



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

Application for Certification
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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 50 Ω 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

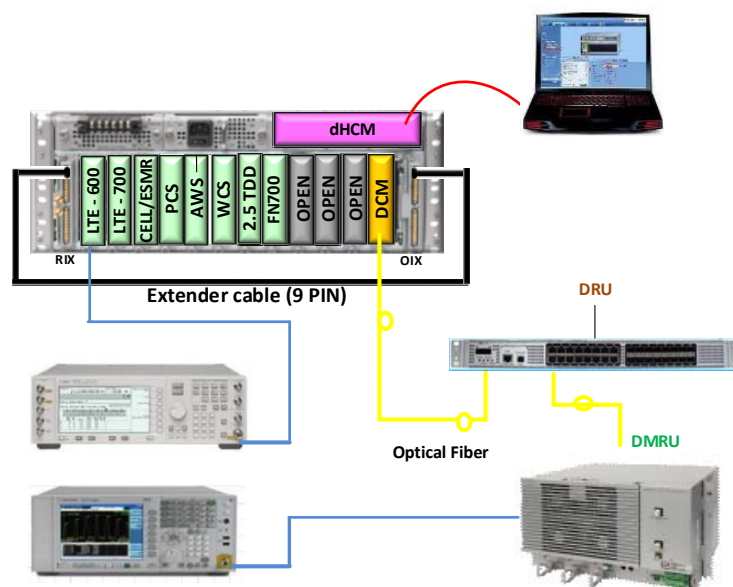


Figure 1. Conducted Test Set-Up

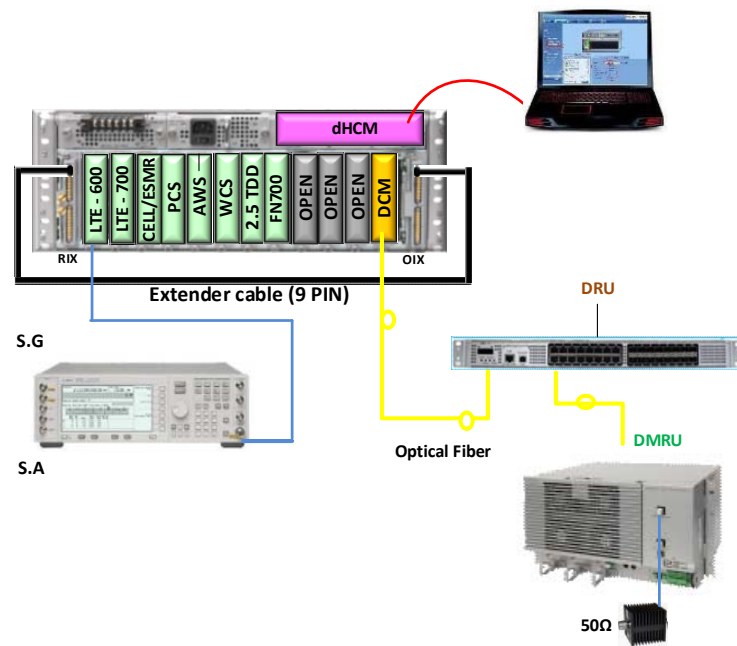


Figure 2. Radiated Test Set-Up

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

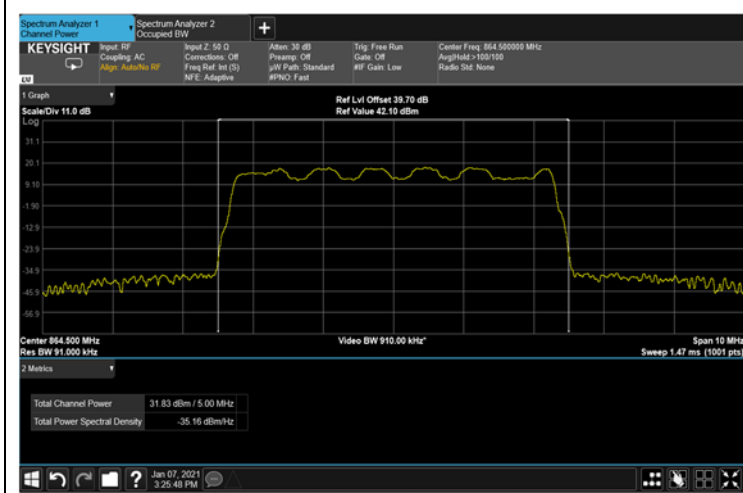


Figure 8: 16QAM 5MHz B.W.; 864.5MHz, 15kHz



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

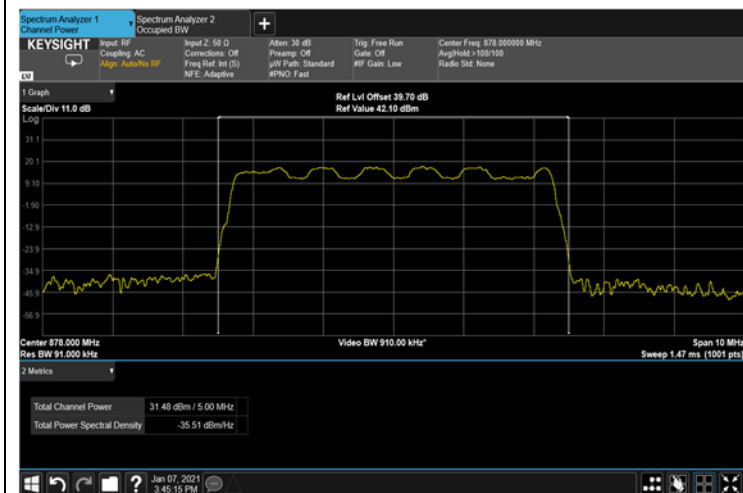


Figure 10: 16QAM 5MHz B.W.; 878.0MHz, 15kHz



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

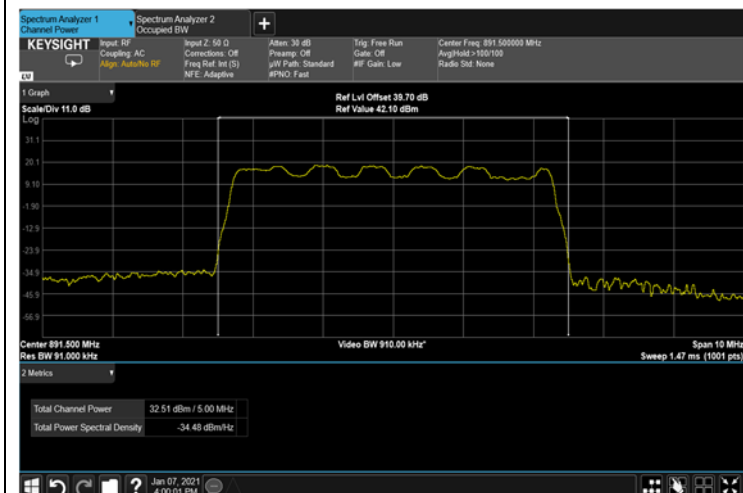
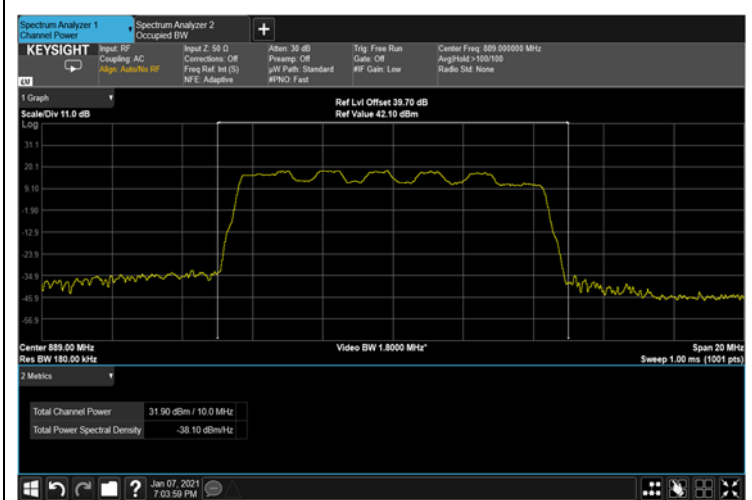
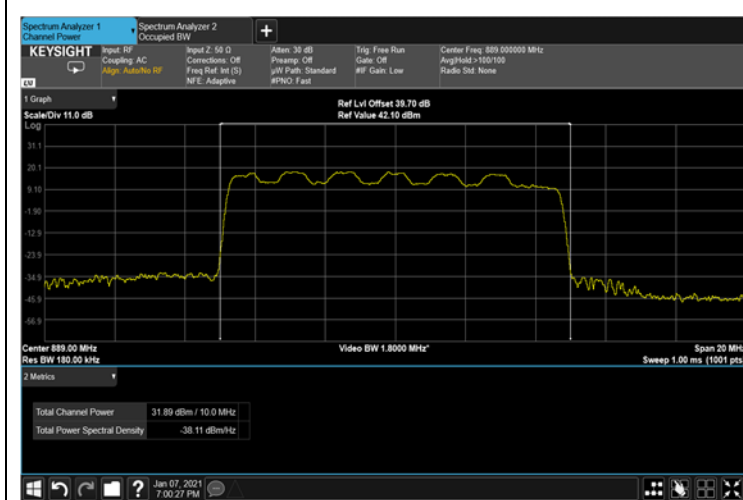
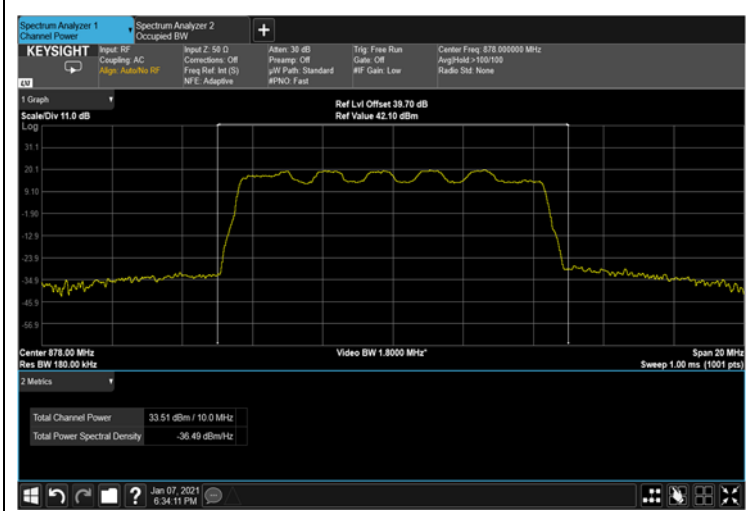
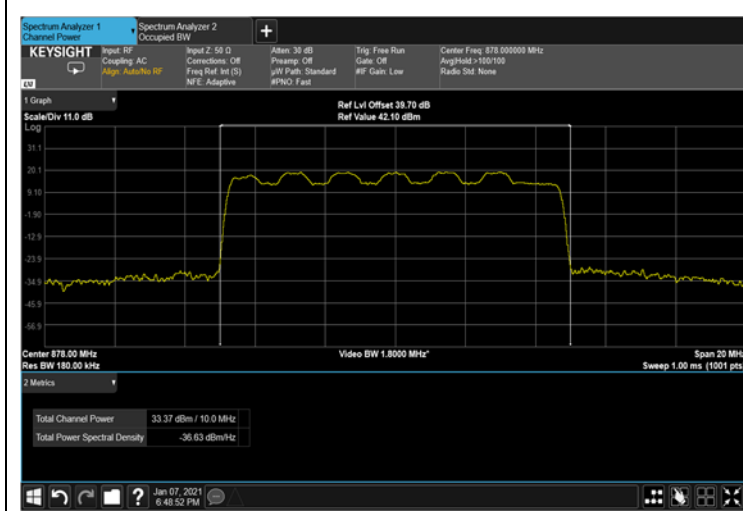
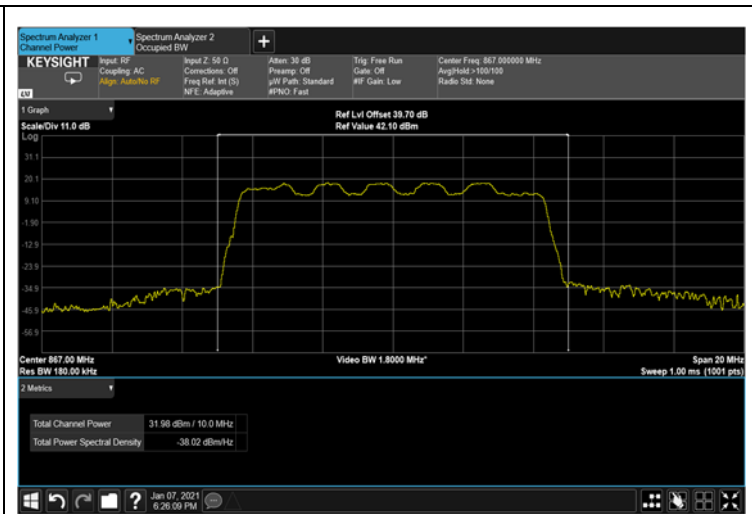
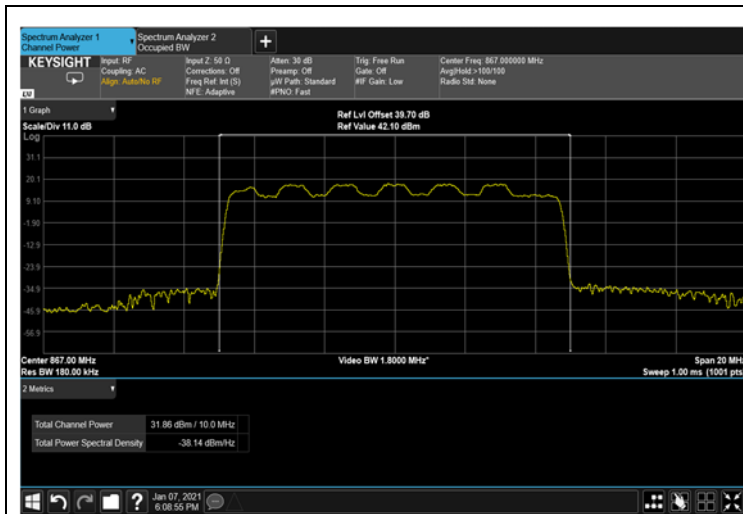
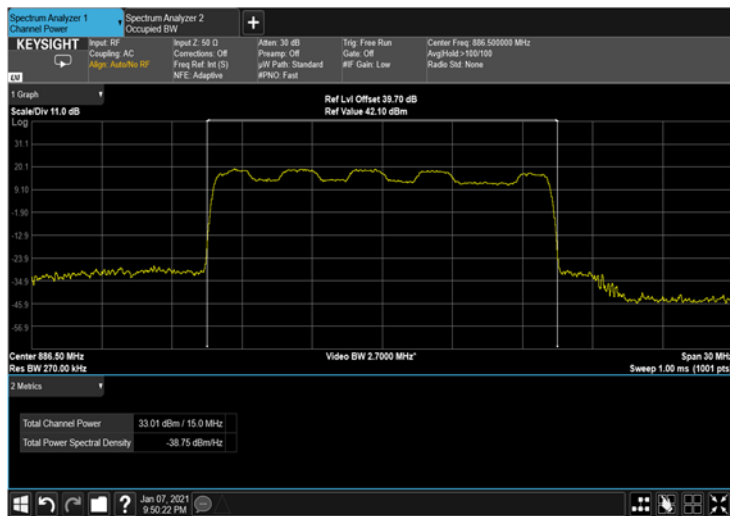
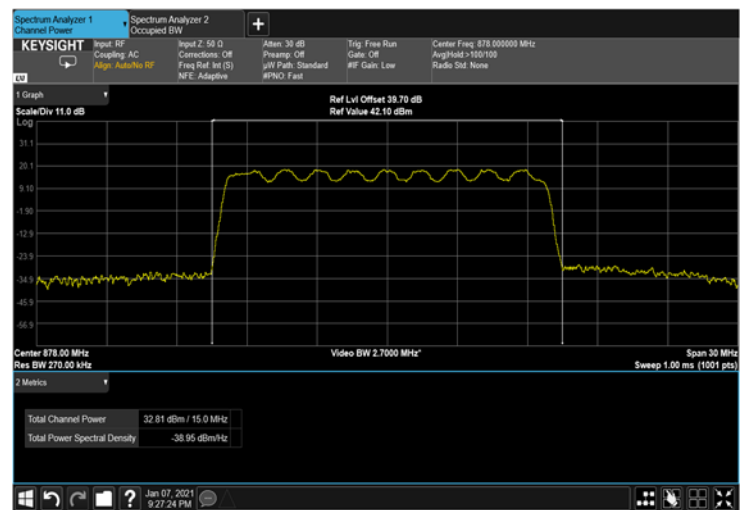
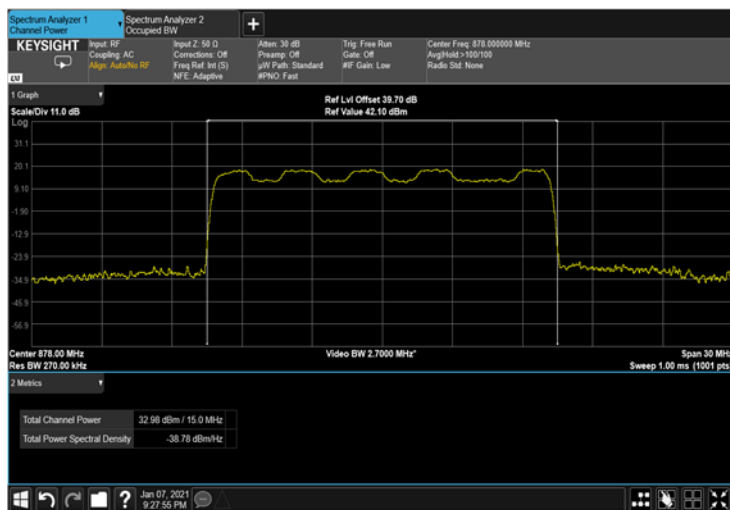
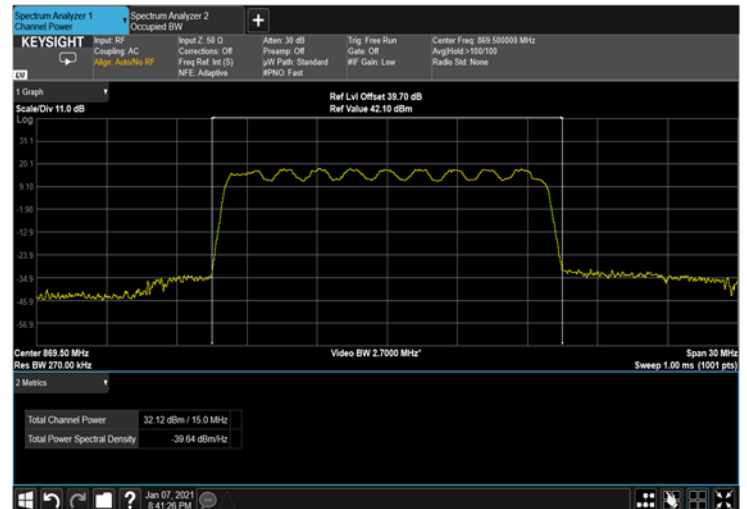
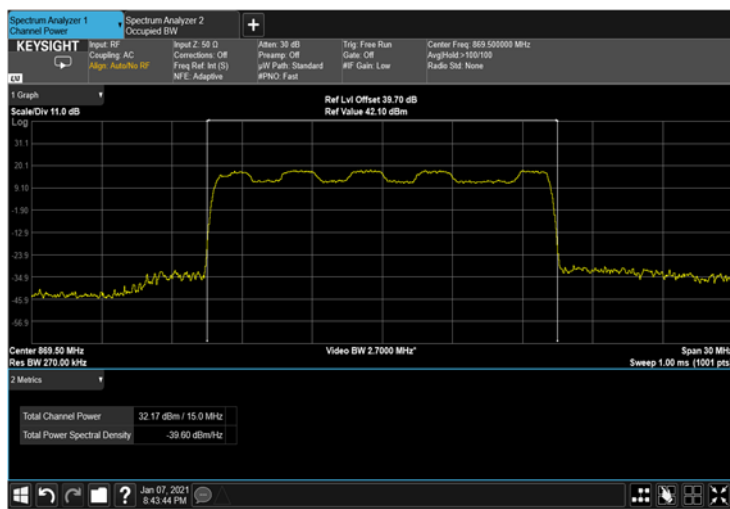


