



DATE: 24 February 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

(CELL/ESMR)

Tested by:

M. Zohar

Approved by:

D. Shidlow

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This report relates only to items tested.



Measurement/Technical Report for Corning Optical Communication Wireless

Corning Everon 6000 DAS - dMRU dMRU Medium Power Modular Remote Unit (CELL/ESMR)

FCC ID: OJFDMRUDPAM8

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

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

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TABLE OF CONTENTS

1	GENERAL INFORMATION -----	5
	1.1 Administrative Information	5
	1.2 List of Accreditations	6
	1.3 Product Description	7
	1.4 Test Methodology	7
	1.5 Test Facility	7
	1.6 Measurement Uncertainty	7
2	SYSTEM TEST CONFIGURATION -----	8
	2.1 Justification	8
	2.2 EUT Exercise Software	8
	2.3 Special Accessories	8
	2.4 Equipment Modifications	8
	2.5 Configuration of Tested System	9
3	TEST SET-UP PHOTOS -----	11
4	RF POWER OUTPUT - 5G -----	14
	4.1 Test Specification	14
	4.2 Test Procedure	14
	4.3 Test Limit	14
	4.4 Test Results	14
	4.5 Test Equipment Used; Channel Power	32
5	RF POWER OUTPUT – 3G AND 4G -----	33
	5.1 Test Specification	33
	5.2 Test Procedure	33
	5.3 Test Limit	33
	5.4 Test Results	33
	5.5 Test Equipment Used; Channel Power	42
6	BAND EDGE SPECTRUM - 5G -----	43
	6.1 Test Specification	43
	6.2 Test Procedure	43
	6.3 Test Limit	43
	6.4 Test Results	43
	6.5 Test Equipment Used; Band Edge Spectrum	54
7	BAND EDGE SPECTRUM – 3G AND 4G -----	55
	7.1 Test Specification	55
	7.2 Test Procedure	55
	7.3 Test Limit	55
	7.4 Test Results	55
	7.5 Test Equipment Used; Band Edge Spectrum	61
8	OCCUPIED BANDWIDTH – 5G -----	62
	8.1 Test Specification	62
	8.2 Test Procedure	62
	8.3 Test Limit	62
	8.4 Test Results	62
	8.5 Test Equipment Used; Occupied Bandwidth	97
9	OCCUPIED BANDWIDTH – 3G AND 4G -----	98
	9.1 Test Specification	98
	9.2 Test Procedure	98
	9.3 Test Limit	98
	9.4 Test Results	98
	9.5 Test Equipment Used; Occupied Bandwidth	114



10	SPURIOUS EMISSIONS AT ANTENNA TERMINALS - 5G -----	115
	10.1 Test Specification	115
	10.2 Test Procedure	115
	10.3 Test Limit	115
	10.4 Test Results.....	115
	10.5 Test Equipment Used; Spurious Emissions at Antenna Terminals.....	140
11	SPURIOUS EMISSIONS AT ANTENNA TERMINALS 3G & 4G -----	141
	11.1 Test Specification	141
	11.2 Test Procedure	141
	11.3 Test Limit	141
	11.4 Test Results.....	141
	11.5 Test Instrumentation Used; Radiated Measurements.....	152
12	SPURIOUS RADIATED EMISSION 3G/4G/5G -----	153
	12.1 Test Specification	153
	12.2 Test Procedure	153
	12.3 Test Limit	154
	12.4 Test Results.....	154
	12.5 Test Instrumentation Used; Radiated Measurements.....	155
13	OUT-OF-BAND REJECTION -----	156
	13.1 Test Specification	156
	13.2 Test Procedure	156
	13.3 Test Limit	156
	13.4 Test Results.....	156
	13.5 Test Equipment Used; Out-of-Band Rejection	157
14	APPENDIX A - CORRECTION FACTORS -----	158
	14.1 Correction factors for RF OATS Cable 35m.....	158
	14.2 Correction factors for RF OATS Cable 10m.....	159
	14.3 Correction factors for Horn Antenna	160
	14.4 Correction factors for Horn Antenna	161
	14.5 Correction factors for Log Periodic Antenna	162
	14.6 Correction factors for Biconical Antenna.....	163
	14.7 Correction factors for ACTIVE LOOP ANTENNA	164



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



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: 3G, 4G and 5G in the CELL-ESMR band.

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 (CELL ESMR PAM)
Working voltage(rated)	48 VDC, 115/230 VAC
Mode of operation	Repeater Booster supporting 3G, 4G and 5G
Modulations	3G: WCDMA; 4G: 16QAM, 64QAM, QPSK; 5G: 16QAM, 64QAM, 256QAM, QPSK
Frequency Range	CELL ESMR (DL: 862-894, UL:817-849)
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)	0.9A

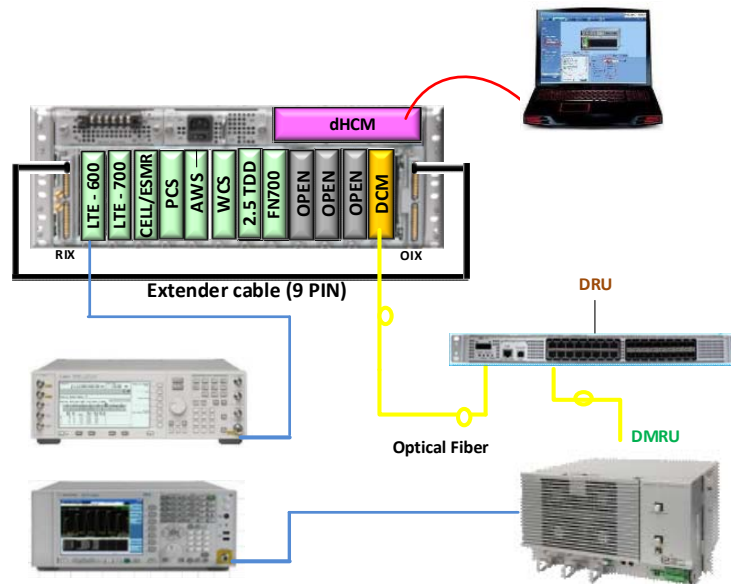


Figure 1. Conducted Test Set-Up

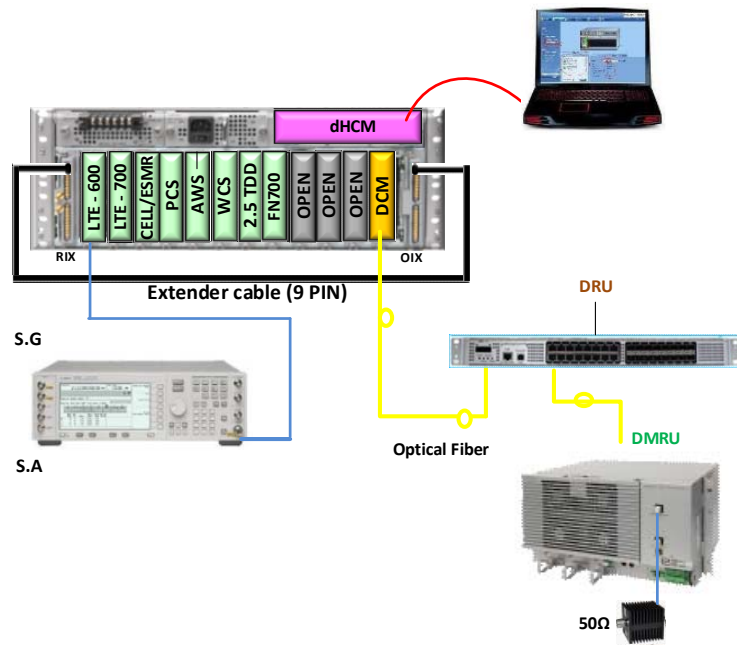


Figure 2. Radiated Test Set-Up

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 - 9.0GHz



4 RF Power Output - 5G

4.1 Test Specification

FCC Part 27, Subpart C (27.50)

4.2 Test Procedure

(Temperature (22°C)/ Humidity (36%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (39.7 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 79.



Modulation	Bandwidth	Sub Carrier	Operation Frequency	Reading
	(MHz)	(kHz)	(MHz)	(dBm)
16QAM	5	15	864.5	31.83
		30		31.94
		15	878.0	31.48
		30		31.5
		15	891.5	32.51
		30		32.45
	10	15	867.0	31.86
		30		31.98
		15	878.0	33.37
		30		33.51
		15	889.0	31.89
		30		31.90
	15	15	869.5	32.17
		30		32.12
		15	878.0	32.98
		30		32.81
		15	886.5	33.01
		30		32.91

Table 1 RF Power Output 16QAM – 5G



Modulation	Bandwidth	Sub Carrier	Operation Frequency	Reading
	(MHz)	(kHz)	(MHz)	(dBm)
64QAM	5	15	864.5	31.77
		30		31.93
		15	878.0	31.79
		30		31.84
		15	891.5	32.53
		30		32.55
	10	15	867.0	32.00
		30		33.01
		15	878.0	33.06
		30		33.04
		15	889.0	31.83
		30		32.47
	15	15	869.5	31.91
		30		31.85
		15	878.0	32.68
		30		32.83
		15	886.5	33.21
		30		33.05

Table 2 RF Power Output 64QAM - 5G



Modulation	Bandwidth	Sub Carrier	Operation Frequency	Reading
	(MHz)	(kHz)	(MHz)	(dBm)
256QAM	5	15	864.5	31.82
		30		32.07
		15	878.0	31.74
		30		31.69
		15	891.5	32.33
		30		32.39
	10	15	867.0	32.56
		30		33.10
		15	878.0	33.96
		30		33.07
		15	889.0	31.85
		30		31.83
	15	15	869.5	31.53
		30		31.51
		15	878.0	32.73
		30		32.47
		15	886.5	33.20
		30		33.29

Table 3 RF Power Output 256QAM - 5G



Modulation	Bandwidth	Sub Carrier	Operation Frequency	Reading
	(MHz)	(kHz)	(MHz)	(dBm)
QPSK	5	15	864.5	31.58
		30		31.90
		15	878.0	31.48
		30		31.55
		15	891.5	31.93
		30		32.04
	10	15	867.0	32.09
		30		31.89
		15	878.0	34.04
		30		33.31
		15	889.0	31.63
		30		31.97
	15	15	869.5	31.75
		30		31.61
		15	878.0	32.27
		30		32.37
		15	886.5	33.19
		30		33.27

