



DATE: 21 December 2020

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

FCC Radio Test Report

For

Corning Optical Communication Wireless

Equipment under test:

**ONE - Optical Network Evolution Wireless
Platform**

MRU (Mid Power Remote Unit)

(WCS Section)

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 ONE - Optical Network Evolution Wireless Platform

FCC ID: OJF1MRU23CR

This report concerns: Original Grant:
 Class II change: X
 Class I change:

Equipment type: B21 - Part 20 Industrial Booster (CMRS)

Limits used: 47CFR Parts 2; 27

Measurement procedure used is KDB 935210 D05 v01r04 April 2020, KDB 971168 D03 v01 and ANSI IEEE C63.26-2015

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

Application for Certification
prepared by:

R. Pinchuck
ITL (Product Testing) Ltd.
1 Bat Sheva St.
Lod 7120101
Israel
e-mail RPinchuck@iltglobal.org

Applicant for this device:
(different from "prepared by")

Isaac Nissan
Corning Optical Communication Wireless
8253 1st Street
Vienna, VA 22812
U.S.A.
Tel: +1-703 855-1773
e-mail: NissanI@corning.com



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1 General Information

1.1 Administrative Information

Manufacturer:	Corning Optical Communication Wireless
Manufacturer's Address:	8253 1st Street Vienna, VA 22812 U.S.A. Tel: +1-703 855-1773
Manufacturer's Representative:	Isaac Nissan
Equipment Under Test (E.U.T):	ONE - Optical Network Evolution Wireless Platform
Equipment Model No.:	MRU (Mid Power Remote Unit)
Equipment Serial No.:	Not Designated
Date of Receipt of E.U.T:	September 01, 2020
Start of Test:	September 01, 2020
End of Test:	November 12, 2020
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

Modular 7 band Enabled Mid Power Neutral Host Solution –

Supported modular frequency bands

700, ESMR+CELL, PCS, AWS, WCS

Integrated 2.5 GHz expansion ready

Composite Output Power

AWS: 34dBm

PCS, WCS: 33dBm

700, ESMR & CELL: 30dBm

Specifications

100% Modularity

NEBS Class 2 Compliant

Small Footprint – 6 Rack Units

Highlights:

Extended ONE platform design Diversity

100% modular component design

Composite output power: 2W

Small Compact Form Factor (6U)

Non-Service Impacting Upgrades

Lower initial deployment costs

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in KDB 935210 D05 v01r04 April 2020, KDB 971168 D03 v01 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 (CISPR 11, EN 55011, CISPR 32, EN 55032, ANSI C63.4)

0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 3.44 dB

Radiated Emission (CISPR 11, EN 55011, CISPR 32, EN 55032, ANSI C63.4) for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.98 dB

2 System Test Configuration

2.1 *Justification*

1. The E.U.T was originally FCC certified on 02/21/2017. It originally supported cellular 3G & 4G technology.
2. Currently the manufacturer has made the following C2PC changes:
Enabling the use of 5G technology via software changes only with the same operation bands. No changes have been made to the hardware.
3. The following tests were performed: RF Output Power, Occupied Bandwidth and Spurious Emissions.
4. The EUT meets the requirements of a C2PC.

2.2 *EUT Exercise Software*

The Element Management System ver. 2.0 used for commands delivery. These commands are used to enable/disable the EUT transmission. EUT Embedded SW versions is mru_da64_20_02.bin.

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

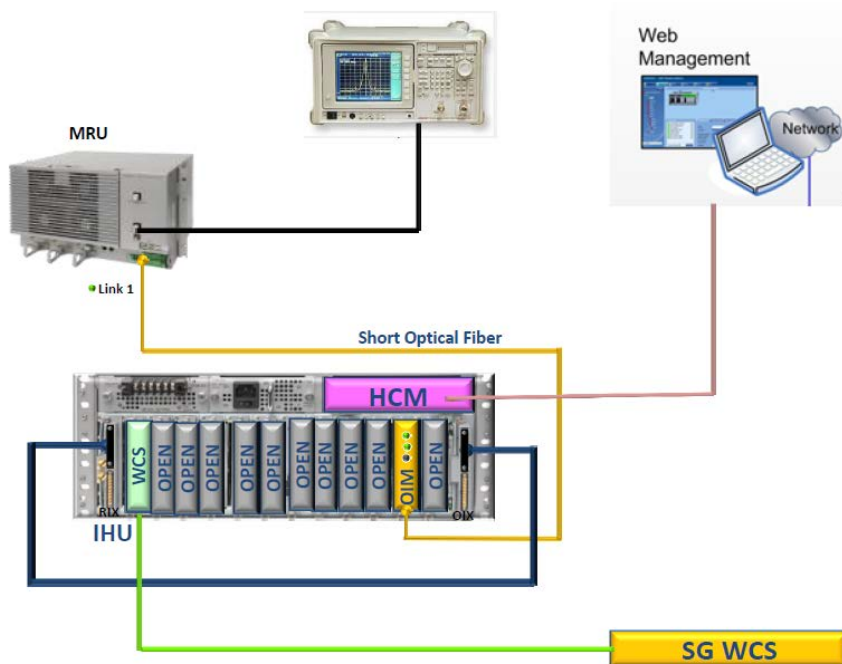


Figure 1. Conducted Test Set-Up

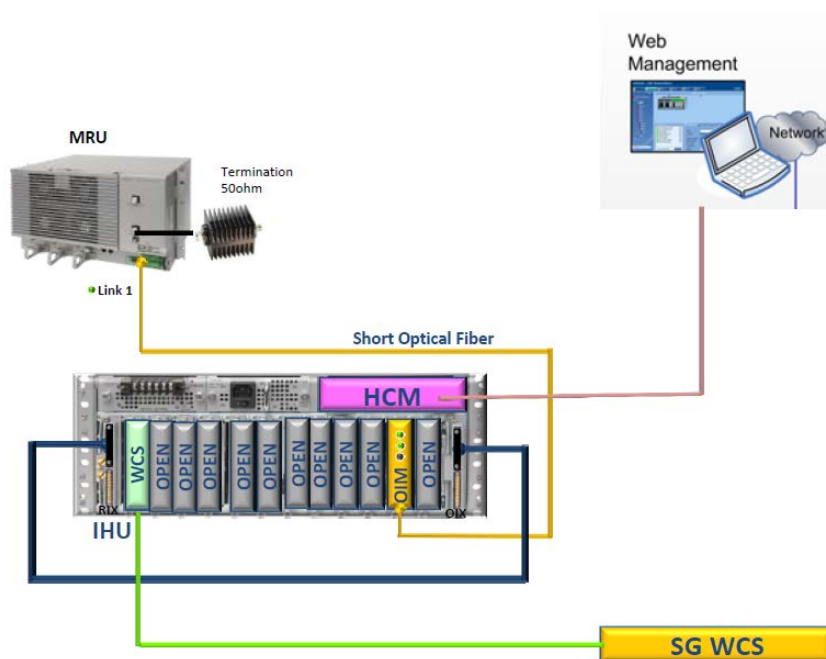


Figure 2. Radiated Test Set-Up

3 Test Set-Up Photos

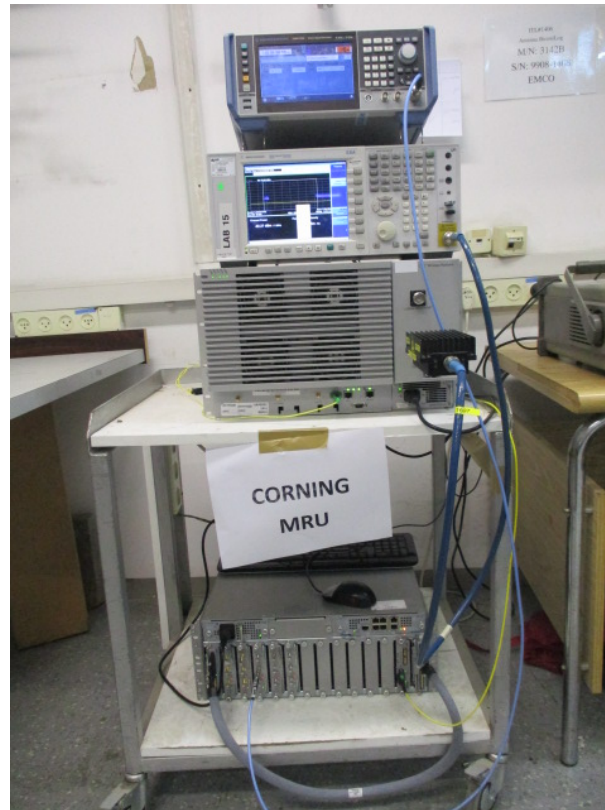


Figure 3. Conducted Emission From Antenna Port Tests

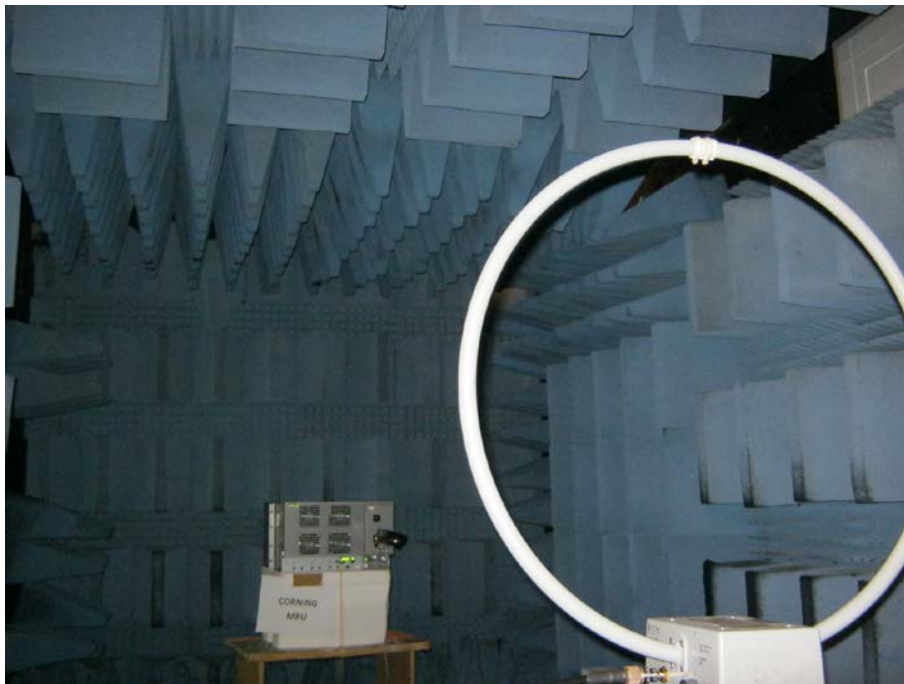


Figure 4. Radiated Emission Test 9kHz - 30MHz



Figure 5. Radiated Emission Test 30 - 200 MHz



Figure 6. Radiated Emission Test 200 - 1000MHz



Figure 7. Radiated Emission Test 1-18GHz

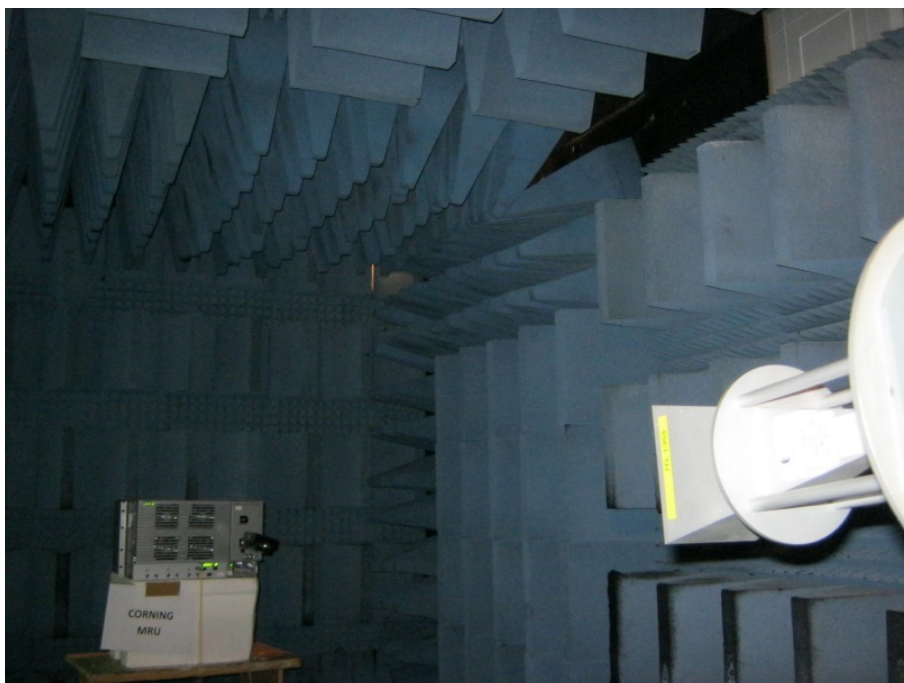


Figure 8. Radiated Emission Test 18-26.5GHz

4 RF Power Output

4.1 Test Specification

FCC Part 27, Subpart C (27.50)

KDB 935210 D05 v01r01, Section 3.

4.2 Test Procedure

(Temperature (22°C)/ Humidity (60%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (41.0 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

4.3 Test Limit

Peak Power Output must not exceed 2000 Watts (63dBm).

4.4 Test Results

JUDGEMENT: Passed

See additional information in Table 1 to Table 4 and Figure 9 to Figure 44.

