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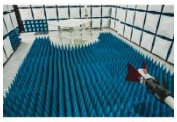

MEASUREMENT REPORT
FCC Part 30 5G mmWave

Applicant Name:
Microsoft Corporation
One Microsoft Way
Redmond, WA 98052
United States

Date of Testing:
05/25 – 08/16/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2105060048-08.C3K

FCC ID:	**C3K1995**
APPLICANT:	**Microsoft Corporation**

Application Type:	Certification
Model:	1995
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 v01r02

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

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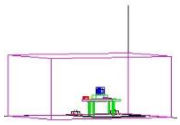
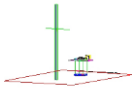


MEASUREMENT REPORT
FCC Part 30



Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n261	Ant. 1	100	27550 - 28300	1	2Tx	QPSK	0.712	28.53	94M3G7D
					2Tx	π/2 BPSK	0.598	27.77	90M8G7D
					2Tx	16QAM	0.400	26.02	94M1W7D
					2Tx	64QAM	0.214	23.30	93M5W7D
				2	2Tx	QPSK	0.537	27.30	190MG7D
					2Tx	π/2 BPSK	1.169	30.68	189MG7D
					2Tx	16QAM	0.300	24.77	189MW7D
					2Tx	64QAM	0.160	22.05	192MW7D
		50	27525 - 28325	1	2Tx	QPSK	0.458	26.61	45M6G7D
					2Tx	π/2 BPSK	0.476	26.78	45M3G7D
					2Tx	16QAM	0.446	26.50	45M4W7D
					2Tx	64QAM	0.280	24.48	45M7W7D
				2	2Tx	QPSK	0.292	24.66	94M8G7D
					2Tx	π/2 BPSK	0.112	20.51	94M3G7D
					2Tx	16QAM	0.083	19.19	94M0W7D
					2Tx	64QAM	0.102	20.08	94M2W7D
n261	Ant. 2	100	27550 - 28300	1	2Tx	QPSK	0.355	25.50	-
					2Tx	π/2 BPSK	0.373	25.72	-
					2Tx	16QAM	0.269	24.30	-
					2Tx	64QAM	0.262	24.19	-
				2	2Tx	QPSK	0.117	20.67	-
					2Tx	π/2 BPSK	0.124	20.94	-
					2Tx	16QAM	0.082	19.16	-
					2Tx	64QAM	0.066	18.18	-
		50	27525 - 28325	1	2Tx	QPSK	0.374	25.73	-
					2Tx	π/2 BPSK	0.384	25.84	-
					2Tx	16QAM	0.238	23.77	-
					2Tx	64QAM	0.270	24.32	-
				2	2Tx	QPSK	0.217	23.36	-
					2Tx	π/2 BPSK	0.217	23.37	-
					2Tx	16QAM	0.148	21.70	-
					2Tx	64QAM	0.169	22.29	-

EUT Overview (Band n261)

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Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n260	Ant. 1	100	37050 - 39950	1	2Tx	QPSK	0.280	24.47	92M9G7D
					2Tx	π/2 BPSK	0.286	24.57	91M1G7D
					2Tx	16QAM	0.178	22.51	93M2W7D
					2Tx	64QAM	0.099	19.95	93M7W7D
				2	2Tx	QPSK	0.157	21.95	191MG7D
					2Tx	π/2 BPSK	0.157	21.97	190MG7D
					2Tx	16QAM	0.107	20.31	191MW7D
					2Tx	64QAM	0.060	17.75	192MW7D
		50	37025 - 39975	1	2Tx	QPSK	0.346	25.39	45M5G7D
					2Tx	π/2 BPSK	0.308	24.88	45M4G7D
					2Tx	16QAM	0.252	24.01	45M4W7D
					2Tx	64QAM	0.127	21.05	45M8W7D
				2	2Tx	QPSK	0.101	20.04	96M2G7D
					2Tx	π/2 BPSK	0.093	19.67	95M2G7D
					2Tx	16QAM	0.063	18.02	98M3W7D
					2Tx	64QAM	0.064	18.03	98M6W7D
n260	Ant.2	100	37050 - 39950	1	2Tx	QPSK	0.372	25.71	-
					2Tx	π/2 BPSK	0.365	25.62	-
					2Tx	16QAM	0.229	23.61	-
					2Tx	64QAM	0.117	20.70	-
				2	2Tx	QPSK	0.214	23.31	-
					2Tx	π/2 BPSK	0.216	23.35	-
					2Tx	16QAM	0.152	21.81	-
					2Tx	64QAM	0.091	19.57	-
		50	37025 - 39975	1	2Tx	QPSK	0.370	25.69	-
					2Tx	π/2 BPSK	0.370	25.68	-
					2Tx	16QAM	0.253	24.04	-
					2Tx	64QAM	0.121	20.84	-
				2	2Tx	QPSK	0.114	20.59	-
					2Tx	π/2 BPSK	0.101	20.03	-
					2Tx	16QAM	0.068	18.34	-
					2Tx	64QAM	0.050	17.00	-

EUT Overview (Band n260)

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

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1.0 INTRODUCTION

1.1 Scope

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

1.2 PCTEST Test Location

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

1.3 Test Facility / Accreditations

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

- PCTEST is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

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

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

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Microsoft Corporation Portable Handset FCC ID: C3K1995**. The test data contained in this report pertains only to the emissions due to the EUT's 5G mmWave function.

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

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

Test Device Serial No.: 21/6MAY-3, 21/6MAY-4

2.2 Device Capabilities

This device contains the following capabilities:

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

2.3 Test Configuration

The EUT was tested per the guidance of KDB 842590 D01 v01r02 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 2Tx (DFT-s-OFDM) and MIMO (CP-OFDM) operation. These Beam ID's were used for final measurements.

This device supports two configurations: one is with screen open and one is with screen closed. Both configurations are tested, and the worst case radiated emissions data is shown in this report.

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 as allowed by the 5G network/carrier. The FTM software was also used for the EUT operation in the EN-DC mode.

2.4 Software and Firmware

The firmware installed during testing was Build number developer - generic 2021.728.20.

2.5 EMI Suppression Device(s)/Modifications

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

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3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26-2015) and the guidance provided in KDB 842590 D01 v01r02 were used in the measurement of the EUT.

3.2 Radiated Power and Radiated Spurious Emissions

§30.202, §30.203

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary for radiated emissions measurements in the spurious domain. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m for measurements above 1GHz.

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

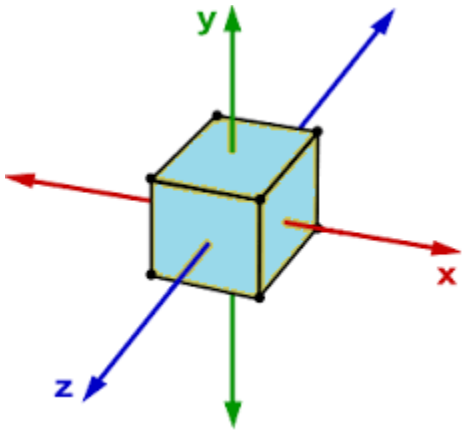

Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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

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

Table 3-1. Far-Field Distance & 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.

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4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to an accredited ISO/IEC 17025 calibration facility. Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Biennial	8/27/2022	17620
Keysight Technologies	N9030A	50GHz PXA Signal Analyzer	1/20/2021	Annual	1/20/2022	US51350301
Megaphase	FAC mmWave	AP FAC mmWave 18ft 40GHz	3/3/2021	Annual	3/3/2022	20033003
Narda	180-442-KF	Wide Band Horn Antenna 18.0 - 40.0 GHz	9/14/2020	Annual	9/14/2021	2172481
OML Inc.	M05RH	WR-05 Horn Antenna, 24dBi, 140 to 220 GHz	10/31/2019	Biennial	10/31/2021	18073001
OML Inc.	M08RH	WR-08 Horn Antenna, 24dBi, 90 to 140 GHz	10/31/2019	Biennial	10/31/2021	18073001
OML Inc.	M12RH	WR-12 Horn Antenna, 24dBi, 60 to 90 GHz	10/31/2019	Biennial	10/31/2021	18073001
OML Inc.	M19RH	WR-19 Horn Antenna, 24dBi, 40 to 60 GHz	10/31/2019	Biennial	10/31/2021	18073001
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	5/25/2021	Annual	5/25/2022	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/10/2020	Annual	9/10/2021	SAX680
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol Science	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107
Virginia Diodes Inc	SAX679	SAX Module (40 - 60GHz)	8/28/2020	Annual	8/28/2021	SAX679
Virginia Diodes Inc	SAX680	SAX Module (60 - 90GHz)	8/14/2020	Annual	9/14/2021	SAX680
Virginia Diodes Inc	SAX681	SAX Module (90 - 140GHz)	10/22/2020	Annual	10/22/2021	SAX681
Virginia Diodes Inc	SAX682	SAX Module (140 - 220GHz)	9/24/2020	Annual	9/24/2021	SAX682
UTiFlex	UTiFlex	FAC mmWave UTiFlex 40GHz	3/3/2021	Annual	3/3/2022	234142-001

Table 5-1. Test Equipment

Notes:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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6.0 SAMPLE CALCULATIONS

Emission Designator

π/2 BPSK/ QPSK Modulation

Emission Designator = 800MG7D

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

QAM Modulation

Emission Designator = 802MW7D

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

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7.0 TEST RESULTS

7.1 Summary

Company Name: Microsoft Corporation

FCC ID: C3K1995

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.

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7.2 Occupied Bandwidth

§2.1049

Test Overview

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

Test Procedure Used

ANSI C63.26-2015 Section 5.4.3
KDB 842590 D01 v01r02 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.

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Band n261

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	100	1	CP-OFDM	QPSK	94.27
			DFT-s-OFDM	pi/2-BPSK	90.84
			CP-OFDM	16QAM	94.12
			CP-OFDM	64QAM	93.53
		2	CP-OFDM	QPSK	189.78
			DFT-s-OFDM	pi/2-BPSK	188.83
			CP-OFDM	16QAM	189.34
			CP-OFDM	64QAM	191.51
	50	1	CP-OFDM	QPSK	45.60
			DFT-s-OFDM	pi/2-BPSK	45.26
			CP-OFDM	16QAM	45.36
			CP-OFDM	64QAM	45.69
		2	CP-OFDM	QPSK	94.80
			DFT-s-OFDM	pi/2-BPSK	94.32
			CP-OFDM	16QAM	94.00
			CP-OFDM	64QAM	94.24

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

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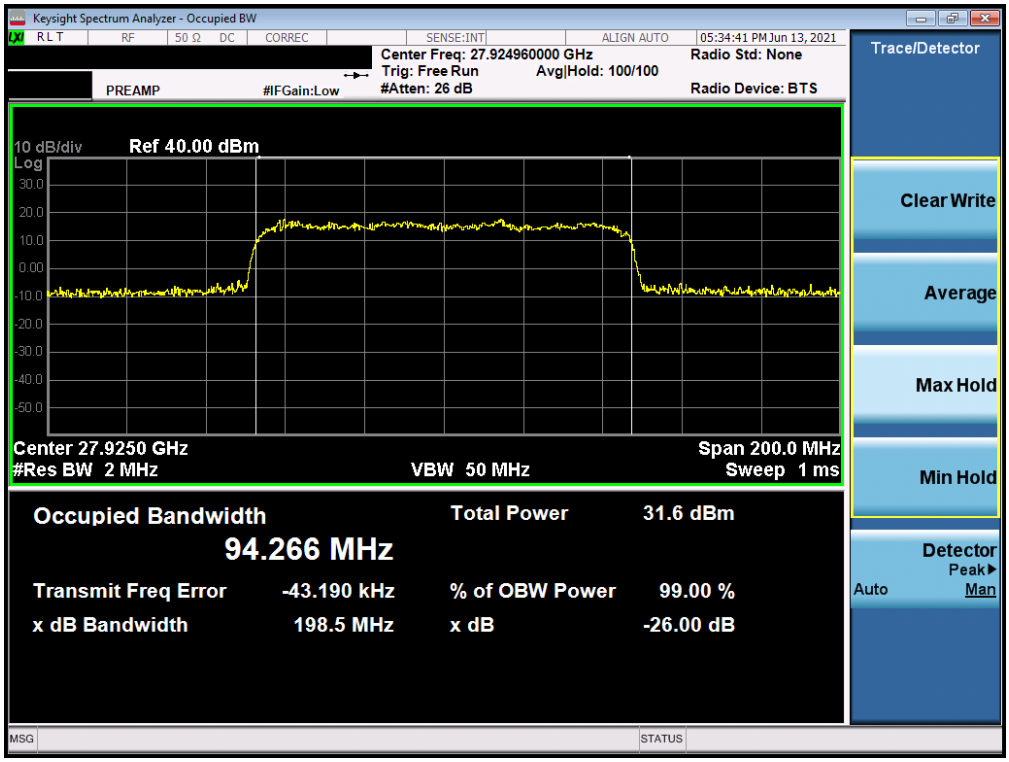
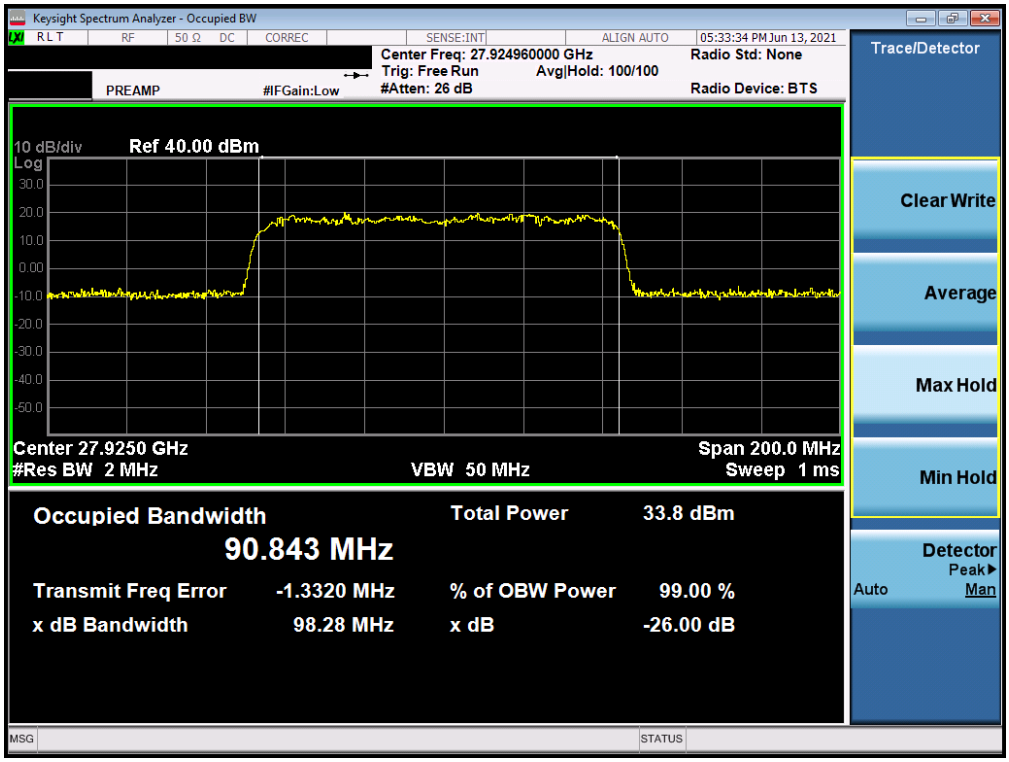


Plot 7-1. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



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

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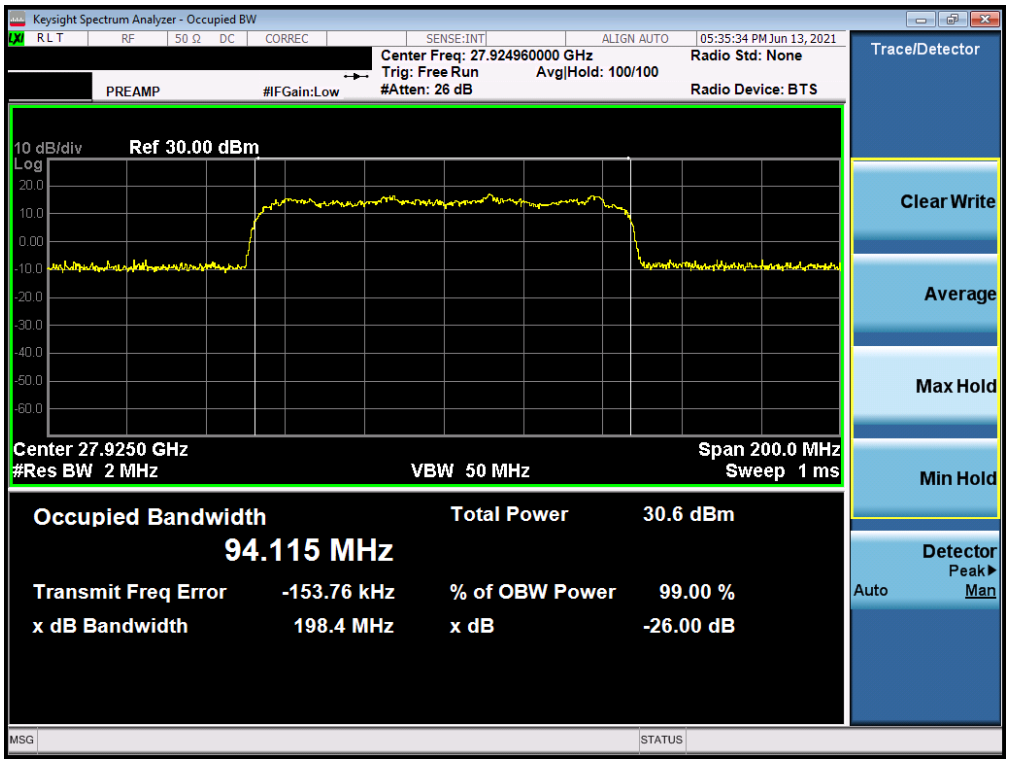
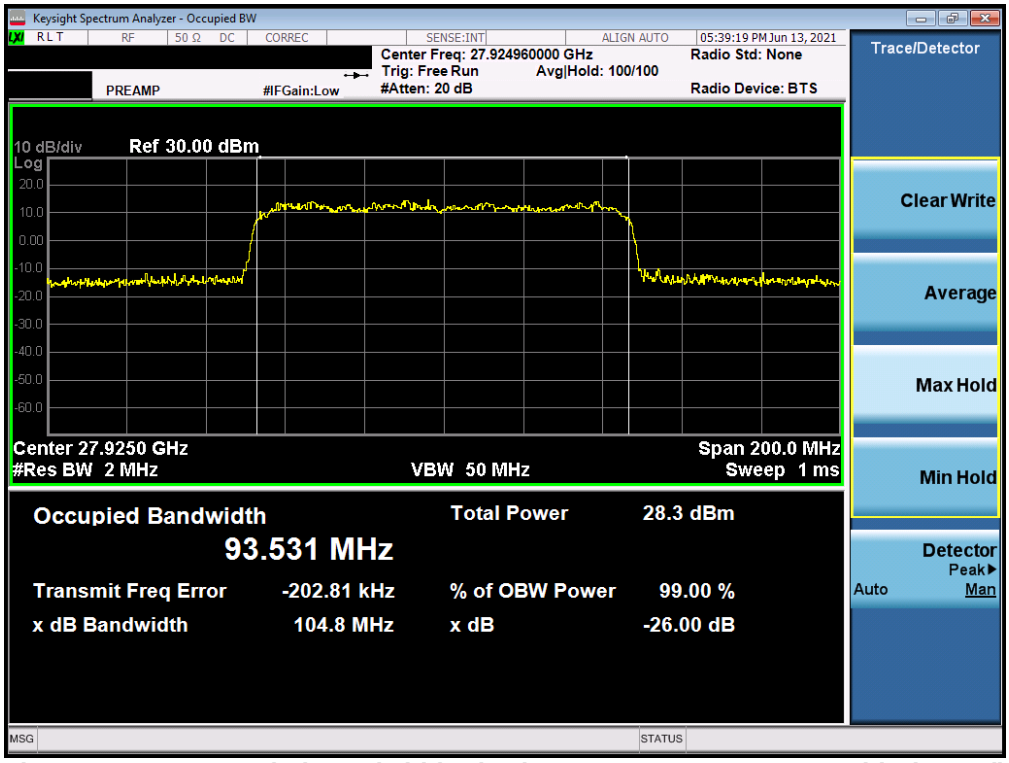


Plot 7-3. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



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

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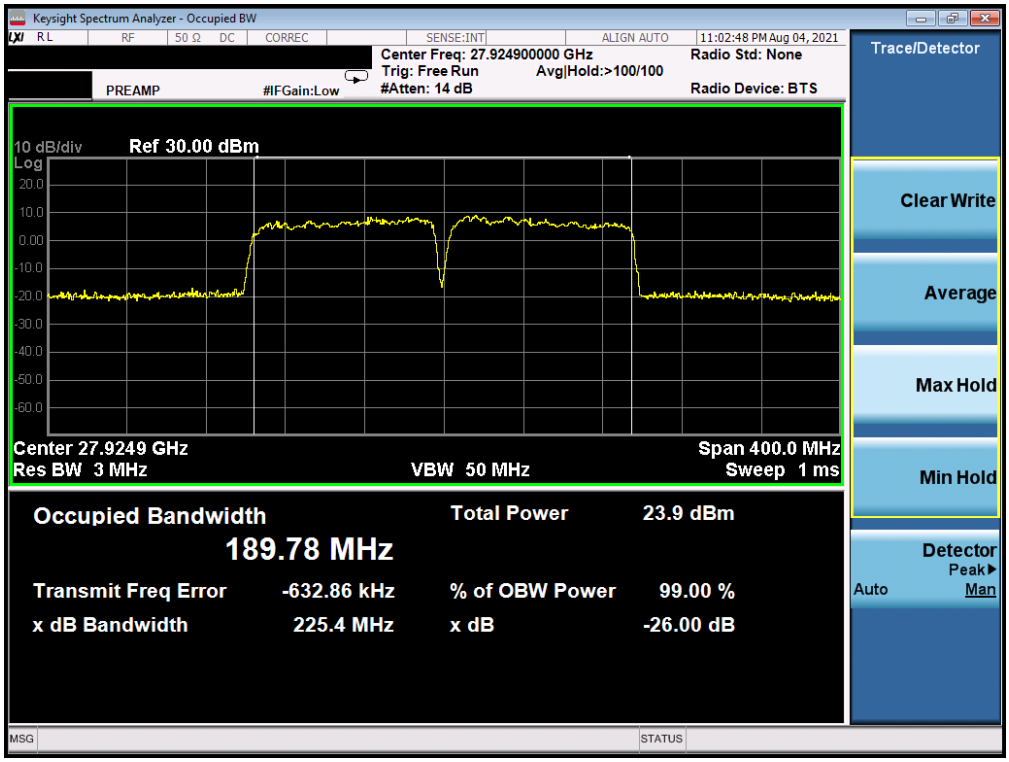
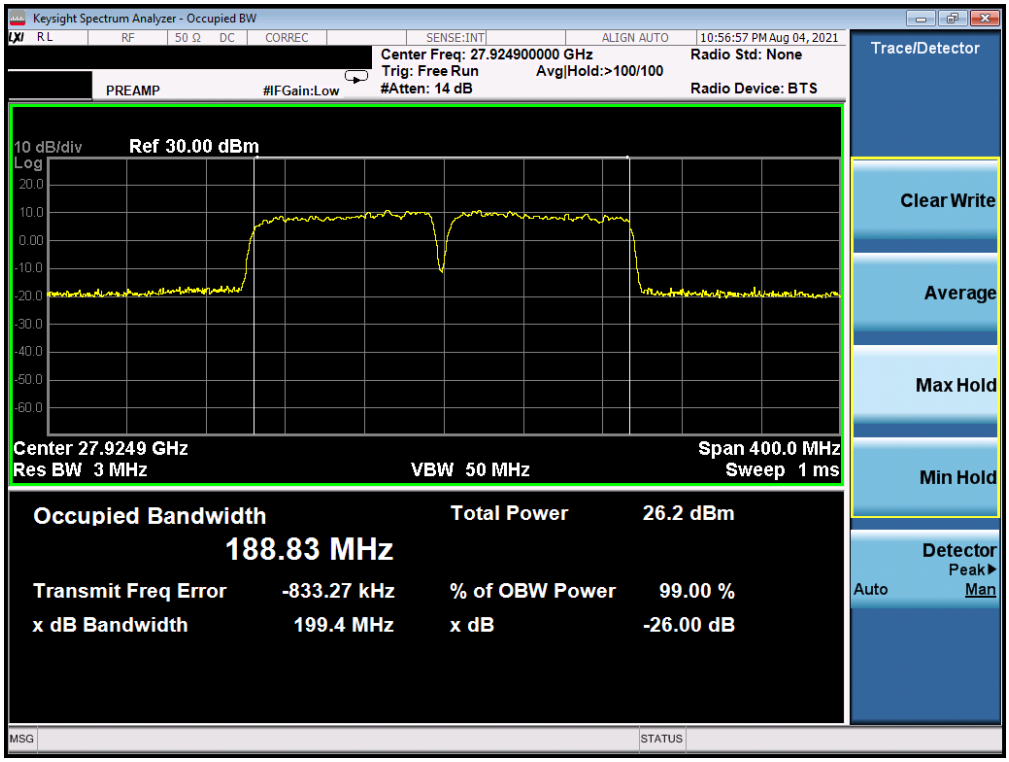


