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TEST REPORT

SCOPE OF WORK
EMISSIONS TESTING – Band 5 Radio Module, Model: RPM-A5A11-B05 (with RP5200i Host Unit)

REPORT NUMBER
104601904MPK-010

ISSUE DATE
April 13, 2021

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Class II Permissive Change
TEST REPORT

Report Number: 104601904MPK-010
Project Number: G104601904

Report Issue Date: April 13, 2021

Product Designation: Band 5 Radio Module
Model Tested: RPM-A5A11-B05 (with RP5200i Host Unit)

FCC ID: QHYRPM-A5A11-B05

to

Standards: CFR47 FCC Part 22

for

CommScope Technologies LLC

Tested by:	**Client:**
Intertek Testing Services NA, Inc.	CommScope Technologies LLC
1365 Adams Court	250 Apollo Drive
Menlo Park, CA 94025	Chelmsford, MA 01824
USA	USA

Report prepared by	**Report reviewed by**
Minh Ly / EMC Project Engineer	**Krishna Vemuri/ EMC Manager**

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Table of Contents

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	Effective Radiated Power CFR47 FCC Parts 2.1046 and 22.913 (a)	Pass
7	Frequency Stability CFR47 FCC Parts 2.1055 and 22.355	Pass
7	Transmitter Spurious Emissions CFR47 Parts 2.1051, 2.1053, 2.1057, and 22.917	Pass
9	List of Test Equipment	-
10	Revision History	-

3 Client Information

This EUT was tested at the request of:

Client: CommScope Technologies LLC
250 Apollo Drive
Chelmsford, MA 01824
USA

Contact: 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 5 Radio Module	CommScope Technologies LLC	RPM-A5A11-B05	20093000033

Received Date:	03/25/2021	**Test Started:**	03/25/2021
Received Condition:	Good	**Test Completed:**	04/08/2021
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 an OCXO which is disciplined from a 1588 reference clock.
It supports bandwidths of 5 and 10MHz with four modulations; TM1.1-QPSK, TM3.2-16QAM, TM3.1-64QAM, and TM3.1a-256QAM. The radio is fixed.
Per manufacturer, the lowest clock frequency generated in the equipment is 30.72MHz.

Description of Radio Host (provided by client)

The RP5200i baseband module host is an upgrade to the RP5000 host baseband module. It continues to support 2x2 MIMO narrow band legacy radio's as well as adding support for 4x4 MIMO wideband radio's. The processor has been upgraded to provide more processing power required for 4x4 MIMO wideband radios. The frequencies supported are shown in the table below:

LTE Band	Downlink	Uplink	Bandwidth DL/UL MHz	Duplex Spacing MHz	Band Gap MHz
5	869 – 894	824 – 849	70	45	20

The lowest clock frequency generated in the host is 33.33MHz.

Equipment Under Test Power Configuration			
Rated Voltage	**Rated Current**	**Rated Frequency**	**Number of Phases**
56 VDC	0.8 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.

Radio/Receiver Characteristics	
Frequency Band(s)	869-894 MHz
Modulation Type(s)	TM1.1-QPSK, TM3.2-16QAM, TM3.1-64 QAM, TM3.1a-256QAM
Maximum Output Power (conducted)	21.28 dBm (Conducted) 22.13 dBd (ERP)
Test Channels	Low, Middle, High Channels of 5 MHz and 10 MHz Bandwidths, Single Channel operation only
Occupied Bandwidth	9.95 MHz (Worst-case)
MIMO Information (# of Transmit and Receive antenna ports)	2x2 MIMO using cross polarized antennas and uncorrelated data streams
Equipment Type	Module in a host
Antenna Type and Gain	Detachable Antenna: +3 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**
--	USB Cable	1.0	Shielded	None	PDA to Laptop
--	LAN (POE Power Cable)	3.0	Unshielded	None	PDA to EUT
--	LAN (Communication)	3.0	Unshielded	None	PDA to Laptop

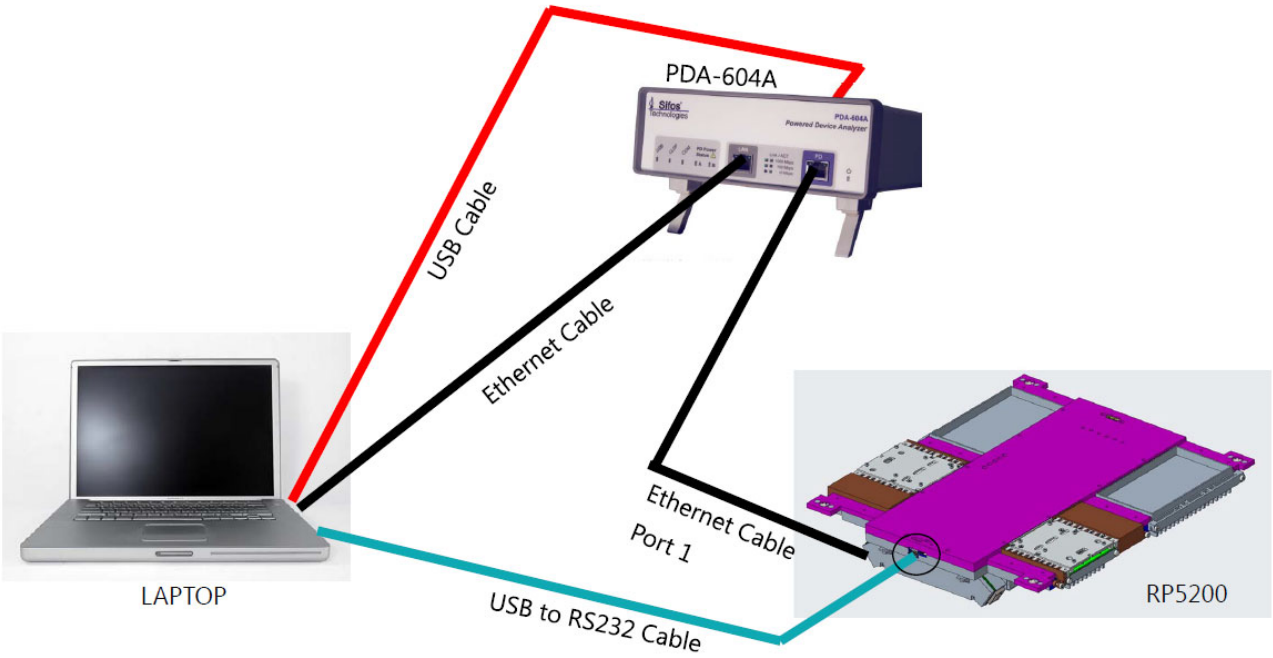
Support Equipment			
Description	**Manufacturer**	**Model Number**	**Serial Number**
Laptop	Dell	LATITUDE E6440	None
Power Device Analzyer	Sifos Technologies	PDA-604A	604A0033
OneCell® RP5200I*	CommScope Technologies LLC	RP5200I Baseband module	05321060002

*Radio host used for testing.

5.1 Method:

Configuration as required by ANSI C63.26-2015, and CFR47 FCC Part 22 (06/2020).

5.2 EUT Block Diagram:



5.3 Justification:

For radiated emission measurements the EUT is placed on a non-conductive table.

Class II permissive change testing was performed based on Band 5 Radio Module, Model: RPM-A5A11-B05 with RP5200i Host Unit.

6 Effective Radiated Power

6.1 Requirement:

The ERP of base stations and repeaters must not exceed:
- 500 watts per emission; or
- 400 watts/MHz (PSD) per section.

6.2 Procedure:

The procedure described in FCC Publication 971168 D01 Power Meas License Digital Systems v03r01 was used. Tests are performed in accordance with ANSI C63.26 Section 5.2.4.4.1 and CFR47 FCC Parts 2.1046.

A spectrum analyzer was connected to the antenna port of the transmitter and the average power was measured using the average power function. Output power from the two antenna ports was not summed since the data streams are uncorrelated and the antennas are cross polarized.

E.R.P Power = Conducted Output Power (dBm) + Antenna gain (dBi) -2.15 (dBi)

6.3 Results:

The maximum conducted output power was measured to be 21.28 dBm, which is much less than the ERP limit. The sample tested was found to Comply.

Band 5, Bandwidth: 5 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)	ERP (dBm)
Low	871.5	ANT0	20.13	20.98
		ANT1	19.72	20.57
Mid	881.5	ANT0	21.07	21.92
		ANT1	21.16	22.01
High	891.5	ANT0	21.09	21.94
		ANT1	21.21	22.06

Band 5, Bandwidth: 5 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)	ERP (dBm)
Low	871.5	ANT0	20.99	21.84
		ANT1	20.65	21.50
Mid	881.5	ANT0	21.01	21.86
		ANT1	21.05	21.90
High	891.5	ANT0	21.20	22.05
		ANT1	21.04	21.89

Band 5, Bandwidth: 5 MHz, Modulation: TM3.1-64QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)	ERP (dBm)
Low	871.5	ANT0	20.77	21.62
		ANT1	20.50	21.35
Mid	881.5	ANT0	21.06	21.91
		ANT1	21.13	21.98
High	891.5	ANT0	21.15	22.00
		ANT1	21.06	21.91

Band 5, Bandwidth: 5 MHz, Modulation: TM3.1a-256QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)	ERP (dBm)
Low	871.5	ANT0	20.76	21.61
		ANT1	20.65	21.50
Mid	881.5	ANT0	21.10	21.95
		ANT1	21.20	22.05
High	891.5	ANT0	21.20	22.05
		ANT1	21.08	21.93

*Worst case E.R.P (highest level) = 21.21 + 3.0 – 2.15 = 22.06 dBm

Band 5, Bandwidth: 10 MHz, Modulation: TM1.1-QPSK

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)	ERP (dBm)
Low	874.0	ANT0	21.28	22.13
		ANT1	20.99	21.84
Mid	881.5	ANT0	20.94	21.79
		ANT1	21.01	21.86
High	889.0	ANT0	20.94	21.79
		ANT1	20.89	21.74

Band 5, Bandwidth: 10 MHz, Modulation: TM3.2-16QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)	ERP (dBm)
Low	874.0	ANT0	21.12	21.97
		ANT1	20.82	21.67
Mid	881.5	ANT0	21.13	21.98
		ANT1	21.06	21.91
High	889.0	ANT0	21.07	21.92
		ANT1	20.94	21.79

Band 5, Bandwidth: 10 MHz, Modulation: TM3.1-64QAM

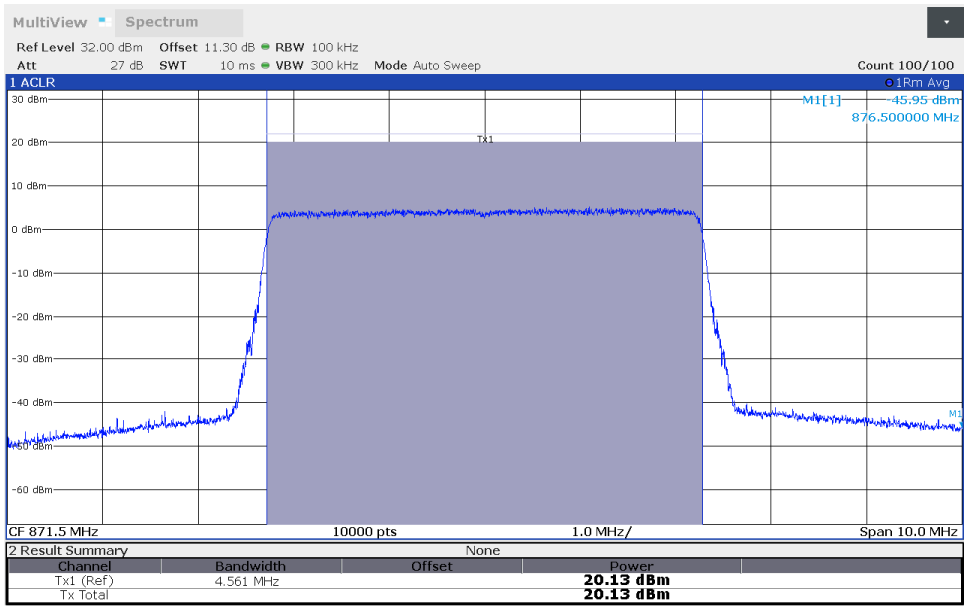
Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)	ERP (dBm)
Low	874.0	ANT0	21.08	21.93
		ANT1	20.77	21.62
Mid	881.5	ANT0	21.02	21.87
		ANT1	21.07	21.92
High	889.0	ANT0	21.01	21.86
		ANT1	20.94	21.79

Band 5, Bandwidth: 10 MHz, Modulation: TM3.1a-256QAM

Channel	Frequency (MHz)	Antenna Port	Output Power (dBm)	ERP (dBm)
Low	874.0	ANT0	21.21	22.06
		ANT1	21.15	22.00
Mid	881.5	ANT0	21.04	21.89
		ANT1	21.11	21.96
High	889.0	ANT0	21.00	21.85
		ANT1	20.94	21.79

*Worst case E.R.P (highest level) = 21.28 + 3.0 – 2.15 = 22.13 dBm

TM1.1-QPSK_5 MHz Bandwidth
Band 5, ANT0, Low Channel



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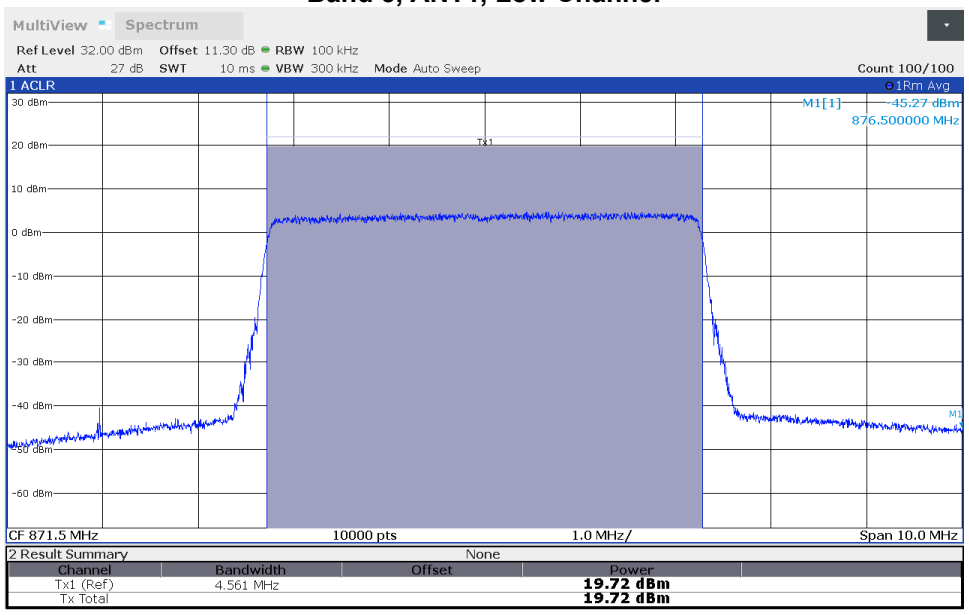
Band 5, ANT1, Low Channel



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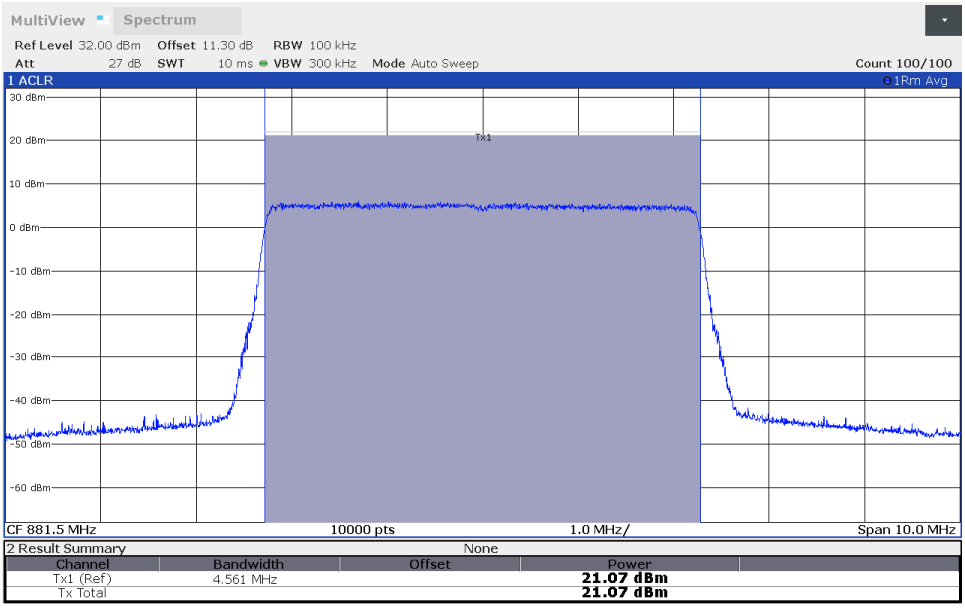

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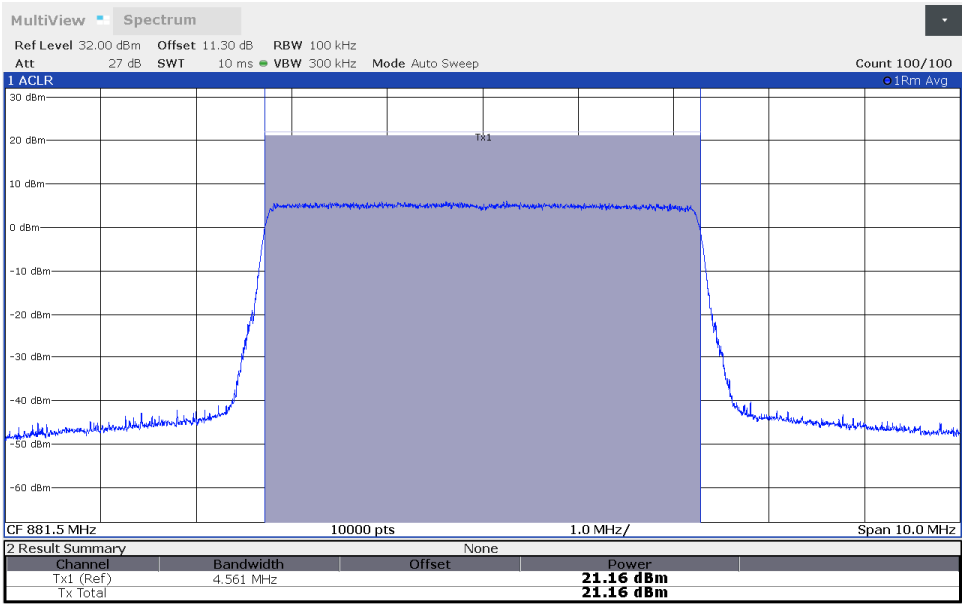
Band 5, ANT1, Mid Channel



