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PART 30 MEASUREMENT REPORT

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

Date of Testing:
3/14/2022- 06/17/2022
Test Report Issue Date:
07/06/2022
Test Site/Location:
Element Lab., Columbia, MD, USA
Test Report Serial No.:
1M2204040049-03-R1.C3K

FCC ID:	**C3K1997**
APPLICANT:	**Microsoft Corporation**

Application Type:	Certification
Model:	1997
EUT Type:	Portable Computing Device
FCC Classification:	Part 30 Mobile Transmitter (5GM)
FCC Rule Part(s):	30
Test Procedure(s):	ANSI C63.26-2015, 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.

Note: This revised Test Report (S/N: 1M2204040049-03-R1.C3K) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

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PART 30 MEASUREMENT REPORT

Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n261	Ant1	100	27550 - 28300	1	SISO	QPSK	0.461	26.64	-
					2Tx	QPSK	0.542	27.34	-
					2Tx	π/2 BPSK	0.585	27.67	-
					2Tx	16QAM	0.370	25.68	-
					2Tx	64QAM	0.255	24.07	-
				2	2Tx	QPSK	0.240	23.81	-
					2Tx	π/2 BPSK	0.232	23.65	-
					2Tx	16QAM	0.172	22.36	-
					2Tx	64QAM	0.153	21.85	-
		50	27525 - 28325	1	SISO	QPSK	0.420	26.23	-
					2Tx	QPSK	0.607	27.83	-
					2Tx	π/2 BPSK	0.541	27.33	-
					2Tx	16QAM	0.463	26.66	-
					2Tx	64QAM	0.369	25.67	-
				2	2Tx	QPSK	0.308	24.89	-
					2Tx	π/2 BPSK	0.279	24.46	-
					2Tx	16QAM	0.197	22.94	-
					2Tx	64QAM	0.121	20.83	-
n261	Ant2	100	27550 - 28300	1	SISO	QPSK	0.755	28.78	94M6G7D
					2Tx	QPSK	0.857	29.33	94M6G7D
					2Tx	π/2 BPSK	0.798	29.02	91M2G7D
					2Tx	16QAM	0.434	26.37	94M6W7D
					2Tx	64QAM	0.288	24.60	95M0W7D
				2	2Tx	QPSK	0.321	25.06	194MG7D
					2Tx	π/2 BPSK	0.308	24.88	193MG7D
					2Tx	16QAM	0.211	23.25	193MW7D
					2Tx	64QAM	0.126	21.02	194MW7D
		50	27525 - 28325	1	SISO	QPSK	0.692	28.40	46M0G7D
					2Tx	QPSK	0.789	28.97	46M0G7D
					2Tx	π/2 BPSK	0.643	28.08	45M9G7D
					2Tx	16QAM	0.447	26.50	45M9W7D
					2Tx	64QAM	0.330	25.19	45M9W7D
				2	2Tx	QPSK	0.366	25.63	95M5G7D
					2Tx	π/2 BPSK	0.370	25.68	95M6G7D
					2Tx	16QAM	0.264	24.21	95M7W7D
					2Tx	64QAM	0.175	22.44	95M8W7D

EUT Overview (Band n261)

Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n260	Ant1	100	37050 - 39950	1	SISO	QPSK	0.679	28.32	95M3G7D
					2Tx	QPSK	0.837	29.23	95M3G7D
					2Tx	π/2 BPSK	0.719	28.57	92M0G7D
					2Tx	16QAM	0.594	27.74	95M2W7D
					2Tx	64QAM	0.498	26.98	96M1W7D
				2	2Tx	QPSK	0.348	25.42	194MG7D
					2Tx	π/2 BPSK	0.313	24.96	194MG7D
					2Tx	16QAM	0.250	23.98	194MW7D
					2Tx	64QAM	0.177	22.48	195MW7D
		50	37025 - 39975	1	SISO	QPSK	0.810	29.09	46M5G7D
					2Tx	QPSK	1.021	30.09	46M5G7D
					2Tx	π/2 BPSK	0.814	29.11	46M2G7D
					2Tx	16QAM	0.579	27.63	46M5W7D
					2Tx	64QAM	0.369	25.67	47M1W7D
				2	2Tx	QPSK	0.331	25.20	96M7G7D
					2Tx	π/2 BPSK	0.332	25.22	96M4G7D
					2Tx	16QAM	0.245	23.89	98M3W7D
					2Tx	64QAM	0.128	21.08	97M0W7D
n260	Ant2	100	37050 - 39950	1	SISO	QPSK	0.308	24.89	-
					2Tx	QPSK	0.600	27.78	-
					2Tx	π/2 BPSK	0.528	27.23	-
					2Tx	16QAM	0.340	25.32	-
					2Tx	64QAM	0.261	24.16	-
				2	2Tx	QPSK	0.327	25.14	-
					2Tx	π/2 BPSK	0.304	24.83	-
					2Tx	16QAM	0.220	23.43	-
					2Tx	64QAM	0.120	20.79	-
		50	37025 - 39975	1	SISO	QPSK	0.288	24.60	-
					2Tx	QPSK	0.555	27.44	-
					2Tx	π/2 BPSK	0.538	27.31	-
					2Tx	16QAM	0.350	25.44	-
					2Tx	64QAM	0.201	23.03	-
				2	2Tx	QPSK	0.292	24.66	-
					2Tx	π/2 BPSK	0.290	24.63	-
					2Tx	16QAM	0.209	23.20	-
					2Tx	64QAM	0.118	20.71	-

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.

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.

1.2 Element Test Location

These measurement tests were conducted at the Element laboratory 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 Element laboratory located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC 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.

- Element Washington DC LLC 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).

- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.

- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Microsoft Corporation Portable Computing Device FCC ID: C3K1997**. 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 π/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.: 01021, 00981

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (FR1 and FR2), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5,6GHz), Bluetooth (1x, EDR, LE)

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 842590 D01. 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 help determine the worst case Beam ID for SISO operation and Beam ID pair for 2Tx (DFT-s-OFDM) and MIMO (CP-OFDM) operation. Several additional Beam ID's were also investigated to determine the Beam ID's producing the highest measured EIRP.

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.

While operating in the FR2 band, this device supports anchor band operation with an LTE carrier. This was investigated during FR2 measurements.

2.4 Software and Firmware

The firmware installed during testing was Build number developer - 1.930.0

2.5 EMI Suppression Device(s)/Modifications

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

3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

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

3.2 Radiated Power and Radiated Spurious Emissions

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

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

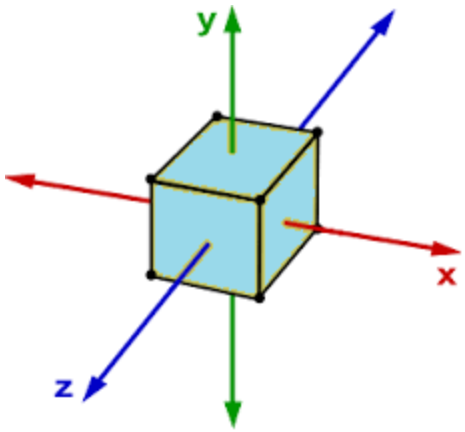


Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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

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

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

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

The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration bandwidth set to at least 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 ANSI C63.26-2015.

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

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

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

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

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

= 18.98 dBm e.i.r.p.

4.0 MEASUREMENT UNCERTAINTY

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

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

5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	ETS-001	EMC Cable and Switch System	12/9/2021	Annual	12/9/2022	ETS
-	ETS-002	EMC Cable and Switch System	3/10/2022	Annual	3/10/2023	ETS
EMCO	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
ESPEC	SH-241	Temperature Chamber	7/2/2020	Biennial	7/2/2022	92002873
ETS-Lindgren	3116C	DRG Horn Antenna	5/11/2021	Biennial	5/11/2023	218893
ETS-Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/20/2021	Biennial	4/20/2023	00125518
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	7/21/2021	Annual	7/21/2022	MY49430494
MEGAPHASE	FAC mmWave	AP FAC mmWave 40GHz	8/18/2021	Annual	8/18/2022	20033003
Narda	180-442-KF	Wide Band Horn Antenna	9/14/2020	Biennial	9/14/2022	2172481
Narda	180-422-KF	Horn (Small)	11/5/2020	Biennial	11/5/2022	U157403-01
OML, Inc.	M05RH	WR-05 Horn Antenna, 24dBi, 140 to 220 GHz	9/24/2020	Biennial	9/24/2022	18073001
OML, Inc.	M08RH	WR-08 Horn Antenna, 24dBi, 90 to 140 GHz	10/22/2020	Biennial	10/22/2022	18073001
OML, Inc.	M12RH	WR-12 Horn Antenna, 24dBi, 60 to 90 GHz	8/12/2020	Biennial	8/12/2022	18073001
OML, Inc.	M19RH	WR-19 Horn Antenna, 24dBi, 40 to 60 GHz	8/28/2020	Biennial	8/28/2022	18073001
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/25/2021	Annual	8/25/2022	1312.8000K67
Rohde & Schwarz	FSW26	Signal Analzyer	2/2/2022	Annual	2/2/2023	101604
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and spectrum analyzer	4/14/2022	Annual	4/14/2023	103187
Sunol Sciences	JB5	Bi-Log Antenna (30M-5GHz)	7/27/2020	Biennial	7/27/2022	A051107
UTiFlex	UTiFlex	FAC mmWave UTiFlex 40GHz	3/9/2022	Annual	3/9/2023	232062-001
UTiFlex	UTiFlex	FAC mmWave UTiFlex 40GHz	3/9/2022	Annual	3/9/2023	234142-001
Virginia Diodes, Inc.	SAX679	SAX Module (40 - 60GHz)	8/28/2020	Biennial	8/28/2022	SAX679
Virginia Diodes, Inc.	SAX680	SAX Module (60 - 90GHz)	8/14/2020	Biennial	8/14/2022	SAX680
Virginia Diodes, Inc.	SAX681	SAX Module (90 - 140GHz)	10/22/2020	Biennial	10/22/2022	SAX681
Virginia Diodes, Inc.	SAX682	SAX Module (140 - 220GHz)	9/24/2020	Biennial	9/24/2022	SAX682

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.

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

7.0 TEST RESULTS

7.1 Summary

Company Name: Microsoft Corporation

FCC ID: C3K1997

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. Per 2.1057(a)(3), spurious emissions were investigated 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 limits first as EIRP measurements to determine if the “early-exit” condition of KDB 842590 D01 applies. If not, then additional TRP measurements are performed.
4) “CC” refers to “Component Carriers”.
5) Beam IDs were chosen based on which Beam ID produces the highest EIRP during EIRP simulation.
6) All testing was performed using FTM (Factory Test Mode) software at continuous Tx operation (100% duty cycle).
7) The CP-OFDM and DFT-s-OFDM transmission schemes were investigated fully for each test type and only the worst case data is included.

7.2 Occupied Bandwidth

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

Test Settings

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

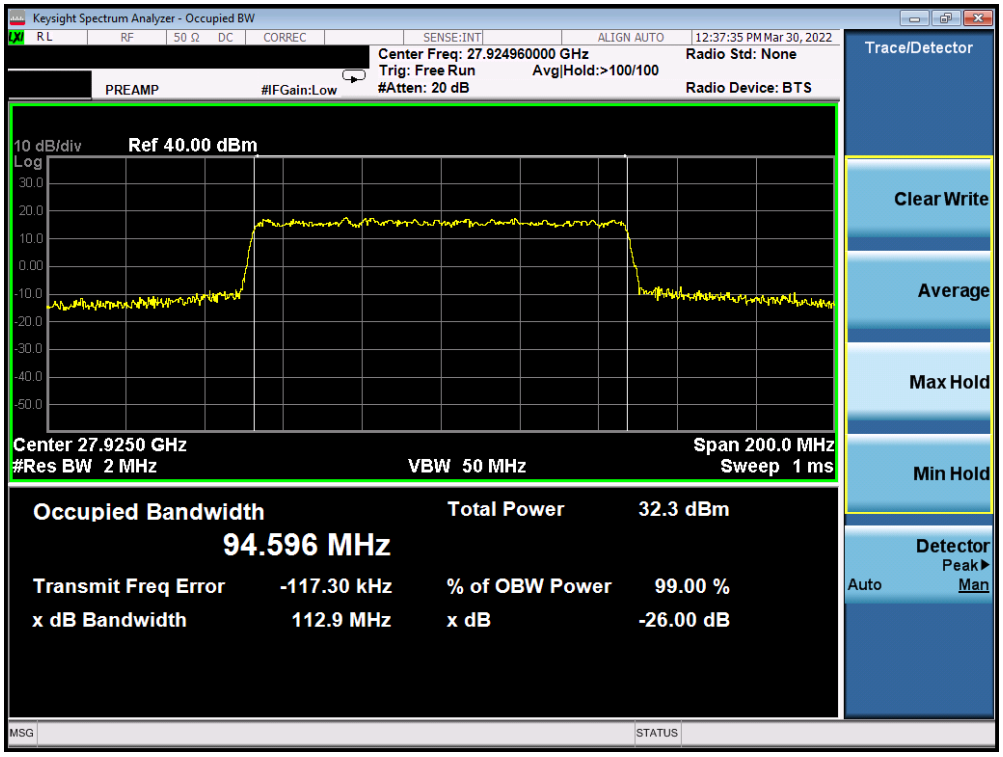
Test Notes

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

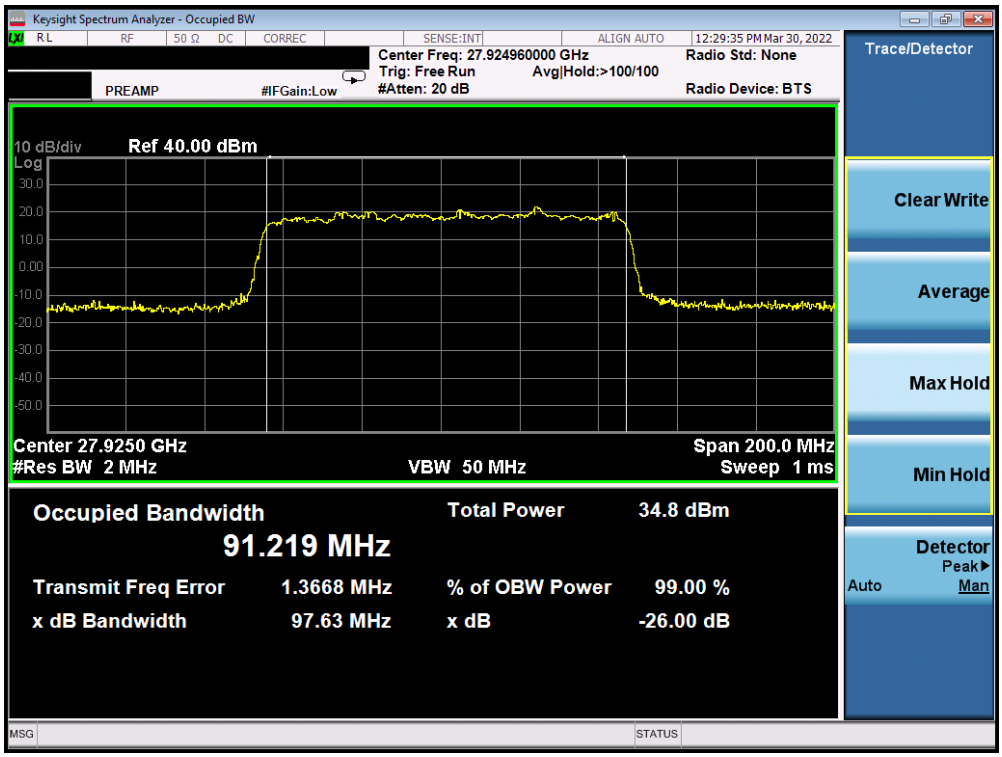
Band n261

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	100	1	CP-OFDM	QPSK	94.60
			DFT-s-OFDM	pi/2-BPSK	91.22
			CP-OFDM	16QAM	94.64
			CP-OFDM	64QAM	95.04
		2	CP-OFDM	QPSK	194.12
			DFT-s-OFDM	pi/2-BPSK	193.22
			CP-OFDM	16QAM	193.48
			CP-OFDM	64QAM	193.62
	50	1	CP-OFDM	QPSK	45.97
			DFT-s-OFDM	pi/2-BPSK	45.89
			CP-OFDM	16QAM	45.94
			CP-OFDM	64QAM	45.89
		2	CP-OFDM	QPSK	95.51
			DFT-s-OFDM	pi/2-BPSK	95.62
			CP-OFDM	16QAM	95.72
			CP-OFDM	64QAM	95.82

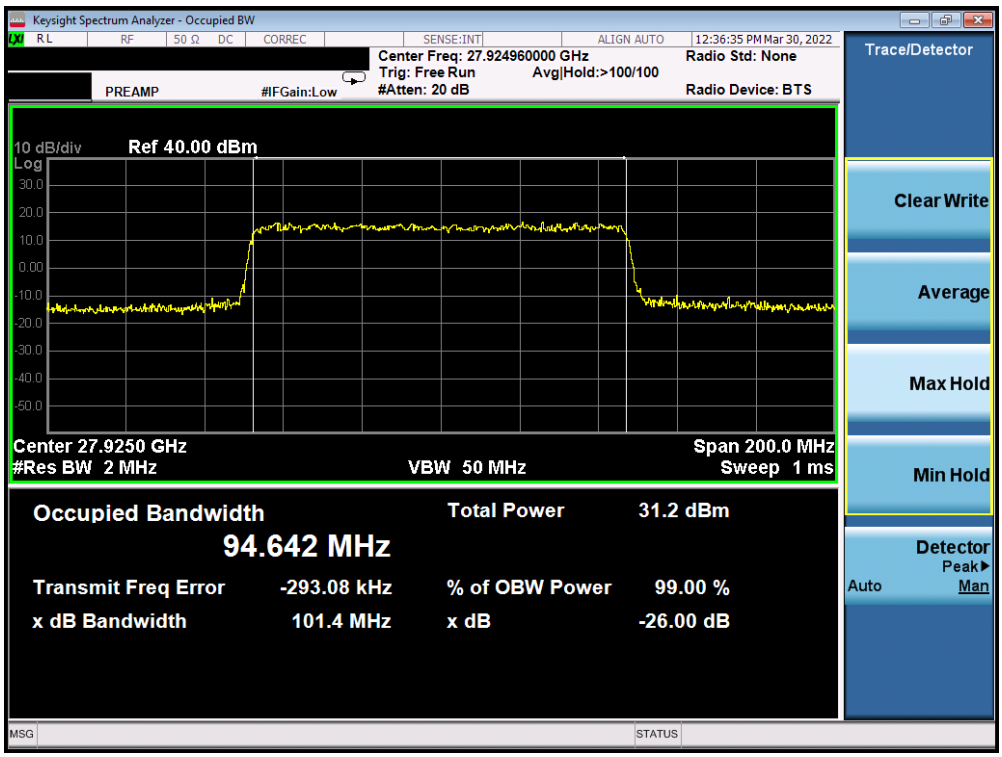
Table 7-2. Summary of Occupied Bandwidths (n261)



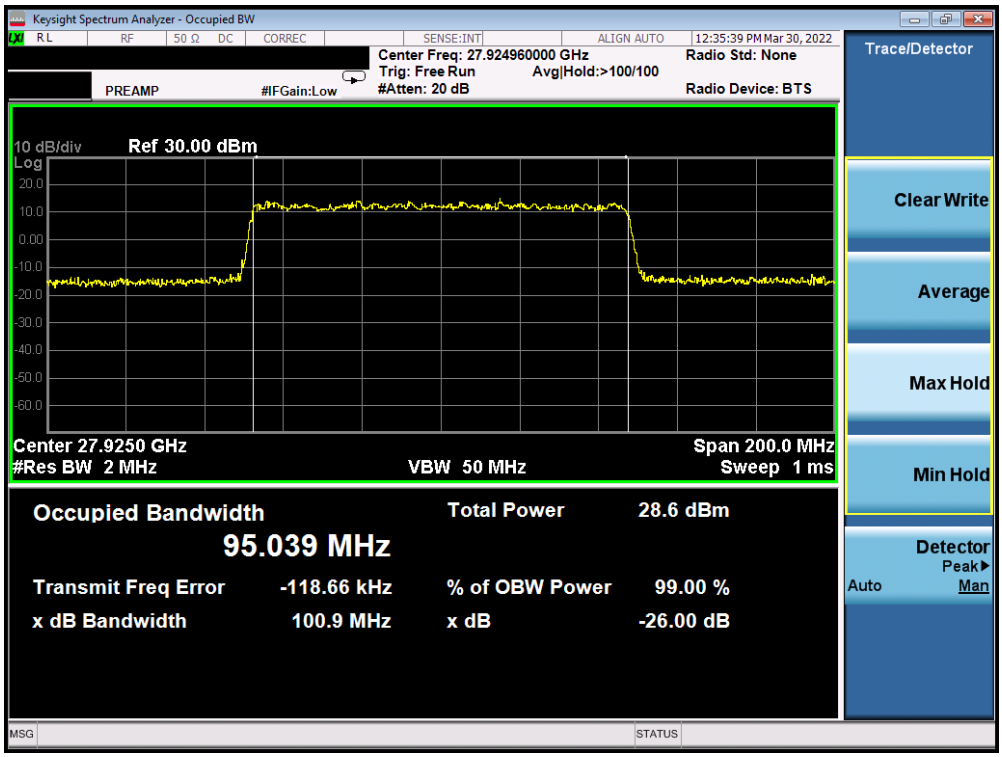
Plot 7-1. Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



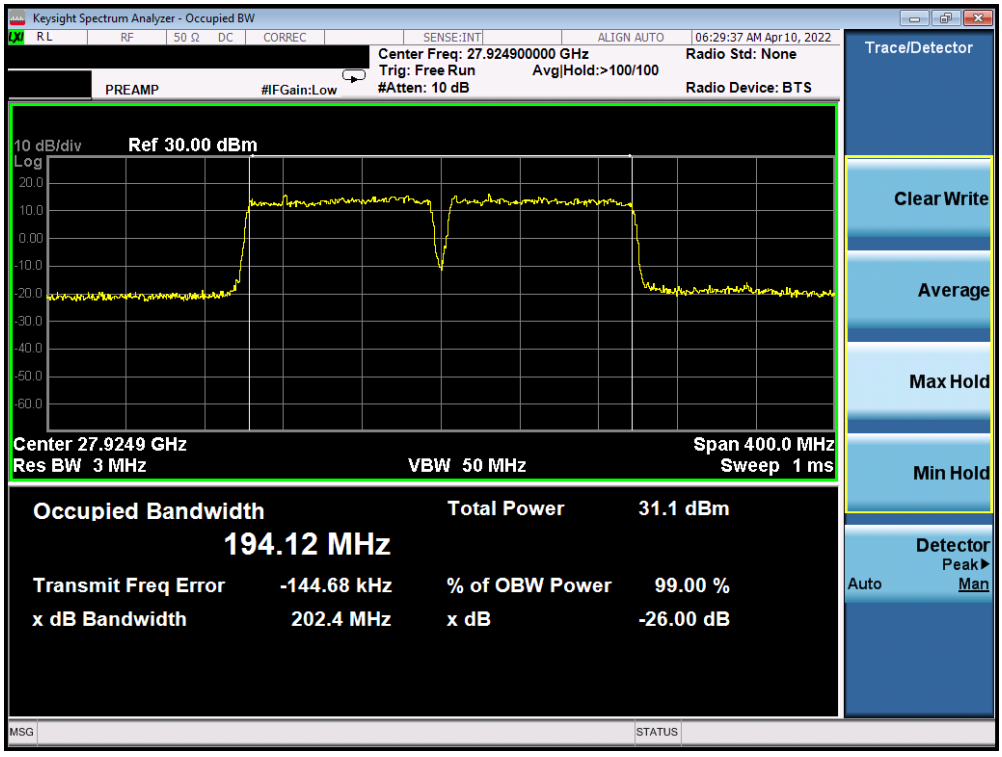
Plot 7-2. Occupied Bandwidth Plot (100MHz-1CC – π/2-BPSK – Mid Channel)



