July 25, 2024

Intellian Technologies USA Inc
2600 Tower Oaks Boulevard, Suite 400
Rockville, MD 20852

Dear Soniya Johnson,

Enclosed is the EMC Wireless test report for compliance testing of the Intellian Technologies USA Inc, OW11Fx. The Intellian Technologies USA Inc OW11Fx was tested to the requirements of the FCC Certification rules under Title 47 of the Code of Federal Regulations (CFR), Part 25 for Satellite Communications.

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. Please contact me if you have any questions regarding these results or if Eurofins Electrical and Electronic Testing NA, Inc. can be of further service to you.

Sincerely,

Michelle Tawmging
Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: (\Intellian Technologies USA Inc\WIR132223-FCC25 Rev. 2)

Eurofins Electrical and Electronic Testing NA, Inc. is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

ACCREDITED
TESTING CERT #0591.01

Electromagnetic Compatibility Criteria
Test Report

For the

Intellian Technologies USA Inc
OW11Fx

Tested under

FCC Certification Rules
Title 47 of the CFR, Part 25 for Satellite Communications

Report: WIR132223-FCC25 Rev. 2

July 25, 2024

Prepared For:

Intellian Technologies USA Inc
2600 Tower Oaks Boulevard, Suite 400
Rockville, MD 20852

Prepared By:
Eurofins Electrical and Electronics Testing NA, Inc.
914 W. Patapsco Ave.
Baltimore, MD 21230

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Electromagnetic Compatibility Criteria
Test Report

For the

Intellian Technologies USA Inc
OW11Fx

FCC Certification Rules
Title 47 of the CFR, Part 25 for Satellite Communications

Donald Salguero
Electromagnetic Compatibility Lab

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements.

Michael Griffiths
Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	July 8, 2024	Initial Issue
1	July 10, 2024	Updated Table 4; Added Appendix.
2	July 25, 2024	Updated FCC ID.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBμA	**D**eci**b**els above one **micro**amp
dBμV	**D**eci**b**els above one **micro**volt
dBμA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBμV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
μH	**microh**enry
μ	**microf**arad
μs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Executive Summary

A. Purpose of Test

An EMC evaluation to determine compliance of the Intellian Technologies USA Inc model OW11Fx with the requirements of Part 25 was performed. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the Intellian Technologies USA Inc model OW11Fx. Intellian Technologies USA Inc should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the OW11Fx has been **permanently** discontinued.

B. Requirements Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 25, in accordance with Intellian Technologies USA Inc, quote number 1SIR1103R1. All tests were conducted using measurement procedure ANSI C63.26-2015.

FCC Reference	Description	Compliance
§2.1051, 25.202(f)	Spurious at Antennas; Out-of-Band Emissions Limits	Compliant
§2,1046, 25.204 (a)(c)	RF Output Power	Compliant
§25,218	Off-axis EIRP Spectral Density	Compliant
§2.1049	Occupied Bandwidth	Compliant
§25.202(d)	Frequency Stability over Temperature/Voltage	Compliant
§2.1053, 25.202 (f)	Cabinet Spurious Radiation	Compliant
§1.1310	RF Exposure	Compliant

Table 1. Requirements Summary of EMC Part 25 ComplianceTesting

II. Equipment Configuration

A. Overview

Eurofins Electrical and Electronics Testing NA, Inc. was contracted by Intellian Technologies USA Inc to perform testing on the OW11Fx, under Intellian Technologies USA Inc's purchase order number 4200001387.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Intellian Technologies USA Inc, OW11Fx.

The results obtained relate only to the item(s) tested.

Model Tested:	OW11Fx	
Model Covered:	OW11Fx	
EUT Specifications:	**Primary Power:**	100-240VAC
	FCC ID:	XXZ-OW11FX
	Type of Modulations:	QPSK, 8PSK, 16QAM
	EUT Frequency Ranges:	14000-14500 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Donald Salguero	
Report Date:	July 25, 2024	

Table 2. EUT Summary Table

B. References

CFR 47, Part 25	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 25: Satellite Communications
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
KDB 971168 D01 v03r01	Measurement Guidance for Certification of Licensed Digital Transmitters
ANSI C63.26:2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.

Table 3. Standard References

C. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 914 W. Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology. Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.01) in accordance with ISO/IEC 17025:2017.

D. Equipment Configuration

Name of EUT/Model:	OW11Fx
Description of EUT and Intended Use:	The outdoor Full Duplex User terminal (FD UT) gets powered through the CNX. Intellian's **Customer Network Exchange (CNX)** units is a critical component for the user terminal installation, providing both the power and data connectivity to the Flat Panel user terminal, and the connectivity to customer equipment and networks. See the attached file for details. This half duplex unit will be used with PSA 450W. The unit runs on **56VDC**. The power supplies are already certified. The OW11FD is an electronically scanned array (ESA) user terminal (UT) which can be operated in the OneWeb low earth orbit (LEO) satellite constellation. The OneWeb communications network comprises terrestrial gateways positioned around the globe communicating with OneWeb user terminals. A radio link to the satellites is established using the UT operating in the Ku-band. The UT provides network and Internet access via the OneWeb distribution partners.
Selected Operation Mode(s):	In order to test the unit in a non-intentional radiation Mode: - We will require the busy scripts running on 'MobaXterm' (in order to power ON the different components of the UT which includes ACU & SSM) - Also run Panel scripts on 'Pycharm' (to initiate Tx & Rx Antenna switching on Panel) In order to test the unit in an intentional radiation Mode: - In addition to running the above scripts, we will be able to start transmission on the Tx/Rx Panel using QDART (includes QPST & QRCT)
Rational for the selection of the Operation Mode(s):	The worst case operation of the UT was implemented based on the internal Investigation by the team. The UT is made to operate at Max Power by implementing Tx/Rx Antenna Switching and the Critical Components are fully functional.
Susceptibility Criteria:	The loss of function is identified when the script that is used for the full operation mode shows error message and stops the feedback messages that we normally see which includes the Tx/Rx switching and temperature of the antenna element.
Monitoring Method(s):	You can use a Power Meter to check the Power Consumption. It should be ~56W when just the CNX WiFi is ON with 3 indicator lights. The Power Consumption goes to ~300-340W when the FD UT Antenna Panels are powered ON by running the Python and Busy scripts for ACU & SSM.
Emissions Class Declaration:	Class B
Configurations:	The testing is done as a system, which includes the CNX-WiFi Connected to Power Adapter & Power Cord. The CNX WiFi has a Coax Port which connects to the Coax cable. The other end of the Coax cable connects to the Half Duplex Antenna.
Rated Power Input	
Input Voltage Range:	100-240VAC
AC or DC:	AC
Voltage Frequency:	-
Number of Phases:	1
Current:	8.05A(max)

Uses an external AC/DC Adapter:	True
Manufacturer:	AdapterTech
Model #:	ATM450A2-P560
Part #:	-
Serial #:	-
The EUT can be battery powered:	False
Power Input Under Test	
Input Voltage:	240VAC
Frequency:	50-60Hz
Physical Description	
EUT Arrangement:	Table Top
System with Multiple Chassis?	False
Size (HxWxD) inches:	37.8” x 19.7” x 4.7”
Weight (lbs):	41lbs
Highest Internal Frequency (MHz):	-
Other Info	
EUT Software (Internal to EUT):	QDART (QPST & QRCT)
Support Software (used by support PC to exercise EUT):	Pycharm & MOBAXterm
Firmware:	V 1.0.0.7
Transmitter Parameters	
Description of your unit:	User Terminal Antenn
Modulation Type:	-
Number of Channels:	0
Frequency Range (MHz):	12000-18000
Antenna Type:	-
Antenna Gain (dB):	-
PMN:	Flat Panel Enterprise Series
HVIN:	OW11Fx
FVIN:	V 1.0.0.7
HMN:	Flat Panel Enterprise Ser
Data Rates:	-
Expected Power Level:	-
Number of Antenna:	0
Number of Intentional Transmitters:	0
Number of Certified Intentional Transmitter Modules:	0
FCC ID:	-
IC ID:	-

Table 4. Equipment Details

Name/Description	Model Number	Part Number	Serial Number	Rev. #
User Terminal Antenna (Full Duplex UT)	OW11Fx	PS-OW11FF-W	P11FL24030020	N/A
CNX - WiFi	BL5008	N.A.	5008233800002	V 0.5
450 Watt AC Adapter	ATM450A2-P560	N/A	N/A	N/A

Table 5. EUT List

Port Name on EUT	Cable Desc. or reason for none	3 Meters or Longer	Length as tested (m)	Max Length (m)	Shielded?	Termination Box ID & Port Name
HD UT - Coax Out	Coax Cable	Yes	3	100	Yes	CNX Wi-Fi - Coax In
CNX Wi-Fi - Ethernet	Ethernet	Yes	3	100	No	Laptop
AC Adapter - AC In	3-Conductor (18 AWG) AC Power	No	1.8	1.8	No	AC Mains
AC Adapter - DC Out	2-Conductor (18 AWG) 56 VDC	No	1.2	1.2	No	CNX Wi-Fi - DC In

Table 6. Ports and Cabling

Name/Description	Manufacturer	Model Number	Serial Number	*Customer Supplied Calibration Data
Dell Laptop	N.A.	N.A.	N.A.	N.A.

Table 7. Support Equipment List

E. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

F. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Intellian Technologies USA Inc upon completion of testing.

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Satellite Communications

§2,1046, 25.204 (a)(c) RF Output Power

Test Requirement(s): **§25.204(a):** In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV, operating in frequency bands between 1 and 15 GHz, shall not exceed the following limits except as provided for in paragraph (c) of this section:

+ 40 dBW in any 4 kHz band for $\theta \leq 0°$

+ 40 + 3θ dBW in any 4 kHz band for $0° < \theta \leq 5°$

where θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

(c) For angles of elevation of the horizon greater than 5° there shall be no restriction as to the equivalent isotropically radiated power transmitted by an earth station towards the horizon.

Test Procedure: For output power measurements**,** the EUT was connected directly to a spectrum analyzer using appropriate attenuation. Settings for the spectrum analyzer were followed using the reference subclause 5.2.4.4.1 of ANSI C63.26-2015. An RMS Power averaging detector was selected and the trace was averaged over at least 100 traces. The RF Output Power was recorded.

For output power measurements in any 4kHz band. The average power spectral density was measured according to subclause 5.2.4.5 of ANSI C63.26-2015. Measurements using a RBW lower than 4kHz were corrected by a factor of $10\log(RBW_{REF} / RBW_{MEAS})$. Due to number of points limitations, a peak prescan measurement was performed first then the average measurement was narrowed down to the 10MHz window centered at the peak found on peak prescan.

Test Results: The EUT is **compliant** with the requirements of this section.

Test Engineer: Donald Salguero

Test Date: June 14, 2024

4kHz EIRP

Modulation	Nominal Bandwidth (MHz)	Center Frequency (GHz)	4kHz Conducted Power (dBm)	Bandwidth Correction (dB)	Gain (dBi)	4kHz EIRP (dBm)	Limit (dBm)
QPSK	20	14.013	-16.06	0.11	48.5	32.55	70.00
		14.263	-15.91	0.11	48.5	32.70	70.00
		14.487	-15.88	0.11	48.5	32.73	70.00
	40	14.0229	-15.64	0.11	48.5	32.97	70.00
		14.2729	-15.42	0.11	48.5	33.19	70.00
		14.4771	-15.78	0.11	48.5	32.83	70.00
8PSK	20	14.013	-16.78	0.11	48.5	31.83	70.00
		14.263	-16.53	0.11	48.5	32.08	70.00
		14.487	-16.43	0.11	48.5	32.18	70.00
	40	14.0229	-15.55	0.11	48.5	33.06	70.00
		14.2729	-15.17	0.11	48.5	33.44	70.00
		14.4771	-15.37	0.11	48.5	33.24	70.00
16QAM	20	14.013	-16.11	0.11	48.5	32.50	70.00
		14.263	-16.36	0.11	48.5	32.25	70.00
		14.487	-16.18	0.11	48.5	32.43	70.00
	40	14.0229	-16.07	0.11	48.5	32.54	70.00
		14.2729	-15.72	0.11	48.5	32.89	70.00
		14.4771	-15.93	0.11	48.5	32.68	70.00

Table 8. 4kHz EIRP, Test Results

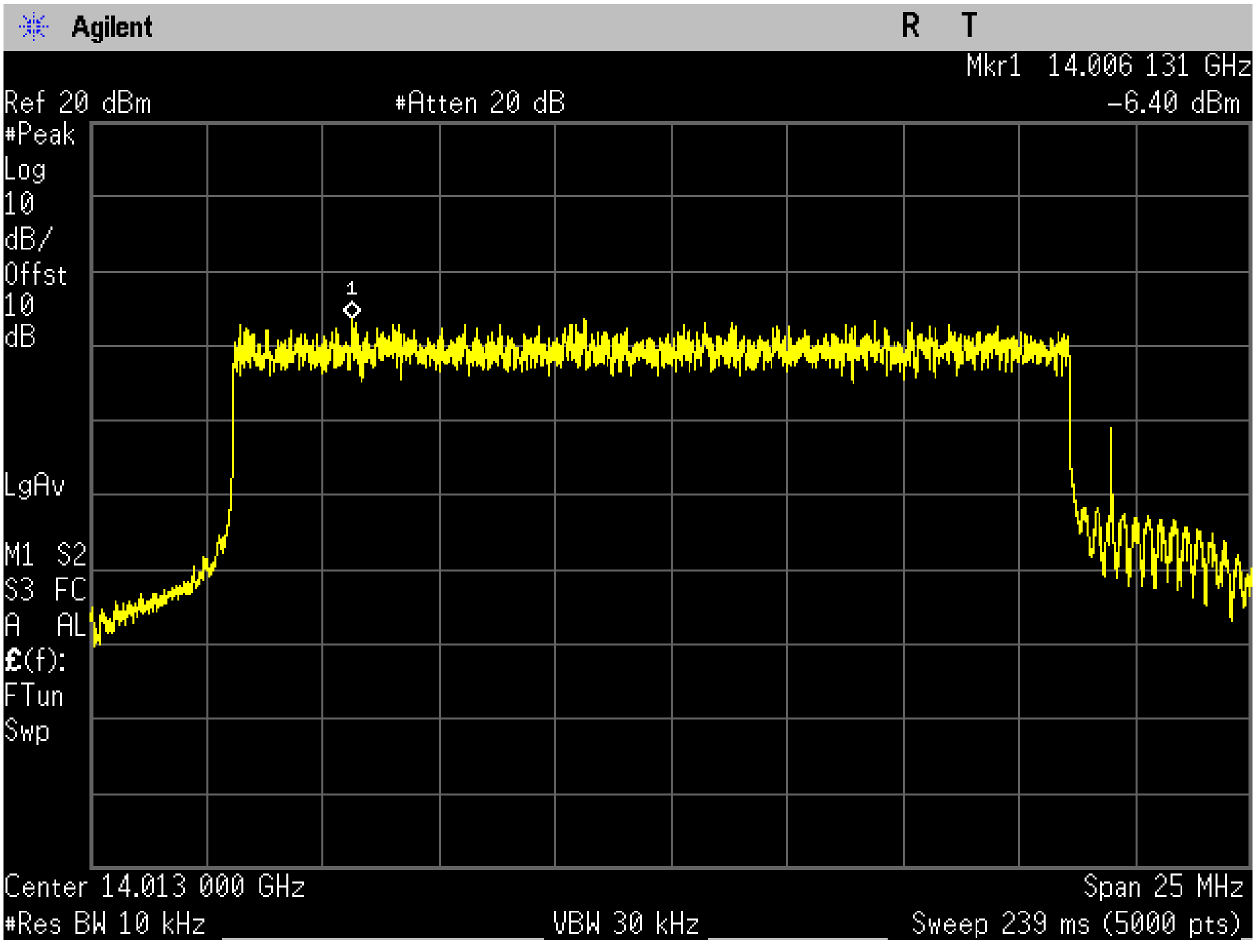


Figure 1. EIRP PSD, QPSK, 20MHz, Low Channel (PreScan).

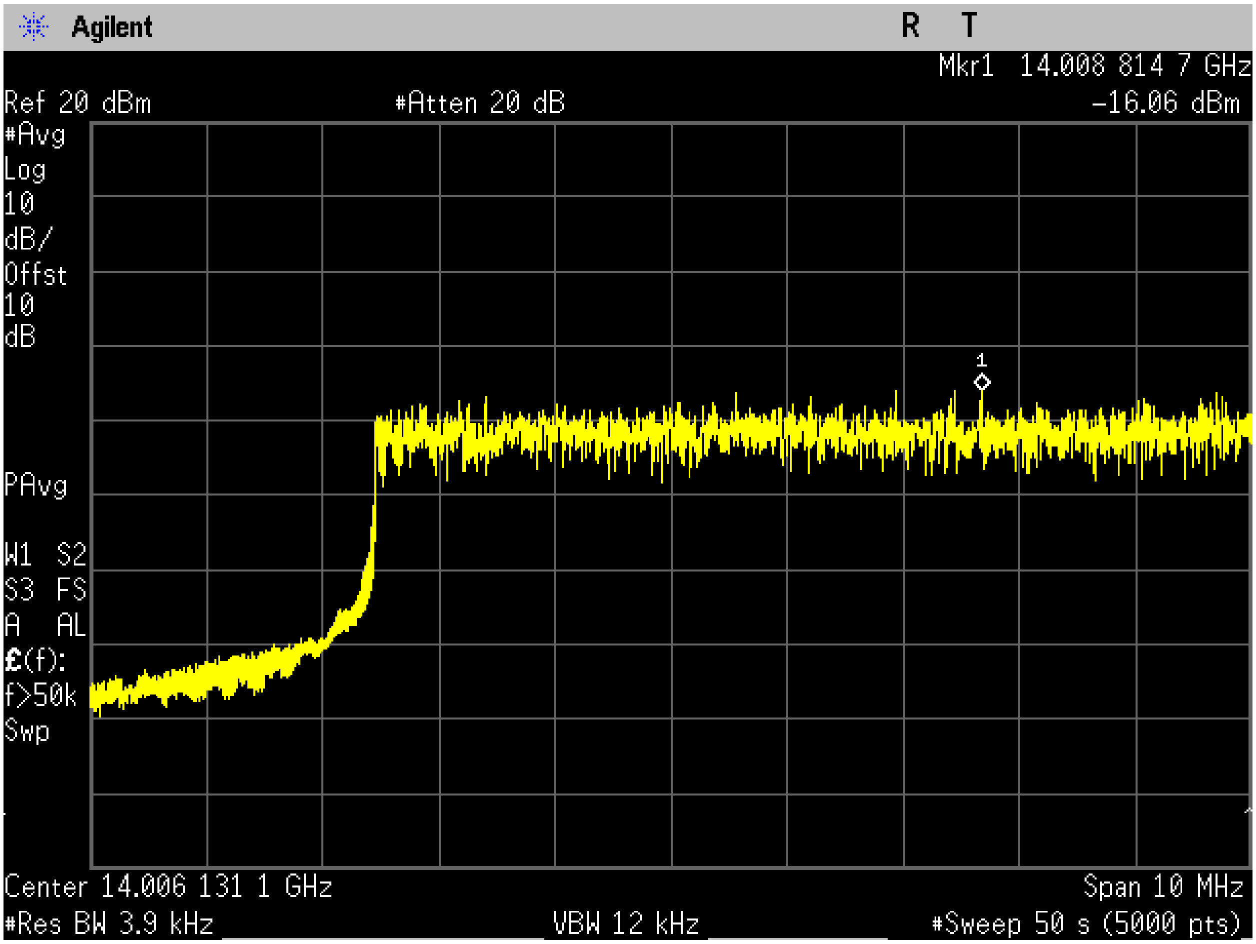


Figure 2. EIRP PSD, QPSK, 20MHz, Low Channel (Final).

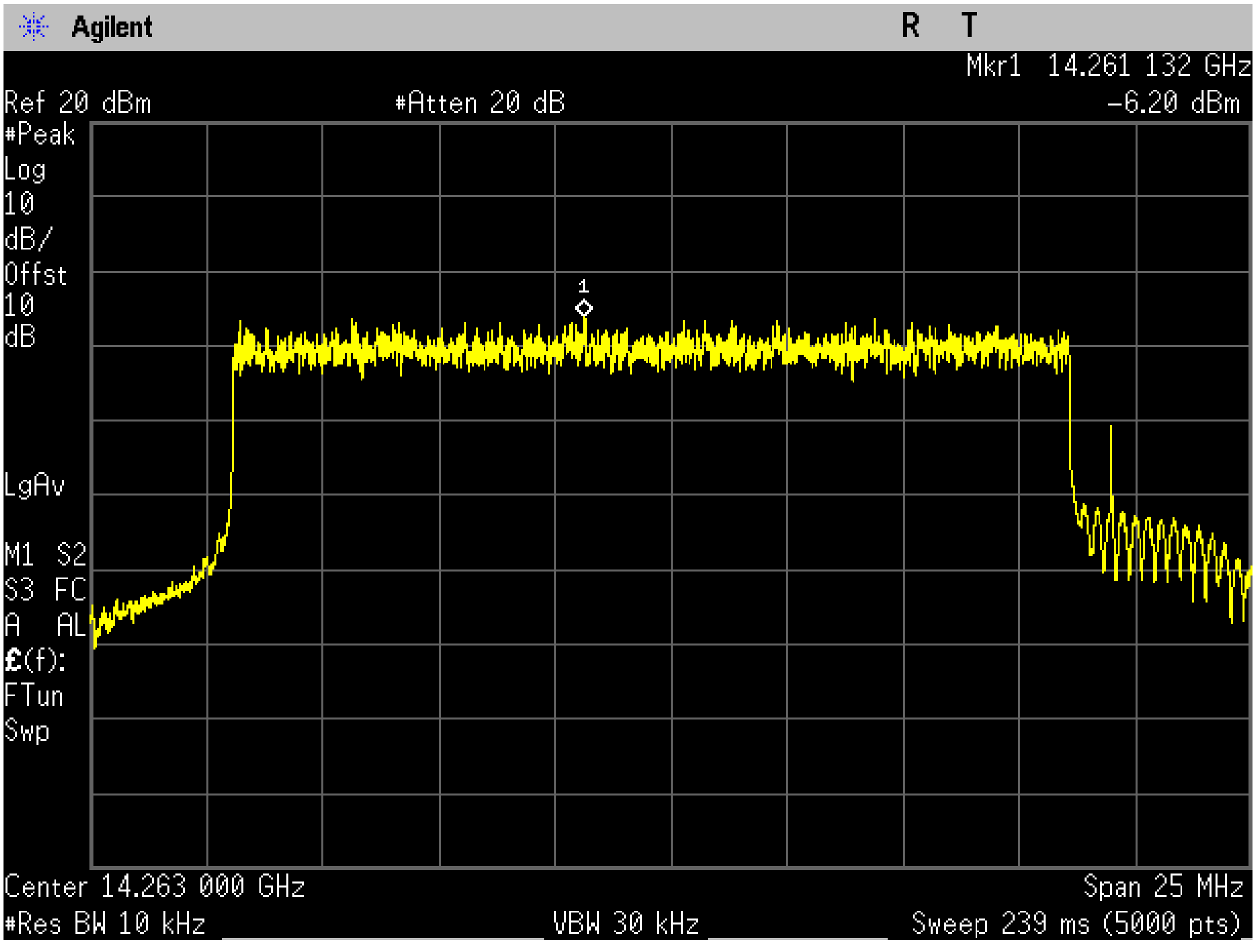


Figure 3. EIRP PSD, QPSK, 20MHz, Mid Channel (PreScan).

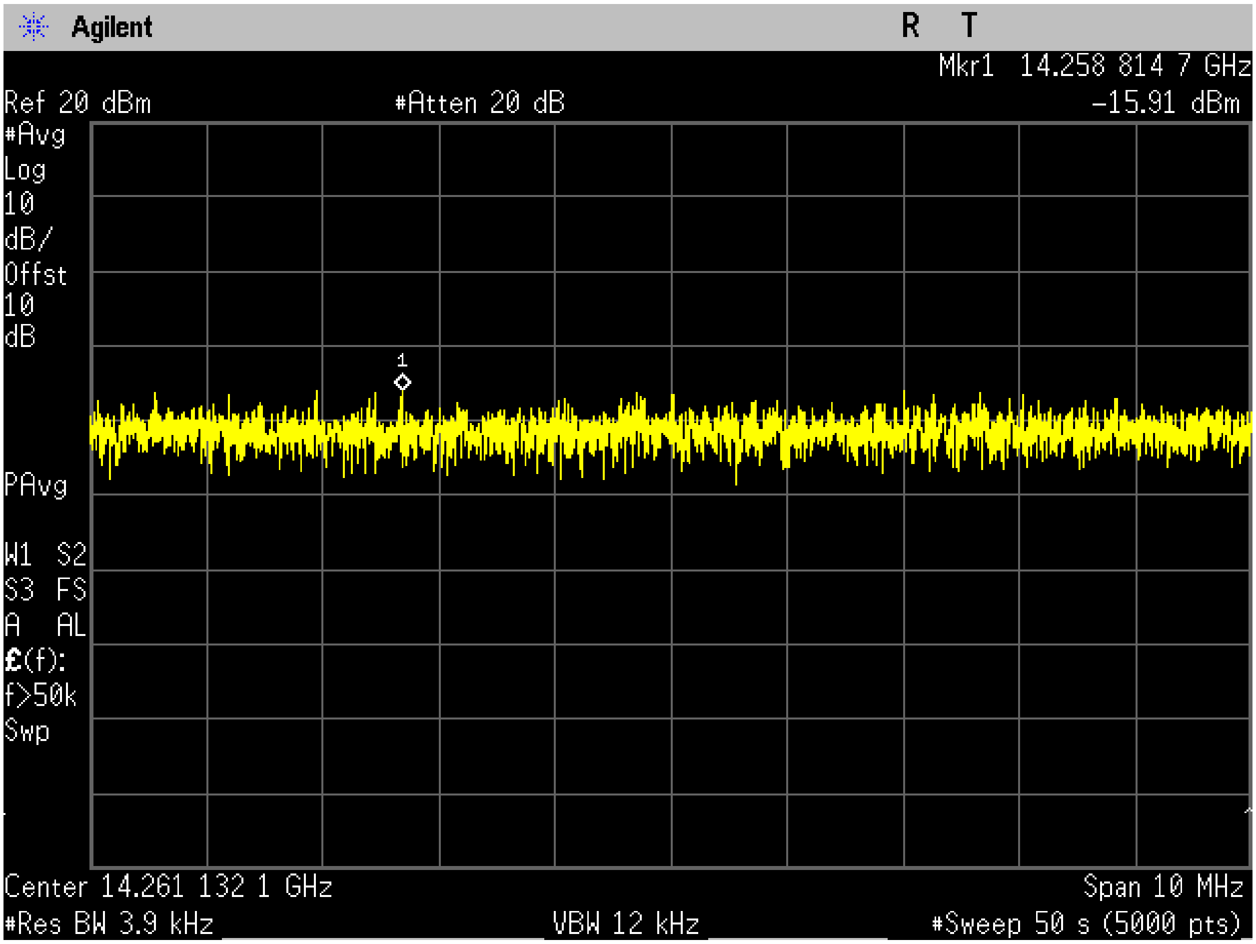


Figure 4. EIRP PSD, QPSK, 20MHz, Mid Channel (Final).

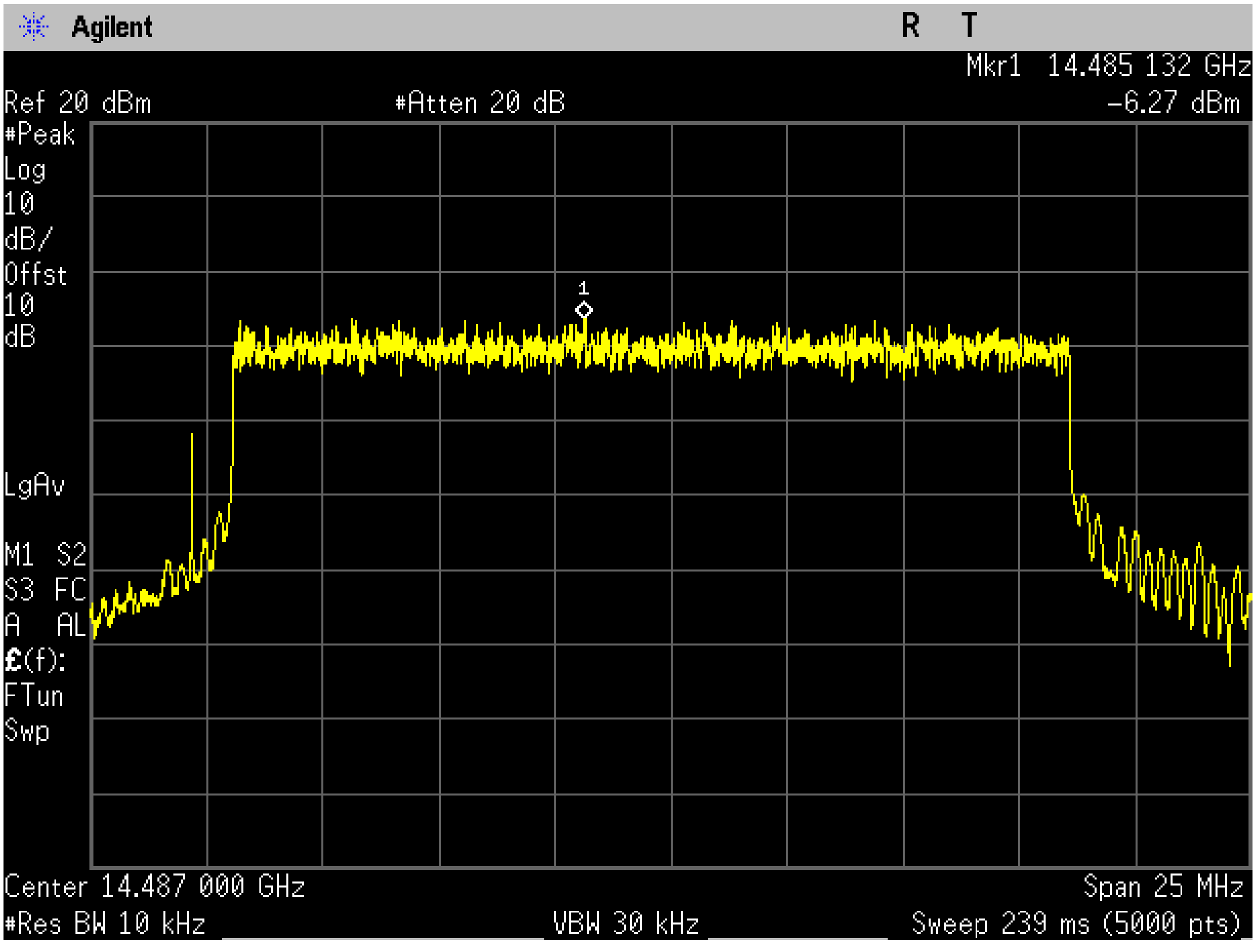


Figure 5. EIRP PSD, QPSK, 20MHz, High Channel (PreScan).

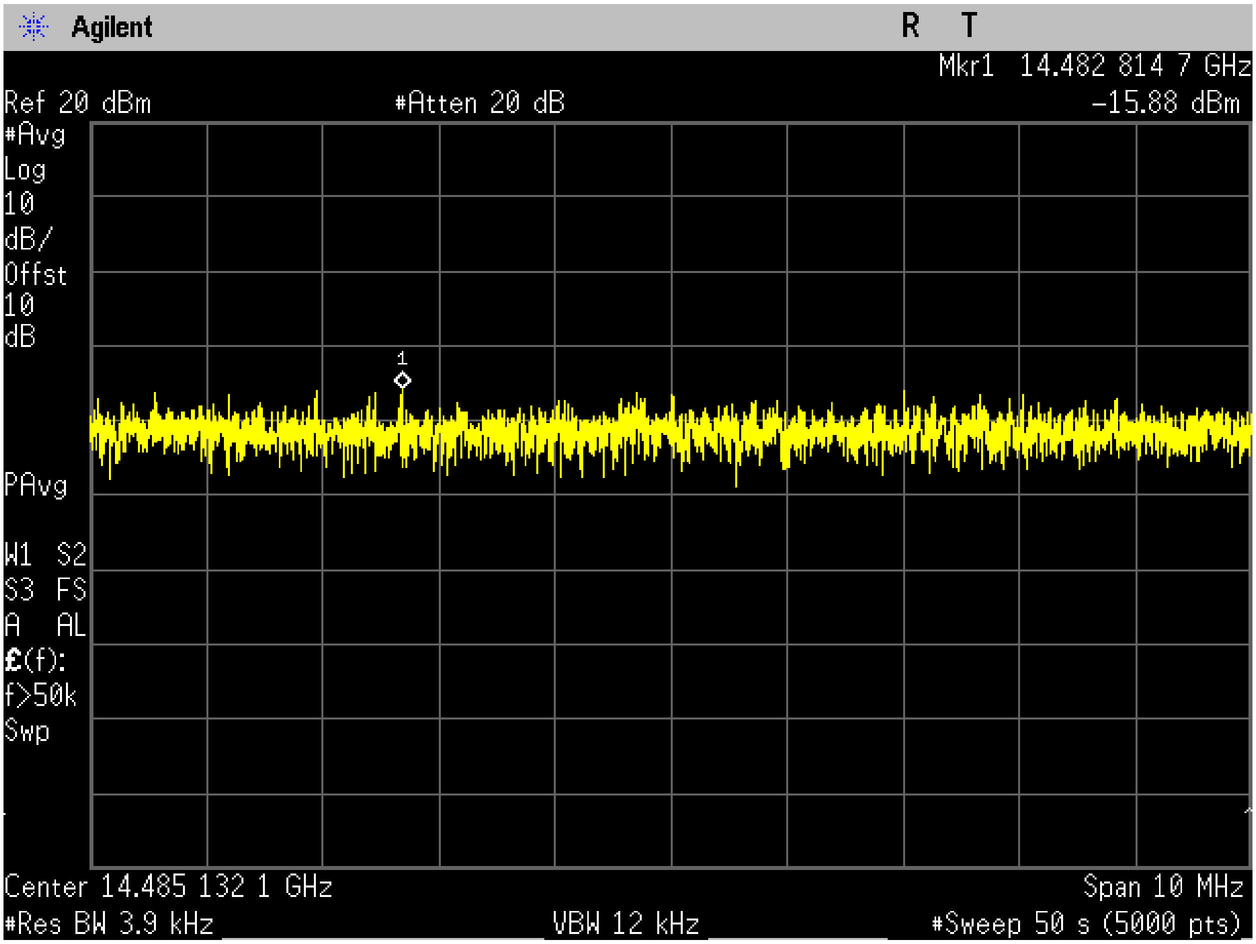


Figure 6. EIRP PSD, QPSK, 20MHz, High Channel (Final).

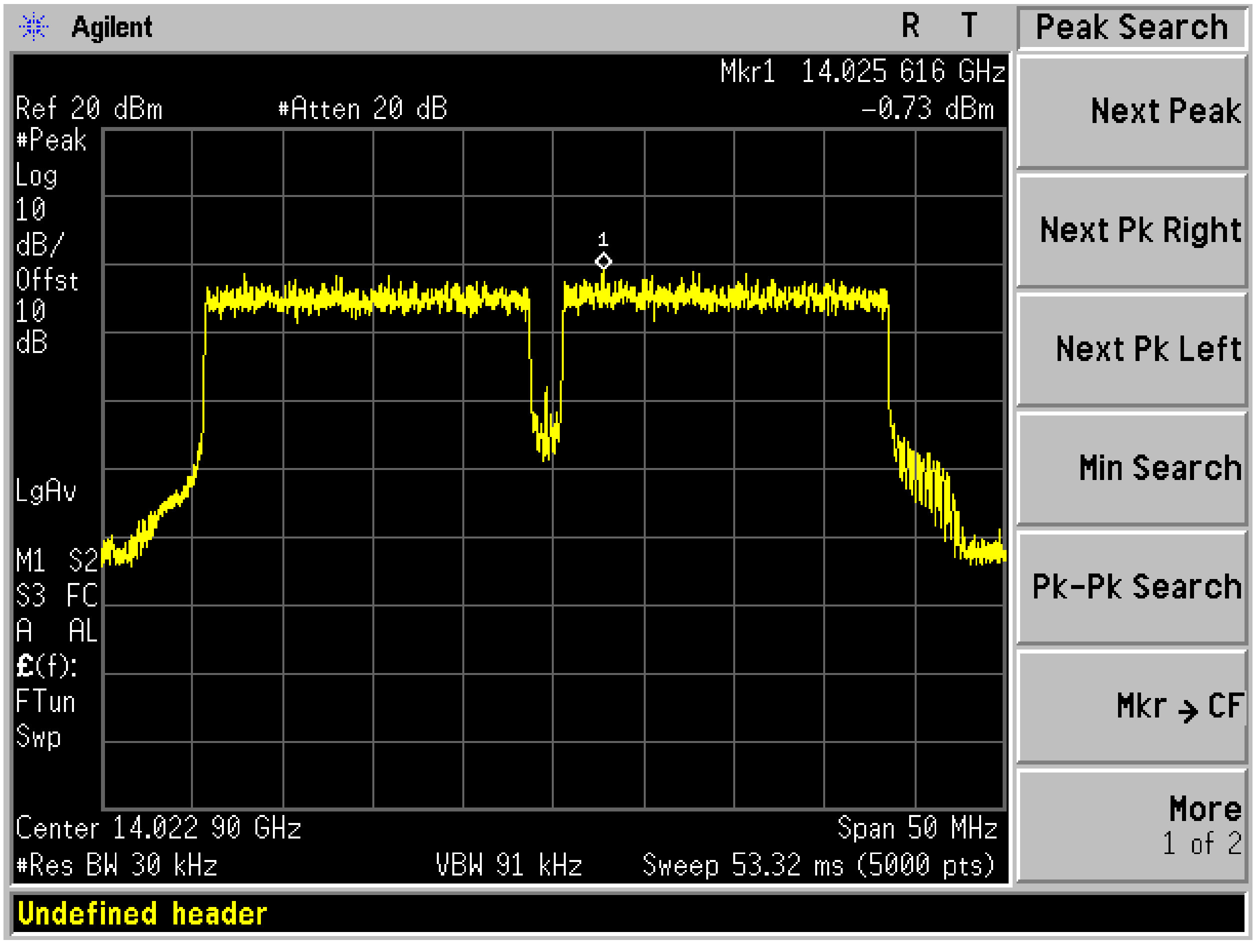


Figure 7. EIRP PSD, QPSK, 40MHz, Low Channel (PreScan).

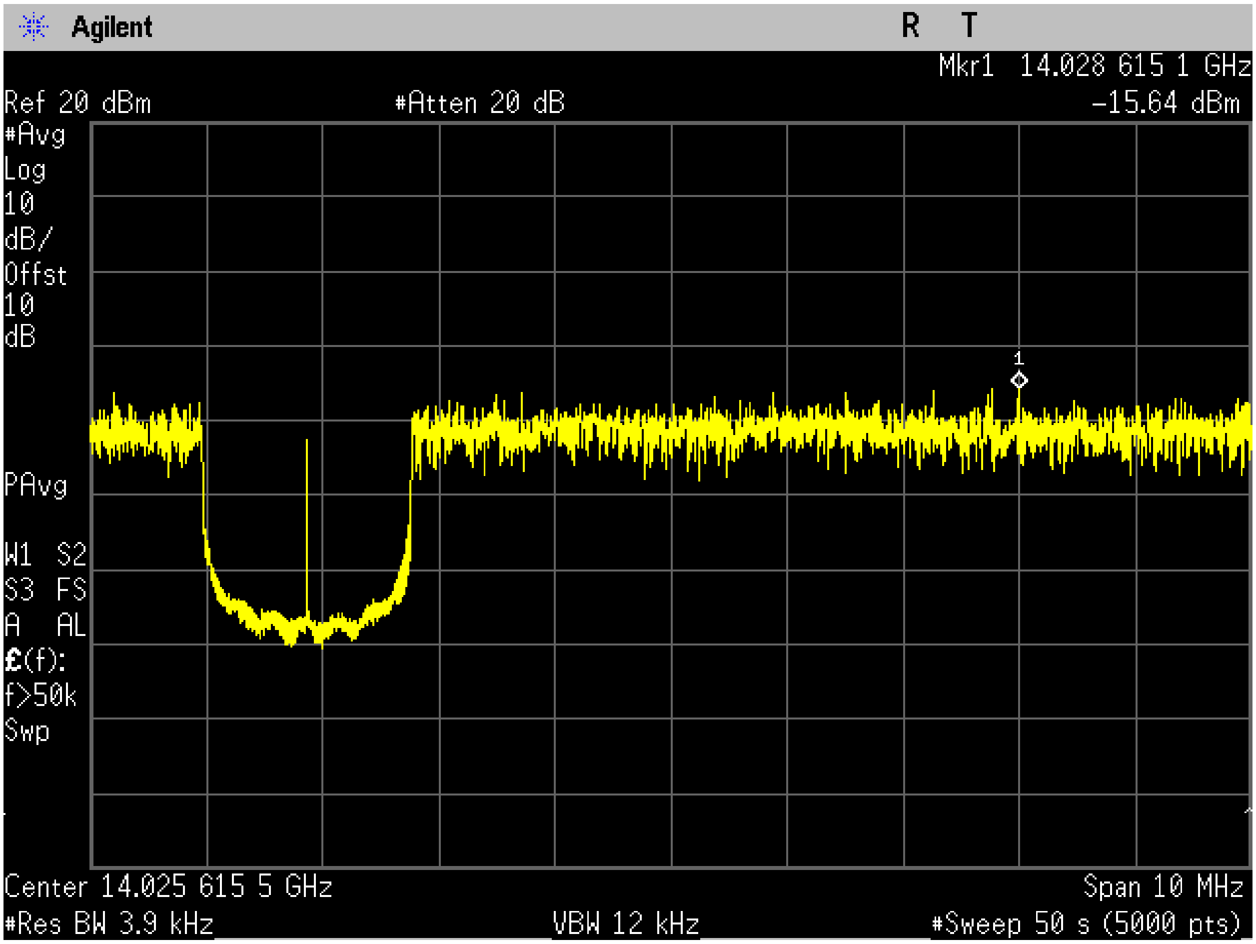


Figure 8. EIRP PSD, QPSK, 40MHz, Low Channel (Final).

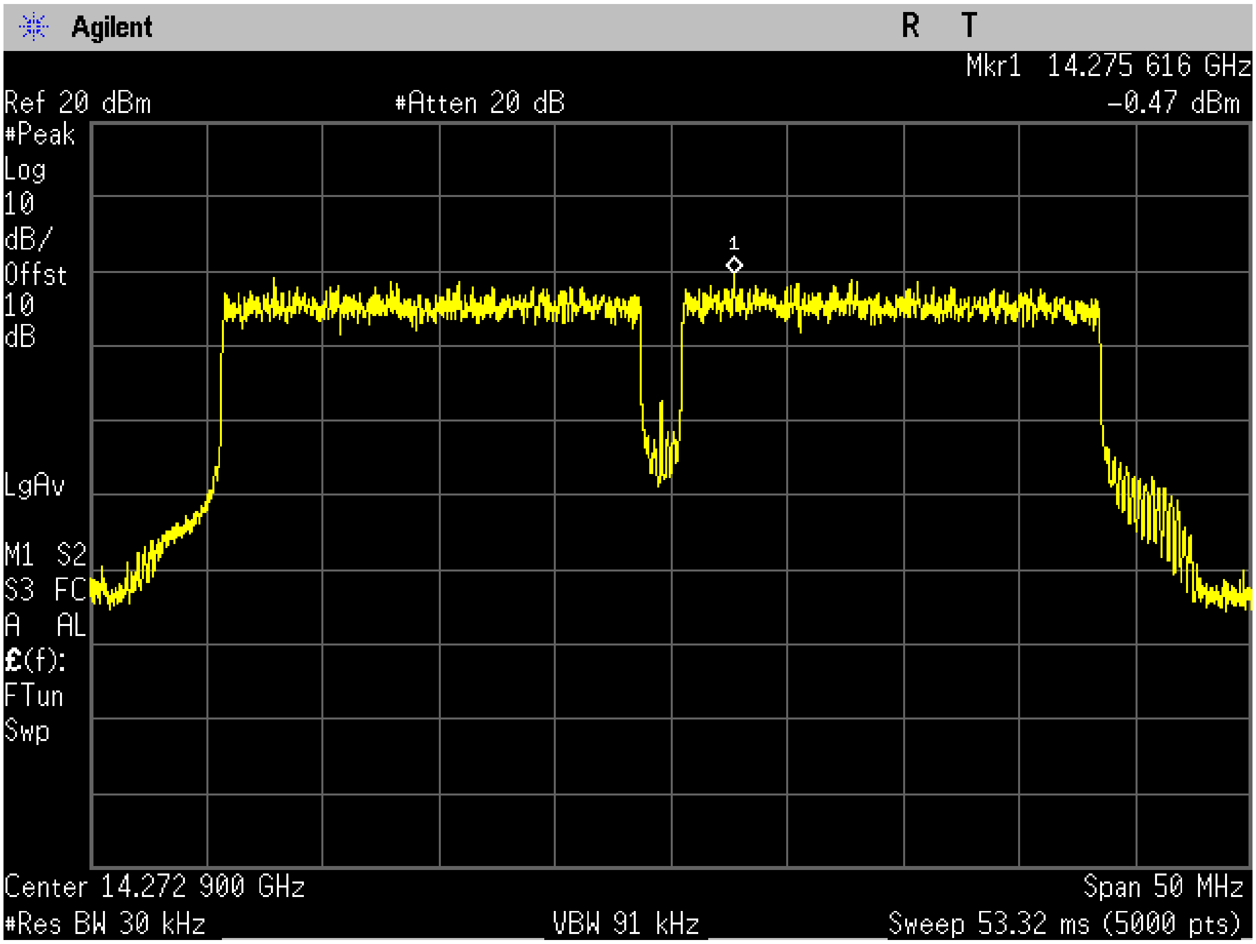


Figure 9. EIRP PSD, QPSK, 40MHz, Mid Channel (PreScan).

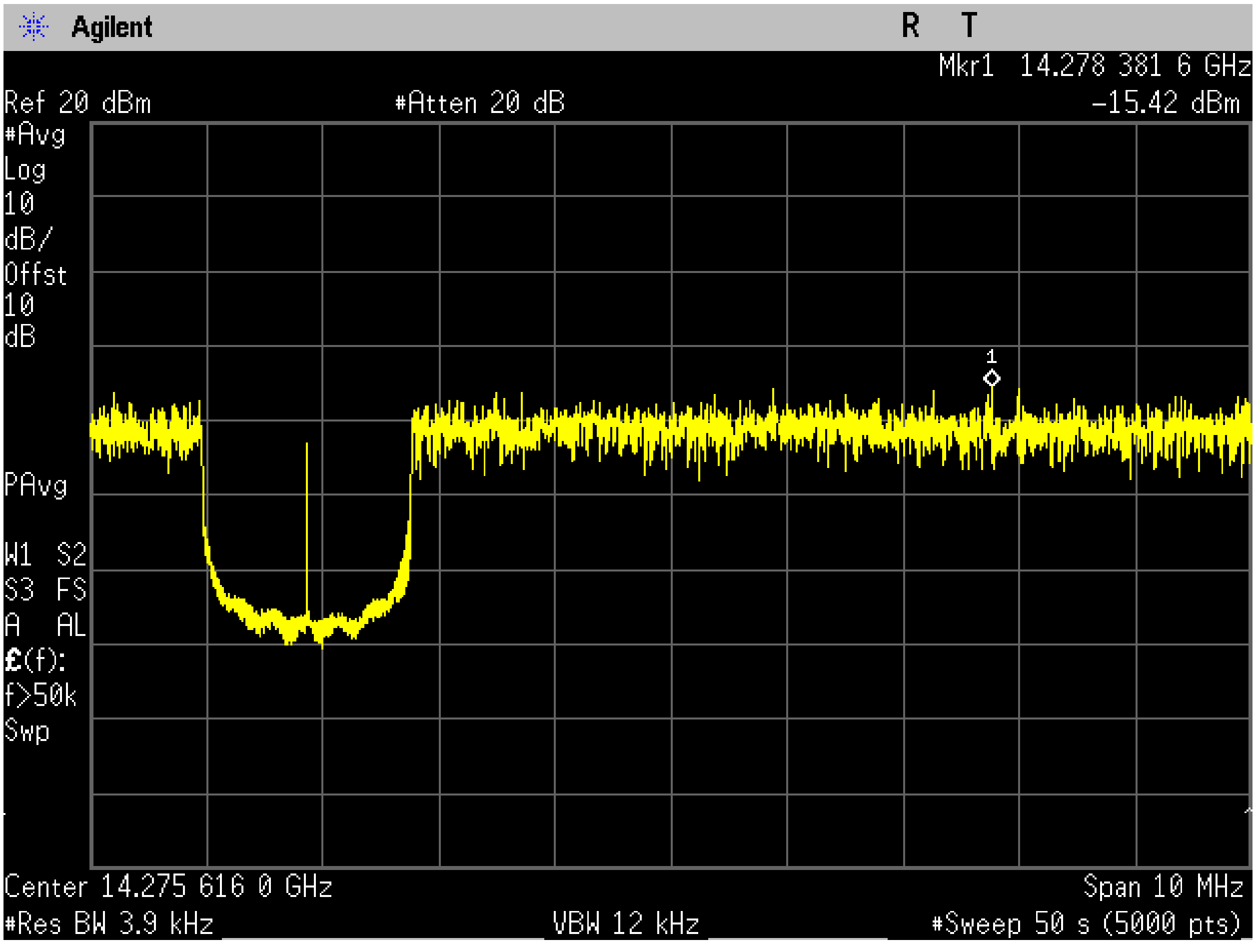


Figure 10. EIRP PSD, QPSK, 40MHz, Mid Channel (Final).

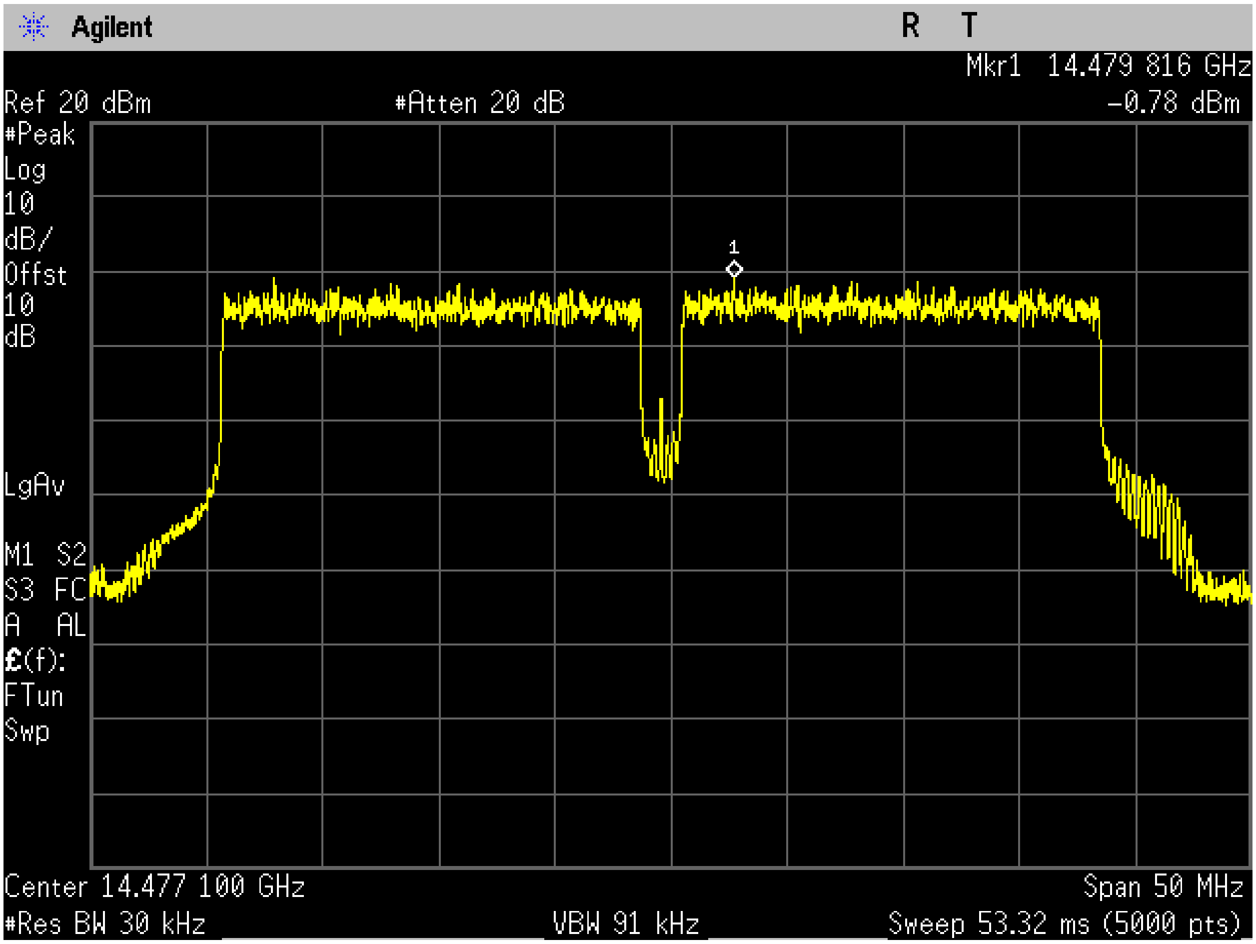


Figure 11. EIRP PSD, QPSK, 40MHz, High Channel (PreScan).

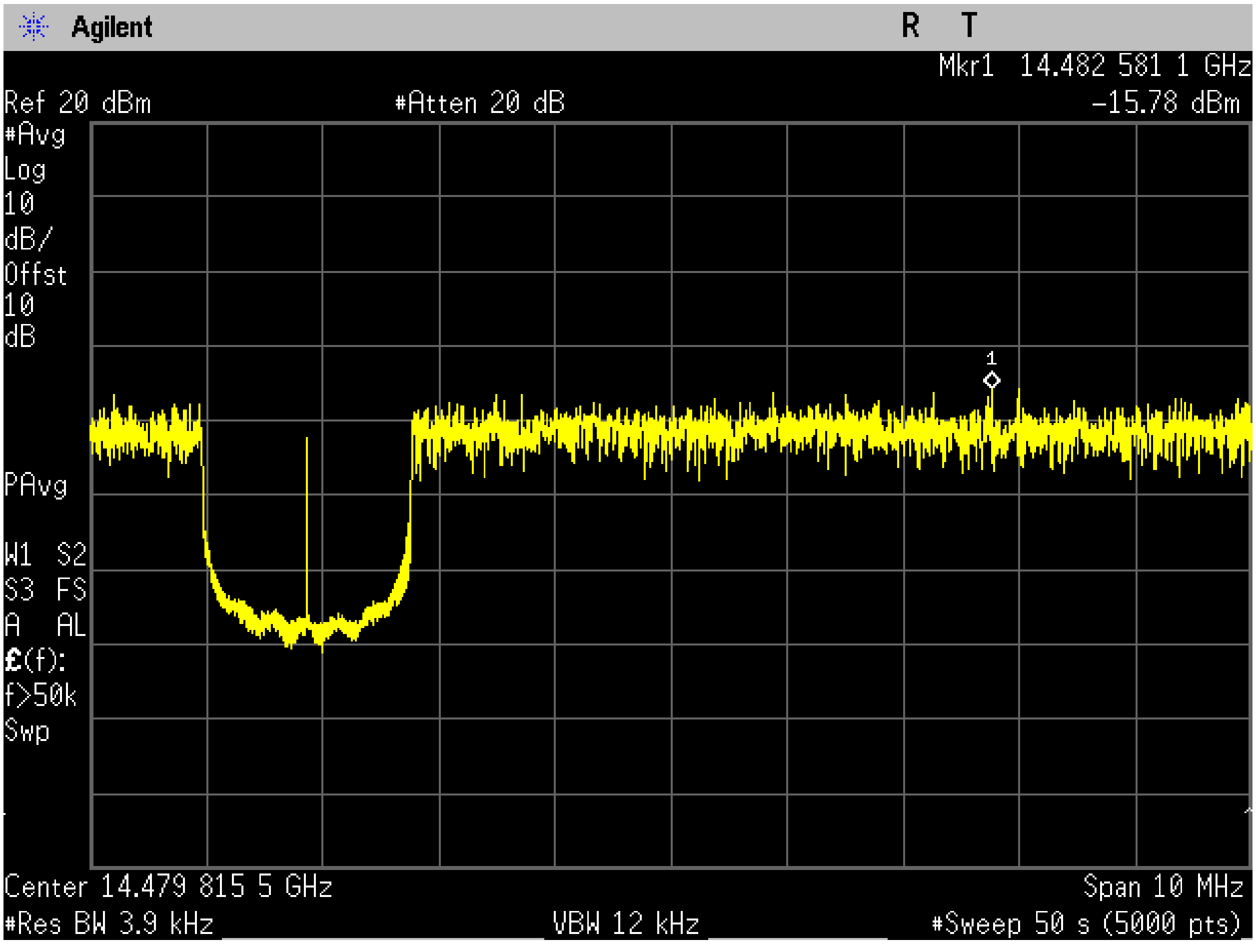


Figure 12. EIRP PSD, QPSK, 40MHz, High Channel (Final).

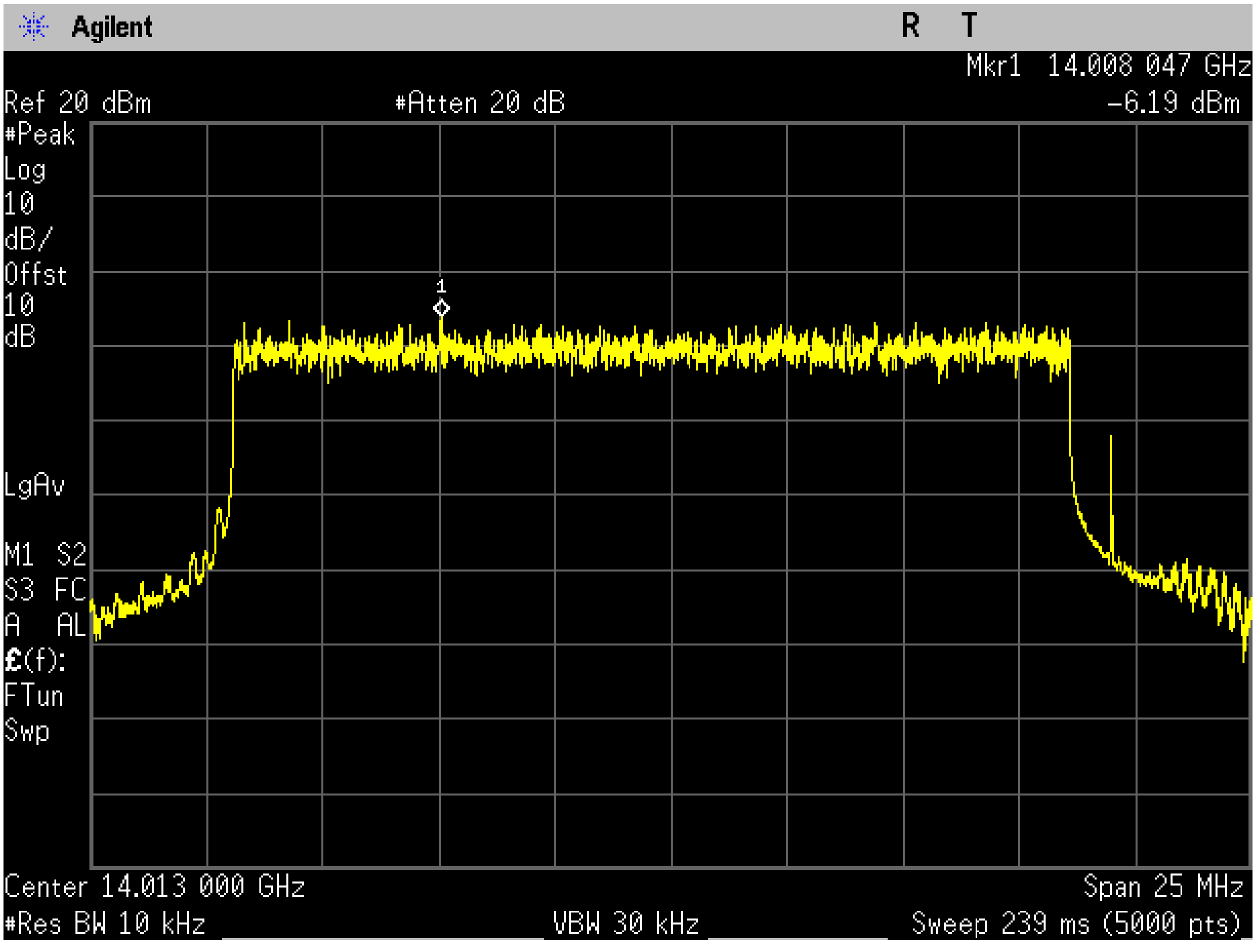


Figure 13. EIRP PSD, 8PSK, 20MHz, Low Channel (PreScan).

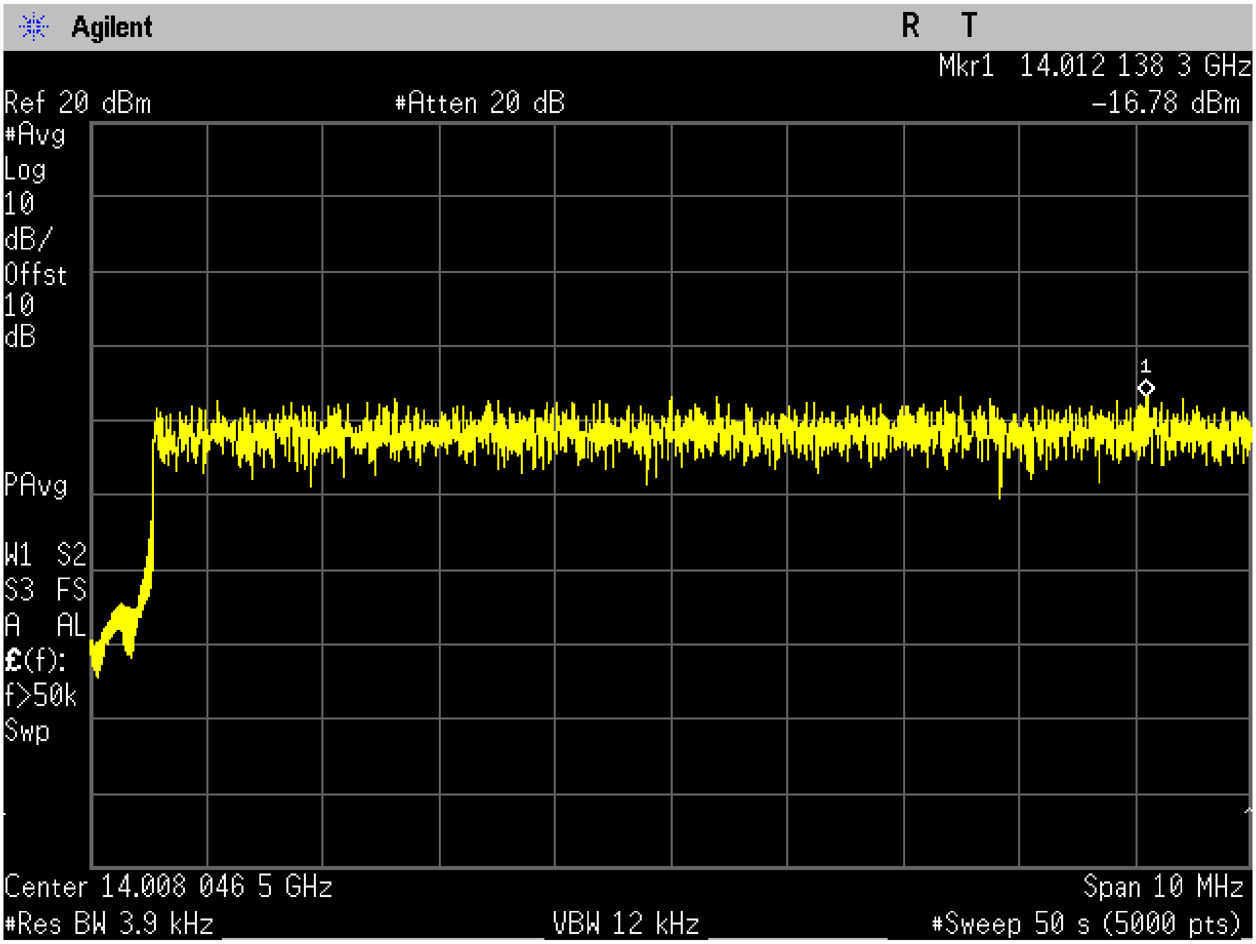


Figure 14. EIRP PSD, 8PSK, 20MHz, Low Channel (Final).

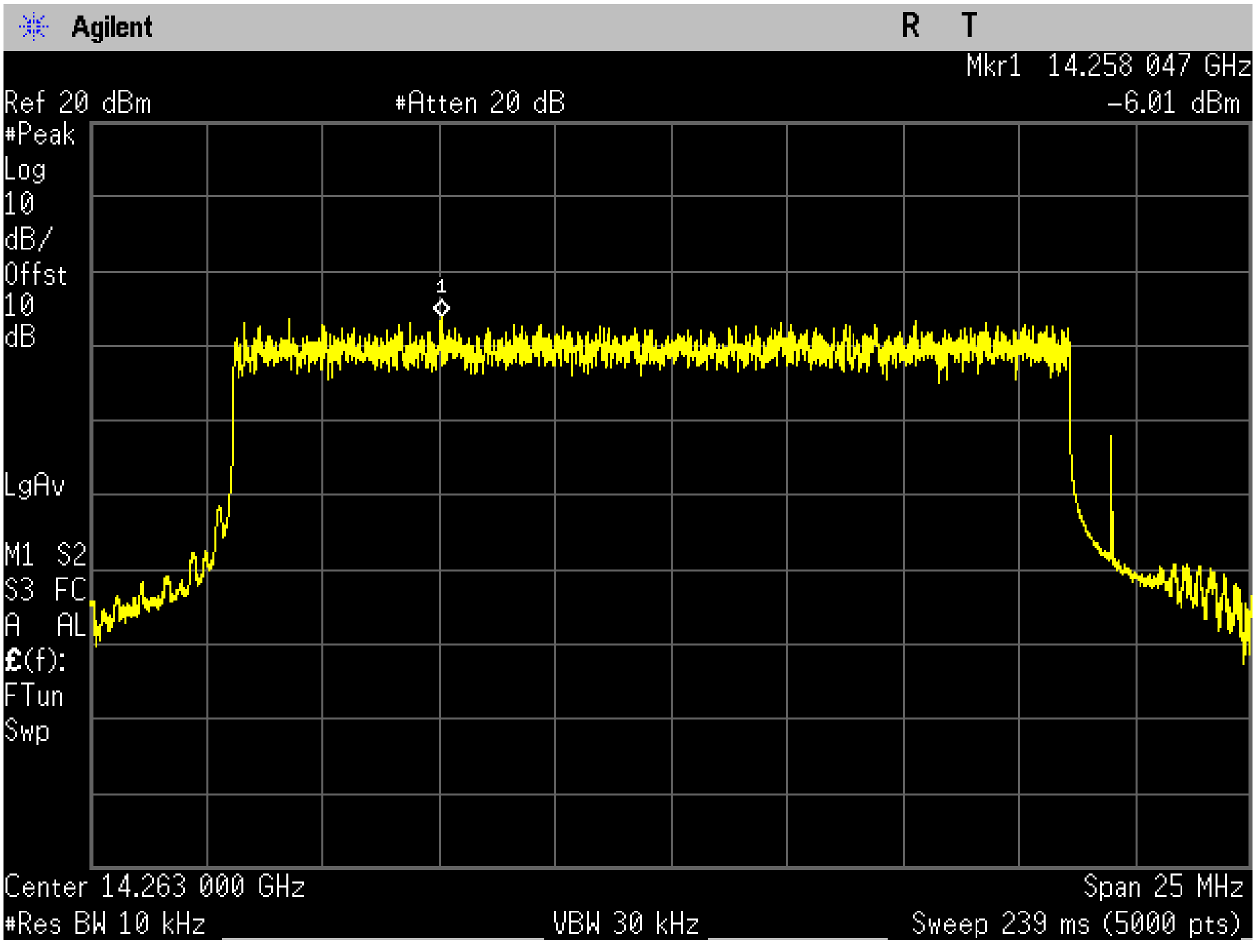


Figure 15. EIRP PSD, 8PSK, 20MHz, Mid Channel (PreScan).

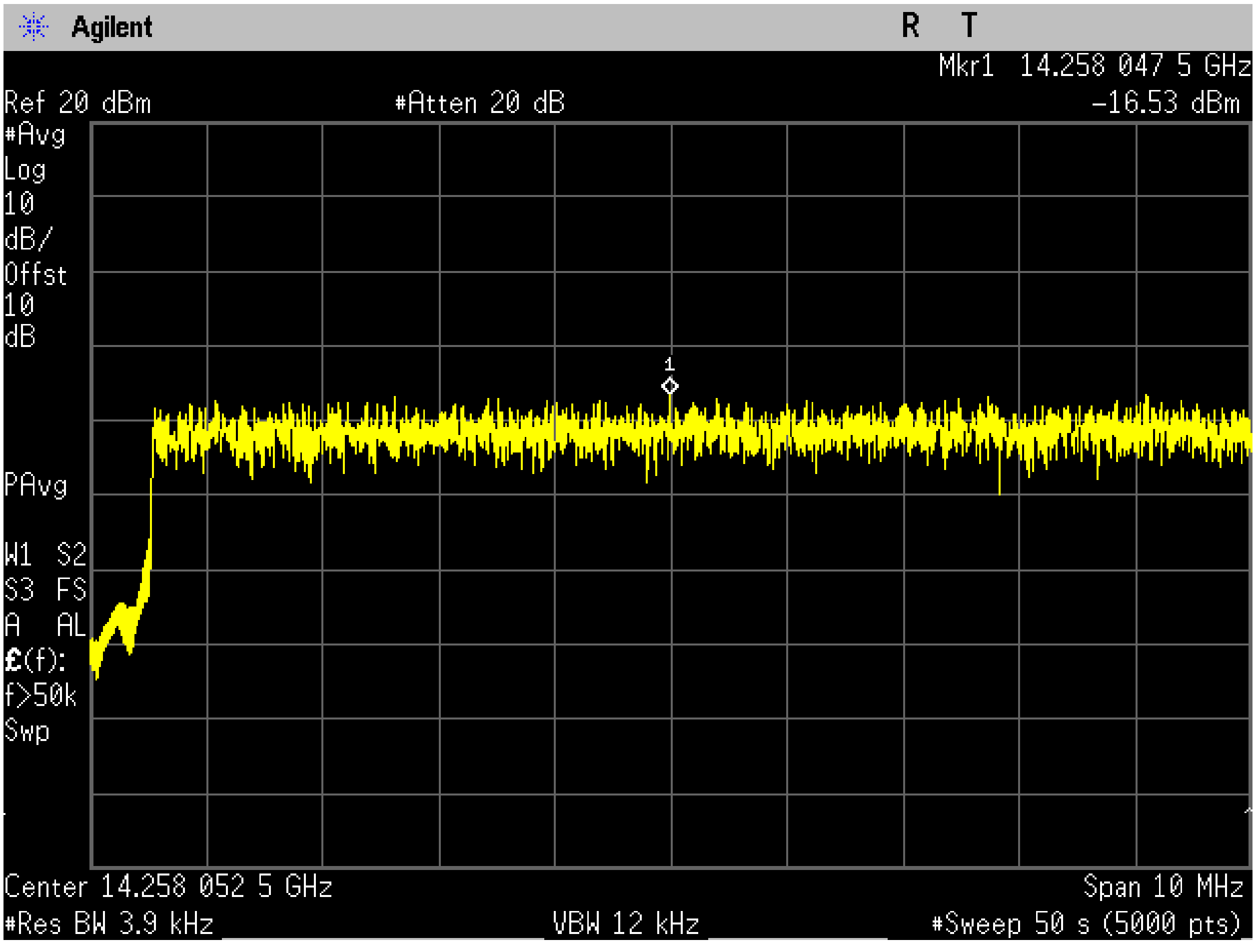


Figure 16. EIRP PSD, 8PSK, 20MHz, Mid Channel (Final).

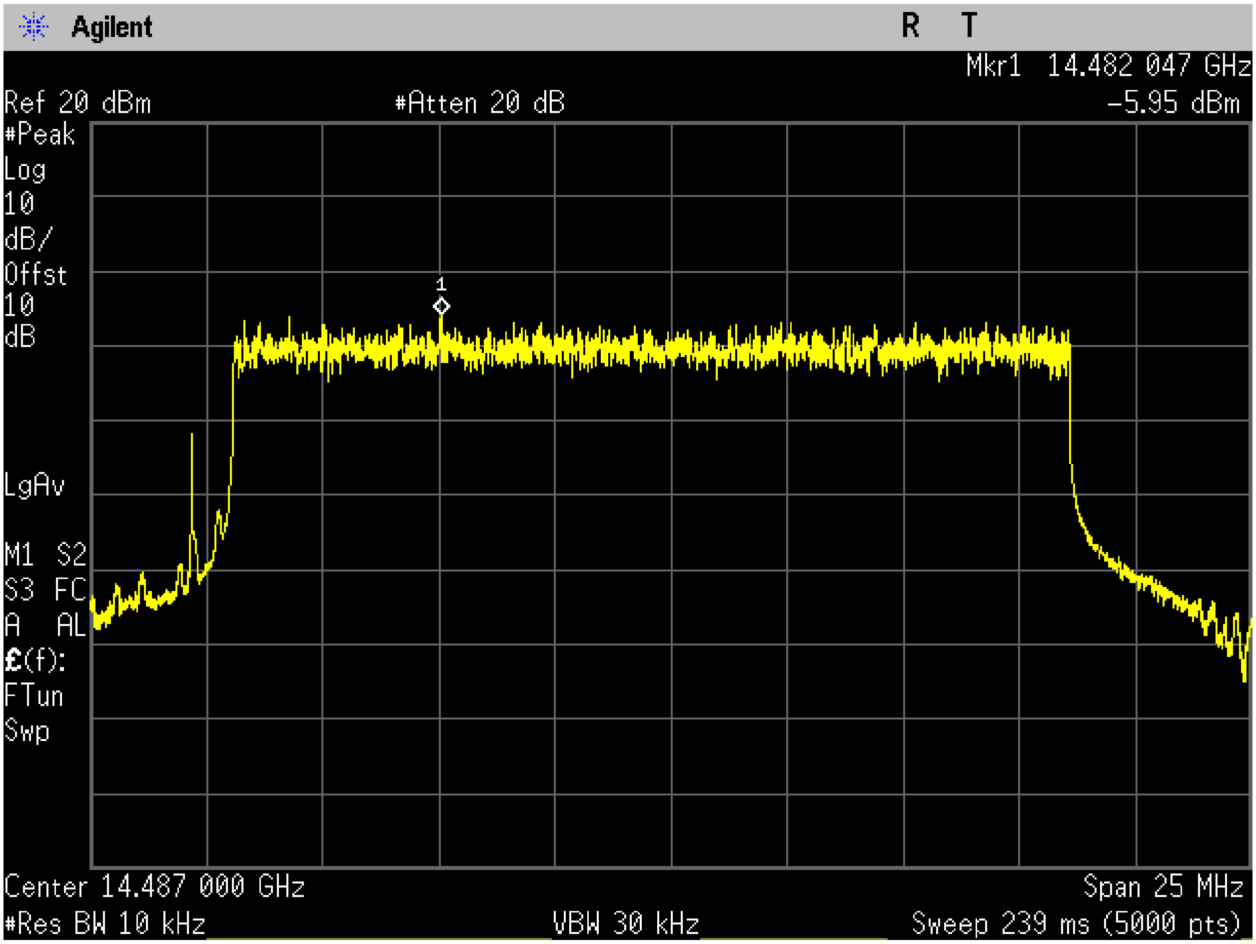


Figure 17. EIRP PSD, 8PSK, 20MHz, High Channel (PreScan).

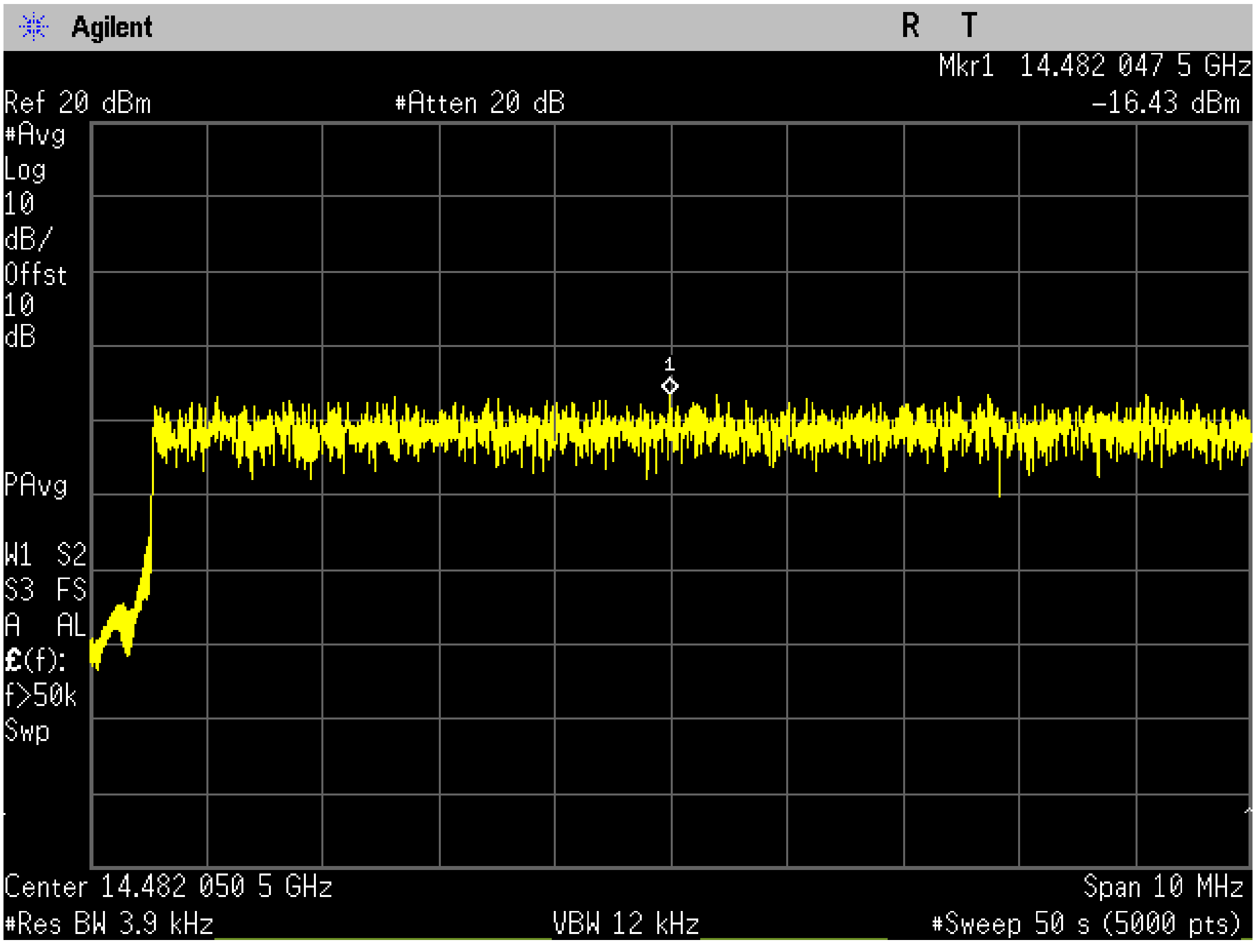


Figure 18. EIRP PSD, 8PSK, 20MHz, High Channel (Final).