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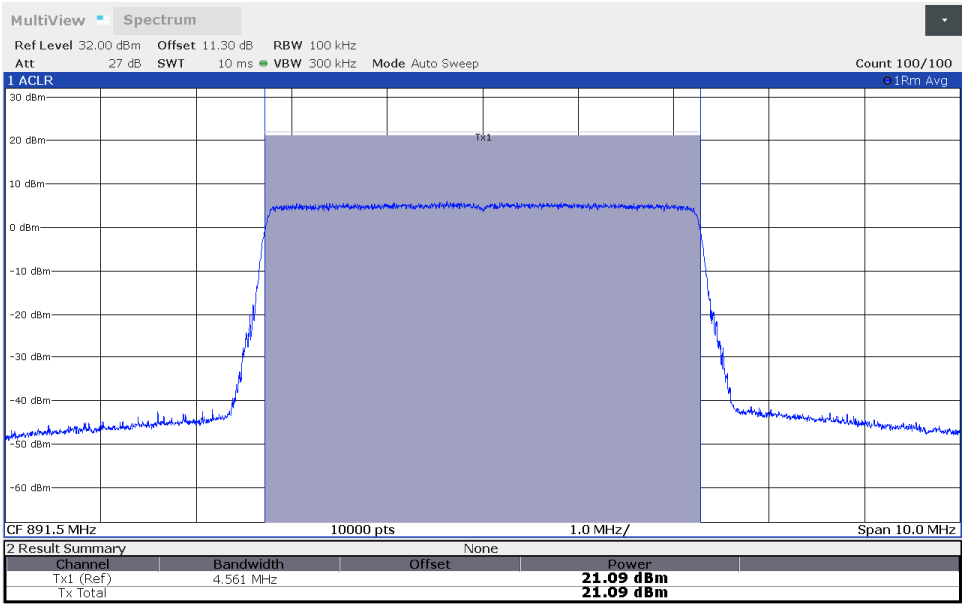

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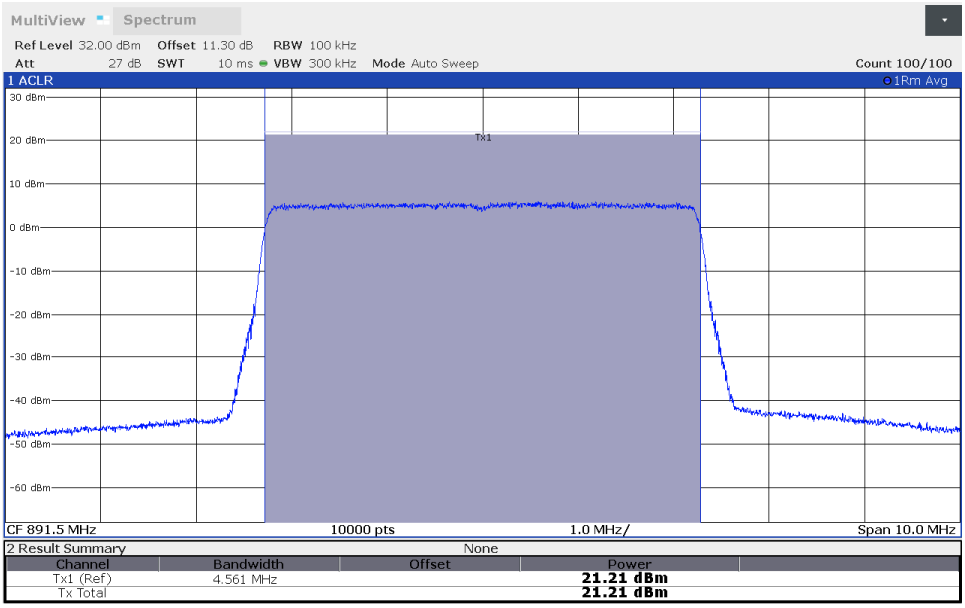
Band 5, ANT1, High Channel



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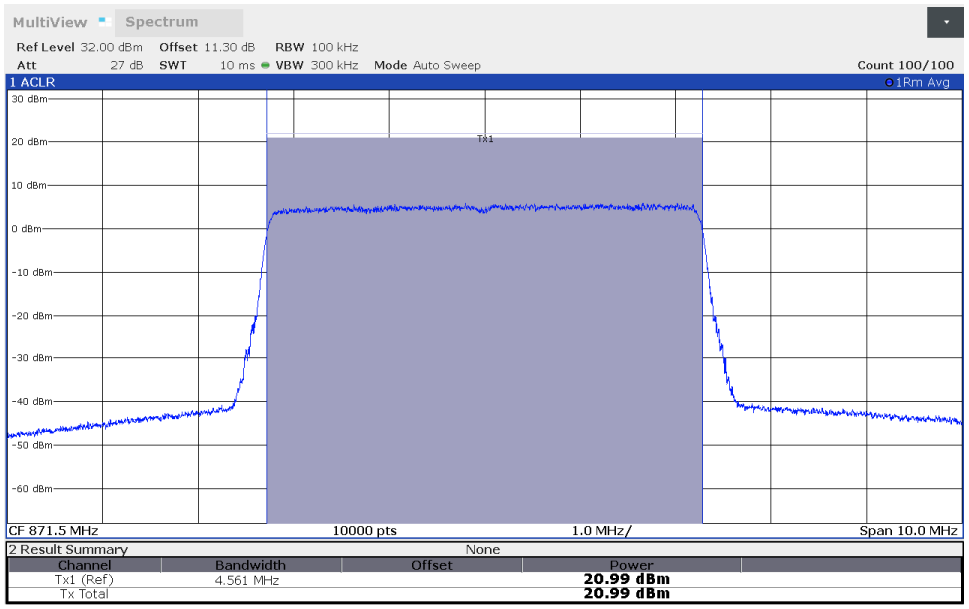
TM3.2-16QAM_5 MHz Bandwidth
Band 5, ANT0, Low Channel



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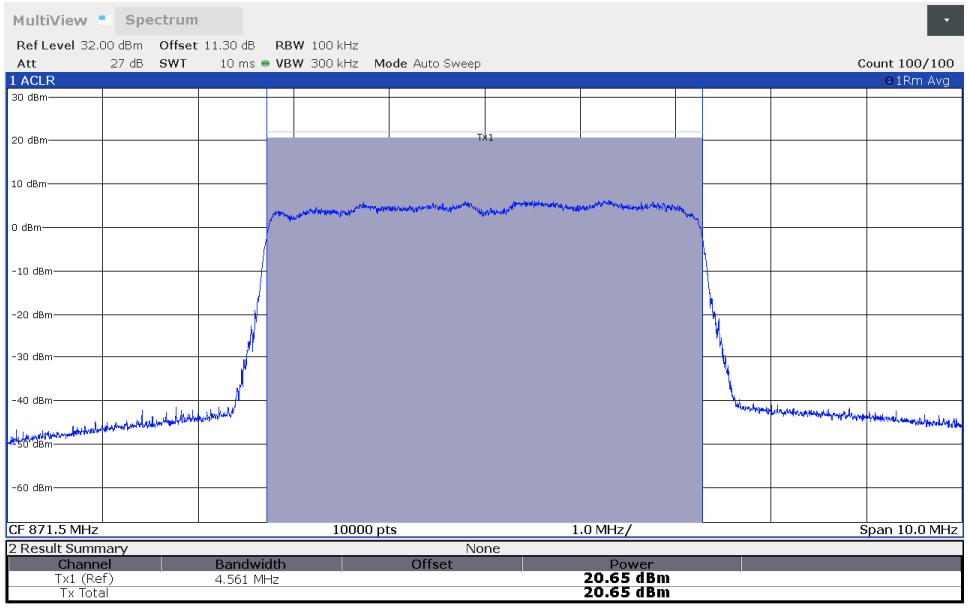
TM3.2-16QAM_5 MHz Bandwidth
Band 5, ANT1, Low Channel



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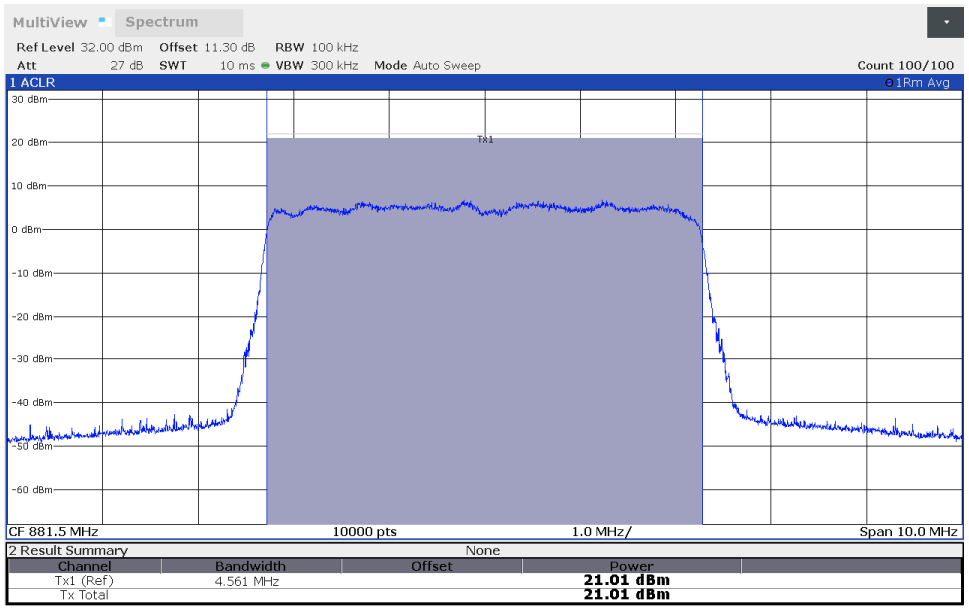

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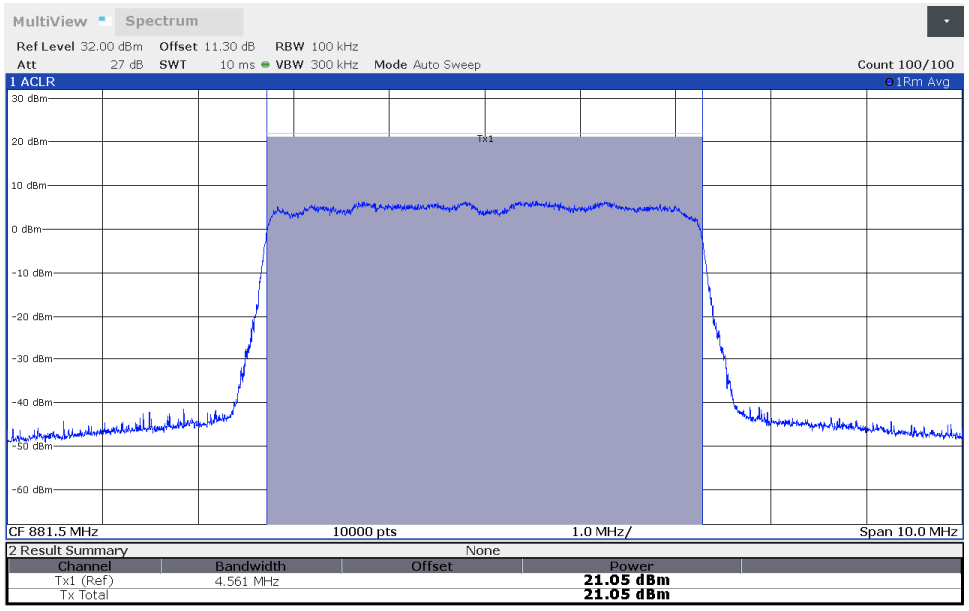

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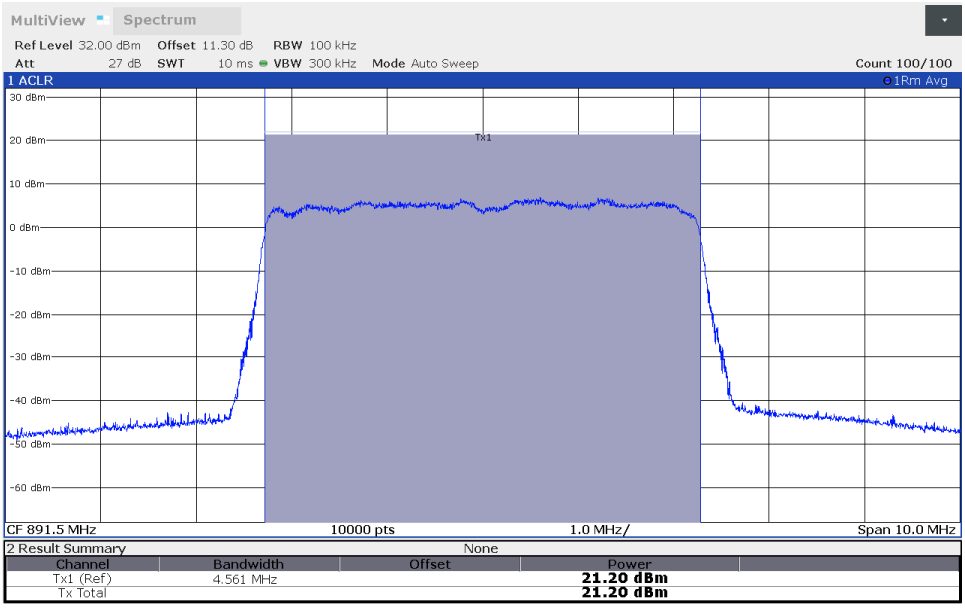
Band 5, ANT0, High Channel



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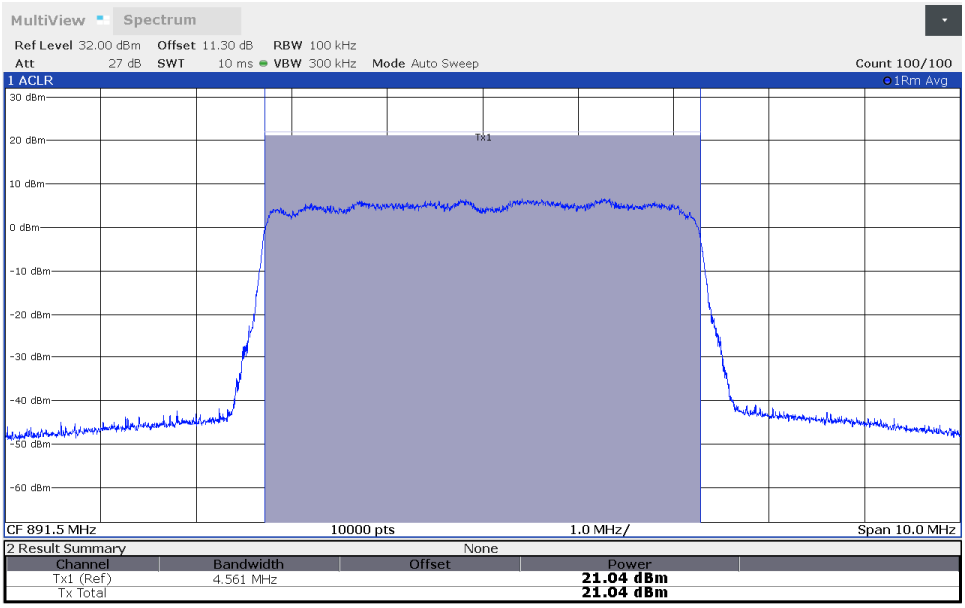
Band 5, ANT1, High Channel



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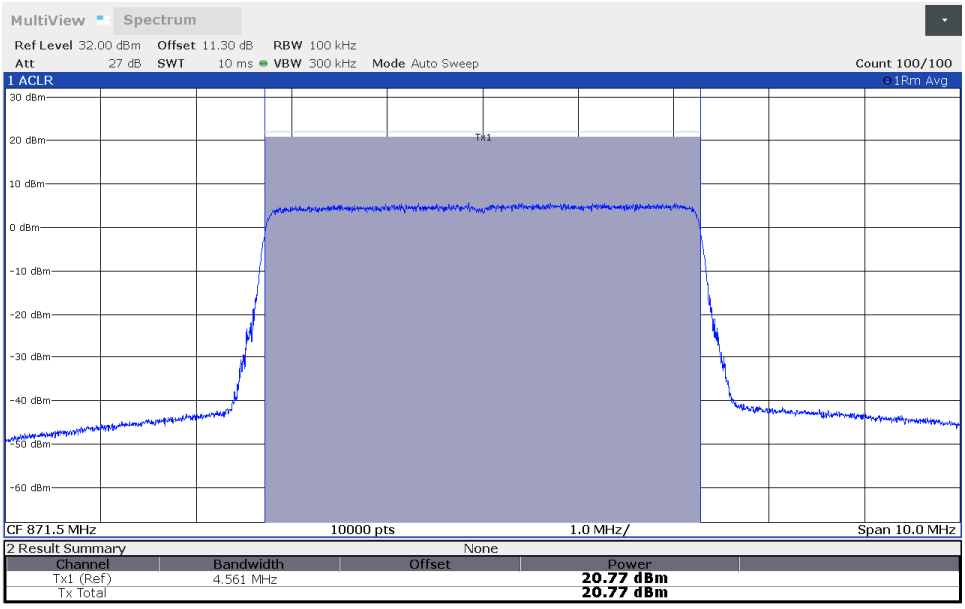
TM3.1-64QAM_5 MHz Bandwidth
Band 5, ANT0, Low Channel



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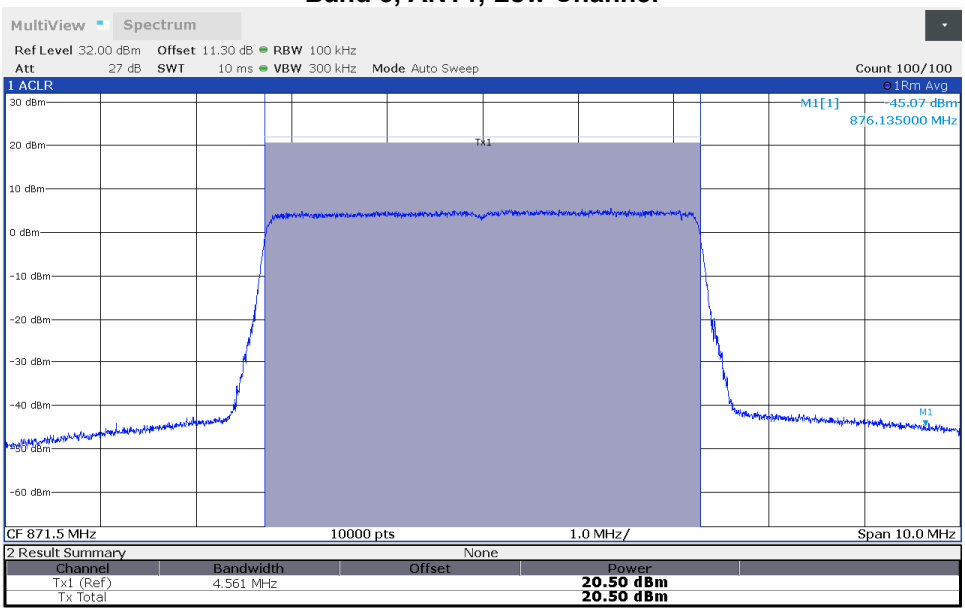

