ELEMENT WASHINGTON DC LLC
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PART 20 & 30 MEASUREMENT REPORT

Applicant Name:
Pivotal Commware
22215 26th Ave SE #100
Bothell WA 98021
UNITED STATES

Date of Testing:
08/09 - 10/02/2023
Test Report Issue Date:
10/20/2023
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2308080090-01-R1.2AUVU

FCC ID:	**2AUVU-5620-12-39**
APPLICANT:	**Pivotal Commware**

Application Type:	Certification
Model:	5620-12-39
EUT Type:	5G mmWave Repeater
FCC Classification(s):	Part 20 Industrial Booster (CMRS) (B2I)
FCC Rule Part(s):	2, 20, 30
Test Procedure(s):	ANSI C63.26-2015, KDB 842590 D01 v01r02, KDB 935210 D02 v04r02, KDB 935210 D05 v01r04

Note: This revised Test Report (S/N: 1M2308080090-01-R1.2AUVU) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

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

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

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Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP Max Power [W]	EIRP Max Power [dBm]	Emission Designator
n260	V_UL	50	37025 - 39975	1	SISO	QPSK	14.93	41.74	46M0G7D
					SISO	16QAM	13.00	41.14	46M0W7D
		100	37200 - 39800	4	SISO	QPSK	14.62	41.65	394MG7D
					SISO	16QAM	13.87	41.42	392MW7D
	H_UL	50	37025 - 39975	1	SISO	QPSK	13.59	41.33	46M0G7D
					SISO	16QAM	11.40	40.57	46M1W7D
		100	37200 - 39800	4	SISO	QPSK	13.46	41.29	393MG7D
					SISO	16QAM	11.25	40.51	393MW7D
	MIMO	50	37025 - 39975	1	MIMO	QPSK	27.67	44.42	-
					MIMO	16QAM	24.38	43.87	-
		100	37200 - 39800	4	MIMO	QPSK	28.05	44.48	-
					MIMO	16QAM	24.27	43.85	-

EUT Overview (Band n260)

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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.

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 lab 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.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Pivotal Commware 5G mmWave Repeater FCC ID: 2AUVU-5620-12-39**. The test data contained in this report pertains only to the emissions due to the 5G mmWave operation of the Service Unit.

The EUT is part of a two-unit repeater system consisting of a Donor Unit (DU) and a Service Unit (SU). Each unit is mounted on a pole and aligned to properly receive and boost 5G signals from a gNodeB. Both units are required for operation as neither can be operated in a standalone mode.

Both units are capable of transmitting boosted 5G mmWave signals. For transmission of such signals, the DU is installed and configured to communicate with a gNodeB. The SU receives the signal from the DU via an RF cable and then re-transmits the signal to provide 5G coverage to a target area. For each unit, the antenna configuration is comprised of two separate linearly polarized antenna feeds: one for horizontally polarized transmission and one for vertically polarized transmission.

Both the DU and the SU were fitted with RF connectors to allow for conducted measurements to compare with the FCC Part 30 limits. Throughout this report, the output data for the DU are labelled as “V-UL” and “H-UL” to represent the vertical and horizontal transmission components of the output.

The EUT does not generate its own RF. The EUT supports any combination of bandwidths, number of carriers, and modulations as input signals from a signal generator connected to its input. The EUT will transmit all signals within the 5G NR n260 band that are received.

Test Device Serial No.: 890003202012325000064, 890003202012330000006

2.2 Device Capabilities

This device contains the following capabilities:

5G FR2 (NR Band n260), LTE (B2, B4, B5, B12, B13, B25, B26, and B41)

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 842590 D01 and KDB 935210 D05. See Section 7.0 of this test report for a description of the conducted and radiated tests.

All conducted testing was performed using a signal generator connected via coaxial cable to waveguide adapters on the input port of one unit of the EUT and measured via adapter connected to coaxial cable from the output port of the other unit. All radiated testing was performed by using a signal generator connected to a horn antenna to transmit to one unit of the EUT and then measuring the radiated output transmission from other unit.

For both conducted and radiated testing, the signal generator was set to transmit representative 5G mmWave NR signals in various sized bandwidths and modulations.

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2.4 Software and Firmware

The test was conducted with firmware version 0.6.0 installed on the EUT.

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. KDB 935210 D05 v01r04 was referenced for testing the EUT as well.

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.

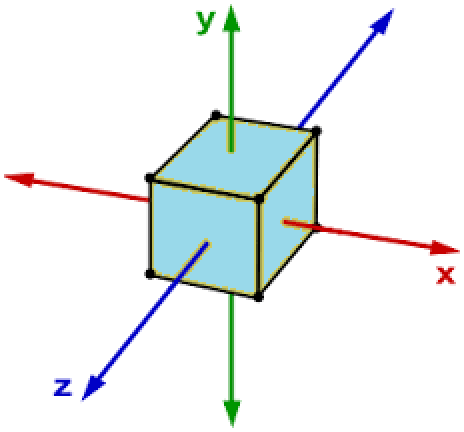

Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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The equipment under test was transmitting while connected to its patch or HBF antenna and is placed on a positioner. 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, for RSE measurements, "D" is the largest dimension of the EUT which was roughly 29cm x 29cm x 7cm. The measurement antenna and harmonic mixer were manipulated around all faces and edges of the EUT to determine location of worst-case emissions.

Frequency Range (GHz)	Wavelength (cm)	Far Field Distance (m)	Measurement Distance (m)
18-40	0.749	0.54	2.00
40-60	0.500	1.44	2.00
60-90	0.333	0.96	2.00
90-140	0.214	0.63	2.00
140-200	0.150	0.39	2.00

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

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.

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3.3 Industrial Booster Test Cases

Per the requirements of KDB 935210 D05 v01r04, the following test cases shall be investigated for Industrial Boosters under FCC Part 20.21:

1. AGC Threshold Level
2. Out-of-Band Rejection
3. Input-versus-Output Signal Comparison
4. Mean Output Power and Amplifier/Booster Gain
5. Out-of-Band/Out-of-Block Emissions and Spurious Emissions
6. Frequency Stability
7. Radiated Spurious Emissions

3.4 Environmental Conditions

The temperature is controlled within range of 15^{o}C to 35^{o}C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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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
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	WL40-1	WLAN Cable Set (40GHz)	1/12/2023	Annual	1/12/2024	WL40-1
-	WL40-2	WLAN Cable Set (40GHz)	1/12/2023	Annual	1/12/2024	WL40-2
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9203-2178
EMCO	3116	Horn Antenna (18-40GHz)	7/5/2023	Biennial	7/5/2025	9203-2178
ESPEC	SU-241	Temperature Chamber	11/10/2022	Annual	11/10/2023	93011064
Narda	180-422-KF	Horn (Small)	8/30/2022	Biennial	8/30/2024	170WX50922
OML, Inc.	M05RH	Horn Antenna, 140 to 220 GHz	9/27/2022	Biennial	9/27/2024	180914-1
OML, Inc.	M08RH	Horn Antenna, 90 to 140 GHz	9/28/2022	Biennial	9/28/2024	180914-1
OML, Inc.	M12RH	Horn Antenna, 60 to 90 GHz	10/4/2022	Biennial	10/4/2024	18073001
OML, Inc.	M19RH	Horn Antenna, 40 to 60 GHz	10/5/2022	Biennial	10/5/2024	190823-1
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz - 44GHz	3/6/2023	Annual	3/6/2024	101867
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	1/13/2023	Annual	1/13/2024	101639
Rohde & Schwarz	SMW200A	Vector Signal Generator	8/16/2022	Biennial	8/16/2024	102130
Sunol Sciences	JB5	Bi-Log Antenna (30M-5GHz)	8/30/2022	Biennial	8/30/2024	A102416-1
Virginia Diodes, Inc.	SAX679	SAX Module (40 - 60GHz)	11/21/2022	Biennial	11/21/2024	SAX679
Virginia Diodes, Inc.	SAX680	SAX Module (60 - 90GHz)	11/21/2022	Biennial	11/21/2024	SAX680
Virginia Diodes, Inc.	SAX681	SAX Module (90 - 140GHz)	1/5/2023	Biennial	1/5/2025	SAX681
Virginia Diodes, Inc.	SAX682	SAX Module (140 - 220GHz)	3/1/2023	Biennial	3/1/2025	SAX682

Table 5-1. Test Equipment

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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:	Pivotal Commware
FCC ID:	2AUVU-5620-12-39
FCC Classification(s):	Part 20 Industrial Booster (CMRS) (B2I)
Mode(s):	TDD

FCC Part Section(s)	KDB 935210 D05 Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049, 20.21	3.4	Input-Versus-Output Signal Comparison	N/A	CONDUCTED	PASS	Section 7.2
20.21	3.3	Out-of-band Rejection	N/A		PASS	Section 7.3
2.1046, 20.21	3.2, 3.5	Measuring AGC Threshold Level, Mean Output Power & Amplifier/Booster Gain	N/A		PASS	Section 7.4
2.1049	-	Occupied Bandwidth	N/A		PASS	Section 7.5
2.1046, 30.202(c)	-	Conducted Power & Equivalent Isotropic Radiated Power	≤ 55 dBm		PASS	Section 7.6
2.1051, 20.21, 30.203	3.6	Band Edge / Out-of-Band Emissions	≤ -5dBm/MHz from the band edge up to 10% of the channel BW ≤-13dBm/MHz for all out-of-band emissions		PASS	Section 7.8
2.1055, 20.21	3.7	Frequency Stability	Fundamental emissions stay within authorized frequency block		PASS	Section 7.9
2.1051, 20.21, 30.203	3.8	Radiated Spurious Emissions	≤ -13 dBm/MHz for spurious emissions	RADIATED	PASS	Section 7.7

Table 7-1. Summary of Radiated Test Results

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Notes:

1. Per 2.1057(a)(2), spurious emissions were investigated up to 200GHz.
2. Testing was completed with a signal generator creating a representative mmWave 5G NR signal, using CP-OFDM schemes, various modulations including QPSK, and QAM, 120kHz subcarrier spacing, 50MHz-single carrier, 50MHz-dual carrier, and 100MHz-four carrier bandwidths, and full and single resource block allocations.
3. The input signal was fed from the signal generator to the EUT via a coaxial cable and it was set at a level so as to produce the maximum output power of the AGC range.
4. Based upon investigations of all possible modulations, testing was mainly performed with QPSK modulation.
5. Unless otherwise specified, triggering from the signal generator was used in order to more accurately gate on the TDD signal with the analyzer.
6. For conducted testing only, the EUT was fitted with waveguide-to-coax RF adapters that allowed for direct measurements. With the exception of radiated spurious emissions, all measurements were performed in a conducted test setup.

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7.2 Input-Versus-Output Signal Comparison

Test Overview

The Input-versus-Output Signal Comparison checks for the change in occupied bandwidth of the output signal from the booster at 3dB above the AGC threshold level and just below the AGC threshold level while not more than 0.5dB below the threshold level. All modes of operation were investigated and the worst case configuration results are reported in this section. Per KDB 935210 D05 clause 3.4, this is to be measured on both the input signal and the output signal.

Test Procedure Used

ANSI C63.26-2015 – Section 5.4.3
KDB 935210 D05 – Section 3.4

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

Test Notes

1. Per previous guidance from FCC specifically to Element lab, a 50MHz 5G NR mmWave signal was used as the input signal as opposed to the 4.1MHz AWGN required in KDB 935210 D05.

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Band n260 – DU

AGC Threshold Level	EUT Antenna Polarization	Channel	Bandwidth [MHz]	Modulation	Input OBW [MHz]	Output OBW [MHz]
0.5dB below Threshold	V-UL	Mid	50	QPSK	45.22	45.85
3dB above Threshold	V-UL	Mid	50	QPSK	45.21	45.90
0.5dB below Threshold	H-UL	Mid	50	QPSK	45.30	45.96
3dB above Threshold	H-UL	Mid	50	QPSK	45.22	45.94

Table 7-2. n260 Occupied Bandwidth by AGC Threshold Level – DFT-s-OFDM

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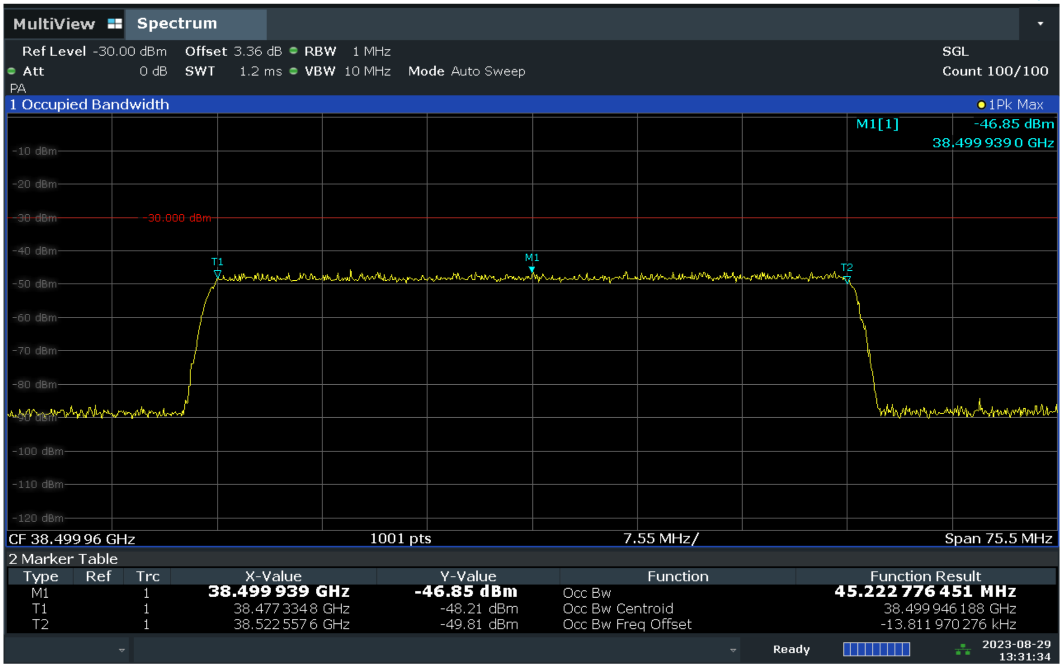
ACLRResults



MultiView Spectrum

Ref Level -30.00 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 0 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
PA

1 Occupied Bandwidth

M1[1] -46.85 dBm 38.499 939 0 GHz

CF 38.499 96 GHz 1001 pts 7.55 MHz/ Span 75.5 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.499 939 GHz**	**-46.85 dBm**	Occ Bw	**45.222 776 451 MHz**
T1		1	38.477 334 8 GHz	-48.21 dBm	Occ Bw Centroid	38.499 946 188 GHz
T2		1	38.522 557 6 GHz	-49.81 dBm	Occ Bw Freq Offset	-13.811 970 276 kHz

Ready 2023-08-29 13:31:34

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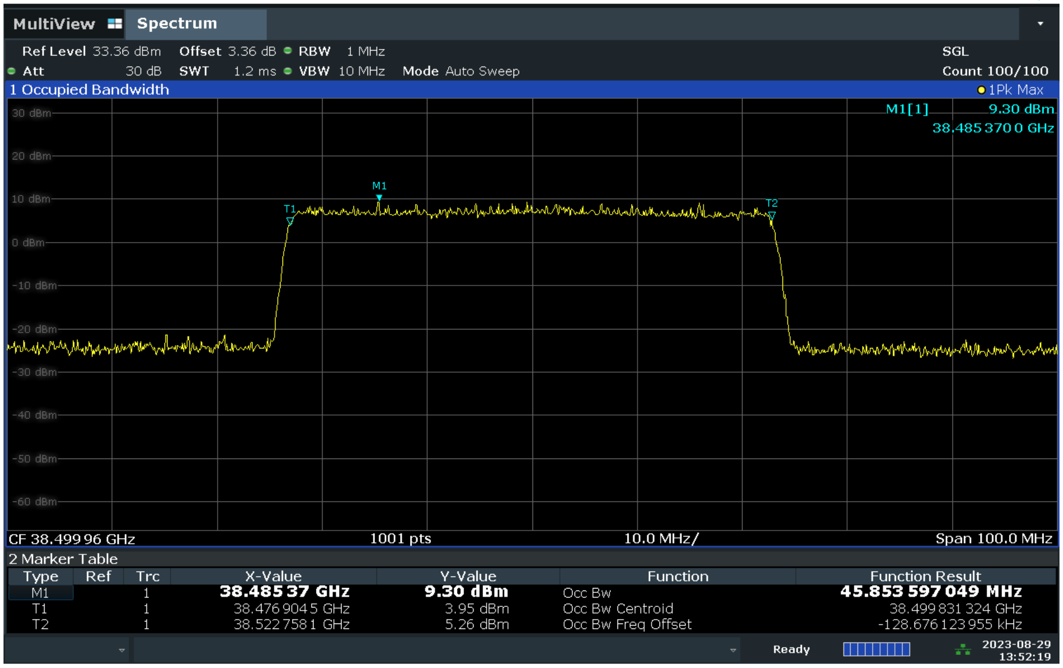
Plot 7-1. Occupied Bandwidth Input at 0.5dB below AGC Threshold – DFT-s – V-UL Polarization.

ACLRResults



MultiView Spectrum

Ref Level 33.36 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 30 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth

M1[1] 9.30 dBm 38.485 370 0 GHz

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.485 37 GHz**	**9.30 dBm**	Occ Bw	**45.853 597 049 MHz**
T1		1	38.476 904 5 GHz	3.95 dBm	Occ Bw Centroid	38.499 831 324 GHz
T2		1	38.522 758 1 GHz	5.26 dBm	Occ Bw Freq Offset	-128.676 123 955 kHz

Ready 2023-08-29 13:52:19

01:52:19 PM 08/29/2023

Plot 7-2. Occupied Bandwidth Output at 0.5dB below AGC Threshold – DFT-s – V-UL Polarization.

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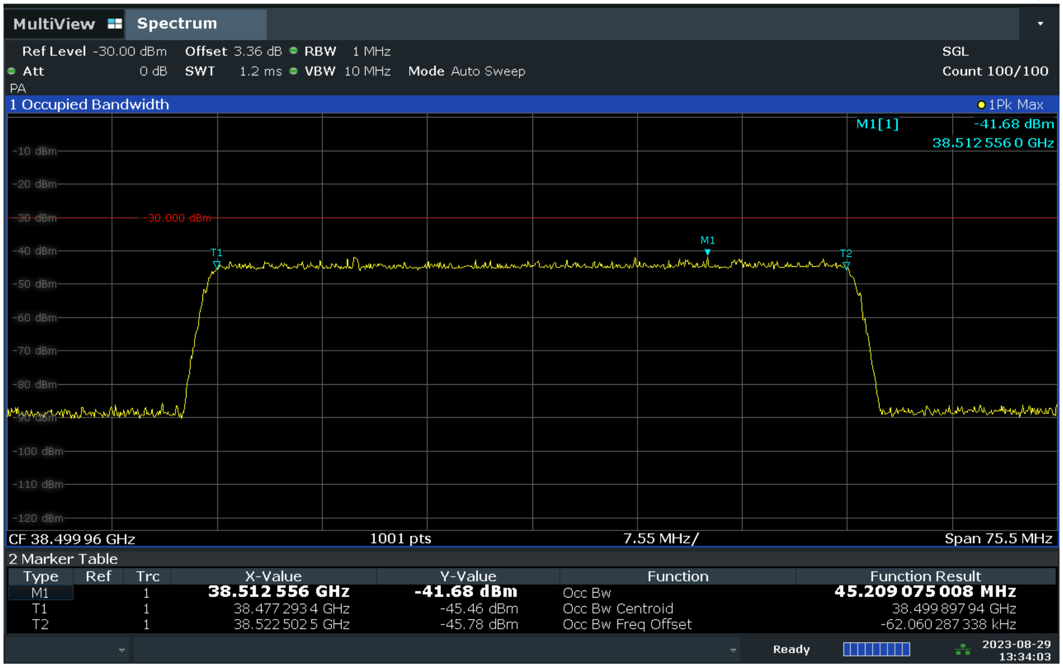
ACLRResults



Ref Level -30.00 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 0 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
PA

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.512 556 GHz**	**-41.68 dBm**	Occ Bw	**45.209 075 008 MHz**
T1		1	38.477 293 4 GHz	-45.46 dBm	Occ Bw Centroid	38.499 897 94 GHz
T2		1	38.522 502 5 GHz	-45.78 dBm	Occ Bw Freq Offset	-62.060 287 338 kHz

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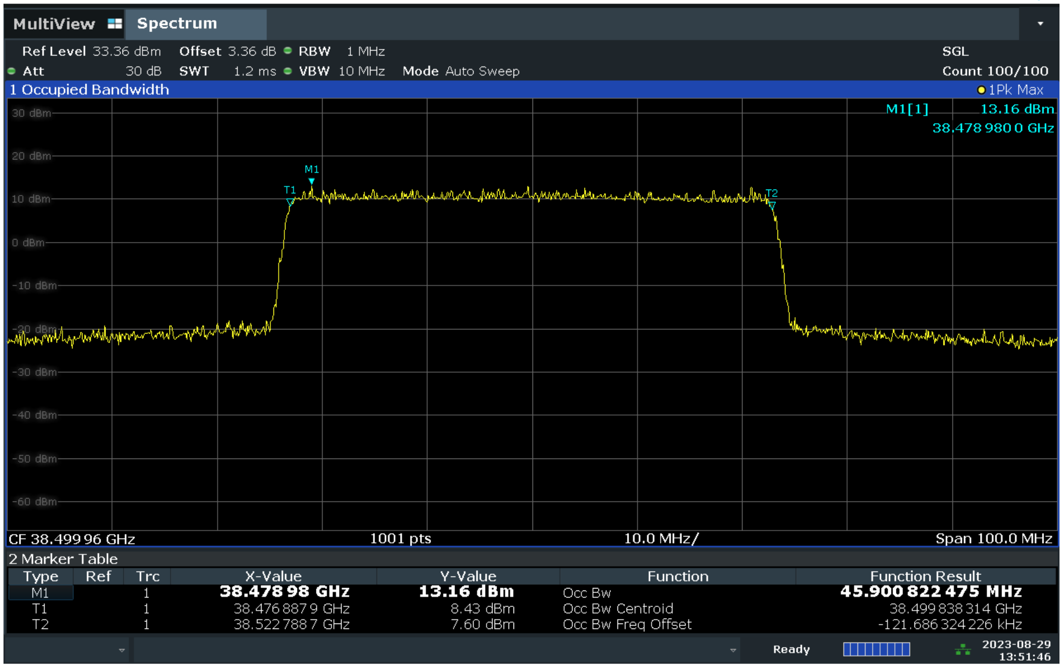
Plot 7-3. Occupied Bandwidth Input at 3dB above AGC Threshold – DFT-s – V-UL Polarization.

ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 30 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.478 98 GHz**	**13.16 dBm**	Occ Bw	**45.900 822 475 MHz**
T1		1	38.476 887 9 GHz	8.43 dBm	Occ Bw Centroid	38.499 838 314 GHz
T2		1	38.522 788 7 GHz	7.60 dBm	Occ Bw Freq Offset	-121.686 324 226 kHz

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Plot 7-4. Occupied Bandwidth Output at 3dB above AGC Threshold – DFT-s – V-UL Polarization.