Plot 7-5. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



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

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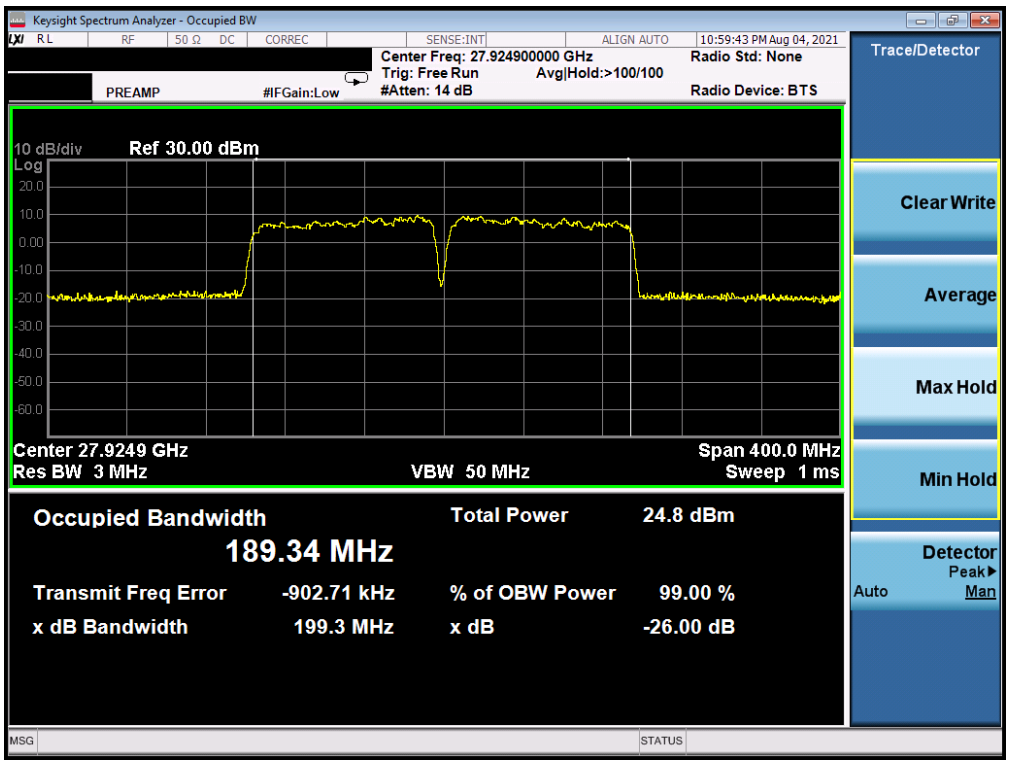
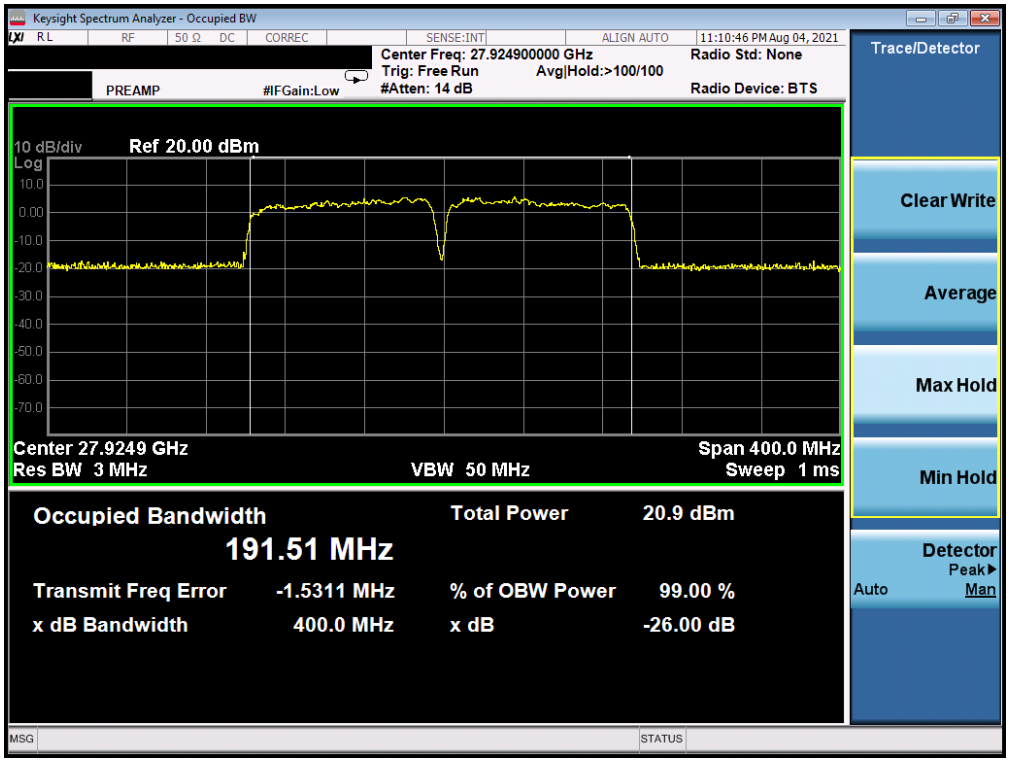


Plot 7-7. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)



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

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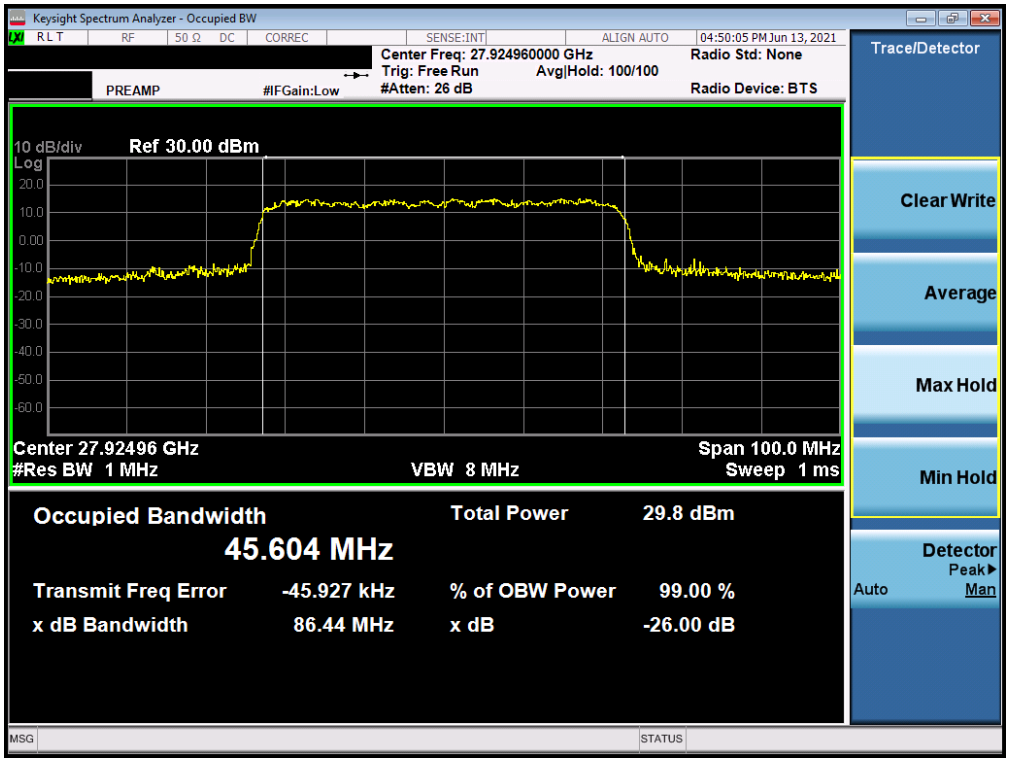
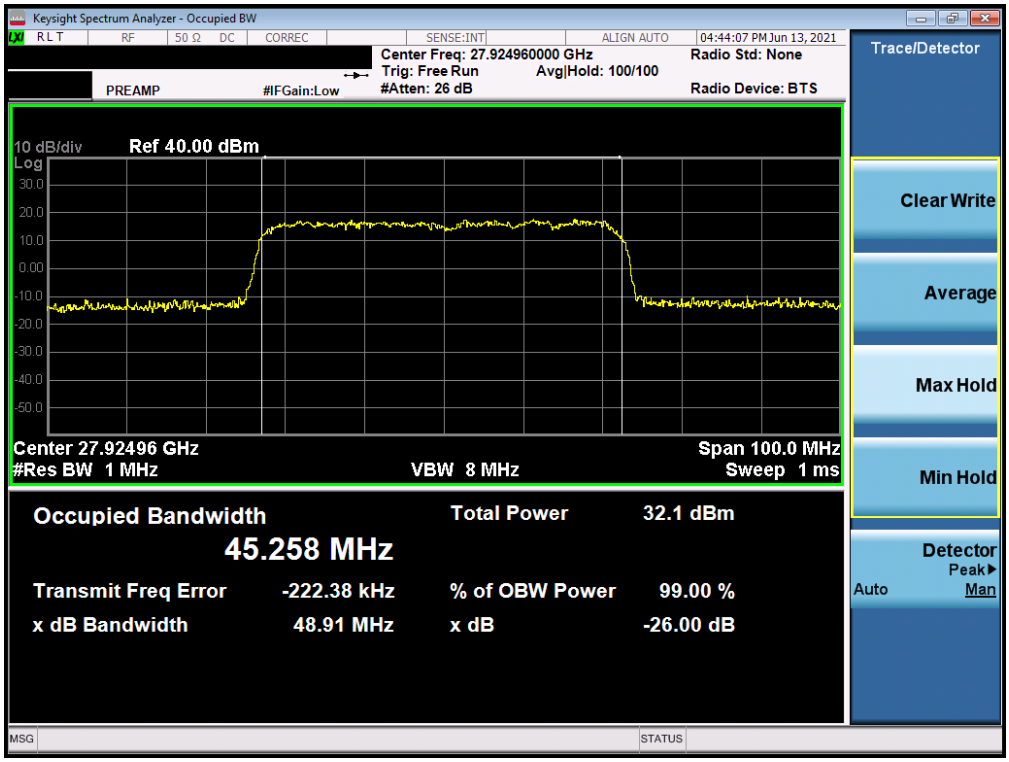


Plot 7-9. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



Plot 7-10. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)

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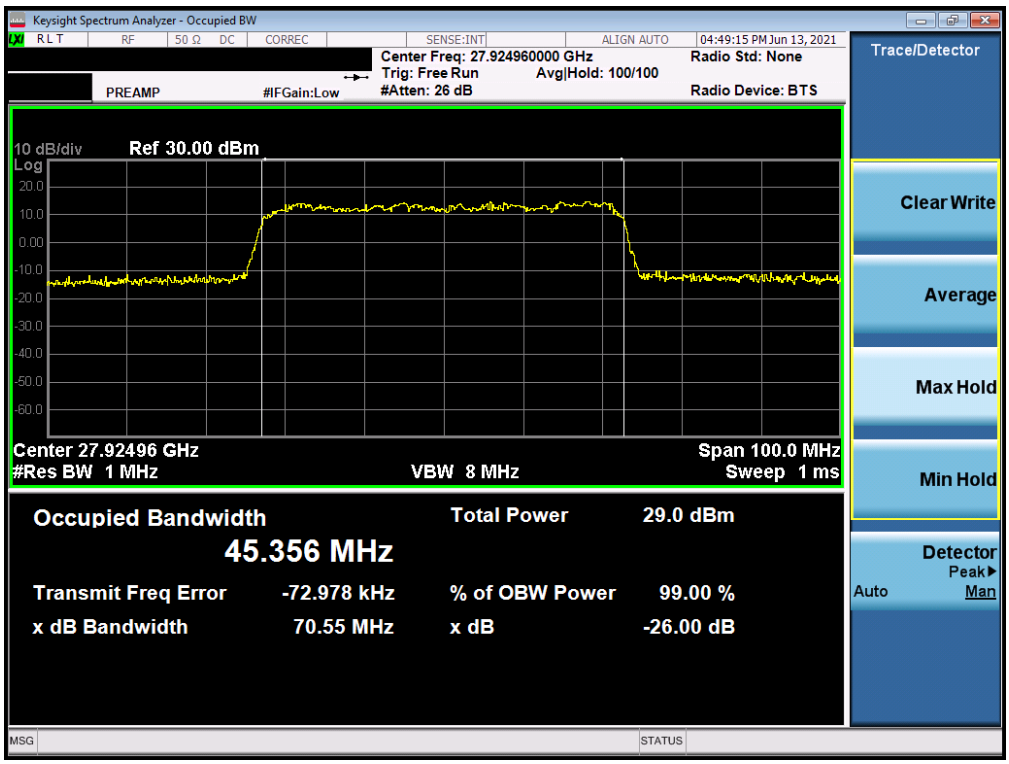
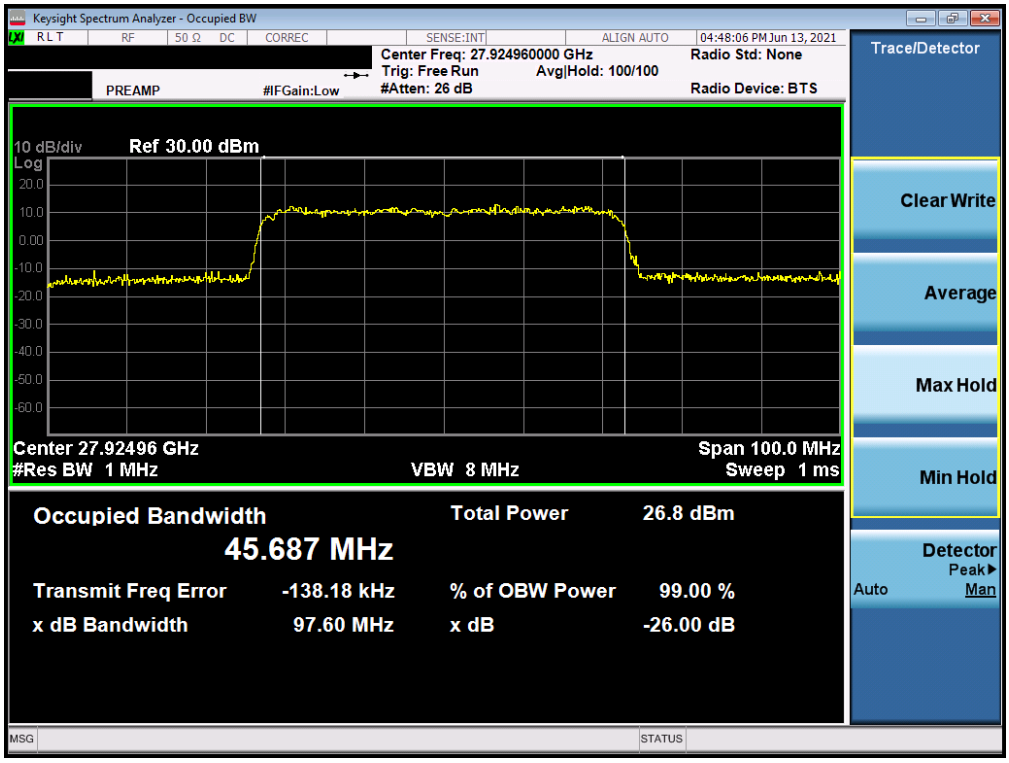


Plot 7-11. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



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

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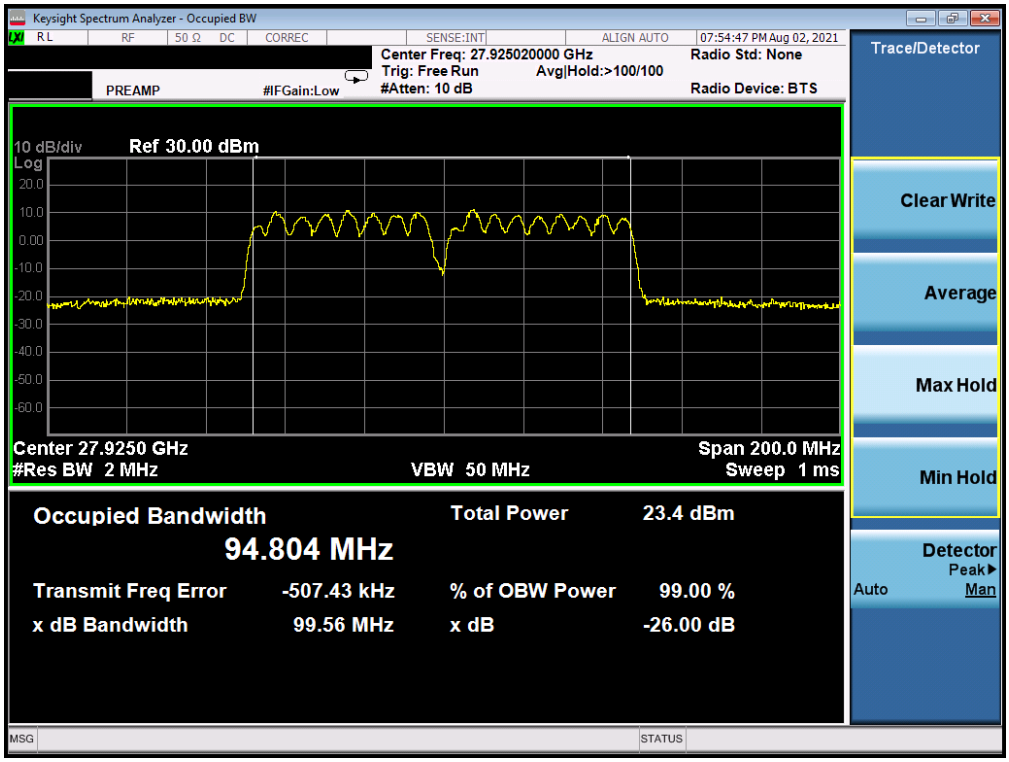
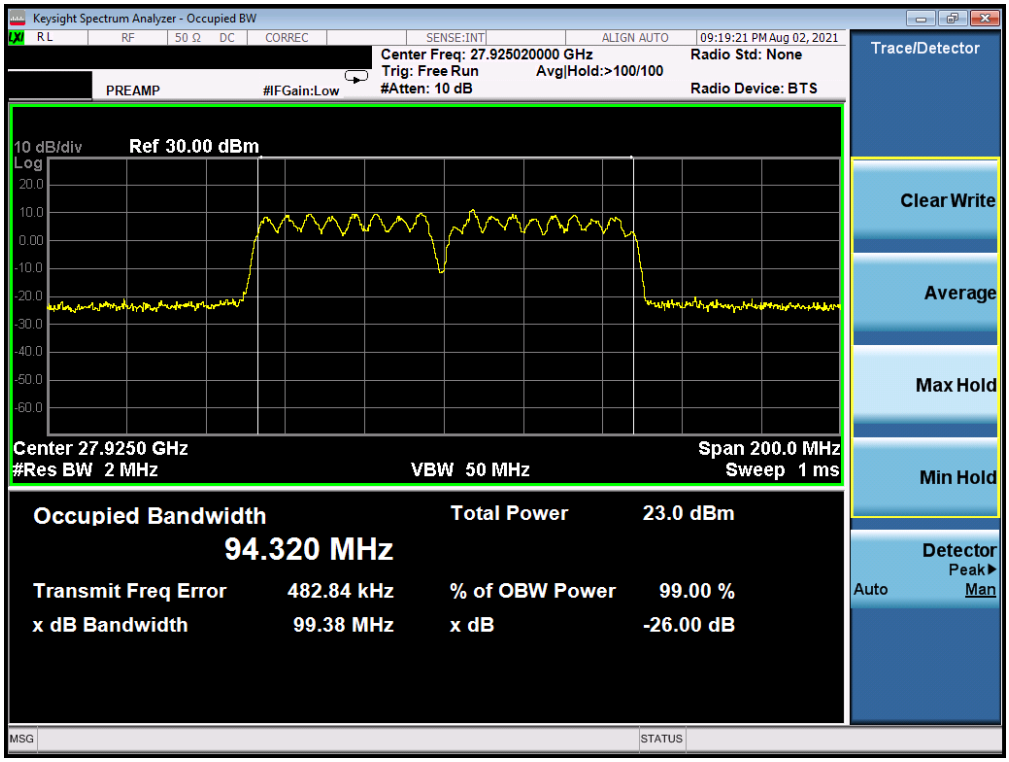


Plot 7-13. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



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

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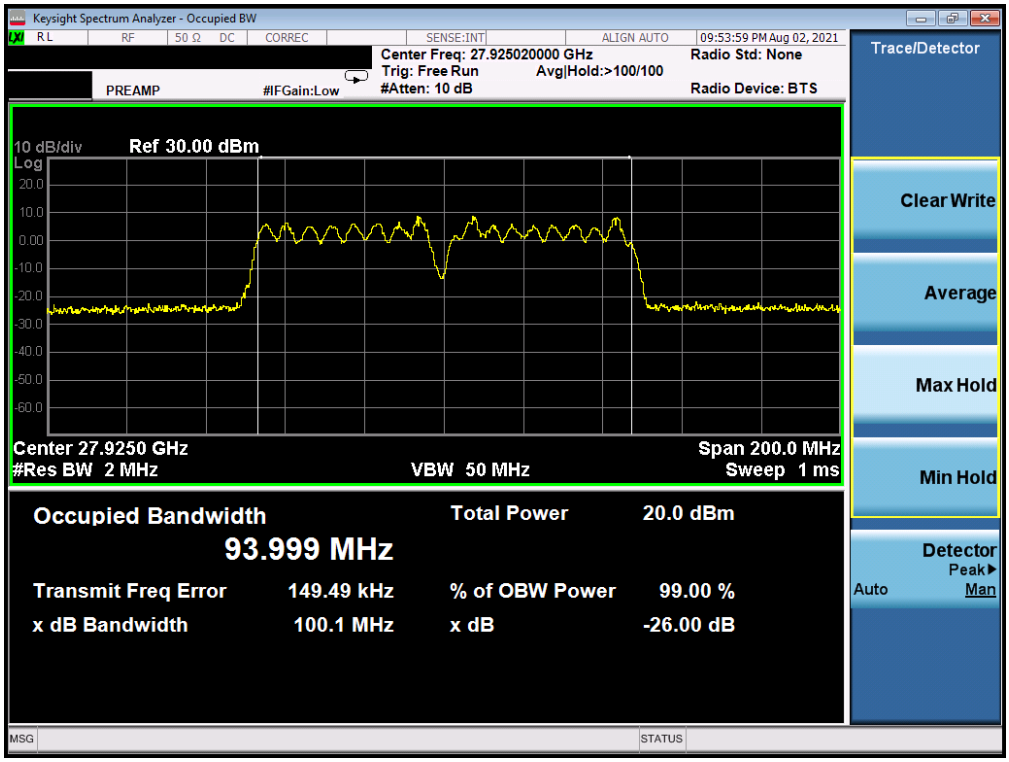
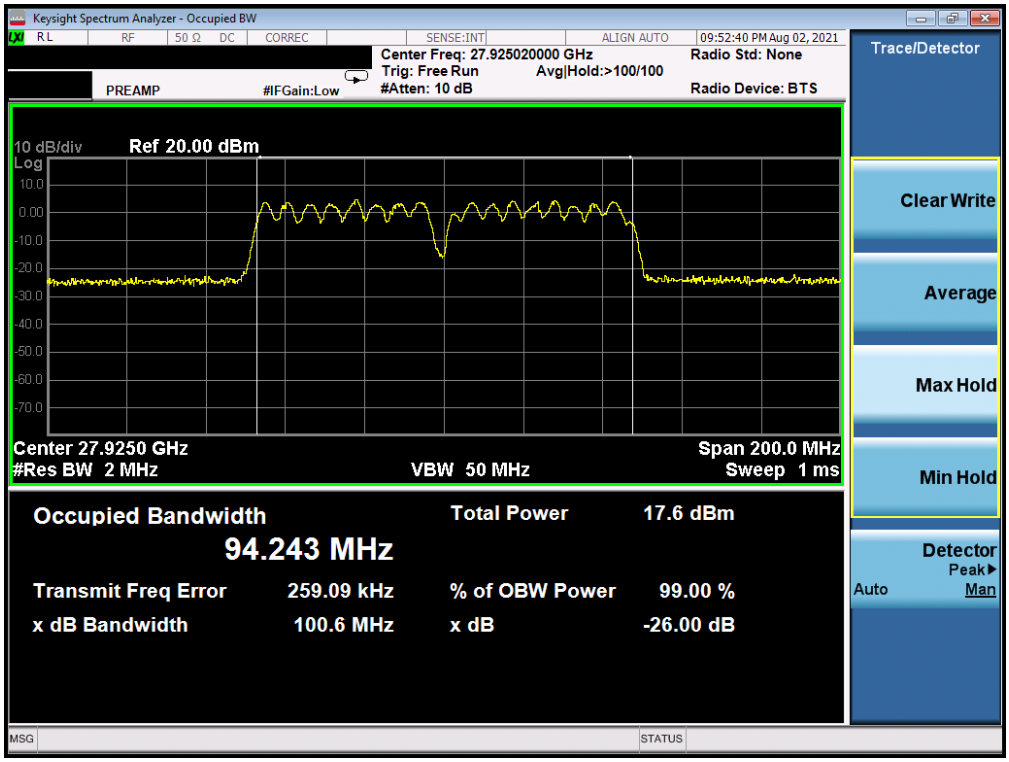