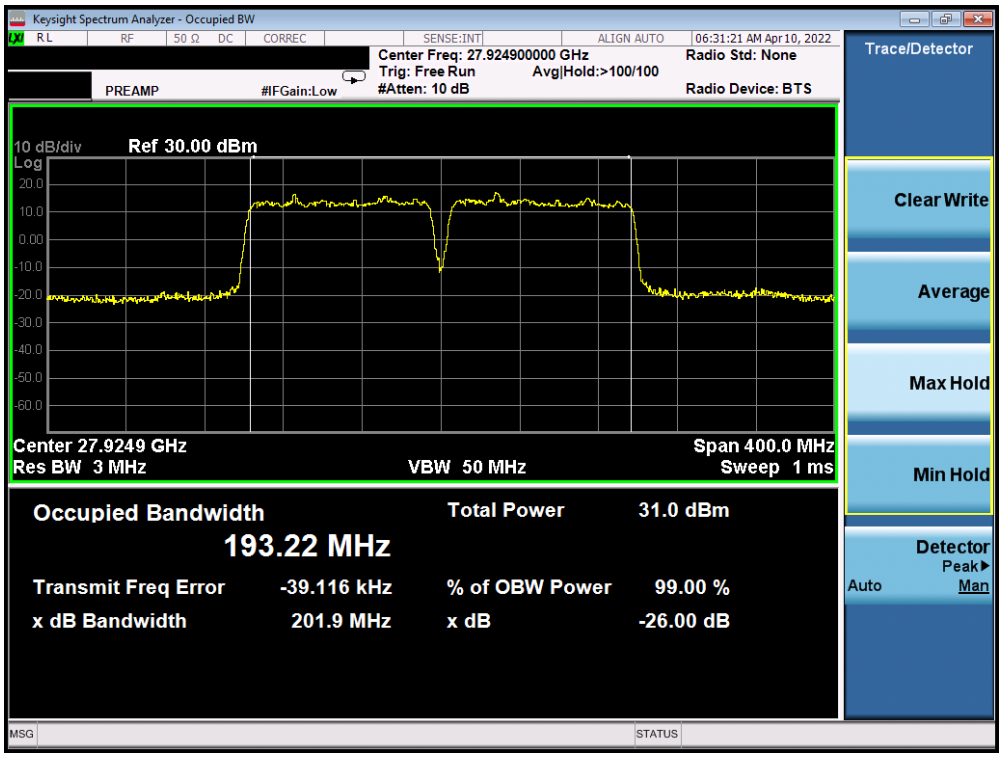
Plot 7-3. Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



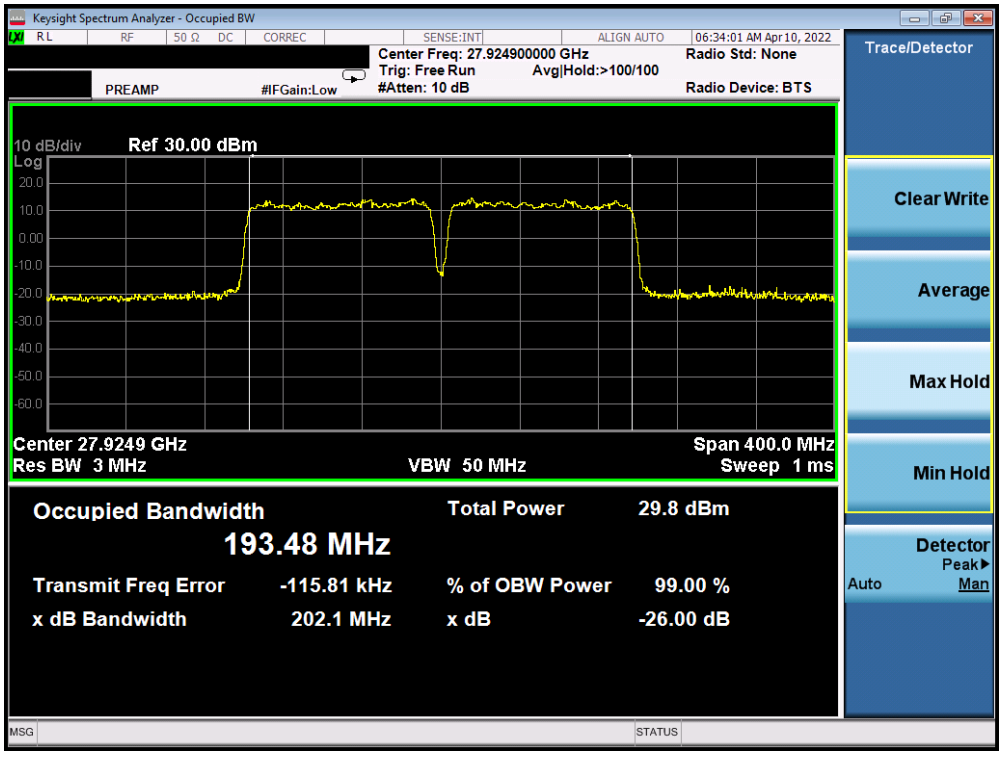
Plot 7-4. Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)



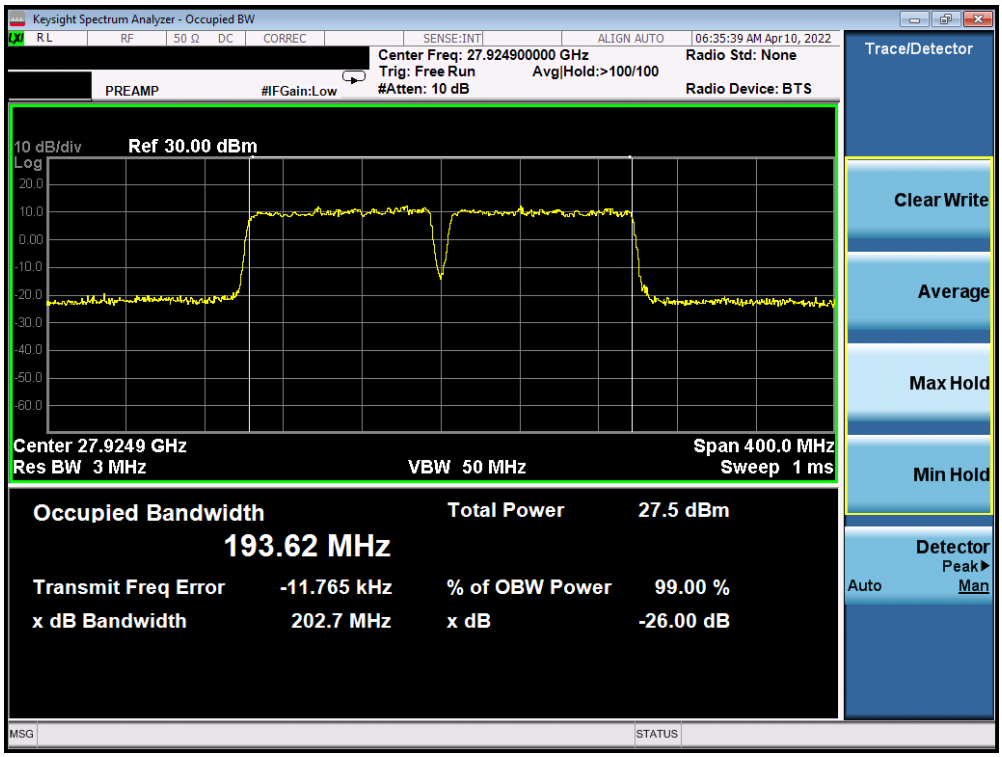
Plot 7-5. Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



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

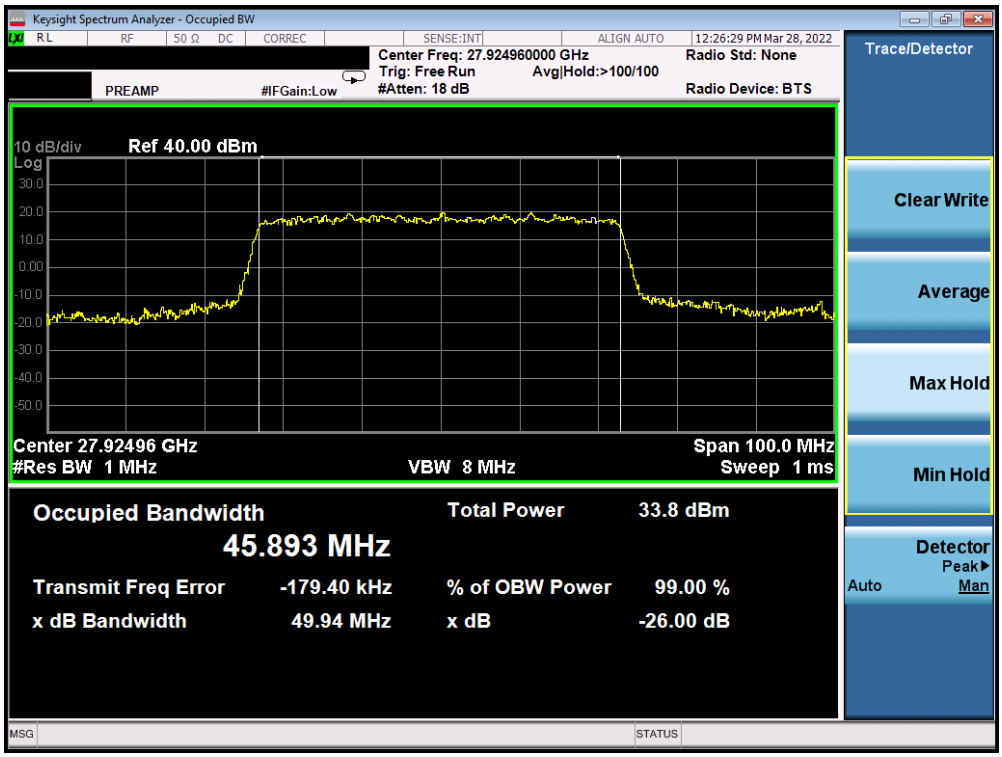


Plot 7-7. Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)

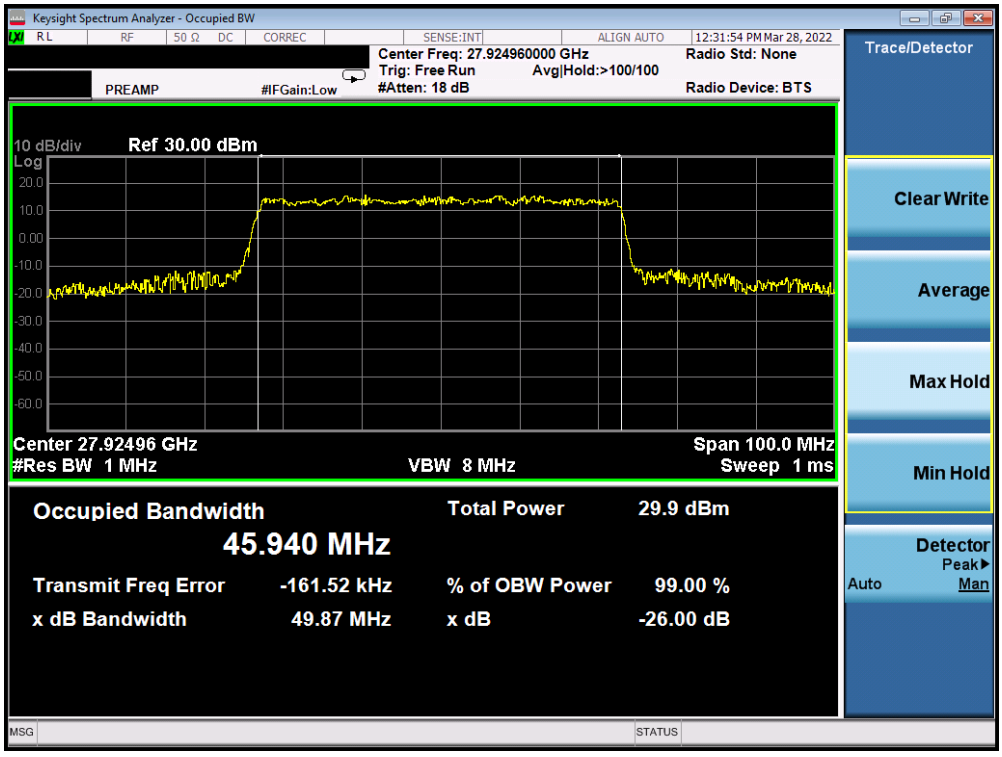


Plot 7-8. Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

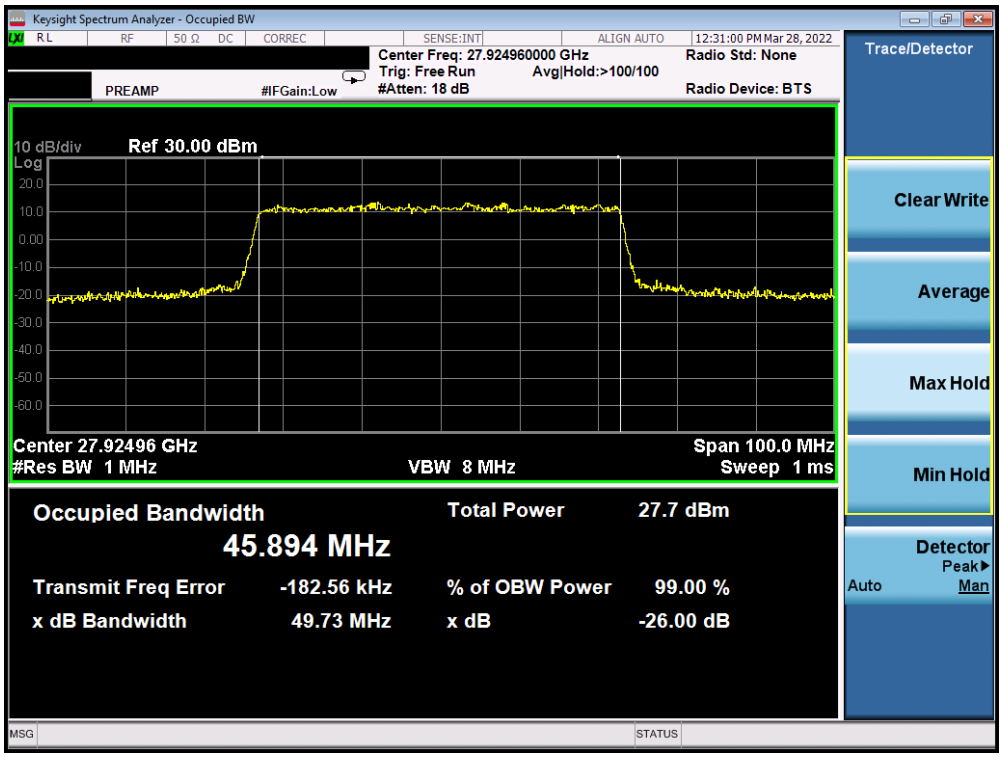
Plot 7-9. Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



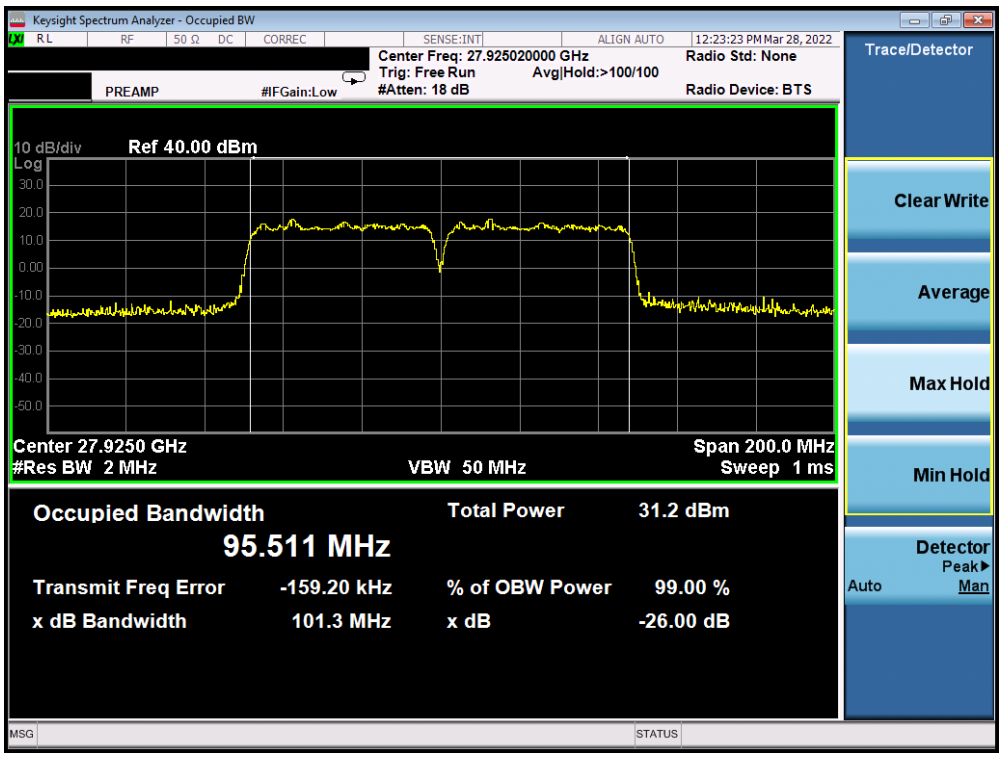
Plot 7-10. Occupied Bandwidth Plot (50MHz-1CC – π/2-BPSK – Mid Channel)



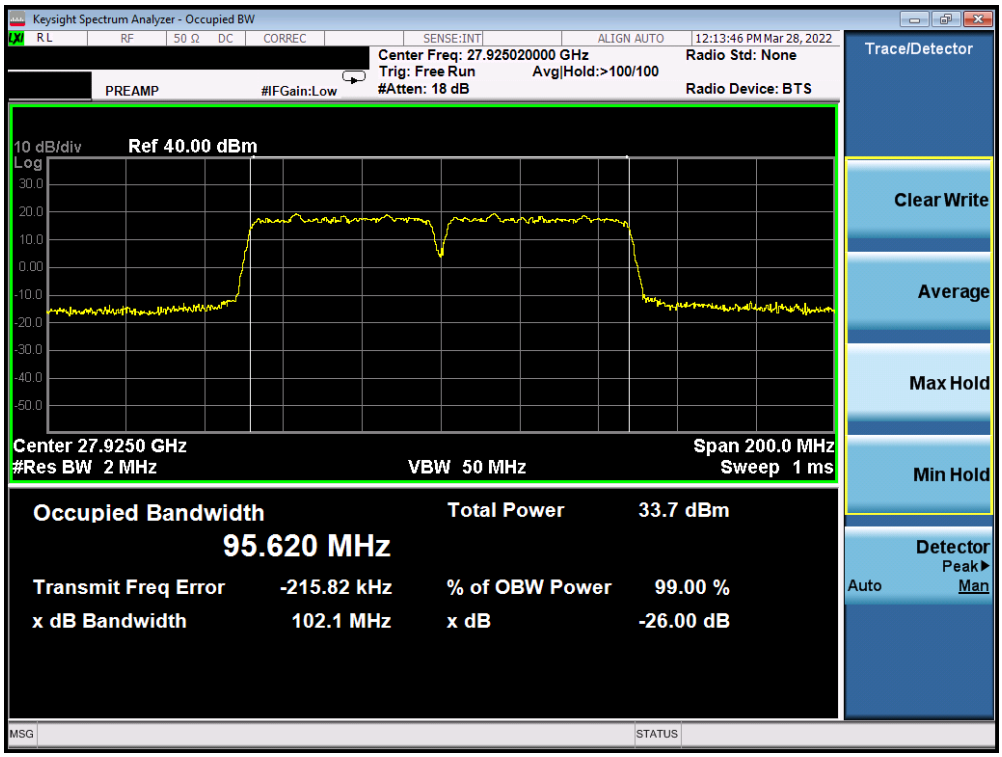
Plot 7-11. Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



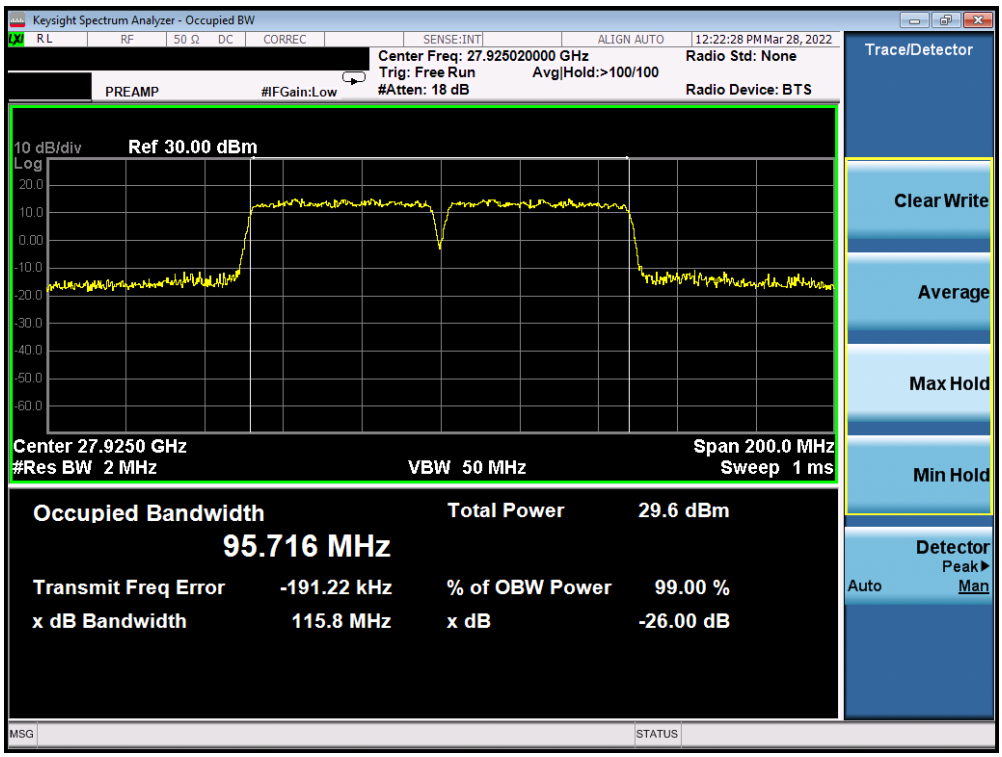
Plot 7-12. Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)



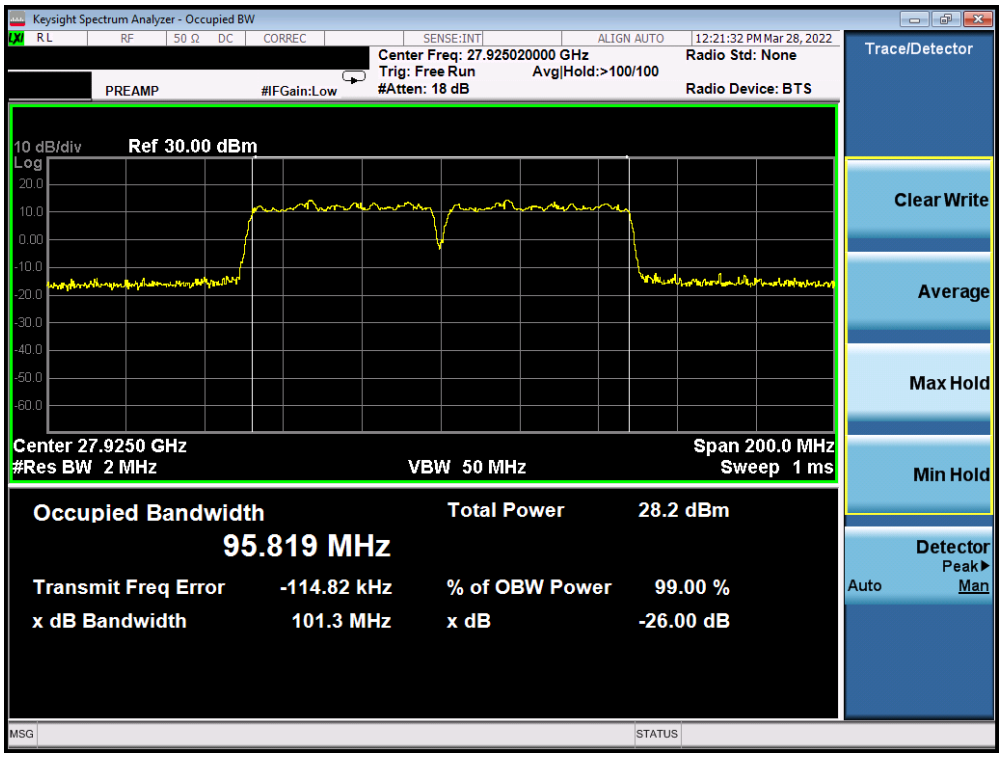
Plot 7-13. Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