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TM3.1-64QAM_5 MHz Bandwidth
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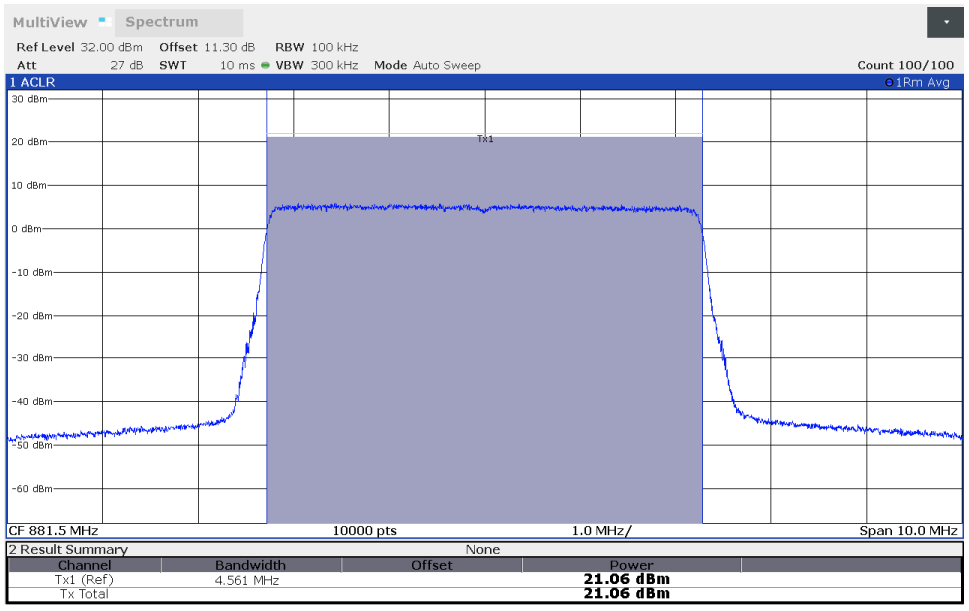

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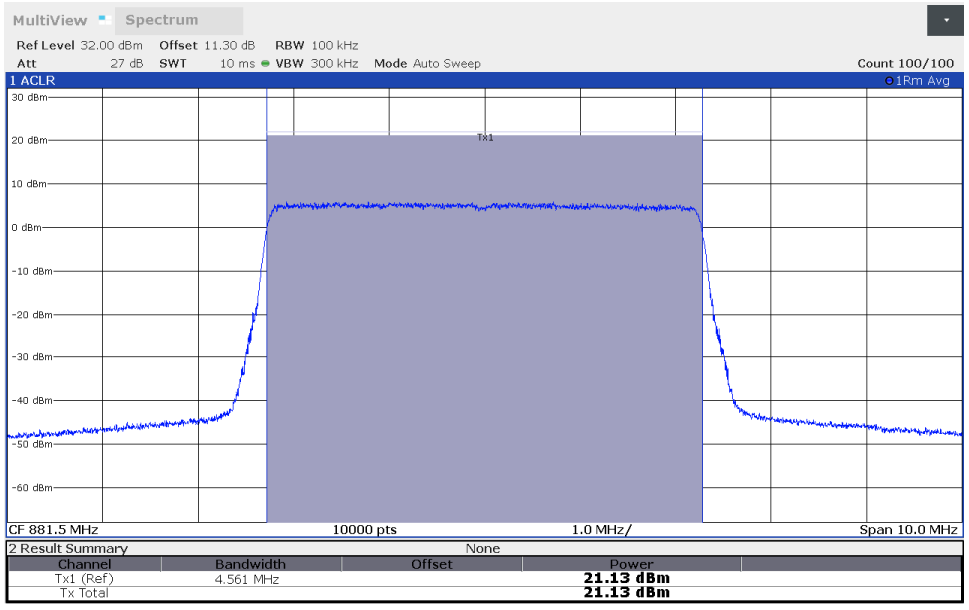
TM3.1-64QAM_5 MHz Bandwidth
Band 5, ANT1, Mid Channel



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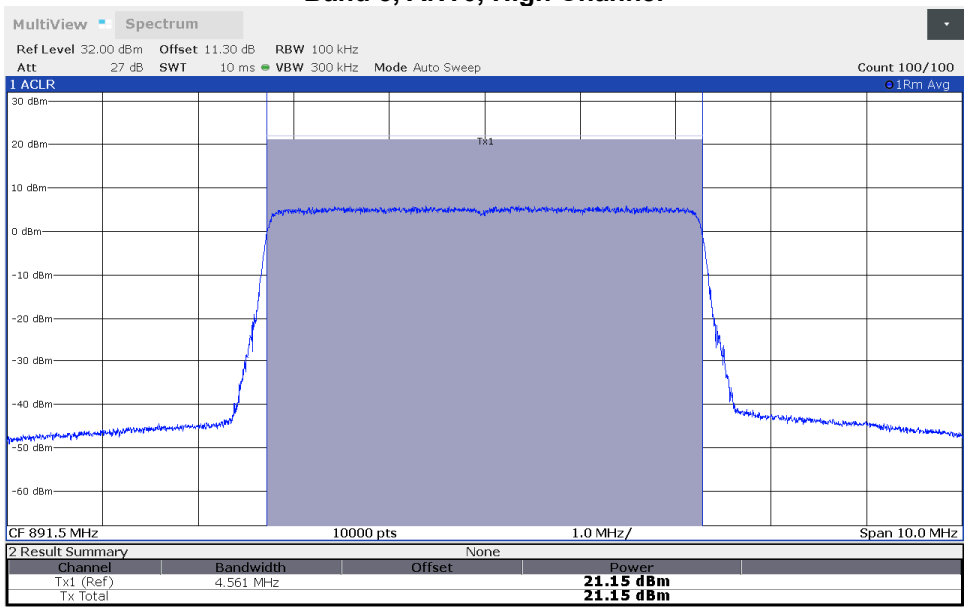
TM3.1-64QAM_5 MHz Bandwidth
Band 5, ANT0, High Channel



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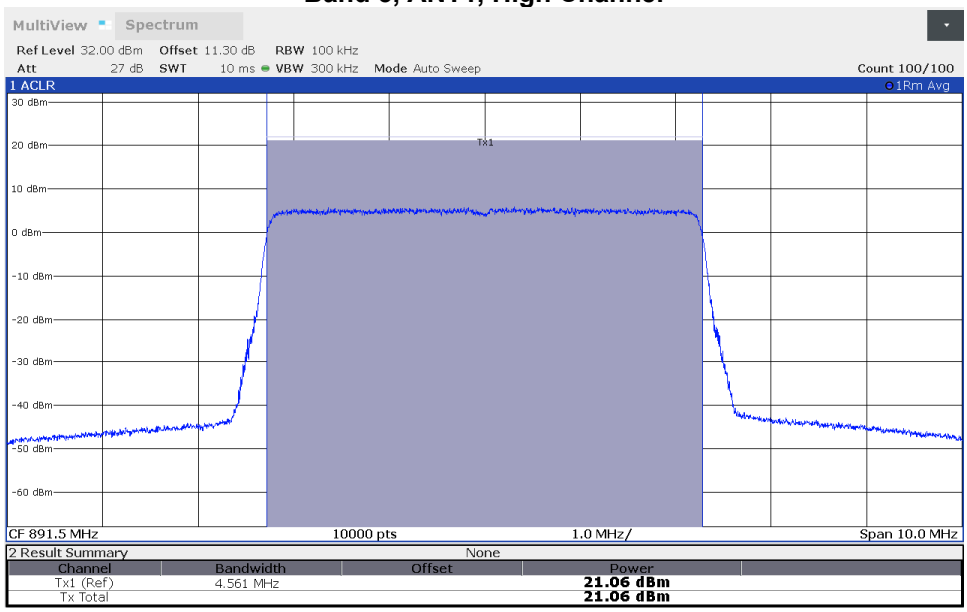
TM3.1-64QAM_5 MHz Bandwidth
Band 5, ANT1, High Channel



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TM3.1a-256QAM_5 MHz Bandwidth
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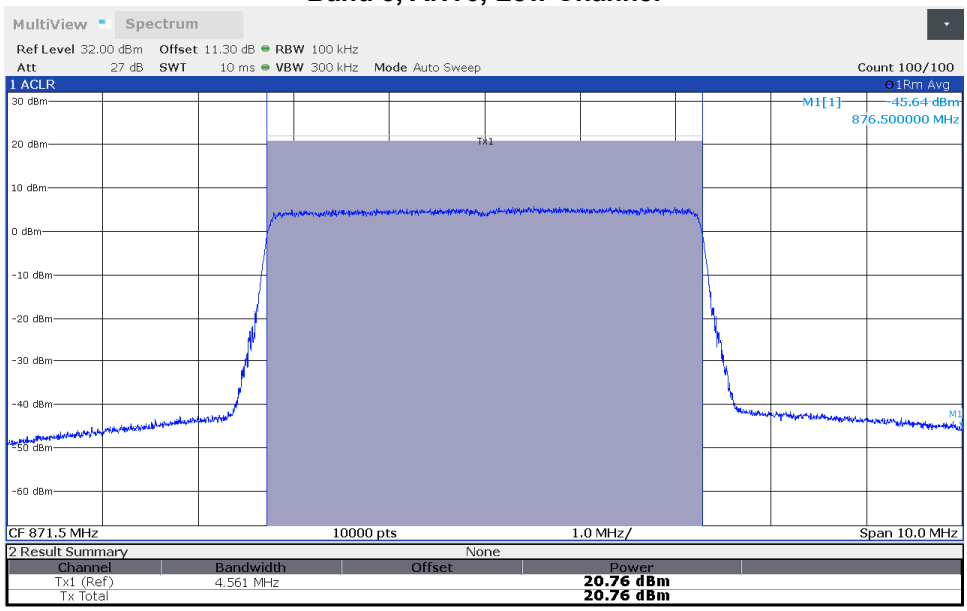

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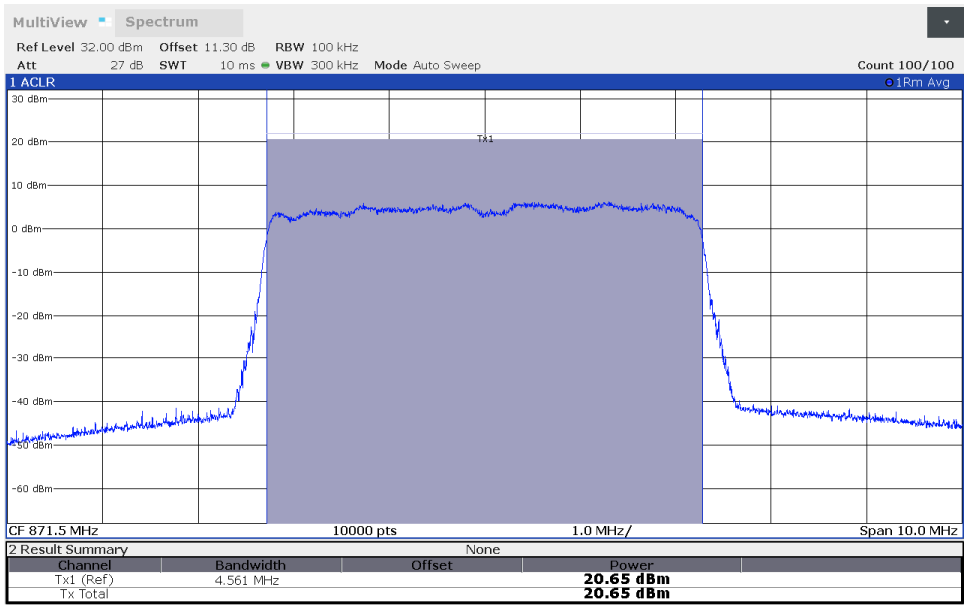
TM3.1a-256QAM_5 MHz Bandwidth
Band 5, ANT1, Low Channel



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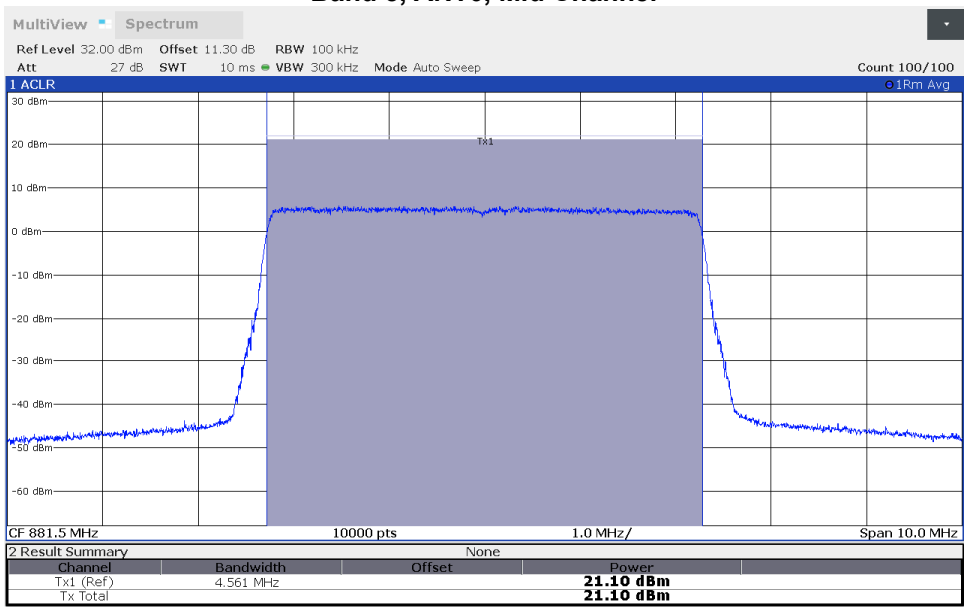
TM3.1a-256QAM_5 MHz Bandwidth
Band 5, ANT0, Mid Channel



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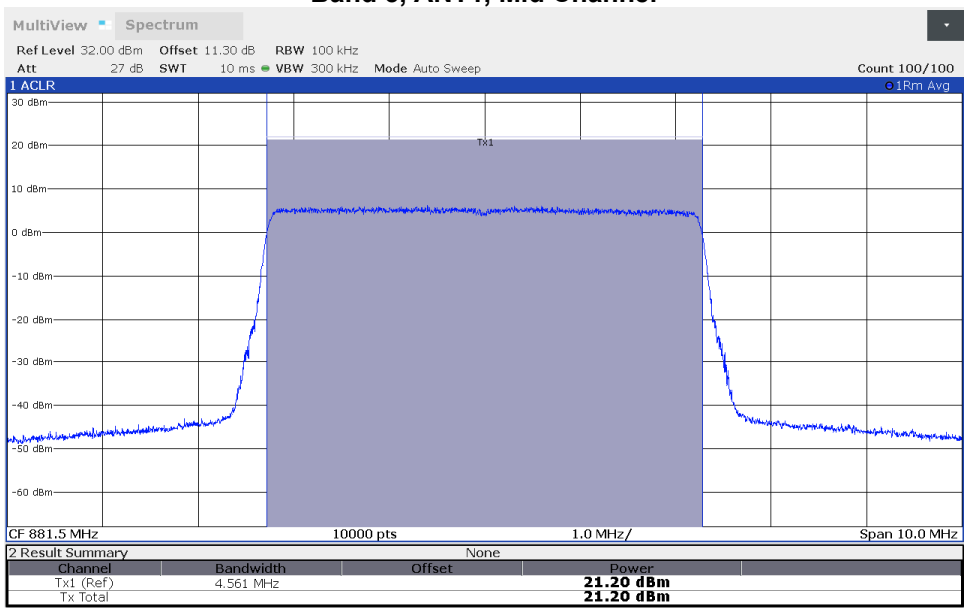

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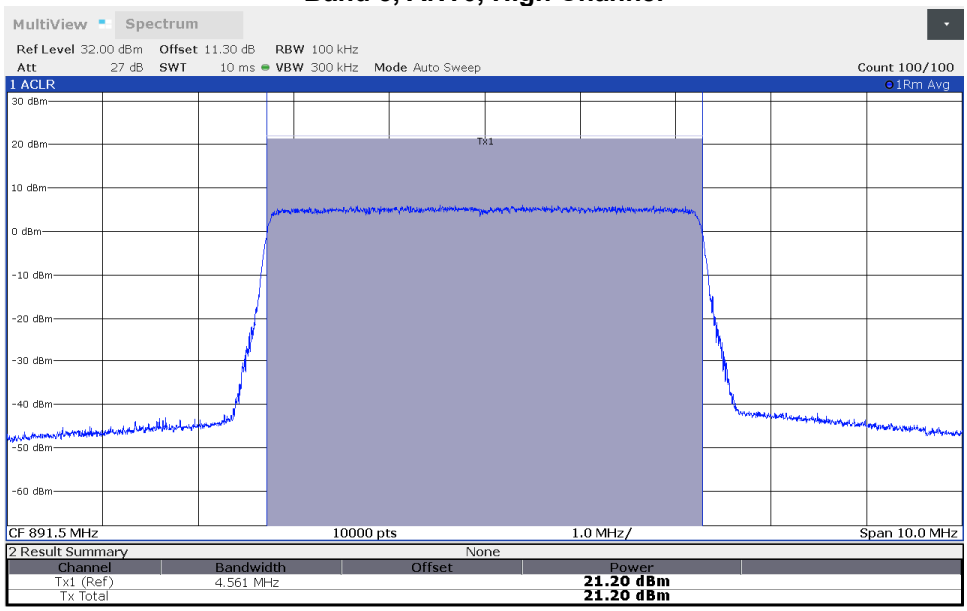