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (dBm)
16QAM	5	15	2352.5	32.89
		30	2352.5	32.41
		15	2355.0	32.05
		30	2355.0	32.22
		15	2357.5	32.63
		30	2357.5	32.02
	10	15	2355.0	32.77
		30	2355.0	32.21
		60	2355.0	32.71

Table 1 RF Power Output 16QAM

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (dBm)
64QAM	5	15	2352.5	32.24
		30	2352.5	32.09
		15	2355.0	32.52
		30	2355.0	32.80
		15	2357.5	32.12
		30	2357.5	32.58
	10	15	2355.0	32.04
		30	2355.0	32.84
		60	2355.0	32.00

Table 2 RF Power Output 64QAM

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (dBm)
256QAM	5	15	2352.5	32.05
		30	2352.5	32.80
		15	2355.0	32.75
		30	2355.0	32.71
		15	2357.5	32.56
		30	2357.5	32.69
	10	15	2355.0	32.57
		30	2355.0	32.53
		60	2355.0	32.39

Table 3 RF Power Output 256QAM

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (dBm)
QPSK	5	15	2352.5	32.01
		30	2352.5	32.10
		15	2355.0	32.73
		30	2355.0	32.22
		15	2357.5	32.60
		30	2357.5	32.69
	10	15	2355.0	32.74
		30	2355.0	32.81
		60	2355.0	32.85

