ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust

ACCREDITED
TESTING Cert No.1152.01

DATE: 10 March 2021

I.T.L. (PRODUCT TESTING) LTD.

FCC Radio Test Report

For

Corning Optical Communication Wireless

Equipment under test:

Corning Everon 6000 DAS - dMRU

dMRU Medium Power Modular Remote Unit

(LOWER 700+UPPER 700)

Tested by: _____
M. Zohar

Approved by: _____
D. Shidlowsky

ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust

Measurement/Technical Report for

Corning Optical Communication Wireless

Corning Everon 6000 DAS - dMRU

dMRU Medium Power Modular Remote Unit

(LOWER 700+UPPER 700)

FCC ID: OJFDMRUDPAM67

This report concerns:	Original Grant: X Class II change: Class I change:
Equipment type:	Part 20 Industrial Booster (CMRS)
Limits used:	47CFR Parts 2; 27; 90

Measurement procedure used is KDB 935210 D05 v01r04 April 2020 and ANSI IEEE C63.26-2015

Substitution Method used as in ANSI TIA-603-E-2016

Application for Certification prepared by:	Applicant for this device: (different from "prepared by")
R. Pinchuck	Isaac Nissan
ITL (Product Testing) Ltd. 1 Bat Sheva St.	Corning Optical Communication Wireless 8253 1st Avenue
Lod 7120101	Vienna, VA 22812
Israel	U.S.A.
e-mail RPinchuck@iltglobal.org	Tel: +1-703 855-1773 e-mail: NissanI@corning.com

TABLE OF CONTENTS

1 General Information

1.1 Administrative Information

Manufacturer:	Corning Optical Communication Wireless
Manufacturer's Address:	8253 1st Avenue Vienna, VA 22812 U.S.A. Tel: +1-703 855-1773
Manufacturer's Representative:	Isaac Nissan
Equipment Under Test (E.U.T):	Corning Everon 6000 DAS - dMRU
Equipment Model No.:	dMRU Medium Power Modular Remote Unit
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	November 1, 2020
Start of Test:	November 2, 2020
End of Test:	February 23, 2021
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St, Lod, Israel 7116002
Test Specifications:	FCC Parts 2; 27; 90

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by/registered with the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation Number is IL1005.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-20025, R-2729, T-20028, G-20068.
5. Department of Innovation, Science and Economic Development (ISED) Canada, CAB identifier: IL1002.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

DMRU - Digital Medium-power Remote Unit.
The MRU is a medium power modular remote antenna unit with a single antenna port.
The Output power for the lower bands: 600/700 MHz Low/700 MHz High/FirstNet, 800/850 MHz is 33 dBm and the output power for the medium bands EAWS, PCS, WCS and 2.5GHz TDD is 37dBm.
The MRU modular structure and integrated high-performance cavity based multiplexing functionalities, enable setups of up to 6 RF modules, for a variety of licensed frequency bands within a single cabinet.
The MRU also provides CBRS/C-Band ready RF interface for future field upgrades.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in KDB 935210 D05 v01r04 April 2020 and ANSI/TIA-603-E-2016. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

Both conducted and radiated emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its FCC Designation Number is IL1005.

1.6 Measurement Uncertainty

Conducted Emission
Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 3.44 dB

Radiated Emission
Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site:

30-1000MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 4.96 dB

1 GHz to 6 GHz
Expanded Uncertainty (95% Confidence, K=2):
±5.19 dB

>6 GHz
Expanded Uncertainty (95% Confidence, K=2):
±5.51 dB

2 System Test Configuration

2.1 Justification

The dMRU is a repeater supporting a broad range of cellular generations: 4G and 5G in the LOWER 700+UPPER 700 band+ First Net.
Evaluation was performed at the low, mid and high channels each one defined per the operation BW.
Evaluation was performed at 115VAC as the nominal power source.
Conducted tests were performed with an external attenuator connected to the spectrum analyzer.
Radiated emission tests were performed with a 50Ω termination connected to the E.U.T output terminal.

2.2 EUT Exercise Software

The Element Management System ver. 1.4 was used for commands delivery. These commands are used to enable/disable the EUT transmission. SW Ver. is 1.4.

2.3 Special Accessories

No special accessories were needed in order to achieve compliance.

2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System

Product Name	Corning Everon 6000 DAS - dMRU
Model Name	dMRU medium power modular remote unit (LOWER 700+UPPER 700+ First Net)
Working voltage(rated)	48 VDC, 115/230 VAC
Mode of operation	Repeater Booster supporting 4G and 5G
Modulations	4G: 16QAM, 64QAM, QPSK; 5G: 16QAM, 64QAM, 256QAM, QPSK
Frequency Range	LOWER 700+UPPER 700 (DL: 728-768, UL:698-716)
Transmit power	~34 dBm (Max) per band
DATA rate	N/A
Modulation BW	5; 10; 15MHz
DC Voltage applied to final RF stage band board (Driver and PA)	28.5V
DC Current applied to final RF stage band board (Driver and PA)	1.7A

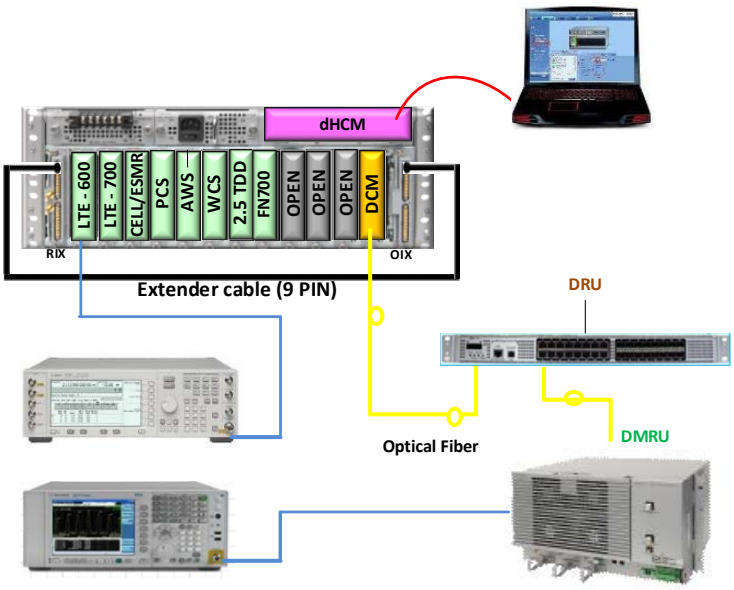

Figure 1. Conducted Test Set-Up

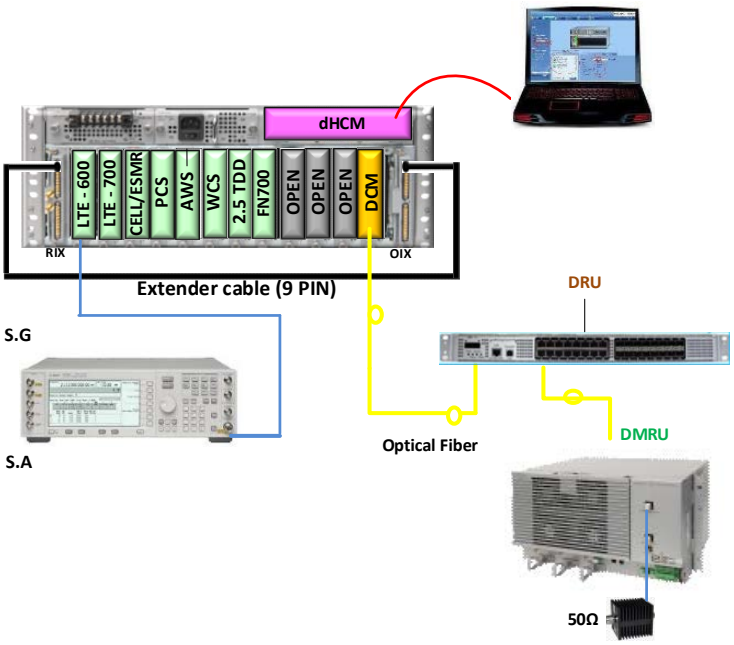

Figure 2. Radiated Test Set-Up

3 Test Set-Up Photos

Figure 3. Conducted Emission From Antenna Port Tests

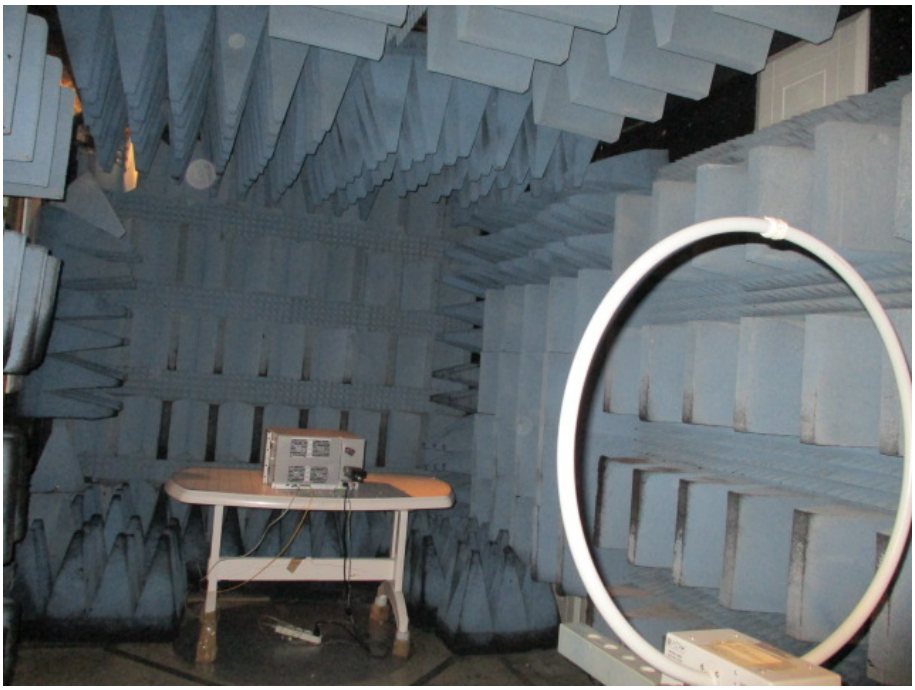

Figure 4. Radiated Emission Test 9kHz - 30MHz

Figure 5. Radiated Emission Test 30 - 200 MHz

Figure 6. Radiated Emission Test 200 - 1000MHz

Figure 7. Radiated Emission Test 1.0 - 8.0GHz

4 RF Power Output - 5G

4.1 Test Specification

Part 27, Subpart C, Section 27.50

Part 90, Subpart R, Section 90.542(a)(3)

4.2 Test Procedure

(Temperature (20°C)/ Humidity (48%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (40.7 dB) and an appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload.

4.3 Test Limit

Peak Power Output must not exceed 1000W (60 dBm).

4.4 Test Results

JUDGEMENT: Passed

See additional information in Table 1 to Table 4 and Figure 8 to Figure 63.

