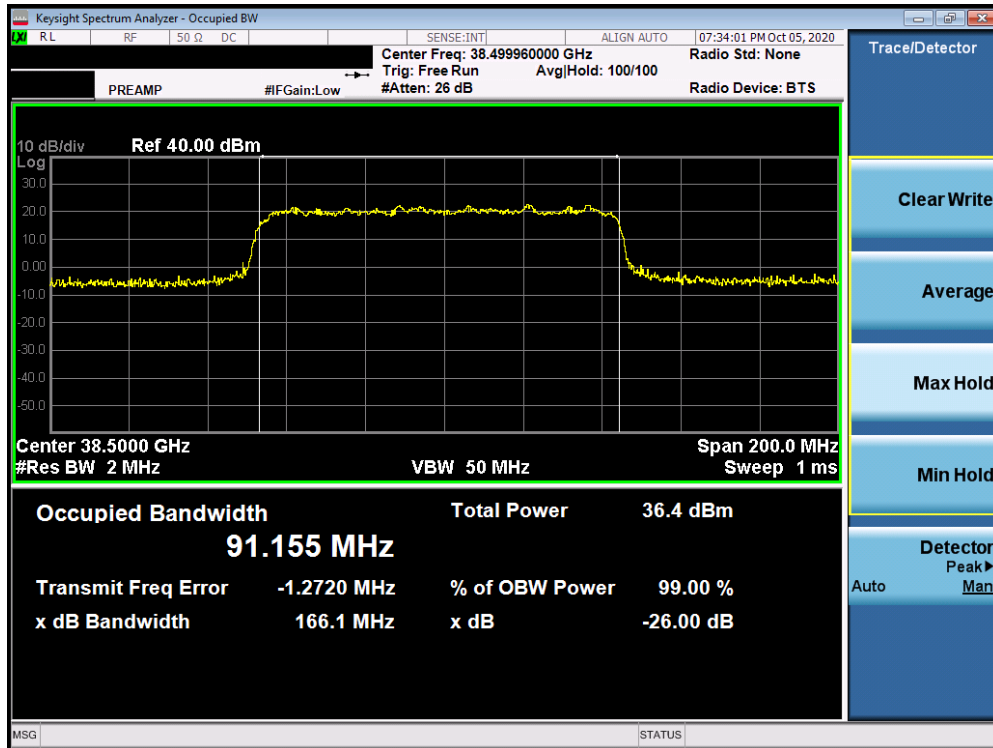
Plot 7-15. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



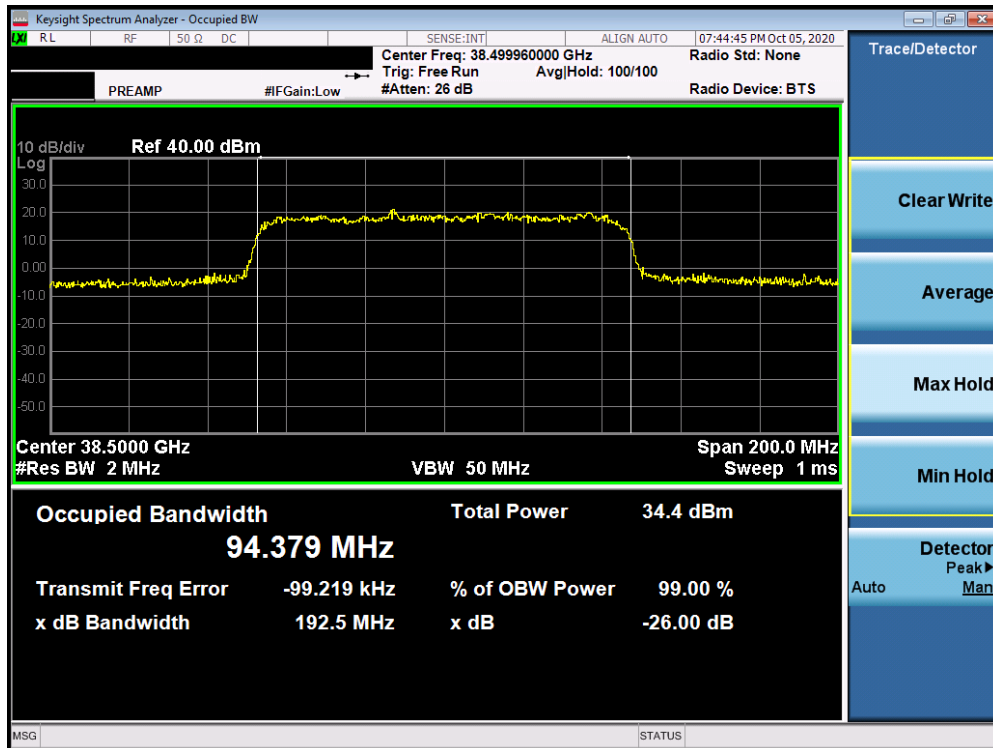
Plot 7-16. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 21 of 77

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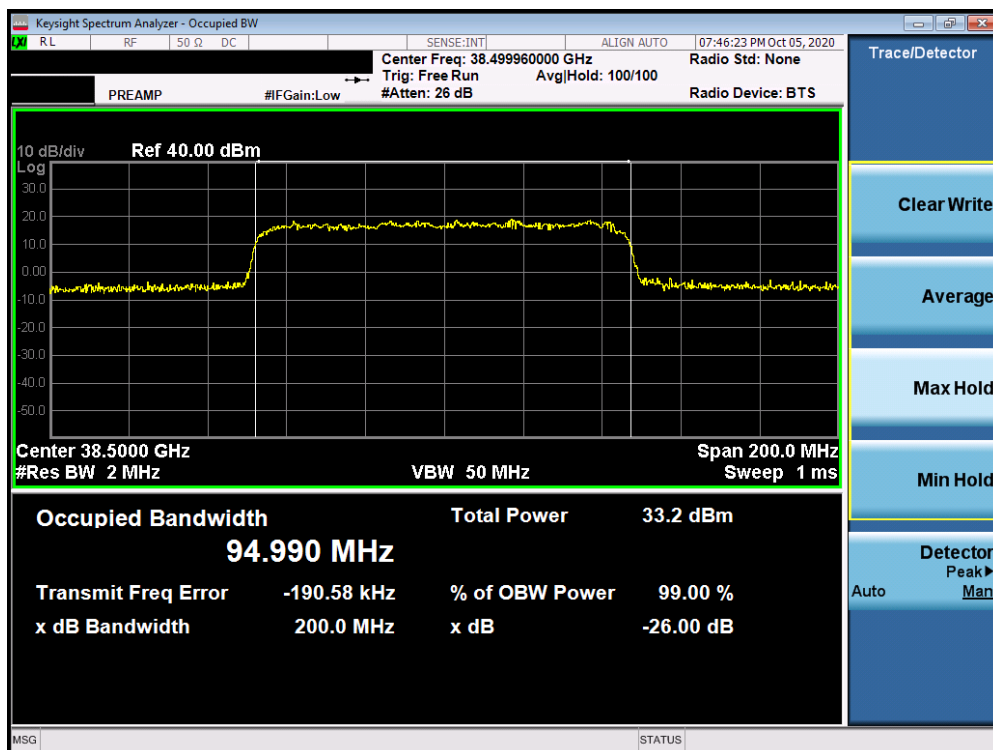


Plot 7-17. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)

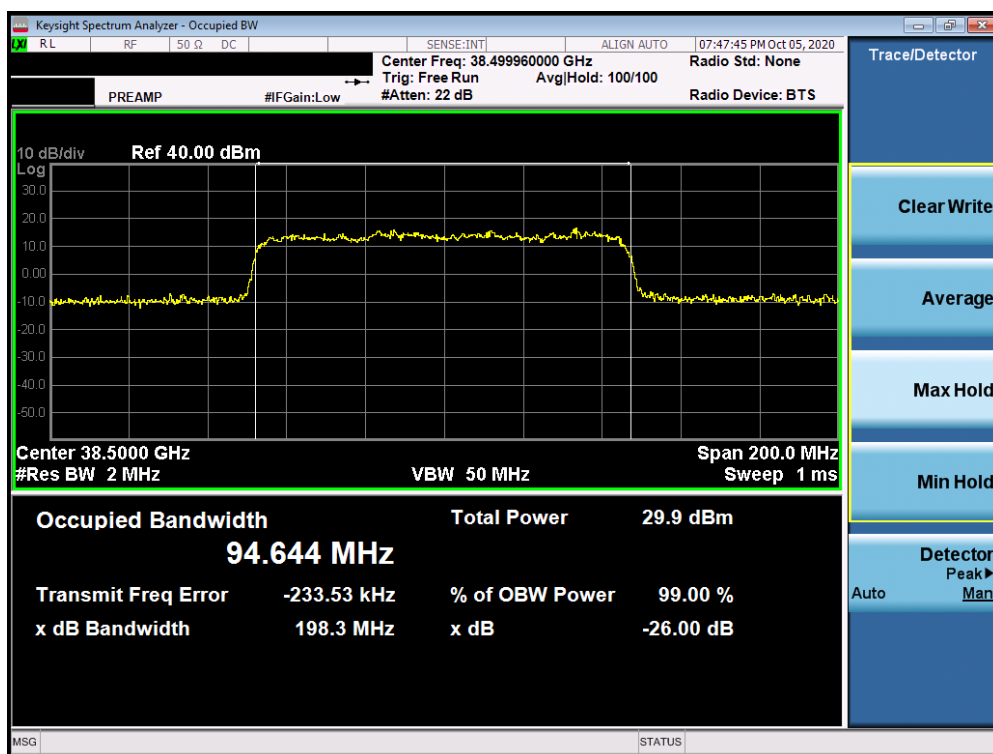


Plot 7-18. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset	Page 22 of 77

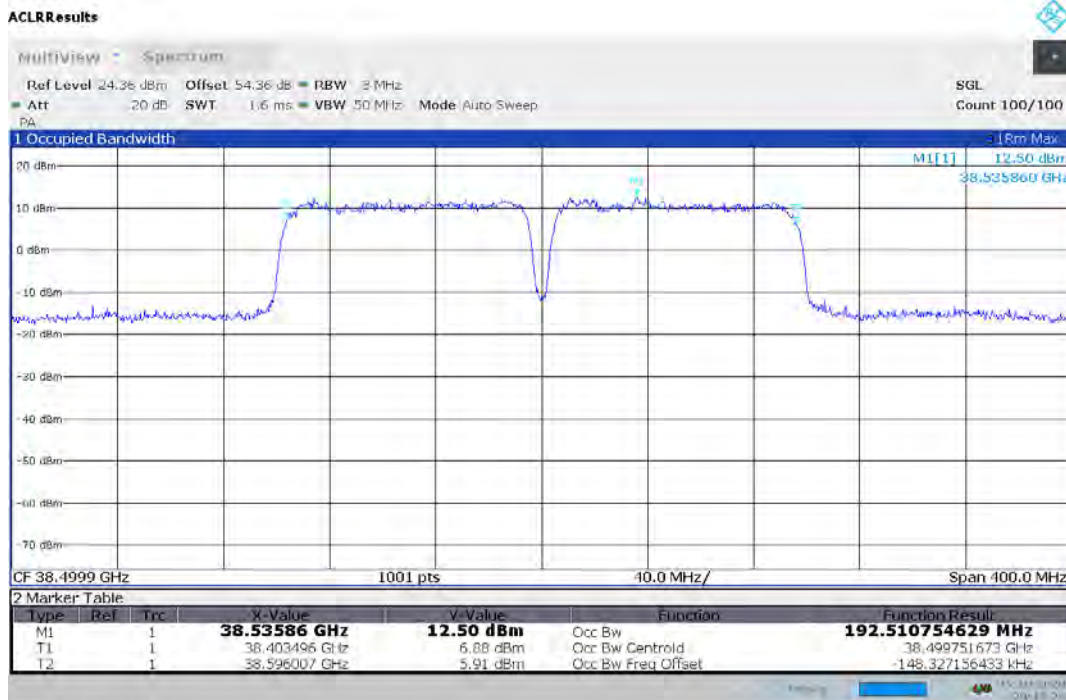


Plot 7-19. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



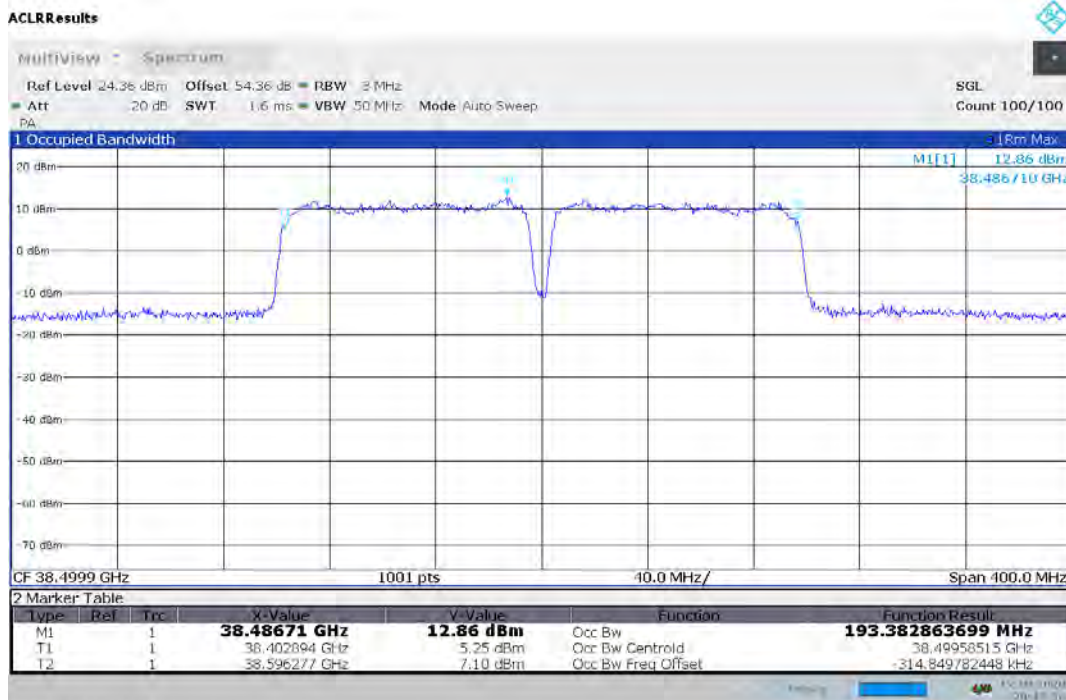
Plot 7-20. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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20:43:26 12.10.2020

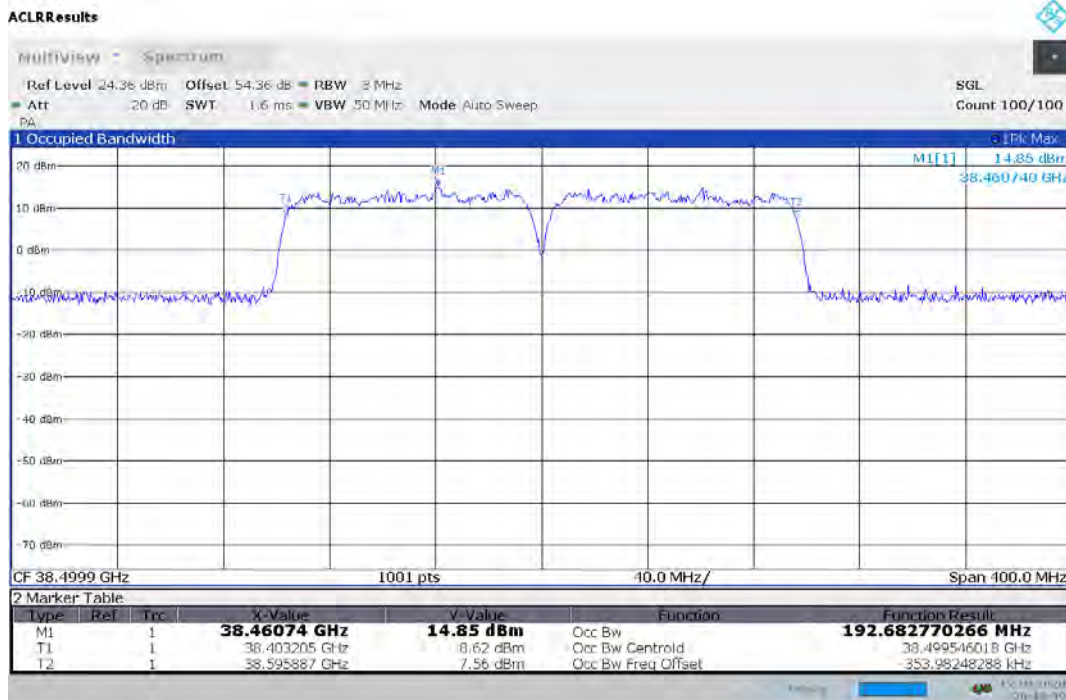
Plot 7-21. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – pi/2-BPSK – Mid Channel)



20:42:57 12.10.2020

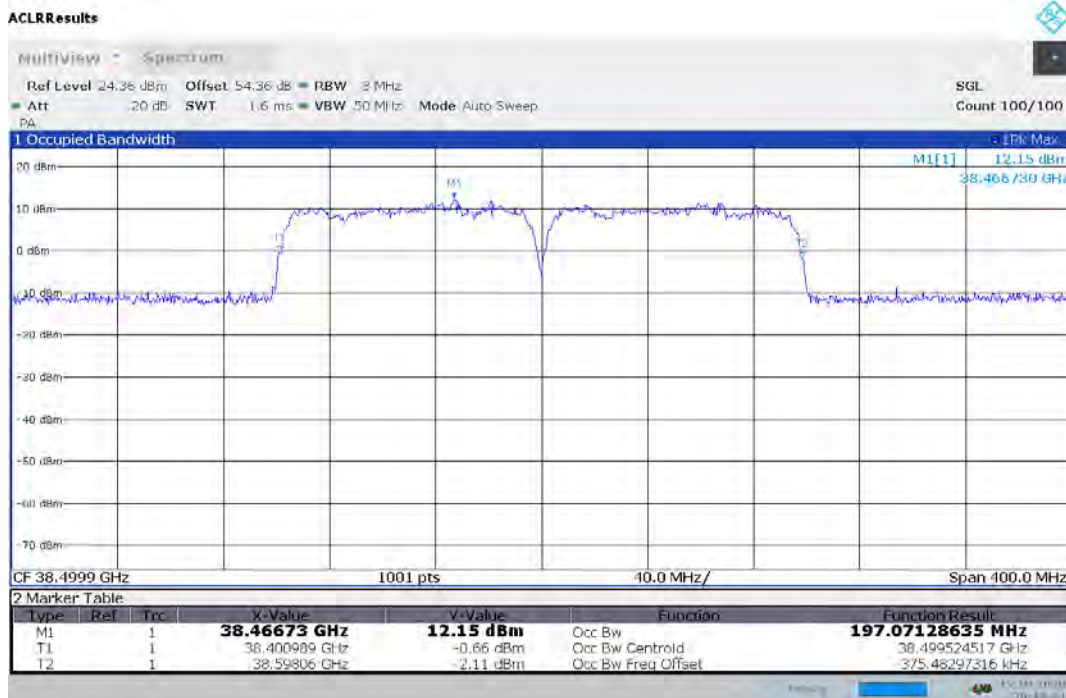
Plot 7-22. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 24 of 77



20:48:09 12.10.2020

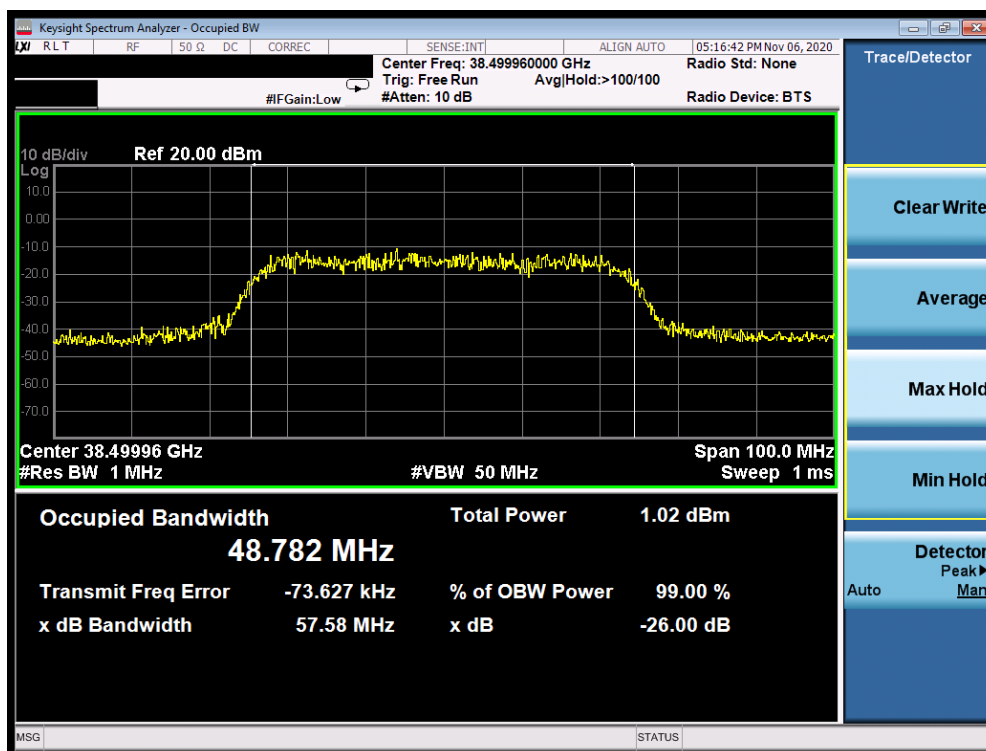
Plot 7-23. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)



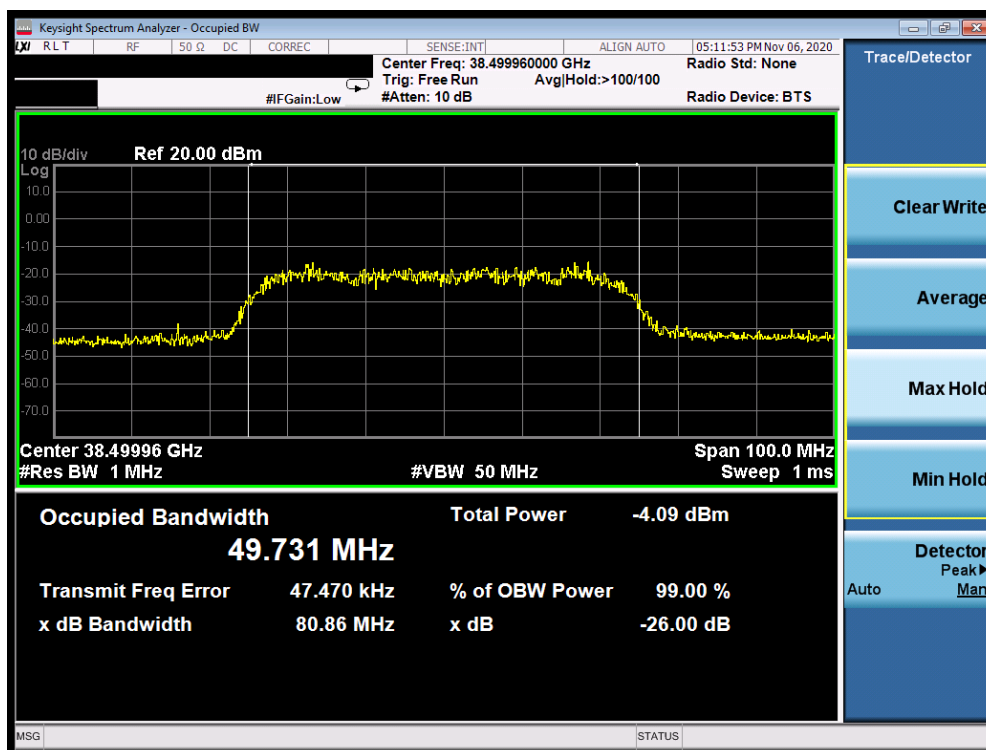
20:48:44 12.10.2020

Plot 7-24. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 25 of 77

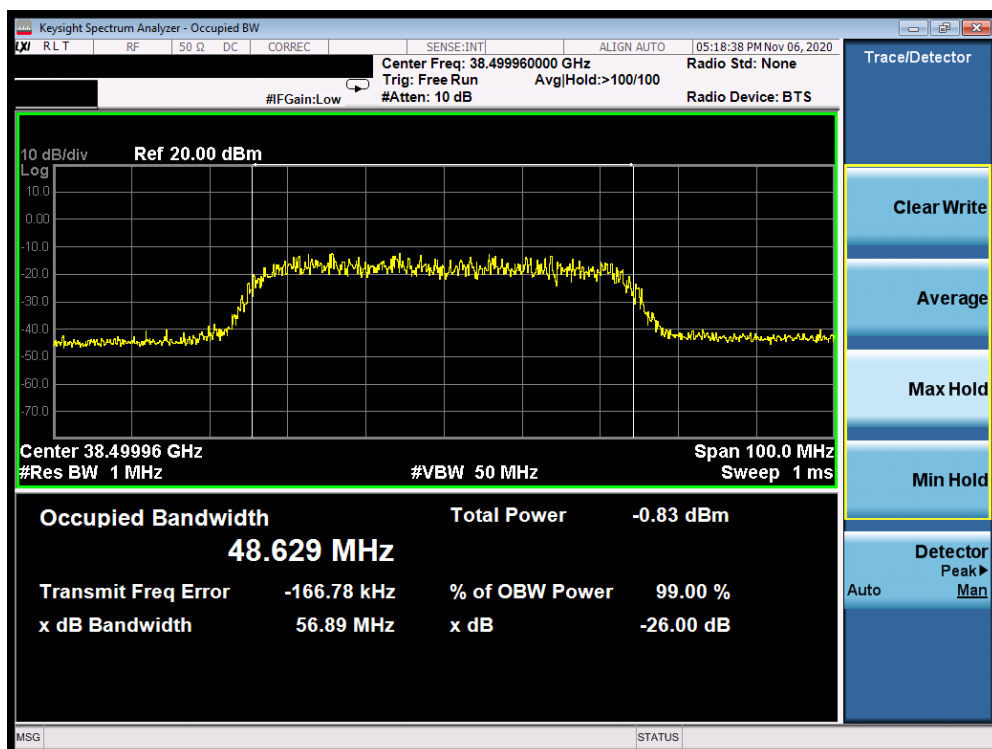


Plot 7-25. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)

