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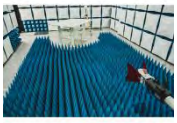


MEASUREMENT REPORT
FCC Part 30 5G mmWave

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

Date of Testing:
5/13/2020 – 7/6/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2004230075-05.A3L

FCC ID:	**A3LSMT978U**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SM-T978U
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

ACCREDITED
CERT #2041.01

TABLE OF CONTENTS

MEASUREMENT REPORT
FCC Part 30

Antenna	Mode	Bandwidth (MHz)	CCs Active	Band	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
						Max. Power (W)	Max. Power (dBm)		
Ant1	SISO	50	1	n261	27500 - 28350	0.553	27.43	45M3G7D	QPSK
Ant1	SISO	50	1	n261	27500 - 28350	0.543	27.35	45M3G7D	pi/2-BPSK
Ant1	SISO	50	1	n261	27500 - 28350	0.346	25.39	45M3W7D	16QAM
Ant1	SISO	50	1	n261	27500 - 28350	0.258	24.12	45M6W7D	64QAM
Ant1	MIMO	50	1	n261	27500 - 28350	0.385	25.86	45M3G7D	QPSK
Ant1	SISO	50	2	n261	27500 - 28350	0.310	24.92	94M5G7D	QPSK
Ant1	SISO	50	2	n261	27500 - 28350	0.310	24.91	94M6G7D	pi/2-BPSK
Ant1	SISO	50	2	n261	27500 - 28350	0.221	23.44	94M5W7D	16QAM
Ant1	SISO	50	2	n261	27500 - 28350	0.132	21.19	94M5W7D	64QAM
Ant1	SISO	100	1	n261	27500 - 28350	0.548	27.39	92M7G7D	QPSK
Ant1	SISO	100	1	n261	27500 - 28350	0.532	27.26	92M6G7D	pi/2-BPSK
Ant1	SISO	100	1	n261	27500 - 28350	0.352	25.46	92M8W7D	16QAM
Ant1	SISO	100	1	n261	27500 - 28350	0.267	24.26	92M9W7D	64QAM
Ant1	MIMO	100	1	n261	27500 - 28350	0.406	26.09	92M7G7D	QPSK
Ant1	SISO	100	2	n261	27500 - 28350	0.304	24.83	190MG7D	QPSK
Ant1	SISO	100	2	n261	27500 - 28350	0.306	24.86	190MG7D	pi/2-BPSK
Ant1	SISO	100	2	n261	27500 - 28350	0.214	23.31	190MW7D	16QAM
Ant1	SISO	100	2	n261	27500 - 28350	0.132	21.22	190MW7D	64QAM

EUT Overview (Back / Ant1 - Band n261)

Antenna	Mode	Bandwidth (MHz)	CCs Active	Band	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
						Max. Power (W)	Max. Power (dBm)		
Ant2	SISO	50	1	n261	27500 - 28350	0.405	26.07	-	QPSK
Ant2	SISO	50	1	n261	27500 - 28350	0.394	25.95	-	pi/2-BPSK
Ant2	SISO	50	1	n261	27500 - 28350	0.249	23.97	-	16QAM
Ant2	SISO	50	1	n261	27500 - 28350	0.160	22.04	-	64QAM
Ant2	MIMO	50	1	n261	27500 - 28350	0.372	25.70	-	QPSK
Ant2	SISO	50	2	n261	27500 - 28350	0.215	23.32	-	QPSK
Ant2	SISO	50	2	n261	27500 - 28350	0.213	23.29	-	pi/2-BPSK
Ant2	SISO	50	2	n261	27500 - 28350	0.147	21.67	-	16QAM
Ant2	SISO	50	2	n261	27500 - 28350	0.104	20.16	-	64QAM
Ant2	SISO	100	1	n261	27500 - 28350	0.394	25.96	-	QPSK
Ant2	SISO	100	1	n261	27500 - 28350	0.383	25.83	-	pi/2-BPSK
Ant2	SISO	100	1	n261	27500 - 28350	0.228	23.57	-	16QAM
Ant2	SISO	100	1	n261	27500 - 28350	0.182	22.61	-	64QAM
Ant2	MIMO	100	1	n261	27500 - 28350	0.368	25.66	-	QPSK
Ant2	SISO	100	2	n261	27500 - 28350	0.205	23.11	-	QPSK
Ant2	SISO	100	2	n261	27500 - 28350	0.203	23.08	-	pi/2-BPSK
Ant2	SISO	100	2	n261	27500 - 28350	0.143	21.56	-	16QAM
Ant2	SISO	100	2	n261	27500 - 28350	0.089	19.47	-	64QAM

EUT Overview (Front / Ant2 - Band n261)

Antenna	Mode	Bandwidth (MHz)	CCs Active	Band	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
						Max. Power (W)	Max. Power (dBm)		
Ant1	SISO	50	1	n260	37000 - 40000	0.384	25.84	-	QPSK
Ant1	SISO	50	1	n260	37000 - 40000	0.382	25.82	-	pi/2-BPSK
Ant1	SISO	50	1	n260	37000 - 40000	0.249	23.97	-	16QAM
Ant1	SISO	50	1	n260	37000 - 40000	0.163	22.12	-	64QAM
Ant1	MIMO	50	1	n260	37000 - 40000	0.235	23.71	-	QPSK
Ant1	SISO	50	2	n260	37000 - 40000	0.181	22.58	-	QPSK
Ant1	SISO	50	2	n260	37000 - 40000	0.176	22.45	-	pi/2-BPSK
Ant1	SISO	50	2	n260	37000 - 40000	0.115	20.61	-	16QAM
Ant1	SISO	50	2	n260	37000 - 40000	0.081	19.07	-	64QAM
Ant1	SISO	100	1	n260	37000 - 40000	0.382	25.82	-	QPSK
Ant1	SISO	100	1	n260	37000 - 40000	0.378	25.77	-	pi/2-BPSK
Ant1	SISO	100	1	n260	37000 - 40000	0.256	24.08	-	16QAM
Ant1	SISO	100	1	n260	37000 - 40000	0.162	22.09	-	64QAM
Ant1	MIMO	100	1	n260	37000 - 40000	0.238	23.77	-	QPSK
Ant1	SISO	100	2	n260	37000 - 40000	0.182	22.61	-	QPSK
Ant1	SISO	100	2	n260	37000 - 40000	0.180	22.55	-	pi/2-BPSK
Ant1	SISO	100	2	n260	37000 - 40000	0.120	20.80	-	16QAM
Ant1	SISO	100	2	n260	37000 - 40000	0.083	19.19	-	64QAM

EUT Overview (Back / Ant1 - Band n260)

Antenna	Mode	Bandwidth (MHz)	CCs Active	Band	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
						Max. Power (W)	Max. Power (dBm)		
Ant2	SISO	50	1	n260	37000 - 40000	0.499	26.98	45M3G7D	QPSK
Ant2	SISO	50	1	n260	37000 - 40000	0.486	26.87	45M1G7D	pi/2-BPSK
Ant2	SISO	50	1	n260	37000 - 40000	0.344	25.37	45M4W7D	16QAM
Ant2	SISO	50	1	n260	37000 - 40000	0.211	23.25	45M2W7D	64QAM
Ant2	MIMO	50	1	n260	37000 - 40000	0.387	25.88	45M3G7D	QPSK
Ant2	SISO	50	2	n260	37000 - 40000	0.266	24.25	94M9G7D	QPSK
Ant2	SISO	50	2	n260	37000 - 40000	0.265	24.23	95M0G7D	pi/2-BPSK
Ant2	SISO	50	2	n260	37000 - 40000	0.181	22.58	94M7W7D	16QAM
Ant2	SISO	50	2	n260	37000 - 40000	0.114	20.57	94M4W7D	64QAM
Ant2	SISO	100	1	n260	37000 - 40000	0.490	26.90	92M6G7D	QPSK
Ant2	SISO	100	1	n260	37000 - 40000	0.485	26.86	90M7G7D	pi/2-BPSK
Ant2	SISO	100	1	n260	37000 - 40000	0.353	25.48	92M9W7D	16QAM
Ant2	SISO	100	1	n260	37000 - 40000	0.213	23.29	93M1W7D	64QAM
Ant2	MIMO	100	1	n260	37000 - 40000	0.396	25.98	92M6G7D	QPSK
Ant2	SISO	100	2	n260	37000 - 40000	0.254	24.05	190MG7D	QPSK
Ant2	SISO	100	2	n260	37000 - 40000	0.257	24.10	191MG7D	pi/2-BPSK
Ant2	SISO	100	2	n260	37000 - 40000	0.176	22.45	191MW7D	16QAM
Ant2	SISO	100	2	n260	37000 - 40000	0.108	20.34	191MW7D	64QAM

EUT Overview (Front / Ant2 - Band n260)

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

1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

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

1.3 Test Facility / Accreditations

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

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMT978U**. The test data contained in this report pertains only to the emissions due to the EUT's 5G mmWave function.

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

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

Antenna	Name	Module
Ant1	Back	Module 0
Ant2	Front	Module 1

Test Device Serial No.: 1255M, 1273M

2.2 Device Capabilities

This device contains the following capabilities:

850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR(n71, n5, n66, n25, n2, n41, n261, n260), 802.11b/g/n/ac/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE)

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

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 (i.e., a maximum uplink duty cycle of 100%). 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.

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.

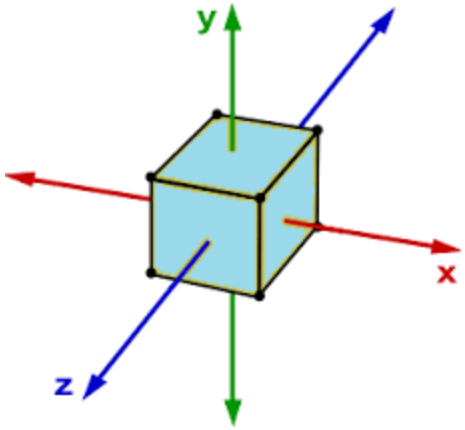


Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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 & Measurment 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.

Field Strength [dBμV/m] = Measured Value [dBm] + AFCL [dB/m] + 107

= - 32.74 dBm + (40.7dB/m + 8.78dB) + 107 = 123.74dBuV/m

= 10^(123.74/20)/1000000 = 1.54 V/m

e.i.r.p. [dBm] = 10 * log((E-Field*D_m)^2/30) + 30dB

= 10*log((1.54V/m * 1.00m)^2/30) + 30dB

= 18.98 dBm e.i.r.p.

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 (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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
Espec	ESX-2CA	Environmental Chamber	8/13/2019	Annual	8/13/2020	17620
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/19/2018	Biennial	7/19/2020	A051107
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	2/14/2019	Biennial	2/14/2021	125518
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	11/1/2019	Annual	11/1/2020	100040
Rohde & Schwarz	TS-PR40	26.5-40 GHz Pre-Amplifier	11/1/2019	Annual	11/1/2020	100037
Agilent	N9030A	PXA Signal Analyzer (44GHz)	8/12/2019	Annual	8/12/2020	MY52350166
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	7/6/2019	Annual	7/6/2020	103200
Anritsu	MS46322A	Vector Network Analyzer	8/19/2019	Annual	8/19/2020	1521001
Anritsu	36585K-2F	Precision Autocal 2-Port	7/16/2019	Annual	7/16/2020	1628014
Virginia Diodes Inc	SAX253	SAX Module (90 - 140GHz)	9/30/2019	Annual	9/30/2020	SAX253
Virginia Diodes Inc	SAX252	SAX Module (60 - 90GHz)	9/30/2019	Annual	9/30/2020	SAX252
Virginia Diodes Inc	SAX411	SAX Module (40 - 60GHz)	10/2/2019	Annual	10/2/2020	SAX411
Virginia Diodes Inc	SAX254	SAX Module (140 - 220GHz)	9/30/2019	Annual	9/30/2020	SAX254
ETS-Lindgren	3116C	DRG Horn Antenna	3/11/2019	Biennial	3/11/2021	218893
OML Inc.	M19RH	WR-19 Horn Antenna, 24dBi, 40 to 60 GHz	7/30/2018	Biennial	7/30/2020	18073001
OML Inc.	M12RH	WR-12 Horn Antenna, 24dBi, 60 to 90 GHz	7/30/2018	Biennial	7/30/2020	18073001
OML Inc.	M08RH	WR-08 Horn Antenna, 24dBi, 90 to 140 GHz	7/30/2018	Biennial	7/30/2020	18073001
OML Inc.	M05RH	WR-05 Horn Antenna, 24dBi, 140 to 220 GHz	7/30/2018	Biennial	7/30/2020	18073001

Table 5-1. Test Equipment

6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 800MG7D

BW = 800 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 802MW7D

BW = 802 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMT978U

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 chosed 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.

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 ≥ 3 x 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

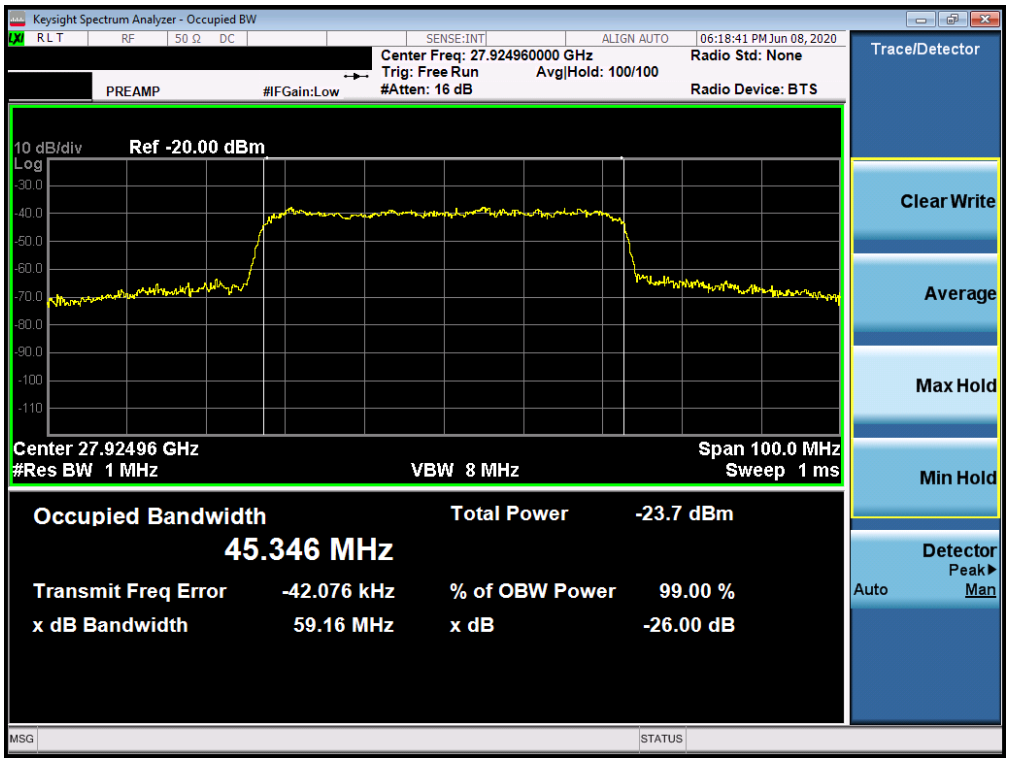
Test Notes

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.

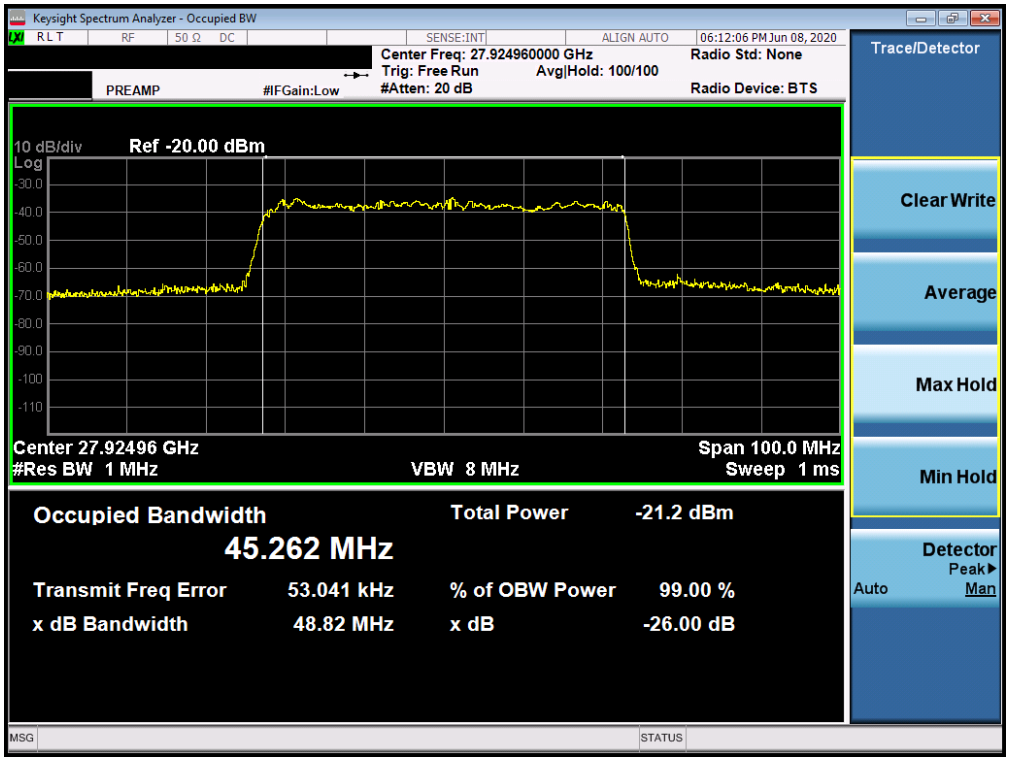
Band n261

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	50	1	CP-OFDM	QPSK	45.35
			DFT-s-OFDM	pi/2-BPSK	45.26
			CP-OFDM	16QAM	45.30
			CP-OFDM	64QAM	45.57
		2	CP-OFDM	QPSK	94.52
			DFT-s-OFDM	pi/2-BPSK	94.62
			CP-OFDM	16QAM	94.50
			CP-OFDM	64QAM	94.47
	100	1	CP-OFDM	QPSK	92.71
			DFT-s-OFDM	pi/2-BPSK	92.63
			CP-OFDM	16QAM	92.77
			CP-OFDM	64QAM	92.89
		2	CP-OFDM	QPSK	190.17
			DFT-s-OFDM	pi/2-BPSK	190.49
			CP-OFDM	16QAM	189.75
			CP-OFDM	64QAM	189.74

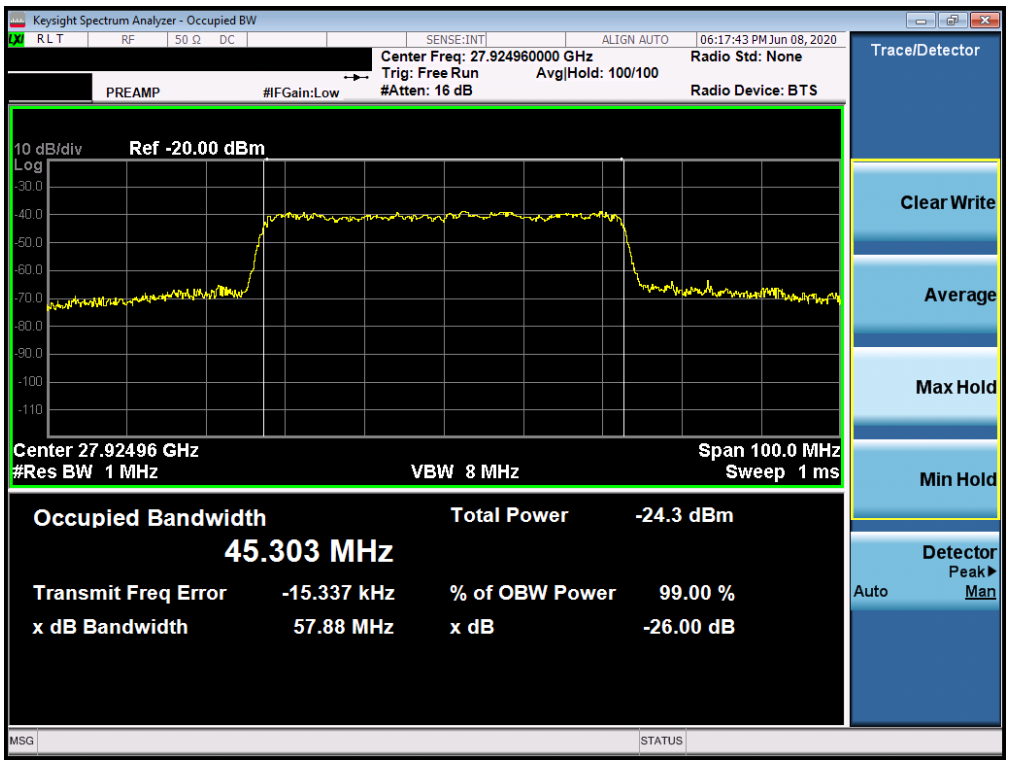
Table 7-2. Summary of Ant 1 Occupied Bandwidths (n261 Back)



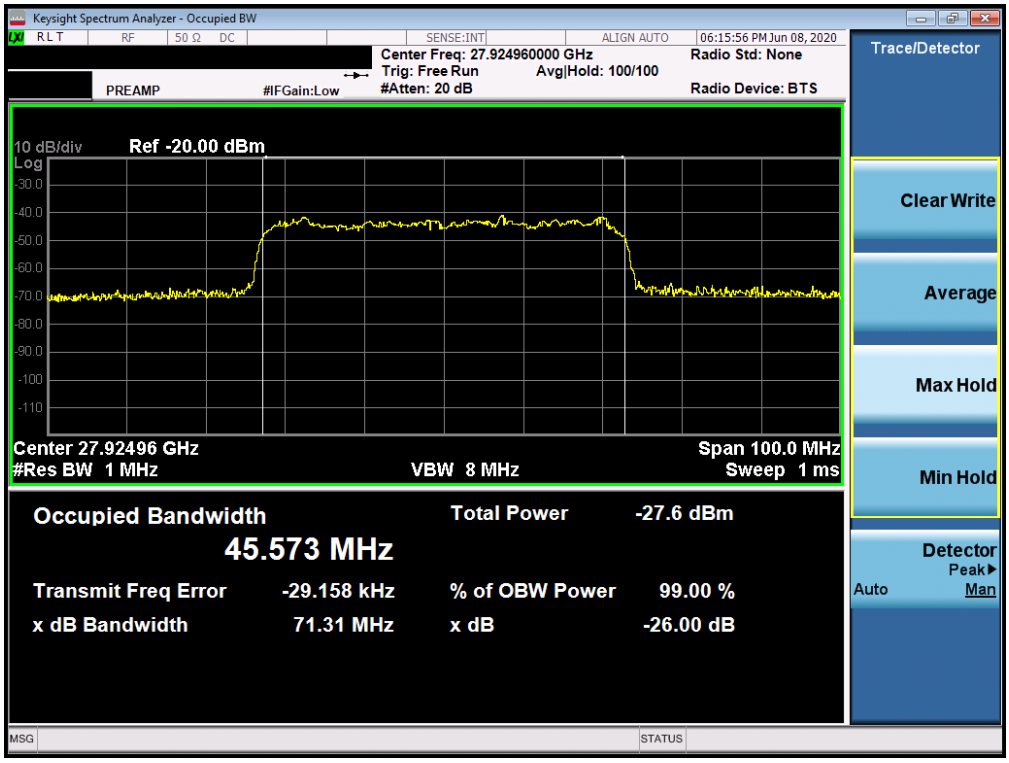
Plot 7-1. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



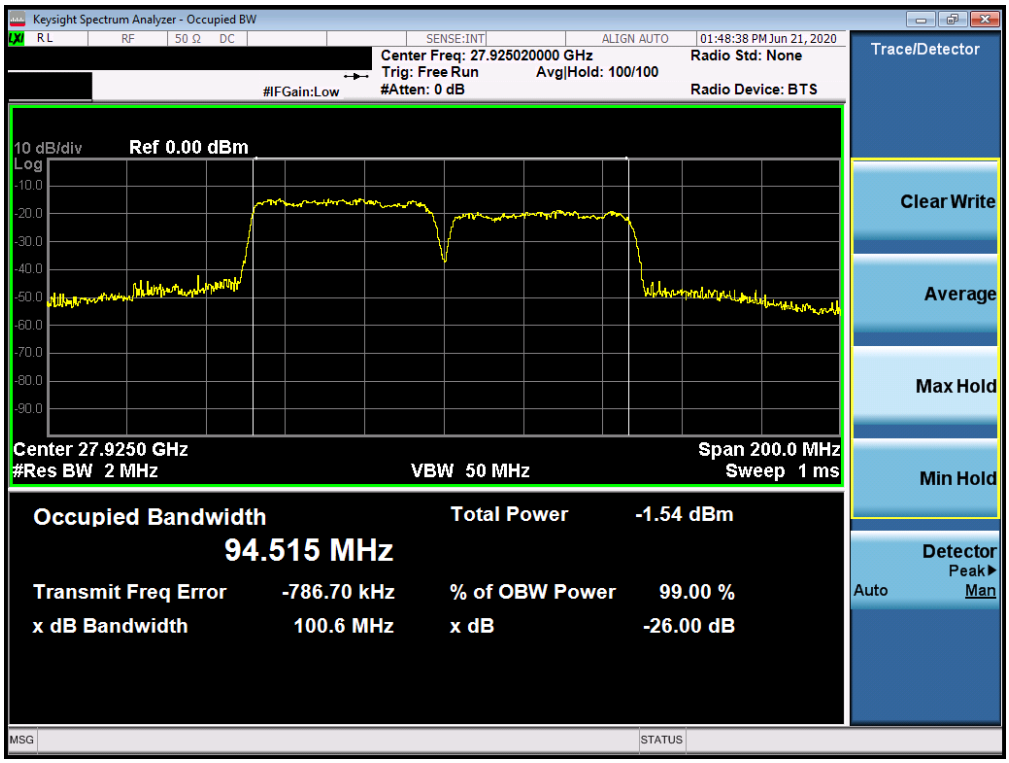
Plot 7-2. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)



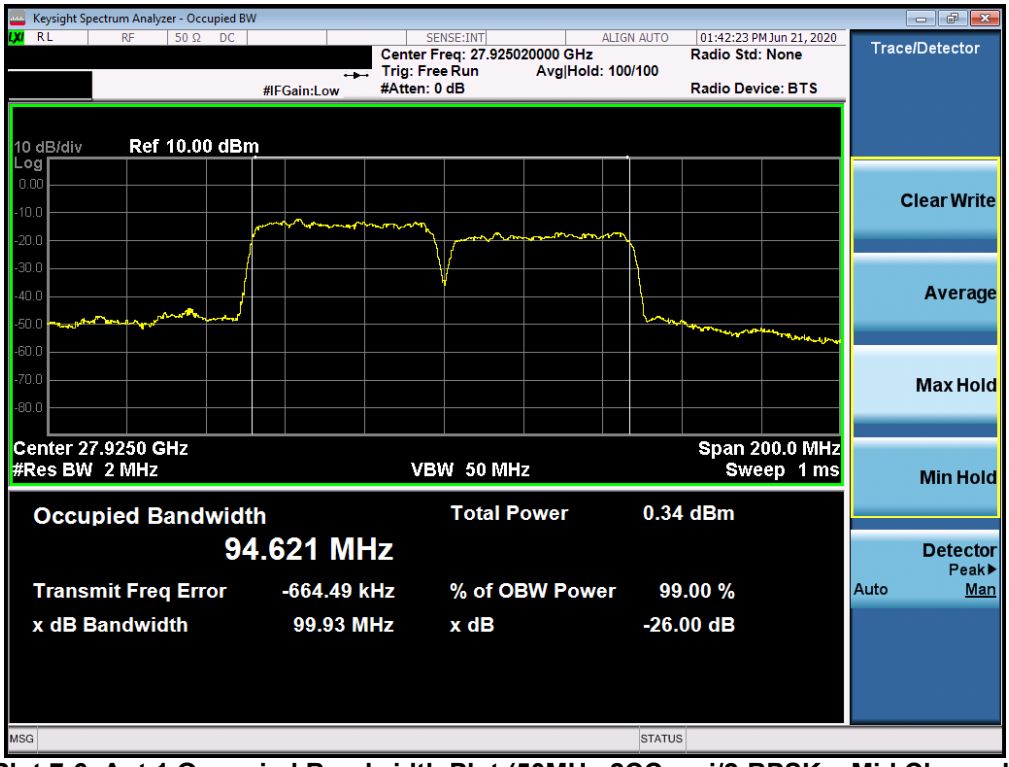
Plot 7-3. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



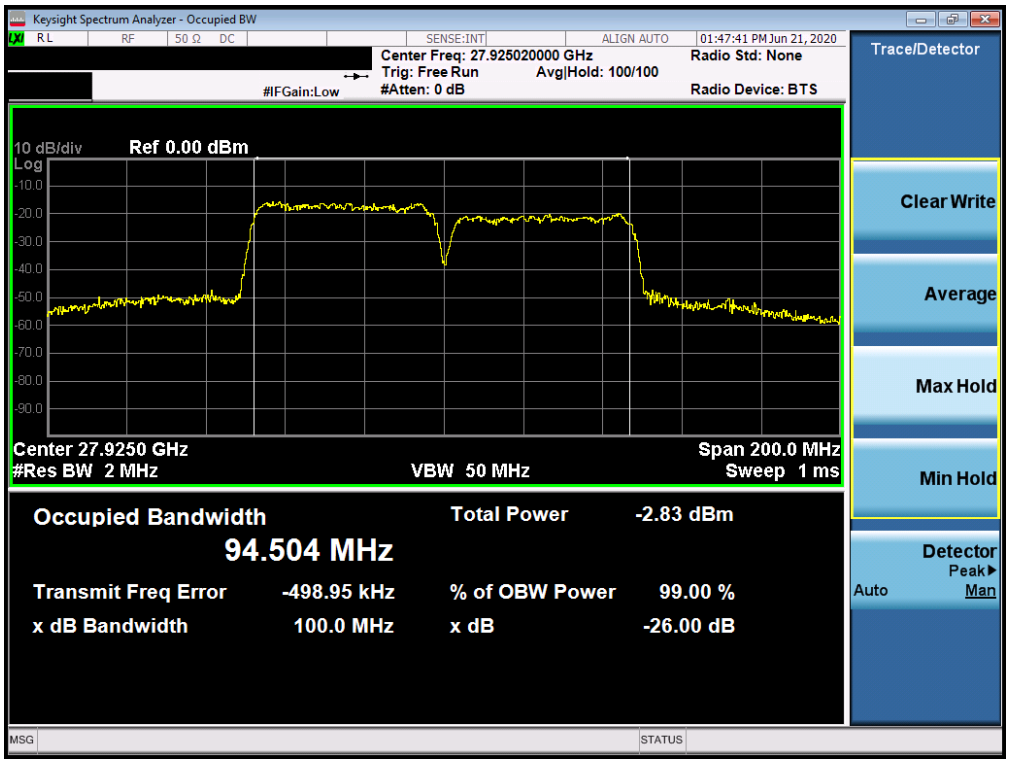
Plot 7-4. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)



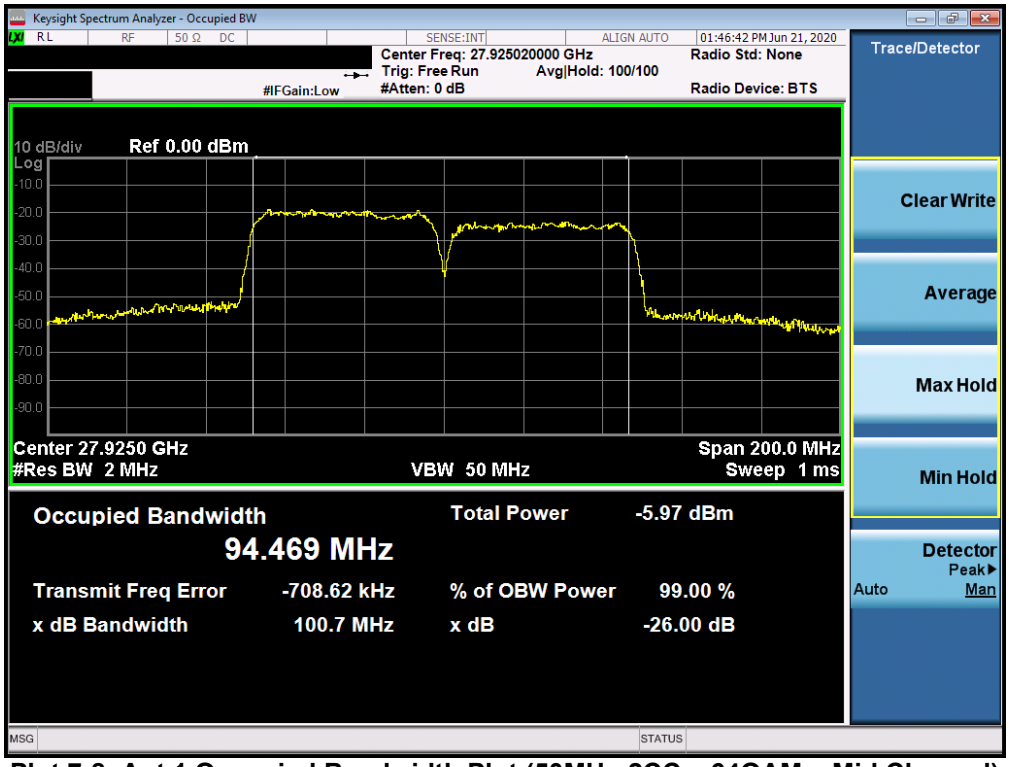
Plot 7-2. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



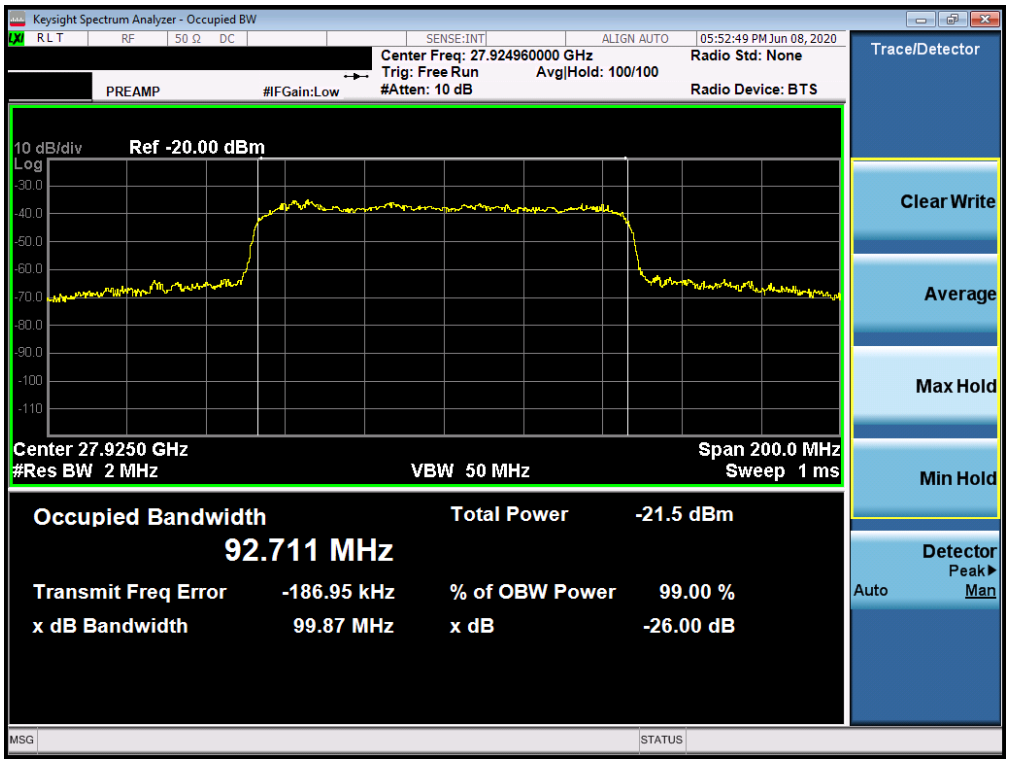
Plot 7-6. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)