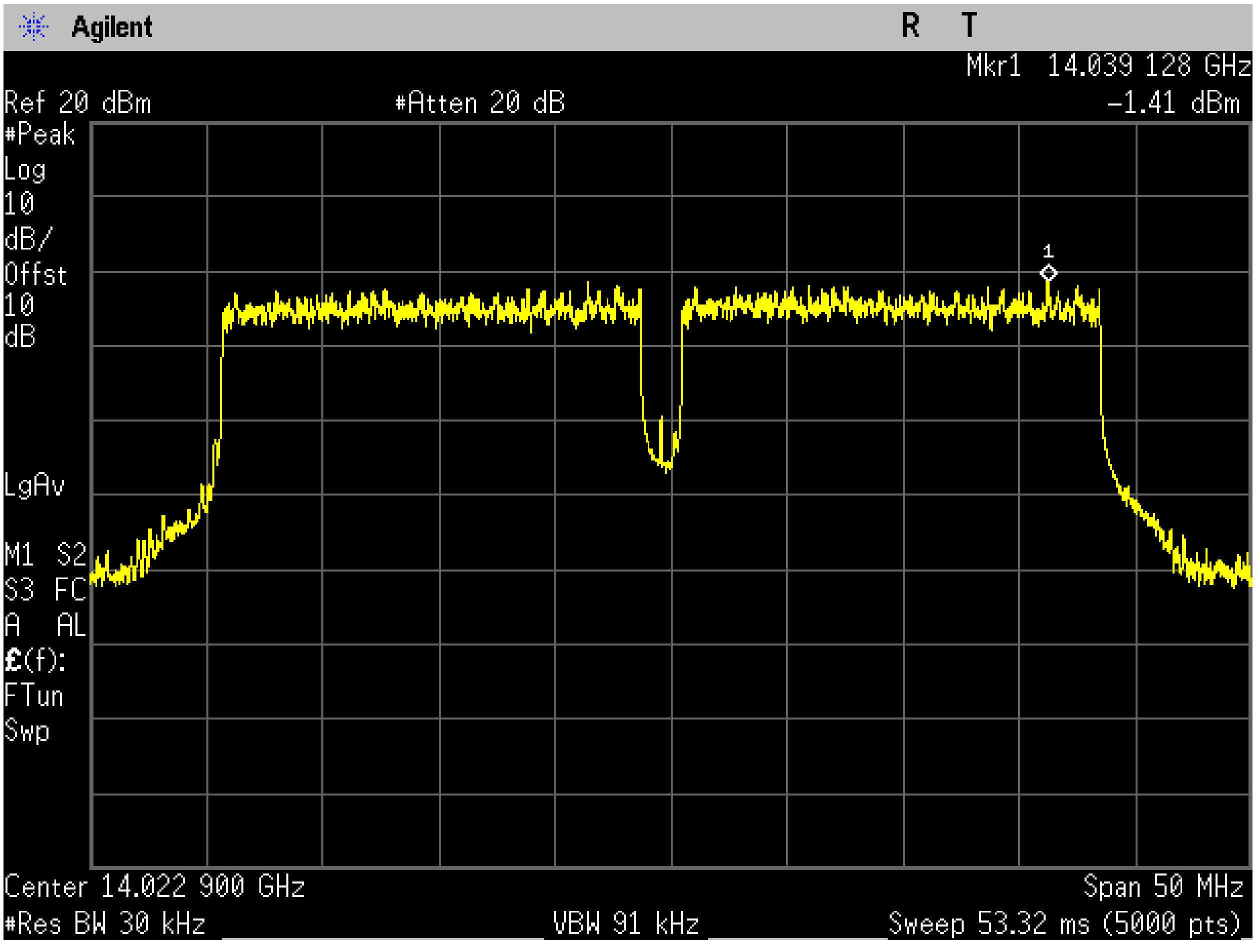


Figure 19. EIRP PSD, 8PSK, 40MHz, Low Channel (PreScan).

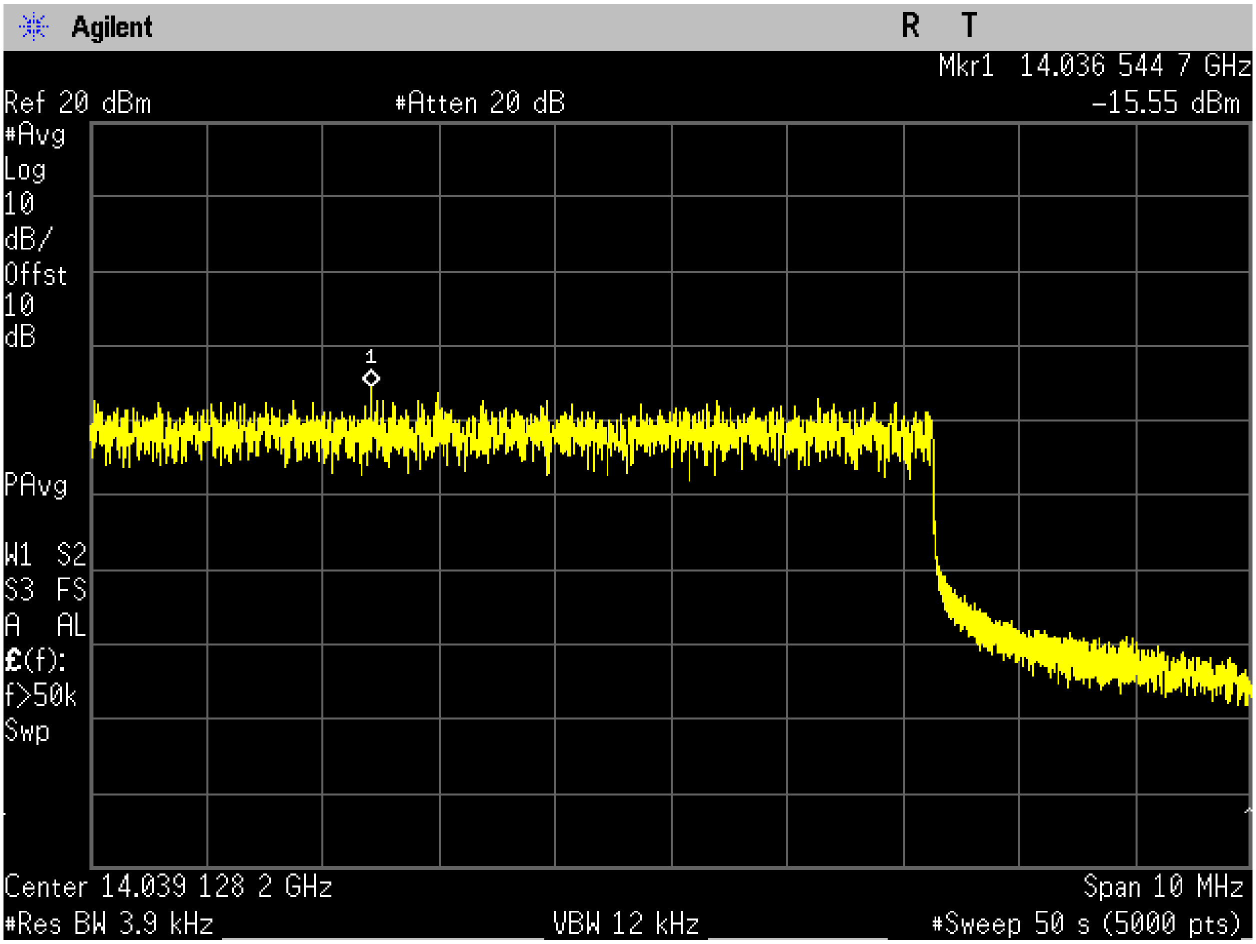


Figure 20. EIRP PSD, 8PSK, 40MHz, Low Channel (Final).

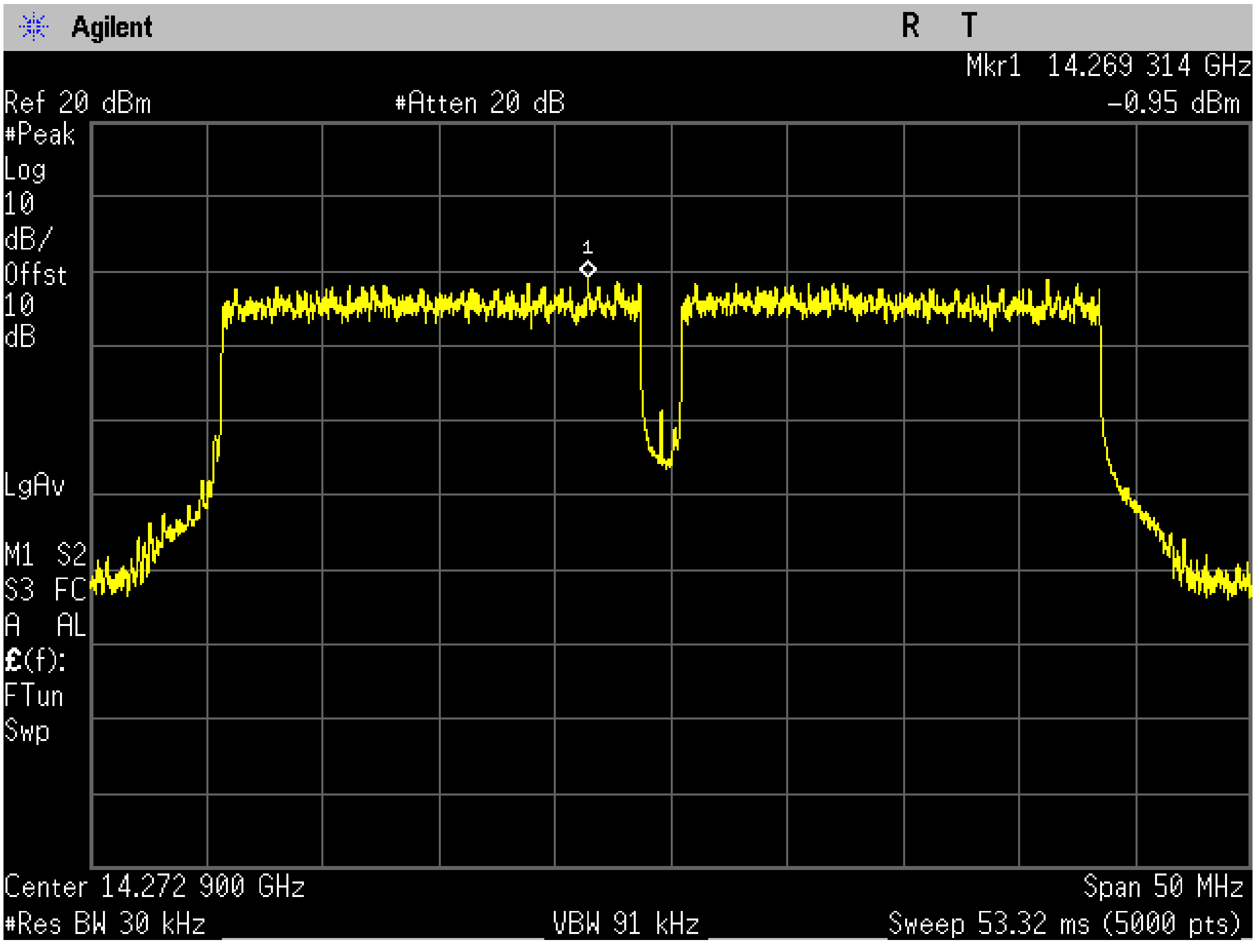


Figure 21. EIRP PSD, 8PSK, 40MHz, Mid Channel (PreScan).

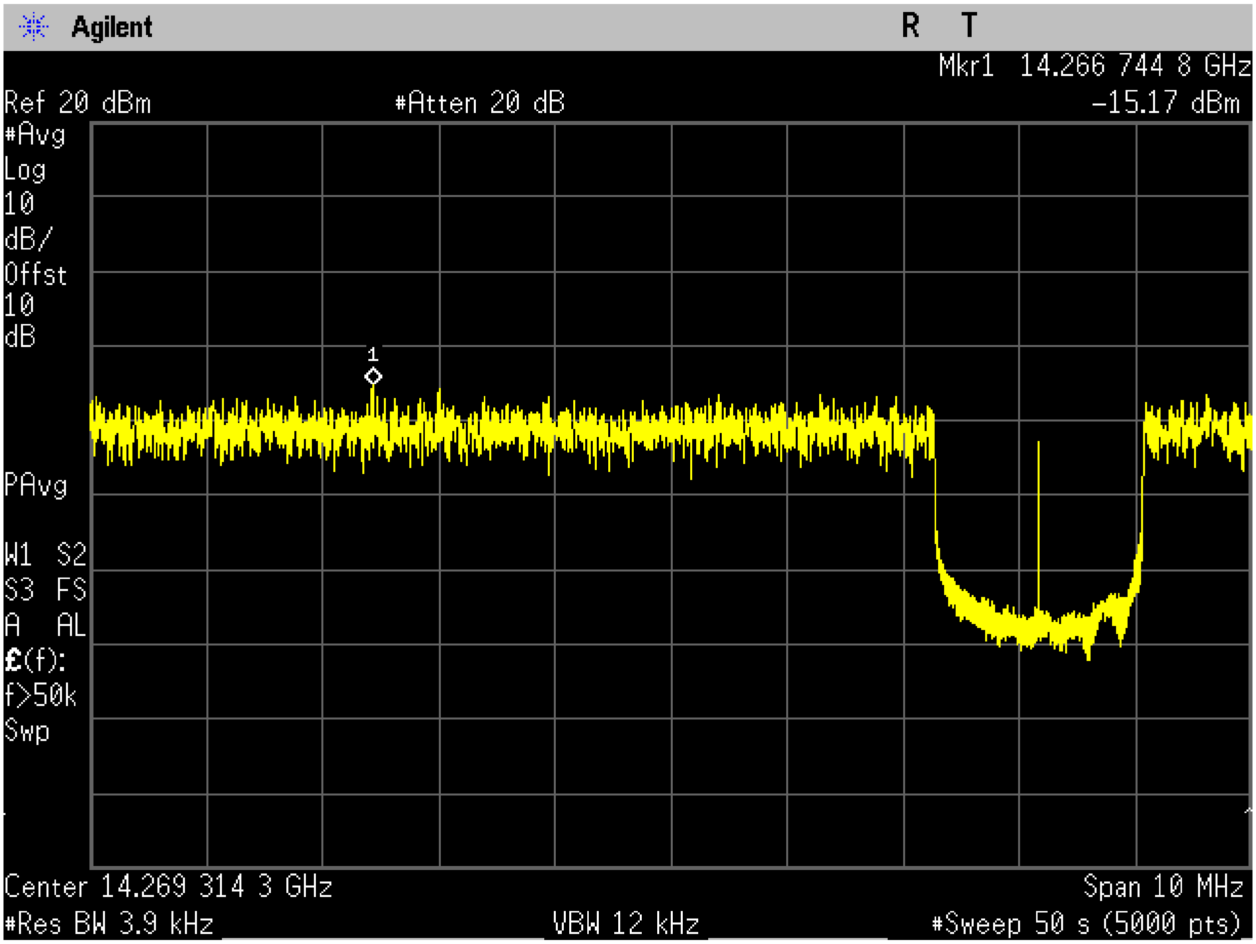


Figure 22. EIRP PSD, 8PSK, 40MHz, Mid Channel (Final).

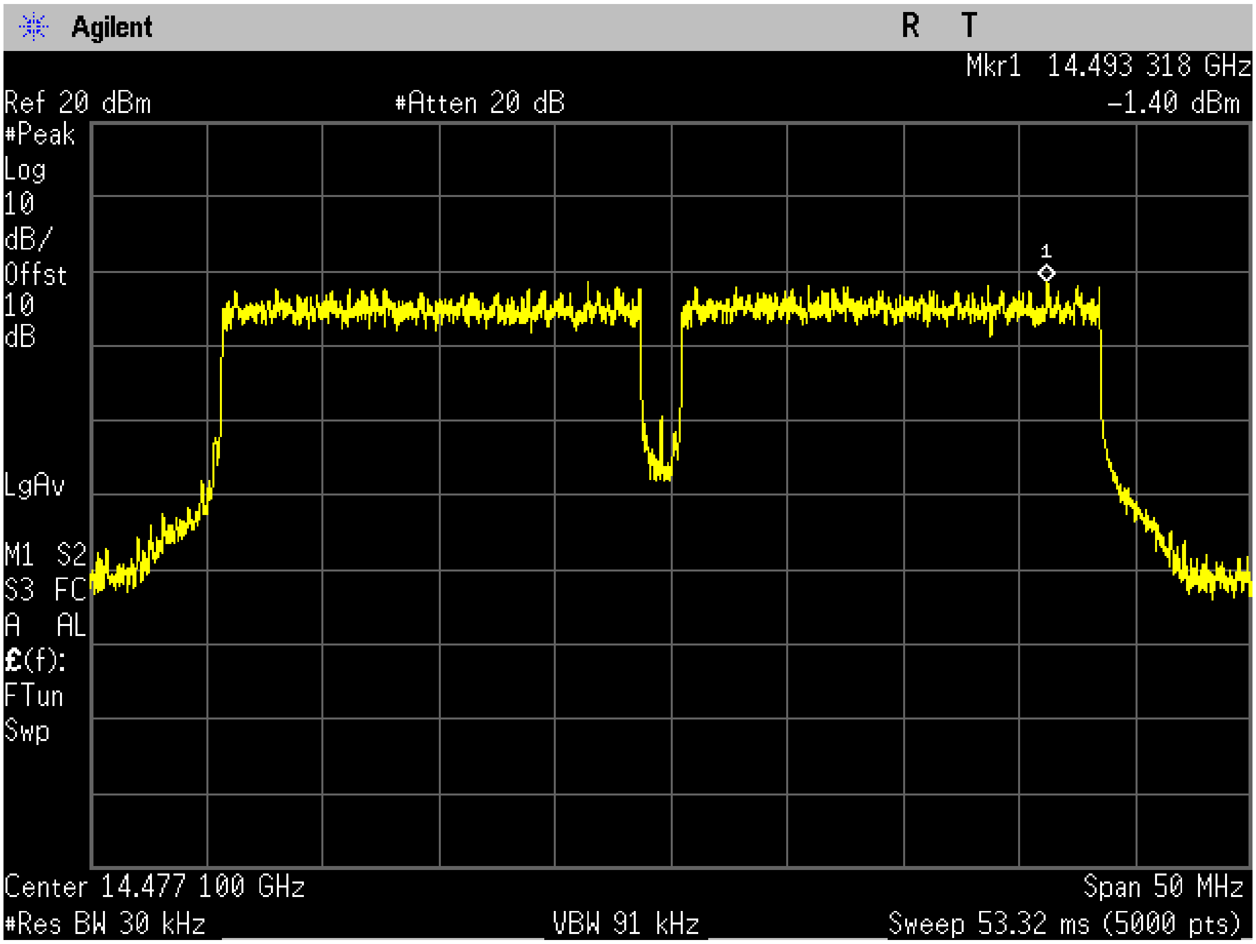


Figure 23. EIRP PSD, 8PSK, 40MHz, High Channel (PreScan).

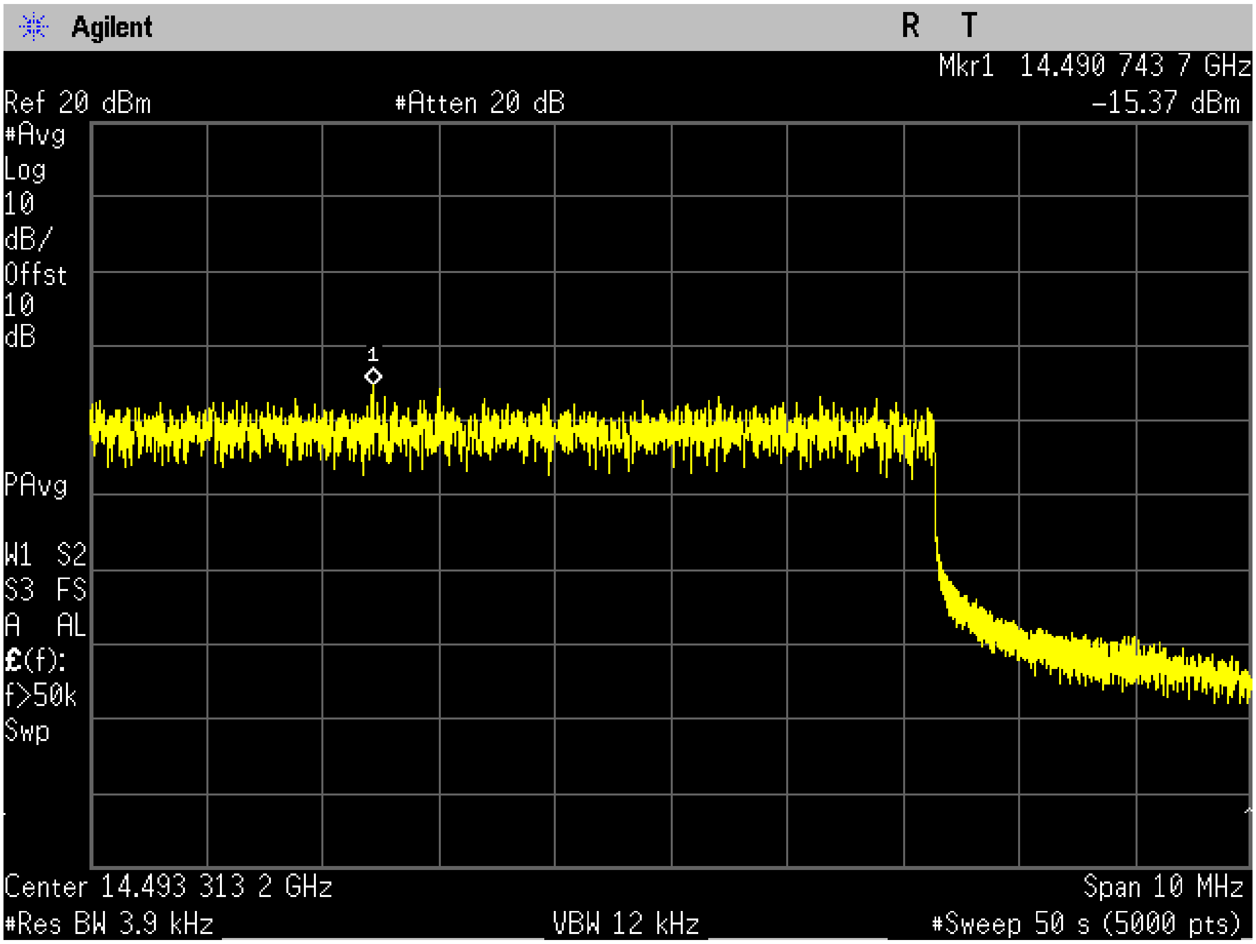


Figure 24. EIRP PSD, 8PSK, 40MHz, High Channel (Final).

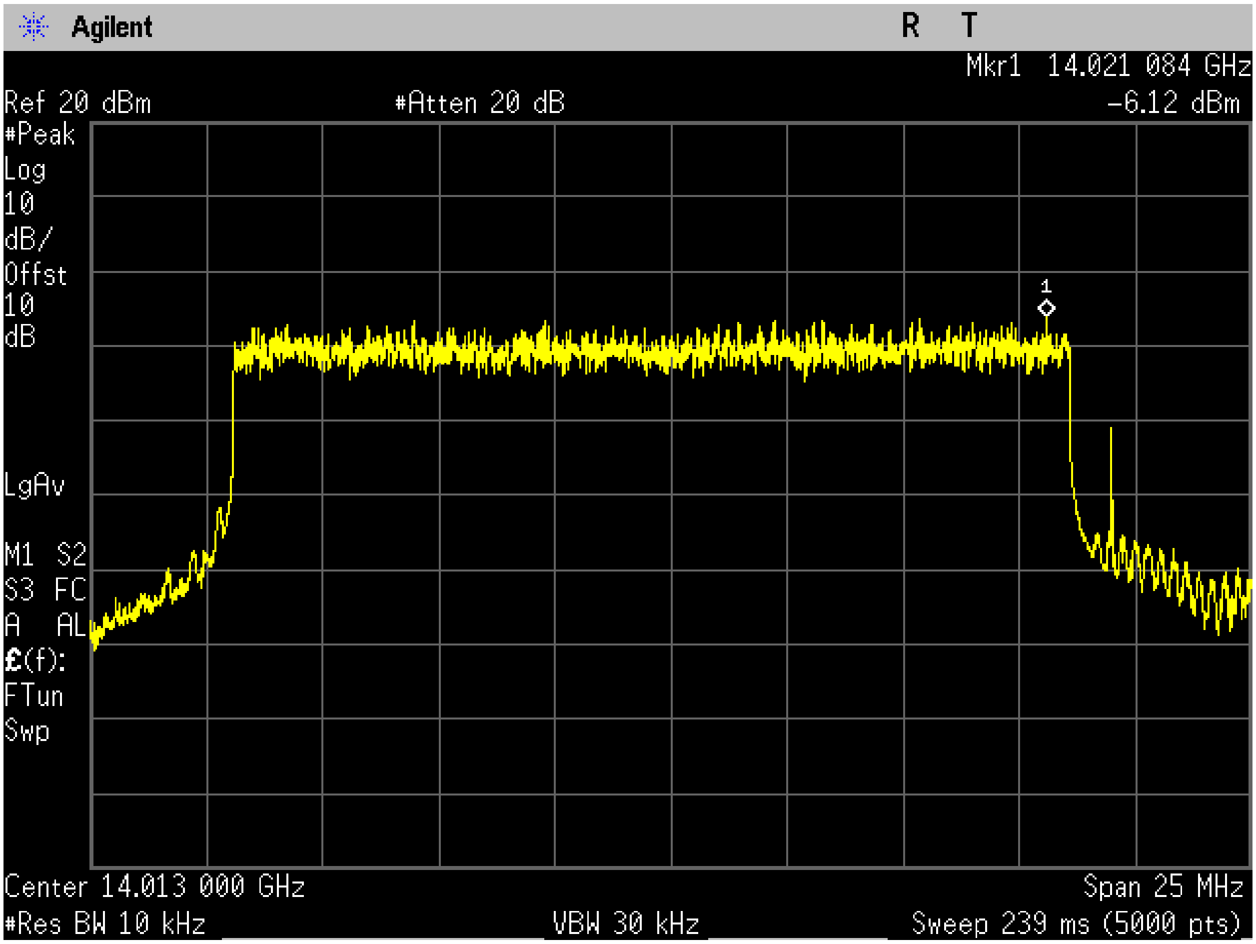


Figure 25. EIRP PSD, 16QAM, 20MHz, Low Channel (PreScan).

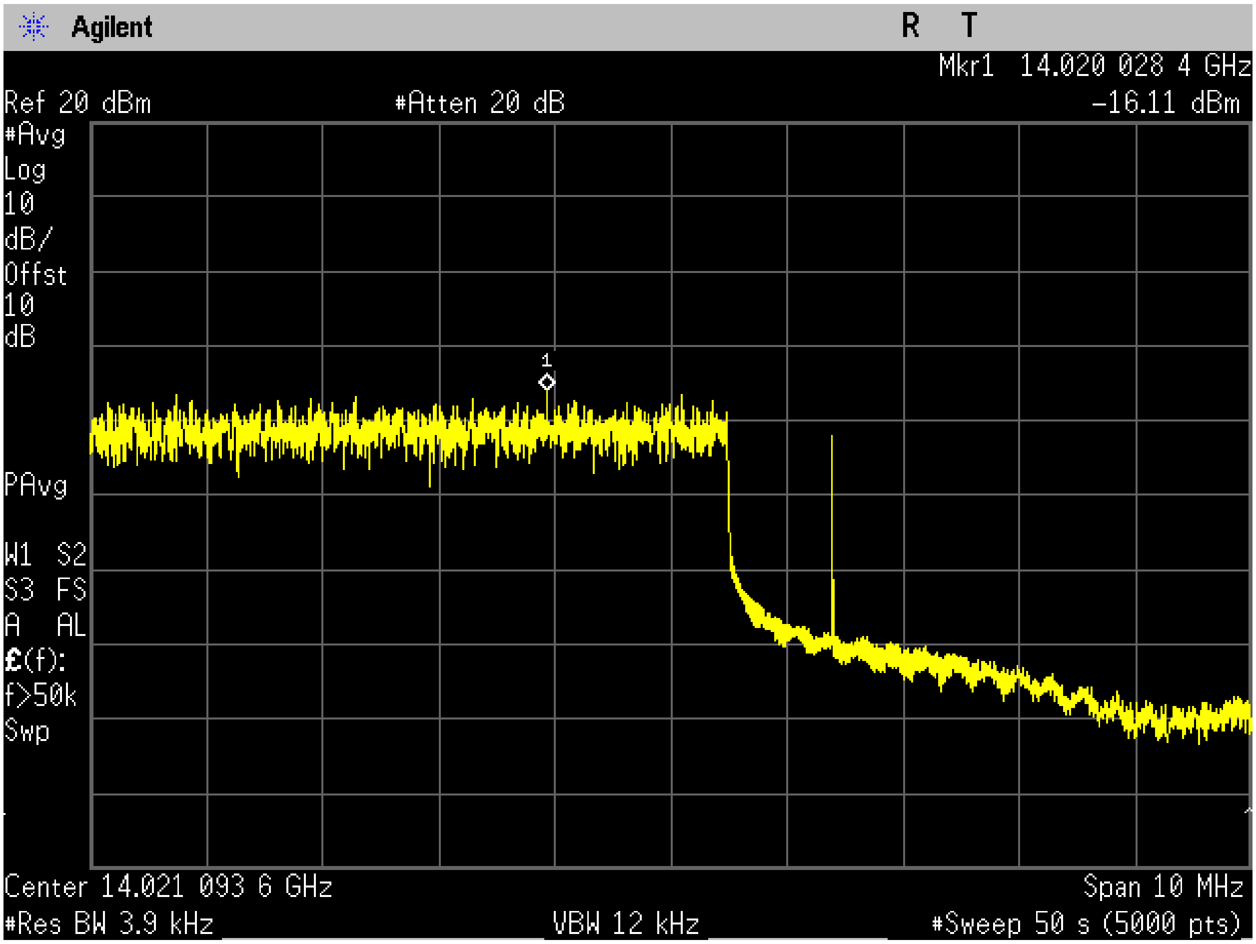


Figure 26. EIRP PSD, 16QAM, 20MHz, Low Channel (Final).

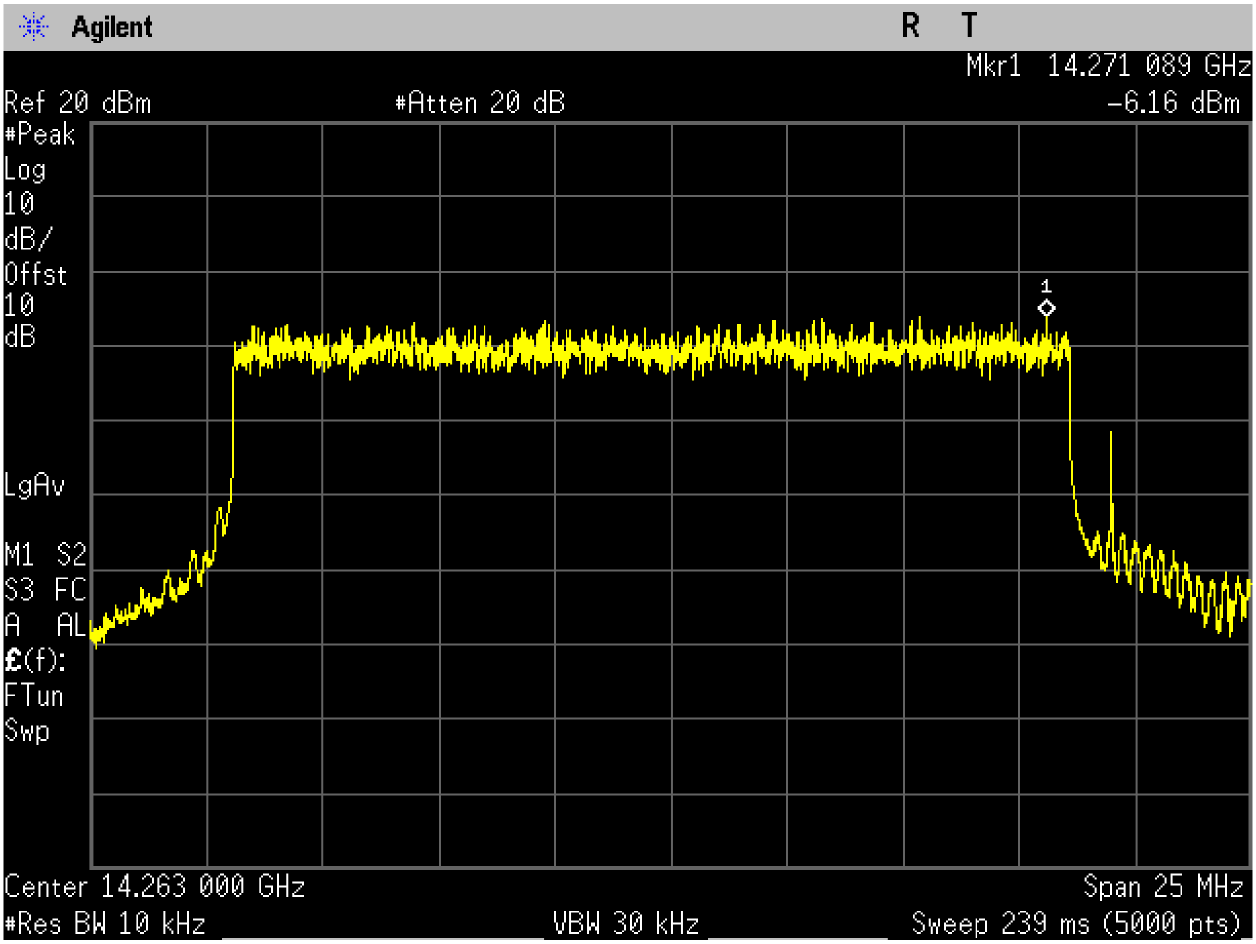


Figure 27. EIRP PSD, 16QAM, 20MHz, Mid Channel (PreScan).

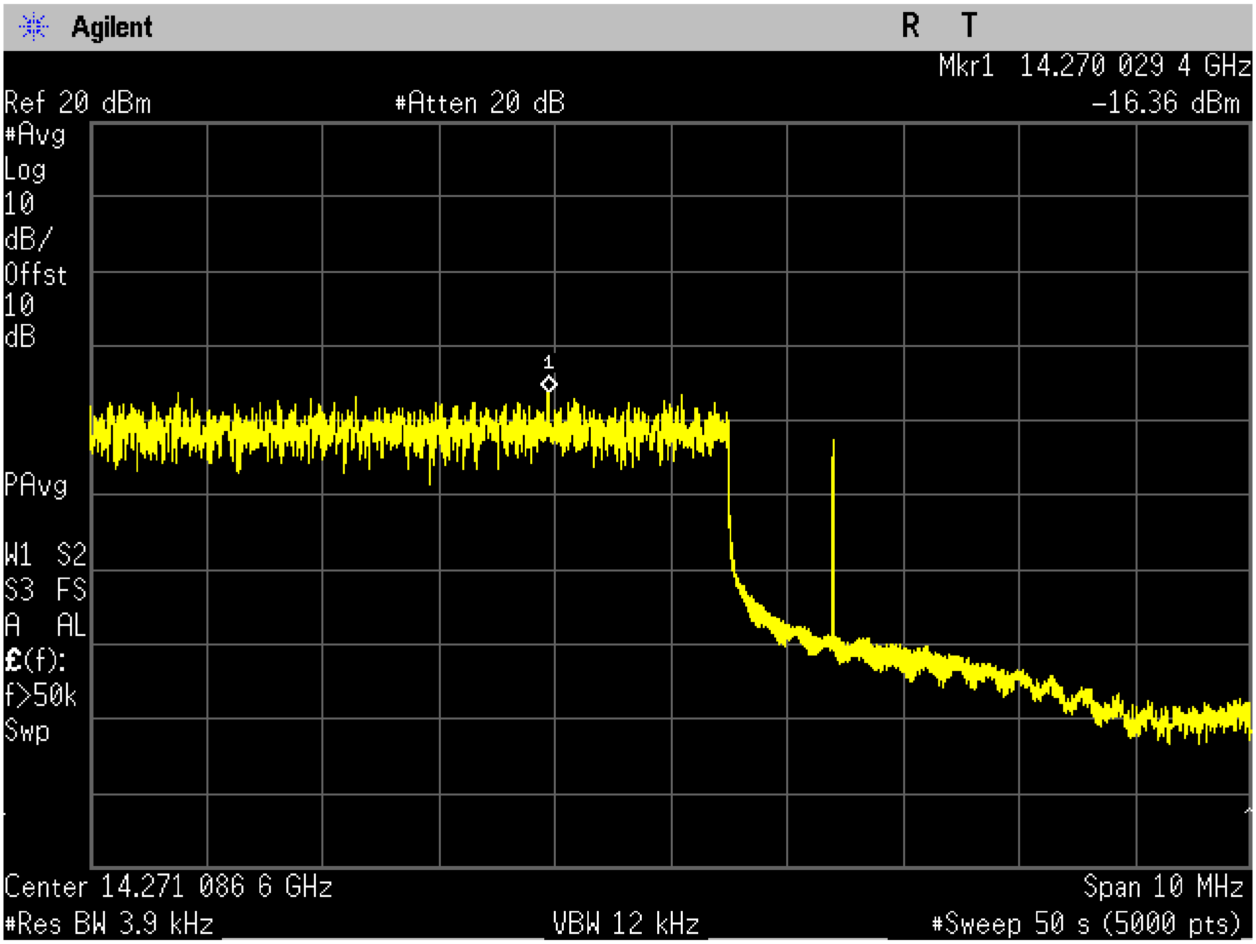


Figure 28. EIRP PSD, 16QAM, 20MHz, Mid Channel (Final).

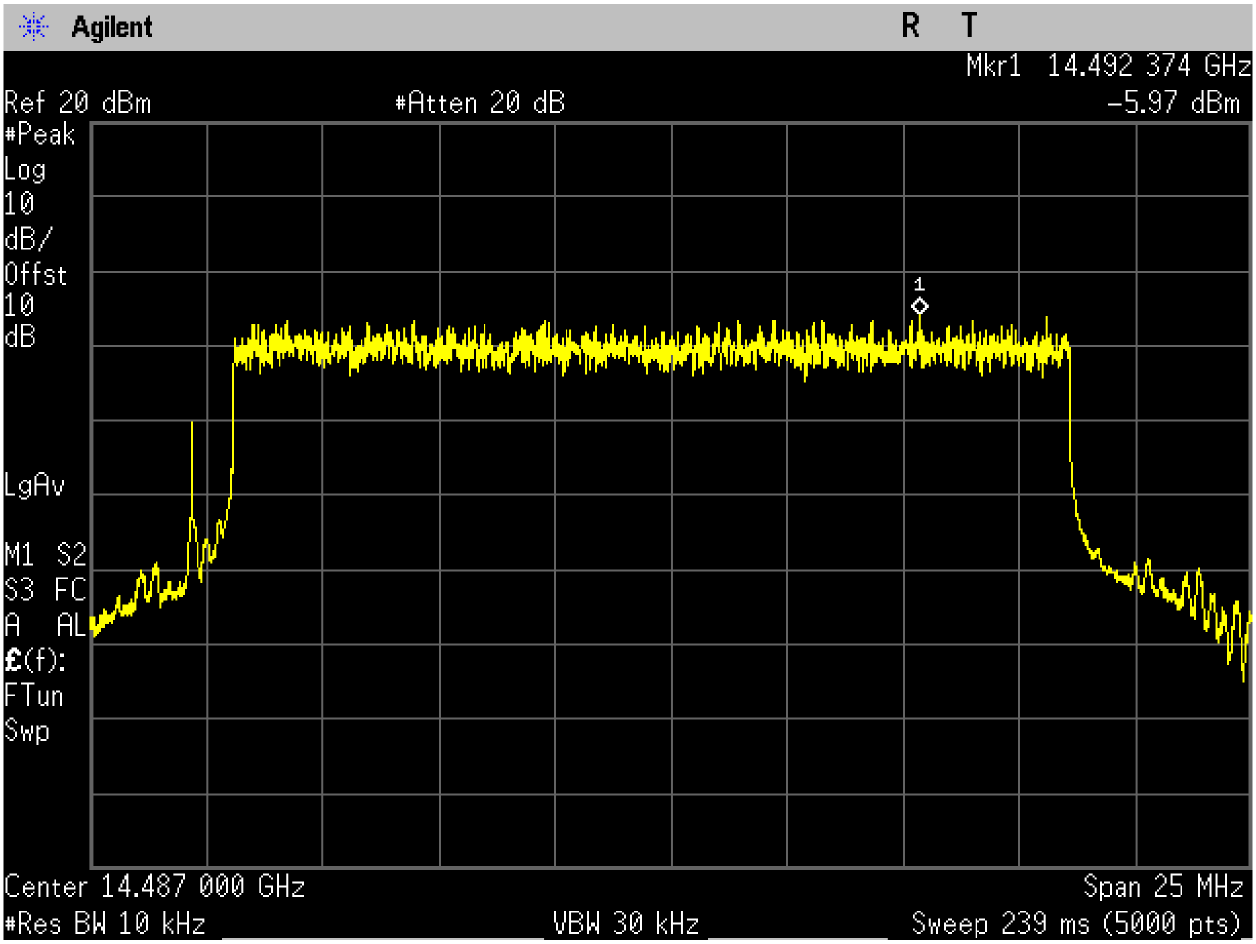


Figure 29. EIRP PSD, 16QAM, 20MHz, High Channel (PreScan).

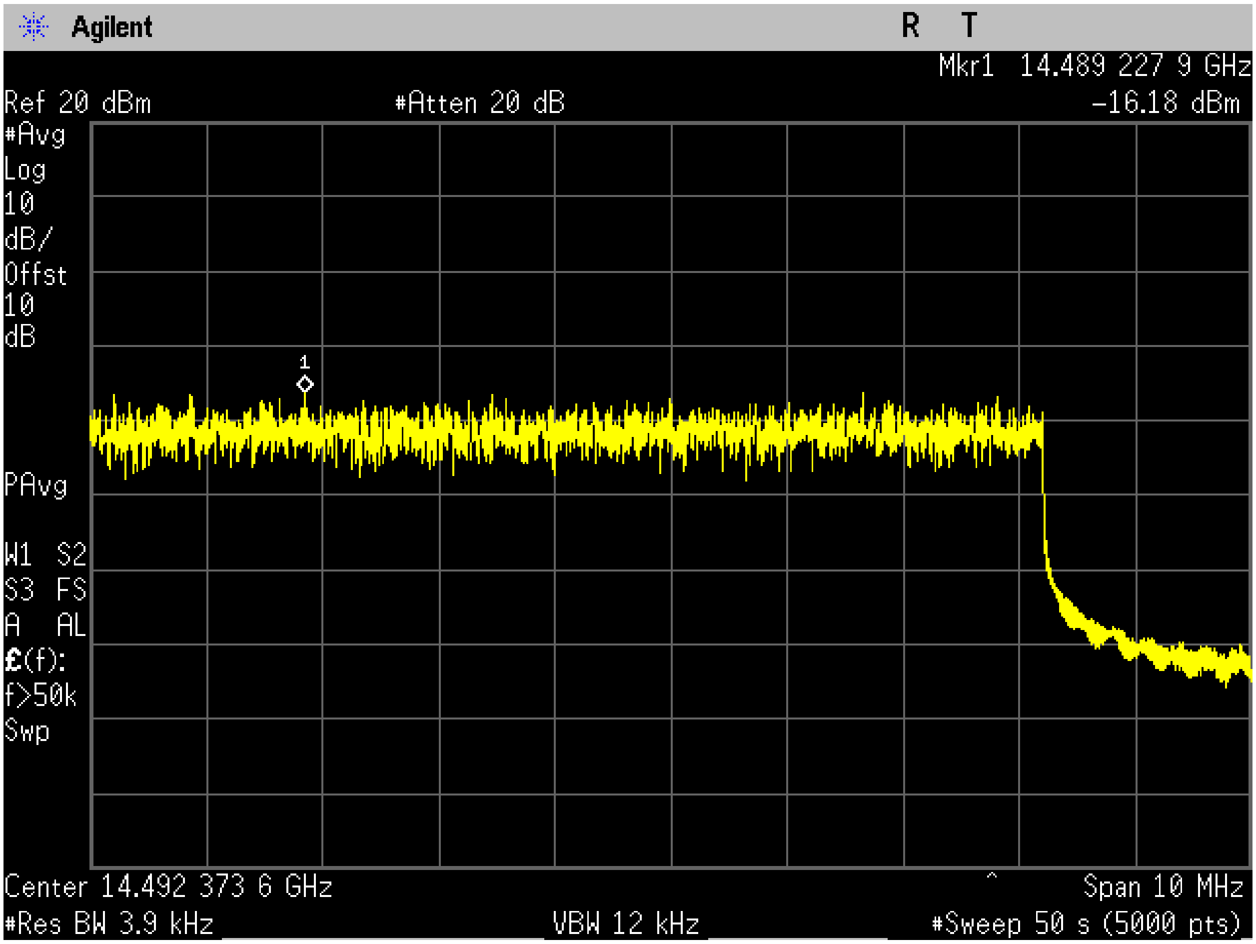


Figure 30. EIRP PSD, 16QAM, 20MHz, High Channel (Final).

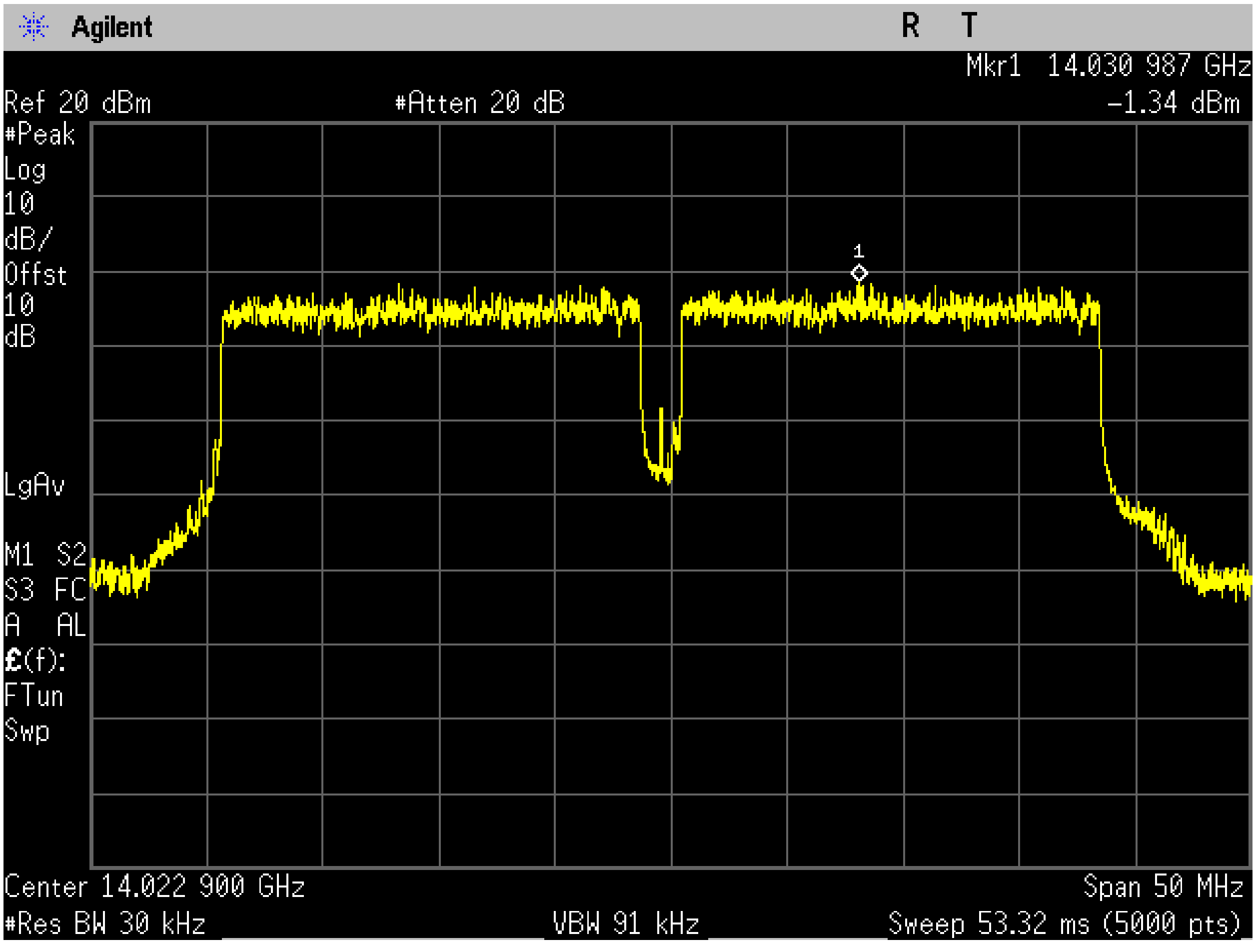


Figure 31. EIRP PSD, 16QAM, 40MHz, Low Channel (PreScan).

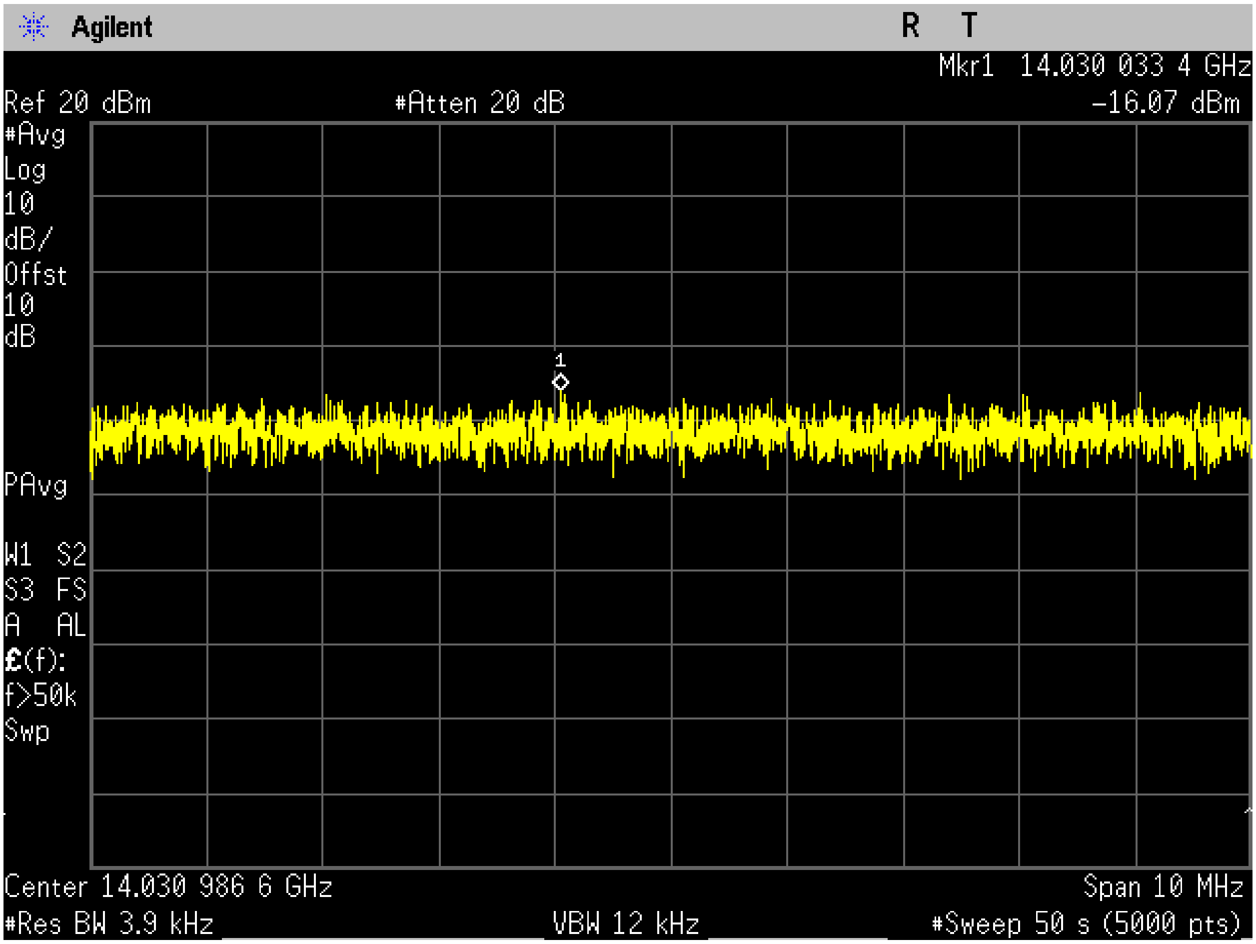


Figure 32. EIRP PSD, 16QAM, 40MHz, Low Channel (Final).

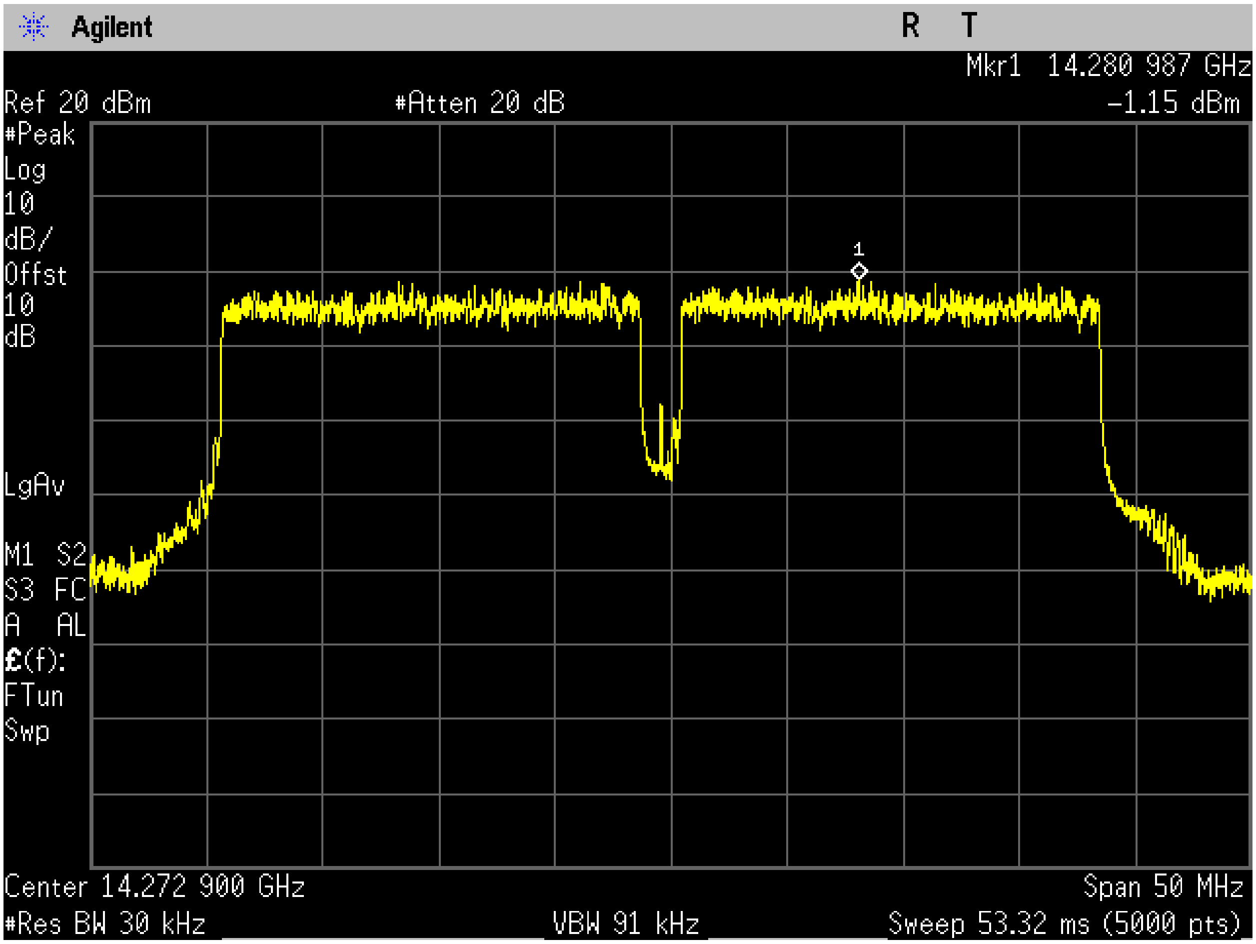


Figure 33. EIRP PSD, 16QAM, 40MHz, Mid Channel (Prescan).

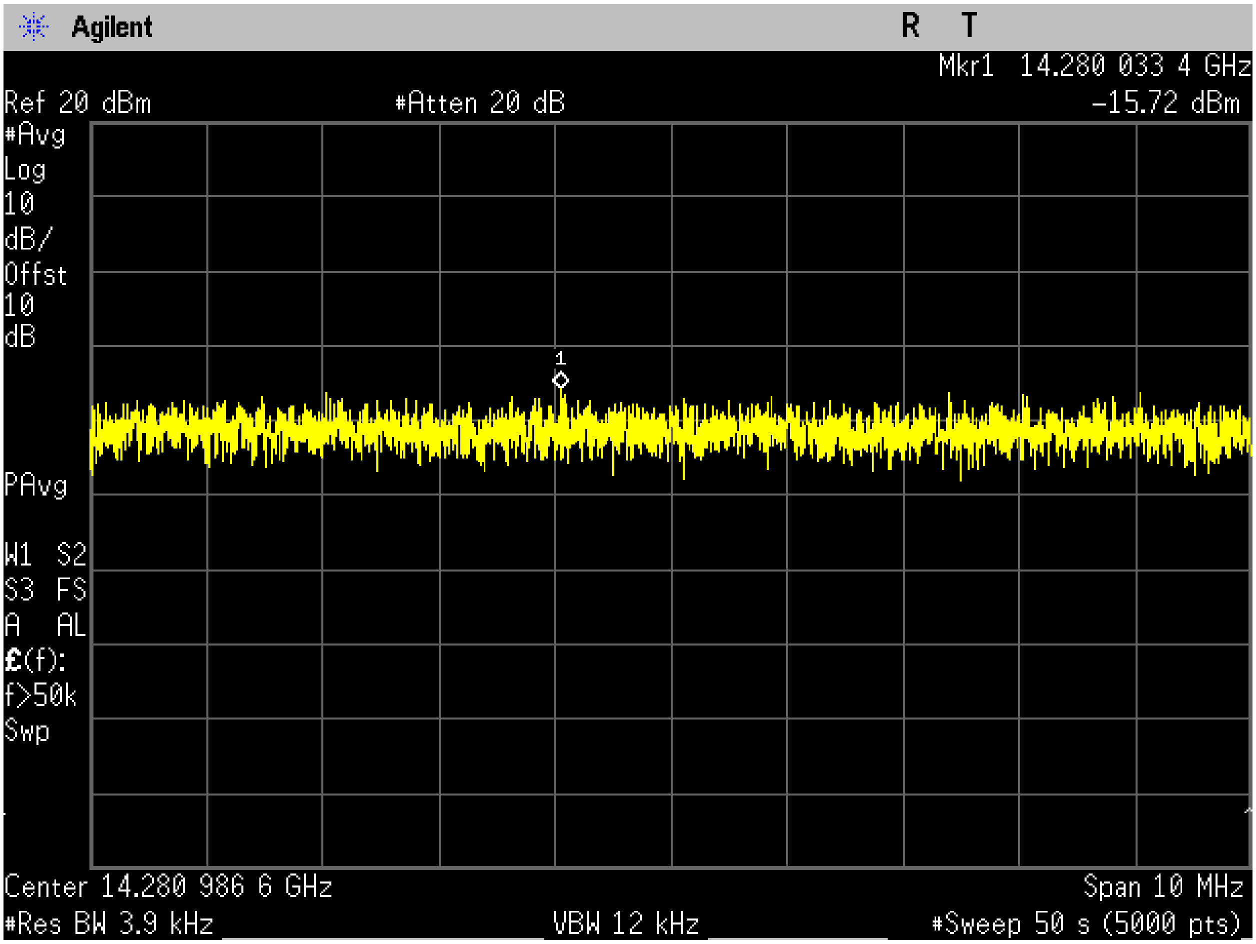


Figure 34. EIRP PSD, 16QAM, 40MHz, Mid Channel (Final).

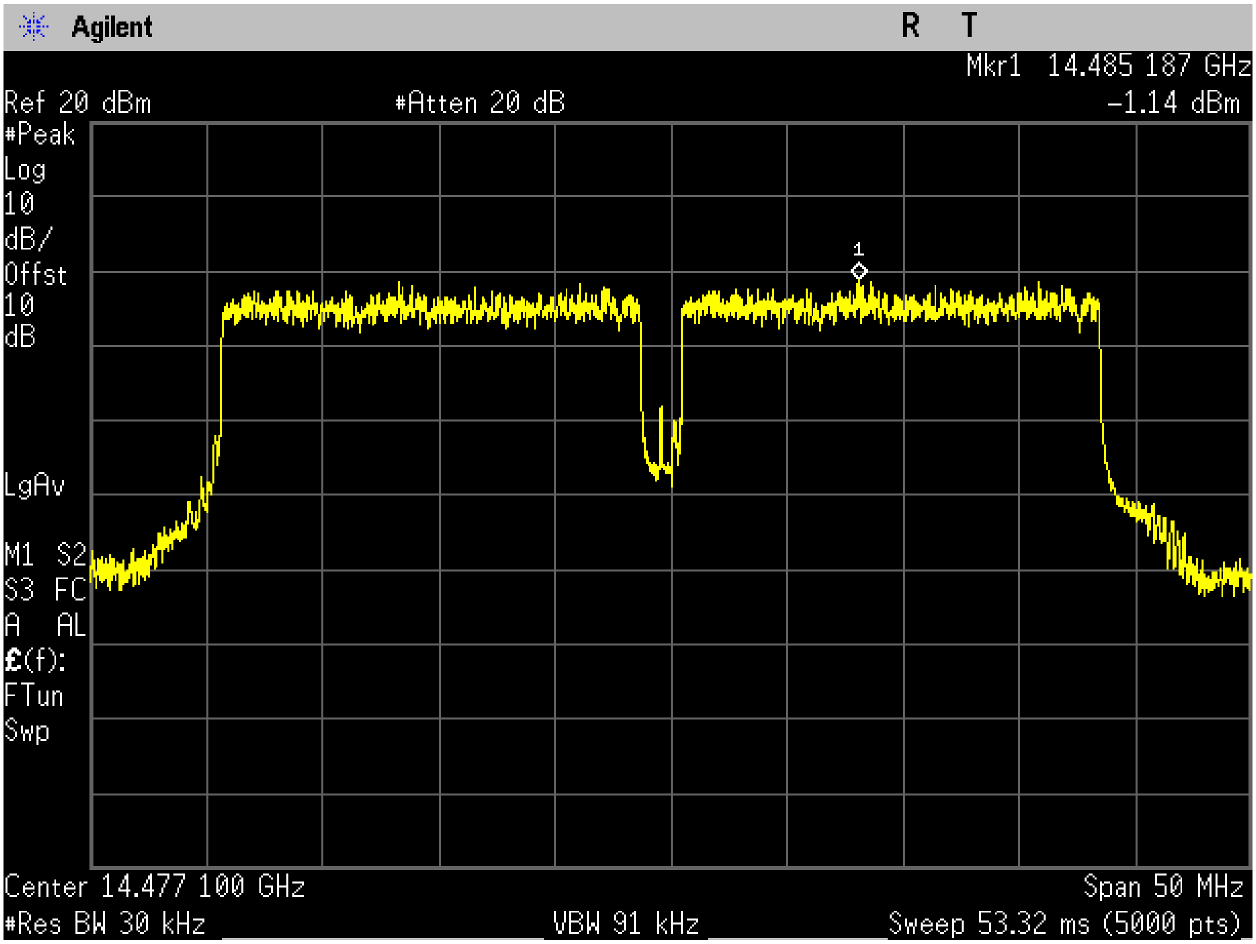


Figure 35. EIRP PSD, 16QAM, 40MHz, High Channel (PreScan).

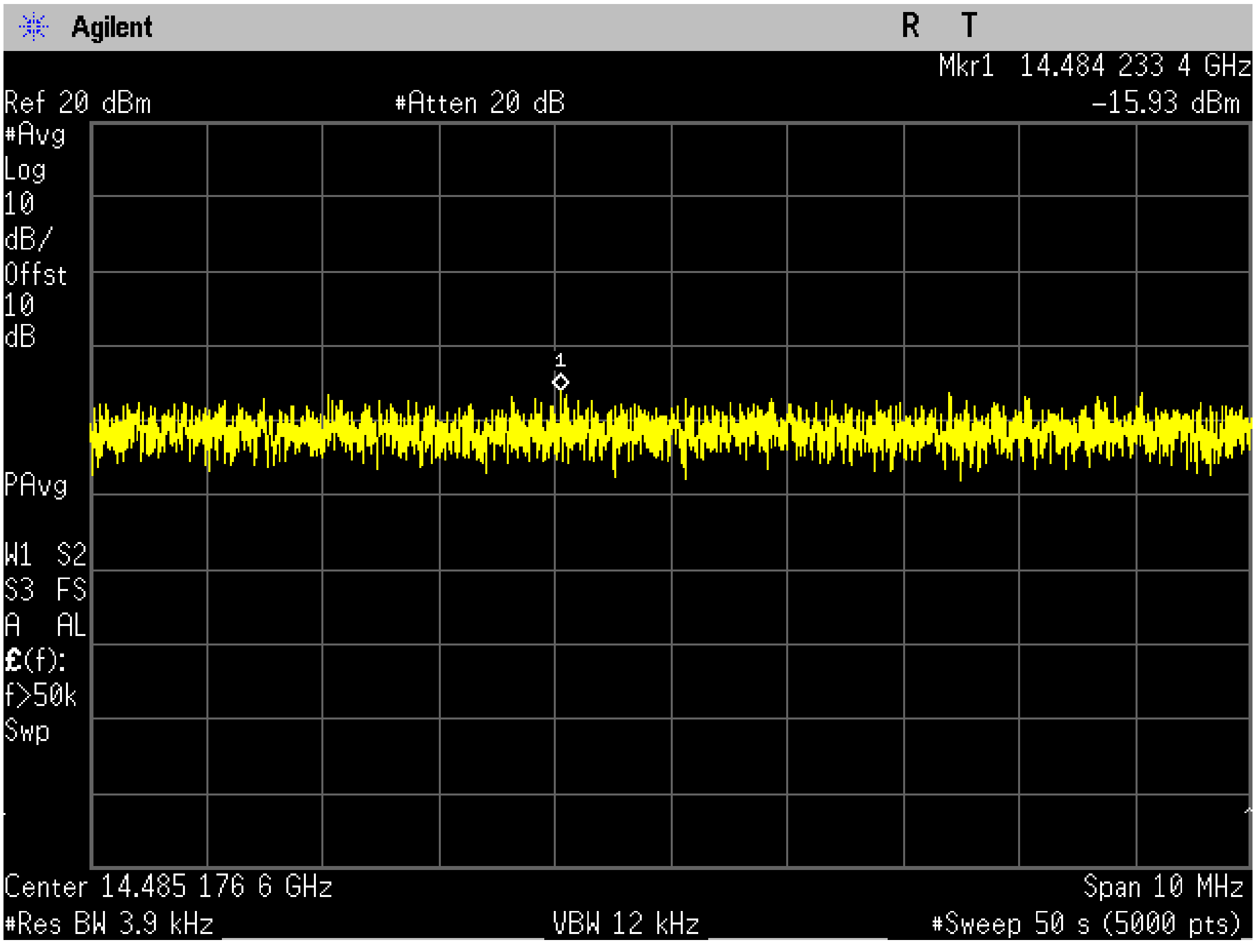


Figure 36. EIRP PSD, 16QAM, 40MHz, High Channel (Final).

EIRP

Modulation	Nominal Bandwidth (MHz)	Center Frequency (GHz)	Conducted Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP (W)
QPSK	20	14.013	15.10	48.5	63.60	2290.87
		14.263	15.06	48.5	63.56	2269.86
		14.487	15.06	48.5	63.56	2269.86
	40	14.0229	18.13	48.5	66.63	4602.57
		14.2729	18.16	48.5	66.66	4634.47
		14.4771	18.14	48.5	66.64	4613.18
8PSK	20	14.013	15.04	48.5	63.54	2259.44
		14.263	15.14	48.5	63.64	2312.06
		14.487	15.17	48.5	63.67	2328.09
	40	14.0229	18.10	48.5	66.60	4570.88
		14.2729	18.13	48.5	66.63	4602.57
		14.4771	18.11	48.5	66.61	4581.42
16QAM	20	14.013	15.09	48.5	63.59	2285.60
		14.263	15.10	48.5	63.60	2290.87
		14.487	15.18	48.5	63.68	2333.46
	40	14.0229	18.05	48.5	66.55	4518.56
		14.2729	18.11	48.5	66.61	4581.42
		14.4771	18.07	48.5	66.57	4539.42

Table 9. EIRP, Test Results

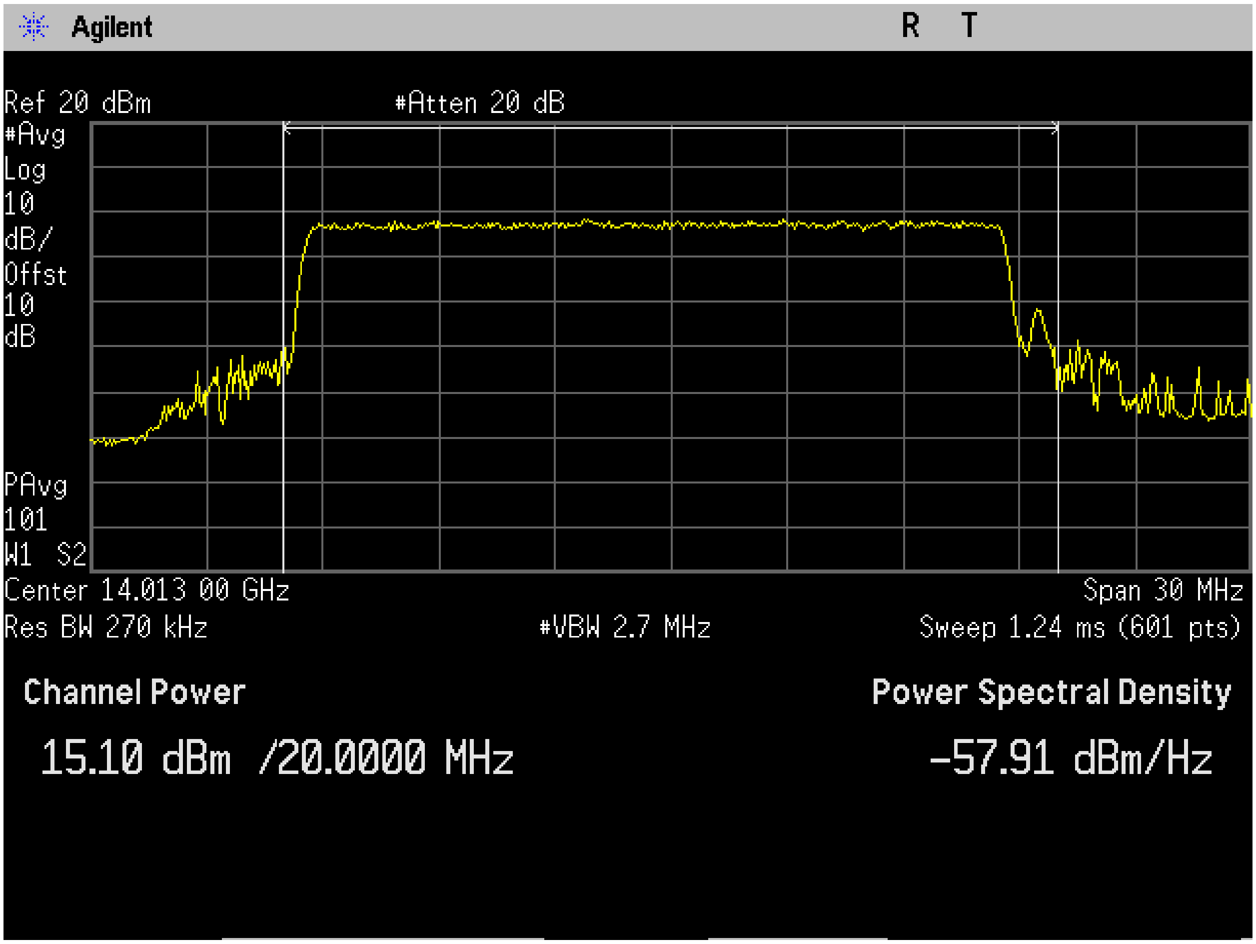


Figure 37. Conducted Power, QPSK, 20MHz, Low Channel.

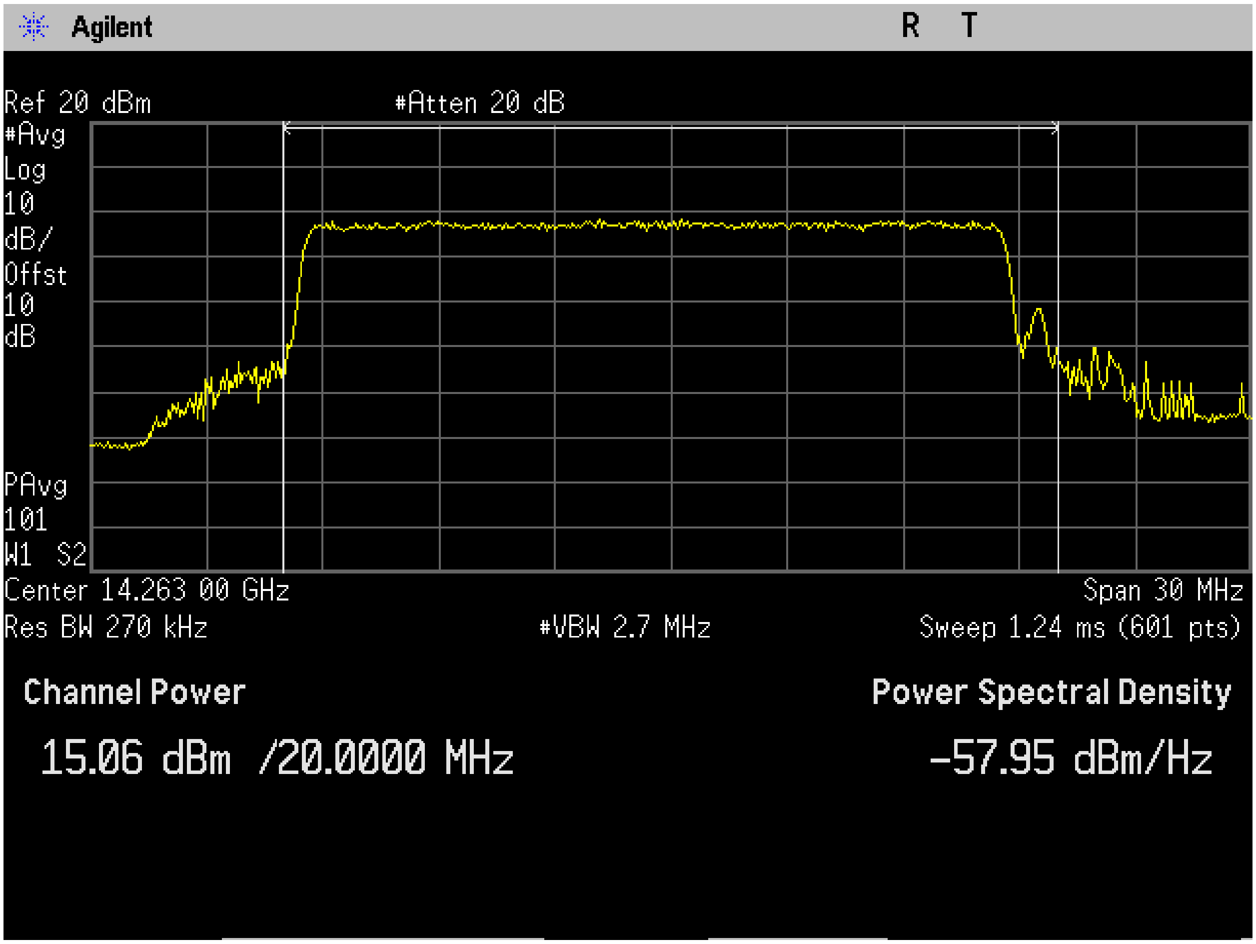


Figure 38. Conducted Power, QPSK, 20MHz, Mid Channel.

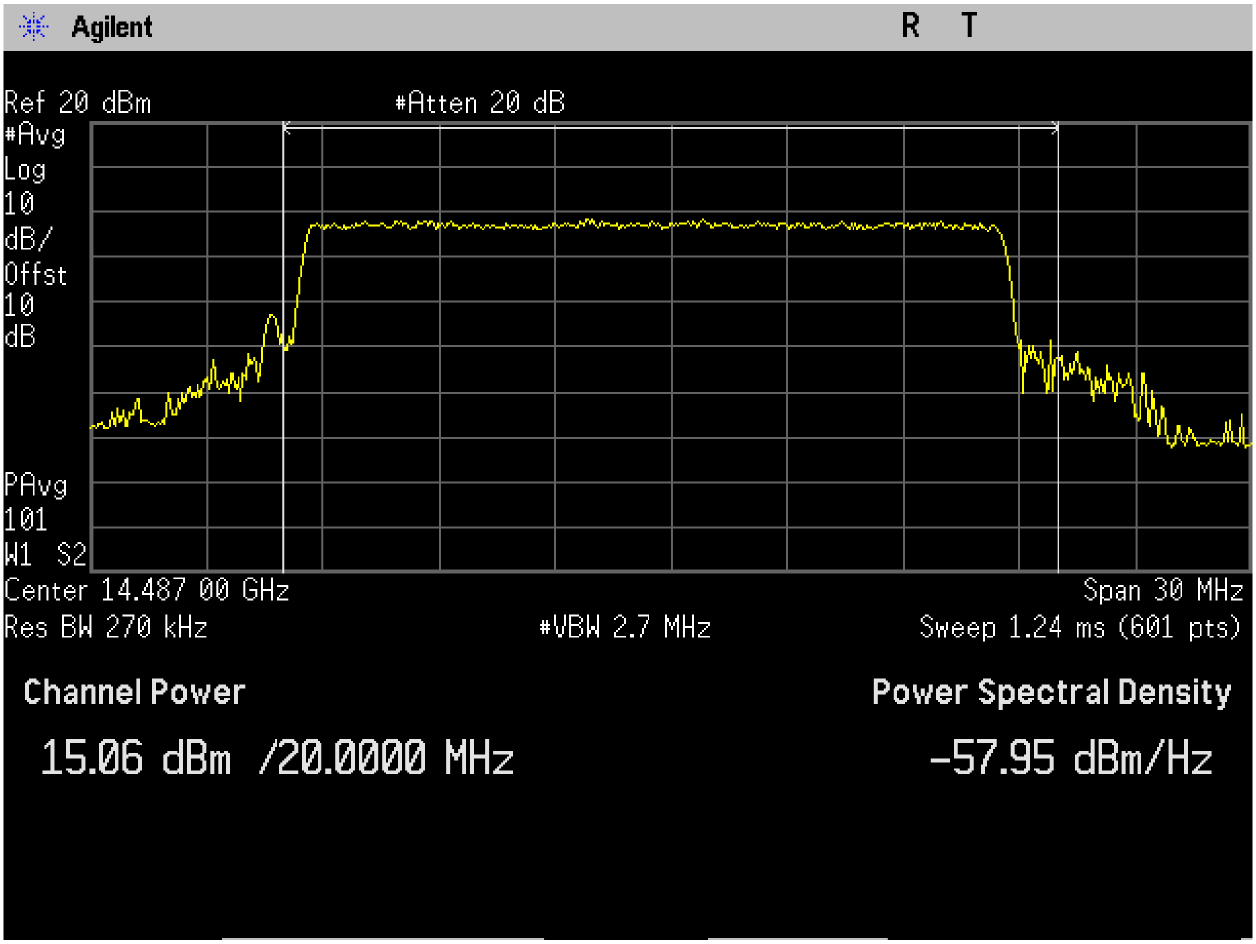


Figure 39. Conducted Power, QPSK, 20MHz, High Channel.