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



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

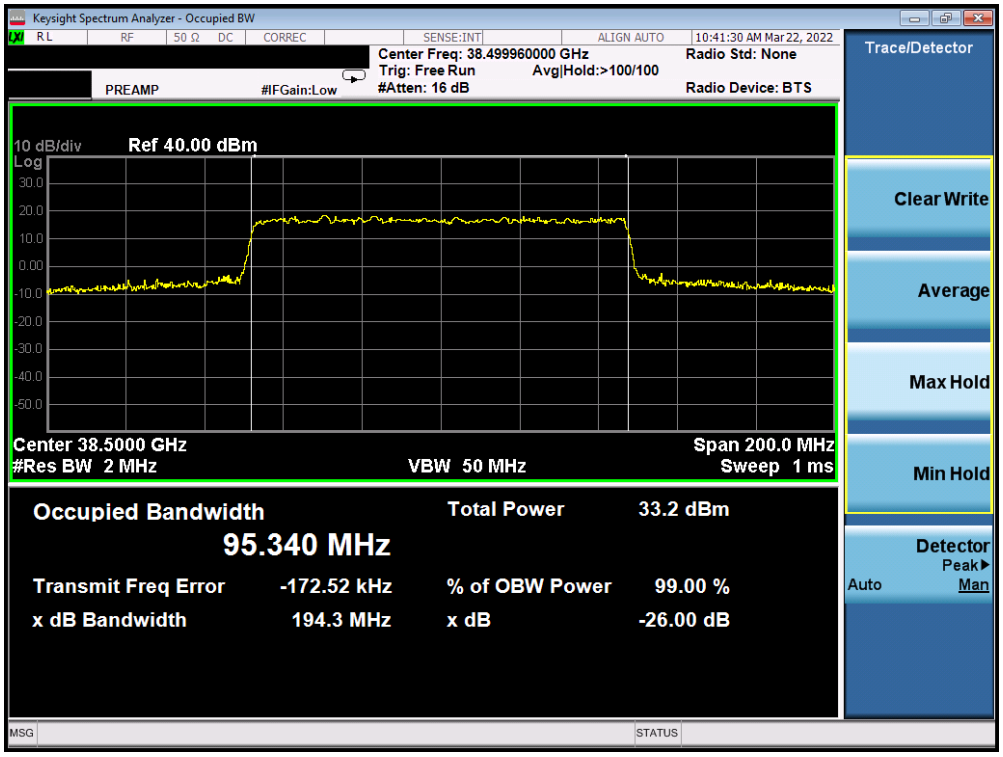


Plot 7-16. Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)

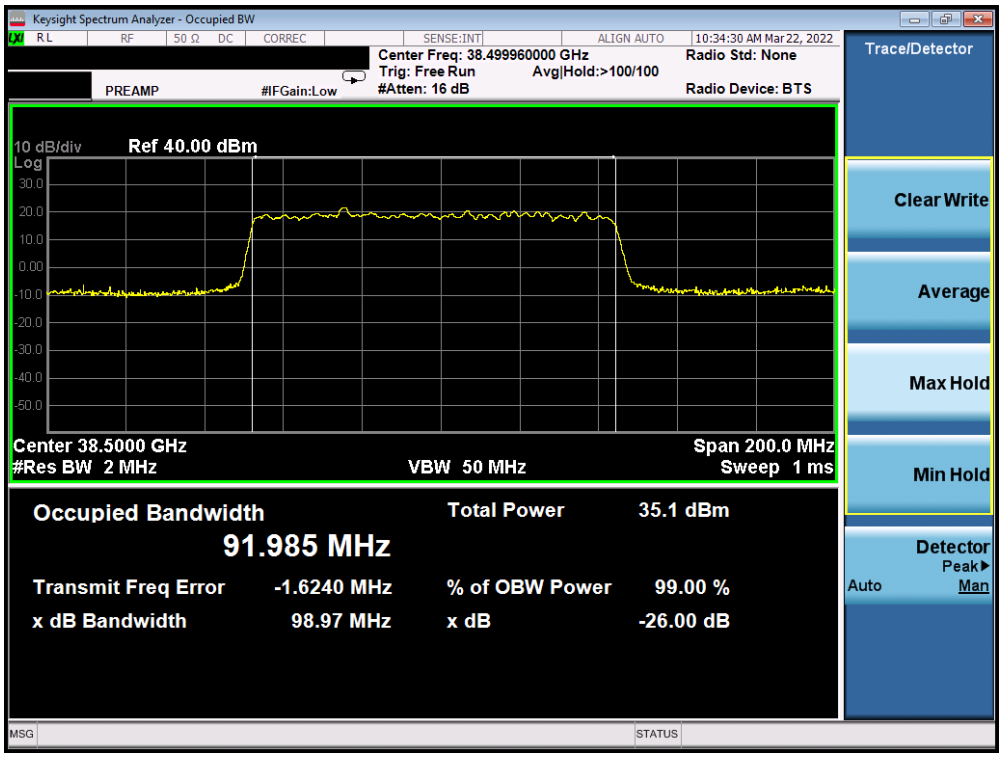
Band n260

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	100	1	CP-OFDM	QPSK	95.34
			DFT-s-OFDM	pi/2-BPSK	91.99
			CP-OFDM	16QAM	95.17
			CP-OFDM	64QAM	96.11
		2	CP-OFDM	QPSK	193.81
			DFT-s-OFDM	pi/2-BPSK	193.62
			CP-OFDM	16QAM	193.90
			CP-OFDM	64QAM	195.08
	50	1	CP-OFDM	QPSK	46.51
			DFT-s-OFDM	pi/2-BPSK	46.20
			CP-OFDM	16QAM	46.45
			CP-OFDM	64QAM	47.14
		2	CP-OFDM	QPSK	96.73
			DFT-s-OFDM	pi/2-BPSK	96.44
			CP-OFDM	16QAM	98.31
			CP-OFDM	64QAM	96.98

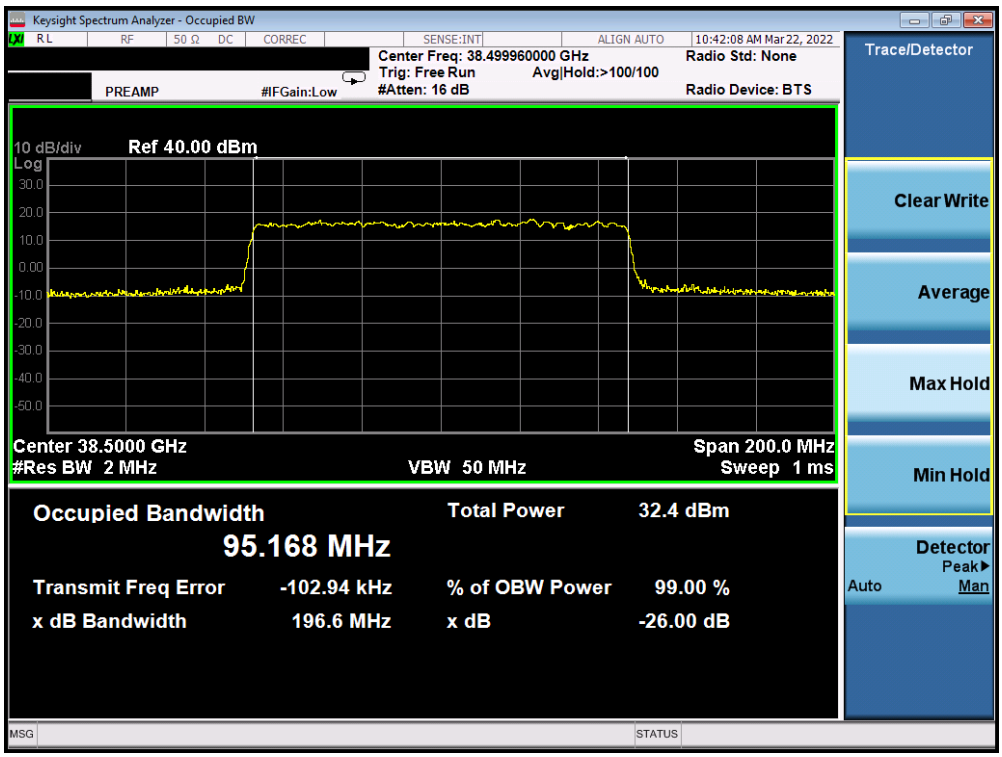
Table 7-3. Summary of Ant 1 Occupied Bandwidths (n260)



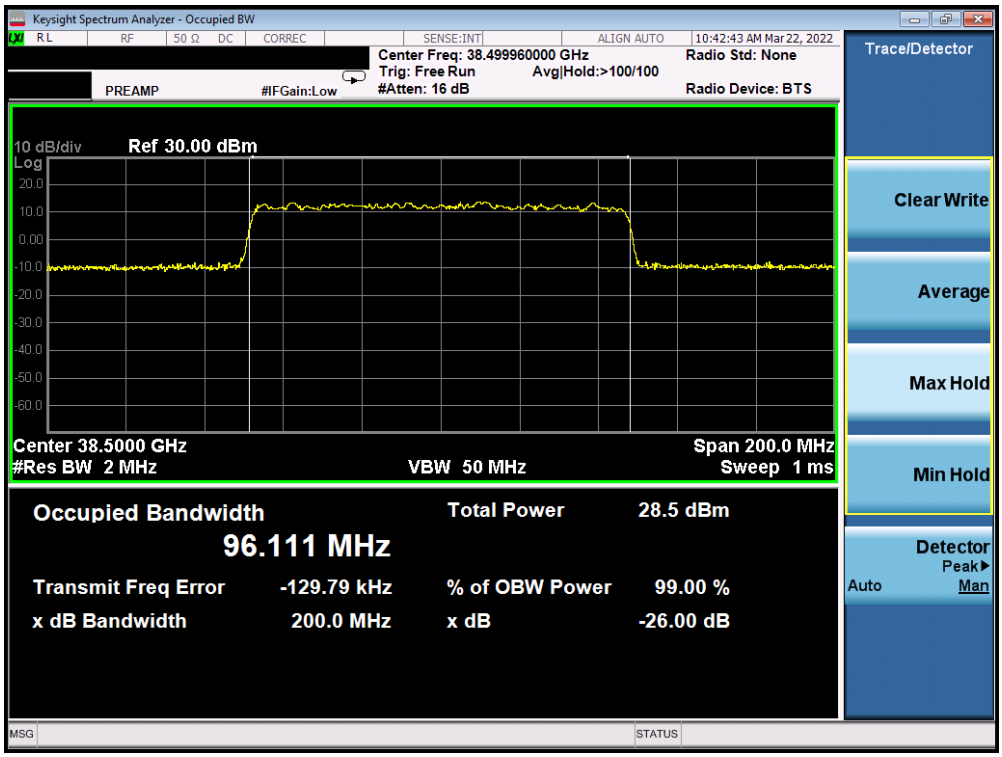
Plot 7-17. Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



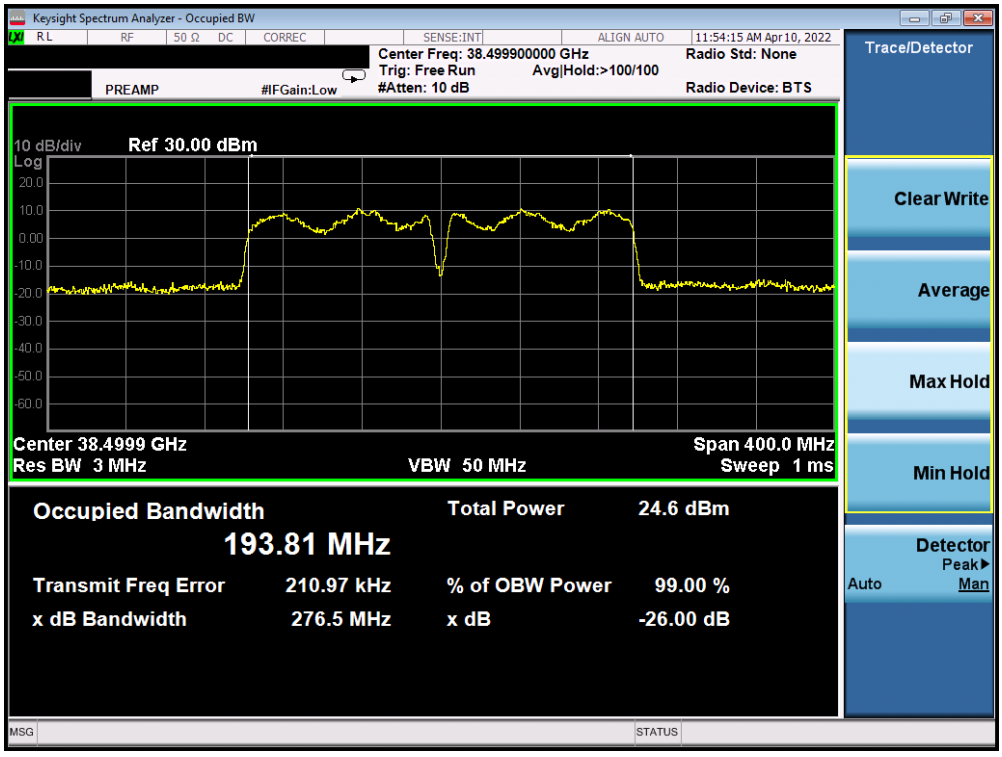
Plot 7-18. Occupied Bandwidth Plot (100MHz-1CC – π/2-BPSK – Mid Channel)



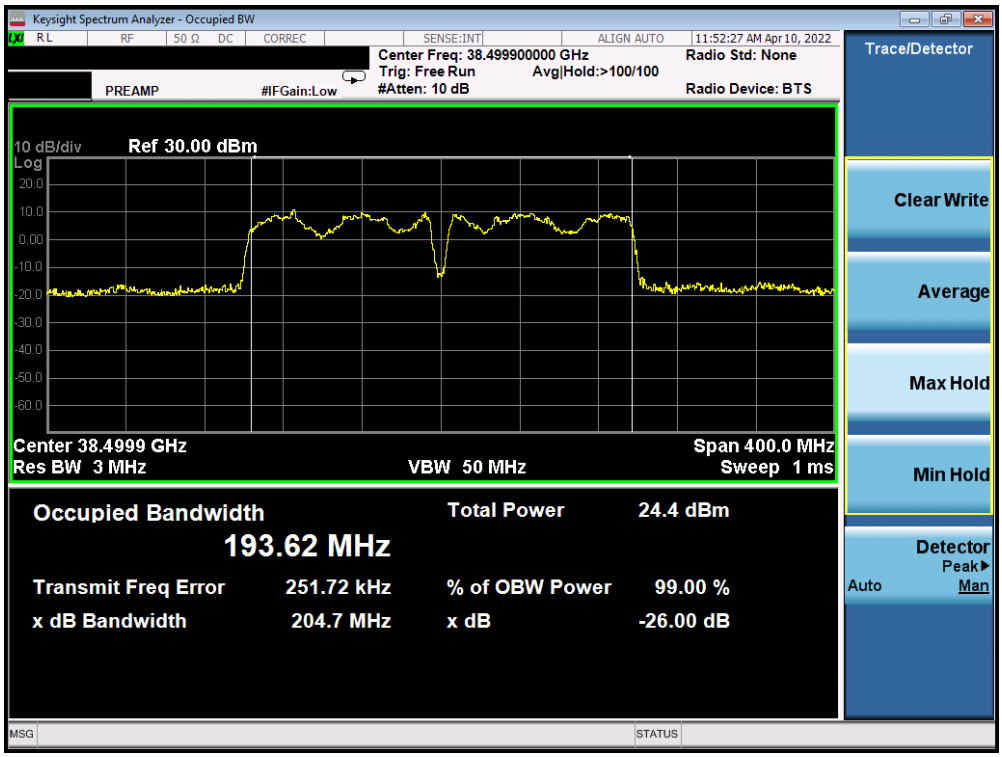
Plot 7-19. Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



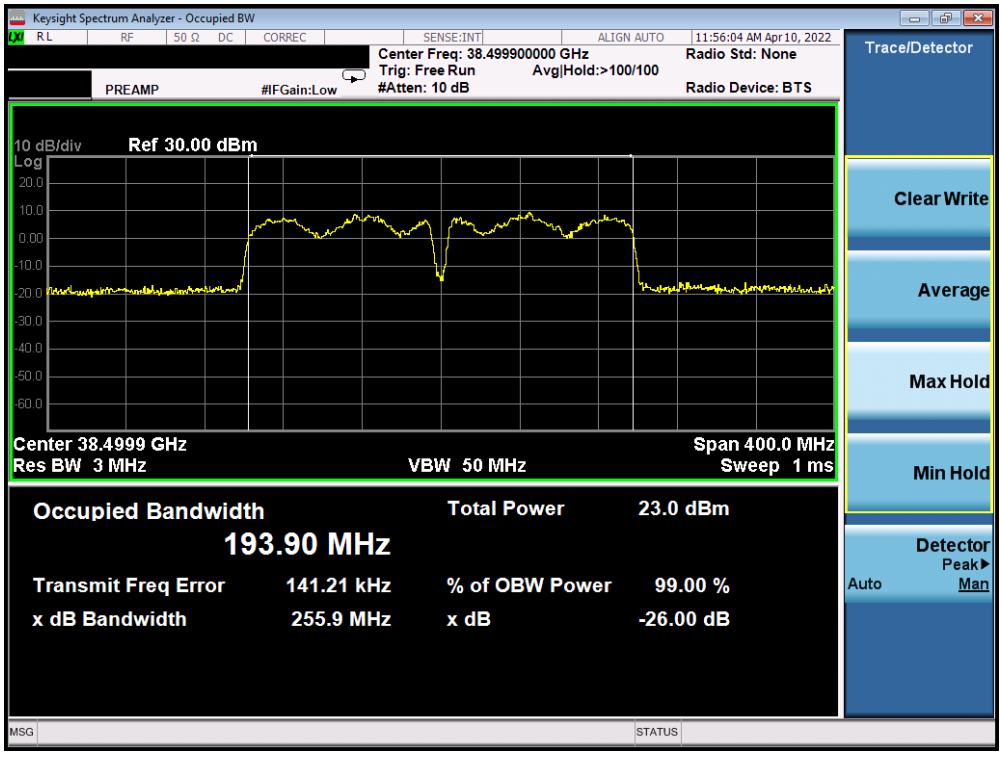
Plot 7-20. Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)



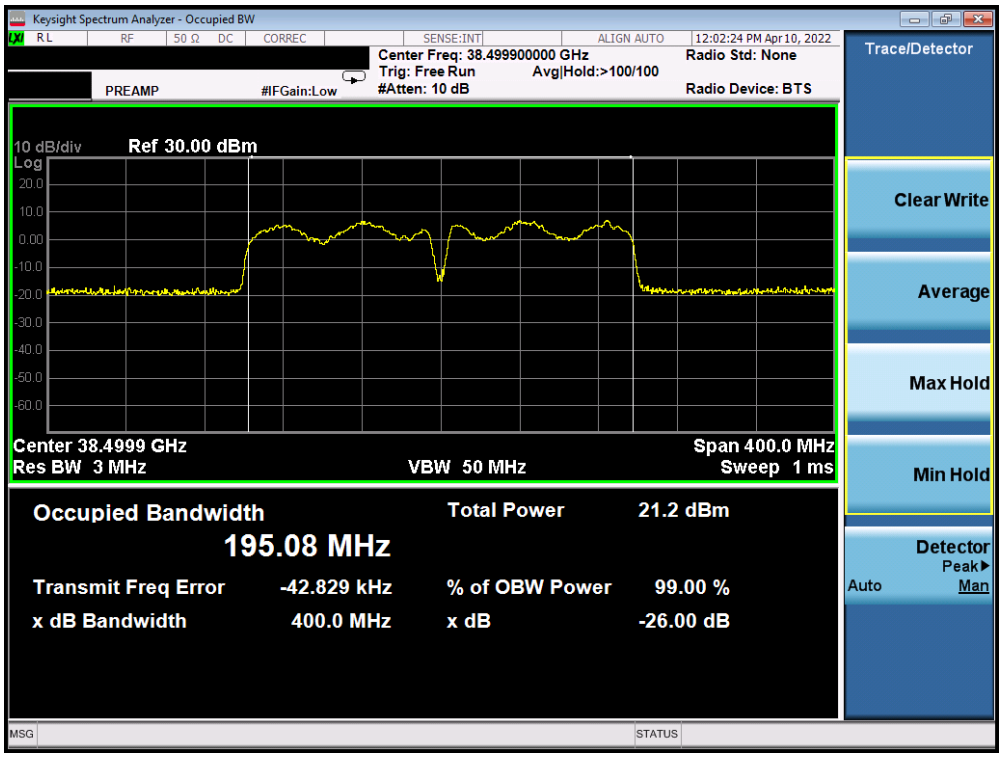
Plot 7-21. Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



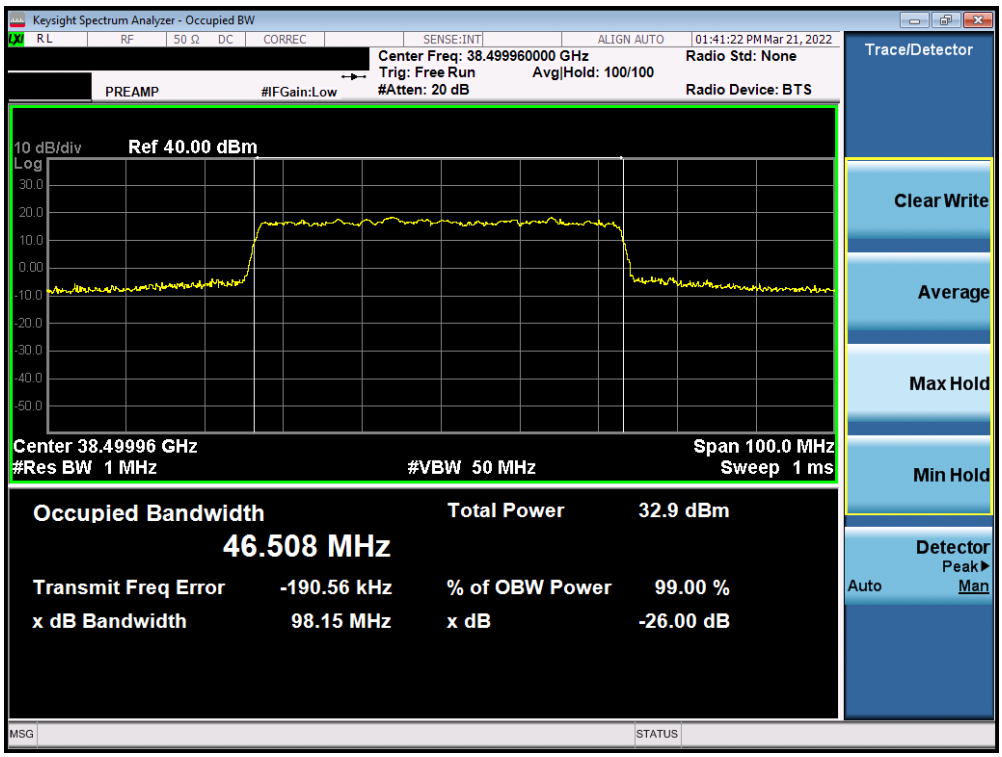
Plot 7-22. Occupied Bandwidth Plot (100MHz-2CC – π/2-BPSK – Mid Channel)



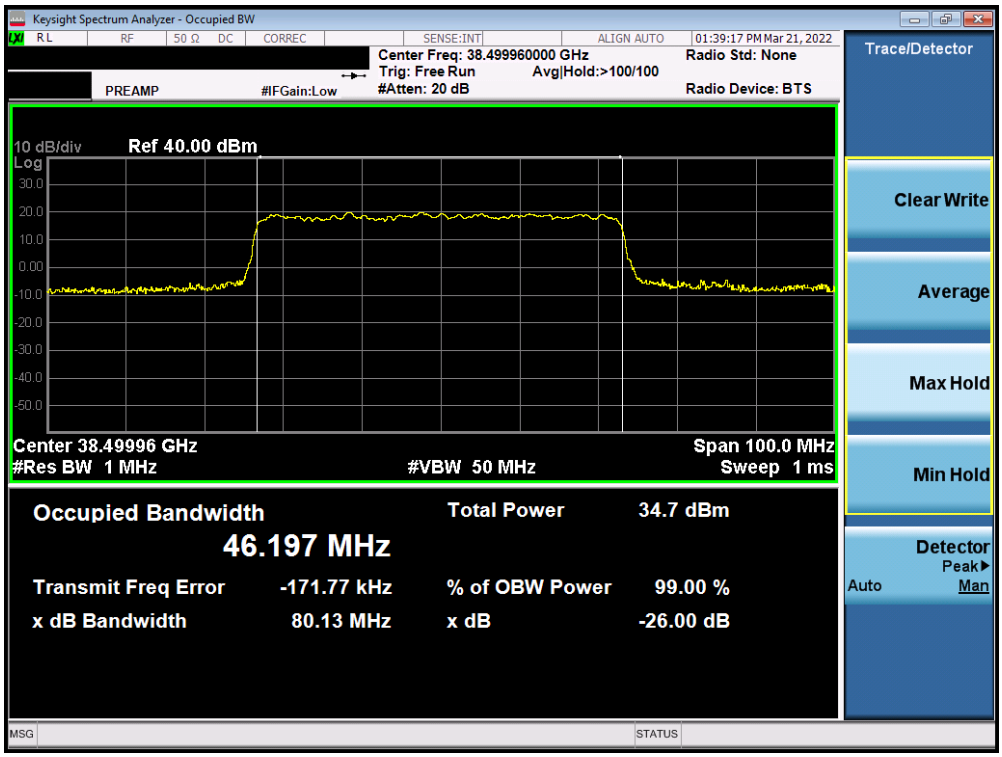
Plot 7-23. Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)



