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TEST REPORT

SCOPE OF WORK
EMISSIONS TESTING – RPM-A5A11-B66 W/ 5G NR waveform With OneCell® RP5100

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104751739BOX-001

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EMISSIONS TEST REPORT

(Class II Permissive Change)

Report Number: 104751739BOX-001
Project Number: G104751739

Report Issue Date: 09/07/2021
Report Revision Date: 02/02/2022

Model(s) Tested:	RPM-A5A11-B66 W/ 5G NR waveform With OneCell® RP5100
Model(s) Partially Tested:	None
Model(s) Not Tested but declared equivalent by the client:	None

Standards: CFR47 FCC Part 27 (08/2021)
(Class II Permissive Change)

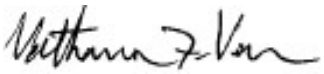
Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
CommScope Technologies LLC
900 Chelmsford St.
Lowell, MA 01851
USA

Report prepared by

Kouma Sinn / EMC Engineering Supervisor

Report reviewed by



Vathana Ven / EMC Engineering Supervisor

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	Maximum Peak Output Power and Human RF exposure CFR47 FCC Parts 2.1046 and 27.50(d)(1-2)	Pass
7	Occupied Bandwidth CFR47 FCC Parts 2.1049 and 27.53(h)(3)	Pass
8	Band Edge Compliance CFR47 FCC 2.1051, 2.1053, and 27.53(h)	Pass
9	Frequency Stability Due to Voltage Variation CFR47 FCC Parts 2.1055 and 27.54	Pass
10	Transmitter Spurious Emissions CFR47 Parts 2.1051, 2.1053, 2.1057, and 27.53(h)	Pass
11	Revision History	--

Notes: Class II permissive change for Band 66 with 5G NR waveform.

3 Client Information

This EUT was tested at the request of:

Client: CommScope Technologies LLC
900 Chelmsford St.
Lowell, MA 01851
USA

Contact: Mr. Kevin Craig
Telephone: (978) 250-2678
Fax: None
Email: kevin.craig@commscope.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: CommScope Telecommunications (China) Ltd.
68 Su Hong Xi Lu, Suzhou Industrial Park.
Suzhou, Jiangsu, 215021, China

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Band 66 Radio Module With OneCell® RP5100 host	CommScope Technologies LLC	RPM-A5A11-B66	BV EMI BAND66
OneCell® RP5100	CommScope Technologies LLC	RP-A51xxi	19198000019

Receive Date:	07/30/2021
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
The Radio Module is band specific using the Analog devices RF Agile Transceiver IC, AD936x. The device combines an RF front end with a flexible mixed-signal baseband section and integrated frequency synthesizers providing a configurable digital interface to the processor. The Radio Module also contains a band specific front end, band specific antenna and required power rails. All power rails required are derived from the 12 VDC bus supplied by the Baseband card. The reference frequency for the radio IC is 38.4 MHz is derived from the from an OCXO which is disciplined from a 1588 reference clock. The original LTE radio has included the 5G NR capabilities for this permissive change. It supports bandwidths of 5, 10, 15, and 20 MHz with four modulations; TM1.1-QPSK, TM3.2-16QAM, TM3.1-64QAM, and TM3.1a-256QAM. The radio is fixed.

Description of Radio Host (provided by client)
The OneCell® RP5100 family is factory configurable with 2 – 4 Radios Modules mounted to a Baseband card. The same PCB's will be used in both indoor and outdoor version of the radio point. The device is fixed. The baseband card is the host for the modular radios. It contains a two ethernet PHY's with one supporting 100M/1G/2.5G/5G/10G ethernet and the other supporting 100M/1G. The main processor is Zylinx Ultrascale+ MPSoC with 2 GB DDR3 and 4 GB Flash memory. The baseband PCBA converts POE power to +12 VDC bus voltage require as input to the radio modules.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
48 VDC	0.960 mA per pair max	DC	N/A

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Pre-programmed to transmit at Low, Mid, and High channels at four different modulations, TM1.1-QPSK, TM3.2-16QAM, TM3.1-64QAM, and TM3.1a-256QAM.

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	RP5100 Diagnostics Ver 1009

Radio/Receiver Characteristics	
Frequency Band(s)	2110-2200 MHz
Modulation Type(s)	TM1.1-QPSK, TM3.2-16QAM, TM3.1-64 QAM, TM3.1a-256QAM
Maximum Output Power (conducted)	23.58 dBm (Conducted)
Test Channels	Low, Middle, High Channels of 5 MHz, 10 MHz, 15 MHz, and 20 MHz Bandwidths, Single Channel operation only
Occupied Bandwidth	18.976 MHz (Worst-case)
MIMO Information (# of Transmit and Receive antenna ports)	2 x 2 MIMO using cross polarized antennas and uncorrelated data streams
Equipment Type	Module in a host
Antenna Type and Gain	Detachable Antenna: +4 dBi (as provided by the client. Intertek takes no responsibility for the accuracy of this information. Actual antenna gain will be determined at the time of licensing)

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
--	LAN (POE Power Cable)	2.58	Shielded	None	POE P/S
--	LAN (Communication)	9.00	Shielded	None	Laptop

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Laptop	Dell	LATITUDE	None
Power Device Analzyer	Sifos Technologies	PDA-604A	604A0033

5.1 Method:

Configuration as required by ANSI C63.26-2015, KDB662911, and CFR47 FCC Part 27 (04/2019).

5.2 EUT Block Diagram:

Photographs are available in a separate exhibit

6 Maximum Peak Output Power and Human RF exposure

6.1 Method

Tests are performed in accordance with CFR47 FCC Parts 2.1046 and 27, KDB 662911, and ANSI C63.26 Section 5.2.4.4.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLSHF204'	Cable, SMA - SMA, 9kHz -40GHz, (Cable Kit 5)	Huber + Suhner	Sucoflex 102EA	234714001	02/03/2021	02/03/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

6.3 Results:

The maximum conducted output power was measured to be 24.13 dBm, which is much less than the EIRP limit of 27.50(d)(1-2). The sample tested was found to Comply. Antenna gain limitations will depend on the location of deployment. Output power from the two antenna ports was not summed since the data streams are uncorrelated and the antennas are cross polarized.

§27.50(d) The following power and antenna height requirements apply to stations transmitting in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz and 2180-2200 MHz bands:
(1) The power of each fixed or base station transmitting in the 1995-2000 MHz, 2110-2155 MHz, 2155-2180 MHz or 2180-2200 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to:
(i) An equivalent isotropically radiated power (EIRP) of 3280 watts when transmitting with an emission bandwidth of 1 MHz or less;
(ii) An EIRP of 3280 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.
(2) The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz 2155-2180 MHz band, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:
(i) An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;
(ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2112.50	ANT0	22.36
		ANT1	22.64
Mid	2155.00	ANT0	23.35
		ANT1	22.70
High	2197.50	ANT0	22.83
		ANT1	22.61

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2115.00	ANT0	22.47
		ANT1	22.15
Mid	2155.00	ANT0	23.15
		ANT1	22.29
High	2195.00	ANT0	22.87
		ANT1	23.10

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2117.50	ANT0	22.21
		ANT1	22.56
Mid	2155.00	ANT0	23.13
		ANT1	22.24
High	2192.50	ANT0	22.87
		ANT1	22.92

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2120.00	ANT0	22.32
		ANT1	23.58
Mid	2155.00	ANT0	23.09
		ANT1	22.27
High	2190.00	ANT0	22.85
		ANT1	22.89

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2112.50	ANT0	22.33
		ANT1	22.56
Mid	2155.00	ANT0	23.24
		ANT1	22.36
High	2197.50	ANT0	22.88
		ANT1	22.70

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2115.00	ANT0	22.20
		ANT1	22.64
Mid	2155.00	ANT0	22.59
		ANT1	22.00
High	2195.00	ANT0	23.03
		ANT1	22.76

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2117.50	ANT0	22.29
		ANT1	22.48
Mid	2155.00	ANT0	22.90
		ANT1	22.20
High	2192.50	ANT0	23.02
		ANT1	22.88

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2120.00	ANT0	22.72
		ANT1	22.30
Mid	2155.00	ANT0	23.10
		ANT1	22.28
High	2190.00	ANT0	22.90
		ANT1	22.97

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2112.50	ANT0	22.34
		ANT1	22.24
Mid	2155.00	ANT0	23.03
		ANT1	22.63
High	2197.50	ANT0	23.08
		ANT1	22.80

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2115.00	ANT0	22.21
		ANT1	22.48
Mid	2155.00	ANT0	23.15
		ANT1	22.30
High	2195.00	ANT0	22.85
		ANT1	22.78

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2117.50	ANT0	22.28
		ANT1	22.49
Mid	2155.00	ANT0	23.12
		ANT1	22.27
High	2192.50	ANT0	23.05
		ANT1	22.91

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2120.00	ANT0	22.40
		ANT1	22.88
Mid	2155.00	ANT0	23.13
		ANT1	22.22
High	2190.00	ANT0	22.83
		ANT1	22.88

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.1a-256QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2112.50	ANT0	22.14
		ANT1	22.31
Mid	2155.00	ANT0	23.32
		ANT1	22.59
High	2197.50	ANT0	23.08
		ANT1	22.96

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.1a-256QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2115.00	ANT0	22.35
		ANT1	22.51
Mid	2155.00	ANT0	22.98
		ANT1	22.33
High	2195.00	ANT0	23.00
		ANT1	22.75

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.1a-256QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2117.50	ANT0	22.32
		ANT1	22.50
Mid	2155.00	ANT0	23.07
		ANT1	22.24
High	2192.50	ANT0	23.01
		ANT1	22.99

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.1a-256QAM

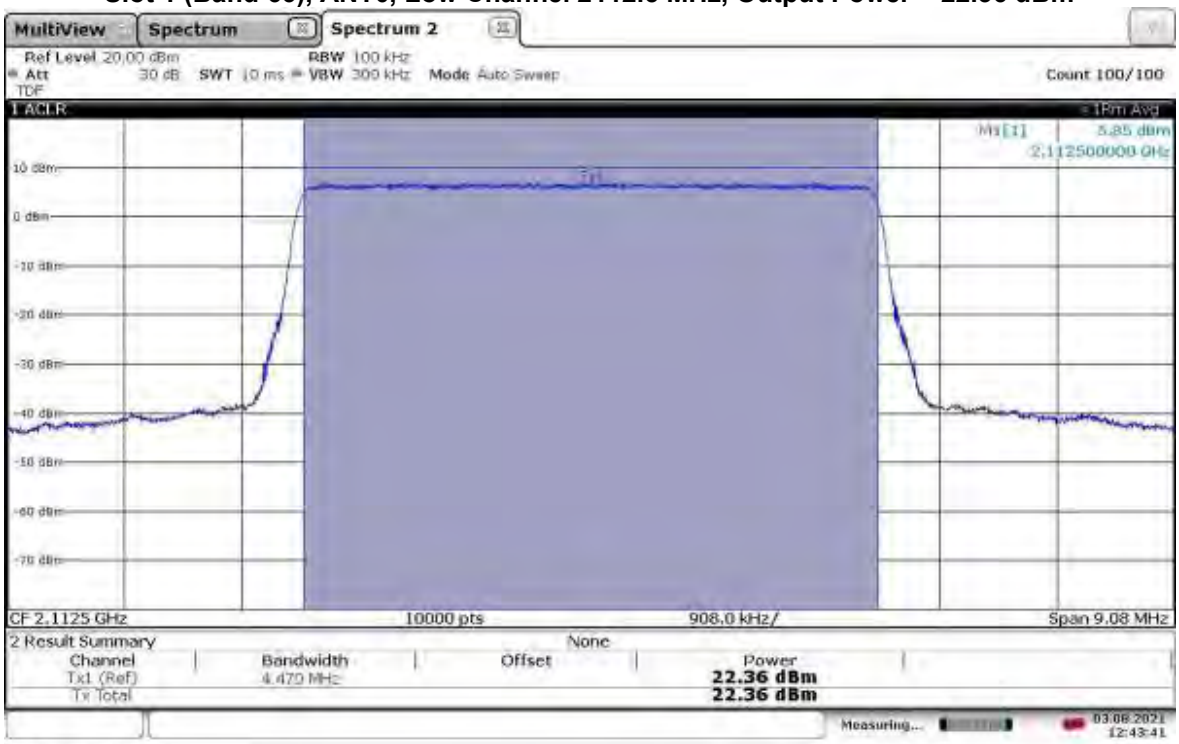
Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)
Low	2120.00	ANT0	22.31
		ANT1	22.70
Mid	2150.00	ANT0	23.07
		ANT1	22.25
High	2190.00	ANT0	22.87
		ANT1	22.88

6.4 Setup Photograph:

Photographs are available in a separate exhibit

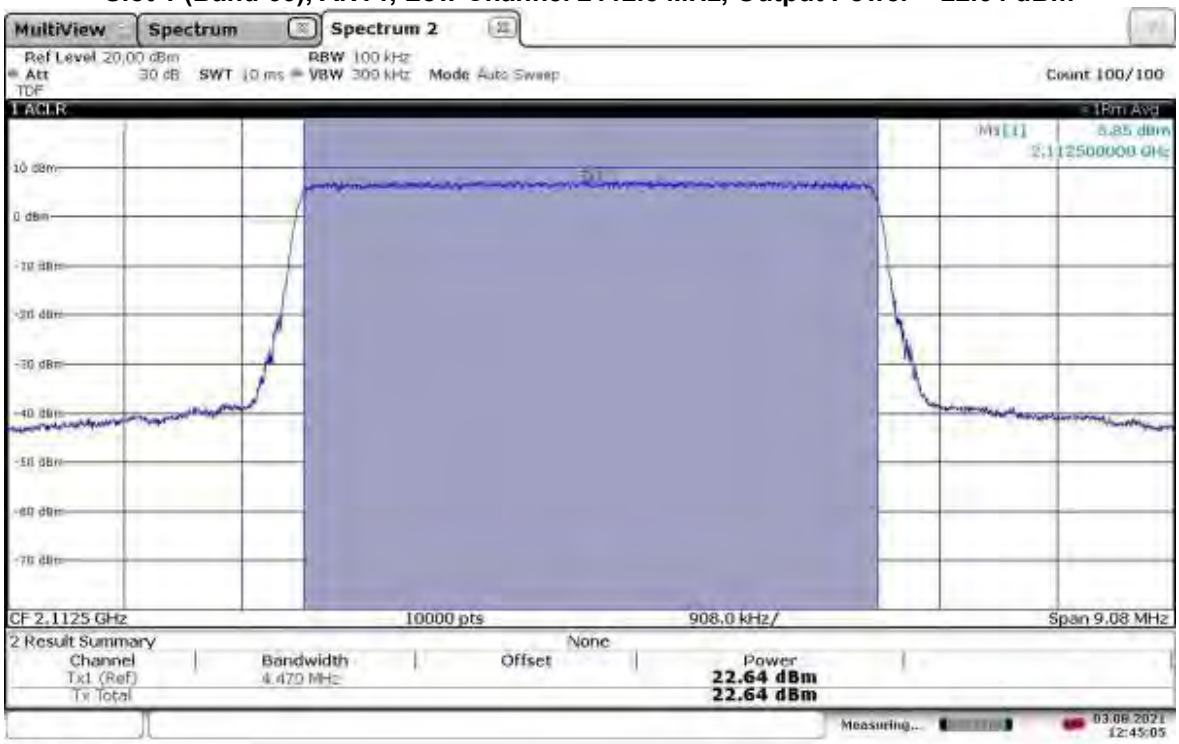
6.5 Plots/Data:

TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2112.5 MHz, Output Power = 22.36 dBm



12:43:41 03.08.2021

TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2112.5 MHz, Output Power = 22.64 dBm



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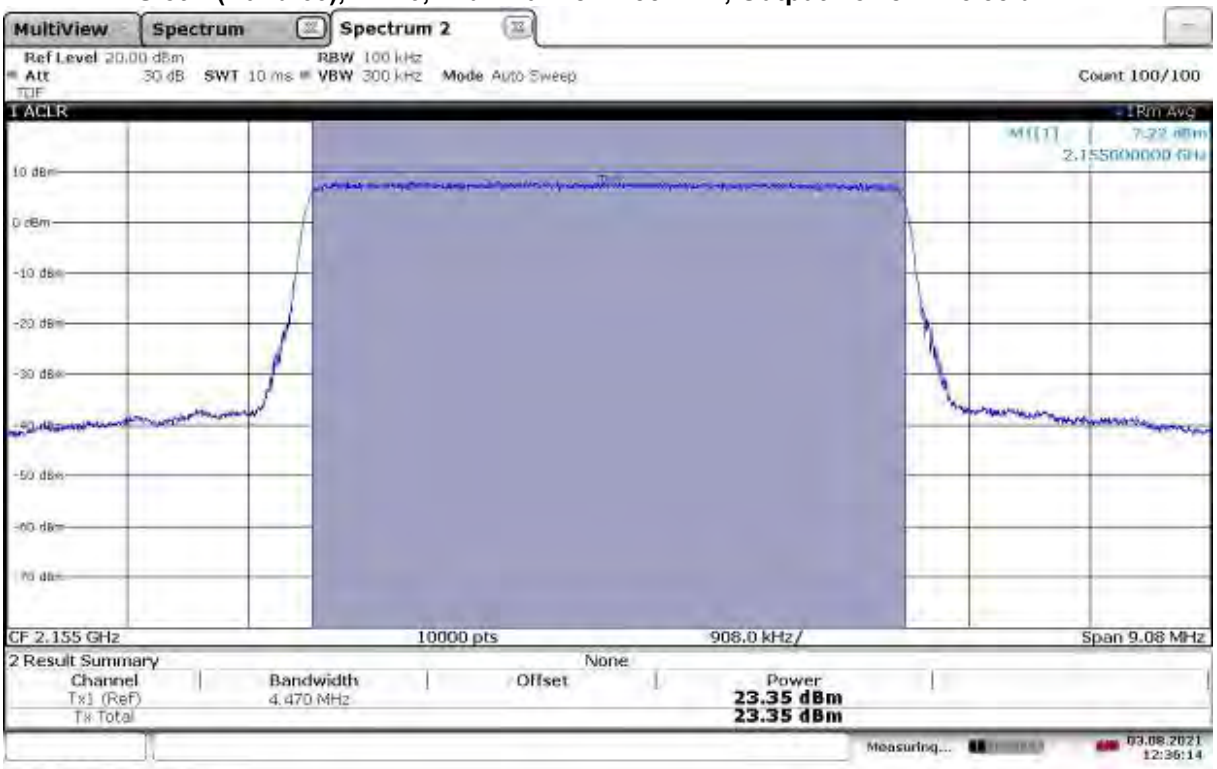
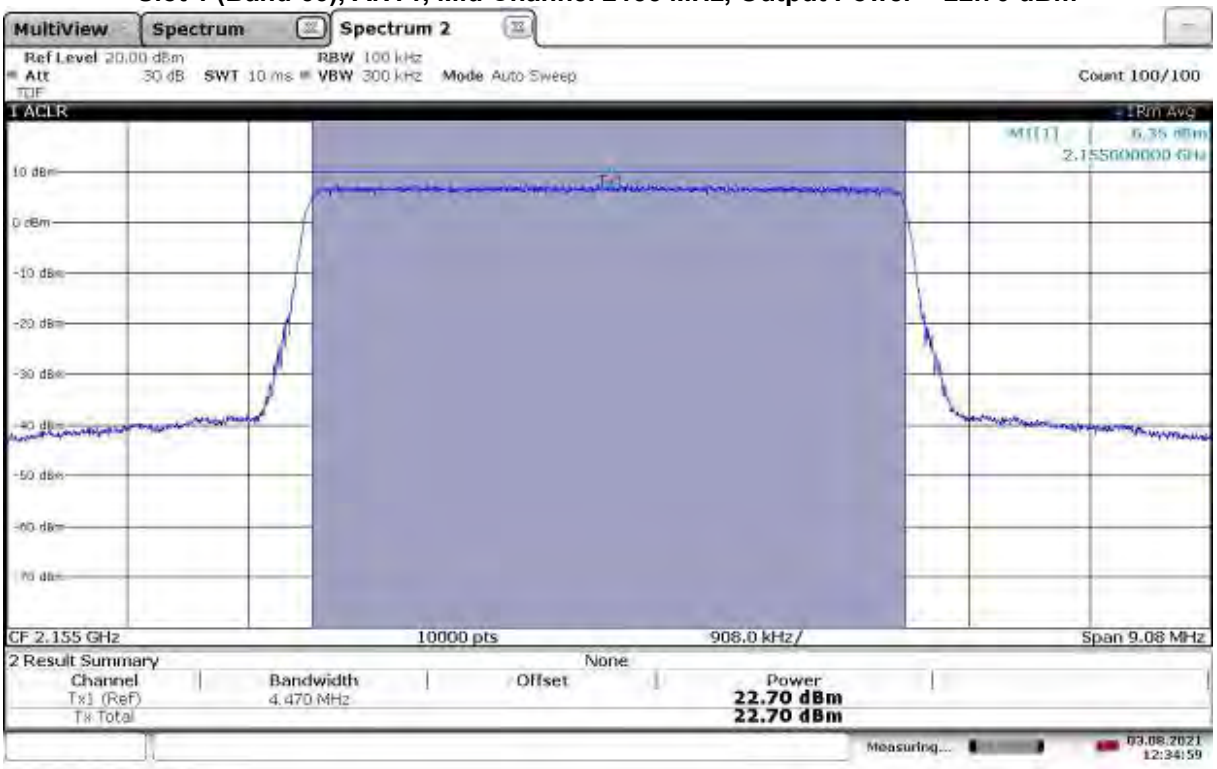
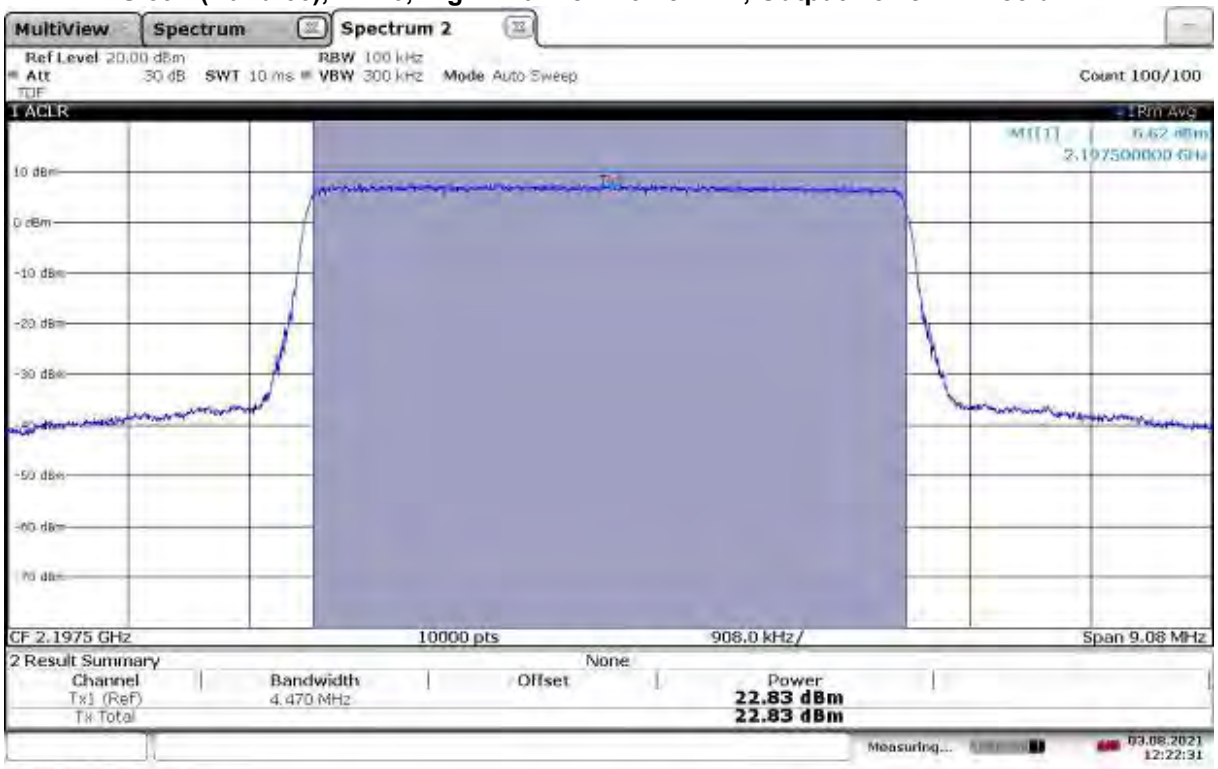
TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.35 dBm



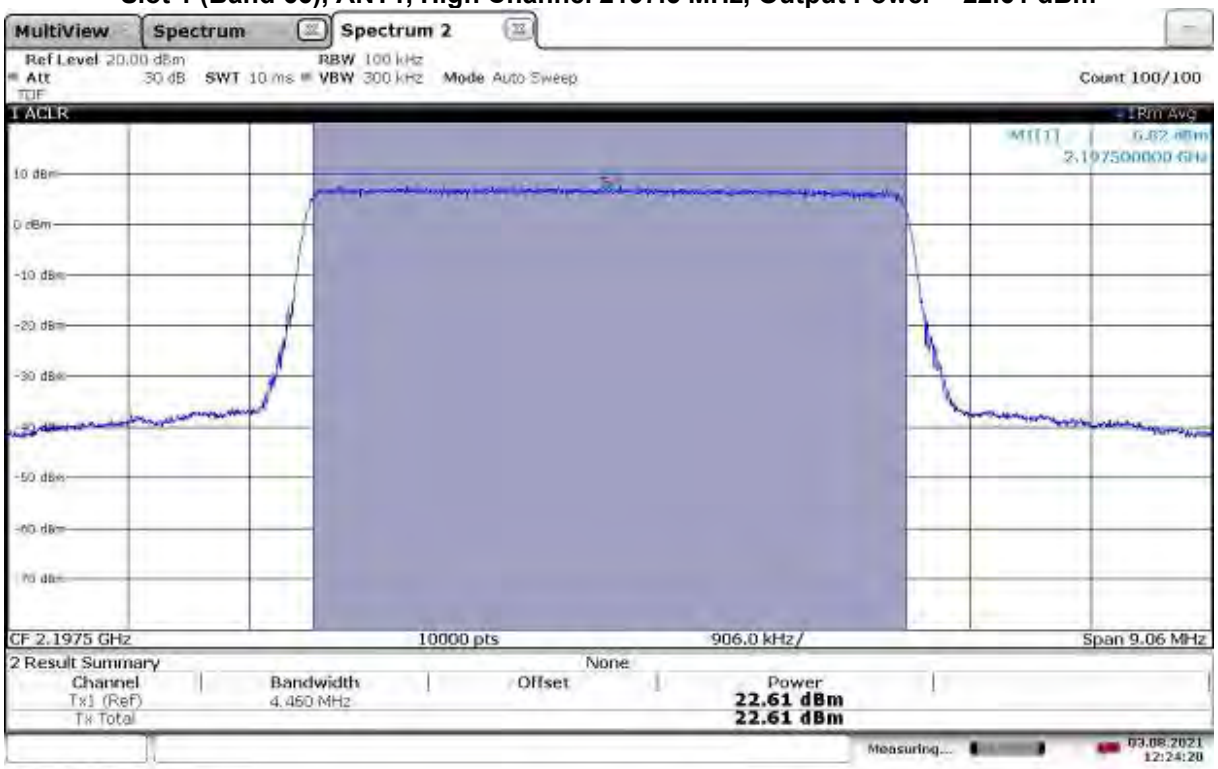
TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.70 dBm



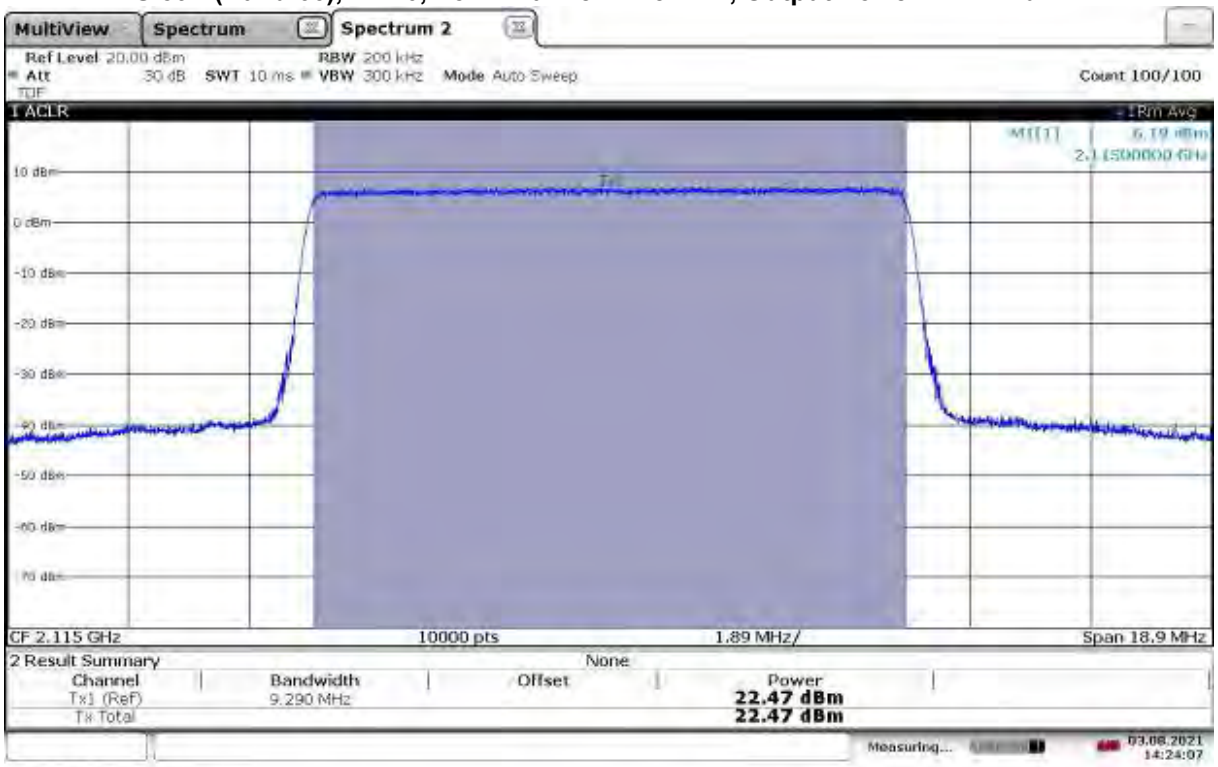
TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2197.5 MHz, Output Power = 22.83 dBm



TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2197.5 MHz, Output Power = 22.61 dBm

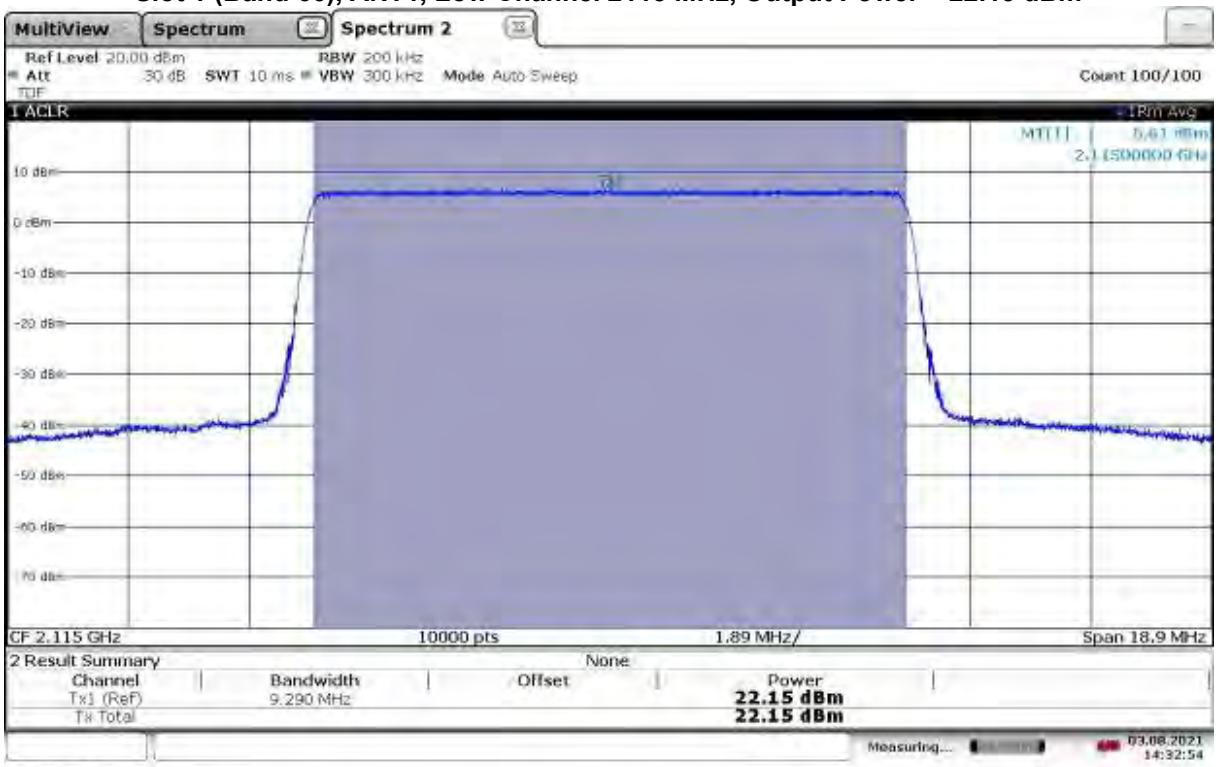


TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2115 MHz, Output Power = 22.47 dBm



14:24:07 03.08.2021

TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2115 MHz, Output Power = 22.15 dBm



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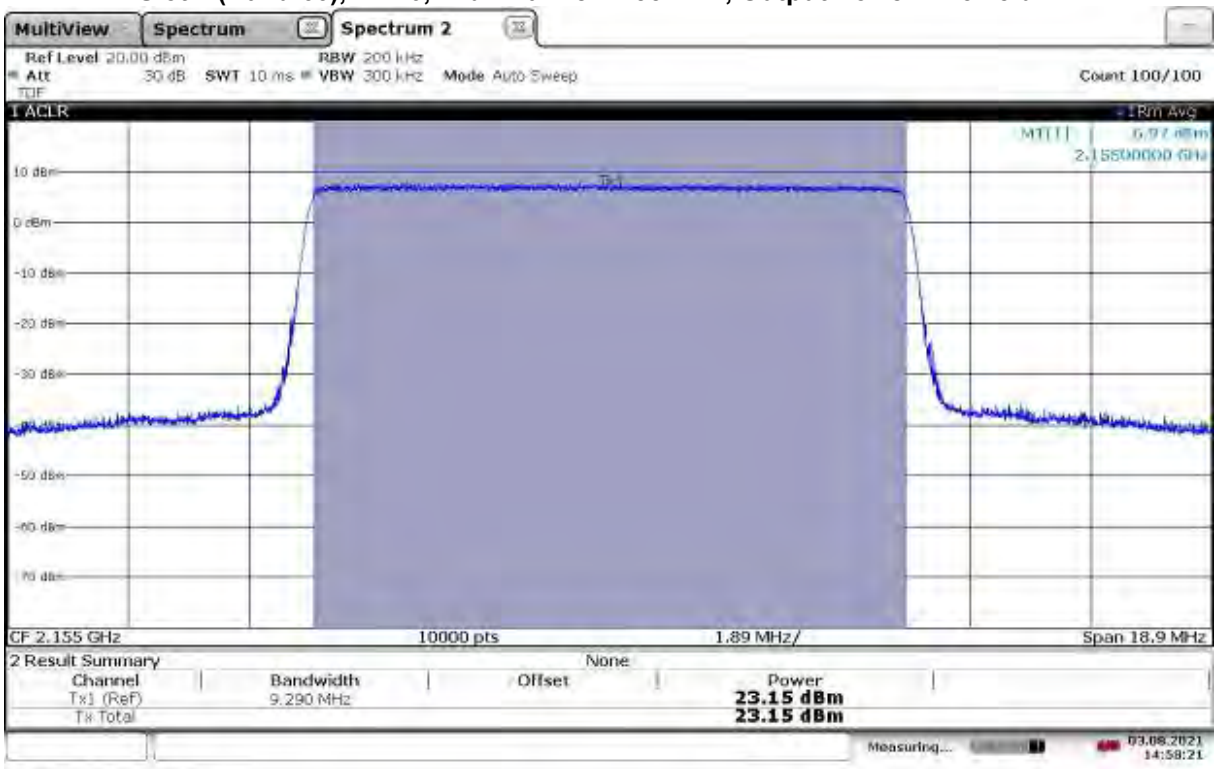
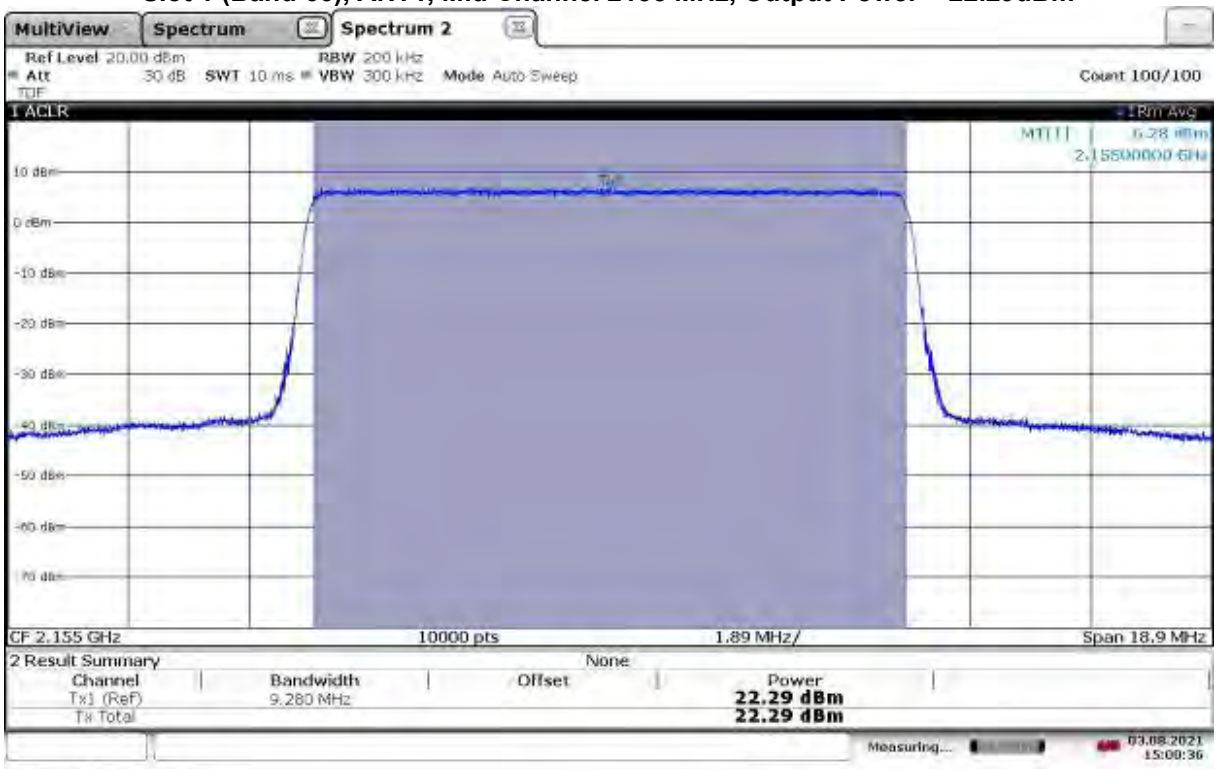
TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.15 dBm



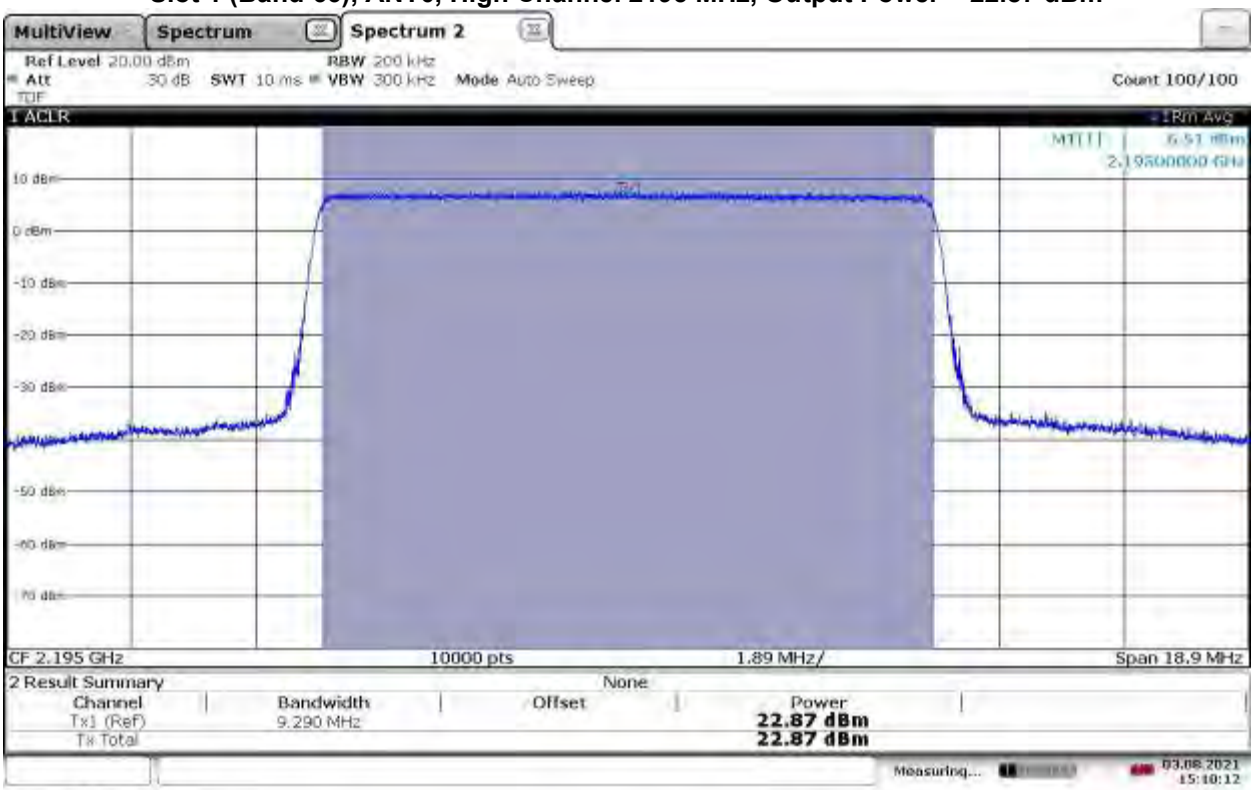
14:58:21 03.08.2021

TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.29dBm



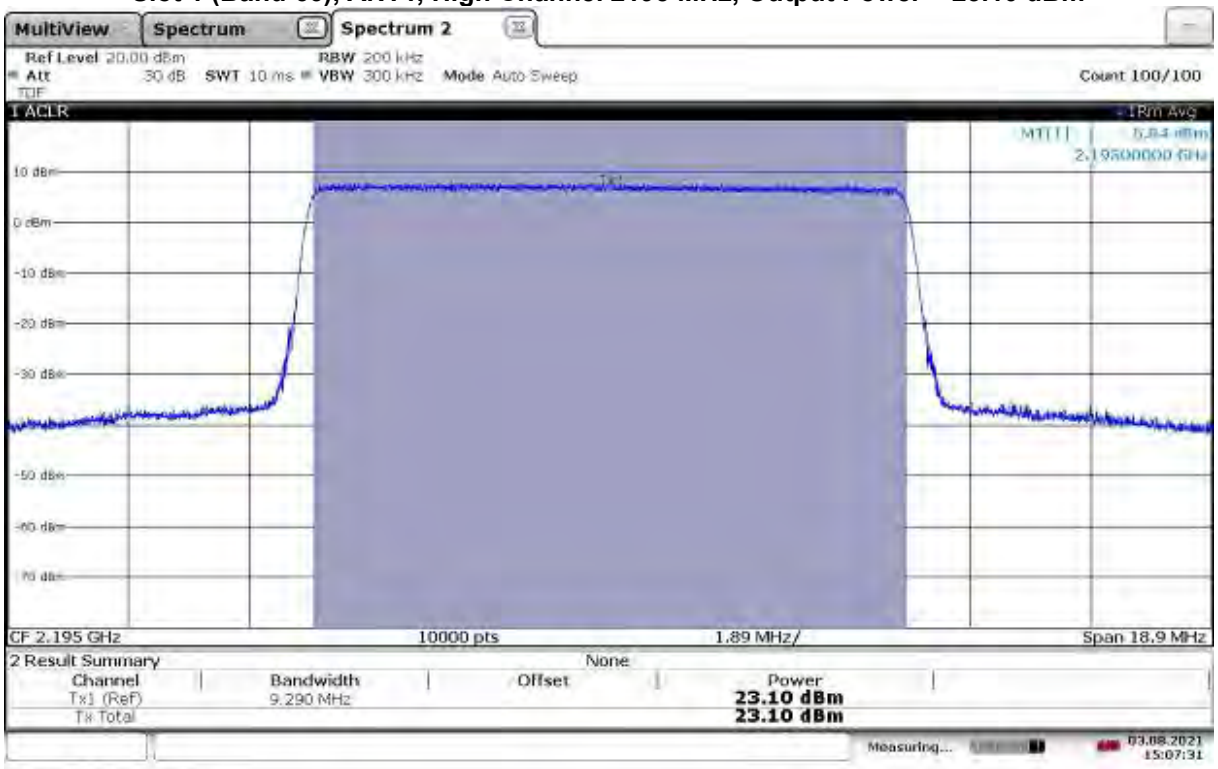
15:00:37 03.08.2021

TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2195 MHz, Output Power = 22.87 dBm



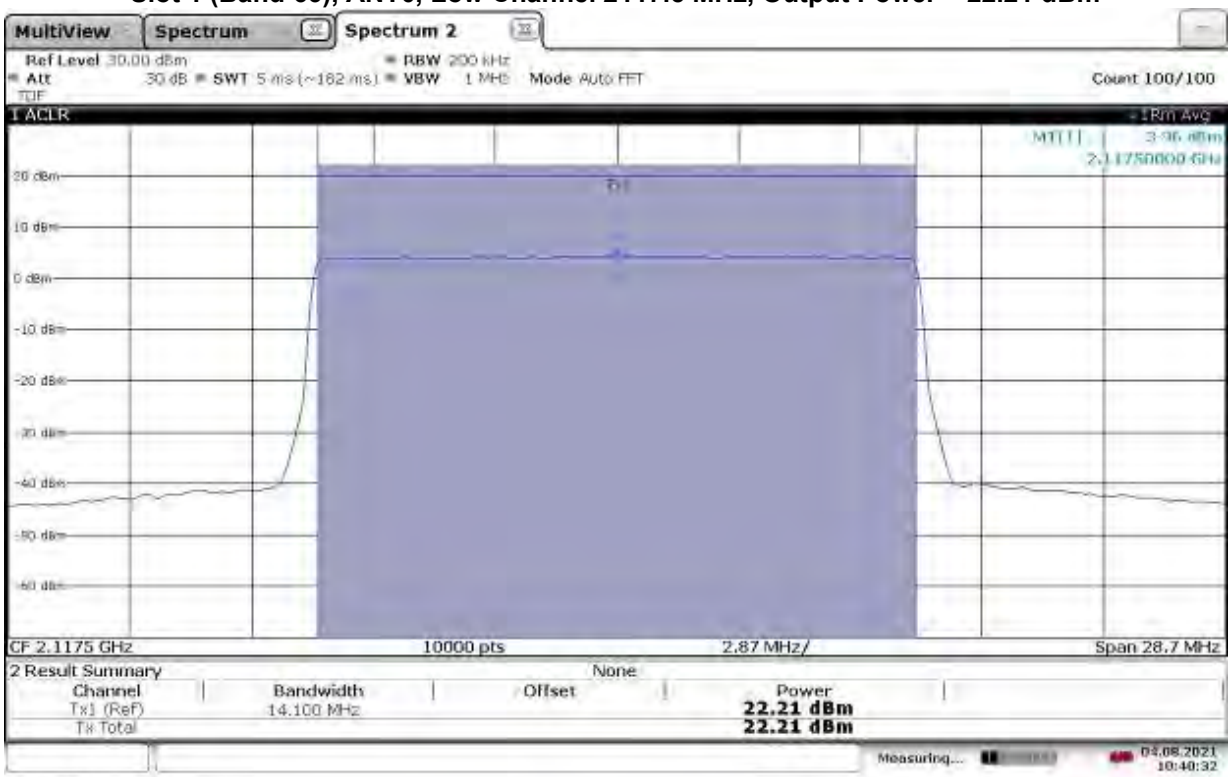
15:10:13 03.08.2021

TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2195 MHz, Output Power = 23.10 dBm



15:07:32 03.08.2021

TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2117.5 MHz, Output Power = 22.21 dBm



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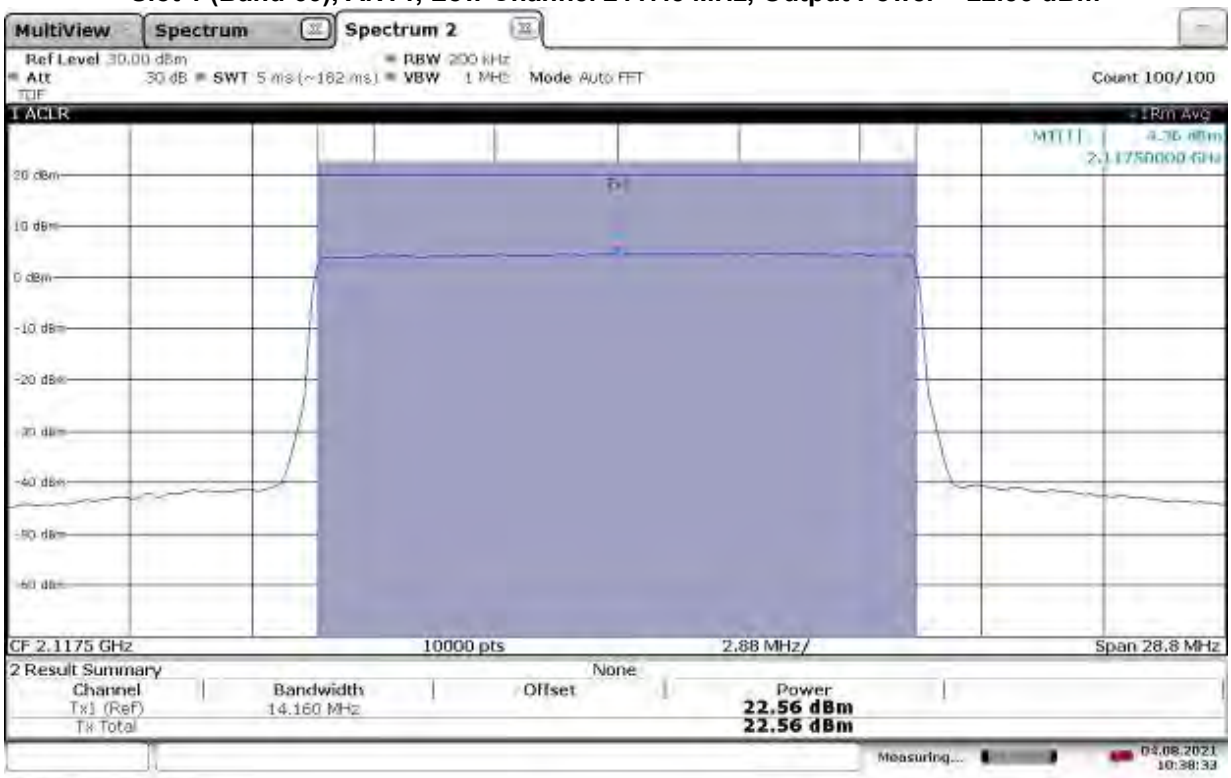
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2117.5 MHz, Output Power = 22.56 dBm



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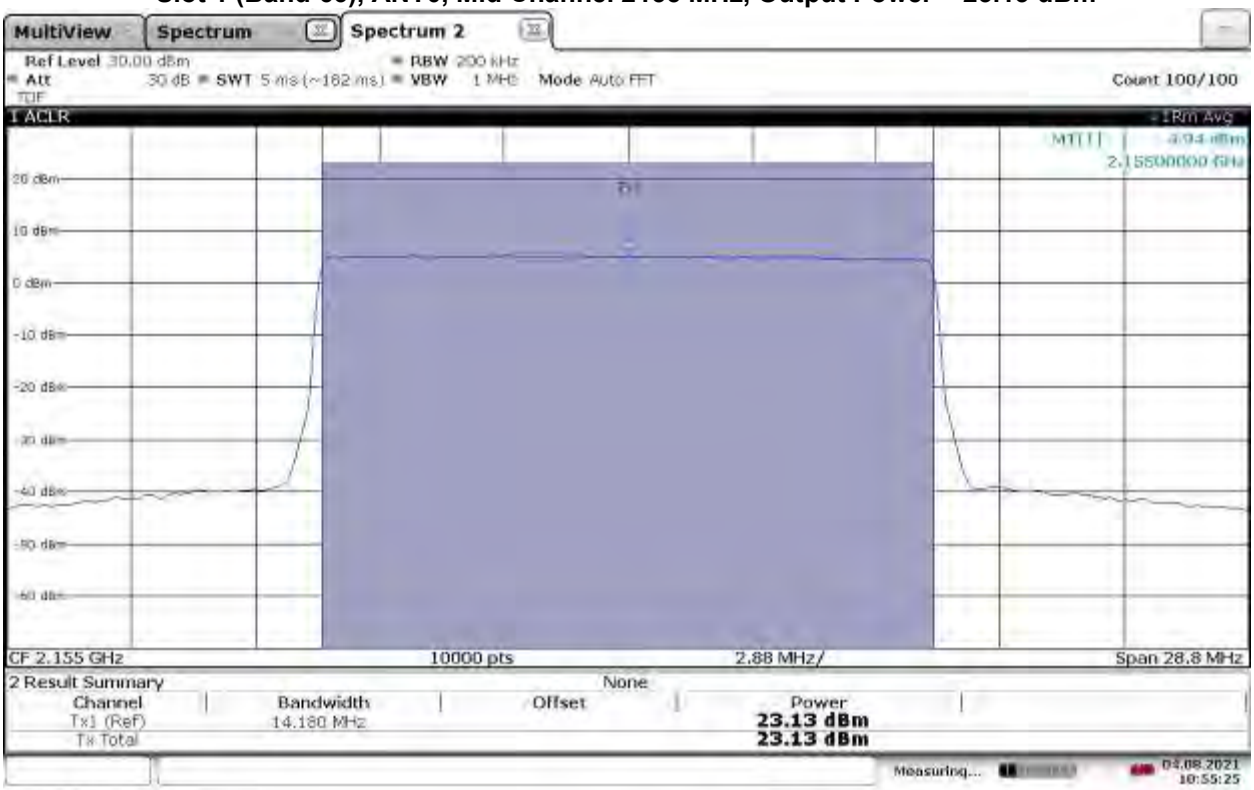
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.13 dBm



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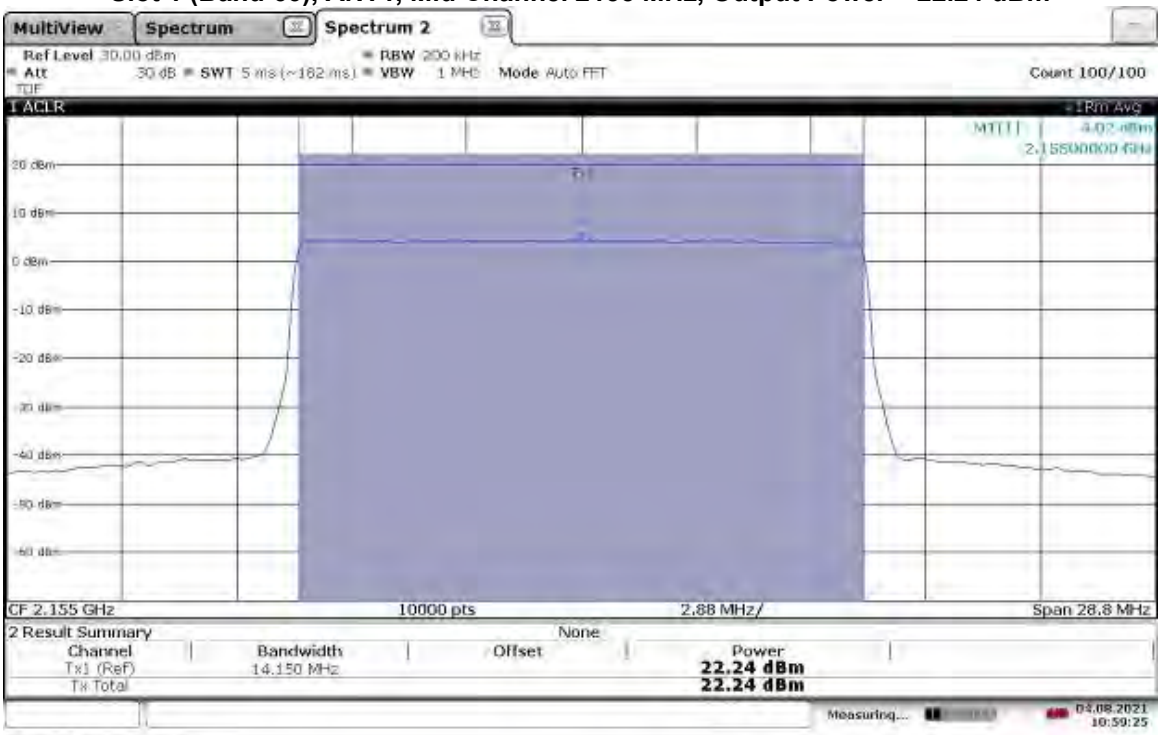
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.24 dBm



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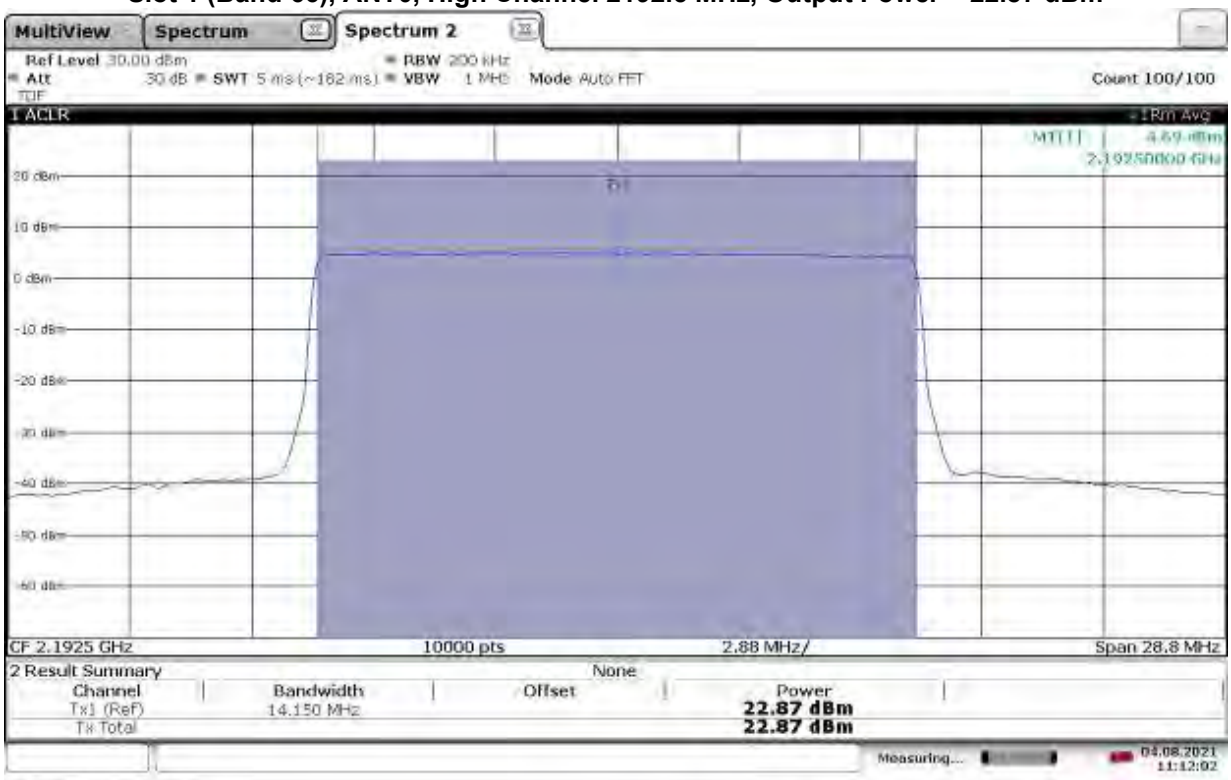
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2192.5 MHz, Output Power = 22.87 dBm



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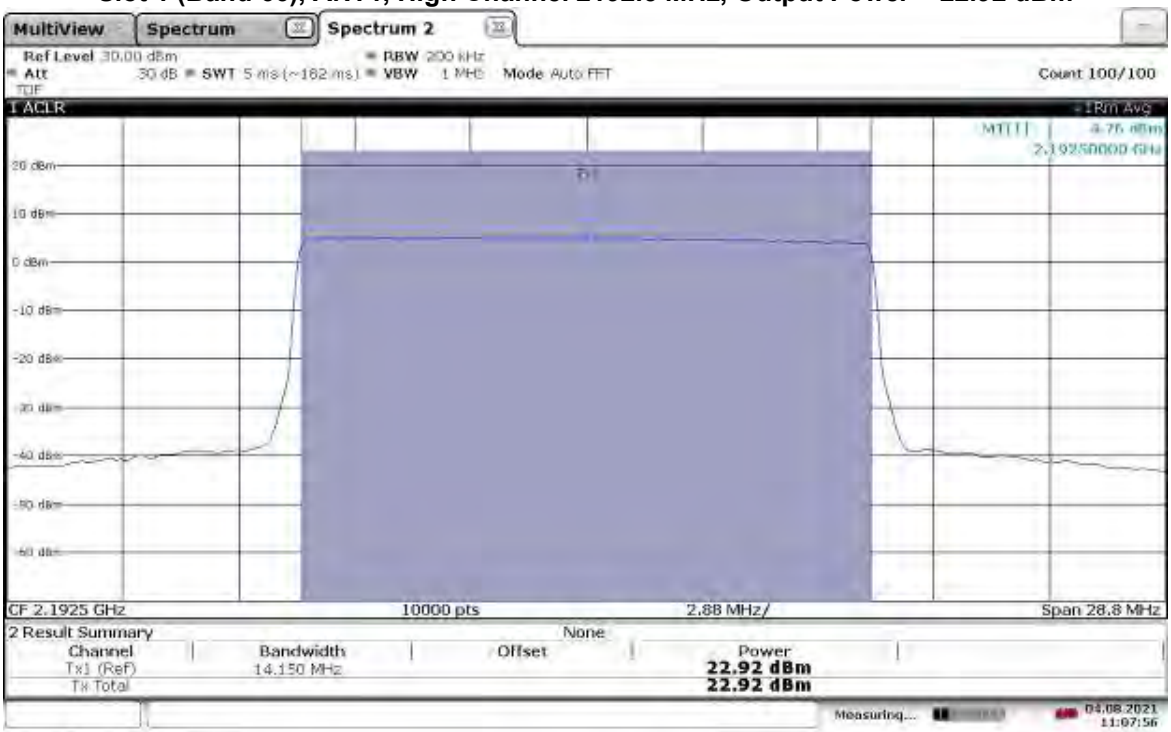
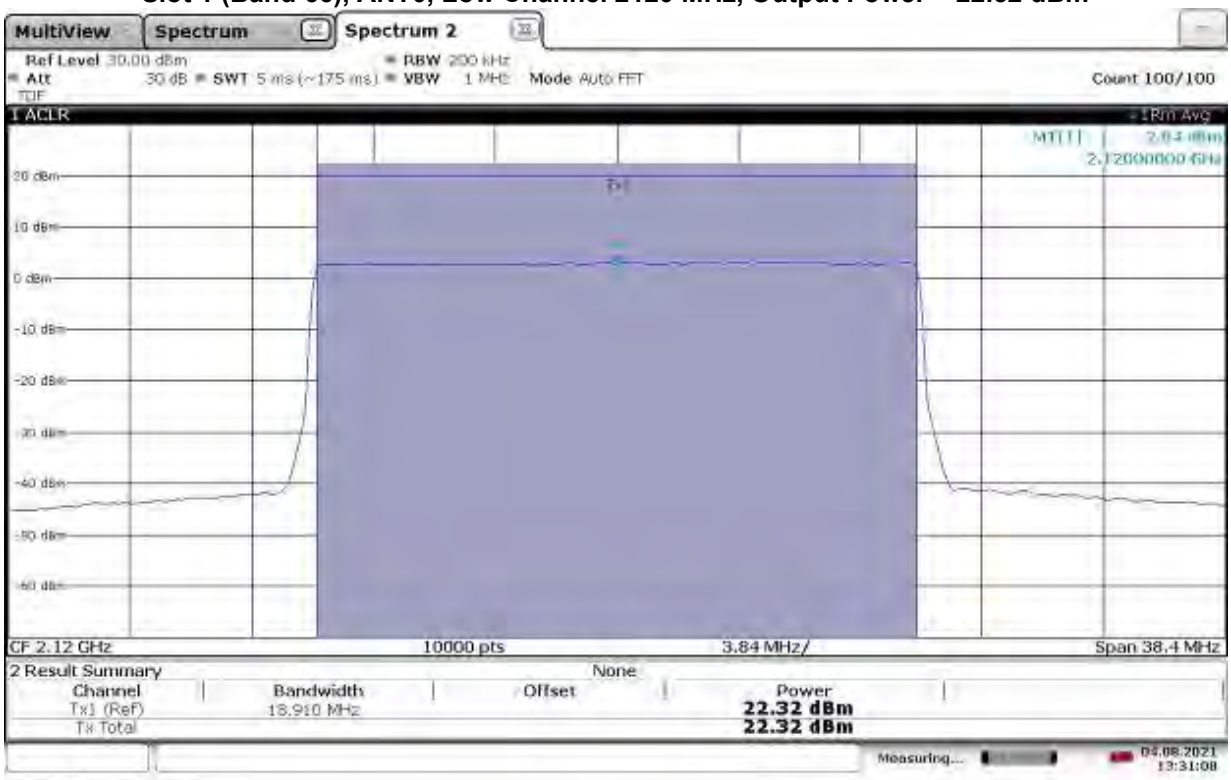
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2192.5 MHz, Output Power = 22.92 dBm

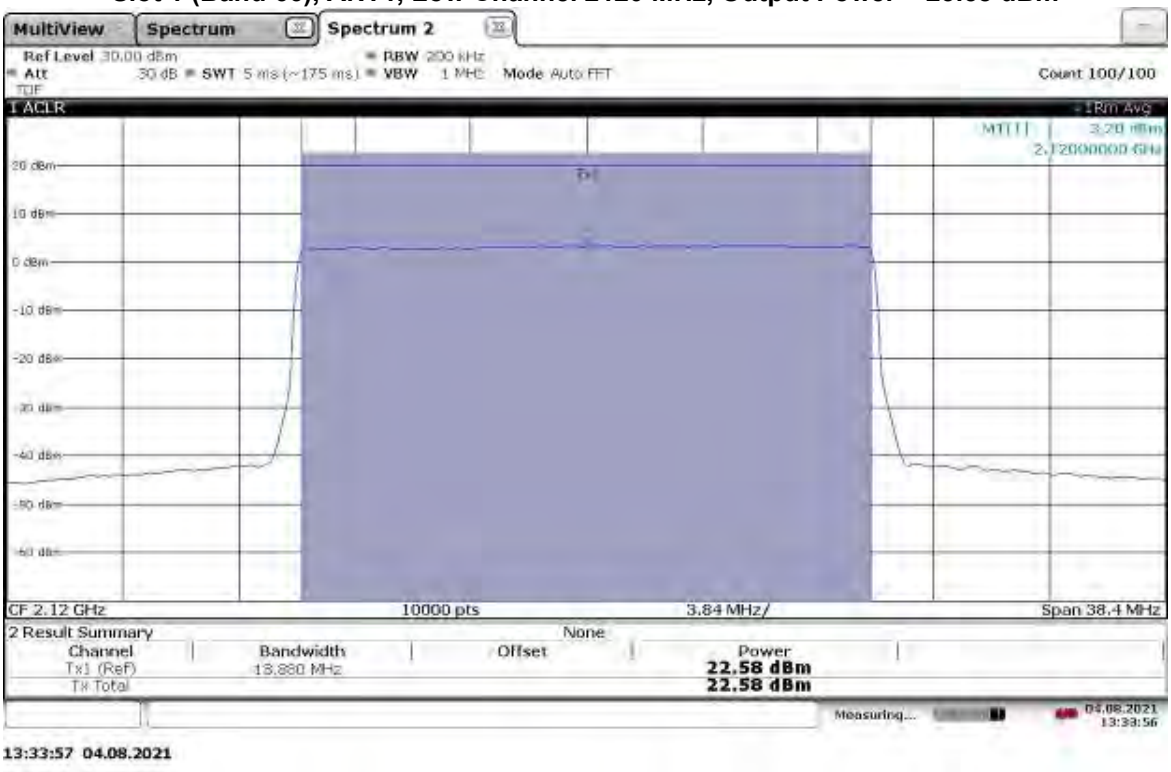


11:07:57 04.08.2021

TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2120 MHz, Output Power = 22.32 dBm

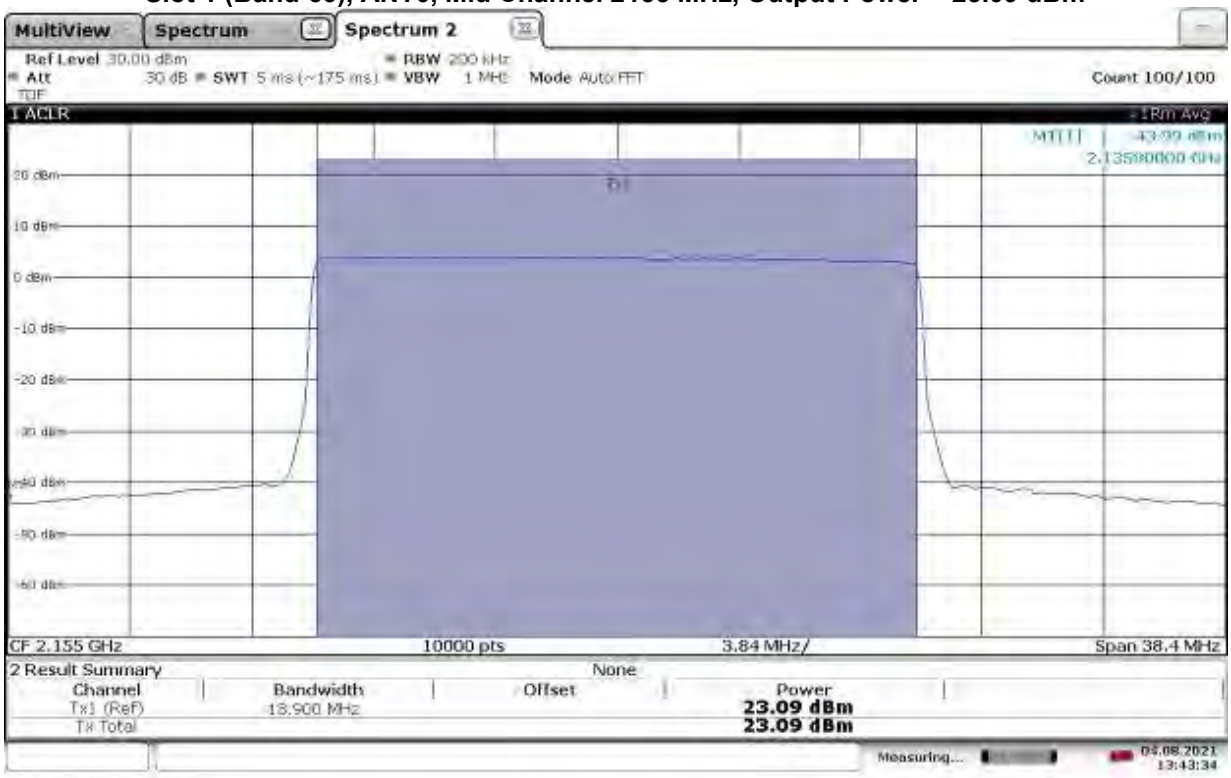


TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2120 MHz, Output Power = 23.58 dBm

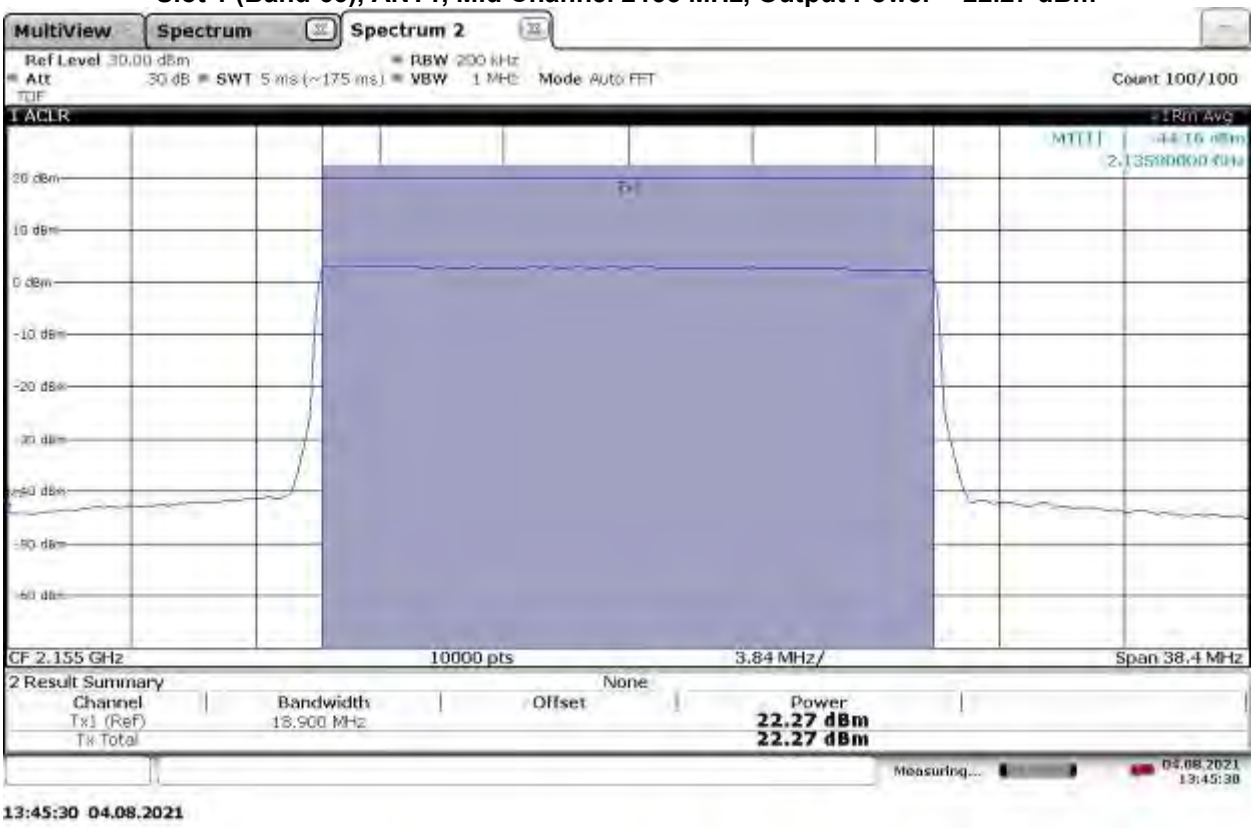


TM1.1-QPSK_20 MHz Bandwidth

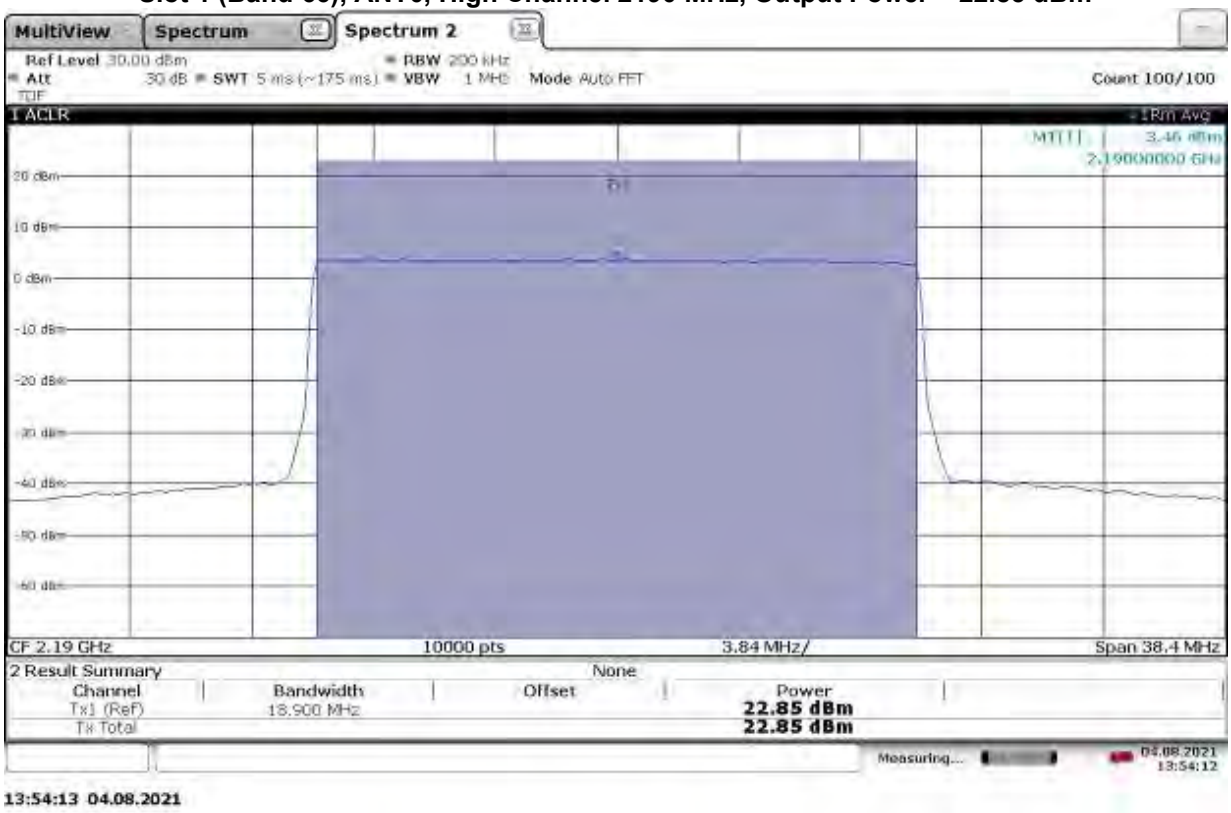
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.09 dBm



TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.27 dBm

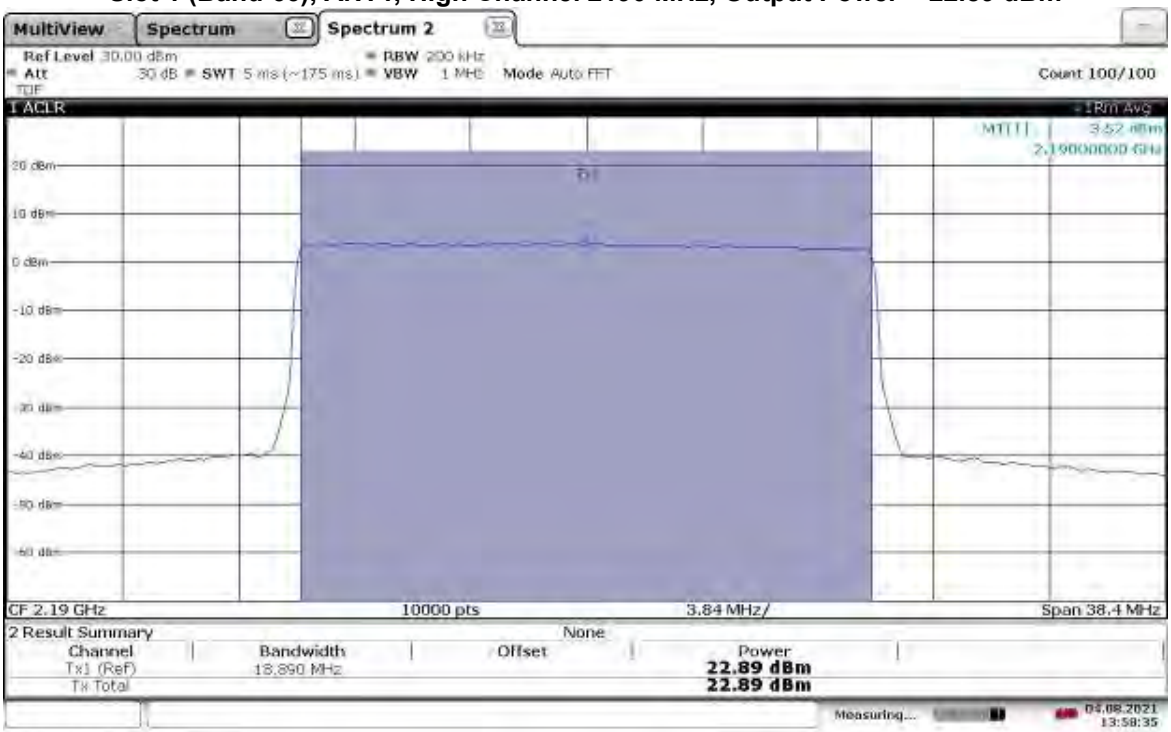


TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2190 MHz, Output Power = 22.85 dBm



13:54:13 04.08.2021

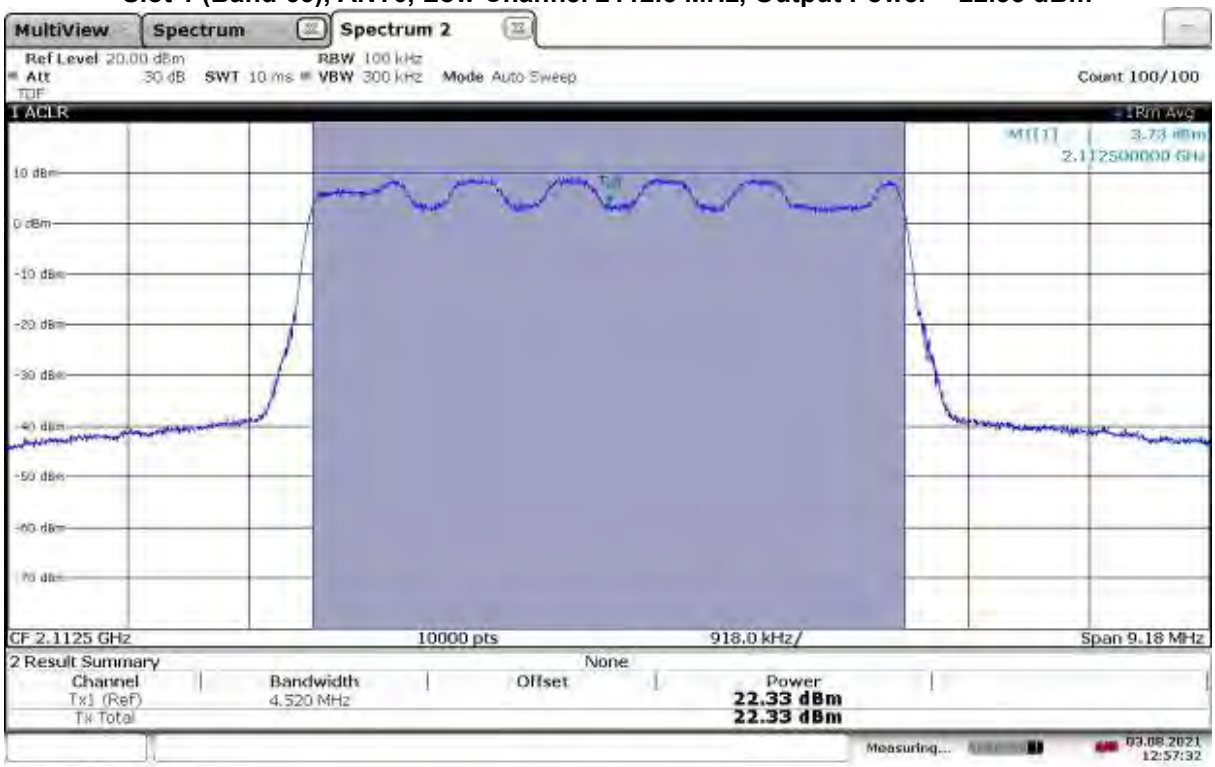
TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2190 MHz, Output Power = 22.89 dBm



13:58:35 04.08.2021

TM3.2-16QAM_5 MHz Bandwidth

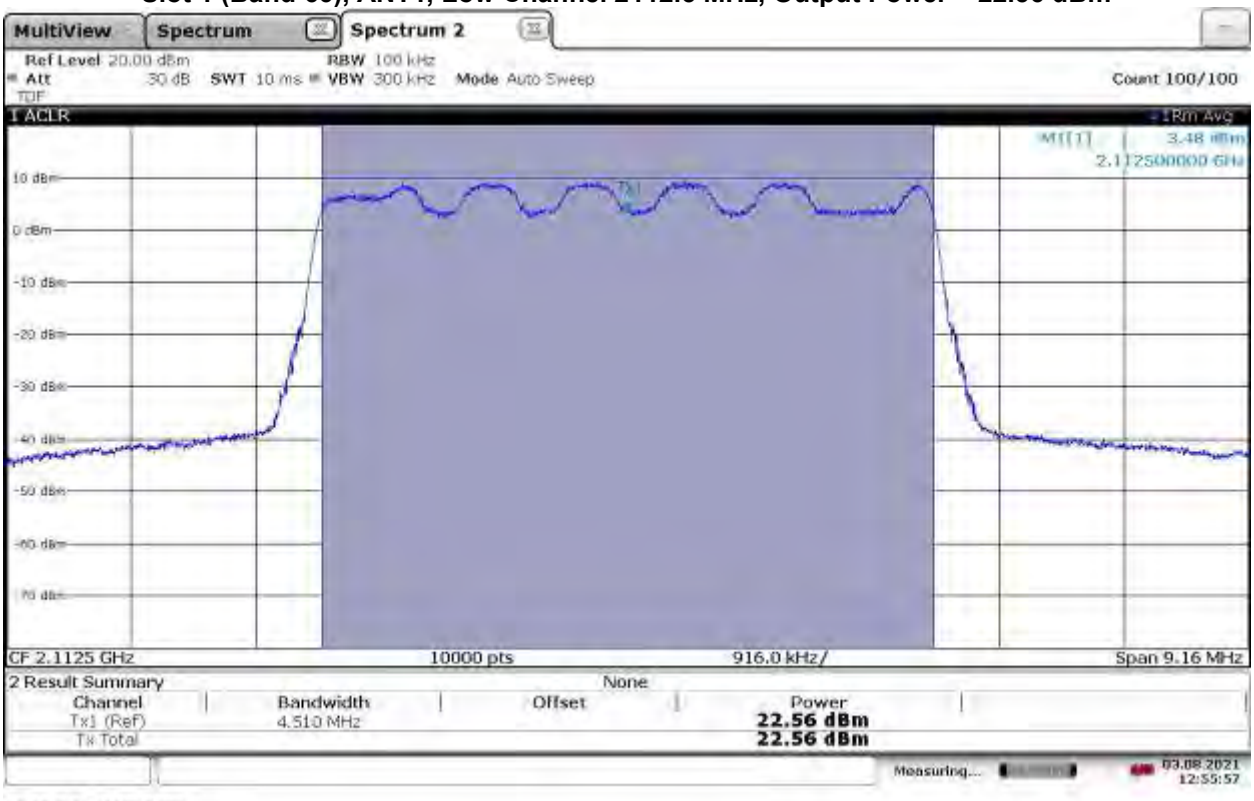
Slot 1 (Band 66), ANT0, Low Channel 2112.5 MHz, Output Power = 22.33 dBm



12:57:32 03.08.2021

TM3.2-16QAM_5 MHz Bandwidth

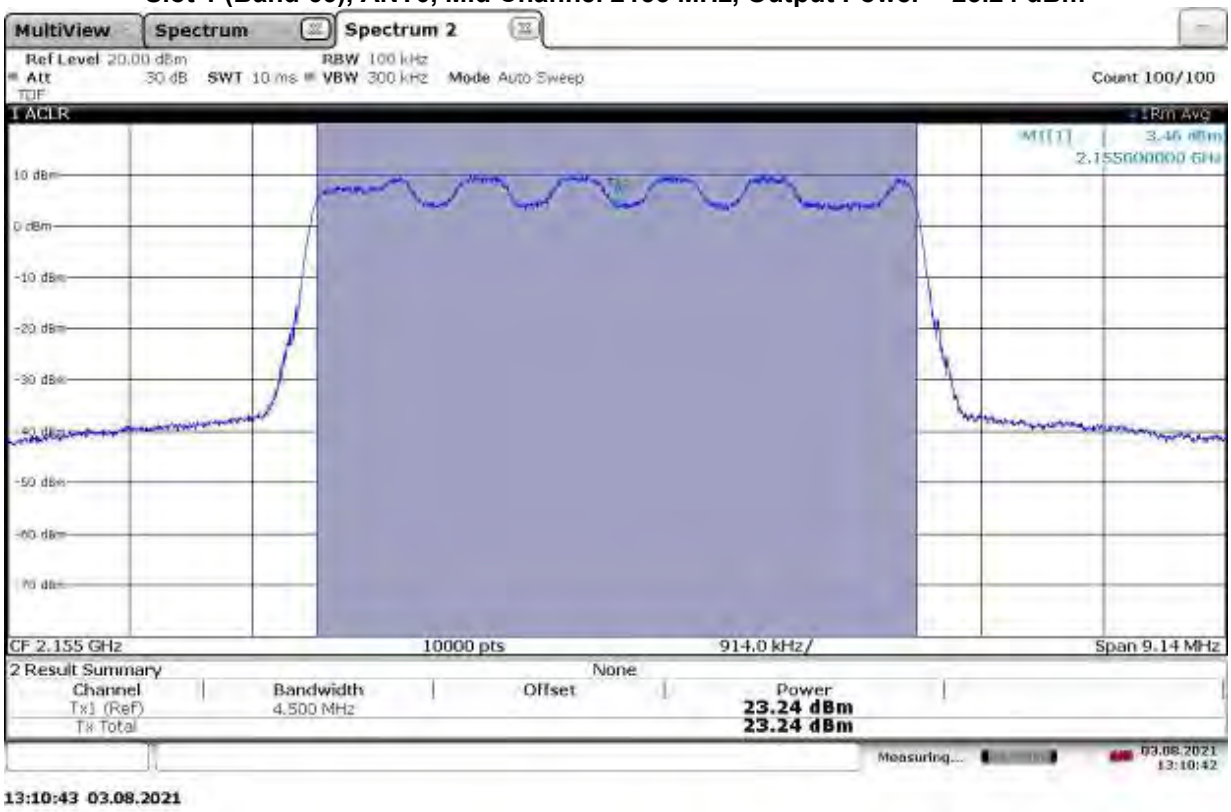
Slot 1 (Band 66), ANT1, Low Channel 2112.5 MHz, Output Power = 22.56 dBm



12:55:57 03.08.2021

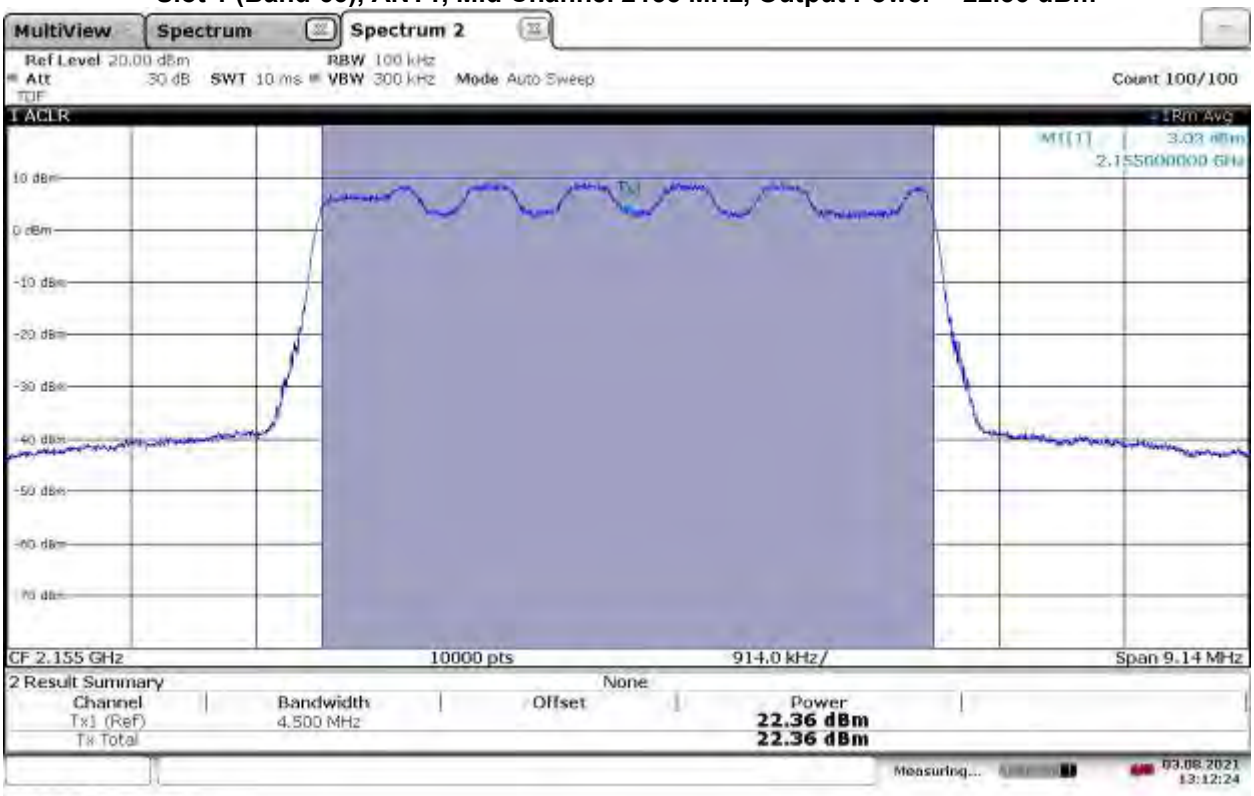
TM3.2-16QAM_5 MHz Bandwidth

Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.24 dBm



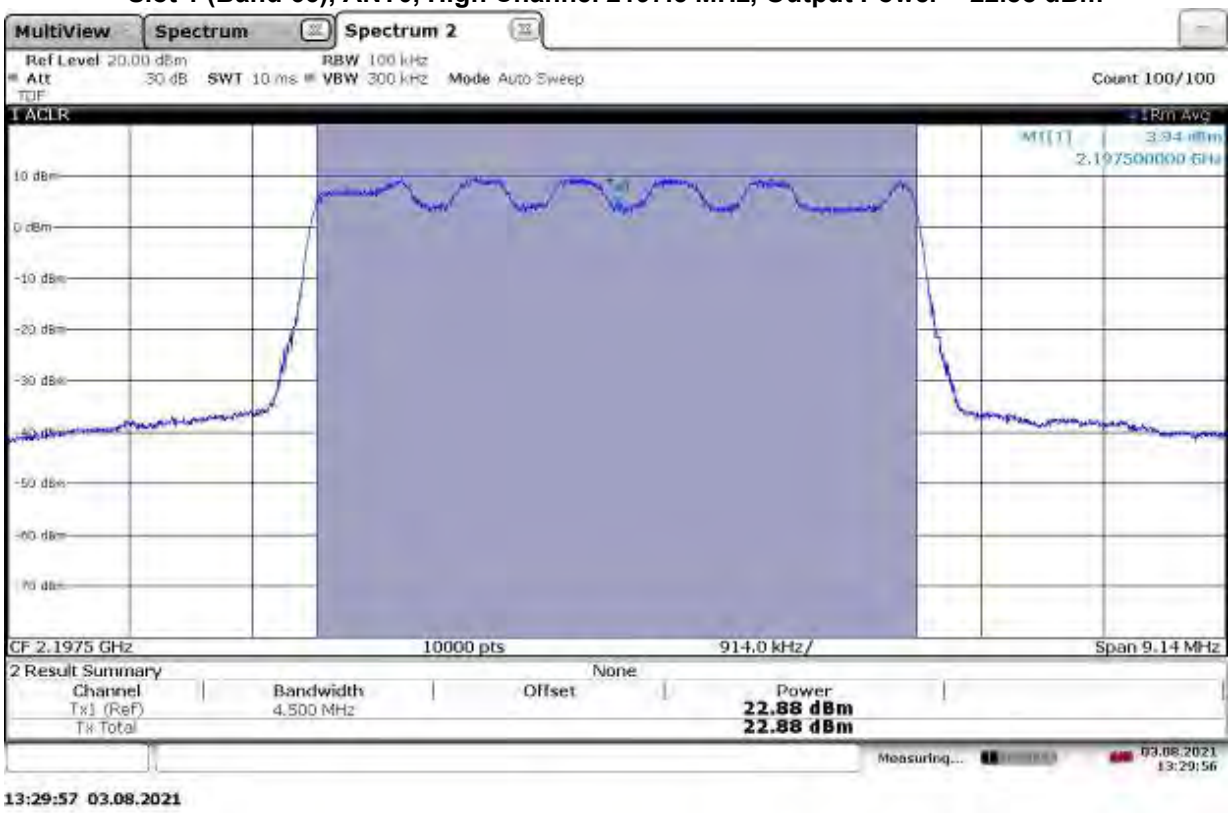
13:10:43 03.08.2021

TM3.2-16QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.36 dBm

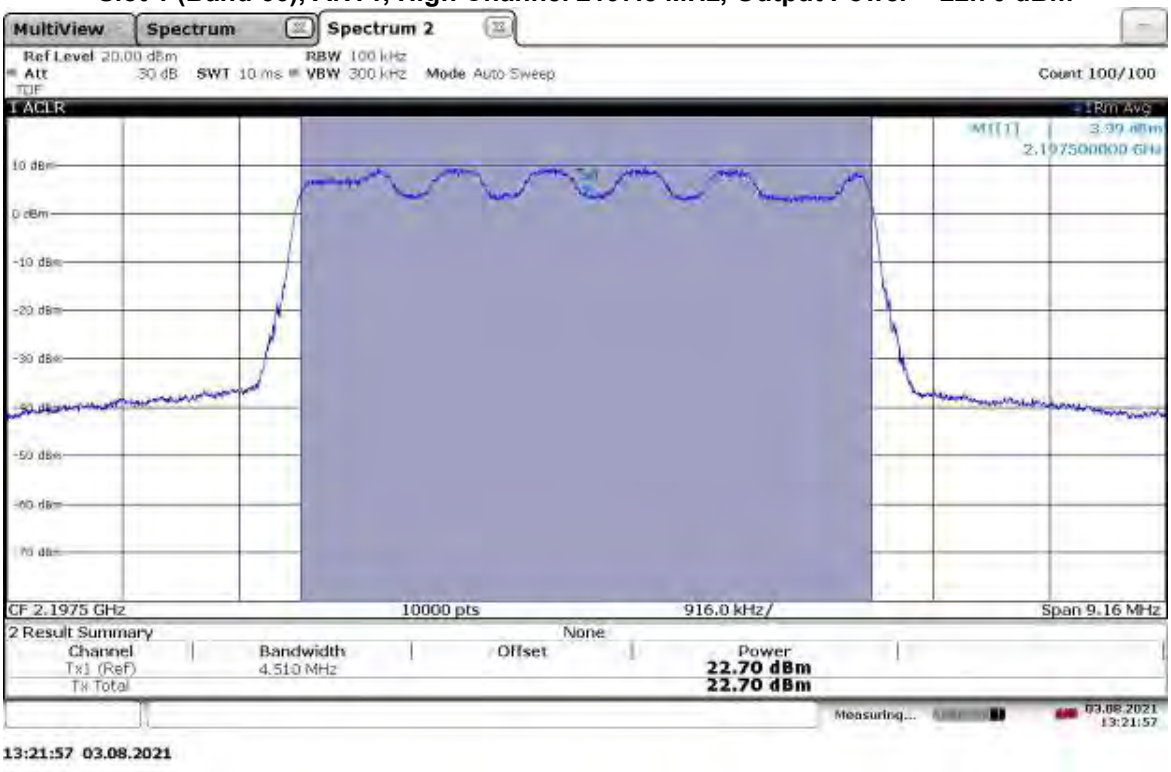


13:12:24 03.08.2021

TM3.2-16QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2197.5 MHz, Output Power = 22.88 dBm

