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DATE: 18 June 2015

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

FCC Radio Test Report

For

Telrad Networks Ltd.

Equipment under test:

BreezeCompact 3000 Base Station

CMP3000-B40-2300-2400MHz

Tested by: _____
M. Zohar

Approved by: _____
D. Shidlowsky

Measurement/Technical Report for

Telrad Networks Ltd.

BreezeCompact 3000 Base Station

FCC ID: ARA-COMPACT23X

IC: 899A-COMPACT23X

This report concerns:	Original Grant: X Class II change: Class I change:
Equipment type:	Licensed Non-Broadcast Transmitter (TNB)
Limits used:	47CFR Parts 2, 27 RSS-195, Issue 2, April 2014 SRSP-516, Issue 1, April 2014

Measurement procedure used is ANSI C63.4-2009.

Substitution Method used as in ANSI/TIA-603-C: 2004

Application for Certification
prepared by:
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Lod 7120101
Israel
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Applicant for this device:
(different from "prepared by")
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1. General Information

1.1 Administrative Information

Manufacturer:	Telrad Networks Ltd.
Manufacturer's Address:	1 Batsheva St. P.O.B. 6118 Lod 711600 Israel Tel: +972-73-246-7651 Fax: +972-73-246-7504
Manufacturer's Representative:	Klara Milman
Equipment Under Test (E.U.T):	BreezeCompact 3000 Base Station
Equipment Model No.:	CMP3000-B40-2300-2400MHz
Equipment Serial No.:	Not designated
Date of Receipt of E.U.T:	13.04.2015
Start of Test:	13.04.2015
End of Test:	20.04.2015
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St, Lod, Israel 7116002
Test Specifications:	FCC Parts 2, 27 RSS-195, Issue 2, April 2014 RSS-Gen, Issue 4, November 2014 SRSP-516, Issue 1, April 2014

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 US1004.
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-3006, R-2729, T-1877, G-245.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025A-1.

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

BreezeCOMPACT3000 all in one high capacity base station with 4Tx/4Rx radio and 4G baseband modem. The BreezeCOMPACT3000 is IP services oriented Broadband Wireless Access system.
BreezeCOMPACT3000 is based on WiMAX technology and future upgradable to TD-LTE, the system is TDD system covering 2305-2315MHz and 2350-2360MHz range. The system contains an all outdoor base station unit.

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2009. 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 US1004.

1.6 Measurement Uncertainty

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 (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site 30-1000MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 4.98 dB

2. System Test Configuration

2.1 Justification

The base station continuously transmitted during the tests while communicating with a subscriber unit for configuration purposes only.

The compact 3000 2305-2315 MHz and 2350-2360 MHZ units containing 4 identical and independent TX & RX chains.

In 4X4 1 carrier 1 sector configuration all TX & RX chains are transmitting/receiving on the same freq.

In 2X4 1 carrier 1 sector configuration only 2 TX & 4 RX chains are transmitting/receiving on the same freq.

In 4X4 2 carrier 1 sector configuration all TX & RX chains are transmitting/receiving on 2 different freq.

In 4X4 2 carrier 2 sector configuration all TX & RX chains are transmitting/receiving on 2 different frequencies on 2 different geographical areas.

In all configurations the RF parameters and performances are identical.

Due to the similarity of the RF chains, tests were performed only on one port, except peak output power test and spectral density test which were repeated for each RF port independently.

The base station was configured to transmit at maximum output power rate in the frequency band 2305-2315 MHz and 2350-2360 MHZ with two bandwidths (5 and 10 MHz) at three representative channels and three modulations.

The unit is powered from 48 VDC.

2.2 EUT Exercise Software

5.0.0.121

2.3 Special Accessories

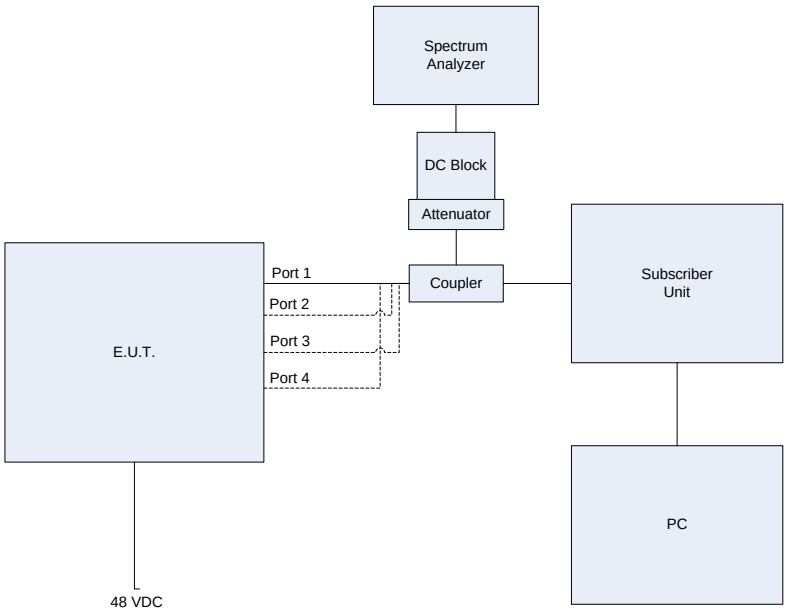
No special accessories were needed in order to achieve compliance.

2.4 Equipment Modifications

No modifications were needed in order to achieve compliance.

2.5 Configuration of Tested System

Model name	COMPACT 2.3G
Working voltage	48V DC
Mode of operation	BASE STATION
Modulations	QPSK,16QAM,64QAM
Frequency Range	2305MHz-2320MHz, 2345MHz-2360MHz
Transmit power	40dBm each port
Antenna Gain	15.6 dBi
Modulation BW	5MHz, 10MHz
Temperature (°C)/ Humidity (%RH)	24°C/40%RH



Note: Each antenna port was tested separately connected via the coupler to the subscriber unit and spectrum analyzer.

Figure 1. Conducted Emission From Antenna Ports Test Set-up

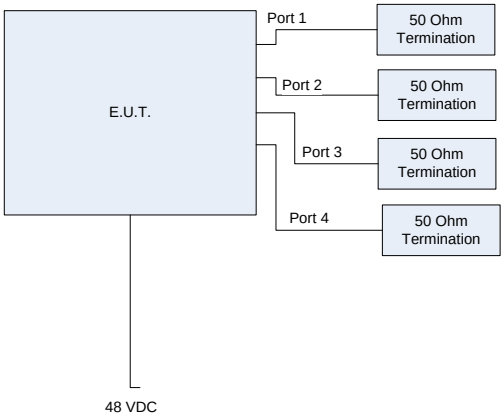


Figure 2. Radiated Emission Test Set-up

3. Test Set-up Photos

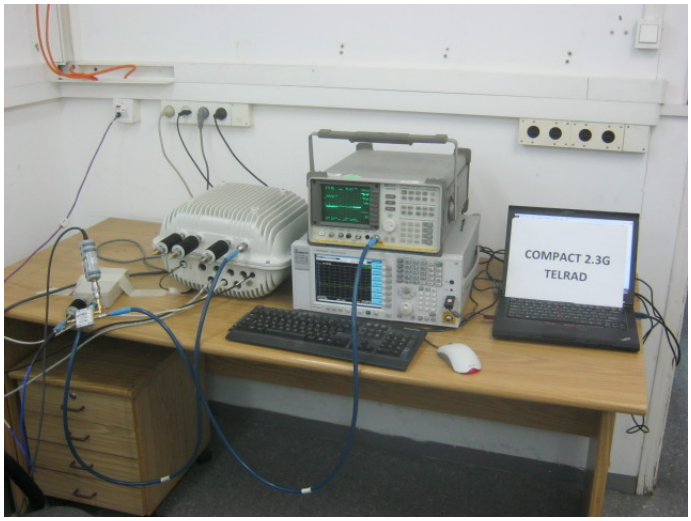


Figure 3. Conducted Emission From Antenna Port Tests

Figure 4. Radiated Emission Test

Figure 5. Radiated Emission Test

Figure 6. Radiated Emission Test

Figure 7. Frequency Stability Test

4. Peak Output Power

4.1 Test Specification

FCC Part 27.50(a)(ii)
RSS 195 Issue 2 April 2014, Section 4.1, 5.5
RSS Gen Issue 4, November 2014, Section 6.12

SRSP-516, Issue 1, April 2014, Section 5.1.1.2

4.2 Test Procedure

The method that used as detailed in FCC KDB 971168 and FCC KDB 662911.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through a directional coupler and external attenuator, D.C block and an appropriate coaxial cable (loss=31.1dB). Duty cycle was calculated for total EIRP (1.9dB). Total offset is 31.1 + 1.9 = 33 db offset which was set in the spectrum analyzer.

The E.U.T. RF output was modulated (QPSK, 16QAM and 64QAM). Special attention was taken to prevent Spectrum Analyzer RF input overload. The tests were performed in 2 operational frequency bands (2305-2320 MHz, 2345-2360 MHz) in two bandwidths (5MHz and 10 MHz) for each modulation (QPSK, 16QAM, 64QAM).

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

The calculated power was calculated by converting the dBm logarithmic result of each port to a numeric result and then adding together all numeric port results. This sum was then converted back to dBm logarithmic.

4.3 Test Results

BW (Hz)	Operation Freq (MHz)	Power Port1 (dBm)	Power Port2 (dBm)	Power Port3 (dBm)	Power Port4 (dBm)	Calculated Power (dBm)	Ant Gain (dBi)	EIRP (dBm)	Spec (dBm)	Margin (dB)
5M	2307.5	40.0	40.1	40.1	40.0	46.07	15.6	61.67	63.0	-1.33
5M	2312.5	39.8	39.8	40.2	40.0	45.97	15.6	61.57	63.0	-1.43
10M	2310.0	39.9	39.9	39.8	40.2	45.97	15.6	61.57	63.0	-1.43
5M	2352.5	40.1	39.9	39.9	39.9	45.97	15.6	61.57	63.0	-1.43
5M	2357.5	39.8	40.1	39.9	39.8	45.92	15.6	61.52	63.0	-1.48
10M	2355.0	40.1	40.1	40.0	39.9	46.05	15.6	61.65	63.0	-1.35

Figure 8 Peak Output Power QPSK

BW (Hz)	Operation Freq (MHz)	Power Port1 (dBm)	Power Port2 (dBm)	Power Port3 (dBm)	Power Port4 (dBm)	Calculated Power (dBm)	Ant Gain (dBi)	EIRP (dBm)	Spec (dBm)	Margin (dB)
5M	2307.5	39.9	40.0	39.9	40.0	45.97	15.6	61.57	63.0	-1.43
5M	2312.5	39.8	39.8	39.9	40.0	45.90	15.6	61.50	63.0	-1.50
10M	2310.0	39.9	39.9	40.0	40.2	46.02	15.6	61.62	63.0	-1.38
5M	2352.5	40.0	40.0	39.8	39.8	45.92	15.6	61.52	63.0	-1.48
5M	2357.5	39.9	40.0	39.8	39.8	45.90	15.6	61.50	63.0	-1.50
10M	2355.0	40.2	40.0	40.6	40.6	46.38	15.6	61.98	63.0	-1.02

Figure 9 Peak Output Power 16QAM

BW (Hz)	Operation Freq (MHz)	Power Port1 (dBm)	Power Port2 (dBm)	Power Port3 (dBm)	Power Port4 (dBm)	Calculated Power (dBm)	Ant Gain (dBi)	EIRP (dBm)	Spec (dBm)	Margin (dB)
5M	2307.5	40.0	40.1	40.0	40.1	46.07	15.6	61.67	63.0	-1.33
5M	2312.5	39.9	39.8	40.0	40.1	45.97	15.6	61.57	63.0	-1.43
10M	2310.0	39.3	39.0	39.2	39.4	45.25	15.6	60.85	63.0	-2.15
5M	2352.5	40.1	39.9	39.8	39.9	45.95	15.6	61.55	63.0	-1.45
5M	2357.5	40.0	40.1	39.9	39.7	45.95	15.6	61.55	63.0	-1.45
10M	2355.0	39.2	39.1	39.2	39.2	45.20	15.6	60.80	63.0	-2.20

Figure 10 Peak Output Power 64QAM

Note - Configuration of 4X4 (TX/RX), 1 sector, 1 carrier transmitting on same frequency on all 4 channels is regarded as worst case:

1) 2 transmitted channels use completely uncorrelated signals resulting 0dBi array gain.
2) 2 other transmitted channels using correlated signals and crossed polarized antennas resulting 0dBi array gain.
3) All 4 TX antennas have 15.6 dBi gain each.
4) Therefore total array gain is 0dBi.
5) Therefore total directional gain is 15.6 dBi.

JUDGEMENT: Passed by 1.02 dB

The E.U.T met the requirements of Part 27 Sub-part C, Section 27.54, RSS 195 Issue 2 April 2014, Section 4.1, 5.5; RSS Gen, Issue 4, November 2014, Section 6.12 and SRSP-516, Issue 1, April 2014, Section 5.1.1.2 specification.