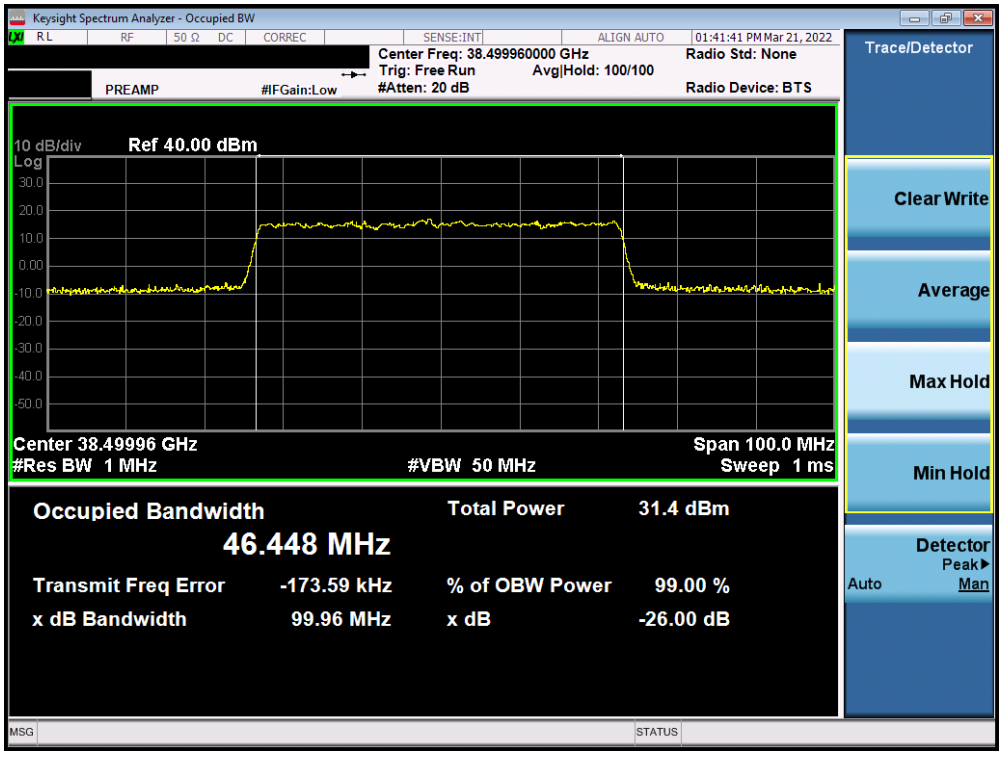
Plot 7-24. Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)



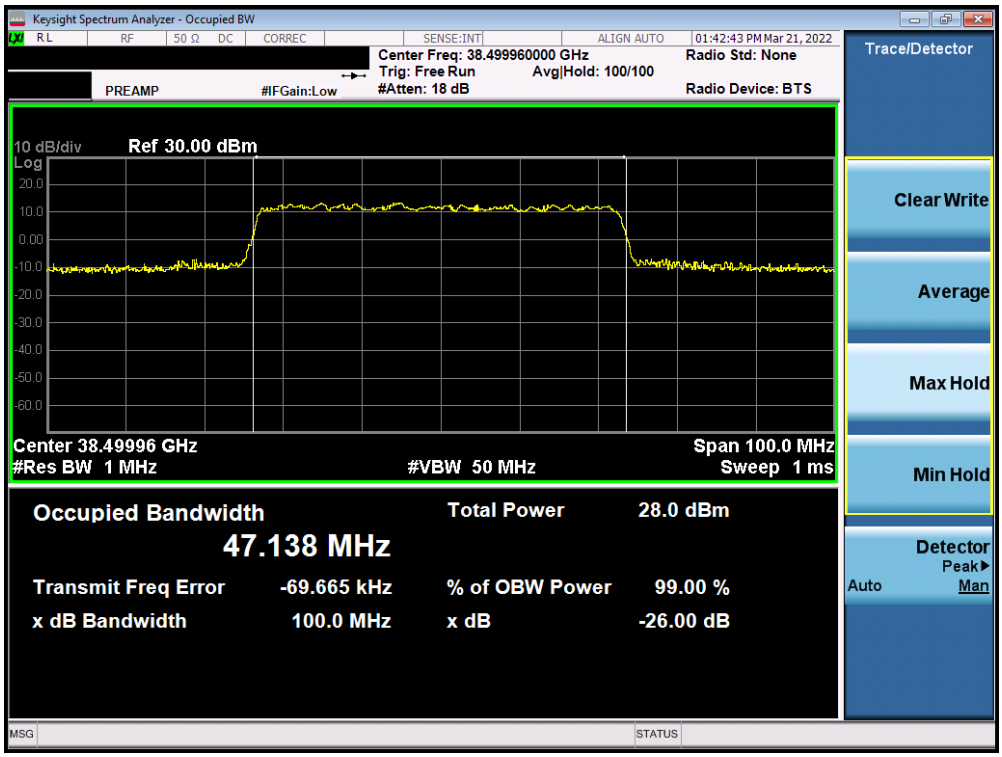
Plot 7-25. Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



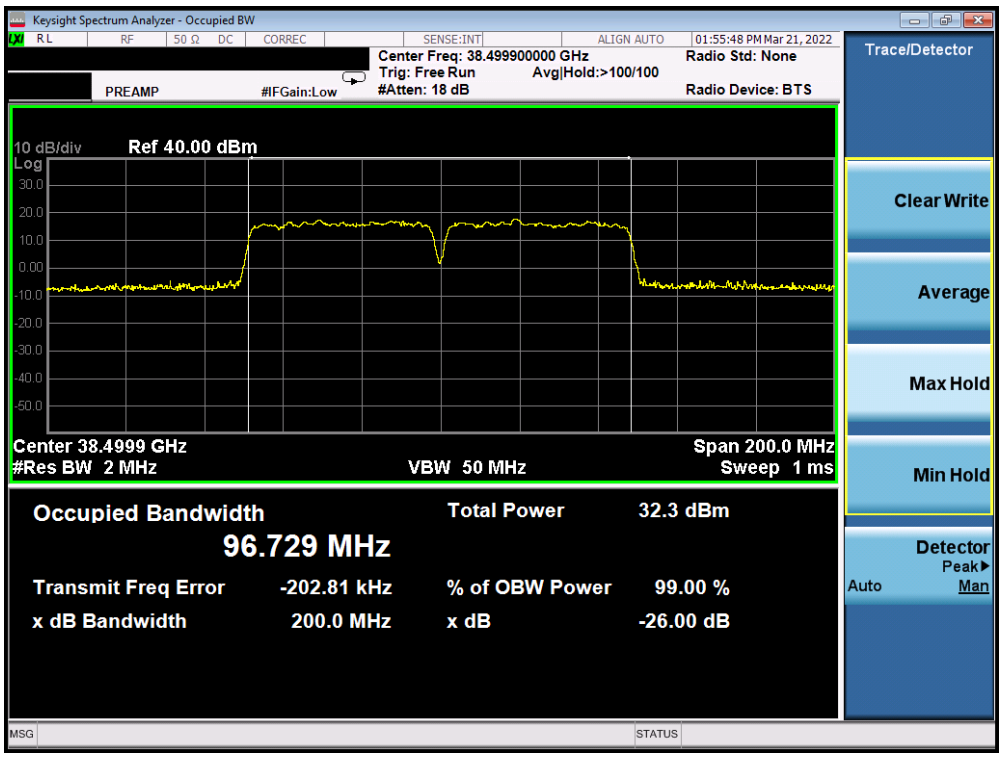
Plot 7-26. Occupied Bandwidth Plot (50MHz-1CC – π/2-BPSK – Mid Channel)



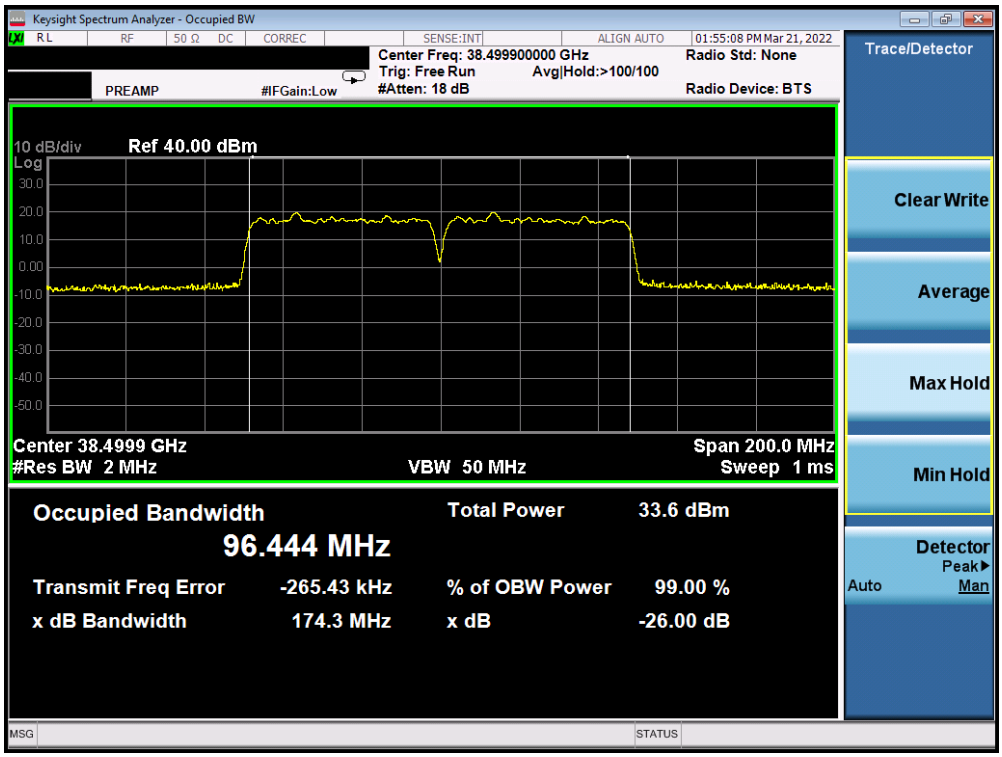
Plot 7-27. Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



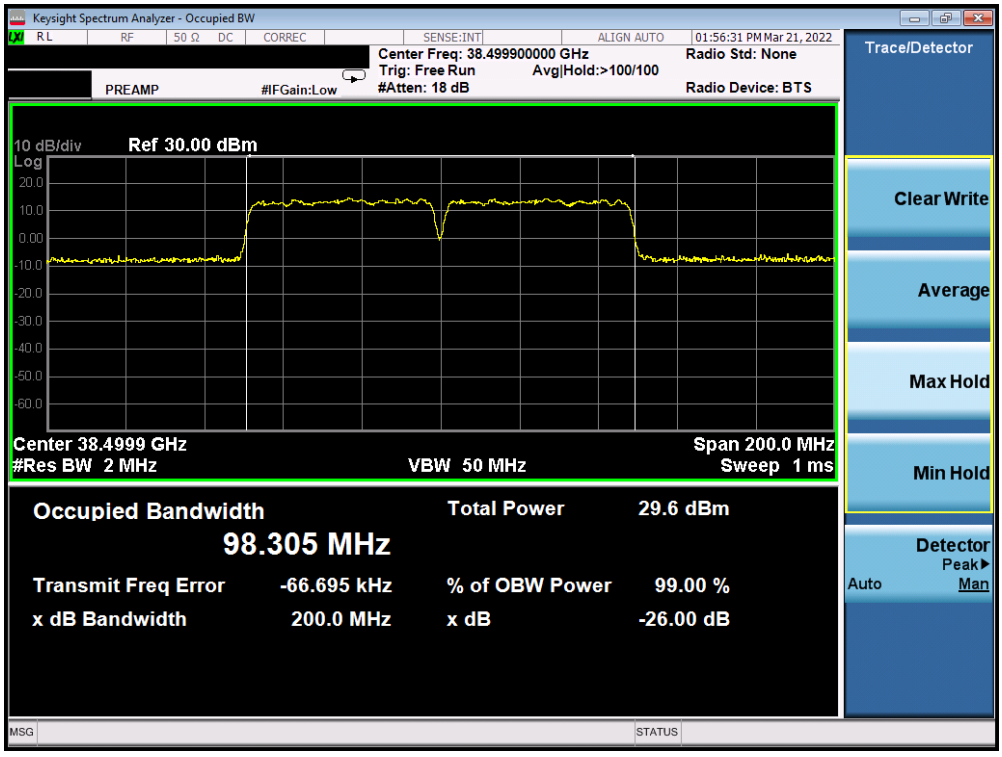
Plot 7-28. Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)



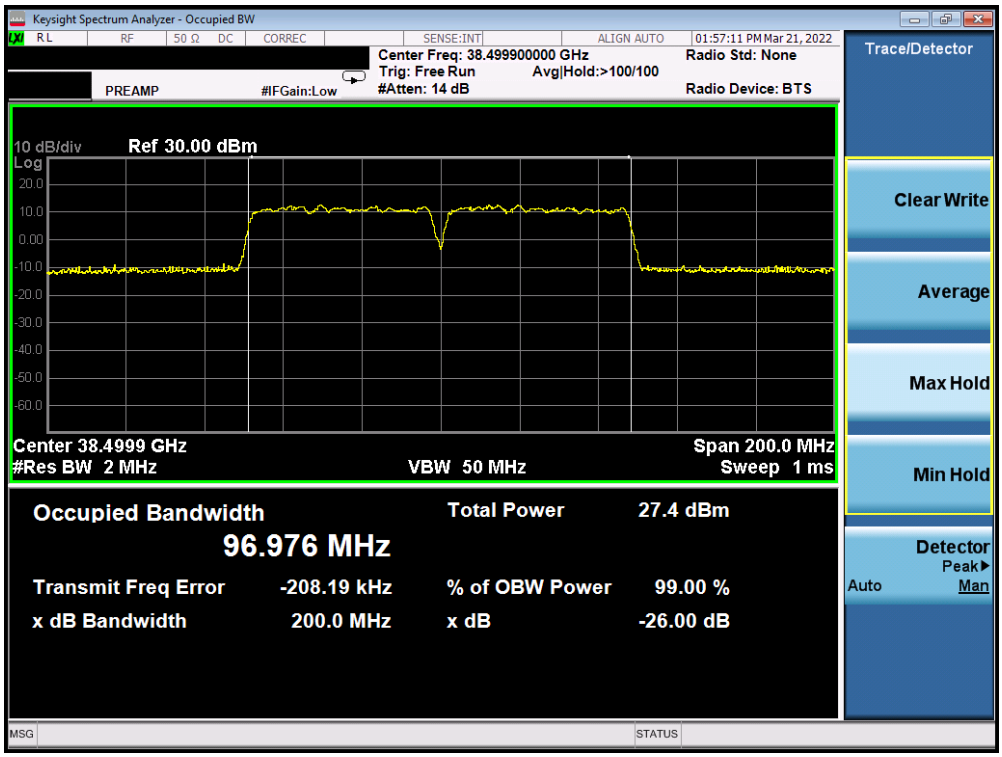
Plot 7-29. Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



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



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



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

7.3 Equivalent Isotropic Radiated Power

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 – 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
3. VBW ≥ 3 x RBW
4. Span = 2x to 3x the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Sweep time = Auto
7. Detector = RMS
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Notes

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

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

3) EIRP measurements for all bands were taken at 1m test distance as was required 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 at the antenna terminals E is calculated as: E (dBµV/m) = Spectrum Analyzer Channel Power Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 107.

5) All EIRP measurements were made with the appropriate offset levels loaded into the spectrum analyzer as determined from the measurement distance, antenna factor, cable loss, and the equations in Note 4 above.

6) Radiated power levels are investigated while the receive antenna was rotated through all angles to determine the worst case polarization/positioning.

7) 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.

8) Several BeamID's are investigated based on the provided simulated data to determine the worst-case BeamID.

9) For each band and antenna array configuration tested, worst case EIRP plots are displayed for all total bandwidths tested (50MHz, 100MHz, 200MHz).

Sample Calculation

The offset level loaded into the spectrum analyzer allows for a direct conversion of the raw channel power level measured by the analyzer into an EIRP. This offset level is frequency dependent and is calculated as follows:

Offset Level [dB] = Antenna Factor [dB/m] + Cable Loss [dB] + 20 Log(Distance [m]) + 107 - 104.8 .

For example, to measure an EIRP at a frequency of 24400MHz with an antenna factor of 40.40dB/m, a cable loss of 7.68dB, and a measurement distance of 1 meter, an offset level of:

Offset Level = 40.40dB/m + 7.68dB + 20 Log(1 meter) + 107 - 104.8 = **50.28 dB**

shall be loaded into the spectrum analyzer.

Band n261 Beam ID Configurations

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

Table 7-4. Ant1 Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	37	-
		V	165	-
	Mid	H	37	-
		V	165	-
	High	H	37	-
		V	165	-
MIMO	Low	2Tx/MIMO	37	165
	Mid	2Tx/MIMO	37	165
	High	2Tx/MIMO	37	165

Table 7-5. Ant2 Worst Case Beam ID

Band n261

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100	1	Mid	27924.96	DFT-s-OFDM	QPSK	33	H	SISO	V	181.7	22	1 / 42	26.64
		Low	27550.08	DFT-s-OFDM	QPSK	161	V	SISO	H	179.2	22	1 / 23	26.11
		Low	27550.08	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	180.0	28	1 / 42	27.34
		Mid	27924.96	CP-OFDM	QPSK	33	H	SISO	V	181.7	22	1 / 23	23.92
		Low	27550.08	CP-OFDM	QPSK	161	V	SISO	H	179.2	22	1 / 23	23.54
		Low	27550.08	CP-OFDM	QPSK	33+161	H + V	MIMO	H	180.0	28	1 / 23	24.62
		Mid	27924.96	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	181.0	24	1 / 33	27.08
		High	28299.96	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	180.0	25	1 / 42	26.37
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	33+161	H + V	2Tx	H	180.0	28	1 / 42	**27.67**
		Low	27525.00	DFT-s-OFDM	16QAM	33+161	H + V	2Tx	H	180.0	28	1 / 42	25.68
		Low	27525.00	DFT-s-OFDM	64QAM	33+161	H + V	2Tx	H	180.0	28	1 / 42	24.07
100+100	2	Low	27525.00	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	179.7	25	66 / 0	23.81
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	33+161	H + V	2Tx	H	179.7	25	66 / 0	23.65
		Low	27525.00	DFT-s-OFDM	16QAM	33+161	H + V	2Tx	H	179.7	25	66 / 0	22.36
		Low	27525.00	DFT-s-OFDM	64QAM	33+161	H + V	2Tx	H	179.7	25	1 / 42	21.85

Table 7-6. Ant1 EIRP Data (Band n261 − 100MHz)

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50	1	Low	27525.00	DFT-s-OFDM	QPSK	33	H	SISO	V	160.7	279	1 / 12	26.23
		Low	27525.00	DFT-s-OFDM	QPSK	161	V	SISO	H	200.7	102	1 / 19	25.95
		Low	27525.00	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	187.2	22	1 / 16	**27.83**
		Low	27525.00	CP-OFDM	QPSK	33	H	SISO	V	160.7	279	1 / 12	22.92
		Low	27525.00	CP-OFDM	QPSK	161	V	SISO	H	200.7	102	1 / 19	22.39
		Low	27525.00	CP-OFDM	QPSK	33+161	H + V	MIMO	H	187.2	22	1 / 19	24.60
		Mid	27924.96	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	185.0	24	1 / 16	27.47
		High	28324.92	DFT-s-OFDM	QPSK	33+161	H + V	2Tx	H	187.0	22	1 / 16	26.92
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	33+161	H + V	2Tx	H	187.2	22	1 / 16	27.33
		Low	27525.00	DFT-s-OFDM	16QAM	33+161	H + V	2Tx	H	187.2	22	1 / 19	26.66
		Low	27525.00	DFT-s-OFDM	64QAM	33+161	H + V	2Tx	H	187.2	22	1 / 12	25.67
50+50	2	Low	27525.00	DFT-s-OFDM	QPSK	33+161	H+V	2Tx	H	178.8	28	32 / 0	24.89
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	33+161	H + V	2Tx	H	178.8	28	32 / 0	24.46
		Low	27525.00	DFT-s-OFDM	16QAM	33+161	H + V	2Tx	H	178.8	28	32 / 0	22.94
		Low	27525.00	DFT-s-OFDM	64QAM	33+161	H + V	2Tx	H	178.8	28	1 / 12	20.83

Table 7-7. Ant1 EIRP Data (Band n261 − 50MHz)

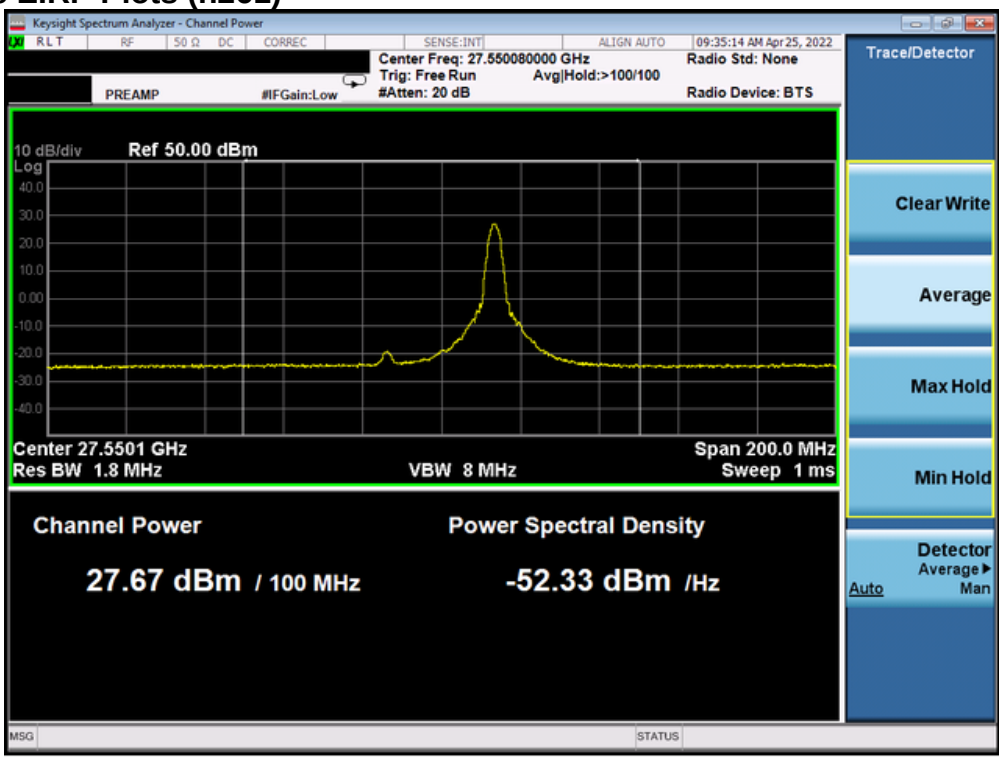
Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100	1	Low	27550.08	DFT-s-OFDM	QPSK	37	H	SISO	V	84.5	83	1 / 23	27.54
		low	27550.08	DFT-s-OFDM	QPSK	165	V	SISO	H	87.3	82	1 / 23	28.78
		Mid	27924.96	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	H	86.8	89	1 / 42	**29.33**
		Mid	27924.96	CP-OFDM	QPSK	37	H	SISO	V	84.5	83	1 / 23	25.50
		Mid	27924.96	CP-OFDM	QPSK	165	V	SISO	H	87.3	82	1 / 23	25.28
		Mid	27924.96	CP-OFDM	QPSK	37+165	H + V	MIMO	H	86.8	89	1 / 23	25.39
		Low	27550.08	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	H	90.4	85	1 / 23	29.07
		High	28299.96	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	H	89.0	95	1 / 23	29.04
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	37+165	H + V	2Tx	H	86.8	89	1 / 23	29.02
		Mid	27924.96	DFT-s-OFDM	16QAM	37+165	H + V	2Tx	H	86.8	89	1 / 33	26.37
		Mid	27924.96	DFT-s-OFDM	64QAM	37+165	H + V	2Tx	H	86.8	89	1 / 33	24.60
100+100	2	Mid	27924.96	DFT-s-OFDM	QPSK	37+165	H+V	2Tx	H	89.2	89	66 / 0	25.06
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	37+165	H + V	2Tx	H	89.2	89	66 / 0	24.88
		Mid	27924.96	DFT-s-OFDM	16QAM	37+165	H + V	2Tx	H	89.2	89	66 / 0	23.25
		Mid	27924.96	DFT-s-OFDM	64QAM	37+165	H + V	2Tx	H	89.2	89	66 / 0	21.02