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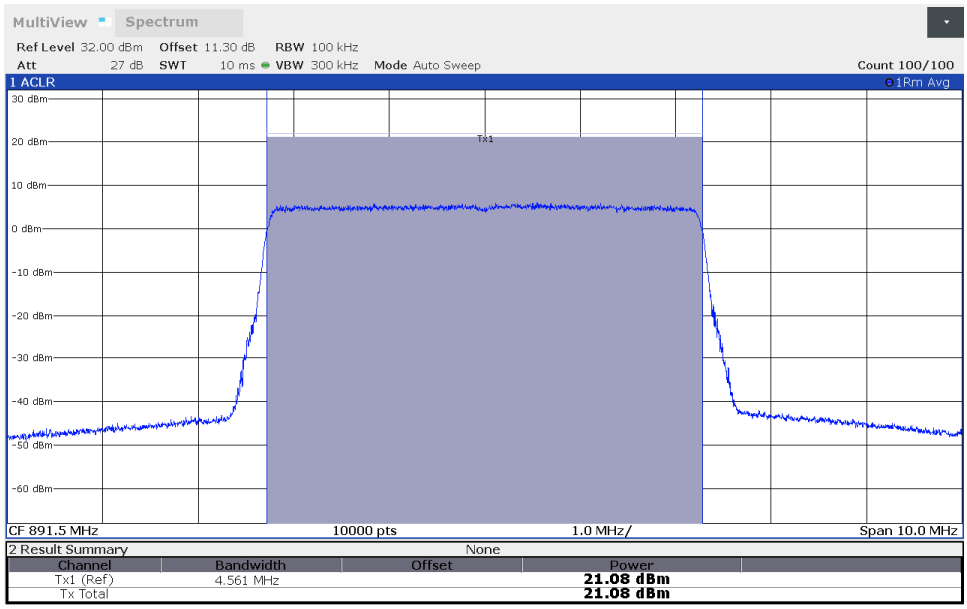
Band 5, ANT1, High Channel



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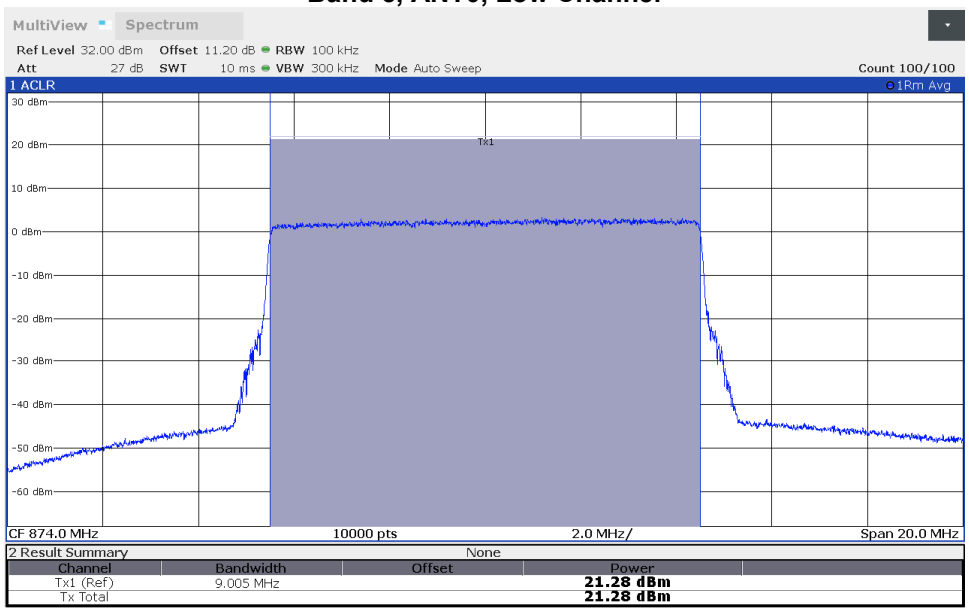
TM1.1-QPSK_10 MHz Bandwidth
Band 5, ANT0, Low Channel



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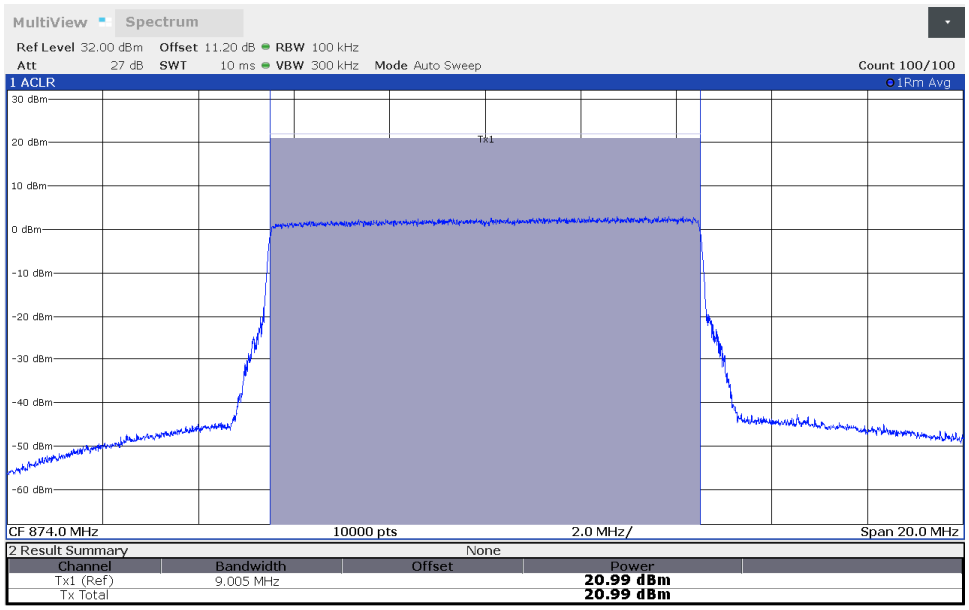
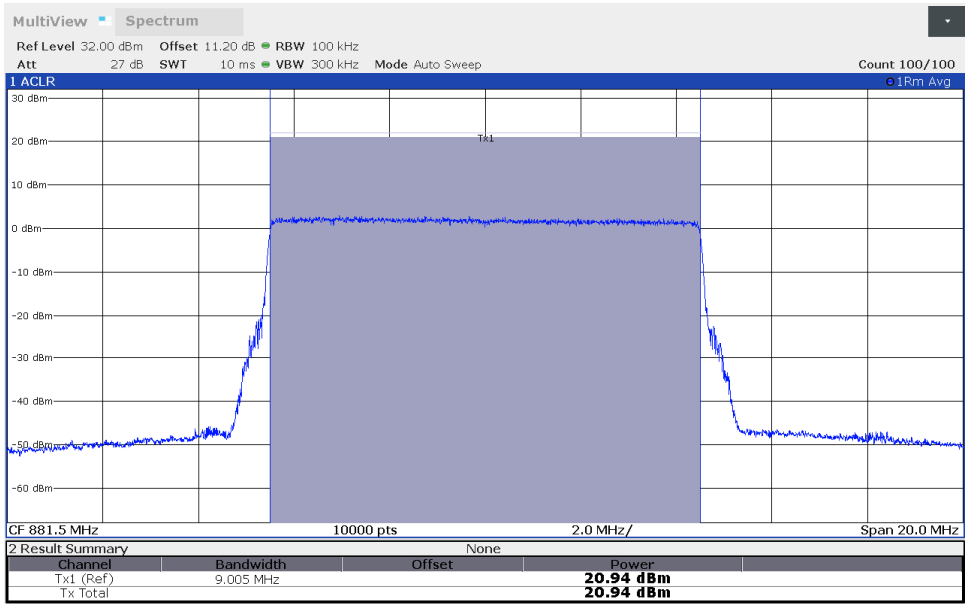
TM1.1-QPSK_10 MHz Bandwidth
Band 5, ANT1, Low Channel