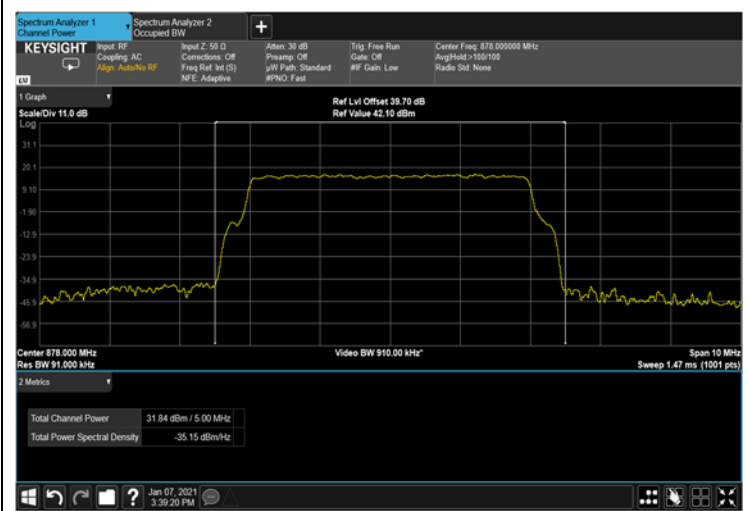
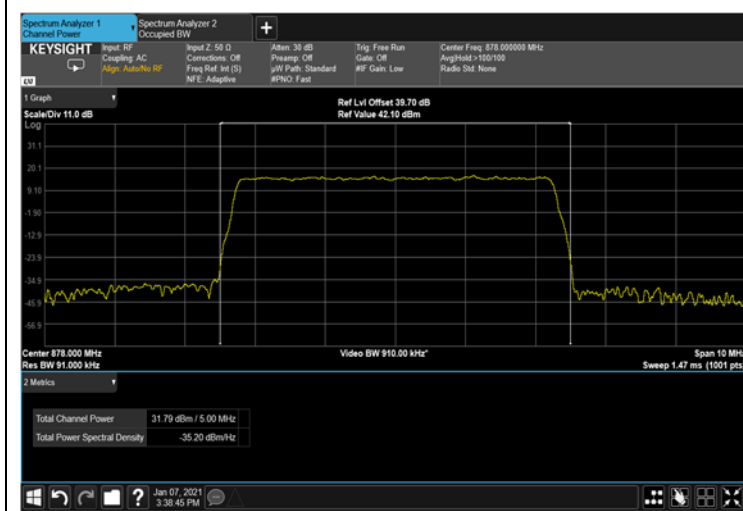
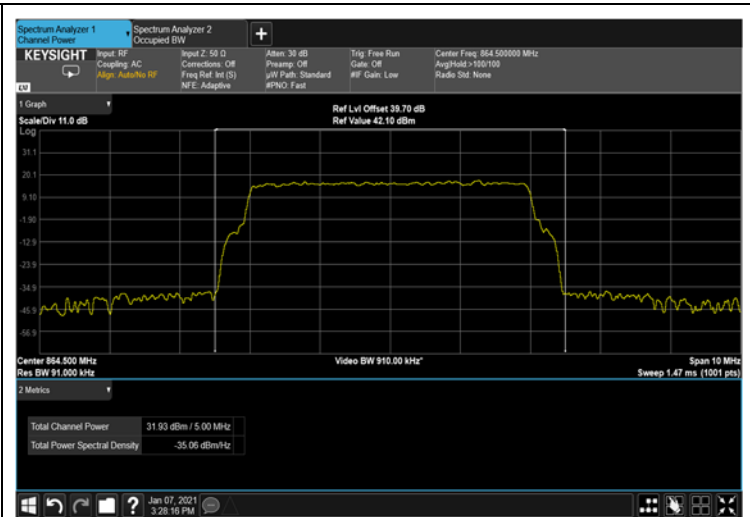
Figure 12: 16QAM 5MHz B.W.; 891.5MHz, 15kHz