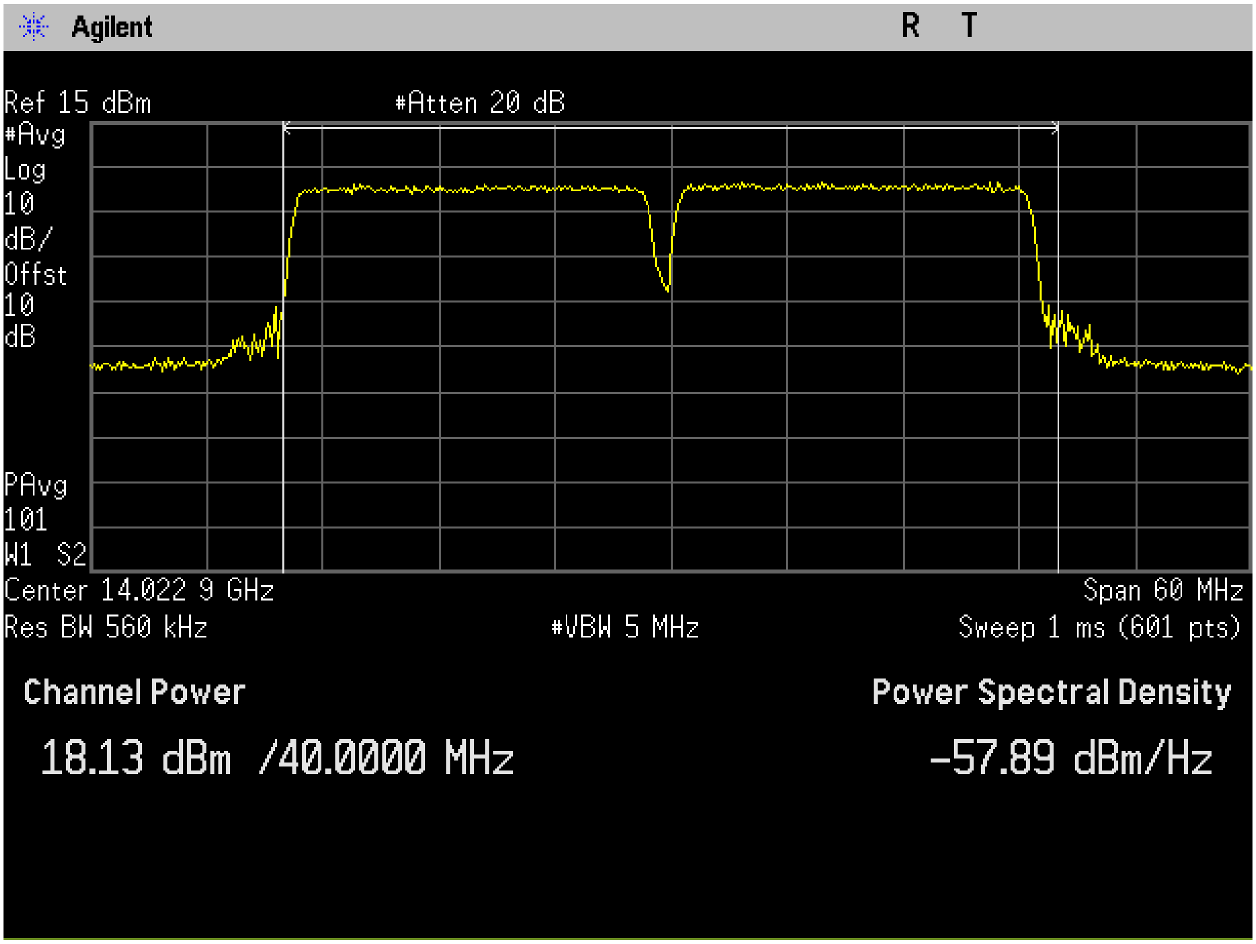


Figure 40. Conducted Power, QPSK, 40MHz, Low Channel.

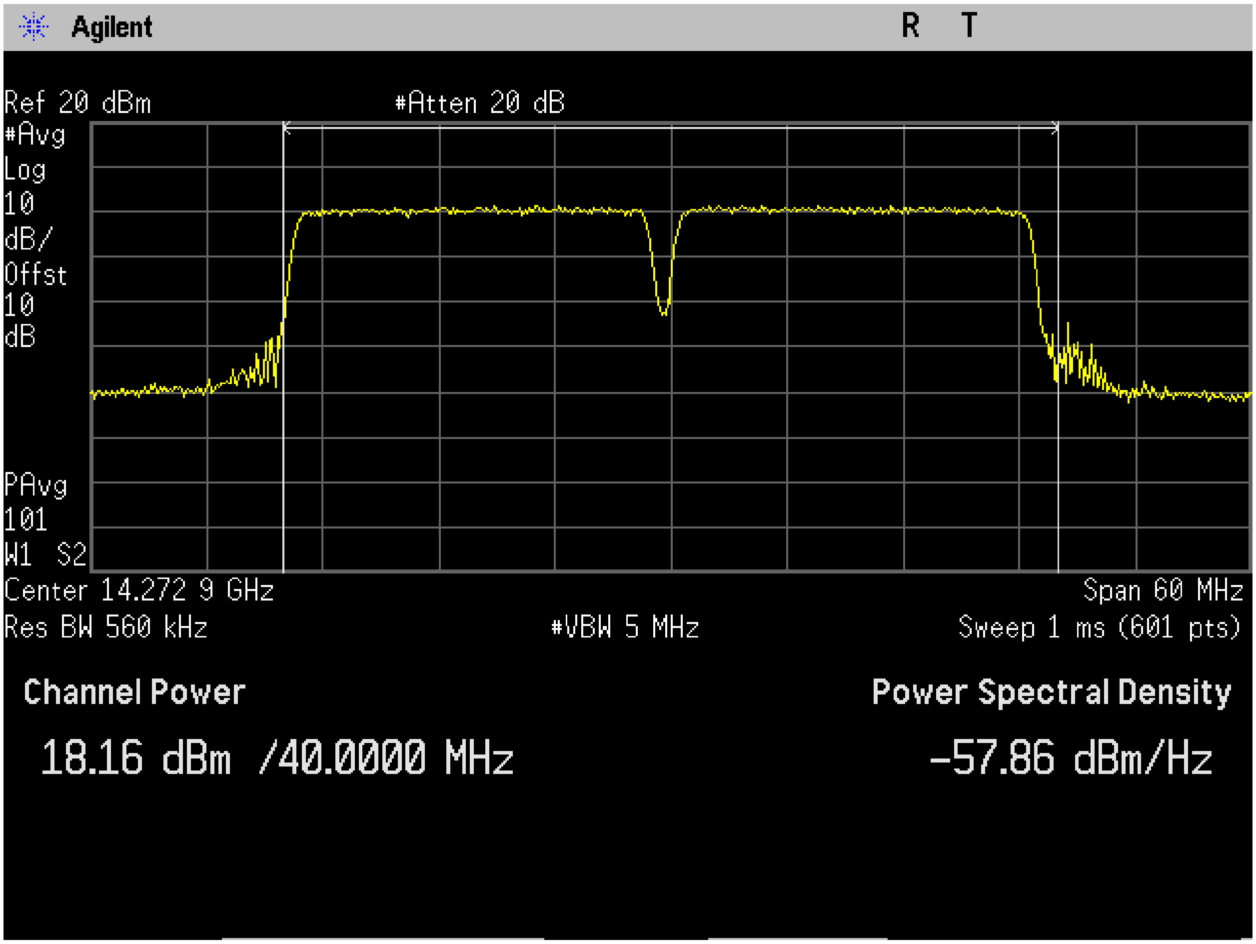


Figure 41. Conducted Power, QPSK, 40MHz, Mid Channel.

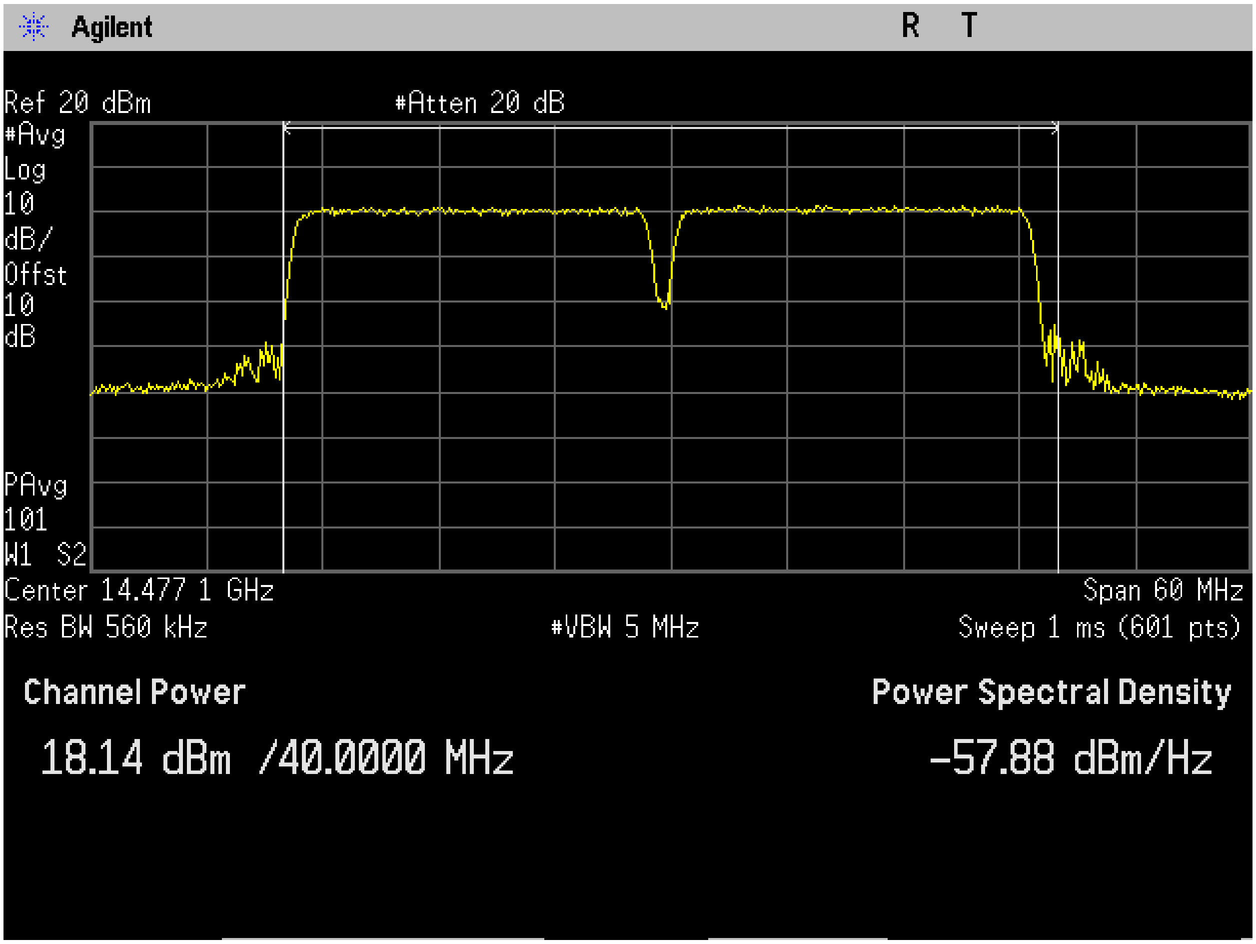


Figure 42. Conducted Power, QPSK, 40MHz, High Channel.

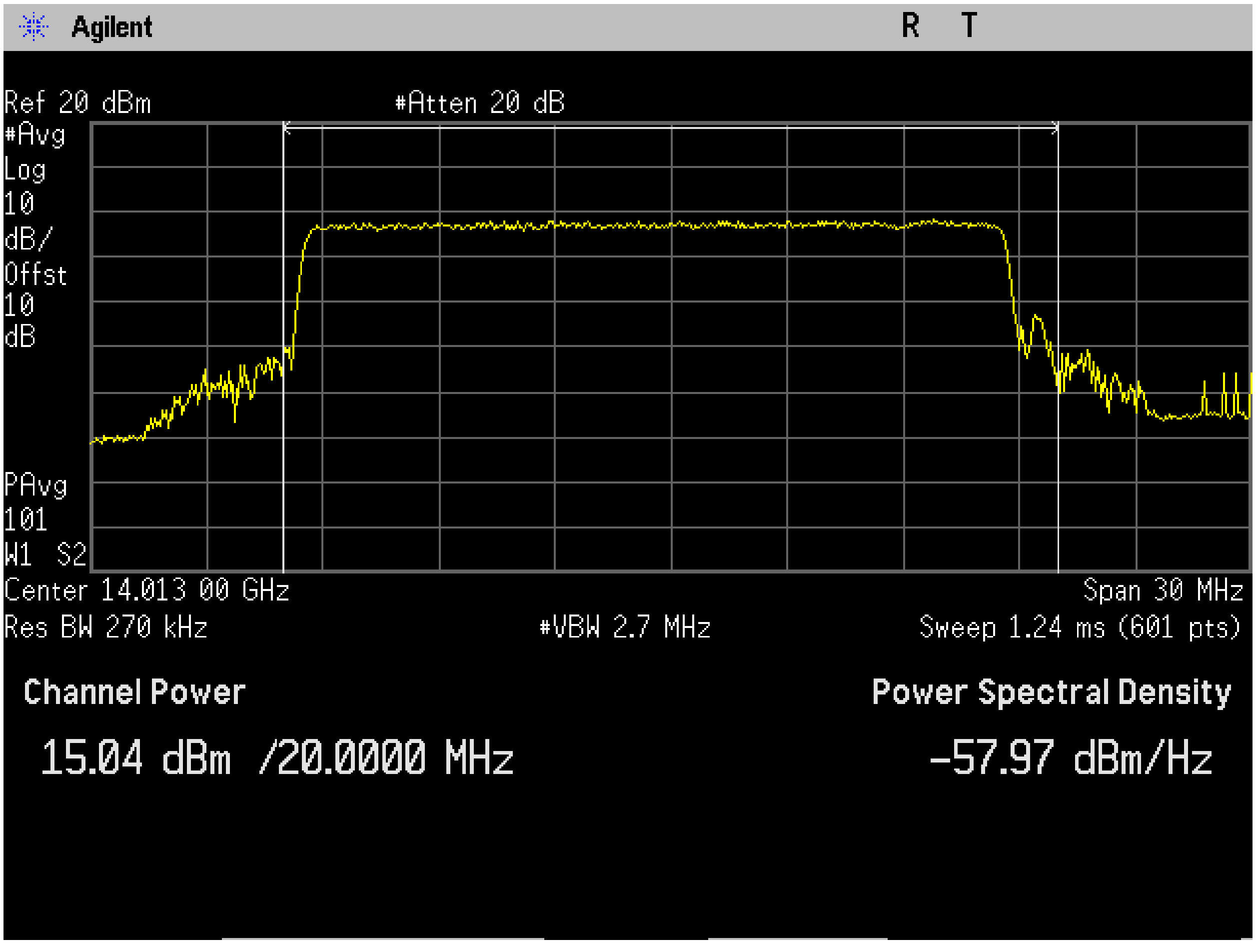


Figure 43. Conducted Power, 8PSK, 20MHz, Low Channel.

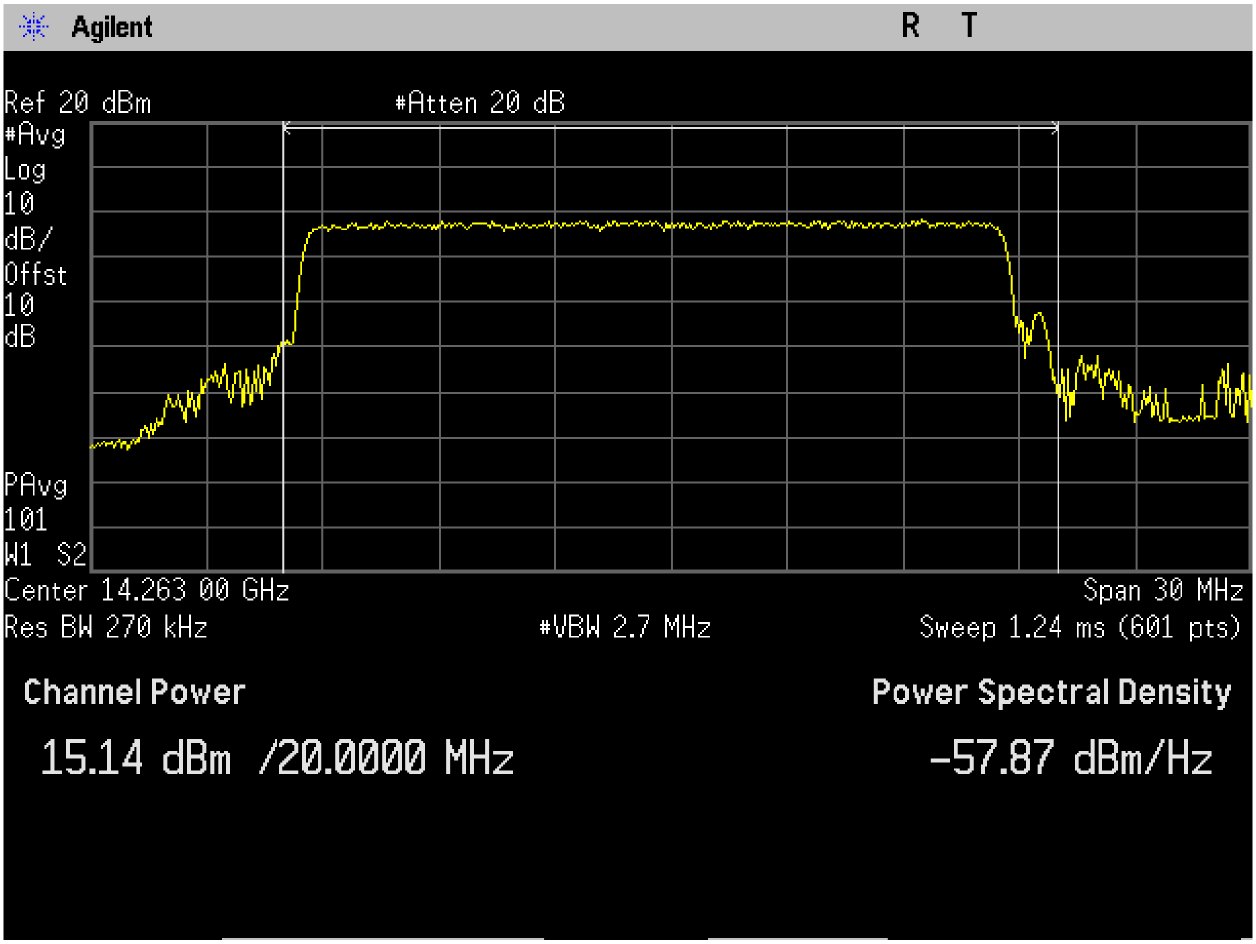


Figure 44. Conducted Power, 8PSK, 20MHz, Mid Channel.

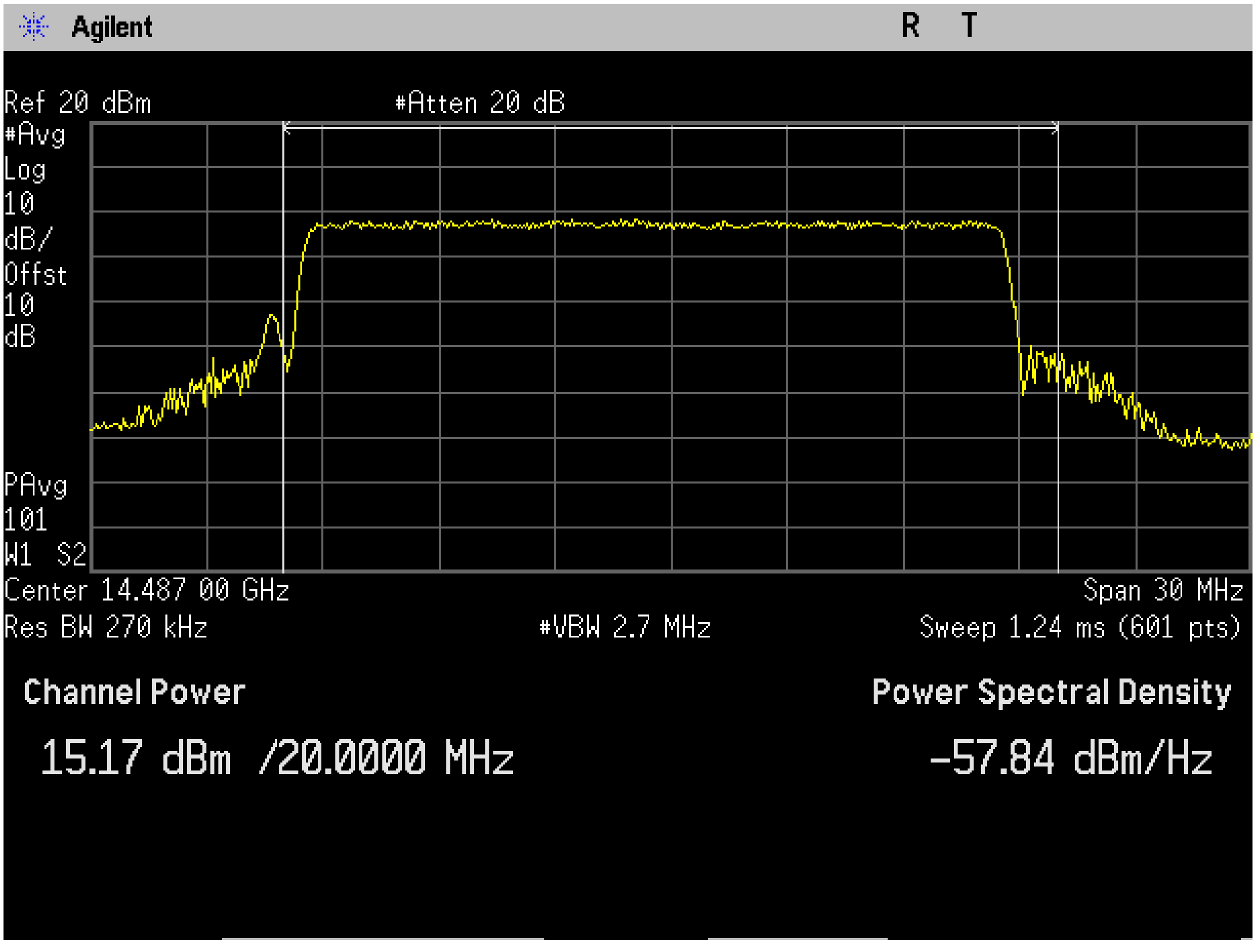


Figure 45. Conducted Power, 8PSK, 20MHz, High Channel.

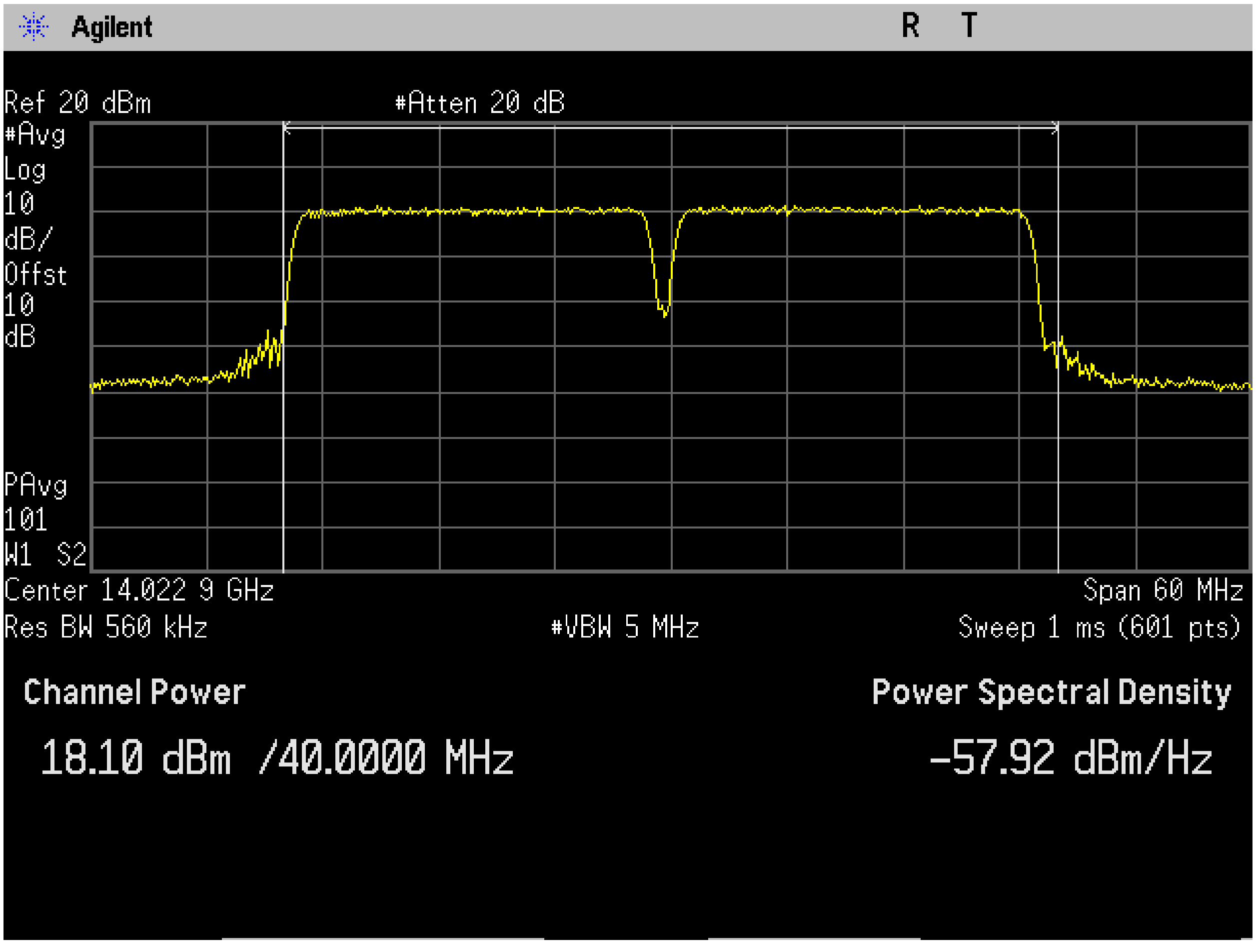


Figure 46. Conducted Power, 8PSK, 40MHz, Low Channel.

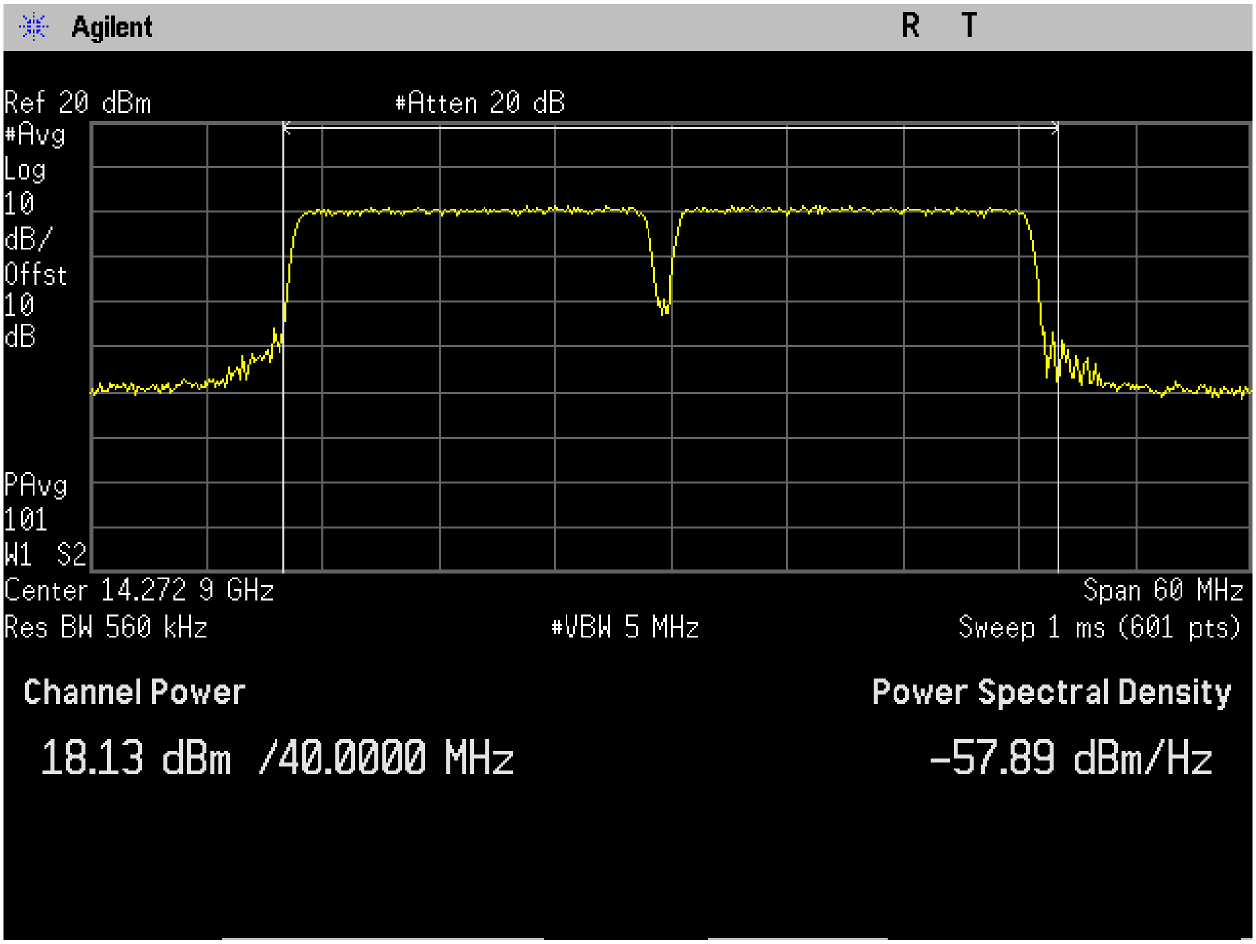


Figure 47. Conducted Power, 8PSK, 40MHz, Mid Channel.

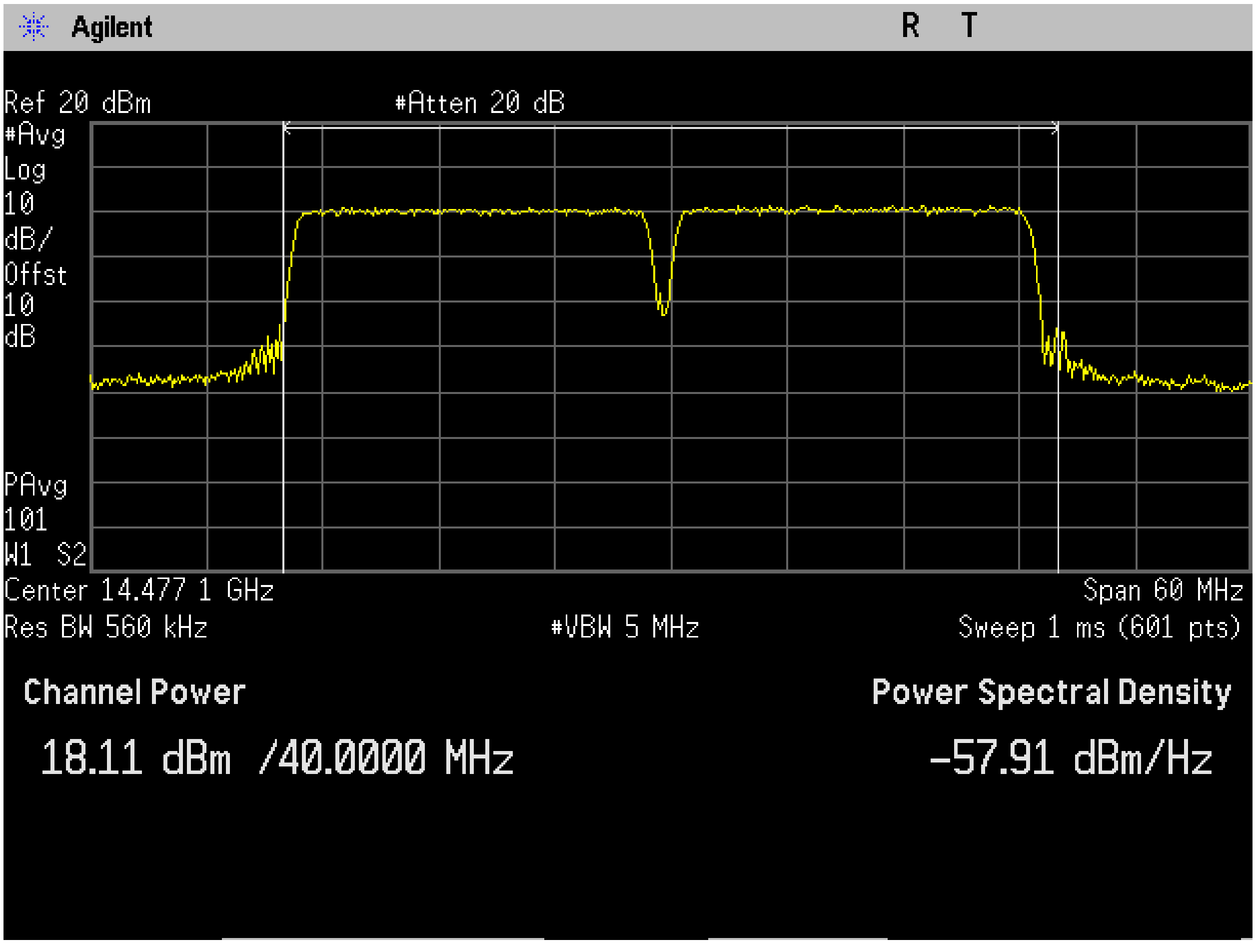


Figure 48. Conducted Power, 8PSK, 40MHz, High Channel.

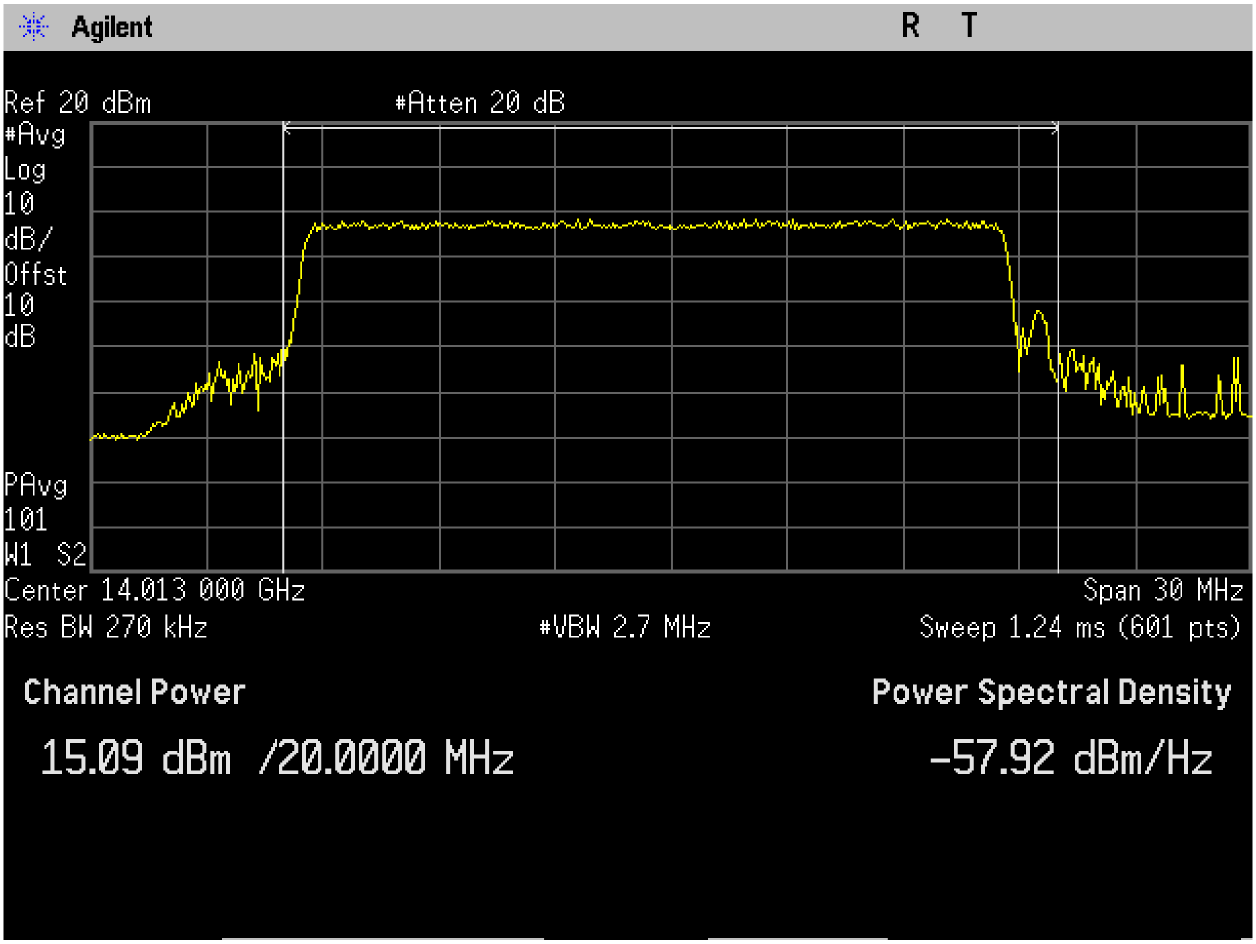


Figure 49. Conducted Power, 16QAM, 20MHz, Low Channel.

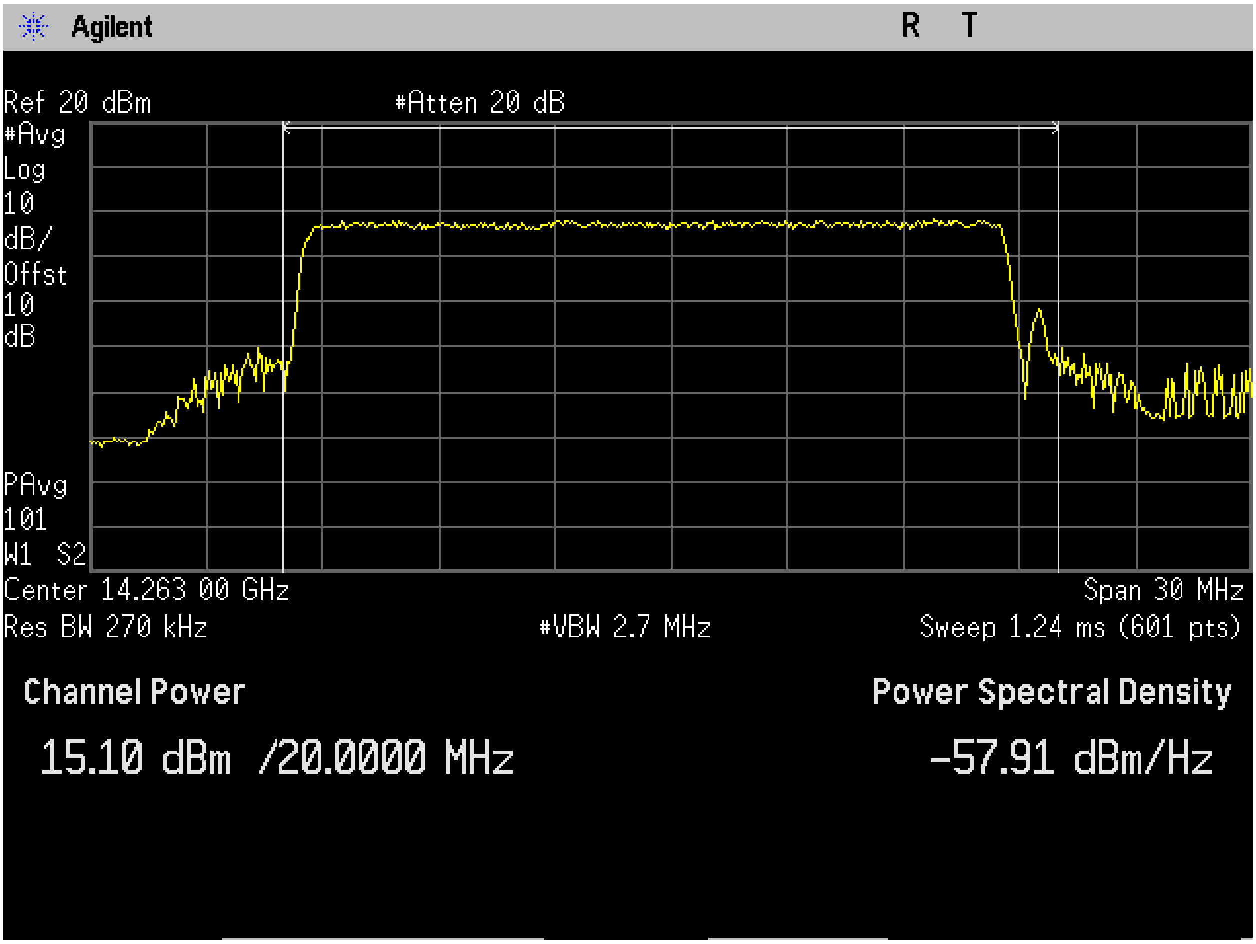


Figure 50. Conducted Power, 16QAM, 20MHz, Mid Channel.

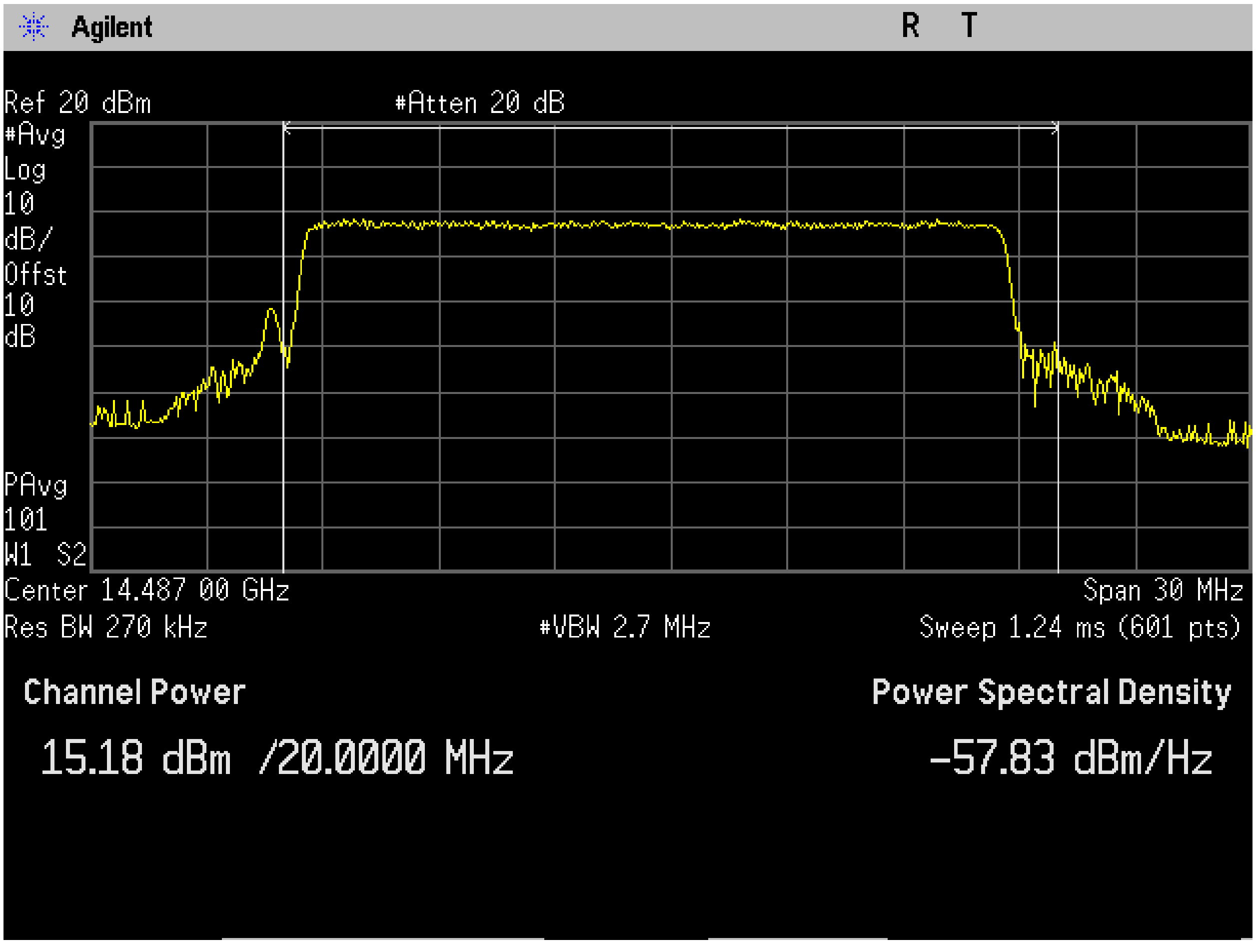


Figure 51. Conducted Power, 16QAM, 20MHz, High Channel.

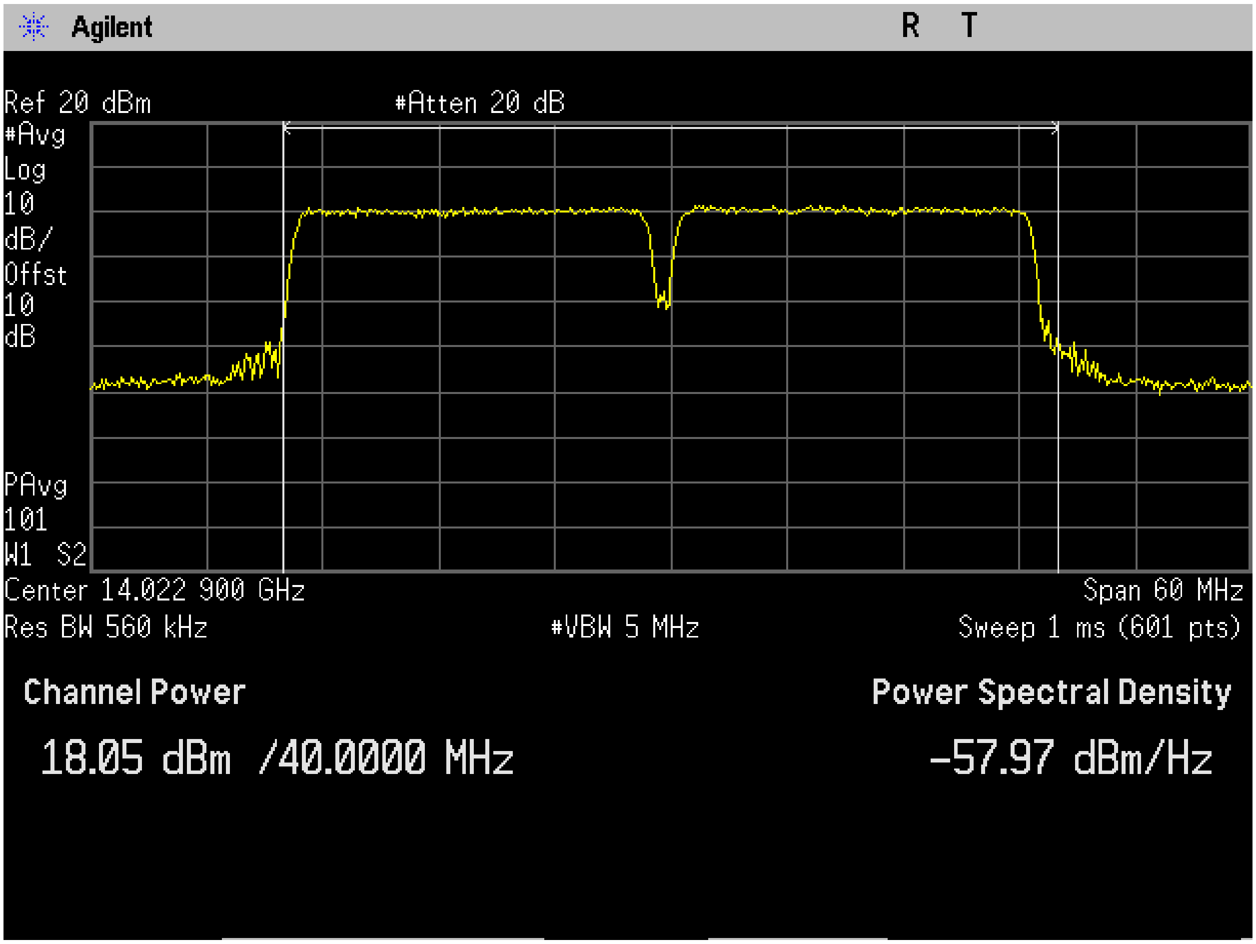


Figure 52. Conducted Power, 16QAM, 40MHz, Low Channel.

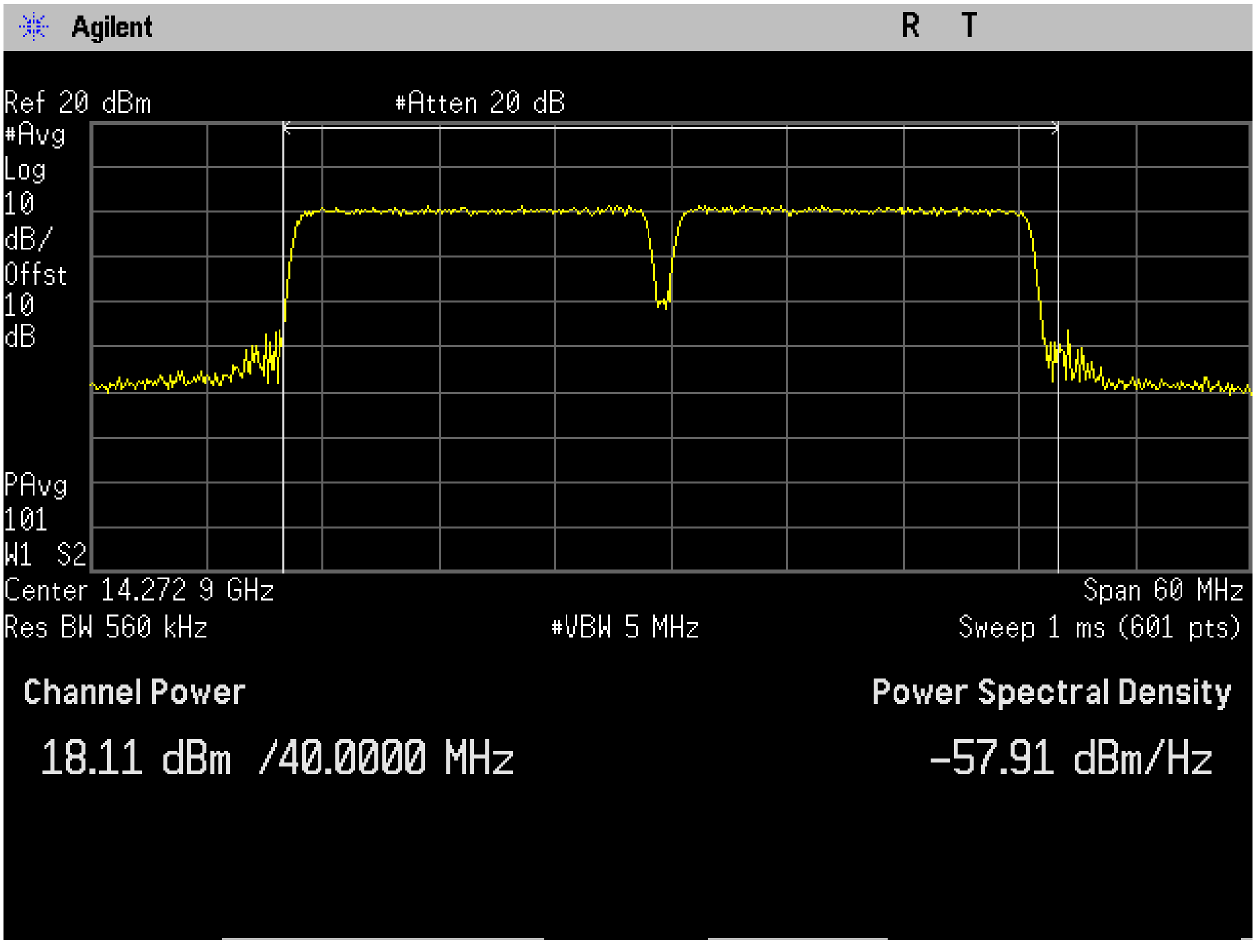


Figure 53. Conducted Power, 16QAM, 40MHz, Mid Channel.

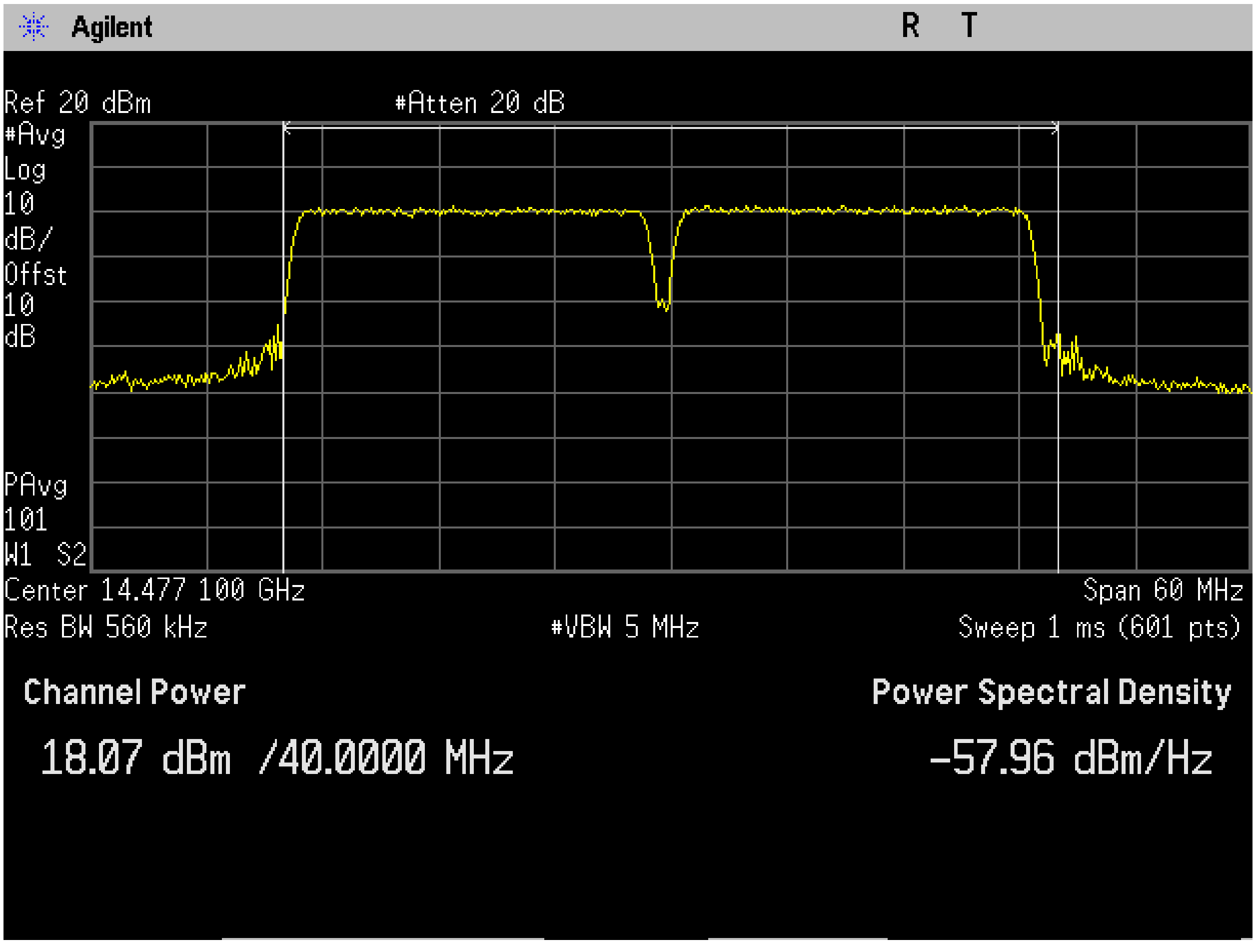


Figure 54. Conducted Power, 16QAM, 40MHz, High Channel.

Electromagnetic Compatibility Criteria for Satellite Communications

§25.218(f) Off-axis EIRP Density Envelopes

Test Requirement(s): (f) Digital earth station operation in the conventional Ku-band.

(1) For co-polarized transmissions in the plane tangent to the GSO arc:

$15-25\log_{10}\theta$	dBW/4 kHz	for 1.5° ≤ θ ≤ 7°.
−6	dBW/4 kHz	for 7° < θ ≤ 9.2°.
$18-25\log_{10}\theta$	dBW/4 kHz	for 9.2° < θ ≤ 19.1°.
−14	dBW/4 kHz	for 19.1° < θ ≤ 180°.

Where θ is as defined in paragraph (c)(1) of this section. The EIRP density levels specified for θ > 7° may be exceeded by up to 3 dB in up to 10% of the range of theta (θ) angles from ±7-180°, and by up to 6 dB in the region of main reflector spillover energy.

(2) For co-polarized transmissions in the plane perpendicular to the GSO arc:

$18-25\log_{10}\theta$	dBW/4 kHz	for 3° ≤ θ ≤ 19.1°.
−14	dBW/4 kHz	for 19.1° < θ ≤ 180°.

Where θ is as defined in paragraph (c)(1) of this section. These EIRP density levels may be exceeded by up to 6 dB in the region of main reflector spillover energy and in up to 10% of the range of θ angles not included in that region, on each side of the line from the earth station to the target satellite.

(3) For cross-polarized transmissions in the plane tangent to the GSO arc and in the plane perpendicular to the GSO arc:

$5-25\log_{10}\theta$	dBW/4 kHz	for 1.5° ≤ θ ≤ 7°.

Where θ is as defined in paragraph (c)(1) of this section.

NOTE. Subtracting the antenna gain values specified in §25.209 Earth station antenna performance standards from these limits, the maximum conducted Off-axis density limit is -14 dBW / 4kHz

Test Procedure: For output power measurements in any 4kHz band. The average power spectral density was measured according to subclause 5.2.4.5 of ANSI C63.26-2015. Measurements using a RBW lower than 4kHz were corrected by a factor of $10\log(RBW_{REF} / RBW_{MEAS})$. Due to number of points limitations, a peak prescan measurement was performed first then the average measurement was narrowed down to the 10MHz window centered at the peak found on peak prescan.

Test Results: The EUT is **compliant** with the requirements of this section. The gain for the off-axis antenna was 0 dBi for the calculation.

Test Engineer: Donald Salguero

Test Date: June 14, 2024

Modulation	Nominal Bandwidth (MHz)	Center Frequency (GHz)	4kHz PSD (dBm)	Bandwidth Correction (dB)	Gain (dBi)	4kHz EIRP PSD (dBm)	Limit (dBm)
QPSK	20	14.013	-16.06	0.11	0	-15.95	16.00
		14.263	-15.91	0.11	0	-15.80	16.00
		14.487	-15.88	0.11	0	-15.77	16.00
	40	14.0229	-15.64	0.11	0	-15.53	16.00
		14.2729	-15.42	0.11	0	-15.31	16.00
		14.4771	-15.78	0.11	0	-15.67	16.00
8PSK	20	14.013	-16.78	0.11	0	-16.67	16.00
		14.263	-16.53	0.11	0	-16.42	16.00
		14.487	-16.43	0.11	0	-16.32	16.00
	40	14.0229	-15.55	0.11	0	-15.44	16.00
		14.2729	-15.17	0.11	0	-15.06	16.00
		14.4771	-15.37	0.11	0	-15.26	16.00
16QAM	20	14.013	-16.11	0.11	0	-16.00	16.00
		14.263	-16.36	0.11	0	-16.25	16.00
		14.487	-16.18	0.11	0	-16.07	16.00
	40	14.0229	-16.07	0.11	0	-15.96	16.00
		14.2729	-15.72	0.11	0	-15.61	16.00
		14.4771	-15.93	0.11	0	-15.82	16.00

Table 10. Off-Axis EIRP PSD, Test Results

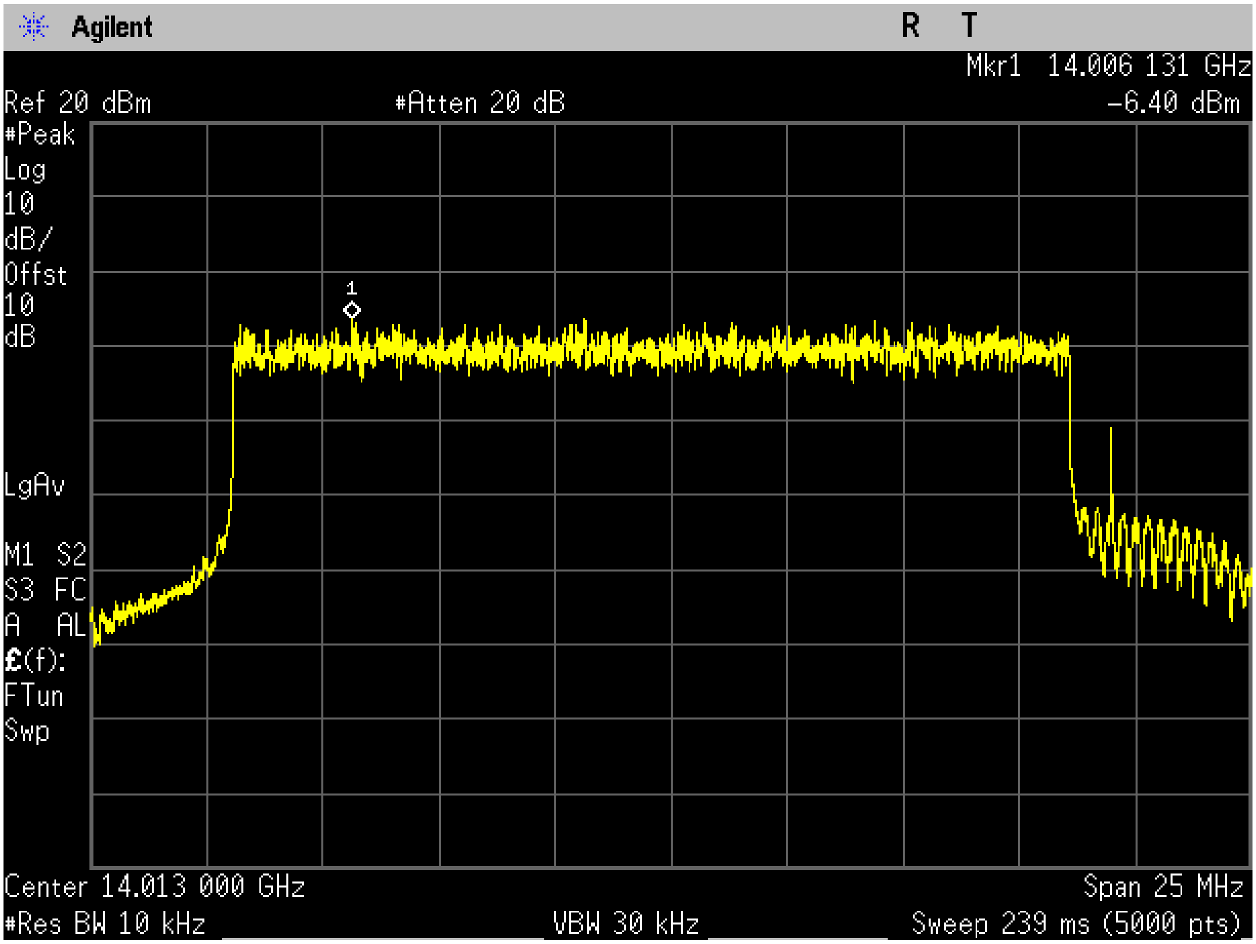


Figure 55. EIRP PSD, QPSK, 20MHz, Low Channel (PreScan).

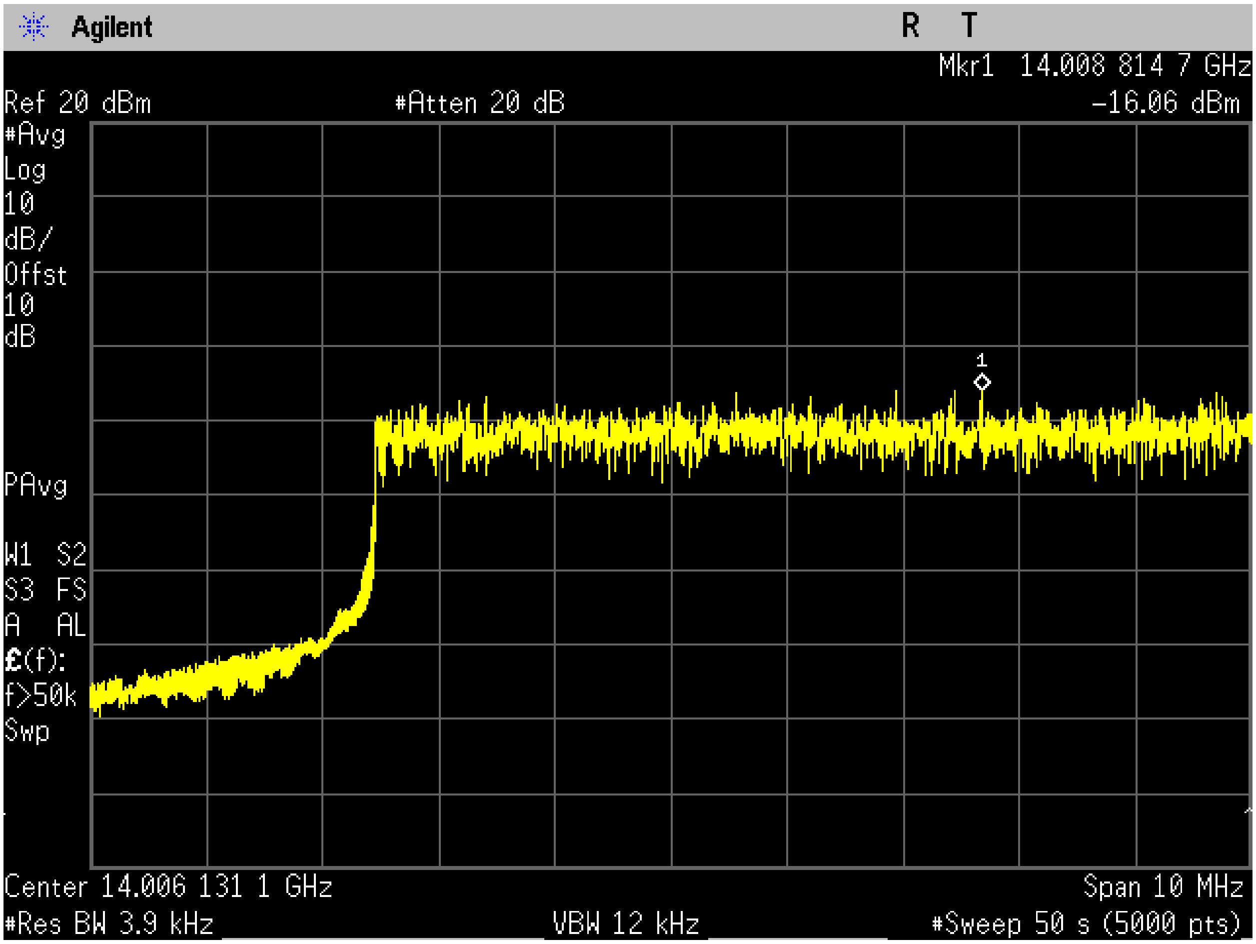


Figure 56. EIRP PSD, QPSK, 20MHz, Low Channel (Final).

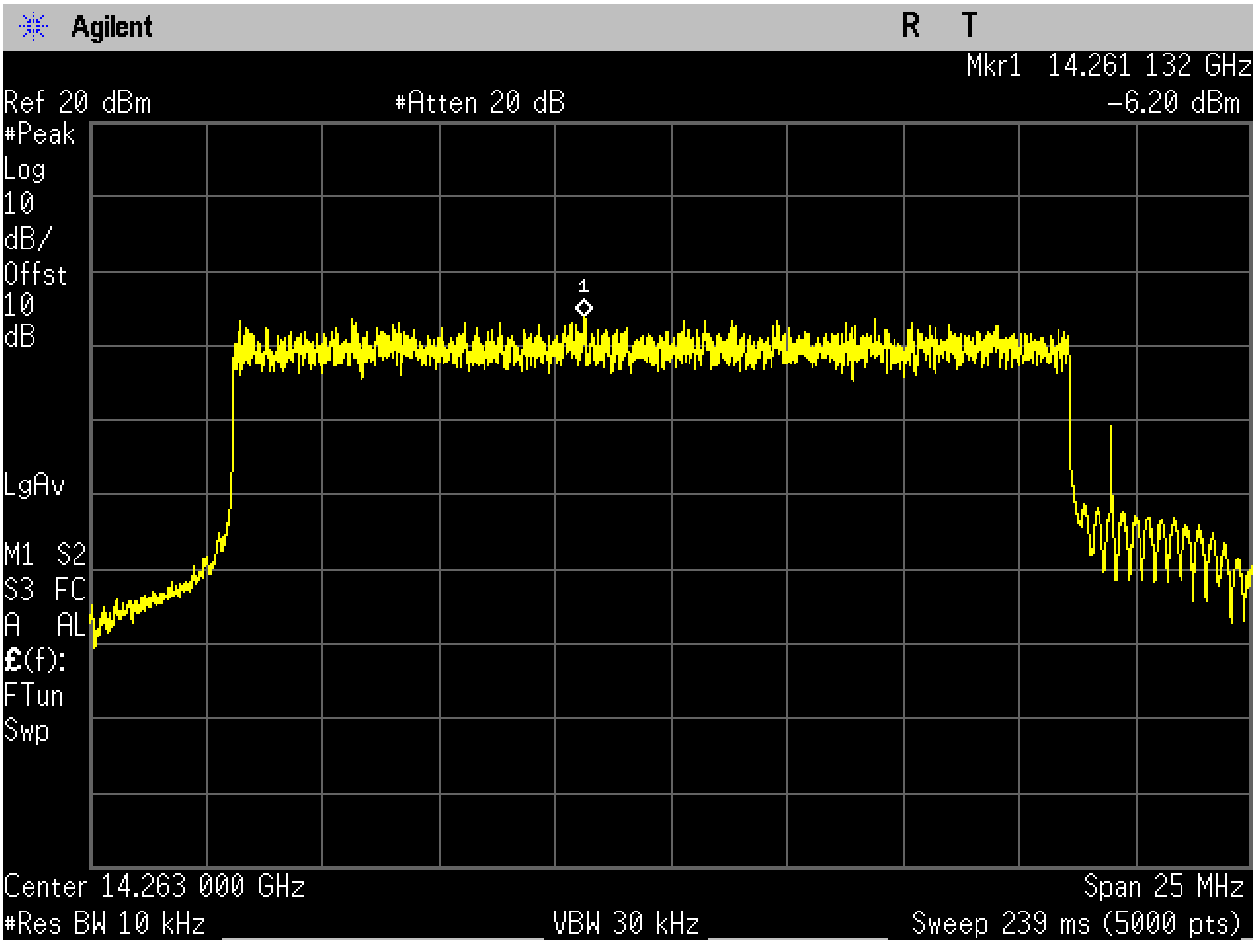


Figure 57. EIRP PSD, QPSK, 20MHz, Mid Channel (PreScan).

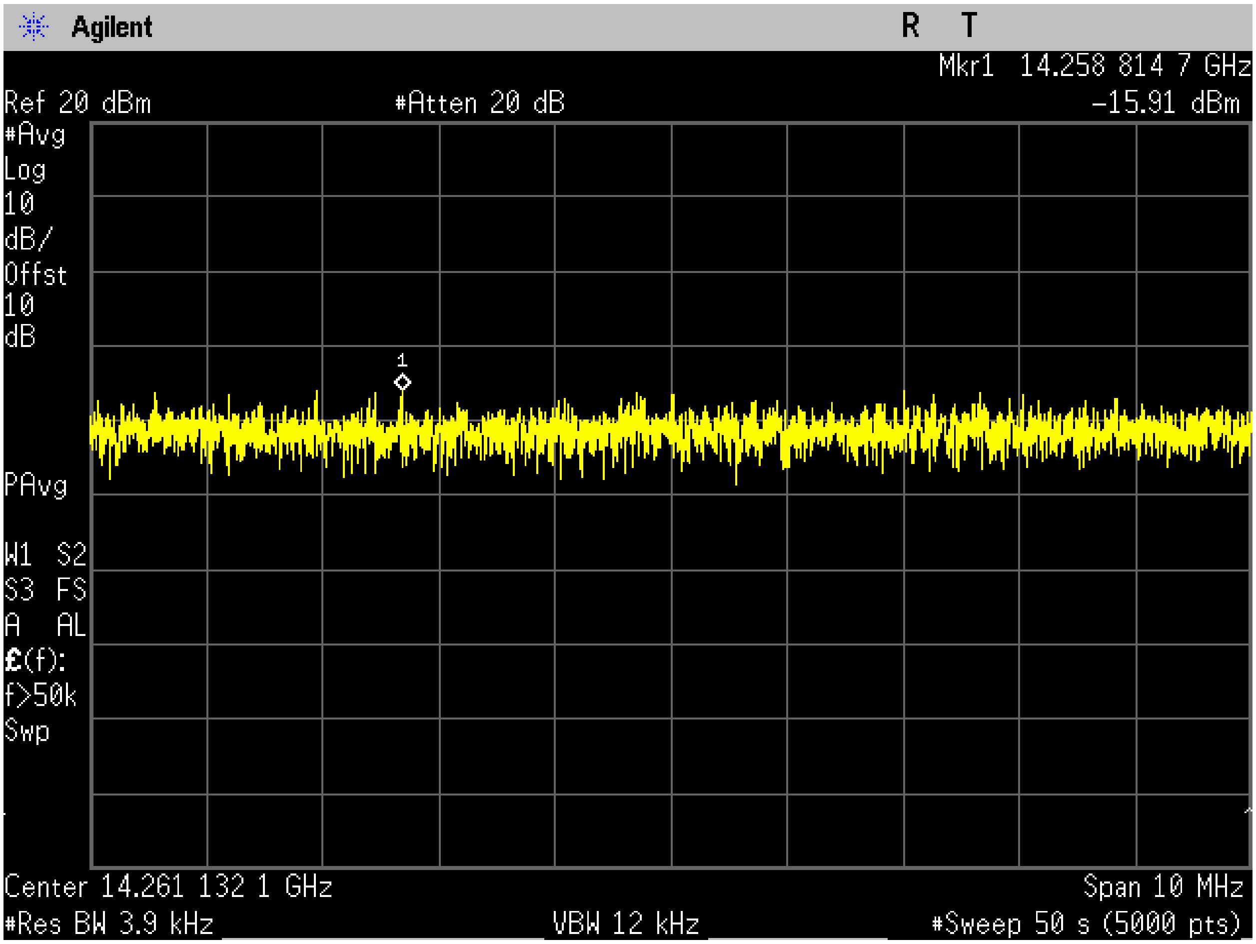


Figure 58. EIRP PSD, QPSK, 20MHz, Mid Channel (Final).

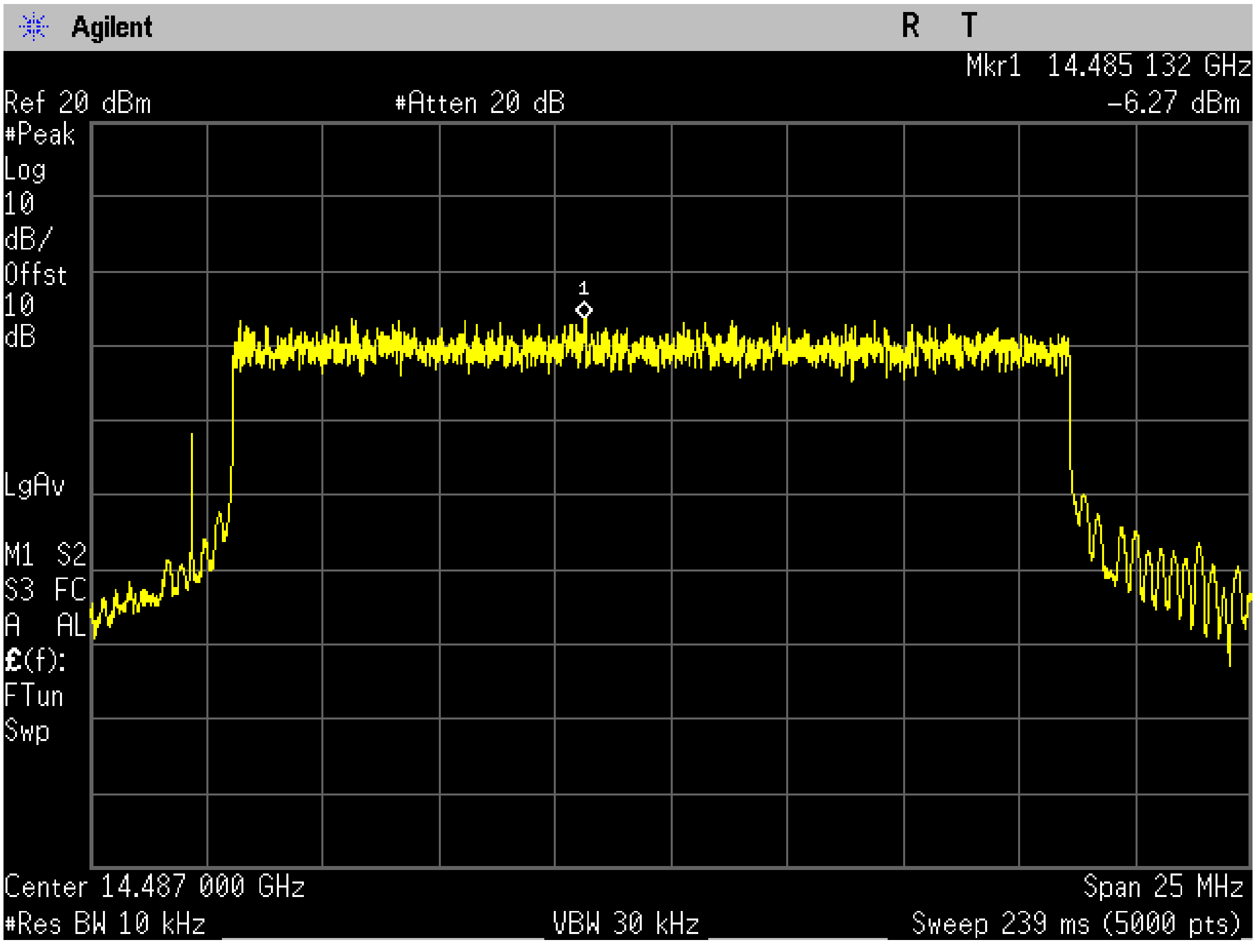


Figure 59. EIRP PSD, QPSK, 20MHz, High Channel (PreScan).

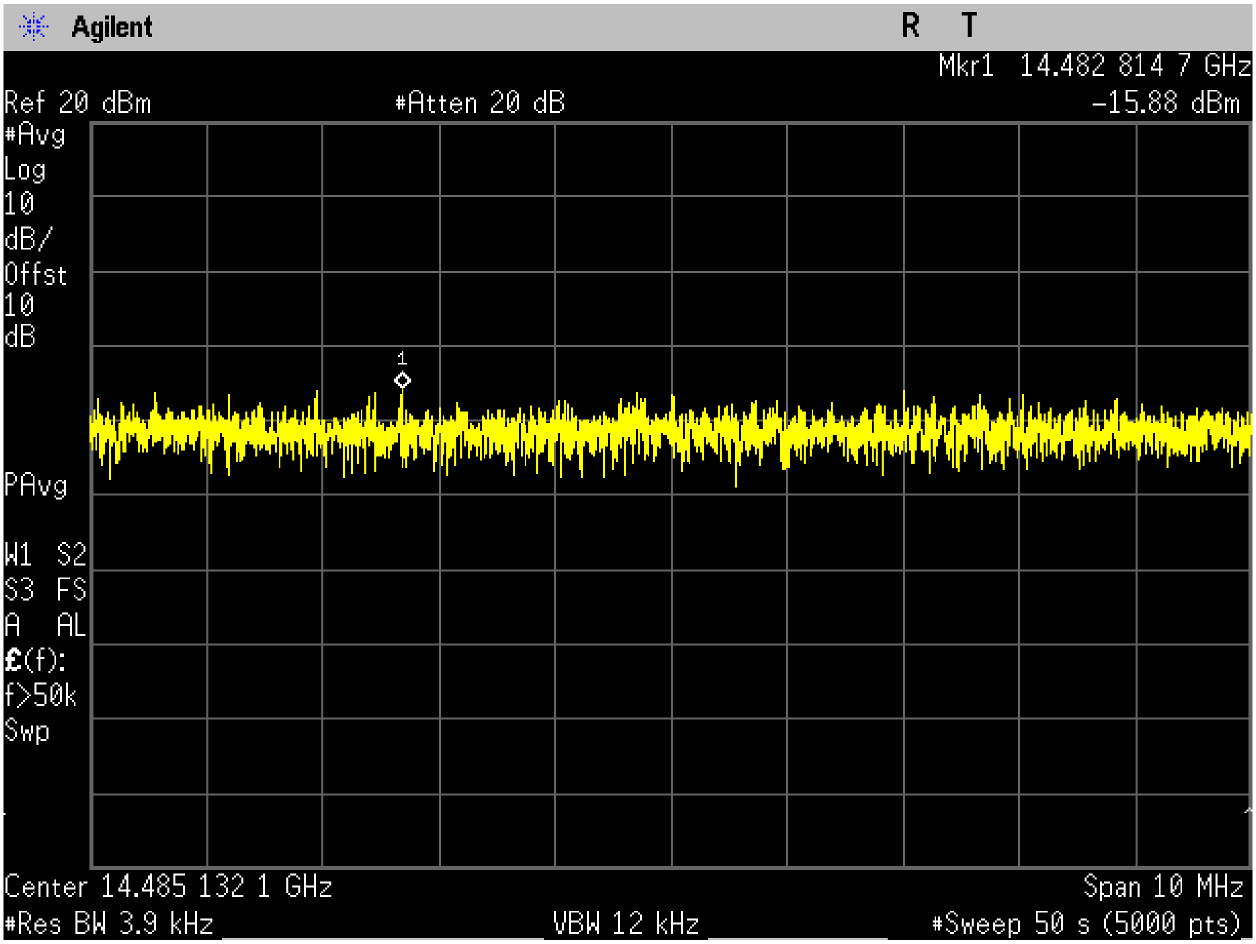


Figure 60. EIRP PSD, QPSK, 20MHz, High Channel (Final).