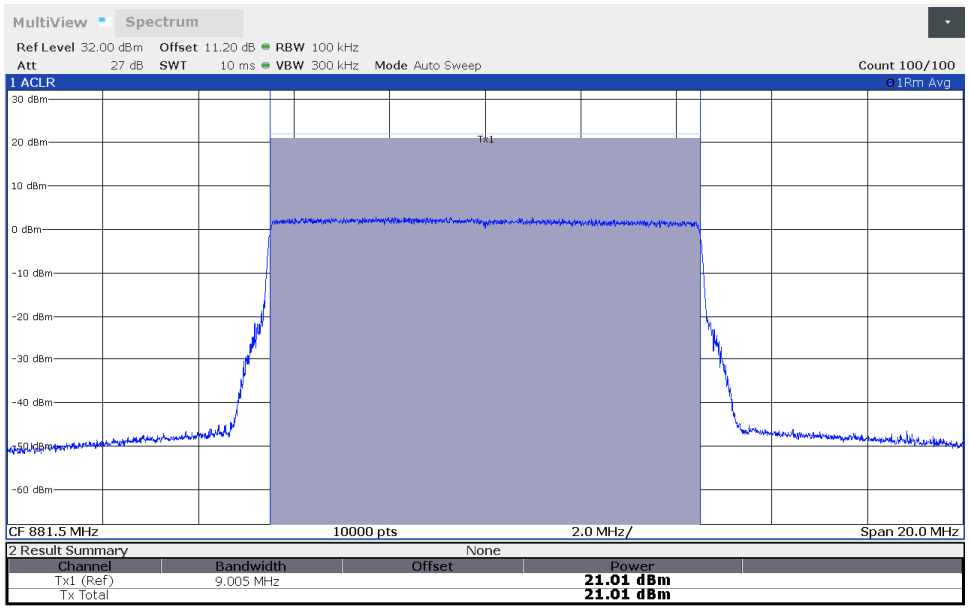
18:06:57 26.03.2021

TM1.1-QPSK_10 MHz Bandwidth
Band 5, ANT0, Mid Channel



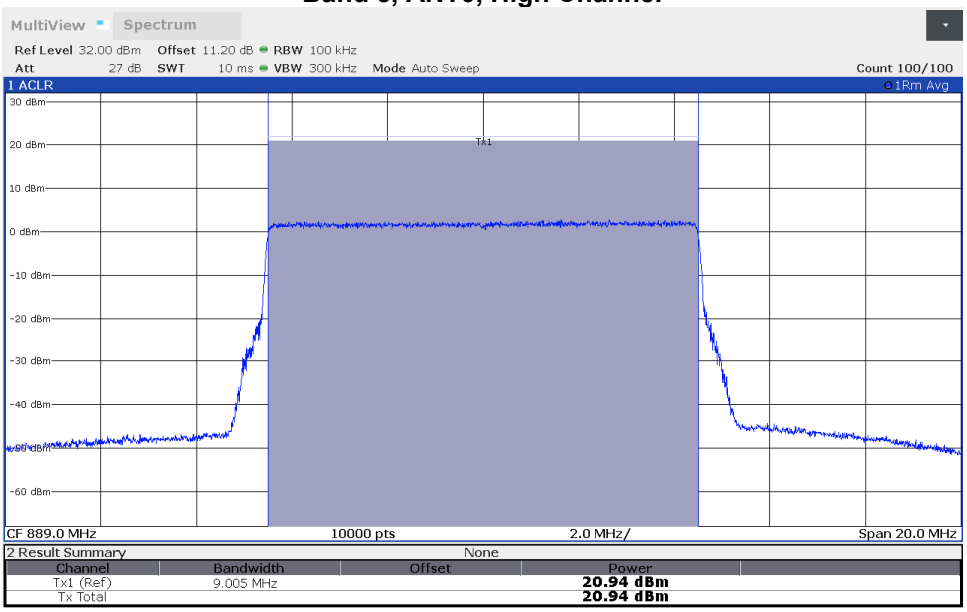
18:08:13 26.03.2021

TM1.1-QPSK_10 MHz Bandwidth
Band 5, ANT1, Mid Channel



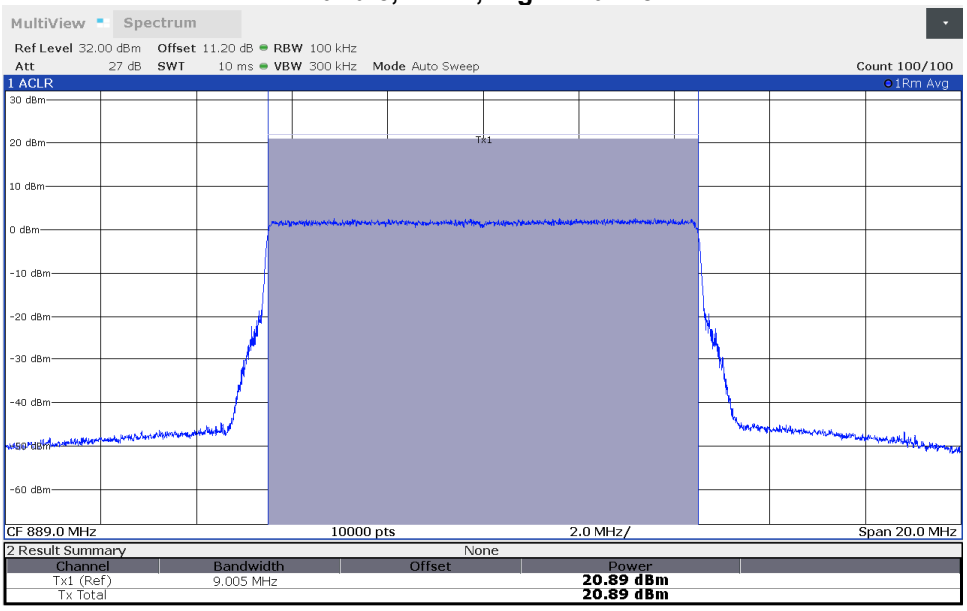
18:07:44 26.03.2021

TM1.1-QPSK_10 MHz Bandwidth
Band 5, ANT0, High Channel



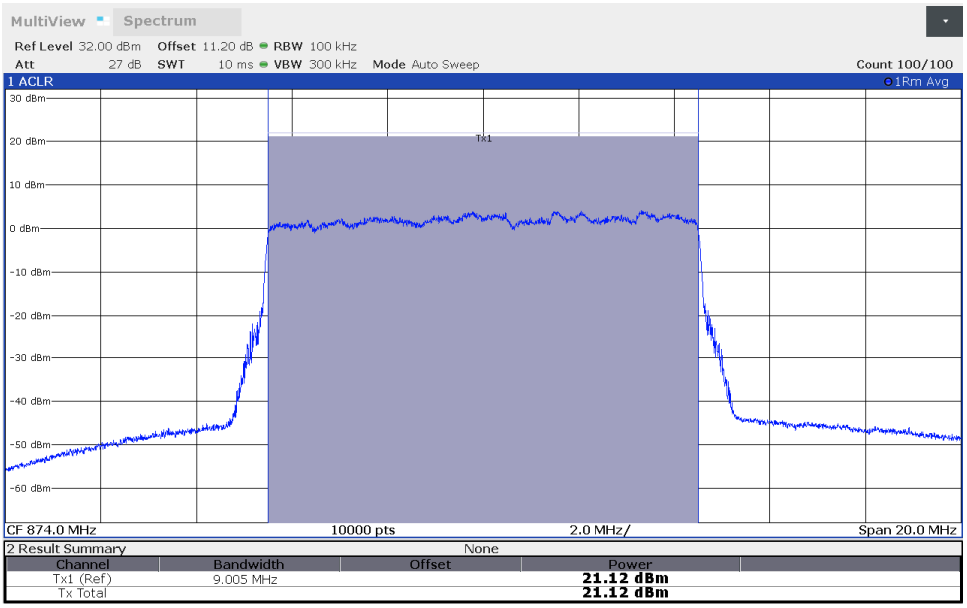
18:08:55 26.03.2021

TM1.1-QPSK_10 MHz Bandwidth
Band 5, ANT1, High Channel



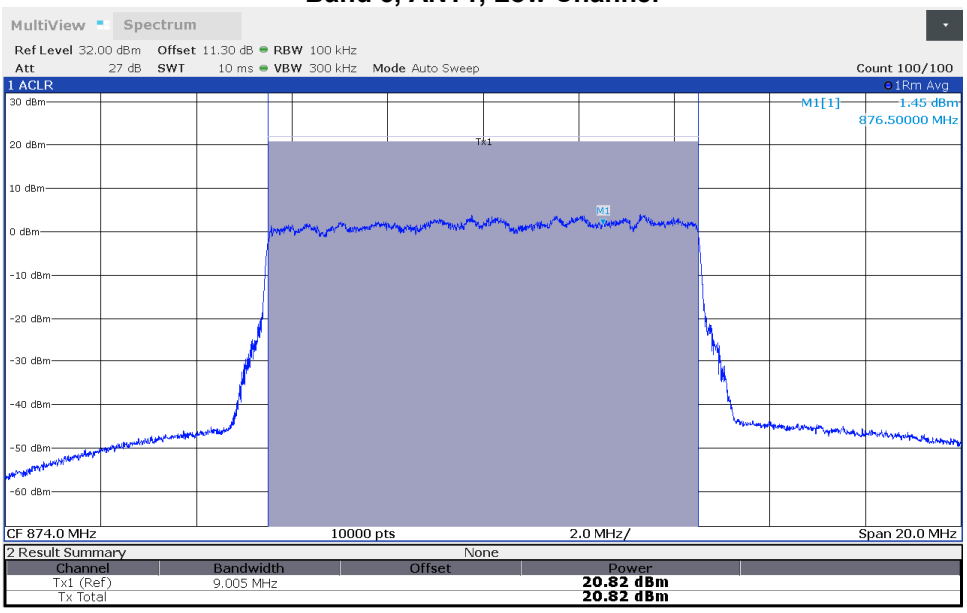
18:09:20 26.03.2021

TM3.2-16QAM_10 MHz Bandwidth
Band 5, ANT0, Low Channel



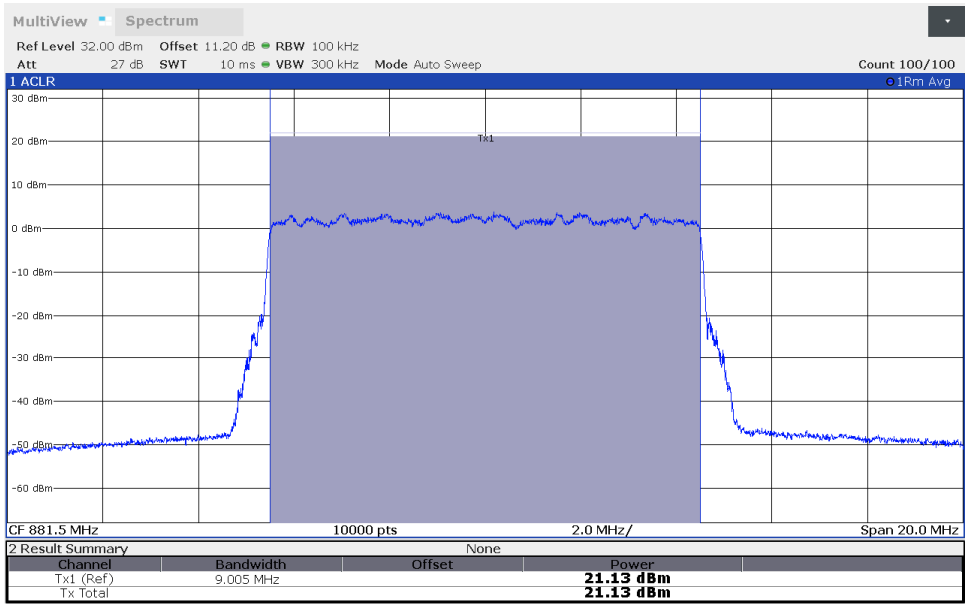
18:19:00 26.03.2021

TM3.2-16QAM_10 MHz Bandwidth
Band 5, ANT1, Low Channel



18:17:22 29.03.2021

TM3.2-16QAM_10 MHz Bandwidth
Band 5, ANT0, Mid Channel



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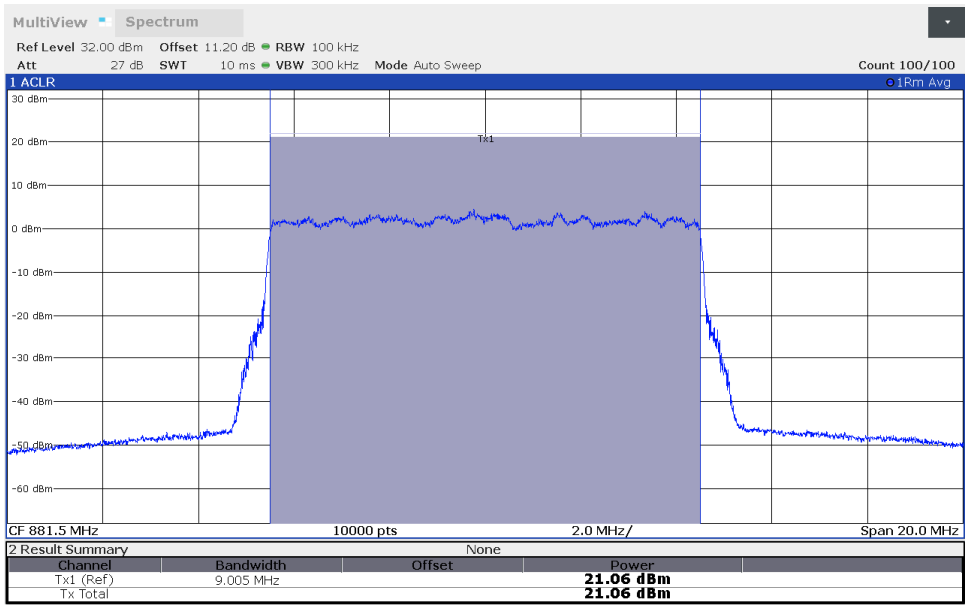
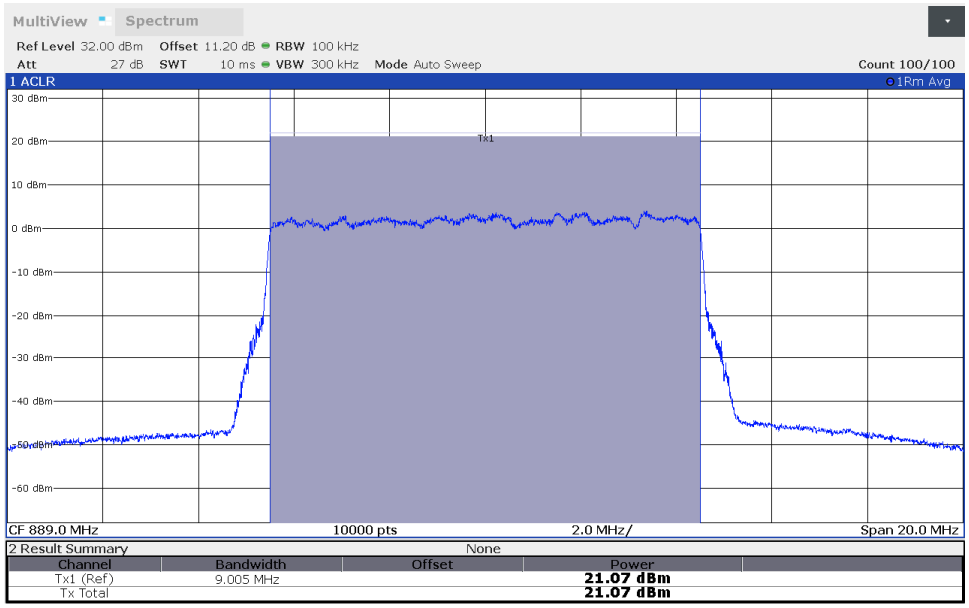
TM3.2-16QAM_10 MHz Bandwidth
Band 5, ANT1, Mid Channel



18:20:02 26.03.2021

TM3.2-16QAM_10 MHz Bandwidth
Band 5, ANT0, High Channel



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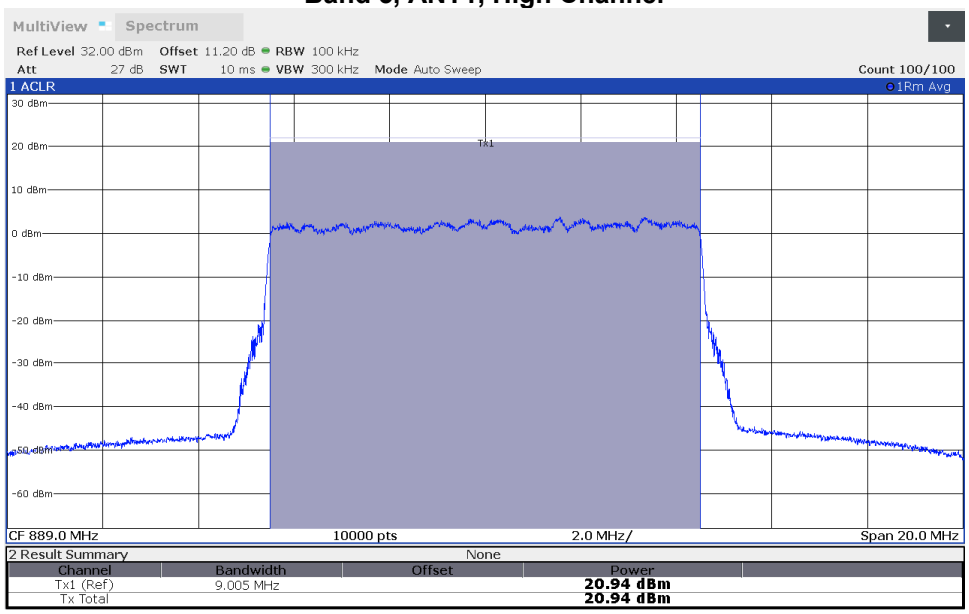
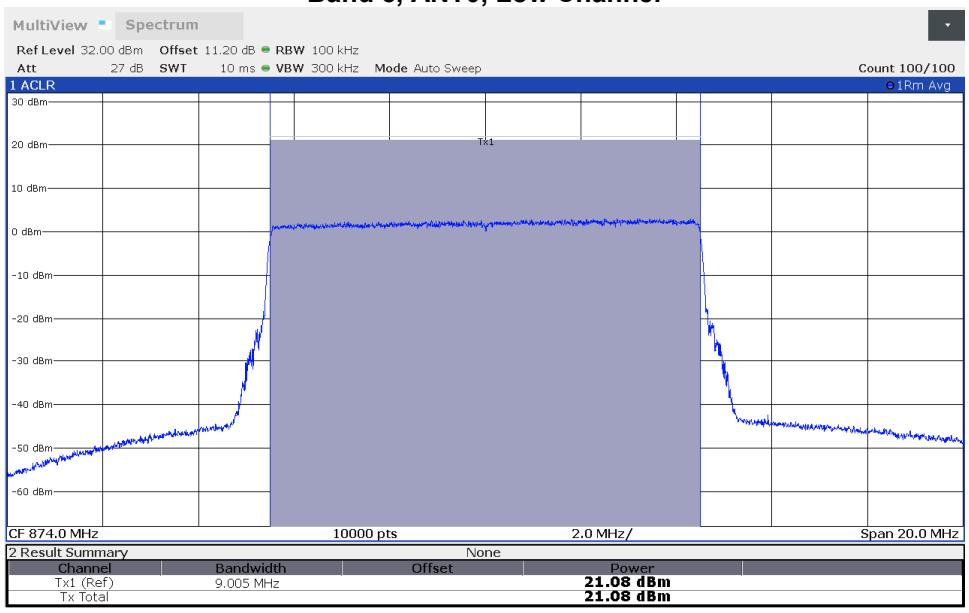
TM3.2-16QAM_10 MHz Bandwidth
Band 5, ANT1, High Channel