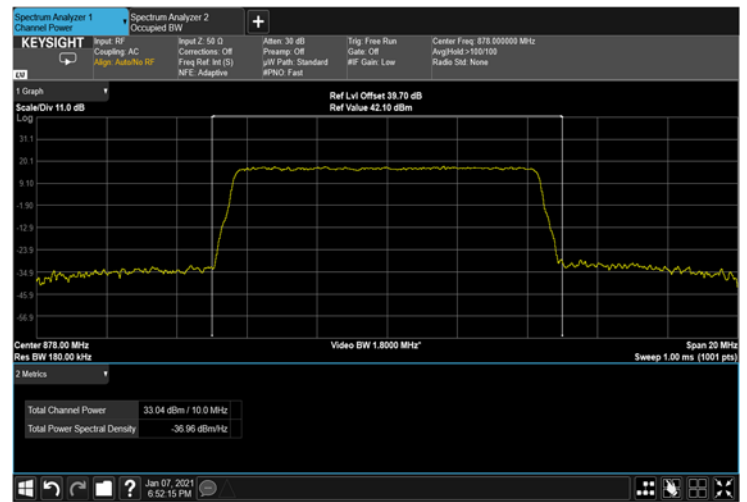
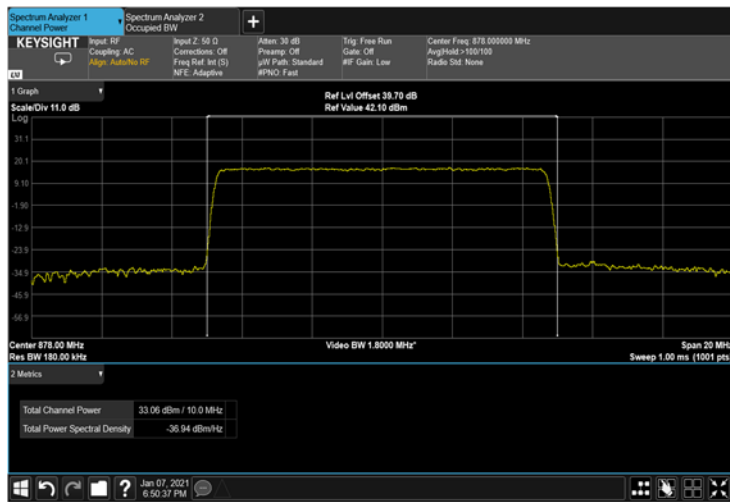
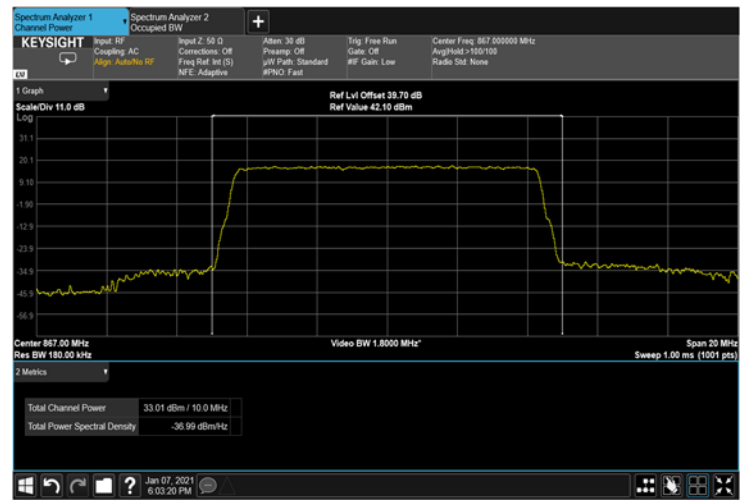
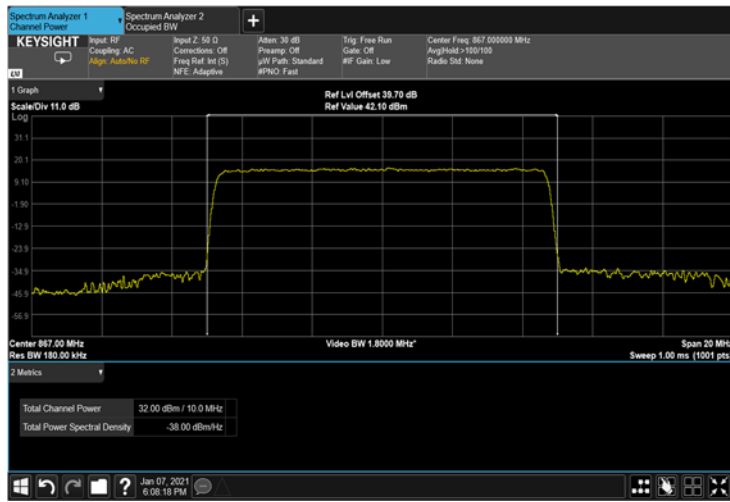
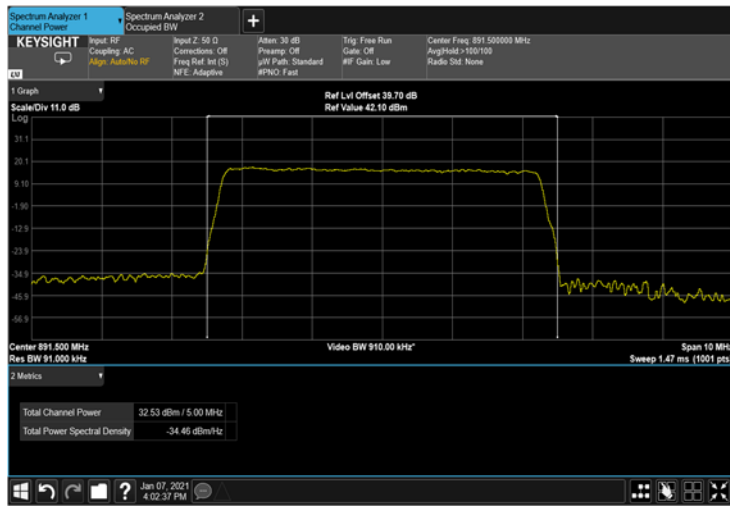


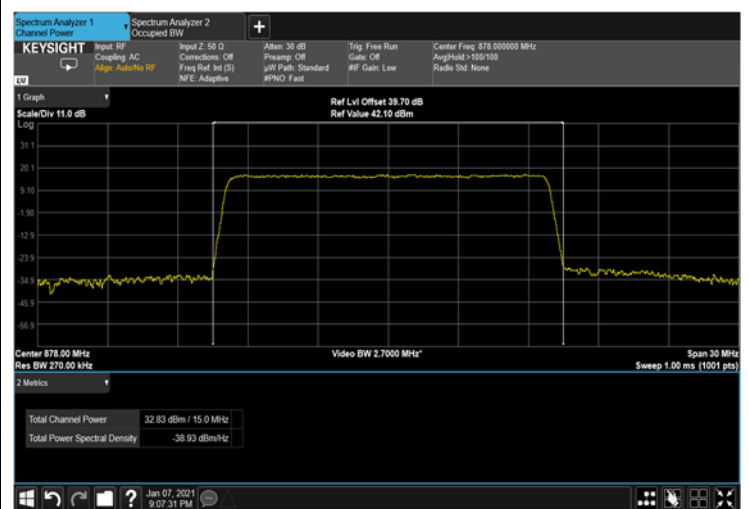
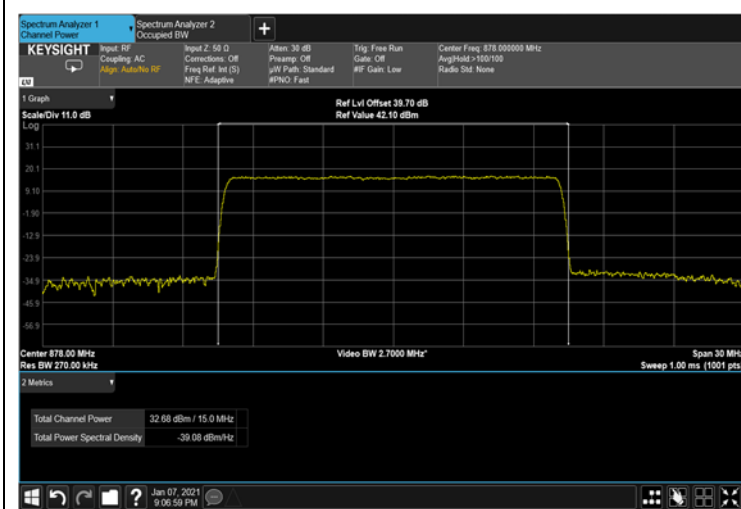
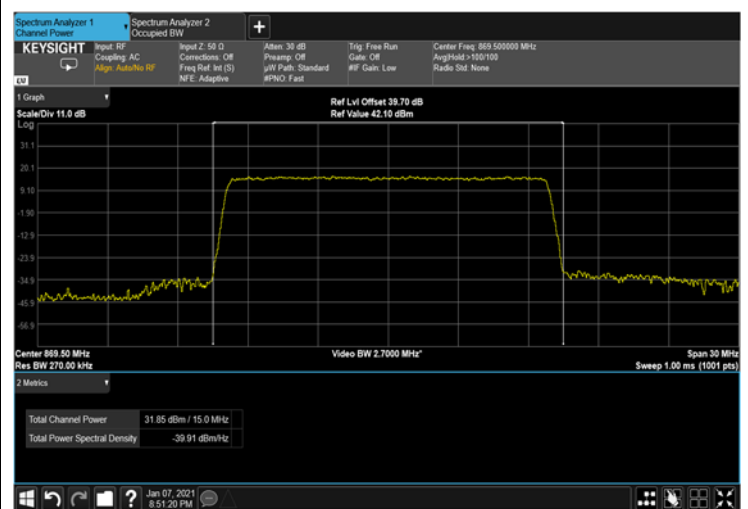
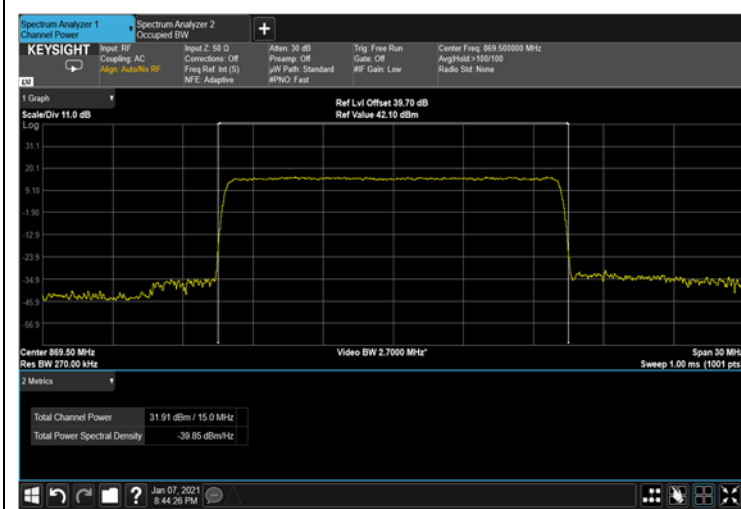
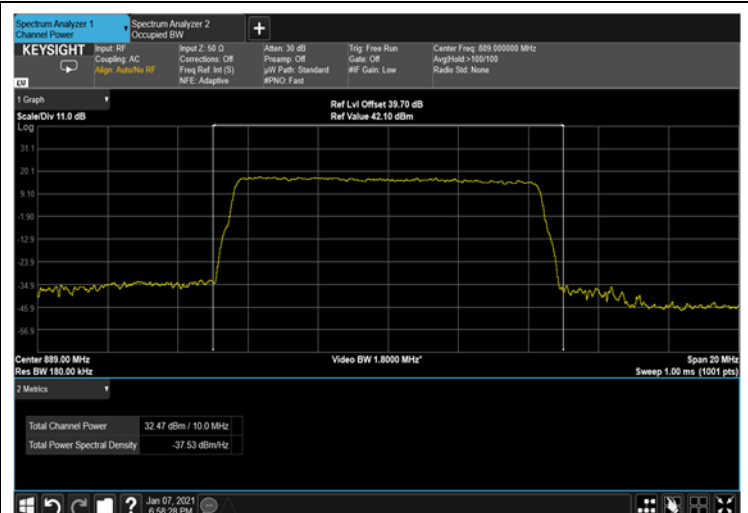
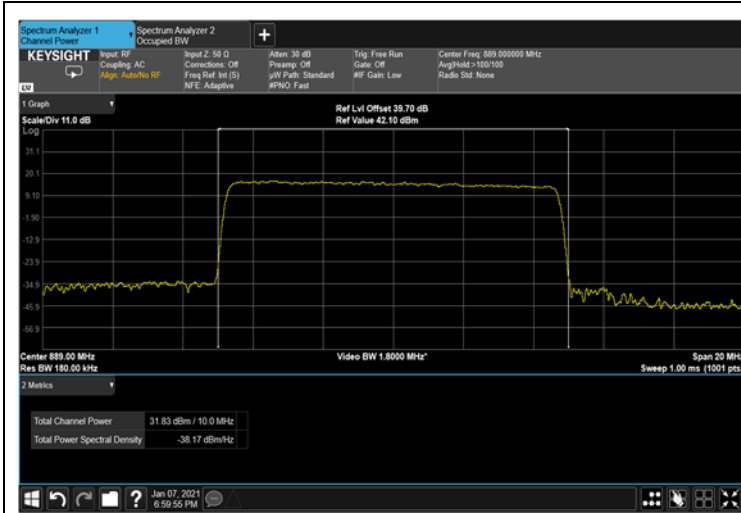
Figure 13: 16QAM 5MHz B.W.; 891.5MHz, 30kHz