Table 4 RF Power Output QPSK - 5G

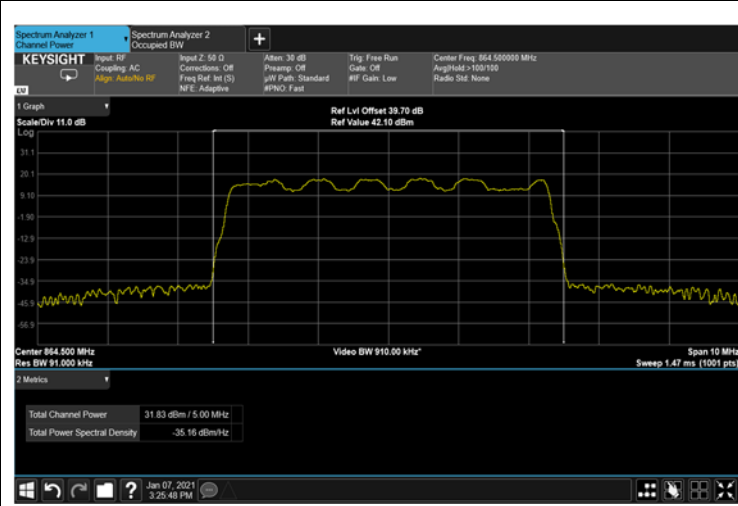


Figure 8: 16QAM 5MHz B.W.; 864.5MHz, 15kHz

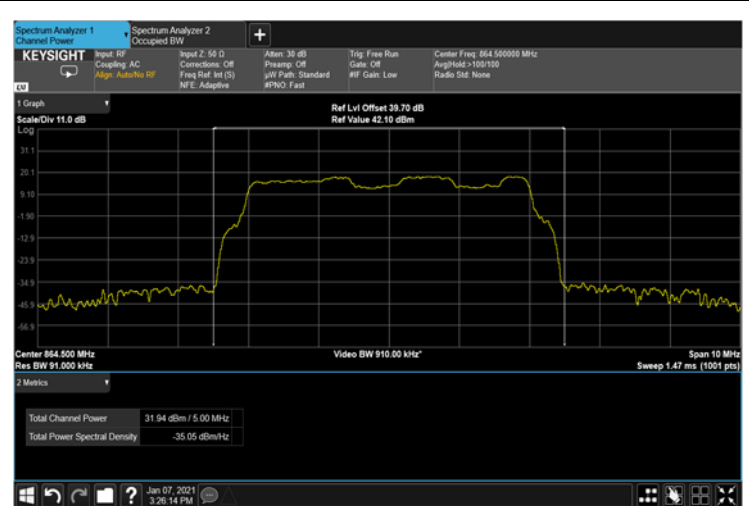


Figure 9: 16QAM 5MHz B.W.; 864.5MHz, 30kHz

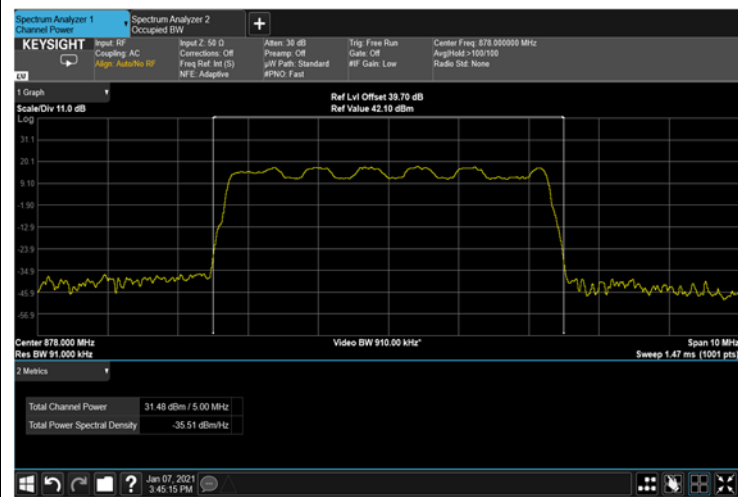


Figure 10: 16QAM 5MHz B.W.; 878.0MHz, 15kHz



Figure 11: 16QAM 5MHz B.W.; 878.0MHz, 30kHz

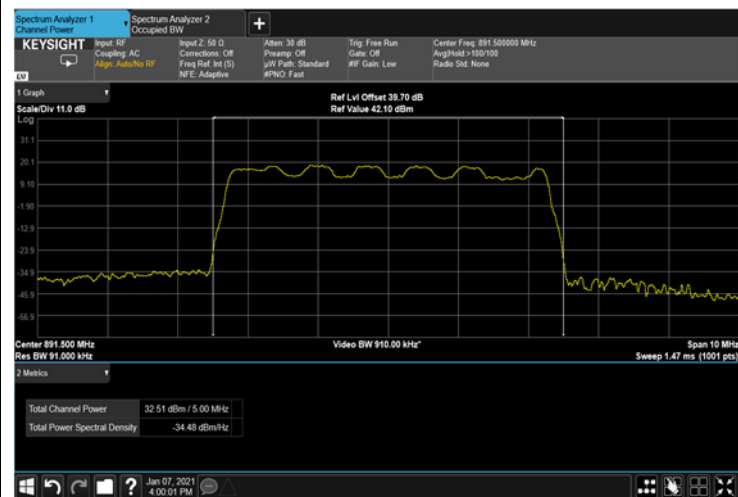


Figure 12: 16QAM 5MHz B.W.; 891.5MHz, 15kHz

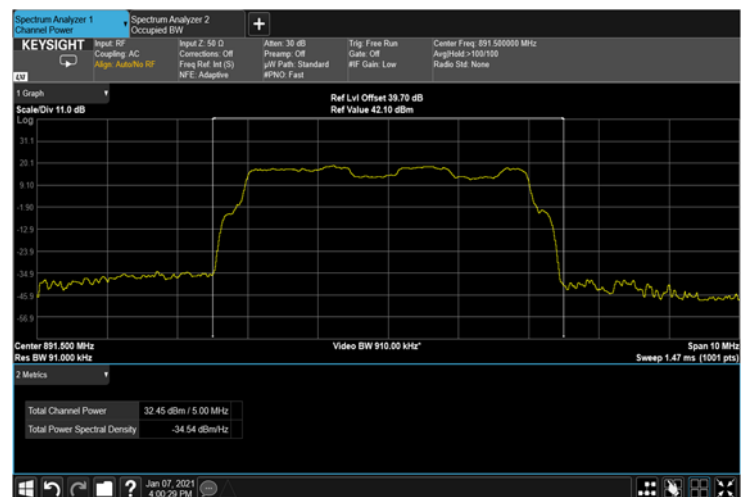
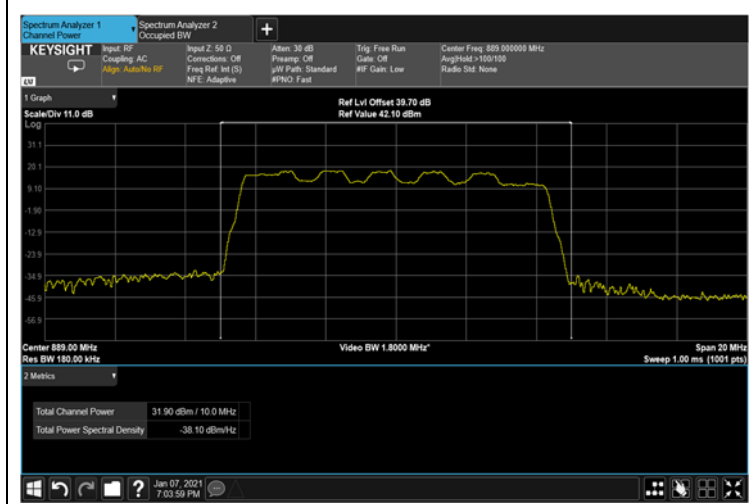
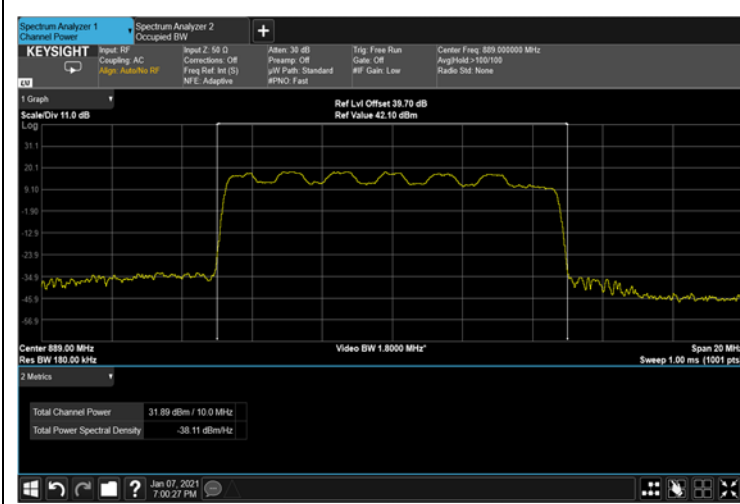
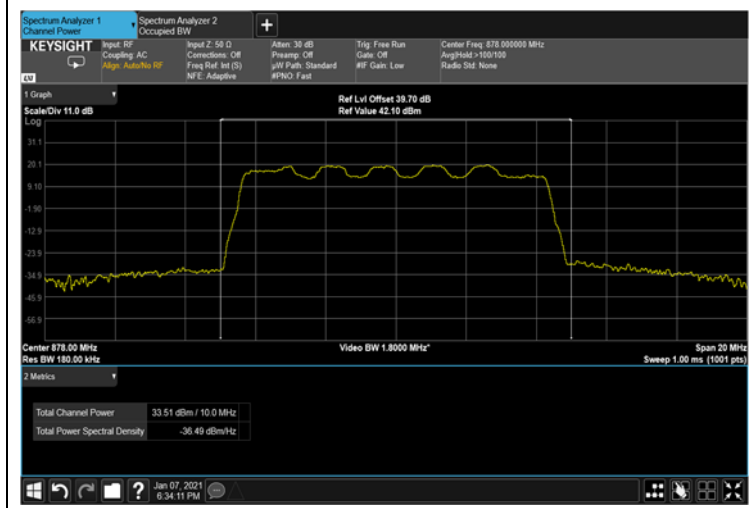
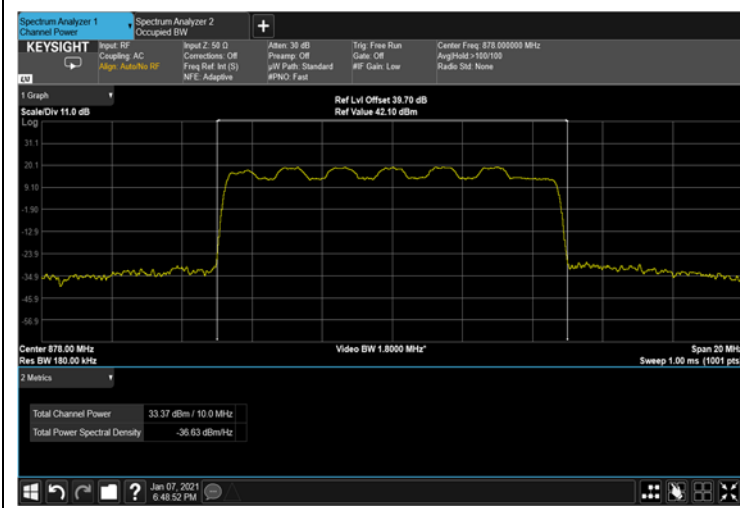
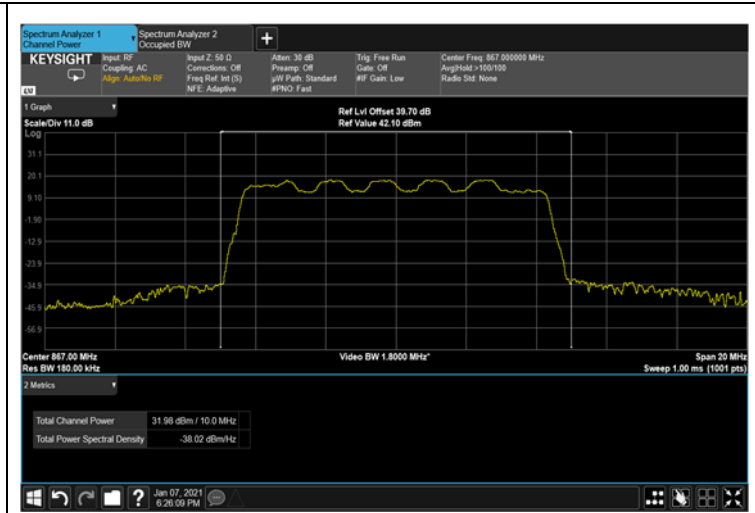
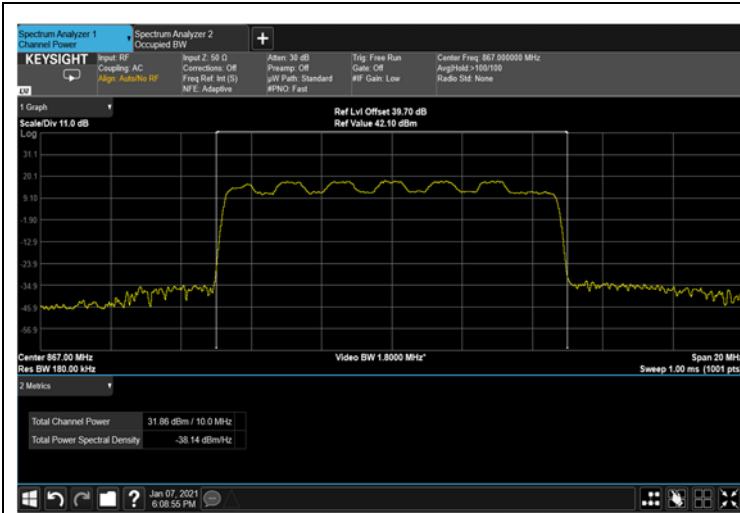