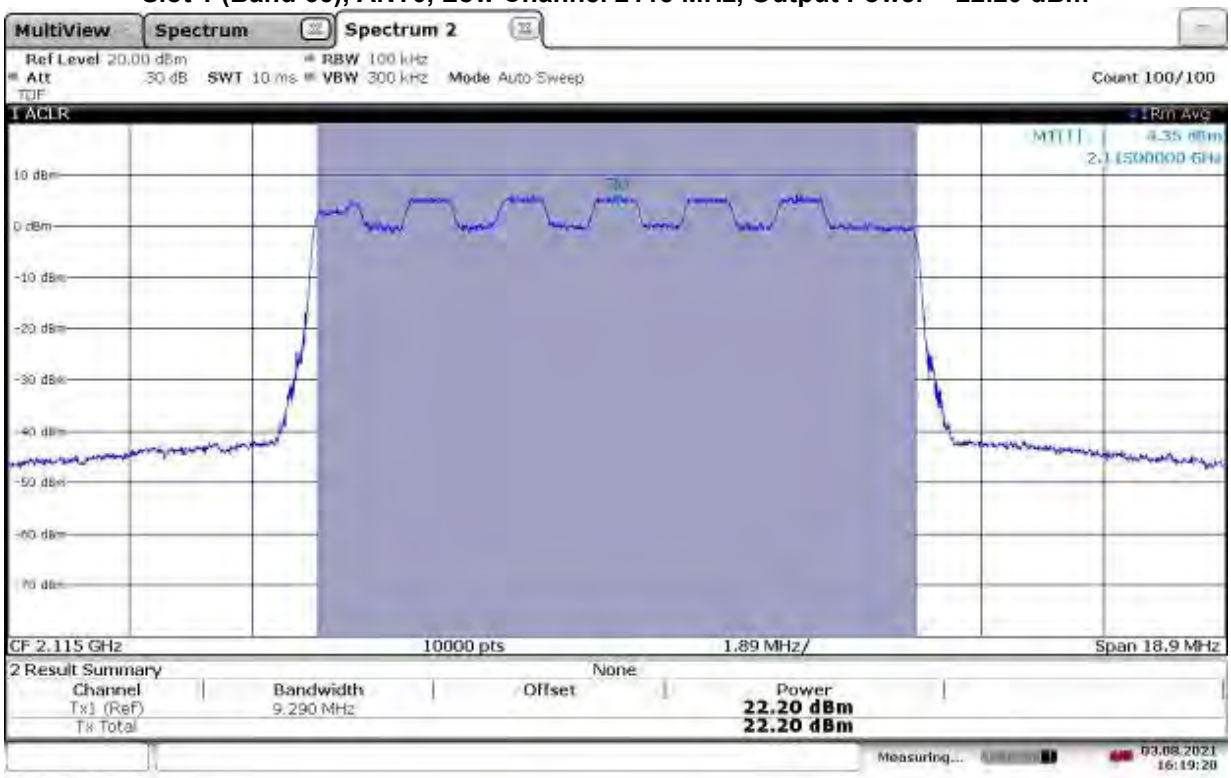


TM3.2-16QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2197.5 MHz, Output Power = 22.70 dBm



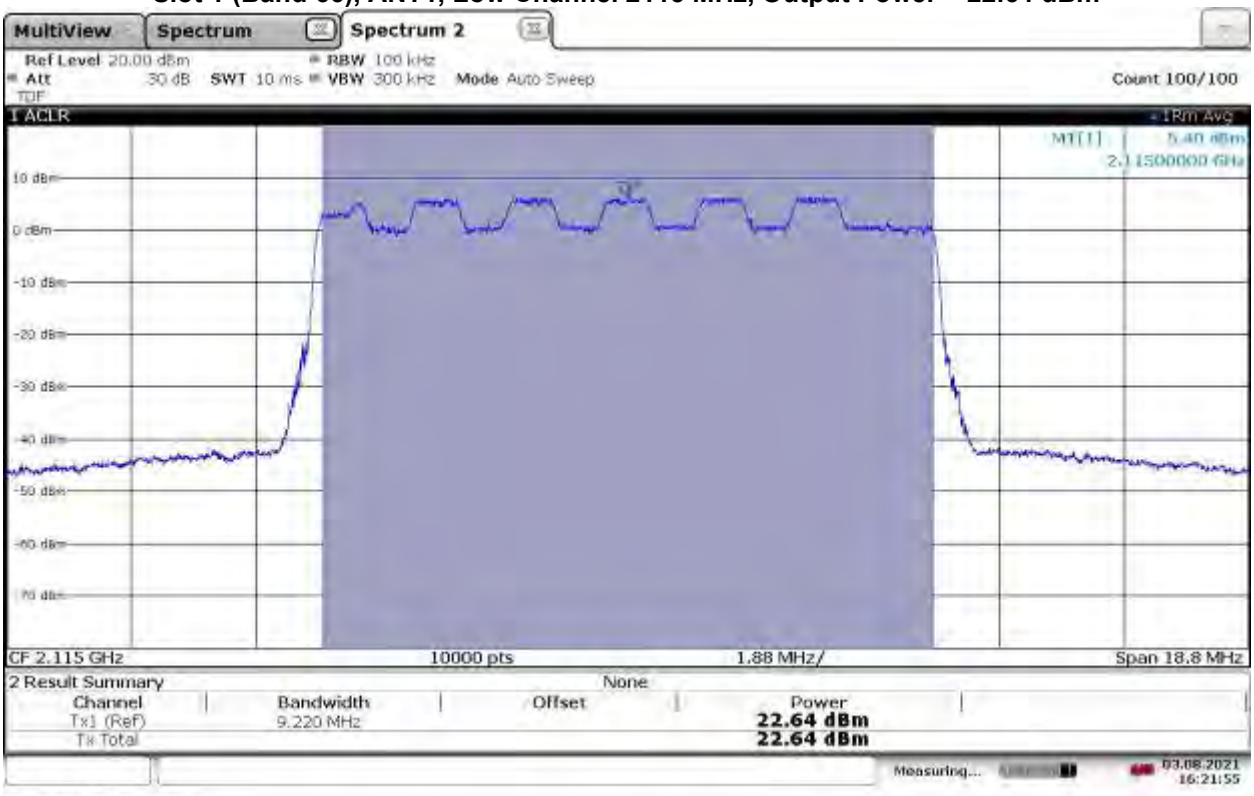
TM3.2-16QAM_10 MHz Bandwidth

Slot 1 (Band 66), ANT0, Low Channel 2115 MHz, Output Power = 22.20 dBm



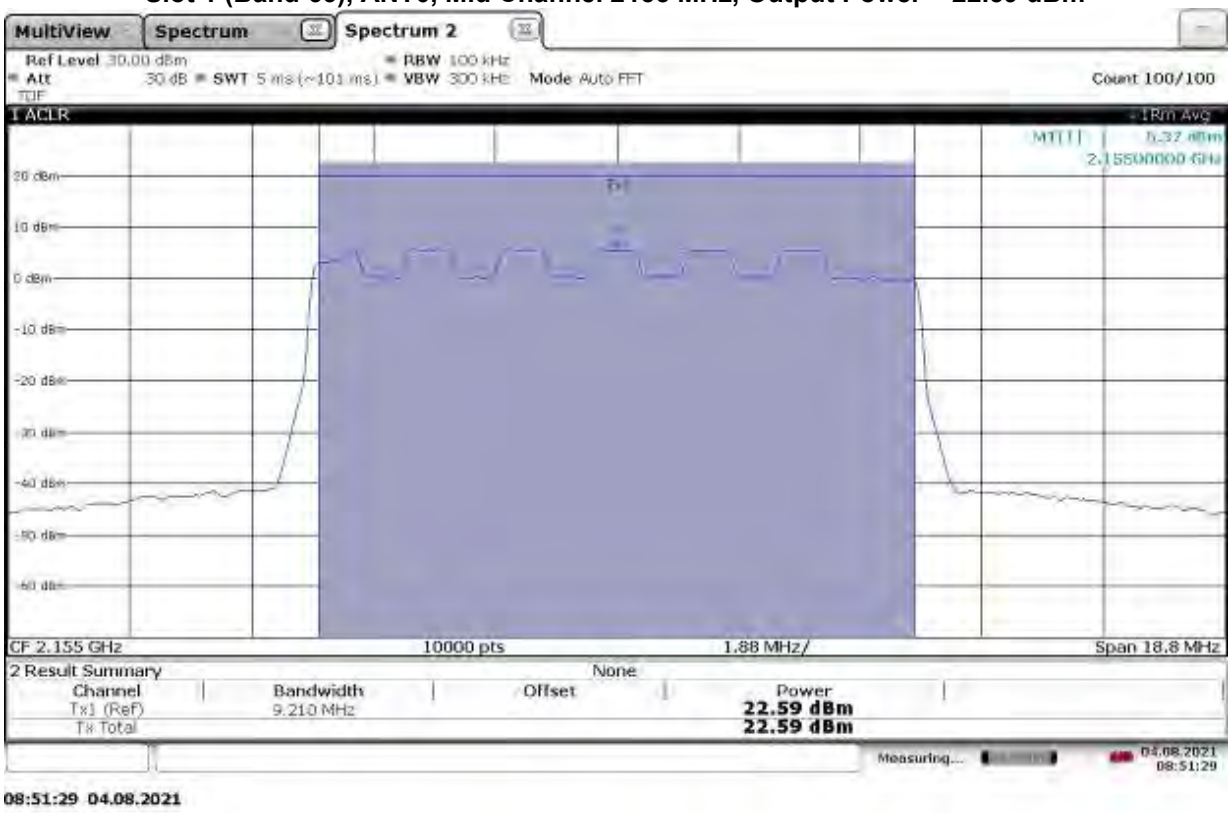
16:19:20 03.08.2021

TM3.2-16QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2115 MHz, Output Power = 22.64 dBm

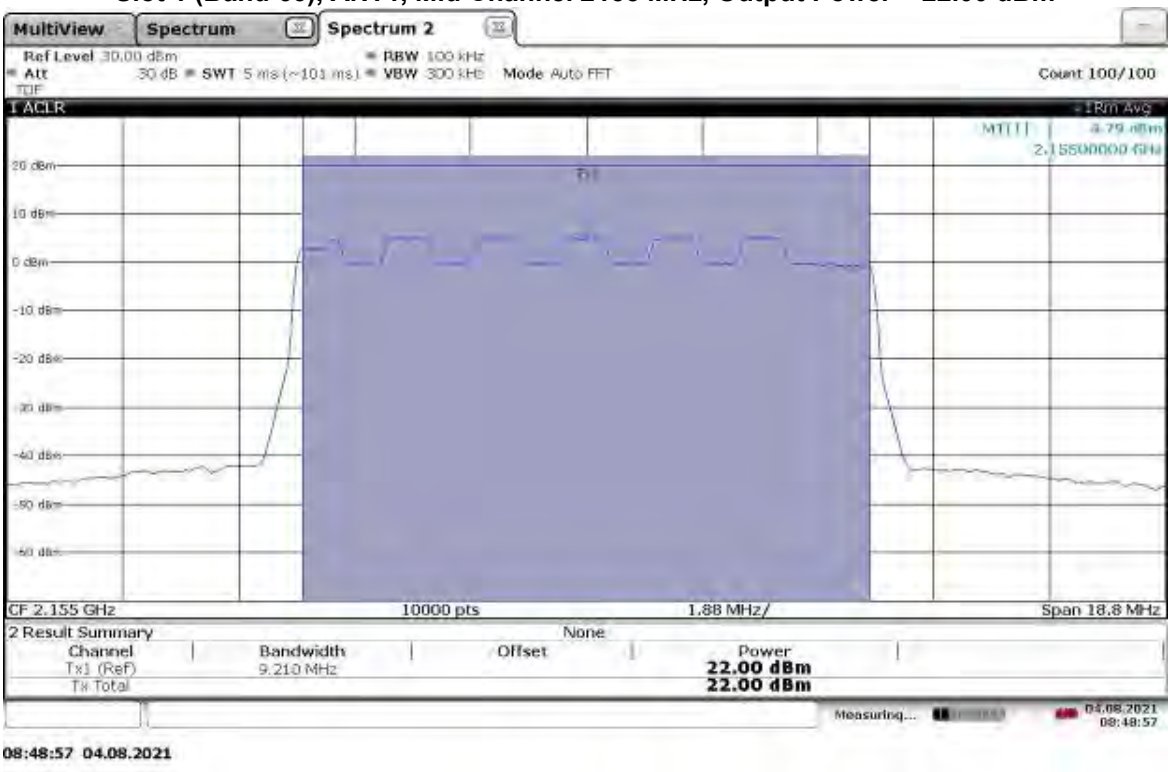


16:21:55 03.08.2021

TM3.2-16QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 22.59 dBm

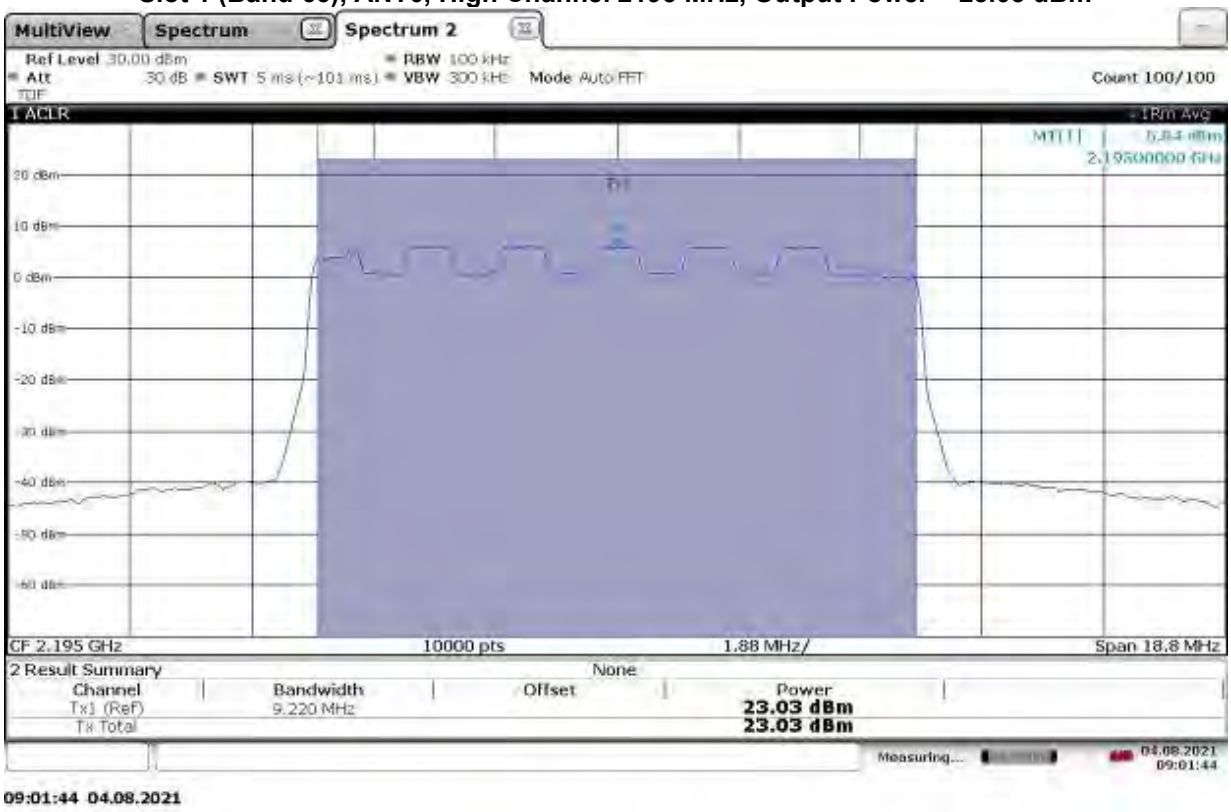


TM3.2-16QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.00 dBm



TM3.2-16QAM_10 MHz Bandwidth

Slot 1 (Band 66), ANT0, High Channel 2195 MHz, Output Power = 23.03 dBm



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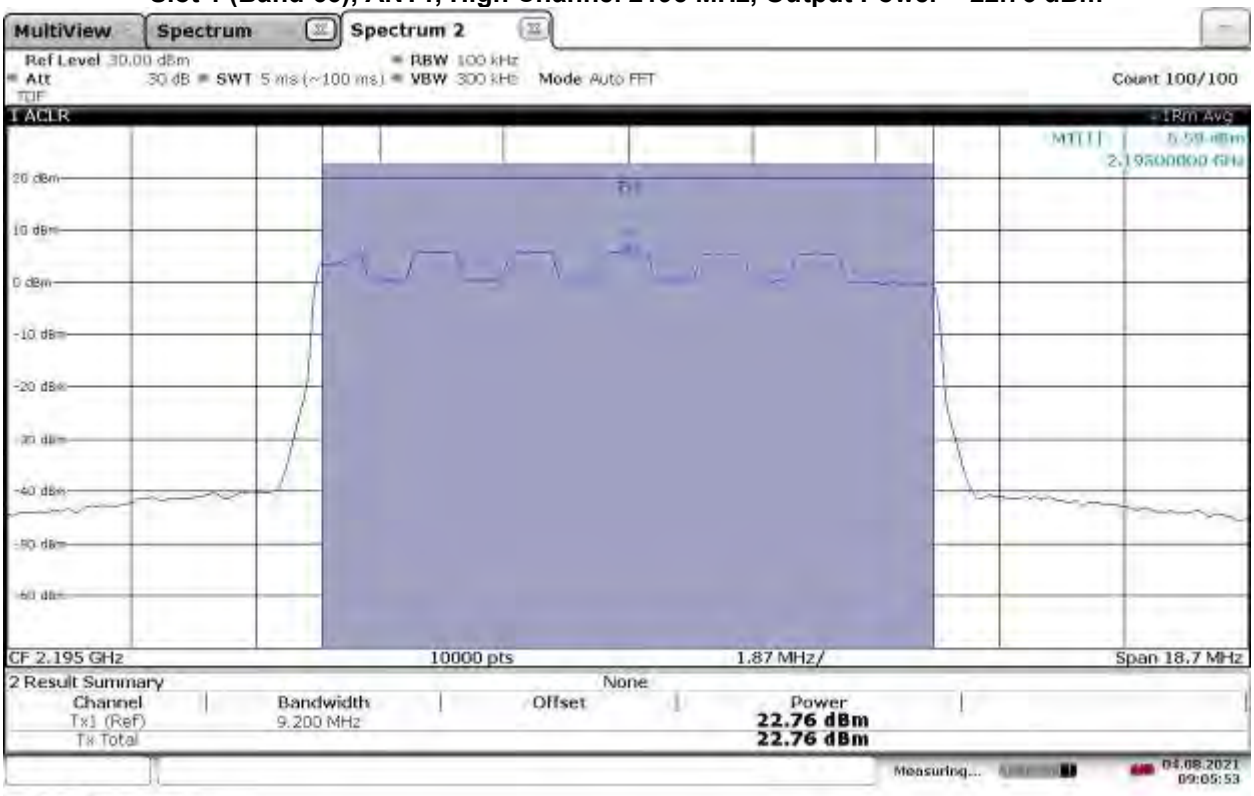
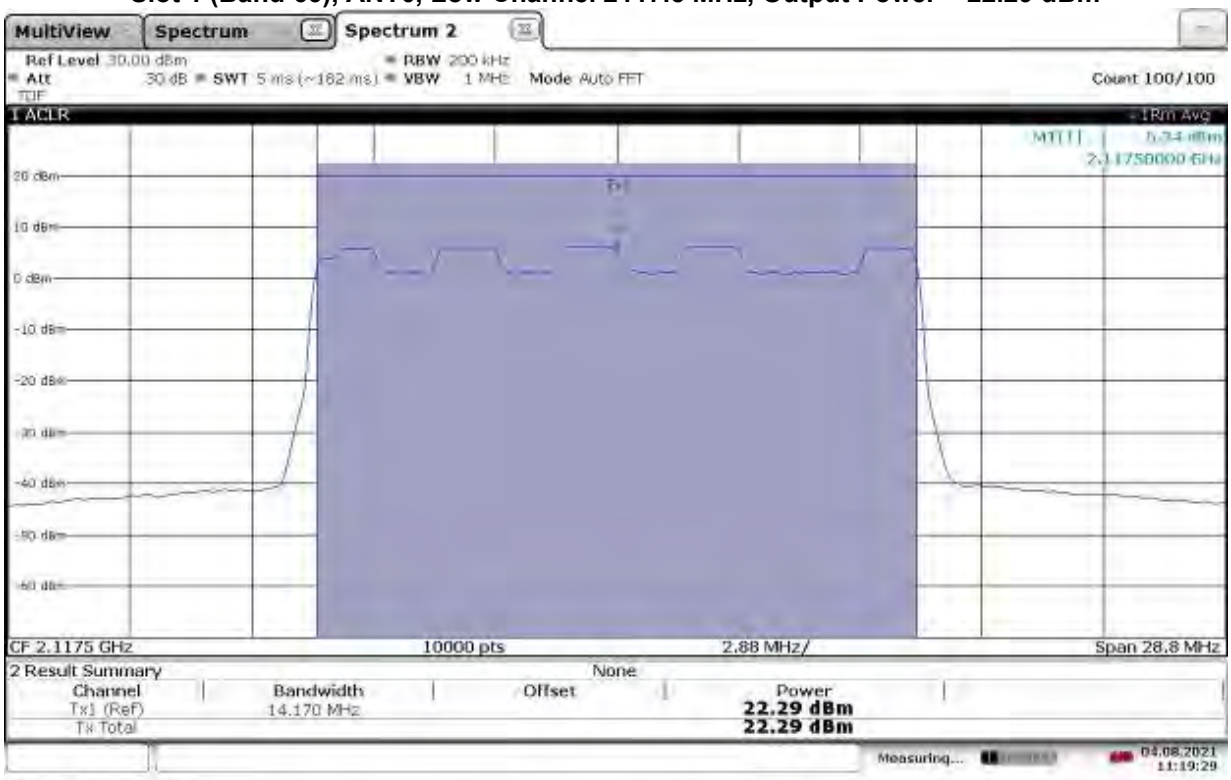
TM3.2-16QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2195 MHz, Output Power = 22.76 dBm

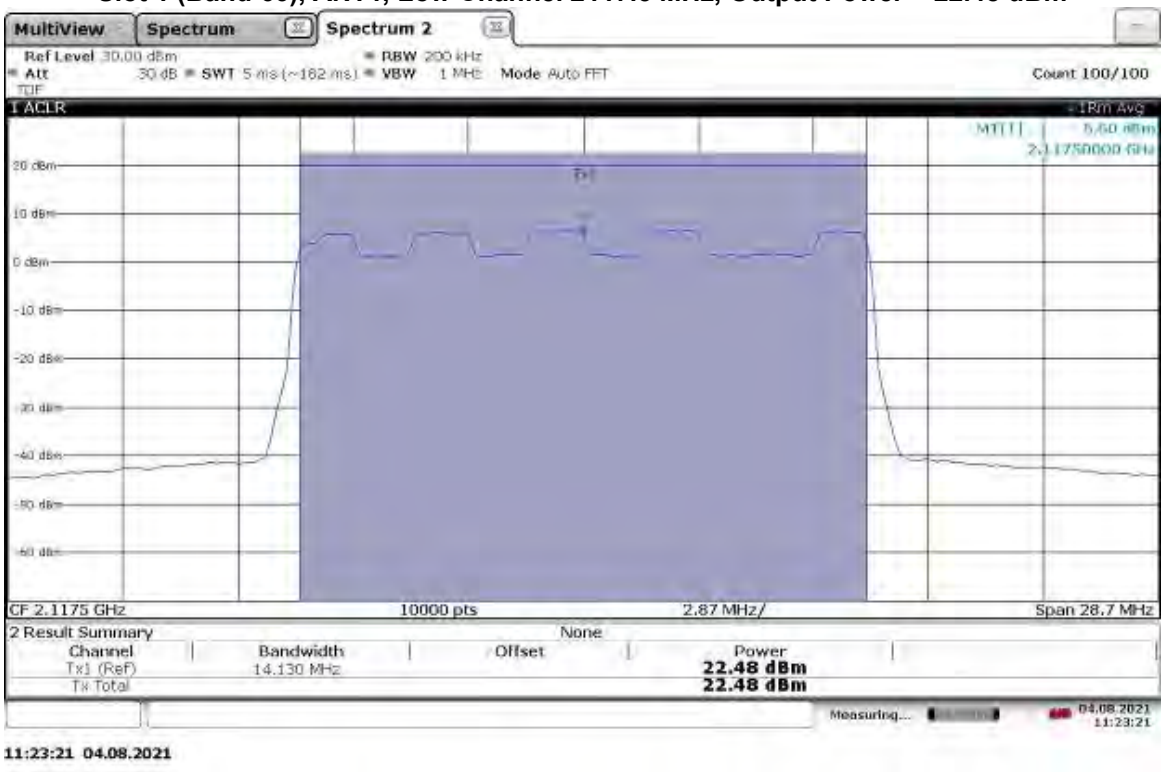


09:05:54 04.08.2021

TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2117.5 MHz, Output Power = 22.29 dBm

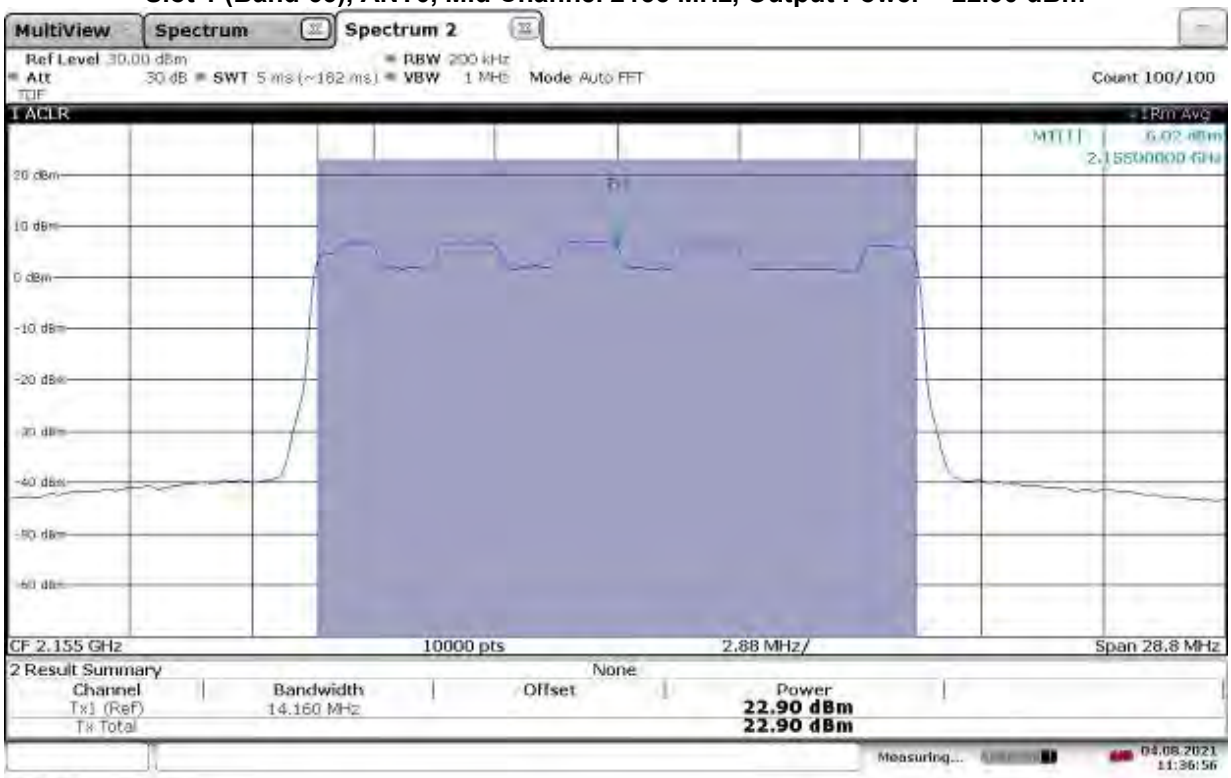


TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2117.5 MHz, Output Power = 22.48 dBm

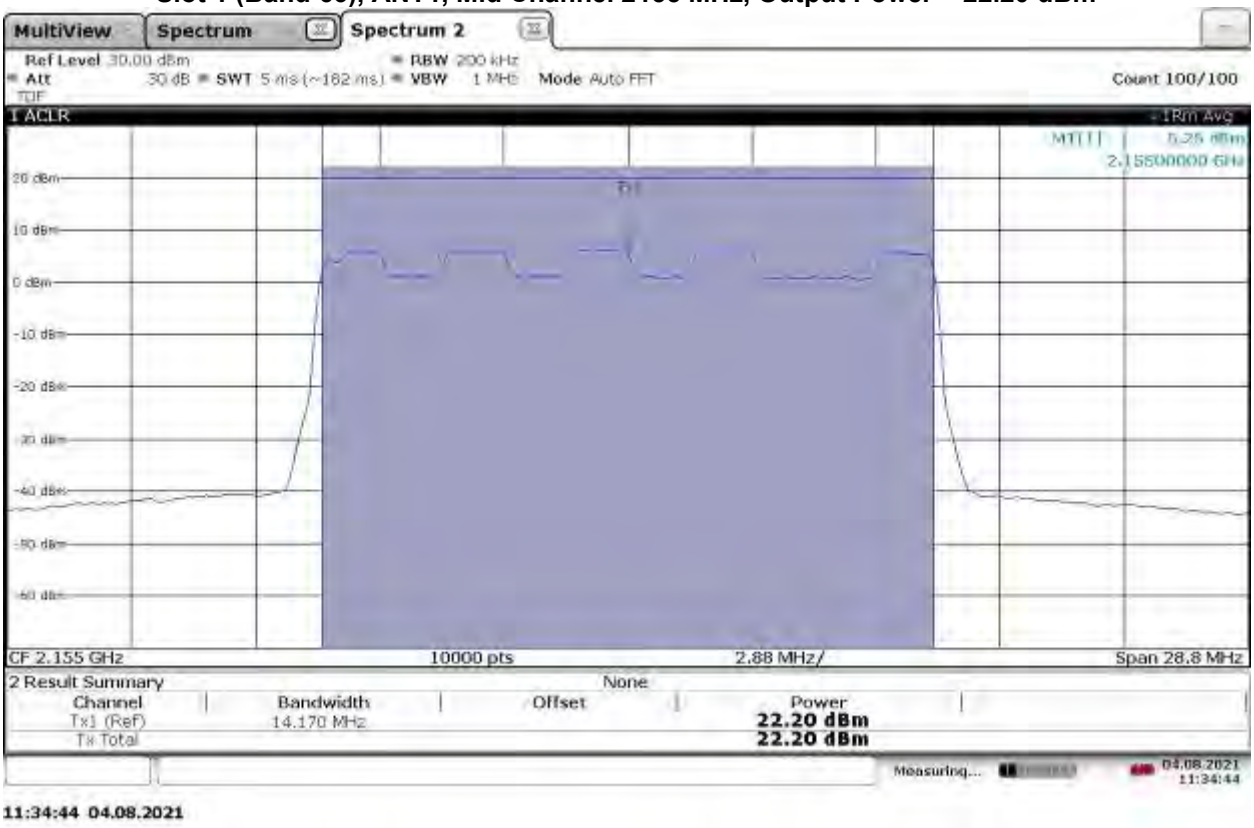


TM3.2-16QAM_15 MHz Bandwidth

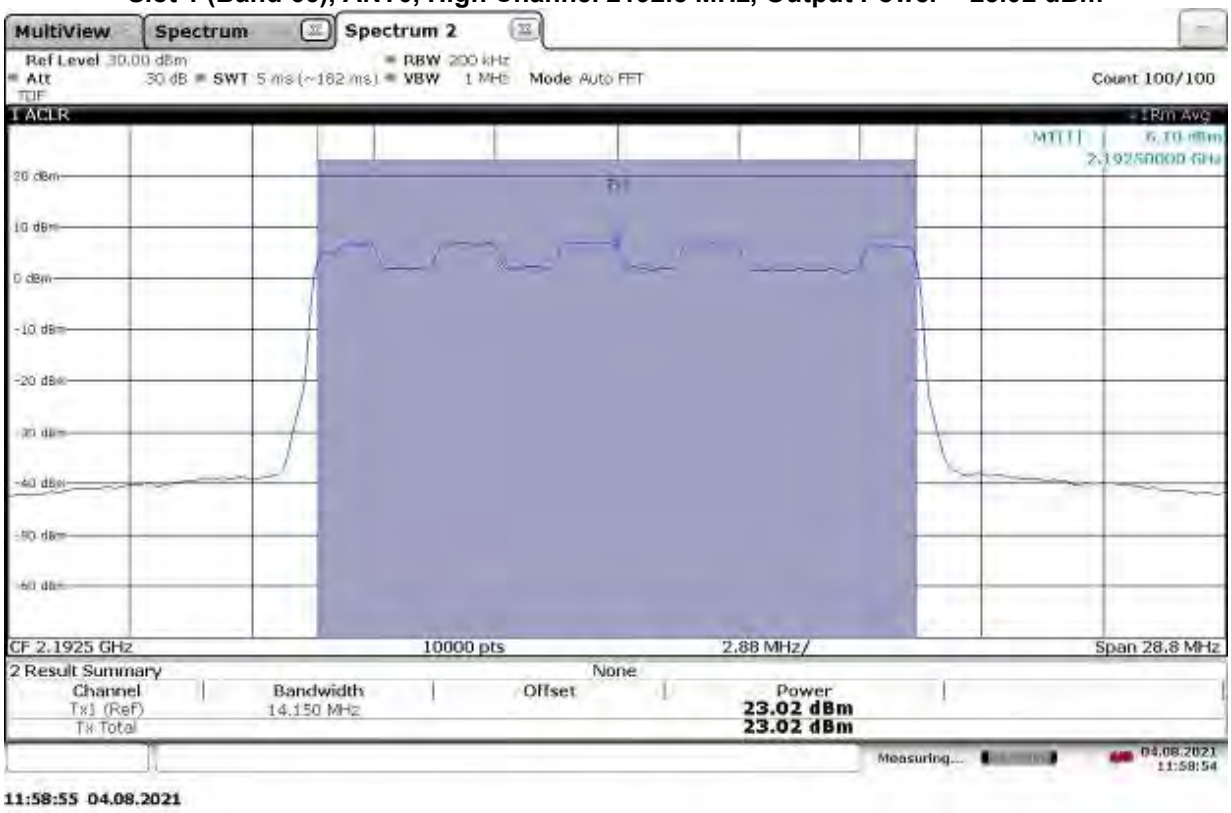
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 22.90 dBm



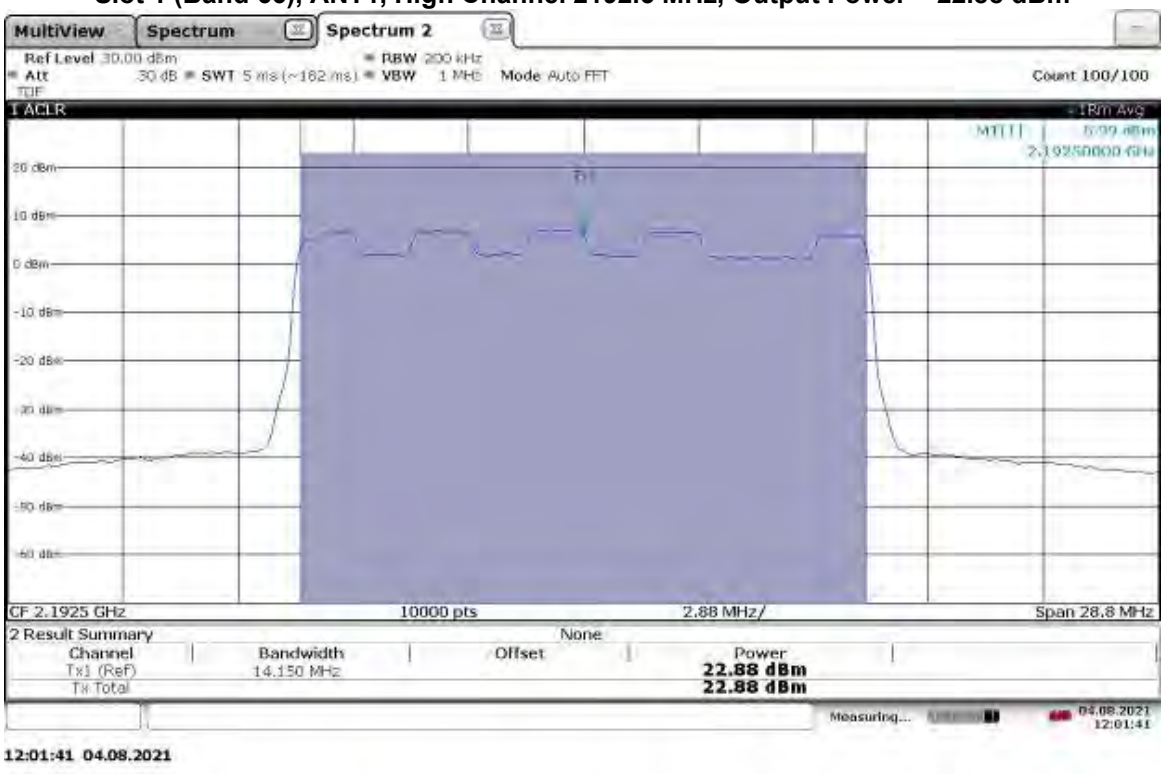
TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.20 dBm



TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2192.5 MHz, Output Power = 23.02 dBm

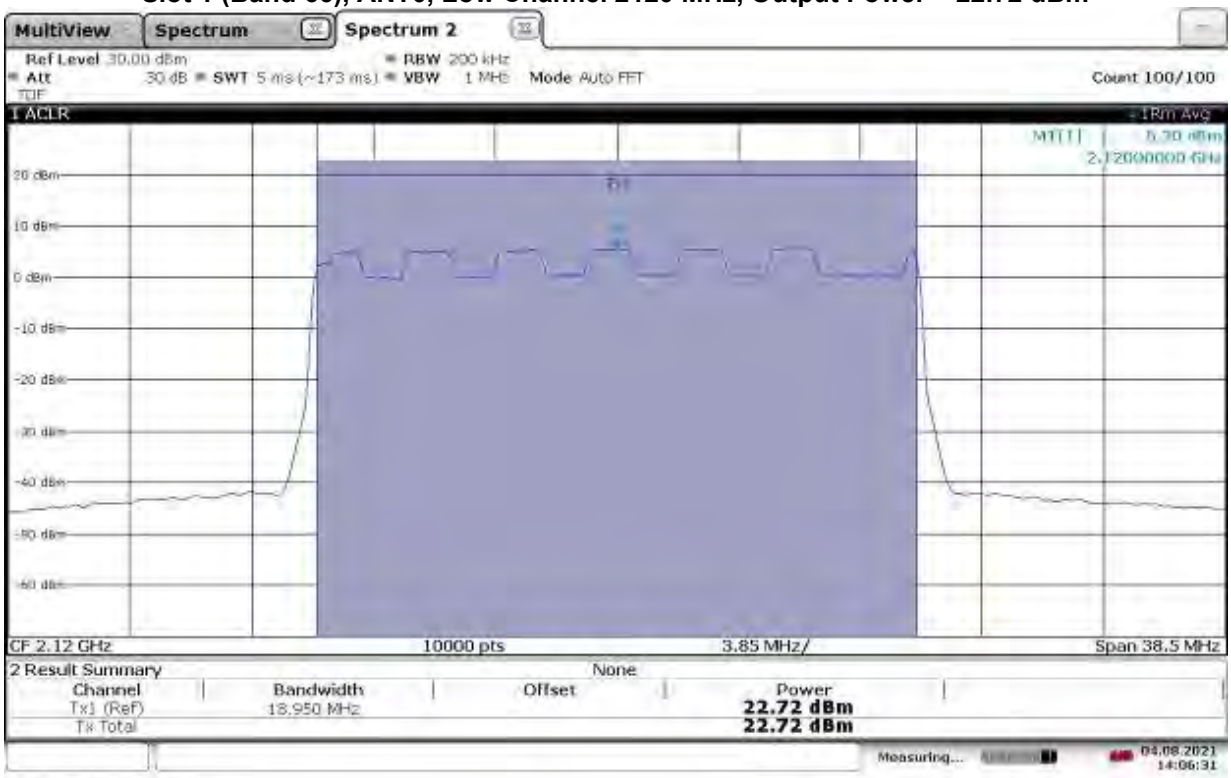


TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2192.5 MHz, Output Power = 22.88 dBm



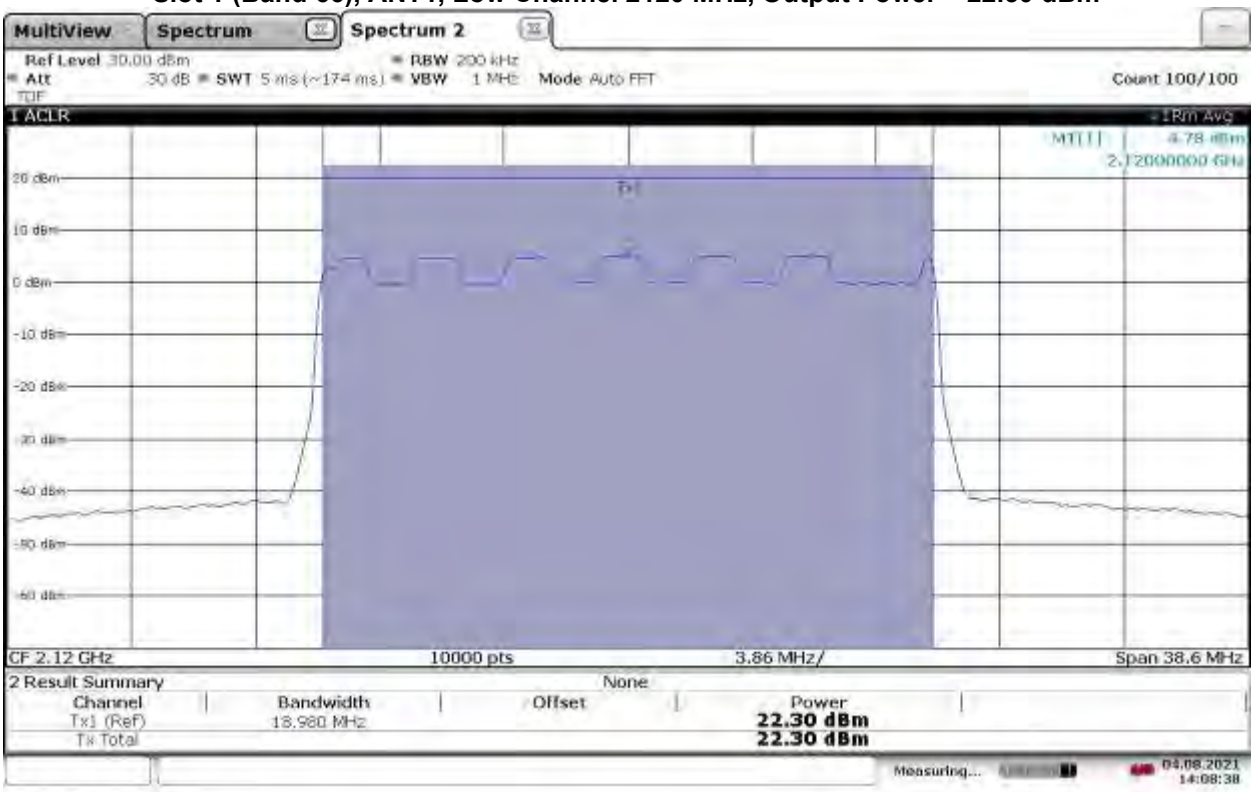
TM3.2-16QAM_20 MHz Bandwidth

Slot 1 (Band 66), ANT0, Low Channel 2120 MHz, Output Power = 22.72 dBm



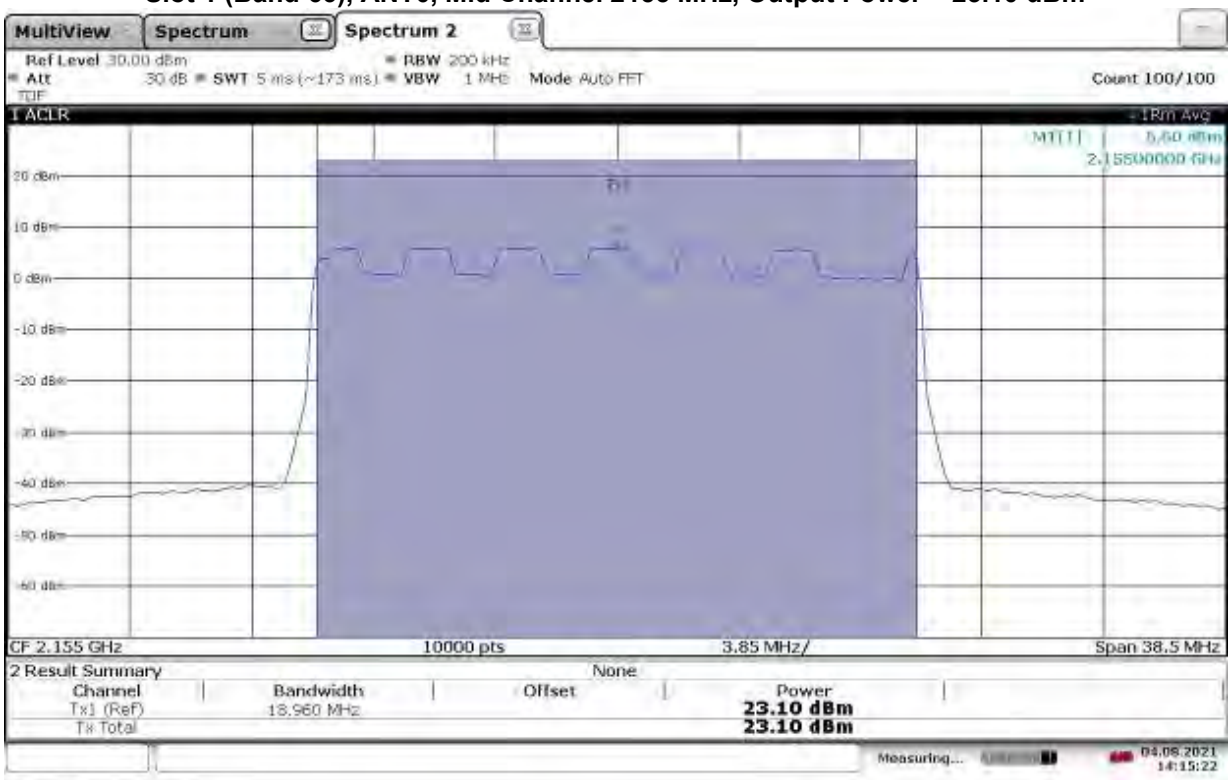
14:06:32 04.08.2021

TM3.2-16QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2120 MHz, Output Power = 22.30 dBm



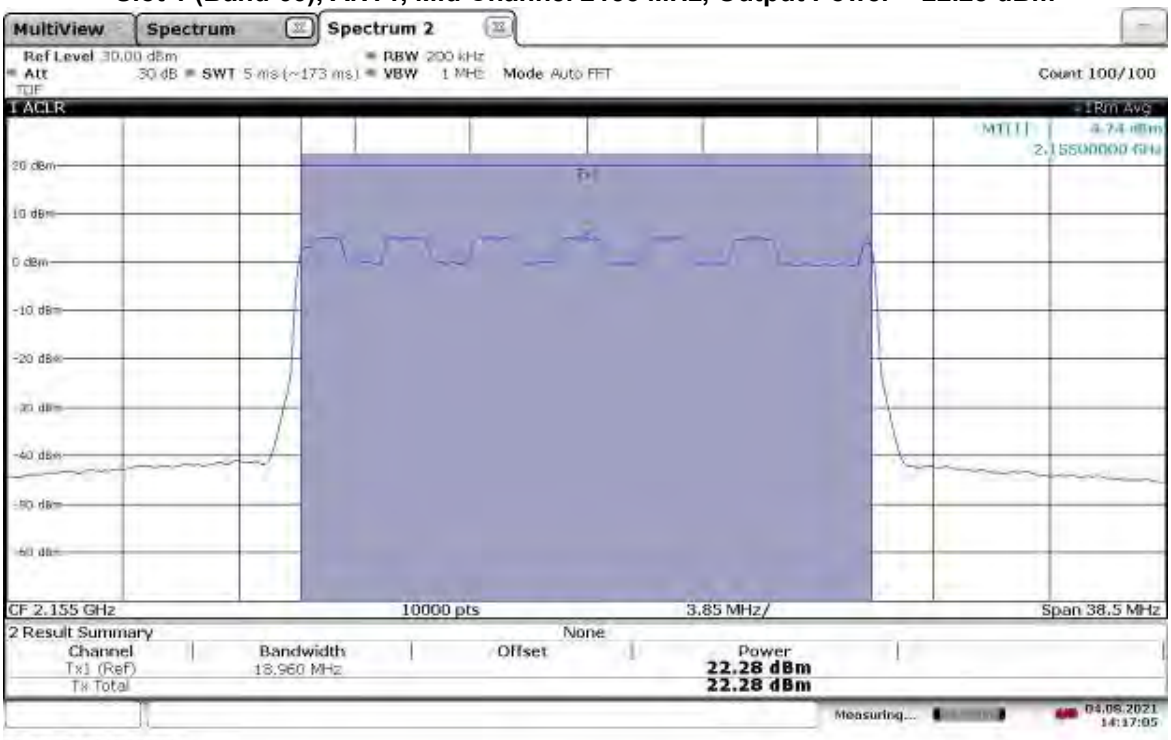
14:08:38 04.08.2021

TM3.2-16QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.10 dBm



14:15:22 04.08.2021

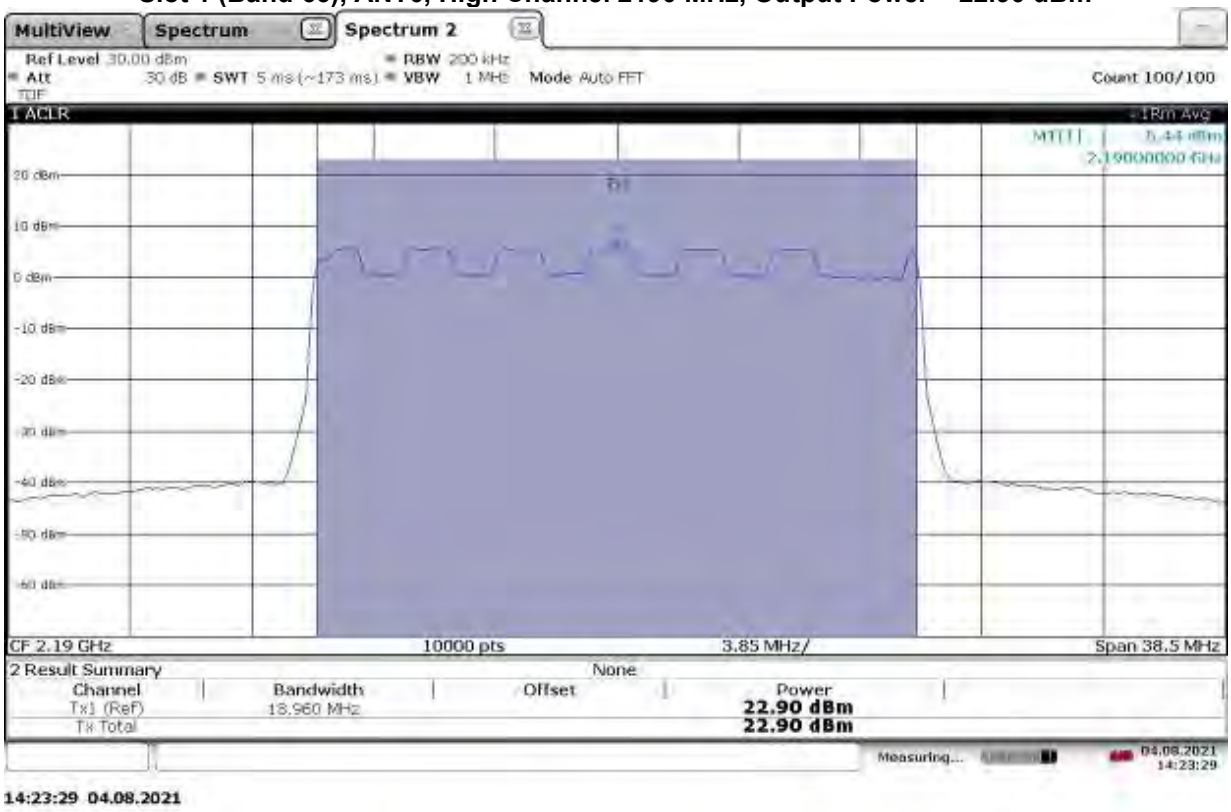
TM3.2-16QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.28 dBm



14:17:06 04.08.2021

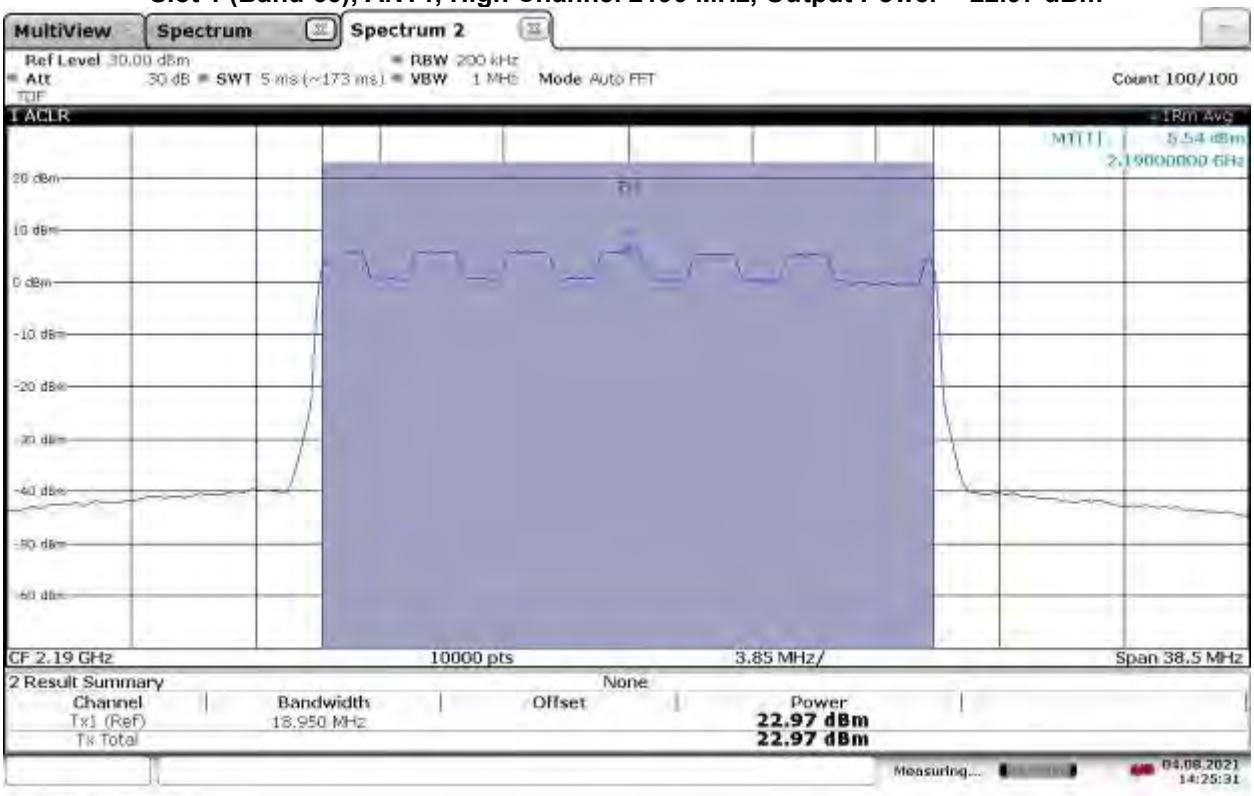
TM3.2-16QAM_20 MHz Bandwidth

Slot 1 (Band 66), ANT0, High Channel 2190 MHz, Output Power = 22.90 dBm



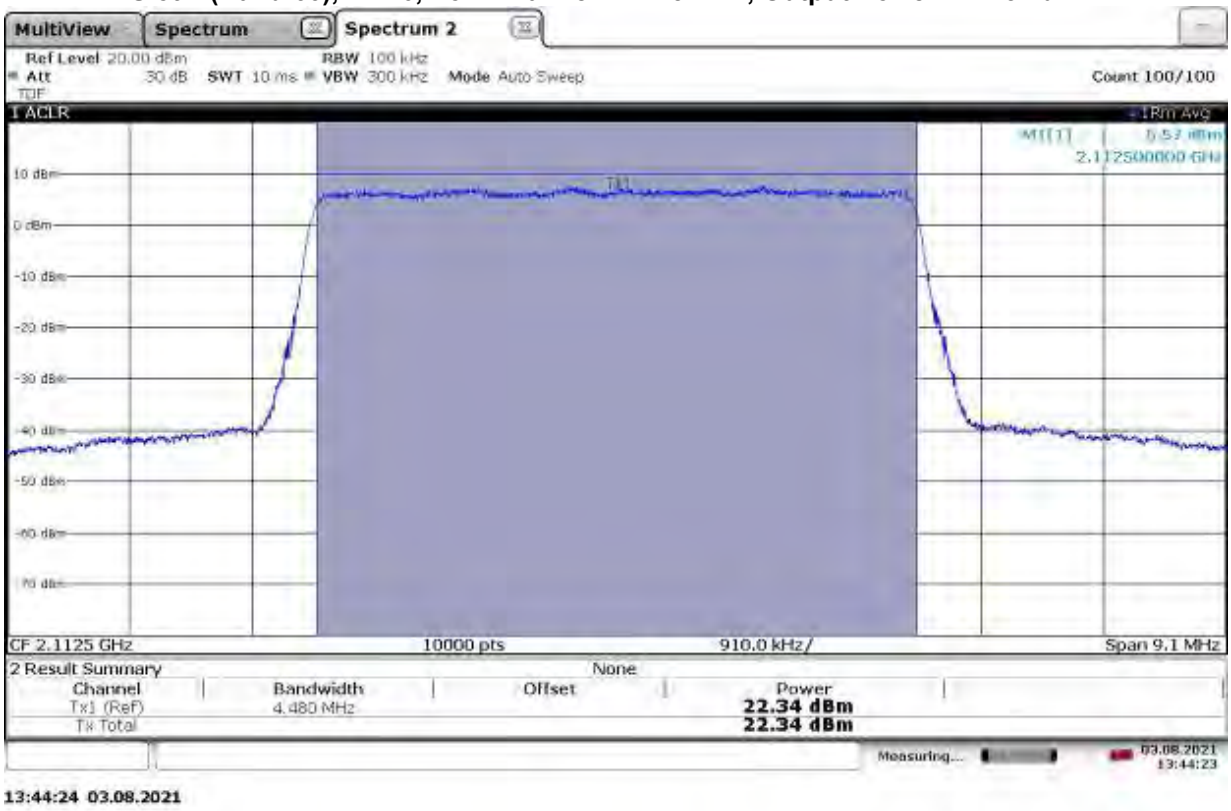
14:23:29 04.08.2021

TM3.2-16QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2190 MHz, Output Power = 22.97 dBm

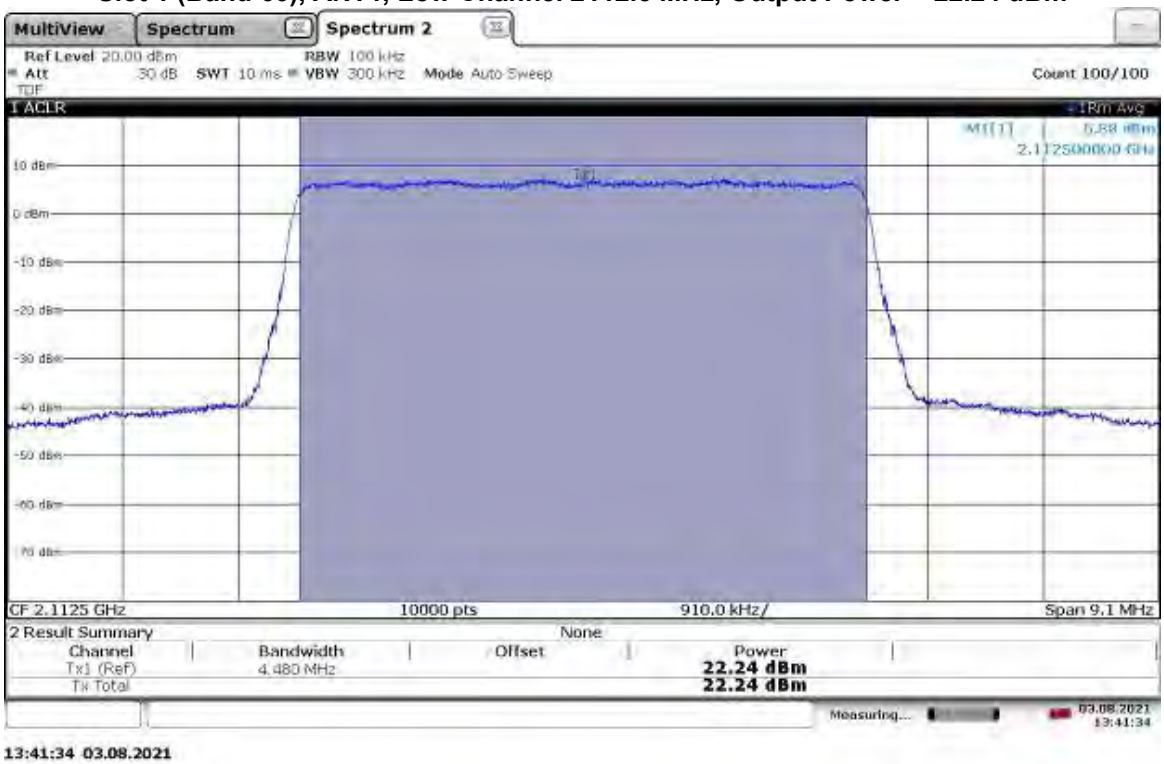


14:25:31 04.08.2021

TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2112.5 MHz, Output Power = 22.34 dBm

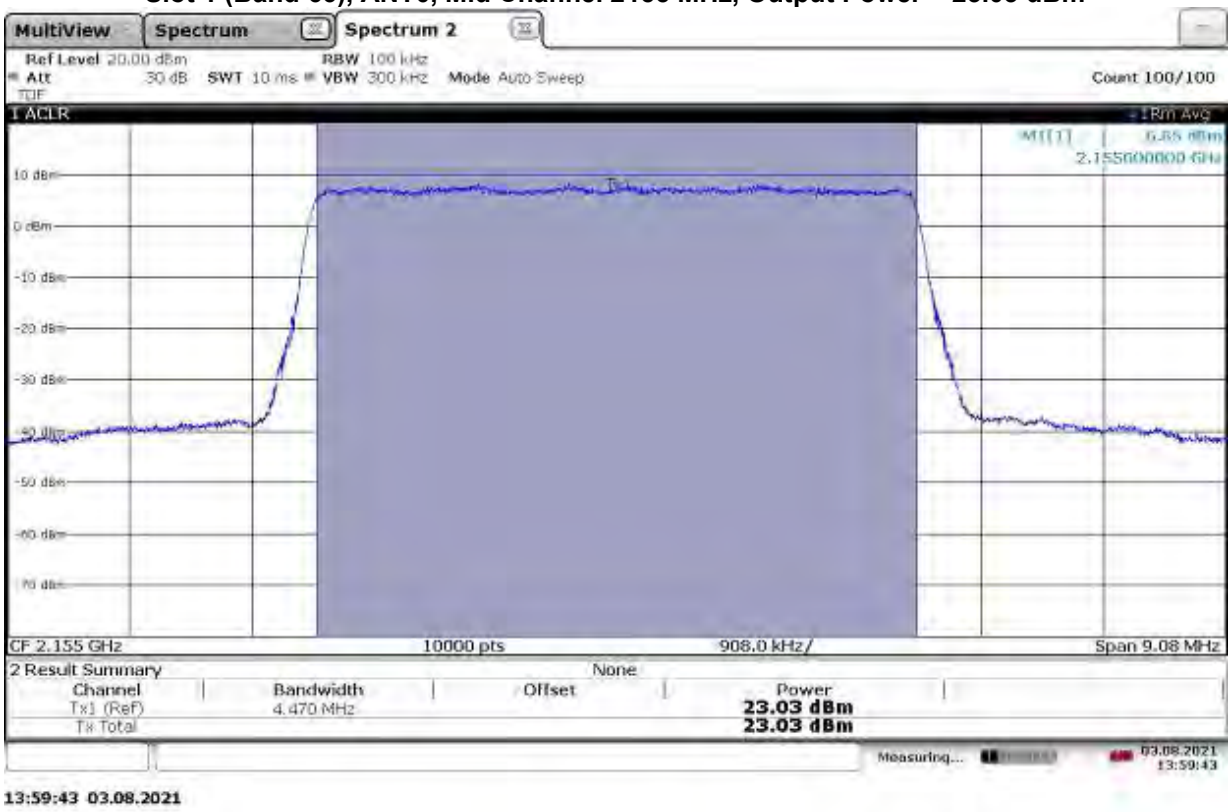


TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2112.5 MHz, Output Power = 22.24 dBm



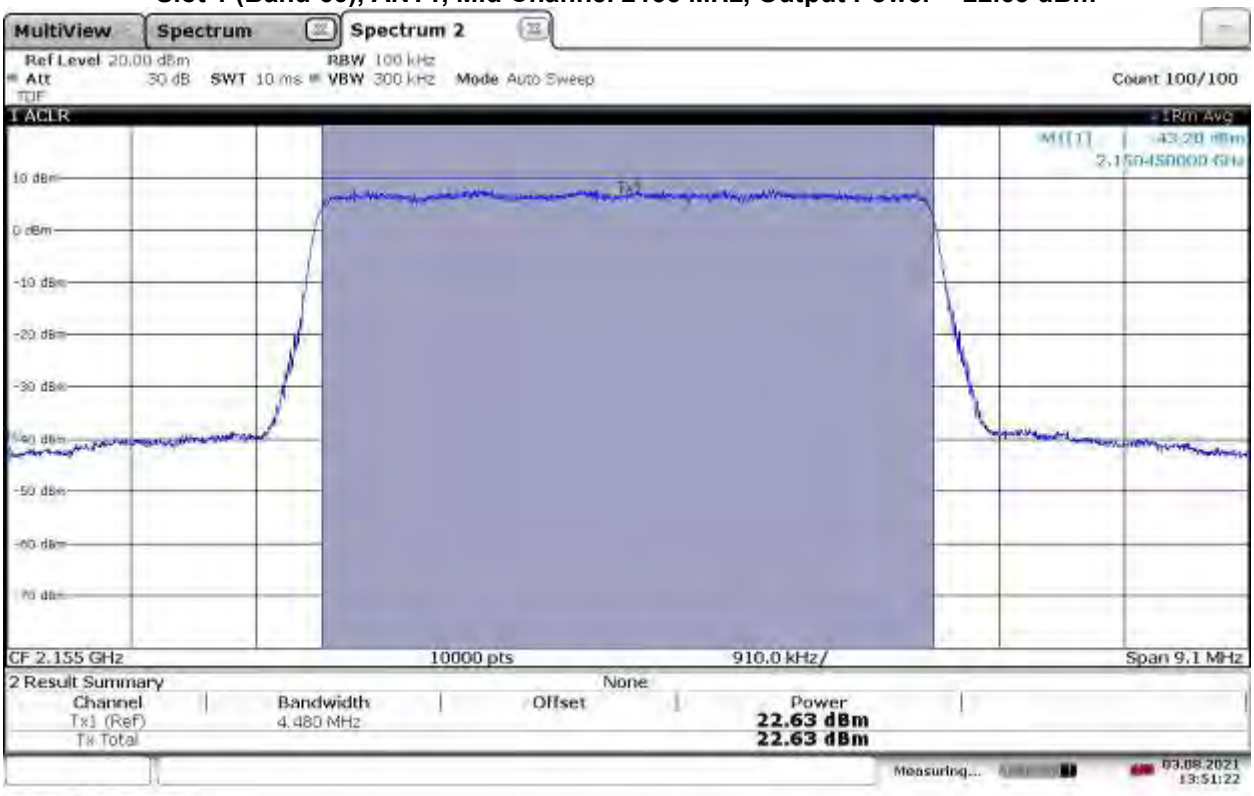
TM3.1-64QAM_5 MHz Bandwidth

Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.03 dBm



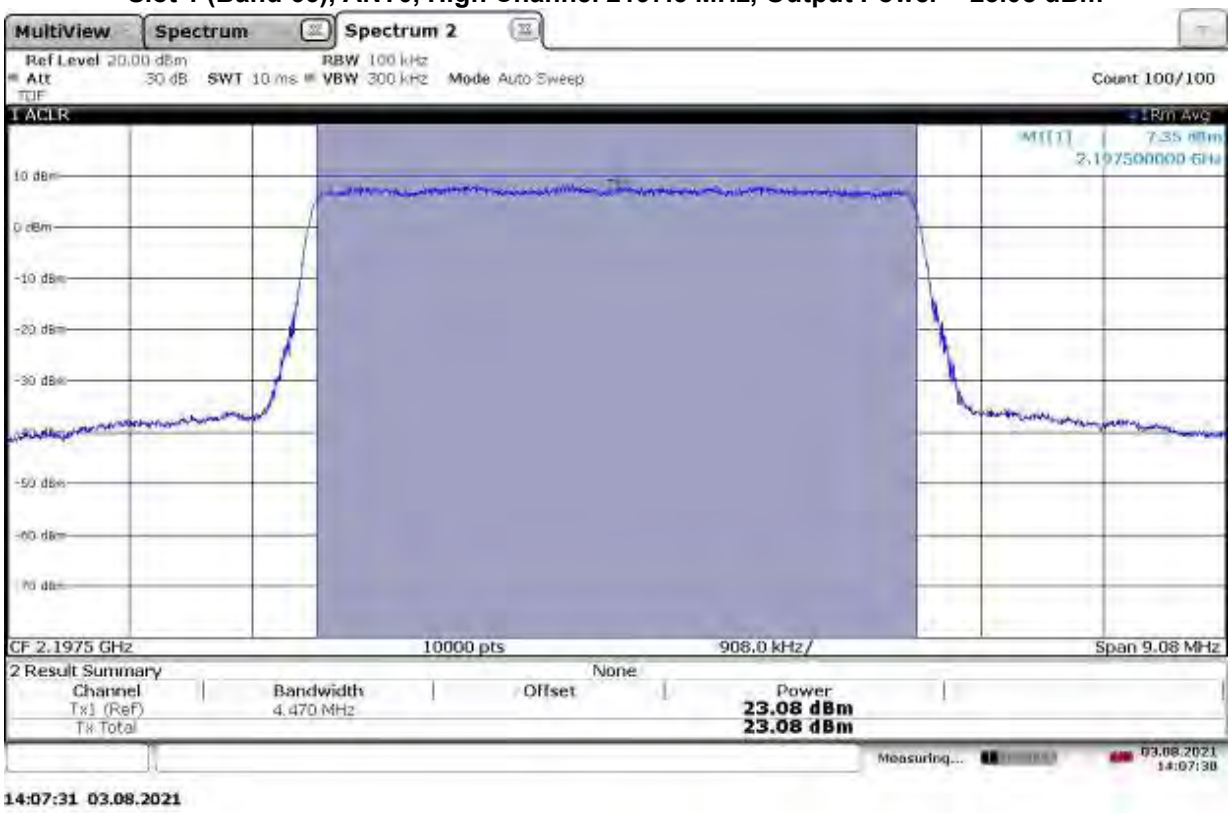
13:59:43 03.08.2021

TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.63 dBm

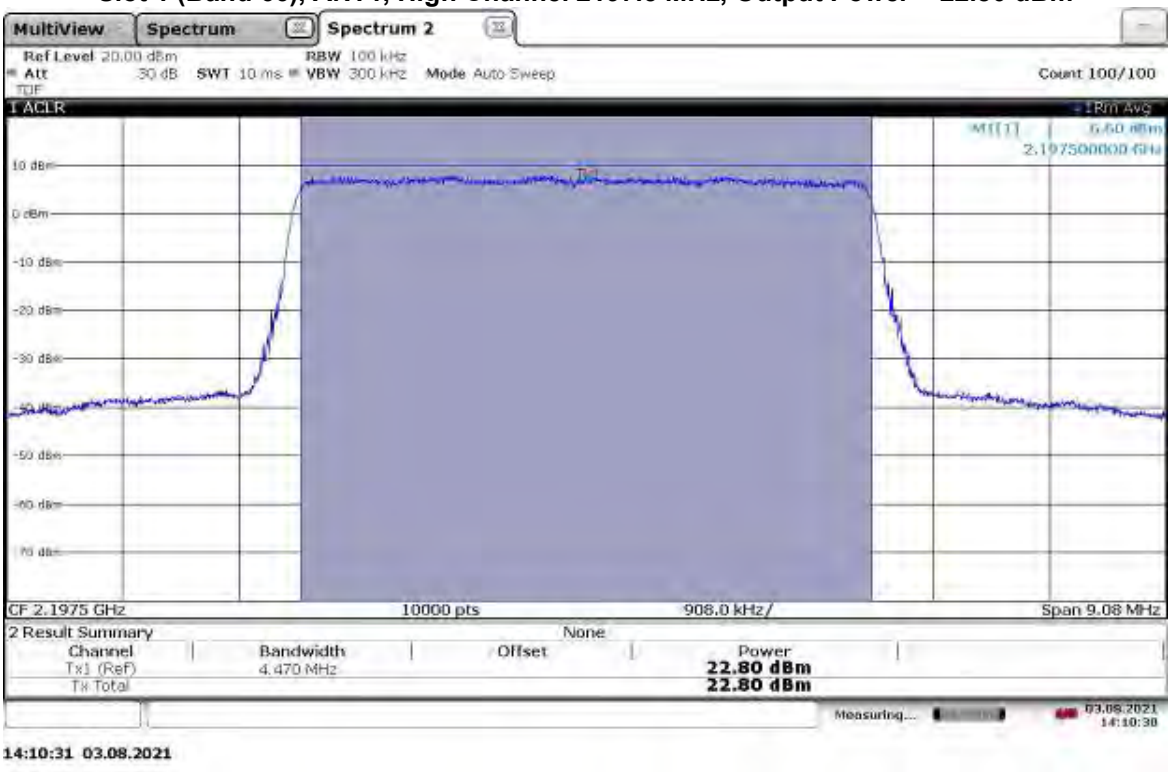


13:51:23 03.08.2021

TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2197.5 MHz, Output Power = 23.08 dBm

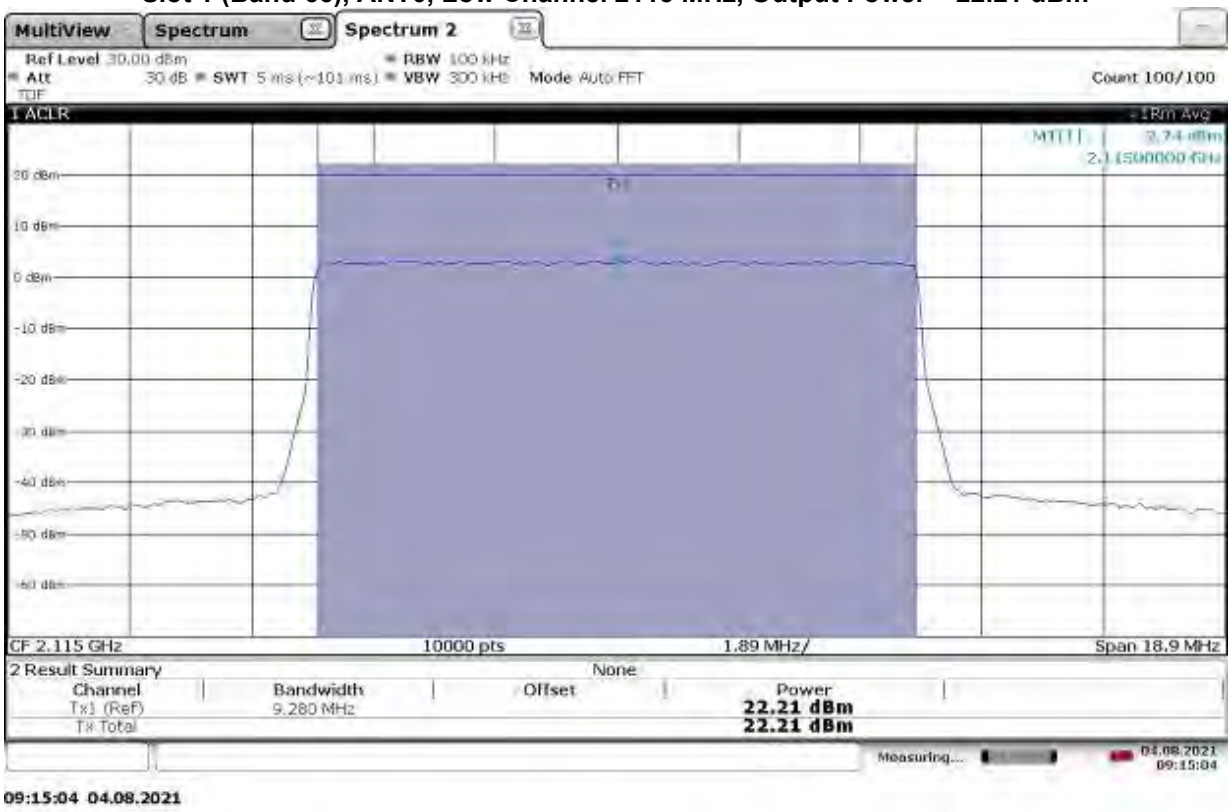


TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2197.5 MHz, Output Power = 22.80 dBm



TM3.1-64QAM_10 MHz Bandwidth

Slot 1 (Band 66), ANT0, Low Channel 2115 MHz, Output Power = 22.21 dBm



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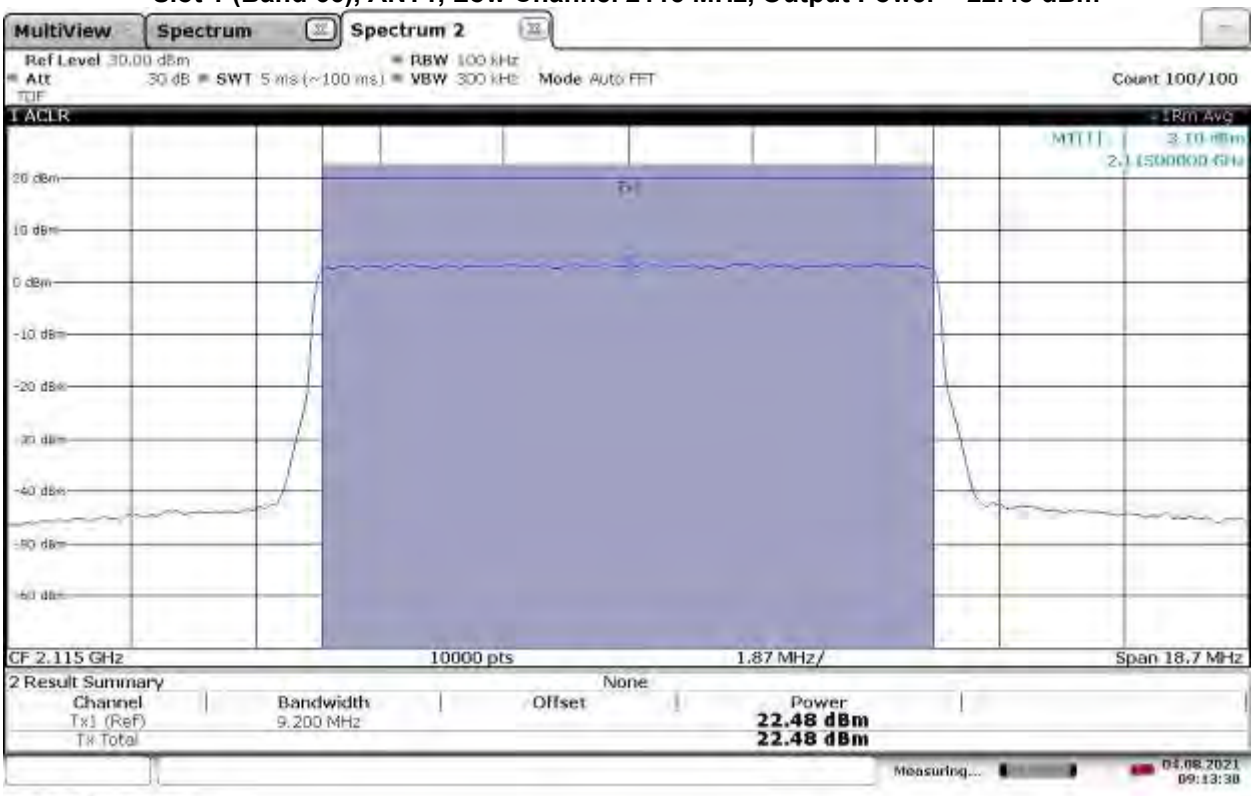
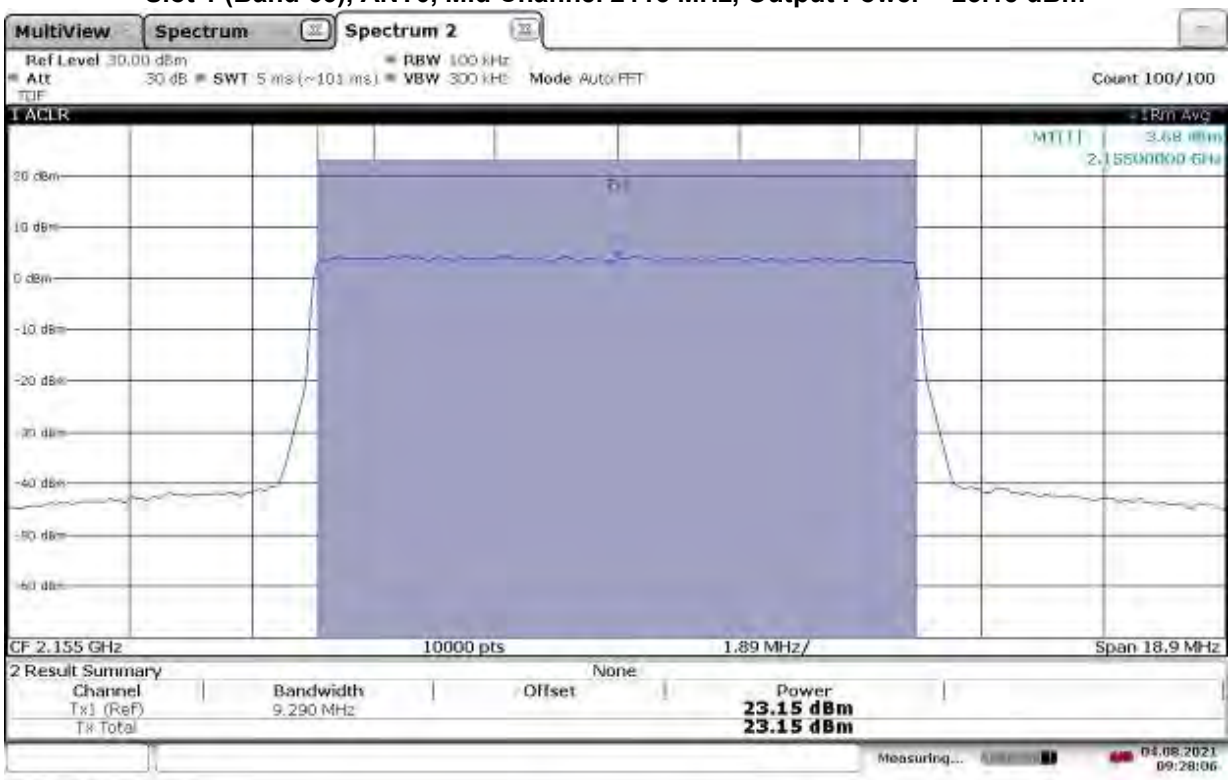
TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2115 MHz, Output Power = 22.48 dBm

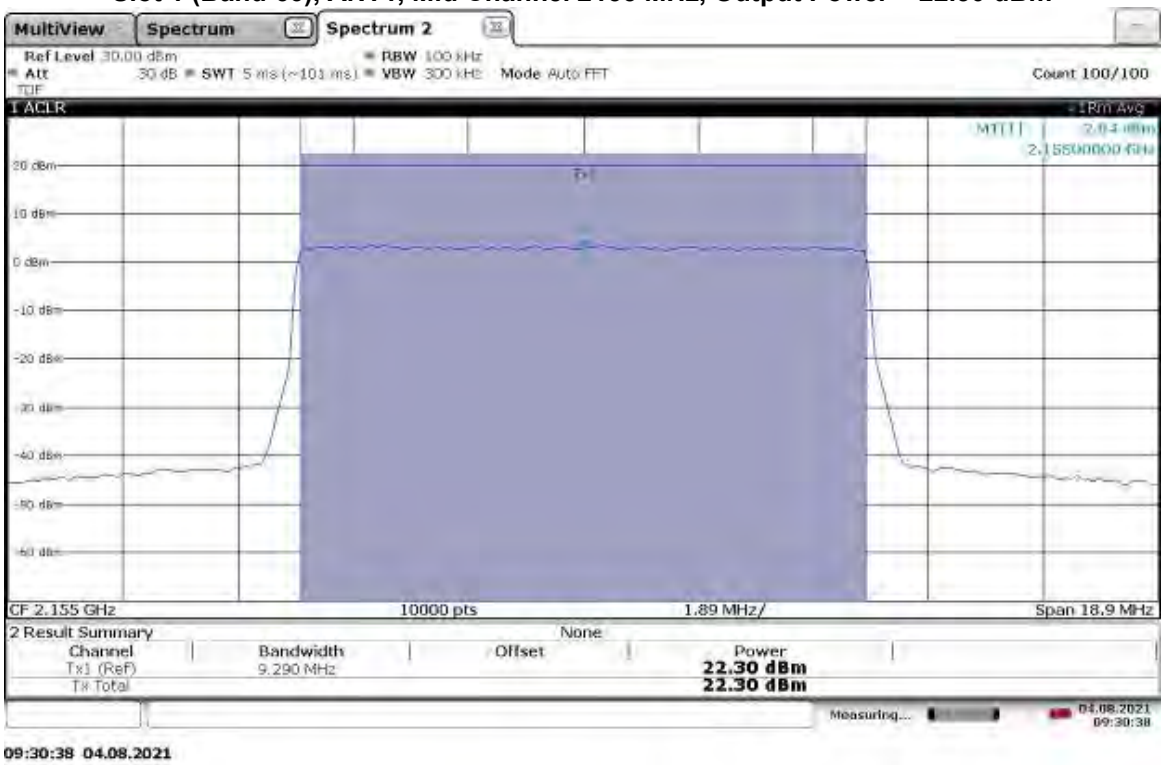


09:13:30 04.08.2021

TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2115 MHz, Output Power = 23.15 dBm

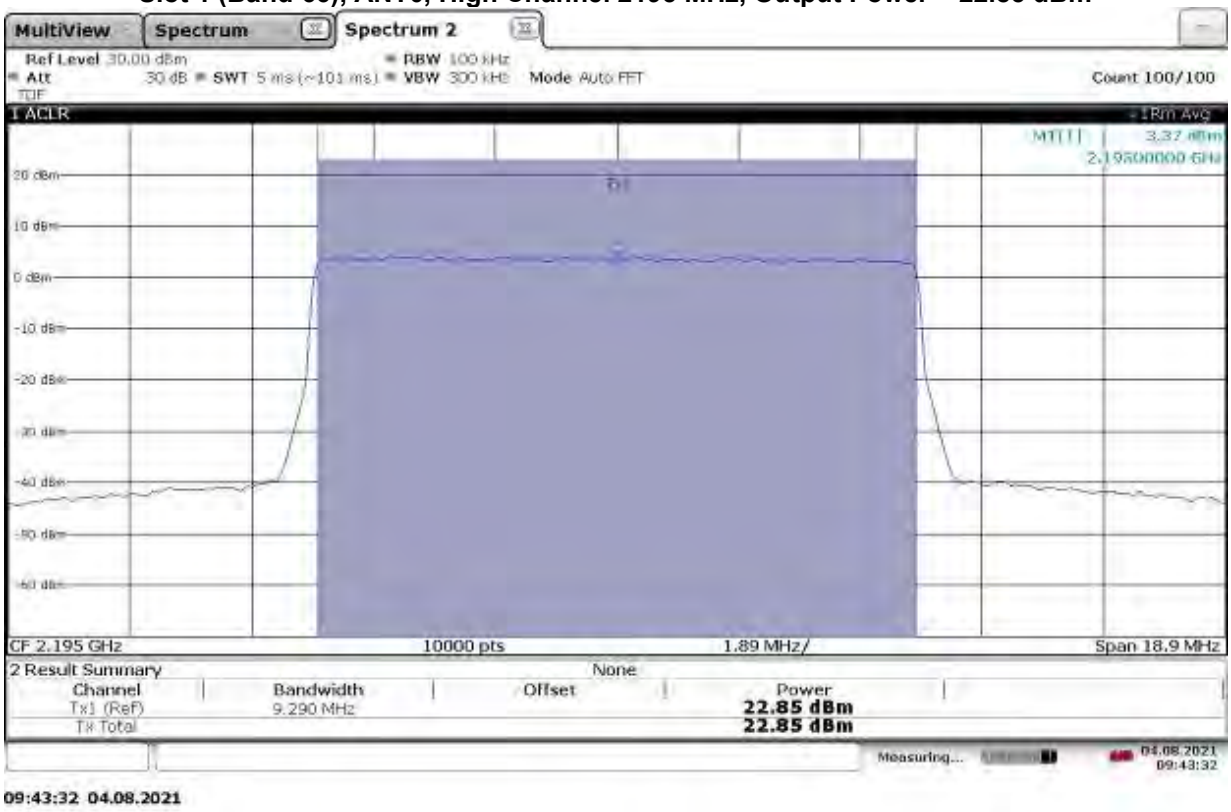


TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.30 dBm

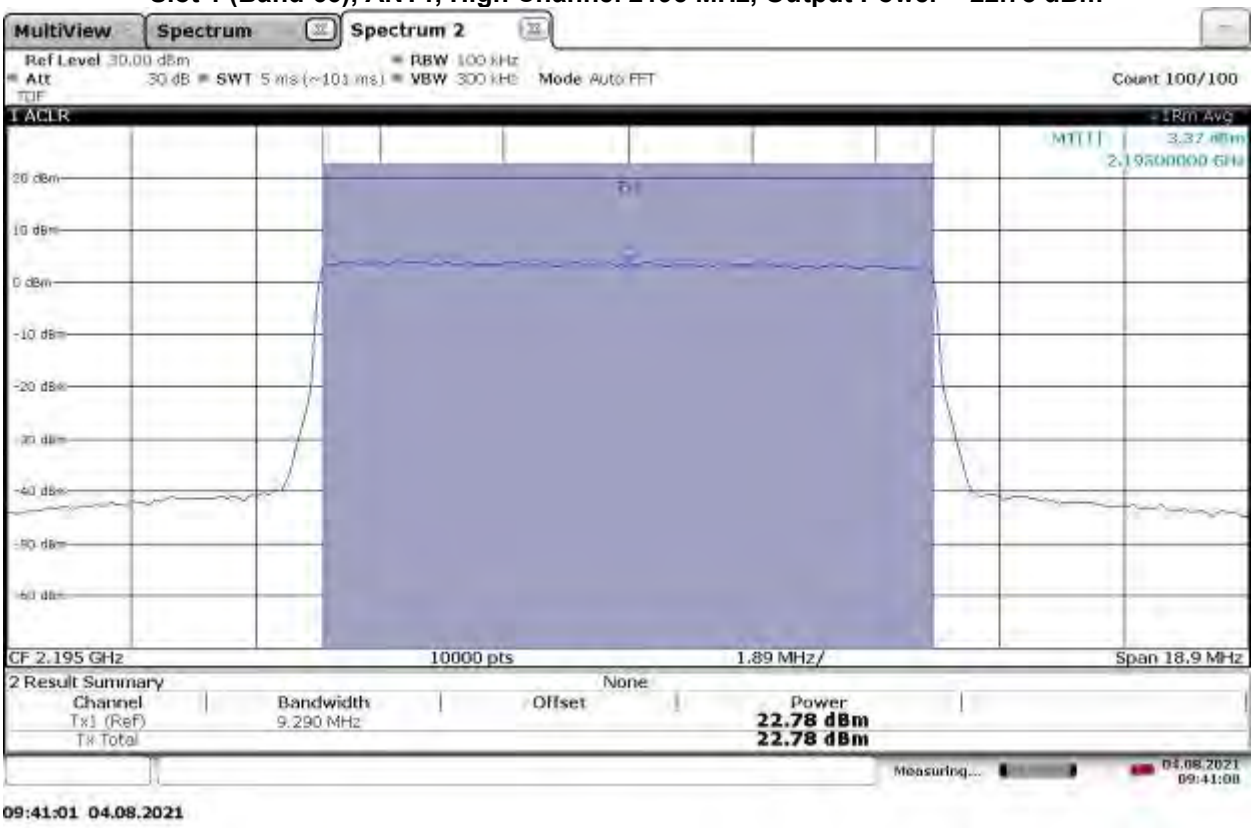


TM3.1-64QAM_10 MHz Bandwidth

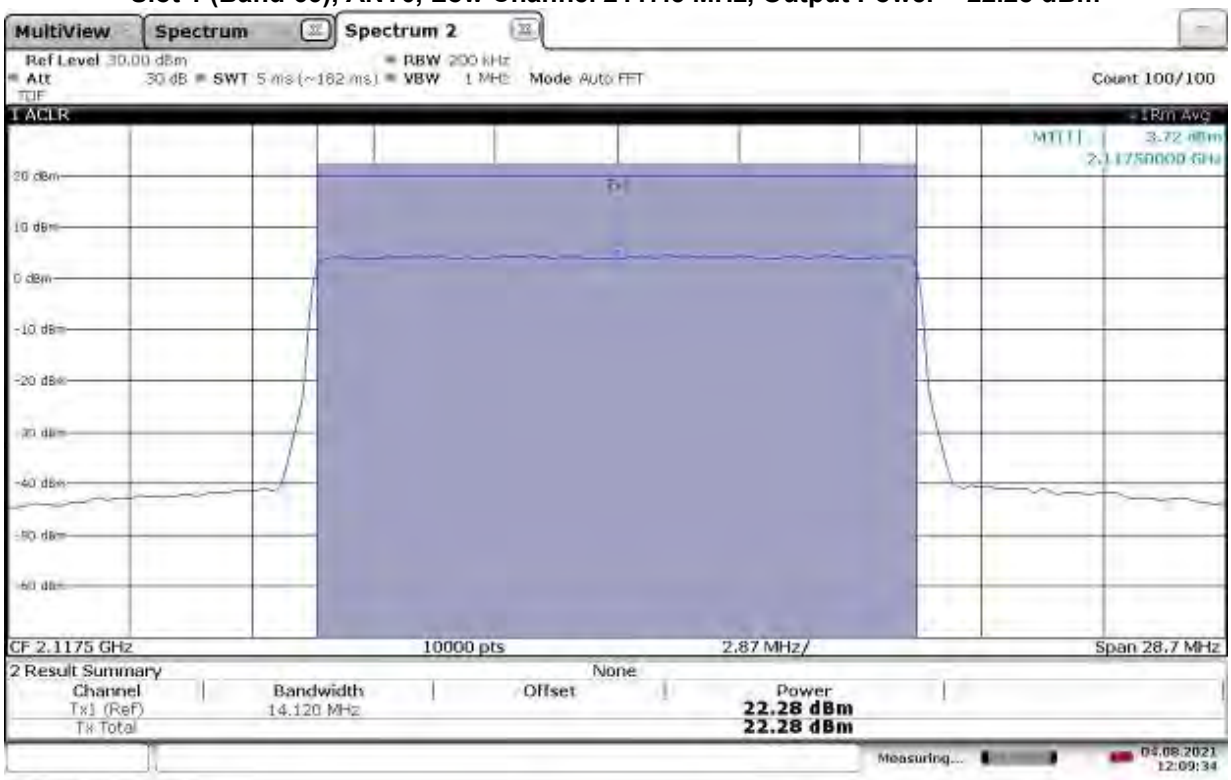
Slot 1 (Band 66), ANT0, High Channel 2195 MHz, Output Power = 22.85 dBm