Modulation	Bandwidth	Sub Carrier	Operation Frequency	Reading
	(MHz)	(kHz)	(MHz)	(dBm)
16QAM	5	15	730.5	33.36
		30		33.57
		15	751.5	34.22
		30		34.13
		15	765.5	33.24
		30		33.53
	10	15	733.0	33.60
		30		33.70
		15	751.5	33.85
		30		33.75
		15	763.0	33.17
		30		33.33
	15	15	735.5	33.54
		30		33.67

Table 1 RF Power Output 16QAM – 5G

Modulation	Bandwidth	Sub Carrier	Operation Frequency	Reading
	(MHz)	(kHz)	(MHz)	(dBm)
64QAM	5	15	730.5	33.50
		30		33.47
		15	751.5	34.23
		30		34.17
		15	765.5	32.72
		30		32.79
	10	15	733.0	33.66
		30		33.71
		15	751.5	33.68
		30		33.58
		15	763.0	33.05
		30		33.00
	15	15	735.5	33.48
		30		33.34

Table 2 RF Power Output 64QAM - 5G

Modulation	Bandwidth	Sub Carrier	Operation Frequency	Reading
	(MHz)	(kHz)	(MHz)	(dBm)
256QAM	5	15	730.5	33.48
		30		33.55
		15	751.5	33.92
		30		33.98
		15	765.5	33.07
		30		32.79
	10	15	733.0	33.83
		30		33.79
		15	751.5	33.63
		30		33.81
		15	763.0	33.04
		30		33.01
	15	15	735.5	33.42
		30		33.39

Table 3 RF Power Output 256QAM - 5G

Modulation	Bandwidth	Sub Carrier	Operation Frequency	Reading
	(MHz)	(kHz)	(MHz)	(dBm)
QPSK	5	15	730.5	33.29
		30		33.13
		15	751.5	34.27
		30		34.27
		15	765.5	33.58
		30		33.60
	10	15	733	33.56
		30		33.67
		15	751.5	33.66
		30		33.80
		15	763	33.17
		30		33.30
	15	15	735.5	33.43
		30		33.82