Figure 13: 16QAM 5MHz B.W.; 891.5MHz, 30kHz



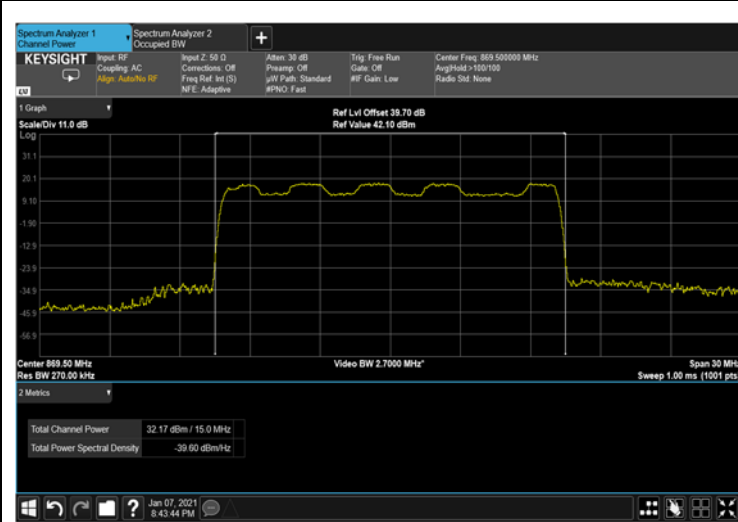


Figure 20: 16QAM 15MHz B.W.; 869.5MHz, 15kHz

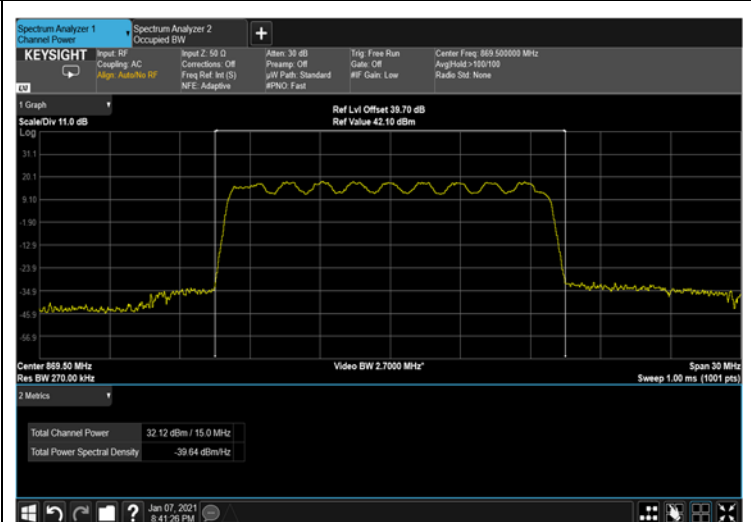


Figure 21: 16QAM 15MHz B.W.; 869.5MHz, 30kHz

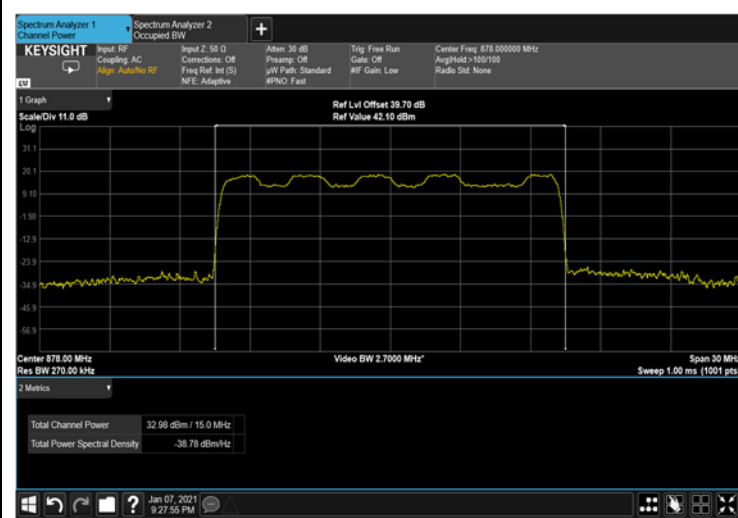


Figure 22: 16QAM 15MHz B.W.; 878.0MHz, 15kHz

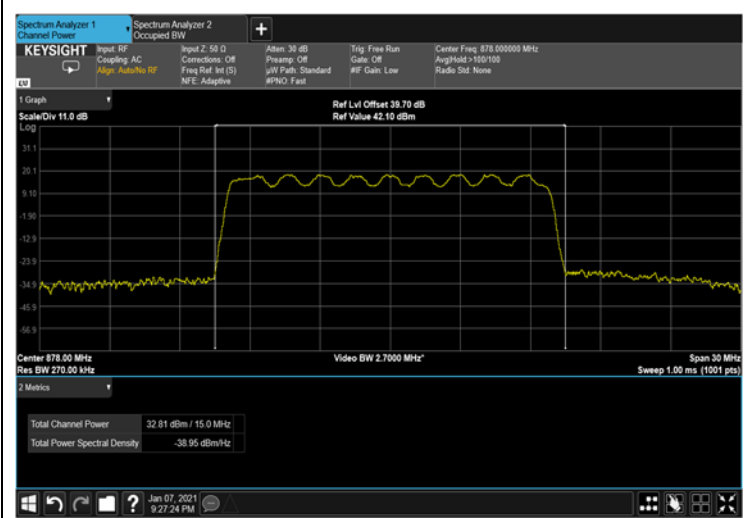


Figure 23: 16QAM 15MHz B.W.; 878.0MHz, 30kHz

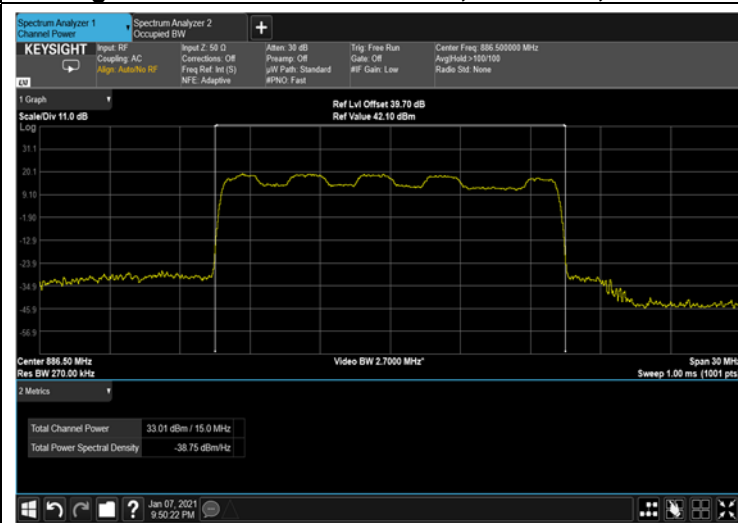


Figure 24: 16QAM 15MHz B.W.; 886.5MHz, 15 kHz

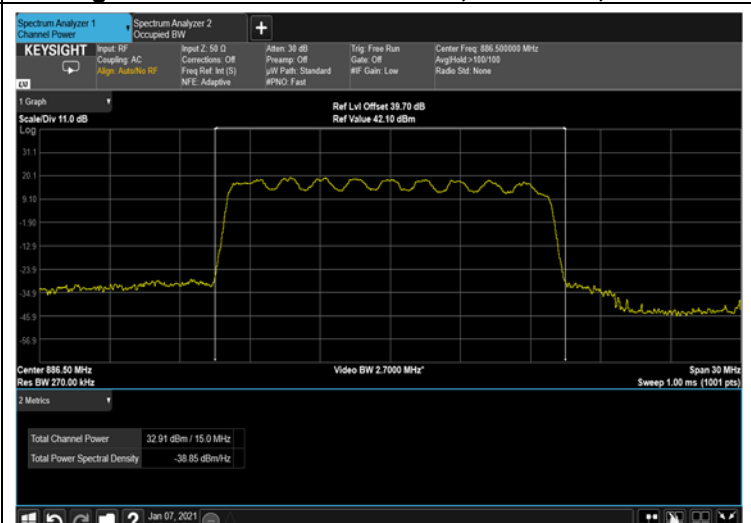


Figure 25: 16QAM 15MHz B.W.; 886.5MHz, 30 kHz

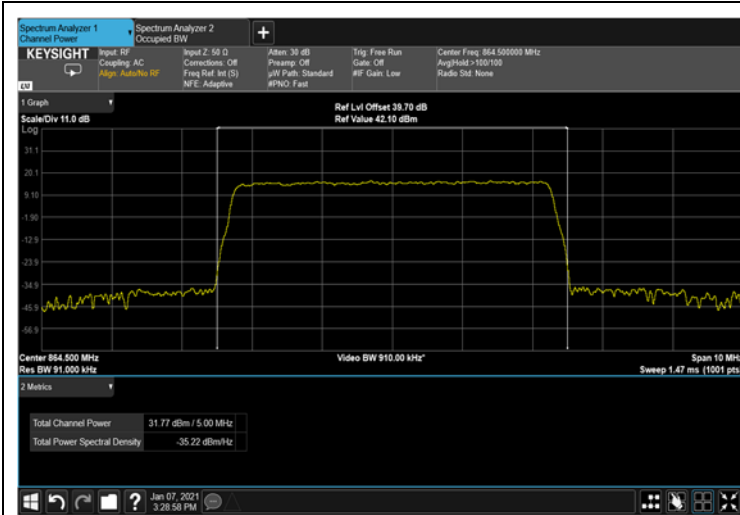


Figure 26: 64QAM 5MHz B.W.; 864.5MHz, 15kHz

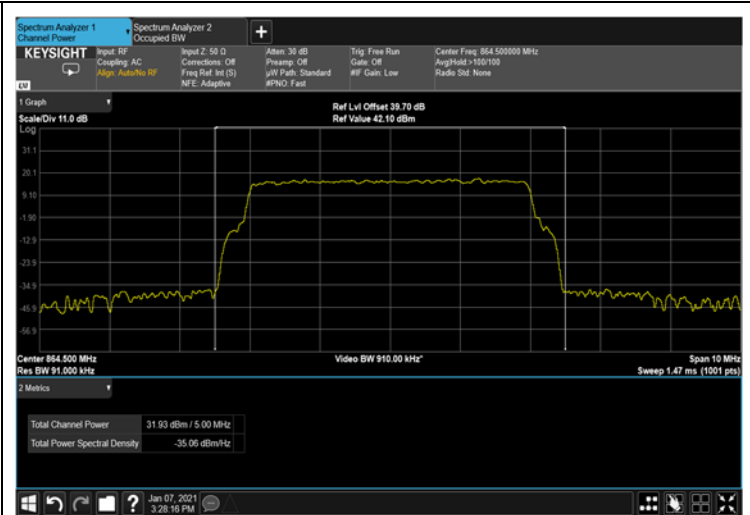


Figure 27: 64QAM 5MHz B.W.; 864.5MHz, 30kHz

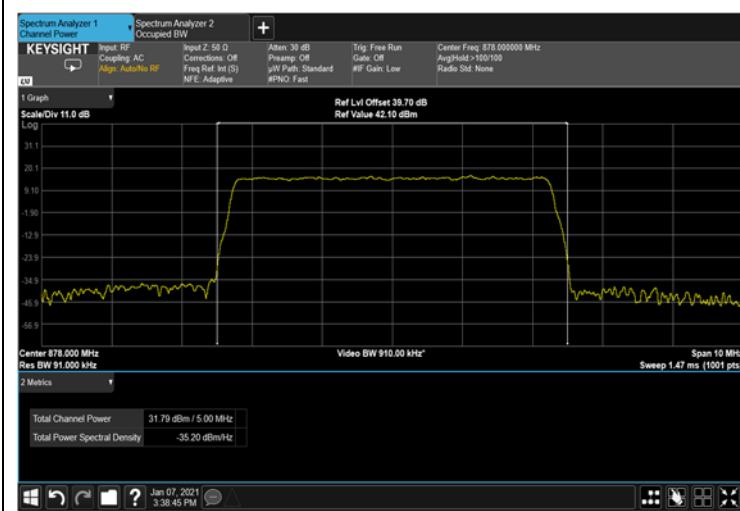


Figure 28: 64QAM 5MHz B.W.; 878.0MHz, 15kHz

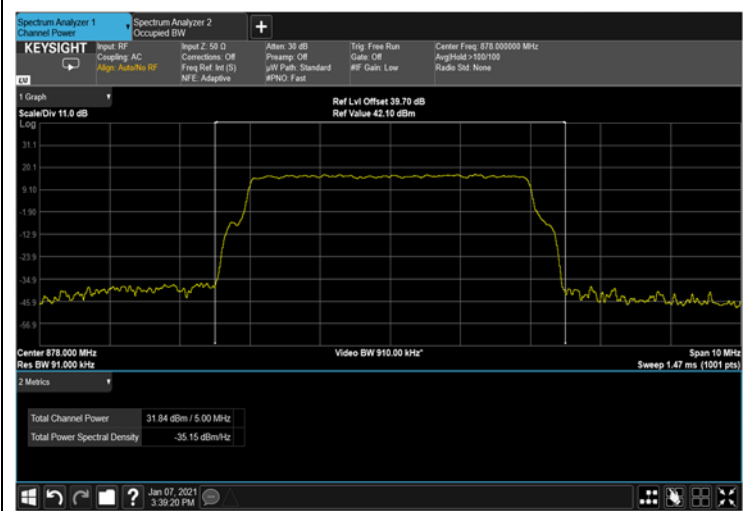
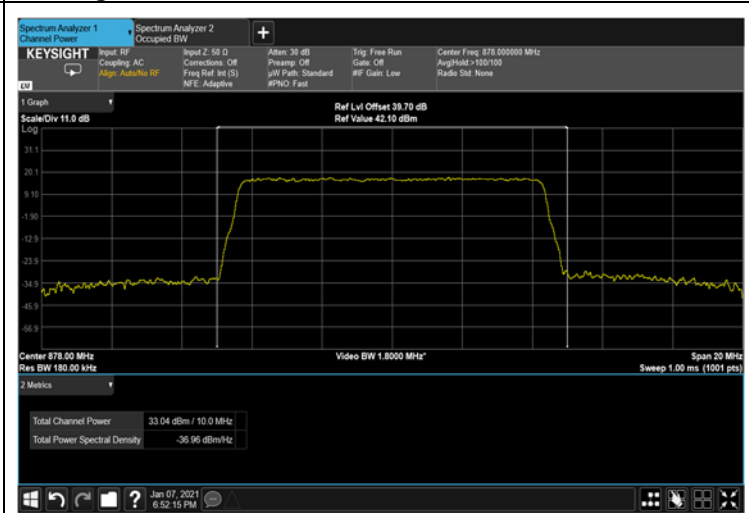
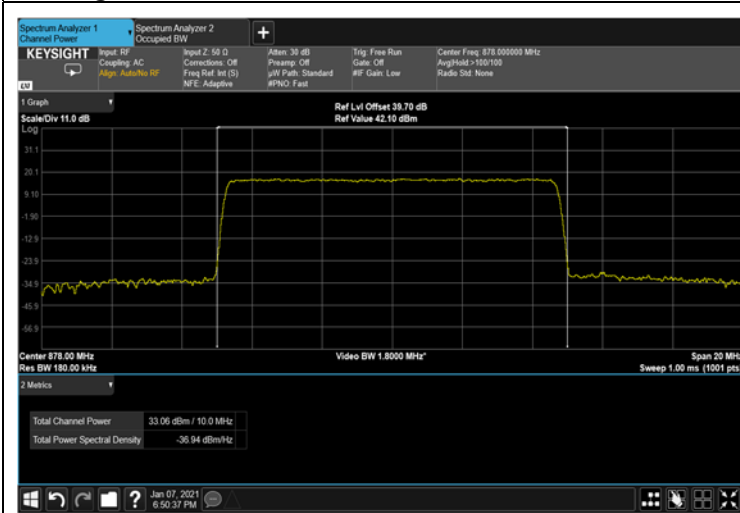
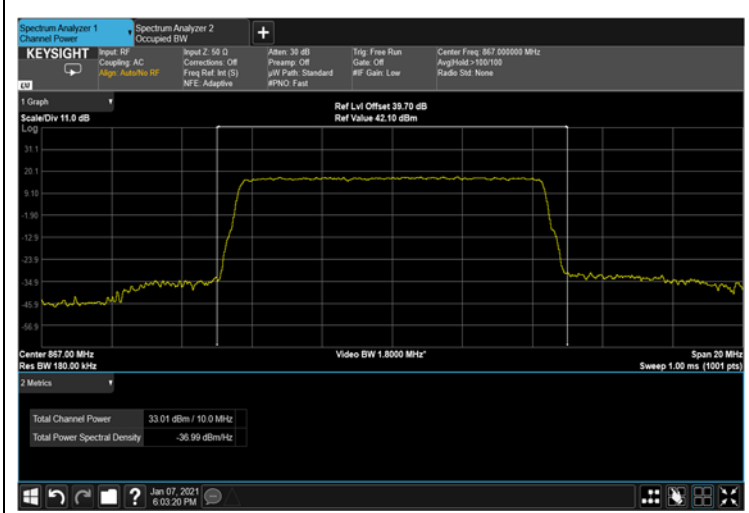
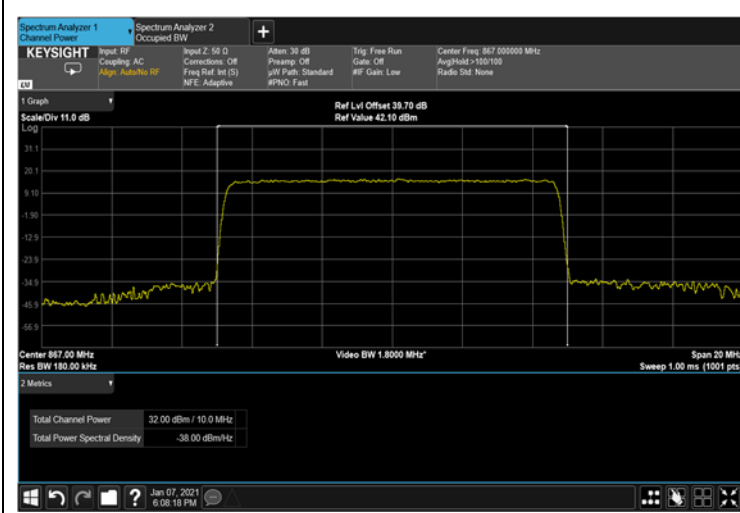
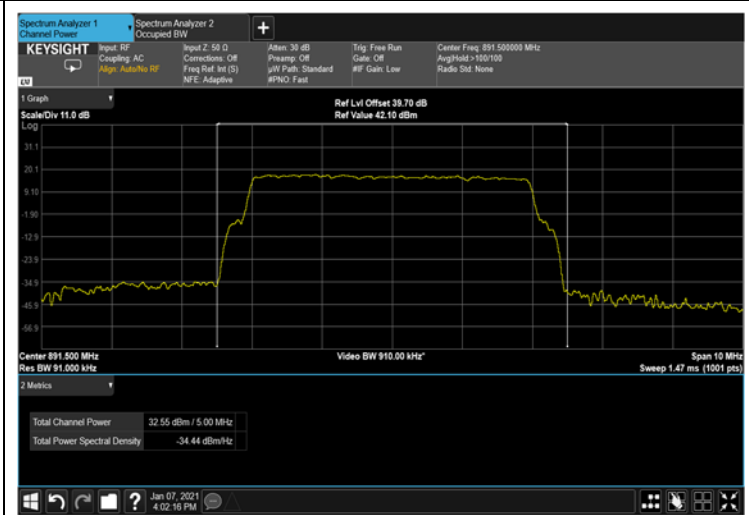
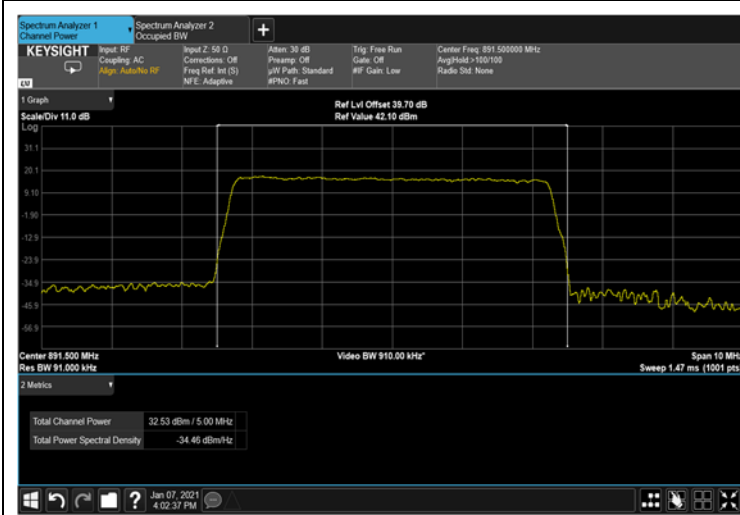