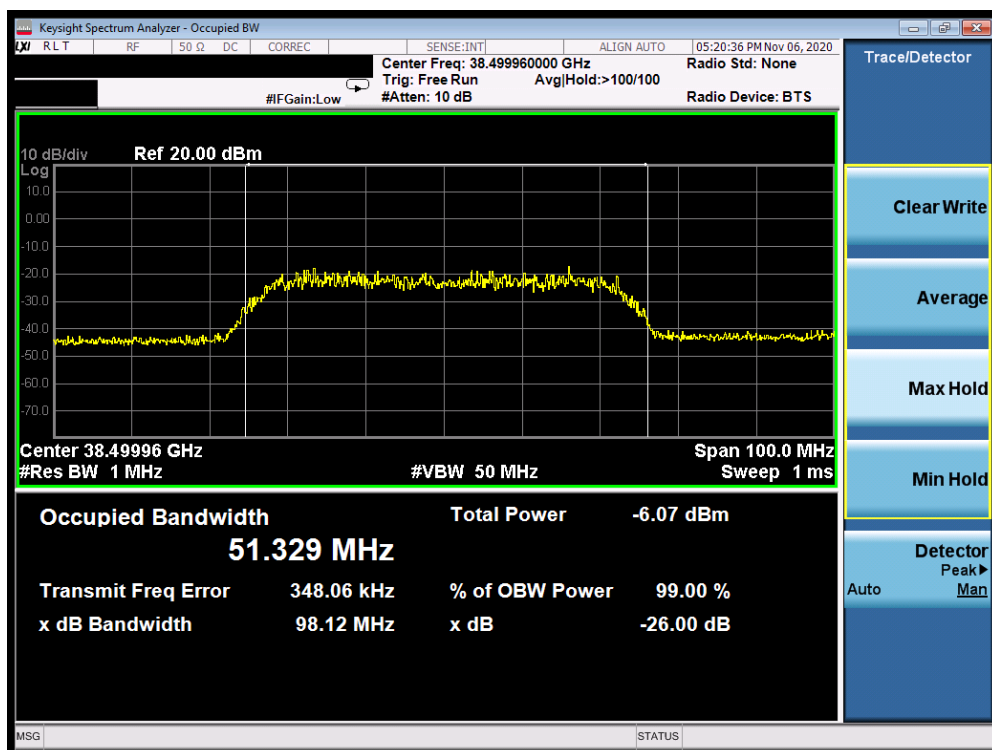


Plot 7-26. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 26 of 77

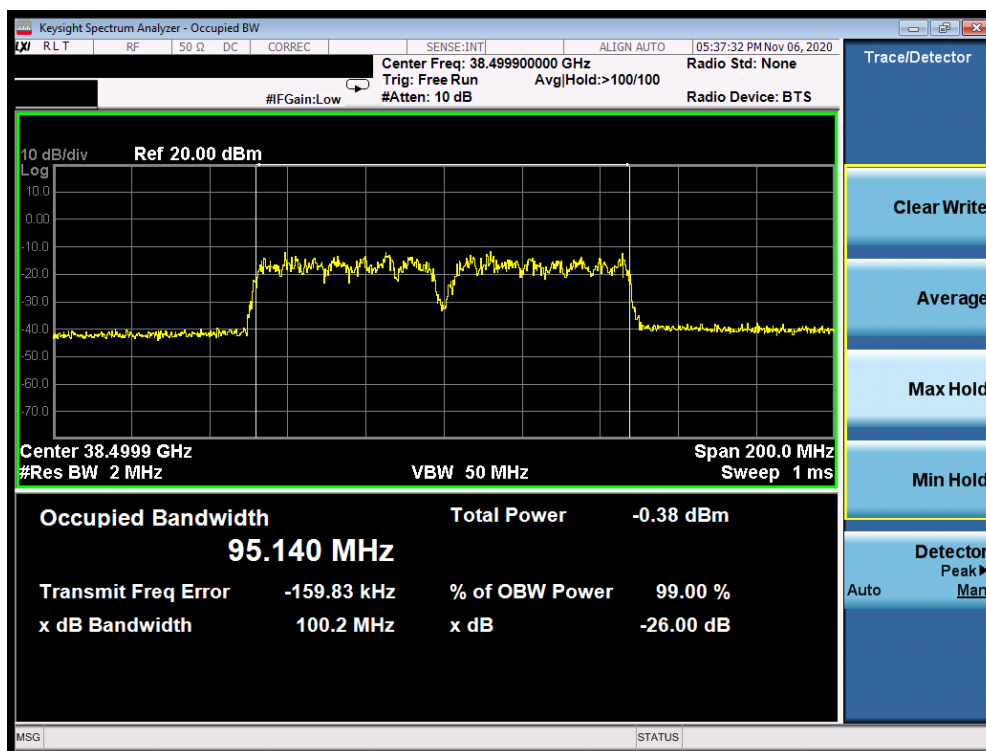


Plot 7-27. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)

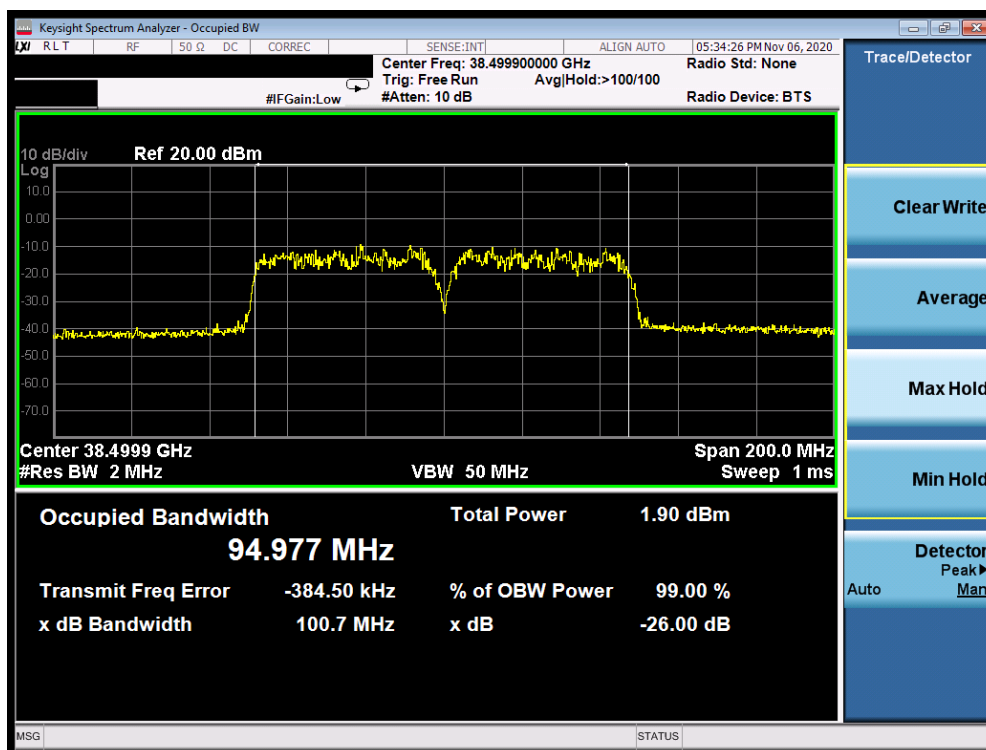


Plot 7-28. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 27 of 77

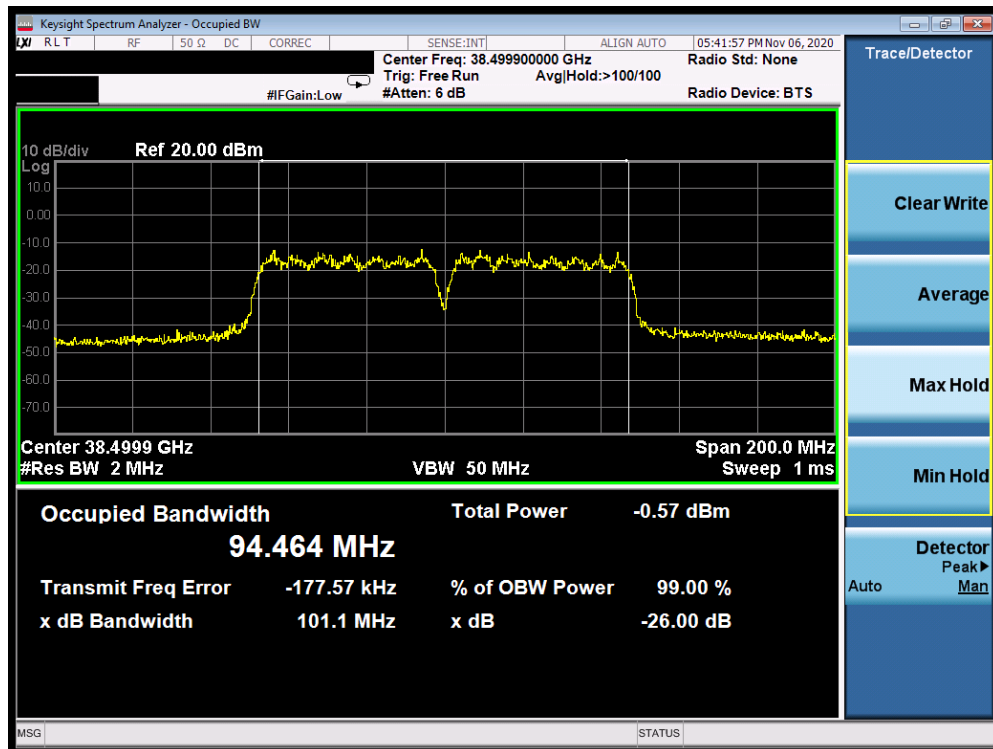


Plot 7-29. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)

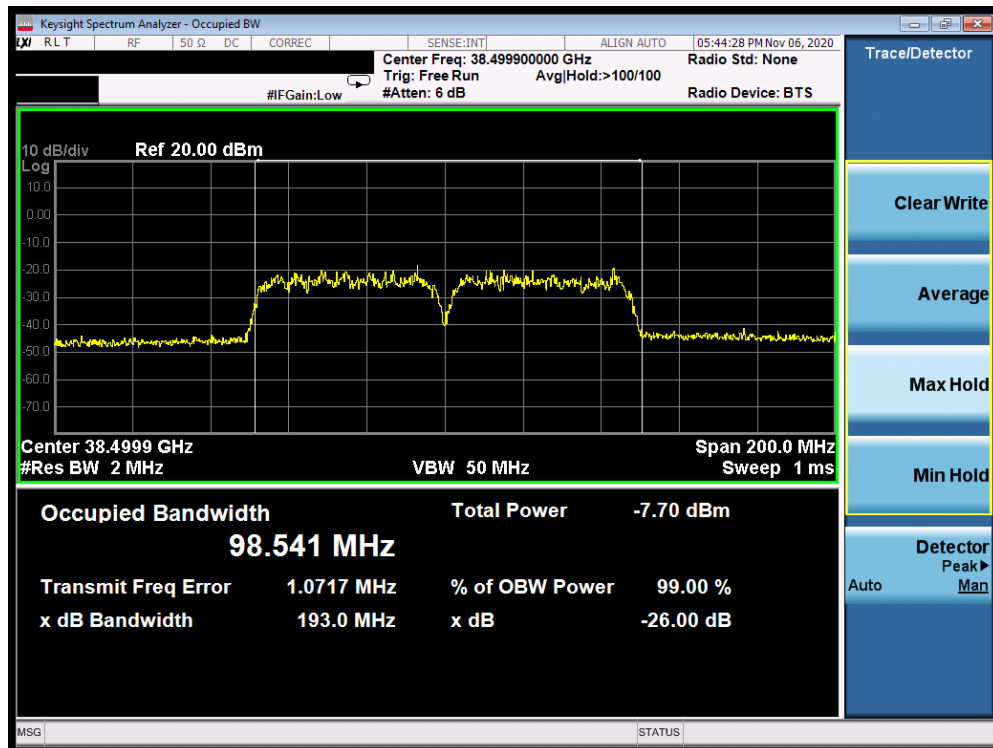


Plot 7-30. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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Plot 7-31. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



Plot 7-32. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
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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

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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.

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Band n261

Bandwidth (MHz)	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]
100	1	Low	27550.08	DFT-s-OFDM	QPSK	145	H	SISO	V	272.0	31.0	1 / 23	27.04
		Low	27550.08	DFT-s-OFDM	QPSK	18	V	SISO	H	288.0	72.0	1 / 23	28.85
		Low	27550.08	DFT-s-OFDM	QPSK	145 + 17	H + V	2Tx	H	93.0	53.0	1 / 42	29.92
		Low	27550.08	CP-OFDM	QPSK	145	H	SISO	V	272.0	31.0	1 / 23	24.65
		Low	27550.08	CP-OFDM	QPSK	18	V	SISO	H	288.0	72.0	1 / 23	26.72
		Low	27550.08	CP-OFDM	QPSK	145 + 17	H + V	MIMO	H	93.0	53.0	1 / 42	26.49
		Mid	27924.96	DFT-s-OFDM	QPSK	145 + 17	H + V	2Tx	H	94.0	54.0	1 / 42	29.02
		High	28299.96	DFT-s-OFDM	QPSK	145 + 17	H + V	2Tx	H	95.0	53.0	1 / 23	29.20
		Low	27525.00	DFT-s-OFDM	$\pi/2$ BPSK	145 + 17	H + V	2Tx	H	93.0	53.0	1 / 33	29.79
		Low	27525.00	DFT-s-OFDM	16QAM	145 + 17	H + V	2Tx	H	93.0	53.0	1 / 42	27.82
100+100	2	Low	27525.00	DFT-s-OFDM	64QAM	145 + 17	H + V	2Tx	H	93.0	53.0	1 / 33	24.98
		Low	27525.00	DFT-s-OFDM	QPSK	145 + 17	H + V	2Tx	H	338.0	258.0	66 / 0	26.80
		Low	27525.00	DFT-s-OFDM	$\pi/2$ BPSK	145 + 17	H + V	2Tx	H	338.0	258.0	66 / 0	26.83
		Low	27525.00	DFT-s-OFDM	16QAM	145 + 17	H + V	2Tx	H	338.0	258.0	66 / 0	24.92
		Low	27525.00	DFT-s-OFDM	64QAM	145 + 17	H + V	2Tx	H	338.0	258.0	66 / 0	22.88

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

Bandwidth (MHz)	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]
50	1	Low	27525.00	DFT-s-OFDM	QPSK	155	H	SISO	V	271.0	34.0	1 / 19	26.66
		Low	27525.00	DFT-s-OFDM	QPSK	18	V	SISO	H	288.0	60.0	1 / 12	28.69
		Low	27525.00	DFT-s-OFDM	QPSK	145 + 17	H + V	2Tx	H	94.0	68.0	1 / 12	30.19
		Low	27525.00	CP-OFDM	QPSK	155	H	SISO	V	271.0	34.0	1 / 19	23.46
		Low	27525.00	CP-OFDM	QPSK	18	V	SISO	H	288.0	60.0	1 / 12	25.51
		Low	27525.00	CP-OFDM	QPSK	145 + 17	H + V	MIMO	H	94.0	68.0	1 / 12	26.45
		Mid	27924.96	DFT-s-OFDM	QPSK	145 + 17	H + V	2Tx	H	91.0	59.0	1 / 12	29.89
		High	28324.92	DFT-s-OFDM	QPSK	145 + 17	H + V	2Tx	H	90.0	62.0	1 / 16	28.87
		Low	27525.00	DFT-s-OFDM	$\pi/2$ BPSK	145 + 17	H + V	2Tx	H	94.0	68.0	1 / 19	30.07
		Low	27525.00	DFT-s-OFDM	16QAM	145 + 17	H + V	2Tx	H	94.0	68.0	1 / 19	28.22
50+50	2	Low	27525.00	DFT-s-OFDM	64QAM	145 + 17	H + V	2Tx	H	94.0	68.0	1 / 16	25.89
		Mid	27924.96	DFT-s-OFDM	QPSK	145 + 17	H + V	2Tx	H	93.0	74.0	32 / 0	26.23
		Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	145 + 17	H + V	2Tx	H	93.0	74.0	32 / 0	26.20
		Mid	27924.96	DFT-s-OFDM	16QAM	145 + 17	H + V	2Tx	H	93.0	74.0	32 / 0	24.54
		Mid	27924.96	DFT-s-OFDM	64QAM	145 + 17	H + V	2Tx	H	93.0	74.0	32 / 0	22.61

Table 7-3. Ant 1 EIRP Data (Band n261 - 50MHz)

Bandwidth (MHz)	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]
100	1	Mid	27924.96	DFT-s-OFDM	QPSK	159	H	SISO	H	330.0	276.0	1 / 23	26.28
		Mid	27924.96	DFT-s-OFDM	QPSK	21	V	SISO	H	108.0	73.0	1 / 23	25.58
		Mid	27924.96	DFT-s-OFDM	QPSK	149 + 21	H + V	2Tx	V	209.0	22.0	1 / 33	29.80
		Mid	27924.96	CP-OFDM	QPSK	159	H	SISO	H	330.0	276.0	1 / 23	23.24
		Mid	27924.96	CP-OFDM	QPSK	21	V	SISO	H	108.0	73.0	1 / 23	21.64
		Mid	27924.96	CP-OFDM	QPSK	149 + 21	H + V	MIMO	V	209.0	22.0	1 / 42	25.61
		Low	27550.08	DFT-s-OFDM	QPSK	149 + 21	H + V	2Tx	V	210.0	29.0	1 / 42	29.40
		High	28299.96	DFT-s-OFDM	QPSK	158 + 30	H + V	2Tx	V	161.0	65.0	1 / 42	29.09
		Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	149 + 21	H + V	2Tx	V	209.0	22.0	1 / 33	28.49
		Mid	27924.96	DFT-s-OFDM	16QAM	149 + 21	H + V	2Tx	V	209.0	22.0	1 / 33	26.73
100+100	2	Mid	27924.96	DFT-s-OFDM	64QAM	149 + 21	H + V	2Tx	V	209.0	22.0	1 / 42	24.85
		Mid	27924.96	DFT-s-OFDM	QPSK	149 + 21	H + V	2Tx	V	212.0	28.0	66 / 0	26.05
		Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	149 + 21	H + V	2Tx	V	212.0	28.0	66 / 0	26.07
		Mid	27924.96	DFT-s-OFDM	16QAM	149 + 21	H + V	2Tx	V	212.0	28.0	66 / 0	24.44
		Mid	27924.96	DFT-s-OFDM	64QAM	149 + 21	H + V	2Tx	V	212.0	28.0	66 / 0	22.25

Table 7-4. Ant 2 EIRP Data (Band n261 - 100MHz)

Bandwidth (MHz)	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]
50	1	High	28324.92	DFT-s-OFDM	QPSK	159	H	SISO	H	330.0	276.0	1 / 12	26.55
		High	28324.92	DFT-s-OFDM	QPSK	21	V	SISO	H	108.0	73.0	1 / 12	25.85
		High	28324.92	DFT-s-OFDM	QPSK	158 + 30	H + V	2Tx	V	168.0	54.0	1 / 12	29.95
		High	28324.92	CP-OFDM	QPSK	159	H	SISO	H	330.0	276.0	1 / 12	23.51
		High	28324.92	CP-OFDM	QPSK	21	V	SISO	H	108.0	73.0	1 / 12	21.91
		High	28324.92	CP-OFDM	QPSK	158 + 30	H + V	MIMO	V	168.0	54.0	1 / 12	26.77
		Low	27525.00	DFT-s-OFDM	QPSK	149 + 21	H + V	2Tx	V	176.0	21.0	1 / 12	29.65
		Mid	27924.96	DFT-s-OFDM	QPSK	149 + 21	H + V	2Tx	V	212.0	29.0	1 / 16	29.75
		High	28324.92	DFT-s-OFDM	$\pi/2$ BPSK	158 + 30	H + V	2Tx	V	168.0	54.0	1 / 12	28.77
		High	28324.92	DFT-s-OFDM	16QAM	158 + 30	H + V	2Tx	V	168.0	54.0	1 / 12	27.26
50+50	2	High	28324.92	DFT-s-OFDM	64QAM	158 + 30	H + V	2Tx	V	168.0	54.0	1 / 12	24.28
		Mid	27924.96	DFT-s-OFDM	QPSK	158 + 30	H + V	2Tx	V	212.0	42.0	32 / 0	23.97
		Mid	27924.96	DFT-s-OFDM	$\pi/2$ BPSK	158 + 30	H + V	2Tx	V	212.0	42.0	32 / 0	23.98
		Mid	27924.96	DFT-s-OFDM	16QAM	158 + 30	H + V	2Tx	V	212.0	42.0	32 / 0	22.29
		Mid	27924.96	DFT-s-OFDM	64QAM	158 + 30	H + V	2Tx	V	212.0	42.0	32 / 0	20.34

Table 7-5. Ant 2 EIRP Data (Band n261 - 50MHz)

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Band n260

Bandwidth (MHz)	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]
100	1	Low	37050.00	DFT-s-OFDM	QPSK	146	H	SISO	H	97.0	51.0	1 / 42	28.15
		Low	37050.00	DFT-s-OFDM	QPSK	18	V	SISO	V	99.0	22.0	1 / 42	27.76
		Low	37050.00	DFT-s-OFDM	QPSK	146 + 18	H + V	2Tx	V	104.0	117.0	1 / 23	30.23
		Low	37050.00	CP-OFDM	QPSK	146	H	SISO	H	97.0	51.0	1 / 42	25.59
		Low	37050.00	CP-OFDM	QPSK	18	V	SISO	V	99.0	22.0	1 / 42	24.82
		Low	37050.00	CP-OFDM	QPSK	146 + 18	H + V	MIMO	V	104.0	117.0	1 / 42	27.25
		Mid	38499.96	DFT-s-OFDM	QPSK	146 + 18	H + V	2Tx	V	103.0	114.0	1 / 42	29.93
		High	39949.92	DFT-s-OFDM	QPSK	146 + 18	H + V	2Tx	V	101.0	114.0	1 / 23	29.26
		Low	37050.00	DFT-s-OFDM	$\pi/2$ BPSK	146 + 18	H + V	2Tx	V	104.0	117.0	1 / 23	30.14
		Low	37050.00	DFT-s-OFDM	16QAM	146 + 18	H + V	2Tx	V	104.0	117.0	1 / 23	29.23
100+100	2	Low	37050.00	DFT-s-OFDM	64QAM	146 + 18	H + V	2Tx	V	104.0	117.0	1 / 42	27.49
		Mid	38499.96	DFT-s-OFDM	QPSK	146 + 18	H + V	2Tx	V	101.0	115.0	66 / 0	24.41
		Mid	38499.96	DFT-s-OFDM	$\pi/2$ BPSK	146 + 18	H + V	2Tx	V	101.0	115.0	66 / 0	24.39
		Mid	38499.96	DFT-s-OFDM	16QAM	146 + 18	H + V	2Tx	V	101.0	115.0	66 / 0	22.94
		Mid	38499.96	DFT-s-OFDM	64QAM	146 + 18	H + V	2Tx	V	101.0	115.0	66 / 0	20.98

Table 7-6. Ant 1 EIRP Data (Band n260 - 100MHz)

Bandwidth (MHz)	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]
50	1	Low	37025.04	DFT-s-OFDM	QPSK	146	H	SISO	H	95.0	51.0	1 / 19	27.28
		Low	37025.04	DFT-s-OFDM	QPSK	18	V	SISO	V	99.0	22.0	1 / 19	27.24
		Low	37025.04	DFT-s-OFDM	QPSK	146 + 18	H + V	2Tx	V	283.0	116.0	1 / 19	30.23
		Low	37025.04	CP-OFDM	QPSK	146	H	SISO	H	95.0	51.0	1 / 19	24.20
		Low	37025.04	CP-OFDM	QPSK	18	V	SISO	V	99.0	22.0	1 / 19	23.87
		Low	37025.04	CP-OFDM	QPSK	146 + 18	H + V	MIMO	V	283.0	116.0	1 / 19	26.81
		Mid	38499.96	DFT-s-OFDM	QPSK	146 + 18	H + V	2Tx	V	272.0	108.0	1 / 12	29.59
		High	39975.00	DFT-s-OFDM	QPSK	146 + 18	H + V	2Tx	V	280.0	113.0	1 / 12	30.15
		Low	37025.04	DFT-s-OFDM	$\pi/2$ BPSK	146 + 18	H + V	2Tx	V	283.0	116.0	1 / 19	29.60
		Low	37025.04	DFT-s-OFDM	16QAM	146 + 18	H + V	2Tx	V	283.0	116.0	1 / 19	28.68
50+50	2	Low	37025.04	DFT-s-OFDM	64QAM	146 + 18	H + V	2Tx	V	283.0	116.0	1 / 19	26.91
		Low	37025.04	DFT-s-OFDM	QPSK	146 + 18	H + V	2Tx	V	280.0	49.0	32 / 0	24.07
		Low	37025.04	DFT-s-OFDM	$\pi/2$ BPSK	146 + 18	H + V	2Tx	V	280.0	49.0	32 / 0	24.15
		Low	37025.04	DFT-s-OFDM	16QAM	146 + 18	H + V	2Tx	V	280.0	49.0	32 / 0	22.53
		Low	37025.04	DFT-s-OFDM	64QAM	146 + 18	H + V	2Tx	V	280.0	49.0	32 / 0	20.75

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

Bandwidth (MHz)	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]
100	1	Low	37050.00	DFT-s-OFDM	QPSK	159	H	SISO	H	269.0	322.0	1 / 23	26.73
		Low	37050.00	DFT-s-OFDM	QPSK	22	V	SISO	V	252.0	339.0	1 / 23	25.43
		Low	37050.00	DFT-s-OFDM	QPSK	159 + 31	H + V	2Tx	H	158.0	256.0	1 / 42	28.64
		Low	37050.00	CP-OFDM	QPSK	159	H	SISO	H	269.0	322.0	1 / 23	23.54
		Low	37050.00	CP-OFDM	QPSK	22	V	SISO	V	252.0	339.0	1 / 23	23.78
		Low	37050.00	CP-OFDM	QPSK	159 + 31	H + V	MIMO	H	158.0	256.0	1 / 42	24.99
		Mid	38499.96	DFT-s-OFDM	QPSK	159 + 31	H + V	2Tx	H	165.0	231.0	1 / 23	28.37
		High	39949.92	DFT-s-OFDM	QPSK	159 + 31	H + V	2Tx	H	153.0	230.0	1 / 23	26.15
		Low	37050.00	DFT-s-OFDM	$\pi/2$ BPSK	159 + 31	H + V	2Tx	H	158.0	256.0	1 / 42	28.48
		Low	37050.00	DFT-s-OFDM	16QAM	159 + 31	H + V	2Tx	H	158.0	256.0	1 / 42	26.07
100+100	2	Low	37050.00	DFT-s-OFDM	64QAM	159 + 31	H + V	2Tx	H	158.0	256.0	1 / 42	24.92
		Low	37050.00	DFT-s-OFDM	QPSK	159 + 31	H + V	2Tx	H	156.0	254.0	66 / 0	22.18
		Low	37050.00	DFT-s-OFDM	$\pi/2$ BPSK	159 + 31	H + V	2Tx	H	156.0	254.0	66 / 0	22.35
		Low	37050.00	DFT-s-OFDM	16QAM	159 + 31	H + V	2Tx	H	156.0	254.0	66 / 0	20.37
		Low	37050.00	DFT-s-OFDM	64QAM	159 + 31	H + V	2Tx	H	156.0	254.0	66 / 0	18.34

Table 7-8. Ant 2 EIRP Data (Band n260 - 100MHz)

Bandwidth (MHz)	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]
50	1	Low	37025.04	DFT-s-OFDM	QPSK	159	H	SISO	H	269.0	322.0	1 / 19	26.60
		Low	37025.04	DFT-s-OFDM	QPSK	22	V	SISO	V	252.0	335.0	1 / 19	25.24
		Low	37025.04	DFT-s-OFDM	QPSK	159 + 31	H + V	2Tx	V	156.0	253.0	1 / 19	28.88
		Low	37025.04	CP-OFDM	QPSK	159	H	SISO	H	269.0	322.0	1 / 19	23.66
		Low	37025.04	CP-OFDM	QPSK	22	V	SISO	V	252.0	335.0	1 / 19	22.88
		Low	37025.04	CP-OFDM	QPSK	159 + 31	H + V	MIMO	V	156.0	253.0	1 / 19	25.21
		Mid	38499.96	DFT-s-OFDM	QPSK	159 + 31	H + V	2Tx	V	169.0	341.0	1 / 12	28.83
		High	39975.00	DFT-s-OFDM	QPSK	159 + 31	H + V	2Tx	V	170.0	348.0	1 / 12	27.27
		Low	37025.04	DFT-s-OFDM	$\pi/2$ BPSK	159 + 31	H + V	2Tx	V	156.0	253.0	1 / 19	28.79
		Low	37025.04	DFT-s-OFDM	16QAM	159 + 31	H + V	2Tx	V	156.0	253.0	1 / 19	26.85
50+50	2	Low	37025.04	DFT-s-OFDM	64QAM	159 + 31	H + V	2Tx	V	156.0	253.0	1 / 19	25.09
		Low	37025.04	DFT-s-OFDM	QPSK	159 + 31	H + V	2Tx	V	157.0	254.0	32 / 0	20.89
		Low	37025.04	DFT-s-OFDM	$\pi/2$ BPSK	159 + 31	H + V	2Tx	V	157.0	254.0	32 / 0	20.74
		Low	37025.04	DFT-s-OFDM	16QAM	159 + 31	H + V	2Tx	V	157.0	254.0	32 / 0	18.81
		Low	37025.04	DFT-s-OFDM	64QAM	159 + 31	H + V	2Tx	V	157.0	254.0	32 / 0	16.67

Table 7-9. Ant 2 EIRP Data (Band n260 - 50MHz)

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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: $\text{EIRP (dBm)} = \text{E (dB}\mu\text{V/m)} + 20\log(\text{D}) - 104.8$; where D is the measurement distance (in the far field region) in m. The field strength E is calculated $\text{E (dB}\mu\text{V/m)} = \text{Spectrum Analyzer Level (dBm)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + \text{Harmonic Mixer Conversion Loss (dB)} + 107$. 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.