Table 4 RF Power Output QPSK

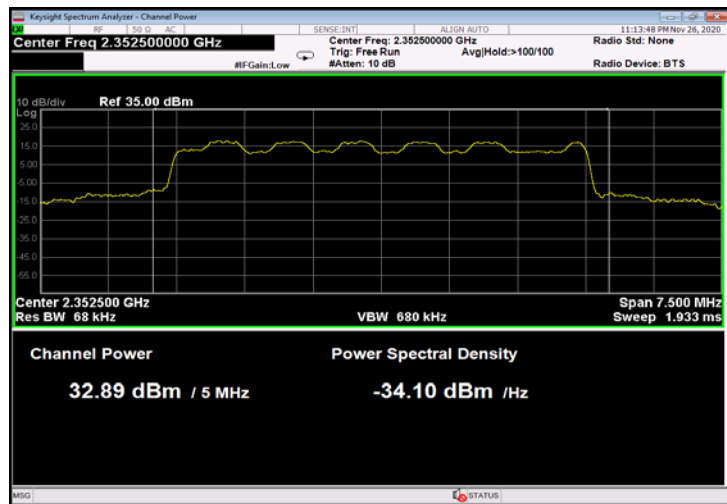


Figure 9: 16QAM 5MHz B.W.; 2352.5MHz, 15kHz

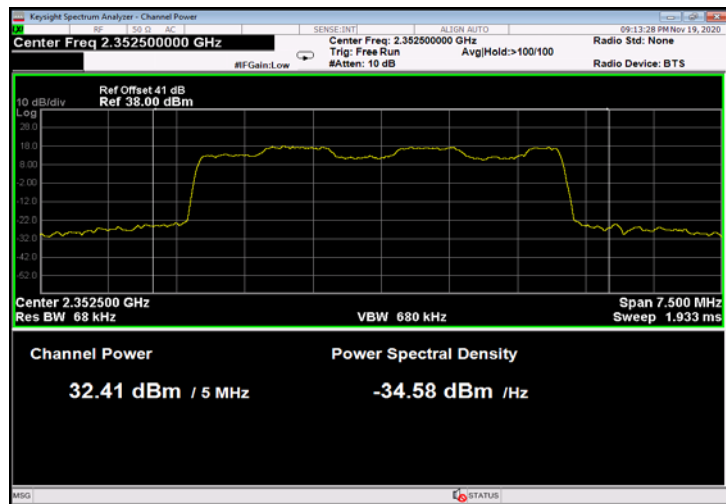


Figure 10: 16QAM 5MHz B.W.; 2352.5MHz, 30kHz

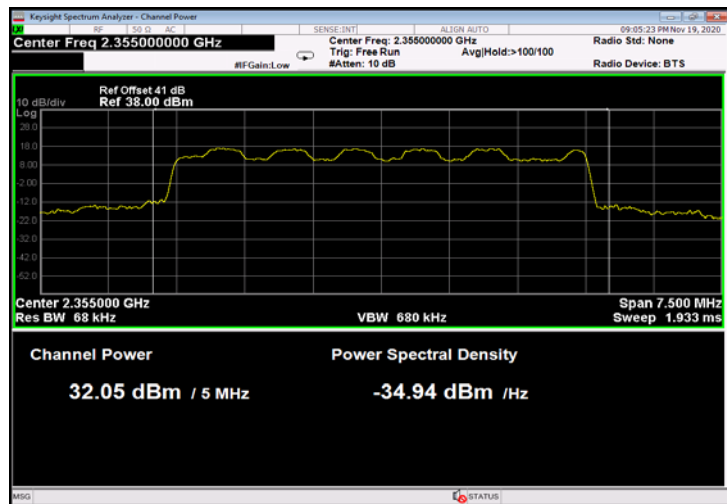


Figure 11: 16QAM 5MHz B.W.; 2355.0MHz, 15kHz

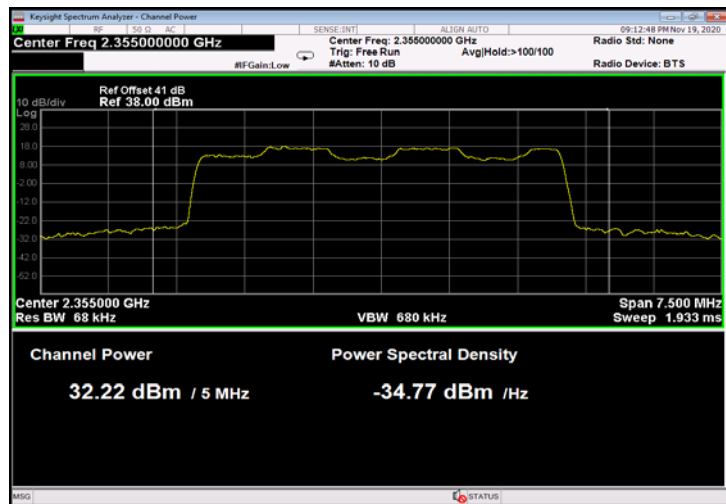


Figure 12: 16QAM 5MHz B.W.; 2355.0MHz, 30kHz

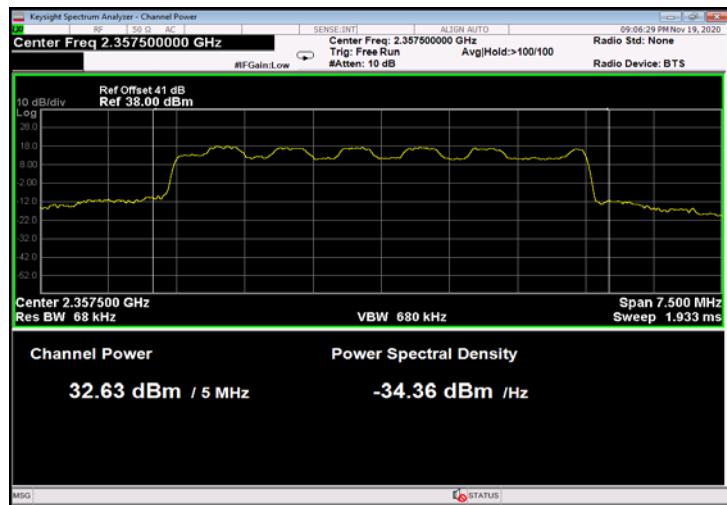


Figure 13: 16QAM 5MHz B.W.; 2357.5MHz, 15kHz

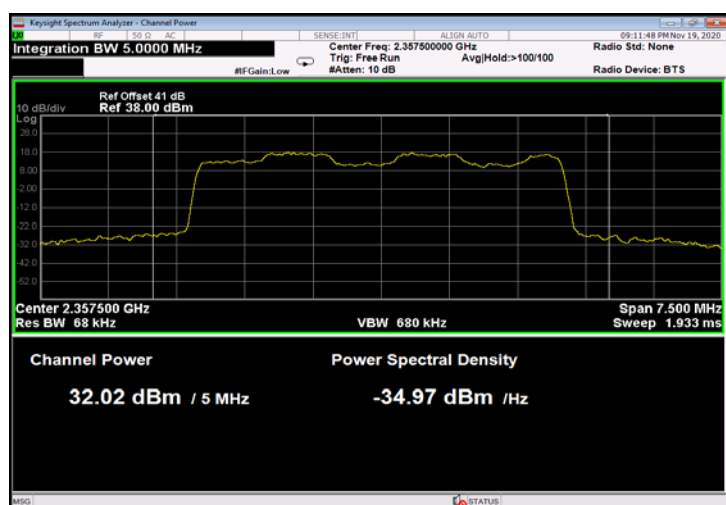


Figure 14: 16QAM 5MHz; 2357.5MHz, 30kHz

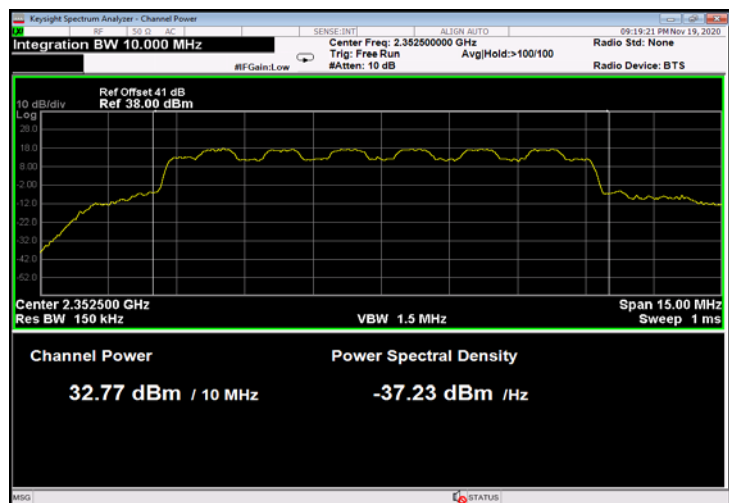


Figure 15: 16QAM 10MHz B.W.; 2355.0MHz, 15kHz

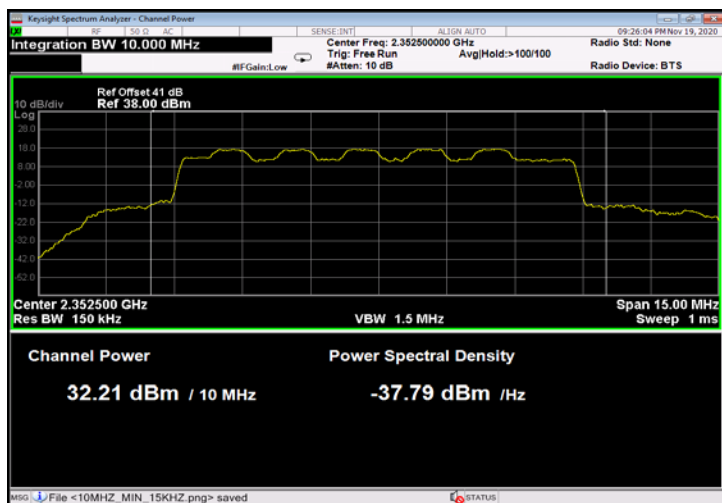


Figure 16: 16QAM 10MHz B.W.; 2355.0MHz, 30kHz

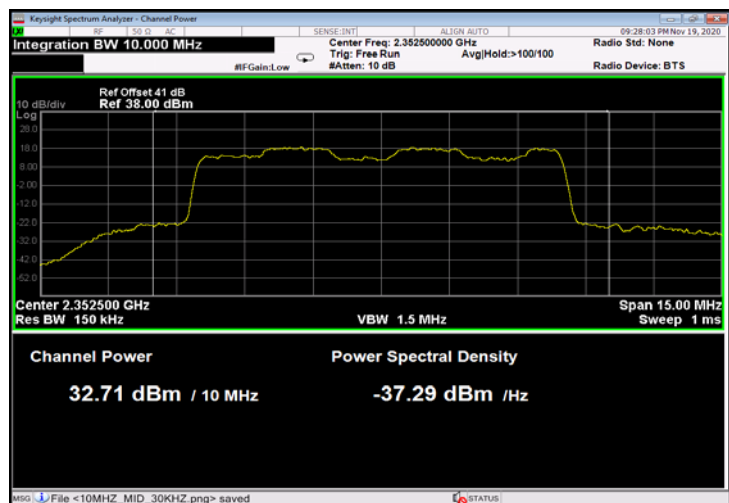


Figure 17: 16QAM 10MHz B.W.; 2355.0MHz, 60kHz

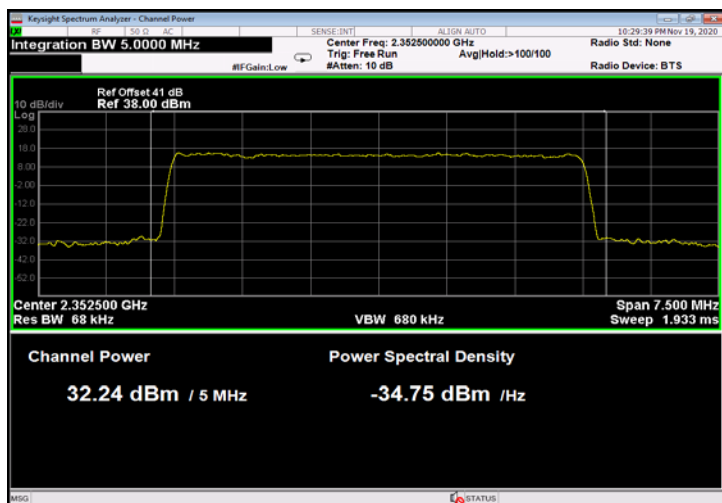


Figure 18: 64QAM 5MHz B.W.; 2352.5MHz, 15kHz

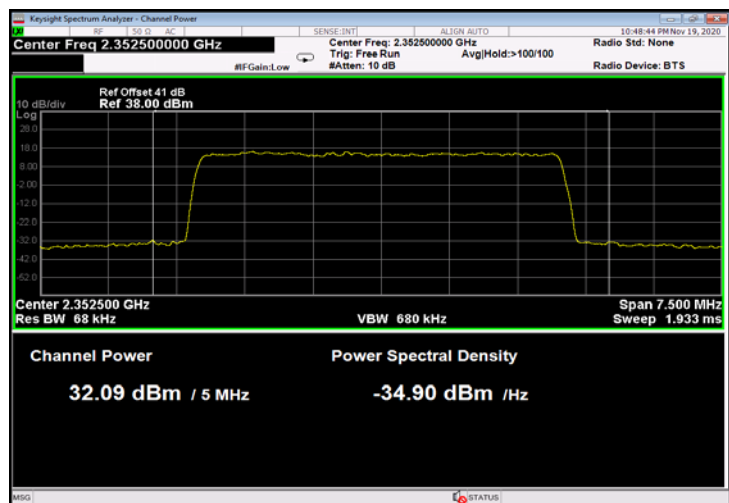


Figure 19: 64QAM 5MHz B.W.; 2352.5MHz, 30kHz

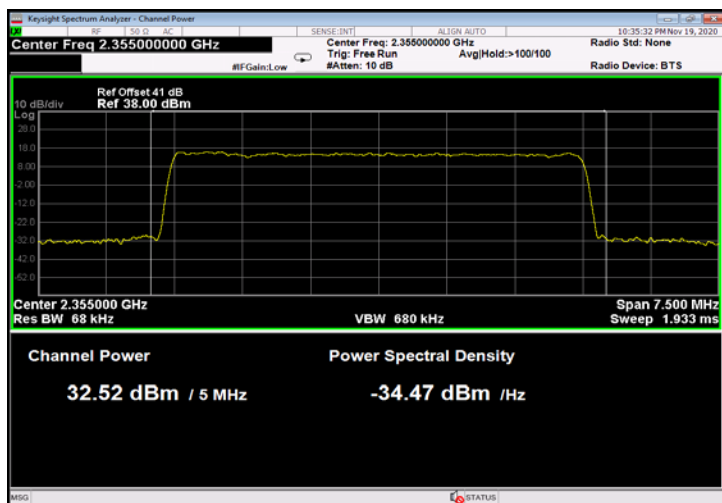


Figure 20: 64QAM 5MHz B.W.; 2355.0MHz, 15kHz

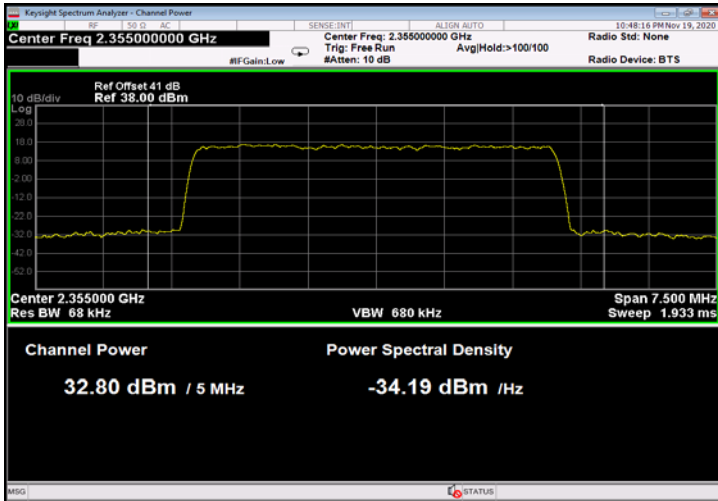


Figure 21: 64QAM 5MHz B.W.; 2355.0MHz, 30kHz

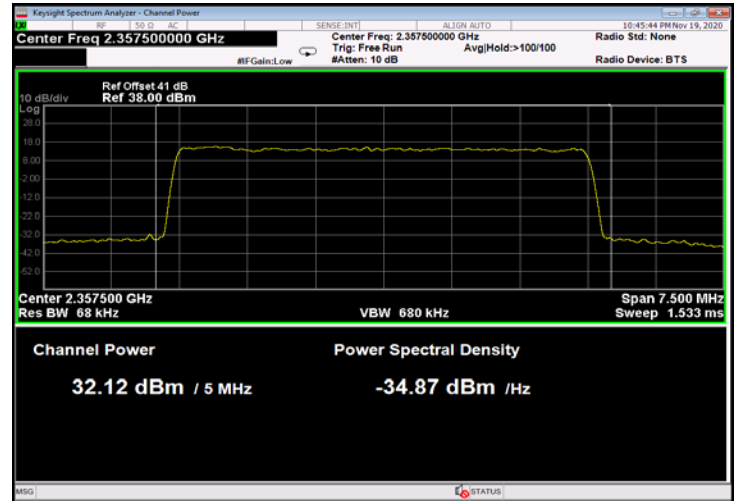


Figure 22: 64QAM 5MHz B.W.; 2357.5MHz, 15kHz

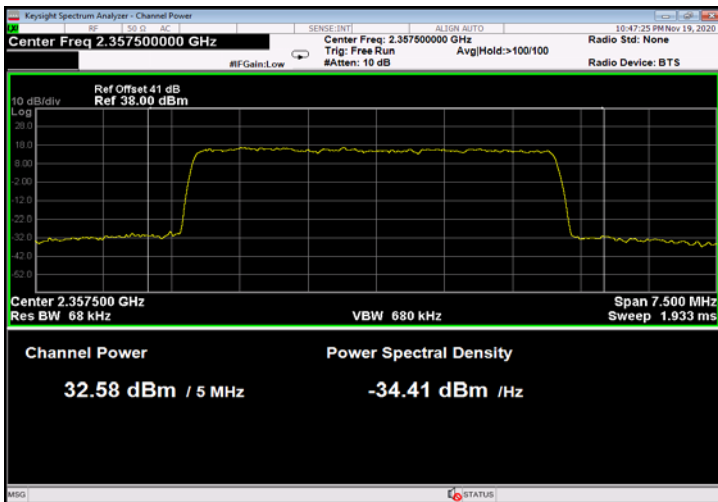


Figure 23: 64QAM 5MHz B.W.; 2357.5MHz, 30kHz

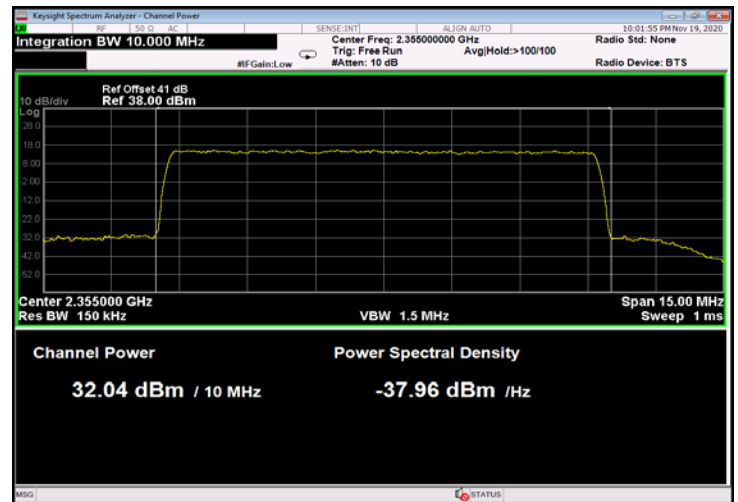


Figure 24: 64QAM 10MHz B.W.; 2355.0MHz, 15kHz

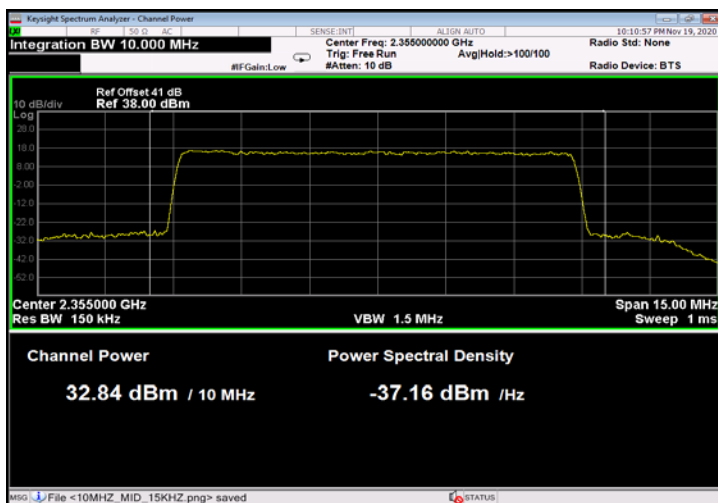


Figure 25: 64QAM 10MHz B.W.; 2355.0MHz, 30kHz

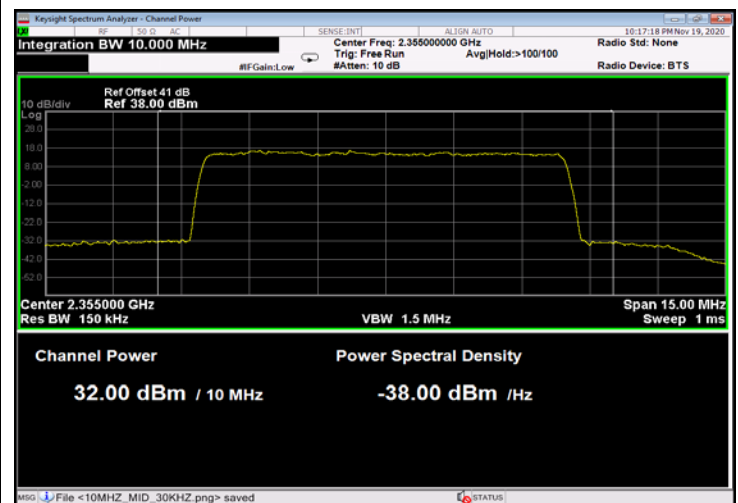


Figure 26: 64QAM 10MHz B.W.; 2355.0MHz, 60kHz

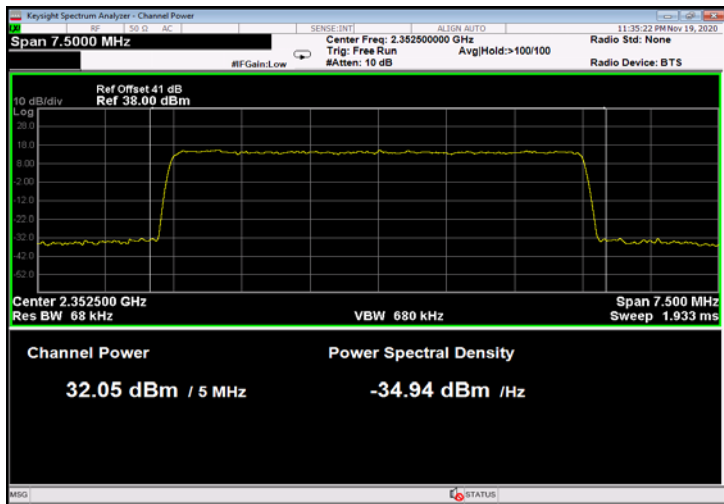


Figure 27: 256QAM 5MHz B.W.;2352.5MHz, 15kHz

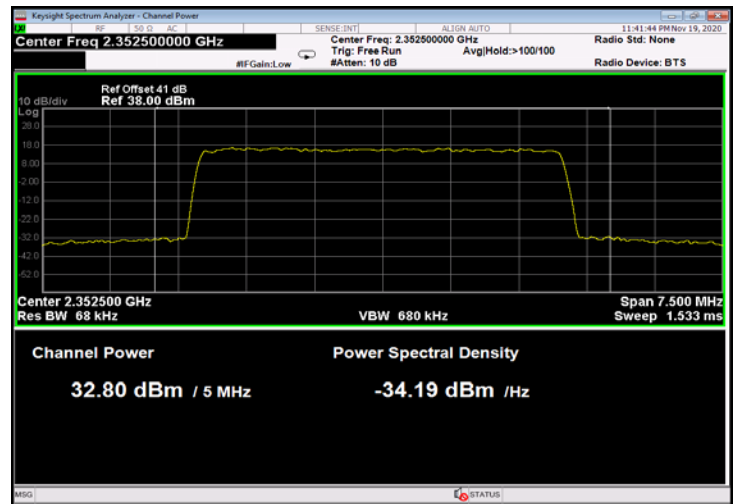


Figure 28: 256QAM 10MHz B.W.; 2352.5MHz, 30kHz

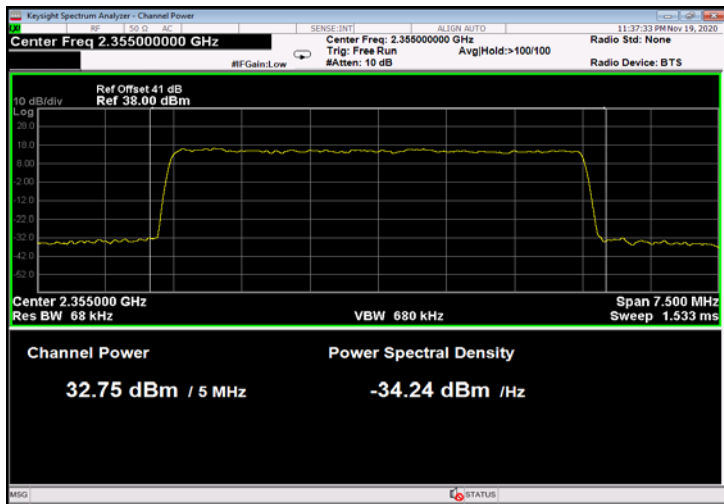


Figure 29: 256QAM 5MHz B.W.; 2355.0MHz, 15kHz

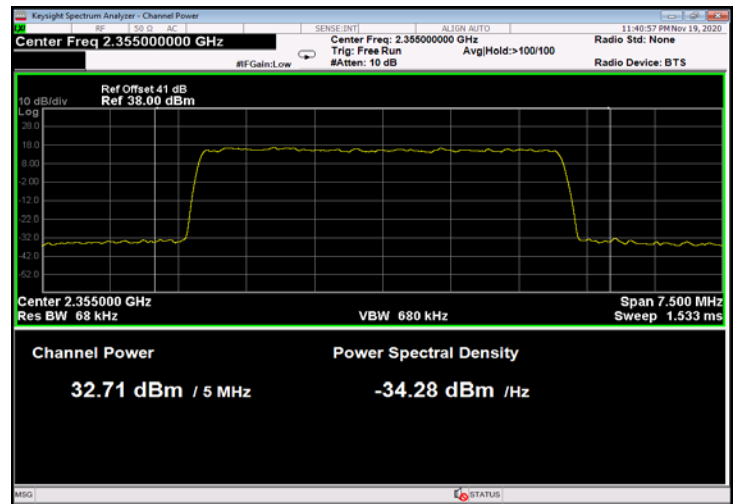


Figure 30: 256QAM 5MHz B.W.; 2355.0MHz, 30kHz

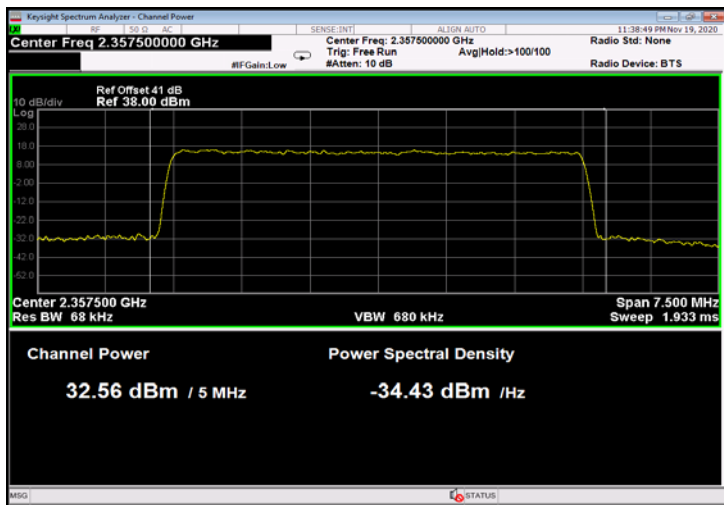


Figure 31: 256QAM 5MHz B.W.; 2357.5MHz, 15kHz

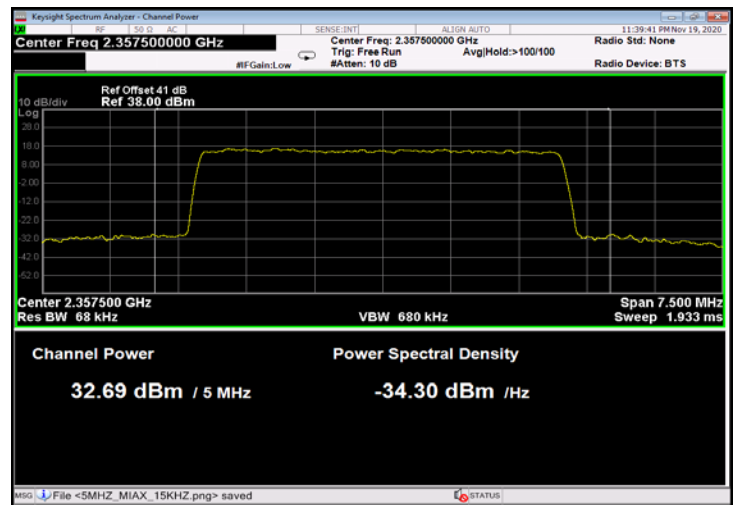