Table 7-8. Ant2 EIRP Data (Band n261 − 100MHz)

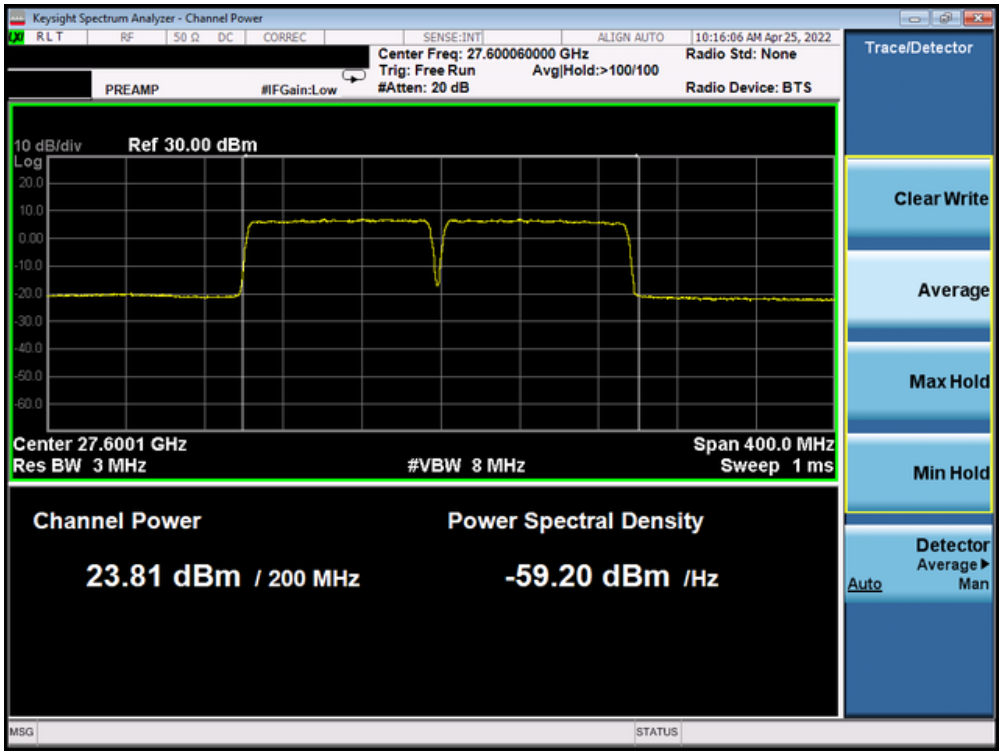
Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50	1	Low	27525.00	DFT-s-OFDM	QPSK	37	H	SISO	V	89.1	94	1 / 16	27.16
		Low	27525.00	DFT-s-OFDM	QPSK	165	V	SISO	H	90.5	97	1 / 19	28.40
		Low	27525.00	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	H	89.1	91	1 / 16	**28.97**
		Low	27525.00	CP-OFDM	QPSK	37	H	SISO	V	89.1	94	1 / 19	24.77
		Low	27525.00	CP-OFDM	QPSK	165	V	SISO	H	90.5	97	1 / 19	25.78
		Low	27525.00	CP-OFDM	QPSK	37+165	H + V	MIMO	H	89.1	91	1 / 16	25.77
		Mid	27924.96	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	H	87.1	94	1 / 16	28.00
		High	28324.92	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	H	88.8	79	1 / 16	26.89
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	37+165	H + V	2Tx	H	89.1	91	1 / 16	28.08
		Low	27525.00	DFT-s-OFDM	16QAM	37+165	H + V	2Tx	H	89.1	91	1 / 16	26.50
		Low	27525.00	DFT-s-OFDM	64QAM	37+165	H + V	2Tx	H	89.1	91	1 / 16	25.19
50+50	2	Low	27525.00	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	H	90.6	86	32 / 0	25.63
		Low	27525.00	DFT-s-OFDM	π/2 BPSK	37+165	H + V	2Tx	H	90.6	86	32 / 0	25.68
		Low	27525.00	DFT-s-OFDM	16QAM	37+165	H + V	2Tx	H	90.6	86	32 / 0	24.21
		Low	27525.00	DFT-s-OFDM	64QAM	37+165	H + V	2Tx	H	90.6	86	1 / 12	22.44

Table 7-9. Ant2 EIRP Data (Band n261 − 50MHz)

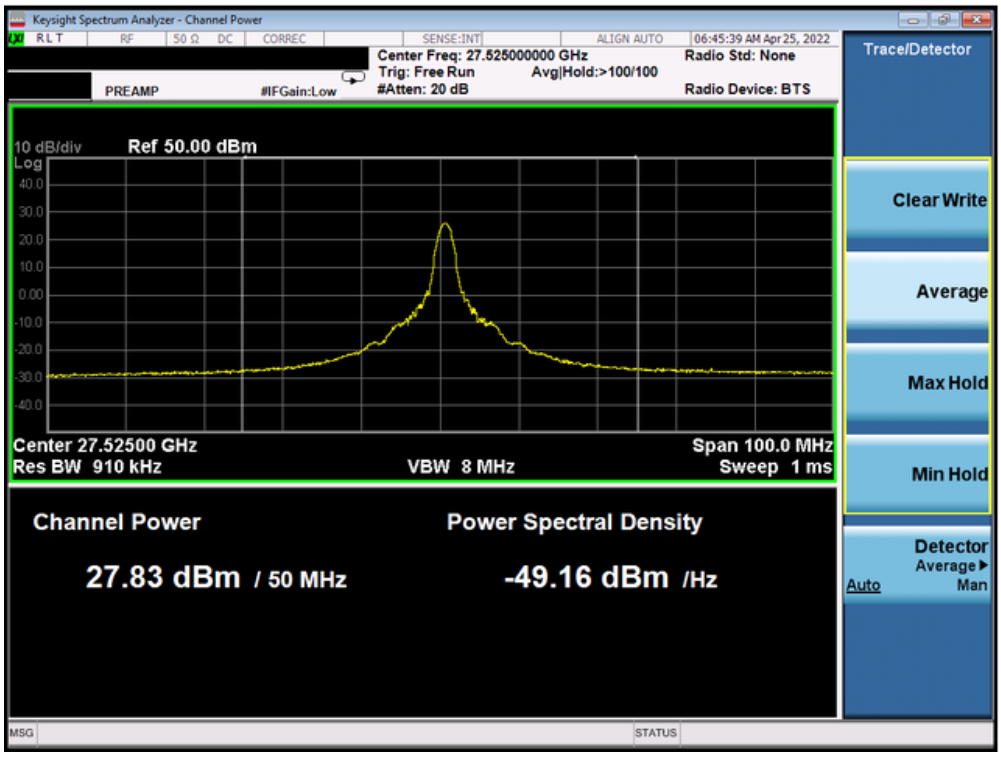
Worst-Case EIRP Plots (n261)



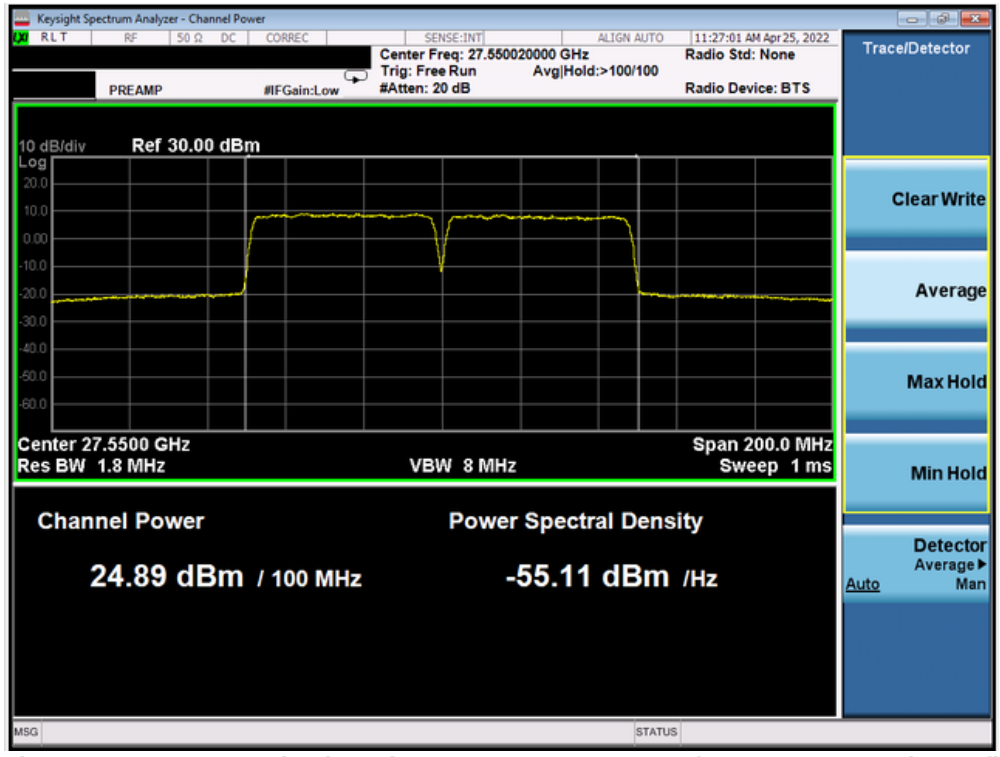
Plot 7-33. Ant1 EIRP Plot (Band n261 − 100MHz-1CC – π/2 BPSK – Low Channel)



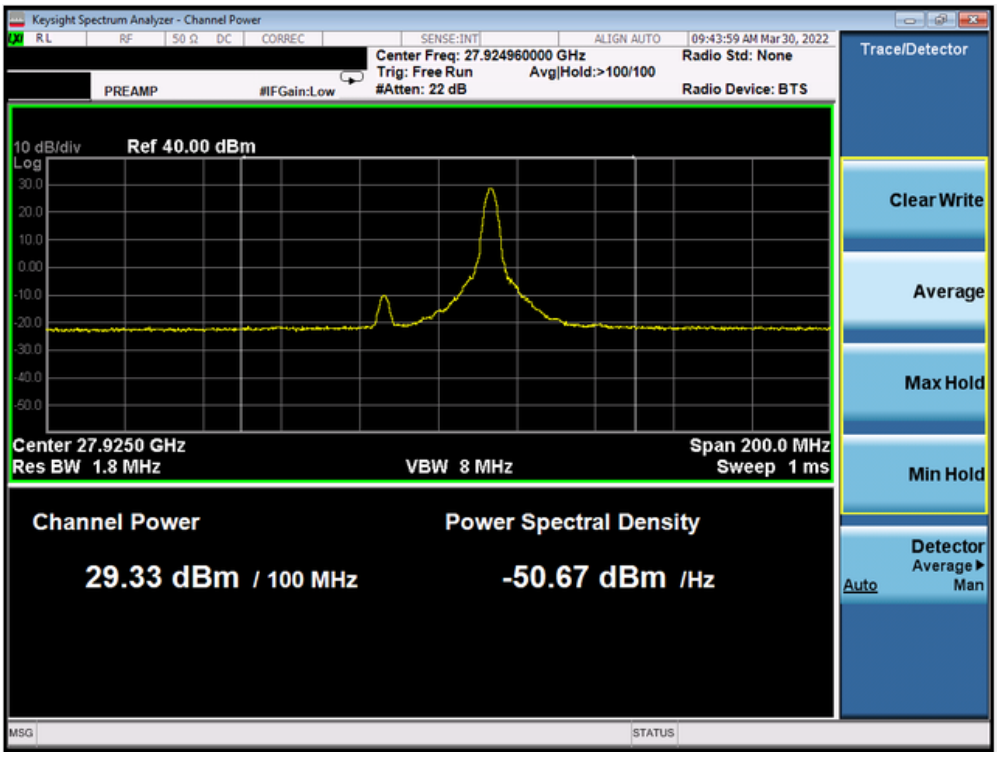
Plot 7-34. Ant1 EIRP Plot (Band n261 − 100MHz-2CC – QPSK – Low Channel)



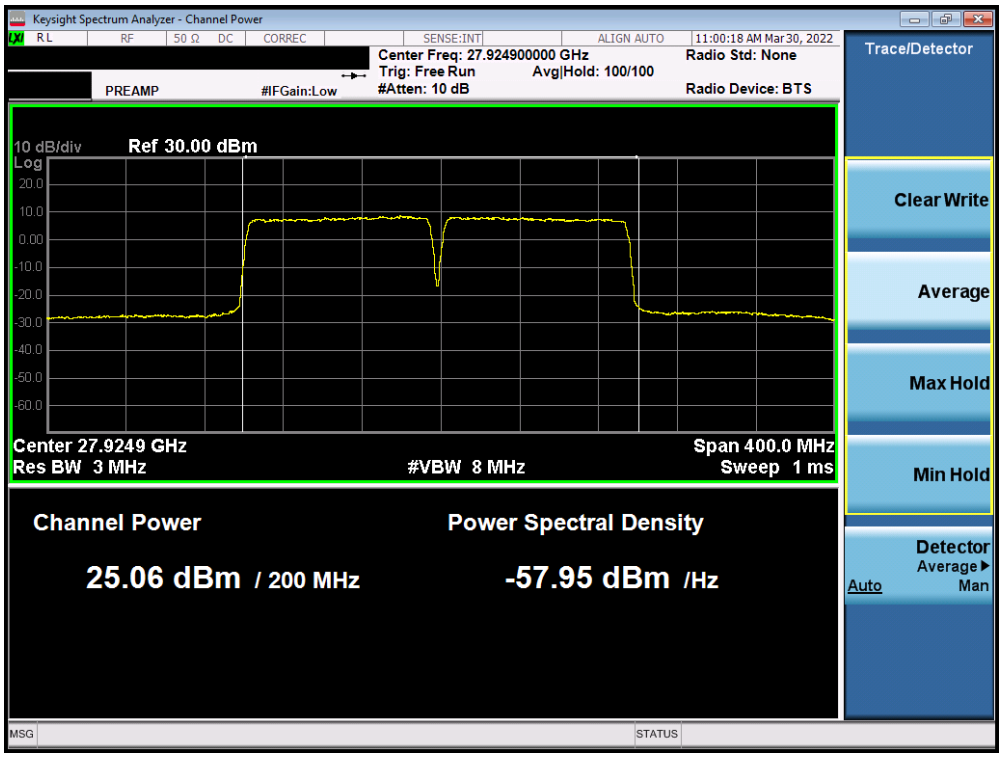
Plot 7-35. Ant1 EIRP Plot (Band n261 − 50MHz-1CC − QPSK – Low Channel)



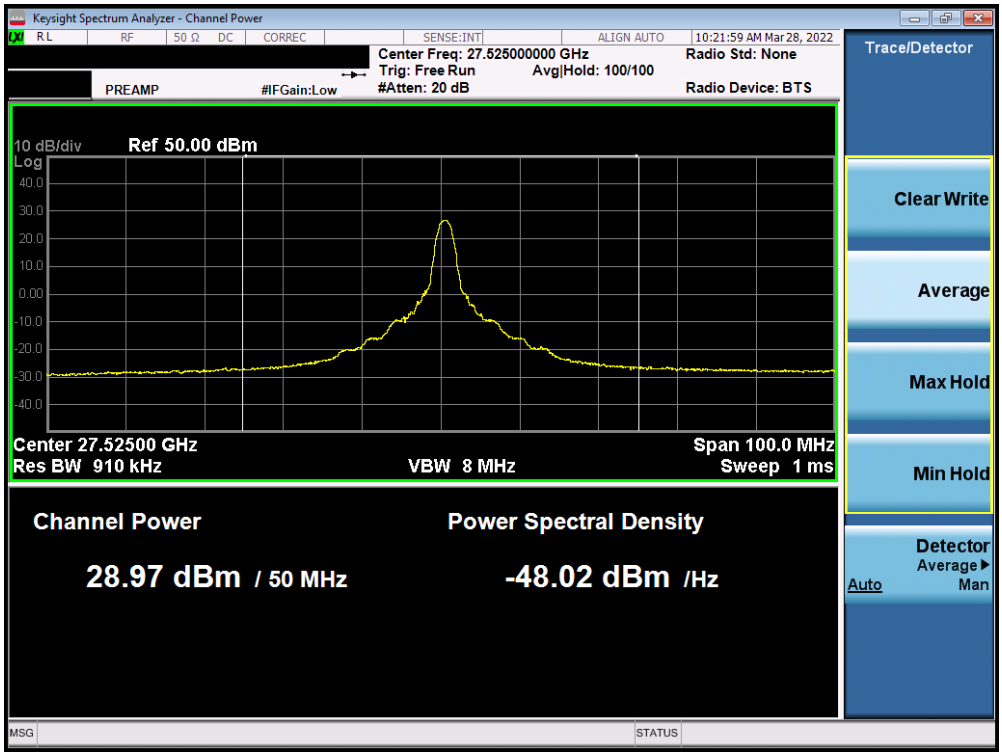
Plot 7-36. Ant1 EIRP Plot (Band n261 − 50MHz-2CC − π/2-BPSK – Low Channel)



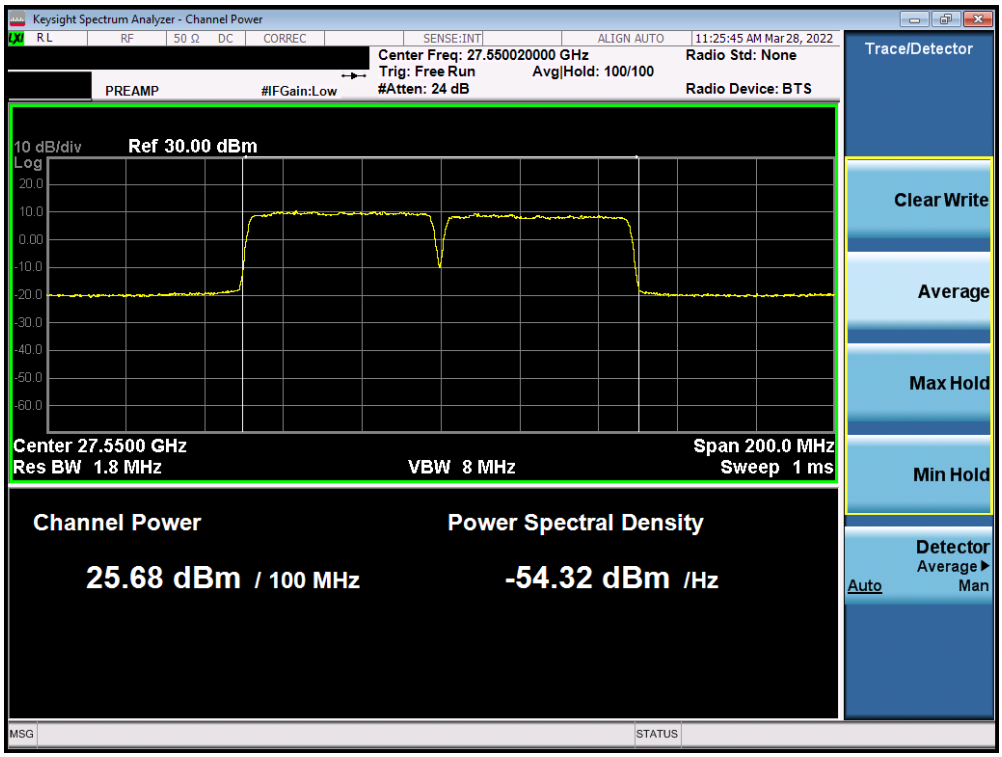
Plot 7-37. Ant2 EIRP Plot (Band n261 − 100MHz-1CC − QPSK – Mid Channel)



Plot 7-38. Ant2 EIRP Plot (Band n261 − 100MHz-2CC – QPSK – Mid Channel)



Plot 7-39. Ant2 EIRP Plot (Band n261 − 50MHz-1CC − QPSK – Low Channel)



Plot 7-40. Ant2 EIRP Plot (Band n261 − 50MHz-2CC − π/2-BPSK – Low Channel)

Band n260 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	25	-
		V	152	-
	Mid	H	25	-
		V	152	-
	High	H	25	-
		V	152	-
MIMO	Low	2Tx/MIMO	24	152
	Mid	2Tx/MIMO	24	152
	High	2Tx/MIMO	24	152

Table 7-10. Ant1 Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	28	-
		V	166	-
	Mid	H	28	-
		V	166	-
	High	H	28	-
		V	166	-
MIMO	Low	2Tx/MIMO	37	165
	Mid	2Tx/MIMO	37	165
	High	2Tx/MIMO	37	165

Table 7-11. Ant2 Worst Case Beam ID

Band n260

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100	1	Mid	38499.96	DFT-s-OFDM	QPSK	25	H	SISO	V	152.8	2	1 / 33	24.17
		Mid	38499.96	DFT-s-OFDM	QPSK	152	V	SISO	H	178.0	12	1 / 42	28.32
		Mid	38499.96	DFT-s-OFDM	QPSK	24+152	H + V	2Tx	H	182.7	33	1 / 42	**29.23**
		Mid	38499.96	CP-OFDM	QPSK	25	H	SISO	V	152.8	2	1 / 33	21.43
		Mid	38499.96	CP-OFDM	QPSK	152	V	SISO	H	178.0	12	1 / 42	24.26
		Mid	38499.96	CP-OFDM	QPSK	24+152	H + V	MIMO	H	182.7	33	1 / 42	26.46
		Low	37050.00	DFT-s-OFDM	QPSK	24+152	H + V	2Tx	H	182.4	38	1 / 42	28.51
		High	39949.92	DFT-s-OFDM	QPSK	24+152	H + V	2Tx	H	180.5	42	1 / 42	28.15
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	24+152	H + V	2Tx	H	182.7	33	1 / 42	28.57
		Mid	38499.96	DFT-s-OFDM	16QAM	24+152	H + V	2Tx	H	182.7	33	1 / 42	27.74
		Mid	38499.96	DFT-s-OFDM	64QAM	24+152	H + V	2Tx	H	182.7	33	1 / 42	26.98
100+100	2	Mid	38499.96	DFT-s-OFDM	QPSK	24+152	H+V	2Tx	H	177.7	8	66 / 0	25.42
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	24+152	H + V	2Tx	H	177.7	8	66 / 0	24.96
		Mid	38499.96	DFT-s-OFDM	16QAM	24+152	H + V	2Tx	H	177.7	8	66 / 0	23.98
		Mid	38499.96	DFT-s-OFDM	64QAM	24+152	H + V	2Tx	H	177.7	8	1 / 42	22.48

Table 7-12. Ant1 EIRP Data (Band n260 − 100MHz)

Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50	1	Mid	38499.96	DFT-s-OFDM	QPSK	25	H	SISO	V	157.0	361	1 / 19	25.25
		Mid	38499.96	DFT-s-OFDM	QPSK	152	V	SISO	H	177.9	364	1 / 16	29.09
		Mid	38499.96	DFT-s-OFDM	QPSK	24+152	H + V	2Tx	H	187.2	22	1 / 16	**30.09**
		Mid	38499.96	CP-OFDM	QPSK	25	H	SISO	V	157.0	361	1 / 19	22.06
		Mid	38499.96	CP-OFDM	QPSK	152	V	SISO	H	177.9	364	1 / 16	25.38
		Mid	38499.96	CP-OFDM	QPSK	24+152	H + V	MIMO	H	187.2	22	1 / 16	26.05
		Low	37025.04	DFT-s-OFDM	QPSK	24+152	H + V	2Tx	H	189.1	22	1 / 16	29.74
		High	39975.00	DFT-s-OFDM	QPSK	24+152	H + V	2Tx	H	185.0	20	1 / 16	28.64
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	24+152	H + V	2Tx	H	187.2	22	1 / 16	29.11
		Mid	38499.96	DFT-s-OFDM	16QAM	24+152	H + V	2Tx	H	187.2	22	1 / 16	27.63
		Mid	38499.96	DFT-s-OFDM	64QAM	24+152	H + V	2Tx	H	187.2	22	1 / 16	25.67
50+50	2	Mid	38499.96	DFT-s-OFDM	QPSK	24+152	H + V	2Tx	H	177.0	364	32 / 0	25.20
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	24+152	H + V	2Tx	H	177	364	32 / 0	25.22
		Mid	38499.96	DFT-s-OFDM	16QAM	24+152	H + V	2Tx	H	177	364	32 / 0	23.89
		Mid	38499.96	DFT-s-OFDM	64QAM	24+152	H + V	2Tx	H	177	364	32 / 0	21.08