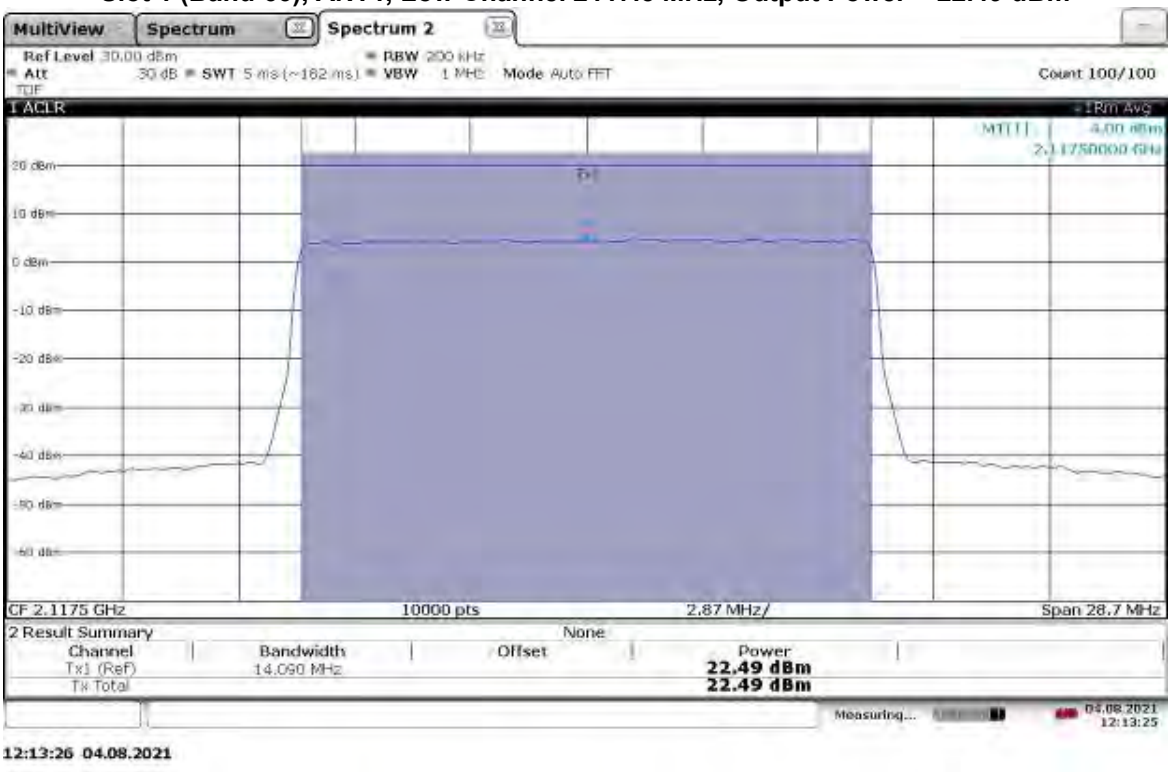
TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2195 MHz, Output Power = 22.78 dBm



TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2117.5 MHz, Output Power = 22.28 dBm

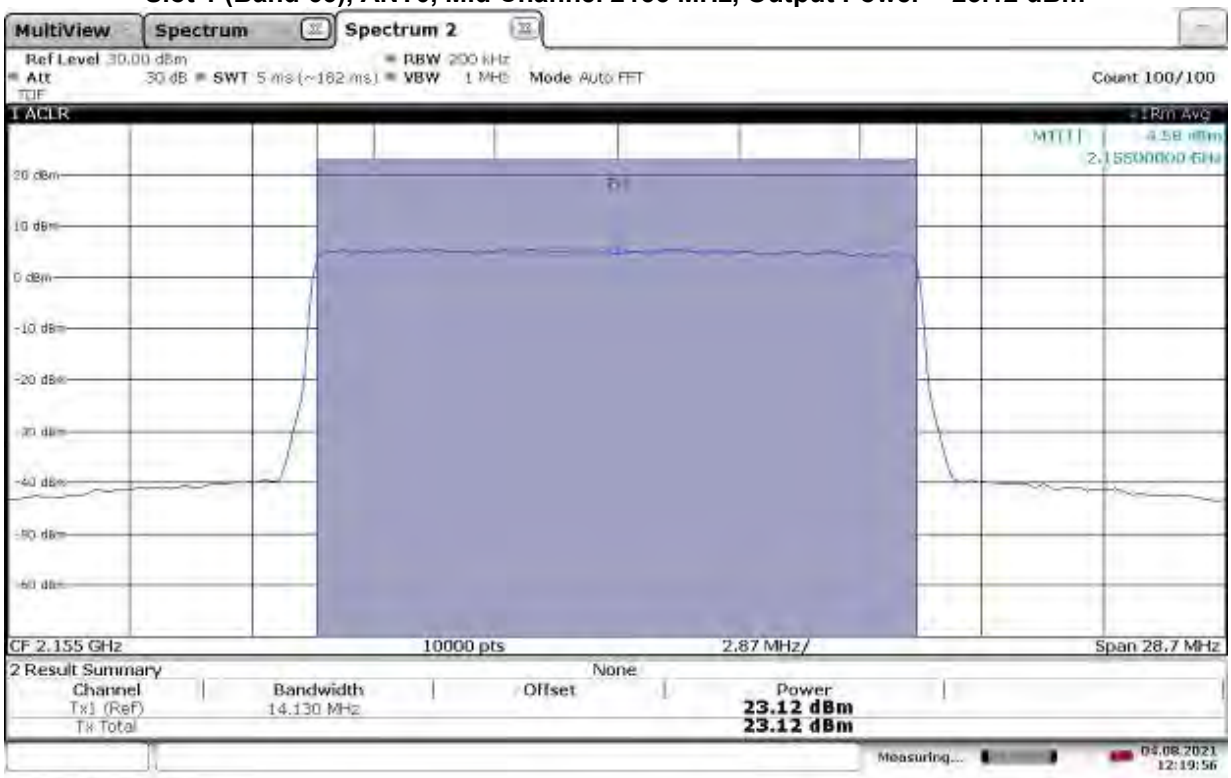


TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2117.5 MHz, Output Power = 22.49 dBm



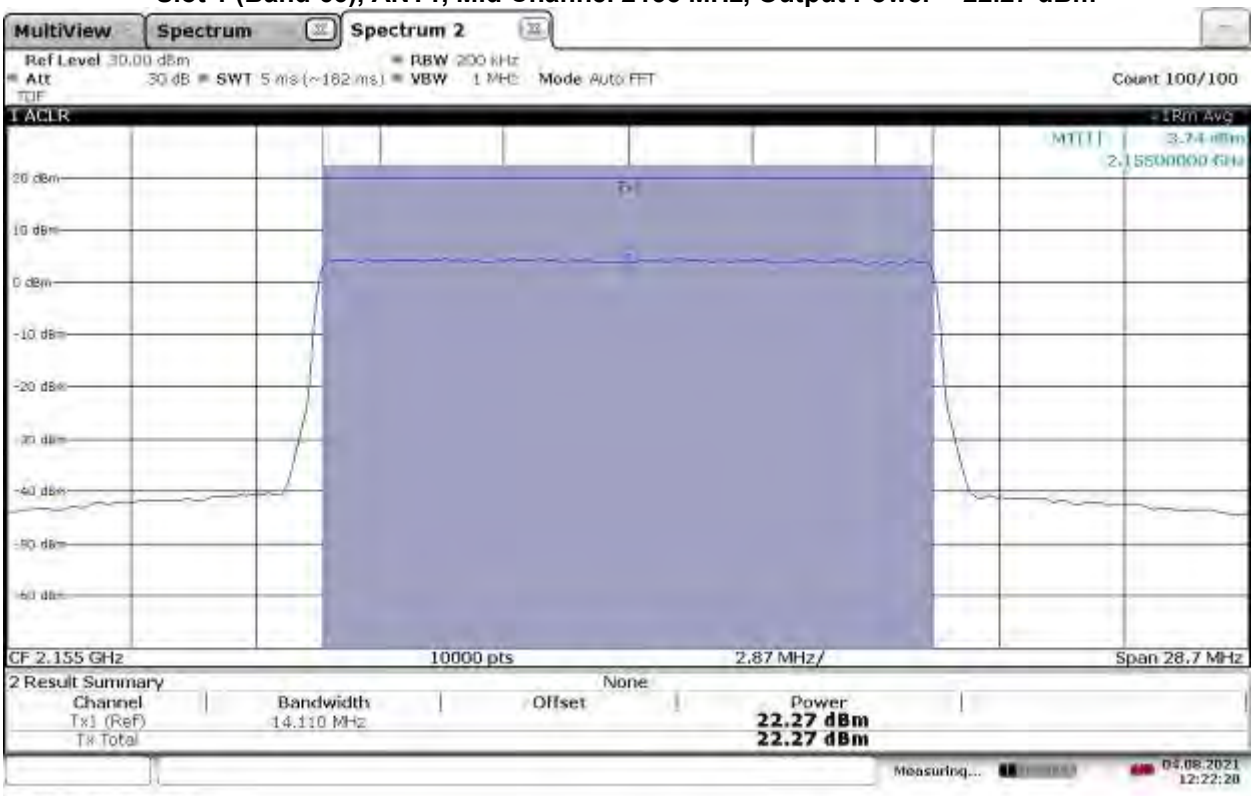
TM3.1-64QAM_15 MHz Bandwidth

Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.12 dBm



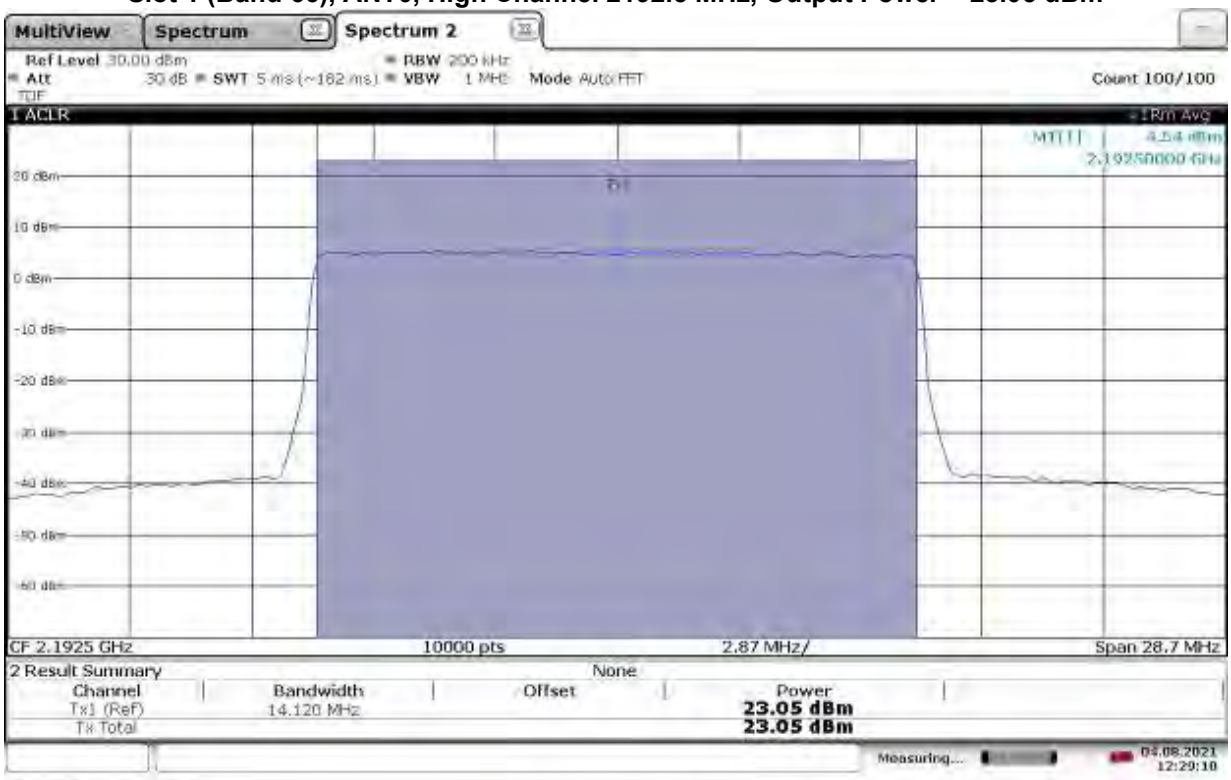
12:19:56 04.08.2021

TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.27 dBm

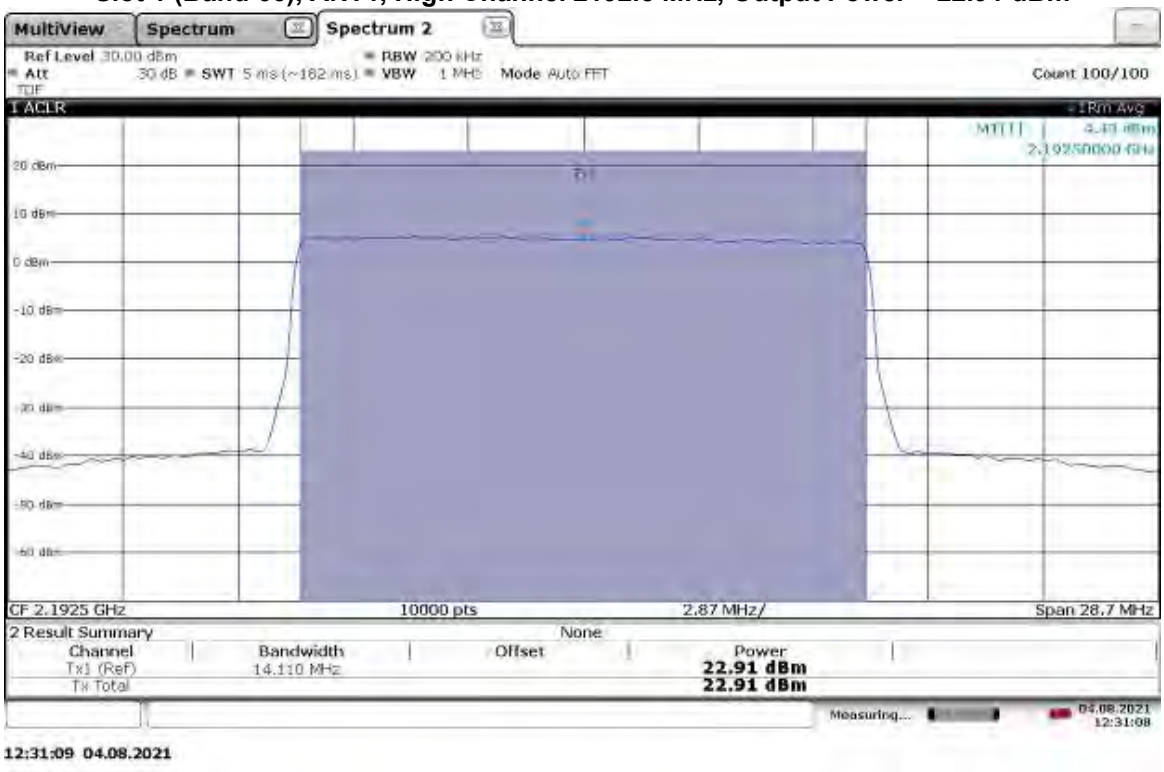


12:22:21 04.08.2021

TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2192.5 MHz, Output Power = 23.05 dBm

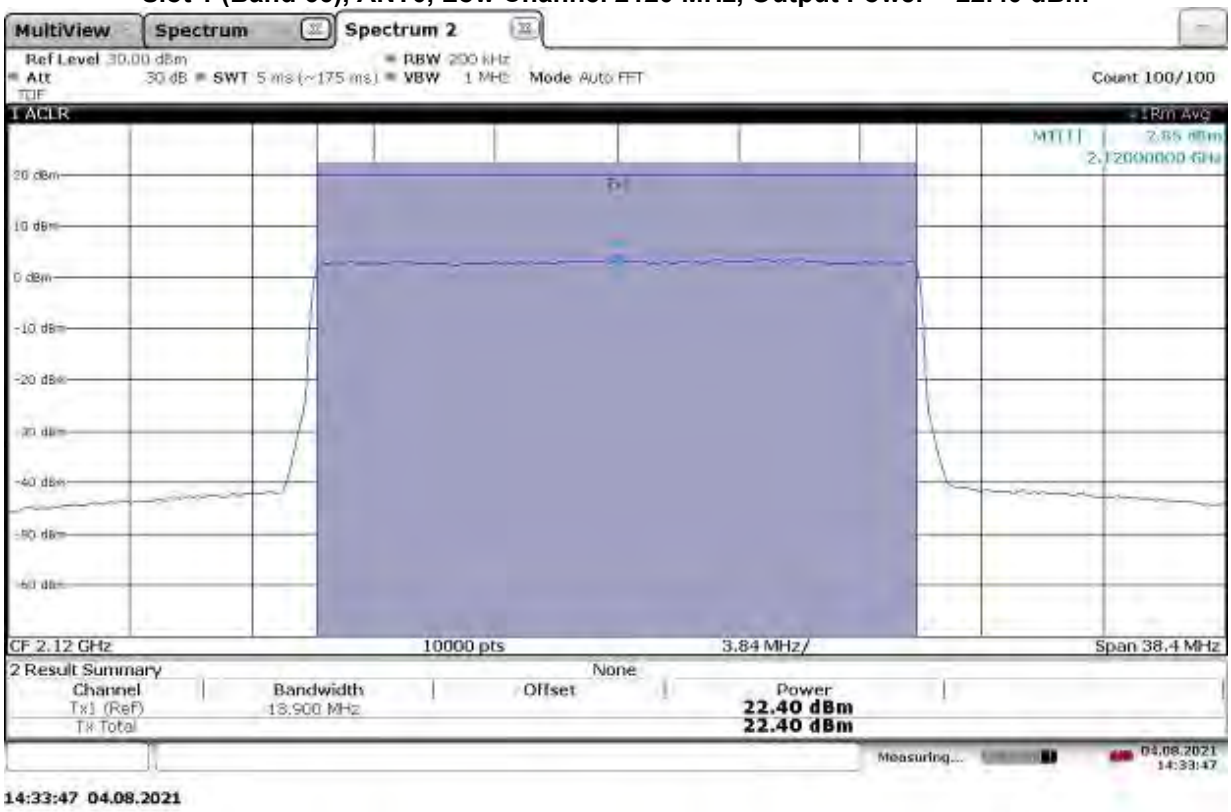


TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2192.5 MHz, Output Power = 22.91 dBm



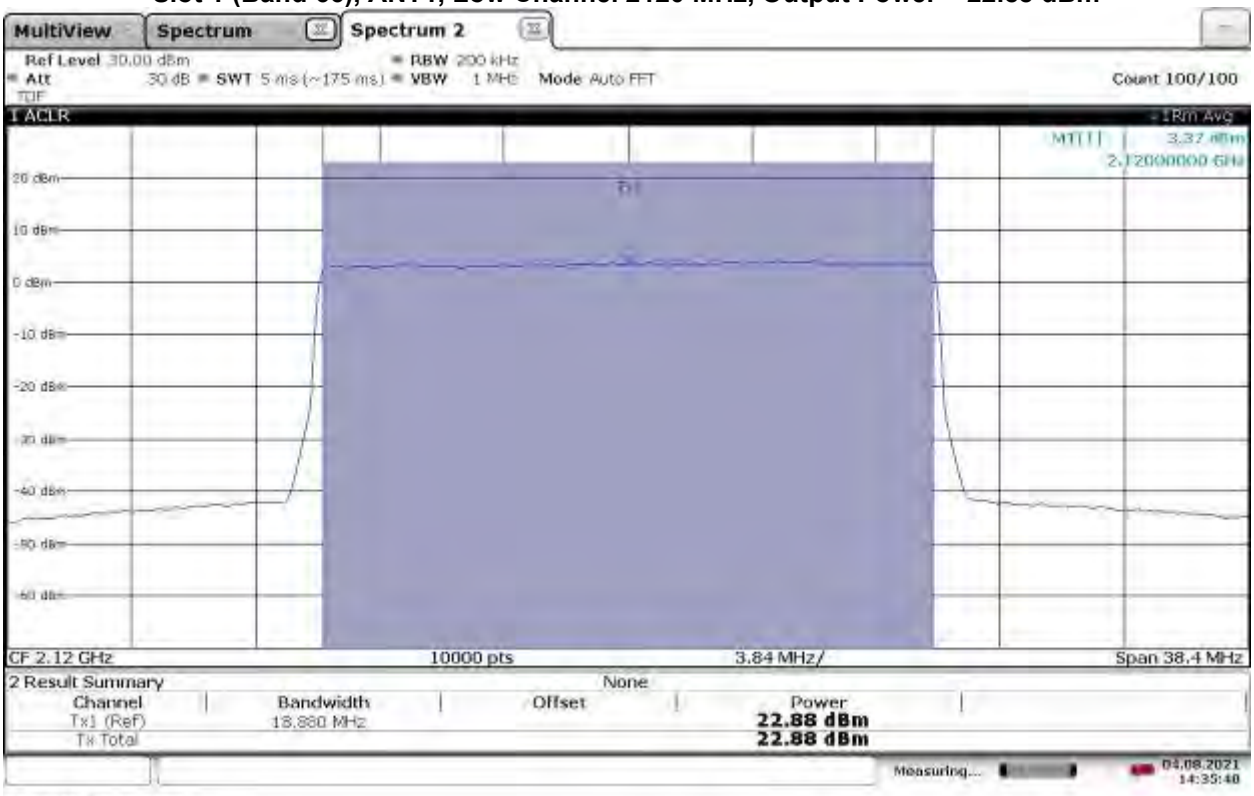
TM3.1-64QAM_20 MHz Bandwidth

Slot 1 (Band 66), ANT0, Low Channel 2120 MHz, Output Power = 22.40 dBm



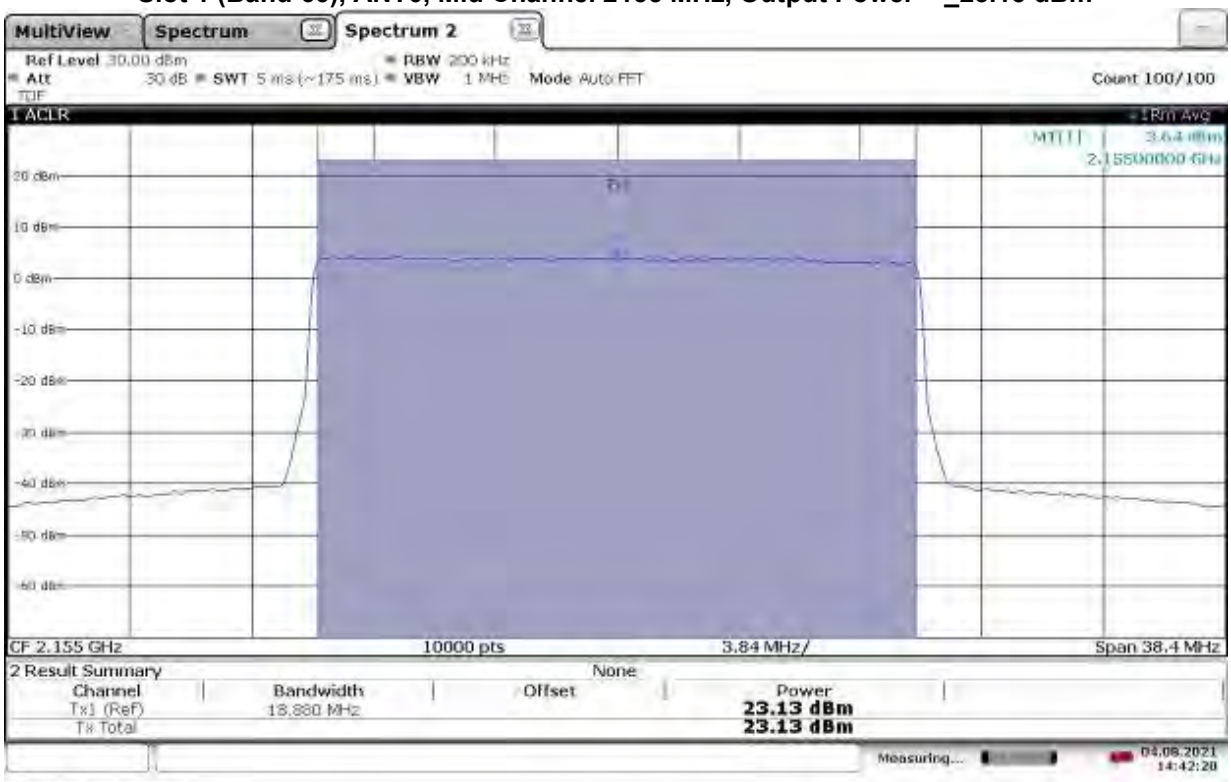
14:33:47 04.08.2021

TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2120 MHz, Output Power = 22.88 dBm

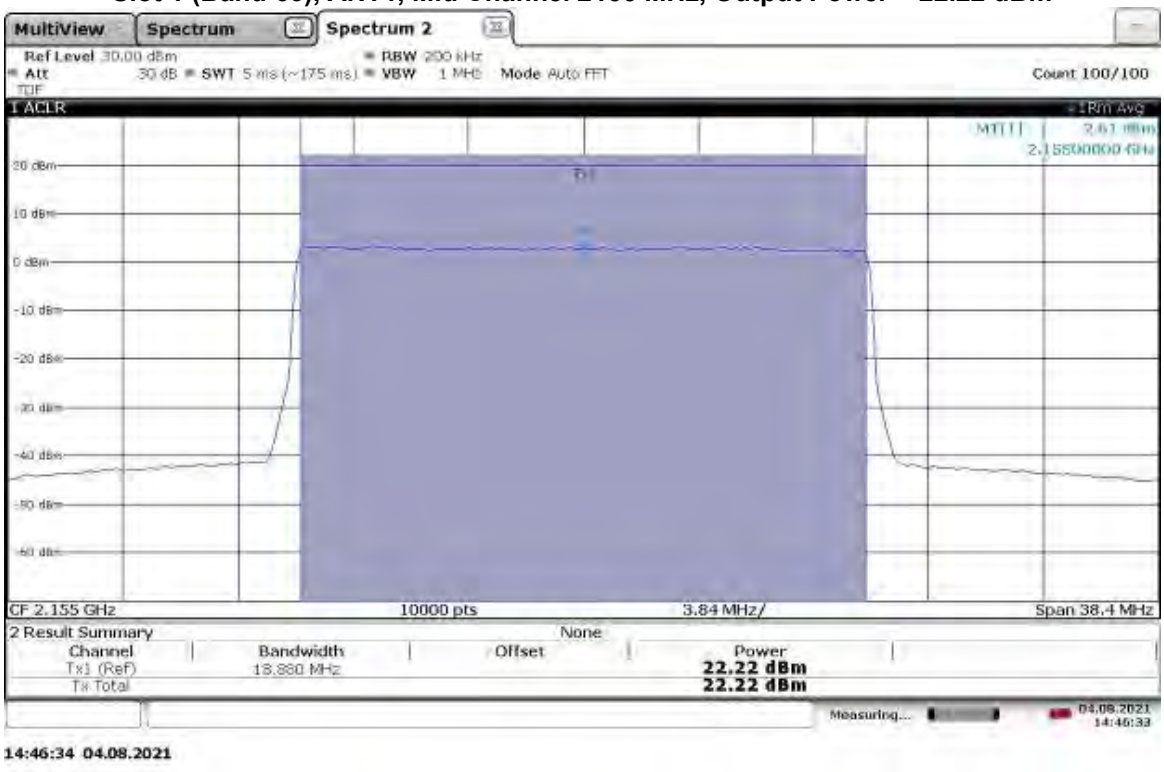


14:35:41 04.08.2021

TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = _23.13 dBm

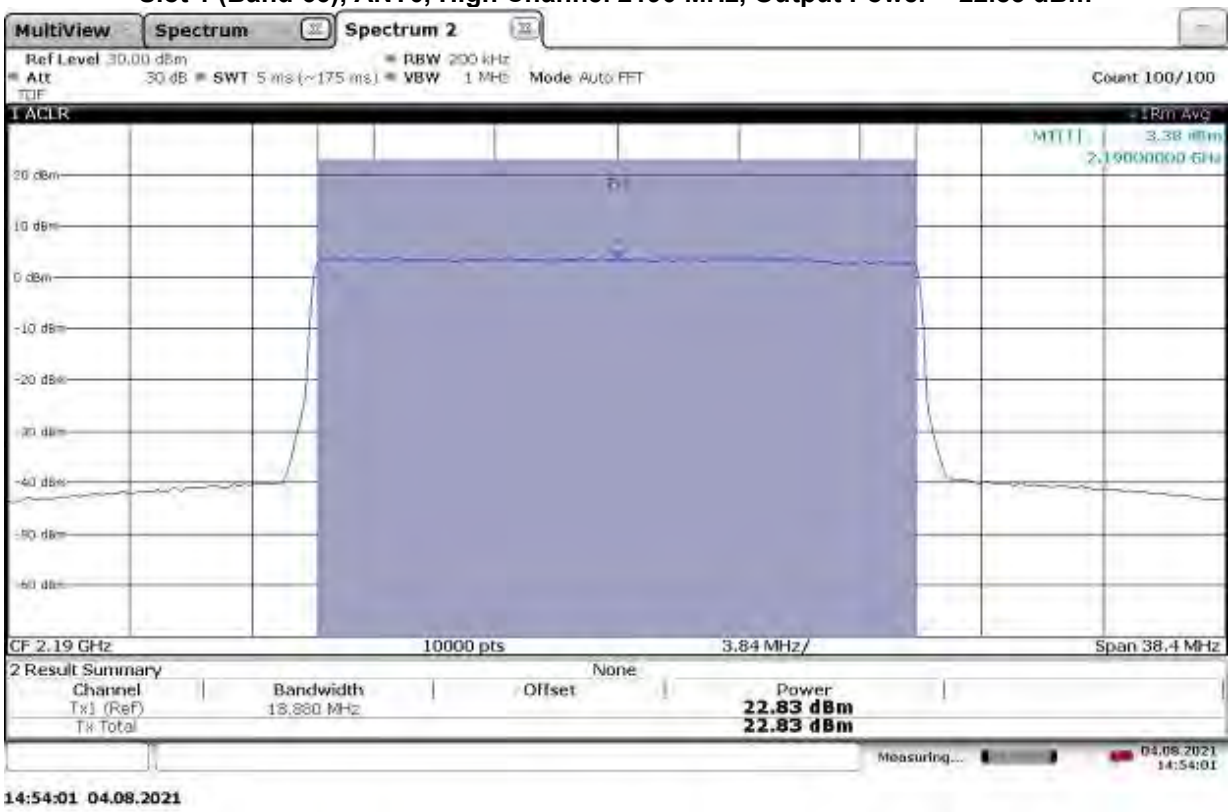


TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.22 dBm



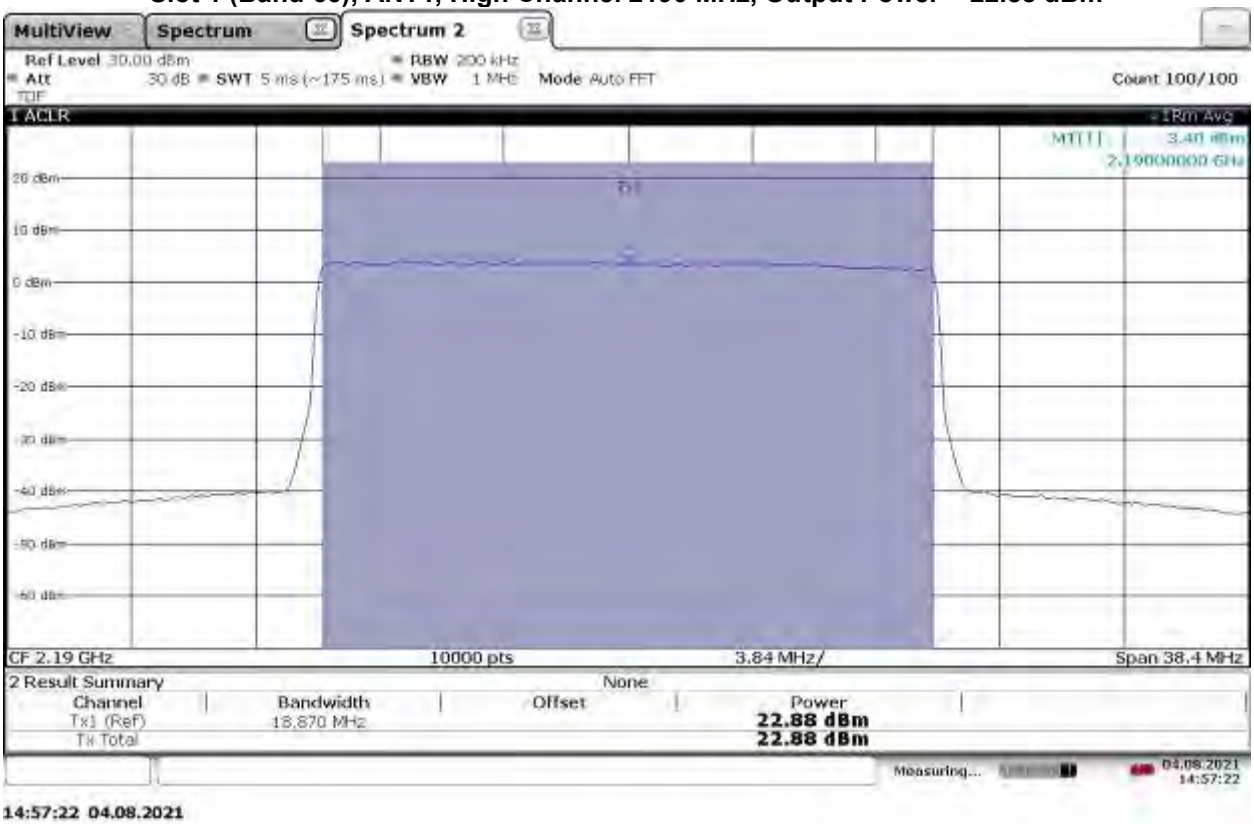
TM3.1-64QAM_20 MHz Bandwidth

Slot 1 (Band 66), ANT0, High Channel 2190 MHz, Output Power = 22.83 dBm



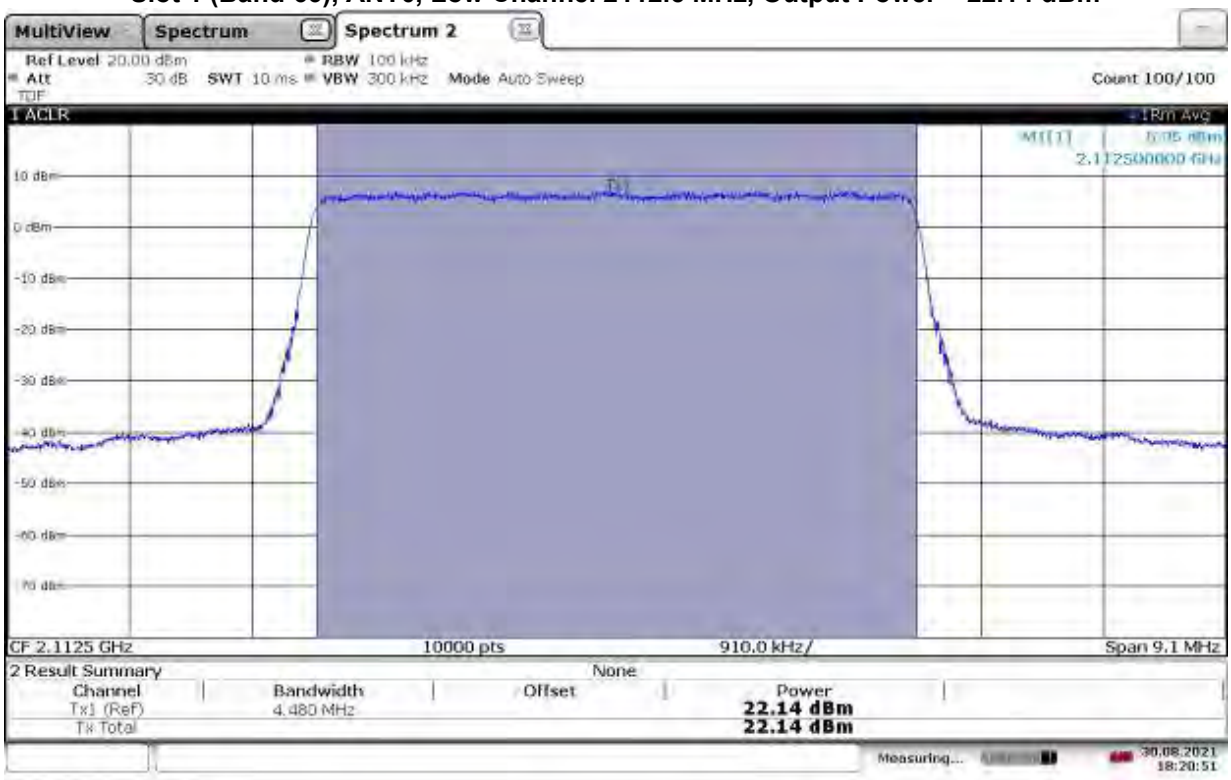
14:54:01 04.08.2021

TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2190 MHz, Output Power = 22.88 dBm



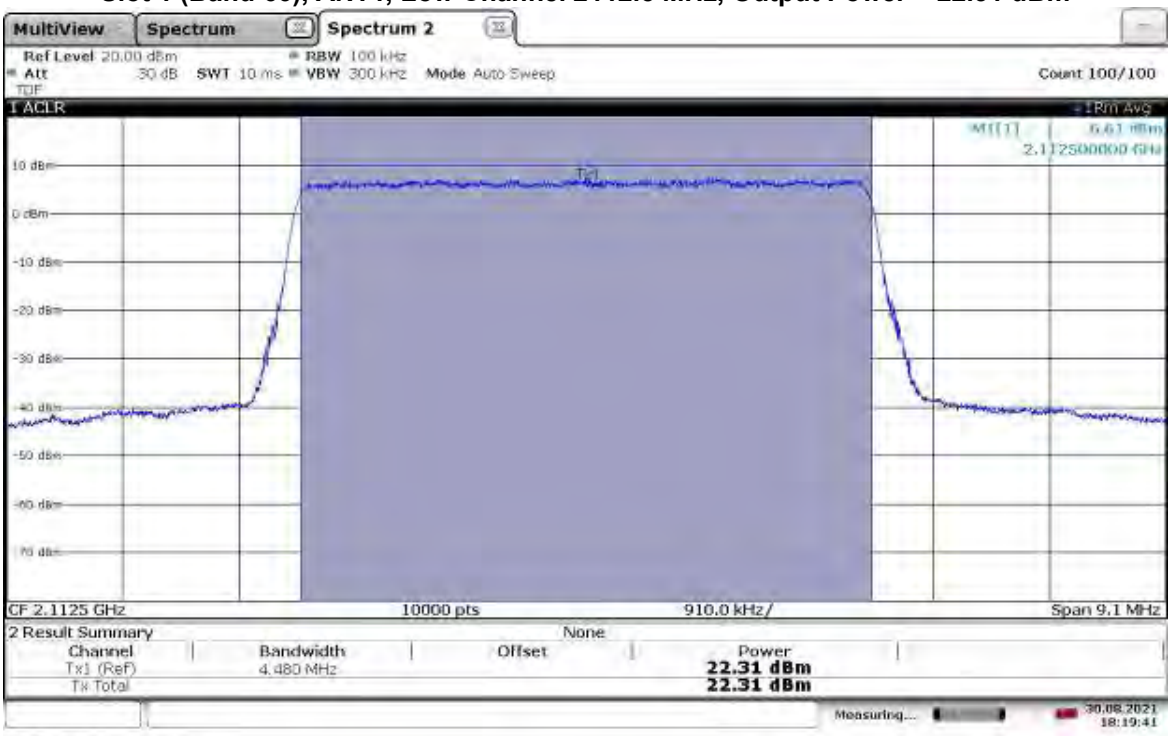
14:57:22 04.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2112.5 MHz, Output Power = 22.14 dBm



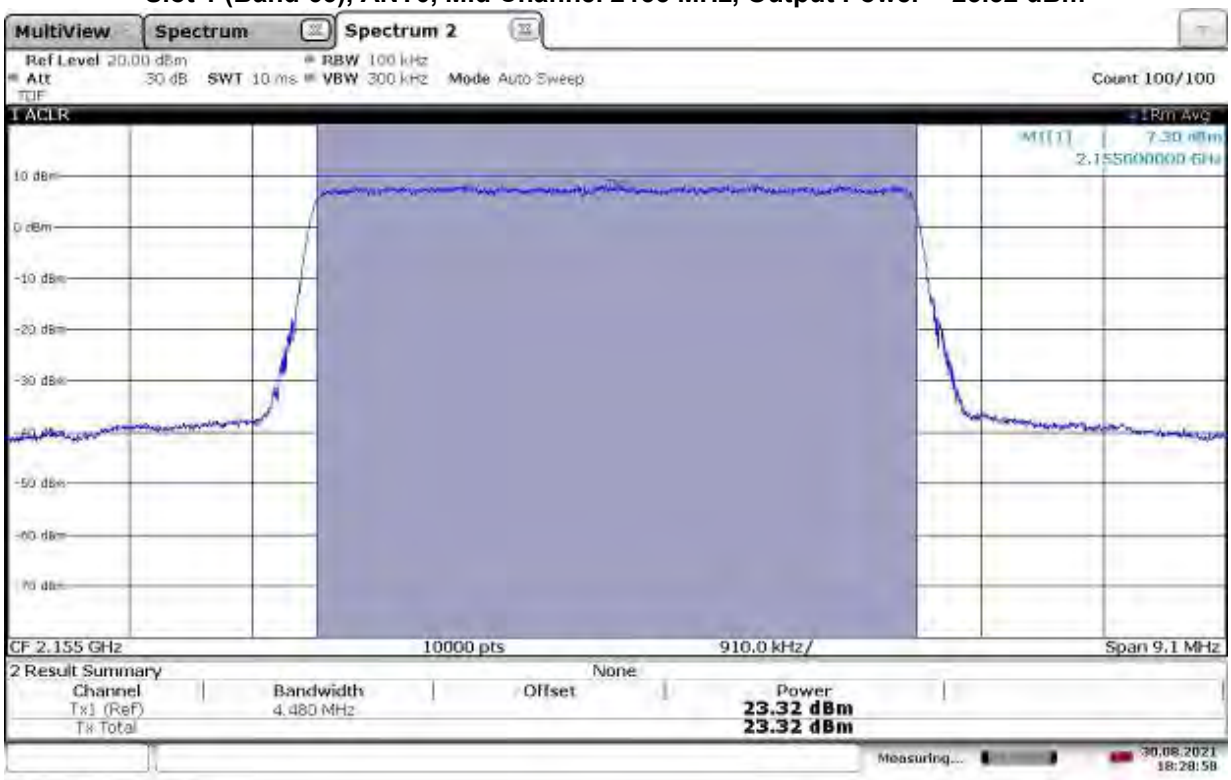
18:20:51 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2112.5 MHz, Output Power = 22.31 dBm



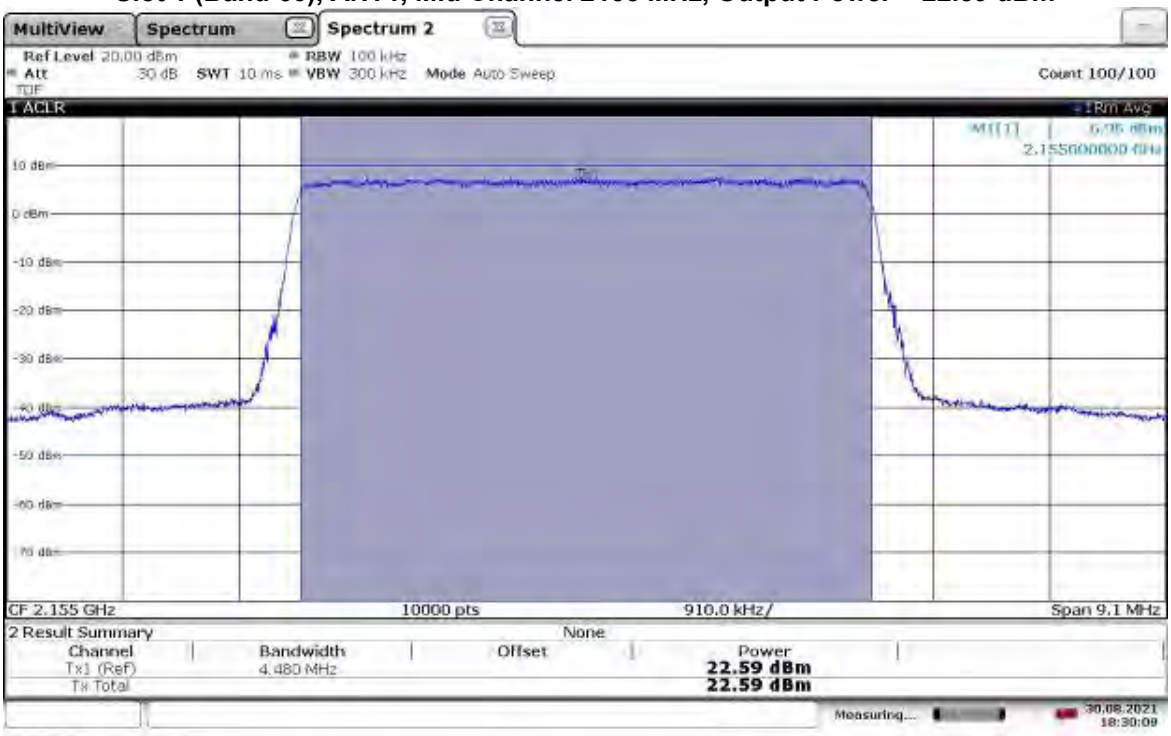
18:19:42 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.32 dBm



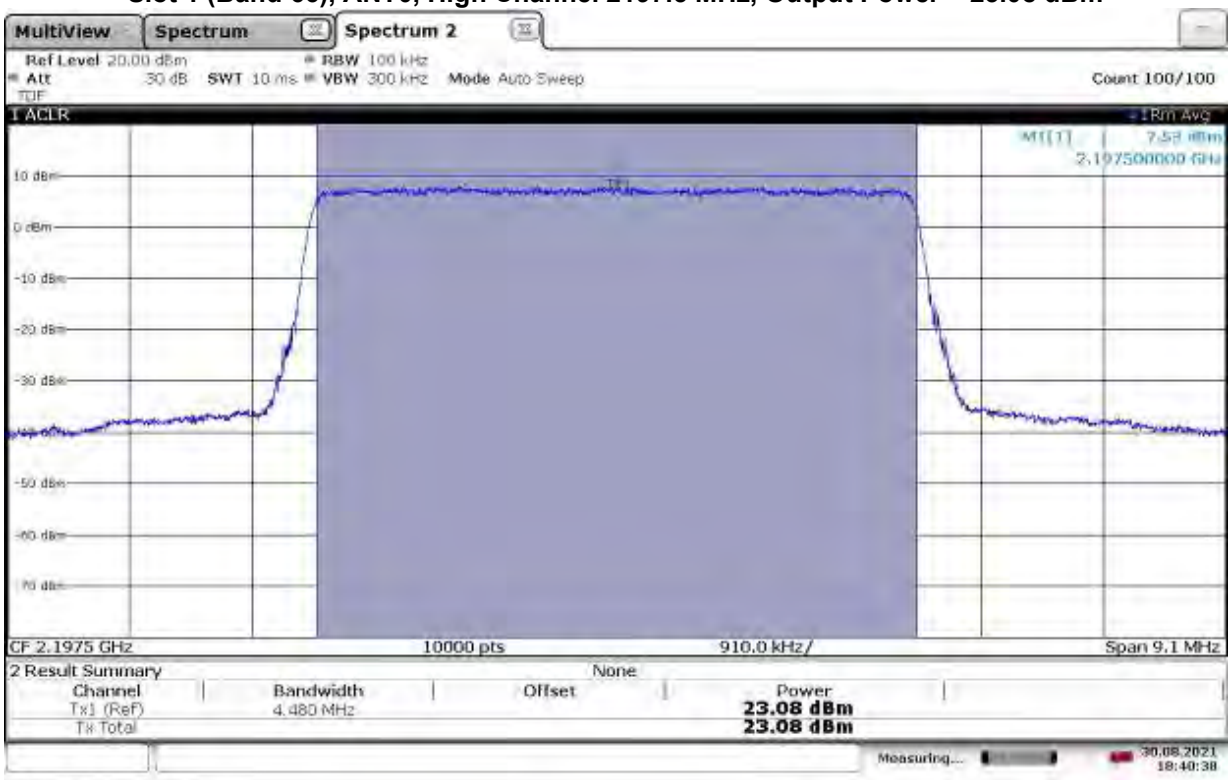
18:28:58 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.59 dBm



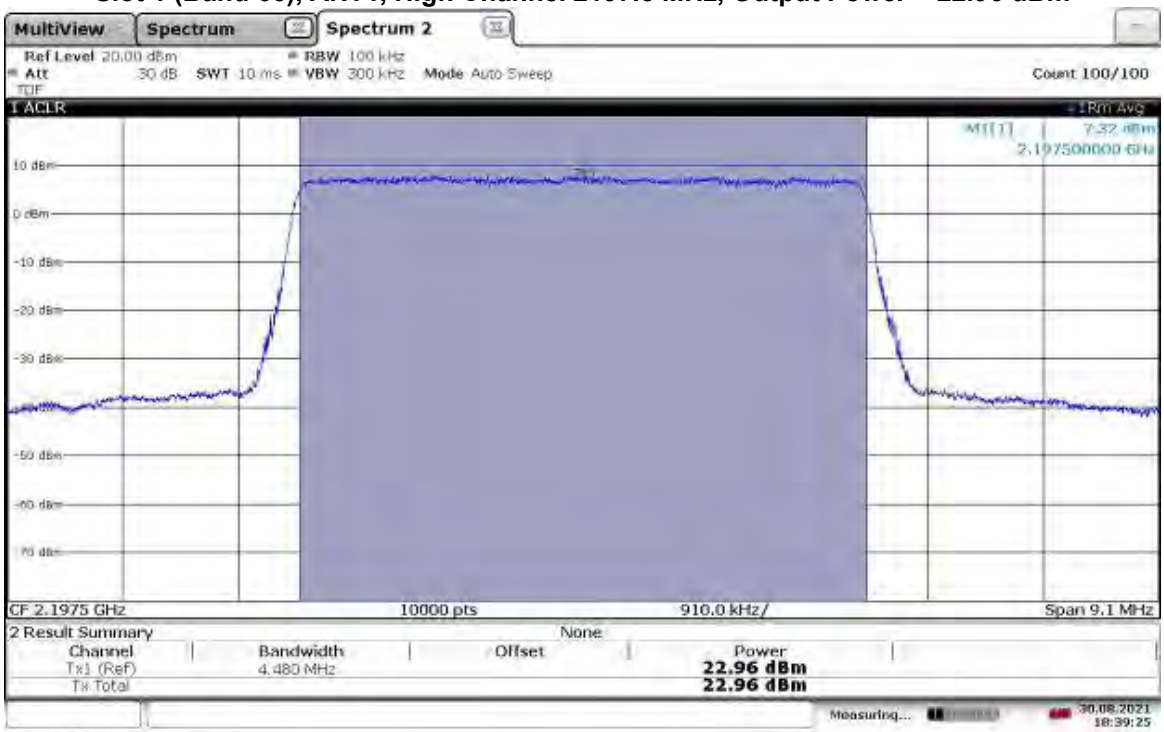
18:30:09 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2197.5 MHz, Output Power = 23.08 dBm



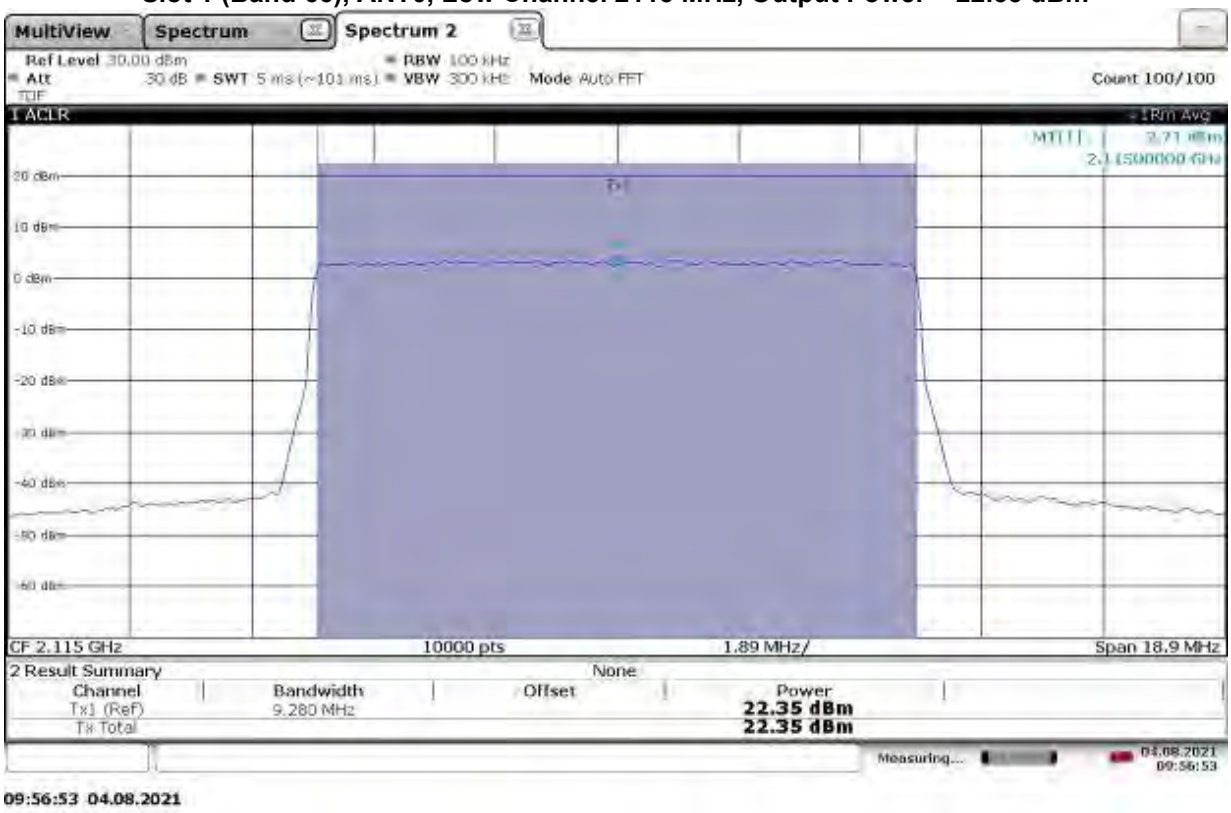
18:40:39 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2197.5 MHz, Output Power = 22.96 dBm

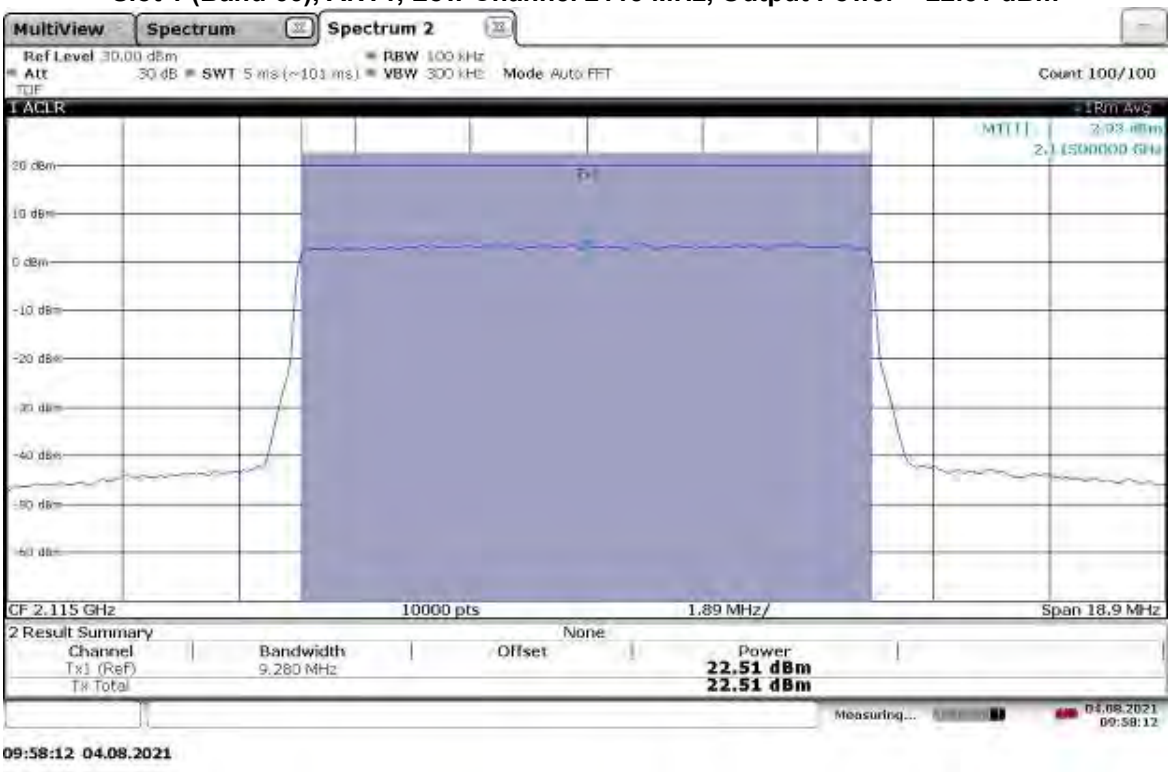


18:39:26 30.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2115 MHz, Output Power = 22.35 dBm

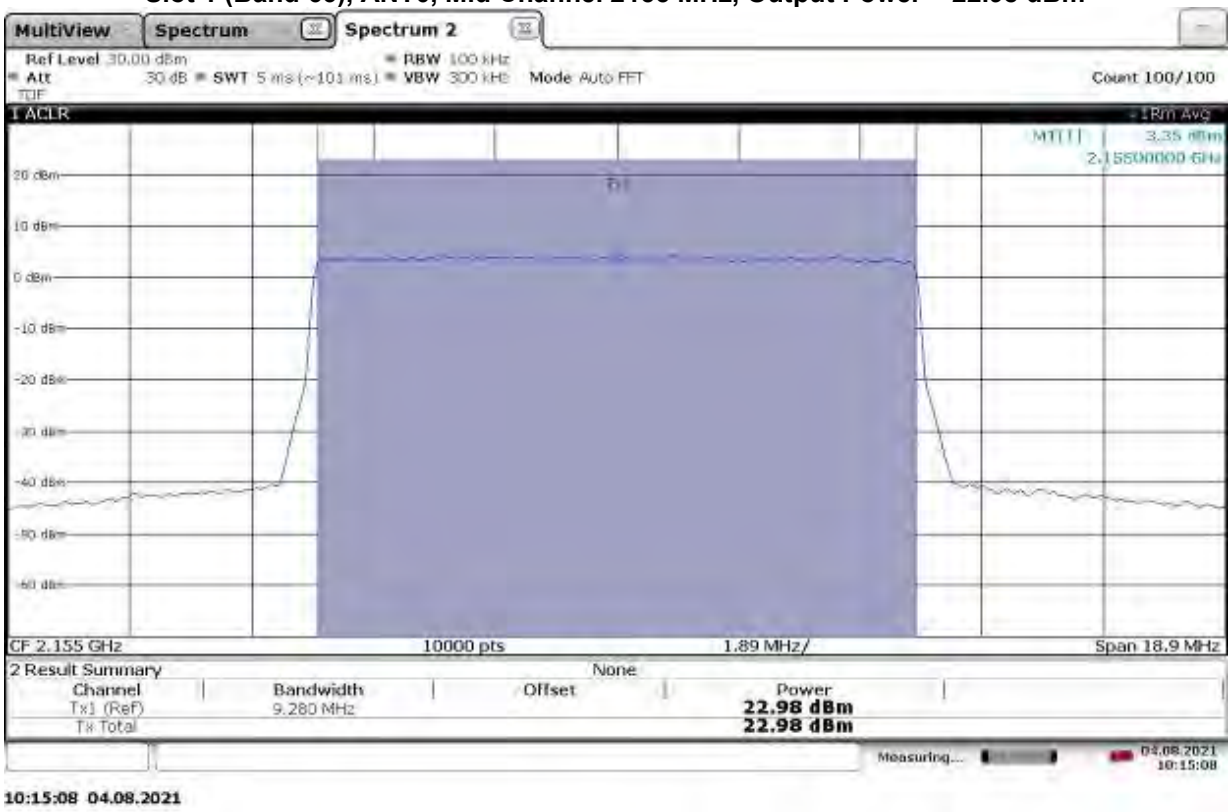


TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2115 MHz, Output Power = 22.51 dBm



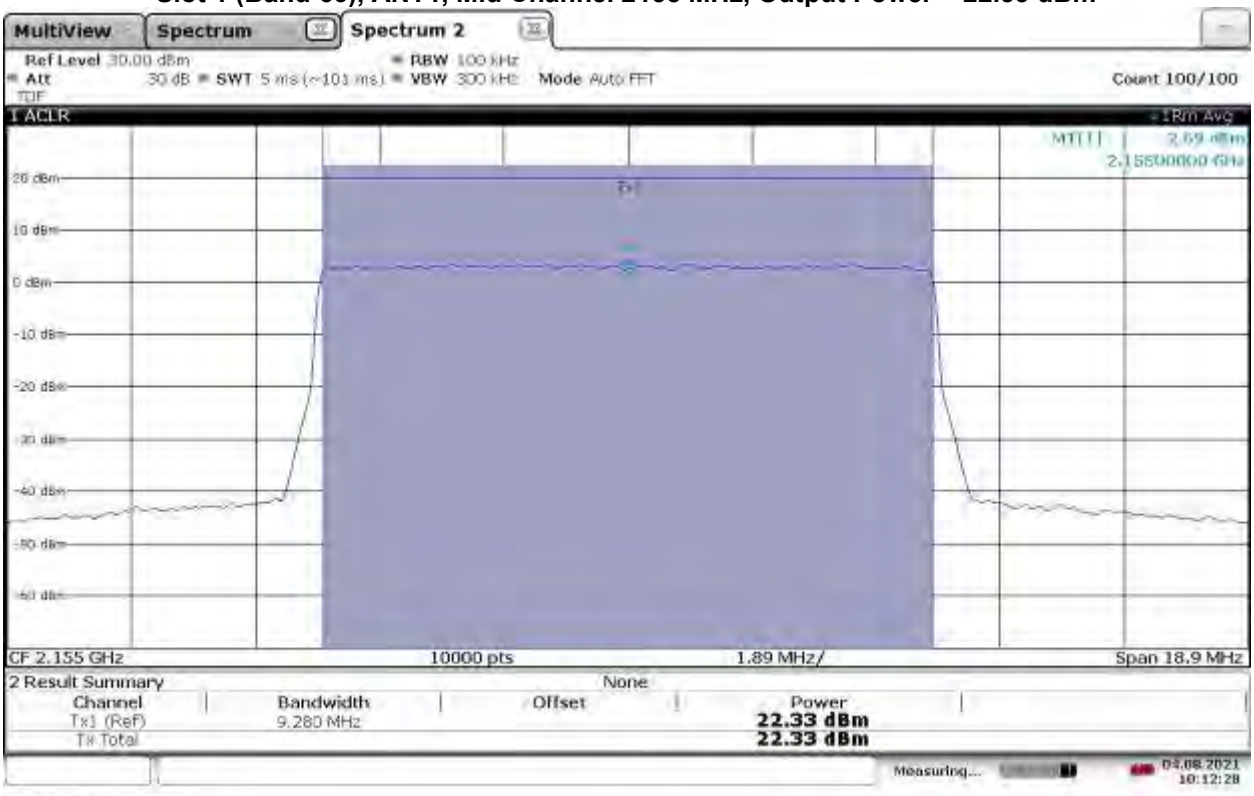
TM3.1a-256QAM_10 MHz Bandwidth

Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 22.98 dBm



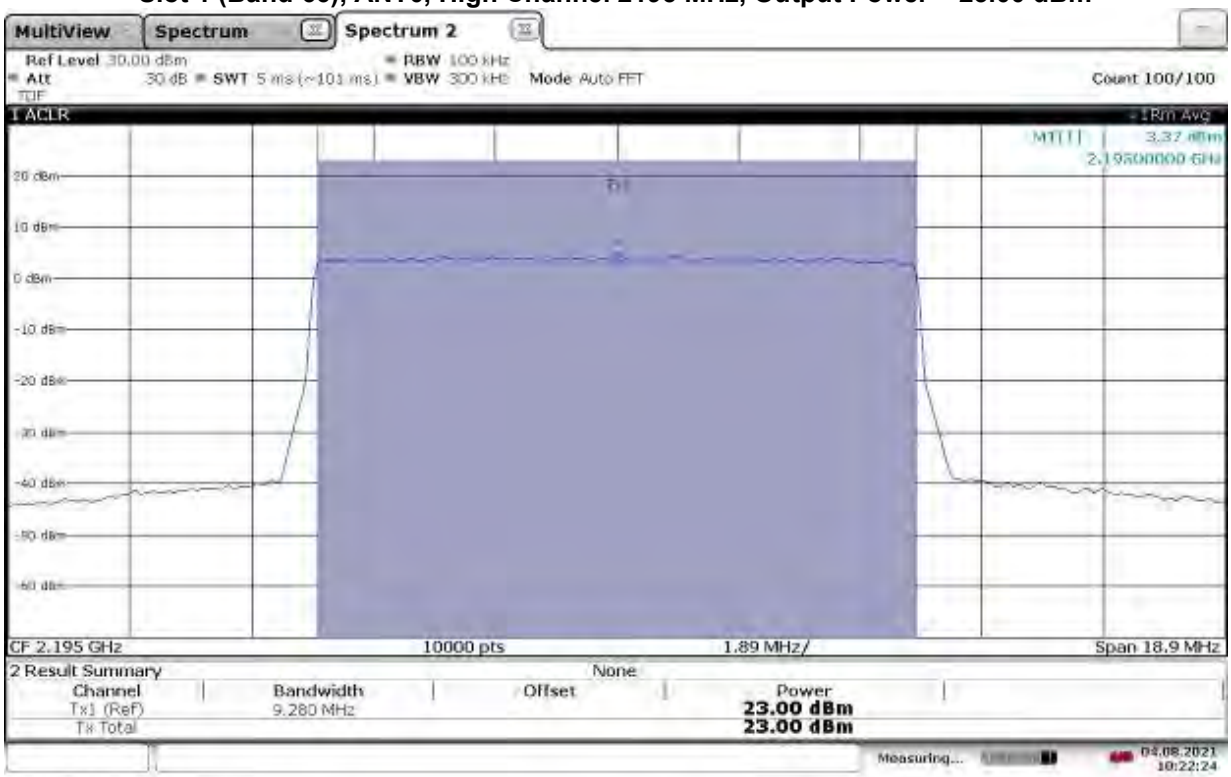
10:15:08 04.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.33 dBm



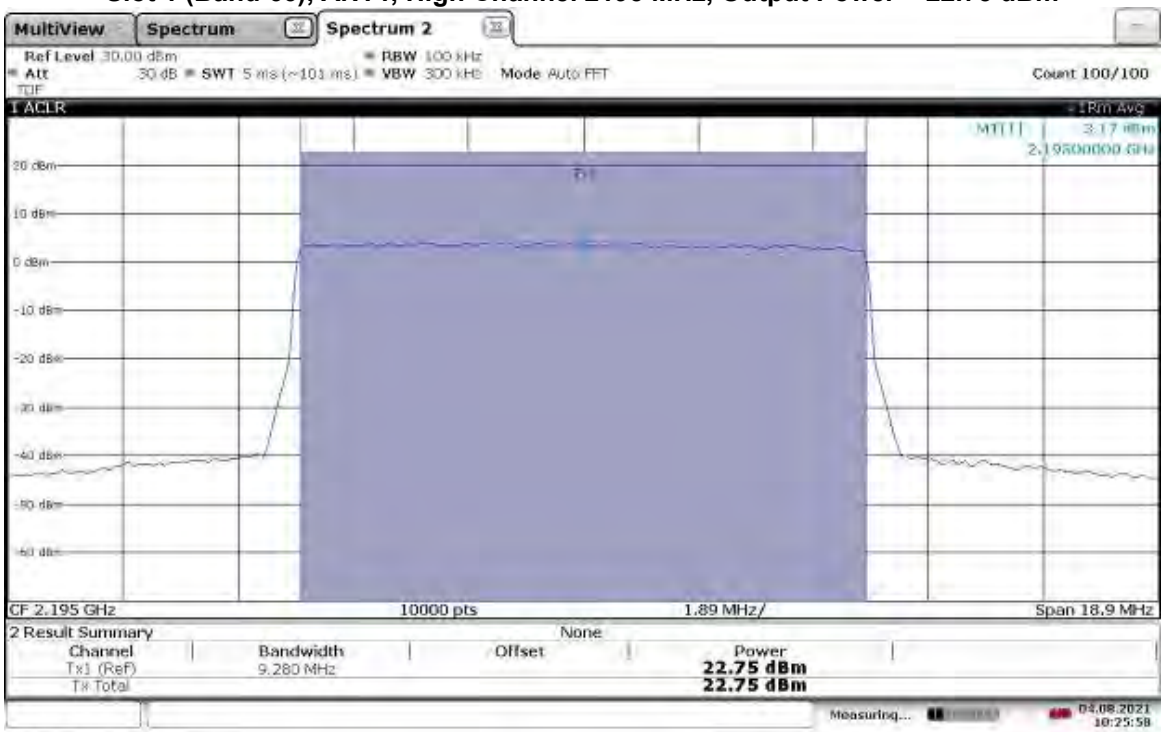
10:12:28 04.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2195 MHz, Output Power = 23.00 dBm



10:22:24 04.08.2021

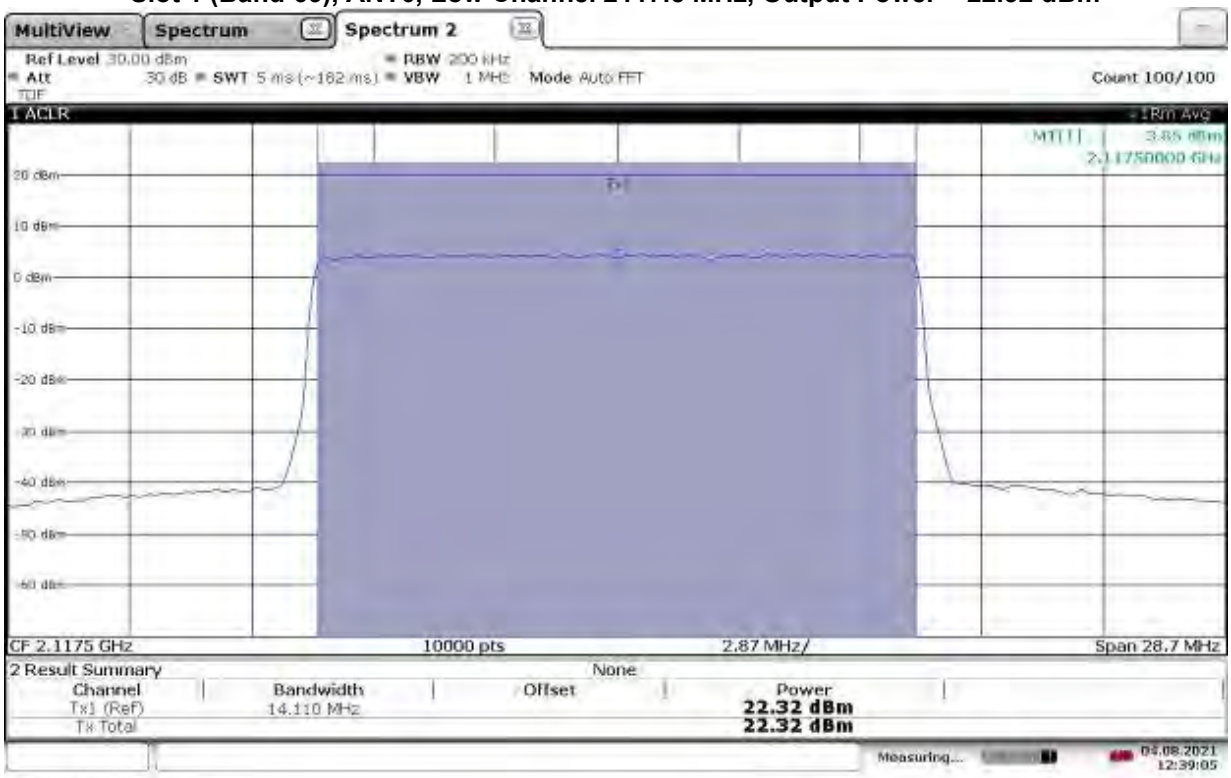
TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2195 MHz, Output Power = 22.75 dBm



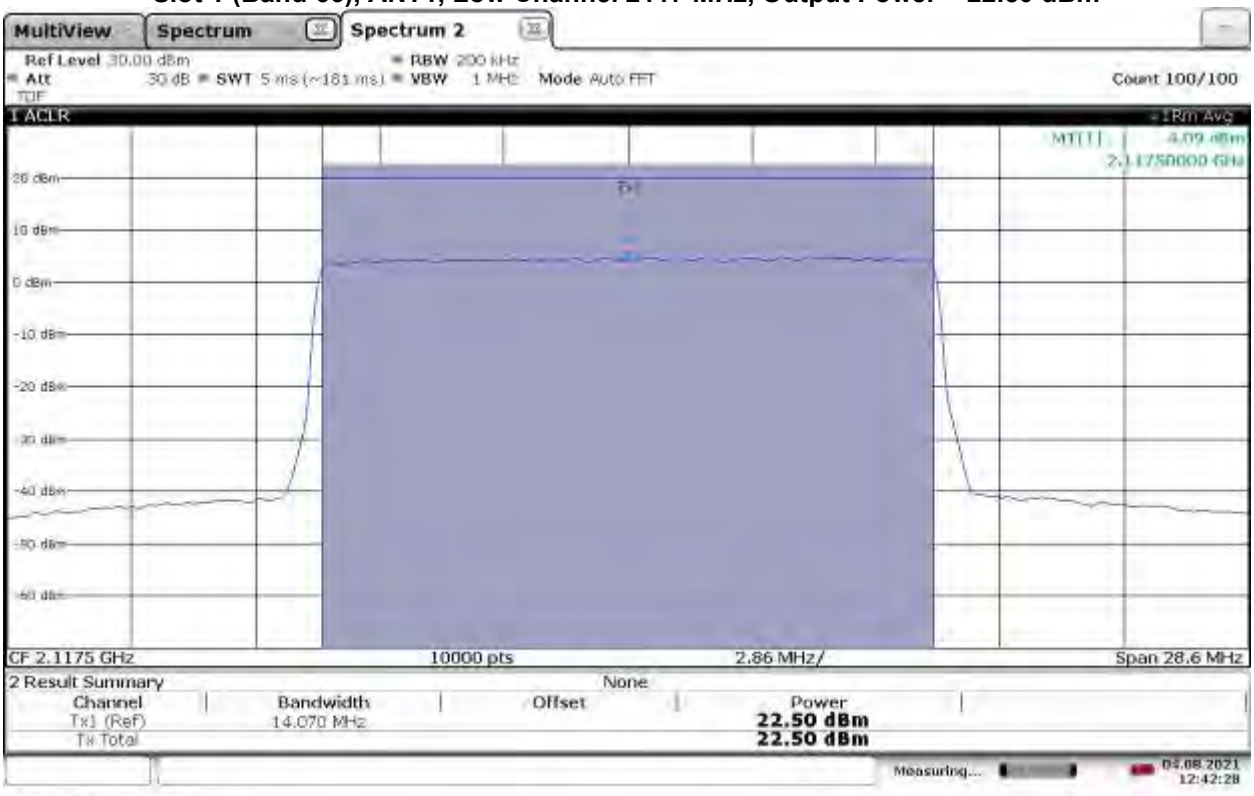
10:25:59 04.08.2021

TM3.1a-256QAM_15 MHz Bandwidth

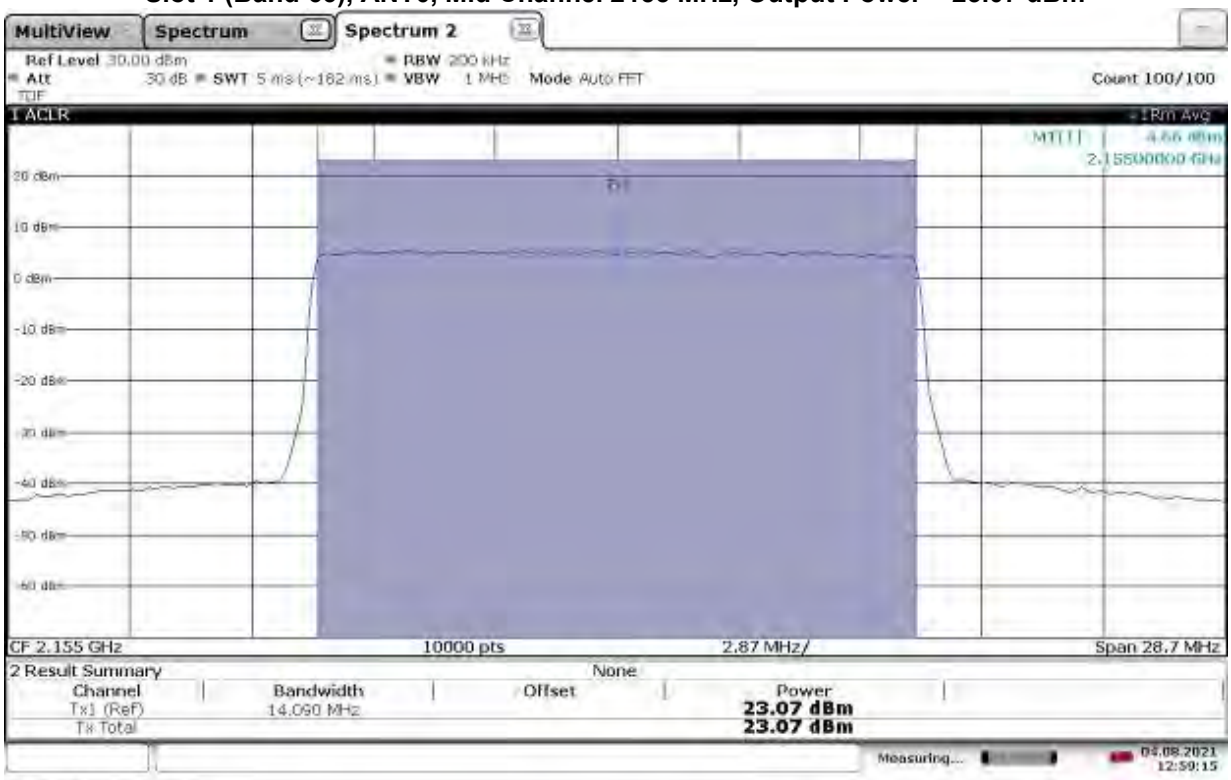
Slot 1 (Band 66), ANT0, Low Channel 2117.5 MHz, Output Power = 22.32 dBm



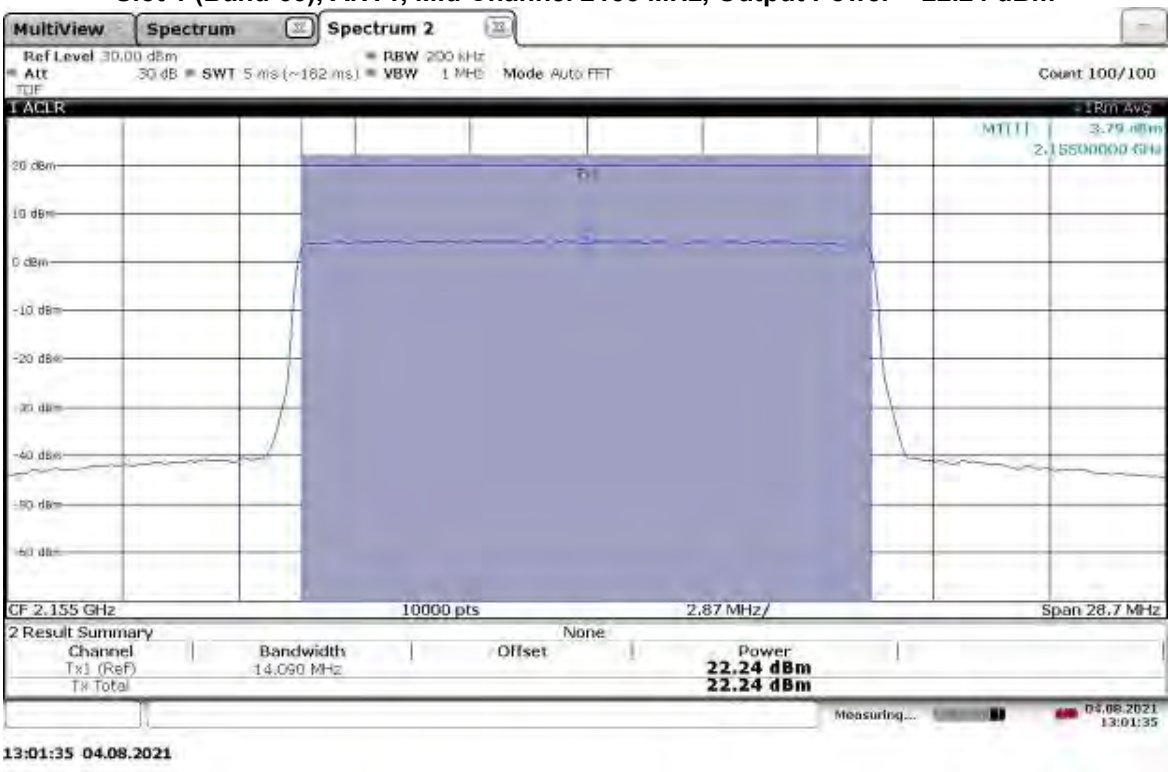
TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2117 MHz, Output Power = 22.50 dBm



TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.07 dBm

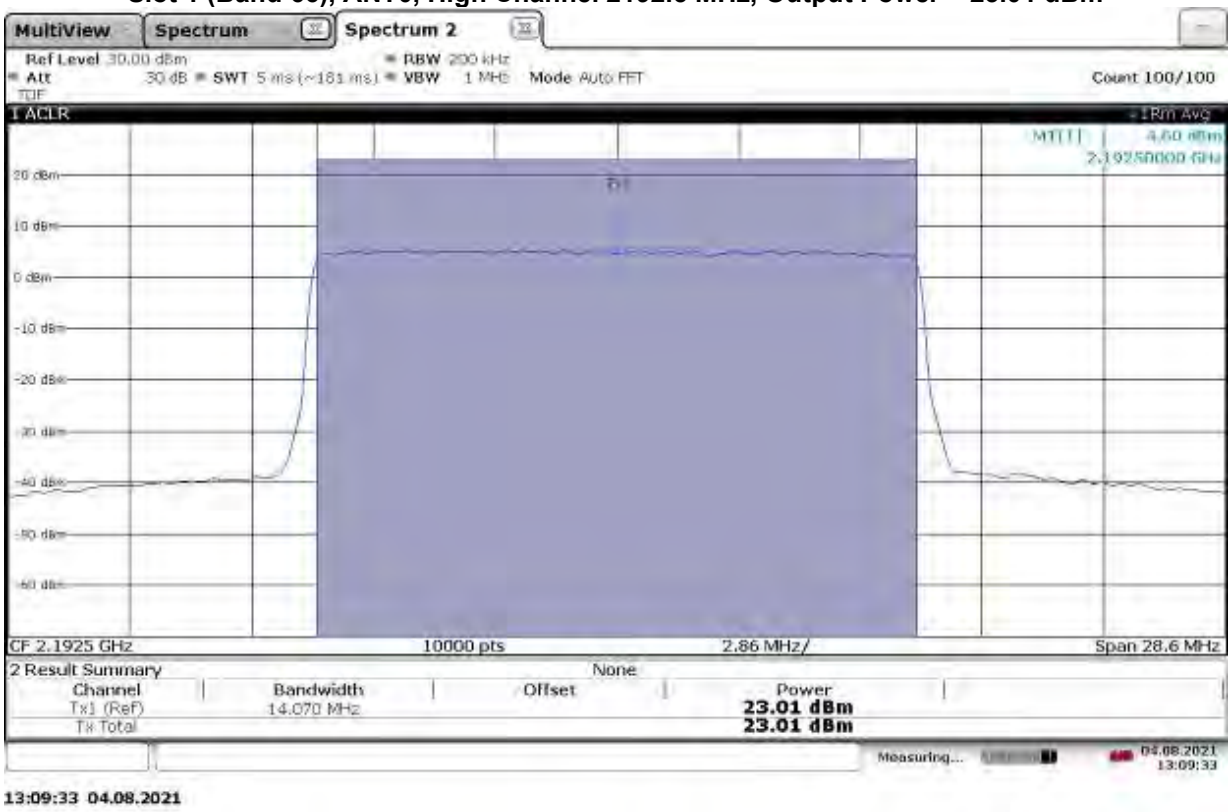


TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.24 dBm



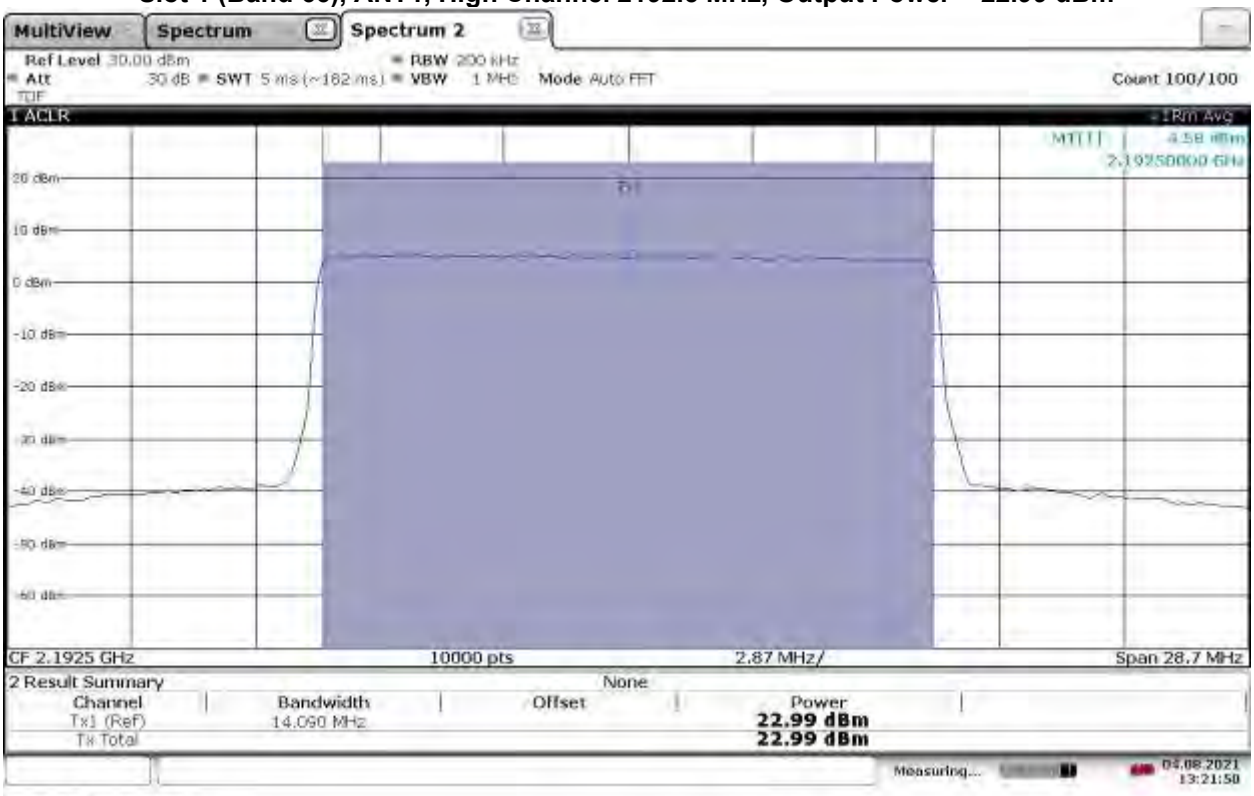
TM3.1a-256QAM_15 MHz Bandwidth

Slot 1 (Band 66), ANT0, High Channel 2192.5 MHz, Output Power = 23.01 dBm



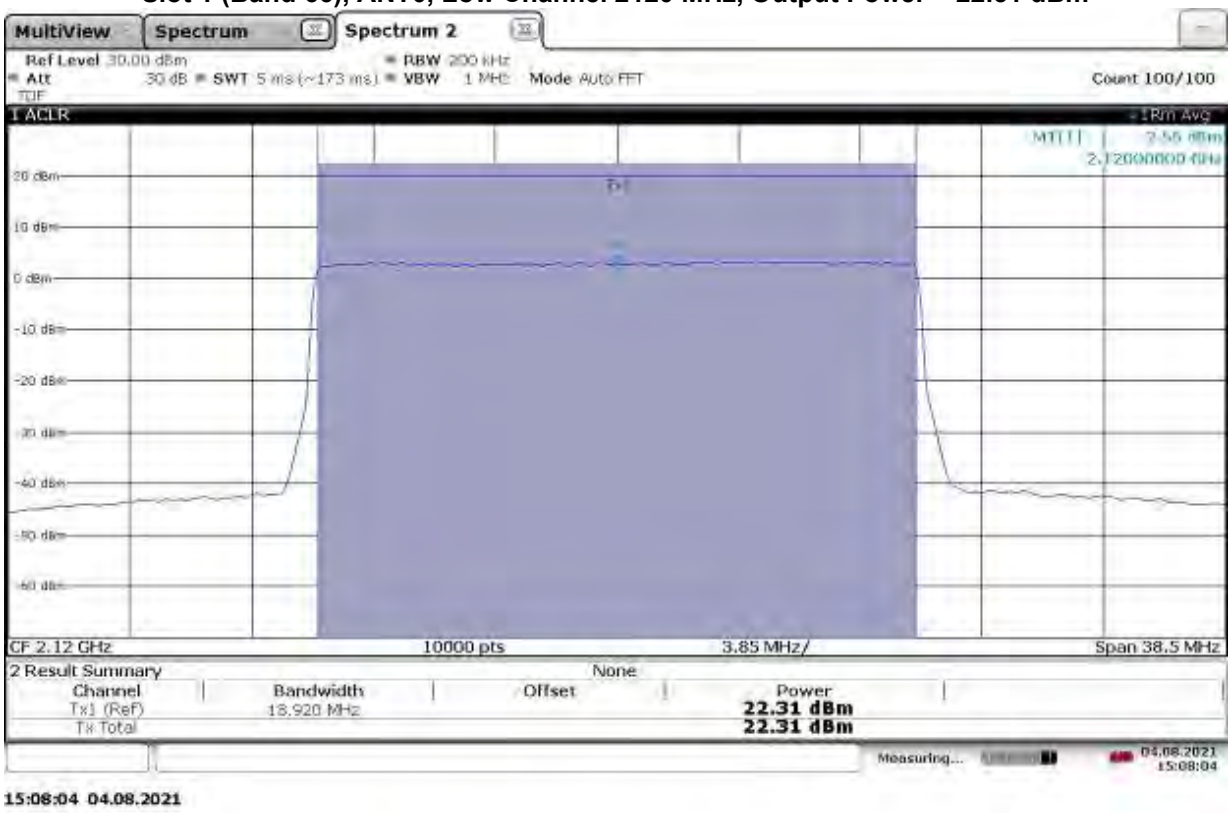
13:09:33 04.08.2021

TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2192.5 MHz, Output Power = 22.99 dBm