Figure 29: 64QAM 5MHz B.W.; 878.0MHz, 30kHz



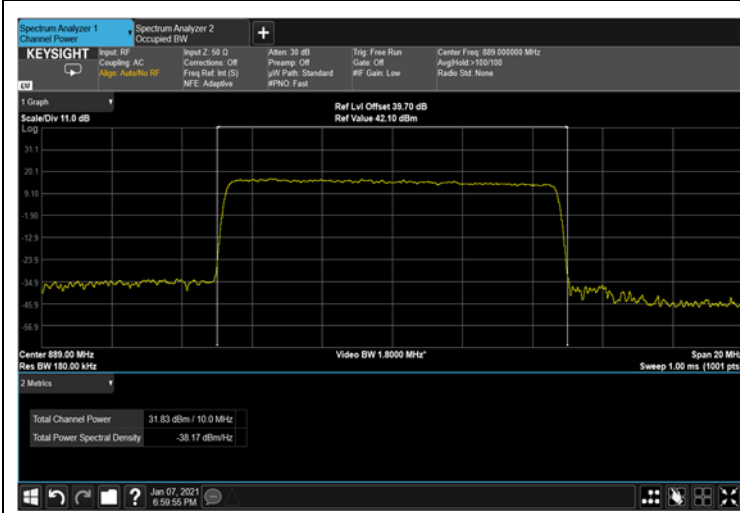


Figure 36: 64QAM 10MHz B.W.; 889.0MHz, 15kHz

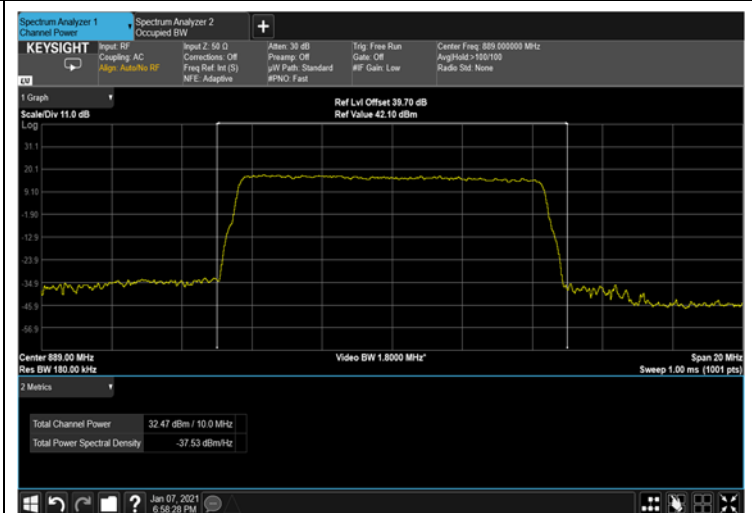


Figure 37: 64QAM 10MHz B.W.; 889.0MHz, 30kHz

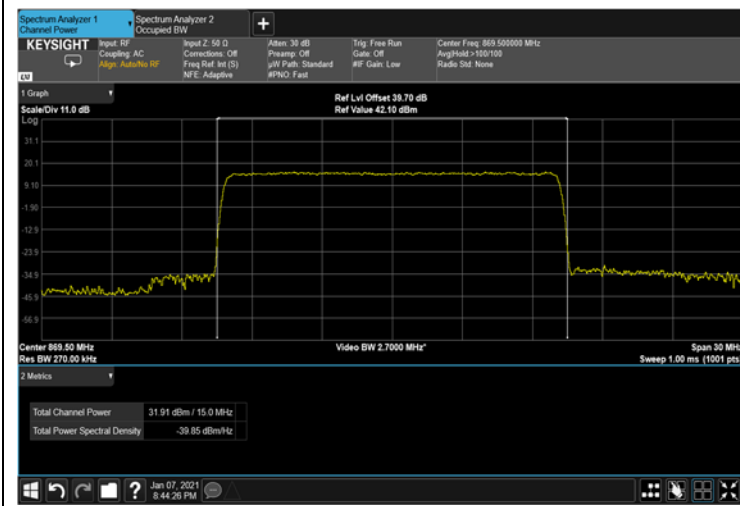


Figure 38: 64QAM 15MHz B.W.; 869.5MHz, 15kHz

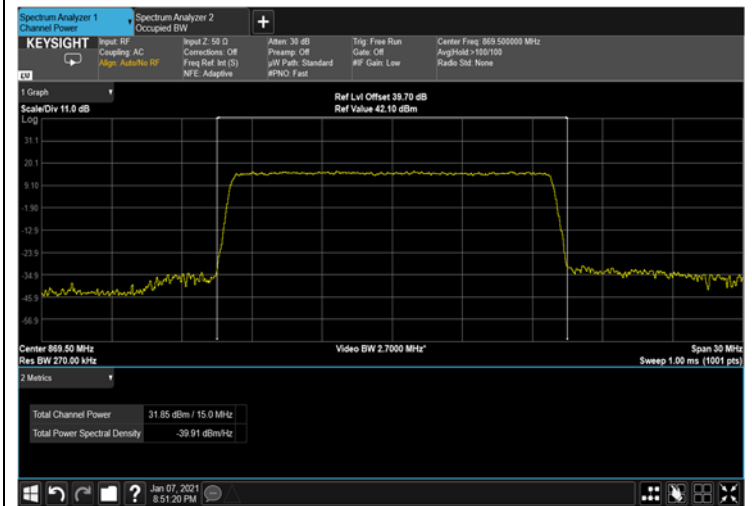


Figure 39: 64QAM 15MHz B.W.; 869.5MHz, 30kHz

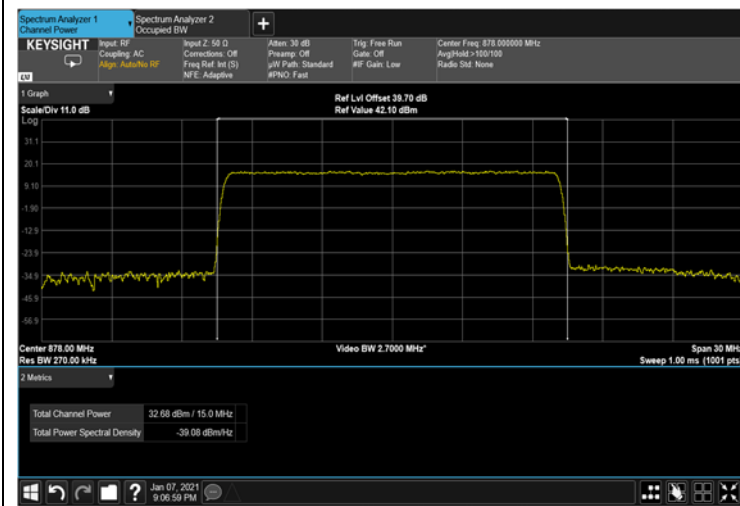


Figure 40: 64QAM 15MHz B.W.; 878.0MHz, 15kHz

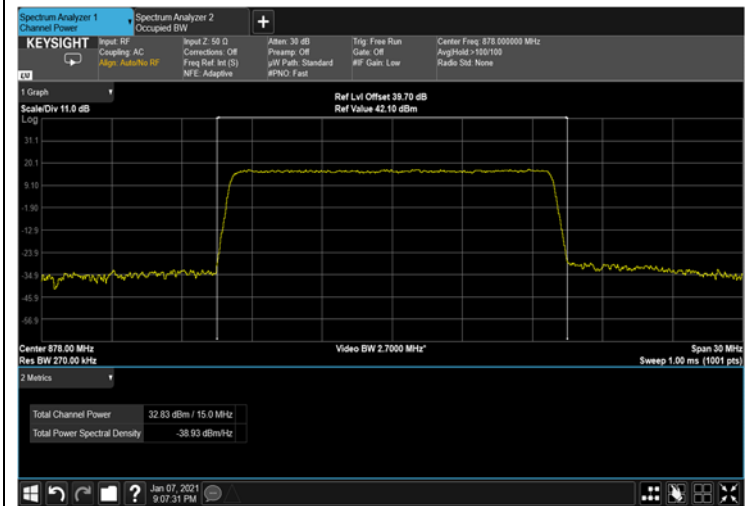
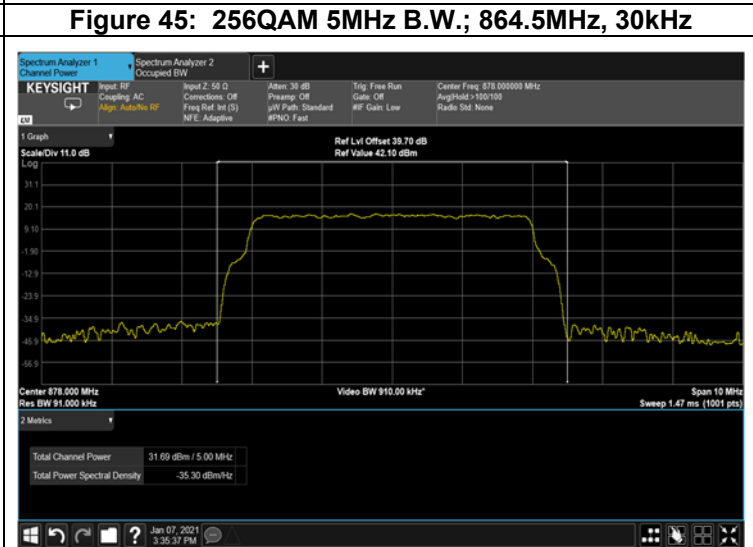
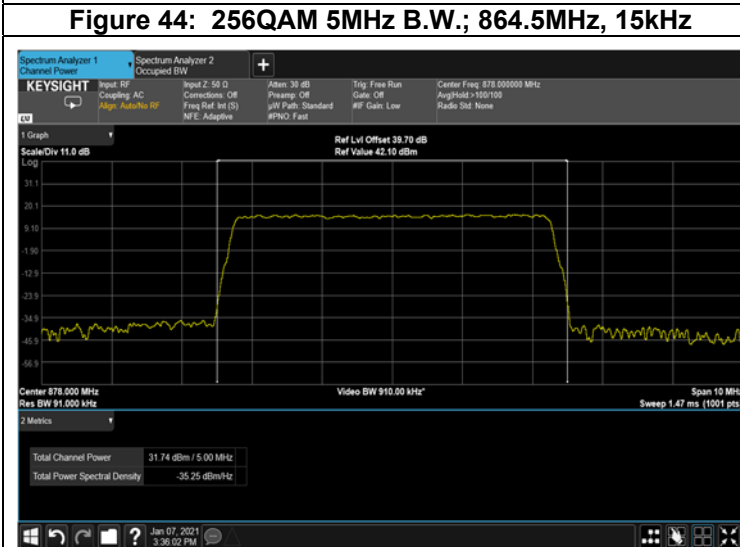
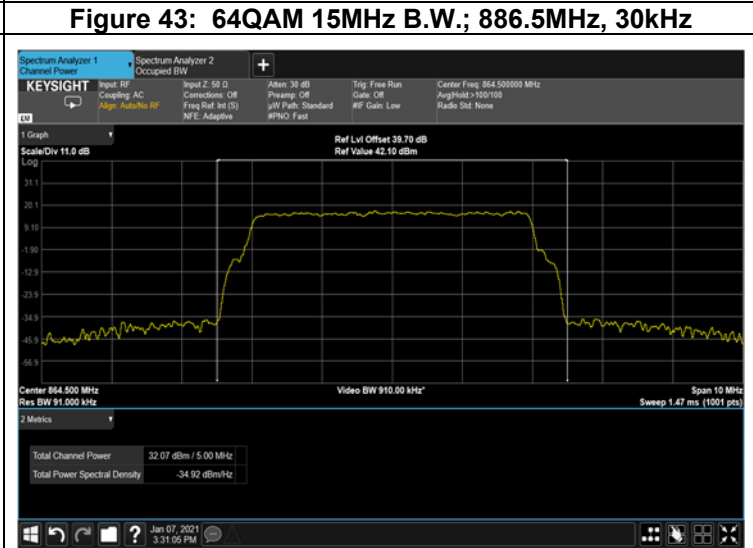
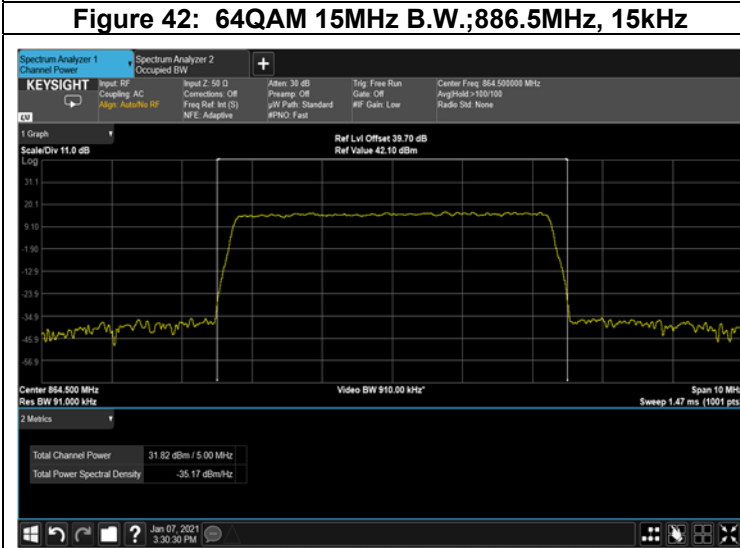
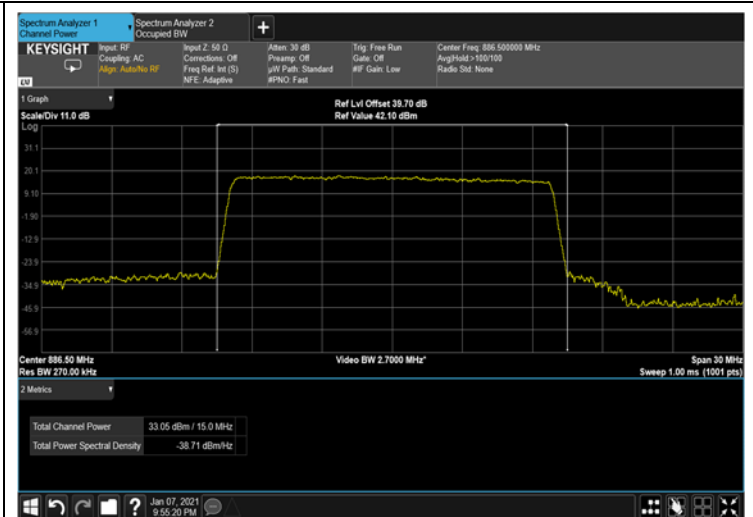
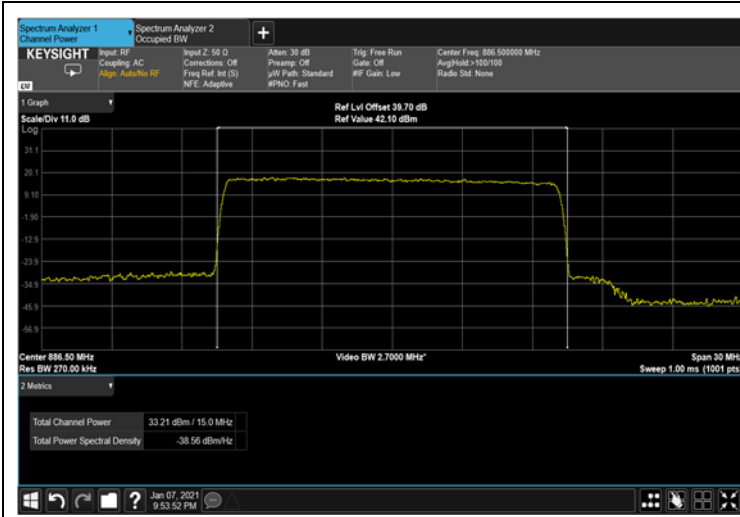
