

**PART 20 & 30 MEASUREMENT REPORT**

**Applicant Name:**  
 Pivotal Commware  
 10801 120th Ave NE #200,  
 Kirkland, WA 98033  
 United States

**Date of Testing:**  
 02/20/2023-03/31/2023  
**Test Report Issue Date:**  
 04/05/2023  
**Test Site/Location:**  
 Element lab., Columbia, MD, USA  
**Test Report Serial No.:**  
 1M2303240041-01.2AUVU

<b>FCC ID:</b>	<b>2AUVU-5620-23-28</b>
<b>APPLICANT:</b>	<b>Pivotal Commware</b>

**Application Type:** Certification  
**Model:** 5620-23-28  
**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


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**



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Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n261	H-DL	50	27525 - 28325	1	SISO	QPSK	14.655	41.66	46M0G7D
					SISO	16-QAM	12.794	41.07	46M1W7D
		100	27550 - 28300	4	SISO	QPSK	9.705	39.87	393MG7D
					SISO	16-QAM	8.872	39.48	393MW7D
n261	V-DL	50	27525 - 28325	1	SISO	QPSK	14.622	41.65	45M9G7D
					SISO	16-QAM	11.508	40.61	45M8W7D
		100	27550 - 28300	4	SISO	QPSK	9.772	39.90	395MG7D
					SISO	16-QAM	9.484	39.77	394MW7D
n261	MIMO	50	27525 - 28325	1	SISO	QPSK	29.309	44.67	-
					SISO	16-QAM	24.322	43.86	-
		100	27550 - 28300	4	SISO	QPSK	19.498	42.90	-
					SISO	16-QAM	18.365	42.64	-

**EUT Overview (Band n261)**

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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-5620-23-28**. 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 n261 band that are received.

**Test Device Serial No.:** 89000260401, 89000260501

### 2.2 Device Capabilities

This device contains the following capabilities:

5G FR2 (NR Band 261, NR Band 257)

### 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.

Although a DFT-s-OFDM waveform typically yields worst-case power, some test cases were also performed with CP-OFDM waveform due to downlink communications normally operating with CP-OFDM only

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## 2.4 Software and Firmware

The test was conducted with firmware version 0.3.1. 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.

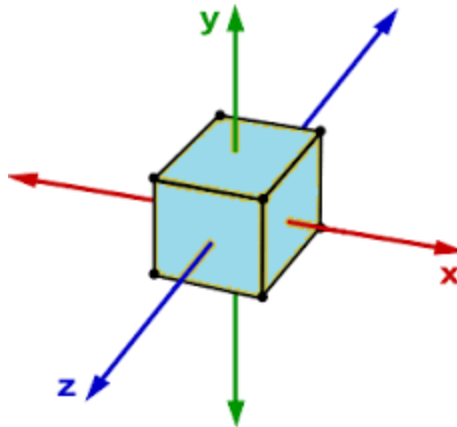


Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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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	0.06	1.44	2.00
60 - 90	0.04	0.96	2.00
90 - 140	0.026	0.631	2.00

**Table 3-1. Far-Field Distance & Measurement 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.

$$\begin{aligned}
 \text{Field Strength [dB}\mu\text{V/m]} &= \text{Measured Value [dBm]} + \text{AFCL [dB/m]} + 107 \\
 &= -32.74 \text{ dBm} + (40.7\text{dB/m} + 8.78\text{dB}) + 107 = 123.74\text{dB}\mu\text{V/m} \\
 &= 10^{(123.74/20)/1000000} = 1.54 \text{ V/m}
 \end{aligned}$$

$$\begin{aligned}
 \text{e.i.r.p. [dBm]} &= 10 * \log((\text{E-Field} * D_m)^2 / 30) + 30\text{dB} \\
 &= 10 * \log((1.54\text{V/m} * 1.00\text{m})^2 / 30) + 30\text{dB} \\
 &= 18.98 \text{ dBm e.i.r.p.}
 \end{aligned}$$

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### 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°C to 35°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  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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


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## 5.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	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)	7/20/2021	Biennial	7/20/2023	9704-5182
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.	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	FSV40-N	Spectrum Analyzer	6/7/2022	Annual	6/7/2023	161616
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	1/13/2023	Annual	1/13/2024	101639
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	103187
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/25/2022	Annual	8/25/2023	101299
Rohde & Schwarz	SMW200A	Vector Signal Generator	8/16/2022	Biennial	8/16/2024	102130
Schwarzbeck	VULB 9162	Bilog; Attenuator	7/27/2022	Annual	7/27/2023	304
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

**Table 5-1. Test Equipment**

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## 6.0 SAMPLE CALCULATIONS

### Emission Designator

#### $\pi/2$ BPSK/ QPSK Modulation

**Emission Designator = 800MG7D**

BW = 800 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

#### QAM Modulation

**Emission Designator = 802MW7D**

BW = 802 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

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## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: Pivotal Commware  
 FCC ID: 2AUVU-5620-23-28  
 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**

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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**Notes:**

1. Per 2.1057(a)(2), spurious emissions were investigated up to 100GHz.
2. Testing was completed with a signal generator creating a representative mmWave 5G NR signal, using DFT-s-OFDM and 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.
7. Some RSE measurements required use of TRP test methods in order to demonstrate compliance. The Two-Cut TRP method was applied as specified in Section 4.4.3.3 of KDB 842590 D01.

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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  $\geq$  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 n261 – SU**

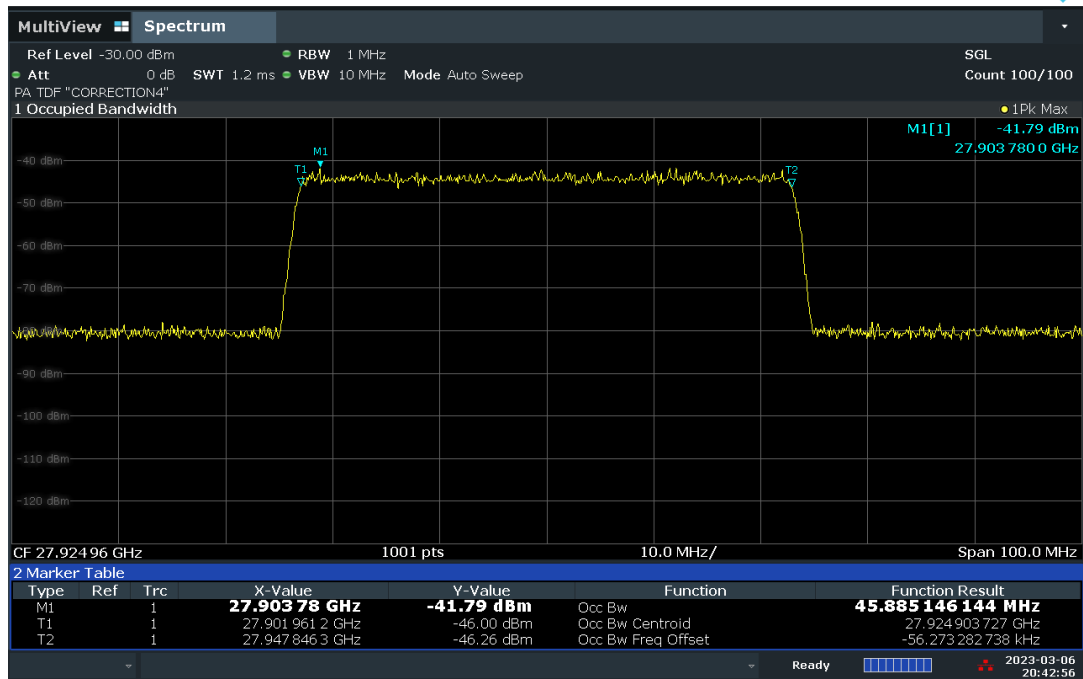
AGC Threshold Level	EUT Antenna Polarization	Channel	Bandwidth [MHz]	Transmission Scheme	Input OBW [MHz]	Output OBW [MHz]
0.5dB below Threshold	H-DL	Mid	50	DFT-s-OFDM	45.89	46.07
3dB above Threshold	H-DL	Mid	50	DFT-s-OFDM	45.84	46.04
0.5dB below Threshold	V-DL	Mid	50	DFT-s-OFDM	46.03	45.96
3dB above Threshold	V-DL	Mid	50	DFT-s-OFDM	45.91	45.86

**Table 7-2. n261 Occupied Bandwidth by AGC Threshold Level – DFT-s-OFDM**

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater		Page 16 of 129



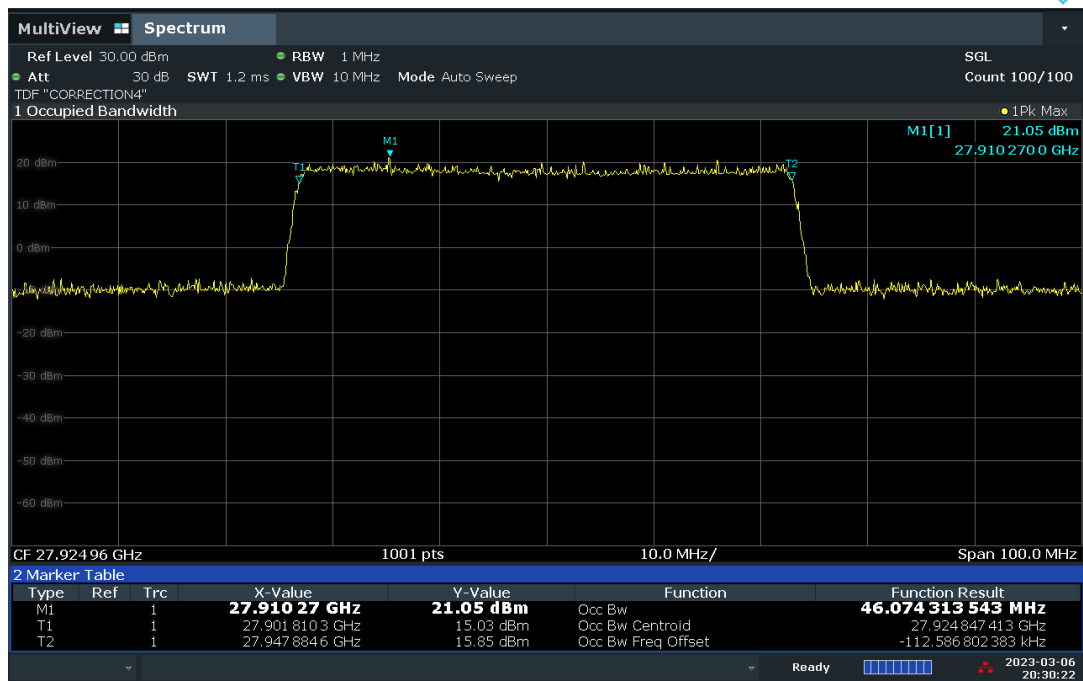
ACLRRResults



08:42:56 PM 03/06/2023

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

ACLRRResults

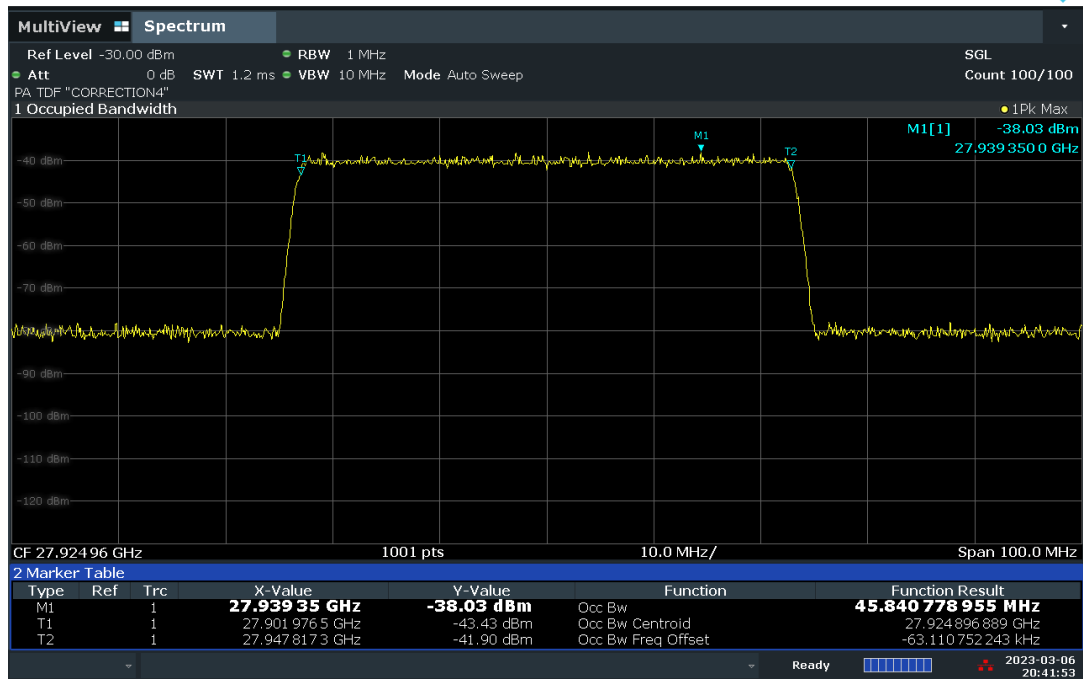


08:30:23 PM 03/06/2023

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

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 17 of 129

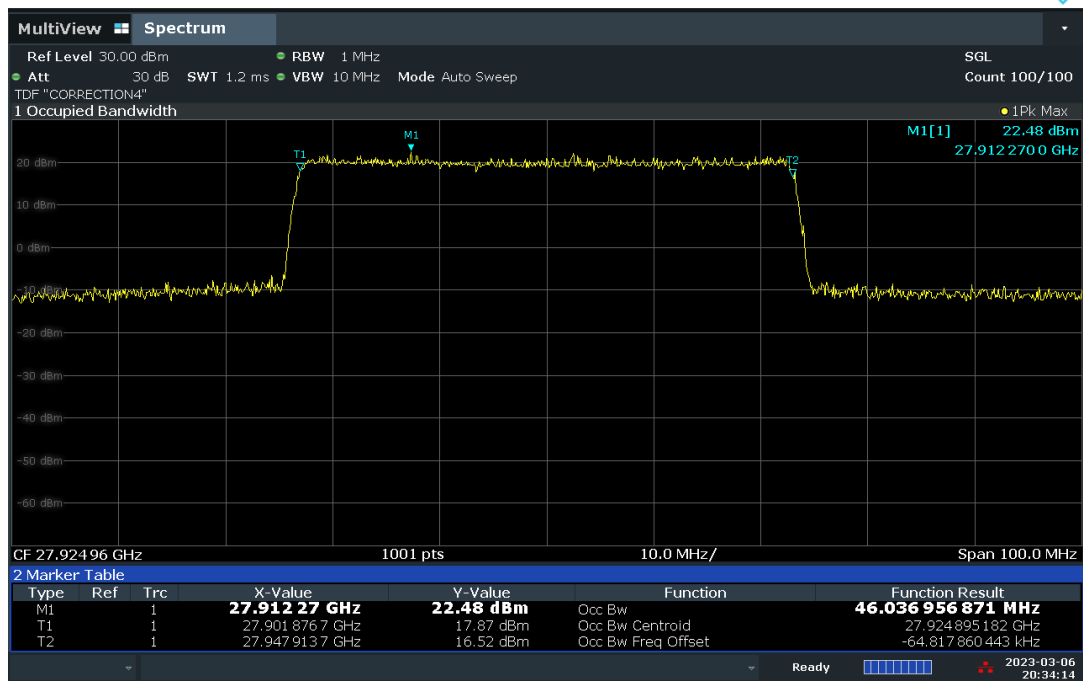
ACLRRResults



08:41:53 PM 03/06/2023

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

ACLRRResults

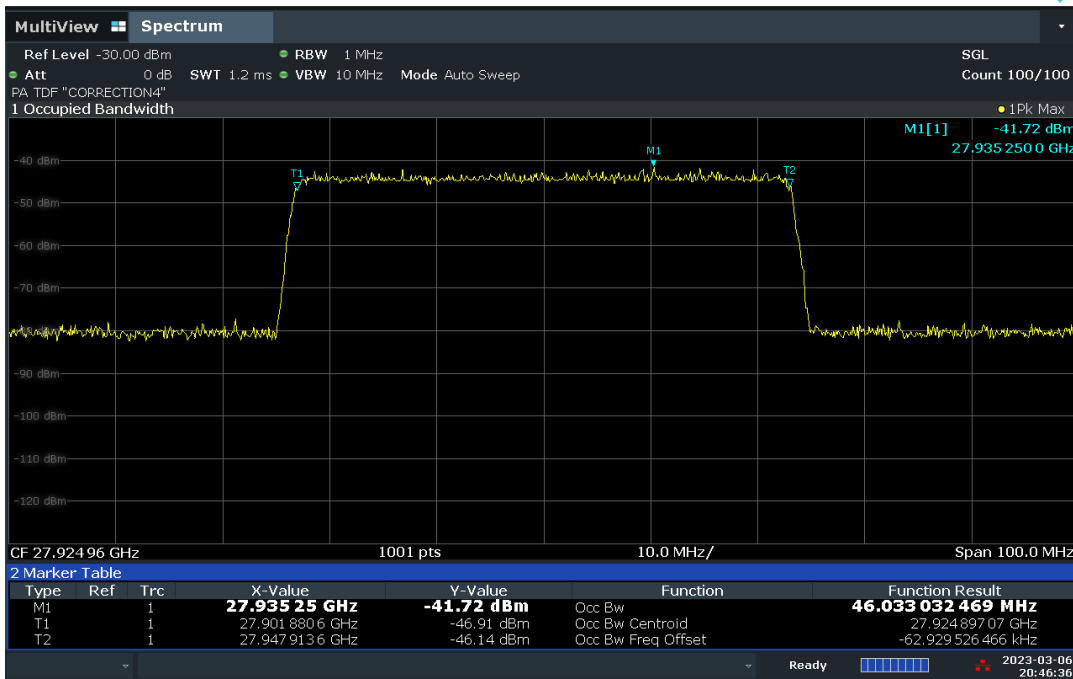


08:34:14 PM 03/06/2023

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

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 18 of 129

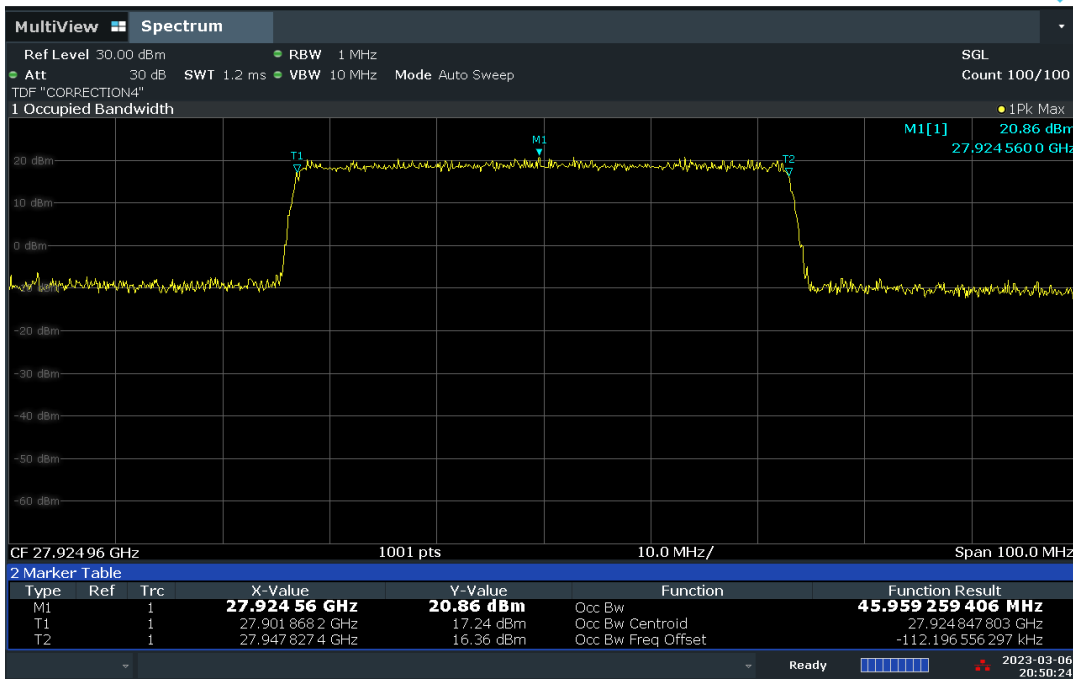
ACLRRResults



08:46:36 PM 03/06/2023

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

ACLRRResults

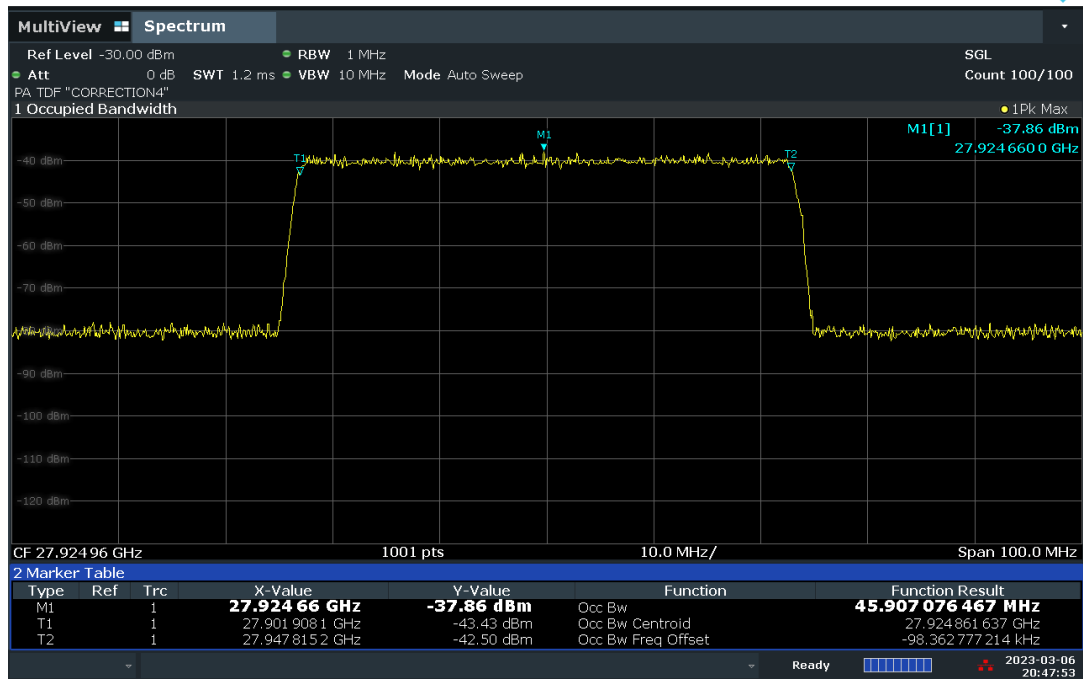


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Plot 7-6. Occupied Bandwidth Output at 0.5dB below AGC Threshold – DFT-s – V-DL Polarization.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 19 of 129

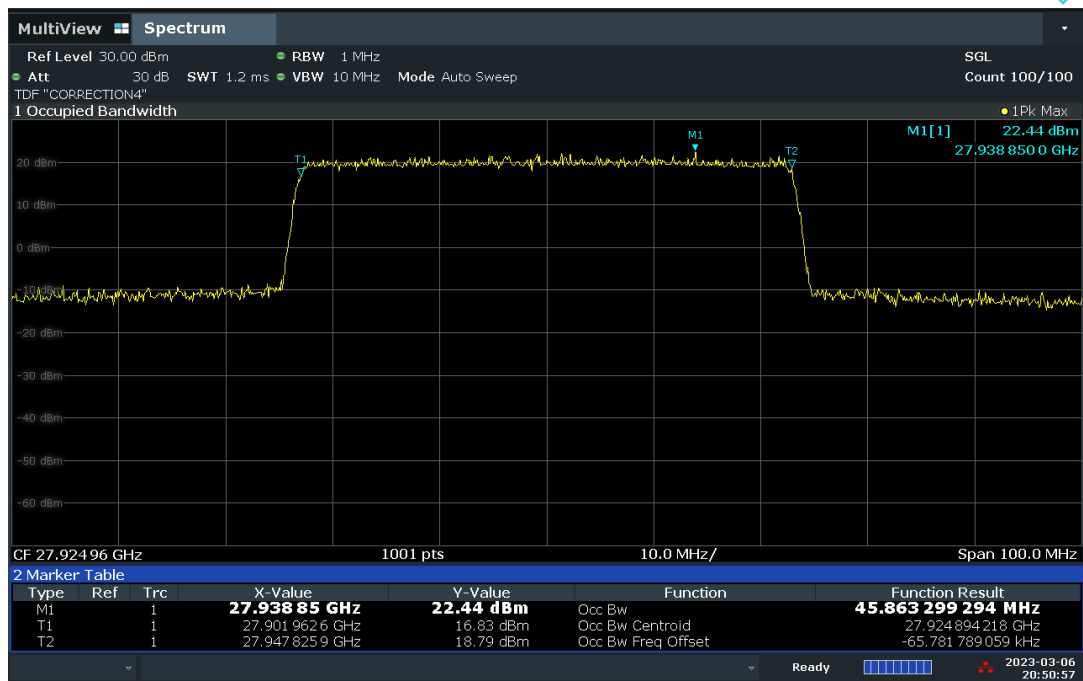
ACLRRResults



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

ACLRRResults




08:50:57 PM 03/06/2023

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

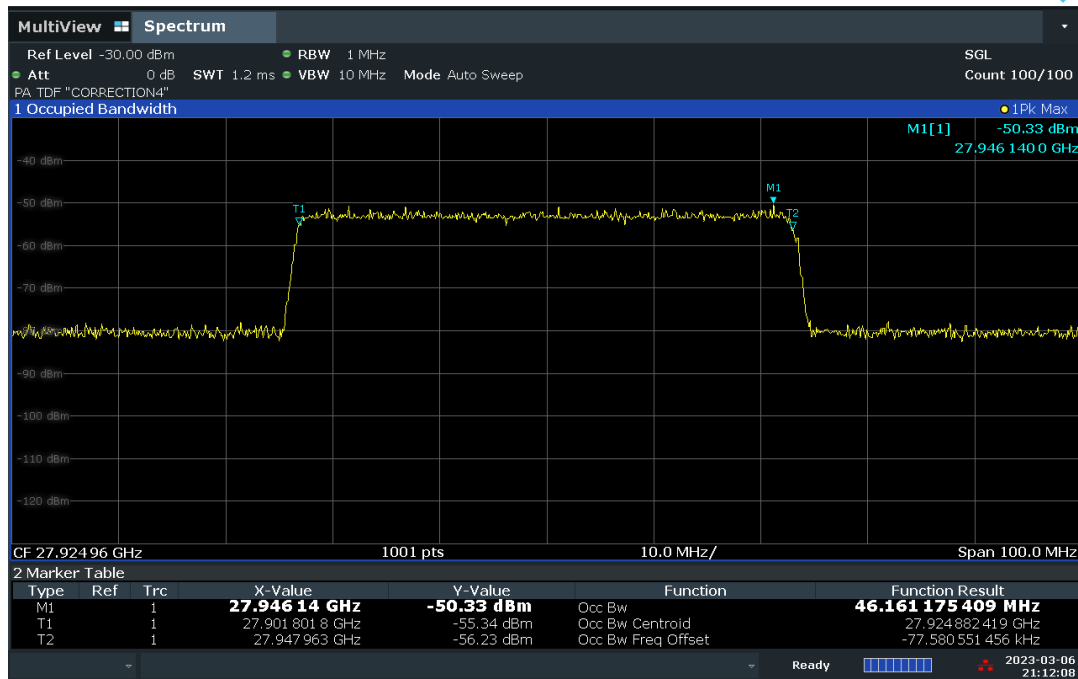
FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 20 of 129

AGC Threshold Level	EUT Antenna Polarization	Channel	Bandwidth	Transmission Scheme	Input OBW [MHz]	Output OBW [MHz]
0.5dB below Threshold	H-UL	Mid	50	CP-OFDM	46.16	47.76
3dB above Threshold	H-UL	Mid	50	CP-OFDM	45.96	46.32
0.5dB below Threshold	V-UL	Mid	50	CP-OFDM	45.98	47.05
3dB above Threshold	V-UL	Mid	50	CP-OFDM	45.92	46.09

**Table 7-3. n261 Occupied Bandwidth by AGC Threshold Level – CP-OFDM**

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater		Page 21 of 129

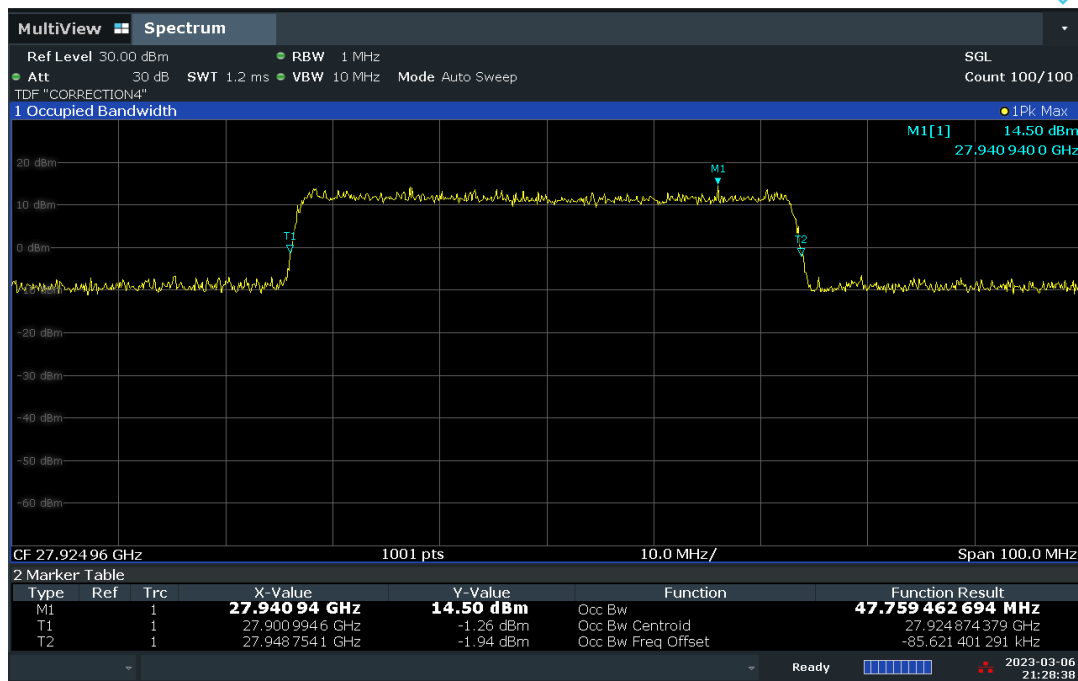
ACLRRResults



09:12:09 PM 03/06/2023

Plot 7-9. Occupied Bandwidth Input at 0.5dB below AGC Threshold – CP – H-DL Polarization.

ACLRRResults

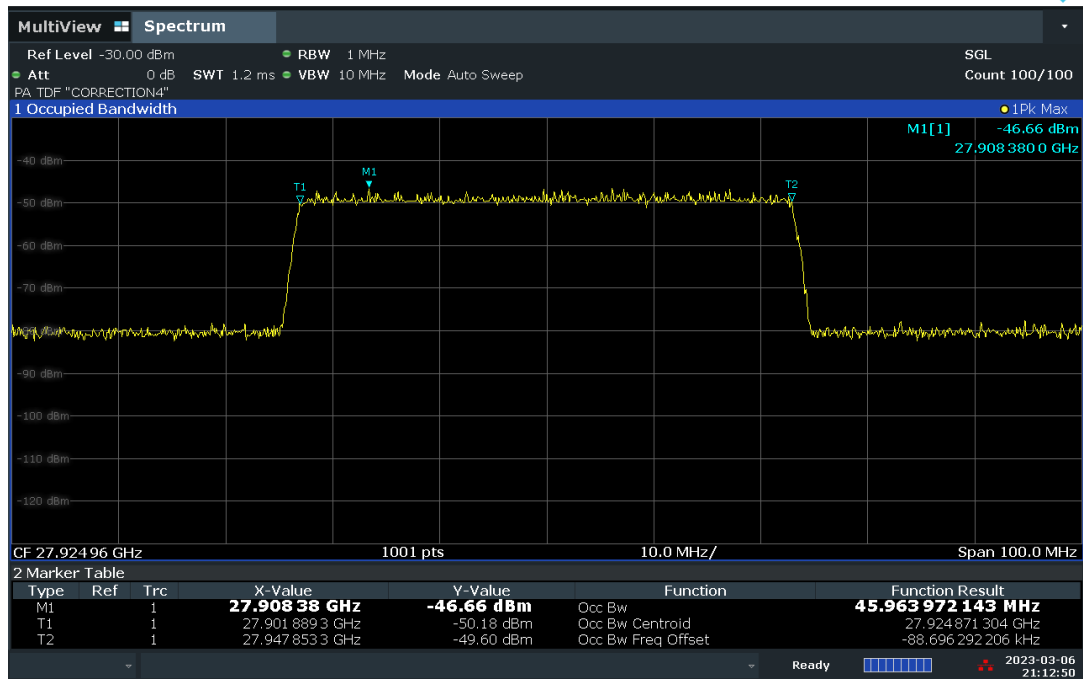


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Plot 7-10. Occupied Bandwidth Output at 0.5dB below AGC Threshold – CP – H-DL Polarization.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 22 of 129

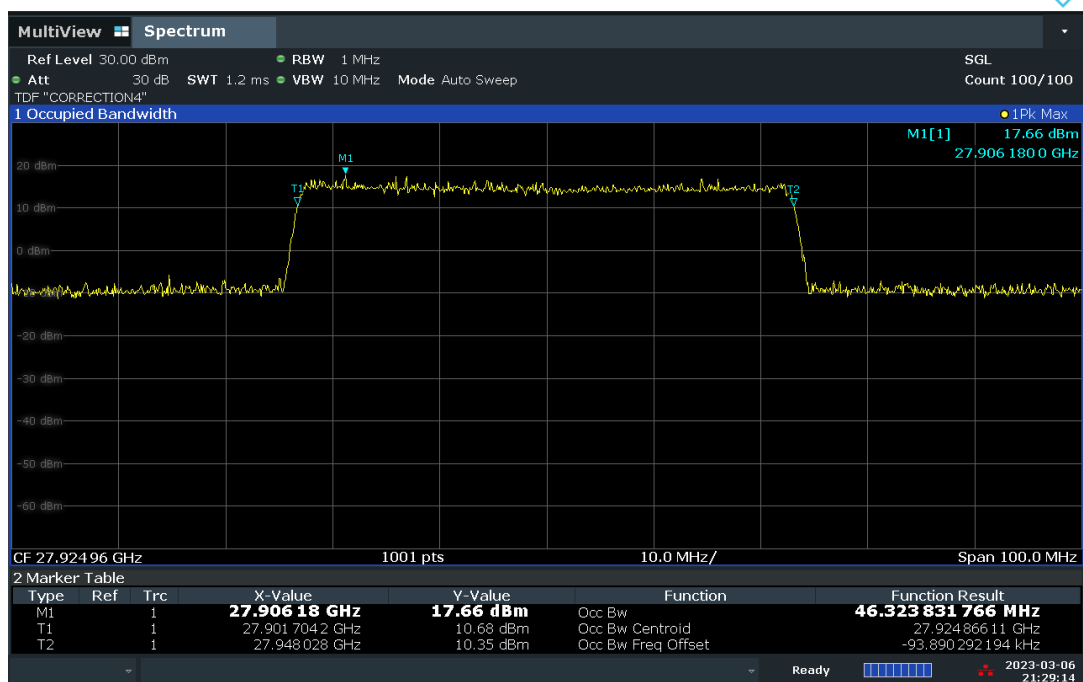
ACLRRResults



09:12:50 PM 03/06/2023

Plot 7-11. Occupied Bandwidth Input at 3dB above AGC Threshold – CP – H-DL Polarization.