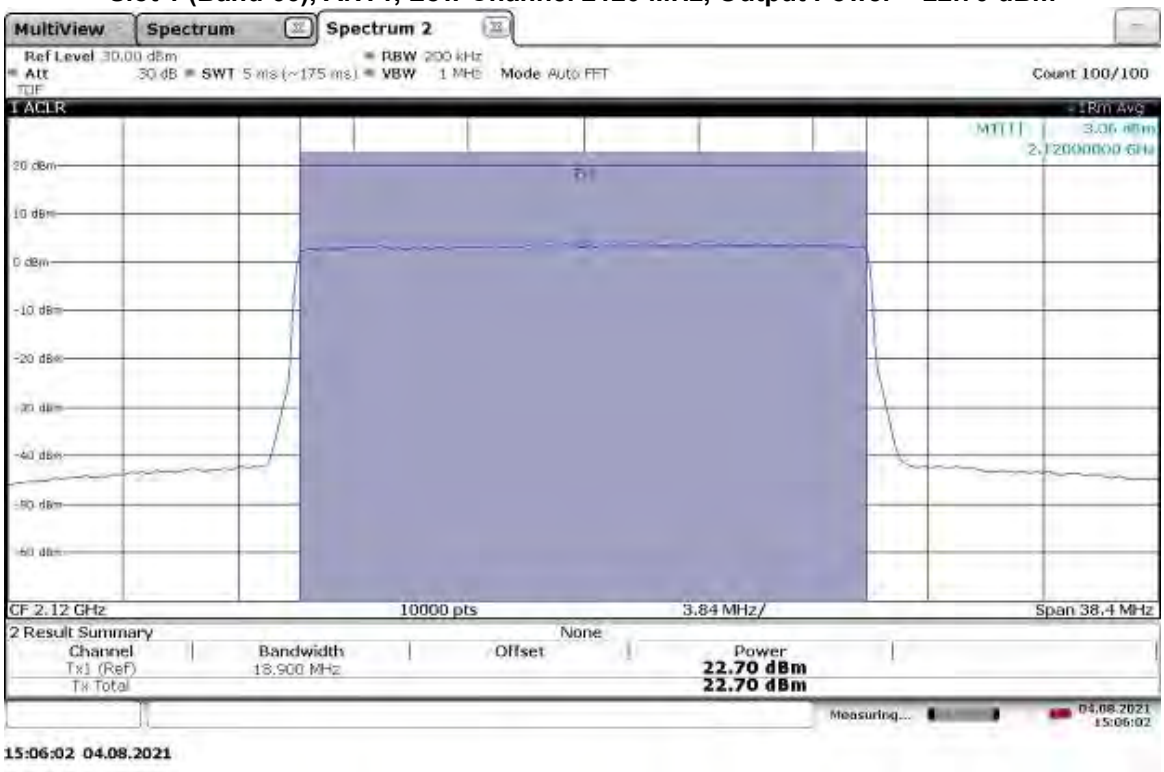


13:21:50 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel 2120 MHz, Output Power = 22.31 dBm

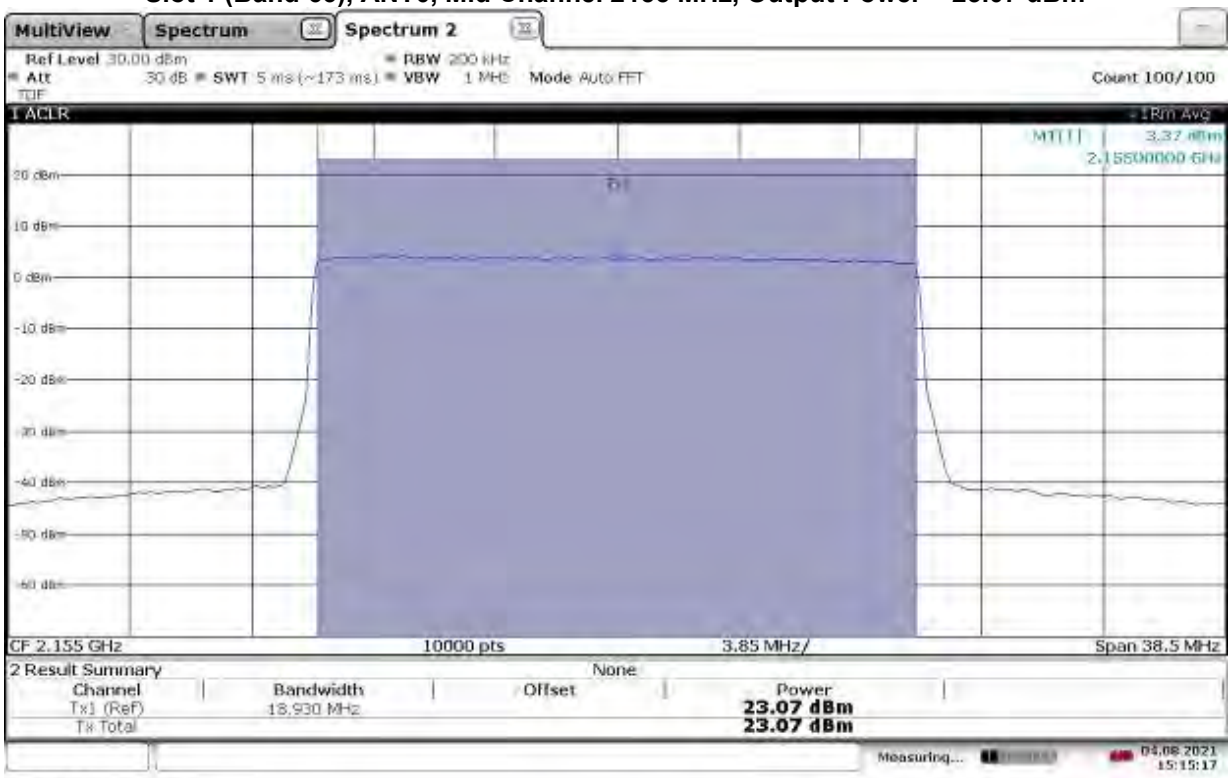


TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel 2120 MHz, Output Power = 22.70 dBm



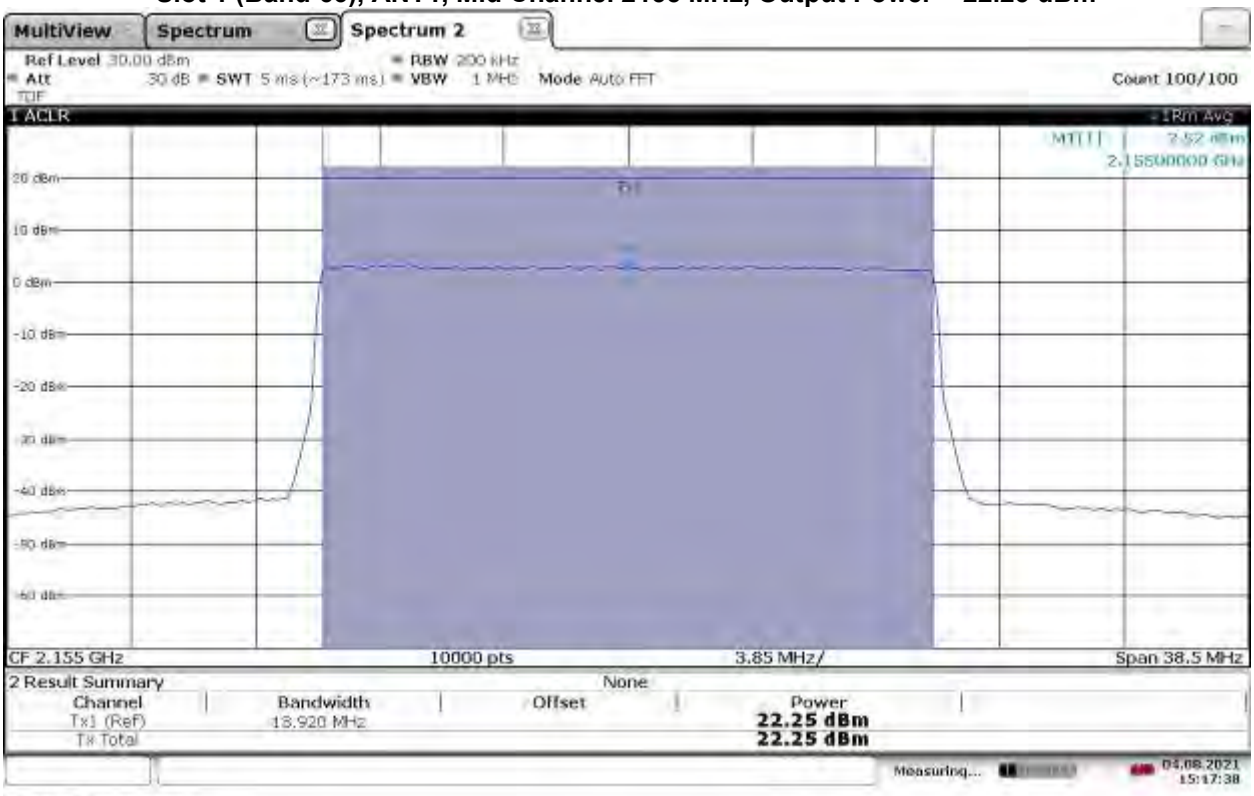
TM3.1a-256QAM_20 MHz Bandwidth

Slot 1 (Band 66), ANT0, Mid Channel 2155 MHz, Output Power = 23.07 dBm



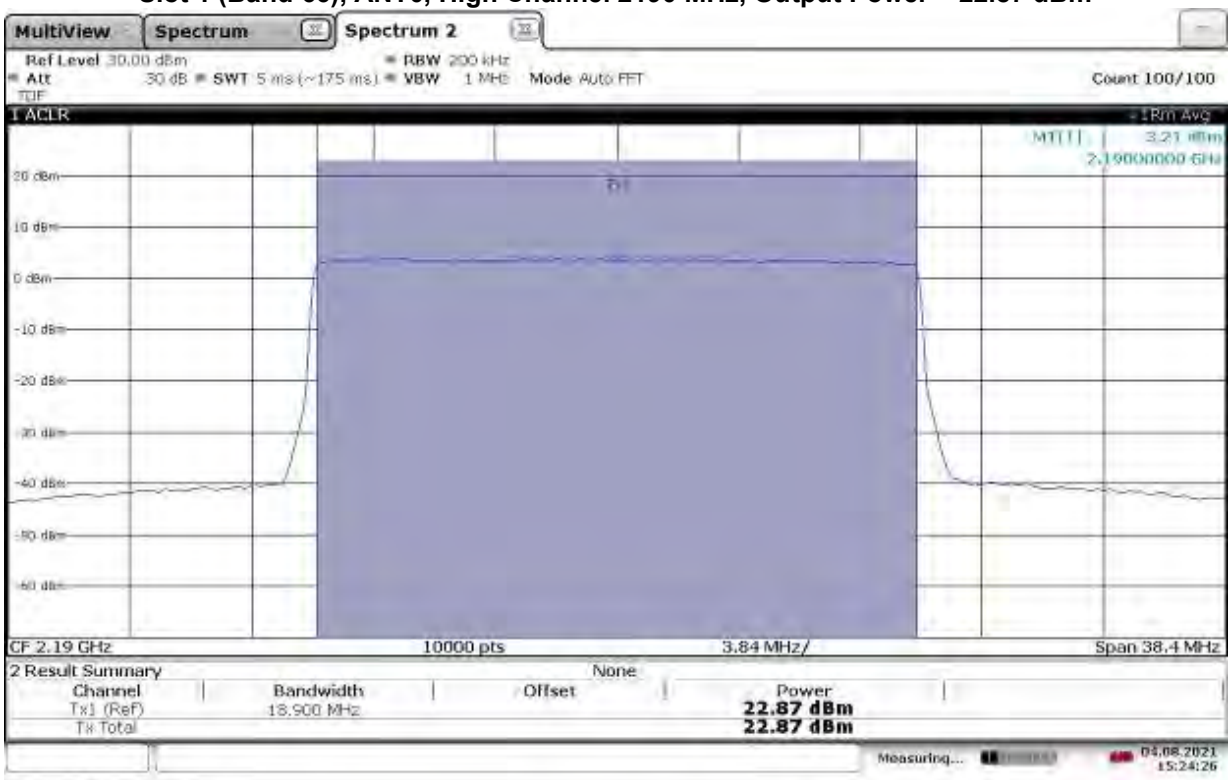
15:15:17 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel 2155 MHz, Output Power = 22.25 dBm



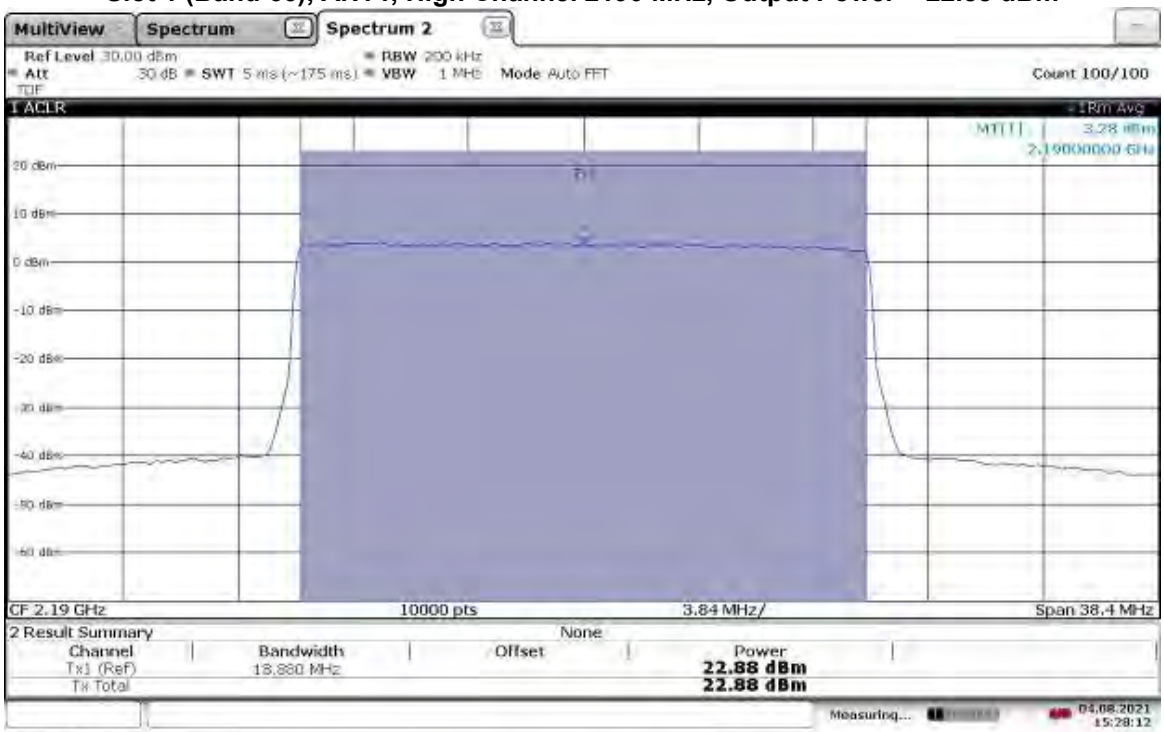
15:17:38 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel 2190 MHz, Output Power = 22.87 dBm



15:24:26 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel 2190 MHz, Output Power = 22.88 dBm



15:28:12 04.08.2021

Limit for Maximum Permissible Exposure (MPE)

FCC Human RF Exposure Limits:

The FCC §1.1310 The criteria listed in table 1 was used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices shall be evaluated according to the provisions of §2.1093 of this chapter.

Part §1.1310 Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

(1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure. The phrase *fully aware* in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of *transient* persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. Such training is not required for *transient* persons, but they must receive written and/or verbal information and notification (for example, using signs) concerning their exposure potential and appropriate means available to mitigate their exposure. The phrase *exercise control* means that an exposed person is allowed to and knows how to reduce or avoid exposure by administrative or engineering controls and work practices, such as use of personal protective equipment or time averaging of exposure.

(2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

Test Procedure

RF exposure for licensed transmitter is handled at the time of licensing, however, an MPE calculation was performed in order to show the distance at which the device is compliant with the limits of §1.1310, assuming antenna gains of 0 dBi and 4 dBi. The highest measured conducted output power was used, adjusted by +3dB to account for two antenna MIMO operation.

FCC Limit For General Population/Uncontrolled Exposure at 2.155 GHz = 1 mW/cm^2

Power Density = [EIRP] / [4π x $(D_{cm})^2$]

Where EIRP is in milliwatts and D is in centimeters. Setting the power density equal to the limit of 1 mW/cm^2 and solving for D_{cm} yields the following results.

Results:

EUT EIRP = Conducted power + Array Gain + Antenna gain in dBi

Power Density Limit = [EIRP] / [4π x $(D_{cm})^2$]
1 mW/cm^2 = [EIRP] / [4π x $(D_{cm})^2$]
D_{cm} = $([EIRP] / [4\pi])^{1/2}$

For Gain = 0 dBi,
EIRP = 23.58 dBm + 10*LOG(2) + 0 dBi = 23.58 dBm + 3 dB + 0dBi
EIRP = 26.58 dBm or 455.00 mW
Therefore, the minimum safe distance D_{cm} = $([516.4] / [4\pi])^{1/2}$
D_{cm} = 6.02 cm at 0 dBi gain two antenna MIMO

For Gain = 4 dBi,
EIRP = 23.58 dBm + 10*LOG(2) + 4 dBi = 23.58 dBm + 3 dB + 4dBi
EIRP = 30.58 dBm or 1142.88 mW
Therefore, the minimum safe distance D_{cm} = $([1297] / [4\pi])^{1/2}$
D_{cm} = 9.54 cm at 4 dBi gain two antenna MIMO

For Gain = X dBi,
EIRP = 22.58 dBm + 10*LOG(2) + X dBi = 23.58dBm + 3 dB + XdBi
EIRP = 26.58 +X dBm or 455.00 + 10^(X/10) mW
Therefore, the minimum safe distance D_{cm} = $([455.00 + 10^{(X/10)}] / [4\pi])^{1/2}$
D_{cm} = $0.282 * (455.00 + 10^{(X/10)})^{1/2}$ cm at X dBi gain two antenna MIMO

Test Personnel:	Kouma Sinn KPS	Test Date:	08/03/2021, 08/04/2021, 08/30/2021
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 27	Limit Applied:	See report section 6.3
Input Voltage:	48 VDC (POE)		
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Ambient Temperature:	24, 24, 22 ºC
		Relative Humidity:	48, 56, 62 %
		Atmospheric Pressure:	1010, 1012, 998 mbars

Deviations, Additions, or Exclusions: None

7 Occupied Bandwidth

7.1 Method

Tests are performed in accordance with ANSI C63.26 and CFR47 FCC Parts 2.1049 and 27.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLSHF204'	Cable, SMA - SMA, 9kHz -40GHz, (Cable Kit 5)	Huber + Suhner	Sucoflex 102EA	234714001	02/03/2021	02/03/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

7.3 Results:

The sample tested was found to Comply.

§27.53(h)(3): The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

§2.1049: The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2112.50	ANT0	4.470
		ANT1	4.470
Mid	2155.00	ANT0	4.474
		ANT1	4.472
High	2197.50	ANT0	4.473
		ANT1	4.467

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2115.00	ANT0	9.291
		ANT1	9.292
Mid	2155.00	ANT0	9.293
		ANT1	9.284
High	2195.00	ANT0	9.286
		ANT1	9.288

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2117.50	ANT0	14.010
		ANT1	14.160
Mid	2155.00	ANT0	14.182
		ANT1	14.157
High	2192.50	ANT0	14.151
		ANT1	14.157

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2120.00	ANT0	18.910
		ANT1	18.882
Mid	2155.00	ANT0	18.902
		ANT1	18.921
High	2190.00	ANT0	18.905
		ANT1	18.892

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2112.50	ANT0	4.524
		ANT1	4.514
Mid	2155.00	ANT0	4.507
		ANT1	4.497
High	2197.50	ANT0	4.502
		ANT1	4.519

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2115.00	ANT0	9.214
		ANT1	9.221
Mid	2155.00	ANT0	9.207
		ANT1	9.215
High	2195.00	ANT0	9.224
		ANT1	9.200

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2117.50	ANT0	14.173
		ANT1	14.395
Mid	2155.00	ANT0	14.160
		ANT1	14.171
High	2192.50	ANT0	14.156
		ANT1	14.150

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2120.00	ANT0	18.956
		ANT1	18.979
Mid	2155.00	ANT0	18.964
		ANT1	18.962
High	2190.00	ANT0	18.953
		ANT1	18.944

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2112.50	ANT0	4.481
		ANT1	4.481
Mid	2155.00	ANT0	4.480
		ANT1	4.482
High	2197.50	ANT0	4.478
		ANT1	4.480

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2115.00	ANT0	9.284
		ANT1	9.286
Mid	2155.00	ANT0	9.293
		ANT1	9.290
High	2195.00	ANT0	9.294
		ANT1	9.296

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2117.50	ANT0	14.125
		ANT1	14.092
Mid	2155.00	ANT0	14.131
		ANT1	14.109
High	2192.50	ANT0	14.124
		ANT1	14.110

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2120.00	ANT0	18.879
		ANT1	18.879
Mid	2150.00	ANT0	18.885
		ANT1	18.884
High	2190.00	ANT0	18.886
		ANT1	18.872

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.1a-256QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2112.50	ANT0	4.479
		ANT1	4.483
Mid	2155.00	ANT0	4.482
		ANT1	4.478
High	2197.50	ANT0	4.487
		ANT1	4.476

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.1a-256QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2115.00	ANT0	9.288
		ANT1	9.288
Mid	2155.00	ANT0	9.266
		ANT1	9.280
High	2195.00	ANT0	9.282
		ANT1	9.285

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.1a-256QAM

Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2117.50	ANT0	14.113
		ANT1	14.078
Mid	2155.00	ANT0	14.065
		ANT1	14.088
High	2192.50	ANT0	14.075
		ANT1	14.064

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.1a-256QAM

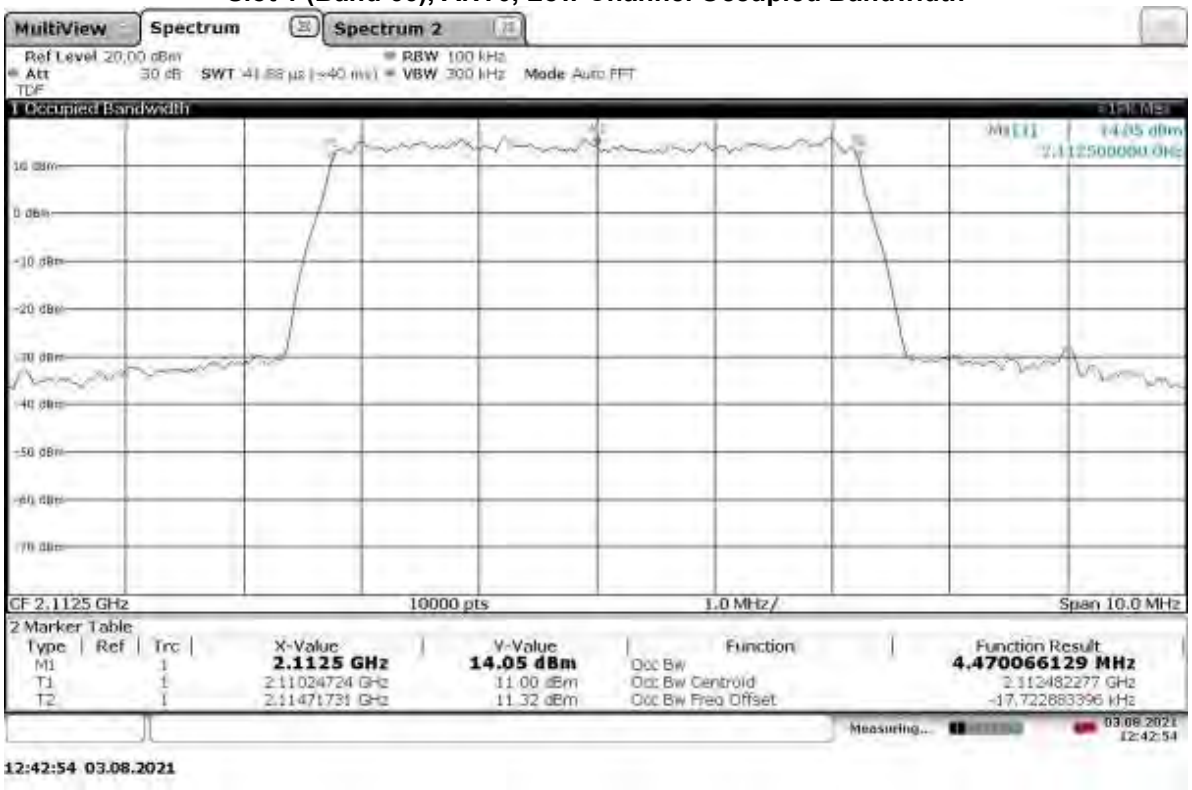
Channel	Frequency (MHz)	Antenna Port	Occupied BW (MHz)
Low	2120.00	ANT0	18.922
		ANT1	18.908
Mid	2150.00	ANT0	18.932
		ANT1	18.926
High	2190.00	ANT0	18.885
		ANT1	18.904

7.4 Setup Photograph:

Photographs are available in a separate exhibit

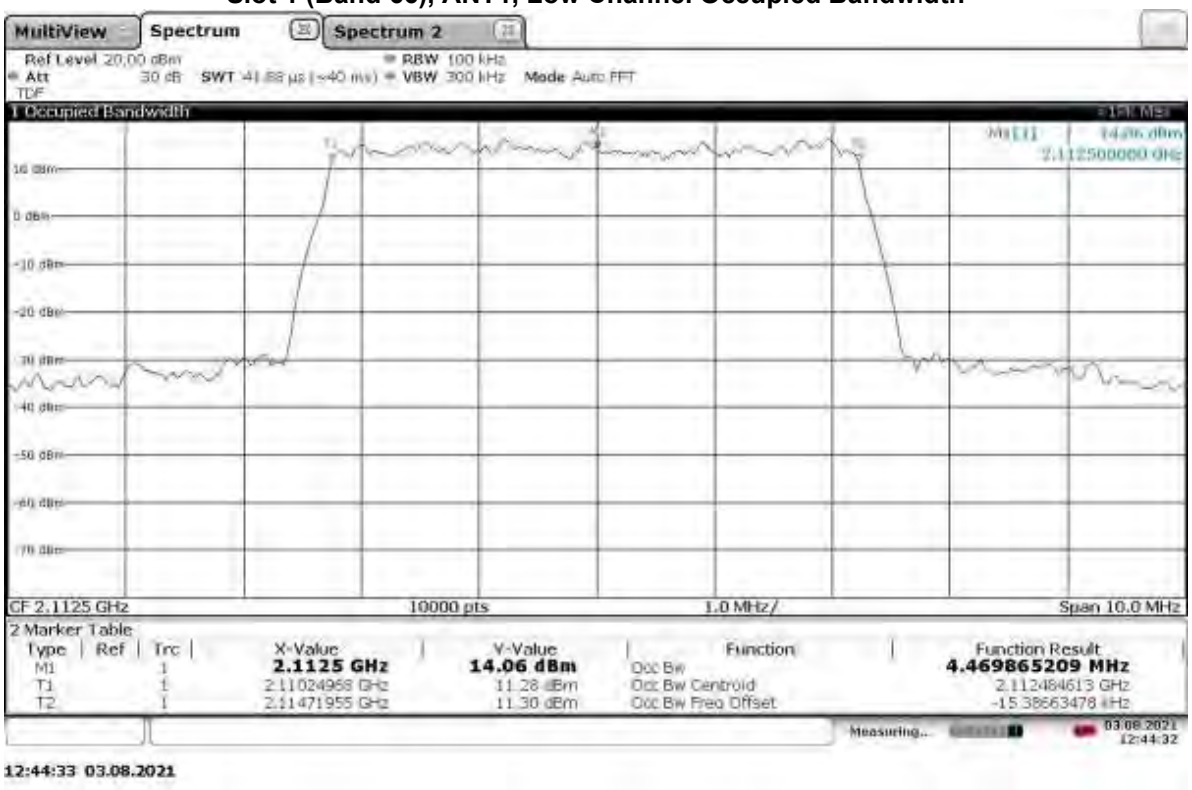
7.5 Plots/Data:

TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



12:42:54 03.08.2021

TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



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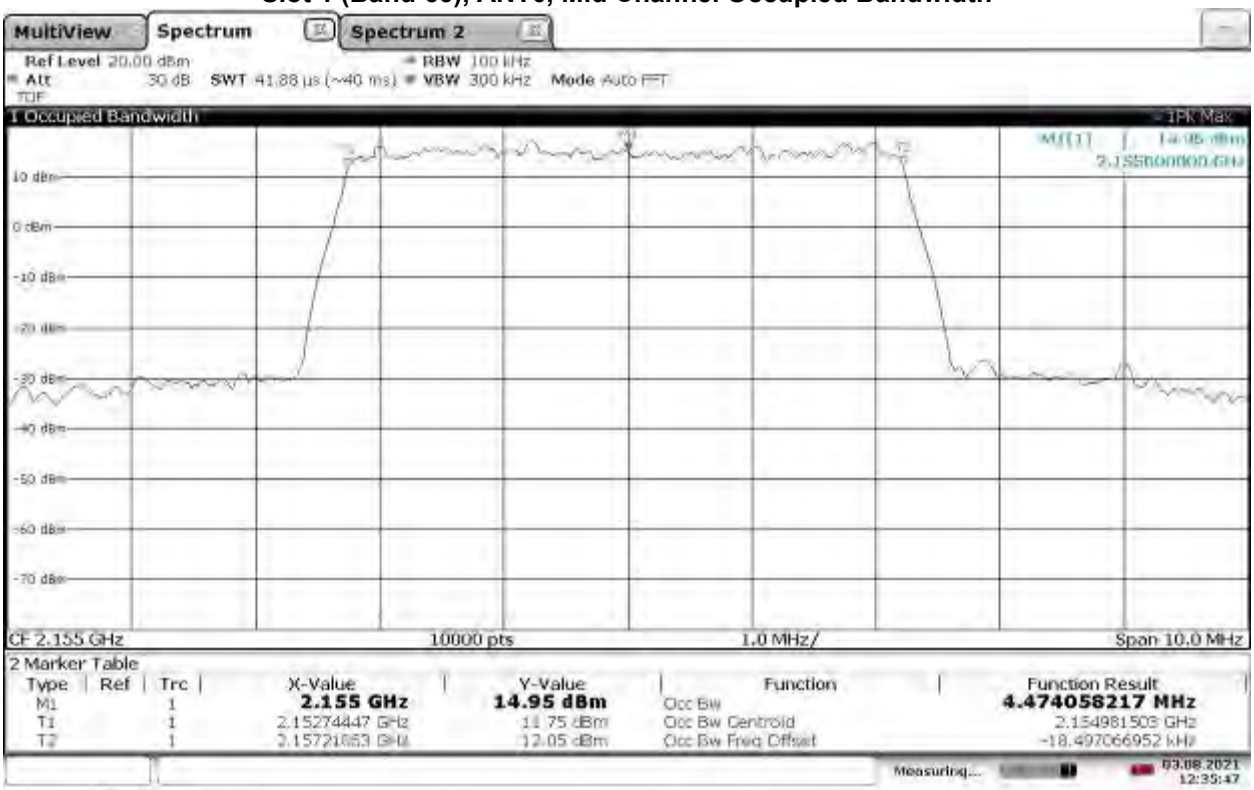
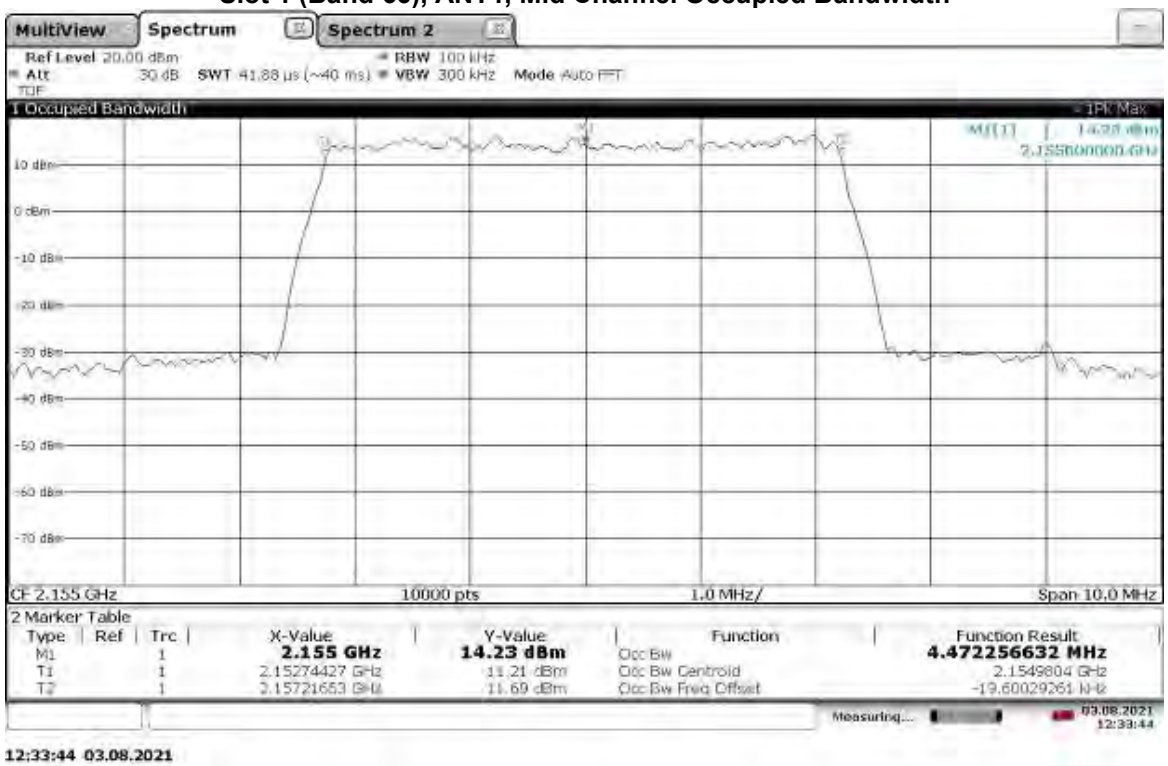
TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth

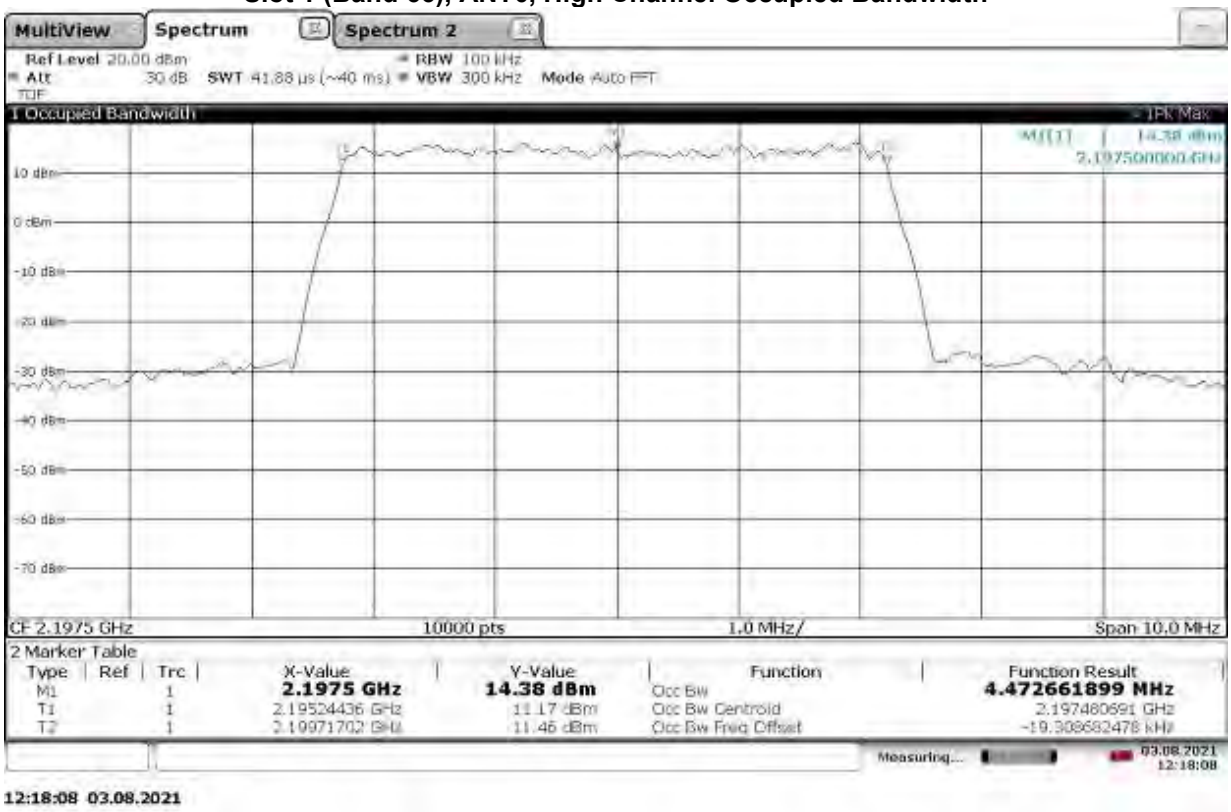


TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



TM1.1-QPSK_5 MHz Bandwidth

Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



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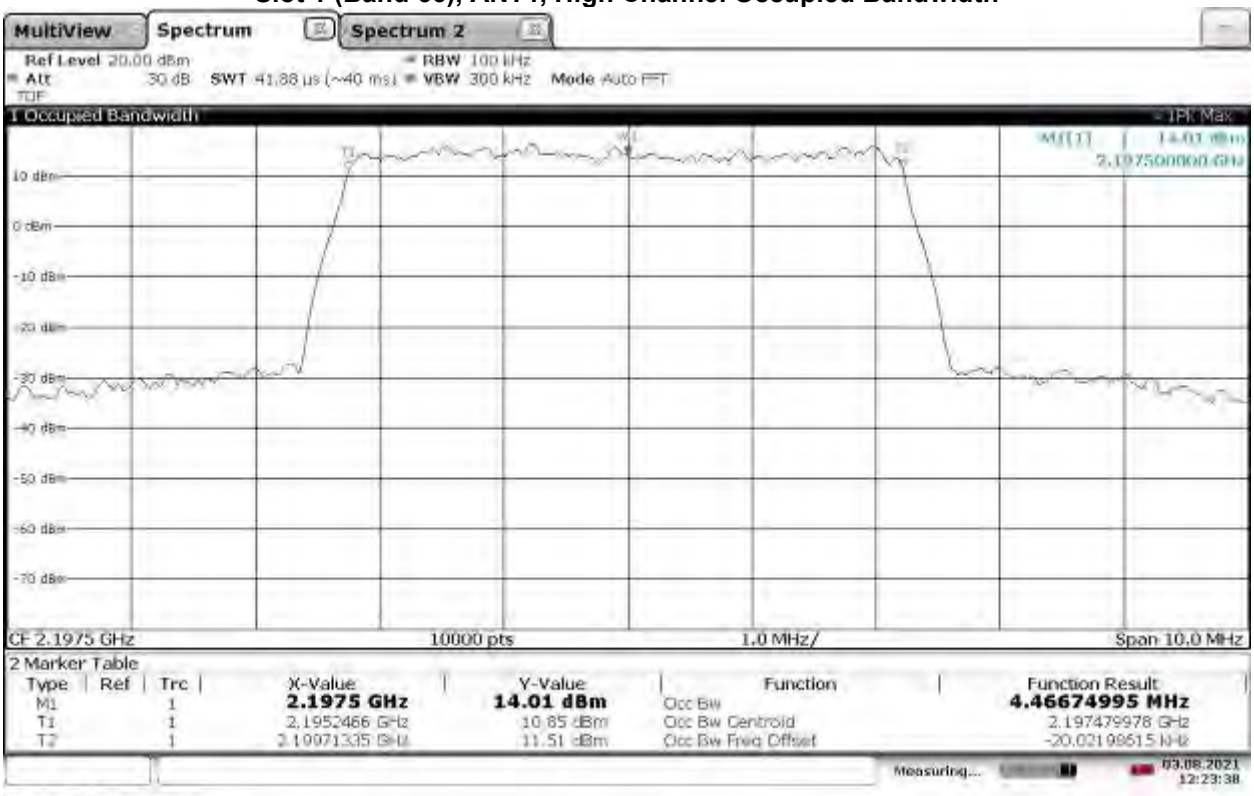
TM1.1-QPSK_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



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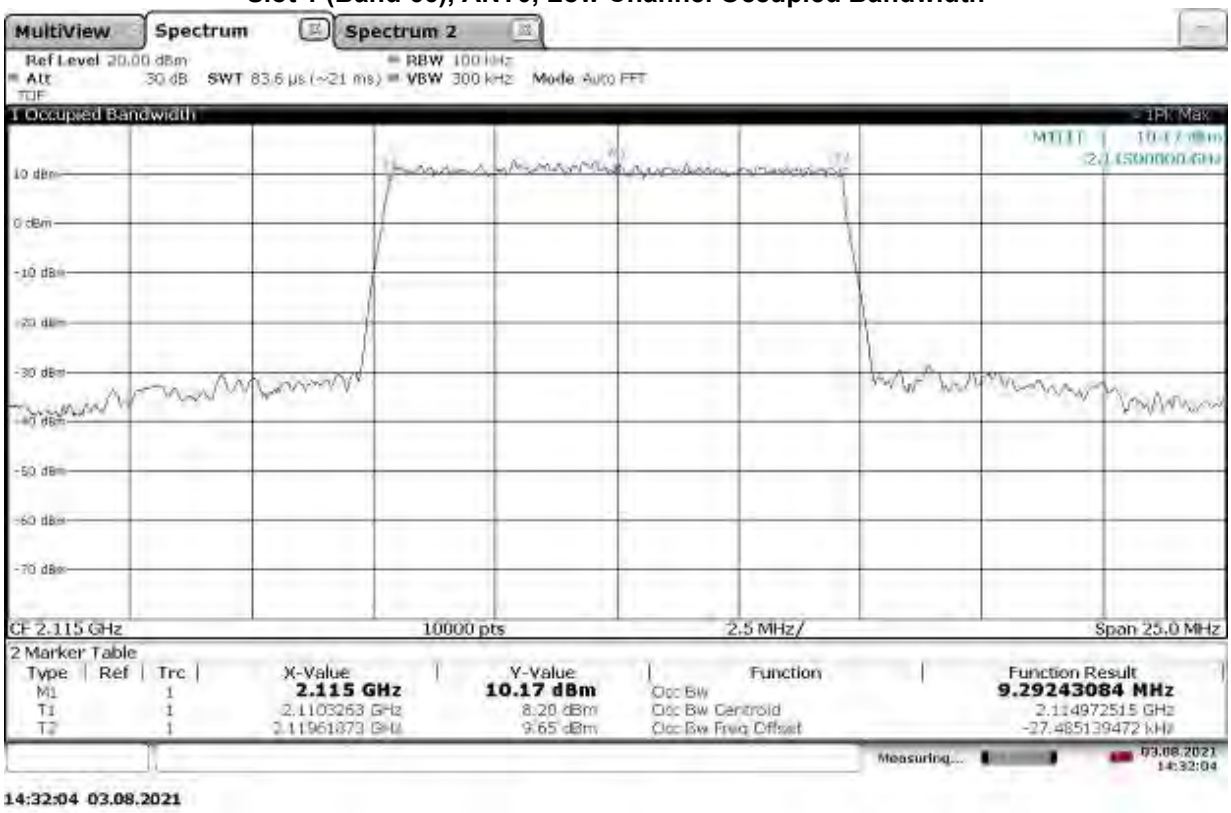
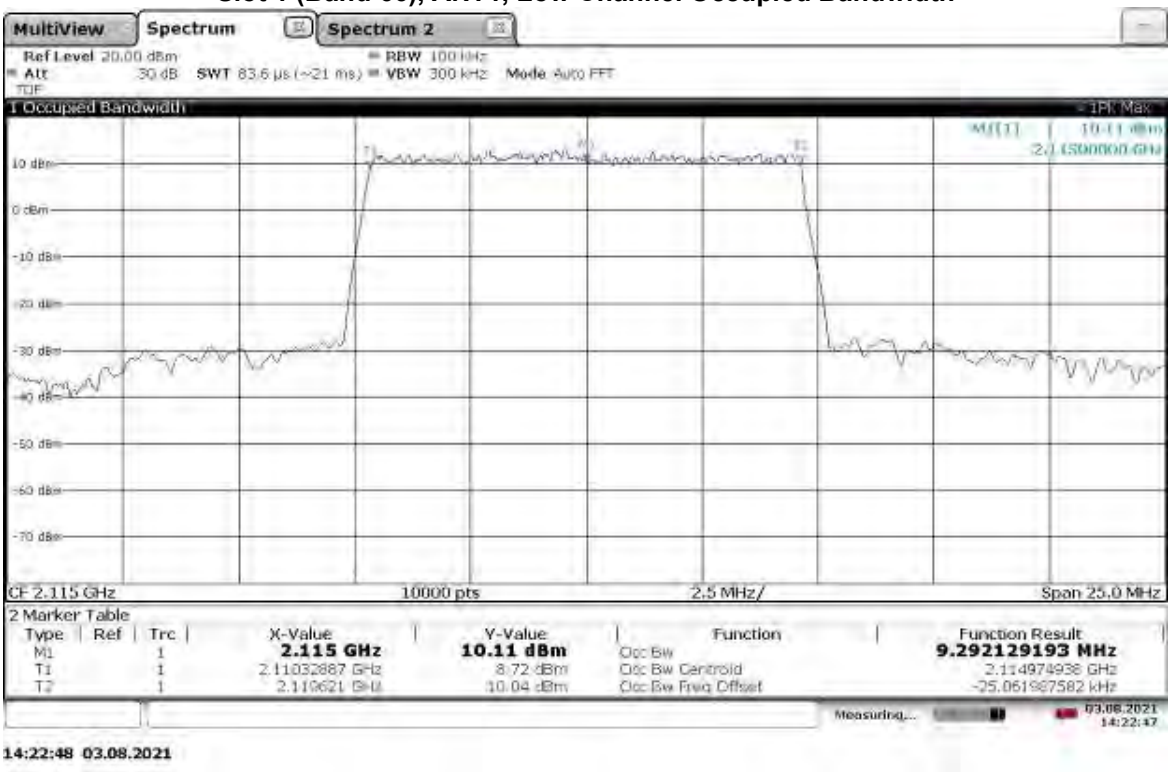
TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth

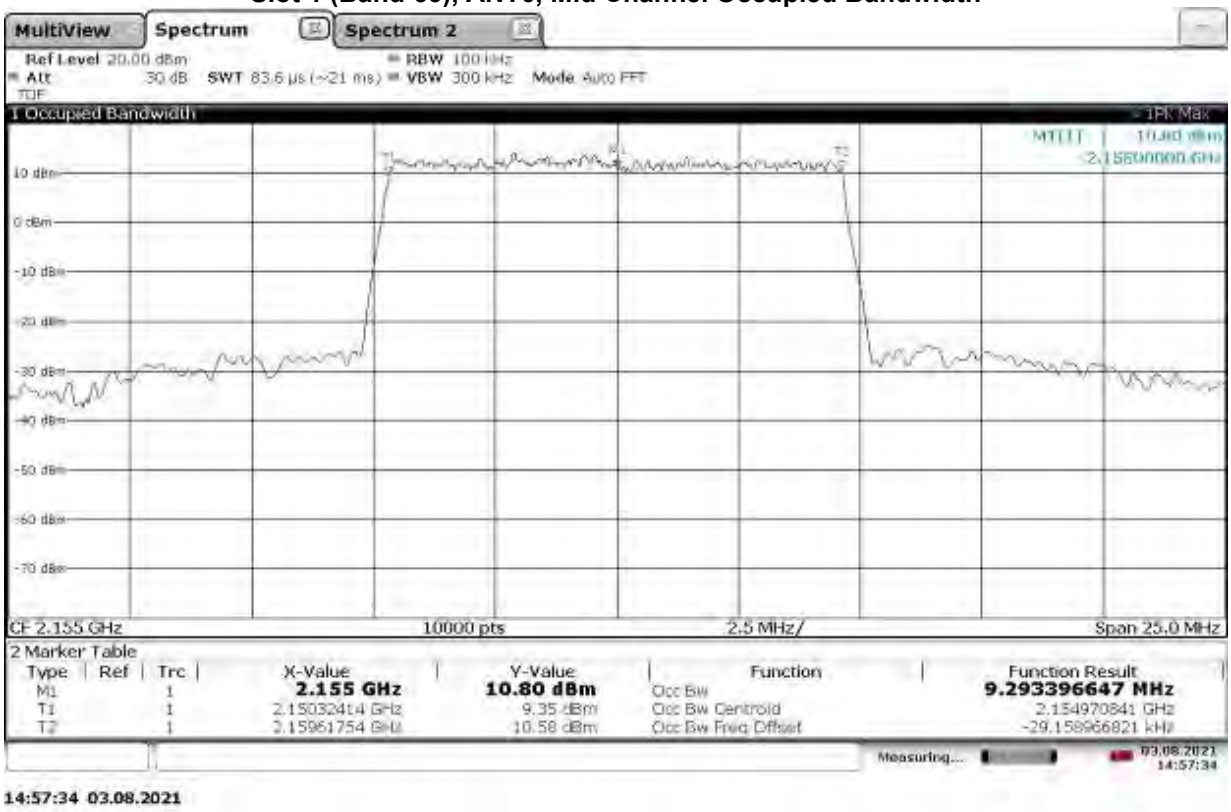


TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



TM1.1-QPSK_10 MHz Bandwidth

Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



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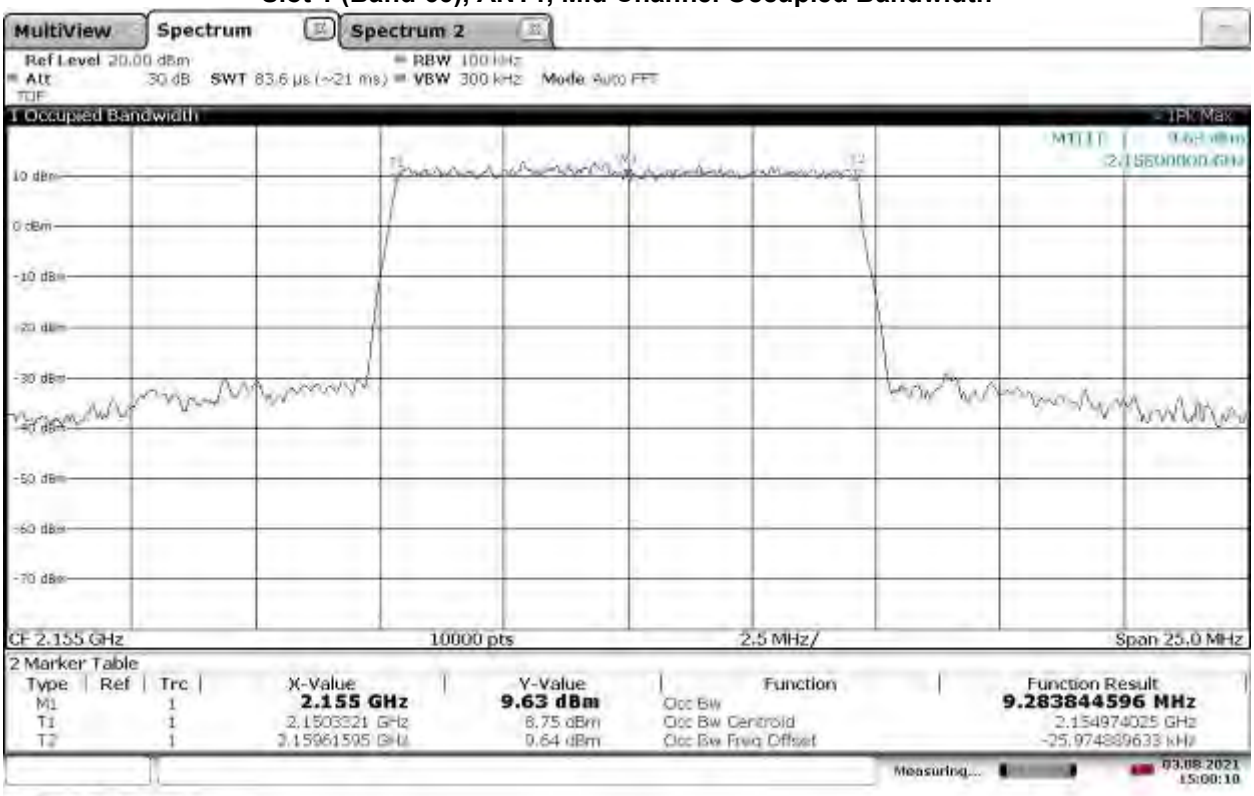
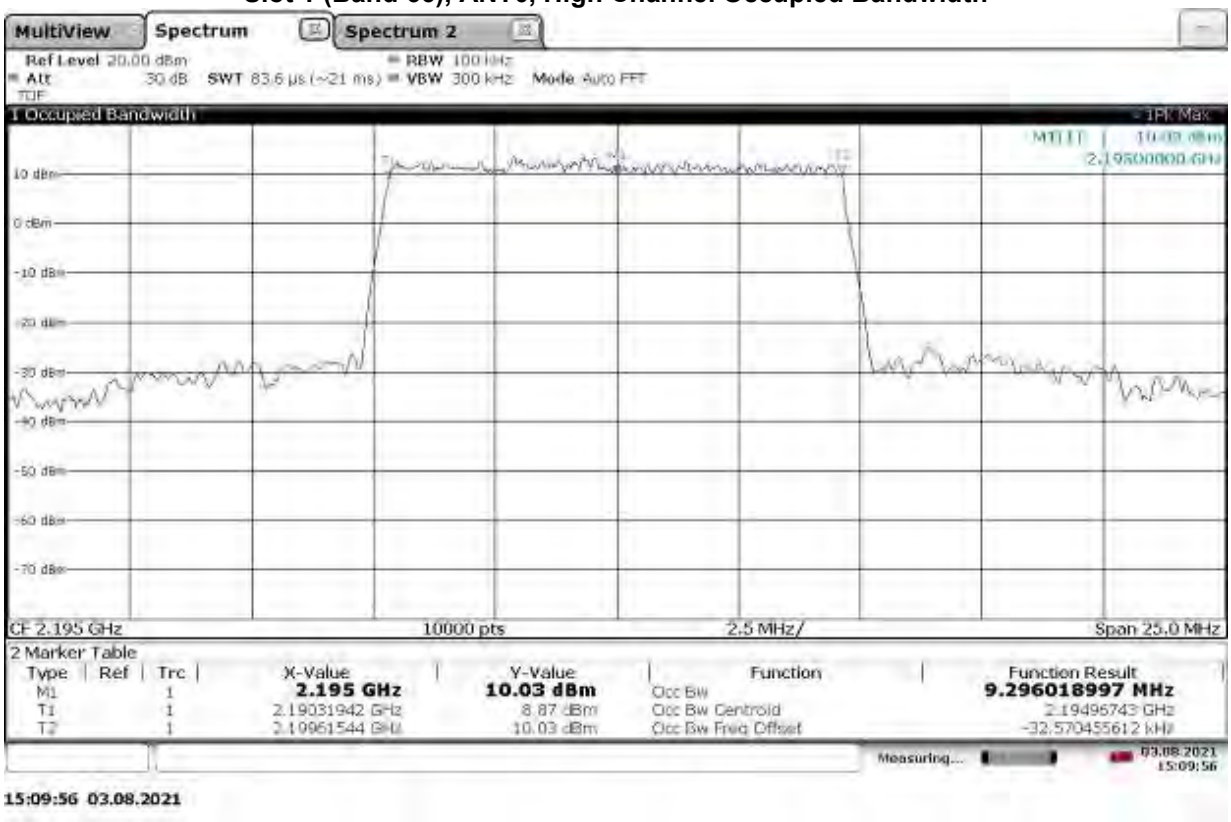
TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth

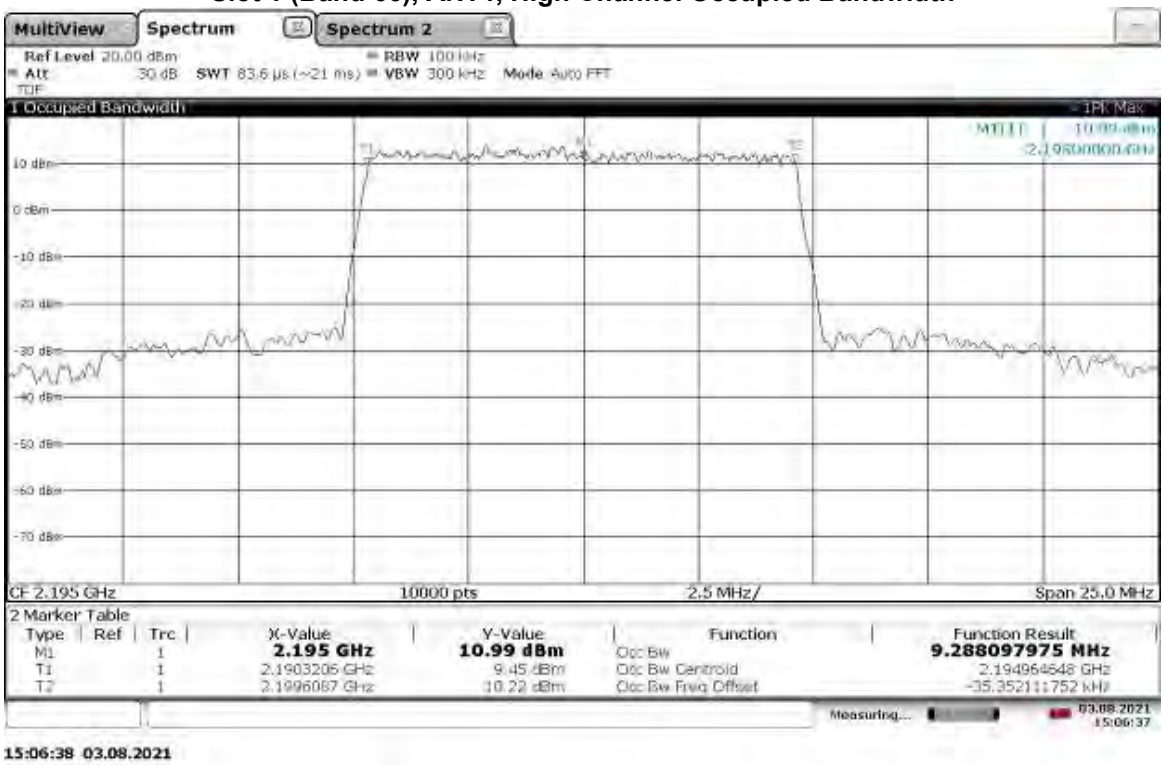


15:00:10 03.08.2021

TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth

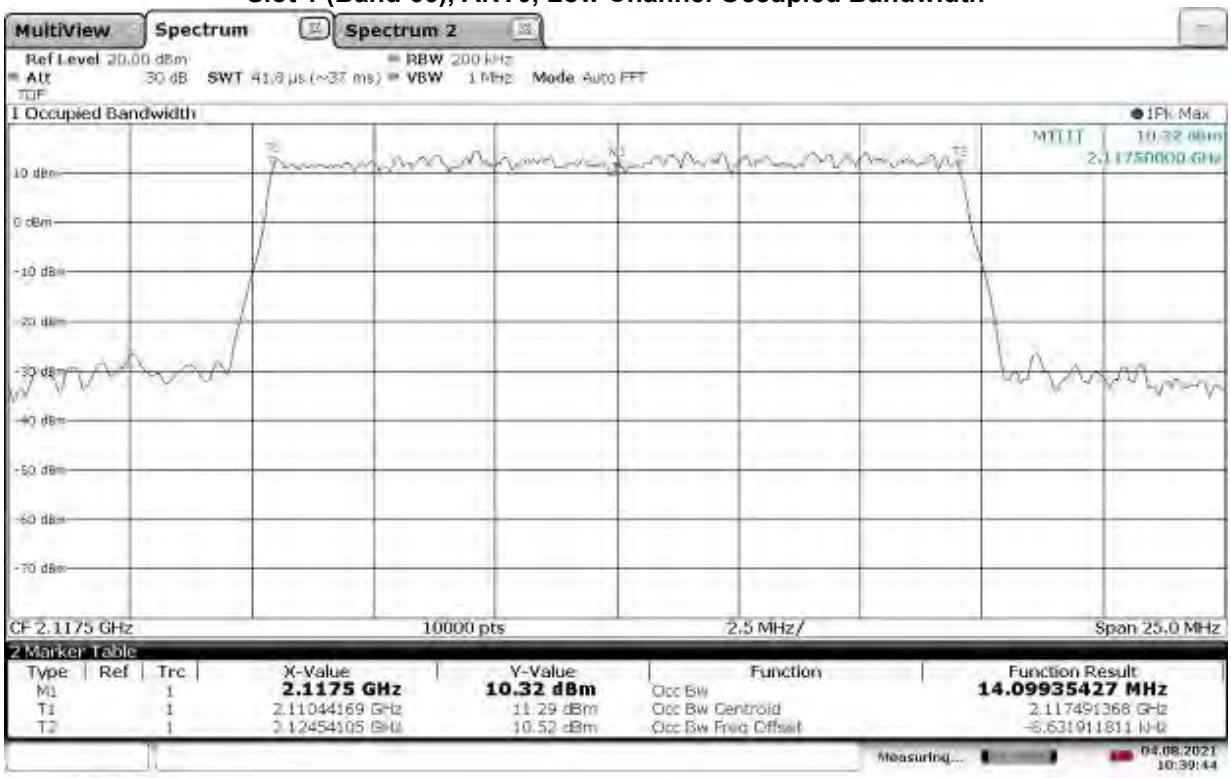


TM1.1-QPSK_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



TM1.1-QPSK_15 MHz Bandwidth

Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



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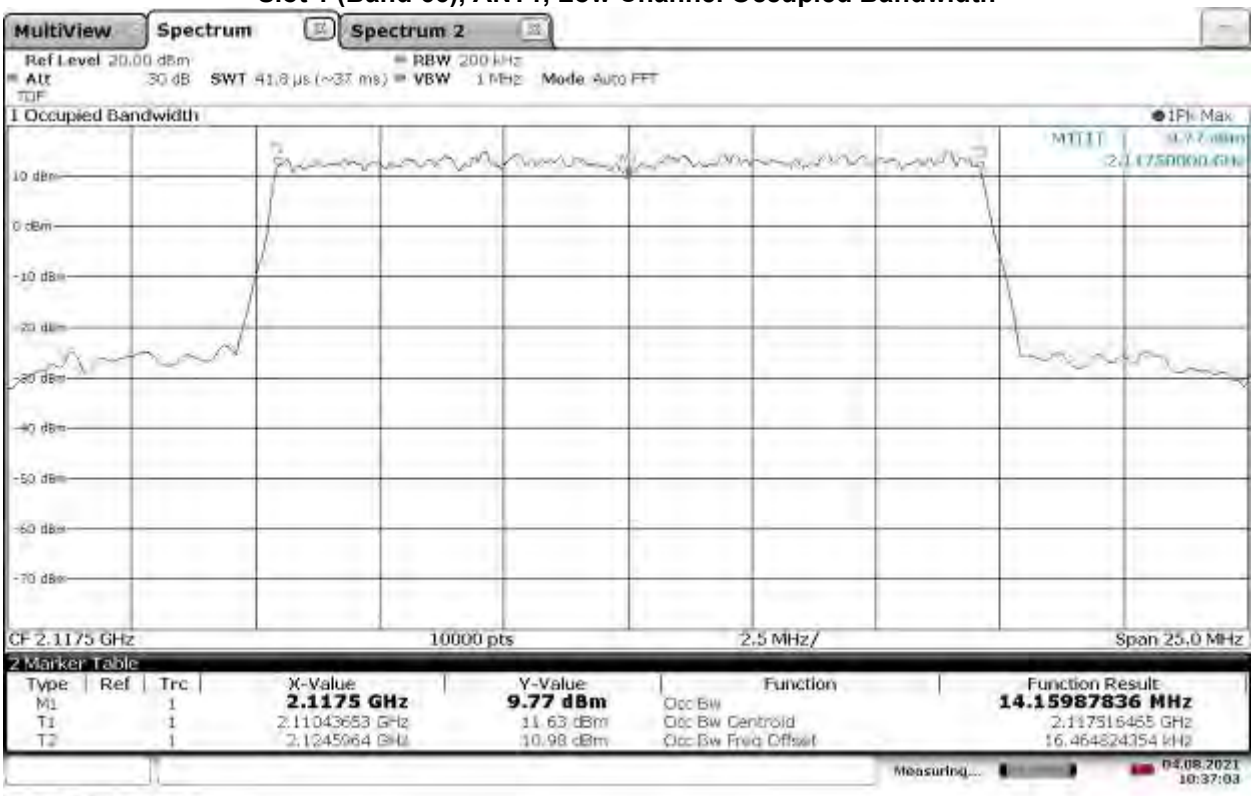
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



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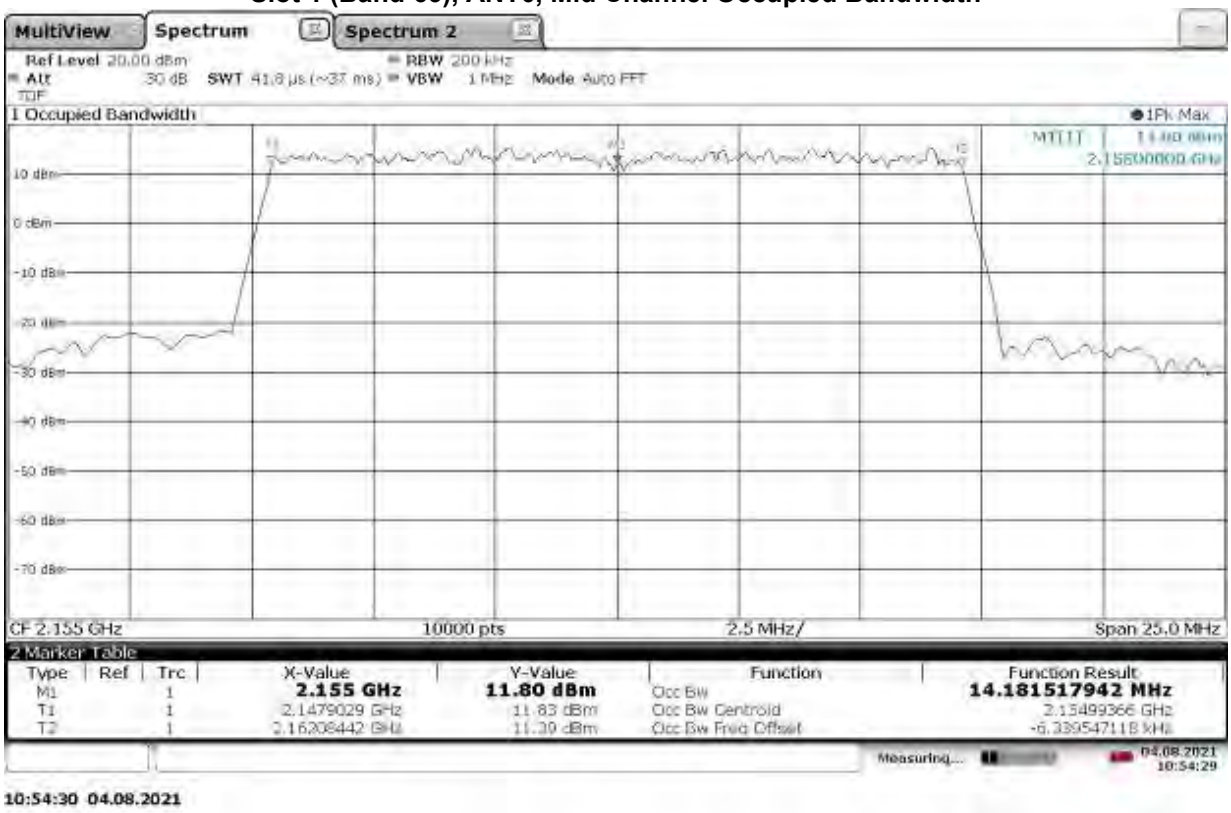
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



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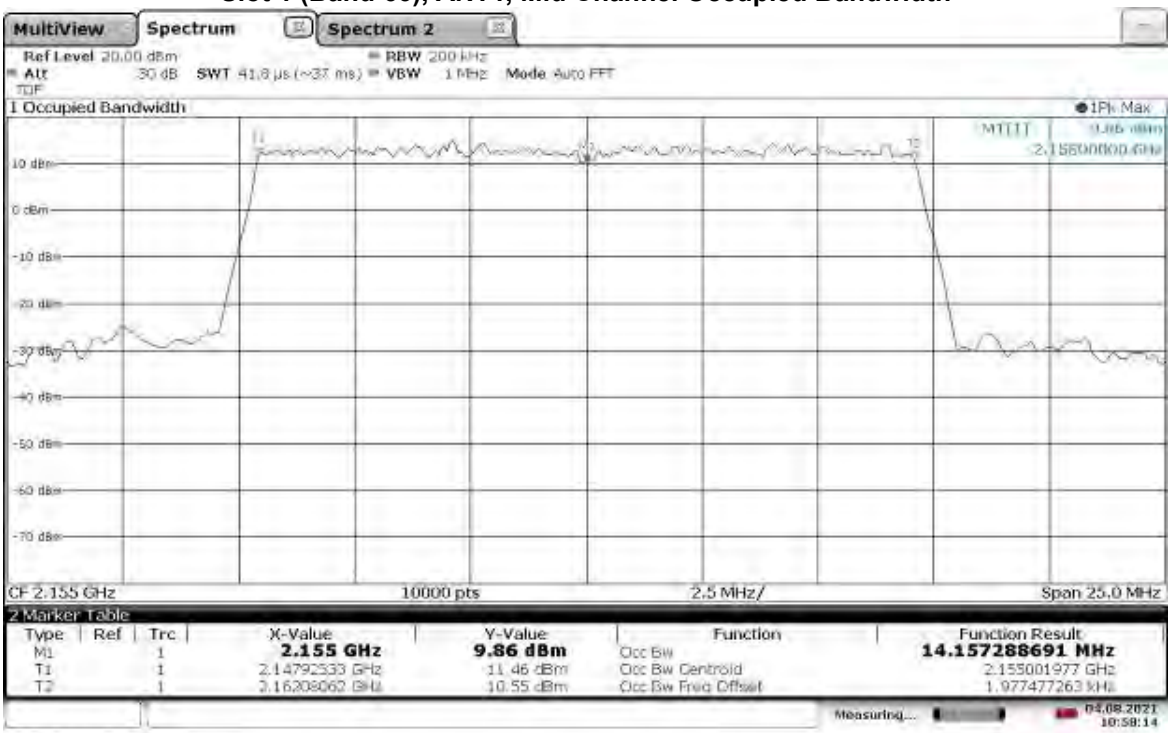
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



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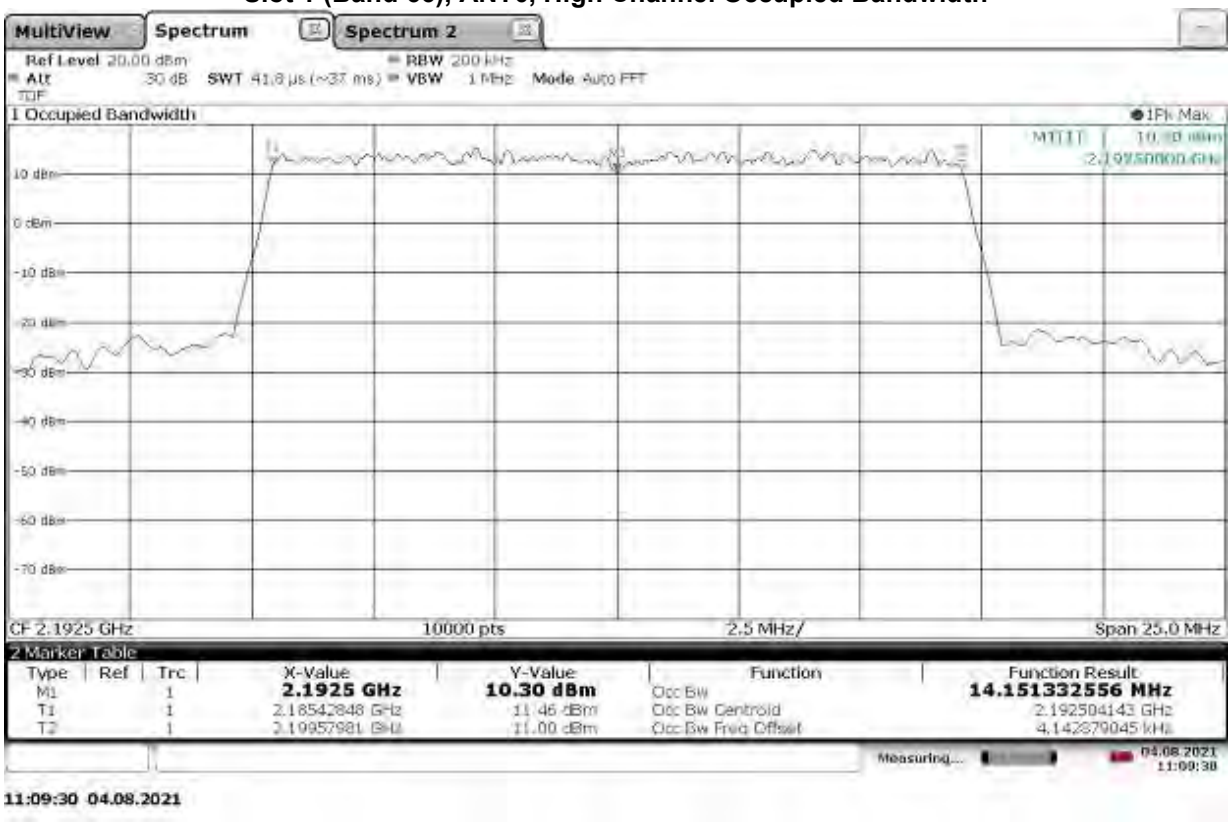
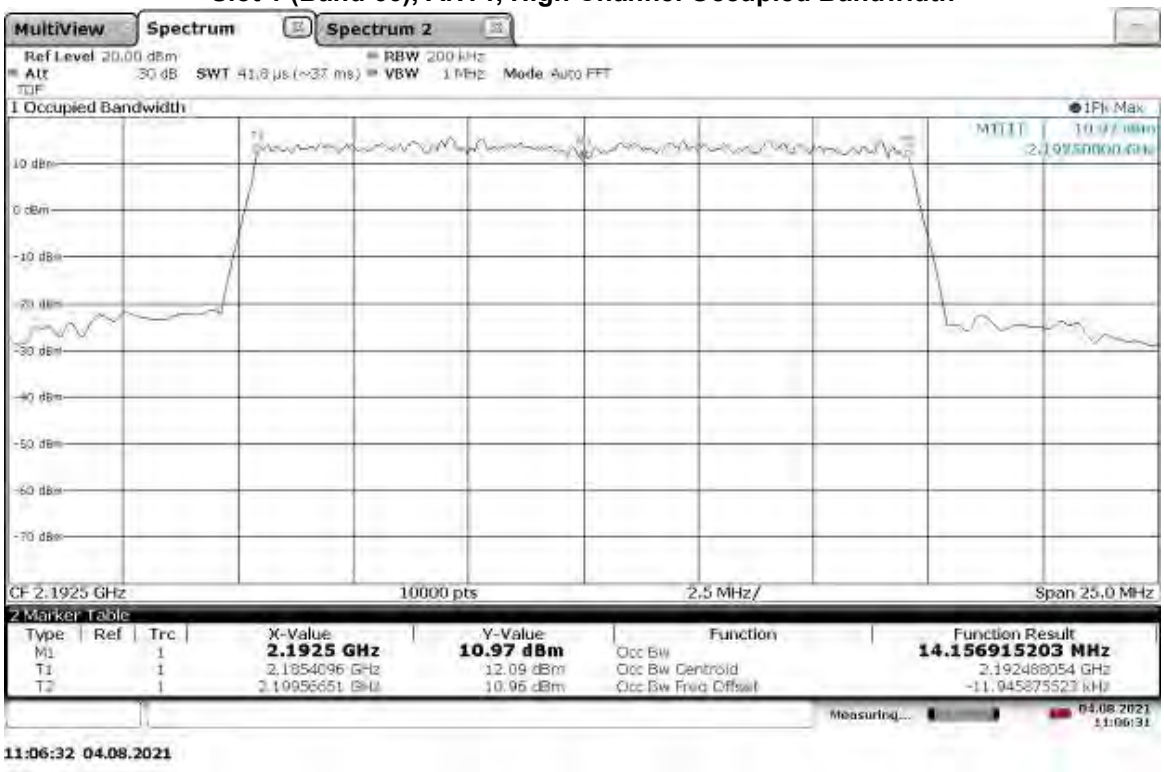
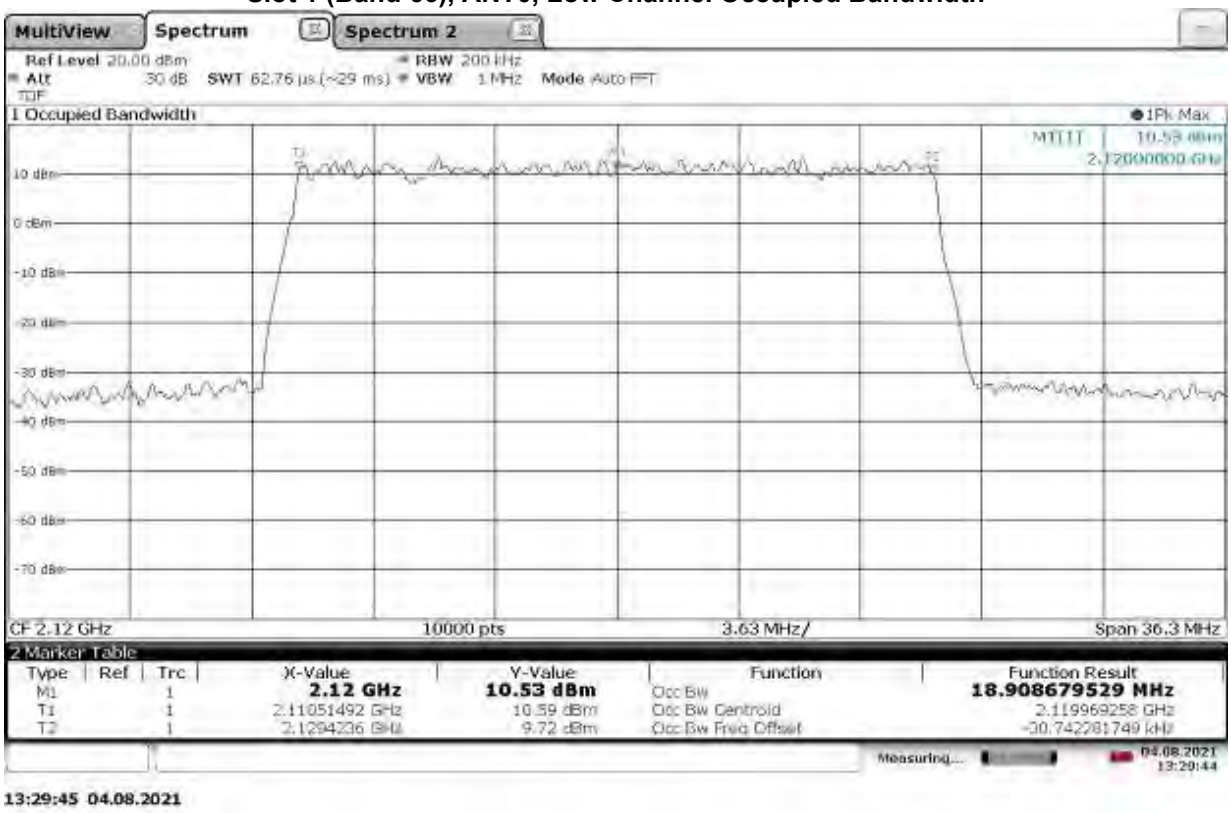
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



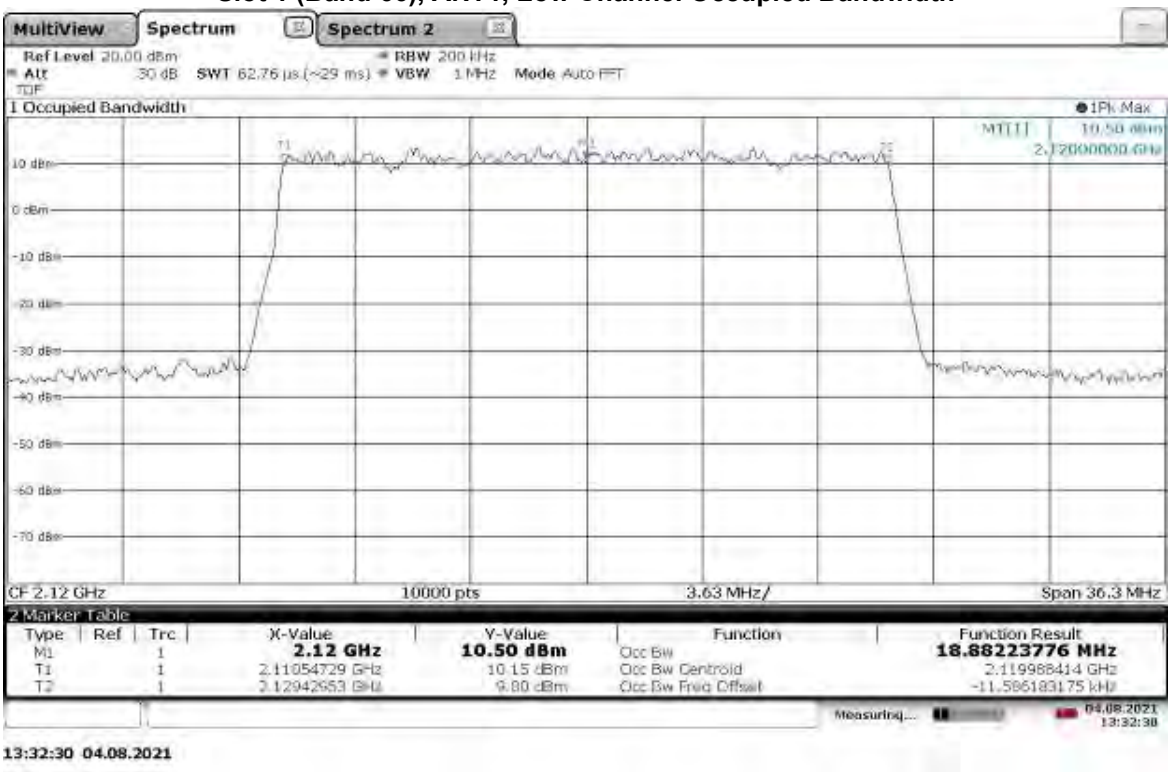
TM1.1-QPSK_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth

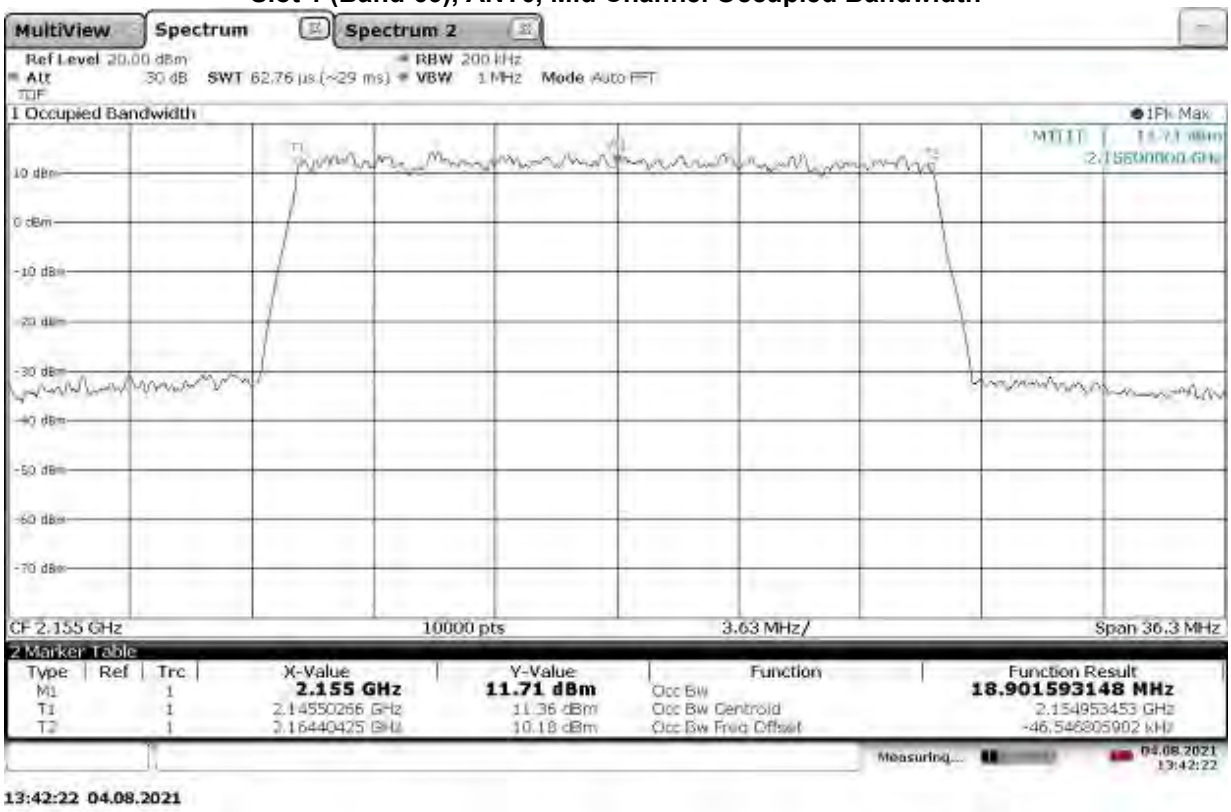


TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



TM1.1-QPSK_20 MHz Bandwidth

Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



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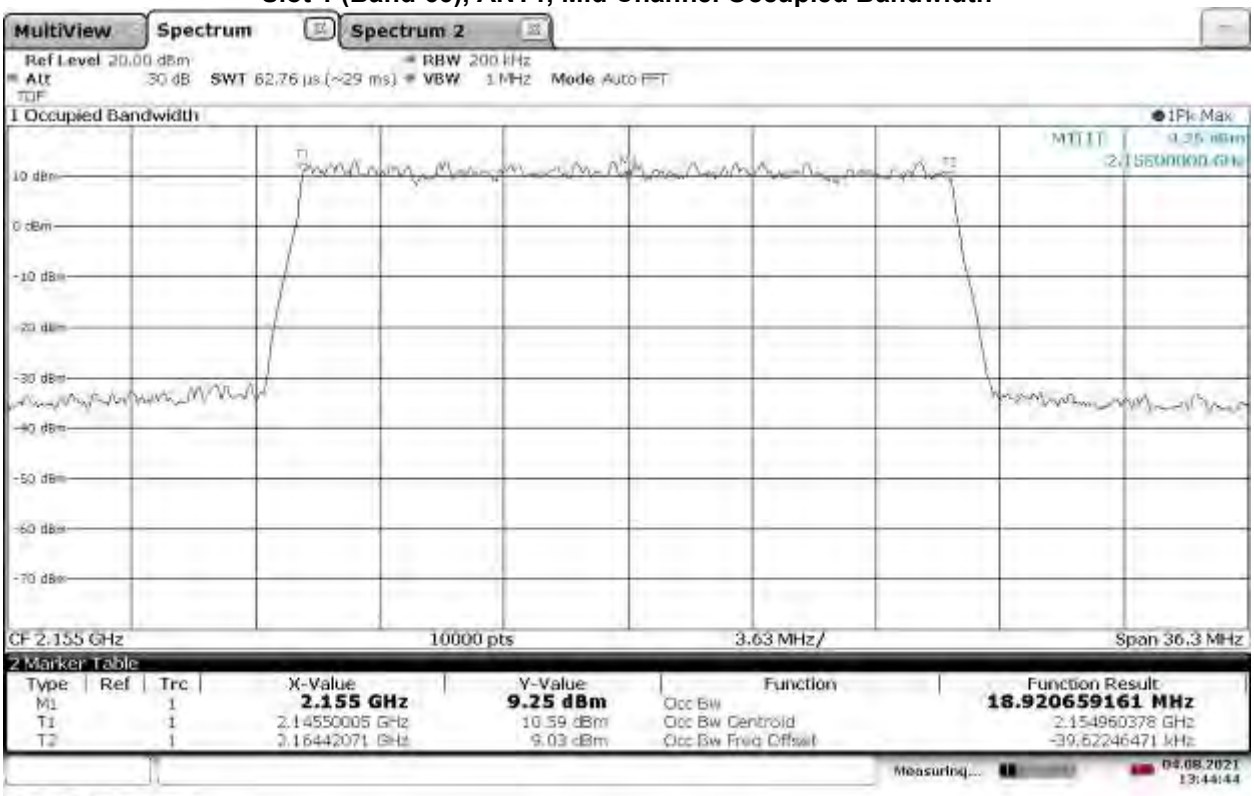
TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



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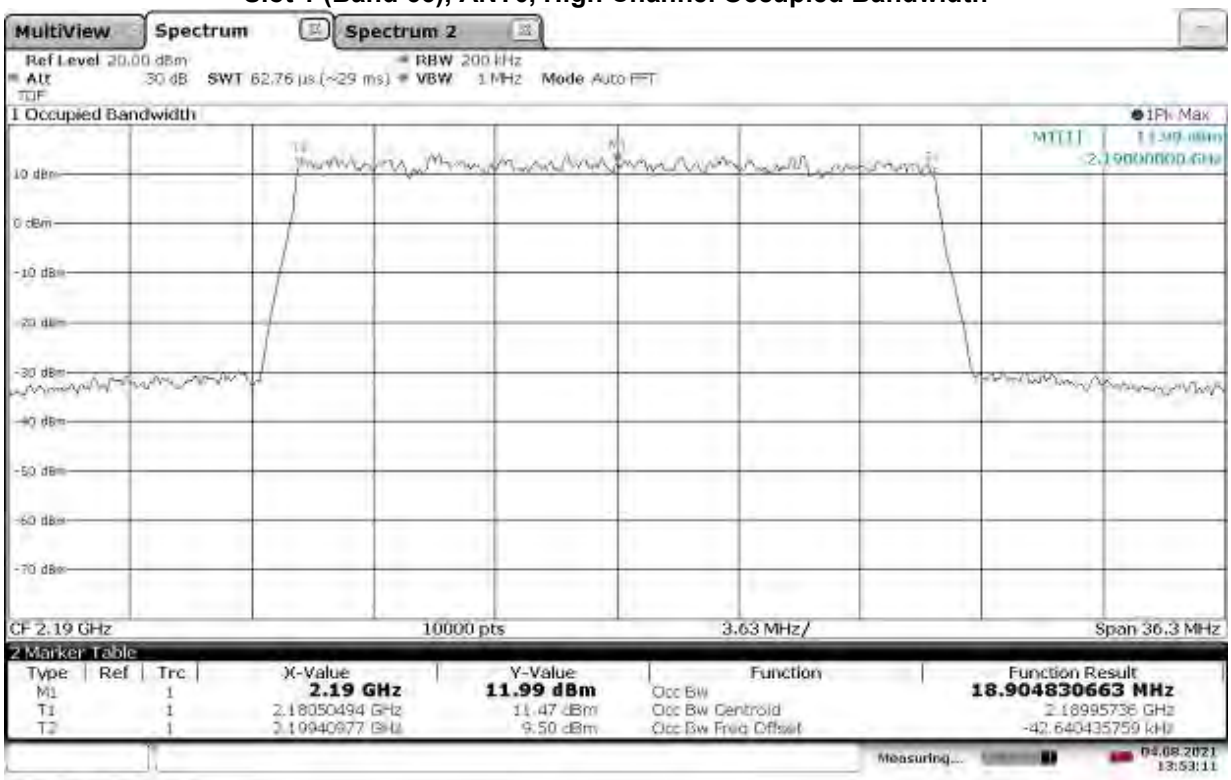
TM1.1-QPSK_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



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TM1.1-QPSK_20 MHz Bandwidth
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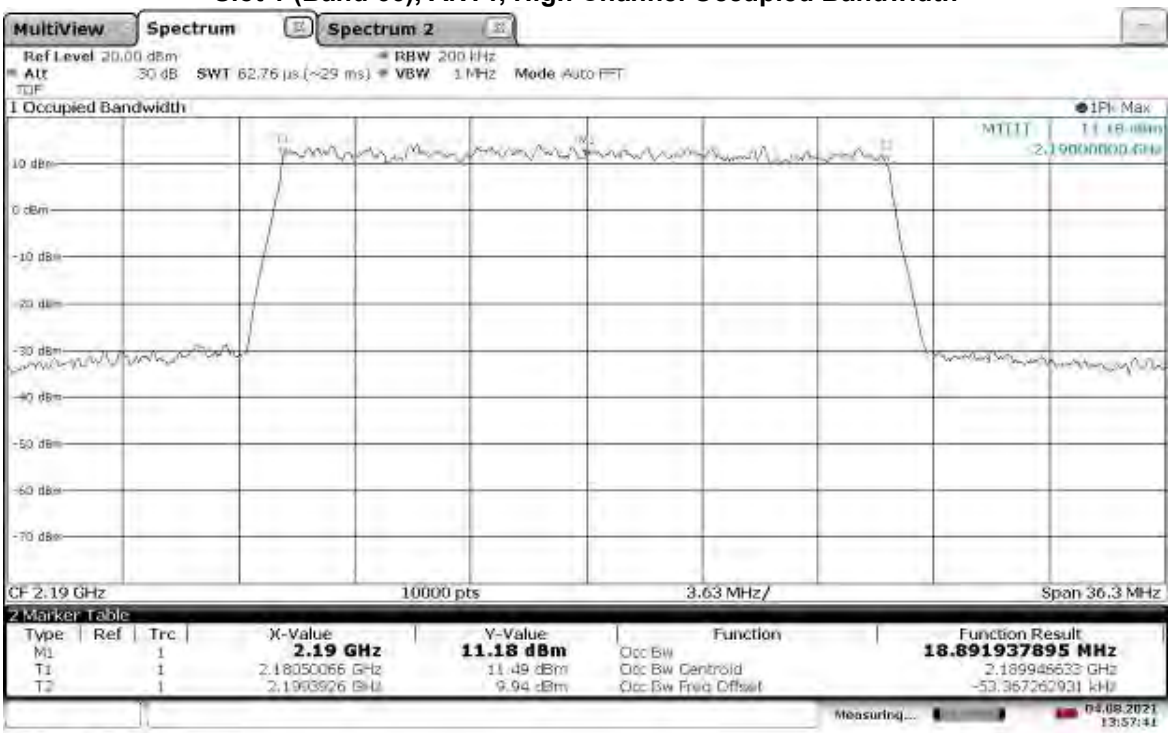

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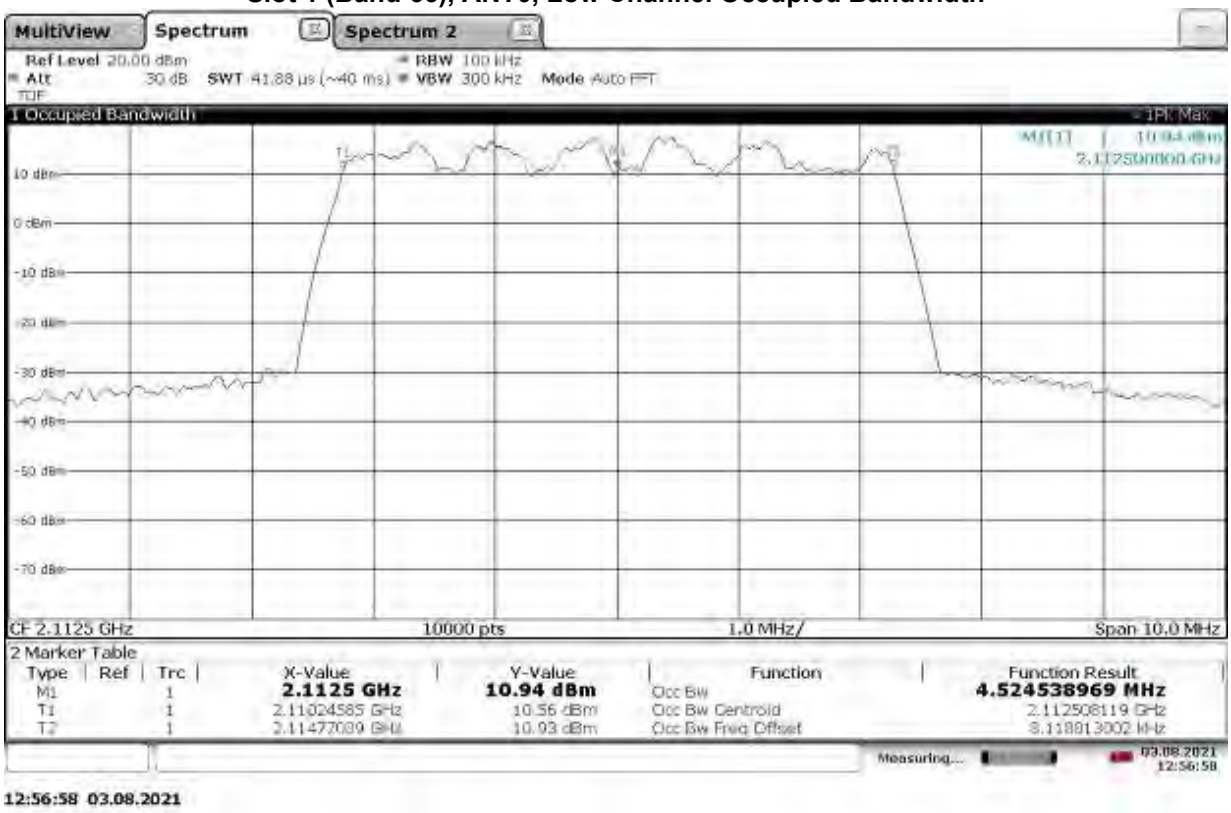
TM3.2-16QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