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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 7-10. 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) 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.

Spurious Emissions EIRP Sample Calculation

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.

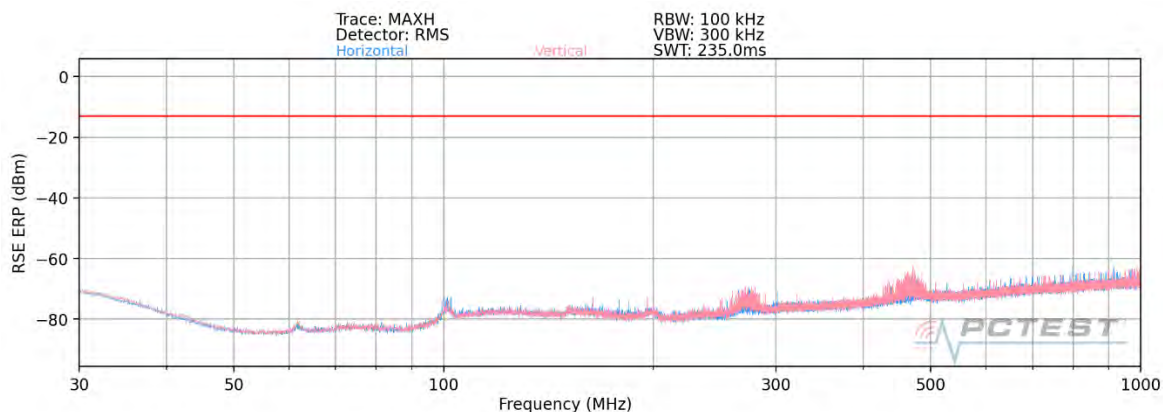
RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Note: Harmonic Mixer Conversion Loss only applies to RSE measurements > 40 GHz where harmonic mixers were used.

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Band n261 – Ant 1

30MHz - 1GHz

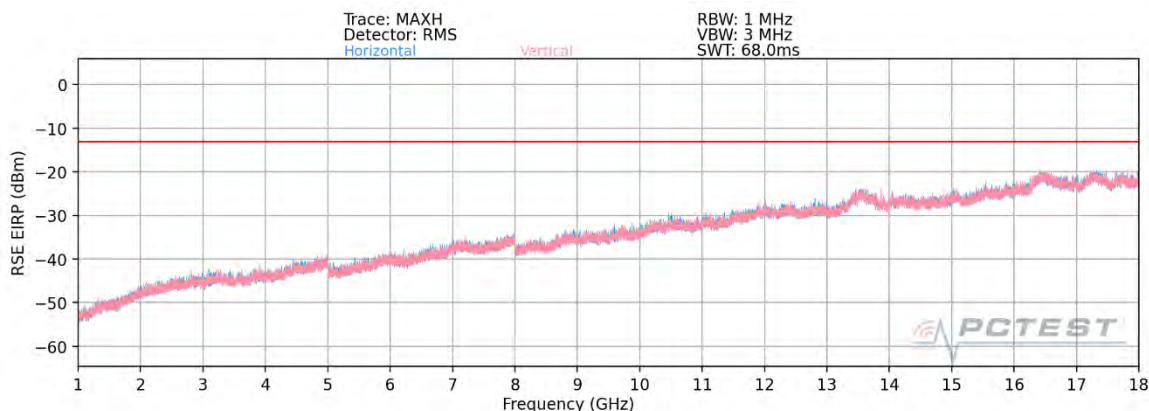


Plot 7-33. Ant 1 - n261 Radiated Spurious Plot

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
61.22	Low	50	2Tx	QPSK	V	103	118	-79.84	-13.00	-66.84
61.25	Mid	50	2Tx	QPSK	V	94	115	-79.91	-13.00	-66.91
62.03	High	50	2Tx	QPSK	V	92	115	-79.22	-13.00	-66.22

Table 7-11. Ant 1 - Spurious Emissions Table (30MHz - 1GHz)

1GHz - 18GHz



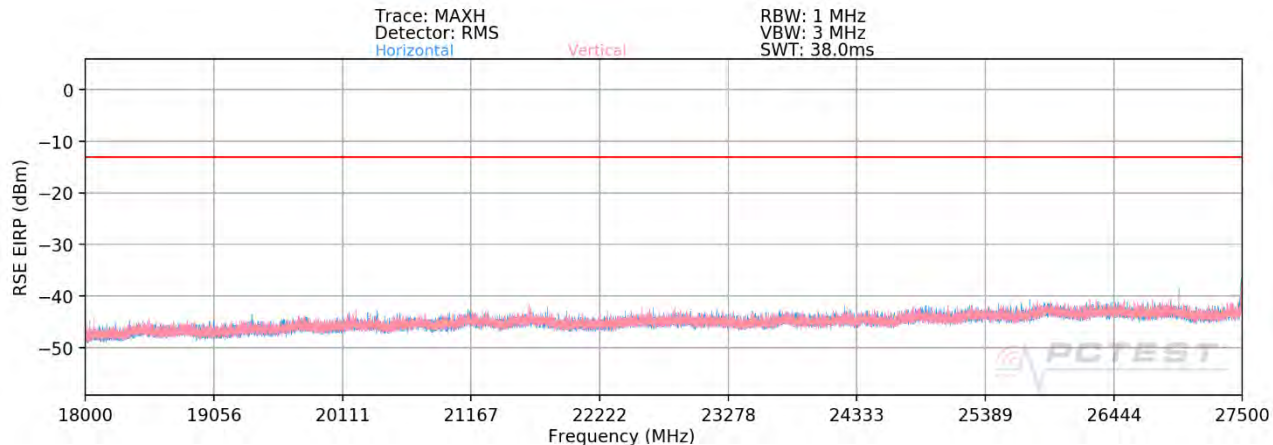
Plot 7-34. Ant 1 - n261 Radiated Spurious Plot

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8617.16	Low	50	2Tx	QPSK	H	287	184	-44.82	-13.00	-31.82
8448.83	Mid	50	2Tx	QPSK	H	285	160	-45.06	-13.00	-32.06
8837.52	High	50	2Tx	QPSK	H	292	164	-45.18	-13.00	-32.18

Table 7-12. Ant 1 - Spurious Emissions Table (1GHz - 18GHz)

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18GHz - 27.5GHz

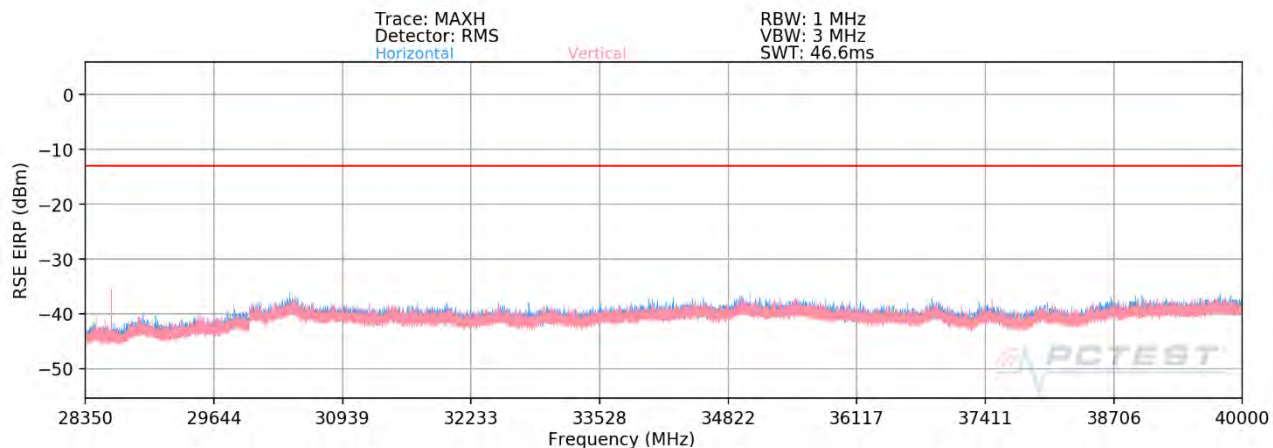


Plot 7-35. Ant 1 - n261 Radiated Spurious Plot

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]
27222.76	Low	50	2Tx	QPSK	V	92	51	-24.18	-13.00	-11.18
27375.32	Mid	50	2Tx	QPSK	V	91	55	-26.39	-13.00	-13.39
27404.80	High	50	2Tx	QPSK	V	91	63	-28.06	-13.00	-15.06

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

28.35GHz - 40GHz



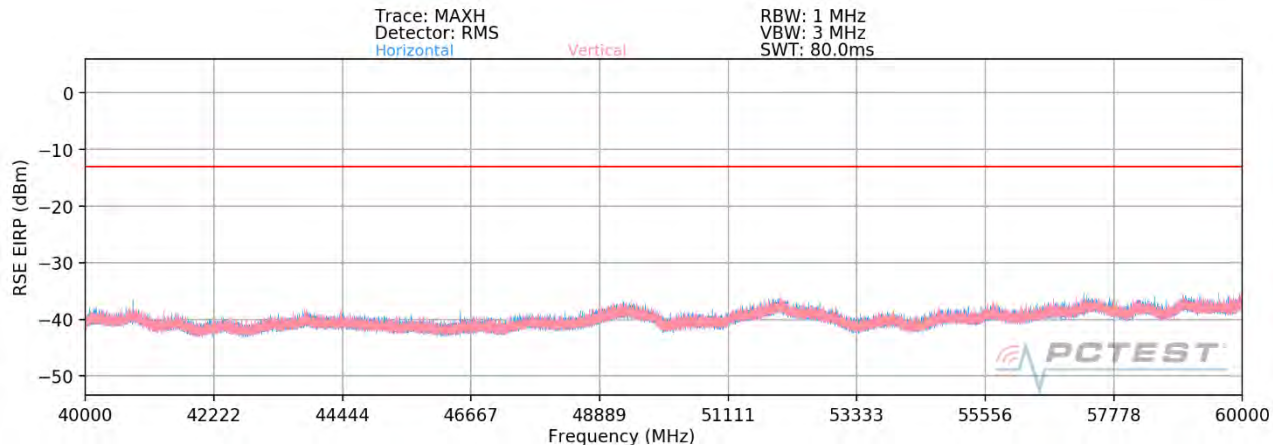
Plot 7-36. Ant 1 - n261 Radiated Spurious Plot

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]
28610.74	Low	50	2Tx	QPSK	V	95	65	-27.22	-13.00	-14.22
29173.46	Mid	50	2Tx	QPSK	V	97	70	-27.33	-13.00	-14.33
29740.69	High	50	2Tx	QPSK	V	102	67	-28.69	-13.00	-15.69

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

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)						Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset					Page 37 of 77	

40GHz - 60GHz

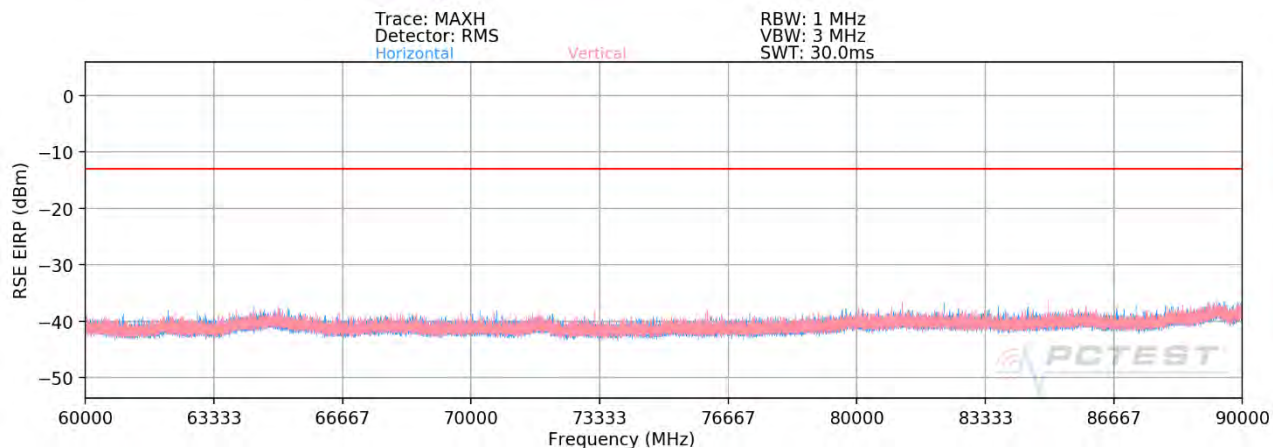


Plot 7-37. Ant 1 - n261 Radiated Spurious Plot

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]
55050.00	Low	50	2Tx	QPSK	H	90	6	-37.49	-13.00	-24.49
55849.92	Mid	50	2Tx	QPSK	H	83	4	-37.95	-13.00	-24.95
56649.84	High	50	2Tx	QPSK	H	90	7	-38.98	-13.00	-25.98

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

60GHz - 90GHz



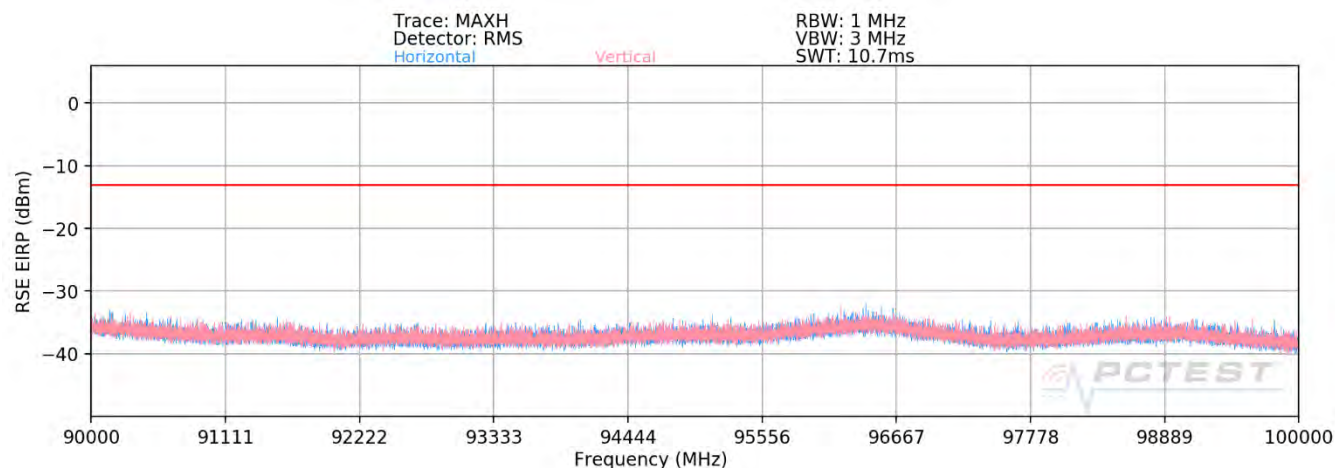
Plot 7-38. Ant 1 - n261 Radiated Spurious Plot

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]
82575.00	Low	50	2Tx	QPSK	V	-	-	-43.40	-13.00	-30.40
83774.88	Mid	50	2Tx	QPSK	V	-	-	-43.25	-13.00	-30.25
84974.76	High	50	2Tx	QPSK	V	-	-	-43.28	-13.00	-30.28

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

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)						Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 - 11/17/2020	EUT Type: Portable Handset					Page 38 of 77	

90GHz - 100GHz



Plot 7-39. Ant 1 - n261 Radiated Spurious Plot

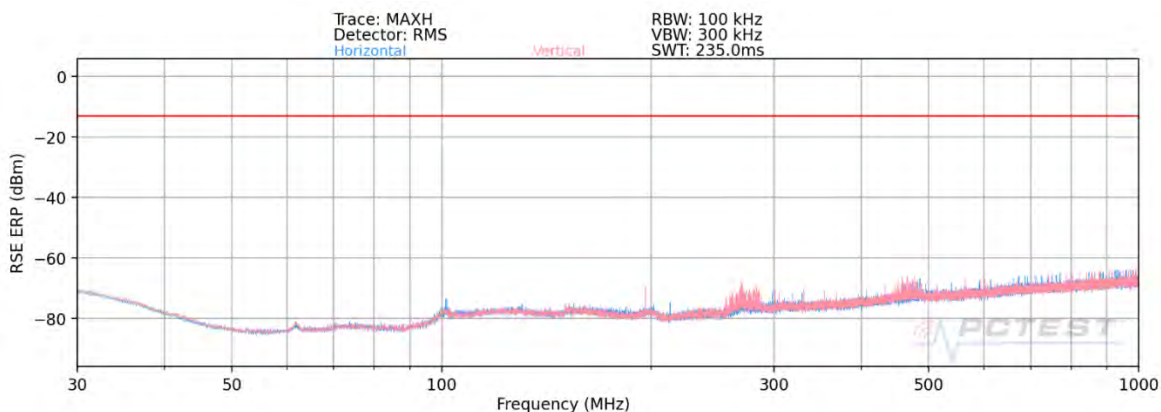
Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
96480.40	Low	50	2Tx	QPSK	V	-	-	-40.41	-13.00	-27.41
96487.10	Mid	50	2Tx	QPSK	V	-	-	-40.45	-13.00	-27.45
96476.00	High	50	2Tx	QPSK	V	-	-	-40.21	-13.00	-27.21

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

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset			Page 39 of 77

Band n261 – Ant 2

30MHz - 1GHz

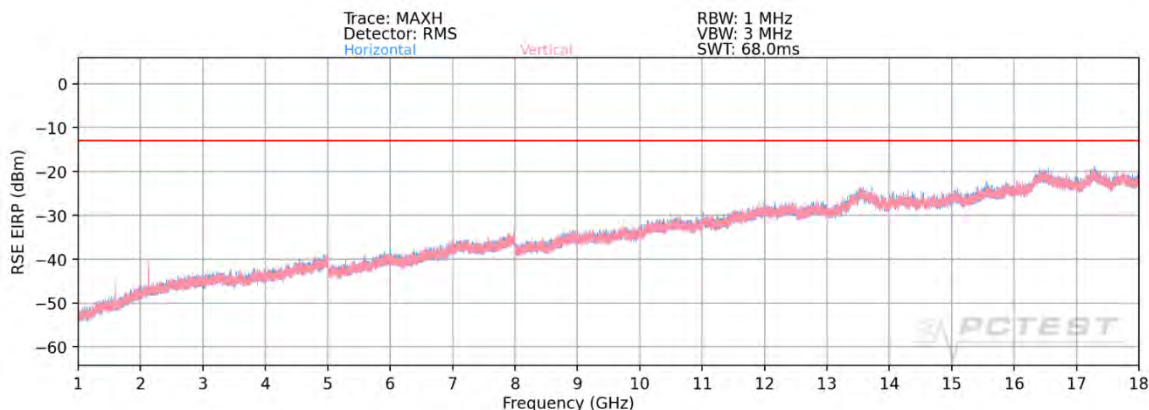


Plot 7-40. Ant 2 - n261 Radiated Spurious Plot

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
61.54	Low	50	2Tx	QPSK	V	105	187	-79.34	-13.00	-66.34
61.25	Mid	50	2Tx	QPSK	V	101	192	-79.57	-13.00	-66.57
61.23	High	50	2Tx	QPSK	V	104	185	-79.43	-13.00	-66.43

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

1GHz - 18GHz



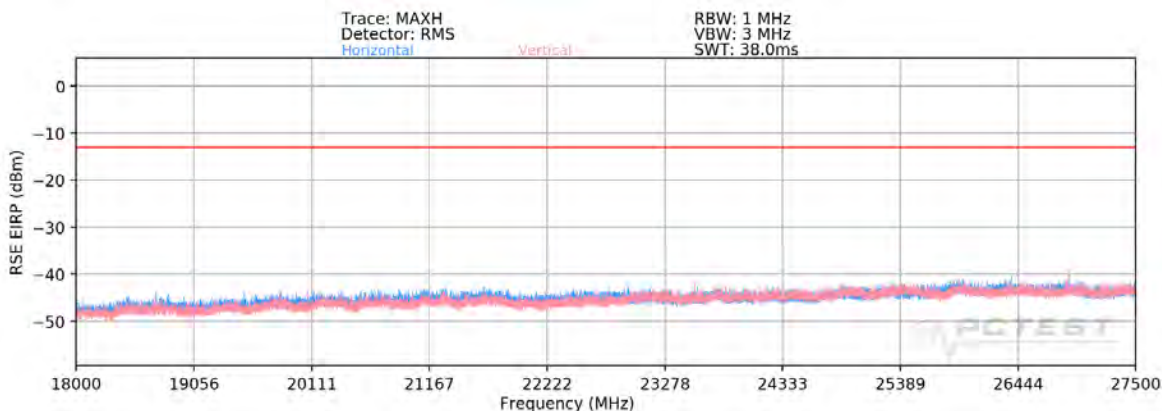
Plot 7-41. Ant 2 - n261 Radiated Spurious Plot

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8697.44	Low	50	2Tx	QPSK	H	284	191	-46.82	-13.00	-33.82
8580.32	Mid	50	2Tx	QPSK	H	280	190	-47.66	-13.00	-34.66
8814.95	High	50	2Tx	QPSK	H	283	172	-48.01	-13.00	-35.01

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

FCC ID: A3LSMG996U	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset	Page 40 of 77	

18GHz - 27.5GHz

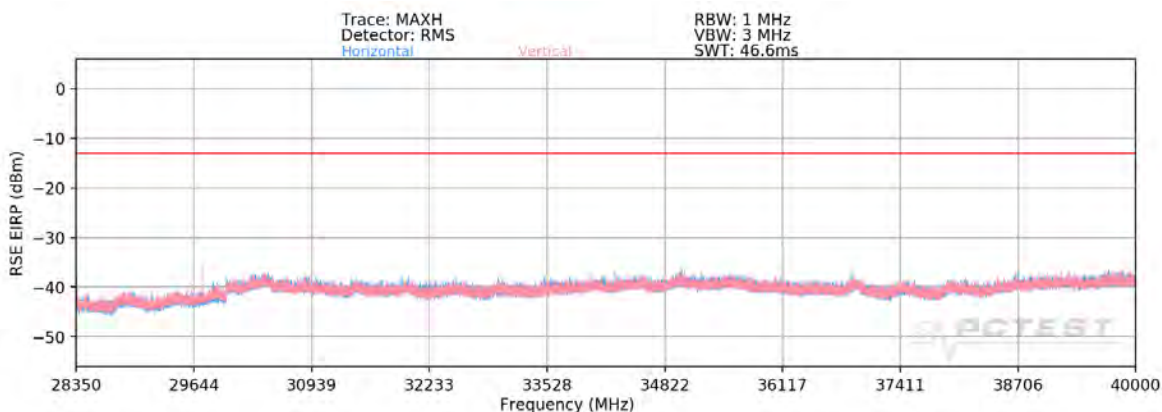


Plot 7-42. Ant 2 - n261 Radiated Spurious Plot

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]
27223.19	Low	50	2Tx	QPSK	V	197	67	-24.57	-13.00	-11.57
27373.77	Mid	50	2Tx	QPSK	V	212	71	-24.17	-13.00	-11.17
27400.94	High	50	2Tx	QPSK	V	210	66	-26.30	-13.00	-13.30

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

28.35GHz - 40GHz



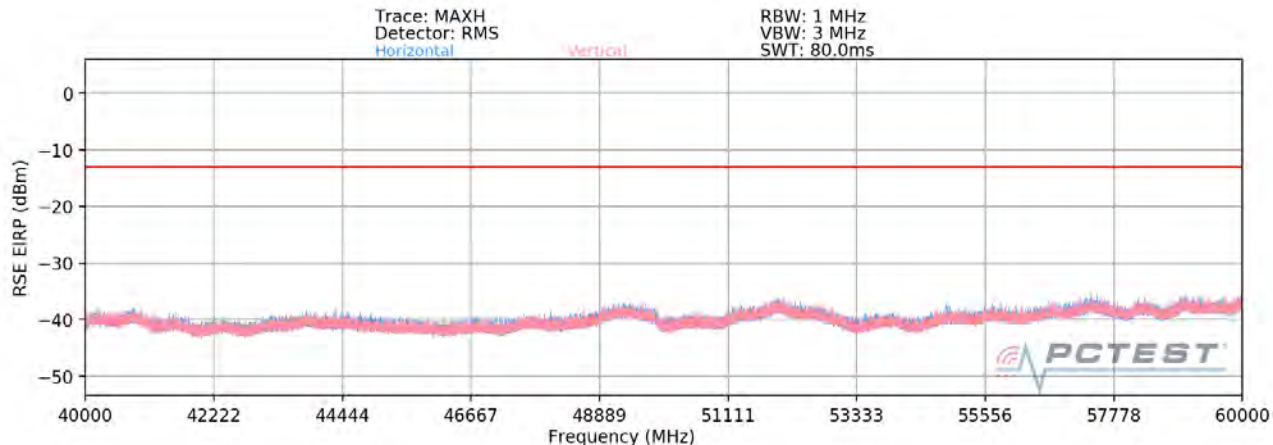
Plot 7-43. Ant 2 - n261 Radiated Spurious Plot

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]
28605.81	Low	50	2Tx	QPSK	V	189	74	-27.52	-13.00	-14.52
29174.37	Mid	50	2Tx	QPSK	V	185	78	-26.87	-13.00	-13.87
29742.24	High	50	2Tx	QPSK	V	185	71	-28.97	-13.00	-15.97

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

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 - 11/17/2020	EUT Type: Portable Handset		Page 41 of 77	

40GHz - 60GHz

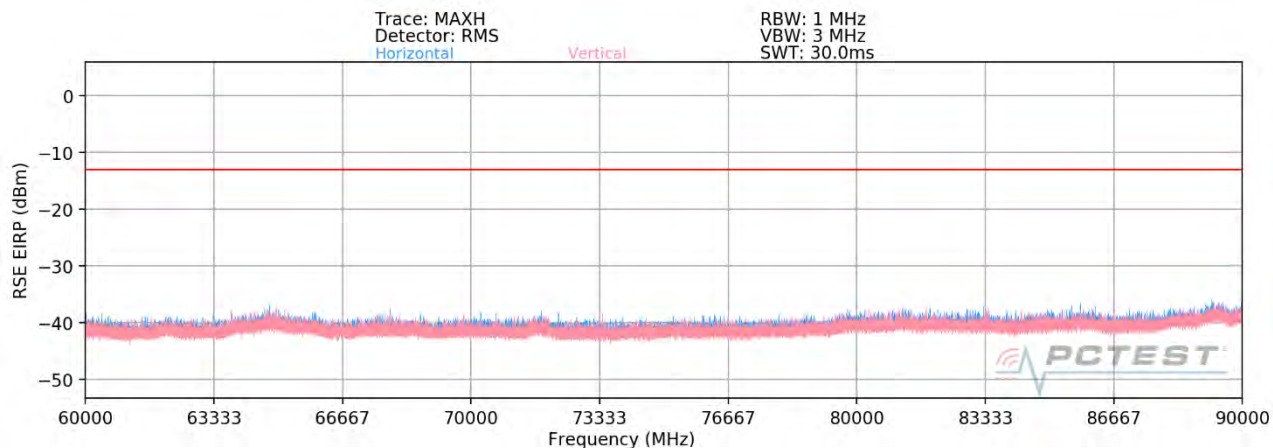


Plot 7-44. Ant 2 - n261 Radiated Spurious Plot

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]
55050.00	Low	50	2Tx	QPSK	H	251	10	-43.24	-13.00	-30.24
55849.92	Mid	50	2Tx	QPSK	H	248	343	-44.40	-13.00	-31.40
56649.84	High	50	2Tx	QPSK	H	251	355	-39.99	-13.00	-26.99