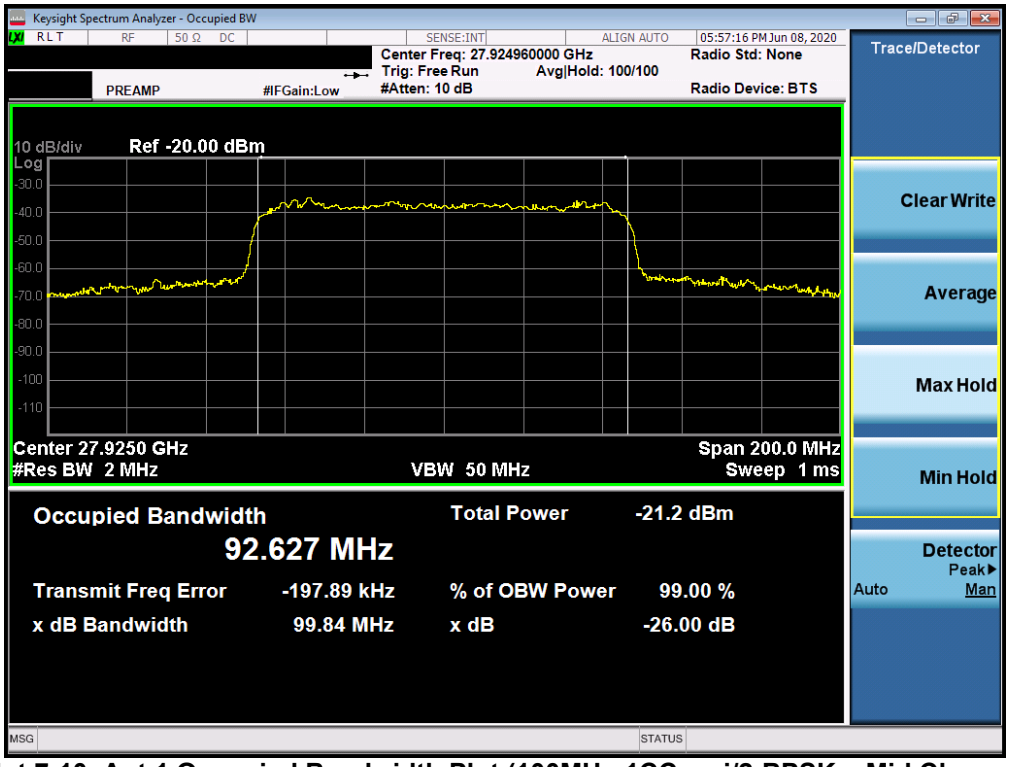
Plot 7-7. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



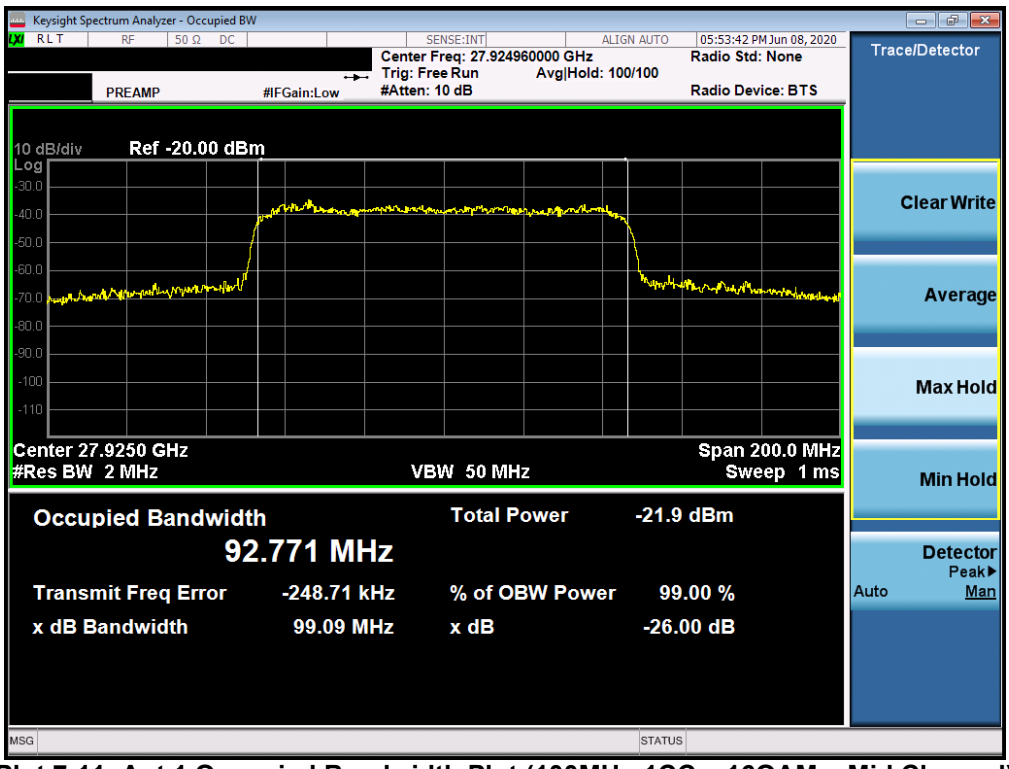
Plot 7-8. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)



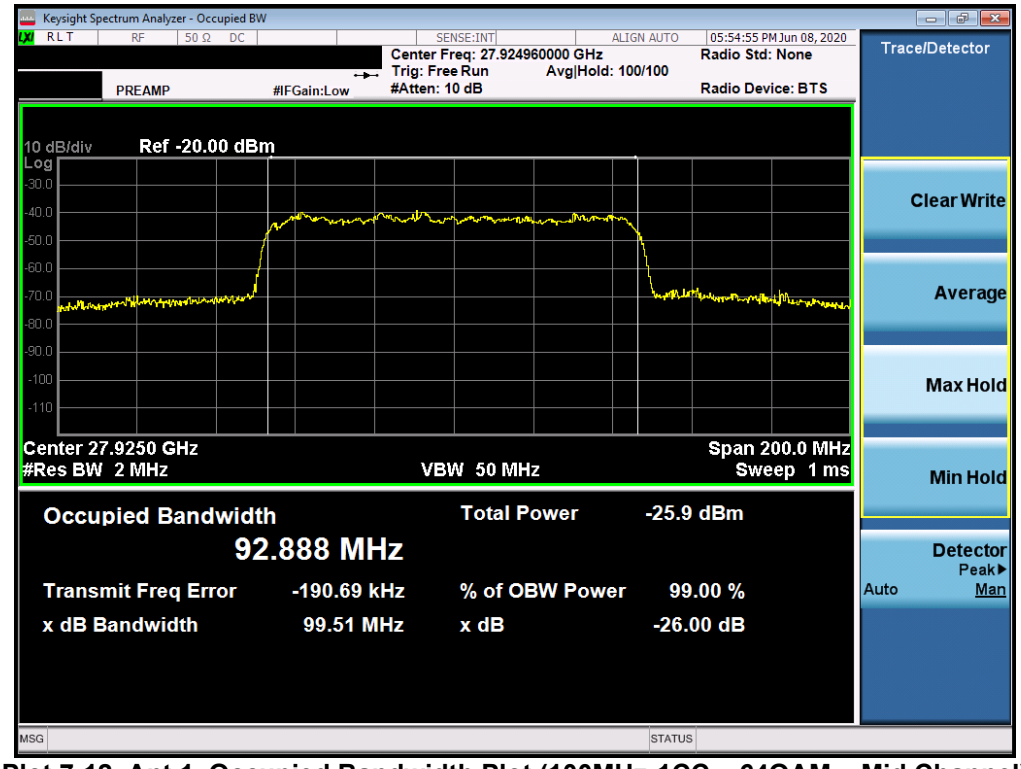
Plot 7-3. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



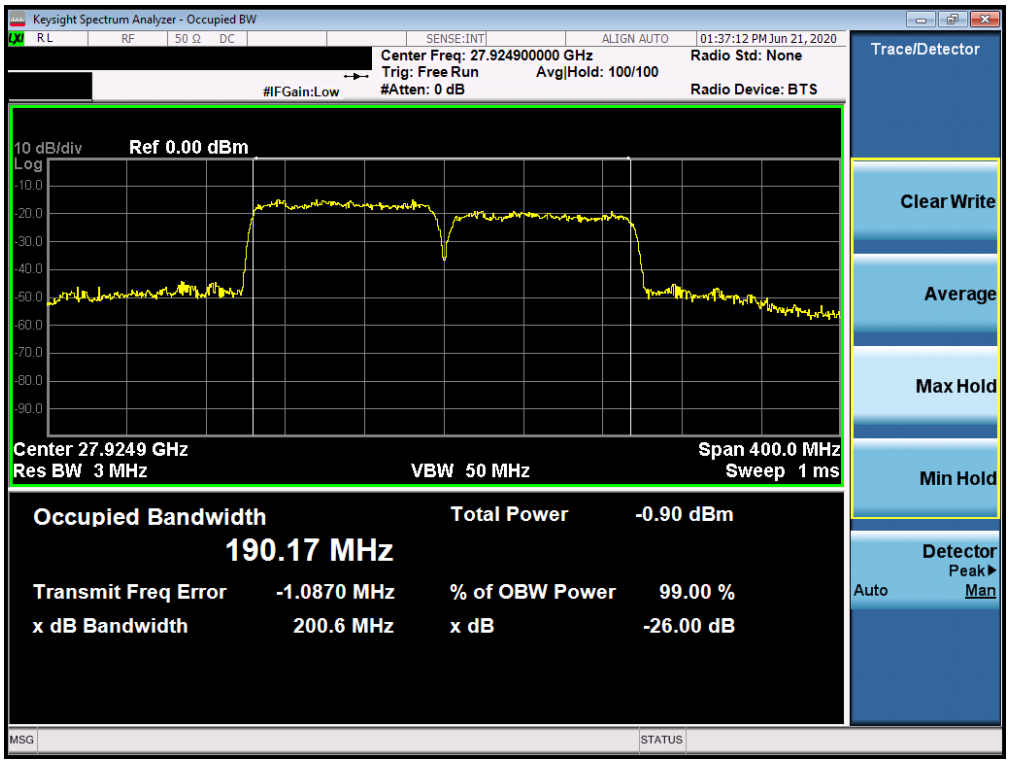
Plot 7-10. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)



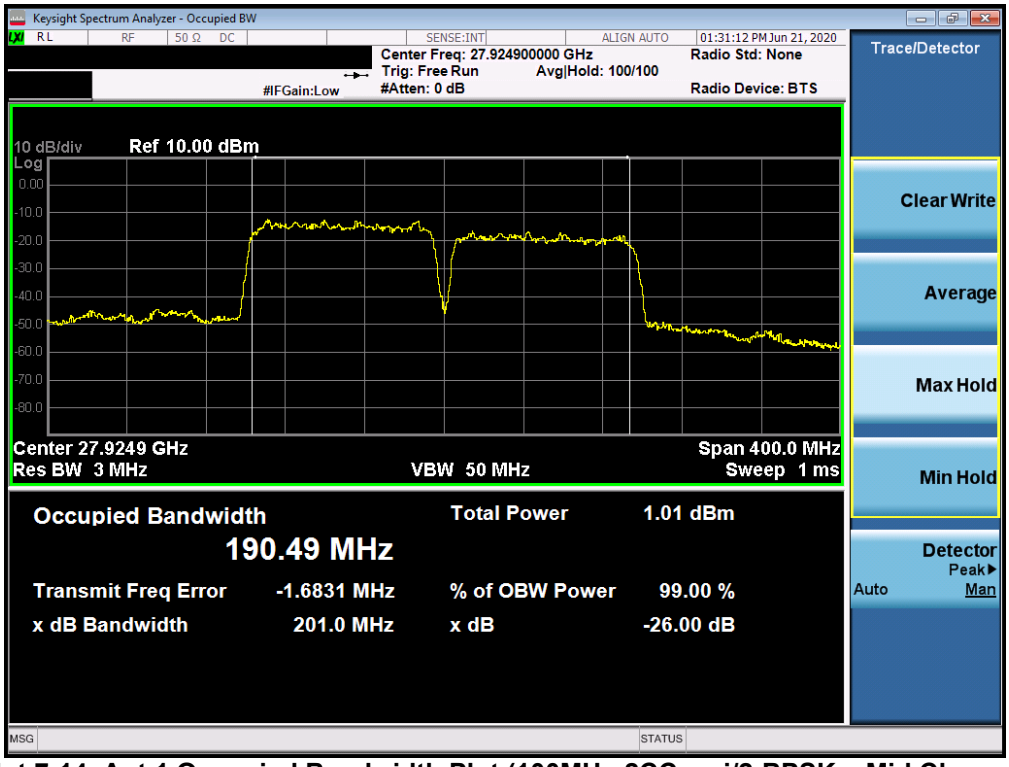
Plot 7-11. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



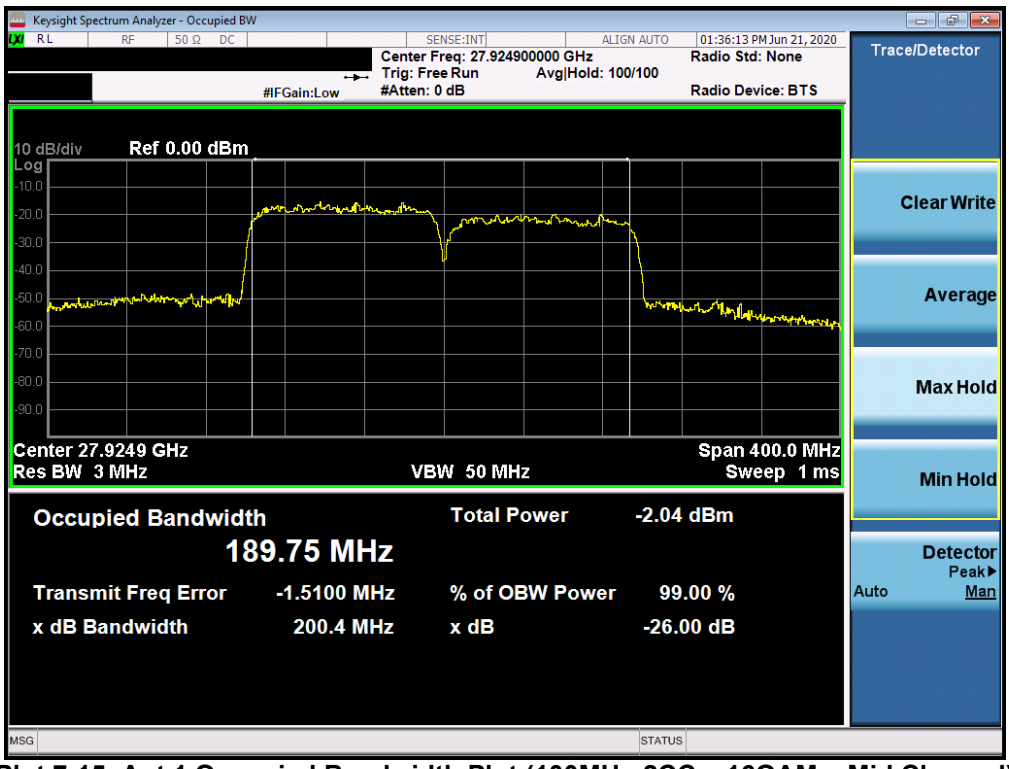
Plot 7-12. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)



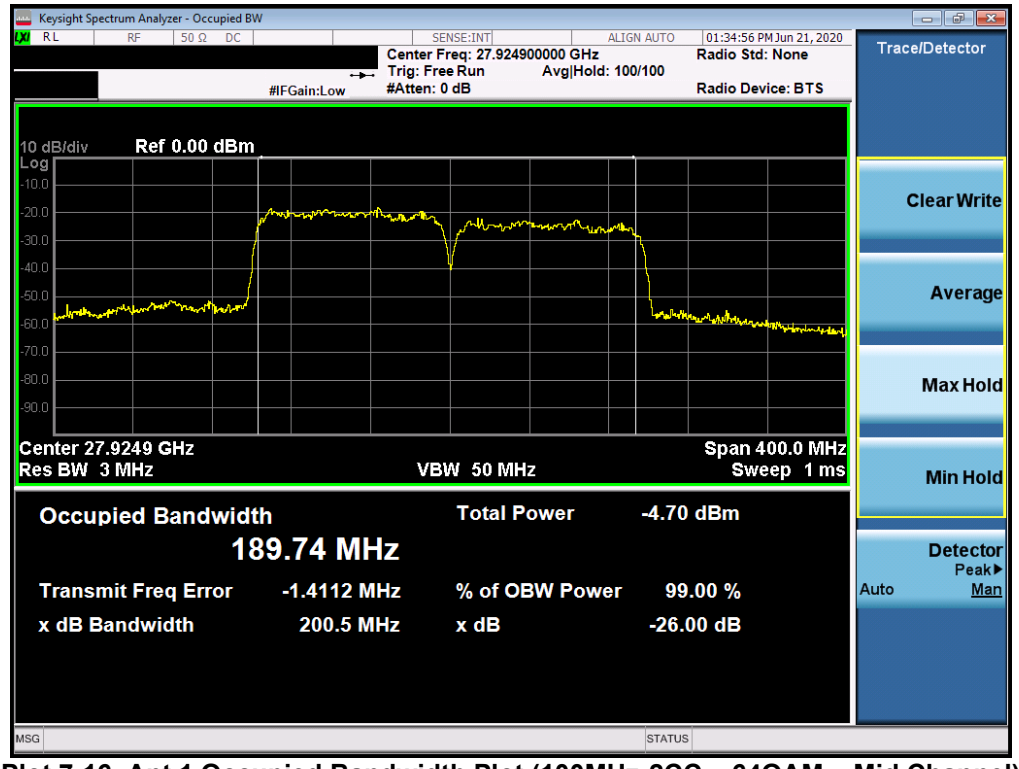
Plot 7-4. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



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



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

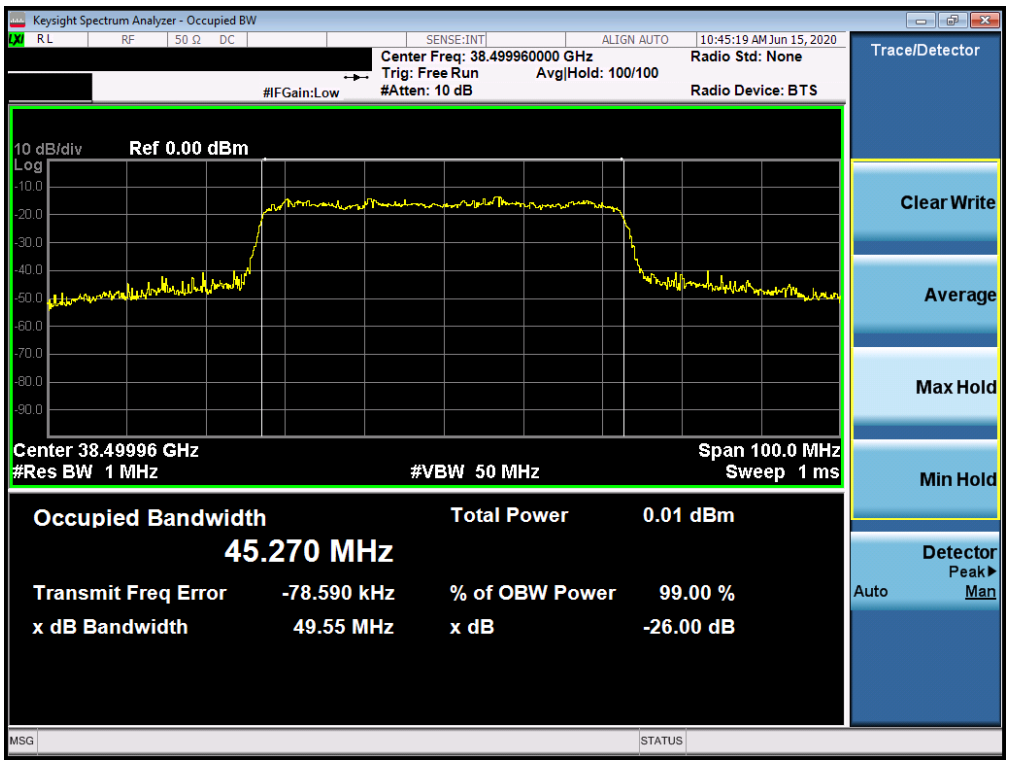


Plot 7-16. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

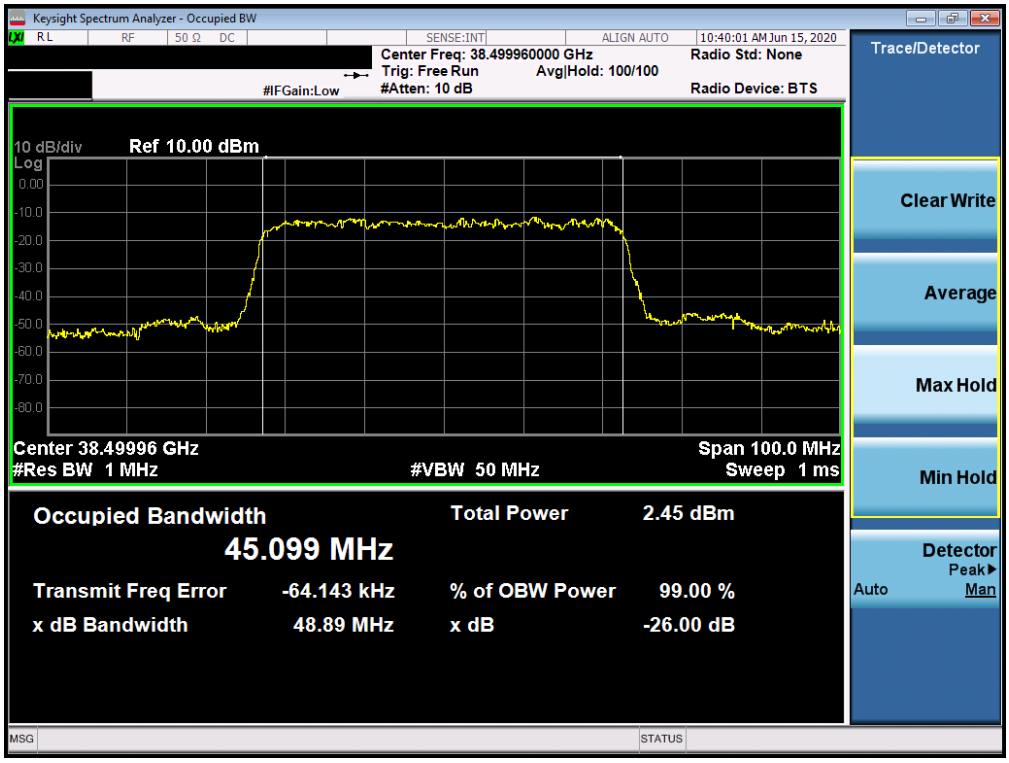
Band n260

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	50	1	CP-OFDM	QPSK	45.27
			DFT-s-OFDM	pi/2-BPSK	45.10
			CP-OFDM	16QAM	45.35
			CP-OFDM	64QAM	45.22
		2	CP-OFDM	QPSK	94.86
			DFT-s-OFDM	pi/2-BPSK	94.98
			CP-OFDM	16QAM	94.67
			CP-OFDM	64QAM	94.44
	100	1	CP-OFDM	QPSK	92.64
			DFT-s-OFDM	pi/2-BPSK	90.67
			CP-OFDM	16QAM	92.90
			CP-OFDM	64QAM	93.06
		2	CP-OFDM	QPSK	190.42
			DFT-s-OFDM	pi/2-BPSK	191.25
			CP-OFDM	16QAM	191.02
			CP-OFDM	64QAM	191.36

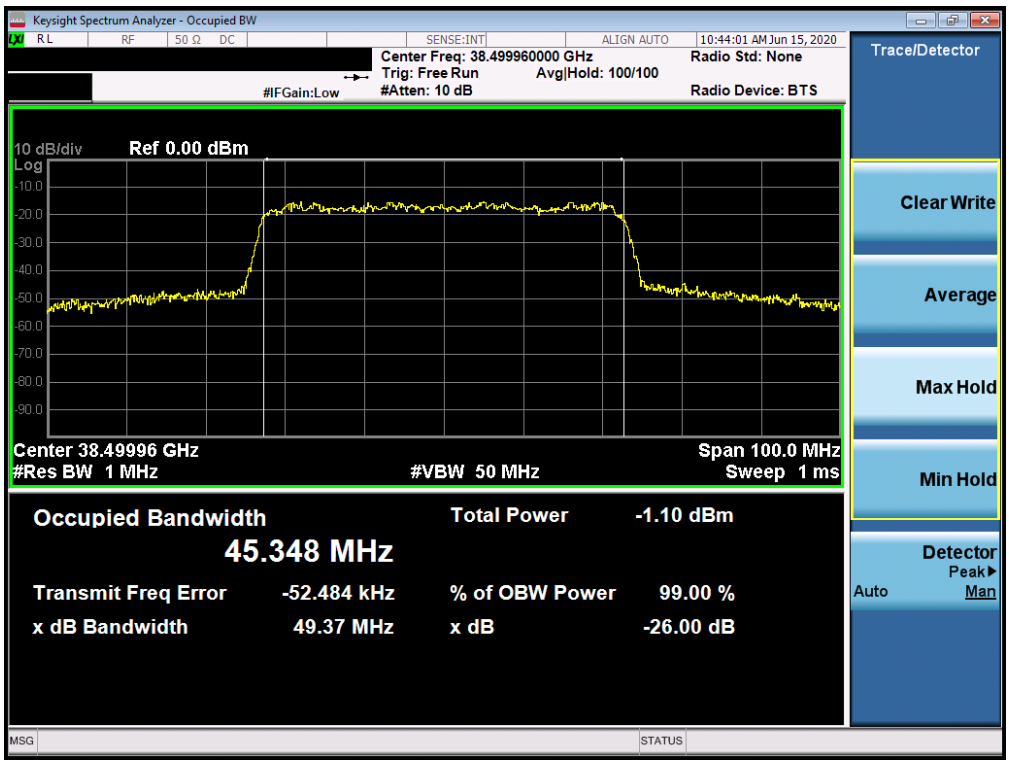
Table 7-3. Summary of Ant 2 Occupied Bandwidths (n260 Front)



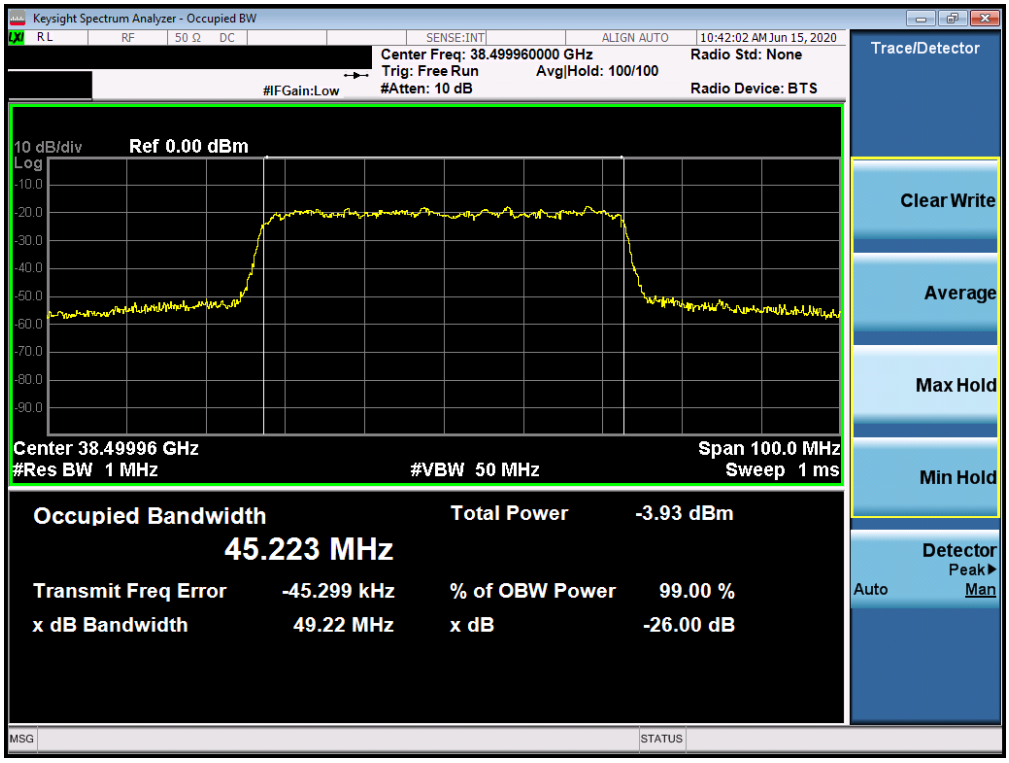
Plot 7-5. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



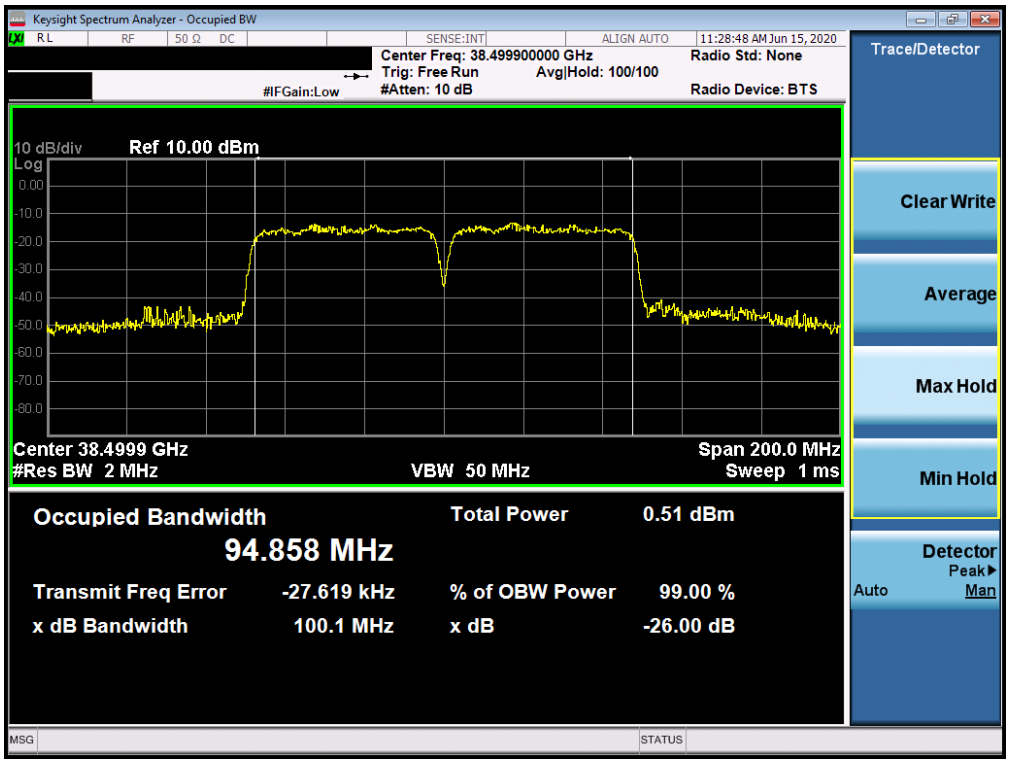
Plot 7-18. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)



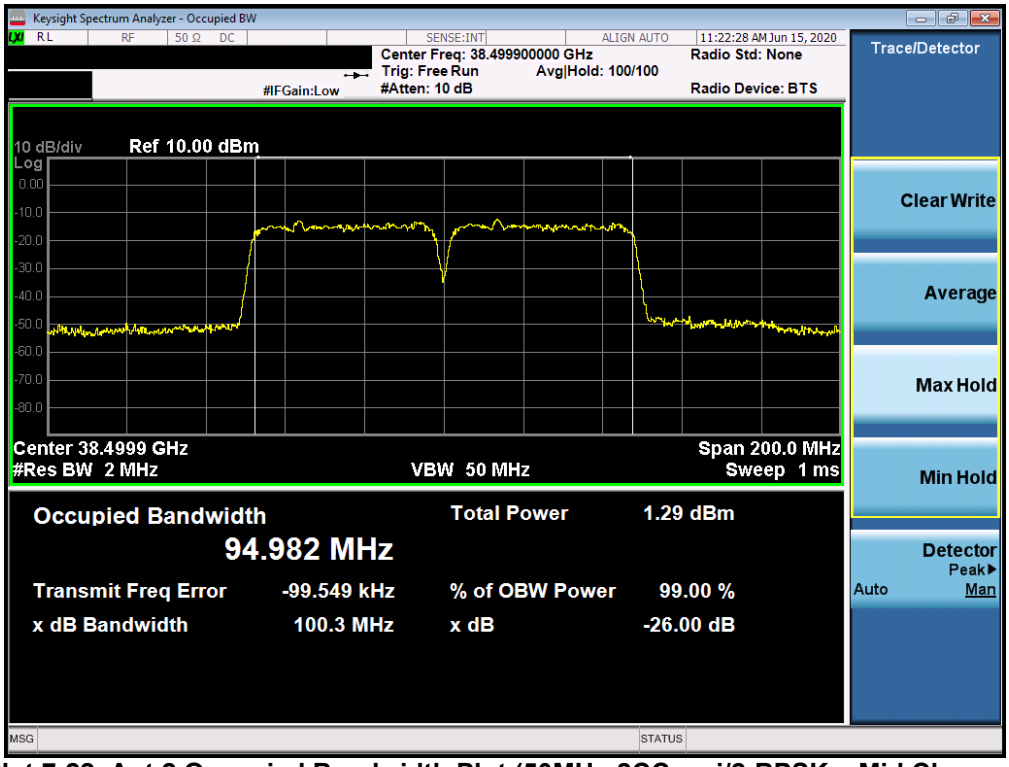
Plot 7-19. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