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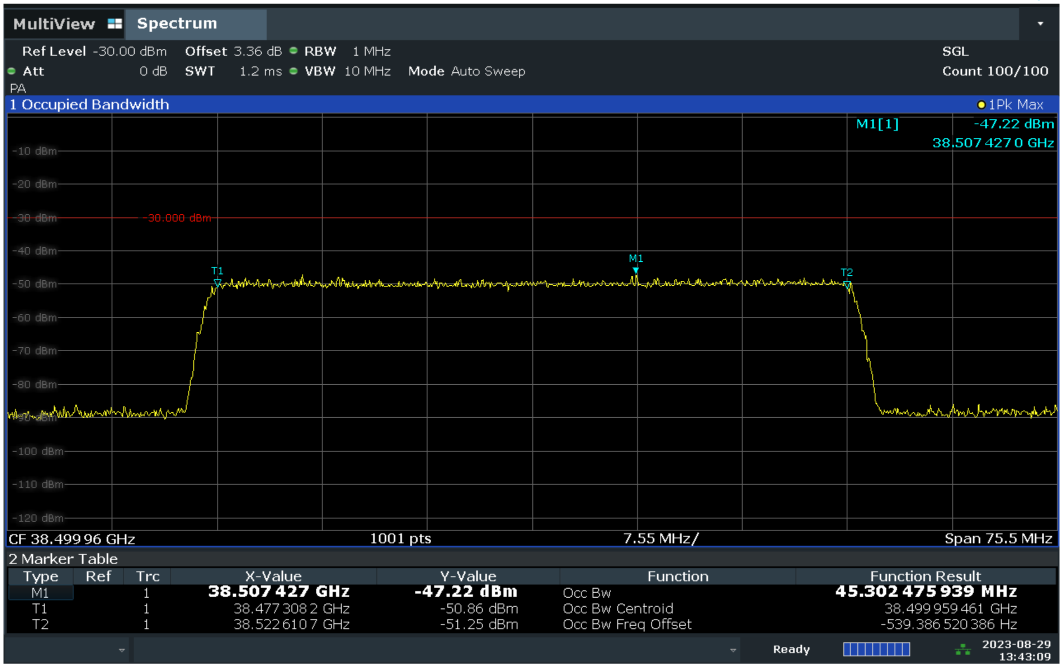
ACLRResults



Ref Level -30.00 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 0 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

CF 38.499 96 GHz 1001 pts 7.55 MHz/ Span 75.5 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.507 427 GHz**	**-47.22 dBm**	Occ Bw	**45.302 475 939 MHz**
T1		1	38.477 308 2 GHz	-50.86 dBm	Occ Bw Centroid	38.499 959 461 GHz
T2		1	38.522 610 7 GHz	-51.25 dBm	Occ Bw Freq Offset	-539.386 520 386 Hz

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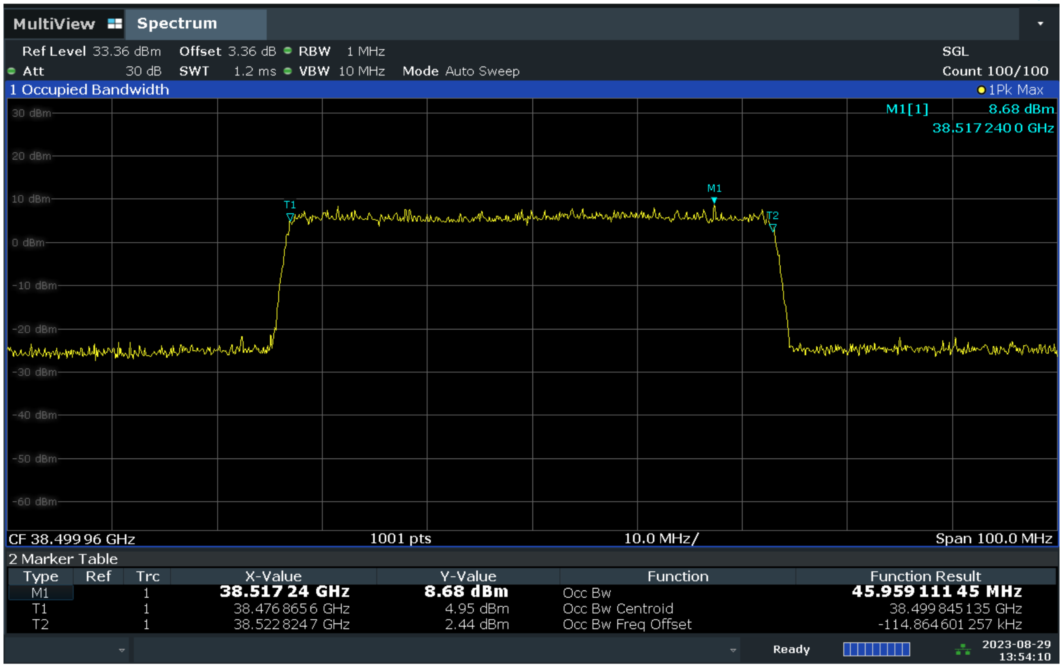
Plot 7-5. Occupied Bandwidth Input at 0.5dB below AGC Threshold – DFT-s – H-UL Polarization.

ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 30 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.517 24 GHz**	**8.68 dBm**	Occ Bw	**45.959 111 45 MHz**
T1		1	38.476 865 6 GHz	4.95 dBm	Occ Bw Centroid	38.499 845 135 GHz
T2		1	38.522 824 7 GHz	2.44 dBm	Occ Bw Freq Offset	-114.864 601 257 kHz

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Plot 7-6. Occupied Bandwidth Output at 0.5dB below AGC Threshold – DFT-s – H-UL Polarization.

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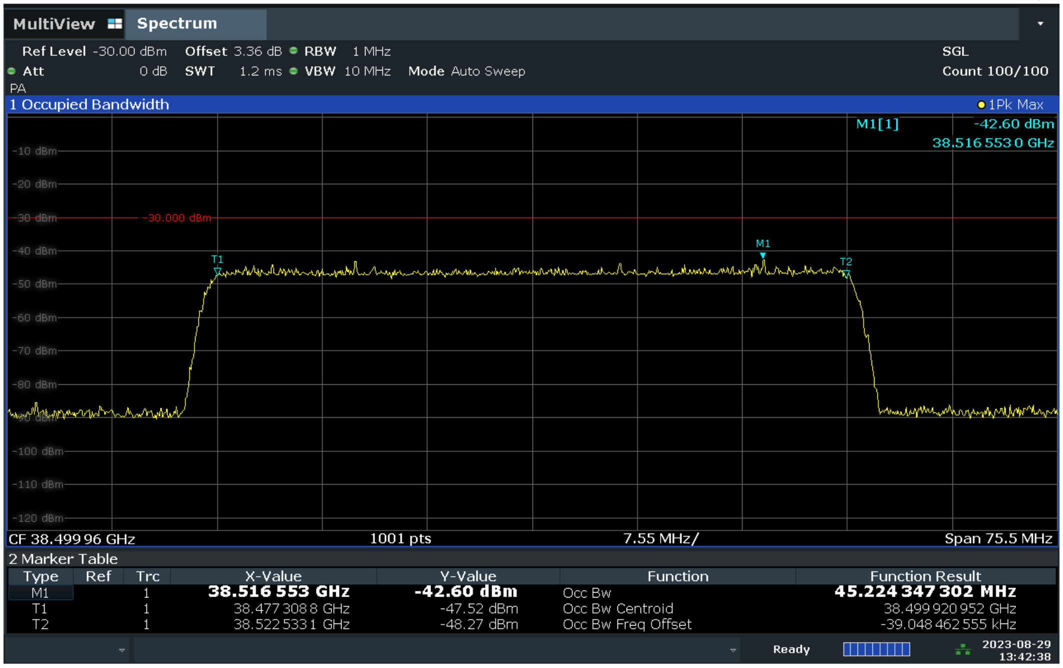
ACLRResults



Ref Level -30.00 dBm Offset 3.36 dB ● RBW 1 MHz SGL
● Att 0 dB SWT 1.2 ms ● VBW 10 MHz Mode Auto Sweep Count 100/100
PA
1 Occupied Bandwidth ● 1Pk Max
M1[1] -42.60 dBm
38.516 553 0 GHz
CF 38.499 96 GHz 1001 pts 7.55 MHz/ Span 75.5 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.516 553 GHz**	**-42.60 dBm**	Occ Bw	**45.224 347 302 MHz**
T1		1	38.477 308 8 GHz	-47.52 dBm	Occ Bw Centroid	38.499 920 952 GHz
T2		1	38.522 533 1 GHz	-48.27 dBm	Occ Bw Freq Offset	-39.048 462 555 kHz

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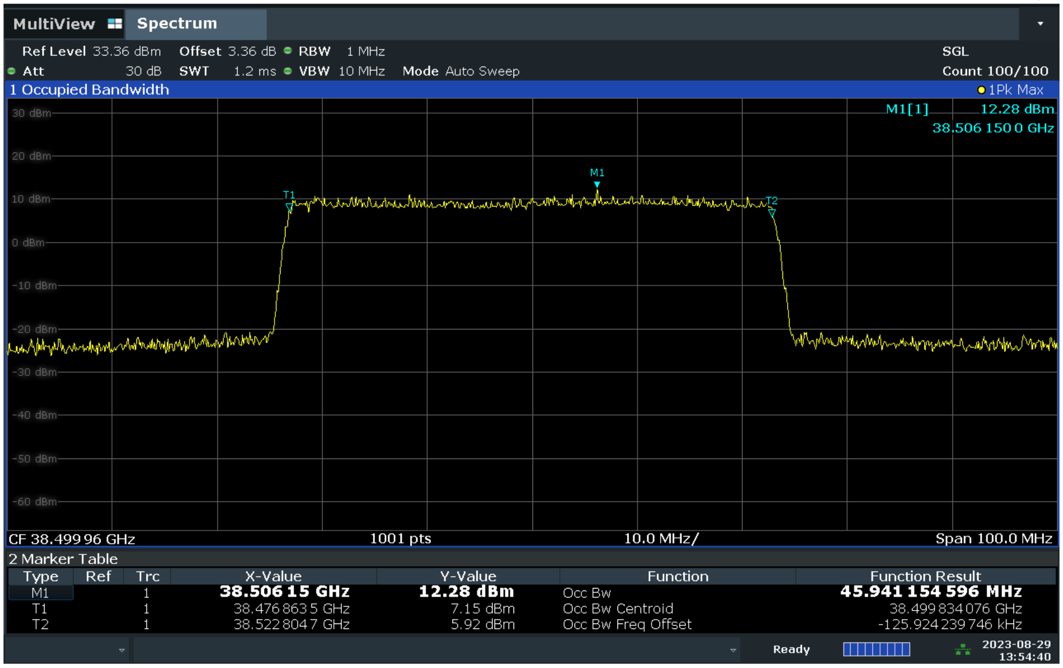
Plot 7-7. Occupied Bandwidth Input at 3dB above AGC Threshold – DFT-s – H-UL Polarization.

ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB ● RBW 1 MHz SGL
● Att 30 dB SWT 1.2 ms ● VBW 10 MHz Mode Auto Sweep Count 100/100
1 Occupied Bandwidth ● 1Pk Max
M1[1] 12.28 dBm
38.506 150 0 GHz
CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.506 15 GHz**	**12.28 dBm**	Occ Bw	**45.941 154 596 MHz**
T1		1	38.476 863 5 GHz	7.15 dBm	Occ Bw Centroid	38.499 834 076 GHz
T2		1	38.522 804 7 GHz	5.92 dBm	Occ Bw Freq Offset	-125.924 239 746 kHz

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Plot 7-8. Occupied Bandwidth Output at 3dB above AGC Threshold – DFT-s – H-UL Polarization.

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7.3 Out-of-band Rejection

Test Overview

A signal generator is set to the input port of the EUT, and the output of the EUT shall be connected to a spectrum analyzer. Per KDB 935210 D05 Section 3.3, the signal generator will sweep a CW signal to ± 250 % of the passband. Per FCC Part 20, an industrial booster shall have its 20dB bandwidth analyzed in order to assess the pass band of the booster.

Test Procedure Used

KDB 935210 D05 v01r04 – Section 3.3

Test Settings

1. Start and stop frequency of the signal generator shall be ± 250 % of the passband, for each applicable CMRS band
2. Span same as the frequency range of the signal generator
3. RBW $\geq$ 1 % to 5 % of the EUT passband
4. VBW $\geq$ 3 x RBW
5. Detector = Peak/Max Hold
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Notes

1. The spectrum plots in this section show a CW signal sweeping across each input feed of each unit of the EUT. Per the guidance from Section 3.3 of KDB 935210 D05, the frequency range of the sweep should be from 29.65GHz to 47.35GHz [250% x (39.975GHz–37.025GHz) = 7.375GHz below and above lower and upper band edges, respectively].

2. In each plot, the marker "M1" is used to display the peak of the output frequency response. The "D1" and "D2" markers are provided to indicate the approximate lower and upper bounds of the 20dB bandwidth of the output frequency response.

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Band n260 – DU

ACLRResults

MultiView Spectrum

Ref Level 3.36 dBm Offset 3.36 dB ● RBW 10 MHz
● Att 0 dB ● SWT 1 s ● VBW 50 MHz Mode Auto Sweep Count 100/100

1 Frequency Sweep ●1Pk Max

D1[1] -20.07 dB 2.885 50 GHz
M1[1] -15.80 dBm 38.546 30 GHz

CF 37.7 GHz 10001 pts 1.62 GHz/ Span 16.2 GHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	38.546 3 GHz	-15.80 dBm		
D1	M1	1	2.885 5 GHz	-20.07 dB		
D2	M1	1	-2.282 8 GHz	-19.91 dB		

Measuring... 2023-08-29 14:42:52

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Plot 7-9. Out-Of-Band Rejection – V-UL Polarization

ACLRResults

MultiView Spectrum

Ref Level 3.36 dBm Offset 3.36 dB ● RBW 10 MHz
● Att 0 dB ● SWT 1 s ● VBW 50 MHz Mode Auto Sweep Count 100/100

1 Frequency Sweep ●1Pk Max

D2[1] -20.41 dB -2.192 00 GHz
M1[1] -14.24 dBm 38.546 30 GHz

CF 37.7 GHz 10001 pts 1.62 GHz/ Span 16.2 GHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	38.546 3 GHz	-14.24 dBm		
D1	M1	1	2.559 9 GHz	-19.92 dB		
D2	M1	1	-2.192 GHz	-20.41 dB		

Measuring... 2023-08-29 14:38:50

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Plot 7-10. Out-Of-Band Rejection – H-UL Polarization

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7.4 Measuring AGC Threshold Level, Mean Output Power & Amplifier/Booster Gain

Test Overview

A signal generator supplies a 5G NR mmWave signal directly into the input port of the device. The output port of the EUT is connected to the input of a signal analyzer. The AGC threshold level is measured by output power of the EUT until a 1dB increase in the input signal power no longer causes a 1dB increase in the output signal power. The Booster Gain is measured by calculating the gain between the input and the output power of the EUT at the signal generator level just below the AGC threshold level, but not more than 0.5dB below.

Test Procedures Used

KDB 935210 D05 V01R04 – Section 3.2 - Measuring AGC threshold level
KDB 935210 D05 V01R04 – Section 3.5 - Mean output power and amplifier/booster gain

Test Settings

1. Conducted 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

Test Notes

1. Per previous guidance from FCC specifically to Element lab, a 50MHz 5G NR mmWave signal was used as the input signal as opposed to the 4.1MHz AWGN required in KDB 935210 D05.

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Band n260 – DU (DFT-s-OFDM)

Bandwidth [MHz]	Frequency [MHz]	Channel	Modulation	RB Size / Offset	EUT Input Power Level [dBm]	Conducted Power [dBm]	Output Power Step [dB]	Calculated Gain [dB]
50	38499.96	Mid	QPSK	Full RB	-48.51	11.92	-	60.43
50	38499.96	Mid	QPSK	Full RB	-47.51	12.92	1.00	60.43
50	38499.96	Mid	QPSK	Full RB	-46.51	13.88	0.96	60.39
50	38499.96	Mid	QPSK	Full RB	-45.51	14.84	0.96	60.35
50	38499.96	Mid	QPSK	Full RB	-44.51	15.76	0.92	60.27
50	38499.96	Mid	QPSK	Full RB	-43.51	16.74	0.98	60.25
50	38499.96	Mid	QPSK	Full RB	-42.51	17.70	0.96	60.21
50	38499.96	Mid	QPSK	Full RB	-41.51	18.64	0.94	60.15
50	38499.96	Mid	QPSK	Full RB	-40.51	19.55	0.91	60.06
50	38499.96	Mid	QPSK	Full RB	-39.51	20.41	0.86	59.92
50	38499.96	Mid	QPSK	Full RB	-38.51	20.18	-0.23	58.69
50	38499.96	Mid	QPSK	Full RB	-37.51	20.19	0.01	57.70
50	38499.96	Mid	QPSK	Full RB	-36.51	20.47	0.28	56.98
50	38499.96	Mid	QPSK	Full RB	-35.51	20.51	0.04	56.02
50	38499.96	Mid	QPSK	Full RB	-34.51	20.41	-0.10	54.92
50	38499.96	Mid	QPSK	Full RB	-33.51	20.40	-0.01	53.91

Table 7-3. Full RB AGC Threshold and Booster Gain – 50MHz 1CC – DFT-s – V-UL Polarization

Note: AGC Threshold is found at **-38.51dBm** EUT Input Power Level.

Bandwidth [MHz]	Frequency [MHz]	Channel	Modulation	RB Size / Offset	EUT Input Power Level [dBm]	Conducted Power [dBm]	Output Power Step [dB]	Calculated Gain [dB]
100	38499.96	Mid	QPSK	Full RB	-48.51	11.22	-	59.73
100	38499.96	Mid	QPSK	Full RB	-47.51	12.20	0.98	59.71
100	38499.96	Mid	QPSK	Full RB	-46.51	13.16	0.96	59.67
100	38499.96	Mid	QPSK	Full RB	-45.51	14.12	0.96	59.63
100	38499.96	Mid	QPSK	Full RB	-44.51	15.07	0.95	59.58
100	38499.96	Mid	QPSK	Full RB	-43.51	15.96	0.89	59.47
100	38499.96	Mid	QPSK	Full RB	-42.51	16.92	0.96	59.43
100	38499.96	Mid	QPSK	Full RB	-41.51	17.75	0.83	59.26
100	38499.96	Mid	QPSK	Full RB	-40.51	18.67	0.92	59.18
100	38499.96	Mid	QPSK	Full RB	-39.51	19.50	0.83	59.01
100	38499.96	Mid	QPSK	Full RB	-38.51	19.52	0.02	58.03
100	38499.96	Mid	QPSK	Full RB	-37.51	19.64	0.12	57.15
100	38499.96	Mid	QPSK	Full RB	-36.51	19.58	-0.06	56.09
100	38499.96	Mid	QPSK	Full RB	-35.51	19.61	0.03	55.12
100	38499.96	Mid	QPSK	Full RB	-34.51	19.55	-0.06	54.06
100	38499.96	Mid	QPSK	Full RB	-33.51	19.59	0.04	53.10

Table 7-4. Full RB AGC Threshold and Booster Gain – 100MHz 4CC – DFT-s – V-UL Polarization

Note: AGC Threshold is found at **-38.51dBm** EUT Input Power Level.

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Bandwidth [MHz]	Frequency [MHz]	Channel	Modulation	RB Size / Offset	EUT Input Power Level [dBm]	Conducted Power [dBm]	Output Power Step [dB]	Calculated Gain [dB]
50	38499.96	Mid	QPSK	Full RB	-48.51	12.41	-	60.92
50	38499.96	Mid	QPSK	Full RB	-47.51	13.39	0.98	60.90
50	38499.96	Mid	QPSK	Full RB	-46.51	14.34	0.95	60.85
50	38499.96	Mid	QPSK	Full RB	-45.51	15.30	0.96	60.81
50	38499.96	Mid	QPSK	Full RB	-44.51	16.21	0.91	60.72
50	38499.96	Mid	QPSK	Full RB	-43.51	17.19	0.98	60.70
50	38499.96	Mid	QPSK	Full RB	-42.51	18.12	0.93	60.63
50	38499.96	Mid	QPSK	Full RB	-41.51	19.01	0.89	60.52
50	38499.96	Mid	QPSK	Full RB	-40.51	19.48	0.47	59.99
50	38499.96	Mid	QPSK	Full RB	-39.51	19.82	0.34	59.33
50	38499.96	Mid	QPSK	Full RB	-38.51	19.57	-0.25	58.08
50	38499.96	Mid	QPSK	Full RB	-37.51	19.82	0.25	57.33
50	38499.96	Mid	QPSK	Full RB	-36.51	19.85	0.03	56.36
50	38499.96	Mid	QPSK	Full RB	-35.51	19.82	-0.03	55.33
50	38499.96	Mid	QPSK	Full RB	-34.51	19.81	-0.01	54.32
50	38499.96	Mid	QPSK	Full RB	-33.51	19.82	0.01	53.33

Table 7-5. Full RB AGC Threshold and Booster Gain – 50MHz 1CC– DFT-s – H-UL Polarization

Note: AGC Threshold is found at **-40.51dBm** EUT Input Power Level.

Bandwidth [MHz]	Frequency [MHz]	Channel	Modulation	RB Size / Offset	EUT Input Power Level [dBm]	Conducted Power [dBm]	Output Power Step [dB]	Calculated Gain [dB]
100	38499.96	Mid	QPSK	Full RB	-48.51	12.29	-	60.80
100	38499.96	Mid	QPSK	Full RB	-47.51	13.13	0.84	60.64
100	38499.96	Mid	QPSK	Full RB	-46.51	13.98	0.85	60.49
100	38499.96	Mid	QPSK	Full RB	-45.51	14.99	1.01	60.50
100	38499.96	Mid	QPSK	Full RB	-44.51	15.95	0.96	60.46
100	38499.96	Mid	QPSK	Full RB	-43.51	16.83	0.88	60.34
100	38499.96	Mid	QPSK	Full RB	-42.51	17.73	0.90	60.24
100	38499.96	Mid	QPSK	Full RB	-41.51	18.55	0.82	60.06
100	38499.96	Mid	QPSK	Full RB	-40.51	19.02	0.47	59.53
100	38499.96	Mid	QPSK	Full RB	-39.51	19.04	0.02	58.55
100	38499.96	Mid	QPSK	Full RB	-38.51	19.01	-0.03	57.52
100	38499.96	Mid	QPSK	Full RB	-37.51	18.98	-0.03	56.49
100	38499.96	Mid	QPSK	Full RB	-36.51	18.97	-0.01	55.48
100	38499.96	Mid	QPSK	Full RB	-35.51	19.01	0.04	54.52
100	38499.96	Mid	QPSK	Full RB	-34.51	18.98	-0.03	53.49
100	38499.96	Mid	QPSK	Full RB	-33.51	18.99	0.01	52.50

Table 7-6. Full RB AGC Threshold and Booster Gain – 100MHz 4CC – DFT-s – H-UL Polarization

Note: AGC Threshold is found at **-40.51dBm** EUT Input Power Level.

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7.5 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 measured are each equal to 0.5 percent of the total mean power measured for a given emission. 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 OBW was measured for multiple transmission schemes and modulations and the worst case results have been included in the report.
2. The plots shown in this section include the appropriate offsets to correct for the frequency-dependent cable loss of the coaxial cable that connects the output port of the EUT to the spectrum analyzer.