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

60GHz - 90GHz



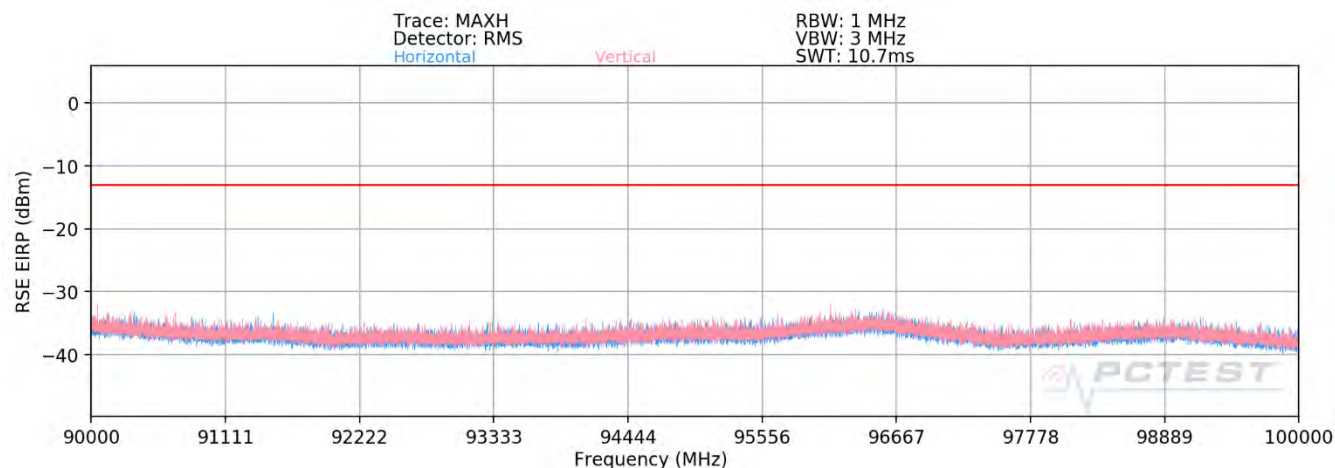
Plot 7-45. Ant 2 - n261 Radiated Spurious Plot

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]
82575.00	Low	50	2Tx	QPSK	V	-	-	-42.85	-13.00	-29.85
83774.88	Mid	50	2Tx	QPSK	V	-	-	-43.89	-13.00	-30.89
84974.76	High	50	2Tx	QPSK	V	-	-	-43.04	-13.00	-30.04

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

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)						Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset					Page 42 of 77	

90GHz - 100GHz



Plot 7-46. Ant 2 - n261 Radiated Spurious Plot

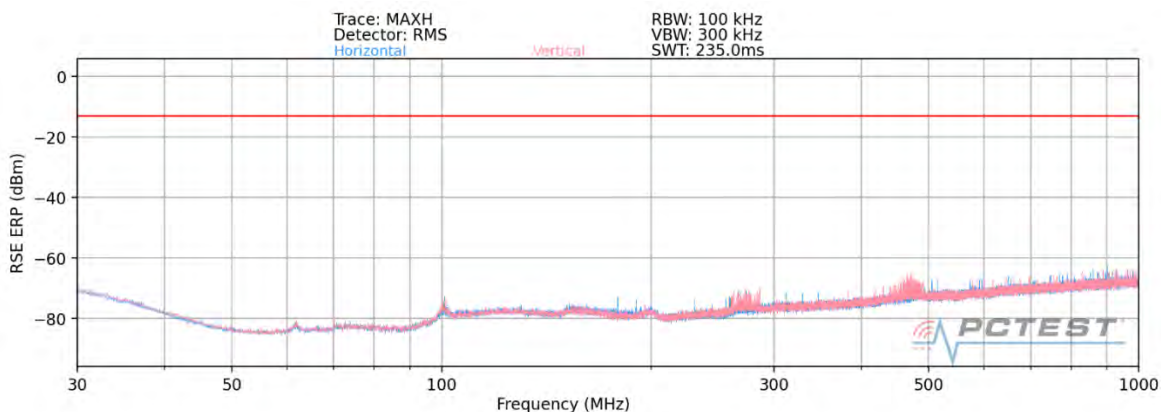
Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
96493.67	Low	50	2Tx	QPSK	V	-	-	-40.27	-13.00	-27.27
96487.16	Mid	50	2Tx	QPSK	V	-	-	-40.54	-13.00	-27.54
96486.23	High	50	2Tx	QPSK	V	-	-	-40.46	-13.00	-27.46

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

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset			Page 43 of 77

Band n260- Ant 1

30MHz - 1GHz

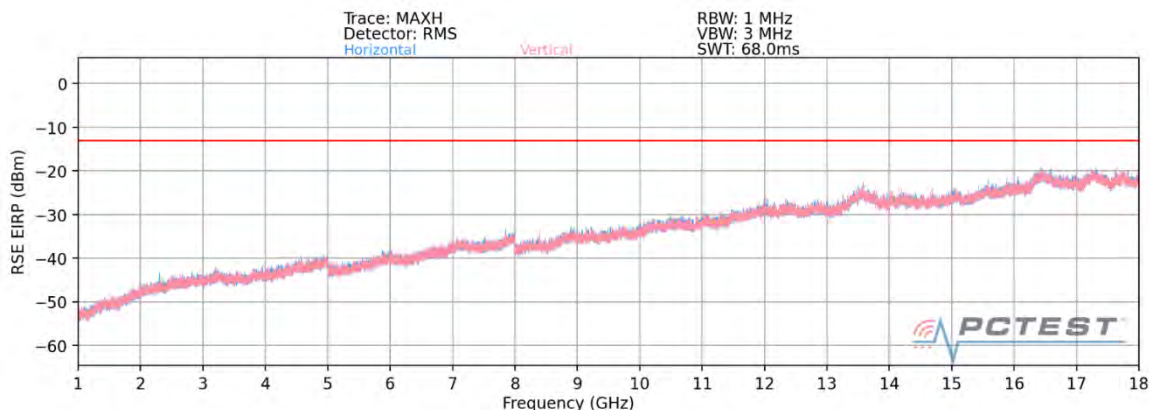


Plot 7-47. Ant 1 - n260 Radiated Spurious Plot

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
62.91	Low	50	2Tx	QPSK	H	84	224	-78.39	-13.00	-65.39
63.07	Mid	50	2Tx	QPSK	H	82	222	-79.83	-13.00	-66.83
62.18	High	50	2Tx	QPSK	H	85	228	-77.95	-13.00	-64.95

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

1GHz - 18GHz



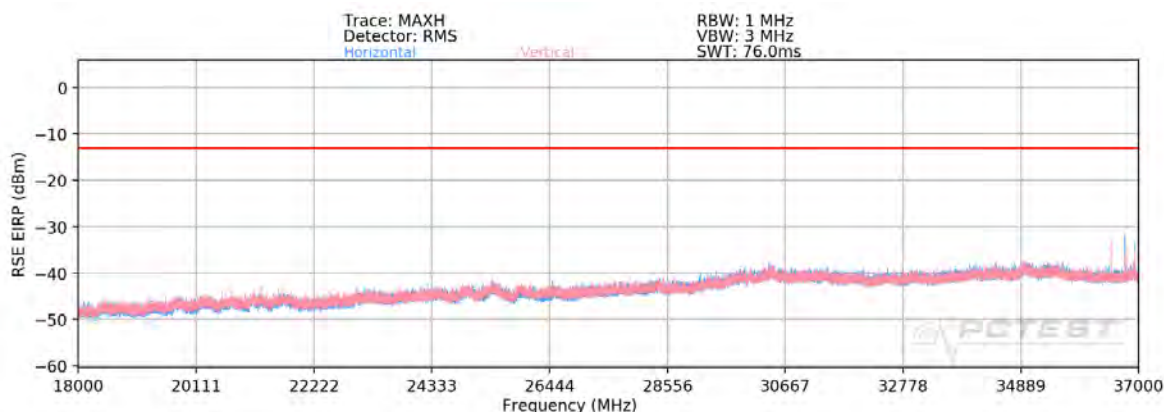
Plot 7-48. Ant 1 - n260 Radiated Spurious Plot

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
9408.41	Low	50	2Tx	QPSK	V	94	274	-42.85	-13.00	-29.85
8765.80	Mid	50	2Tx	QPSK	V	90	277	-43.16	-13.00	-30.16
8981.18	High	50	2Tx	QPSK	V	82	274	-43.72	-13.00	-30.72

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

FCC ID: A3LSMG996U	 PCTEST ENGINEERING LABORATORY, INC.		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset			Page 44 of 77

18GHz – 37GHz

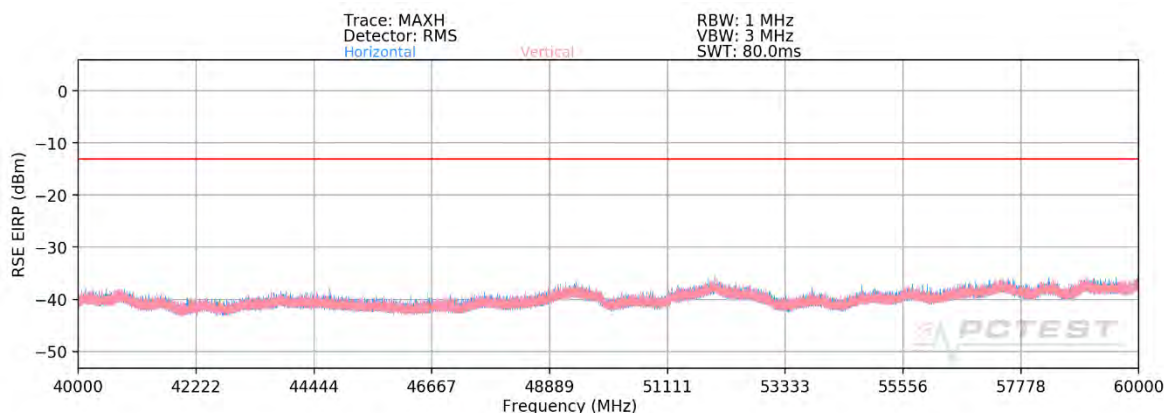


Plot 7-49. Ant 1 - n260 Radiated Spurious Plot

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]
36747.00	Low	50	2Tx	QPSK	H	102	64	-26.84	-13.00	-13.84
36901.50	Mid	50	2Tx	QPSK	H	-	-	-37.78	-13.00	-24.78
36876.80	High	50	2Tx	QPSK	H	-	-	-37.91	-13.00	-24.91

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

40GHz - 60GHz



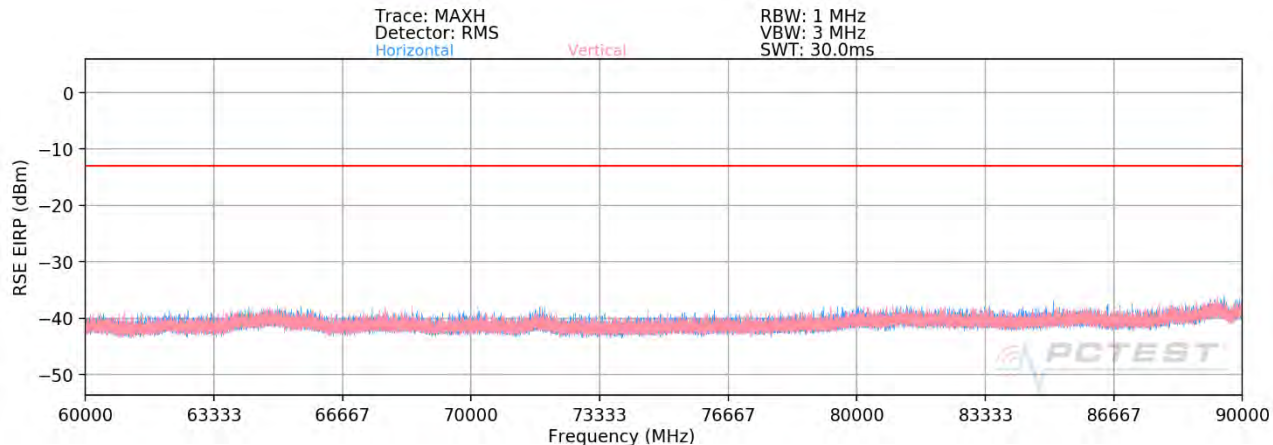
Plot 7-50. Ant 1 - n260 Radiated Spurious Plot

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]
42930.10	Low	50	2Tx	QPSK	H	95	10	-37.38	-13.00	-24.38
41125.90	Mid	50	2Tx	QPSK	H	90	305	-39.44	-13.00	-26.44
42576.40	High	50	2Tx	QPSK	H	263	120	-40.72	-13.00	-27.72

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

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 45 of 77

60GHz - 90GHz

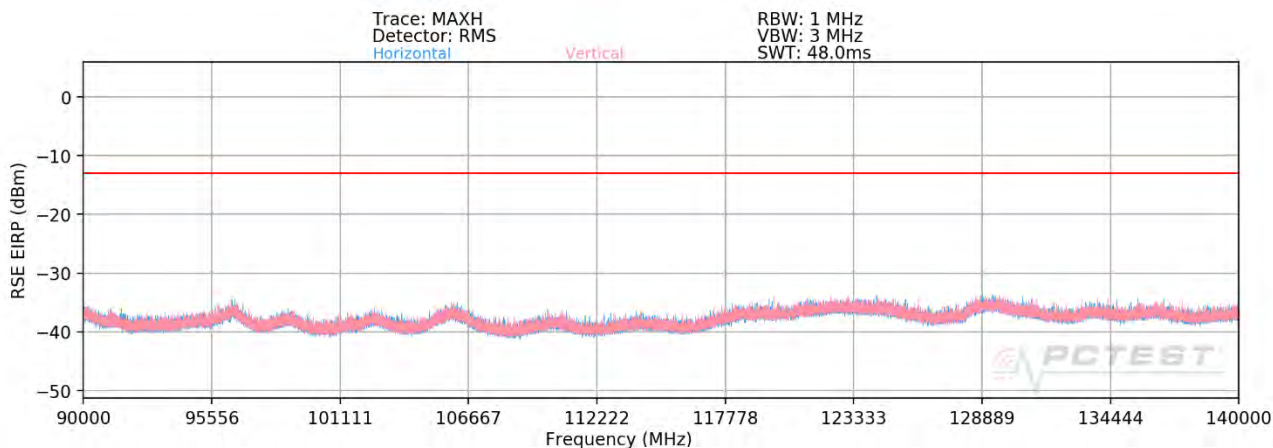


Plot 7-51. Ant 1 - n260 Radiated Spurious Plot

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]
74051.04	Low	50	2Tx	QPSK	V	318	28	-40.45	-13.00	-27.45
77000.94	Mid	50	2Tx	QPSK	V	313	31	-39.77	-13.00	-26.77
79950.75	High	50	2Tx	QPSK	V	315	8	-42.36	-13.00	-29.36

Table 7-43. Ant 1 - Spurious Emissions Table (60GHz - 90GHz)

90GHz - 140GHz



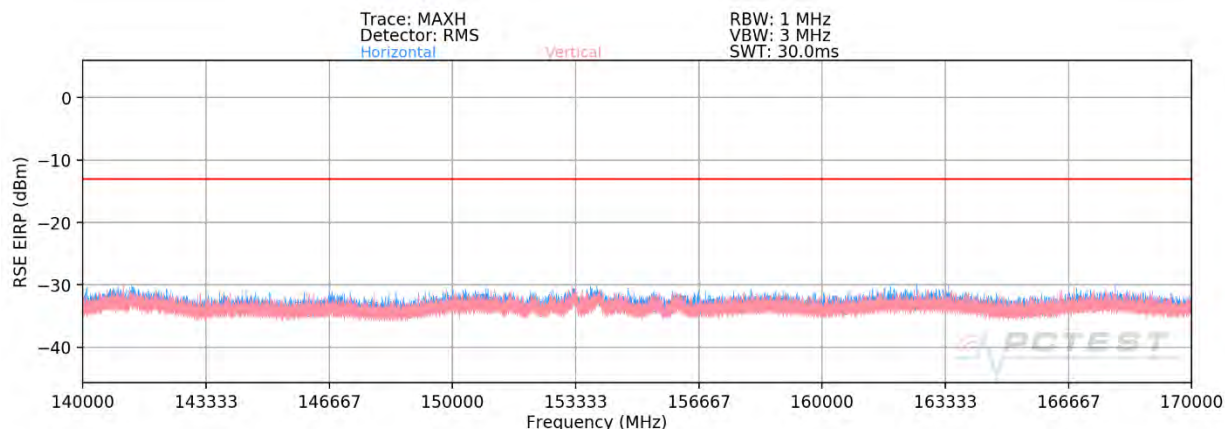
Plot 7-52. Ant 1 - n260 Radiated Spurious Plot

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]
111075.03	Low	50	2Tx	QPSK	V	-	-	-42.87	-13.00	-29.87
115504.55	Mid	50	2Tx	QPSK	V	-	-	-42.72	-13.00	-29.72
119927.55	High	50	2Tx	QPSK	V	-	-	-40.52	-13.00	-27.52

Table 7-44. Ant 1 - Spurious Emissions Table (90GHz - 140GHz)

FCC ID: A3LSMG996U	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset	Page 46 of 77	

140GHz - 170GHz

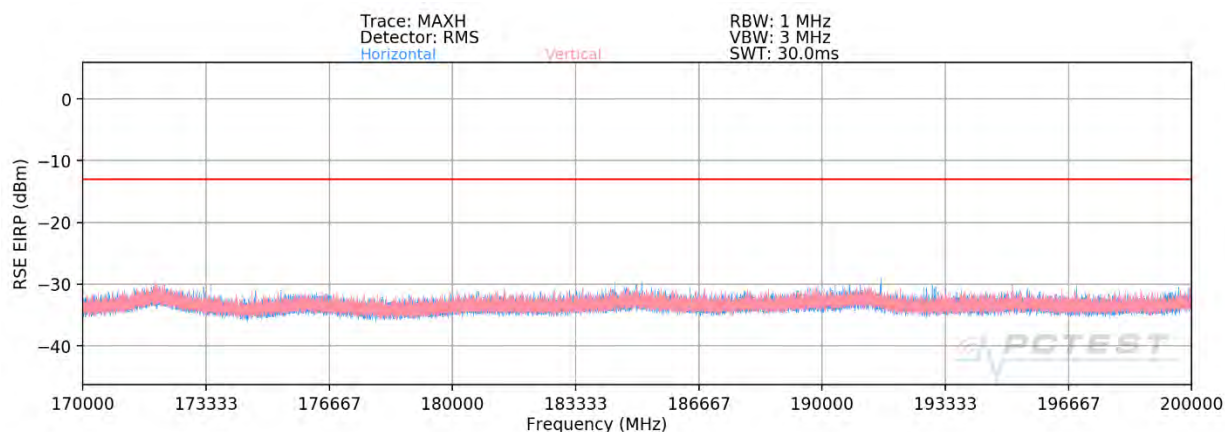


Plot 7-53. Ant 1 - n260 Radiated Spurious Plot

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]
148092.25	Low	50	2Tx	QPSK	V	-	-	-38.92	-13.00	-25.92
153997.65	Mid	50	2Tx	QPSK	V	-	-	-37.57	-13.00	-24.57
159912.30	High	50	2Tx	QPSK	V	-	-	-38.98	-13.00	-25.98

Table 7-45. Ant 1 - Spurious Emissions Table (140GHz - 170GHz)

170GHz - 200GHz



Plot 7-54. Ant 1 - n260 Radiated Spurious Plot

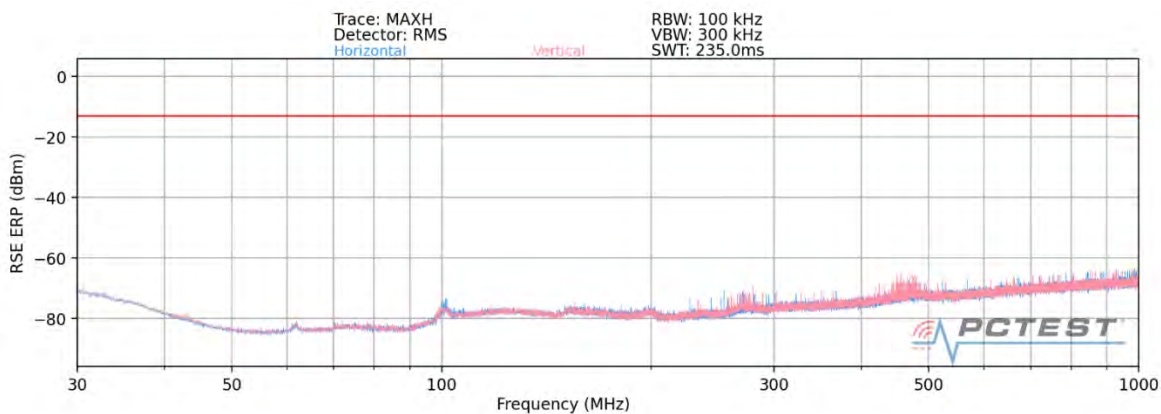
Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
185118.72	Low	50	2Tx	QPSK	V	-	-	-37.97	-13.00	-24.97
192498.35	Mid	50	2Tx	QPSK	V	-	-	-38.65	-13.00	-25.65
199885.65	High	50	2Tx	QPSK	V	-	-	-38.03	-13.00	-25.03

Table 7-46. Ant 1 - Spurious Emissions Table (170GHz - 200GHz)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)		SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 - 11/17/2020	EUT Type: Portable Handset		Page 47 of 77	

Band n260- Ant 2

30MHz - 1GHz

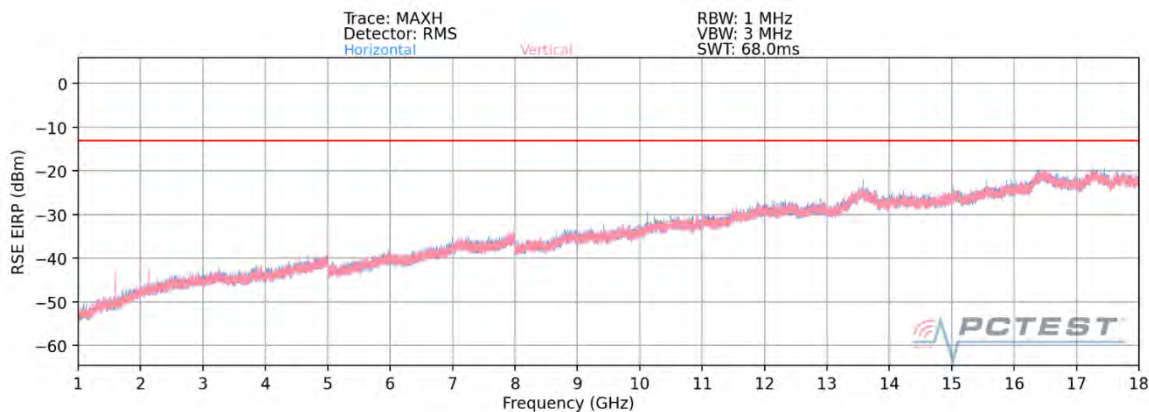


Plot 7-55. Ant 2 - n260 Radiated Spurious Plot

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
62.35	Low	50	2Tx	QPSK	V	87	110	-80.13	-13.00	-67.13
62.47	Mid	50	2Tx	QPSK	V	94	118	-79.54	-13.00	-66.54
62.88	High	50	2Tx	QPSK	V	90	120	-79.69	-13.00	-66.69

Table 7-47. Ant 2 - Spurious Emissions Table (30MHz - 1GHz)

1GHz - 18GHz



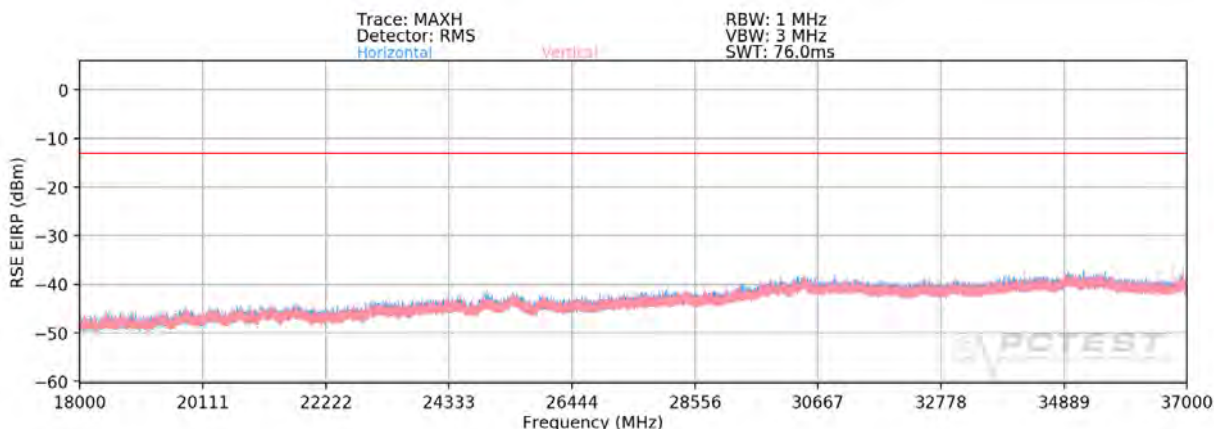
Plot 7-56. Ant 2 - n260 Radiated Spurious Plot

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8575.82	Low	50	2Tx	QPSK	V	210	230	-35.62	-13.00	-22.62
9051.46	Mid	50	2Tx	QPSK	V	224	231	-34.96	-13.00	-21.96
8736.20	High	50	2Tx	QPSK	V	165	231	-36.17	-13.00	-23.17

Table 7-48. Ant 2 - Spurious Emissions Table (1GHz - 18GHz)

FCC ID: A3LSMG996U	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset	Page 48 of 77	