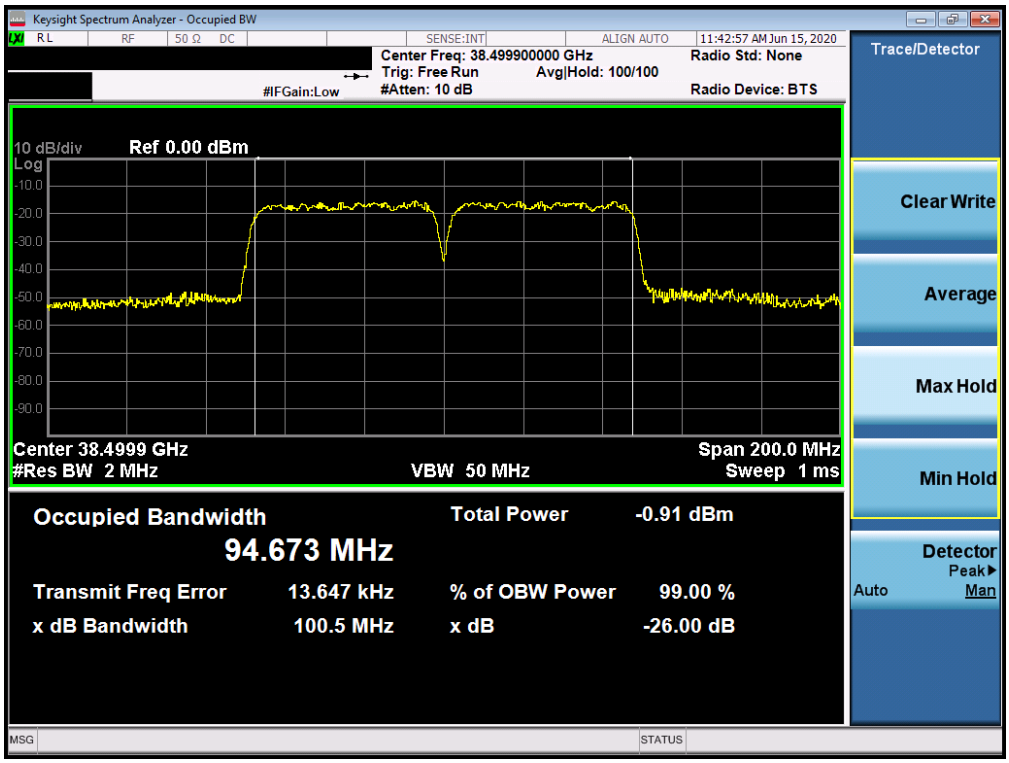
Plot 7-20. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)



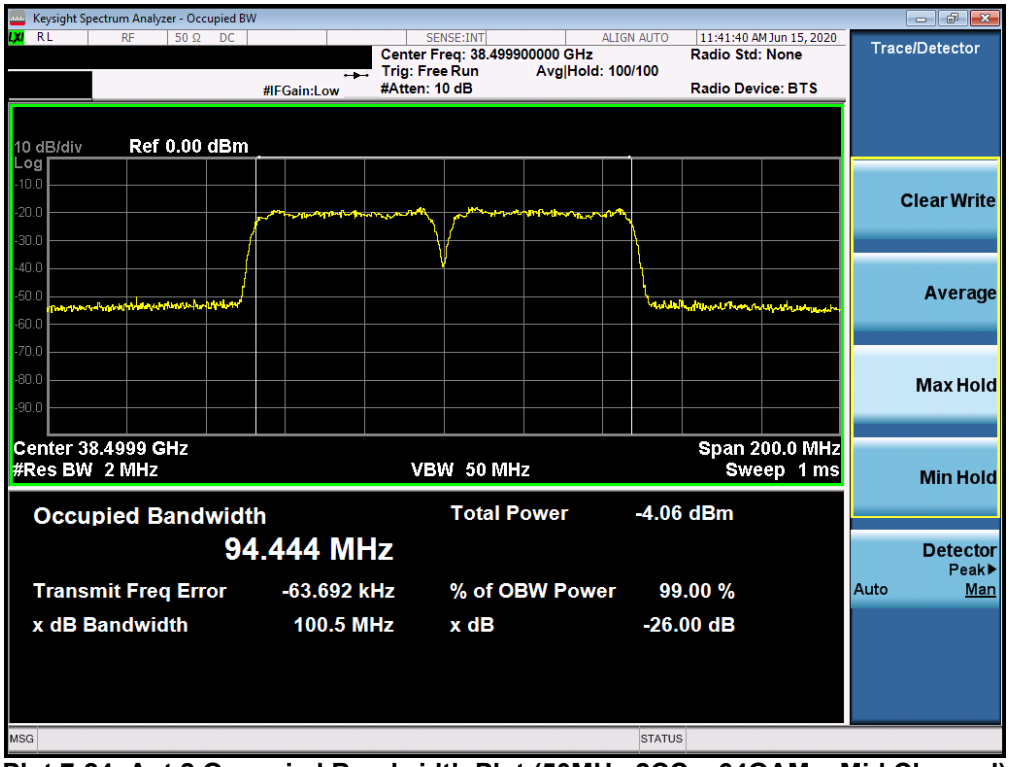
Plot 7-6. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



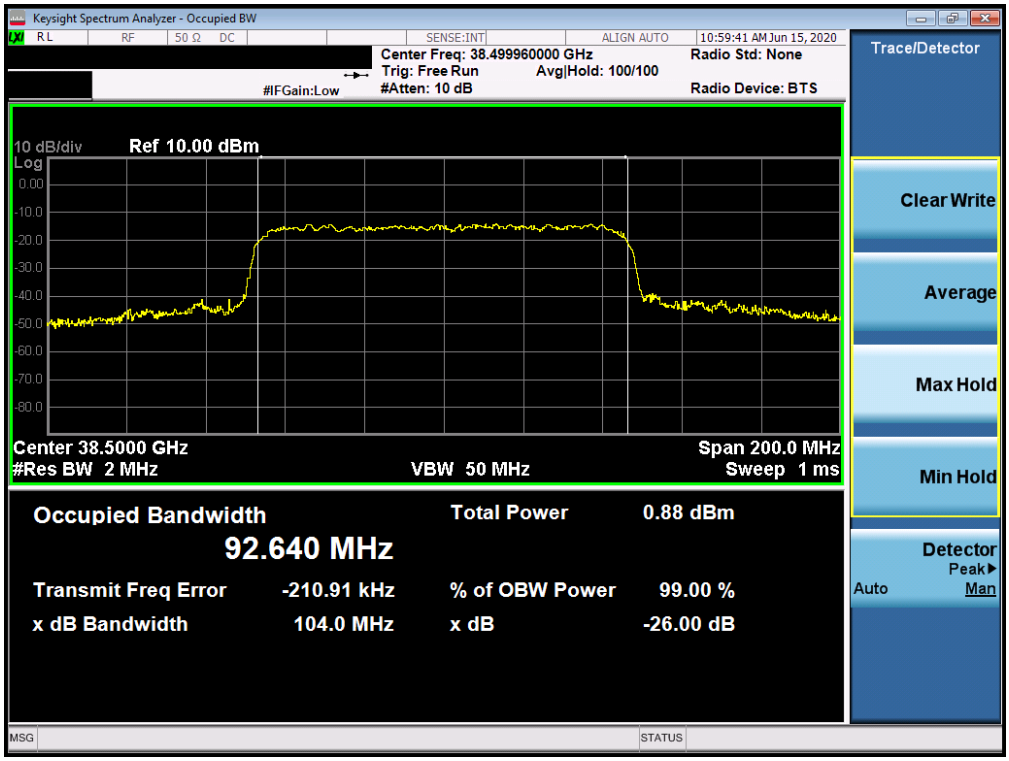
Plot 7-22. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)



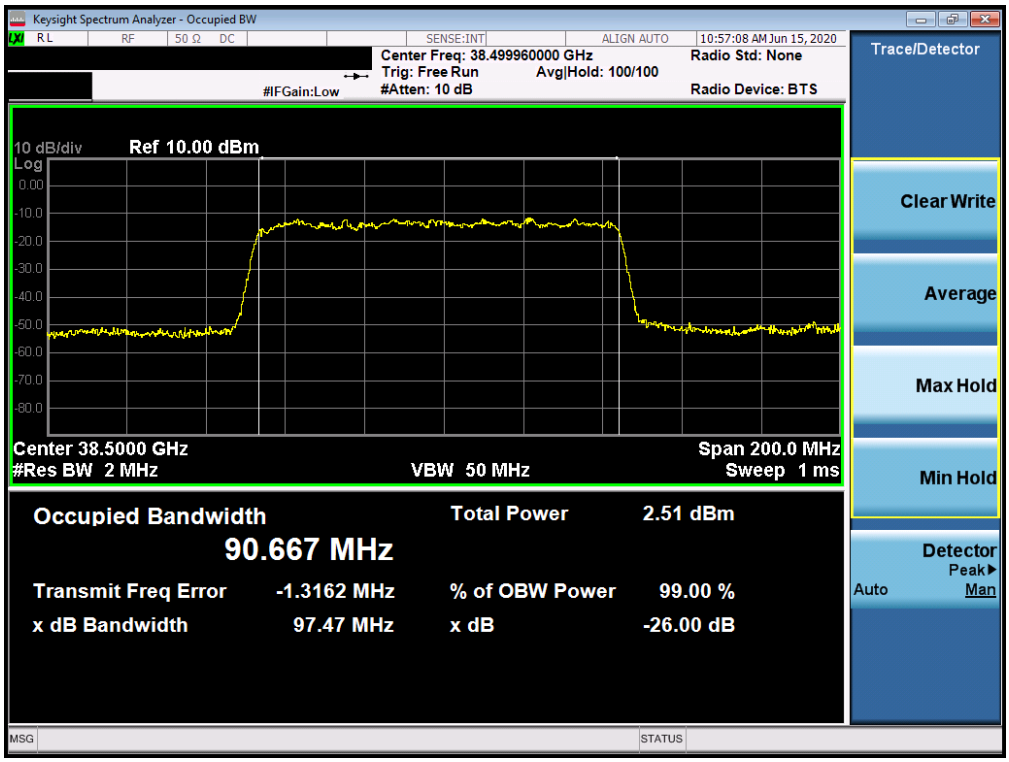
Plot 7-23. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



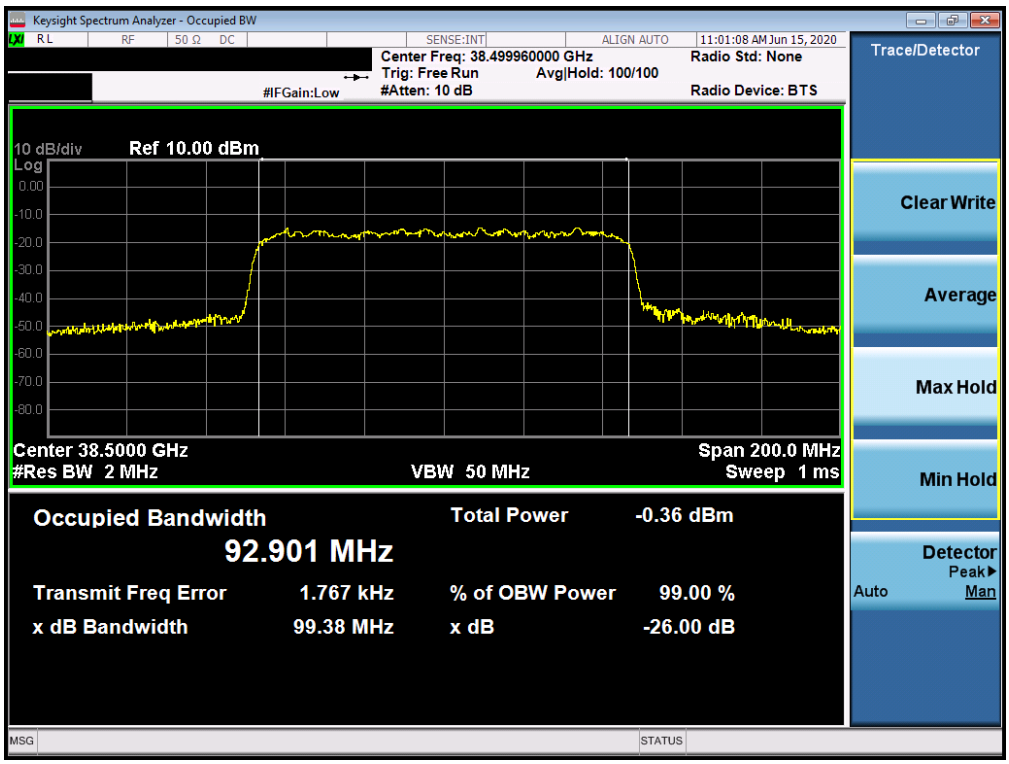
Plot 7-24. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)



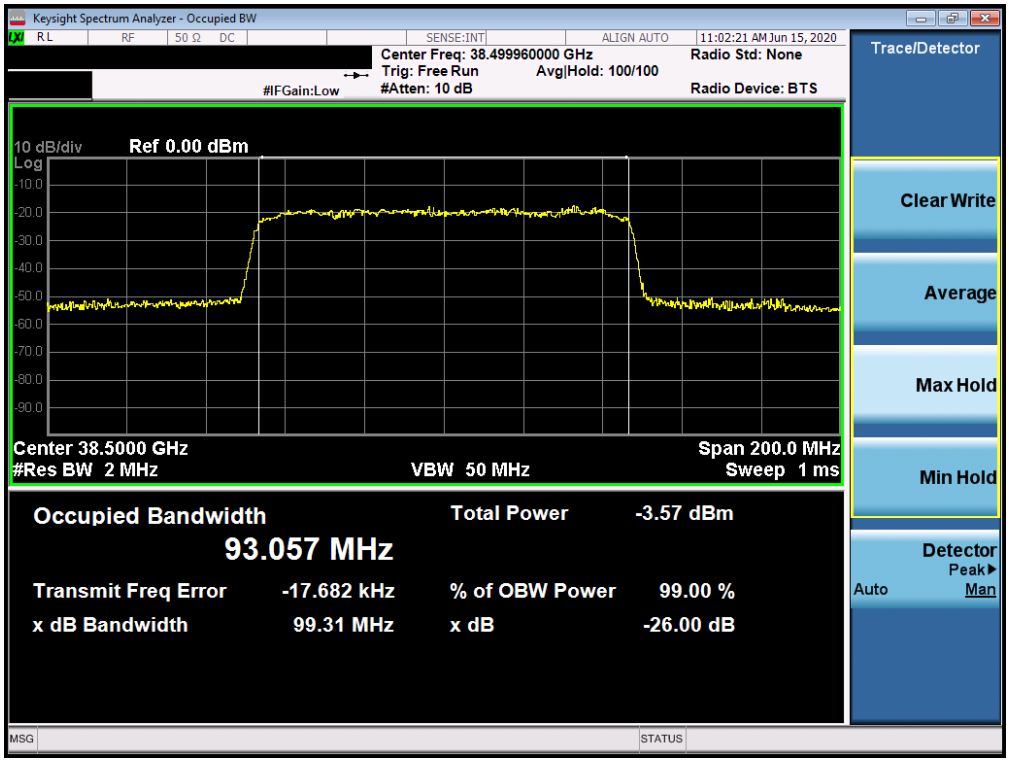
Plot 7-7. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



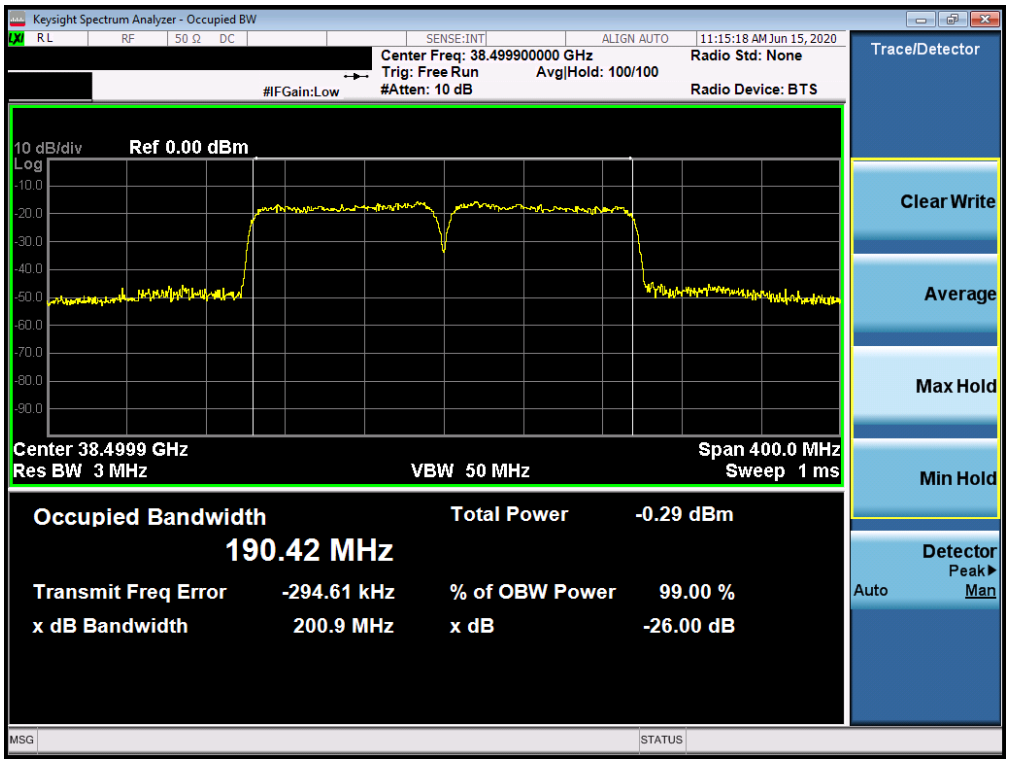
Plot 7-26. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)



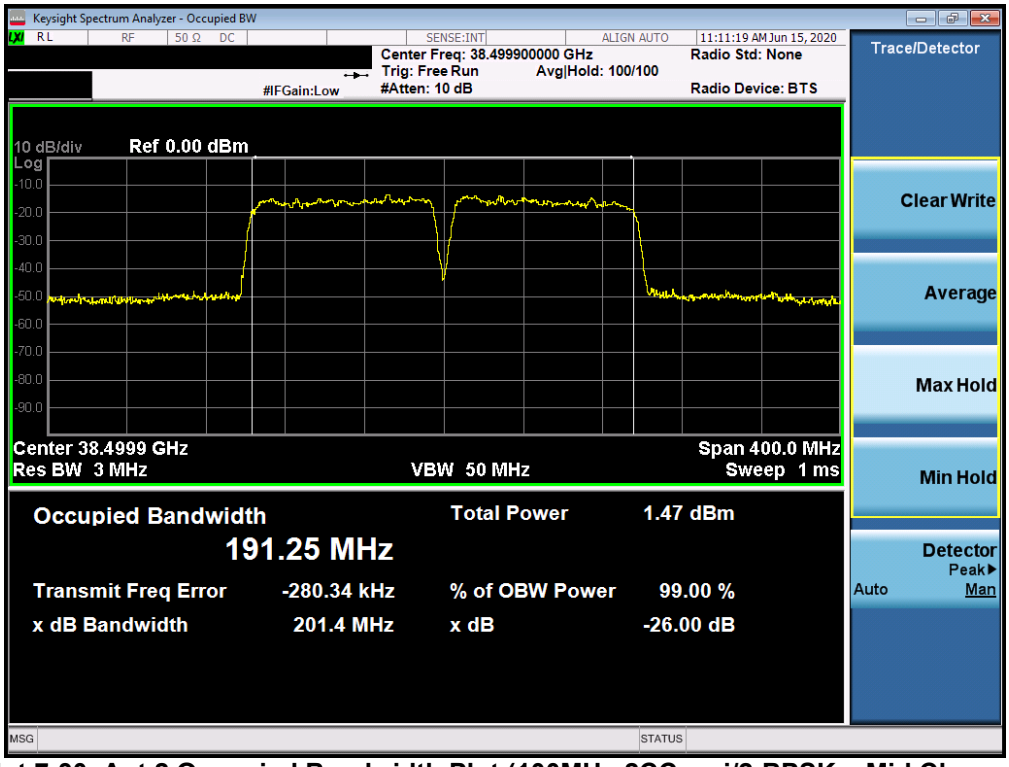
Plot 7-27. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



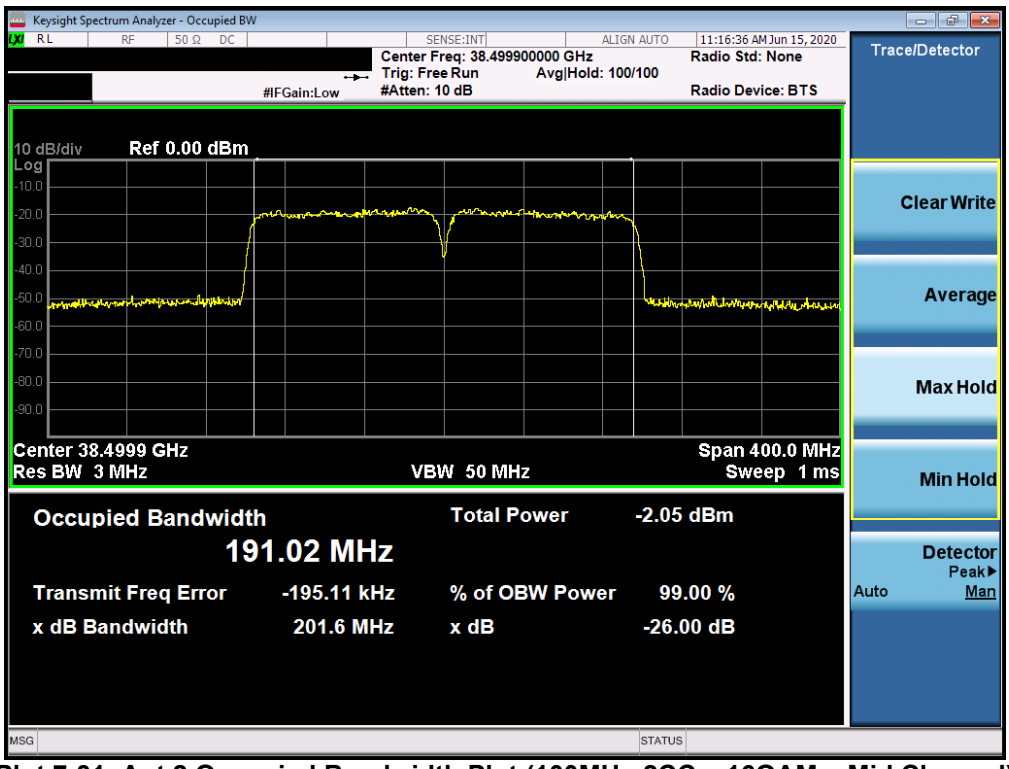
Plot 7-28. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)



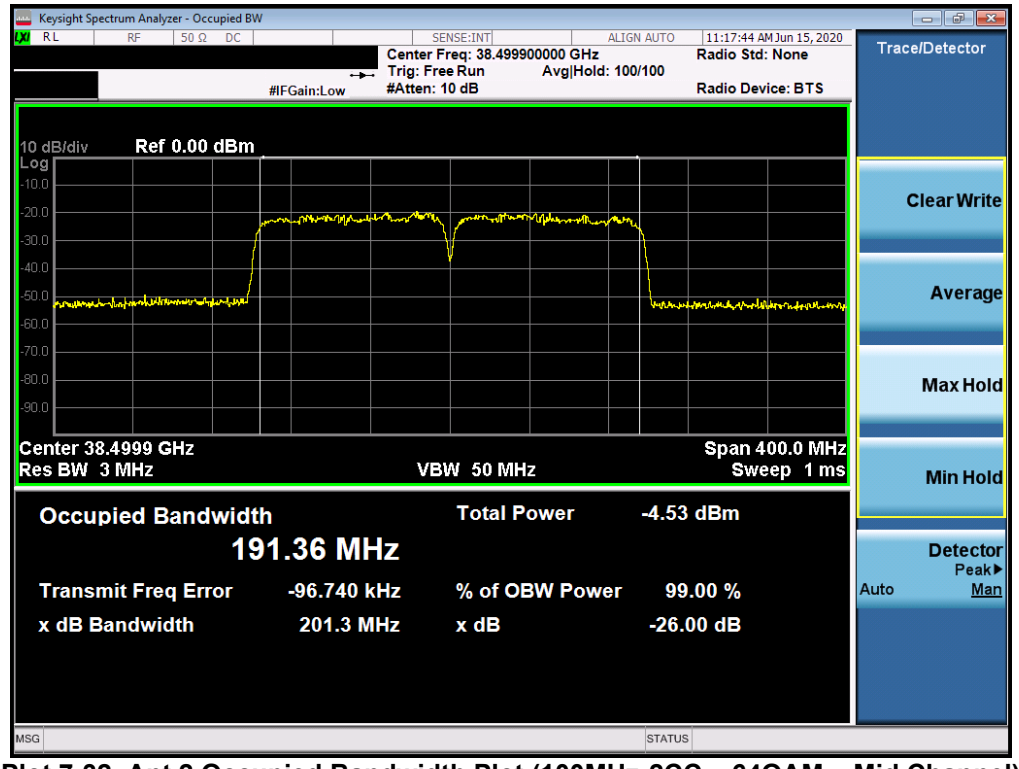
Plot 7-8. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



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



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



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

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 ≥ 3 x RBW
4. Span = 2x to 3x the OBW
5. No. of sweep points ≥ 2 x 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

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.

Band n261 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	143	-
		V	24	-
	Mid	H	143	-
		V	24	-
	High	H	143	-
		V	24	-
MIMO	Low	MIMO	15	143
	Mid	MIMO	15	143
	High	MIMO	24	152

Table 7-4. Ant 1 Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	148	-
		V	29	-
	Mid	H	146	-
		V	28	-
	High	H	147	-
		V	28	-
MIMO	Low	MIMO	19	147
	Mid	MIMO	20	148
	High	MIMO	19	147

Table 7-5. Ant 2 Worst Case Beam ID

Band n261

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam PoI	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	27525.00	Low	DFT-s-OFDM	QPSK	H	SISO	143	H	285	82	1/16	27.38
	27924.96	Mid	DFT-s-OFDM	QPSK	H	SISO	143	H	281	88	1/16	27.43
	27924.96	Mid	DFT-s-OFDM	QPSK	V	SISO	24	H	269	89	1/16	26.86
	27924.96	Mid	CP-OFDM	QPSK	H	SISO	143	H	281	88	1/16	24.72
	27924.96	Mid	CP-OFDM	QPSK	V	SISO	24	H	269	89	1/16	24.13
	27924.96	Mid	CP-OFDM	QPSK	MIMO	MIMO	15+143	H	279	84	1/16	25.86
	28324.92	High	DFT-s-OFDM	QPSK	H	SISO	143	H	285	85	1/16	27.36
	27924.96	Mid	DFT-s-OFDM	pi/2-BPSK	H	SISO	143	H	281	88	1/16	27.35
	27924.96	Mid	DFT-s-OFDM	16QAM	H	SISO	143	H	281	88	1/16	25.39
	27924.96	Mid	DFT-s-OFDM	64QAM	H	SISO	143	H	281	88	1/16	24.12

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam PoI	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	27924.96	Mid	DFT-s-OFDM	QPSK	H	SISO	143	H	280	84	32/0	24.92
	27924.96	Mid	DFT-s-OFDM	QPSK	V	SISO	24	H	269	91	32/0	23.78
	27924.96	Mid	DFT-s-OFDM	pi/2-BPSK	H	SISO	143	H	280	84	32/0	24.91
	27924.96	Mid	DFT-s-OFDM	16QAM	H	SISO	143	H	280	84	32/0	23.44
	27924.96	Mid	DFT-s-OFDM	64QAM	H	SISO	143	H	280	84	32/0	21.19

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam PoI	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	27550.08	Low	DFT-s-OFDM	QPSK	H	SISO	143	H	286	88	1/33	27.27
	27924.96	Mid	DFT-s-OFDM	QPSK	H	SISO	143	H	277	82	1/33	27.39
	27924.96	Mid	DFT-s-OFDM	QPSK	V	SISO	24	H	269	91	1/33	26.63
	27924.96	Mid	CP-OFDM	QPSK	H	SISO	143	H	277	82	1/33	24.46
	27924.96	Mid	CP-OFDM	QPSK	V	SISO	24	H	269	91	1/33	24.08
	27924.96	Mid	CP-OFDM	QPSK	MIMO	MIMO	15+143	H	278	83	1/33	26.09
	28299.96	High	DFT-s-OFDM	QPSK	H	SISO	143	H	279	81	1/33	27.30
	27924.96	Mid	DFT-s-OFDM	pi/2-BPSK	H	SISO	143	H	277	82	1/33	27.26
	27924.96	Mid	DFT-s-OFDM	16QAM	H	SISO	143	H	277	82	1/33	25.46
	27924.96	Mid	DFT-s-OFDM	64QAM	H	SISO	143	H	277	82	1/33	24.26

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam PoI	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	27924.96	Mid	DFT-s-OFDM	QPSK	H	SISO	143	H	280	85	64/0	24.83
	27924.96	Mid	DFT-s-OFDM	QPSK	V	SISO	24	H	270	91	64/0	23.54
	27924.96	Mid	DFT-s-OFDM	pi/2-BPSK	H	SISO	143	H	280	85	64/0	24.86
	27924.96	Mid	DFT-s-OFDM	16QAM	H	SISO	143	H	280	85	64/0	23.31
	27924.96	Mid	DFT-s-OFDM	64QAM	H	SISO	143	H	280	85	64/0	21.22

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam Pol	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	27525.00	Low	DFT-s-OFDM	QPSK	V	SISO	29	V	81	128	1/16	24.62
	27924.96	Mid	DFT-s-OFDM	QPSK	H	SISO	146	V	80	67	1/16	25.91
	27924.96	Mid	DFT-s-OFDM	QPSK	V	SISO	28	V	82	103	1/16	26.07
	27924.96	Mid	CP-OFDM	QPSK	H	SISO	146	V	80	67	1/16	22.37
	27924.96	Mid	CP-OFDM	QPSK	V	SISO	28	V	82	103	1/16	23.31
	27924.96	Mid	CP-OFDM	QPSK	MIMO	MIMO	20+148	V	287	285	1/16	25.70
	28324.92	High	DFT-s-OFDM	QPSK	V	SISO	28	V	80	101	1/16	25.85
	27924.96	Mid	DFT-s-OFDM	pi/2-BPSK	V	SISO	28	V	82	103	1/16	25.95
	27924.96	Mid	DFT-s-OFDM	16QAM	V	SISO	28	V	82	103	1/16	23.97
	27924.96	Mid	DFT-s-OFDM	64QAM	V	SISO	28	V	82	103	1/16	22.04

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam Pol	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	27924.96	Mid	DFT-s-OFDM	QPSK	H	SISO	146	V	83	67	32/0	22.98
	27924.96	Mid	DFT-s-OFDM	QPSK	V	SISO	28	V	82	102	32/0	23.32
	27924.96	Mid	DFT-s-OFDM	pi/2-BPSK	V	SISO	28	V	82	102	32/0	23.29
	27924.96	Mid	DFT-s-OFDM	16QAM	V	SISO	28	V	82	102	32/0	21.67
	27924.96	Mid	DFT-s-OFDM	64QAM	V	SISO	28	V	82	102	32/0	20.16

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam Pol	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	27550.08	Low	DFT-s-OFDM	QPSK	V	SISO	29	V	82	129	1/33	24.57
	27924.96	Mid	DFT-s-OFDM	QPSK	H	SISO	146	V	84	66	1/33	25.88
	27924.96	Mid	DFT-s-OFDM	QPSK	V	SISO	28	V	81	102	1/33	25.96
	27924.96	Mid	CP-OFDM	QPSK	H	SISO	146	V	84	66	1/33	22.16
	27924.96	Mid	CP-OFDM	QPSK	V	SISO	28	V	81	102	1/33	23.07
	27924.96	Mid	CP-OFDM	QPSK	MIMO	MIMO	20+148	V	288	291	1/33	25.66
	28299.96	High	DFT-s-OFDM	QPSK	V	SISO	28	V	80	100	1/33	25.38
	27924.96	Mid	DFT-s-OFDM	pi/2-BPSK	V	SISO	28	V	81	102	1/33	25.83
	27924.96	Mid	DFT-s-OFDM	16QAM	V	SISO	28	V	81	102	1/33	23.57
	27924.96	Mid	DFT-s-OFDM	64QAM	V	SISO	28	V	81	102	1/33	22.61

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam Pol	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	27924.96	Mid	DFT-s-OFDM	QPSK	H	SISO	146	V	83	66	64/0	22.89
	27924.96	Mid	DFT-s-OFDM	QPSK	V	SISO	28	V	80	102	64/0	23.11
	27924.96	Mid	DFT-s-OFDM	pi/2-BPSK	V	SISO	28	V	80	102	64/0	23.08
	27924.96	Mid	DFT-s-OFDM	16QAM	V	SISO	28	V	80	102	64/0	21.56
	27924.96	Mid	DFT-s-OFDM	64QAM	V	SISO	28	V	80	102	64/0	19.47

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

Band n260 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	143	-
		V	23	-
	Mid	H	153	-
		V	14	-
	High	H	153	-
		V	13	-
MIMO	Low	MIMO	23	151
	Mid	MIMO	24	152
	High	MIMO	13	141

Table 7-14. Ant 1 Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	146	-
		V	20	-
	Mid	H	156	-
		V	29	-
	High	H	147	-
		V	19	-
MIMO	Low	MIMO	28	156
	Mid	MIMO	28	156
	High	MIMO	19	147

Table 7-15. Ant 2 Worst Case Beam ID

Band n260

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam PoI	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	37025.04	Low	DFT-s-OFDM	QPSK	H	SISO	143	H	250	120	1/16	23.57
	38499.96	Mid	DFT-s-OFDM	QPSK	H	SISO	153	H	245	120	1/16	25.84
	38499.96	Mid	DFT-s-OFDM	QPSK	V	SISO	14	H	276	131	1/16	25.15
	38499.96	Mid	CP-OFDM	QPSK	H	SISO	153	H	245	120	1/16	23.19
	38499.96	Mid	CP-OFDM	QPSK	V	SISO	14	H	276	131	1/16	22.08
	38499.96	Mid	CP-OFDM	QPSK	MIMO	MIMO	24+152	H	261	120	1/16	23.71
	39975.00	High	DFT-s-OFDM	QPSK	H	SISO	153	H	248	118	1/16	25.80
	38499.96	Mid	DFT-s-OFDM	pi/2-BPSK	H	SISO	153	H	245	120	1/16	25.82
	38499.96	Mid	DFT-s-OFDM	16QAM	H	SISO	153	H	245	120	1/16	23.97
	38499.96	Mid	DFT-s-OFDM	64QAM	H	SISO	153	H	245	120	1/16	22.12

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam PoI	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	38499.96	Mid	DFT-s-OFDM	QPSK	H	SISO	153	H	246	117	32/0	22.58
	38499.96	Mid	DFT-s-OFDM	QPSK	V	SISO	14	H	274	114	32/0	21.70
	38499.96	Mid	DFT-s-OFDM	pi/2-BPSK	H	SISO	153	H	246	117	32/0	22.45
	38499.96	Mid	DFT-s-OFDM	16QAM	H	SISO	153	H	246	117	32/0	20.61
	38499.96	Mid	DFT-s-OFDM	64QAM	H	SISO	153	H	246	117	32/0	19.07