Plot 7-15. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



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

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Band n260

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	100	1	CP-OFDM	QPSK	92.92
			DFT-s-OFDM	pi/2-BPSK	91.09
			CP-OFDM	16QAM	93.21
			CP-OFDM	64QAM	93.73
		2	CP-OFDM	QPSK	190.87
			DFT-s-OFDM	pi/2-BPSK	189.90
			CP-OFDM	16QAM	191.30
			CP-OFDM	64QAM	191.62
	50	1	CP-OFDM	QPSK	45.51
			DFT-s-OFDM	pi/2-BPSK	45.36
			CP-OFDM	16QAM	45.37
			CP-OFDM	64QAM	45.76
		2	CP-OFDM	QPSK	96.20
			DFT-s-OFDM	pi/2-BPSK	95.22
			CP-OFDM	16QAM	98.34
			CP-OFDM	64QAM	98.58

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

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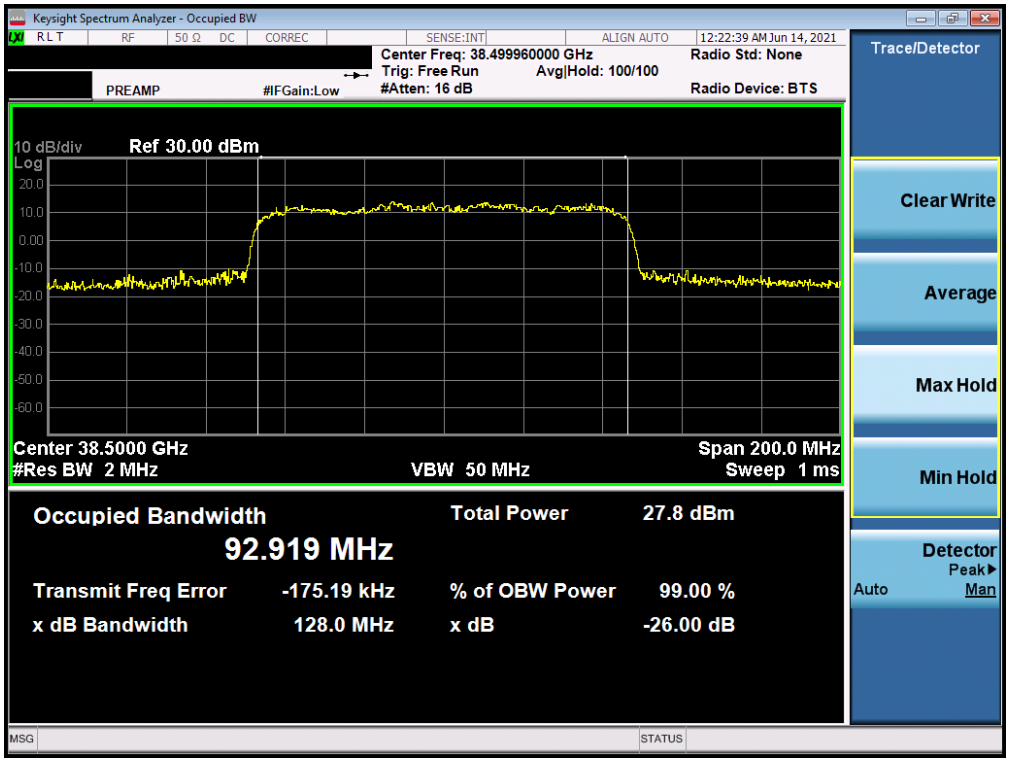
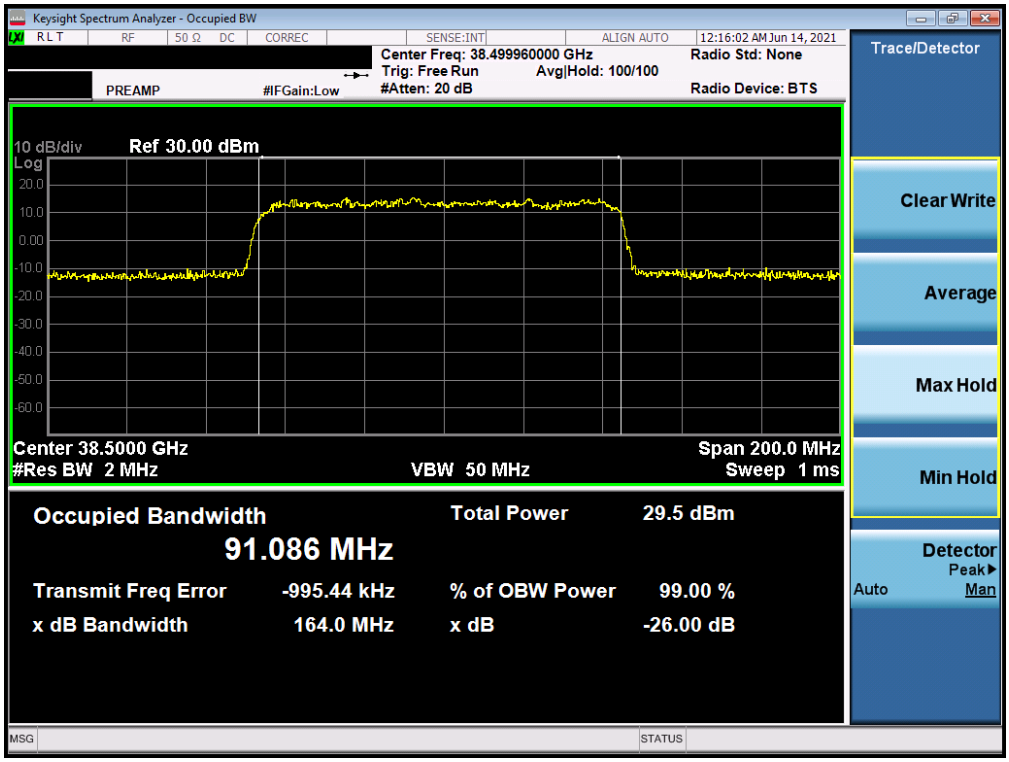


Plot 7-17. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



Plot 7-18. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)

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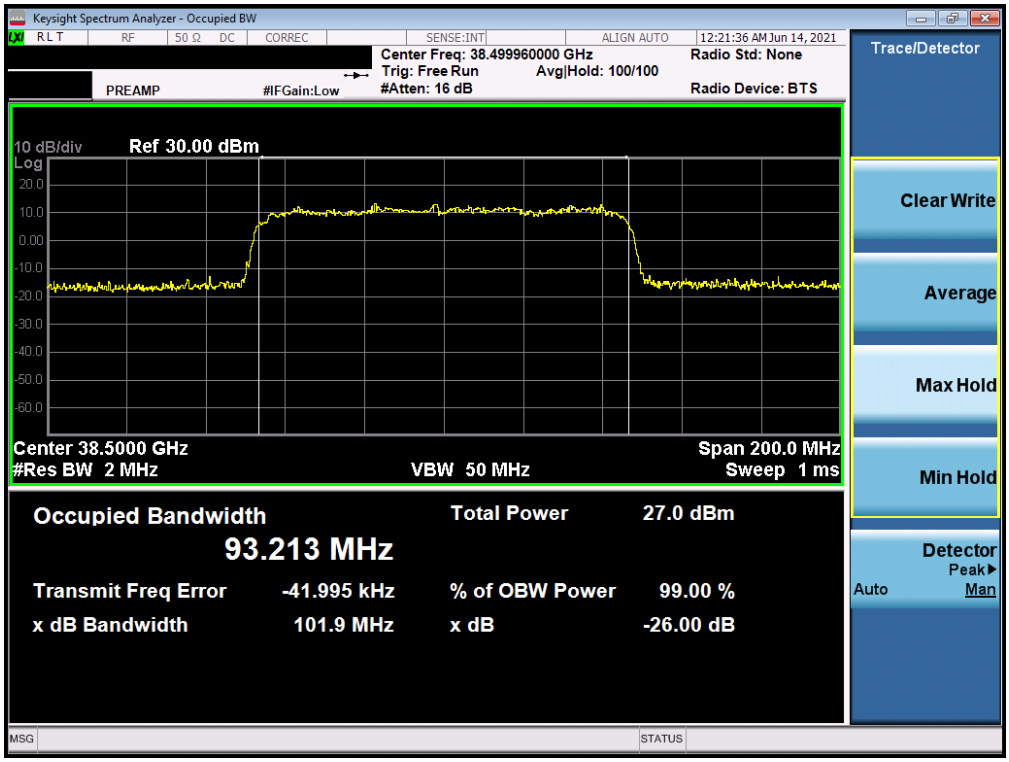
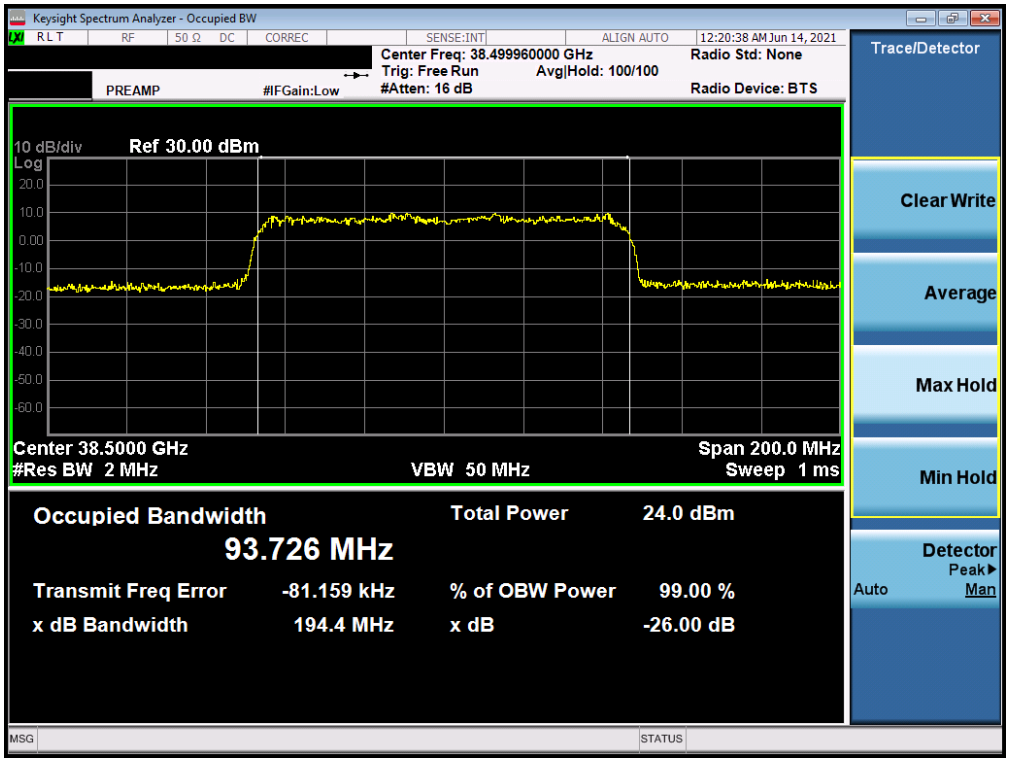


Plot 7-19. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



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

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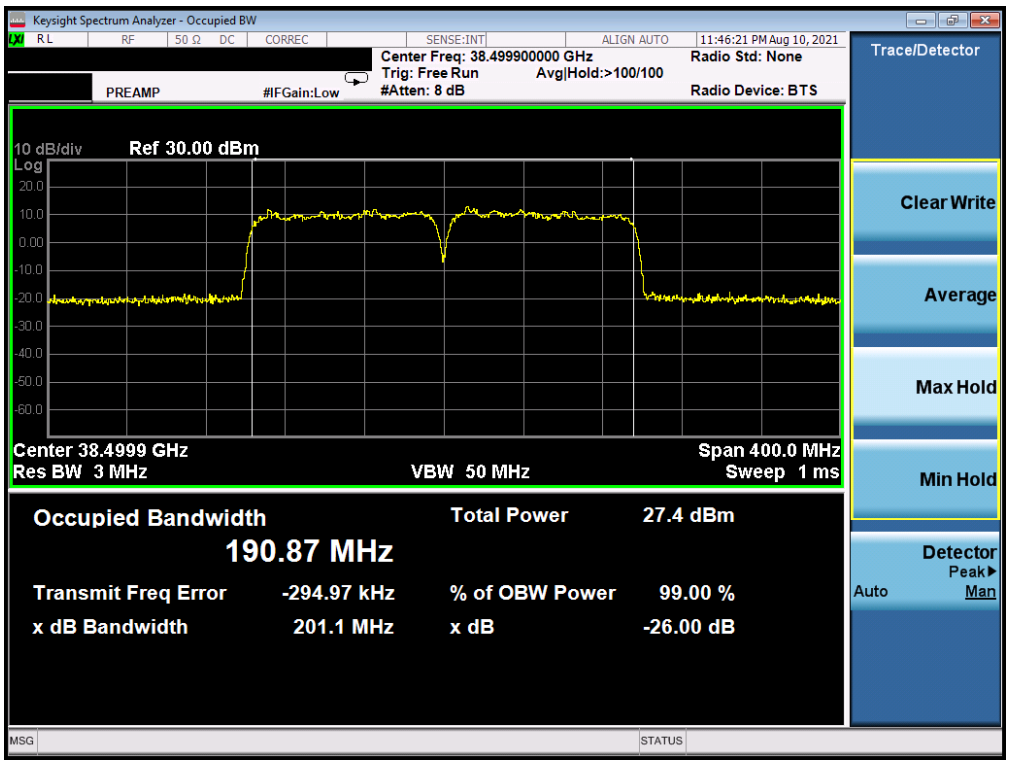
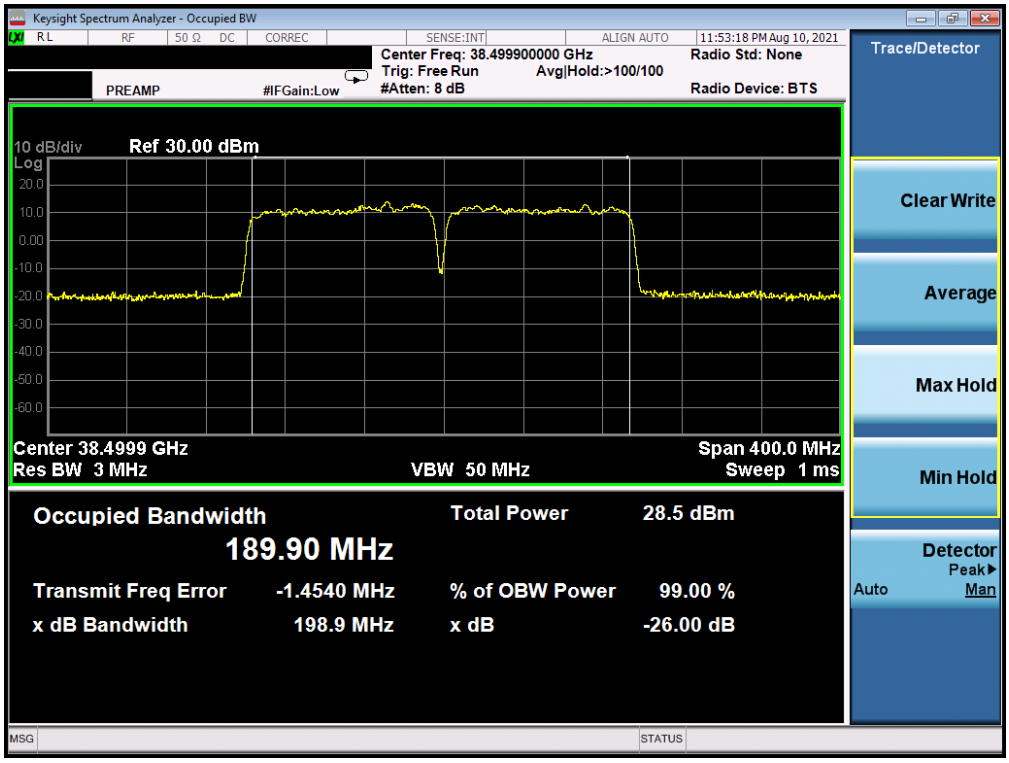


Plot 7-21. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



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

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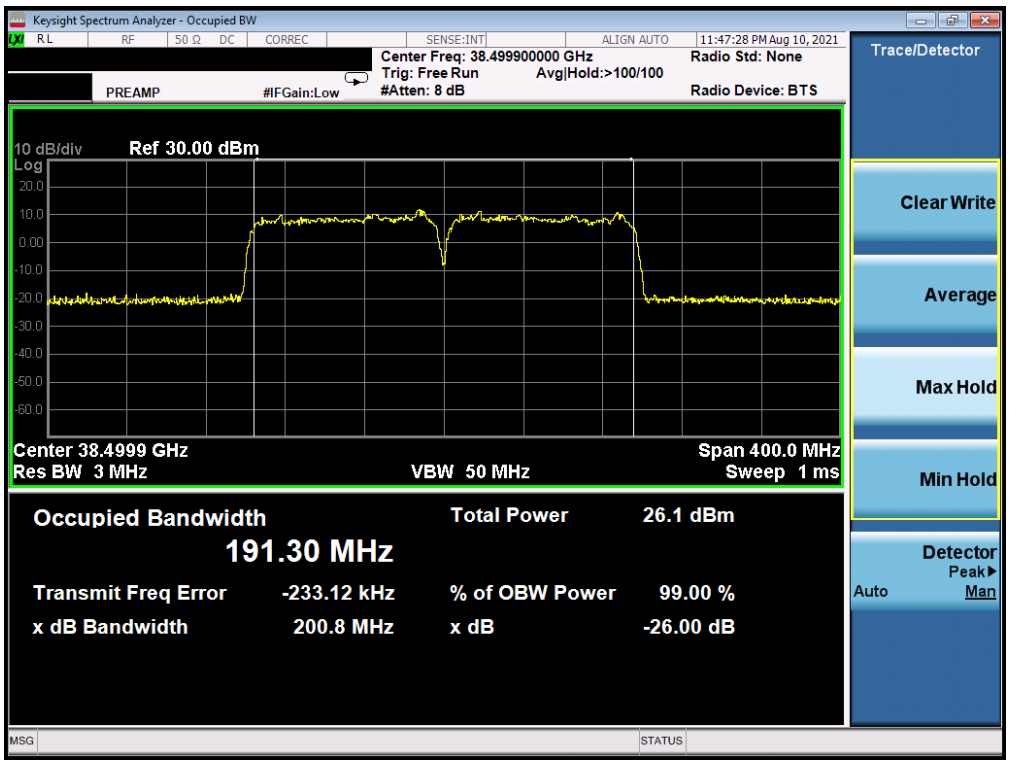
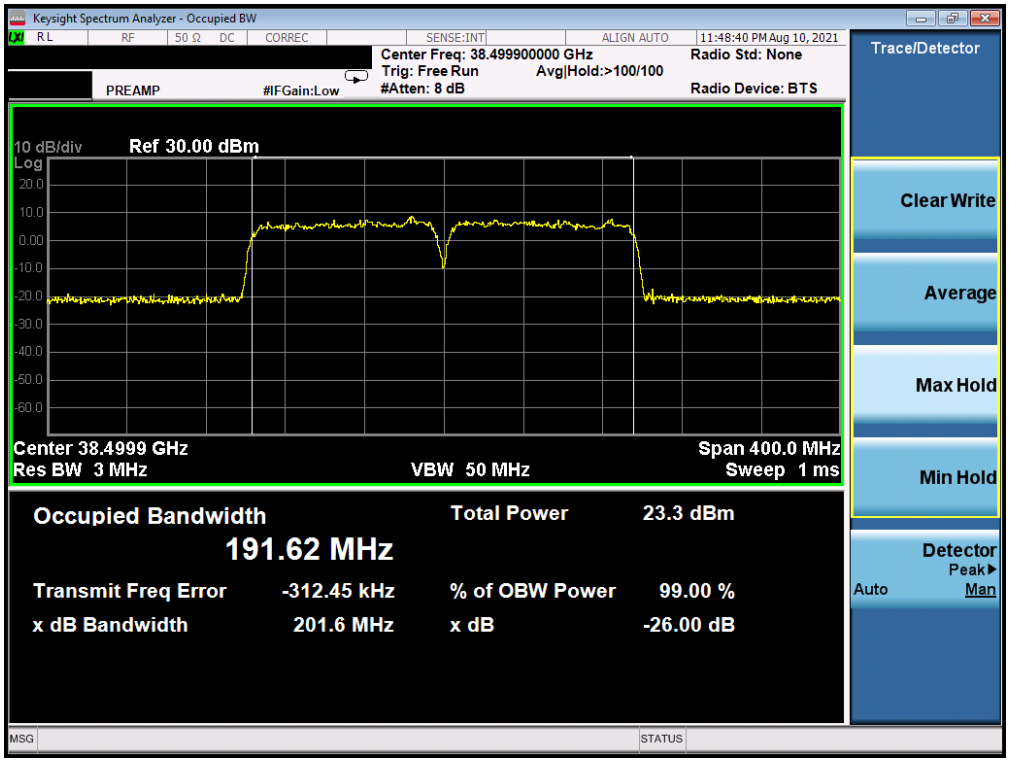


Plot 7-23. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)