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TM3.2-16QAM_5 MHz Bandwidth
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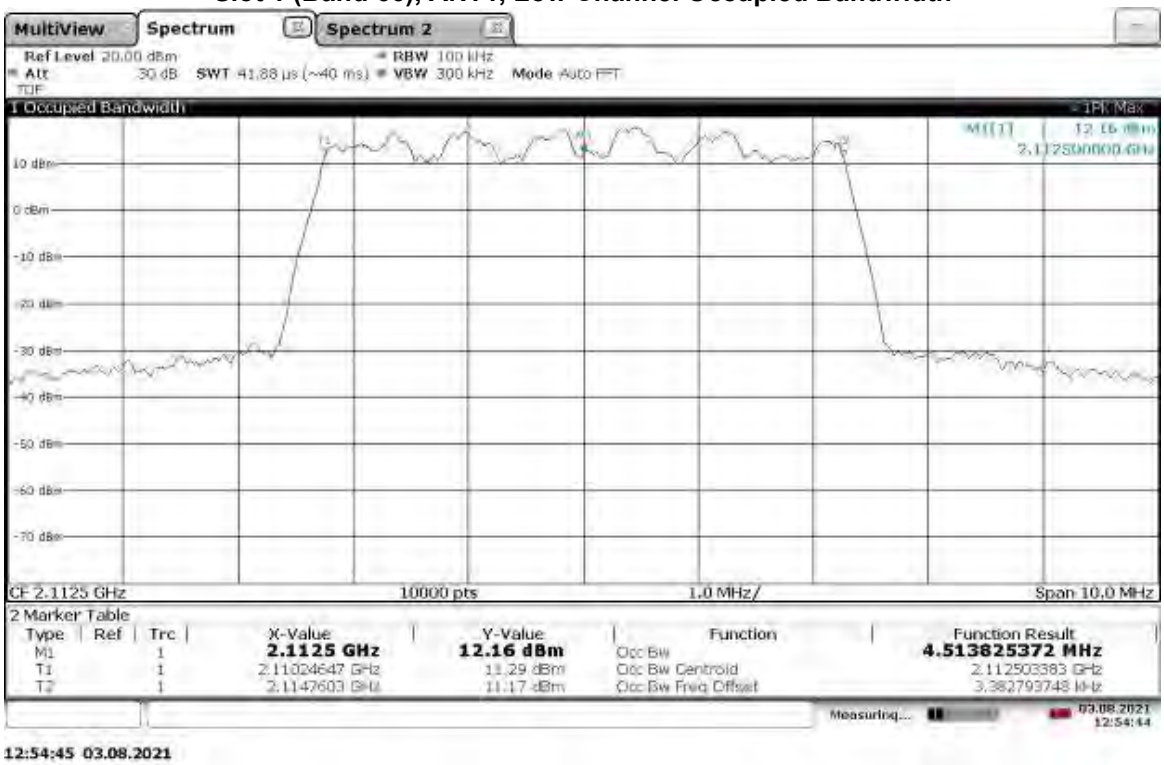

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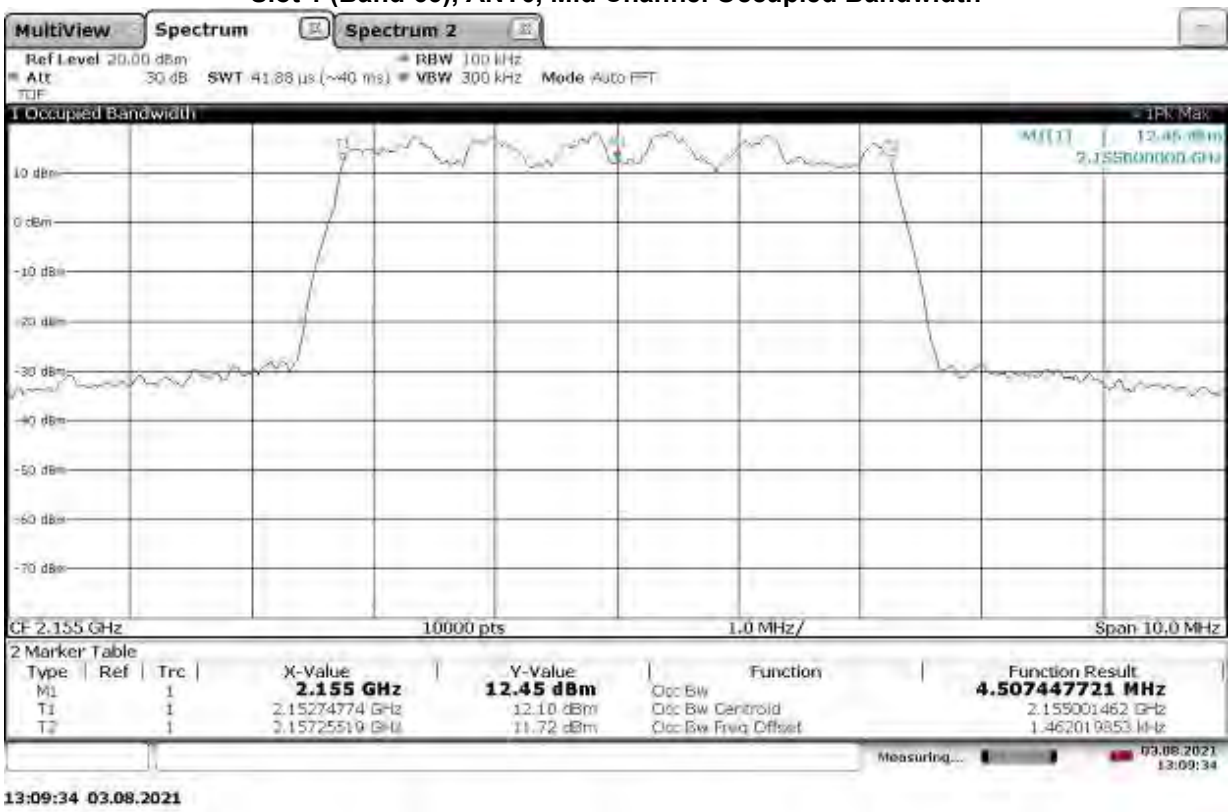
TM3.2-16QAM_5 MHz Bandwidth

Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



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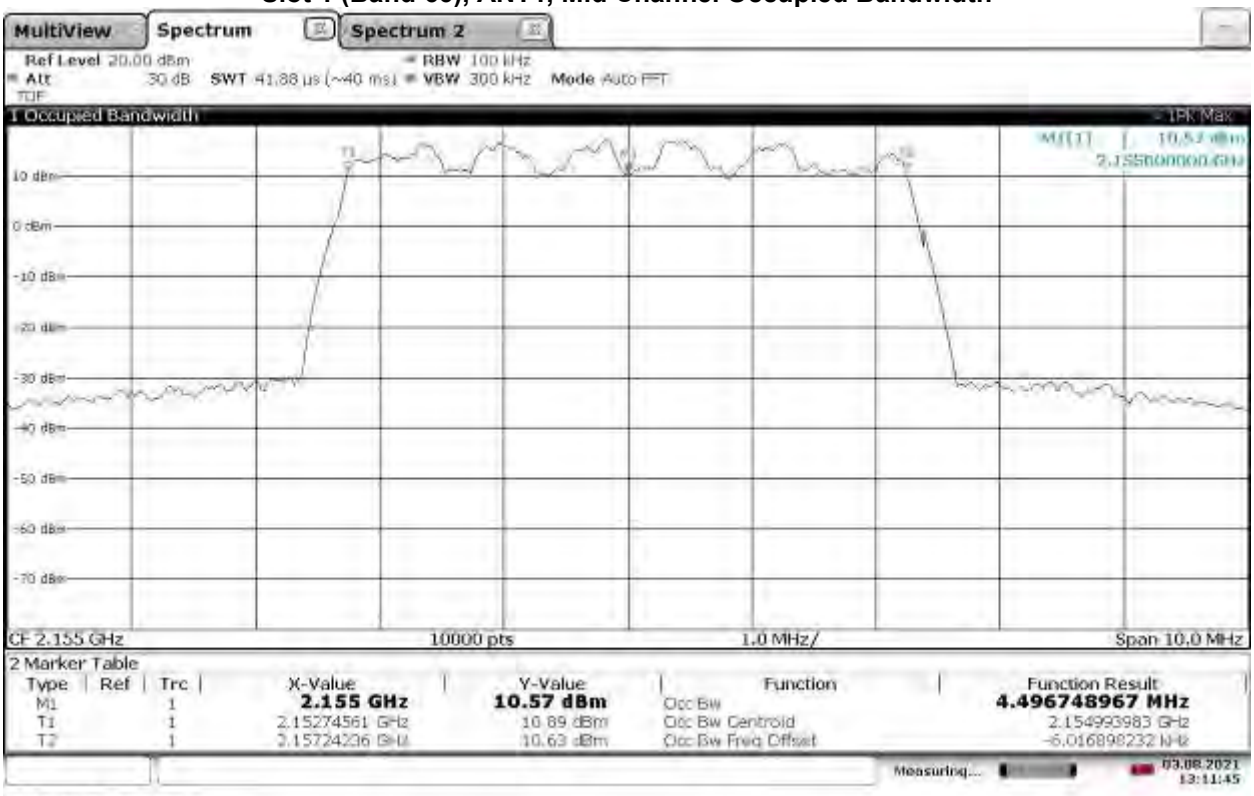
TM3.2-16QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



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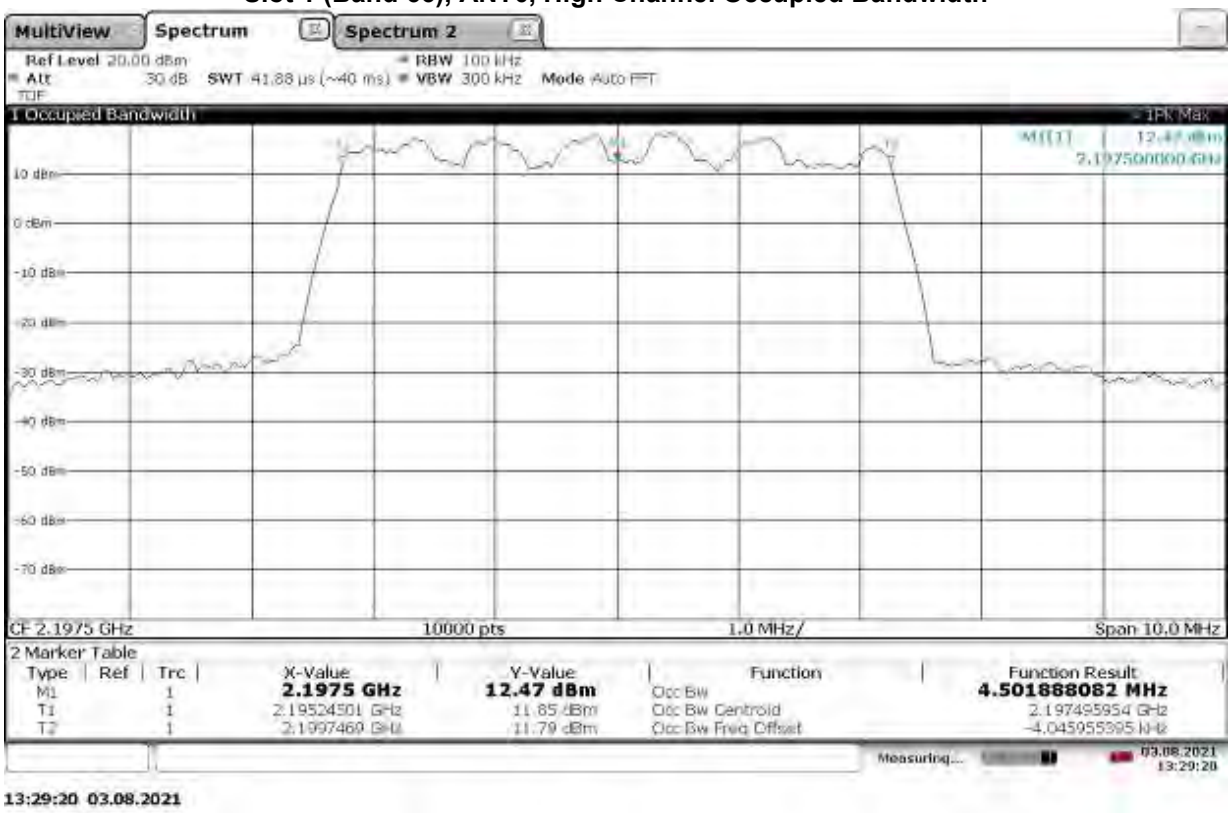
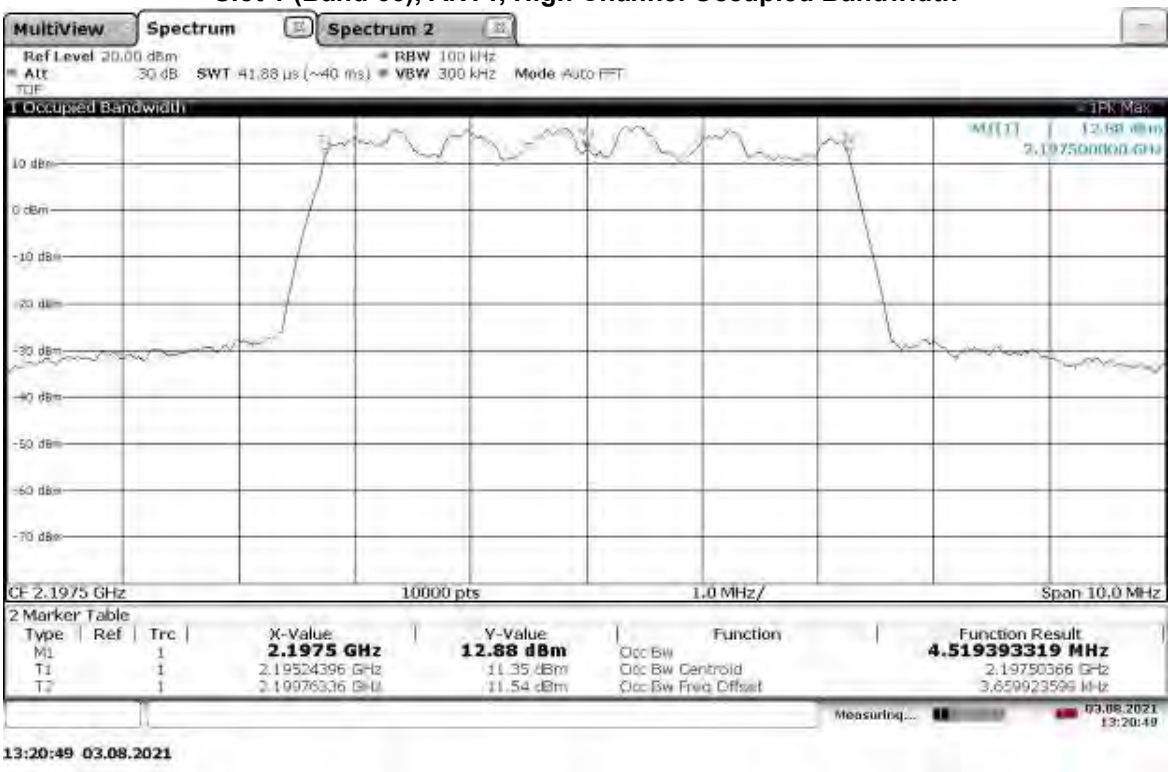
TM3.2-16QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth

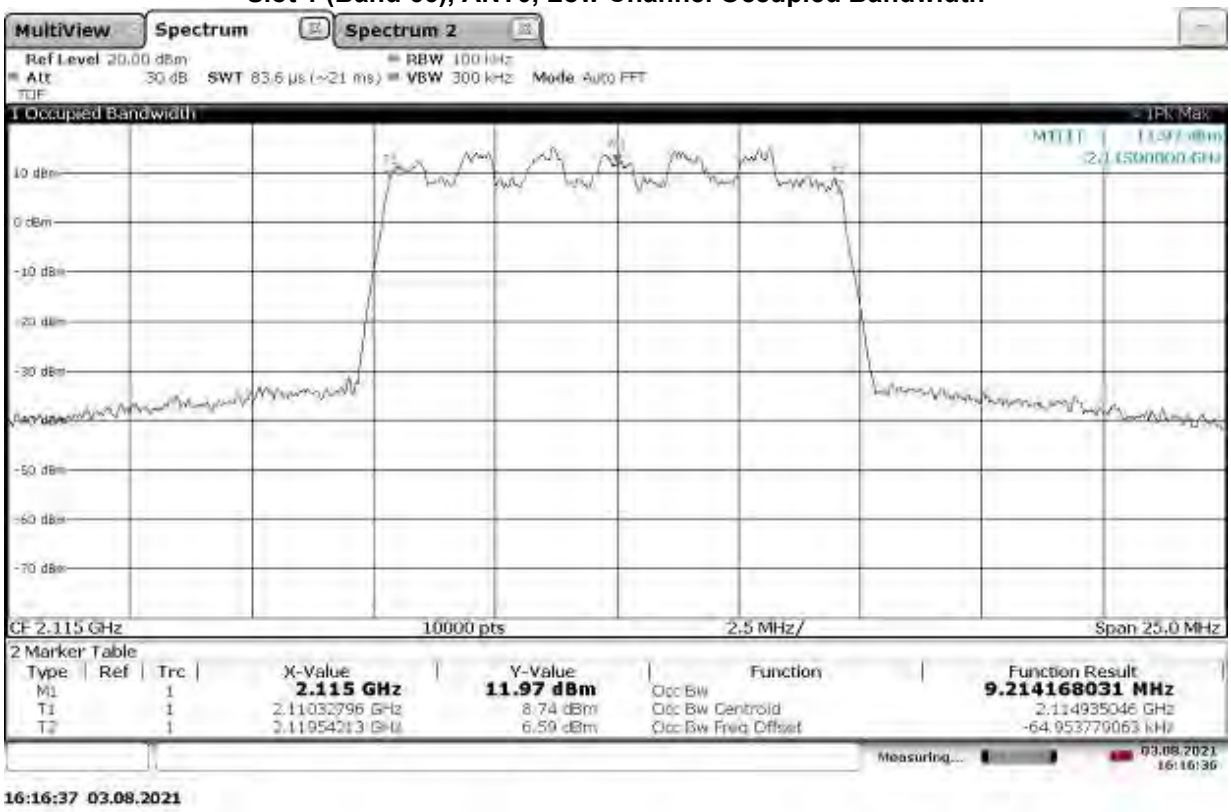


TM3.2-16QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



TM3.2-16QAM_10 MHz Bandwidth

Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



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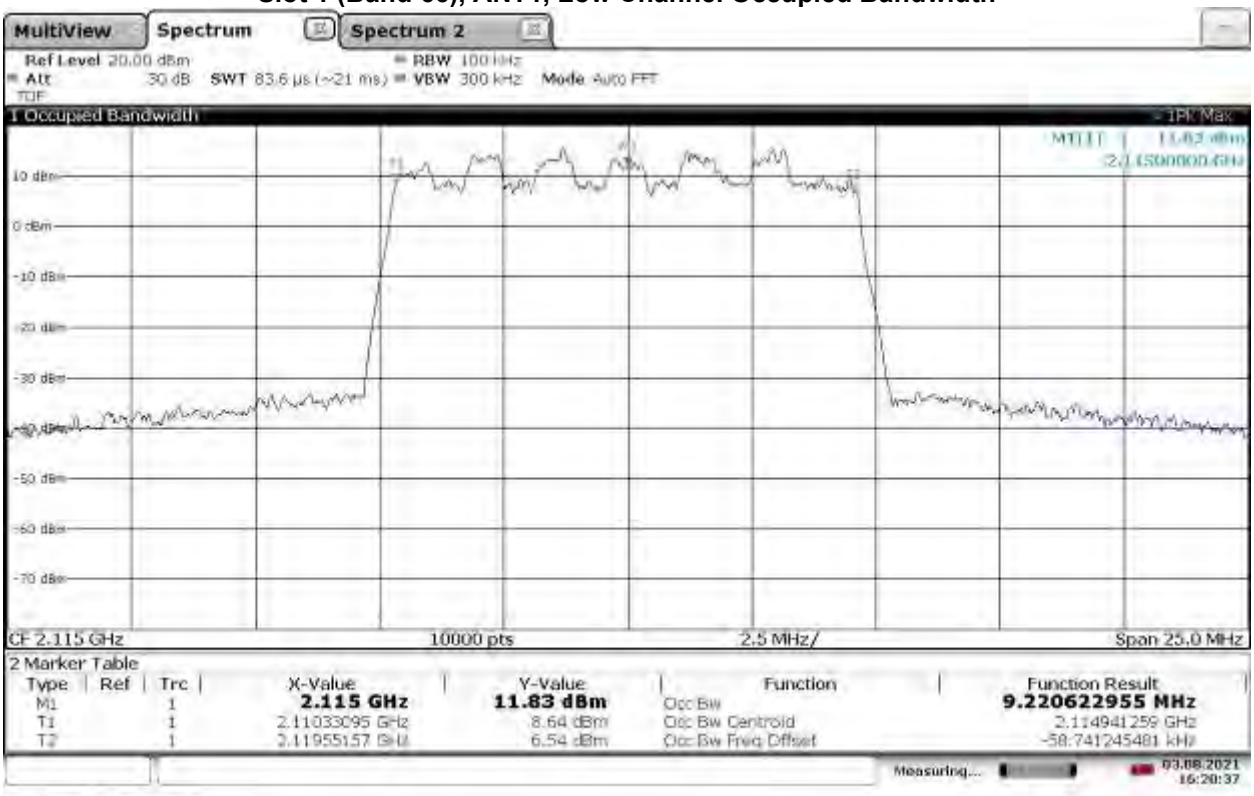
TM3.2-16QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



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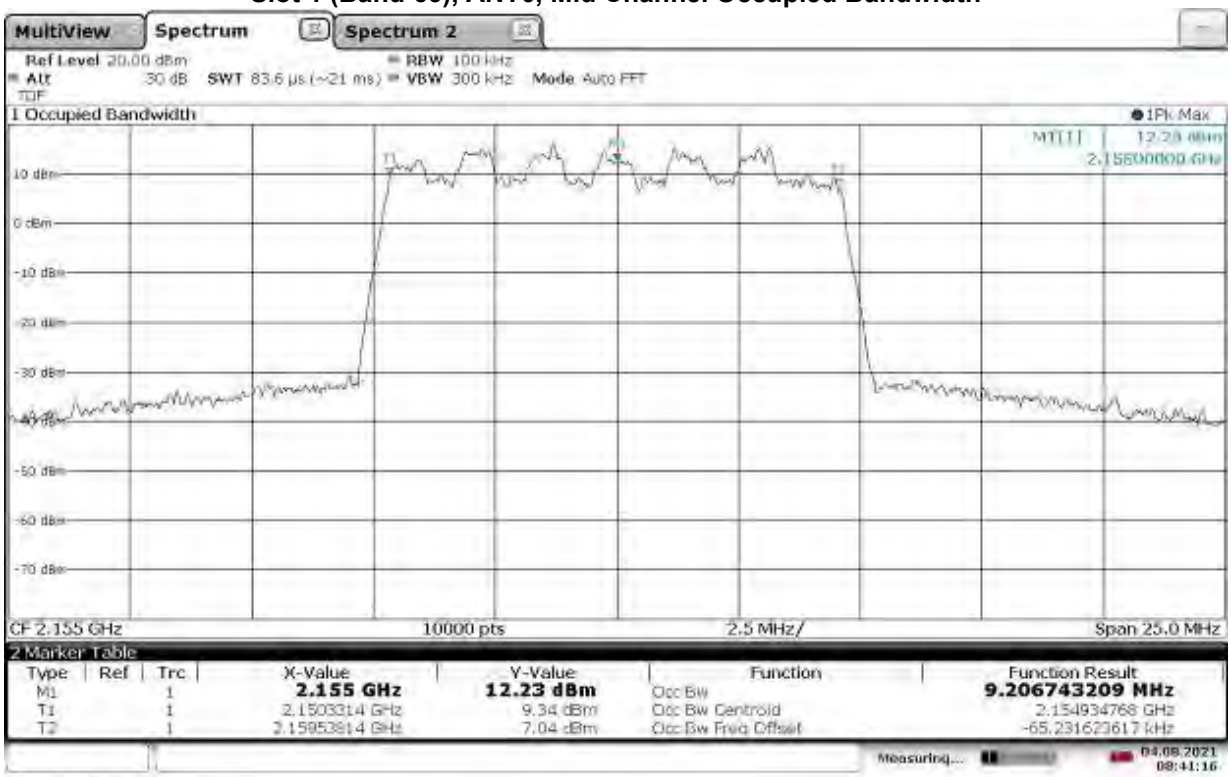
TM3.2-16QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



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TM3.2-16QAM_10 MHz Bandwidth
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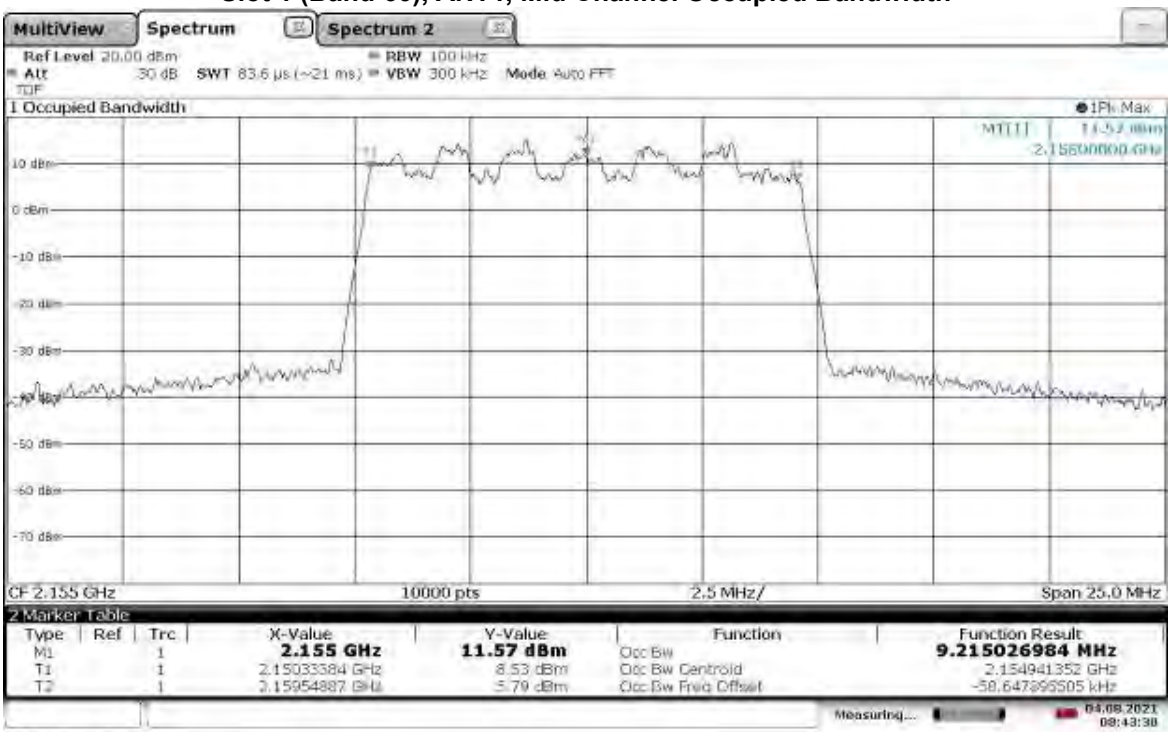

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TM3.2-16QAM_10 MHz Bandwidth
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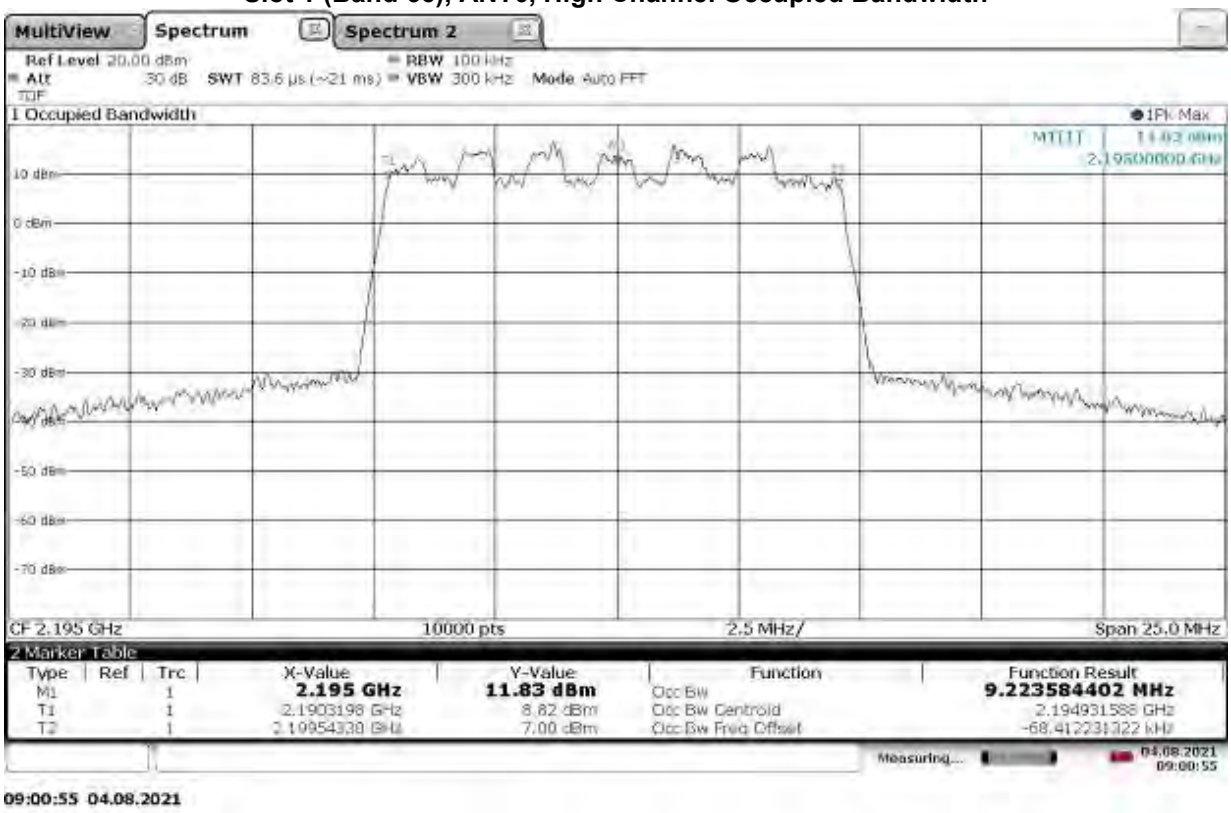
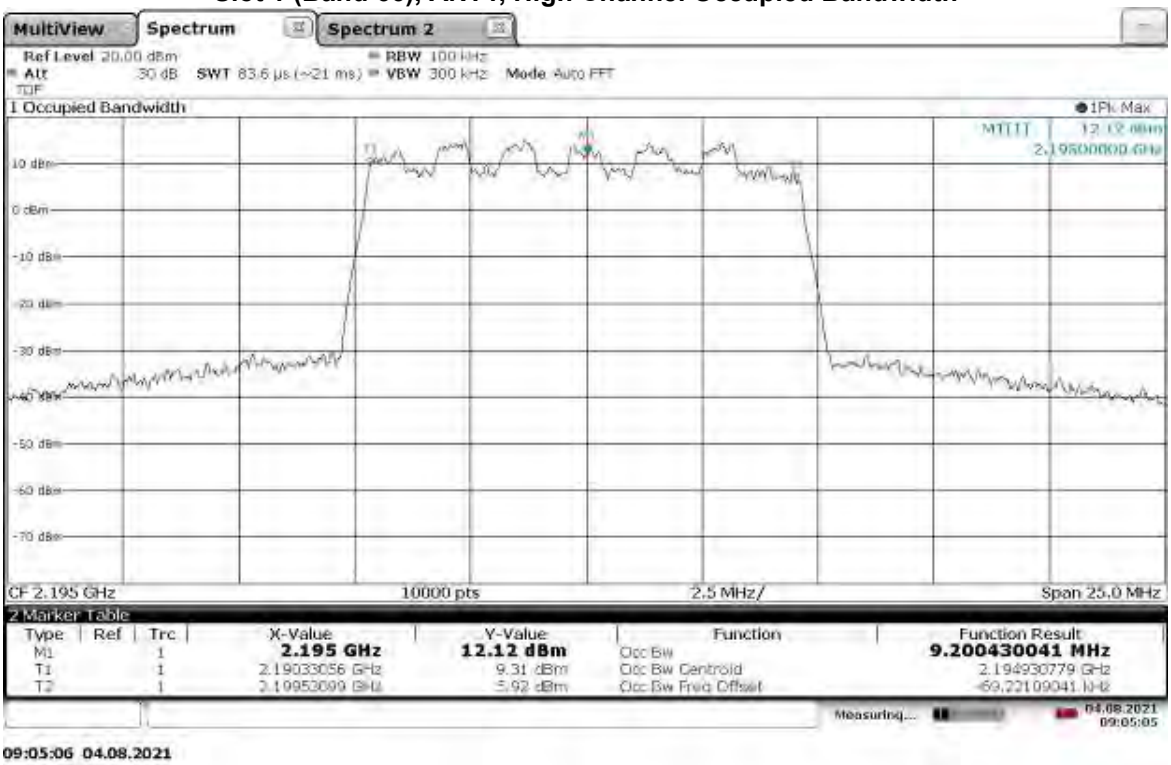
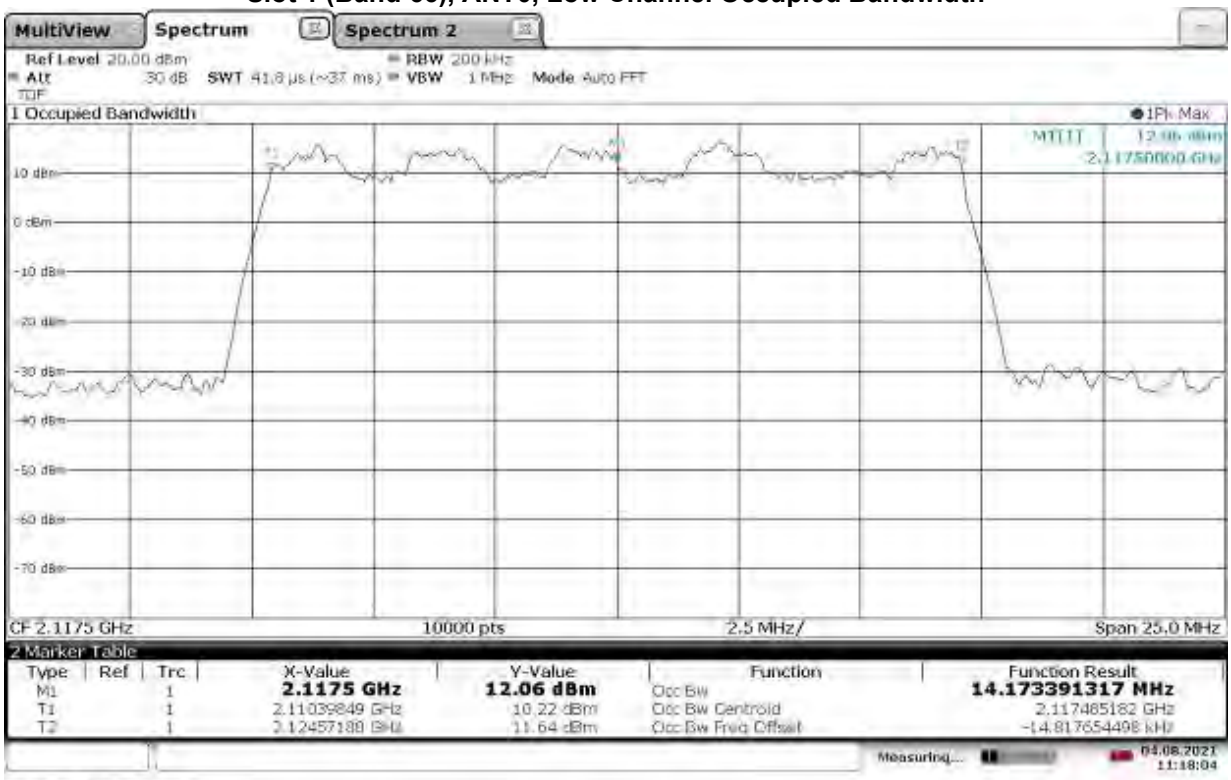


TM3.2-16QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



TM3.2-16QAM_15 MHz Bandwidth

Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



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TM3.2-16QAM_15 MHz Bandwidth
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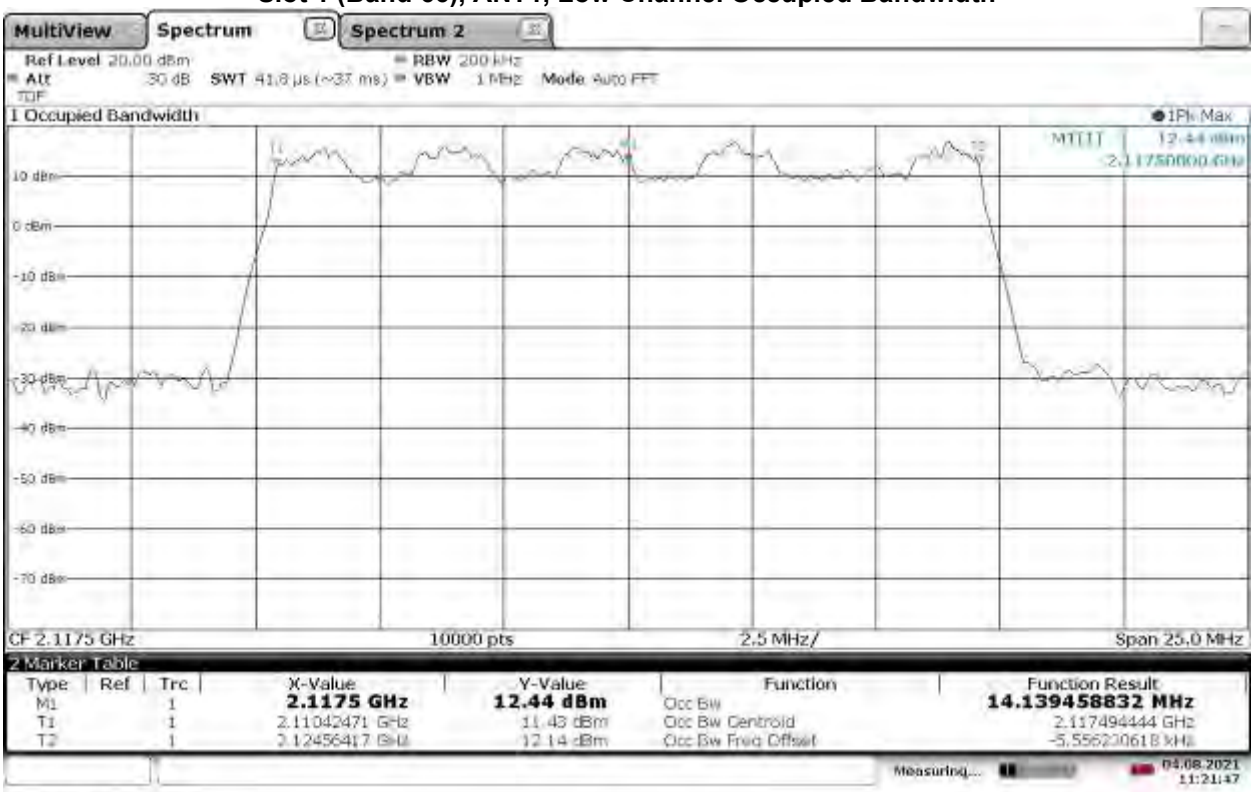
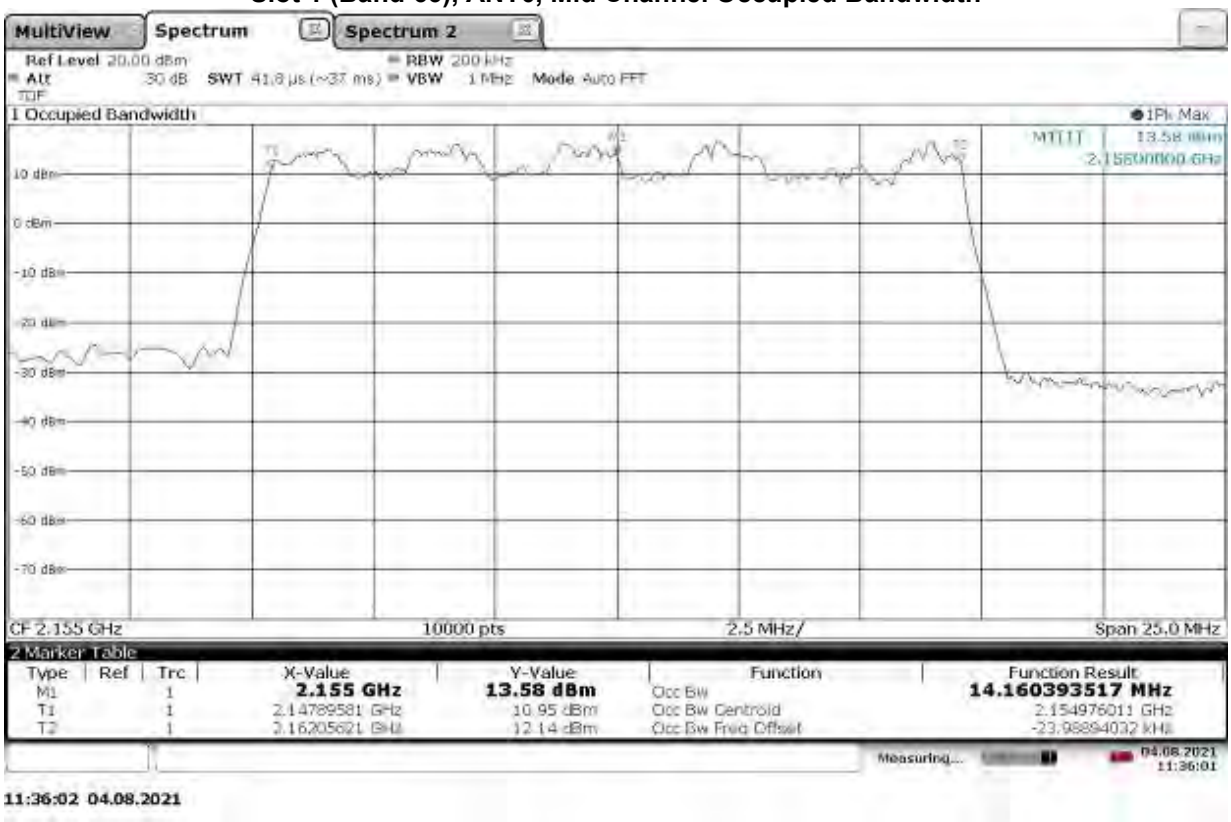
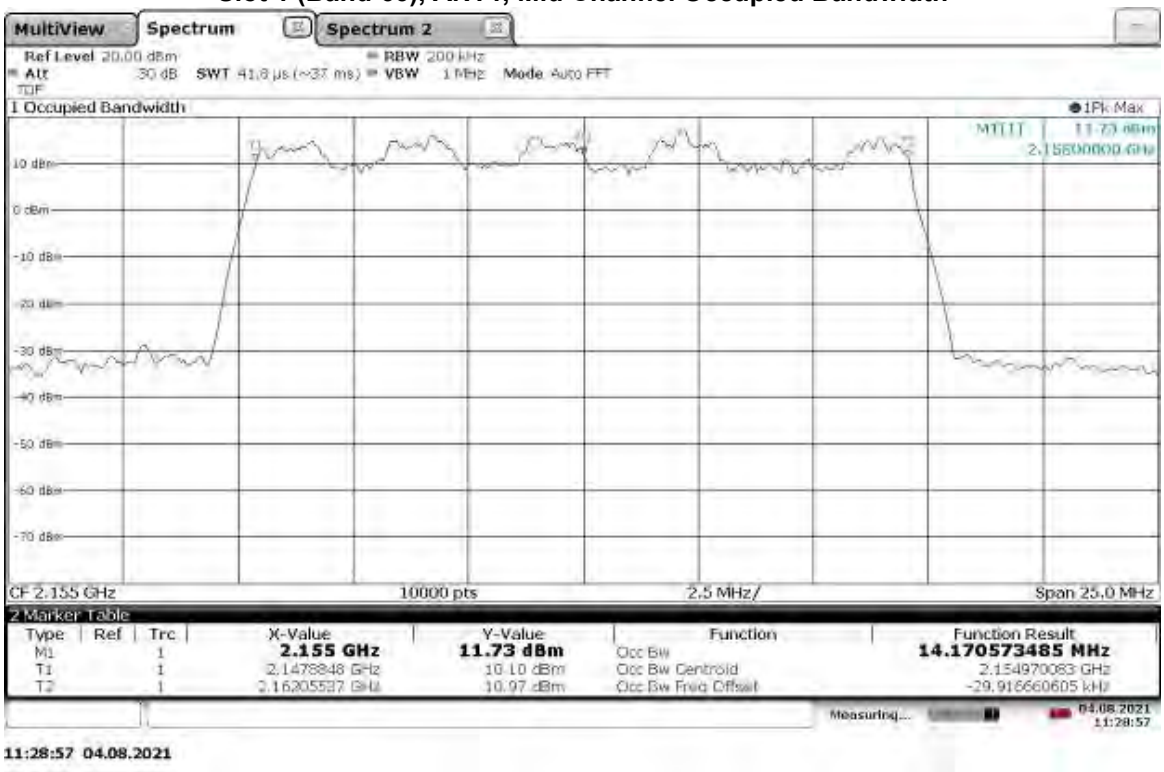


11:21:47 04.08.2021

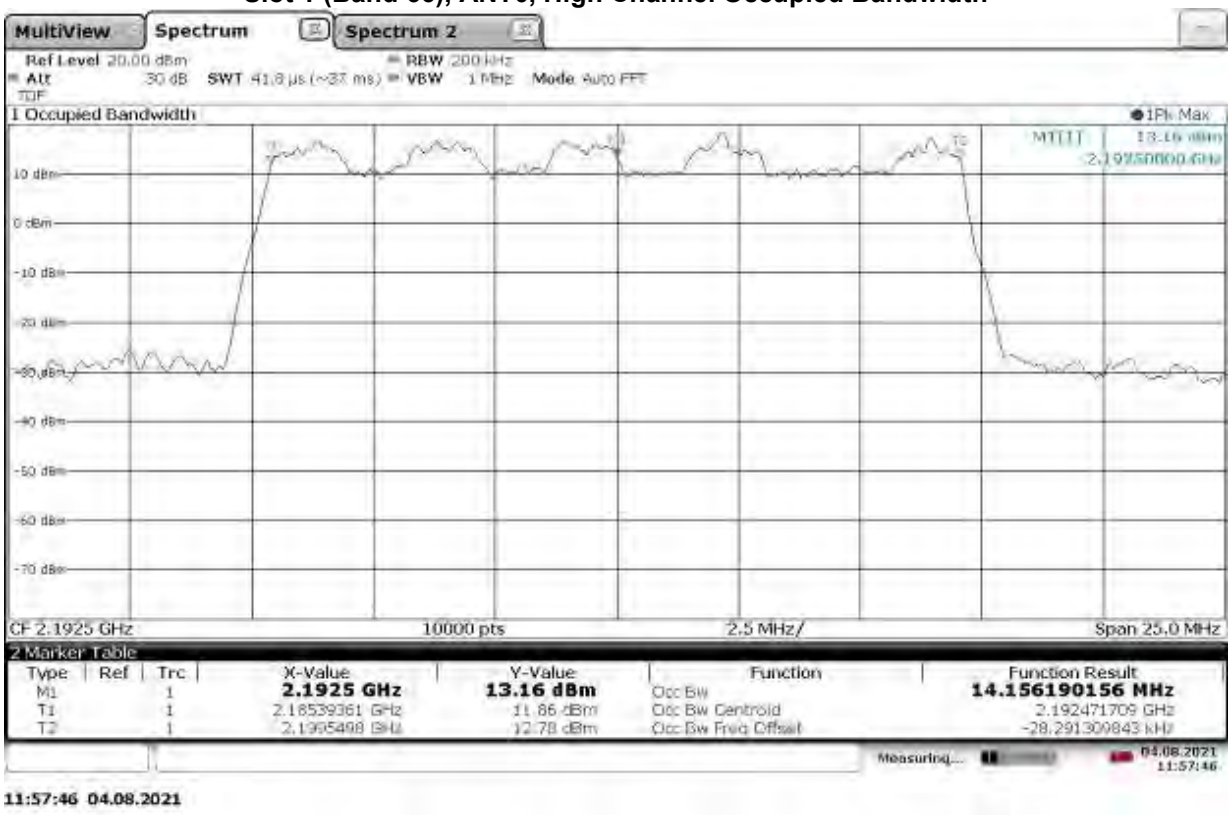
TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth

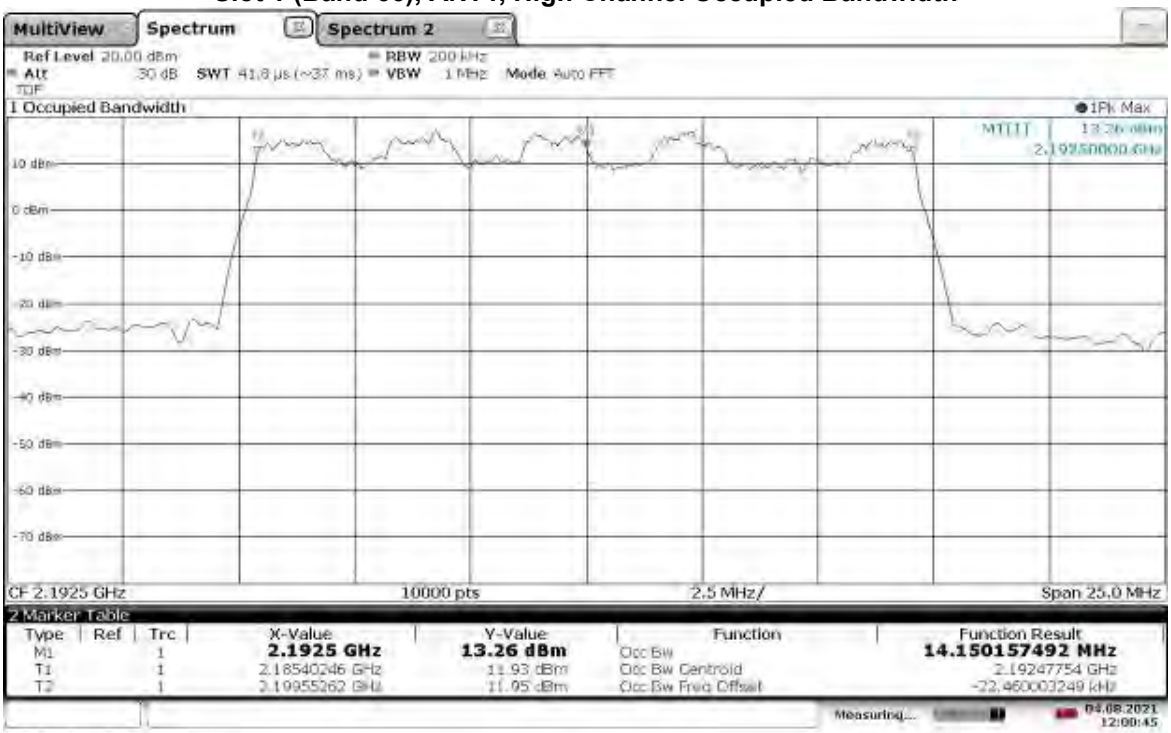


TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



11:57:46 04.08.2021

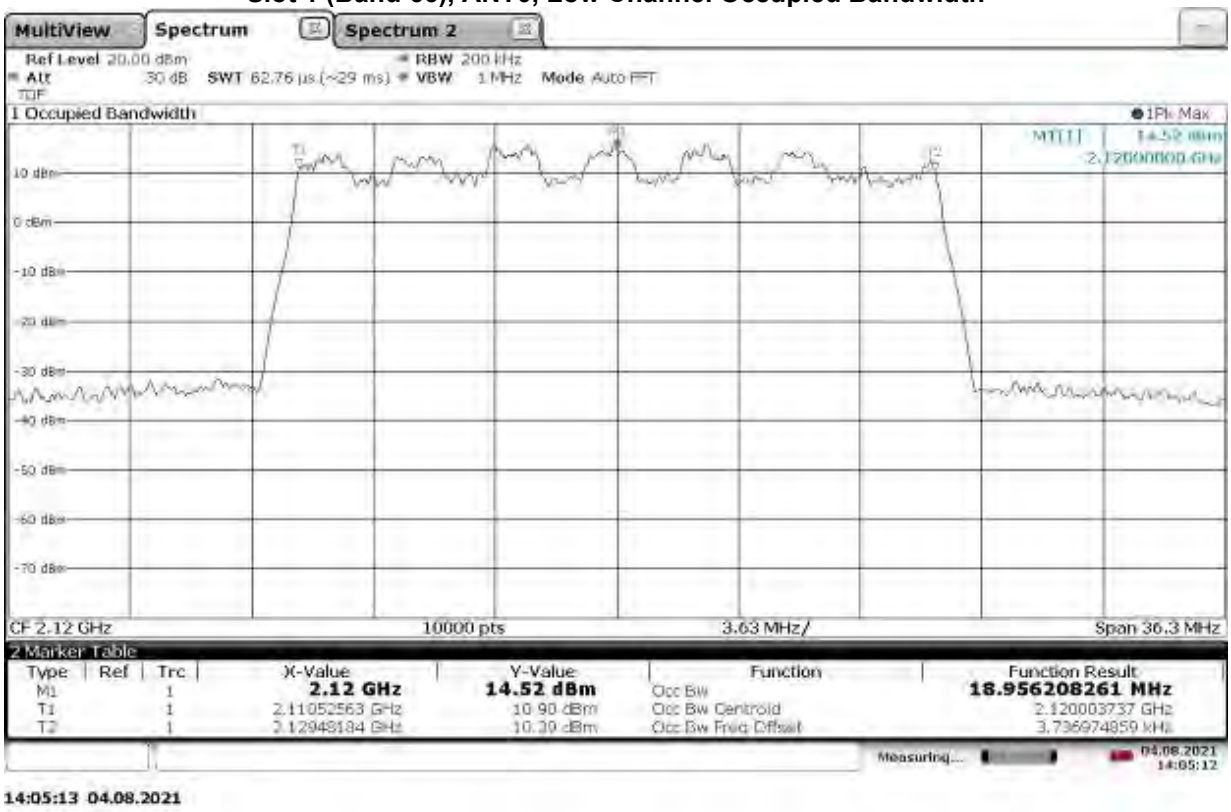
TM3.2-16QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



12:00:45 04.08.2021

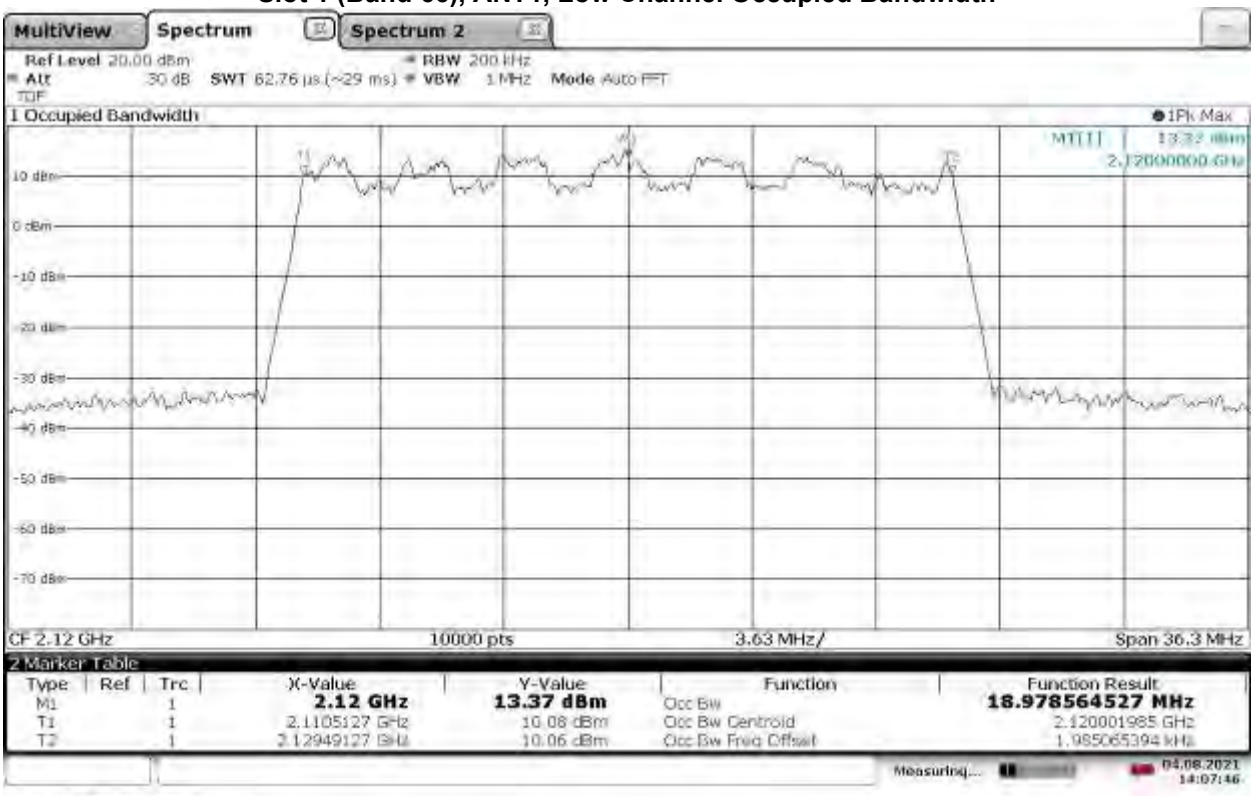
TM3.2-16QAM_20 MHz Bandwidth

Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



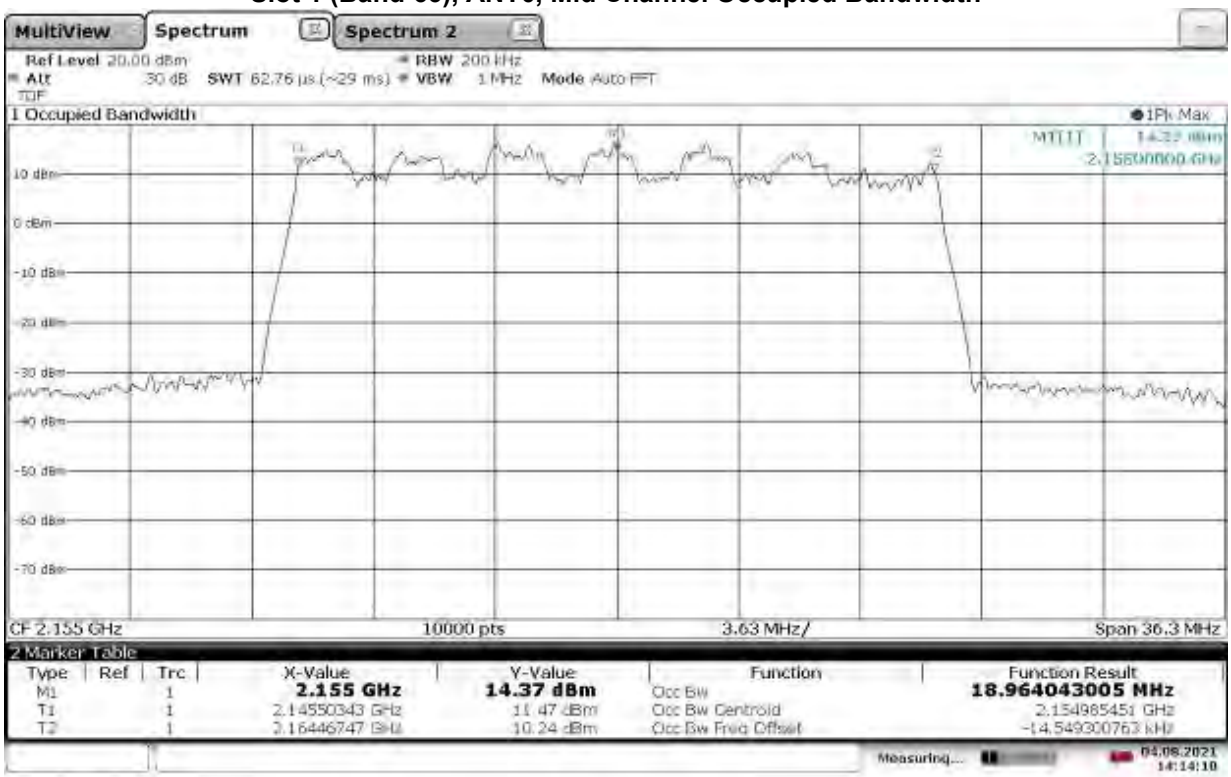
14:05:13 04.08.2021

TM3.2-16QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



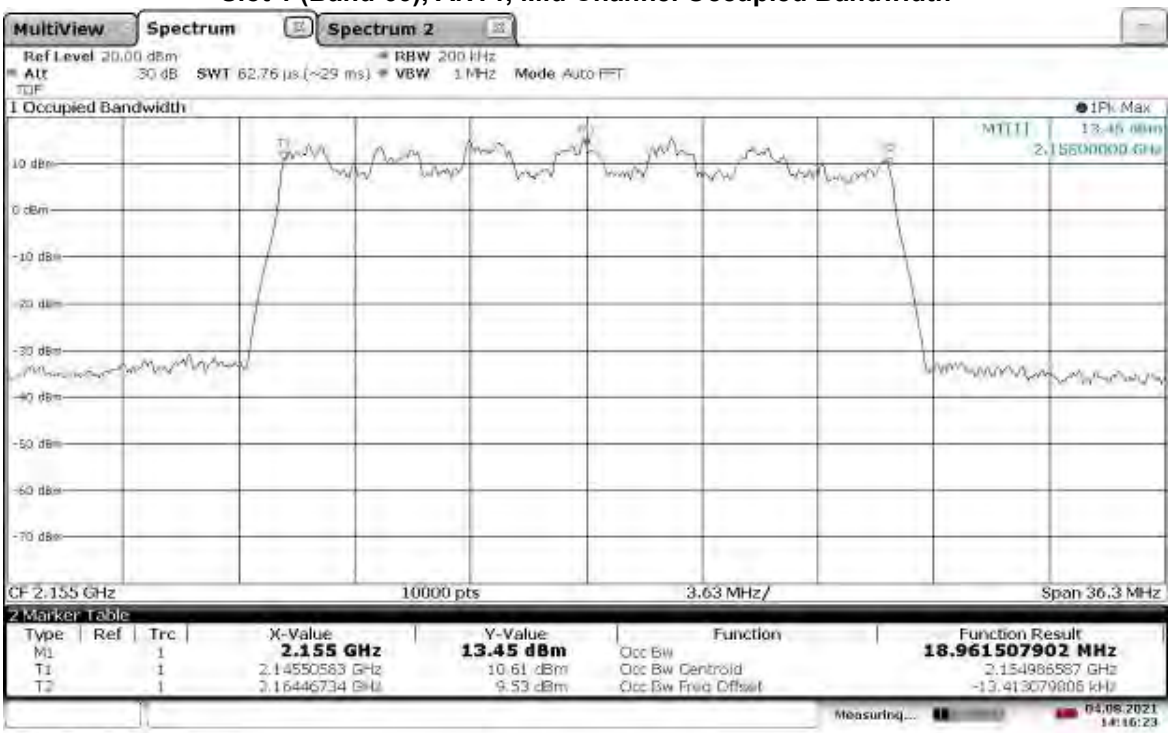
14:07:46 04.08.2021

TM3.2-16QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



14:14:11 04.08.2021

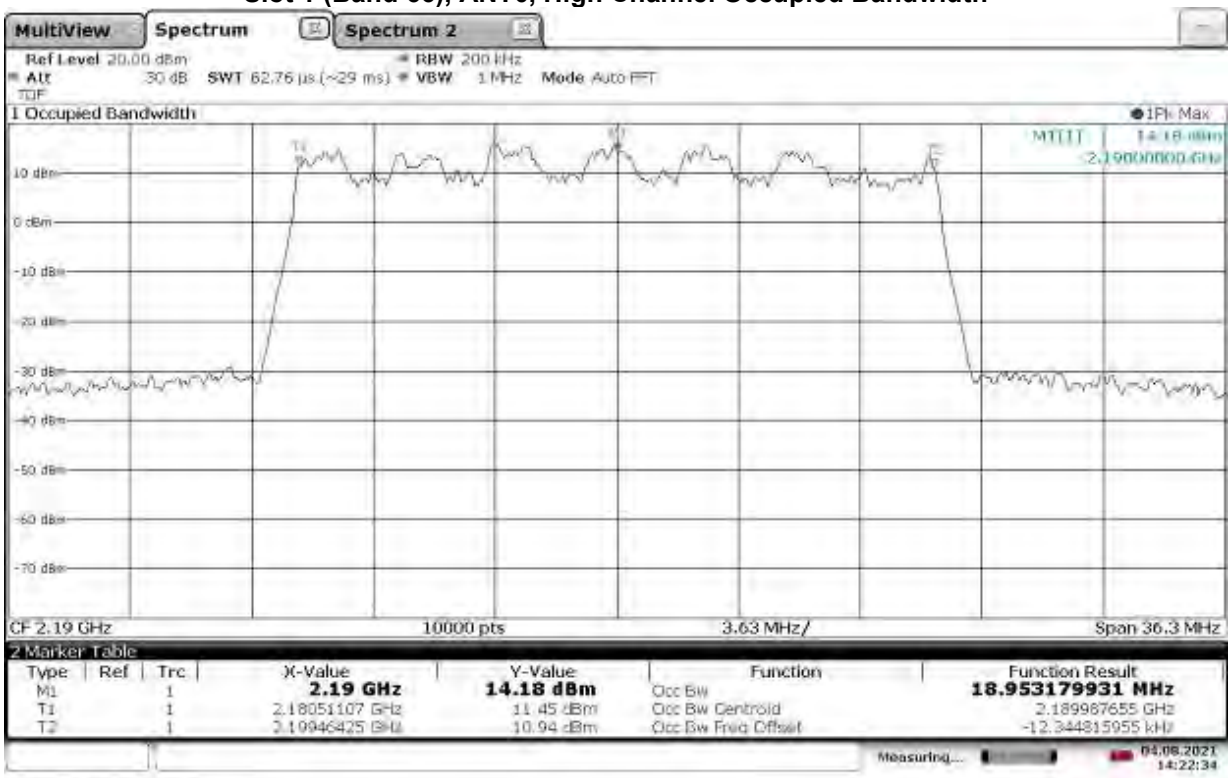
TM3.2-16QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



14:16:23 04.08.2021

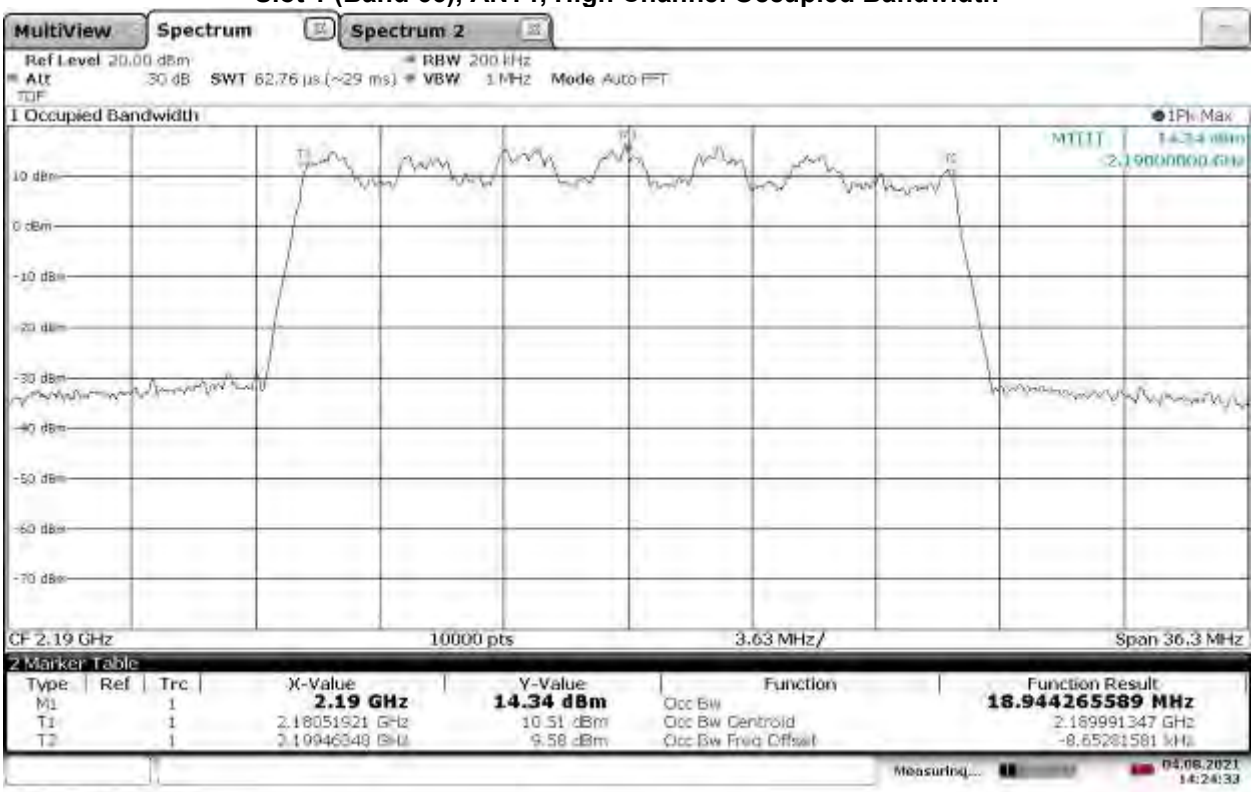
TM3.2-16QAM_20 MHz Bandwidth

Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



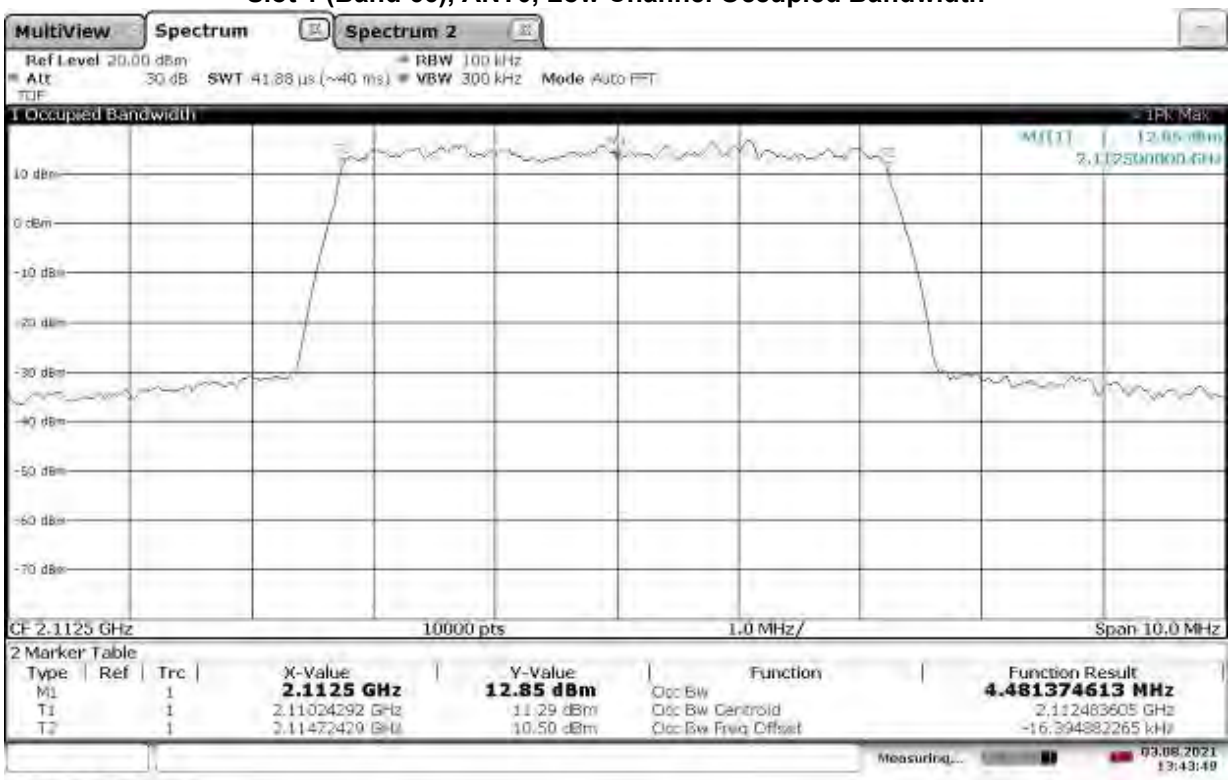
14:22:34 04.08.2021

TM3.2-16QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



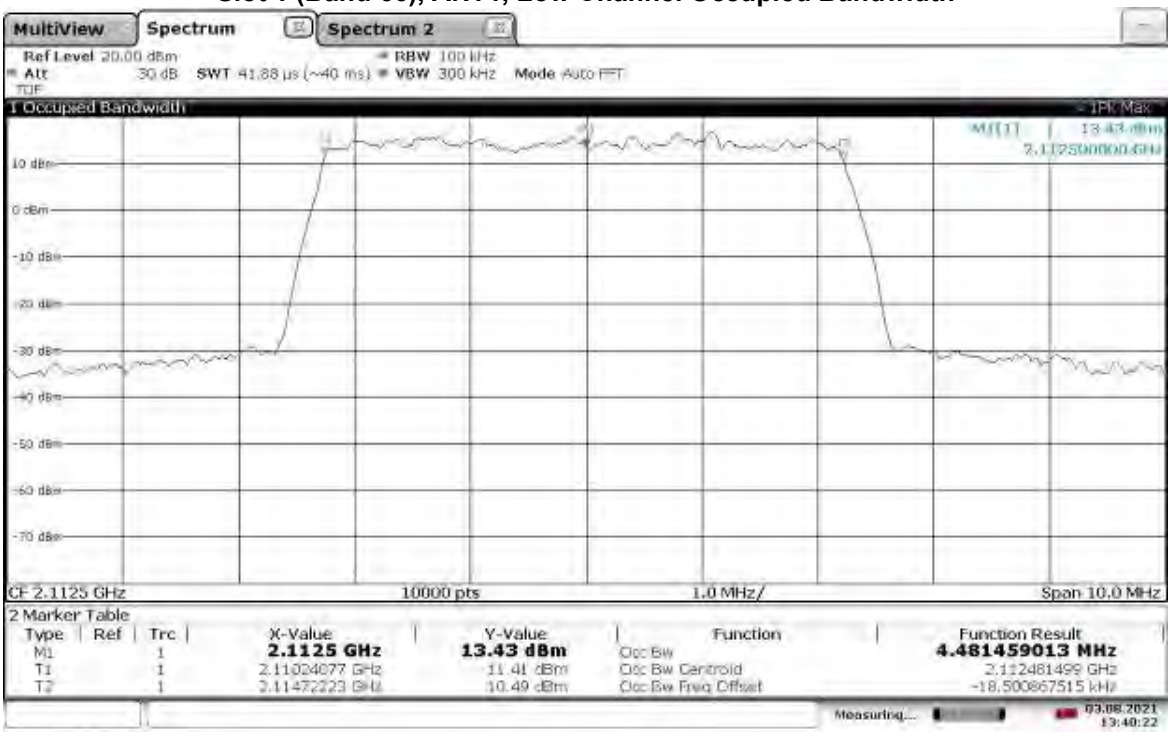
14:24:33 04.08.2021

TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



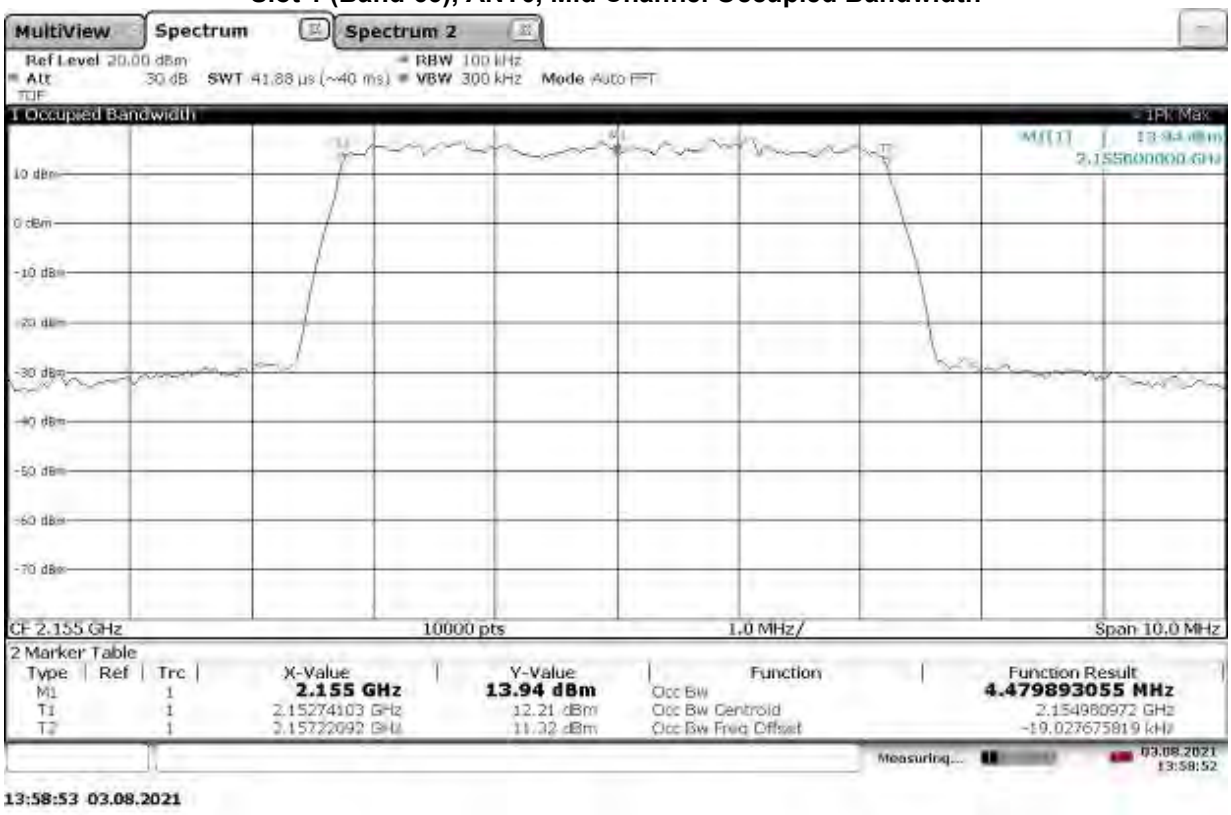
13:43:49 03.08.2021

TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth

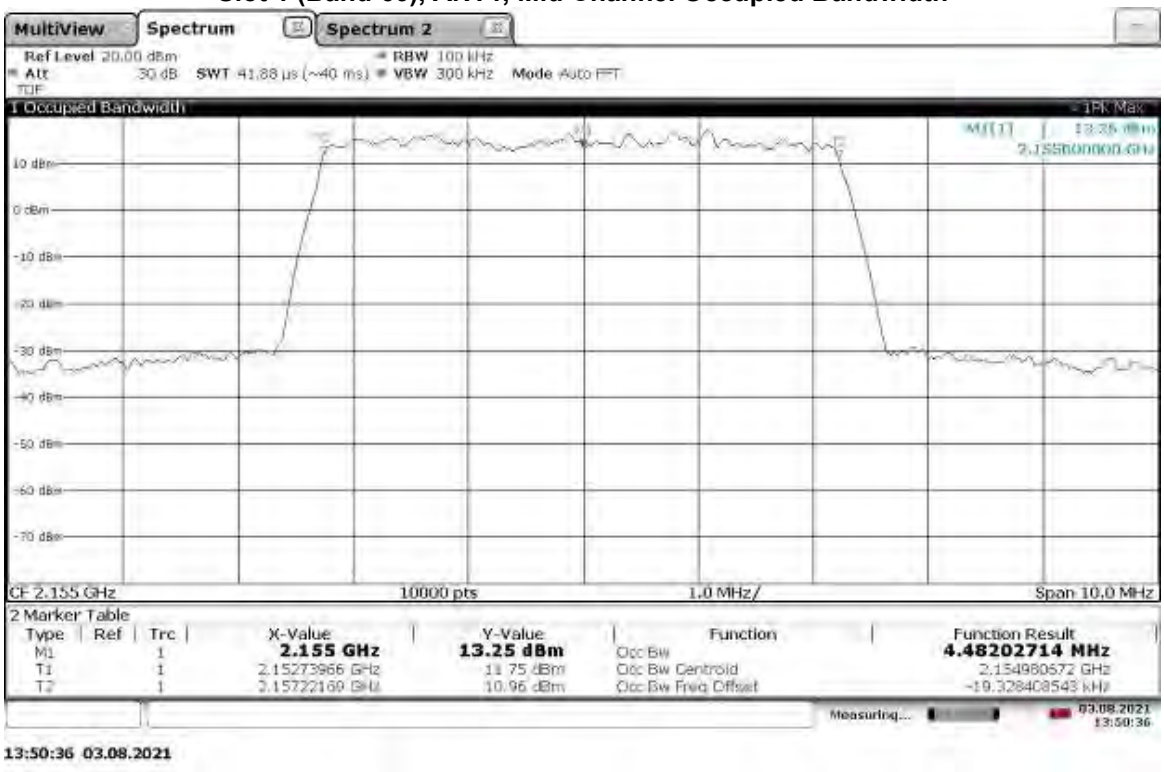


13:40:23 03.08.2021

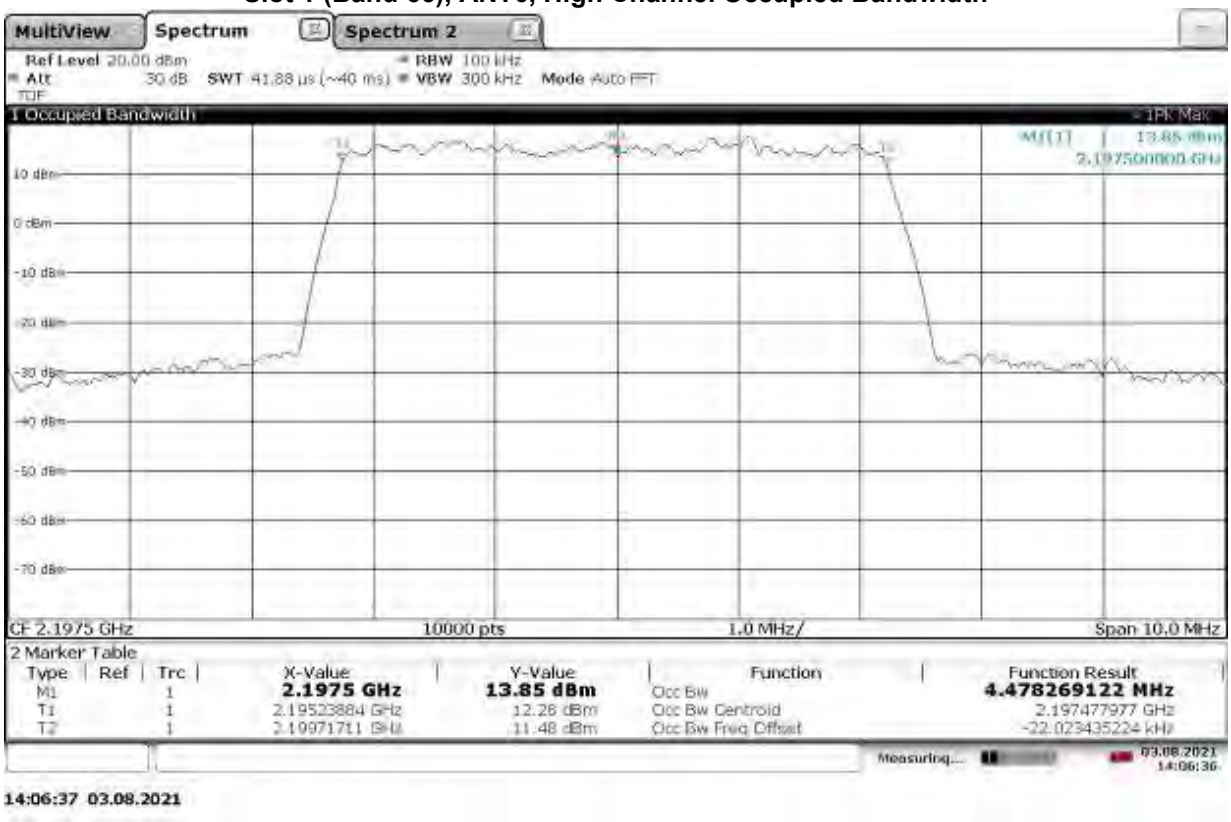
TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



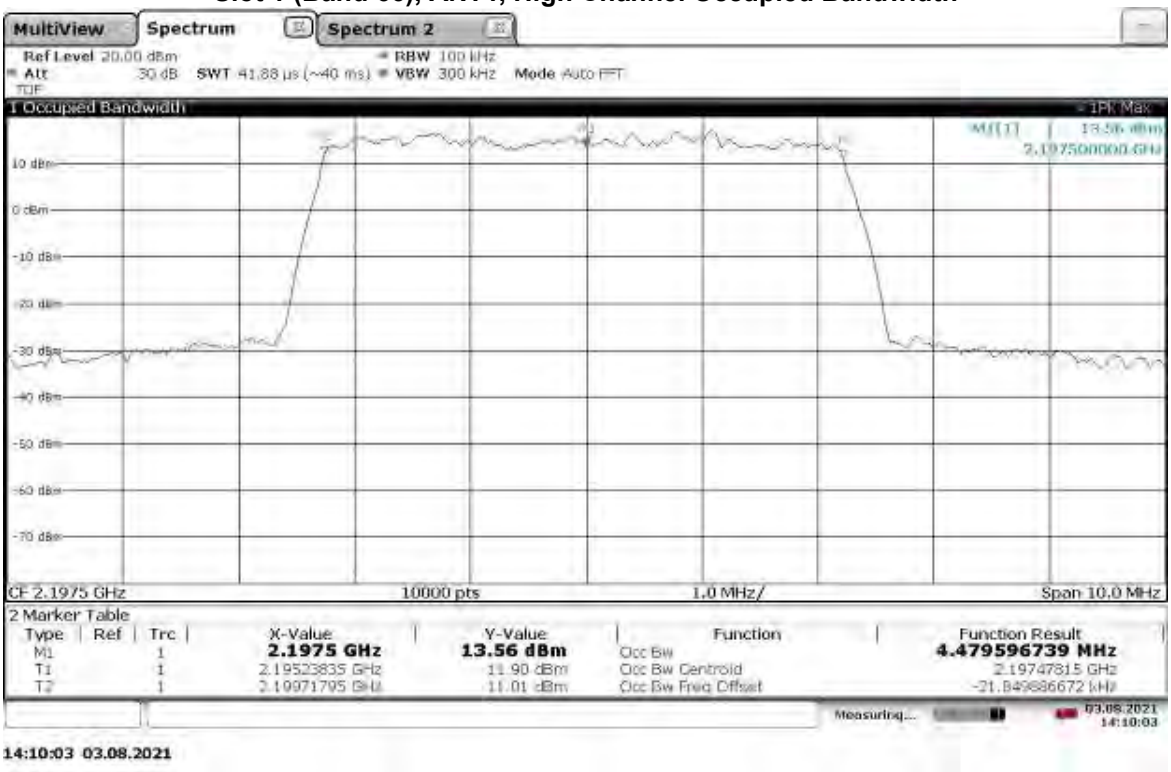
TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



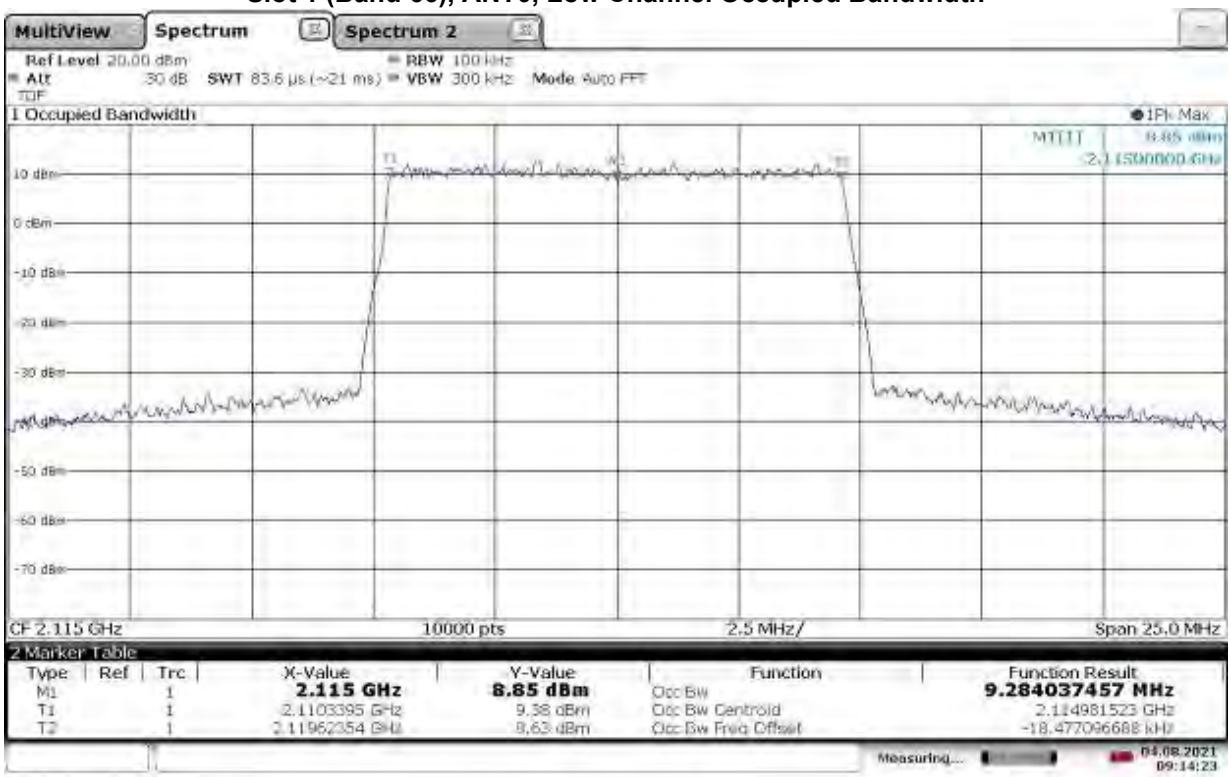
TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