ACLRRResults

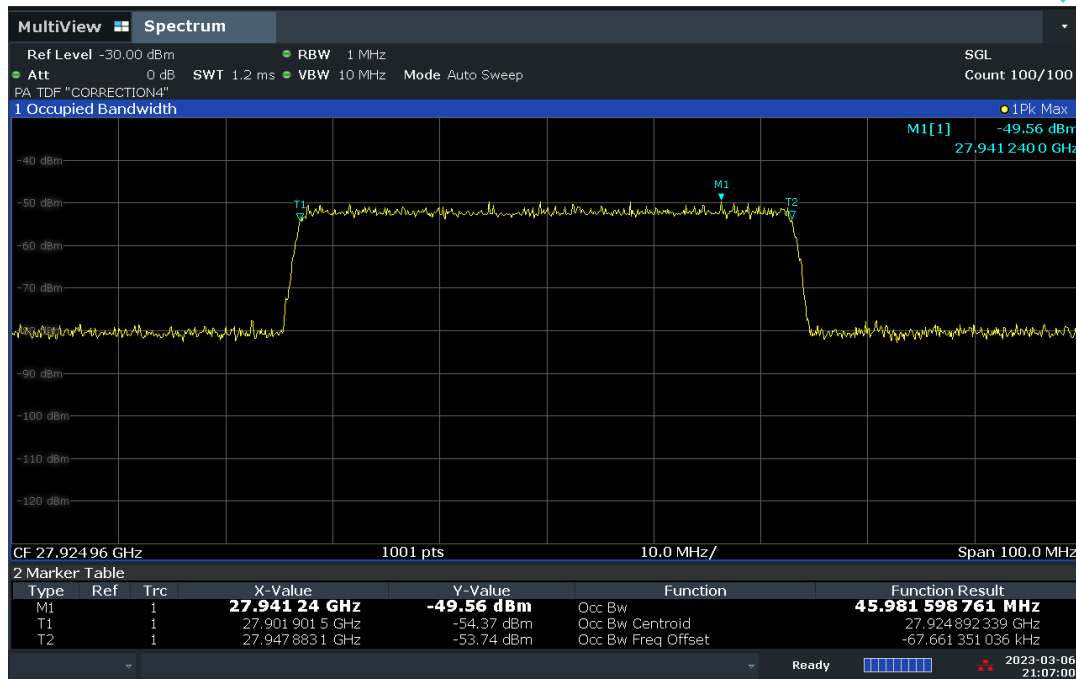


09:29:15 PM 03/06/2023

Plot 7-12. Occupied Bandwidth Output at 3dB above AGC Threshold – CP – H-DL Polarization.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 23 of 129

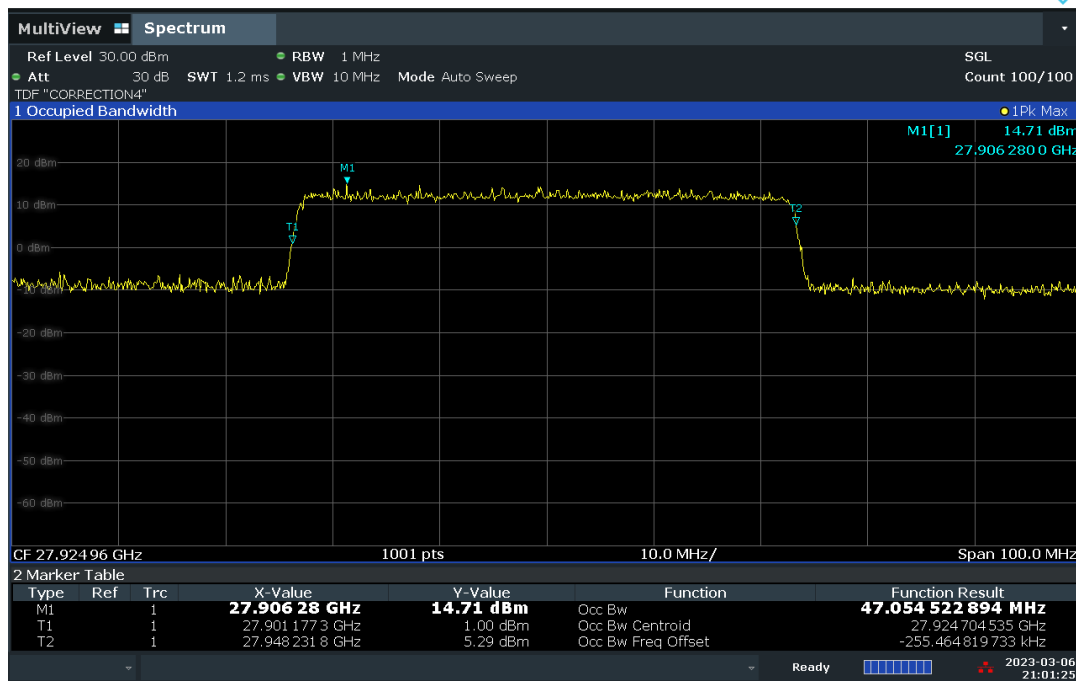
ACLRRResults



09:07:00 PM 03/06/2023

Plot 7-13. Occupied Bandwidth Input at 0.5dB below AGC Threshold – CP – V-DL Polarization.

ACLRRResults



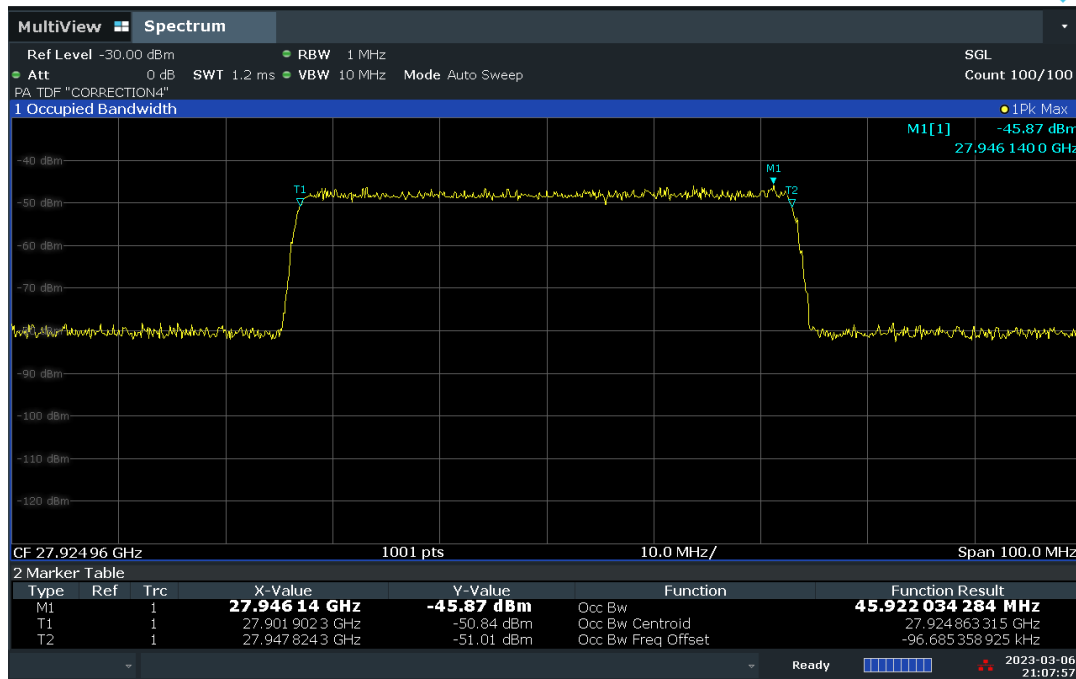
09:01:26 PM 03/06/2023

Plot 7-14. Occupied Bandwidth Output at 0.5dB below AGC Threshold – CP – V-DL Polarization.

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 24 of 129



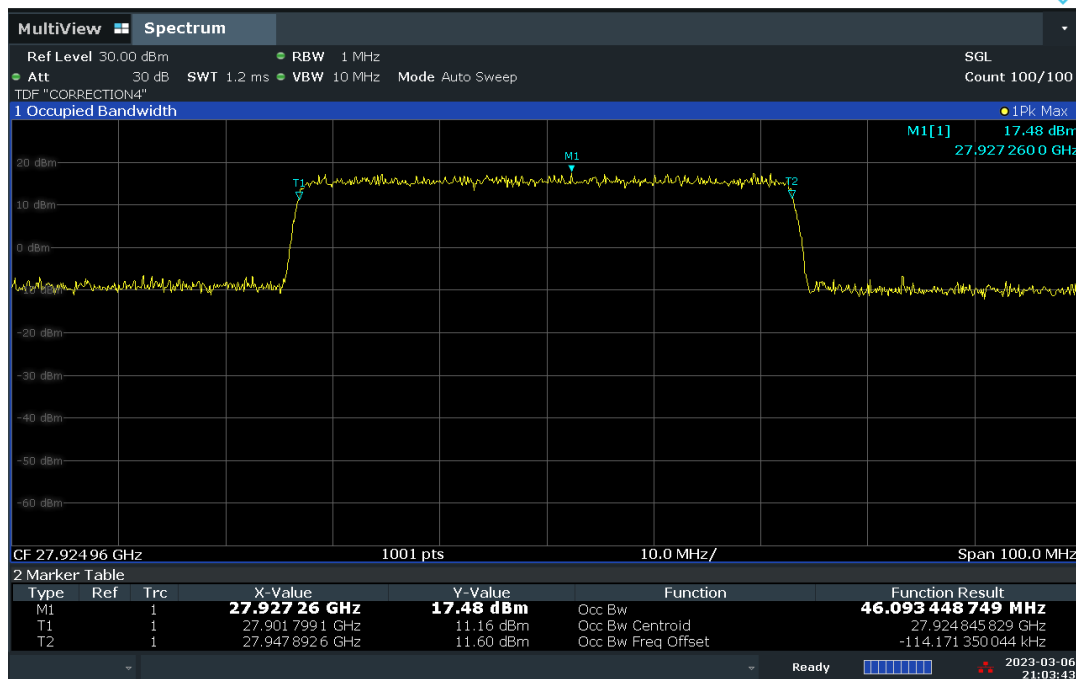
ACLRRResults



09:07:57 PM 03/06/2023

Plot 7-15. Occupied Bandwidth Input at 3dB above AGC Threshold – CP – V-DL Polarization.

ACLRRResults



09:03:44 PM 03/06/2023

Plot 7-16. Occupied Bandwidth Output at 3dB above AGC Threshold – CP – V-DL Polarization.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 25 of 129

## 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  $\pm 250\%$  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  $\pm 250\%$  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  $\geq 3 \times$  RBW
5. Detector = Peak/Max Hold
6. Number of sweep points  $\geq 2 \times$  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

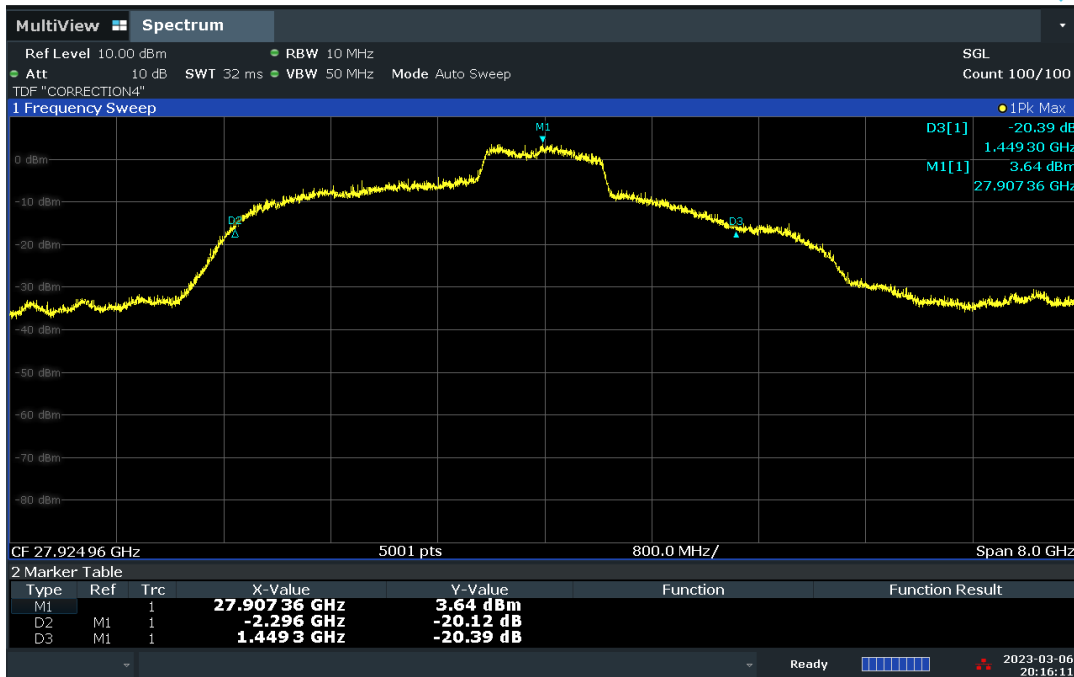
### Test Notes

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 25.375GHz to 30.475GHz [ $250\% \times (28.35\text{GHz} - 27.5\text{GHz}) = 2.125\text{GHz}$  below and above lower and upper band edges, respectively]. However, in order to more clearly display the 20dB bandwidth, a larger frequency range is displayed in the these plots.
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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Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 26 of 129

## Band n261 – SU

ACLRRResults



08:16:11 PM 03/06/2023

Plot 7-17. Out-Of-Band Rejection – H-DL Polarization

ACLRRResults



08:06:27 PM 03/06/2023

Plot 7-18. Out-Of-Band Rejection – V-DL Polarization

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 27 of 129

## 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  $\geq$  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.


FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 28 of 129

### Band n261 – SU (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	27924.96	Mid	QPSK	Full RB	-46.83	16.64	-	63.47
50	27924.96	Mid	QPSK	Full RB	-45.83	17.55	0.91	63.38
50	27924.96	Mid	QPSK	Full RB	-44.83	18.44	0.89	63.27
50	27924.96	Mid	QPSK	Full RB	-43.83	19.35	0.91	63.18
50	27924.96	Mid	QPSK	Full RB	-42.83	20.26	0.91	63.09
50	27924.96	Mid	QPSK	Full RB	-41.83	21.16	0.90	62.99
50	27924.96	Mid	QPSK	Full RB	-40.83	22.04	0.88	62.87
50	27924.96	Mid	QPSK	Full RB	-39.83	22.89	0.85	62.72
50	27924.96	Mid	QPSK	Full RB	-38.83	23.76	0.87	62.59
50	27924.96	Mid	QPSK	Full RB	-37.83	24.62	0.86	62.45
50	27924.96	Mid	QPSK	Full RB	-36.83	25.46	0.84	62.29
50	27924.96	Mid	QPSK	Full RB	-35.83	26.27	0.81	62.10
50	27924.96	Mid	QPSK	Full RB	-34.83	27.03	0.76	61.86
50	27924.96	Mid	QPSK	Full RB	-33.83	27.80	0.77	61.63
50	27924.96	Mid	QPSK	Full RB	-32.83	28.54	0.74	61.37
50	27924.96	Mid	QPSK	Full RB	-31.83	28.52	-0.02	60.35
50	27924.96	Mid	QPSK	Full RB	-30.83	28.50	-0.02	59.33
50	27924.96	Mid	QPSK	Full RB	-29.83	28.47	-0.03	58.30
50	27924.96	Mid	QPSK	Full RB	-28.83	28.41	-0.06	57.24
50	27924.96	Mid	QPSK	Full RB	-27.83	28.79	0.38	56.62
50	27924.96	Mid	QPSK	Full RB	-26.83	28.42	-0.37	55.25
50	27924.96	Mid	QPSK	Full RB	-25.83	28.78	0.36	54.61
50	27924.96	Mid	QPSK	Full RB	-24.83	28.77	-0.01	53.60
50	27924.96	Mid	QPSK	Full RB	-23.83	28.79	0.02	52.62
50	27924.96	Mid	QPSK	Full RB	-22.83	28.81	0.02	51.64

**Table 7-4. Full RB AGC Threshold and Booster Gain – 50MHz 1CC– DFT-s – H-DL Polarization**


**Note:** AGC Threshold is found at **-34.83dBm** EUT Input Power Level.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 29 of 129

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	27924.96	Mid	QPSK	Full RB	-46.83	17.92	-	64.75
100	27924.96	Mid	QPSK	Full RB	-45.83	18.70	0.78	64.53
100	27924.96	Mid	QPSK	Full RB	-44.83	19.50	0.80	64.33
100	27924.96	Mid	QPSK	Full RB	-43.83	20.27	0.77	64.10
100	27924.96	Mid	QPSK	Full RB	-42.83	21.04	0.77	63.87
100	27924.96	Mid	QPSK	Full RB	-41.83	21.82	0.78	63.65
100	27924.96	Mid	QPSK	Full RB	-40.83	22.63	0.81	63.46
100	27924.96	Mid	QPSK	Full RB	-39.83	23.39	0.76	63.22
100	27924.96	Mid	QPSK	Full RB	-38.83	24.17	0.78	63.00
100	27924.96	Mid	QPSK	Full RB	-37.83	24.92	0.75	62.75
100	27924.96	Mid	QPSK	Full RB	-36.83	25.67	0.75	62.50
100	27924.96	Mid	QPSK	Full RB	-35.83	26.41	0.74	62.24
100	27924.96	Mid	QPSK	Full RB	-34.83	26.37	-0.04	61.20
100	27924.96	Mid	QPSK	Full RB	-33.83	26.34	-0.03	60.17
100	27924.96	Mid	QPSK	Full RB	-32.83	26.33	-0.01	59.16
100	27924.96	Mid	QPSK	Full RB	-31.83	26.22	-0.11	58.05
100	27924.96	Mid	QPSK	Full RB	-30.83	26.22	0.00	57.05
100	27924.96	Mid	QPSK	Full RB	-29.83	26.21	-0.01	56.04
100	27924.96	Mid	QPSK	Full RB	-28.83	26.26	0.05	55.09
100	27924.96	Mid	QPSK	Full RB	-27.83	26.23	-0.03	54.06
100	27924.96	Mid	QPSK	Full RB	-26.83	26.24	0.01	53.07
100	27924.96	Mid	QPSK	Full RB	-25.83	26.19	-0.05	52.02
100	27924.96	Mid	QPSK	Full RB	-24.83	26.25	0.06	51.08
100	27924.96	Mid	QPSK	Full RB	-23.83	26.18	-0.07	50.01
100	27924.96	Mid	QPSK	Full RB	-22.83	26.21	0.03	49.04

**Table 7-5. Full RB AGC Threshold and Booster Gain – 100MHz 4CC – DFT-s – H-DL Polarization**


**Note:** AGC Threshold is found at **-34.83dBm** EUT Input Power Level.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater		Page 30 of 129

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	27924.96	Mid	QPSK	Full RB	-46.83	17.68	-	64.51
50	27924.96	Mid	QPSK	Full RB	-45.83	18.57	0.89	64.40
50	27924.96	Mid	QPSK	Full RB	-44.83	19.44	0.87	64.27
50	27924.96	Mid	QPSK	Full RB	-43.83	20.32	0.88	64.15
50	27924.96	Mid	QPSK	Full RB	-42.83	21.21	0.89	64.04
50	27924.96	Mid	QPSK	Full RB	-41.83	22.09	0.88	63.92
50	27924.96	Mid	QPSK	Full RB	-40.83	22.95	0.86	63.78
50	27924.96	Mid	QPSK	Full RB	-39.83	23.79	0.84	63.62
50	27924.96	Mid	QPSK	Full RB	-38.83	24.65	0.86	63.48
50	27924.96	Mid	QPSK	Full RB	-37.83	25.48	0.83	63.31
50	27924.96	Mid	QPSK	Full RB	-36.83	26.29	0.81	63.12
50	27924.96	Mid	QPSK	Full RB	-35.83	27.03	0.74	62.86
50	27924.96	Mid	QPSK	Full RB	-34.83	27.77	0.74	62.60
50	27924.96	Mid	QPSK	Full RB	-33.83	28.12	0.35	61.95
50	27924.96	Mid	QPSK	Full RB	-32.83	28.45	0.33	61.28
50	27924.96	Mid	QPSK	Full RB	-31.83	28.41	-0.04	60.24
50	27924.96	Mid	QPSK	Full RB	-30.83	28.39	-0.02	59.22
50	27924.96	Mid	QPSK	Full RB	-29.83	28.29	-0.10	58.12
50	27924.96	Mid	QPSK	Full RB	-28.83	28.30	0.01	57.13
50	27924.96	Mid	QPSK	Full RB	-27.83	28.27	-0.03	56.10
50	27924.96	Mid	QPSK	Full RB	-26.83	28.28	0.01	55.11
50	27924.96	Mid	QPSK	Full RB	-25.83	28.27	-0.01	54.10
50	27924.96	Mid	QPSK	Full RB	-24.83	28.60	0.33	53.43
50	27924.96	Mid	QPSK	Full RB	-23.83	28.63	0.03	52.46
50	27924.96	Mid	QPSK	Full RB	-22.83	28.61	-0.02	51.44

**Table 7-6. Full RB AGC Threshold and Booster Gain – 50MHz 1CC – DFT-s – V-DL Polarization**


**Note:** AGC Threshold is found at **-35.83dBm** EUT Input Power Level.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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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]
100	27924.96	Mid	QPSK	Full RB	-46.83	17.60	-	64.43
100	27924.96	Mid	QPSK	Full RB	-45.83	18.36	0.76	64.19
100	27924.96	Mid	QPSK	Full RB	-44.83	19.13	0.77	63.96
100	27924.96	Mid	QPSK	Full RB	-43.83	19.87	0.74	63.70
100	27924.96	Mid	QPSK	Full RB	-42.83	20.64	0.77	63.47
100	27924.96	Mid	QPSK	Full RB	-41.83	21.41	0.77	63.24
100	27924.96	Mid	QPSK	Full RB	-40.83	22.17	0.76	63.00
100	27924.96	Mid	QPSK	Full RB	-39.83	22.91	0.74	62.74
100	27924.96	Mid	QPSK	Full RB	-38.83	23.61	0.70	62.44
100	27924.96	Mid	QPSK	Full RB	-37.83	24.33	0.72	62.16
100	27924.96	Mid	QPSK	Full RB	-36.83	25.02	0.69	61.85
100	27924.96	Mid	QPSK	Full RB	-35.83	25.71	0.69	61.54
100	27924.96	Mid	QPSK	Full RB	-34.83	26.39	0.68	61.22
100	27924.96	Mid	QPSK	Full RB	-33.83	26.65	0.26	60.48
100	27924.96	Mid	QPSK	Full RB	-32.83	26.61	-0.04	59.44
100	27924.96	Mid	QPSK	Full RB	-31.83	26.59	-0.02	58.42
100	27924.96	Mid	QPSK	Full RB	-30.83	26.61	0.02	57.44
100	27924.96	Mid	QPSK	Full RB	-29.83	26.53	-0.08	56.36
100	27924.96	Mid	QPSK	Full RB	-28.83	26.52	-0.01	55.35
100	27924.96	Mid	QPSK	Full RB	-27.83	26.48	-0.04	54.31
100	27924.96	Mid	QPSK	Full RB	-26.83	26.51	0.03	53.34
100	27924.96	Mid	QPSK	Full RB	-25.83	26.56	0.05	52.39
100	27924.96	Mid	QPSK	Full RB	-24.83	26.53	-0.03	51.36
100	27924.96	Mid	QPSK	Full RB	-23.83	26.49	-0.04	50.32
100	27924.96	Mid	QPSK	Full RB	-22.83	26.56	0.07	49.39

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

**Note:** AGC Threshold is found at -33.83dBm EUT Input Power Level.

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### Band n261 – SU (CP-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	27924.96	Mid	QPSK	Full RB	-51.83	12.33	-	64.16
50	27924.96	Mid	QPSK	Full RB	-50.83	13.24	0.91	64.07
50	27924.96	Mid	QPSK	Full RB	-49.83	14.15	0.91	63.98
50	27924.96	Mid	QPSK	Full RB	-48.83	14.99	0.84	63.82
50	27924.96	Mid	QPSK	Full RB	-47.83	15.90	0.91	63.73
50	27924.96	Mid	QPSK	Full RB	-46.83	16.82	0.92	63.65
50	27924.96	Mid	QPSK	Full RB	-45.83	17.72	0.90	63.55
50	27924.96	Mid	QPSK	Full RB	-44.83	18.64	0.92	63.47
50	27924.96	Mid	QPSK	Full RB	-43.83	19.02	0.38	62.85
50	27924.96	Mid	QPSK	Full RB	-42.83	18.55	-0.47	61.38
50	27924.96	Mid	QPSK	Full RB	-41.83	19.00	0.45	60.83
50	27924.96	Mid	QPSK	Full RB	-40.83	19.01	0.01	59.84
50	27924.96	Mid	QPSK	Full RB	-39.83	18.94	-0.07	58.77
50	27924.96	Mid	QPSK	Full RB	-38.83	19.32	0.38	58.15
50	27924.96	Mid	QPSK	Full RB	-37.83	19.32	0.00	57.15
50	27924.96	Mid	QPSK	Full RB	-36.83	19.34	0.02	56.17
50	27924.96	Mid	QPSK	Full RB	-35.83	19.37	0.03	55.20
50	27924.96	Mid	QPSK	Full RB	-34.83	19.40	0.03	54.23
50	27924.96	Mid	QPSK	Full RB	-33.83	19.34	-0.06	53.17
50	27924.96	Mid	QPSK	Full RB	-32.83	19.38	0.04	52.21
50	27924.96	Mid	QPSK	Full RB	-31.83	18.94	-0.44	50.77
50	27924.96	Mid	QPSK	Full RB	-30.83	18.96	0.02	49.79
50	27924.96	Mid	QPSK	Full RB	-29.83	19.05	0.09	48.88
50	27924.96	Mid	QPSK	Full RB	-28.83	18.76	-0.29	47.59
50	27924.96	Mid	QPSK	Full RB	-27.83	19.18	0.42	47.01

**Table 7-8. Full RB AGC Threshold and Booster Gain – 50MHz 1CC – CP – H-DL Polarization**


**Note:** AGC Threshold is found at **-43.83dBm** EUT Input Power Level.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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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]
100	27924.96	Mid	QPSK	Full RB	-46.83	18.15	-	64.98
100	27924.96	Mid	QPSK	Full RB	-45.83	18.91	0.76	64.74
100	27924.96	Mid	QPSK	Full RB	-44.83	19.68	0.77	64.51
100	27924.96	Mid	QPSK	Full RB	-43.83	20.45	0.77	64.28
100	27924.96	Mid	QPSK	Full RB	-42.83	21.24	0.79	64.07
100	27924.96	Mid	QPSK	Full RB	-41.83	22.05	0.81	63.88
100	27924.96	Mid	QPSK	Full RB	-40.83	22.82	0.77	63.65
100	27924.96	Mid	QPSK	Full RB	-39.83	23.59	0.77	63.42
100	27924.96	Mid	QPSK	Full RB	-38.83	24.38	0.79	63.21
100	27924.96	Mid	QPSK	Full RB	-37.83	25.10	0.72	62.93
100	27924.96	Mid	QPSK	Full RB	-36.83	25.85	0.75	62.68
100	27924.96	Mid	QPSK	Full RB	-35.83	26.18	0.33	62.01
100	27924.96	Mid	QPSK	Full RB	-34.83	25.74	-0.44	60.57
100	27924.96	Mid	QPSK	Full RB	-33.83	26.09	0.35	59.92
100	27924.96	Mid	QPSK	Full RB	-32.83	26.11	0.02	58.94
100	27924.96	Mid	QPSK	Full RB	-31.83	26.04	-0.07	57.87
100	27924.96	Mid	QPSK	Full RB	-30.83	26.05	0.01	56.88
100	27924.96	Mid	QPSK	Full RB	-29.83	25.98	-0.07	55.81
100	27924.96	Mid	QPSK	Full RB	-28.83	26.04	0.06	54.87
100	27924.96	Mid	QPSK	Full RB	-27.83	26.03	-0.01	53.86
100	27924.96	Mid	QPSK	Full RB	-26.83	26.04	0.01	52.87
100	27924.96	Mid	QPSK	Full RB	-25.83	26.00	-0.04	51.83
100	27924.96	Mid	QPSK	Full RB	-24.83	26.01	0.01	50.84
100	27924.96	Mid	QPSK	Full RB	-23.83	26.00	-0.01	49.83
100	27924.96	Mid	QPSK	Full RB	-22.83	26.02	0.02	48.85

**Table 7-9. Full RB AGC Threshold and Booster Gain – 100MHz 4CC – CP – H-DL Polarization**


**Note:** AGC Threshold is found at **-35.83dBm** EUT Input Power Level.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater		Page 34 of 129

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	27924.96	Mid	QPSK	Full RB	-51.83	13.12	-	64.95
50	27924.96	Mid	QPSK	Full RB	-50.83	14.04	0.92	64.87
50	27924.96	Mid	QPSK	Full RB	-49.83	14.96	0.92	64.79
50	27924.96	Mid	QPSK	Full RB	-48.83	15.78	0.82	64.61
50	27924.96	Mid	QPSK	Full RB	-47.83	16.67	0.89	64.50
50	27924.96	Mid	QPSK	Full RB	-46.83	17.60	0.93	64.43
50	27924.96	Mid	QPSK	Full RB	-45.83	18.36	0.76	64.19
50	27924.96	Mid	QPSK	Full RB	-44.83	18.48	0.12	63.31
50	27924.96	Mid	QPSK	Full RB	-43.83	18.84	0.36	62.67
50	27924.96	Mid	QPSK	Full RB	-42.83	19.27	0.43	62.10
50	27924.96	Mid	QPSK	Full RB	-41.83	19.20	-0.07	61.03
50	27924.96	Mid	QPSK	Full RB	-40.83	19.22	0.02	60.05
50	27924.96	Mid	QPSK	Full RB	-39.83	19.22	0.00	59.05
50	27924.96	Mid	QPSK	Full RB	-38.83	19.13	-0.09	57.96
50	27924.96	Mid	QPSK	Full RB	-37.83	19.14	0.01	56.97
50	27924.96	Mid	QPSK	Full RB	-36.83	19.16	0.02	55.99
50	27924.96	Mid	QPSK	Full RB	-35.83	18.99	-0.17	54.82
50	27924.96	Mid	QPSK	Full RB	-34.83	18.78	-0.21	53.61
50	27924.96	Mid	QPSK	Full RB	-33.83	19.17	0.39	53.00
50	27924.96	Mid	QPSK	Full RB	-32.83	19.11	-0.06	51.94
50	27924.96	Mid	QPSK	Full RB	-31.83	19.19	0.08	51.02
50	27924.96	Mid	QPSK	Full RB	-30.83	18.89	-0.30	49.72
50	27924.96	Mid	QPSK	Full RB	-29.83	18.69	-0.20	48.52
50	27924.96	Mid	QPSK	Full RB	-28.83	18.99	0.30	47.82
50	27924.96	Mid	QPSK	Full RB	-27.83	19.18	0.19	47.01

**Table 7-10. Full RB AGC Threshold and Booster Gain – 50MHz 1CC – CP – V-DL Polarization**


**Note:** AGC Threshold is found at **-44.83dBm** EUT Input Power Level.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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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]
100	27924.96	Mid	QPSK	Full RB	-46.83	18.34	-	65.17
100	27924.96	Mid	QPSK	Full RB	-45.83	19.12	0.78	64.95
100	27924.96	Mid	QPSK	Full RB	-44.83	19.92	0.80	64.75
100	27924.96	Mid	QPSK	Full RB	-43.83	20.64	0.72	64.47
100	27924.96	Mid	QPSK	Full RB	-42.83	21.43	0.79	64.26
100	27924.96	Mid	QPSK	Full RB	-41.83	22.23	0.80	64.06
100	27924.96	Mid	QPSK	Full RB	-40.83	23.02	0.79	63.85
100	27924.96	Mid	QPSK	Full RB	-39.83	23.78	0.76	63.61
100	27924.96	Mid	QPSK	Full RB	-38.83	24.52	0.74	63.35
100	27924.96	Mid	QPSK	Full RB	-37.83	25.23	0.71	63.06
100	27924.96	Mid	QPSK	Full RB	-36.83	26.02	0.79	62.85
100	27924.96	Mid	QPSK	Full RB	-35.83	25.99	-0.03	61.82
100	27924.96	Mid	QPSK	Full RB	-34.83	25.94	-0.05	60.77
100	27924.96	Mid	QPSK	Full RB	-33.83	25.94	0.00	59.77
100	27924.96	Mid	QPSK	Full RB	-32.83	25.89	-0.05	58.72
100	27924.96	Mid	QPSK	Full RB	-31.83	26.22	0.33	58.05
100	27924.96	Mid	QPSK	Full RB	-30.83	26.19	-0.03	57.02
100	27924.96	Mid	QPSK	Full RB	-29.83	26.18	-0.01	56.01
100	27924.96	Mid	QPSK	Full RB	-28.83	26.18	0.00	55.01
100	27924.96	Mid	QPSK	Full RB	-27.83	26.16	-0.02	53.99
100	27924.96	Mid	QPSK	Full RB	-26.83	26.16	0.00	52.99
100	27924.96	Mid	QPSK	Full RB	-25.83	26.19	0.03	52.02
100	27924.96	Mid	QPSK	Full RB	-24.83	26.10	-0.09	50.93
100	27924.96	Mid	QPSK	Full RB	-23.83	26.15	0.05	49.98
100	27924.96	Mid	QPSK	Full RB	-22.83	26.19	0.04	49.02

**Table 7-11. Full RB AGC Threshold and Booster Gain – 100MHz 4CC – CP – V-DL Polarization**

**Note:** AGC Threshold is found at **-35.83dBm** EUT Input Power Level.

FCC ID: 2AUVU-5620-23-28		<b>PART 20 &amp; 30 MEASUREMENT REPORT (CERTIFICATION)</b>	<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2303240041-01.2AUVU	<b>Test Dates:</b> 02/20/2023-03/31/2023	<b>EUT Type:</b> 5G mmWave Repeater	Page 36 of 129

## 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  $\geq$  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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Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 37 of 129

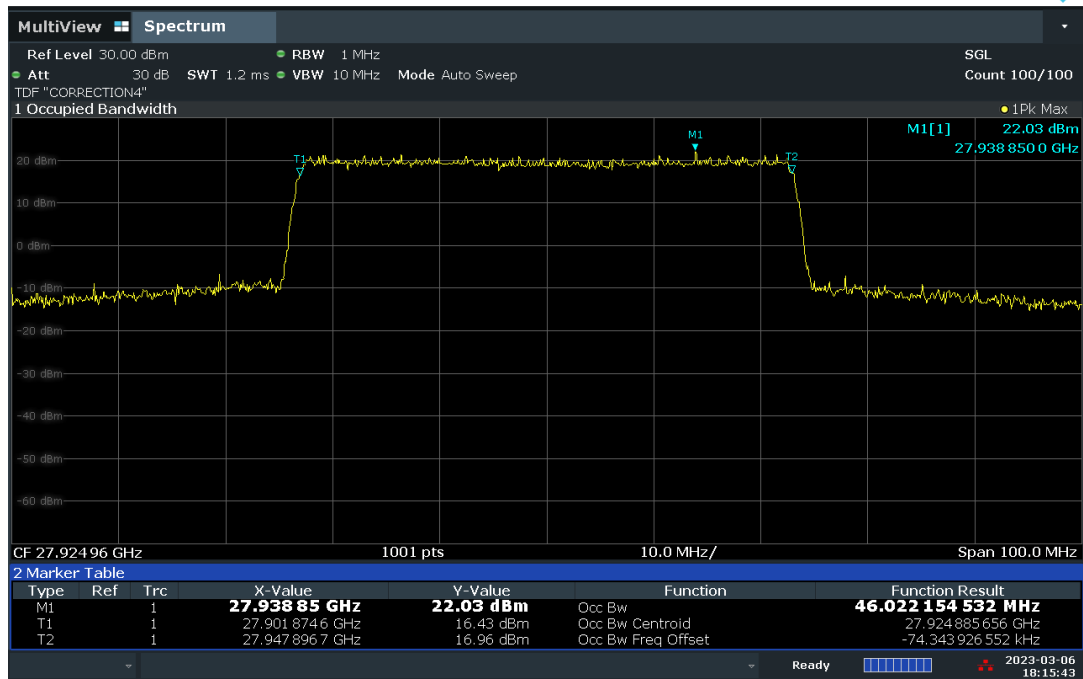
**Band n261 – SU (DFT-s-OFDM)**

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
H_DL	50	1	DFT-s-OFDM	QPSK	46.02
			DFT-s-OFDM	16QAM	46.07
		2	DFT-s-OFDM	QPSK	95.69
			DFT-s-OFDM	16QAM	95.71
	100	4	DFT-s-OFDM	QPSK	393.23
			DFT-s-OFDM	16QAM	392.97
V_DL	50	1	DFT-s-OFDM	QPSK	45.89
			DFT-s-OFDM	16QAM	45.83
		2	DFT-s-OFDM	QPSK	95.60
			DFT-s-OFDM	16QAM	95.55
	100	4	DFT-s-OFDM	QPSK	395.25
			DFT-s-OFDM	16QAM	394.36

**Table 7-12. Summary of SU Occupied Bandwidths – DFT-s-OFDM**

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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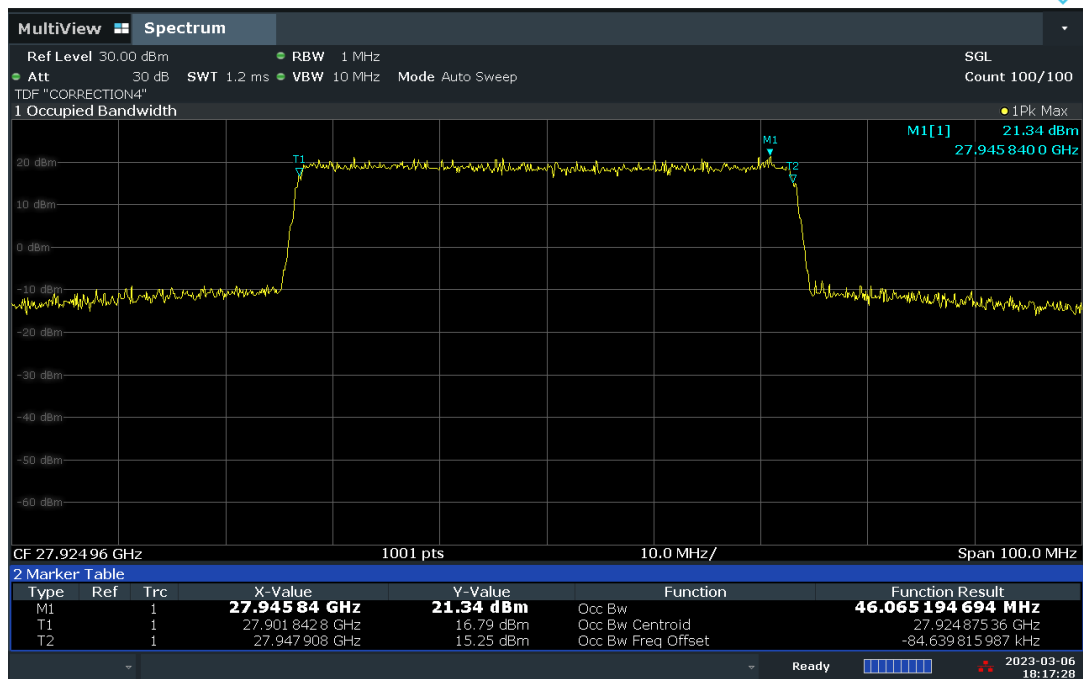
ACLRRResults



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Plot 7-19. Occupied Bandwidth Plot – DFT-s – H-DL Polarization (50MHz-1CC – QPSK – Mid Channel)