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam PoI	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	37050.00	Low	DFT-s-OFDM	QPSK	H	SISO	143	H	249	121	1/33	23.67
	38499.96	Mid	DFT-s-OFDM	QPSK	H	SISO	153	H	245	120	1/33	25.82
	38499.96	Mid	DFT-s-OFDM	QPSK	V	SISO	14	H	276	117	1/33	24.92
	38499.96	Mid	CP-OFDM	QPSK	H	SISO	153	H	245	120	1/33	23.07
	38499.96	Mid	CP-OFDM	QPSK	V	SISO	14	H	276	117	1/33	21.74
	38499.96	Mid	CP-OFDM	QPSK	MIMO	MIMO	24+152	H	261	122	1/33	23.77
	39949.92	High	DFT-s-OFDM	QPSK	H	SISO	153	H	248	127	1/33	25.68
	38499.96	Mid	DFT-s-OFDM	pi/2-BPSK	H	SISO	153	H	245	120	1/33	25.77
	38499.96	Mid	DFT-s-OFDM	16QAM	H	SISO	153	H	245	120	1/33	24.08
	38499.96	Mid	DFT-s-OFDM	64QAM	H	SISO	153	H	245	120	1/33	22.09

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam PoI	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	38499.96	Mid	DFT-s-OFDM	QPSK	H	SISO	153	H	246	116	64/0	22.61
	38499.96	Mid	DFT-s-OFDM	QPSK	V	SISO	14	H	276	114	64/0	21.78
	38499.96	Mid	DFT-s-OFDM	pi/2-BPSK	H	SISO	153	H	246	116	64/0	22.55
	38499.96	Mid	DFT-s-OFDM	16QAM	H	SISO	153	H	246	116	64/0	20.80
	38499.96	Mid	DFT-s-OFDM	64QAM	H	SISO	153	H	246	116	64/0	19.19

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam Pol	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	37025.04	Low	DFT-s-OFDM	QPSK	V	SISO	20	H	285	247	1/16	26.45
	38499.96	Mid	DFT-s-OFDM	QPSK	H	SISO	156	H	85	106	1/16	26.37
	38499.96	Mid	DFT-s-OFDM	QPSK	V	SISO	29	H	291	244	1/16	26.98
	38499.96	Mid	CP-OFDM	QPSK	H	SISO	156	H	85	106	1/16	22.78
	38499.96	Mid	CP-OFDM	QPSK	V	SISO	29	H	291	244	1/16	24.16
	38499.96	Mid	CP-OFDM	QPSK	MIMO	MIMO	28+156	V	77	104	1/16	25.88
	39975.00	High	DFT-s-OFDM	QPSK	V	SISO	19	H	260	258	1/16	26.30
	38499.96	Mid	DFT-s-OFDM	pi/2-BPSK	V	SISO	29	H	291	244	1/16	26.87
	38499.96	Mid	DFT-s-OFDM	16QAM	V	SISO	29	H	291	244	1/16	25.37
	38499.96	Mid	DFT-s-OFDM	64QAM	V	SISO	29	H	291	244	1/16	23.25

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam Pol	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	38499.96	Mid	DFT-s-OFDM	QPSK	H	SISO	156	H	84	103	32/0	23.86
	38499.96	Mid	DFT-s-OFDM	QPSK	V	SISO	29	H	291	245	32/0	24.25
	38499.96	Mid	DFT-s-OFDM	pi/2-BPSK	V	SISO	29	H	291	245	32/0	24.23
	38499.96	Mid	DFT-s-OFDM	16QAM	V	SISO	29	H	291	245	32/0	22.58
	38499.96	Mid	DFT-s-OFDM	64QAM	V	SISO	29	H	291	245	32/0	20.57

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam Pol	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
1	37050.00	Low	DFT-s-OFDM	QPSK	V	SISO	20	H	284	248	1/33	26.06
	38499.96	Mid	DFT-s-OFDM	QPSK	H	SISO	156	H	84	104	1/33	26.29
	38499.96	Mid	DFT-s-OFDM	QPSK	V	SISO	29	H	293	243	1/33	26.90
	38499.96	Mid	CP-OFDM	QPSK	H	SISO	156	H	84	104	1/33	22.74
	38499.96	Mid	CP-OFDM	QPSK	V	SISO	29	H	293	243	1/33	24.07
	38499.96	Mid	CP-OFDM	QPSK	MIMO	MIMO	28+156	V	77	104	1/33	25.98
	39949.92	High	DFT-s-OFDM	QPSK	V	SISO	19	H	261	258	1/33	26.17
	38499.96	Mid	DFT-s-OFDM	pi/2-BPSK	V	SISO	29	H	293	243	1/33	26.86
	38499.96	Mid	DFT-s-OFDM	16QAM	V	SISO	29	H	293	243	1/33	25.48
	38499.96	Mid	DFT-s-OFDM	64QAM	V	SISO	29	H	293	243	1/33	23.29

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

CCs active	Frequency [MHz]	Channel	Transmission Scheme	Modulation	Beam Pol	Ant. Div.	BeamID	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
2	38499.96	Mid	DFT-s-OFDM	QPSK	H	SISO	156	H	84	104	64/0	23.93
	38499.96	Mid	DFT-s-OFDM	QPSK	V	SISO	29	H	291	245	64/0	24.05
	38499.96	Mid	DFT-s-OFDM	pi/2-BPSK	V	SISO	29	H	291	245	64/0	24.10
	38499.96	Mid	DFT-s-OFDM	16QAM	V	SISO	29	H	291	245	64/0	22.45
	38499.96	Mid	DFT-s-OFDM	64QAM	V	SISO	29	H	291	245	64/0	20.34

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

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 ≥ 2 x 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: 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 Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 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/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.

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

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

6) All emissions from 30MHz - 40GHz were measured using a spectrum analyzer with an internal preamplifier. Emissions >40GHz were measured using a harmonic mixer with the spectrum analyzer.

7) All RSE's were measured with 1CC. It was determined that adding more CC's causes the overall amplitude of just 1CC to decrease, therefore, 1CC is the worst case for the purposes of spurious emissions measurements.

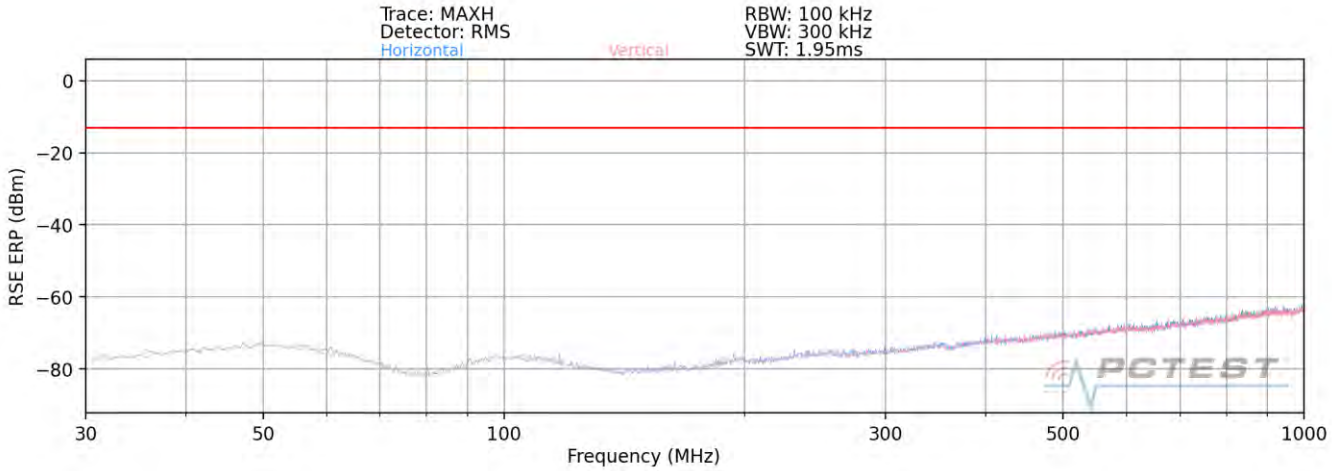
8) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

9) All RSE's were investigated in EN-DC mode and with 802.11 chipset active. It was determined that there is no new emission introduced by EN-DC mode, or the 802.11 chipset. For EN-DC mode, n261 uses LTE B2, B5, B12, B13 and B66, and n260 uses LTE B2, B5, B13 and B66.

10) There was no discernible difference in the spurious emission levels when using different LTE anchor bands. Thus, LTE Band 2 was used as a representative anchor band for EN-DC investigations.

Band n261 – Ant 1

30MHz - 1GHz



Plot 7-9. Ant 1- n261 Radiated Spurious Plot (1CC QPSK Mid Channel H Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

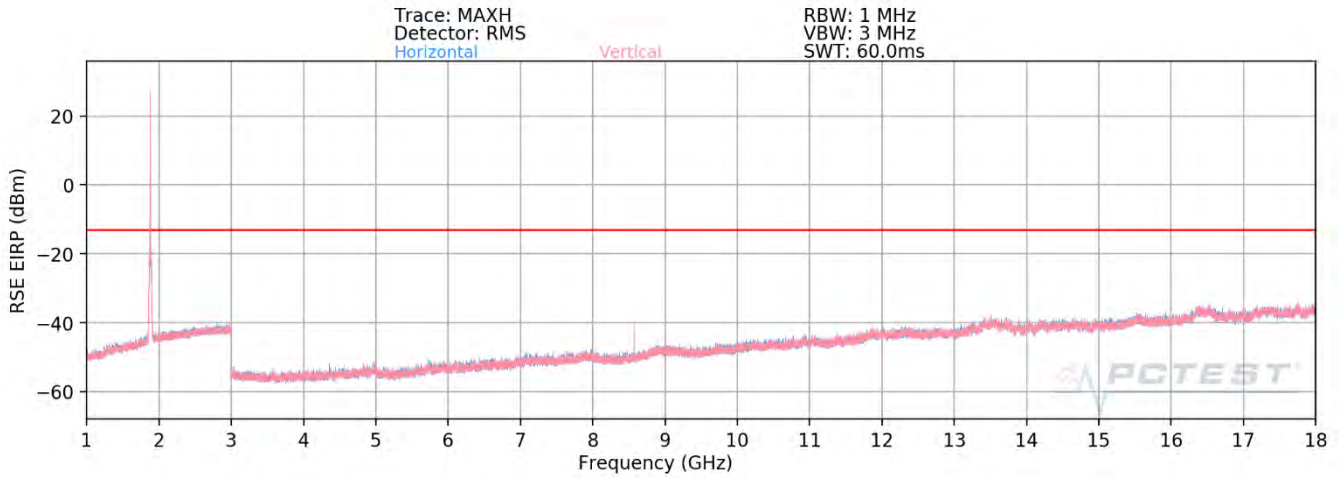
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
48.74	Mid	50	V	QPSK	V	-	-	-72.67	-13.00	-59.67
499.01	Mid	50	V	QPSK	V	-	-	-69.42	-13.00	-56.42
986.26	Mid	50	V	QPSK	V	-	-	-62.91	-13.00	-49.91

Table 7-25. Ant 1 - SISO -Spurious Emissions Table (30MHz - 1GHz)

Notes

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

1GHz - 18GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

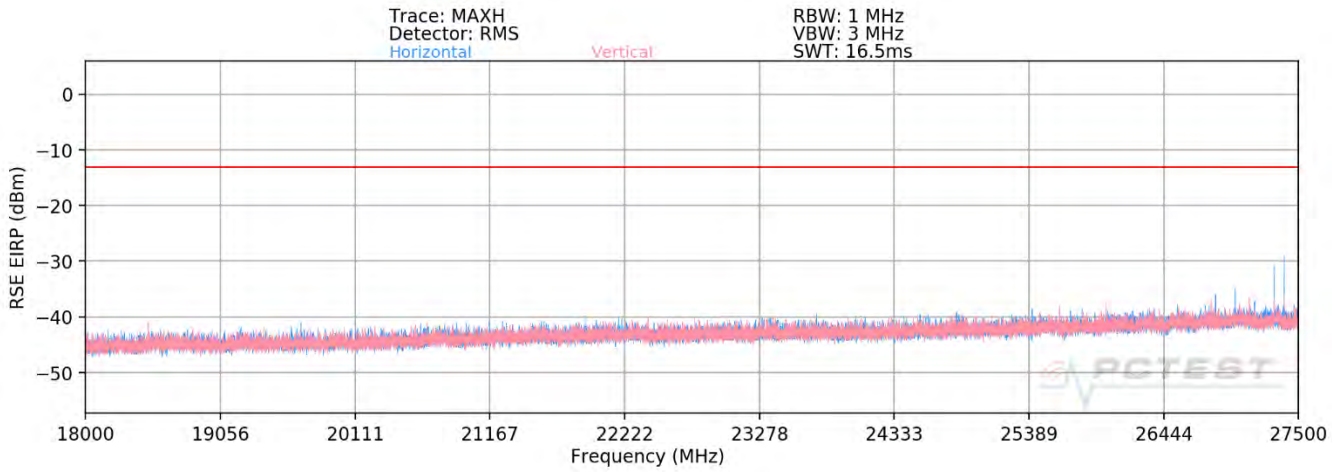
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8812.12	Low	50	H	QPSK	V	150	121	-41.43	-13.00	-28.43
8571.97	Mid	50	H	QPSK	V	157	102	-42.68	-13.00	-29.68
8972.21	High	50	H	QPSK	V	358	219	-45.03	-13.00	-32.03

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

Notes

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

18GHz - 27.5GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

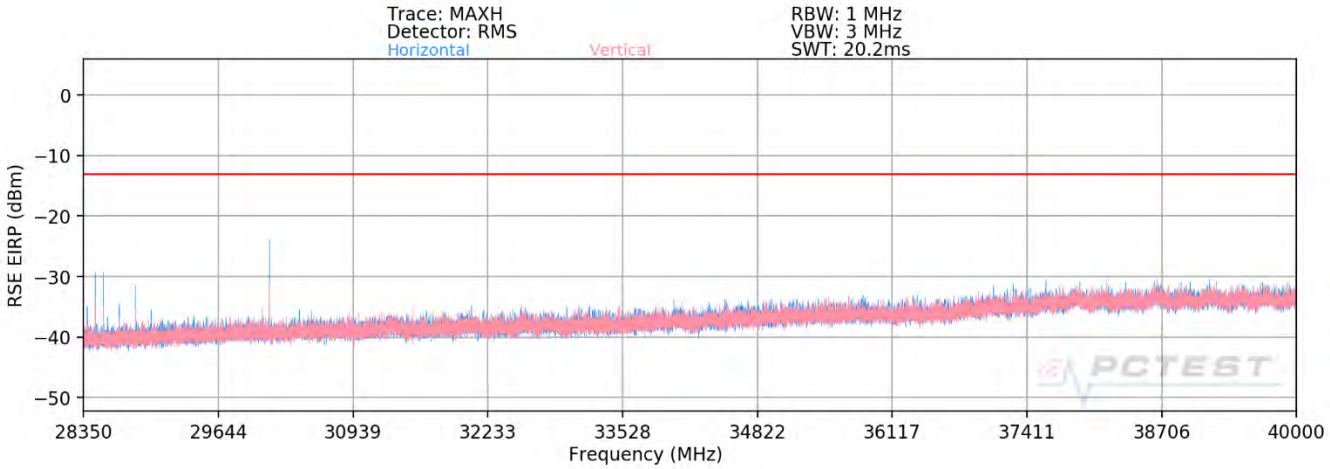
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
27371.96	Low	50	H	QPSK	H	284	270	-27.84	-13.00	-14.84
27401.03	Low	50	H	QPSK	H	281	273	-33.76	-13.00	-20.76
27311.15	Mid	50	H	QPSK	H	281	271	-32.53	-13.00	-19.53
27387.84	Mid	50	H	QPSK	H	282	272	-30.40	-13.00	-17.40
27327.22	High	50	H	QPSK	H	281	272	-37.12	-13.00	-24.12
27340.84	High	50	H	QPSK	H	282	268	-37.48	-13.00	-24.48

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

Notes

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

28.35GHz - 40GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

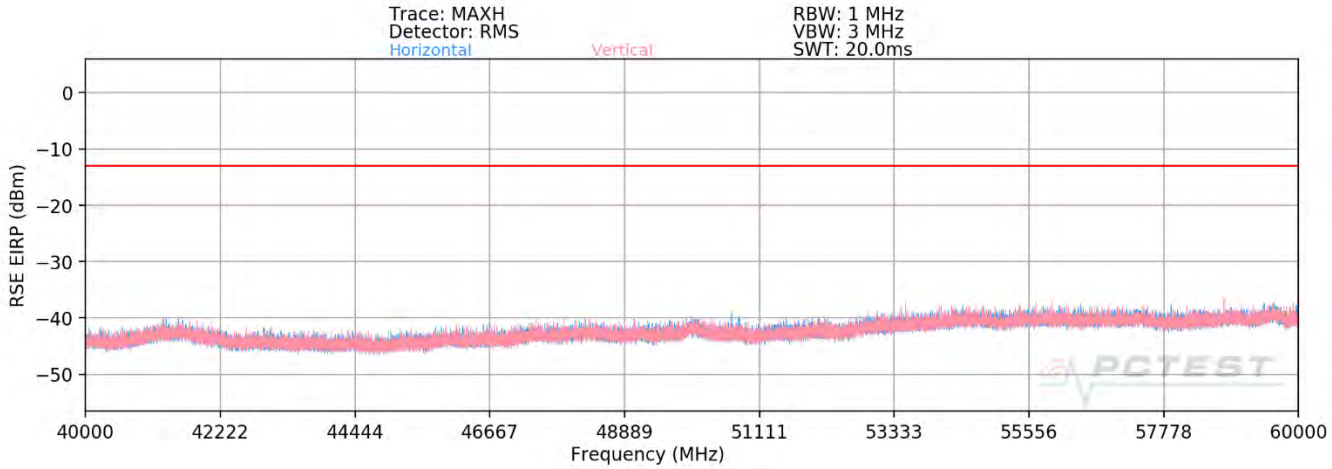
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
28615.18	Low	50	H	QPSK	H	266	271	-22.07	-13.00	-9.07
28461.93	Mid	50	H	QPSK	H	277	272	-25.78	-13.00	-12.78
30135.09	Mid	50	H	QPSK	H	42	67	-28.11	-13.00	-15.11
28478.98	High	50	H	QPSK	H	281	268	-27.20	-13.00	-14.20

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

Notes

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

40GHz - 60GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

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

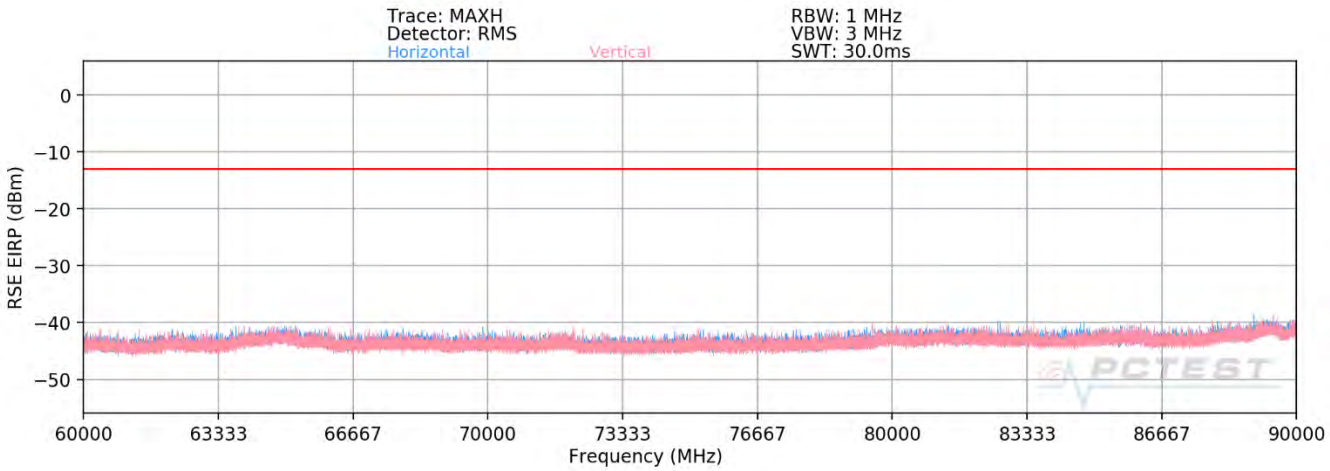
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55051.62	Low	50	H	QPSK	H	100	70	-46.30	-13.00	-33.30
55850.85	Mid	50	H	QPSK	H	98	72	-46.01	-13.00	-33.01
56651.19	High	50	H	QPSK	H	100	74	-46.45	-13.00	-33.45

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

Notes

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

60GHz - 90GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

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

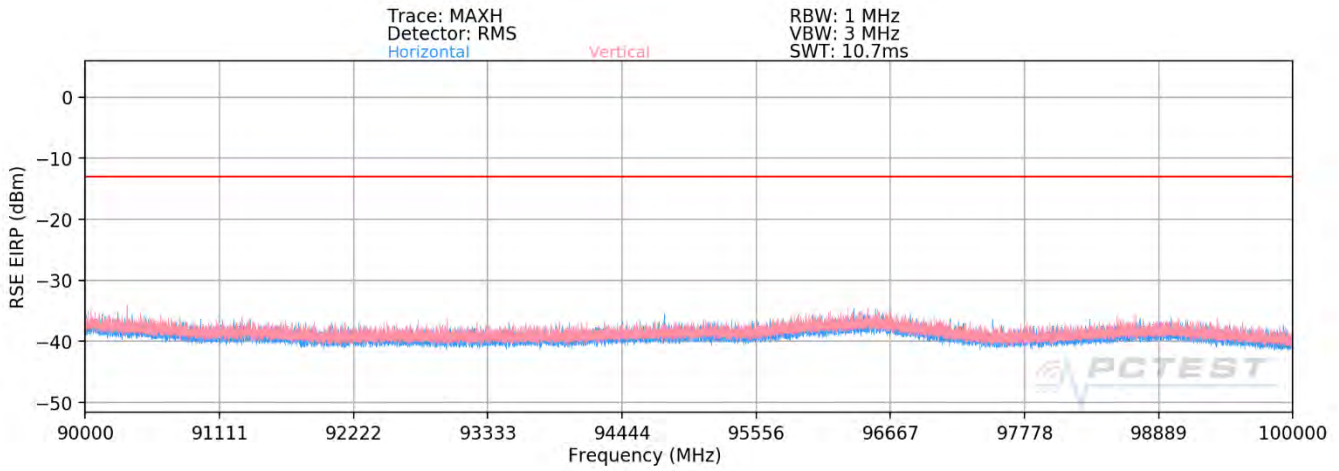
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82586.94	Low	50	H	QPSK	H	-	-	-49.46	-13.00	-36.46
83776.20	Mid	50	H	QPSK	H	75	110	-48.97	-13.00	-35.97
84976.65	High	50	H	QPSK	H	128	123	-48.73	-13.00	-35.73

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

Notes

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

90GHz - 100GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

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

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
95481.86	Low	50	H	QPSK	H	-	-	-47.34	-13.00	-34.34
95486.41	Mid	50	H	QPSK	H	-	-	-47.19	-13.00	-34.19
95501.90	High	50	H	QPSK	H	-	-	-47.39	-13.00	-34.39

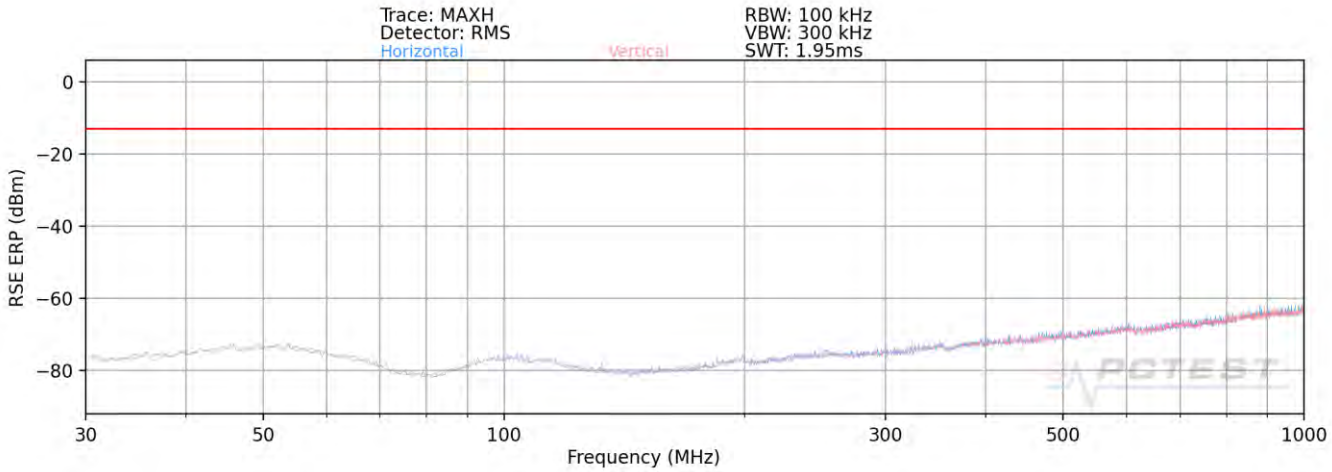
Table 7-31. Ant 1 - SISO -Spurious Emissions Table (90GHz - 100GHz)

Notes

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

Band n261 – Ant 2

30MHz - 1GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

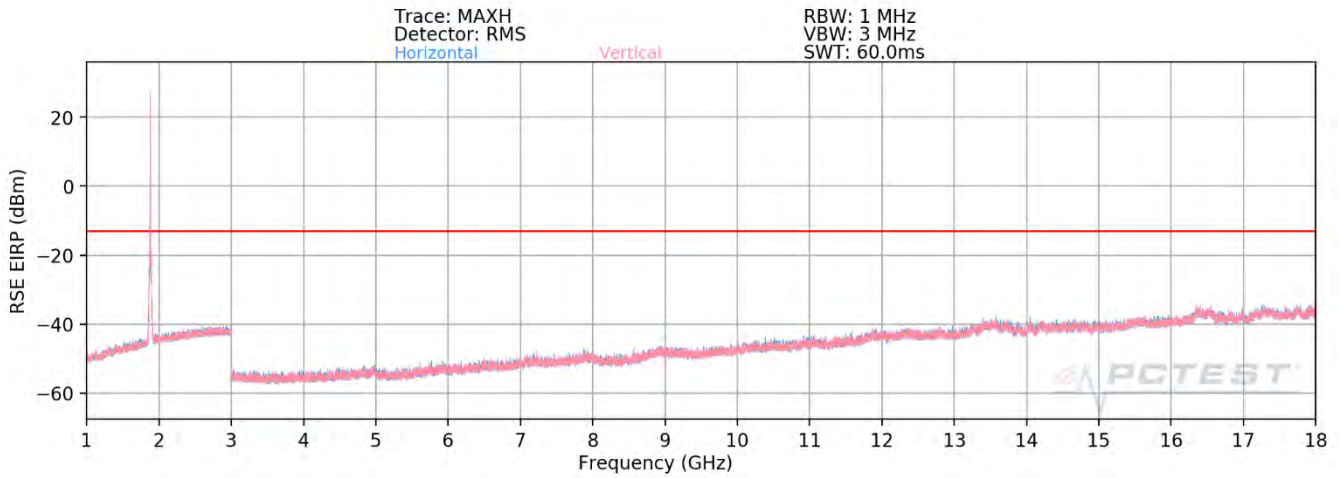
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
45.74	Mid	50	H	QPSK	V	-	-	-72.26	-13.00	-59.26
591.96	Mid	50	H	QPSK	V	-	-	-67.73	-13.00	-54.73
923.29	Mid	50	H	QPSK	V	-	-	-63.21	-13.00	-50.21

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

Notes

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

1GHz - 18GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

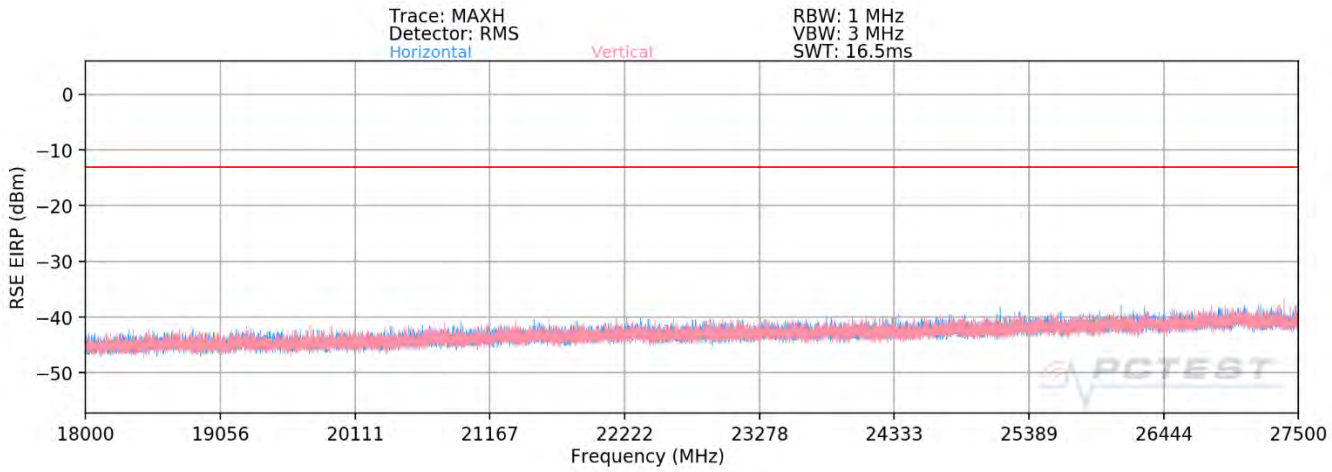
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8812.18	Low	50	H	QPSK	V	204	161	-47.50	-13.00	-34.50
8572.27	Mid	50	H	QPSK	V	159	101	-48.06	-13.00	-35.06
8971.89	High	50	H	QPSK	V	180	137	-48.87	-13.00	-35.87

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

Notes

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

18GHz - 27.5GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

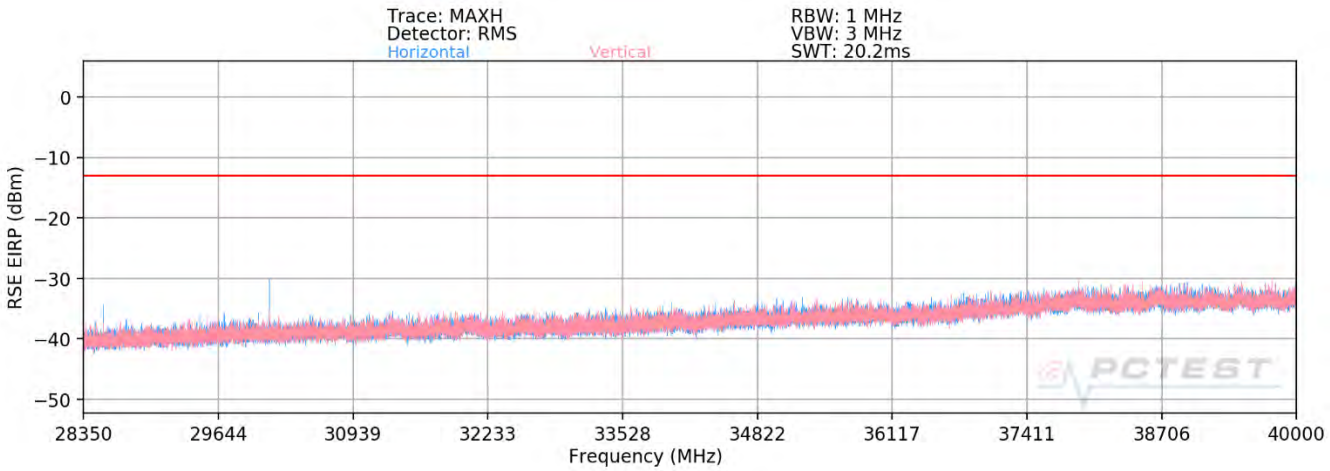
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
27371.95	Low	50	H	QPSK	H	72	107	-32.62	-13.00	-19.62
27387.93	Mid	50	H	QPSK	H	118	108	-34.09	-13.00	-21.09
27327.17	High	50	H	QPSK	H	94	106	-35.76	-13.00	-22.76

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

Notes

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

28.35GHz - 40GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

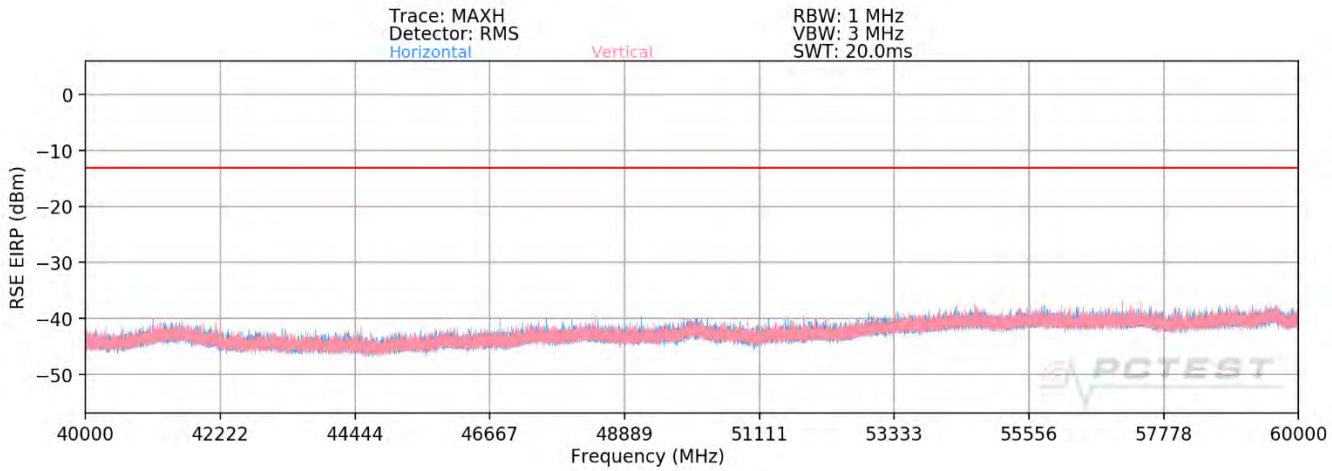
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
28615.15	Low	50	H	QPSK	H	75	103	-25.13	-13.00	-12.13
28463.08	Mid	50	H	QPSK	H	116	106	-34.46	-13.00	-21.46
30135.27	Mid	50	H	QPSK	H	46	42	-35.26	-13.00	-22.26
28479.15	High	50	H	QPSK	H	95	77	-31.19	-13.00	-18.19