TM3.1-64QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth

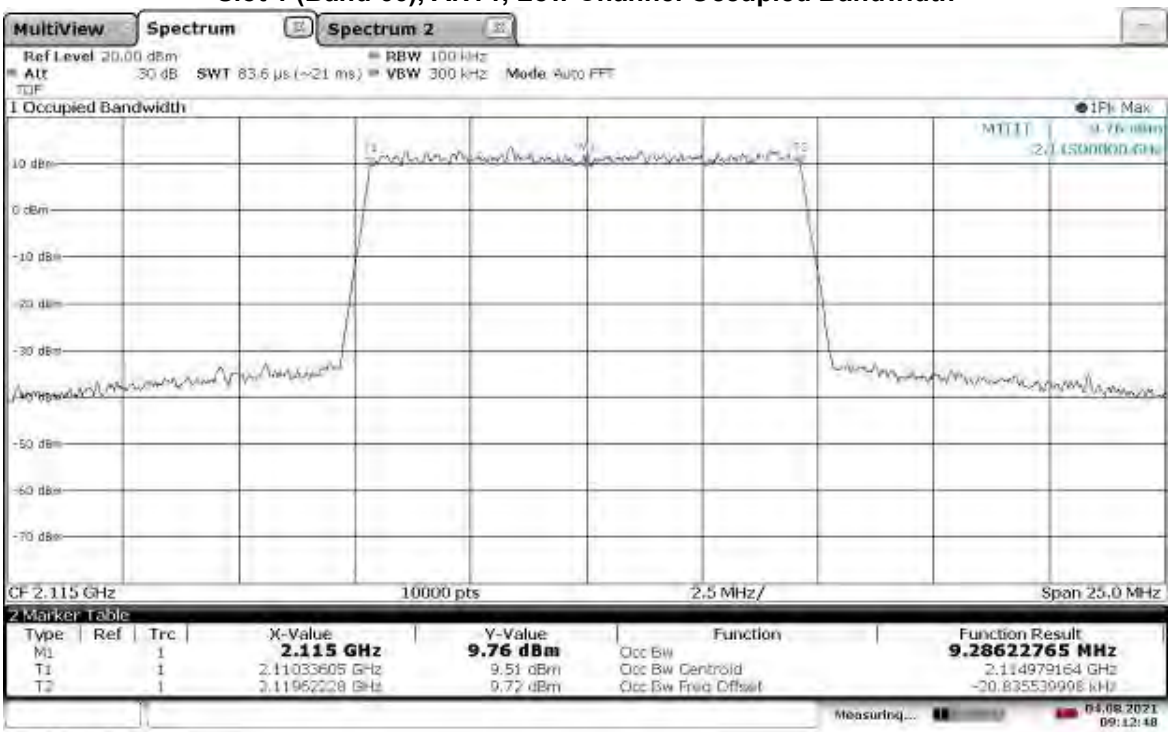


TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



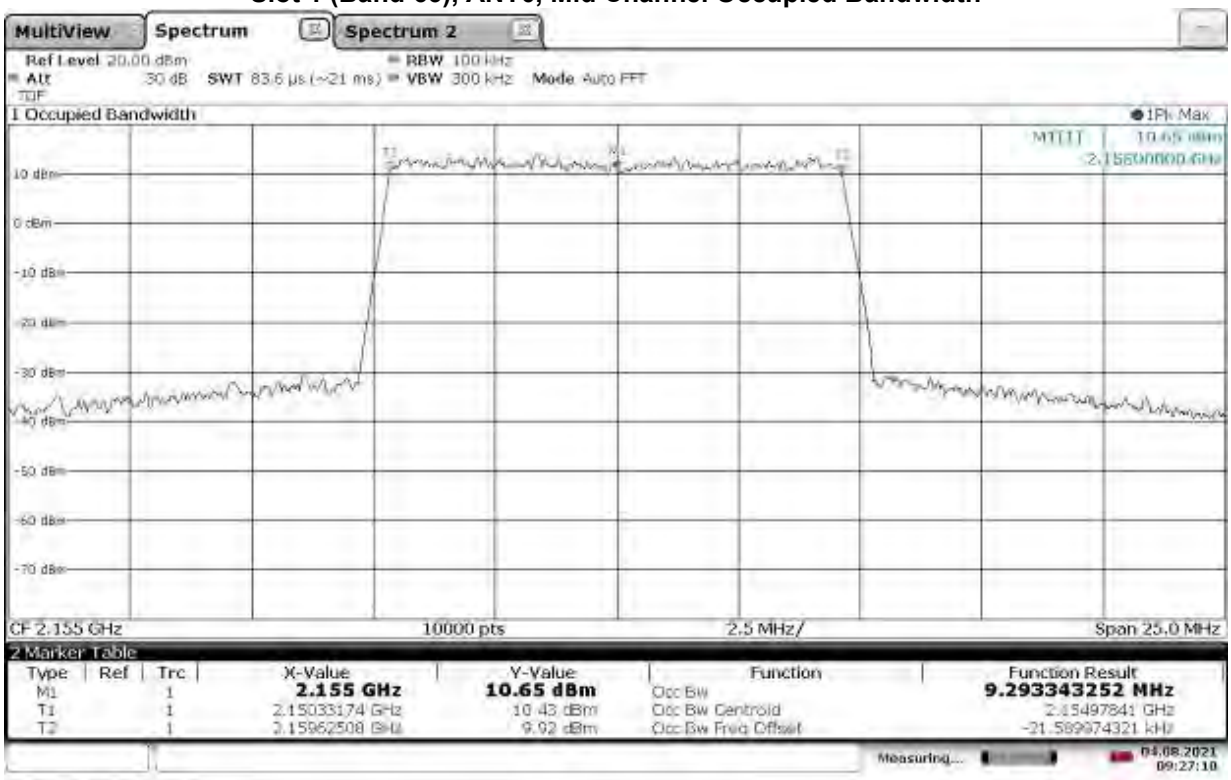
09:14:24 04.08.2021

TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



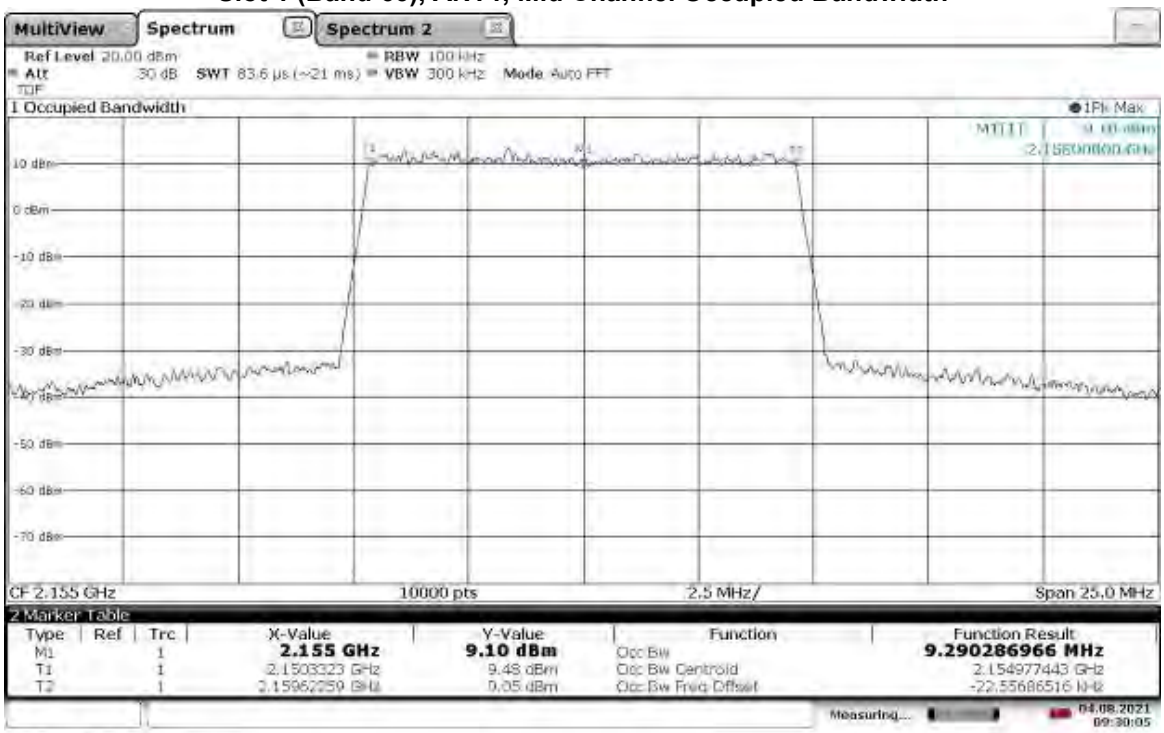
09:12:49 04.08.2021

TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



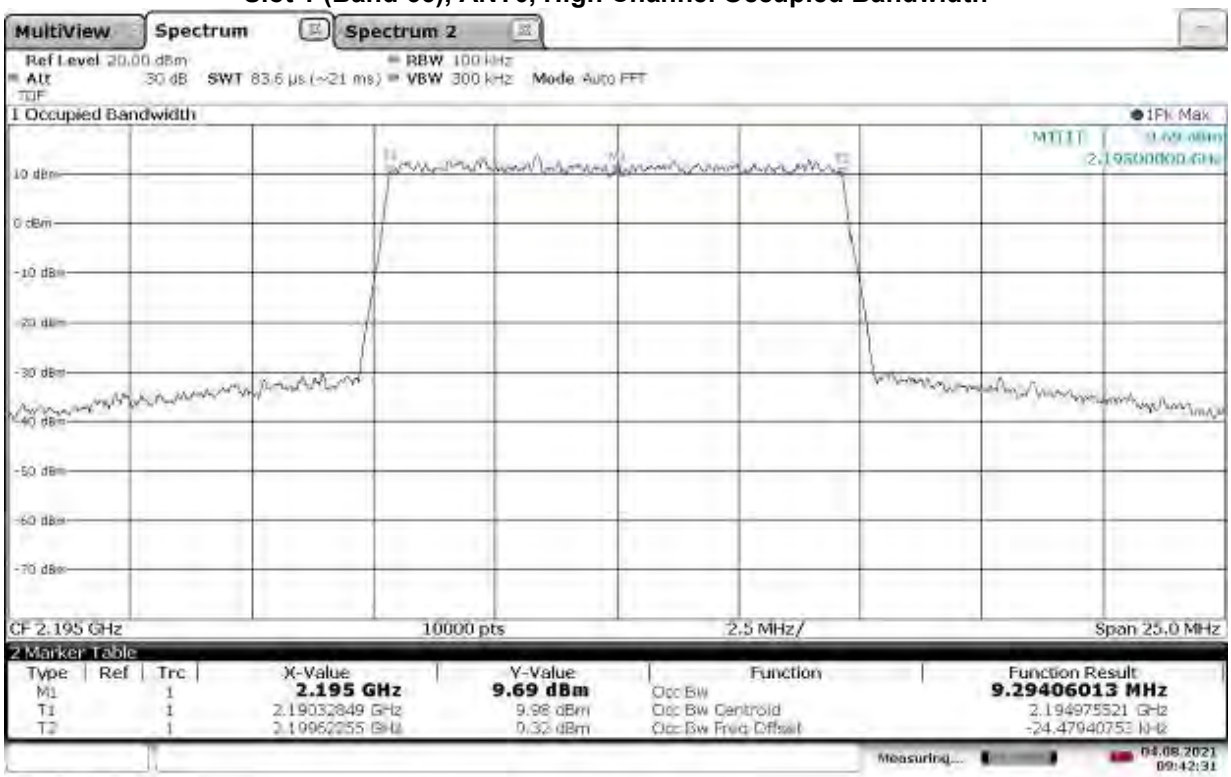
09:27:10 04.08.2021

TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



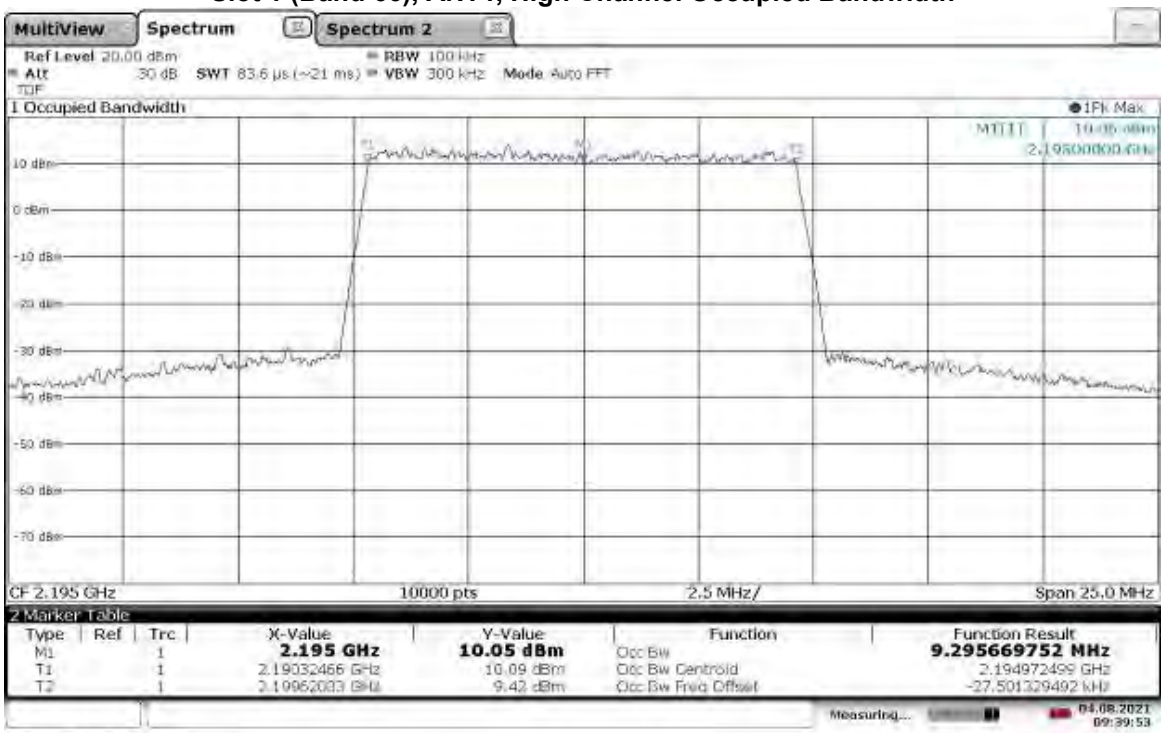
09:30:06 04.08.2021

TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



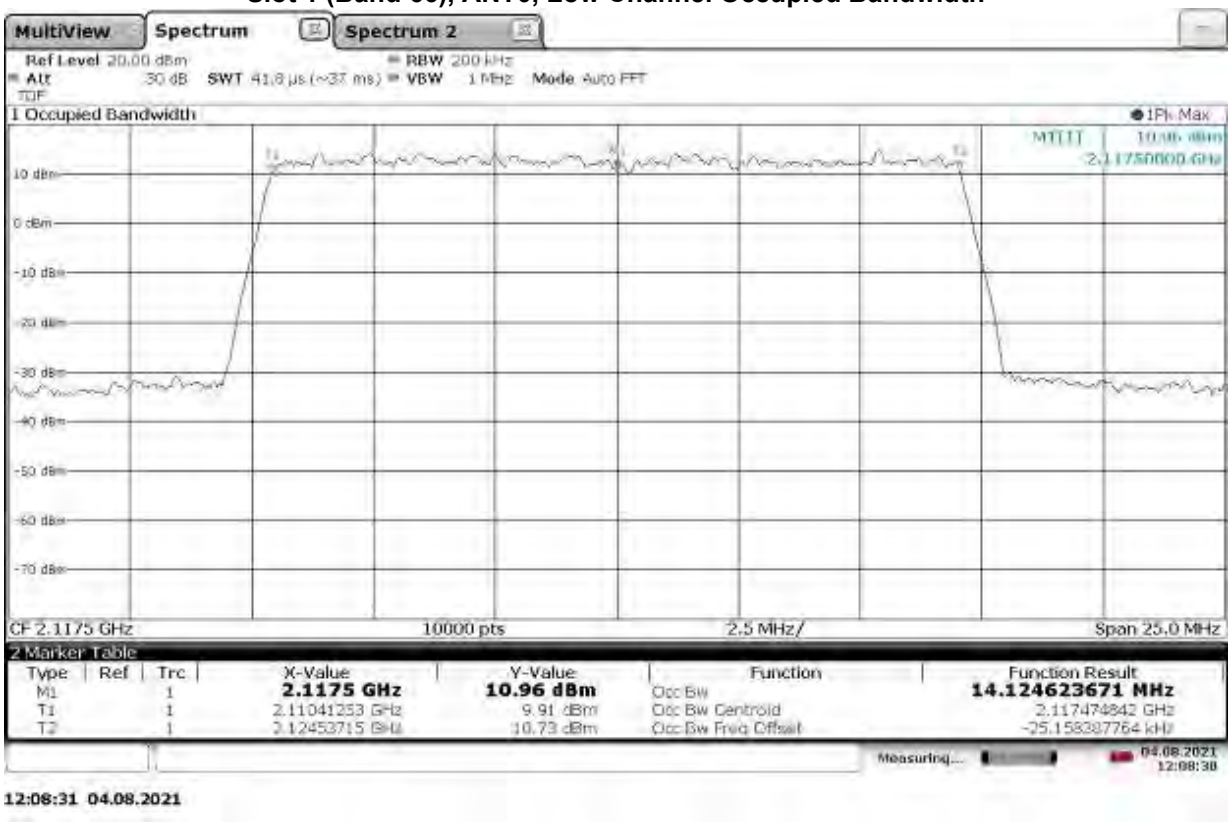
09:42:31 04.08.2021

TM3.1-64QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth

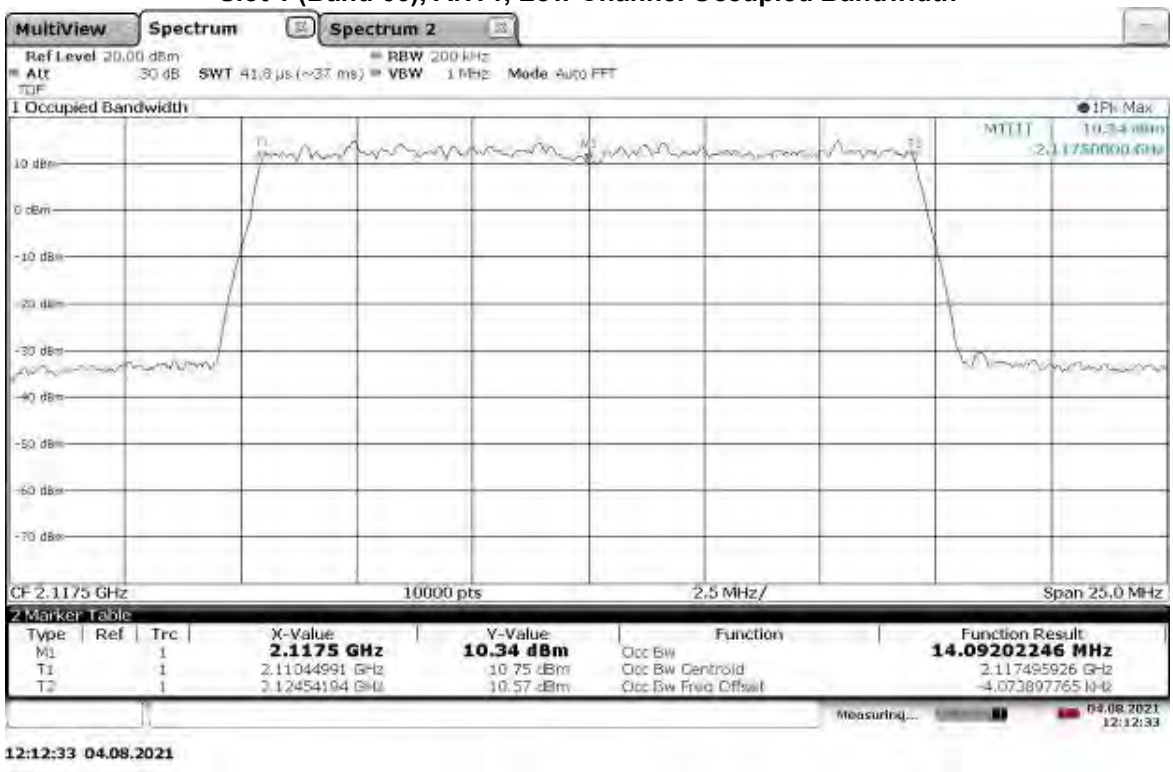


09:39:54 04.08.2021

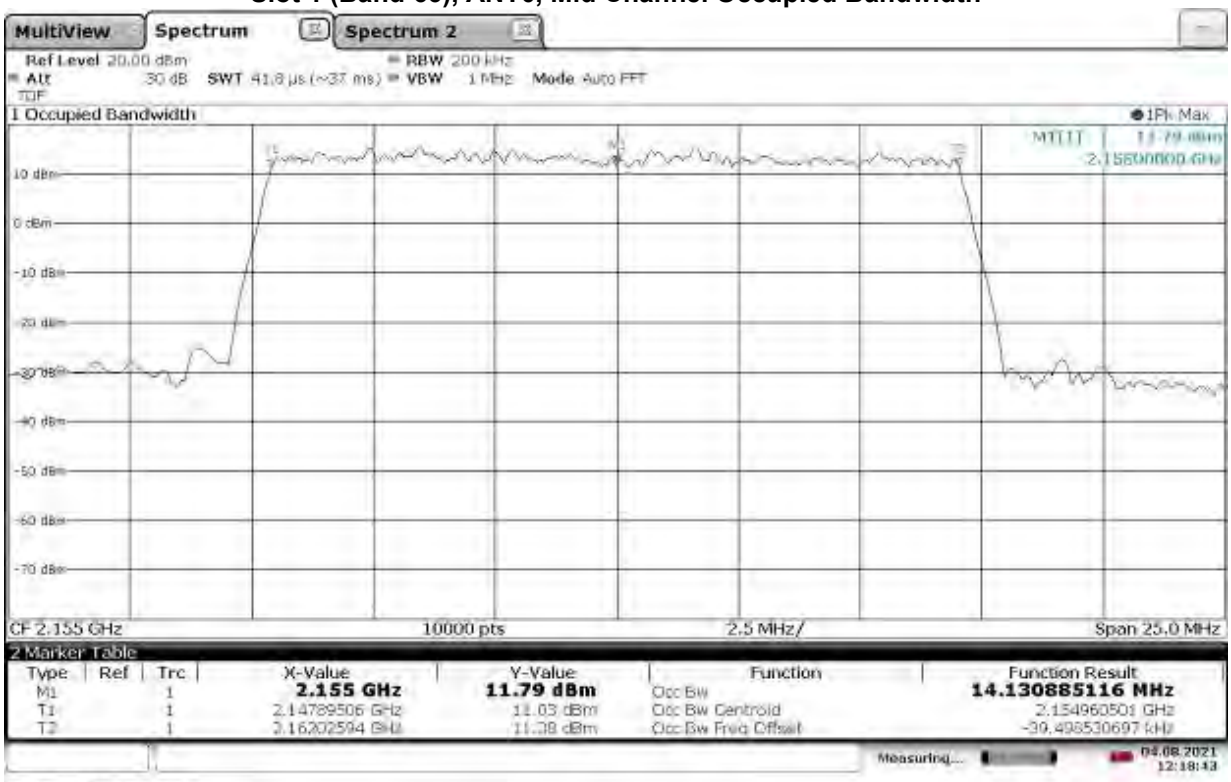
TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth

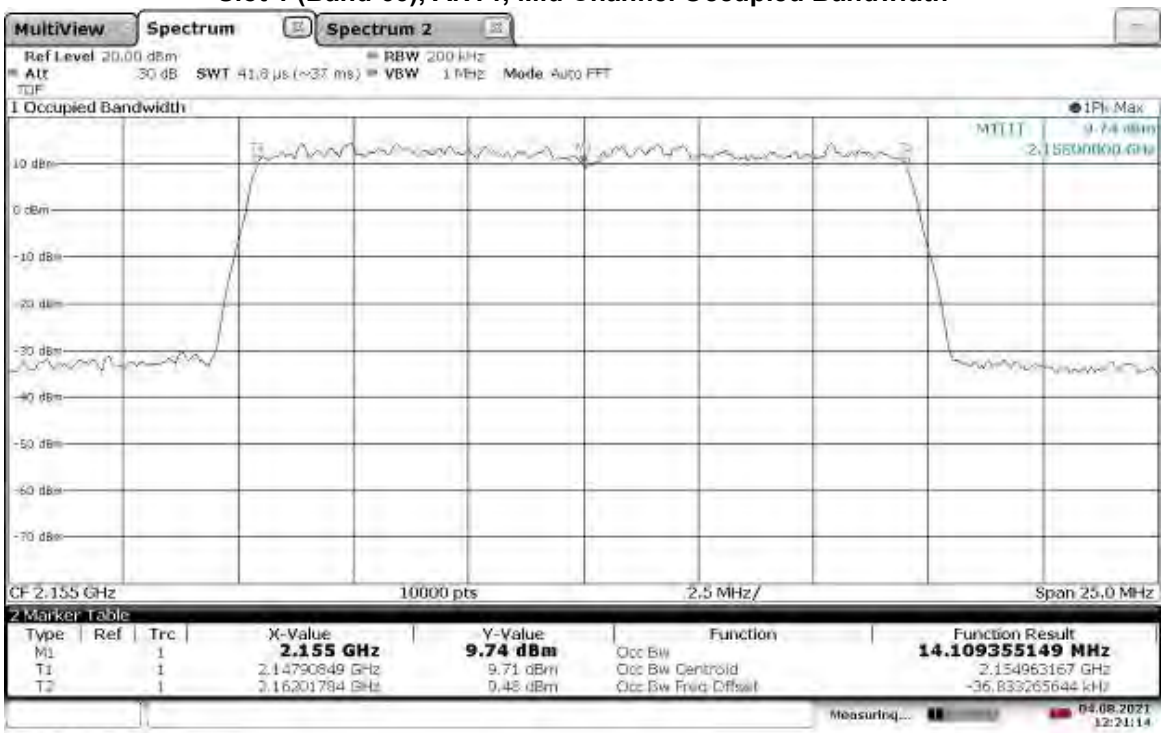


TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



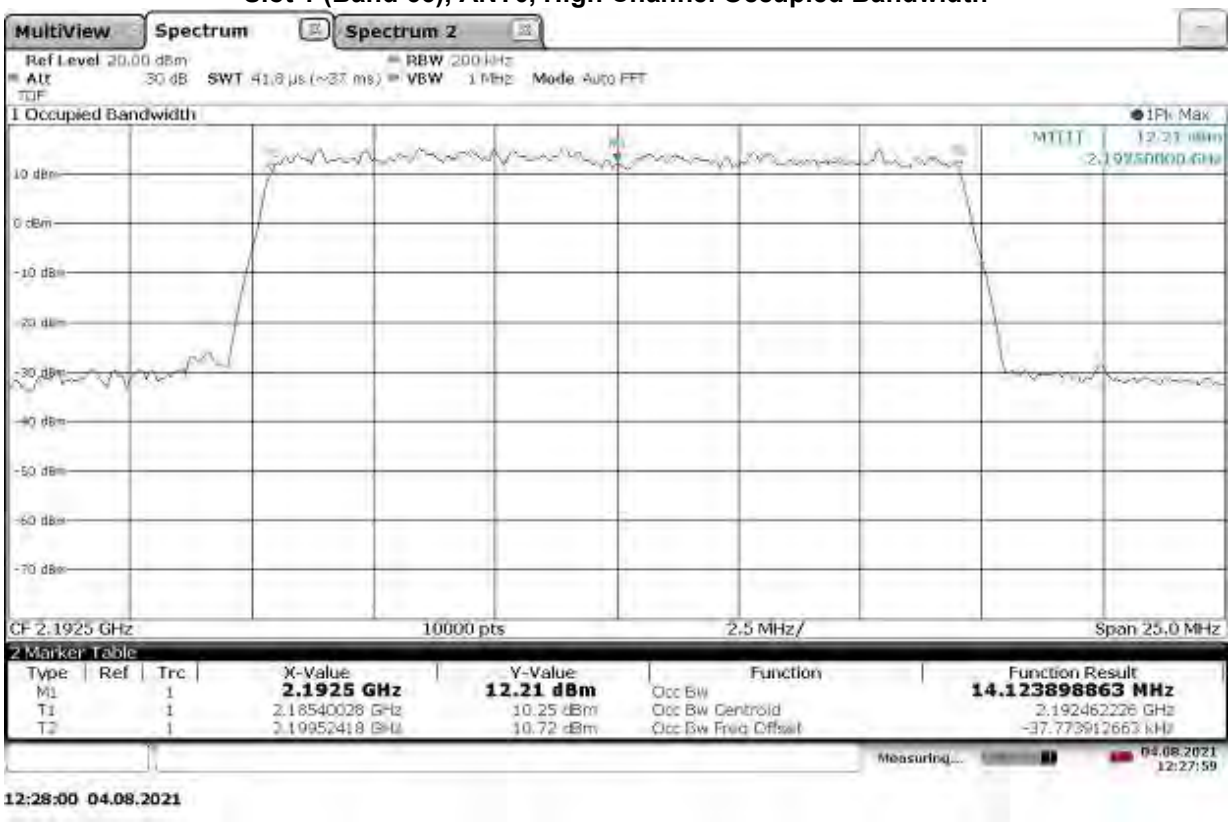
12:18:43 04.08.2021

TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth

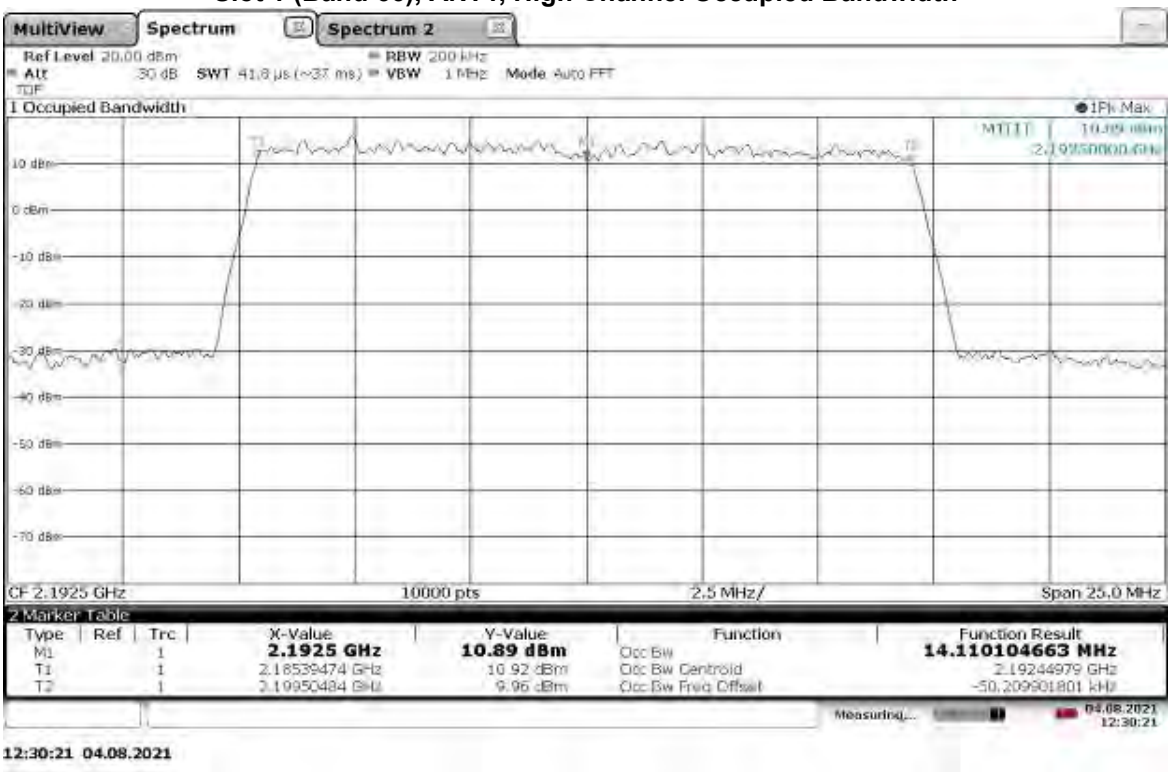


12:21:14 04.08.2021

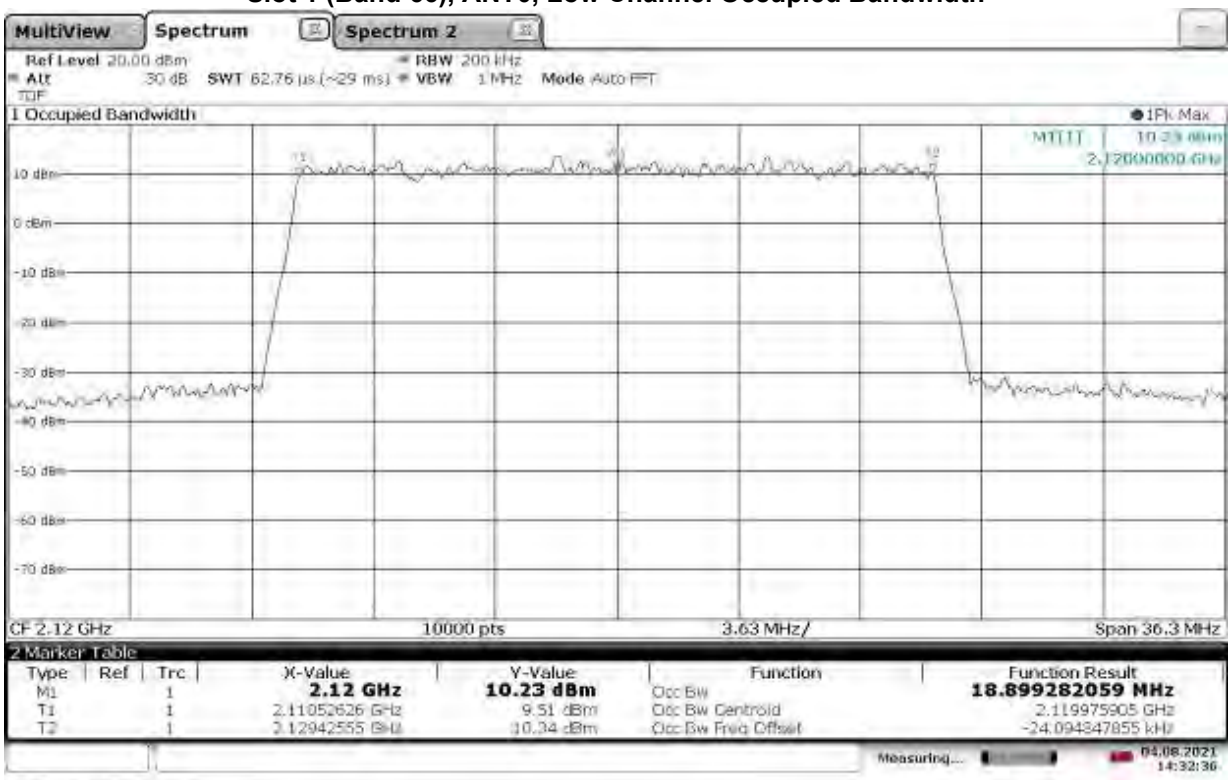
TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



TM3.1-64QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth

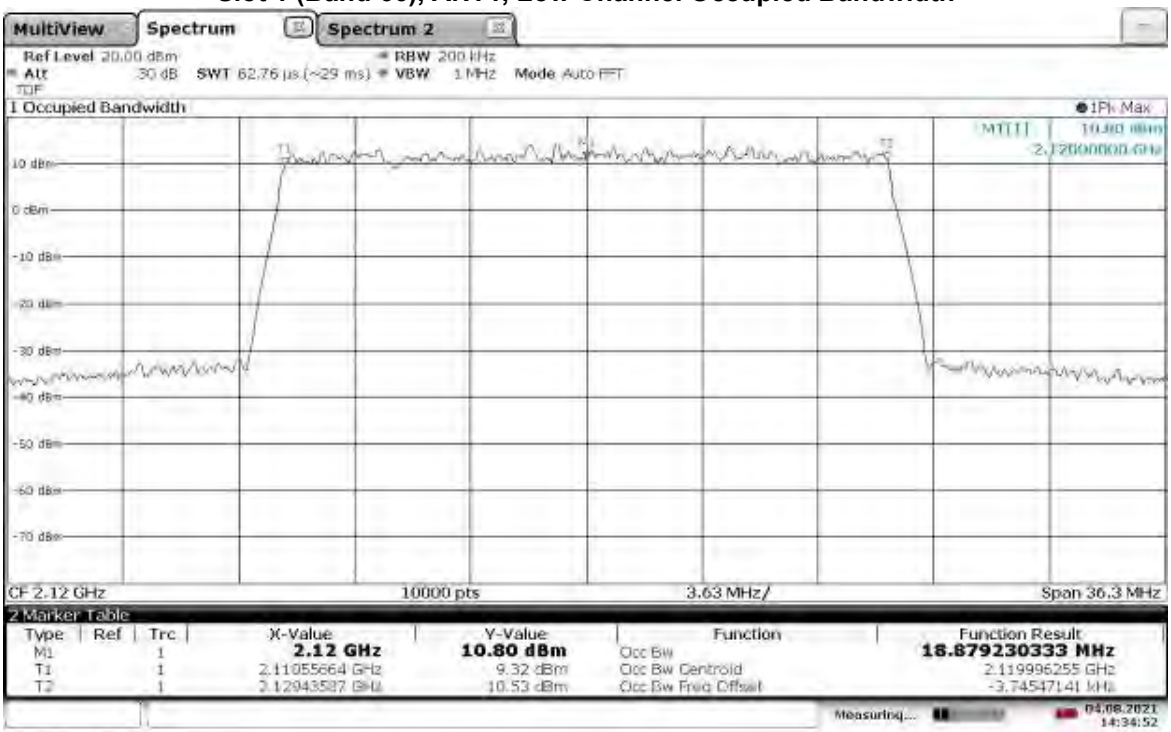


TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



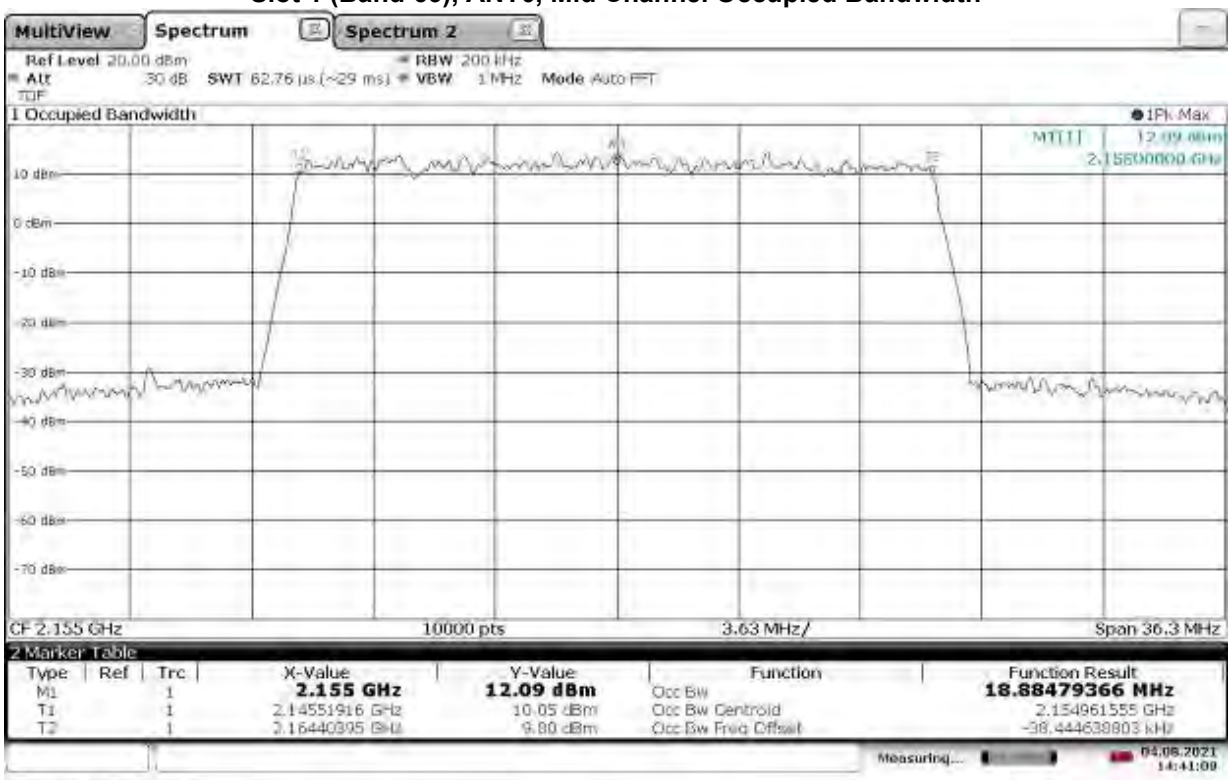
14:32:37 04.08.2021

TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



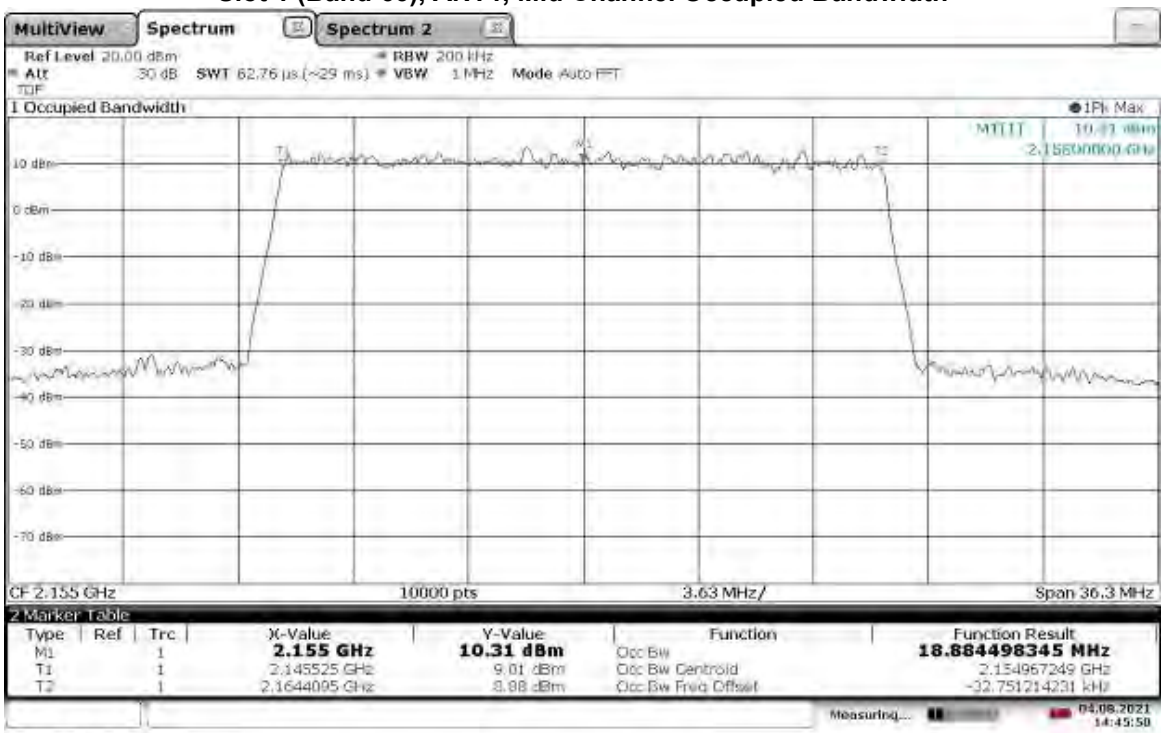
14:34:52 04.08.2021

TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



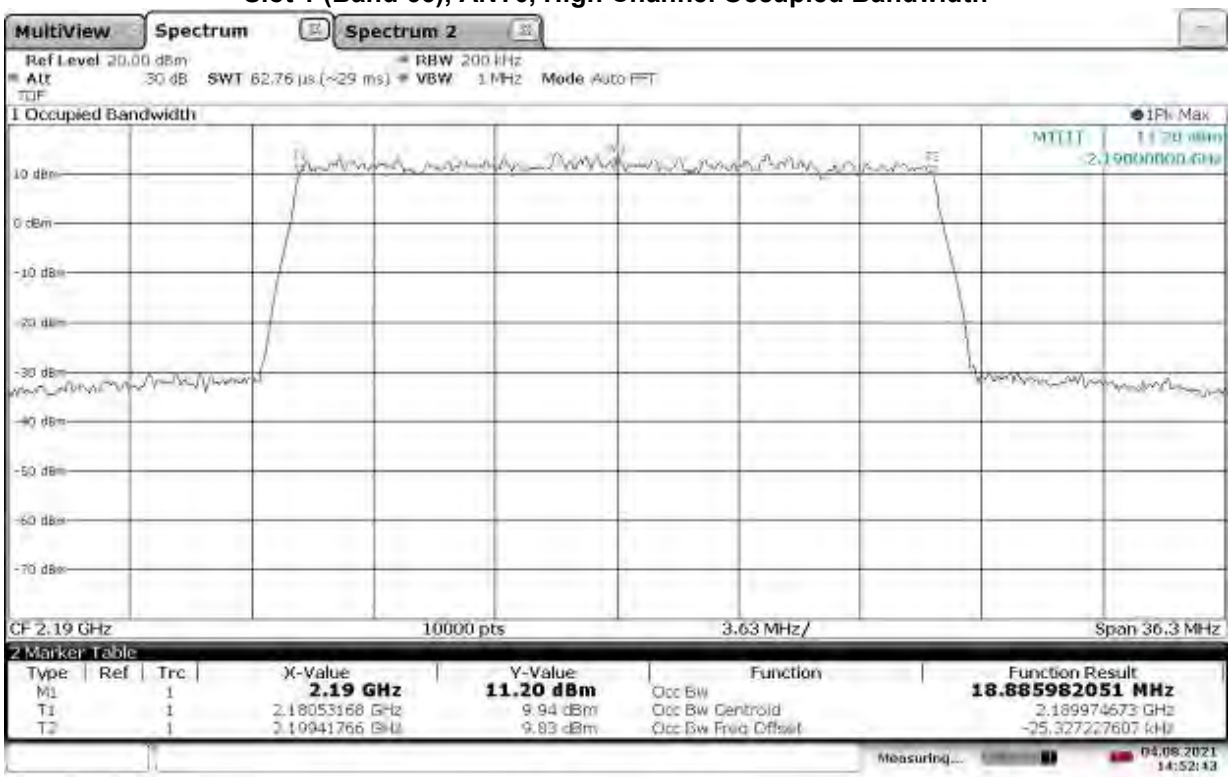
14:41:10 04.08.2021

TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



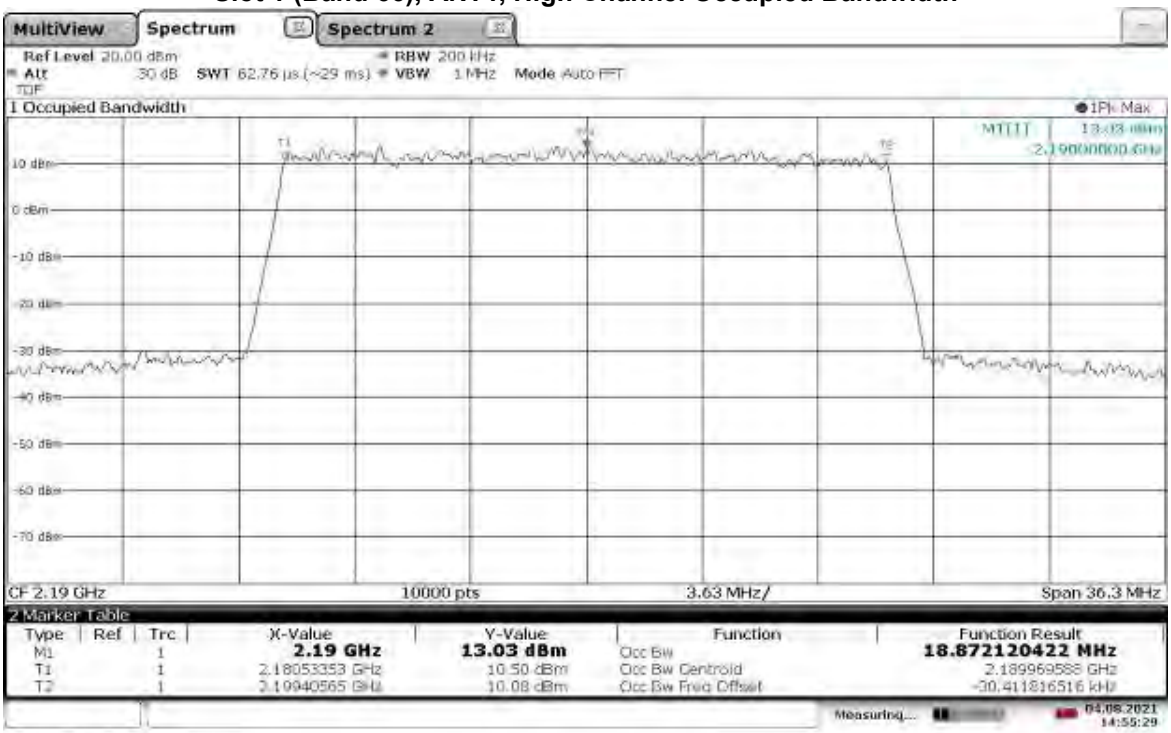
14:45:50 04.08.2021

TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



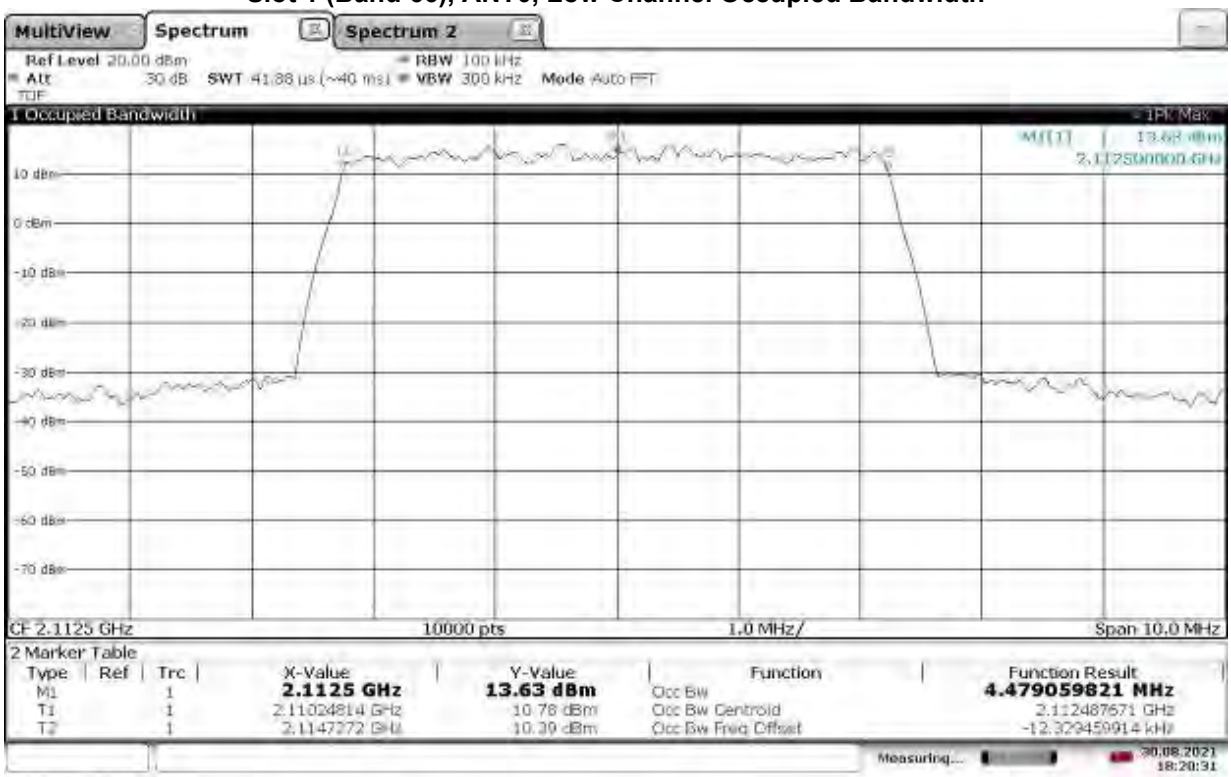
14:52:44 04.08.2021

TM3.1-64QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



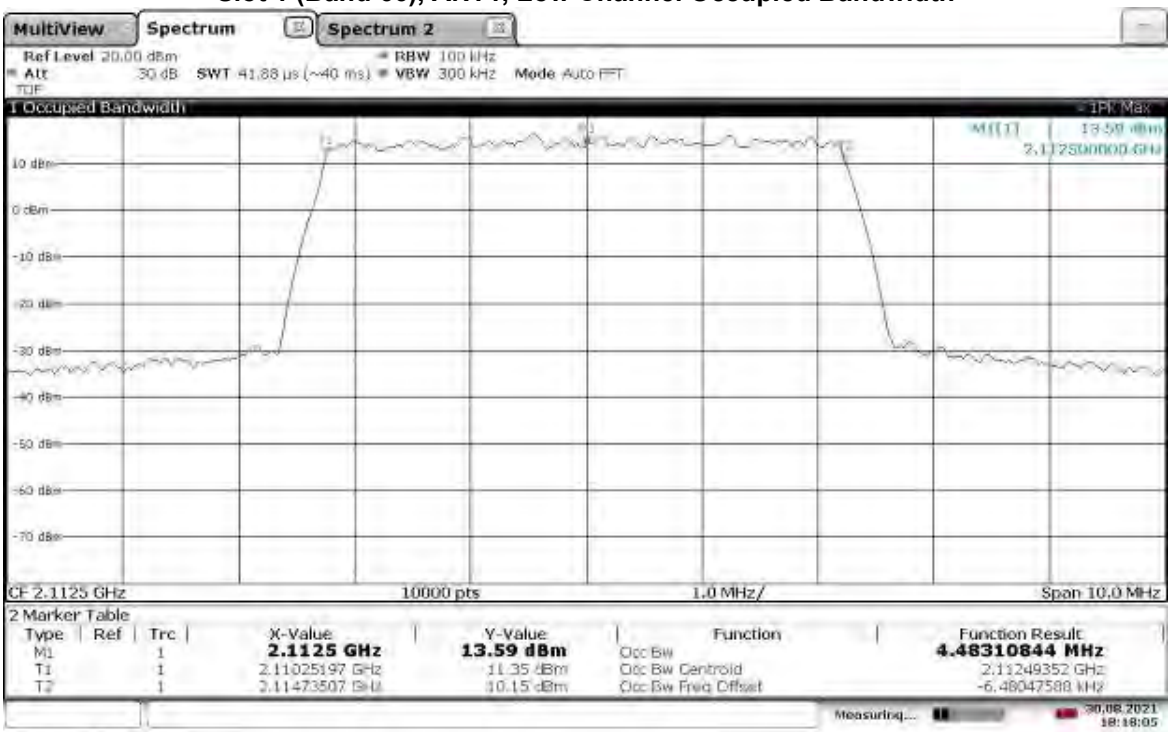
14:55:30 04.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



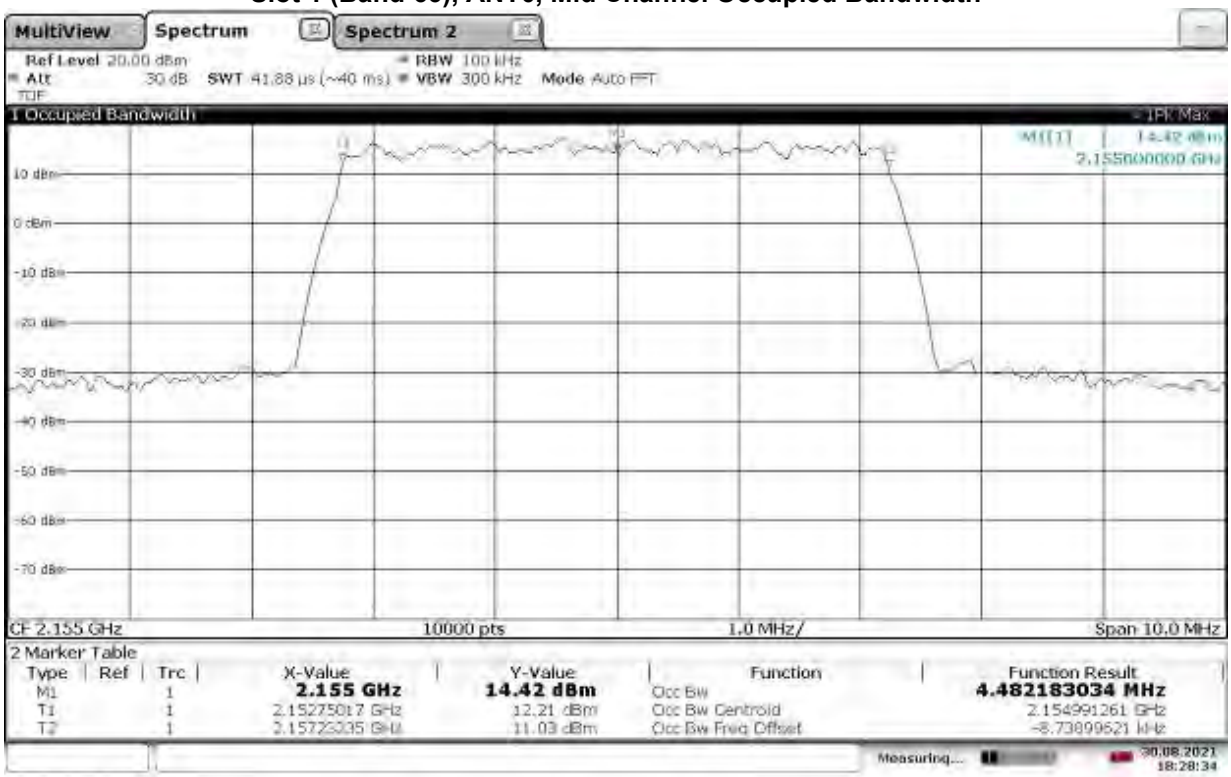
18:20:31 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



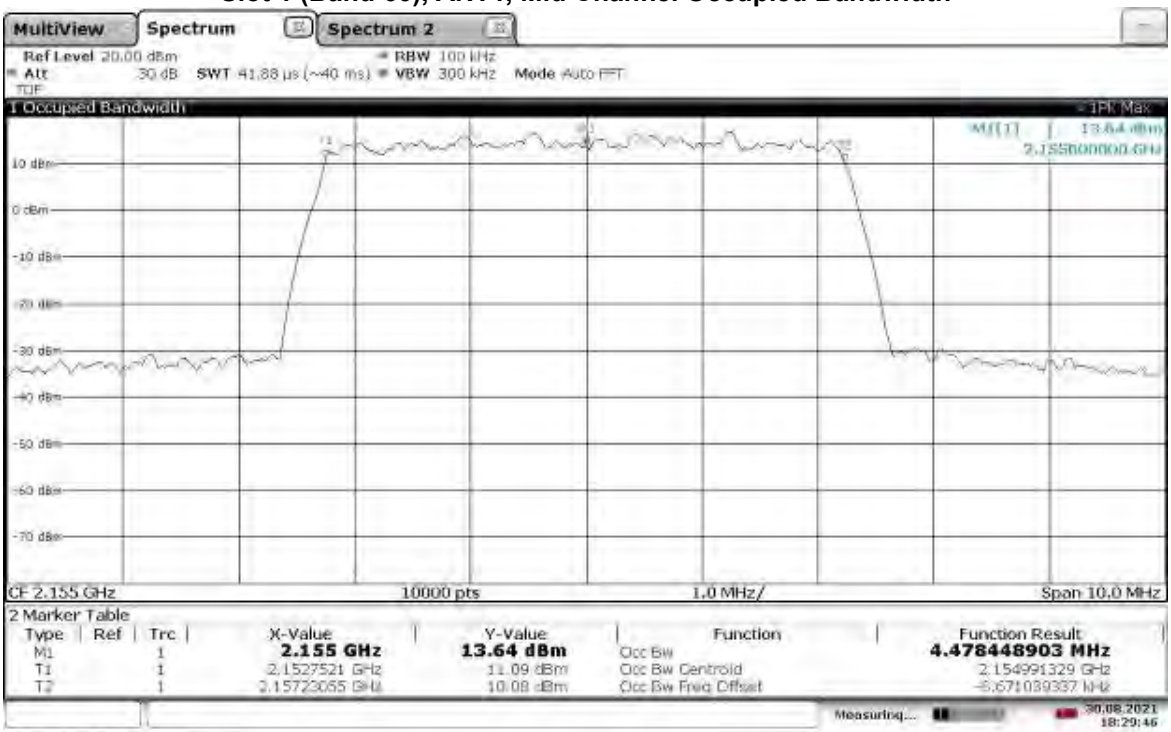
18:18:05 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



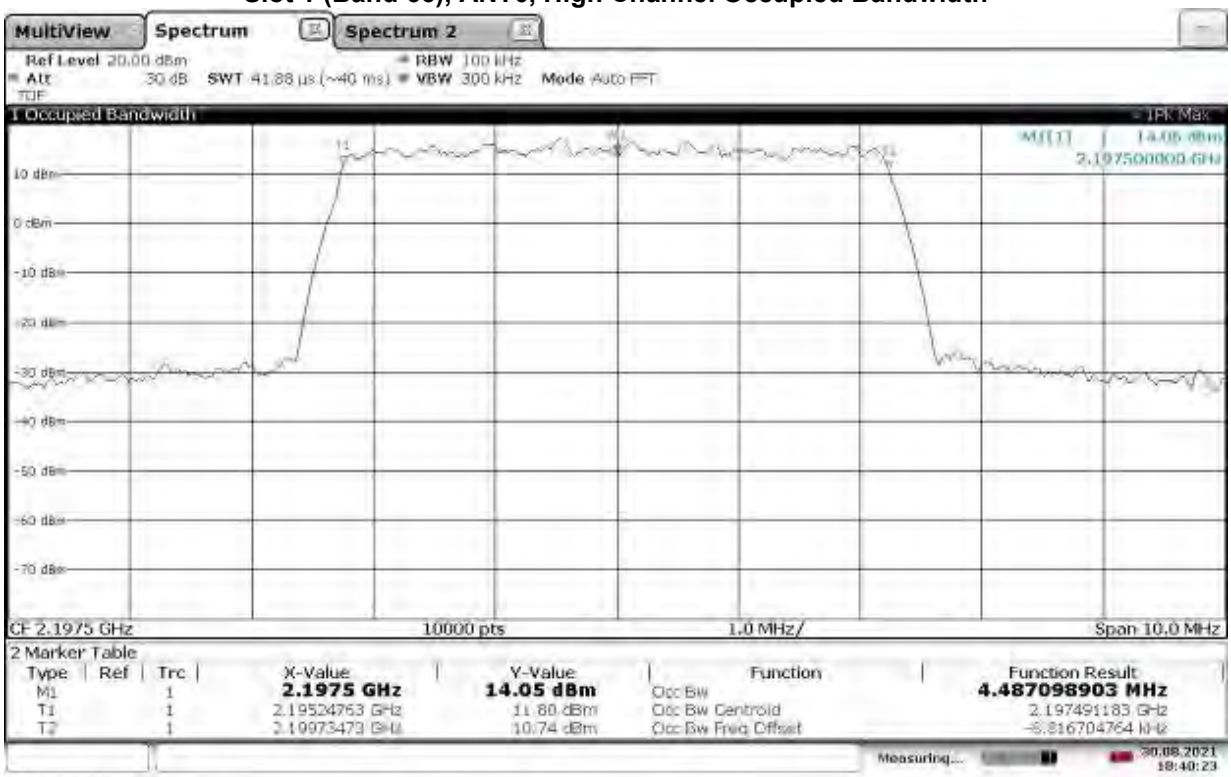
18:28:34 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



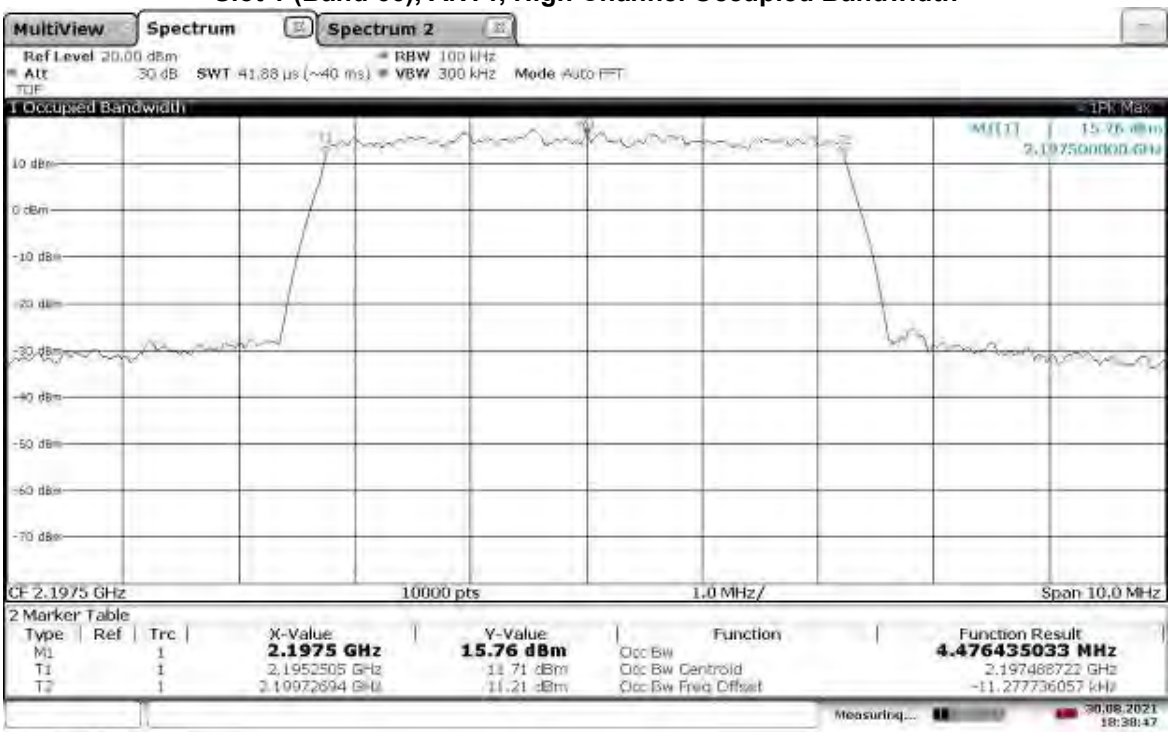
18:29:46 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



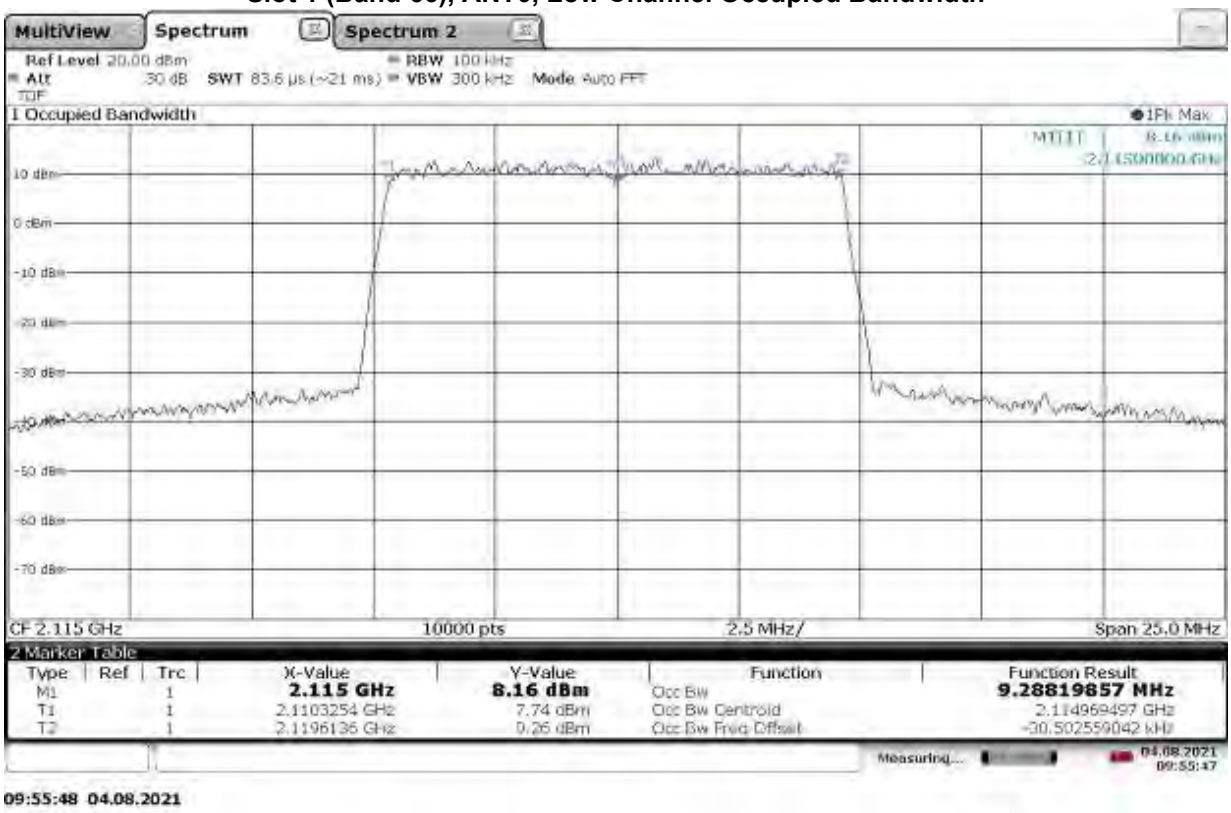
18:40:24 30.08.2021

TM3.1a-256QAM_5 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



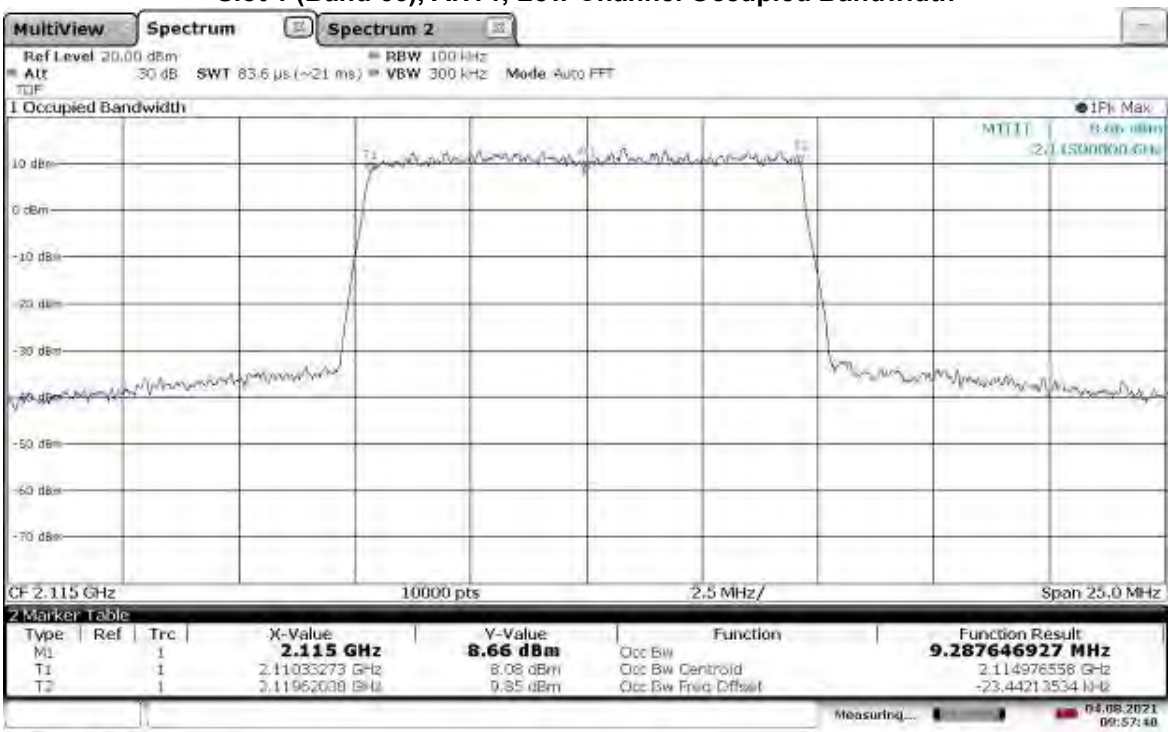
18:38:48 30.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



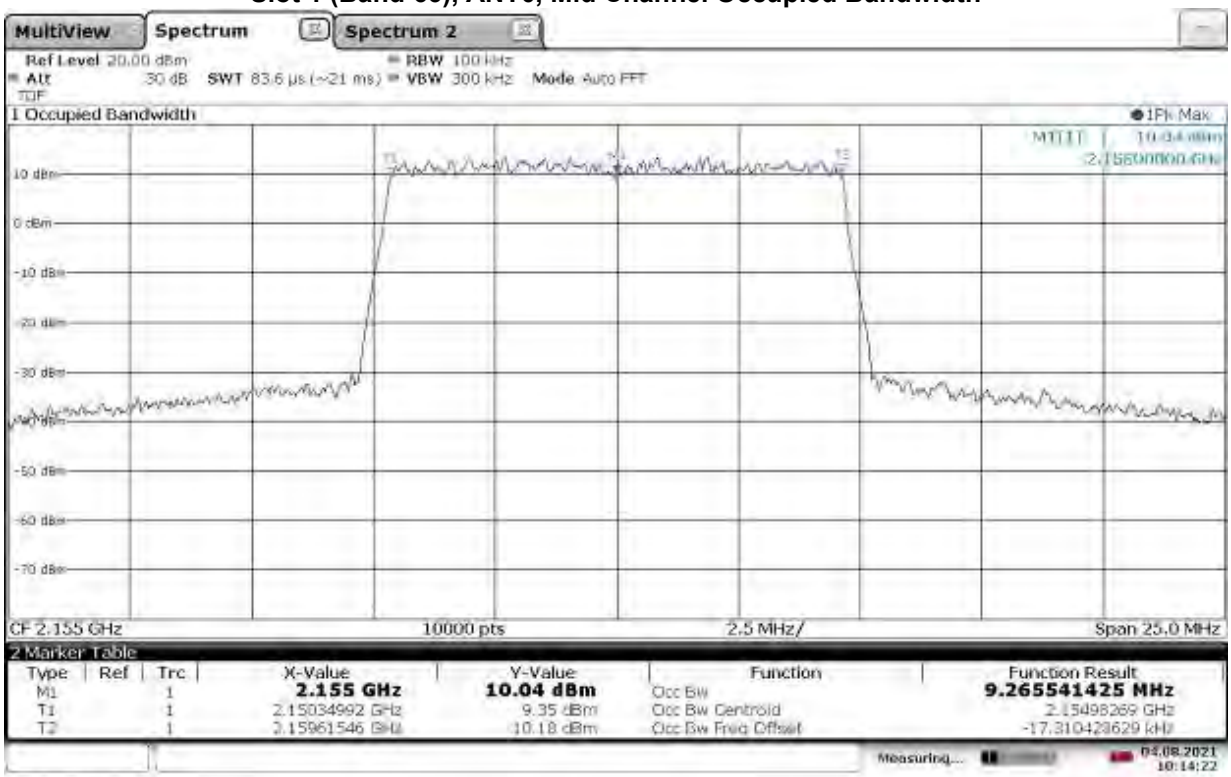
09:55:48 04.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



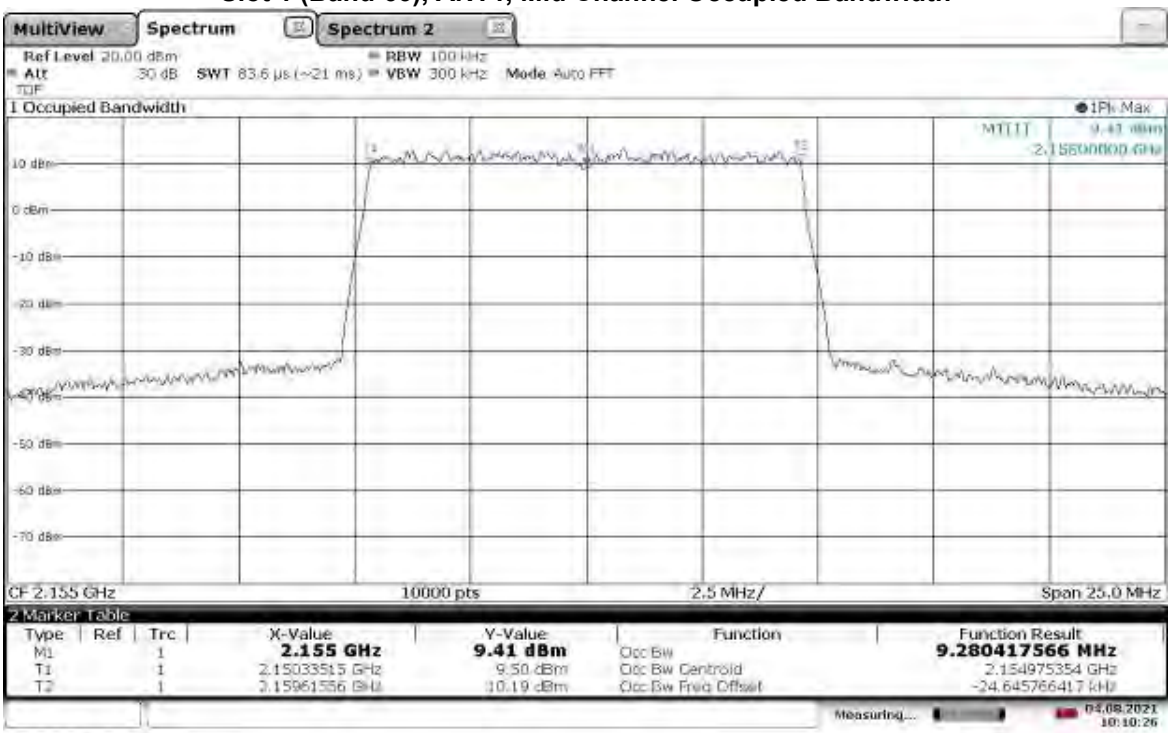
09:57:41 04.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



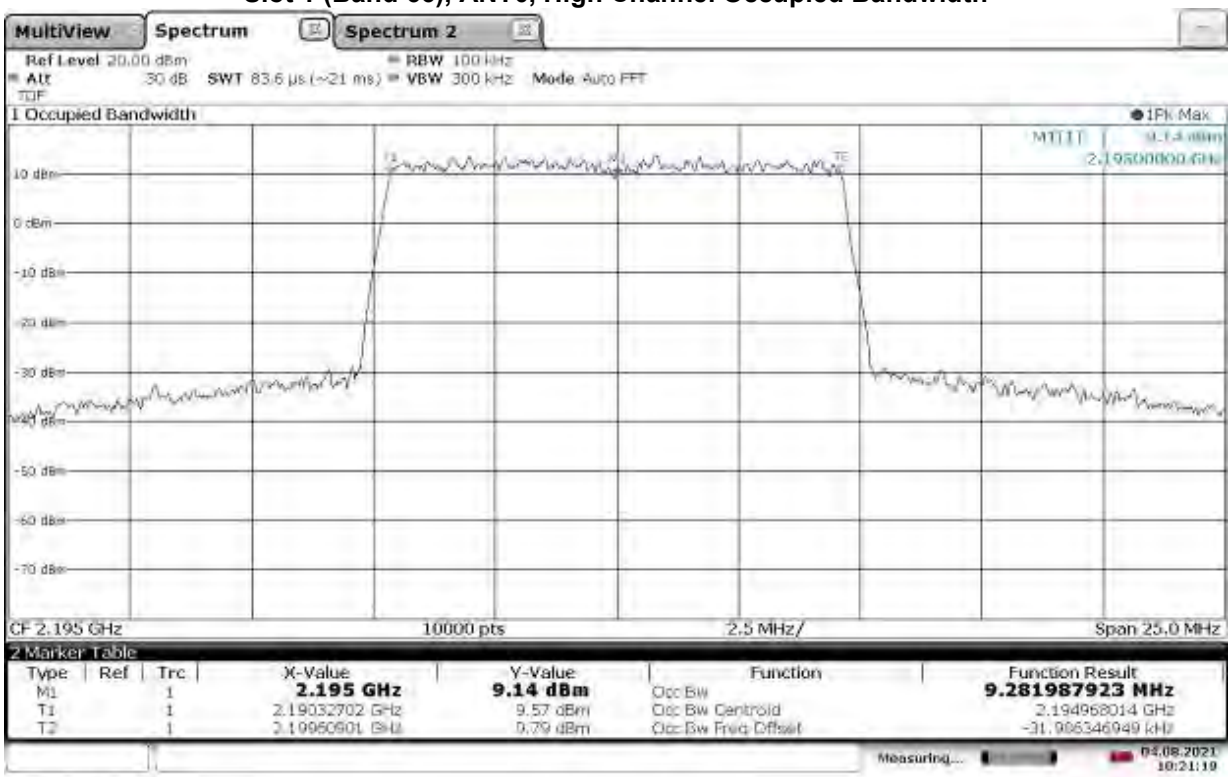
10:14:22 04.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



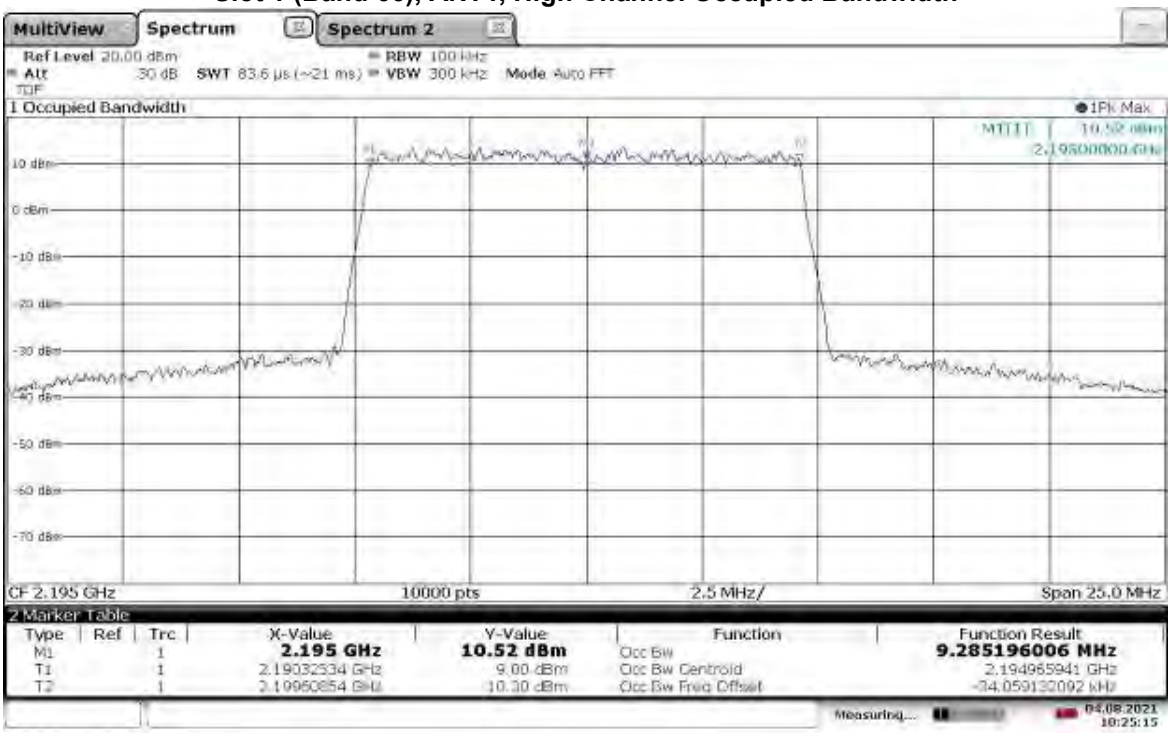
10:10:26 04.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



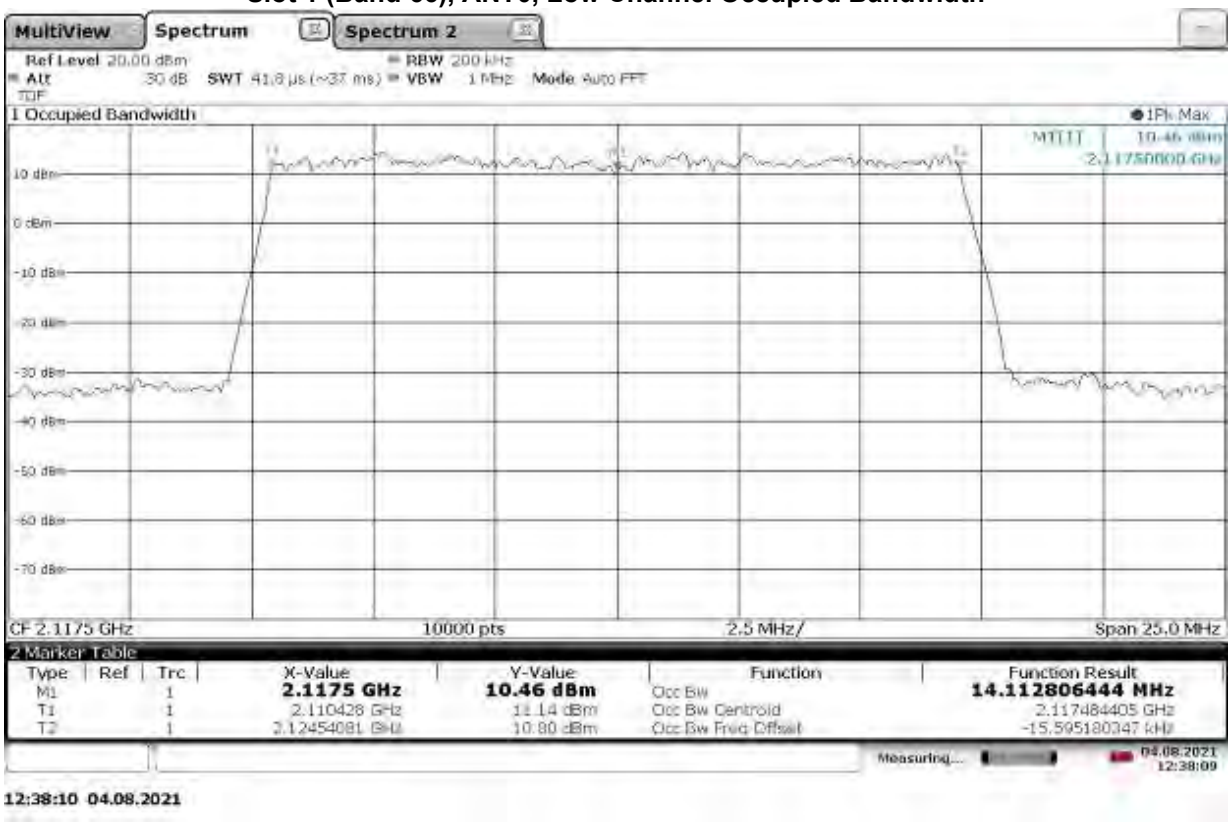
10:21:19 04.08.2021

TM3.1a-256QAM_10 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth

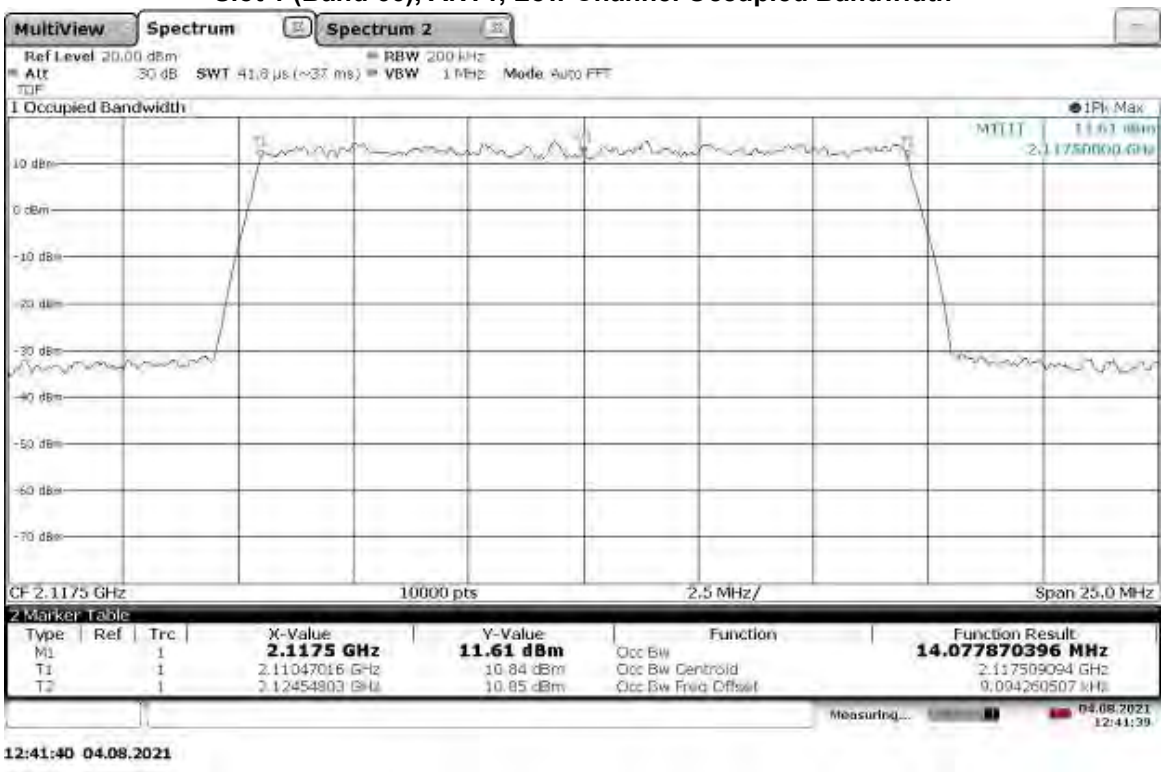


10:25:16 04.08.2021

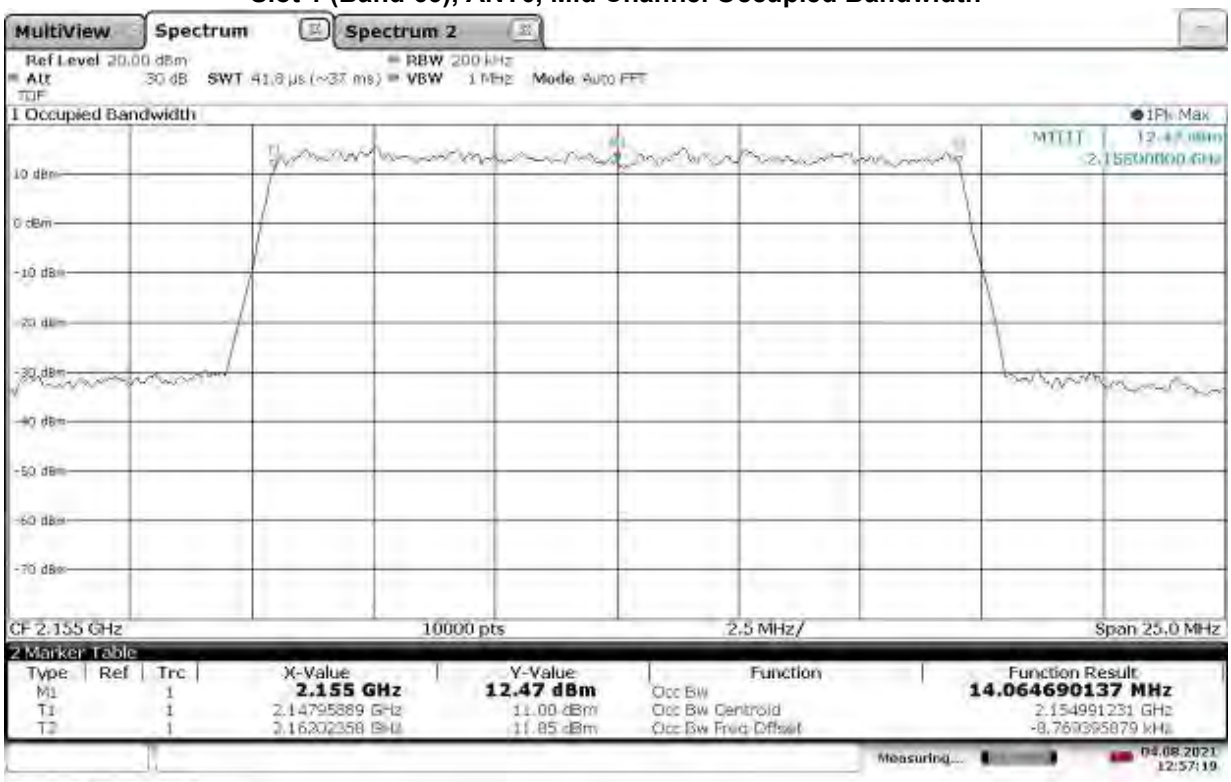
TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth