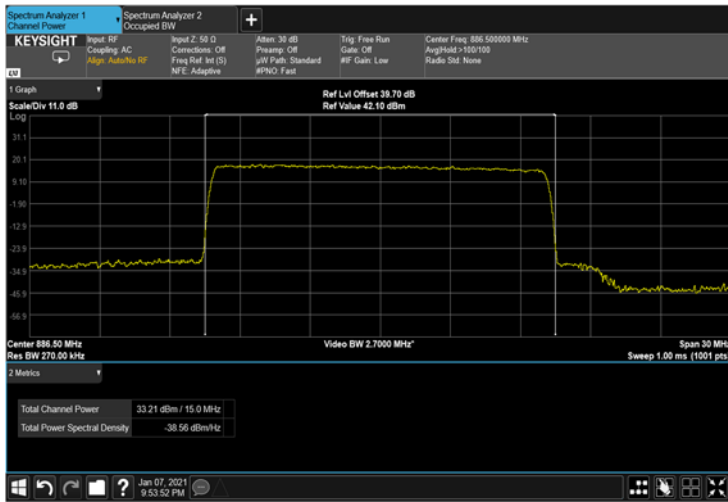


Figure 42: 64QAM 15MHz B.W.;886.5MHz, 15kHz

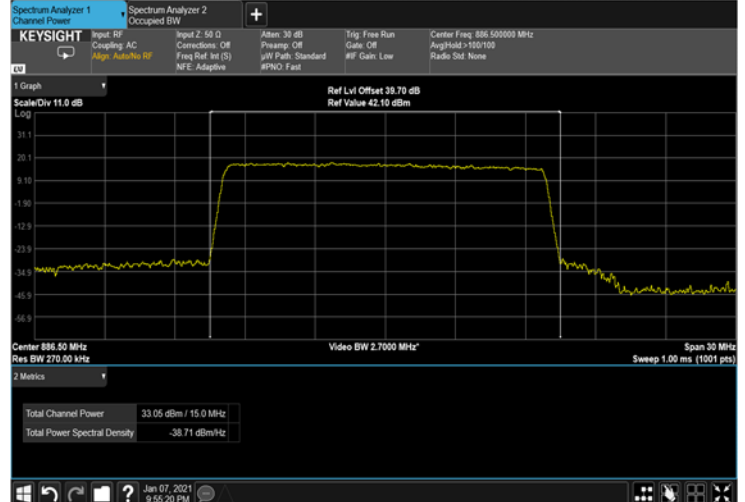


Figure 43: 64QAM 15MHz B.W.; 886.5MHz, 30kHz



Figure 44: 256QAM 5MHz B.W.; 864.5MHz, 15kHz



Figure 45: 256QAM 5MHz B.W.; 864.5MHz, 30kHz

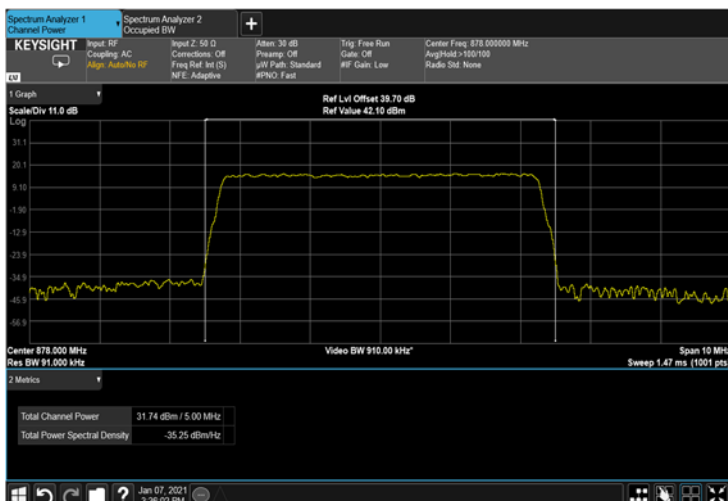


Figure 46: 256QAM 5MHz; 878.0MHz B.W., 15kHz

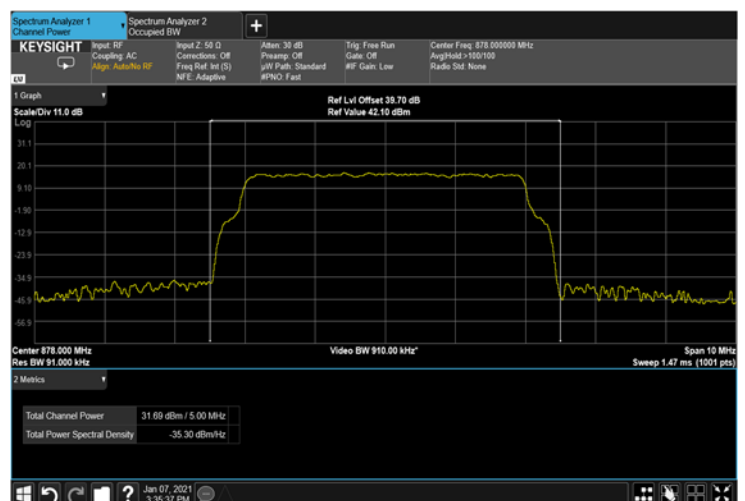


Figure 47: 256QAM 5MHz; 878.0MHz B.W., 30kHz



Figure 48: 256QAM 5MHz B.W.; 891.5MHz, 15kHz



Figure 49: 256QAM 5MHz B.W.; 891.5MHz, 30kHz

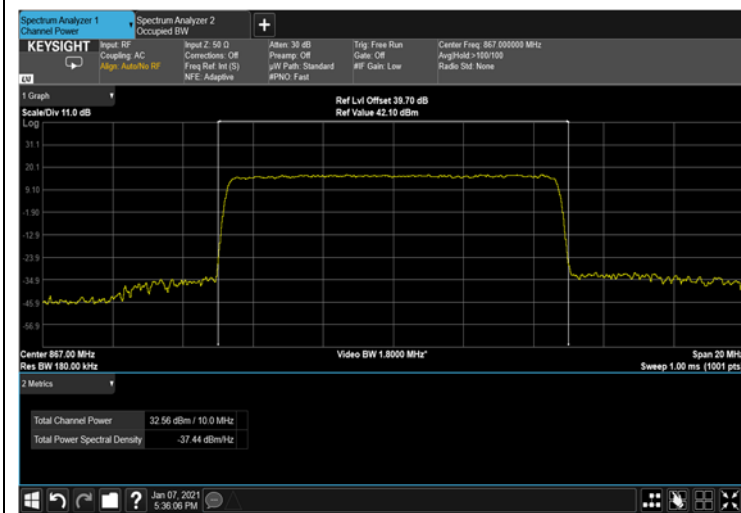


Figure 50: 256QAM 10MHz B.W.; 867.0MHz, 15kHz



Figure 51: 256QAM 10MHz B.W.; 867.0MHz, 30kHz