ACLRRResults

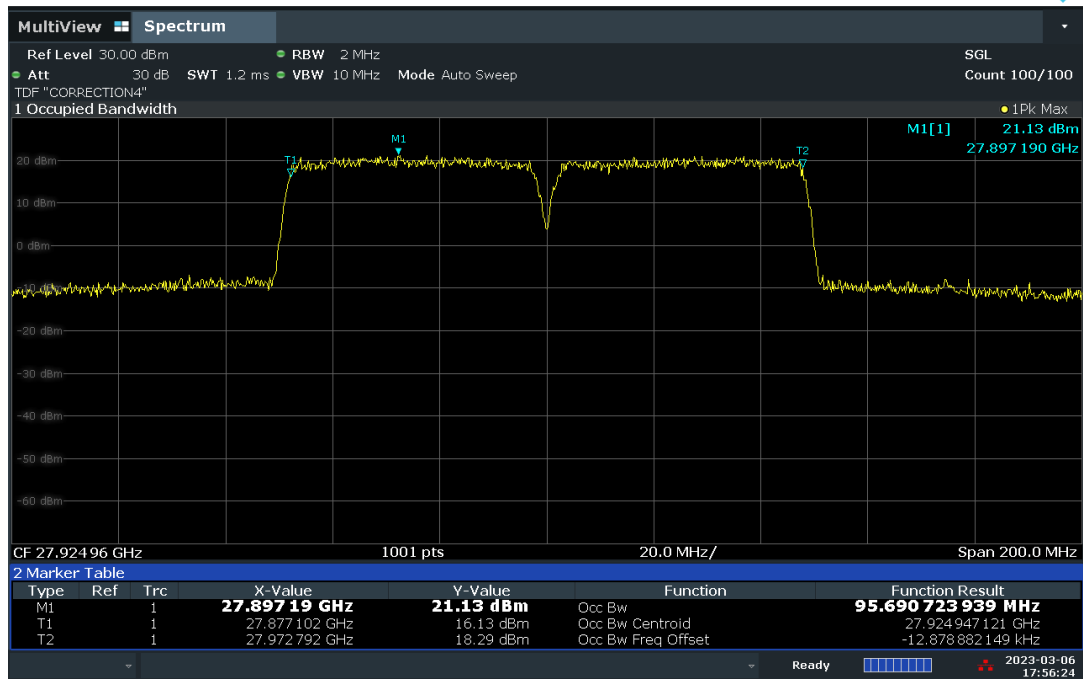


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Plot 7-20. Occupied Bandwidth Plot – DFT-s – H-DL Polarization (50MHz-1CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 39 of 129

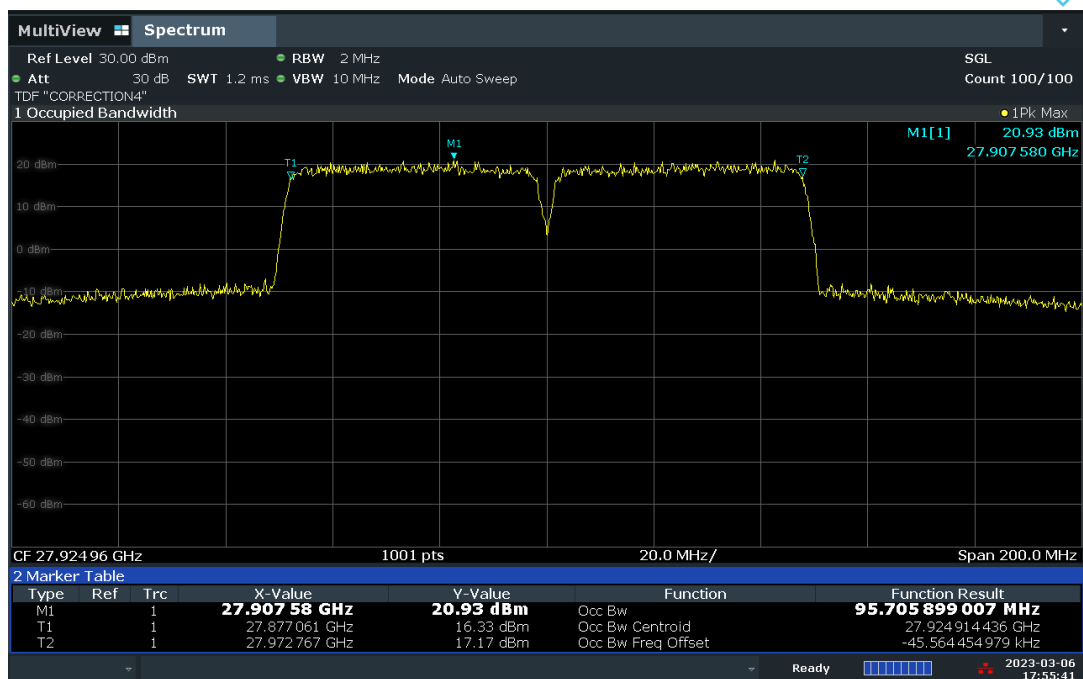
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Plot 7-21. Occupied Bandwidth Plot – DFT-s – H-DL Polarization (50MHz-2CC – QPSK – Mid Channel)

ACLRRResults



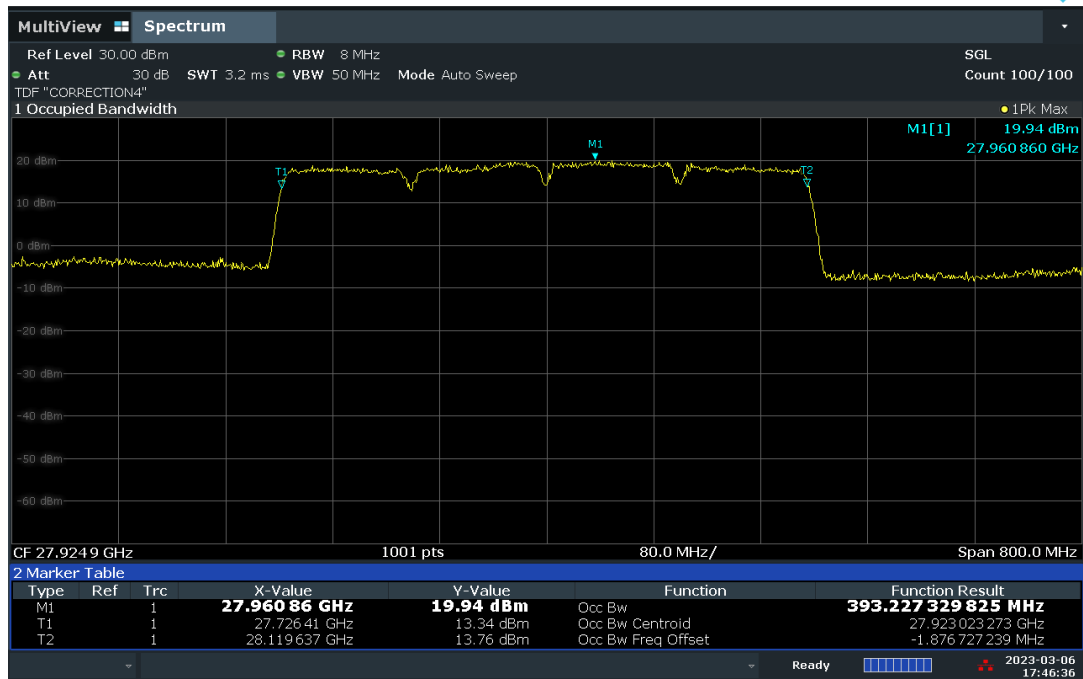
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Plot 7-22. Occupied Bandwidth Plot – DFT-s – H-DL Polarization (50MHz-2CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 40 of 129



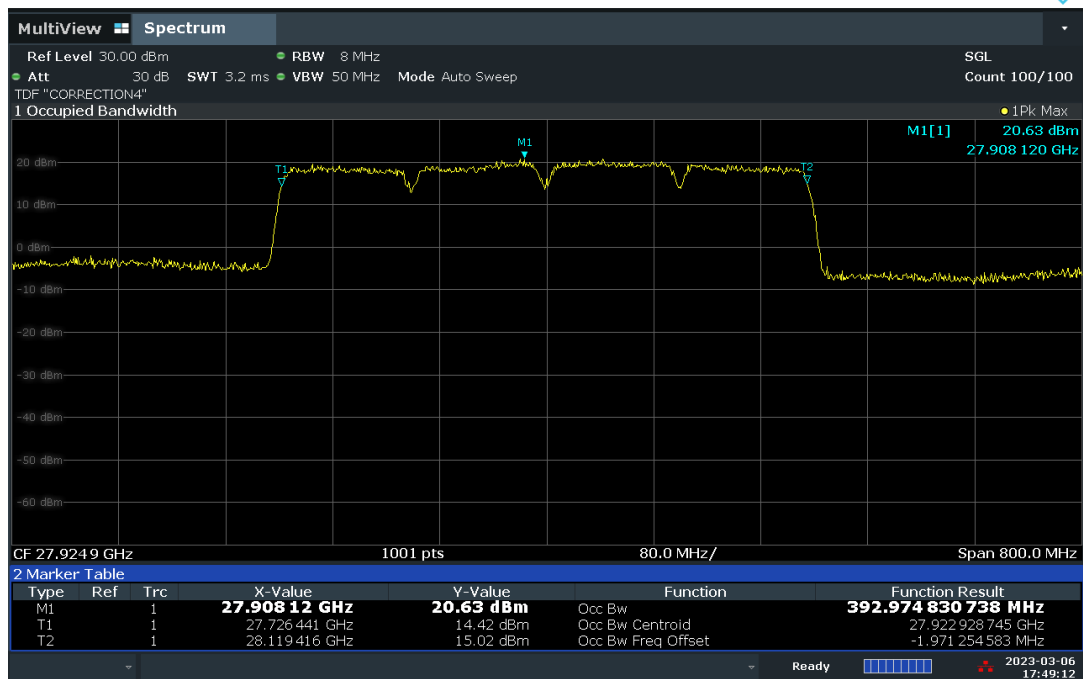
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Plot 7-23. Occupied Bandwidth Plot – DFT-s – H-DL Polarization (100MHz-4CC – QPSK – Mid Channel)

ACLRRResults

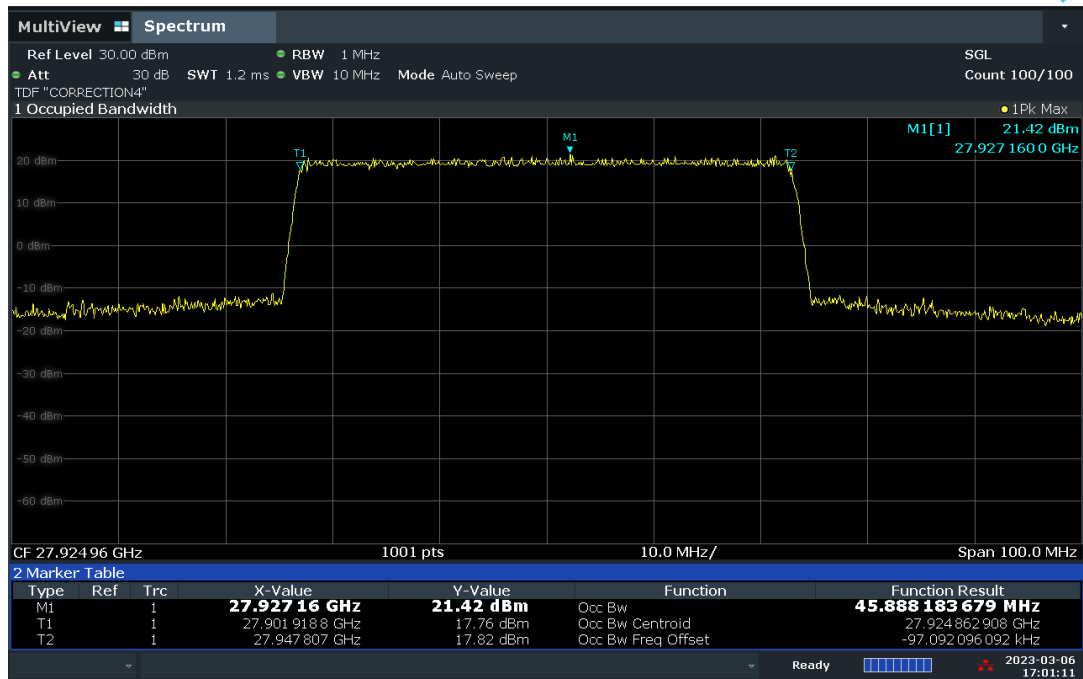


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Plot 7-24. Occupied Bandwidth Plot – DFT-s – H-DL Polarization (100MHz-4CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 41 of 129

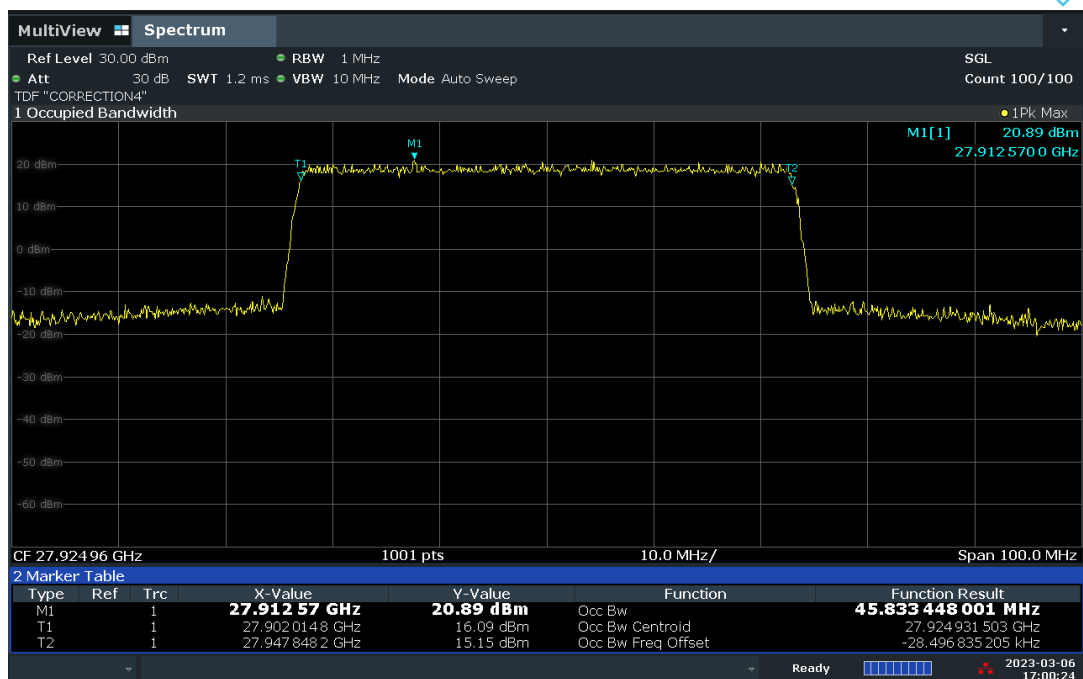
ACLRRResults



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Plot 7-25. Occupied Bandwidth Plot – DFT-s – V-DL Polarization (50MHz-1CC – QPSK – Mid Channel)

ACLRRResults

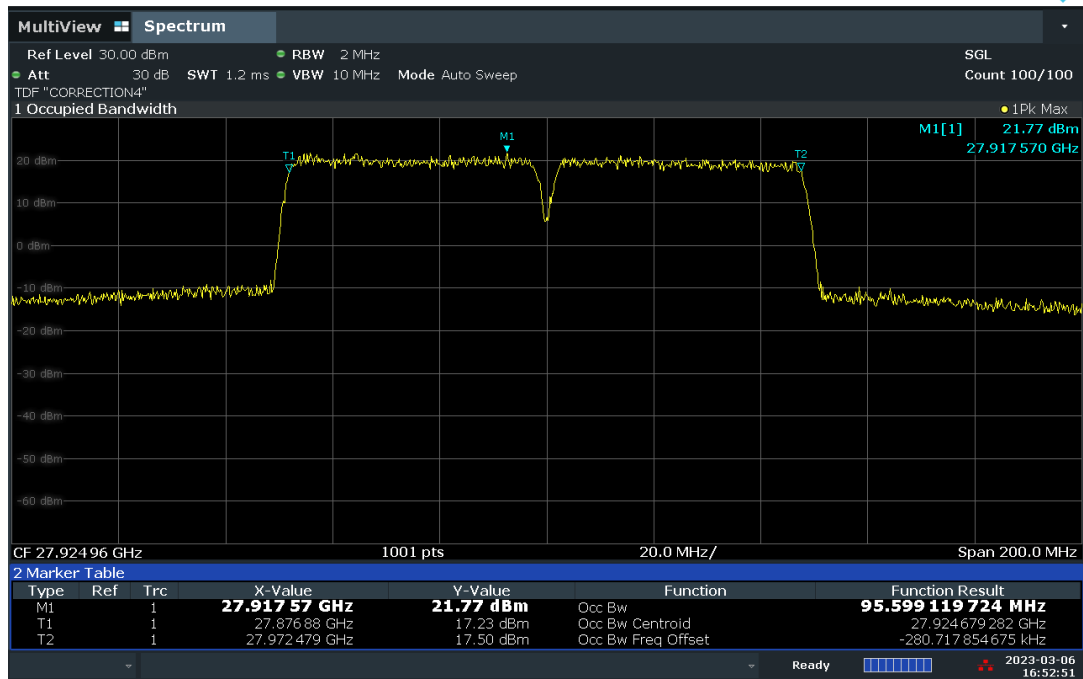


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Plot 7-26. Occupied Bandwidth Plot – DFT-s – V-DL Polarization (50MHz-1CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 42 of 129

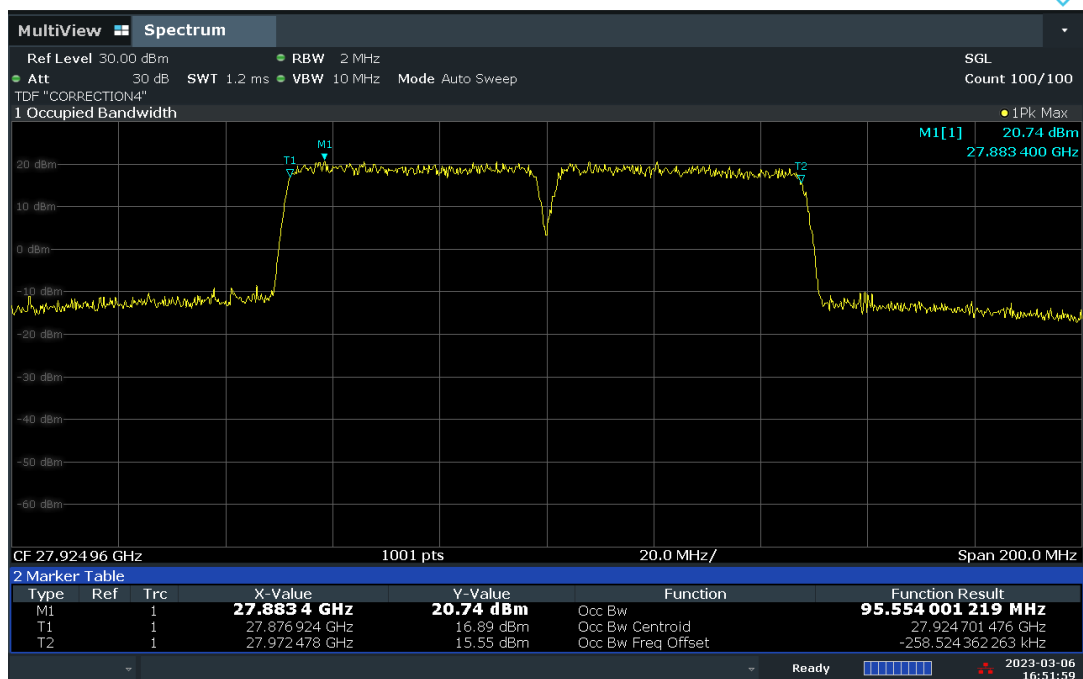
ACLRRResults



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Plot 7-27. Occupied Bandwidth Plot – DFT-s – V-DL Polarization (50MHz-2CC – QPSK – Mid Channel)

ACLRRResults

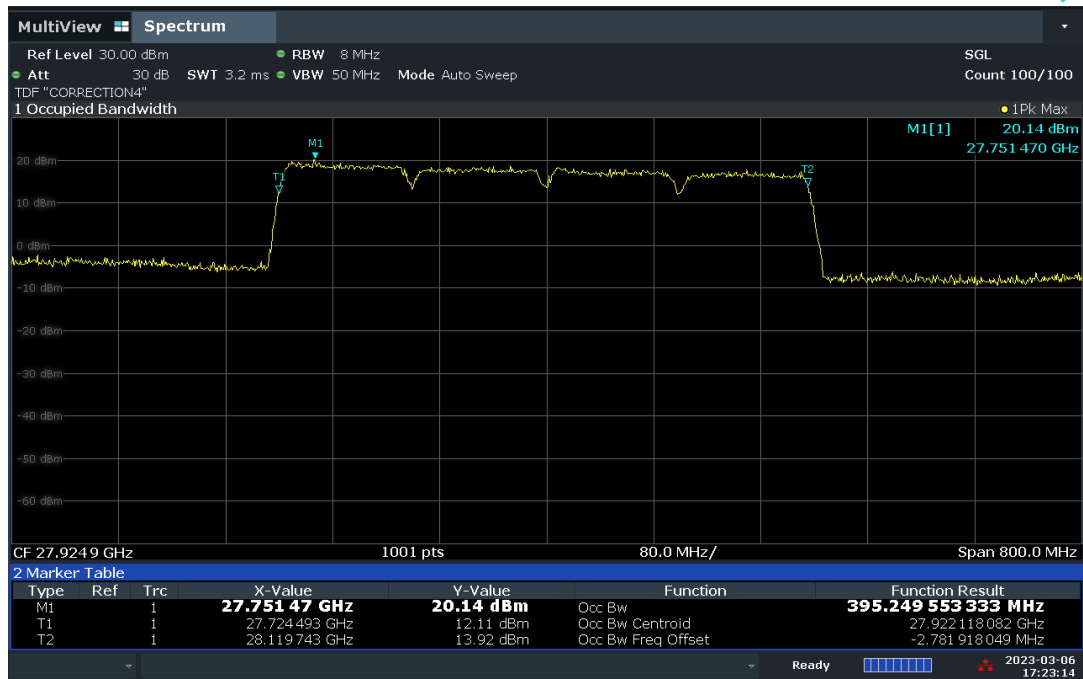


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Plot 7-28. Occupied Bandwidth Plot – DFT-s – V-DL Polarization (50MHz-2CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 43 of 129

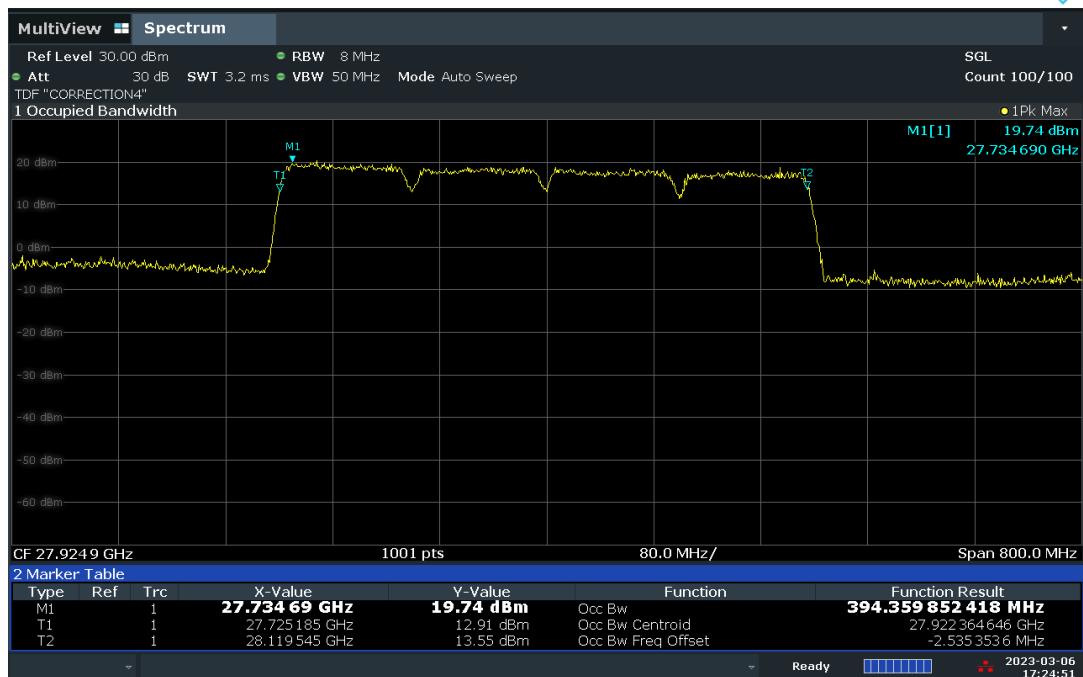
ACLRRResults



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Plot 7-29. Occupied Bandwidth Plot – DFT-s – V-DL Polarization (100MHz-4CC – QPSK – Mid Channel)

ACLRRResults



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Plot 7-30. Occupied Bandwidth Plot – DFT-s – V-DL Polarization (100MHz-4CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 44 of 129

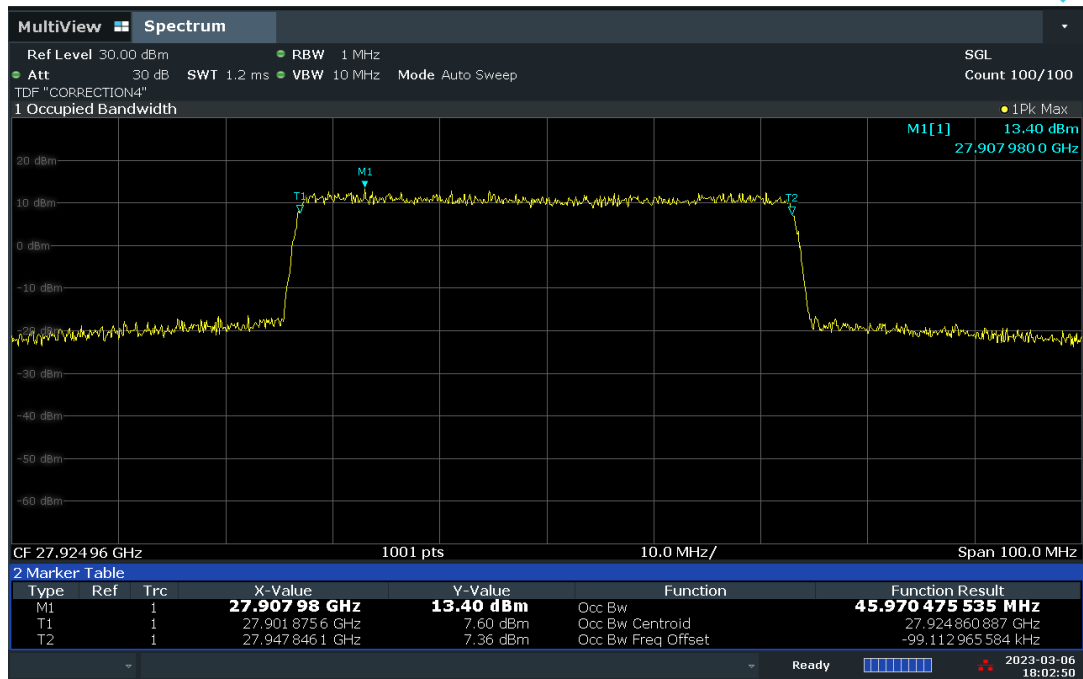
**Band n261 – SU (CP-OFDM)**

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
H_DL	50	1	CP-OFDM	QPSK	45.97
			CP-OFDM	16QAM	45.89
		2	CP-OFDM	QPSK	95.54
			CP-OFDM	16QAM	95.46
	100	4	CP-OFDM	QPSK	394.69
			CP-OFDM	16QAM	394.89
V_DL	50	1	CP-OFDM	QPSK	45.75
			CP-OFDM	16QAM	45.84
		2	CP-OFDM	QPSK	95.52
			CP-OFDM	16QAM	95.46
	100	4	CP-OFDM	QPSK	395.80
			CP-OFDM	16QAM	396.13

**Table 7-13. Summary of SU Occupied Bandwidths – CP-OFDM**

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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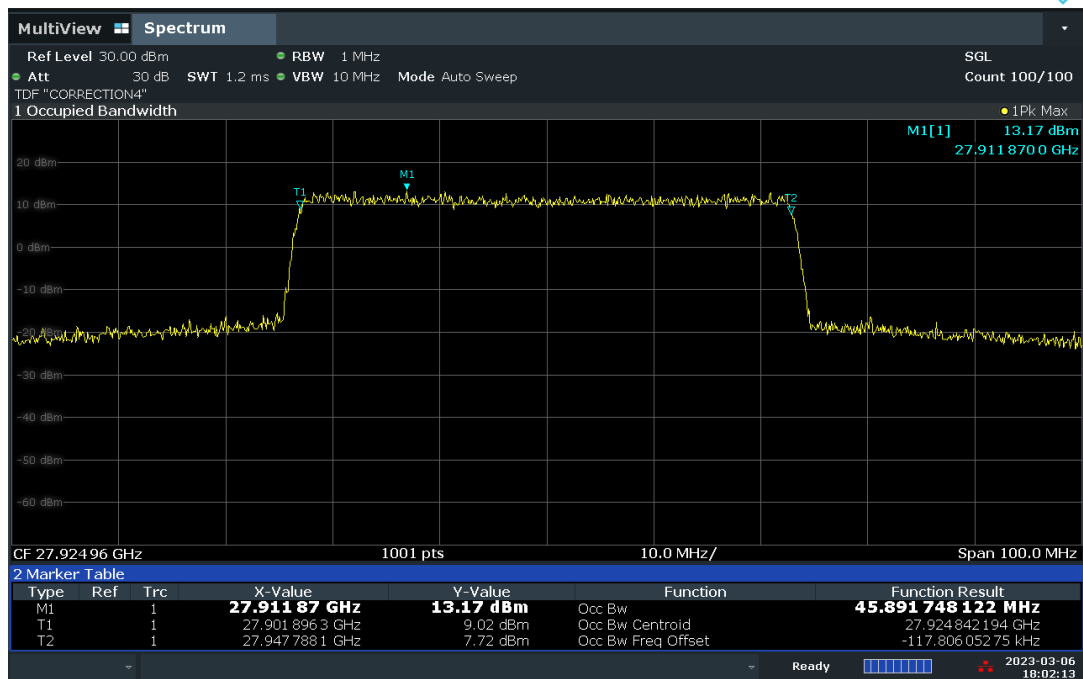
ACLRRResults



06:02:50 PM 03/06/2023

Plot 7-31. Occupied Bandwidth Plot – CP – H-DL Polarization (50MHz-1CC – QPSK – Mid Channel)

ACLRRResults

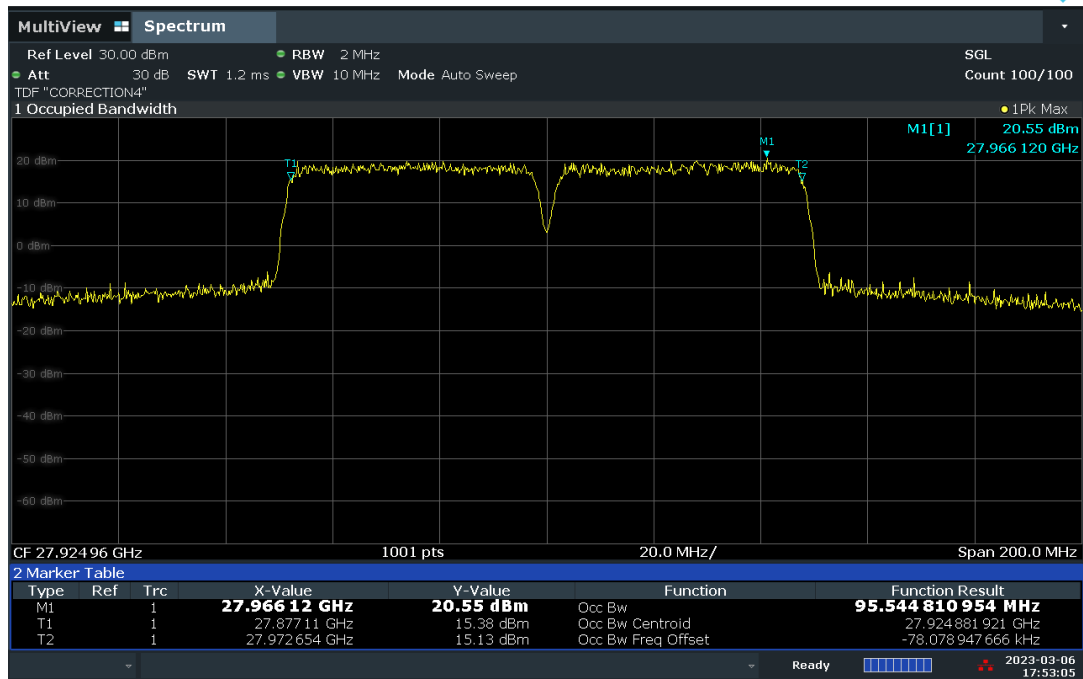


06:02:14 PM 03/06/2023

Plot 7-32. Occupied Bandwidth Plot – CP – H-DL Polarization (50MHz-1CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 46 of 129

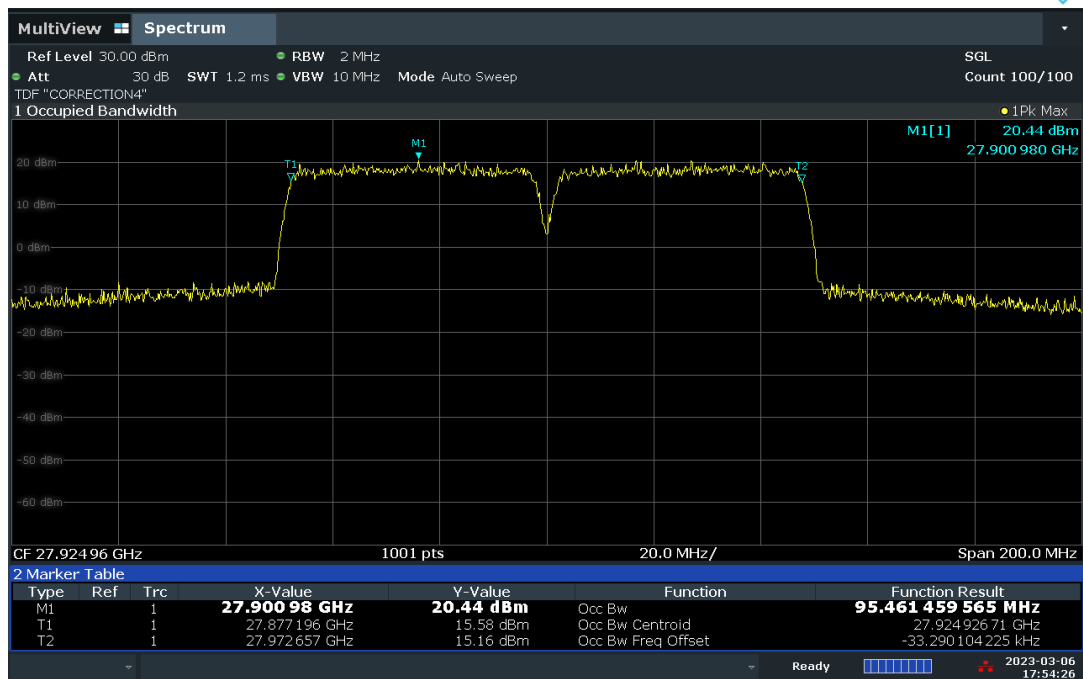
ACLRRResults



05:53:06 PM 03/06/2023

Plot 7-33. Occupied Bandwidth Plot – CP – H-DL Polarization (50MHz-2CC – QPSK – Mid Channel)

ACLRRResults

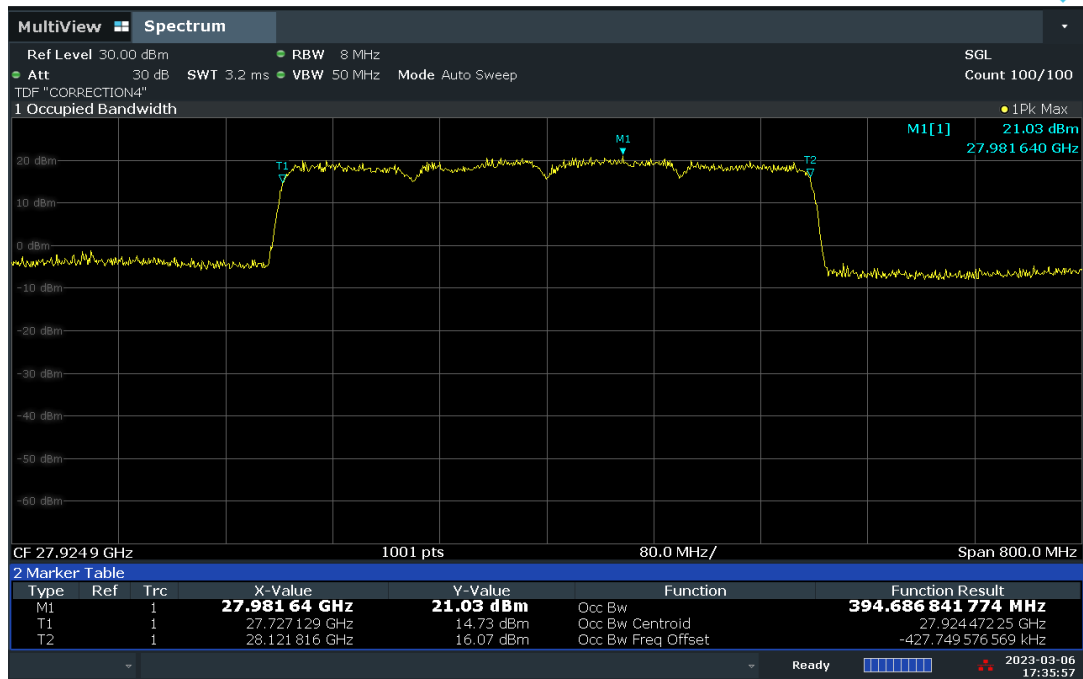


05:54:27 PM 03/06/2023

Plot 7-34. Occupied Bandwidth Plot – CP – H-DL Polarization (50MHz-2CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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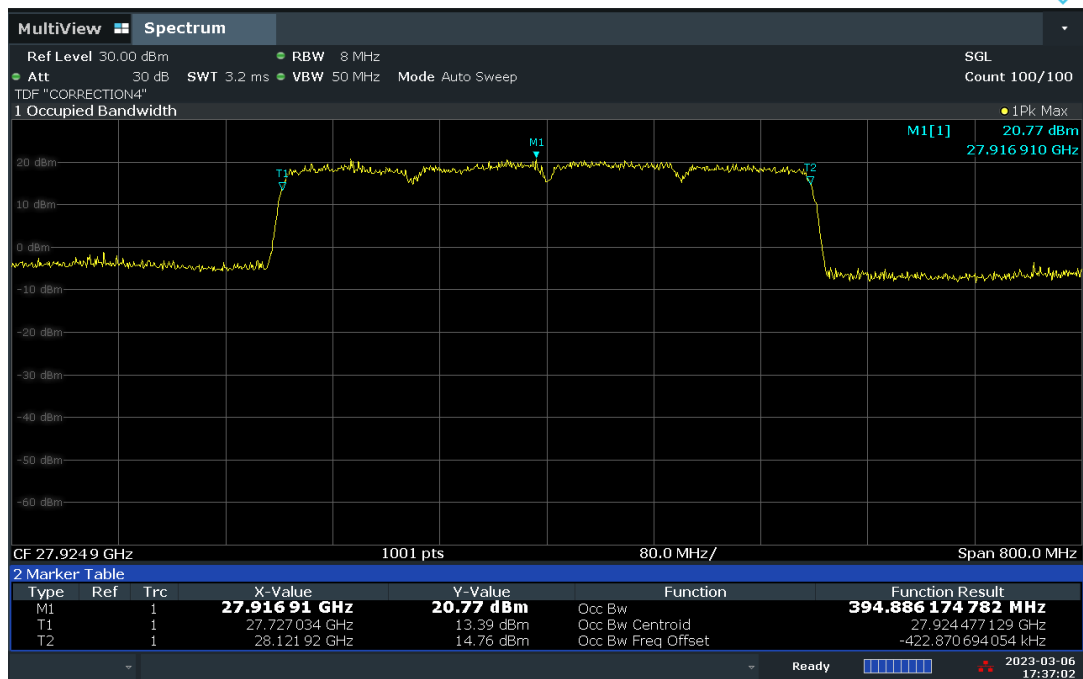
ACLRRResults