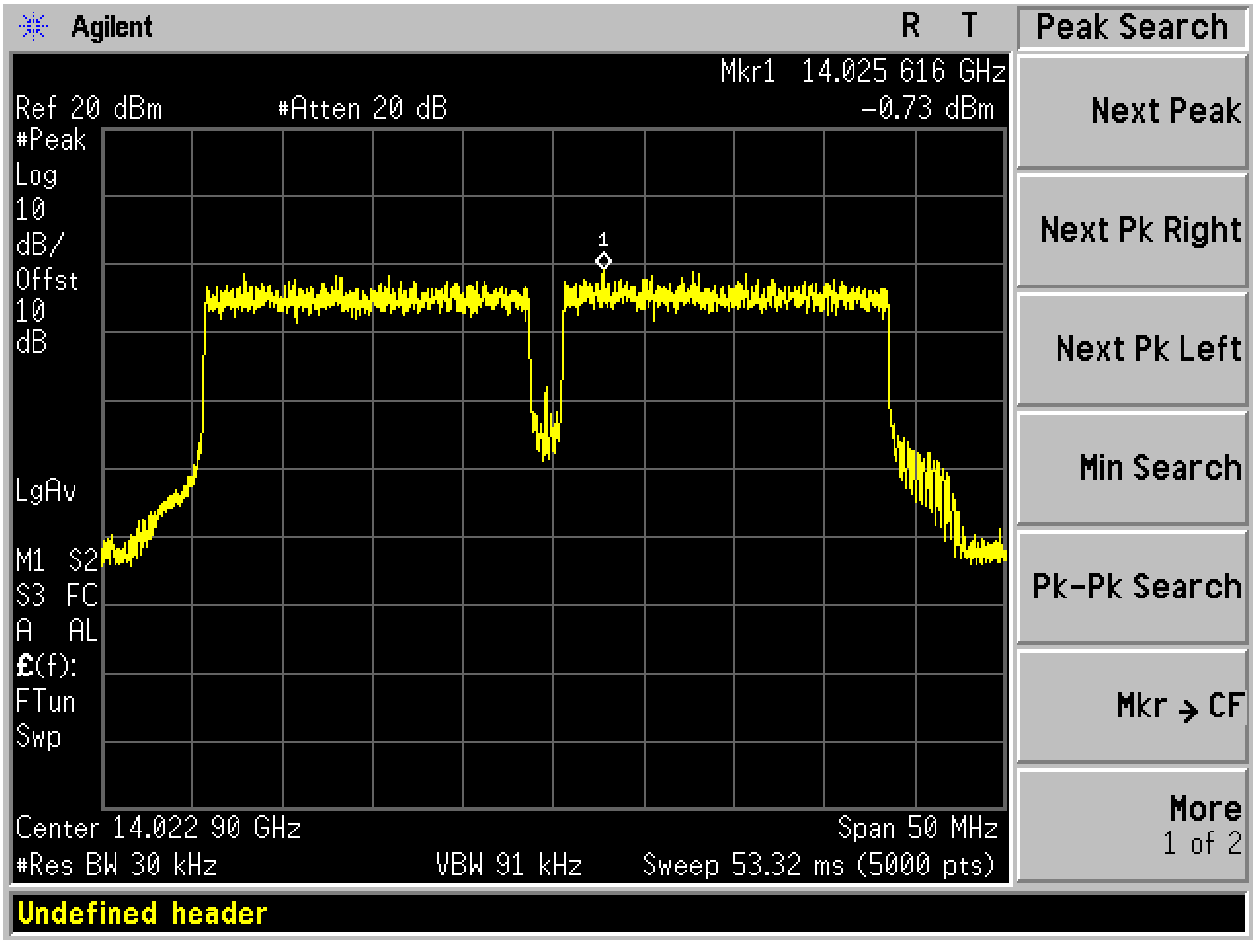


Figure 61. EIRP PSD, QPSK, 40MHz, Low Channel (PreScan).

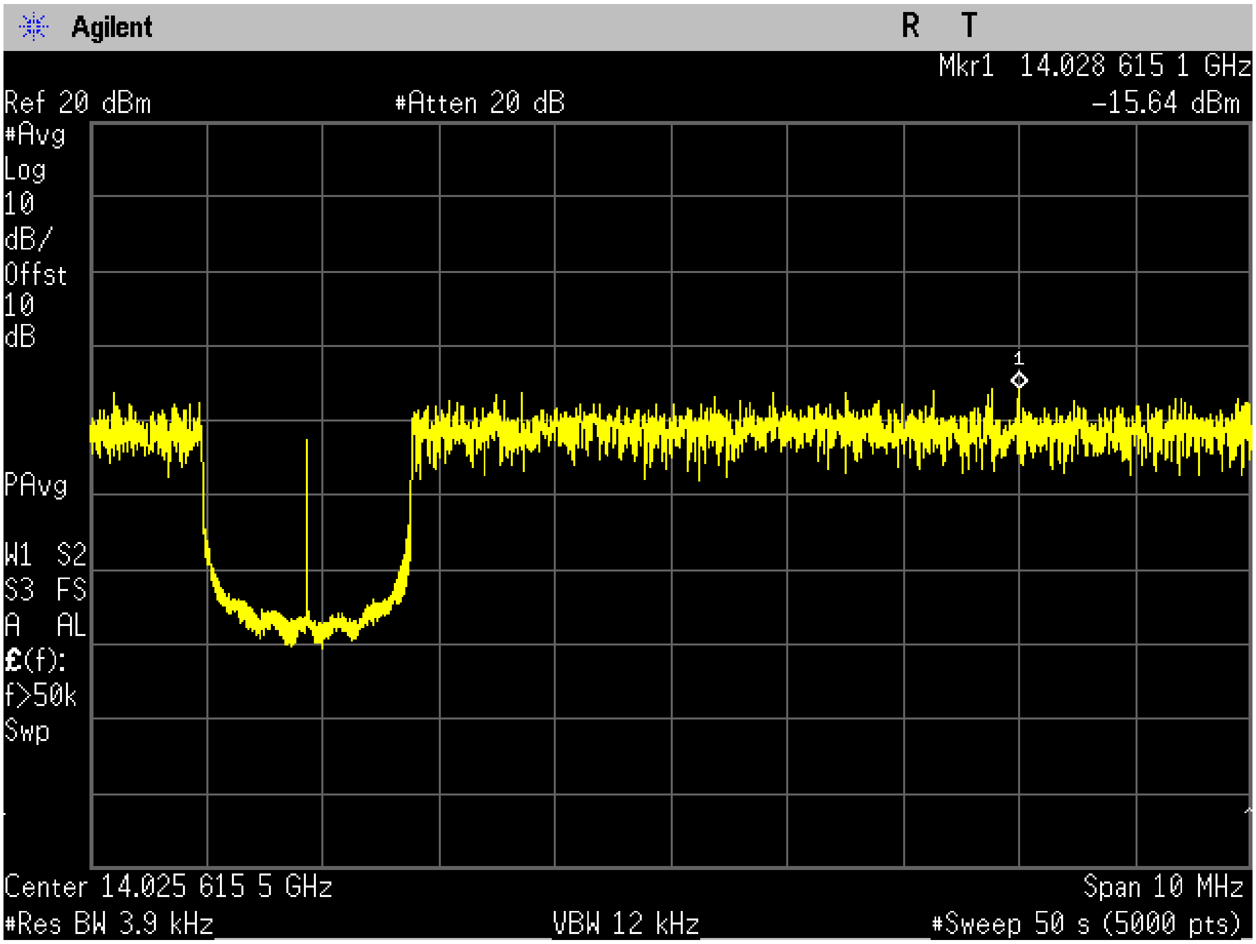


Figure 62. EIRP PSD, QPSK, 40MHz, Low Channel (Final).

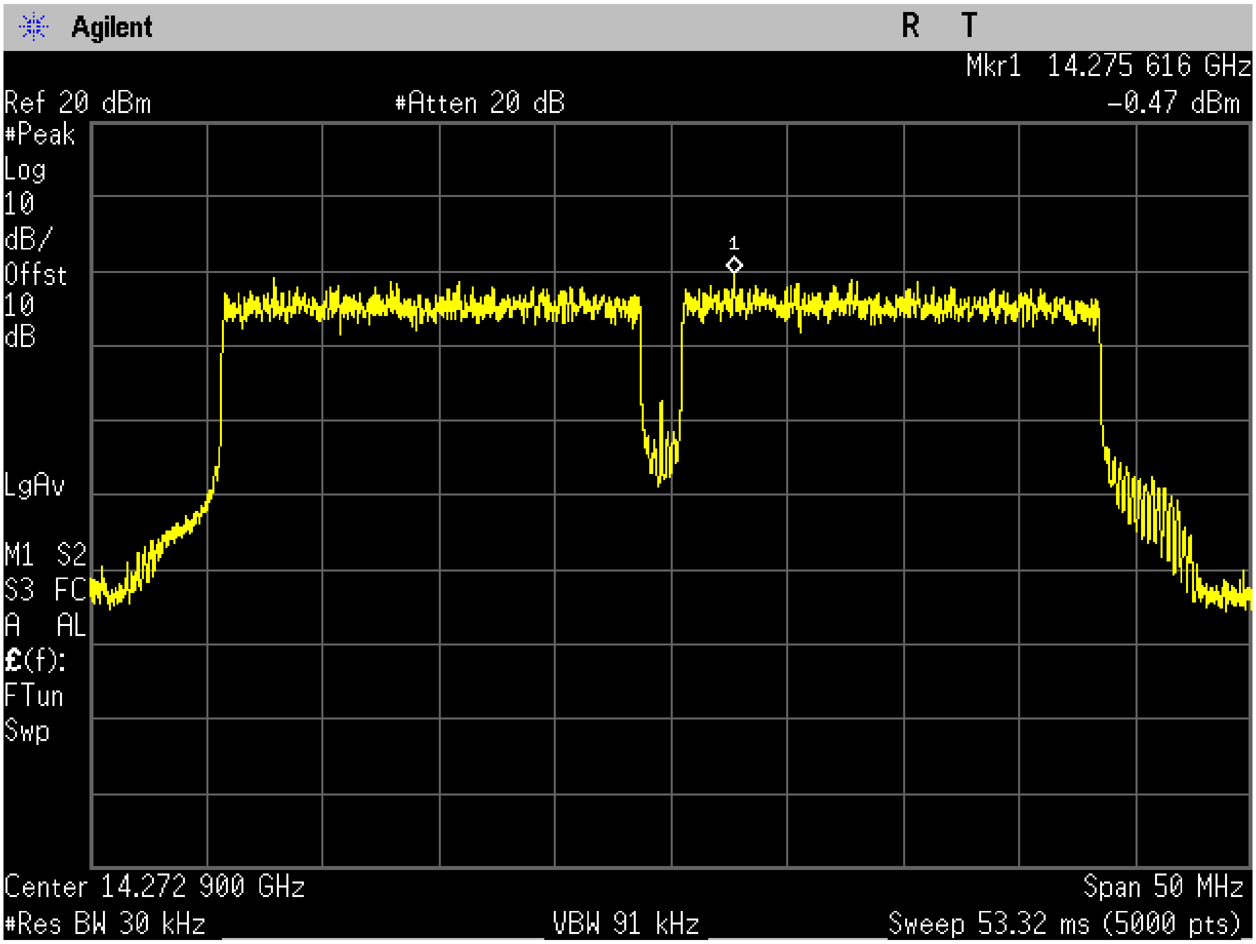


Figure 63. EIRP PSD, QPSK, 40MHz, Mid Channel (PreScan).

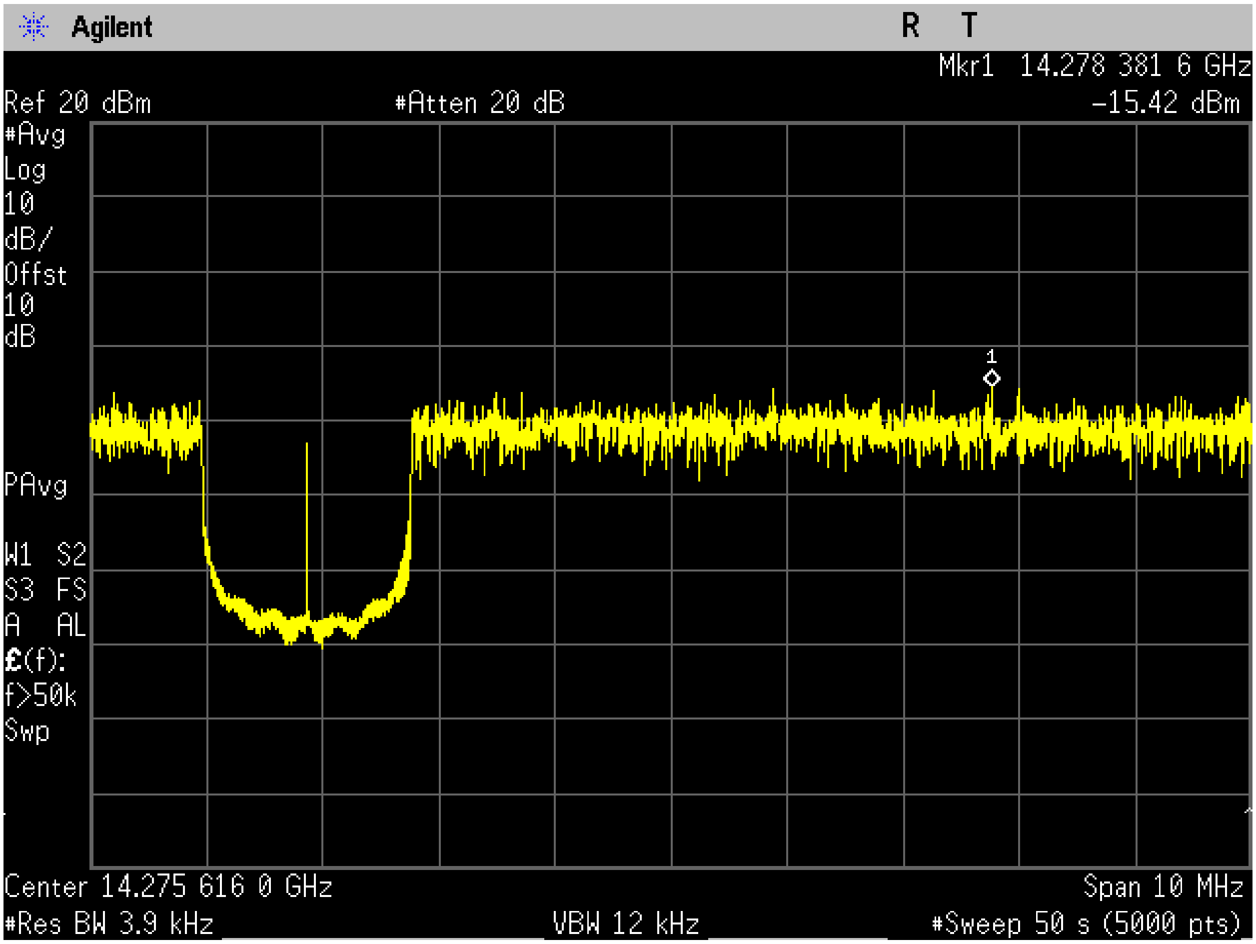


Figure 64. EIRP PSD, QPSK, 40MHz, Mid Channel (Final).

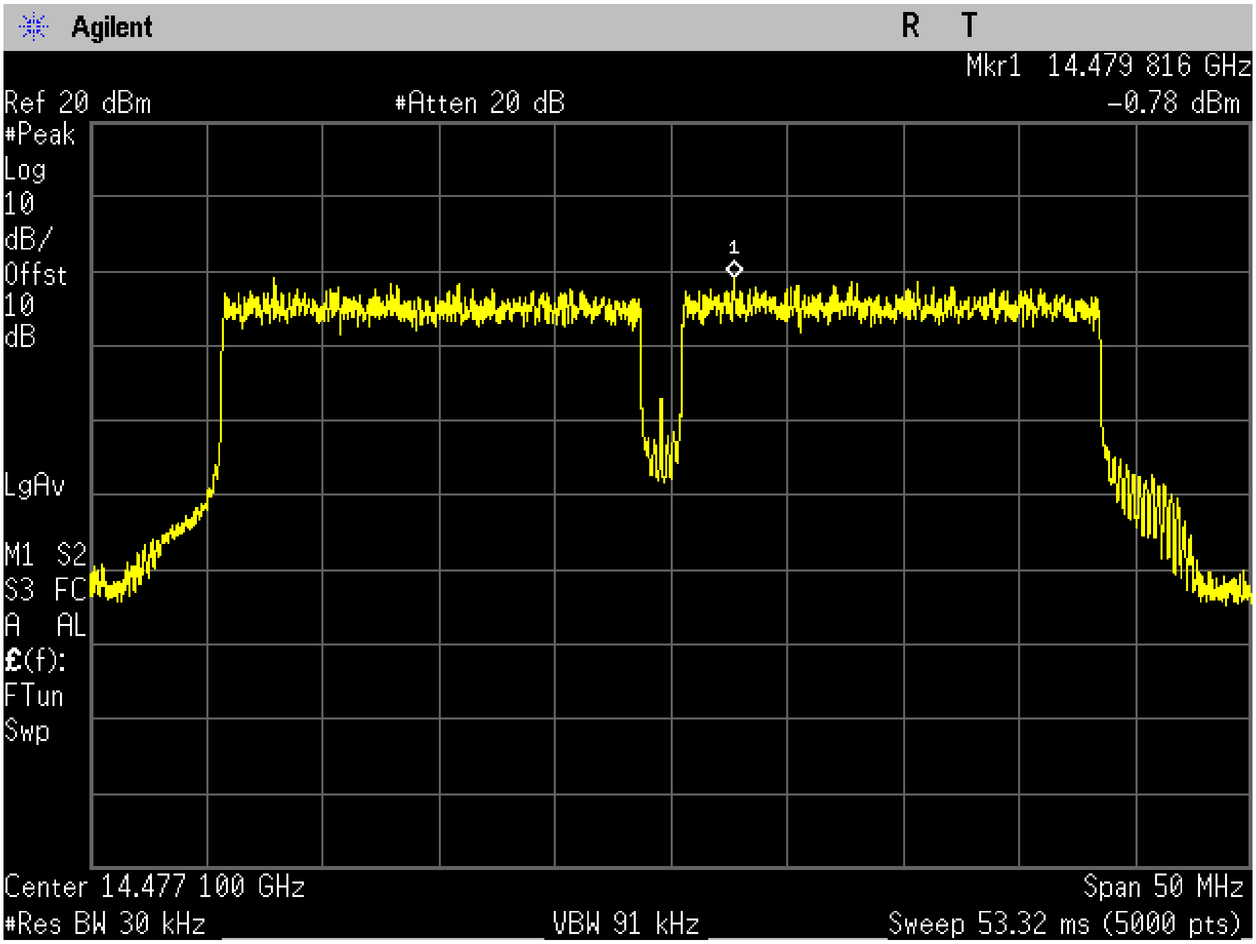


Figure 65. EIRP PSD, QPSK, 40MHz, High Channel (PreScan).

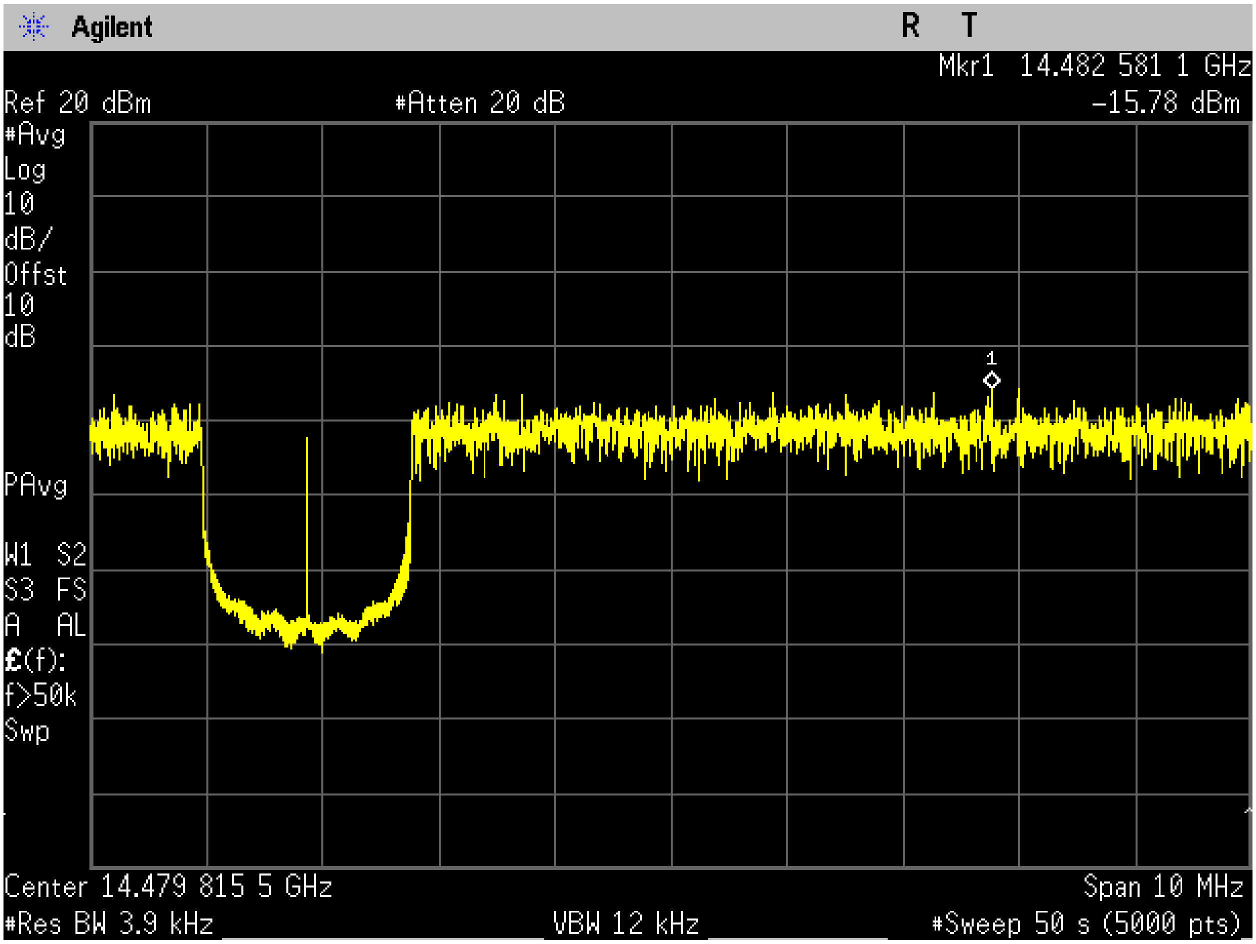


Figure 66. EIRP PSD, QPSK, 40MHz, High Channel (Final).

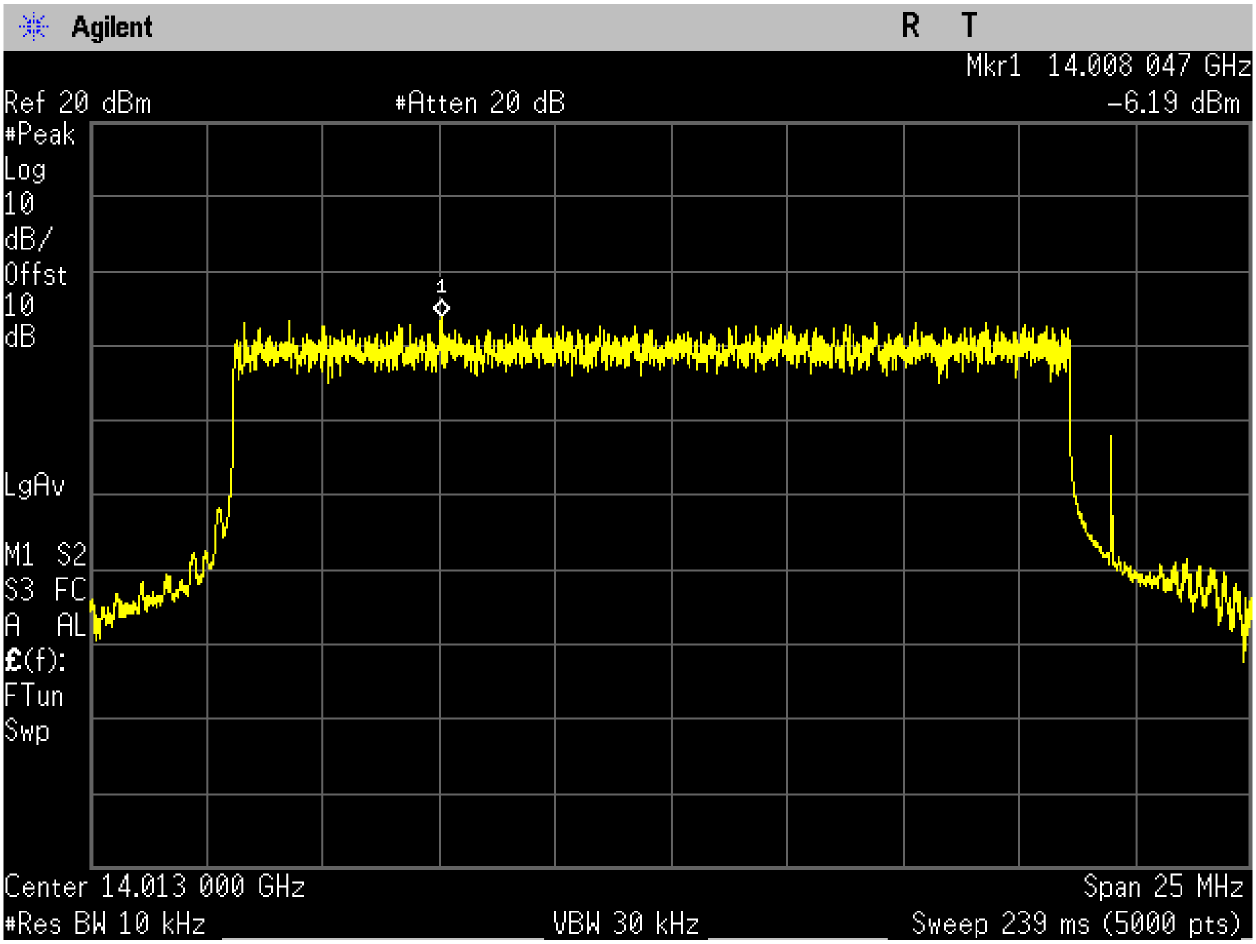


Figure 67. EIRP PSD, 8PSK, 20MHz, Low Channel (PreScan).

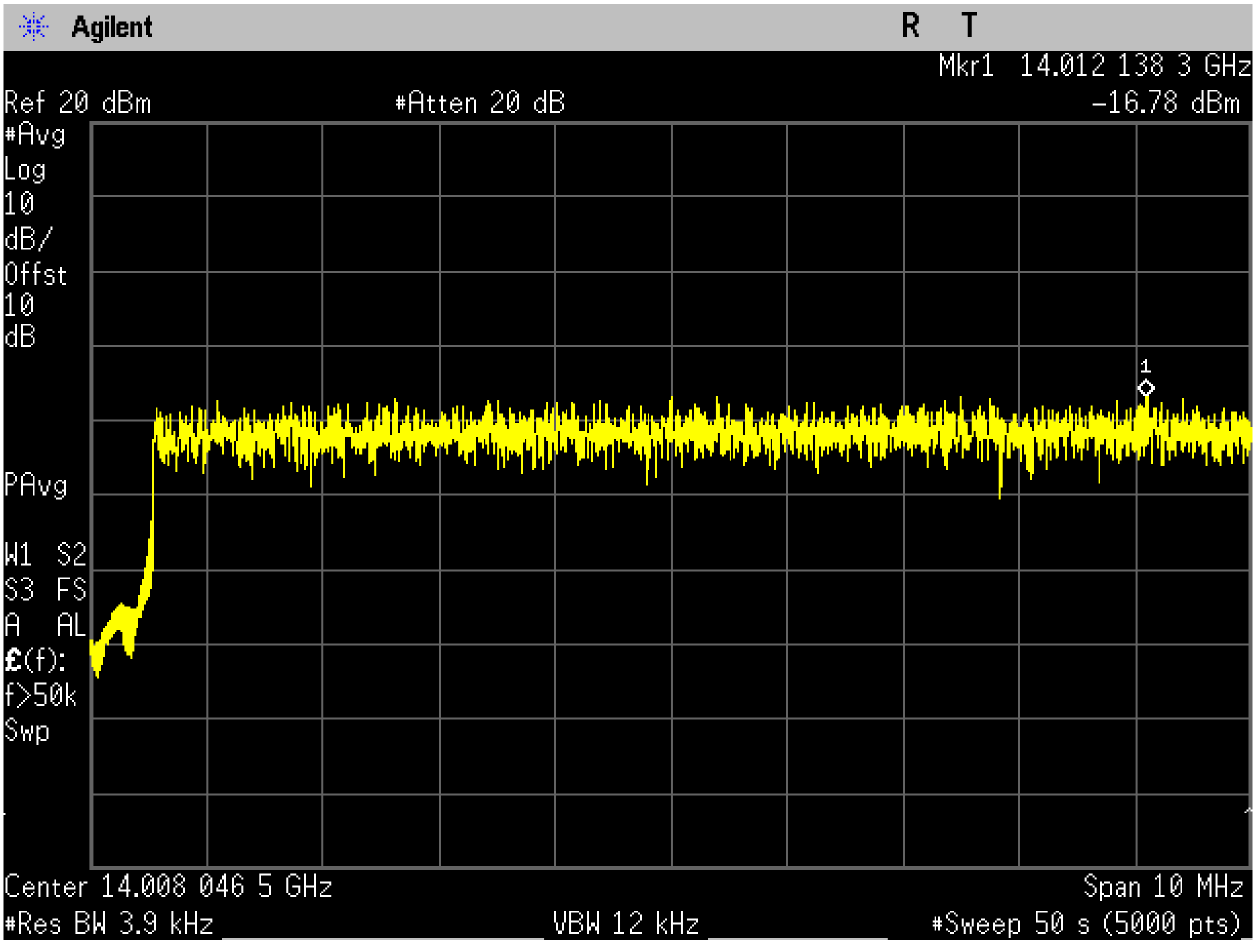


Figure 68. EIRP PSD, 8PSK, 20MHz, Low Channel (Final).

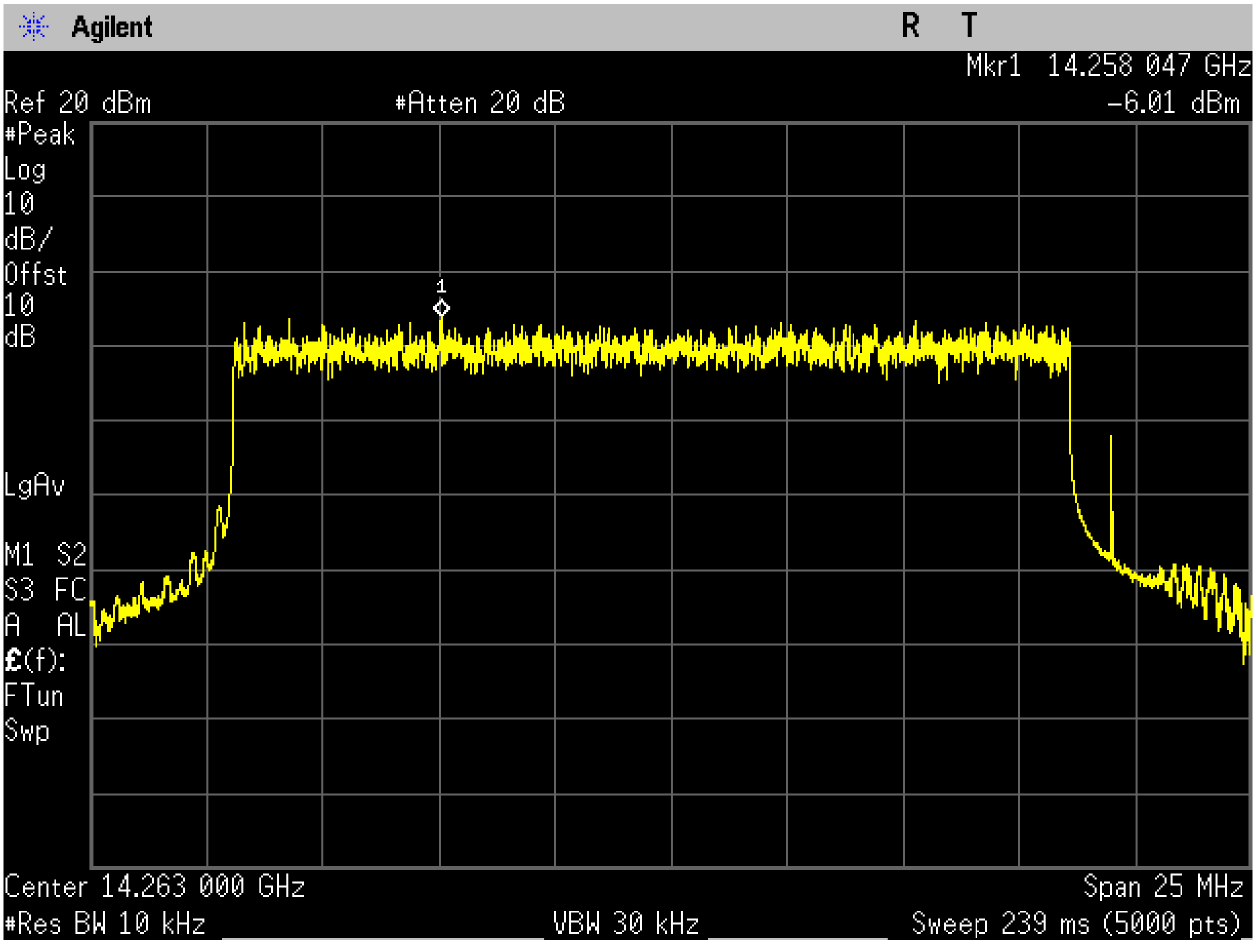


Figure 69. EIRP PSD, 8PSK, 20MHz, Mid Channel (PreScan).

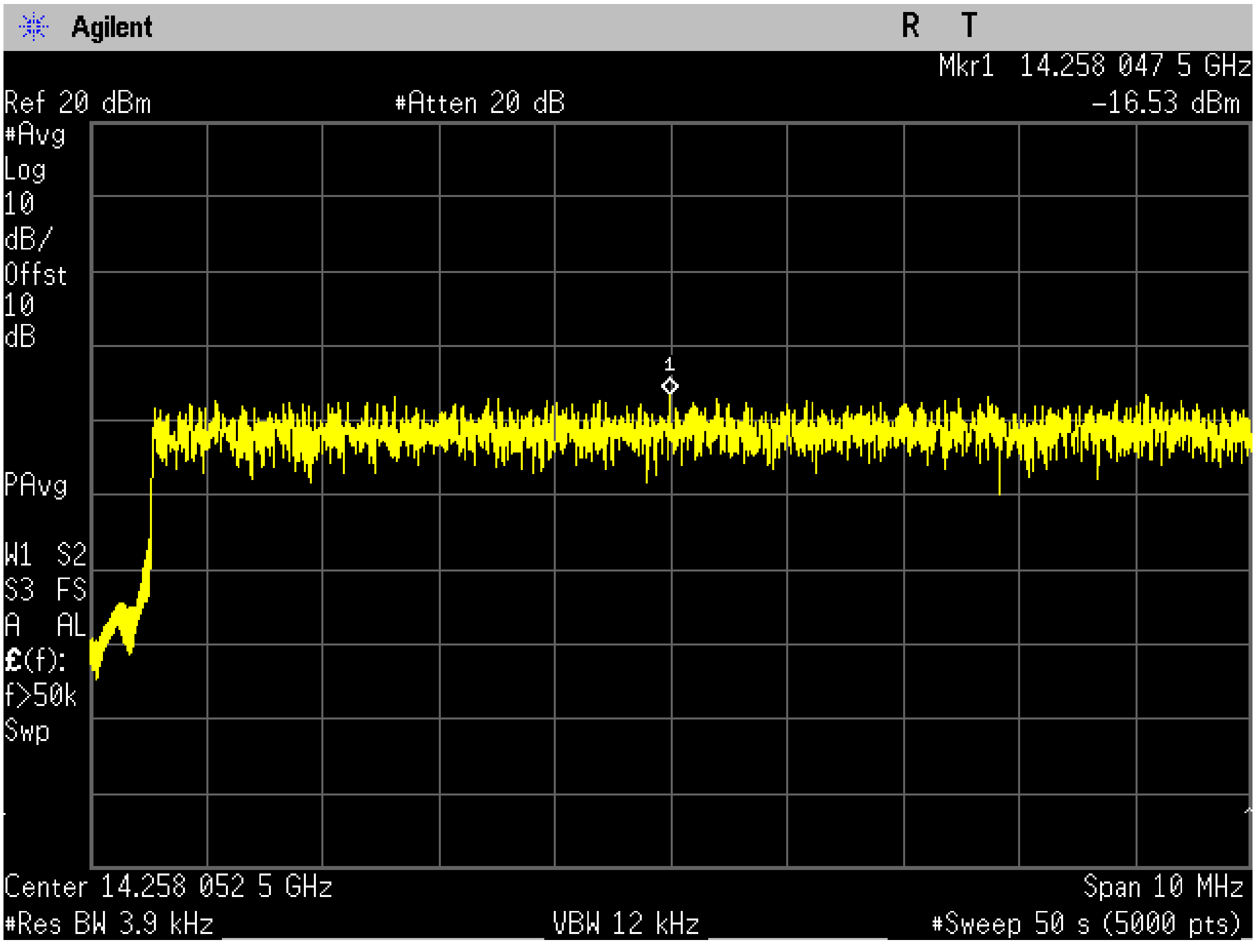


Figure 70. EIRP PSD, 8PSK, 20MHz, Mid Channel (Final).

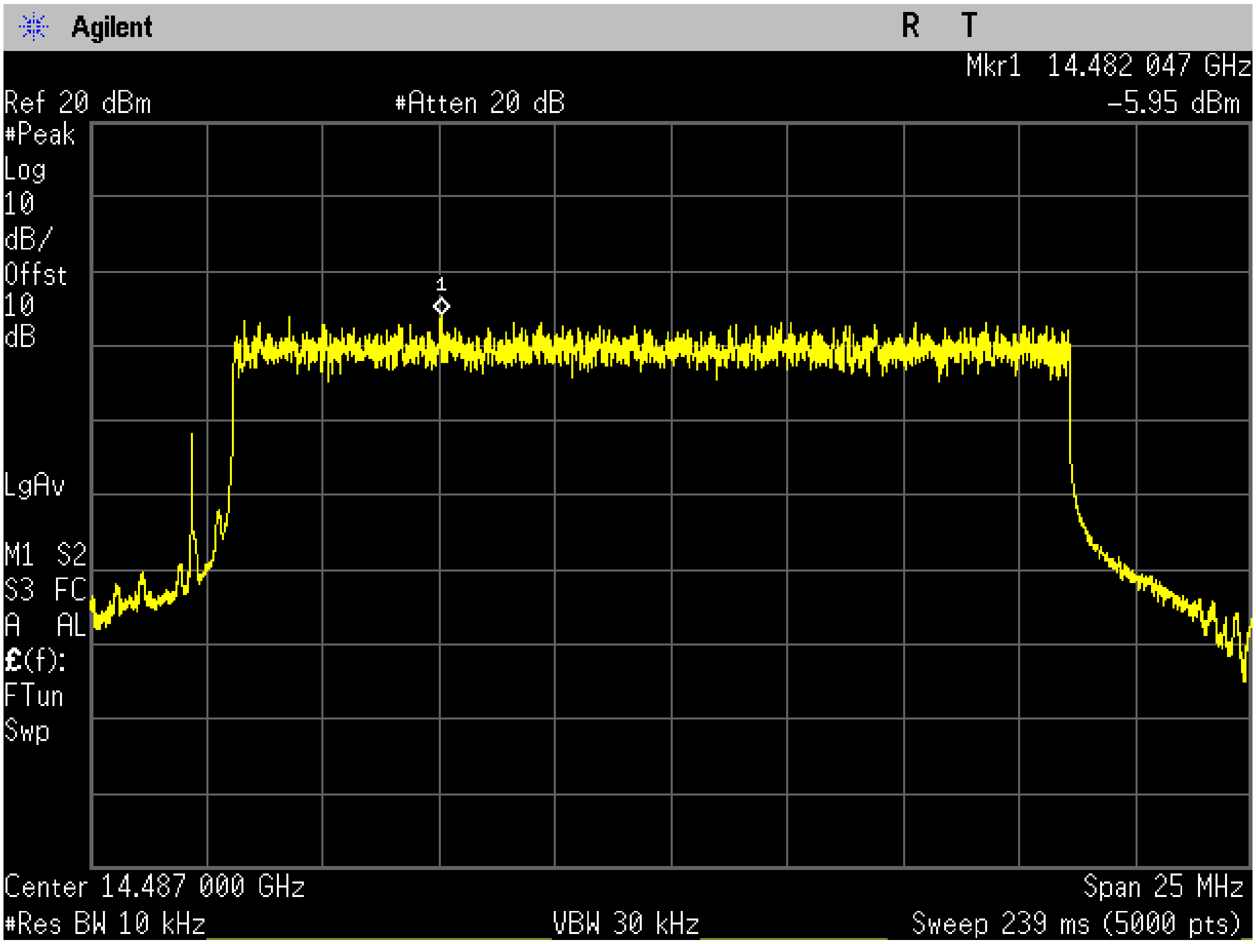


Figure 71. EIRP PSD, 8PSK, 20MHz, High Channel (PreScan).

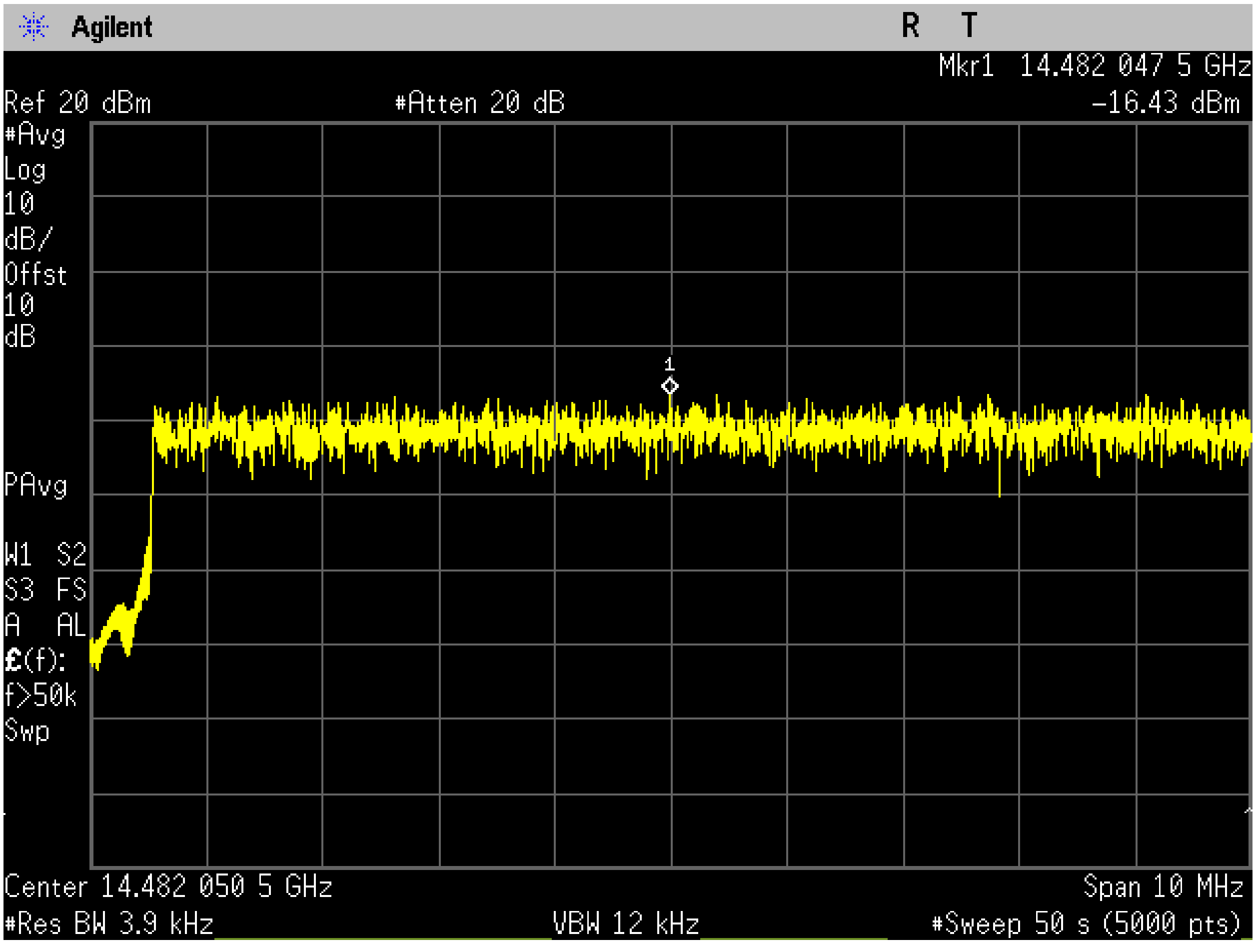


Figure 72. EIRP PSD, 8PSK, 20MHz, High Channel (Final).

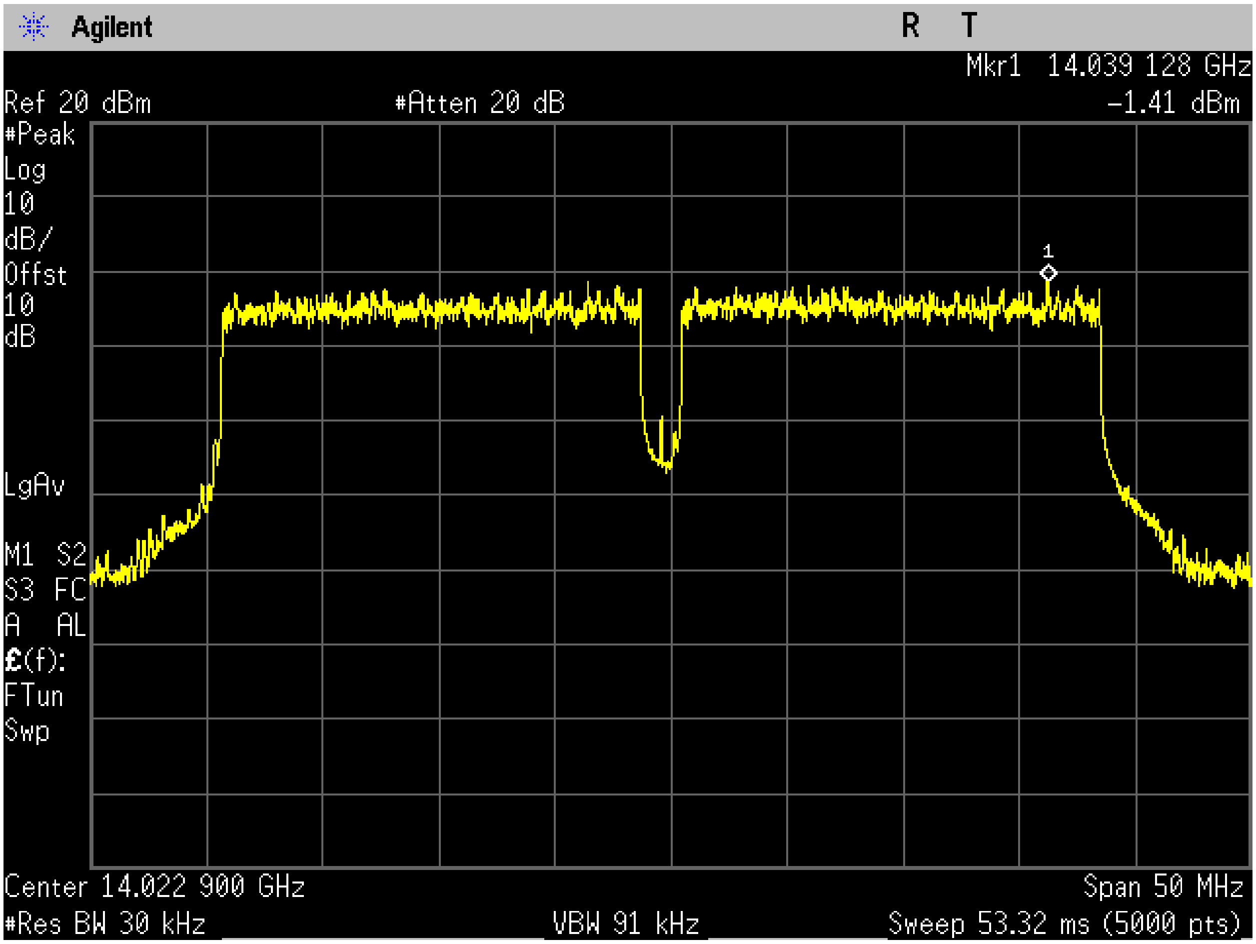


Figure 73. EIRP PSD, 8PSK, 40MHz, Low Channel (PreScan).

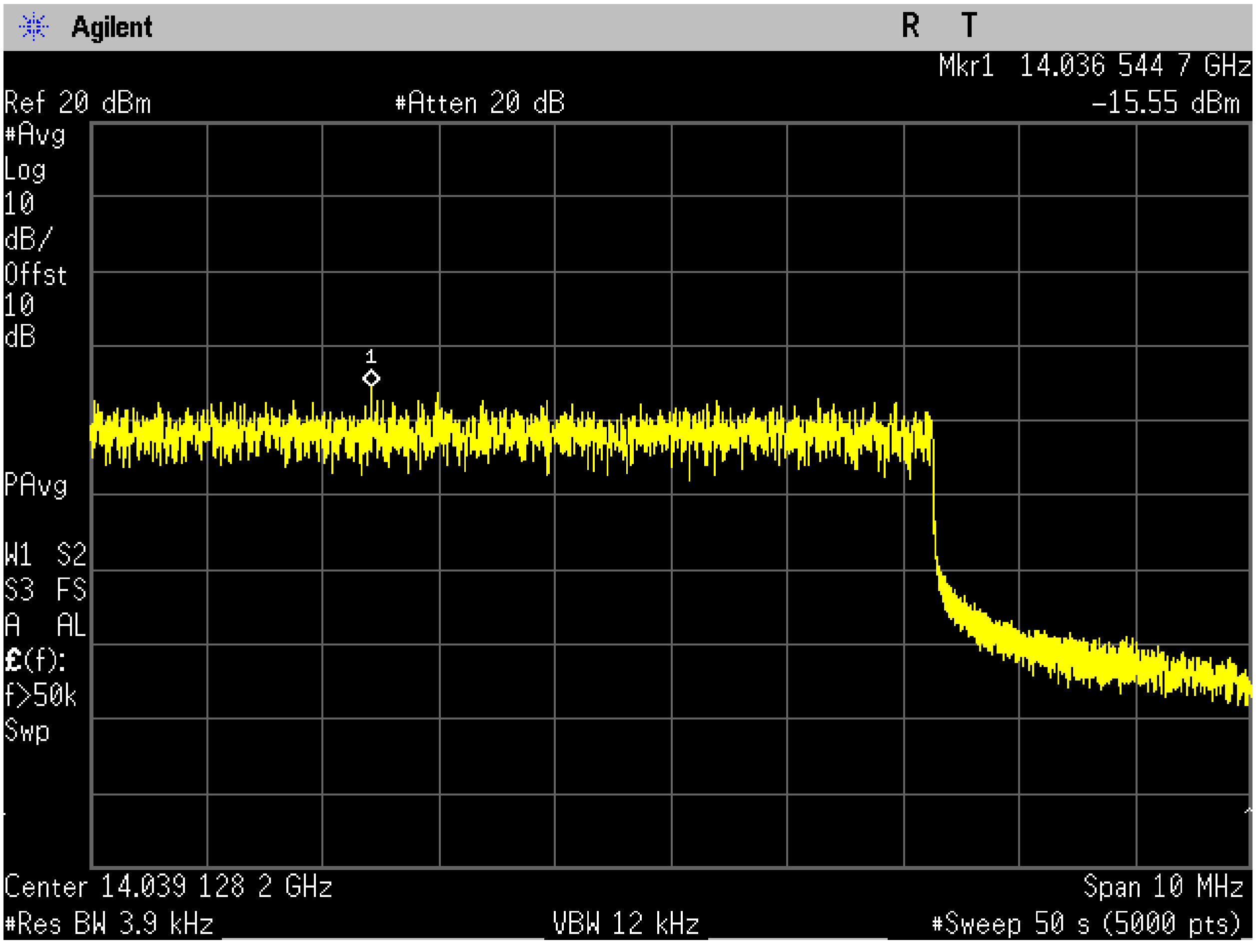


Figure 74. EIRP PSD, 8PSK, 40MHz, Low Channel (Final).

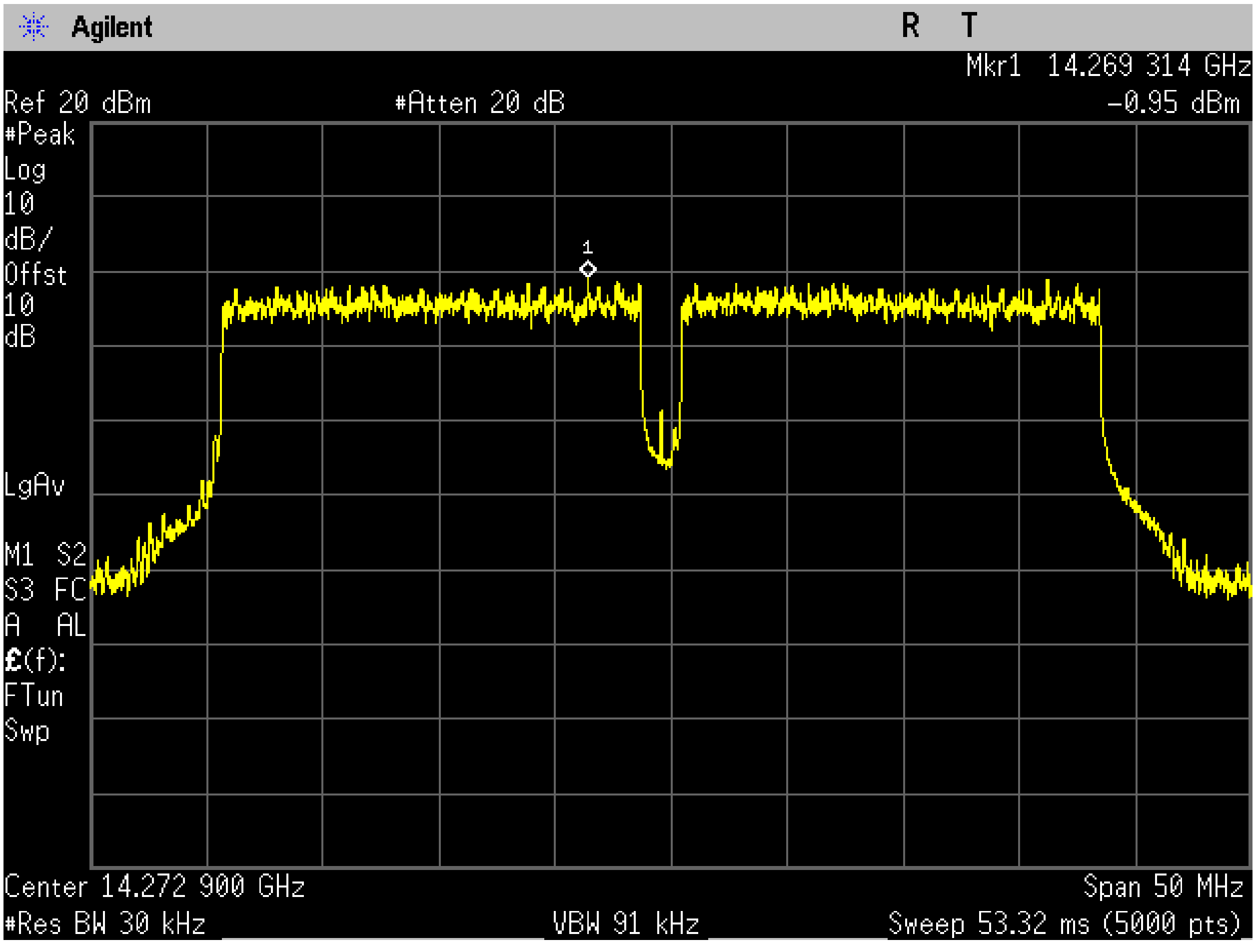


Figure 75. EIRP PSD, 8PSK, 40MHz, Mid Channel (PreScan).

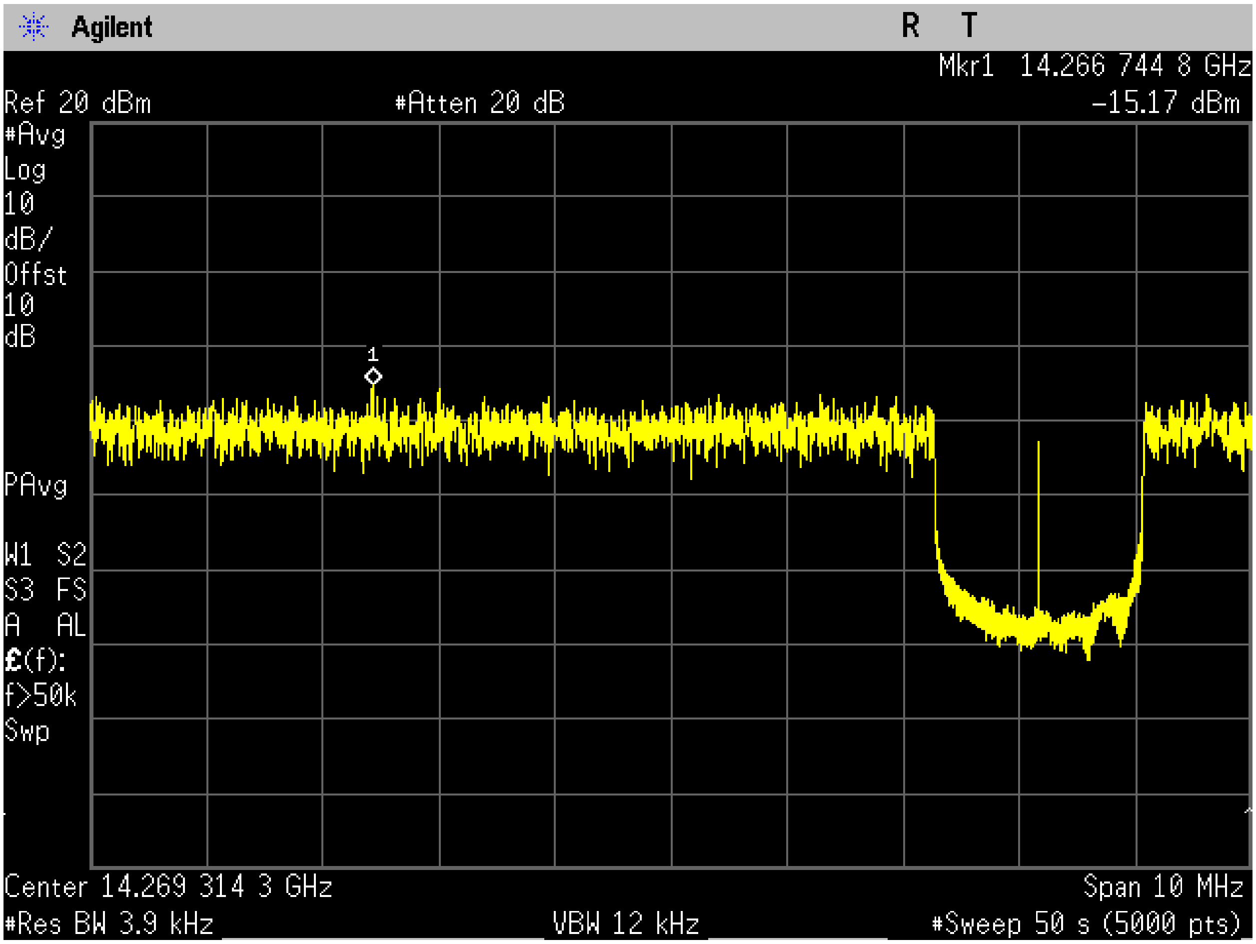


Figure 76. EIRP PSD, 8PSK, 40MHz, Mid Channel (Final).

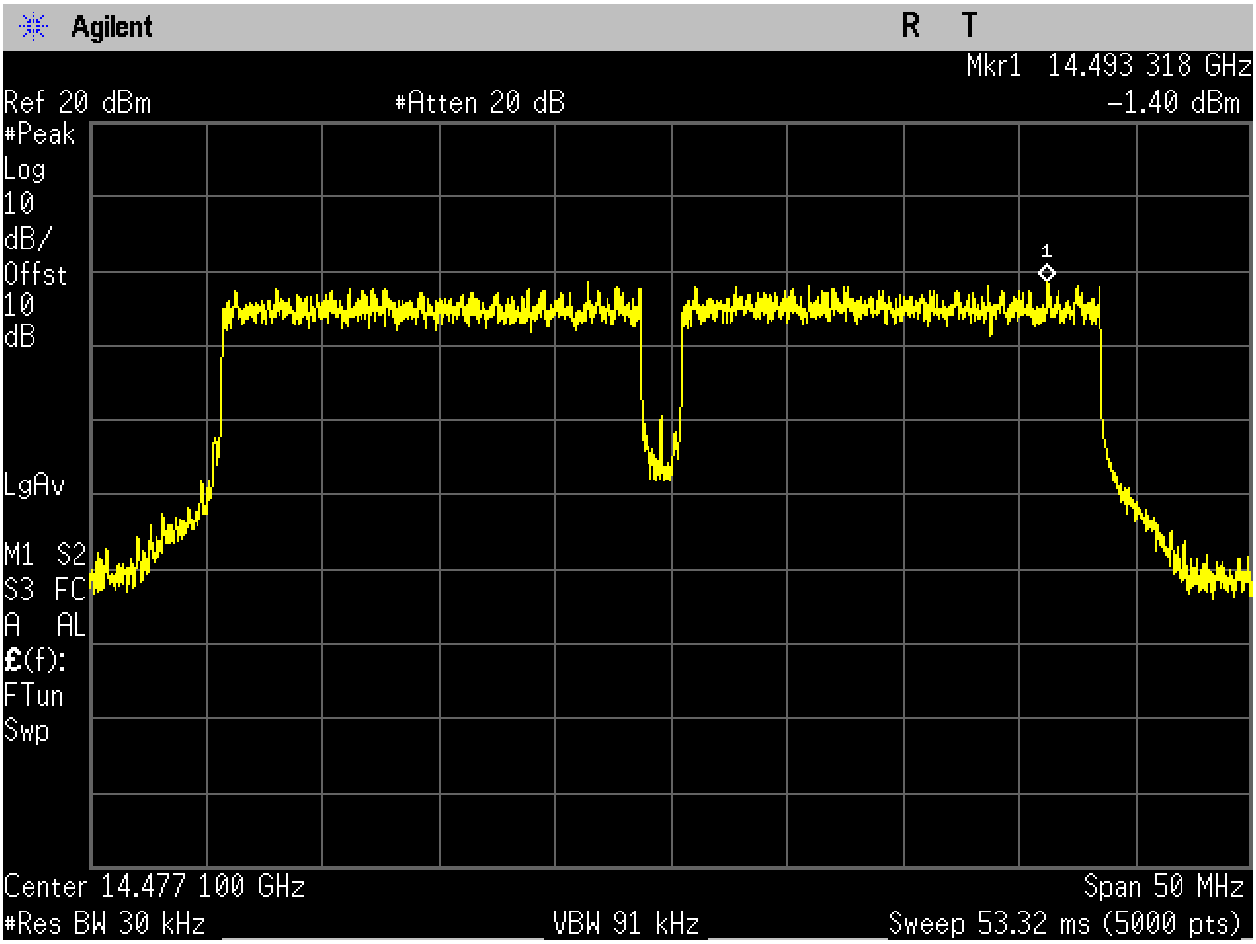


Figure 77. EIRP PSD, 8PSK, 40MHz, High Channel (PreScan).

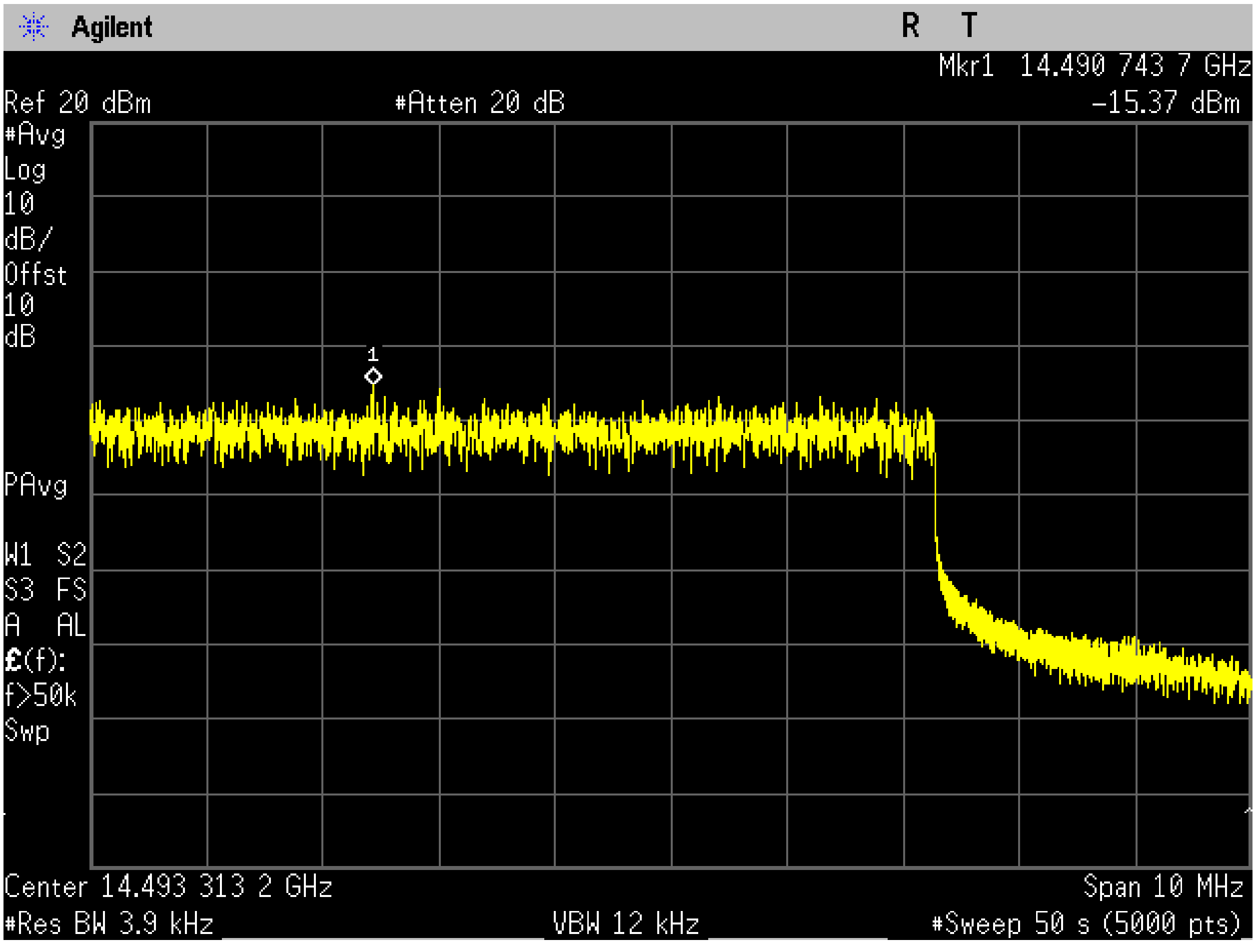


Figure 78. EIRP PSD, 8PSK, 40MHz, High Channel (Final).

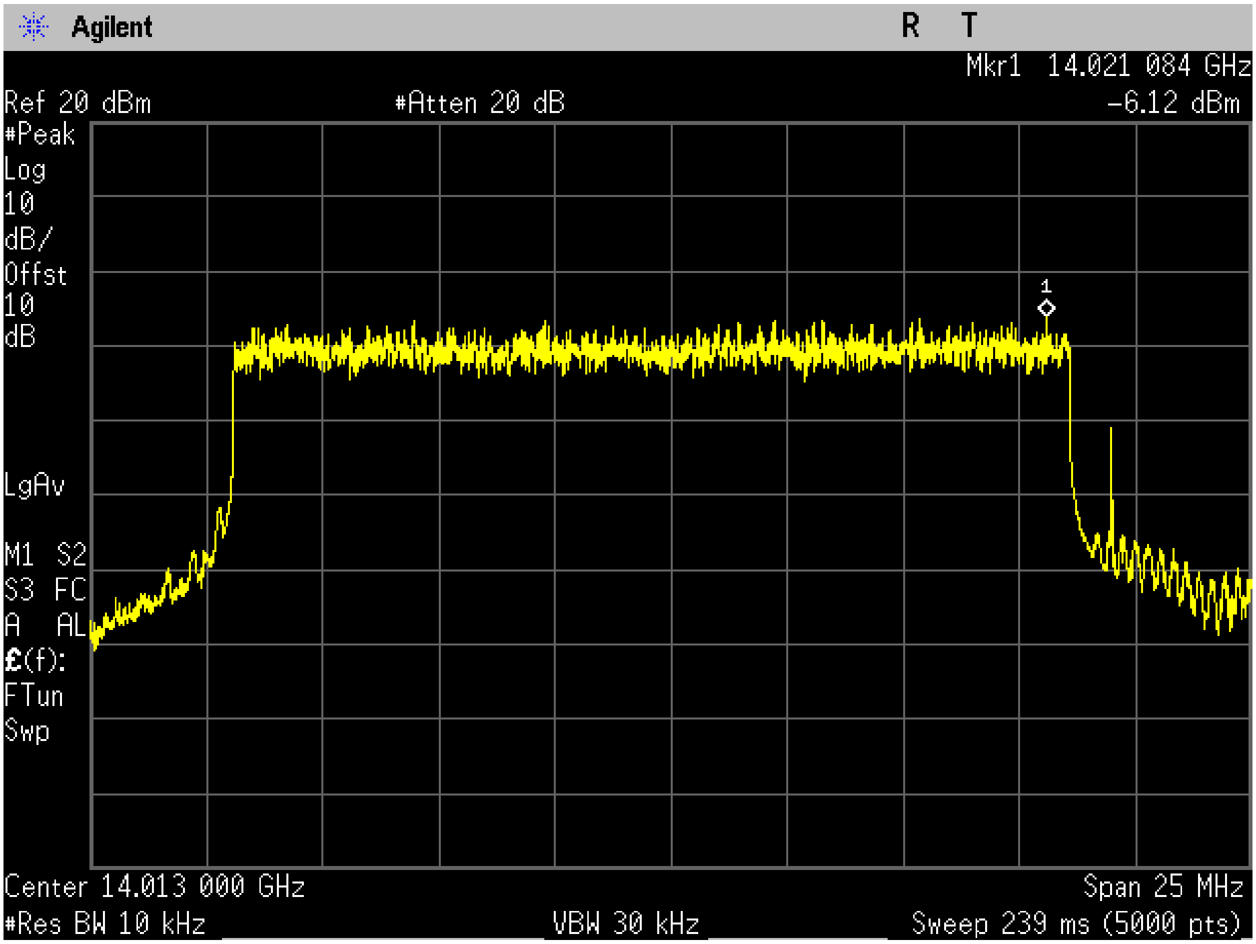


Figure 79. EIRP PSD, 16QAM, 20MHz, Low Channel (PreScan).

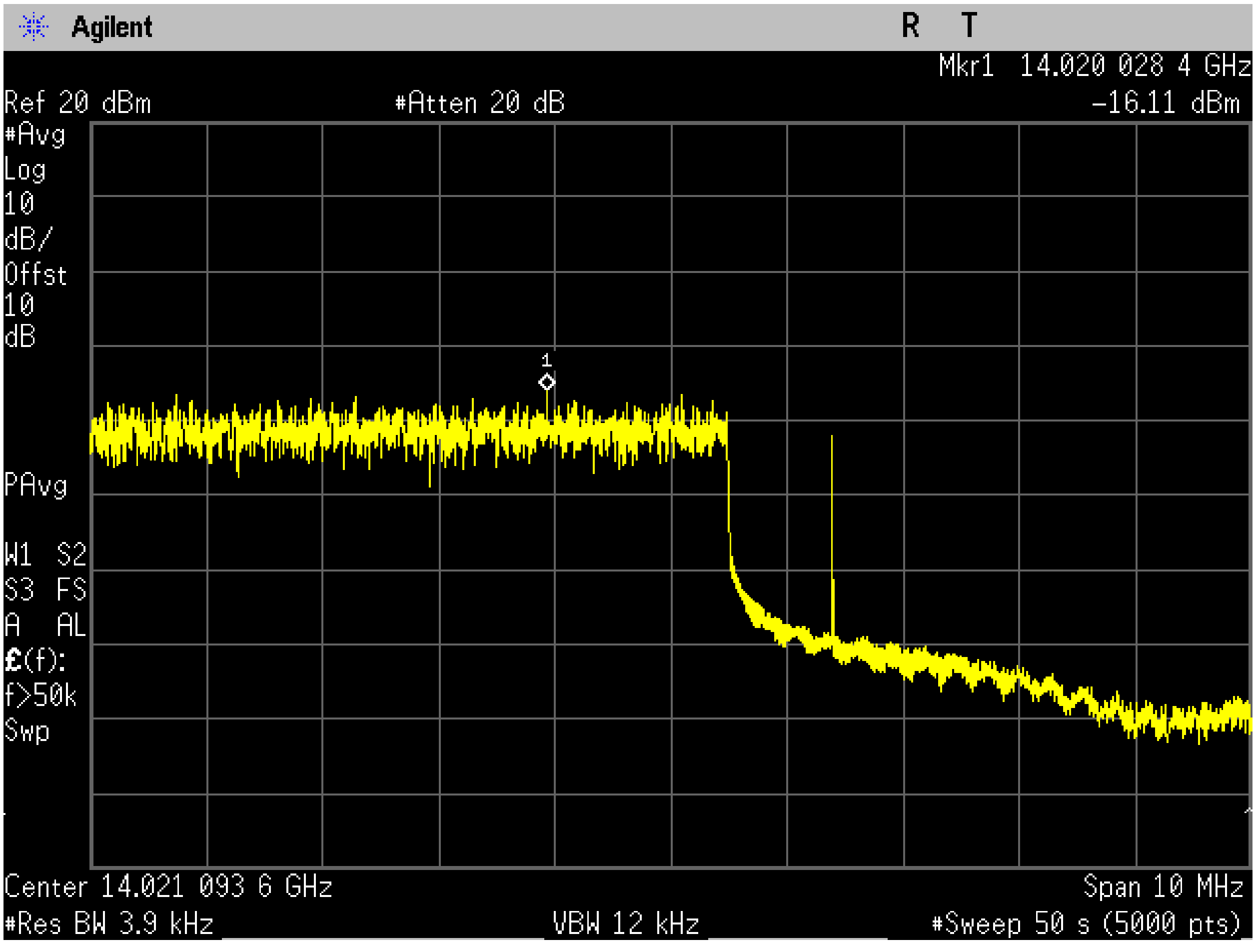


Figure 80. EIRP PSD, 16QAM, 20MHz, Low Channel (Final).

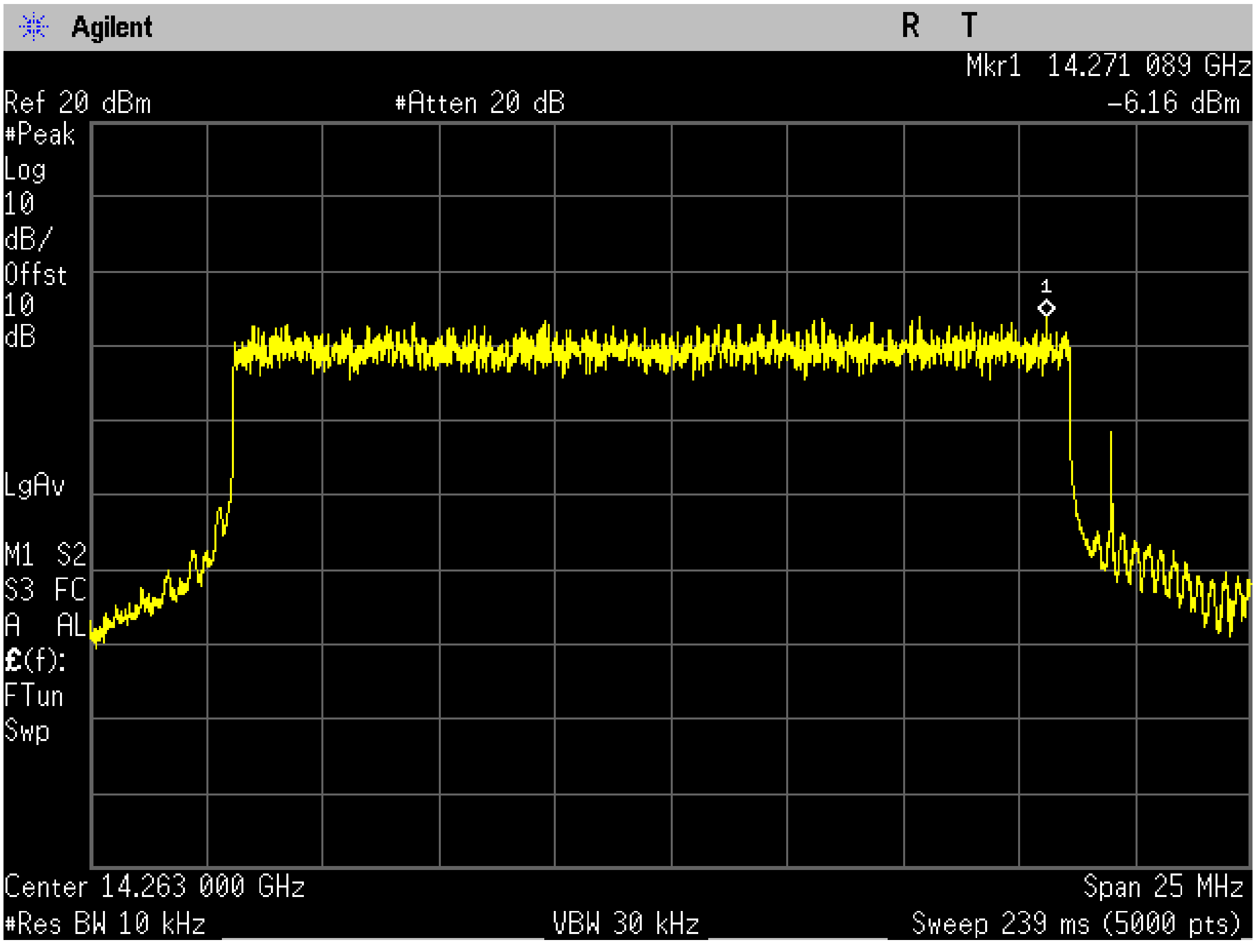


Figure 81. EIRP PSD, 16QAM, 20MHz, Mid Channel (PreScan).