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

Notes

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

40GHz - 60GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

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

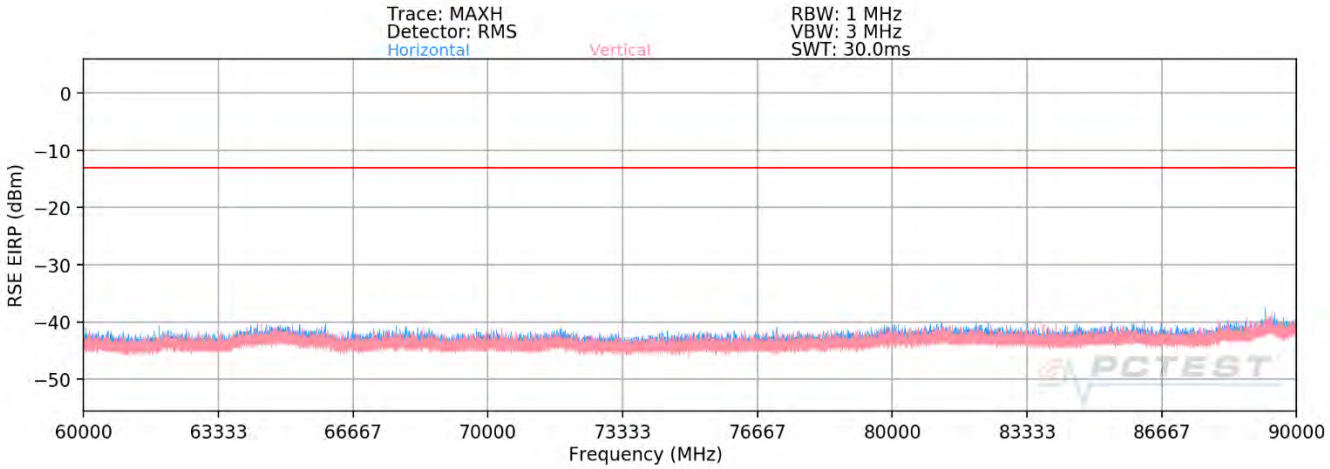
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55051.17	Low	50	H	QPSK	V	254	295	-47.57	-13.00	-34.57
55850.91	Mid	50	H	QPSK	V	77	110	-45.84	-13.00	-32.84
56651.25	High	50	H	QPSK	V	66	115	-45.73	-13.00	-32.73

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

Notes

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

60GHz - 90GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

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

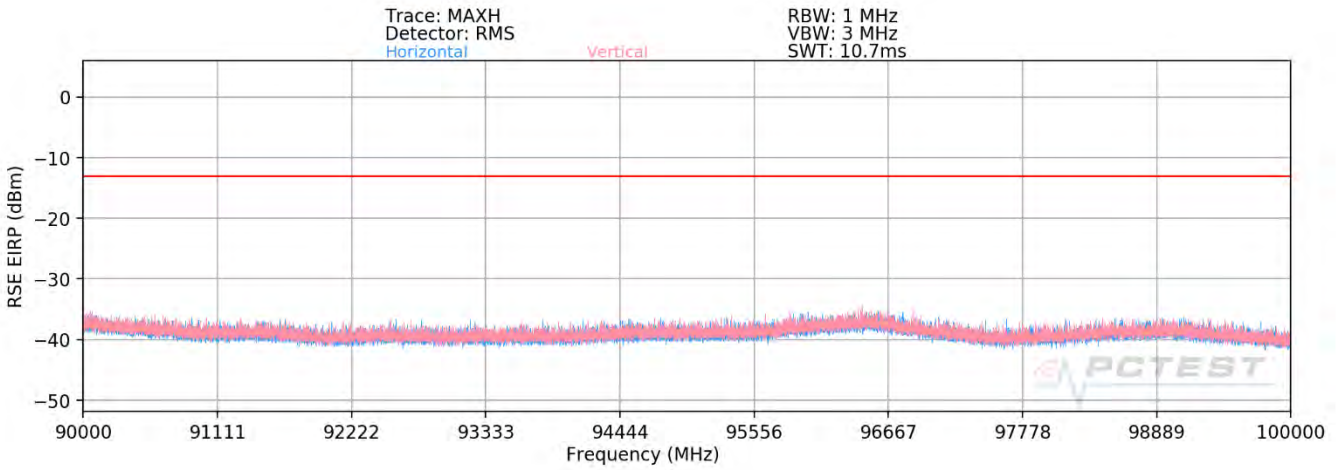
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82585.47	Low	50	H	QPSK	V	-	-	-49.37	-13.00	-36.37
83763.75	Mid	50	H	QPSK	V	-	-	-49.75	-13.00	-36.75
84984.78	High	50	H	QPSK	V	-	-	-49.52	-13.00	-36.52

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

Notes

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

90GHz - 100GHz



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

Spurious Emissions EIRP Sample Calculation (n261)

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

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

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
95482.34	Low	50	H	QPSK	V	-	-	-47.27	-13.00	-34.27
95480.09	Mid	50	H	QPSK	V	-	-	-47.25	-13.00	-34.25
95501.63	High	50	H	QPSK	V	-	-	-47.22	-13.00	-34.22

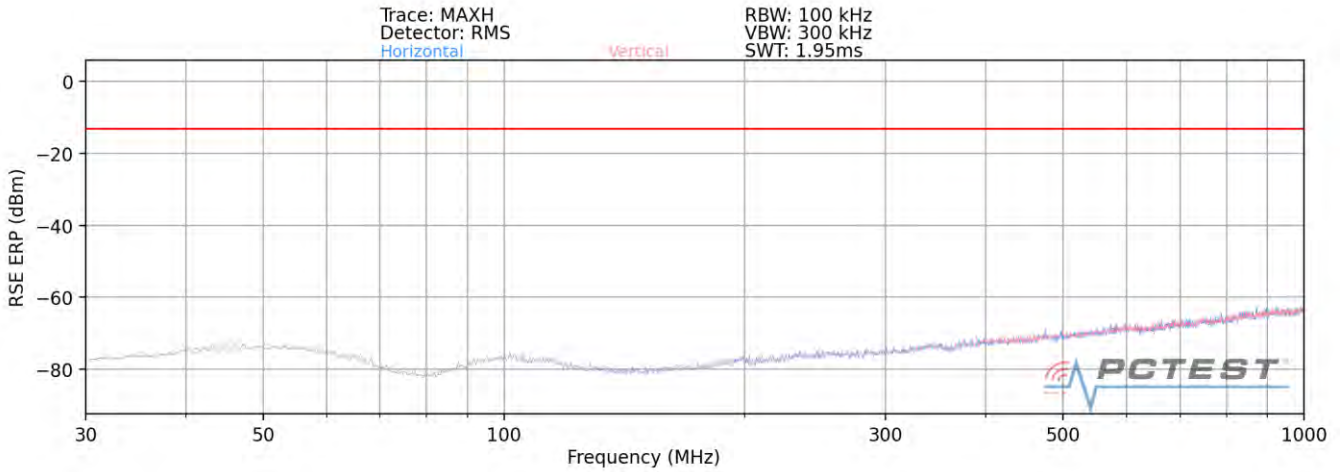
Table 7-38. Ant 2 - SISO -Spurious Emissions Table (90GHz - 100GHz)

Notes

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

Band n260- Ant 1

30MHz - 1GHz



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

Spurious Emissions EIRP Sample Calculation (n260)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

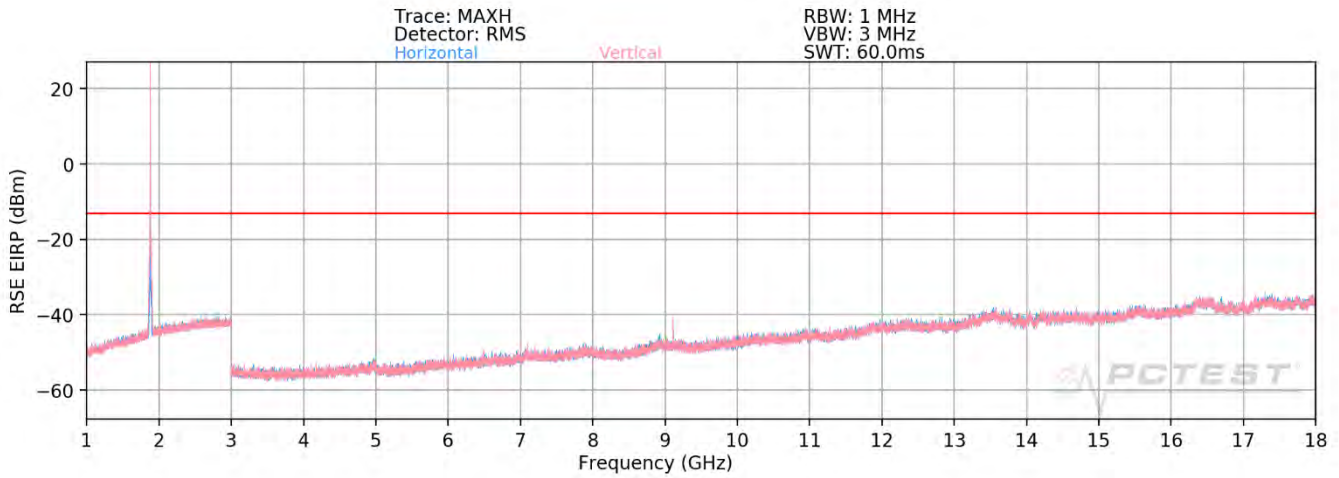
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
50.24	Mid	50	V	QPSK	V	-	-	-72.76	-13.00	-59.76
596.96	Mid	50	V	QPSK	V	-	-	-67.13	-13.00	-54.13
983.26	Mid	50	V	QPSK	V	-	-	-63.36	-13.00	-50.36

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

Notes

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

1GHz - 18GHz



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

Spurious Emissions EIRP Sample Calculation (n260)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

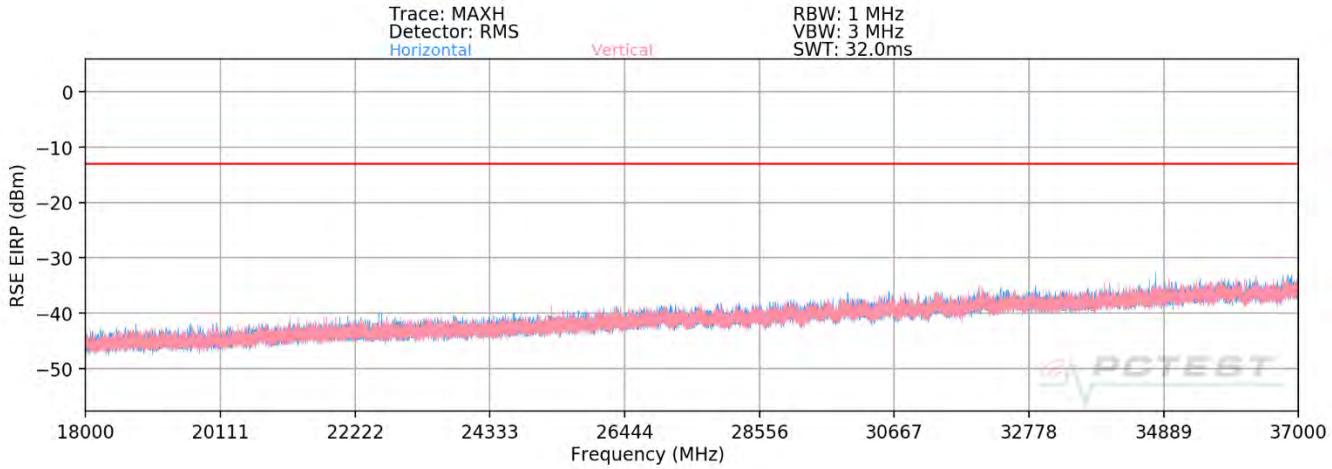
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8404.85	Low	50	V	QPSK	V	151	134	-44.59	-13.00	-31.59
9111.70	Mid	50	V	QPSK	V	208	168	-42.42	-13.00	-29.42
9153.27	High	50	V	QPSK	V	208	104	-39.31	-13.00	-26.31

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

Notes

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

18GHz – 37GHz



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

Spurious Emissions EIRP Sample Calculation (n260)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

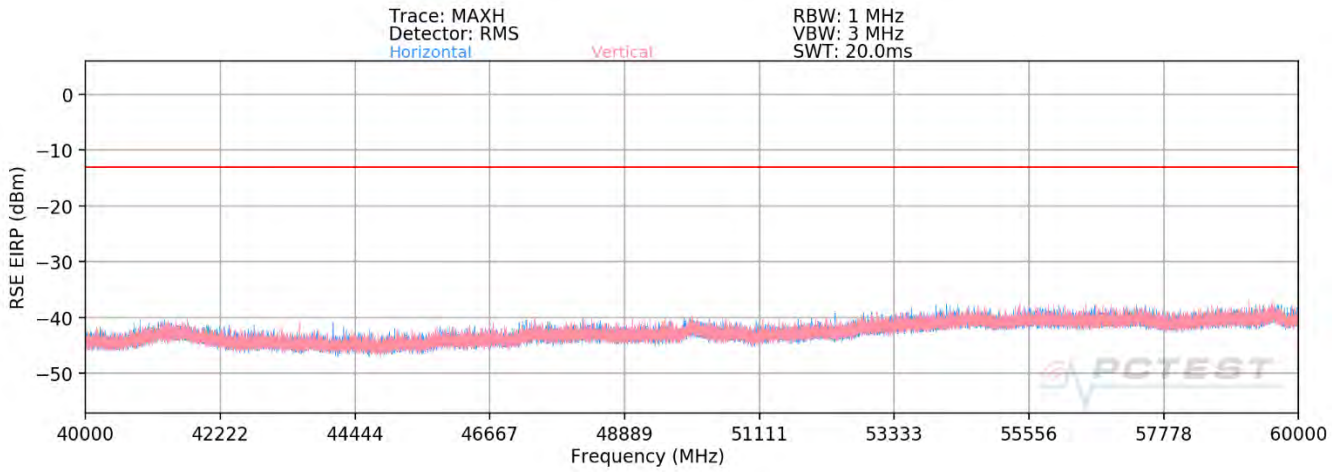
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
36565.32	Low	50	V	QPSK	H	-	-	-41.89	-13.00	-28.89
36681.57	Mid	50	V	QPSK	H	-	-	-41.92	-13.00	-28.92
36612.75	High	50	V	QPSK	H	-	-	-41.98	-13.00	-28.98

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

Notes

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

40GHz - 60GHz



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

Spurious Emissions EIRP Sample Calculation (n260)

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

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

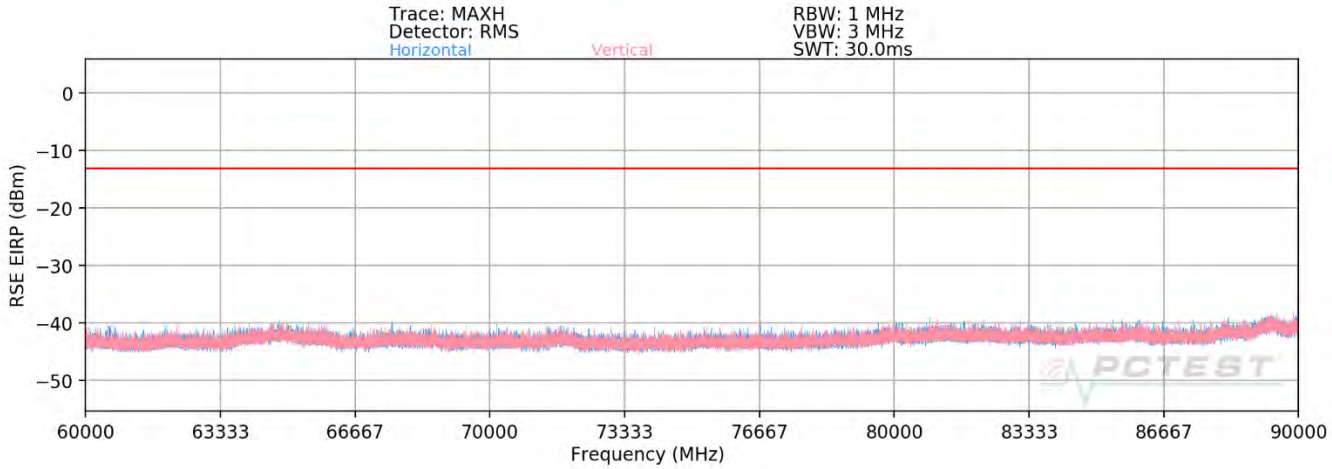
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
42931.12	Low	50	V	QPSK	H	245	236	-39.05	-13.00	-26.05
44083.06	Mid	50	V	QPSK	H	243	238	-41.75	-13.00	-28.75
46233.51	High	50	V	QPSK	H	259	233	-47.53	-13.00	-34.53

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

Notes

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

60GHz - 90GHz



Plot 7-51. Ant 1-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

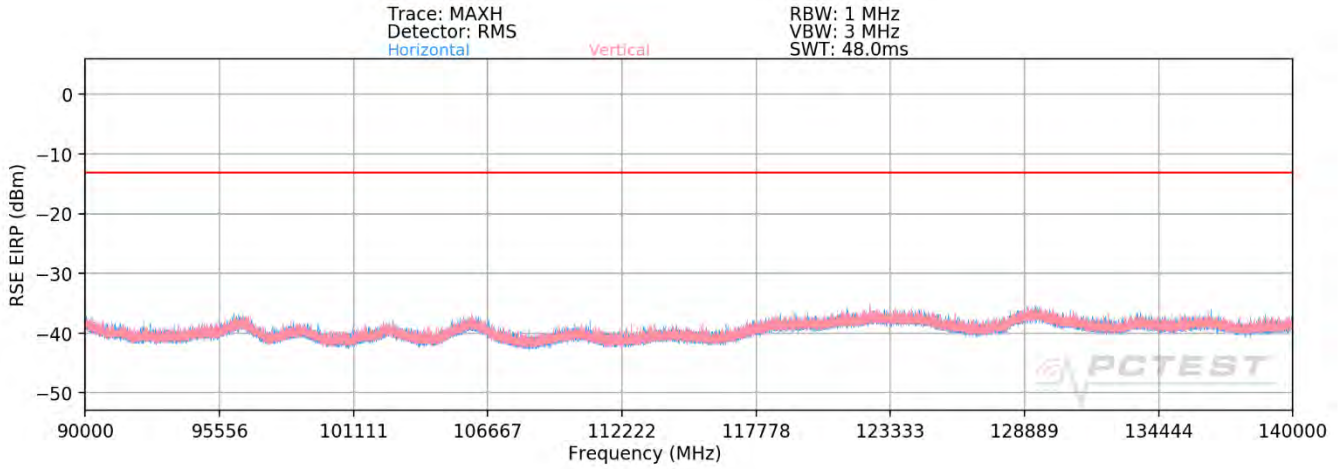
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
74051.13	Low	50	V	QPSK	H	303	231	-43.36	-13.00	-30.36
77000.94	Mid	50	V	QPSK	H	303	229	-45.56	-13.00	-32.56
79492.29	High	50	V	QPSK	H	305	240	-48.33	-13.00	-35.33

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

Notes

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

90GHz - 140GHz



Plot 7-52. Ant 1-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

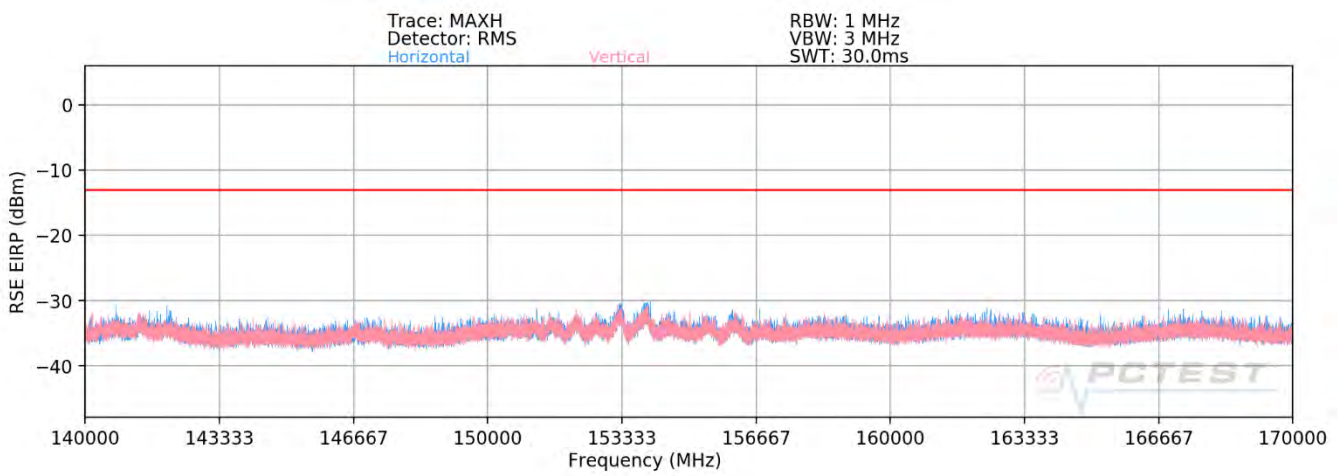
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
111076.53	Low	50	V	QPSK	H	276	248	-44.76	-13.00	-31.76
115501.23	Mid	50	V	QPSK	H	276	259	-42.56	-13.00	-29.56
119926.38	High	50	V	QPSK	H	285	260	-42.51	-13.00	-29.51

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

Notes

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

140GHz - 170GHz



Plot 7-53. Ant 1-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

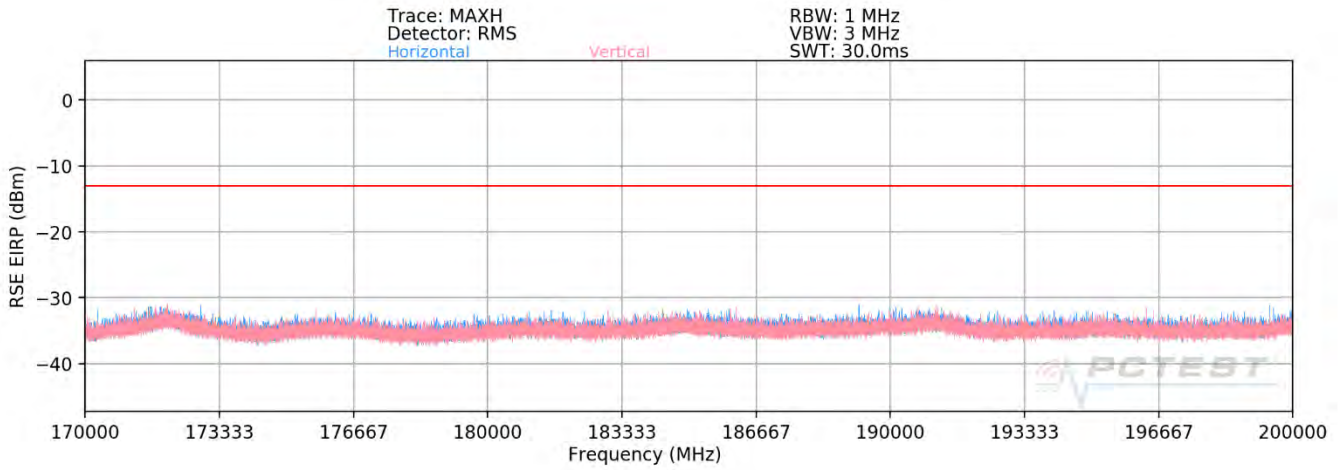
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
148089.57	Low	50	V	QPSK	H	-	-	-41.32	-13.00	-28.32
154009.83	Mid	50	V	QPSK	H	-	-	-41.07	-13.00	-28.07
159890.46	High	50	V	QPSK	H	-	-	-41.23	-13.00	-28.23

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

Notes

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

170GHz - 200GHz



Plot 7-54. Ant 1-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
185110.83	Low	50	V	QPSK	H	-	-	-40.59	-13.00	-27.59
192492.57	Mid	50	V	QPSK	H	-	-	-40.79	-13.00	-27.79
199867.20	High	50	V	QPSK	H	-	-	-40.72	-13.00	-27.72

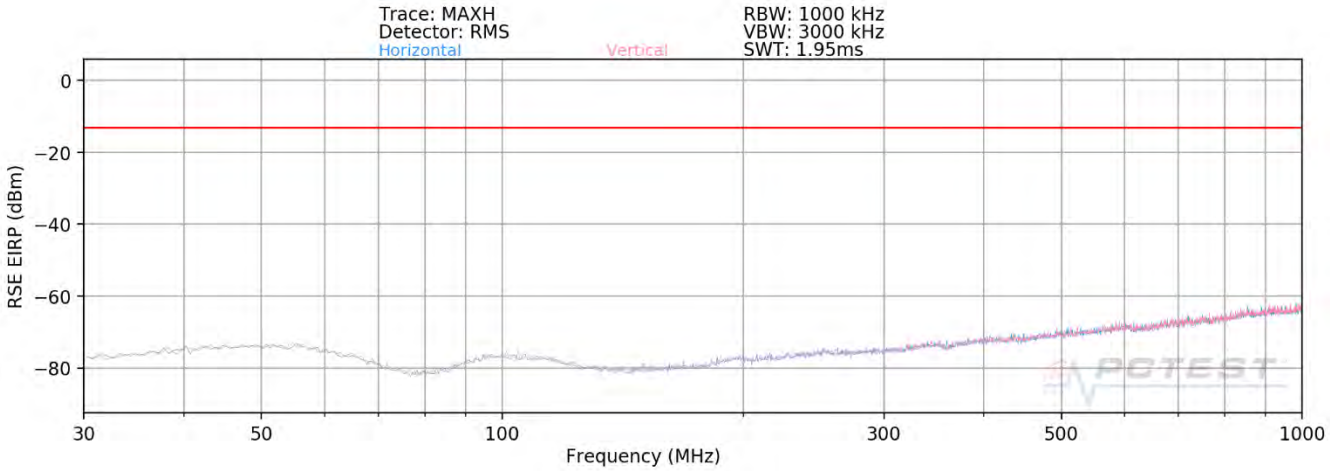
Table 7-46. Ant 1 - SISO -Spurious Emissions Table (170GHz - 200GHz)

Notes

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

Band n260- Ant 2

30MHz - 1GHz



Plot 7-55. Ant 2-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

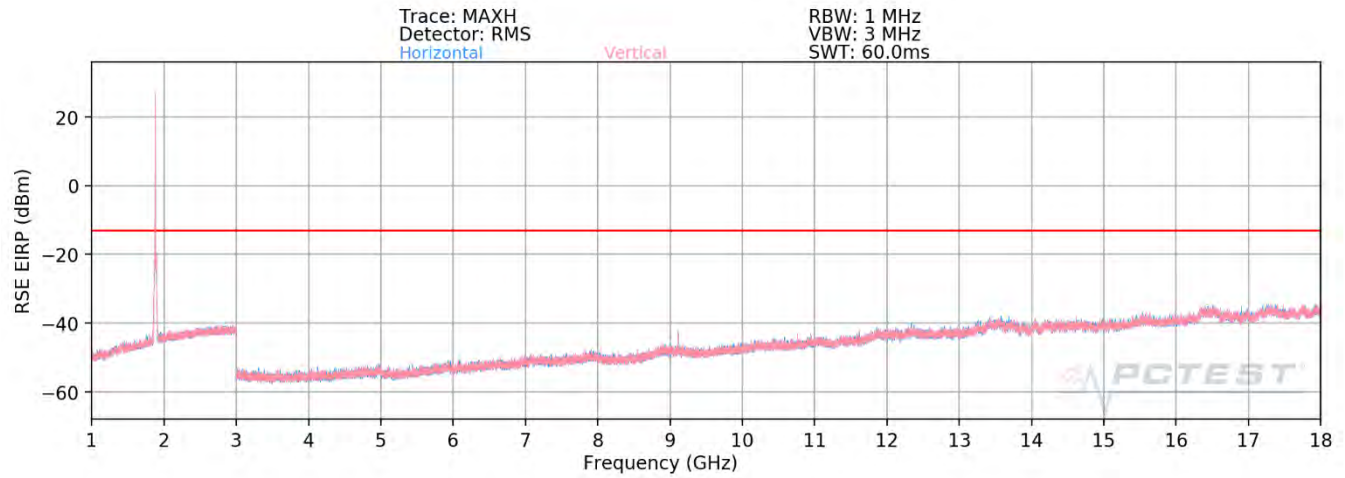
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
51.74	Low	50	V	QPSK	H	-	-	-73.34	-13.00	-60.34
567.97	Mid	50	V	QPSK	H	-	-	-68.34	-13.00	-55.34
943.78	Mid	50	V	QPSK	H	-	-	-63.35	-13.00	-50.35

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

Notes

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

1GHz - 18GHz



Plot 7-56. Ant 2-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

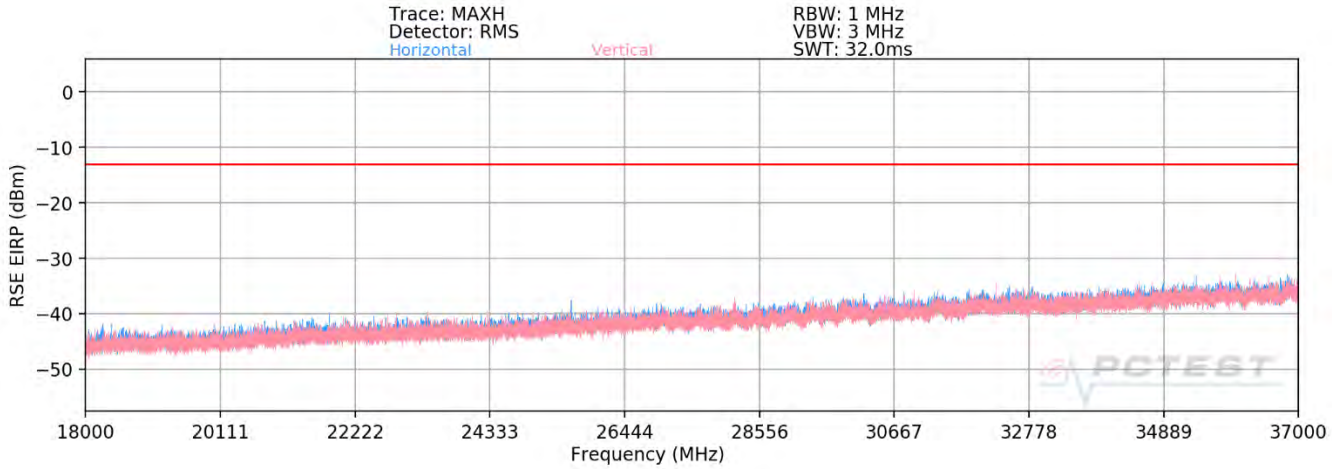
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8404.82	Low	50	V	QPSK	H	110	302	-45.72	-13.00	-32.72
9111.79	Mid	50	V	QPSK	H	109	222	-45.77	-13.00	-32.77
9153.09	High	50	V	QPSK	H	161	227	-43.98	-13.00	-30.98

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

Notes

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

18GHz – 37GHz



Plot 7-57. Ant 2-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

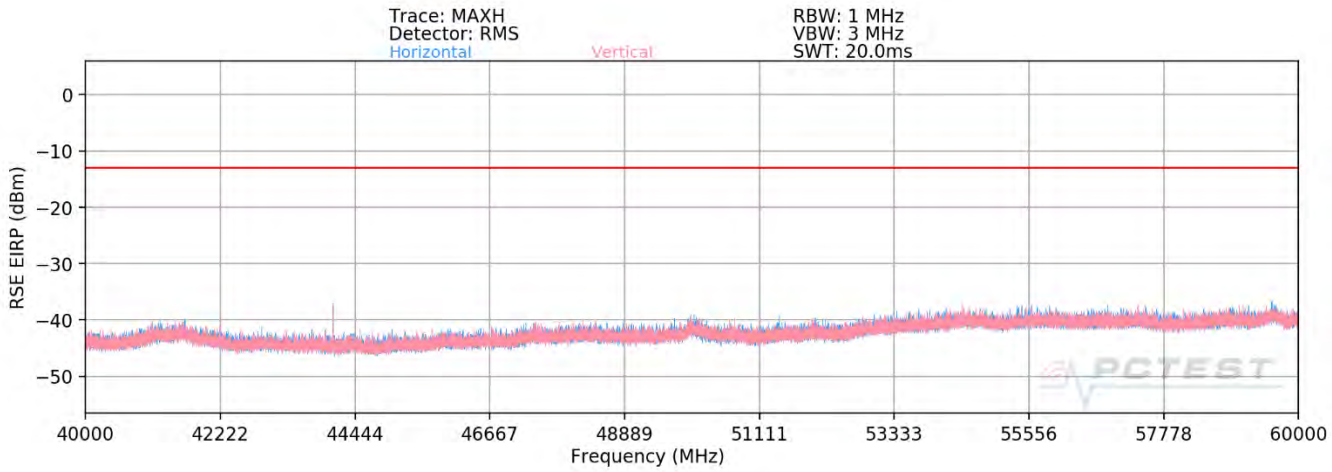
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
36603.96	Low	50	V	QPSK	H	-	-	-41.97	-13.00	-28.97
36584.03	Mid	50	V	QPSK	H	-	-	-41.95	-13.00	-28.95
36688.29	High	50	V	QPSK	H	-	-	-42.07	-13.00	-29.07

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

Notes

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

40GHz - 60GHz



Plot 7-58. Ant 2-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

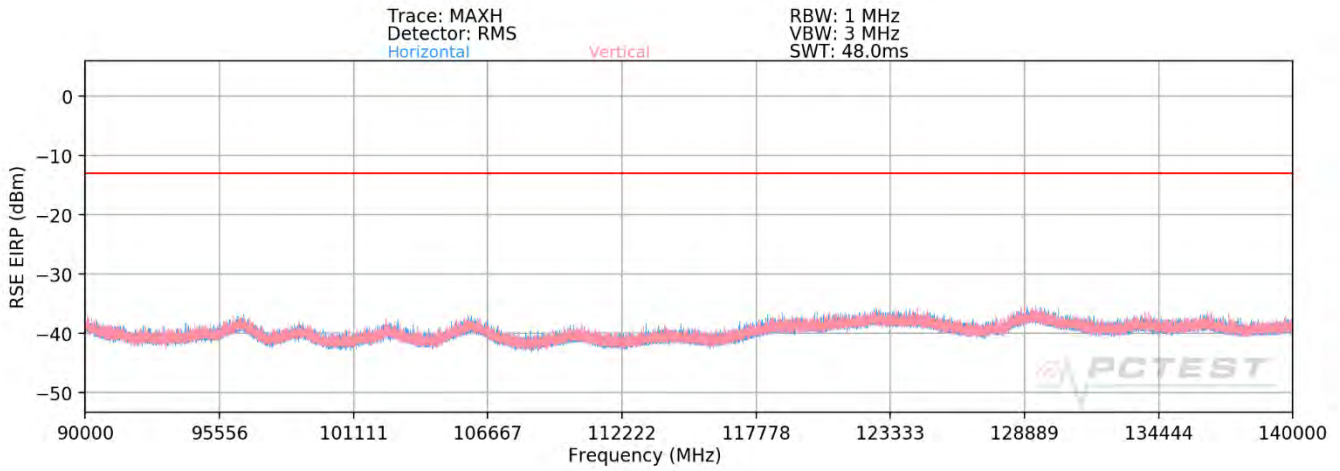
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
42931.18	Low	50	V	QPSK	H	303	93	-36.34	-13.00	-23.34
44083.15	Mid	50	V	QPSK	H	328	80	-38.39	-13.00	-25.39
46233.57	High	50	V	QPSK	H	306	107	-39.46	-13.00	-26.46