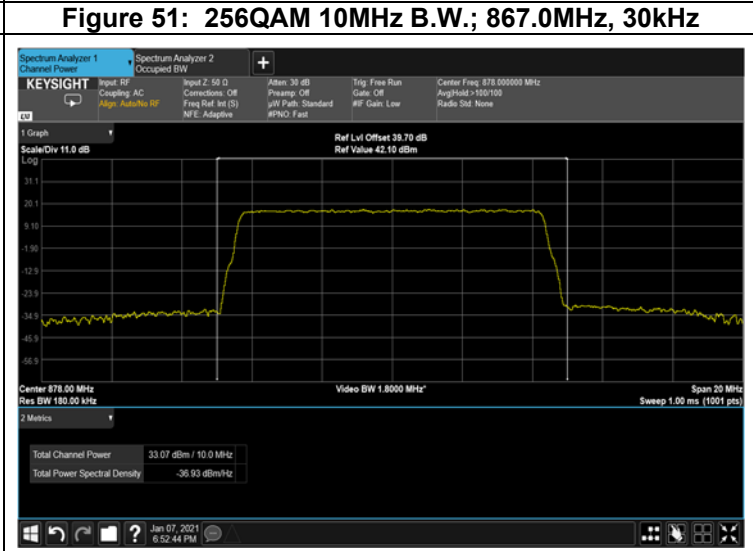
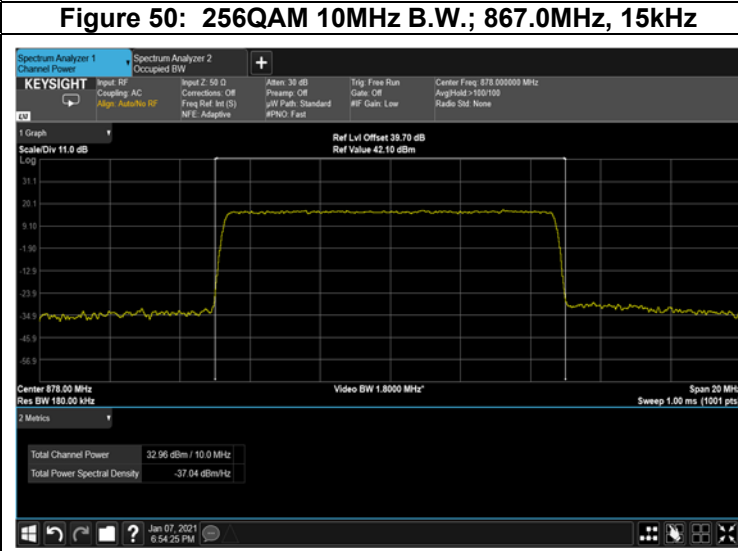
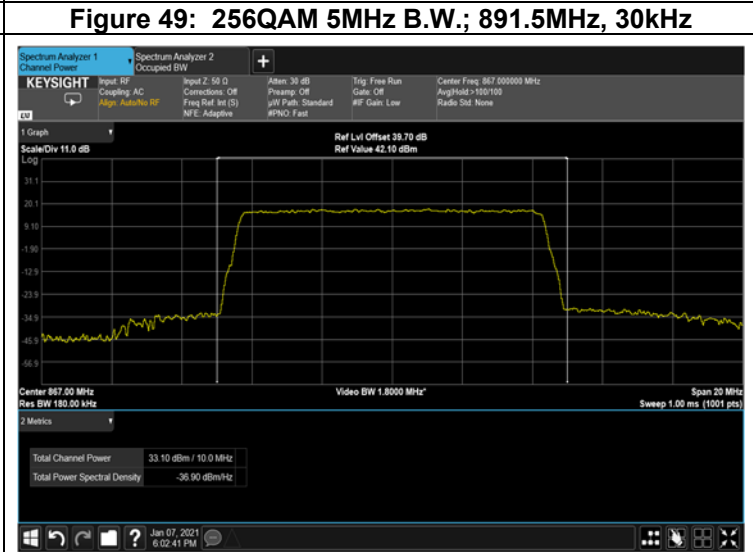
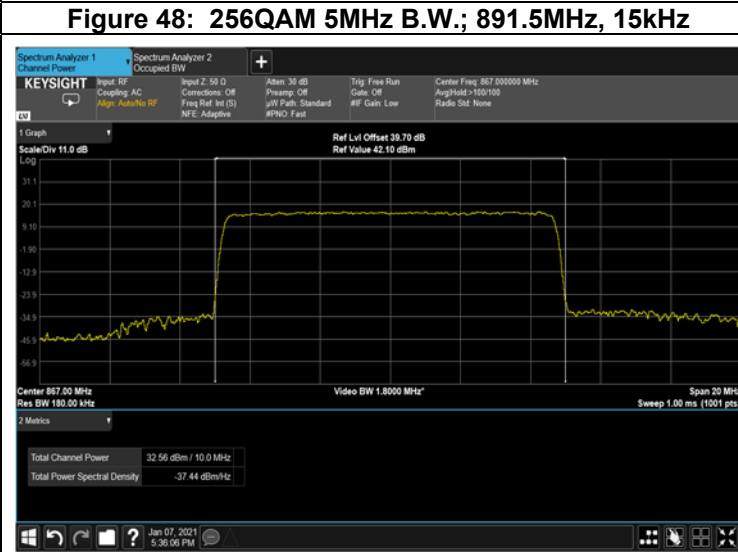
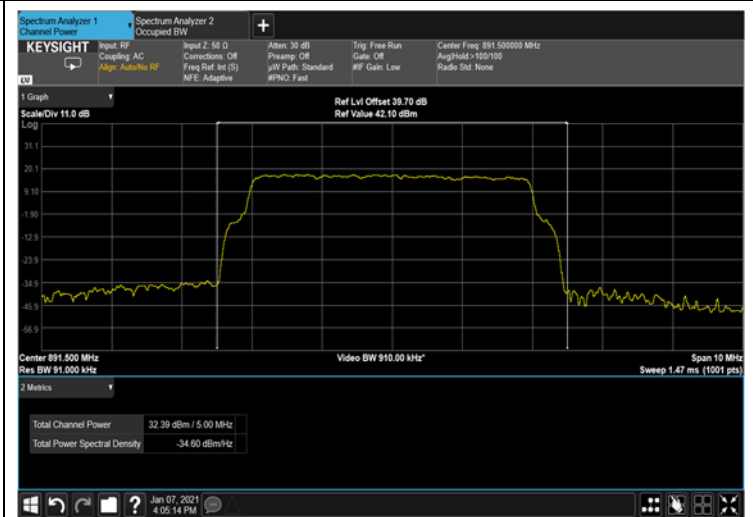
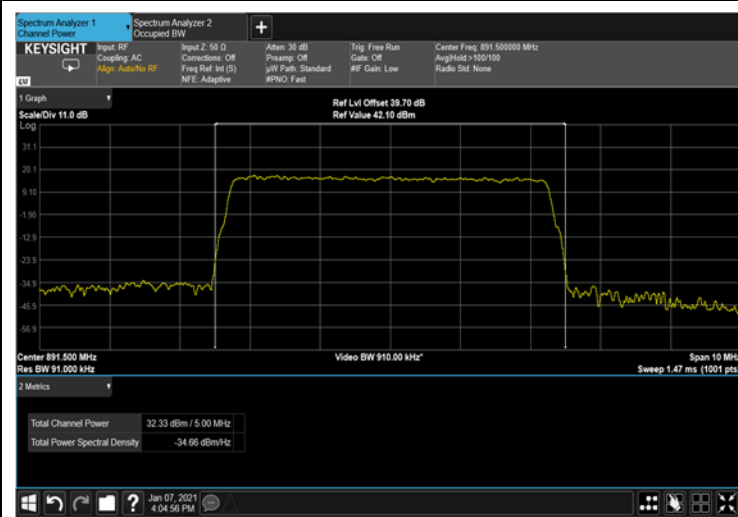
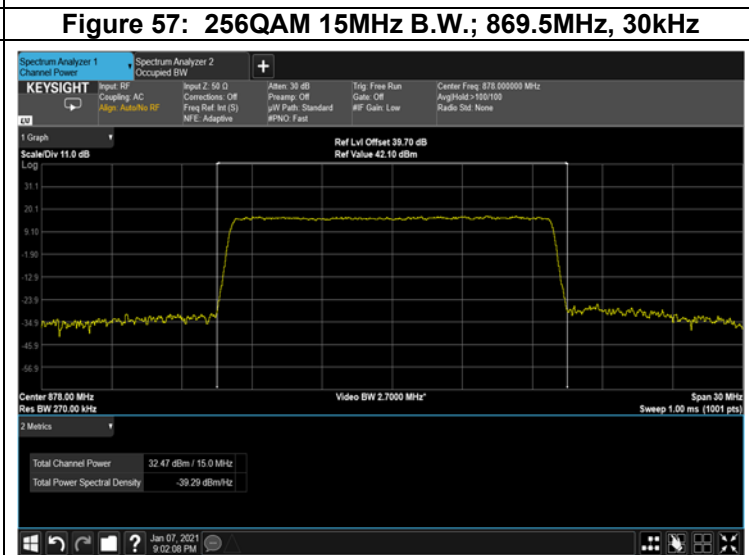
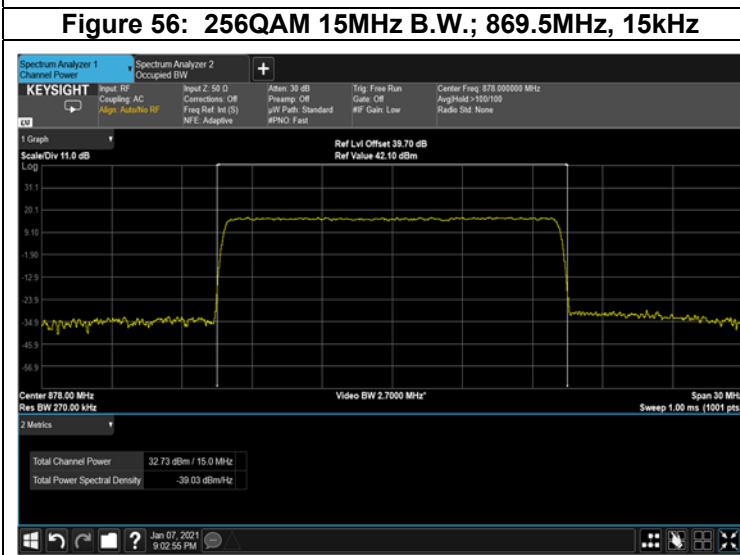
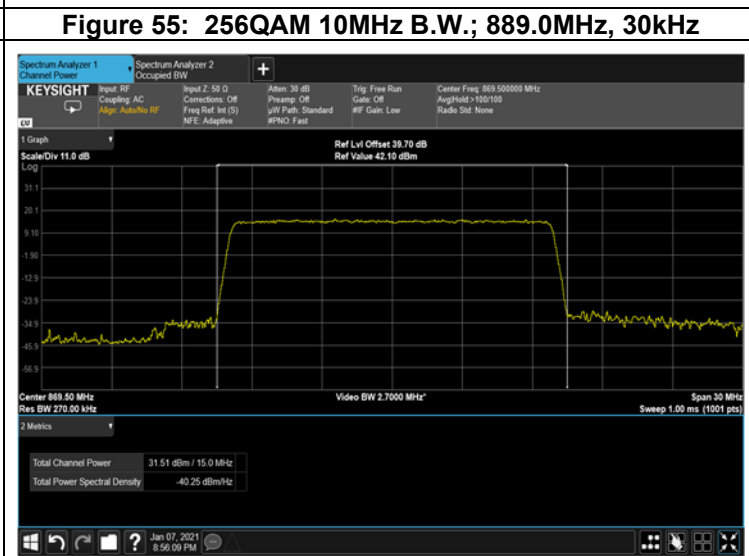
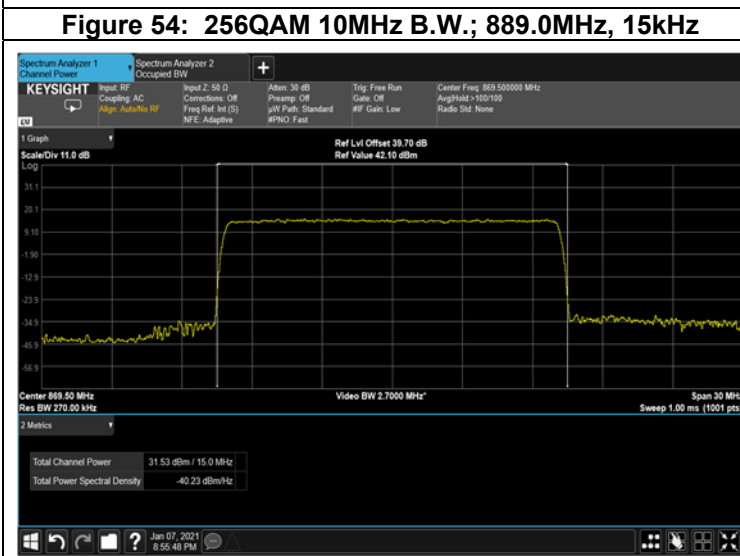
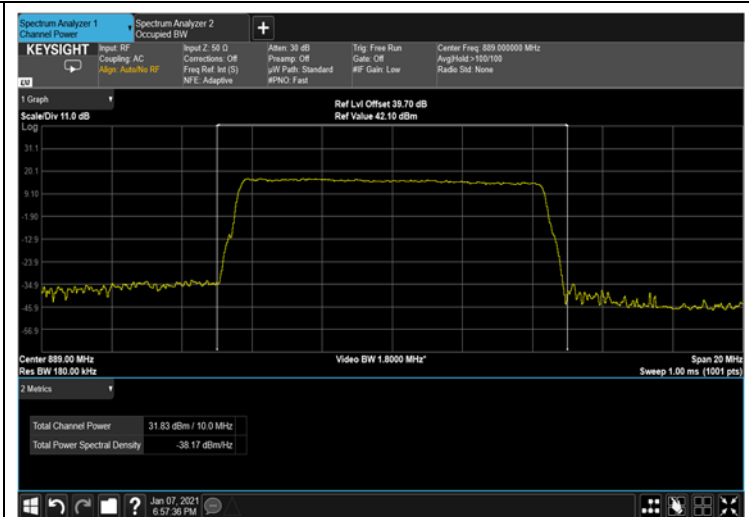
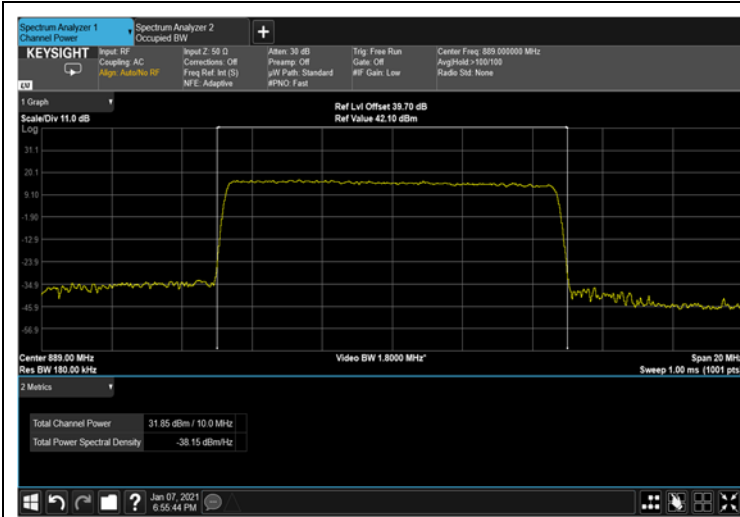
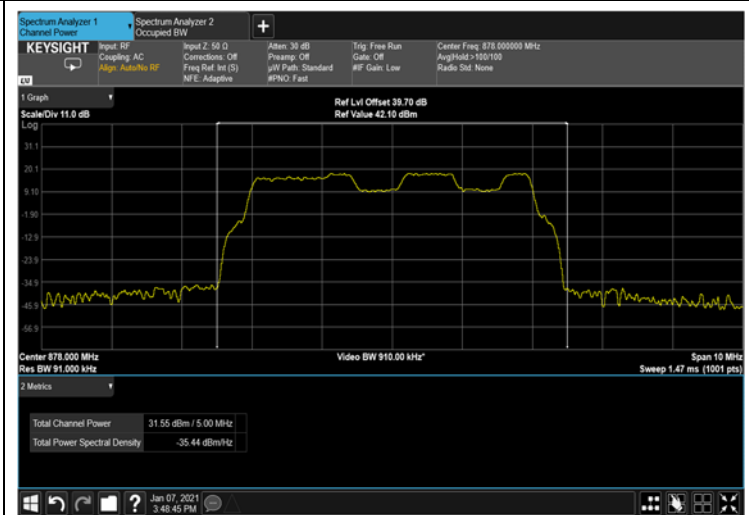
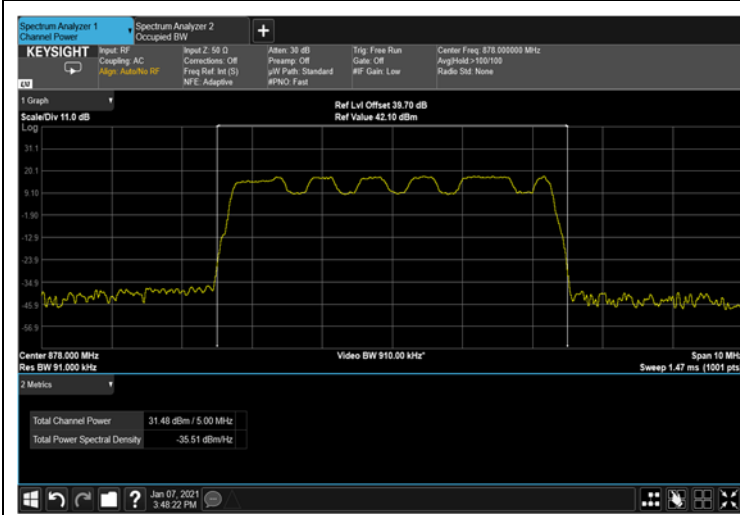
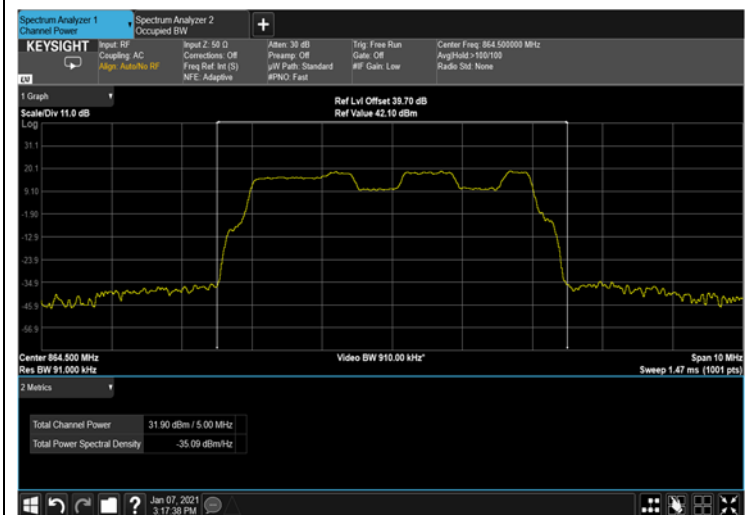
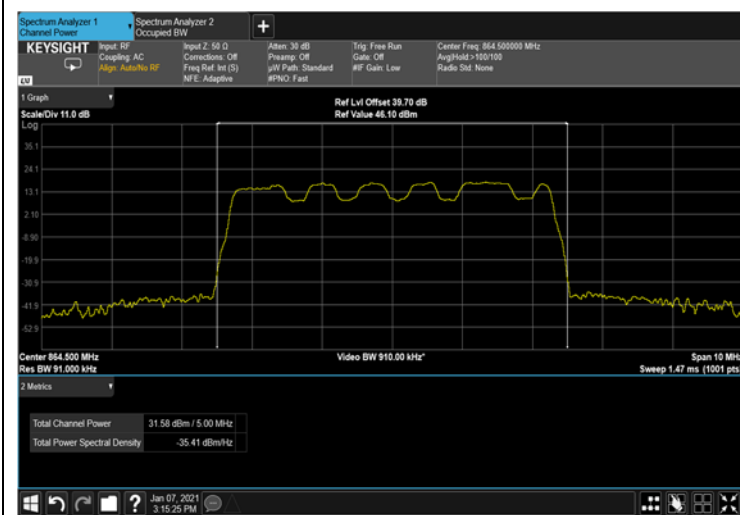
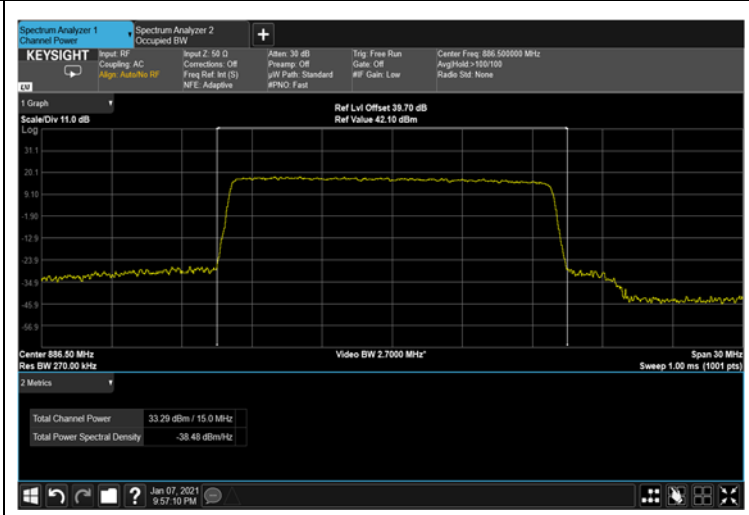
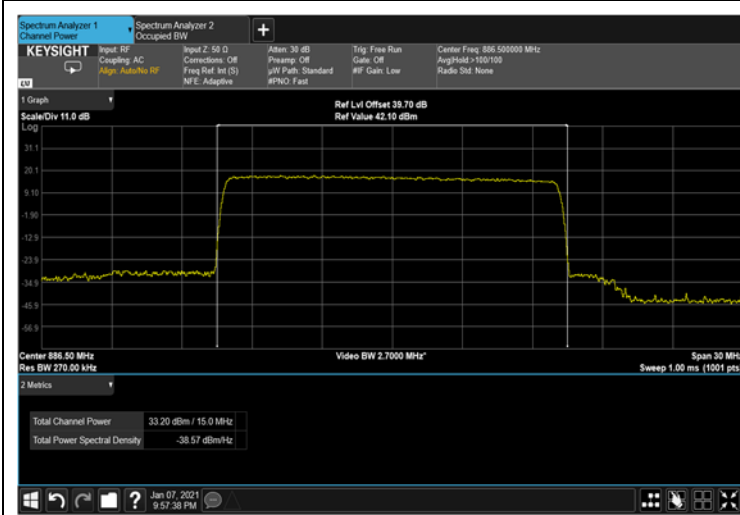