Table 4 RF Power Output QPSK - 5G

Figure 8: 16QAM 5MHz B.W; 730.5MHz, 15kHz

Figure 9: 16QAM 5MHz B.W; 730.5MHz, 30kHz

Figure 10: 16QAM 5MHz B.W; 751.5MHz, 15kHz

Figure 11: 16QAM 5MHz B.W; 751.5MHz, 30kHz

Figure 12: 16QAM 5MHz; 765.5MHz, 15kHz

Figure 13: 16QAM 5MHz; 765.5MHz, 30kHz

Figure 14: 16QAM 10MHz B.W; 733MHz, 15kHz

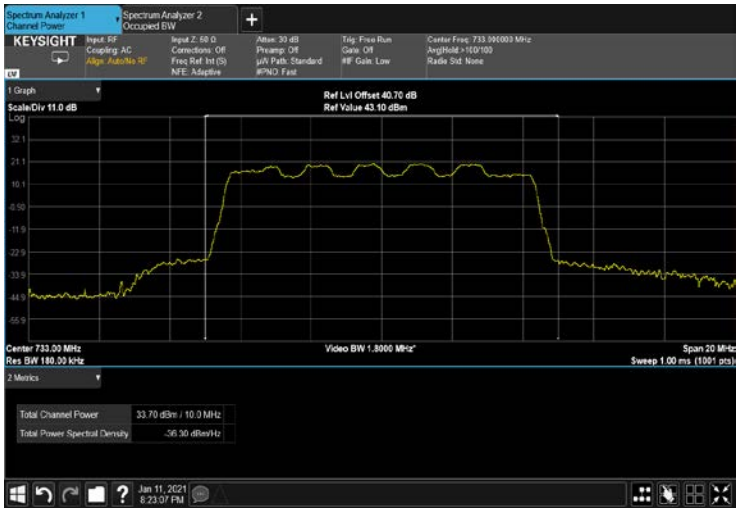

Figure 15: 16QAM 10MHz B.W; 733MHz, 30kHz

Figure 16: 16QAM 10MHz B.W; 751.5MHz, 15kHz

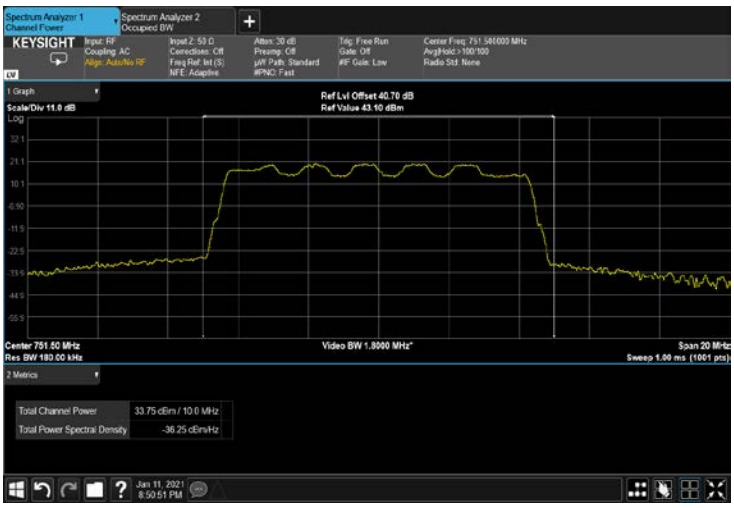

Figure 17: 16QAM 10MHz B.W; 751.5MHz, 30kHz

Figure 18: 16QAM 10MHz B.W; 763MHz, 15kHz

Figure 19: 16QAM 10MHz B.W; 763MHz, 30kHz

Figure 20: 16QAM 15MHz B.W; 735.5MHz, 15kHz

Figure 21: 16QAM 15MHz B.W; 735.5MHz, 30kHz

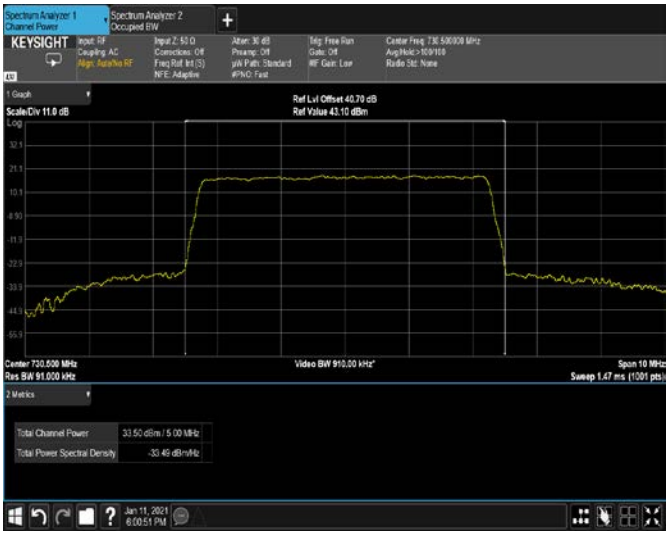

Figure 22: 64QAM 5MHz B.W; 730.5MHz, 15kHz

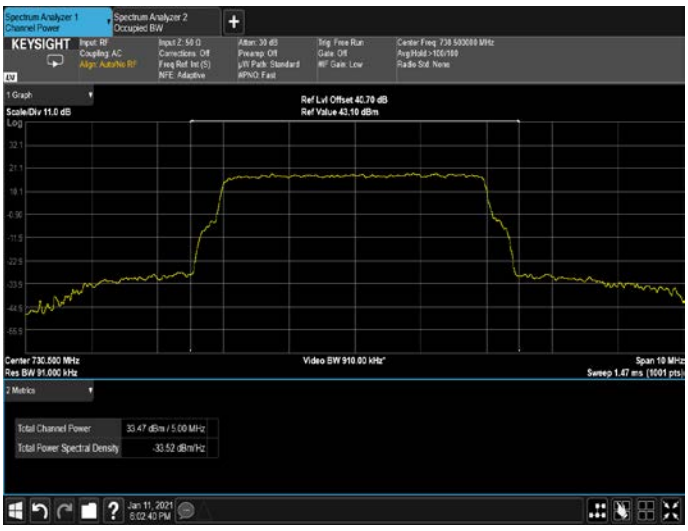

Figure 23: 64QAM 5MHz B.W; 730.5MHz, 30kHz

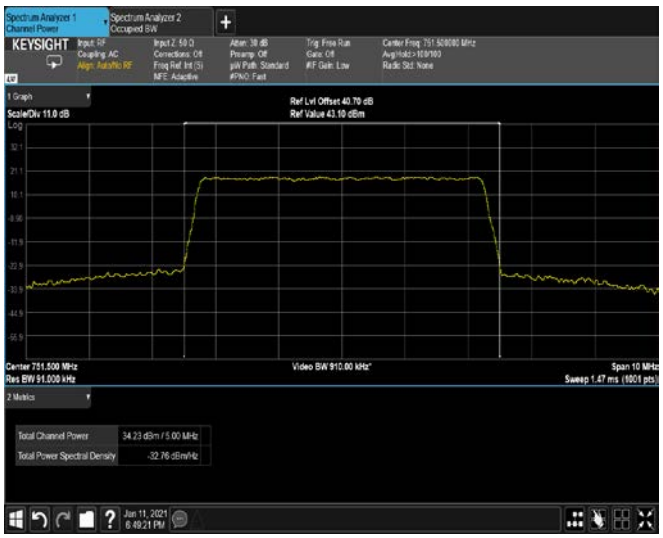

Figure 24: 64QAM 5MHz B.W; 751.5MHz, 15kHz

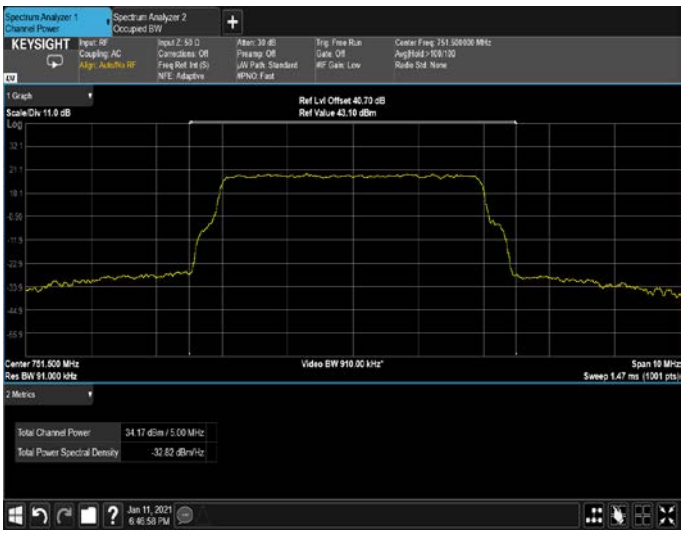

Figure 25: 64QAM 5MHz B.W; 751.5MHz, 30kHz

Figure 26: 64QAM 5MHz; 765.5MHz, 15kHz

Figure 27: 64QAM 5MHz; 765.5MHz, 30kHz

Figure 28: 64QAM 10MHz B.W; 733MHz, 15kHz

Figure 29: 64QAM 10MHz B.W; 733MHz, 30kHz

Figure 30: 64QAM 10MHz B.W; 751.5MHz, 15kHz

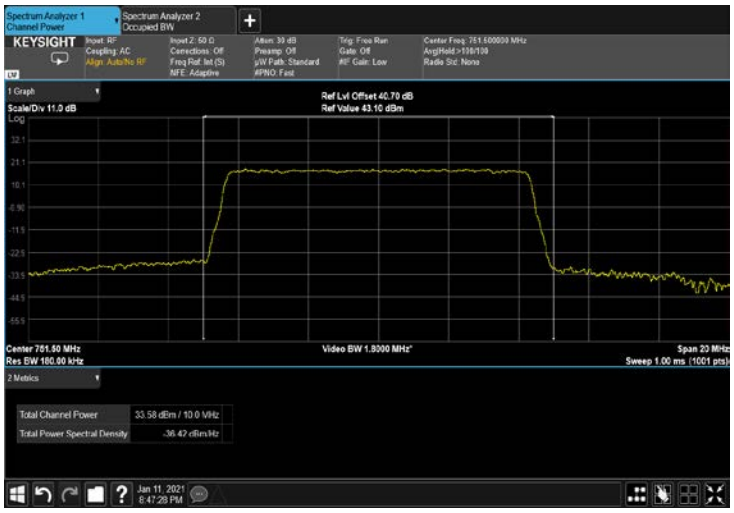

Figure 31: 64QAM 10MHz B.W; 751.5MHz, 30kHz

Figure 32: 64QAM 10MHz B.W; 763MHz, 15kHz

Figure 33: 64QAM 10MHz B.W; 763MHz, 30kHz

Figure 34: 64QAM 15MHz B.W; 735.5MHz, 15kHz

Figure 35: 64QAM 15MHz B.W; 735.5MHz, 30kHz

Figure 36: 256QAM 5MHz B.W; 730.5MHz, 15kHz

Figure 37: 256QAM 5MHz B.W; 730.5MHz, 30kHz

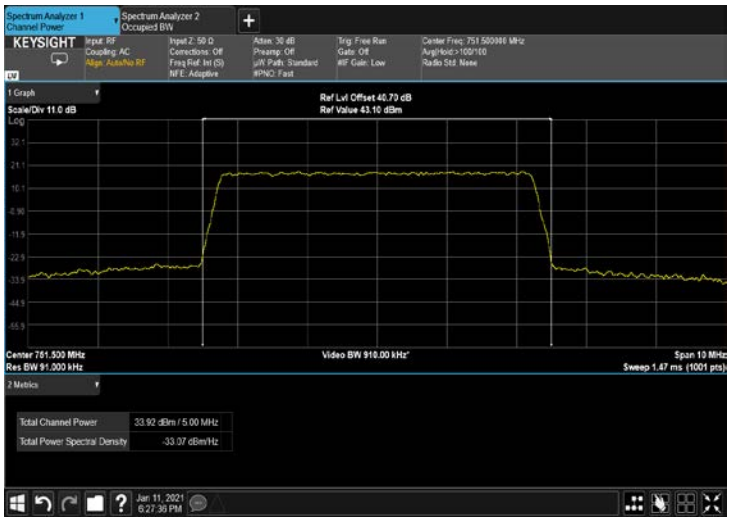

Figure 38: 256QAM 5MHz; 751.5MHz B.W, 15kHz

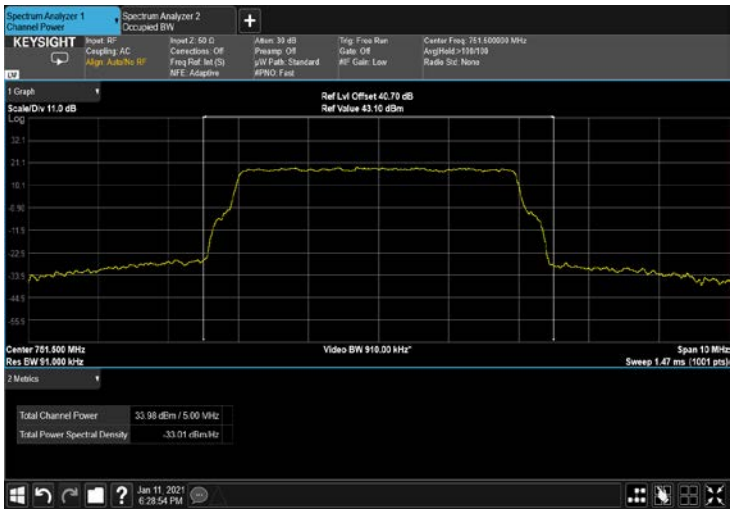

Figure 39: 256QAM 5MHz; 751.5MHz B.W, 30kHz

Figure 40: 256QAM 5MHz B.W; 765.5MHz, 15kHz

Figure 41: 256QAM 5MHz B.W; 765.5MHz, 30kHz

Figure 42: 256QAM 10MHz B.W; 733MHz, 15kHz

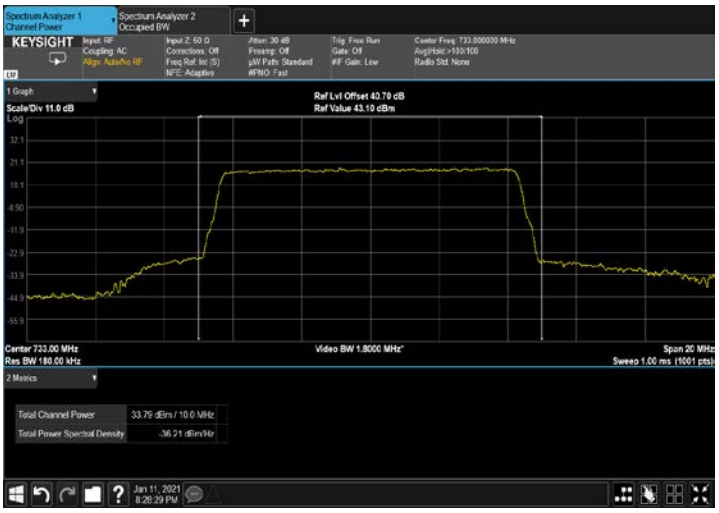

Figure 43: 256QAM 10MHz B.W; 733MHz, 30kHz

Figure 44: 256QAM 10MHz B.W; 751.5MHz, 15kHz

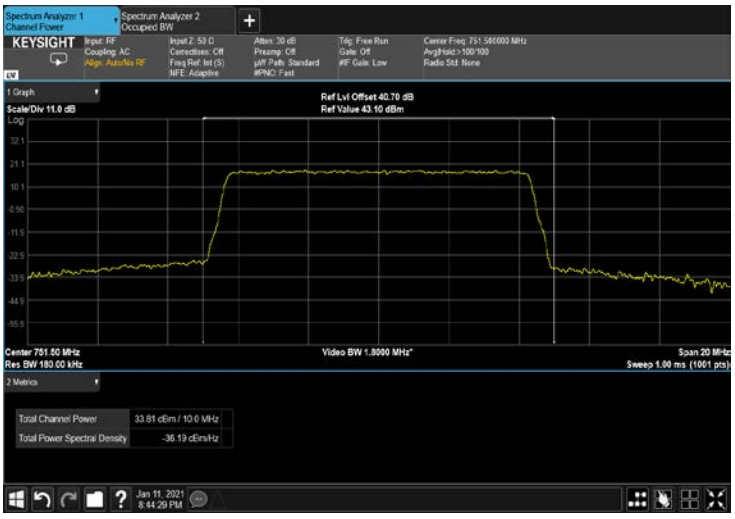

Figure 45: 256QAM 10MHz B.W; 751.5MHz, 30kHz

Figure 46: 256QAM 10MHz B.W; 763MHz, 15kHz

Figure 47: 256QAM 10MHz B.W; 763MHz, 30kHz

Figure 48: 256QAM 15MHz B.W; 735.5MHz, 15kHz

Figure 49: 256QAM 15MHz B.W; 735.5MHz, 30kHz

Figure 50: QPSK 5MHz B.W; 730.5MHz, 15kHz

Figure 51: QPSK 5MHz B.W; 730.5MHz, 30kHz

Figure 52: QPSK 5MHz B.W; 751.5MHz, 15kHz

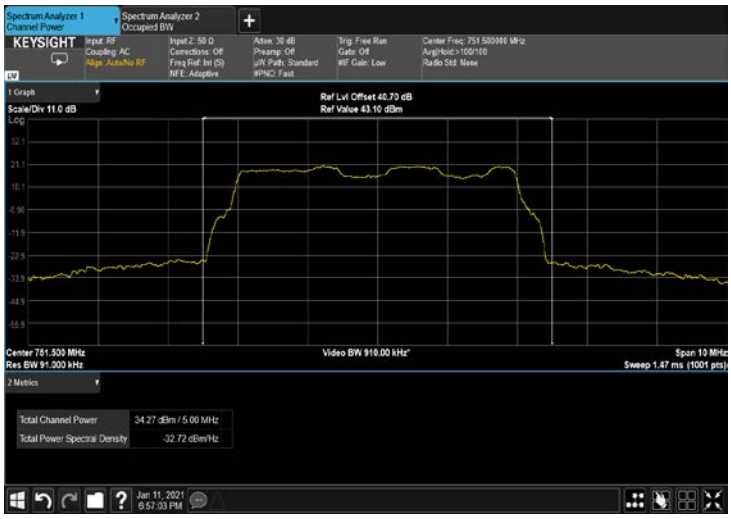

Figure 53: QPSK 5MHz B.W; 751.5MHz, 30kHz

Figure 54: QPSK 5MHz B.W; 765.5MHz, 15kHz

Figure 55: QPSK 5MHz B.W; 765.5MHz, 30kHz

Figure 56: QPSK 10MHz B.W; 733MHz, 15kHz

Figure 57: QPSK 10MHz B.W; 733MHz, 30kHz

Figure 58: QPSK 10MHz B.W; 751.5MHz, 15kHz

Figure 59: QPSK 10MHz B.W; 751.5MHz, 30kHz

Figure 60: QPSK 10MHz B.W; 763MHz, 15kHz

Figure 61: QPSK 10MHz B.W; 763MHz, 30kHz

Figure 62: QPSK 15MHz B.W; 735.5MHz, 15kHz

Figure 63: QPSK 15MHz B.W; 735.5MHz, 30kHz

4.5 Test Equipment Used; RF Output Power

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
EXA signal Analyzer	Keysight	UXA N9040B	MY56080119	January 31, 2020	January 31, 2022
EXG Vector Signal Generator	Agilent Technologies	N5172B	MY53051952	January 17, 2019	January 17, 2022
40 dB Attenuator	Weinschel Associates	WA 39-40-33	-	November 1, 2020	November 1, 2021
RF Coaxial Cable	Huber-Suner	SLLS210B	-	November 1, 2020	November 1, 2021

Table 5 Test Equipment Used

5 RF Power Output – 4G

5.1 Test Specification

Part 27, Subpart C, Section 27.50

Part 90, Subpart R, Section 90.542(a)(3)

5.2 Test Procedure

(Temperature (20°C)/ Humidity (48%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (40.7 dB) and an appropriate coaxial cable. Special attention was taken to prevent Spectrum Analyzer RF input overload.

5.3 Test Limit

Peak Power Output must not exceed 1000W (60 dBm).

5.4 Test Results

JUDGEMENT: Passed

See additional information in Table 6 to Table 8 and Figure 64 to Figure 84.

Modulation	Bandwidth (MHz)	Operation Frequency (MHz)	Reading (dBm)
16QAM	5	730.5	33.59
		751.5	33.90
		765.5	32.94
	10	733.0	33.98
		751.5	33.83
		763.0	33.50
	15	735.5	33.08

Table 6 RF Power Output 16QAM - 4G

Modulation	Bandwidth (MHz)	Operation Frequency (MHz)	Reading (dBm)
64QAM	5	730.5	33.62
		751.5	33.67
		765.5	33.15
	10	733.0	33.94
		751.5	33.70
		763.0	33.54
	15	735.5	33.01

Table 7 RF Power Output 64AM - 4G

Modulation	Bandwidth (MHz)	Operation Frequency (MHz)	Reading (dBm)
QPSK	5	730.5	33.54
		751.5	33.86
		765.5	33.08
	10	733.0	33.99
		751.5	33.81
		763.0	33.94
	15	735.5	33.02

Table 8 RF Power Output QPSK - 4G

Figure 64: 16QAM 5MHz B.W; 730.5MHz – 4G

Figure 65: 16QAM 5MHz B.W; 751.5MHz – 4G

Figure 66: 16QAM 5MHz B.W; 765.5MHz – 4G

Figure 67: 16QAM 10MHz B.W; 733.0MHz – 4G

Figure 68: 16QAM 10MHz B.W; 751.5MHz – 4G

Figure 69: 16QAM 10MHz B.W; 763.0MHz – 4G

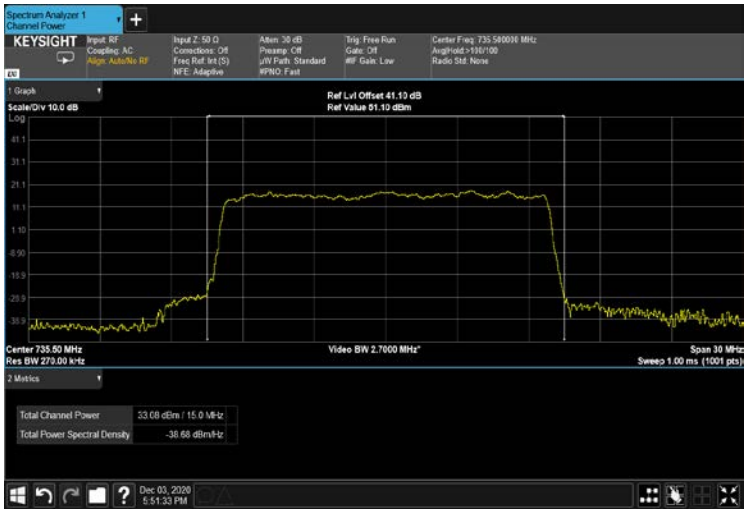

Figure 70: 16QAM 15MHz B.W; 735.5MHz – 4G

Figure 71: 64QAM 5MHz B.W; 730.5MHz – 4G

Figure 72: 64QAM 5MHz B.W; 751.5MHz – 4G

Figure 73: 64QAM 5MHz B.W; 765.5MHz – 4G

Figure 74: 64QAM 10MHz B.W; 733.0MHz – 4G

Figure 75: 64QAM 10MHz B.W; 751.5MHz – 4G

Figure 76: 64QAM 10MHz B.W; 763.0MHz – 4G

Figure 77: 64QAM 15MHz B.W; 735.5MHz – 4G

Figure 78: QPSK 5MHz B.W; 730.5MHz – 4G

Figure 79: QPSK 5MHz B.W; 751.5MHz – 4G

Figure 80: QPSK 5MHz B.W; 765.5MHz – 4G

Figure 81: QPSK 10MHz B.W; 733.0MHz – 4G

Figure 82: QPSK 10MHz; 751.5MHz – 4G

Figure 83: QPSK 10MHz; 763.0MHz – 4G

Figure 84: QPSK 15MHz B.W; 735.5MHz – 4G

5.5 Test Equipment Used; RF Output Power

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
EXA signal Analyzer	Keysight	UXA N9040B	MY56080119	January 31, 2020	January 31, 2022
EXG Vector Signal Generator	Agilent Technologies	N5172B	MY53051952	January 17, 2019	January 17, 2022
40 dB Attenuator	Weinschel Associates	WA 39-40-33	-	November 1, 2020	November 1, 2021
RF Coaxial Cable	Huber-Suner	SLLS210B	-	November 1, 2020	November 1, 2021

Table 9 Test Equipment Used

6 Band Edge Spectrum - 5G

6.1 Test Specification

FCC Part 27, Subpart C, Section 27.53

6.2 Test Procedure

(Temperature (20°C)/ Humidity (48%RH))
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (40.7 dB).
The spectrum analyzer was set the RBW to proper value

6.3 Test Limit

The power of any emission outside of the authorized operating frequency ranges (728-768 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + log (P) dB, yielding –13dBm.