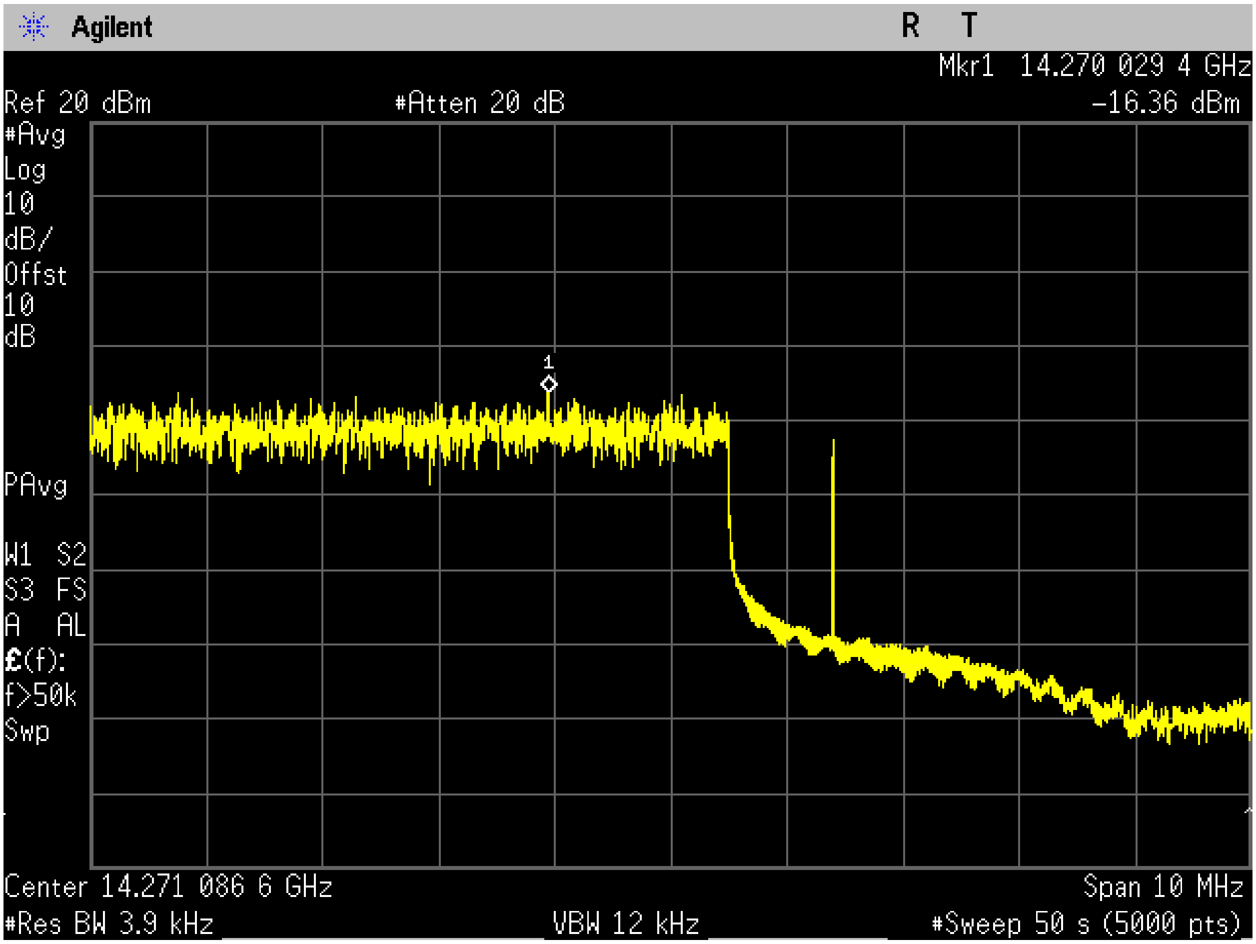


Figure 82. EIRP PSD, 16QAM, 20MHz, Mid Channel (Final).

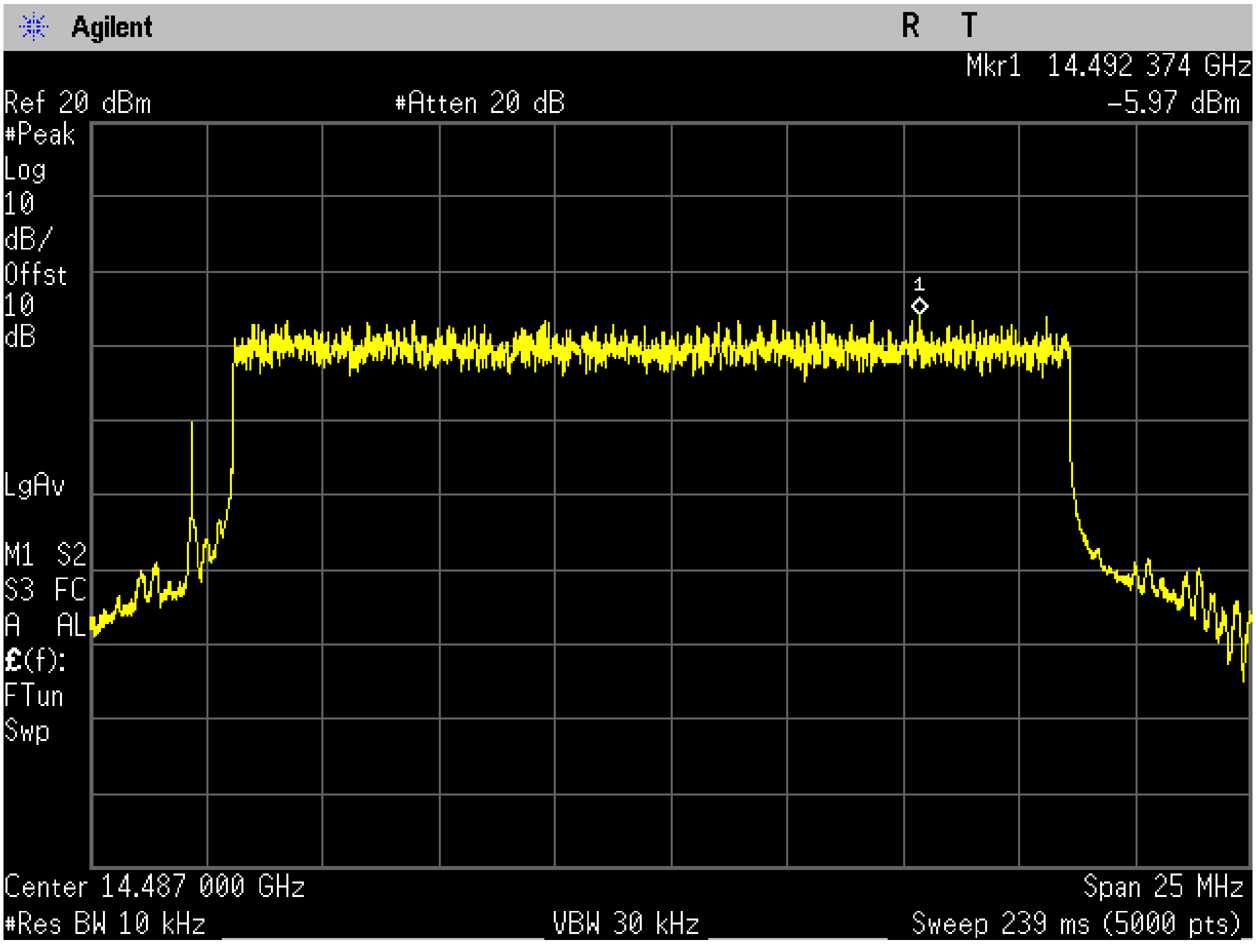


Figure 83. EIRP PSD, 16QAM, 20MHz, High Channel (PreScan).

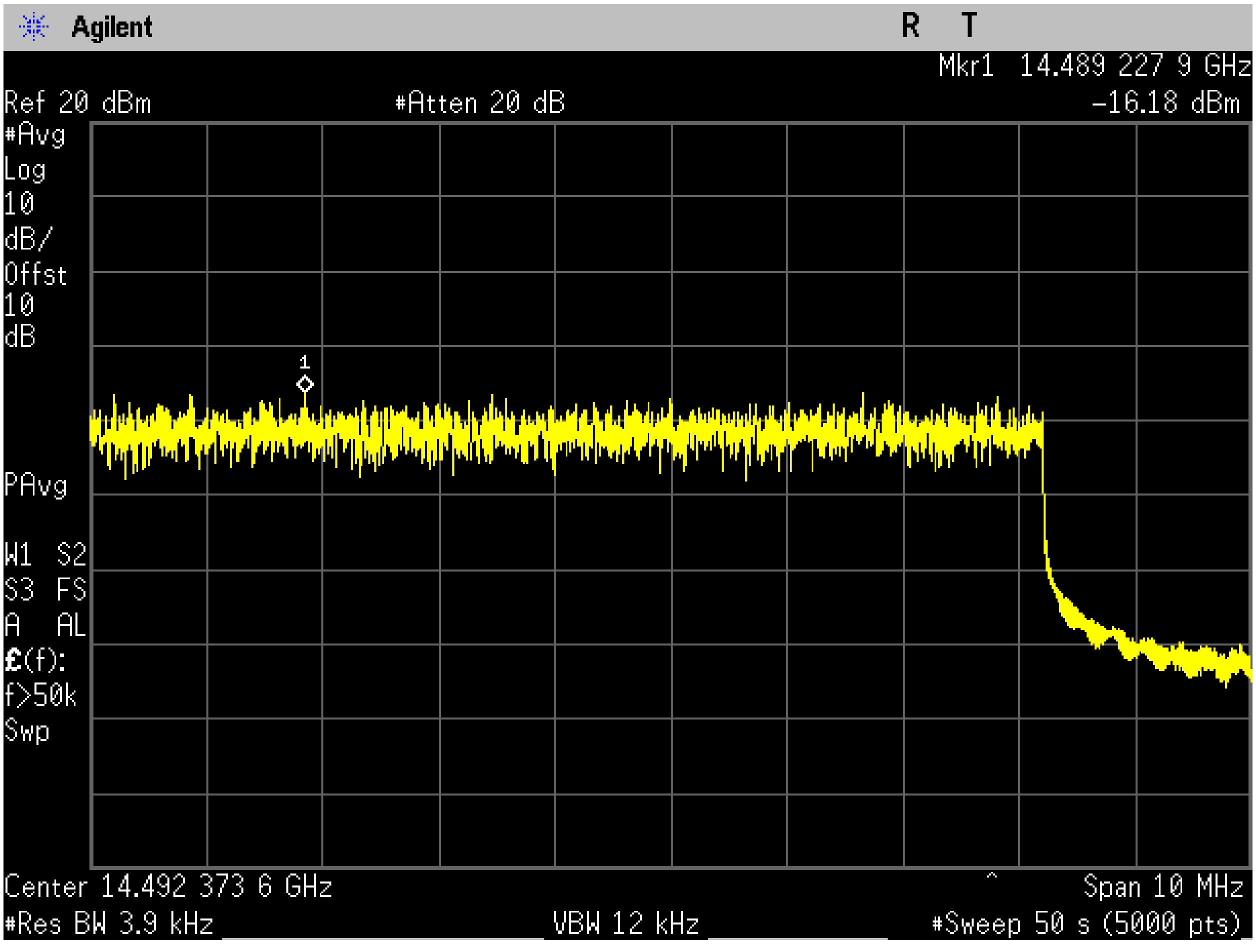


Figure 84. EIRP PSD, 16QAM, 20MHz, High Channel (Final).

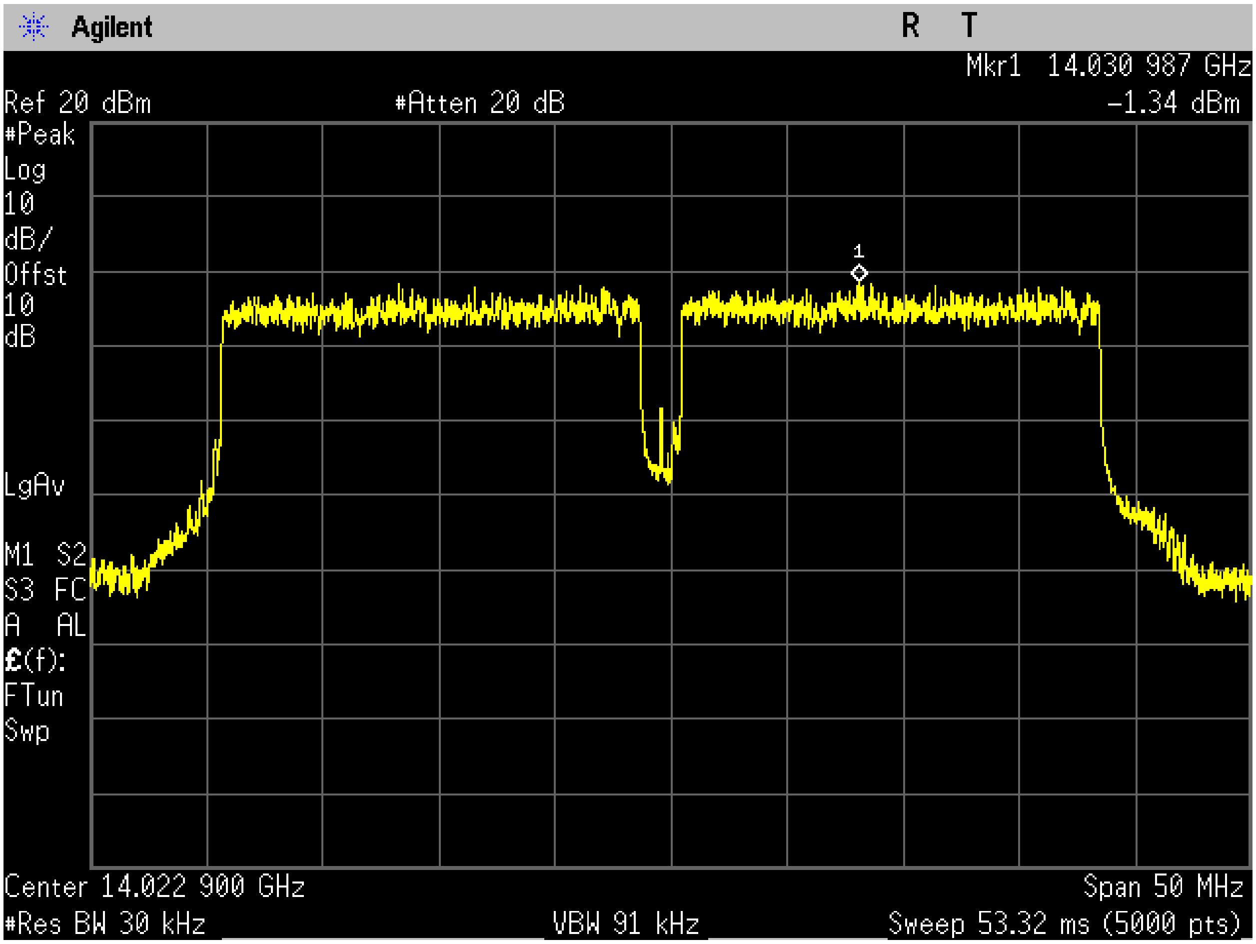


Figure 85. EIRP PSD, 16QAM, 40MHz, Low Channel (PreScan).

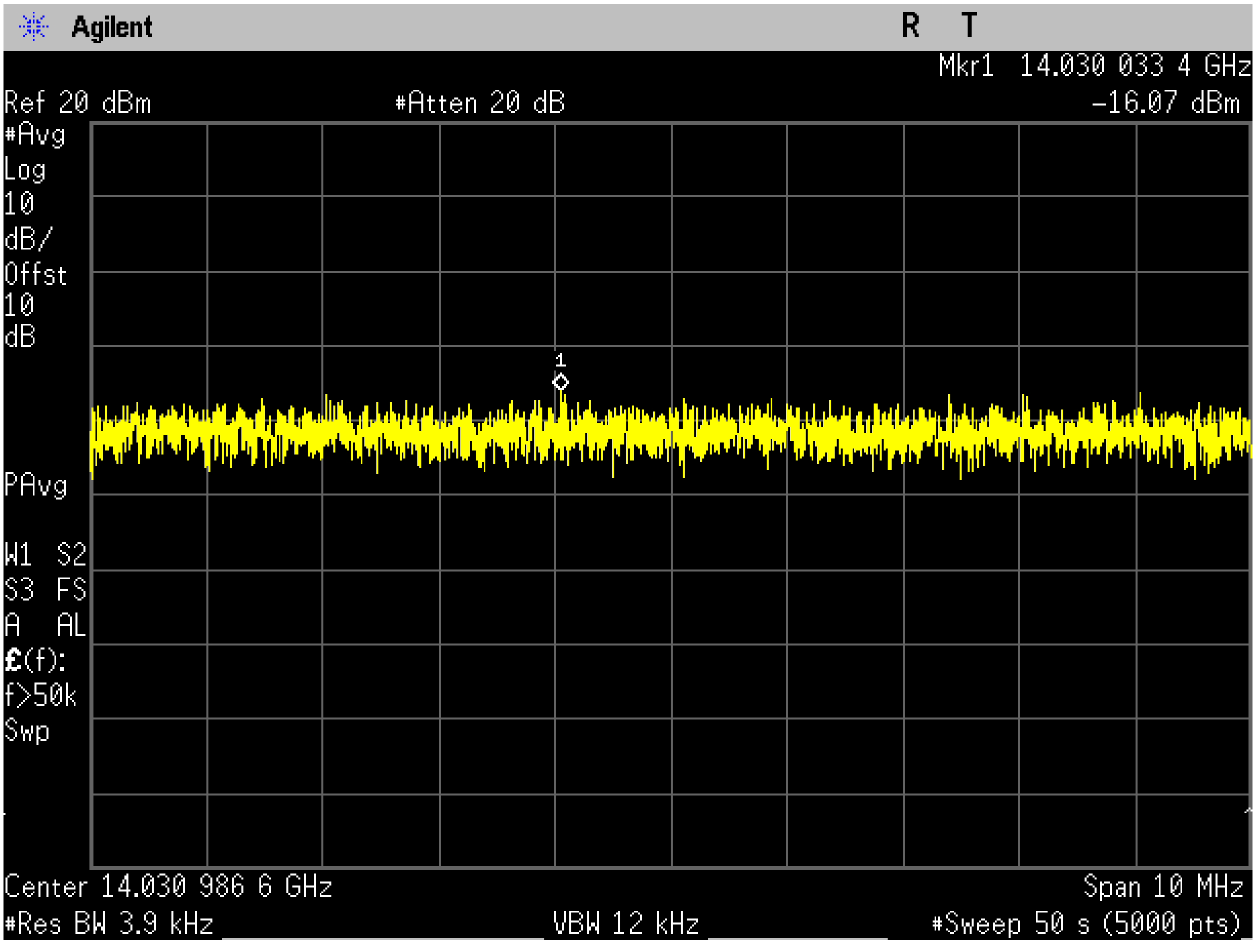


Figure 86. EIRP PSD, 16QAM, 40MHz, Low Channel (Final).

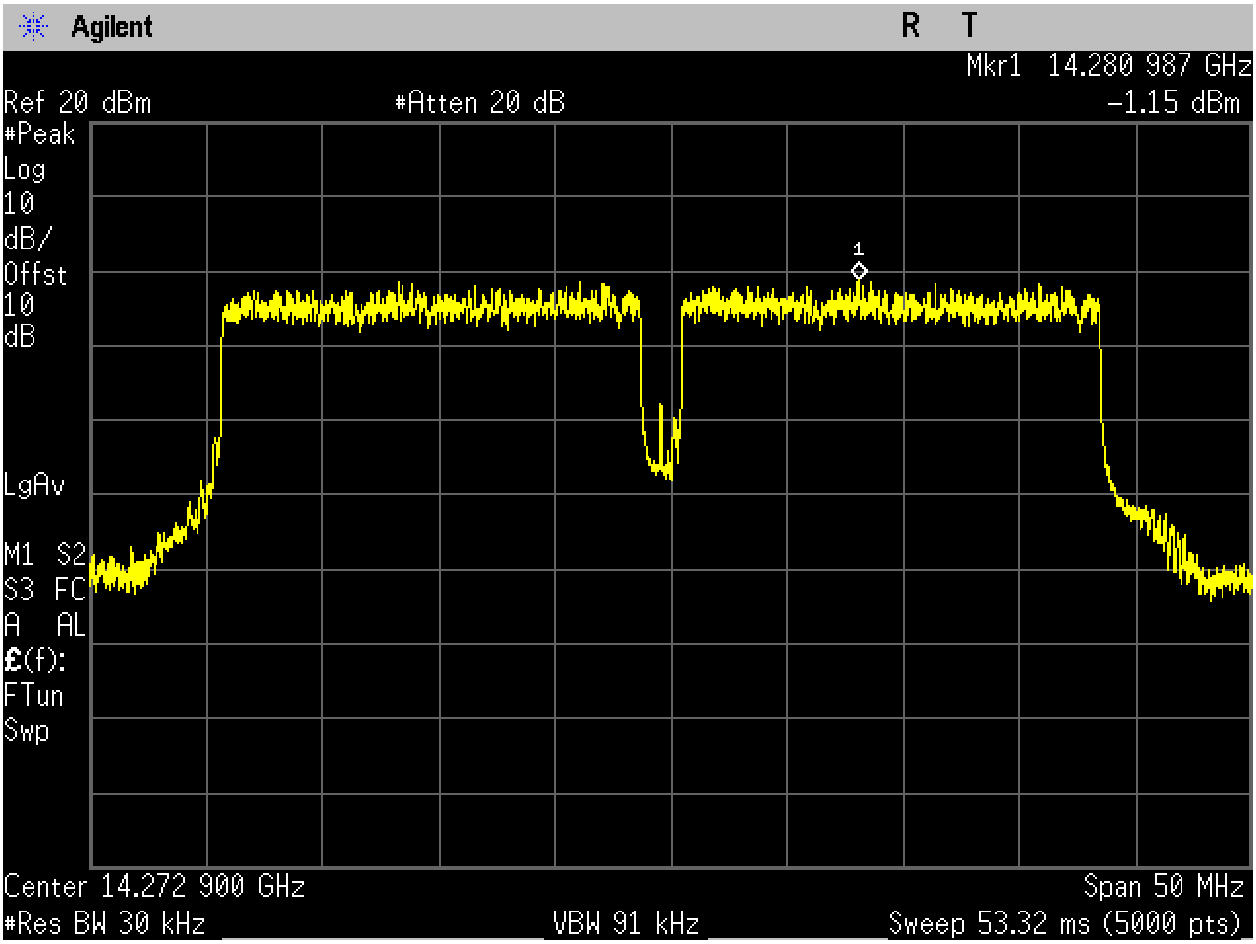


Figure 87. EIRP PSD, 16QAM, 40MHz, Mid Channel (Prescan).

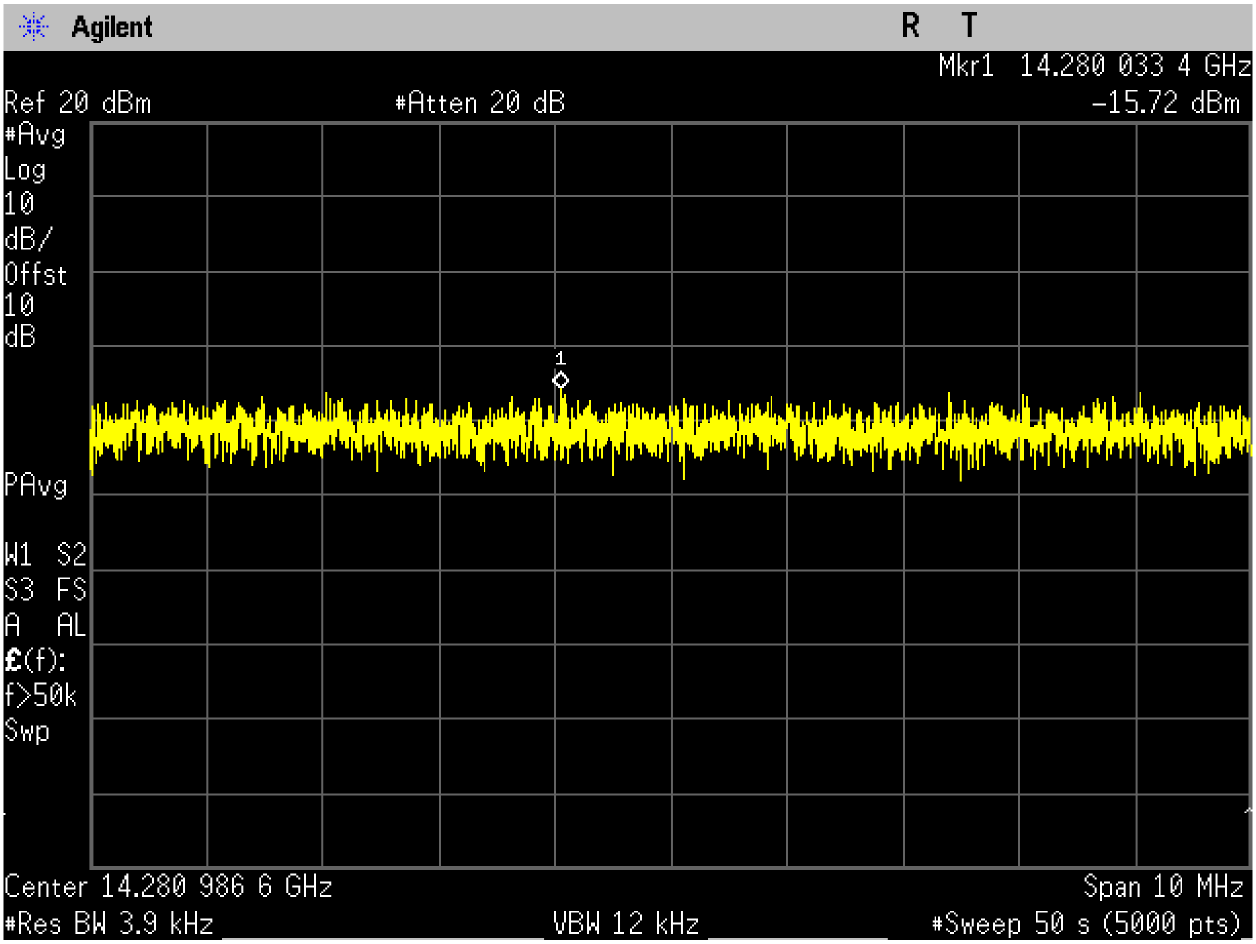


Figure 88. EIRP PSD, 16QAM, 40MHz, Mid Channel (Final).

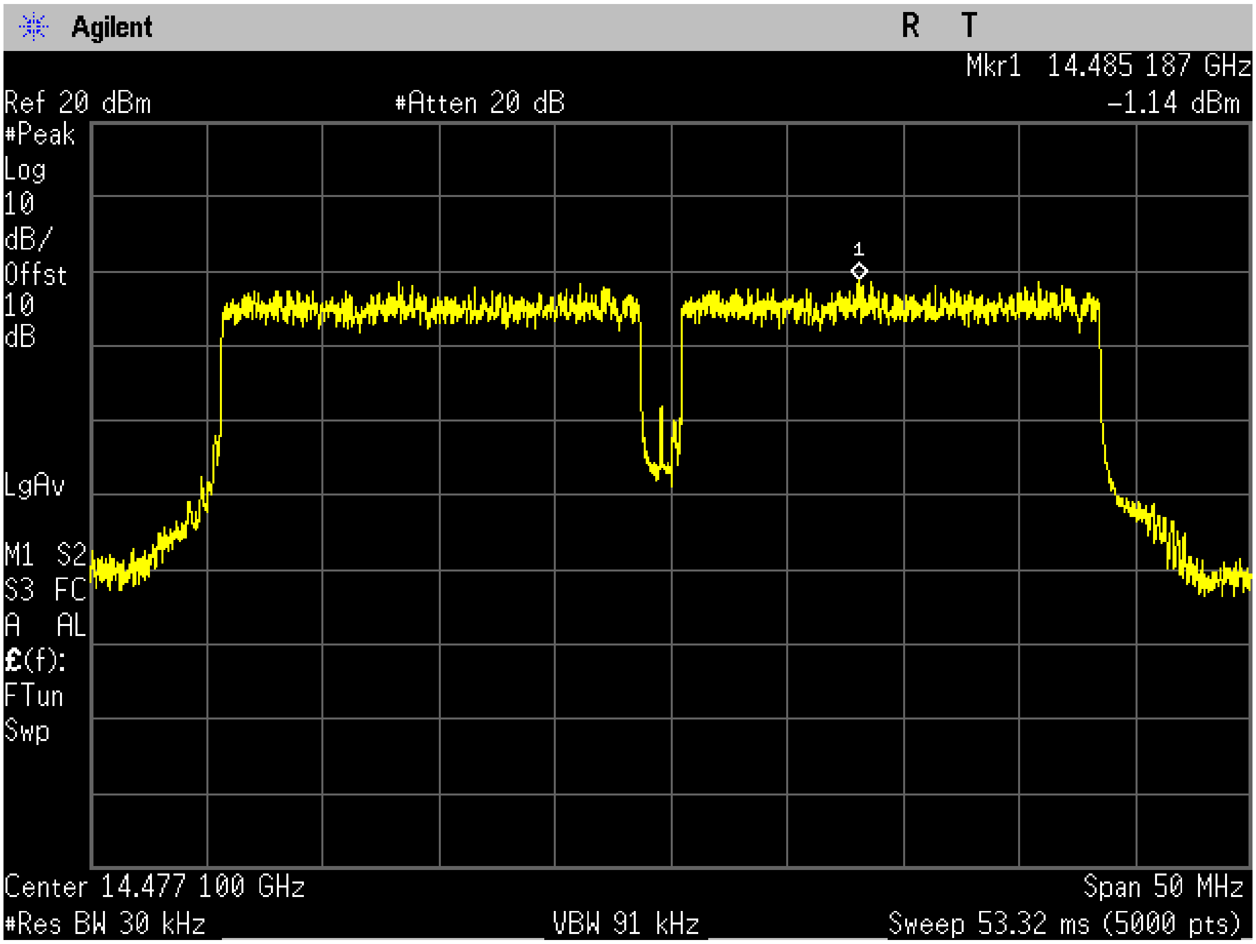


Figure 89. EIRP PSD, 16QAM, 40MHz, High Channel (PreScan).

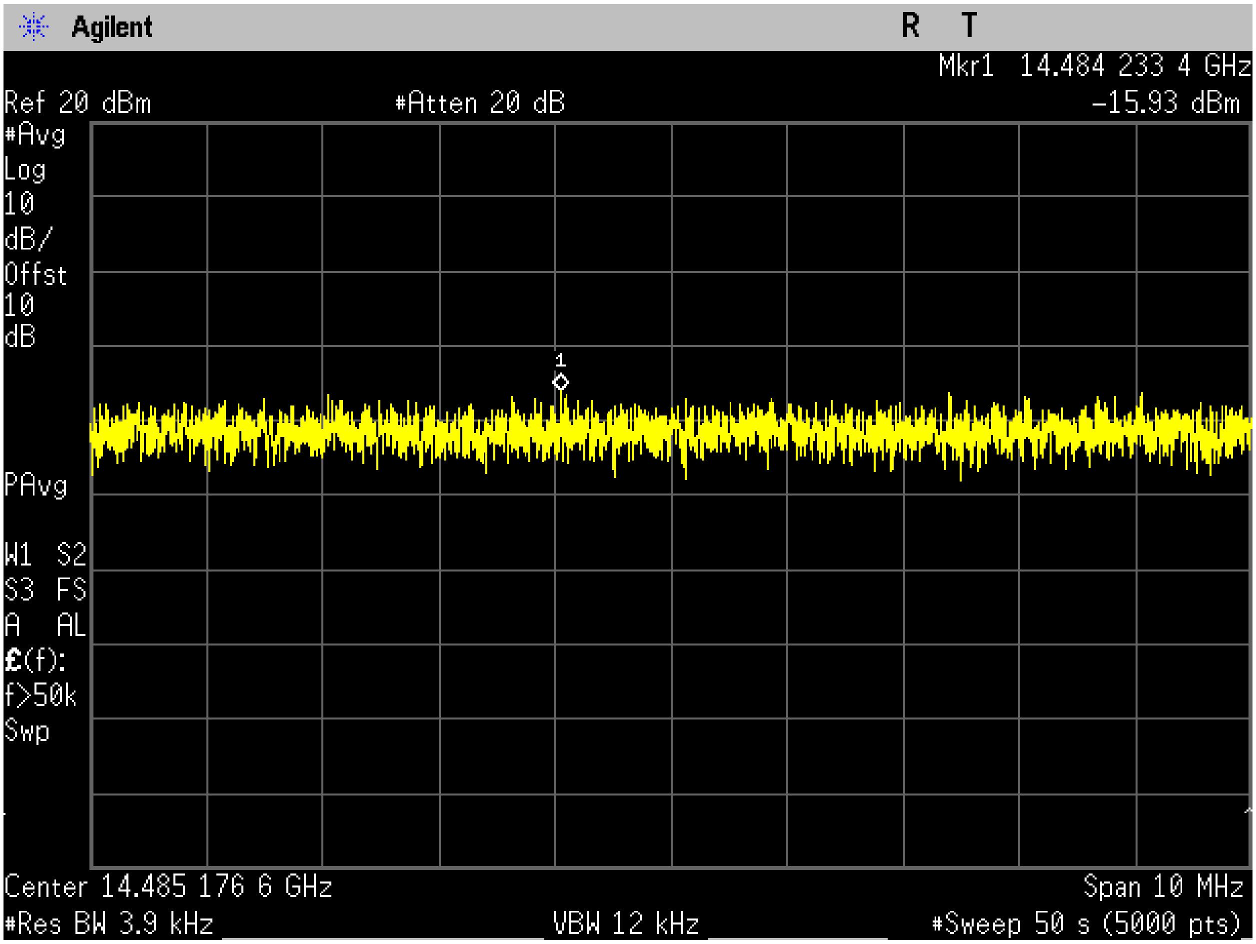


Figure 90. EIRP PSD, 16QAM, 40MHz, High Channel (Final).

Electromagnetic Compatibility Criteria for Satellite Communications

§25.202(h)(1) Spurious at Antenna Port

Test Requirement(s): **§25.202** (f) Emission limitations. Except for SDARS terrestrial repeaters and as provided for in paragraph (i), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The out-of-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

Test Procedure: The unwanted emissions limit was expressed in terms of average power. The use of 'Max-Hold' will not result in a true average power measurement. Instead, the trace averaging mode would be used. Alternatively, a single sweep measurement could be used with the sweep time set such that a 1ms per trace point is achieved. The Spurious Emissions at Antenna Terminals were measured following subclauses 5.7.3 and 5.7.4 of ANSI C63.26-2015. The EUT was connected to a spectrum analyzer using appropriate attenuation. Care was taken to ensure that the appropriate adjustments for cable losses were used for each measurement range.

During out-of-band measurements, a peak detector was used with a RBW > 4kHz. Final measurements would be performed with a RBW = 3.9kHz as needed when a peak of interest was found during peak prescan. If emissions measured during prescan were found to be very low against the limit, then a final average measurement would not be taken.

Test Results: The EUT is **compliant** with the requirements of this section.

Test Engineer: Donald Salguero

Test Date: June 14 – June 17, 2024

OoB

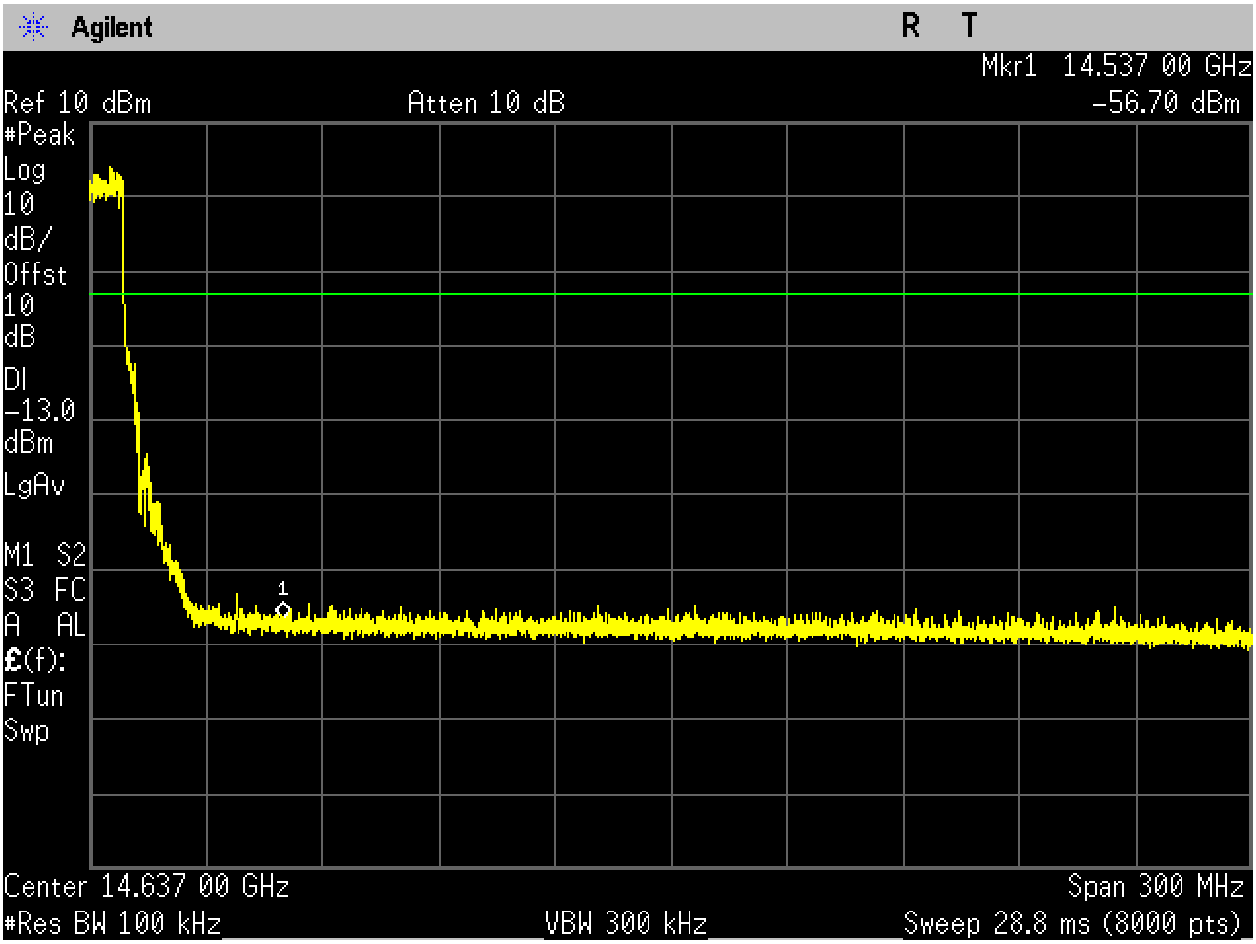


Figure 91. Band Edge (high), 16QAM, 20MHz, High Channel.

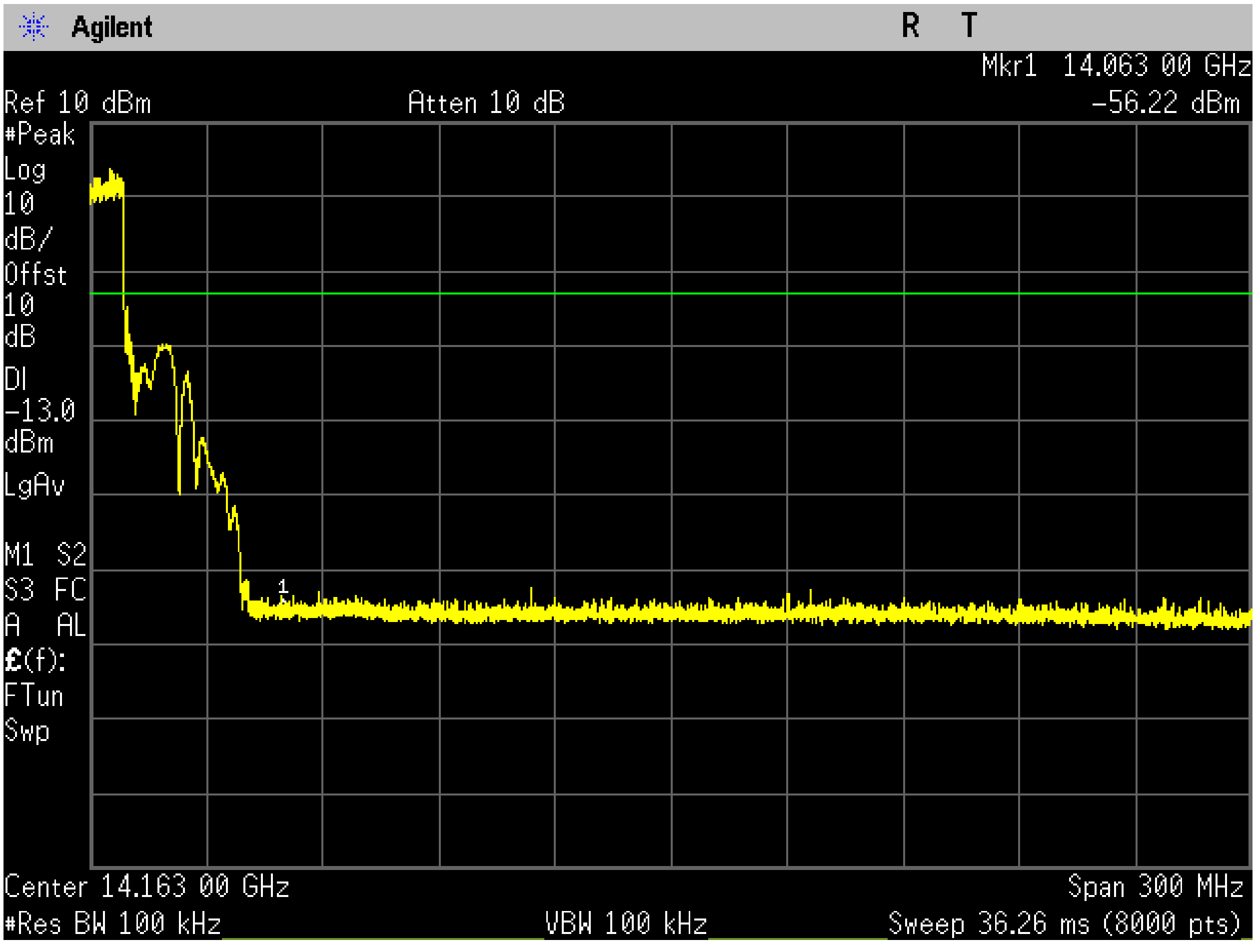


Figure 92. Band Edge (high), 16QAM, 20MHz, Low Channel.

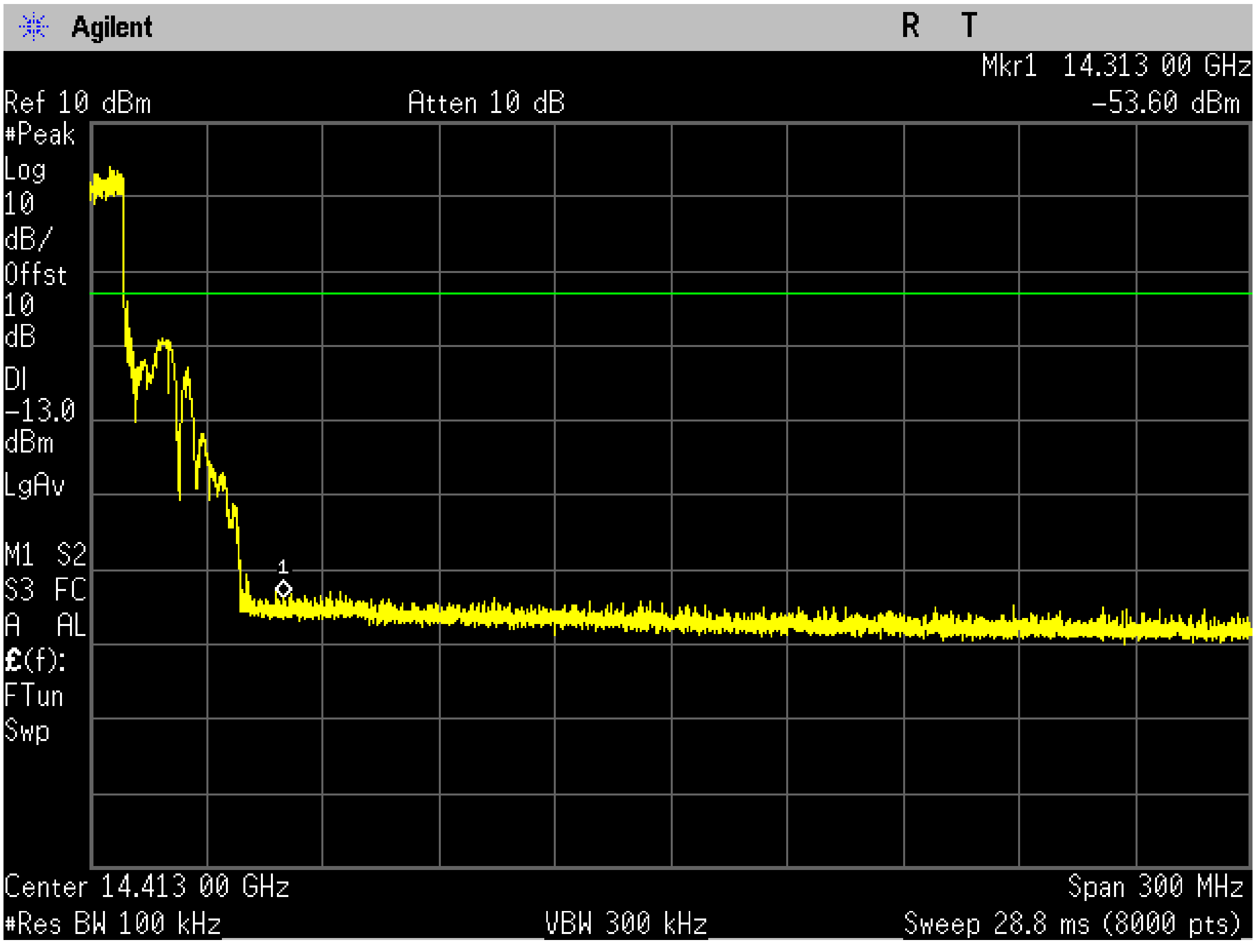


Figure 93. Band Edge (high), 16QAM, 20MHz, Mid Channel.

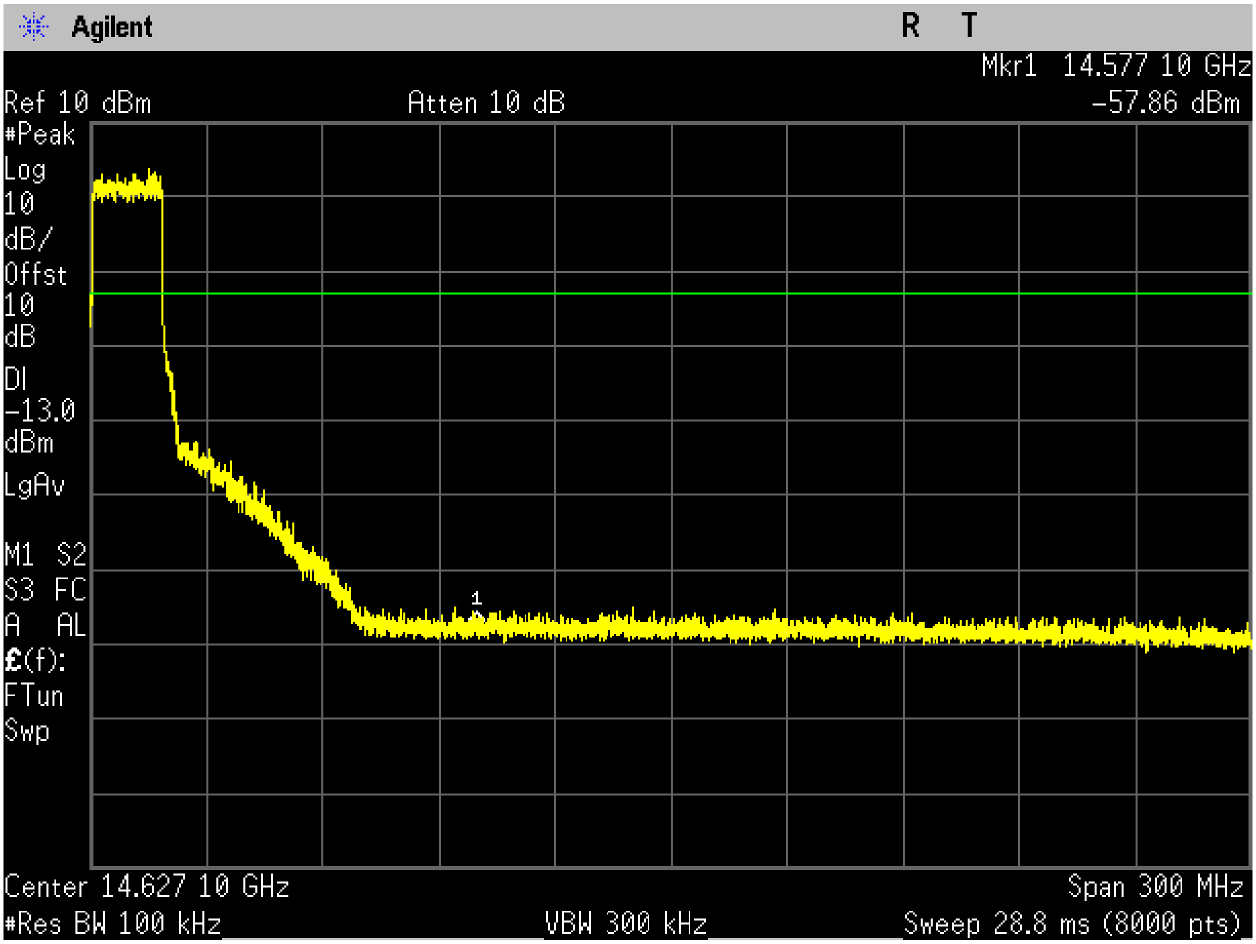


Figure 94. Band Edge (high), 16QAM, 40MHz, High Channel.

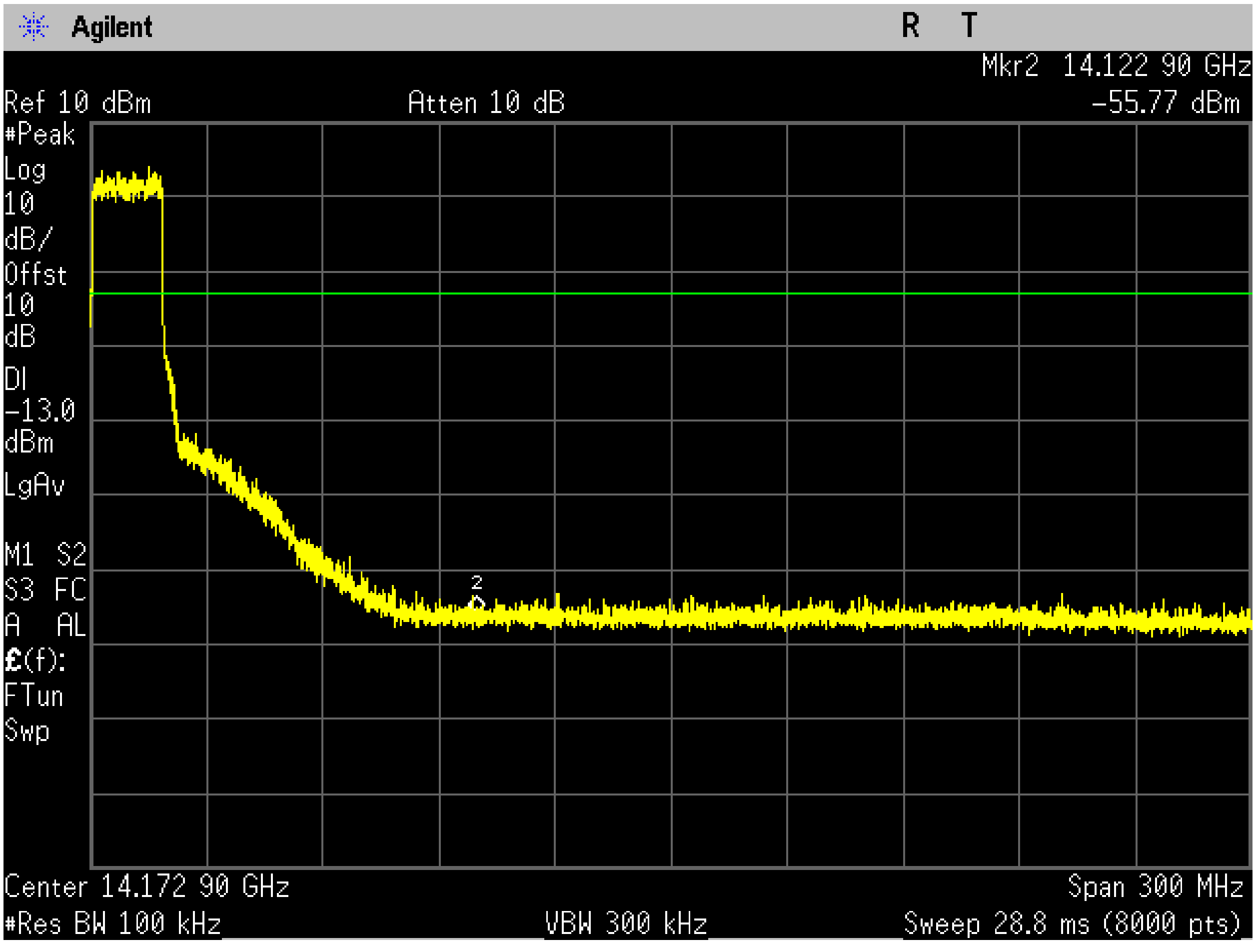


Figure 95. Band Edge (high), 16QAM, 40MHz, Low Channel.

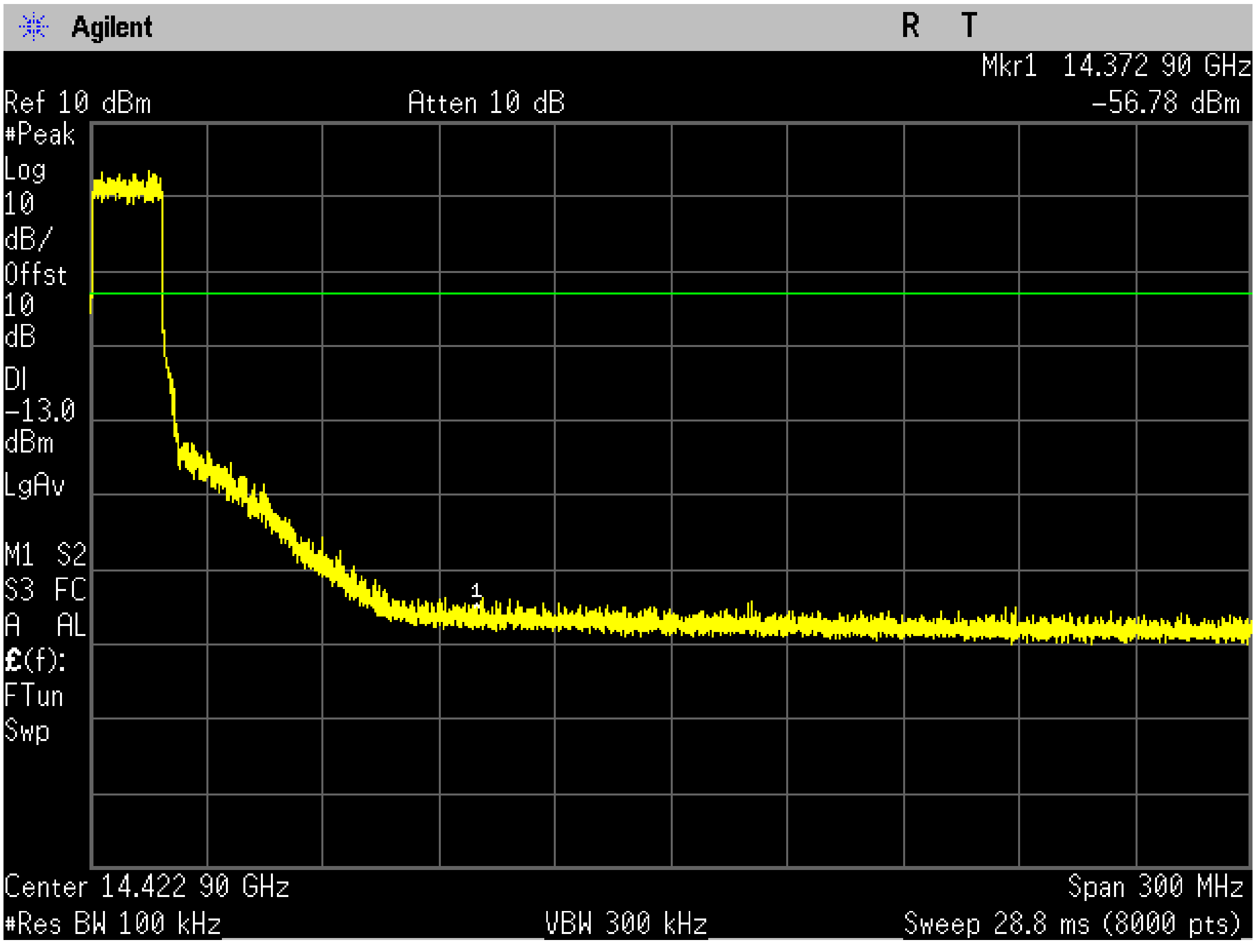


Figure 96. Band Edge (high), 16QAM, 40MHz, Mid Channel.

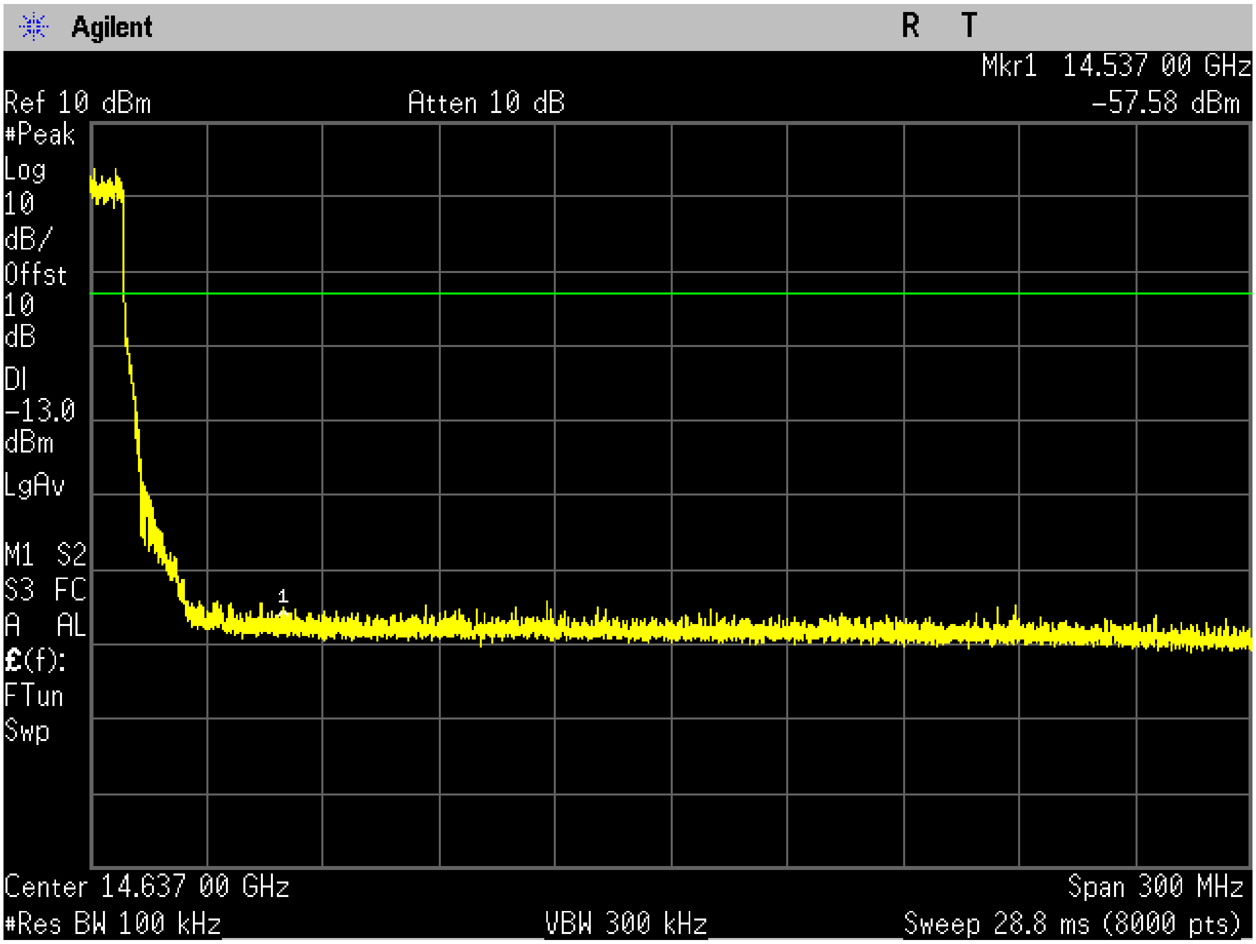


Figure 97. Band Edge (high), 8PSK, 20MHz, High Channel.

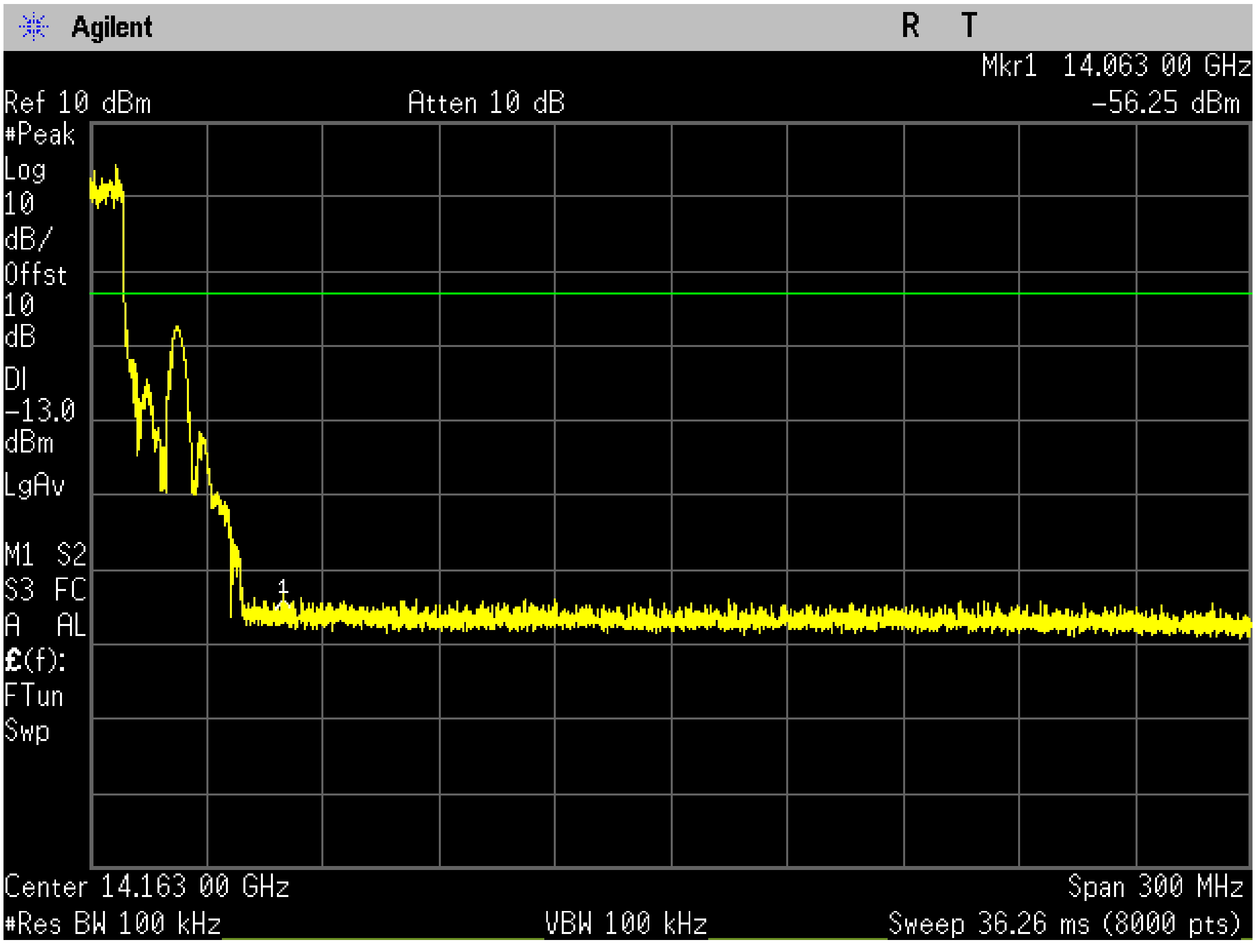


Figure 98. Band Edge (high), 8PSK, 20MHz, Low Channel.

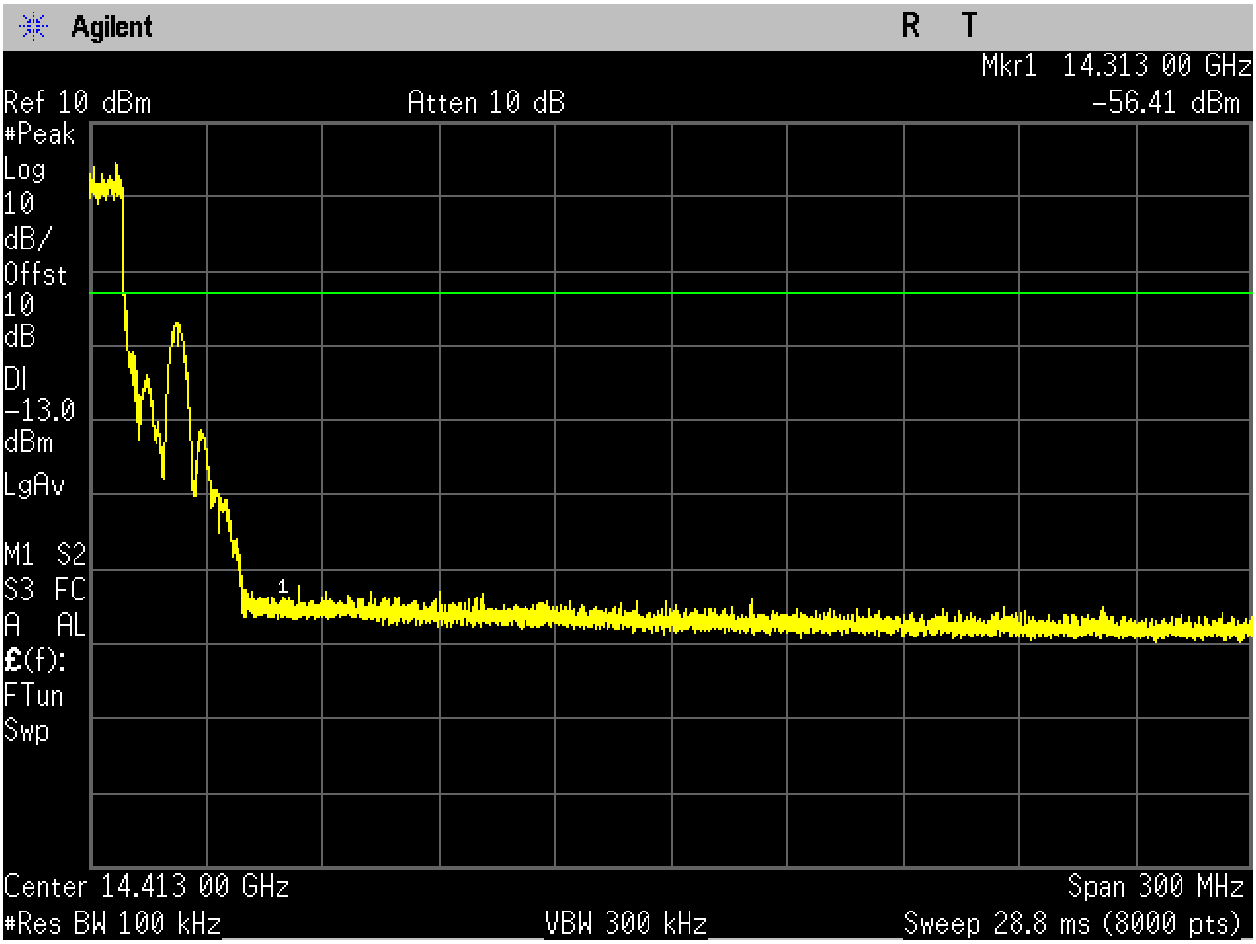


Figure 99. Band Edge (high), 8PSK, 20MHz, Mid Channel.

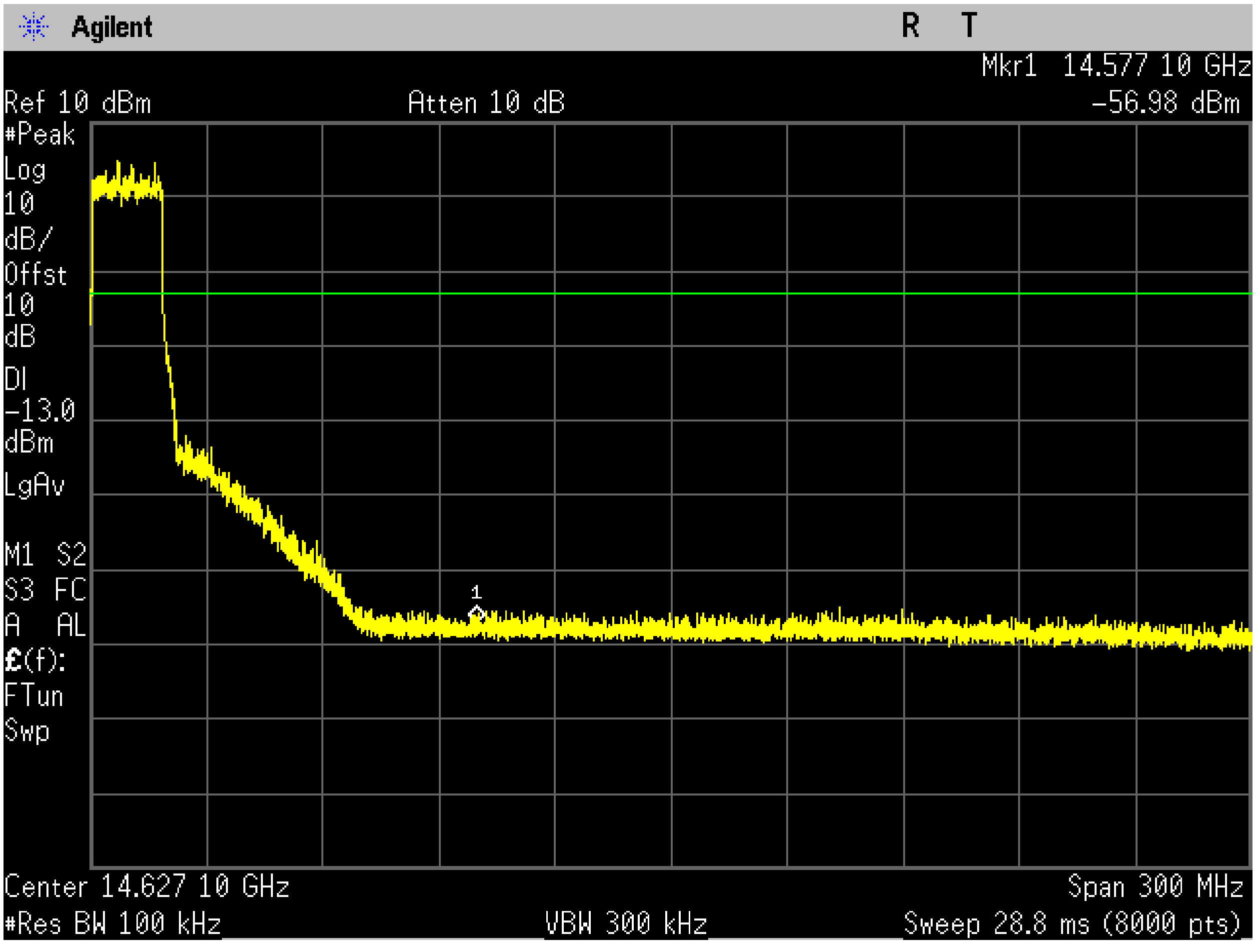


Figure 100. Band Edge (high), 8PSK, 40MHz, High Channel.

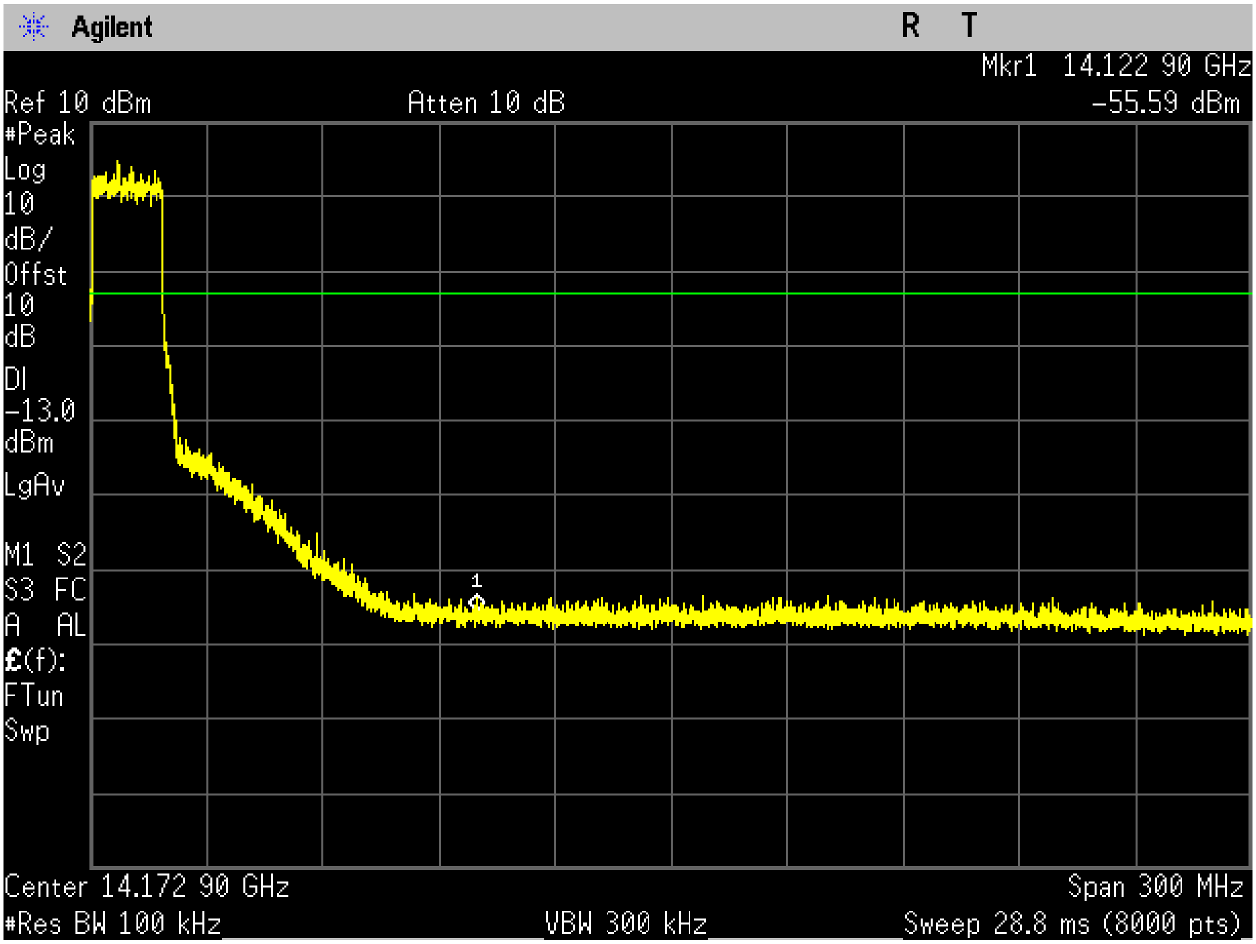


Figure 101. Band Edge (high), 8PSK, 40MHz, Low Channel.

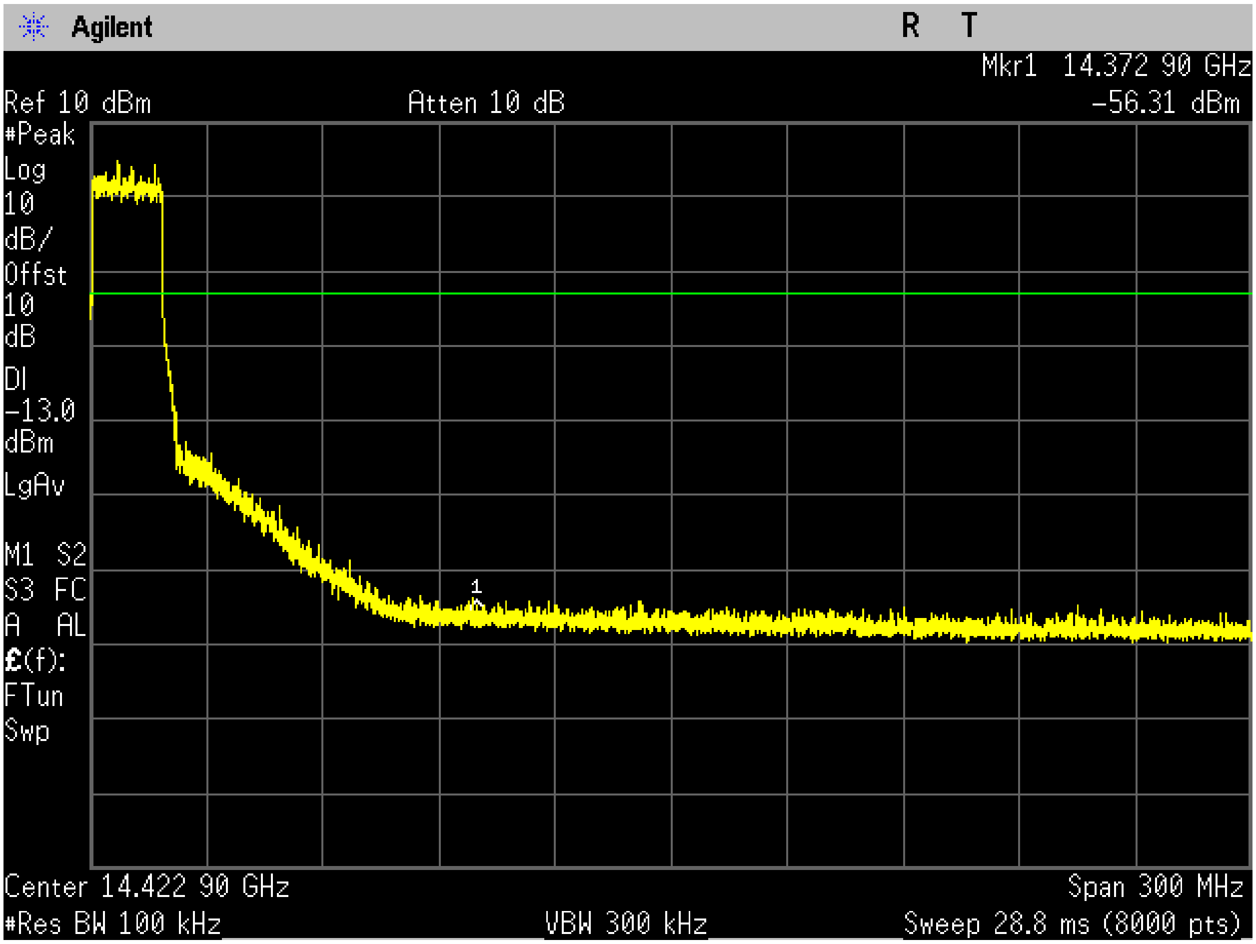


Figure 102. Band Edge (high), 8PSK, 40MHz, Mid Channel.

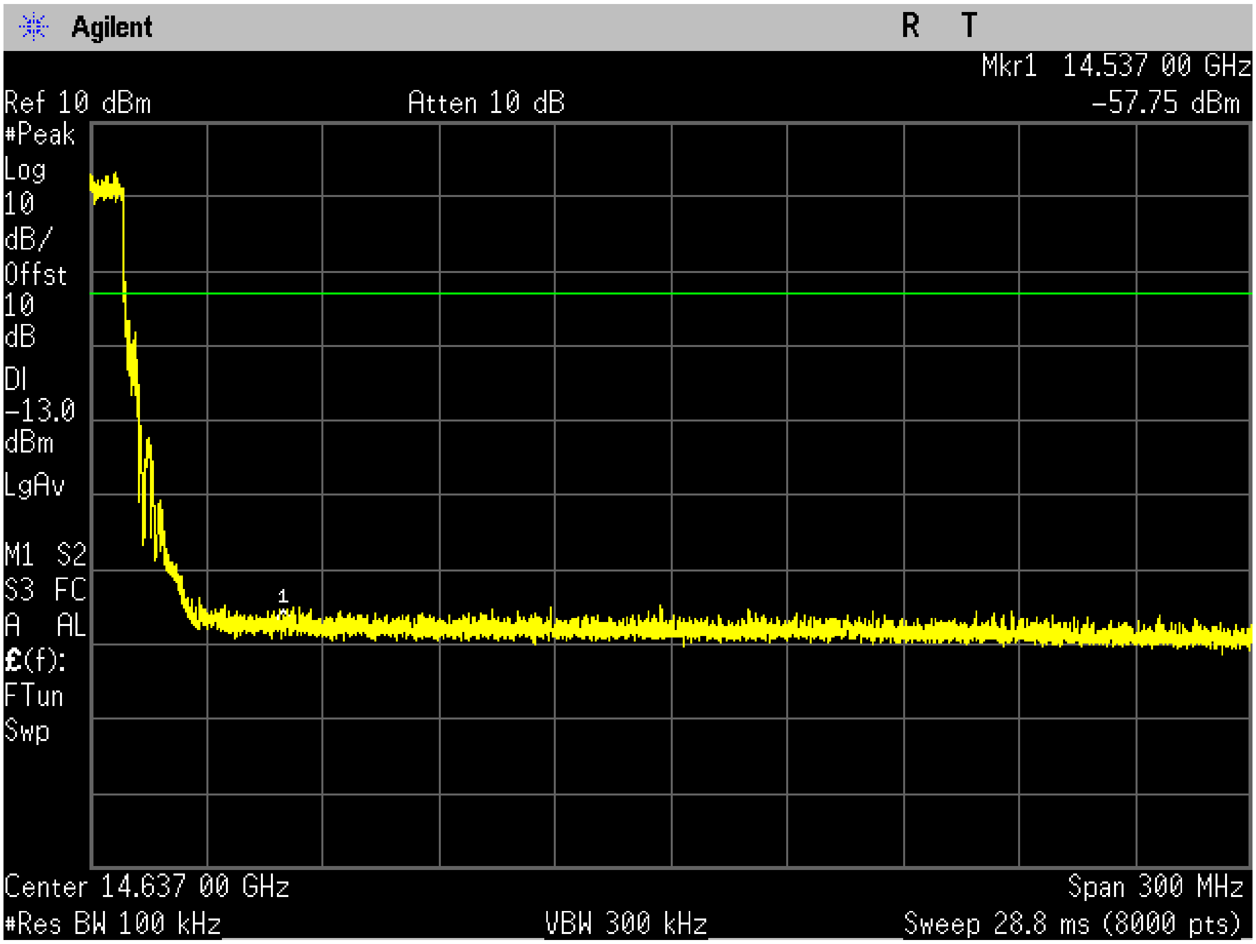


Figure 103. Band Edge (high), QPSK, 20MHz, High Channel.