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Band n260 – DU (DFT-s-OFDM)

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
V_UL	50	1	DFT-s-OFDM	QPSK	45.97
			DFT-s-OFDM	16QAM	46.03
		2	DFT-s-OFDM	QPSK	96.00
			DFT-s-OFDM	16QAM	95.93
	100	4	DFT-s-OFDM	QPSK	393.51
			DFT-s-OFDM	16QAM	392.30
H_UL	50	1	DFT-s-OFDM	QPSK	46.03
			DFT-s-OFDM	16QAM	46.06
		2	DFT-s-OFDM	QPSK	96.21
			DFT-s-OFDM	16QAM	96.11
	100	4	DFT-s-OFDM	QPSK	393.15
			DFT-s-OFDM	16QAM	392.64

Table 7-7. Summary of DU Occupied Bandwidths – DFT-s-OFDM

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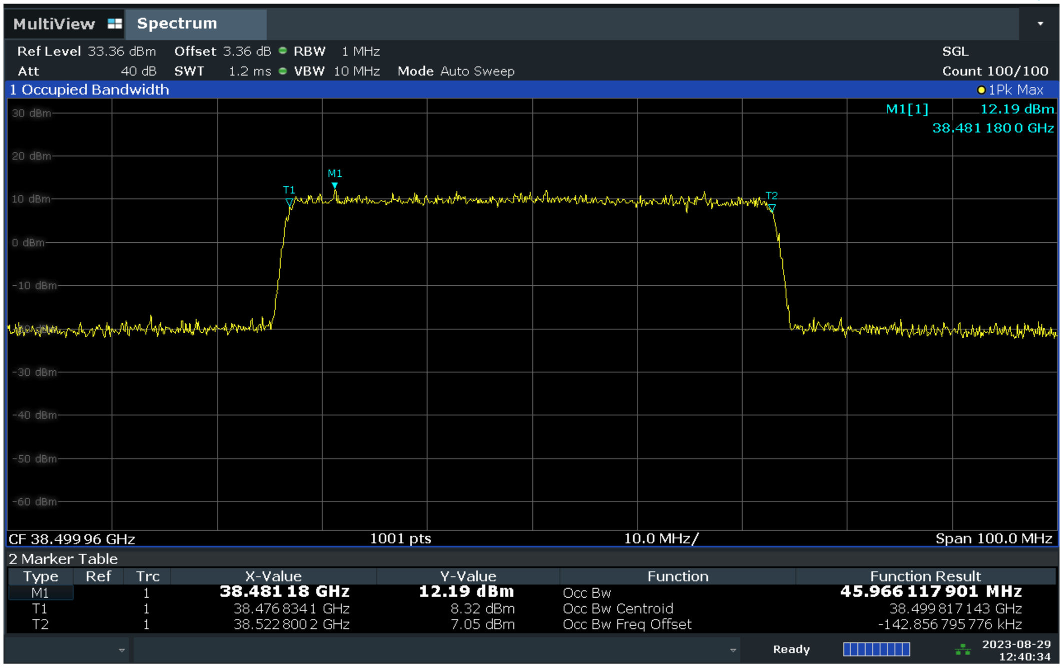
ACLRResults



MultiView Spectrum

Ref Level 33.36 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 40 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 12.19 dBm
38.481 180 0 GHz

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	38.481 18 GHz	12.19 dBm	Occ Bw	45.966 117 901 MHz
T1		1	38.476 834 1 GHz	8.32 dBm	Occ Bw Centroid	38.499 817 143 GHz
T2		1	38.522 800 2 GHz	7.05 dBm	Occ Bw Freq Offset	-142.856 795 776 kHz

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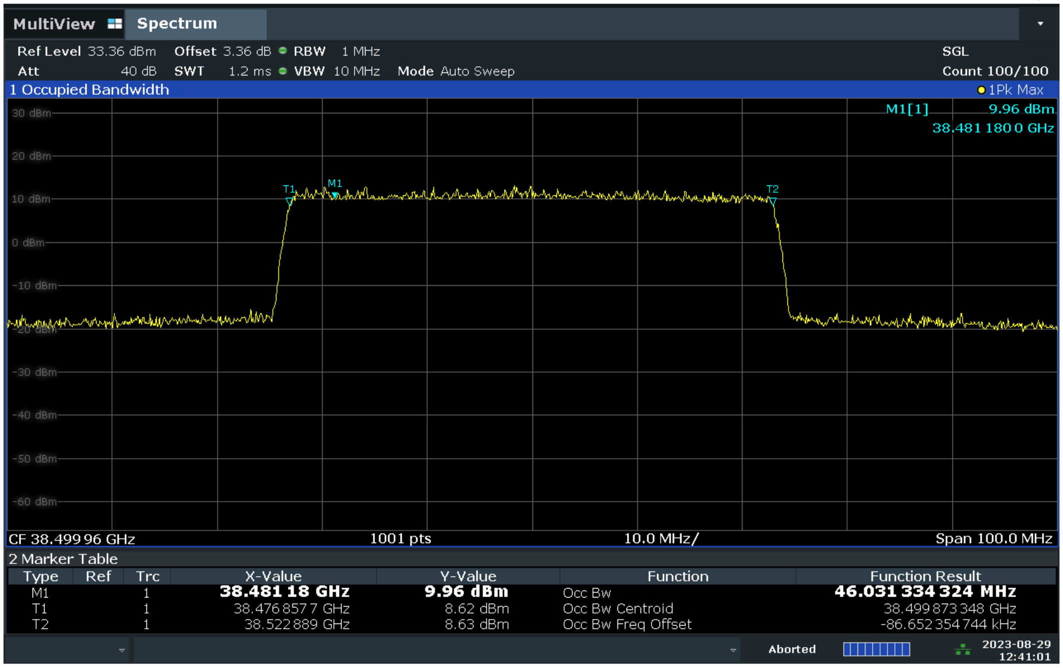
Plot 7-11. Occupied Bandwidth Plot – DFT-s – V-UL Polarization (50MHz-1CC – QPSK – Mid Channel)

ACLRResults



MultiView Spectrum

Ref Level 33.36 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 40 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 9.96 dBm
38.481 180 0 GHz

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	38.481 18 GHz	9.96 dBm	Occ Bw	46.031 334 324 MHz
T1		1	38.476 857 7 GHz	8.62 dBm	Occ Bw Centroid	38.499 873 348 GHz
T2		1	38.522 889 GHz	8.63 dBm	Occ Bw Freq Offset	-86.652 354 744 kHz

Aborted 2023-08-29 12:41:01

12:41:02 PM 08/29/2023

Plot 7-12. Occupied Bandwidth Plot – DFT-s – V-UL Polarization (50MHz-1CC – 16QAM – Mid Channel)

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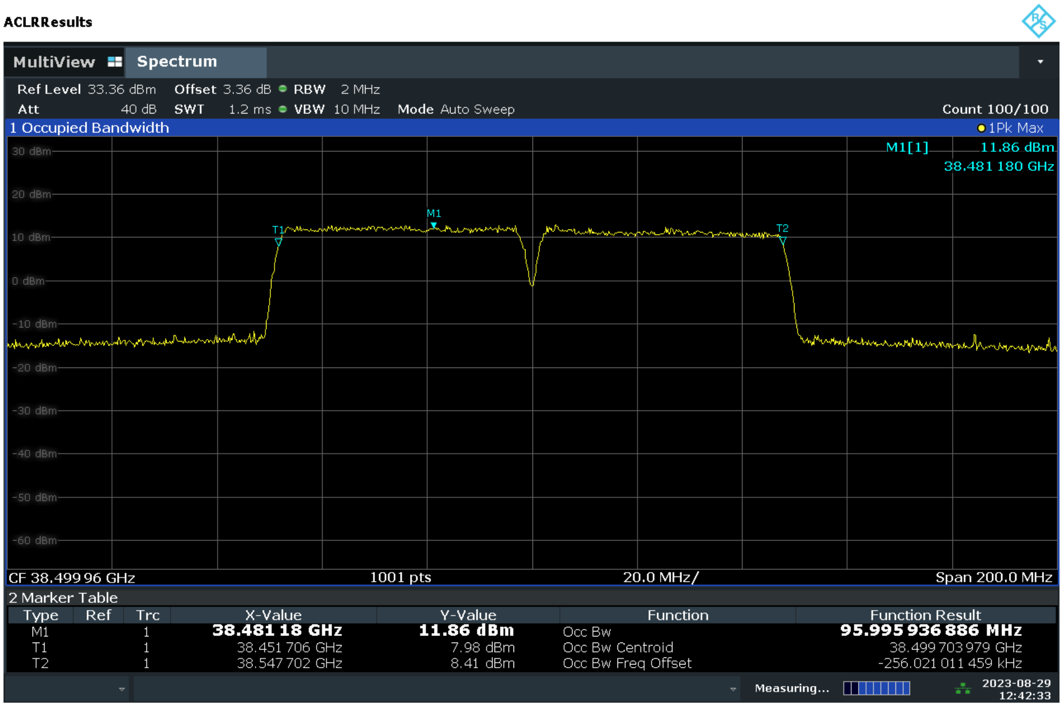
ACLRResults



MultiView Spectrum

Ref Level 33.36 dBm Offset 3.36 dB RBW 2 MHz
Att 40 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 11.86 dBm
38.481 180 GHz

CF 38.499 96 GHz 1001 pts 20.0 MHz/ Span 200.0 MHz

2 Marker Table

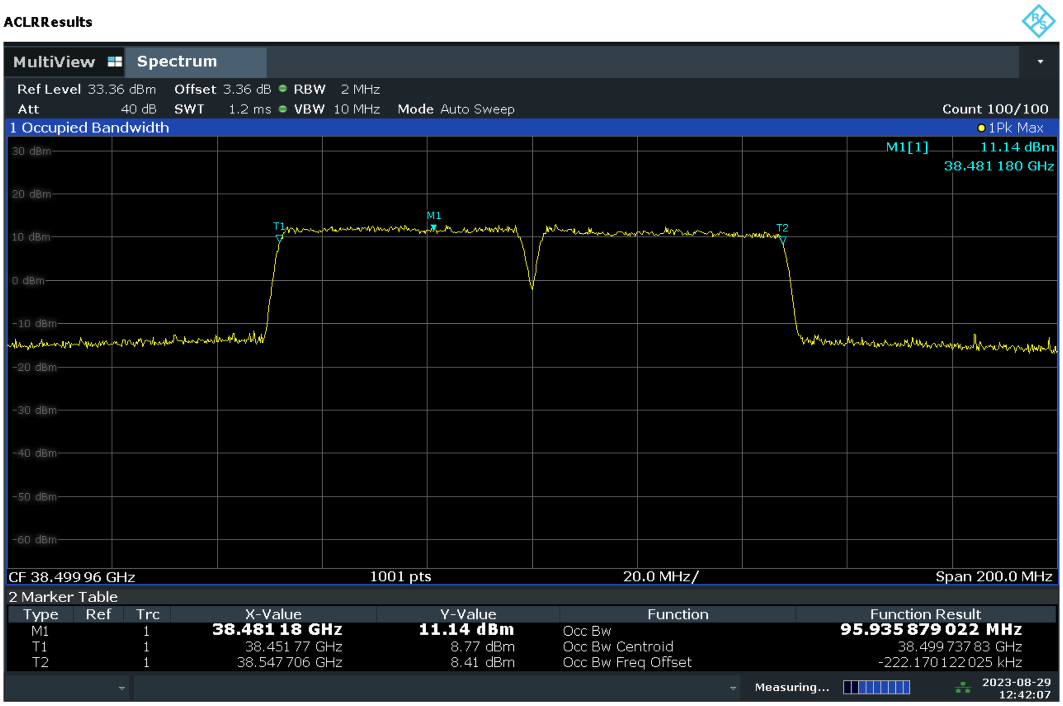
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.481 18 GHz**	**11.86 dBm**	Occ Bw	**95.995 936 886 MHz**
T1		1	38.451 706 GHz	7.98 dBm	Occ Bw Centroid	38.499 703 979 GHz
T2		1	38.547 702 GHz	8.41 dBm	Occ Bw Freq Offset	-256.021 011 459 kHz

Measuring... 2023-08-29 12:42:33

12:42:33 PM 08/29/2023

Plot 7-13. Occupied Bandwidth Plot – DFT-s – V-UL Polarization (50MHz-2CC – QPSK – Mid Channel)

ACLRResults



MultiView Spectrum

Ref Level 33.36 dBm Offset 3.36 dB RBW 2 MHz
Att 40 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 11.14 dBm
38.481 180 GHz

CF 38.499 96 GHz 1001 pts 20.0 MHz/ Span 200.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.481 18 GHz**	**11.14 dBm**	Occ Bw	**95.935 879 022 MHz**
T1		1	38.451 77 GHz	8.77 dBm	Occ Bw Centroid	38.499 737 83 GHz
T2		1	38.547 706 GHz	8.41 dBm	Occ Bw Freq Offset	-222.170 122 025 kHz

Measuring... 2023-08-29 12:42:07

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Plot 7-14. Occupied Bandwidth Plot – DFT-s – V-UL Polarization (50MHz-2CC – 16QAM – Mid Channel)

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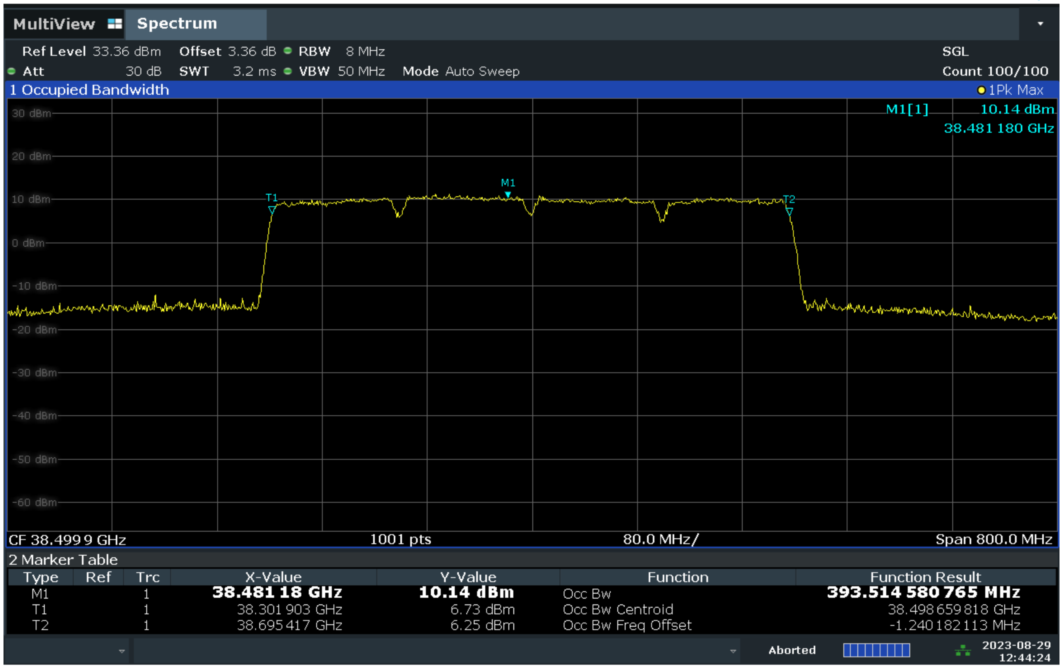
ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB RBW 8 MHz SGL
Att 30 dB SWT 3.2 ms VBW 50 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 10.14 dBm
38.481 180 GHz

CF 38.499 9 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.481 18 GHz**	**10.14 dBm**	Occ Bw	**393.514 580 765 MHz**
T1		1	38.301 903 GHz	6.73 dBm	Occ Bw Centroid	38.498 659 818 GHz
T2		1	38.695 417 GHz	6.25 dBm	Occ Bw Freq Offset	-1.240 182 113 MHz

2023-08-29
12:44:24

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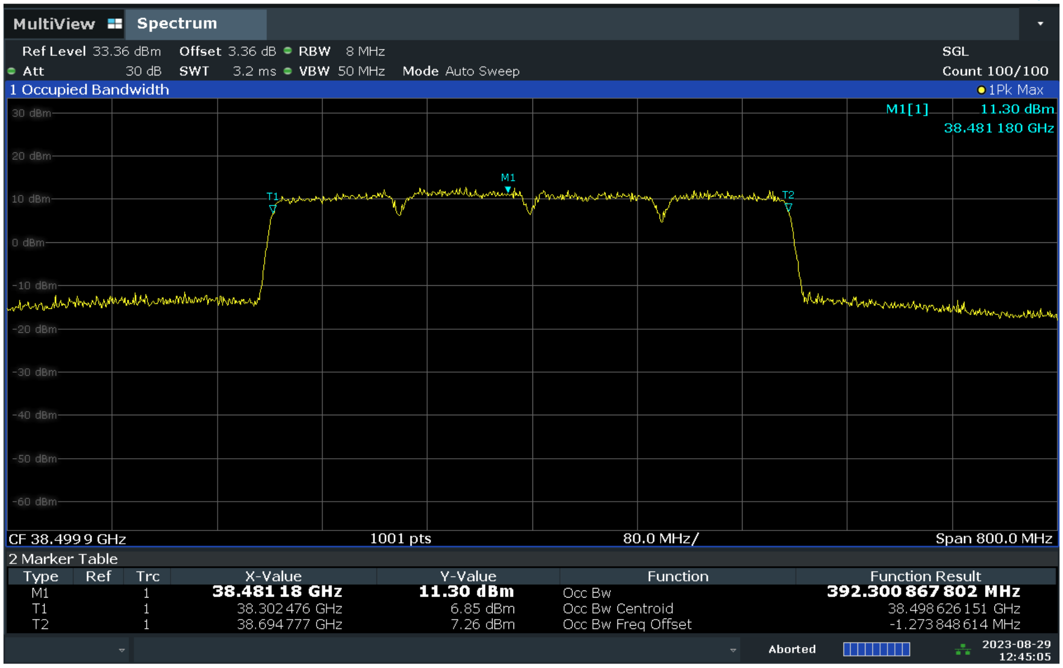
Plot 7-15. Occupied Bandwidth Plot – DFT-s – V-UL Polarization (100MHz-4CC – QPSK – Mid Channel)

ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB RBW 8 MHz SGL
Att 30 dB SWT 3.2 ms VBW 50 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 11.30 dBm
38.481 180 GHz

CF 38.499 9 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.481 18 GHz**	**11.30 dBm**	Occ Bw	**392.300 867 802 MHz**
T1		1	38.302 476 GHz	6.85 dBm	Occ Bw Centroid	38.498 626 151 GHz
T2		1	38.694 777 GHz	7.26 dBm	Occ Bw Freq Offset	-1.273 848 614 MHz

2023-08-29
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Plot 7-16. Occupied Bandwidth Plot – DFT-s – V-UL Polarization (100MHz-4CC – 16QAM – Mid Channel)

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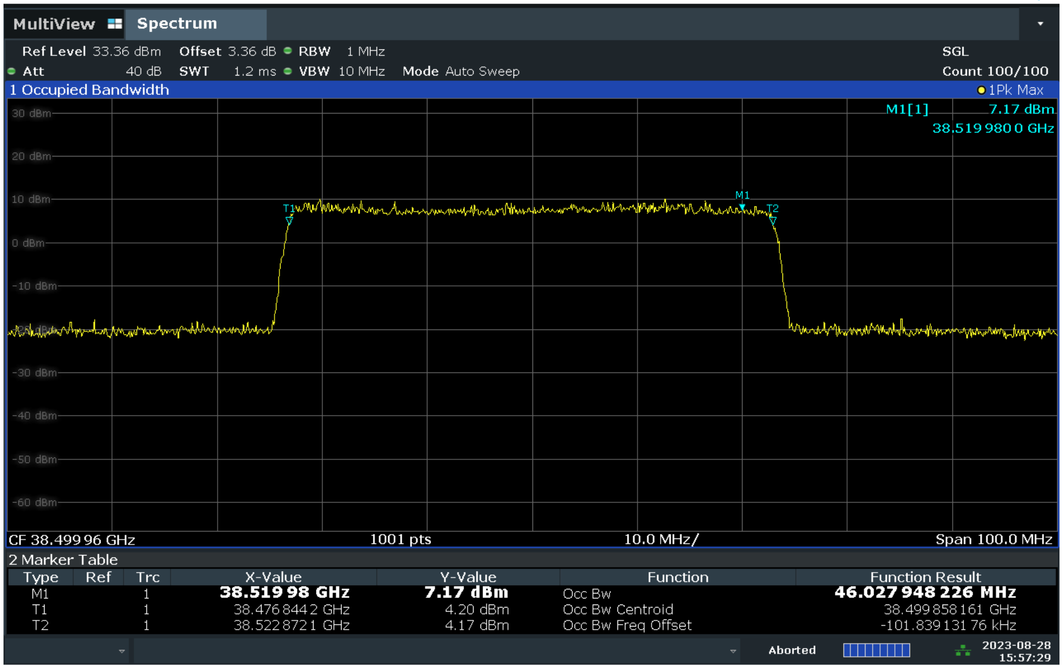
ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 40 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 7.17 dBm
38.519 980 0 GHz

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.519 98 GHz**	**7.17 dBm**	Occ Bw	**46.027 948 226 MHz**
T1		1	38.476 844 2 GHz	4.20 dBm	Occ Bw Centroid	38.499 858 161 GHz
T2		1	38.522 872 1 GHz	4.17 dBm	Occ Bw Freq Offset	-101.839 131 76 kHz

2023-08-28
15:57:29

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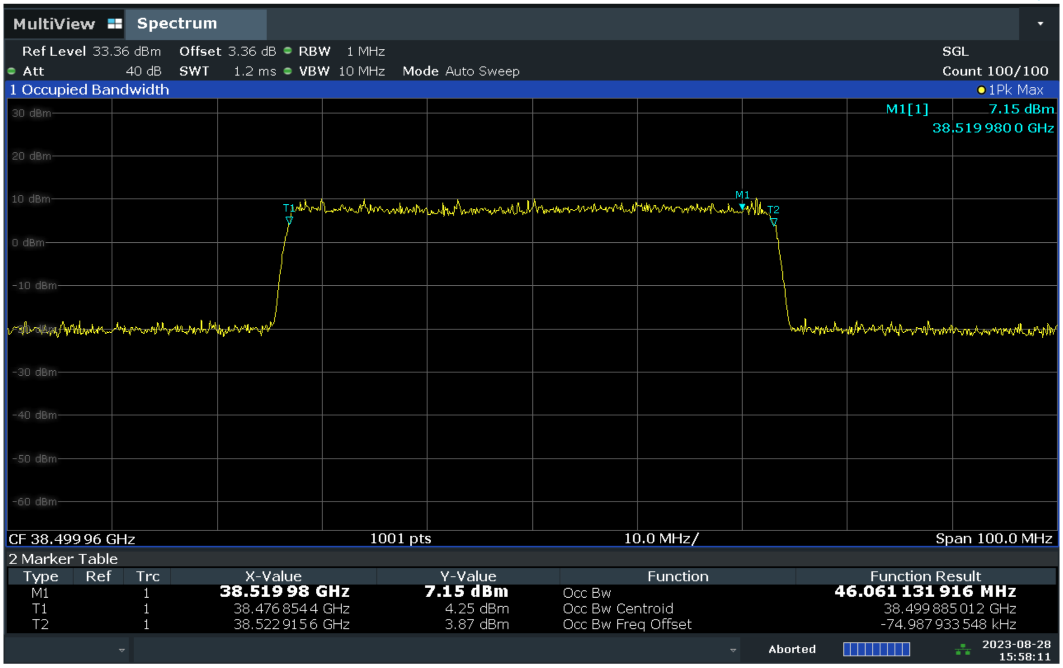
Plot 7-17. Occupied Bandwidth Plot – DFT-s – H-UL Polarization (50MHz-1CC – QPSK – Mid Channel)

ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB RBW 1 MHz SGL
Att 40 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 7.15 dBm
38.519 980 0 GHz

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.519 98 GHz**	**7.15 dBm**	Occ Bw	**46.061 131 916 MHz**
T1		1	38.476 854 4 GHz	4.25 dBm	Occ Bw Centroid	38.499 885 012 GHz
T2		1	38.522 915 6 GHz	3.87 dBm	Occ Bw Freq Offset	-74.987 933 548 kHz

2023-08-28
15:58:11

03:58:12 PM 08/28/2023

Plot 7-18. Occupied Bandwidth Plot – DFT-s – H-UL Polarization (50MHz-1CC – 16QAM – Mid Channel)

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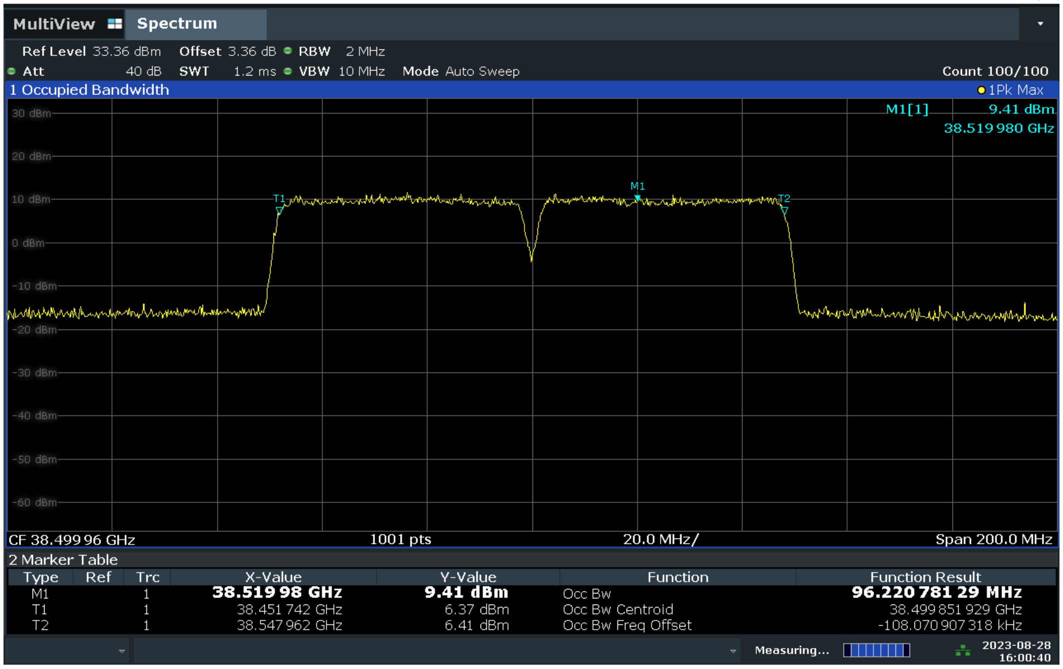
ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB RBW 2 MHz
Att 40 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
1 Occupied Bandwidth 1Pk Max
M1[1] 9.41 dBm
38.519 980 GHz
CF 38.499 96 GHz 1001 pts 20.0 MHz/ Span 200.0 MHz