18GHz – 37GHz

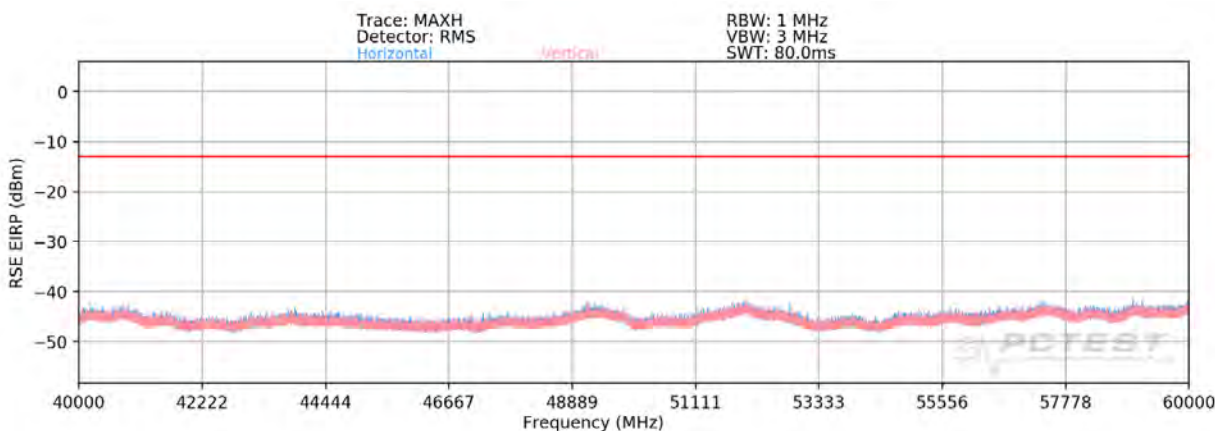


Plot 7-57. Ant 2 - n260 Radiated Spurious Plot

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]
36750.17	Low	50	2Tx	QPSK	H	95	229	-33.92	-13.00	-20.92
36912.22	Mid	50	2Tx	QPSK	H	-	-	-37.99	-13.00	-24.99
36851.46	High	50	2Tx	QPSK	H	-	-	-38.21	-13.00	-25.21

Table 7-49. Ant 2 - Spurious Emissions Table (18GHz – 37GHz)

40GHz - 60GHz



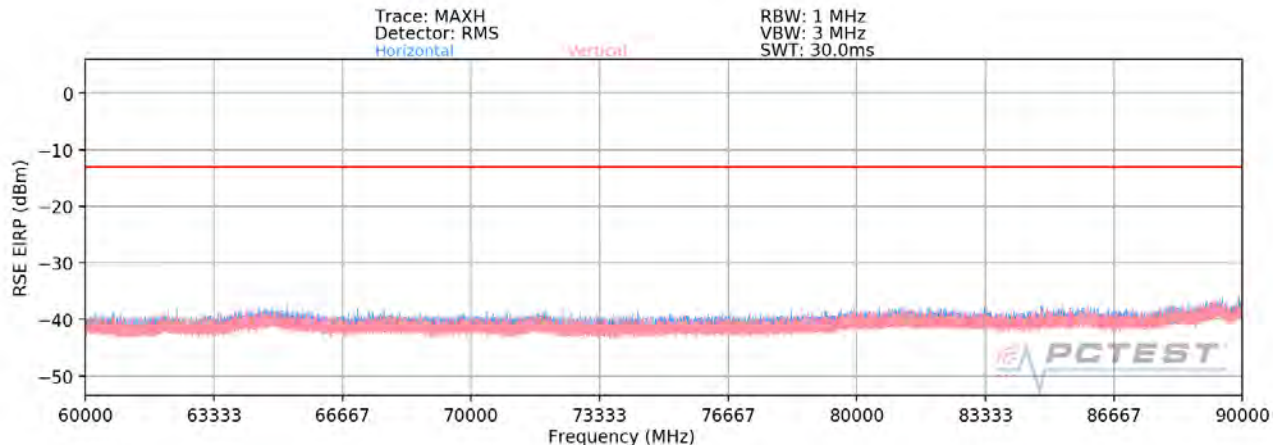
Plot 7-58. Ant 2 - n260 Radiated Spurious Plot

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]
51564.90	Low	50	2Tx	QPSK	H	179	343	-39.70	-13.00	-26.70
41095.90	Mid	50	2Tx	QPSK	H	150	153	-40.00	-13.00	-27.00
42616.40	High	50	2Tx	QPSK	H	301	242	-40.44	-13.00	-27.44

Table 7-50. Ant 2 - Spurious Emissions Table (40GHz - 60GHz)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 49 of 77

60GHz - 90GHz

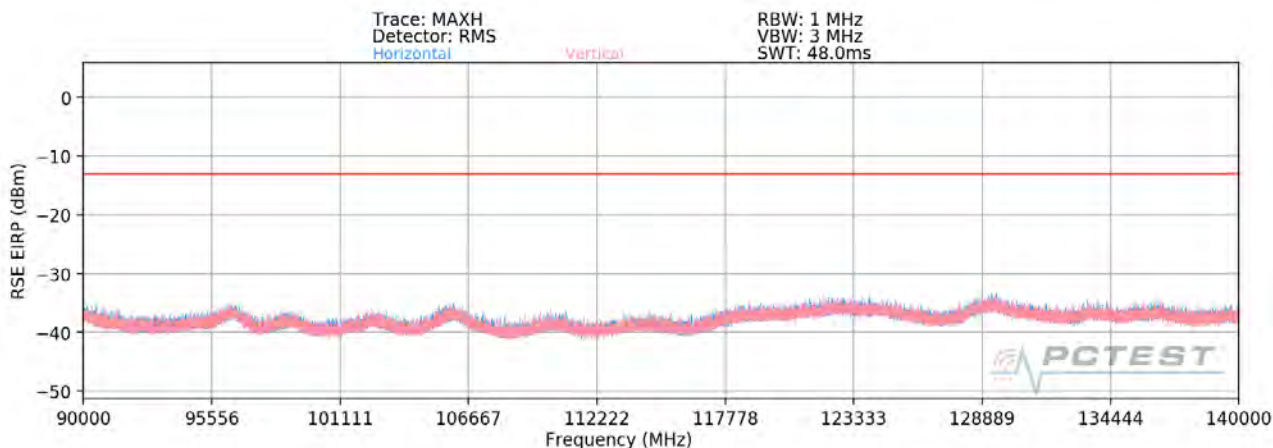


Plot 7-34. Ant 2 - n260 Radiated Spurious Plot

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]
74050.89	Low	50	2Tx	QPSK	V	35	336	-41.78	-13.00	-28.78
77000.73	Mid	50	2Tx	QPSK	V	147	332	-40.32	-13.00	-27.32
79951.08	High	50	2Tx	QPSK	V	138	359	-41.99	-13.00	-28.99

Table 7-51. Ant 2 - Spurious Emissions Table (60GHz - 90GHz)

90GHz - 140GHz



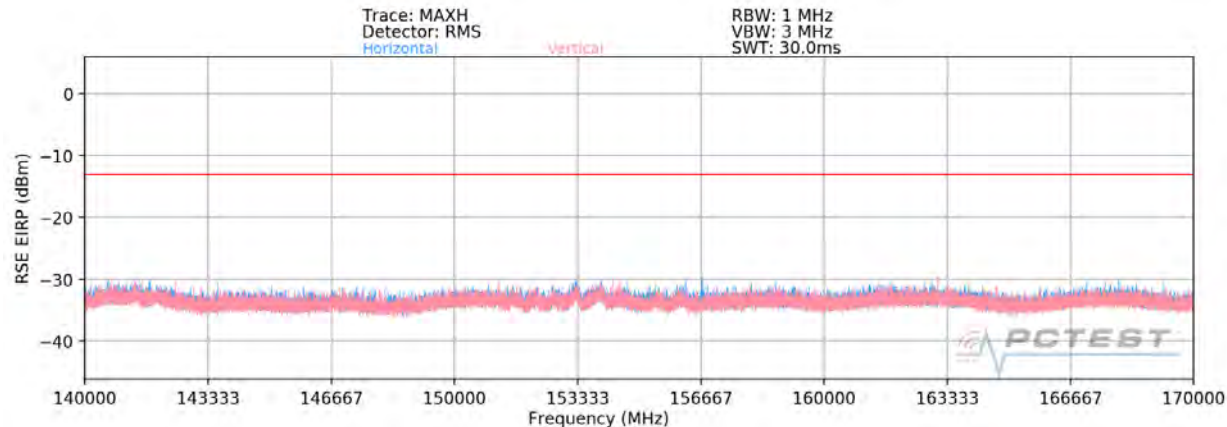
Plot 7-60. Ant 2 - n260 Radiated Spurious Plot

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]
111089.04	Low	50	2Tx	QPSK	V	-	-	-42.88	-13.00	-29.88
115512.02	Mid	50	2Tx	QPSK	V	-	-	-42.92	-13.00	-29.92
119927.22	High	50	2Tx	QPSK	V	-	-	-40.44	-13.00	-27.44

Table 7-52. Ant2 - Spurious Emissions Table (90GHz - 140GHz)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 - 11/17/2020	EUT Type: Portable Handset		Page 50 of 77

140GHz - 170GHz

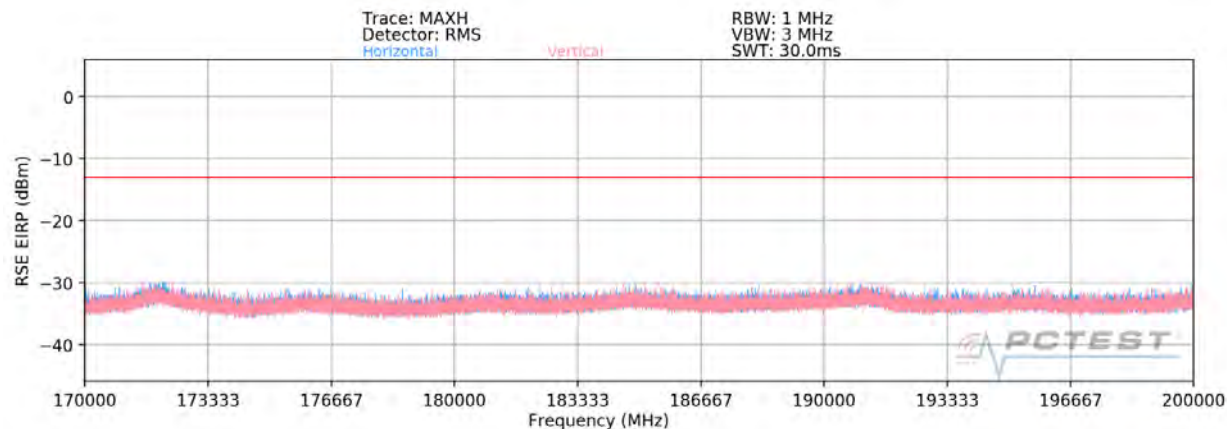


Plot 7-61. Ant 2 - n260 Radiated Spurious Plot

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]
148117.02	Low	50	2Tx	QPSK	V	-	-	-39.46	-13.00	-26.46
153992.40	Mid	50	2Tx	QPSK	V	-	-	-37.52	-13.00	-24.52
159907.11	High	50	2Tx	QPSK	V	-	-	-38.79	-13.00	-25.79

Table 7-53. Ant 2 - Spurious Emissions Table (140GHz - 170GHz)

170GHz - 200GHz



Plot 7-62. Ant 2 - n260 Radiated Spurious Plot

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]
185136.18	Low	50	2Tx	QPSK	V	-	-	-37.92	-13.00	-24.92
192514.88	Mid	50	2Tx	QPSK	V	-	-	-38.50	-13.00	-25.50
199878.75	High	50	2Tx	QPSK	V	-	-	-37.99	-13.00	-24.99

Table 7-54. Ant 2 - Spurious Emissions Table (170GHz - 200GHz)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 - 11/17/2020	EUT Type: Portable Handset		Page 51 of 77	

7.5 Band Edge Emissions

\$2.1051, \$30.203

Test Overview

All out of band emissions are measured in a radiated 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 minimum permissible attenuation level of any spurious emission is -13dBm/1MHz. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be -5 dBm/MHz or lower.

Test Procedure Used

ANSI C63.26-2015 Section 5 and ANSI C63.26-2015 Section 6.4
KDB 842590 D01 v01r01 Section 4.4.2

Test Settings

1. Start and stop frequency were set such that both upper and lower band edges are measured.
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW = 1MHz
4. VBW $\geq 3 \times$ RBW
5. Detector = RMS
6. Number of sweep points $\geq 2 \times$ Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning.
- 2) Band Edge emissions were measured at a 1 meter distance.
- 3) The spectrum analyzer for each measurement shows an offset value that was determined using the measurement antenna factor, cable loss, far field measurement distance. A sample calculation is shown on the following page.
- 4) 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 were fully investigated and only the worst case has been included in this report.
- 5) All combinations of 1CC and 2CC were fully investigated, and only the worst case has been included in this report.
- 6) All 2CC cases were investigated with PCC prioritization feature, which was the higher PCC at the band edge for the worst case.

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Sample Analyzer Offset Calculation (at 27.5GHz)

Measurement Antenna Factor = 40.70dB/m

Cable Loss = 8.82dB

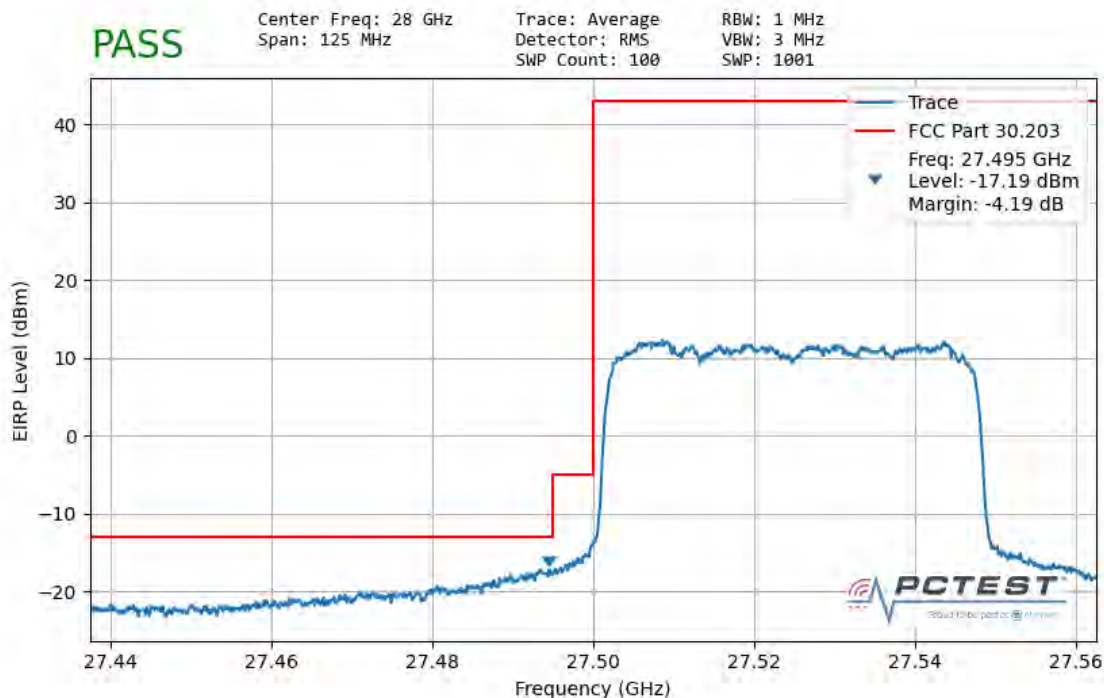
$$\begin{aligned}\text{Analyzer Offset (dB)} &= \text{AF (dB/m)} + \text{CL (dB)} + 107 + 20\log_{10}(D) - 104.8\text{dB, where } D = 1\text{m} \\ &= 40.70\text{dB/m} + 8.82\text{dB} + 107 + 20\log_{10}(1\text{m}) - 104.8\text{dB} \\ &= 51.72\text{dB}\end{aligned}$$

Note:

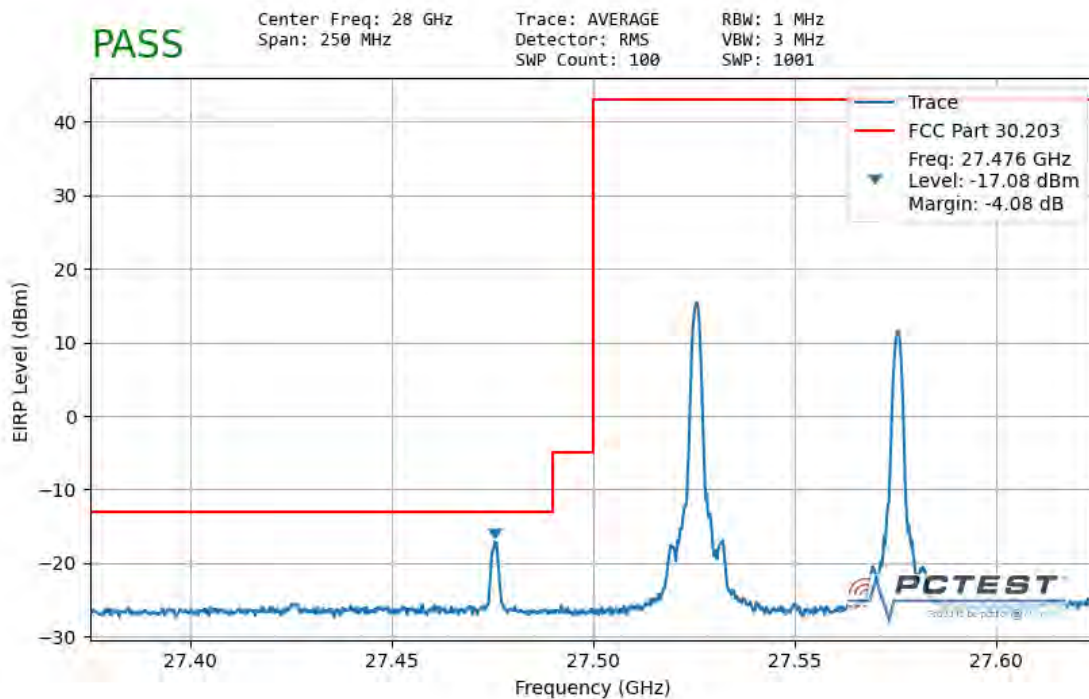
While it is allowed to use the antenna gain subtraction method in the band edge as it is defined in Part 30, the device meets the requirements via early exit condition as specified in KDB publication 842590 D01.

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Band n261 – Worst-Case

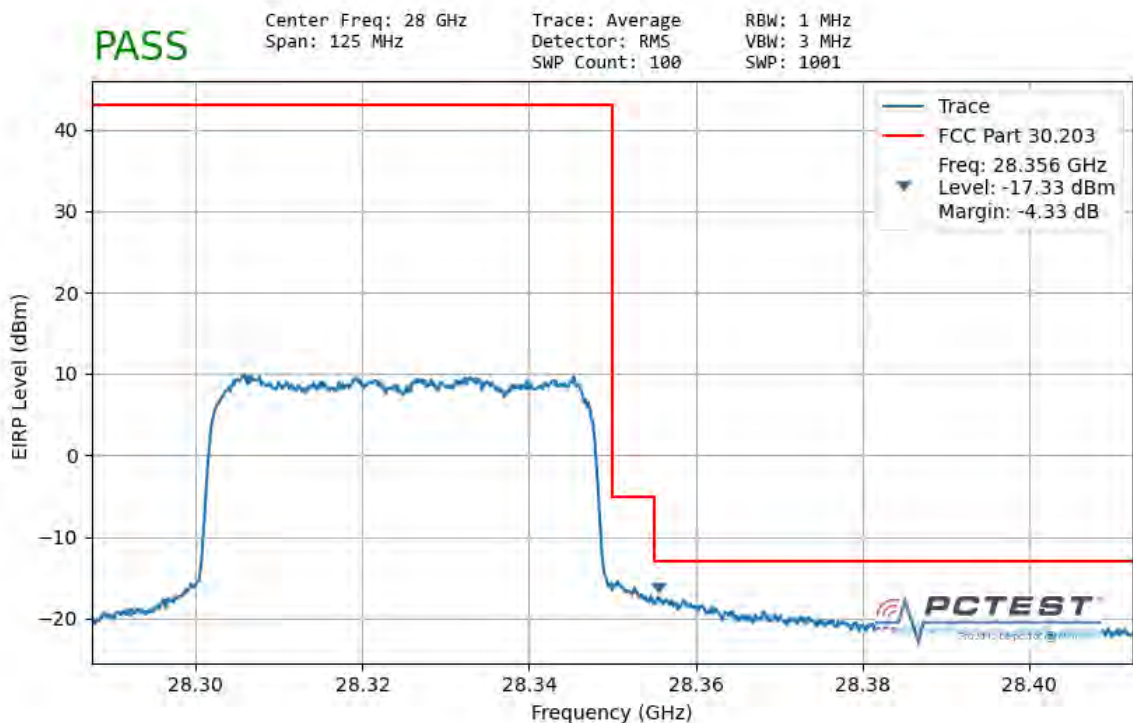


Plot 7-63. Ant 1 Lower Band Edge (50MHz-1CC – QPSK Full RB)

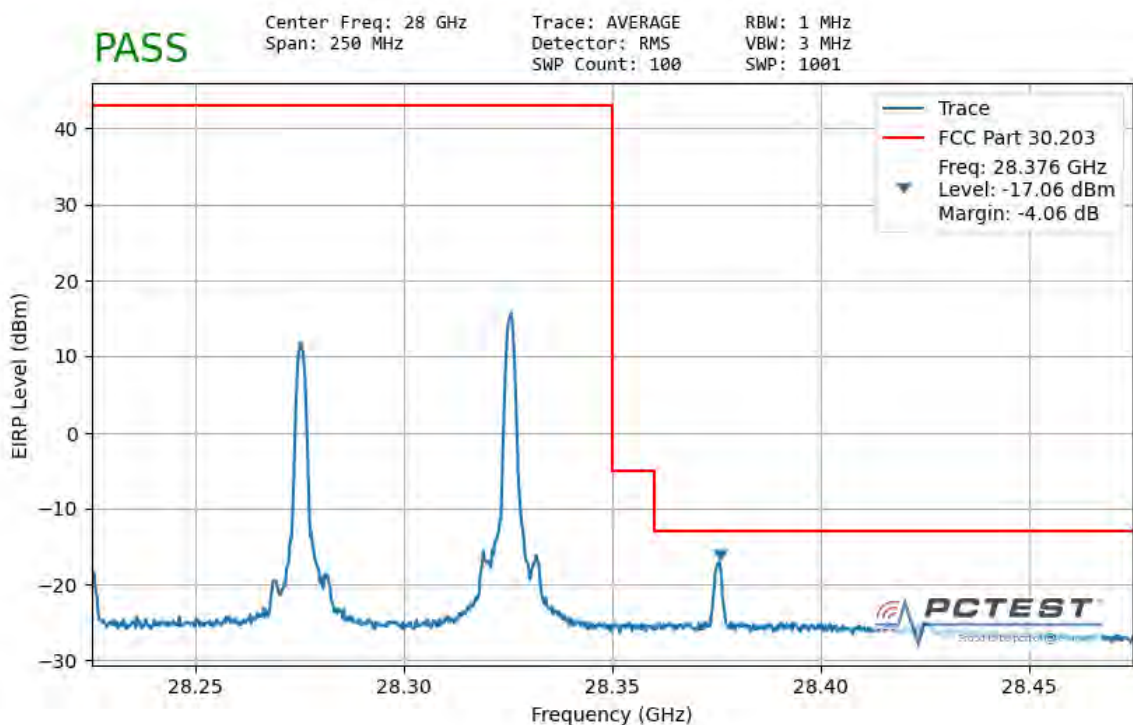


Plot 7-64. Ant 1 Lower Band Edge (50MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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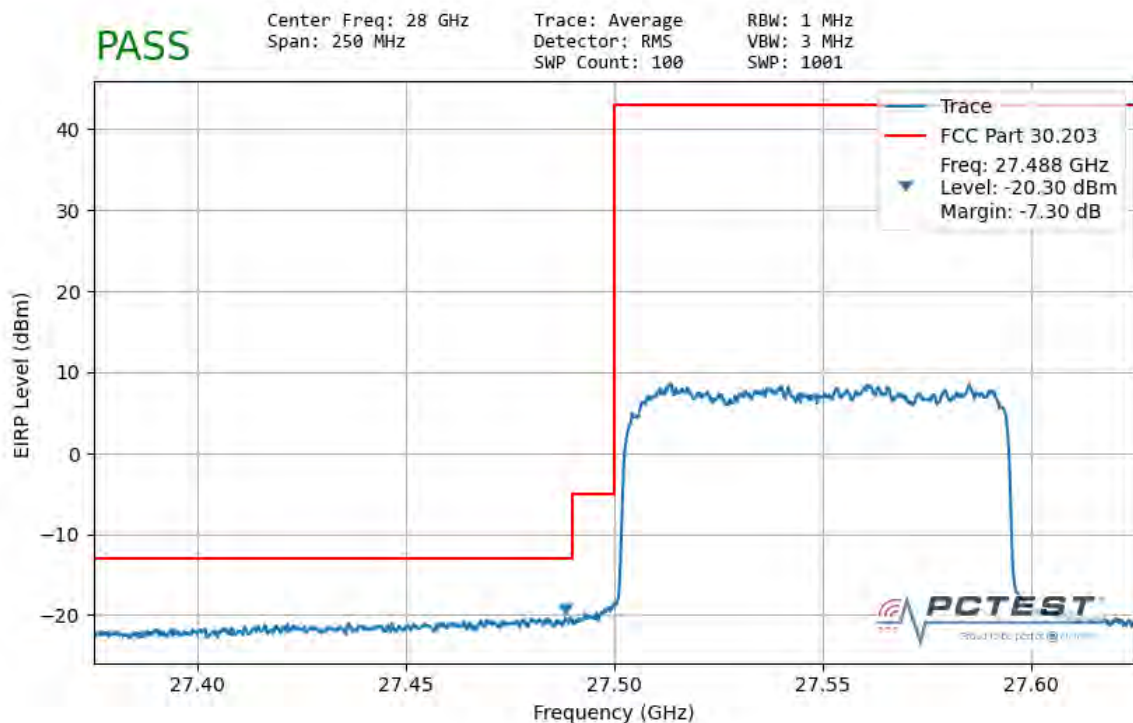


Plot 7-65. Ant 1 Upper Band Edge (50MHz-1CC – QPSK Full RB)

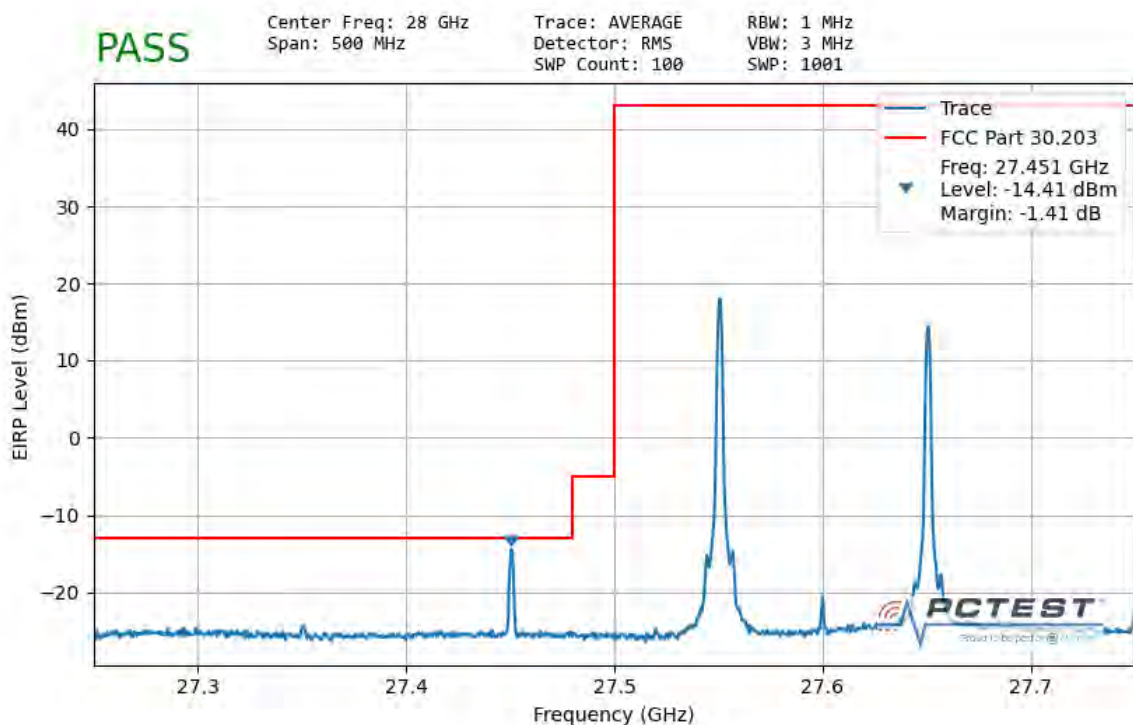


Plot 7-66. Ant 1 Upper Band Edge (50MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 55 of 77