05:35:58 PM 03/06/2023

Plot 7-35. Occupied Bandwidth Plot – CP – H-DL Polarization (100MHz-4CC – QPSK – Mid Channel)

ACLRRResults



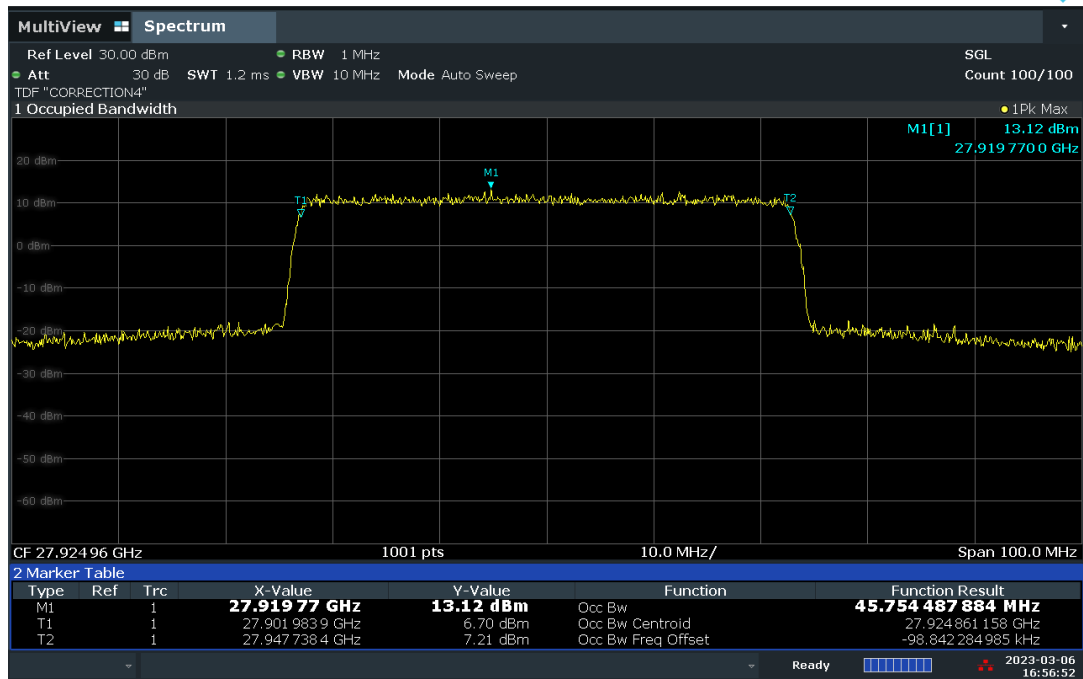
05:37:03 PM 03/06/2023

Plot 7-36. Occupied Bandwidth Plot – CP – H-DL Polarization (100MHz-4CC – 16QAM – Mid Channel)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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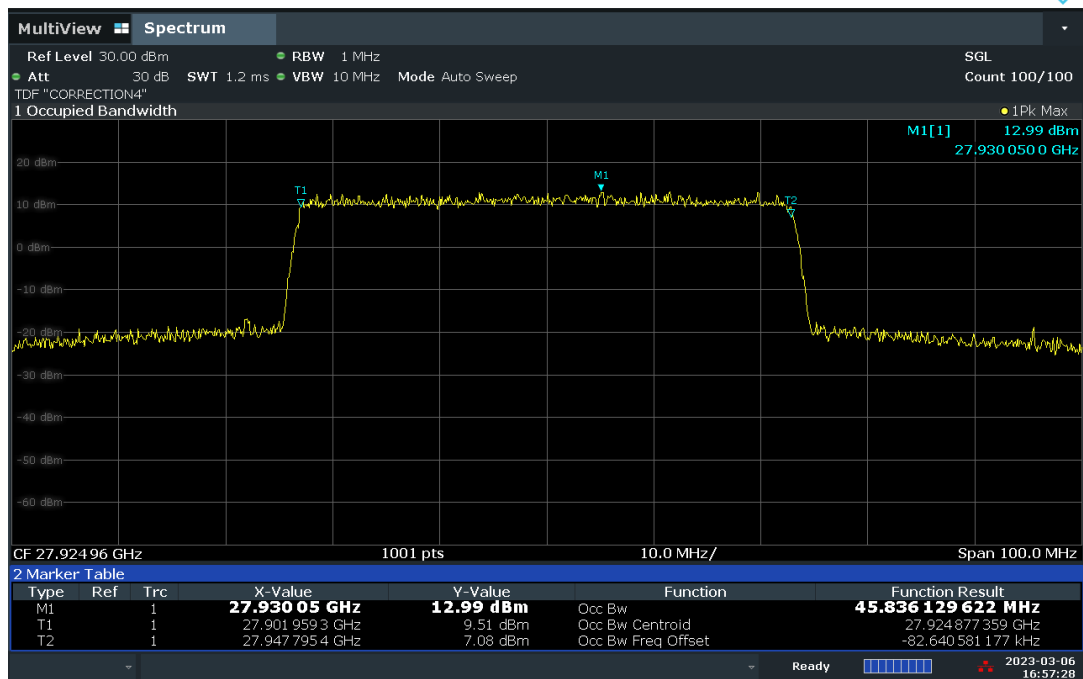
ACLRRResults



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Plot 7-37. Occupied Bandwidth Plot – CP – V-DL Polarization (50MHz-1CC – QPSK – Mid Channel)

ACLRRResults

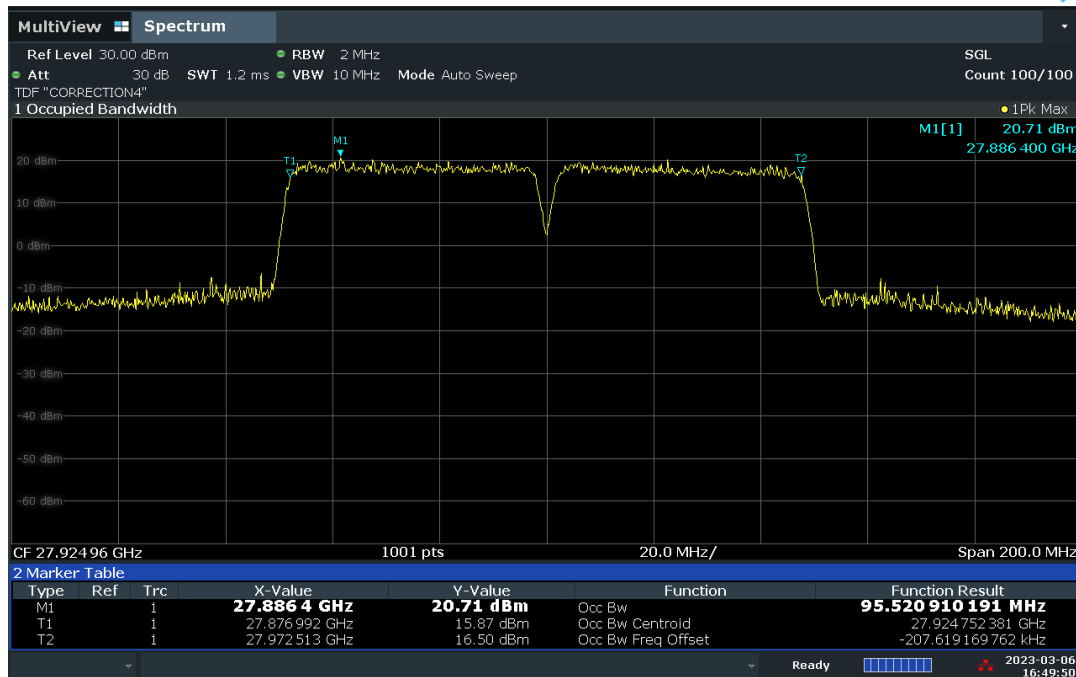


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Plot 7-38. Occupied Bandwidth Plot – CP – V-DL Polarization (50MHz-1CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 49 of 129

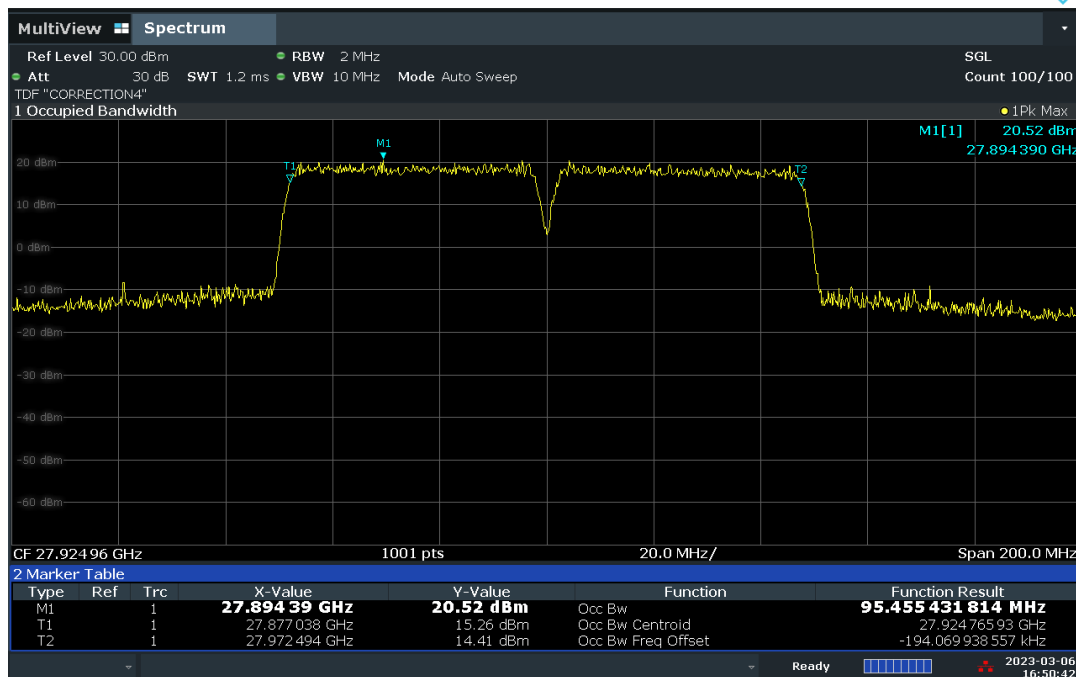
ACLRRResults



04:49:51 PM 03/06/2023

Plot 7-39. Occupied Bandwidth Plot – CP – V-DL Polarization (50MHz-2CC – QPSK – Mid Channel)

ACLRRResults

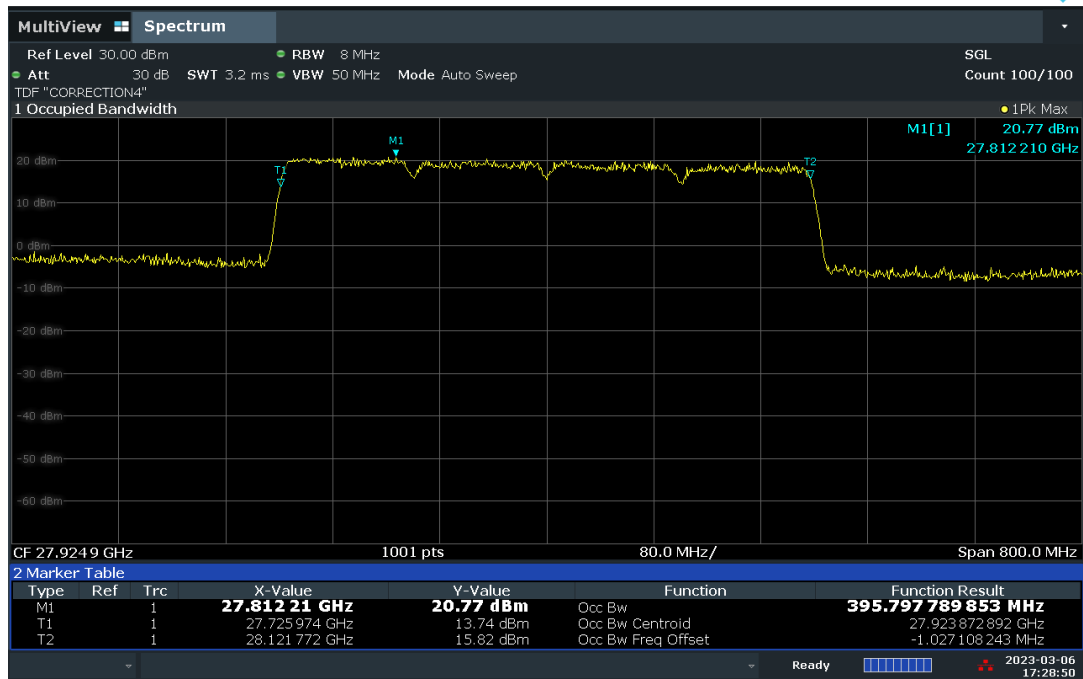


04:50:43 PM 03/06/2023

Plot 7-40. Occupied Bandwidth Plot – CP – V-DL Polarization (50MHz-2CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 50 of 129

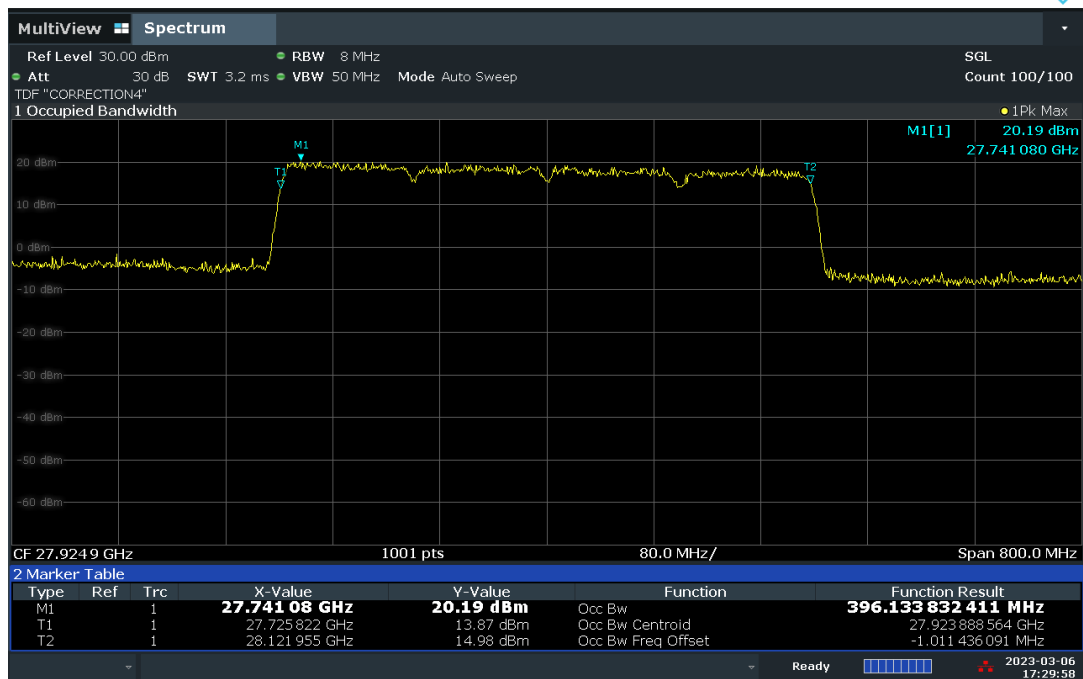
ACLRRResults



05:28:50 PM 03/06/2023

Plot 7-41. Occupied Bandwidth Plot – CP – V-DL Polarization (100MHz-4CC – QPSK – Mid Channel)

ACLRRResults



05:29:58 PM 03/06/2023

Plot 7-42. Occupied Bandwidth Plot – CP – V-DL Polarization (100MHz-4CC – 16QAM – Mid Channel)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 51 of 129

## 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 Isotropic 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  $\geq$  3 x RBW
5. Span = 2x to 3x the OBW
6. No. of sweep points  $\geq$  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 both CP-OFDM and 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 horizontally 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.

**Sample Conducted MIMO Calculation:**

$$\begin{aligned} &\text{Antenna 1} + \text{Antenna 2} = \text{MIMO} \\ &(28.65\text{dBm} + 28.66\text{dBm}) = (732.82\text{mW} + 734.51\text{mW}) = 1467.33\text{mW} = 31.67\text{dBm} \end{aligned}$$

**Sample EIRP Calculation:**

$$\begin{aligned} &\text{Conducted Power} + \text{Antenna Gain} = \text{EIRP} \\ &31.67\text{dBm} + 13.0\text{dBi} = 44.67\text{dBm} \end{aligned}$$

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## Band n261 – SU (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	27525.00	H-DL	DFT-s-OFDM	QPSK	50	1	Full	28.66	13.00	41.66
Low	27525.00	H-DL	DFT-s-OFDM	QPSK	50	1	1 / 16	18.97	13.00	31.97
Mid	27924.96	H-DL	DFT-s-OFDM	QPSK	50	1	Full	28.32	13.00	41.32
High	28324.92	H-DL	DFT-s-OFDM	QPSK	50	1	Full	27.19	13.00	40.19
Low	27525.00	H-DL	DFT-s-OFDM	16-QAM	50	1	Full	28.07	13.00	41.07
Low	27549.96	H-DL	DFT-s-OFDM	QPSK	50	2	Full	27.74	13.00	40.74
Low	27549.96	H-DL	DFT-s-OFDM	QPSK	50	2	1 / 16	18.84	13.00	31.84
Mid	27924.96	H-DL	DFT-s-OFDM	QPSK	50	2	Full	26.98	13.00	39.98
High	28299.96	H-DL	DFT-s-OFDM	QPSK	50	2	Full	25.70	13.00	38.70
Low	27549.96	H-DL	DFT-s-OFDM	16-QAM	50	2	Full	27.29	13.00	40.29
Low	27700.02	H-DL	DFT-s-OFDM	QPSK	100	4	Full	26.87	13.00	39.87
Low	27700.02	H-DL	DFT-s-OFDM	QPSK	100	4	1 / 33	17.97	13.00	30.97
Mid	27924.96	H-DL	DFT-s-OFDM	QPSK	100	4	Full	26.65	13.00	39.65
High	28150.02	H-DL	DFT-s-OFDM	QPSK	100	4	Full	26.22	13.00	39.22
Low	27700.02	H-DL	DFT-s-OFDM	16-QAM	100	4	Full	26.48	13.00	39.48


**Table 7-14. NR Band n261 - Conducted Power and EIRP – DFT-s – H-DL 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	27525.00	V-DL	DFT-s-OFDM	QPSK	50	1	Full	28.65	13.00	41.65
Low	27525.00	V-DL	DFT-s-OFDM	QPSK	50	1	1 / 16	19.17	13.00	32.17
Mid	27924.96	V-DL	DFT-s-OFDM	QPSK	50	1	Full	28.61	13.00	41.61
High	28324.92	V-DL	DFT-s-OFDM	QPSK	50	1	Full	27.93	13.00	40.93
Low	27525.00	V-DL	DFT-s-OFDM	16-QAM	50	1	Full	27.61	13.00	40.61
Low	27549.96	V-DL	DFT-s-OFDM	QPSK	50	2	Full	27.89	13.00	40.89
Low	27549.96	V-DL	DFT-s-OFDM	QPSK	50	2	1 / 16	19.18	13.00	32.18
Mid	27924.96	V-DL	DFT-s-OFDM	QPSK	50	2	Full	27.51	13.00	40.51
High	28299.96	V-DL	DFT-s-OFDM	QPSK	50	2	Full	26.64	13.00	39.64
Low	27549.96	V-DL	DFT-s-OFDM	16-QAM	50	2	Full	27.81	13.00	40.81
Low	27700.02	V-DL	DFT-s-OFDM	QPSK	100	4	Full	26.90	13.00	39.90
Low	27700.02	V-DL	DFT-s-OFDM	QPSK	100	4	1 / 33	18.70	13.00	31.70
Mid	27924.96	V-DL	DFT-s-OFDM	QPSK	100	4	Full	26.84	13.00	39.84
High	28150.02	V-DL	DFT-s-OFDM	QPSK	100	4	Full	26.53	13.00	39.53
Low	27700.02	V-DL	DFT-s-OFDM	16-QAM	100	4	Full	26.77	13.00	39.77

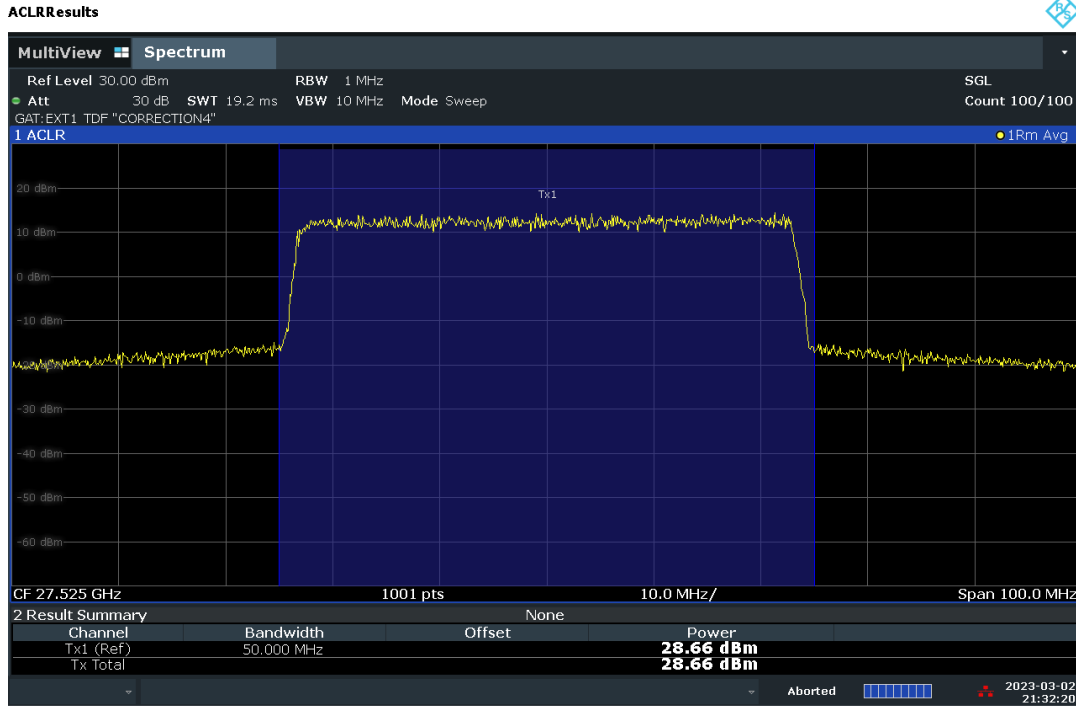
**Table 7-15. NR Band n261 - Conducted Power and EIRP – DFT-s – V-DL Polarization**

Channel	Center Frequency [MHz]	Ant. Pol.	Transmission Scheme	Modulation	Bandwidth [MHz]	# of Carriers [CCs]	RB Size/Offset	MIMO Conducted Power [dBm]	Tx Ant Gain [dBi]	MIMO EIRP [dBm]
Low	27525.00	MIMO	DFT-s-OFDM	QPSK	50	1	Full	31.67	13.00	44.67
Low	27525.00	MIMO	DFT-s-OFDM	QPSK	50	1	1 / 16	22.08	13.00	35.08
Mid	27924.96	MIMO	DFT-s-OFDM	QPSK	50	1	Full	31.48	13.00	44.48
High	28324.92	MIMO	DFT-s-OFDM	QPSK	50	1	Full	30.59	13.00	43.59
Low	27525.00	MIMO	DFT-s-OFDM	16-QAM	50	1	Full	30.86	13.00	43.86
Low	27549.96	MIMO	DFT-s-OFDM	QPSK	50	2	Full	30.83	13.00	43.83
Low	27549.96	MIMO	DFT-s-OFDM	QPSK	50	2	1 / 16	22.02	13.00	35.02
Mid	27924.96	MIMO	DFT-s-OFDM	QPSK	50	2	Full	30.26	13.00	43.26
High	28299.96	MIMO	DFT-s-OFDM	QPSK	50	2	Full	29.21	13.00	42.21
Low	27549.96	MIMO	DFT-s-OFDM	16-QAM	50	2	Full	30.57	13.00	43.57
Low	27700.02	MIMO	DFT-s-OFDM	QPSK	100	4	Full	29.90	13.00	42.90
Low	27700.02	MIMO	DFT-s-OFDM	QPSK	100	4	1 / 33	21.36	13.00	34.36
Mid	27924.96	MIMO	DFT-s-OFDM	QPSK	100	4	Full	29.76	13.00	42.76
High	28150.02	MIMO	DFT-s-OFDM	QPSK	100	4	Full	29.39	13.00	42.39
Low	27700.02	MIMO	DFT-s-OFDM	16-QAM	100	4	Full	29.64	13.00	42.64

**Table 7-16. NR Band n261 - Conducted Power – DFT-s – MIMO**

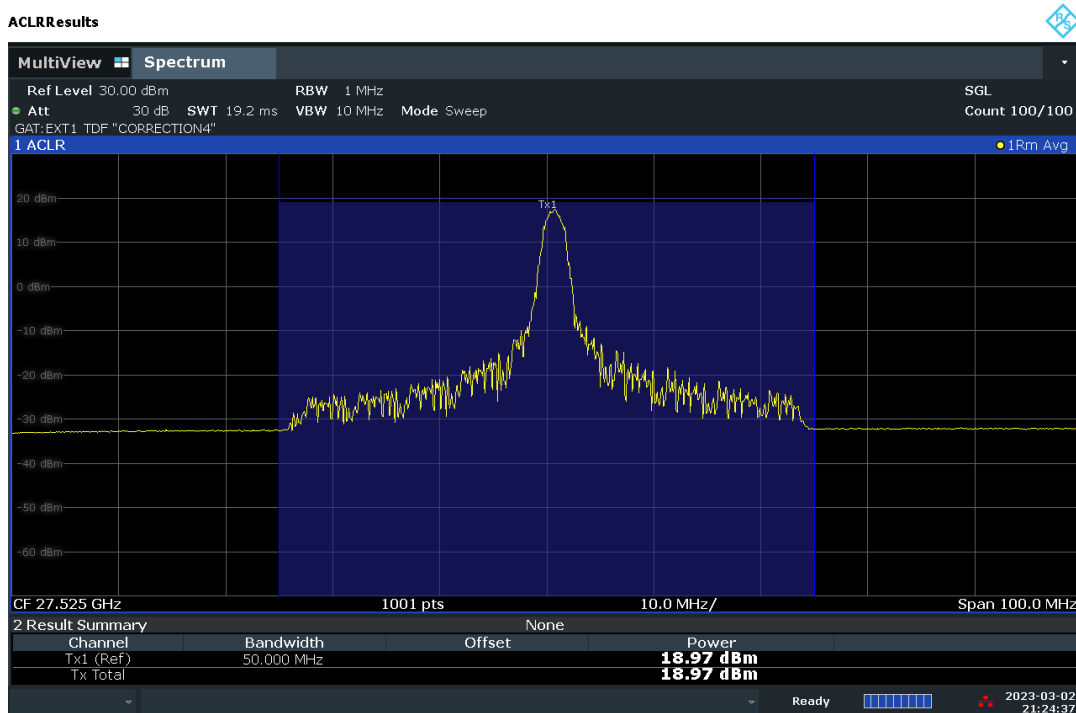
FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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## H-DL Polarization



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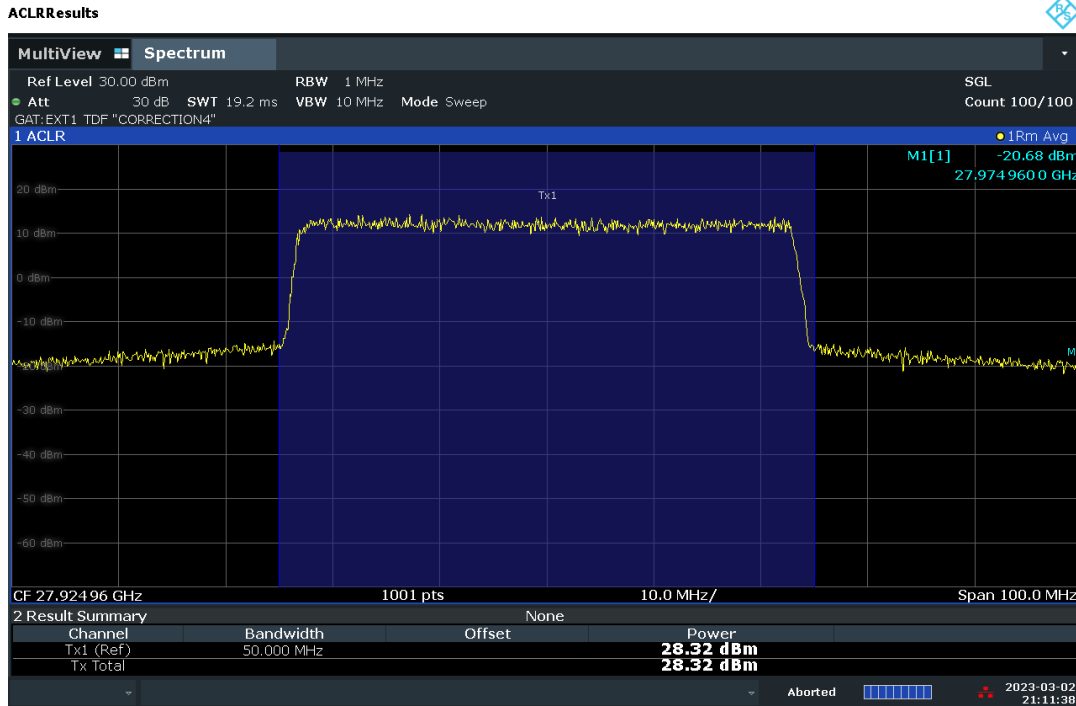
Plot 7-43. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-1CC – QPSK – Low Ch. – Full RB)



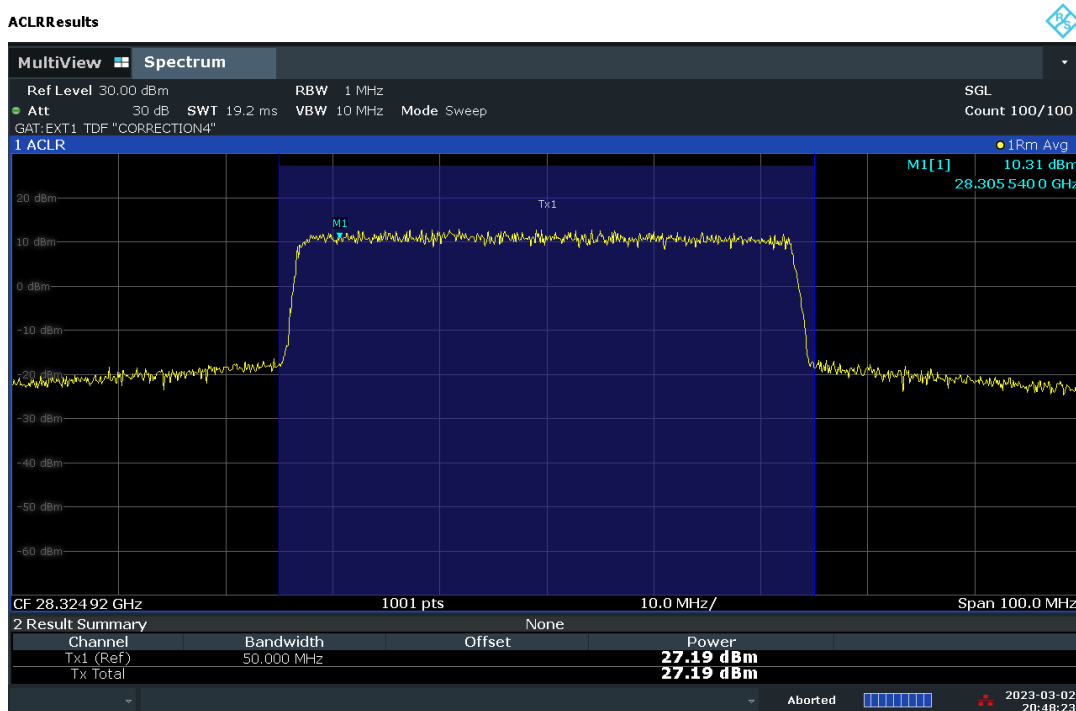
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Plot 7-44. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-1CC – QPSK – Low Ch. – 1RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-45. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-1CC – QPSK – Mid Ch. – Full RB)

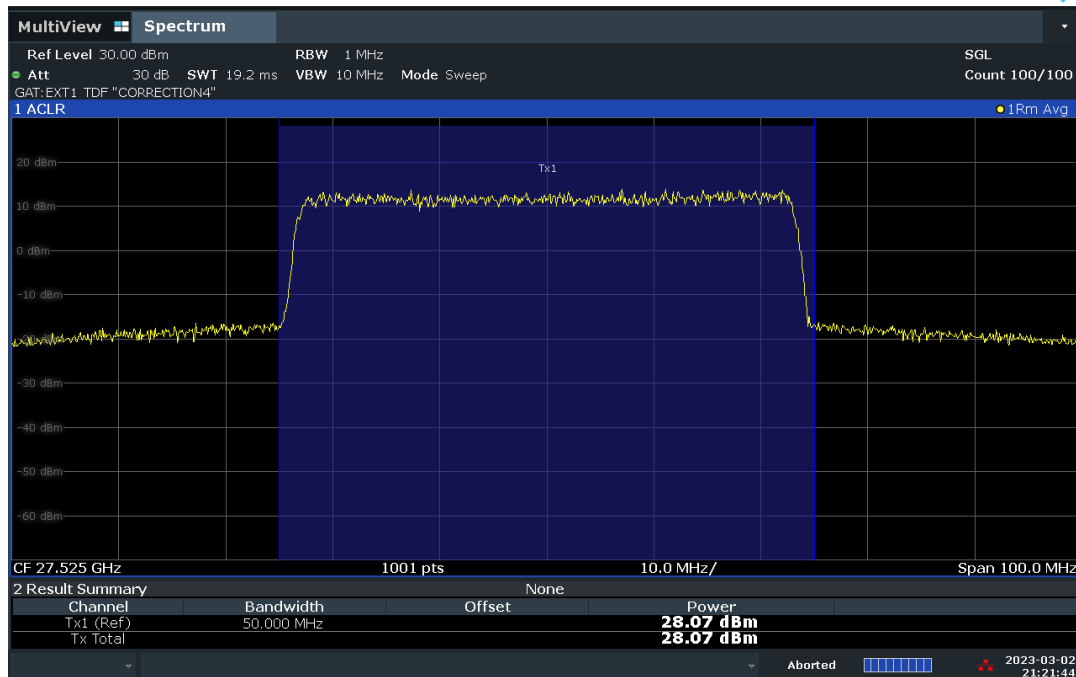


Plot 7-46. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-1CC – QPSK – High Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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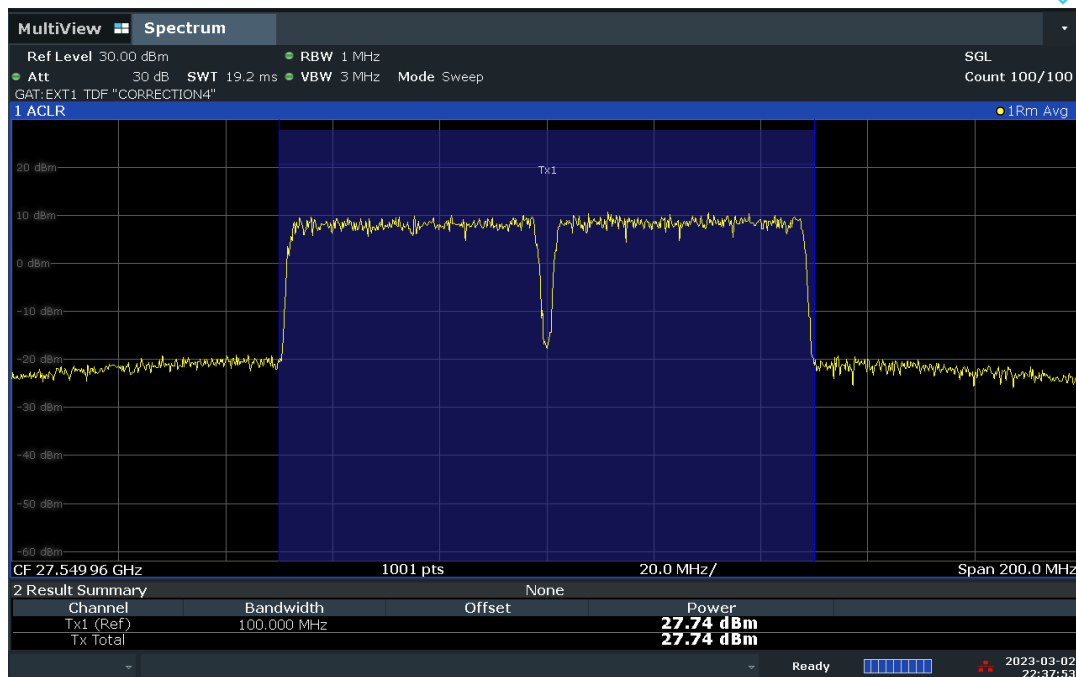
ACLRRResults