2 Marker Table

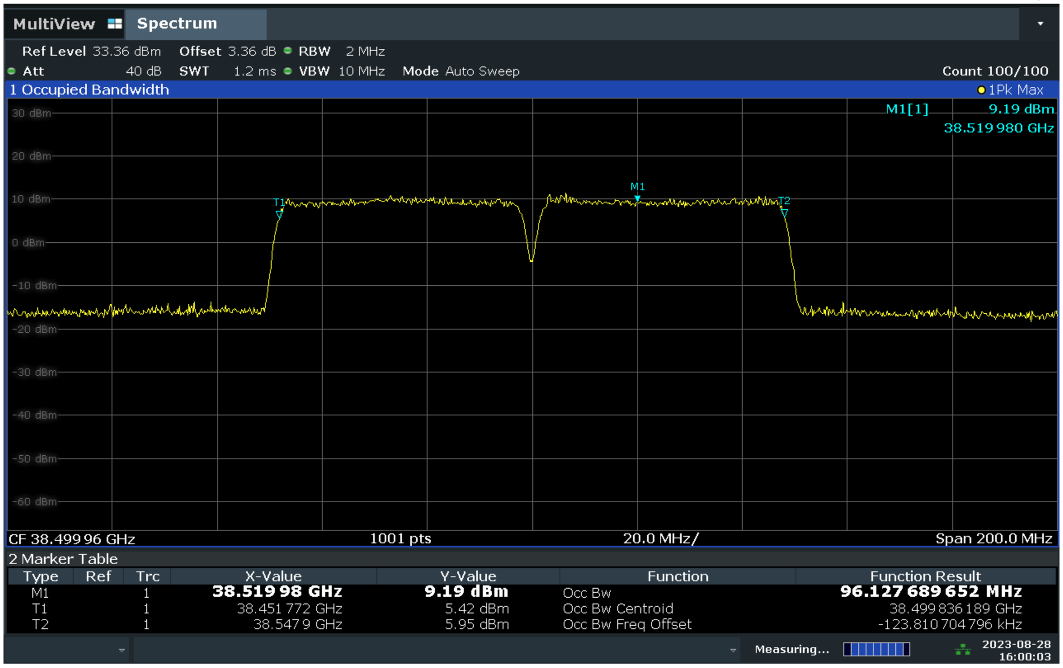
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.519 98 GHz**	**9.41 dBm**	Occ Bw	**96.220 781 29 MHz**
T1		1	38.451 742 GHz	6.37 dBm	Occ Bw Centroid	38.499 851 929 GHz
T2		1	38.547 962 GHz	6.41 dBm	Occ Bw Freq Offset	-108.070 907 318 kHz

2023-08-28
16:00:40

04:00:42 PM 08/28/2023

Plot 7-19. Occupied Bandwidth Plot – DFT-s – H-UL Polarization (50MHz-2CC – QPSK – Mid Channel)

ACLRResults



Ref Level 33.36 dBm Offset 3.36 dB RBW 2 MHz
Att 40 dB SWT 1.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
1 Occupied Bandwidth 1Pk Max
M1[1] 9.19 dBm
38.519 980 GHz
CF 38.499 96 GHz 1001 pts 20.0 MHz/ Span 200.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.519 98 GHz**	**9.19 dBm**	Occ Bw	**96.127 689 652 MHz**
T1		1	38.451 772 GHz	5.42 dBm	Occ Bw Centroid	38.499 836 189 GHz
T2		1	38.547 9 GHz	5.95 dBm	Occ Bw Freq Offset	-123.810 704 796 kHz

2023-08-28
16:00:03

04:00:03 PM 08/28/2023

Plot 7-20. Occupied Bandwidth Plot – DFT-s – H-UL Polarization (50MHz-2CC – 16QAM – Mid Channel)

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Ref Level 33.36 dBm Offset 3.36 dB RBW 8 MHz SGL
Att 30 dB SWT 3.2 ms VBW 50 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 10.18 dBm
38.519 980 GHz

CF 38.499 9 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.519 98 GHz**	**10.18 dBm**	Occ Bw	**393.151 977 278 MHz**
T1		1	38.302 481 GHz	5.68 dBm	Occ Bw Centroid	38.499 056 838 GHz
T2		1	38.695 633 GHz	6.51 dBm	Occ Bw Freq Offset	-843.161 645 027 kHz

2023-08-28
16:07:35

04:07:36 PM 08/28/2023

Plot 7-21. Occupied Bandwidth Plot – DFT-s – H-UL Polarization (100MHz-4CC – QPSK – Mid Channel)

Ref Level 33.36 dBm Offset 3.36 dB RBW 8 MHz SGL
Att 30 dB SWT 3.2 ms VBW 50 MHz Mode Auto Sweep Count 100/100

1 Occupied Bandwidth ●1Pk Max

M1[1] 10.54 dBm
38.519 980 GHz

CF 38.499 9 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**38.519 98 GHz**	**10.54 dBm**	Occ Bw	**392.641 081 308 MHz**
T1		1	38.302 347 GHz	8.28 dBm	Occ Bw Centroid	38.498 667 934 GHz
T2		1	38.694 988 GHz	7.72 dBm	Occ Bw Freq Offset	-1.232 066 327 MHz

2023-08-28
16:09:38

04:09:39 PM 08/28/2023

Plot 7-22. Occupied Bandwidth Plot – DFT-s – H-UL Polarization (100MHz-4CC – 16QAM – Mid Channel)

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7.6 Conducted Power & Equivalent Isotropic Radiated Power

Test Overview

A transmitter port of the EUT is connected to the input of a signal analyzer. A signal generator supplies a 5G NR signal directly into the input port of the device. All measurements are performed as RMS average measurements while the EUT is operating at the appropriate frequencies with the max power condition as specified by the AGC software of the EUT. The Equivalent Isotripic Radiated Power (EIRP) is then calculated using these conducted power measurements.

The average power of the sum of all antenna elements is limited to a maximum EIRP of +55 dBm.

Test Procedures Used

ANSI C63.26-2015 Section 5.2.4.4.1

Test Settings

1. Conducted power measurements are performed using the signal analyzer's "channel power" measurement capability.
2. For pulsed signals, triggering was set to enable measurements only during full power bursts, with the sweep time set less than or equal to the transmission burst duration. For continuously transmitted signals, triggering was set to Free Run.
3. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
4. VBW ≥ 3 x RBW
5. Span = 2x to 3x the OBW
6. No. of sweep points ≥ 2 x span / RBW
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 with all possible input signal configurations. The worst case emissions are reported with the regards to modulations, RB sizes and offsets, and channel bandwidth configurations as shown in the tables below. It was determined that full RB allocations provided the worst case results.

2) As the SU is only designed to boost 5G NR downlink signals, its power levels were only investigated with CP-OFDM transmission schemes. The power levels of the DU, which is designed to boost 5G NR uplink signals, were investigated with DFT-s-OFDM transmission schemes.

3) The input signal to the EUT was set in order to produce the maximum power allowed by the AGC software of the EUT.

4) The MIMO Conducted Powers were calculated by using the "measure and sum the spectral maxima across the outputs" technique specified in Section 6.4.3.2.3 of ANSI C63.26-2015. The spectra were summed linearly and converted to dBm for comparison with the limit.

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5) The MIMO Conducted Powers shown in the tables in this section are the mathematical summations (in linear units) of the measured conducted powers of the horizonally polarized and vertically polarized antenna feeds of an individual unit (i.e either the SU or DU).

6) The single-polarization EIRP levels shown in the tables in this section are the mathematical summations (in logarithmic units) of the corresponding single-polarization conducted powers and the gain of the transmit antenna for that polarization.

7) Per the guidance of ANSI C63.26-2015 Section 6.4.5.3.3(a) for cross-polarized antennas, the MIMO EIRP levels shown in the tables in this section are the mathematical summations (in logarithmic units) of the corresponding MIMO conducted powers and the gain of an individual transmit antenna.

8) The gain of the transmit antenna for each unit is provided by the manufacturer.

9) The conducted power plots shown in this section include the appropriate offsets to correct for the frequency-dependent cable loss of the coaxial cable that connects the output port of the EUT to the spectrum analyzer.

<u>Sample Conducted MIMO Calculation:</u>

Antenna 1 + Antenna 2 = MIMO

(19.39dBm + 19.33dBm) = (86.90mW + 85.70mW) = 172.60mW = 22.37dBm

<u>Sample EIRP Calculation:</u>

Conducted Power + Antenna Gain = EIRP

22.37dBm + 22.0dBi = 44.37dBm

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Band n260 – DU (DFT-s-OFDM)

Channel	Center Frequency [MHz]	Ant. Pol.	Transmission Scheme	Modulation	Bandwidth [MHz]	# of Carriers (CCs)	RB Size/Offset	Conducted Power [dBm]	Tx Ant Gain [dBi]	EIRP [dBm]
Low	37025.04	V-UL	DFT-s-OFDM	QPSK	50	1	Full	19.39	22.0	41.39
Low	37025.04	V-UL	DFT-s-OFDM	QPSK	50	1	1/16	16.31	22.0	38.31
Low	37025.04	V-UL	DFT-s-OFDM	16-QAM	50	1	Full	19.14	22.0	41.14
Mid	38499.96	V-UL	DFT-s-OFDM	QPSK	50	1	Full	19.11	22.0	41.11
Mid	38499.96	V-UL	DFT-s-OFDM	QPSK	50	1	1/16	15.62	22.0	37.62
Mid	38499.96	V-UL	DFT-s-OFDM	16-QAM	50	1	Full	18.30	22.0	40.30
High	39975.00	V-UL	DFT-s-OFDM	QPSK	50	1	Full	19.74	22.0	41.74
High	39975.00	V-UL	DFT-s-OFDM	QPSK	50	1	1/16	15.73	22.0	37.73
High	39975.00	V-UL	DFT-s-OFDM	16-QAM	50	1	Full	18.92	22.0	40.92
Low	37199.94	V-UL	DFT-s-OFDM	QPSK	100	4	Full	19.65	22.0	41.65
Low	37199.94	V-UL	DFT-s-OFDM	QPSK	100	4	1/33	18.79	22.0	40.79
Low	37199.94	V-UL	DFT-s-OFDM	16-QAM	100	4	Full	19.42	22.0	41.42
Mid	38500.02	V-UL	DFT-s-OFDM	QPSK	100	4	Full	19.34	22.0	41.34
Mid	38500.02	V-UL	DFT-s-OFDM	QPSK	100	4	1/33	17.24	22.0	39.24
Mid	38500.02	V-UL	DFT-s-OFDM	16-QAM	100	4	Full	18.46	22.0	40.46
High	39799.98	V-UL	DFT-s-OFDM	QPSK	100	4	Full	19.00	22.0	41.00
High	39799.98	V-UL	DFT-s-OFDM	QPSK	100	4	1/33	17.94	22.0	39.94
High	39799.98	V-UL	DFT-s-OFDM	16-QAM	100	4	Full	18.86	22.0	40.86

Table 7-8. NR Band n260 - Conducted Power and EIRP – DFT-s – V-UL Polarization

Channel	Center Frequency [MHz]	Ant. Pol.	Transmission Scheme	Modulation	Bandwidth [MHz]	# of Carriers (CCs)	RB Size/Offset	Conducted Power [dBm]	Tx Ant Gain [dBi]	EIRP [dBm]
Low	37025.04	H-UL	DFT-s-OFDM	QPSK	50	1	Full	19.33	22.0	41.33
Low	37025.04	H-UL	DFT-s-OFDM	QPSK	50	1	1/16	15.36	22.0	37.36
Low	37025.04	H-UL	DFT-s-OFDM	16-QAM	50	1	Full	18.57	22.0	40.57
Mid	38499.96	H-UL	DFT-s-OFDM	QPSK	50	1	Full	18.78	22.0	40.78
Mid	38499.96	H-UL	DFT-s-OFDM	QPSK	50	1	1/16	15.77	22.0	37.77
Mid	38499.96	H-UL	DFT-s-OFDM	16-QAM	50	1	Full	18.01	22.0	40.01
High	39975.00	H-UL	DFT-s-OFDM	QPSK	50	1	Full	19.06	22.0	41.06
High	39975.00	H-UL	DFT-s-OFDM	QPSK	50	1	1/16	15.81	22.0	37.81
High	39975.00	H-UL	DFT-s-OFDM	16-QAM	50	1	Full	18.36	22.0	40.36
Low	37199.94	H-UL	DFT-s-OFDM	QPSK	100	4	Full	19.29	22.0	41.29
Low	37199.94	H-UL	DFT-s-OFDM	QPSK	100	4	1/33	15.96	22.0	37.96
Low	37199.94	H-UL	DFT-s-OFDM	16-QAM	100	4	Full	18.17	22.0	40.17
Mid	38500.02	H-UL	DFT-s-OFDM	QPSK	100	4	Full	18.75	22.0	40.75
Mid	38500.02	H-UL	DFT-s-OFDM	QPSK	100	4	1/33	16.33	22.0	38.33
Mid	38500.02	H-UL	DFT-s-OFDM	16-QAM	100	4	Full	17.63	22.0	39.63
High	39799.98	H-UL	DFT-s-OFDM	QPSK	100	4	Full	18.73	22.0	40.73
High	39799.98	H-UL	DFT-s-OFDM	QPSK	100	4	1/33	17.02	22.0	39.02
High	39799.98	H-UL	DFT-s-OFDM	16-QAM	100	4	Full	18.51	22.0	40.51

Table 7-9. NR Band n260 - Conducted Power and EIRP – DFT-s – H-UL Polarization

Channel	Center Frequency [MHz]	Ant. Pol.	Transmission Scheme	Modulation	Bandwidth [MHz]	# of Carriers (CCs)	RB Size/Offset	Conducted Power [dBm]	Tx Ant Gain [dBi]	EIRP [dBm]
Low	37025.04	MIMO	DFT-s-OFDM	QPSK	50	1	Full	22.37	22.0	44.37
Low	37025.04	MIMO	DFT-s-OFDM	QPSK	50	1	1/16	18.87	22.0	40.87
Low	37025.04	MIMO	DFT-s-OFDM	16-QAM	50	1	Full	21.87	22.0	43.87
Mid	38499.96	MIMO	DFT-s-OFDM	QPSK	50	1	Full	21.96	22.0	43.96
Mid	38499.96	MIMO	DFT-s-OFDM	QPSK	50	1	1/16	18.71	22.0	40.71
Mid	38499.96	MIMO	DFT-s-OFDM	16-QAM	50	1	Full	21.17	22.0	43.17
High	39975.00	MIMO	DFT-s-OFDM	QPSK	50	1	Full	22.42	22.0	44.42
High	39975.00	MIMO	DFT-s-OFDM	QPSK	50	1	1/16	18.78	22.0	40.78
High	39975.00	MIMO	DFT-s-OFDM	16-QAM	50	1	Full	21.66	22.0	43.66
Low	37199.94	MIMO	DFT-s-OFDM	QPSK	100	4	Full	22.48	22.0	44.48
Low	37199.94	MIMO	DFT-s-OFDM	QPSK	100	4	1/33	20.61	22.0	42.61
Low	37199.94	MIMO	DFT-s-OFDM	16-QAM	100	4	Full	21.85	22.0	43.85
Mid	38500.02	MIMO	DFT-s-OFDM	QPSK	100	4	Full	22.07	22.0	44.07
Mid	38500.02	MIMO	DFT-s-OFDM	QPSK	100	4	1/33	19.82	22.0	41.82
Mid	38500.02	MIMO	DFT-s-OFDM	16-QAM	100	4	Full	21.08	22.0	43.08
High	39799.98	MIMO	DFT-s-OFDM	QPSK	100	4	Full	21.88	22.0	43.88
High	39799.98	MIMO	DFT-s-OFDM	QPSK	100	4	1/33	20.51	22.0	42.51
High	39799.98	MIMO	DFT-s-OFDM	16-QAM	100	4	Full	21.70	22.0	43.70

Table 7-10. NR Band n260 - Conducted Power – DFT-s – MIMO

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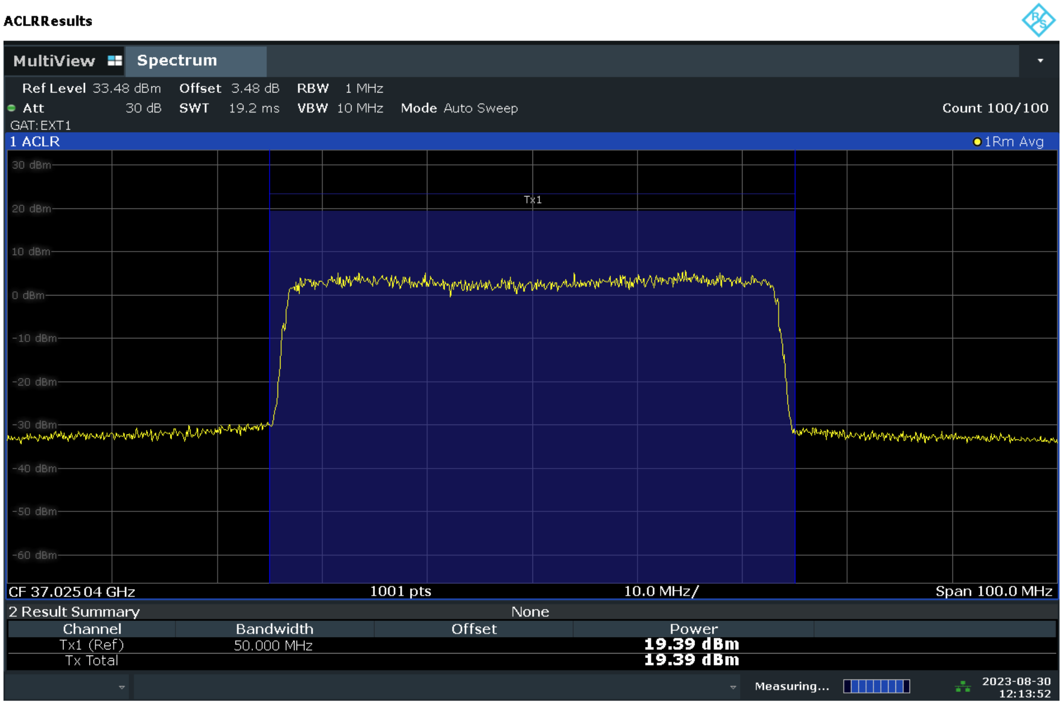
V-UL Polarization



ACLRResults

MultiView Spectrum

Ref Level 33.48 dBm Offset 3.48 dB RBW 1 MHz

Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep

Count 100/100

GAT:EXT1

1 ACLR ●1Rm Avg

CF 37.025 04 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

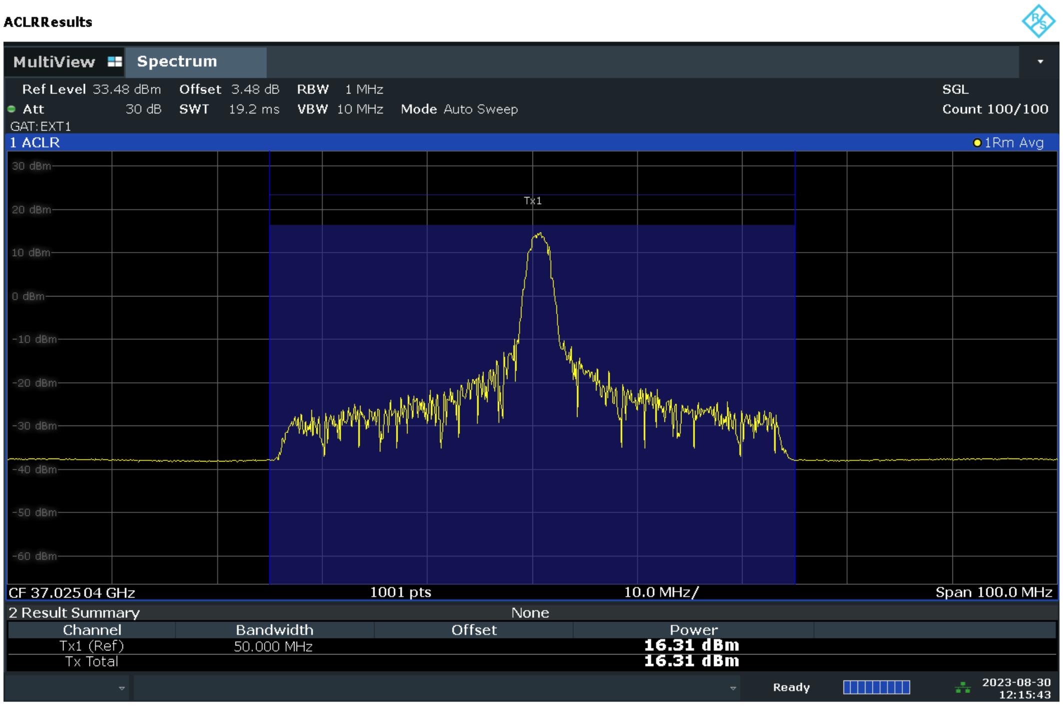
2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		**19.39 dBm**
Tx Total			**19.39 dBm**

Measuring... 2023-08-30 12:13:52

12:13:53 PM 08/30/2023

Plot 7-23. Conducted Power Plot – DFT-S – V-UL Polarization (50MHz-1CC − QPSK – Low Ch. – Full RB)



ACLRResults

MultiView Spectrum

Ref Level 33.48 dBm Offset 3.48 dB RBW 1 MHz

Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep

SGL

Count 100/100

GAT:EXT1

1 ACLR ●1Rm Avg

CF 37.025 04 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		**16.31 dBm**
Tx Total			**16.31 dBm**

Ready 2023-08-30 12:15:43

12:15:43 PM 08/30/2023

Plot 7-24. Conducted Power Plot – DFT-S – V-UL Polarization (50MHz-1CC − QPSK – Low Ch. – 1RB)

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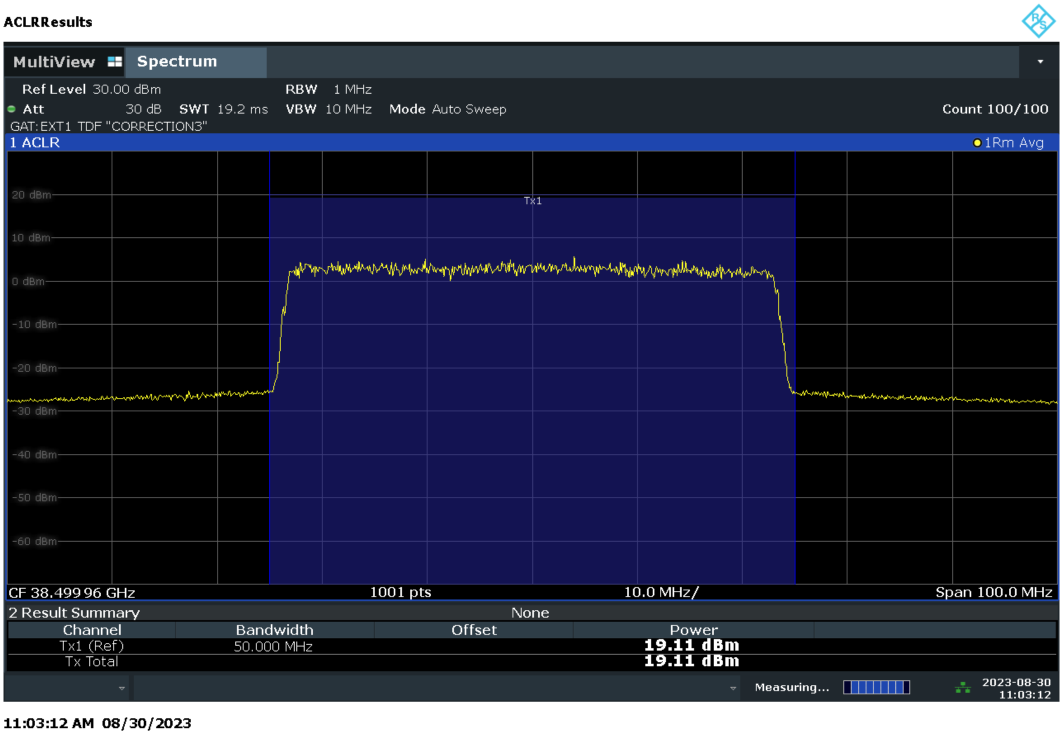