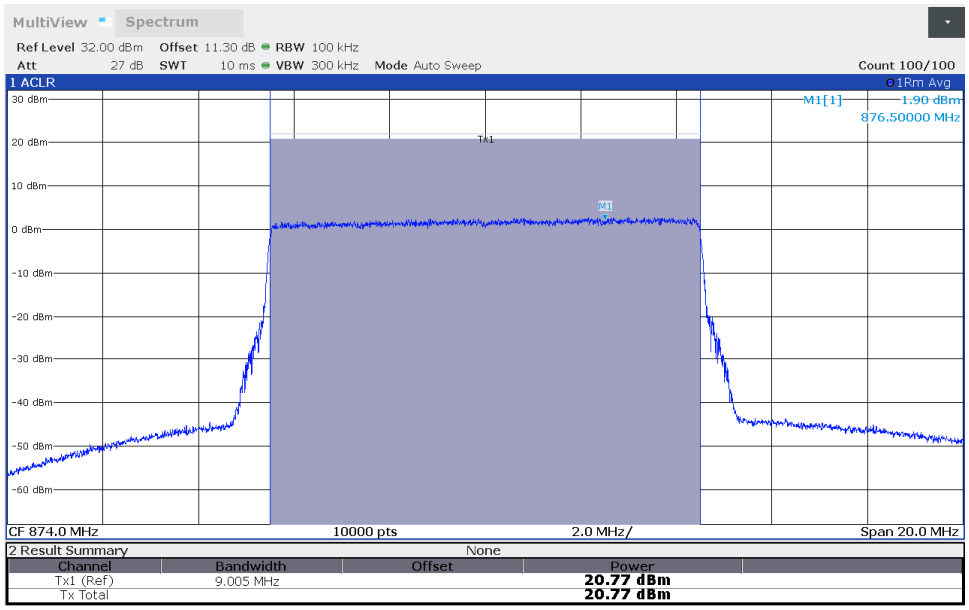
18:20:38 26.03.2021

TM3.1-64QAM_10 MHz Bandwidth
Band 5, ANT0, Low Channel



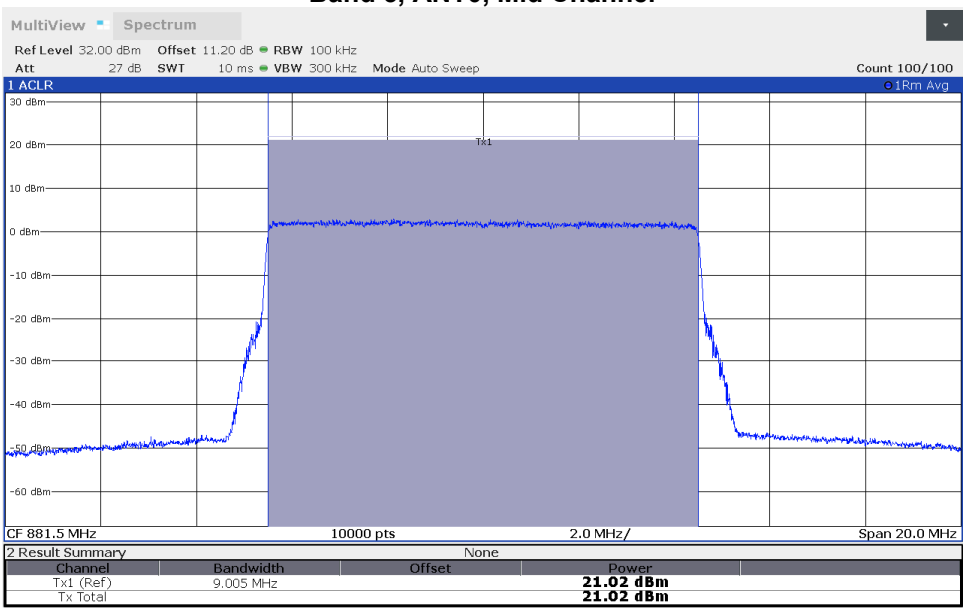
18:27:21 26.03.2021

TM3.1-64QAM_10 MHz Bandwidth
Band 5, ANT1, Low Channel



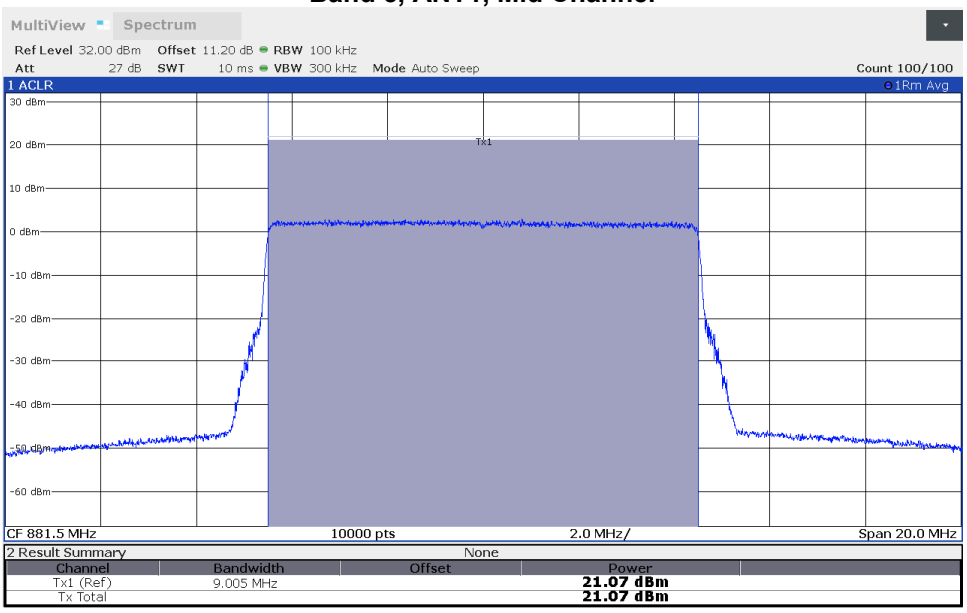
18:11:31 29.03.2021

TM3.1-64QAM_10 MHz Bandwidth
Band 5, ANT0, Mid Channel



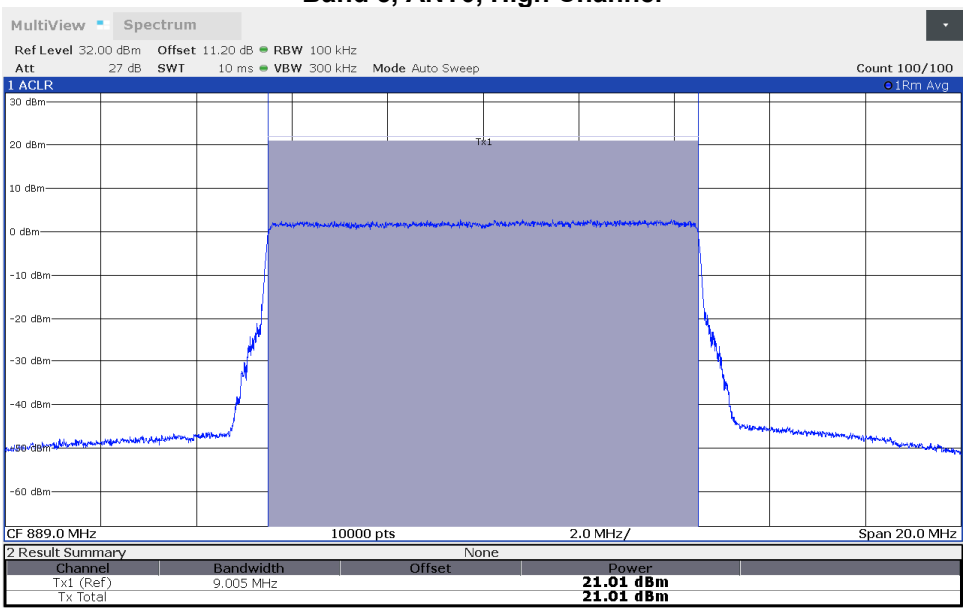
18:28:38 26.03.2021

TM3.1-64QAM_10 MHz Bandwidth
Band 5, ANT1, Mid Channel



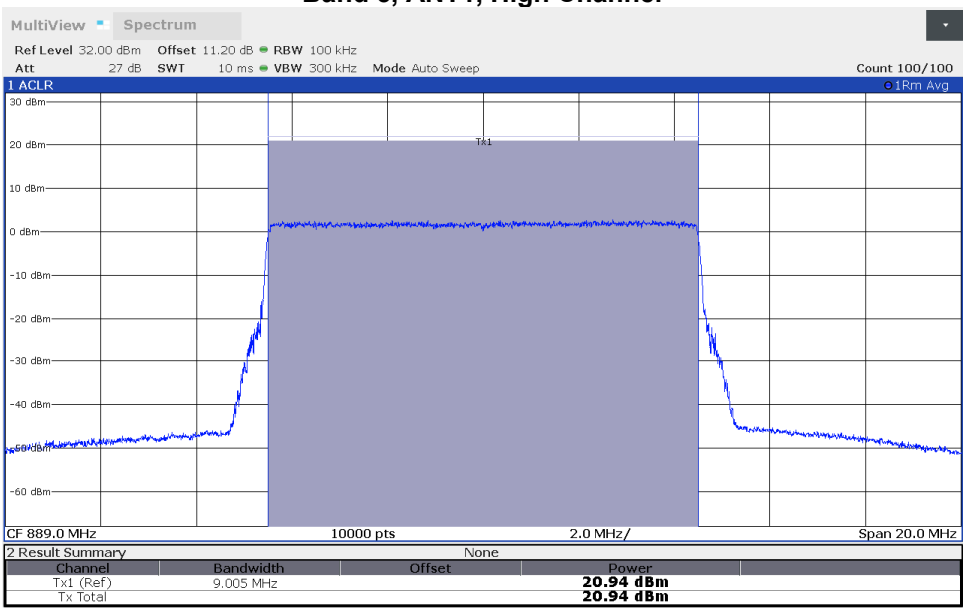
18:28:19 26.03.2021

TM3.1-64QAM_10 MHz Bandwidth
Band 5, ANT0, High Channel



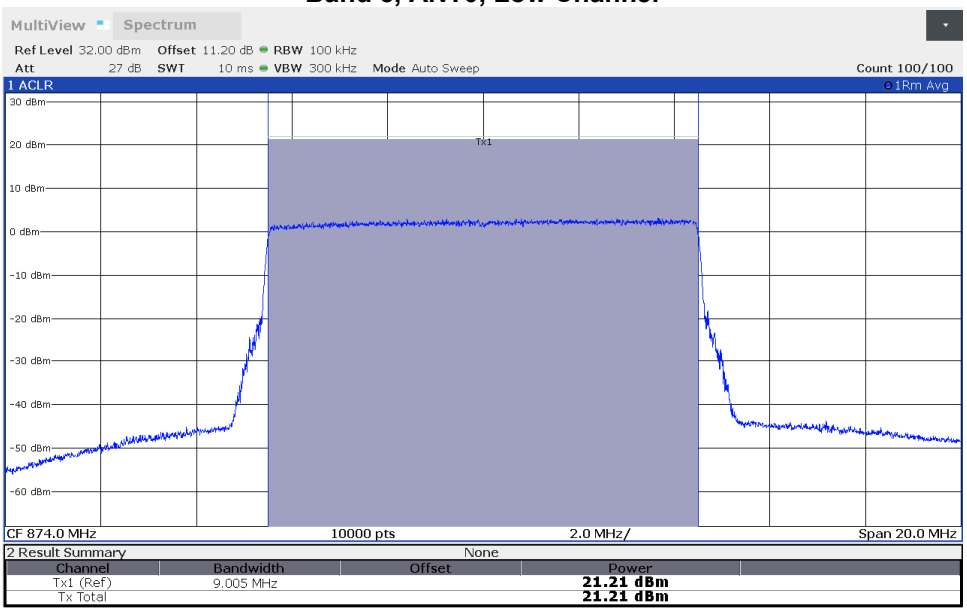
18:29:19 26.03.2021

TM3.1-64QAM_10 MHz Bandwidth
Band 5, ANT1, High Channel



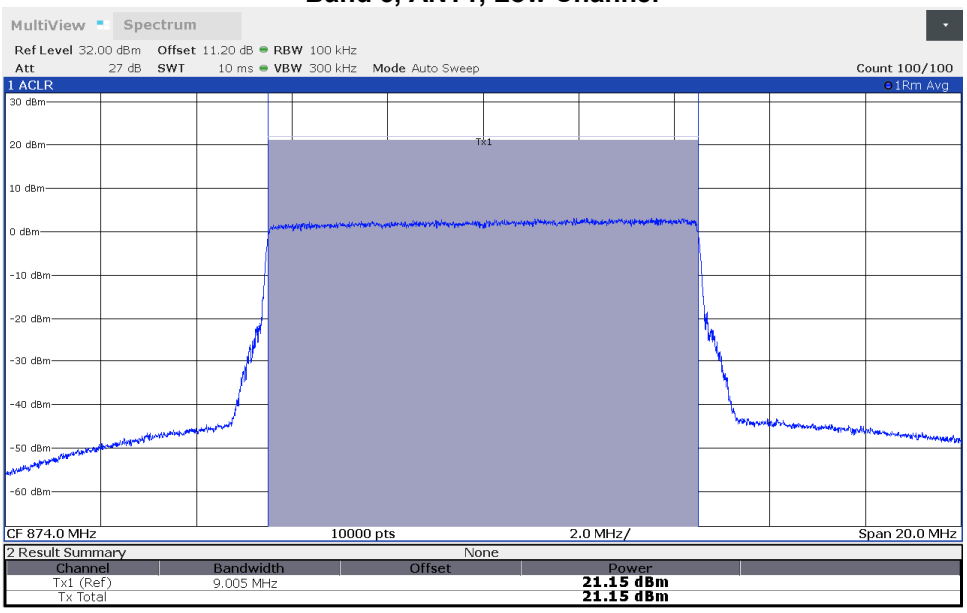
18:29:43 26.03.2021

TM3.1a-256QAM_10 MHz Bandwidth
Band 5, ANT0, Low Channel



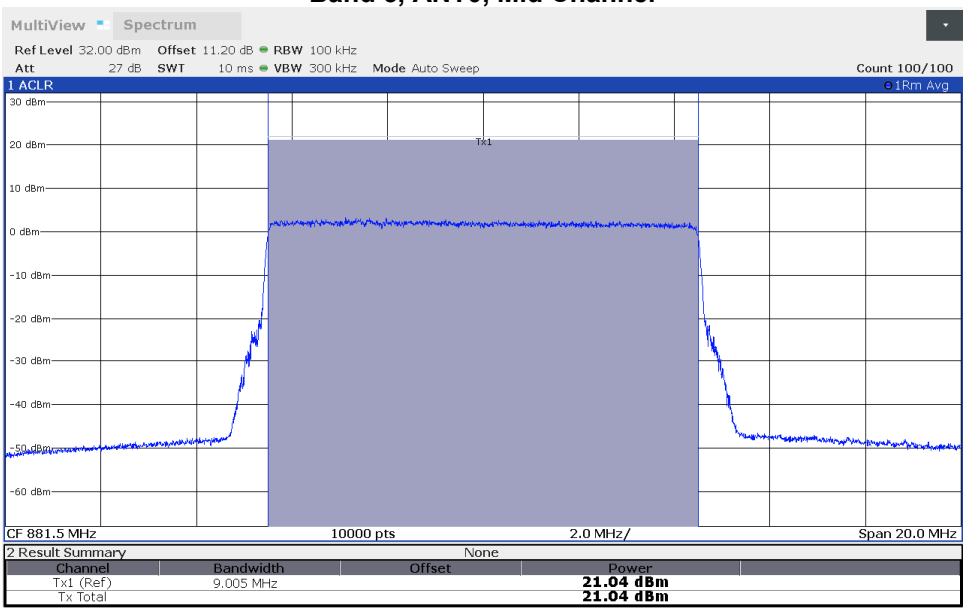
18:06:00 26.03.2021

TM3.1a-256QAM_10 MHz Bandwidth
Band 5, ANT1, Low Channel



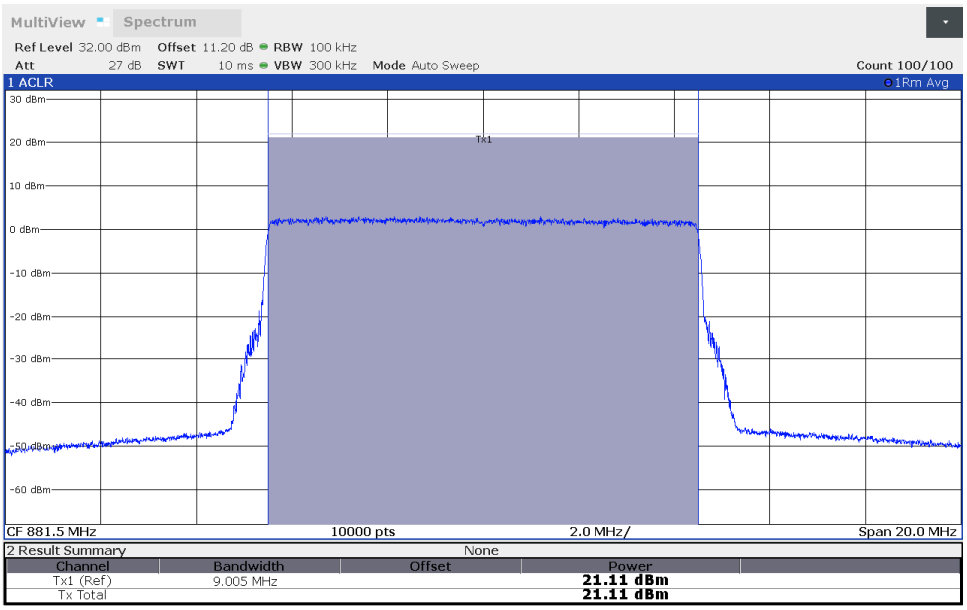
18:40:47 26.03.2021

TM3.1a-256QAM_10 MHz Bandwidth
Band 5, ANT0, Mid Channel



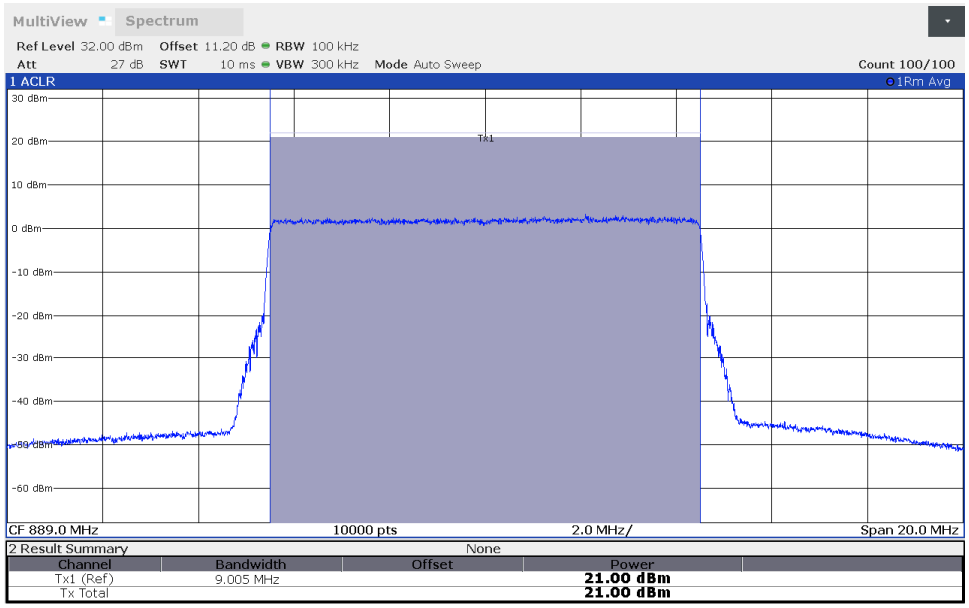
18:41:40 26.03.2021

TM3.1a-256QAM_10 MHz Bandwidth
Band 5, ANT1, Mid Channel



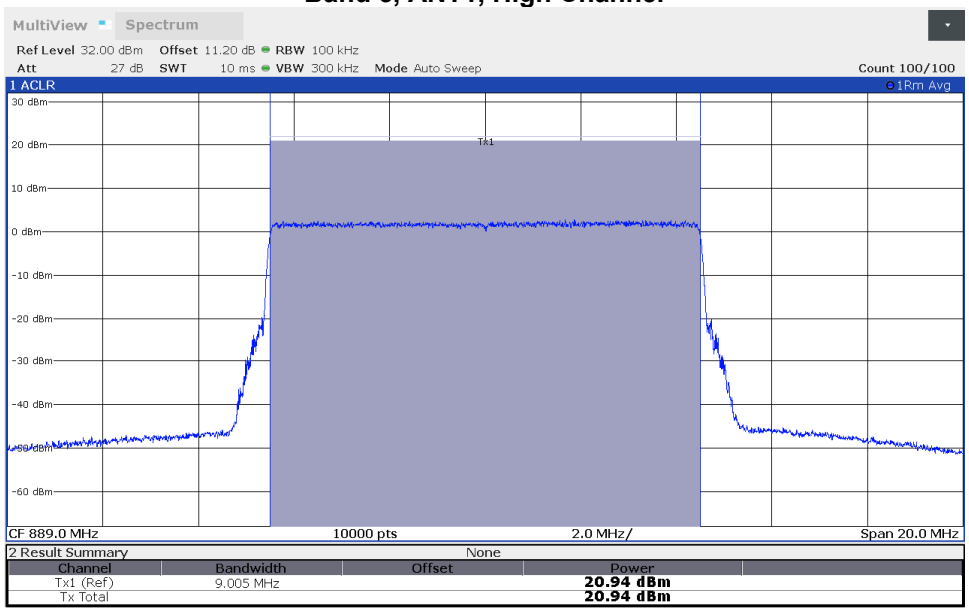
18:42:06 26.03.2021

TM3.1a-256QAM_10 MHz Bandwidth
Band 5, ANT0, High Channel



18:43:09 26.03.2021

TM3.1a-256QAM_10 MHz Bandwidth
Band 5, ANT1, High Channel



18:42:45 26.03.2021

Test Personnel:	Minh Ly	Test Date:	March 26, 2021
Supervising/Reviewing Engineer: (Where Applicable)			
Product Standard:	FCC Part 22	Limit Applied:	See report section 6.1
Input Voltage:	56 VDC (POE)		
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Ambient Temperature:	24 ºC
		Relative Humidity:	40%
		Atmospheric Pressure:	30 in Hg

Deviations, Additions, or Exclusions: None

7 Frequency Stability

7.1 Requirement:

In the 821 – 896 MHz band, the Carrier frequency must be maintained within the tolerances of 1.5 ppm.

7.2 Procedure:

The procedure described in FCC Publication 971168 D01 Power Meas License Digital Systems v03r01 was used. Tests are performed in accordance with ANSI C63.26 Section 5.6 and CFR47 FCC Parts 2.1055.

The EUT was placed inside the temperature chamber. The EUT was setup to transmit the maximum power at low and high channel. After the temperature stabilized for approximately 20 minutes, the transmitting frequency was measured by using the occupied bandwidth function on the Spectrum analyzer. The center frequency was derived from $(f_H + f_L) / 2$. The measurements were made on the low and high frequency with a 10 degree increment in temperature.

At the room temperature, the frequency was measured when the EUT was powered with the nominal voltage, 48VDC (minimum), and 57VDC (maximum) voltage as declared by customer.

7.3 Result:

The sample tested was found to Comply.

Frequency Stability Over Temperatures
Band 5, Bandwidth: 5 MHz, Modulation: TM1.1-QPSK

Temperature (°C)	Frequency at nominal voltage (MHz)	Maximum deviation from frequency at 20°C, ppm
Low CH		
-30	871.501420	1.01
-20	871.501940	0.41
-10	871.502010	0.33
0	871.502120	0.21
10	871.502545	0.28
20	871.502300	0.00
30	871.501735	0.65
40	871.502565	0.30
50	871.501880	0.48
High CH		
-30	891.496828	0.69
-20	891.497020	0.47
-10	891.496655	0.88
0	891.497420	0.02
10	891.497175	0.30
20	891.497440	0.00
30	891.497100	0.38
40	891.497000	0.49
50	891.497355	0.10

Voltage (DC)	Frequency at 20°C (MHz)	Maximum deviation from 56VDC, ppm
Low CH		
48V	871.502160	0.16
57V	871.502470	0.20
High CH		
48V	891.497225	0.24
57V	891.497235	0.23

Frequency Stability Over Temperatures
Band 5, Bandwidth: 10 MHz, Modulation: TM1.1-QPSK

Temperature (°C)	Frequency at nominal voltage (MHz)	Maximum deviation from frequency at 20°C, ppm
Low CH		
-30	873.999135	0.61
-20	873.999530	0.16
-10	873.999175	0.57
0	873.998960	0.81
10	873.999135	0.61
20	873.999670	0.00
30	873.998960	0.81
40	873.999035	0.73
50	873.998905	0.88
High CH		
-30	888.990120	1.14
-20	888.991165	0.04
-10	888.991020	0.12
0	888.990605	0.59
10	888.991515	0.43
20	888.991130	0.00
30	888.991325	0.22
40	888.991150	0.02
50	888.991200	0.08

Voltage (DC)	Frequency at 20°C (MHz)	Maximum deviation from 56VDC, ppm
Low CH		
48V	873.999190	0.55
57V	873.999205	0.53
High CH		
48V	888.991135	0.01
57V	888.991140	0.01

Test Personnel:	Minh Ly	Test Date:	04/01/2021
Supervising/Reviewing Engineer: (Where Applicable)			
Product Standard:	FCC Part 22	Limit Applied:	See report section 7.1
Input Voltage:	See plots		
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Ambient Temperature:	N/A
		Relative Humidity:	N/A
		Atmospheric Pressure:	N/A

Deviations, Additions, or Exclusions: None

8 Transmitter spurious emissions

8.1 Requirement:

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.

8.2 Procedure:

The procedure described in FCC Publication 971168 D01 Power Meas License Digital Systems v03r01 was used. Tests are performed in accordance with ANSI C63.26 Section 5.7, CFR47 FCC Parts 2.1051 and 2.1053.

Conducted Spurious Emission:
A spectrum analyzer was connected to the antenna port of the transmitter.

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 3 x RBW.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

The unwanted emissions were measured from 30 MHz to 10 GHz for low, mid, and high channel for both 5MHz & 10MHz Bandwidth. Plots are corrected for cable loss and then compared to the limits.

Radiated Spurious Emission:
The measurement antenna was placed at a distance of 10 meters for 30MHz – 1GHz and 3 meters for 1-10GHz from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to 10th harmonic was investigated. The worst case of emissions were reported.

During the spurious emission measurement, the antenna port of the EUT was terminated by 50ohms load. The substitution method was used to investigate at the highest peak in each frequency range (30MHz – 1GHz and 1GHz – 10GHz). The EUT was substituted by a reference antenna (Biconical antenna for 30MHz – 200MHz, log-periodic for 200MHz – 1GHz, or Horn antenna - above 1GHz), connected to a signal generator. The signal generator output level ($\mathbf{V_g}$ in dBm) was adjusted to obtain the same reading as from EUT. The ERP at the spurious emissions frequency was calculated as follows.

$$ERP_{(dBm)} = \mathbf{V_g + G_{(dBd)} + CF_{(dB)}}$$

The spurious emissions attenuation is the difference between the ERP level at the fundamental frequency and the level of the spurious emissions.