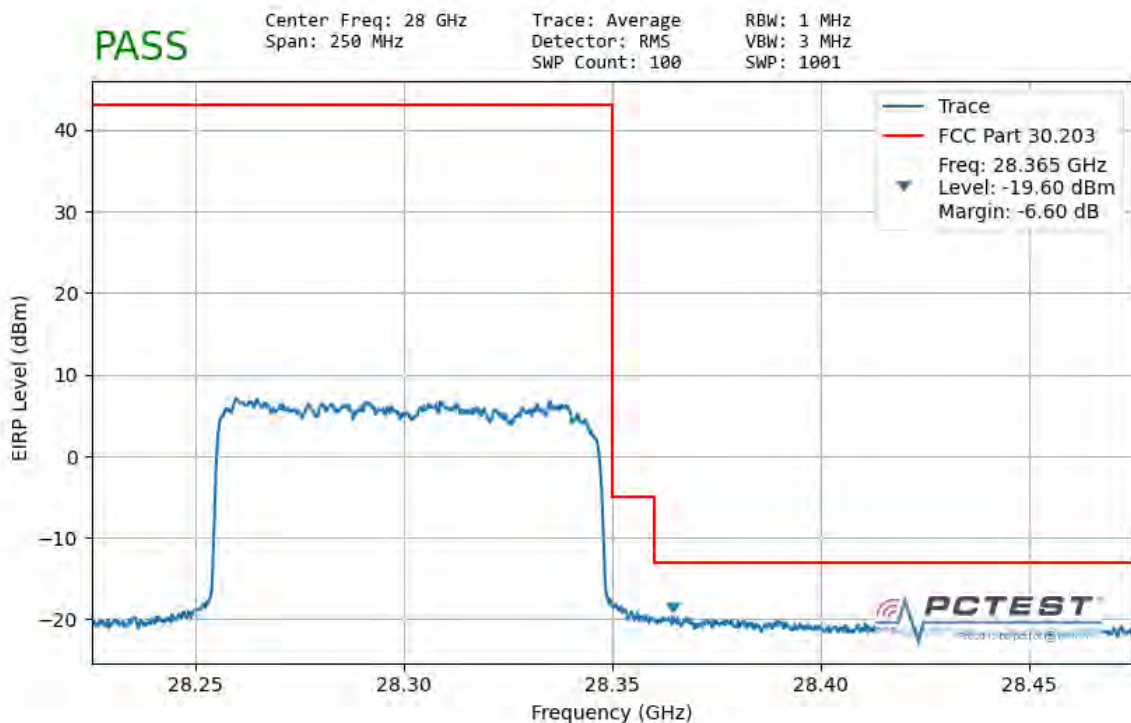


Plot 7-67. Ant 1 Lower Band Edge (100MHz-1CC – QPSK Full RB)

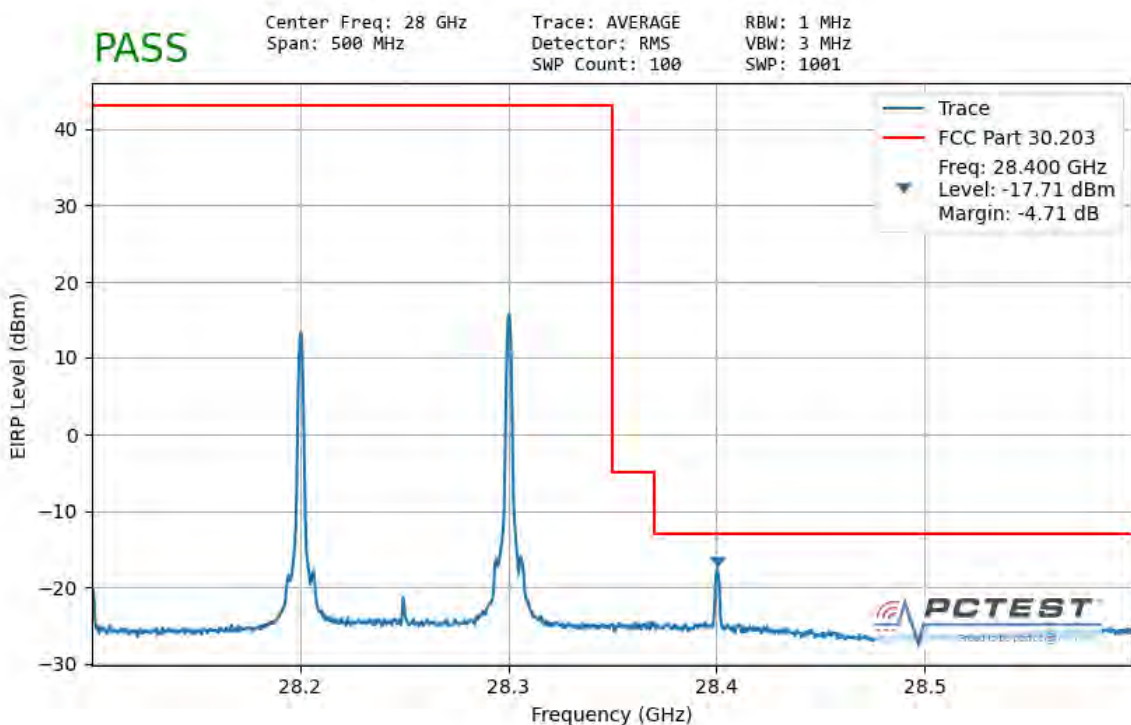


Plot 7-68. Ant 1 Lower Band Edge (100MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U	PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 56 of 77

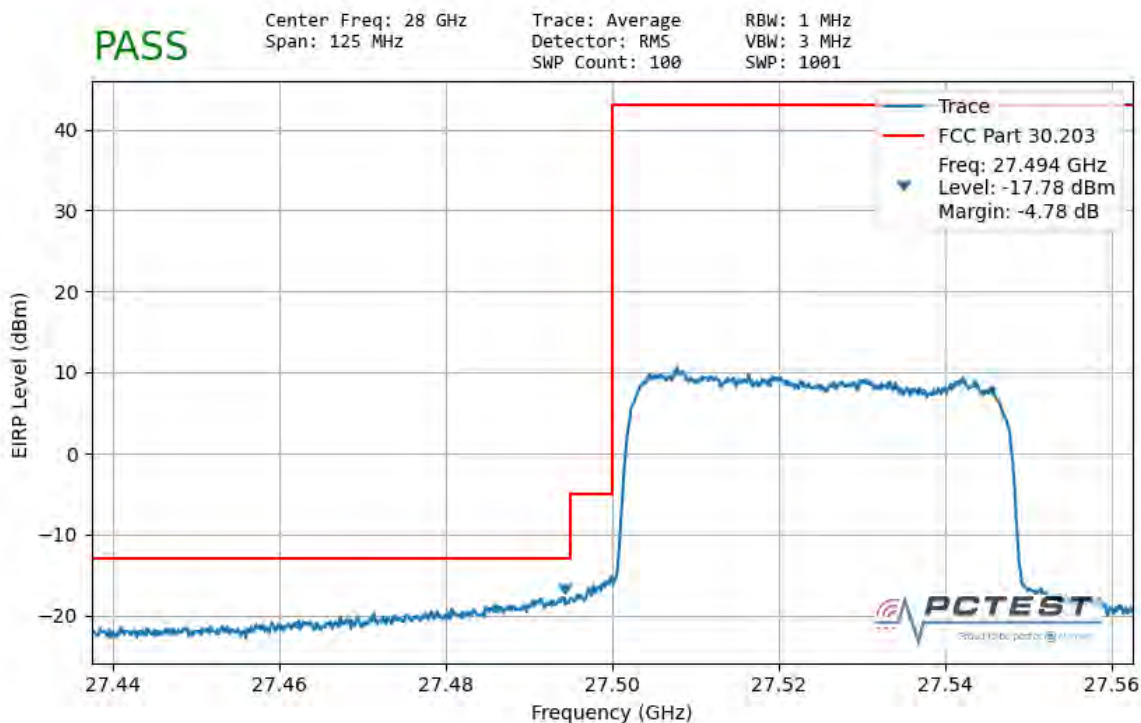


Plot 7-69. Ant 1 Upper Band Edge (100MHz-1CC – QPSK Full RB)

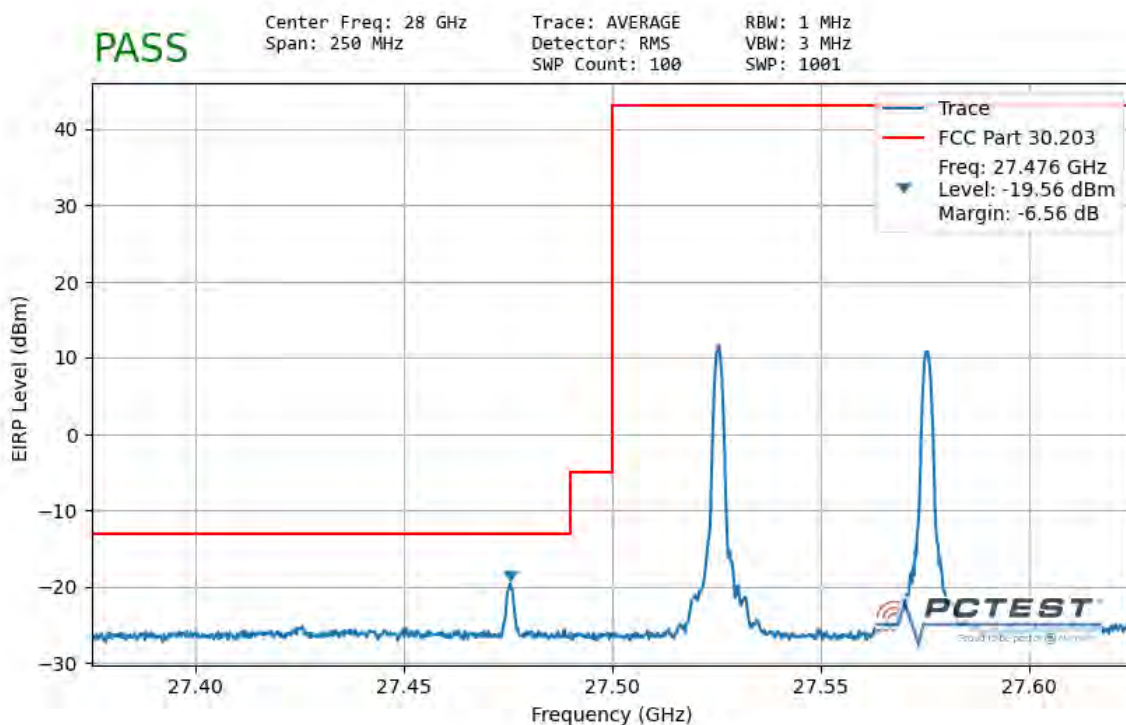


Plot 7-70. Ant 1 Upper Band Edge (100MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 57 of 77

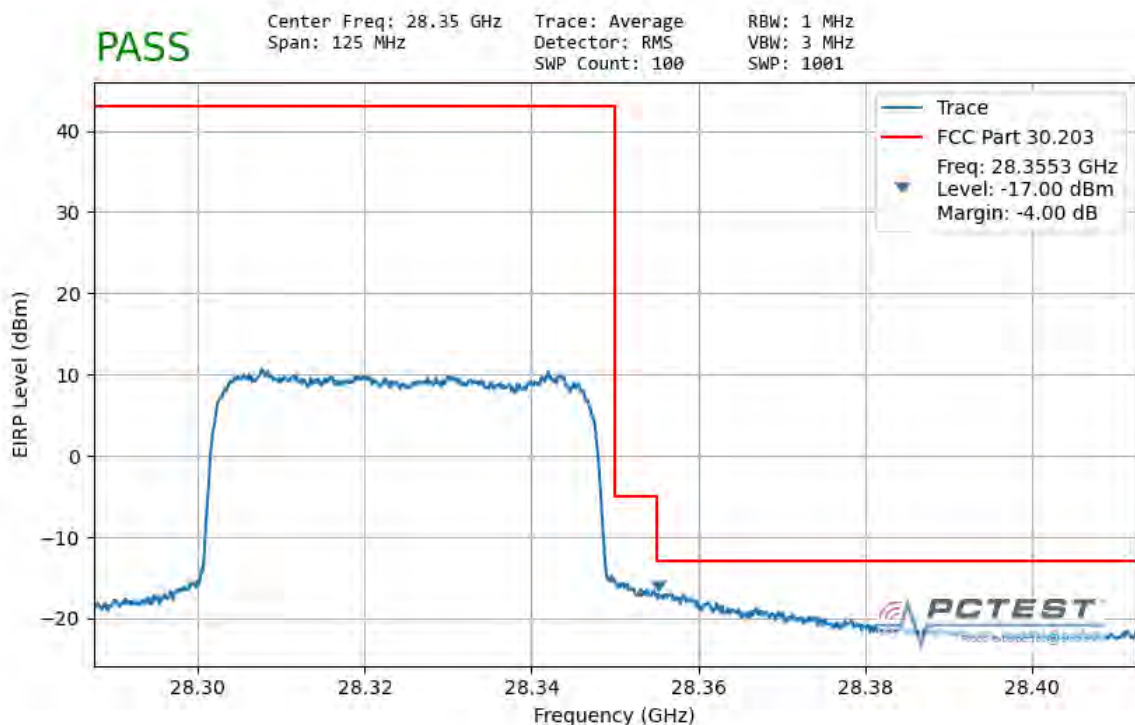


Plot 7-71. Ant 2 Lower Band Edge (50MHz-1CC – QPSK Full RB)

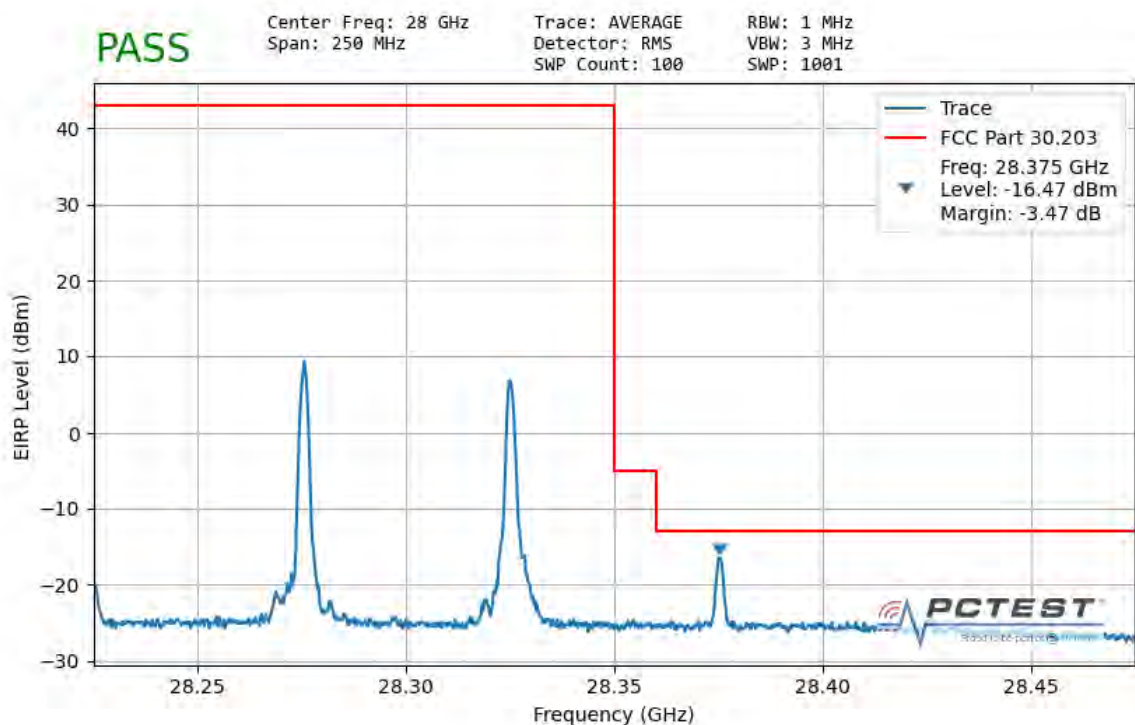


Plot 7-72. Ant 2 Lower Band Edge (50MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 58 of 77

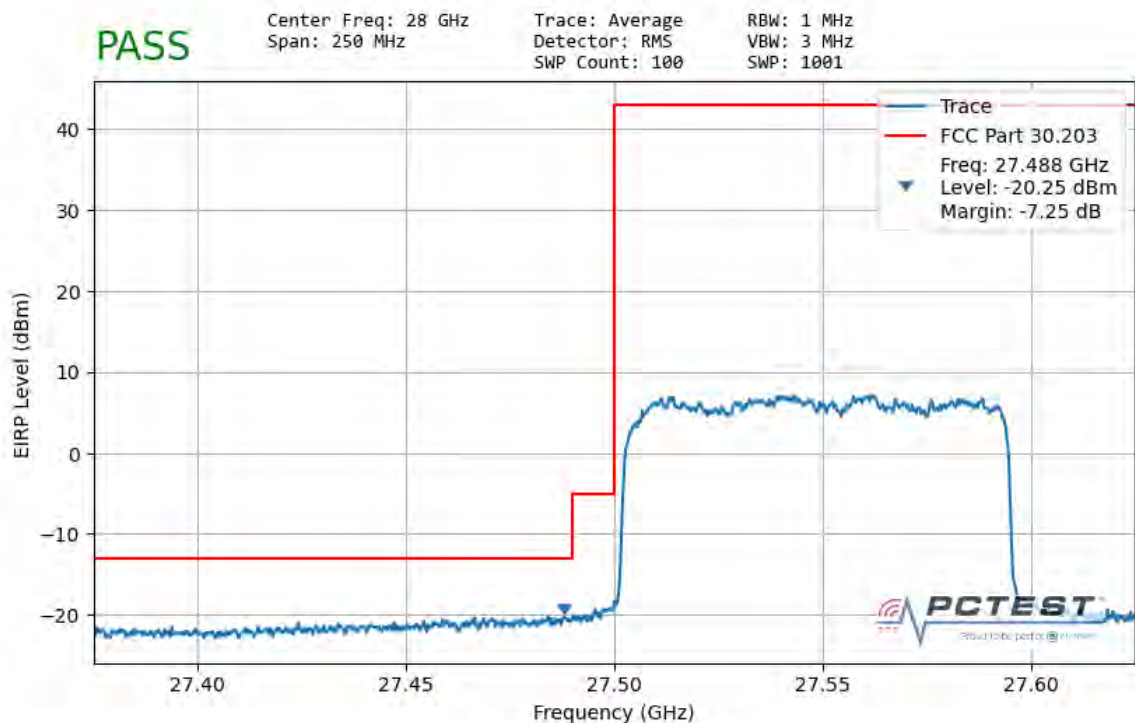


Plot 7-73. Ant 2 Upper Band Edge (50MHz-1CC – QPSK Full RB)

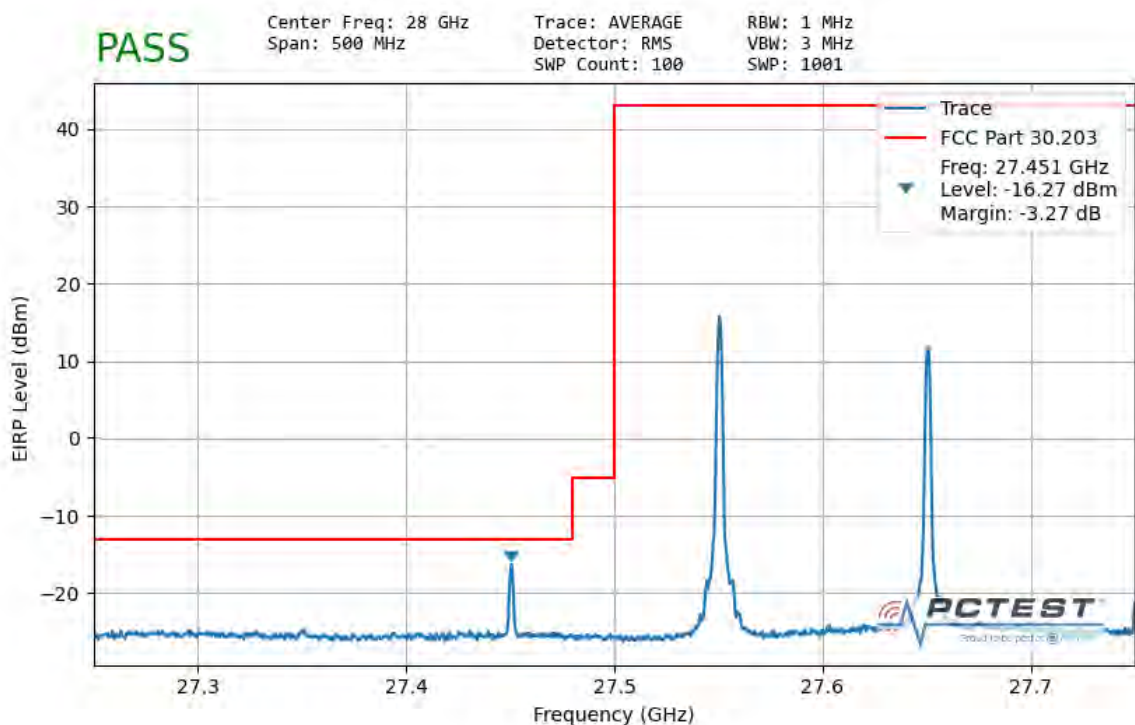


Plot 7-74. Ant 2 Upper Band Edge (50MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 59 of 77

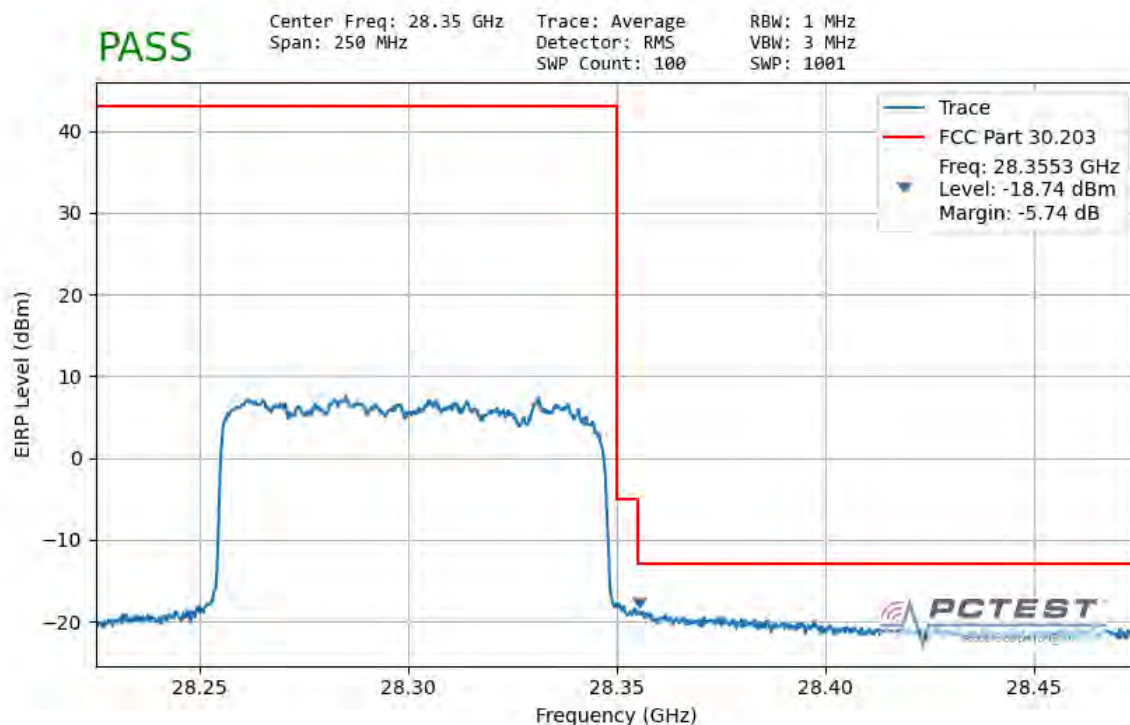


Plot 7-75. Ant 2 Lower Band Edge (100MHz-1CC – QPSK Full RB)

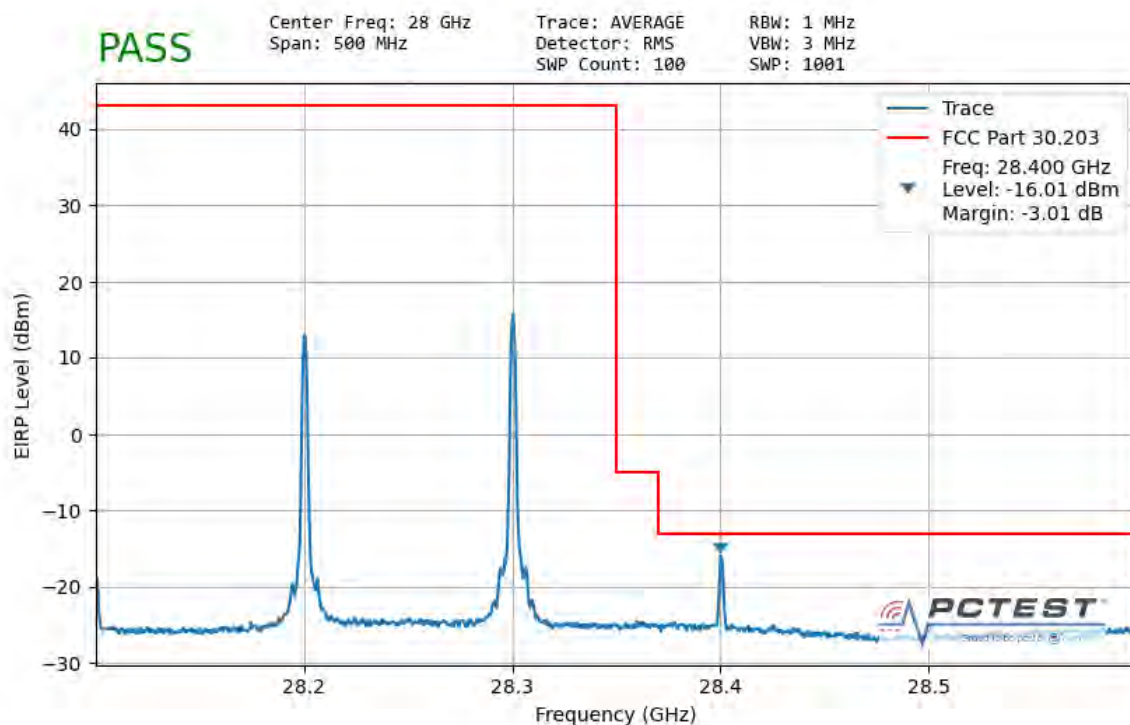


Plot 7-76. Ant 2 Lower Band Edge (100MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 60 of 77