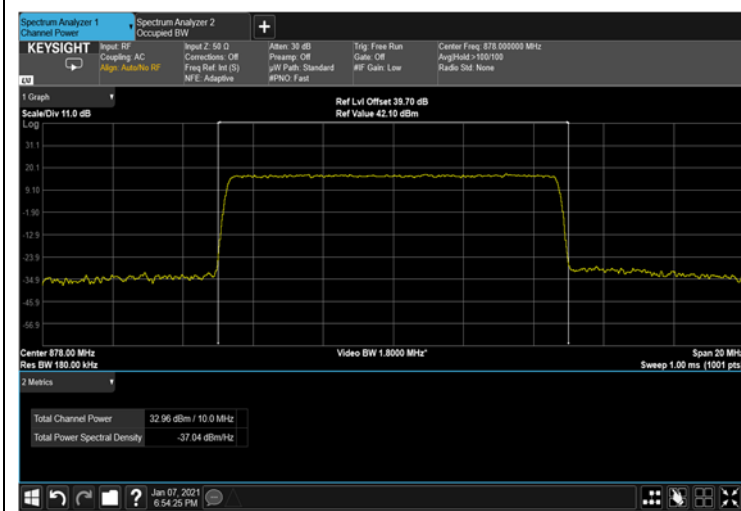


Figure 52: 256QAM 10MHz B.W.; 878.0MHz, 15kHz

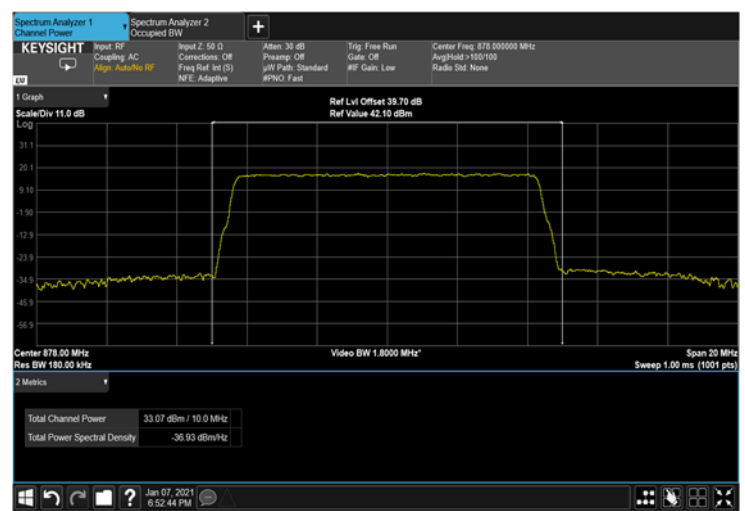


Figure 53: 256QAM 10MHz B.W.; 878.0MHz, 30kHz

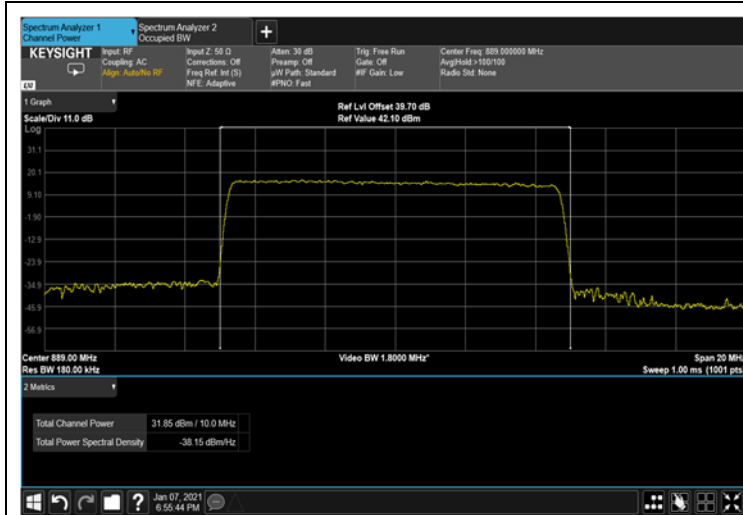


Figure 54: 256QAM 10MHz B.W.; 889.0MHz, 15kHz

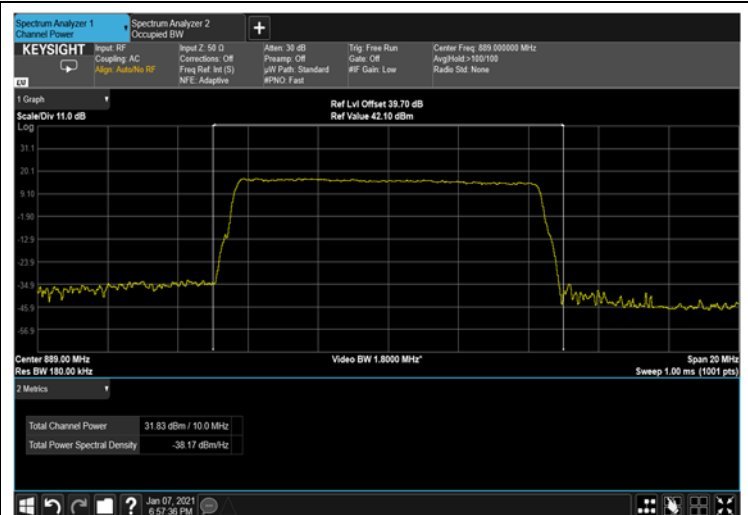


Figure 55: 256QAM 10MHz B.W.; 889.0MHz, 30kHz

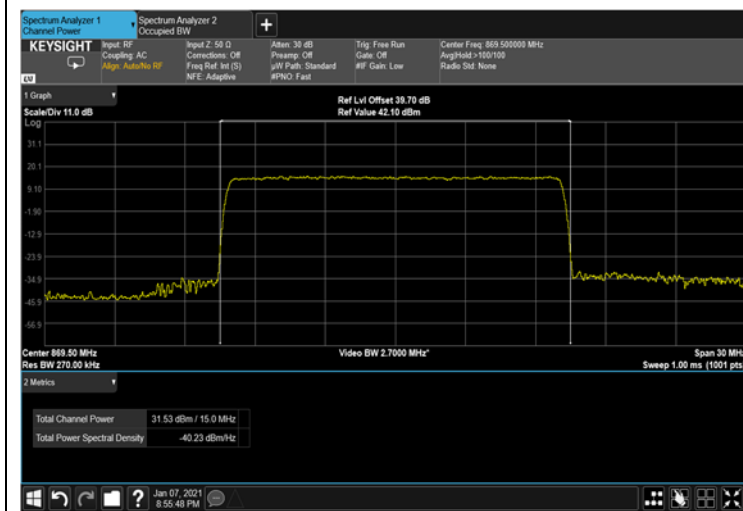


Figure 56: 256QAM 15MHz B.W.; 869.5MHz, 15kHz

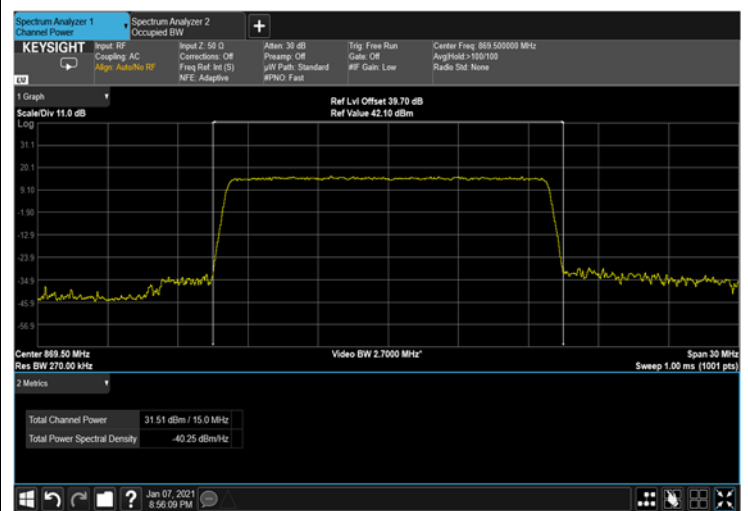


Figure 57: 256QAM 15MHz B.W.; 869.5MHz, 30kHz

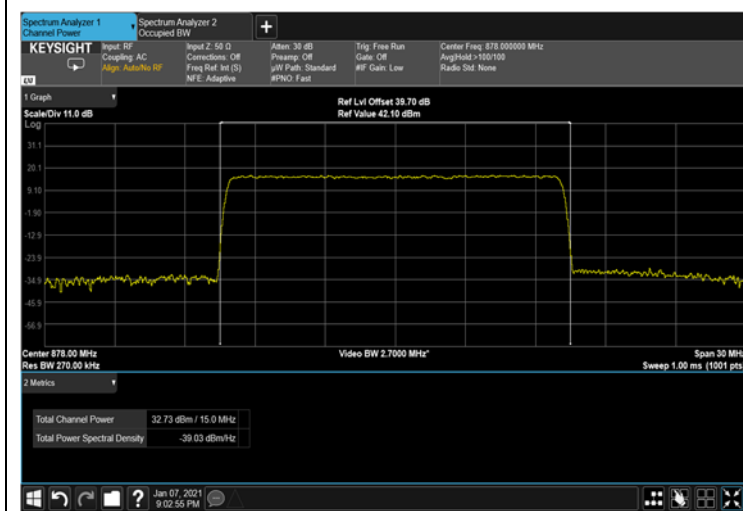


Figure 58: 256QAM 15MHz B.W.; 878.0MHz, 15kHz

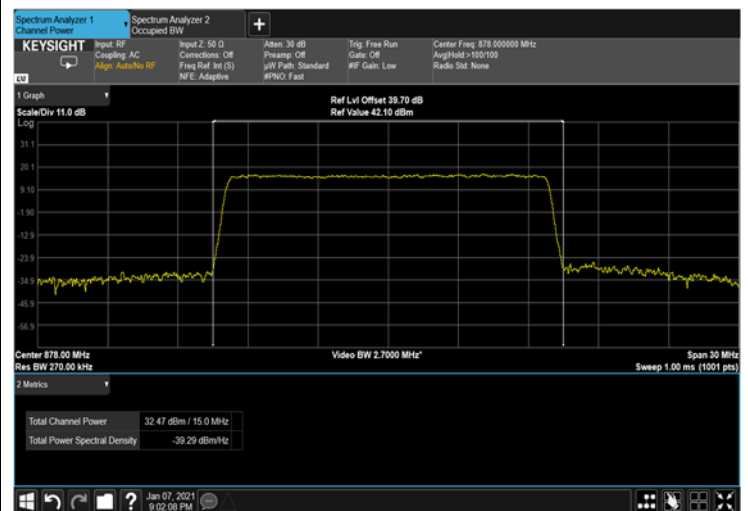
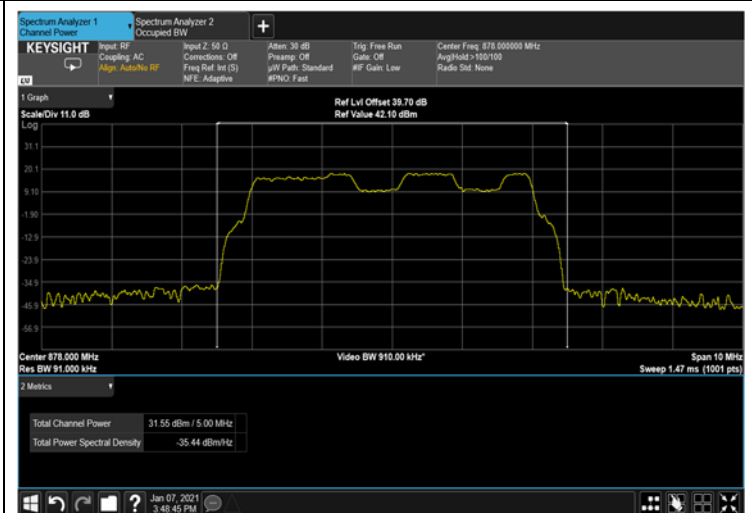