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

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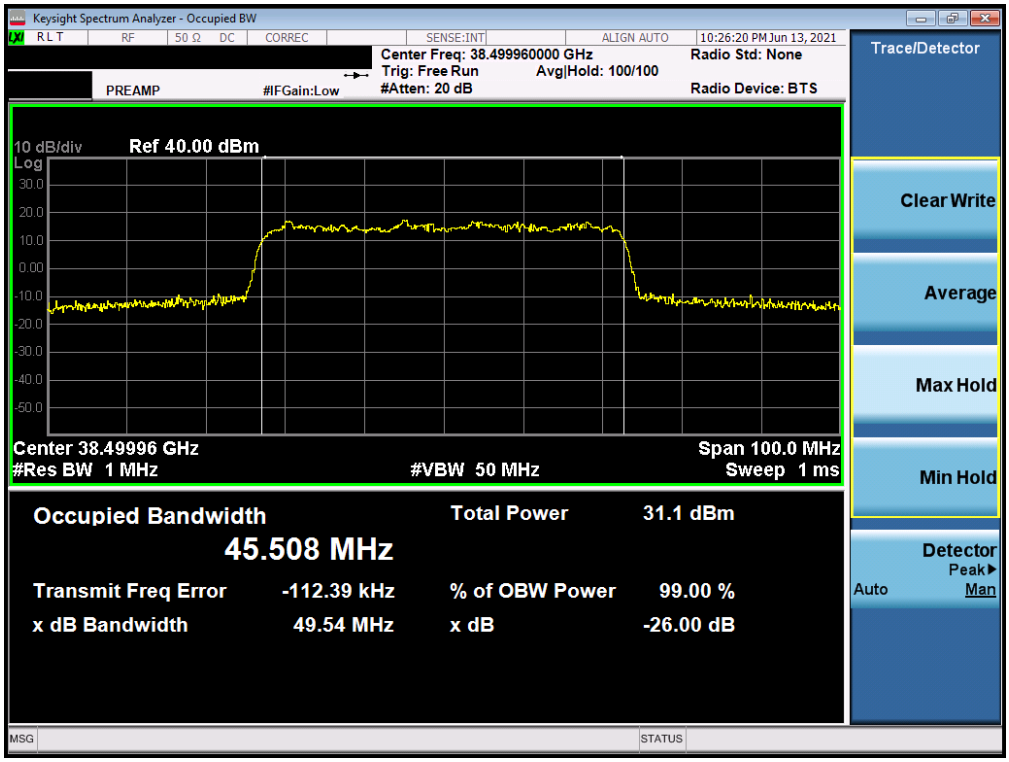
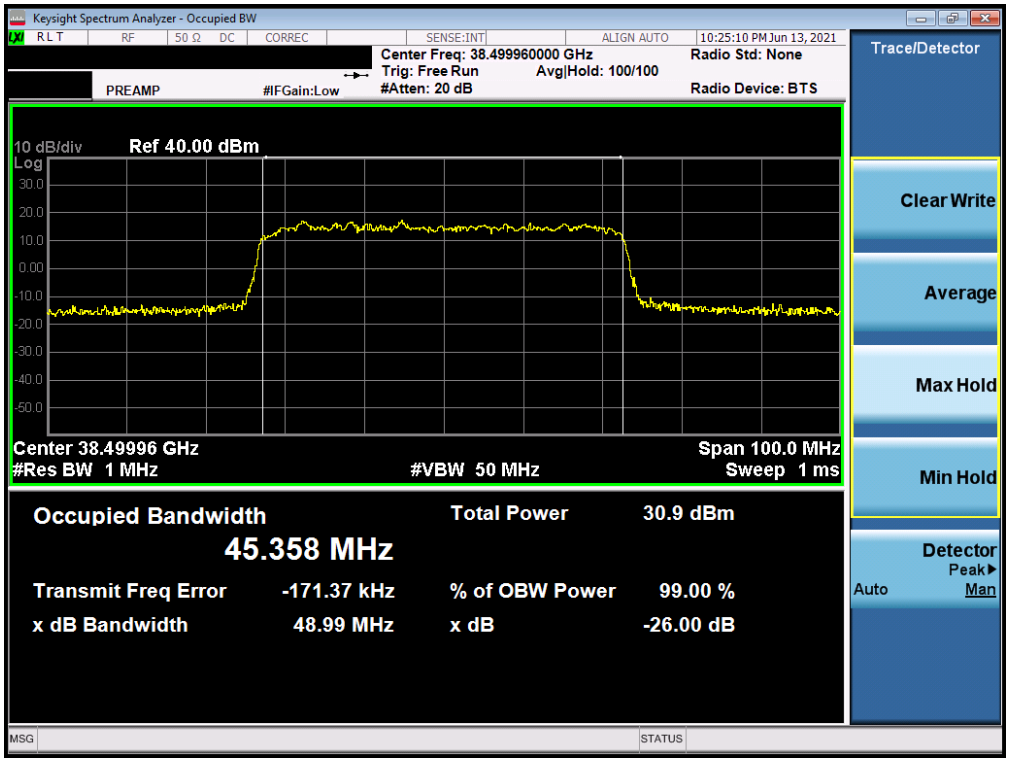


Plot 7-25. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



Plot 7-26. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)

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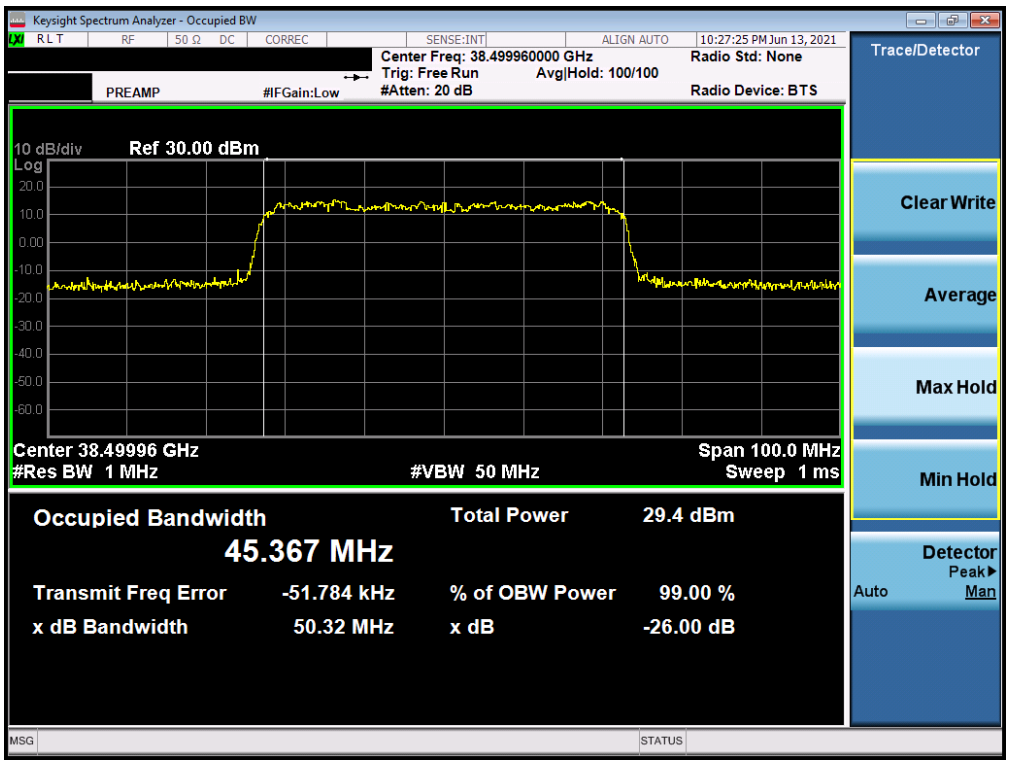
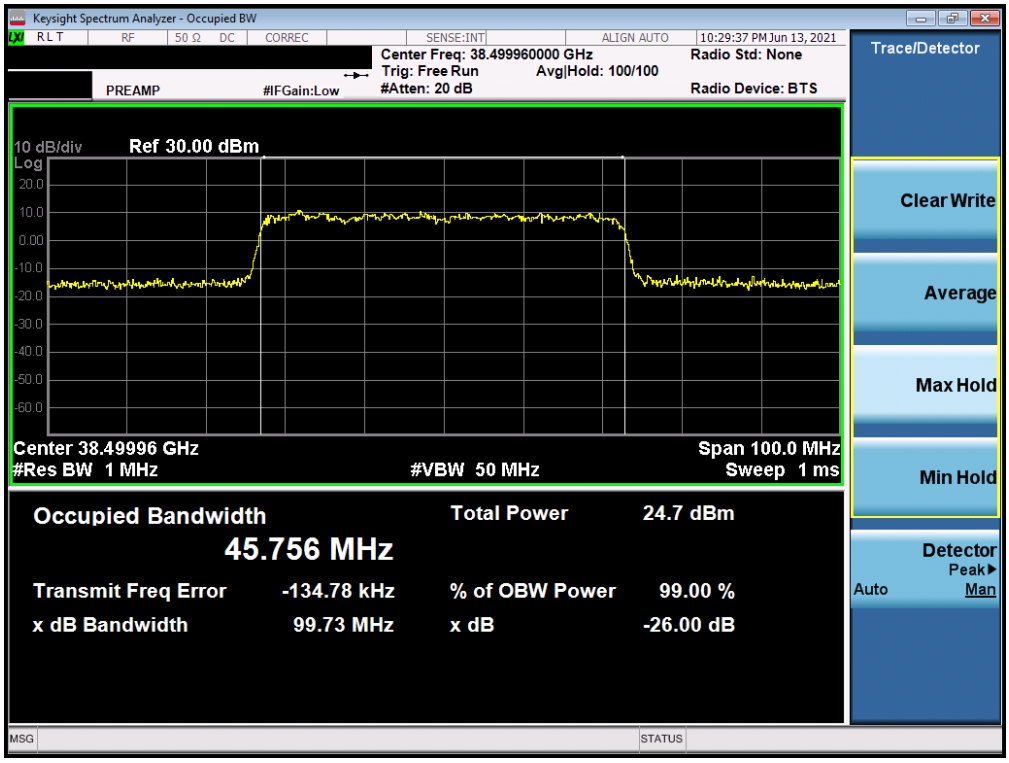


Plot 7-27. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



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

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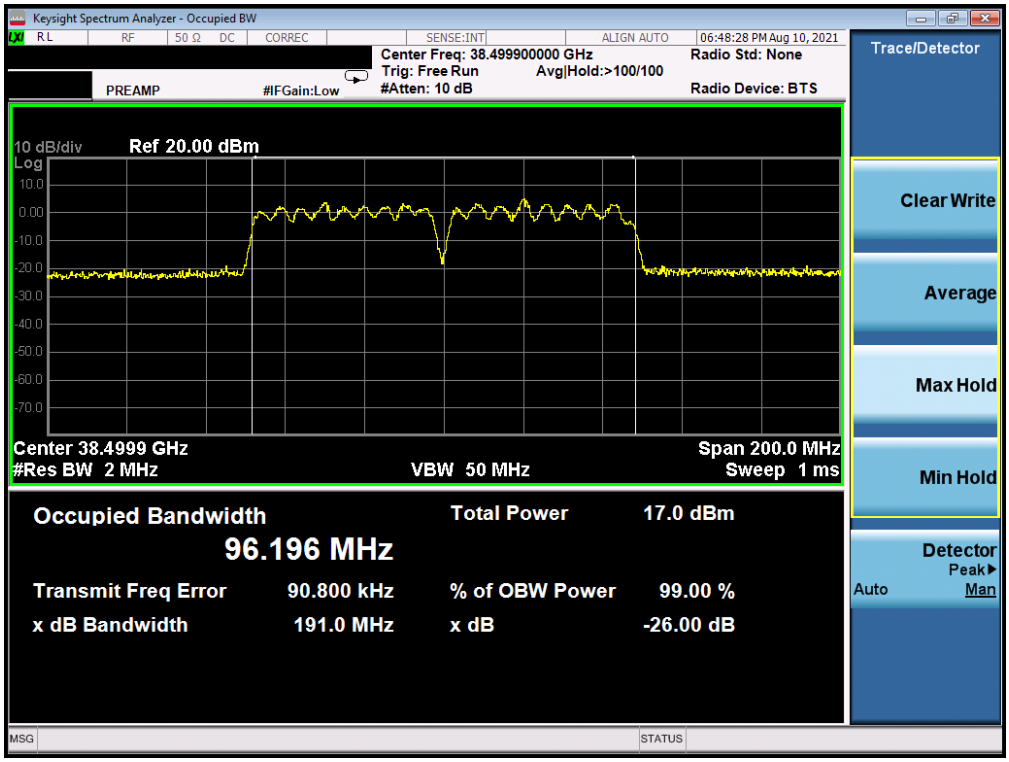
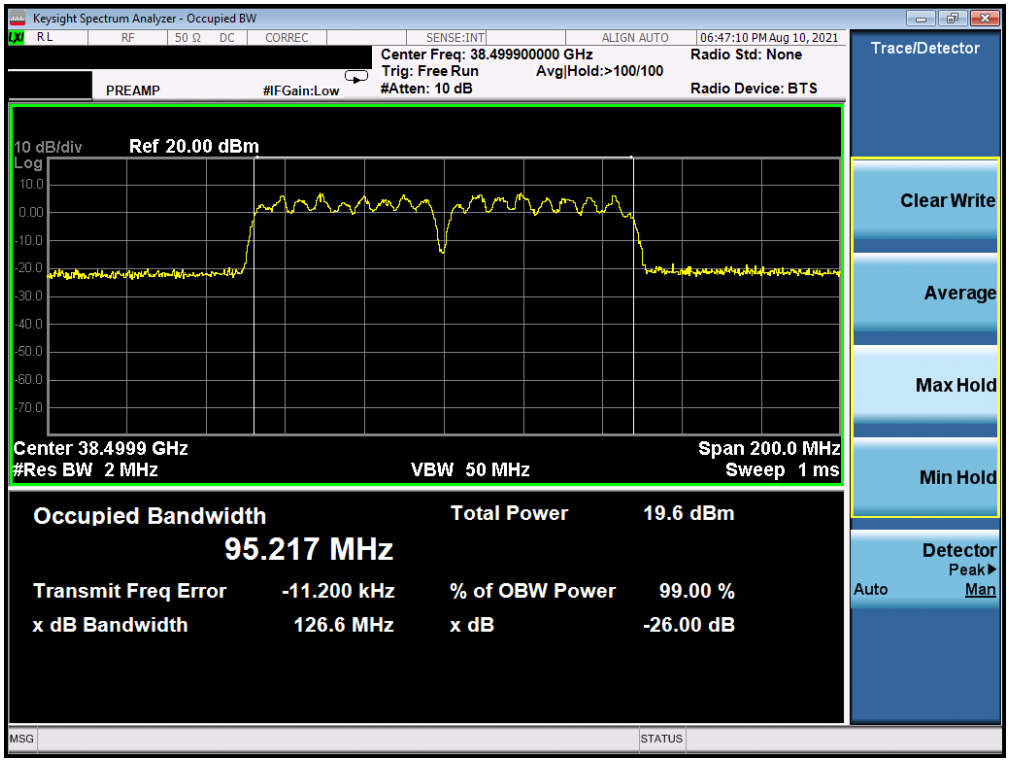


Plot 7-29. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



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

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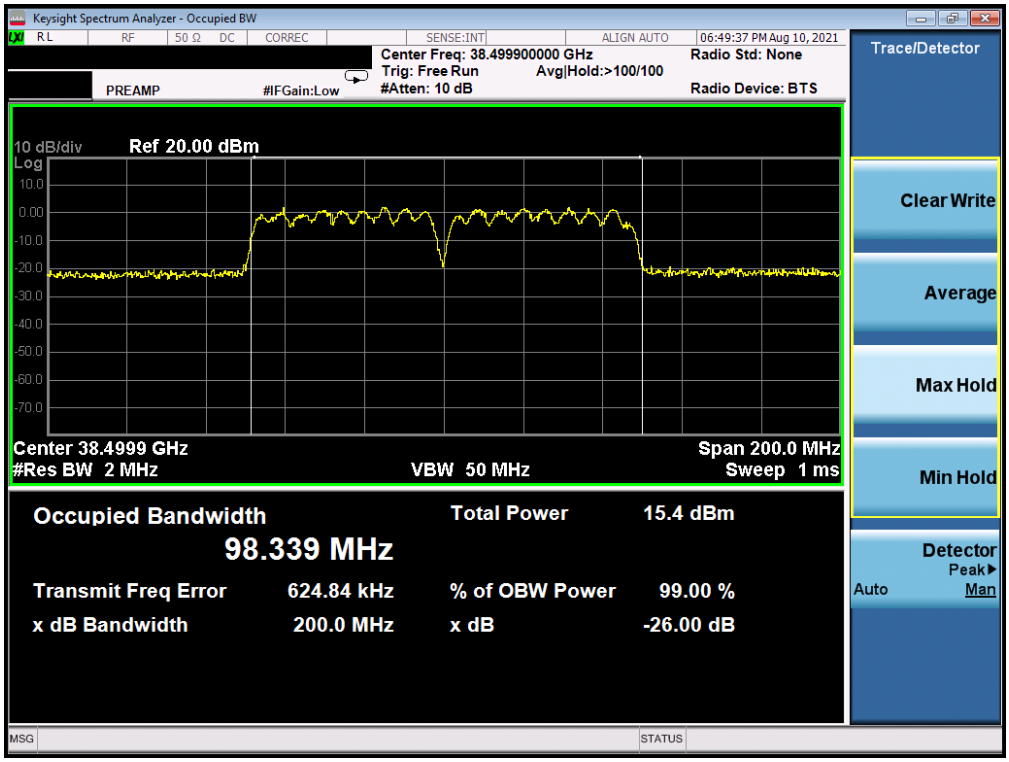
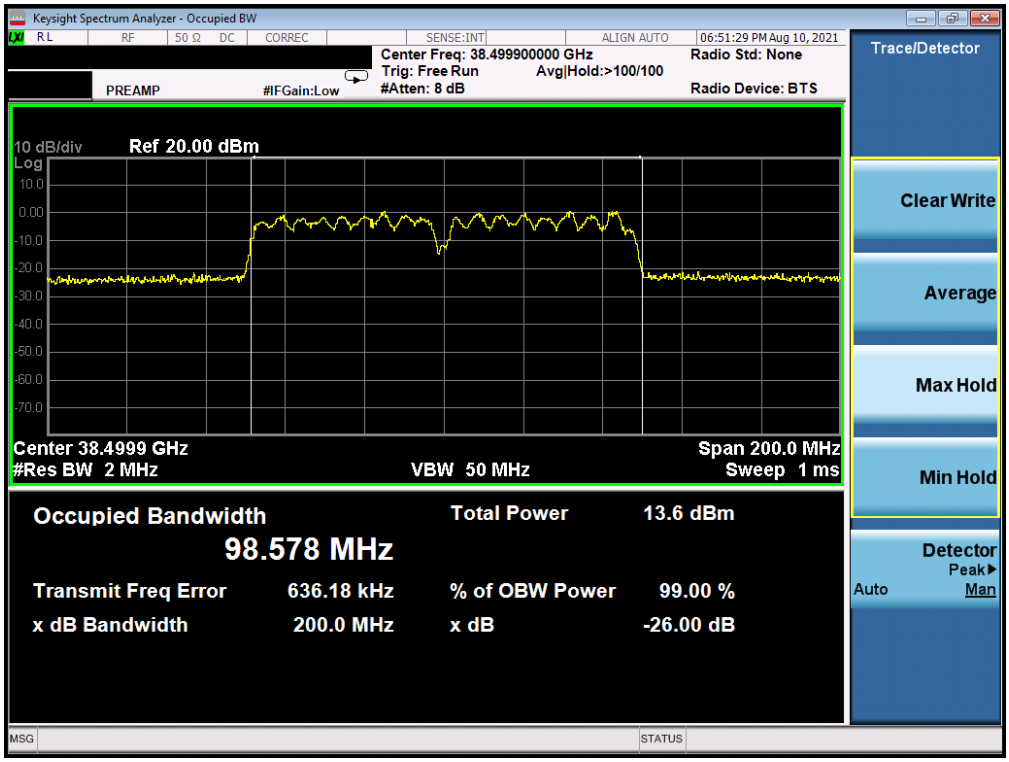


Plot 7-31. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



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

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7.3 Equivalent Isotropic Radiated Power

§2.1046, §30.202

Test Overview

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

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

Test Procedures Used

ANSI C63.26-2015 Section 5.2.4.4.1
KDB 842590 D01 v01r02 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

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Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below. Both H-Beam and V-Beam were investigated and the worst-case measurements were reported below.

2) Elements within the same antenna array are correlated to produce beamforming array gain. Antenna arrays cannot be correlated with another antenna array. During testing, only one antenna array was active.

3) EIRP measurements were taken at 1m test distance or as needed for Far-Field conditions, see **Table 3-1**.

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.

7) The folder open configuration was the worst case, so the full "open" test results are shown in this section.

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Band n261 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low/ Mid/ High	V	28	-
		H	149	-
MIMO	Low/ Mid/ High	2Tx/MIMO	149	21

Table 7-4. Ant 1 Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low/ Mid/ High	V	24	-
		H	144	-
MIMO	Low/ Mid/ High	2Tx/MIMO	144	16

Table 7-5. Ant 2 Worst Case Beam ID

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Band n261

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100	1	Mid	27924.96	DFT-s-OFDM	QPSK	149	H	SISO	H	81	284	1 / 23	22.79
		Mid	27924.96	DFT-s-OFDM	QPSK	28	V	SISO	H	270	269	1 / 23	26.92
		Mid	27924.96	DFT-s-OFDM	QPSK	21+149	H + V	2Tx	H	284	113	1 / 23	28.53
		Mid	27924.96	CP-OFDM	QPSK	149	H	SISO	H	81	284	1 / 42	23.86
		Mid	27924.96	CP-OFDM	QPSK	28	V	SISO	H	270	269	1 / 23	19.81
		Mid	27924.96	CP-OFDM	QPSK	21+149	H + V	MIMO	H	284	113	1 / 23	25.07
		Low	27550.08	DFT-s-OFDM	QPSK	21+149	H + V	2Tx	H	284	113	1 / 23	26.79
		High	28299.96	DFT-s-OFDM	QPSK	21+149	H + V	2Tx	H	289	115	1 / 23	26.57
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	21+149	H + V	2Tx	H	284	113	1 / 23	27.77
		Mid	27924.96	DFT-s-OFDM	16QAM	21+149	H + V	2Tx	H	284	113	1 / 23	26.02
		Mid	27924.96	DFT-s-OFDM	64QAM	21+149	H + V	2Tx	H	284	113	1 / 42	23.30
100+100	2	Mid	27924.96	DFT-s-OFDM	QPSK	21+149	H + V	2Tx	H	290	110	66 / 0	27.30
		Mid	27924.96	CP-OFDM	QPSK	21+149	H + V	2Tx	H	297	28	66 / 0	25.49
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	21+149	H + V	2Tx	H	297	28	66 / 0	**30.68**
		Mid	27924.96	DFT-s-OFDM	16QAM	21+149	H + V	2Tx	H	297	28	66 / 0	24.77
		Mid	27924.96	DFT-s-OFDM	64QAM	21+149	H + V	2Tx	H	297	28	66 / 0	22.05

Table 7-6. Ant 1 EIRP Data (Band n261 - 100MHz)

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50	1	Mid	27924.96	DFT-s-OFDM	QPSK	149	H	SISO	H	90	283	1 / 19	22.14
		Mid	27924.96	DFT-s-OFDM	QPSK	28	V	SISO	H	274	268	1 / 19	26.50
		Mid	27924.96	DFT-s-OFDM	QPSK	21+149	H + V	2Tx	H	287	113	1 / 12	26.61
		Mid	27924.96	CP-OFDM	QPSK	149	H	SISO	H	90	283	1 / 19	19.31
		Mid	27924.96	CP-OFDM	QPSK	28	V	SISO	H	274	268	1 / 19	22.96
		Mid	27924.96	CP-OFDM	QPSK	21+149	H + V	MIMO	H	287	113	1 / 19	23.76
		Low	27525.00	DFT-s-OFDM	QPSK	21+149	H + V	2Tx	H	290	113	1 / 19	26.49
		High	28324.92	DFT-s-OFDM	QPSK	21+149	H + V	2Tx	H	228	114	1 / 12	26.21
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	21+149	H + V	2Tx	H	287	113	1 / 16	**26.78**
		Mid	27924.96	DFT-s-OFDM	16QAM	21+149	H + V	2Tx	H	287	113	1 / 16	26.50
		Mid	27924.96	DFT-s-OFDM	64QAM	21+149	H + V	2Tx	H	287	113	1 / 16	24.48
50+50	2	Mid	27924.96	DFT-s-OFDM	QPSK	21+149	H + V	2Tx	H	294	283	32 / 0	24.66
		Mid	27924.96	CP-OFDM	QPSK	21+149	H + V	2Tx	H	77	88	1 / 16	24.11
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	21+149	H + V	2Tx	H	110	63	32 / 0	20.51
		Mid	27924.96	DFT-s-OFDM	16QAM	21+149	H + V	2Tx	H	109	65	1 / 16	19.19
		Mid	27924.96	DFT-s-OFDM	64QAM	21+149	H + V	2Tx	H	110	62	1 / 16	20.08