Figure 32: 256QAM 5MHz B.W.; 2357.5MHz, 30kHz

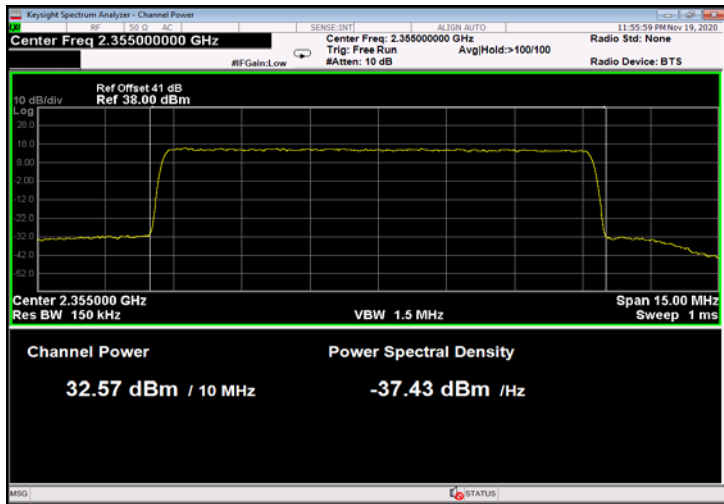


Figure 33: 256QAM 10MHz B.W.; 2355.0MHz, 15kHz

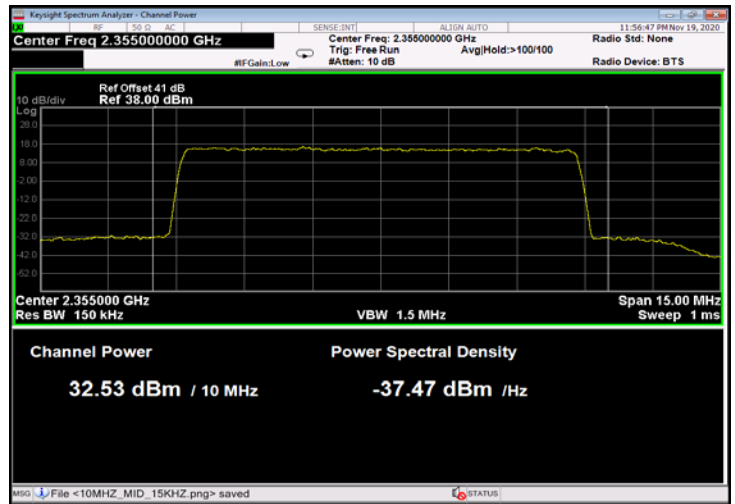


Figure 34: 256QAM 10MHz B.W.; 2355.0MHz, 30kHz

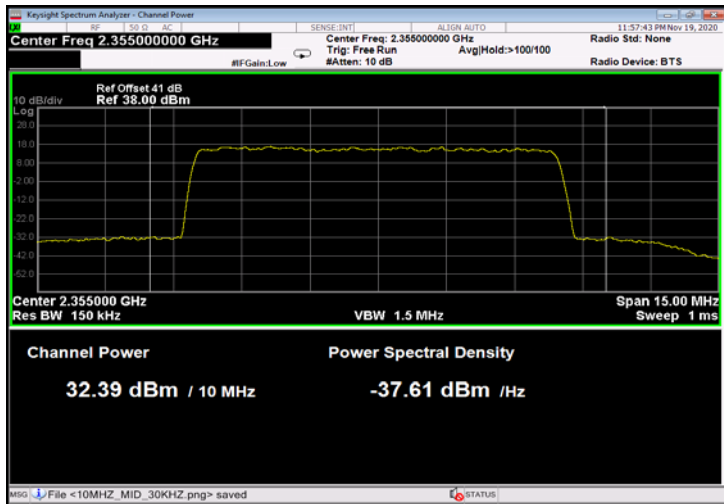


Figure 35: 256QAM 10MHz B.W.; 2355.0MHz, 60kHz

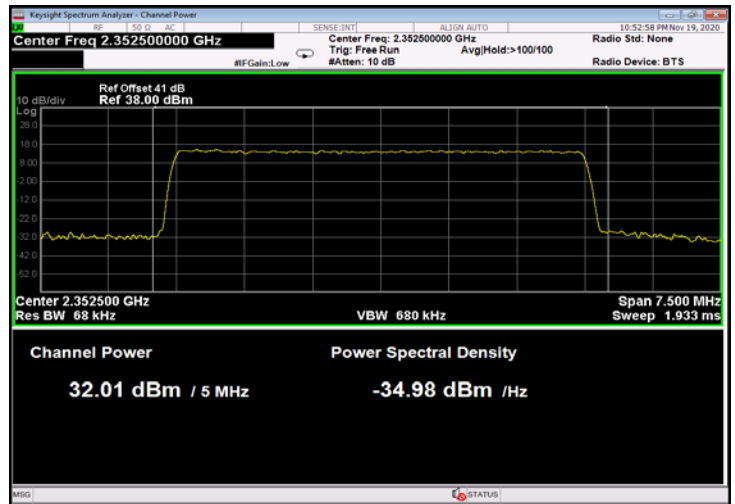


Figure 36: QPSK 5MHz B.W.; 2352.5MHz, 15kHz

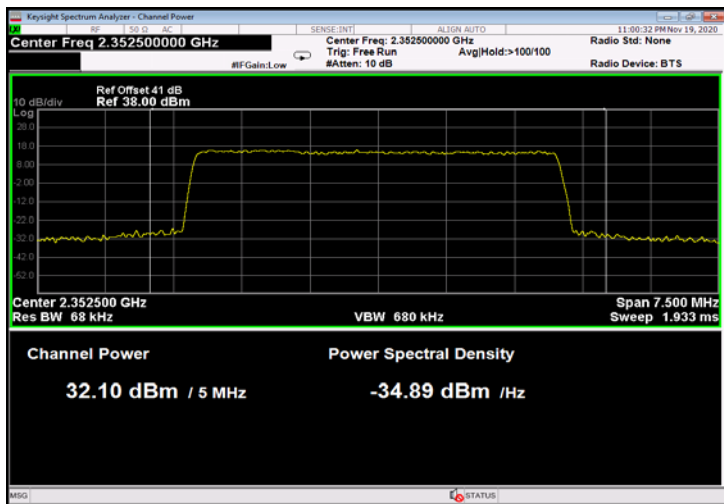


Figure 37: QPSK 5MHz B.W.; 2352.5MHz, 30kHz

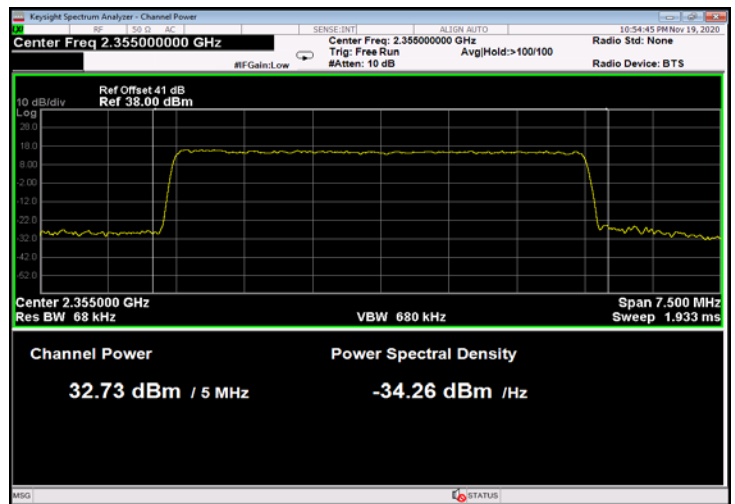


Figure 38: QPSK 5MHz B.W.; 2355.0MHz, 15kHz

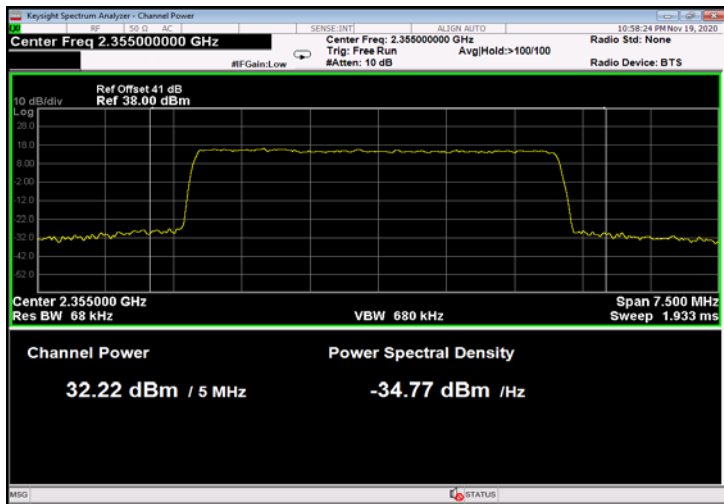


Figure 39: QPSK 5MHz B.W.; 2355.0MHz, 30kHz

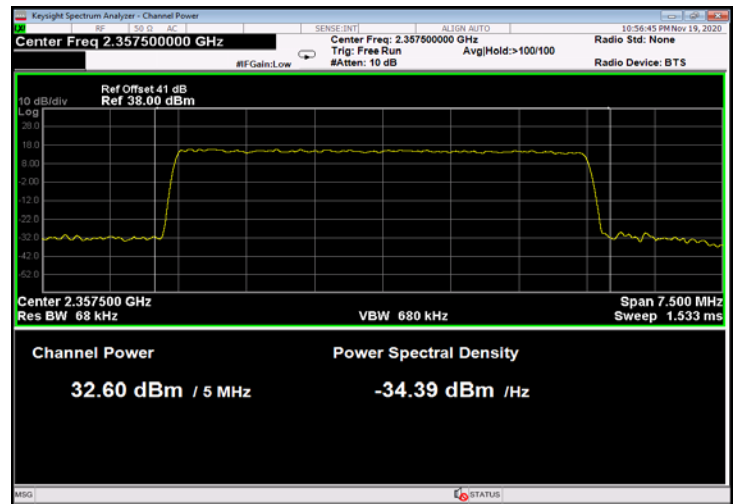


Figure 40: QPSK 5MHz B.W.; 2357.50MHz, 15kHz

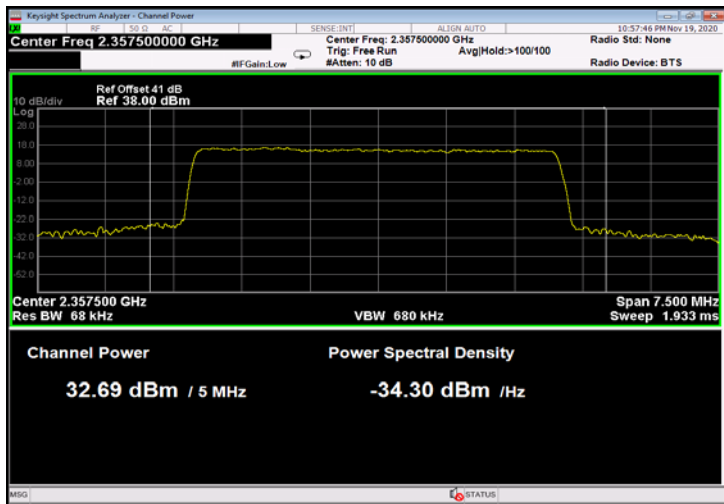


Figure 41: QPSK 5MHz B.W.; 2357.5MHz, 30kHz

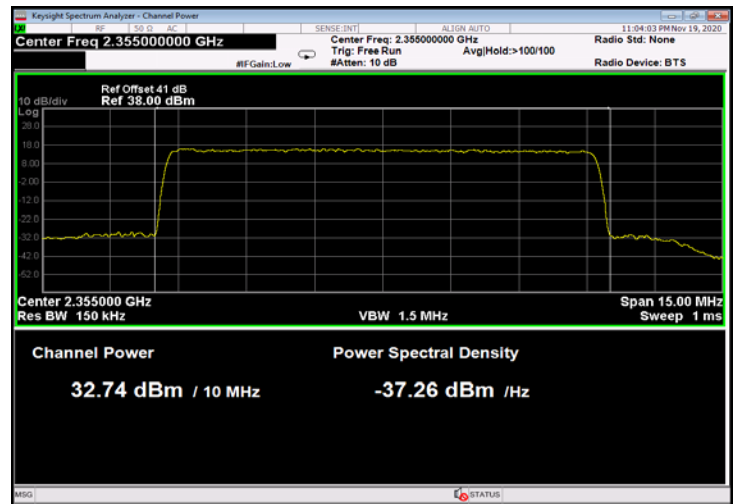


Figure 42: QPSK 10MHz B.W.; 2355.0MHz, 15kHz

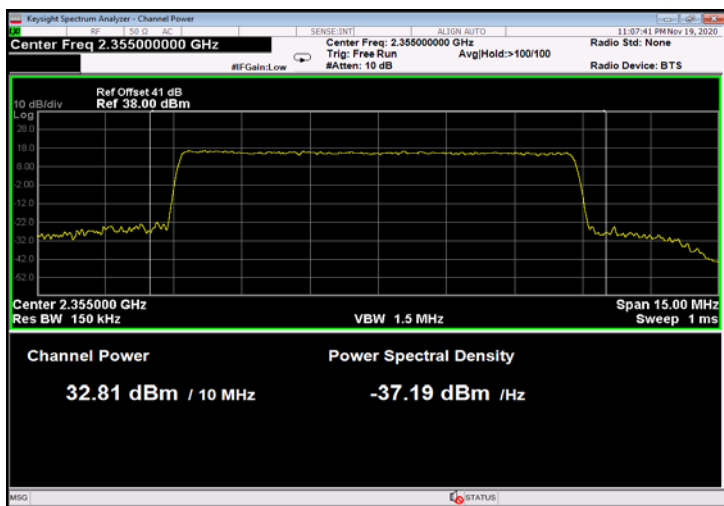


Figure 43: QPSK 10MHz B.W.; 2355.0MHz, 30kHz

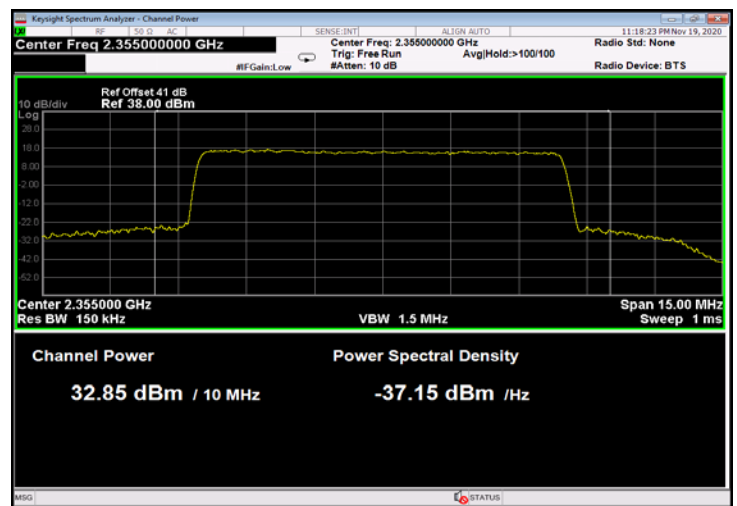


Figure 44: QPSK 10MHz B.W.; 2355.0MHz, 60kHz



4.5 Test Equipment Used; RF Power Output

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
EXA signal Analyzer	Agilent Technologies	N9010A	MY52220686	November 28, 2018	November 28, 2020
Vector Signal Generator	R&S	SMBV100B	1423.1003K02-101470-XE	October 2, 2019	October 2, 2022
40 dB Attenuator	Weinschel	WA 39-40-33	A1323	July 7, 2020	July 31, 2021
RF Cable	Huber Suhner	Sucofelex	27504/4PEA	August 23, 2020	August 31, 2021

Table 5 Test Equipment Used



5 Occupied Bandwidth

5.1 Test Specification

FCC Part 2, Section 1049

5.2 Test Procedure

(Temperature (20°C)/ Humidity (57%RH))

The E.U.T. antenna terminal was connected to the spectrum analyzer through an external attenuator and an appropriate coaxial cable. The spectrum analyzer was set to proper resolution B.W.

OBW function (99%) was employed for this evaluation.

Occupied bandwidth measured was repeated for each modulation.

5.3 Test Limit

N/A

5.4 Test Results

JUDGEMENT: Passed

See additional information in Table 6 to Table 13 and Figure 45 to Figure 116.