ACLRResults

Ref Level 30.00 dBm RBW 1 MHz
Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

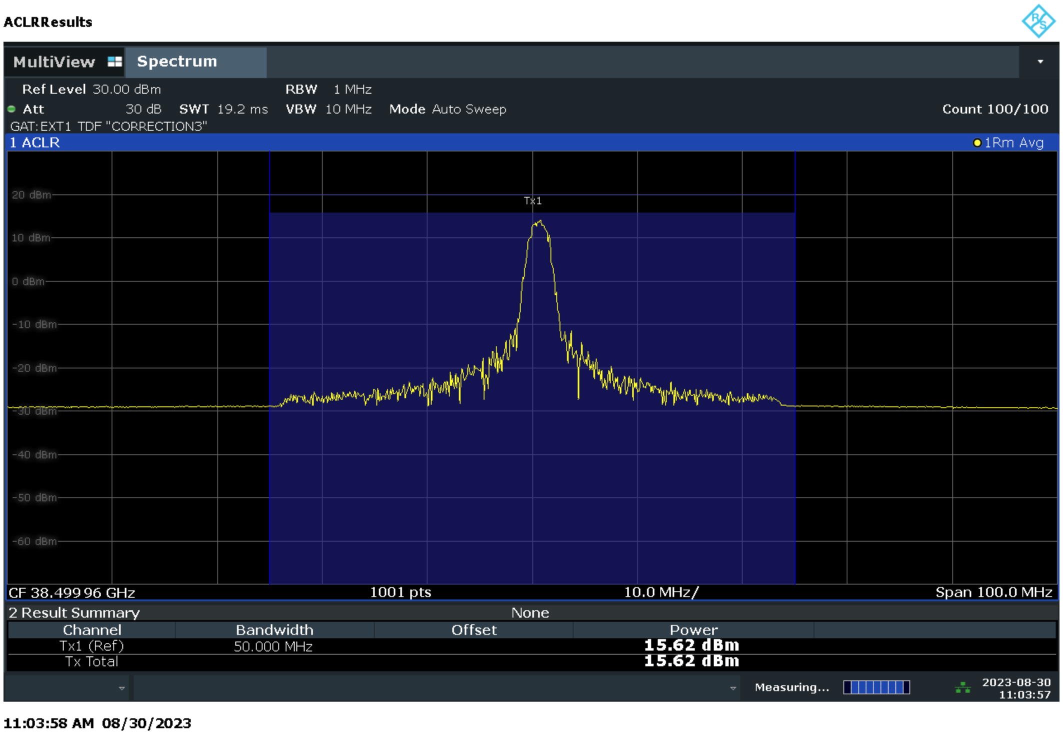
2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		19.11 dBm
Tx Total			19.11 dBm

2023-08-30 11:03:12

11:03:12 AM 08/30/2023

Plot 7-25. Conducted Power Plot – DFT-S – V-UL Polarization (50MHz-1CC − QPSK – Mid Ch. – Full RB)



ACLRResults

Ref Level 30.00 dBm RBW 1 MHz
Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		15.62 dBm
Tx Total			15.62 dBm

2023-08-30 11:03:57

11:03:58 AM 08/30/2023

Plot 7-26. Conducted Power Plot – DFT-S – V-UL Polarization (50MHz-1CC − QPSK – Mid Ch. – 1 RB)

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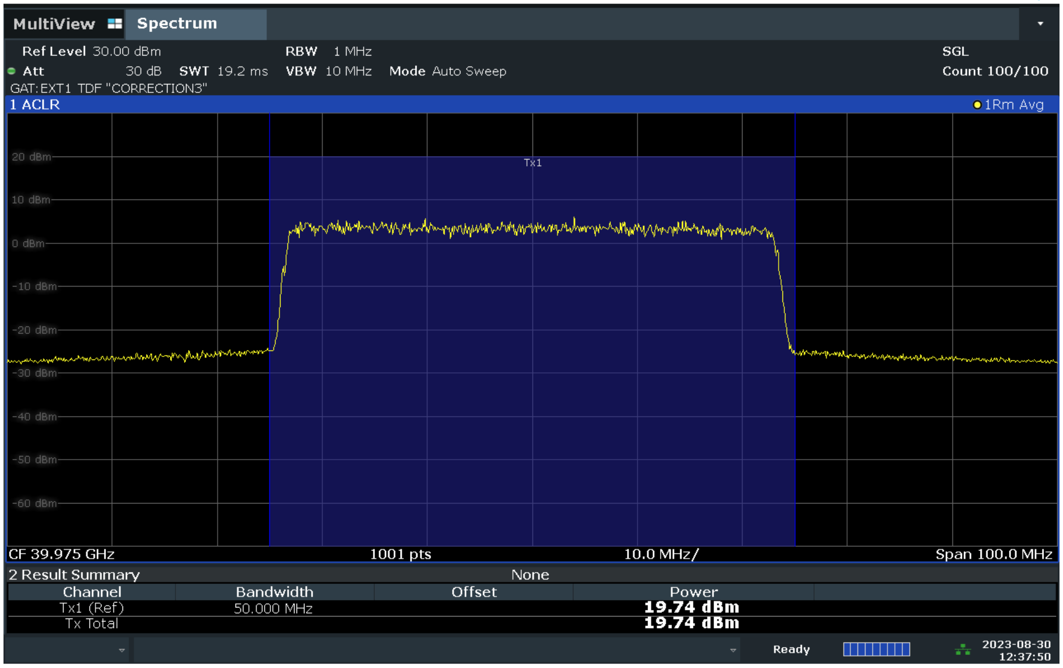
ACLRResults



MultiView Spectrum

Ref Level 30.00 dBm RBW 1 MHz SGL

Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

GAT:EXT1 TDF "CORRECTION3"

1 ACLR ●1Rm Avg

CF 39.975 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

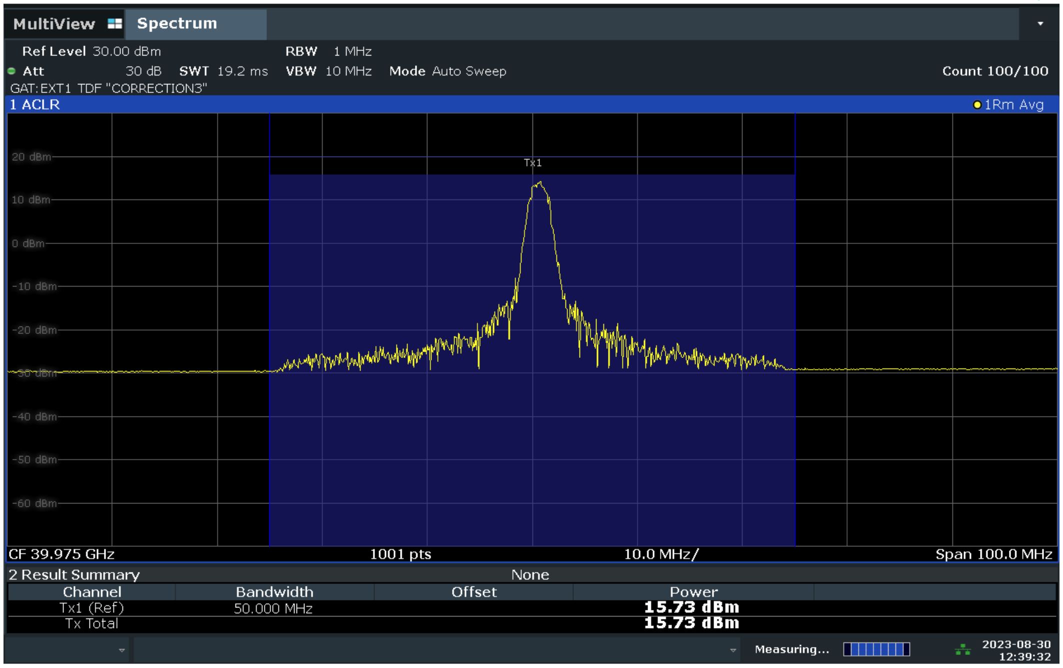
Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		19.74 dBm
Tx Total			19.74 dBm

Ready 2023-08-30 12:37:50

12:37:50 PM 08/30/2023

Plot 7-27. Conducted Power Plot – DFT-S – V-UL Polarization (50MHz-1CC − QPSK – High Ch. – Full RB)

ACLRResults



MultiView Spectrum

Ref Level 30.00 dBm RBW 1 MHz

Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

GAT:EXT1 TDF "CORRECTION3"

1 ACLR ●1Rm Avg

CF 39.975 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		15.73 dBm
Tx Total			15.73 dBm

Measuring... 2023-08-30 12:39:32

12:39:33 PM 08/30/2023

Plot 7-28. Conducted Power Plot – DFT-S – V-UL Polarization (50MHz-1CC − QPSK – High Ch. – 1 RB)

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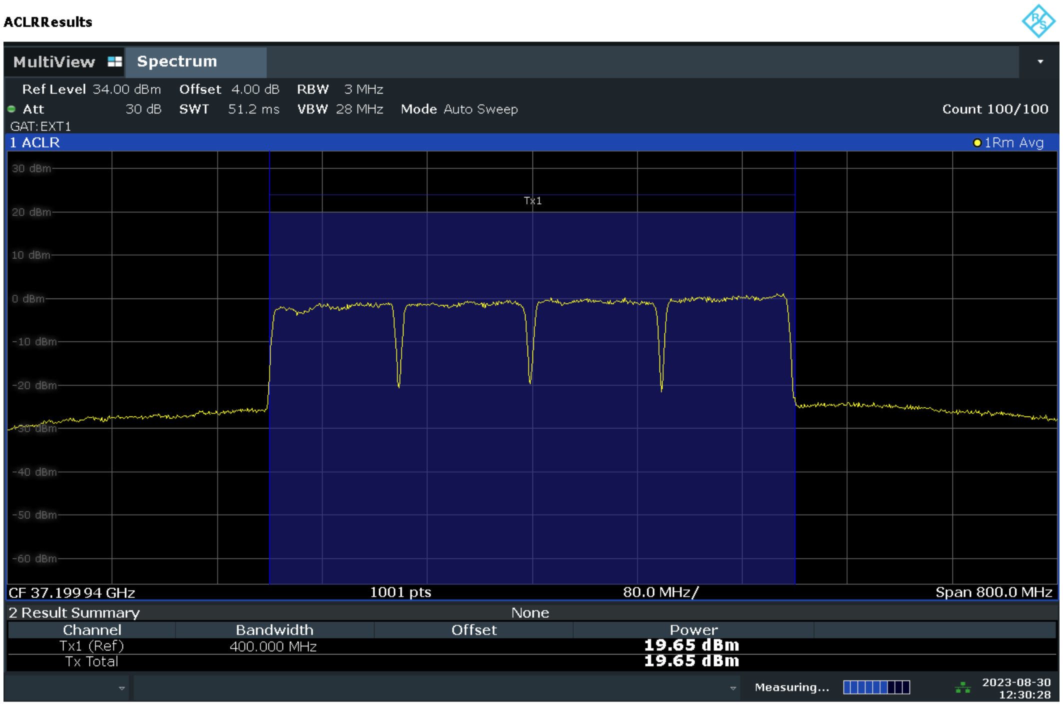
ACLRResults



Ref Level 34.00 dBm Offset 4.00 dB RBW 3 MHz
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1

CF 37.199 94 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

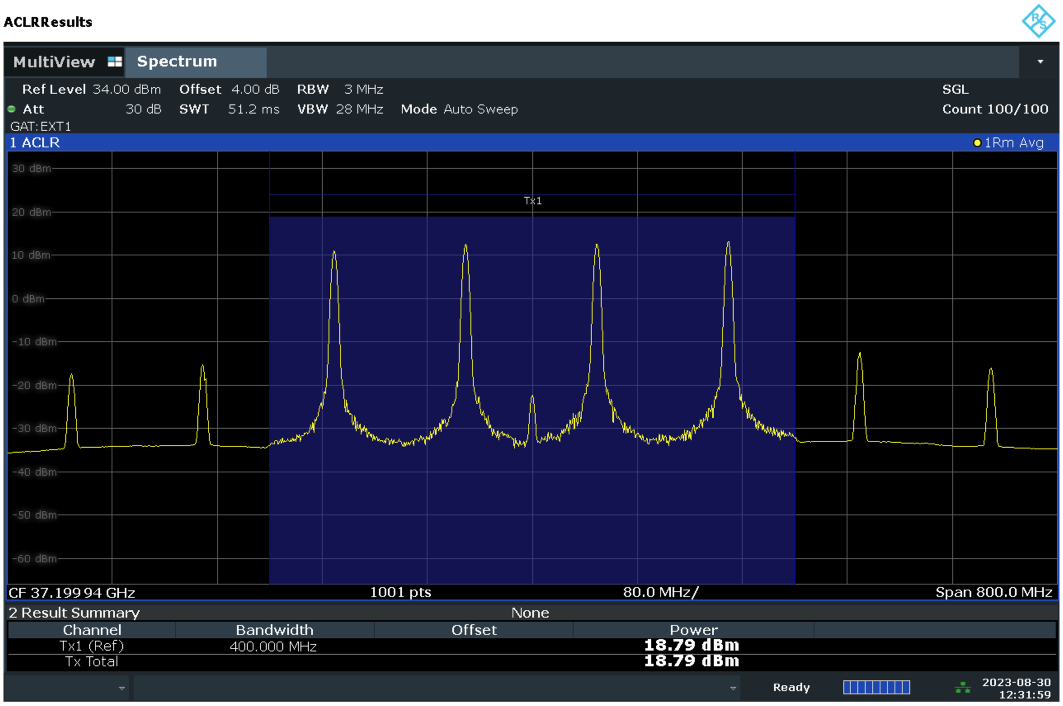
Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		**19.65 dBm**
Tx Total			**19.65 dBm**

2023-08-30 12:30:28

12:30:28 PM 08/30/2023

Plot 7-29. Conducted Power Plot – DFT-S – V-UL Polarization (100MHz-4CC − QPSK – Low Ch. – Full RB)

ACLRResults



Ref Level 34.00 dBm Offset 4.00 dB RBW 3 MHz SGL
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1

CF 37.199 94 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		**18.79 dBm**
Tx Total			**18.79 dBm**

2023-08-30 12:31:59

12:31:59 PM 08/30/2023

Plot 7-30. Conducted Power Plot – DFT-S – V-UL Polarization (100MHz-4CC − QPSK – Low Ch. – 1RB)

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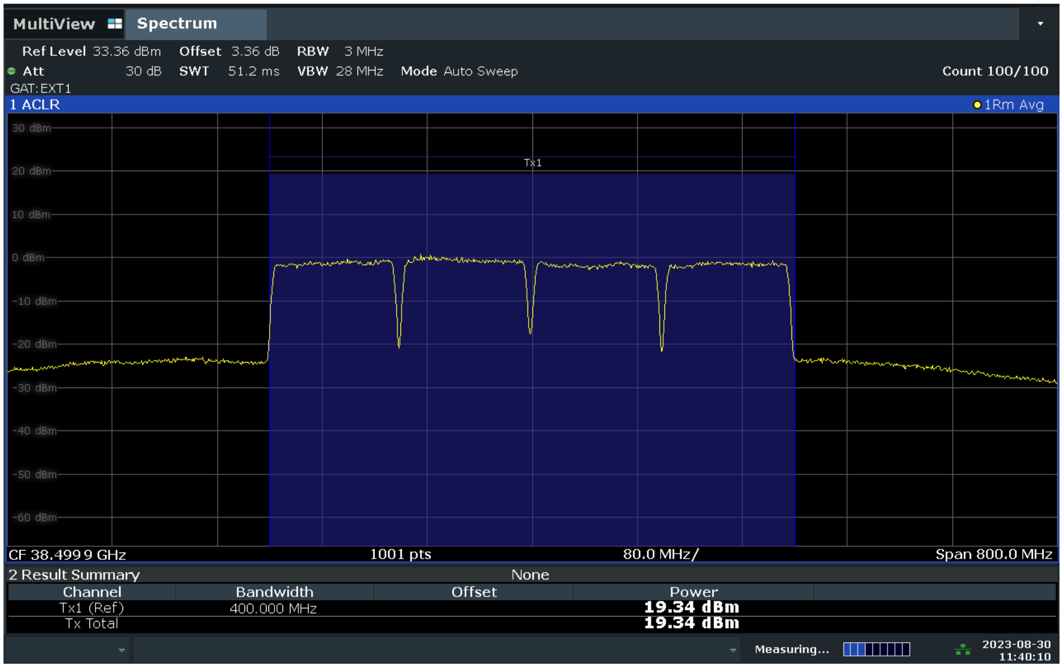
ACLRResults



MultiView Spectrum

Ref Level 33.36 dBm Offset 3.36 dB RBW 3 MHz
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1

1 ACLR ● 1Rm Avg

CF 38.4999 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

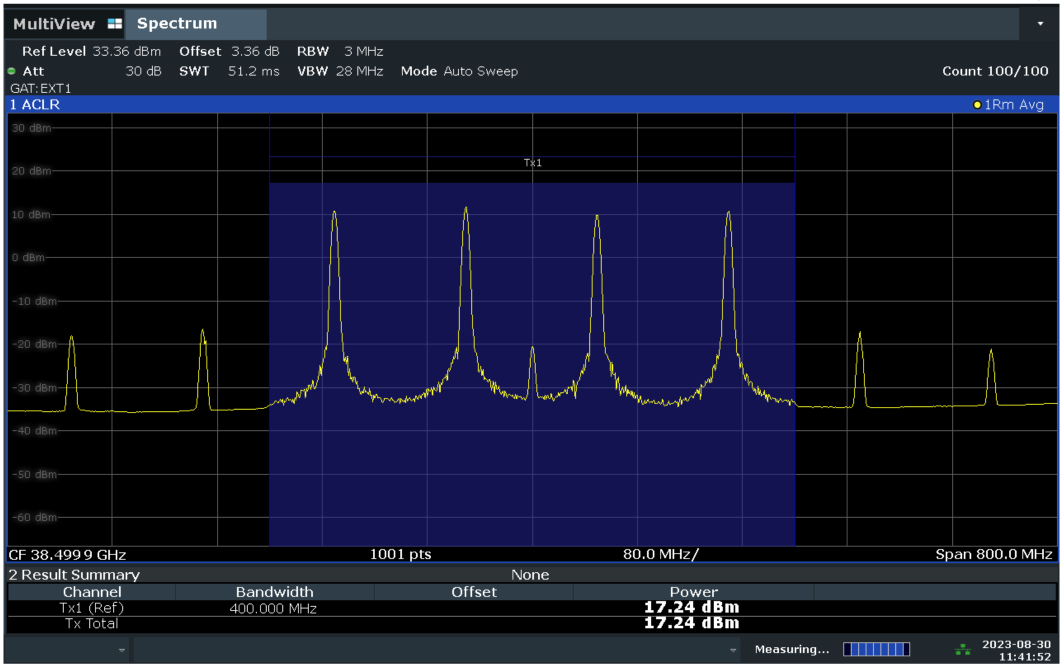
Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		**19.34 dBm**
Tx Total			**19.34 dBm**

Measuring... 2023-08-30 11:40:10

11:40:11 AM 08/30/2023

Plot 7-31. Conducted Power Plot – DFT-S – V-UL Polarization (100MHz-4CC − QPSK – Mid Ch. – Full RB)

ACLRResults



MultiView Spectrum

Ref Level 33.36 dBm Offset 3.36 dB RBW 3 MHz
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1

1 ACLR ● 1Rm Avg

CF 38.4999 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		**17.24 dBm**
Tx Total			**17.24 dBm**

Measuring... 2023-08-30 11:41:52

11:41:52 AM 08/30/2023

Plot 7-32. Conducted Power Plot – DFT-S – V-UL Polarization (100MHz-4CC − QPSK – Mid Ch. – 1 RB)

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ACLR Results

Ref Level 30.00 dBm RBW 3 MHz
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

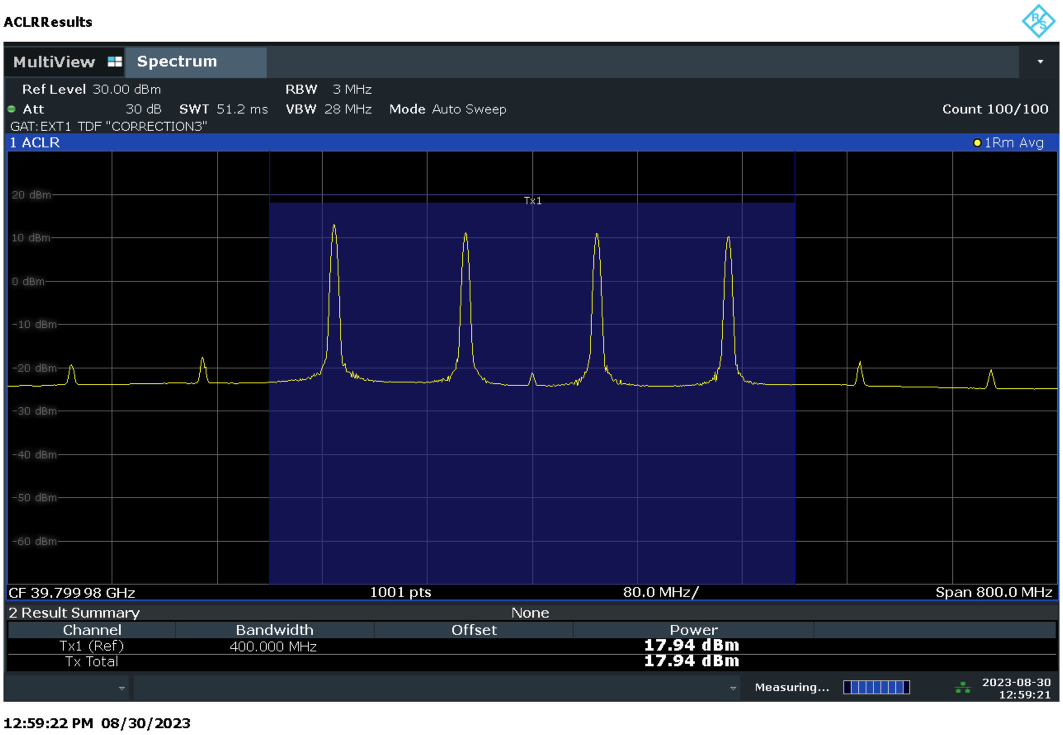
CF 39.799 98 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		19.00 dBm
Tx Total			19.00 dBm

12:54:44 PM 08/30/2023

Plot 7-33. Conducted Power Plot – DFT-S – V-UL Polarization (100MHz-4CC − QPSK – High Ch. – Full RB)



ACLR Results

Ref Level 30.00 dBm RBW 3 MHz
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 39.799 98 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		17.94 dBm
Tx Total			17.94 dBm

12:59:22 PM 08/30/2023

Plot 7-34. Conducted Power Plot – DFT-S – V-UL Polarization (100MHz-4CC − QPSK – High Ch. – 1 RB)