Table 7-13. Ant1 EIRP Data (Band n260 − 50MHz)

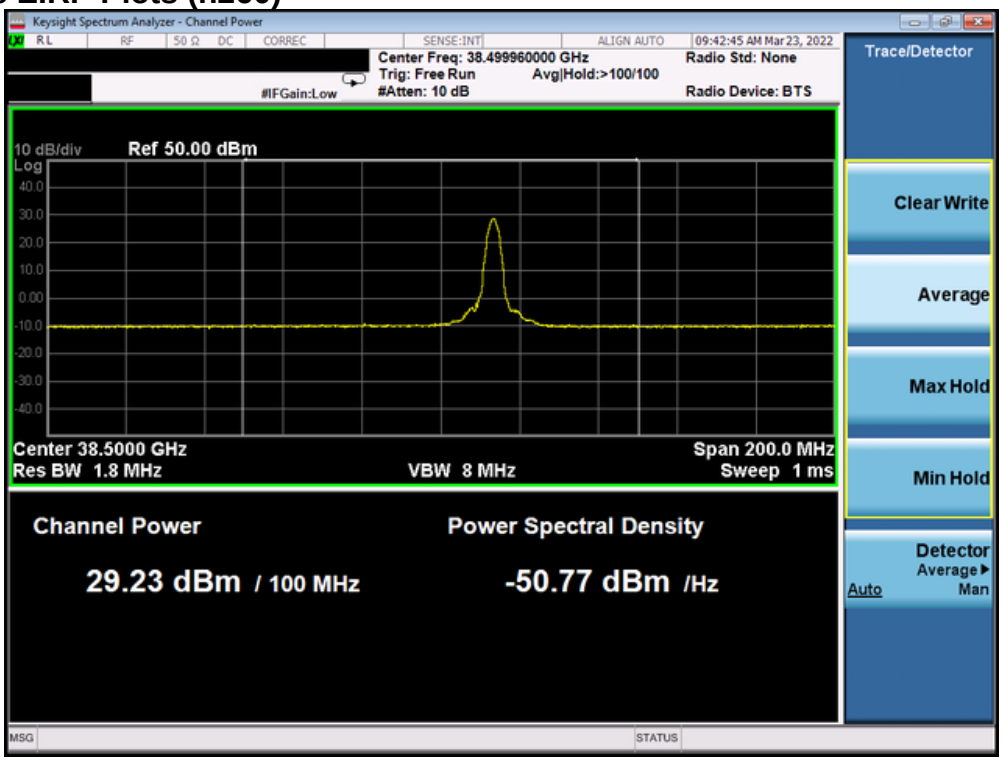
Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100	1	Mid	38499.96	DFT-s-OFDM	QPSK	28	H	SISO	V	80.7	69	1 / 42	24.89
		Low	37050.00	DFT-s-OFDM	QPSK	166	V	SISO	H	249.7	289	1 / 42	24.21
		Mid	38499.96	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	V	84.8	60	1 / 23	**27.78**
		Mid	38499.96	CP-OFDM	QPSK	28	H	SISO	V	80.7	69	1 / 42	22.96
		Low	37050.00	CP-OFDM	QPSK	166	V	SISO	H	249.7	289	1 / 42	21.05
		Mid	38499.96	CP-OFDM	QPSK	37+165	H + V	MIMO	V	84.8	60	1 / 23	23.36
		Low	37050.00	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	V	86.2	61	1 / 42	24.46
		High	39949.92	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	V	82.7	59	1 / 23	26.27
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	37+165	H + V	2Tx	V	84.8	60	1 / 23	27.23
		Mid	38499.96	DFT-s-OFDM	16QAM	37+165	H + V	2Tx	V	84.8	60	1 / 42	25.32
		Mid	38499.96	DFT-s-OFDM	64QAM	37+165	H + V	2Tx	V	84.8	60	1 / 42	24.16
100+100	2	Mid	38499.96	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	V	84.2	56	66 / 0	25.14
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	37+165	H + V	2Tx	V	84.2	56	66 / 0	24.83
		Mid	38499.96	DFT-s-OFDM	16QAM	37+165	H + V	2Tx	V	84.2	56	66 / 0	23.43
		Mid	38499.96	DFT-s-OFDM	64QAM	37+165	H + V	2Tx	V	84.2	56	1 / 33	20.79

Table 7-14. Ant2 EIRP Data (Band n260 − 100MHz)

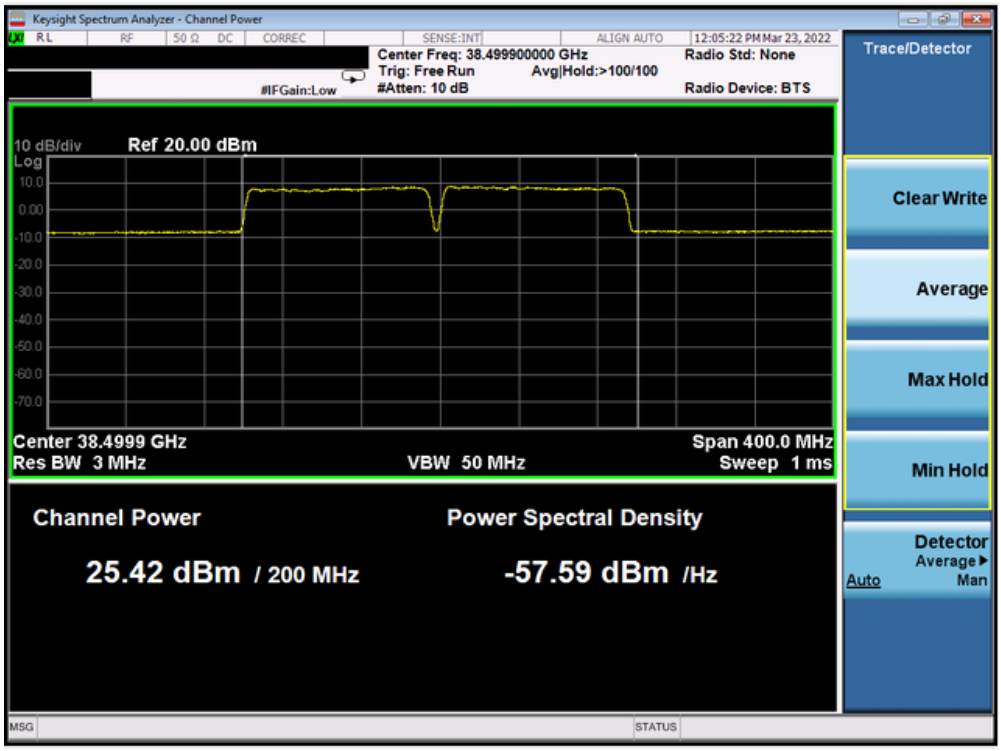
Bandwidth (MHz)	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50	1	Mid	38499.96	DFT-s-OFDM	QPSK	28	H	SISO	V	80.7	66	1 / 19	24.08
		Low	37025.04	DFT-s-OFDM	QPSK	166	V	SISO	H	245.7	276	1 / 12	24.60
		Mid	38499.96	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	V	84.7	60	1 / 16	**27.44**
		Mid	38499.96	CP-OFDM	QPSK	28	H	SISO	V	80.7	66	1 / 16	21.03
		Low	37025.04	CP-OFDM	QPSK	166	V	SISO	H	245.7	276	1 / 12	21.34
		Mid	38499.96	CP-OFDM	QPSK	37+165	H + V	MIMO	V	84.7	60	1 / 16	23.04
		Low	37025.04	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	V	86.4	62	1 / 19	24.44
		High	39975.00	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	V	82.5	58	1 / 12	25.78
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	37+165	H + V	2Tx	V	84.7	60	1 / 16	27.31
		Mid	38499.96	DFT-s-OFDM	16QAM	37+165	H + V	2Tx	V	84.7	60	1 / 19	25.44
		Mid	38499.96	DFT-s-OFDM	64QAM	37+165	H + V	2Tx	V	84.7	60	1 / 16	23.03
50+50	2	Mid	38499.96	DFT-s-OFDM	QPSK	37+165	H + V	2Tx	V	86.2	59	32 / 0	24.66
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	37+165	H + V	2Tx	V	86.2	59	32 / 0	24.63
		Mid	38499.96	DFT-s-OFDM	16QAM	37+165	H + V	2Tx	V	86.2	59	32 / 0	23.20
		Mid	38499.96	DFT-s-OFDM	64QAM	37+165	H + V	2Tx	V	86.2	59	1 / 19	20.71

Table 7-15. Ant2 EIRP Data (Band n260 − 50MHz)

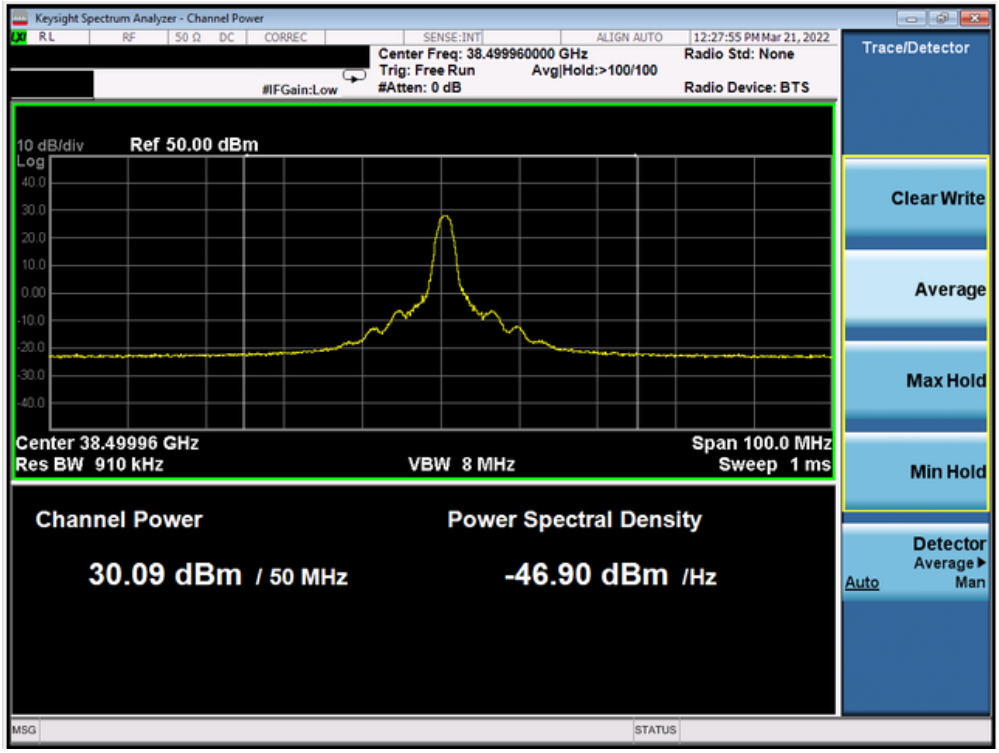
Worst-Case EIRP Plots (n260)



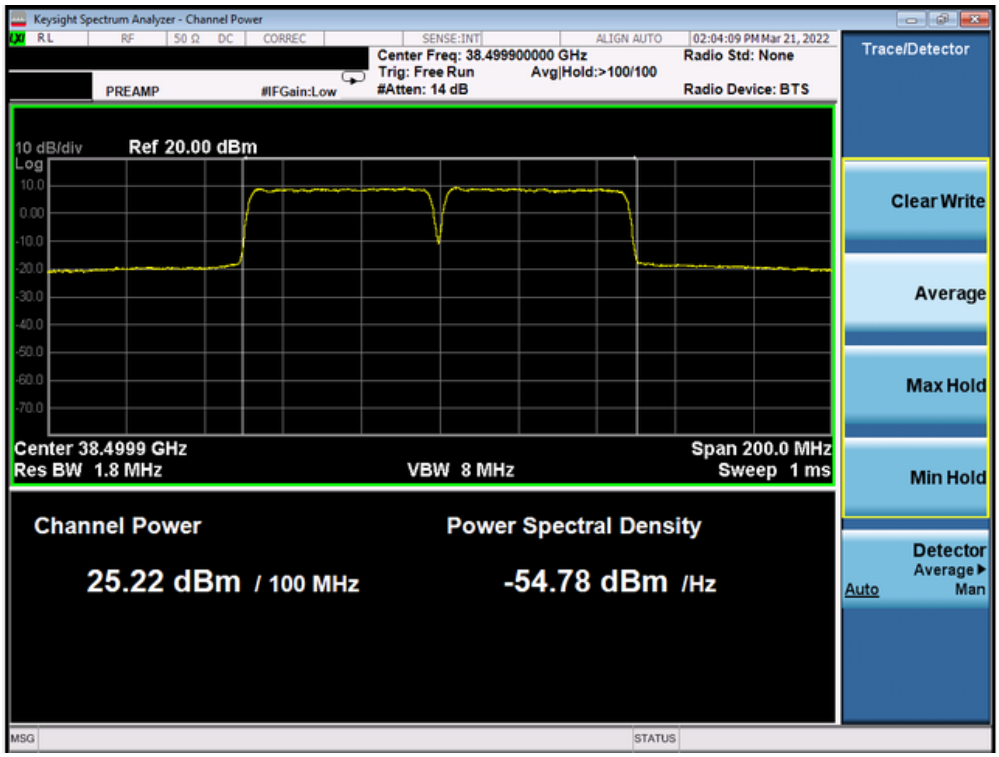
Plot 7-41. Ant1 EIRP Plot (Band n260 − 100MHz-1CC − QPSK – Mid Channel)



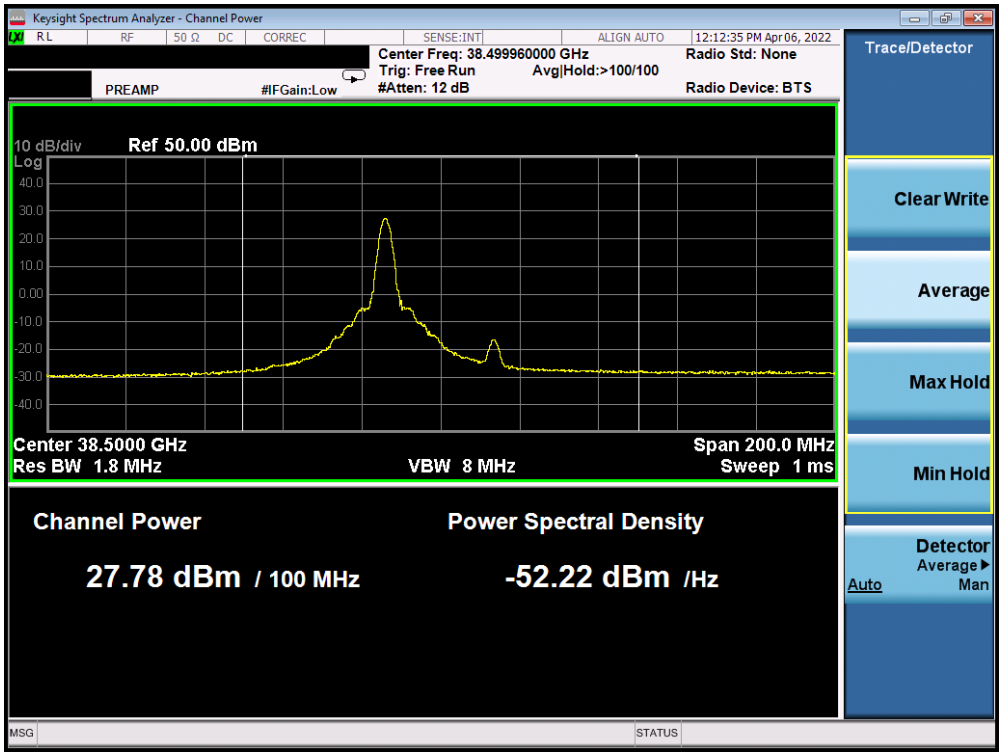
Plot 7-42. Ant1 EIRP Plot (Band n260 − 100MHz-2CC − QPSK – Mid Channel)



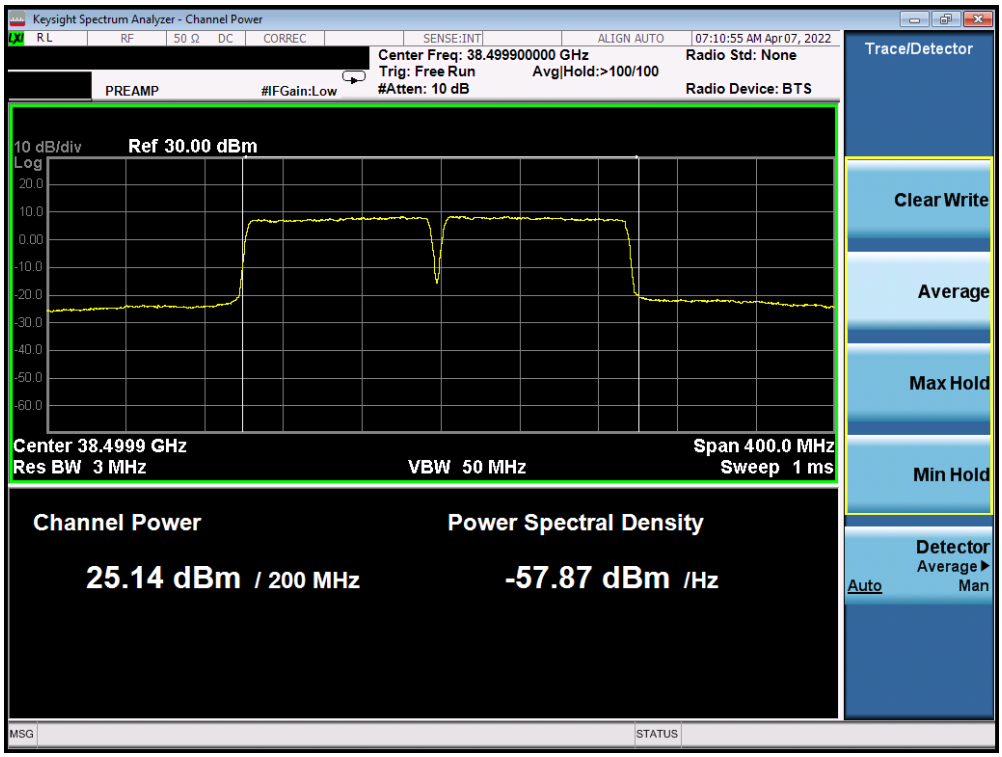
Plot 7-43. Ant1 EIRP Plot (Band n260 − 50MHz-1CC − QPSK – Mid Channel)



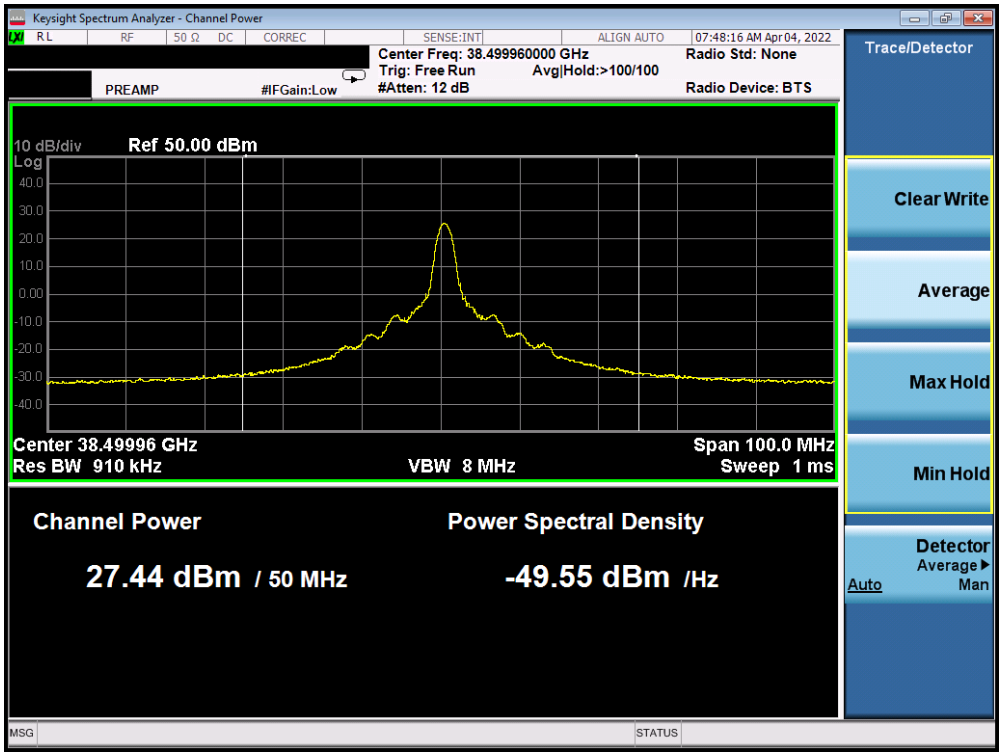
Plot 7-44. Ant1 EIRP Plot (Band n260 − 50MHz-2CC − BPSK – Mid Channel)



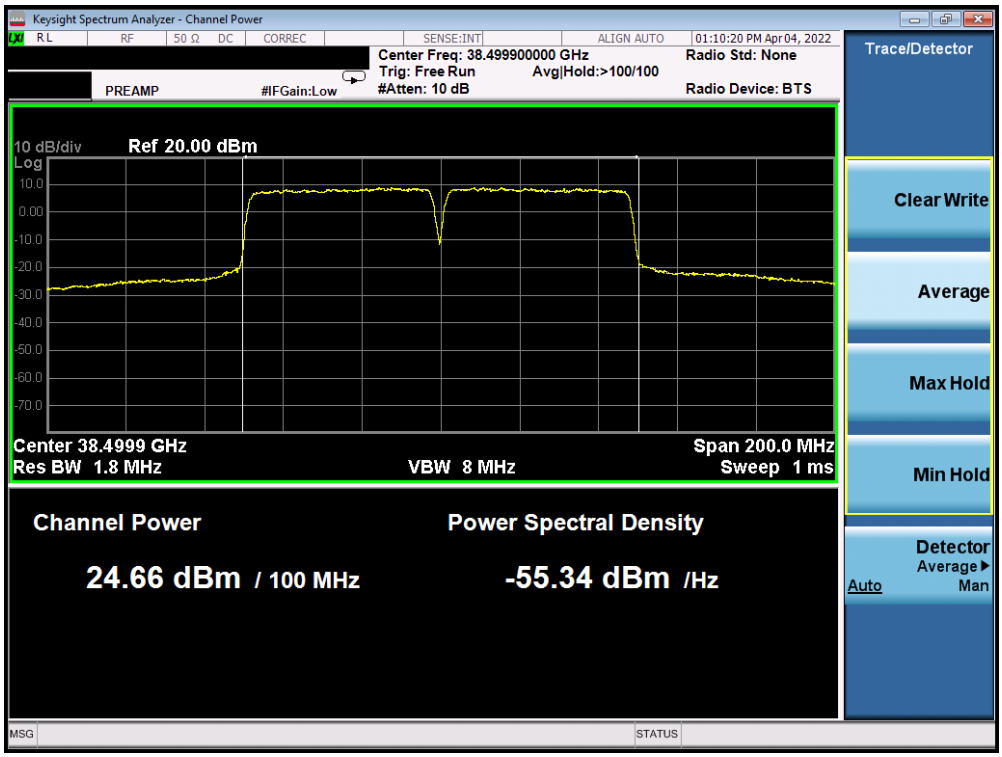
Plot 7-45. Ant2 EIRP Plot (Band n260 − 100MHz-1CC − QPSK – Mid Channel)



Plot 7-46. Ant2 EIRP Plot (Band n260 − 100MHz-2CC – QPSK – Mid Channel)



Plot 7-47. Ant2 EIRP Plot (Band n260 − 50MHz-1CC − QPSK – Mid Channel)



Plot 7-48. Ant2 EIRP Plot (Band n260 − 50MHz-2CC – QPSK – Mid Channel)

7.4 Radiated Spurious and Harmonic Emissions

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

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 5.5.4
KDB 842590 D01 – 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. Emissions that were found to be non-compliant using the EIRP method were re-measured using the Spherical Grid TRP Method per KDB 842590 D01 Section 4.4.3.3.4.