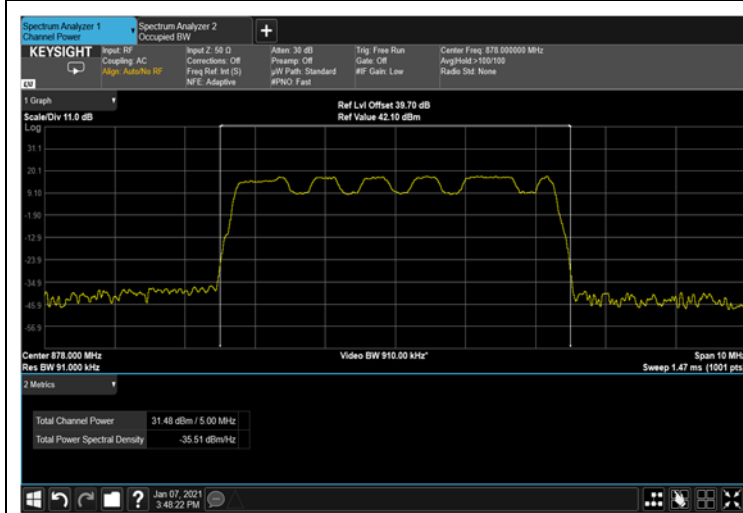
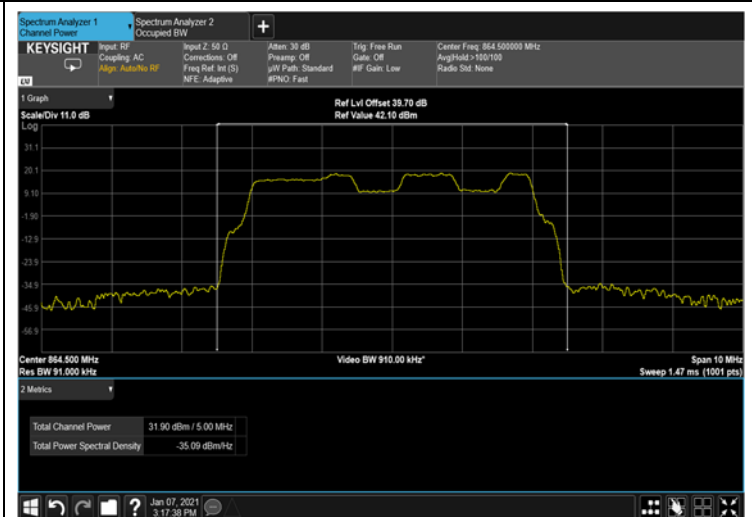
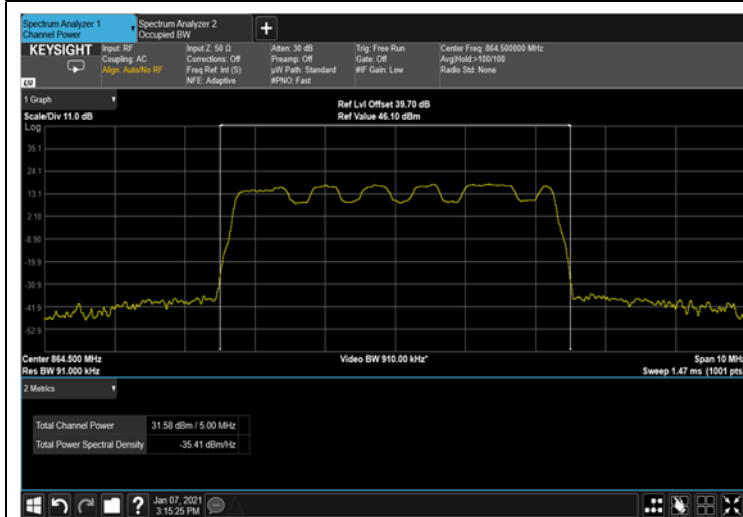
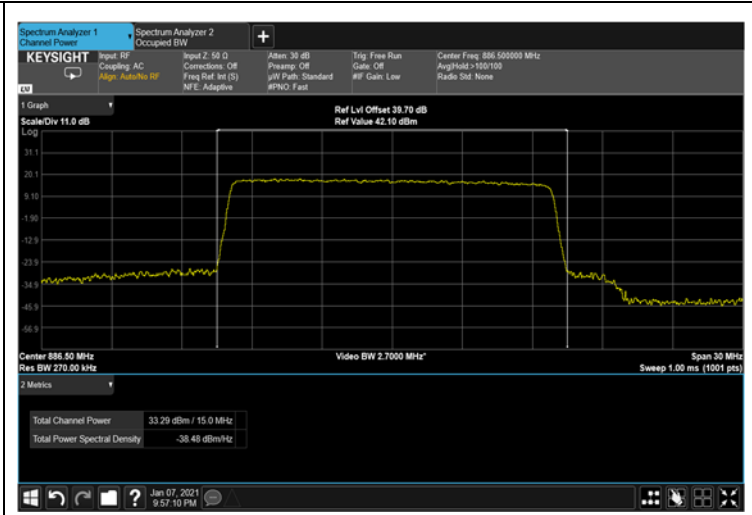
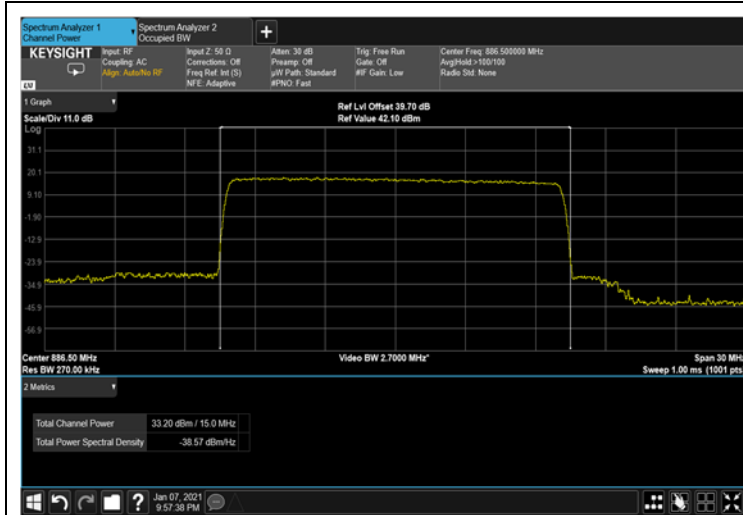
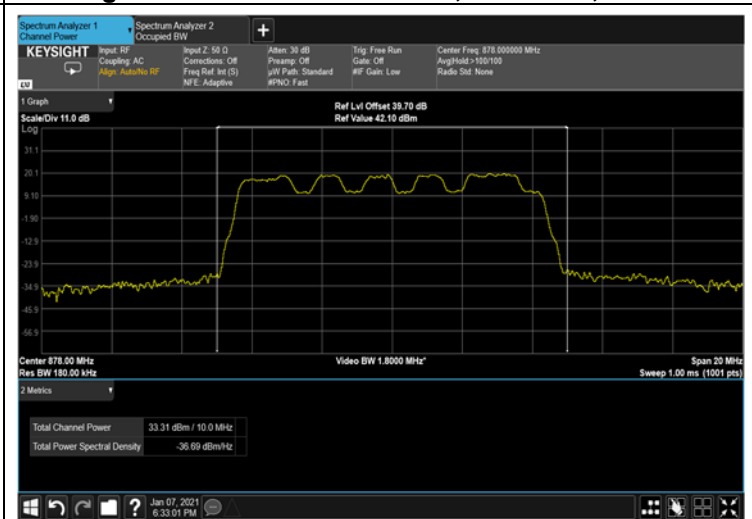
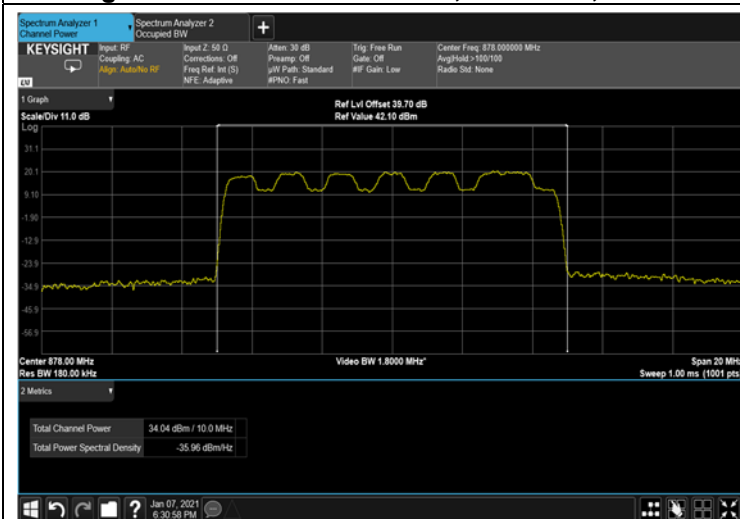
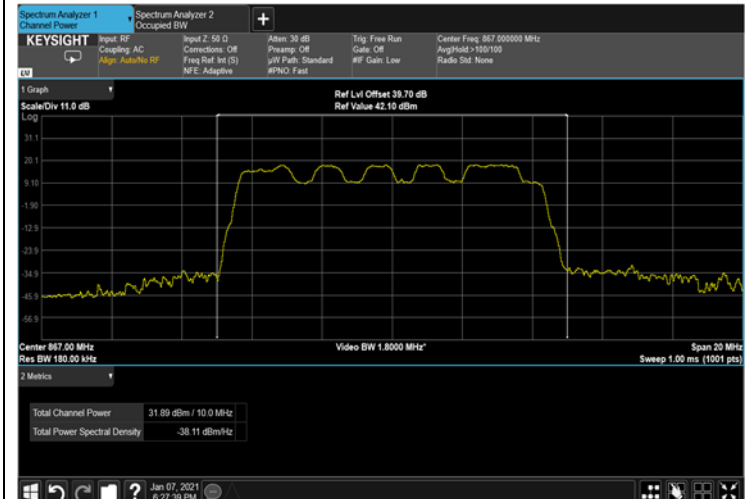
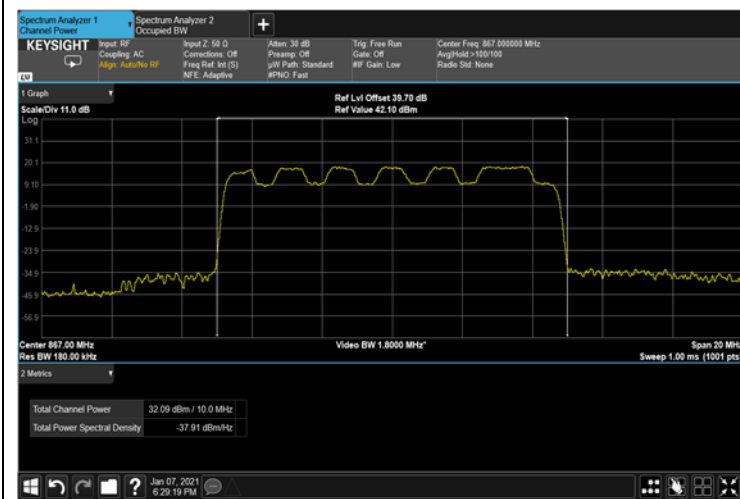
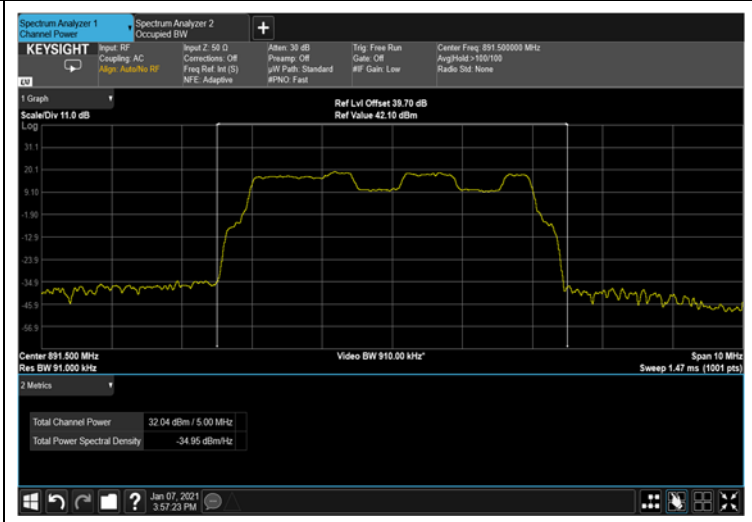
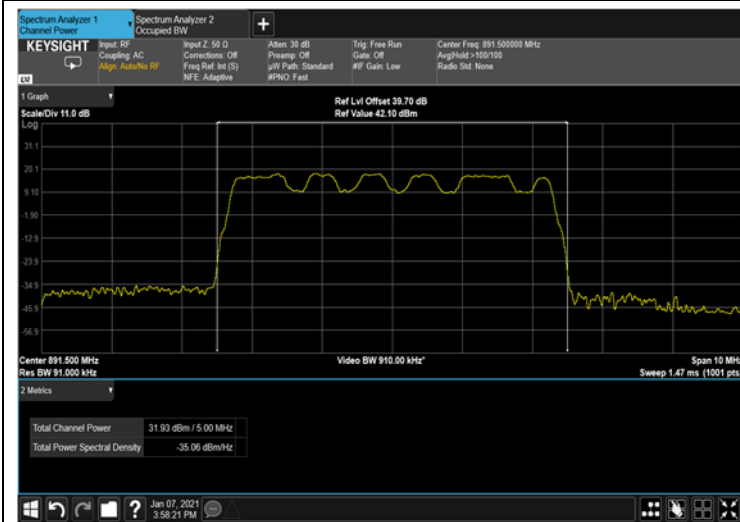
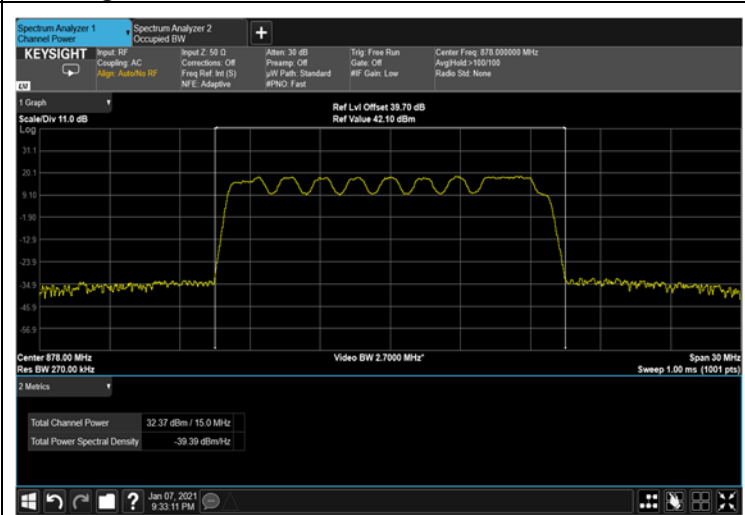
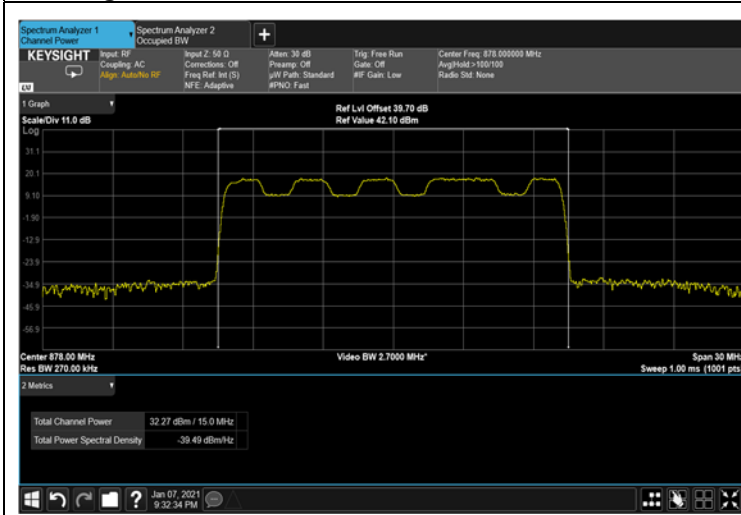
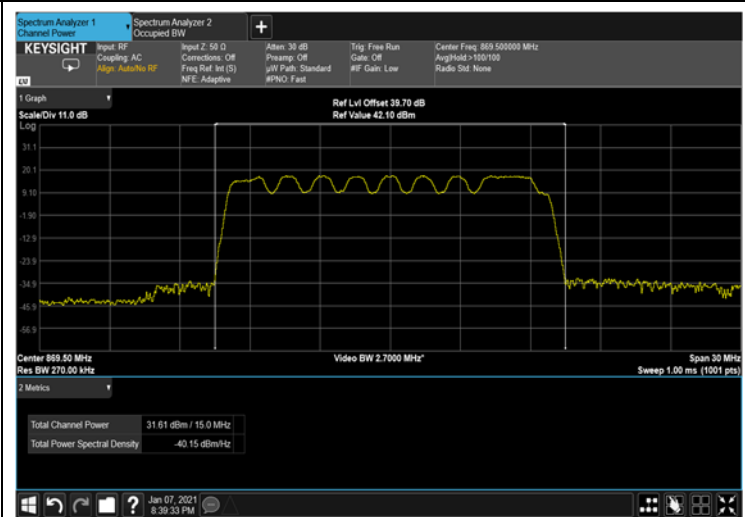
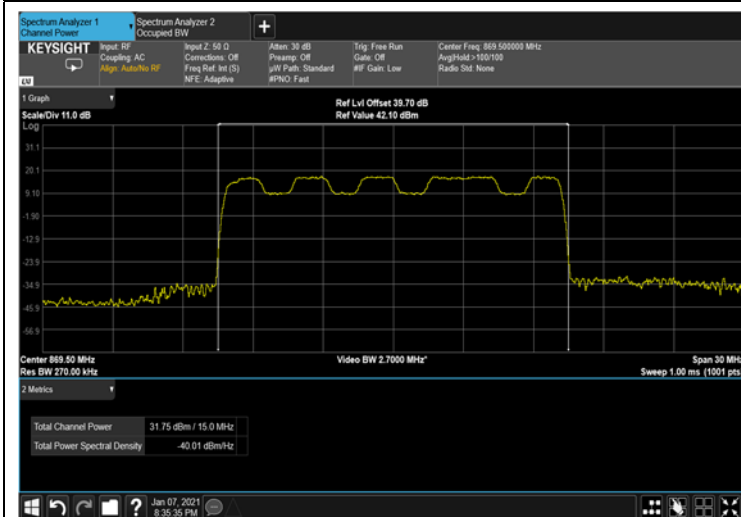
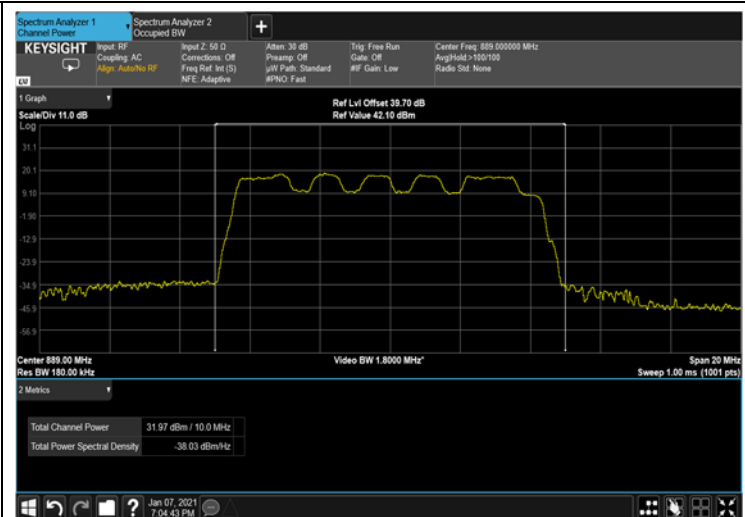
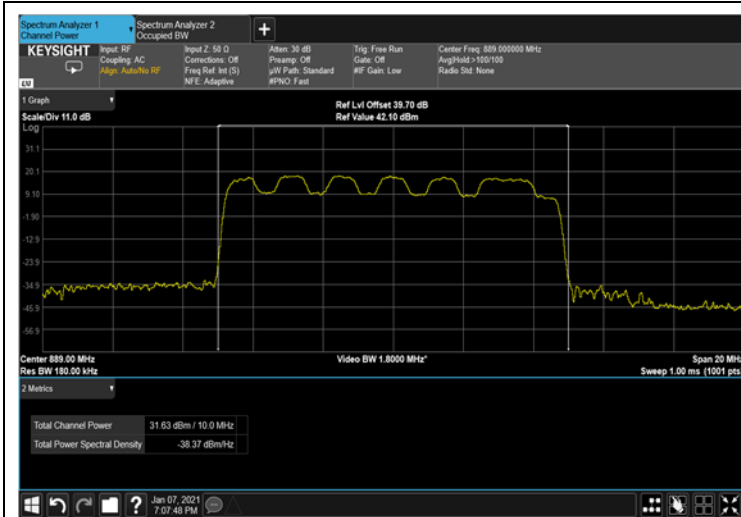