6.4 Test Results

JUDGEMENT: Passed

See additional information in Table 10 to Table 13 and Figure 85 to Figure 124.

Modulation	Bandwidth	Sub Carrier	Band Edge Frequency	Reading	Limit
	(MHz)	(kHz)	(MHz)	(dBm)	(dBm)
16QAM	5	15	730.5	-22.947	-13.0
			765.5	-27.271	-13.0
		30	730.5	-27.196	-13.0
			765.5	-36.238	-13.0
	10	15	733.0	-26.932	-13.0
			763.0	-35.183	-13.0
		30	733.0	-27.605	-13.0
			763.0	-33.816	-13.0
	15	15	735.5	-27.530	-13.0
		30	735.5	-27.379	-13.0

Table 10 Band Edge Spectrum Results 16QAM – 5G

Modulation	Bandwidth	Sub Carrier	Band Edge Frequency	Reading	Limit
	(MHz)	(kHz)	(MHz)	(dBm)	(dBm)
64QAM	5	15	730.5	-28.323	-13.0
			765.5	-27.688	-13.0
		30	730.5	-31.199	-13.0
			765.5	-37.030	-13.0
	10	15	733.0	-27.518	-13.0
			763.0	-34.808	-13.0
		30	733.0	-28.225	-13.0
			763.0	-35.604	-13.0
	15	15	735.5	-28.450	-13.0
		30	735.5	-29.775	-13.0

Table 11 Band Edge Spectrum Results 64QAM – 5G

Modulation	Bandwidth	Sub Carrier	Band Edge Frequency	Reading	Limit
	(MHz)	(kHz)	(MHz)	(dBm)	(dBm)
256QAM	5	15	730.5	-22.265	-13.0
			765.5	-29.393	-13.0
		30	730.5	-26.679	-13.0
			765.5	-38.530	-13.0
	10	15	733.0	-28.356	-13.0
			763.0	-36.373	-13.0
		30	733.0	-27.363	-13.0
			763.0	-36.147	-13.0
	15	15	735.5	-29.905	-13.0
		30	735.5	-27.455	-13.0

Table 12 Band Edge Spectrum Results 256QAM – 5G

Modulation	Bandwidth	Sub Carrier	Band Edge Frequency	Reading	Limit
	(MHz)	(kHz)	(MHz)	(dBm)	(dBm)
QPSK	5	15	730.5	-23.573	-13.0
			765.5	-28.014	-13.0
		30	730.5	-25.175	-13.0
			765.5	-37.084	-13.0
	10	15	733.0	-28.019	-13.0
			763.0	-36.609	-13.0
		30	733.0	-27.624	-13.0
			763.0	-33.056	-13.0
	15	15	735.5	-27.571	-13.0
		30	735.5	-28.494	-13.0