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Plot 7-47. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-1CC – 16QAM – Low Ch. – Full RB)

ACLRRResults

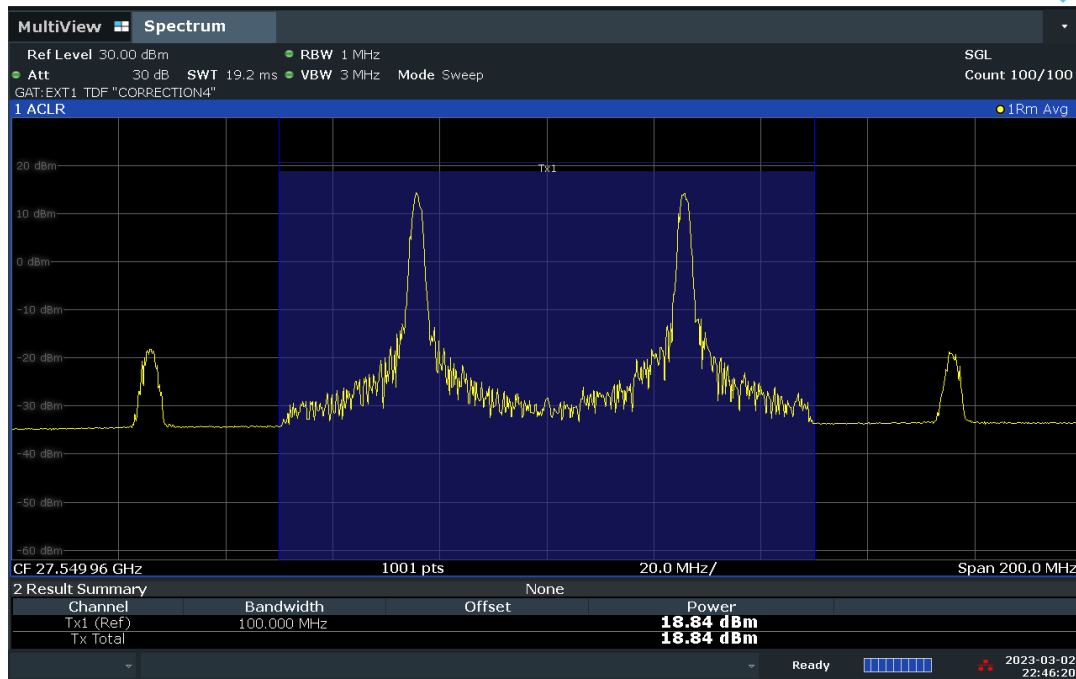


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Plot 7-48. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-2CC – QPSK – Low Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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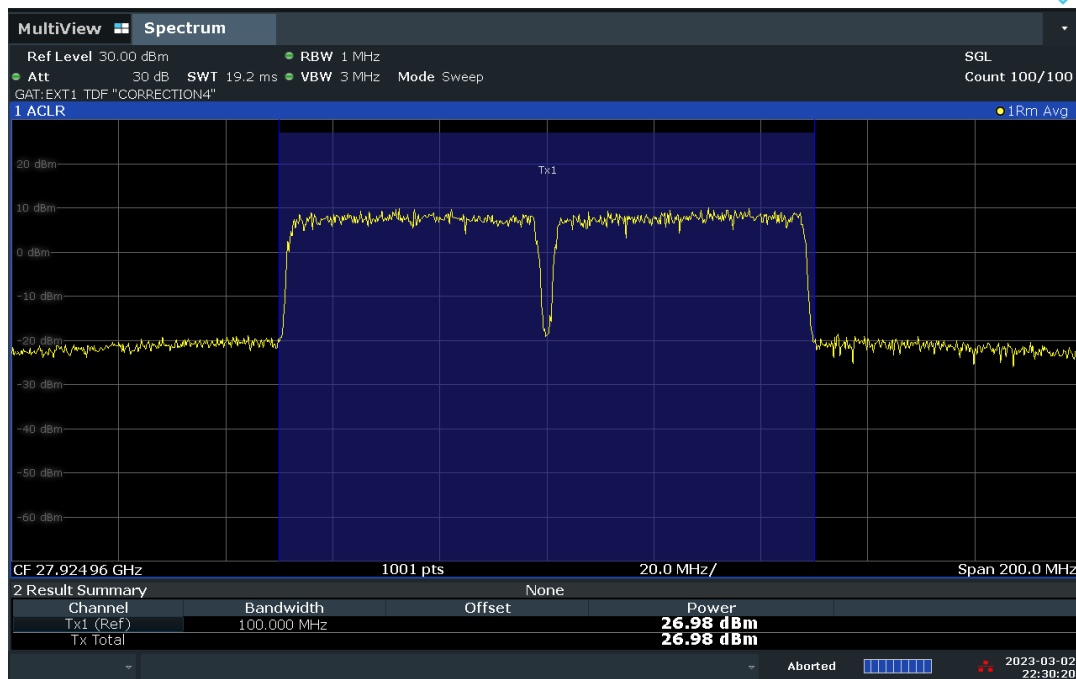
ACLRRResults



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Plot 7-49. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-2CC – QPSK – Low Ch. – 1RB)

ACLRRResults



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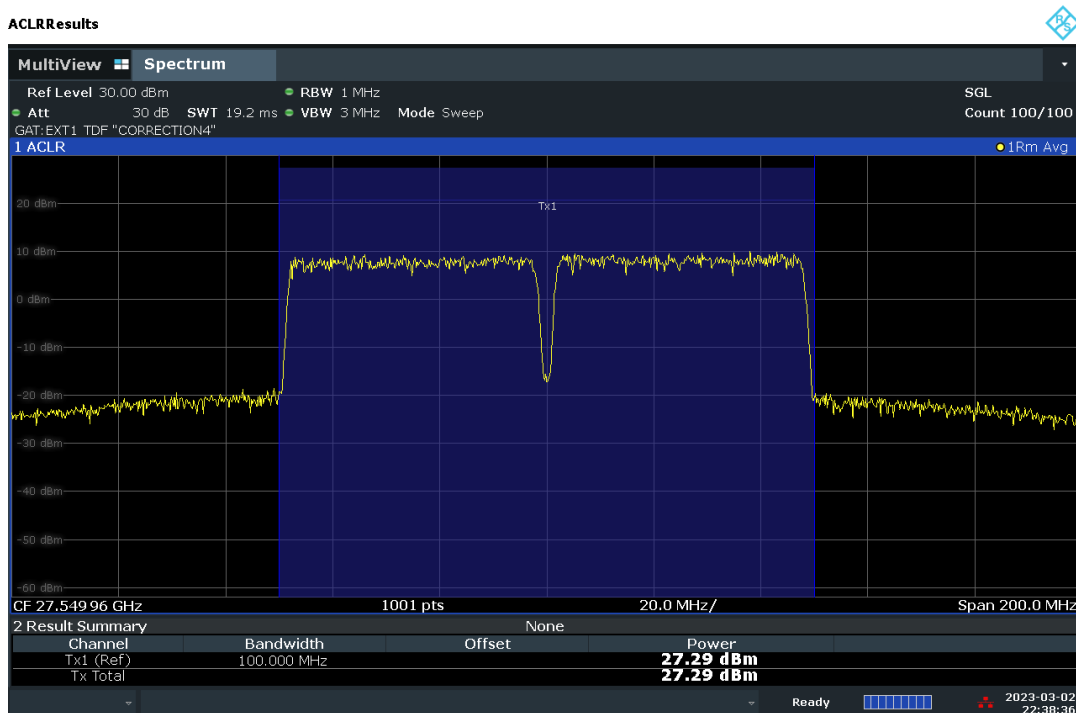
Plot 7-50. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-2CC – QPSK – Mid Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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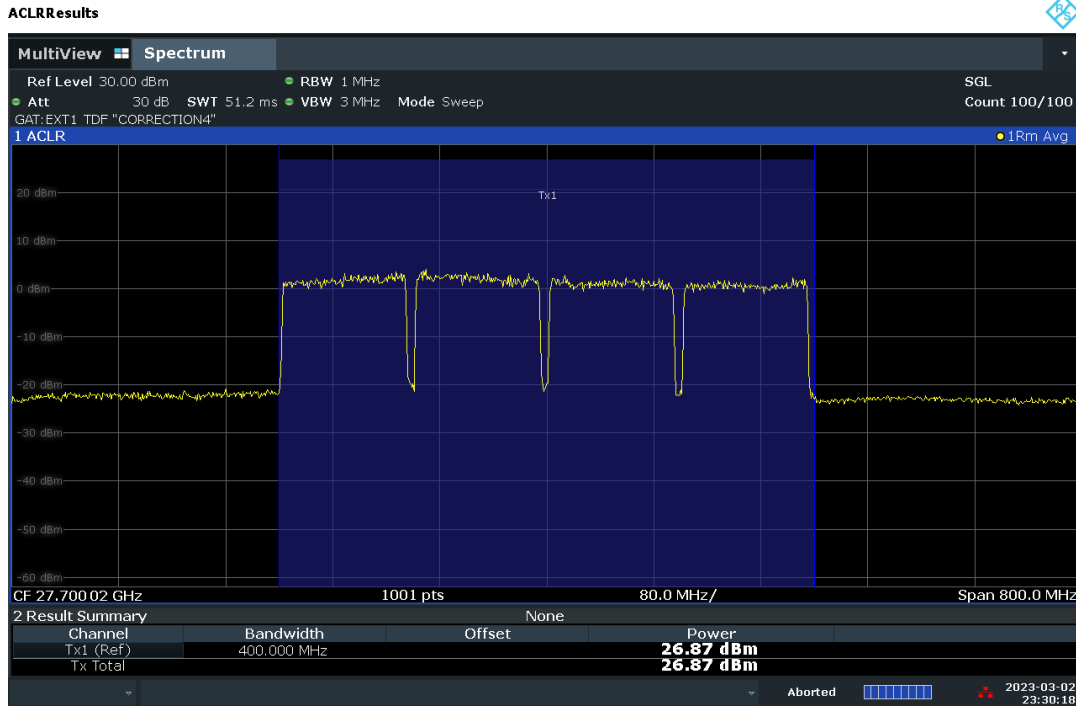
Plot 7-51. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-2CC – QPSK – High Ch. – Full RB)



10:38:37 PM 03/02/2023

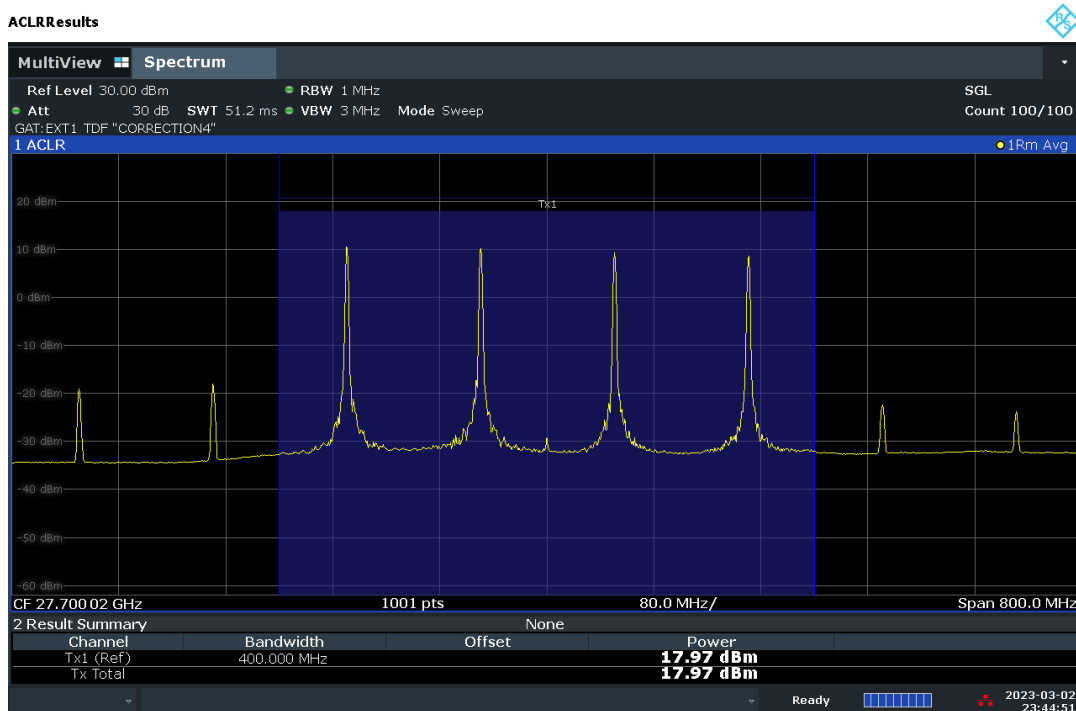
Plot 7-52. Conducted Power Plot – DFT-s – H-DL Polarization (50MHz-2CC – 16QAM – Low Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28	PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater
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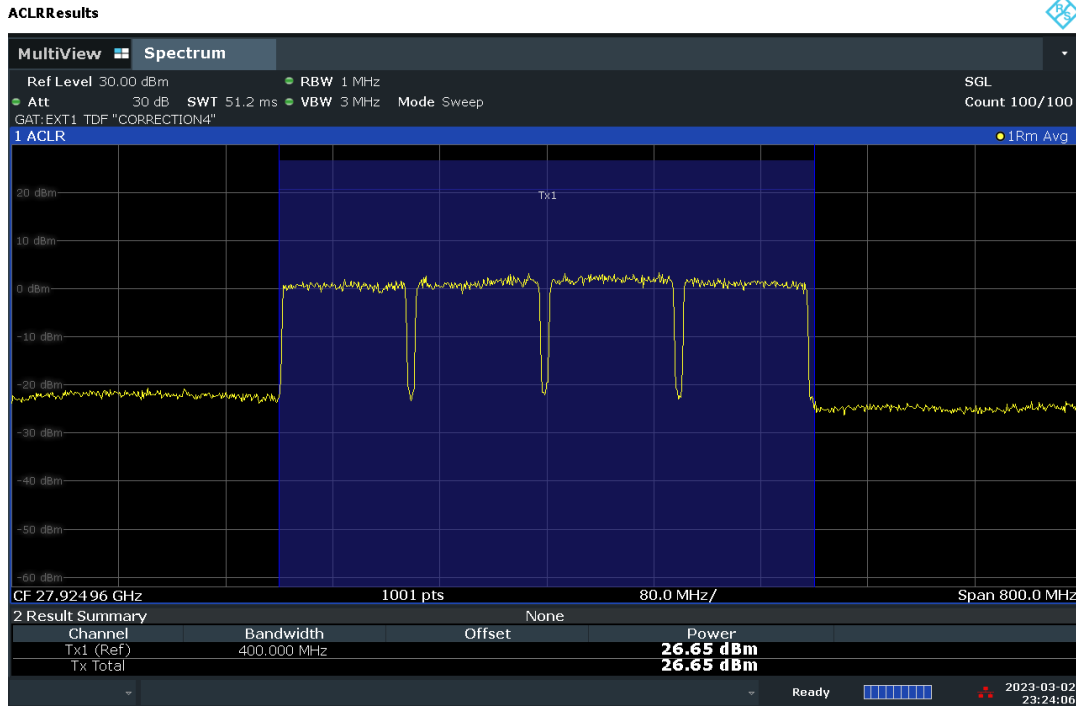
Plot 7-53. Conducted Power Plot – DFT-s – H-DL Polarization (100MHz-4CC – QPSK – Low Ch. – Full RB)



11:44:52 PM 03/02/2023

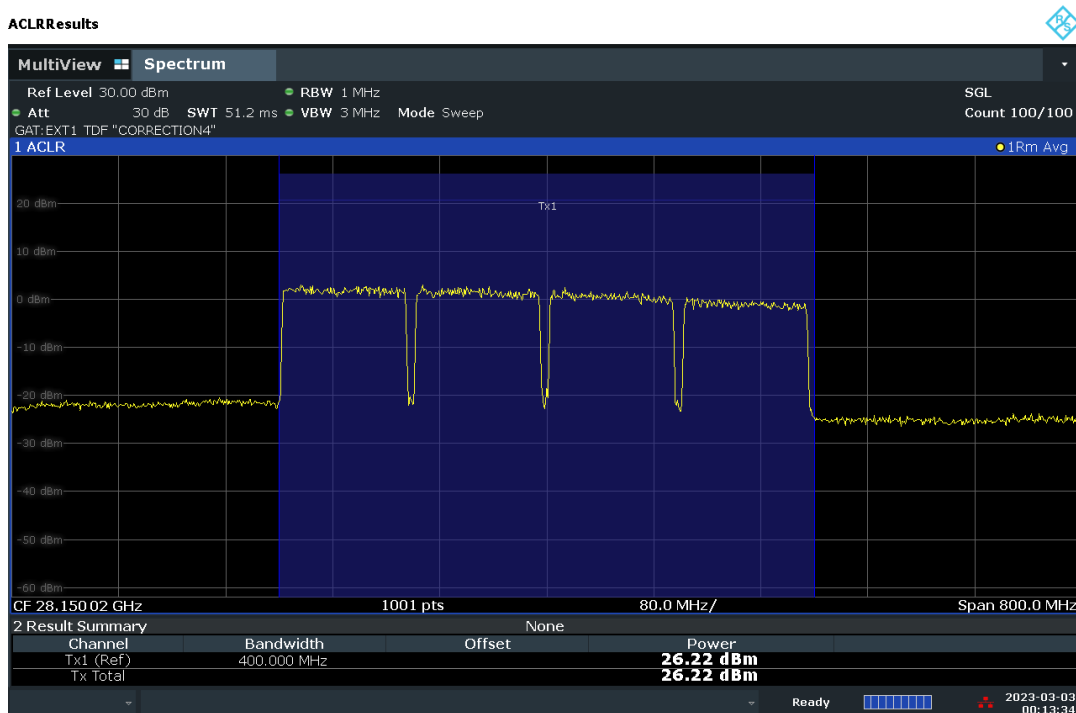
Plot 7-54. Conducted Power Plot – DFT-s – H-DL Polarization (100MHz-4CC – QPSK – Low Ch. – 1RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 60 of 129



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Plot 7-55. Conducted Power Plot – DFT-s – H-DL Polarization (100MHz-4CC – QPSK – Mid Ch. – Full RB)

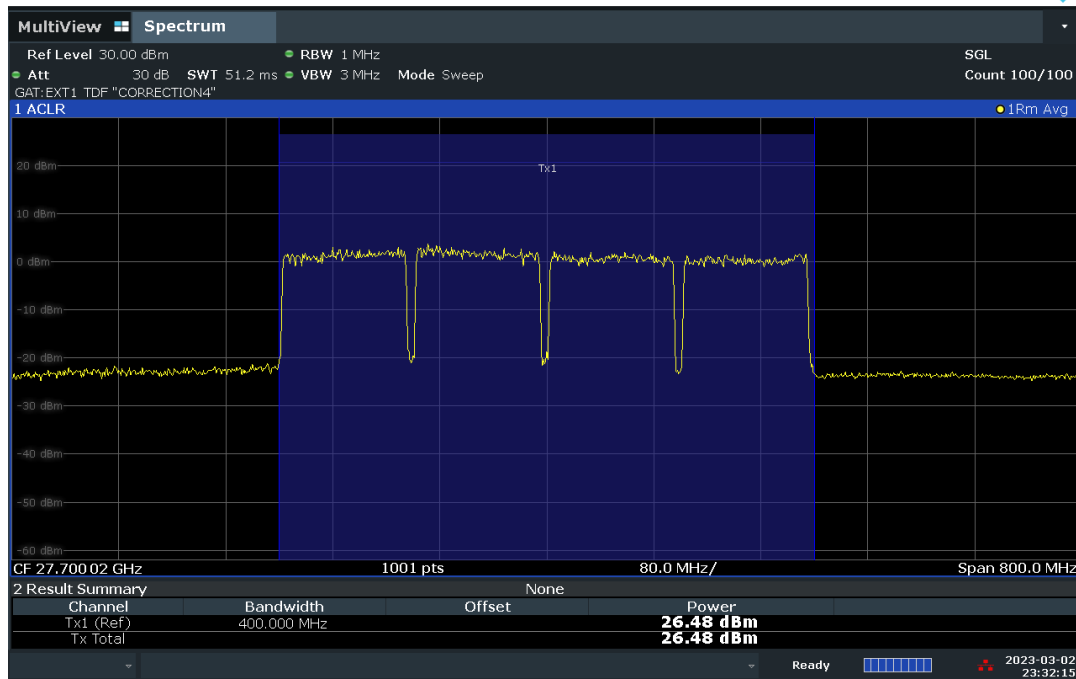


12:13:34 AM 03/03/2023

Plot 7-56. Conducted Power Plot – DFT-s – H-DL Polarization (100MHz-4CC – QPSK – High Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 61 of 129

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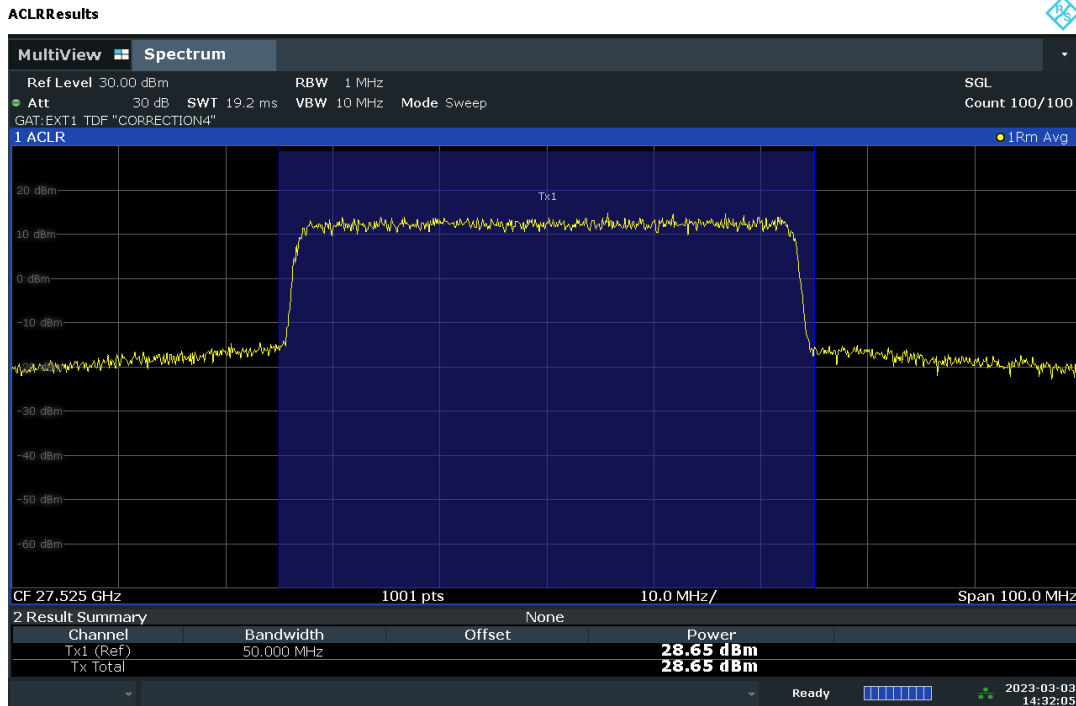


11:32:16 PM 03/02/2023

Plot 7-57. Conducted Power Plot – DFT-s – H-DL Polarization (100MHz-4CC – 16QAM – Low Ch. – Full RB)

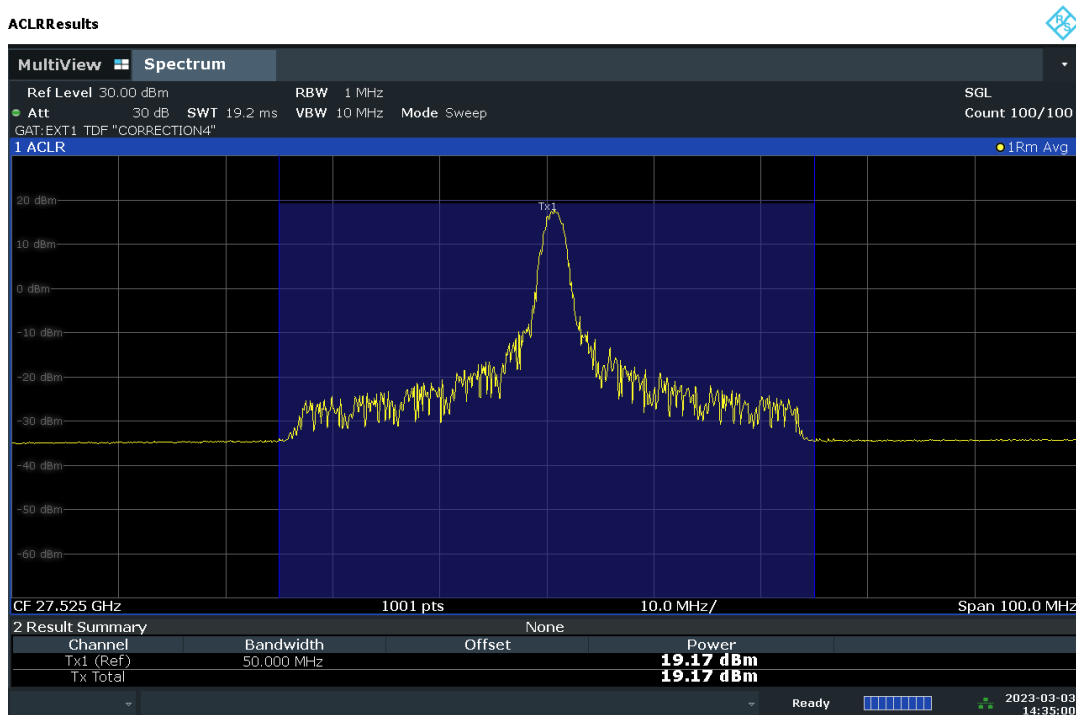
FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 62 of 129

## V-DL Polarization



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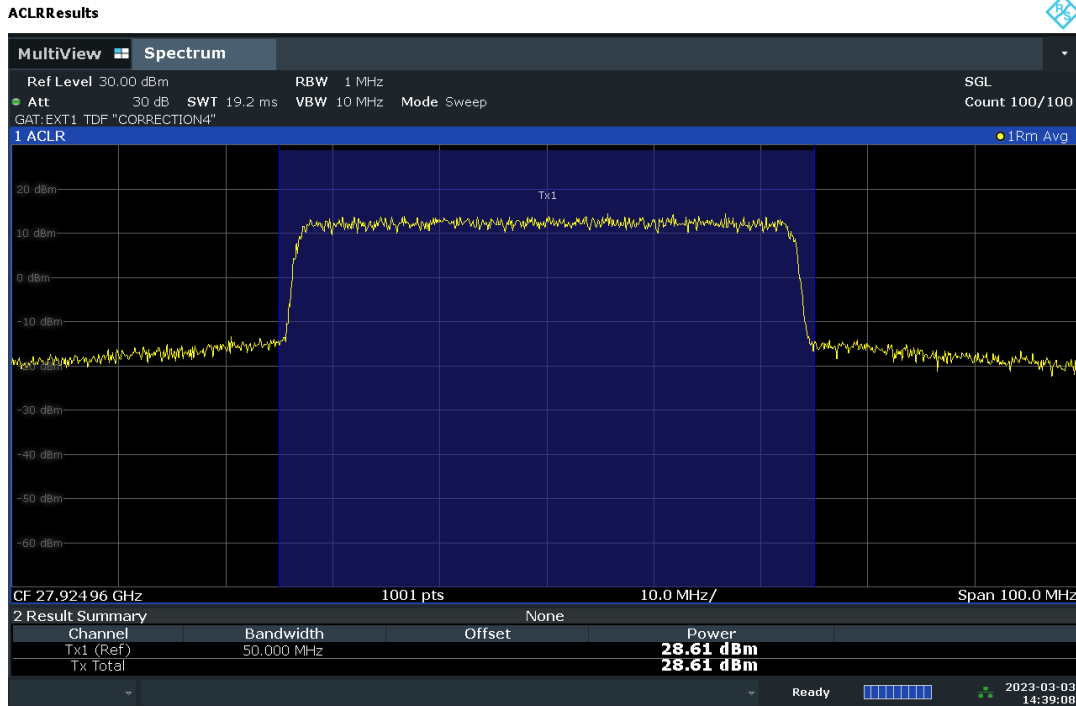
Plot 7-58. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-1CC – QPSK – Low Ch. – Full RB)



02:35:01 PM 03/03/2023

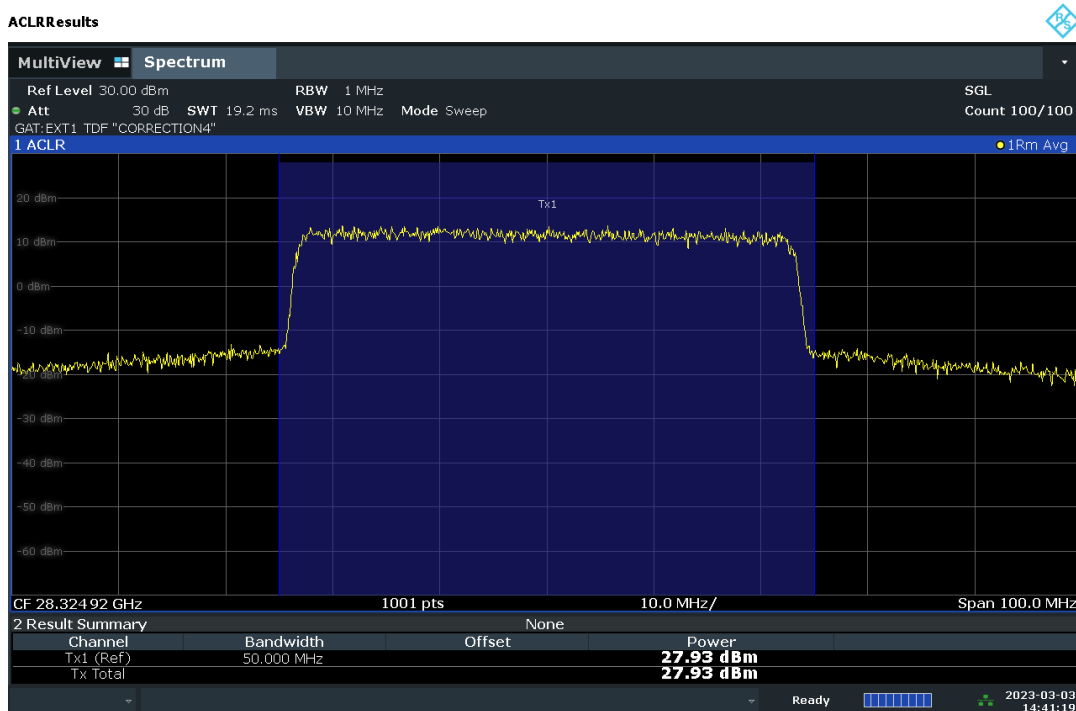
Plot 7-59. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-1CC – QPSK – Low Ch. – 1RB)

FCC ID: 2AUUV-5620-23-28	PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater
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02:39:08 PM 03/03/2023

Plot 7-60. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-1CC – QPSK – Mid Ch. – Full RB)



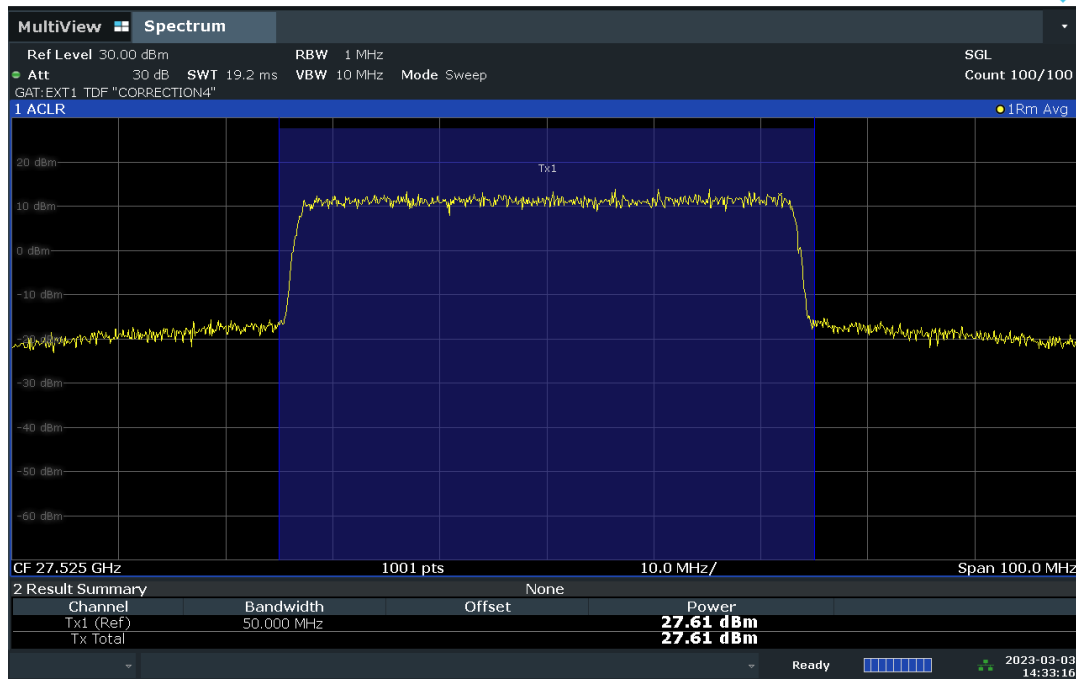
02:41:19 PM 03/03/2023

Plot 7-61. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-1CC – QPSK – High Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 64 of 129



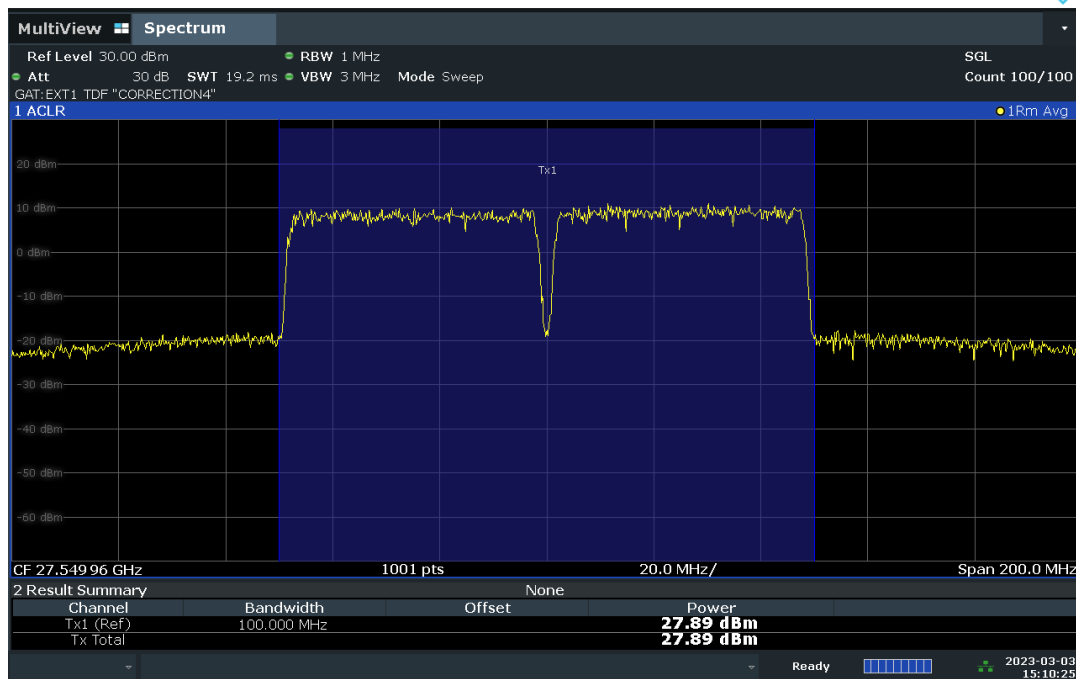
ACLRRResults



02:33:16 PM 03/03/2023

Plot 7-62. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-1CC – 16QAM – Low Ch. – Full RB)