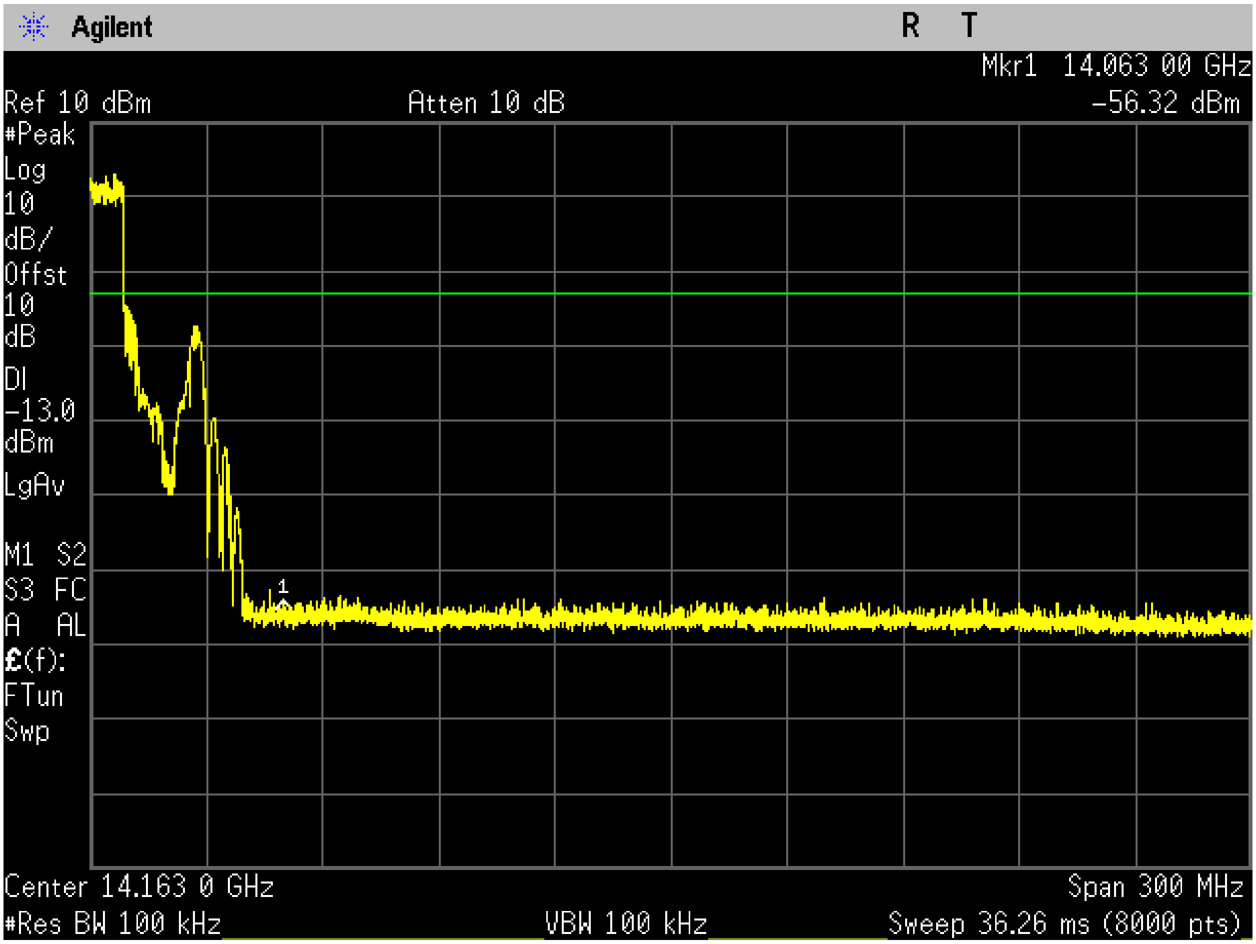


Figure 104. Band Edge (high), QPSK, 20MHz, Low Channel.

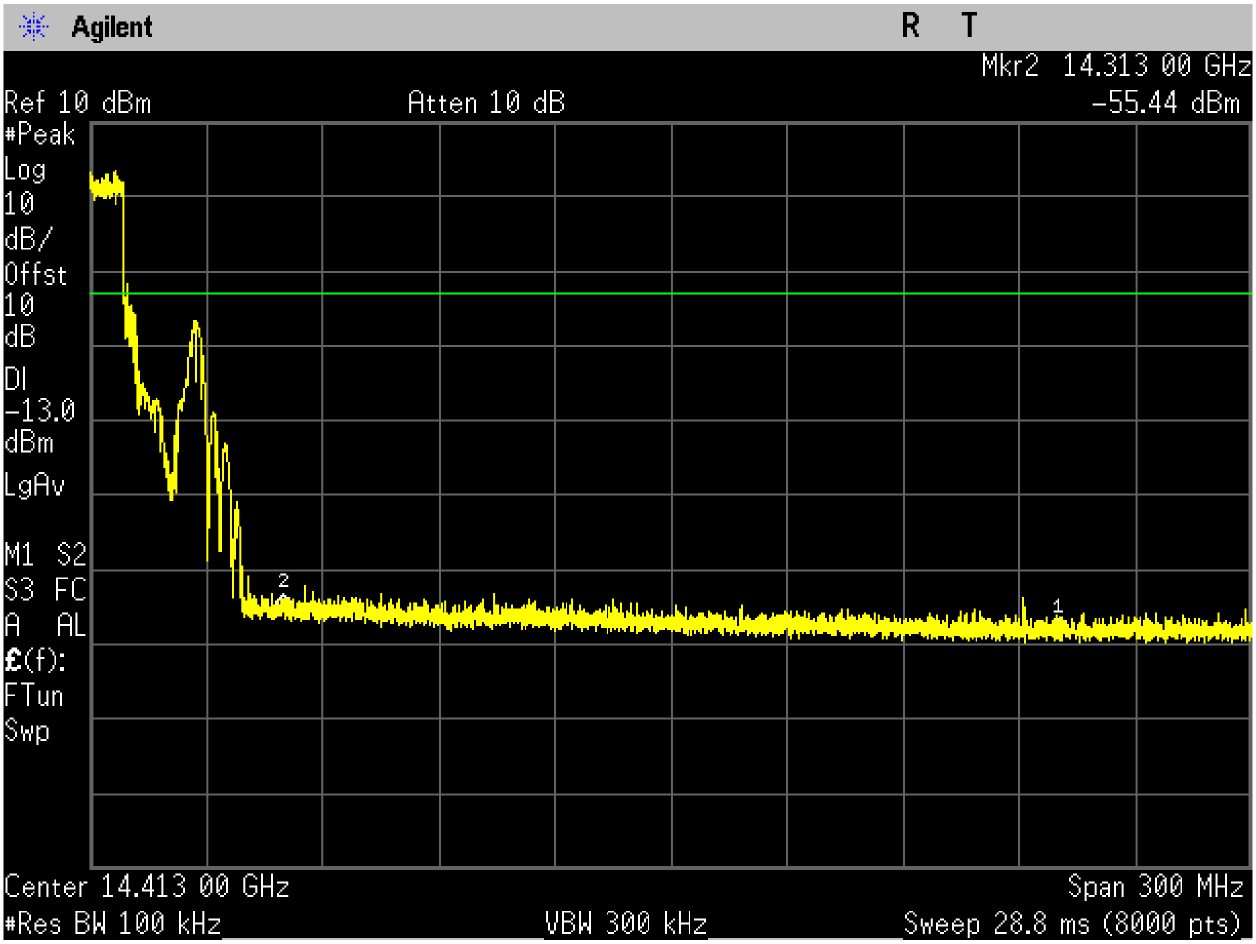


Figure 105. Band Edge (high), QPSK, 20MHz, Mid Channel.

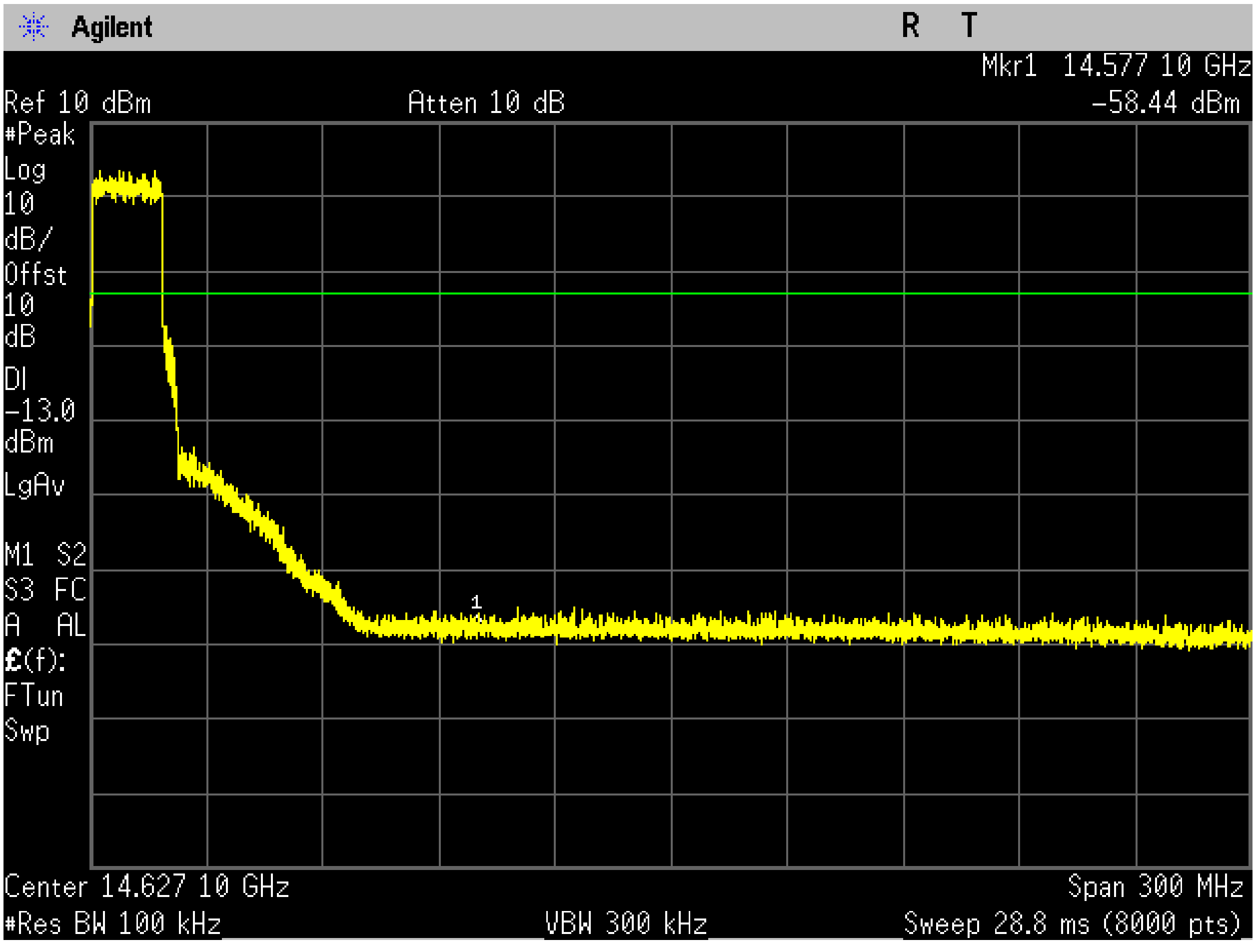


Figure 106. Band Edge (high), QPSK, 40MHz, High Channel.

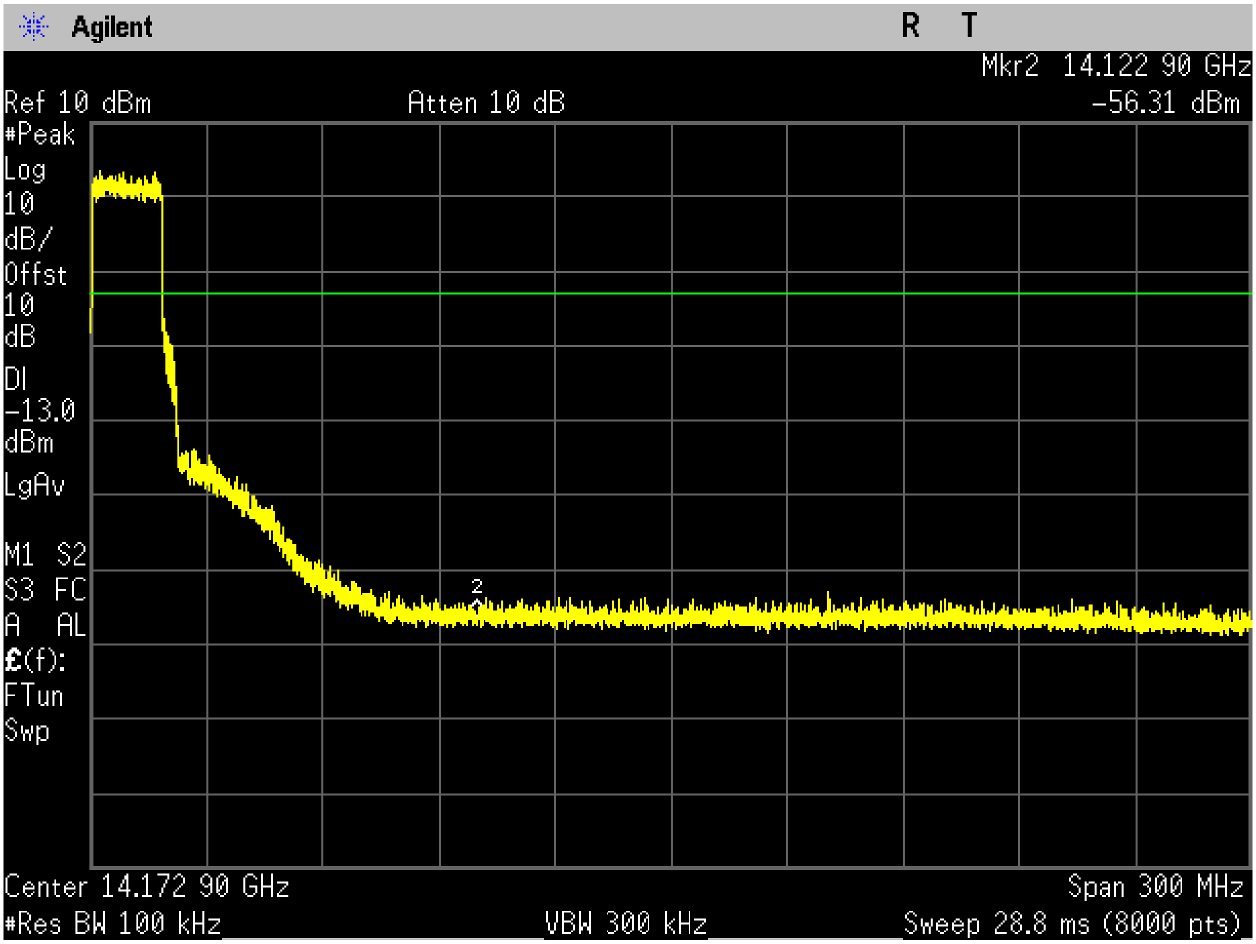


Figure 107. Band Edge (high), QPSK, 40MHz, Low Channel.

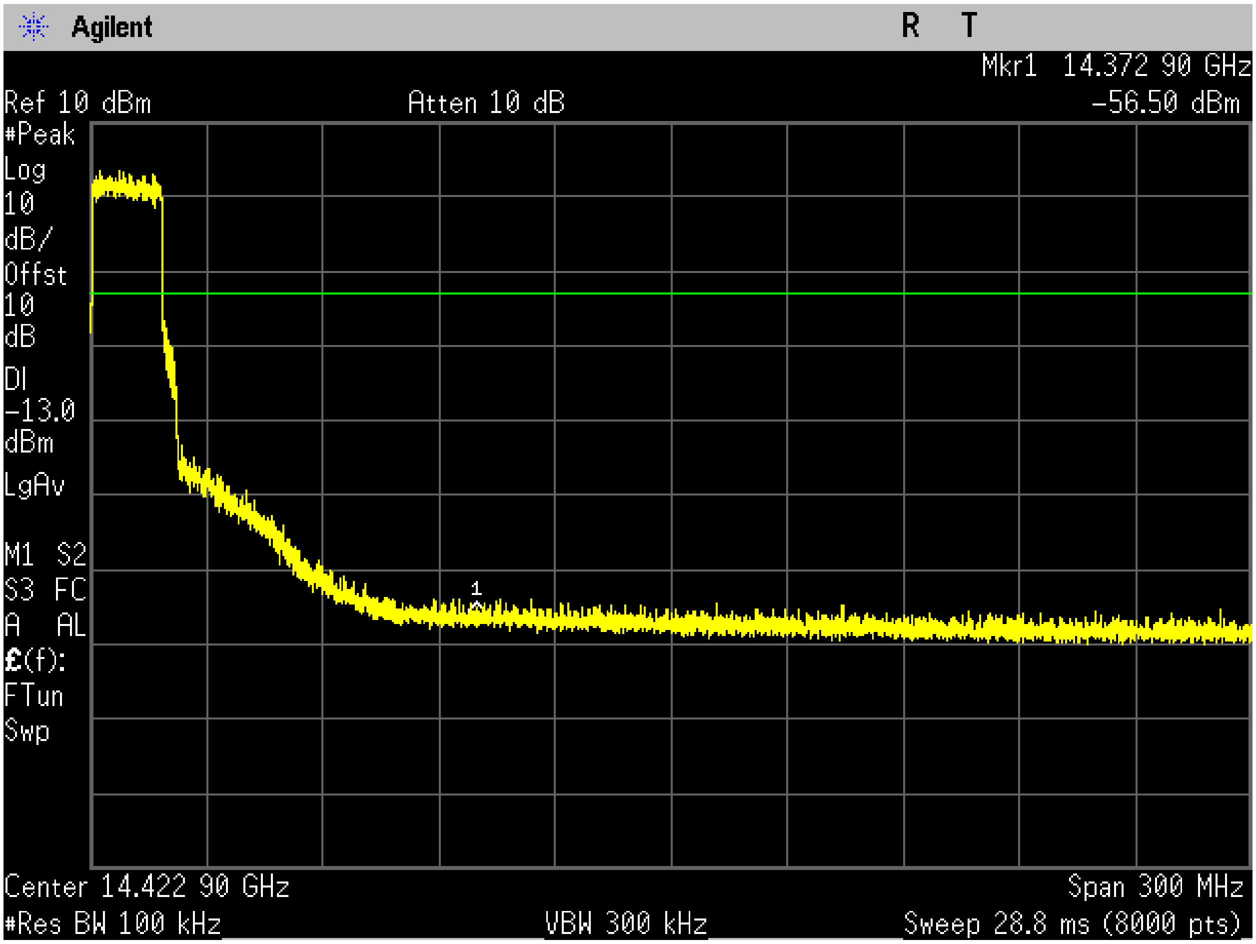


Figure 108. Band Edge (high), QPSK, 40MHz, Mid Channel.

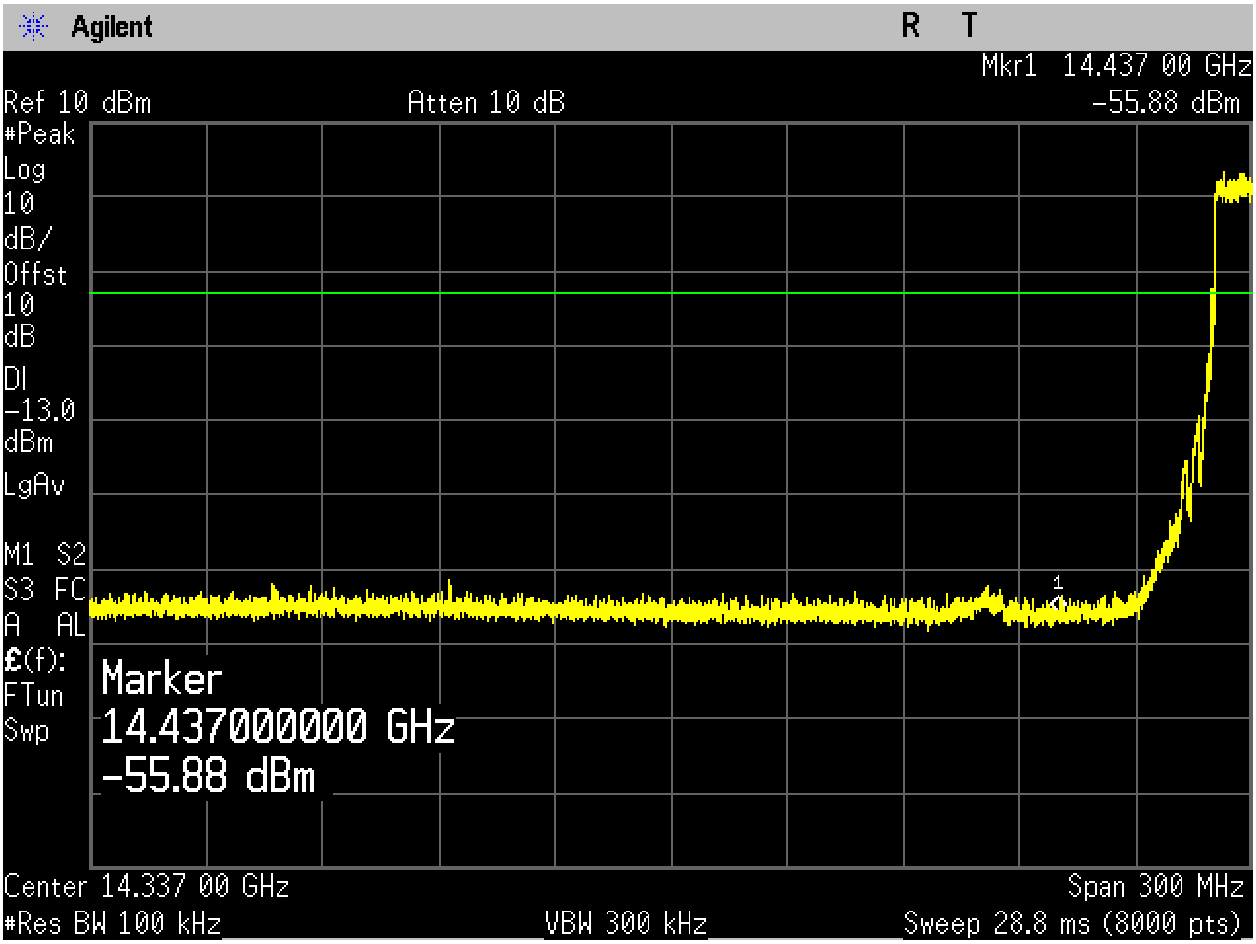


Figure 109. Band Edge (low), 16QAM, 20MHz, High Channel.

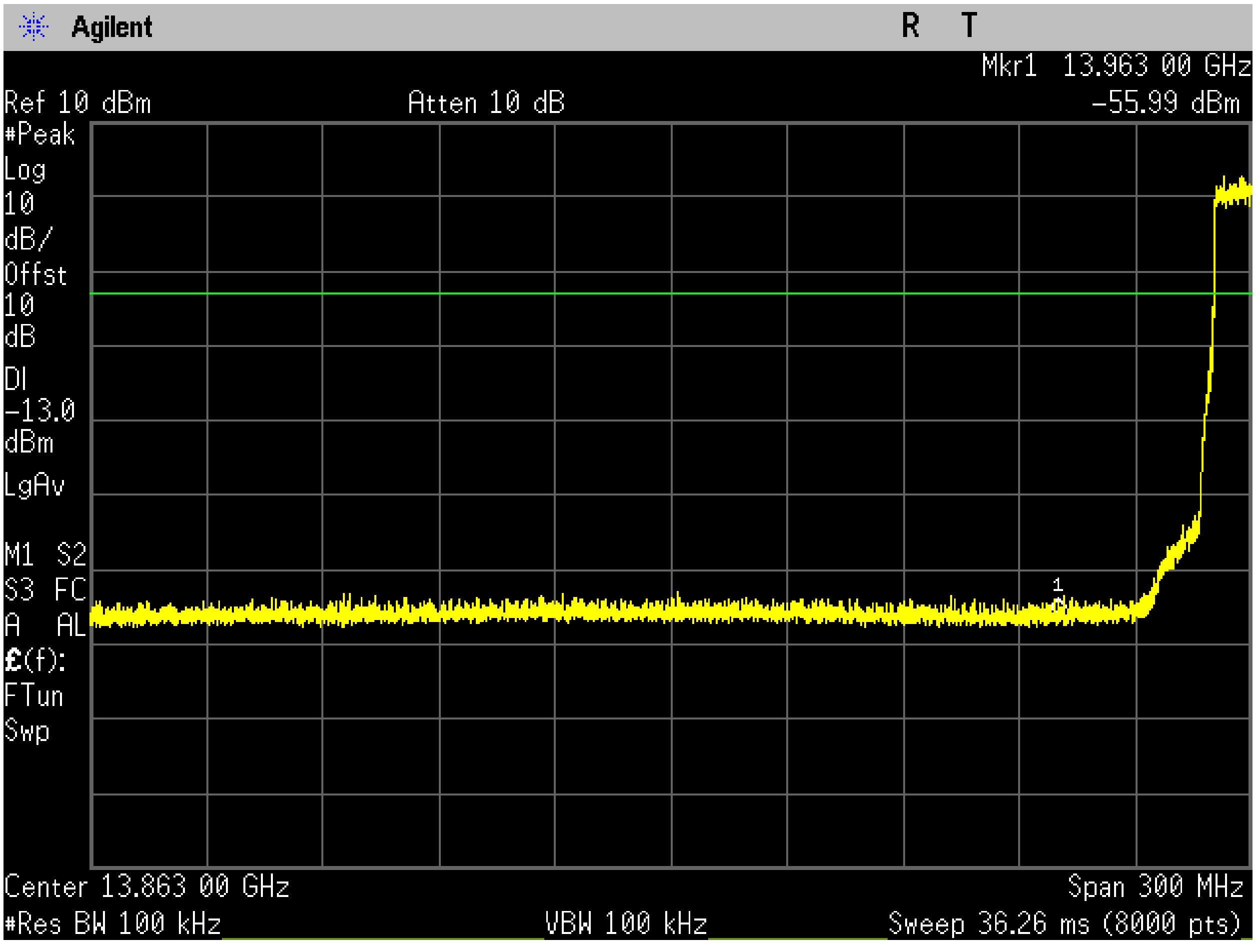


Figure 110. Band Edge (low), 16QAM, 20MHz, Low Channel.

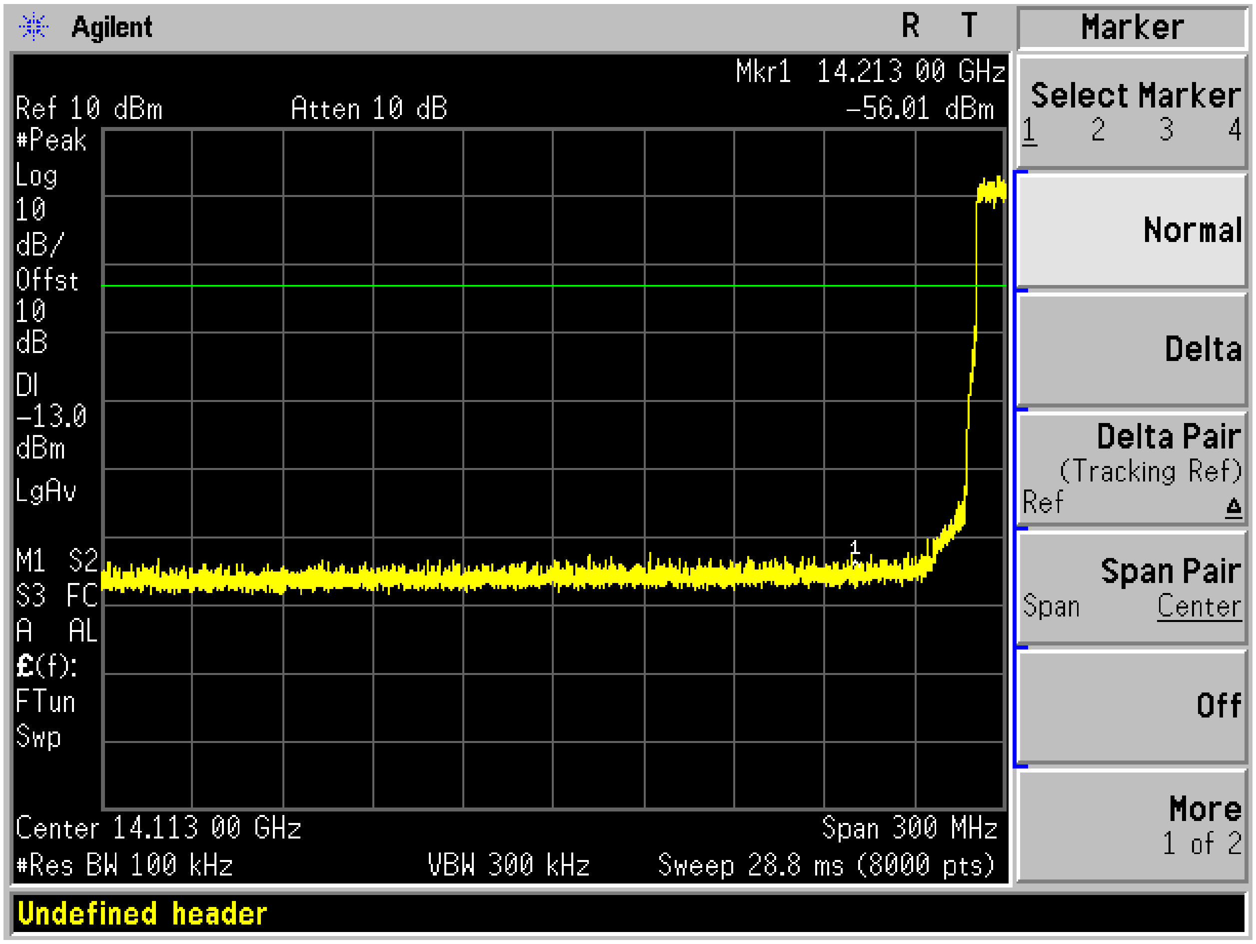


Figure 111. Band Edge (low), 16QAM, 20MHz, Mid Channel.

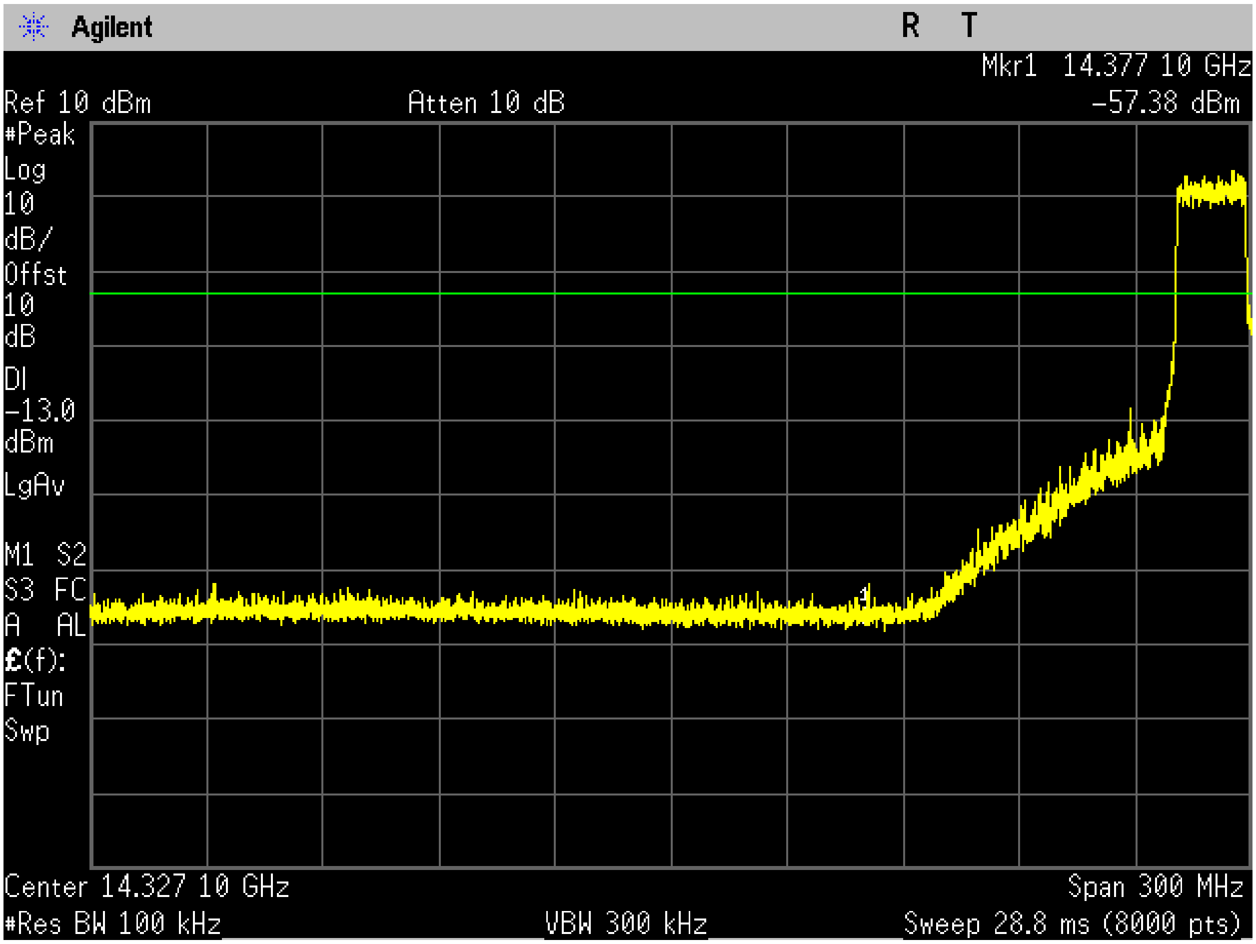


Figure 112. Band Edge (low), 16QAM, 40MHz, High Channel.

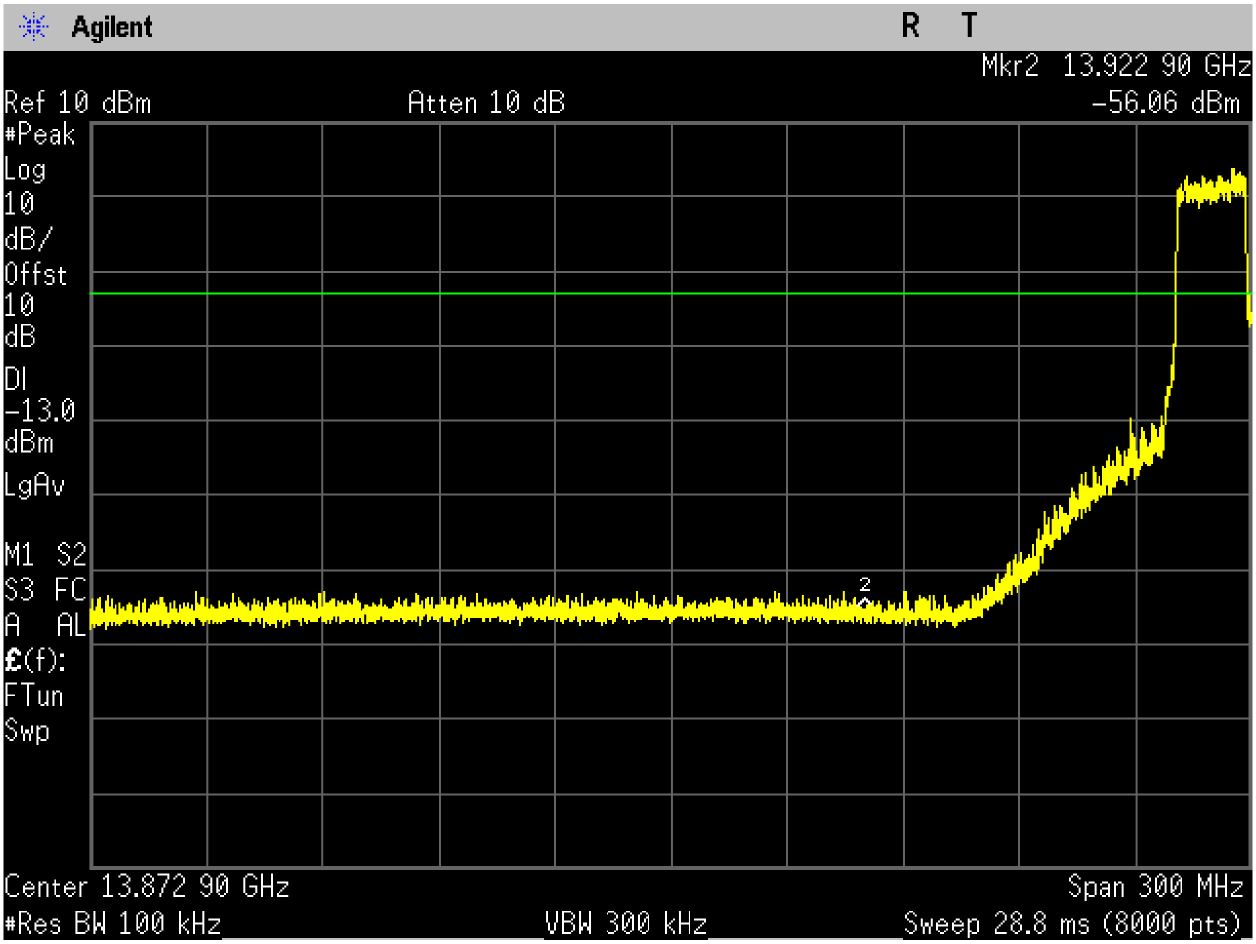


Figure 113. Band Edge (low), 16QAM, 40MHz, Low Channel.

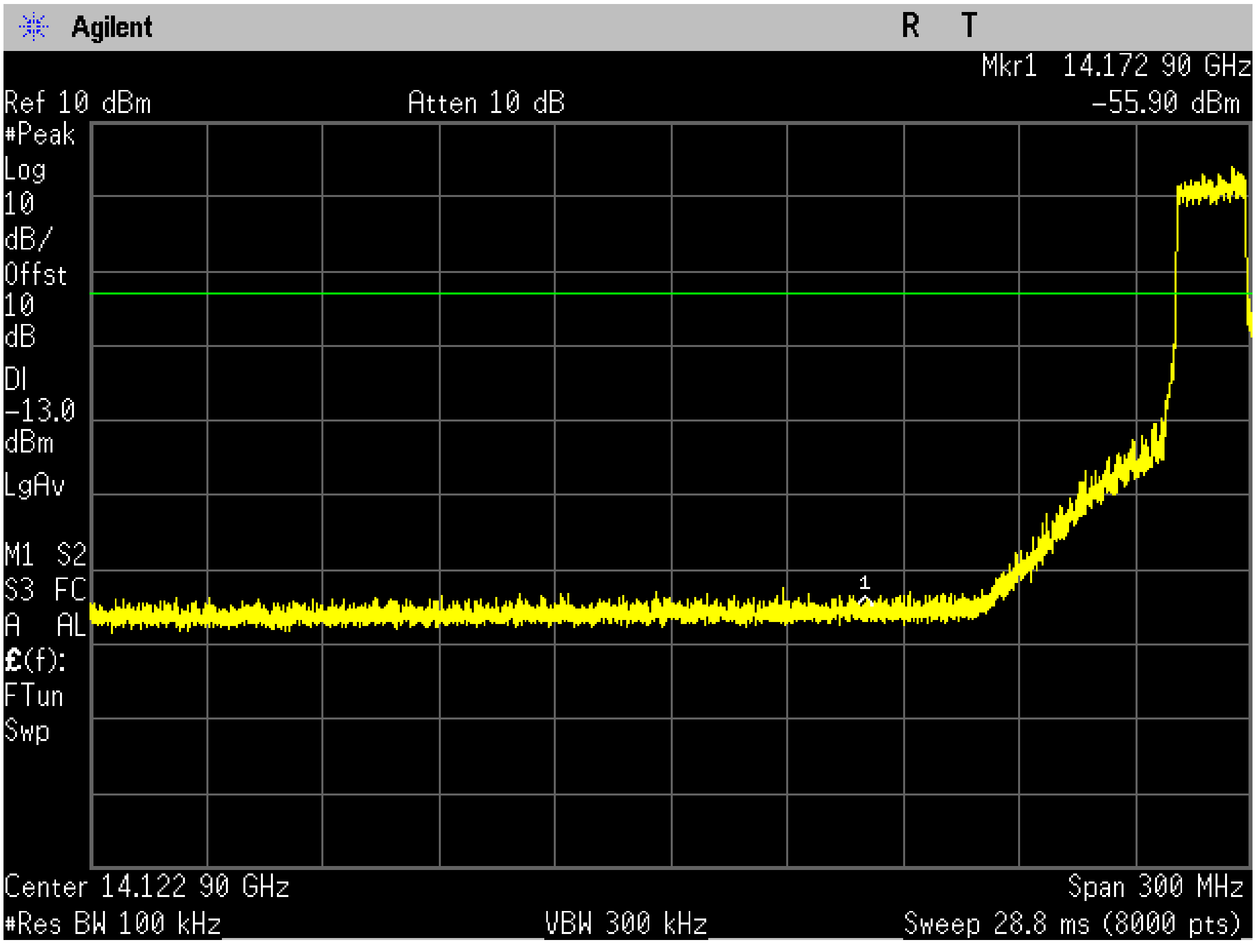


Figure 114. Band Edge (low), 16QAM, 40MHz, Mid Channel.

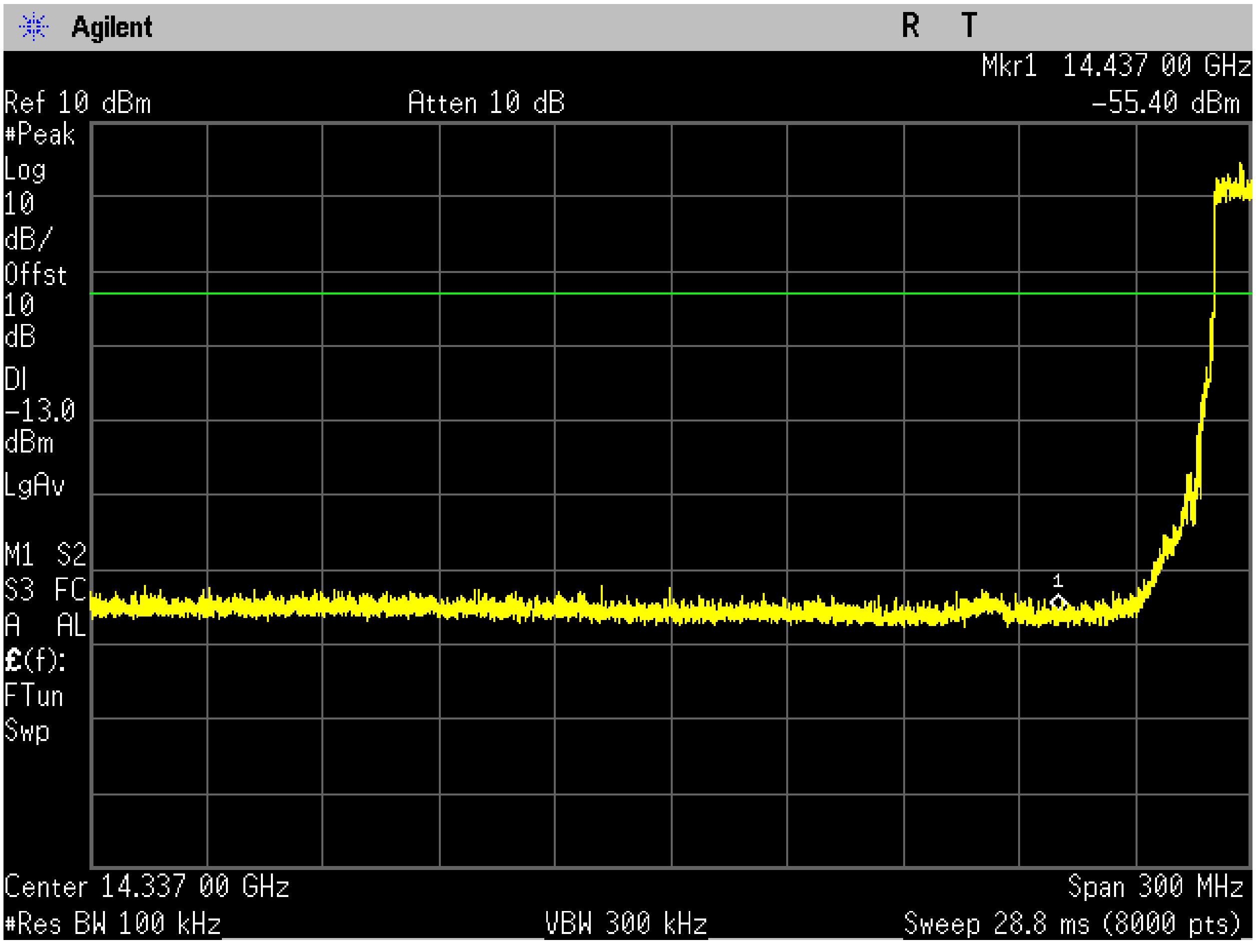


Figure 115. Band Edge (low), 8PSK, 20MHz, High Channel.

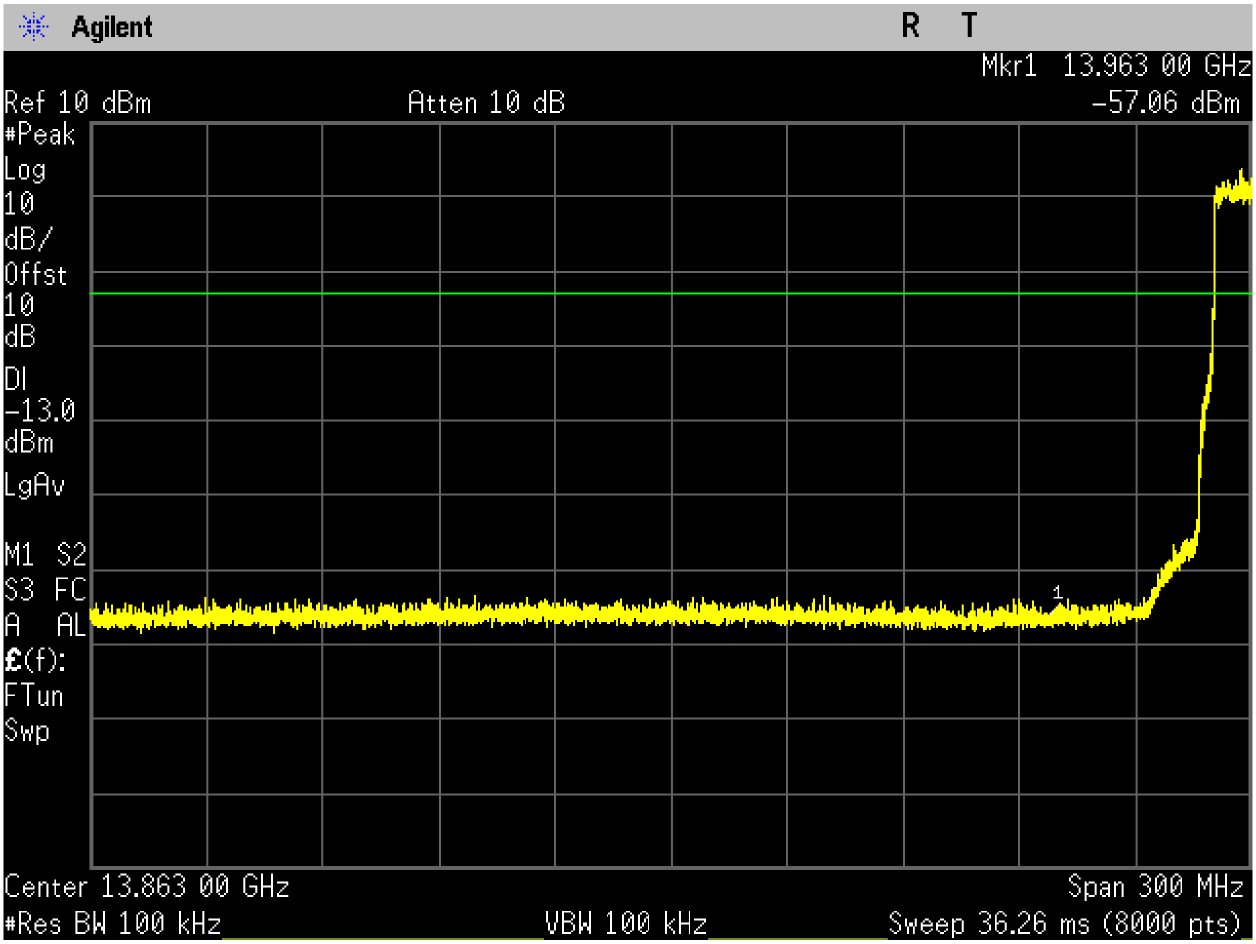


Figure 116. Band Edge (low), 8PSK, 20MHz, Low Channel.

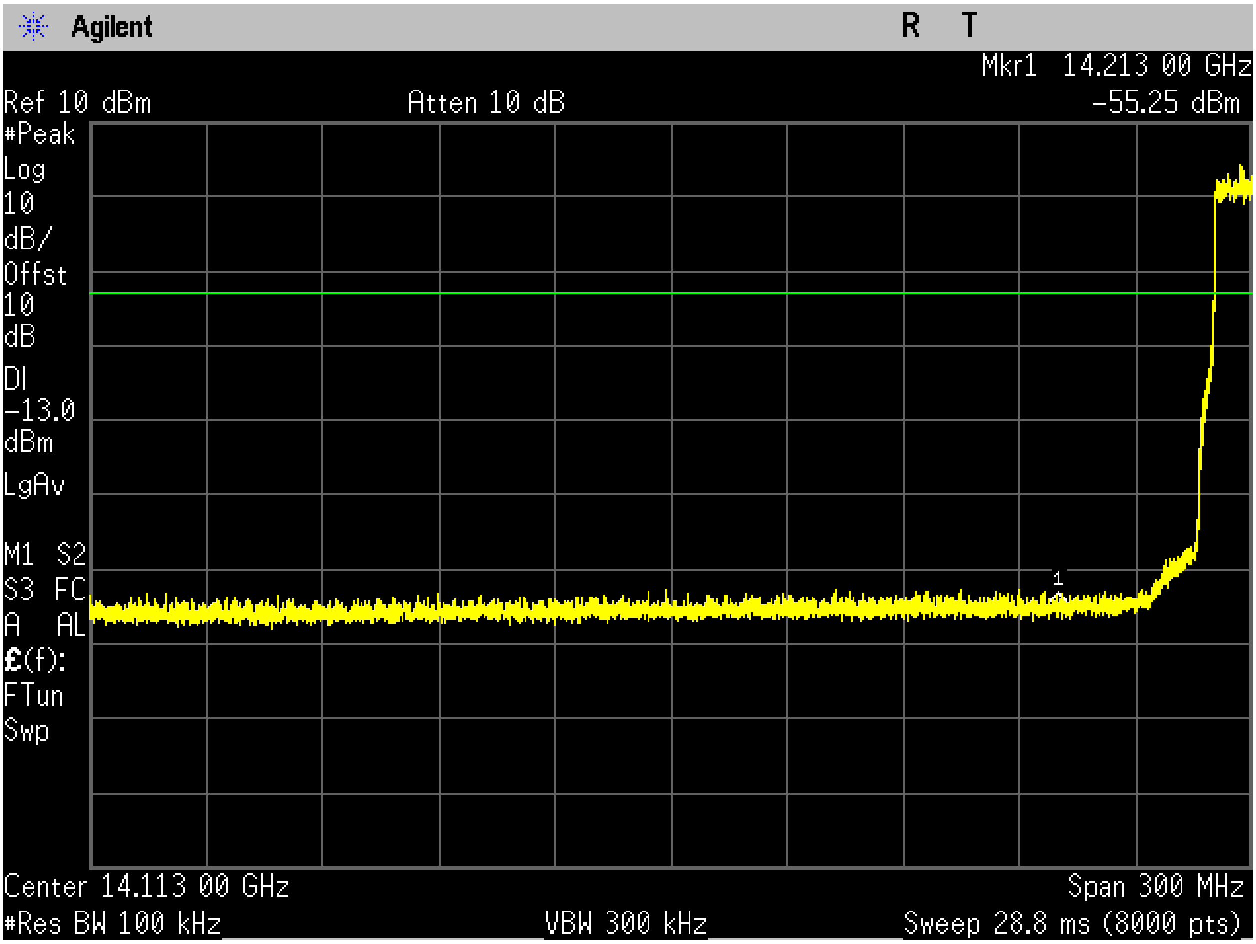


Figure 117. Band Edge (low), 8PSK, 20MHz, Mid Channel.

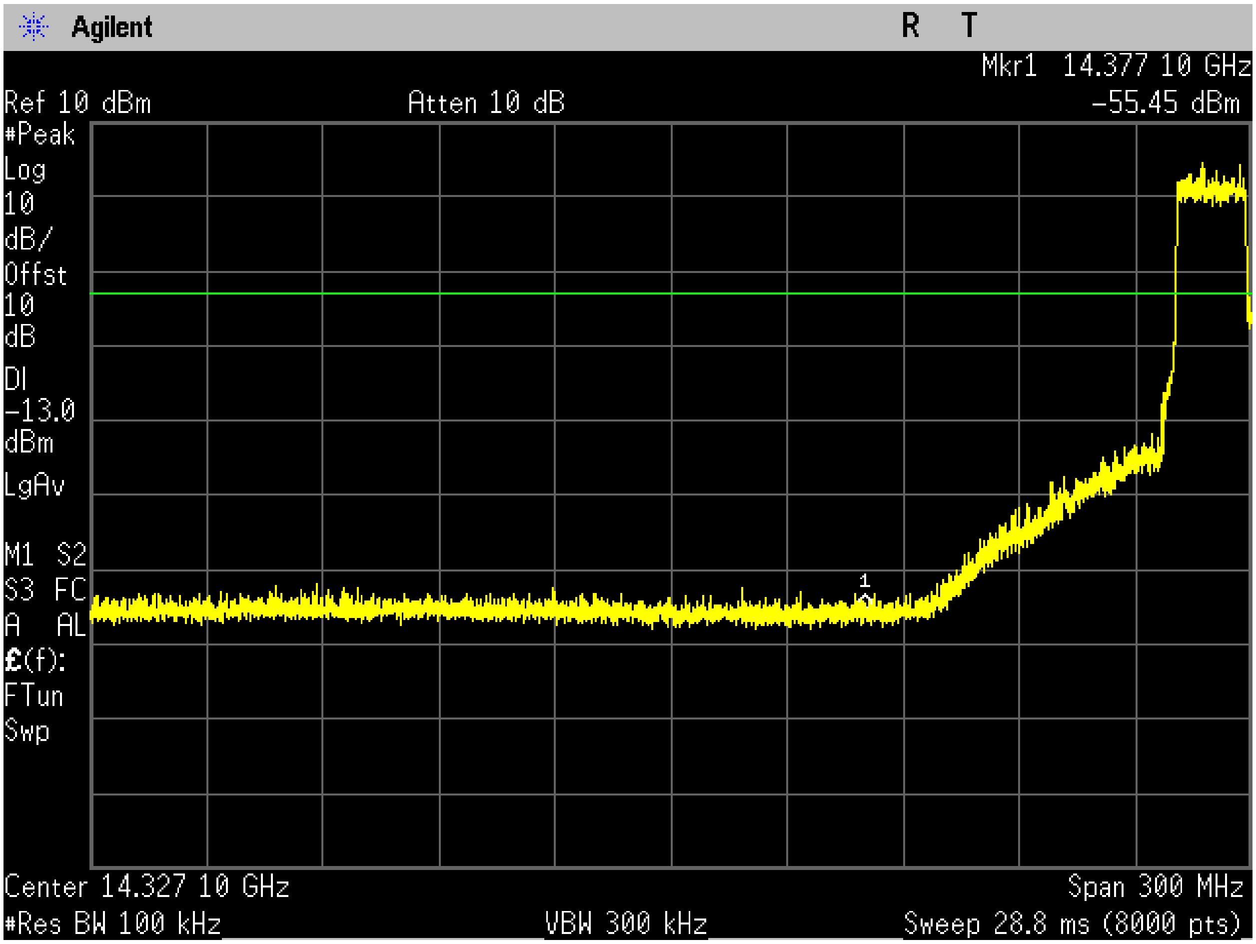


Figure 118. Band Edge (low), 8PSK, 40MHz, High Channel.

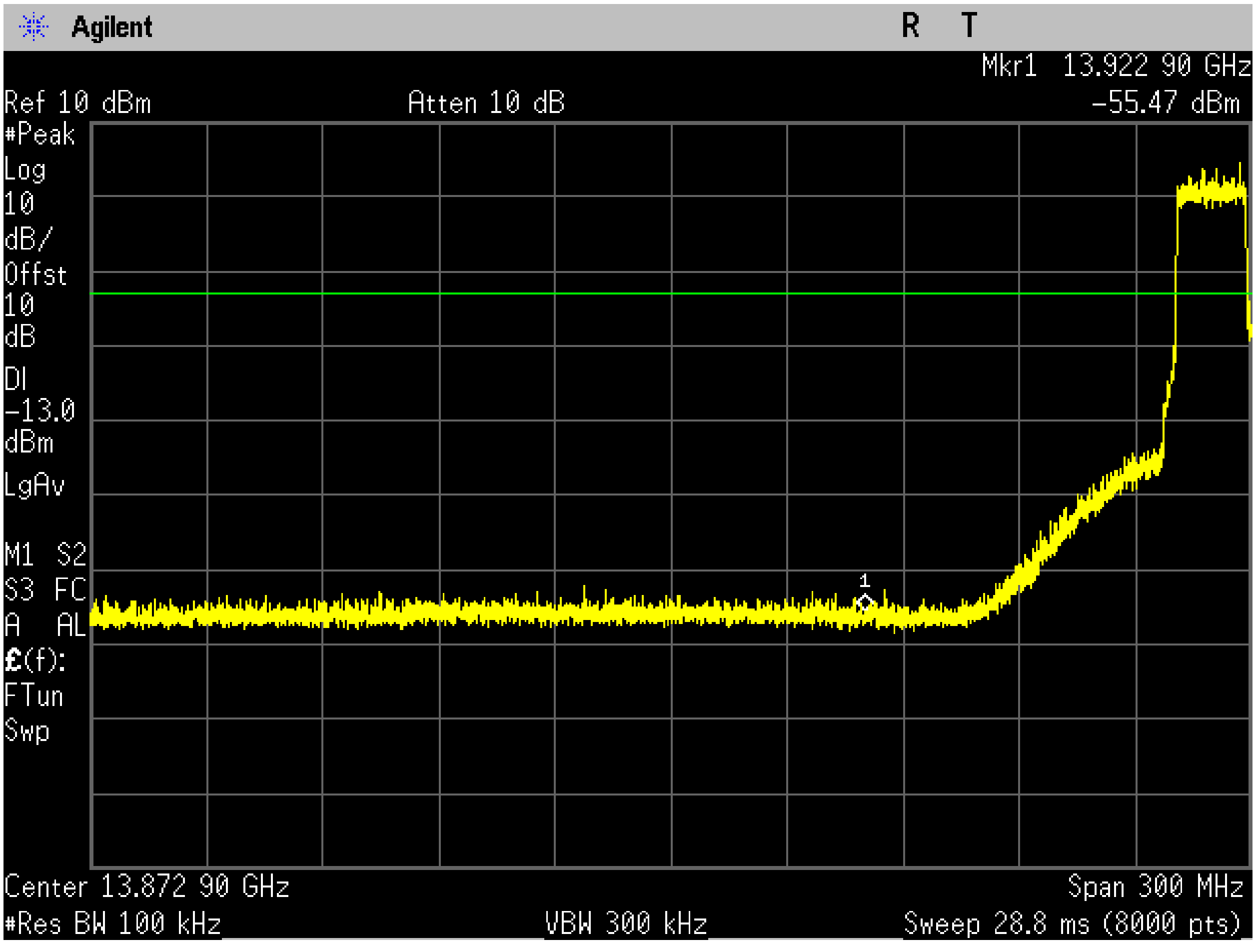


Figure 119. Band Edge (low), 8PSK, 40MHz, Low Channel.

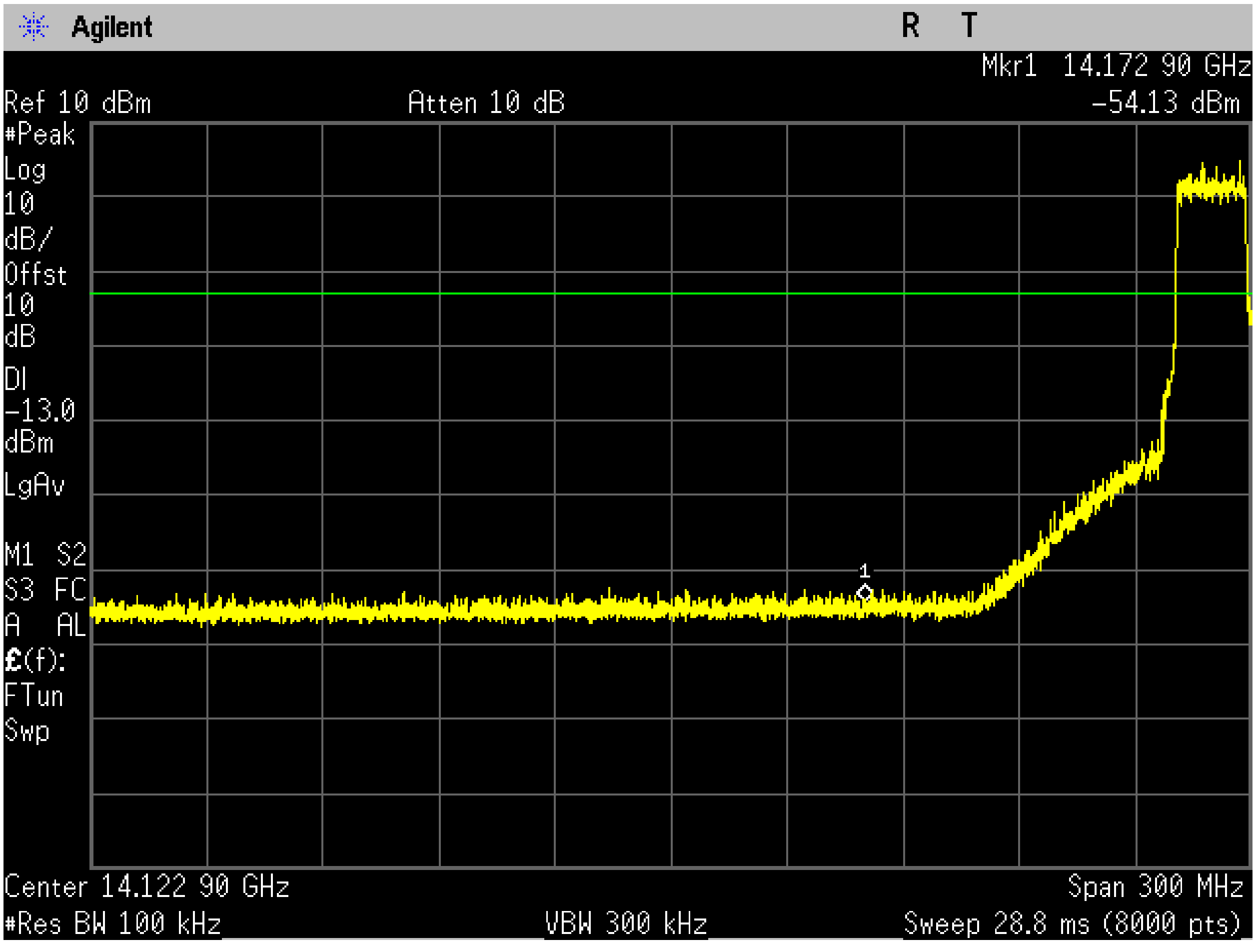


Figure 120. Band Edge (low), 8PSK, 40MHz, Mid Channel.

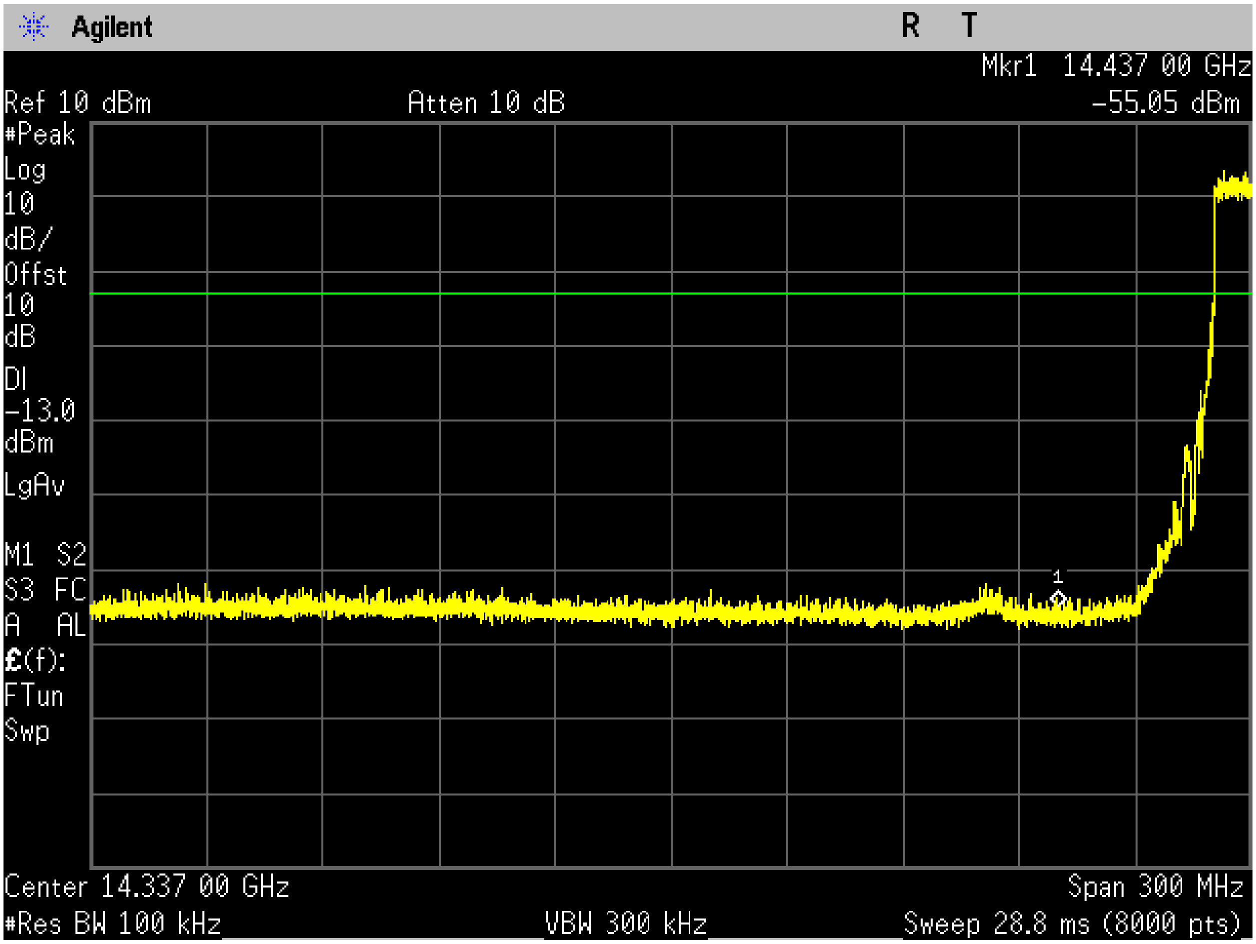


Figure 121. Band Edge (low), QPSK, 20MHz, High Channel.

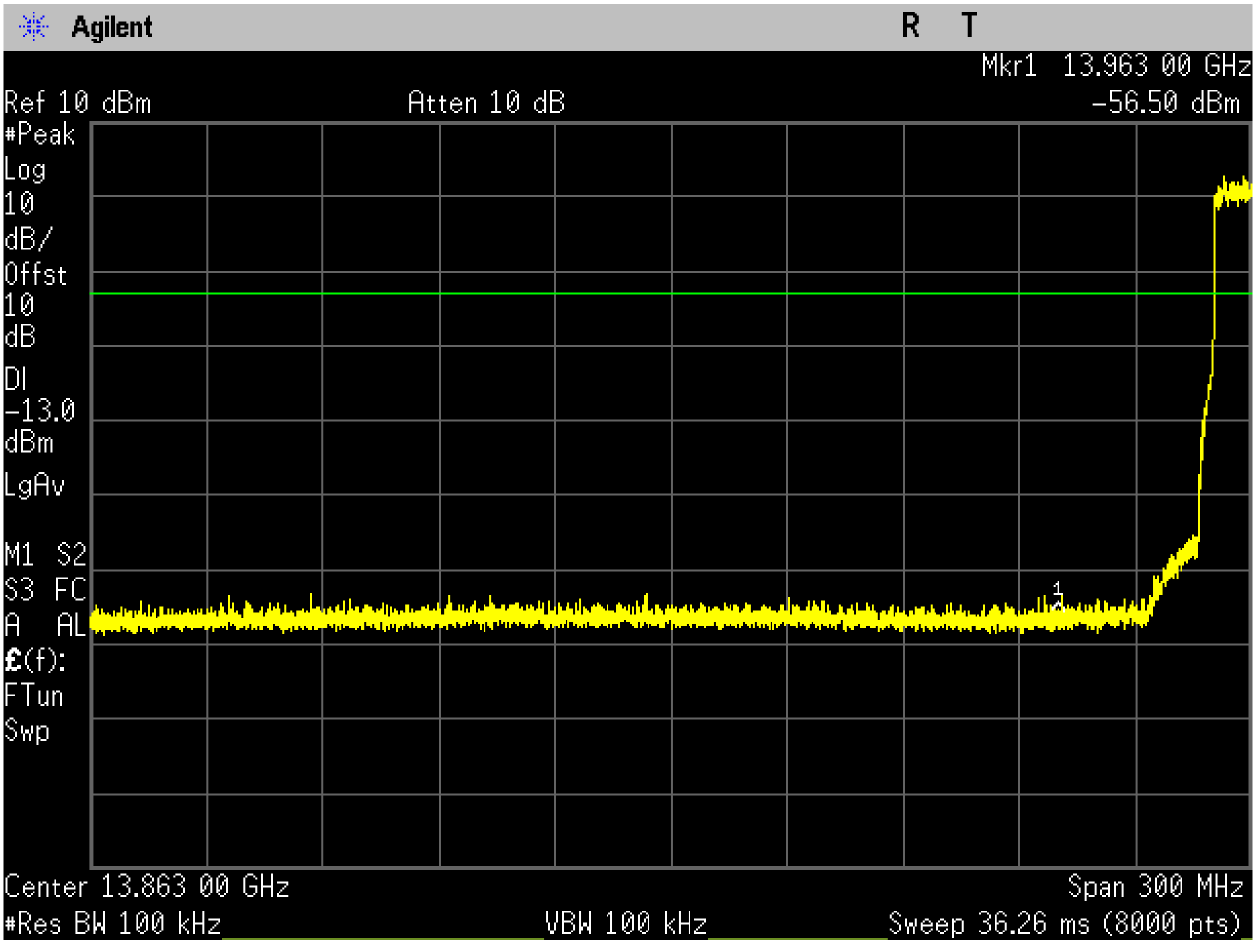


Figure 122. Band Edge (low), QPSK, 20MHz, Low Channel.

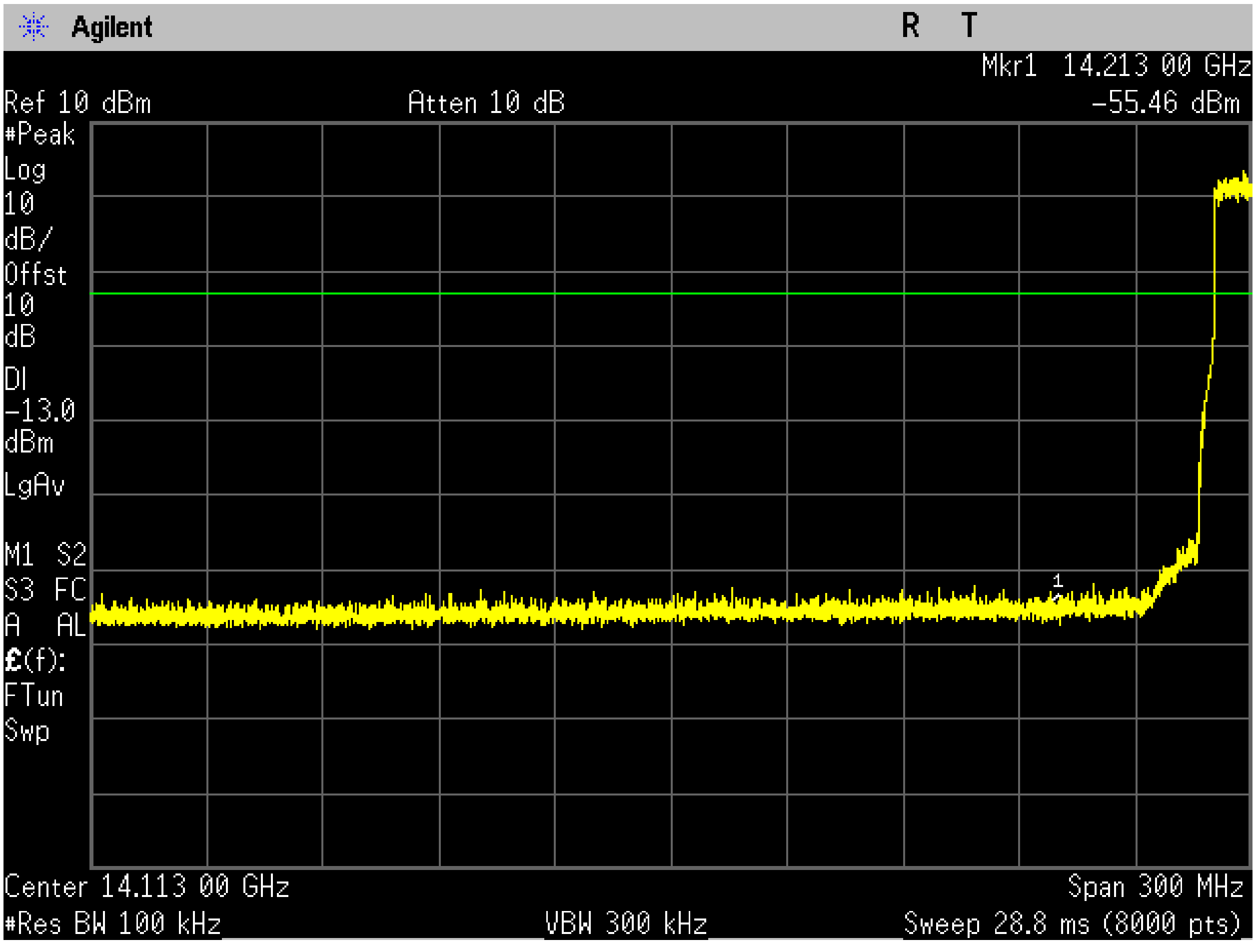


Figure 123. Band Edge (low), QPSK, 20MHz, Mid Channel.

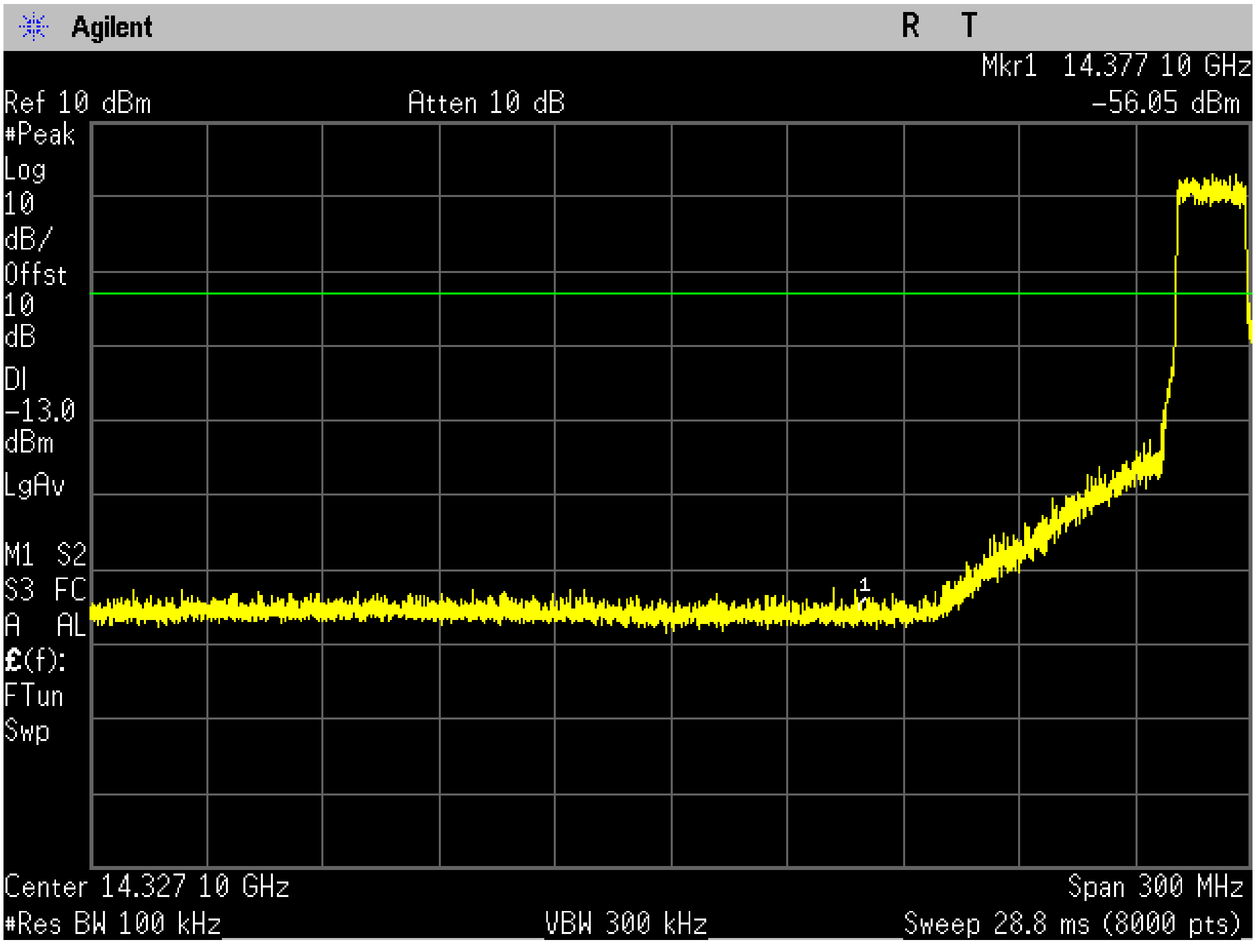


Figure 124. Band Edge (low), QPSK, 40MHz, High Channel.