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

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Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100	1	Low	27550.08	DFT-s-OFDM	QPSK	144	H	SISO	H	88	80	1 / 23	22.07
		Low	27550.08	DFT-s-OFDM	QPSK	24	V	SISO	H	123	93	1 / 33	22.75
		Low	27550.08	DFT-s-OFDM	QPSK	16+144	H + V	2Tx	V	287	251	1 / 23	25.50
		Low	27550.08	CP-OFDM	QPSK	144	H	SISO	H	88	80	1 / 42	18.94
		Low	27550.08	CP-OFDM	QPSK	24	V	SISO	H	123	93	1 / 23	19.91
		Low	27550.08	CP-OFDM	QPSK	16+144	H + V	MIMO	V	287	251	1 / 23	21.84
		Mid	27924.96	DFT-s-OFDM	QPSK	16+144	H + V	2Tx	V	258	257	1 / 42	24.97
		High	28299.96	DFT-s-OFDM	QPSK	16+144	H + V	2Tx	V	285	248	1 / 23	24.71
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	16+144	H + V	2Tx	V	287	251	1 / 42	**25.72**
		Low	27525.00	DFT-s-OFDM	16QAM	16+144	H + V	2Tx	V	287	251	1 / 33	24.30
		Low	27525.00	DFT-s-OFDM	64QAM	16+144	H + V	2Tx	V	287	251	1 / 33	24.19
100+100	2	Low	27525.00	DFT-s-OFDM	QPSK	16+144	H + V	2Tx	H	108	73	66 / 0	20.67
		Low	27525.00	CP-OFDM	QPSK	16+144	H + V	2Tx	H	109	74	1 / 23	19.01
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	16+144	H + V	2Tx	H	108	73	66 / 0	20.94
		Low	27525.00	DFT-s-OFDM	16QAM	16+144	H + V	2Tx	H	108	73	1 / 23	19.16
		Low	27525.00	DFT-s-OFDM	64QAM	16+144	H + V	2Tx	H	108	73	1 / 23	18.18

Table 7-8. Ant 2 EIRP Data (Band n261 - 100MHz)

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50	1	Low	27525.00	DFT-s-OFDM	QPSK	144	H	SISO	H	87	78	1 / 19	21.72
		Low	27525.00	DFT-s-OFDM	QPSK	24	V	SISO	H	122	93	1 / 16	22.95
		Low	27525.00	DFT-s-OFDM	QPSK	16+144	H + V	2Tx	V	282	256	1 / 16	25.73
		Low	27525.00	CP-OFDM	QPSK	144	H	SISO	H	87	78	1 / 19	18.97
		Low	27525.00	CP-OFDM	QPSK	24	V	SISO	H	122	93	1 / 16	20.31
		Low	27525.00	CP-OFDM	QPSK	16+144	H + V	MIMO	V	282	256	1 / 19	22.54
		Mid	27924.96	DFT-s-OFDM	QPSK	16+144	H + V	2Tx	V	258	256	1 / 19	24.95
		High	28324.92	DFT-s-OFDM	QPSK	16+144	H + V	2Tx	V	289	250	1 / 12	24.22
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	16+144	H + V	2Tx	V	282	256	1 / 19	**25.84**
		Low	27525.00	DFT-s-OFDM	16QAM	16+144	H + V	2Tx	V	282	256	1 / 16	23.77
		Low	27525.00	DFT-s-OFDM	64QAM	16+144	H + V	2Tx	V	282	256	1 / 19	24.32
50+50	2	Low	27525.00	DFT-s-OFDM	QPSK	16+144	H + V	2Tx	H	76	77	32 / 0	23.36
		Low	27525.00	CP-OFDM	QPSK	16+144	H + V	2Tx	H	61	79	1 / 16	20.18
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	16+144	H + V	2Tx	H	76	77	32 / 0	23.37
		Low	27525.00	DFT-s-OFDM	16QAM	16+144	H + V	2Tx	H	76	77	32 / 0	21.70
		Low	27525.00	DFT-s-OFDM	64QAM	16+144	H + V	2Tx	H	76	77	1 / 16	22.29

Table 7-9. Ant 2 EIRP Data (Band n261 - 50MHz)

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Band n260 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low/ Mid/ High	V	32	-
		H	152	-
MIMO	Low/ Mid/ High	2Tx/MIMO	161	33

Table 7-10. Ant 1 Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low/ Mid/ High	V	17	-
		H	157	-
MIMO	Low/ Mid/ High	2Tx/MIMO	156	28

Table 7-11. Ant 2 Worst Case Beam ID

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Band n260

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100	1	High	39949.92	DFT-s-OFDM	QPSK	152	H	SISO	H	98	73	1 / 42	23.79
		High	39949.92	DFT-s-OFDM	QPSK	32	V	SISO	V	281	287	1 / 42	23.06
		High	39949.92	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	282	269	1 / 42	24.47
		High	39949.92	CP-OFDM	QPSK	152	H	SISO	H	98	73	1 / 42	20.53
		High	39949.92	CP-OFDM	QPSK	32	V	SISO	V	281	287	1 / 23	20.37
		High	39949.92	CP-OFDM	QPSK	33+161	H + V	MIMO	H	282	269	1 / 42	21.06
		Low	37050.00	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	288	260	1 / 23	22.40
		Mid	38499.96	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	286	259	1 / 42	21.51
		High	39949.92	DFT-s-OFDM	π/2 BPSK	33+161	H + V	2Tx	H	282	269	1 / 42	**24.57**
		High	39949.92	DFT-s-OFDM	16QAM	33+161	H + V	2Tx	H	282	269	1 / 33	22.51
		High	39949.92	DFT-s-OFDM	64QAM	33+161	H + V	2Tx	H	282	269	1 / 42	19.95
100+100	2	High	39949.92	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	72	86	66 / 0	21.95
		High	39949.92	CP-OFDM	QPSK	33+161	H + V	2Tx	H	72	85	66 / 0	19.74
		High	39949.92	DFT-s-OFDM	π/2 BPSK	33+161	H + V	2Tx	H	72	86	66 / 0	21.97
		High	39949.92	DFT-s-OFDM	16QAM	33+161	H + V	2Tx	H	72	86	66 / 0	20.31
		High	39949.92	DFT-s-OFDM	64QAM	33+161	H + V	2Tx	H	72	86	66 / 0	17.75

Table 7-12. Ant 1 EIRP Data (Band n260 - 100MHz)

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50	1	Mid	38499.96	DFT-s-OFDM	QPSK	152	H	SISO	H	99	71	1 / 16	23.09
		Mid	38499.96	DFT-s-OFDM	QPSK	32	V	SISO	V	280	287	1 / 19	22.30
		Mid	38499.96	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	285	257	1 / 19	**25.39**
		Mid	38499.96	CP-OFDM	QPSK	152	H	SISO	H	99	71	1 / 16	23.09
		Mid	38499.96	CP-OFDM	QPSK	32	V	SISO	V	280	287	1 / 19	19.50
		Mid	38499.96	CP-OFDM	QPSK	33+161	H + V	MIMO	H	285	257	1 / 19	21.73
		Low	37025.04	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	287	262	1 / 16	23.92
		High	39975.00	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	283	267	1 / 16	24.57
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	33+161	H + V	2Tx	H	285	257	1 / 19	24.88
		Mid	38499.96	DFT-s-OFDM	16QAM	33+161	H + V	2Tx	H	285	257	1 / 19	24.01
		Mid	38499.96	DFT-s-OFDM	64QAM	33+161	H + V	2Tx	H	285	257	1 / 19	21.05
50+50	2	Mid	38499.96	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	V	278	291	32 / 0	20.04
		Mid	38499.96	CP-OFDM	QPSK	33+161	H + V	2Tx	V	252	285	1 / 19	13.55
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	33+161	H + V	2Tx	V	278	291	32 / 0	19.67
		Mid	38499.96	DFT-s-OFDM	16QAM	33+161	H + V	2Tx	V	278	291	32 / 0	18.02
		Mid	38499.96	DFT-s-OFDM	64QAM	33+161	H + V	2Tx	V	278	291	1 / 19	18.03

Table 7-13. Ant 1 EIRP Data (Band n260 - 50MHz)

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100	1	High	39949.92	DFT-s-OFDM	QPSK	157	H	SISO	H	83	66	1 / 42	24.13
		High	39949.92	DFT-s-OFDM	QPSK	17	V	SISO	H	117	59	1 / 42	23.24
		High	39949.92	DFT-s-OFDM	QPSK	28+156	H + V	2Tx	V	281	258	1 / 42	**25.71**
		High	39949.92	CP-OFDM	QPSK	157	H	SISO	H	83	66	1 / 42	20.37
		High	39949.92	CP-OFDM	QPSK	17	V	SISO	H	117	59	1 / 33	19.55
		High	39949.92	CP-OFDM	QPSK	28+156	H + V	MIMO	V	281	258	1 / 42	23.05
		Low	37050.00	DFT-s-OFDM	QPSK	28+156	H + V	2Tx	V	278	260	1 / 33	24.42
		Mid	38499.96	DFT-s-OFDM	QPSK	28+156	H + V	2Tx	V	285	258	1 / 42	24.70
		High	39949.92	DFT-s-OFDM	π/2 BPSK	28+156	H + V	2Tx	V	281	258	1 / 42	25.62
		High	39949.92	DFT-s-OFDM	16QAM	28+156	H + V	2Tx	V	281	258	1 / 33	23.61
		High	39949.92	DFT-s-OFDM	64QAM	28+156	H + V	2Tx	V	281	258	1 / 42	20.70
100+100	2	High	39949.92	DFT-s-OFDM	QPSK	28+156	H + V	2Tx	V	80	80	66 / 0	23.31
		High	39949.92	CP-OFDM	QPSK	28+156	H + V	2Tx	V	82	80	66 / 0	20.57
		High	39949.92	DFT-s-OFDM	π/2 BPSK	28+156	H + V	2Tx	V	80	80	66 / 0	23.35
		High	39949.92	DFT-s-OFDM	16QAM	28+156	H + V	2Tx	V	80	80	66 / 0	21.81
		High	39949.92	DFT-s-OFDM	64QAM	28+156	H + V	2Tx	V	80	80	66 / 0	19.57

Table 7-14. Ant 2 EIRP Data (Band n260 - 100MHz)

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Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50	1	High	39975.00	DFT-s-OFDM	QPSK	157	H	SISO	H	83	66	1 / 19	22.49
		High	39975.00	DFT-s-OFDM	QPSK	17	V	SISO	H	92	93	1 / 19	22.93
		High	39975.00	DFT-s-OFDM	QPSK	28+156	H + V	2Tx	V	280	256	1 / 12	**25.69**
		High	39975.00	CP-OFDM	QPSK	157	H	SISO	H	83	66	1 / 12	18.73
		High	39975.00	CP-OFDM	QPSK	17	V	SISO	H	92	93	1 / 12	19.50
		High	39975.00	CP-OFDM	QPSK	28+156	H + V	MIMO	V	280	256	1 / 12	22.60
		Low	37025.04	DFT-s-OFDM	QPSK	28+156	H + V	2Tx	V	282	262	1 / 19	21.25
		Mid	38499.96	DFT-s-OFDM	QPSK	28+156	H + V	2Tx	V	278	261	1 / 19	24.33
		High	39975.00	DFT-s-OFDM	π/2 BPSK	28+156	H + V	2Tx	V	280	256	1 / 19	25.68
		High	39975.00	DFT-s-OFDM	16QAM	28+156	H + V	2Tx	V	280	256	1 / 19	24.04
		High	39975.00	DFT-s-OFDM	64QAM	28+156	H + V	2Tx	V	280	256	1 / 19	20.84
50+50	2	High	39975.00	DFT-s-OFDM	QPSK	28+156	H + V	2Tx	H	285	77	32 / 0	20.59
		High	39975.00	CP-OFDM	QPSK	28+156	H + V	2Tx	H	285	71	1 / 12	17.08
		High	39975.00	DFT-s-OFDM	π/2 BPSK	28+156	H + V	2Tx	H	285	77	32 / 0	20.03
		High	39975.00	DFT-s-OFDM	16QAM	28+156	H + V	2Tx	H	285	77	32 / 0	18.34
		High	39975.00	DFT-s-OFDM	64QAM	28+156	H + V	2Tx	H	285	77	1 / 12	17.00

Table 7-15. Ant 2 EIRP Data (Band n260 - 50MHz)

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7.4 Radiated Spurious and Harmonic Emissions

§2.1051, §30.203

Test Overview

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

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

Test Procedure Used

ANSI C63.26-2015 Section 5.7.4
KDB 842590 D01 v01r02 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.

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

Table 7-16. 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, B13, B48 and B66, and n260 uses LTE B2, B5, B12, B13, B14, B30, B48 and B66.

10) The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1 meter or as described in Table 7-16 to maintain far-field conditions.

11) The plots in this section were taken with the analyzer set to max hold. All final measurements shown in the tables that accompany the plots were taken with trace averaging performed over 100 sweeps while the analyzer was triggering on a specific emission of interest.

12) The folder open configuration was the worst case, so the full "open" test results are shown in this section.

Spurious Emissions EIRP Sample Calculation

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors.

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

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

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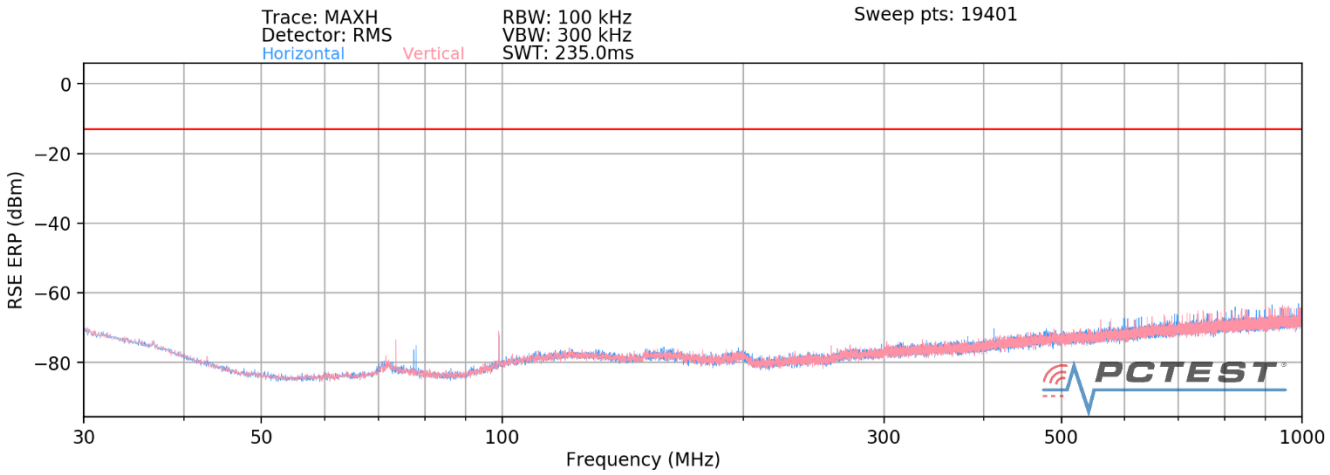
Band n261 – Ant 1

30MHz - 1GHz



Plot 7-33. Ant 1 - n261 Radiated Spurious Plot – Anchor Band 2

Spurious Emissions ERP Sample Calculation (n261)

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

RSE ERP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 – 2.15 (dB)

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
71.17	Mid	100	2Tx	QPSK	V	117	345	-70.84	-13.00	-57.84
77.90	Mid	100	2Tx	QPSK	H	391	230	-76.05	-13.00	-63.05
99.14	Mid	100	2Tx	QPSK	V	177	237	-67.79	-13.00	-54.79
335.43	Mid	100	2Tx	QPSK	V	267	51	-70.34	-13.00	-57.34
404.18	Mid	100	2Tx	QPSK	H	392	132	-69.28	-13.00	-56.28
608.32	Mid	100	2Tx	QPSK	H	196	344	-65.09	-13.00	-52.09

Table 7-17. Ant 1 - Spurious Emissions Table (30MHz - 1GHz)

Notes

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

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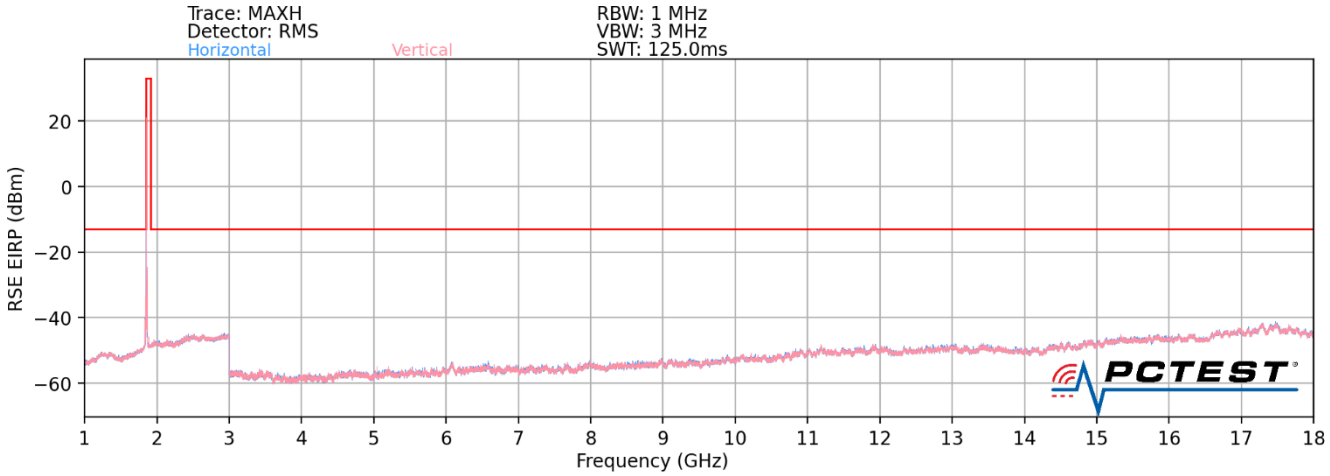
1GHz - 18GHz



Plot 7-34. Ant 1 - n261 Radiated Spurious Plot– Anchor Band 2

Notes

Since the RSE for 1-18GHz is noise floor, RSE measurements are not taken.

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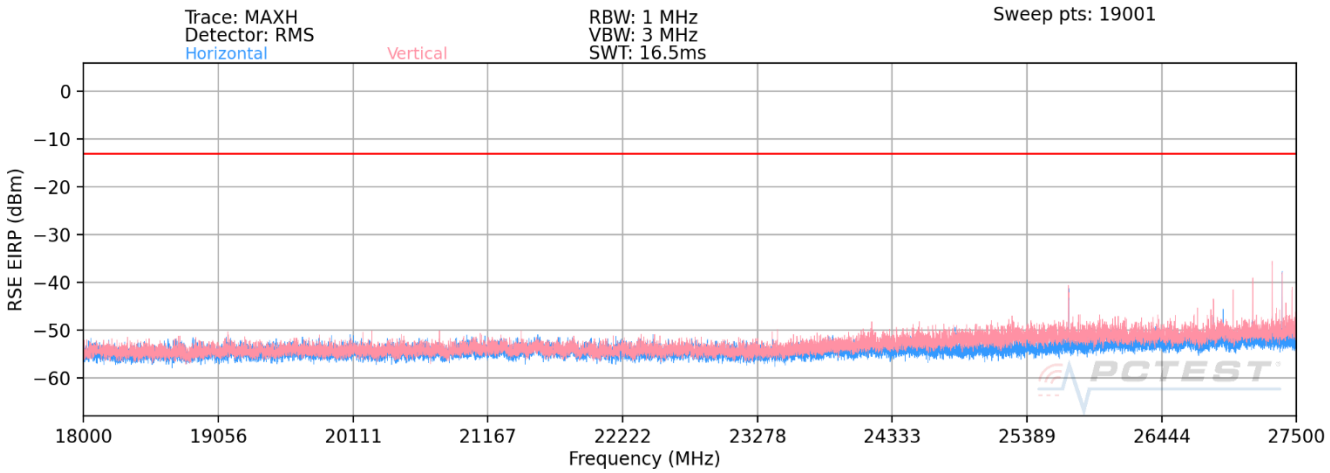
18GHz - 27.5GHz



Plot 7-35. Ant 1 - n261 Radiated Spurious Plot– 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 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
25717.00	Low	100	2Tx	QPSK	V	150	3	-50.23	-13.00	-37.23
26885.00	Mid	100	2Tx	QPSK	V	150	360	-55.85	-13.00	-42.85
27387.70	High	100	2Tx	QPSK	V	150	327	-43.45	-13.00	-30.45
27150.00	High	100	2Tx	QPSK	V	150	35	-56.93	-13.00	-43.93
27424.00	High	100	2Tx	QPSK	V	150	225	-48.52	-13.00	-35.52

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

Notes

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

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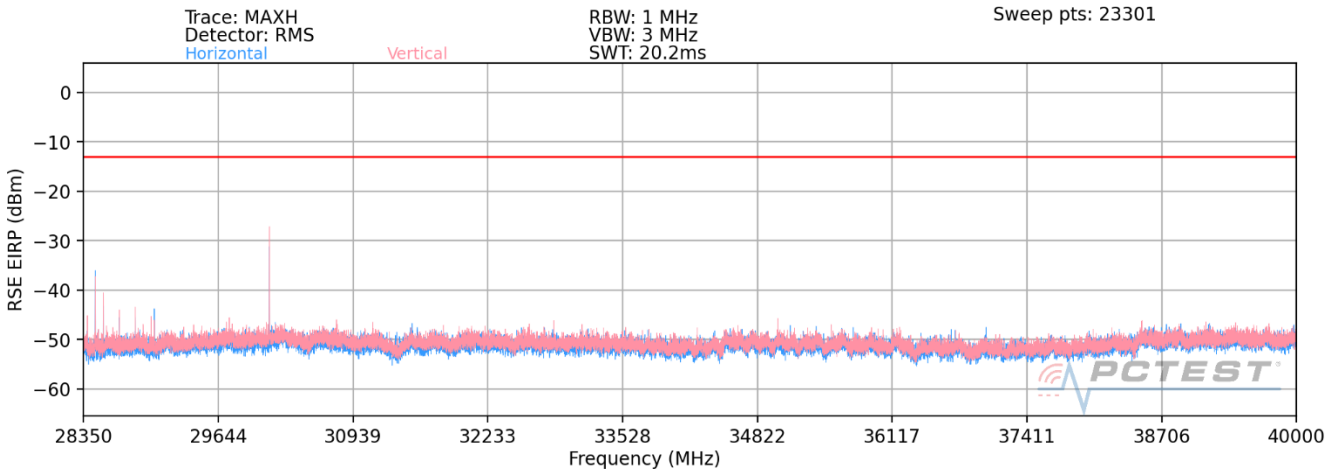
28.35GHz - 40GHz



Plot 7-36. Ant 1 - n261 Radiated Spurious Plot– 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 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
29000.00	Low	100	2Tx	QPSK	V	150	-	-57.13	-13.00	-25.06
30134.00	Mid	100	2Tx	QPSK	V	150	231	-39.65	-13.00	-24.40
36988.00	High	100	2Tx	QPSK	V	150	-	-59.00	-13.00	-21.37
28463.00	Low	100	2Tx	QPSK	V	150	168	-45.68	-13.00	-32.68
28539.67	Low	100	2Tx	QPSK	V	150	208	-48.71	-13.00	-35.71
28693.15	Low	100	2Tx	QPSK	V	150	207	-50.77	-13.00	-37.77
28846.78	Low	100	2Tx	QPSK	V	150	211	-51.98	-13.00	-38.98
29030.27	Low	100	2Tx	QPSK	V	150	166	-52.97	-13.00	-39.97
28923.00	Low	100	2Tx	QPSK	V	150	210	-53.40	-13.00	-40.40

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

Notes

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

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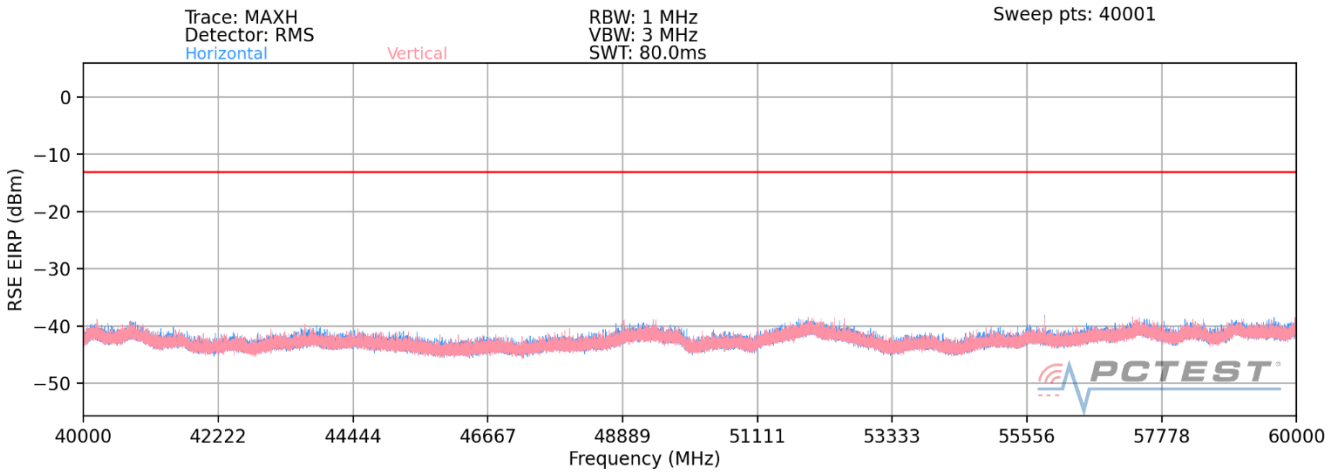
40GHz - 60GHz



Plot 7-37. Ant 1 - n261 Radiated Spurious Plot– 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 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55099.92	Low	100	2Tx	QPSK	V	117	129	-38.06	-13.00	-25.06
55851.24	Mid	100	2Tx	QPSK	V	75	48	-37.40	-13.00	-24.40
56601.11	High	100	2Tx	QPSK	V	29	96	-34.37	-13.00	-21.37

Table 7-29. Ant 1 - 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.