Figure 59: 256QAM 15MHz B.W.; 878.0MHz, 30kHz







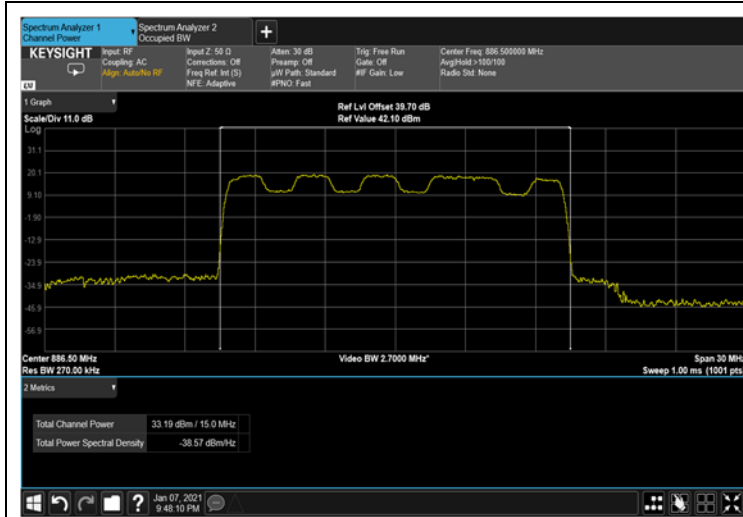


Figure 78: QPSK 15MHz B.W.; 886.5MHz, 15kHz

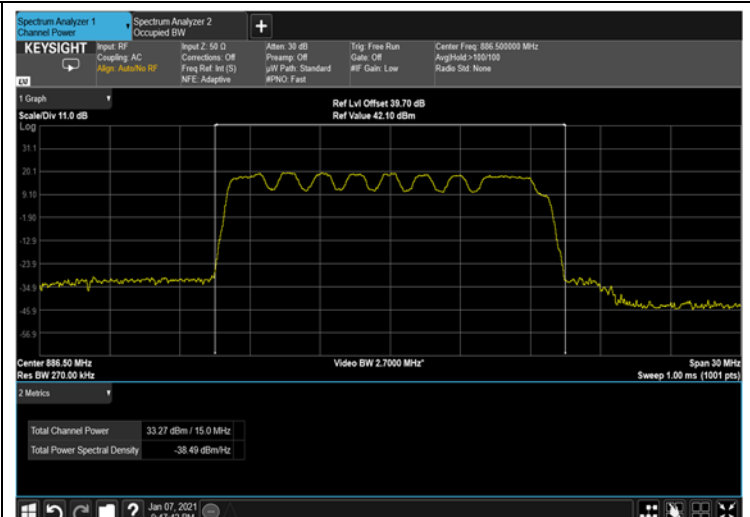


Figure 79: QPSK 15MHz B.W.; 886.5MHz, 30kHz



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

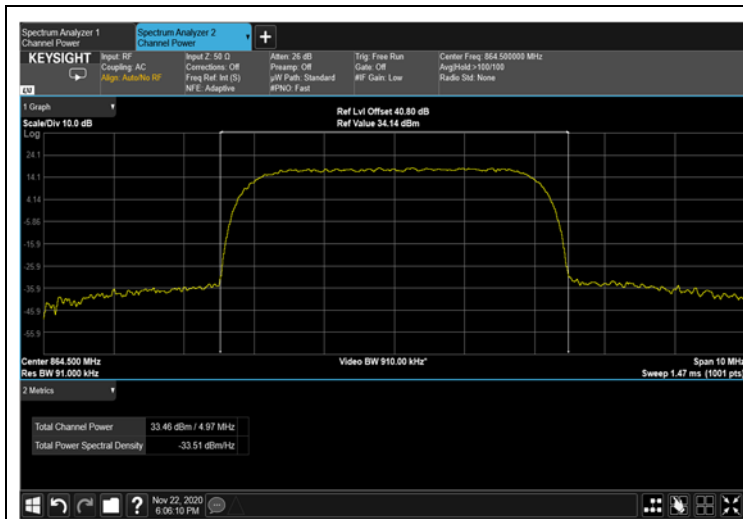


Figure 80: WCDMA 5MHz B.W.; 864.5MHz – 3G



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

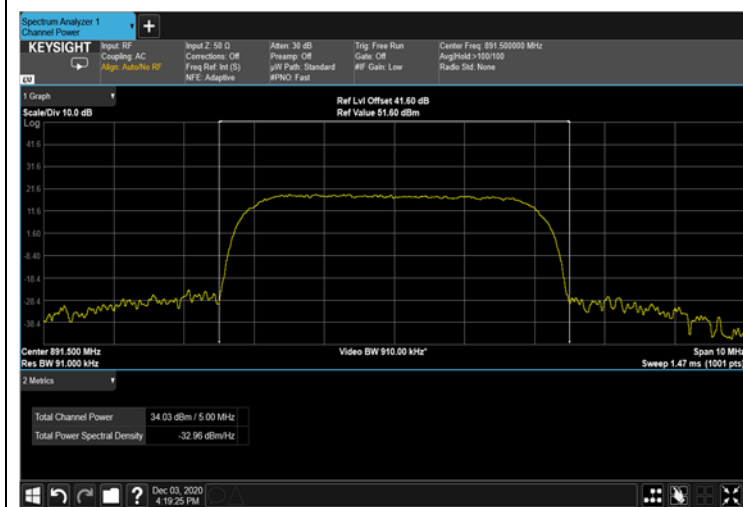
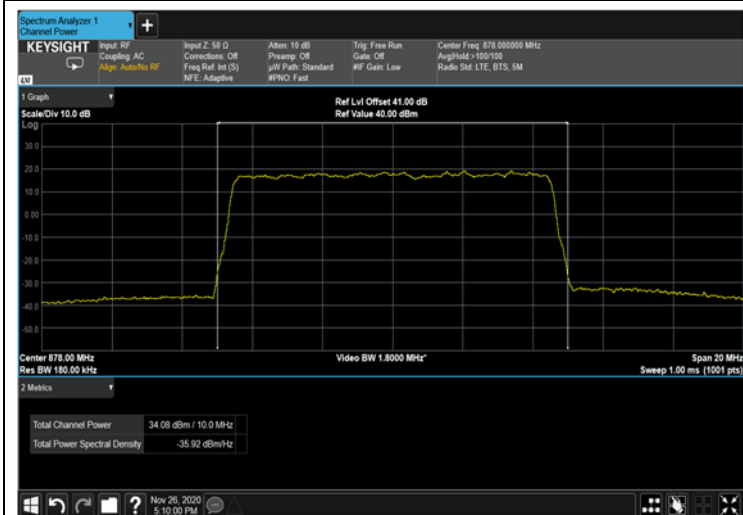
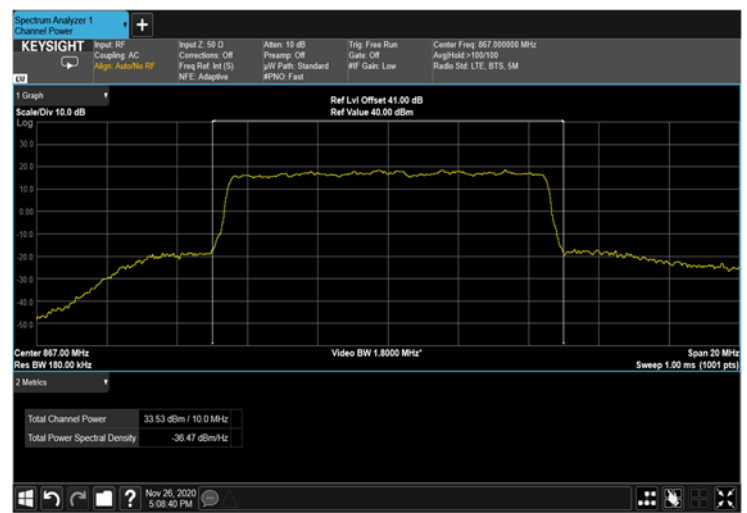
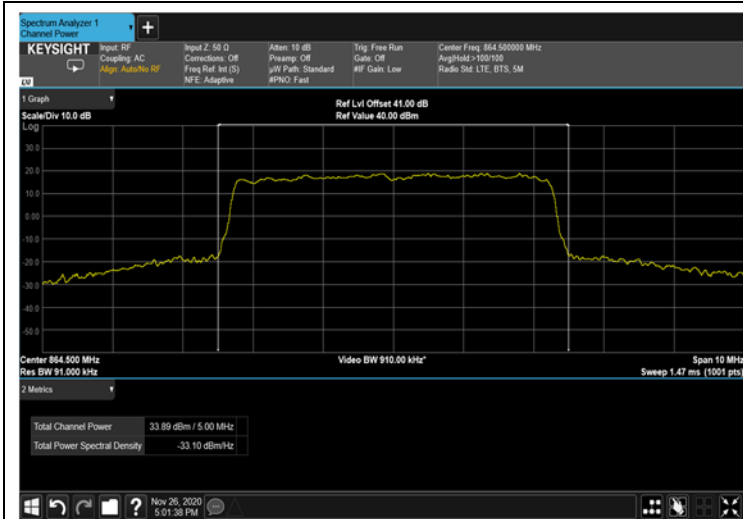
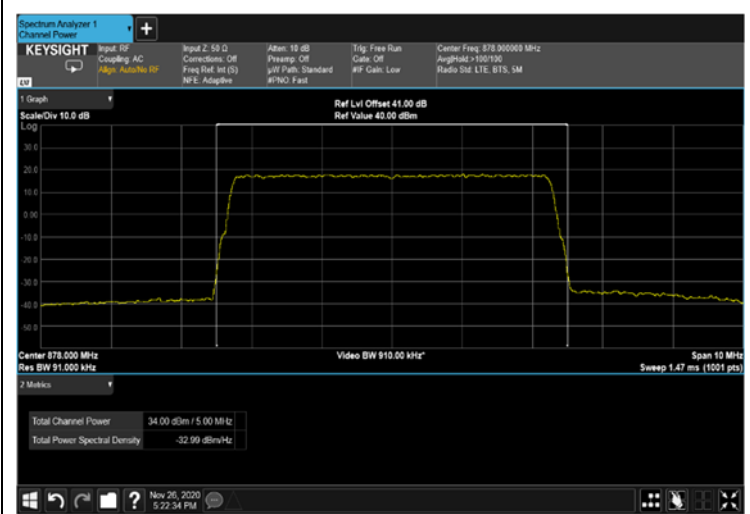
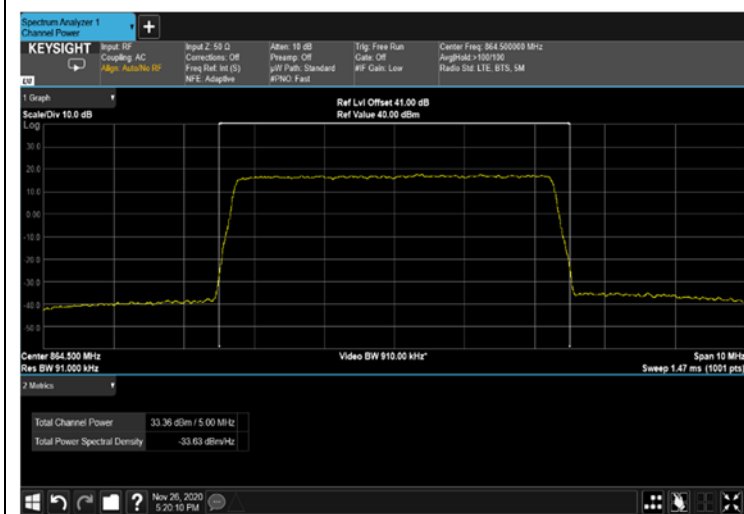
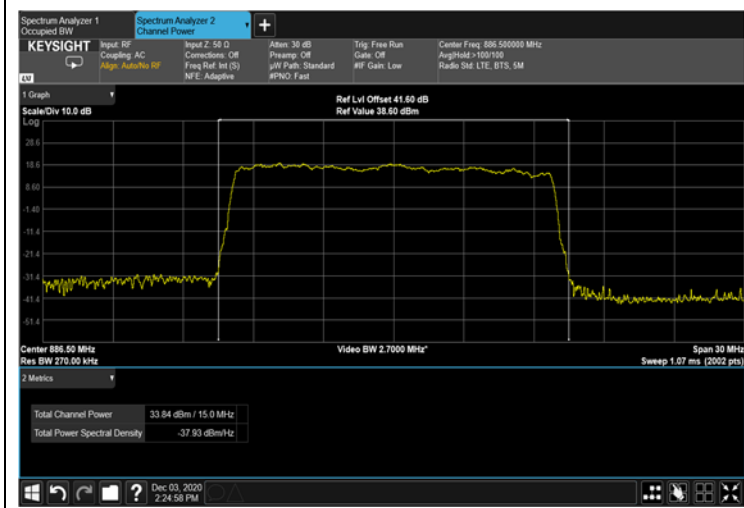
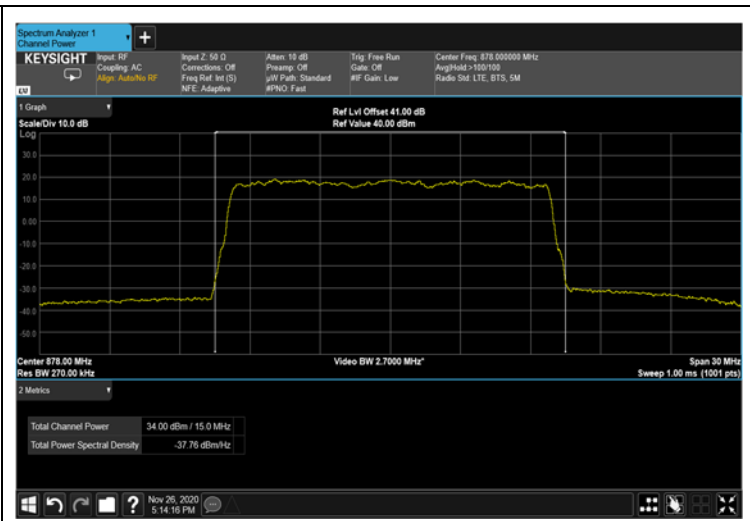
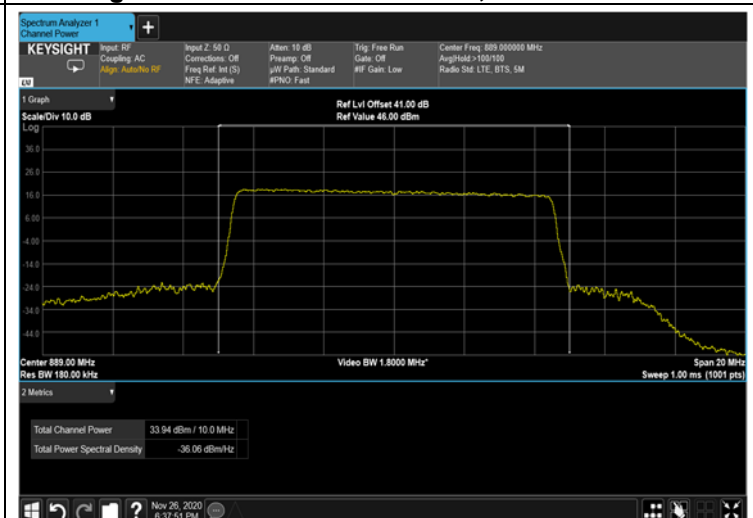
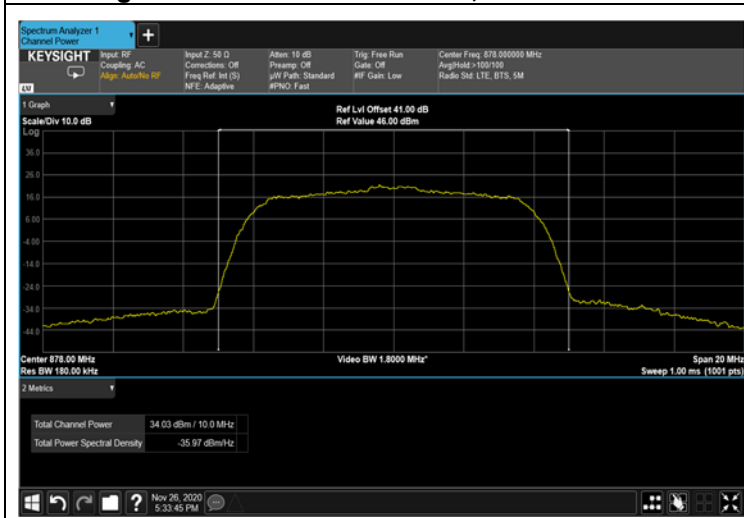
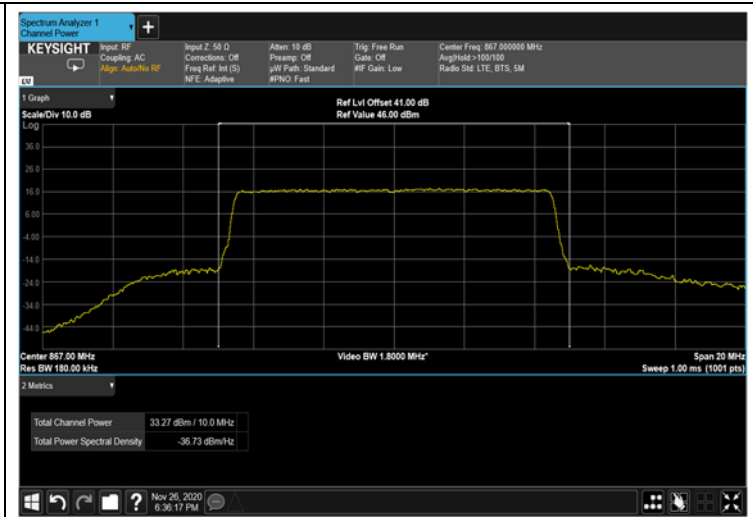
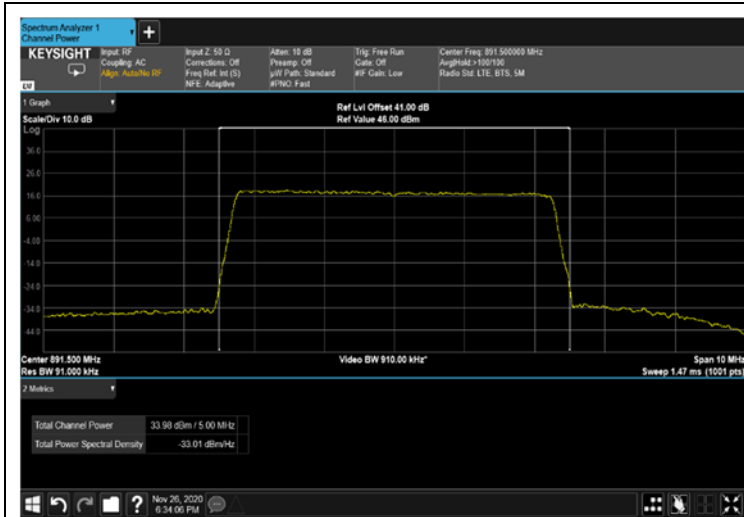
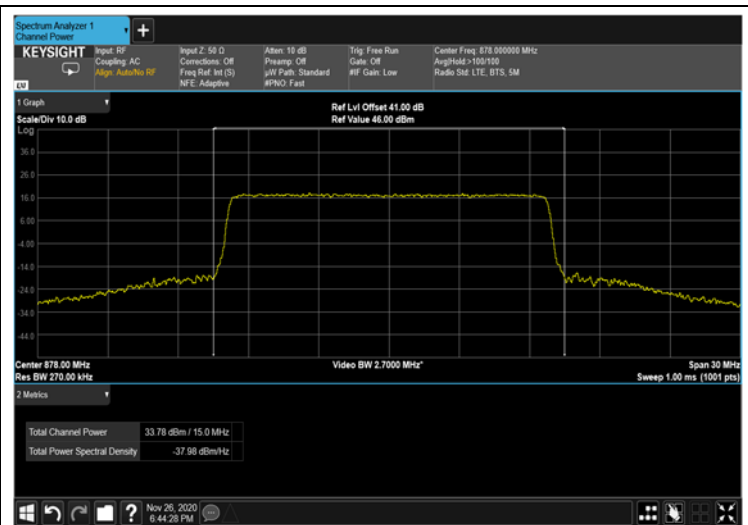