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

Notes

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

60GHz - 90GHz



Plot 7-10. Ant 2-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

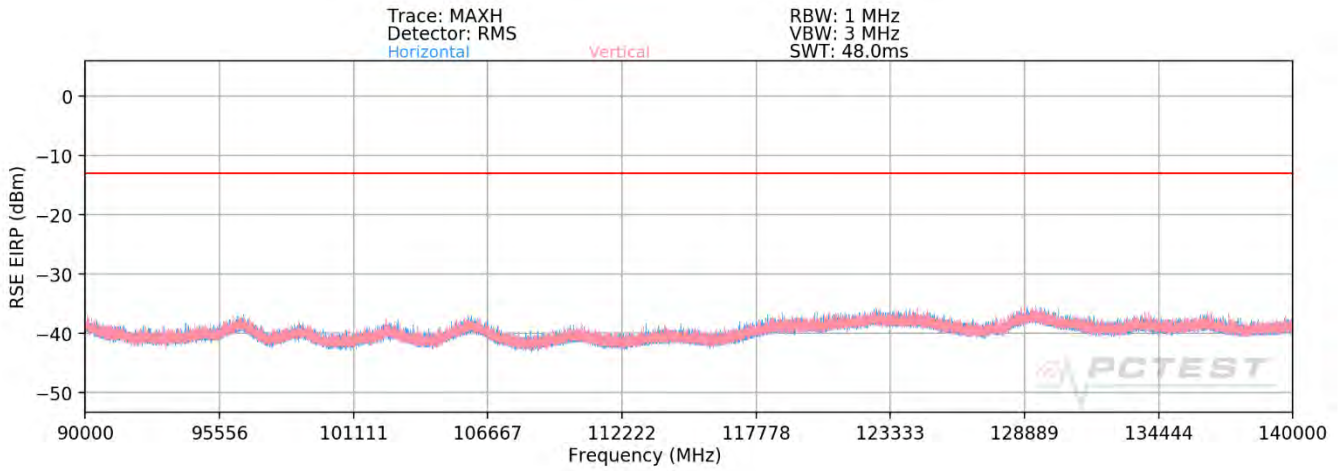
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
74051.19	Low	50	V	QPSK	H	320	91	-45.18	-13.00	-32.18
77000.82	Mid	50	V	QPSK	H	351	32	-47.54	-13.00	-34.54
79951.02	High	50	V	QPSK	H	298	90	-47.91	-13.00	-34.91

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

Notes

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

90GHz - 140GHz



Plot 7-60. Ant 2-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

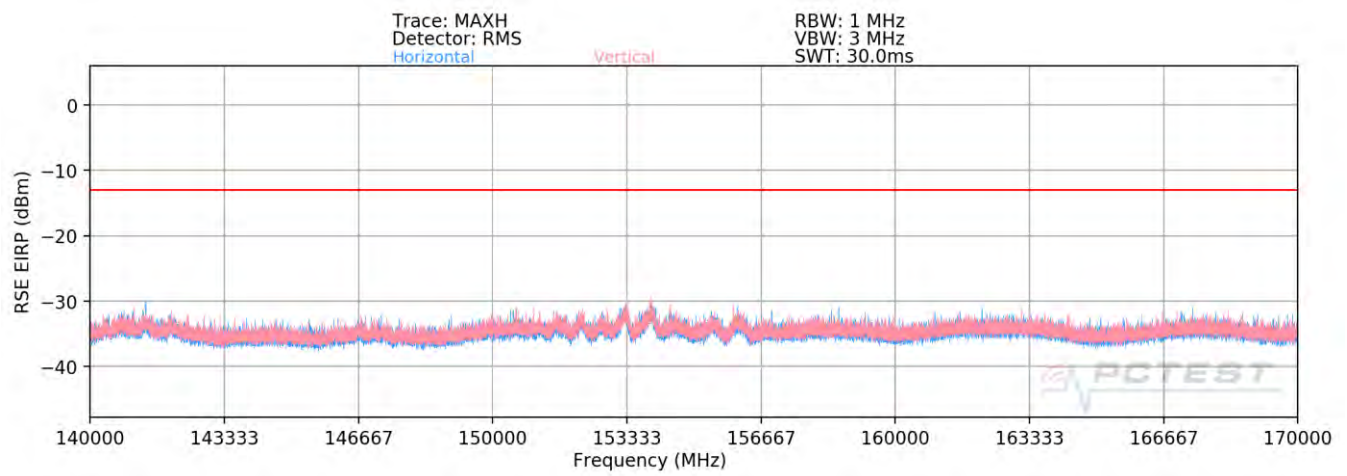
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
111076.50	Low	50	V	QPSK	H	316	115	-44.28	-13.00	-31.28
115501.17	Mid	50	V	QPSK	H	345	46	-44.63	-13.00	-31.63
119926.26	High	50	V	QPSK	H	318	111	-41.24	-13.00	-28.24

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

Notes

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

140GHz - 170GHz



Plot 7-61. Ant 2-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

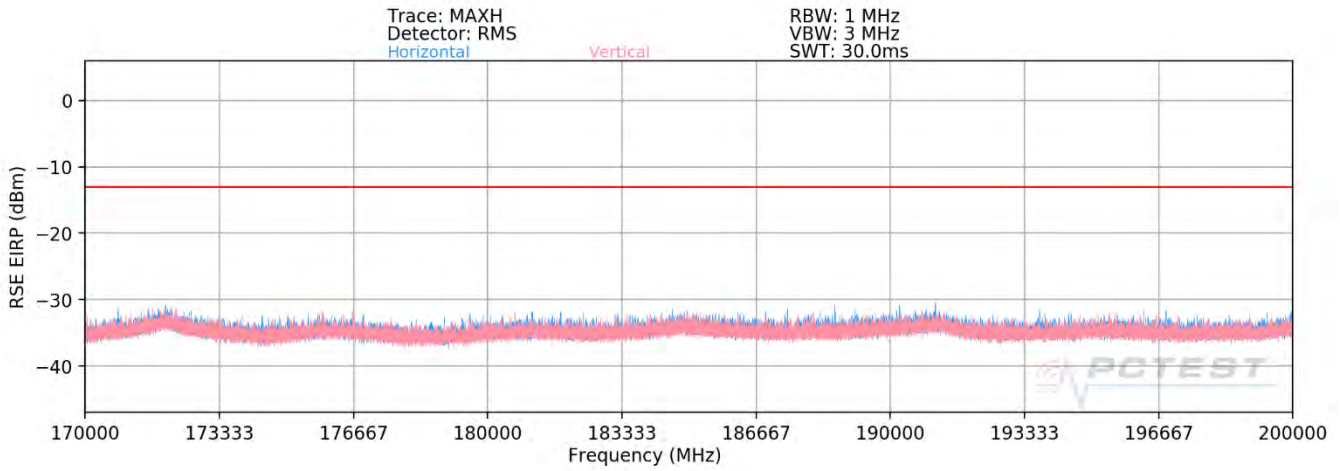
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
148089.12	Low	50	V	QPSK	H	-	-	-41.41	-13.00	-28.41
154009.20	Mid	50	V	QPSK	H	-	-	-41.02	-13.00	-28.02
159911.49	High	50	V	QPSK	H	-	-	-41.26	-13.00	-28.26

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

Notes

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

170GHz - 200GHz



Plot 7-62. Ant 2-n260 Radiated Spurious Plot (1CC QPSK Mid Channel V Beam – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
185135.61	Low	50	V	QPSK	H	-	-	-40.58	-13.00	-27.58
192484.89	Mid	50	V	QPSK	H	-	-	-40.79	-13.00	-27.79
199858.97	High	50	V	QPSK	H	-	-	-40.73	-13.00	-27.73

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

Notes

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

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 4.4.2.5

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 ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x 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.

Sample Analyzer Offset Calculation (at 27.5GHz)

Measurement Antenna Factor = 40.70dB/m

Cable Loss = 8.82dB

Analyzer Offset (dB) = AF (dB/m) + CL (dB) + 107 + $20\log_{10}(D)$ – 104.8dB, where D = 1m

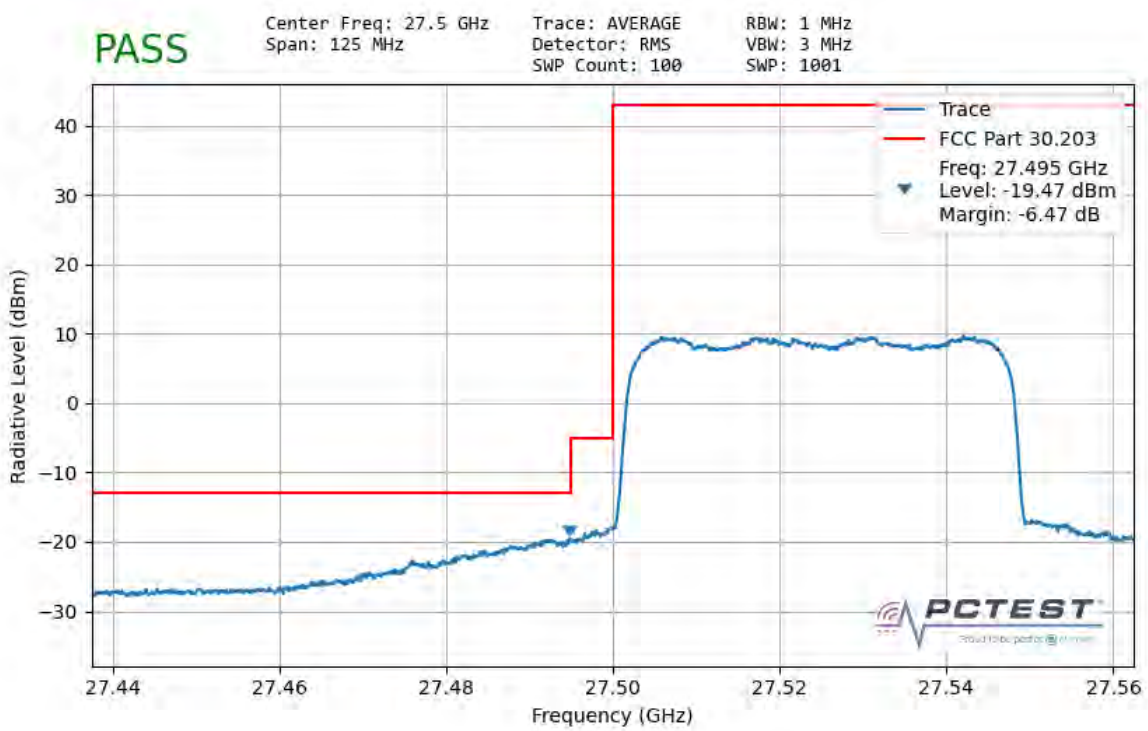
= 40.70dB/m + 8.82dB + 107 + $20\log_{10}(1m)$ – 104.8dB

= 51.72dB

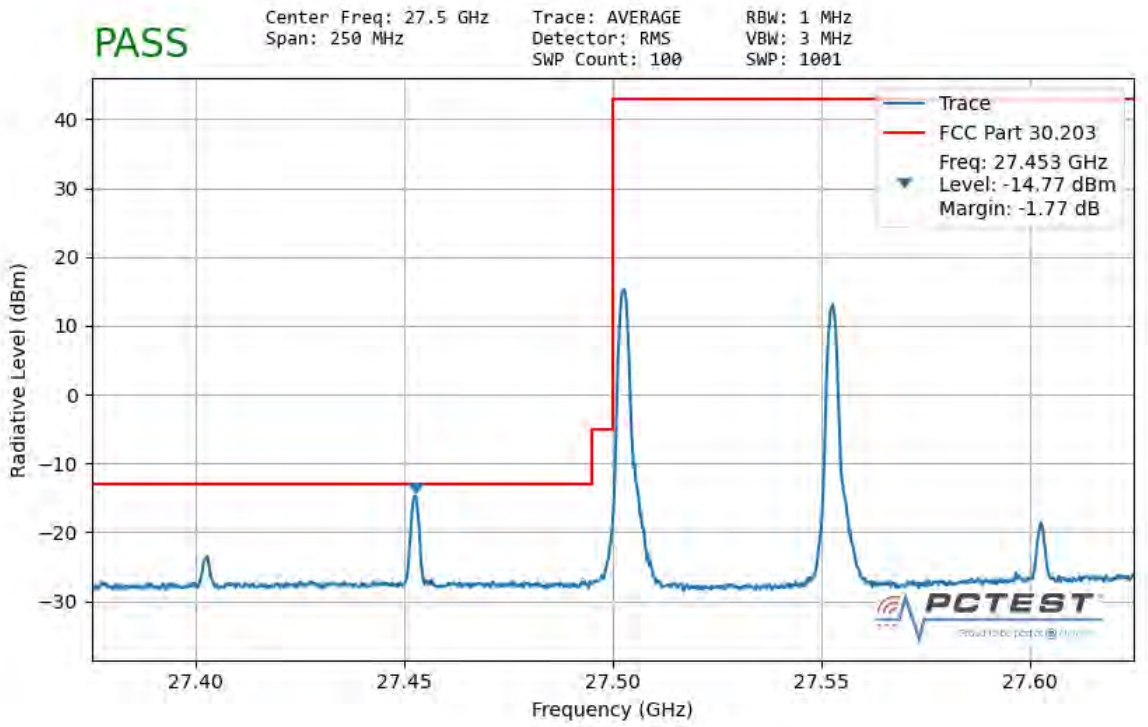
Note:

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.

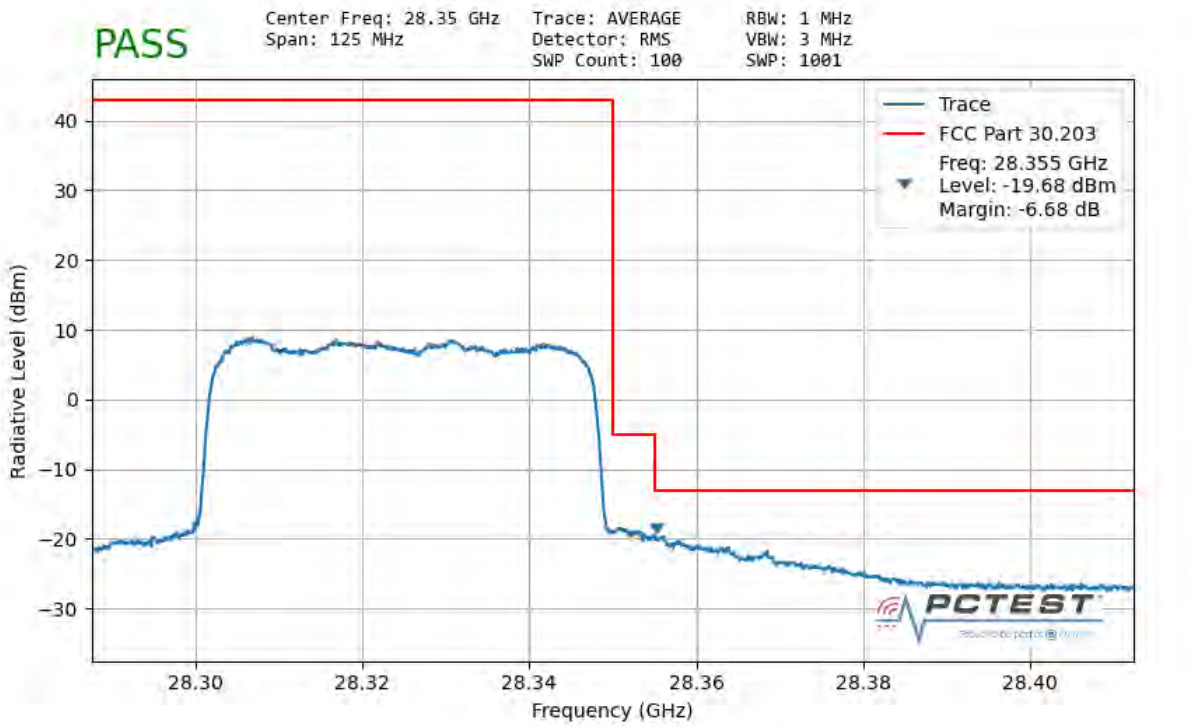
Band n261 – Worst-Case



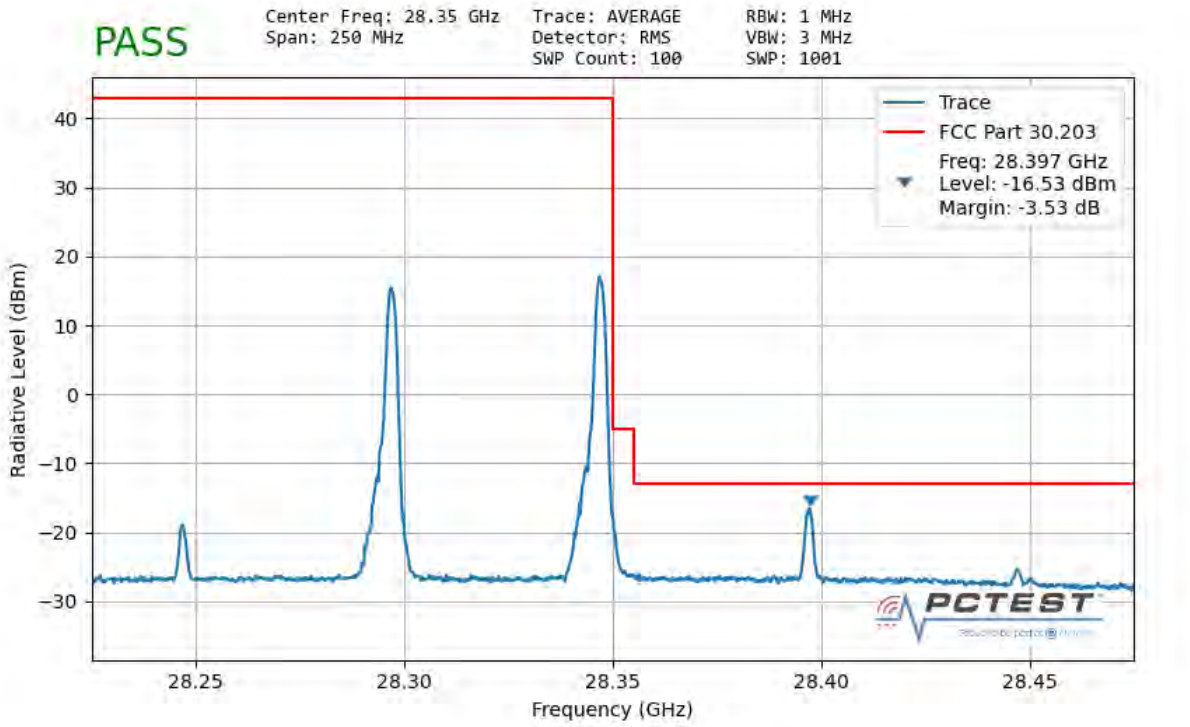
Plot 7-63. Ant 1 Lower Band Edge (50MHz-1CC – QPSK Full RB)



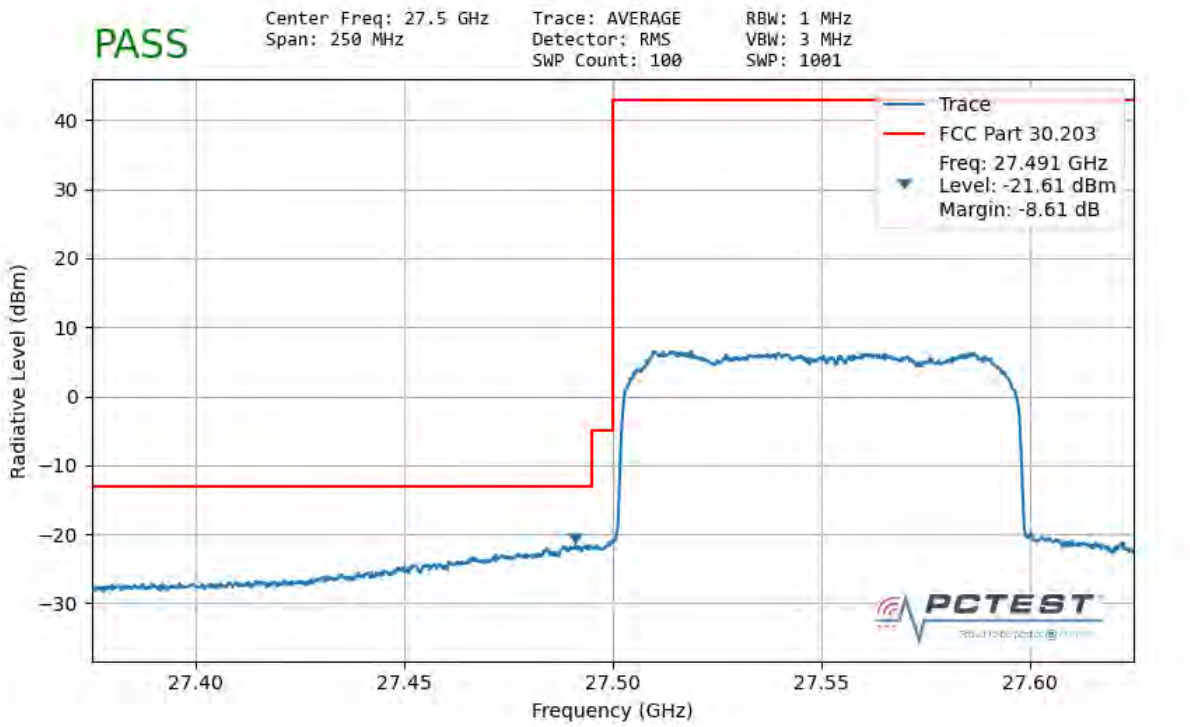
Plot 7-64. Ant 1 Lower Band Edge (50MHz-2CC – QPSK 1 RB)



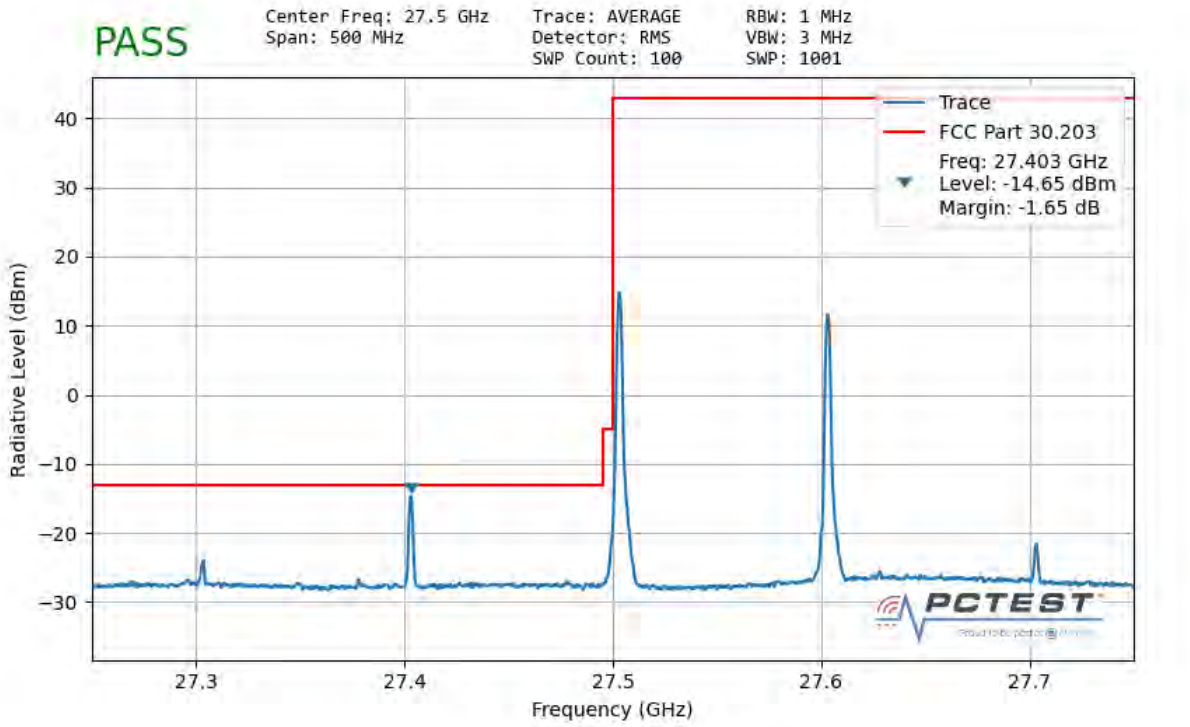
Plot 7-65. Ant 1 Upper Band Edge (50MHz-1CC – QPSK Full RB)



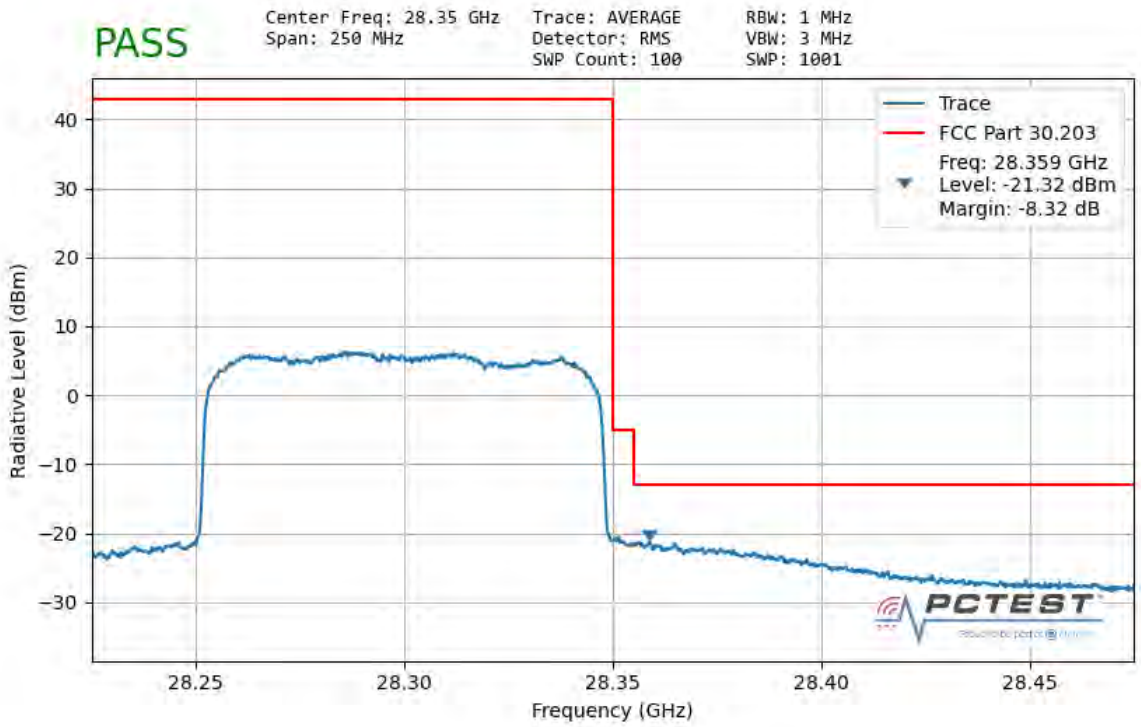
Plot 7-66. Ant 1 Upper Band Edge (50MHz-2CC – QPSK 1 RB)



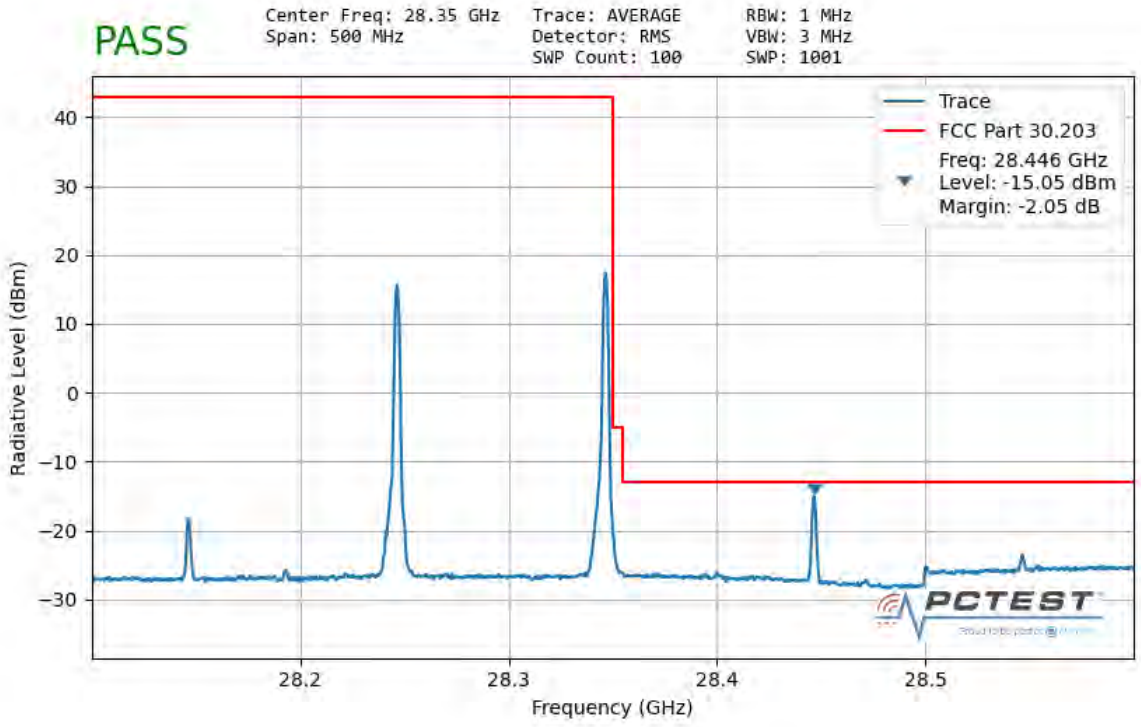
Plot 7-67. Ant 1 Lower Band Edge (100MHz-1CC – QPSK Full RB)



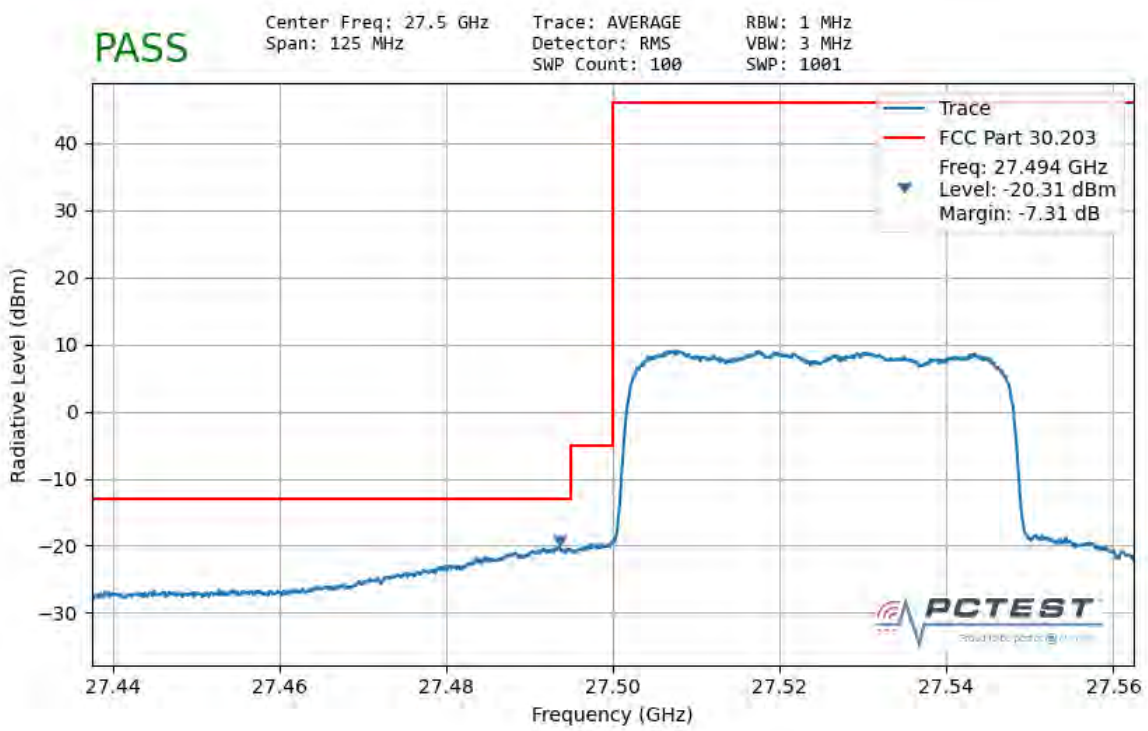
Plot 7-68. Ant 1 Lower Band Edge (100MHz-2CC – QPSK 1 RB)



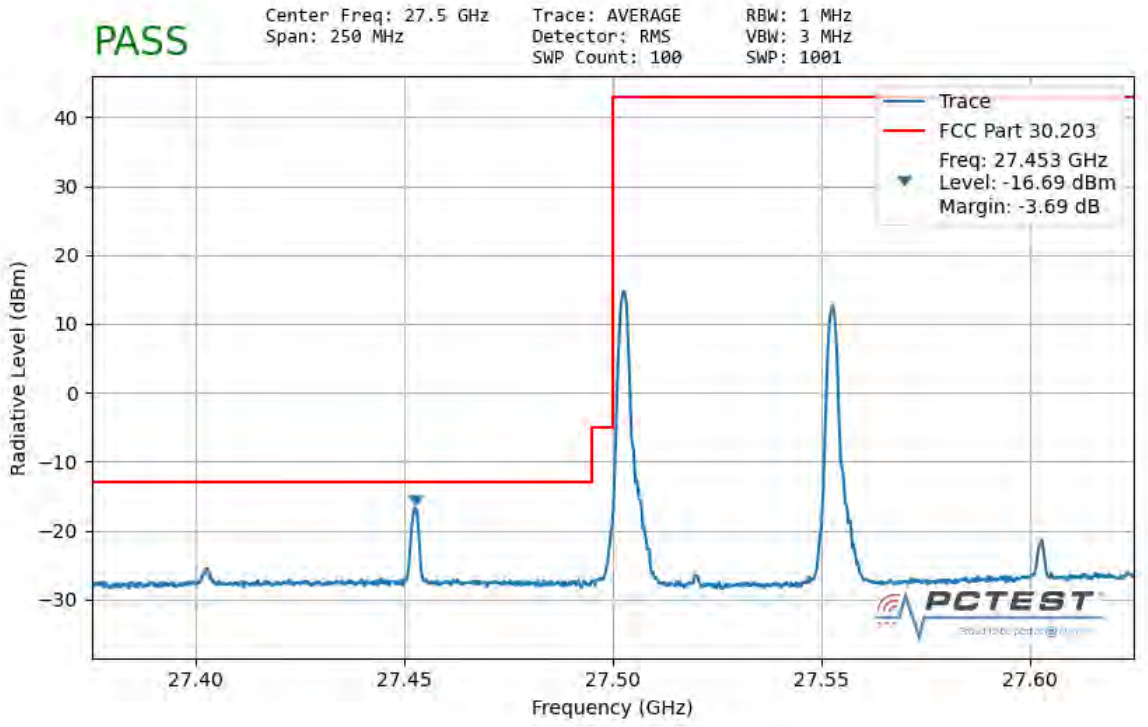
Plot 7-69. Ant 1 Upper Band Edge (100MHz-1CC – QPSK Full RB)