Table 13 Band Edge Spectrum Results QPSK – 5G

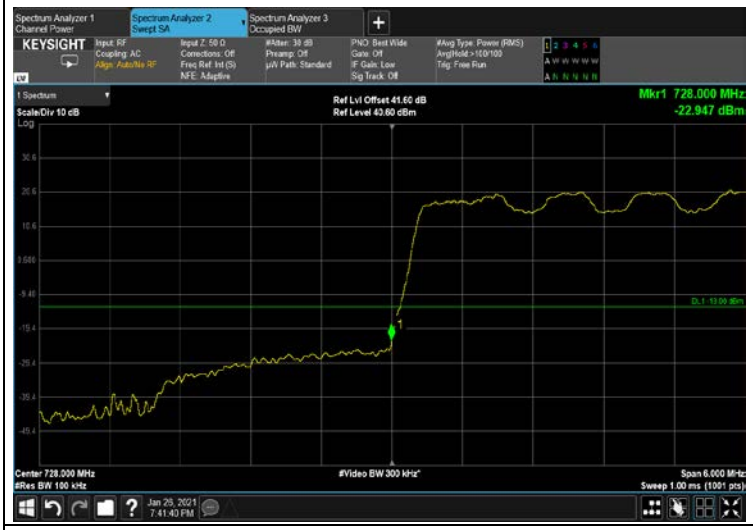

Figure 85: 16QAM 5MHz B.W.; 730.5MHz, 15kHz Lower Edge

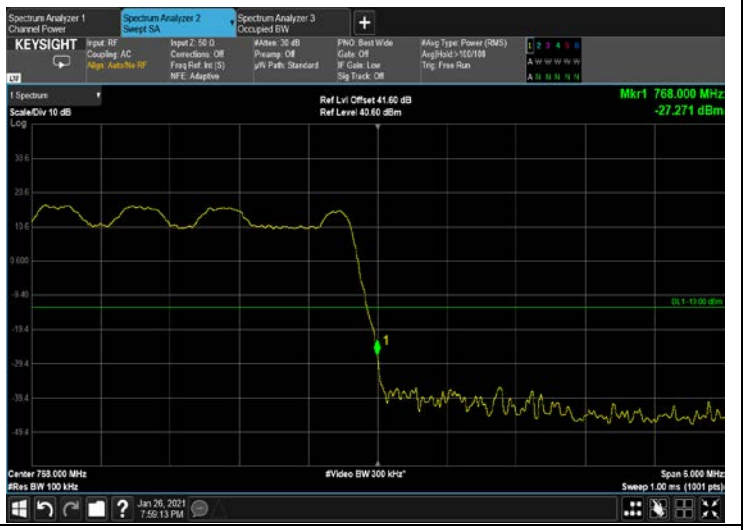

Figure 86: 16QAM 5MHz B.W.; 765.5MHz, 15kHz Upper Edge

Figure 87: 16QAM 5MHz B.W.; 730.5MHz, 30kHz Lower Edge

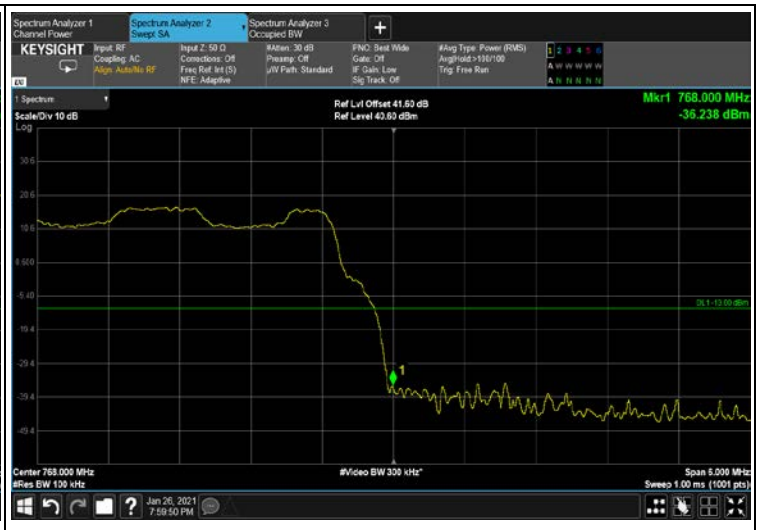

Figure 88: 16QAM 5MHz B.W.; 765.5MHz, 30kHz Upper Edge

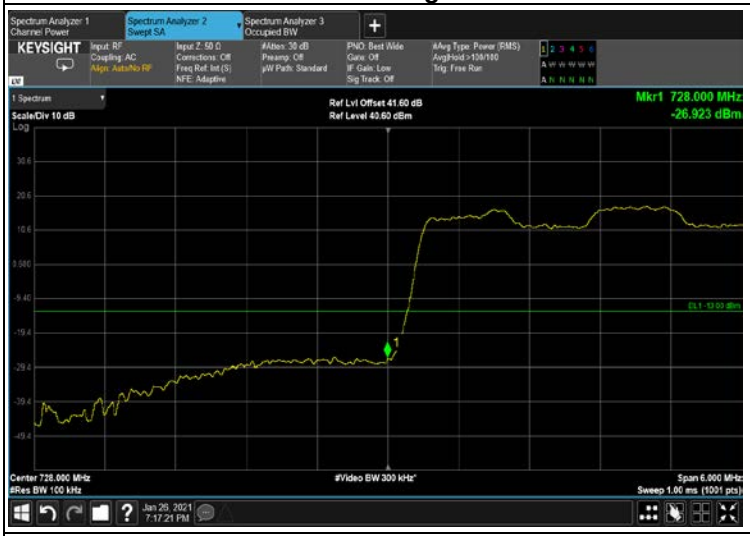

Figure 89: 16QAM 10MHz B.W.; 733MHz, 15kHz Lower Edge

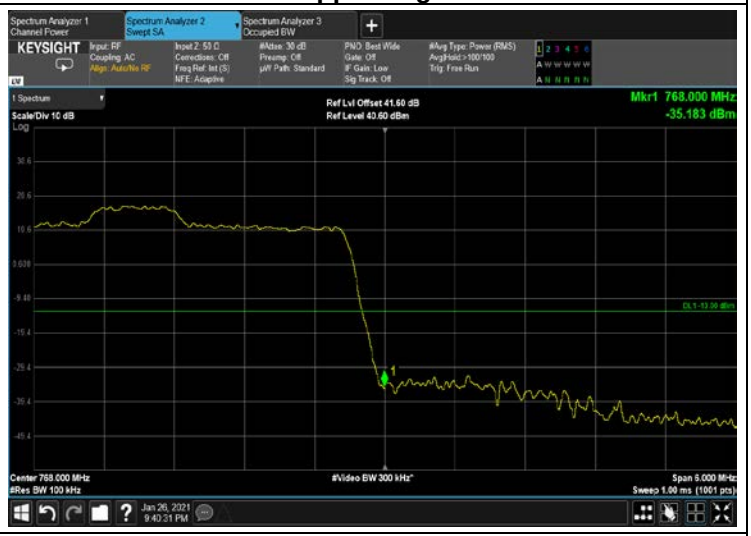

Figure 90: 16QAM 10MHz B.W.; 763MHz, 15kHz Upper Edge

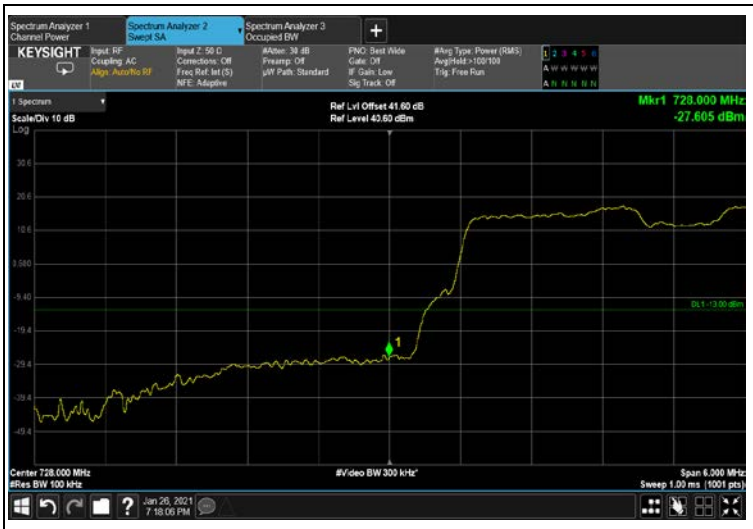

Figure 91: 16QAM 10MHz B.W.; 733MHz, 30kHz Lower Edge

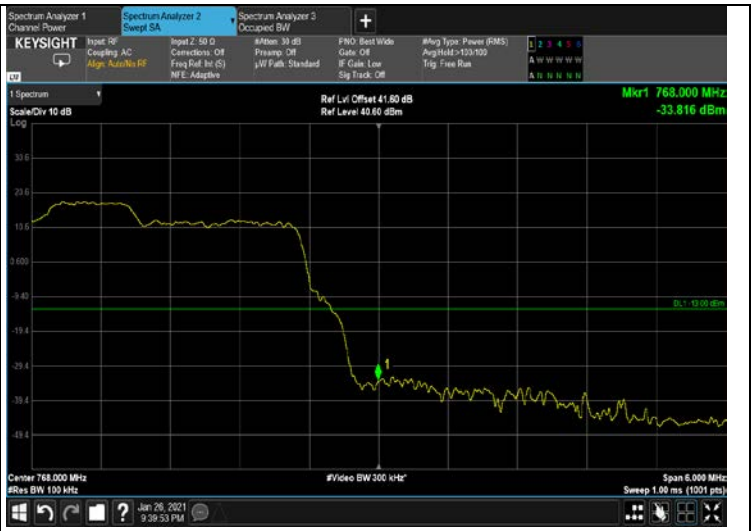

Figure 92: 16QAM 10MHz B.W.; 763MHz, 30kHz Upper Edge

Figure 93: 16QAM 15MHz B.W.; 735.5MHz, 15kHz Lower Edge

Figure 94: 16QAM 15MHz B.W.; 735.5MHz, 30kHz Lower Edge

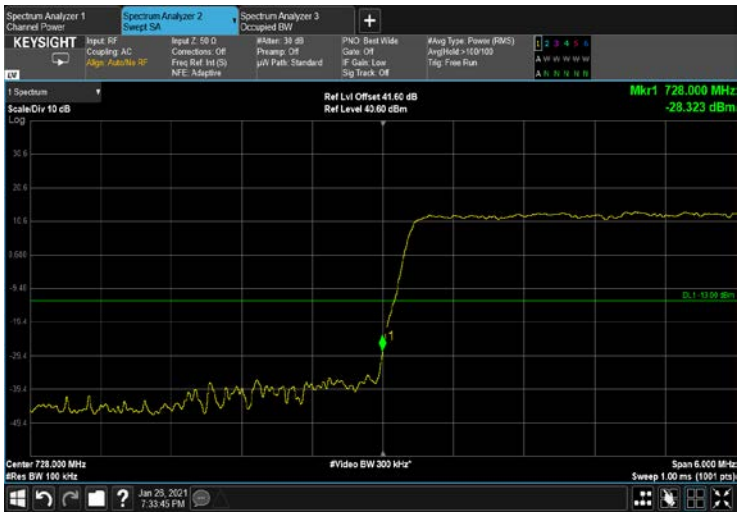

Figure 95: 64QAM 5MHz B.W.; 730.5MHz, 15kHz Lower Edge

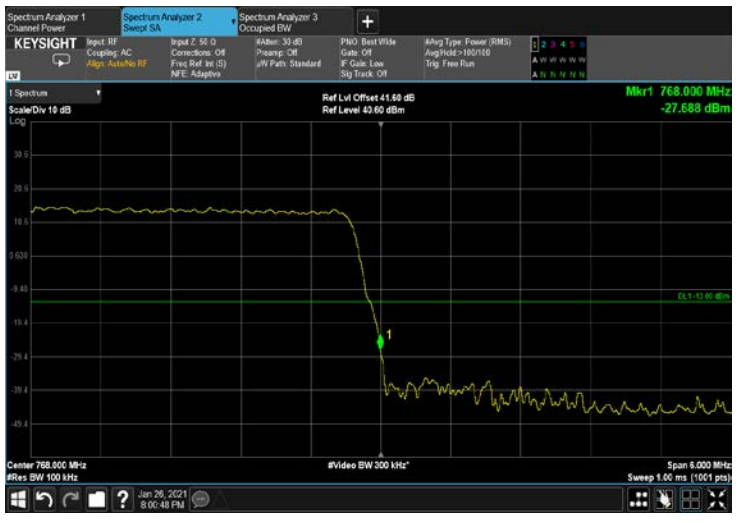

Figure 96: 64QAM 5MHz B.W.; 765.5MHz, 15kHz Upper Edge

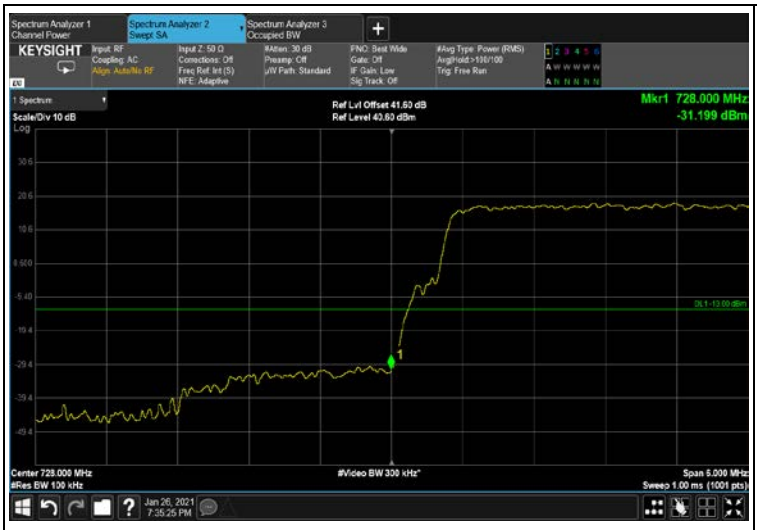

Figure 97: 64QAM 5MHz B.W.; 730.5MHz, 30kHz Lower Edge

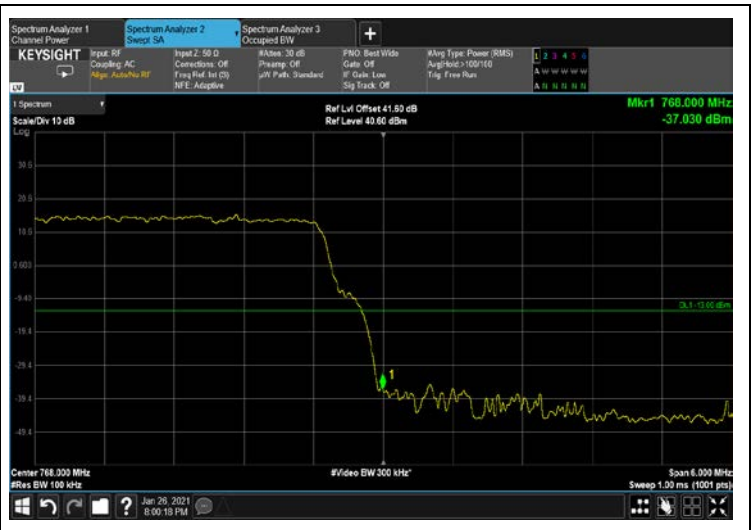

Figure 98: 64QAM 5MHz B.W.; 765.5MHz, 30kHz Upper Edge

Figure 99: 64QAM 10MHz B.W.; 733MHz, 15kHz Lower Edge

Figure 100: 64QAM 10MHz B.W.; 763MHz, 15kHz Upper Edge

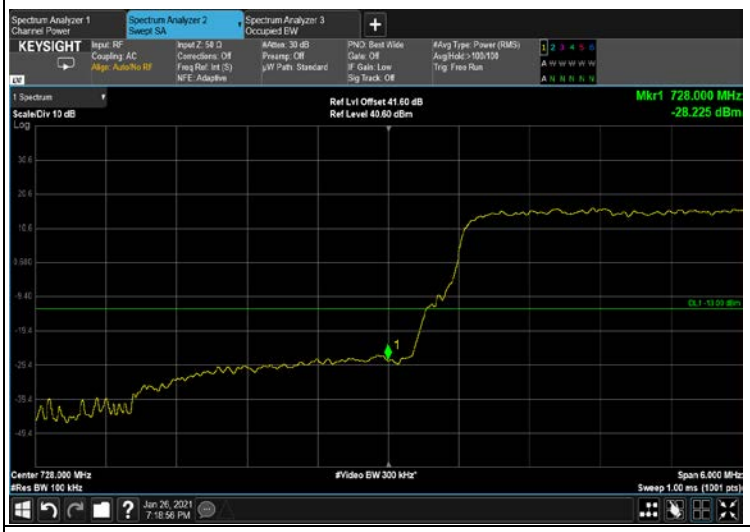

Figure 101: 64QAM 10MHz B.W.; 733MHz, 30kHz Lower Edge

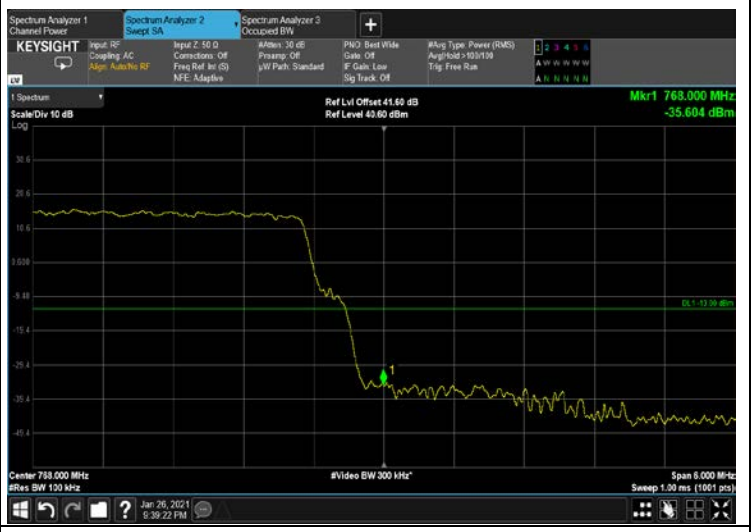

Figure 102: 64QAM 10MHz B.W.; 763MHz, 30kHz Upper Edge

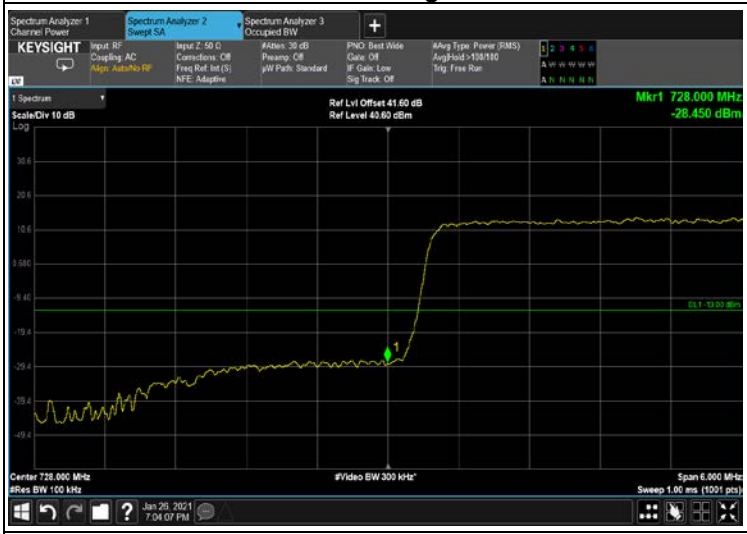

Figure 103: 64QAM 15MHz B.W.; 735.5MHz, 15kHz Lower Edge

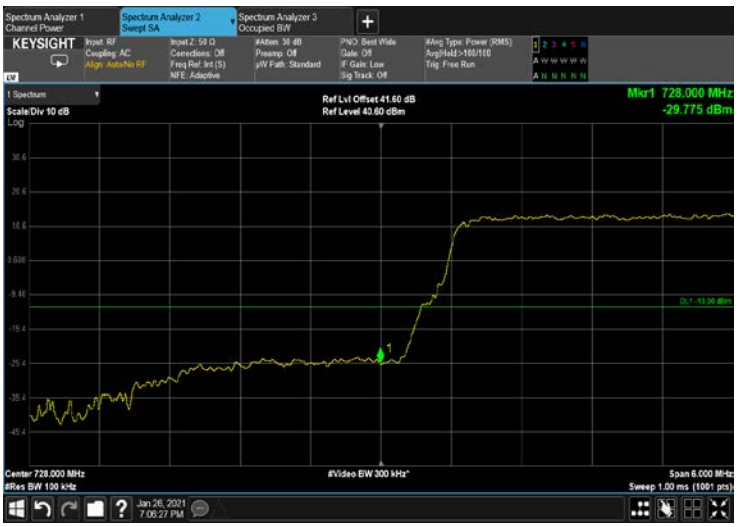

Figure 104: 64QAM 15MHz B.W.; 735.5MHz, 30kHz Lower Edge