3) 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.

4) 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.

5) 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 Factors and Cable Losses have been applied in the spectrum analyzer for each measurement. For measurements > 40GHz, a Harmonic Mixer Conversion Loss was also applied to the spectrum analyzer.

6) Emissions below 18GHz were measured at a 3 meter test distance, while emissions above 18GHz were measured at the appropriate far field distance. The far field of the mmWave signal is based on formula: R > 2D^2/wavelength, where D is the larger between the dimension of the measurement antenna and the transmitting antenna of the EUT. In this case, D is the largest dimension of the measurement antenna.

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

Table 7-16. Far-Field Distance & Measurement Distance per Frequency Range

7) All emissions from 18MHz - 40GHz were measured using a spectrum analyzer with an internal preamplifier. Emissions >40GHz were measured using a harmonic mixer with the spectrum analyzer.

8) 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.

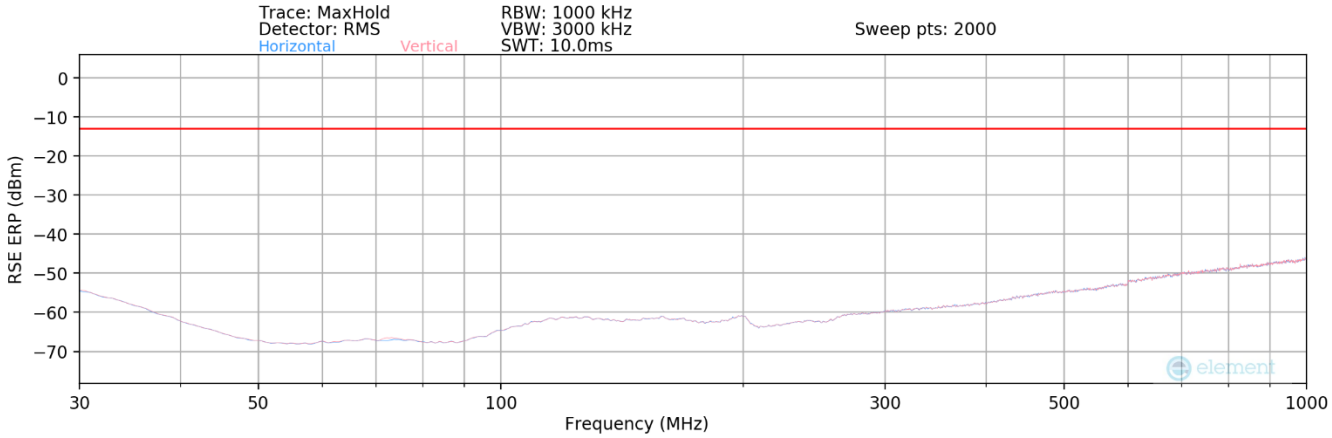
9) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

10) 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, B66 and B48, n260 uses LTE B2, B14, B13 and B66.

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

Band n261 – Ant1

30MHz - 1GHz



Plot 7-49. Ant1 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

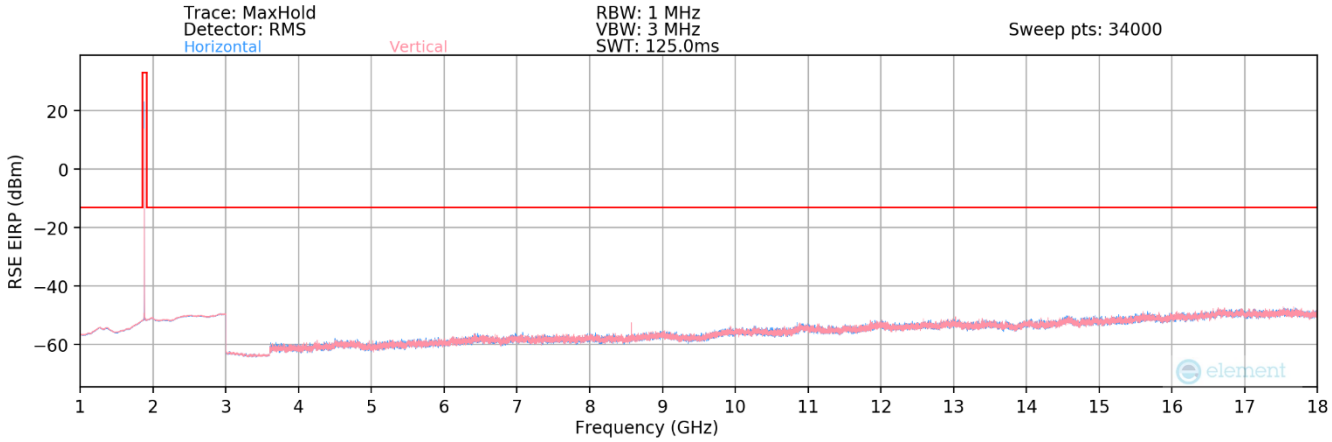
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
191.65	Low	50	2Tx	QPSK	V	-	-	-60.11	-13.00	-47.11
534.16	Mid	50	2Tx	QPSK	V	-	-	-51.89	-13.00	-38.89
831.41	High	50	2Tx	QPSK	V	-	-	-47.06	-13.00	-34.06

Table 7-17. Ant1 - n261 Radiated 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.

1GHz - 18GHz



Plot 7-50. Ant1 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

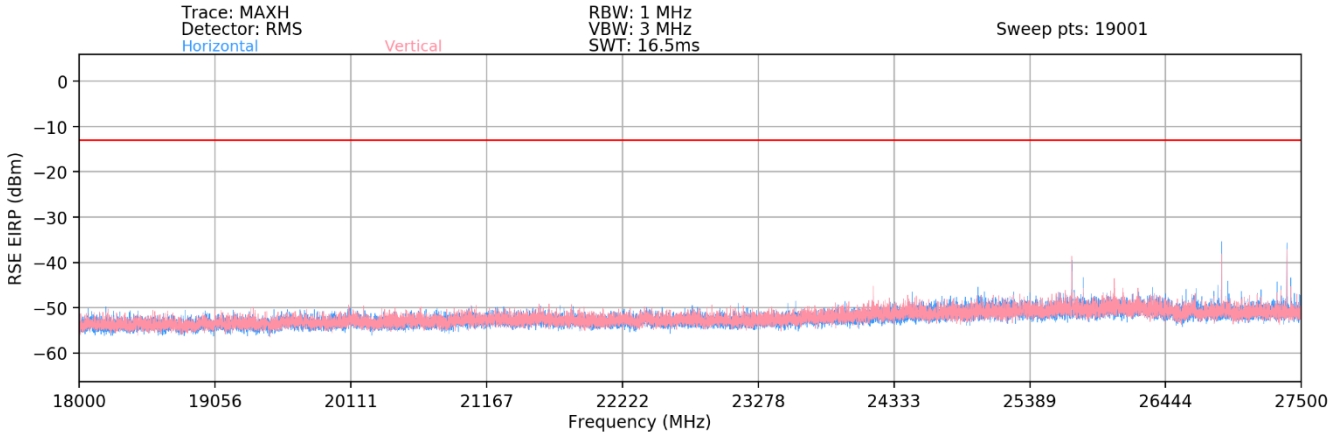
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
4015.38	Low	50	2Tx	QPSK	V	-	-	-64.01	-13.00	-51.01
8571.98	Mid	50	2Tx	QPSK	V	148	156	-55.36	-13.00	-42.36
13001.92	High	50	2Tx	QPSK	V	-	-	-56.18	-13.00	-43.18

Table 7-18. Ant1 - n261 Radiated 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.

18GHz - 27.5GHz



Plot 7-51. Ant1 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

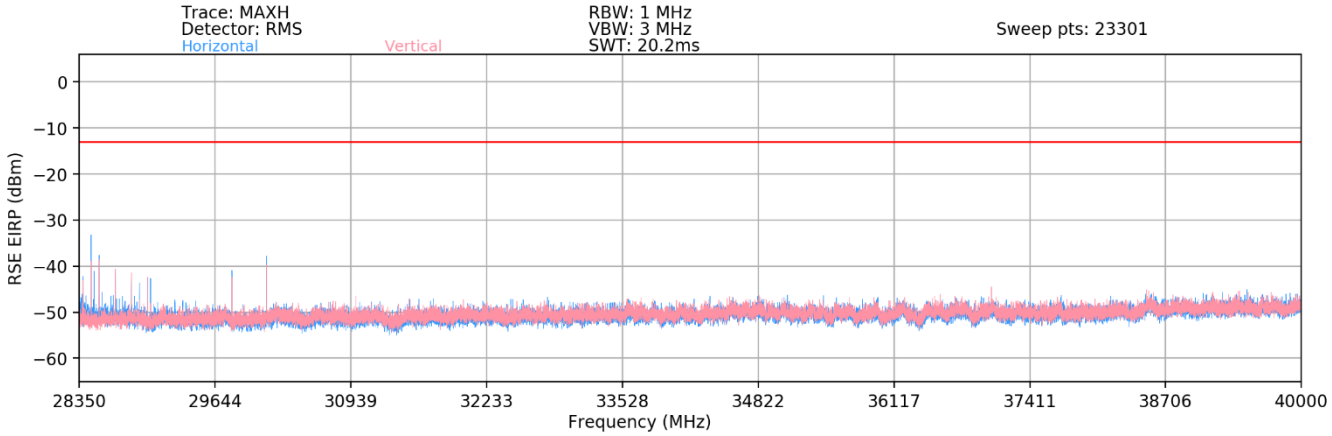
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
19355.00	Low	50	2Tx	QPSK	H	160	150	-56.37	-13.00	-43.37
25741.00	Mid	50	2Tx	QPSK	H	176	150	-48.58	-13.00	-35.58
27388.00	High	50	2Tx	QPSK	H	269	150	-43.32	-13.00	-30.32
24162.00	High	50	2Tx	QPSK	H	368	150	-55.74	-13.00	-42.74
26879.00	High	50	2Tx	QPSK	H	281	150	-45.68	-13.00	-32.68

Table 7-19. Ant1 - n261 Radiated 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.

28.35GHz - 40GHz



Plot 7-52. Ant1 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

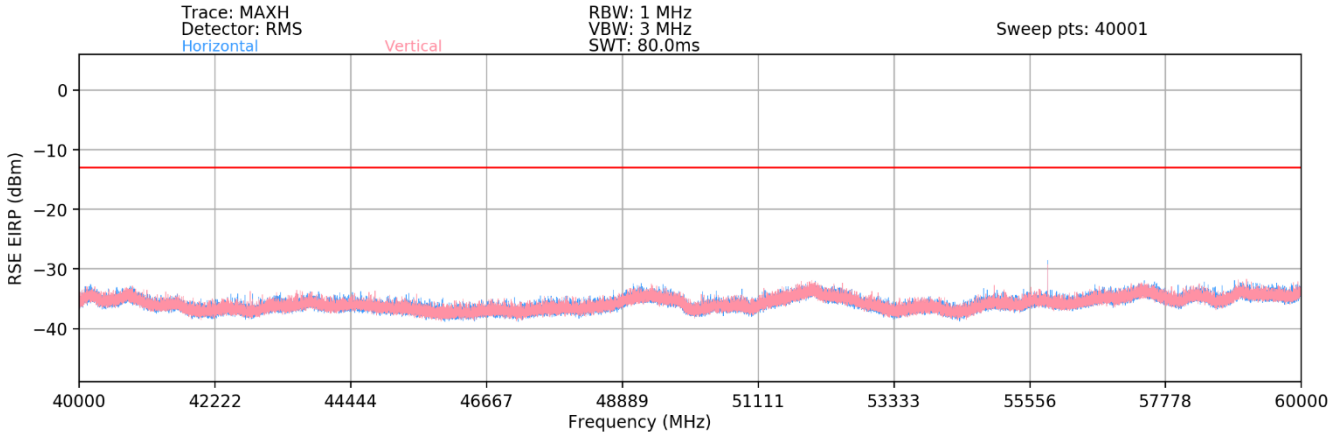
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
28463.00	Low	50	2Tx	QPSK	H	253	150	-43.50	-13.00	-30.50
28492.00	Low	50	2Tx	QPSK	H	278	150	-53.83	-13.00	-40.83
28540.14	Low	50	2Tx	QPSK	H	268	150	-46.53	-13.00	-33.53
28693.00	Low	50	2Tx	QPSK	H	274	150	-50.75	-13.00	-37.75
29001.25	Low	50	2Tx	QPSK	H	270	150	-48.26	-13.00	-35.26
29805.00	Mid	50	2Tx	QPSK	H	278	150	-49.52	-13.00	-36.52
30134.00	Mid	50	2Tx	QPSK	H	260	150	-46.44	-13.00	-33.44

Table 7-20. Ant1 - n261 Radiated 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

40GHz - 60GHz



Plot 7-53. Ant1 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

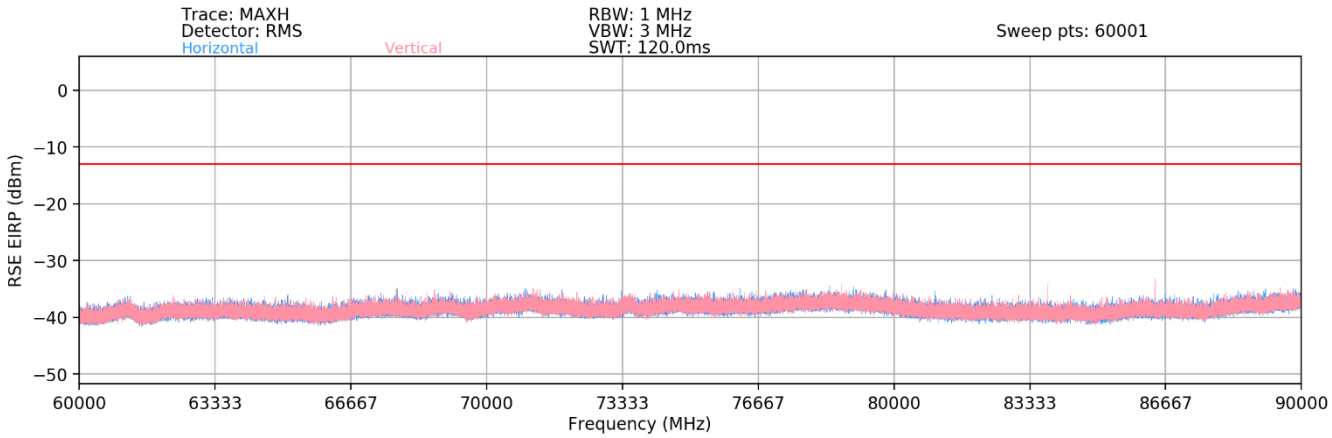
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55051.47	Low	50	2Tx	QPSK	H	75	1	-37.46	-13.00	-24.46
55851.24	Mid	50	2Tx	QPSK	H	75	358	-30.55	-13.00	-17.55
56601.11	High	50	2Tx	QPSK	H	78	345	-29.56	-13.00	-16.56

Table 7-21. Ant1 - n261 Radiated Spurious Emissions Table (40GHz - 60GHz)

Notes

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

60GHz - 90GHz



Plot 7-54. Ant1 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

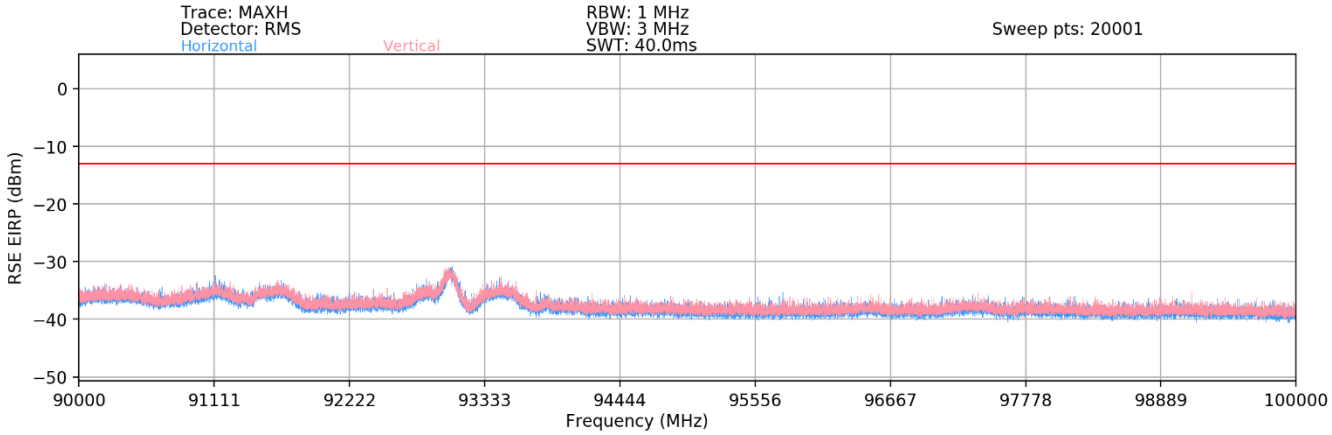
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82648.32	Low	50	2Tx	QPSK	V	281	361	-40.23	-13.00	-27.23
83776.61	Mid	50	2Tx	QPSK	V	35	345	-37.10	-13.00	-24.10
86411.78	High	50	2Tx	QPSK	V	318	9	-38.24	-13.00	-25.24

Table 7-22. Ant1 - n261 Radiated Spurious Emissions Table (60GHz - 90GHz)

Notes

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

90GHz - 100GHz



Plot 7-55. Ant1 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
94987.20	Low	50	2Tx	QPSK	V	-	-	-44.38	-13.00	-31.38
96586.42	Mid	50	2Tx	QPSK	V	-	-	-45.05	-13.00	-32.05
98998.17	High	50	2Tx	QPSK	V	-	-	-42.29	-13.00	-29.29

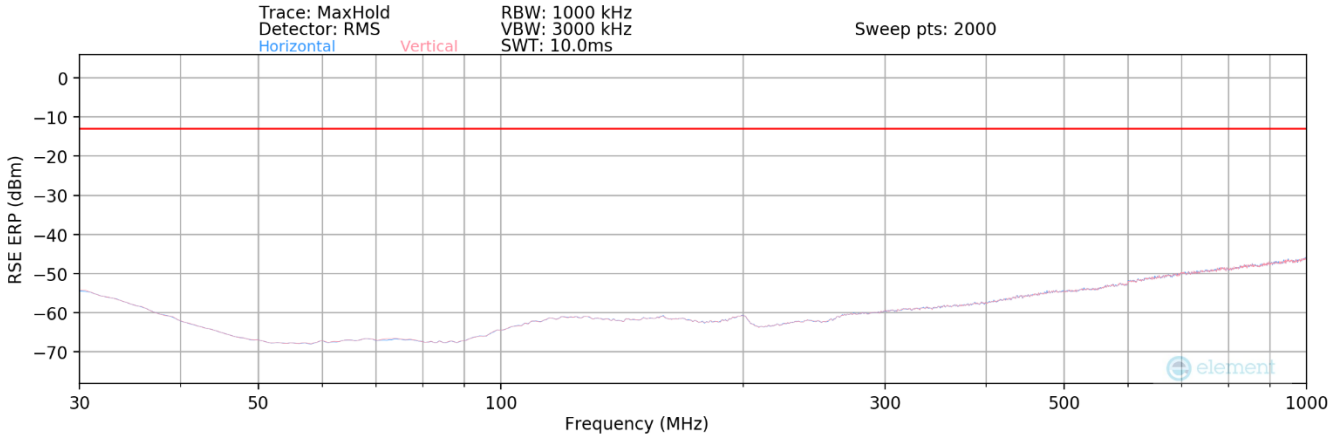
Table 7-23. Ant1 - n261 Radiated Spurious Emissions Table (90GHz - 100GHz)

Notes

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

Band n261 – Ant2

30MHz - 1GHz



Plot 7-56. Ant2 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

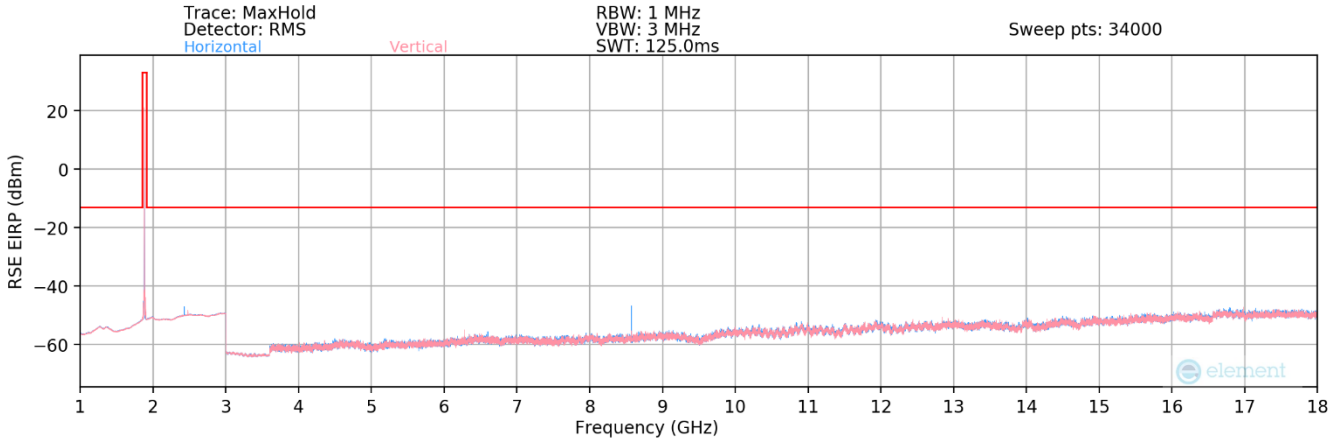
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
276.92	Low	50	2Tx	QPSK	H	-	-		-13.00	-78.35
561.73	Mid	50	2Tx	QPSK	H	-	-		-13.00	-76.91
902.30	High	50	2Tx	QPSK	H	-	-		-13.00	-76.65

Table 7-24. Ant2 - n261 Radiated 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.

1GHz - 18GHz



Plot 7-57. Ant2 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

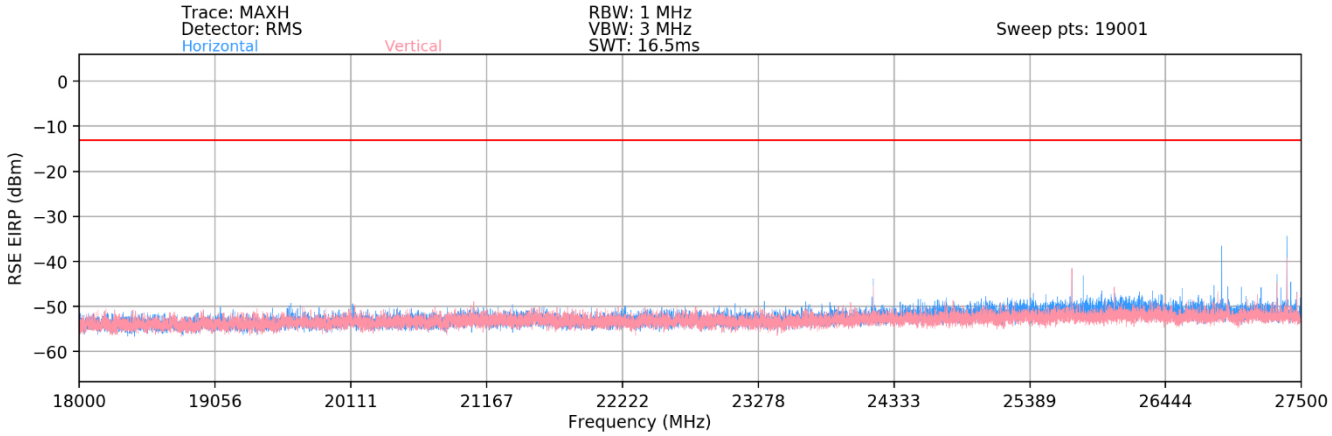
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5179.50	Low	50	2Tx	QPSK	H	-	-	-62.67	-13.00	-49.67
8572.05	Mid	50	2Tx	QPSK	H	228	128	-44.87	-13.00	-31.87
16777.00	High	50	2Tx	QPSK	H	-	-	-52.29	-13.00	-39.29

Table 7-25. Ant2 - n261 Radiated 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.