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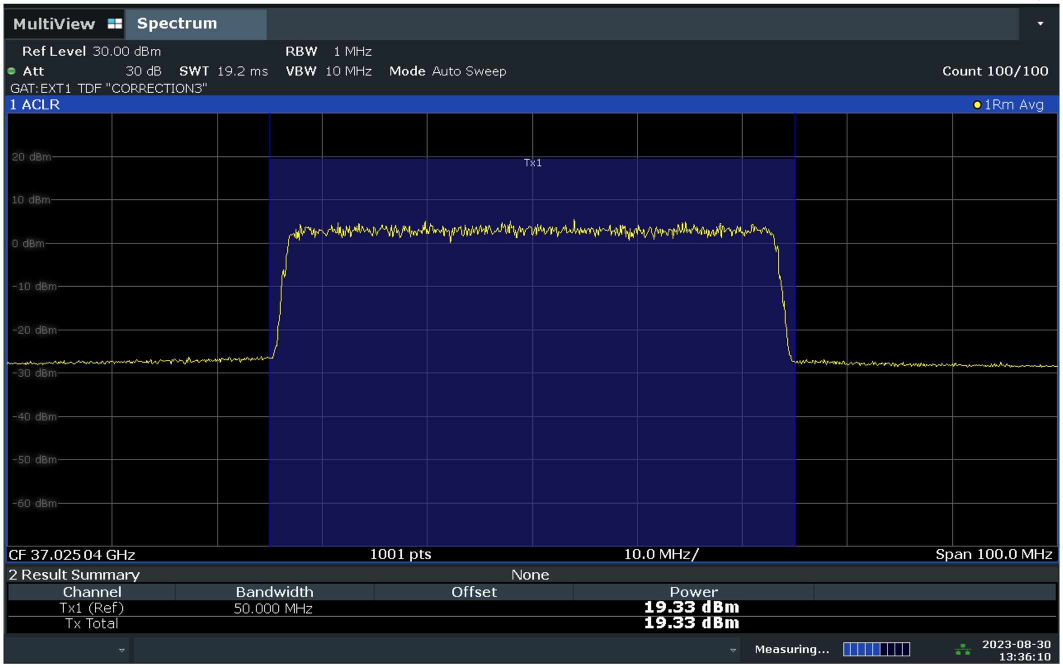
H-UL Polarization

ACLRResults



Ref Level 30.00 dBm RBW 1 MHz
Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 37.025 04 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

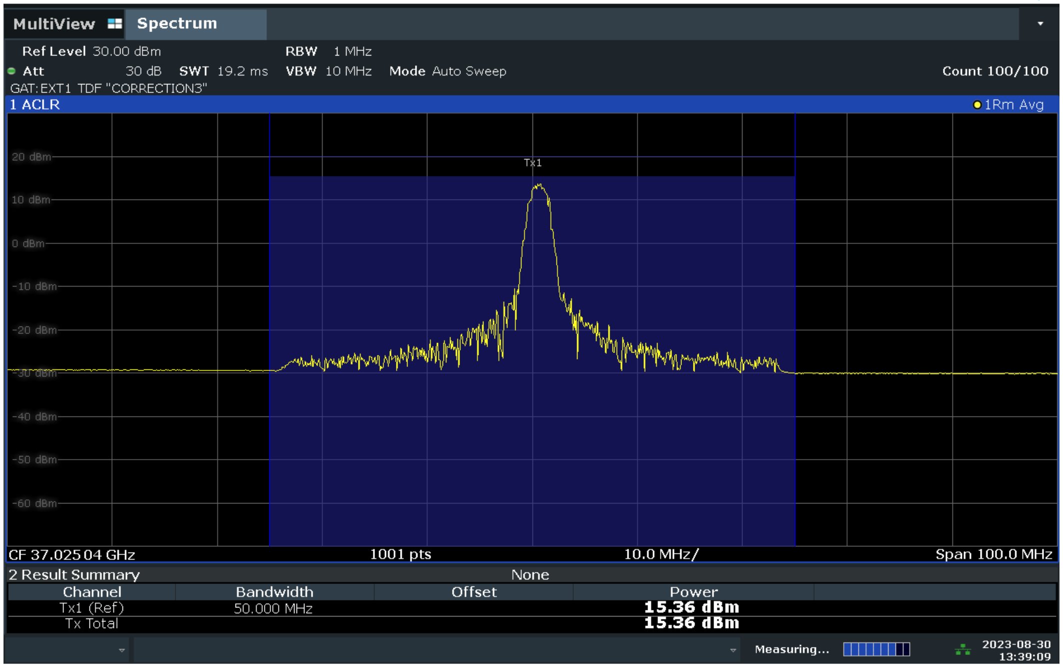
Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		19.33 dBm
Tx Total			19.33 dBm

2023-08-30
13:36:10

01:36:11 PM 08/30/2023

Plot 7-35. Conducted Power Plot – DFT-S – H-UL Polarization (50MHz-1CC − QPSK – Low Ch. – Full RB)

ACLRResults



Ref Level 30.00 dBm RBW 1 MHz
Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 37.025 04 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		15.36 dBm
Tx Total			15.36 dBm

2023-08-30
13:39:09

01:39:09 PM 08/30/2023

Plot 7-36. Conducted Power Plot – DFT-S – H-UL Polarization (50MHz-1CC − QPSK – Low Ch. – 1RB)

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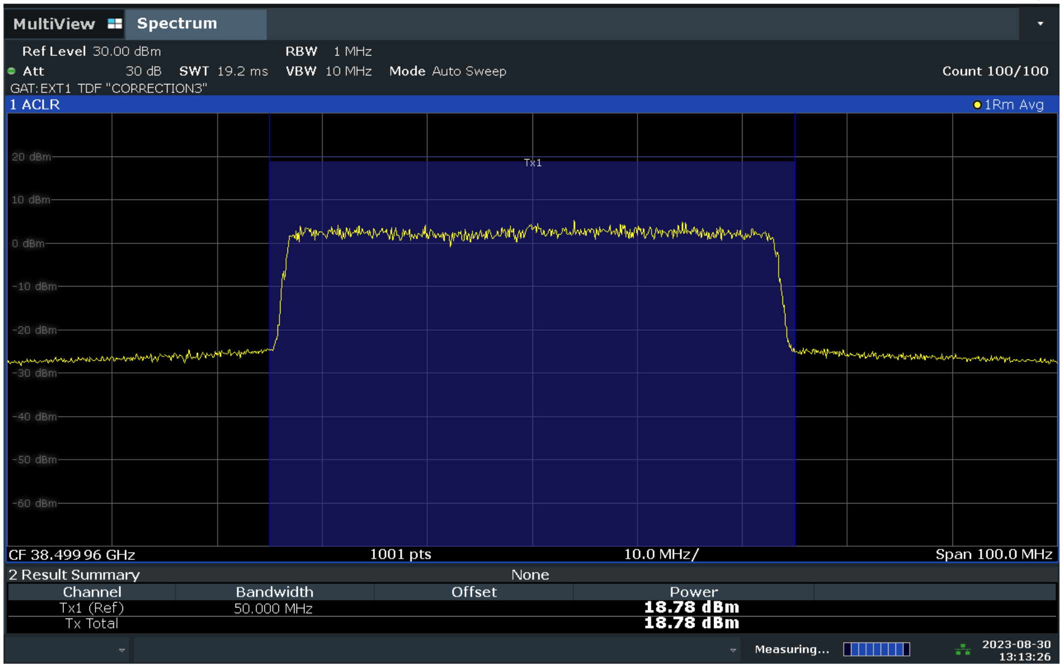
ACLRResults



Ref Level 30.00 dBm RBW 1 MHz
Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

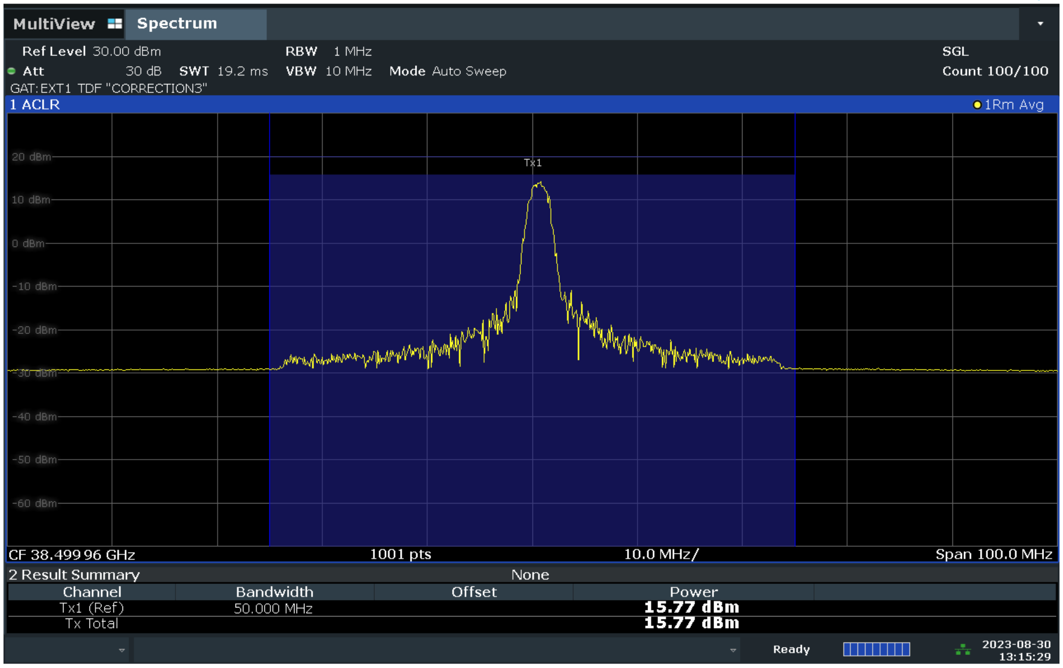
Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		**18.78 dBm**
Tx Total			**18.78 dBm**

2023-08-30 13:13:26

01:13:26 PM 08/30/2023

Plot 7-37. Conducted Power Plot – DFT-S – H-UL Polarization (50MHz-1CC − QPSK – Mid Ch. – Full RB)

ACLRResults



Ref Level 30.00 dBm RBW 1 MHz SGL
Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 38.499 96 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		**15.77 dBm**
Tx Total			**15.77 dBm**

2023-08-30 13:15:29

01:15:30 PM 08/30/2023

Plot 7-38. Conducted Power Plot – DFT-S – H-UL Polarization (50MHz-1CC − QPSK – Mid Ch. – 1 RB)

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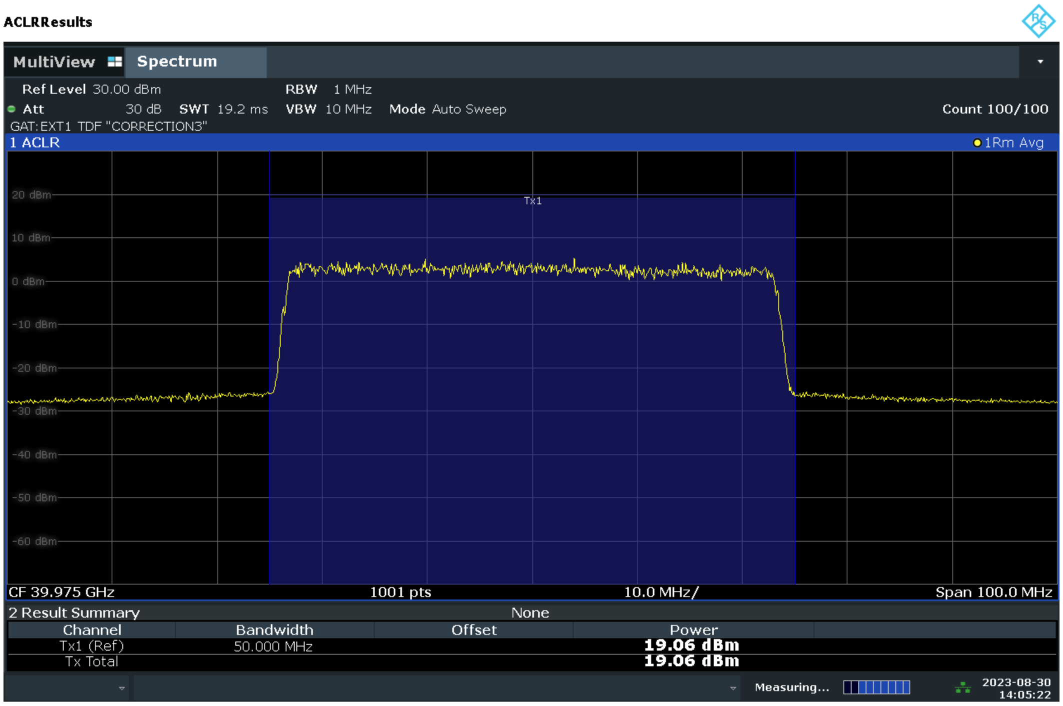


ACLRResults

MultiView Spectrum

Ref Level 30.00 dBm RBW 1 MHz

Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

GAT:EXT1 TDF "CORRECTION3"

1 ACLR ●1Rm Avg

CF 39.975 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

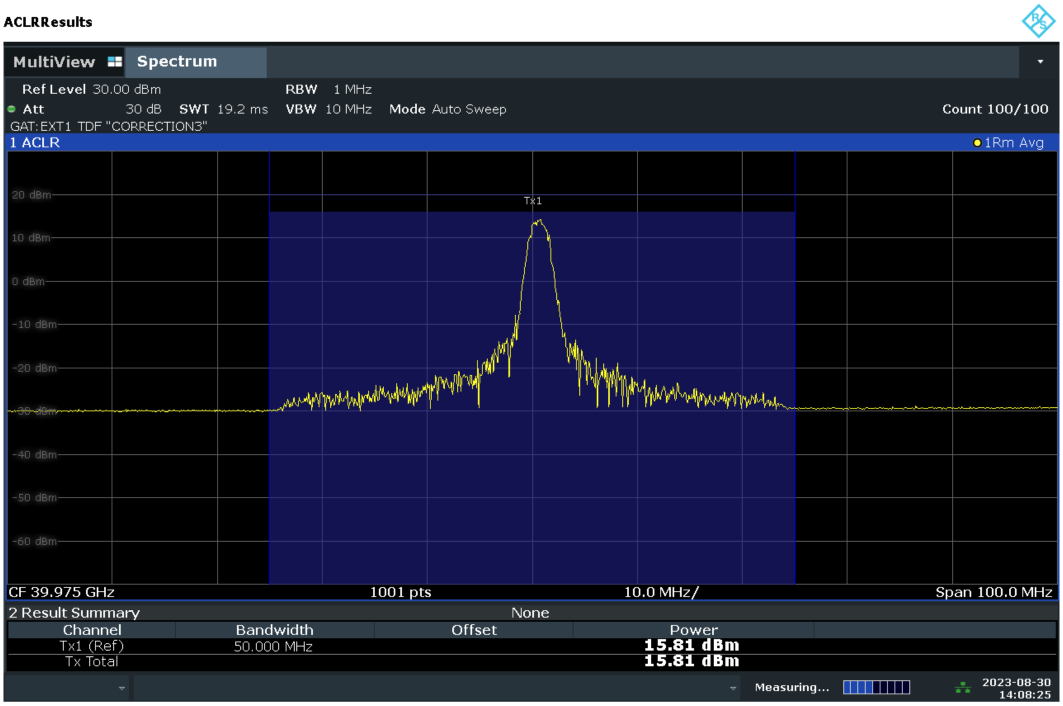
2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		**19.06 dBm**
Tx Total			**19.06 dBm**

Measuring... 2023-08-30 14:05:22

02:05:23 PM 08/30/2023

Plot 7-39. Conducted Power Plot – DFT-S – H-UL Polarization (50MHz-1CC – QPSK – High Ch. – Full RB)



ACLRResults

MultiView Spectrum

Ref Level 30.00 dBm RBW 1 MHz

Att 30 dB SWT 19.2 ms VBW 10 MHz Mode Auto Sweep Count 100/100

GAT:EXT1 TDF "CORRECTION3"

1 ACLR ●1Rm Avg

CF 39.975 GHz 1001 pts 10.0 MHz/ Span 100.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	50.000 MHz		**15.81 dBm**
Tx Total			**15.81 dBm**

Measuring... 2023-08-30 14:08:25

02:08:26 PM 08/30/2023

Plot 7-40. Conducted Power Plot – DFT-S – H-UL Polarization (50MHz-1CC – QPSK – High Ch. – 1 RB)

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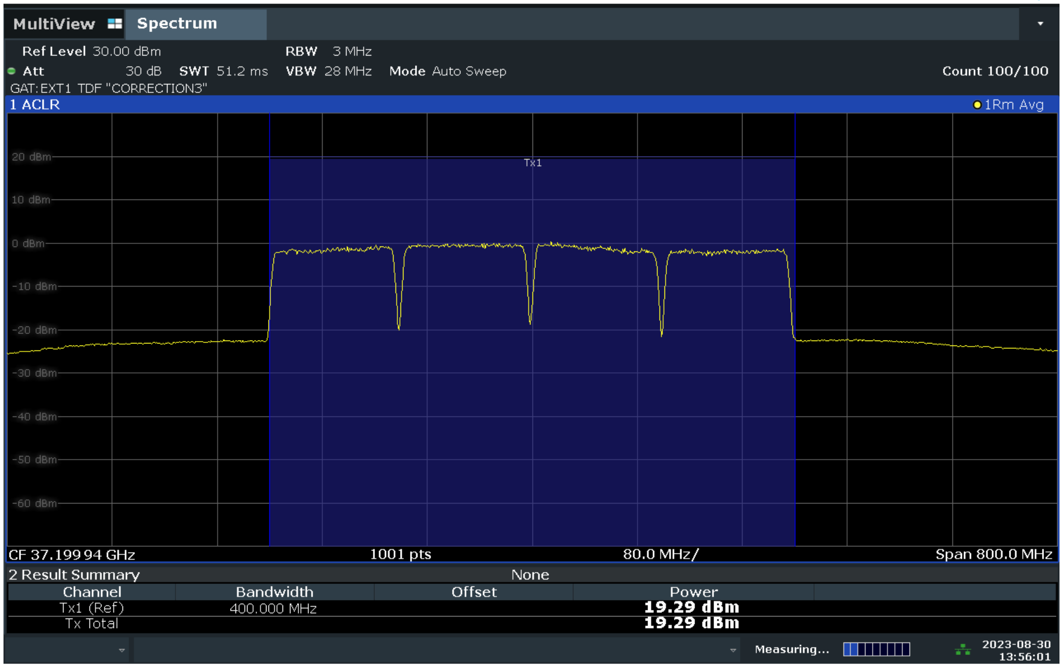
ACLRResults



Ref Level 30.00 dBm RBW 3 MHz
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 37.199 94 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

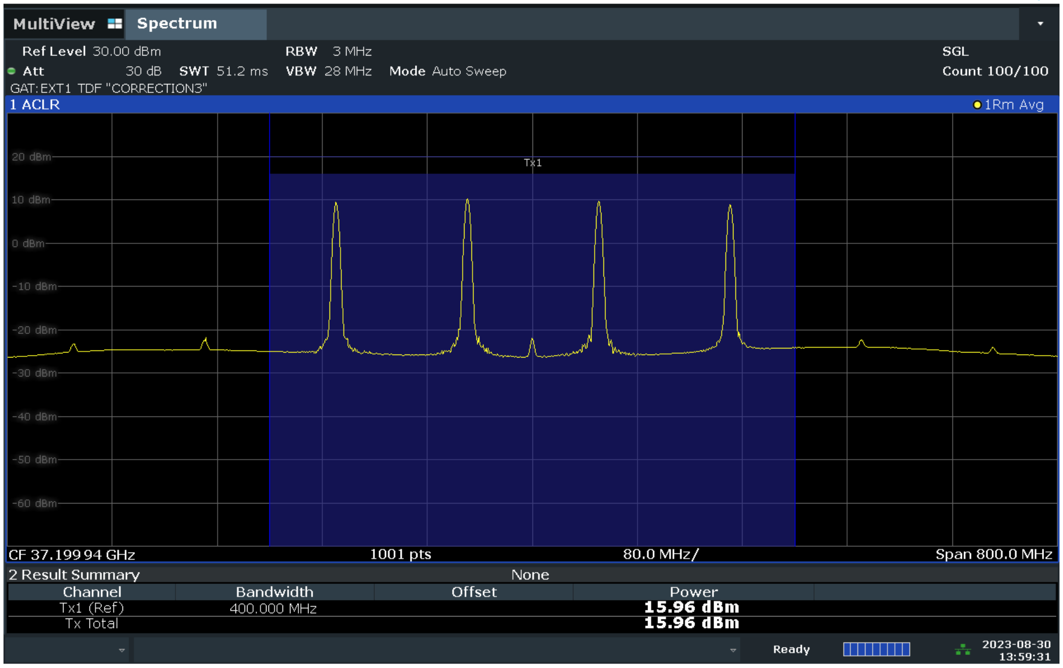
2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		19.29 dBm
Tx Total			19.29 dBm

01:56:01 PM 08/30/2023

Plot 7-41. Conducted Power Plot – DFT-S – H-UL Polarization (100MHz-4CC − QPSK – Low Ch. – Full RB)

ACLRResults



Ref Level 30.00 dBm RBW 3 MHz SGL
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 37.199 94 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		15.96 dBm
Tx Total			15.96 dBm

01:59:31 PM 08/30/2023

Plot 7-42. Conducted Power Plot – DFT-S – H-UL Polarization (100MHz-4CC − QPSK – Low Ch. – 1RB)

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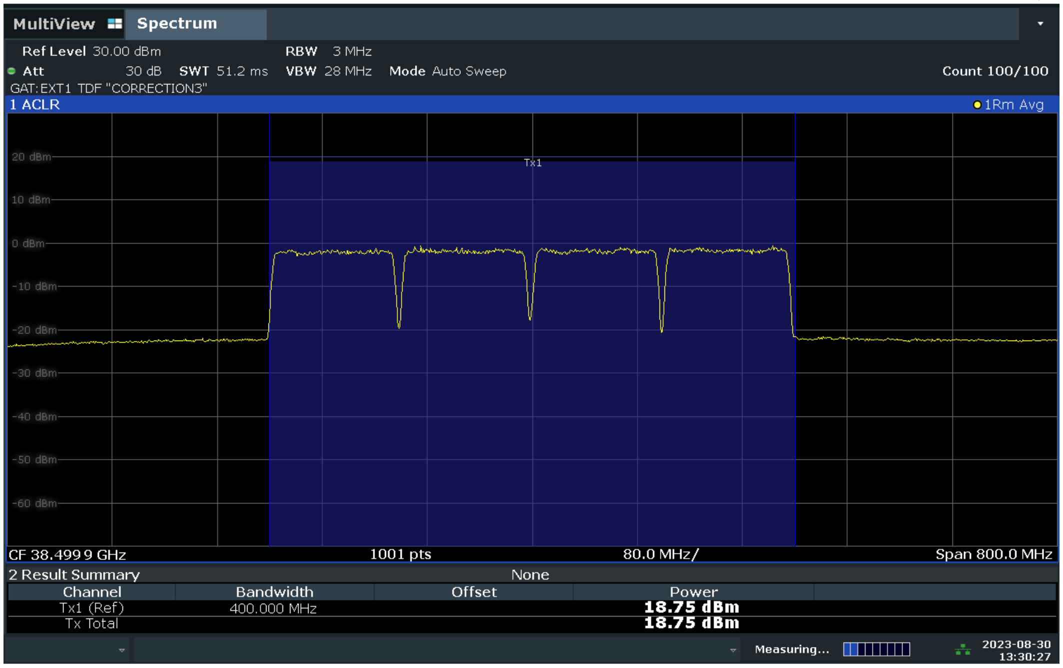
ACLRResults



Ref Level 30.00 dBm RBW 3 MHz
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 38.4999 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