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (MHz)
16QAM	5	15	2352.5	4.4840
		30	2352.5	3.9447
		15	2355.0	4.4849
		30	2355.0	3.9442
		15	2357.5	4.4848
		30	2357.5	3.9440
	10	15	2355.0	9.2373
		30	2355.0	8.5627
		60	2355.0	7.8836

Table 6 Occupied Bandwidth 16QAM - Input

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (MHz)
64QAM	5	15	2352.5	4.4913
		30	2352.5	3.9439
		15	2355.0	4.4919
		30	2355.0	3.9446
		15	2357.5	4.4919
		30	2357.5	3.9439
	10	15	2355.0	9.3150
		30	2355.0	8.5904
		60	2355.0	7.8881

Table 7 Occupied Bandwidth 64QAM - Input

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (MHz)
256QAM	5	2352.5	2352.5	4.4974
		2352.5	2352.5	3.9422
		2355	2355.0	4.4966
		2355	2355.0	3.9427
		2357.5	2357.5	4.4974
		2357.5	2357.5	3.9391
	10	2355	2355.0	9.3004
		2355	2355.0	8.5877
		2355	2355.0	7.8845

Table 8 Occupied Bandwidth 256QAM - Input

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (MHz)
QPSK	5	2352.5	2352.5	4.4950
		2352.5	2352.5	3.9666
		2355	2355.0	4.4967
		2355	2355.0	3.9672
		2357.5	2357.5	4.4948
		2357.5	2357.5	3.9646
	10	2355	2355.0	9.3118
		2355	2355.0	8.6027
		2355	2355.0	7.9281

Table 9 Occupied Bandwidth QPSK – Input

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (MHz)
16QAM	5	2352.5	2352.5	4.4970
		2352.5	2352.5	3.9448
		2355	2355.0	4.4969
		2355	2355.0	3.9448
		2357.5	2357.5	4.4958
		2357.5	2357.5	3.9433
	10	2355	2355.0	9.3129
		2355	2355.0	8.5757
		2355	2355.0	7.8863

Table 10 Occupied Bandwidth 16QAM - Output

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (MHz)
64QAM	5	2352.5	2352.5	4.4934
		2352.5	2352.5	3.9445
		2355	2355.0	4.4922
		2355	2355.0	3.9444
		2357.5	2357.5	4.4894
		2357.5	2357.5	3.9471
	10	2355	2355.0	9.3083
		2355	2355.0	8.5886
		2355	2355.0	7.8796

Table 11 Occupied Bandwidth 64QAM - Output

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (MHz)
256QAM	5	2352.5	2352.5	4.4970
		2352.5	2352.5	3.9416
		2355	2355.0	4.4977
		2355	2355.0	3.9426
		2357.5	2357.5	4.4960
		2357.5	2357.5	3.9389
	10	2355	2355.0	9.2797
		2355	2355.0	8.5814
		2355	2355.0	7.8818

Table 12 Occupied Bandwidth 256QAM - Output

Modulation	Bandwidth (MHz)	Sub Carrier (kHz)	Operation Frequency (MHz)	Reading (MHz)
QPSK	5	2352.5	2352.5	4.4918
		2352.5	2352.5	3.9695
		2355	2355.0	4.4952
		2355	2355.0	3.9698
		2357.5	2357.5	4.4939
		2357.5	2357.5	3.9642
	10	2355	2355.0	9.3017
		2355	2355.0	8.5934
		2355	2355.0	7.9286