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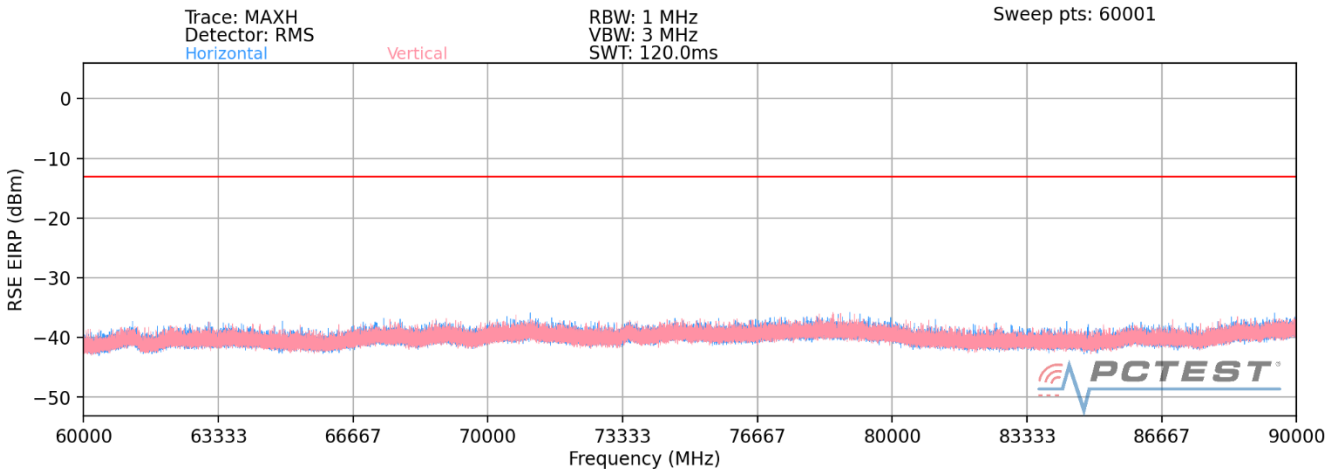
60GHz - 90GHz



Plot 7-38. Ant 1 - n261 Radiated Spurious Plot– 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 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82648.32	Low	100	2Tx	QPSK	V	-	-	-47.37	-13.00	-34.37
83776.61	Mid	100	2Tx	QPSK	V	135	90	-43.72	-13.00	-30.72
82658.78	High	100	2Tx	QPSK	V	-	-	-47.44	-13.00	-34.44

Table 7-30. Ant 1 - 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.

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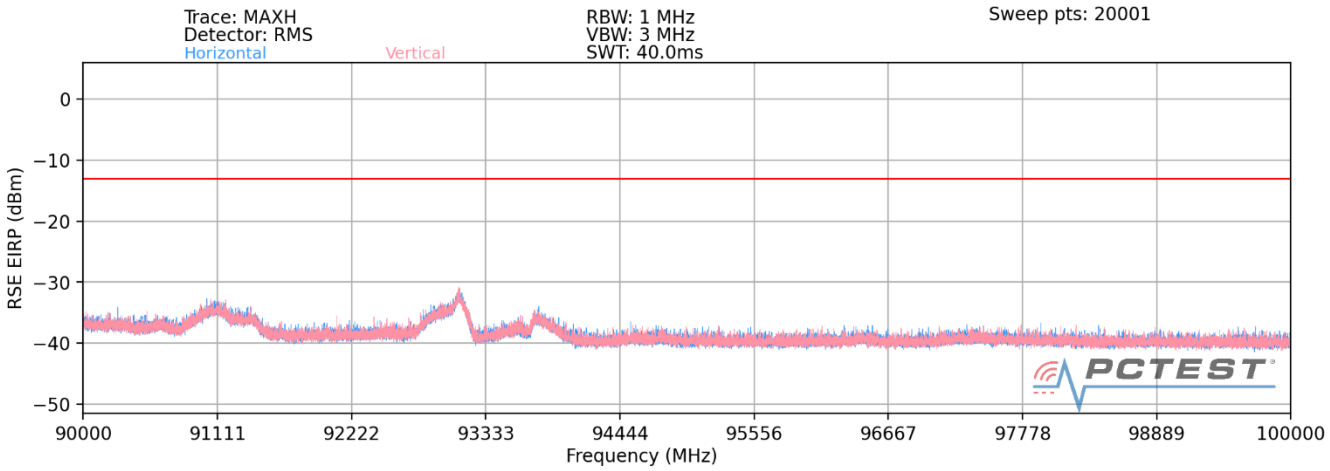
90GHz - 100GHz



Plot 7-39. Ant 1 - n261 Radiated Spurious Plot– 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 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
94987.20	Low	100	2Tx	QPSK	V	-	-	-47.24	-13.00	-34.24
96586.42	Mid	100	2Tx	QPSK	V	-	-	-46.70	-13.00	-33.70
98998.17	High	100	2Tx	QPSK	V	-	-	-47.76	-13.00	-34.76

Table 7-31. Ant 1 - 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

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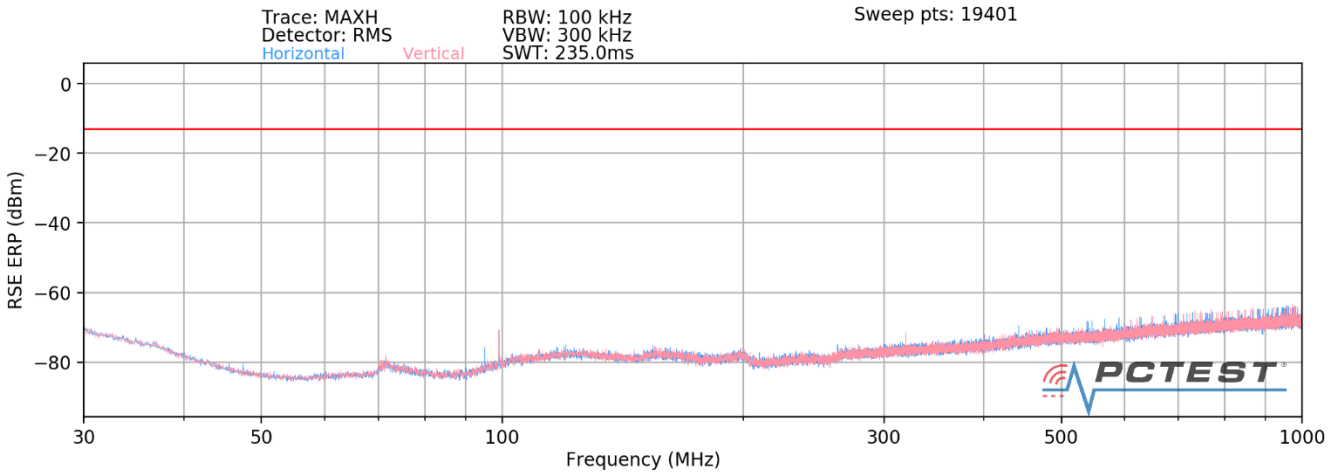
Band n261 – Ant 2

30MHz - 1GHz



Plot 7-40. Ant 2 - n261 Radiated Spurious Plot– Anchor Band 2

Spurious Emissions ERP Sample Calculation (n261)

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

RSE ERP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 – 2.15 (dB)

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
95.76	Mid	50	2Tx	QPSK	H	187	67	-74.06	-13.00	-61.06
99.14	Mid	50	2Tx	QPSK	V	125	180	-68.47	-13.00	-55.47
330.67	Mid	50	2Tx	QPSK	V	153	1	-70.33	-13.00	-57.33
463.56	Mid	50	2Tx	QPSK	H	391	17	-67.45	-13.00	-54.45
561.11	Mid	50	2Tx	QPSK	H	226	254	-66.28	-13.00	-53.28
600.38	Mid	50	2Tx	QPSK	H	238	168	-65.01	-13.00	-52.01

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

Notes

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

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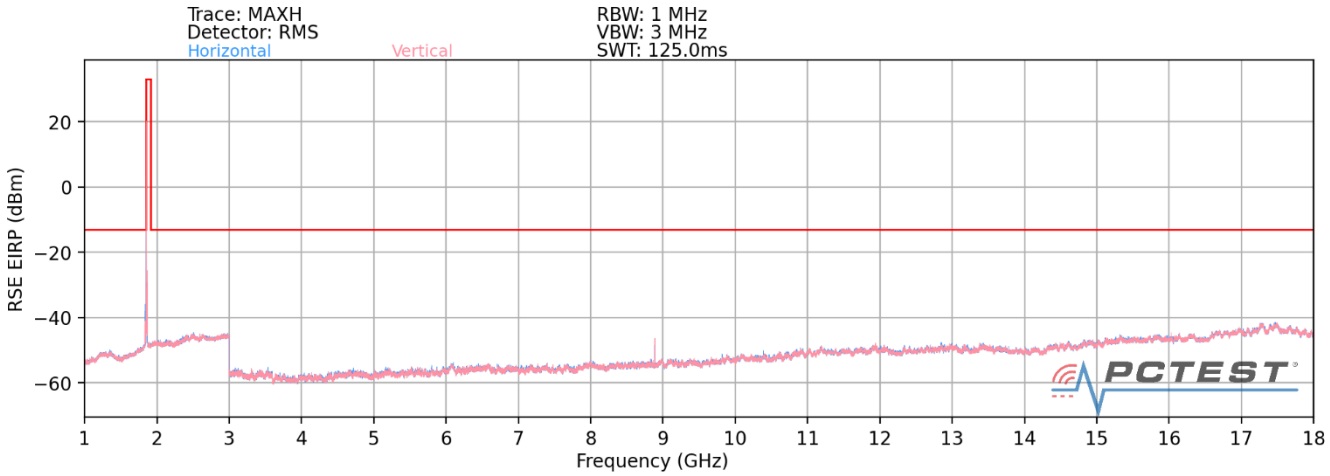
1GHz - 18GHz



Plot 7-41. Ant 2 - n261 Radiated Spurious Plot– Anchor Band 2

Spurious Emissions ERP Sample Calculation (n261)

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

RSE ERP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 – 2.15 (dB)

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8812.07	Low	50	2Tx	QPSK	V	269	221	-23.78	-13.00	-10.78
8887.13	Mid	50	2Tx	QPSK	V	265	187	-22.33	-13.00	-9.33
8972.02	High	50	2Tx	QPSK	V	235	185	-22.69	-13.00	-9.69

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

Notes

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

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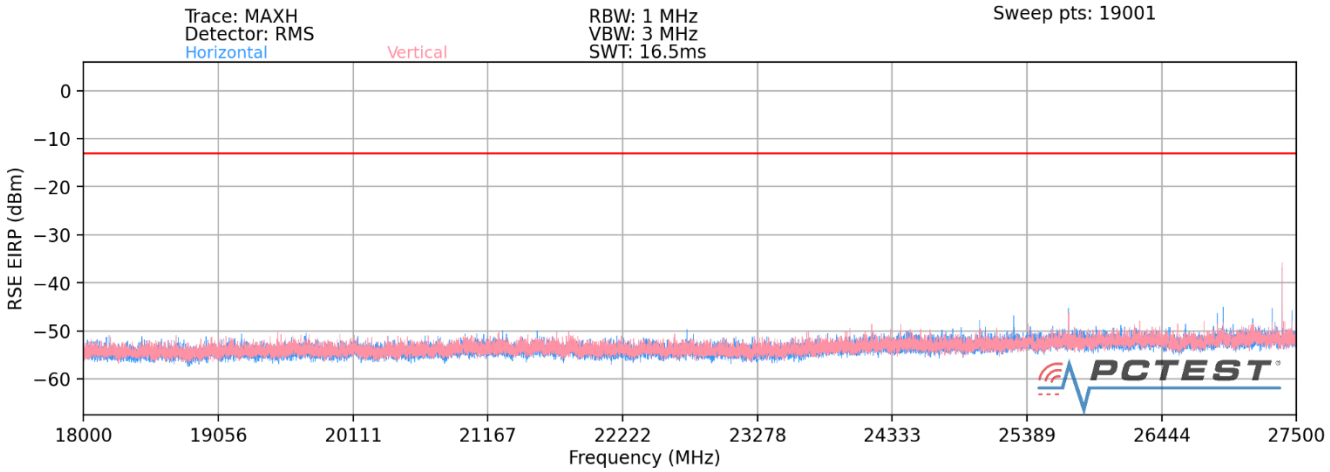
18GHz - 27.5GHz



Plot 7-42. Ant 2 - n261 Radiated Spurious Plot– 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
25175.70	Low	50	2Tx	QPSK	V	150	33	-56.84	-13.00	-43.84
26879.50	Mid	50	2Tx	QPSK	V	150	323	-55.91	-13.00	-42.91
27387.00	High	50	2Tx	QPSK	V	150	319	-44.76	-13.00	-31.76
25716.00	Low	50	2Tx	QPSK	V	150	315	-55.04	-13.00	-42.04
26926.29	Mid	50	2Tx	QPSK	H	150	54	-53.56	-13.00	-40.56
26880.02	Mid	50	2Tx	QPSK	H	150	239	-53.84	-13.00	-40.84

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

Notes

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

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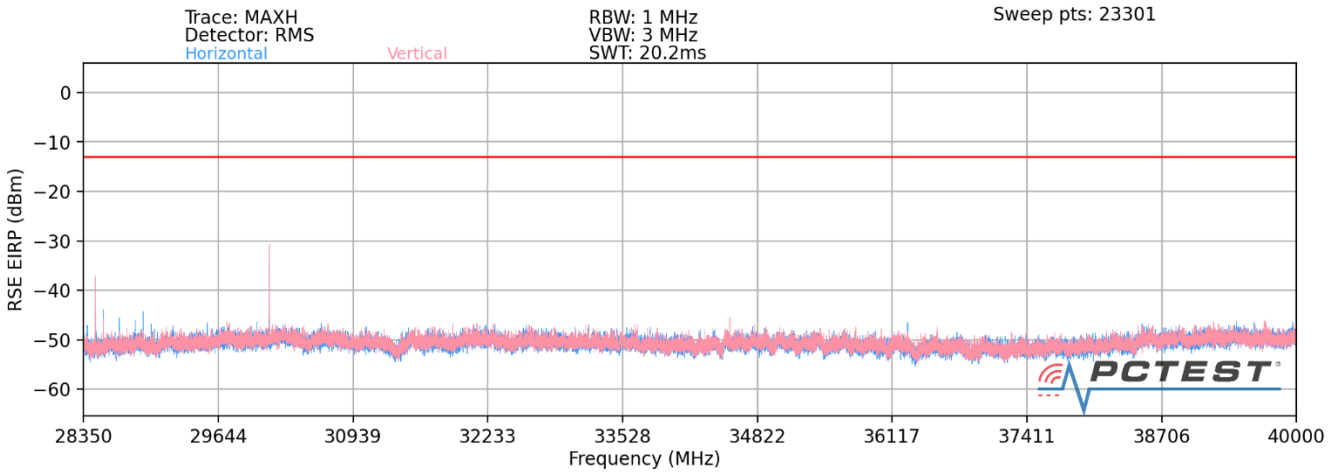
28.35GHz - 40GHz



Plot 7-43. Ant 2 - n261 Radiated Spurious Plot– 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 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
28462.68	Low	50	2Tx	QPSK	V	150	324	-45.71	-13.00	-32.71
28540.67	Mid	50	2Tx	QPSK	V	150	312	-54.43	-13.00	-41.43
30135.00	High	50	2Tx	QPSK	V	150	63	-43.50	-13.00	-30.50
28922.86	Mid	50	2Tx	QPSK	V	150	312	-56.76	-13.00	-43.76
33668.50	High	50	2Tx	QPSK	V	150	320	-58.25	-13.00	-45.25
28693.88	Mid	50	2Tx	QPSK	H	150	294	-54.86	-13.00	-41.86
28690.02	Mid	50	2Tx	QPSK	H	150	10	-55.92	-13.00	-42.92

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

Notes

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

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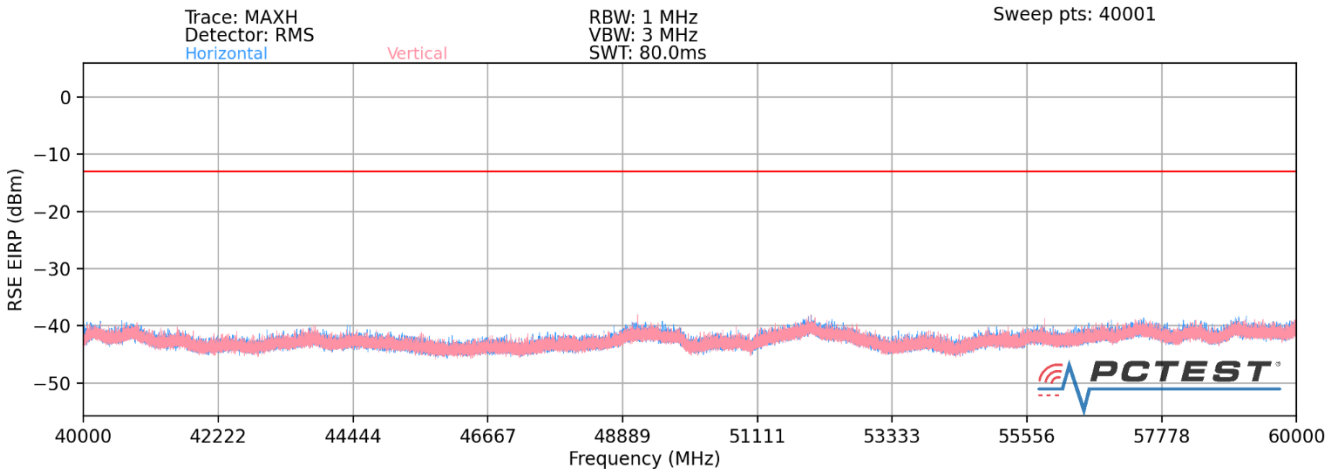
40GHz - 60GHz



Plot 7-44. Ant 2 - n261 Radiated Spurious Plot– 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 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55052.22	Low	50	2Tx	QPSK	H	233	32	-38.77	-13.00	-25.77
55851.18	Mid	50	2Tx	QPSK	H	232	25	-39.00	-13.00	-26.00
56651.25	High	50	2Tx	QPSK	H	345	345	-42.00	-13.00	-29.00

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

Notes

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

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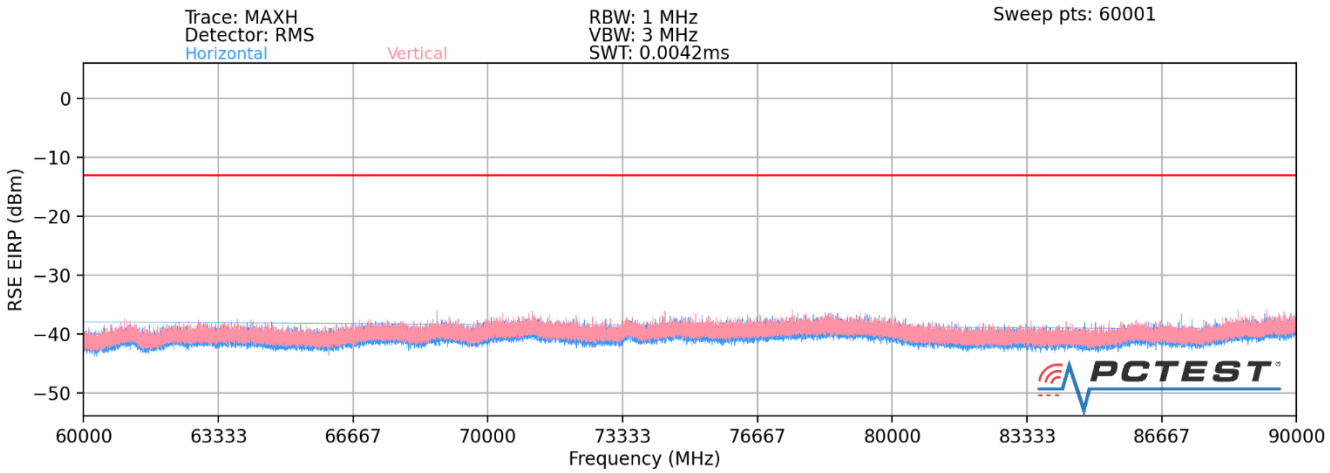
60GHz - 90GHz



Plot 7-45. Ant 2 - n261 Radiated Spurious Plot– 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 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82576.89	Low	50	2Tx	QPSK	V	8	324	-46.84	-13.00	-33.84
83776.78	Mid	50	2Tx	QPSK	V	45	296	-45.83	-13.00	-32.83
84965.95	High	50	2Tx	QPSK	V	-	-	-47.79	-13.00	-34.79

Table 7-37. Ant 2 - 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.

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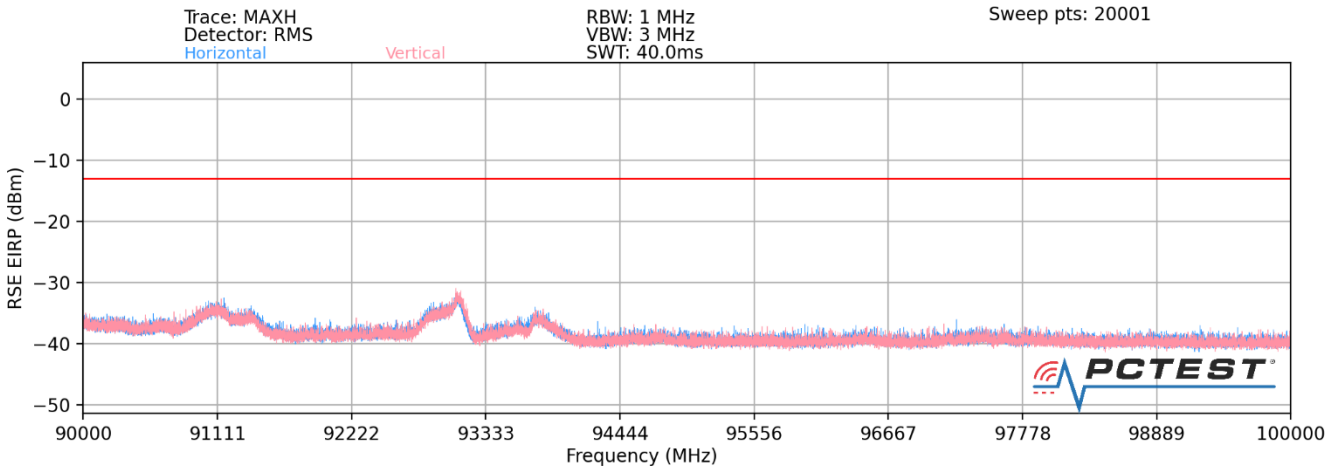
90GHz - 100GHz



Plot 7-46. Ant 2 - n261 Radiated Spurious Plot– 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 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
92989.27	Low	50	2Tx	QPSK	V	-	-	-47.30	-13.00	-34.30
95008.19	Mid	50	2Tx	QPSK	V	-	-	-47.11	-13.00	-34.11
98496.69	High	50	2Tx	QPSK	V	-	-	-46.74	-13.00	-33.74

Table 7-38. Ant 2 - 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.