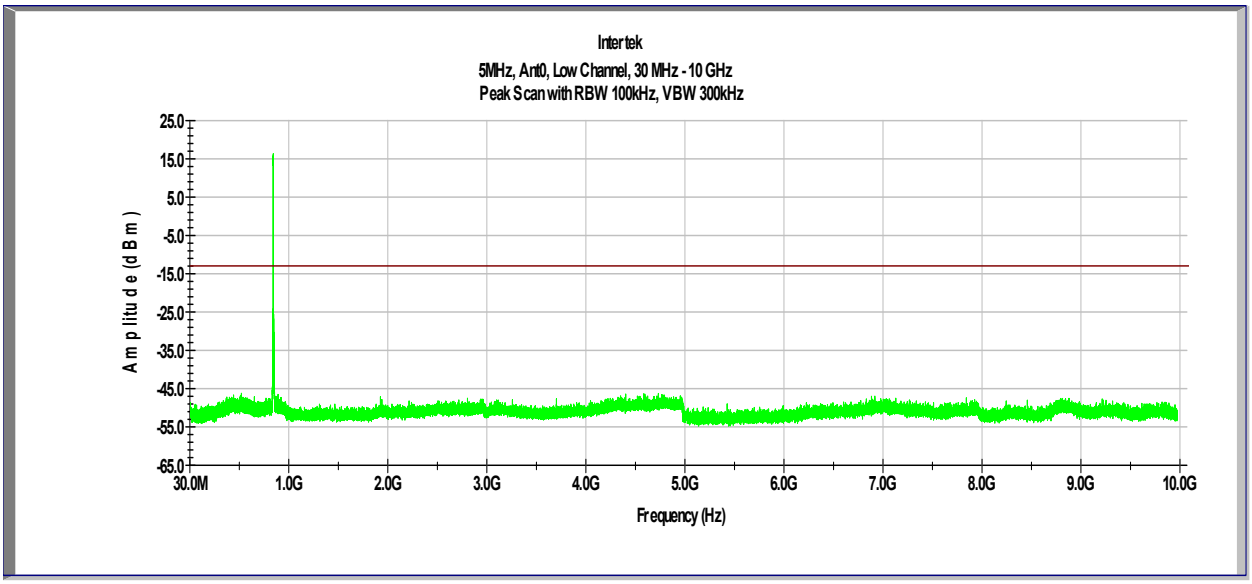
Preliminary testing was performed for all modulation/data rate modes. The worse-case data rate which resulted in the highest power and lowest spectrum were selected for final measurements:

5 MHz, Modulation: TM1.1-QPSK & 10 MHz, Modulation: TM1.1-QPSK

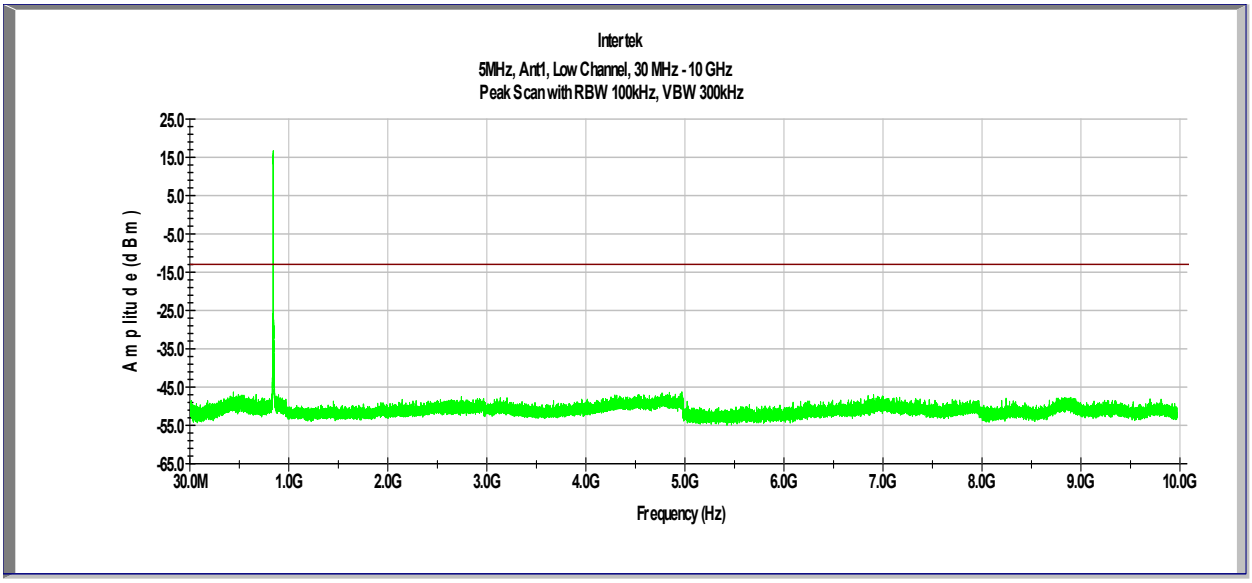
8.3 Results:

The sample tested was found to Comply.

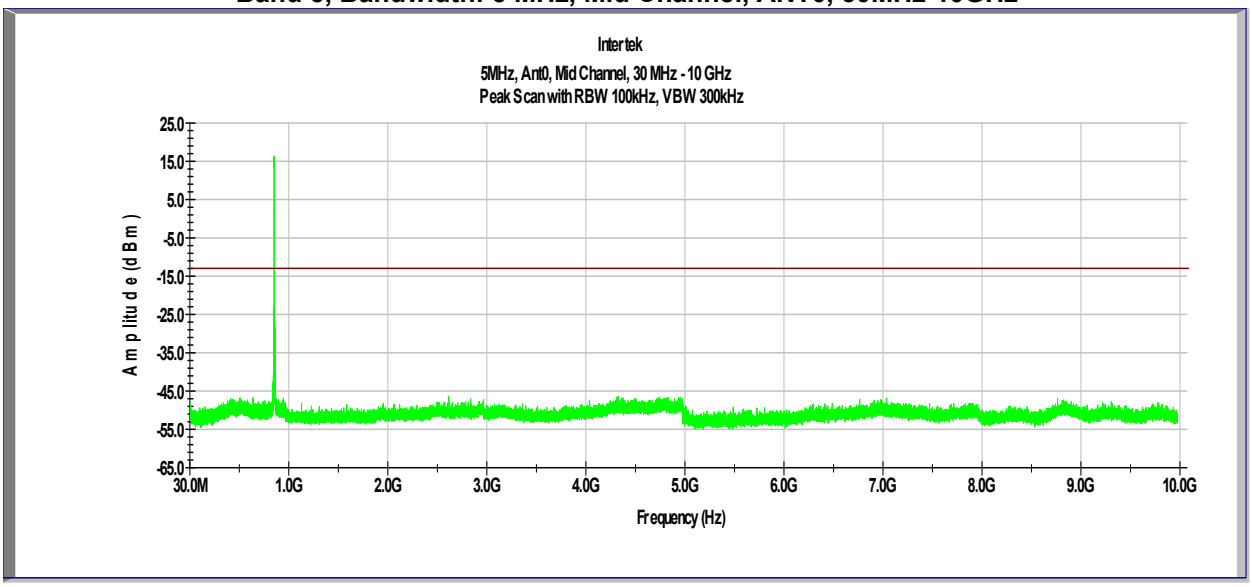
Conducted Spurious Emission
Band 5, Bandwidth: 5 MHz, Low Channel, ANT0, 30MHz-10GHz



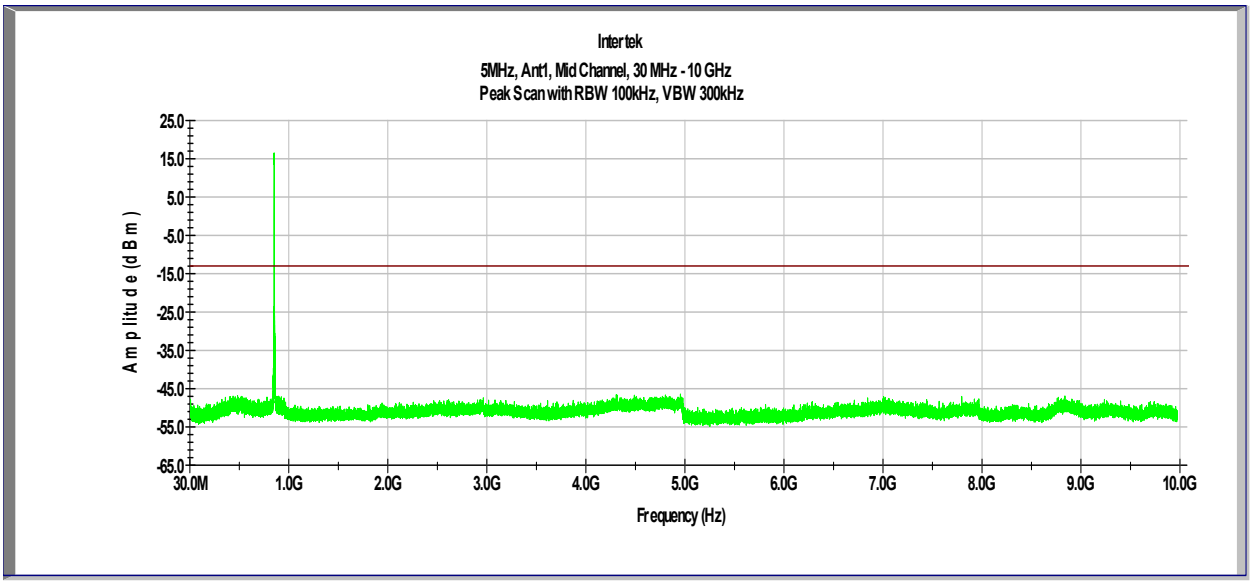
Conducted Spurious Emission
Band 5, Bandwidth: 5 MHz, Low Channel, ANT1, 30MHz-10GHz



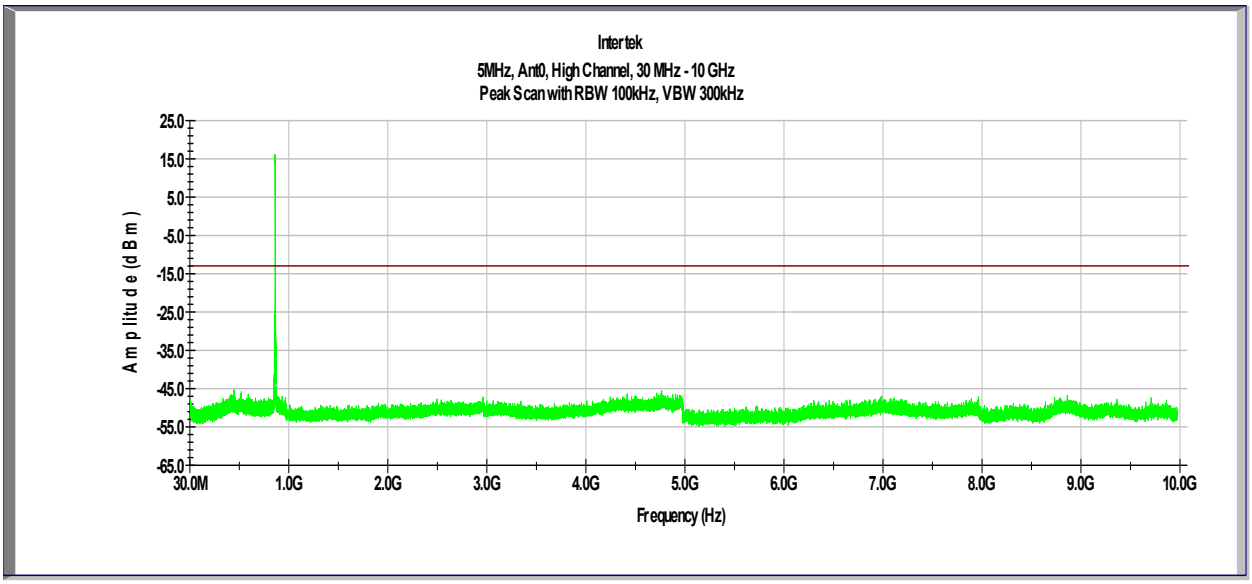
Conducted Spurious Emission
Band 5, Bandwidth: 5 MHz, Mid Channel, ANT0, 30MHz-10GHz



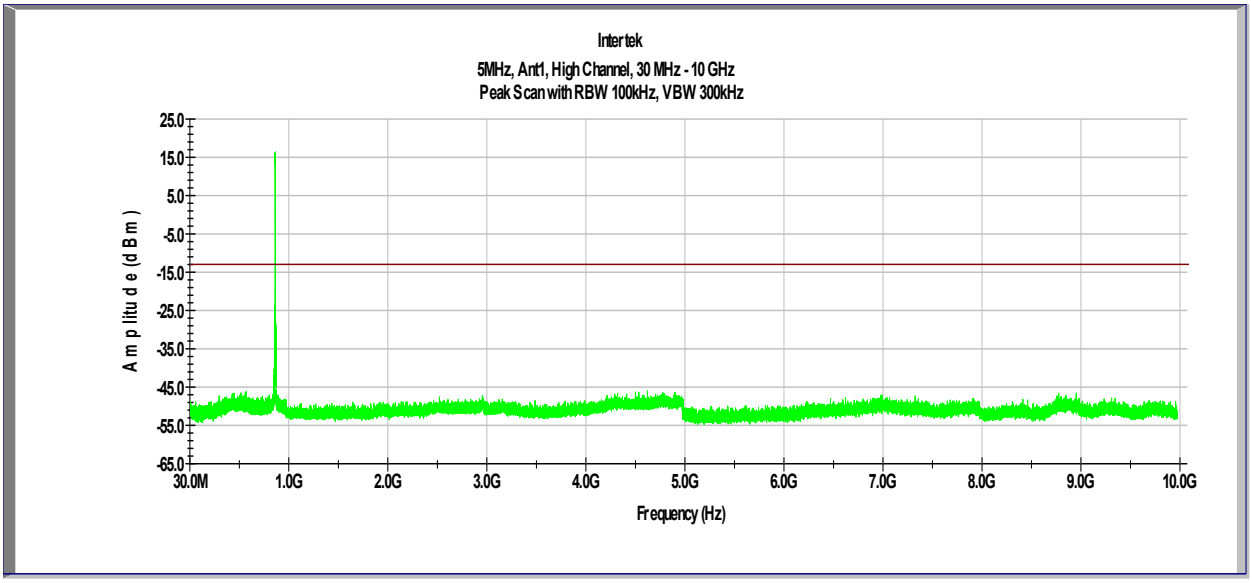
Conducted Spurious Emission
Band 5, Bandwidth: 5 MHz, Mid Channel, ANT1, 30MHz-10GHz



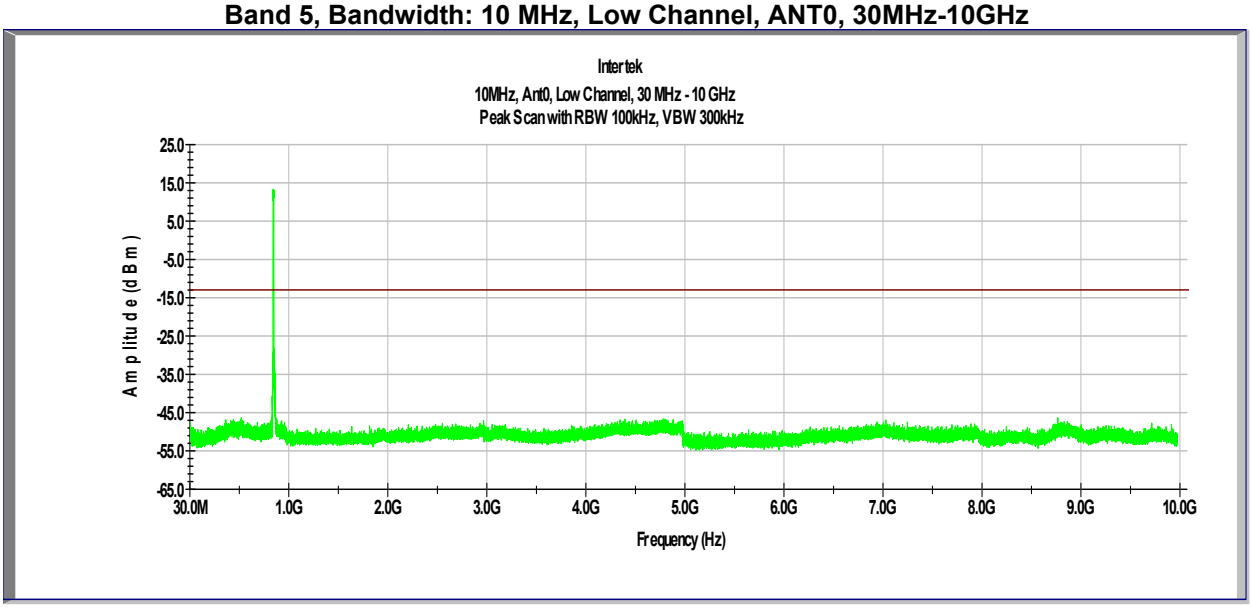
Conducted Spurious Emission
Band 5, Bandwidth: 5 MHz, High Channel, ANT0, 30MHz-10GHz



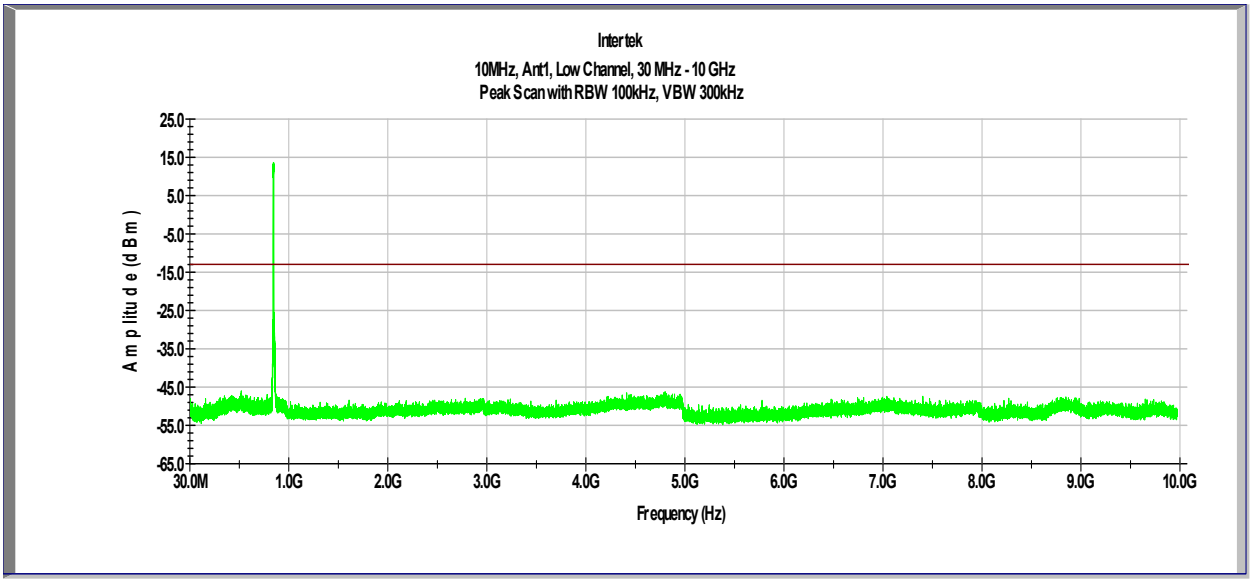
Conducted Spurious Emission
Band 5, Bandwidth: 5 MHz, High Channel, ANT1, 30MHz-10GHz