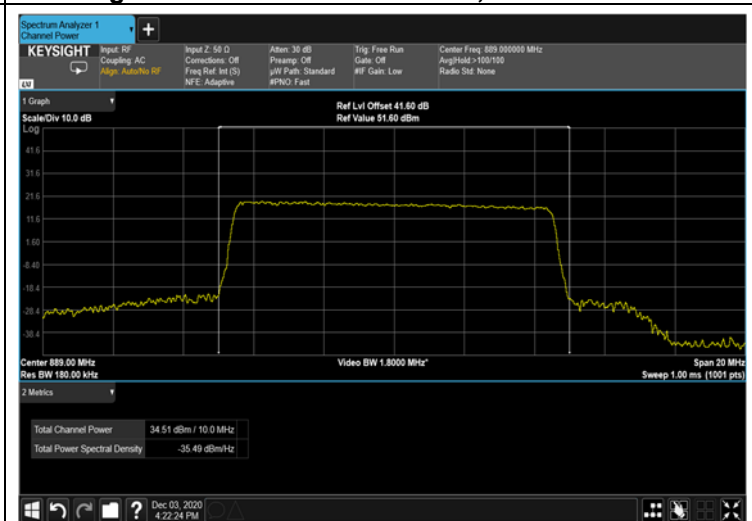
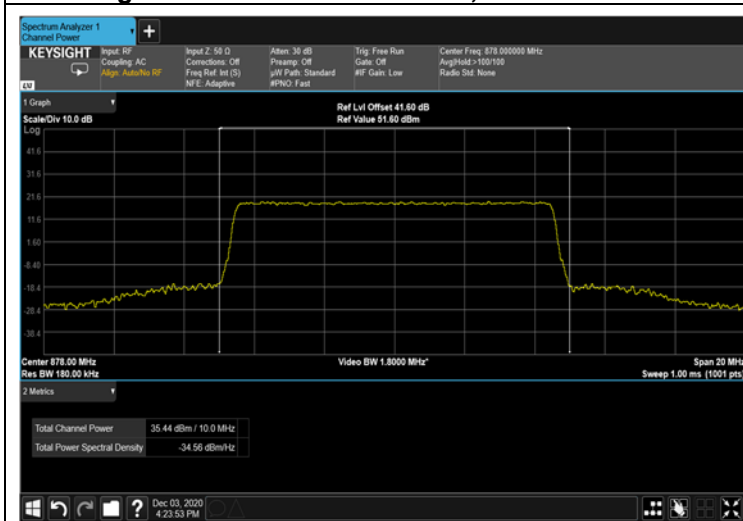
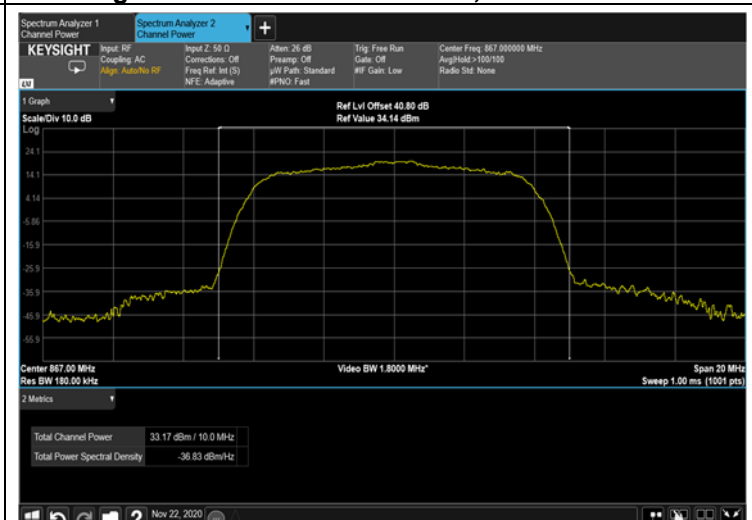
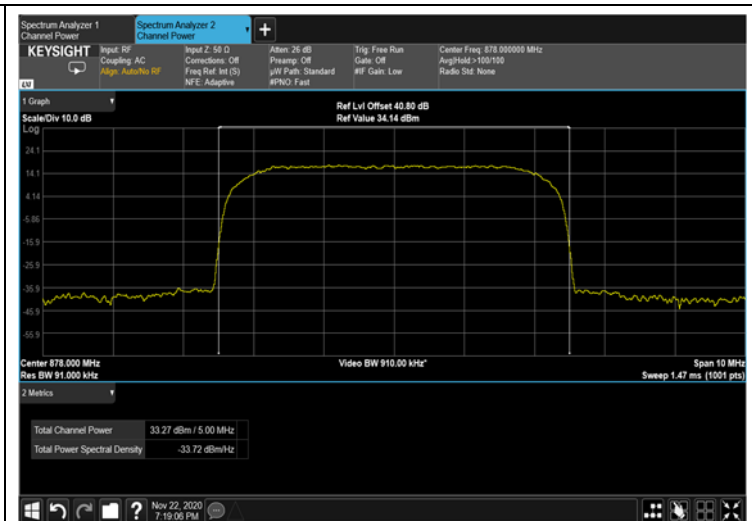
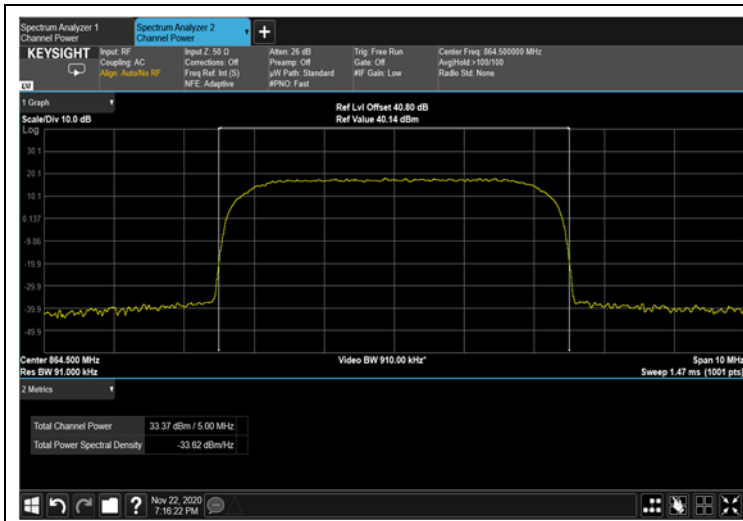
Figure 82: WCDMA 5MHz B.W.; 891.5MHz – 3G

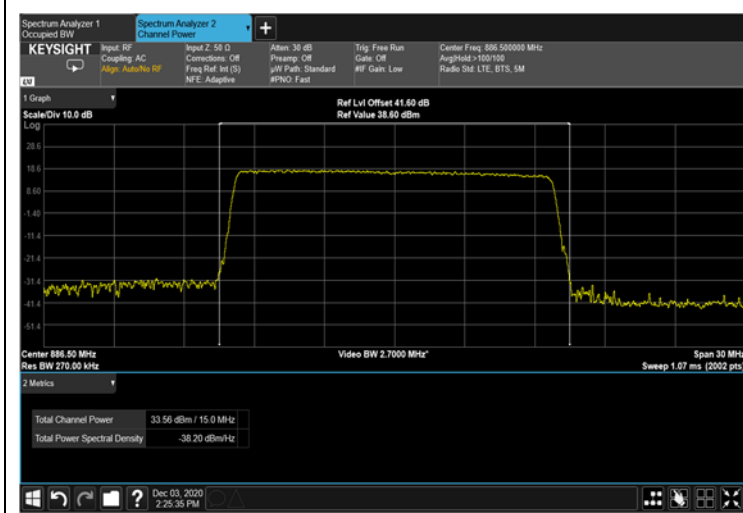
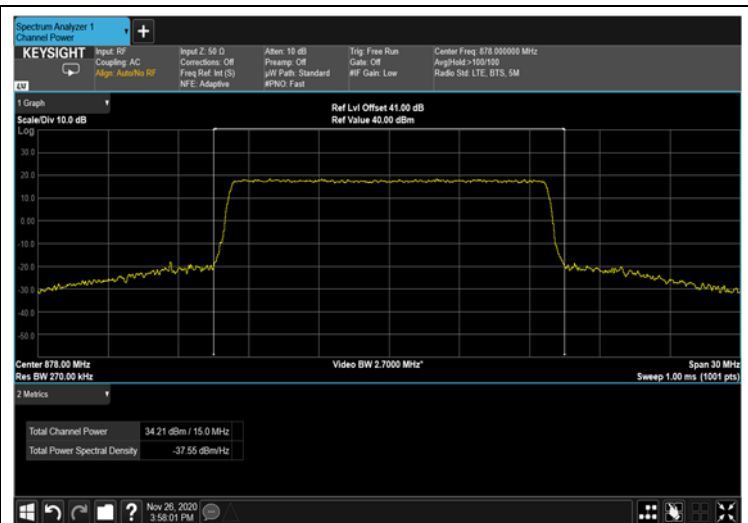
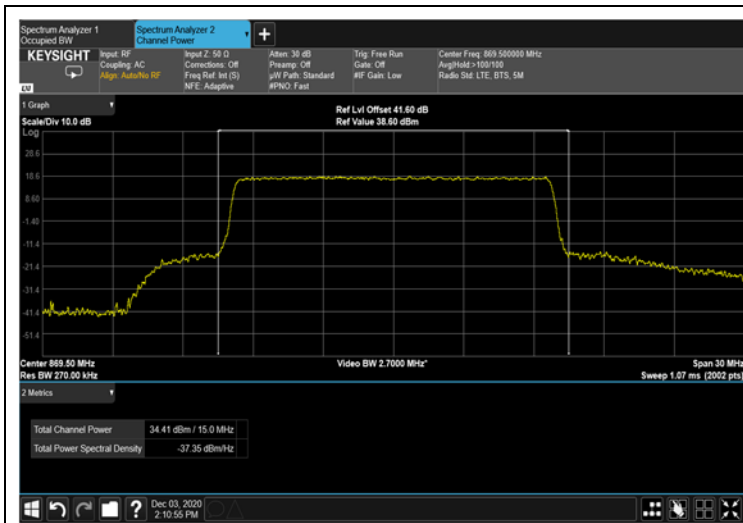














5.5 Test Equipment Used; Channel Power

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