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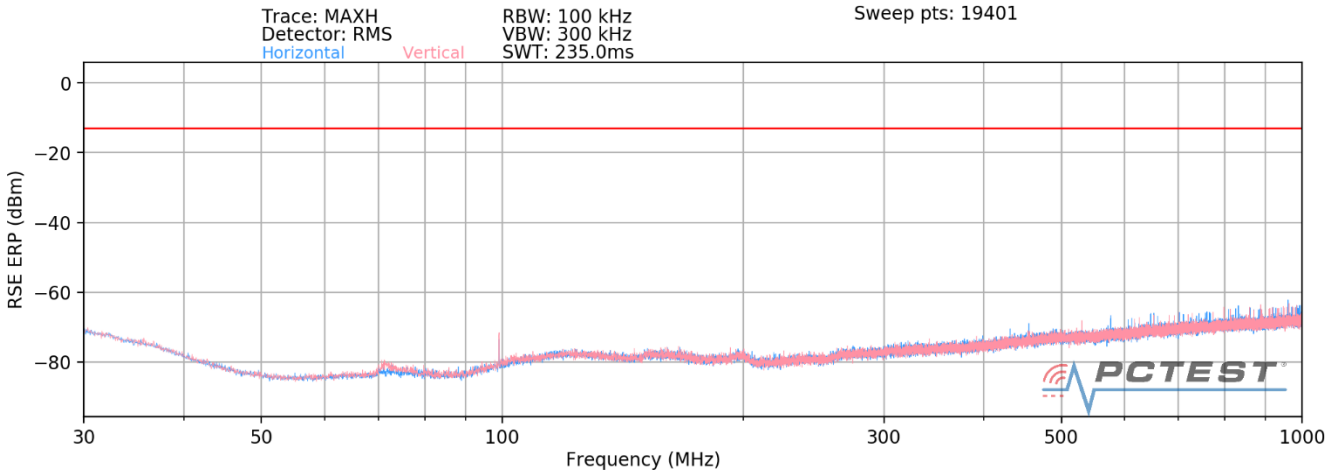
Band n260- Ant 1

30MHz - 1GHz



Plot 7-47. Ant 1 - n260 Radiated Spurious Plot– 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
99.14	Mid	50	2Tx	QPSK	V	124	337	-64.93	-13.00	-51.93
462.98	Mid	50	2Tx	QPSK	H	379	47	-67.50	-13.00	-54.50
534.13	Mid	50	2Tx	QPSK	V	392	103	-66.52	-13.00	-53.52
575.82	Mid	50	2Tx	QPSK	H	324	289	-65.52	-13.00	-52.52
639.71	Mid	50	2Tx	QPSK	H	391	230	-64.25	-13.00	-51.25
697.26	Mid	50	2Tx	QPSK	H	214	40	-63.76	-13.00	-50.76

Table 7-39. Ant 1 - 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 1 meter.

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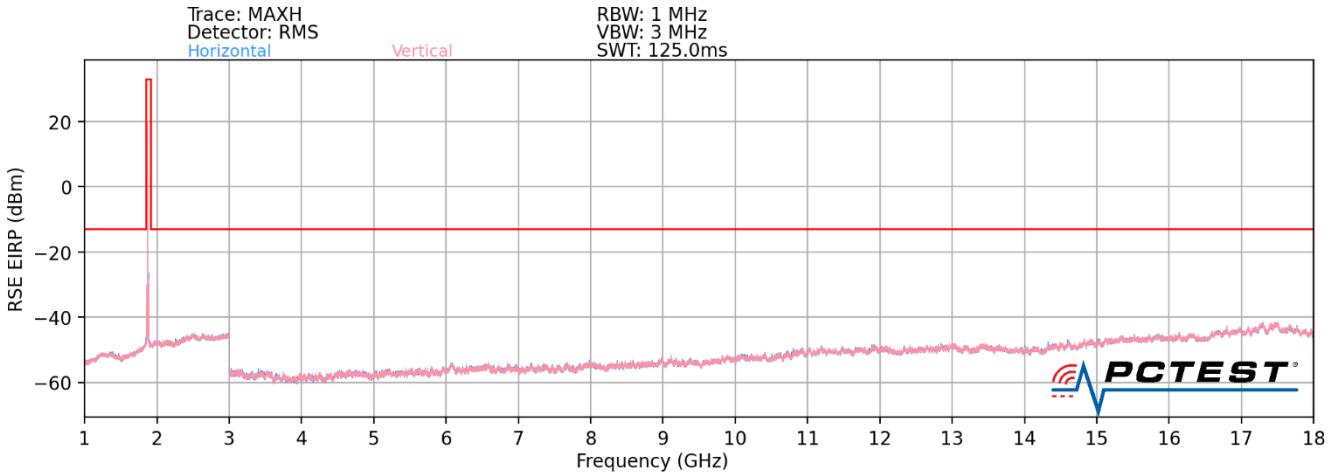
1GHz - 18GHz



Plot 7-48. Ant 1 - n260 Radiated Spurious Plot– Anchor Band 2

Notes

Since the RSE for 1-18GHz is noise floor, RSE measurements are not taken.

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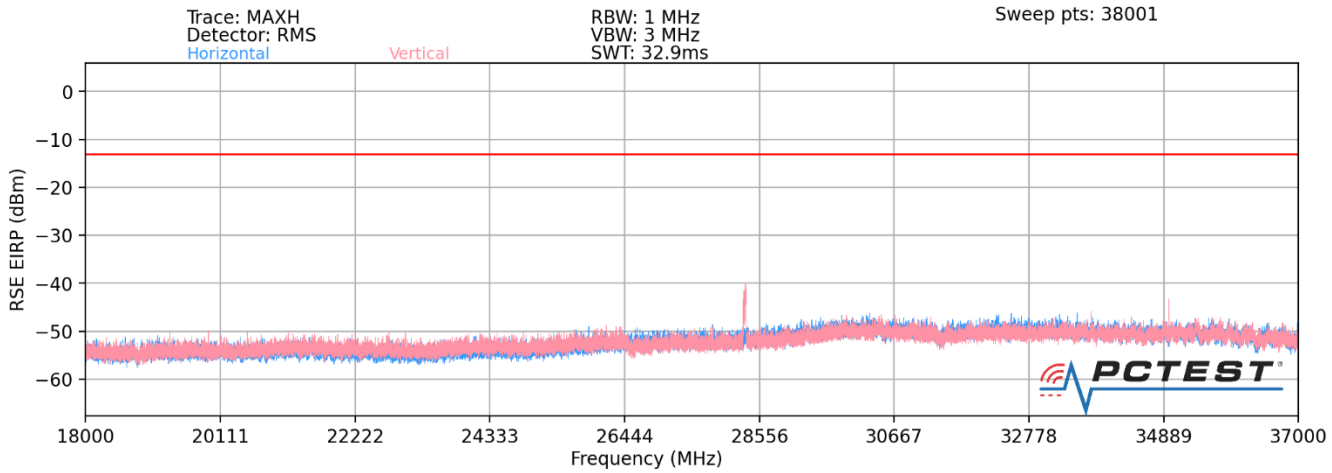
18GHz – 37GHz



Plot 7-49. Ant 1 - n260 Radiated Spurious Plot– 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
18222.50	Low	50	2Tx	QPSK	H	150	246	-61.45	-13.00	-48.45
29354.00	Mid	50	2Tx	QPSK	H	150	237	-61.96	-13.00	-48.96
34808.60	High	50	2Tx	QPSK	H	150	250	-55.88	-13.00	-42.88
28329.00	Mid	50	2Tx	QPSK	H	150	327	-53.41	-13.00	-40.41

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

Notes

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

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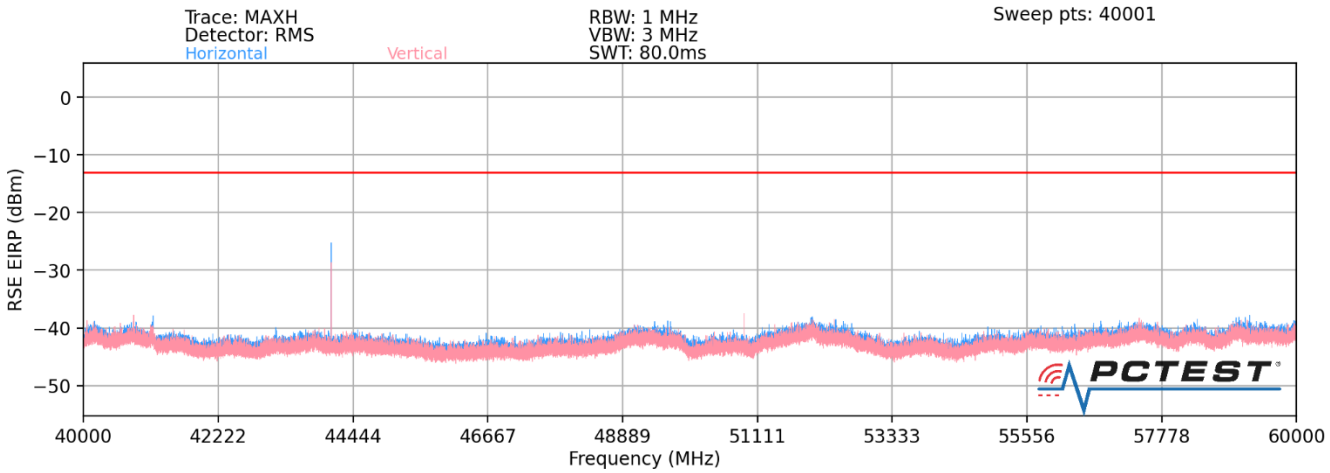
40GHz - 60GHz



Plot 7-50. Ant 1 - n260 Radiated Spurious Plot– 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
42931.19	Low	50	2Tx	QPSK	H	117	331	-26.30	-13.00	-13.30
44083.37	Mid	50	2Tx	QPSK	H	300	91	-25.08	-13.00	-12.08
42916.89	High	50	2Tx	QPSK	H	31	345	-33.69	-13.00	-20.69

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

Notes

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

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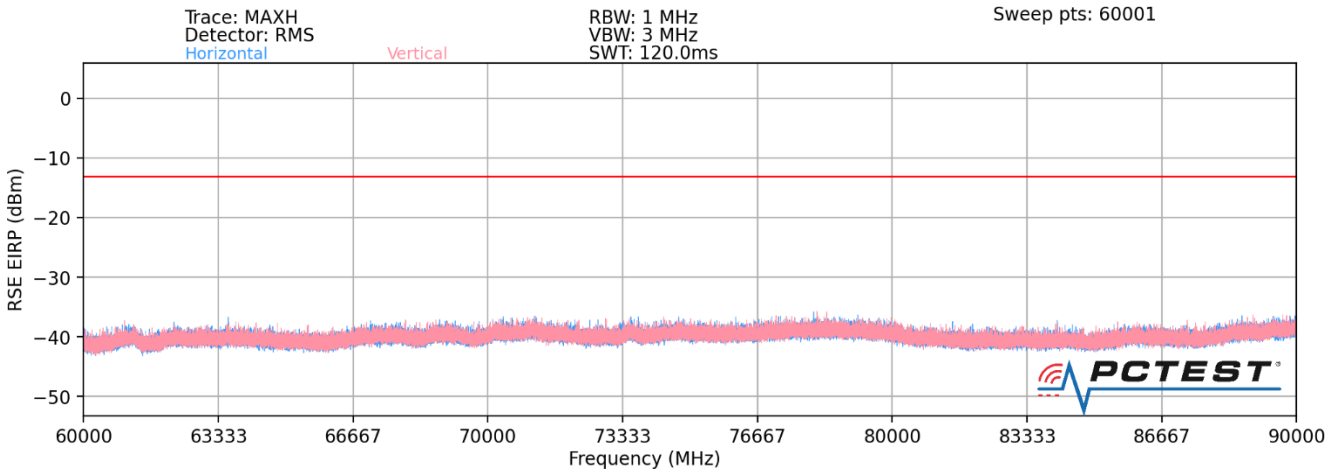
60GHz - 90GHz



Plot 7-51. Ant 1 - n260 Radiated Spurious Plot– 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
74051.25	Low	50	2Tx	QPSK	V	16	68	-39.49	-13.00	-26.49
77000.52	Mid	50	2Tx	QPSK	V	42	103	-34.18	-13.00	-21.18
79951.35	High	50	2Tx	QPSK	V	194	226	-46.01	-13.00	-33.01

Table 7-43. Ant 1 - 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.

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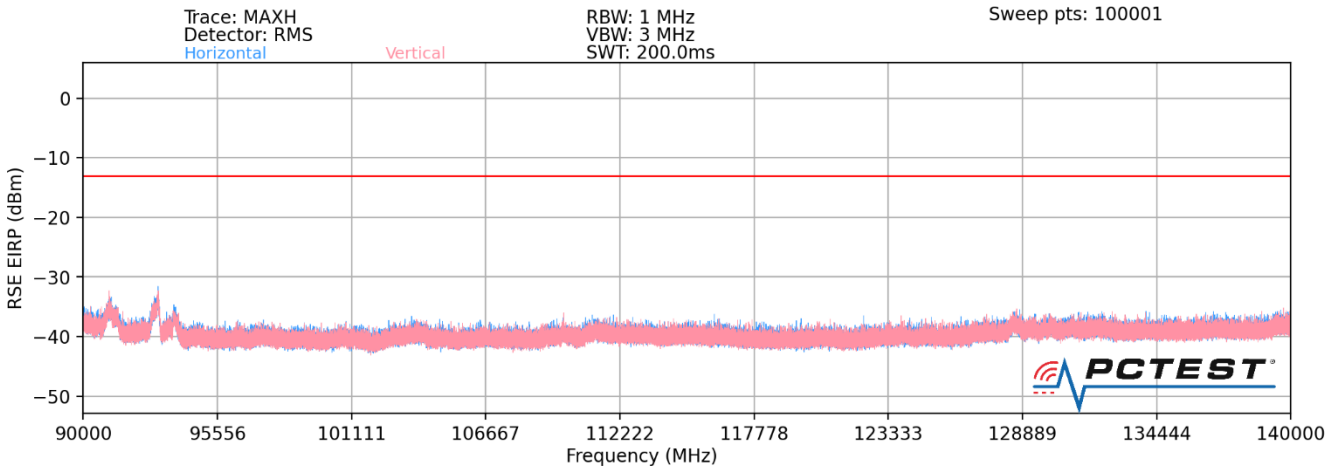
90GHz - 140GHz



Plot 7-52. Ant 1 - n260 Radiated Spurious Plot– 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
111076.92	Low	50	2Tx	QPSK	V	140	307	-37.16	-13.00	-24.16
115501.51	Mid	50	2Tx	QPSK	V	45	290	-34.19	-13.00	-21.19
119926.71	High	50	2Tx	QPSK	V	52	301	-36.52	-13.00	-23.52

Table 7-44. Ant 1 - 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.

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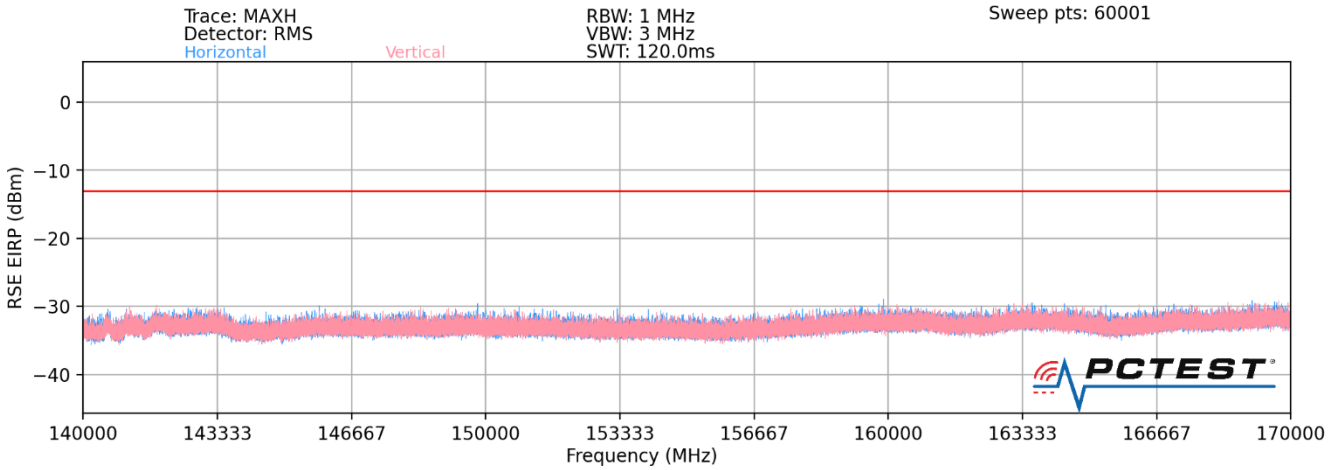
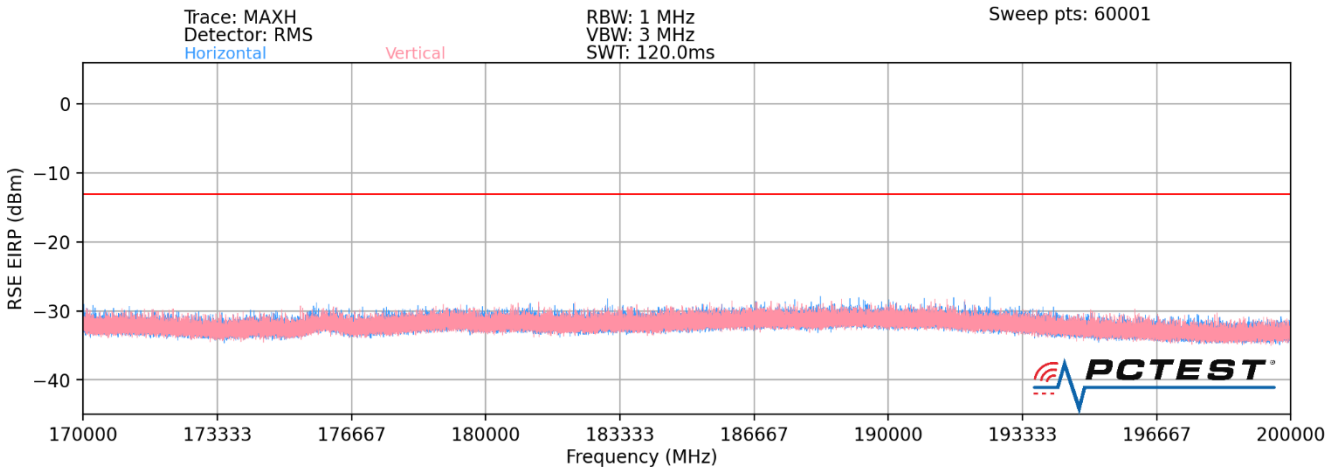
140GHz - 200GHz



Plot 7-53. Ant 1 - n260 Radiated Spurious Plot– Anchor Band 2



Plot 7-54. Ant 1 - n260 Radiated Spurious Plot– 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
149273.46	Low	50	2Tx	QPSK	V	-	-	-54.99	-13.00	-41.99
154017.86	Mid	50	2Tx	QPSK	V	-	-	-54.54	-13.00	-41.54
199872.99	High	50	2Tx	QPSK	V	-	-	-55.39	-13.00	-42.39

Table 7-45. Ant 1 - 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.

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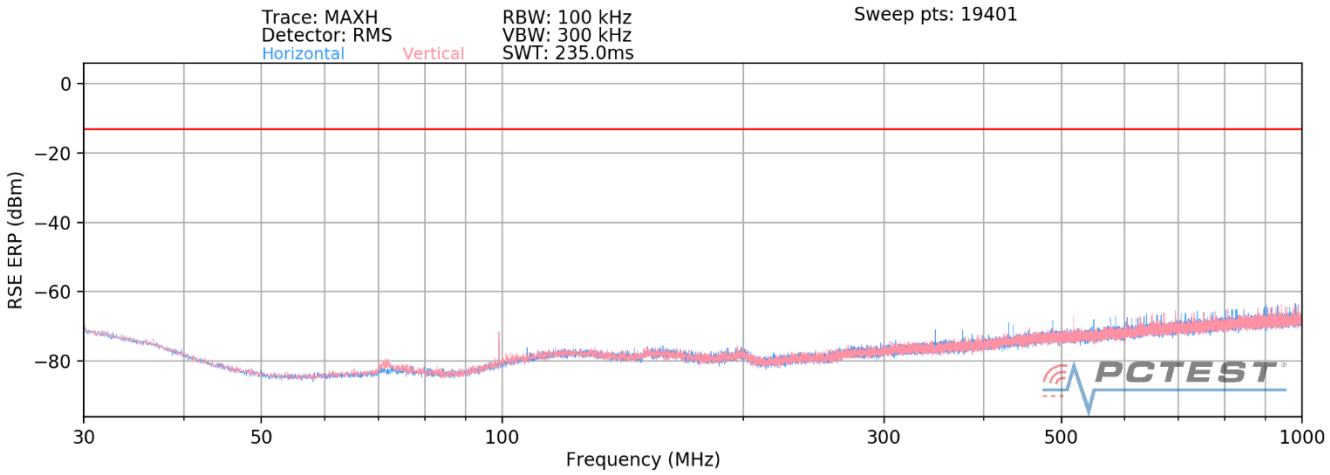
Band n260- Ant 2

30MHz - 1GHz



Plot 7-55. Ant 2 - n260 Radiated Spurious Plot– 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
71.18	Mid	50	2Tx	QPSK	V	249	6	-71.19	-13.00	-58.19
77.41	Mid	50	2Tx	QPSK	H	391	239	-76.08	-13.00	-63.08
99.10	Mid	50	2Tx	QPSK	V	206	134	-68.96	-13.00	-55.96
414.38	Mid	50	2Tx	QPSK	H	392	53	-68.93	-13.00	-55.93
533.00	Mid	50	2Tx	QPSK	H	371	193	-66.51	-13.00	-53.51
605.24	Mid	50	2Tx	QPSK	H	387	54	-64.97	-13.00	-51.97

Table 7-47. Ant 2 - 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 1 meter.

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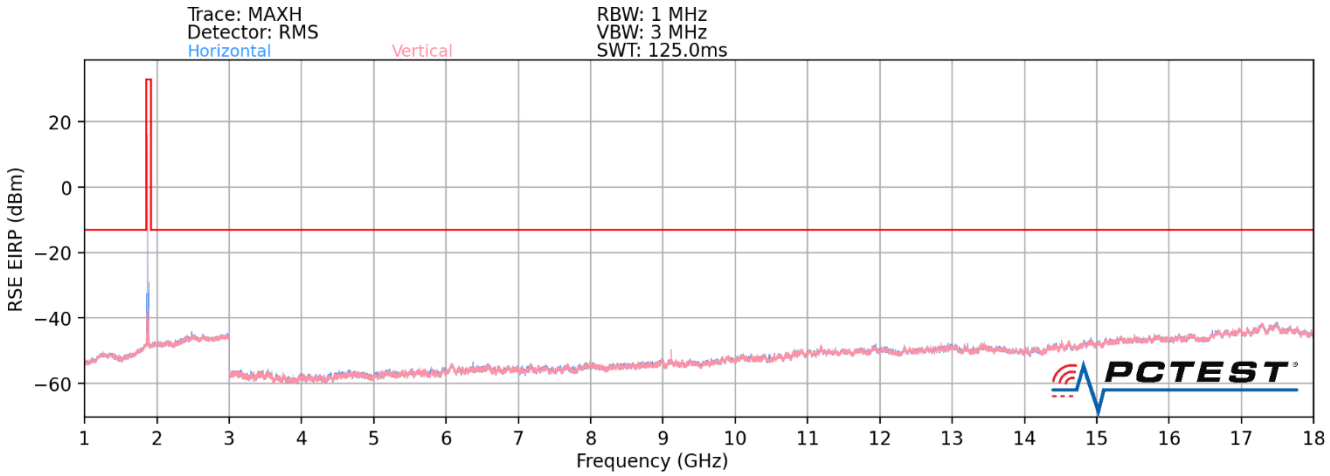
1GHz - 18GHz



Plot 7-56. Ant 2 - n260 Radiated Spurious Plot– 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
8404.95	Low	50	2Tx	QPSK	H	112	201	-66.48	-13.00	-53.48
9111.73	Mid	50	2Tx	QPSK	H	111	140	-58.85	-13.00	-45.85
9153.27	High	50	2Tx	QPSK	H	112	310	-57.26	-13.00	-44.26

Table 7-48. Ant 2 - 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 1 meter.