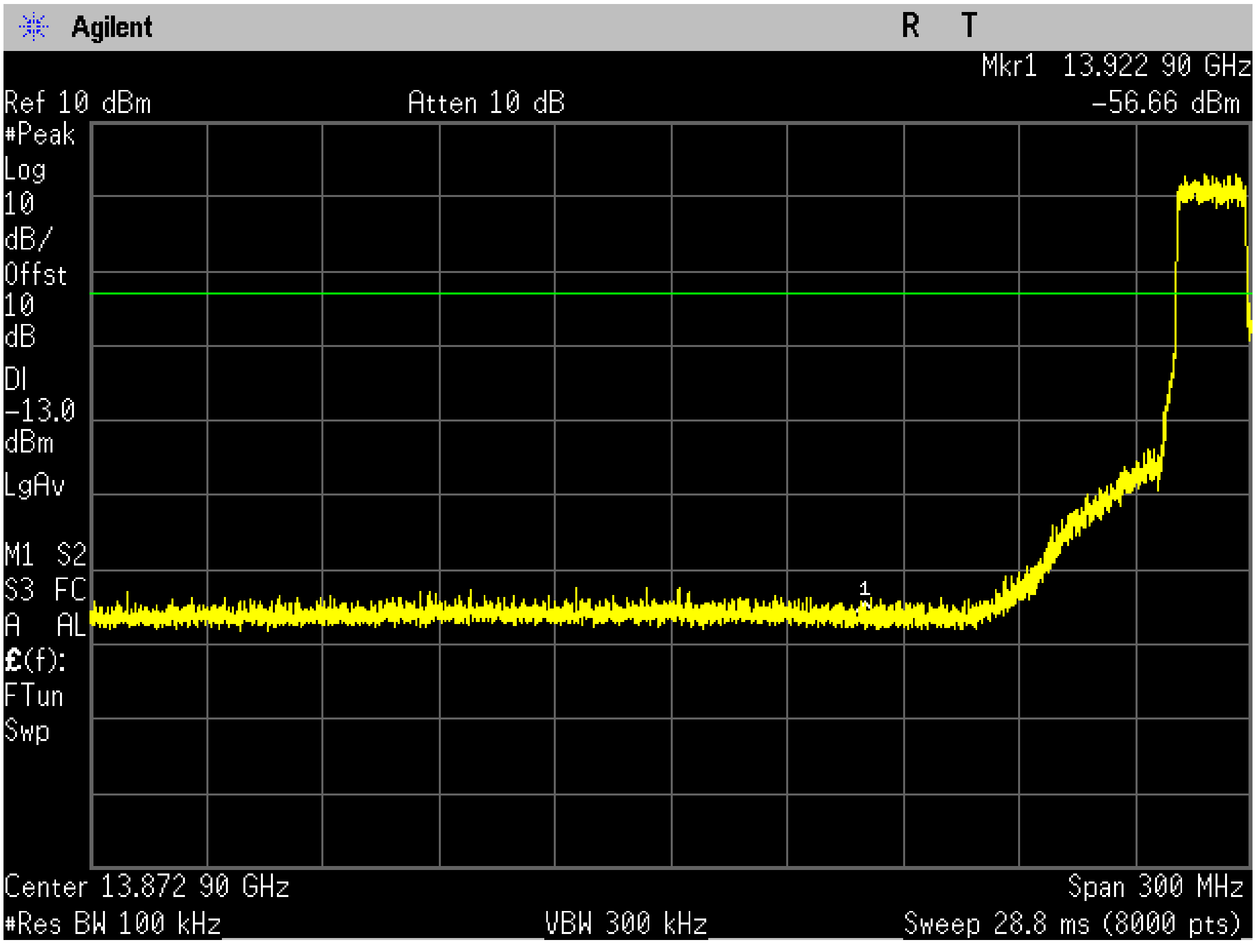


Figure 125. Band Edge (low), QPSK, 40MHz, Low Channel.

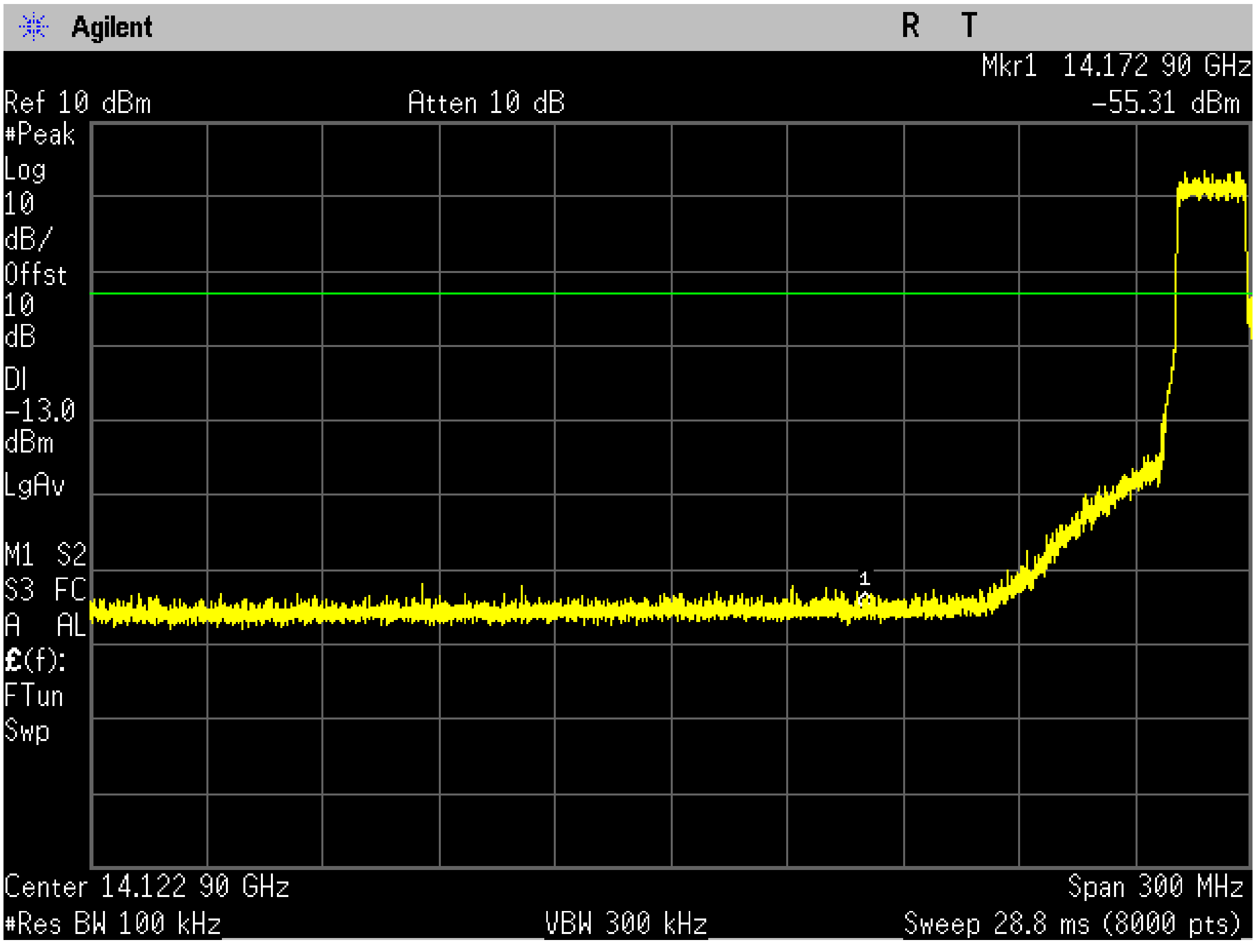


Figure 126. Band Edge (low), QPSK, 40MHz, Mid Channel.

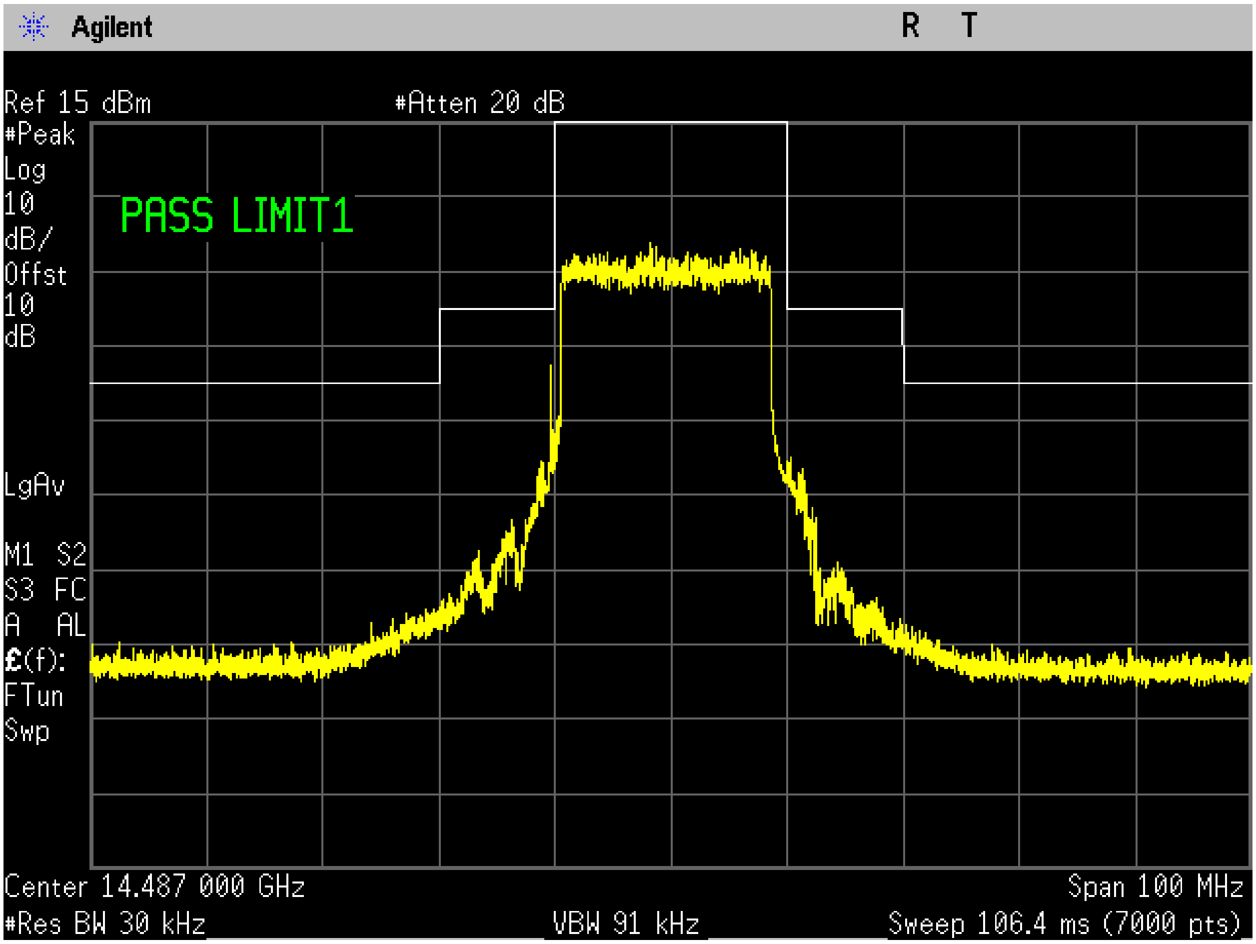


Figure 127. OoB, 16QAM, 20MHz, High Channel.

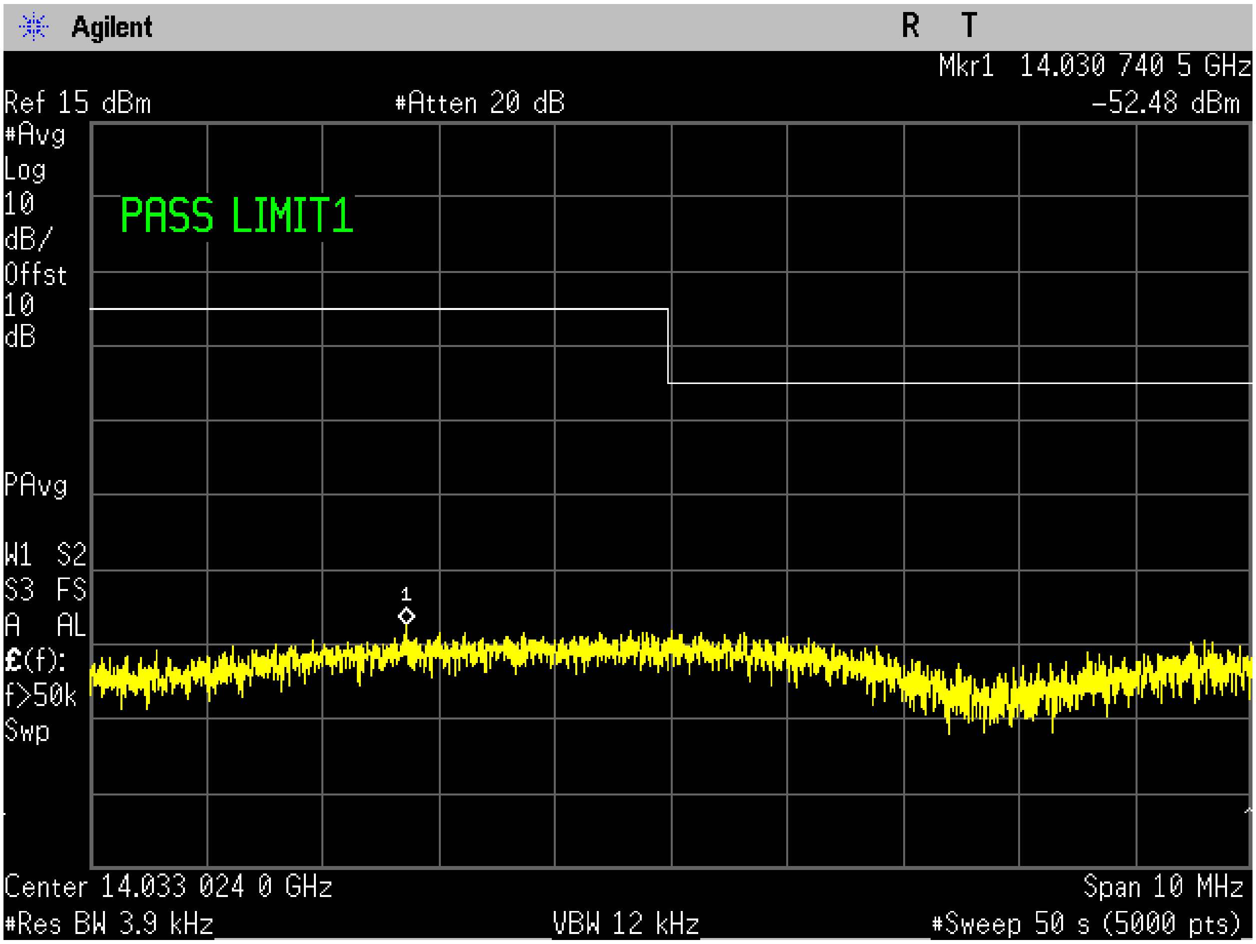


Figure 128. OoB, 16QAM, 20MHz, Low Channel (final).

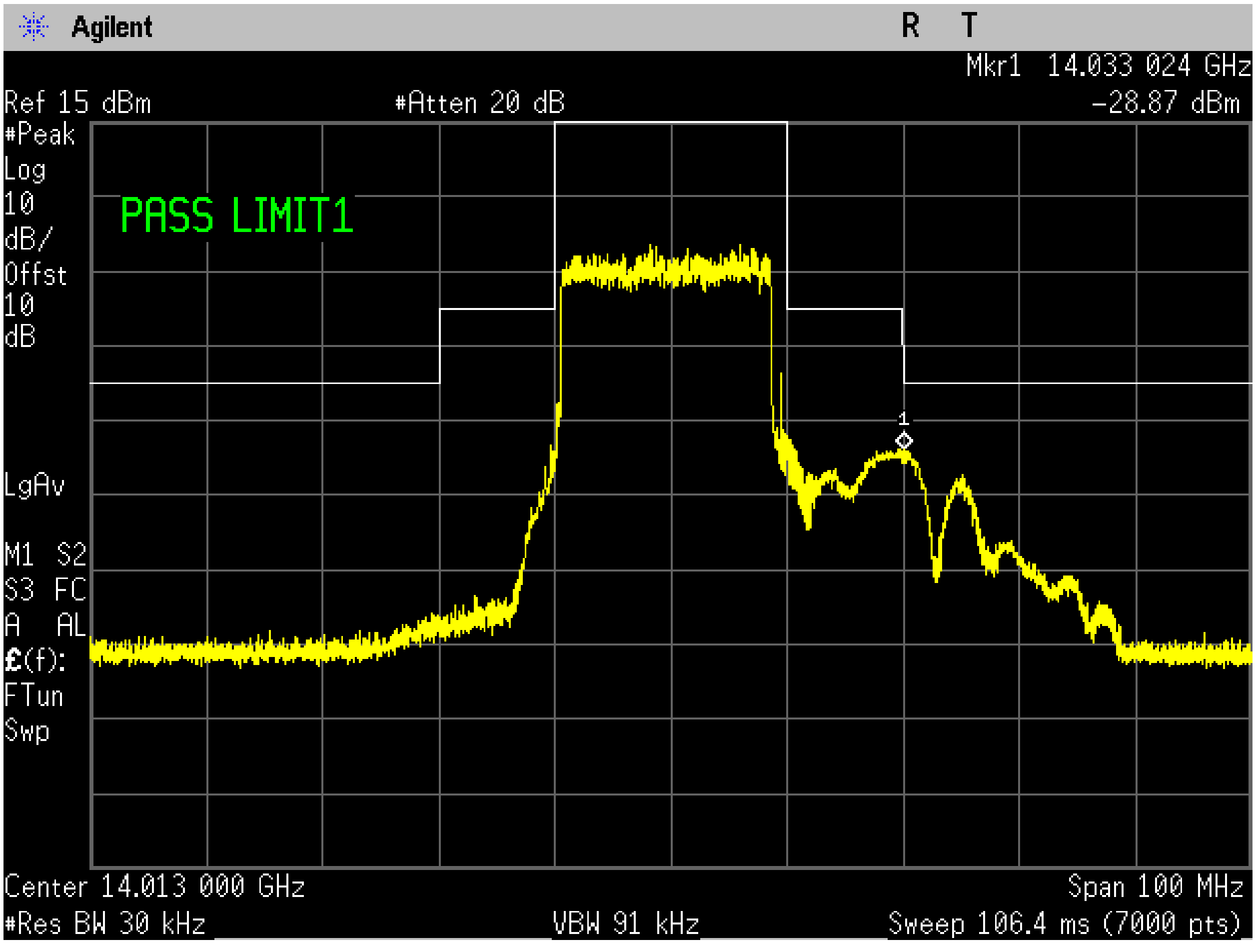


Figure 129. OoB, 16QAM, 20MHz, Low Channel (prescan).

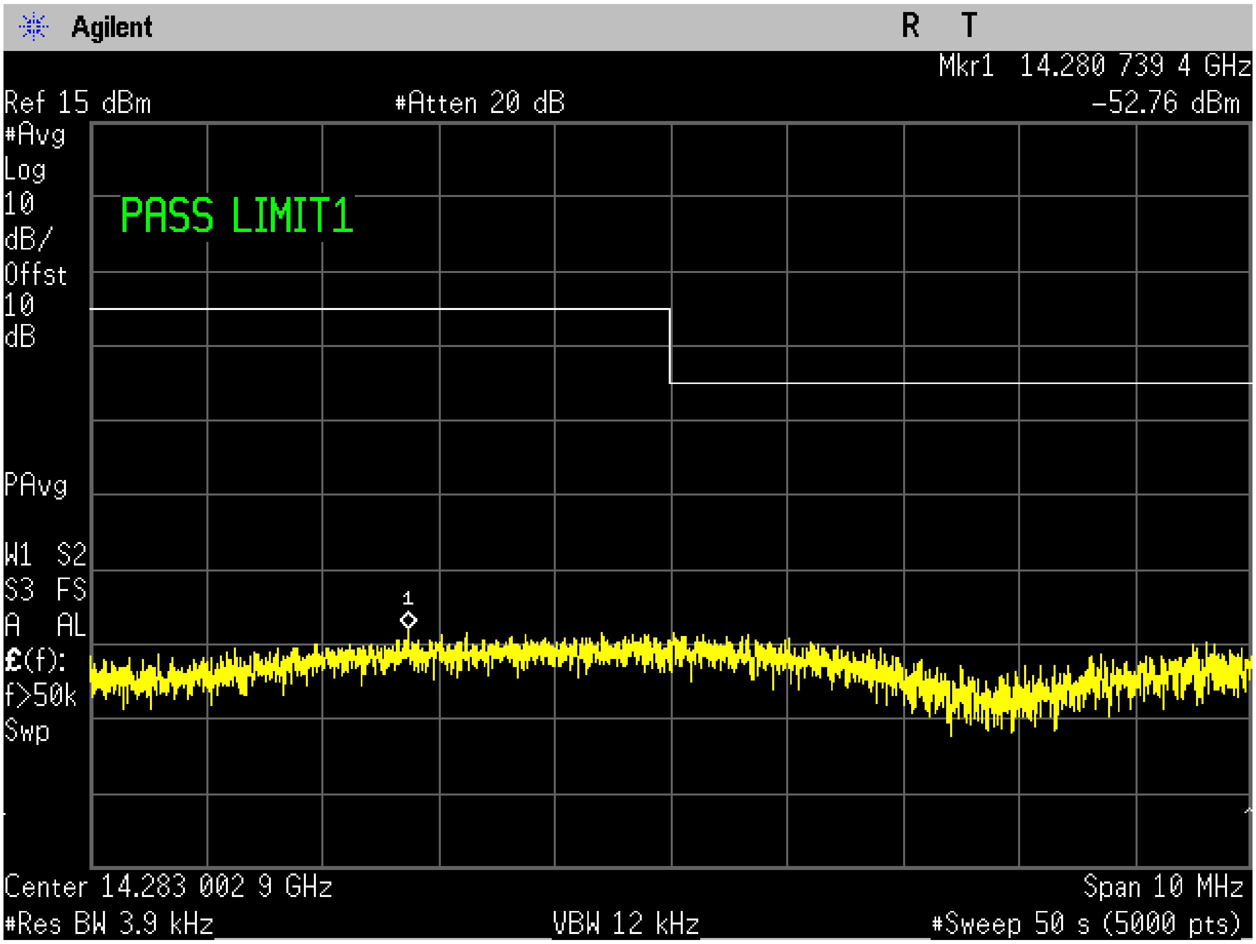


Figure 130. OoB, 16QAM, 20MHz, Mid Channel (final).

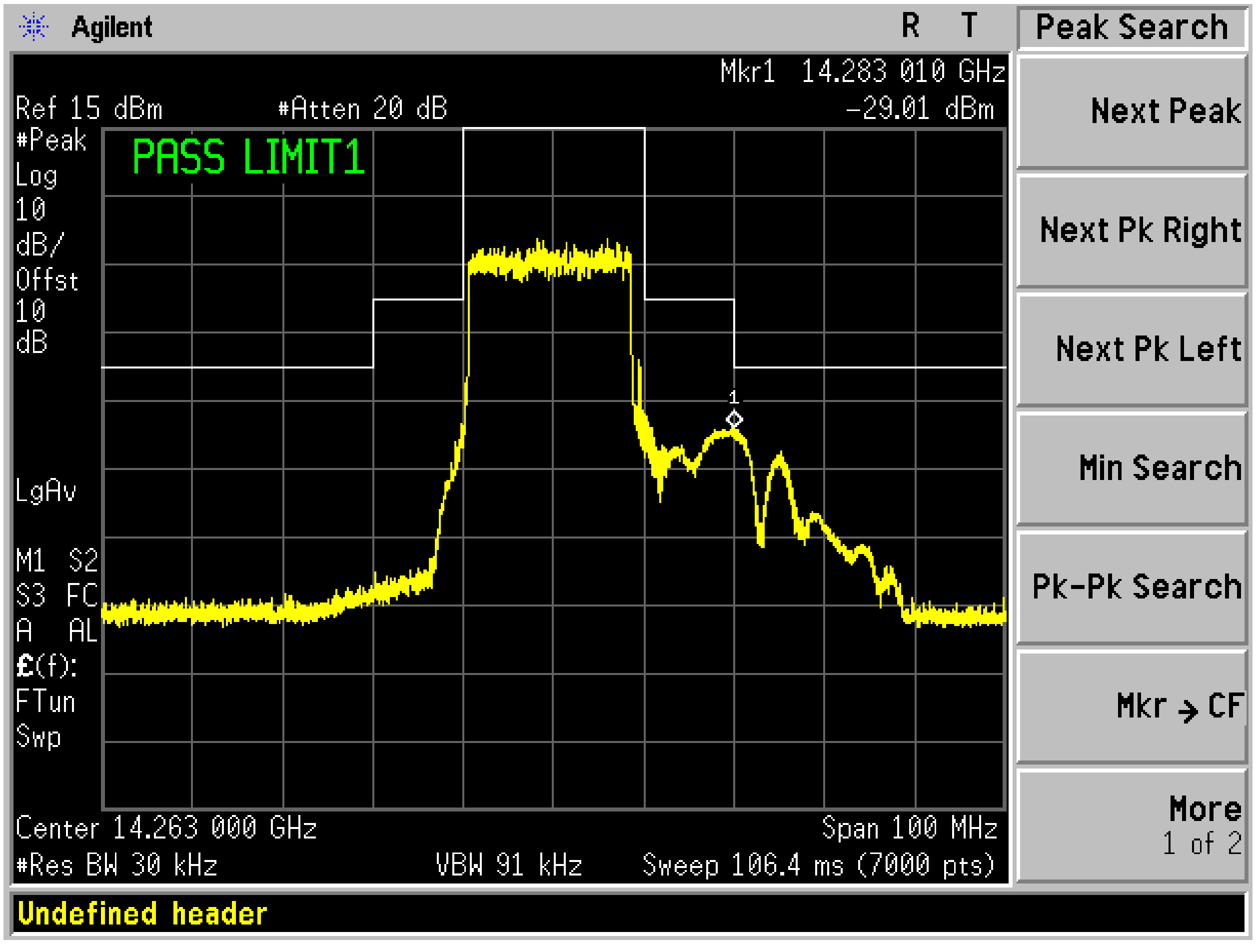


Figure 131. OoB, 16QAM, 20MHz, Mid Channel (prescan).

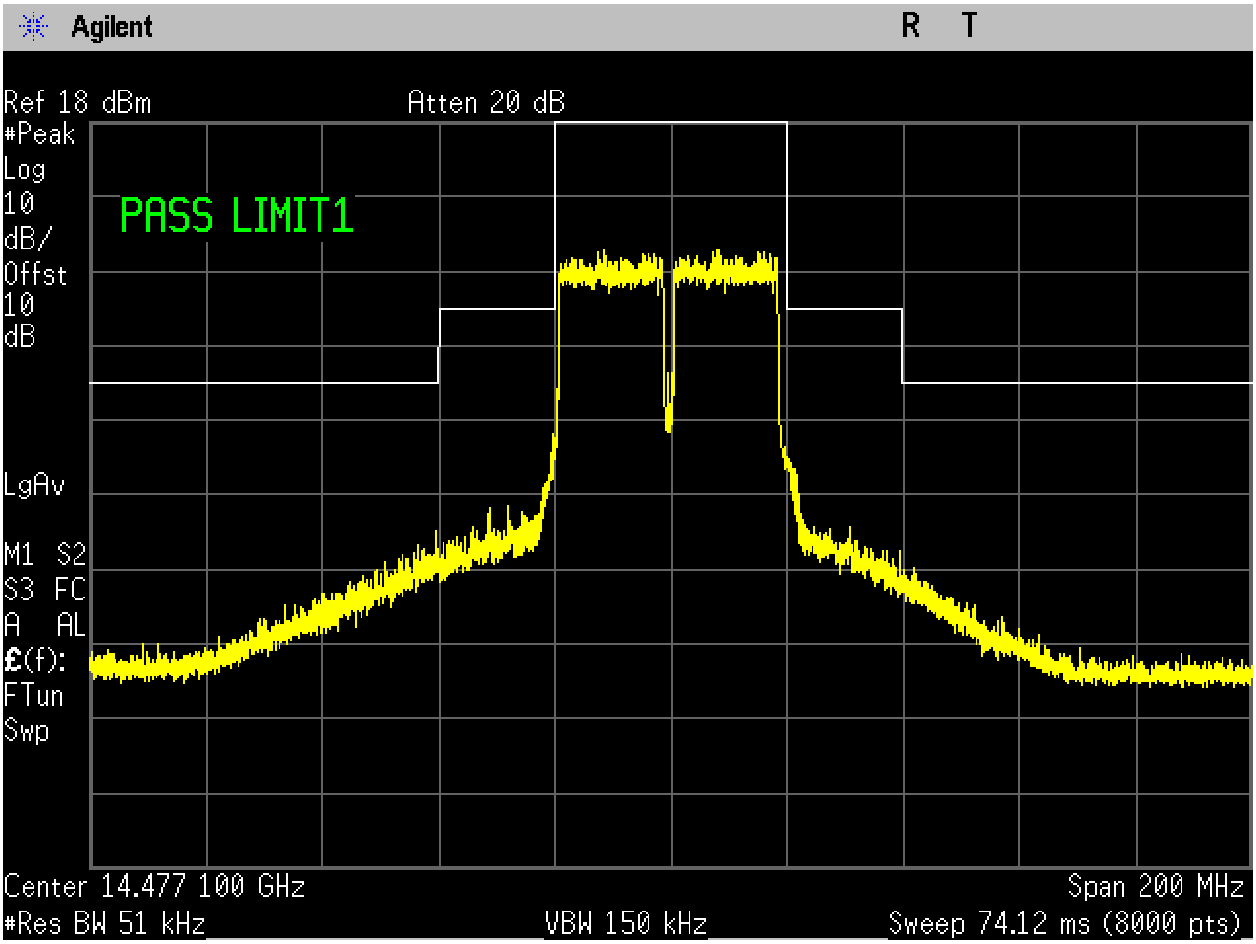


Figure 132. OoB, 16QAM, 40MHz, High Channel.

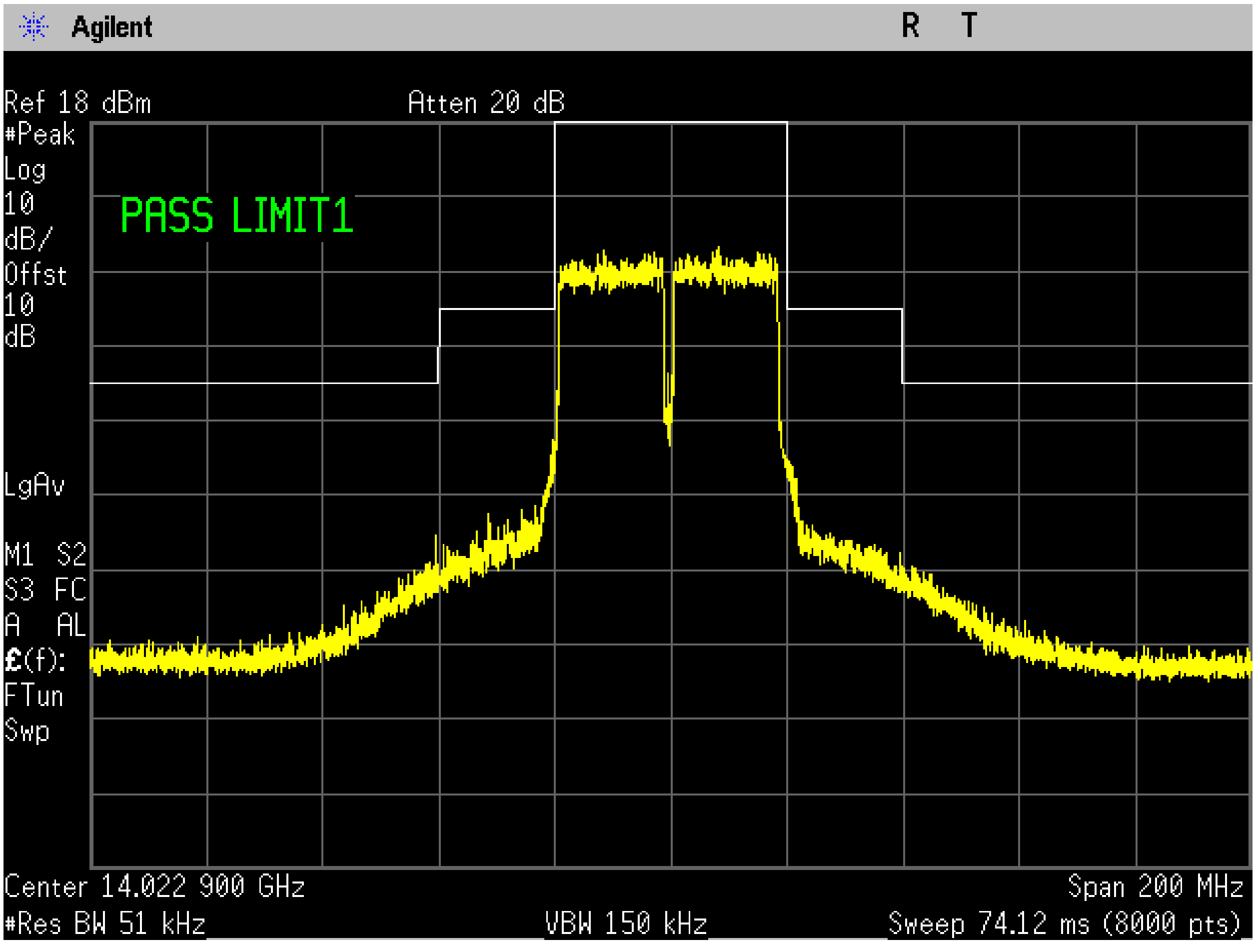


Figure 133. OoB, 16QAM, 40MHz, Low Channel.

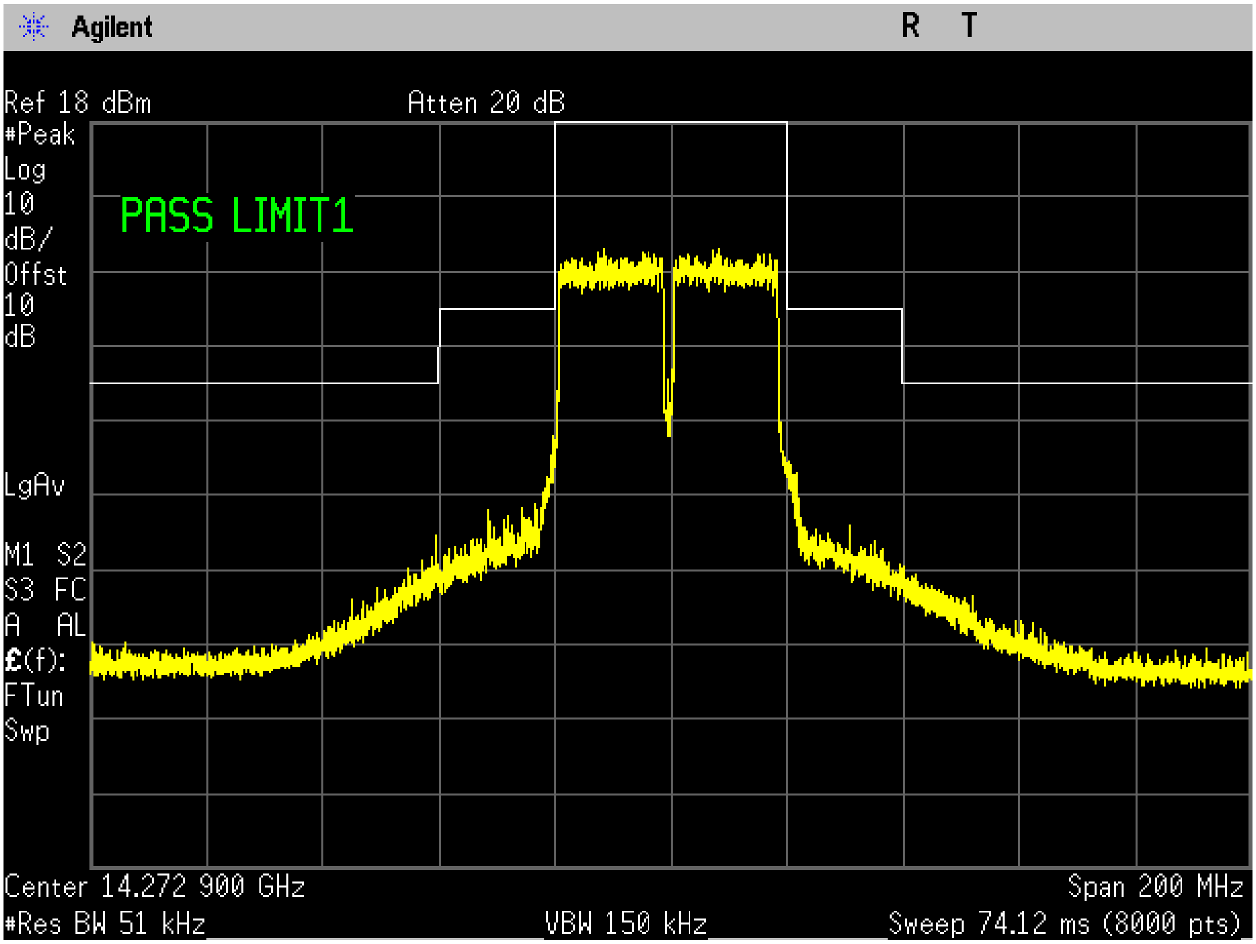


Figure 134. OoB, 16QAM, 40MHz, Mid Channel.

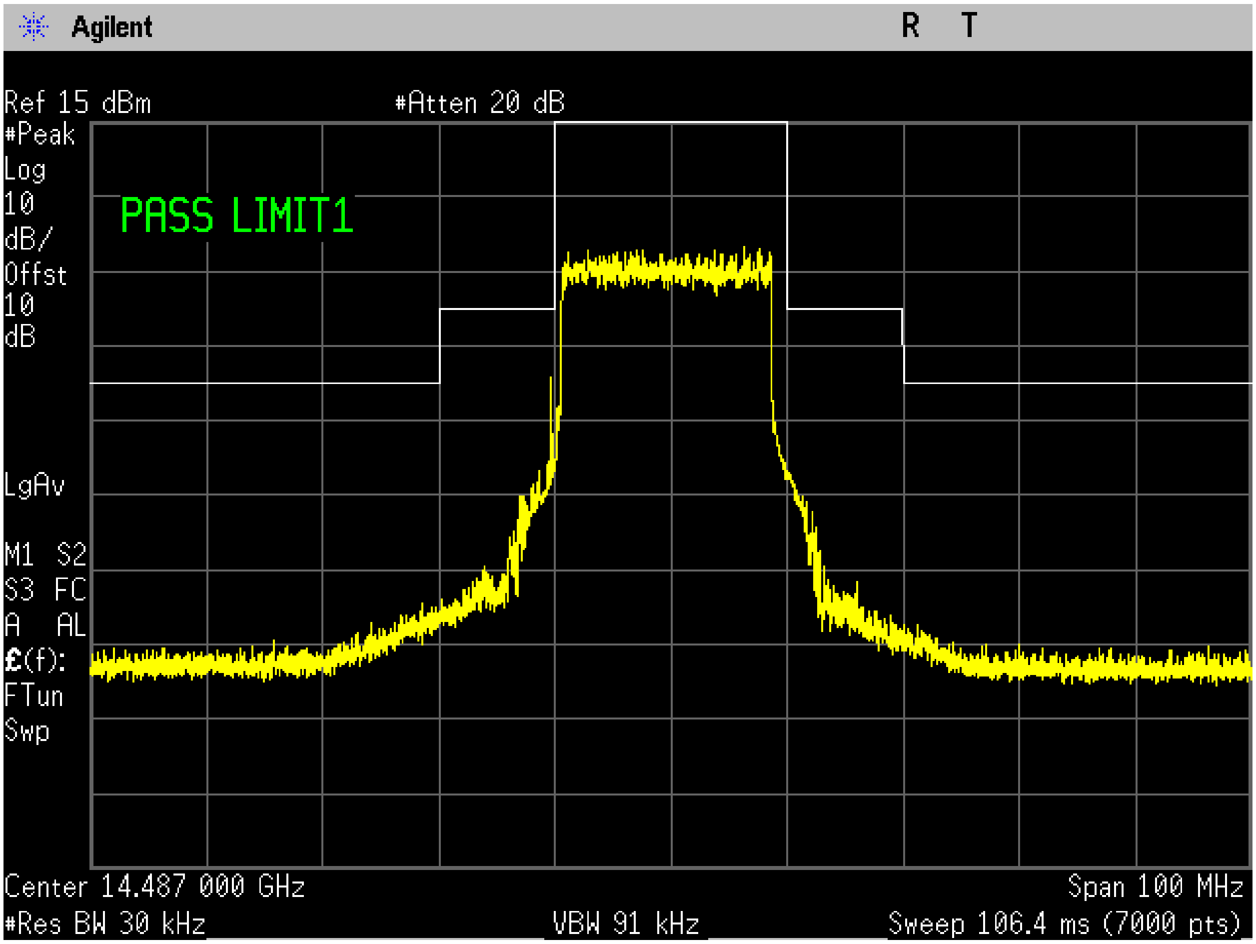


Figure 135. OoB, 8PSK, 20MHz, High Channel.

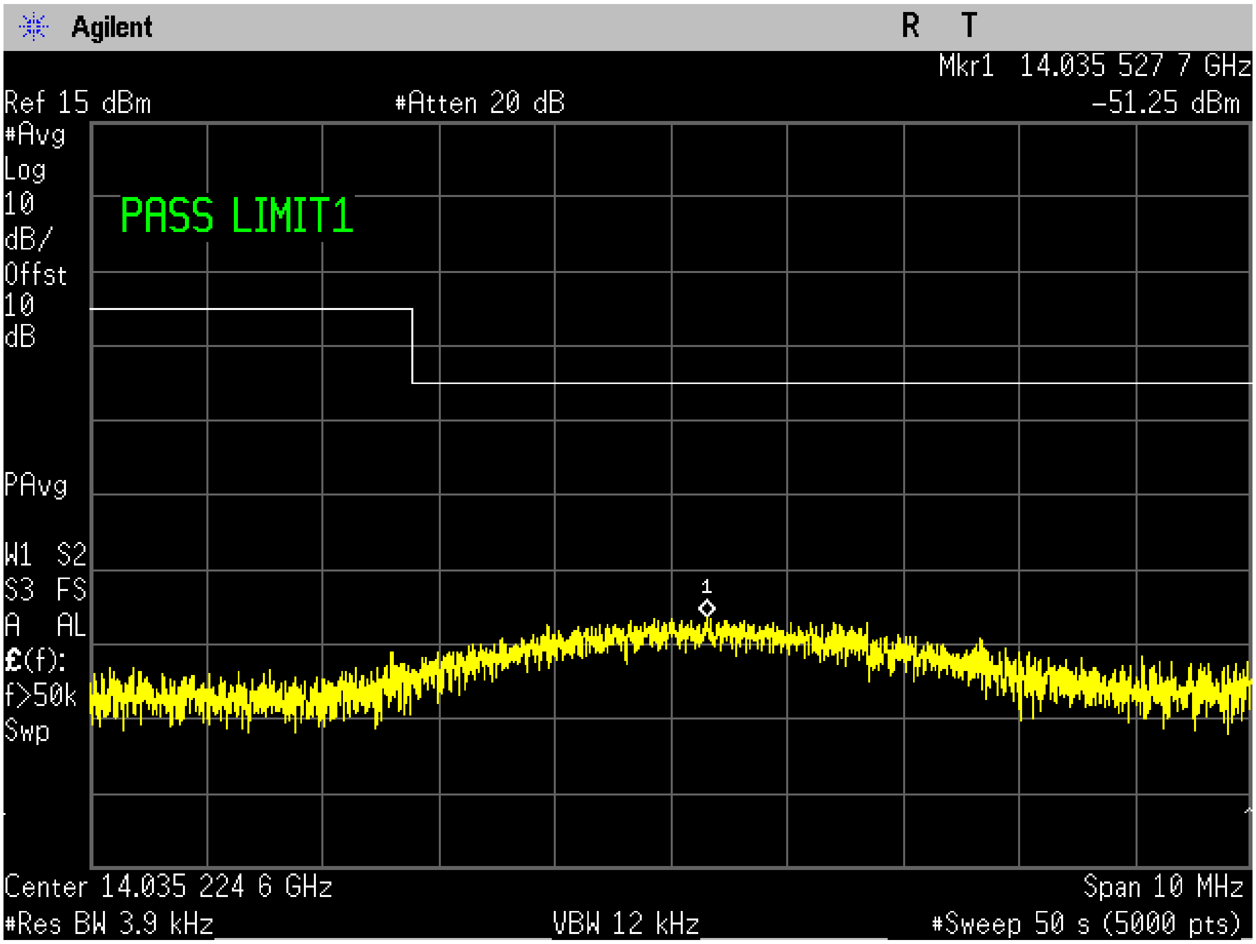


Figure 136. OoB, 8PSK, 20MHz, Low Channel (final).

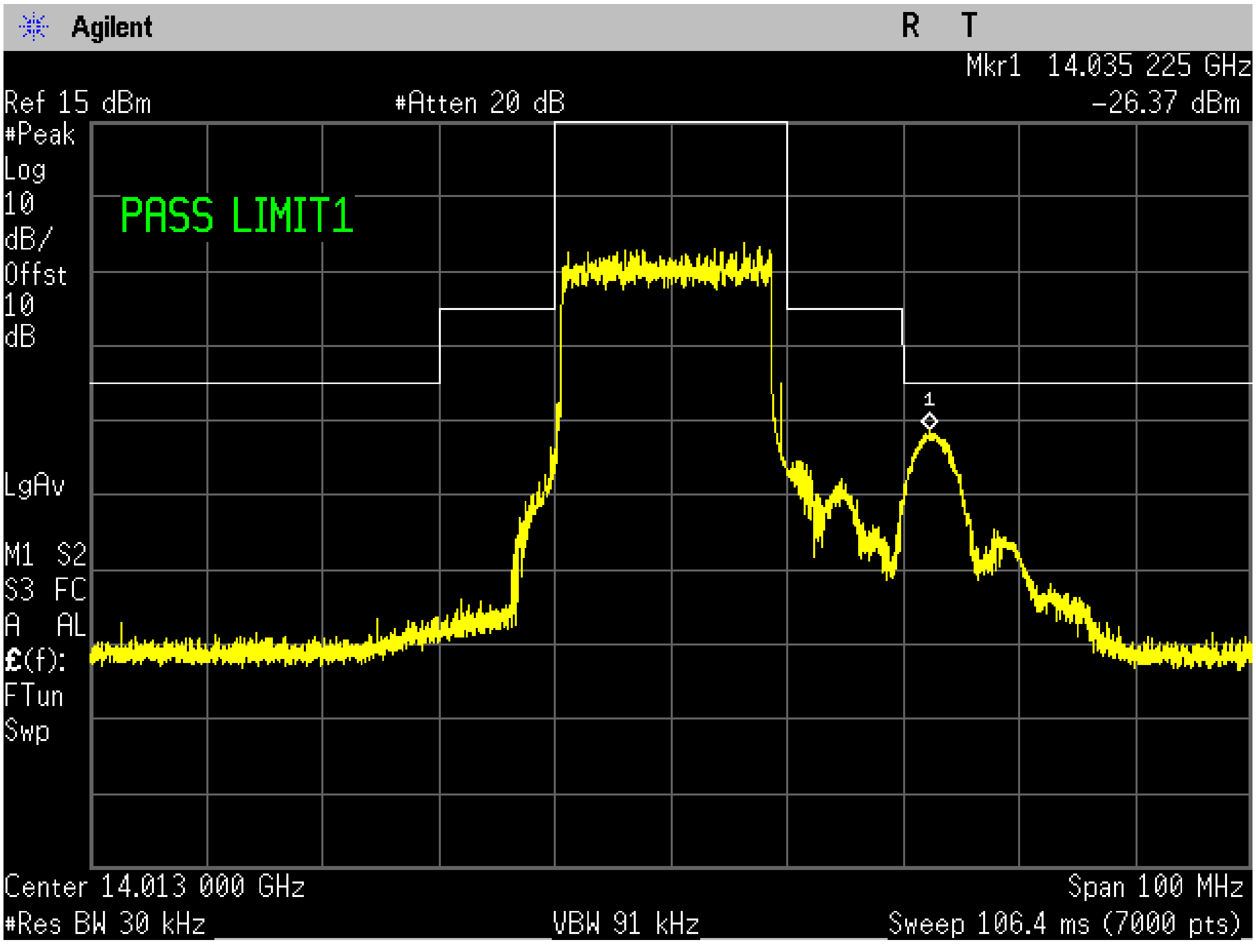


Figure 137. OoB, 8PSK, 20MHz, Low Channel (prescan).

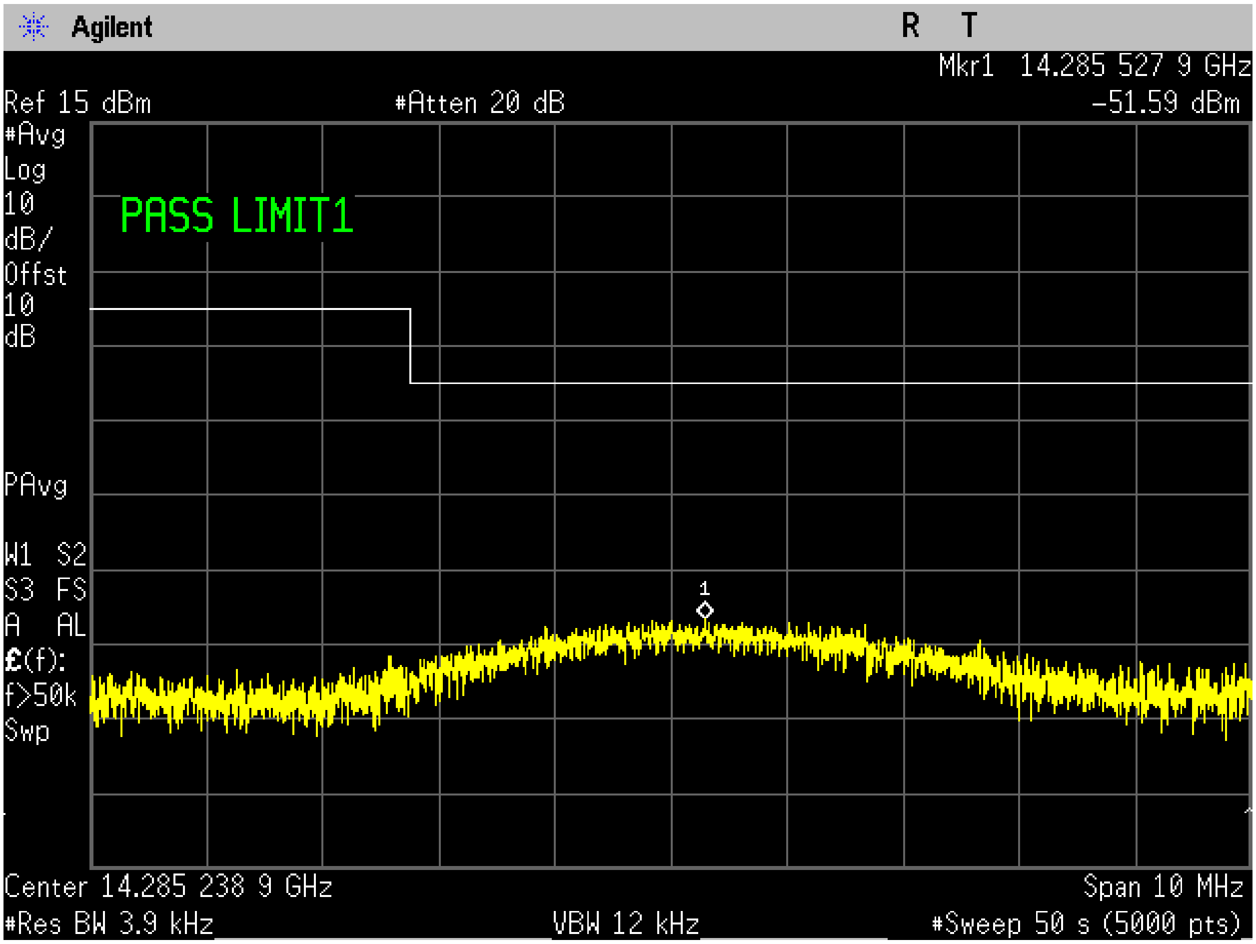


Figure 138. OoB, 8PSK, 20MHz, Mid Channel (final).

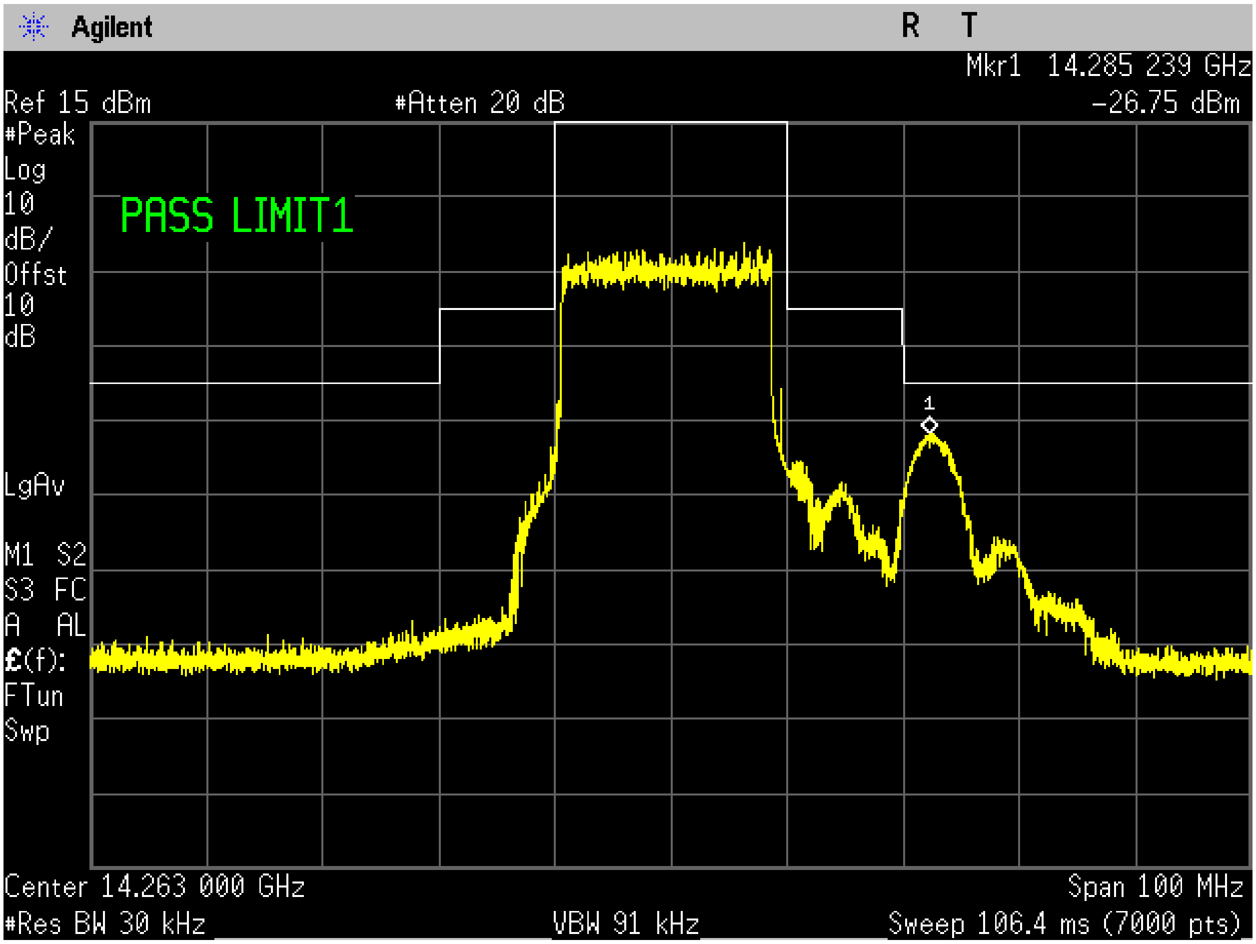


Figure 139. OoB, 8PSK, 20MHz, Mid Channel (prescan).

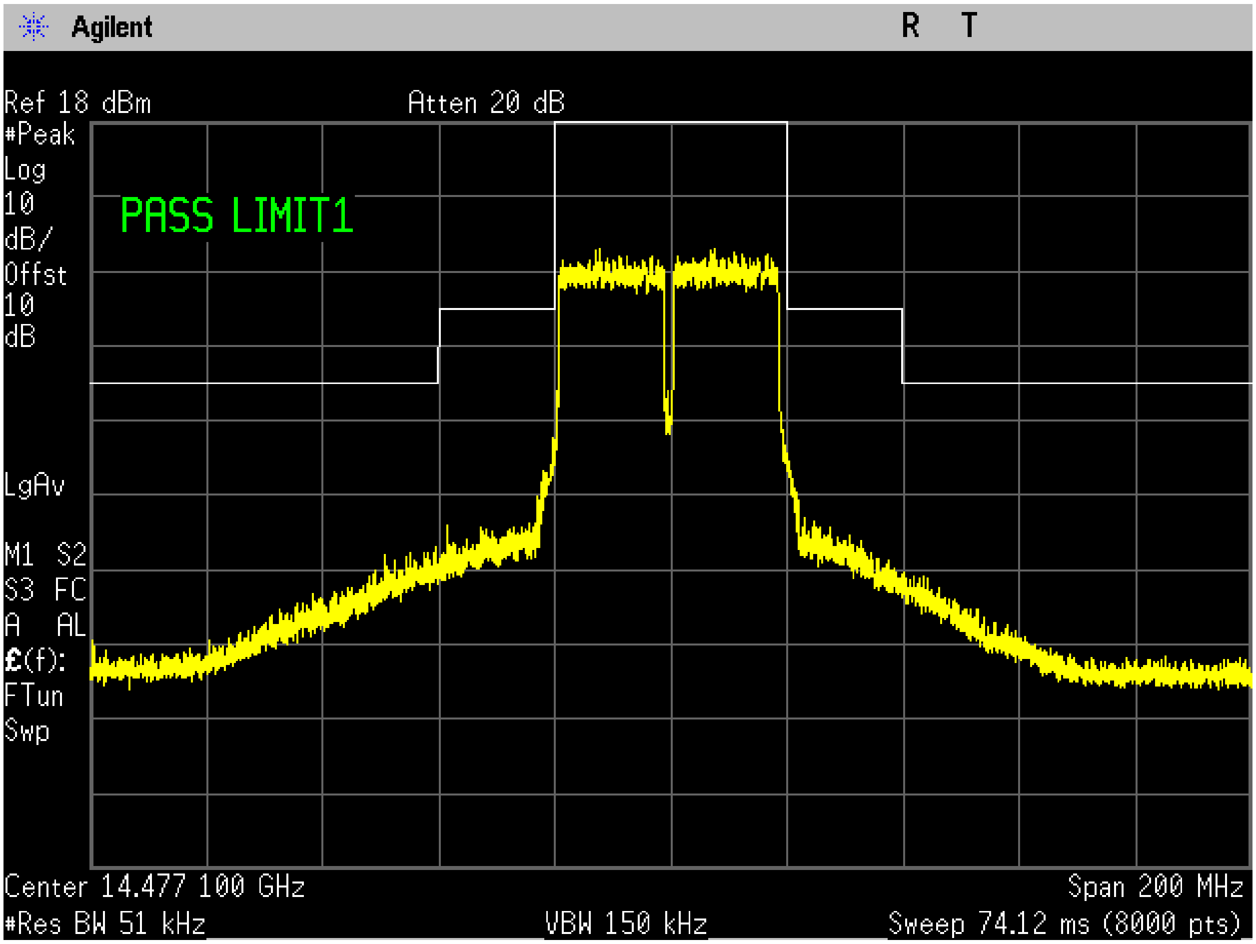


Figure 140. OoB, 8PSK, 40MHz, High Channel.

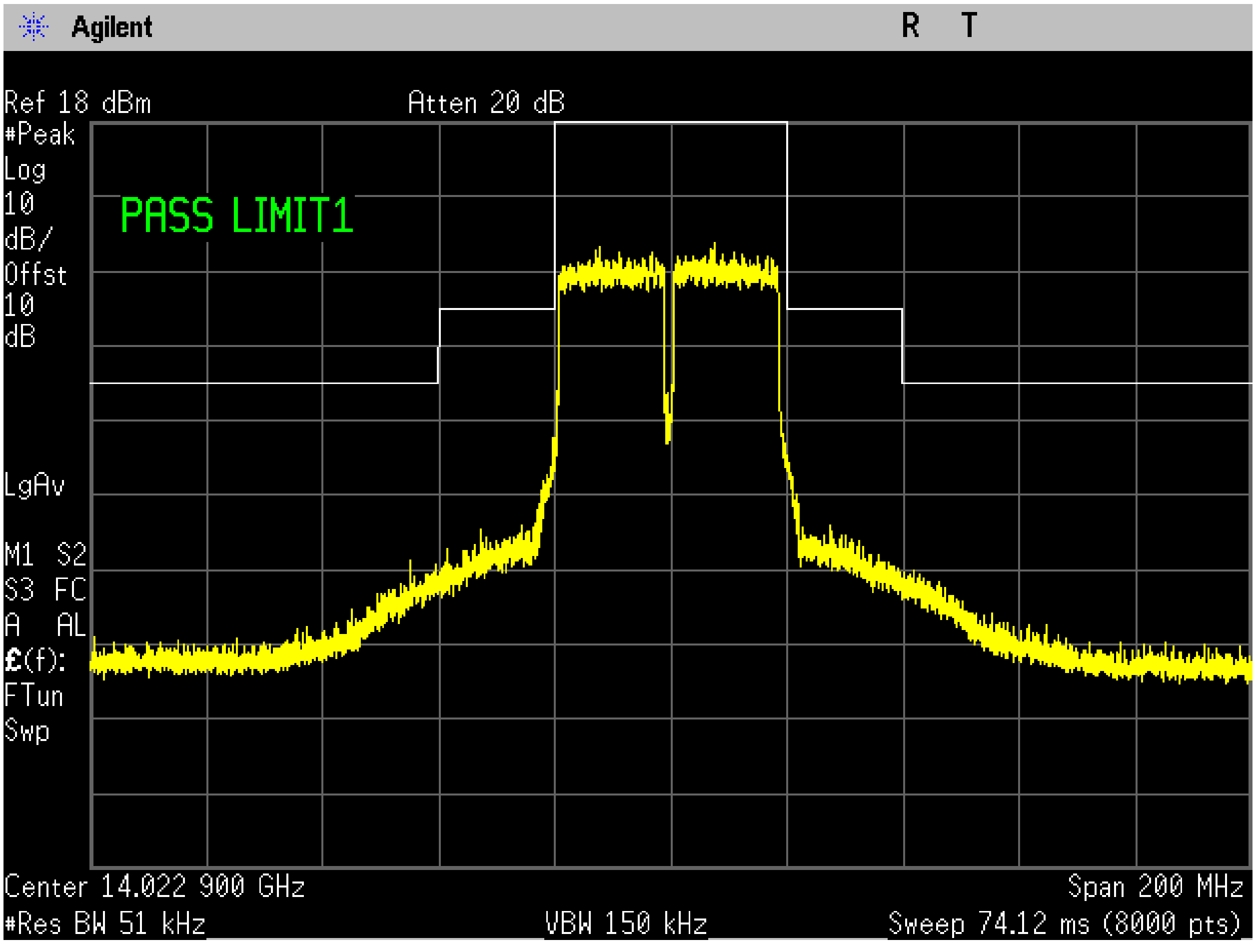


Figure 141. OoB, 8PSK, 40MHz, Low Channel.

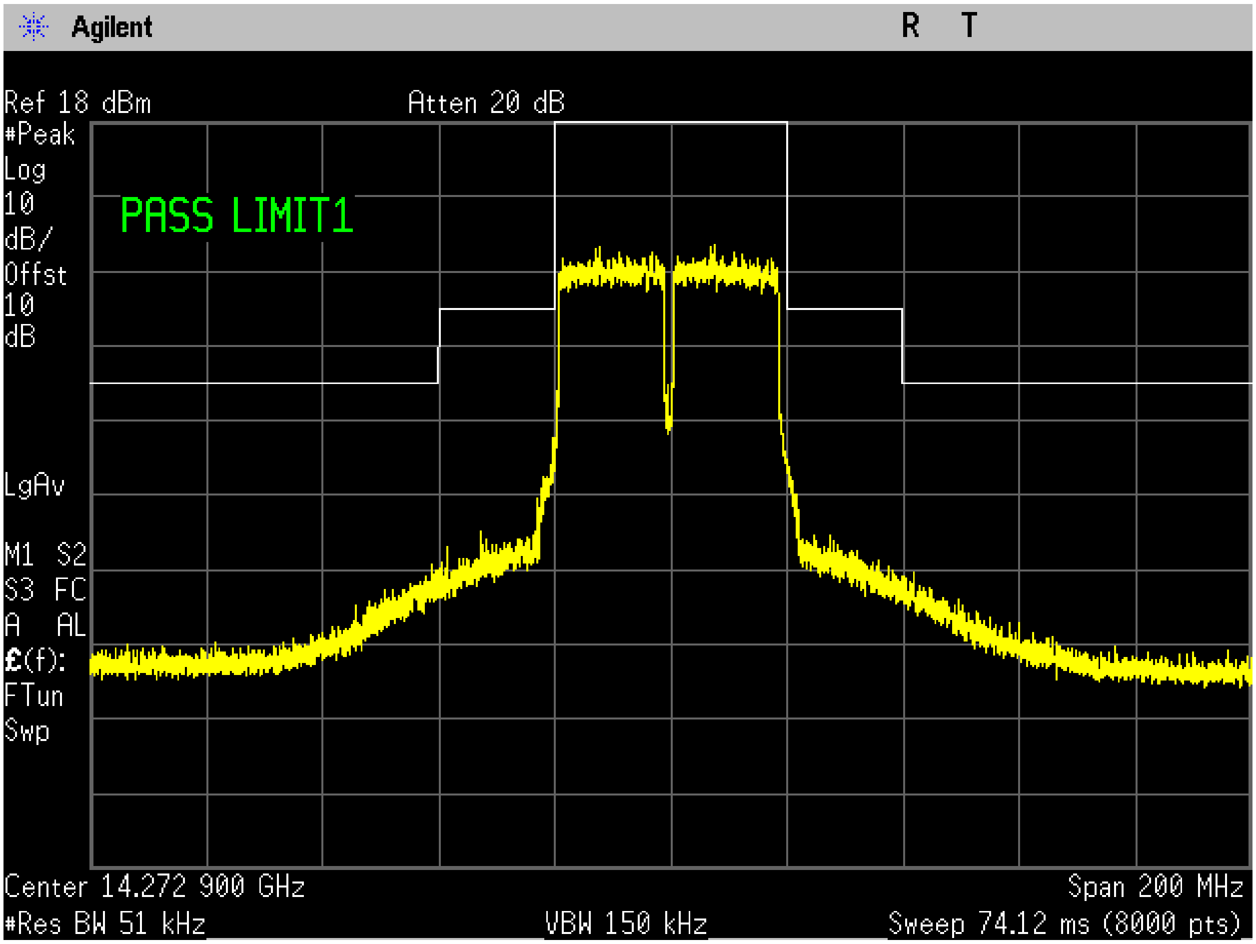


Figure 142. OoB, 8PSK, 40MHz, Mid Channel.

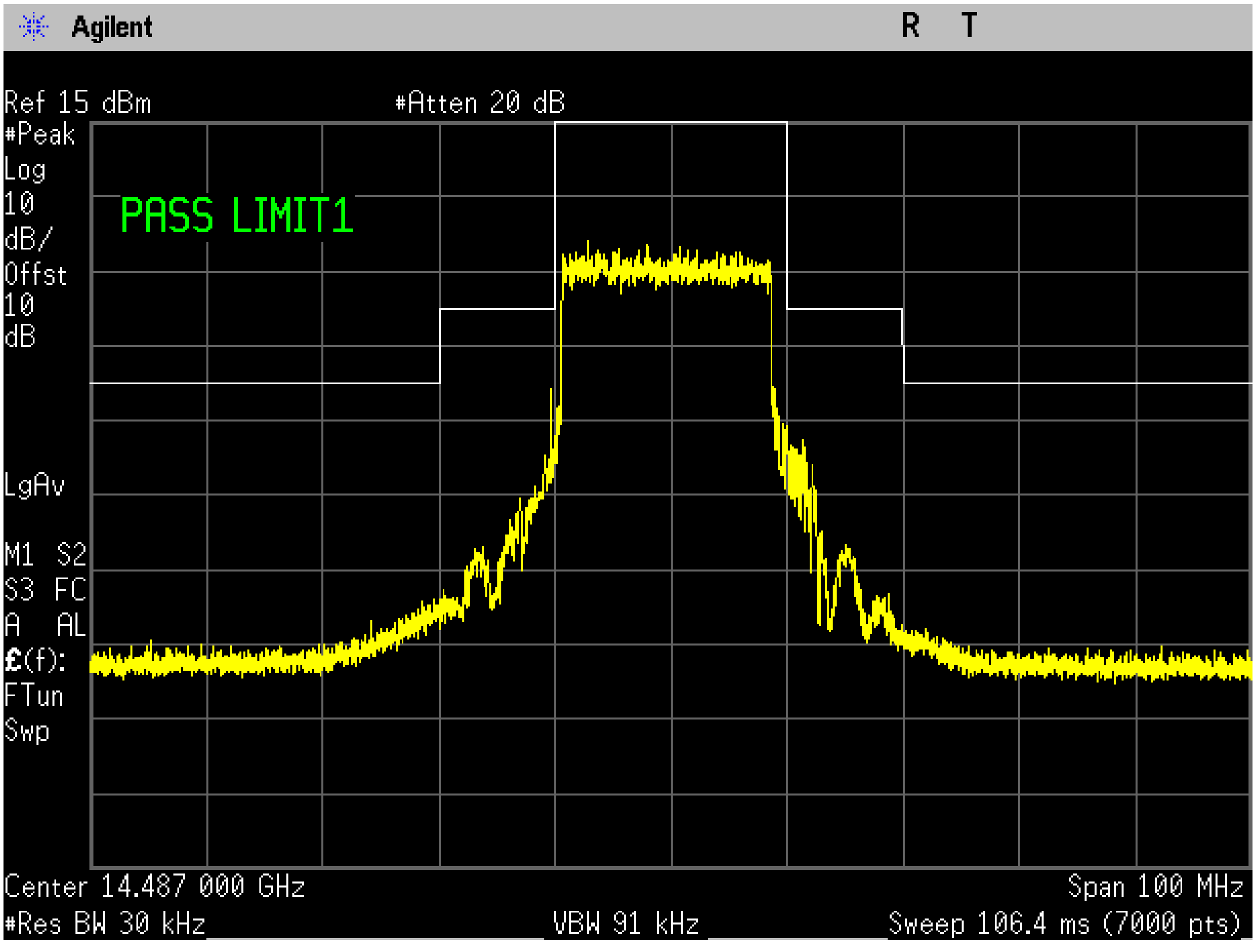


Figure 143. OoB, QPSK, 20MHz, High Channel.

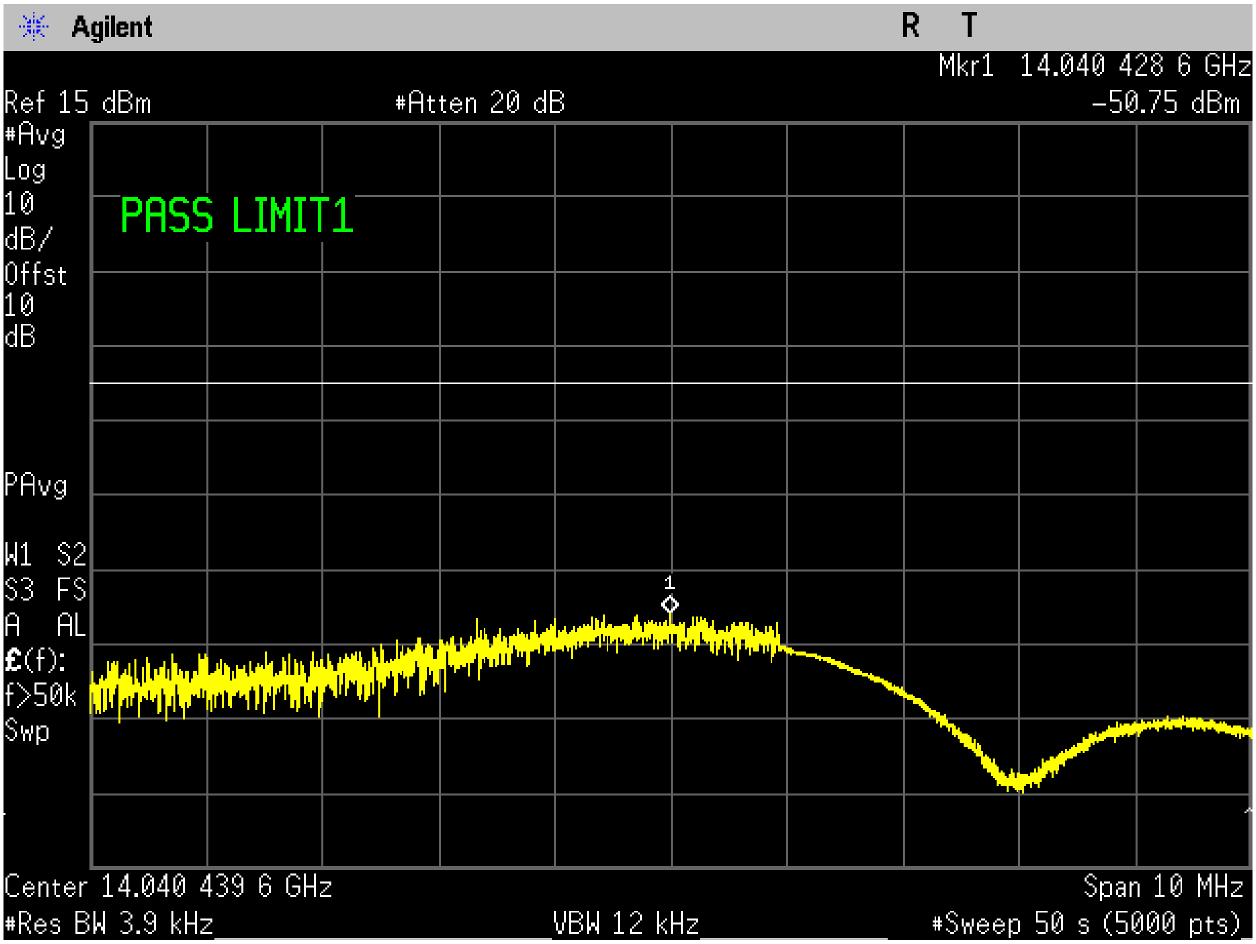


Figure 144. OoB, QPSK, 20MHz, Low Channel (final).

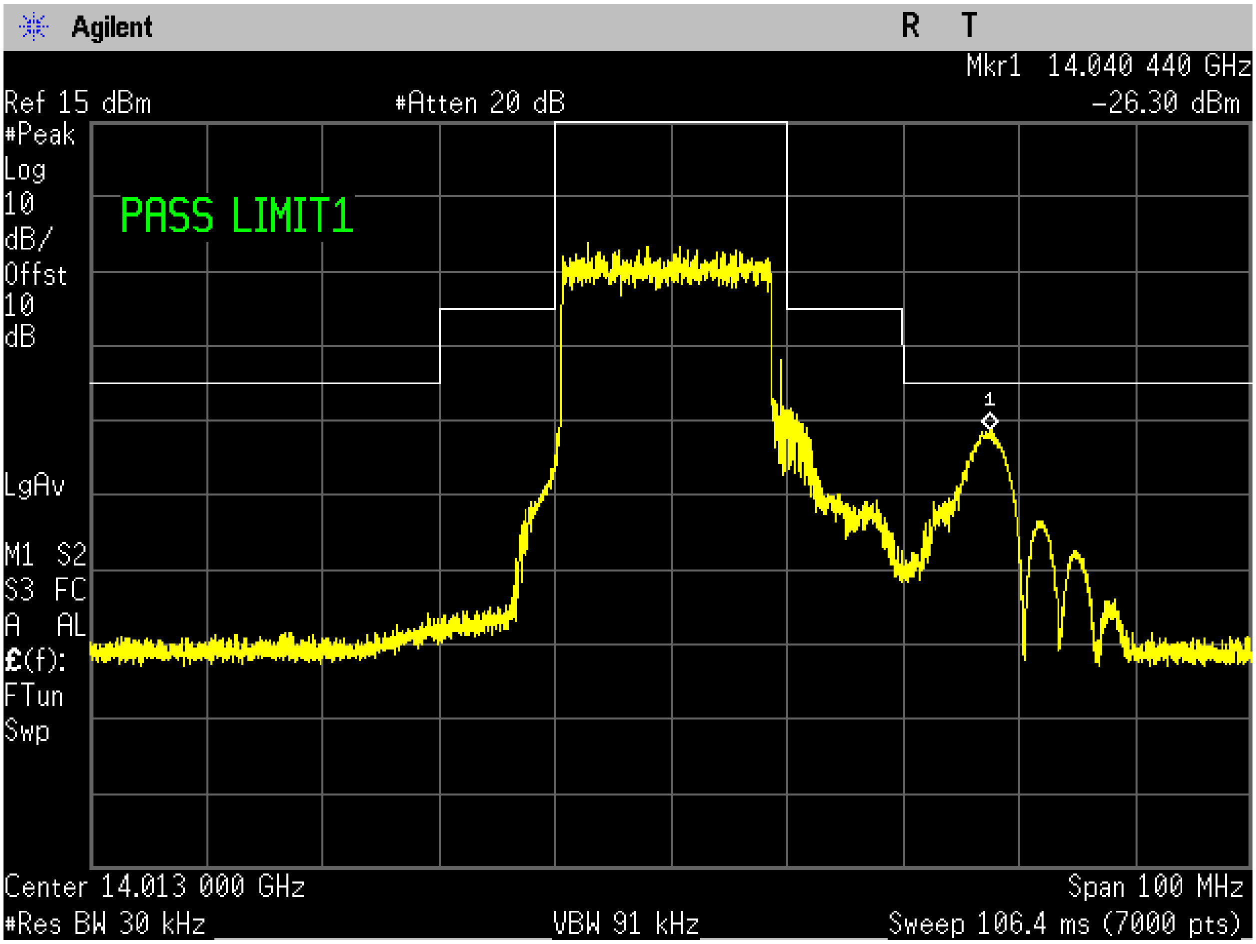


Figure 145. OoB, QPSK, 20MHz, Low Channel (prescan).

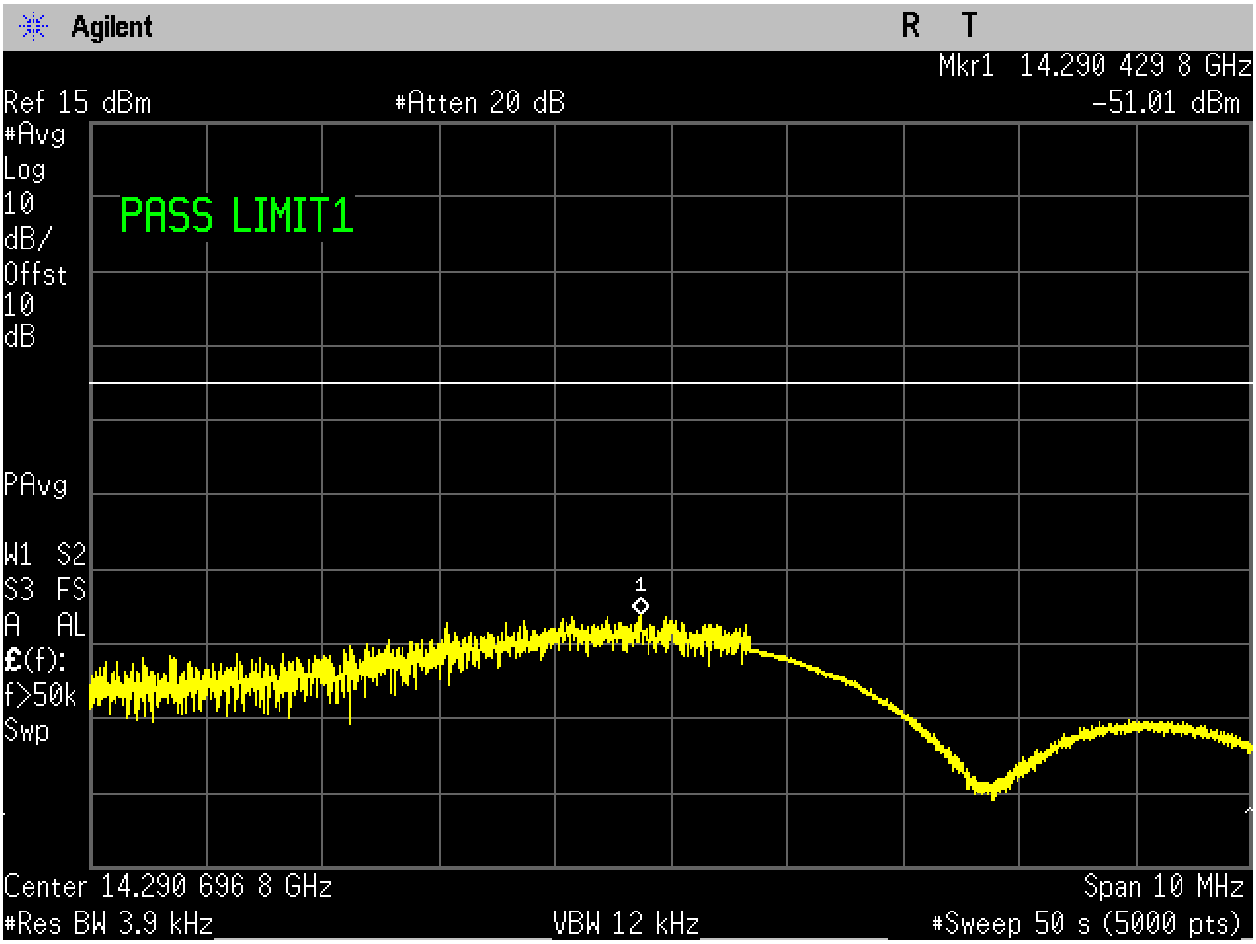


Figure 146. OoB, QPSK, 20MHz, Mid Channel (final).