Table 13 Occupied Bandwidth QPSK – Output



INPUT

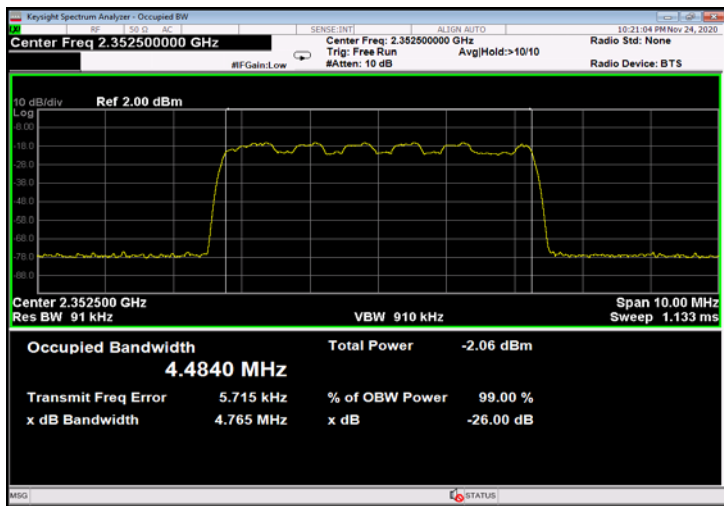


Figure 45: 16QAM 5MHz B.W.; 2352.5MHz, 15kHz - Input

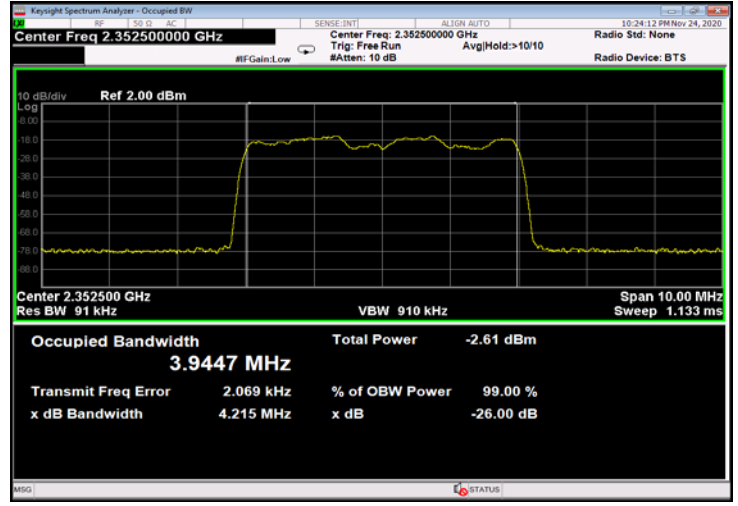


Figure 46: 16QAM 5MHz B.W.; 2352.5MHz, 30kHz- Input

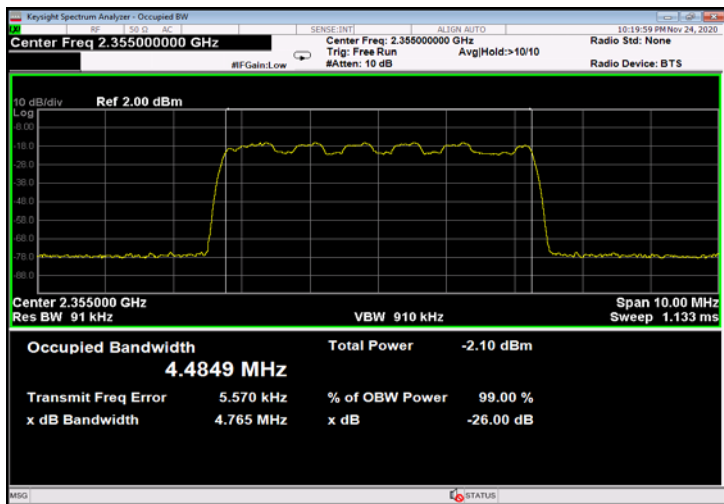


Figure 47: 16QAM 5MHz B.W.; 2355.0MHz, 15kHz- Input

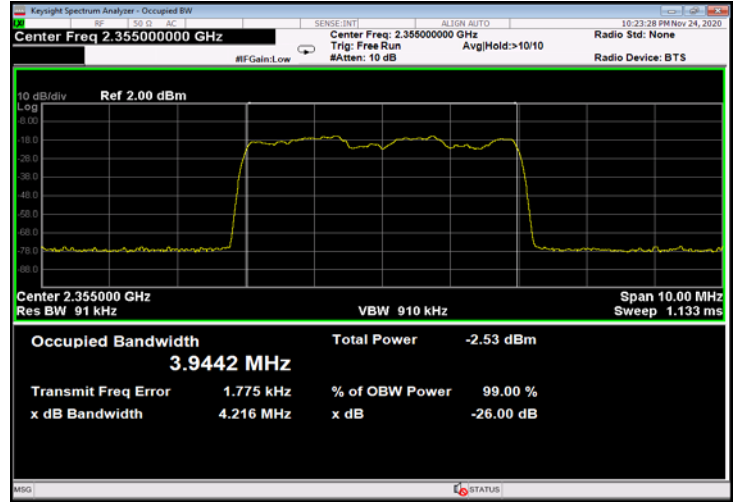


Figure 48: 16QAM 5MHz B.W.; 2355.0MHz, 30kHz- Input

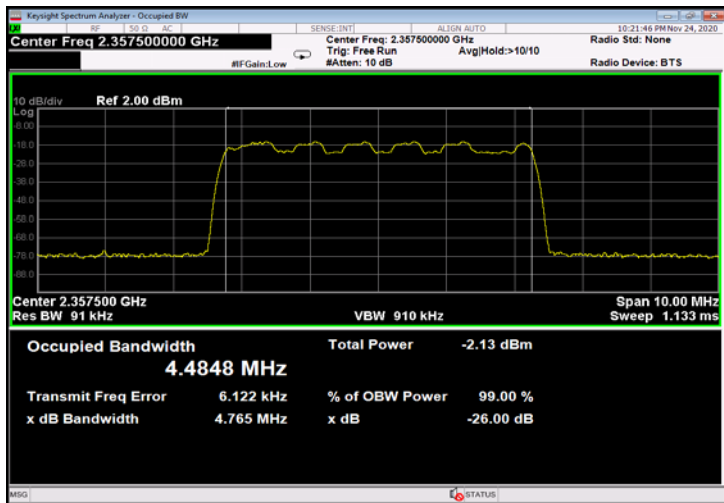


Figure 49: 16QAM 5MHz B.W.; 2357.5MHz, 15kHz- Input

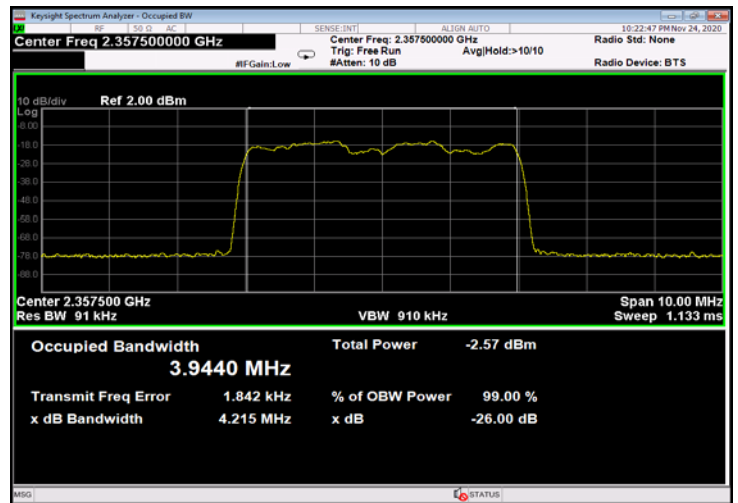


Figure 50: 16QAM 5MHz; 2357.5MHz, 30kHz- Input

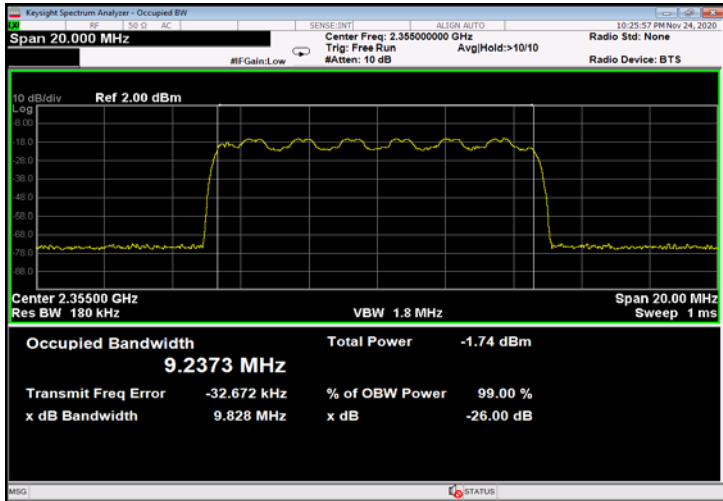


Figure 51: 16QAM 10MHz B.W.; 2355.0MHz, 15kHz- Input

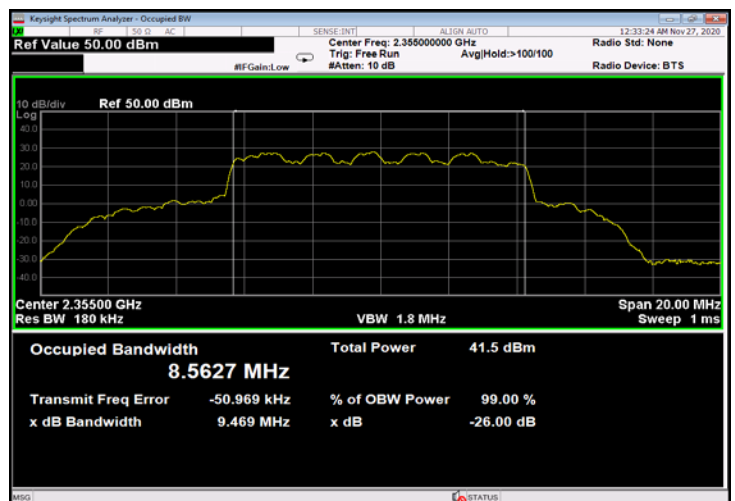


Figure 52: 16QAM 10MHz B.W.; 2355.0MHz, 30kHz- Input

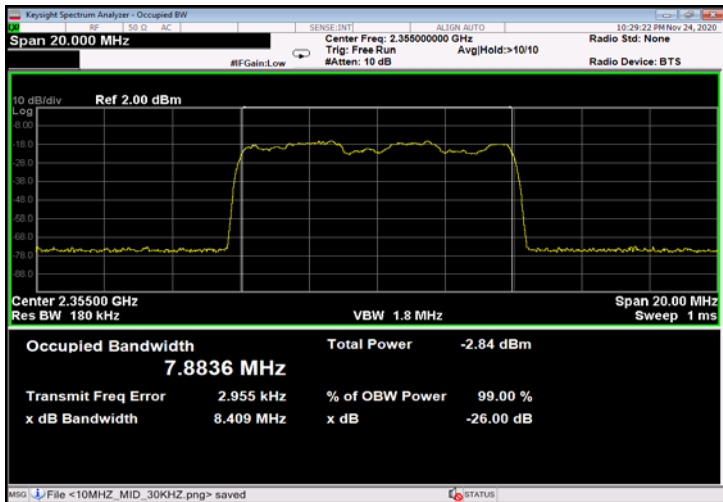


Figure 53: 16QAM 10MHz B.W.; 2355.0MHz, 60kHz- Input

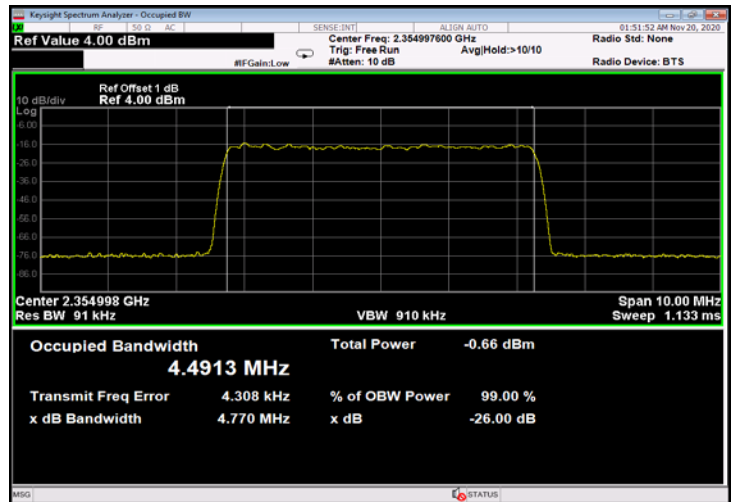


Figure 54: 64QAM 5MHz B.W.; 2352.5MHz, 15kHz - Input

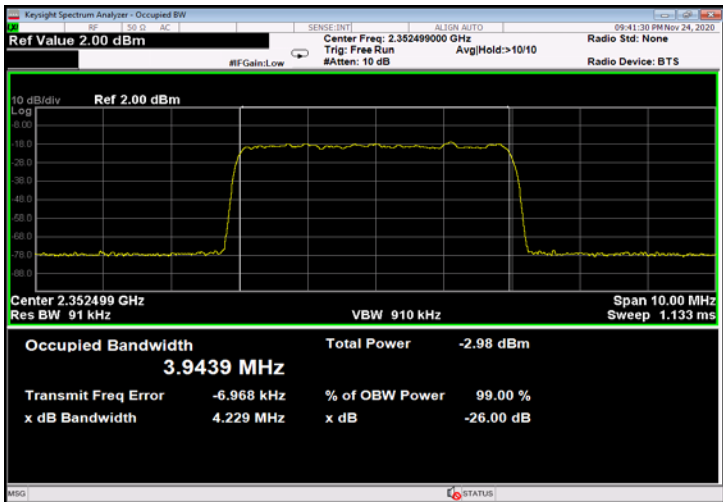


Figure 55: 64QAM 5MHz B.W.; 2352.5MHz, 30kHz - Input

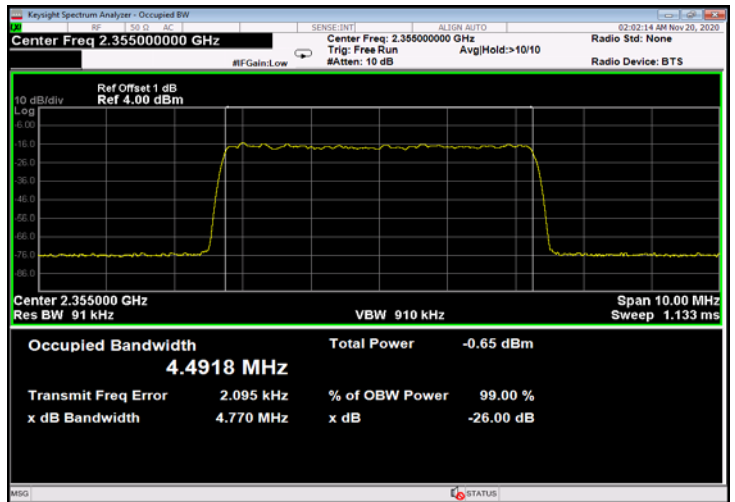


Figure 56: 64QAM 5MHz B.W.; 2355.0MHz, 15kHz - Input

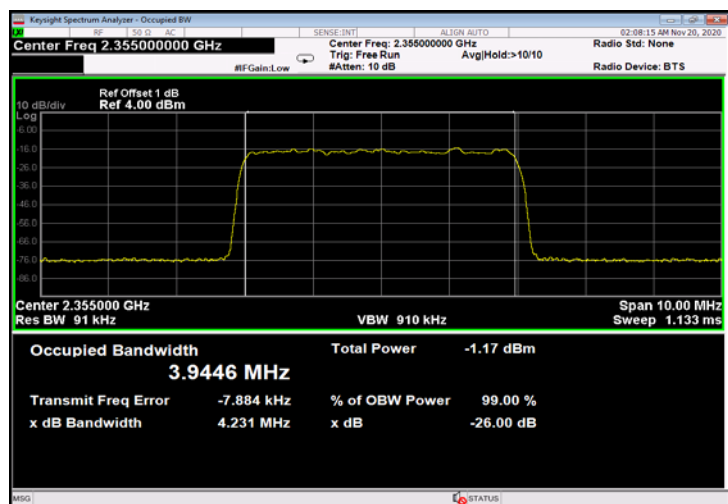


Figure 57: 64QAM 5MHz B.W.; 2355.0MHz, 30kHz - Input

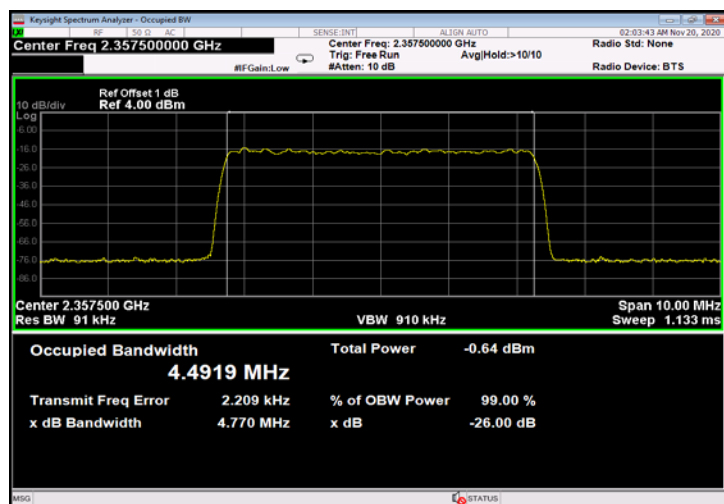


Figure 58: 64QAM 5MHz B.W.; 2357.5MHz, 15kHz - Input

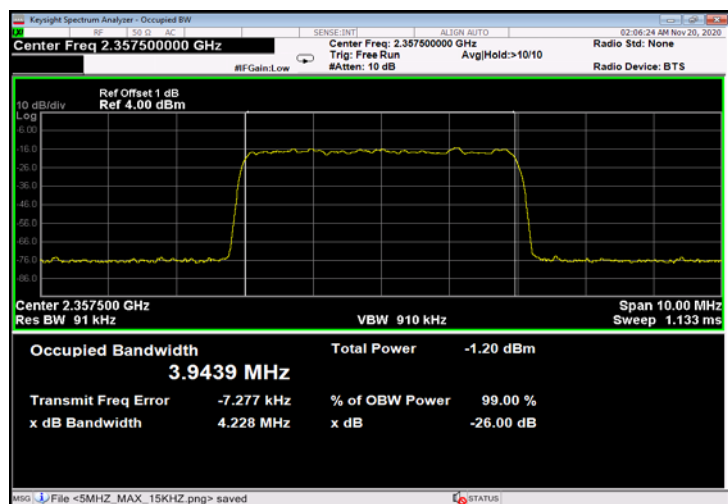


Figure 59: 64QAM 5MHz B.W.; 2357.5MHz, 30kHz - Input

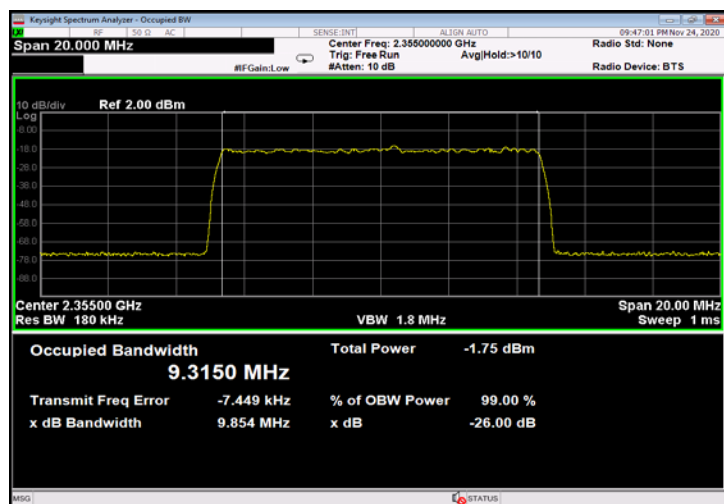


Figure 60: 64QAM 10MHz B.W.; 2355.0MHz, 15kHz - Input