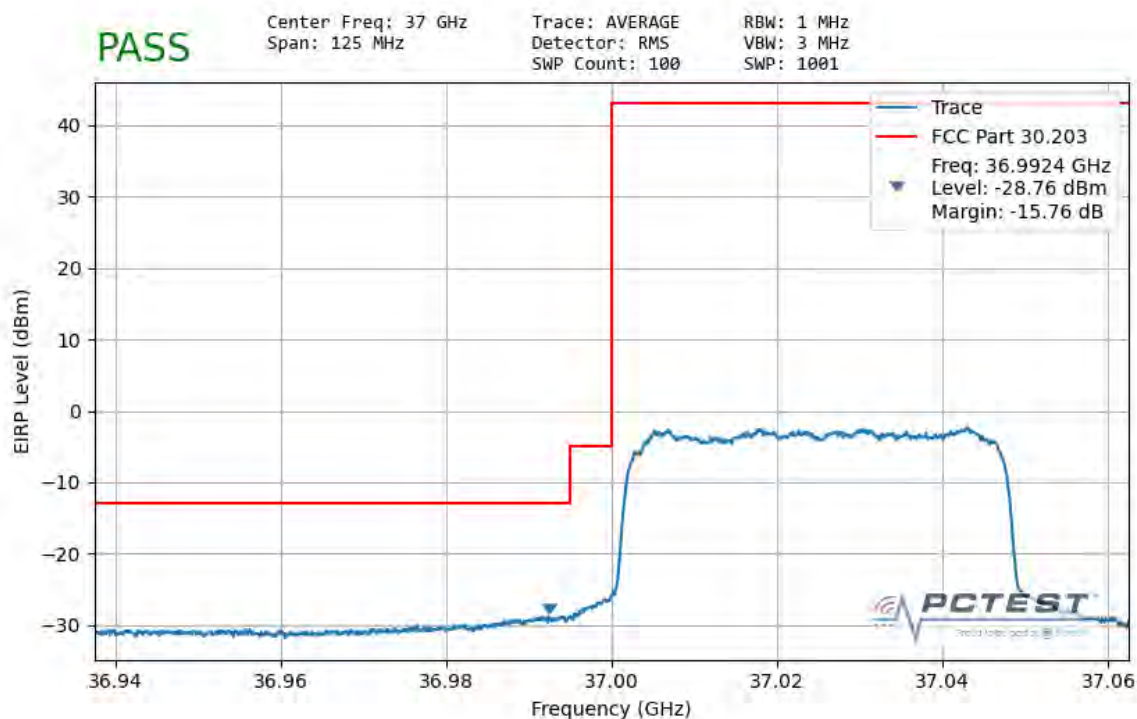
Plot 7-77. Ant 2 Upper Band Edge (100MHz-1CC – QPSK Full RB)



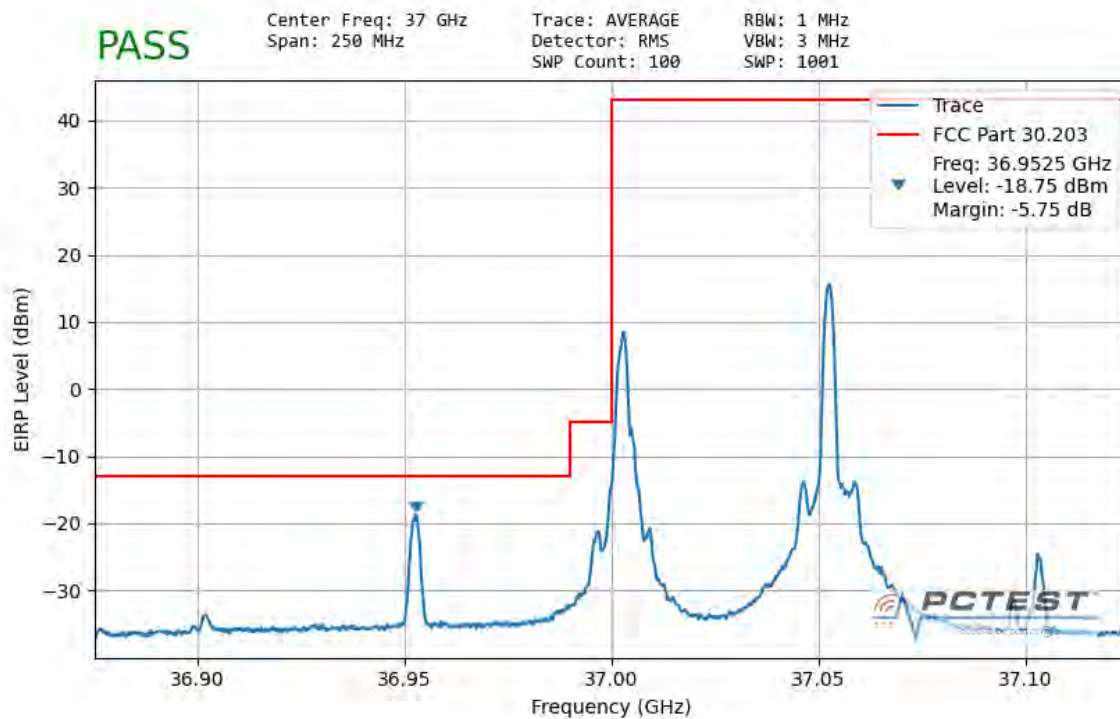
Plot 7-78. Ant 2 Upper Band Edge (100MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 61 of 77

Band n260 – Worst Case

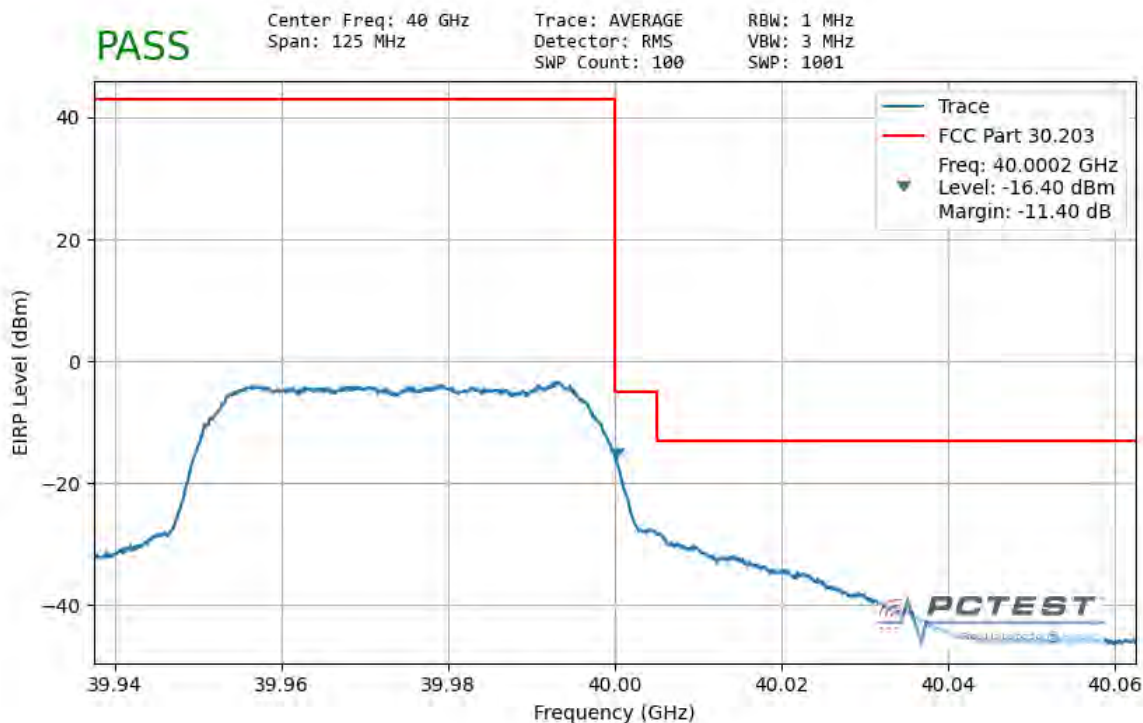


Plot 7-79. Ant 1 Lower Band Edge (50MHz-1CC – QPSK Full RB)

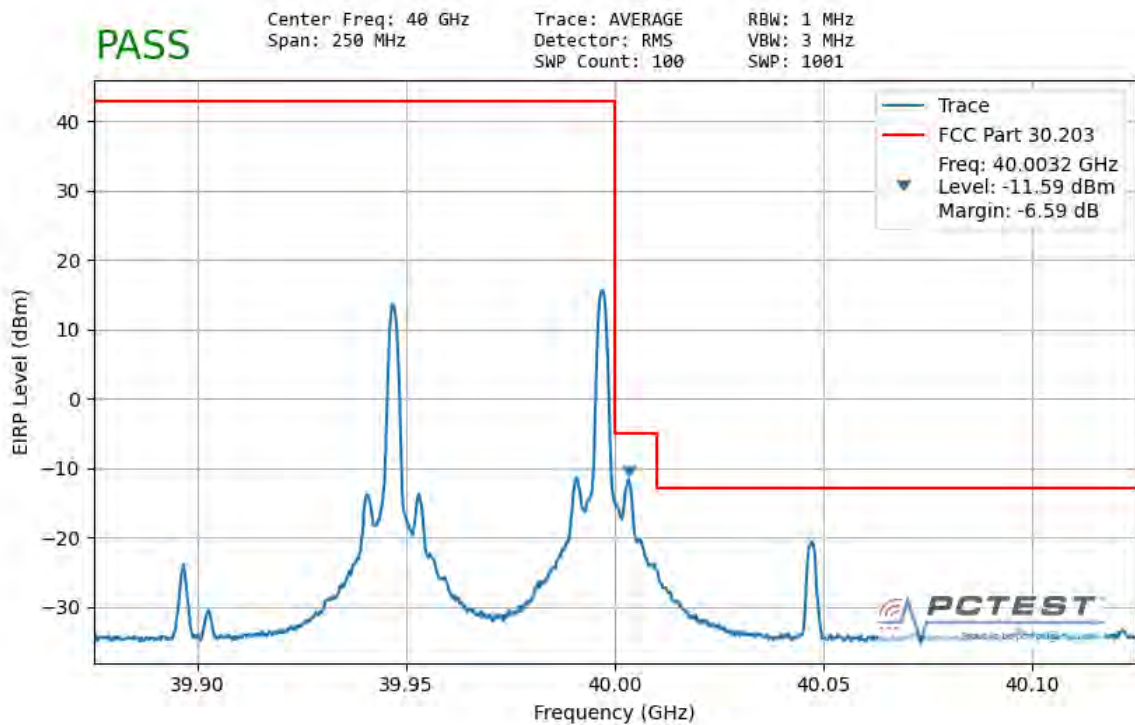


Plot 7-80. Ant 1 Lower Band Edge (50MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 62 of 77

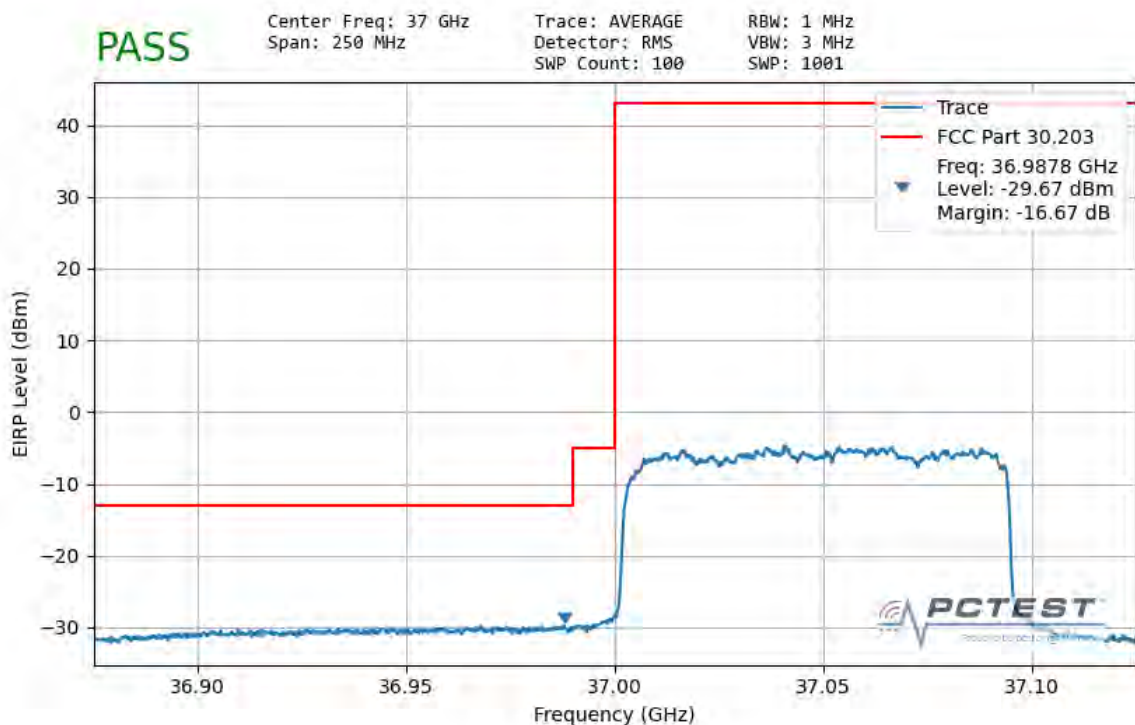


Plot 7-81. Ant 1 Upper Band Edge (50MHz-1CC – QPSK Full RB)

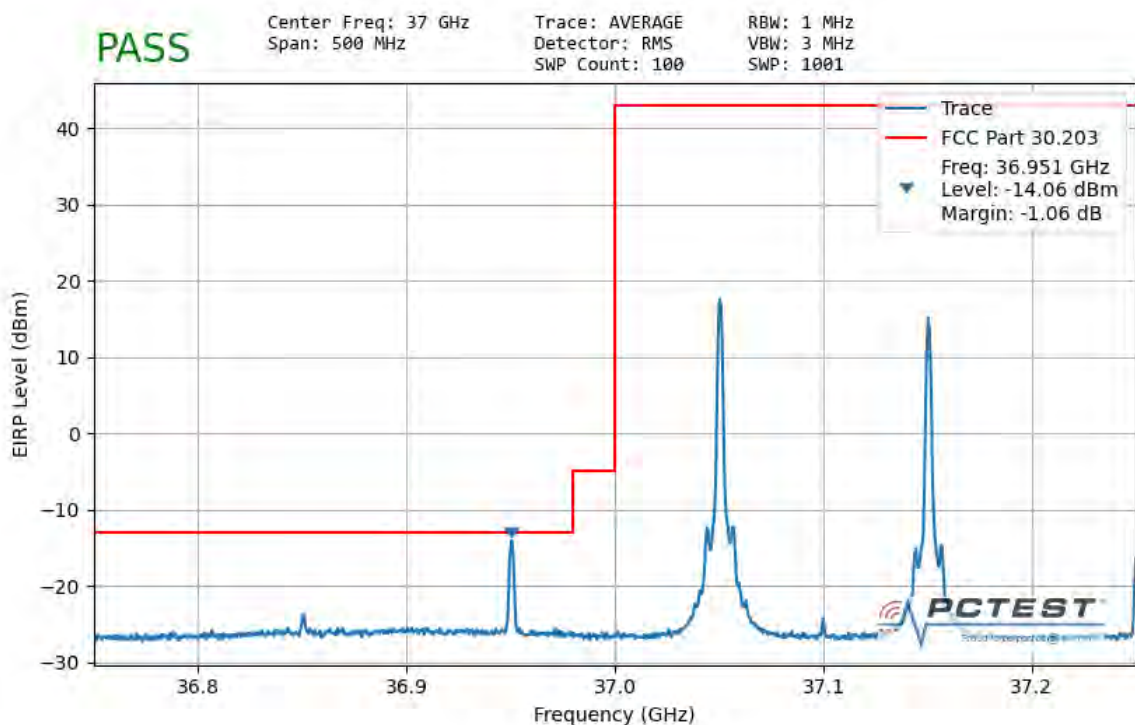


Plot 7-82. Ant 1 Upper Band Edge (50MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 63 of 77

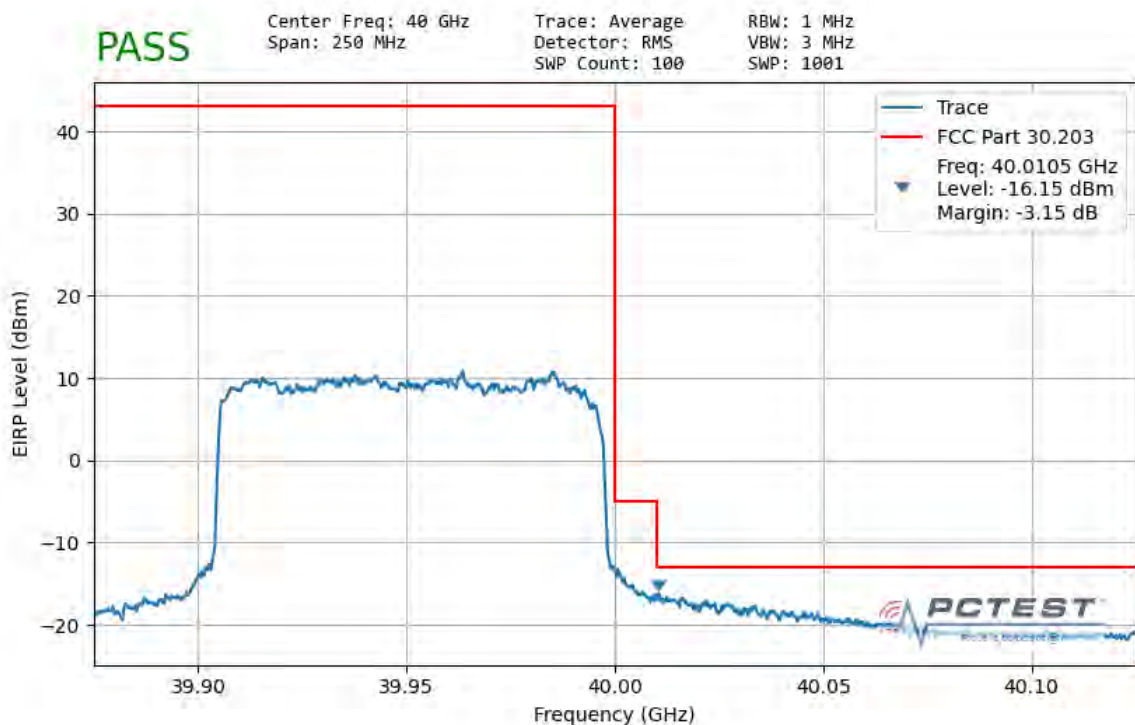


Plot 7-83. Ant 1 Lower Band Edge (100MHz-1CC – QPSK Full RB)

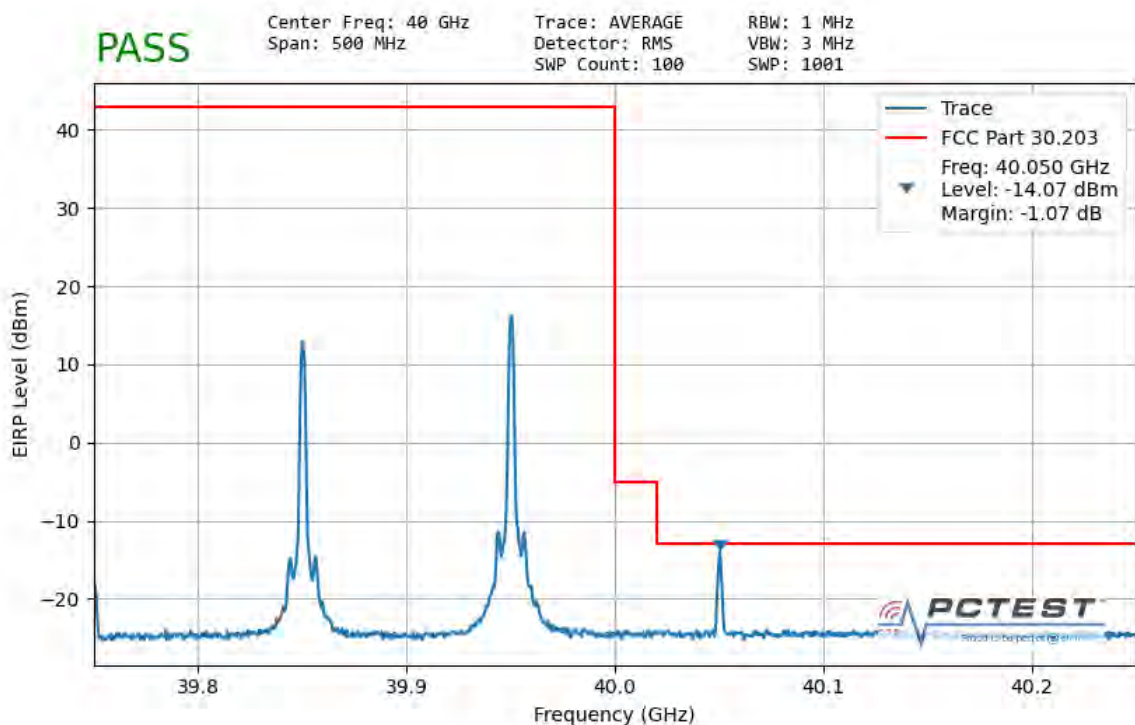


Plot 7-84. Ant 1 Lower Band Edge (100MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 64 of 77

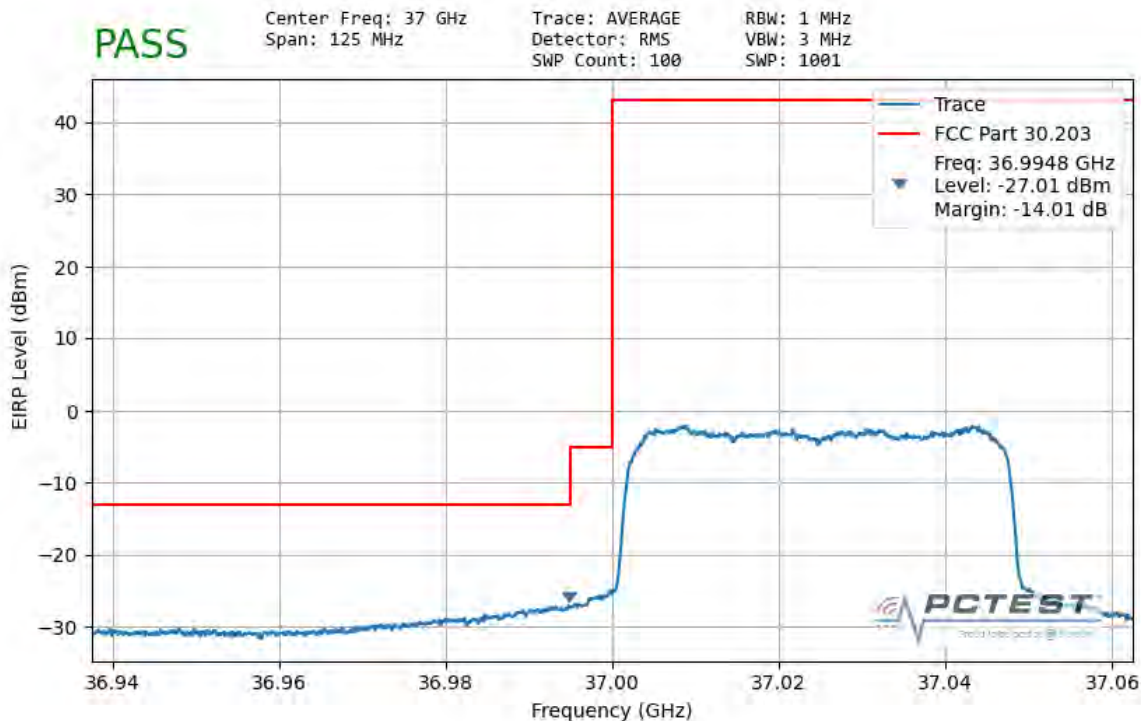


Plot 7-85. Ant 1 Upper Band Edge (100MHz-1CC – QPSK Full RB)

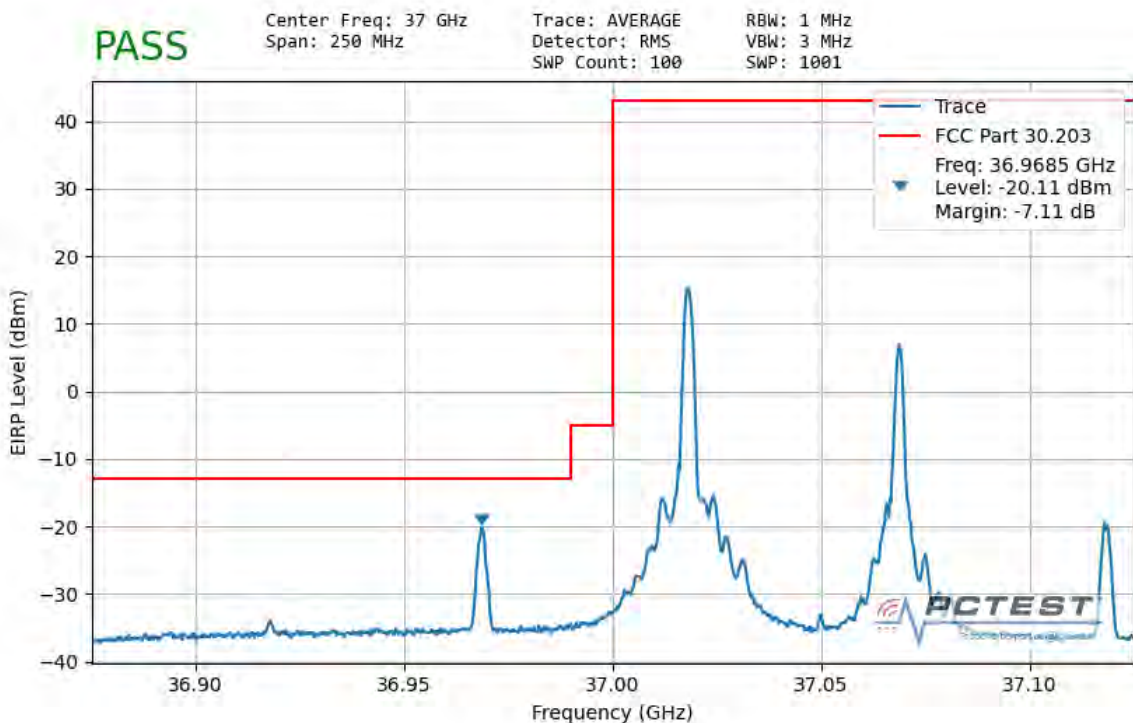


Plot 7-86. Ant 1 Upper Band Edge (100MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 65 of 77