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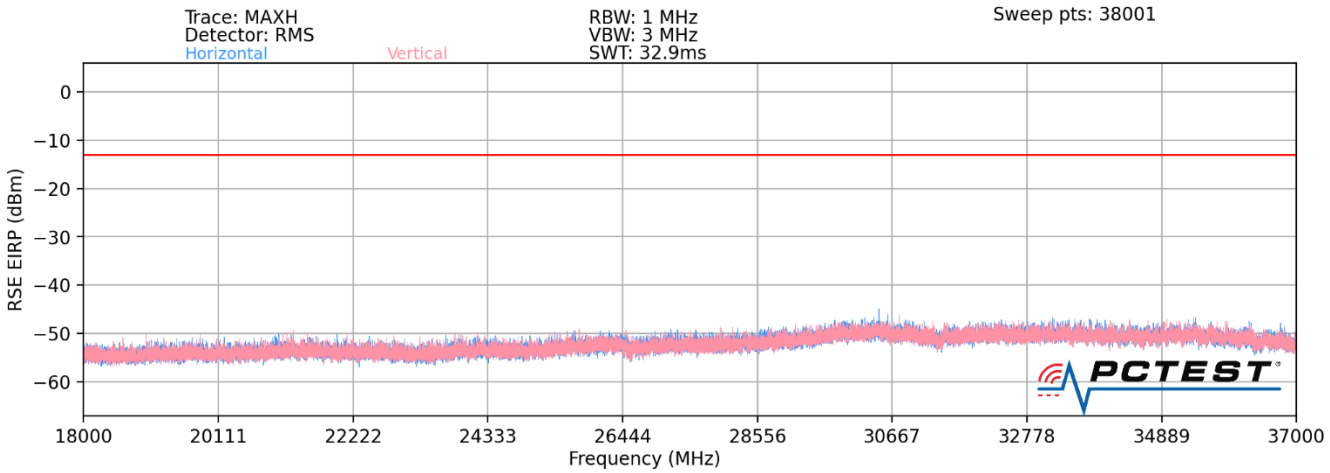
18GHz – 37GHz



Plot 7-57. Ant 2 - n260 Radiated Spurious Plot– 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]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
18145.00	Low	50	2Tx	QPSK	H	150	44	-55.34	-13.00	-42.34
28776.00	Mid	50	2Tx	QPSK	H	150	-	-57.93	-13.00	-44.93
34852.50	High	50	2Tx	QPSK	H	150	-	-56.78	-13.00	-43.78

Table 7-49. Ant 2 - 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.

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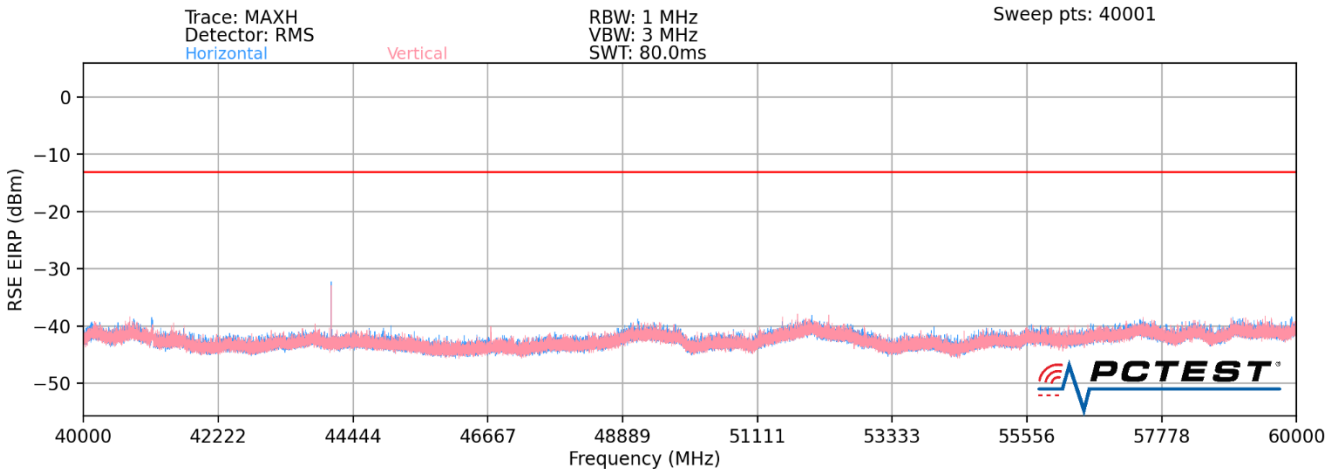
40GHz - 60GHz



Plot 7-58. Ant 2 - n260 Radiated Spurious Plot– 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
42931.05	Low	50	2Tx	QPSK	H	234	290	-24.82	-13.00	-11.82
44082.96	Mid	50	2Tx	QPSK	H	15	100	-29.15	-13.00	-16.15
40525.94	High	50	2Tx	QPSK	H	16	331	-36.50	-13.00	-23.50

Table 7-50. Ant 2 - 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 meter.

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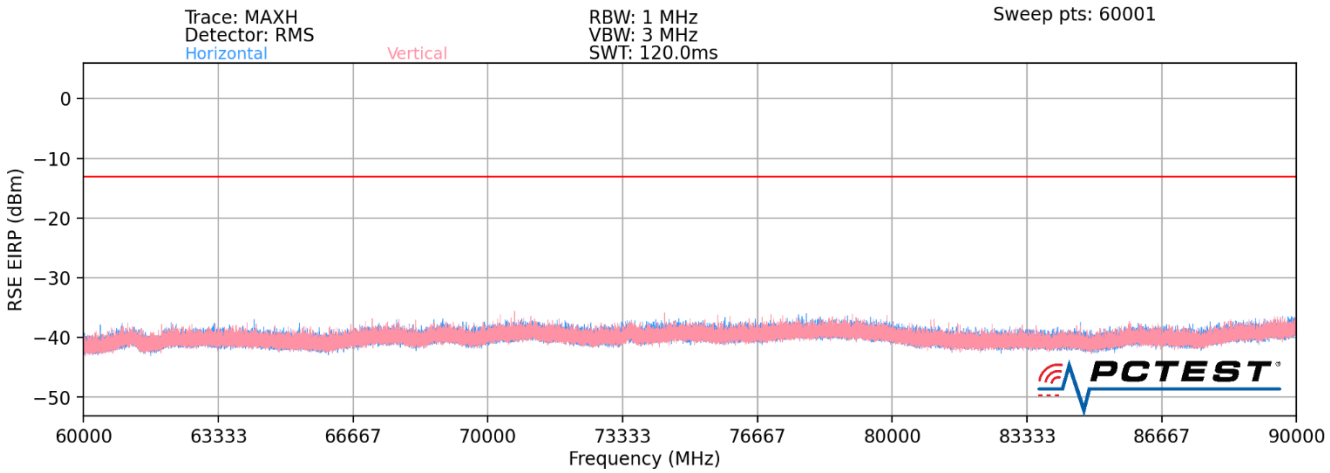
60GHz - 90GHz



Plot 7-34. Ant 2 - n260 Radiated Spurious Plot– 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
74050.92	Low	50	2Tx	QPSK	V	12	88	-35.96	-13.00	-22.96
77000.82	Mid	50	2Tx	QPSK	V	28	99	-35.00	-13.00	-22.00
79950.66	High	50	2Tx	QPSK	V	11	101	-43.66	-13.00	-30.66

Table 7-51. Ant 2 - 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.

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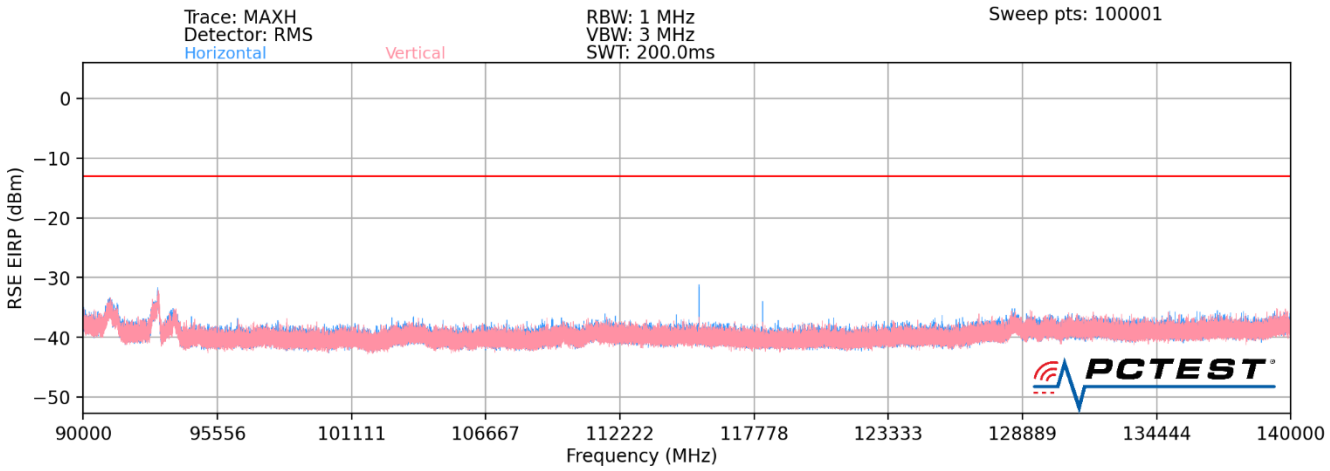
90GHz - 140GHz



Plot 7-60. Ant 2 - n260 Radiated Spurious Plot– 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
111076.76	Low	50	2Tx	QPSK	H	28	265	-41.29	-13.00	-28.29
115501.57	Mid	50	2Tx	QPSK	H	289	320	-36.88	-13.00	-23.88
119926.83	High	50	2Tx	QPSK	H	350	288	-43.28	-13.00	-30.28
118135.44	-	50	2Tx	QPSK	H	83	140	-39.73	-13.00	-26.73

Table 7-52. Ant2 - 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.

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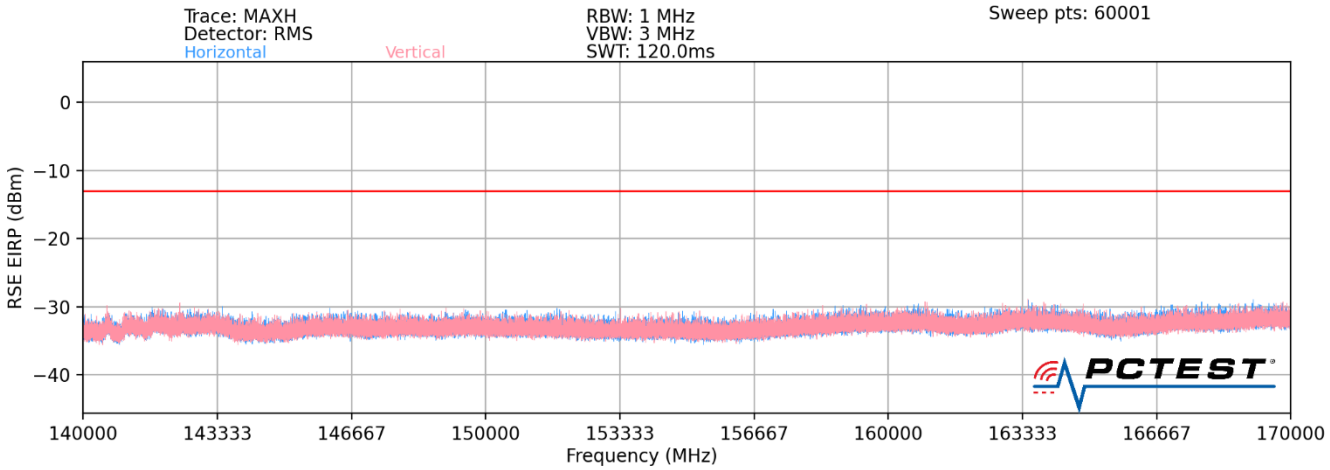
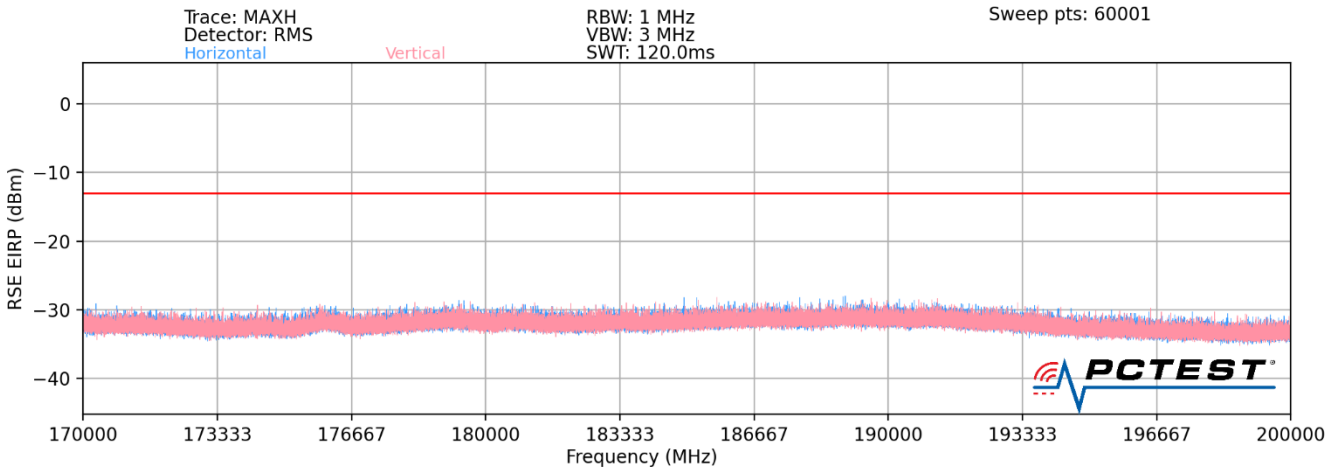
140GHz - 200GHz



Plot 7-61. Ant 2 - n260 Radiated Spurious Plot– Anchor Band 2



Plot 7-62. Ant 2 - n260 Radiated Spurious Plot– 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]	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
148093.31	Low	50	2Tx	QPSK	H	-	-	-54.40	-13.00	-41.40
154014.29	Mid	50	2Tx	QPSK	H	-	-	-54.61	-13.00	-41.61
199877.82	High	50	2Tx	QPSK	H	-	-	-55.44	-13.00	-42.44

Table 7-53. Ant 2 - 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.

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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 v01r02 Section 4.4.2.4

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) The Total Radiated Power measurements shown in this section were performed in accordance with the guidance of Sections 4.4.2 & 4.4.3 of KDB 842590 D01 v01r02 for the 2-cut Method When Pattern Multiplication Is Not Applicable. TRP measurements are marked as "TRP" in the caption under the corresponding plot in this section.

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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

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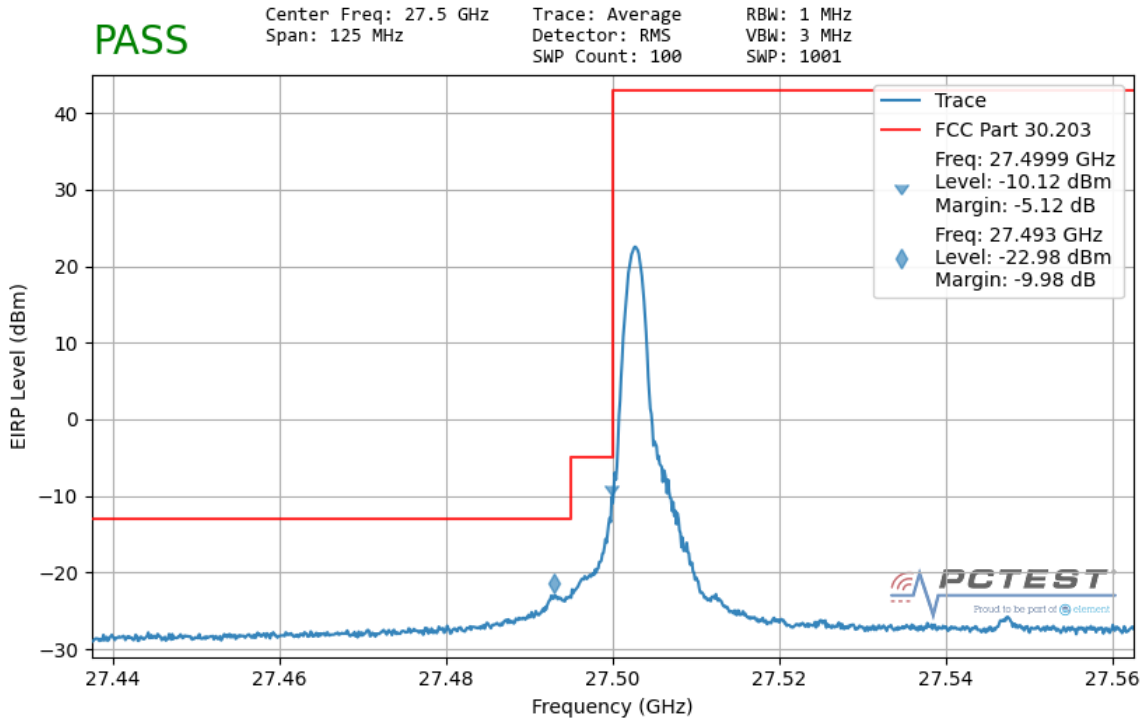
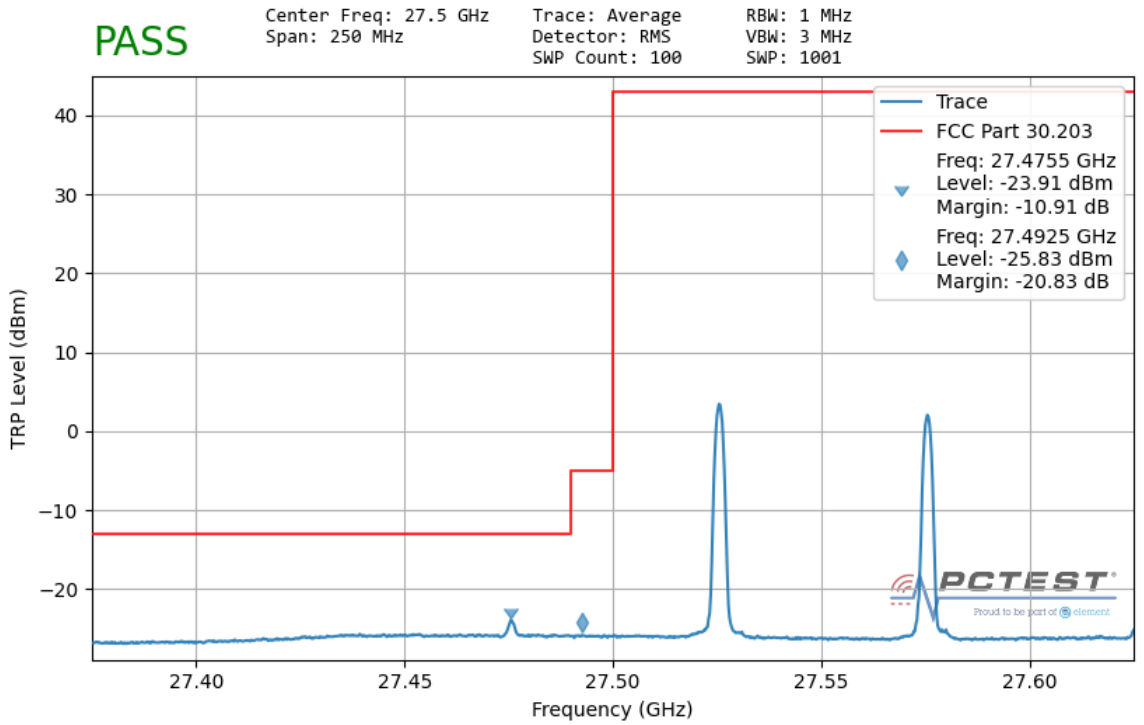
Band n261 – ANT 1 – Worst-Case



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



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

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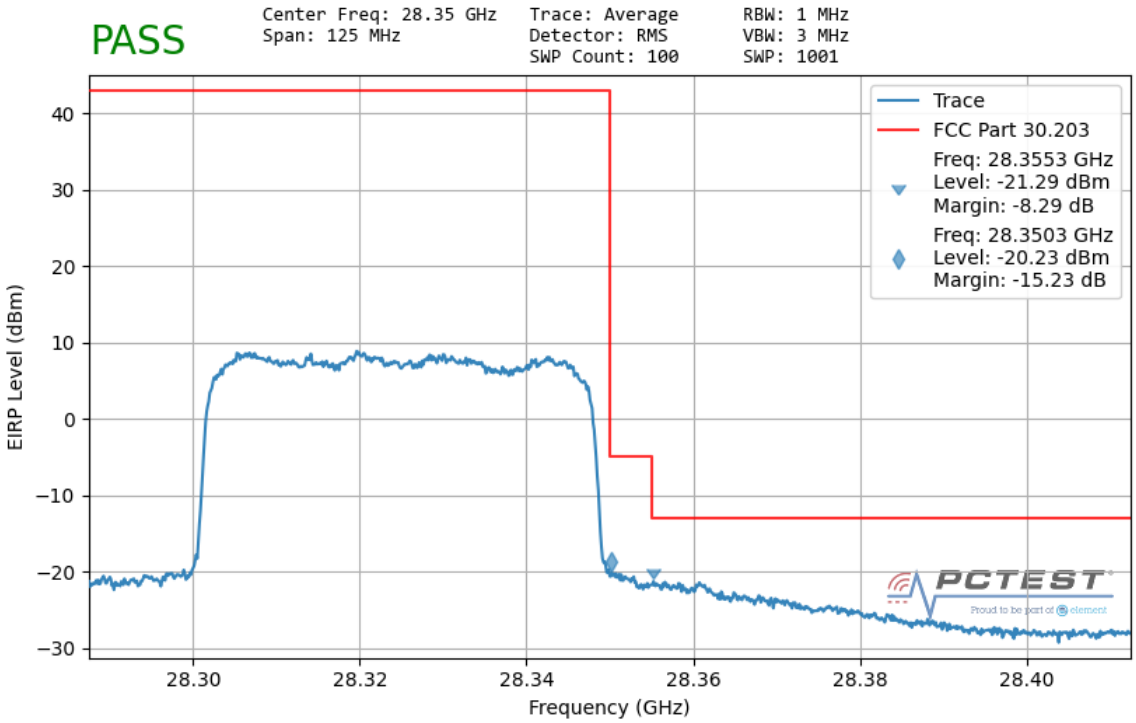
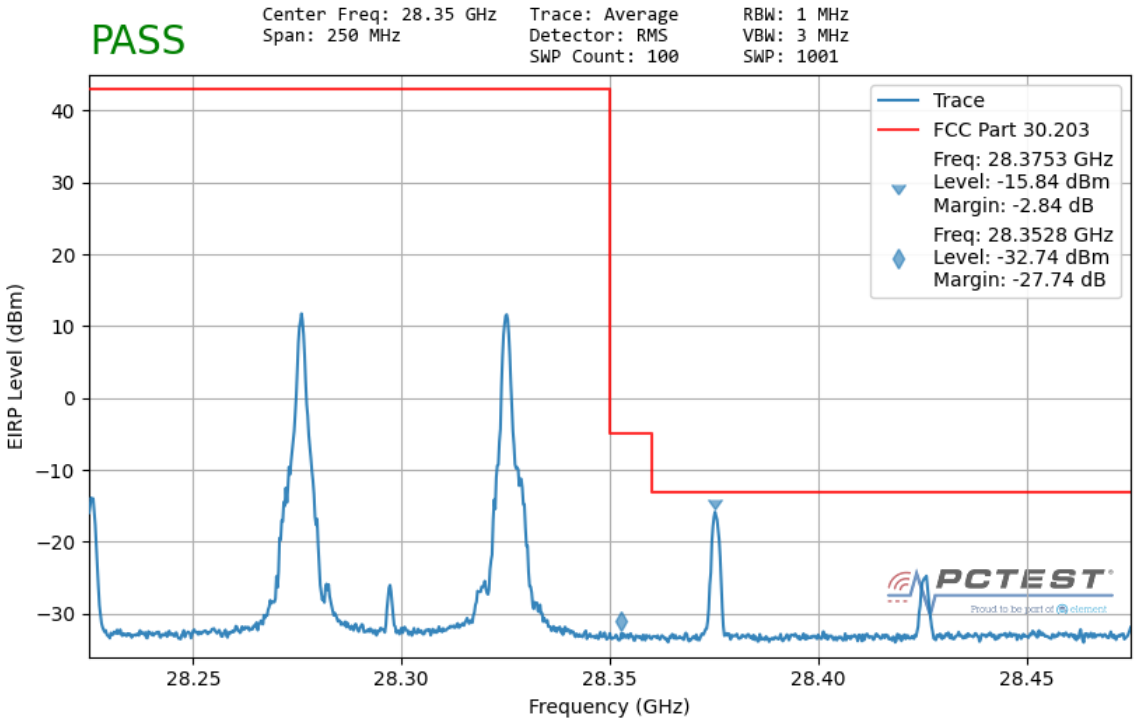


Plot 7-65. Ant 1 Upper Band Edge (50MHz-1CC – QPSK Full RB)



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

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