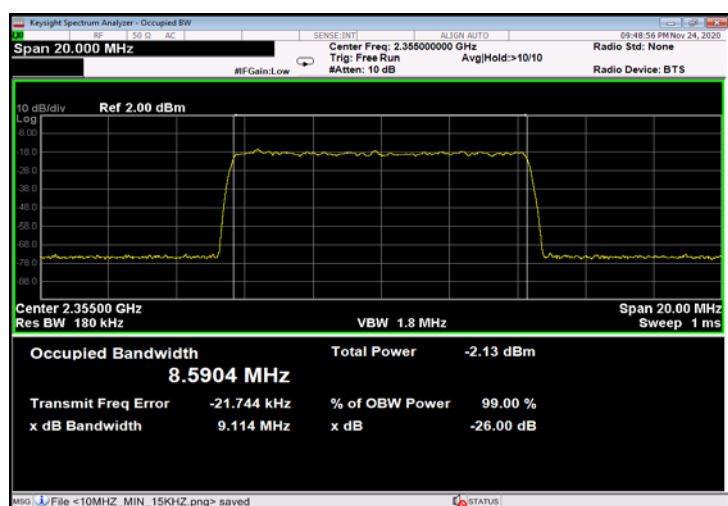


Figure 61: 64QAM 10MHz B.W.; 2355.0MHz, 30kHz - Input

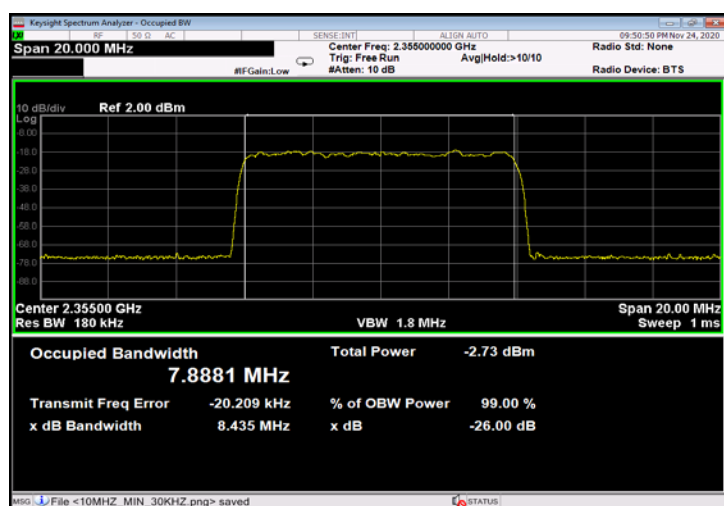


Figure 62: 64QAM 10MHz B.W.; 2355.0MHz, 60kHz - Input

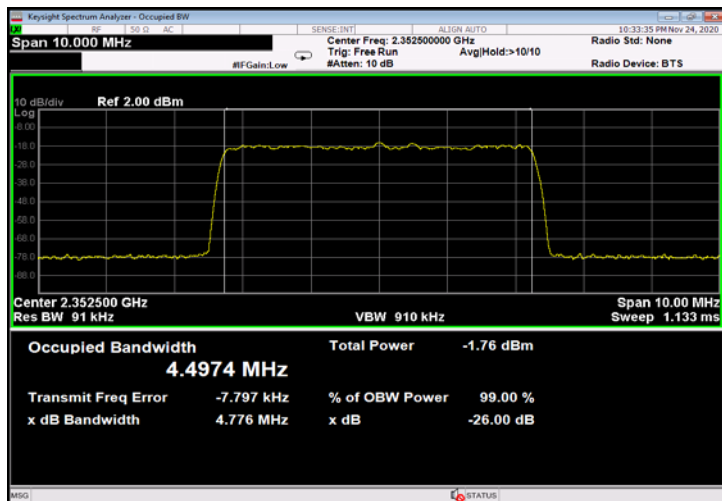


Figure 63: 256QAM 5MHz B.W.; 2352.5MHz, 15kHz - Input

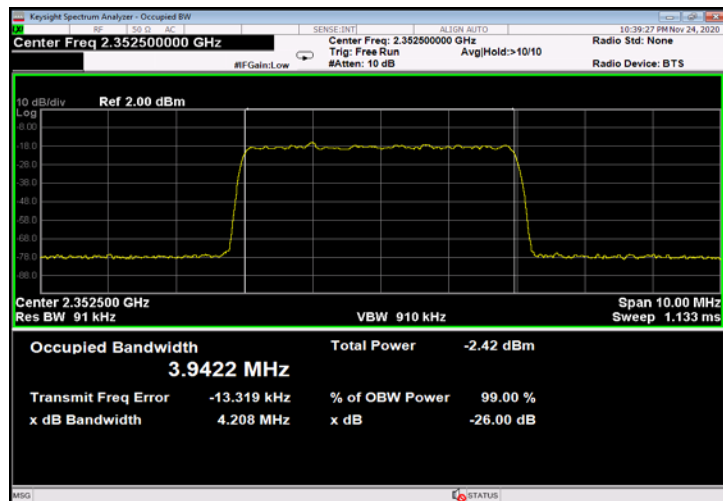


Figure 64: 256QAM 10MHz B.W.; 2352.5MHz, 30kHz - Input

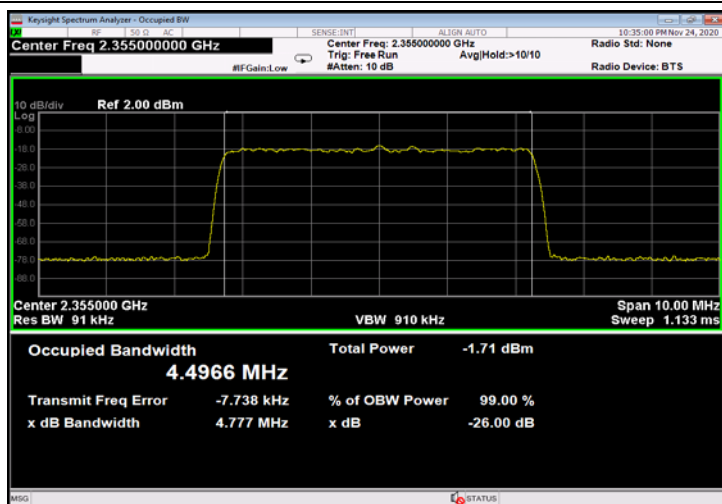


Figure 65: 256QAM 5MHz B.W.; 2355.0MHz, 15kHz - Input

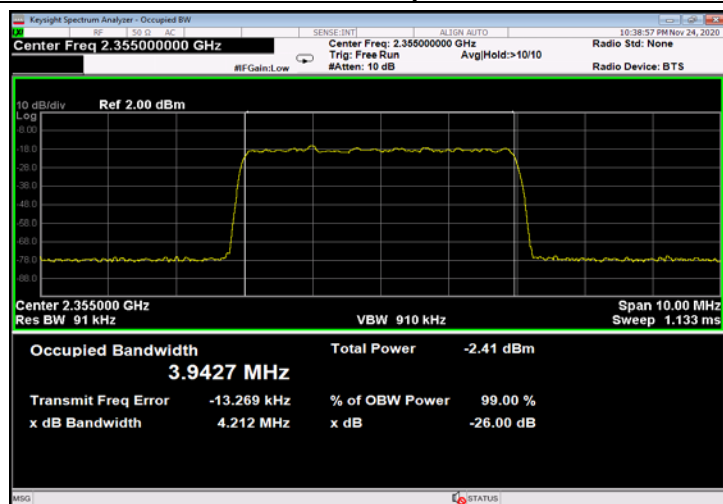


Figure 66: 256QAM 5MHz B.W.; 2355.0MHz, 30kHz - Input

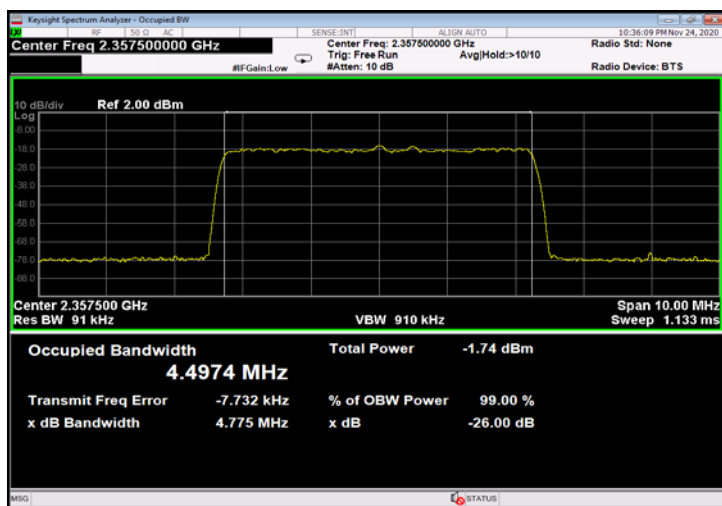


Figure 67: 256QAM 5MHz B.W.; 2357.5MHz, 15kHz - Input

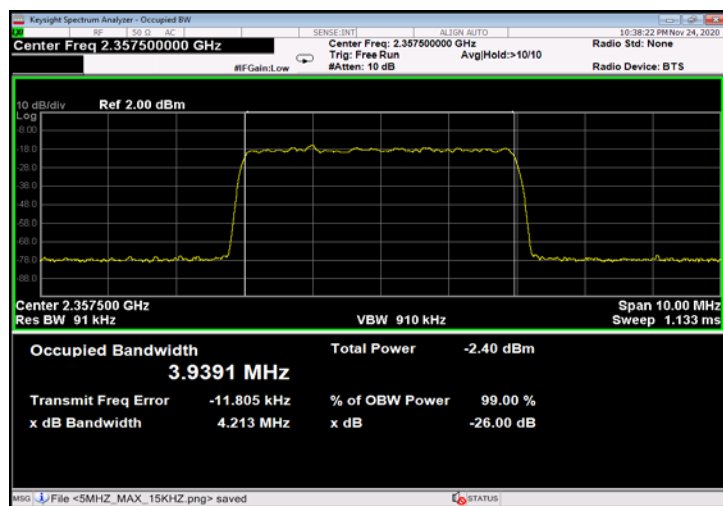


Figure 68: 256QAM 5MHz B.W.; 2357.5MHz, 30kHz - Input

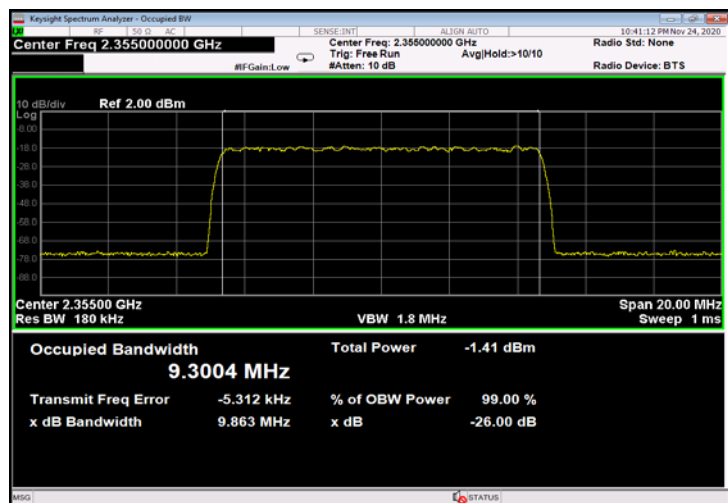


Figure 69: 256QAM 10MHz B.W.; 2355.0MHz, 15kHz - Input

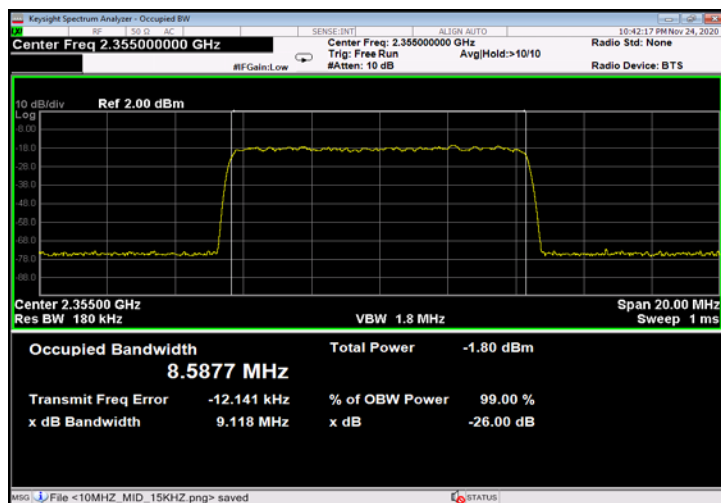


Figure 70: 256QAM 10MHz B.W.; 2355.0MHz, 30kHz - Input

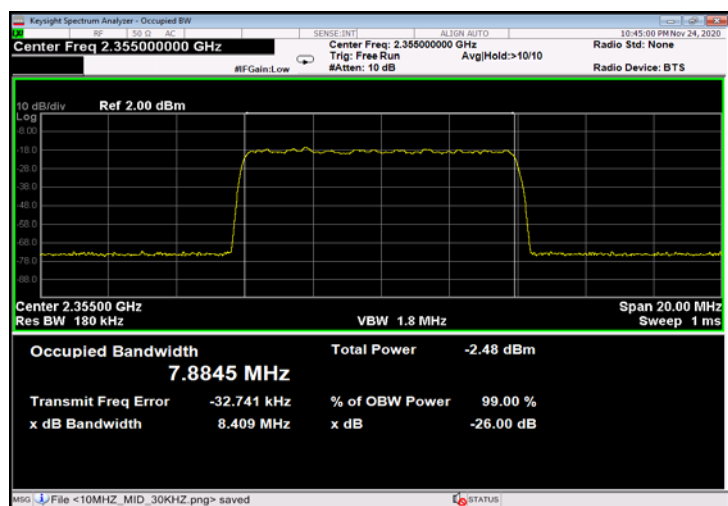


Figure 71: 256QAM 10MHz B.W.; 2355.0MHz, 60kHz - Input

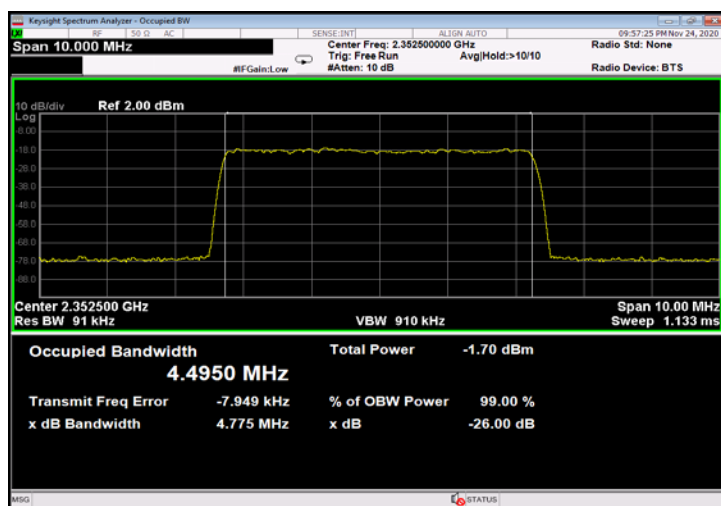


Figure 72: QPSK 5MHz B.W.; 2352.5MHz, 15kHz - Input

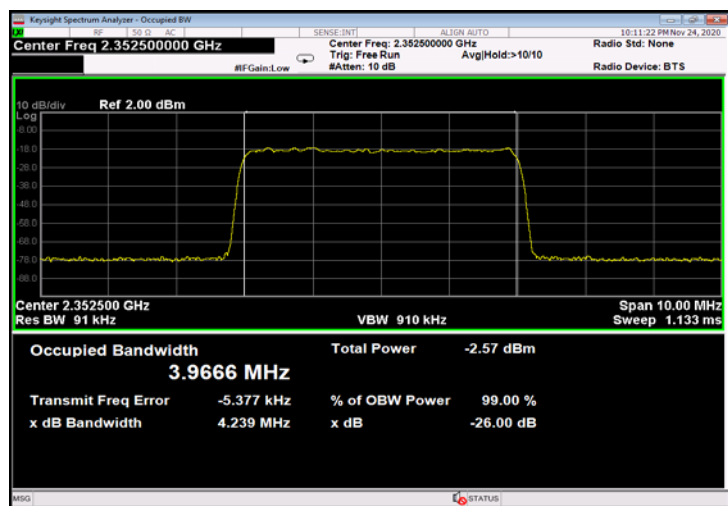


Figure 73: QPSK 5MHz B.W.; 2352.5MHz, 30kHz - Input

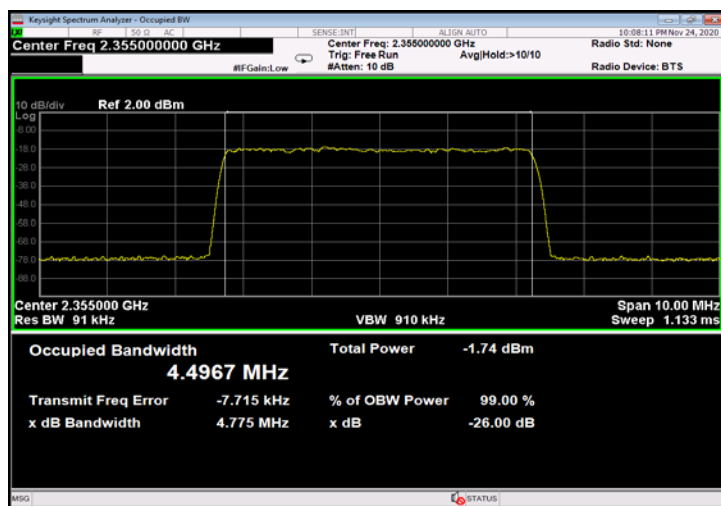


Figure 74: QPSK 5MHz B.W.; 2355.0MHz, 15kHz - Input

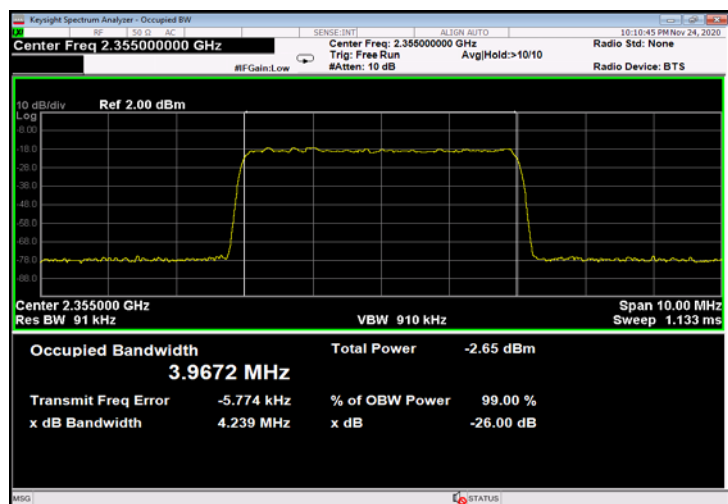


Figure 75: QPSK 5MHz B.W.; 2355.0MHz, 30kHz - Input

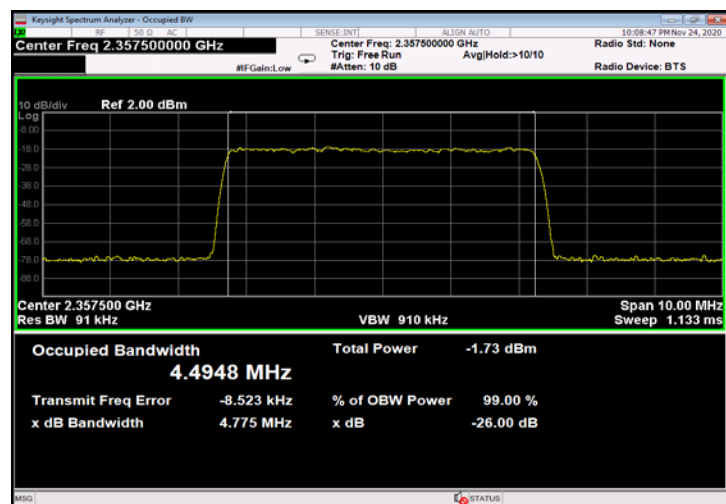


Figure 76: QPSK 5MHz B.W.; 2357.5MHz, 15kHz - Input