Figure 41: 64QAM 15MHz B.W.; 878.0MHz, 30kHz









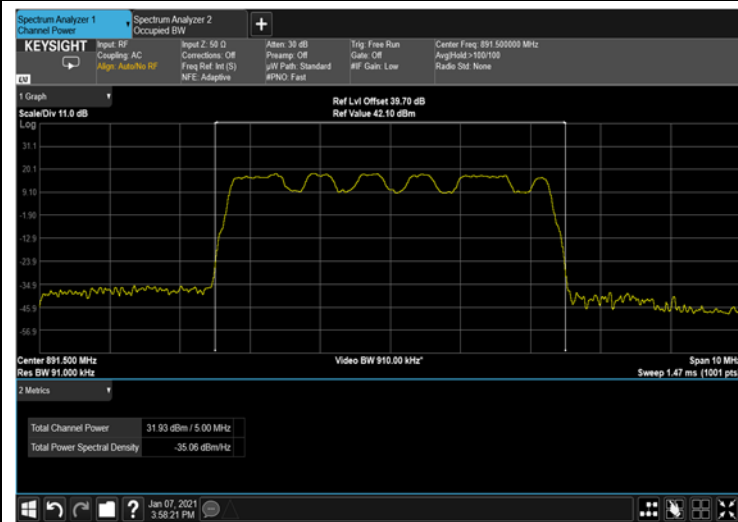


Figure 66: QPSK 5MHz B.W.; 891.5MHz, 15kHz

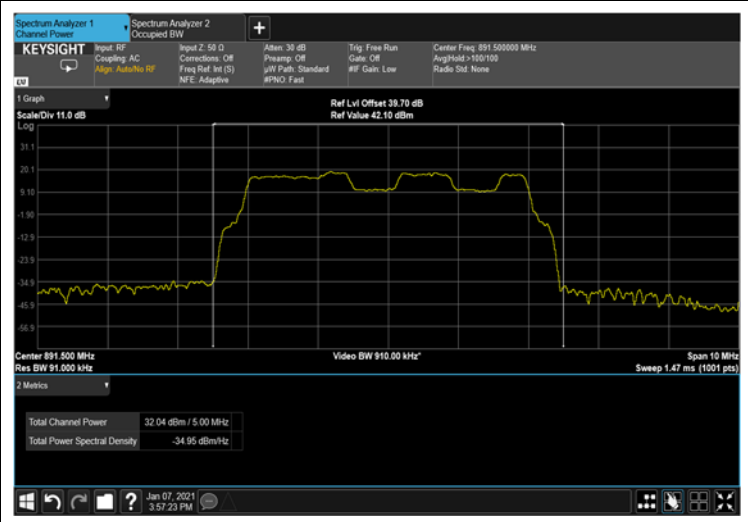


Figure 67: QPSK 5MHz B.W.; 891.5MHz, 30kHz

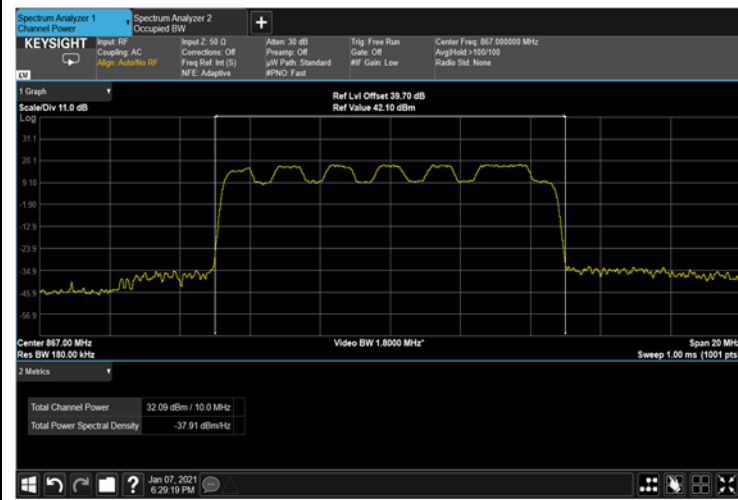


Figure 68: QPSK 10MHz B.W.; 867.0MHz, 15kHz

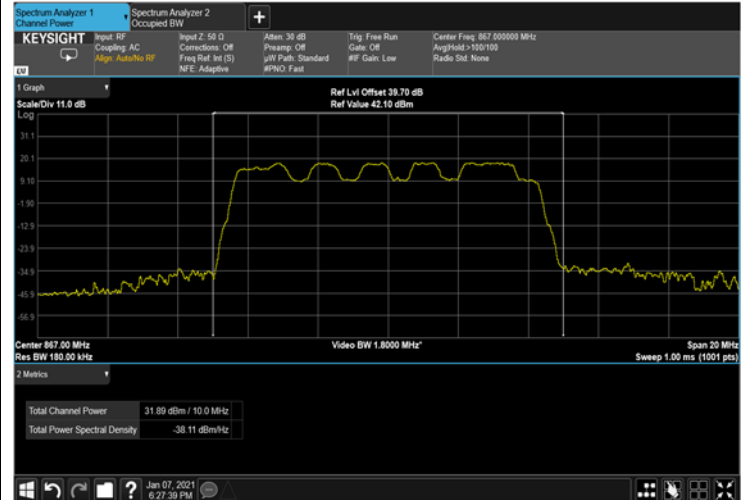


Figure 69: QPSK 10MHz B.W.; 867.0MHz, 30kHz

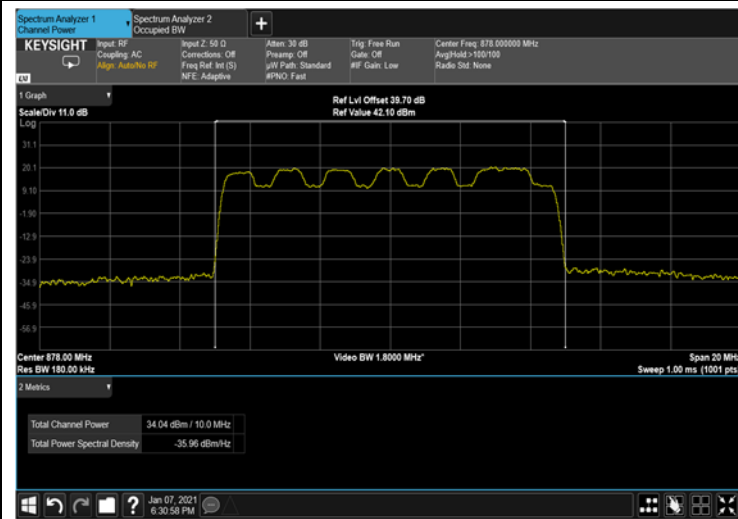


Figure 70: QPSK 10MHz B.W.; 878.0MHz, 15kHz

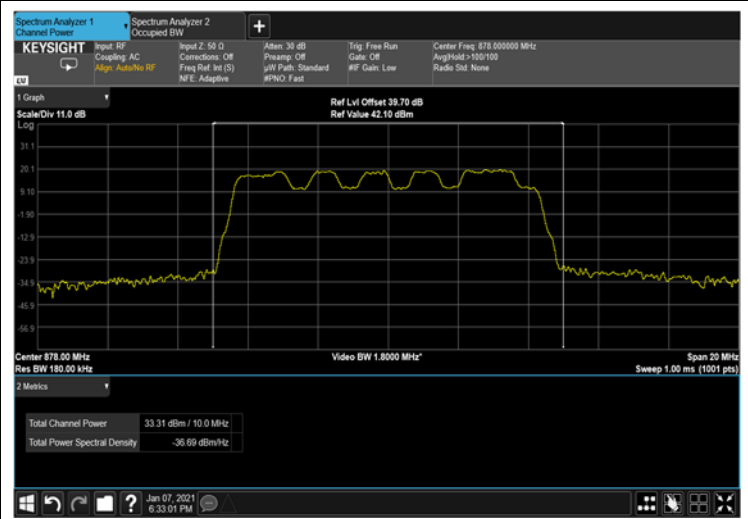
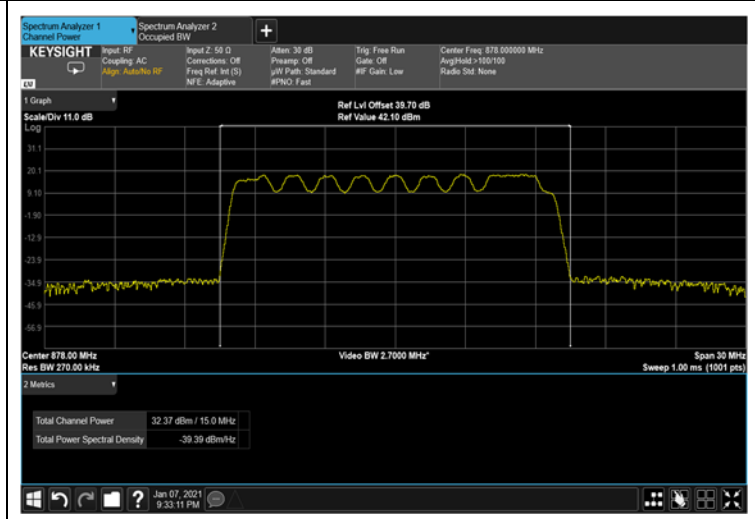
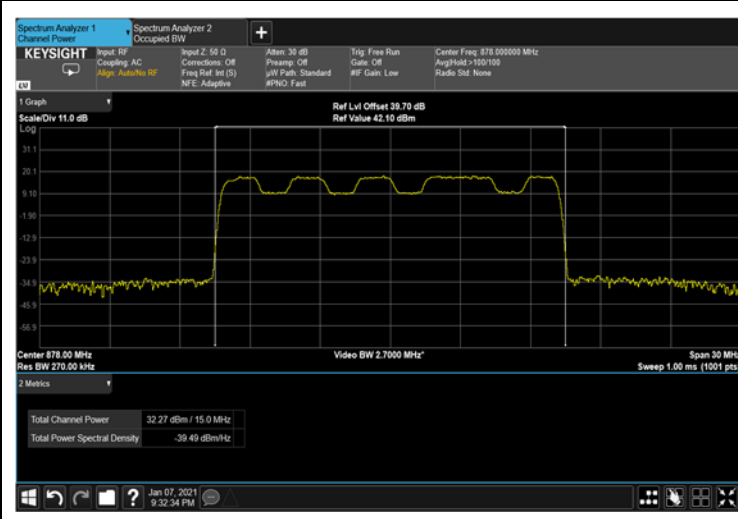
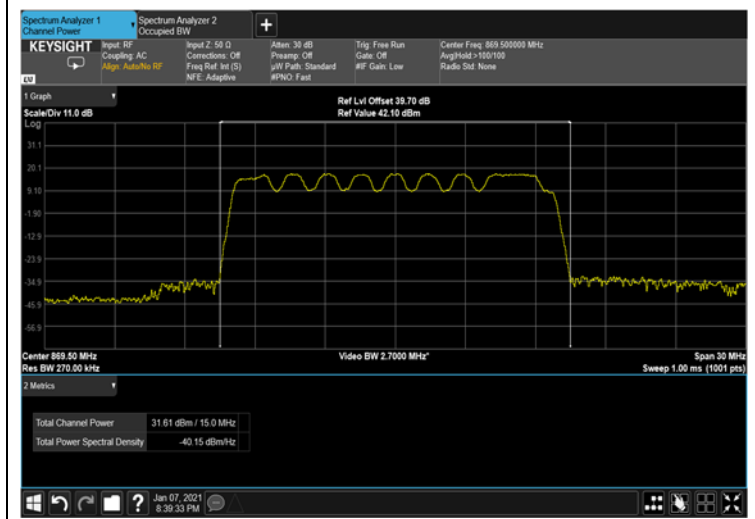
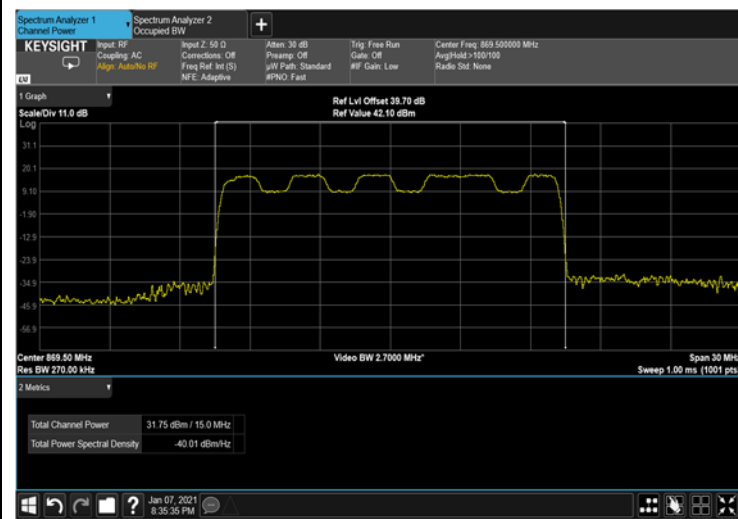
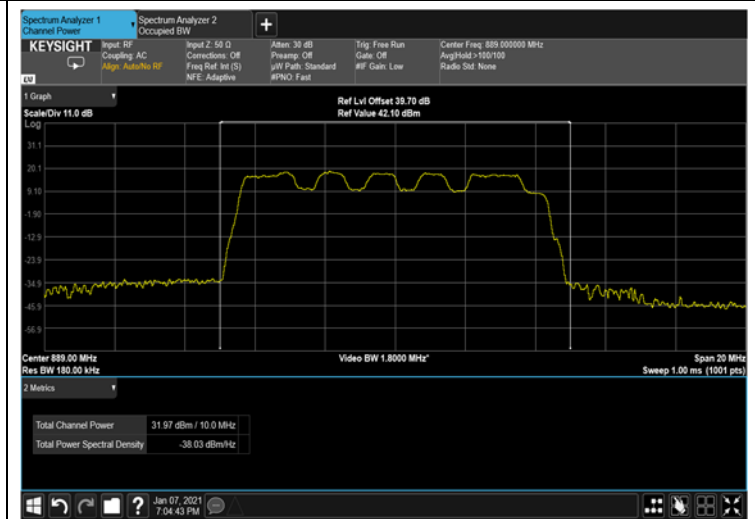
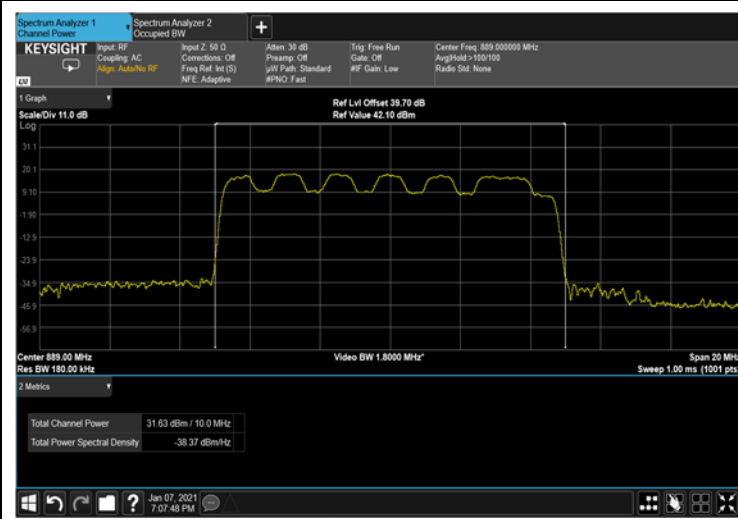