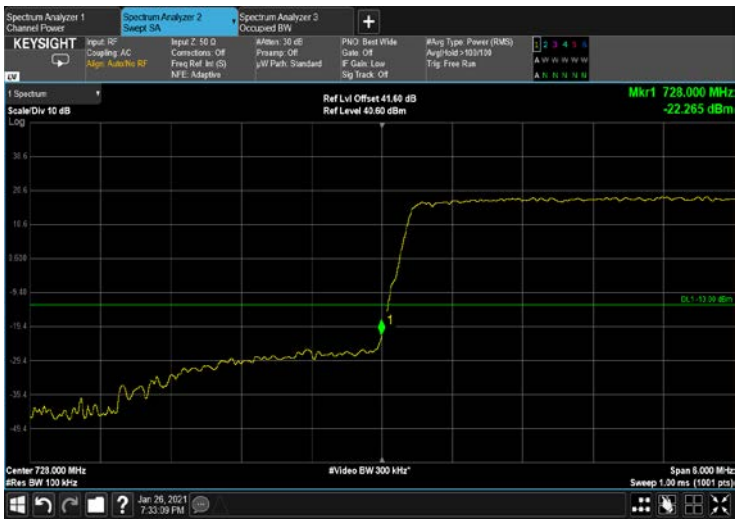

Figure 105: 256QAM 5MHz B.W.; 730.5MHz, 15kHz Lower Edge

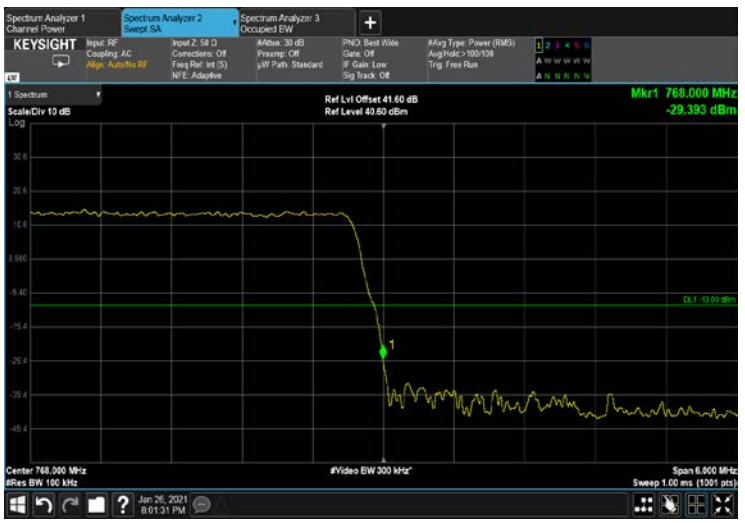

Figure 106: 256QAM 5MHz B.W.; 765.5MHz, 15kHz Upper Edge

Figure 107: 256QAM 5MHz B.W.; 730.5MHz, 30kHz Lower Edge

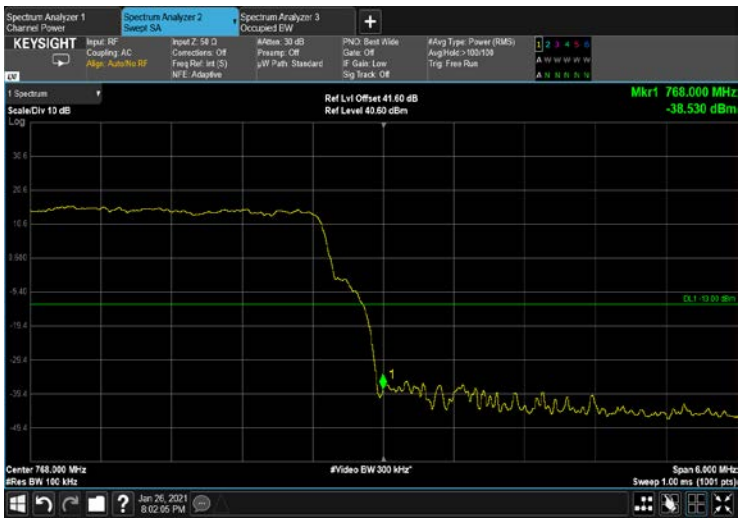

Figure 108: 256QAM 5MHz B.W.; 765.5MHz, 30kHz Upper Edge

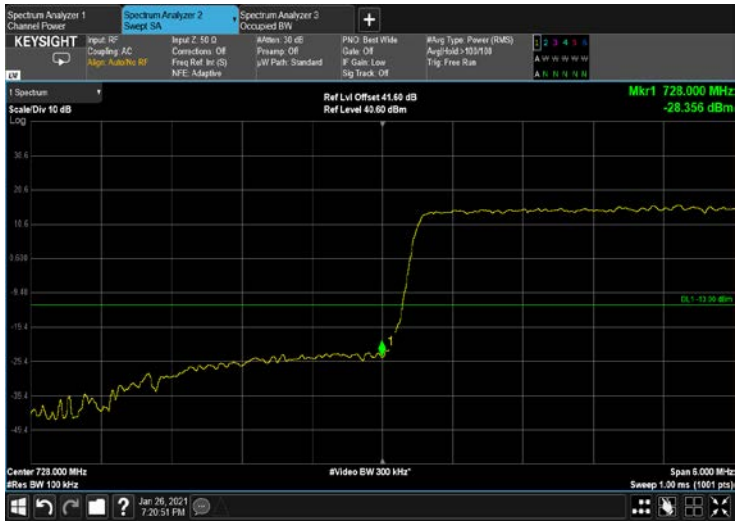

Figure 109: 256QAM 10MHz B.W.; 733MHz, 15kHz Lower Edge

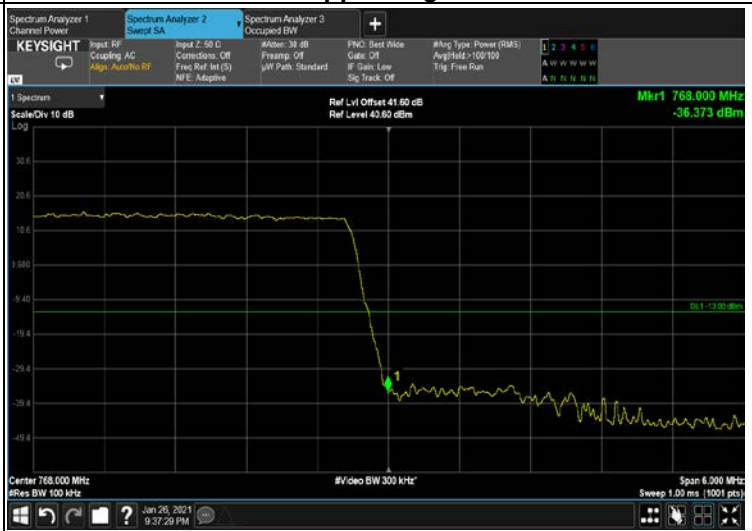

Figure 110: 256QAM 10MHz B.W.; 765MHz, 15kHz Upper Edge

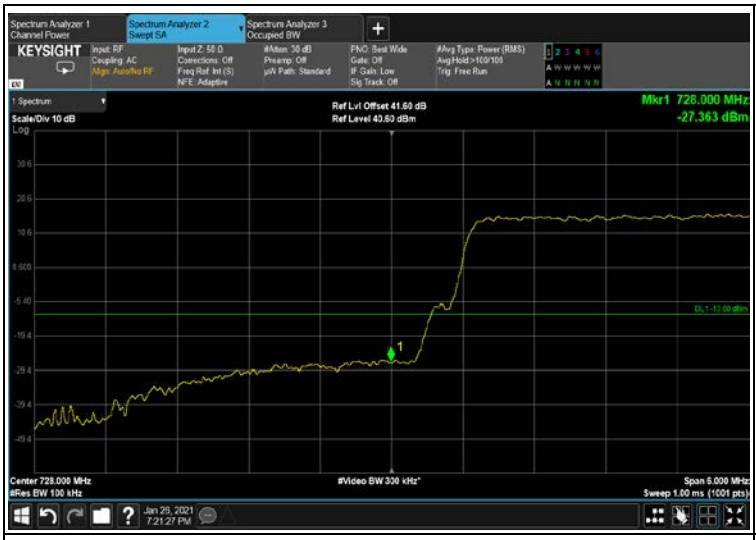

Figure 111: 256QAM 10MHz B.W.; 733MHz, 30kHz Lower Edge

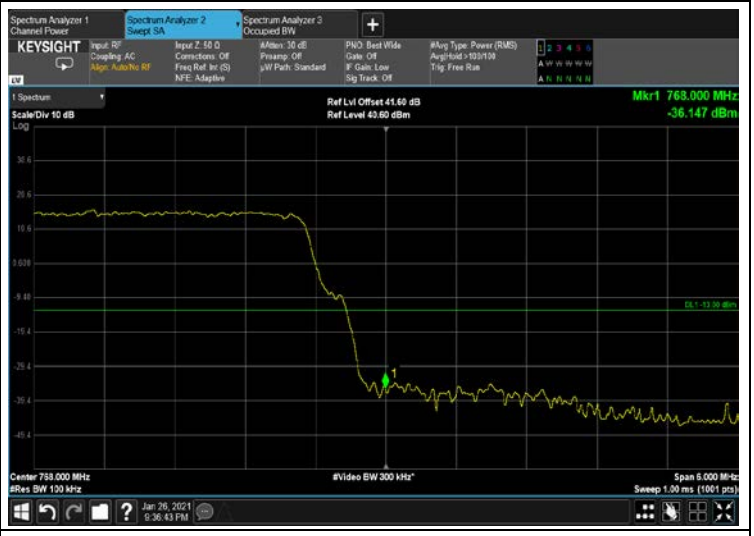

Figure 112: 256QAM 10MHz B.W.; 763MHz, 30kHz Upper Edge

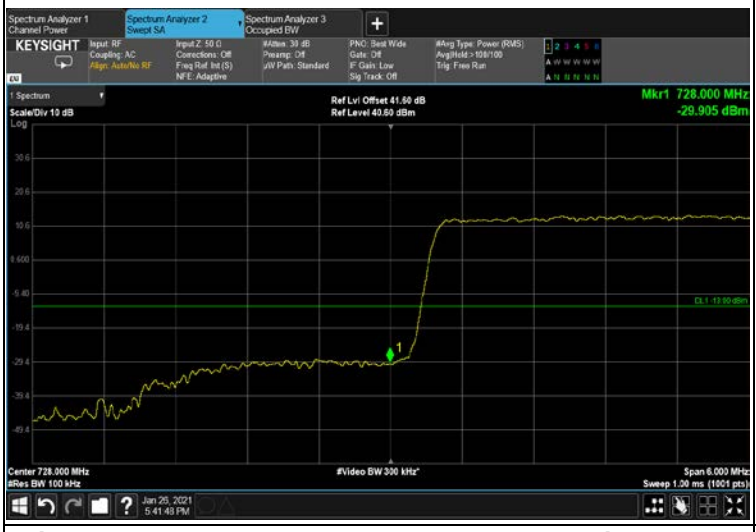

Figure 113: 256QAM 15MHz B.W.; 735.5Hz, 15kHz Lower Edge

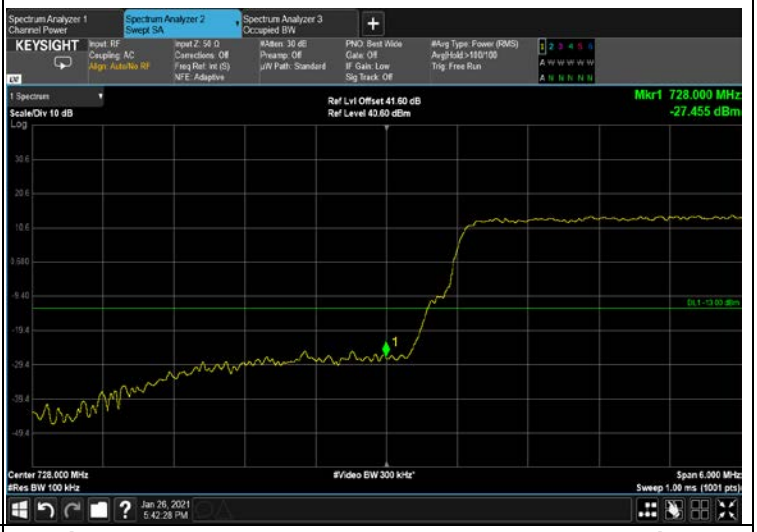

Figure 114: 256QAM 15MHz B.W.; 735.5MHz, 30kHz Lower Edge

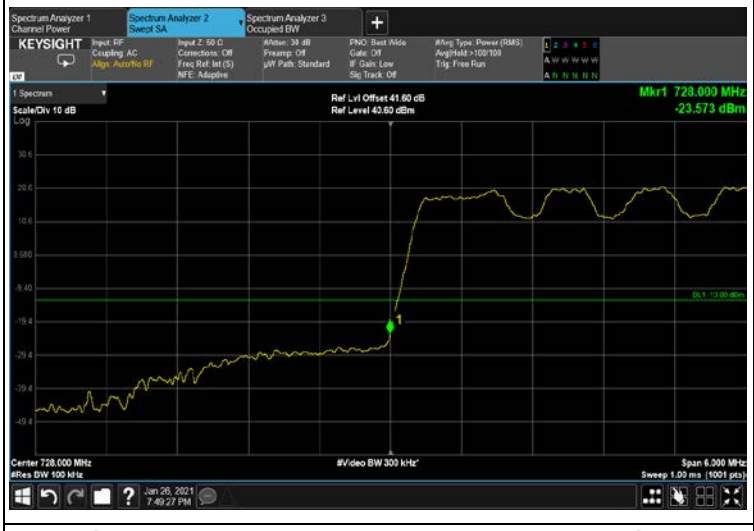

Figure 115: QPSK 5MHz B.W.; 730.5MHz, 15kHz Lower Edge

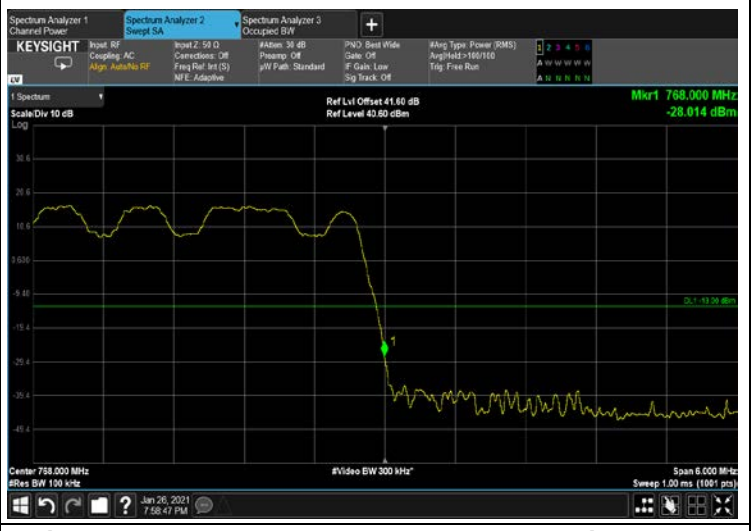

Figure 116: QPSK 5MHz B.W.; 765.5MHz, 15kHz Upper Edge

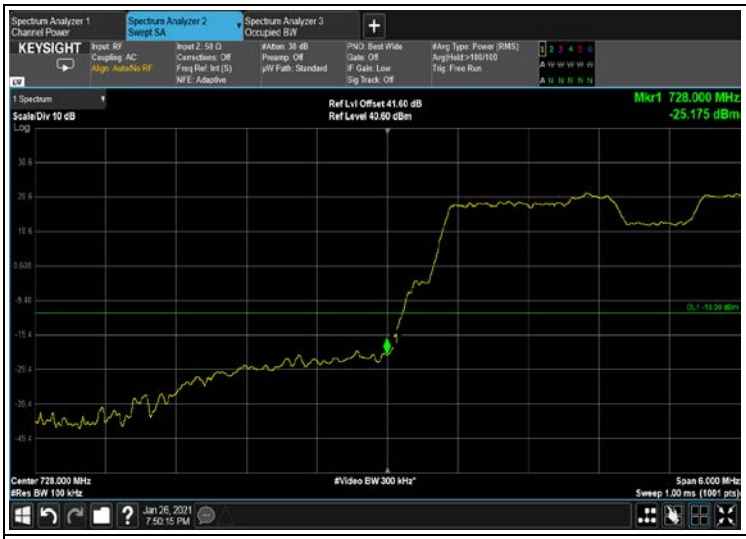

Figure 117: QPSK 5MHz B.W.; 730.5MHz, 30kHz Lower Edge

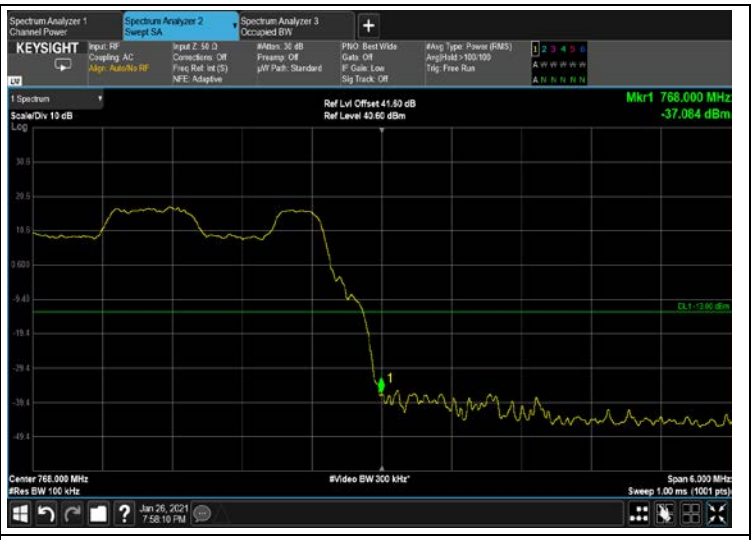

Figure 118: QPSK 5MHz B.W.; 765.5MHz, 30kHz Upper Edge

Figure 119: QPSK 10MHz B.W.; 733MHz, 15kHz Lower Edge

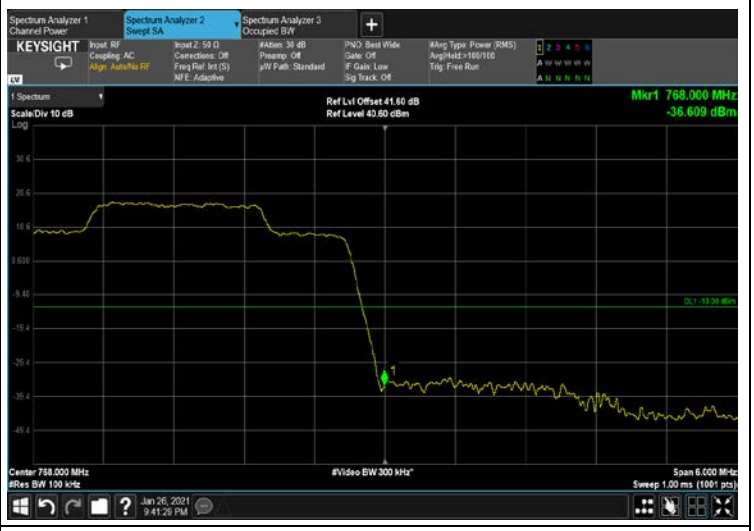

Figure 120: QPSK 10MHz B.W.; 763MHz, 15kHz Upper Edge

Figure 121: QPSK 10MHz B.W.; 733MHz, 30kHz Lower Edge

Figure 122: QPSK 10MHz B.W.; 763MHz, 30kHz Upper Edge

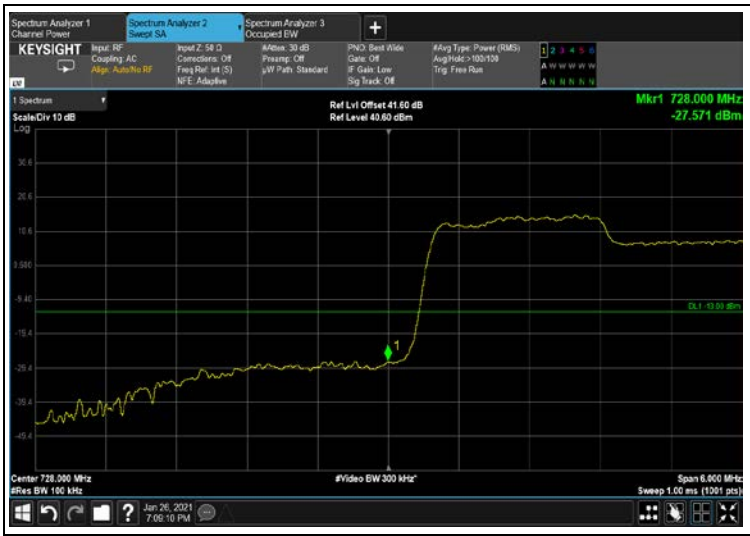

Figure 123: QPSK 15MHz B.W.; 735.5MHz, 15kHz Lower Edge

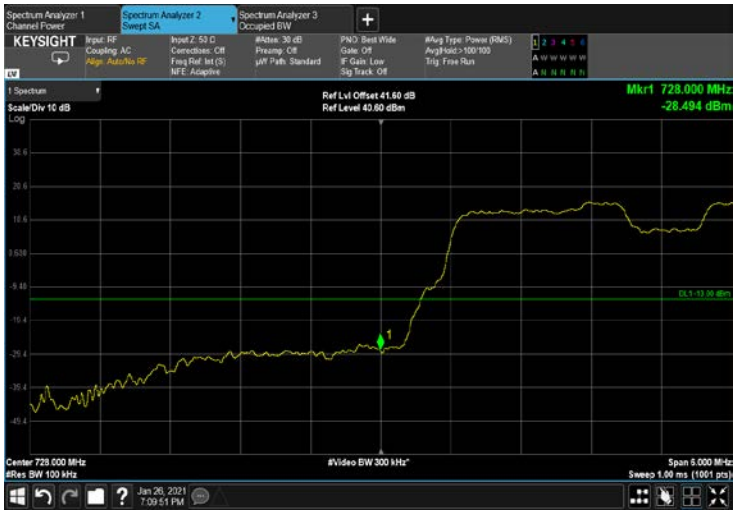

Figure 124: QPSK 15MHz B.W.; 735.5MHz, 30kHz Lower Edge