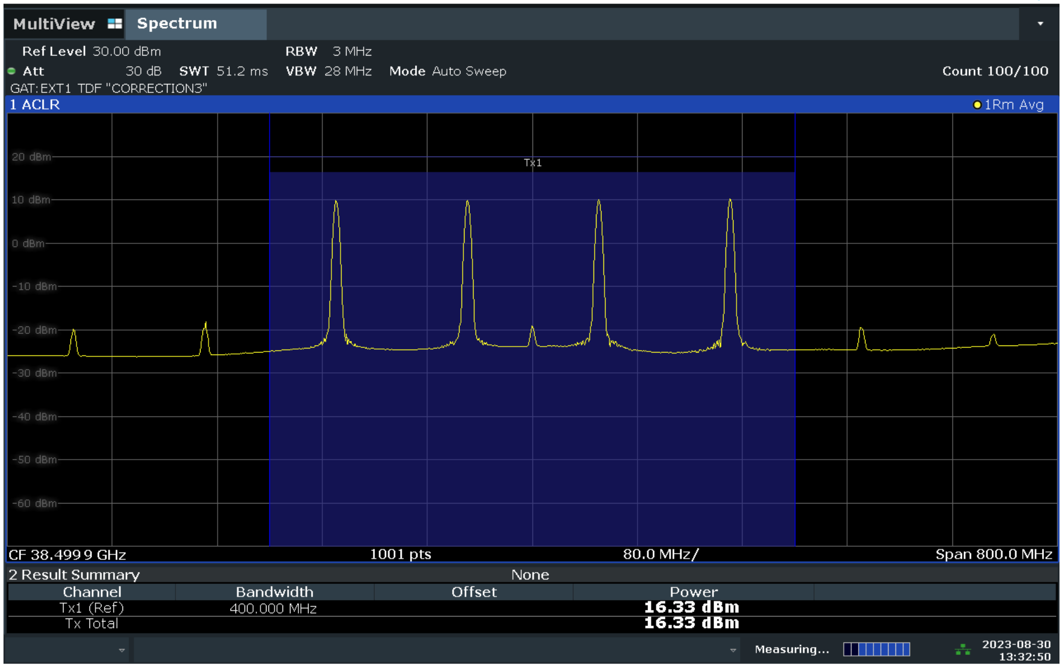
Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		18.75 dBm
Tx Total			18.75 dBm

2023-08-30 13:30:27

01:30:28 PM 08/30/2023

Plot 7-43. Conducted Power Plot – DFT-S – H-UL Polarization (100MHz-4CC − QPSK – Mid Ch. – Full RB)

ACLRResults



Ref Level 30.00 dBm RBW 3 MHz
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

CF 38.4999 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		16.33 dBm
Tx Total			16.33 dBm

2023-08-30 13:32:50

01:32:50 PM 08/30/2023

Plot 7-44. Conducted Power Plot – DFT-S – H-UL Polarization (100MHz-4CC − QPSK – Mid Ch. – 1 RB)

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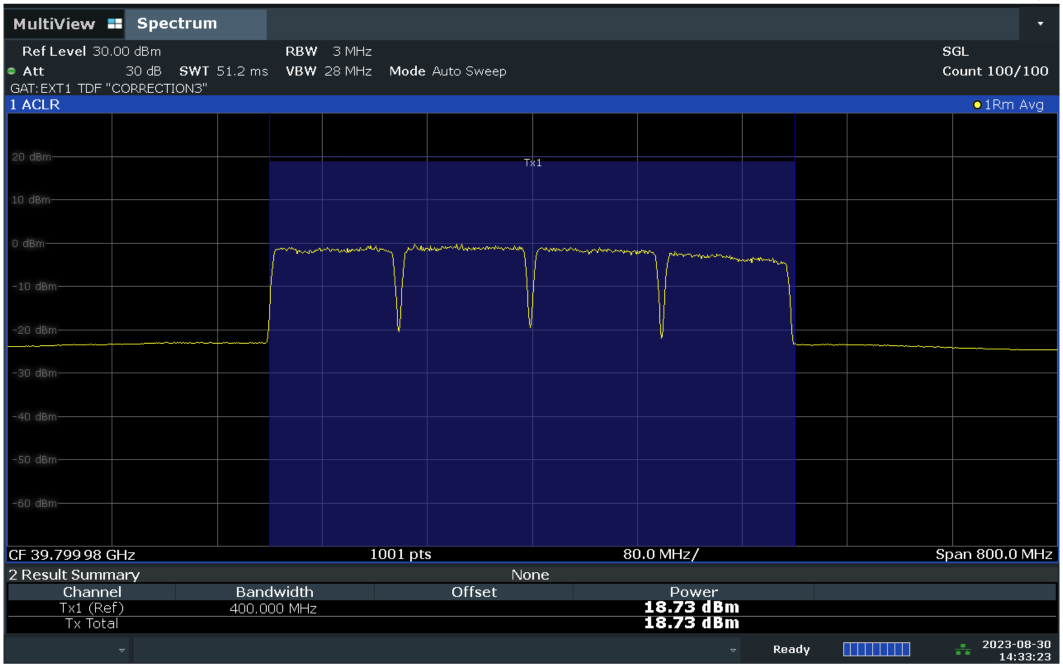
ACLRResults



Ref Level 30.00 dBm RBW 3 MHz SGL
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

1 ACLR ●1Rm Avg

CF 39.799 98 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

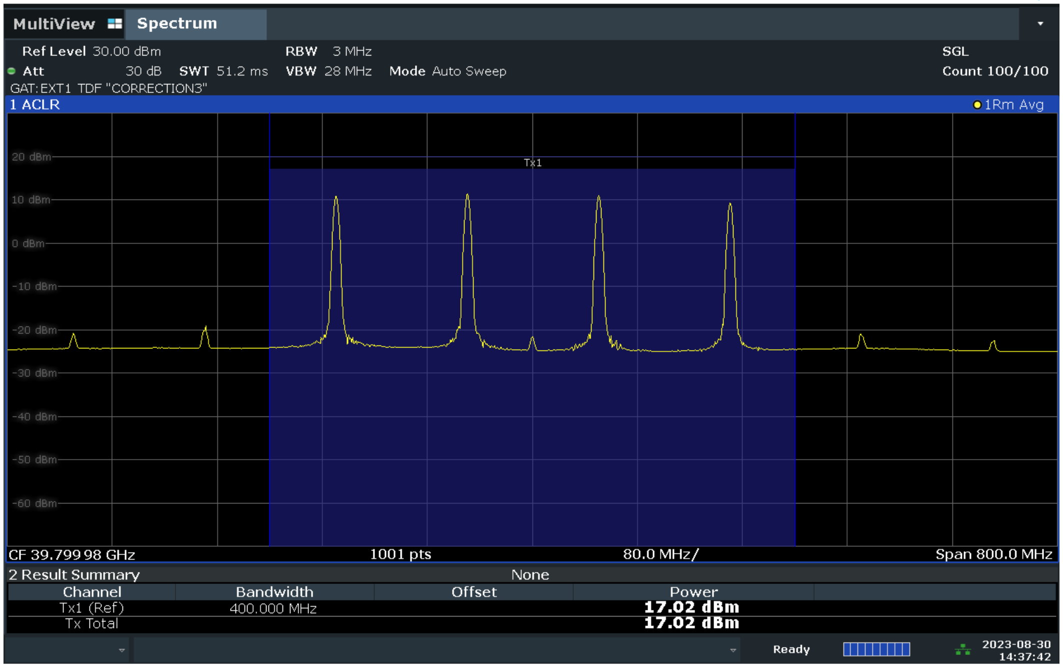
Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		**18.73 dBm**
Tx Total			**18.73 dBm**

Ready 2023-08-30 14:33:23

02:33:24 PM 08/30/2023

Plot 7-45. Conducted Power Plot – DFT-S – H-UL Polarization (100MHz-4CC − QPSK – High Ch. – Full RB)

ACLRResults



Ref Level 30.00 dBm RBW 3 MHz SGL
Att 30 dB SWT 51.2 ms VBW 28 MHz Mode Auto Sweep Count 100/100
GAT:EXT1 TDF "CORRECTION3"

1 ACLR ●1Rm Avg

CF 39.799 98 GHz 1001 pts 80.0 MHz/ Span 800.0 MHz

2 Result Summary None

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	400.000 MHz		**17.02 dBm**
Tx Total			**17.02 dBm**

Ready 2023-08-30 14:37:42

02:37:43 PM 08/30/2023

Plot 7-46. Conducted Power Plot – DFT-S – H-UL Polarization (100MHz-4CC − QPSK – High Ch. – 1 RB)

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7.7 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 200 GHz . 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. The worst case found was 50MHz-1CC bandwidth/component carrier, QPSK Modulation, with 1RB. The EUT was tested under such signaling conditions.

2) All radiated spurious emissions were measured as EIRP to compare with the §30.203 TRP limits.

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) 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.

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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, for RSE measurements, "D" is the largest dimension of the EUT which was roughly 29cm x 29cm x 7cm. The measurement antenna and harmonic mixer were manipulated around all faces and edges of the EUT to determine location of worst-case emissions..

Frequency Range (GHz)	Wavelength (cm)	Far Field Distance (m)	Measurement Distance (m)
18-40	0.749	0.54	2.00
40-60	0.500	1.44	2.00
60-90	0.333	0.96	2.00
90-140	0.214	0.63	2.00
140-200	0.150	0.39	2.00

Table 7-11. 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) To cover the simultaneous transmissions, the LTE module (FCC ID: XMR201906EG21G) was set to transmit at the same time as the mmWave functionality of the host.

8) The spectrum scan plots in this section are used for the purpose of signal identification. Each emission is subject to a unique limit based on the rule under which the transmitter operates. For instances where an emission is the product of co-located transmitters (i.e. an intermodulation product), the limit on that emission is the least strict between the rule parts under which each transmitter operates.

9) The limit lines on the spectrum scan plots in this section are displayed in regards to the part 30 limits for n260 mmWave spurious emissions. The limits for spurious emissions solely due to the other transmitters are not displayed on the plots. Instead, the applicable limits are displayed in the accompanying tables.

10) The fundamental emissions from multiple co-located transmitters may appear on spectrum scan plots. These are not investigated as spurious emissions.

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

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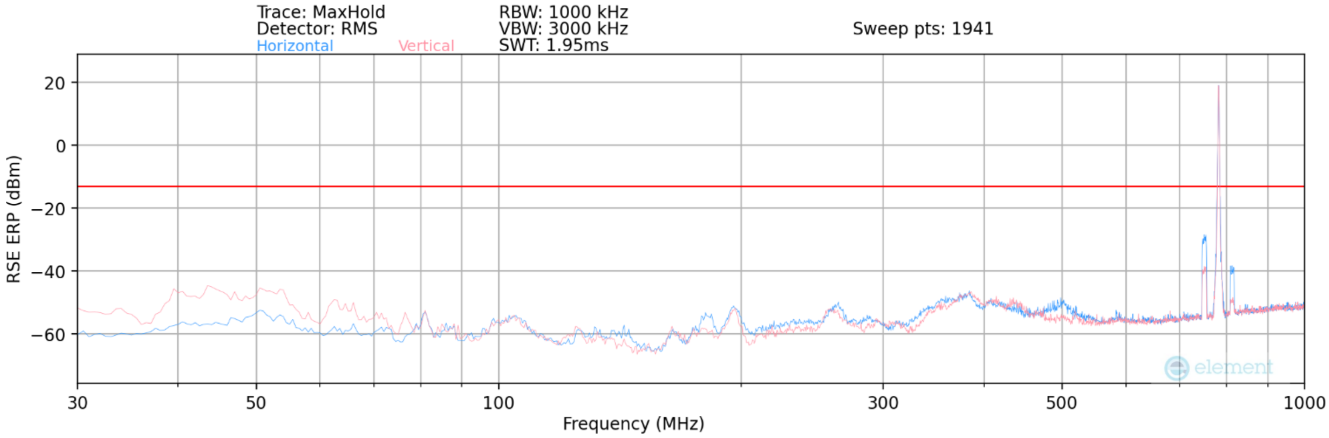
Band n260 – DU

30MHz - 1GHz



Plot 7-47. n260 Radiated Spurious Plot (1CC QPSK Mid Channel) - DU

Spurious Emissions ERP Sample Calculation (n260)

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

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 Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
80.95	Low	50	V	QPSK	221	57	-53.40	-13.00	-40.40
520.00	Low	50	V	QPSK	108	69	-52.05	-13.00	-39.05
753.00	Low	50	V	QPSK	151	174	-31.92	-13.00	-18.92
83.00	Mid	50	V	QPSK	152	58	-55.70	-13.00	-42.70
584.00	Mid	50	V	QPSK	150	118	-52.70	-13.00	-39.70
751.00	Mid	50	V	QPSK	148	129	-30.51	-13.00	-17.51
83.45	High	50	V	QPSK	125	74	-59.28	-13.00	-46.28
519.00	High	50	V	QPSK	156	105	-53.59	-13.00	-40.59
749.00	High	50	V	QPSK	106	171	-32.54	-13.00	-19.54

Table 7-12. n260 Radiated Spurious Emissions Table (30MHz - 1GHz) - DU

Notes

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

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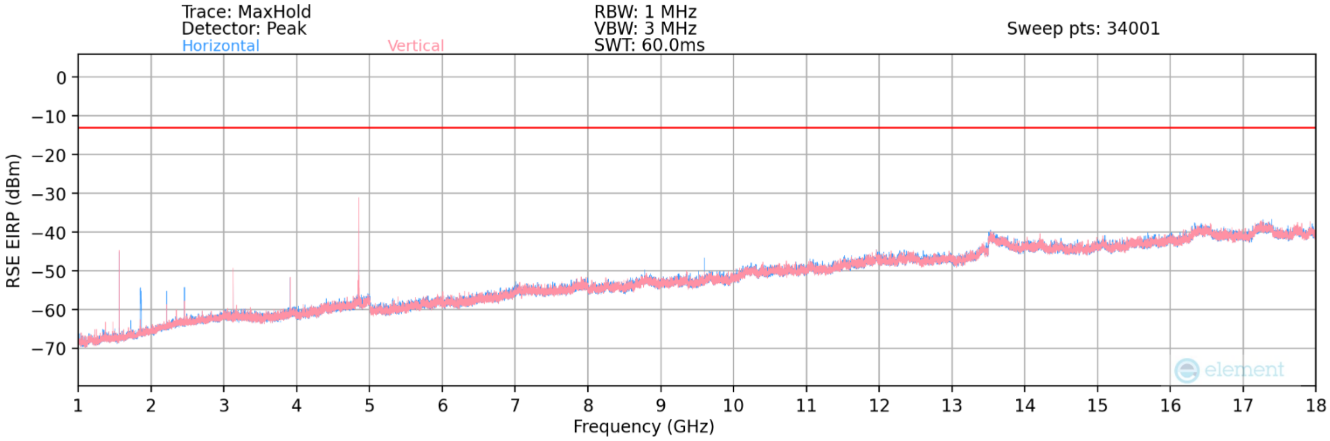
1GHz - 18GHz



Plot 7-48. n260 Radiated Spurious Plot (1CC QPSK Mid Channel) - DU

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 Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
3128.30	Low	50	V	QPSK	201	283	-40.31	-13.00	-27.31
1564.05	Mid	50	V	QPSK	150	31	-45.82	-13.00	-32.82
2211.78	Mid	50	V	QPSK	395	32	-44.18	-13.00	-31.18
3130.00	Mid	50	V	QPSK	190	277	-38.91	-13.00	-25.91
3910.00	Mid	50	V	QPSK	103	345	-38.19	-13.00	-25.19
4850.08	Mid	50	V	QPSK	107	320	-22.41	-13.00	-9.41
9600.00	Mid	50	V	QPSK	147	271	-36.36	-13.00	-23.36
5125.87	High	50	V	QPSK	164	318	-35.91	-13.00	-22.91

Table 7-13. n260 Radiated Spurious Emissions Table (1GHz - 18GHz) - DU

Notes

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

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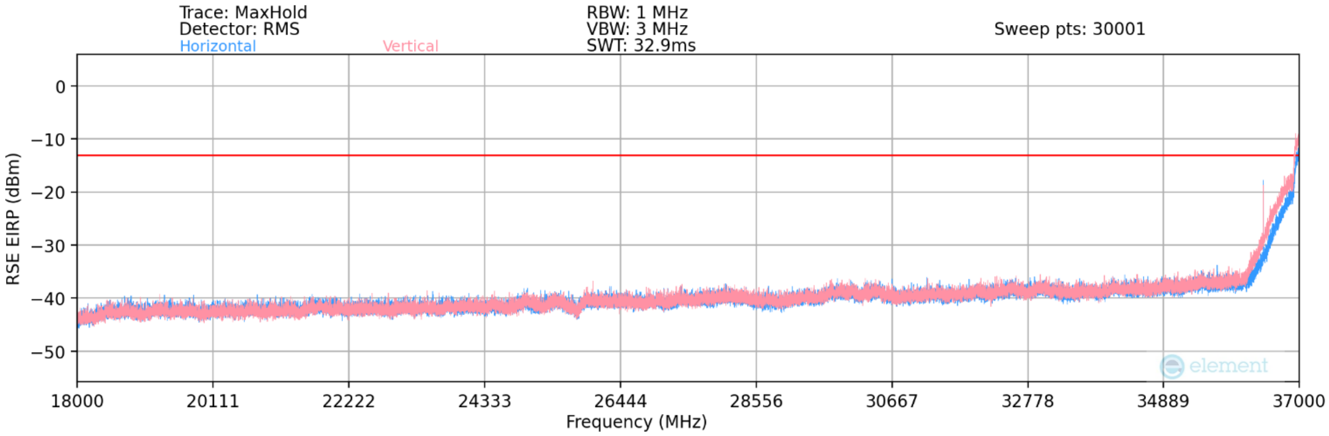
18GHz - 37GHz



Plot 7-49 n260 Radiated Spurious Plot (1CC QPSK Low Channel) – DU

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 2 meter.

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

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarizatio [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
36436.50	Low	50	V	QPSK	351	2	-20.79	-13.00	-7.79
36667.00	Mid	50	V	QPSK	-	-	-26.61	-13.00	-13.61
36898.00	High	50	V	QPSK	-	-	-29.11	-13.00	-16.11
36941.50	Low	50	V	QPSK	355	2	-14.58	-13.00	-1.58

Table 7-14. n260 Radiated Spurious Emissions Table (18GHz - 37GHz) - DU

Notes

1. The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses. Measurements were performed at a distance of 2 meter.
2. Even though the RSE at 36.9GHz seems to be failing on the pre-scan, when measured with Trace average and RMS, the RSE value is within limits.

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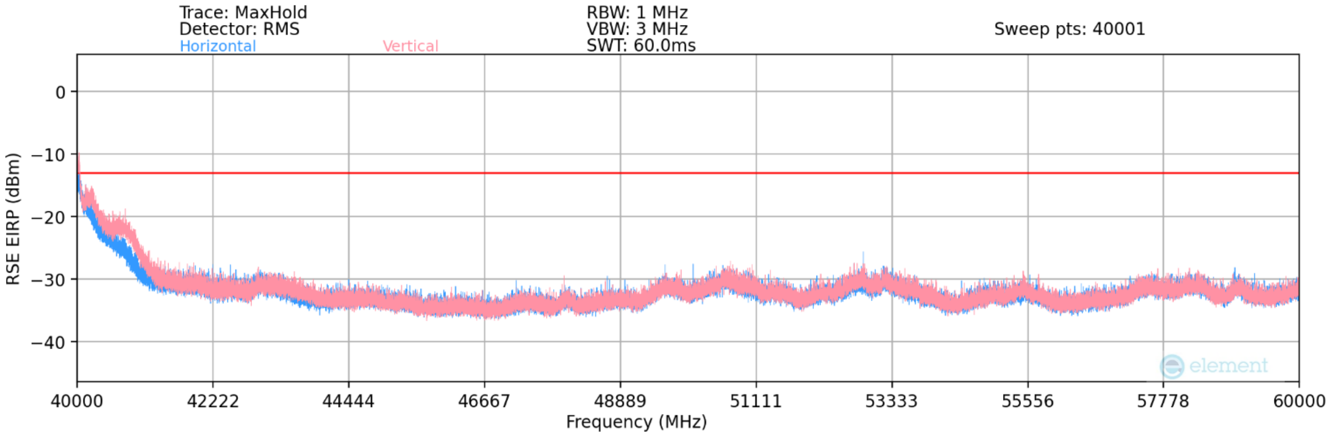
40GHz - 60GHz



Plot 7-50. n260 Radiated Spurious Plot (1CC QPSK High Channel) - DU

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 2 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 Polarizatio [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
49413.85	Low	50	H	QPSK	262	336	-27.35	-13.00	-14.35
49806.50	Low	50	H	QPSK	264	335	-25.98	-13.00	-12.98
49776.25	Mid	50	H	QPSK	263	347	-27.98	-13.00	-14.98
50913.00	Mid	50	H	QPSK	268	348	-16.88	-13.00	-3.88
49814.65	High	50	H	QPSK	251	346	-28.81	-13.00	-15.81
52714.00	High	50	H	QPSK	255	355	-23.12	-13.00	-10.12
40060.50	High	50	H	QPSK	272	346	-19.41	-13.00	-6.41

Table 7-15. n260 Radiated Spurious Emissions Table (40GHz - 60GHz) - DU

Notes

1. The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses. Measurements were performed at a distance of 2 meter.
2. Even though the RSE at 40.06GHz seems to be failing on the pre-scan, when measured with Trace average and RMS, the RSE value is within limits.

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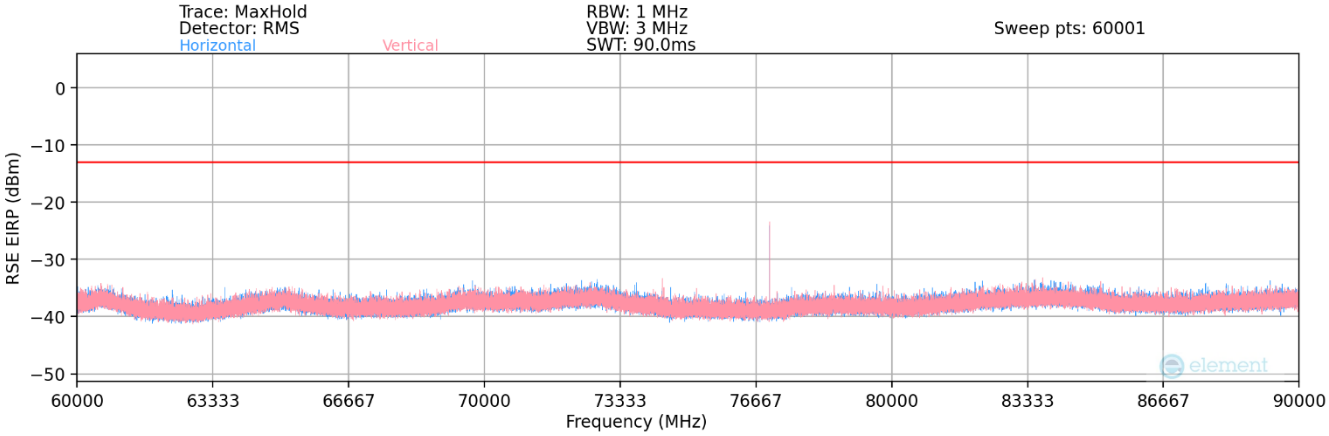
60GHz - 90GHz



Plot 7-51. n260 Radiated Spurious Plot (1CC QPSK Mid Channel) - DU

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 2 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	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
74050.08	Low	50	H	QPSK	90	334	-15.30	-13.00	-2.30
76999.92	Mid	50	H	QPSK	94	347	-22.02	-13.00	-9.02
79950.00	High	50	H	QPSK	96	356	-23.39	-13.00	-10.39

Table 7-16. n260 Radiated Spurious Emissions Table (60GHz - 90GHz) - DU

Notes

The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses. Measurements were performed at a distance of 2 meter.