Figure 71: QPSK 10MHz B.W.; 878.0MHz, 30kHz



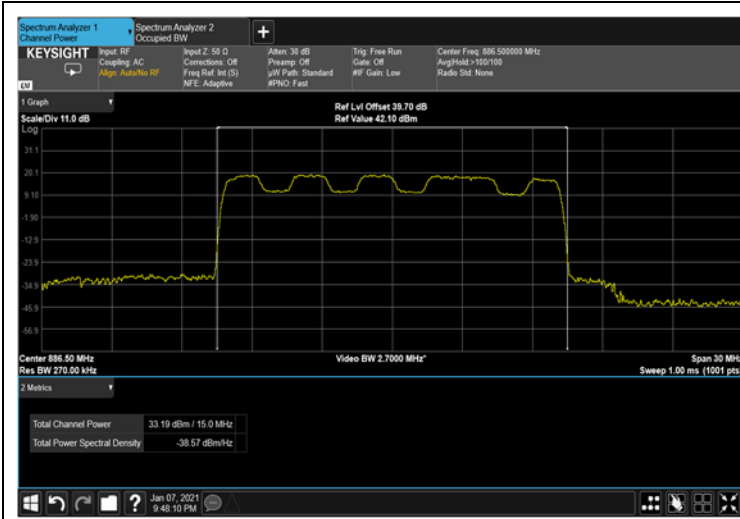


Figure 78: QPSK 15MHz B.W.; 886.5MHz, 15kHz

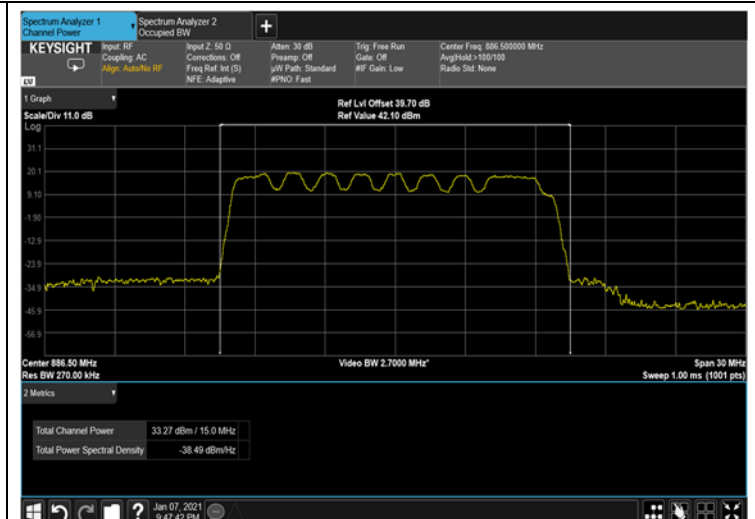


Figure 79: QPSK 15MHz B.W.; 886.5MHz, 30kHz



4.5 Test Equipment Used; Channel 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 – 3G and 4G

5.1 Test Specification

FCC Part 27, Subpart C (27.50)

5.2 Test Procedure

(Temperature (22°C)/ Humidity (36%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator (39.7 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 9 and Figure 83 to Figure 109.



Modulation	Bandwidth	Operation Frequency	Reading
	(MHz)	(MHz)	(dBm)
WCDMA	5	864.5	33.46
		878.0	34.30
		891.5	34.03

Table 6 RF Power Output WCDMA - 3G

Modulation	Bandwidth	Operation Frequency	Reading
	(MHz)	(MHz)	(dBm)
16QAM	5	864.5	33.89
		878.0	33.90
		891.5	34.30
	10	867.0	33.53
		878.0	34.08
		889.0	34.10
	15	869.5	34.51
		878.0	34.00
		886.5	33.84

Table 7 RF Power Output 16QAM - 4G

Modulation	Bandwidth	Operation Frequency	Reading
	(MHz)	(MHz)	(dBm)
64QAM	5	864.5	33.36
		878.0	34.00
		891.5	33.09
	10	867.0	33.27
		878.0	34.03
		889.0	33.94
	15	869.5	34.54
		878.0	33.78
		886.5	34.65

Table 8 RF Power Output 64AM - 4G



Modulation	Bandwidth	Operation Frequency	Reading
	(MHz)	(MHz)	(dBm)
QPSK	5	864.5	33.37
		878.0	33.27
		891.5	34.36
	10	867.0	33.17
		878.0	35.44
		889.0	34.51
	15	869.5	34.41
		878.0	34.21
		886.5	33.56

Table 9 RF Power Output QPSK - 4G

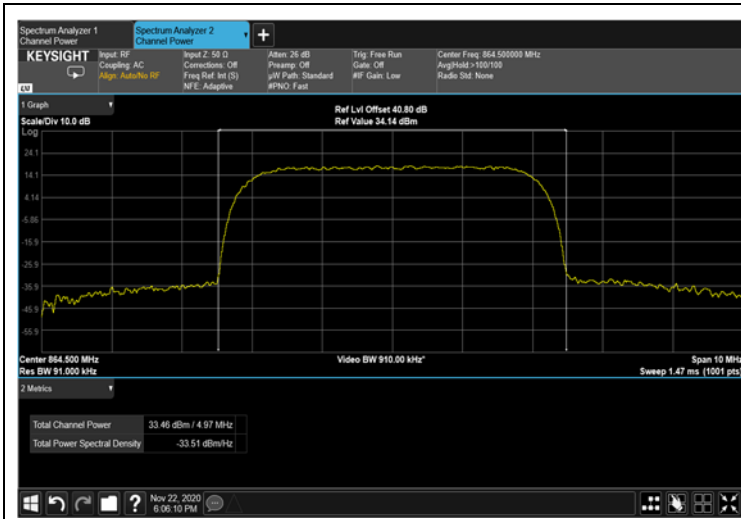


Figure 80: WCDMA 5MHz B.W.; 864.5MHz – 3G

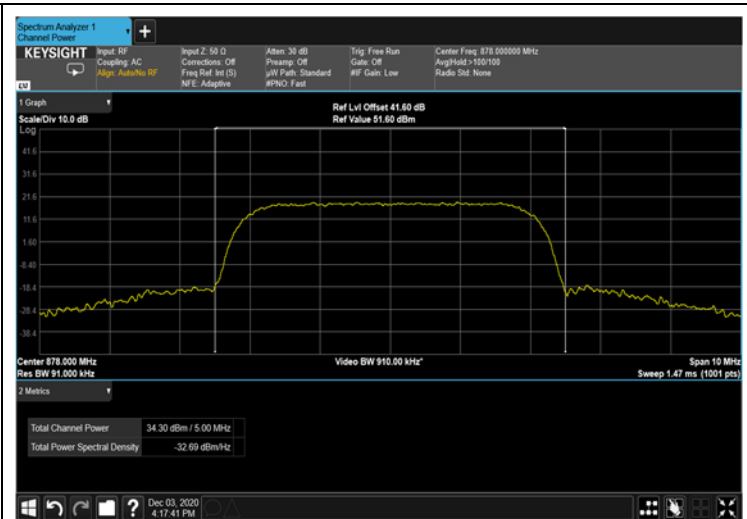


Figure 81: WCDMA 5MHz B.W.; 878.0MHz – 3G

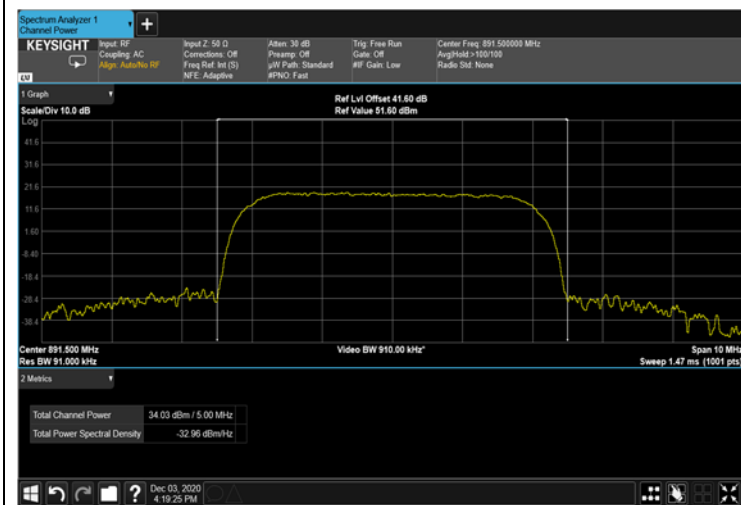


Figure 82: WCDMA 5MHz B.W.; 891.5MHz – 3G

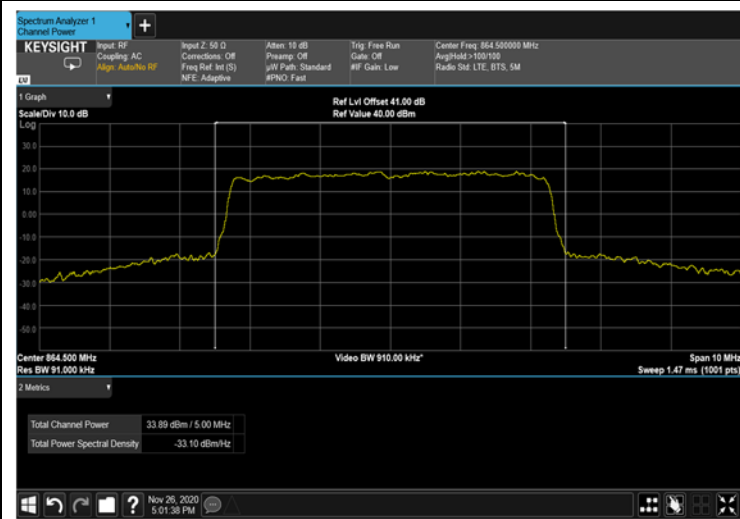


Figure 83: 16QAM 5MHz B.W.; 864.5MHz – 4G



Figure 84: 16QAM 5MHz B.W.; 878.0MHz – 4G

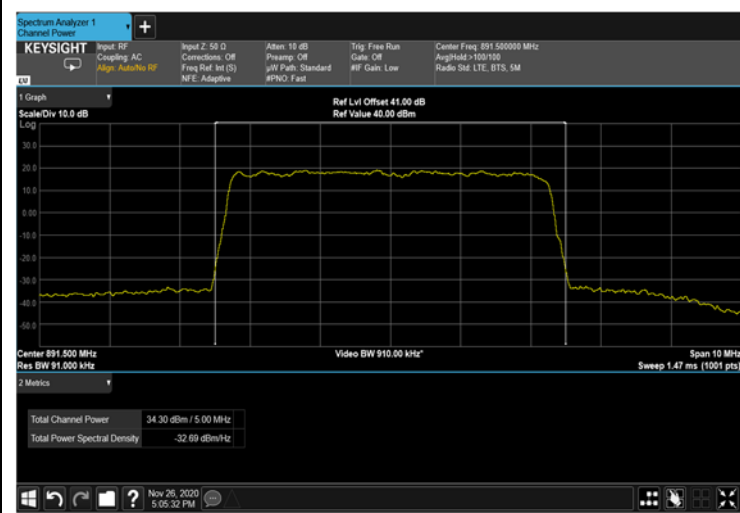


Figure 85: 16QAM 5MHz B.W.; 891.5MHz – 4G

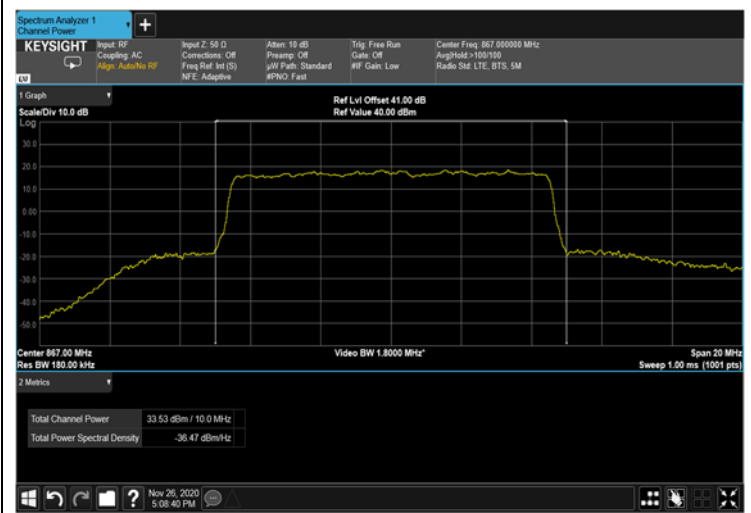


Figure 86: 16QAM 10MHz B.W.; 867.0MHz – 4G

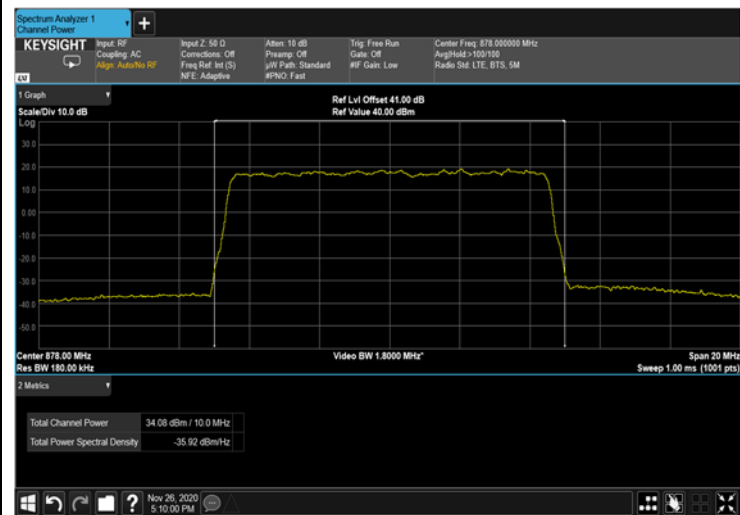
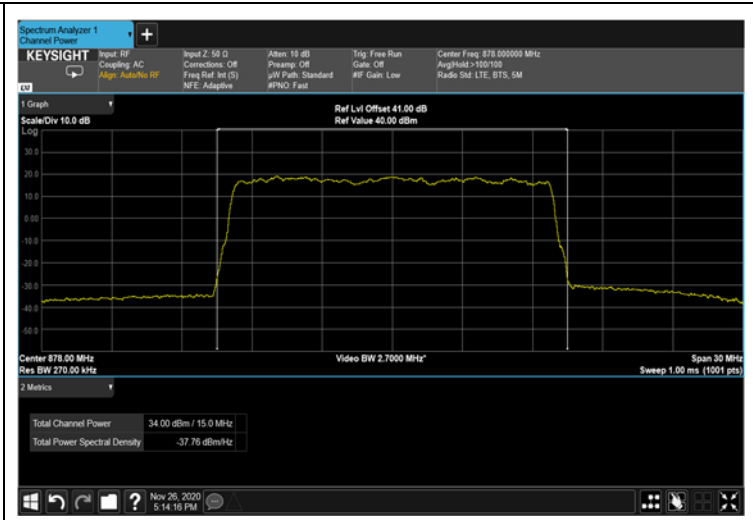