See additional information in *Figure 11* to *Figure 84.*

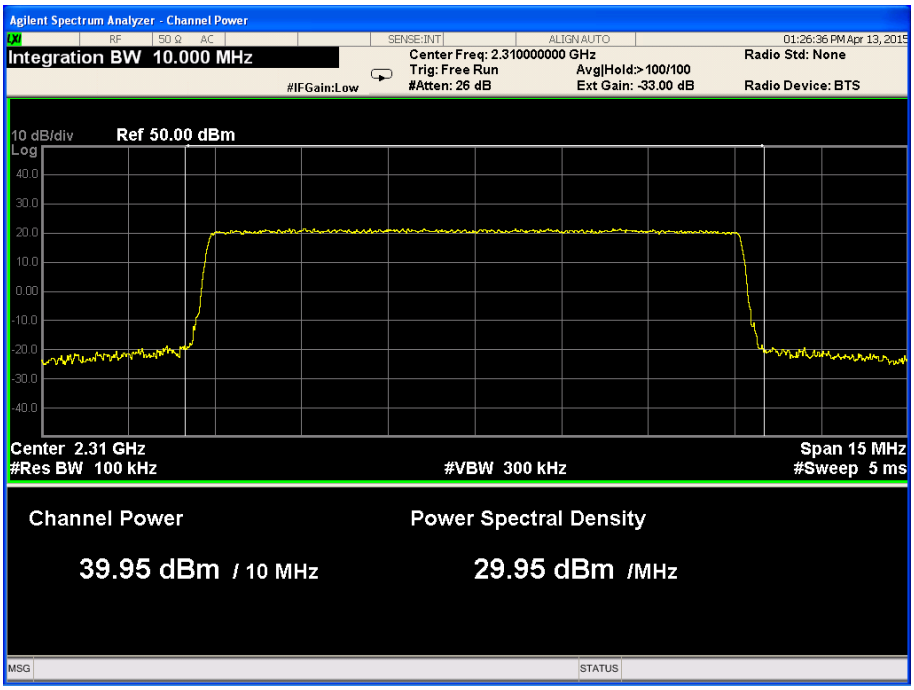


Figure 11. —QPSK - 2310.0 MHz, BW 10MHz Port 1

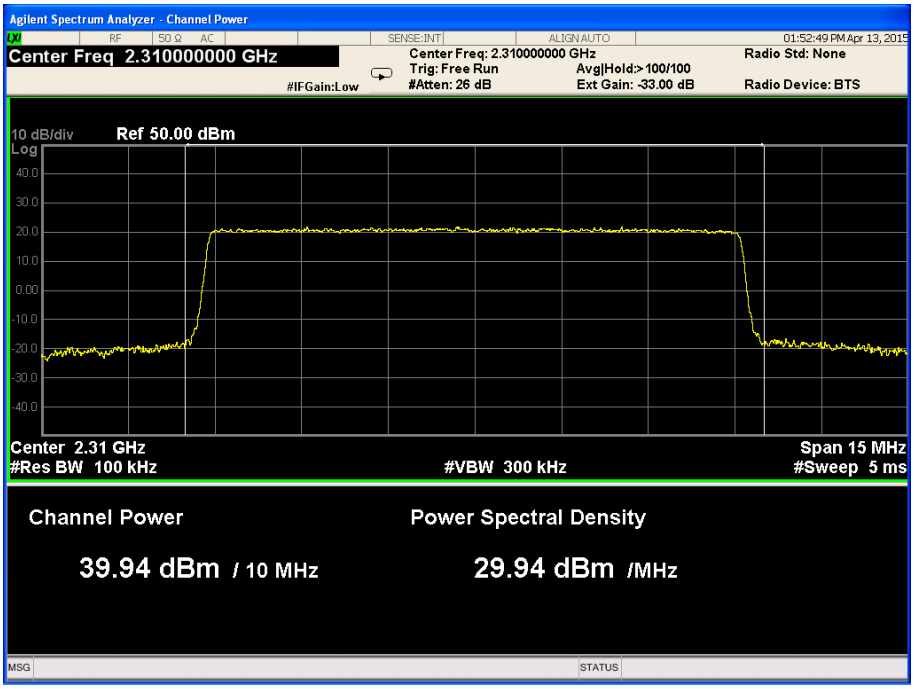


Figure 12. —QPSK - 2310.0 MHz, BW 10MHz Port 2

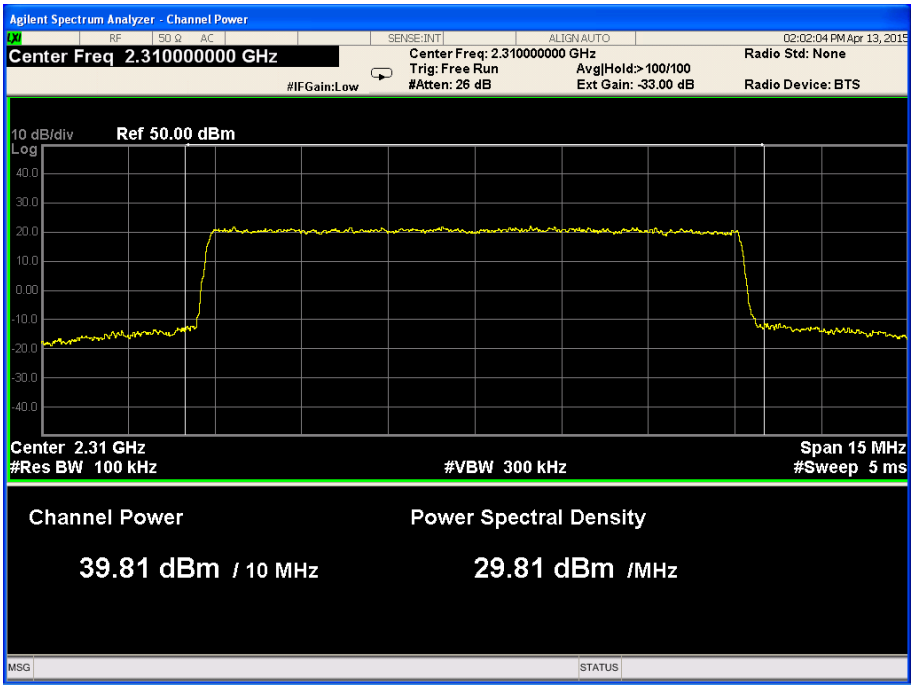


Figure 13. — QPSK - 2310.0 MHz, BW 10MHz Port 3

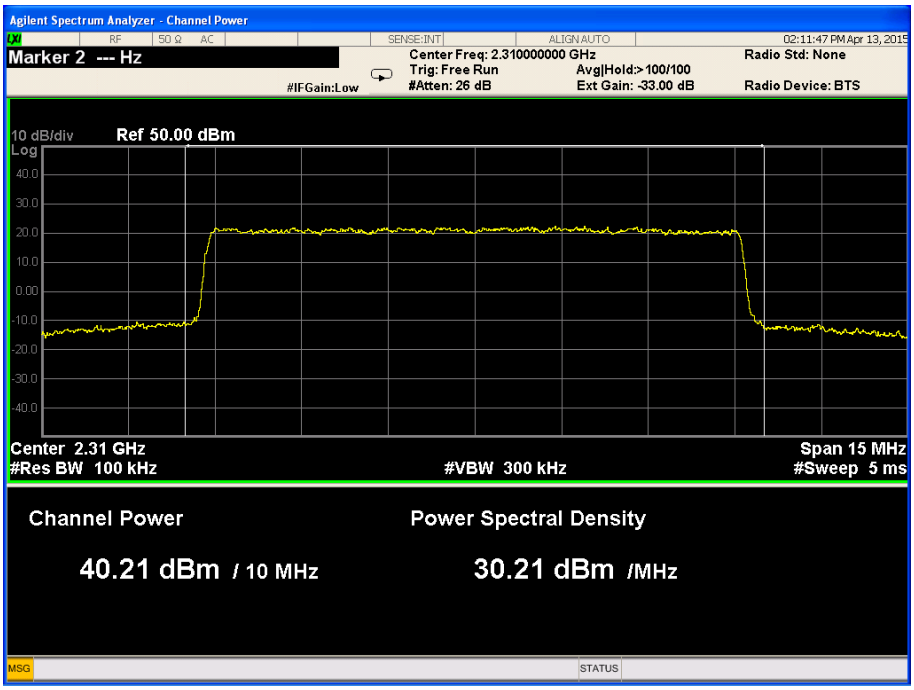


Figure 14. — QPSK - 2310.0 MHz, BW 10MHz Port 4

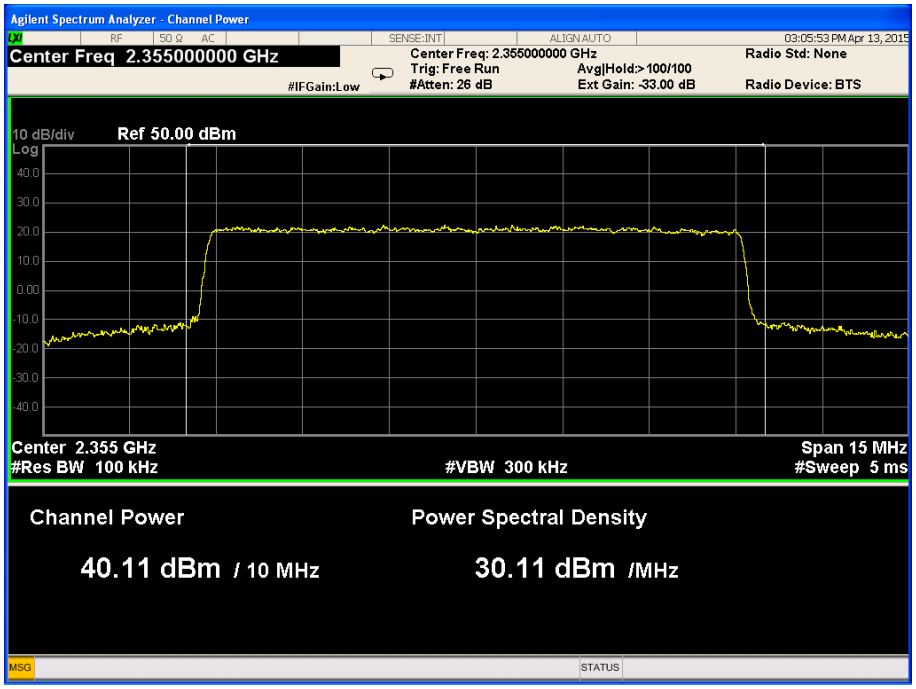


Figure 15. — QPSK - 2355.0 MHz, BW 10MHz Port 1

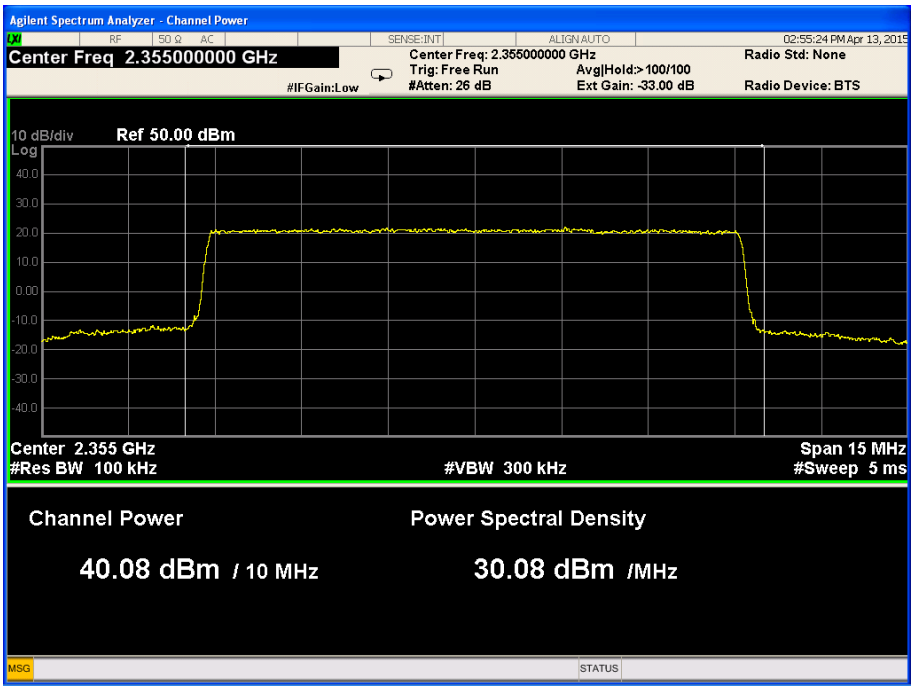


Figure 16. — QPSK - 2355.0 MHz, BW 10MHz Port 2

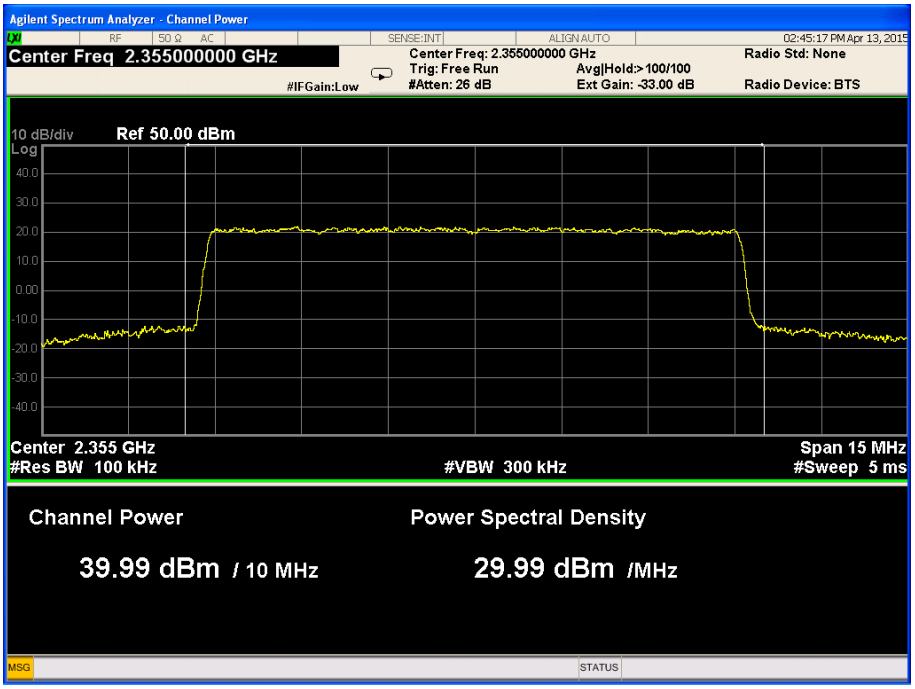


Figure 17. — QPSK - 2355.0 MHz, BW 10MHz Port 3

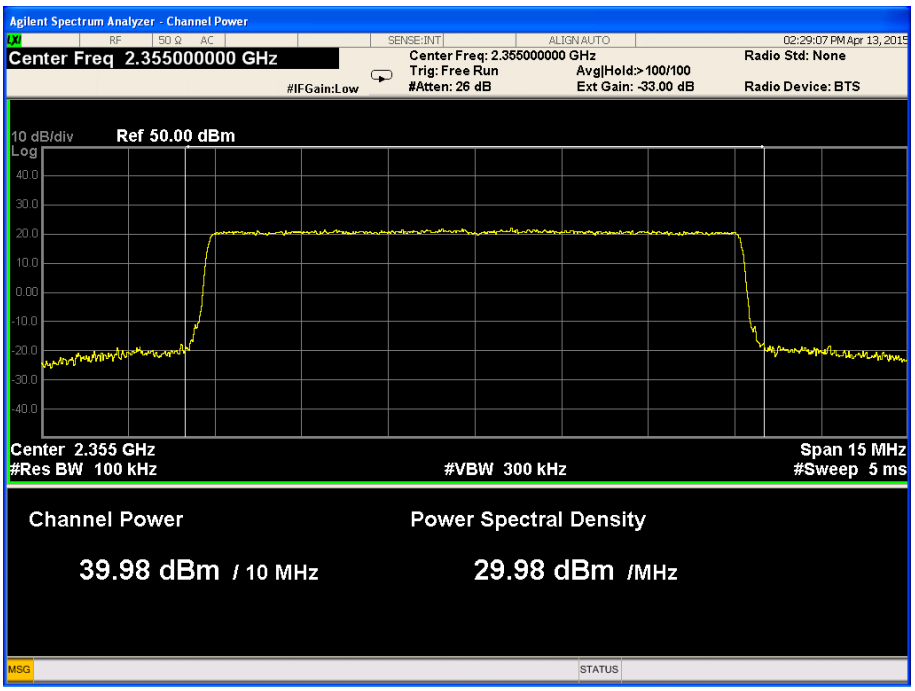


Figure 18. — QPSK - 2355.0 MHz, BW 10MHz Port 4

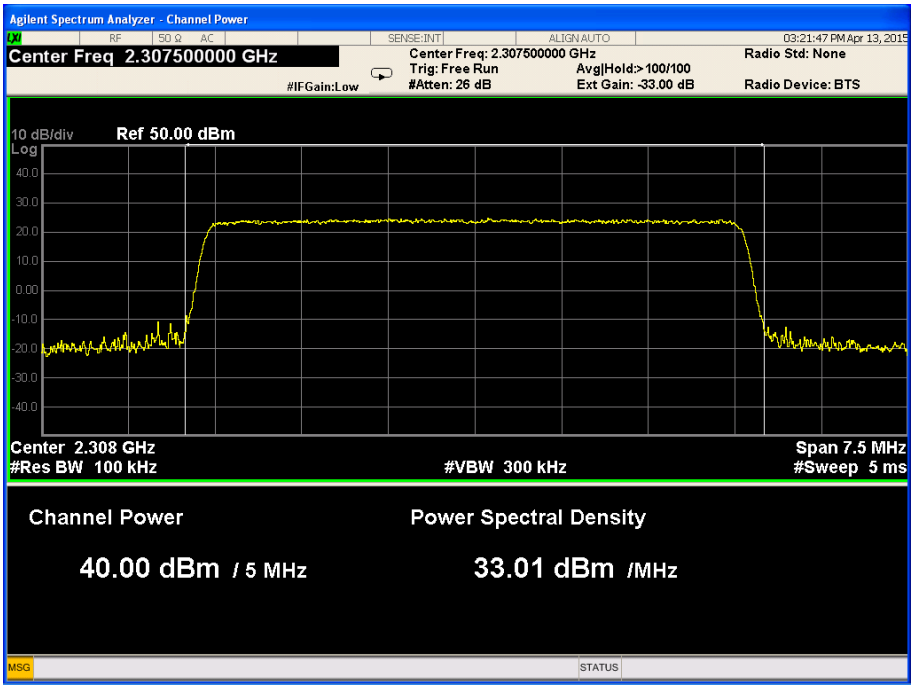


Figure 19. — QPSK - 2307.5 MHz, BW 5MHz Port 1

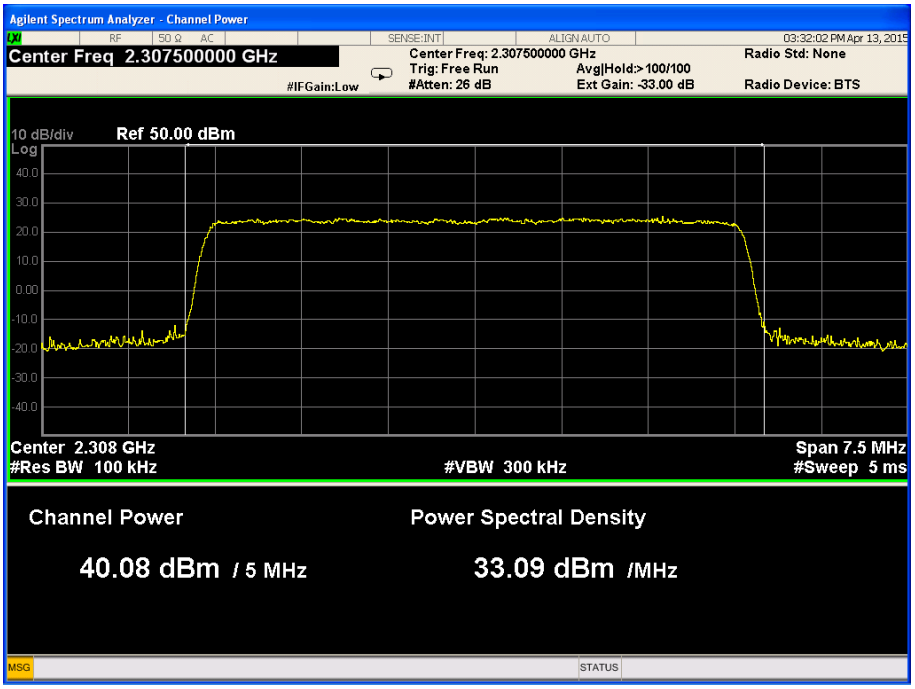


Figure 20. — QPSK - 2307.5 MHz, BW 5MHz Port 2

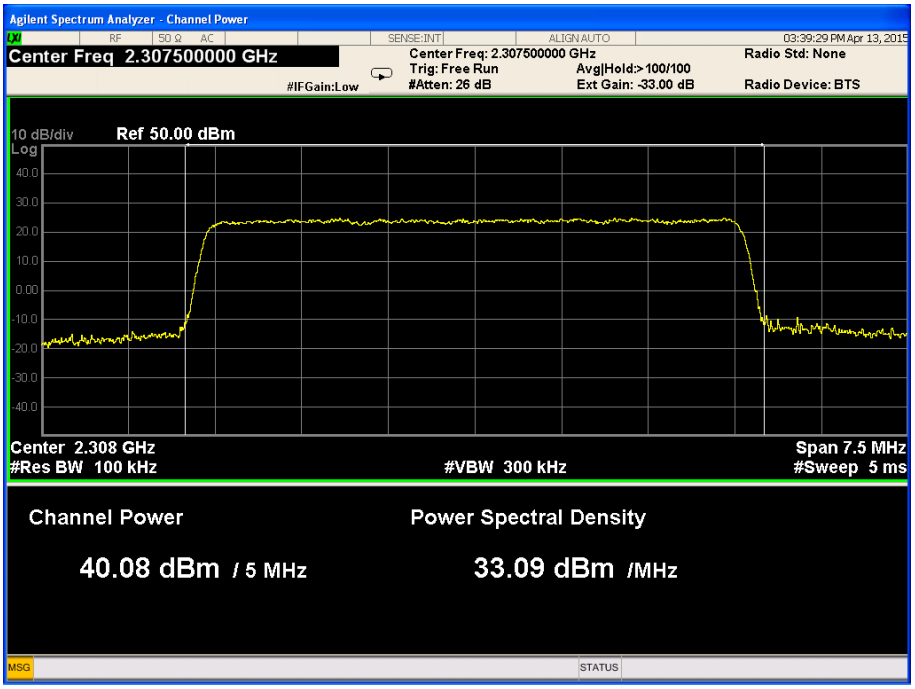


Figure 21. — QPSK - 2307.5 MHz, BW 5MHz Port 3

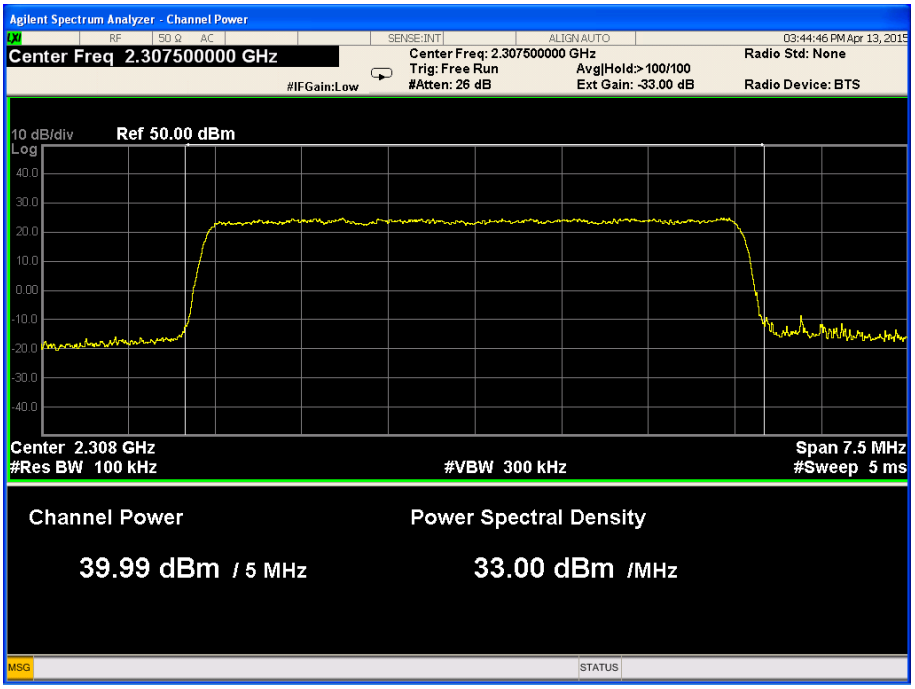


Figure 22. — QPSK - 2307.5 MHz, BW 5MHz Port 4

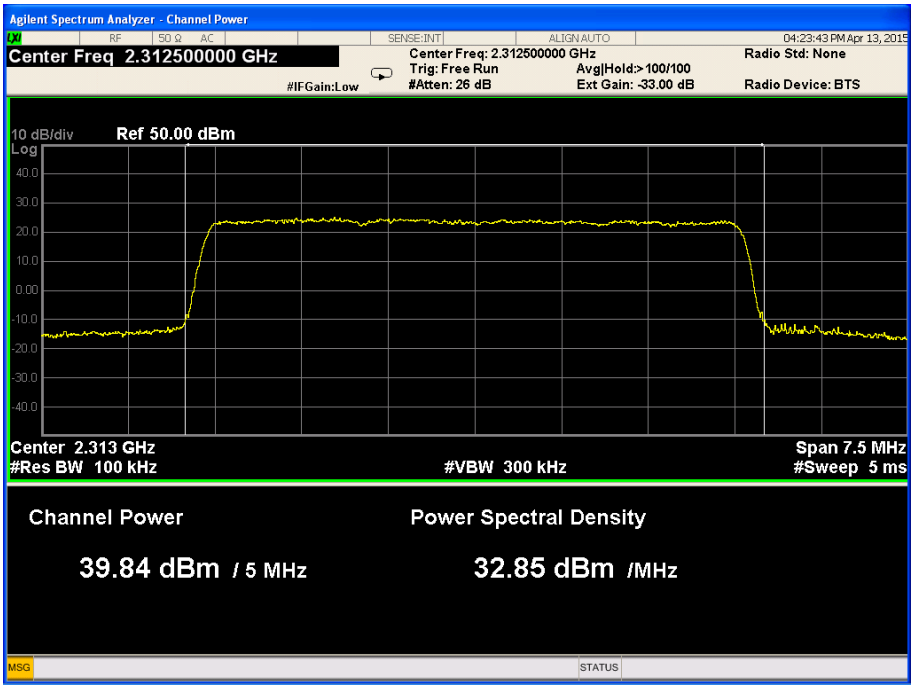