18GHz - 27.5GHz



Plot 7-58. Ant2 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

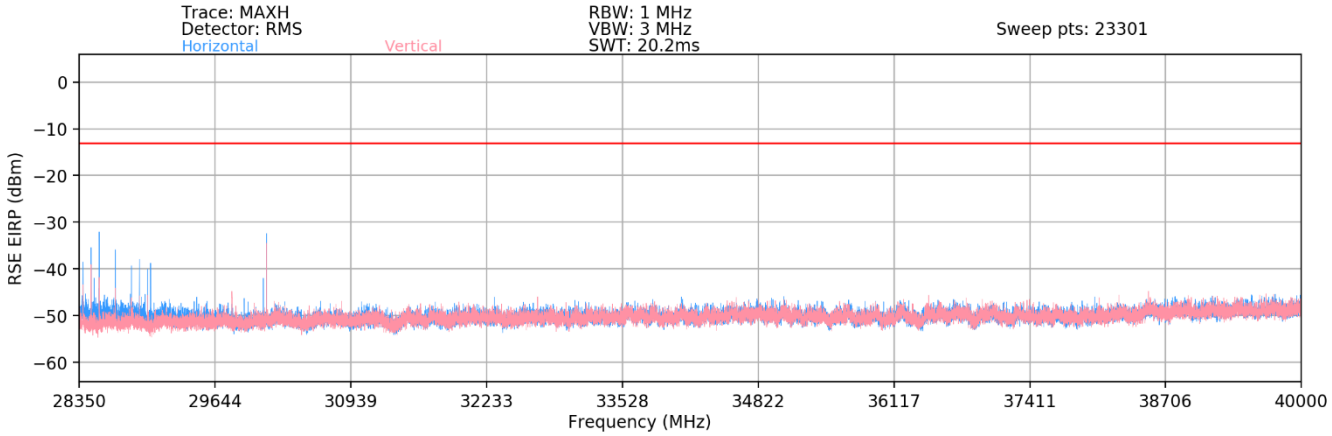
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
23986.48	Low	50	2Tx	QPSK	H	174	150	-51.91	-13.00	-38.91
25600.00	Mid	50	2Tx	QPSK	V	220	150	-49.12	-13.00	-36.12
26045.00	High	50	2Tx	QPSK	H	180	150	-52.56	-13.00	-39.56
27387.00	High	50	2Tx	QPSK	H	184	150	-44.21	-13.00	-31.21
26800.00	High	50	2Tx	QPSK	H	218	150	-42.54	-13.00	-29.54

Table 7-26. Ant2 - n261 Radiated 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.

28.35GHz - 40GHz



Plot 7-59. Ant2 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

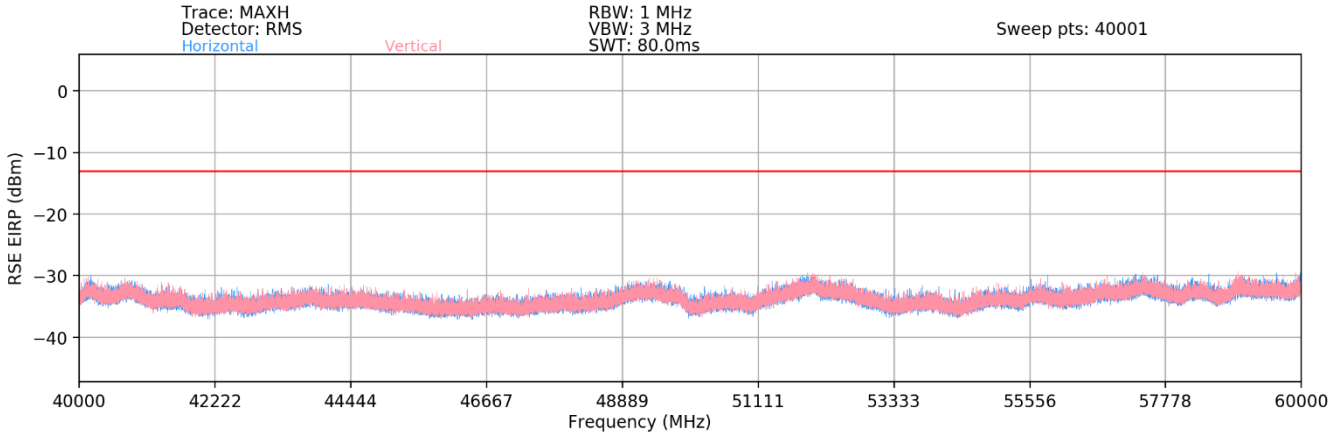
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
28385.00	Low	50	2Tx	QPSK	H	201	150	-48.11	-13.00	-35.11
28539.00	Mid	50	2Tx	QPSK	H	203	150	-42.53	-13.00	-29.53
28616.00	Mid	50	2Tx	QPSK	H	191	150	-55.42	-13.00	-42.42
28663.00	Mid	50	2Tx	QPSK	H	195	150	-47.81	-13.00	-34.81
28728.00	Mid	50	2Tx	QPSK	H	197	150	-51.02	-13.00	-38.02
29002.00	Mid	50	2Tx	QPSK	H	181	150	-59.25	-13.00	-46.25
30105.20	Mid	50	2Tx	QPSK	H	181	150	-44.55	-13.00	-31.55

Table 7-27. Ant2 - n261 Radiated 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

40GHz - 60GHz



Plot 7-60. Ant2 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

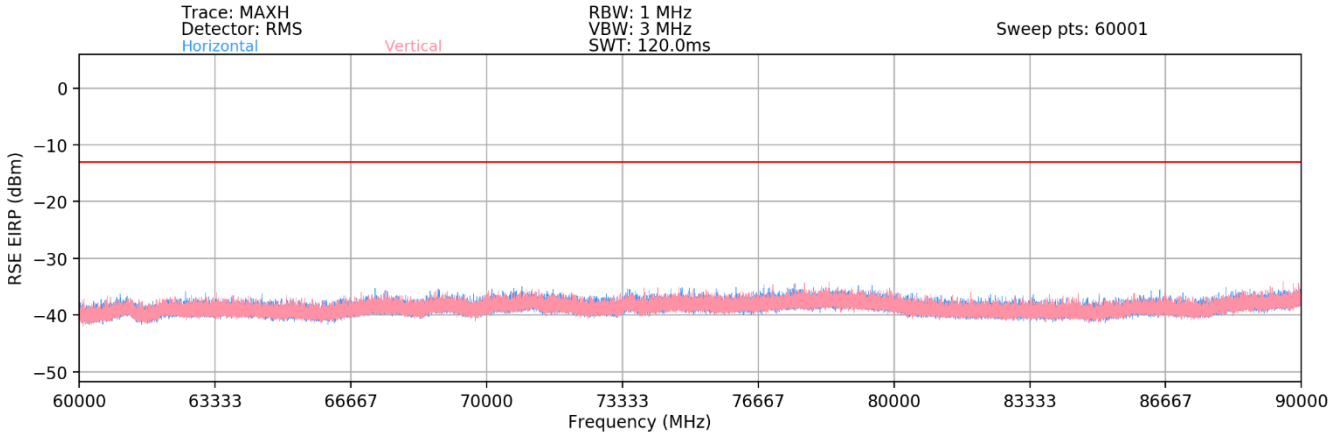
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
55051.47	Low	50	2Tx	QPSK	H	303	15	-40.75	-13.00	-27.75
55851.24	Mid	50	2Tx	QPSK	H	262	90	-37.21	-13.00	-24.21
56651.10	High	50	2Tx	QPSK	H	203	366	-38.76	-13.00	-25.76

Table 7-28. Ant2 - n261 Radiated Spurious Emissions Table (40GHz - 60GHz)

Notes

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

60GHz - 90GHz



Plot 7-61. Ant2 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

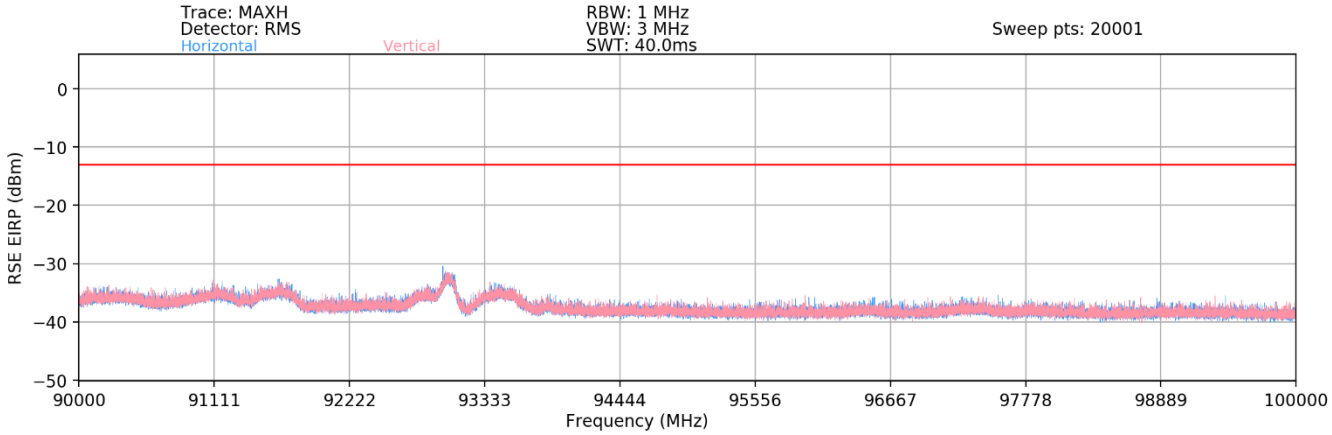
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82648.32	Low	50	2Tx	QPSK	H	272	47	-43.88	-13.00	-30.88
83776.61	Mid	50	2Tx	QPSK	H	344	21	-44.73	-13.00	-31.73
86411.78	High	50	2Tx	QPSK	H	304	94	-45.03	-13.00	-32.03

Table 7-29. Ant2 - n261 Radiated Spurious Emissions Table (60GHz - 90GHz)

Notes

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

90GHz - 100GHz



Plot 7-62. Ant2 - n261 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n261)

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

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

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
94987.20	Low	50	2Tx	QPSK	H	-	-	-44.74	-13.00	-31.74
96586.42	Mid	50	2Tx	QPSK	H	-	-	-44.98	-13.00	-31.98
98998.17	High	50	2Tx	QPSK	H	-	-	-45.19	-13.00	-32.19

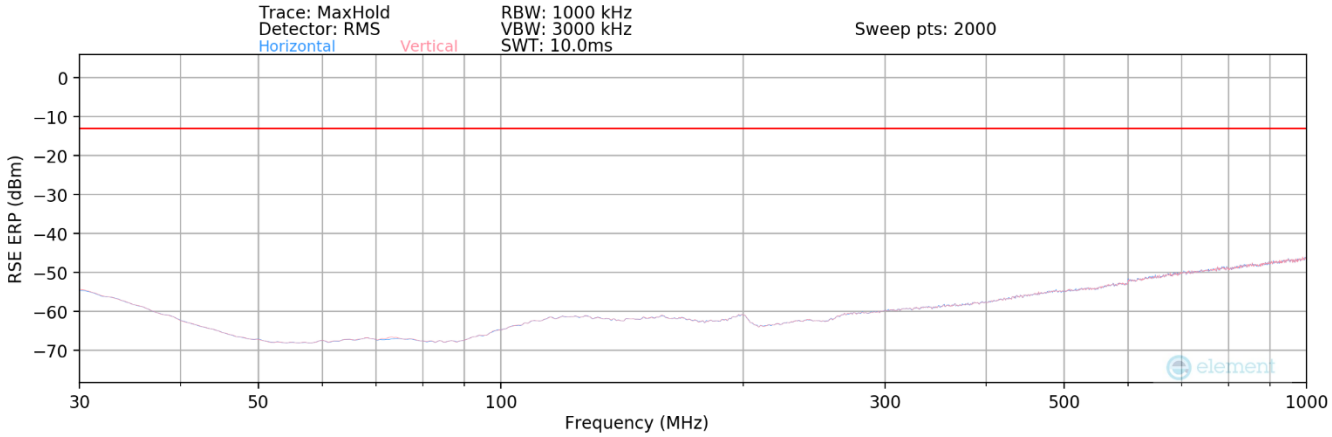
Table 7-30. Ant2 - n261 Radiated Spurious Emissions Table (90GHz - 100GHz)

Notes

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

Band n260 – Ant1

30MHz - 1GHz



Plot 7-63. Ant1 - n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

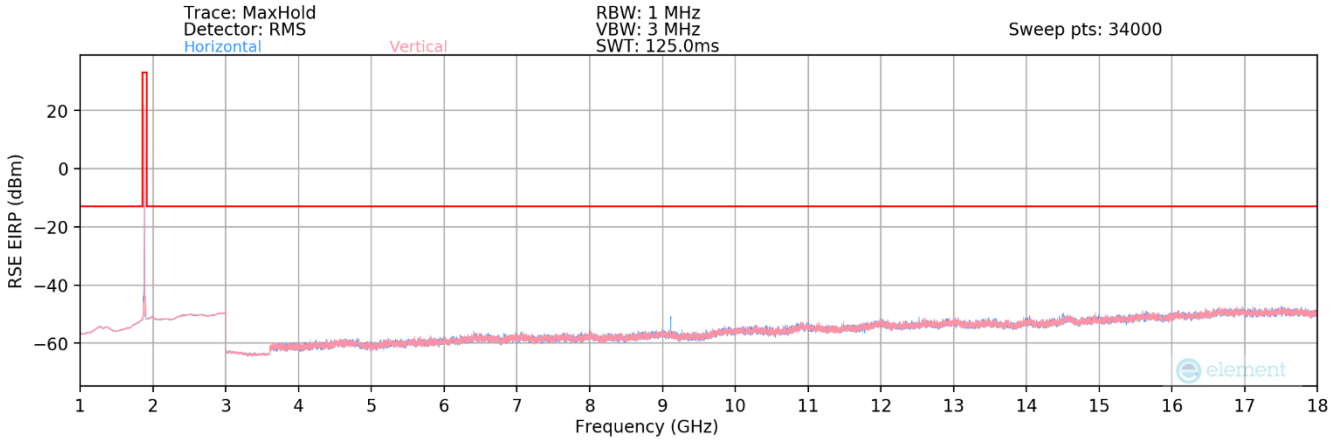
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
195.15	Low	50	2Tx	QPSK	H	-	-	-59.44	-13.00	-46.44
489.10	Mid	50	2Tx	QPSK	H	-	-	-52.94	-13.00	-39.94
868.33	High	50	2Tx	QPSK	H	-	-	-47.25	-13.00	-34.25

Table 7-31. Ant1 - n260 Radiated 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.

1GHz - 18GHz



Plot 7-64. Ant1 - n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

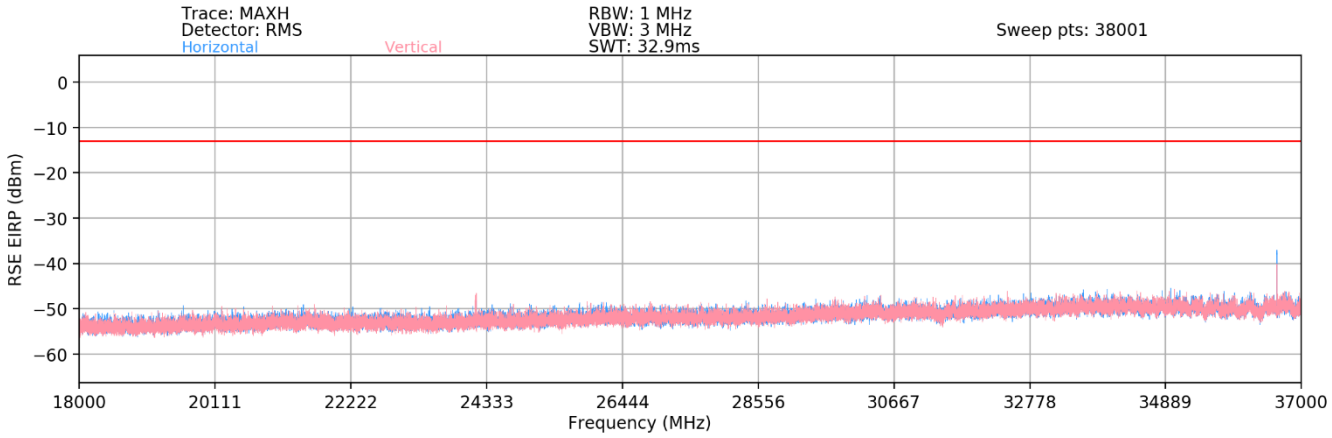
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
4002.24	Low	50	2Tx	QPSK	H	-	-	-61.78	-13.00	-48.78
9111.87	Mid	50	2Tx	QPSK	H	203	283	-50.06	-13.00	-37.06
12498.00	High	50	2Tx	QPSK	H	-	-	-54.56	-13.00	-41.56

Table 7-86. Ant1 - 2Tx - Spurious Emissions Table (1GHz - 18GHz)

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.

18GHz - 37GHz



Plot 7-65. Ant1 - n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

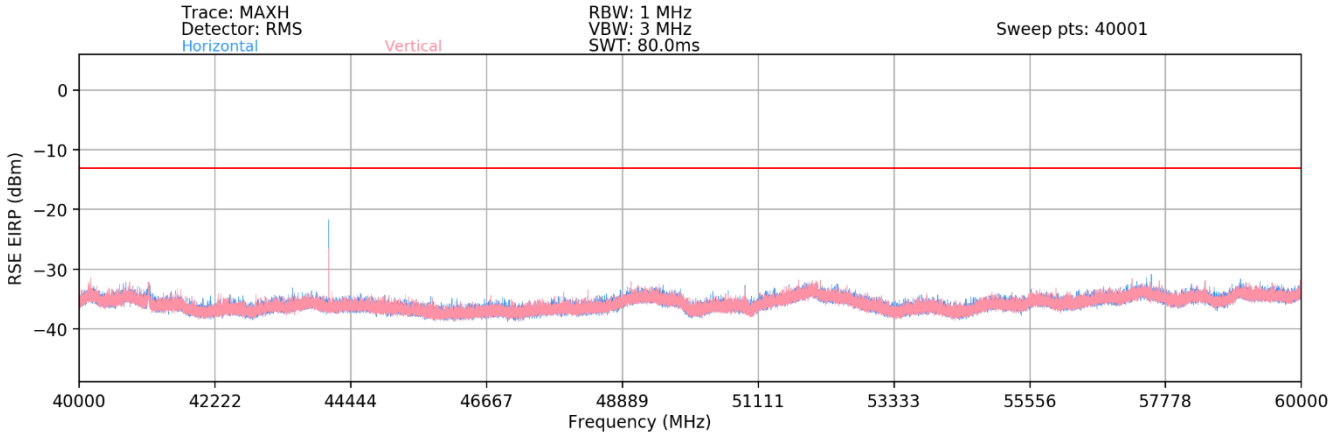
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
19074.00	Low	50	2Tx	QPSK	H	98	150	-56.91	-13.00	-43.91
34971.00	Mid	50	2Tx	QPSK	H	262	150	-56.29	-13.00	-43.29
36620.00	High	50	2Tx	QPSK	H	57	150	-56.23	-13.00	-43.23
24173.00	Low	50	2Tx	QPSK	H	32	150	-55.07	-13.00	-42.07

Table 7-32. Ant1 - n260 Radiated 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.

40GHz - 60GHz



Plot 7-66. Ant1 - n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

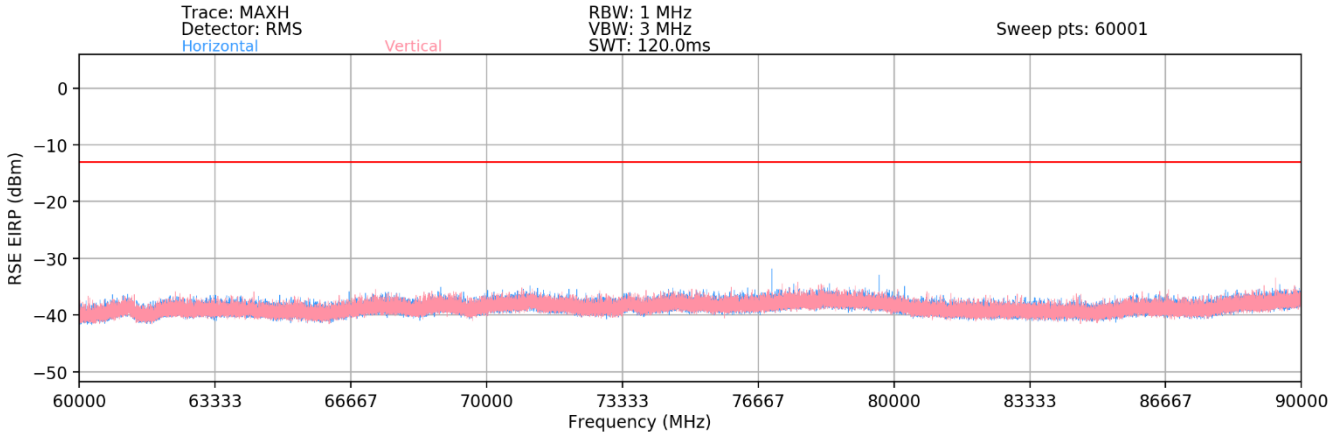
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
42931.23	Low	50	2Tx	QPSK	H	80	5	-26.32	-13.00	-13.32
44083.22	Mid	50	2Tx	QPSK	H	95	21	-23.71	-13.00	-10.71
45972.44	High	50	2Tx	QPSK	H	100	350	-45.67	-13.00	-32.67

Table 7-33. Ant1 - n260 Radiated Spurious Emissions Table (40GHz - 60GHz)

Notes

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

60GHz - 90GHz



Plot 7-67. Ant1 - n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

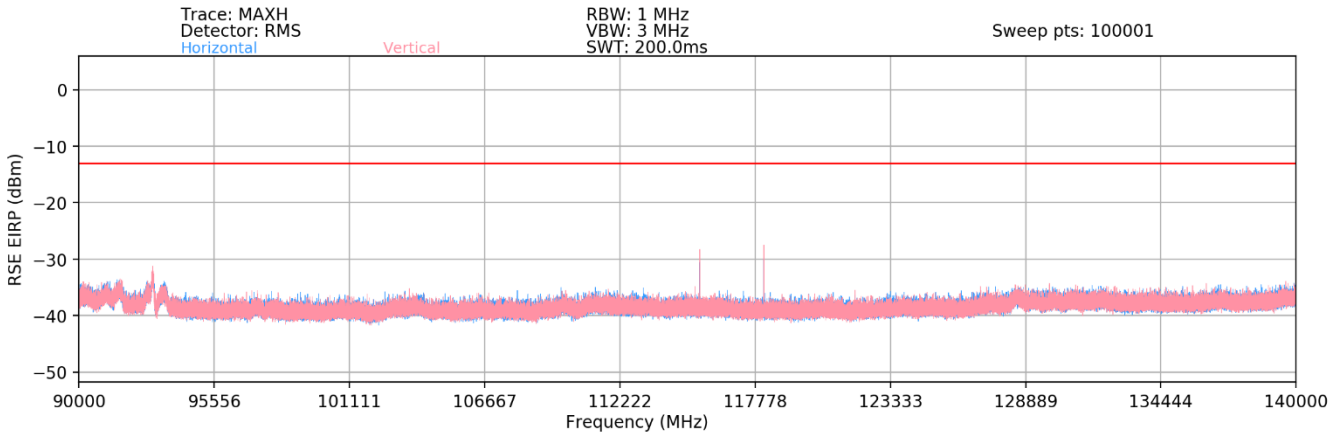
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
74051.25	Low	50	2Tx	QPSK	H	48	358	-33.79	-13.00	-20.79
77000.52	Mid	50	2Tx	QPSK	H	54	339	-32.85	-13.00	-19.85
79951.35	High	50	2Tx	QPSK	H	132	292	-41.70	-13.00	-28.70

Table 7-34. Ant1 - n260 Radiated Spurious Emissions Table (60GHz - 90GHz)

Notes

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

90GHz - 140GHz



Plot 7-68. Ant1 - n260 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx − EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n260)

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

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

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
111076.92	Low	50	2Tx	QPSK	V	65	347	-24.71	-13.00	-11.71
115501.51	Mid	50	2Tx	QPSK	V	64	346	-22.69	-13.00	-9.69
118136.71	High	50	2Tx	QPSK	V	79	350	-29.93	-13.00	-16.93

Table 7-35. Ant1 - n260 Radiated 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.