Figure 87: 16QAM 10MHzC.S; 878.0MHz – 4G



Figure 88: 16QAM 10MHzC.S; 889.0MHz – 4G



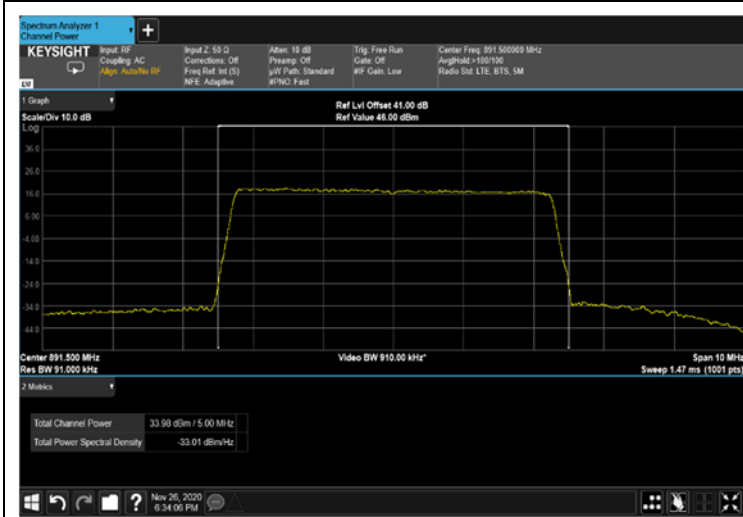


Figure 94: 64QAM 5MHz B.W.; 891.5MHz – 4G

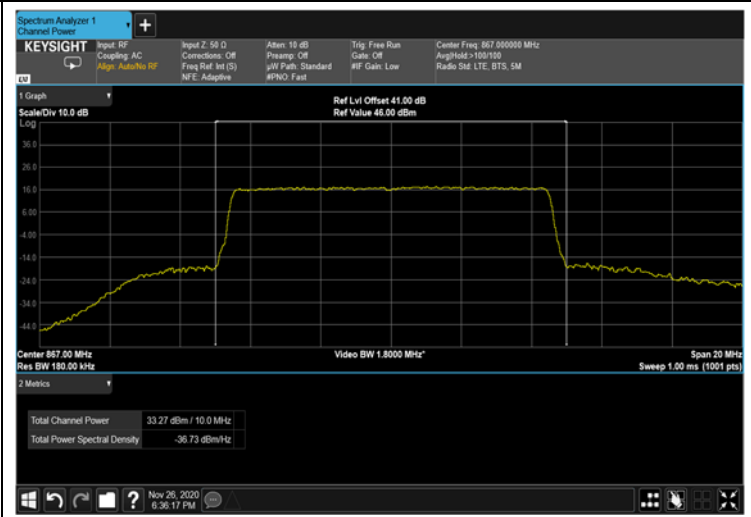


Figure 95: 64QAM 10MHz B.W.; 867.0MHz – 4G

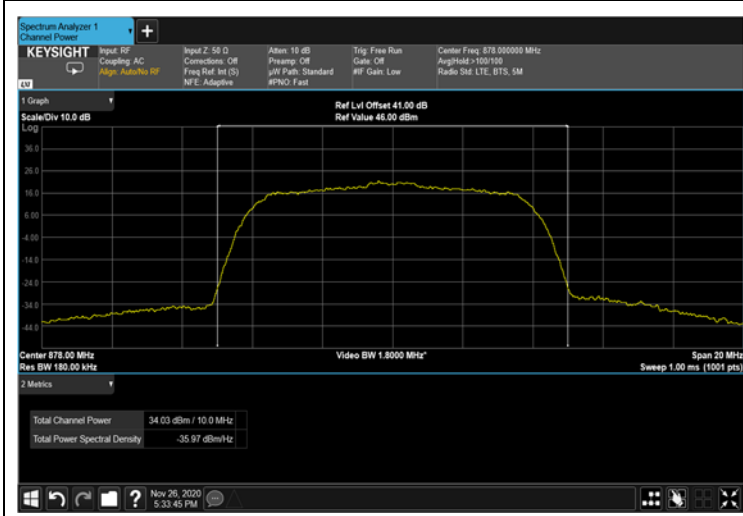


Figure 96: 64QAM 10MHz B.W.; 878.0MHz – 4G

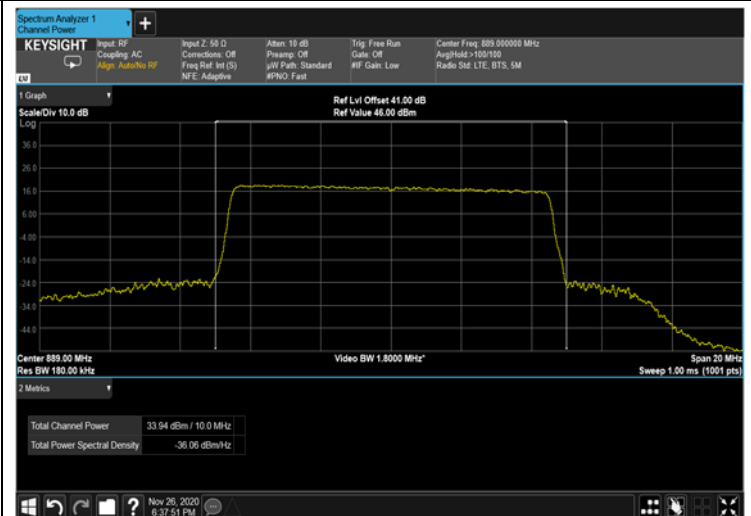
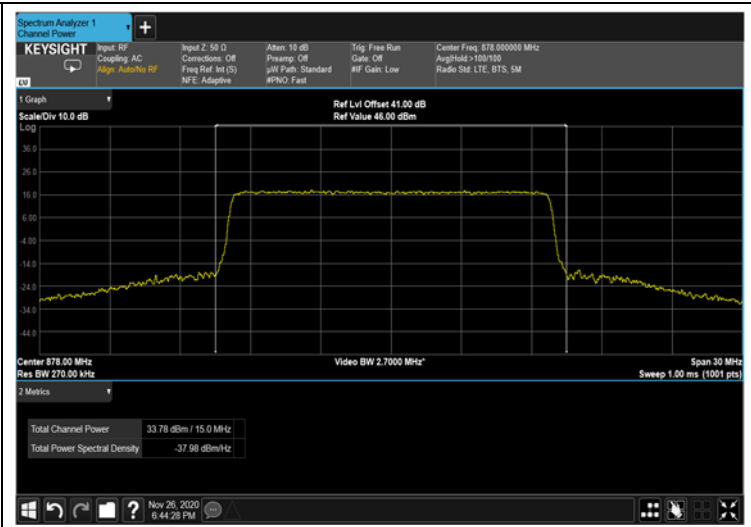
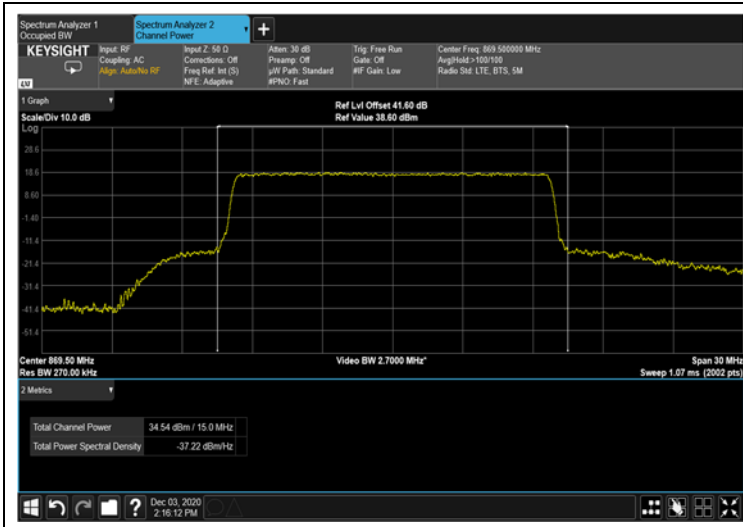
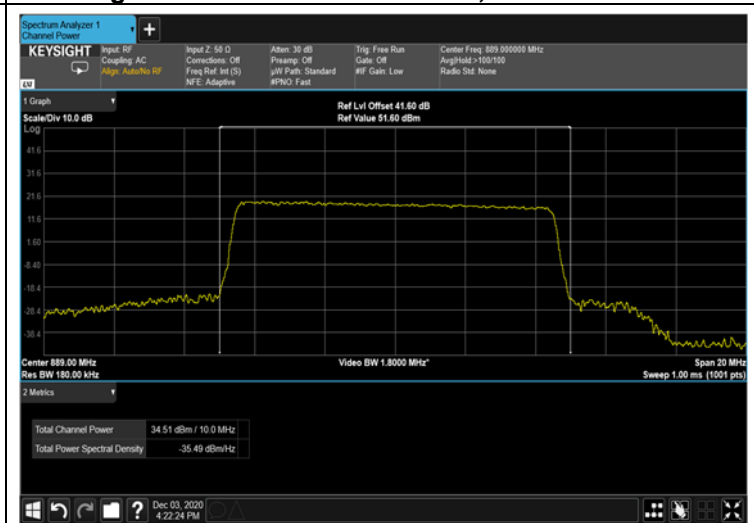
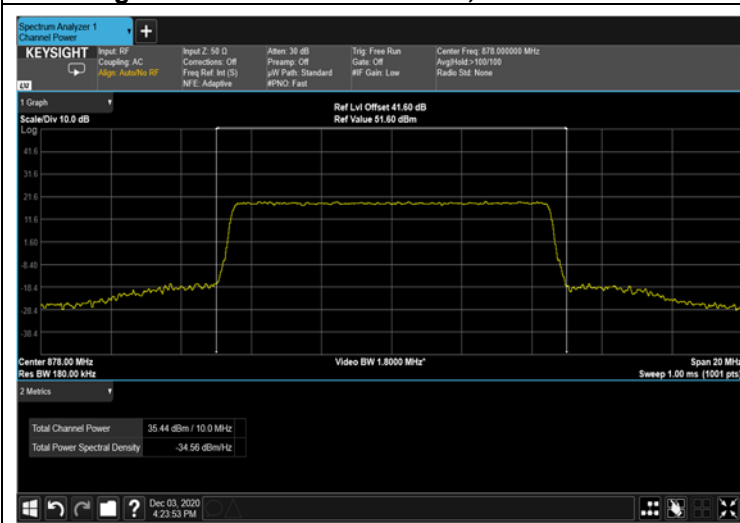
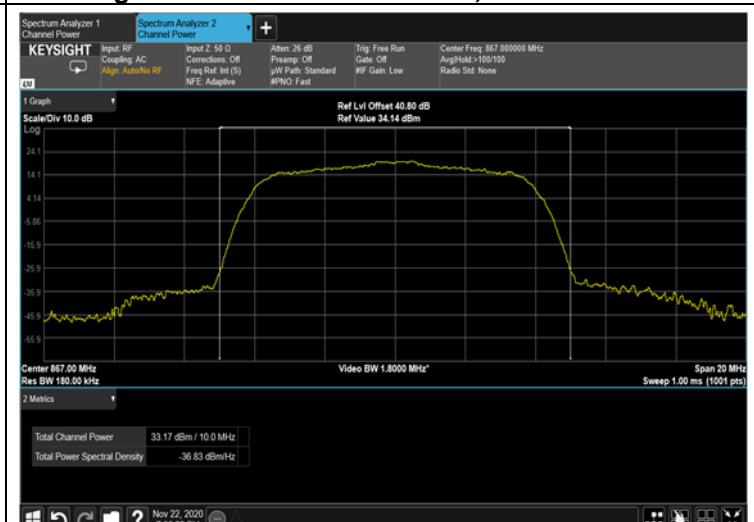
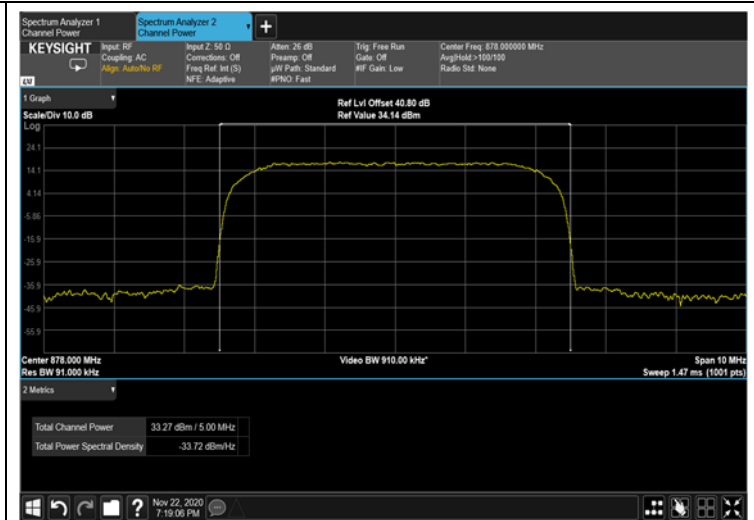
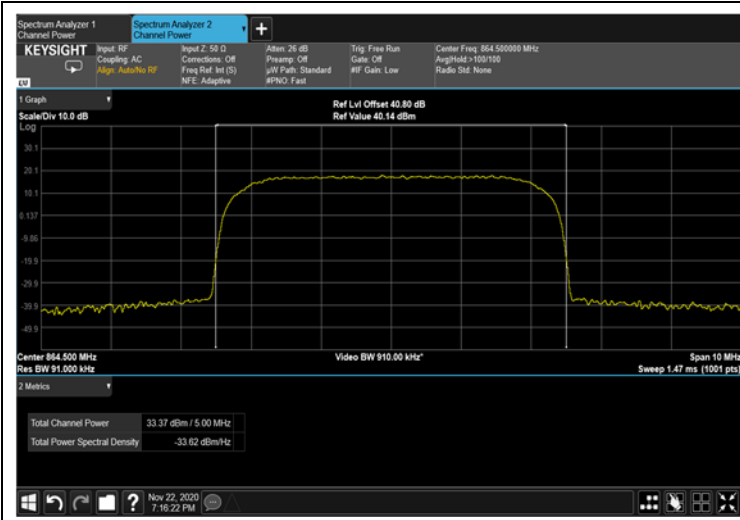


Figure 97: 64QAM 10MHz B.W.; 889.0MHz – 4G





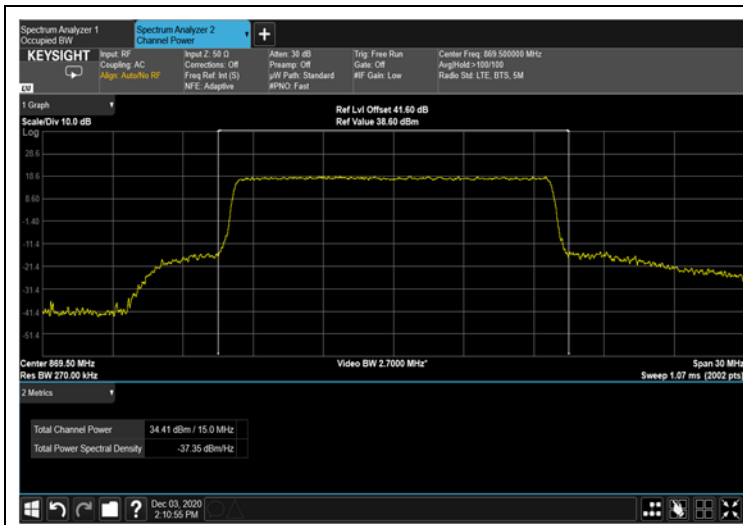


Figure 107: QPSK 15MHz B.W.; 869.5MHz – 4G

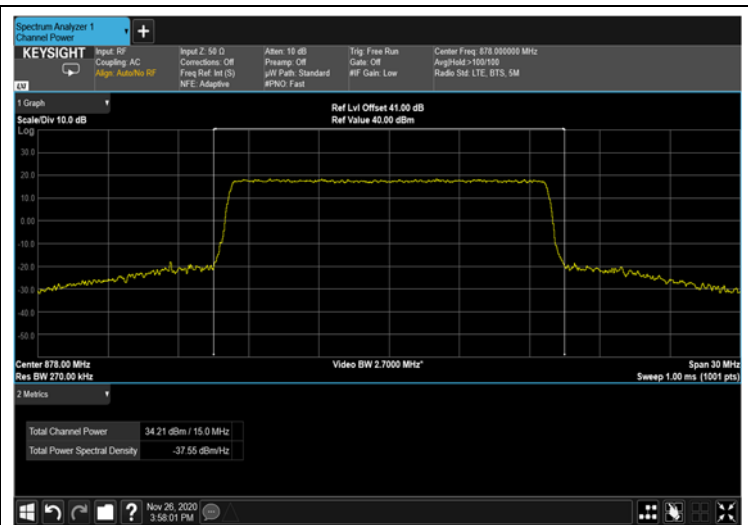


Figure 108: QPSK 15MHz B.W.; 878.0MHz – 4G



Figure 109: QPSK 15MHz B.W.; 886.5MHz – 4G



5.5 Test Equipment Used; Channel 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 10 Test Equipment Used