Figure 23. — QPSK - 2312.5 MHz, BW 5MHz Port 1

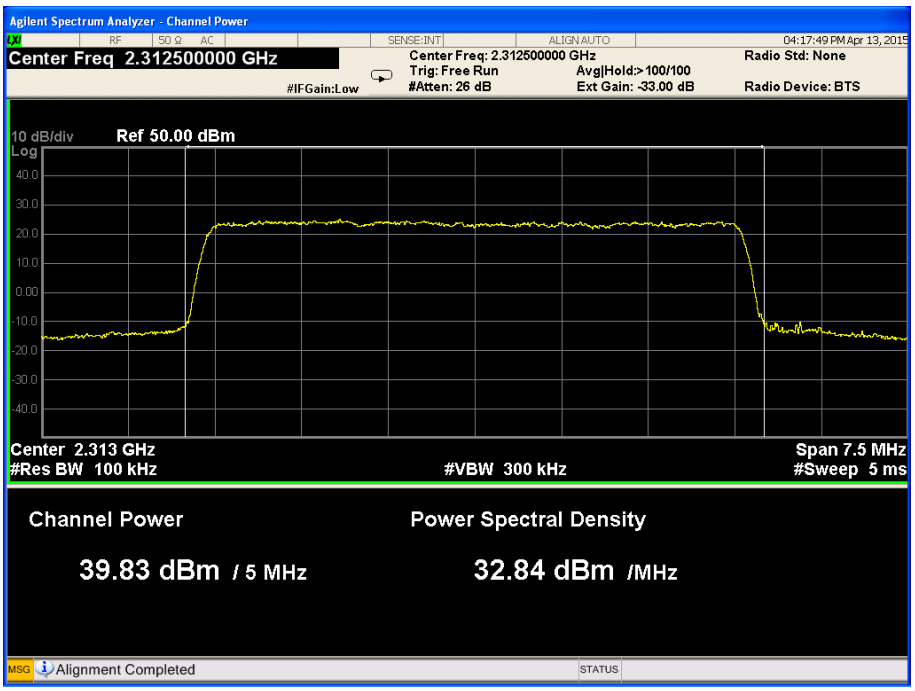


Figure 24. — QPSK - 2312.5 MHz, BW 5MHz Port 2

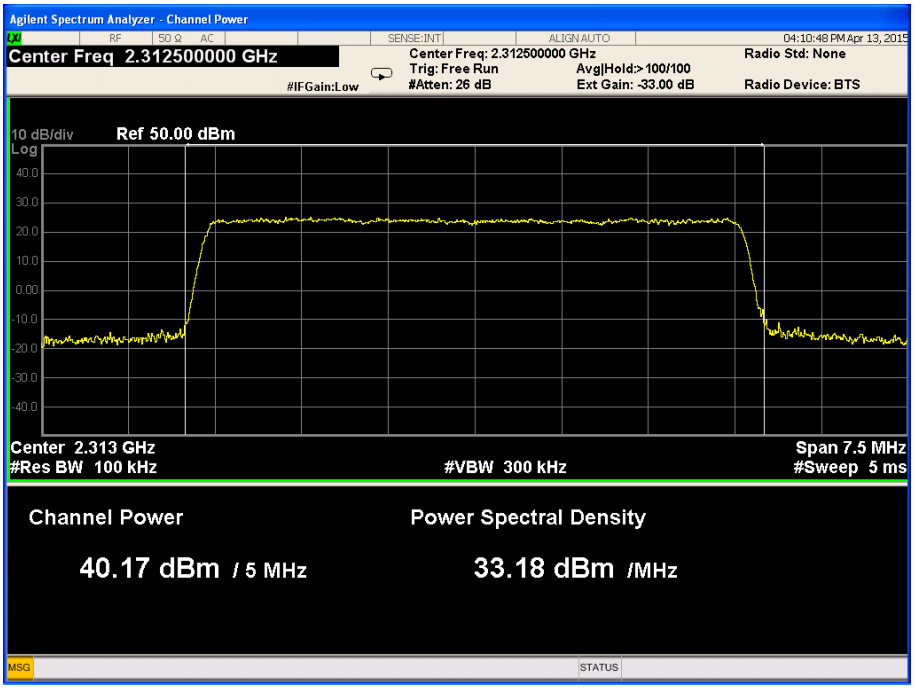


Figure 25. — QPSK - 2312.5 MHz, BW 5MHz Port 3

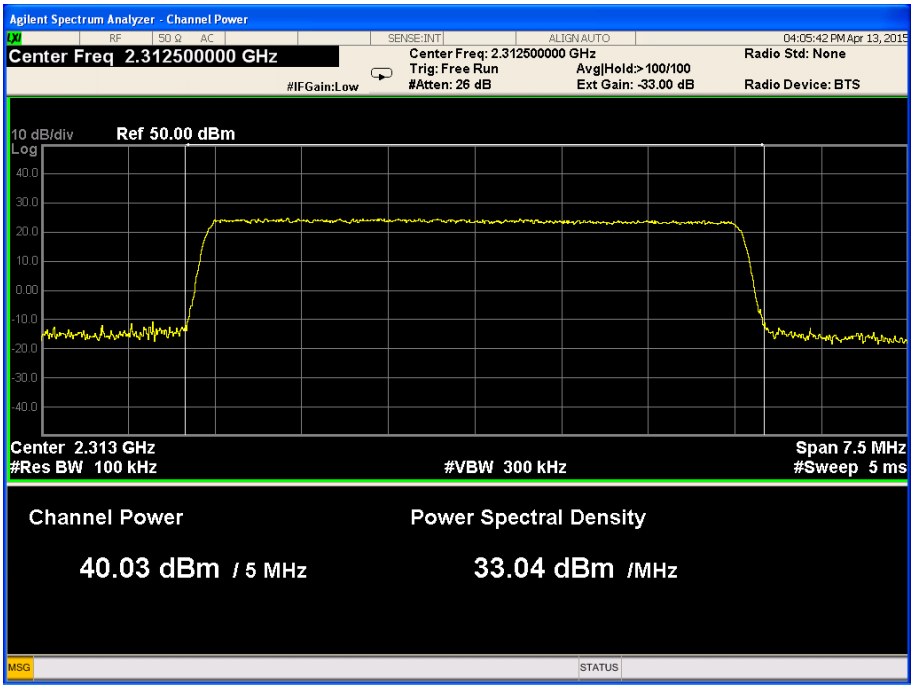


Figure 26. — QPSK - 2312.5 MHz, BW 5MHz Port 4

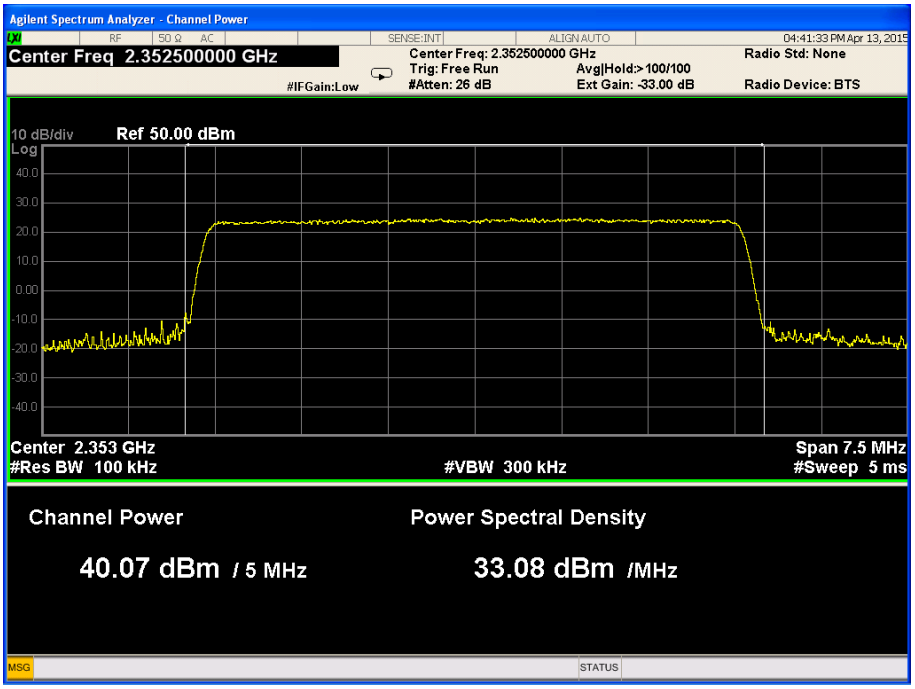


Figure 27. — QPSK - 2352.5 MHz, BW 5MHz Port 1

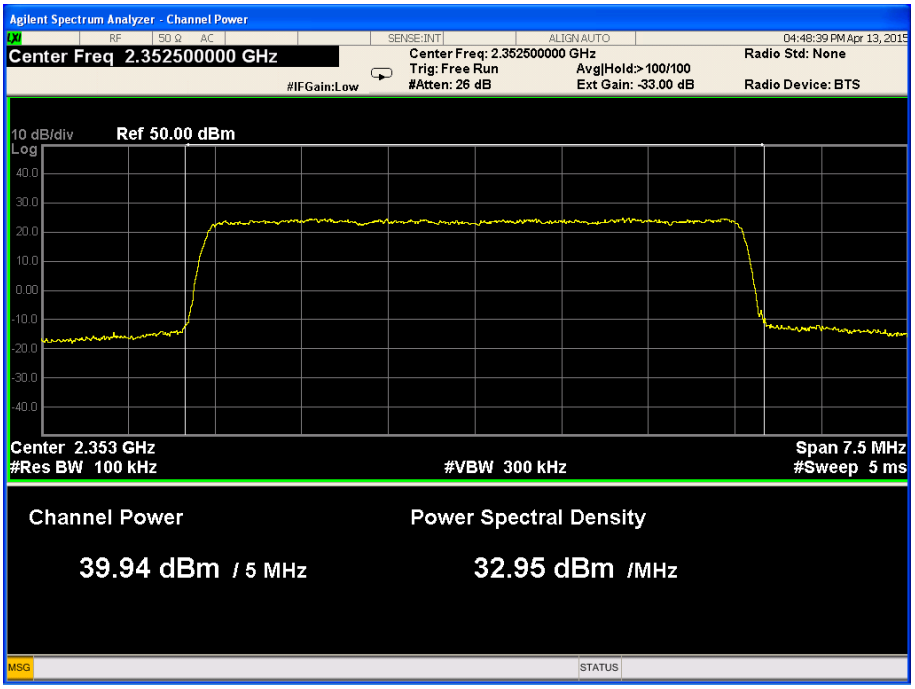


Figure 28. — QPSK - 2352.5 MHz, BW 5MHz Port 2

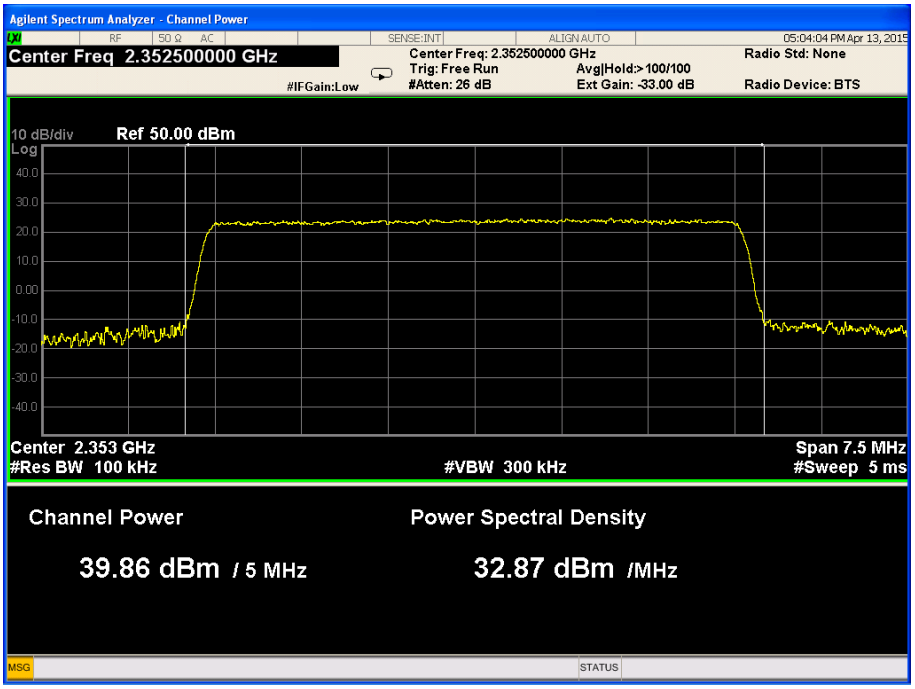


Figure 29. — QPSK - 2352.5 MHz, BW 5MHz Port 3

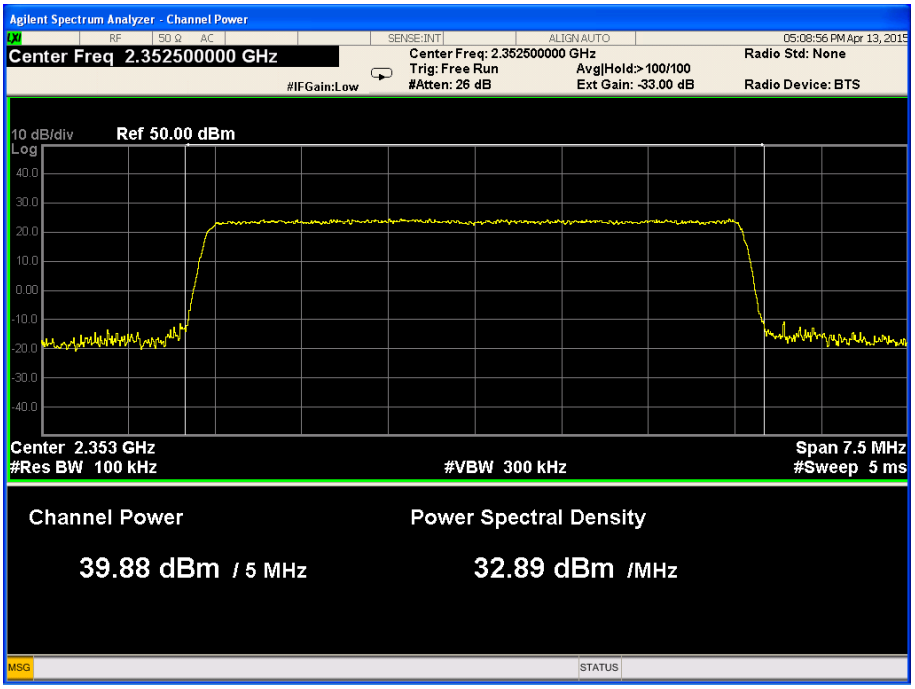


Figure 30. — QPSK - 2352.5 MHz, BW 5MHz Port 4

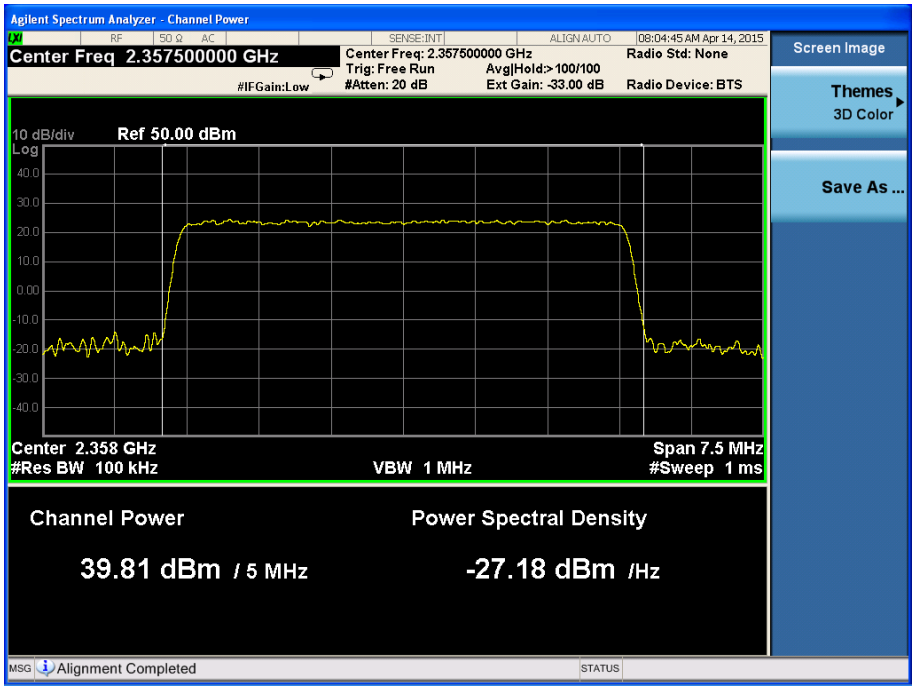


Figure 31. — QPSK - 2357.5 MHz, BW 5MHz Port 1

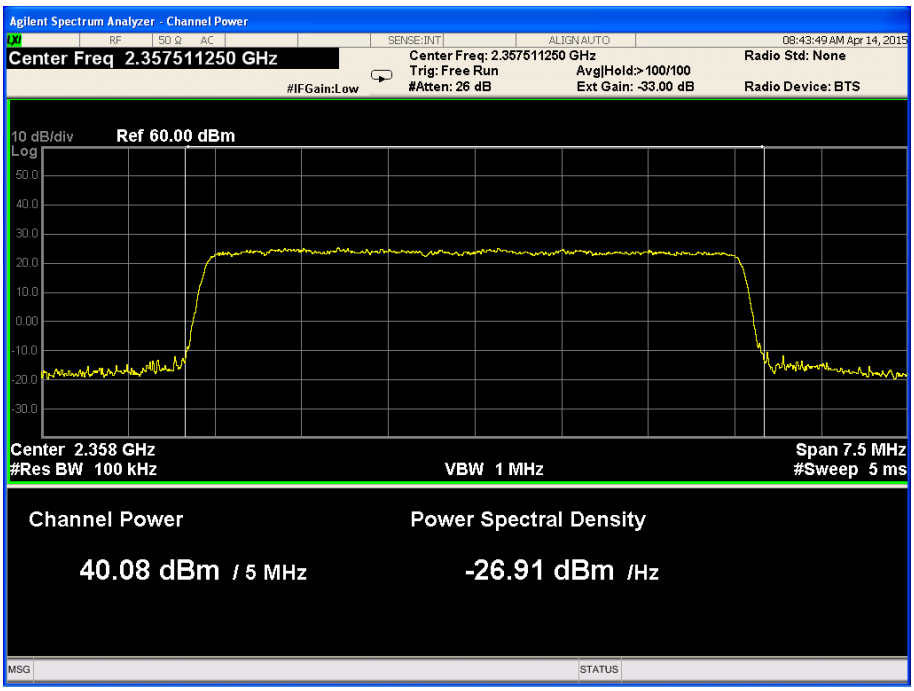


Figure 32. — QPSK - 2357.5 MHz, BW 5MHz Port 2

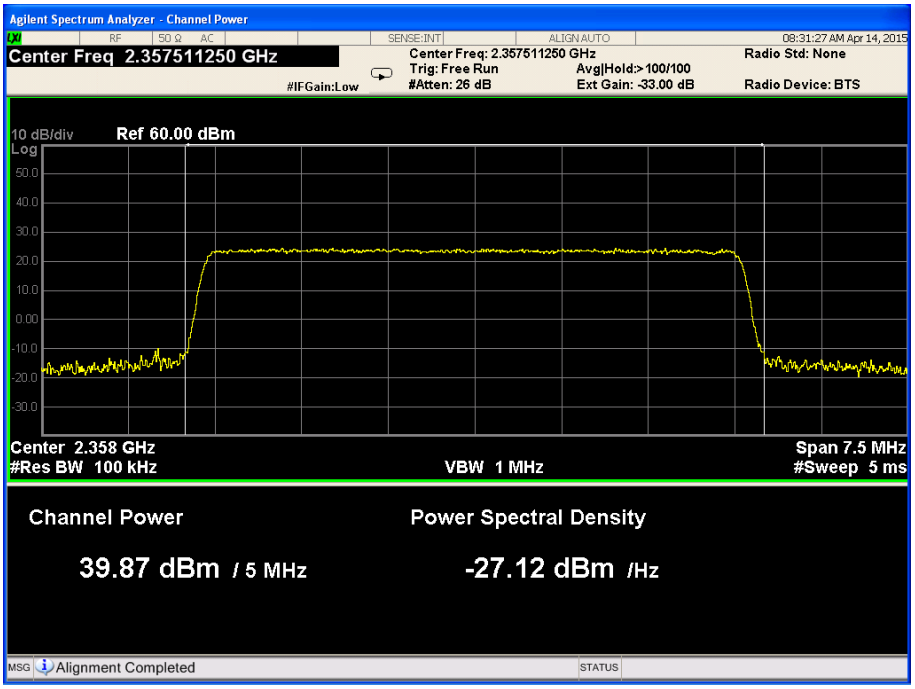


Figure 33. — QPSK - 2357.5 MHz, BW 5MHz Port 3

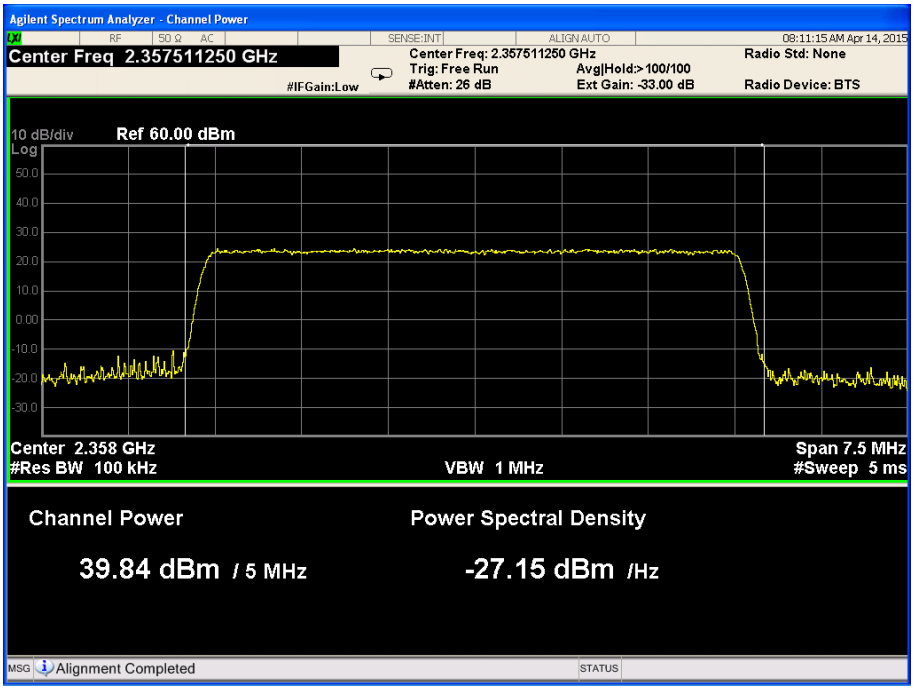


Figure 34. — QPSK - 2357.5 MHz, BW 5MHz Port 4

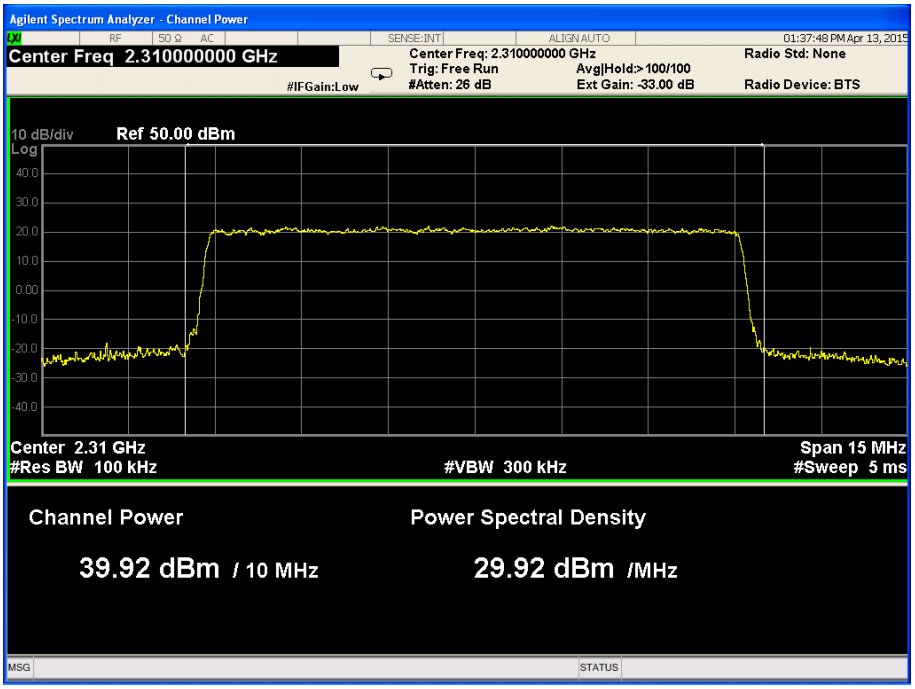


Figure 35. — 16QAM 2310.0 MHz, BW 10MHz Port 1

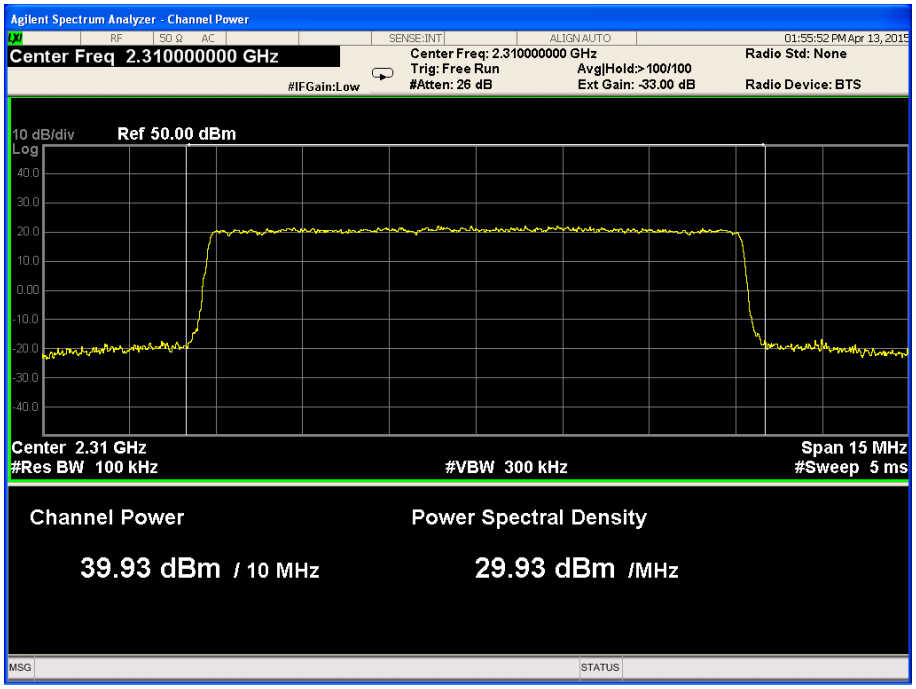