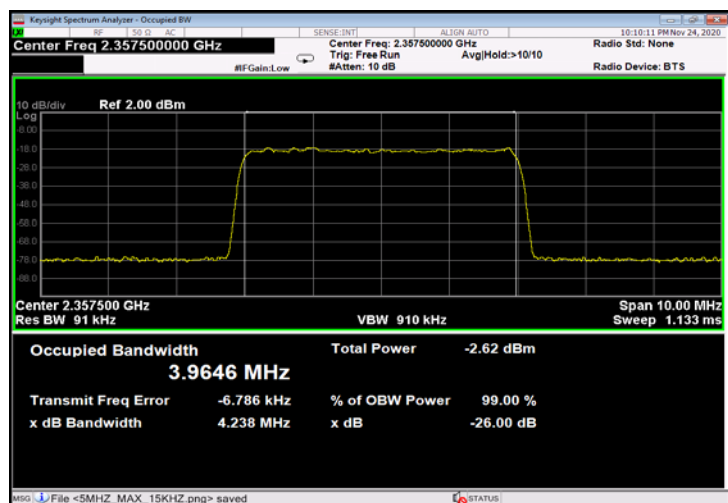


Figure 77: QPSK 5MHz B.W.; 2357.5MHz, 30kHz - Input

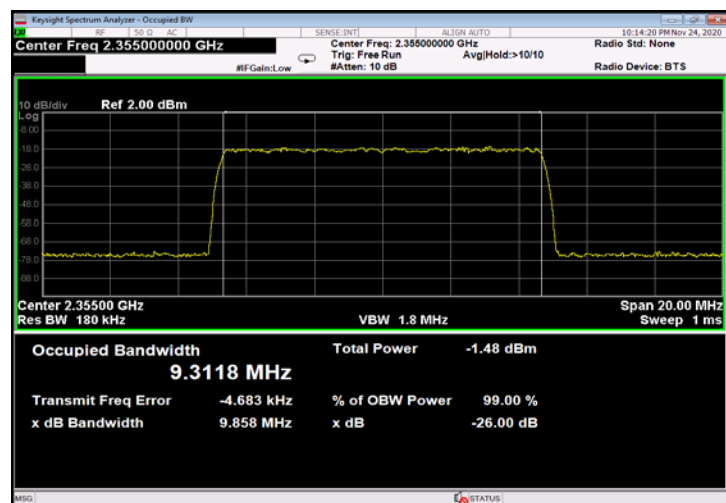


Figure 78: QPSK 10MHz B.W.; 2355.0MHz, 15kHz - Input

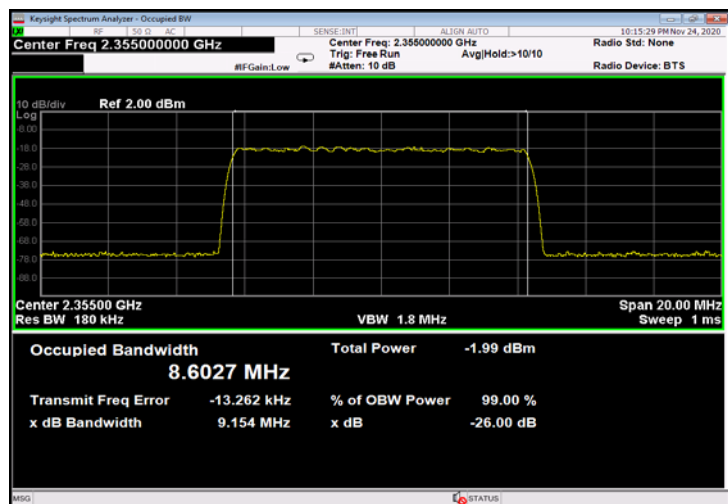


Figure 79: QPSK 10MHz B.W.; 2355.0MHz, 30kHz - Input

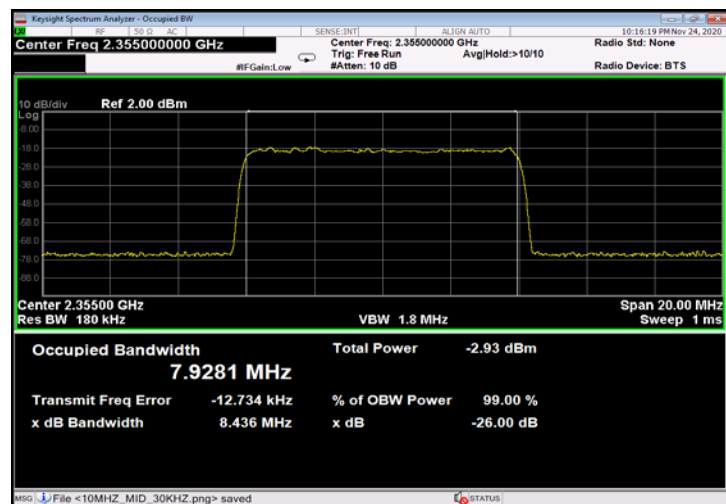


Figure 80: QPSK 10MHz B.W.; 2355.0MHz, 60kHz - Input



OUTPUT

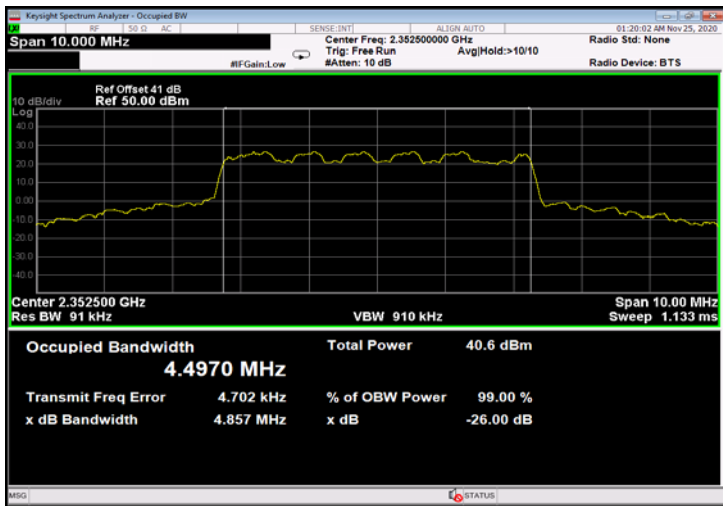


Figure 81: 16QAM 5MHz B.W.; 2352.5MHz, 15kHz - Output

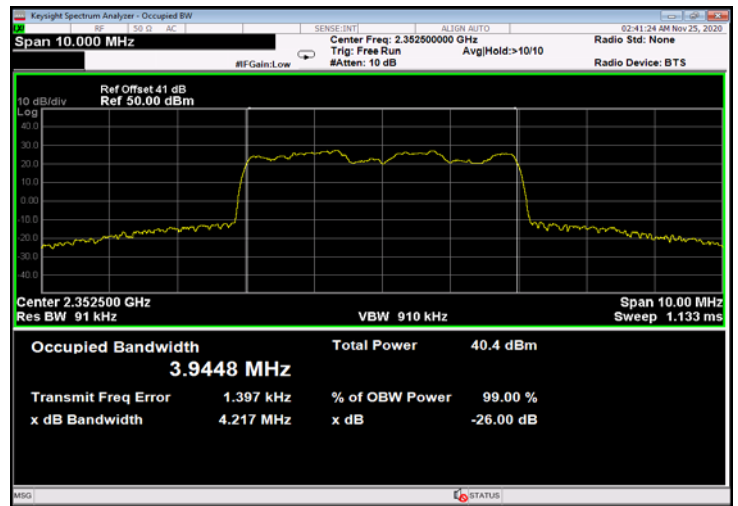


Figure 82: 16QAM 5MHz B.W.; 2352.5MHz, 30kHz- Output

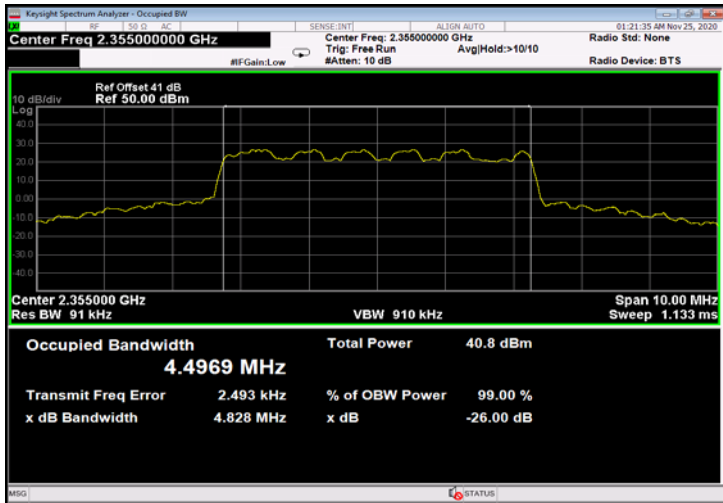


Figure 83: 16QAM 5MHz B.W.; 2355.0MHz, 15kHz- Output

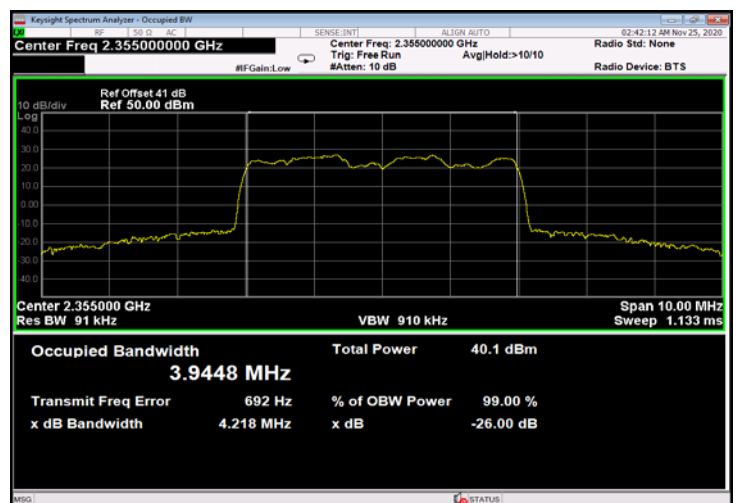


Figure 84: 16QAM 5MHz B.W.; 2355.0MHz, 30kHz- Output

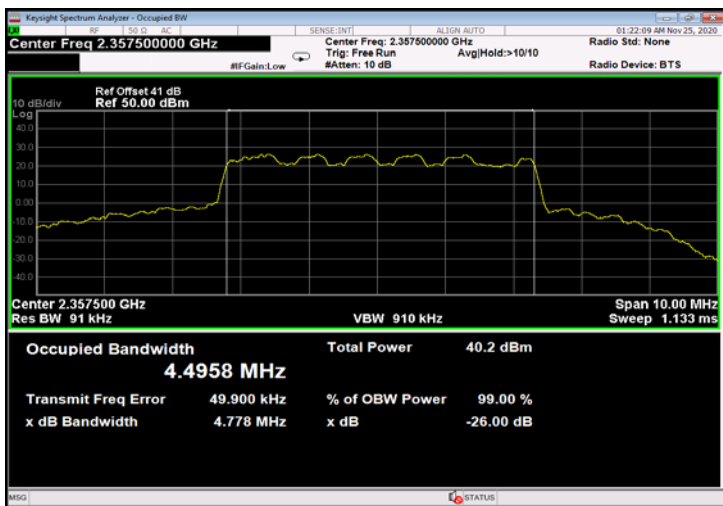


Figure 85: 16QAM 5MHz B.W.; 2357.5MHz, 15kHz - Output

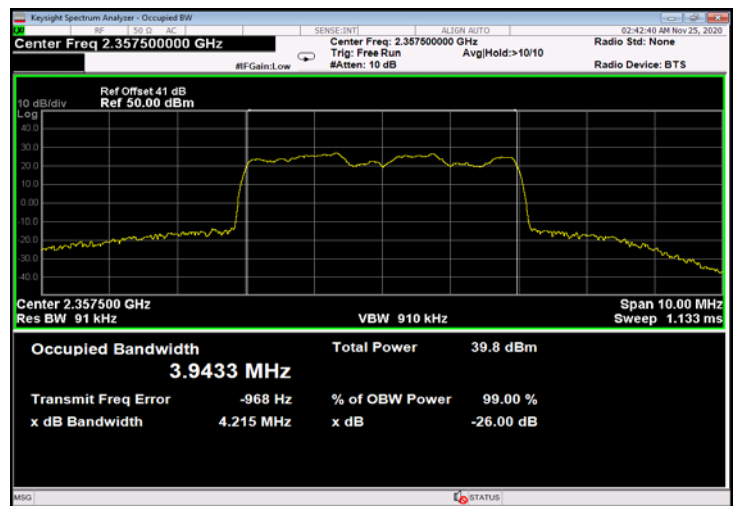


Figure 86: 16QAM 5MHz; 2357.5MHz, 30kHz- Output

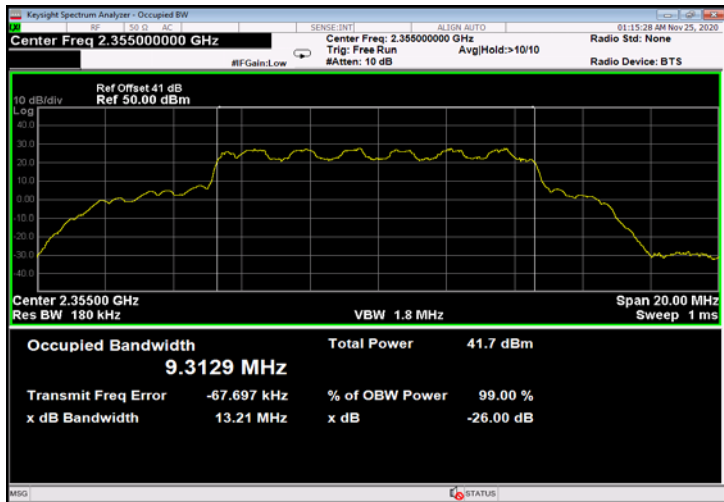


Figure 87: 16QAM 10MHz B.W.; 2355.0MHz,
15kHz- Output

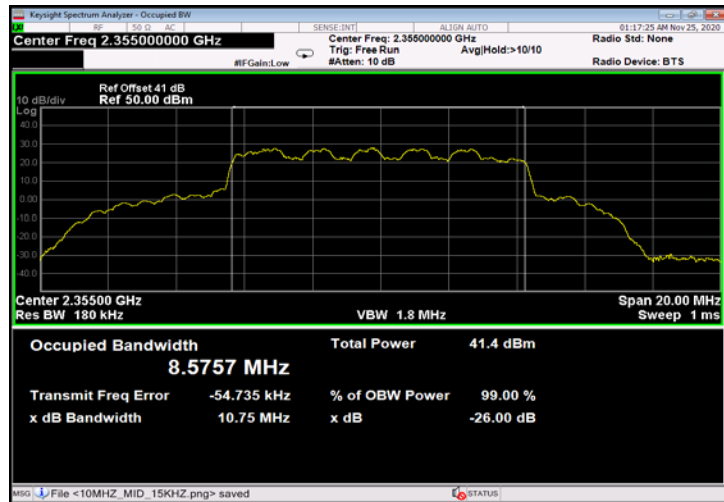


Figure 88: 16QAM 10MHz B.W.; 2355.0MHz,
30kHz- Output

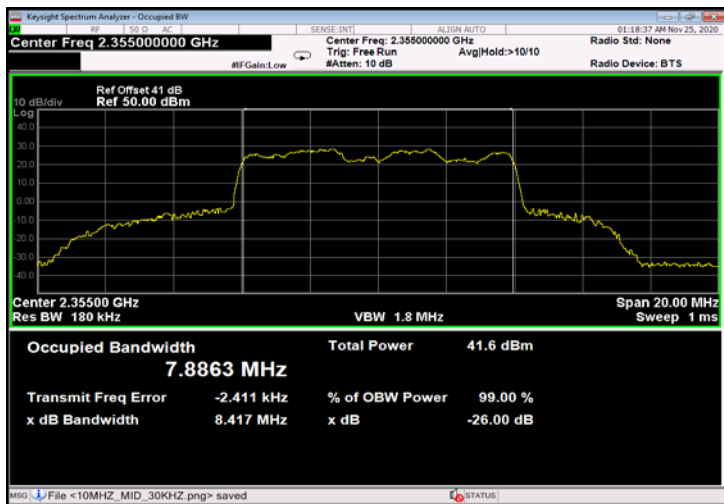


Figure 89: 16QAM 10MHz B.W.; 2355.0MHz,
60kHz- Output

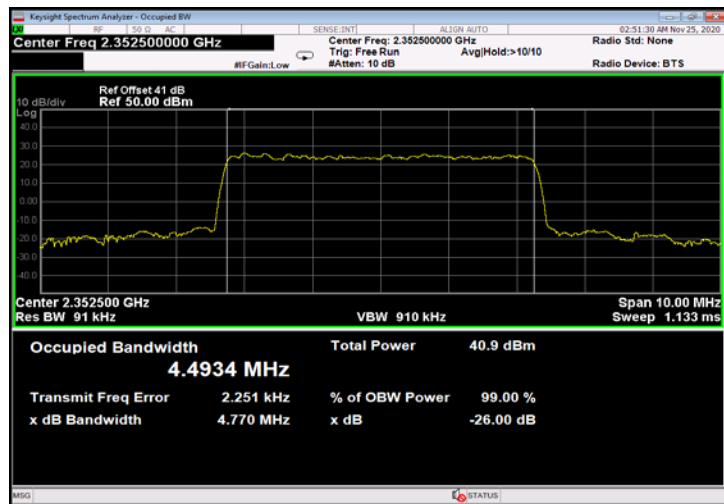


Figure 90: 64QAM 5MHz B.W.; 2352.5MHz,
15kHz - Output

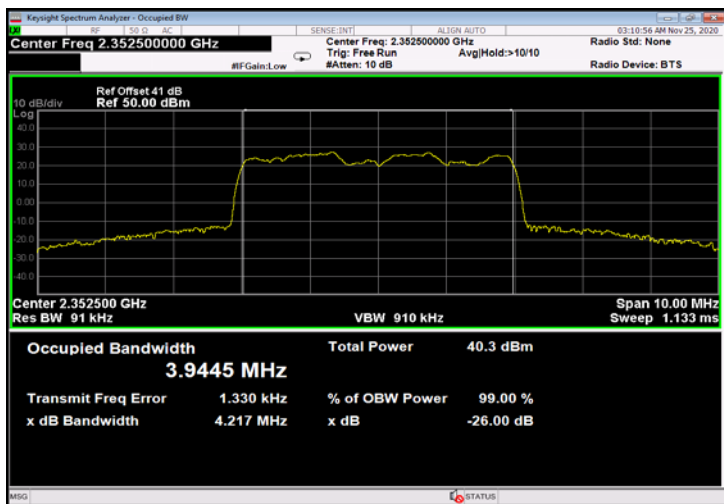


Figure 91: 64QAM 5MHz B.W.; 2352.5MHz,
30kHz - Output

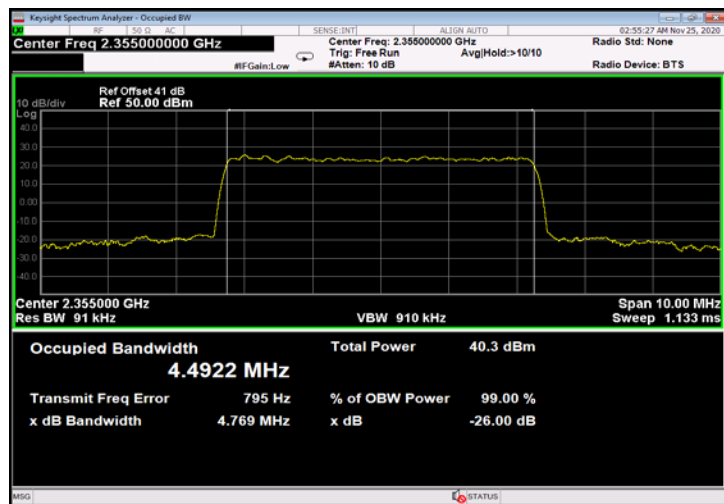


Figure 92: 64QAM 5MHz B.W.; 2355.0MHz,
15kHz - Output