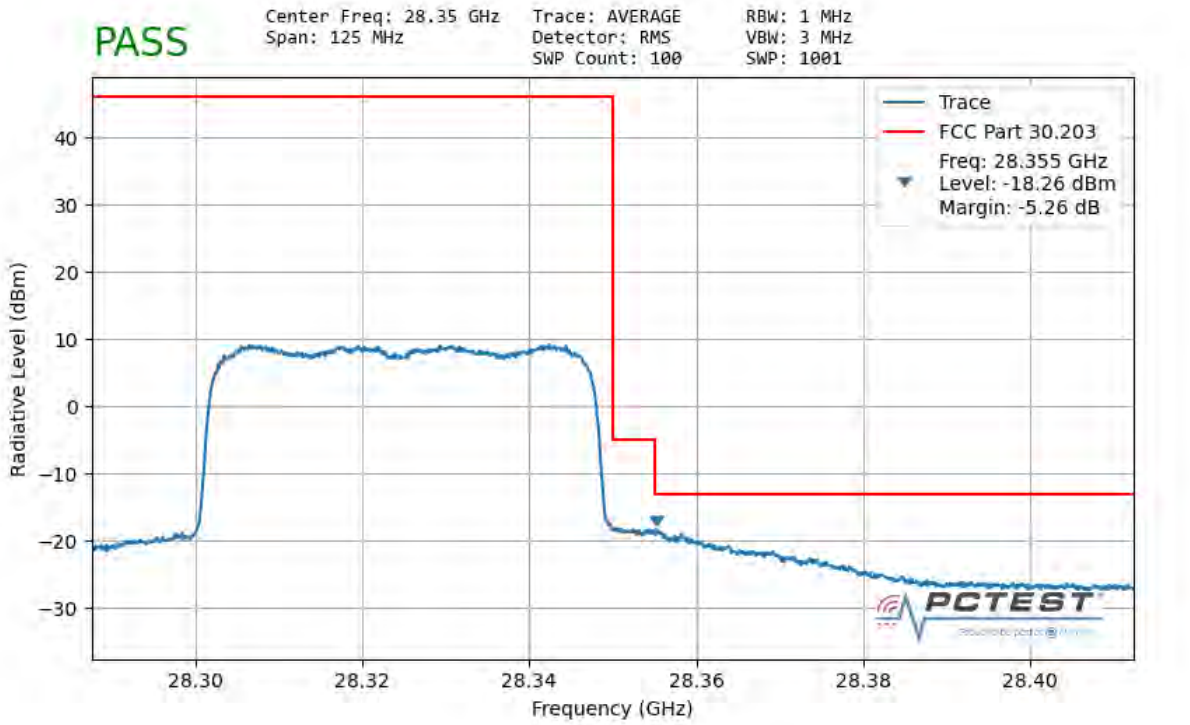
Plot 7-70. Ant 1 Upper Band Edge (100MHz-2CC – QPSK 1 RB)



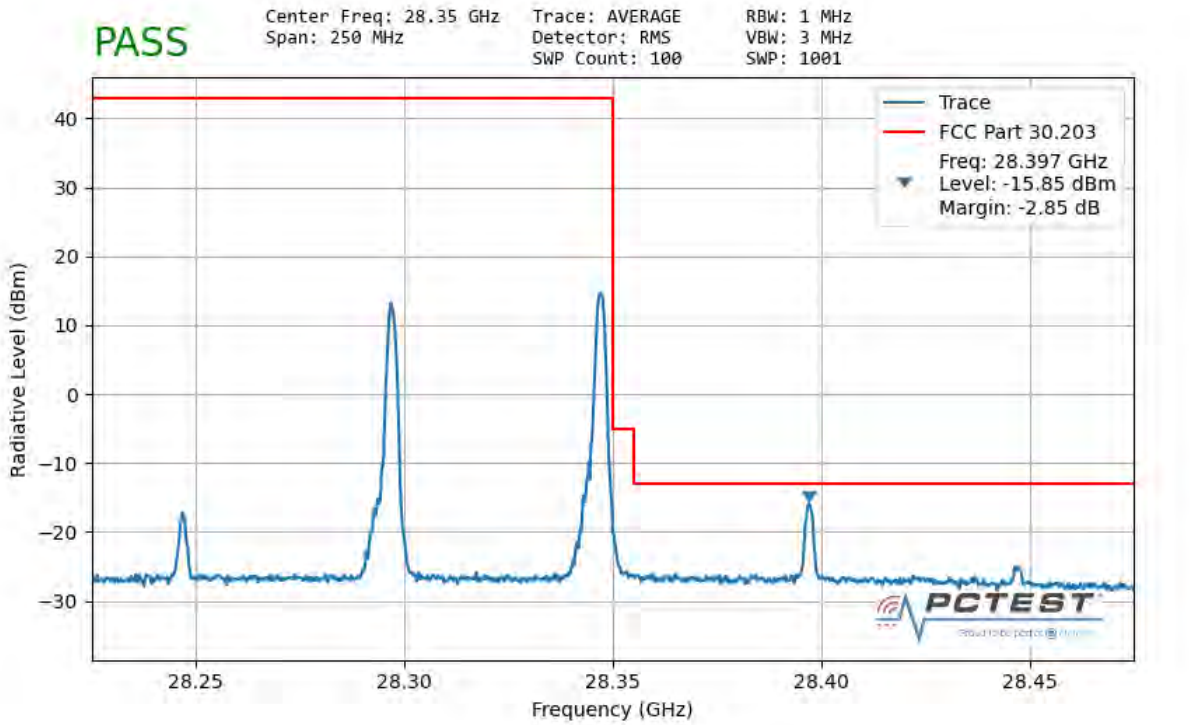
Plot 7-71. Ant 2 Lower Band Edge (50MHz-1CC – QPSK Full RB)



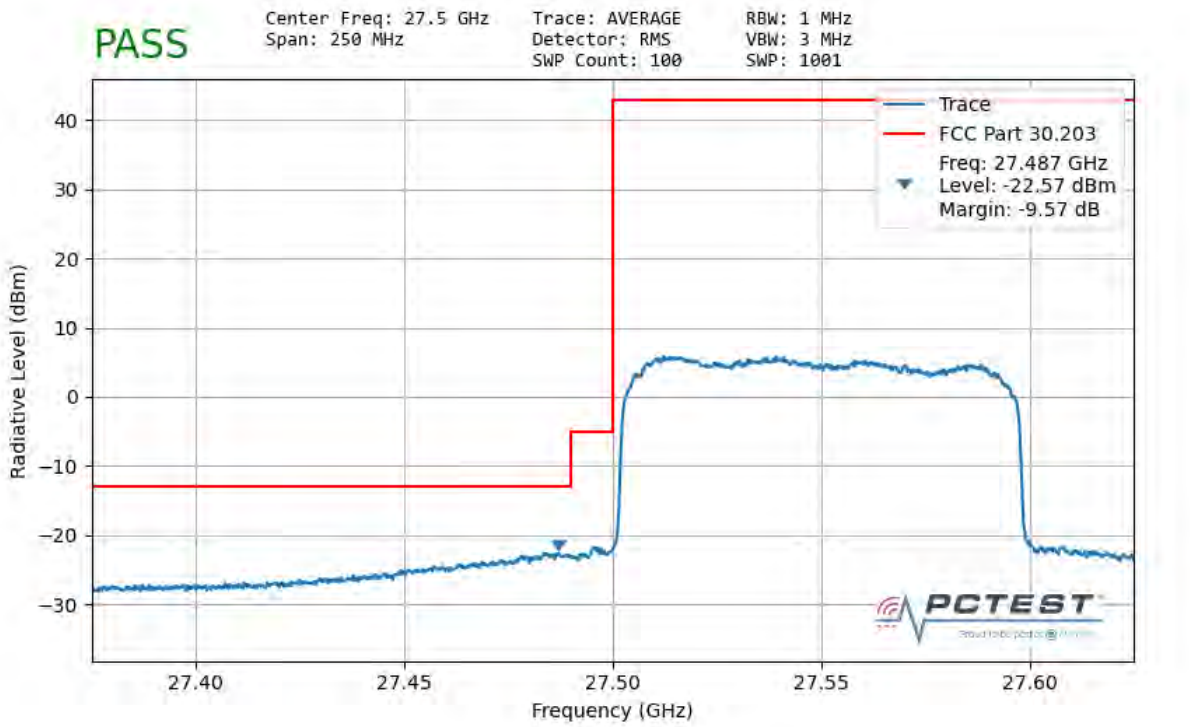
Plot 7-72. Ant 2 Lower Band Edge (50MHz-2CC – QPSK 1 RB)



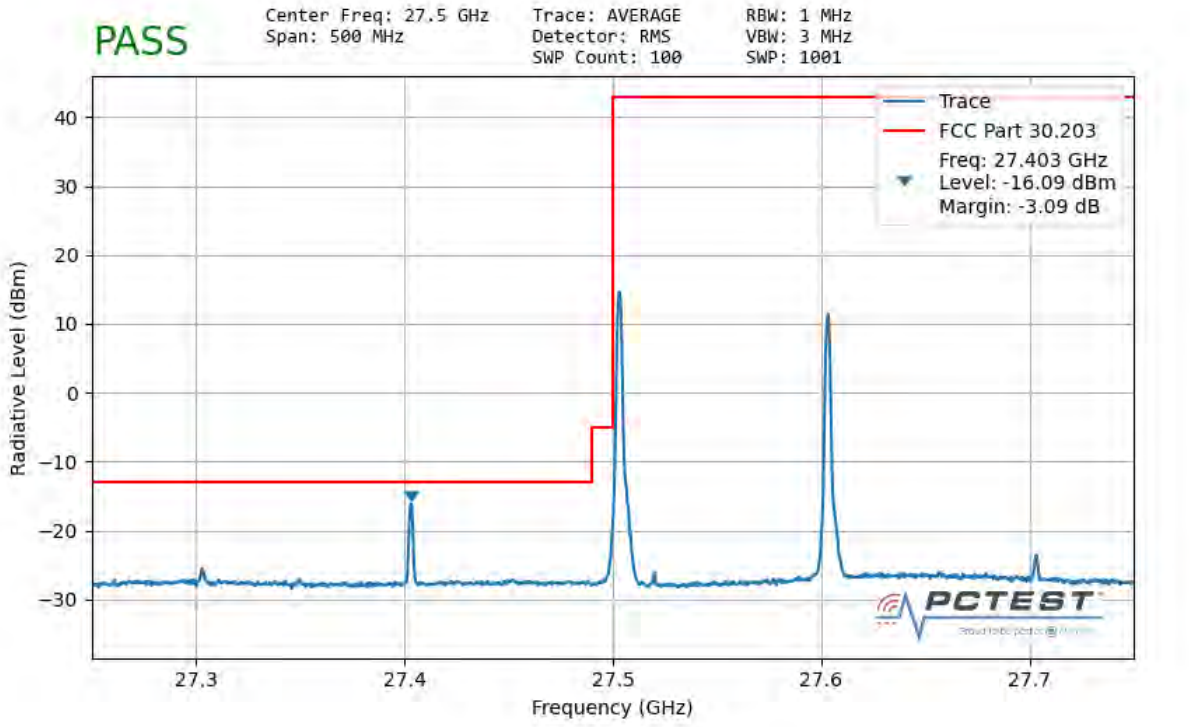
Plot 7-73. Ant 2 Upper Band Edge (50MHz-1CC – QPSK Full RB)



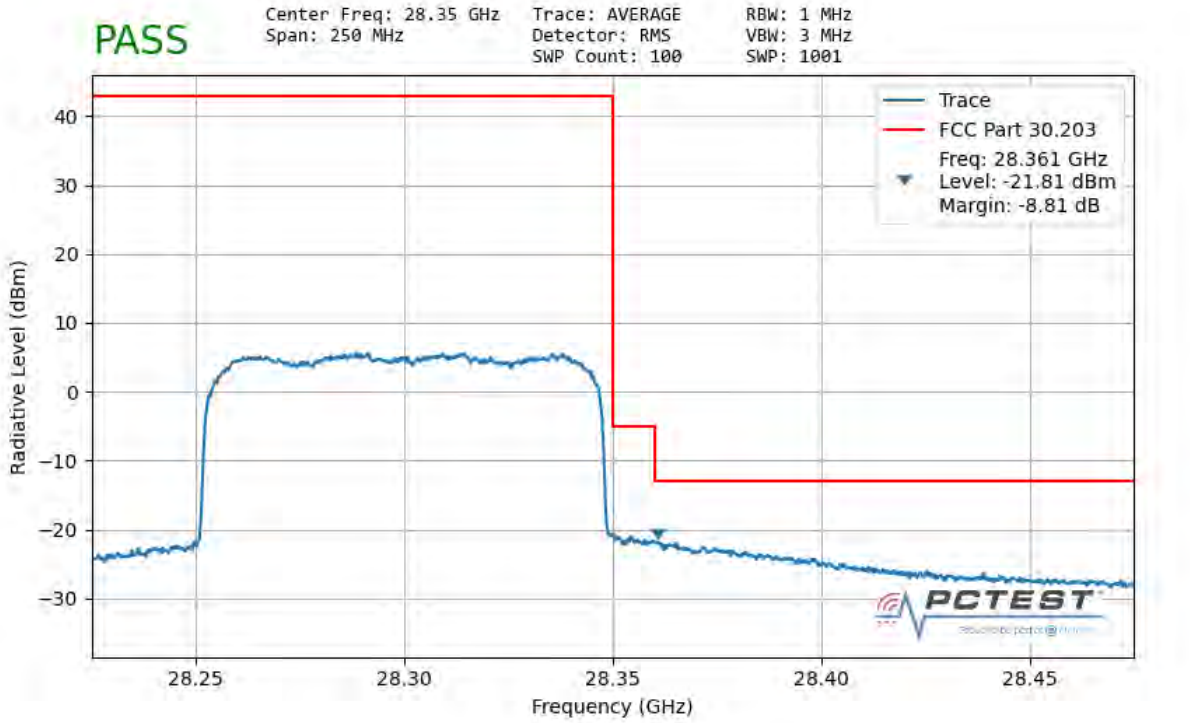
Plot 7-74. Ant 2 Upper Band Edge (50MHz-2CC – QPSK 1 RB)



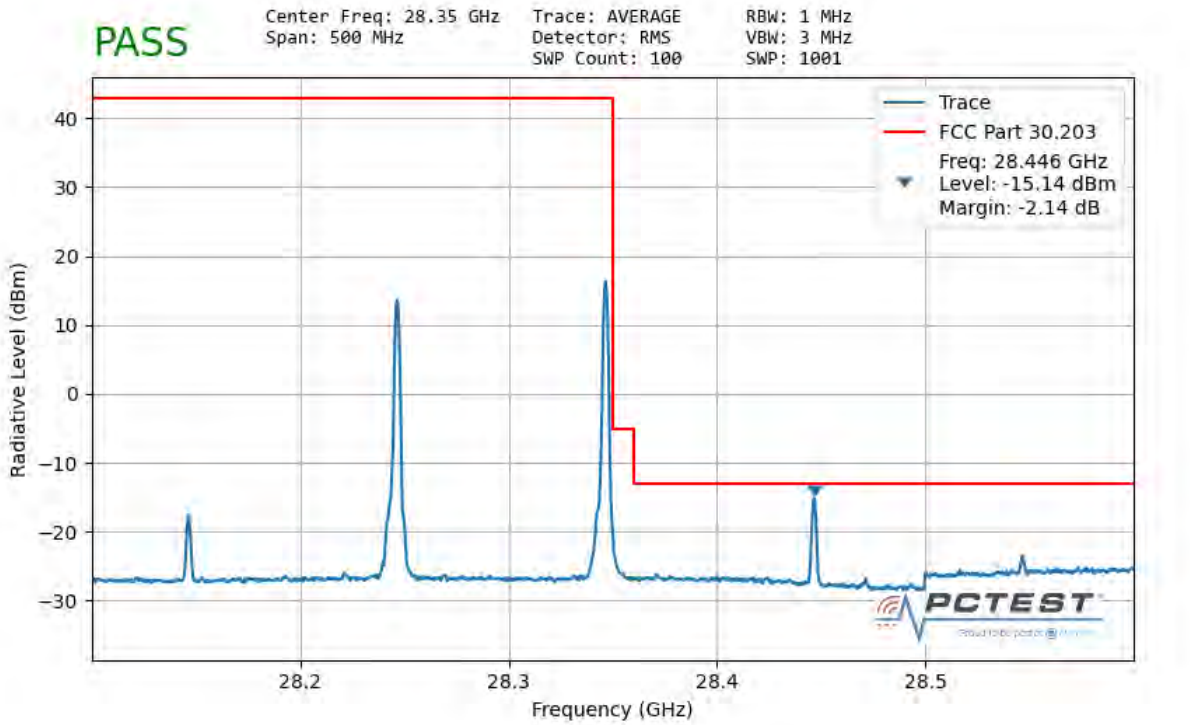
Plot 7-75. Ant 2 Lower Band Edge (100MHz-1CC – QPSK Full RB)



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

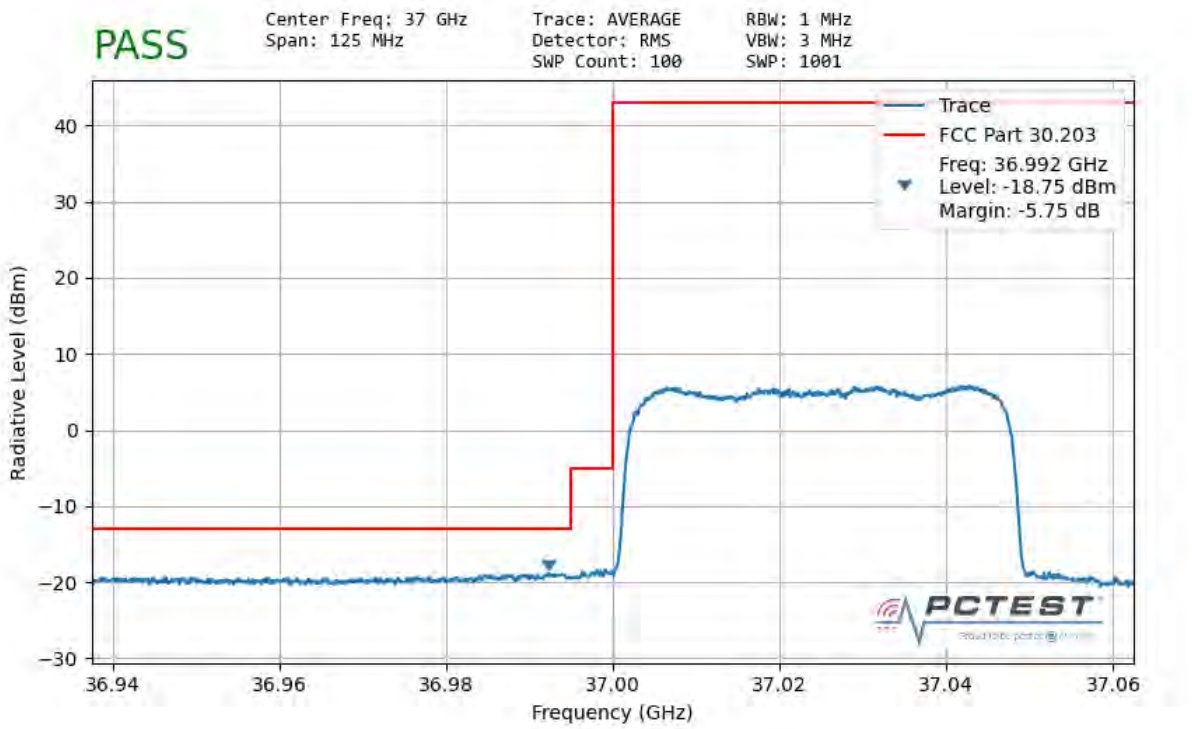


Plot 7-77. Ant 2 Upper Band Edge (100MHz-1CC – QPSK Full RB)

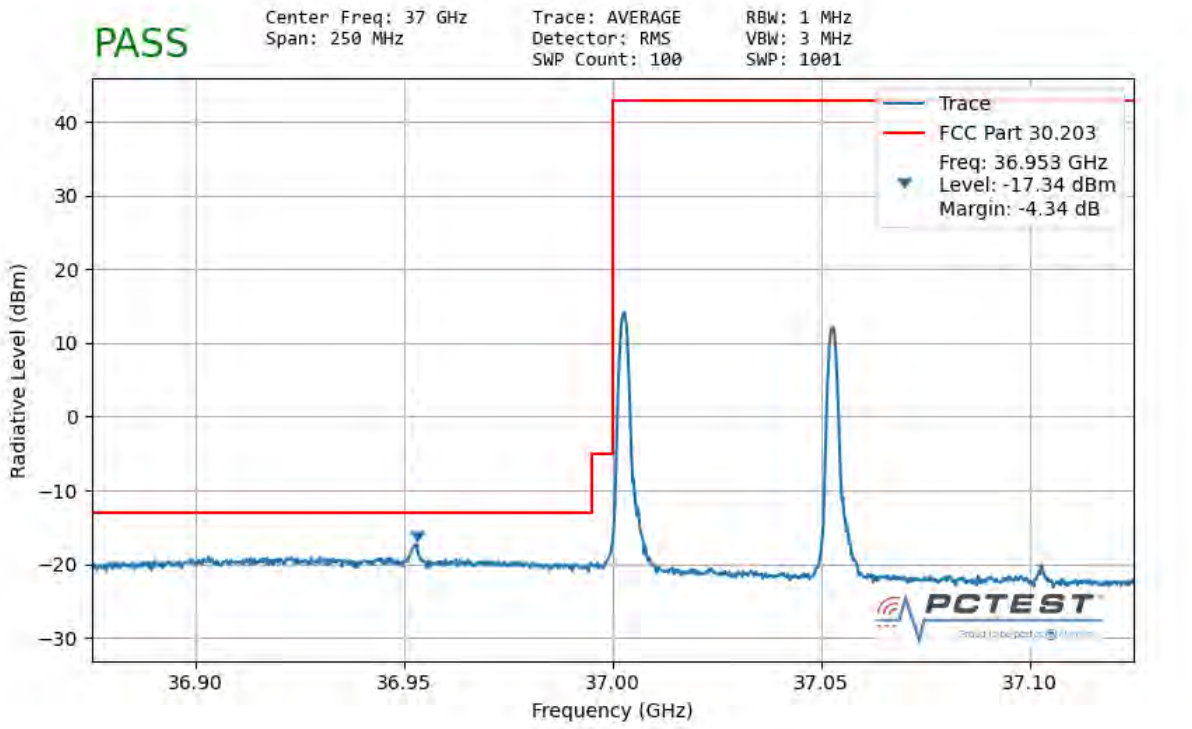


Plot 7-78. Ant 2 Upper Band Edge (100MHz-2CC – QPSK 1 RB)

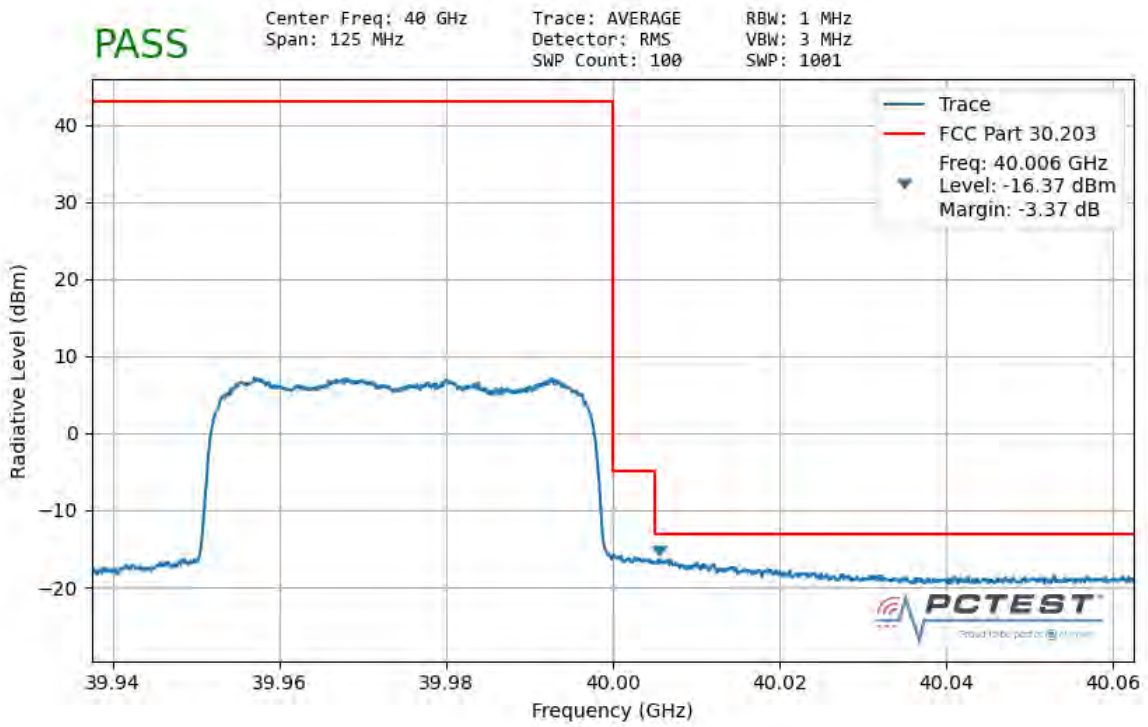
Band n260 – Worst Case



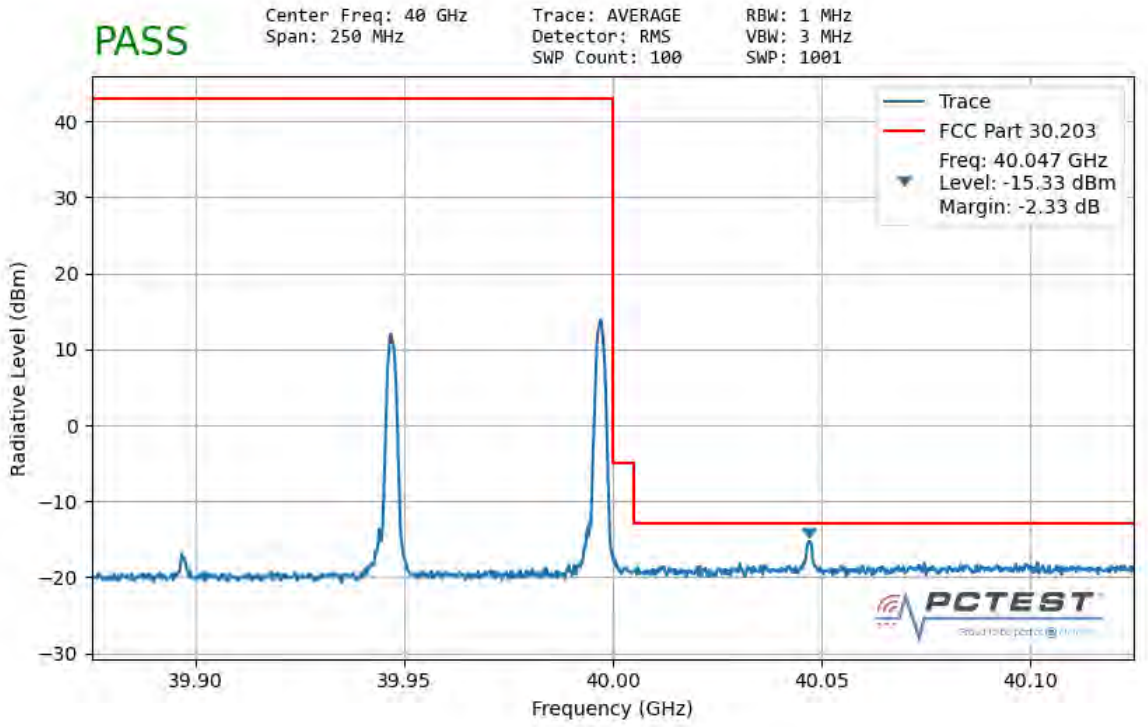
Plot 7-79. Ant 1 Lower Band Edge (50MHz-1CC – QPSK Full RB)



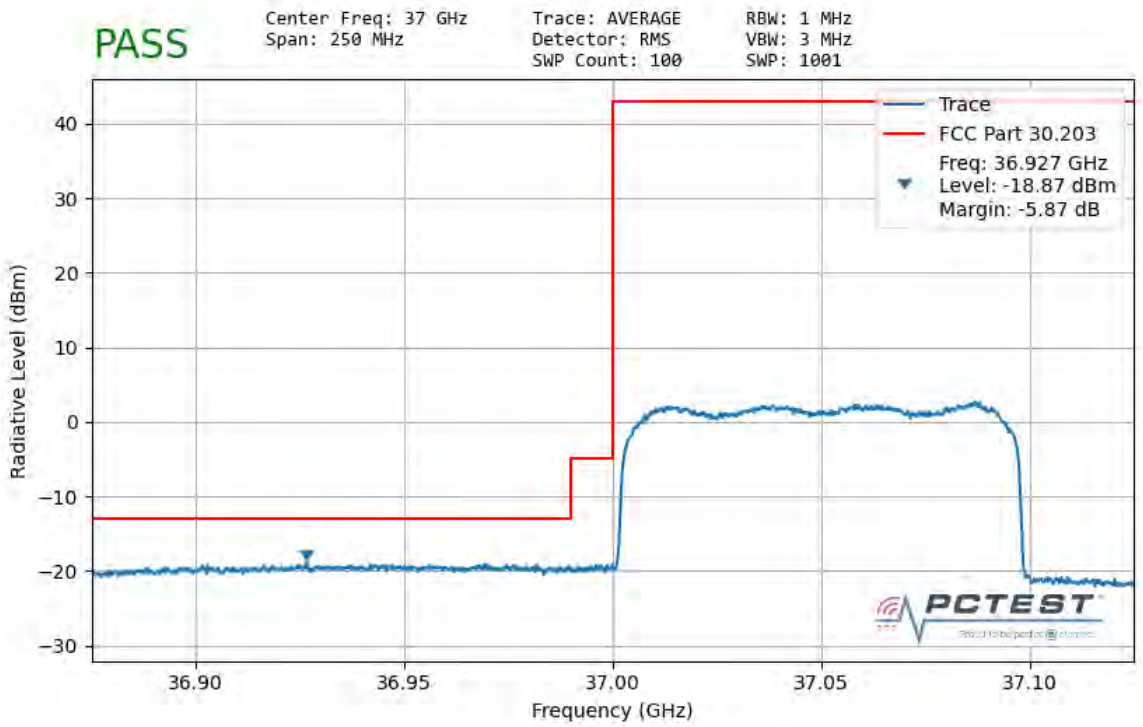
Plot 7-80. Ant 1 Lower Band Edge (50MHz-2CC – QPSK 1 RB)



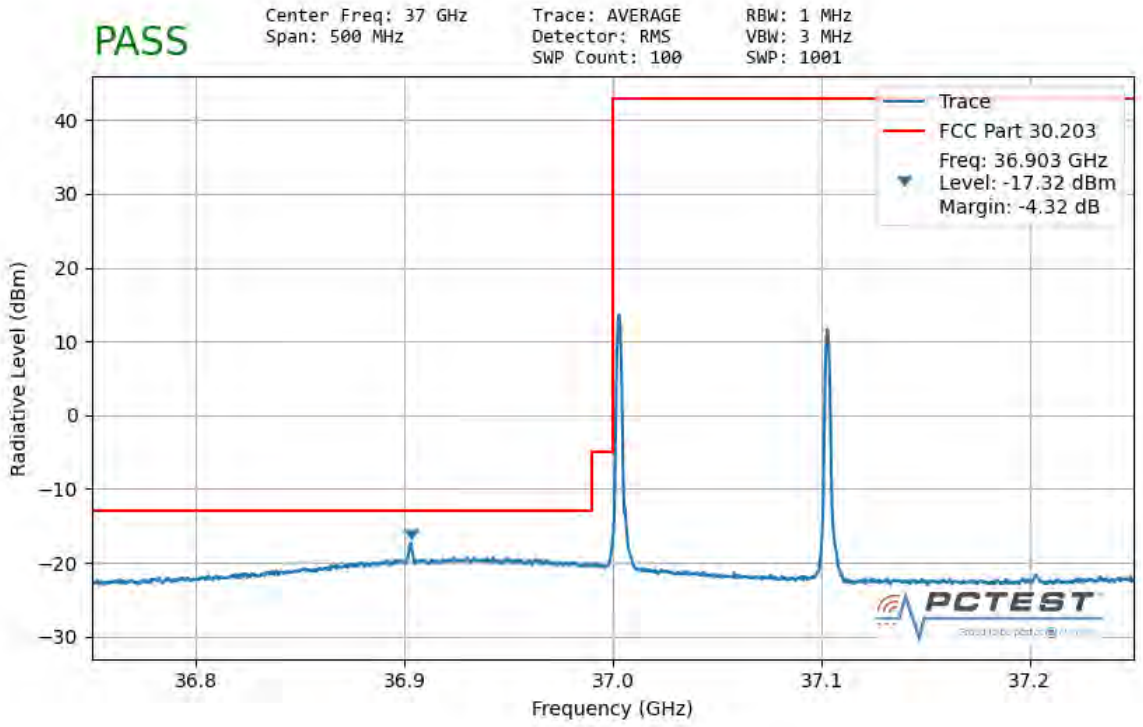
Plot 7-81. Ant 1 Upper Band Edge (50MHz-1CC – QPSK Full RB)



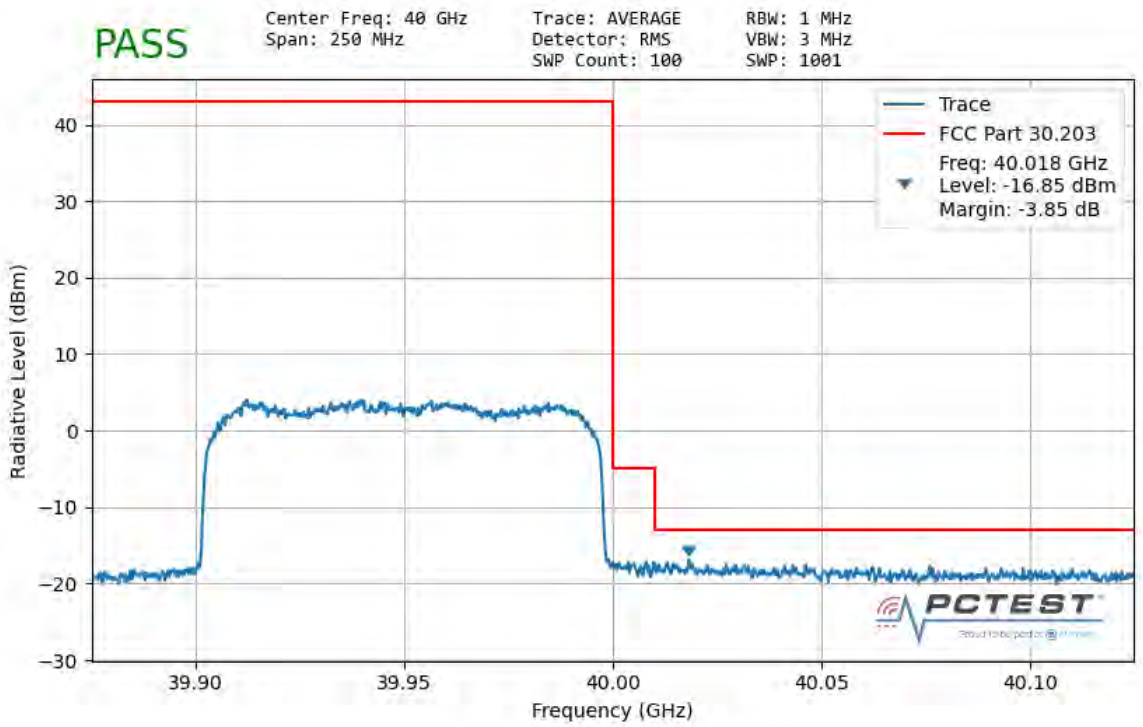
Plot 7-82. Ant 1 Upper Band Edge (50MHz-2CC – QPSK 1 RB)