Figure 36. — 16QAM 2310.0 MHz, BW 10MHz Port 2

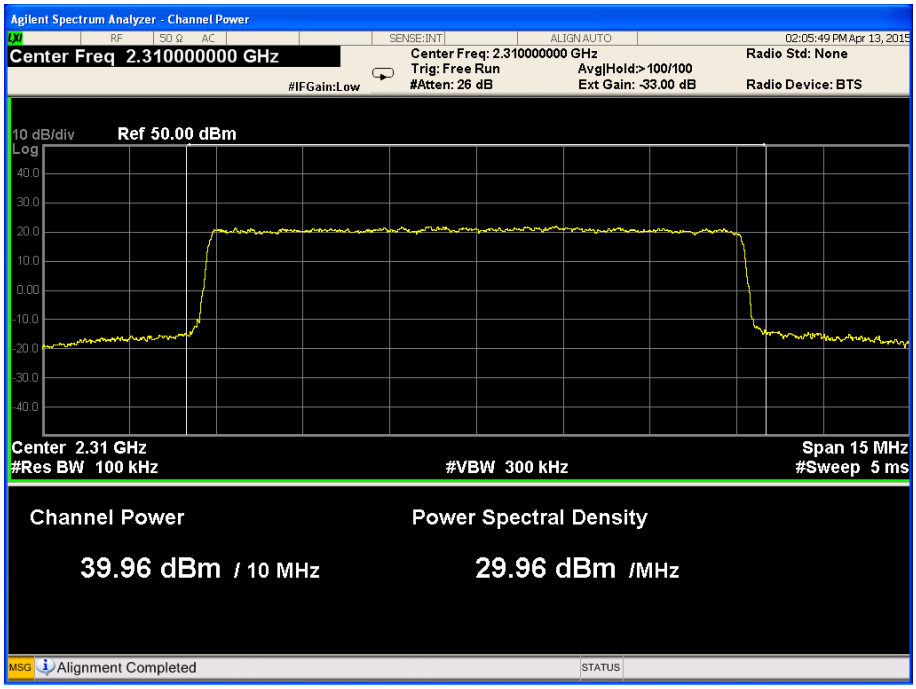


Figure 37. — 16QAM 2310.0 MHz, BW 10MHz Port 3

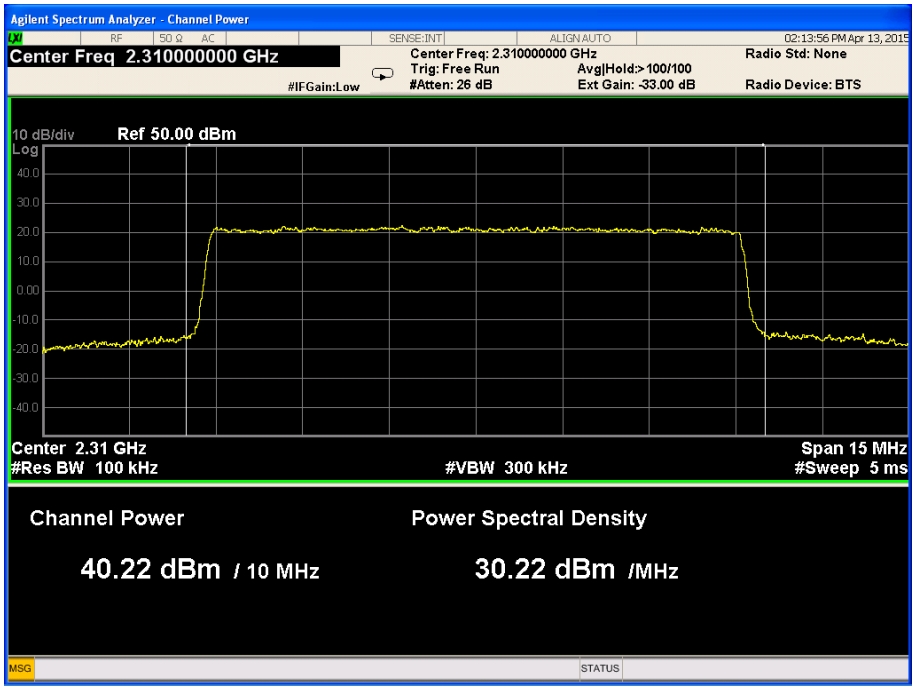


Figure 38. — 16QAM 2310.0 MHz, BW 10MHz Port 4

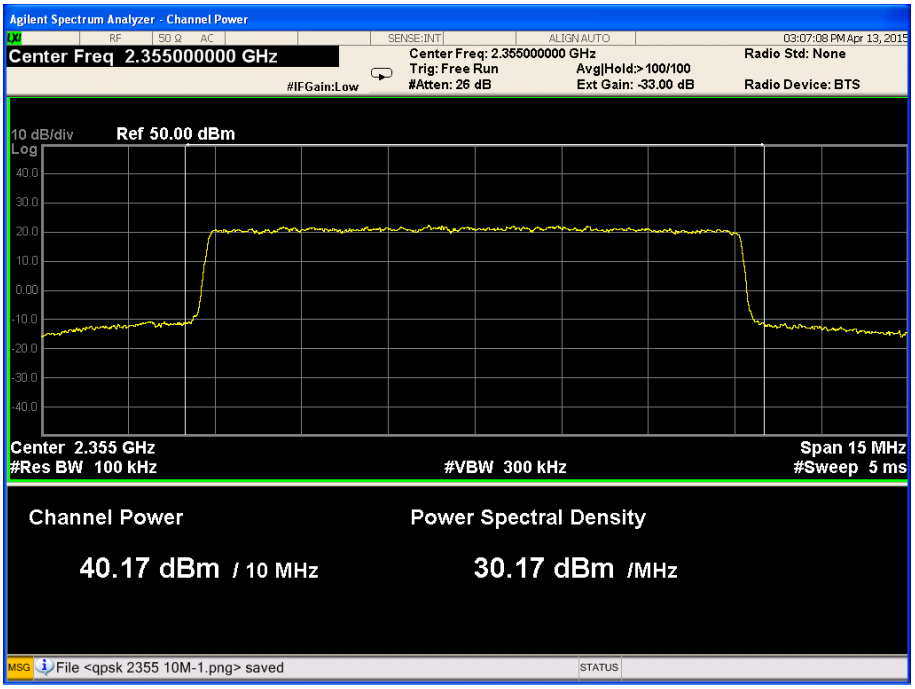


Figure 39. — 16QAM 2355.0 MHz, BW 10MHz Port 1

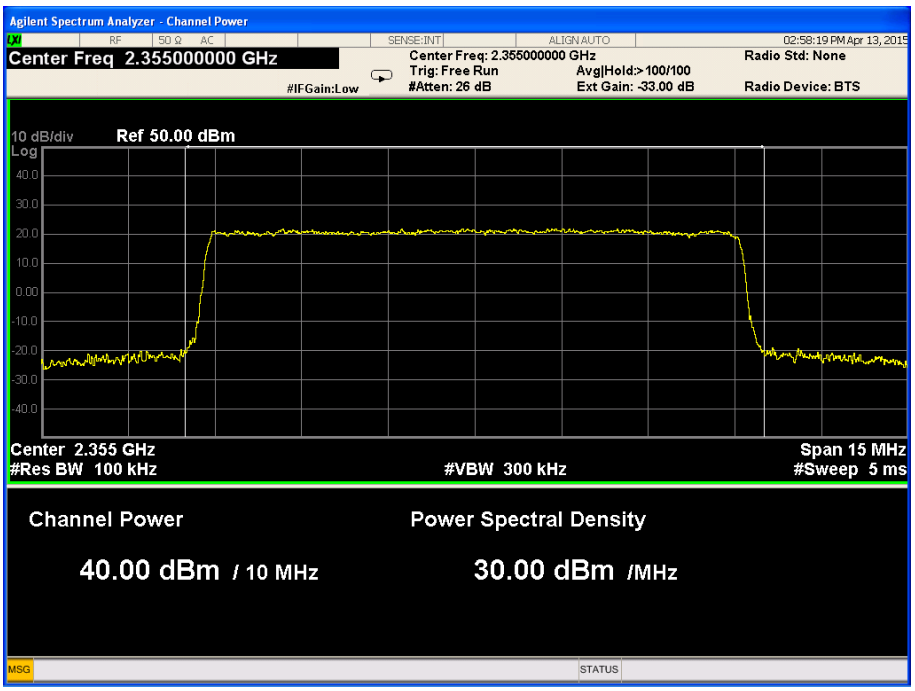


Figure 40 .— 16QAM 2355.0 MHz, BW 10MHz Port 2

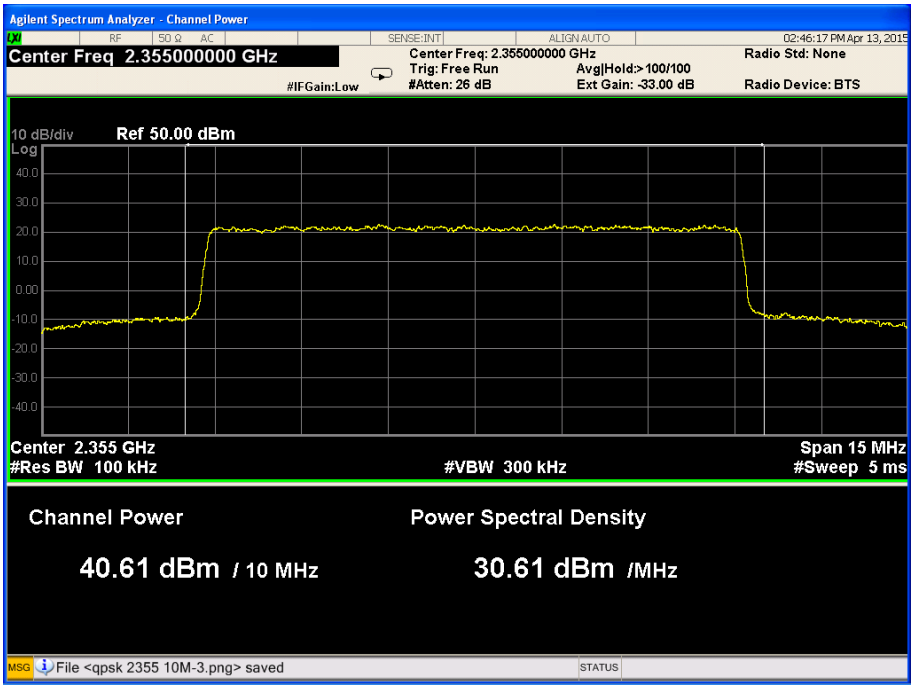


Figure 41. — 16QAM 2355.0 MHz, BW 10MHz Port 3

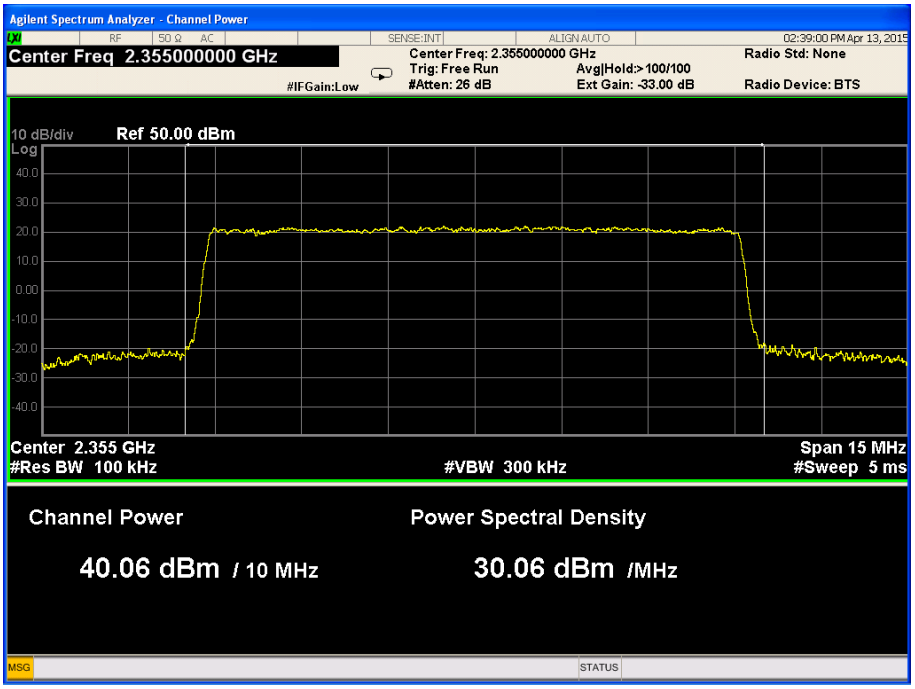


Figure 42. — 16QAM 2355.0 MHz, BW 10MHz Port 4

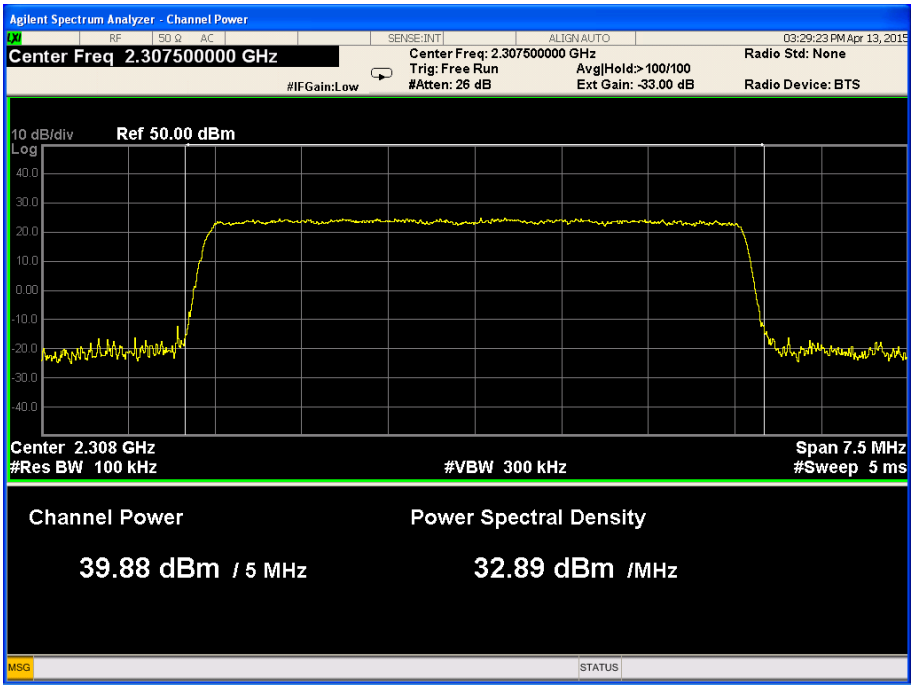


Figure 43. — 16QAM 2307.5 MHz, BW 5MHz Port 1

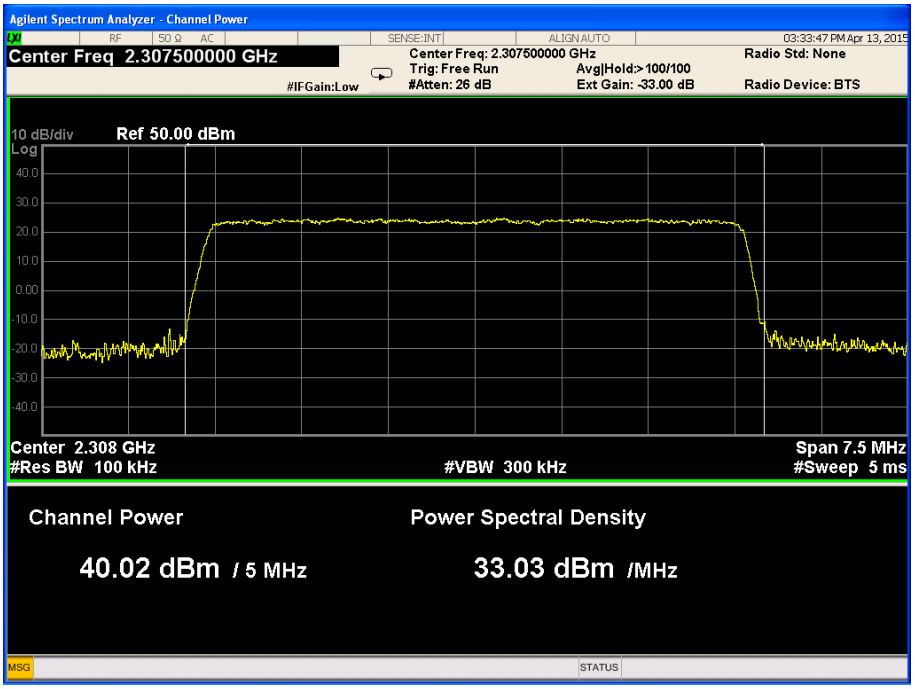


Figure 44. — 16QAM 2307.5 MHz, BW 5MHz Port 2

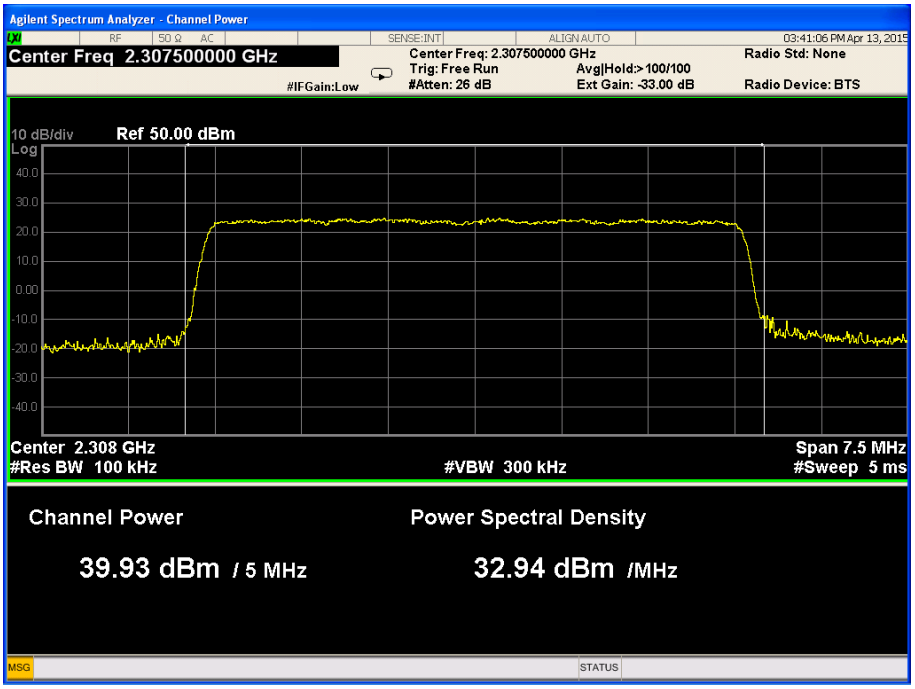


Figure 45. — 16QAM 2307.5 MHz, BW 5MHz Port 3

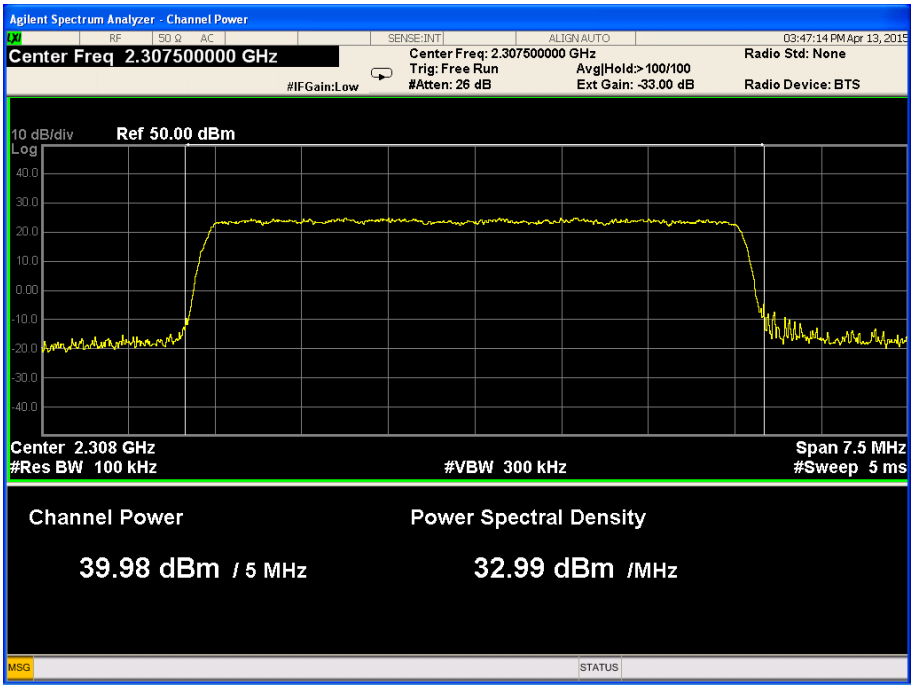


Figure 46. — 16QAM 2307.5 MHz, BW 5MHz Port 4

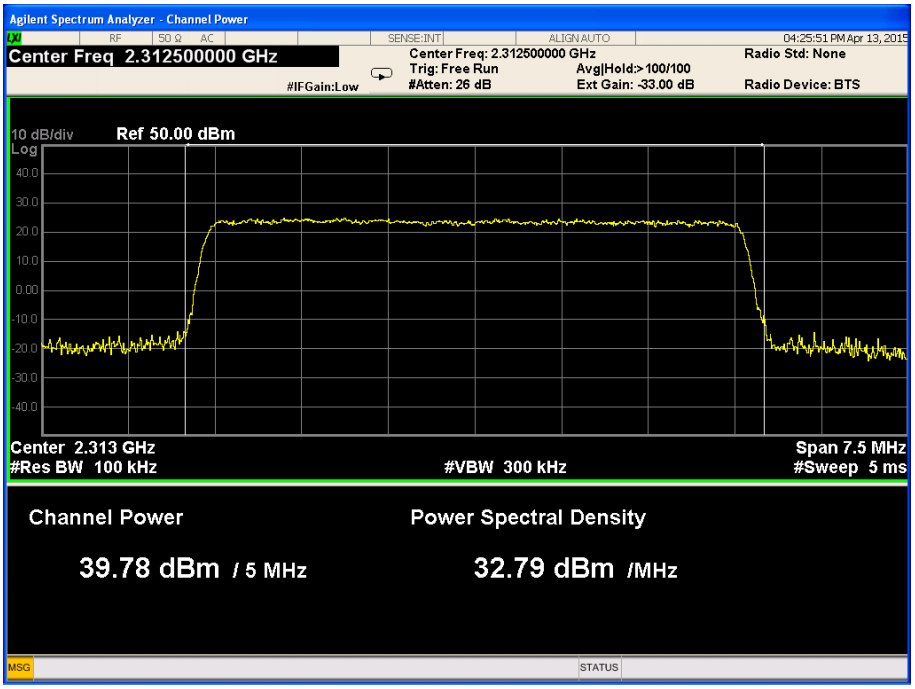


Figure 47. — 16QAM 2312.5 MHz, BW 5MHz Port 1

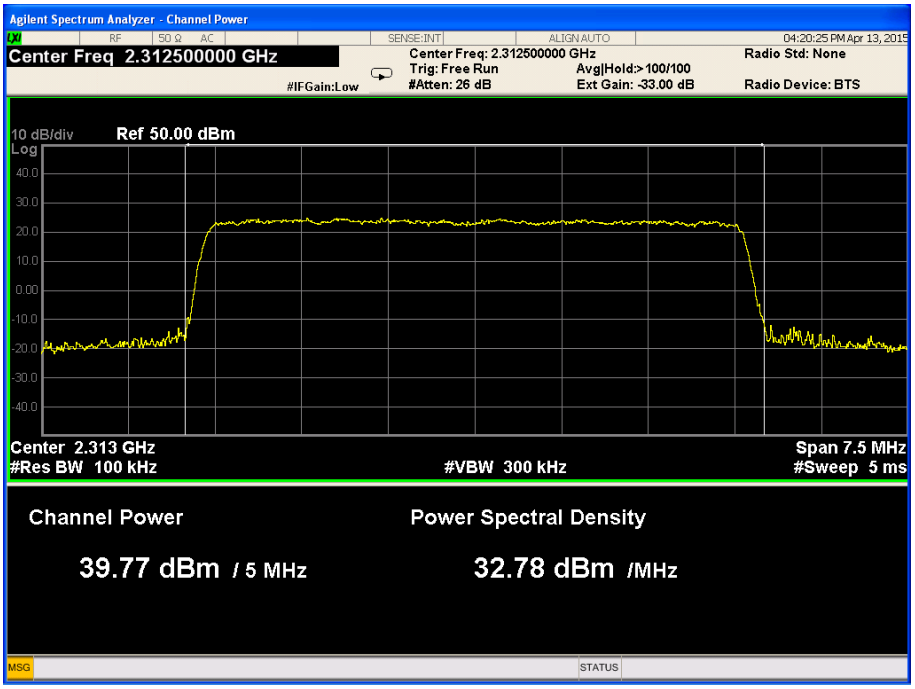


Figure 48. — 16QAM 2312.5 MHz, BW 5MHz Port 2

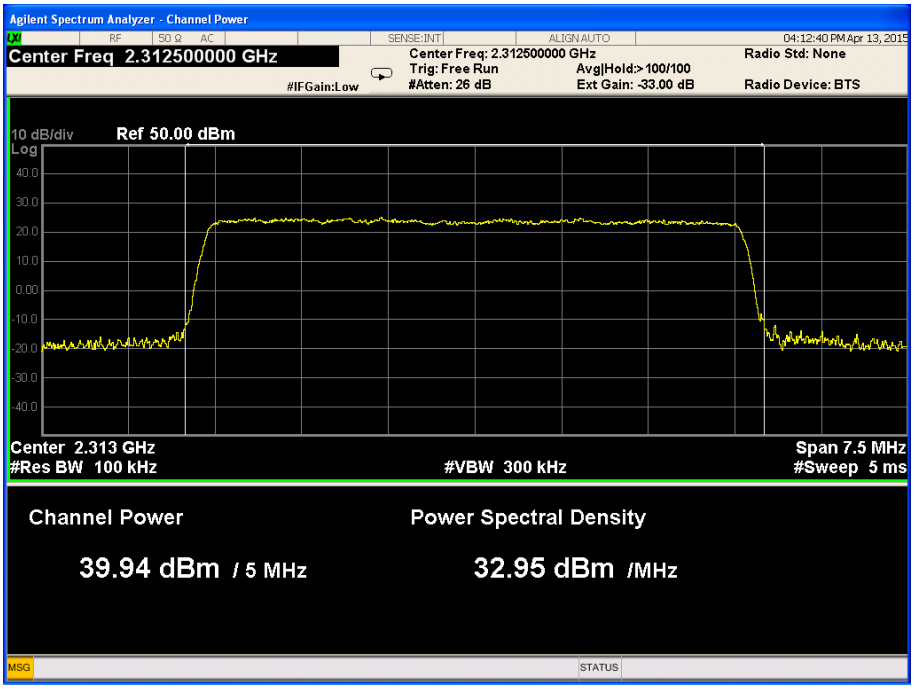