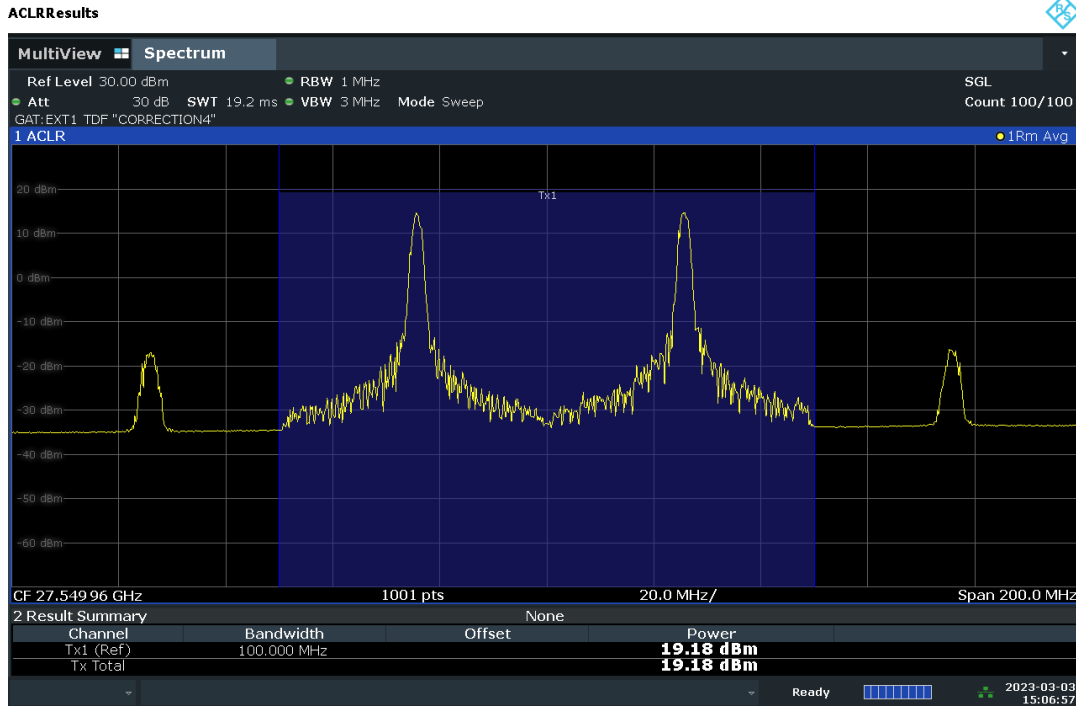
ACLRRResults



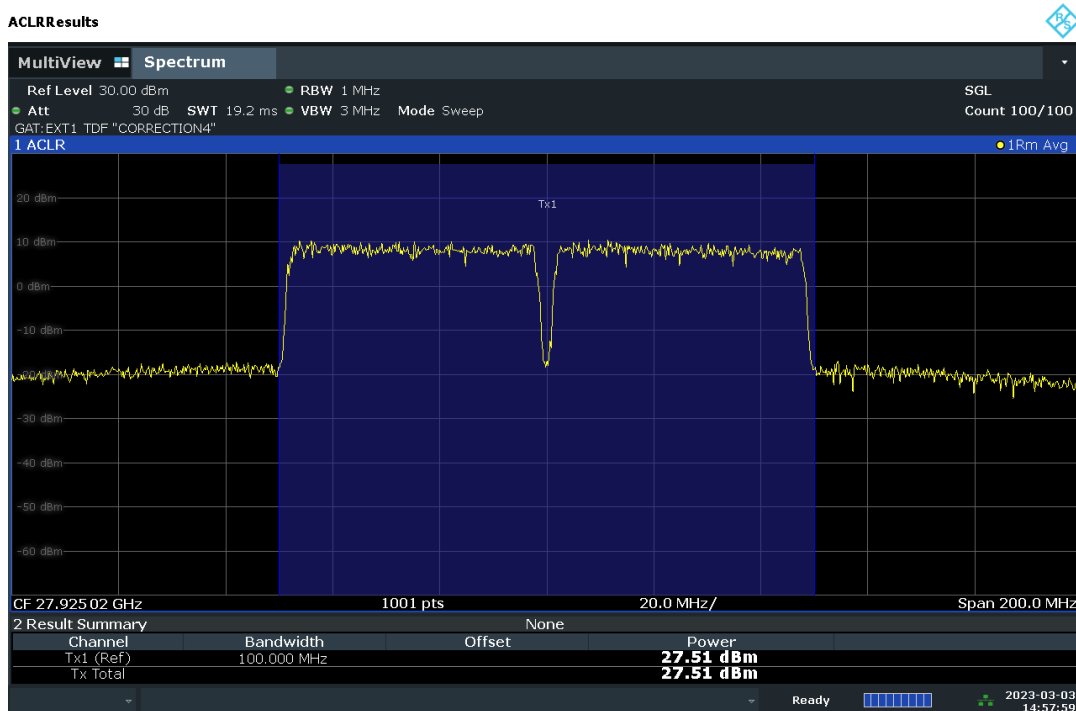
03:10:25 PM 03/03/2023

Plot 7-63. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-2CC – QPSK – Low Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 65 of 129



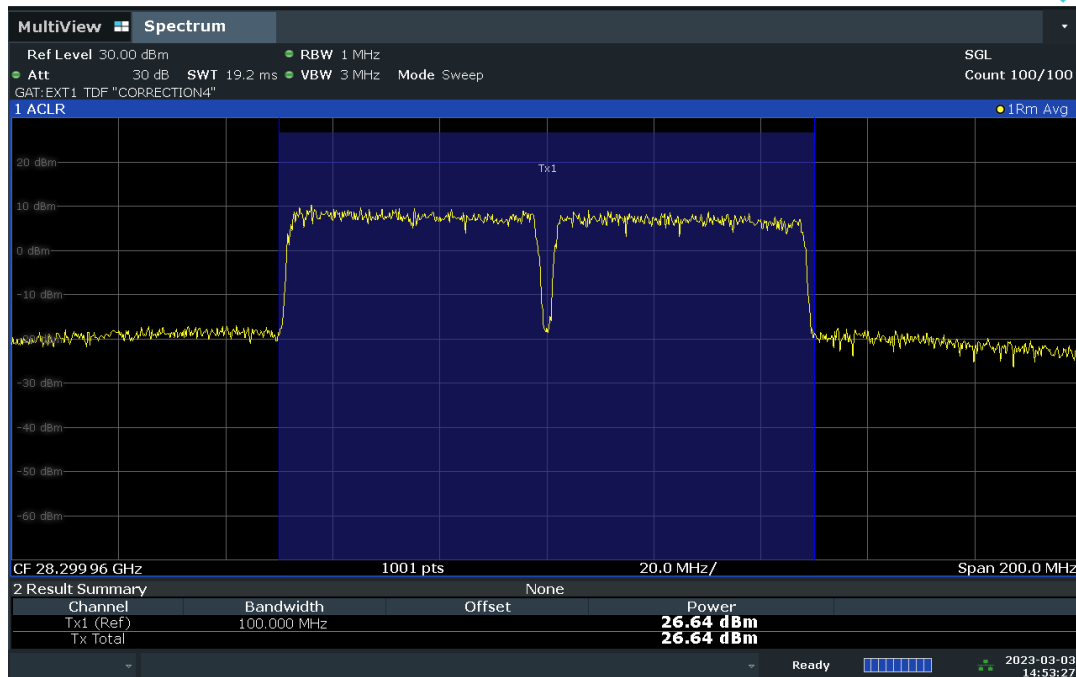
Plot 7-64. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-2CC – QPSK – Low Ch. – 1RB)



Plot 7-65. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-2CC – QPSK – Mid Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 66 of 129

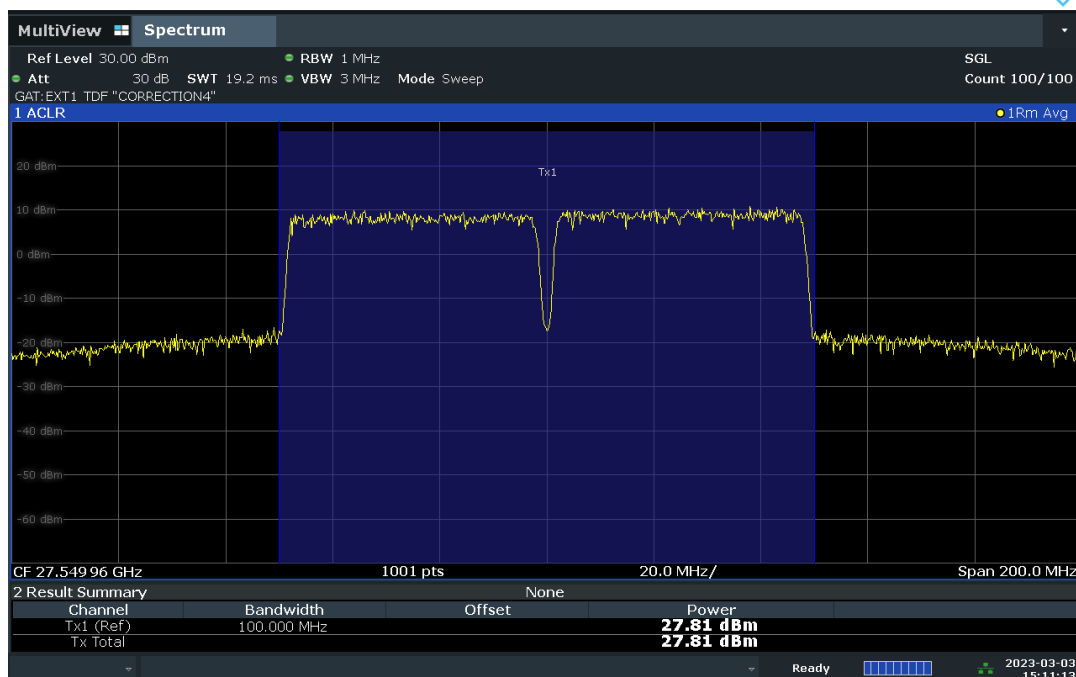
ACLRRResults



02:53:28 PM 03/03/2023

Plot 7-66. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-2CC – QPSK – High Ch. – Full RB)

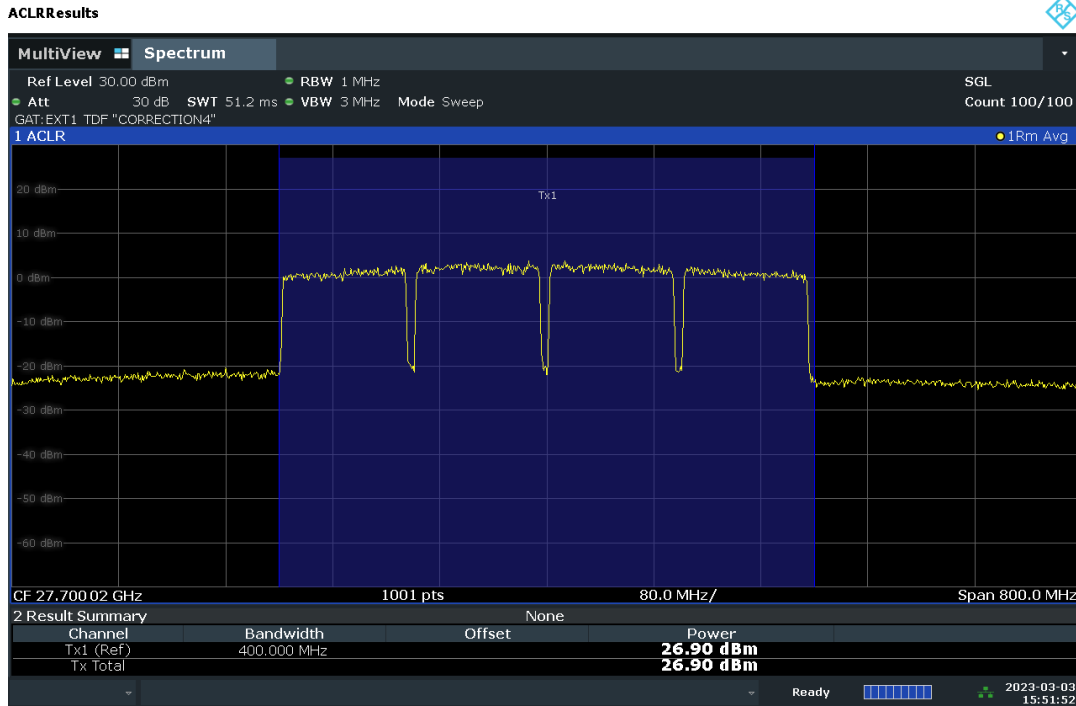
ACLRRResults



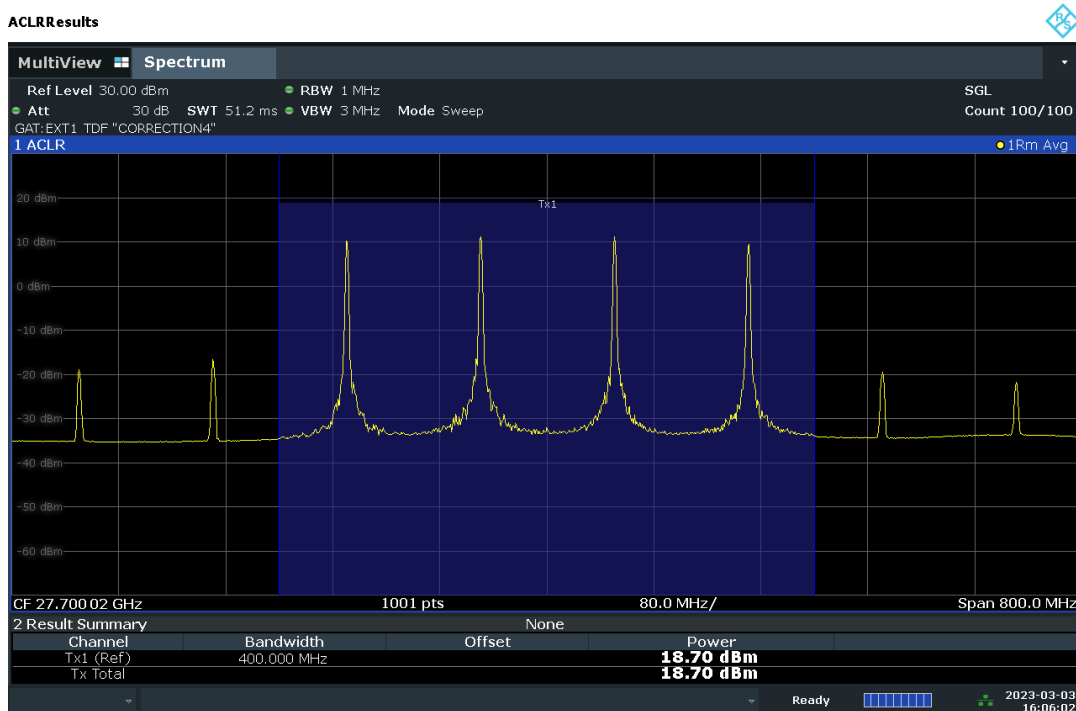
03:11:14 PM 03/03/2023

Plot 7-67. Conducted Power Plot – DFT-s – V-DL Polarization (50MHz-2CC – 16QAM – Low Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 67 of 129

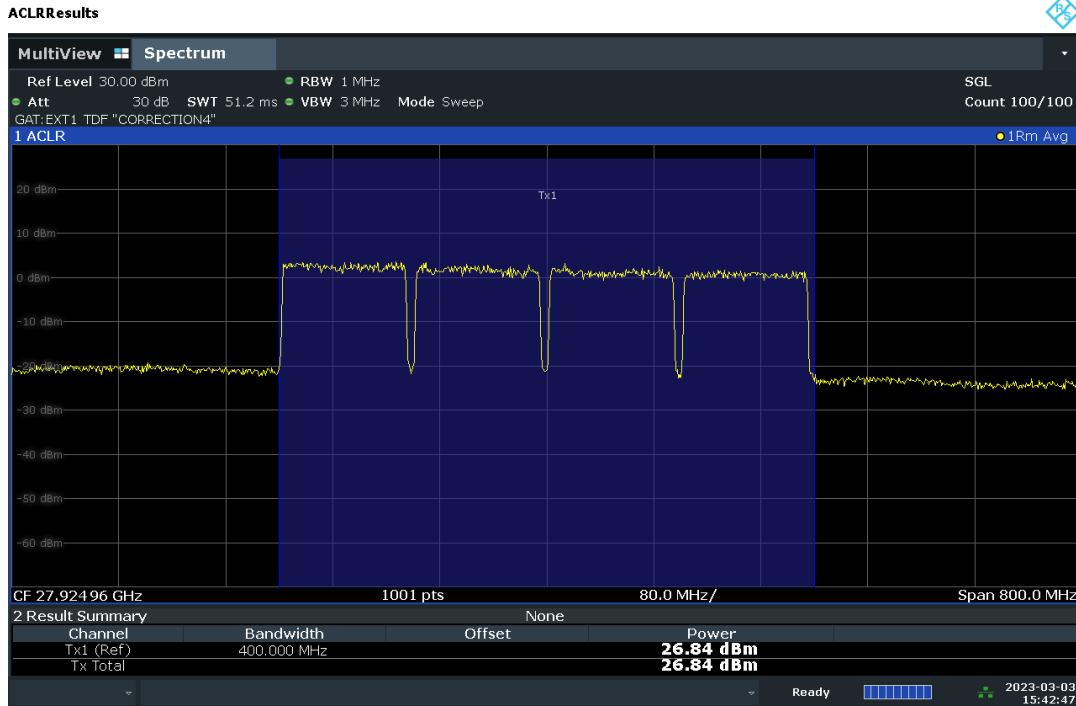


Plot 7-68. Conducted Power Plot – DFT-s – V-DL Polarization (100MHz-4CC – QPSK – Low Ch. – Full RB)



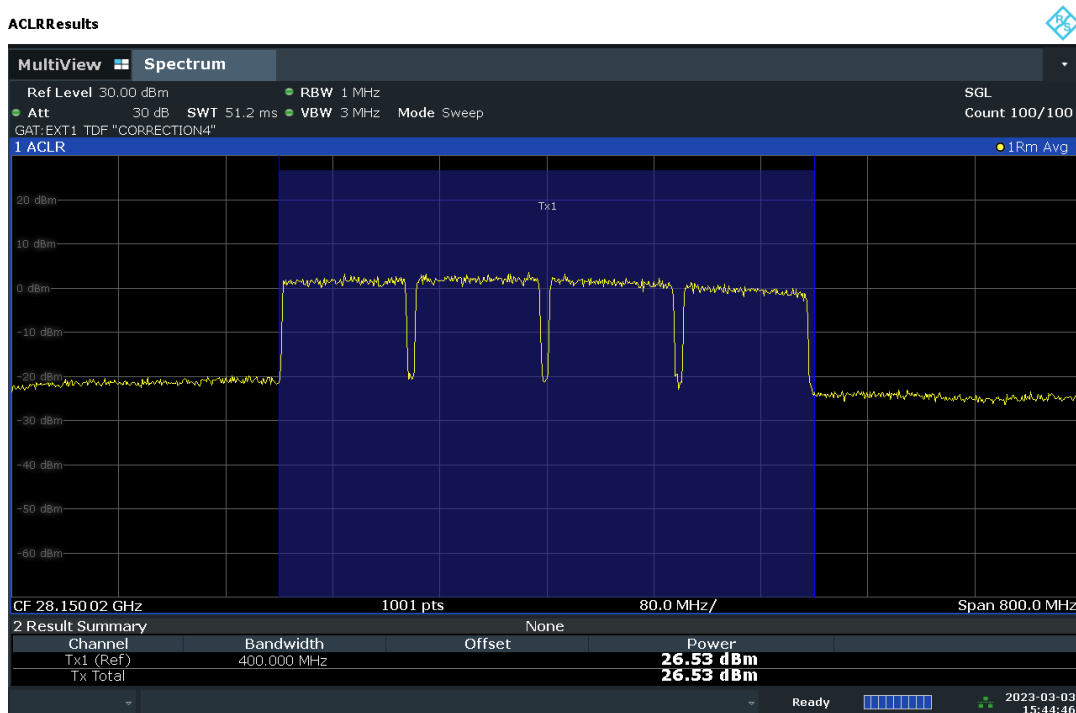
Plot 7-69. Conducted Power Plot – DFT-s – V-DL Polarization (100MHz-4CC – QPSK – Low Ch. – 1RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 68 of 129



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Plot 7-70. Conducted Power Plot – DFT-s – V-DL Polarization (100MHz-4CC – QPSK – Mid Ch. – Full RB)

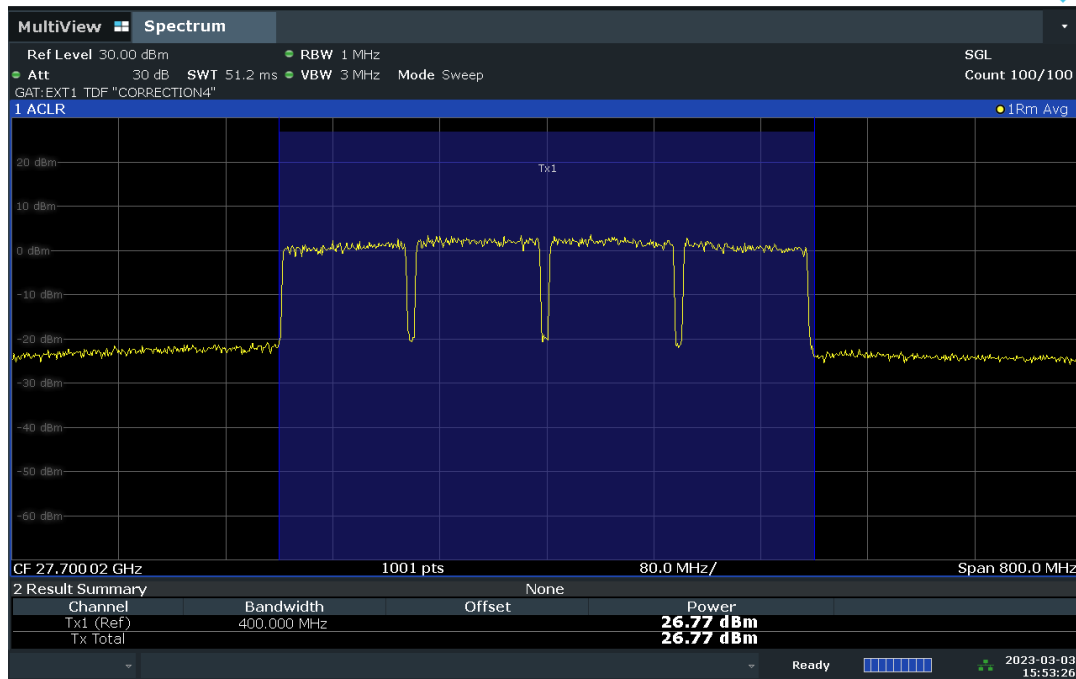


03:44:47 PM 03/03/2023

Plot 7-71. Conducted Power Plot – DFT-s – V-DL Polarization (100MHz-4CC – QPSK – High Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 69 of 129

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Plot 7-72. Conducted Power Plot – DFT-s – V-DL Polarization (100MHz-4CC – 16QAM – Low Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28	PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater
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## Band n261 – SU (CP-OFDM)

annel	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	27525.00	H-DL	CP-OFDM	QPSK	50	1	Full	20.21	13.00	33.21
Low	27525.00	H-DL	CP-OFDM	QPSK	50	1	1 / 16	16.70	13.00	29.70
Mid	27924.96	H-DL	CP-OFDM	QPSK	50	1	Full	19.68	13.00	32.68
High	28324.92	H-DL	CP-OFDM	QPSK	50	1	Full	18.56	13.00	31.56
Low	27525.00	H-DL	CP-OFDM	16-QAM	50	1	Full	20.19	13.00	33.19
Low	27549.96	H-DL	CP-OFDM	QPSK	50	2	Full	26.16	13.00	39.16
Low	27549.96	H-DL	CP-OFDM	QPSK	50	2	1 / 16	16.65	13.00	29.65
Mid	27924.96	H-DL	CP-OFDM	QPSK	50	2	Full	25.75	13.00	38.75
High	28299.96	H-DL	CP-OFDM	QPSK	50	2	Full	24.88	13.00	37.88
Low	27549.96	H-DL	CP-OFDM	16-QAM	50	2	Full	26.15	13.00	39.15
Low	27700.02	H-DL	CP-OFDM	QPSK	100	4	Full	26.42	13.00	39.42
Low	27700.02	H-DL	CP-OFDM	QPSK	100	4	1 / 33	17.20	13.00	30.20
Mid	27924.96	H-DL	CP-OFDM	QPSK	100	4	Full	26.33	13.00	39.33
High	28150.02	H-DL	CP-OFDM	QPSK	100	4	Full	26.12	13.00	39.12
Low	27700.02	H-DL	CP-OFDM	16-QAM	100	4	Full	26.41	13.00	39.41


Table 7-17. NR Band n261 - Conducted Power and EIRP – CP – H-DL 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	27525.00	V-DL	CP-OFDM	QPSK	50	1	Full	20.31	13.00	33.31
Low	27525.00	V-DL	CP-OFDM	QPSK	50	1	1 / 16	16.64	13.00	29.64
Mid	27924.96	V-DL	CP-OFDM	QPSK	50	1	Full	20.16	13.00	33.16
High	28324.92	V-DL	CP-OFDM	QPSK	50	1	Full	19.71	13.00	32.71
Low	27525.00	V-DL	CP-OFDM	16-QAM	50	1	Full	20.27	13.00	33.27
Low	27549.96	V-DL	CP-OFDM	QPSK	50	2	Full	26.96	13.00	39.96
Low	27549.96	V-DL	CP-OFDM	QPSK	50	2	1 / 16	16.30	13.00	29.30
Mid	27924.96	V-DL	CP-OFDM	QPSK	50	2	Full	26.63	13.00	39.63
High	28299.96	V-DL	CP-OFDM	QPSK	50	2	Full	26.23	13.00	39.23
Low	27549.96	V-DL	CP-OFDM	16-QAM	50	2	Full	26.64	13.00	39.64
Low	27700.02	V-DL	CP-OFDM	QPSK	100	4	Full	26.78	13.00	39.78
Low	27700.02	V-DL	CP-OFDM	QPSK	100	4	1 / 33	17.91	13.00	30.91
Mid	27924.96	V-DL	CP-OFDM	QPSK	100	4	Full	26.74	13.00	39.74
High	28150.02	V-DL	CP-OFDM	QPSK	100	4	Full	26.35	13.00	39.35
Low	27700.02	V-DL	CP-OFDM	16-QAM	100	4	Full	26.68	13.00	39.68

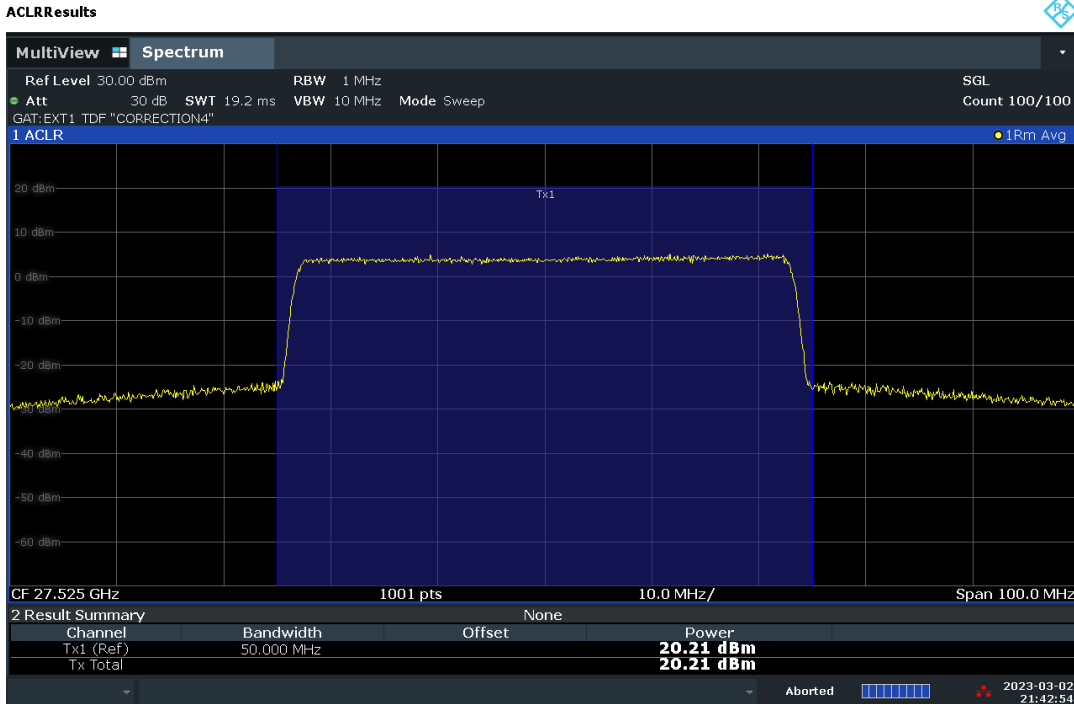
Table 7-18. NR Band n261 - Conducted Power and EIRP – CP – V-DL Polarization

Channel	Center Frequency [MHz]	Ant. Pol.	Transmission Scheme	Modulation	Bandwidth [MHz]	# of Carriers [CCs]	RB Size/Offset	MIMO Conducted Power [dBm]	Tx Ant Gain [dBi]	MIMO EIRP [dBm]
Low	27525.00	MIMO	CP-OFDM	QPSK	50	1	Full	23.27	13.00	36.27
Low	27525.00	MIMO	CP-OFDM	QPSK	50	1	1 / 16	19.68	13.00	32.68
Mid	27924.96	MIMO	CP-OFDM	QPSK	50	1	Full	22.94	13.00	35.94
High	28324.92	MIMO	CP-OFDM	QPSK	50	1	Full	22.18	13.00	35.18
Low	27525.00	MIMO	CP-OFDM	16-QAM	50	1	Full	23.24	13.00	36.24
Low	27549.96	MIMO	CP-OFDM	QPSK	50	2	Full	29.59	13.00	42.59
Low	27549.96	MIMO	CP-OFDM	QPSK	50	2	1 / 16	19.49	13.00	32.49
Mid	27924.96	MIMO	CP-OFDM	QPSK	50	2	Full	29.22	13.00	42.22
High	28299.96	MIMO	CP-OFDM	QPSK	50	2	Full	28.62	13.00	41.62
Low	27549.96	MIMO	CP-OFDM	16-QAM	50	2	Full	29.41	13.00	42.41
Low	27700.02	MIMO	CP-OFDM	QPSK	100	4	Full	29.61	13.00	42.61
Low	27700.02	MIMO	CP-OFDM	QPSK	100	4	1 / 33	20.58	13.00	33.58
Mid	27924.96	MIMO	CP-OFDM	QPSK	100	4	Full	29.55	13.00	42.55
High	28150.02	MIMO	CP-OFDM	QPSK	100	4	Full	29.25	13.00	42.25
Low	27700.02	MIMO	CP-OFDM	16-QAM	100	4	Full	29.56	13.00	42.56

Table 7-19. NR Band n261 - Conducted Power – CP – MIMO

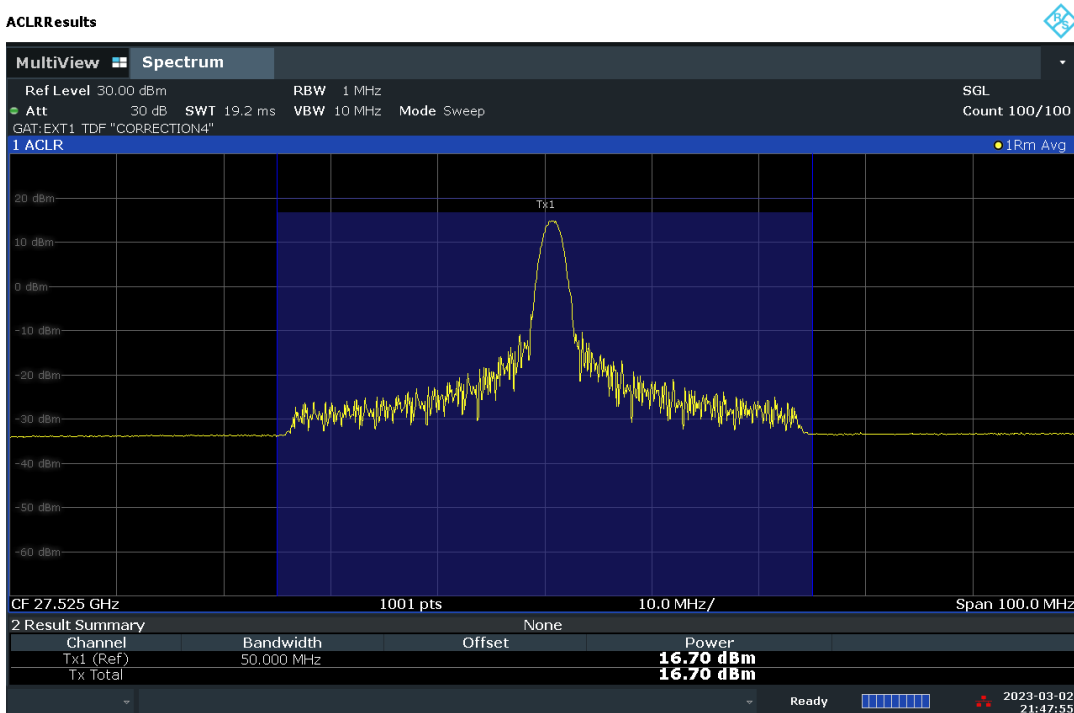
FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater		Page 71 of 129

## H-DL Polarization



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Plot 7-73. Conducted Power Plot – CP – H-DL Polarization (50MHz-1CC – QPSK – Low Ch. – Full RB)

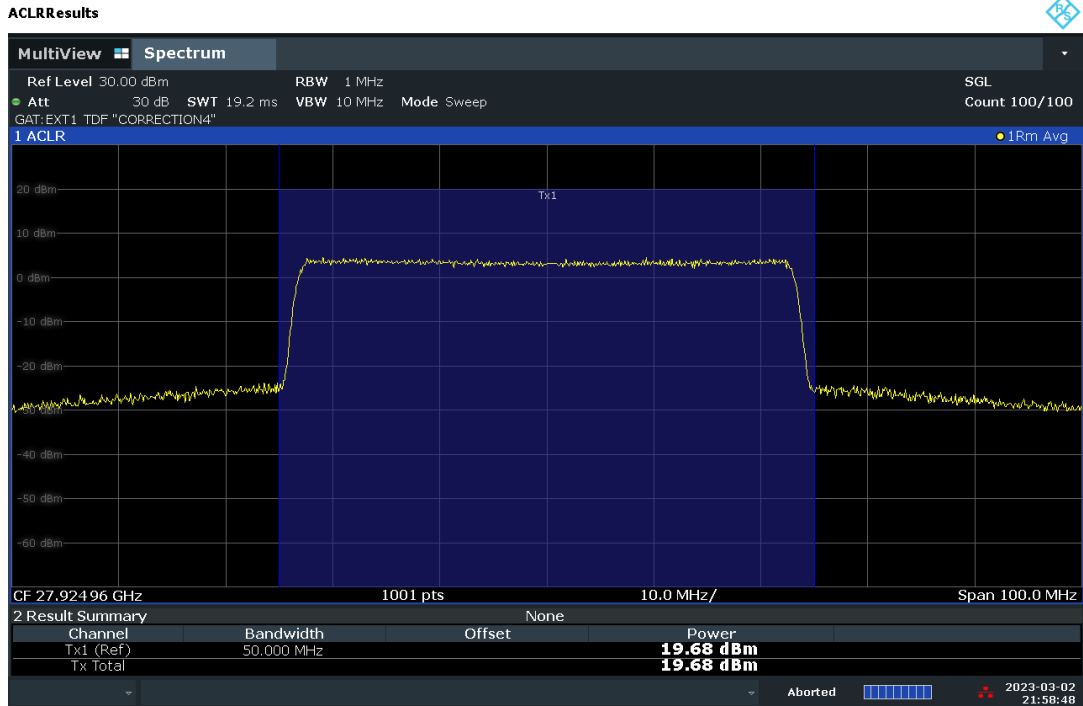


09:47:56 PM 03/02/2023

Plot 7-74. Conducted Power Plot – CP – H-DL Polarization (50MHz-1CC – QPSK – Low Ch. – 1RB)

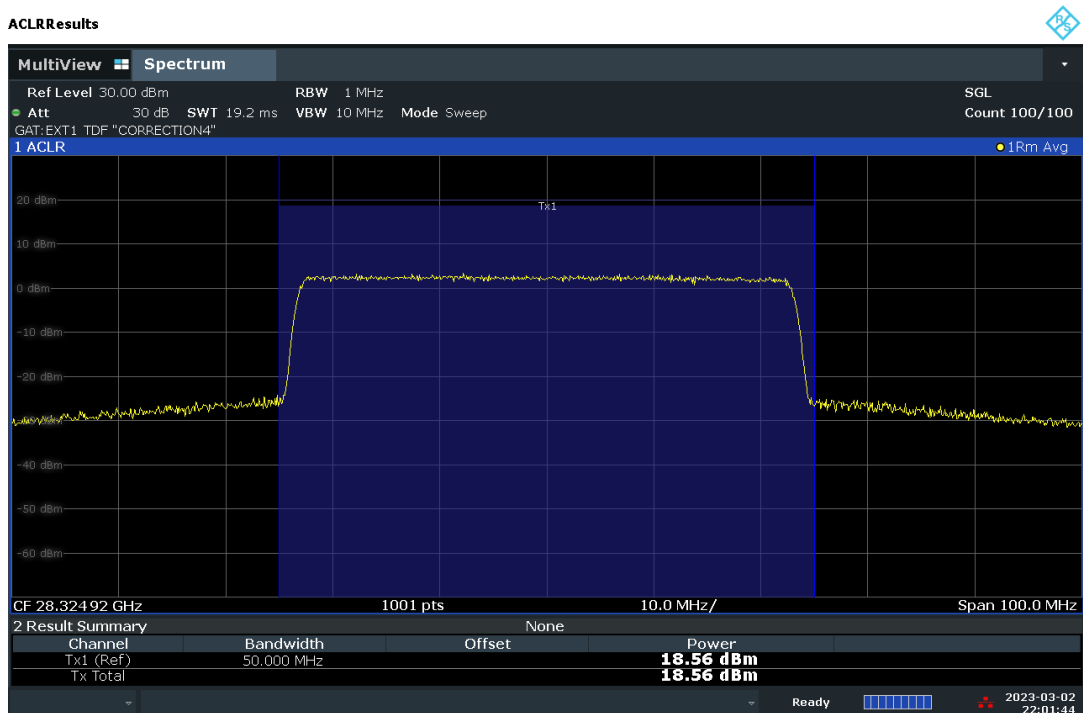
FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 72 of 129





09:58:48 PM 03/02/2023

Plot 7-75. Conducted Power Plot – CP – H-DL Polarization (50MHz-1CC – QPSK – Mid Ch. – Full RB)