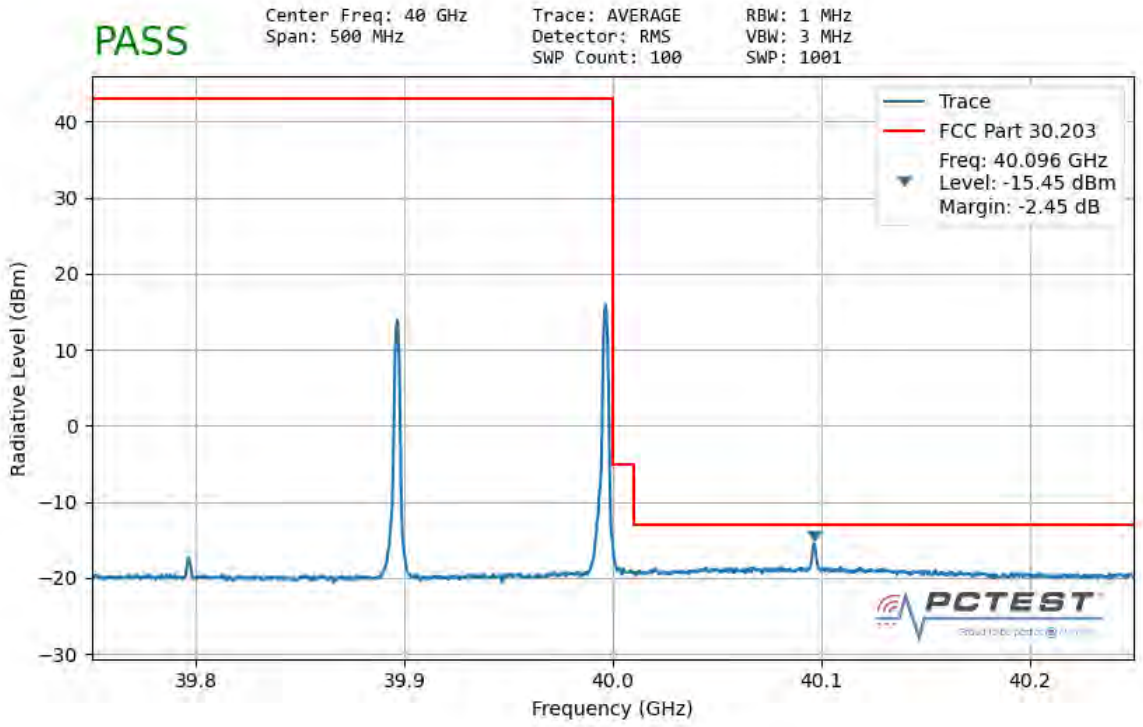
Plot 7-83. Ant 1 Lower Band Edge (100MHz-1CC – QPSK Full RB)



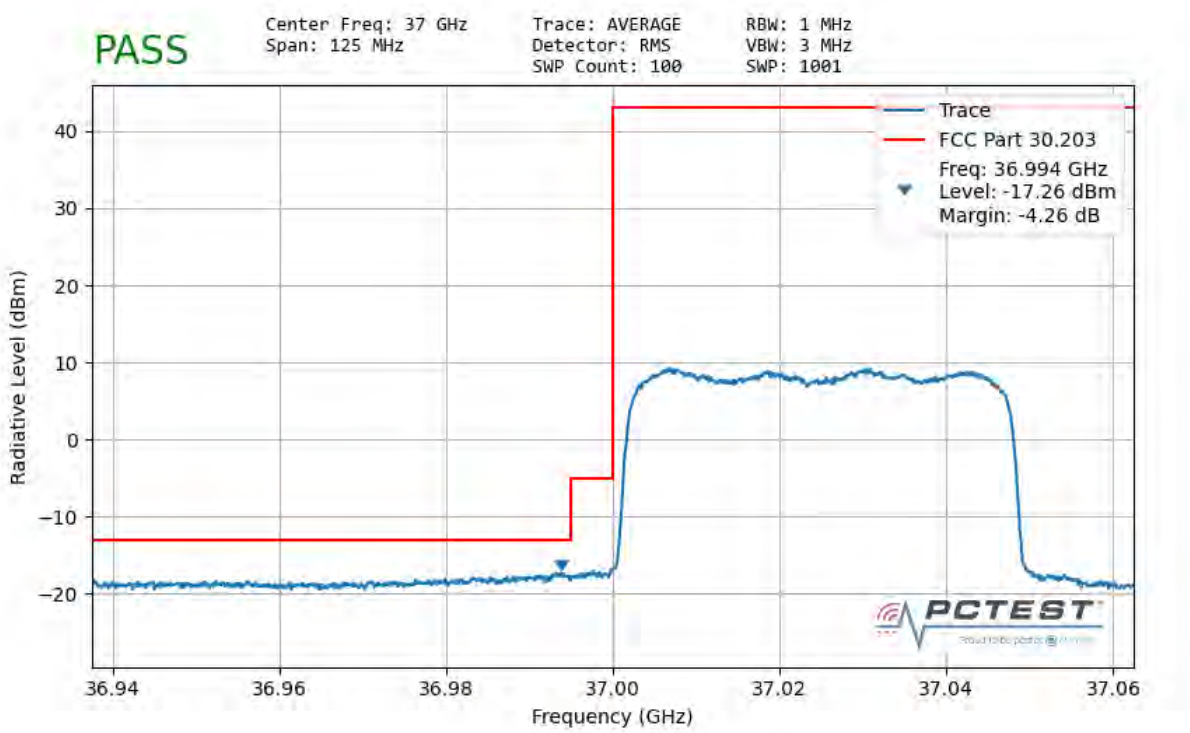
Plot 7-84. Ant 1 Lower Band Edge (100MHz-2CC – QPSK 1 RB)



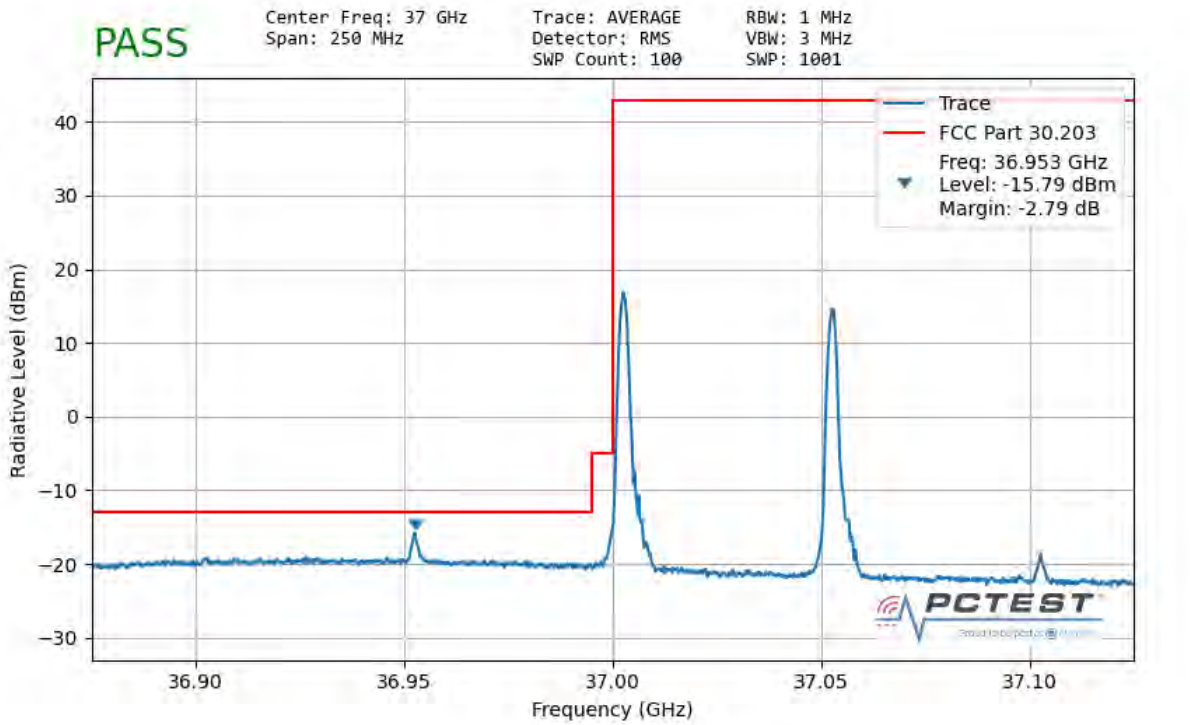
Plot 7-85. Ant 1 Upper Band Edge (100MHz-1CC – QPSK Full RB)



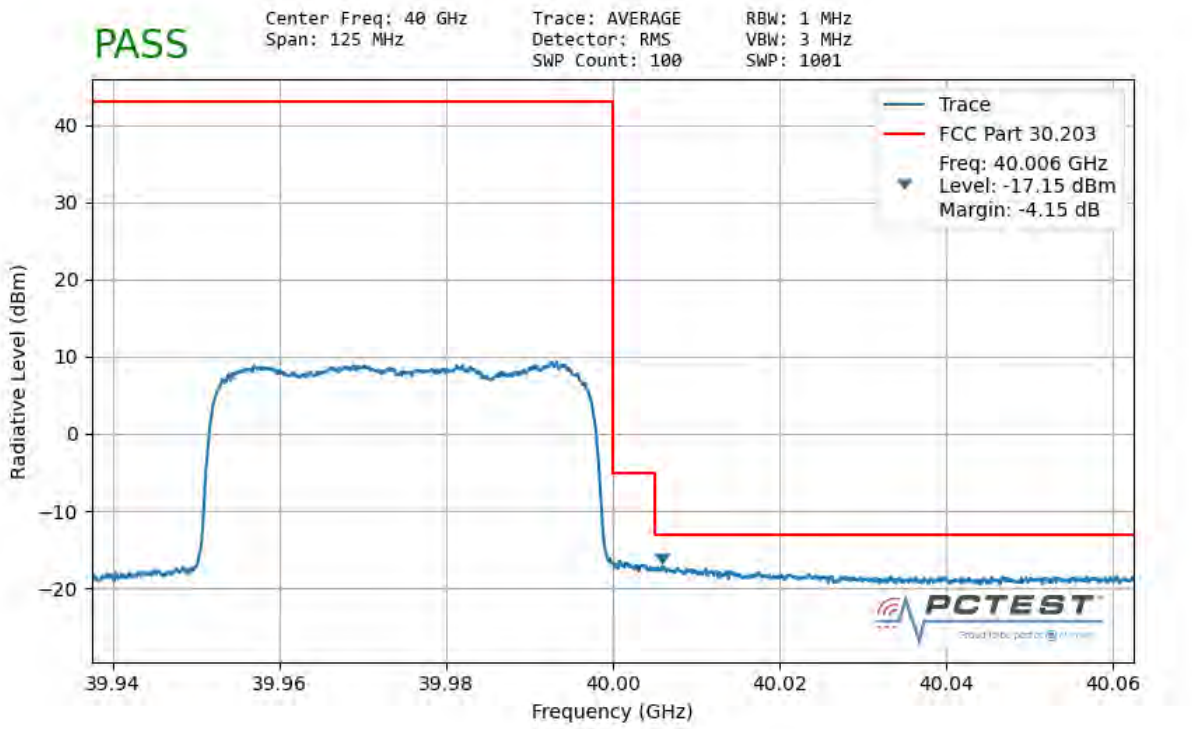
Plot 7-86. Ant 1 Upper Band Edge (100MHz-2CC – QPSK 1 RB)



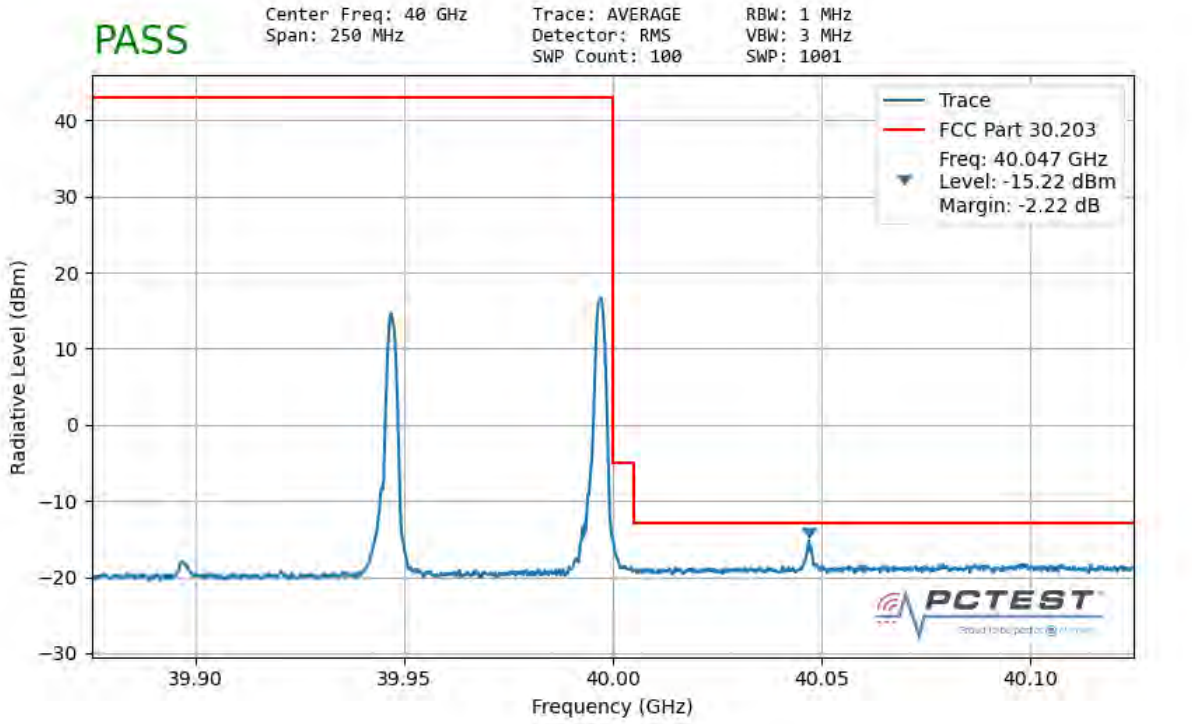
Plot 7-87. Ant 2 Lower Band Edge (50MHz-1CC – QPSK Full RB)



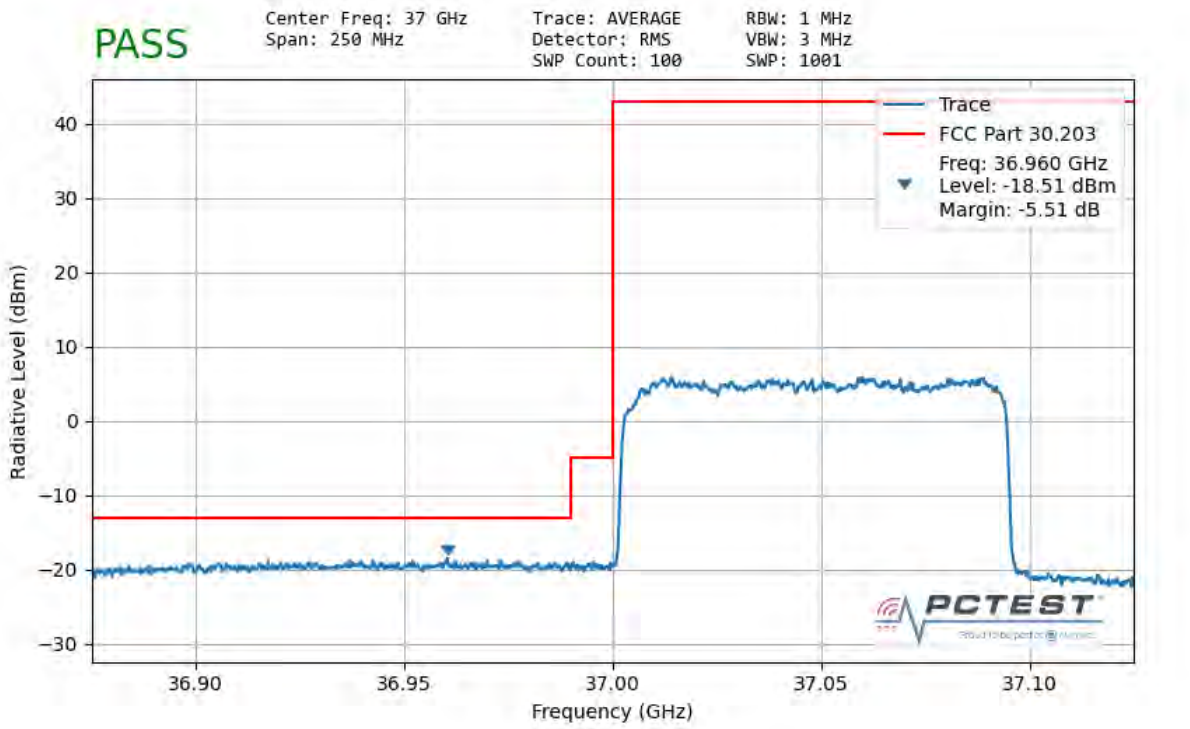
Plot 7-88. Ant 2 Lower Band Edge (50MHz-2CC – QPSK 1 RB)



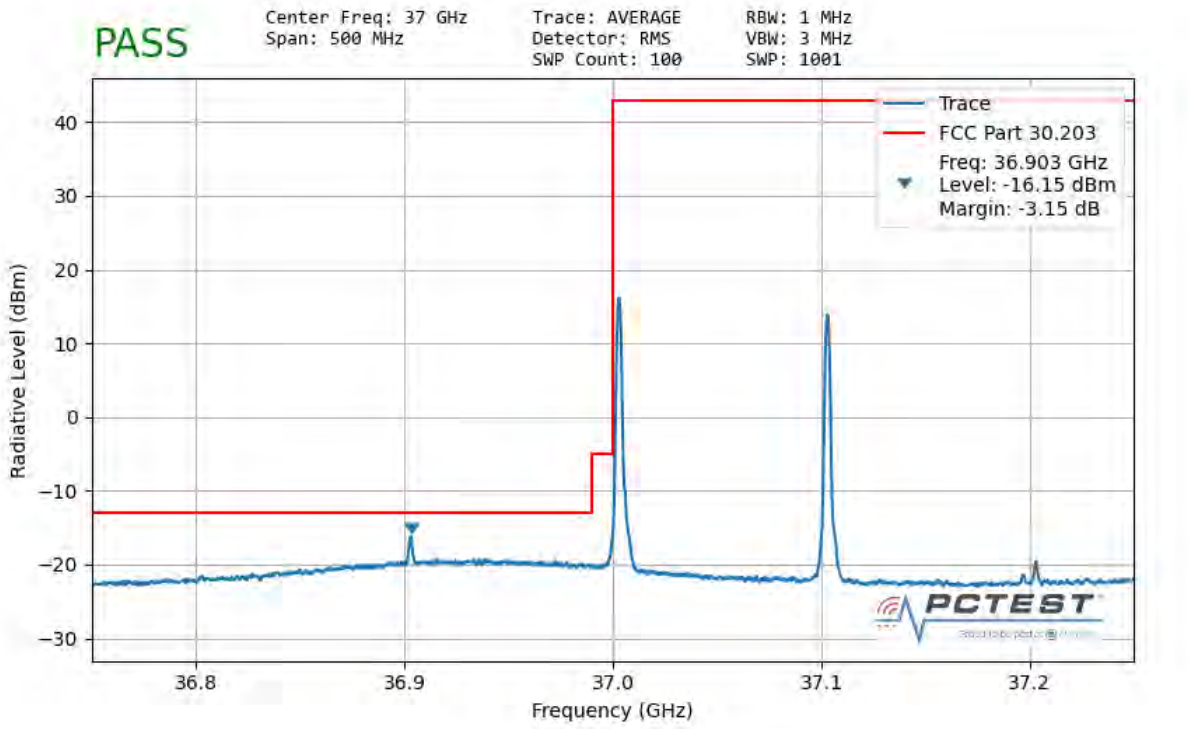
Plot 7-89. Ant 2 Upper Band Edge (50MHz-1CC – QPSK Full RB)



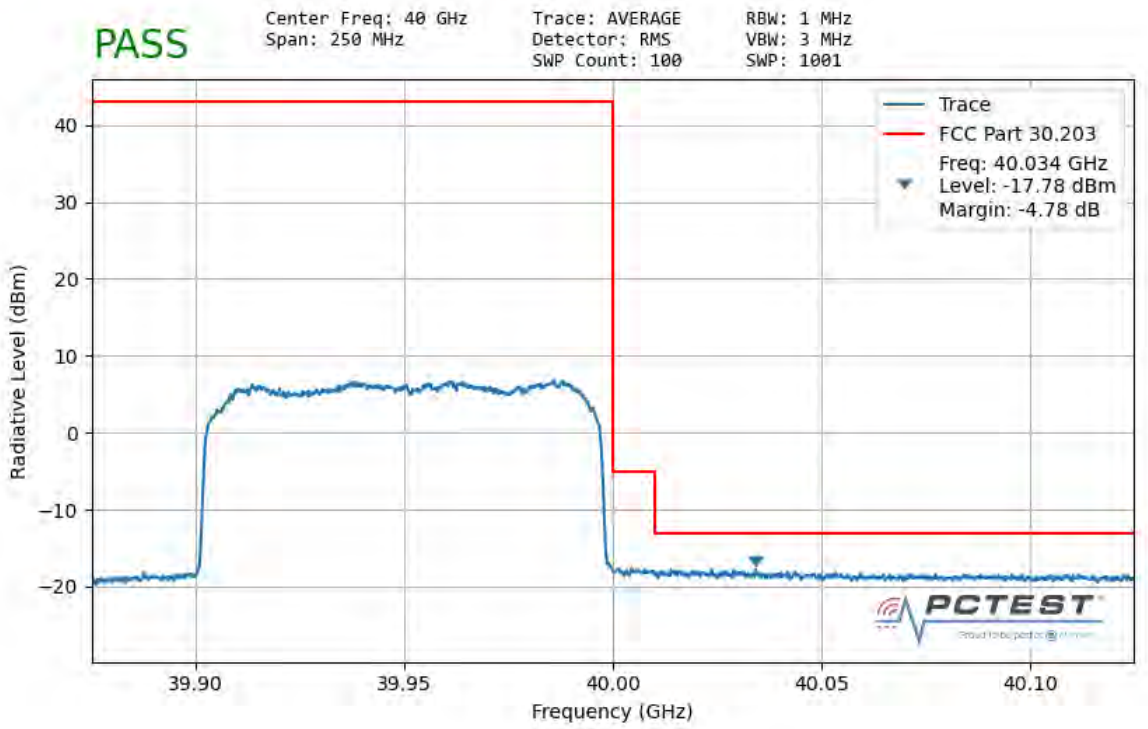
Plot 7-90. Ant 2 Upper Band Edge (50MHz-2CC – QPSK 1 RB)



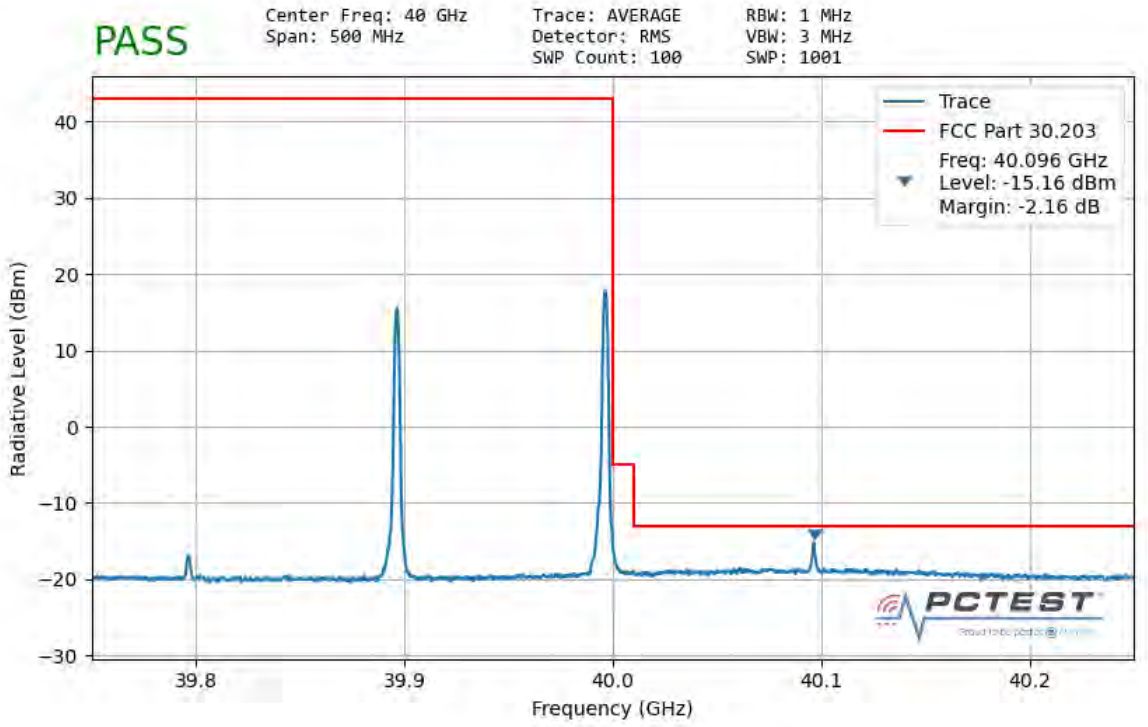
Plot 7-91. Ant 2 Lower Band Edge (100MHz-1CC – QPSK Full RB)



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



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)

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).

Frequency Stability Measurements (Band n261)

§2.1055

OPERATING FREQUENCY:	27,924,960,000	Hz
CHANNEL:	2077915	
REFERENCE VOLTAGE:	4.33	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	+ 20 (Ref)	27,924,750,000	0	0.0000000
100 %		- 30	27,923,782,000	968,000	0.0034664
100 %		- 20	27,924,623,000	127,000	0.0004548
100 %		- 10	27,923,683,000	1,067,000	0.0038210
100 %		0	27,922,593,000	2,157,000	0.0077243
100 %		+ 10	27,920,986,000	3,764,000	0.0134790
100 %		+ 20	27,921,573,000	3,177,000	0.0113769
100 %		+ 30	27,924,679,000	71,000	0.0002543
100 %		+ 40	27,925,287,000	-537,000	-0.0019230
100 %		+ 50	27,924,961,000	-211,000	-0.0007556
BATT. ENDPOINT	3.38	+ 20	27,924,765,000	-15,000	-0.0000537

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.

Frequency Stability Measurements (Band n261)

§2.1055

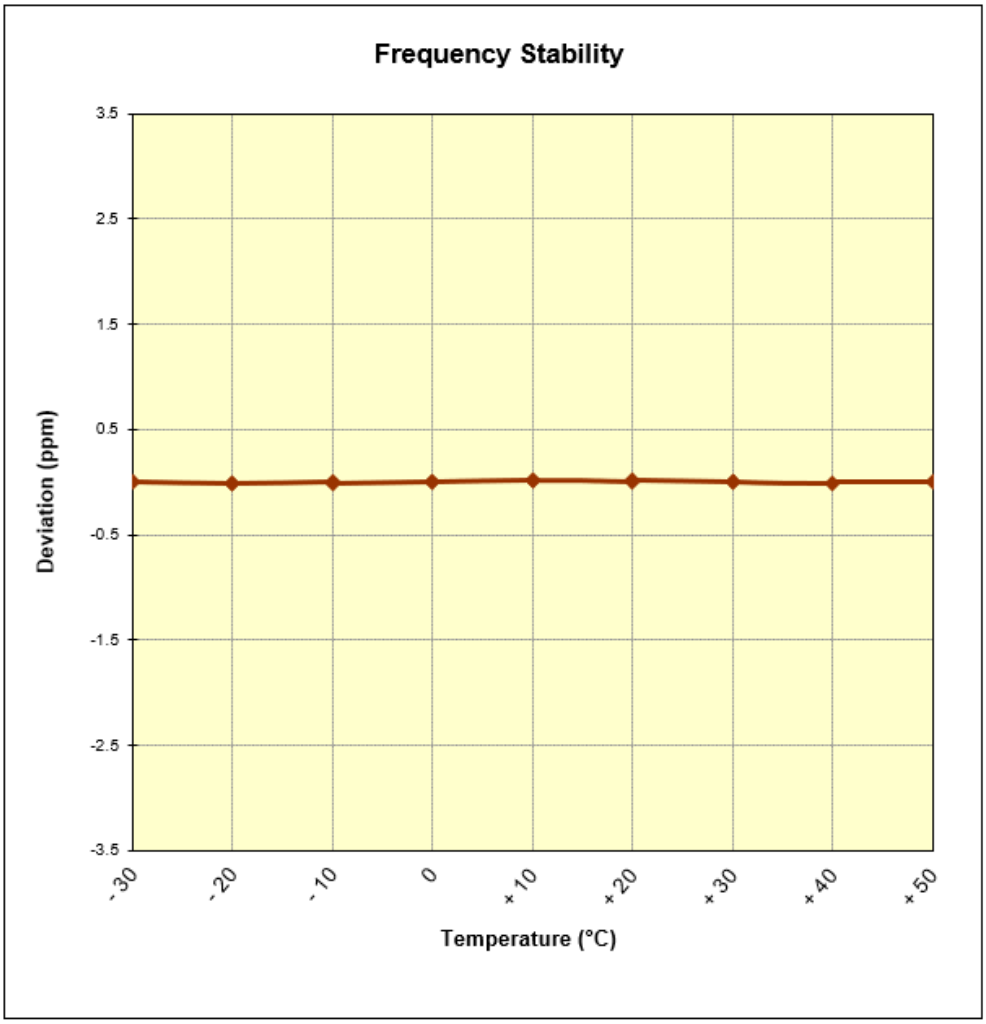


Figure 7-1. Frequency Stability Graph (n261)

Frequency Stability Measurements (Band n260)

§2.1055

OPERATING FREQUENCY:	38,499,960,000	Hz
CHANNEL:	2254165	
REFERENCE VOLTAGE:	4.33	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.33	+ 20 (Ref)	38,499,968,000	0	0.0000000
100 %		- 30	38,493,962,000	6,006,000	0.0156000
100 %		- 20	38,495,582,000	4,386,000	0.0113922
100 %		- 10	38,499,783,000	185,000	0.0004805
100 %		0	38,497,265,000	2,703,000	0.0070208
100 %		+ 10	38,499,723,000	245,000	0.0006364
100 %		+ 20	38,495,781,000	4,187,000	0.0108753
100 %		+ 30	38,498,263,000	1,705,000	0.0044286
100 %		+ 40	38,501,383,000	-1,415,000	-0.0036753
100 %		+ 50	38,499,265,000	703,000	0.0018260
BATT. ENDPOINT	3.38	+ 20	38,499,782,000	186,000	0.0004831

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.

Frequency Stability Measurements (Band n260)

§2.1055

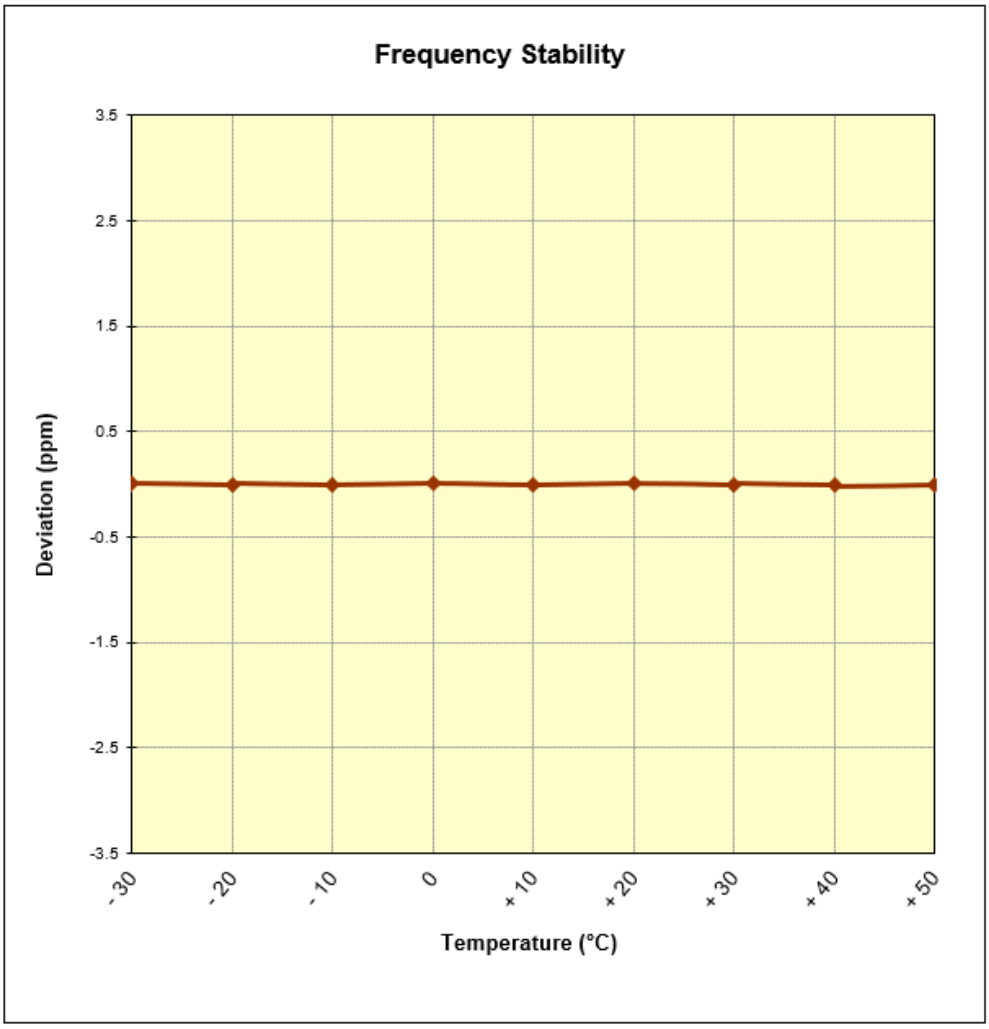


Figure 7-2. Frequency Stability Graph (n260)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMT978U** complies with all the requirements of Part 30.

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

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 Shipped	Unit	Description	Order-Job 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

Page 1 of 1