Figure 49. — 16QAM 2312.5 MHz, BW 5MHz Port 3

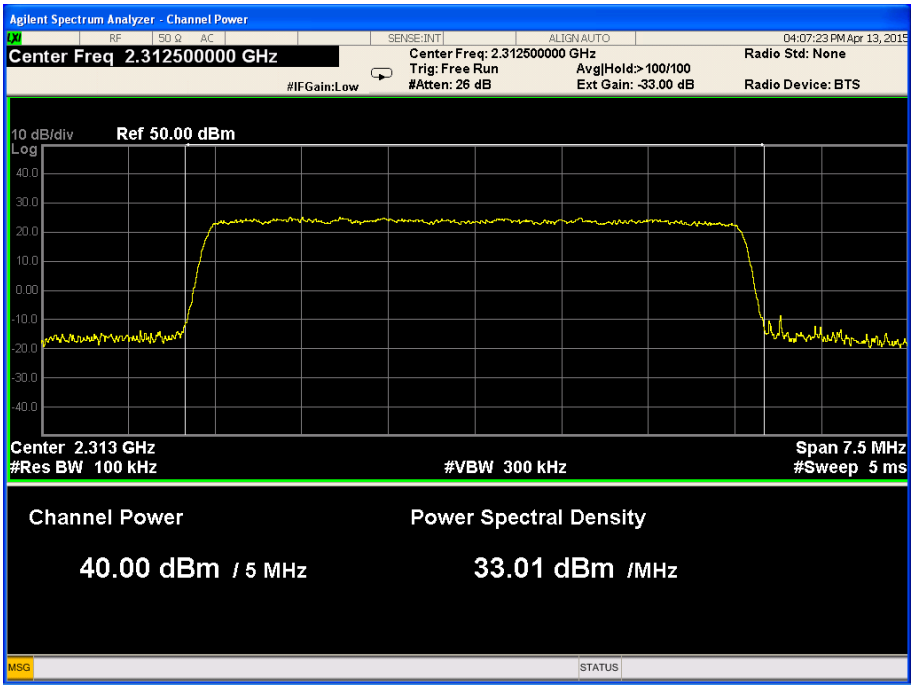


Figure 50. — 16QAM 2312.5 MHz, BW 5MHz Port 4

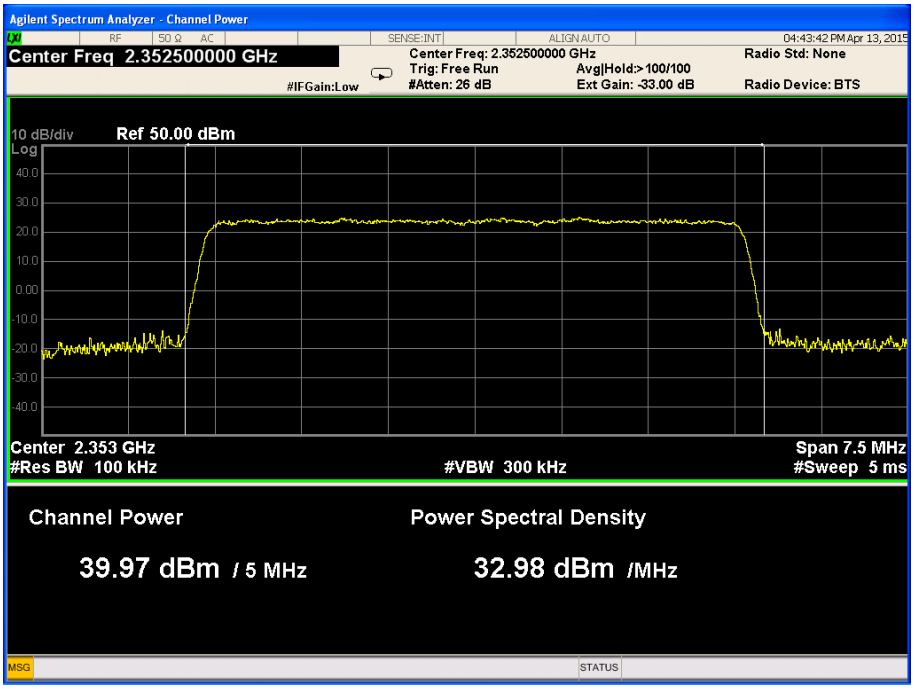


Figure 51. — 16QAM 2352.5 MHz, BW 5MHz Port 1

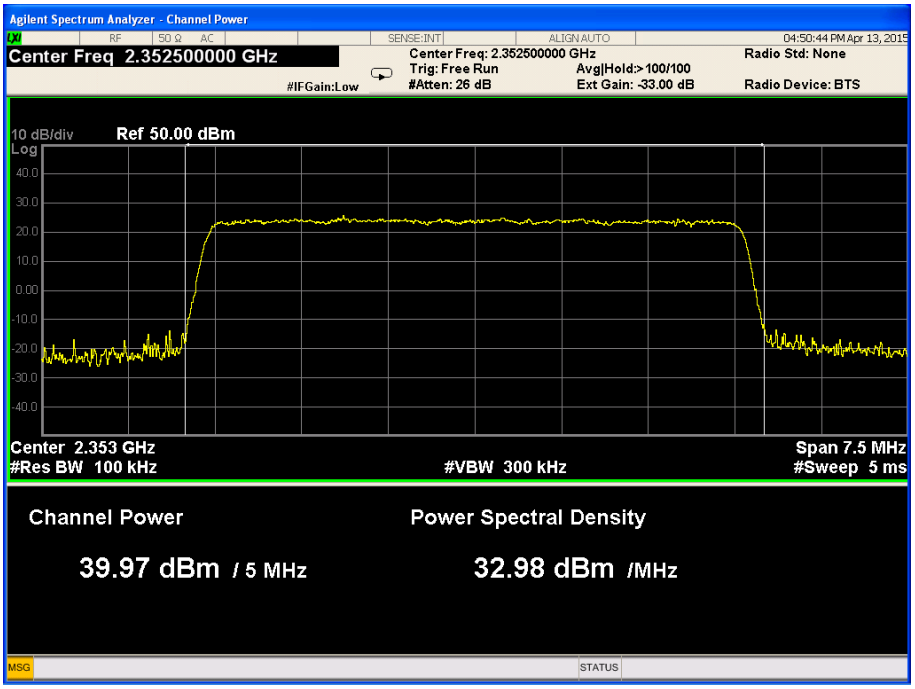


Figure 52. — 16QAM 2352.5 MHz, BW 5MHz Port 2

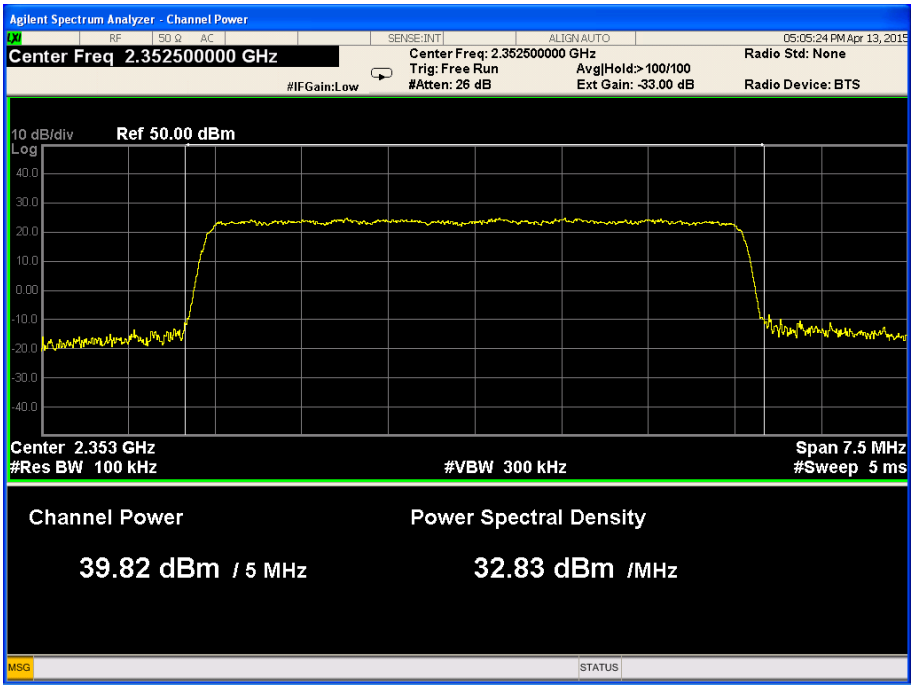


Figure 53. — 16QAM 2352.5 MHz, BW 5MHz Port 3

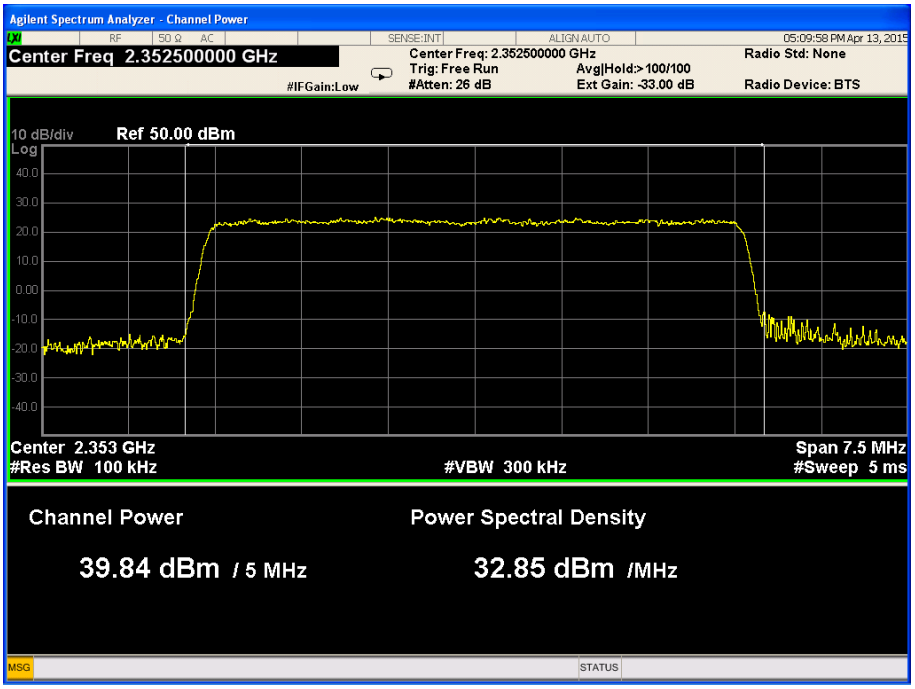


Figure 54. — 16QAM 2352.5 MHz, BW 5MHz Port 4

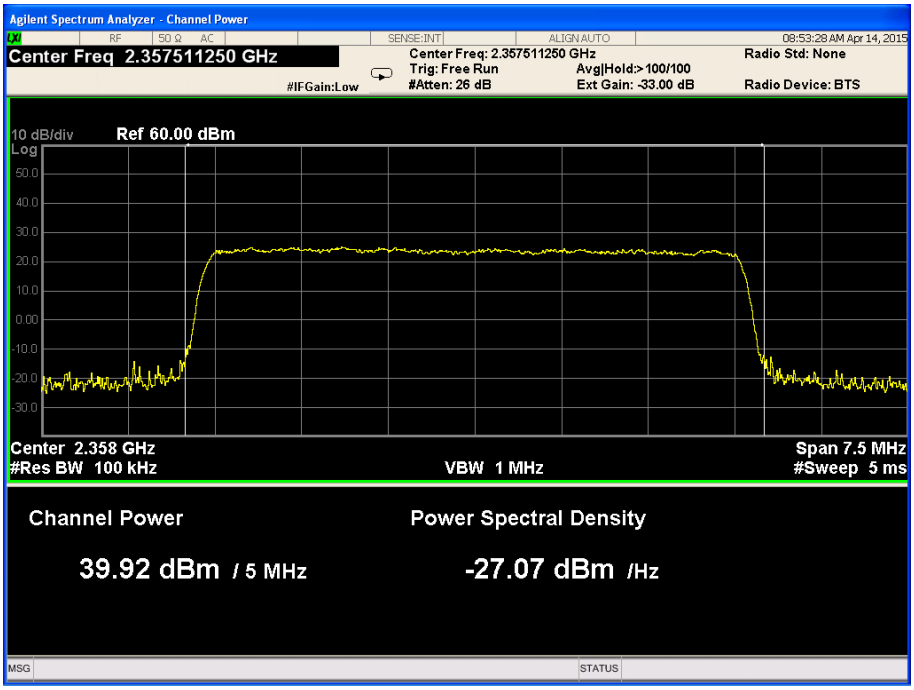


Figure 55. — 16QAM 2357.5 MHz, BW 5MHz Port 1

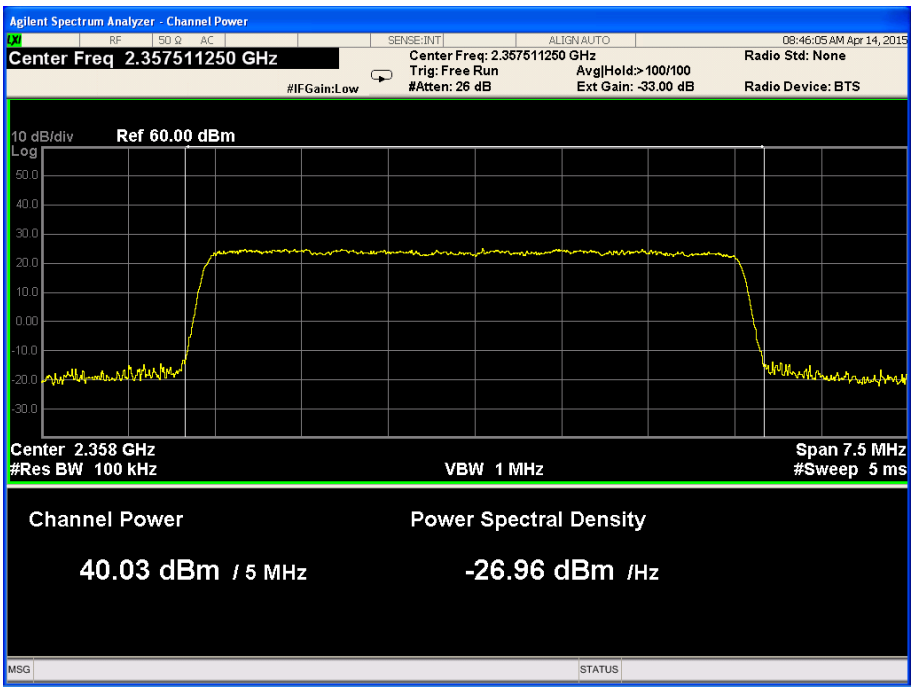


Figure 56. — 16QAM 2357.5 MHz, BW 5MHz Port 2

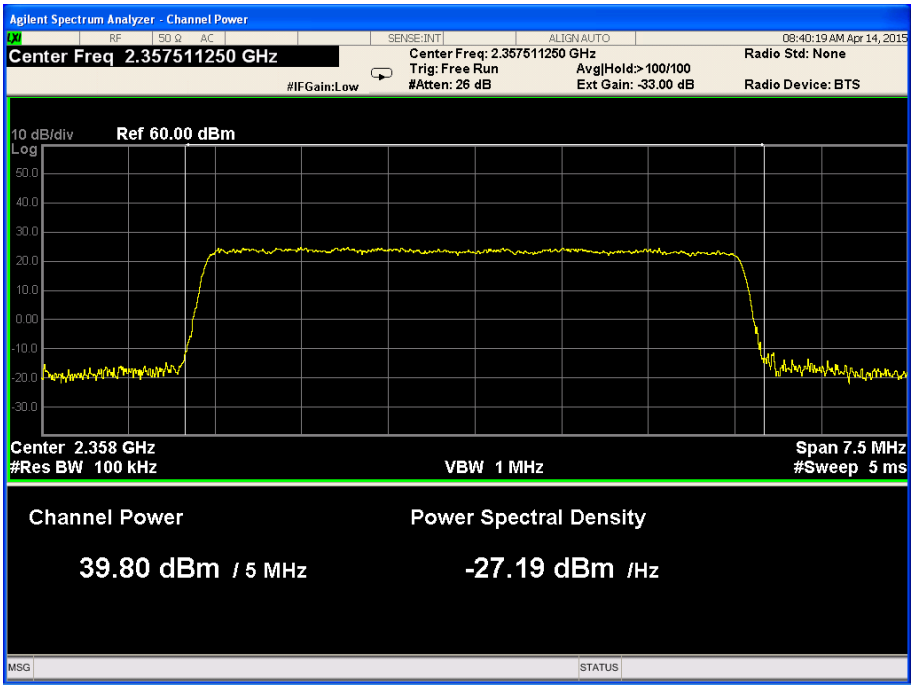


Figure 57. — 16QAM 2357.5 MHz, BW 5MHz Port 3

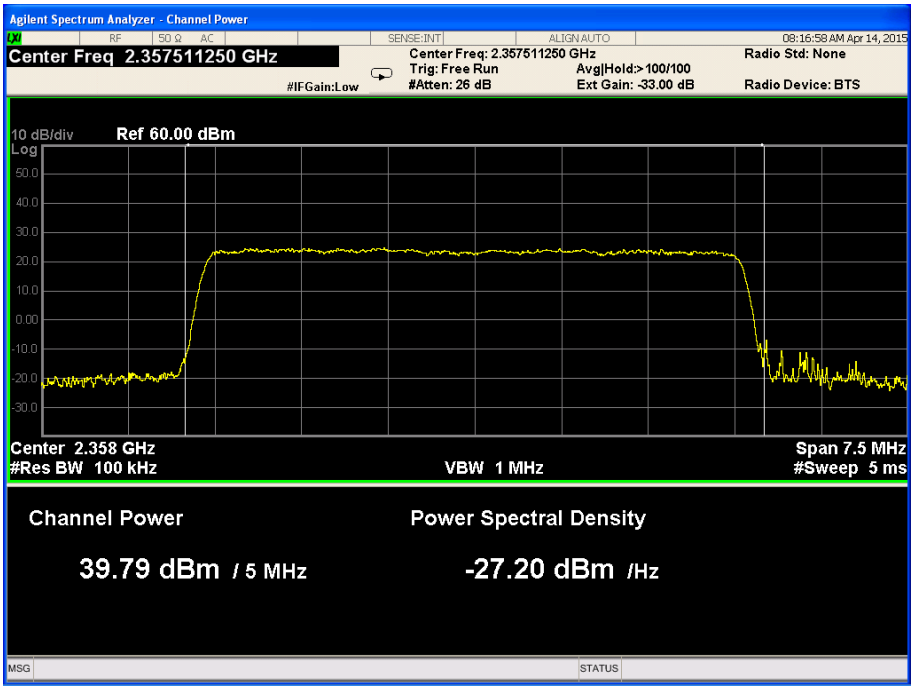


Figure 58. — 16QAM 2357.5 MHz, BW 5MHz Port 4

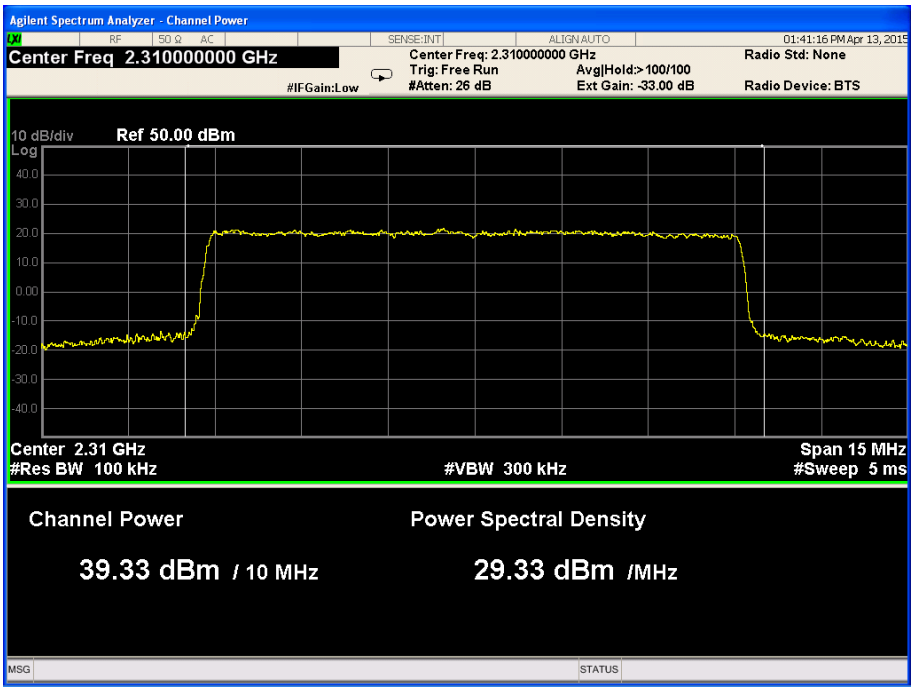


Figure 59. — 64QAM 2310.0 MHz, BW 10MHz Port l 1

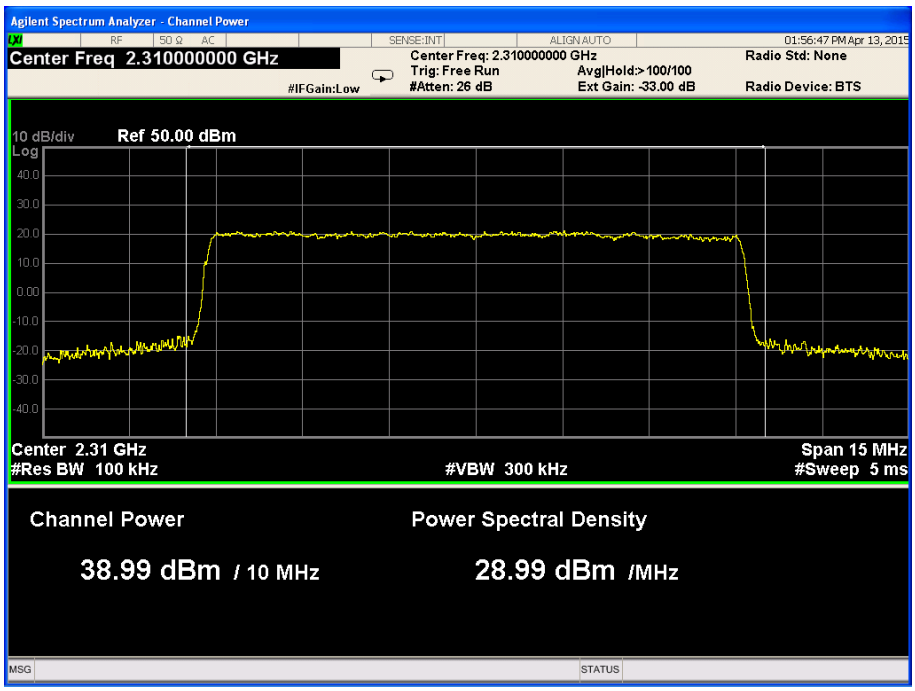


Figure 60. — 64QAM 2310.0 MHz, BW 10MHz Port 2

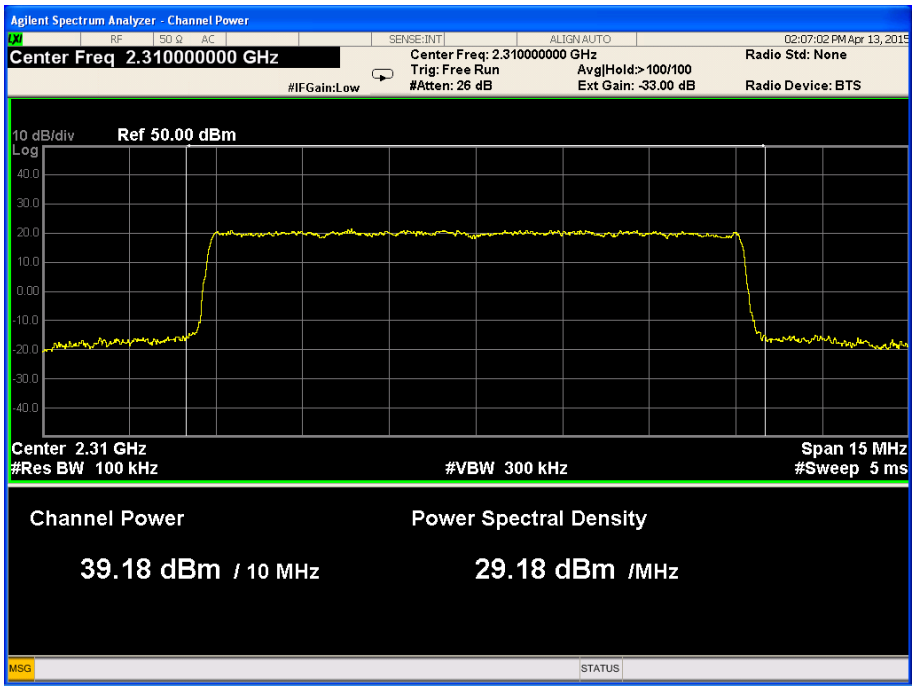


Figure 61. — 64QAM 2310.0 MHz, BW 10MHz Port 3

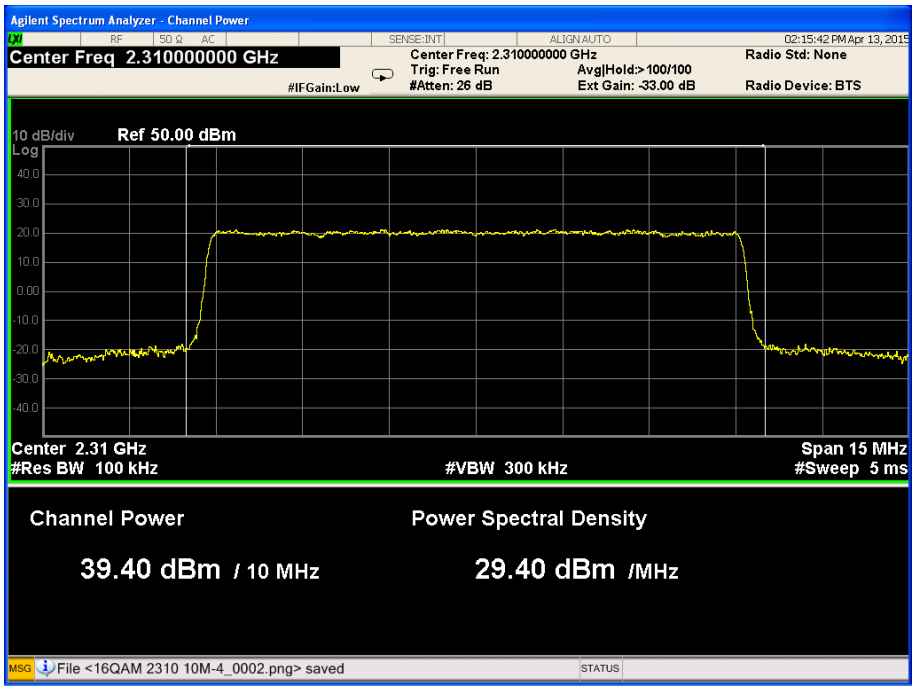