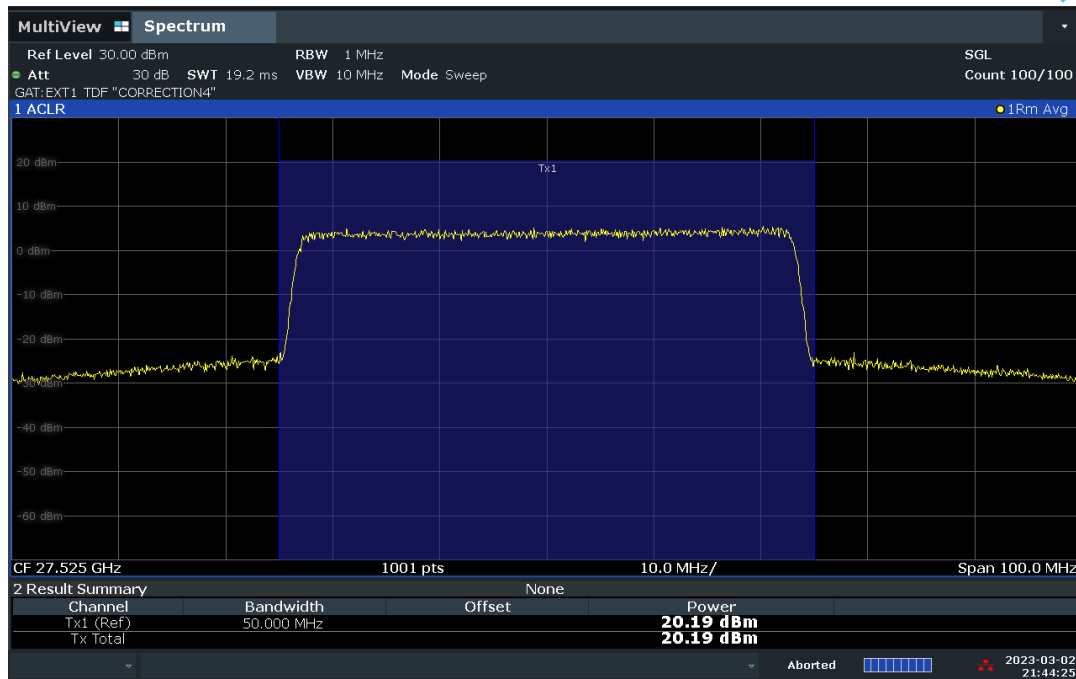


10:01:45 PM 03/02/2023

Plot 7-76. Conducted Power Plot – CP – H-DL Polarization (50MHz-1CC – QPSK – High Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 73 of 129

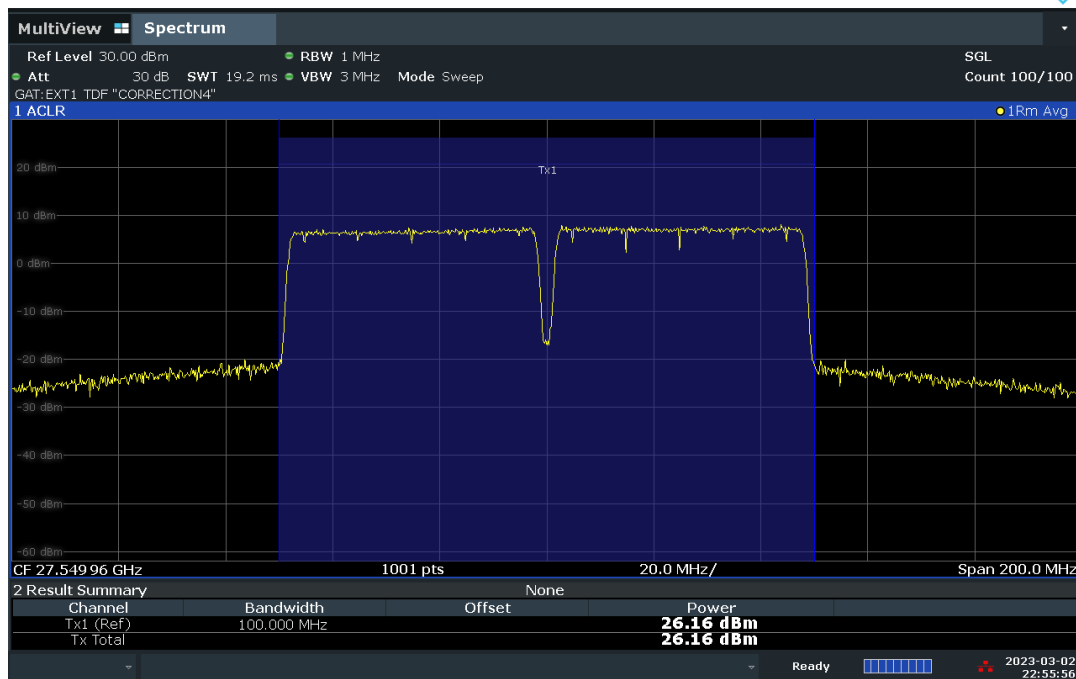
ACLRRResults



09:44:26 PM 03/02/2023

Plot 7-77. Conducted Power Plot – CP – H-DL Polarization (50MHz-1CC – 16QAM – Low Ch. – Full RB)

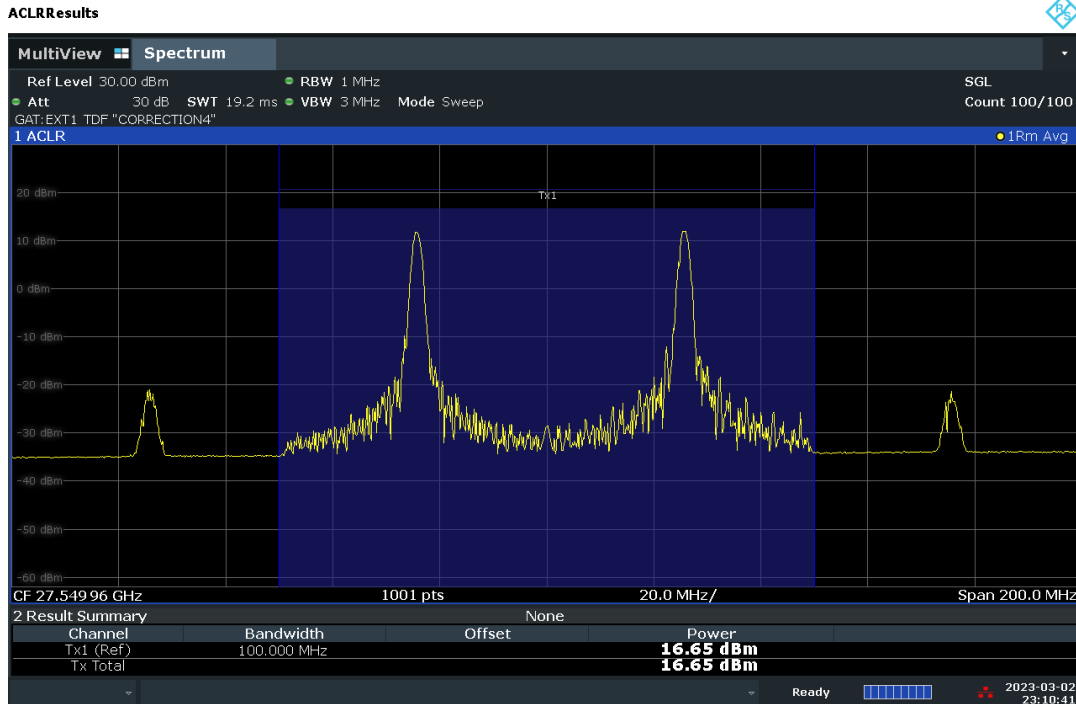
ACLRRResults



10:55:56 PM 03/02/2023

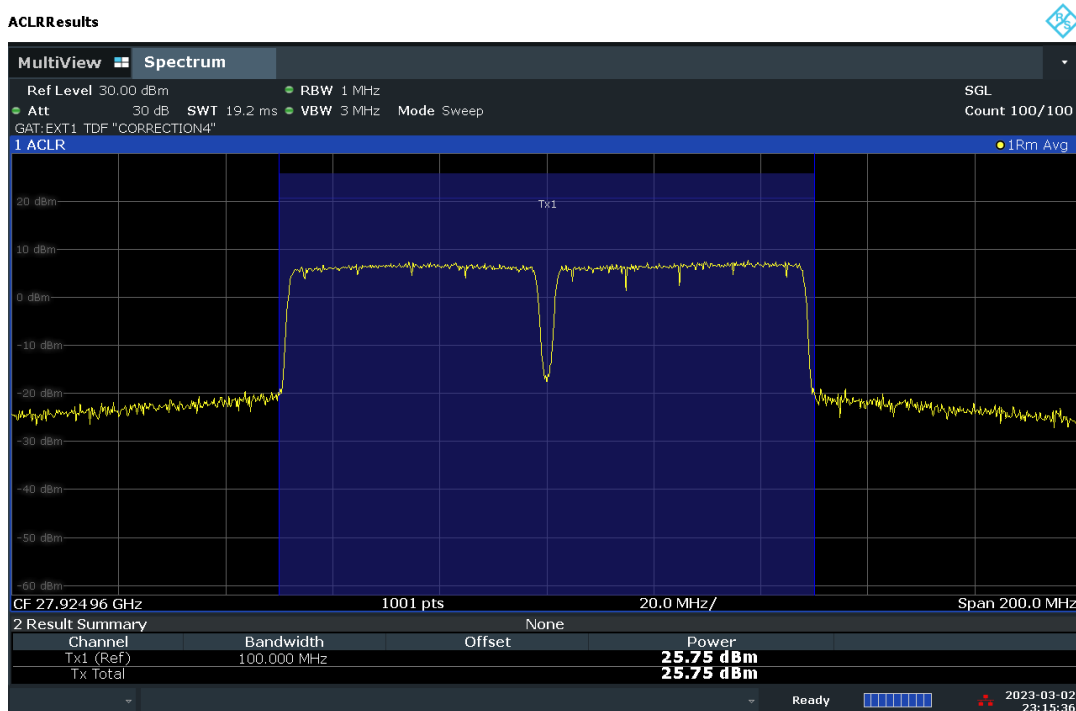
Plot 7-78. Conducted Power Plot – CP – H-DL Polarization (50MHz-2CC – QPSK – Low Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 74 of 129



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Plot 7-79. Conducted Power Plot – CP – H-DL Polarization (50MHz-2CC – QPSK – Low Ch. – 1RB)

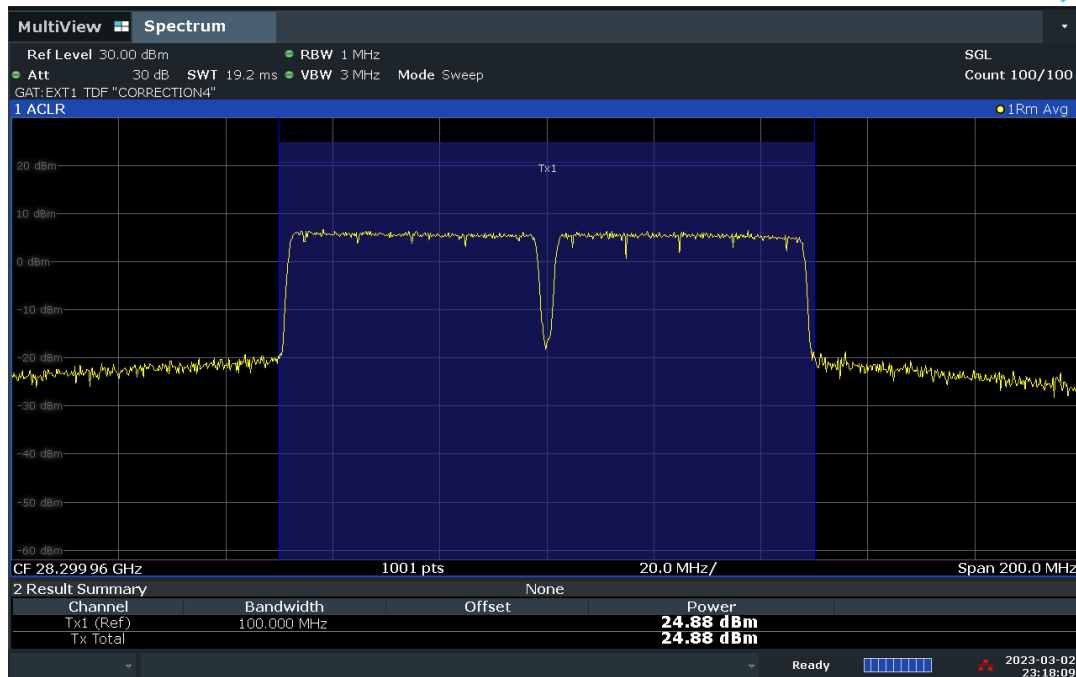


11:15:36 PM 03/02/2023

Plot 7-80. Conducted Power Plot – CP – H-DL Polarization (50MHz-2CC – QPSK – Mid Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 75 of 129

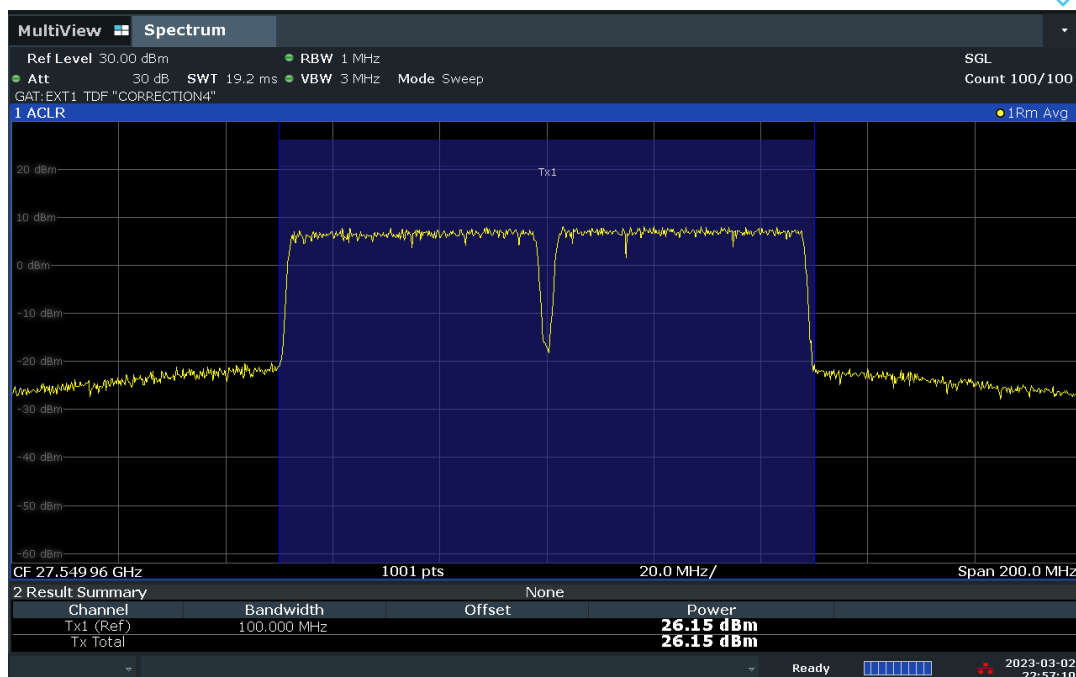
ACLRRResults



11:18:10 PM 03/02/2023

Plot 7-81. Conducted Power Plot – CP – H-DL Polarization (50MHz-2CC – QPSK – High Ch. – Full RB)

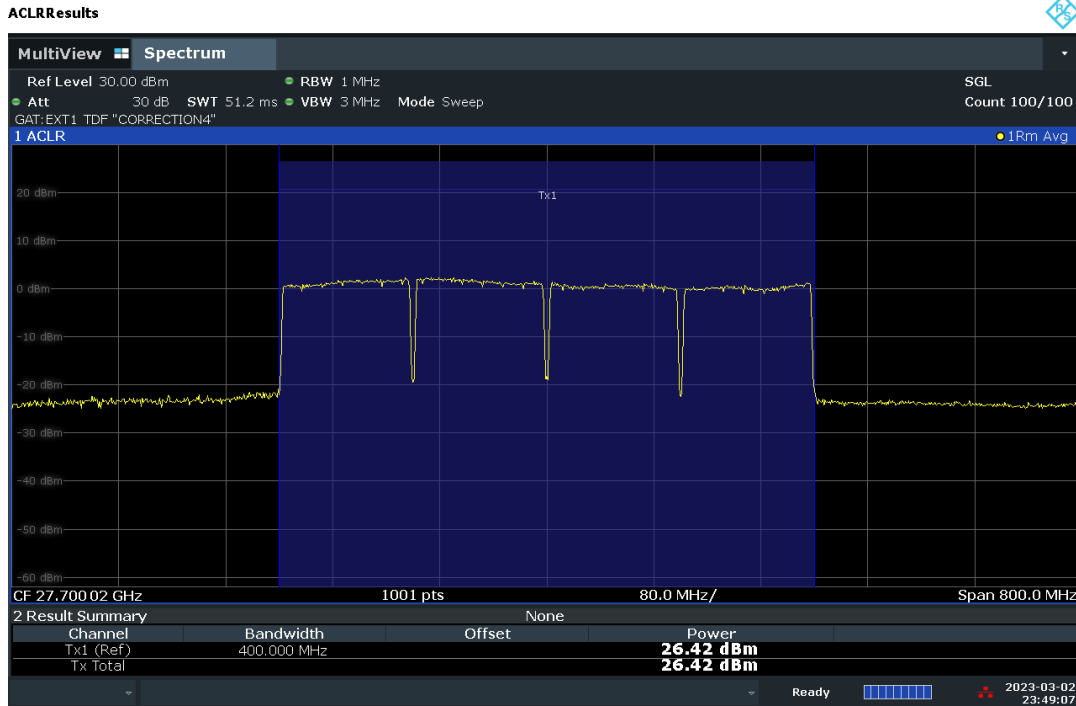
ACLRRResults



10:57:10 PM 03/02/2023

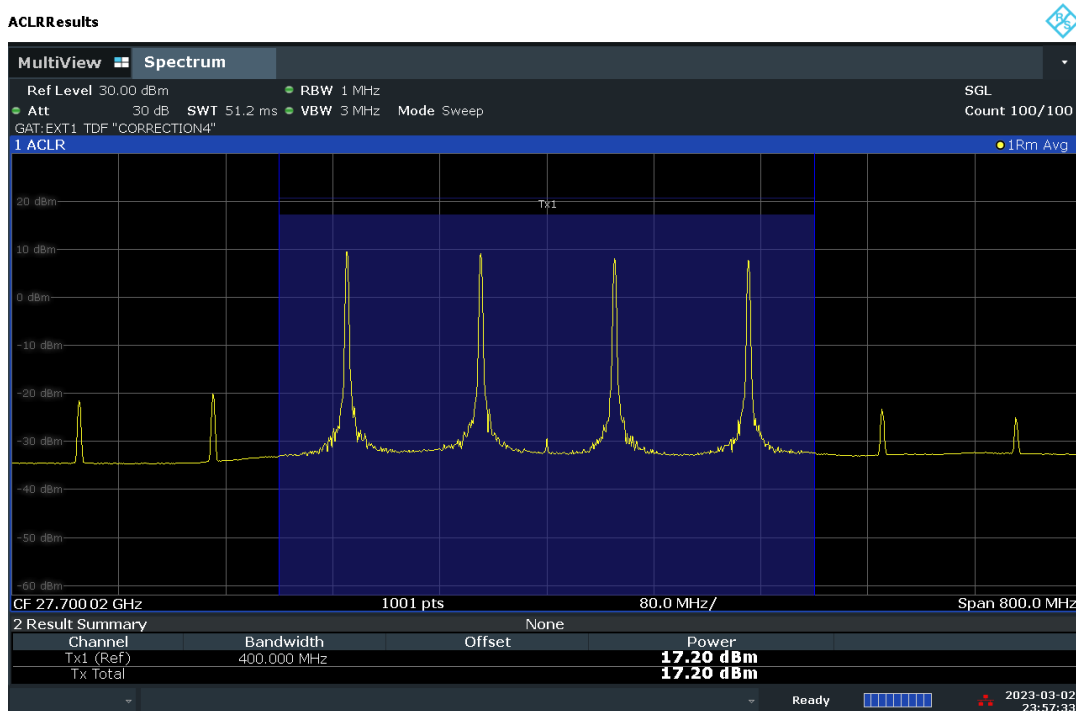
Plot 7-82. Conducted Power Plot – CP – H-DL Polarization (50MHz-2CC – 16QAM – Low Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 76 of 129



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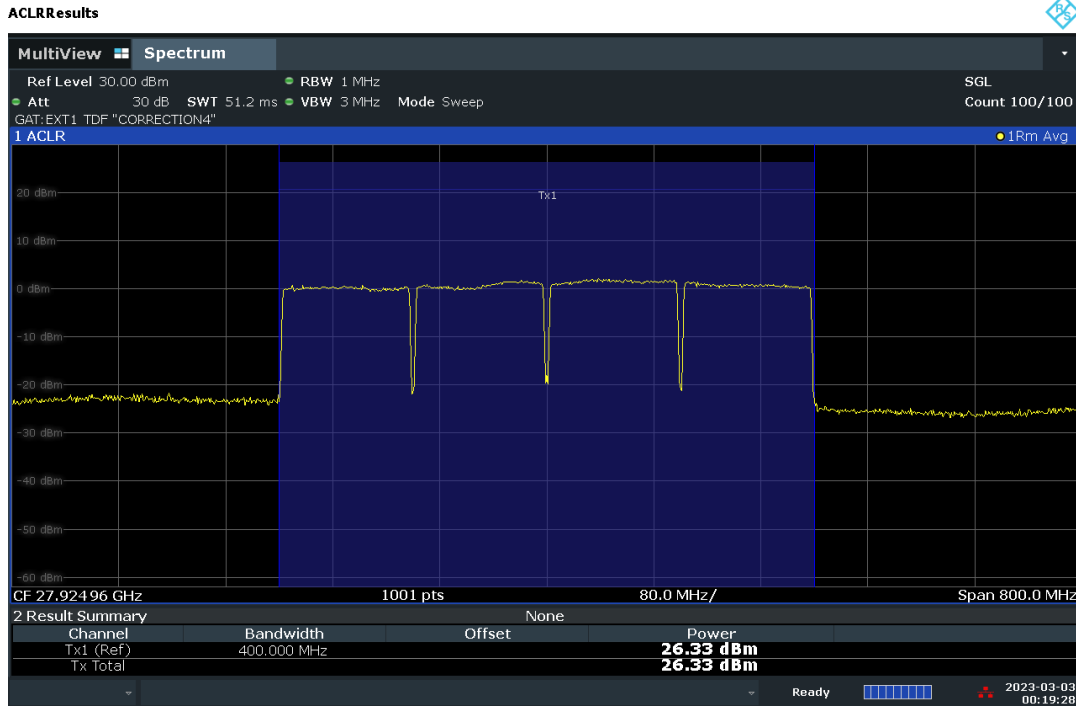
Plot 7-83. Conducted Power Plot – CP – H-DL Polarization (100MHz-4CC – QPSK – Low Ch. – Full RB)



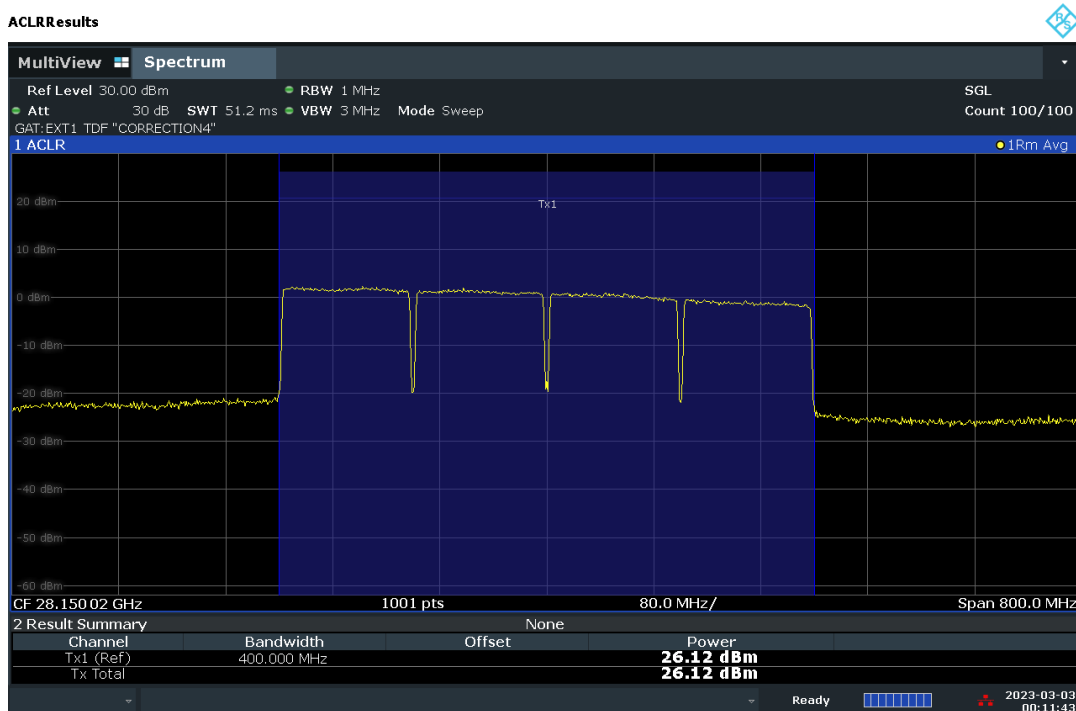
11:57:33 PM 03/02/2023

Plot 7-84. Conducted Power Plot – CP – H-DL Polarization (100MHz-4CC – QPSK – Low Ch. – 1RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 77 of 129



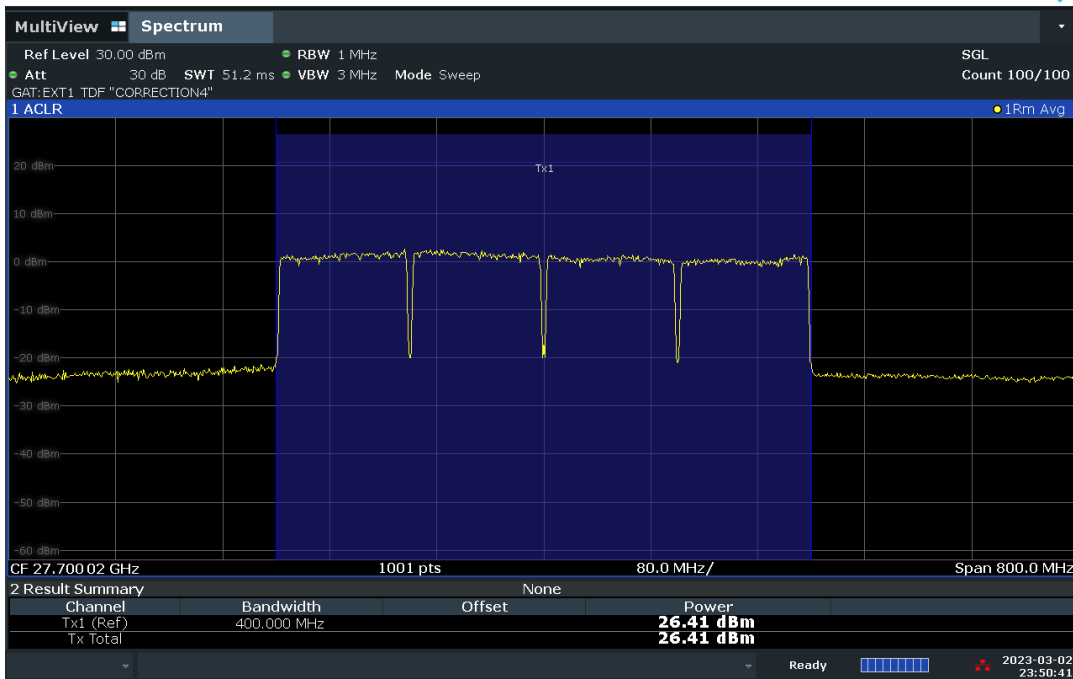
Plot 7-85. Conducted Power Plot – CP – H-DL Polarization (100MHz-4CC – QPSK – Mid Ch. – Full RB)



Plot 7-86. Conducted Power Plot – CP – H-DL Polarization (100MHz-4CC – QPSK – High Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 78 of 129

ACLRRResults

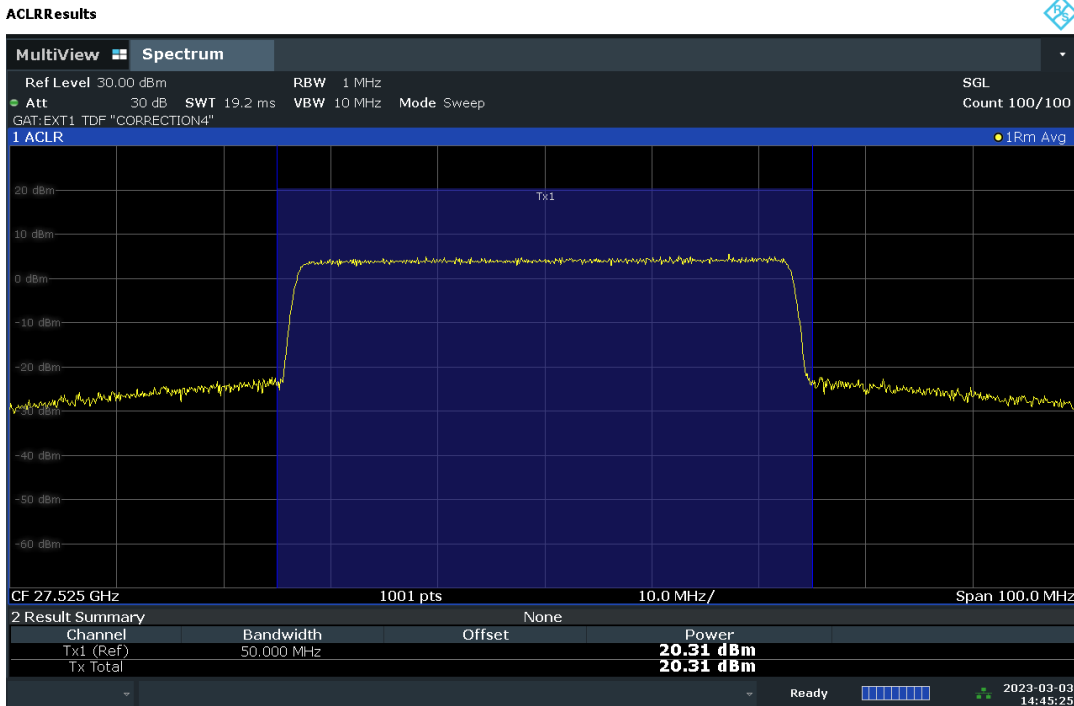


11:50:41 PM 03/02/2023

Plot 7-87. Conducted Power Plot – CP – H-DL Polarization (100MHz-4CC – 16QAM – Low Ch. – Full RB)

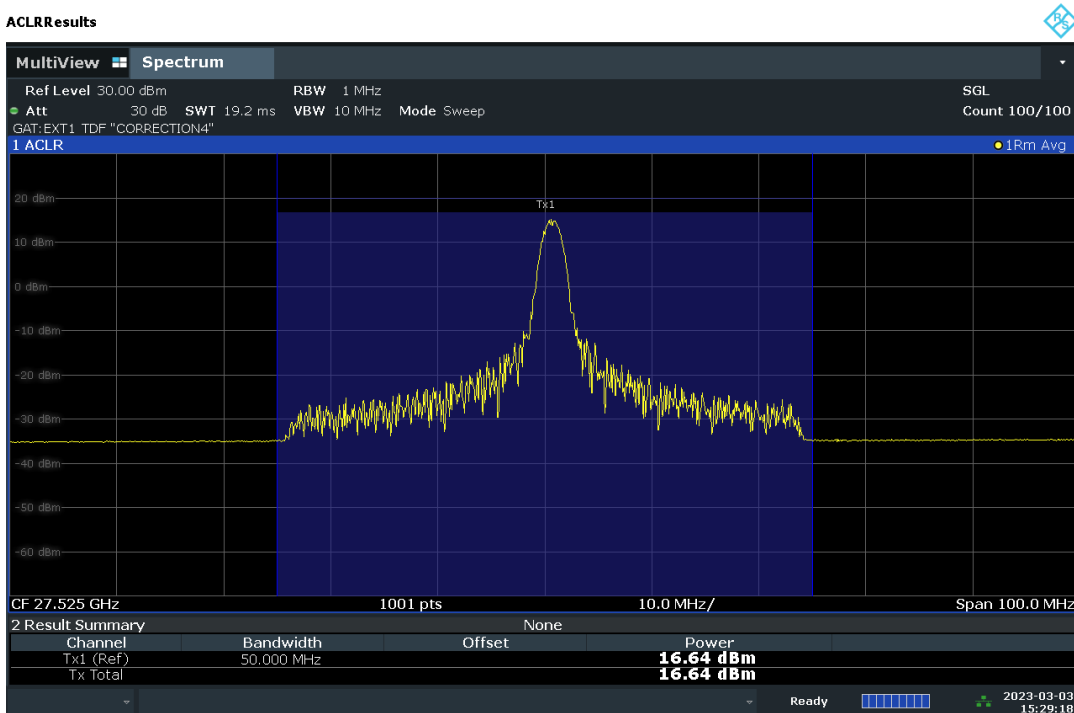
FCC ID: 2AUVU-5620-23-28	PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater
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## V-DL Polarization



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Plot 7-88. Conducted Power Plot – CP – V-DL Polarization (50MHz-1CC – QPSK – Low Ch. – Full RB)

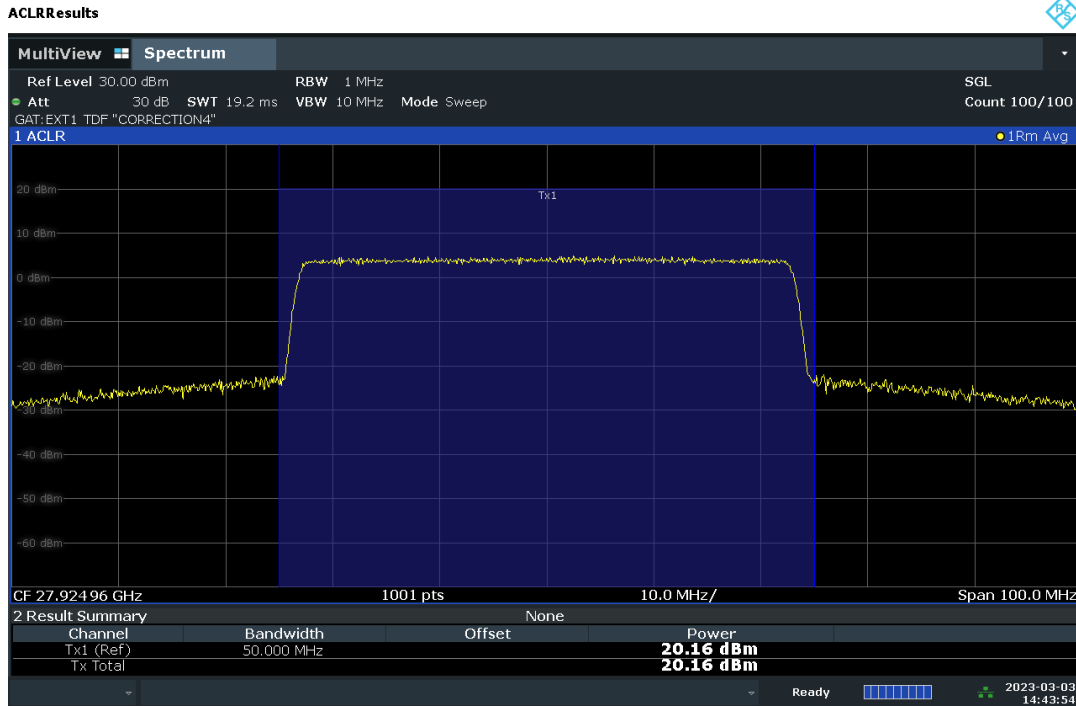


03:29:19 PM 03/03/2023

Plot 7-89. Conducted Power Plot – CP – V-DL Polarization (50MHz-1CC – QPSK – Low Ch. – 1RB)

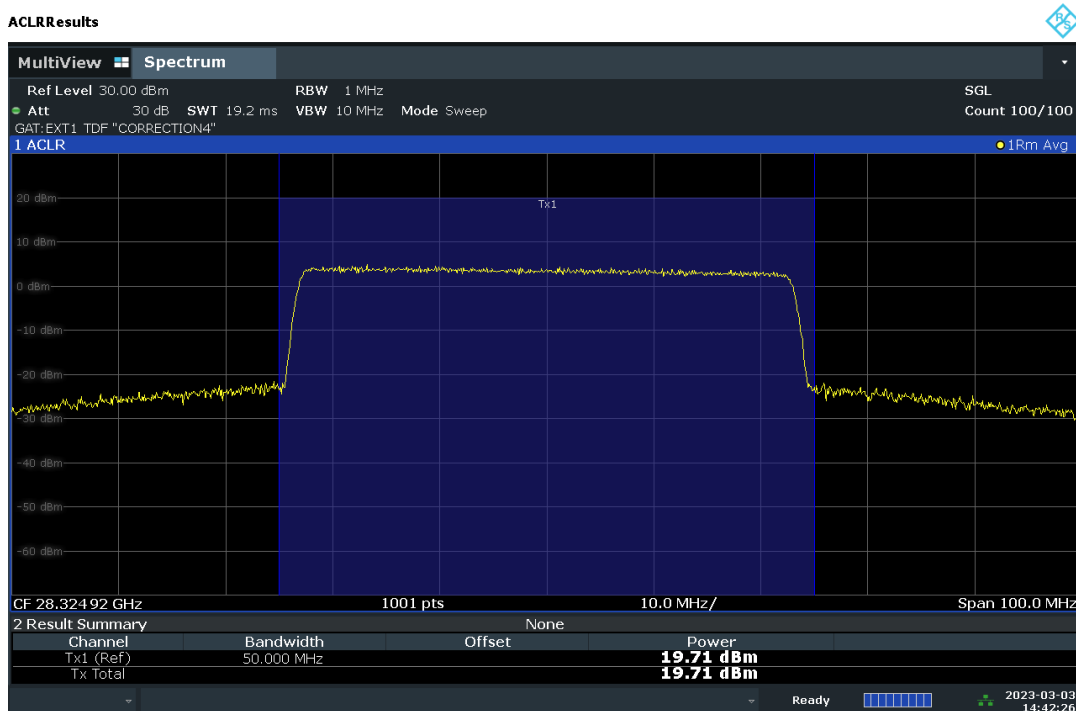
FCC ID: 2AUUV-5620-23-28	PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater
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Plot 7-90. Conducted Power Plot – CP – V-DL Polarization (50MHz-1CC – QPSK – Mid Ch. – Full RB)