6.5 Test Equipment Used; Band Edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
EXA signal Analyzer	Keysight	UXA N9040B	MY56080119	January 31, 2020	January 31, 2022
EXG Vector Signal Generator	Agilent Technologies	N5172B	MY53051952	January 17, 2019	January 17, 2022
40 dB Attenuator	Weinschel Associates	WA 39-40-33	-	November 1, 2020	November 1, 2021
RF Coaxial Cable	Huber-Suner	SLLS210B	-	November 1, 2020	November 1, 2021

Table 14 Test Equipment Used

7 Band Edge Spectrum – 4G

7.1 Test Specification

FCC Part 27, Subpart C, Section 27.53

7.2 Test Procedure

(Temperature (20°C)/ Humidity (48%RH))
The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable (40.7 dB).
The spectrum analyzer was set the RBW to proper value

7.3 Test Limit

The power of any emission outside of the authorized operating frequency ranges (728-768 MHz) must be attenuated below the transmitting power (P) by a factor of at least 43 + log (P) dB, yielding –13dBm.

7.4 Test Results

JUDGEMENT: Passed

See additional information in Table 15 to Table 17 and Figure 125 to Figure 139.

Modulation	Bandwidth	Band Edge Frequency	Reading	Limit
	(MHz)	(MHz)	(dBm)	(dBm)
16QAM	5	730.5	-34.756	-13.0
		765.5	-32.061	-13.0
	10	733.0	-33.434	-13.0
		763.0	-36.224	-13.0
	15	735.5	-31.398	-13.0

Table 15 Band Edge Spectrum Results 16QAM – 4G

Modulation	Bandwidth	Band Edge Frequency	Reading	Limit
	(MHz)	(MHz)	(dBm)	(dBm)
64QAM	5	730.5	-33.923	-13.0
		765.5	-31.465	-13.0
	10	733.0	-32.561	-13.0
		763.0	-35.995	-13.0
	15	735.5	-31.802	-13.0

Table 16 Band Edge Spectrum Results 64QAM – 4G

Modulation	Bandwidth	Band Edge Frequency	Reading	Limit
	(MHz)	(MHz)	(dBm)	(dBm)
QPSK	5	730.5	-33.430	-13.0
		765.5	-32.223	-13.0
	10	733.0	-32.330	-13.0
		763.0	-35.900	-13.0
	15	735.5	-30.684	-13.0