Figure 62. — 64QAM 2310.0 MHz, BW 10MHz Port 4

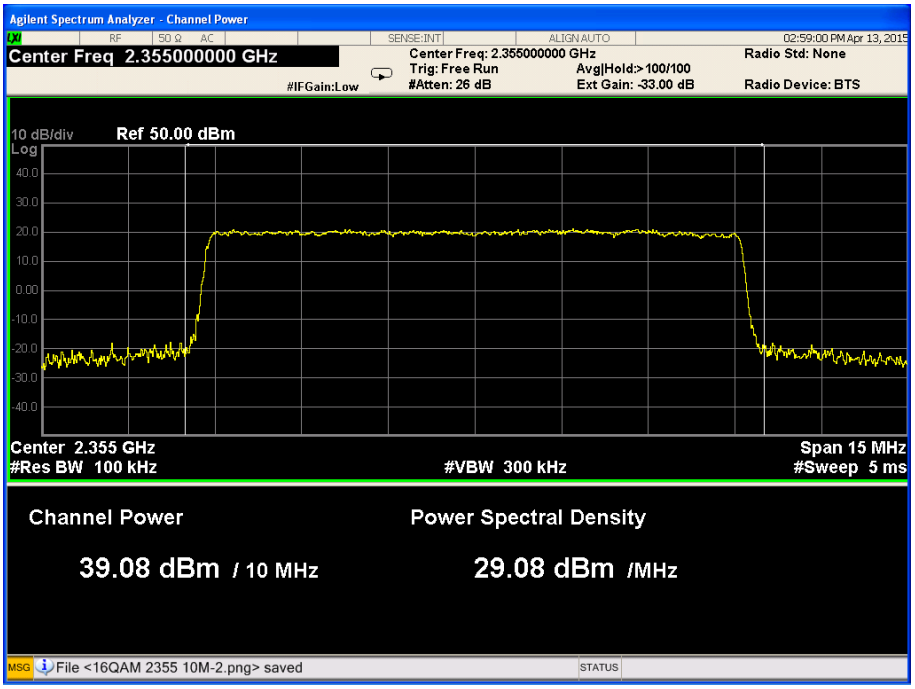


Figure 63. — 64QAM 2355.0 MHz, BW 10MHz Port 1

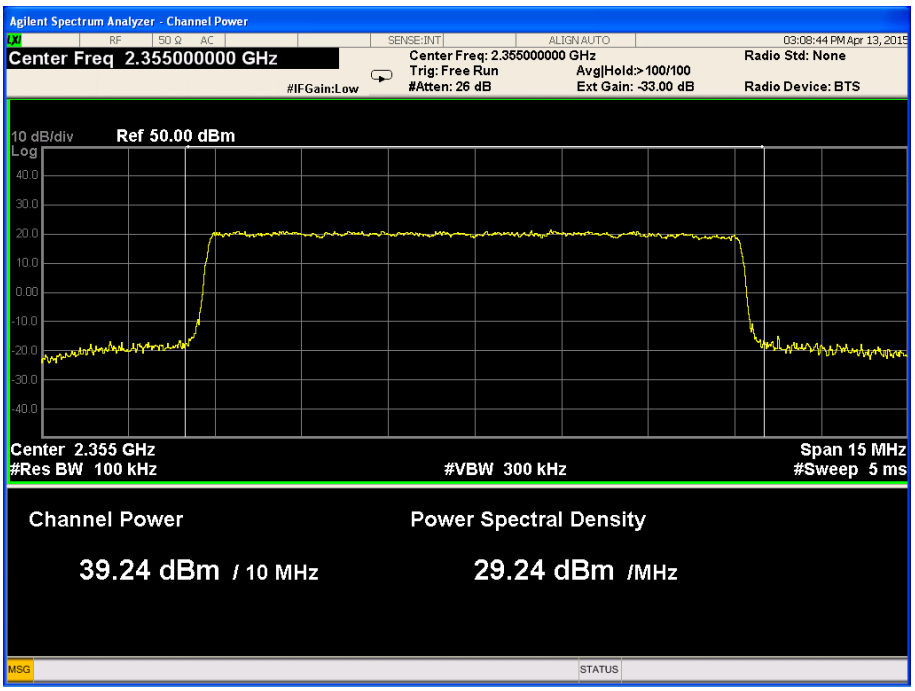


Figure 64. — 64QAM 2355.0 MHz, BW 10MHz Port 2

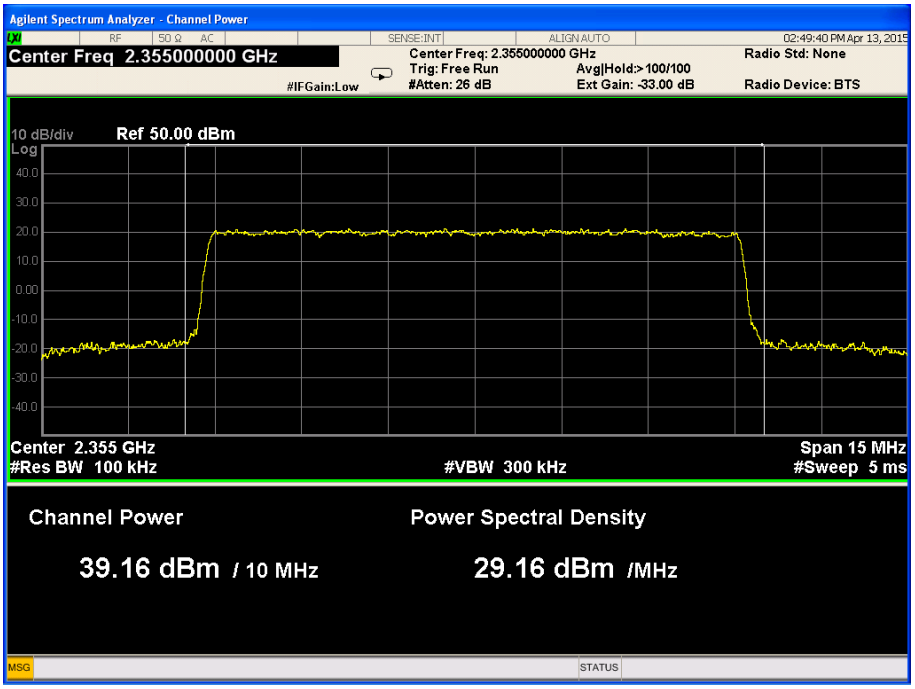


Figure 65. — 64QAM 2355.0 MHz, BW 10MHz Port 3

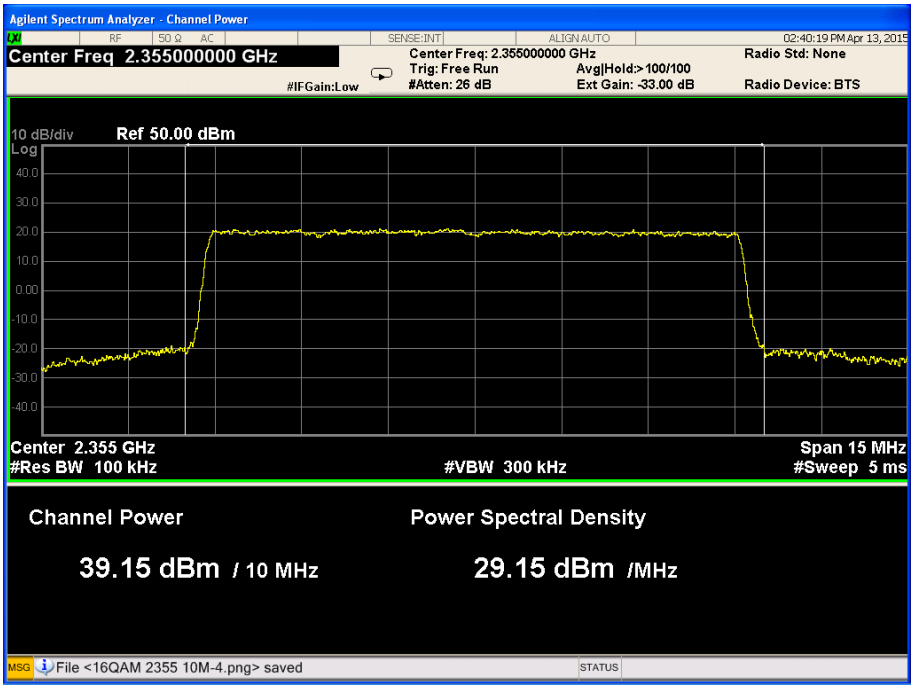


Figure 66. — 64QAM 2355.0 MHz, BW 10MHz Port 4

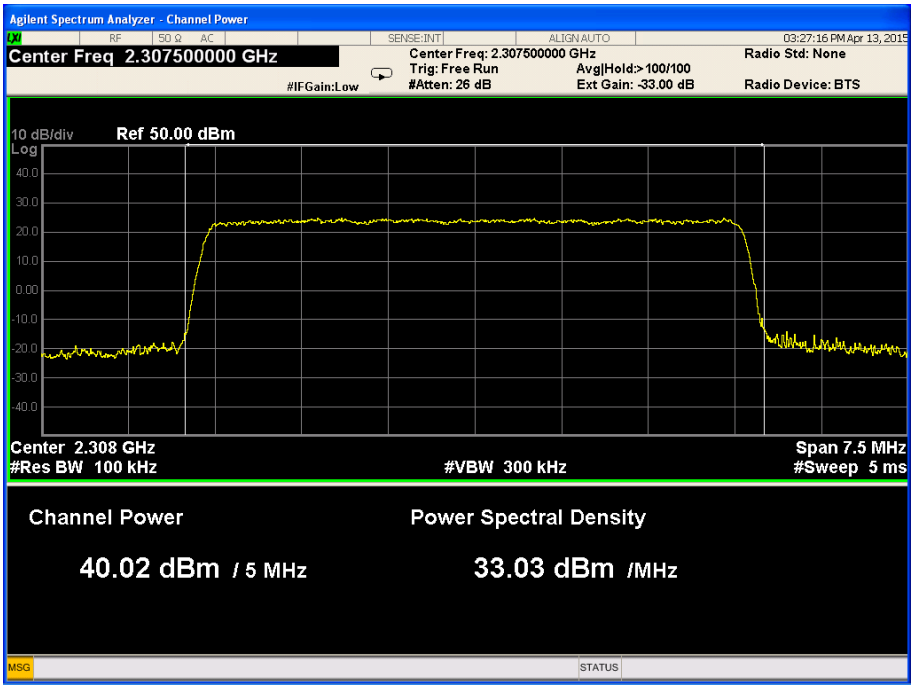


Figure 67. — 64QAM 2307.5 MHz, BW 5MHz Port 1

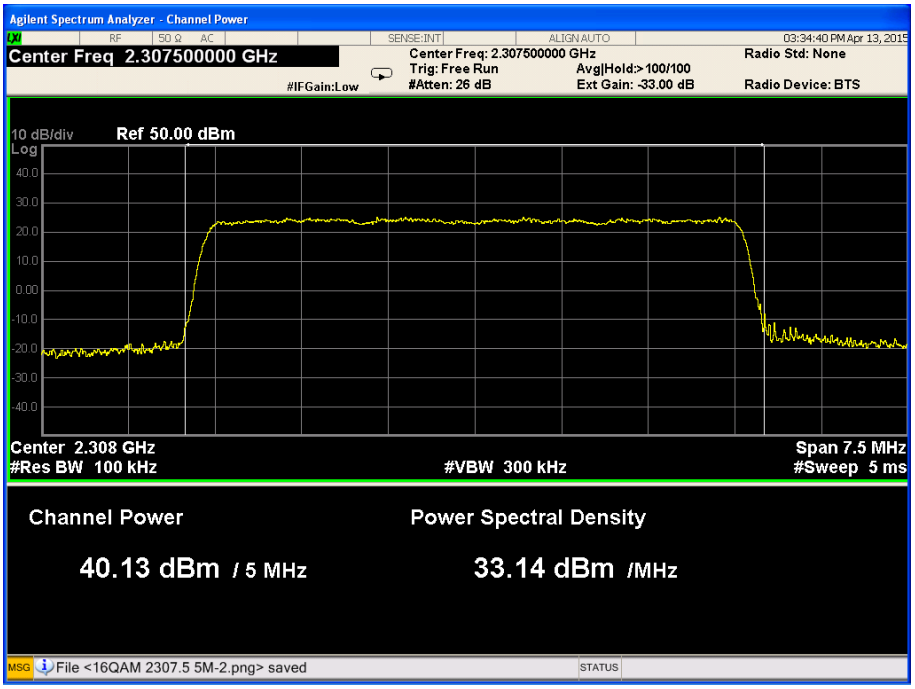


Figure 68. — 64QAM 2307.5 MHz, BW 5MHz Port 2

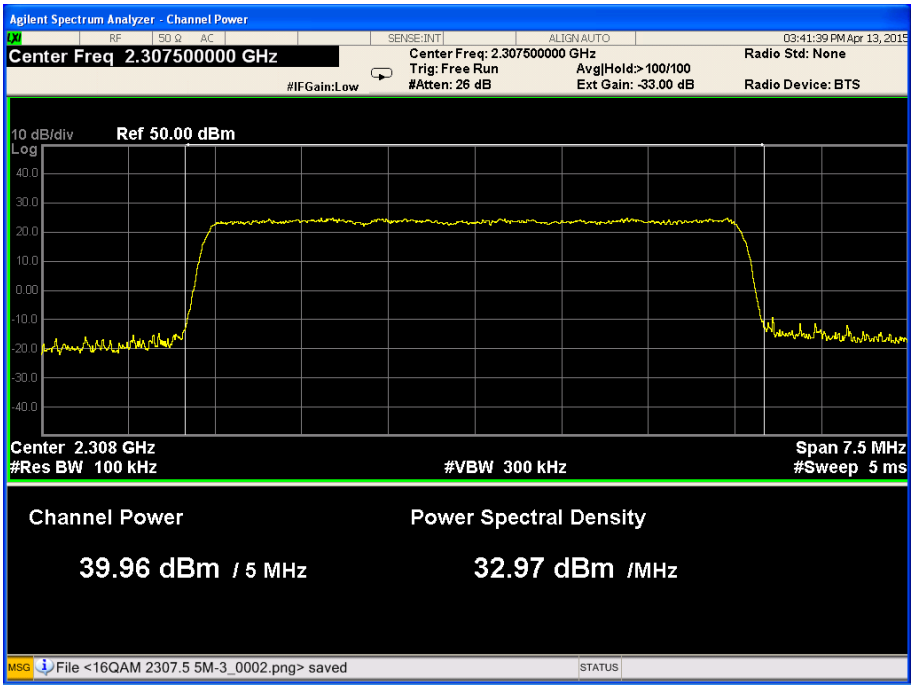


Figure 69. — 64QAM 2307.5 MHz, BW 5MHz Port 3

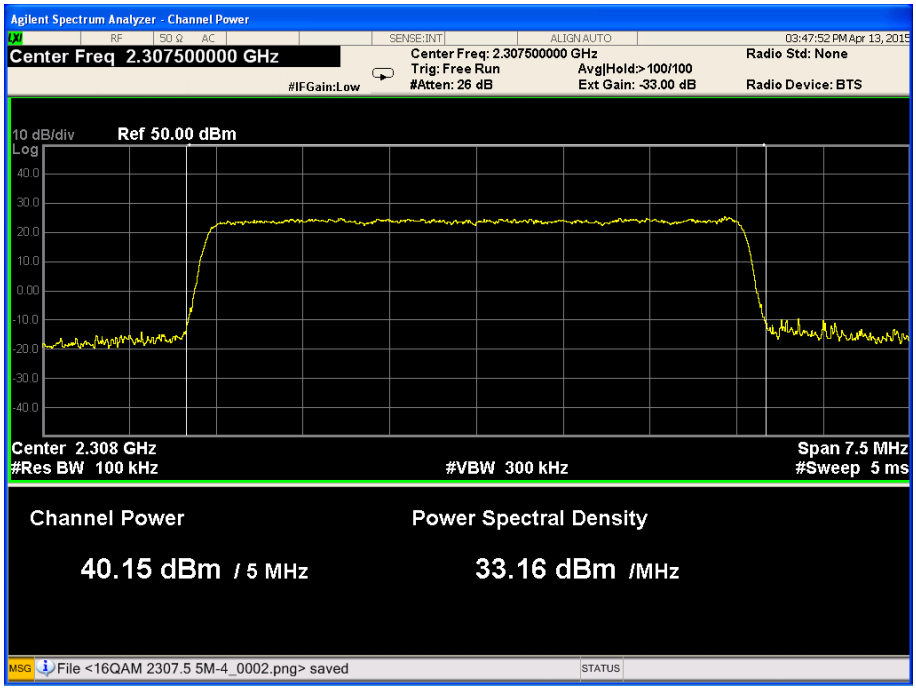


Figure 70. — 64QAM 2307.5 MHz, BW 5MHz Port 4

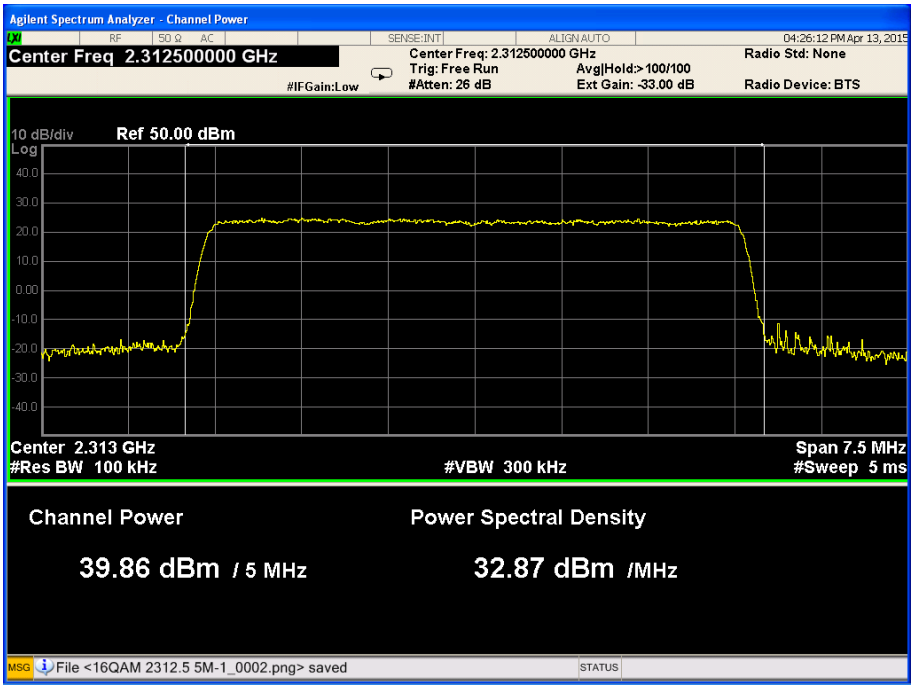


Figure 71. — 64QAM 2312.5 MHz, BW 5MHz Port 1

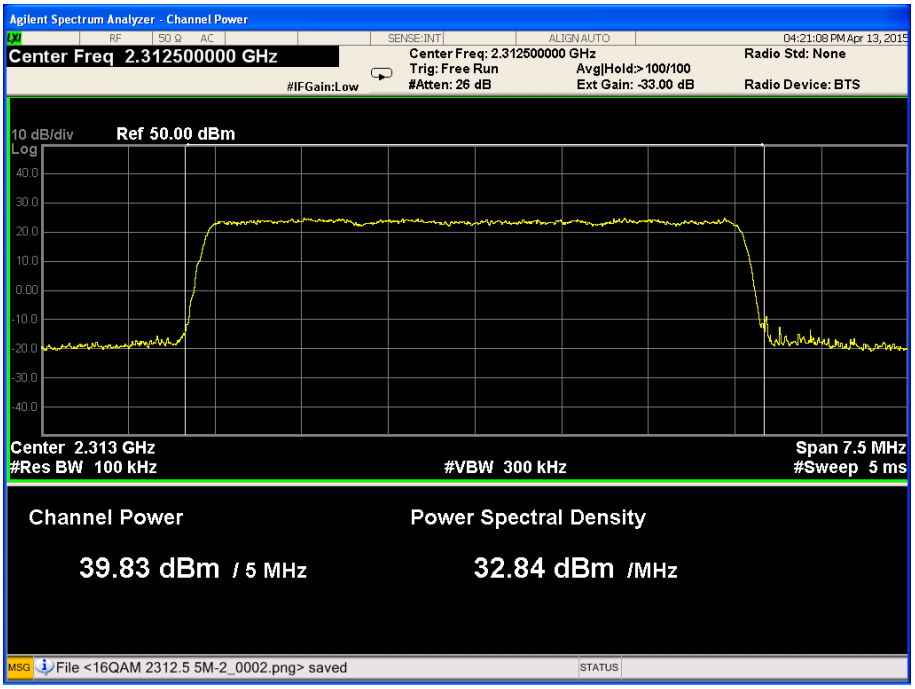


Figure 72. — 64QAM 2312.5 MHz, BW 5MHz Port 2

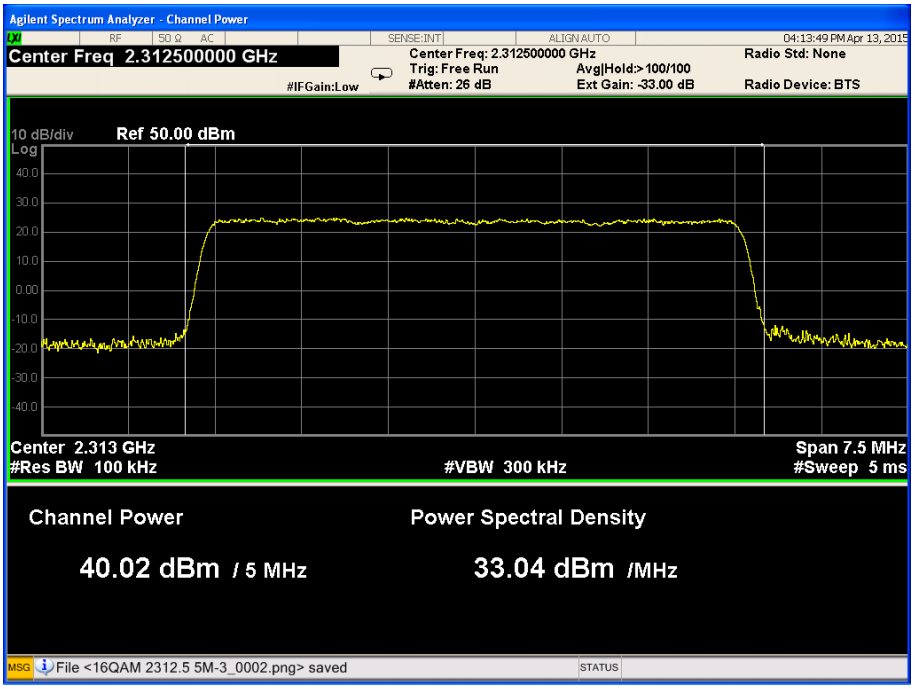


Figure 73. — 64QAM 2312.5 MHz, BW 5MHz Port 3

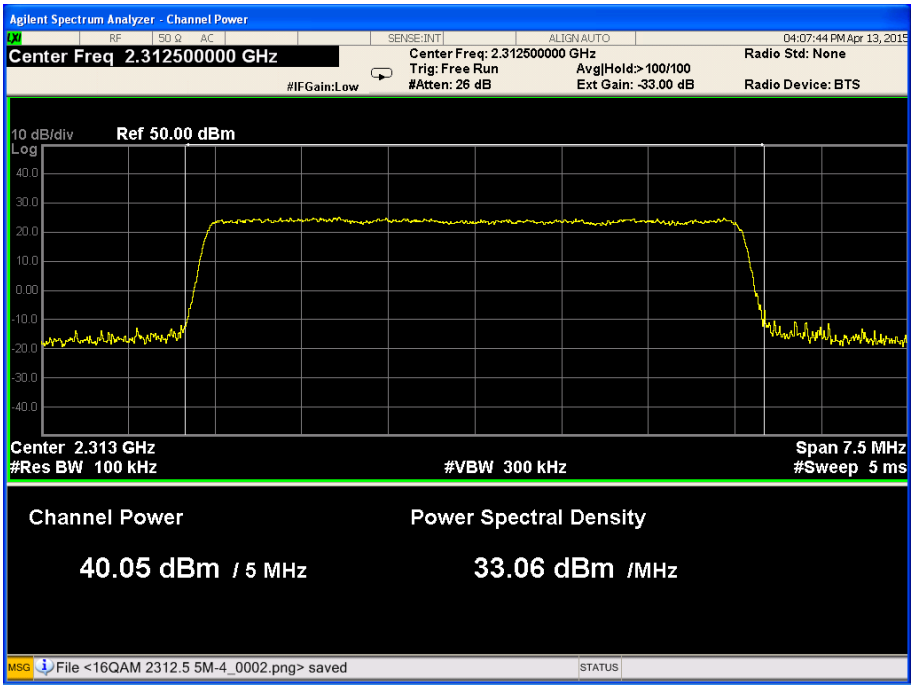


Figure 74. — 64QAM 2312.5 MHz, BW 5MHz Port 4

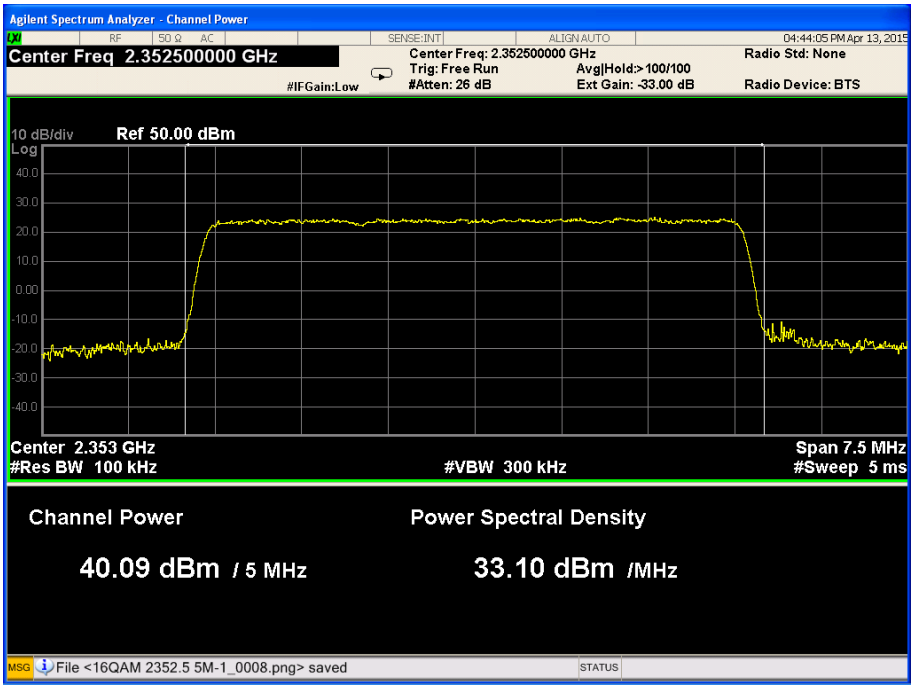


Figure 75. — 64QAM 2352.5 MHz, BW 5MHz Port 1