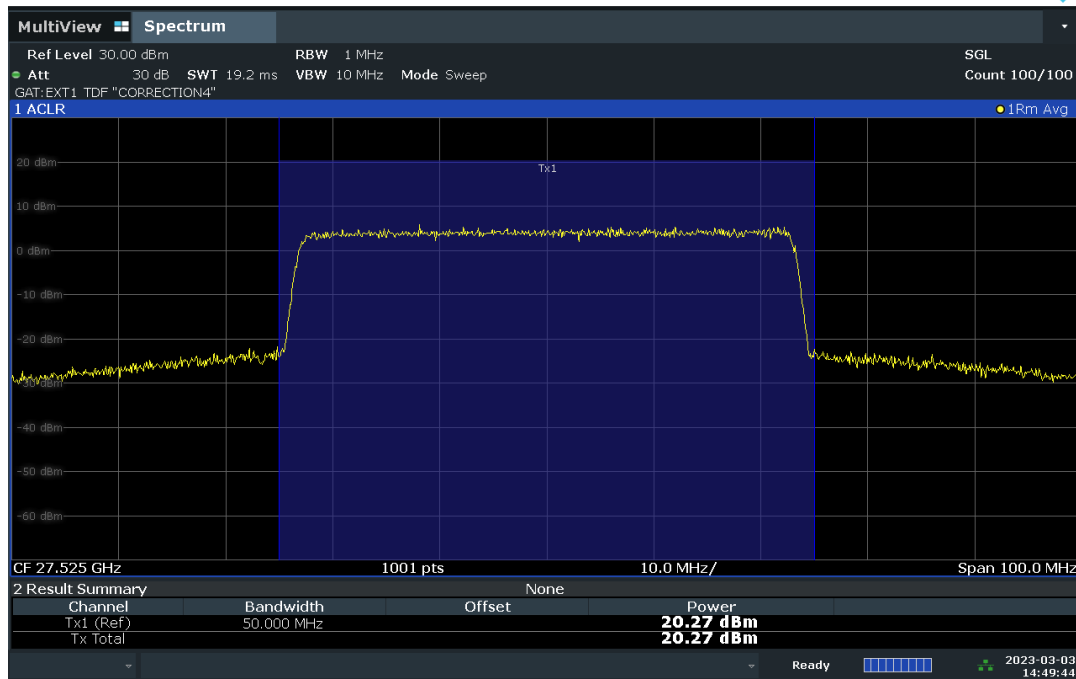


02:42:26 PM 03/03/2023

Plot 7-91. Conducted Power Plot – CP – V-DL Polarization (50MHz-1CC – QPSK – High Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 81 of 129

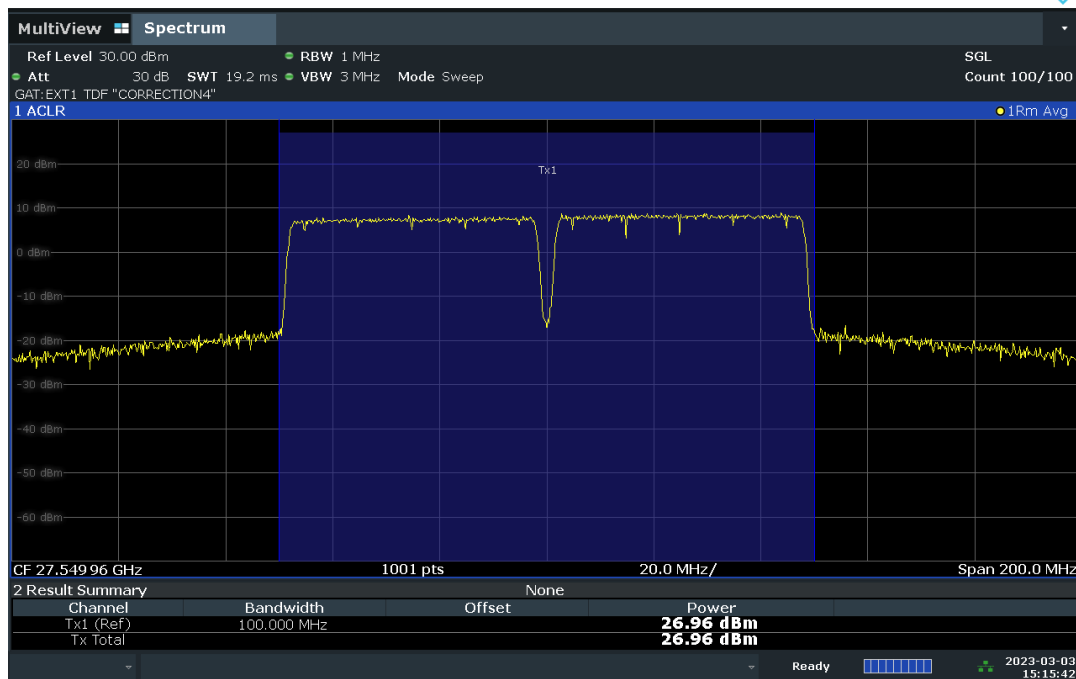
ACLRRResults



02:49:44 PM 03/03/2023

Plot 7-92. Conducted Power Plot – CP – V-DL Polarization (50MHz-1CC – 16QAM – Low Ch. – Full RB)

ACLRRResults

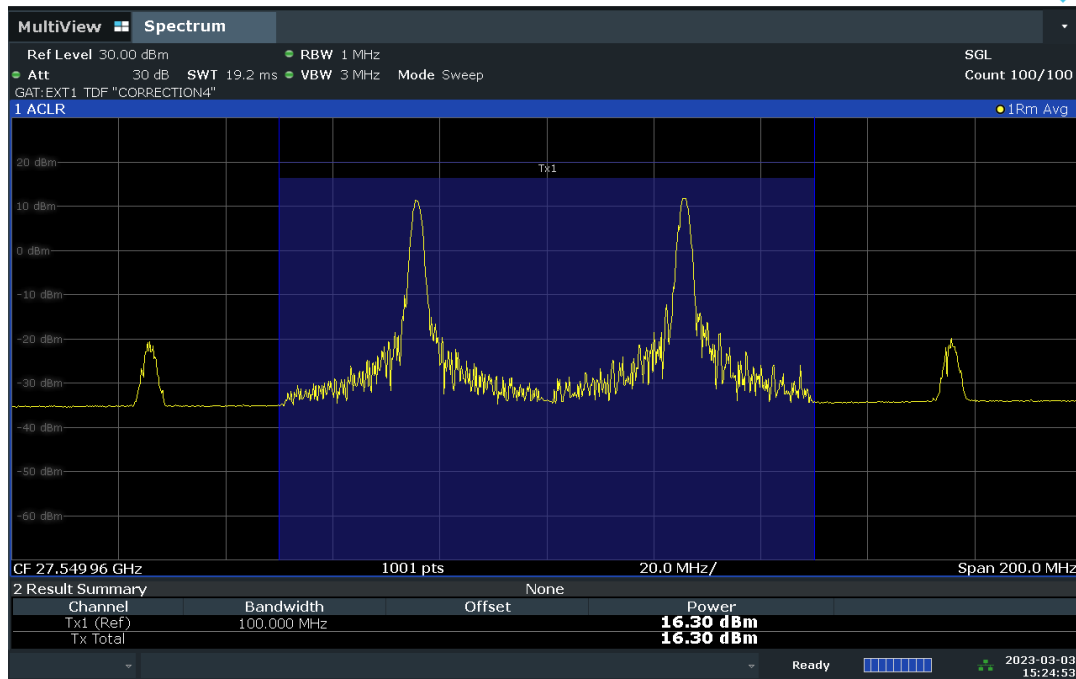


03:15:43 PM 03/03/2023

Plot 7-93. Conducted Power Plot – CP – V-DL Polarization (50MHz-2CC – QPSK – Low Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28	PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater
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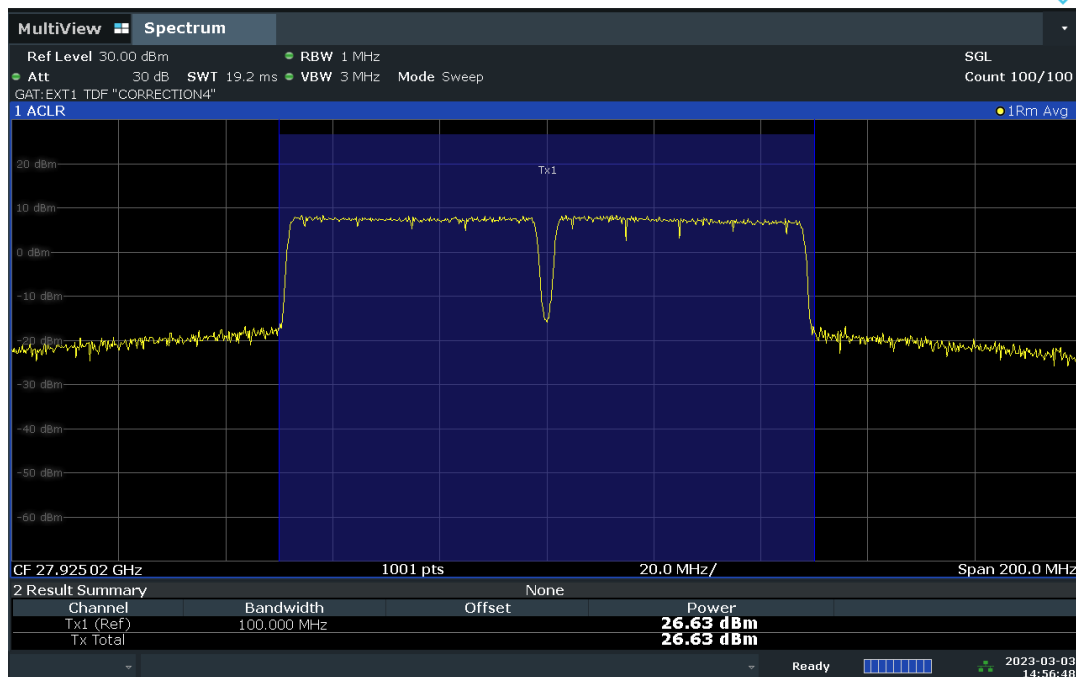
ACLRRResults



03:24:53 PM 03/03/2023

Plot 7-94. Conducted Power Plot – CP – V-DL Polarization (50MHz-2CC – QPSK – Low Ch. – 1RB)

ACLRRResults

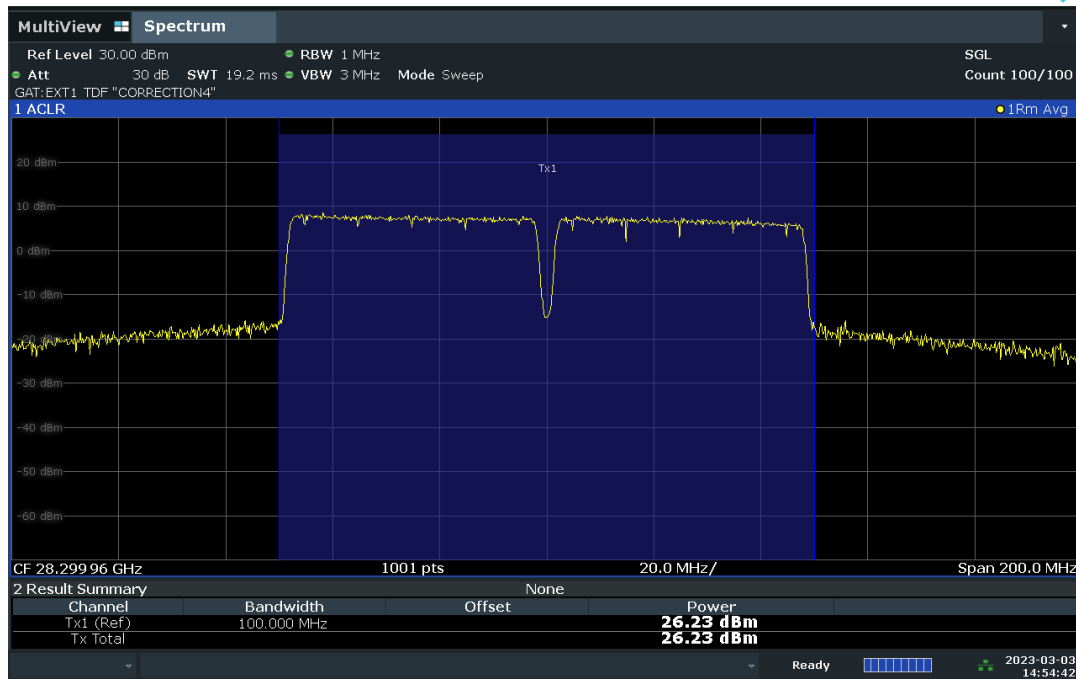


02:56:49 PM 03/03/2023

Plot 7-95. Conducted Power Plot – CP – V-DL Polarization (50MHz-2CC – QPSK – Mid Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 83 of 129

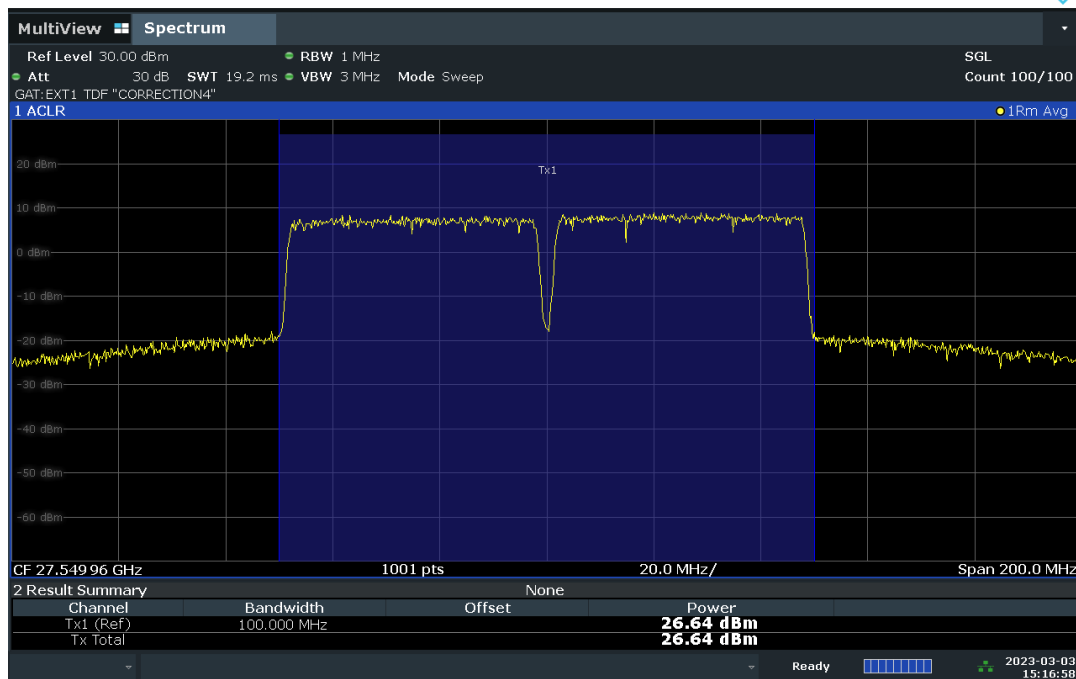
ACLRRResults



02:54:42 PM 03/03/2023

Plot 7-96. Conducted Power Plot – CP – V-DL Polarization (50MHz-2CC – QPSK – High Ch. – Full RB)

ACLRRResults

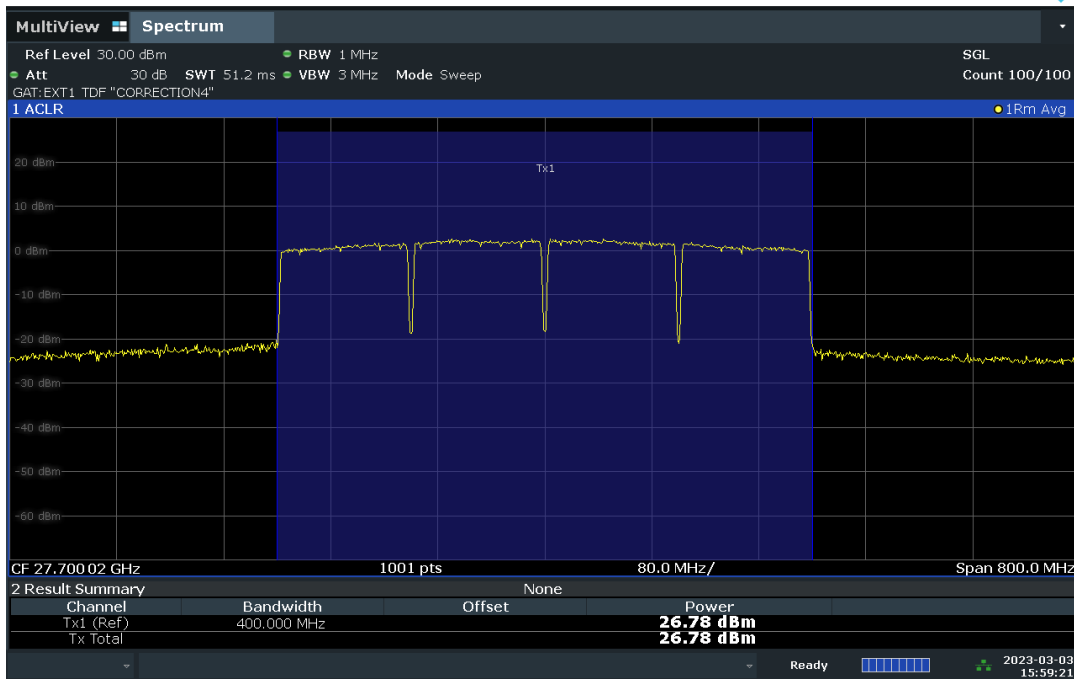


03:16:59 PM 03/03/2023

Plot 7-97. Conducted Power Plot – CP – V-DL Polarization (50MHz-2CC – 16QAM – Low Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 84 of 129

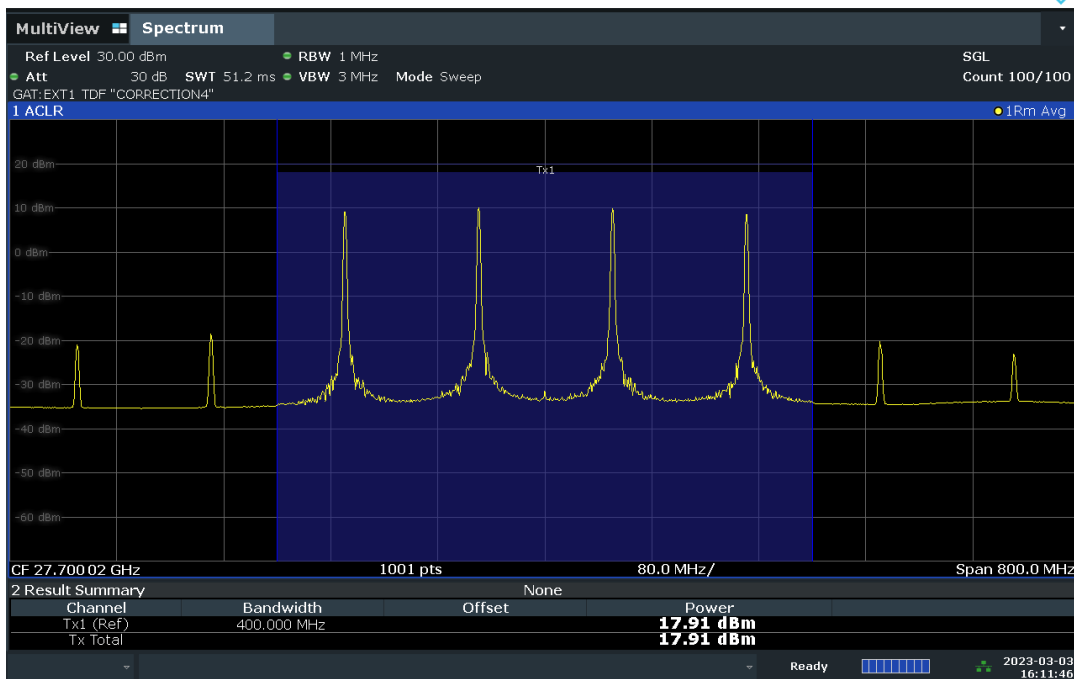
ACLRRResults



03:59:22 PM 03/03/2023

Plot 7-98. Conducted Power Plot – CP – V-DL Polarization (100MHz-4CC – QPSK – Low Ch. – Full RB)

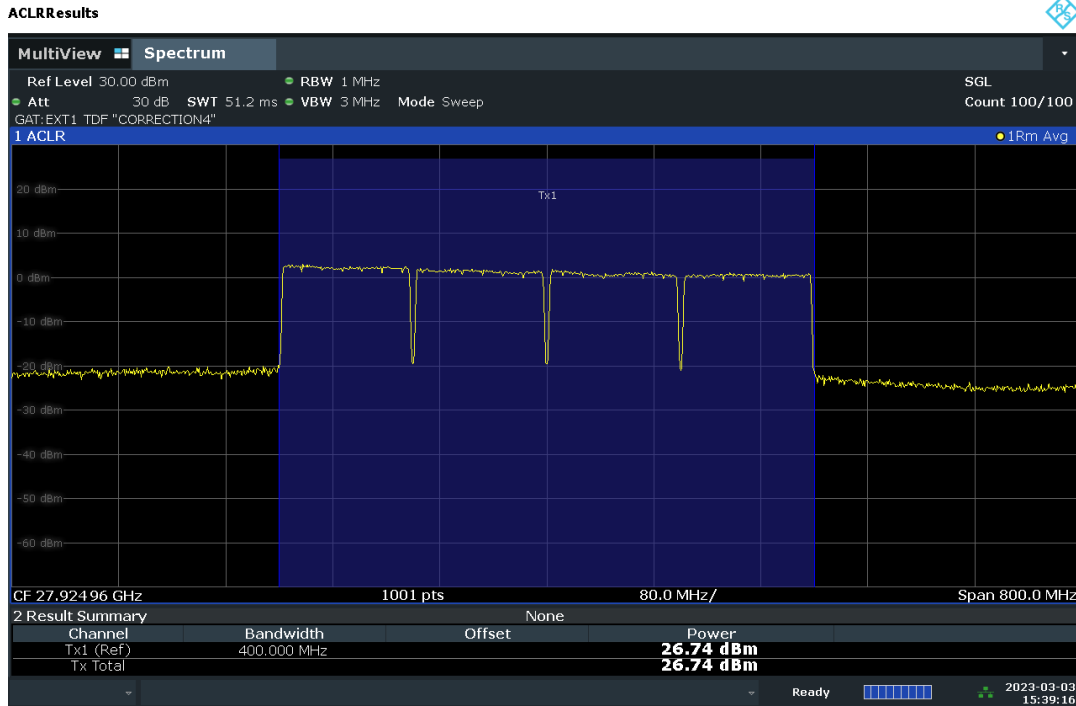
ACLRRResults



04:11:46 PM 03/03/2023

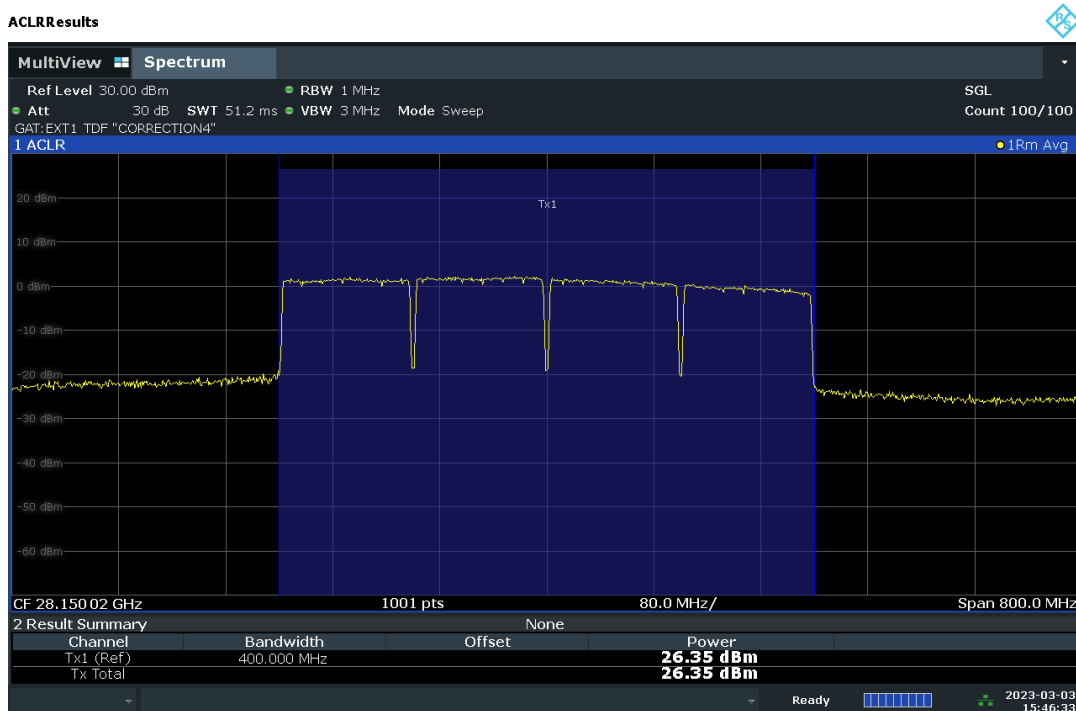
Plot 7-99. Conducted Power Plot – CP – V-DL Polarization (100MHz-4CC – QPSK – Low Ch. – 1RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 85 of 129



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Plot 7-100. Conducted Power Plot – CP – V-DL Polarization (100MHz-4CC – QPSK – Mid Ch. – Full RB)

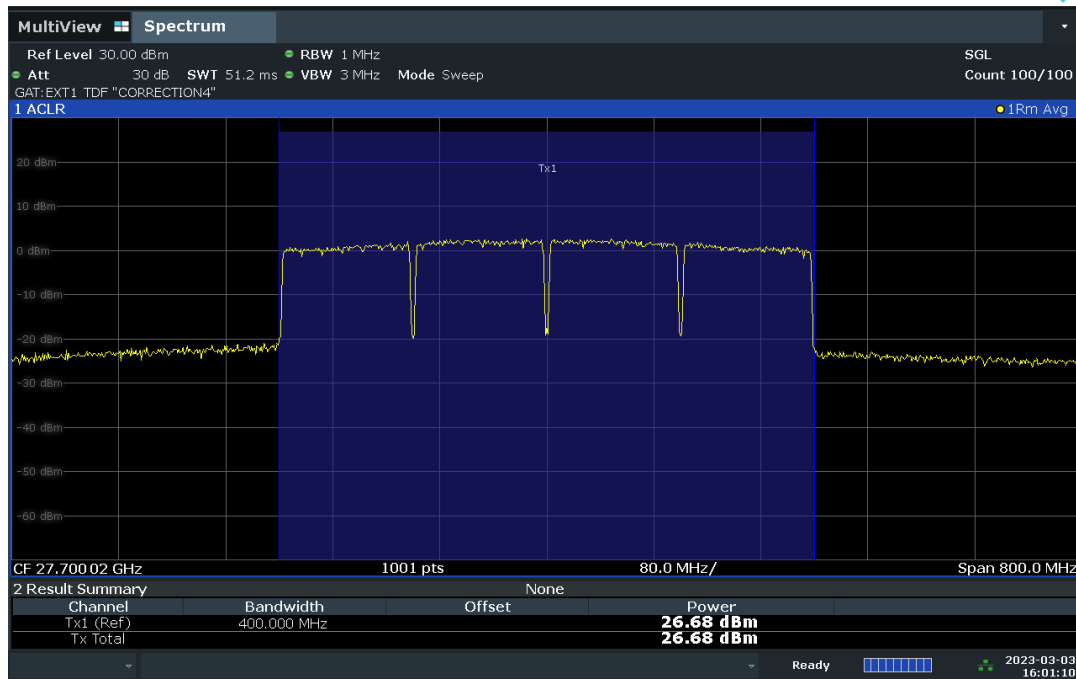


03:46:34 PM 03/03/2023

Plot 7-101. Conducted Power Plot – CP – V-DL Polarization (100MHz-4CC – QPSK – High Ch. – Full RB)

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUUV	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater	Page 86 of 129

ACLRRResults



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Plot 7-102. Conducted Power Plot – CP – V-DL Polarization (100MHz-4CC – 16QAM – Low Ch. – Full RB)

FCC ID: 2AUVU-5620-23-28	PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1M2303240041-01.2AUVU	Test Dates: 02/20/2023-03/31/2023	EUT Type: 5G mmWave Repeater
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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 100 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  $\geq 2 \times \text{Span/RBW}$
6. The trace was allowed to stabilize
7. RBW = 1MHz, VBW = 3MHz

### Test Notes

- 1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below. 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 – 100GHz show corrected average EIRP levels. The average EIRP reported below is calculated per section 5.2.7 of ANSI C63.26-2015 which states:  $\text{EIRP (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m. The field strength E is calculated  $E \text{ (dB}\mu\text{V/m)} = \text{Spectrum Analyzer Level (dBm)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + \text{Harmonic Mixer Conversion Loss (dB)} + 107$ . All appropriate Antenna 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:  $R > 2D^2/\text{wavelength}$ , 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	0.06	1.44	2.00
60 - 90	0.04	0.96	2.00
90 - 140	0.026	0.631	2.00

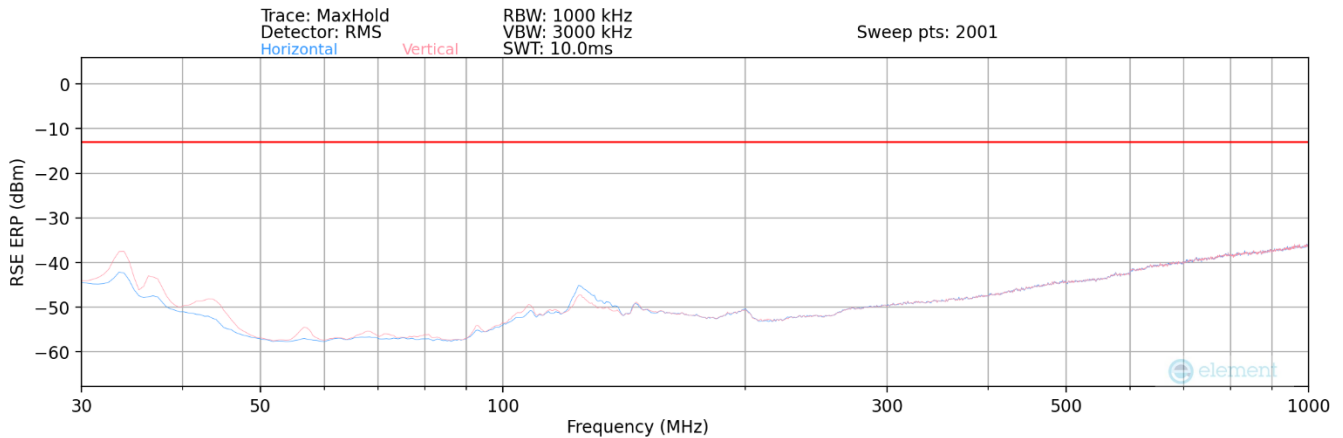
**Table 7-20. Far-Field Distance & Measurement Distance per Frequency Range**

- 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) 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.
- 8) The limit lines on the spectrum scan plots in this section are displayed in regards to the part 30 limits for n261 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.
- 9) The fundamental emissions from multiple co-located transmitters may appear on spectrum scan plots. These are not investigated as spurious emissions.
- 10) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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## Band n261 – SU

### 30MHz - 1GHz



Plot 7-103. n261 Radiated Spurious Plot (1CC QPSK Mid Channel) - SU

### Spurious Emissions ERP Sample Calculation (n261)

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


$$\text{RSE ERP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8 - 2.15 \text{ (dB)}$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
33.89	Low	50	MIMO	QPSK	V	156	84	-38.99	-13.00	-25.99
37.16	Mid	50	MIMO	QPSK	V	112	356	-45.42	-13.00	-32.42
44.56	High	50	MIMO	QPSK	V	121	151	-50.84	-13.00	-37.84
57.80	High	50	MIMO	QPSK	V	135	289	-55.66	-13.00	-42.66
110.20	High	50	MIMO	QPSK	V	150	302	-51.27	-13.00	-38.27
140.40	High	50	MIMO	QPSK	H	189	24	-49.56	-13.00	-36.56
350.00	High	50	MIMO	QPSK	V	-	-	-50.92	-13.00	-37.92

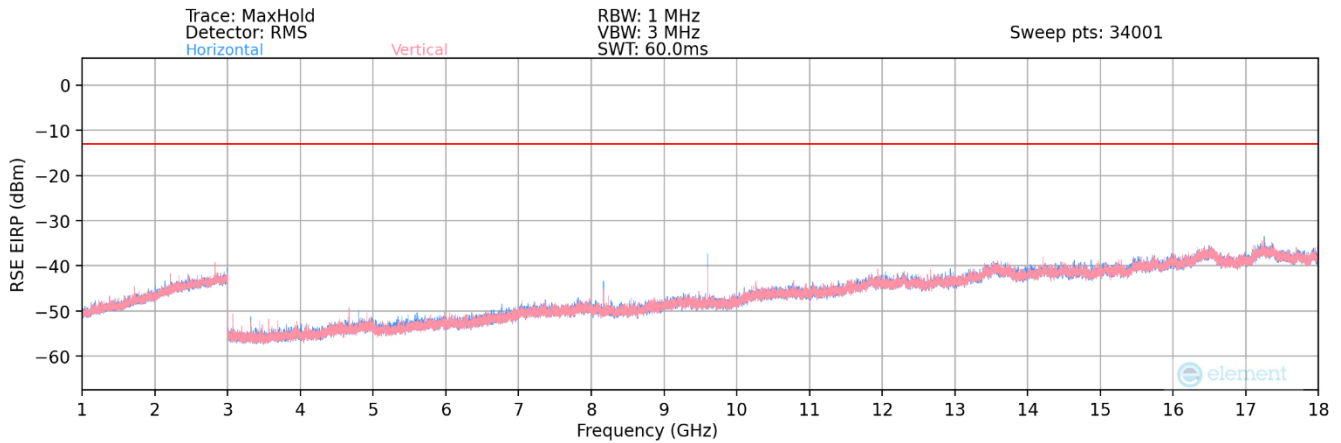
Table 7-21. n261 Radiated Spurious Emissions Table (30MHz - 1GHz) - SU

### 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.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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# 1GHz - 18GHz



**Plot 7-104. n261 Radiated Spurious Plot (1CC QPSK Mid Channel) - SU**

## 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.

$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Antenna Height [cm]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
2826.00	Low	50	MIMO	QPSK	H	-	-	-44.19	-13.00	-31.19
3071.00	Mid	50	MIMO	QPSK	H	-	-	-53.53	-13.00	-40.53
3317.50	High	50	MIMO	QPSK	H	290	24	-52.75	-13.00	-39.75
3456.00	High	50	MIMO	QPSK	H	-	-	-54.94	-13.00	-41.94
3601.00	High	50	MIMO	QPSK	H	-	-	-54.64	-13.00	-41.64
4801.00	High	50	MIMO	QPSK	H	158	13	-49.11	-13.00	-36.11
8168.00	High	50	MIMO	QPSK	H	294	354	-42.85	-13.00	-29.85
9600.00	High	50	MIMO	QPSK	H	359	5	-36.43	-13.00	-23.43
11200.00	High	50	MIMO	QPSK	H	-	-	-44.86	-13.00	-31.86

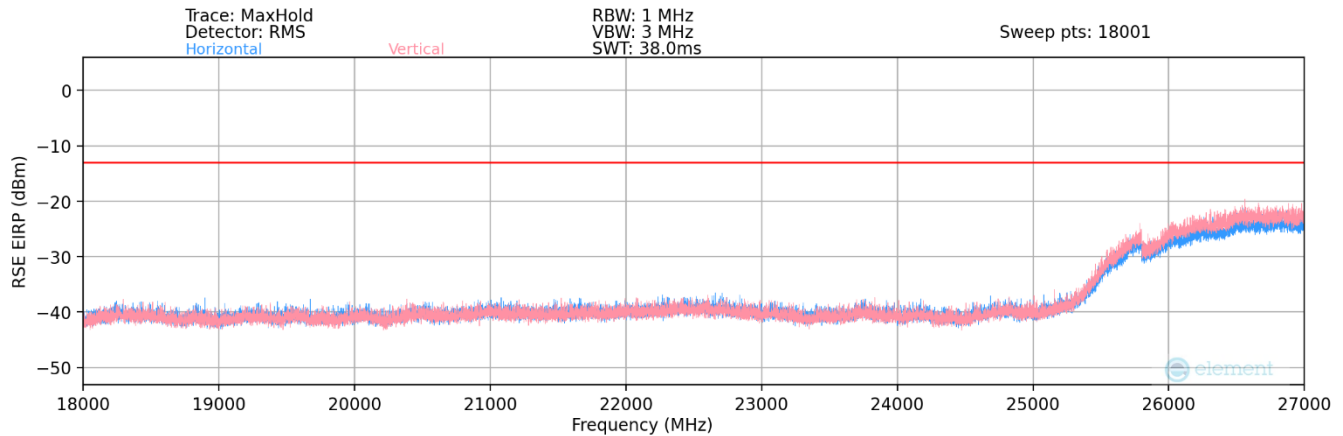
**Table 7-22. n261 Radiated Spurious Emissions Table (1GHz - 18GHz) - SU**

### 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.

FCC ID: 2AUVU-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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## 18GHz - 27.5GHz



**Plot 7-105. n261 Radiated Spurious Plot (1CC QPSK Mid Channel) – SU**

### 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 2 meter.


$$\text{RSE EIRP (dBm)} = \text{Analyzer Level (dBm)} + 107 + \text{AFCL (dB/m)} + 20\text{Log(Dm)} - 104.8$$

Frequency [MHz]	Channel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
24780.80	Low	50	MIMO	QPSK	-	-	-35.32	-13.00	-22.32
24547.50	Mid	50	MIMO	QPSK	-	-	-36.08	-13.00	-23.08
26111.50	High	50	MIMO	QPSK	-	-	-17.83	-13.00	-4.83

**Table 7-23. n261 Radiated Spurious Emissions Table (18GHz - 27.5GHz) - SU**

### 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.

FCC ID: 2AUUV-5620-23-28		PART 20 & 30 MEASUREMENT REPORT (CERTIFICATION)		Approved by: Technical Manager
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