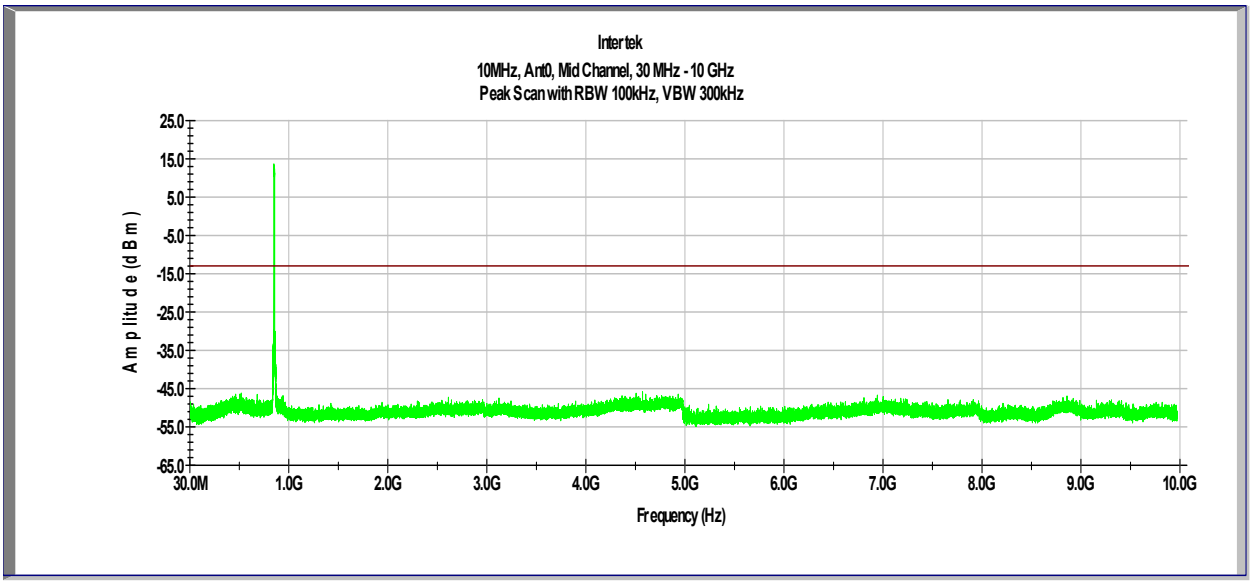
Conducted Spurious Emission
Band 5, Bandwidth: 10 MHz, Low Channel, ANT0, 30MHz-10GHz



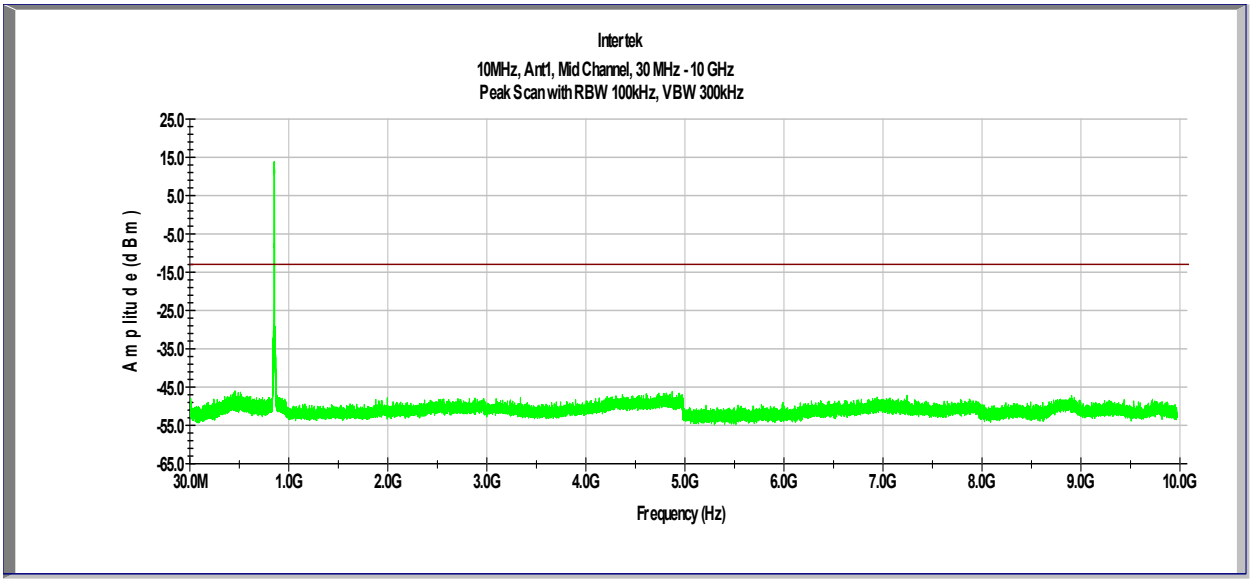
Conducted Spurious Emission
Band 5, Bandwidth: 10 MHz, Low Channel, ANT1, 30MHz-10GHz



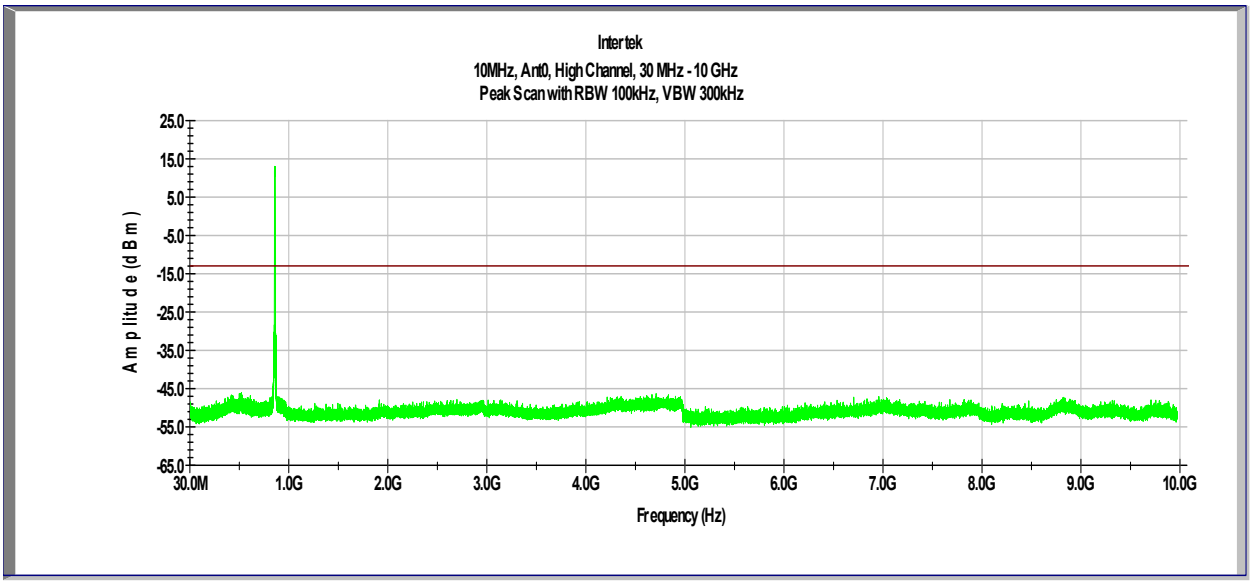
Conducted Spurious Emission
Band 5, Bandwidth: 10 MHz, Mid Channel, ANT0, 30MHz-10GHz



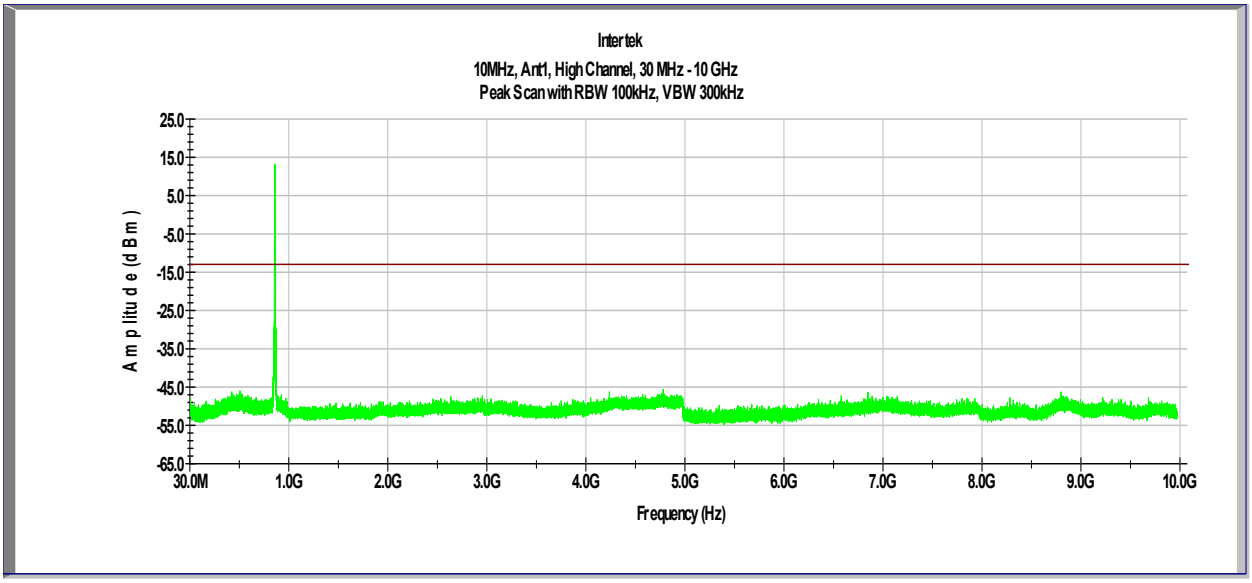
Conducted Spurious Emission
Band 5, Bandwidth: 10 MHz, Mid Channel, ANT1, 30MHz-10GHz



Conducted Spurious Emission
Band 5, Bandwidth: 10 MHz, High Channel, ANT0, 30MHz-10GHz



Conducted Spurious Emission
Band 5, Bandwidth: 10 MHz, High Channel, ANT1, 30MHz-10GHz



Transmitter Radiated Spurious Emissions
(Measured by Substitution Method)
5MHz, Low Channel

Freq.	Raw Amplitude	Sig Gen	Cable Loss	Antenna Sub Gain	EIRP	ERP	Limit	Margin
MHz	dBuV/m	dBm	dB	dBi	dBi	dBd	dBm	dB
40.153	45.0	-38.0	0.3	-15.4	-53.7	-55.8	-13	-42.8
50.273	50.1	-45.8	0.3	-7.9	-54.0	-56.1	-13	-43.1
1000.000	39.6	-43.2	2.0	1.8	-43.3	-45.4	-13	-32.4
1904.400	66.8	-49.1	2.8	8.7	-43.2	-45.3	-13	-32.3
2616.133	66.6	-49.4	3.2	10.2	-42.4	-44.5	-13	-31.5
5529.367	54.5	-52.2	5.6	11.1	-46.7	-48.8	-13	-35.8

Transmitter Radiated Spurious Emissions
(Measured by Substitution Method)
5MHz, Mid Channel

Freq.	Raw Amplitude	Sig Gen	Cable Loss	Antenna Sub Gain	EIRP	ERP	Limit	Margin
MHz	dBuV/m	dBm	dB	dBi	dBi	dBd	dBm	dB
39.344	45.3	-36.6	0.3	-16.0	-53.0	-55.1	-13	-42.1
50.596	49.6	-46.6	0.3	-7.7	-54.7	-56.8	-13	-43.8
1000.000	40.4	-42.4	2.0	1.8	-42.6	-44.7	-13	-31.7
1199.467	67.8	-49.9	2.4	7.3	-45.0	-47.1	-13	-34.1
1908.367	65.9	-49.9	2.8	8.7	-44.0	-46.1	-13	-33.1
3071.733	61.0	-53.5	3.5	10.4	-46.6	-48.7	-13	-35.7

Transmitter Radiated Spurious Emissions
(Measured by Substitution Method)
5MHz, High Channel

Freq.	Raw Amplitude	Sig Gen	Cable Loss	Antenna Sub Gain	EIRP	ERP	Limit	Margin
MHz	dBuV/m	dBm	dB	dBi	dBi	dBd	dBm	dB
39.991	45.1	-37.7	0.3	-15.5	-53.5	-55.6	-13	-42.6
50.499	49.9	-46.2	0.3	-7.8	-54.3	-56.4	-13	-43.4
53.151	49.9	-49.1	0.3	-6.1	-55.6	-57.7	-13	-44.7
1000.000	40.1	-42.7	2.0	1.8	-42.8	-44.9	-13	-31.9
1199.467	67.6	-50.1	2.4	7.3	-45.3	-47.4	-13	-34.4
2673.933	63.8	-51.3	3.2	10.1	-44.4	-46.5	-13	-33.5
5529.367	55.3	-51.4	5.6	11.1	-45.8	-47.9	-13	-34.9

Transmitter Radiated Spurious Emissions
(Measured by Substitution Method)
10MHz, Low Channel

Freq.	Raw Amplitude	Sig Gen	Cable Loss	Antenna Sub Gain	EIRP	ERP	Limit	Margin
MHz	dBuV/m	dBm	dB	dBi	dBi	dBd	dBm	dB
41.220	46.3	-38.1	0.3	-14.5	-53.0	-55.1	-13	-42.1
50.823	51.0	-45.4	0.3	-7.6	-53.4	-55.5	-13	-42.5
1000.000	40.0	-42.8	2.0	1.8	-42.9	-45.0	-13	-32.0
1200.033	68.4	-49.3	2.4	7.3	-44.4	-46.5	-13	-33.5
3071.733	60.6	-53.8	3.5	10.4	-47.0	-49.1	-13	-36.1
5529.367	55.0	-51.7	5.6	11.1	-46.2	-48.3	-13	-35.3

Transmitter Radiated Spurious Emissions
(Measured by Substitution Method)
10MHz, Mid Channel

Freq.	Raw Amplitude	Sig Gen	Cable Loss	Antenna Sub Gain	EIRP	ERP	Limit	Margin
MHz	dBuV/m	dBm	dB	dBi	dBi	dBd	dBm	dB
40.638	45.6	-38.1	0.3	-15.0	-53.4	-55.5	-13	-42.5
52.051	51.9	-46.0	0.3	-6.8	-53.1	-55.2	-13	-42.2
1000.000	39.4	-43.4	2.0	1.8	-43.5	-45.6	-13	-32.6
1200.033	68.0	-49.7	2.4	7.3	-44.8	-46.9	-13	-33.9
3071.733	60.4	-54.1	3.5	10.4	-47.2	-49.3	-13	-36.3
6752.800	50.6	-50.9	6.1	10.4	-46.6	-48.7	-13	-35.7

Transmitter Radiated Spurious Emissions
(Measured by Substitution Method)
10MHz, High Channel

Freq.	Raw Amplitude	Sig Gen	Cable Loss	Antenna Sub Gain	EIRP	ERP	Limit	Margin
MHz	dBuV/m	dBm	dB	dBi	dBi	dBd	dBm	dB
39.506	45.9	-36.3	0.3	-15.9	-52.5	-54.6	-13	-41.6
51.728	51.2	-46.3	0.3	-7.0	-53.6	-55.7	-13	-42.7
1000.000	39.3	-43.5	2.0	1.8	-43.7	-45.8	-13	-32.8
1777.467	66.9	-51.5	2.8	9.7	-44.6	-46.7	-13	-33.7
3071.733	60.7	-53.8	3.5	10.4	-46.9	-49.0	-13	-36.0
5529.367	54.4	-52.3	5.6	11.1	-46.8	-48.9	-13	-35.9

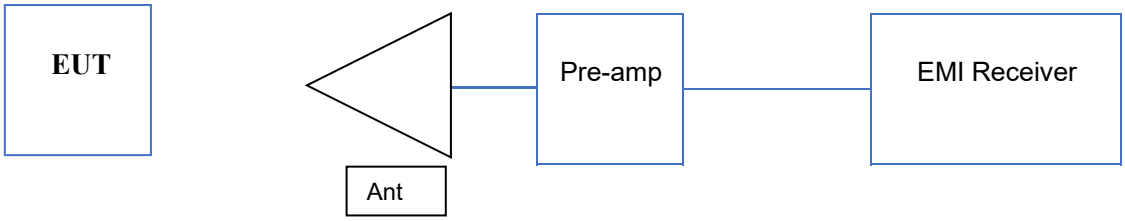
ERP is calculated as: **$ERP_{(dBm)}$= $Sig\ Gen_{(dBm)}$ + $Antenna\ Gain_{(dBi)}$ – $Cable\ Loss_{(dB)}$ - $2.1_{(dB)}$**

Note: Investigation performed up to 10.0 GHz. All other emissions not reported are at least 10dB below the limits

Result:	**Complies by 31.5 dB**

8.4 Test Setup Configuration:

The following photographs show the testing configurations used.



Test Personnel:	Minh Ly	Test Date:	03/30/2021
Supervising/Reviewing Engineer: (Where Applicable)			
Product Standard:	FCC Part 22	Limit Applied:	See report section 8.1
Input Voltage:	56 VDC (POE)		
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Ambient Temperature:	21 ºC
		Relative Humidity:	42 %
		Atmospheric Pressure:	30 inHg

Deviations, Additions, or Exclusions: None

9 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model Tested/Type	Asset #	Cal Int	Cal Due
EMI Receiver	Rohde and Schwarz	ESU	ITS 00961	12	03/09/22
BI-Log Antenna	Teseq	CBL6111D	ITS 01650	12	08/17/21
Pre-Amplifier	Sonoma Instrument	310N	ITS 01714	12	11/13/21
RE Cable	TRU Corporation	TRU CORE 300	ITS 01462	12	09/01/21
RE Cable	TRU Corporation	TRU CORE 300	ITS 01465	12	09/01/21
RE Cable	TRU Corporation	TRU CORE 300	ITS 01470	12	09/01/21
RF Cable	TRU Corporation	TRU CORE 300	ITS 01342	12	09/01/21
Active Horn Antenna	ETS Lindgren	3117PA	ITS 01636	12	12/17/21
Log Periodic	Com-power	ALP-100	ITS 01785	12	06/26/21
Bicon	Com-power	AB-900A	ITS 01391	12	07/22/21
Horn Antenna	ETS	3115	ITS 00982	12	04/21/21
Spectrum Analyzer	Rohde and Schwarz	FSW	ITS 01818	12	07/09/21
10 Meter Chamber	Panashield	10 Meter Semi-Anechoic Chamber	ITS 00984	36	07/29/23
Environmental Chamber	Espec	BTX-475	ITS 01436	12	10/20/21

10 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	April 13, 2021	104601904MPK-010	ML	KV	Original Issue