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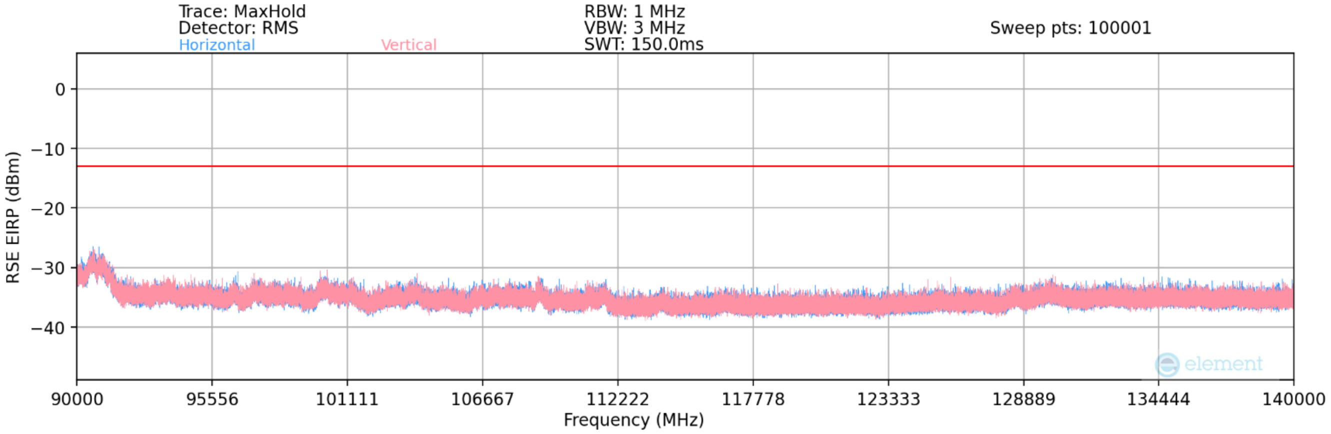
90GHz - 140GHz



Plot 7-52. n260 Radiated Spurious Plot (1CC QPSK Mid Channel) - DU

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 2 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	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
111075.12	Low	50	H	QPSK	-	-	-30.85	-13.00	-17.85
115499.88	Mid	50	H	QPSK	-	-	-31.06	-13.00	-18.06
119925.00	High	50	H	QPSK	-	-	-31.80	-13.00	-18.80

Table 7-17. n260 Radiated Spurious Emissions Table (90GHz - 140GHz) - DU

Notes

The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses. Measurements were performed at a distance of 2 meter.

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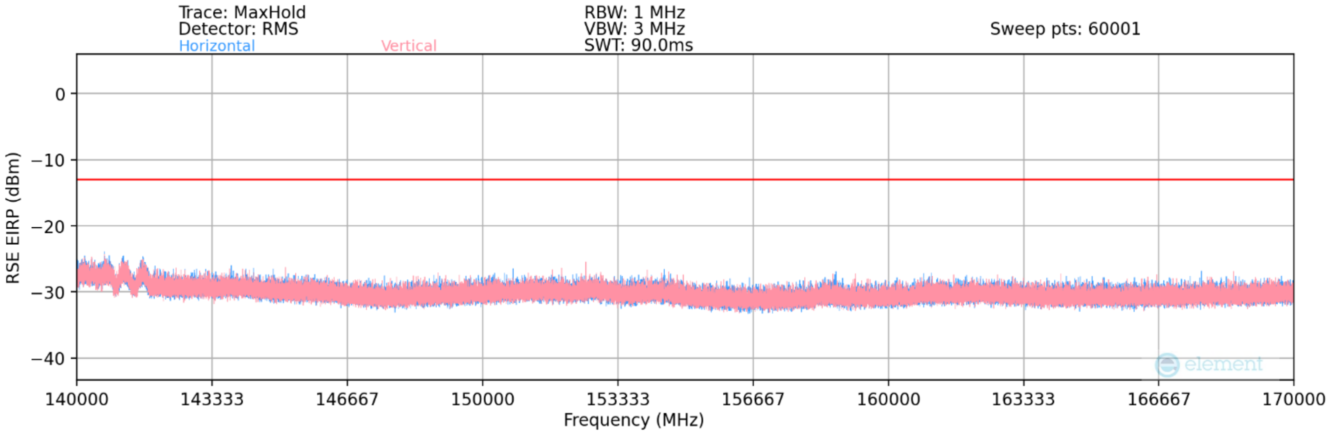
140GHz - 170GHz



Plot 7-53. n260 Radiated Spurious Plot (1CC QPSK Mid Channel) - DU

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 2 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	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
148100.16	Low	50	H	QPSK	-	-	-26.13	-13.00	-13.13
153999.84	Mid	50	H	QPSK	-	-	-25.22	-13.00	-12.22
159900.00	High	50	H	QPSK	-	-	-26.06	-13.00	-13.06

Table 7-18. n260 Radiated Spurious Emissions Table (140GHz - 170GHz) - DU

<u>Notes</u>

The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses. Measurements were performed at a distance of 2 meter.

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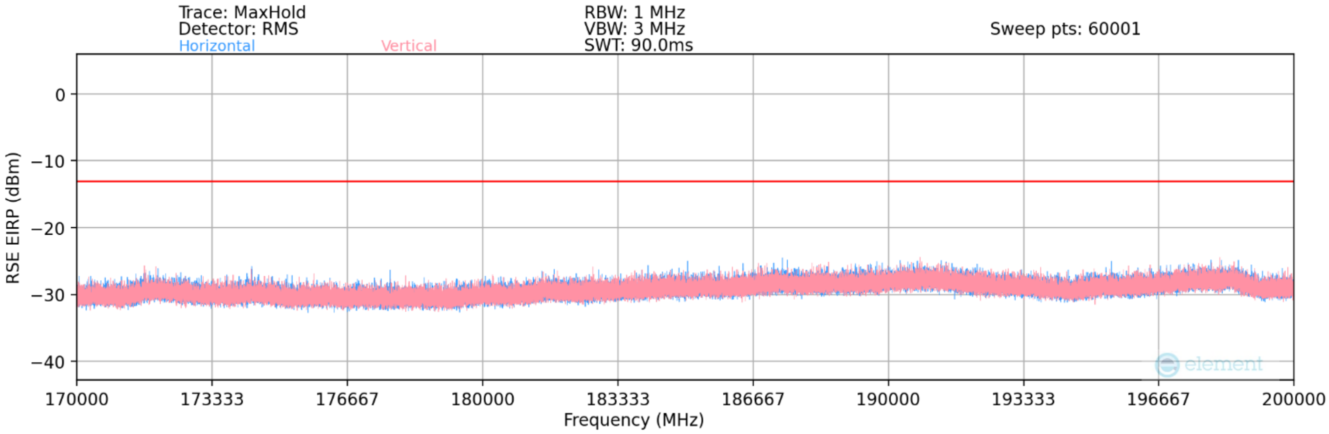
170GHz - 200GHz



Plot 7-54. n260 Radiated Spurious Plot (1CC QPSK Mid Channel) - DU

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 2 meter.

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

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Positioner Roll [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
185125.20	Low	50	H	QPSK	-	-	-23.97	-13.00	-10.97
192499.80	Mid	50	H	QPSK	-	-	-23.56	-13.00	-10.56
199875.00	High	50	H	QPSK	-	-	-24.59	-13.00	-11.59

Table 7-19. n260 Radiated Spurious Emissions Table (170GHz - 200GHz) - DU

Notes

The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses. Measurements were performed at a distance of 2 meter.

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7.8 Band Edge / Out-of-Band Emissions

Test Overview

A signal generator is used to generate a 5G NR signal as an input to the EUT system via a coaxial cable. All out-of-band emissions are then measured in a conducted setup while the EUT is operating at its maximum power and at the appropriate frequencies. 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 Section 4.4.2.4
KDB 935210 D05 Section 3.6

Test Settings

1. Start and stop frequency were set such that both upper and lower band edges are measured.
2. Span was set large enough so as to capture all out of band emissions near the band edge.
3. RBW = 1MHz
4. VBW $\geq$ 3 x RBW
5. Detector = RMS
6. Trace mode = trace averaging (RMS) over 100 sweeps
7. Number of sweep points ≥ 2 x Span/RBW
8. Sweep time = auto couple

Test Notes

1) For FCC Part 30 compliance, all combinations of 5G NR component carriers, bandwidths, and RB allocations were fully investigated and only the worst case scenarios have been included in this section.

2) Per previous guidance from FCC specifically to Element lab, both stimulus conditions – a single test signal, and two adjacent test signals – were investigated with 50MHz 5G NR mmWave input signals as opposed to the 4.1MHz AWGN required in KDB 925210 D05.

3) For all the plots in this section, appropriate frequency-varying corrections were applied to compensate for cable loss in the conducted measurement setup.

4) The band edge emission plots in this section are the spectral sums of the H and V output ports per ANSI C63.26-2015 Section 6.4.3.2.2 (measure and sum the spectra across the outputs).

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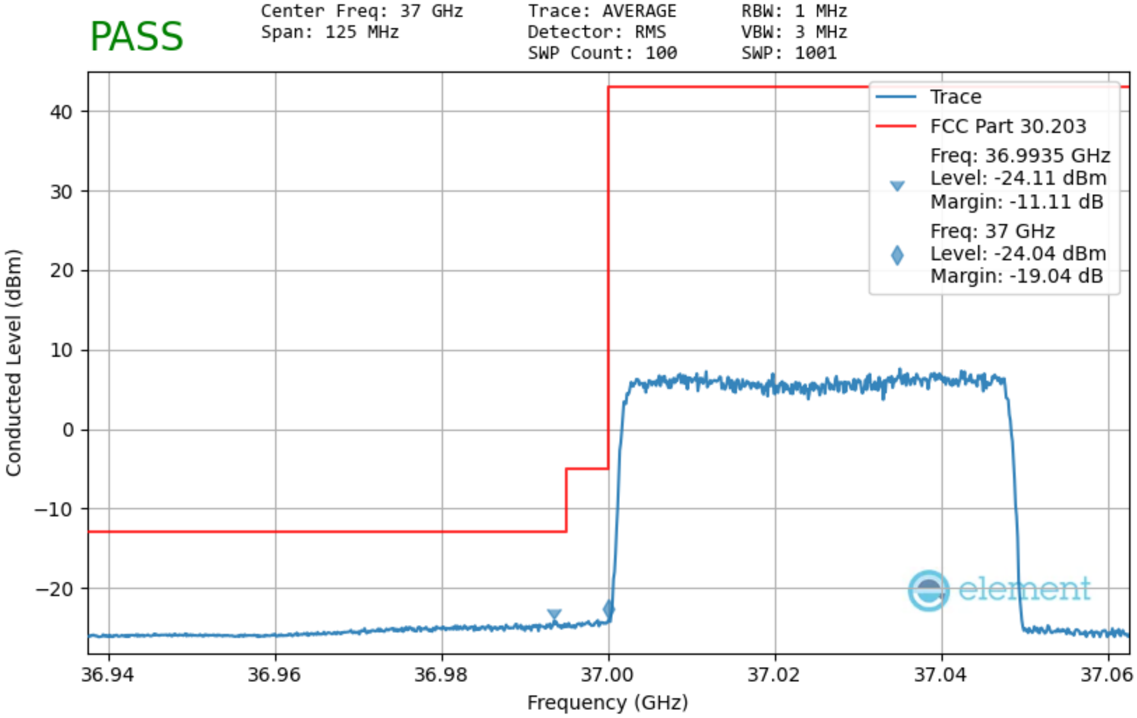
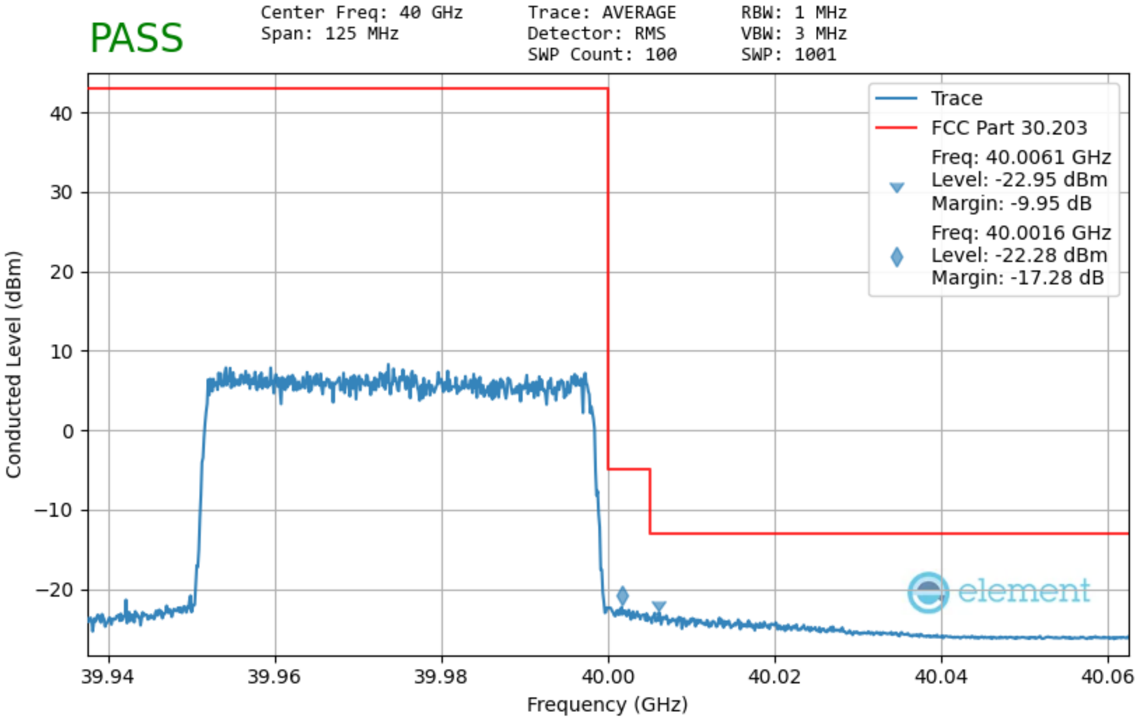
Band n260 – DU (DFT-s-OFDM)



Plot 7-55. Lower Band Edge − DFT-s – MIMO-UL Polarization (50MHz-1CC – QPSK Full RB)



Plot 7-56. Upper Band Edge − DFT-s – MIMO-UL Polarization (50MHz-1CC – QPSK Full RB)

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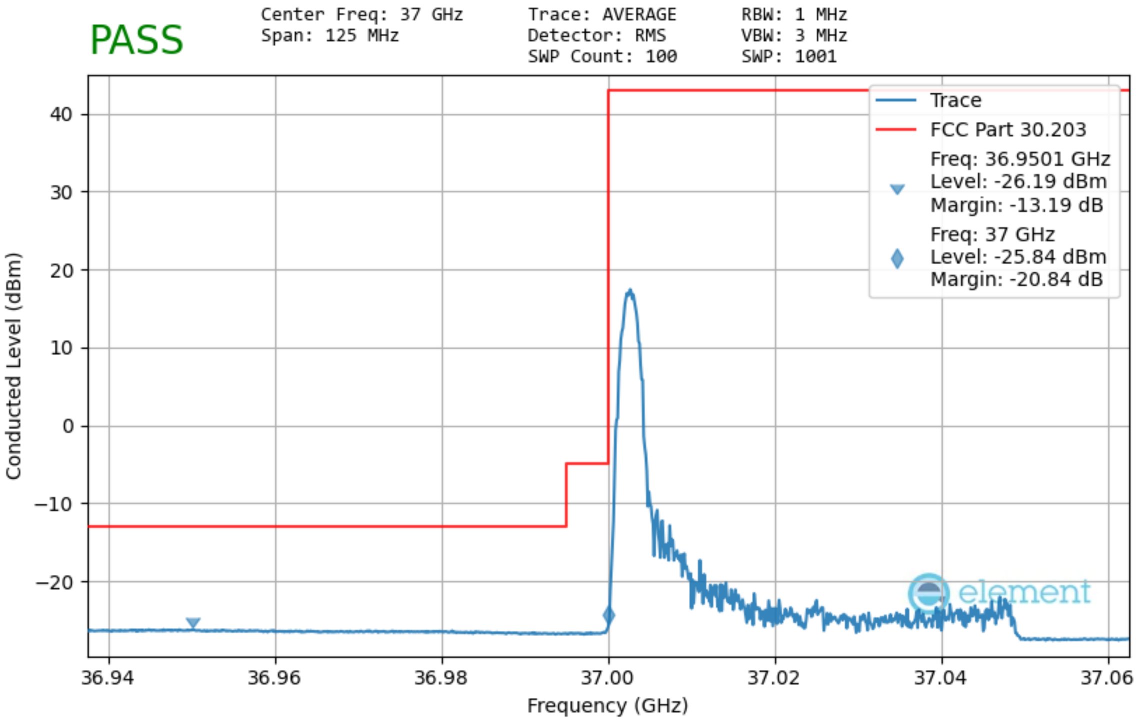
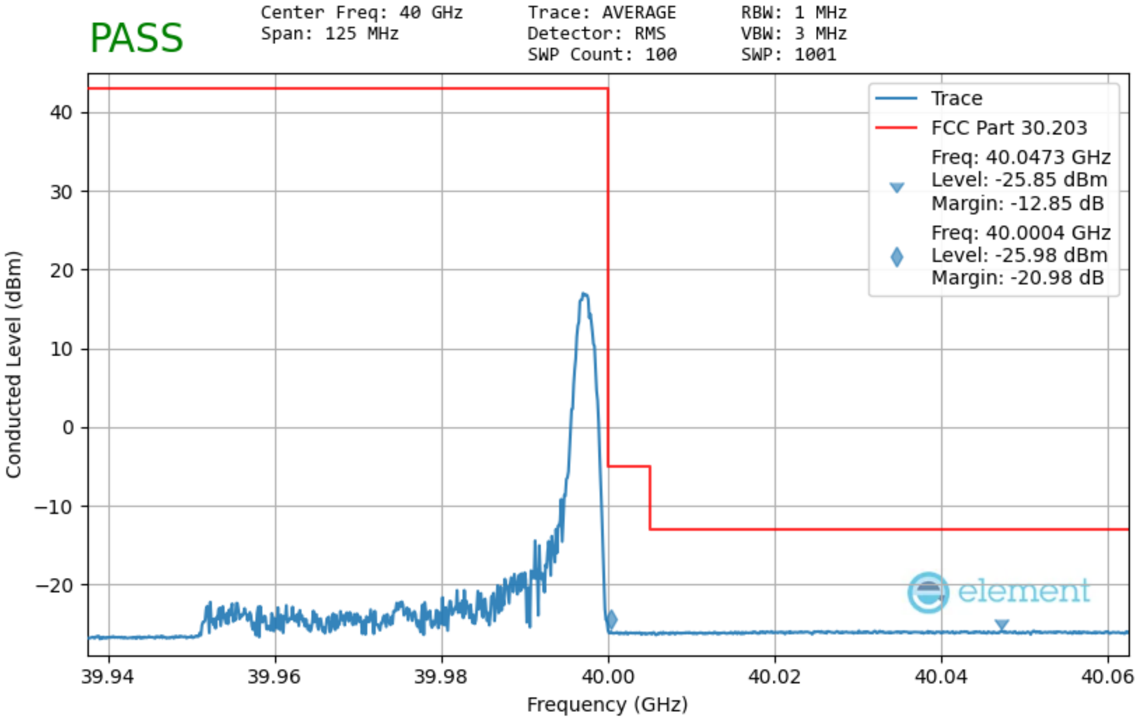


Plot 7-57. Lower Band Edge − DFT-s – MIMO-UL Polarization (50MHz-1CC – QPSK 1 RB)



Plot 7-58. Upper Band Edge − DFT-s – MIMO-UL Polarization (50MHz-1CC – QPSK 1 RB)

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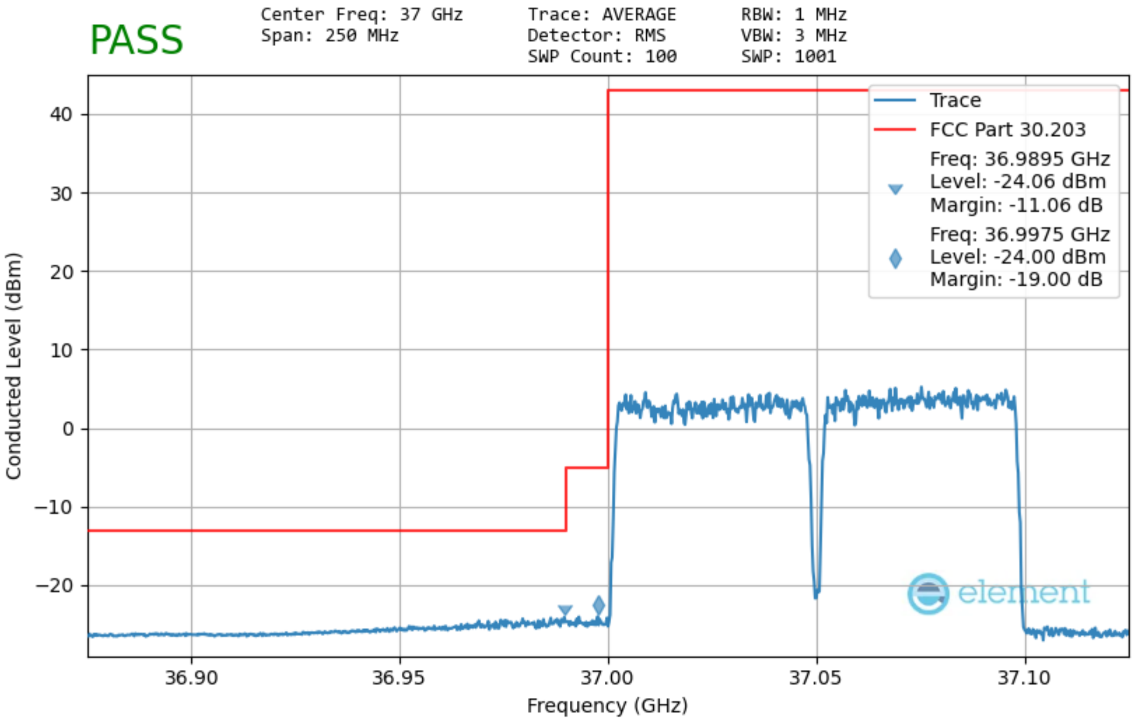
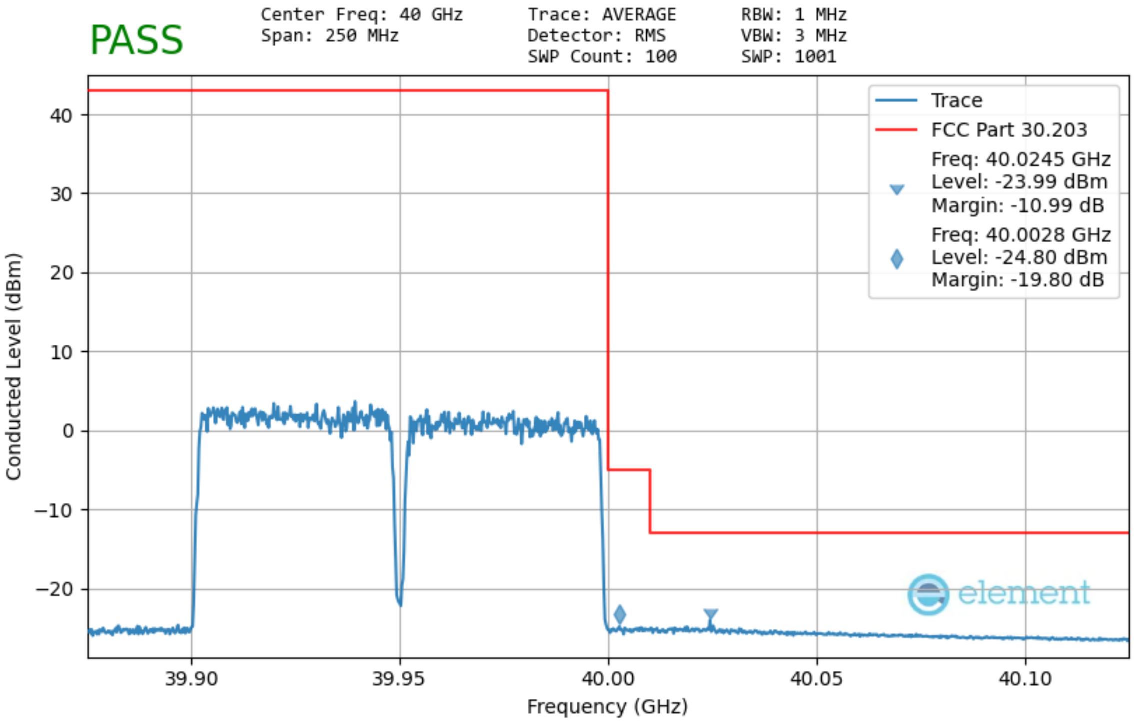


Plot 7-59. Lower Band Edge − DFT-s – MIMO-UL Polarization (50MHz-2CC – QPSK Full RB)



Plot 7-60. Upper Band Edge − DFT-s – MIMO-UL Polarization (50MHz-2CC – QPSK Full RB)

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