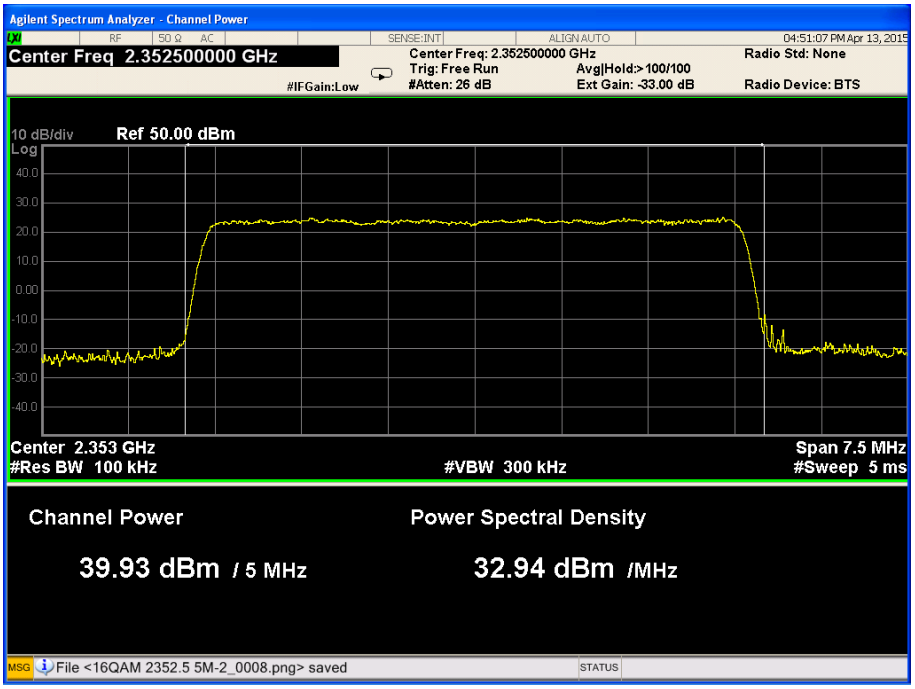


Figure 76. — 64QAM 2352.5 MHz, BW 5MHz Port 2

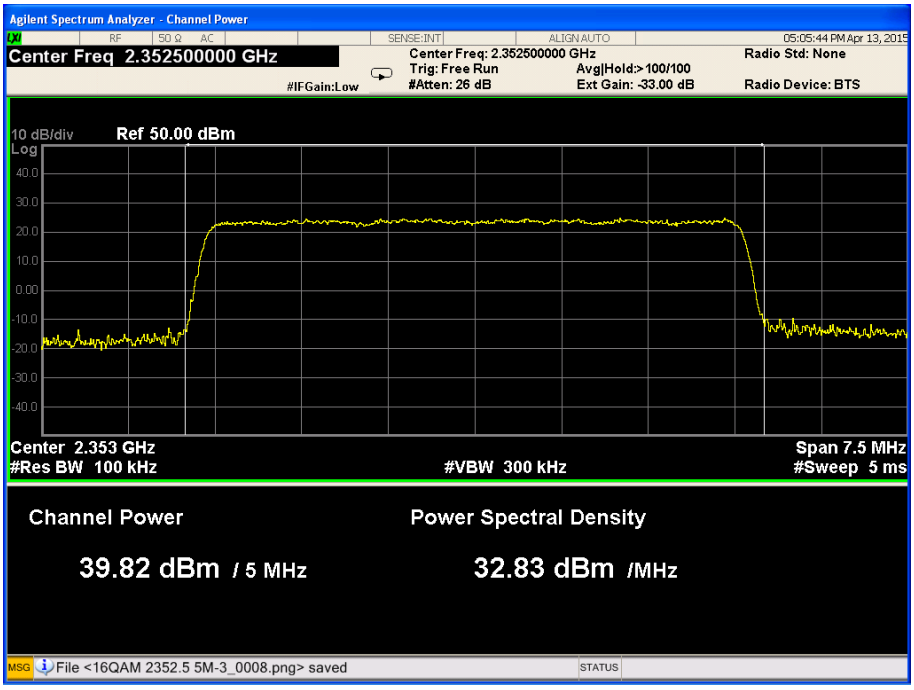


Figure 77. — 64QAM 2352.5 MHz, BW 5MHz Port 3

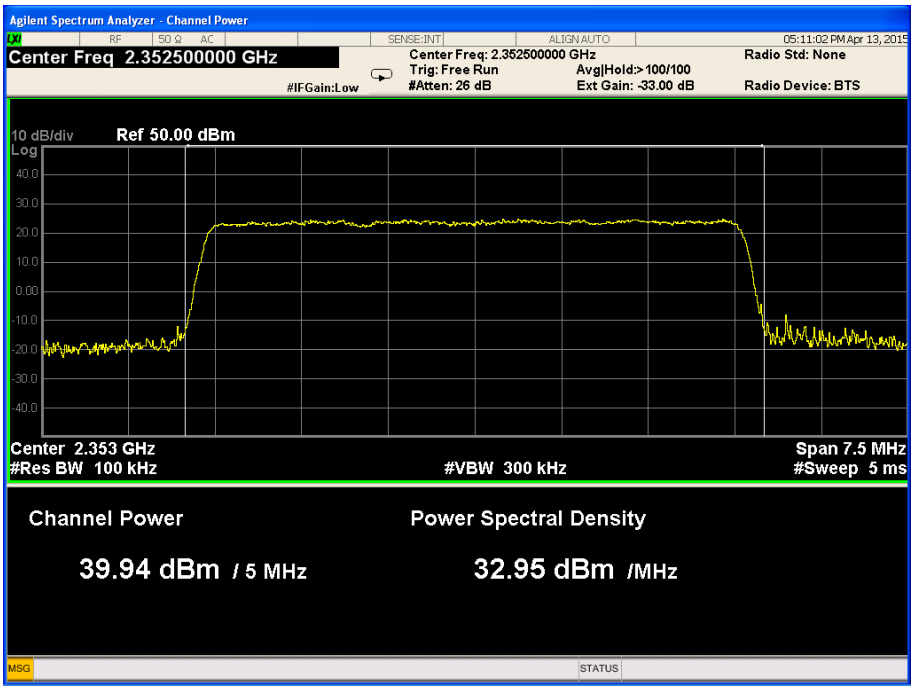


Figure 78. — 64QAM 2352.5 MHz, BW 5MHz Port 4

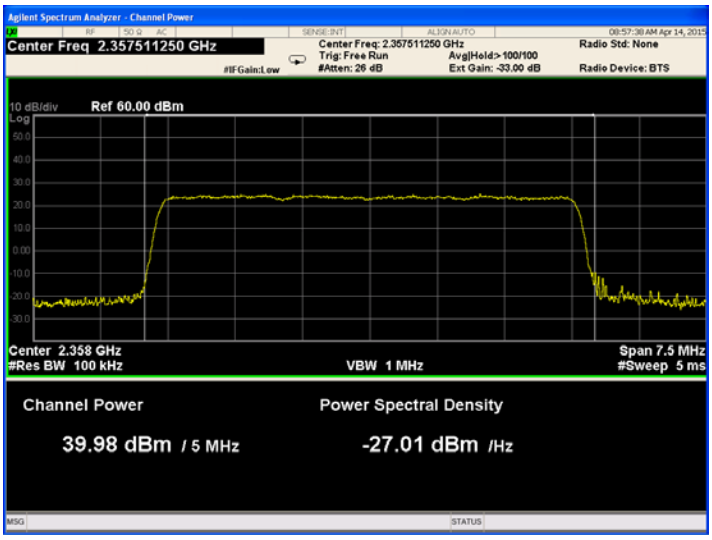


Figure 79. — 64QAM 2357.5 MHz, BW 5MHz Port 1

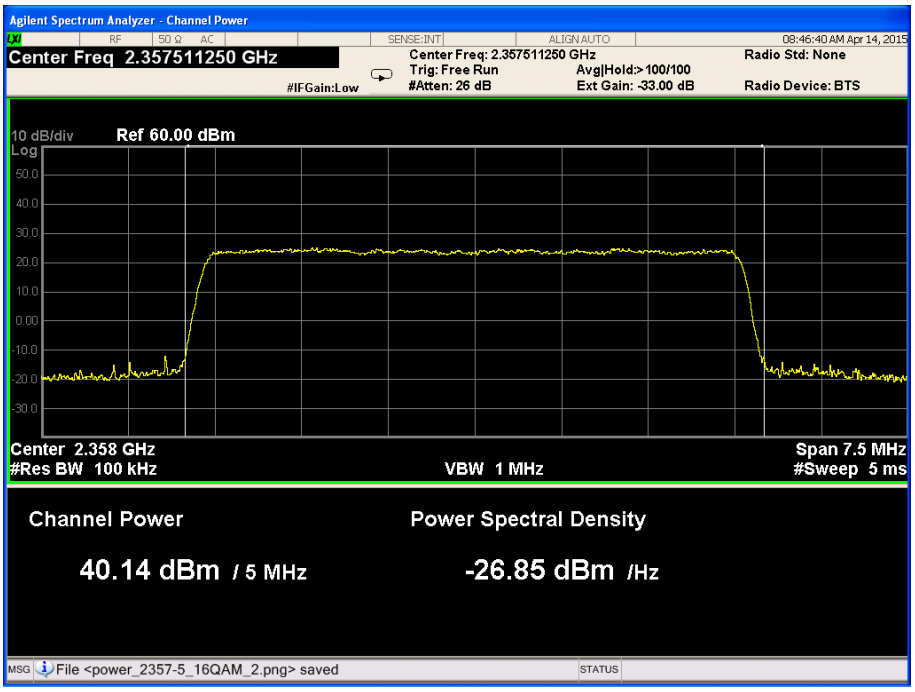


Figure 80. — 64QAM 2357.5 MHz, BW 5MHz Port 2

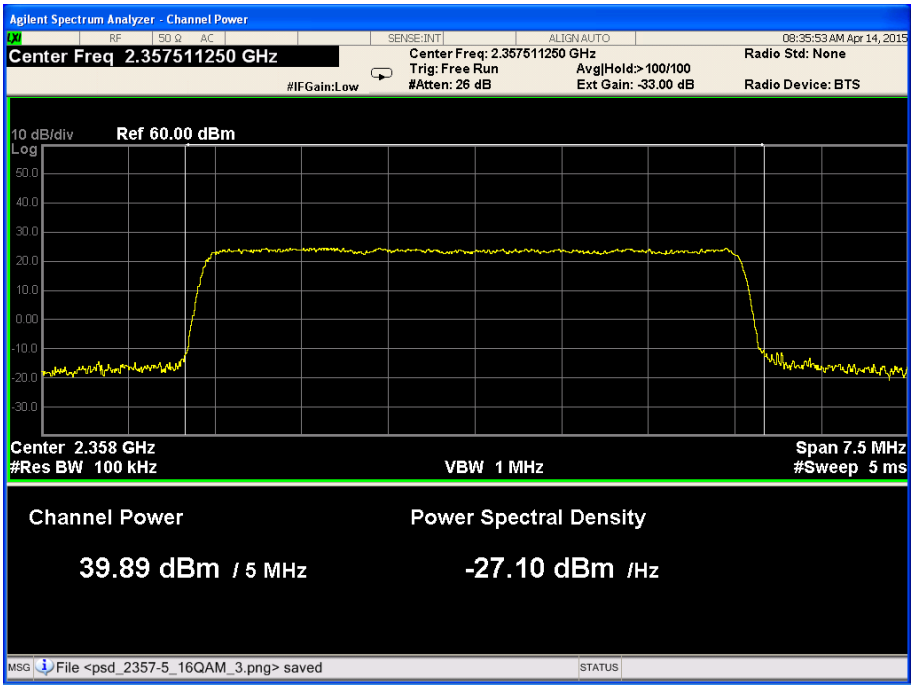


Figure 81. — 64QAM 2357.5 MHz, BW 5MHz Port 3

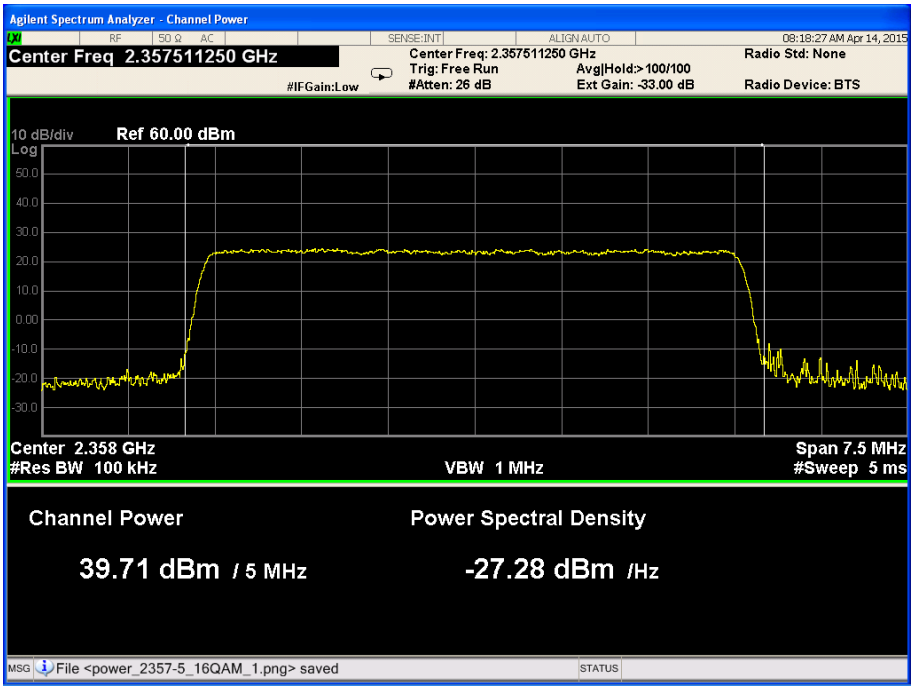


Figure 82. — 64QAM 2357.5 MHz, BW 5MHz Port 4

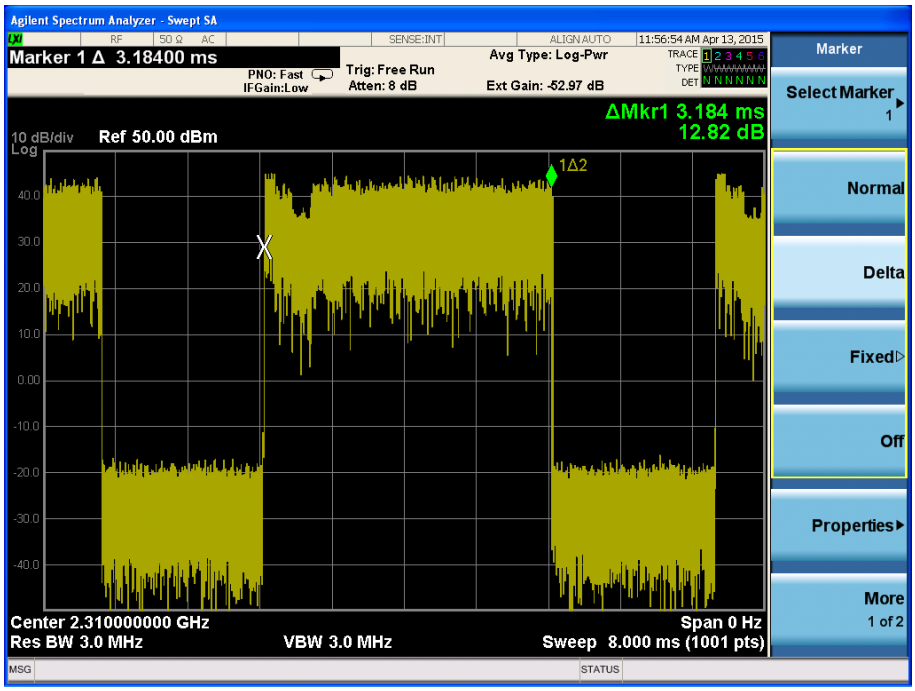


Figure 83. — Burst Time “on” = 3.1mSec

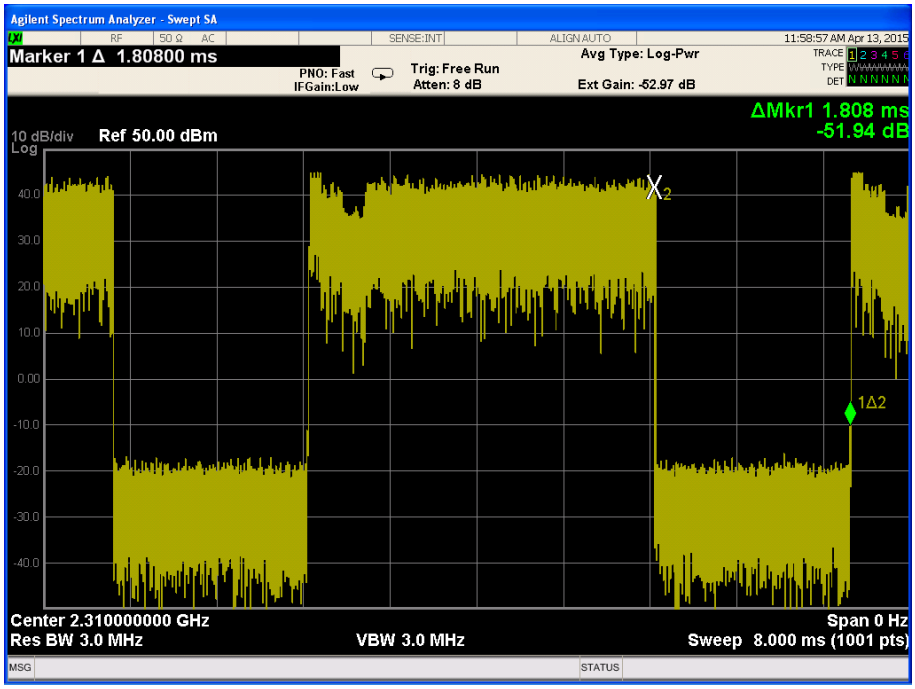


Figure 84. — Burst Time “0ff” = 1.8mSec

4.4 Test Equipment Used; Peak Output Power

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	R&S	ESIB7	100120	January 4, 2015	1 year
Spectrum Analyzer	R&S	FSL6	100194	January 1, 2015	1 year
Spectrum Analyzer	HP	8592L	3826A01204	March 4, 2015	1 year
Active Loop Antenna	EMCO	6502	2950	November 4, 2014	1 year
Biconical Log Antenna	EMCO	3142B	1078	May 22, 2014	2 years