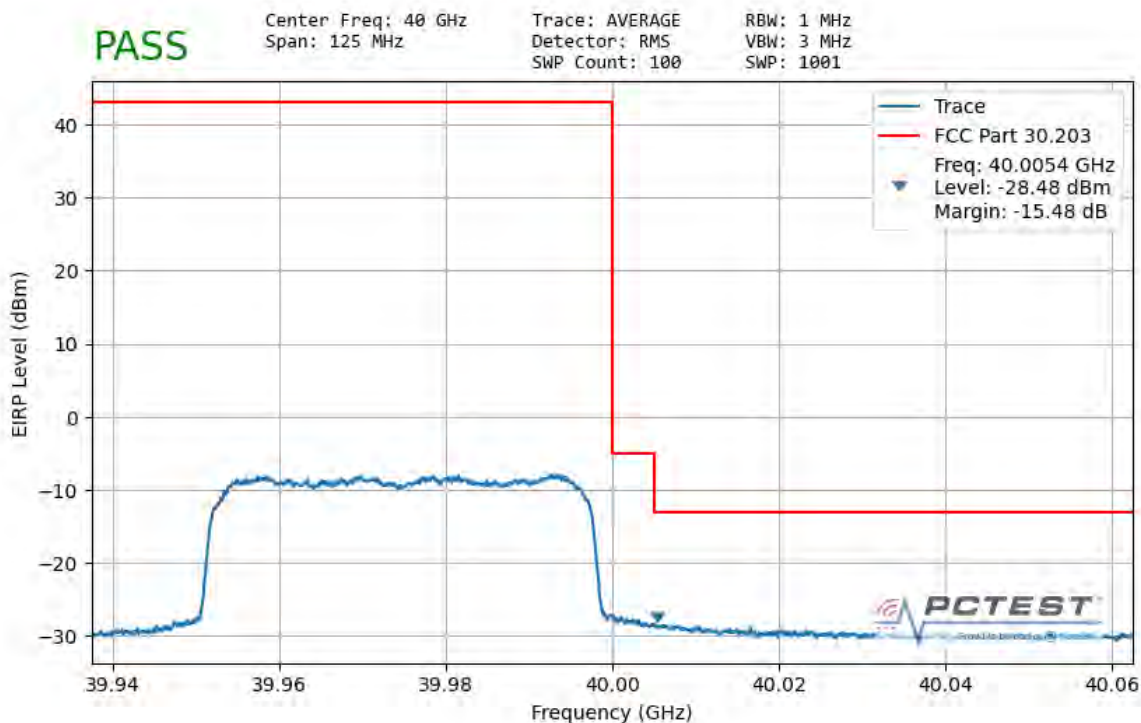


Plot 7-87. Ant 2 Lower Band Edge (50MHz-1CC – QPSK Full RB)

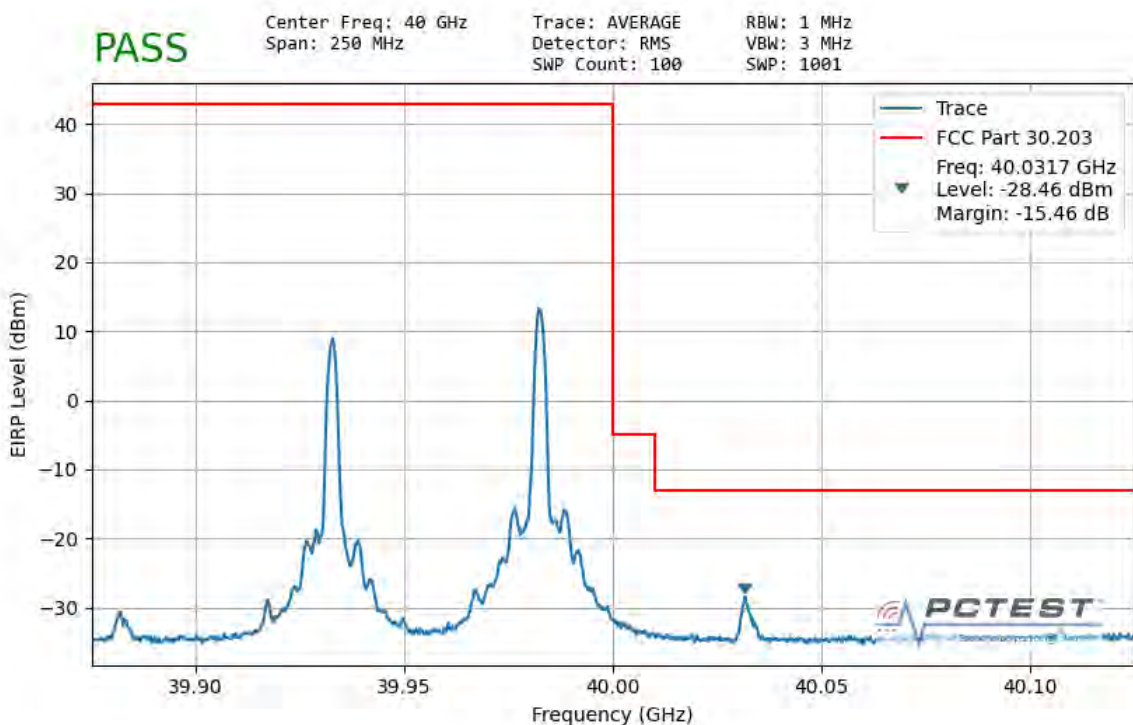


Plot 7-88. Ant 2 Lower Band Edge (50MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 66 of 77

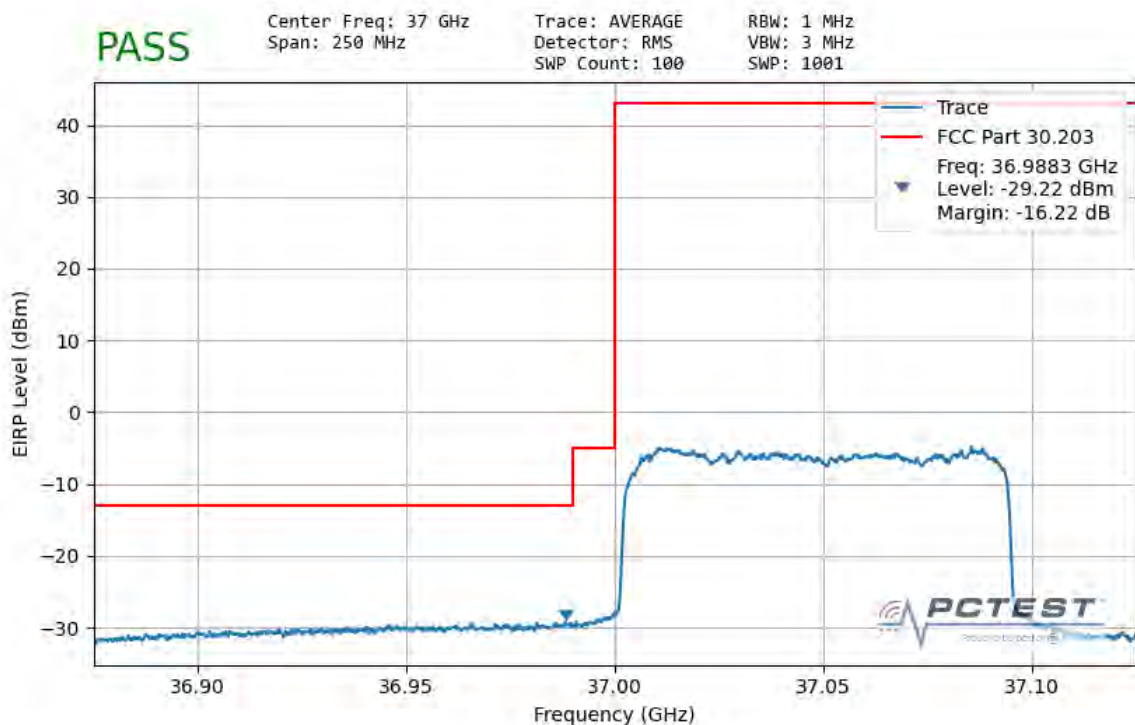


Plot 7-89. Ant 2 Upper Band Edge (50MHz-1CC – QPSK Full RB)

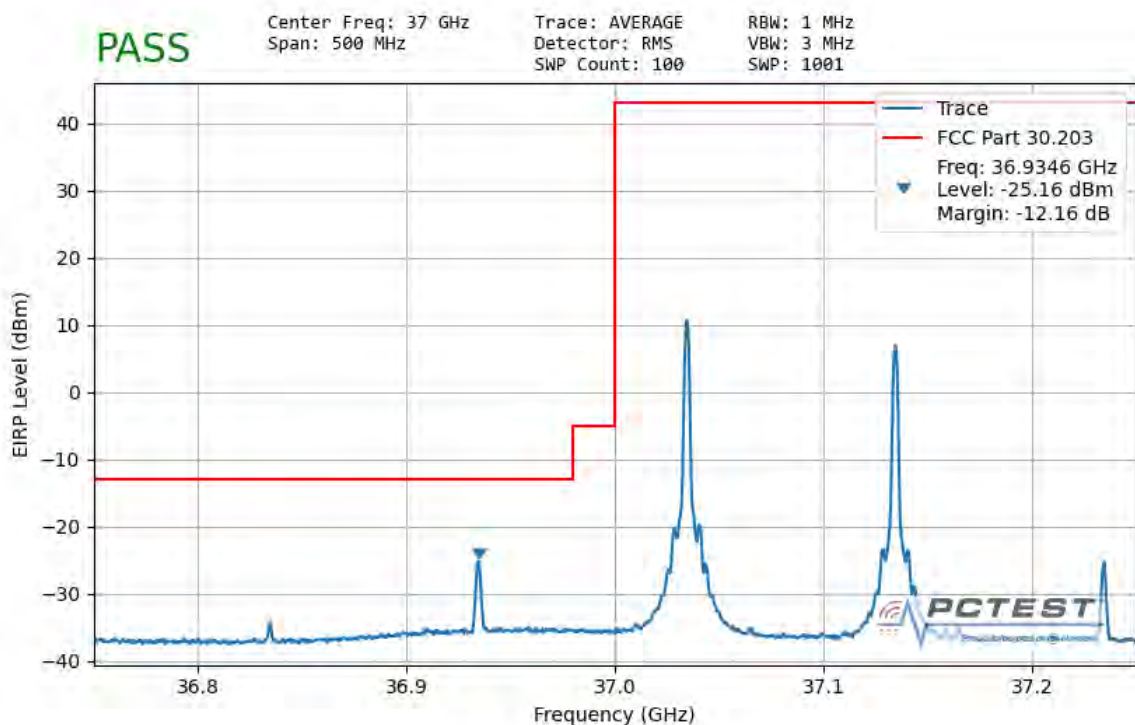


Plot 7-90. Ant 2 Upper Band Edge (50MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 67 of 77

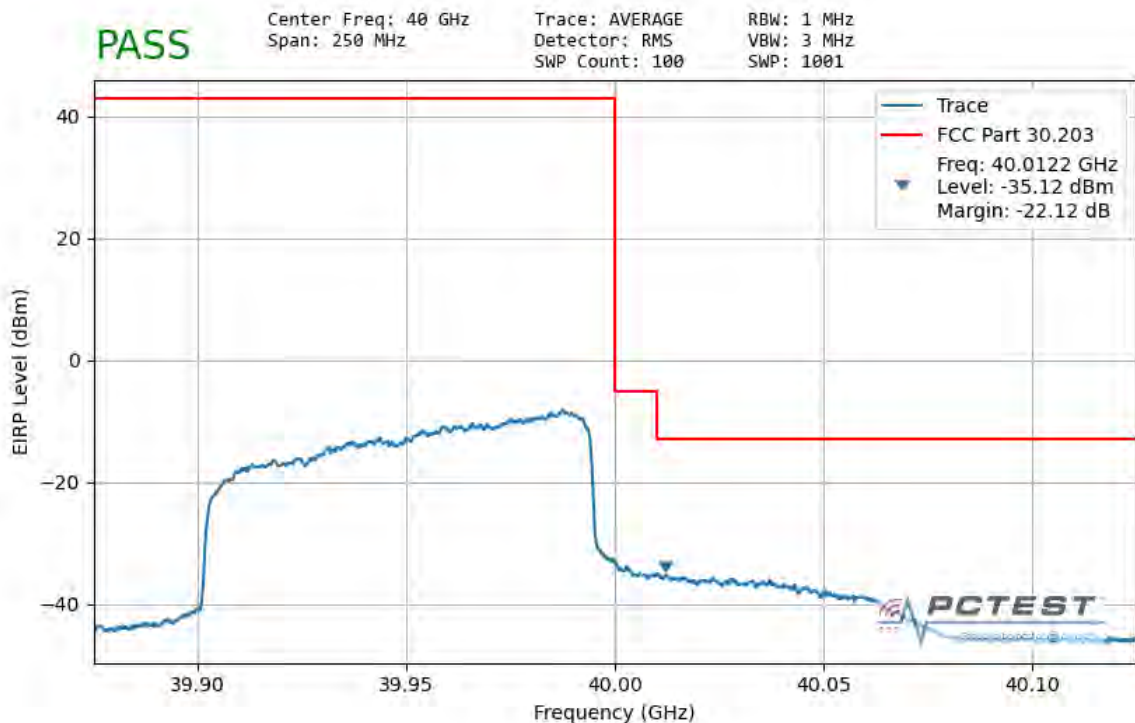


Plot 7-91. Ant 2 Lower Band Edge (100MHz-1CC – QPSK Full RB)

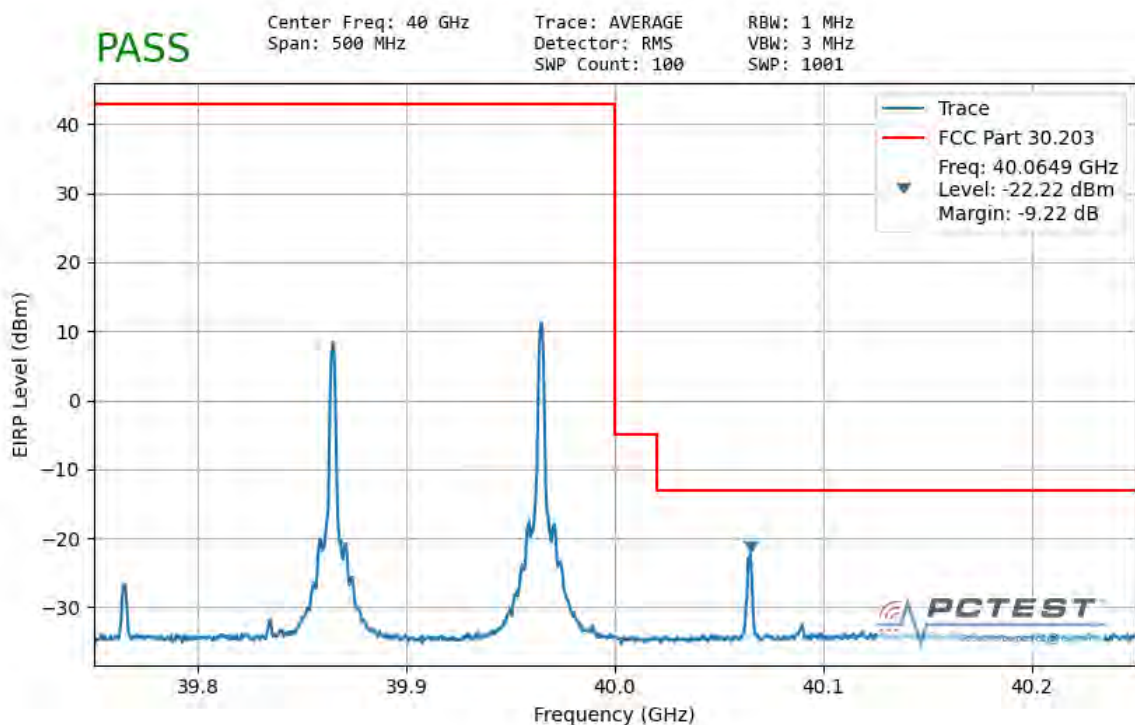


Plot 7-92. Ant 2 Lower Band Edge (100MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 68 of 77



Plot 7-93. Ant 2 Upper Band Edge (100MHz-1CC – QPSK Full RB)



Plot 7-94. Ant 2 Upper Band Edge (100MHz-2CC – QPSK 1 RB)

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M2009140143-06.A3L	Test Dates: 9/14 – 11/17/2020	EUT Type: Portable Handset		Page 69 of 77

7.6 Frequency Stability / Temperature Variation

§2.1055

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Test Procedure Used

ANSI C63.5-2015 Section 5.6
KDB 842590 D01 v01r01 Section 4.5

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was measured using horn antenna connected to a spectrum analyzer. The EUT was placed inside an environmental chamber. Using a foam plug, the horn antenna measured the frequency of the fundamental signal.

Test Notes

The Frequency Deviation column in the table below is the amount of deviation measured from the center frequency of the Reference measurement (first row).

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Frequency Stability Measurements (Band n261)

§2.1055

OPERATING FREQUENCY: 27,922,080,000 Hz
 CHANNEL: 2254091
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	28,083,456,264	0	0.0000000
100 %		- 30	27,712,664,411	370,791,853	1.3279521
100 %		- 20	28,062,116,548	21,339,716	0.0764260
100 %		- 10	28,218,846,302	-135,390,038	-0.4848852
100 %		0	27,802,943,595	280,512,669	1.0046267
100 %		+ 10	27,878,457,442	204,998,822	0.7341818
100 %		+ 20	27,767,332,043	316,124,221	1.1321657
100 %		+ 30	27,724,034,253	359,422,011	1.2872322
100 %		+ 40	28,036,279,997	47,176,267	0.1689569
100 %		+ 50	27,696,411,597	387,044,667	1.3861599
BATT. ENDPOINT	3.14	+ 20	27,710,548,894	372,907,370	1.3355286

Table 7-55. Frequency Stability Data (n261)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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Frequency Stability Measurements (Band n261)

§2.1055

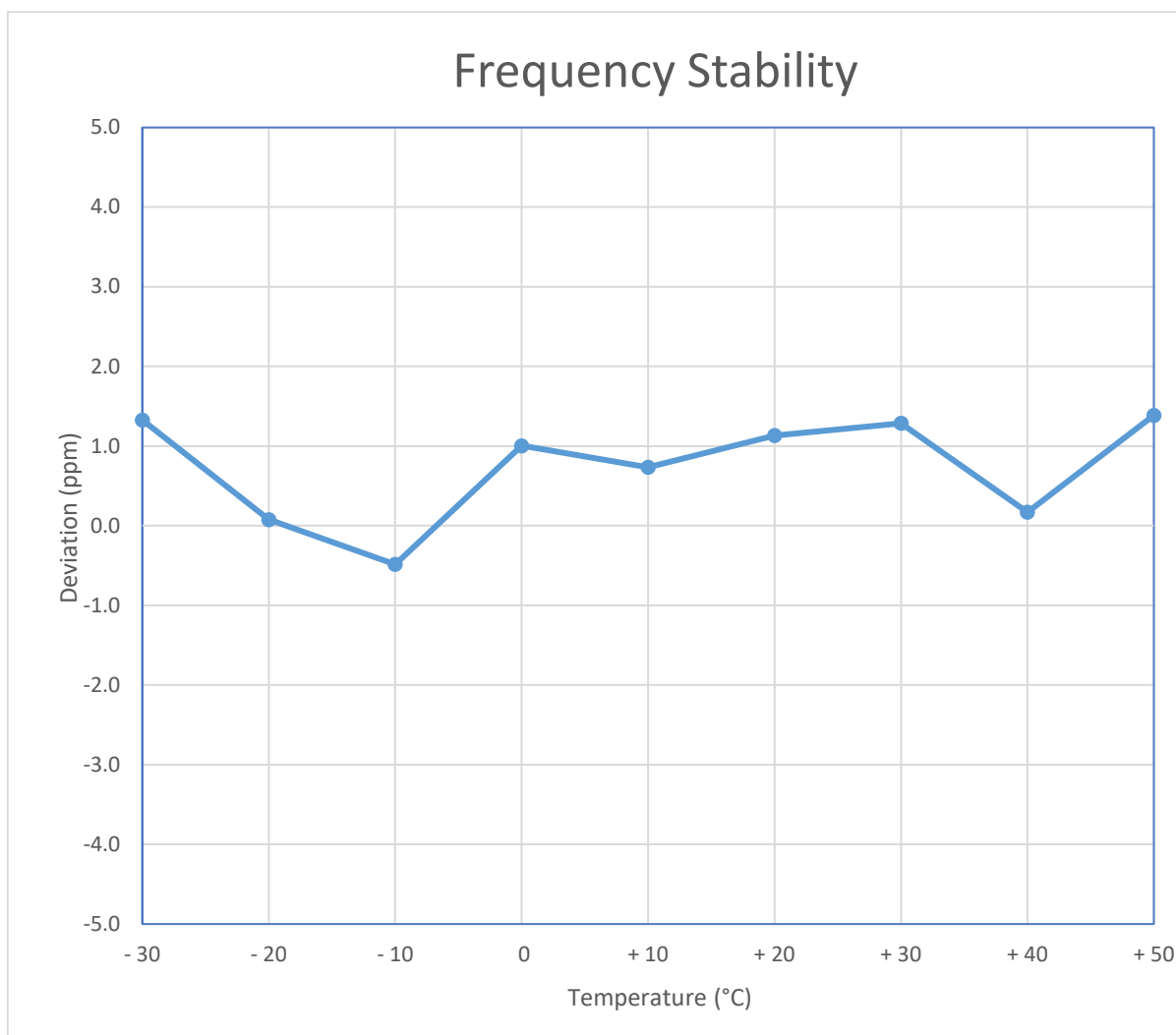


Figure 7-1. Frequency Stability Graph (n261)

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Frequency Stability Measurements (Band n260)

\$2.1055

OPERATING FREQUENCY: 38,495,520,000 Hz
 CHANNEL: 2254091
 REFERENCE VOLTAGE: 3.85 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.85	+ 20 (Ref)	38,429,007,931	0	0.0000000
100 %		- 30	38,390,913,909	38,094,022	0.0989570
100 %		- 20	38,180,924,999	248,082,932	0.6444462
100 %		- 10	38,686,076,605	-257,068,674	-0.6677885
100 %		0	38,758,893,745	-329,885,814	-0.8569460
100 %		+ 10	38,634,991,808	-205,983,877	-0.5350853
100 %		+ 20	38,548,493,894	-119,485,963	-0.3103893
100 %		+ 30	38,234,320,200	194,687,731	0.5057413
100 %		+ 40	38,466,885,424	-37,877,493	-0.0983945
100 %		+ 50	38,219,943,471	209,064,460	0.5430878
BATT. ENDPOINT	3.14	+ 20	38,502,424,903	-73,416,972	-0.1907156

Table 7-56. Frequency Stability Data (n260)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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Frequency Stability Measurements (Band n260)

§2.1055

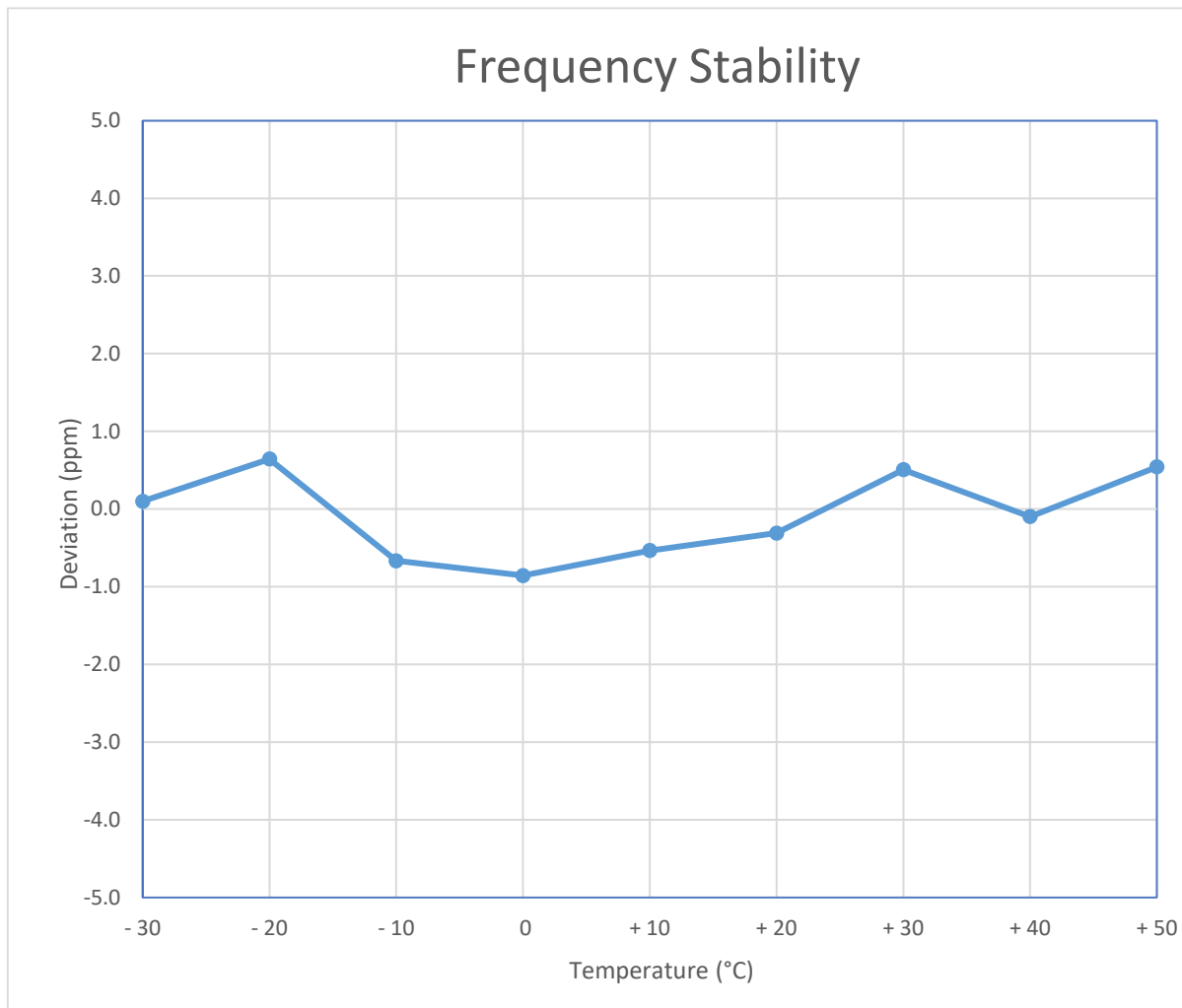


Figure 7-2. Frequency Stability Graph (n260)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG996U** complies with all the requirements of Part 30.

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9.0 APPENDIX A

9.1 VDI Mixer Verification Certificate



Virginia Diodes, Inc
979 2nd St. SE
Suite 309
Charlottesville, VA 22902
Phone: 434-297-3257
Fax: 434-297-3258

Certificate of Conformance

To: PCTEST Engineering Laboratory
7185 Oakland Mills Road
Columbia, MD 21046
United States

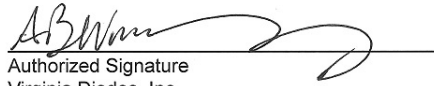
From: Virginia Diodes, Inc
979 2nd St. SE
Suite 309
Charlottesville, VA 22902

Packing List No: 193065

Today's Date: 10/02/19

Quantity			
Shipped	Unit	Description	Order-Job Number
1	EA	VDIWR19.0SAX WR19SAX / SN: SAX 411	19329-01

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).


Authorized Signature
Virginia Diodes, Inc

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Virginia Diodes, Inc
 979 2nd St. SE
 Suite 309
 Charlottesville, VA 22902
 Phone: 434-297-3257
 Fax: 434-297-3258

Certificate of Conformance

To: PCTEST Engineering Laboratory
 7185 Oakland Mills Road
 Columbia, MD 21046
 United States

From: Virginia Diodes, Inc
 979 2nd St. SE
 Suite 309
 Charlottesville, VA 22902

Packing List No: 193037
 Shipping Date: 09/30/19

Today's Date: 09/30/19
 PO Number: 190719.DP1R

Quantity			Order-Job
Shipped	Unit	Description	Number
1	EA	SAX RETEST-WR12SAX WR12SAX / SN: SAX 252	19408-01
1	EA	SAX RETEST-WR8.0SAX WR8.0SAX / SN: SAX 253	19408-02
1	EA	SAX RETEST-WR5.1SAX WR5.1SAX / SN: SAX 254	19408-03

The VDI product(s) in this shipment meet(s) the guidelines for performance specifications established in accordance with the corresponding Purchase Order. Data presented in the User Guide, where applicable, has been obtained in accordance with VDI's Quality Management System. All instruments, used to obtain data, which require calibration have been calibrated with equipment traceable to the National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI).

Authorized Signature
 Virginia Diodes, Inc



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FCC ID: A3LSMG996U		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
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