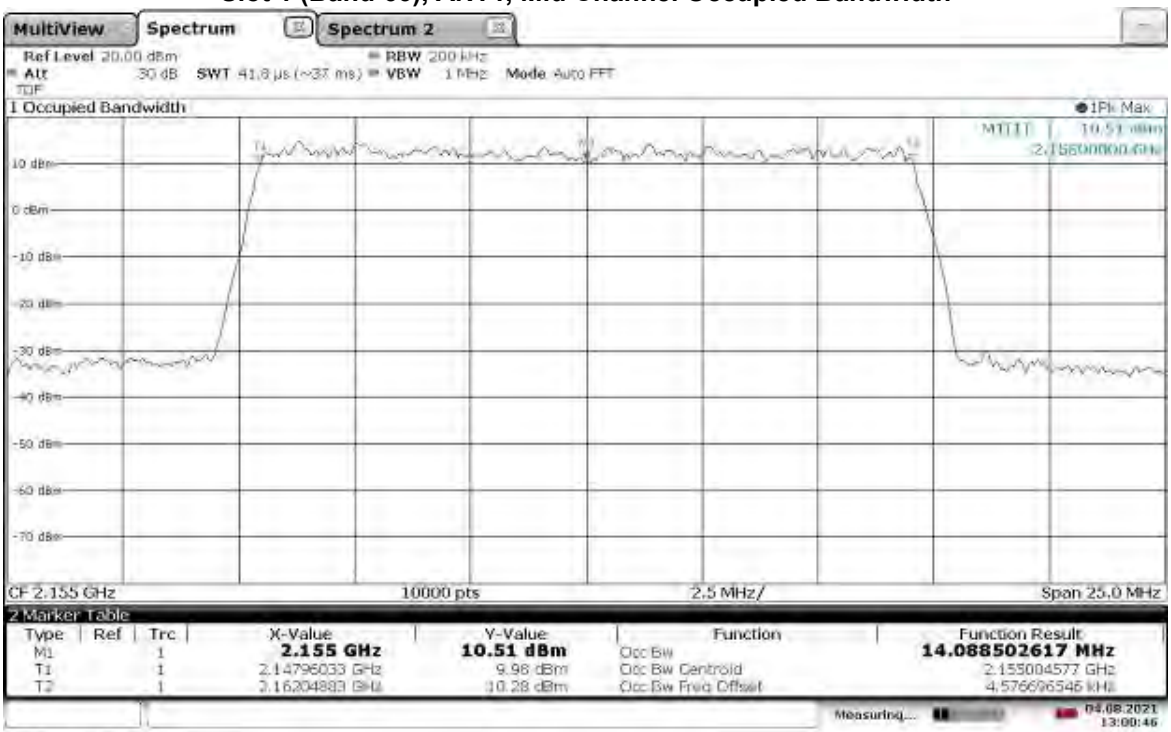


TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



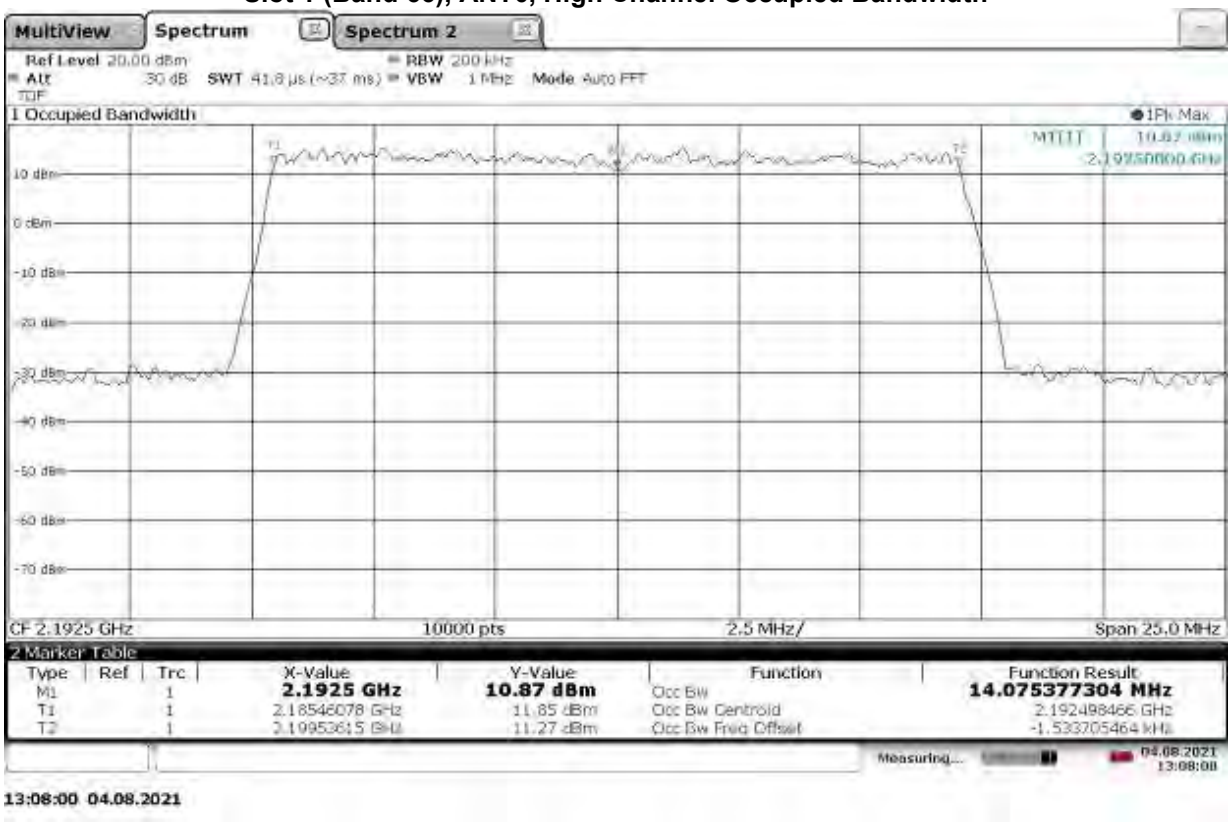
12:57:19 04.08.2021

TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



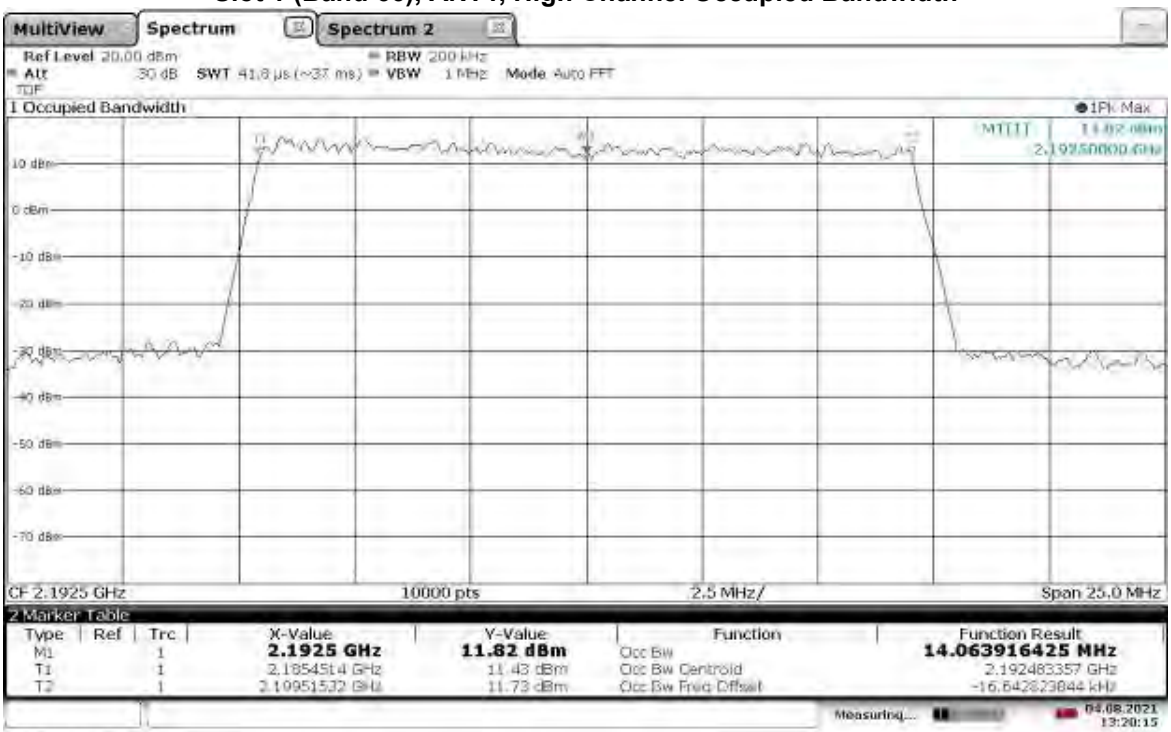
13:00:47 04.08.2021

TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



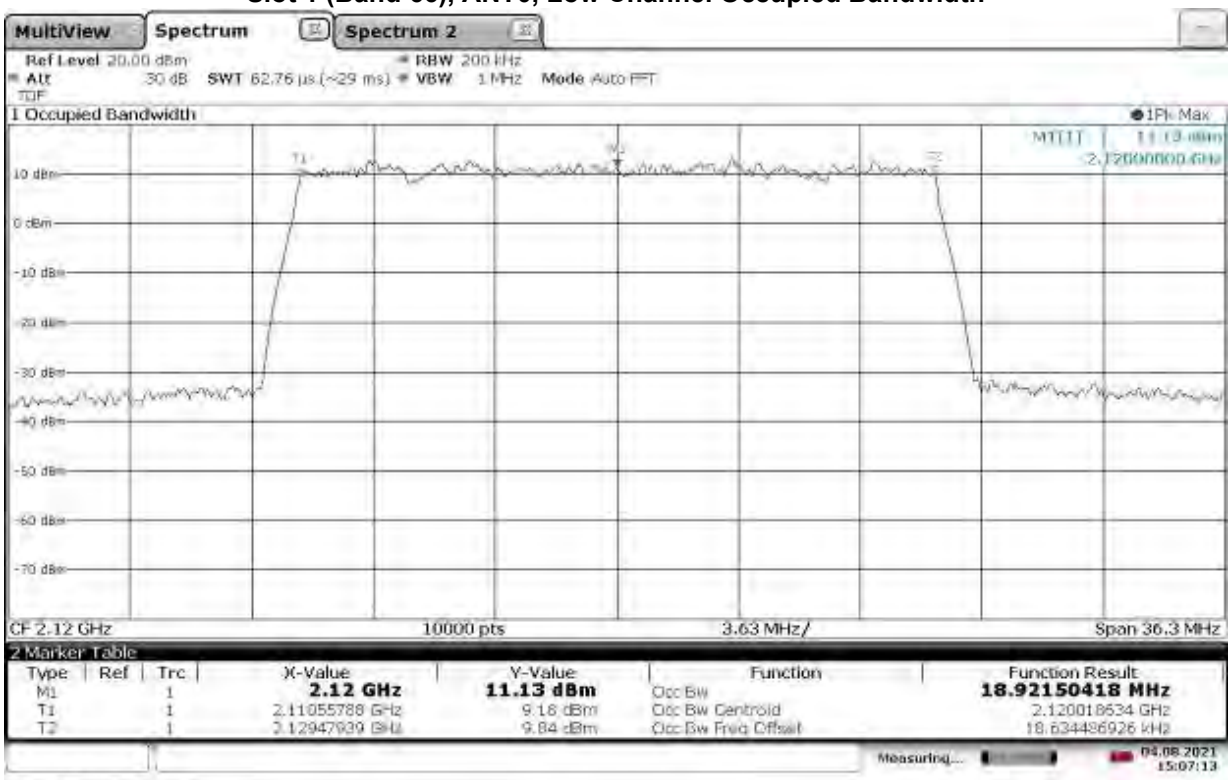
13:08:00 04.08.2021

TM3.1a-256QAM_15 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



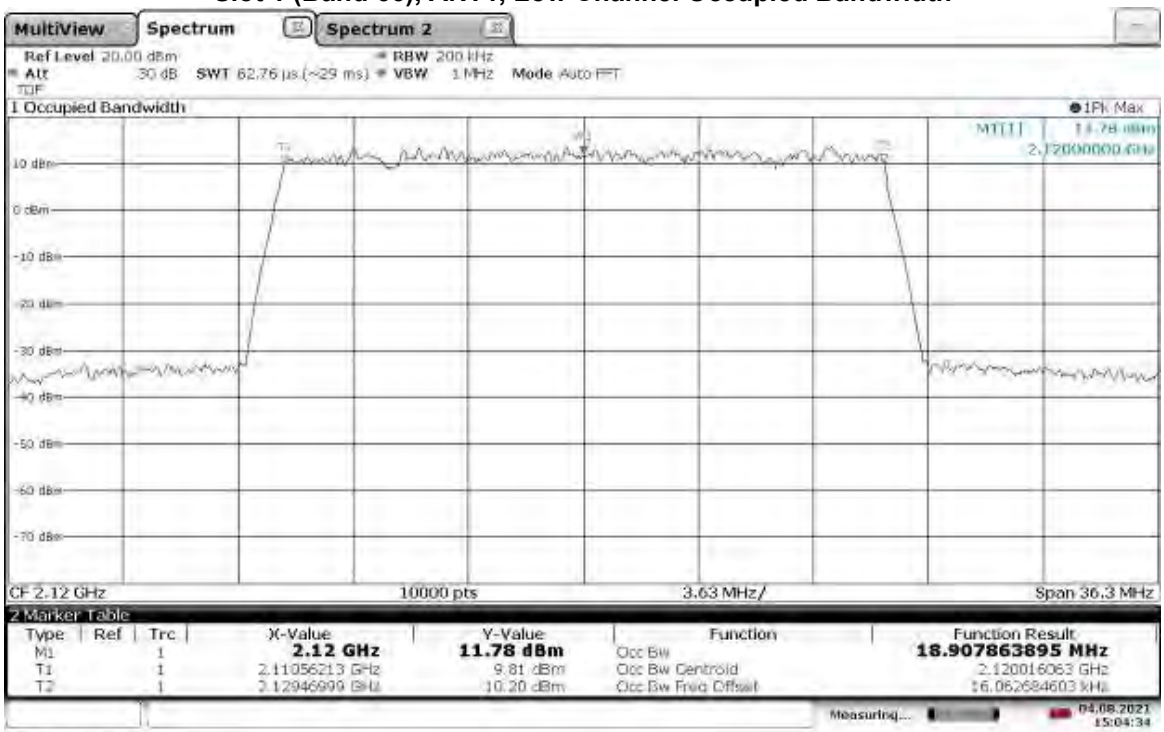
13:20:15 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Low Channel Occupied Bandwidth



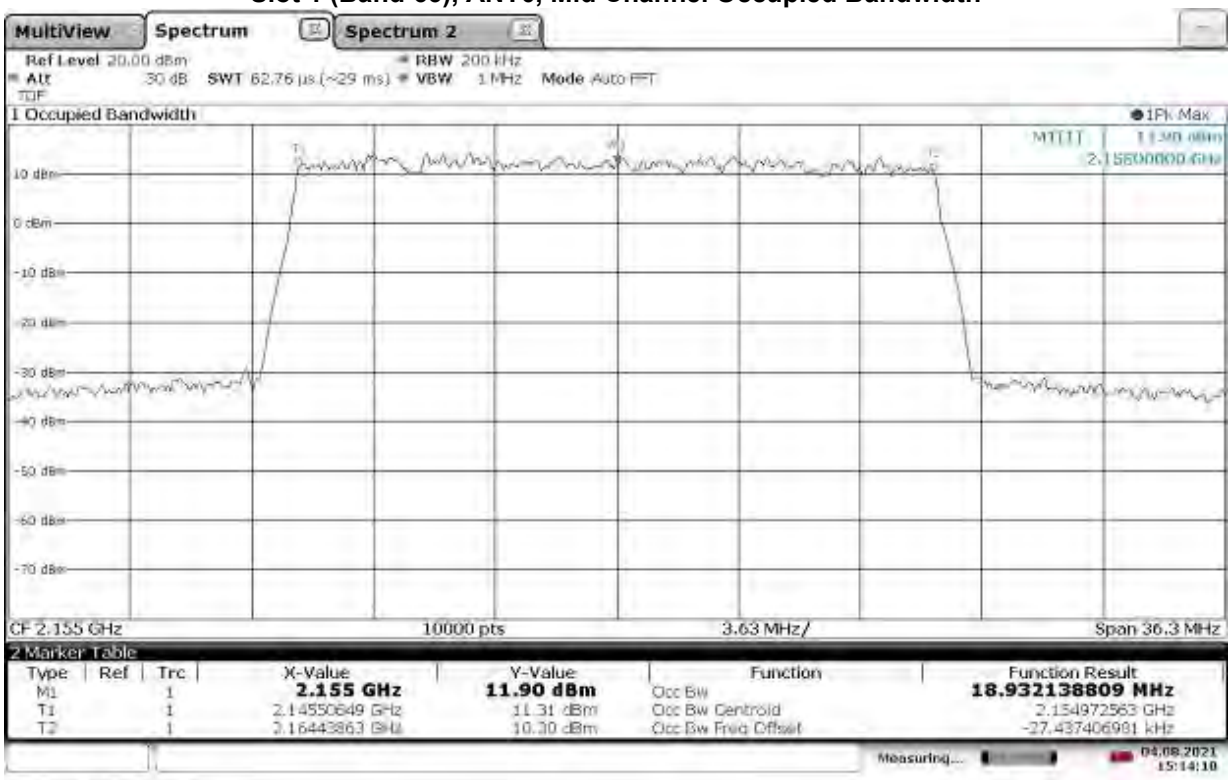
15:07:13 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Low Channel Occupied Bandwidth



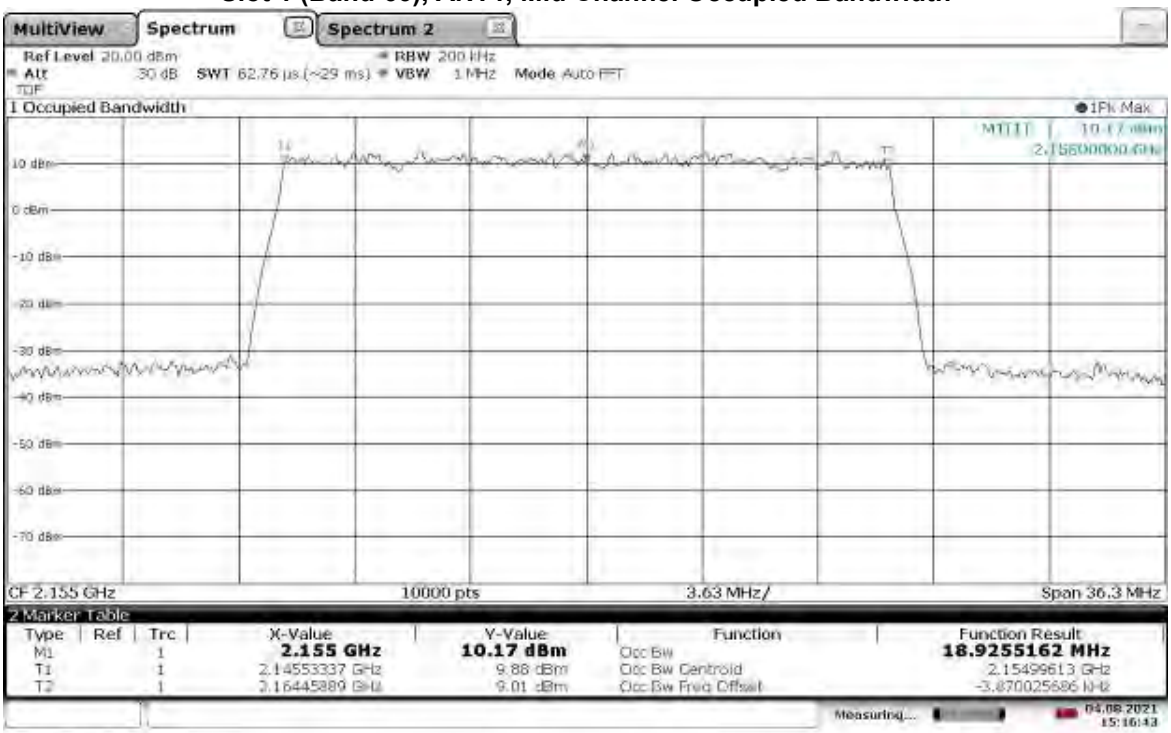
15:04:34 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, Mid Channel Occupied Bandwidth



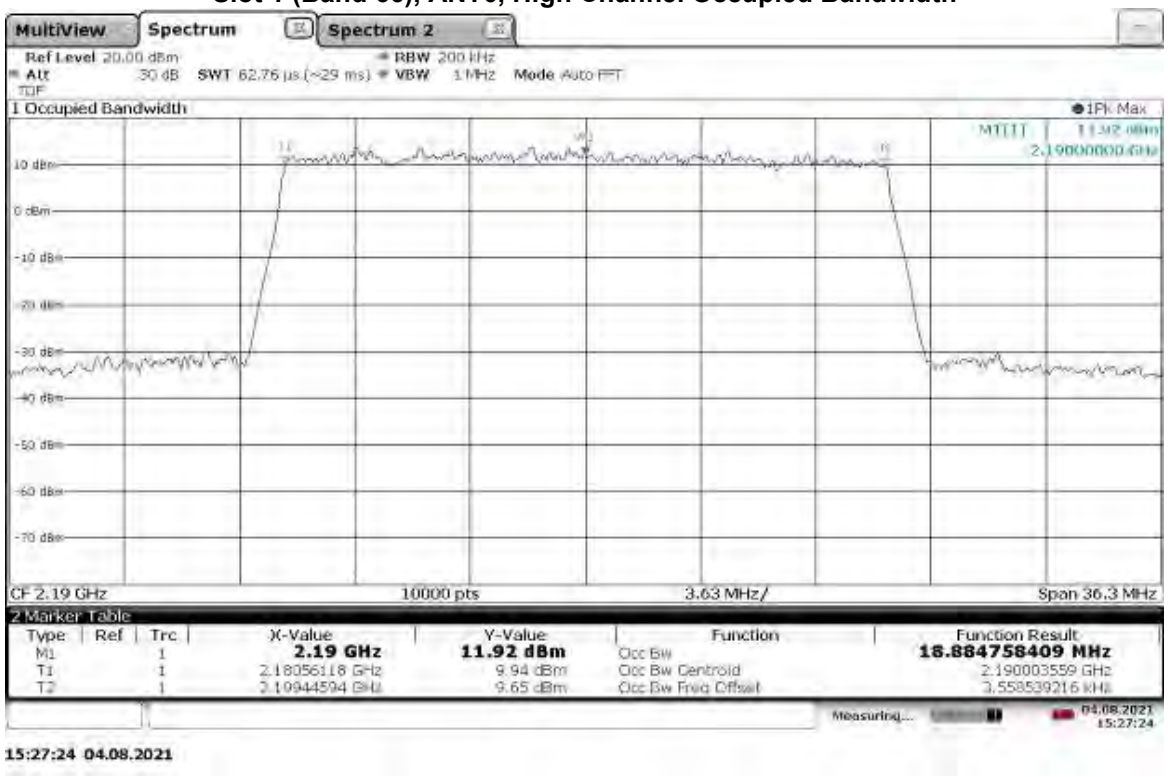
15:14:10 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, Mid Channel Occupied Bandwidth



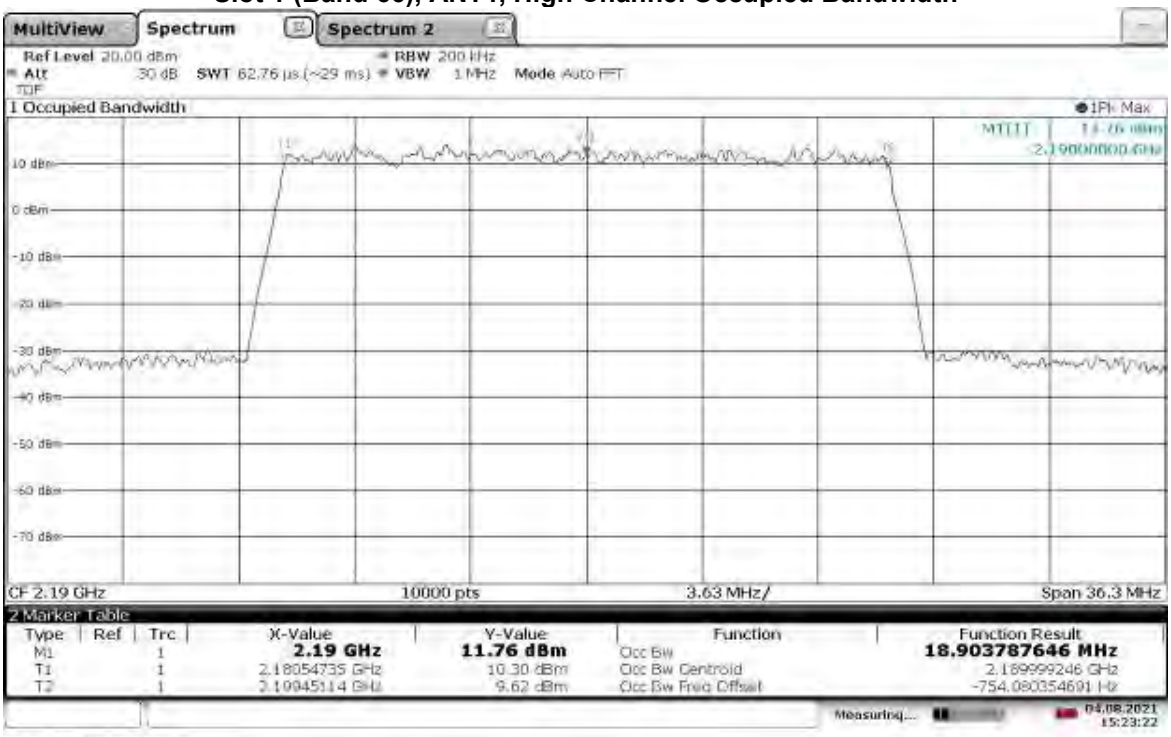
15:16:44 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT0, High Channel Occupied Bandwidth



15:27:24 04.08.2021

TM3.1a-256QAM_20 MHz Bandwidth
Slot 1 (Band 66), ANT1, High Channel Occupied Bandwidth



15:23:22 04.08.2021

Report Number: 104751739BOX-001

Issued: 09/07/2021
Revised: 02/02/2022

Test Personnel:	Kouma Sinn KPS	Test Date:	08/03/2021, 08/04/2021, 08/30/2021
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 27	Limit Applied:	See report section 7.3
Input Voltage:	48 VDC (POE)		
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Ambient Temperature:	24, 24, 22 ºC
		Relative Humidity:	48, 56, 62 %
		Atmospheric Pressure:	1010, 1012, 998 mbars

Deviations, Additions, or Exclusions: None

8 Band Edge Compliance

8.1 Method

Tests are performed in accordance with ANSI C63.26 and CFR47 FCC Parts 2.1051, 2.1053, and 27.

TEST SITE: EMC Lab & 10m ALSE

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLSHF204'	Cable, SMA - SMA, 9kHz -40GHz, (Cable Kit 5)	Huber + Suhner	Sucoflex 102EA	234714001	02/03/2021	02/03/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

8.3 Results:

The sample tested was found to Comply.

§ 27.53(h): The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM1.1-QPSK

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2112.50	ANT0	-30.05
		ANT1	-38.07
High	2197.50	ANT0	-27.18
		ANT1	-34.15

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM1.1-QPSK

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2115.00	ANT0	-30.46
		ANT1	-30.44
High	2195.00	ANT0	-28.70
		ANT1	-29.85

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM1.1-QPSK

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2117.50	ANT0	-31.18
		ANT1	-40.17
High	2192.50	ANT0	-29.43
		ANT1	-35.78

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM1.1-QPSK

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2120.00	ANT0	-40.99
		ANT1	-32.81
High	2190.00	ANT0	-30.73
		ANT1	-36.35

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.2-16QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2112.50	ANT0	-29.66
		ANT1	-38.04
High	2197.50	ANT0	-27.52
		ANT1	-34.86

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.2-16QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2115.00	ANT0	-30.33
		ANT1	-30.56
High	2195.00	ANT0	-29.89
		ANT1	-34.86

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.2-16QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2117.50	ANT0	-38.18
		ANT1	-39.13
High	2192.00	ANT0	-29.04
		ANT1	-35.33

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.2-16QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2120.00	ANT0	-31.73
		ANT1	-40.09
High	2190.00	ANT0	-31.21
		ANT1	-30.74

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.1-64QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2112.50	ANT0	-29.68
		ANT1	-29.95
High	2197.50	ANT0	-27.21
		ANT1	-33.62

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.1-64QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2115.00	ANT0	-31.15
		ANT1	-39.40
High	2195.00	ANT0	-28.98
		ANT1	-35.26

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.1-64QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2117.50	ANT0	-30.89
		ANT1	-39.76
High	2192.50	ANT0	28.92
		ANT1	-36.16

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.1-64QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2120.00	ANT0	-31.57
		ANT1	-31.58
High	2190.00	ANT0	-31.10
		ANT1	-31.71

Slot 1 (Band 66), Bandwidth: 5 MHz, Modulation: TM3.1a-256QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2112.50	ANT0	-29.82
		ANT1	-37.04
High	2197.50	ANT0	-27.27
		ANT1	-33.41

Slot 1 (Band 66), Bandwidth: 10 MHz, Modulation: TM3.1a-256QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2115.00	ANT0	-30.47
		ANT1	-38.98
High	2195.00	ANT0	-28.80
		ANT1	-34.96

Slot 1 (Band 66), Bandwidth: 15 MHz, Modulation: TM3.1a-256QAM

Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2117.50	ANT0	-32.34
		ANT1	-38.12
High	2192.50	ANT0	-29.65
		ANT1	-36.96

Slot 1 (Band 66), Bandwidth: 20 MHz, Modulation: TM3.1a-256QAM

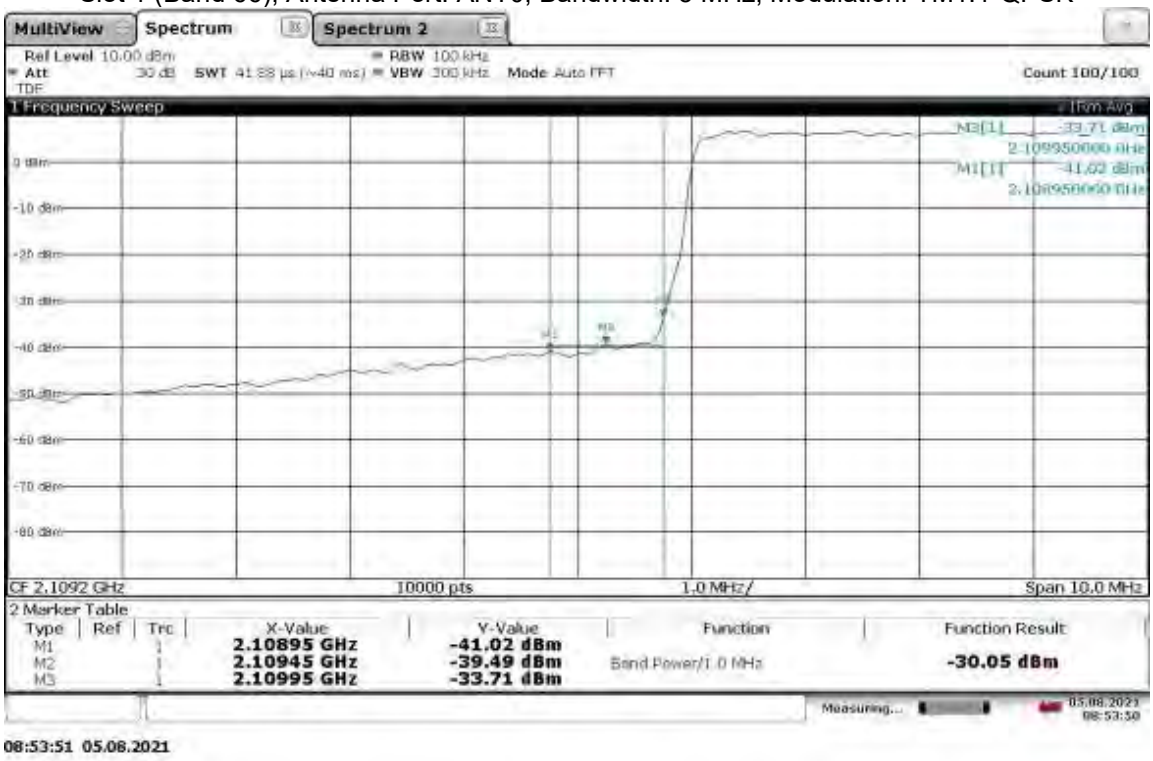
Band Edge	Frequency (MHz)	Antenna Port	Reading (dBm)
Low	2120.00	ANT0	-31.73
		ANT1	-31.75
High	2190.00	ANT0	-29.86
		ANT1	-30.92

8.4 Setup Photograph:

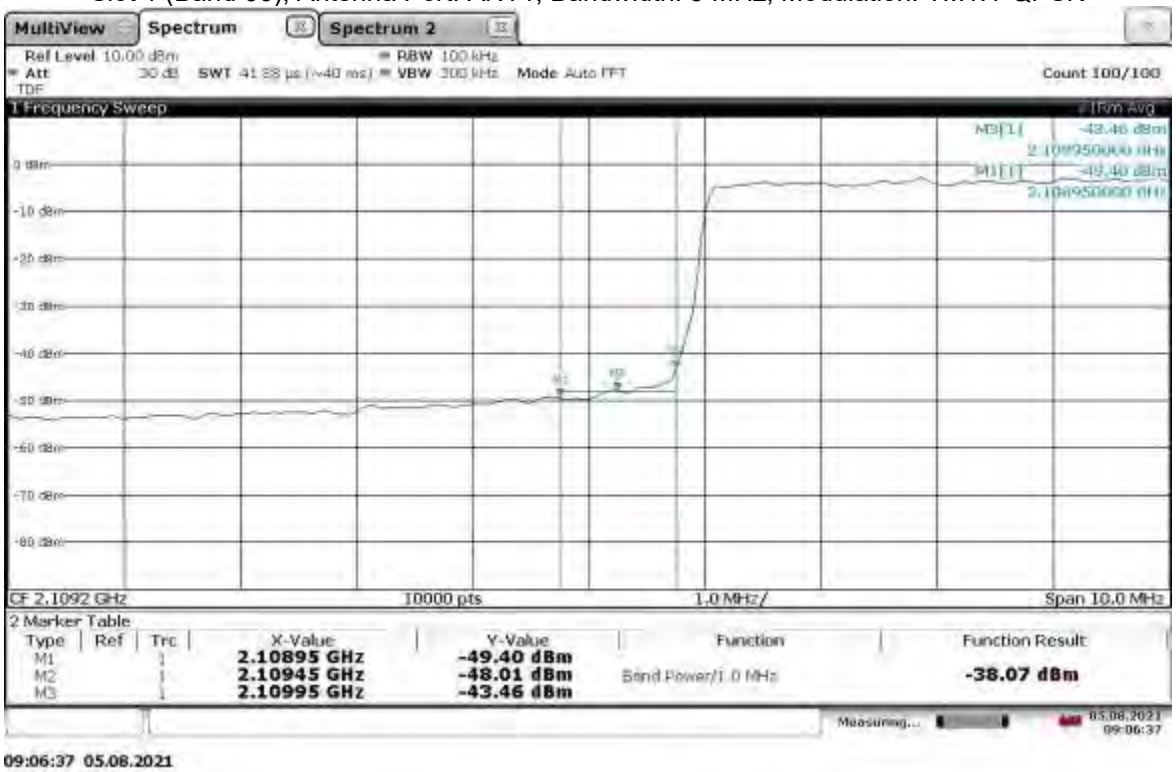
Photographs are available in a separate exhibit

8.5 Plots/Data:

Band Edge Compliant, Lower Band Edge, 2112.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 5 MHz, Modulation: TM1.1-QPSK



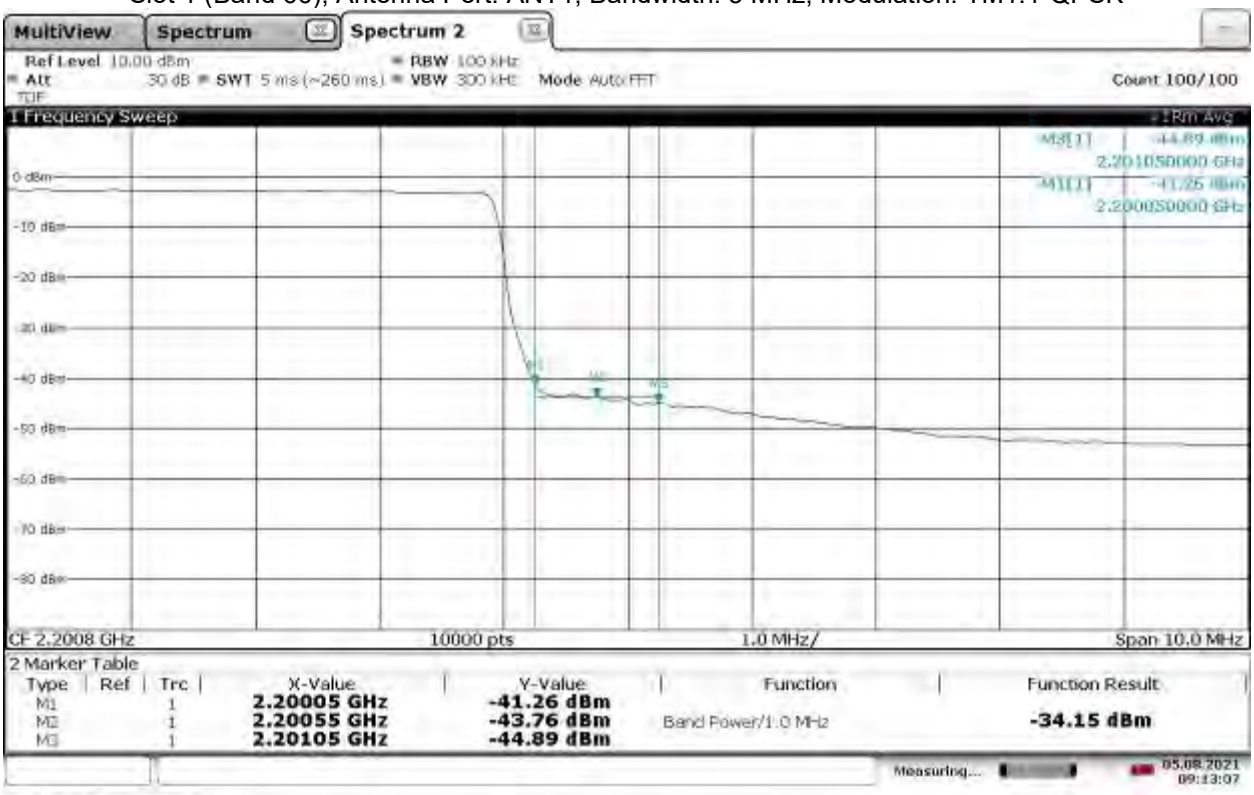
Band Edge Compliant, Lower Band Edge, 2112.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 5 MHz, Modulation: TM1.1-QPSK



Band Edge Compliant, Upper Band Edge, 2197.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 5 MHz, Modulation: TM1.1-QPSK

08:45:54 05.08.2021

Band Edge Compliant, Upper Band Edge, 2197.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 5 MHz, Modulation: TM1.1-QPSK



09:13:07 05.08.2021

Band Edge Compliant, Lower Band Edge, 2115 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 10 MHz, Modulation: TM1.1-QPSK

10:07:50 05.08.2021

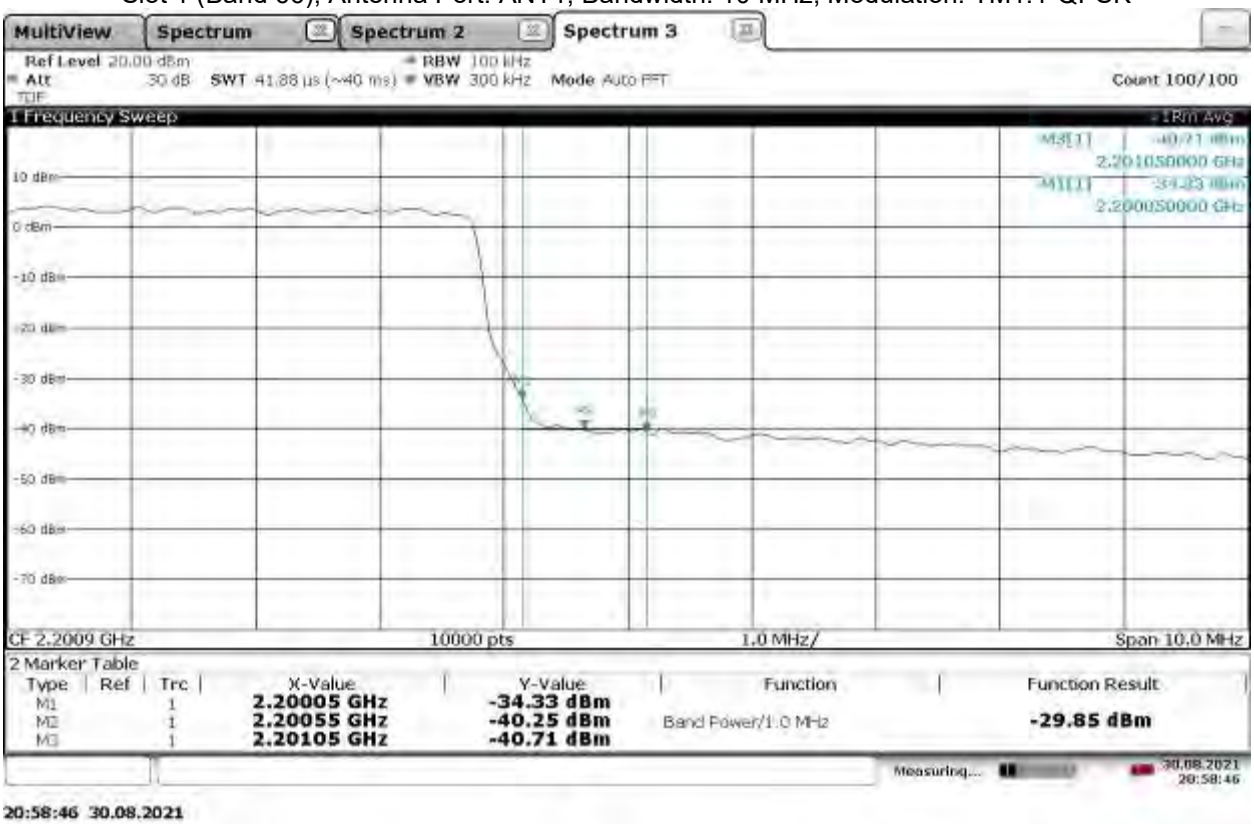
Band Edge Compliant, Lower Band Edge, 2115 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 10 MHz, Modulation: TM1.1-QPSK

10:09:00 05.08.2021

Band Edge Compliant, Upper Band Edge, 2195 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 10 MHz, Modulation: TM1.1-QPSK

10:20:21 05.08.2021

Band Edge Compliant, Upper Band Edge, 2195 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 10 MHz, Modulation: TM1.1-QPSK



20:58:46 30.08.2021

Band Edge Compliant, Lower Band Edge, 2117.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 15 MHz, Modulation: TM1.1-QPSK

11:38:00 05.08.2021

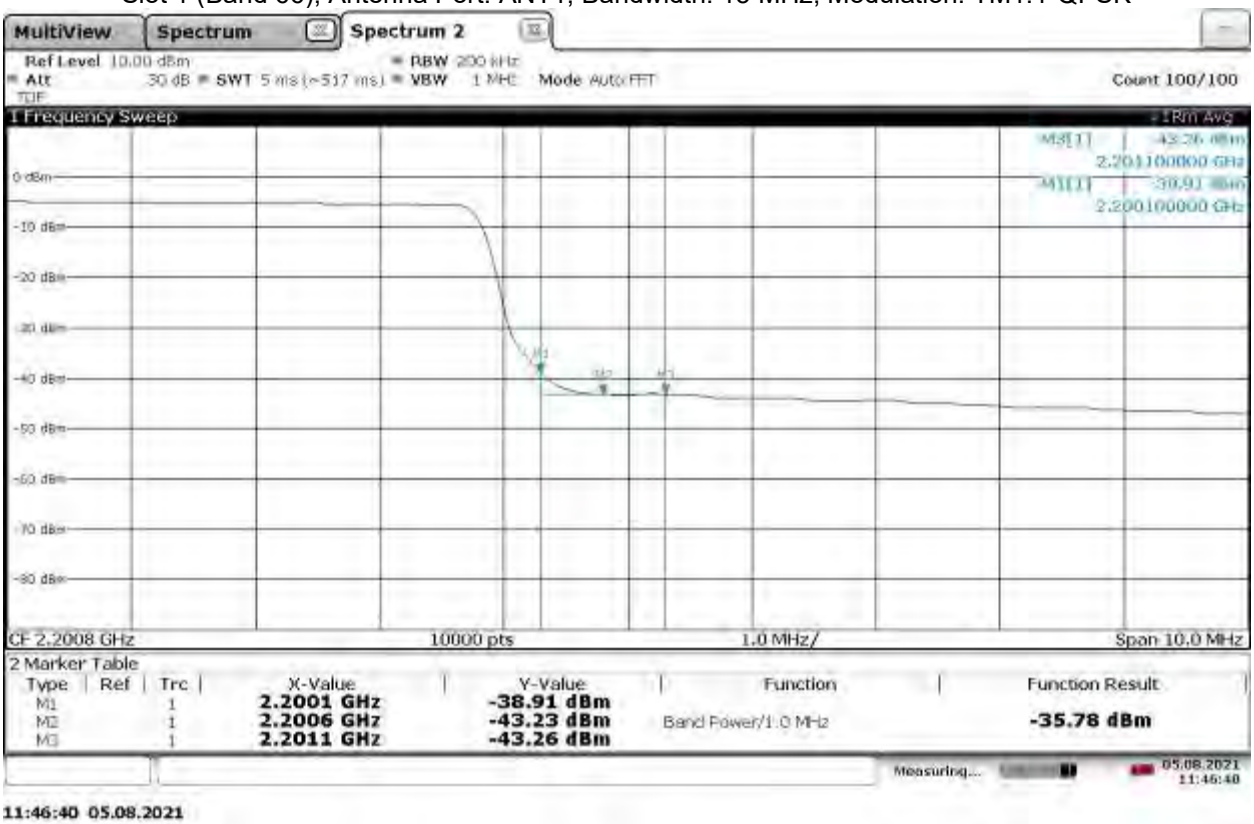
Band Edge Compliant, Lower Band Edge, 2117.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 15 MHz, Modulation: TM1.1-QPSK

11:39:46 05.08.2021

Band Edge Compliant, Upper Band Edge, 2192.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 15 MHz, Modulation: TM1.1-QPSK

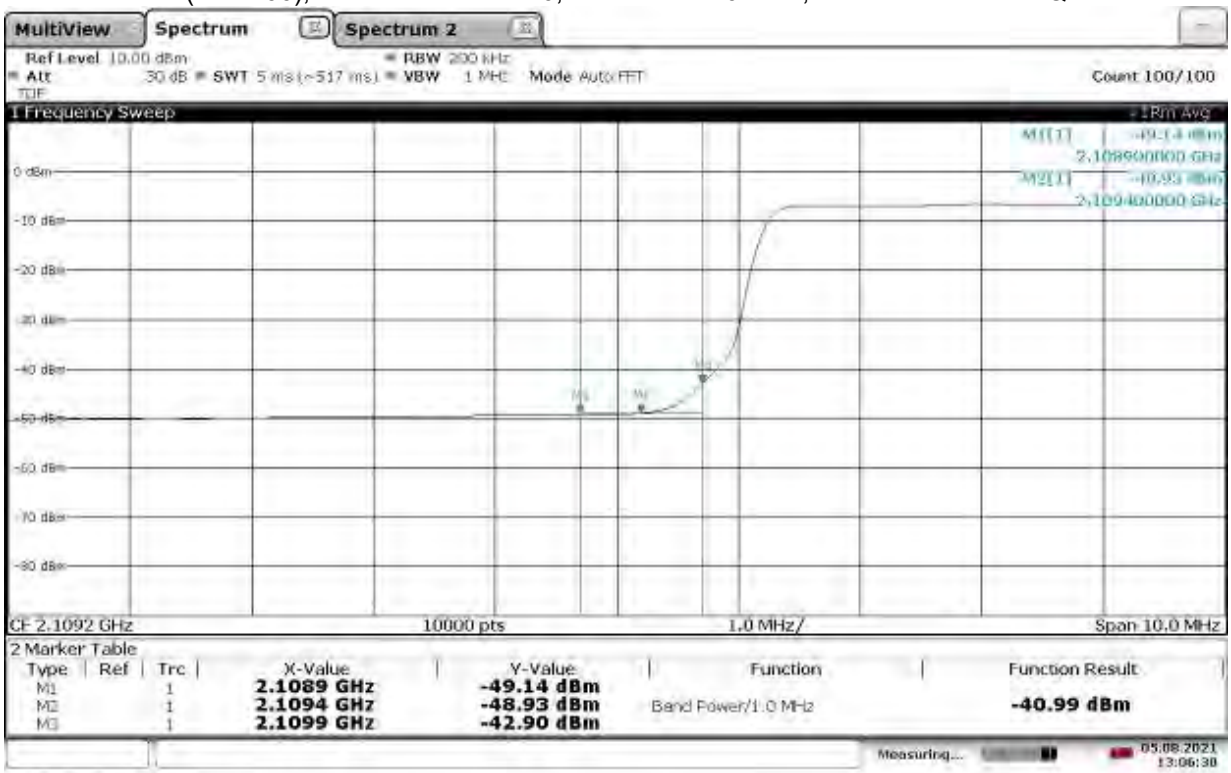
11:48:32 05.08.2021

Band Edge Compliant, Upper Band Edge, 2192.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 15 MHz, Modulation: TM1.1-QPSK



11:46:40 05.08.2021

Band Edge Compliant, Lower Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 20 MHz, Modulation: TM1.1-QPSK



Band Edge Compliant, Lower Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 20 MHz, Modulation: TM1.1-QPSK

Band Edge Compliant, Upper Band Edge, 2190 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 20 MHz, Modulation: TM1.1-QPSK

13:14:32 05.08.2021

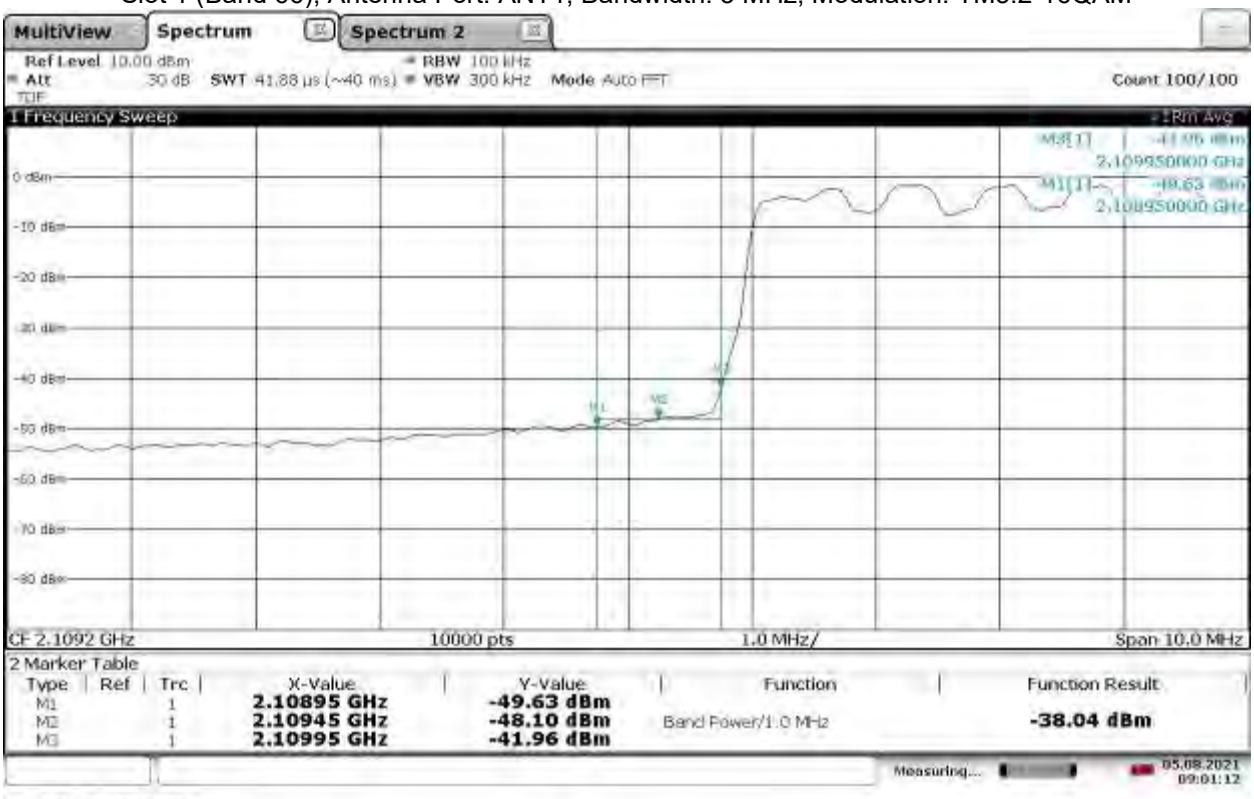
Band Edge Compliant, Upper Band Edge, 2190MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 20 MHz, Modulation: TM1.1-QPSK

13:16:07 05.08.2021

Band Edge Compliant, Lower Band Edge, 2112.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 5 MHz, Modulation: TM3.2-16QAM

08:59:42 05.08.2021

Band Edge Compliant, Lower Band Edge, 2112.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 5 MHz, Modulation: TM3.2-16QAM

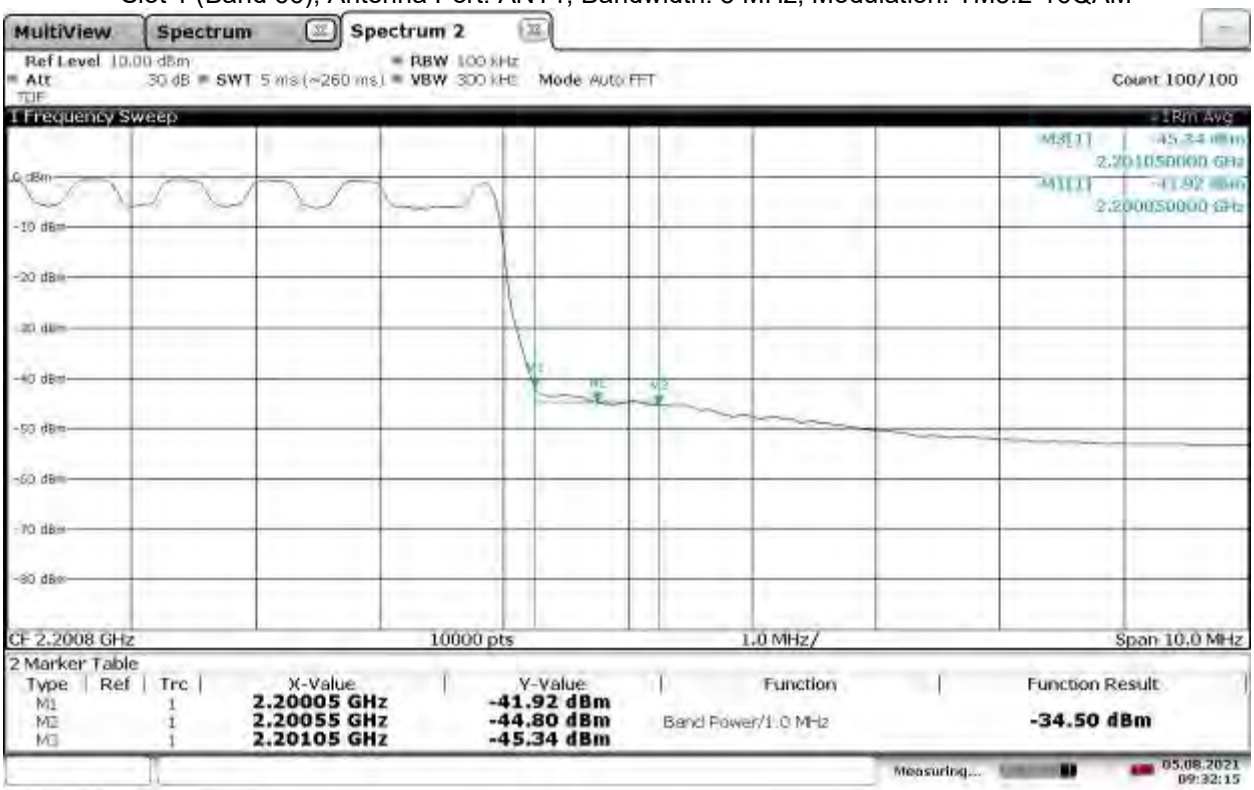


09:01:12 05.08.2021

Band Edge Compliant, Upper Band Edge, 2197.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 5 MHz, Modulation: TM3.2-16QAM

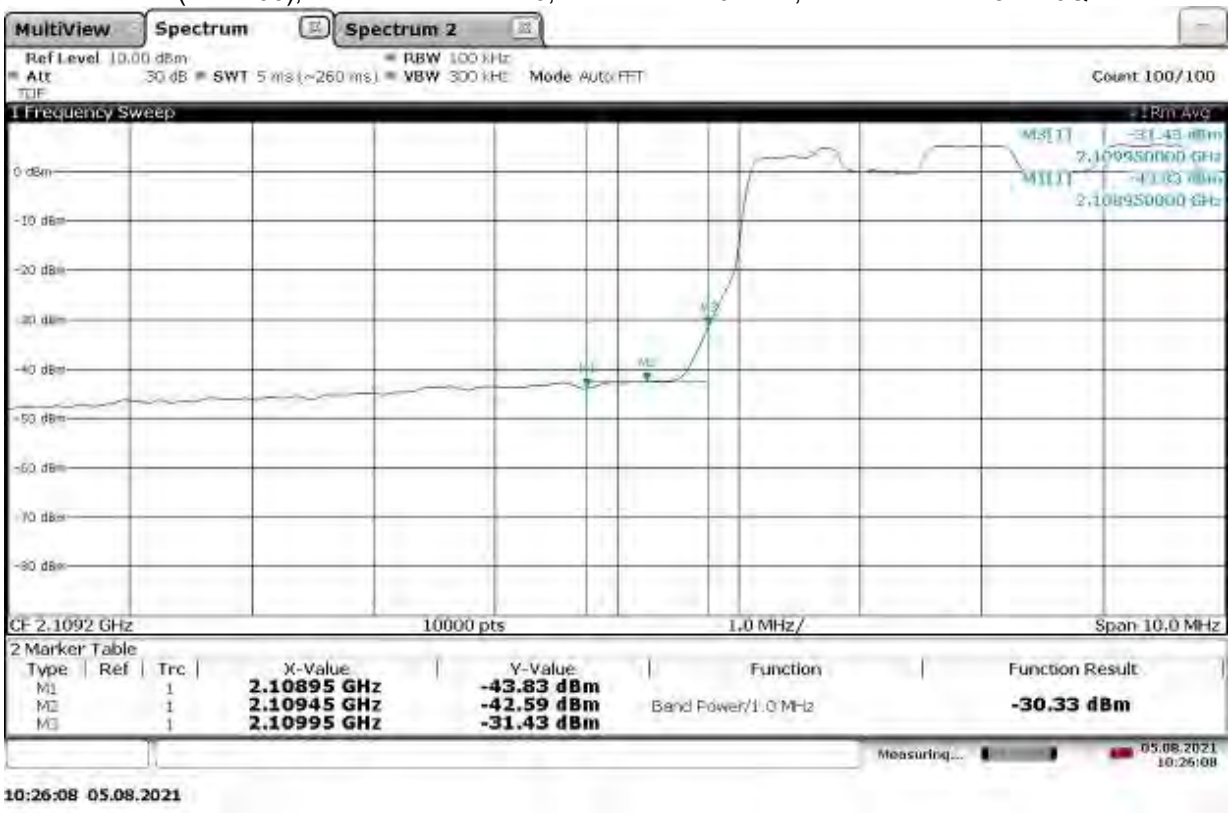
09:33:49 05.08.2021

Band Edge Compliant, Upper Band Edge, 2197.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 5 MHz, Modulation: TM3.2-16QAM

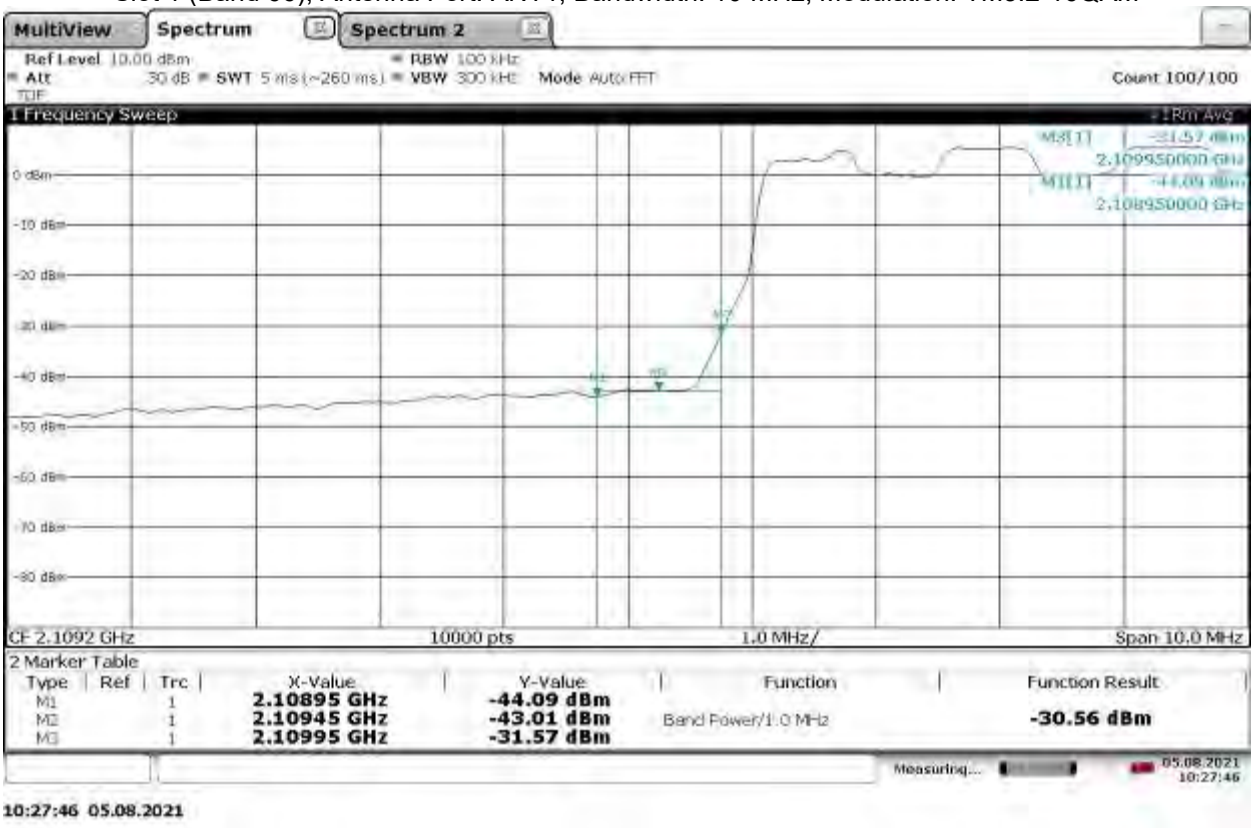


09:32:16 05.08.2021

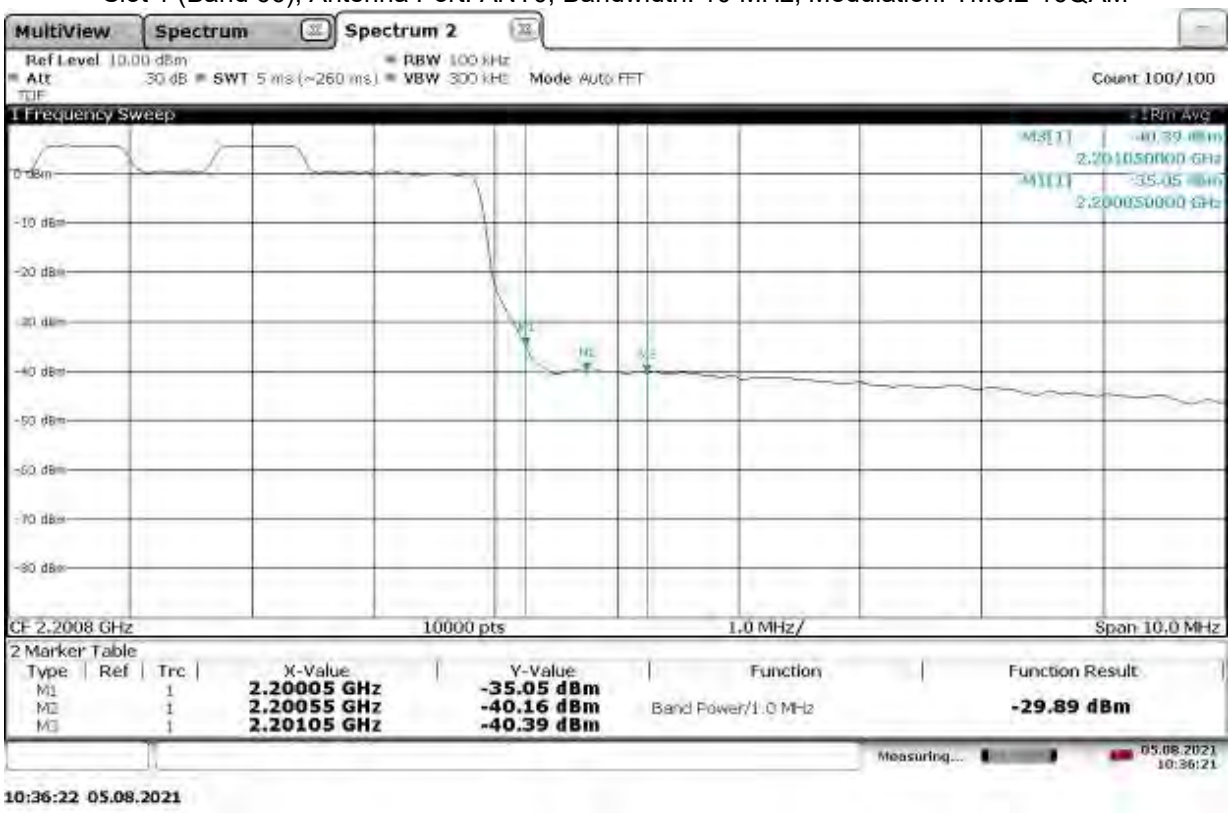
Band Edge Compliant, Lower Band Edge, 2115 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 10 MHz, Modulation: TM3.2-16QAM



Band Edge Compliant, Lower Band Edge, 2115 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 10 MHz, Modulation: TM3.2-16QAM

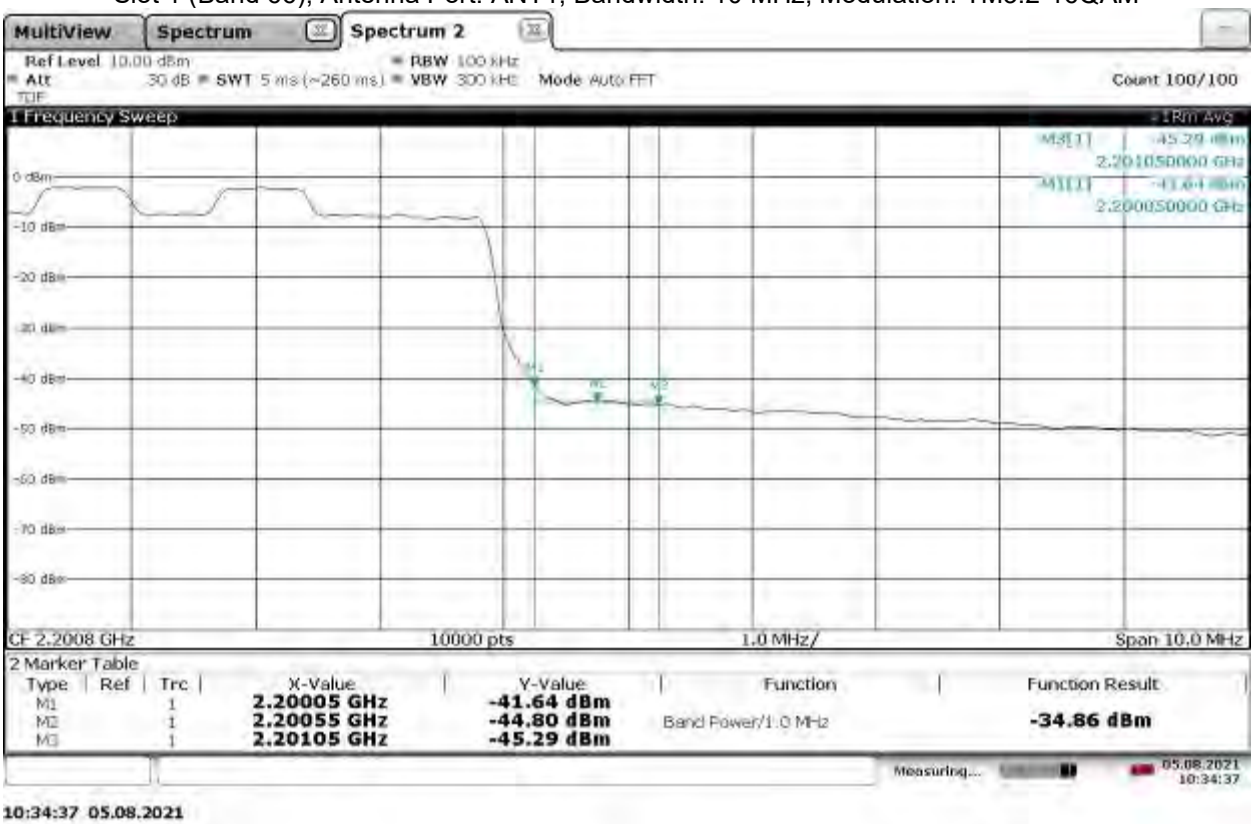


Band Edge Compliant, Upper Band Edge, 2195 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 10 MHz, Modulation: TM3.2-16QAM



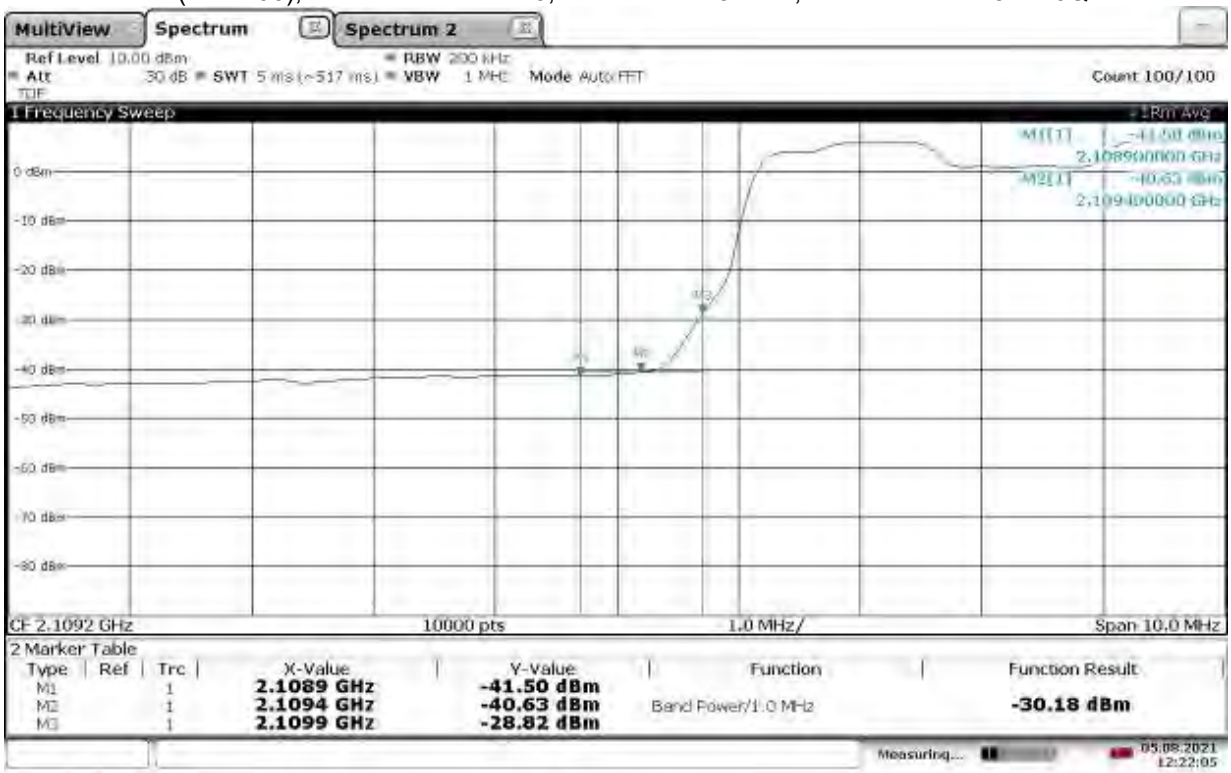
10:36:22 05.08.2021

Band Edge Compliant, Upper Band Edge, 2195 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 10 MHz, Modulation: TM3.2-16QAM



10:34:37 05.08.2021

Band Edge Compliant, Lower Band Edge, 2117.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 15 MHz, Modulation: TM3.2-16QAM



12:22:06 05.08.2021

Band Edge Compliant, Lower Band Edge, 2117.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 15 MHz, Modulation: TM3.2-16QAM

12:24:10 05.08.2021

Band Edge Compliant, Upper Band Edge, 2192.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 15 MHz, Modulation: TM3.2-16QAM

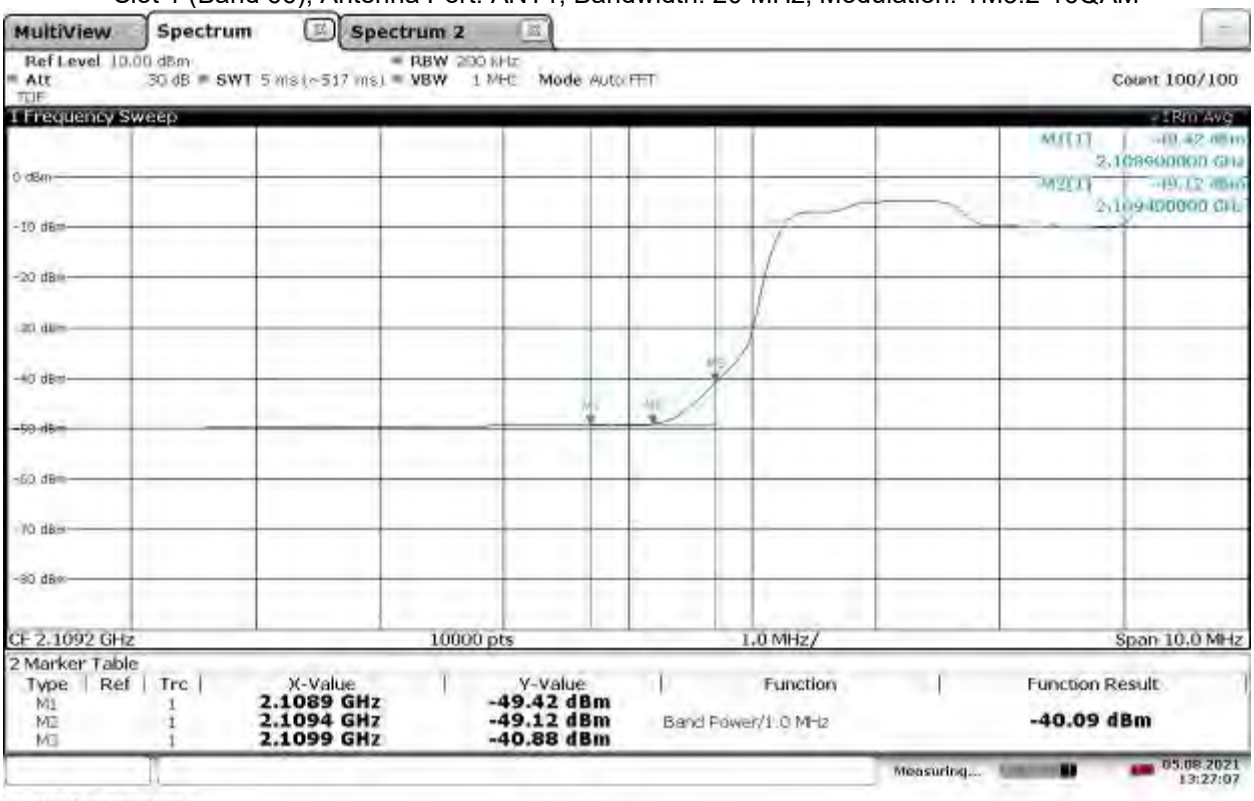
12:32:27 05.08.2021

Band Edge Compliant, Upper Band Edge, 2192.5MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 15 MHz, Modulation: TM3.2-16QAM

12:30:26 05.08.2021

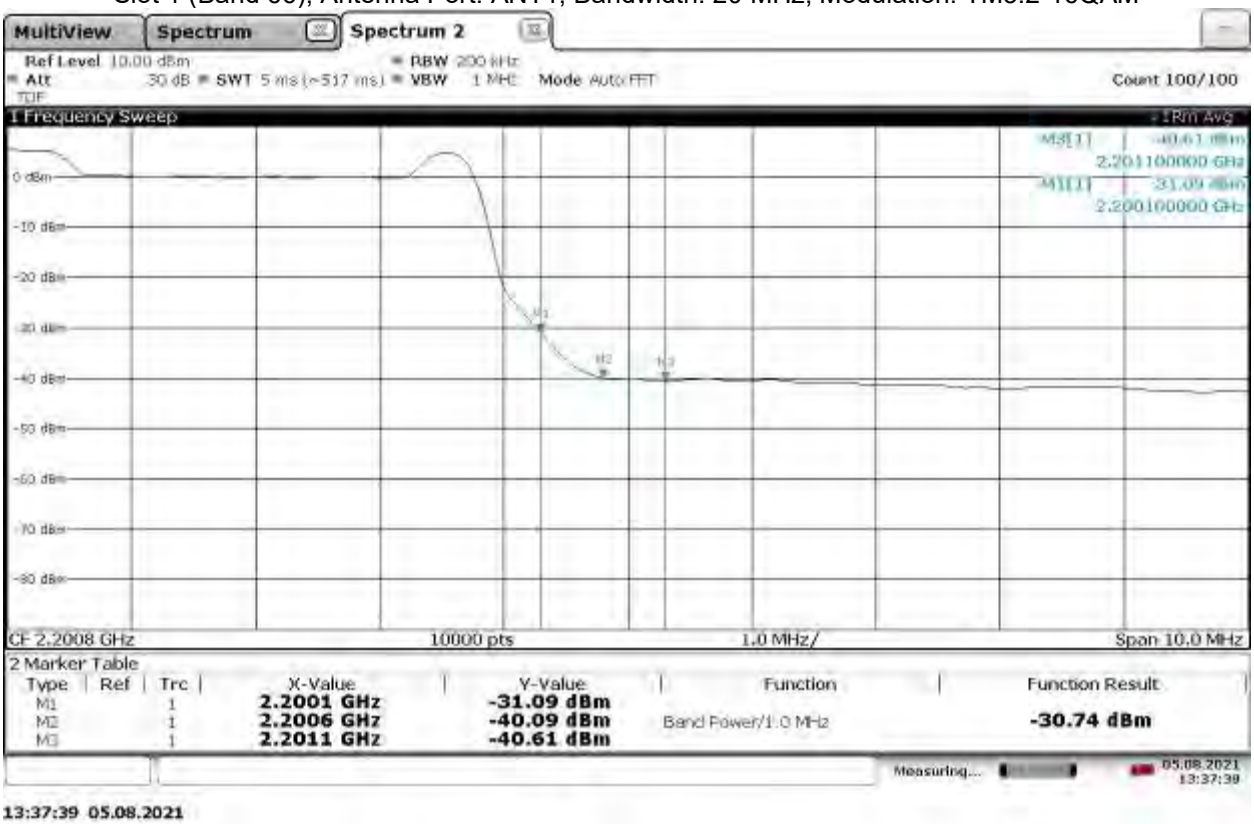
Band Edge Compliant, Lower Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 20 MHz, Modulation: TM3.2-16QAM

Band Edge Compliant, Lower Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 20 MHz, Modulation: TM3.2-16QAM

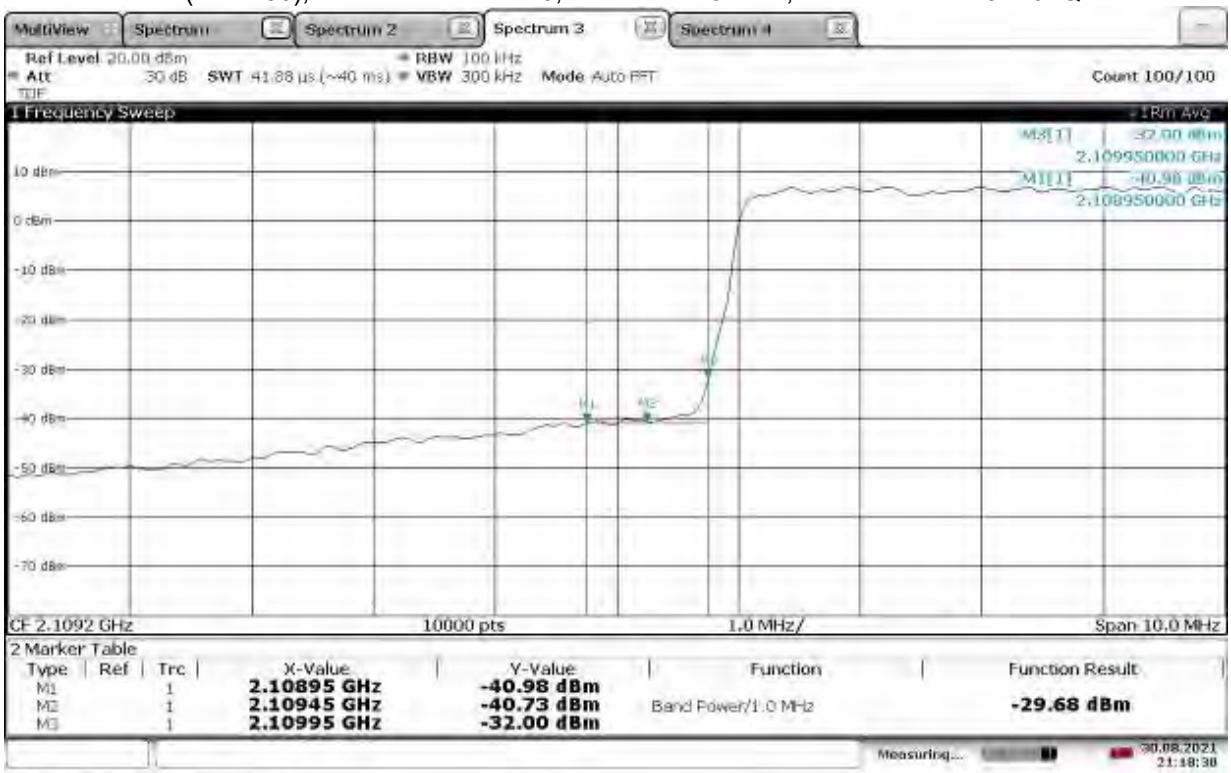


Band Edge Compliant, Upper Band Edge, 2190 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 20 MHz, Modulation: TM3.2-16QAM

Band Edge Compliant, Upper Band Edge, 2190 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 20 MHz, Modulation: TM3.2-16QAM

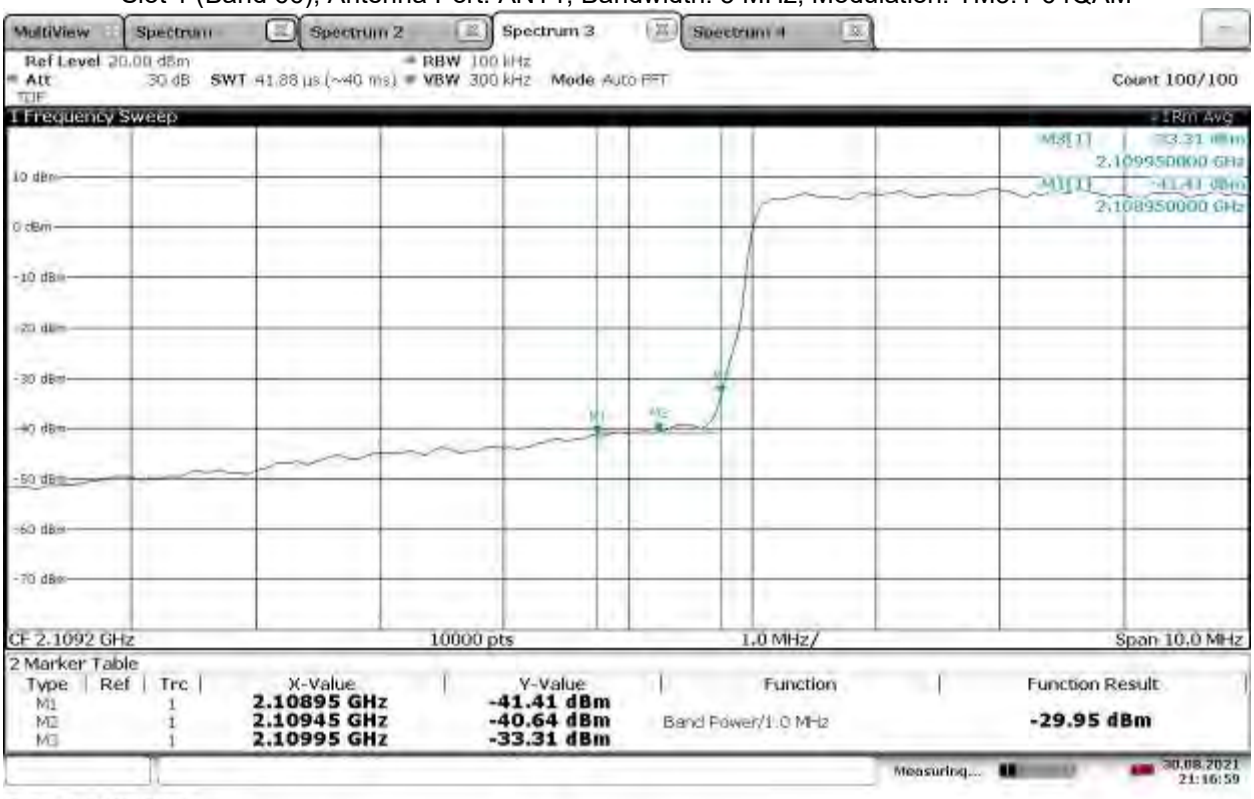


Band Edge Compliant, Lower Band Edge, 2112.50 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 5 MHz, Modulation: TM3.1-64QAM



21:18:31 30.08.2021

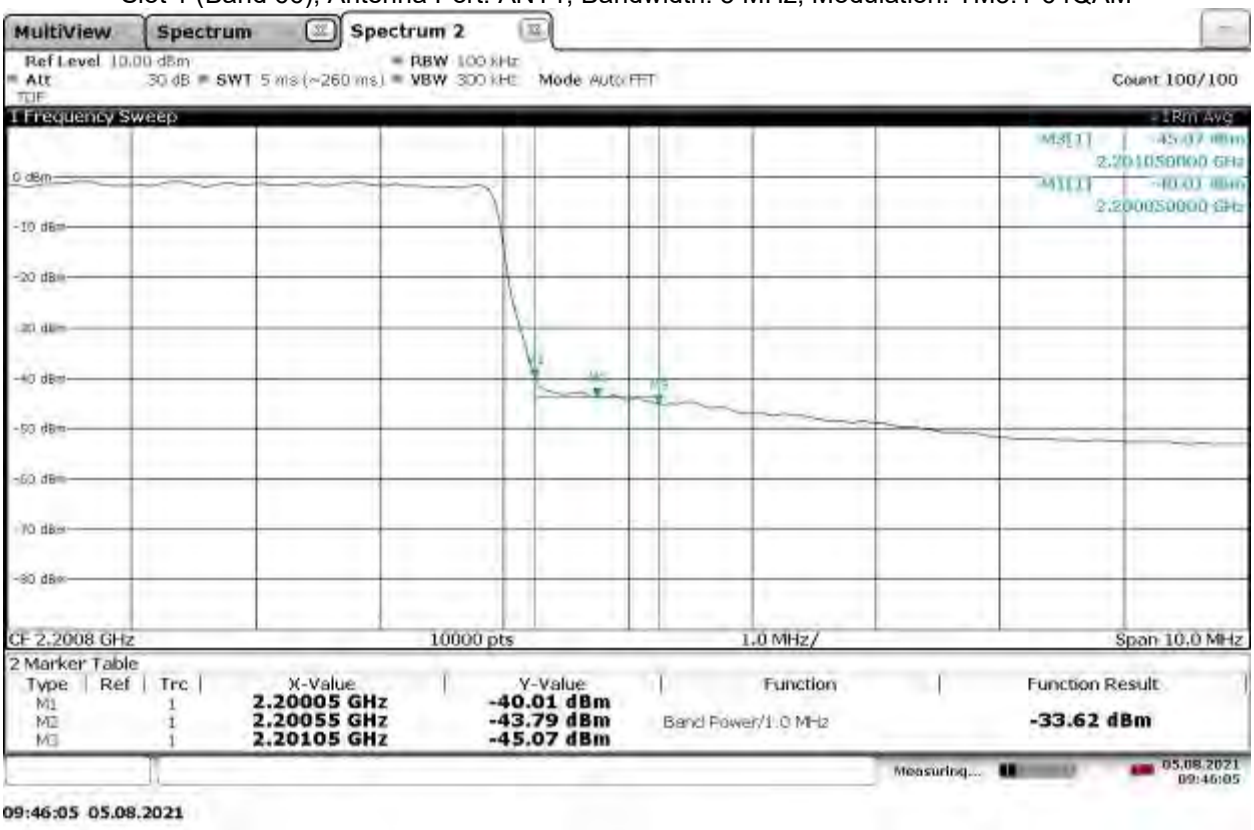
Band Edge Compliant, Lower Band Edge, 2112.50 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 5 MHz, Modulation: TM3.1-64QAM



21:17:01 30.08.2021

Band Edge Compliant, Upper Band Edge, 2197.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 5 MHz, Modulation: TM3.1-64QAM

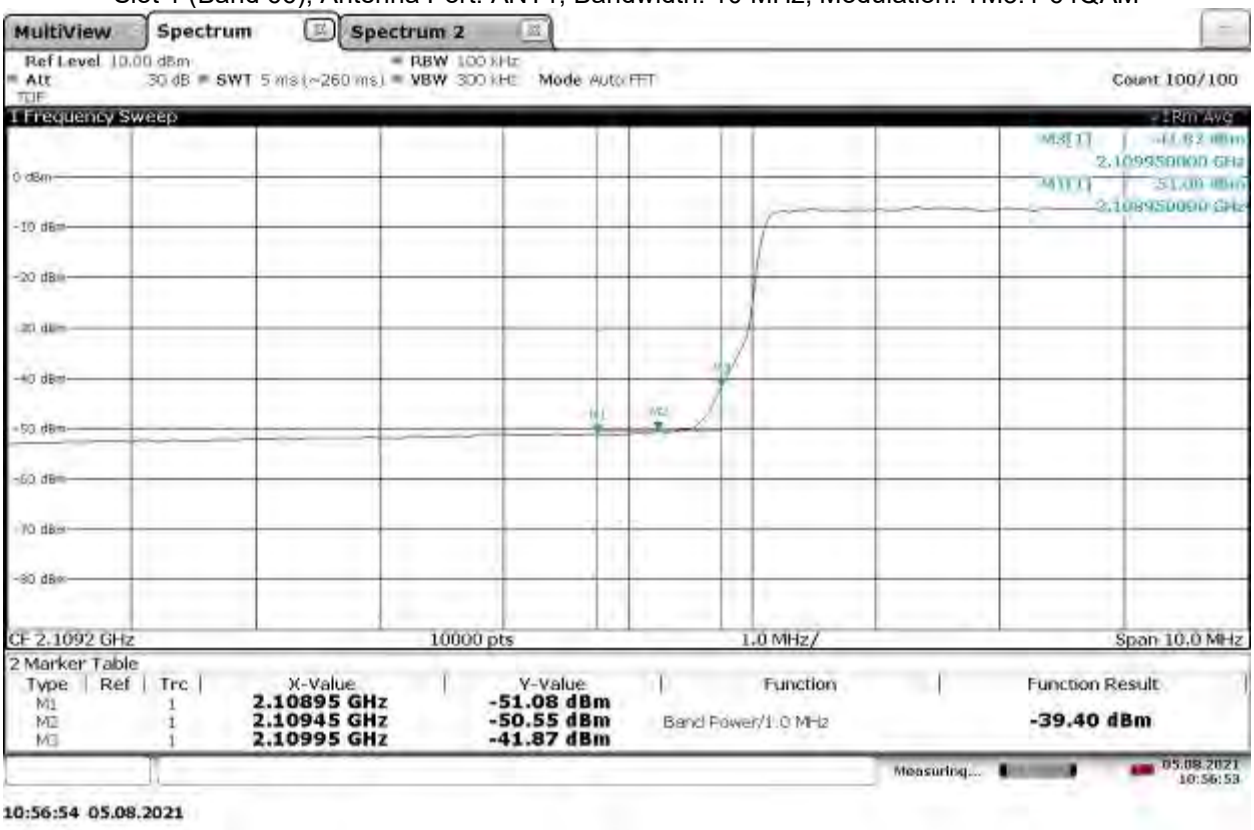
Band Edge Compliant, Upper Band Edge, 2197.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 5 MHz, Modulation: TM3.1-64QAM



Band Edge Compliant, Lower Band Edge, 2115 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 10 MHz, Modulation: TM3.1-64QAM

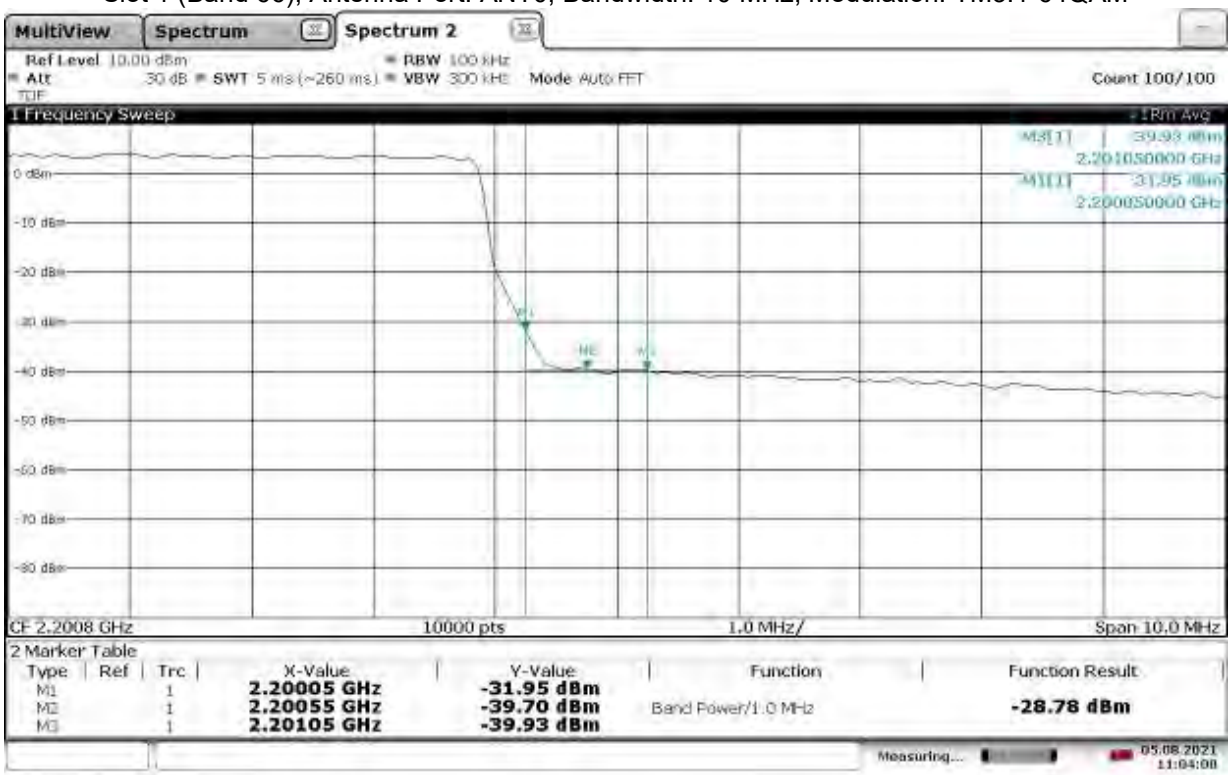
10:55:27 05.08.2021

Band Edge Compliant, Lower Band Edge, 2115 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 10 MHz, Modulation: TM3.1-64QAM

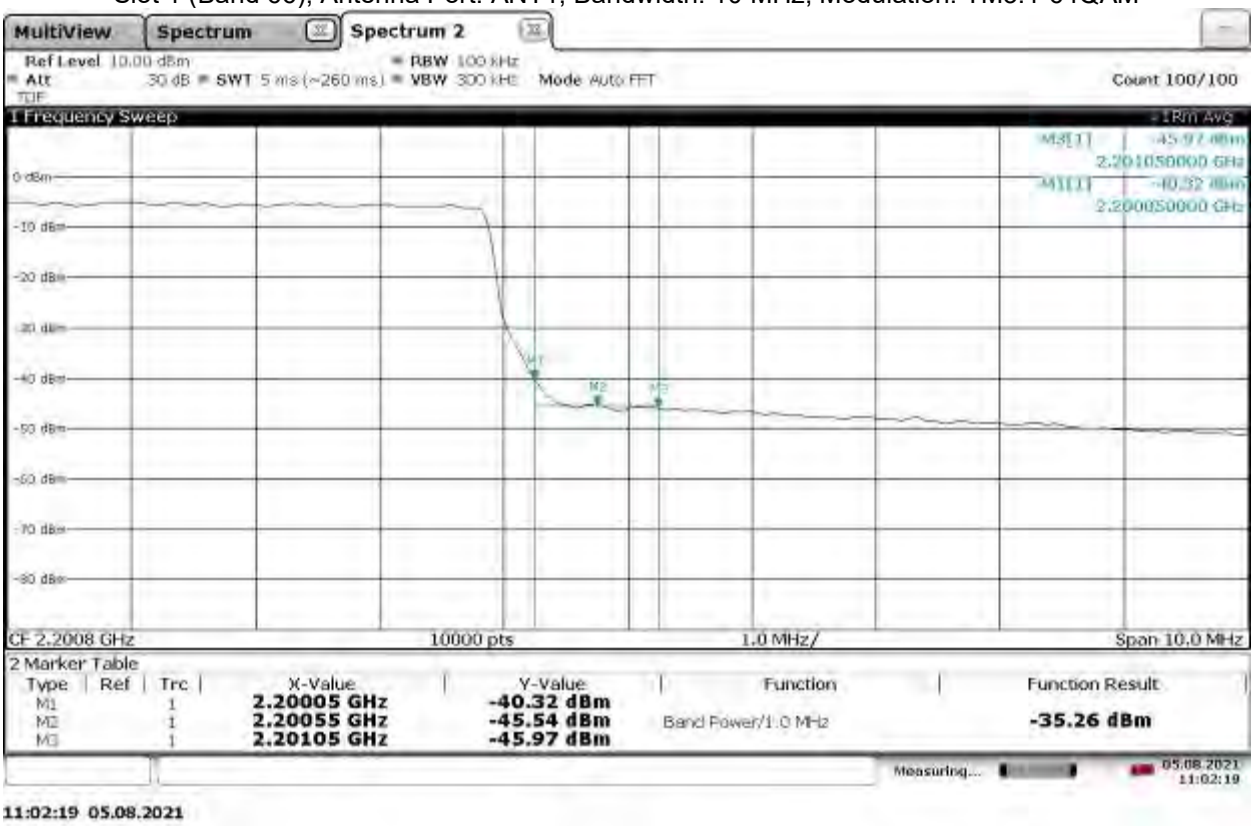


10:56:54 05.08.2021

Band Edge Compliant, Upper Band Edge, 2195 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 10 MHz, Modulation: TM3.1-64QAM



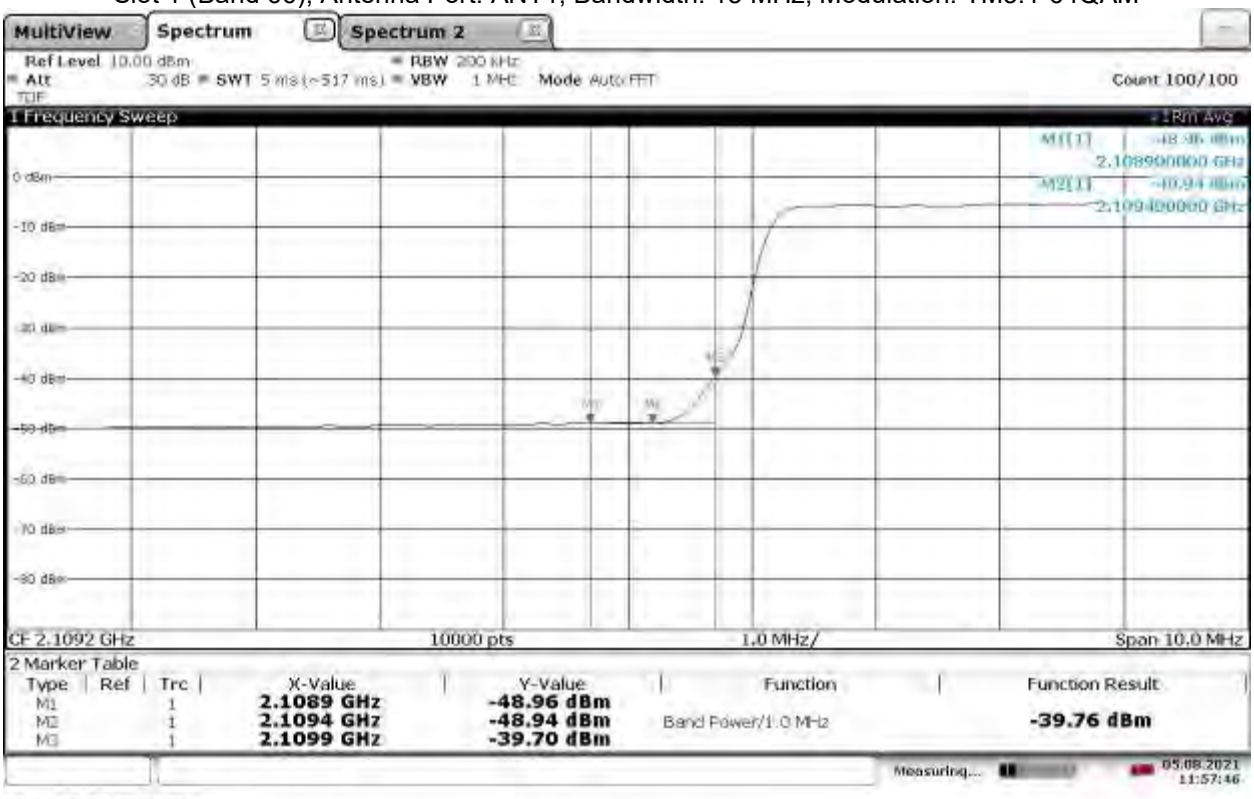
Band Edge Compliant, Upper Band Edge, 2195 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 10 MHz, Modulation: TM3.1-64QAM