Table 17 Band Edge Spectrum Results QPSK – 4G

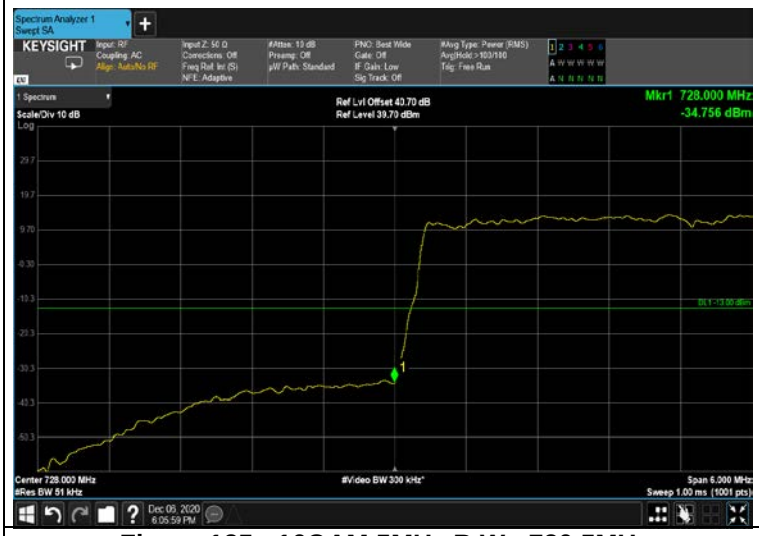

Figure 125: 16QAM 5MHz B.W.; 730.5MHz Lower Edge – 4G

Figure 126: 16QAM 5MHz B.W.; 765.5MHz Upper Edge – 4G

Figure 127: 16QAM 10MHz B.W.; 733.0MHz Lower Edge – 4G

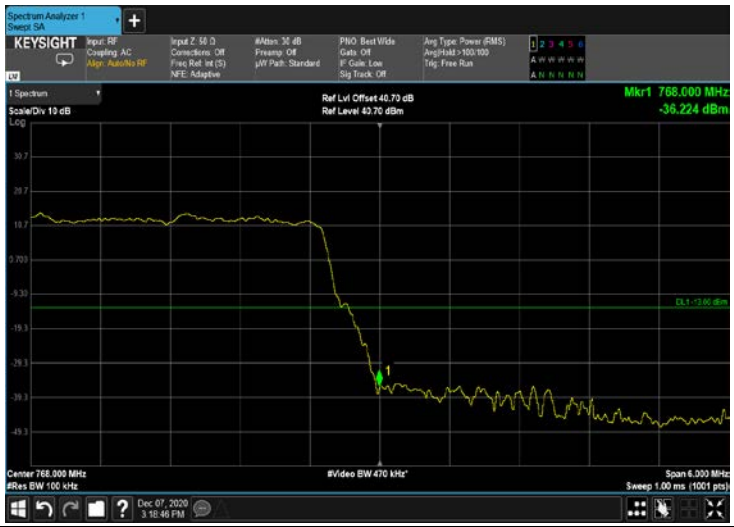

Figure 128: 16QAM 10MHz B.W.; 763.0MHz Upper Edge – 4G

Figure 129: 16QAM 15MHz B.W.; 735.5MHz Lower Edge – 4G

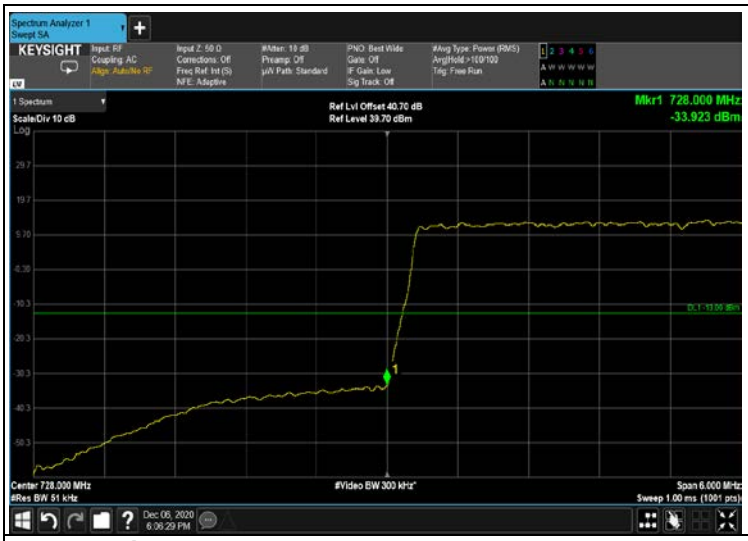

Figure 130: 64QAM 5MHz B.W.; 730.5MHz Lower Edge – 4G

Figure 131: 64QAM 5MHz B.W.; 765.5MHz Upper Edge – 4G

Figure 132: 64QAM 10MHz B.W.; 733.0MHz Lower Edge – 4G

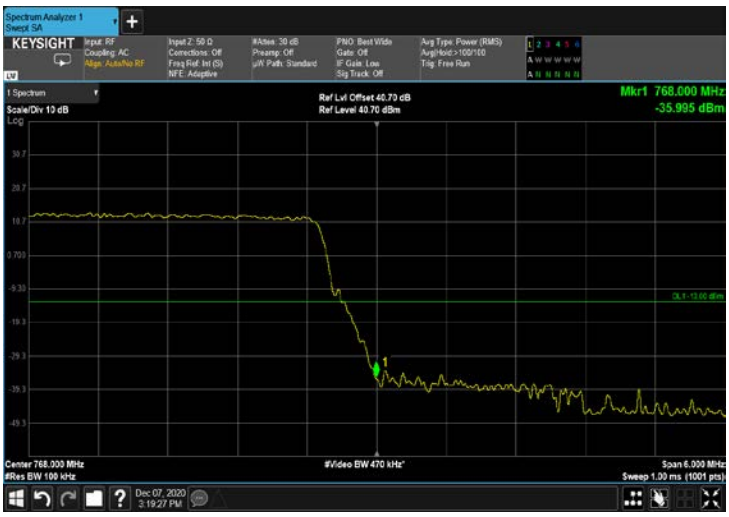

Figure 133: 64QAM 10MHz B.W.; 763.0MHz Upper Edge – 4G

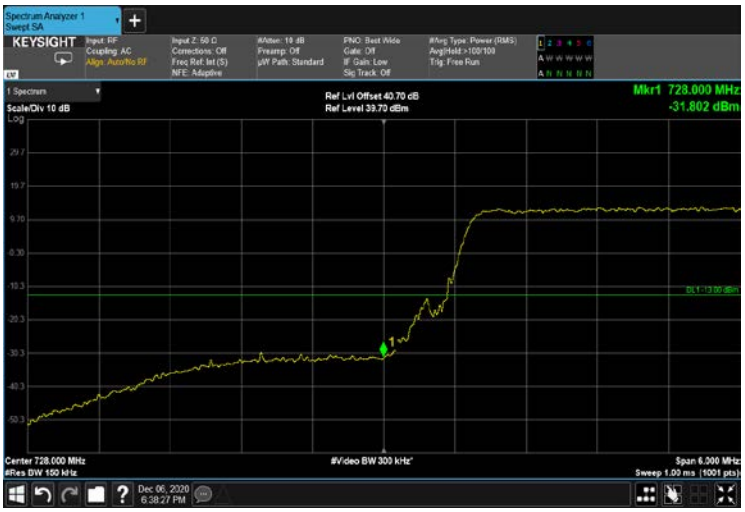

Figure 134: 64QAM 15MHz B.W.; 735.5MHz Lower Edge – 4G

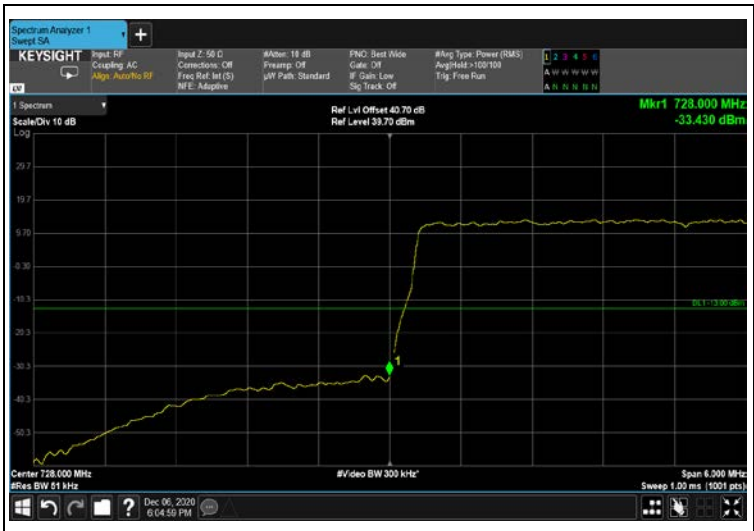

Figure 135: QPSK 5MHz B.W.;730.5MHz Lower Edge – 4G

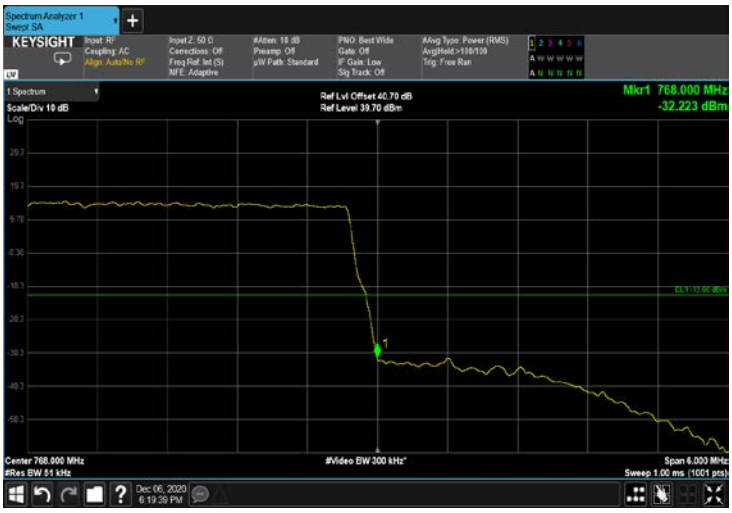

Figure 136: QPSK 5MHz B.W.; 765.5MHz Upper Edge – 4G

Figure 137: QPSK 10MHz B.W.; 733.0MHz Lower Edge – 4G

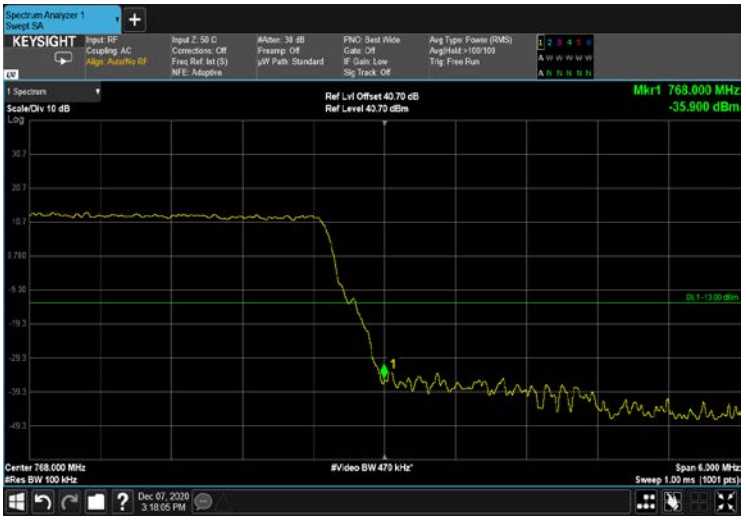

Figure 138: QPSK 10MHz B.W.; 763.0MHz Upper Edge – 4G

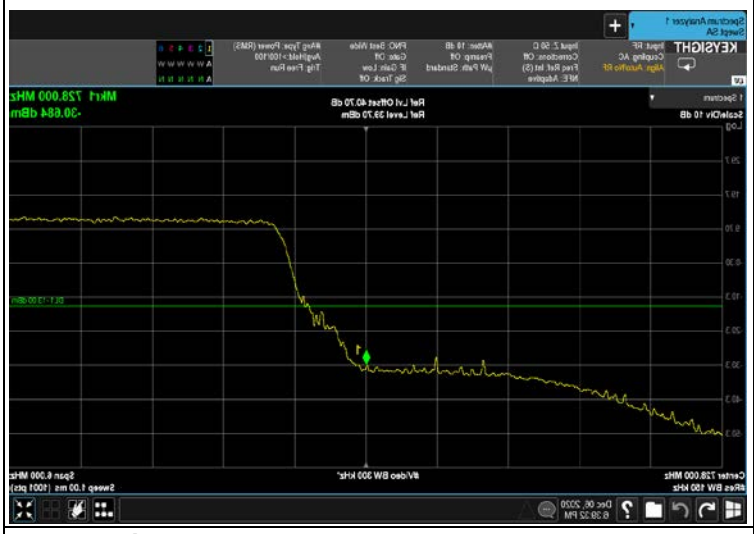

Figure 139: QPSK 15MHz B.W.; 735.5MHz Lower Edge – 4G

7.5 Test Equipment Used; Band Edge Spectrum

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
EXA signal Analyzer	Keysight	UXA N9040B	MY56080119	January 31, 2020	January 31, 2022
EXG Vector Signal Generator	Agilent Technologies	N5172B	MY53051952	January 17, 2019	January 17, 2022
40 dB Attenuator	Weinschel Associates	WA 39-40-33	-	November 1, 2020	November 1, 2021
RF Coaxial Cable	Huber-Suner	SLLS210B	-	November 1, 2020	November 1, 2021

Table 18 Test Equipment Used

8 Peak to Average Power Ratio - 5G

8.1 Test Specification

FCC Part 27, Subpart C, Section 27.50

8.2 Test Procedure

(Temperature (22°C)/ Humidity (40%RH))
The method used is detailed in FCC KDB 971168 D03 v01

Measurements was using CCDF function for each modulation.

8.3 Test Limit

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

8.4 Test Results

JUDGEMENT: Passed

For additional information see Table 19 to Table 22 and Figure 140 to Figure 195.