Horn Antenna	ETS	3115	6142	March 14, 2012	3 years*
Horn Antenna	A.R.A	SWH-28	1007	March 30, 2014	2 years
D.C Block	JFW	50DB-007	1-23	N/A	N/A
Coupler	PULSAR	CS 10-05-436	10	N/A	N/A
Notch Filter	TELRAD	RMC2310_2355 D10M08	10050150	N/A	N/A
MXA Signal Analyzer	Agilent	N9020A	MY46471581	February 12 2015	2 years
Spectrum Analyzer	HP	8563E	3810A8846	November 30, 2014	1 year
10 dB Attenuator	Weinschel	33-10-34	BZ5739	N/A	N/A
5 dB Attenuator	Mini-circuits	VAT-5+	15542	N/A	N/A
Power Splitter	Mini-circuits	ZN2PD-63-S+	F442300839	N/A	N/A
Attenuator	Weinschel	24-20-34	BZ144	N/A	N/A
Attenuator	Weinschel	24-20-34	BY0842	N/A	N/A
Attenuator	Weinschel	24-20-34	BY0855	N/A	N/A
Attenuator	Weinschel	24-20-34	BY0842	N/A	N/A
Signal Generator	WILTRON	6747B	278007	October 23, 2014	1 year

Low Noise Amplifier	Sophia Wireless	LNA 28-B	232	August 29, 2014	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	August 22, 2014	1 year
Environmental Chamber	THERMOTRON CORP	SM 32C Mini Max	25-1030	February 24, 2015	1 year
Antenna Mast	ETS	2070-2	-	N/A	N/A
Turntable	ETS	2087	-	N/A	N/A
Mast & Table Controller	ETS/EMCO	2090	9608-1456	N/A	N/A

*Note – Extended to May 19, 2015

Figure 85 Test Equipment Used