Band Edge Compliant, Lower Band Edge, 2117.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 15 MHz, Modulation: TM3.1-64QAM

11:55:30 05.08.2021

Band Edge Compliant, Lower Band Edge, 2117.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 15 MHz, Modulation: TM3.1-64QAM



11:57:46 05.08.2021

Band Edge Compliant, Upper Band Edge, 2192.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 15 MHz, Modulation: TM3.1-64QAM

12:06:06 05.08.2021

Band Edge Compliant, Upper Band Edge, 2192.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 15 MHz, Modulation: TM3.1-64QAM

12:04:22 05.08.2021

Band Edge Compliant, Lower Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 20 MHz, Modulation: TM3.1-64QAM

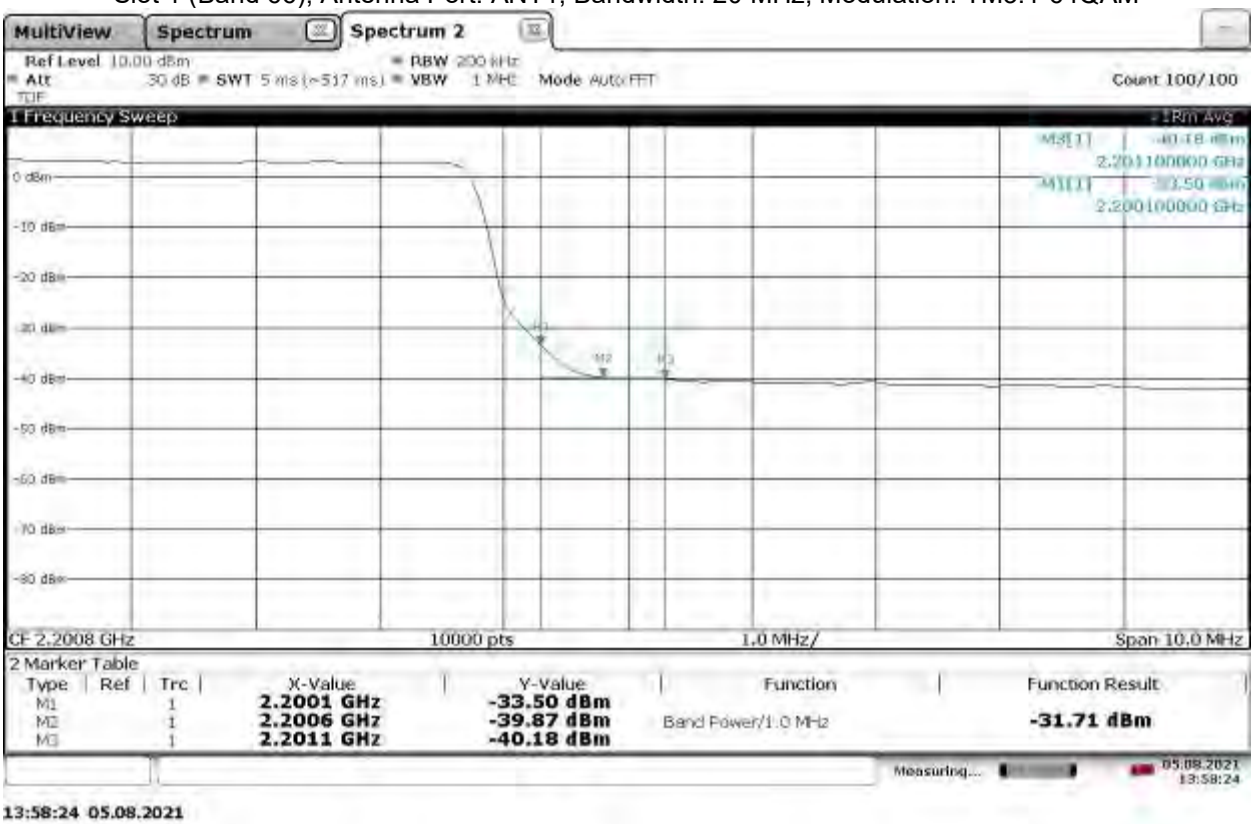
13:45:52 05.08.2021

Band Edge Compliant, Lower Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 20 MHz, Modulation: TM3.1-64QAM

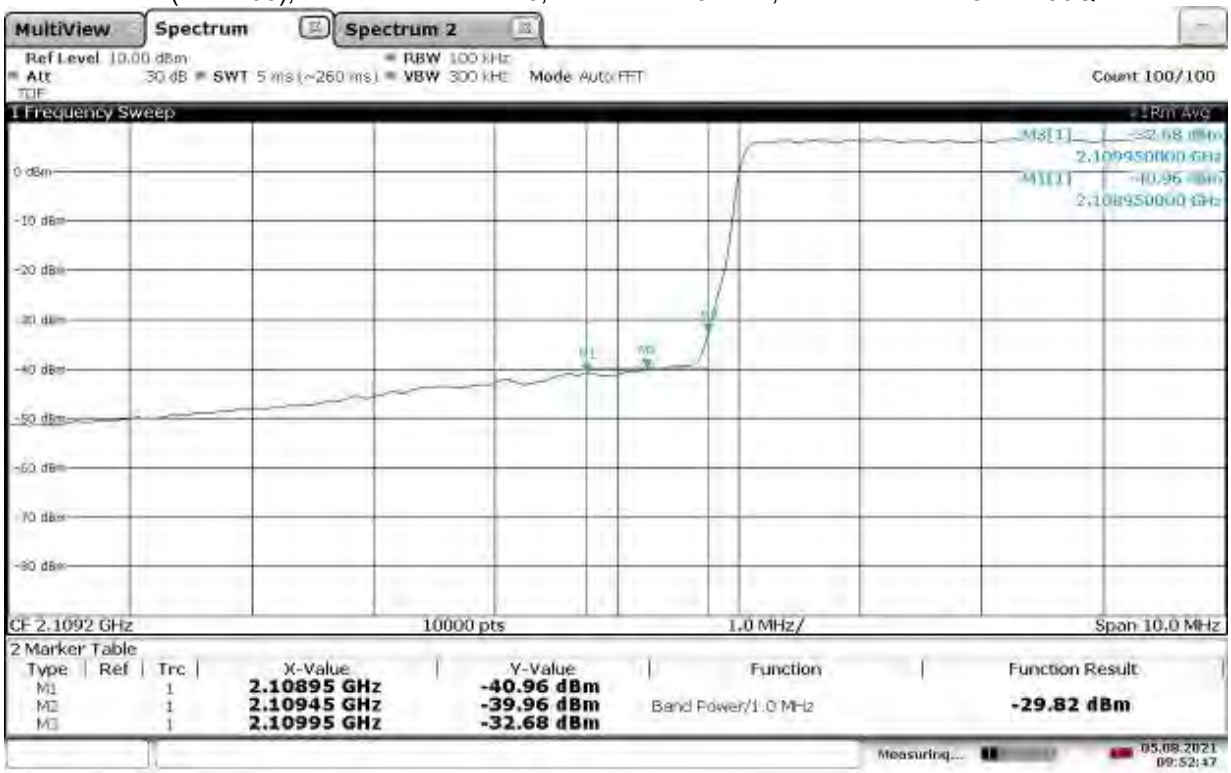
13:44:07 05.08.2021

Band Edge Compliant, Upper Band Edge, 2190 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 20 MHz, Modulation: TM3.1-64QAM

Band Edge Compliant, Upper Band Edge, 2190 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 20 MHz, Modulation: TM3.1-64QAM



Band Edge Compliant, Lower Band Edge, 2112.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 5 MHz, Modulation: TM3.1a-256QAM



09:52:47 05.08.2021

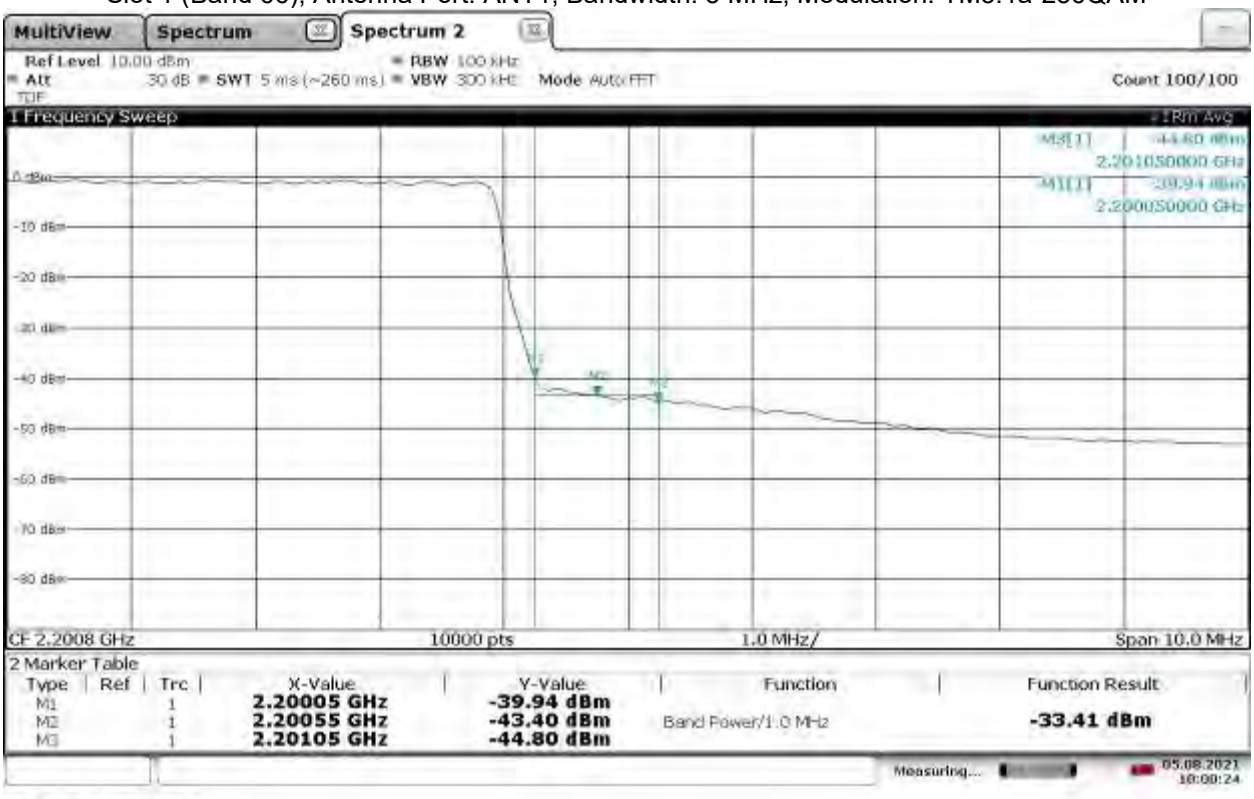
Band Edge Compliant, Lower Band Edge, 2112.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 5 MHz, Modulation: TM3.1a-256QAM

09:53:48 05.08.2021

Band Edge Compliant, Upper Band Edge, 2197.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 5 MHz, Modulation: TM3.1a-256QAM

10:02:15 05.08.2021

Band Edge Compliant, Upper Band Edge, 2197.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 5 MHz, Modulation: TM3.1a-256QAM



10:00:24 05.08.2021

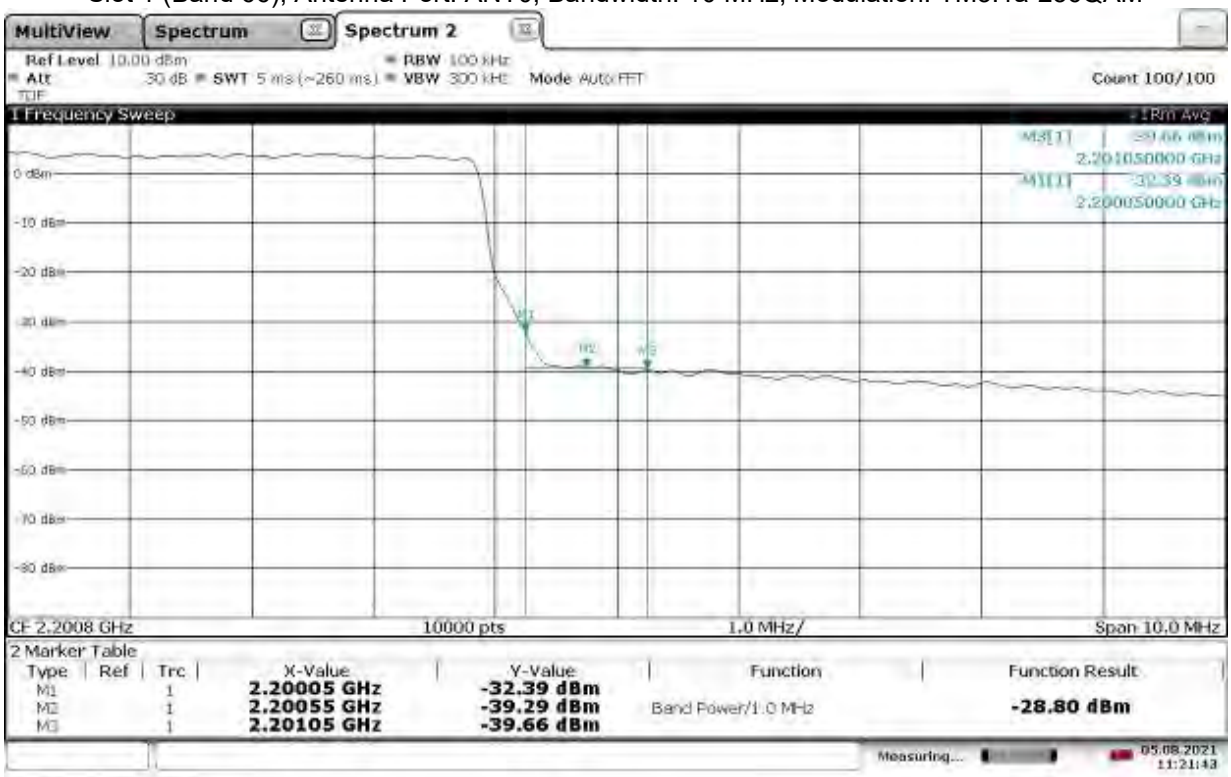
Band Edge Compliant, Lower Band Edge, 2115 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 10 MHz, Modulation: TM3.1a-256QAM

11:13:14 05.08.2021

Band Edge Compliant, Lower Band Edge, 2115MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 10 MHz, Modulation: TM3.1a-256QAM

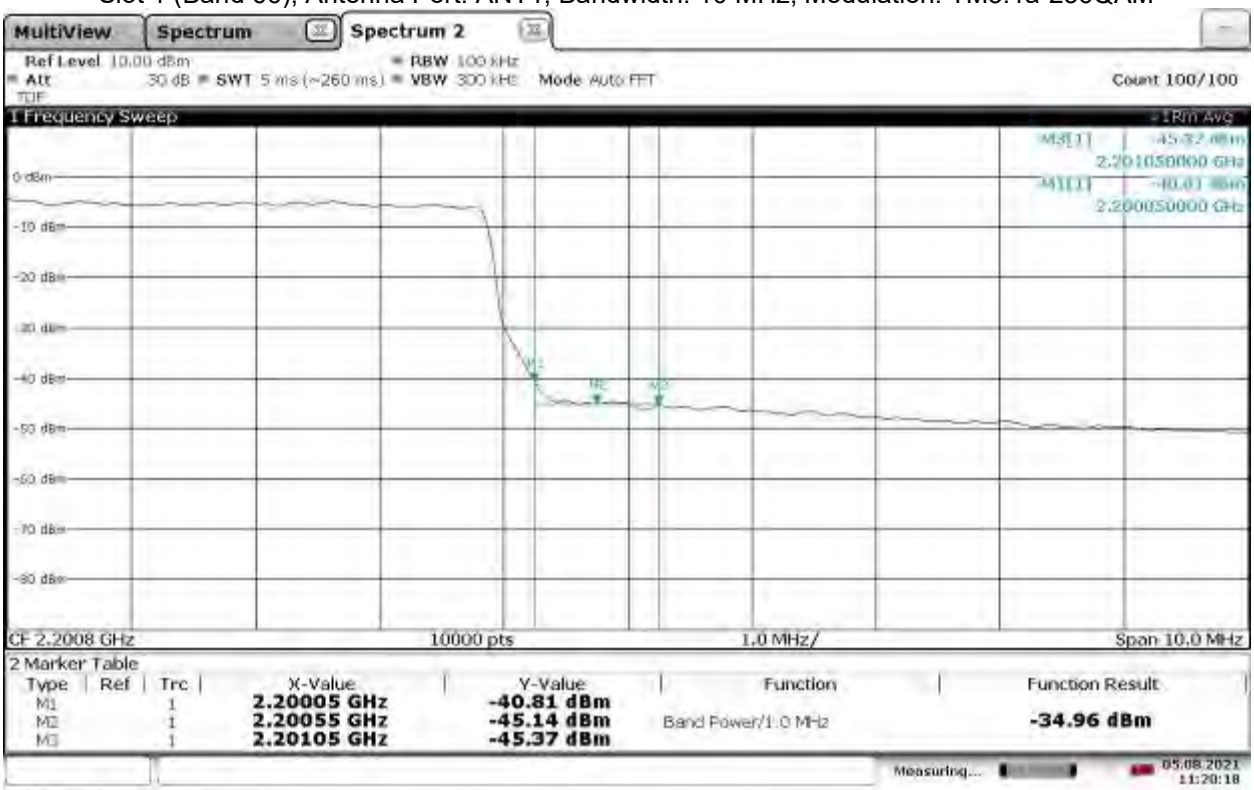
11:14:23 05.08.2021

Band Edge Compliant, Upper Band Edge, 2195 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 10 MHz, Modulation: TM3.1a-256QAM



11:21:43 05.08.2021

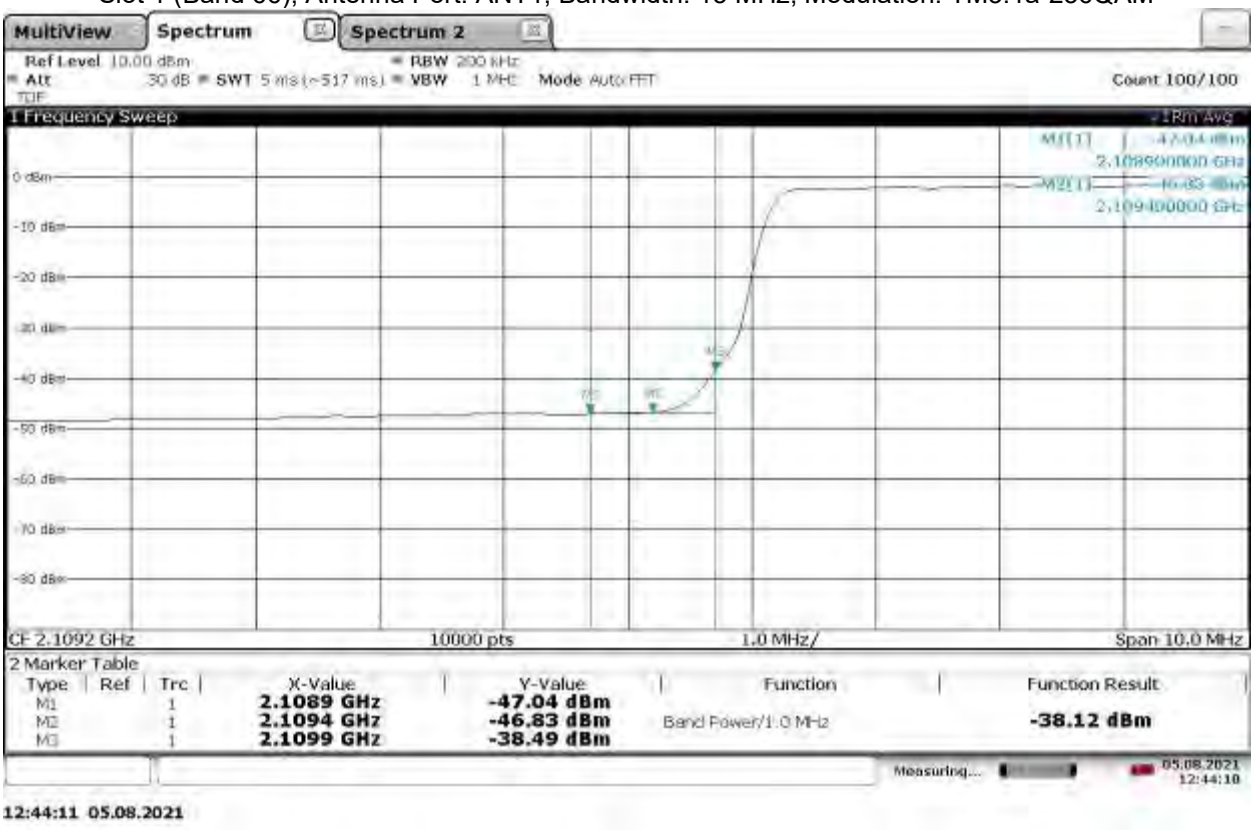
Band Edge Compliant, Upper Band Edge, 2195 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 10 MHz, Modulation: TM3.1a-256QAM



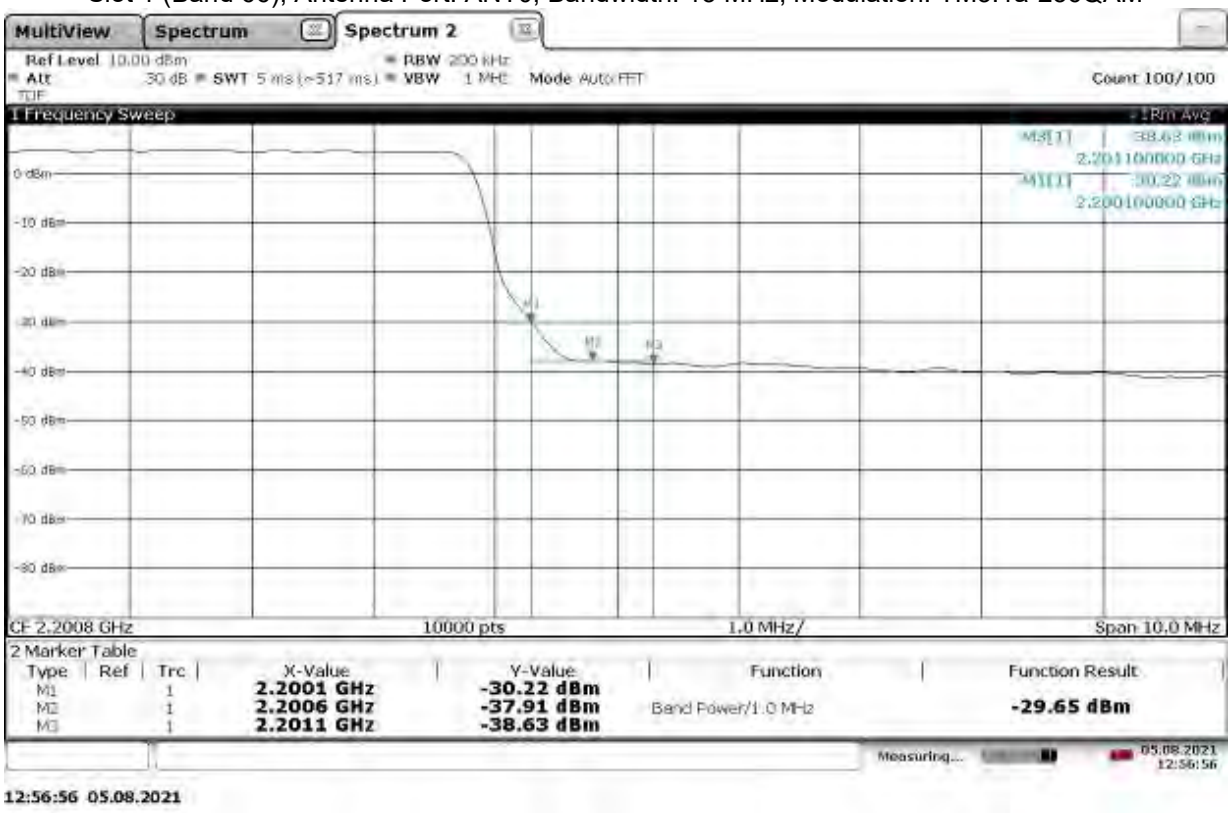
11:20:18 05.08.2021

Band Edge Compliant, Lower Band Edge, 2117.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 15 MHz, Modulation: TM3.1a-256QAM

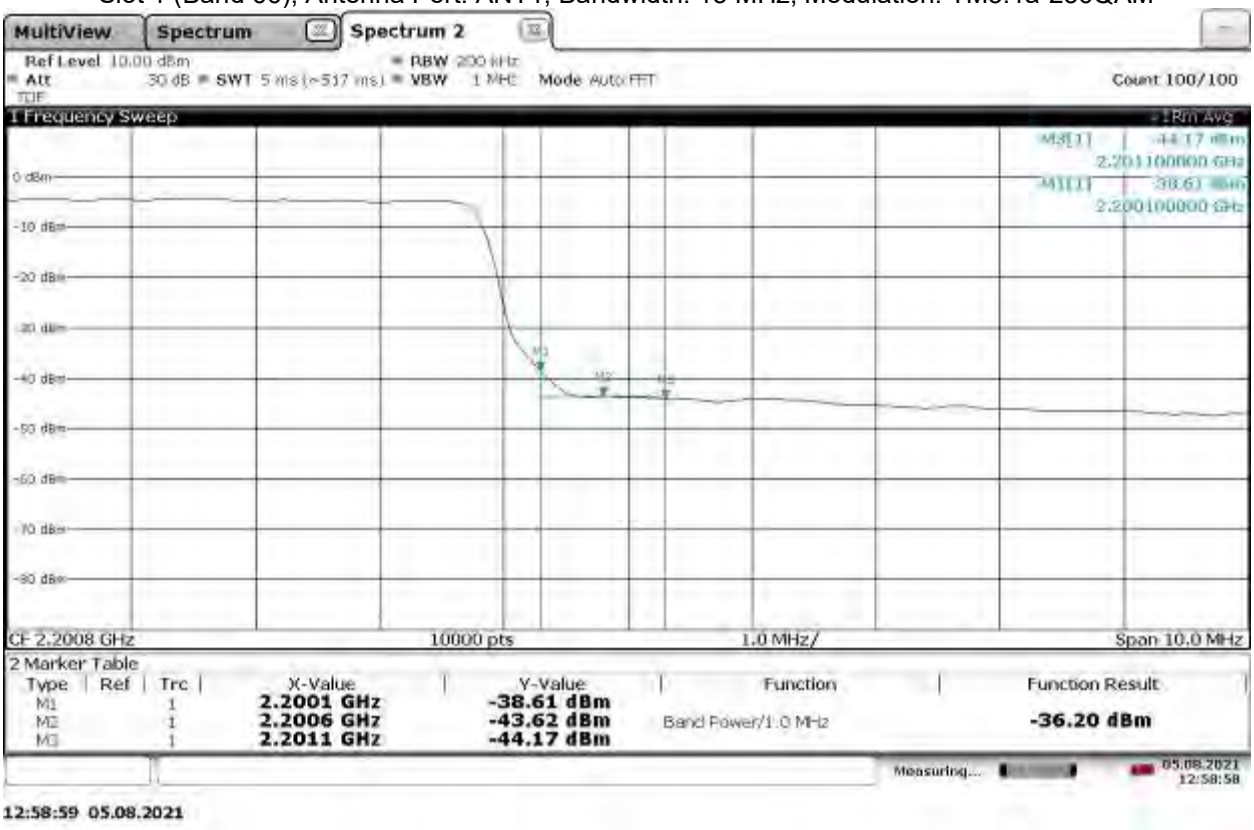
Band Edge Compliant, Lower Band Edge, 2117.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 15 MHz, Modulation: TM3.1a-256QAM



Band Edge Compliant, Upper Band Edge, 2192.5 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 15 MHz, Modulation: TM3.1a-256QAM



Band Edge Compliant, Upper Band Edge, 2192.5 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 15 MHz, Modulation: TM3.1a-256QAM



Band Edge Compliant, Lower Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 20 MHz, Modulation: TM3.1a-256QAM

14:08:43 05.08.2021

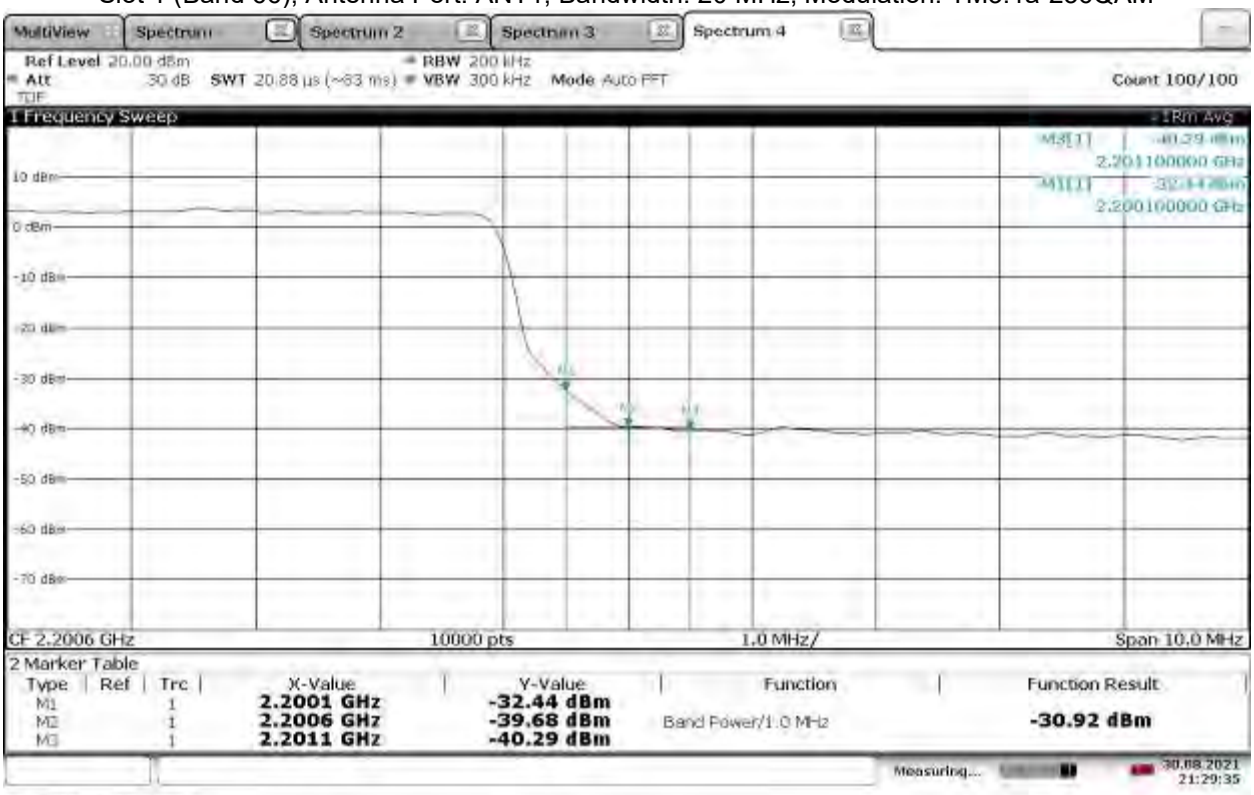
Band Edge Compliant, Lower Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 20 MHz, Modulation: TM3.1a-256QAM

14:06:01 05.08.2021

Band Edge Compliant, Upper Band Edge, 2120 MHz
Slot 1 (Band 66), Antenna Port: ANT0, Bandwidth: 20 MHz, Modulation: TM3.1a-256QAM

21:30:10 30.08.2021

Band Edge Compliant, Upper Band Edge, 2120MHz
Slot 1 (Band 66), Antenna Port: ANT1, Bandwidth: 20 MHz, Modulation: TM3.1a-256QAM



21:29:35 30.08.2021

Report Number: 104751739BOX-001

Issued: 09/07/2021
Revised: 02/02/2022

Test Personnel:	Kouma Sinn KPS	Test Date:	08/05/2021, 08/30/2021
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 27	Limit Applied:	See report section 8.3
Input Voltage:	48 VDC (POE)		
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Ambient Temperature:	24, 22 ºC
		Relative Humidity:	60, 62 %
		Atmospheric Pressure:	1011, 998 mbars

Deviations, Additions, or Exclusions: None

9 Frequency Stability Due Voltage Variation

9.1 Method

Tests are performed in accordance with ANSI C63.26 and CFR47 FCC Parts 2.1055 and 27.

TEST SITE: EMC Lab & 10m ALSE

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLSHF204'	Cable, SMA - SMA, 9kHz -40GHz, (Cable Kit 5)	Huber + Suhner	Sucoflex 102EA	234714001	02/03/2021	02/03/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

9.3 Results:

The sample tested was found to Comply.

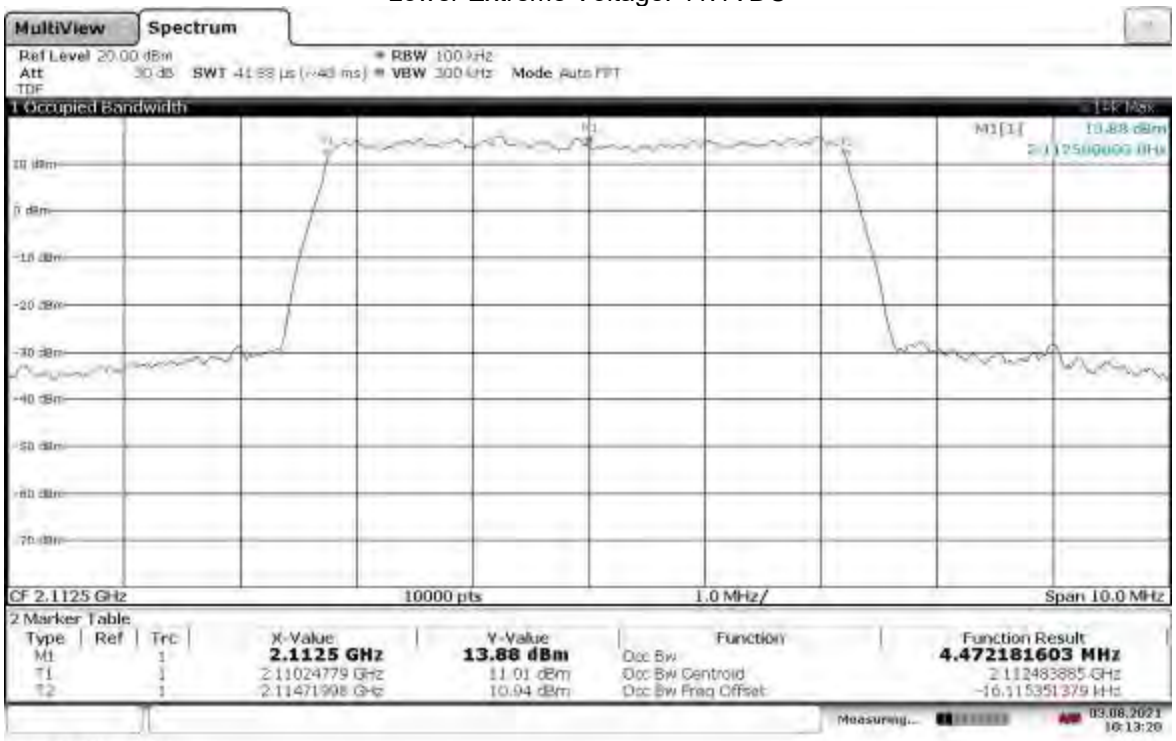
§27.54 Frequency stability – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The occupied bandwidth measurement was used to make sure the lower and upper frequencies of the occupied bandwidth remains within the assigned band of 2110-2200 MHz.

9.4 Setup Photograph:

Confidential – Test setup photo not included in this report

9.5 Plots/Data:

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 5 MHz, Low Channel,
Lower Extreme Voltage: 41.1VDC

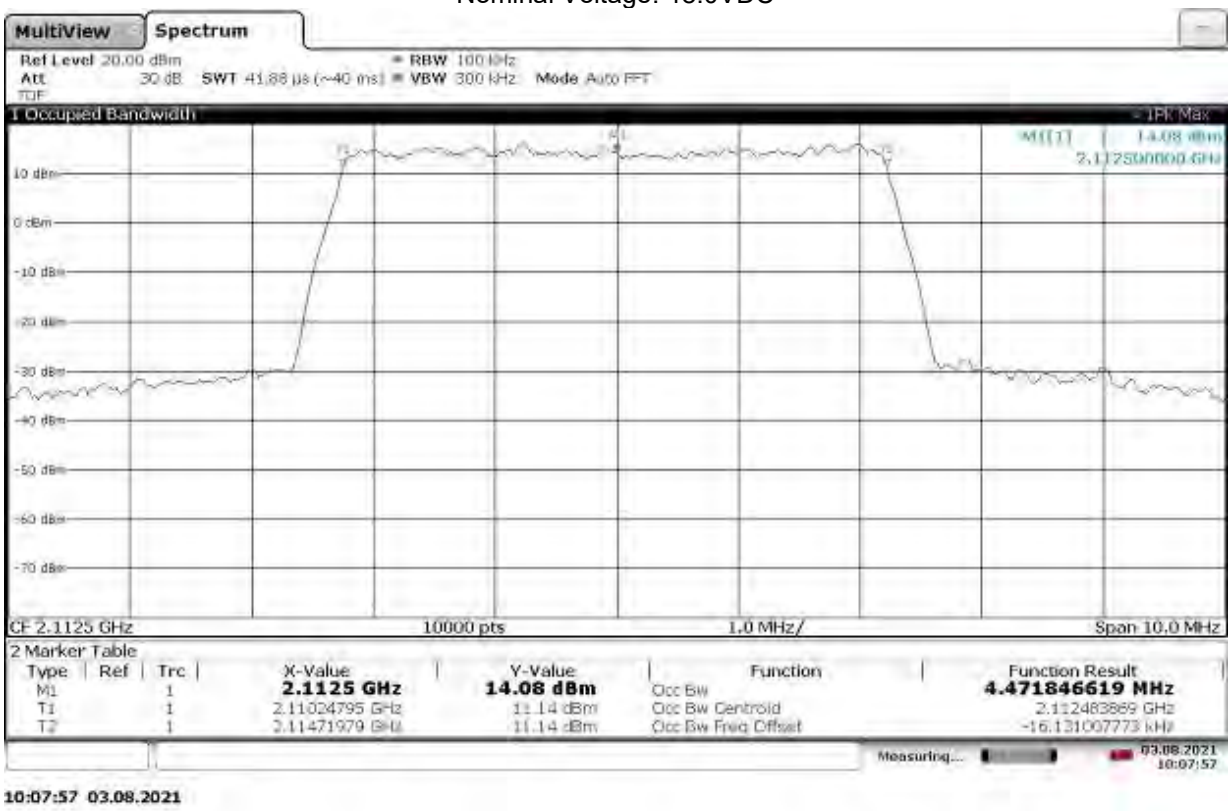


10:13:20 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 5 MHz, High Channel,
Lower Extreme Voltage: 41.1VDC

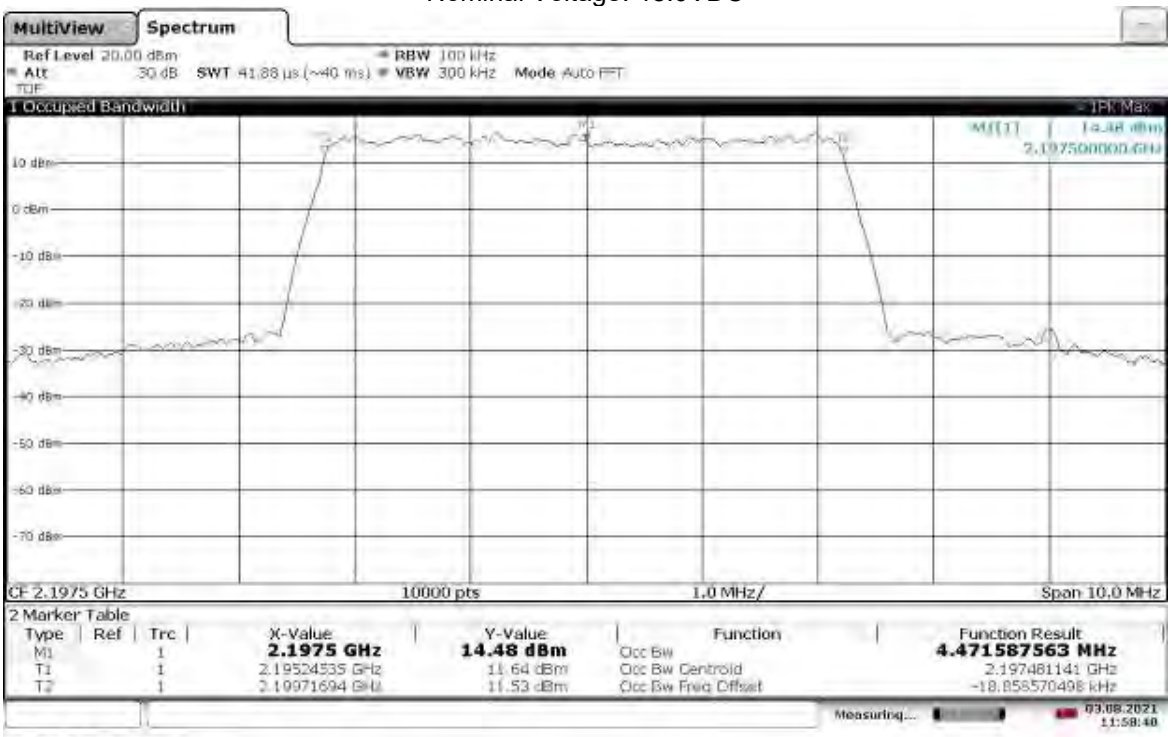
12:08:04 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 5 MHz, Low Channel,
Nominal Voltage: 48.0VDC



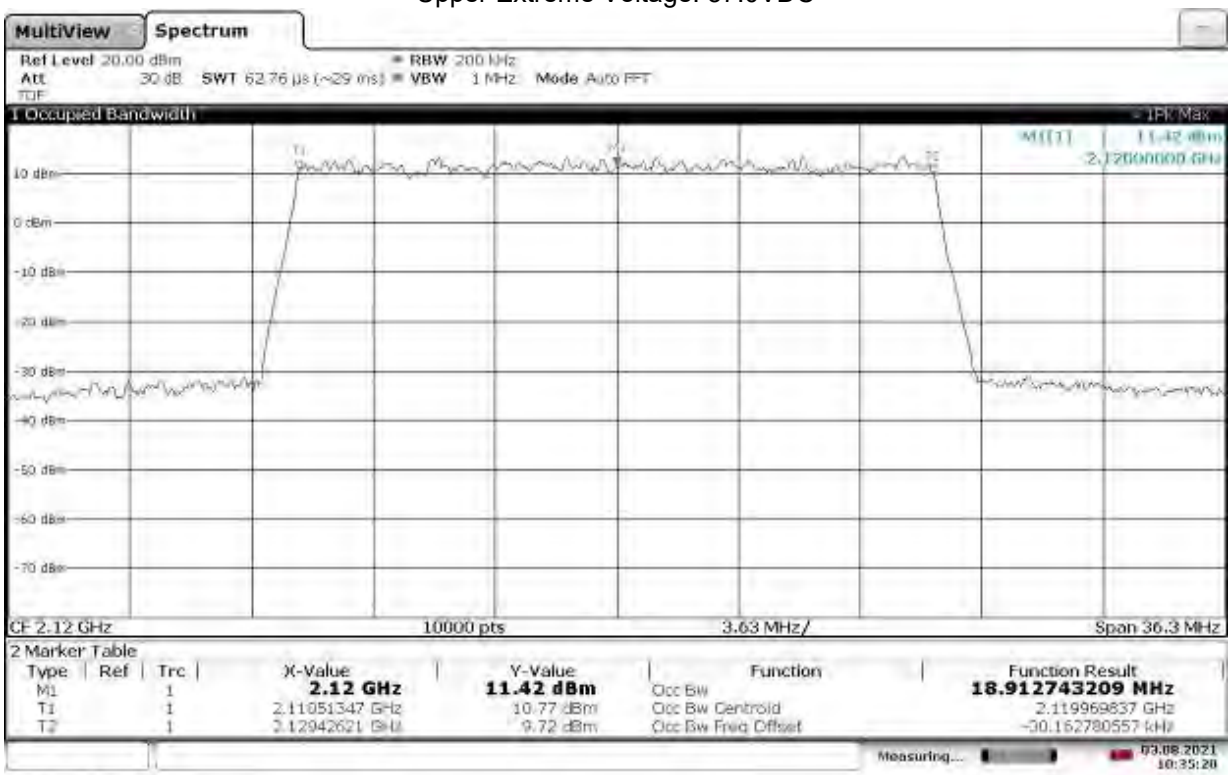
10:07:57 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 5 MHz, High Channel,
Nominal Voltage: 48.0VDC



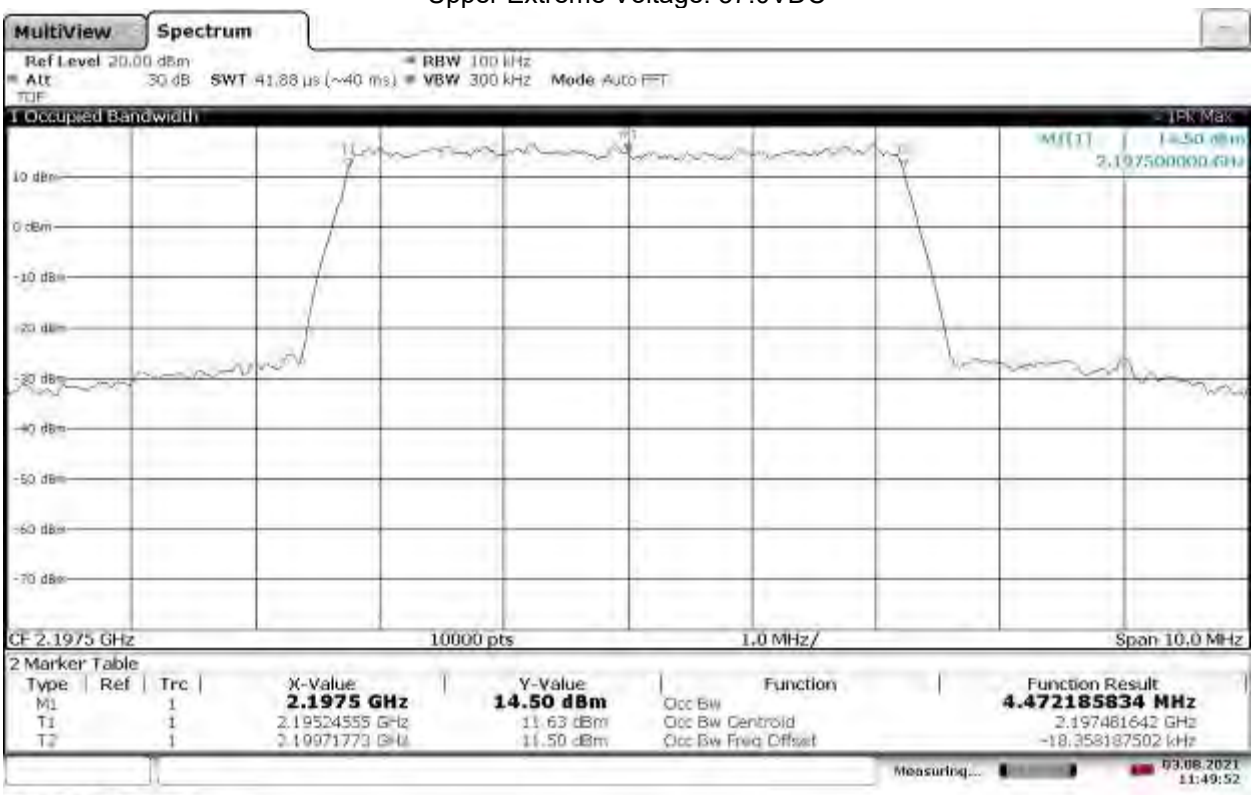
11:58:40 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 5 MHz, Low Channel,
Upper Extreme Voltage: 57.0VDC



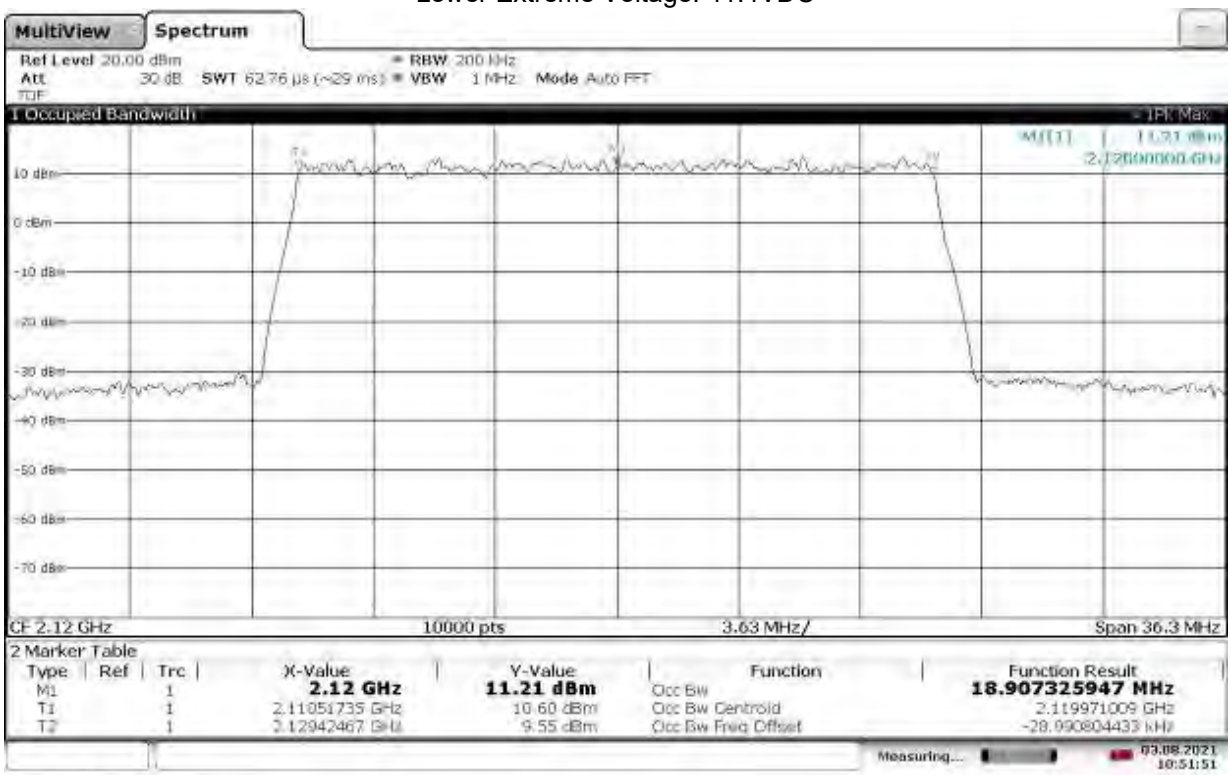
10:35:20 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 5 MHz, High Channel,
Upper Extreme Voltage: 57.0VDC



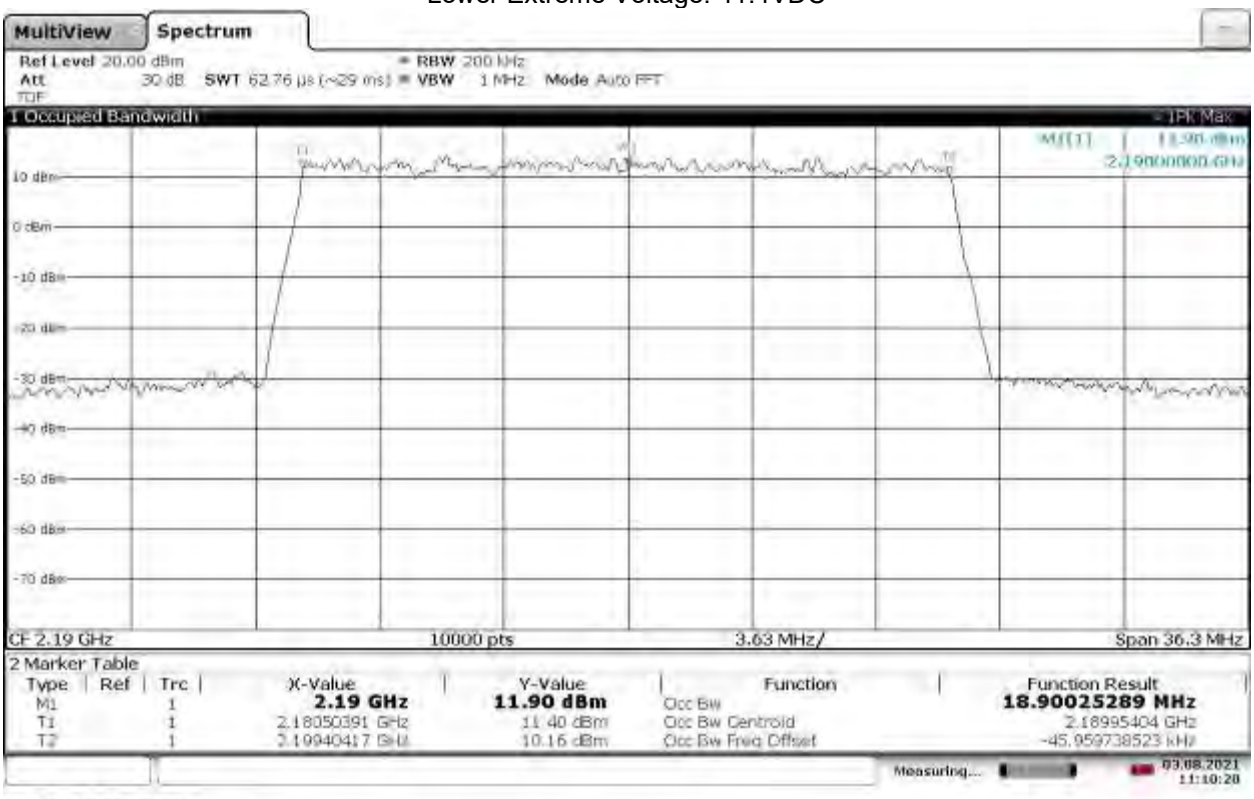
11:49:52 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 20 MHz, Low Channel,
Lower Extreme Voltage: 41.4VDC



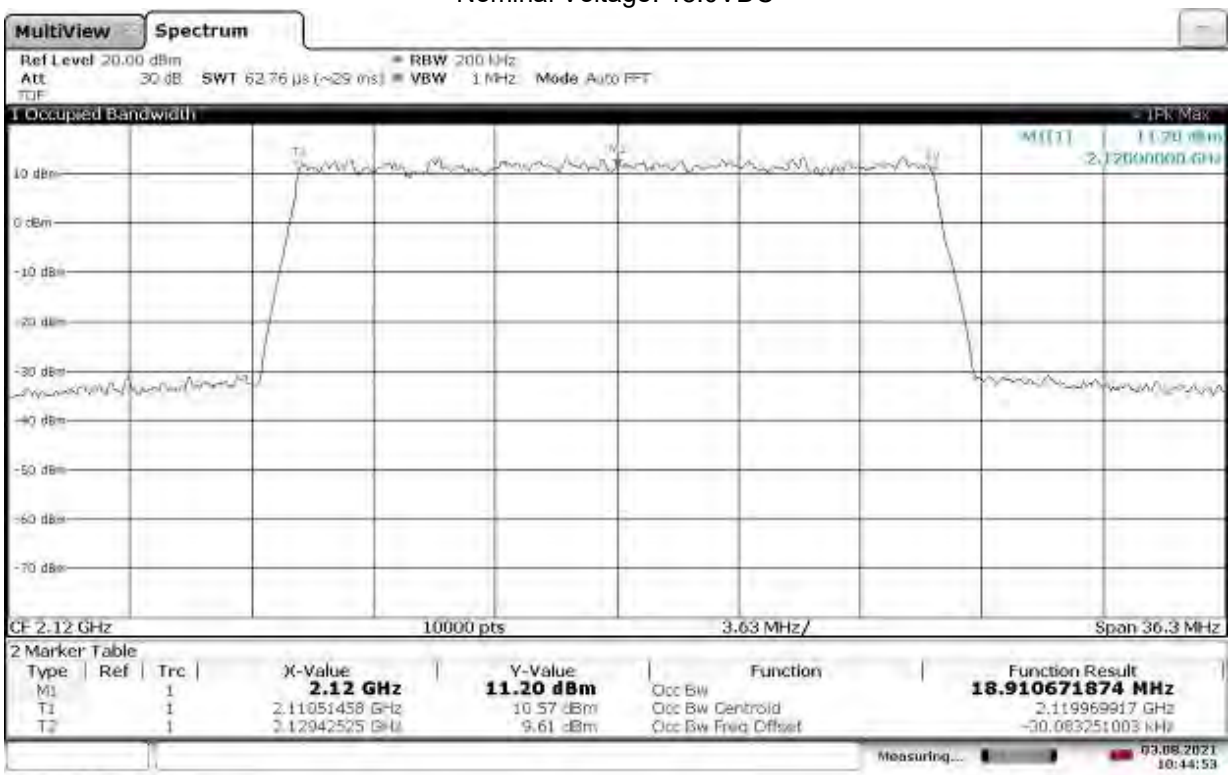
10:51:51 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 20 MHz, High Channel,
Lower Extreme Voltage: 41.4VDC



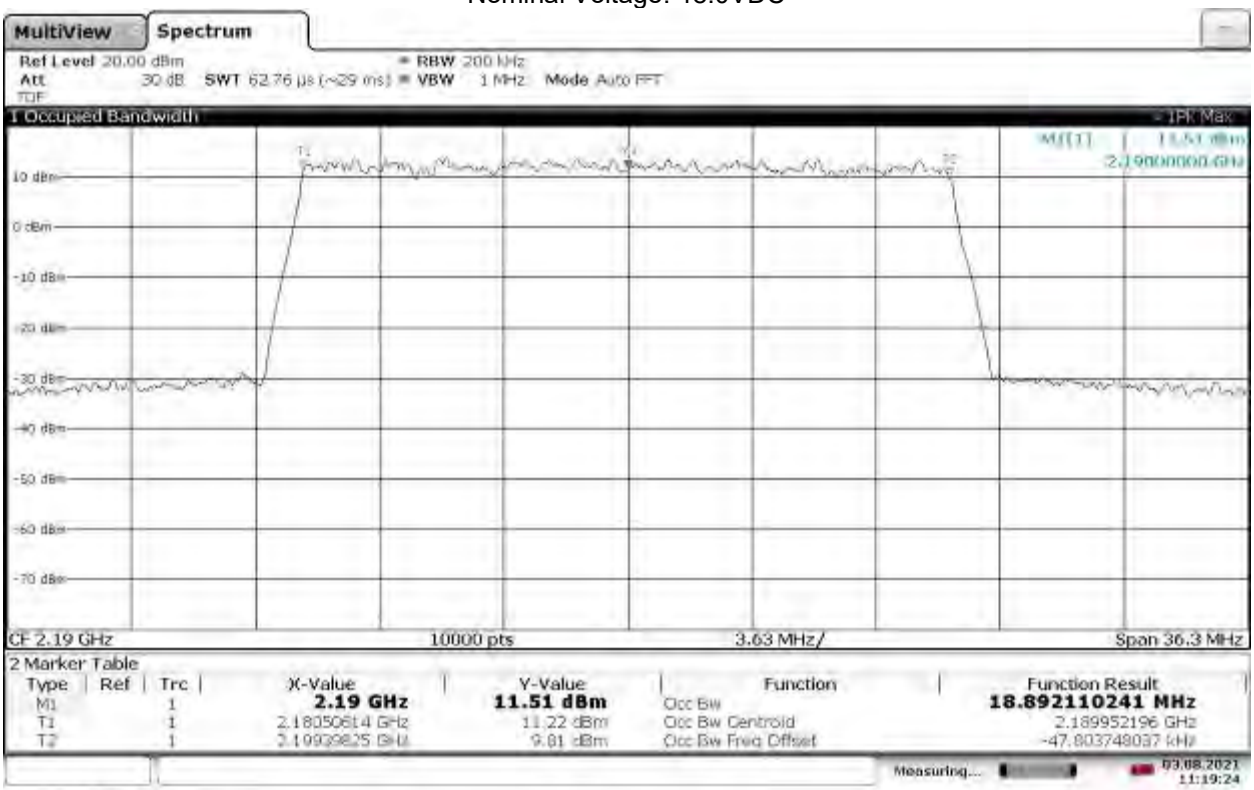
11:10:20 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 20 MHz, Low Channel, Nominal Voltage: 48.0VDC



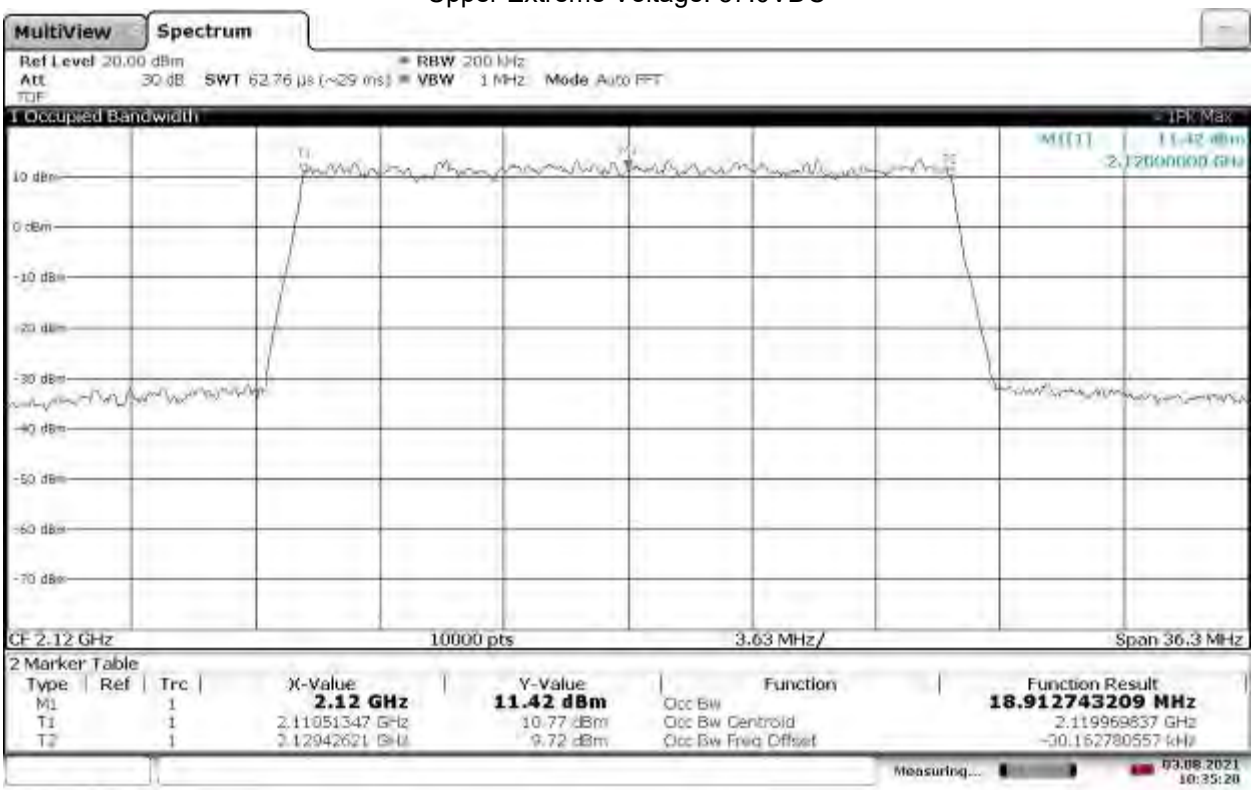
10:44:53 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 20 MHz, High Channel, Nominal Voltage: 48.0VDC



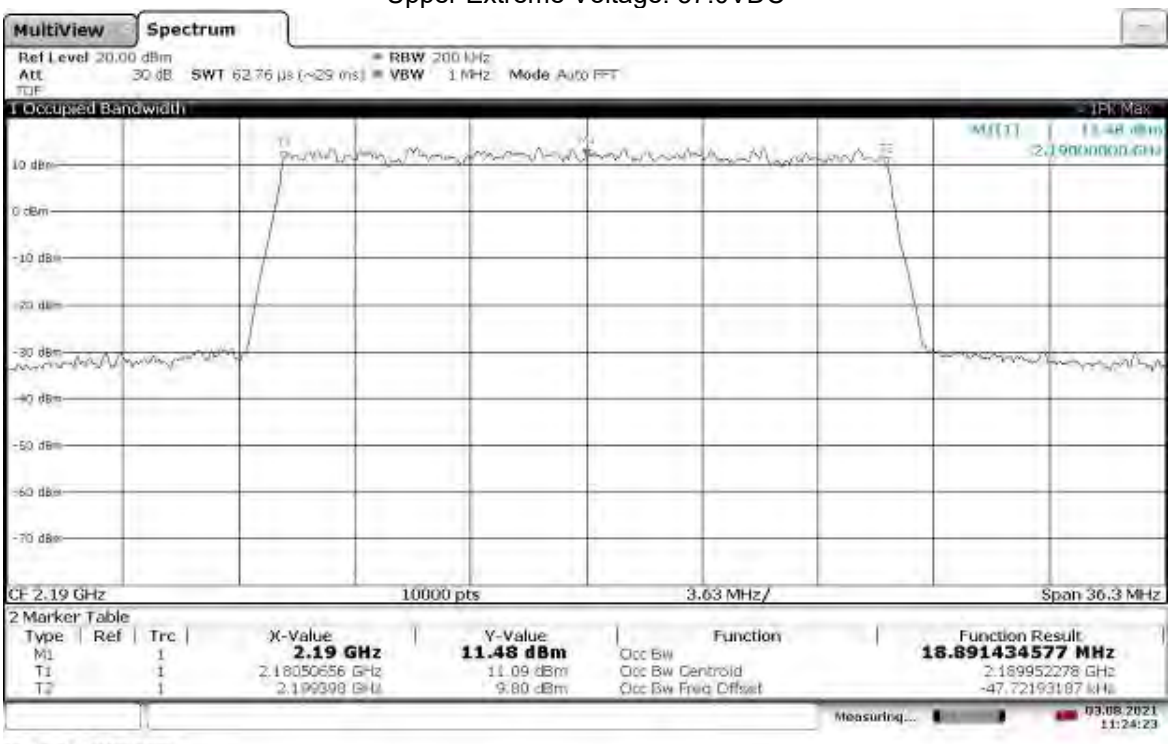
11:19:24 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 20 MHz, Low Channel,
Upper Extreme Voltage: 57.0VDC



10:35:20 03.08.2021

Slot 1 (Band 66), ANT0, Modulation: QPSK, Bandwidth: 20 MHz, High Channel,
Upper Extreme Voltage: 57.0VDC



11:24:23 03.08.2021

Test Personnel:	Kouma Sinn KPS	Test Date:	08/03/2021
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 27	Limit Applied:	See report section 10.3
Input Voltage:	Internal Battery Powered		
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Ambient Temperature:	24 ºC
		Relative Humidity:	48 %
		Atmospheric Pressure:	1010mbars

Deviations, Additions, or Exclusions: None

10 Transmitter spurious emissions

10.1 Method

Tests are performed in accordance with ANSI C63.26, CFR47 FCC Parts 2.1051, 2.1053, 2.1057, and 27.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	5.0 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

Alternately, when BAT-EMC Emission Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. The “Correction” includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the “Level” column.

10.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
147239'	Digital Multimeter (Full Color)	Fluke	187	89300561	02/06/2021	02/06/2022
145108'	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	10/07/2020	10/07/2021
145145'	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/09/2021	06/09/2022
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	11/25/2020	11/25/2021
PRE11'	50dB gain pre-amp	Pasternack	PRE11	PRE11	09/11/2020	09/11/2021
IW006'	DC-18GHz cable 8.4m long	Insulated Wire	2800-NPS	IW006	11/25/2020	11/25/2021
HS003'	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	10/07/2020	10/07/2021
ETS005'	1-18GHz horn antenna	ETS-Lindgren	3117	00218279	09/28/2020	09/28/2021
IW002'	2 meter Armored cable	Insulated Wire	2800-NPS	002	09/23/2020	09/23/2021
IW003'	8.4 meter cable	Insulated Wire	2800-NPS	003	10/08/2020	10/08/2021
PRE12'	Pre-amplifier	Com Power	PAM-118A	18040117	12/07/2020	12/07/2021
145-414'	Cables 145-400 145-403 145-405 145-409	Huber + Suhner	3m Track A cables	multiple	07/09/2021	07/09/2022
HORN2'	HORN ANTENNA	EMCO	3115	9602-4675	07/15/2021	07/15/2022
REA004'	3GHz High Pass Filter	Reactel, Inc	7HSX-3G/18G-S11	06-1	02/19/2021	02/19/2022
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/28/2021	01/28/2022
MEG002'	Cable,SMA-SMA,9KHz-40GHz, (Cable Kit 6)	Megaphase	TM40-K1K1-197	59006401001	09/19/2019	09/19/2020
REA006'	18GHz High Pass Filter	Reactel, Inc	7HS-18G/40G K11	(06)1	04/23/2021	04/23/2022
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/19/2021	02/19/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
PRE9'	100MHz-40GHz Preamp	MITEQ	NSP4000-NFG	1260417	09/22/2020	09/22/2021

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.18.0.16

10.3 Results:

The sample tested was found to Comply. Where a resolution bandwidth of less than 1 MHz was used (in some cases, 120 kHz or 100 kHz), more than 10 dB margin to the limit is shown. Since the two antenna ports transmit uncorrelated data streams and use cross polarized antennas, no adjustments to the test results were applied due to MIMO operation, per KDB 662911.

§27.53(h): The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Note: All spurious emissions were tested with narrowest bandwidth and QPSK modulation settings. Since there were no emissions within 30dB of limit, and settings had ~1dB effect on peak readings, other settings were not tested and EUT was considered compliant.

10.4 Setup Photographs:

Confidential – Test setup photo not included in this report

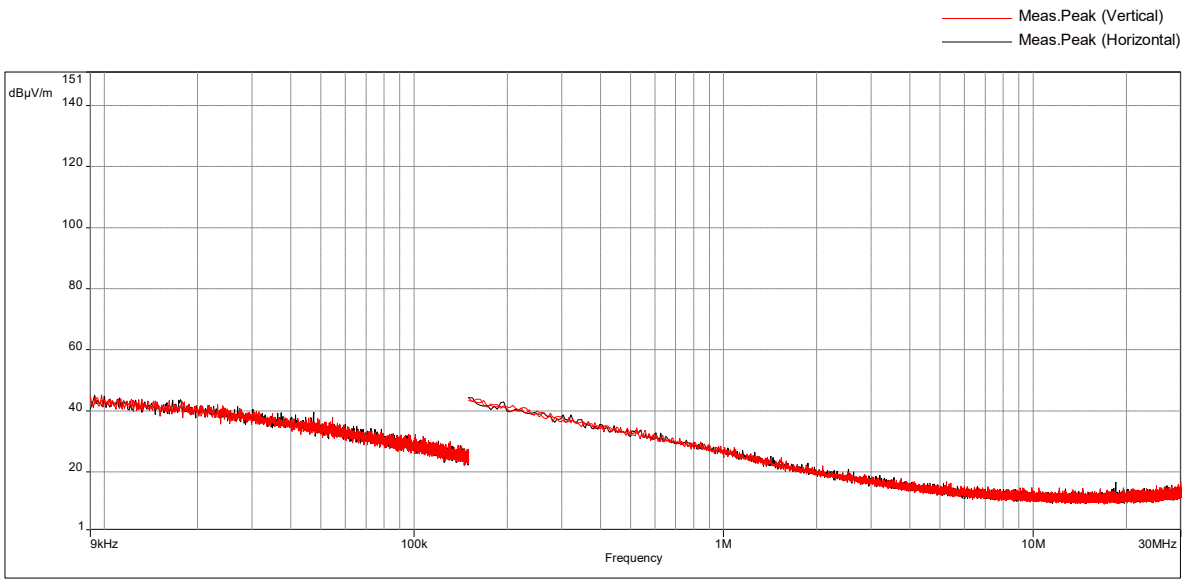
10.5 Plots/Data:

Radiated Emissions, 9kHz-30 MHz
Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), Mid 2155MHz

Test Information:

Date and Time	8/29/2021 1:05:51 PM
Client and Project Number	Commscope
Engineer	Kouma Sinn
Temperature	23 C
Humidity	45 %
Atmospheric Pressure	1015 mbar
Comments	Scan 30: Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), Mid 2155MHz, RE 9kHz-30MHz Loop antenna, Electric Field, 10M Location

Graph:



Results: No emission was detected.

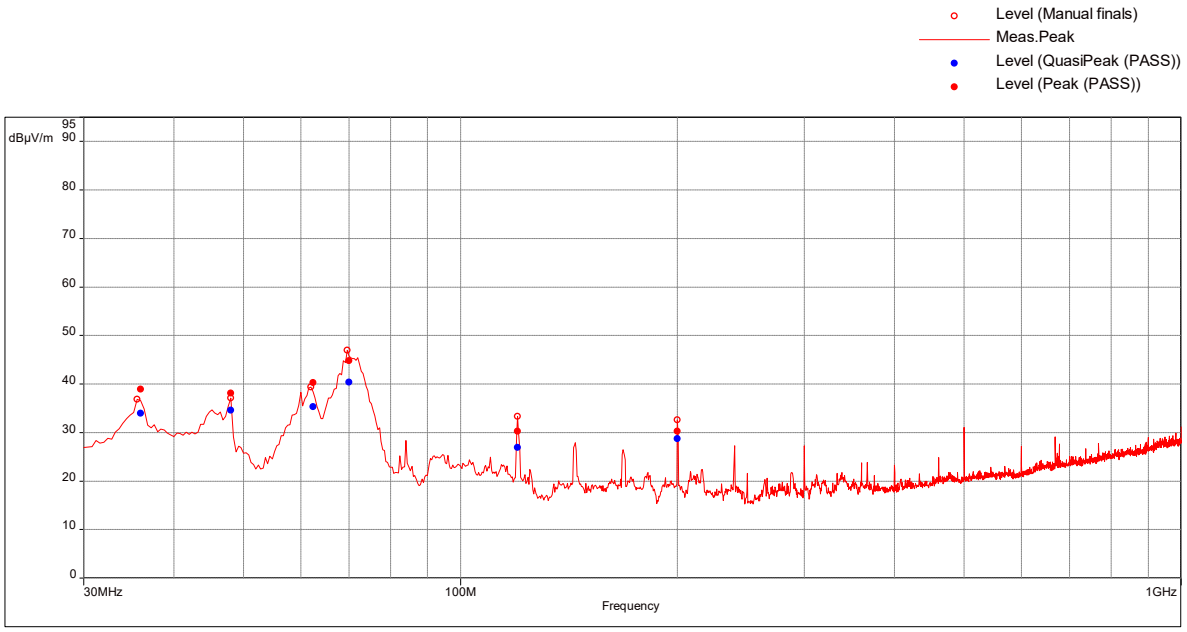
Radiated Emissions, 30-1000 MHz

Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), Low 2112.5 MHz

Test Information:

Date and Time	8/29/2021 9:34:05 AM
Client and Project Number	Commscope
Engineer	Kouma Sinn
Temperature	23 C
Humidity	45 %
Atmospheric Pressure	1015 mbar
Comments	Scan 28: Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), Low 2112.5MHz, RE 30-1000 MHz SA mode

Graph:



Results:

Peak (PASS) (6)

Frequency (MHz)	Peak Level (dBµV/m)	E.I.R.P Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
35.97894737	38.94	-45.86	-13	-32.86	92.00	1.00	Vertical	120000.00	-16.89
48.03157895	38.08	-46.72	-13	-33.72	0.00	1.00	Vertical	120000.00	-24.54
62.25263158	40.29	-44.51	-13	-31.51	60.00	1.51	Vertical	120000.00	-25.43
70.2	44.83	-39.97	-13	-26.97	328.00	1.91	Vertical	120000.00	-24.87
120.0315789	30.29	-54.51	-13	-41.51	348.00	1.52	Vertical	120000.00	-18.77
200	30.29	-54.51	-13	-41.51	359.00	1.57	Vertical	120000.00	-19.48

Notes:

1) The level in E.I.R.P (dBm) is calculated from the peak readings as below. E.I.R.P (dBm) = E Peak (dBµV/m) + 20*Log(d) – 104.8, where d is the measurement distance (in the far field region) in meter.

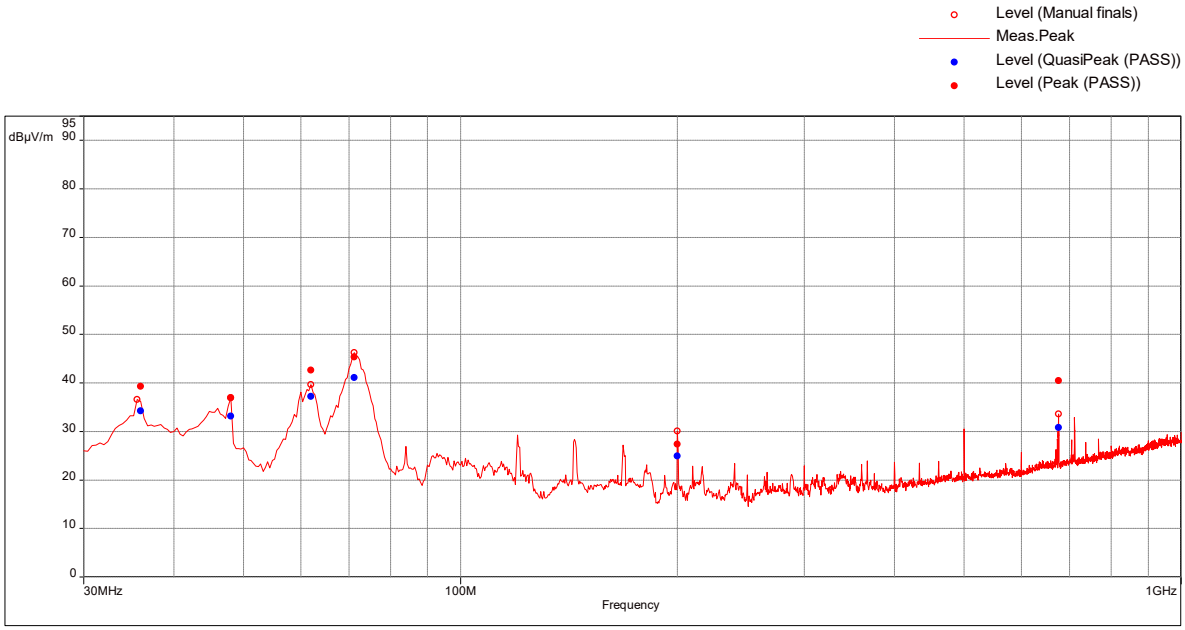
Radiated Emissions, 30-1000 MHz

Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), Mid 2155 MHz

Test Information:

Date and Time	8/29/2021 10:59:15 AM
Client and Project Number	Commscope
Engineer	Kouma Sinn
Temperature	23 C
Humidity	45 %
Atmospheric Pressure	1015 mbar
Comments	Scan 29: Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), Mid 2155MHz, RE 30-1000 MHz SA mode

Graph:



Results:

Peak (PASS) (6)

Frequency (MHz)	Peak Level (dBµV/m)	E.I.R.P Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
35.97894737	39.28	-45.52	-13	-32.52	291.00	1.00	Vertical	120000.00	-16.89
48	36.98	-47.82	-13	-34.82	348.00	1.00	Vertical	120000.00	-24.52
62	42.62	-42.18	-13	-29.18	47.00	1.63	Vertical	120000.00	-25.45
71.38947368	45.37	-39.43	-13	-26.43	246.00	1.69	Vertical	120000.00	-24.86
200	27.34	-57.46	-13	-44.46	316.00	3.26	Vertical	120000.00	-19.48
675.4736842	40.47	-44.33	-13	-31.33	348.00	4.00	Vertical	120000.00	-10.35

Notes:

1) The level in E.I.R.P (dBm) is calculated from the peak readings as below. E.I.R.P (dBm) = E Peak (dBµV/m) + 20*Log(d) – 104.8, where d is the measurement distance (in the far field region) in meter.

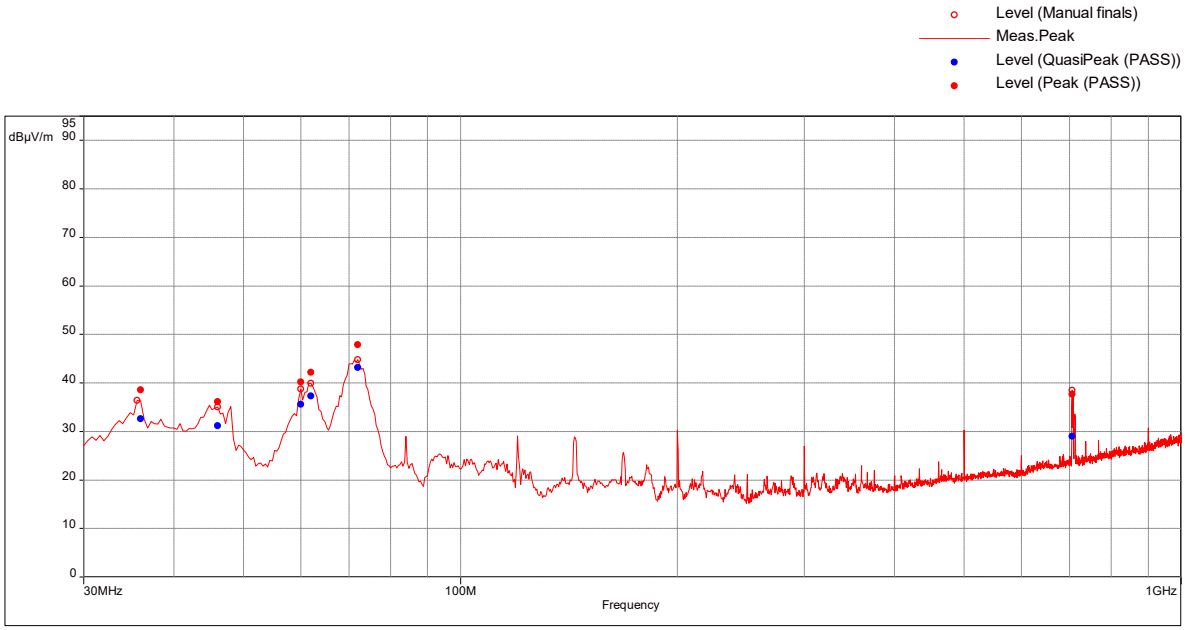
Radiated Emissions, 30-1000 MHz

Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), High 2197.5MHz

Test Information:

Date and Time	8/29/2021 11:58:19 AM
Client and Project Number	Commscope
Engineer	Kouma Sinn
Temperature	23 C
Humidity	45 %
Atmospheric Pressure	1015 mbar
Comments	Scan 30: Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), High 2197.5MHz, RE 30-1000 MHz SA mode

Graph:



Results:

Peak (PASS) (6)

Frequency (MHz)	Peak Level (dBµV/m)	E.I.R.P Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
35.94736842	38.54	-46.26	-13	-33.26	175.00	1.00	Vertical	120000.00	-16.86
46.09473684	36.11	-48.69	-13	-35.69	311.00	1.21	Vertical	120000.00	-23.61
59.96842105	40.20	-44.6	-13	-31.6	359.00	1.96	Vertical	120000.00	-25.58
62.03157895	42.17	-42.63	-13	-29.63	36.00	2.84	Vertical	120000.00	-25.45
72	47.86	-36.94	-13	-23.94	67.00	1.85	Vertical	120000.00	-24.85
706.4736842	37.69	-47.11	-13	-34.11	348.00	3.57	Horizontal	120000.00	-9.47

Notes:

1) The level in E.I.R.P (dBm) is calculated from the peak readings as below. E.I.R.P (dBm) = E Peak (dBµV/m) + 20*Log(d) – 104.8, where d is the measurement distance (in the far field region) in meter.

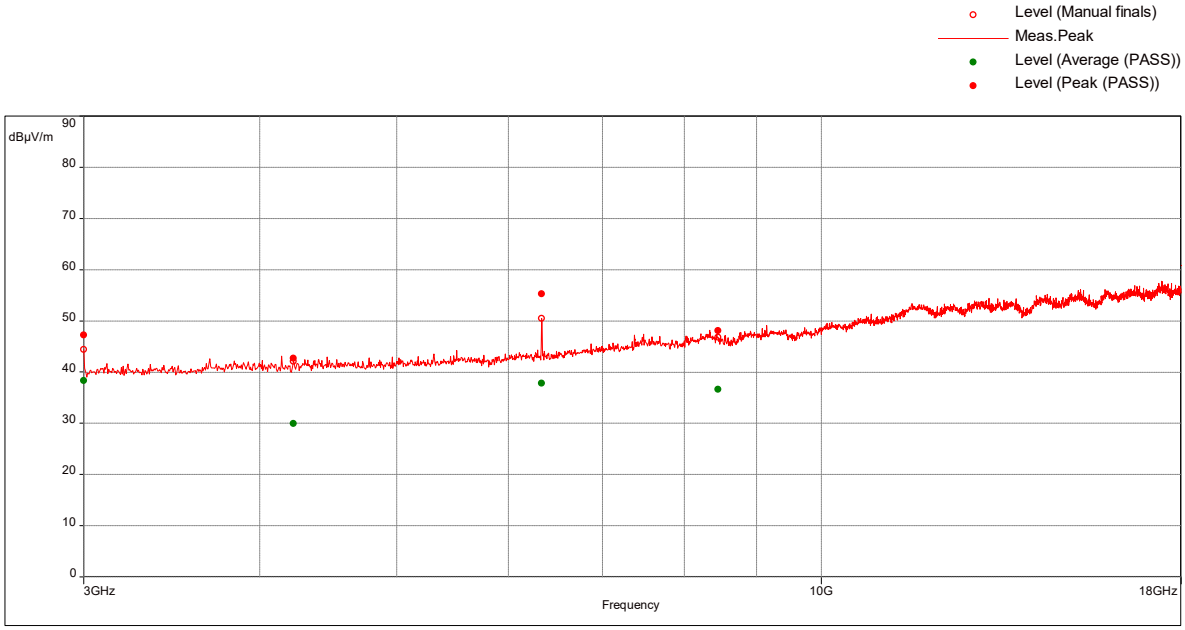
Radiated Emissions, 1-22 GHz

Band 66 w 5100 host, 5 MHz Bandwidth (worst-case), QPSK Modulation (worst-case), Low 2112.5MHz

Test Information:

Date and Time	8/28/2021 12:26:21 PM
Client and Project Number	Commscope
Engineer	Kouma Sinn
Temperature	23 C
Humidity	40 %
Atmospheric Pressure	1017mbar
Comments	Scan 25: Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), Low 2112.5 MHz, RE 3-18 GHz_REA004 SA mode

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Peak Level (dBµV/m)	E.I.R.P Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
3000	47.25	-48.01	-13	-35.01	87.00	3.69	Horizontal	1000000.00	-2.35
4225	42.66	-52.6	-13	-39.6	105.00	1.40	Vertical	1000000.00	-0.81
6336.842105	55.23	-40.03	-13	-27.03	215.00	1.00	Horizontal	1000000.00	4.15
8450.263158	48.11	-47.15	-13	-34.15	169.00	3.98	Horizontal	1000000.00	7.67

Notes:

Notes:

1) The level in E.I.R.P (dBm) is calculated from the peak readings as below. E.I.R.P (dBm) = E Peak (dBµV/m) + 20*Log(d) – 104.8, where d is the measurement distance (in the far field region) in meter.
2) Manual scan was performed from 1-3 GHz and 18-22 GHz at 10 cm distance with no emission was detected.

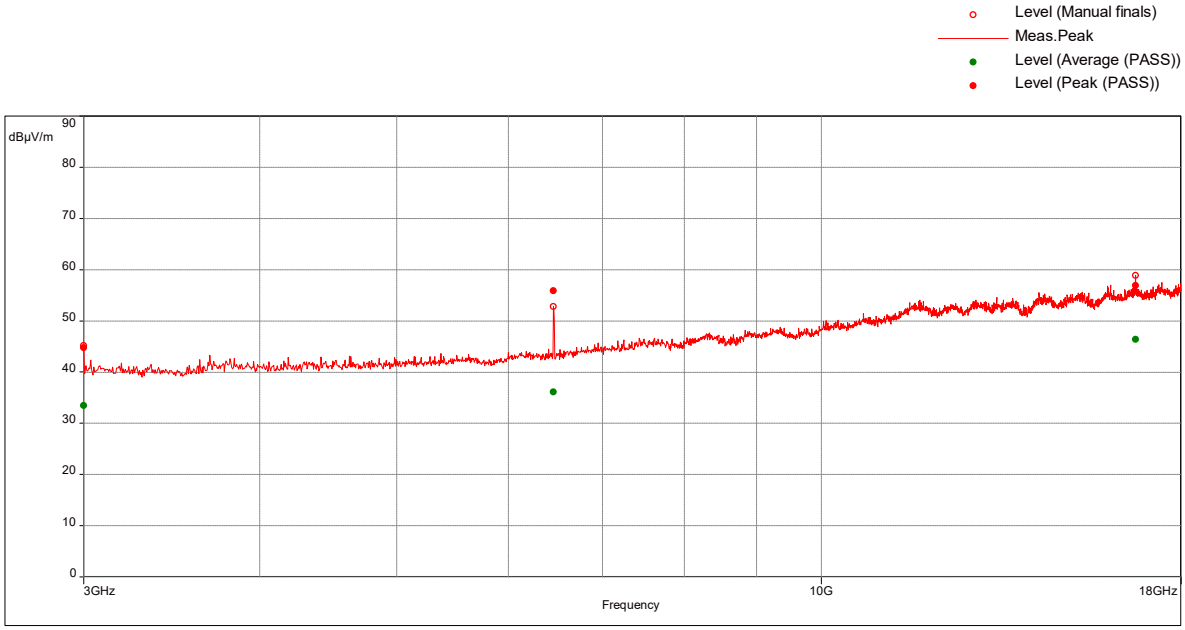
Radiated Emissions, 1-22 GHz

Band 66 w 5100 host, 5 MHz Bandwidth (worst-case), QPSK Modulation (worst-case), Mid 2155MHz

Test Information:

Date and Time	8/28/2021 12:58:42 PM
Client and Project Number	Commscope
Engineer	Kouma Sinn
Temperature	23 C
Humidity	40 %
Atmospheric Pressure	1017mbar
Comments	Scan 26: Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), Mid 2155 MHz, RE 3-18 GHz_REA004 SA mode

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Peak Level (dBµV/m)	E.I.R.P Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
3000	44.75	-50.51	-13	-37.51	266.00	2.70	Horizontal	1000000.00	-2.35
6461.578947	55.86	-39.4	-13	-26.4	214.00	1.00	Horizontal	1000000.00	4.33
16712.63158	56.90	-38.36	-13	-25.36	189.00	3.05	Vertical	1000000.00	19.64

Notes:

1) The level in E.I.R.P (dBm) is calculated from the peak readings as below. E.I.R.P (dBm) = E Peak (dBµV/m) + 20*Log(d) – 104.8, where d is the measurement distance (in the far field region) in meter.
2) Manual scan was performed from 1-3 GHz and 18-22 GHz at 10 cm distance with no emission was detected.

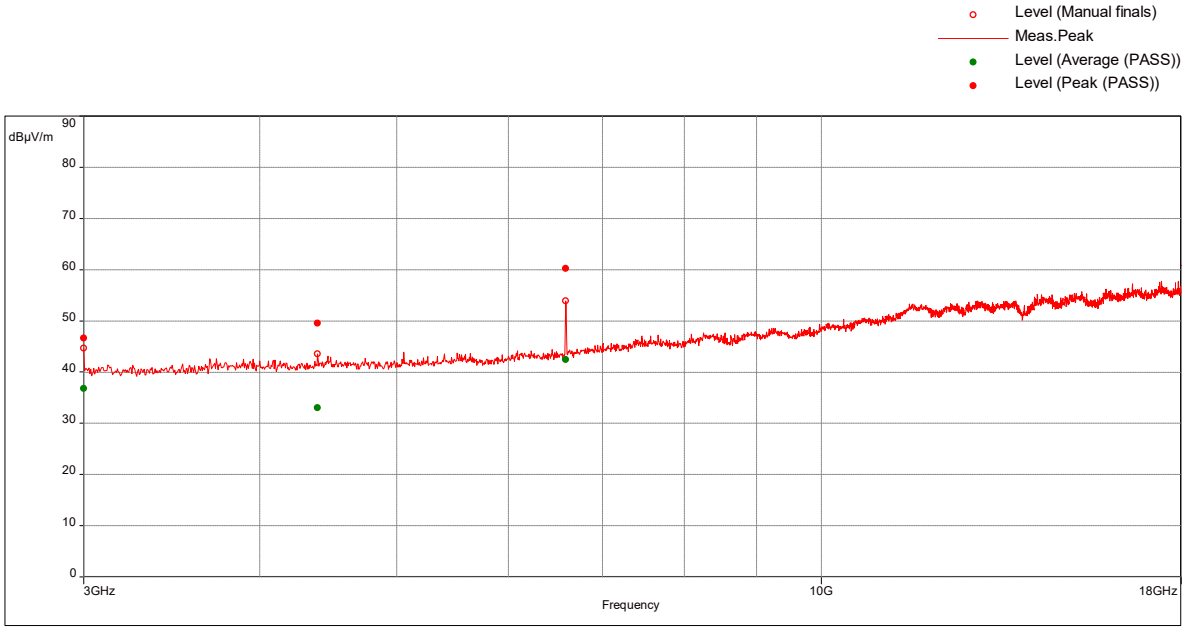
Radiated Emissions, 1-22 GHz

Band 66 w 5100 host, 5 MHz Bandwidth (worst-case), QPSK Modulation (worst-case), High 2197.5MHz

Test Information:

Date and Time	8/28/2021 1:28:08 PM
Client and Project Number	Commscope
Engineer	Kouma Sinn
Temperature	23 C
Humidity	40 %
Atmospheric Pressure	1017mbar
Comments	Scan 27: Band 66 w 5100 host, 5MHz Bandwidth (Worst-case), QPSK (Worst-case), High 2197.5 MHz, RE 3-18 GHz_REA004 SA mode

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Peak Level (dBµV/m)	E.I.R.P Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
3000	46.68	-48.58	-13	-35.58	79.00	1.20	Horizontal	1000000.00	-2.35
4393.421053	49.56	-45.7	-13	-32.7	321.00	1.30	Horizontal	1000000.00	-0.23
6591.842105	60.23	-35.03	-13	-22.03	220.00	1.05	Horizontal	1000000.00	4.38

Notes:

1) The level in E.I.R.P (dBm) is calculated from the peak readings as below. E.I.R.P (dBm) = E Peak (dBµV/m) + 20*Log(d) – 104.8, where d is the measurement distance (in the far field region) in meter.
2) Manual scan was performed from 1-3 GHz and 18-22 GHz at 10 cm distance with no emission was detected.

Report Number: 104751739BOX-001

Issued: 09/07/2021
Revised: 02/02/2022

Test Personnel:	Kouma Sinn KPS	Test Date:	08/28/2021, 08/29/2021
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 27	Limit Applied:	See report section 10.3
Input Voltage:	48 VDC (POE)		
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Ambient Temperature:	23, 23 ºC
		Relative Humidity:	40, 45 %
		Atmospheric Pressure:	1017, 1015 mbars

Deviations, Additions, or Exclusions: None

11 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	09/07/2021	104751739BOX-001	KPS	VFV	Original Issue
1	10/11/2021	104751739BOX-001	KPS	VFV	Changed “5 GHz NR” to “5G NR” throughout the report
2	01/10/2022	104751739BOX-001	KPS	VFV	Reference the original LTE and new 5G NR capabilities of this device in product description
3	02/02/2022	104751739BOX-001	KPS	VFV	Added justification for worst case for spurious emissions on page 165