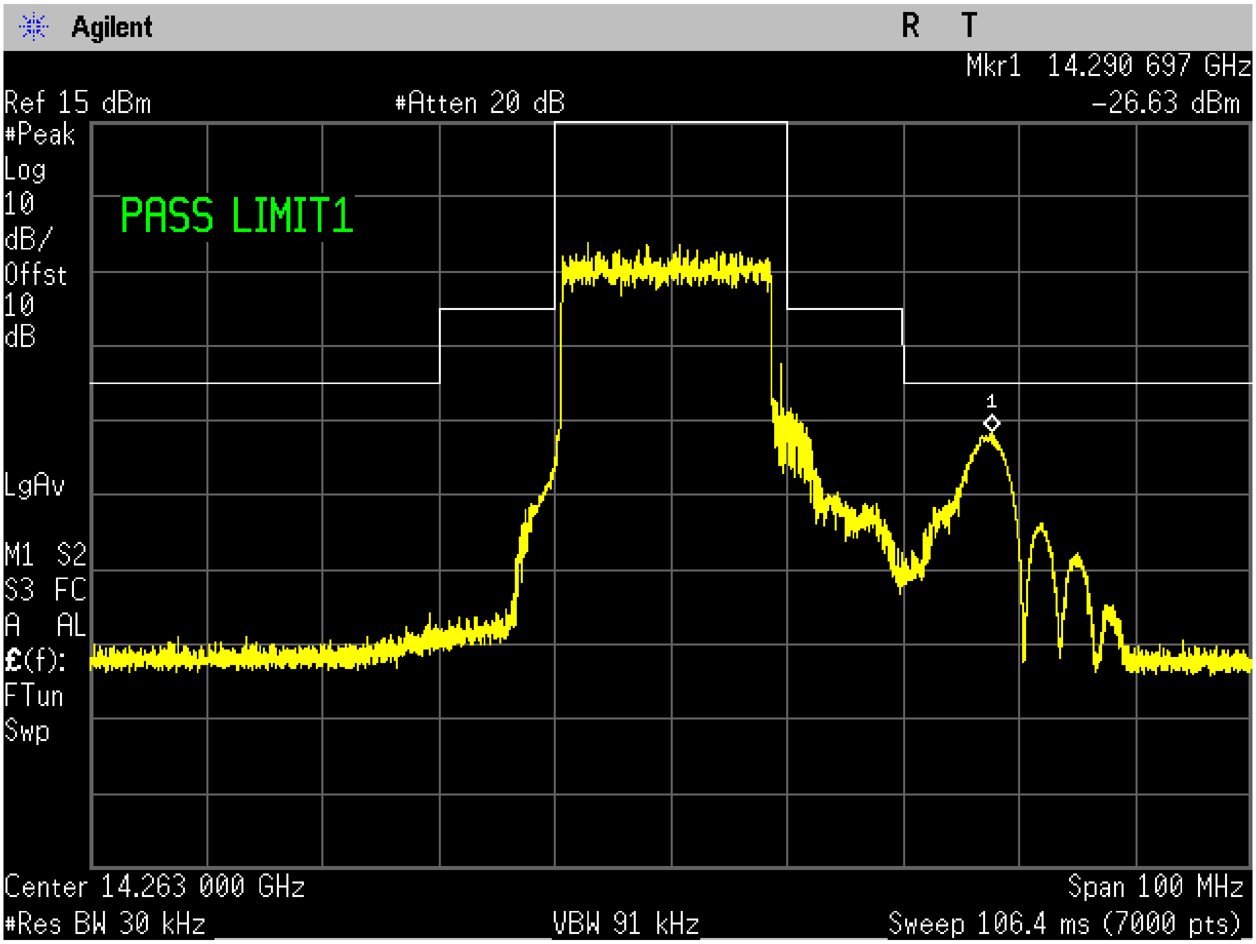


Figure 147. OoB, QPSK, 20MHz, Mid Channel (prescan).

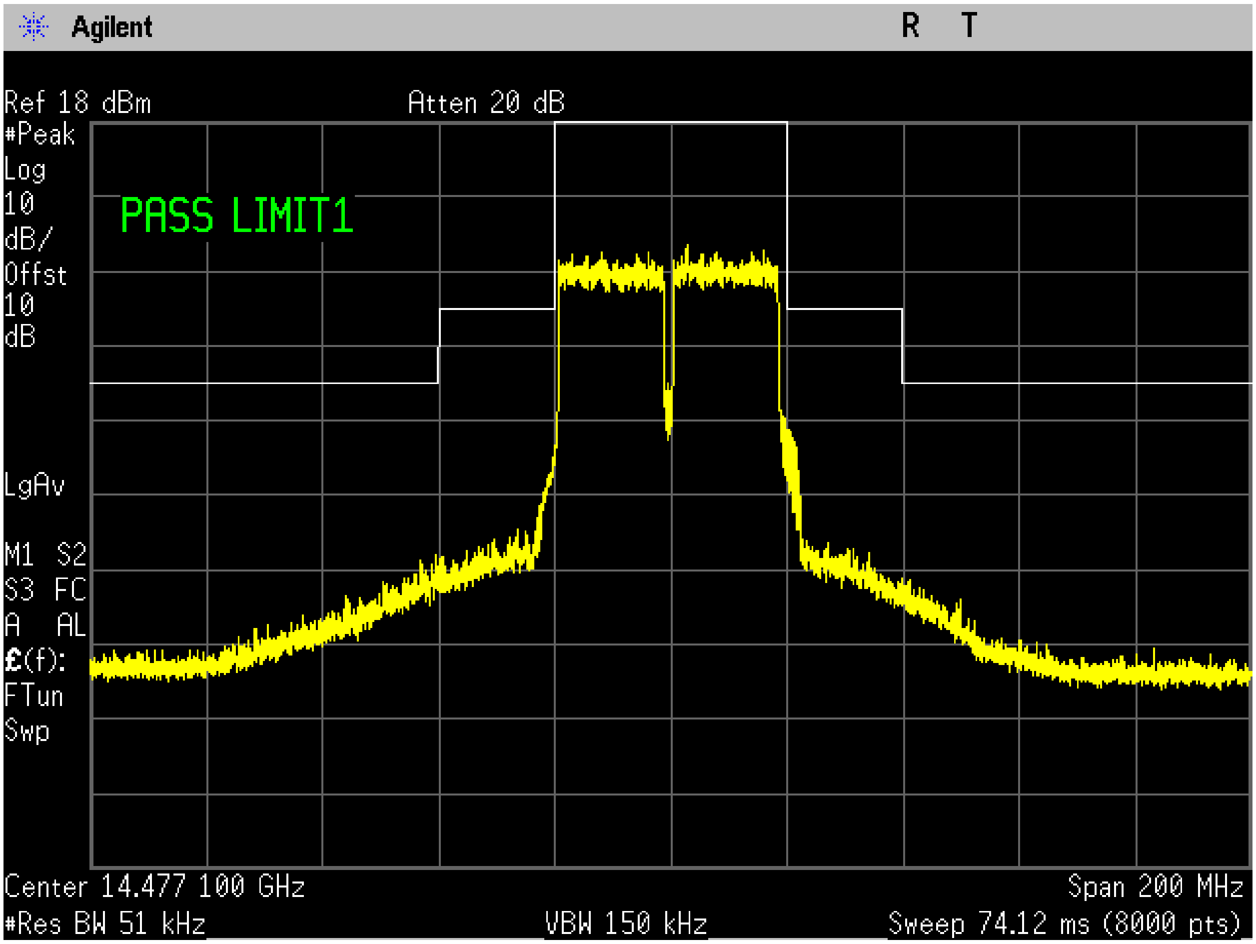


Figure 148. OoB, QPSK, 40MHz, High Channel.

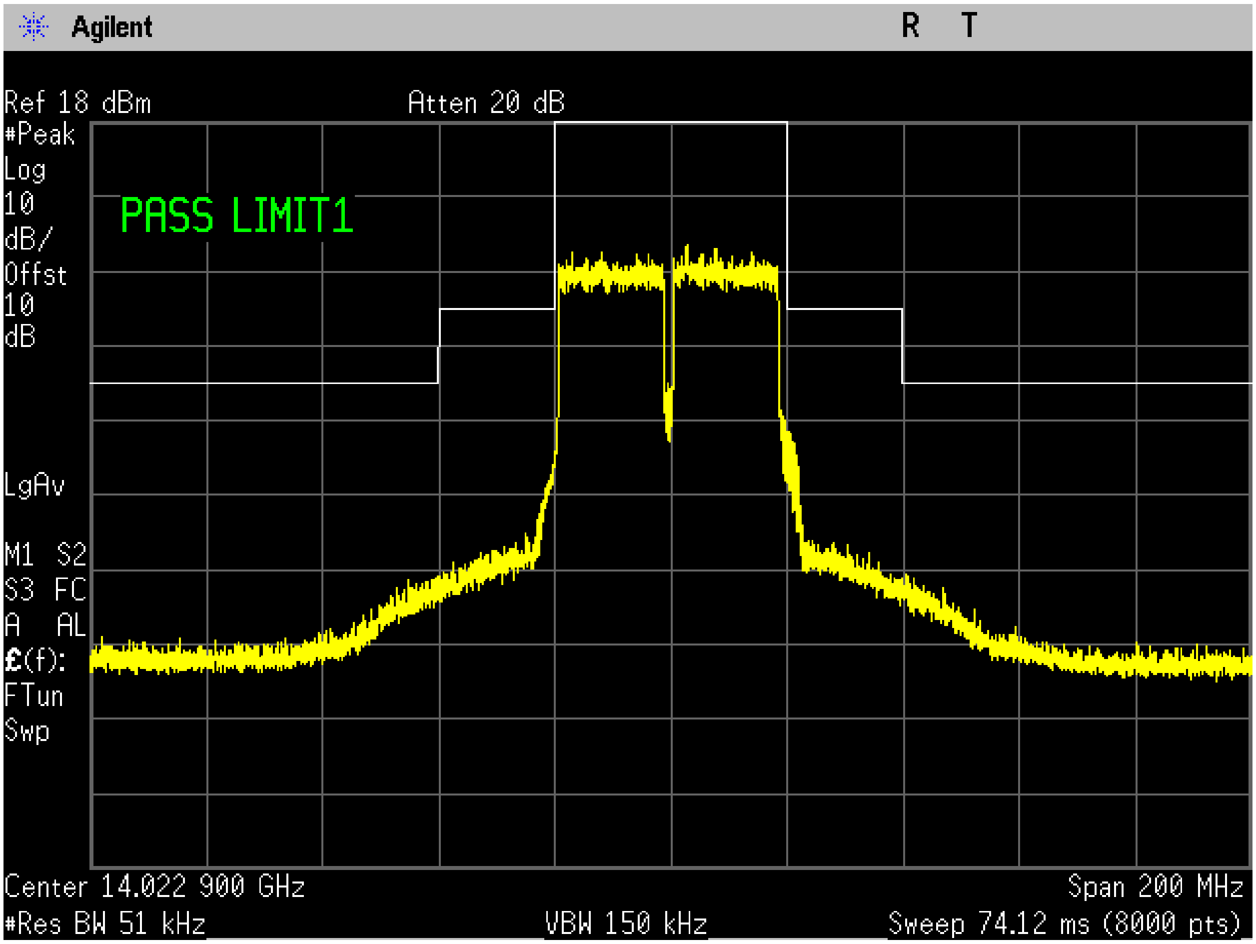


Figure 149. OoB, QPSK, 40MHz, Low Channel.

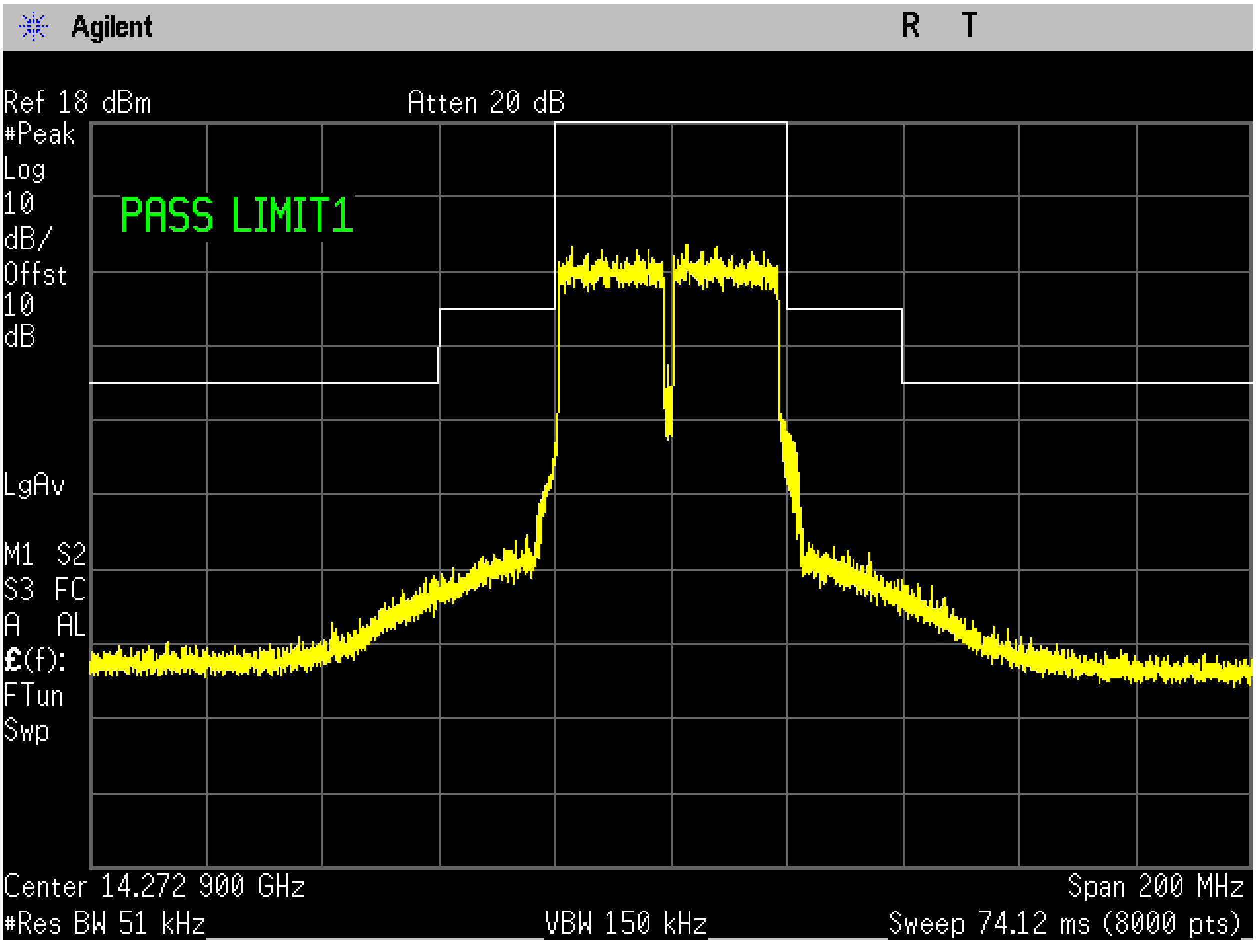


Figure 150. OoB, QPSK, 40MHz, Mid Channel.

TX Spurious (Antenna Port)

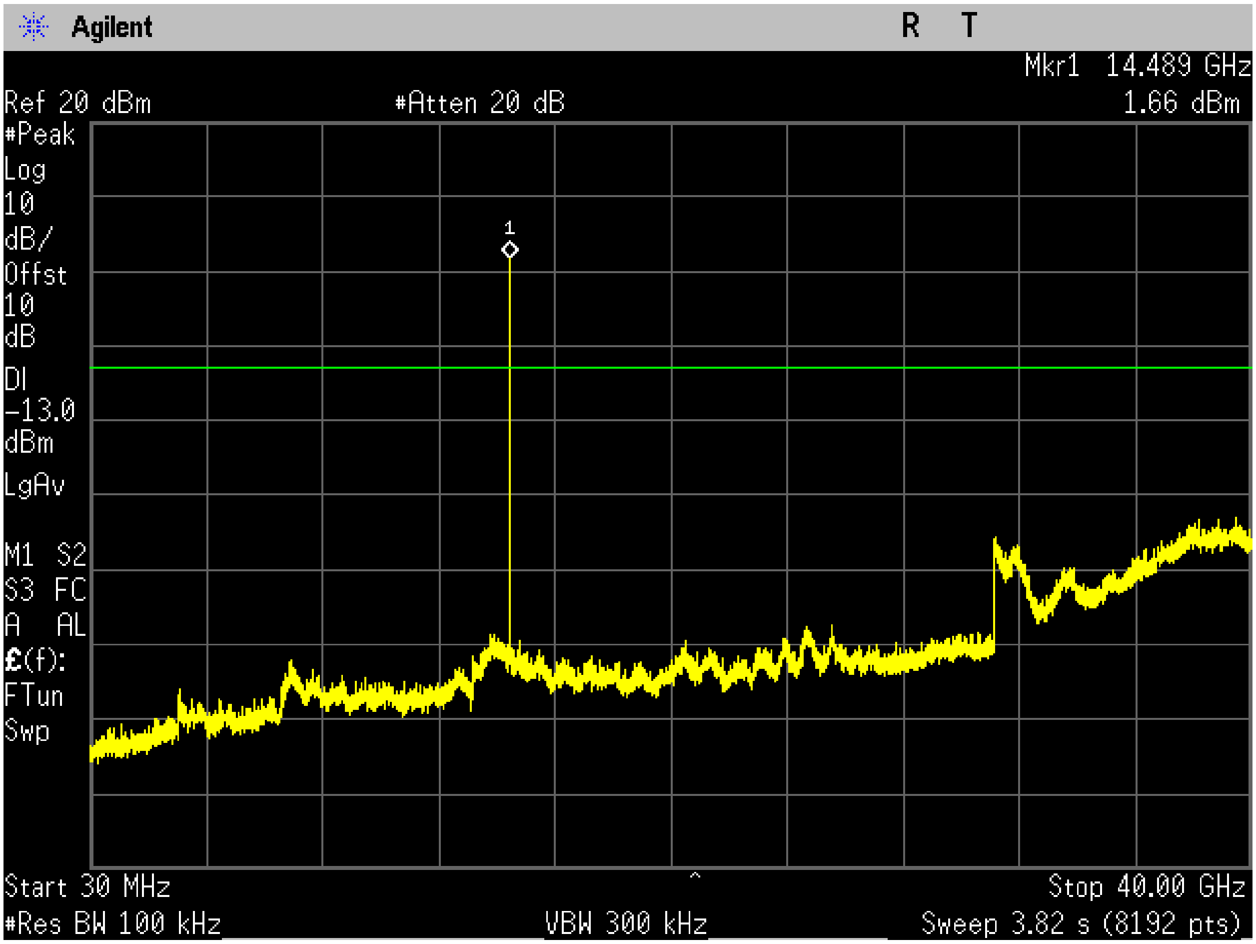


Figure 151. Conducted Spurious, 16QAM, 20MHz, High Channel, 30MHz - 40GHz.

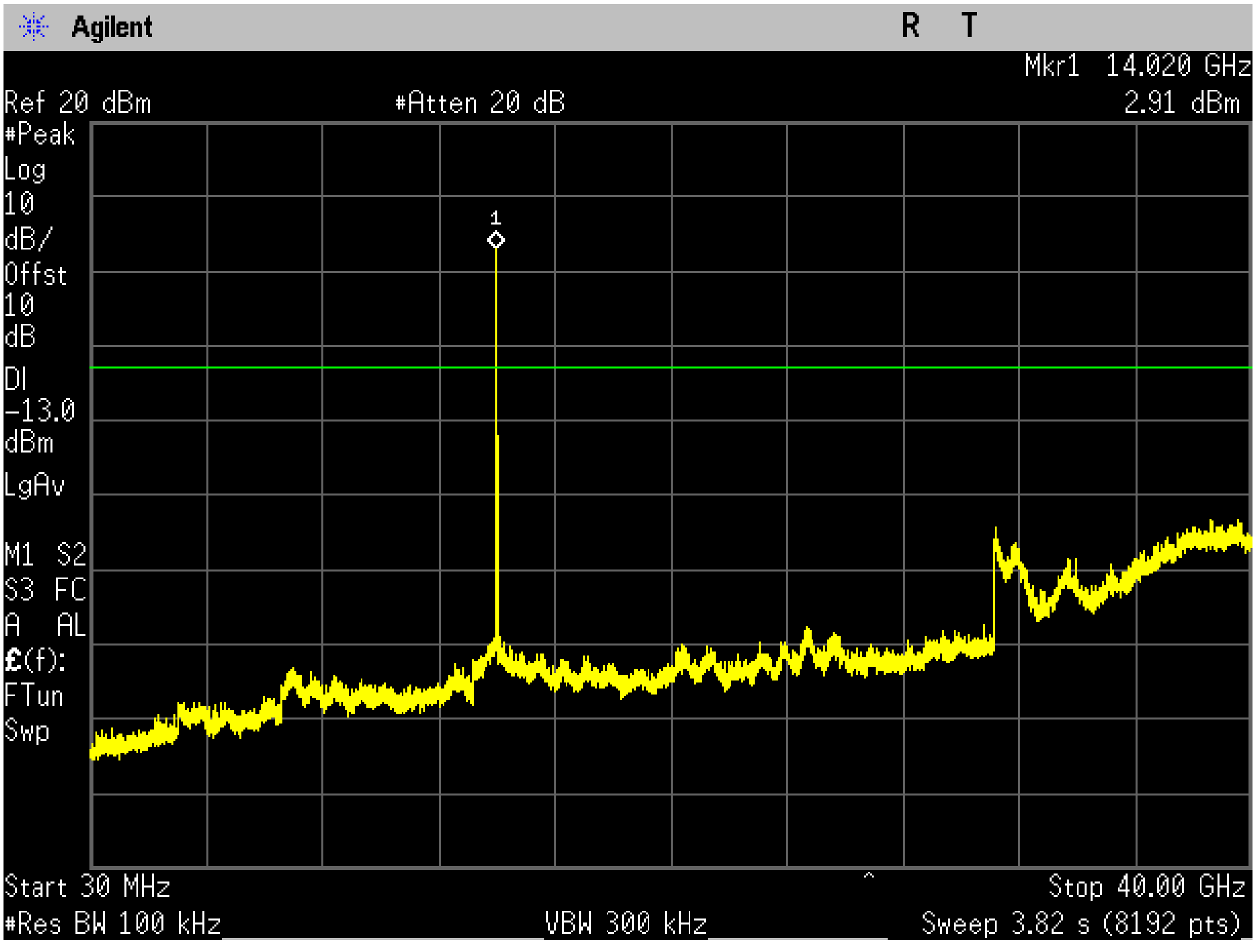


Figure 152. Conducted Spurious, 16QAM, 20MHz, Low Channel, 30MHz - 40GHz.

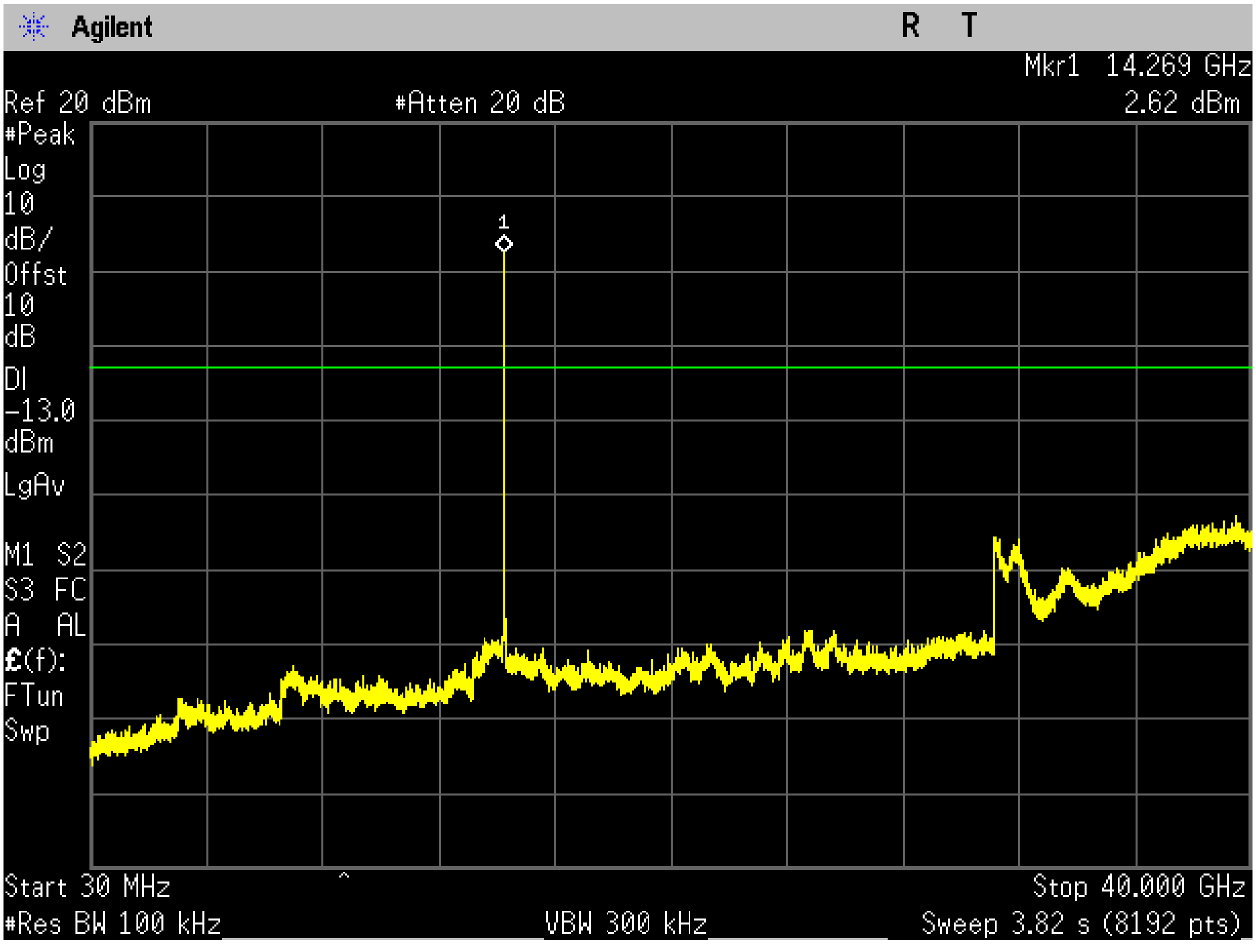


Figure 153. Conducted Spurious, 16QAM, 20MHz, Mid Channel, 30MHz - 40GHz.

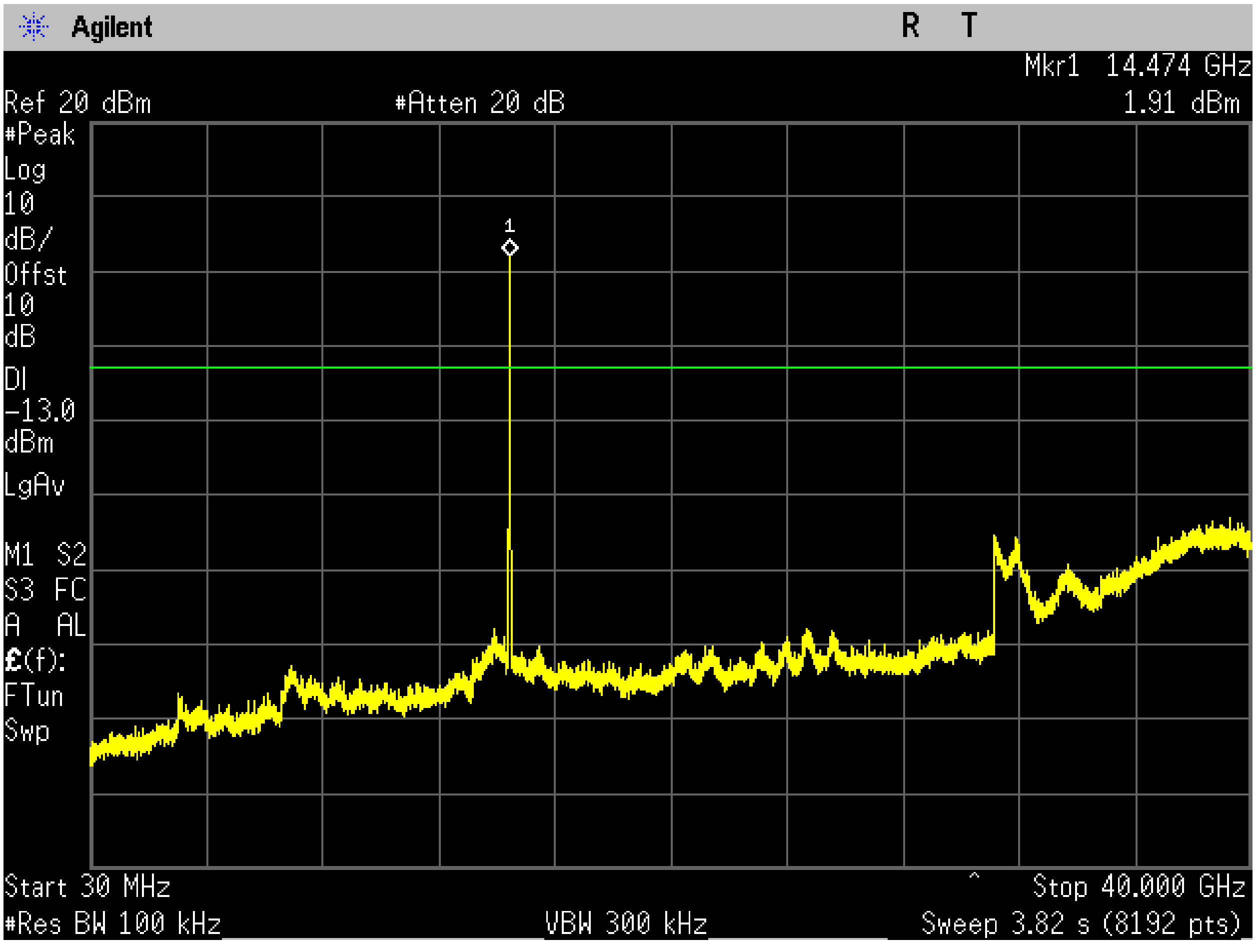


Figure 154. Conducted Spurious, 16QAM, 40MHz, High Channel, 30MHz - 40GHz.

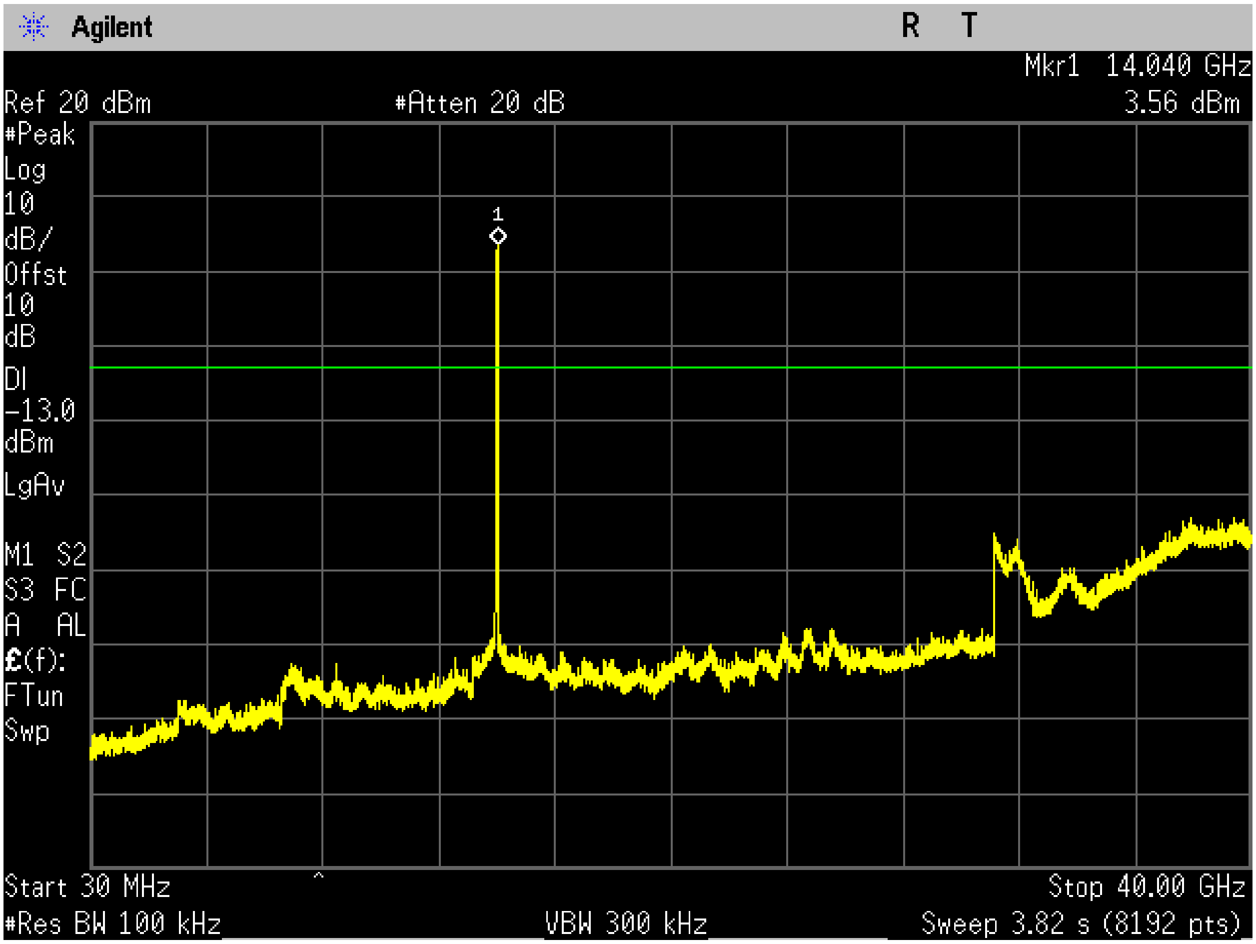


Figure 155. Conducted Spurious, 16QAM, 40MHz, Low Channel, 30MHz - 40GHz.

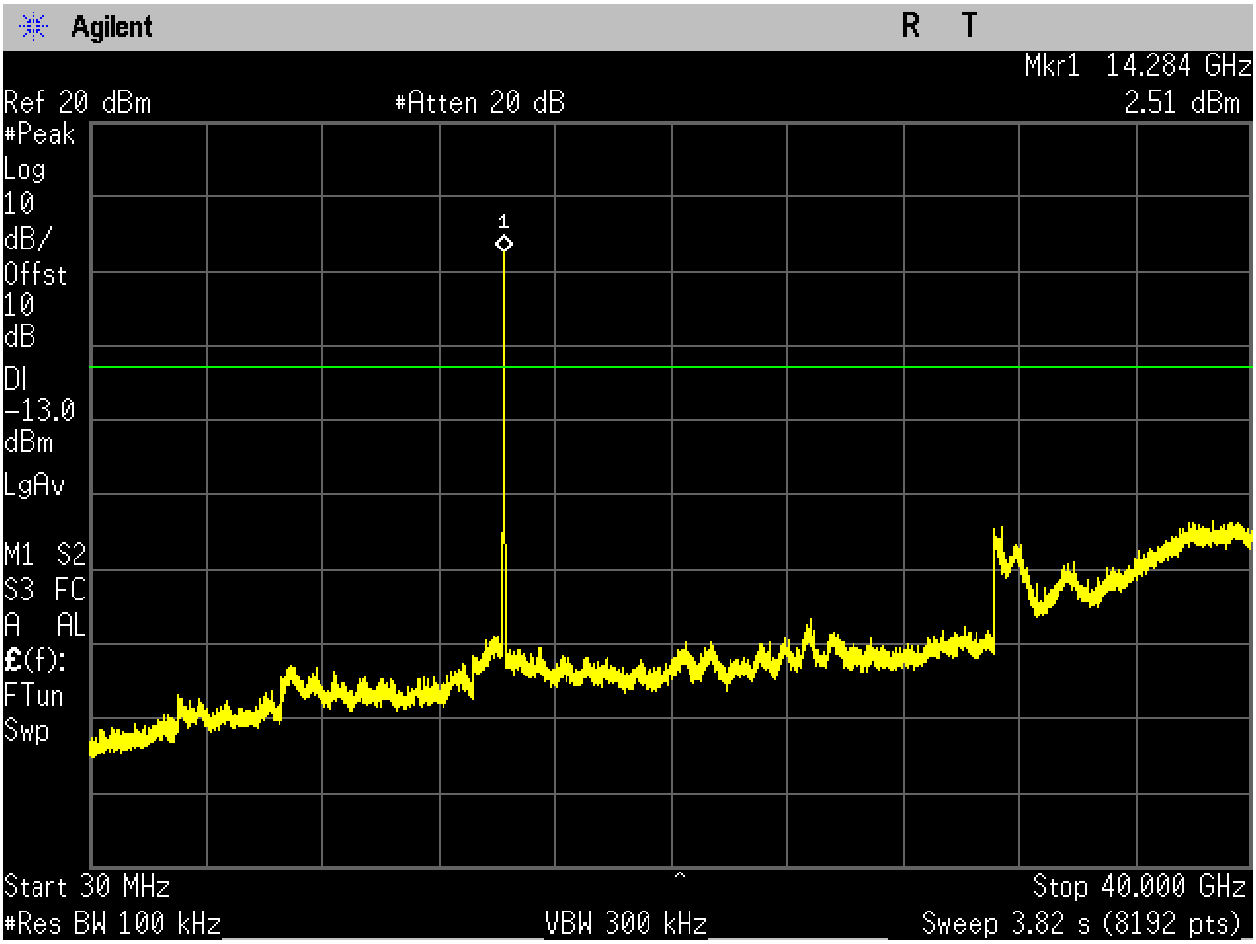


Figure 156. Conducted Spurious, 16QAM, 40MHz, Mid Channel, 30MHz - 40GHz.

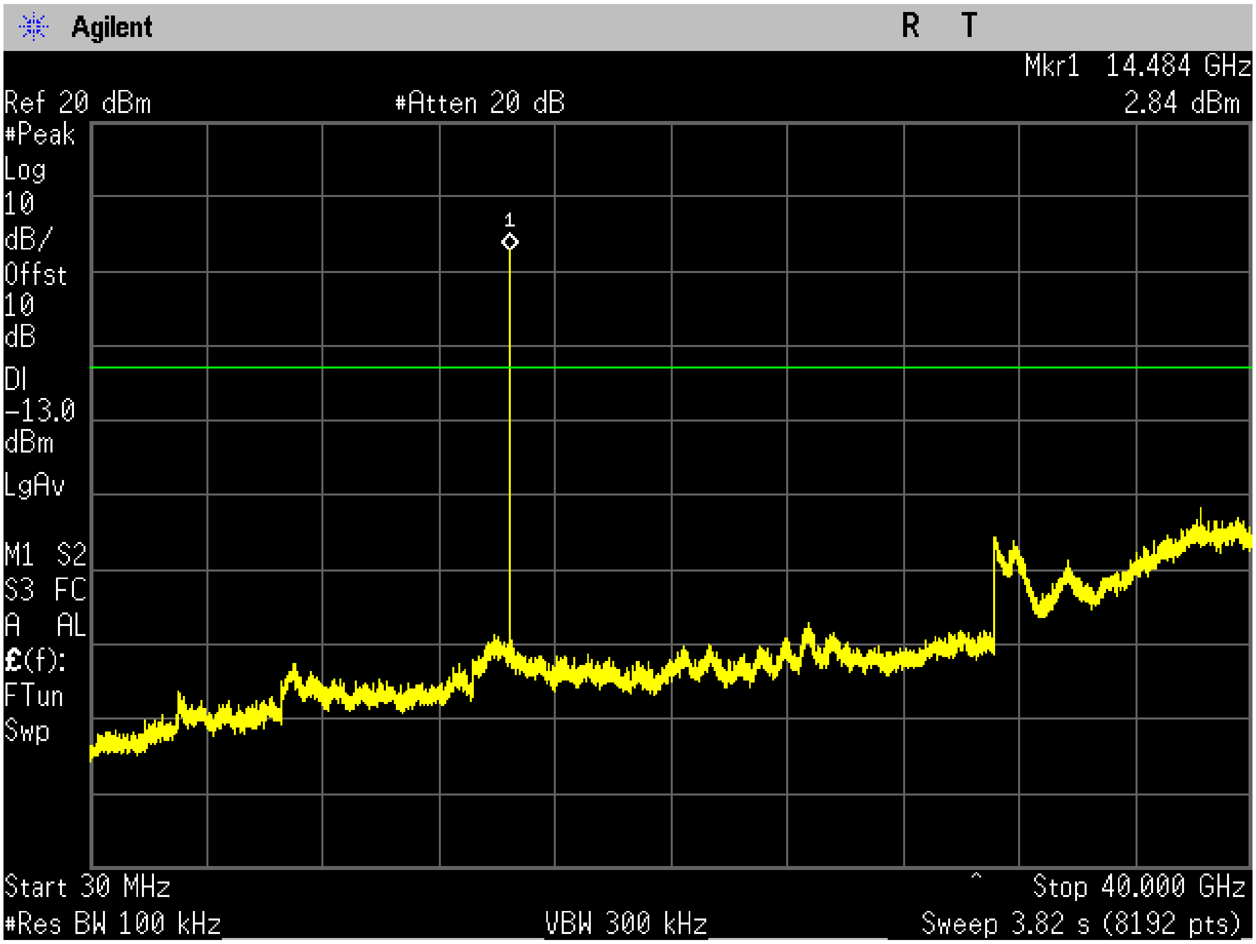


Figure 157. Conducted Spurious, 8PSK, 20MHz, High Channel, 30MHz - 40GHz.

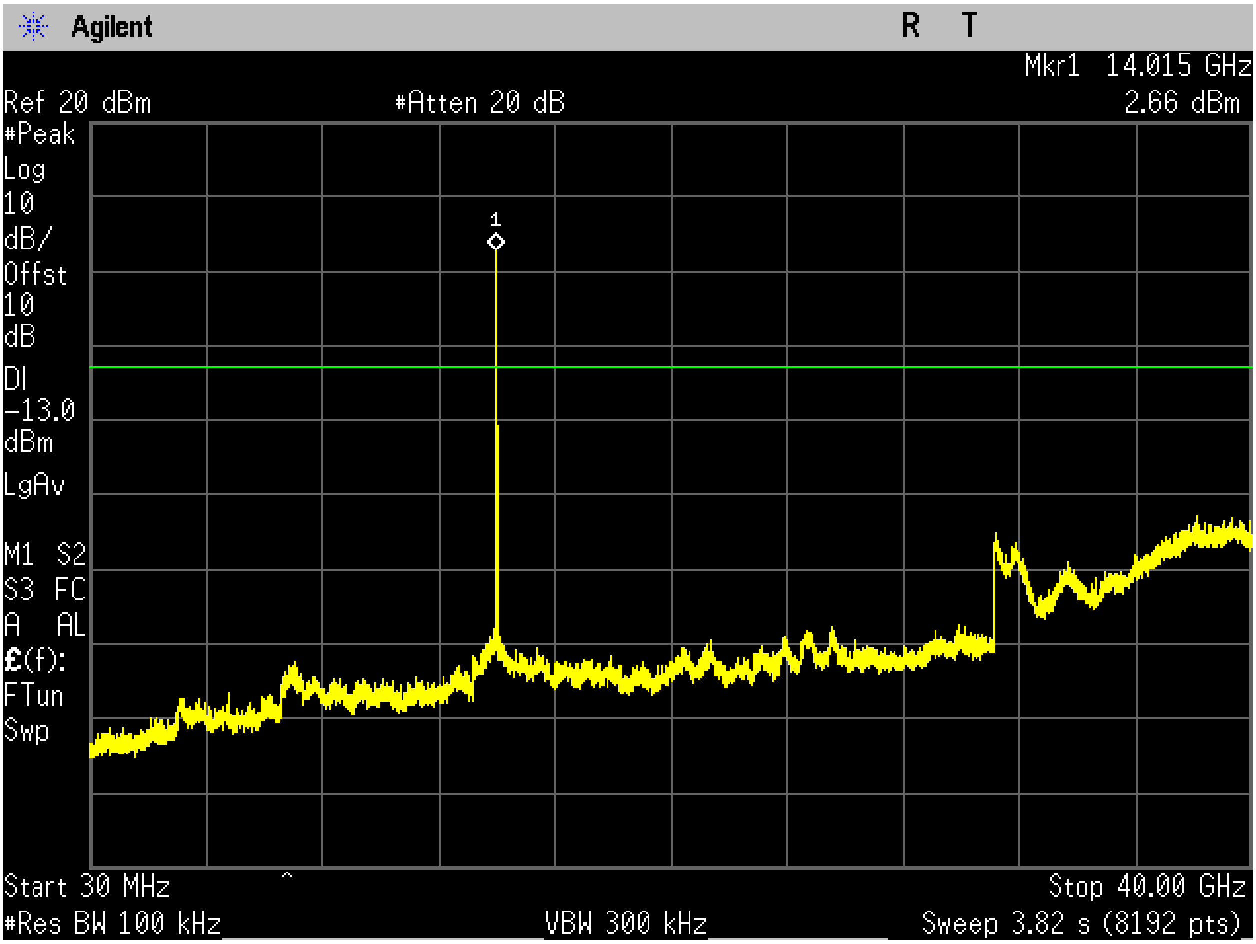


Figure 158. Conducted Spurious, 8PSK, 20MHz, Low Channel, 30MHz - 40GHz.

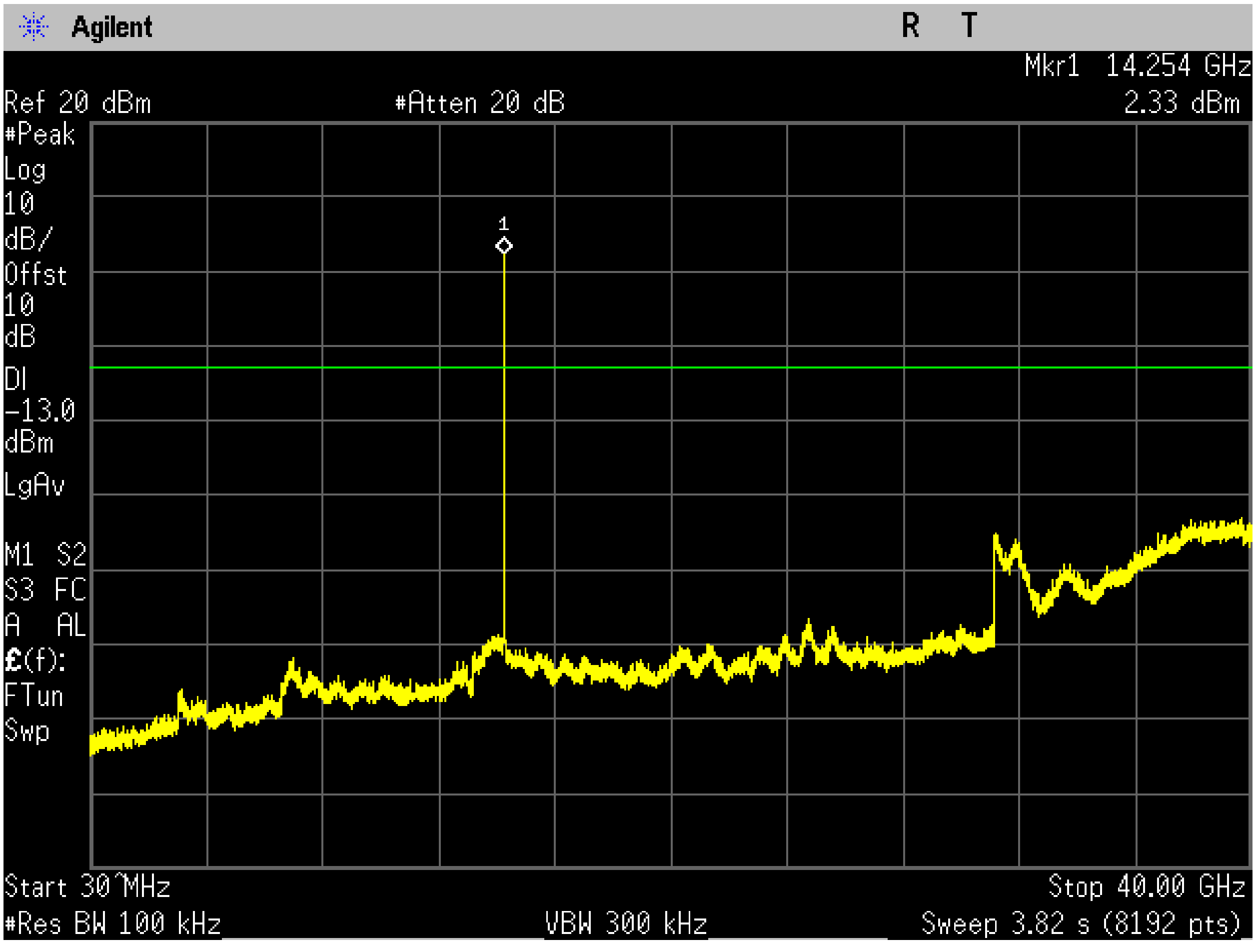


Figure 159. Conducted Spurious, 8PSK, 20MHz, Mid Channel, 30MHz - 40GHz.

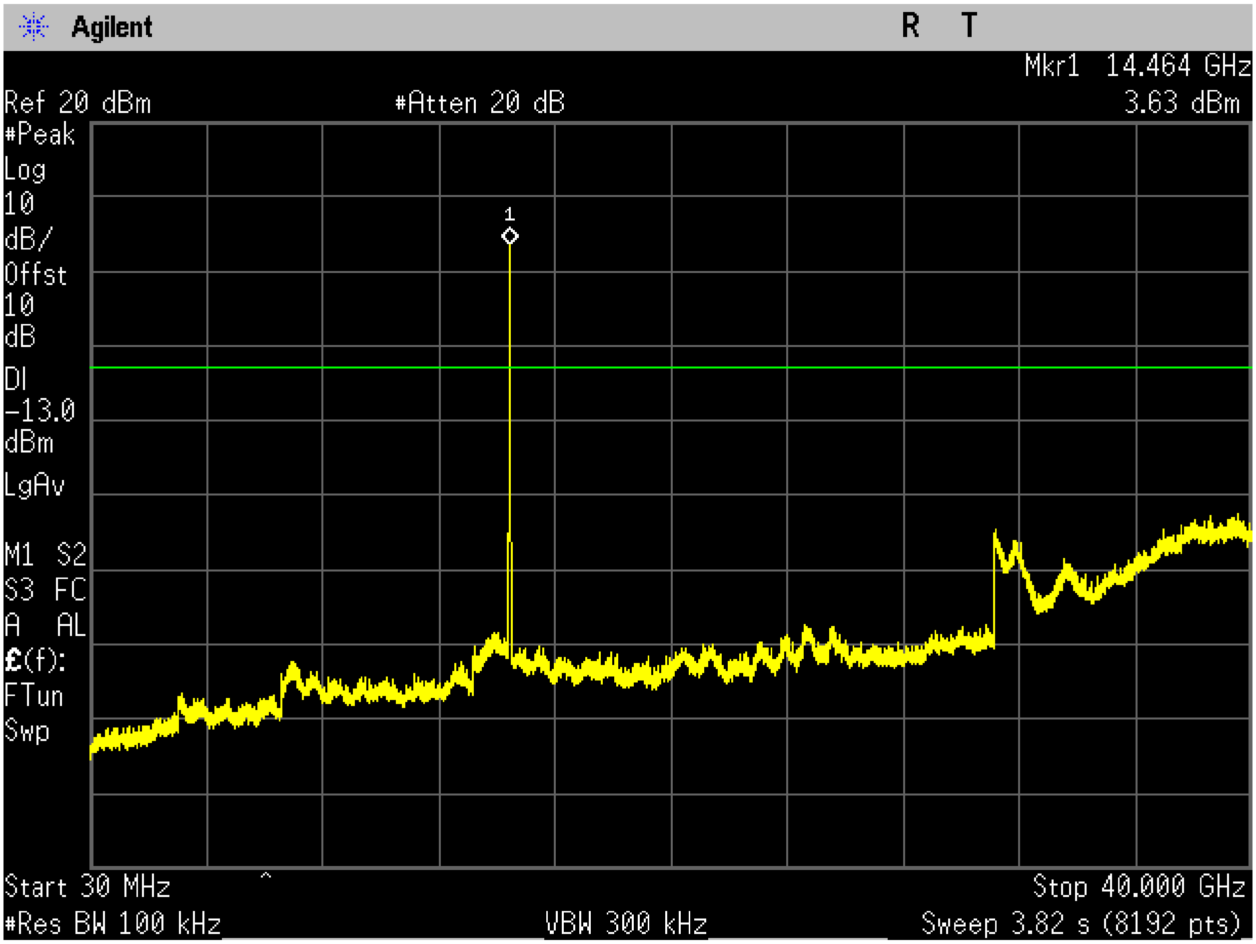


Figure 160. Conducted Spurious, 8PSK, 40MHz, High Channel, 30MHz - 40GHz.

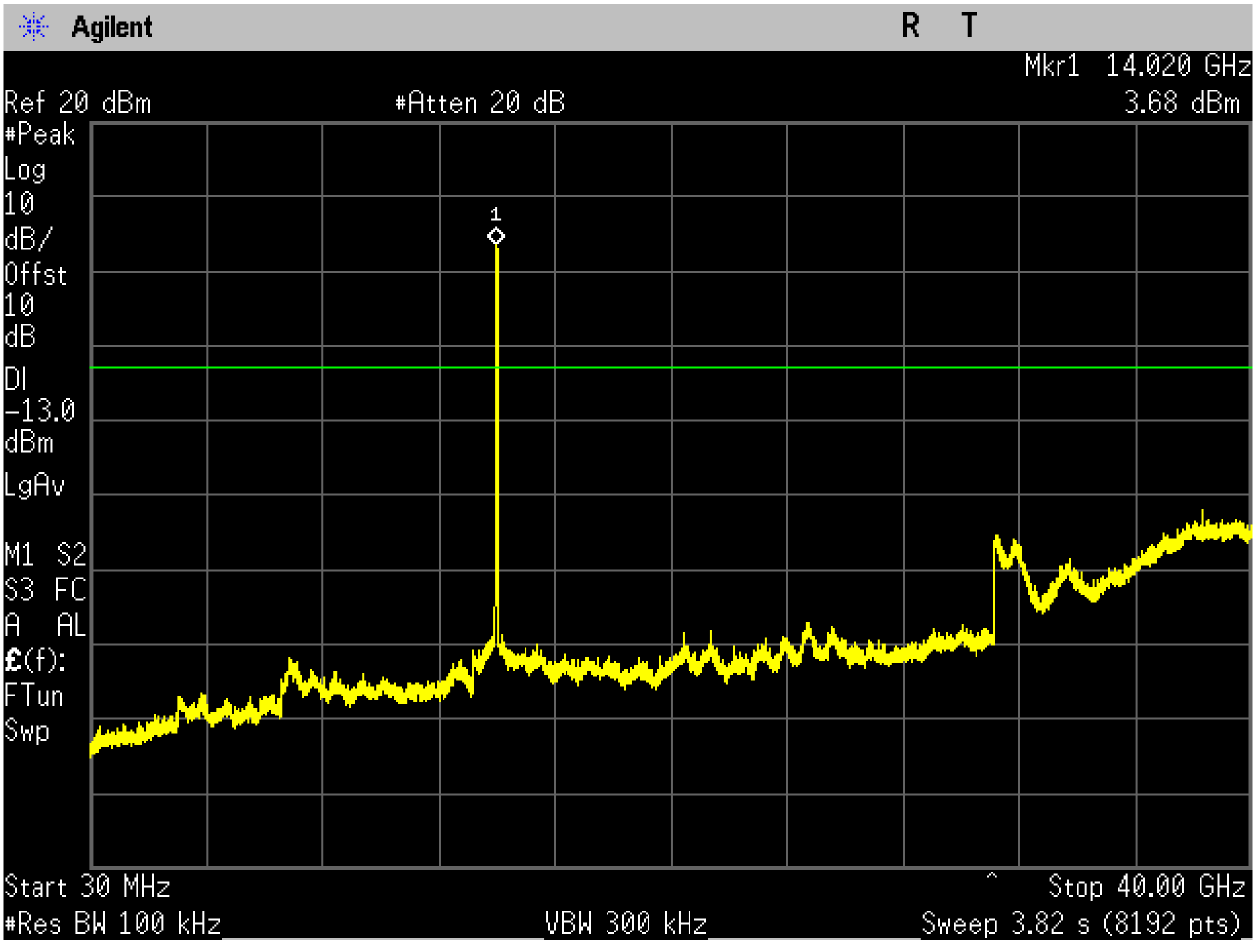


Figure 161. Conducted Spurious, 8PSK, 40MHz, Low Channel, 30MHz - 40GHz.

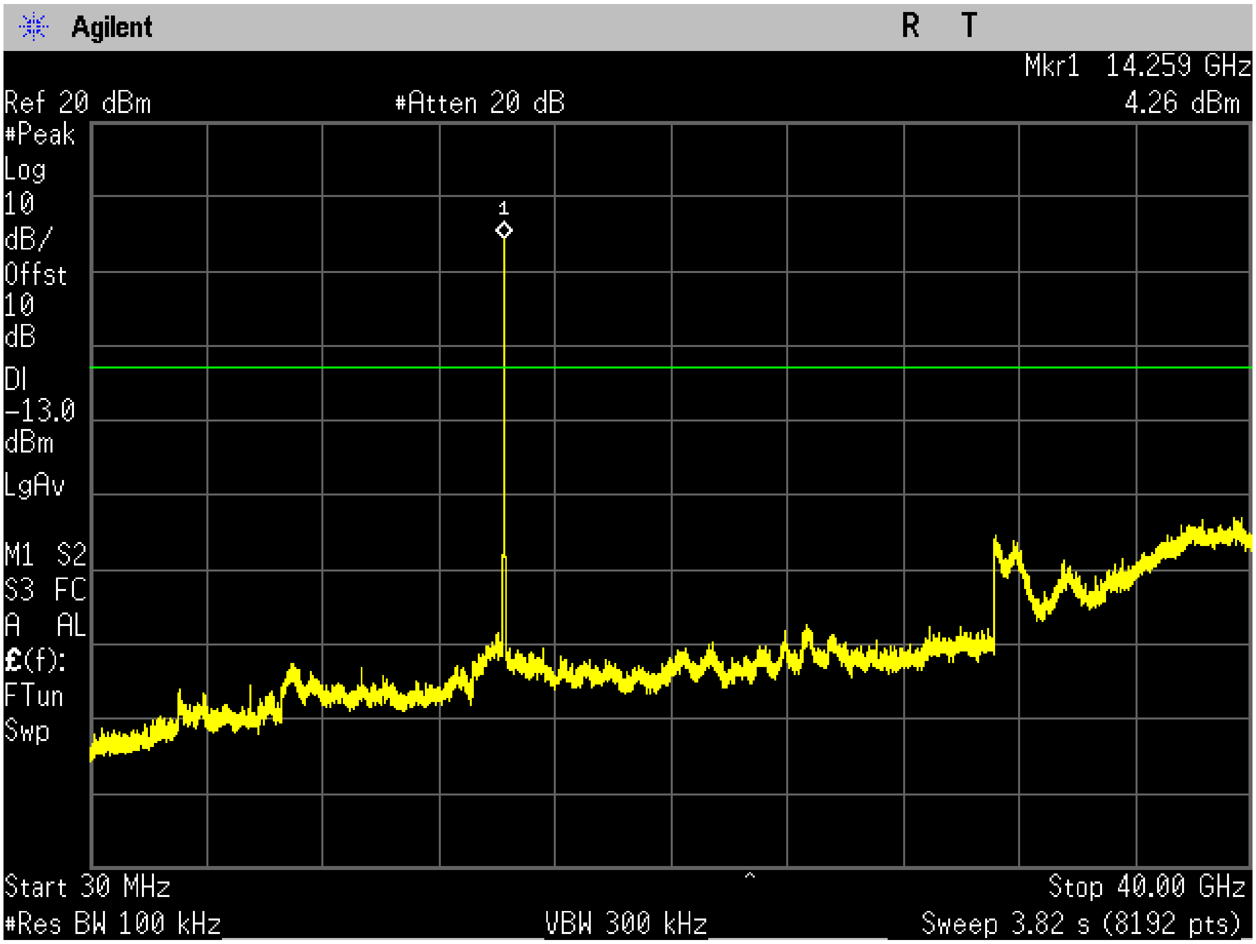


Figure 162. Conducted Spurious, 8PSK, 40MHz, Mid Channel, 30MHz - 40GHz.

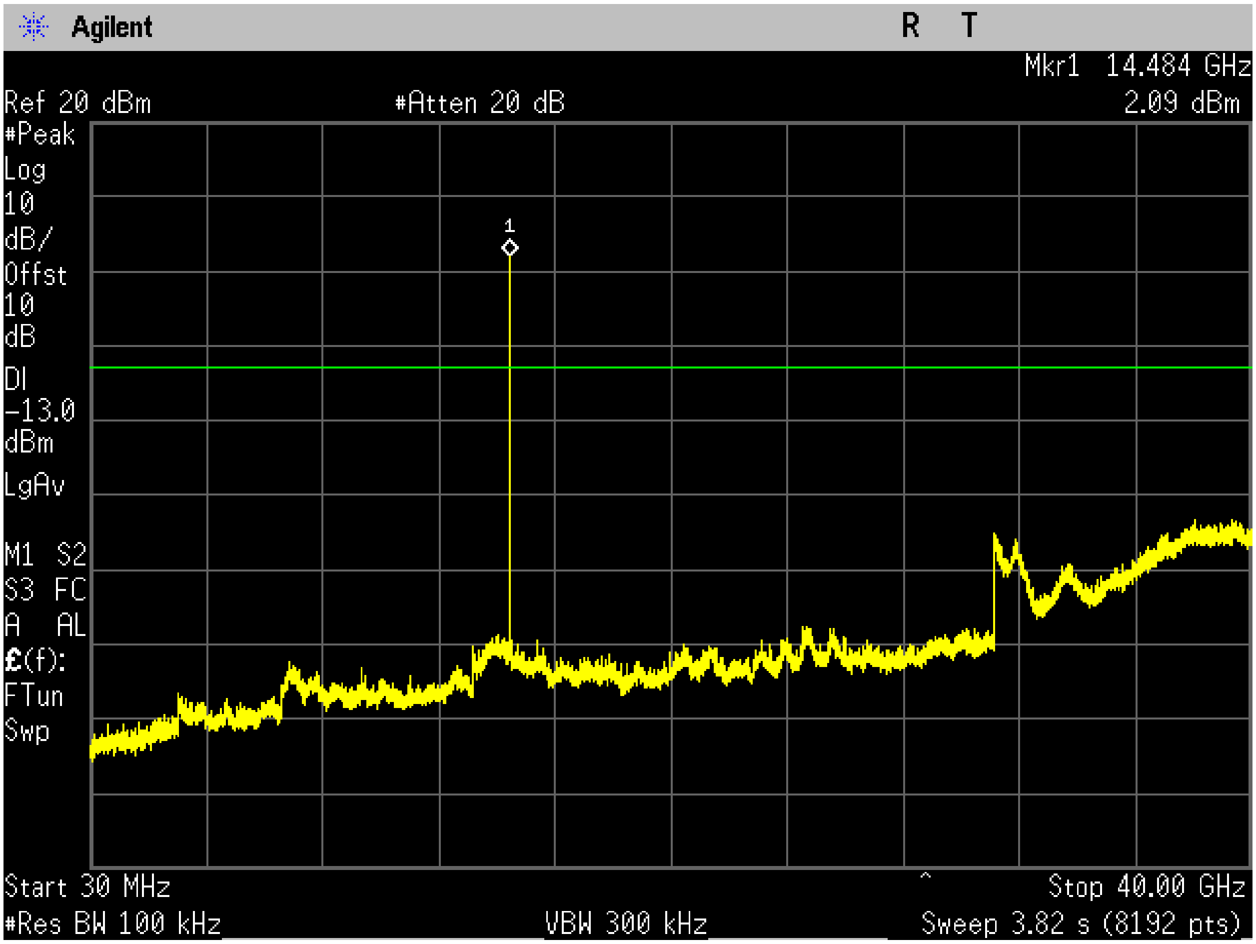


Figure 163. Conducted Spurious, QPSK, 20MHz, High Channel, 30MHz - 40GHz.

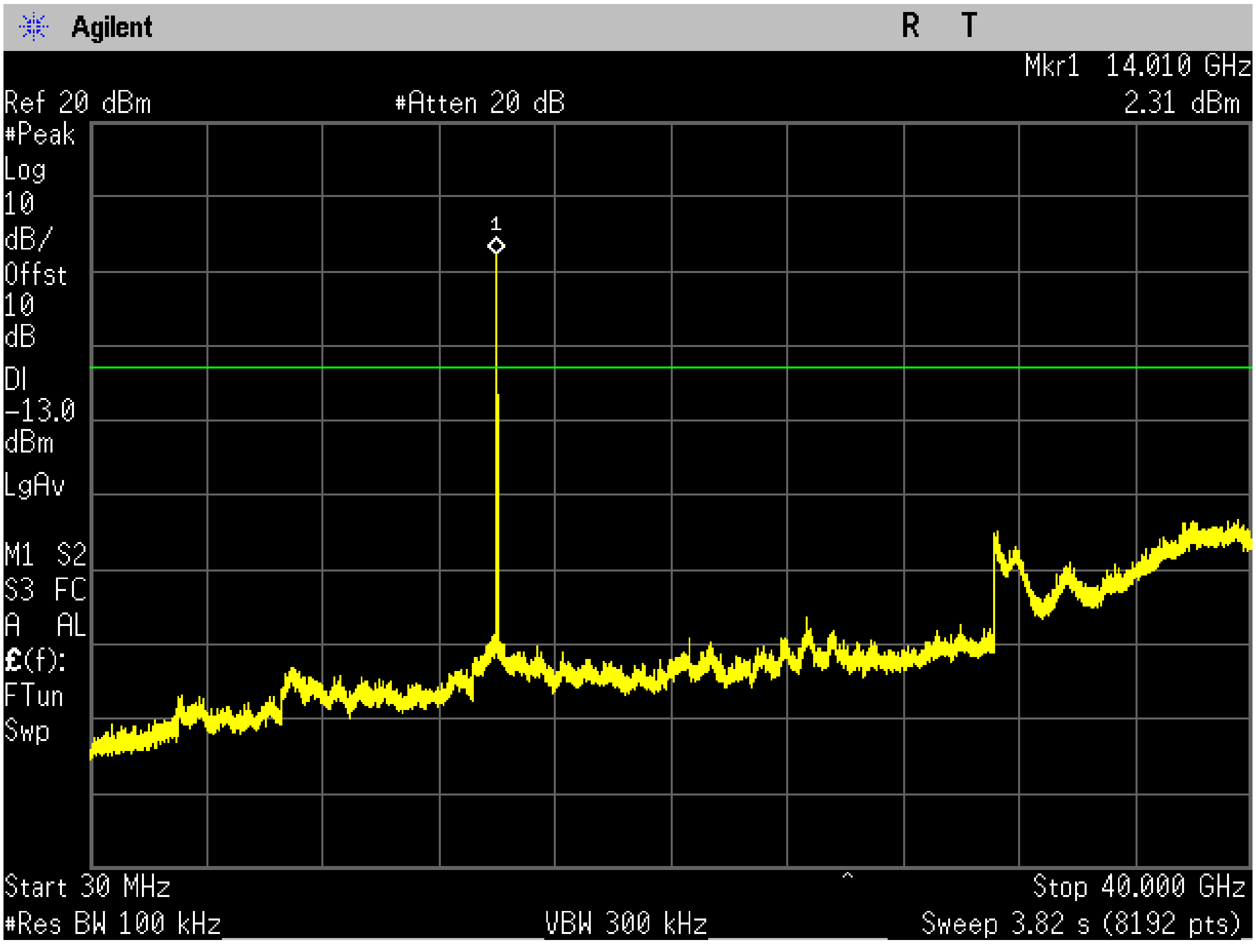


Figure 164. Conducted Spurious, QPSK, 20MHz, Low Channel, 30MHz - 40GHz.

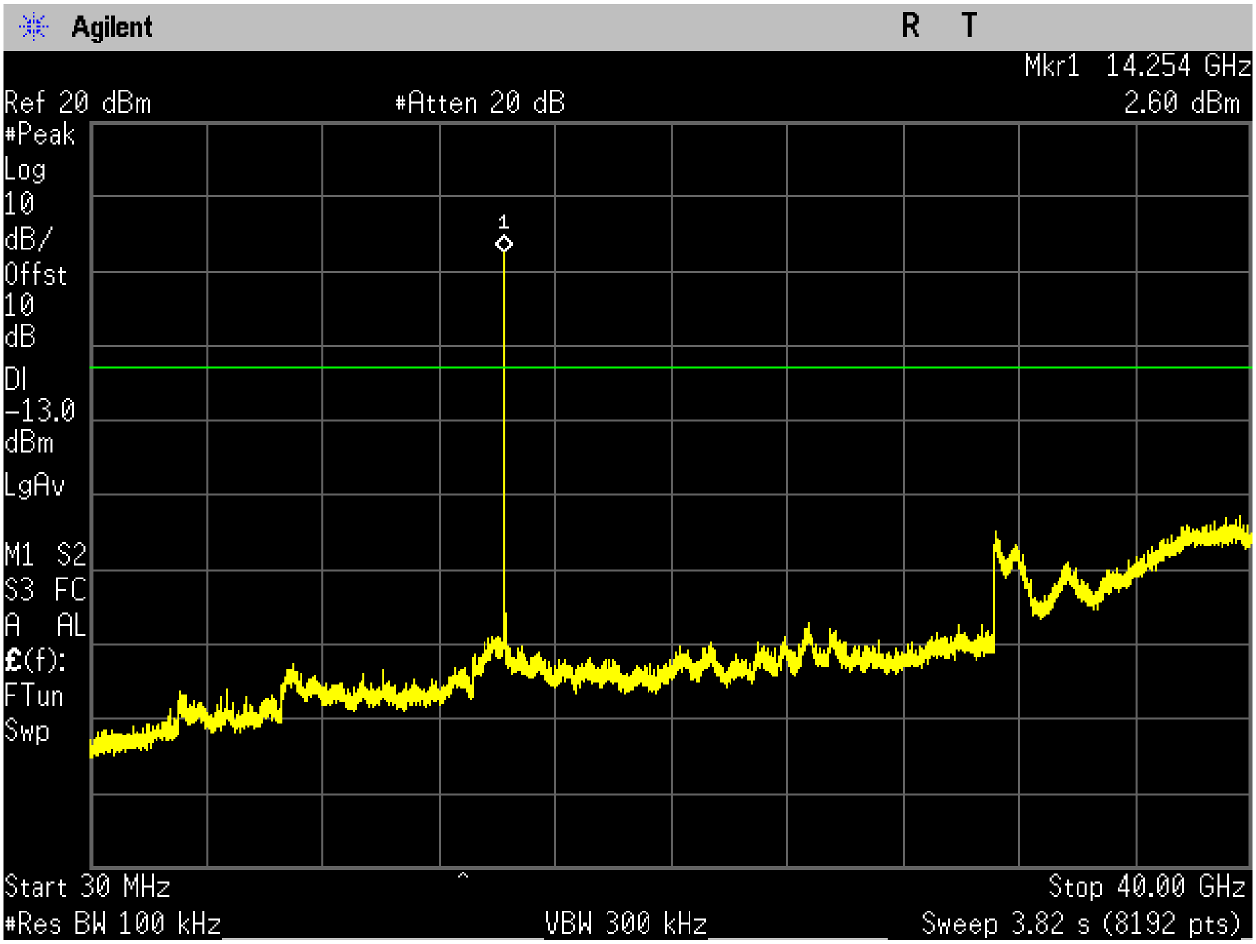


Figure 165. Conducted Spurious, QPSK, 20MHz, Mid Channel, 30MHz - 40GHz.

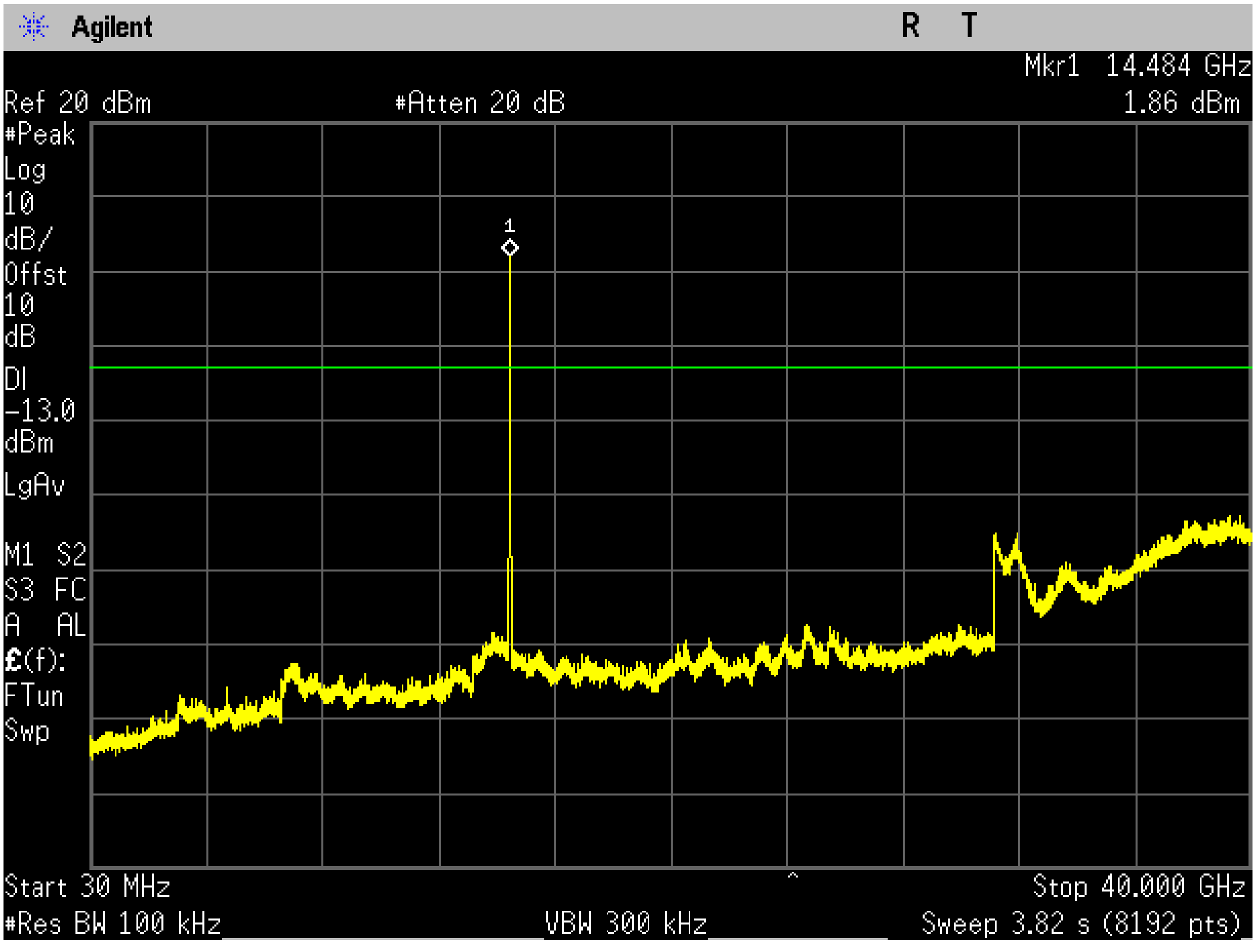


Figure 166. Conducted Spurious, QPSK, 40MHz, High Channel, 30MHz - 40GHz.

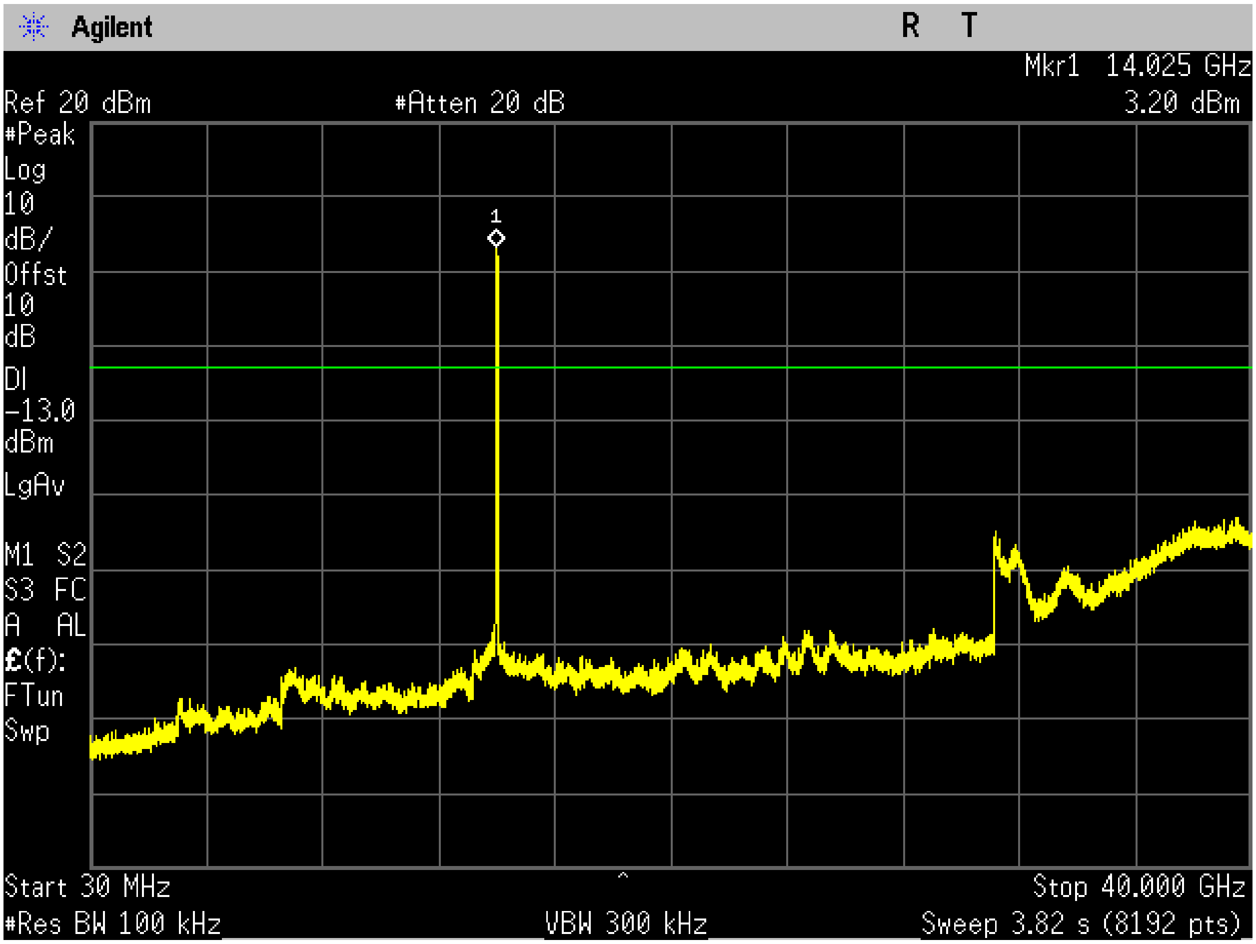


Figure 167. Conducted Spurious, QPSK, 40MHz, Low Channel, 30MHz - 40GHz.

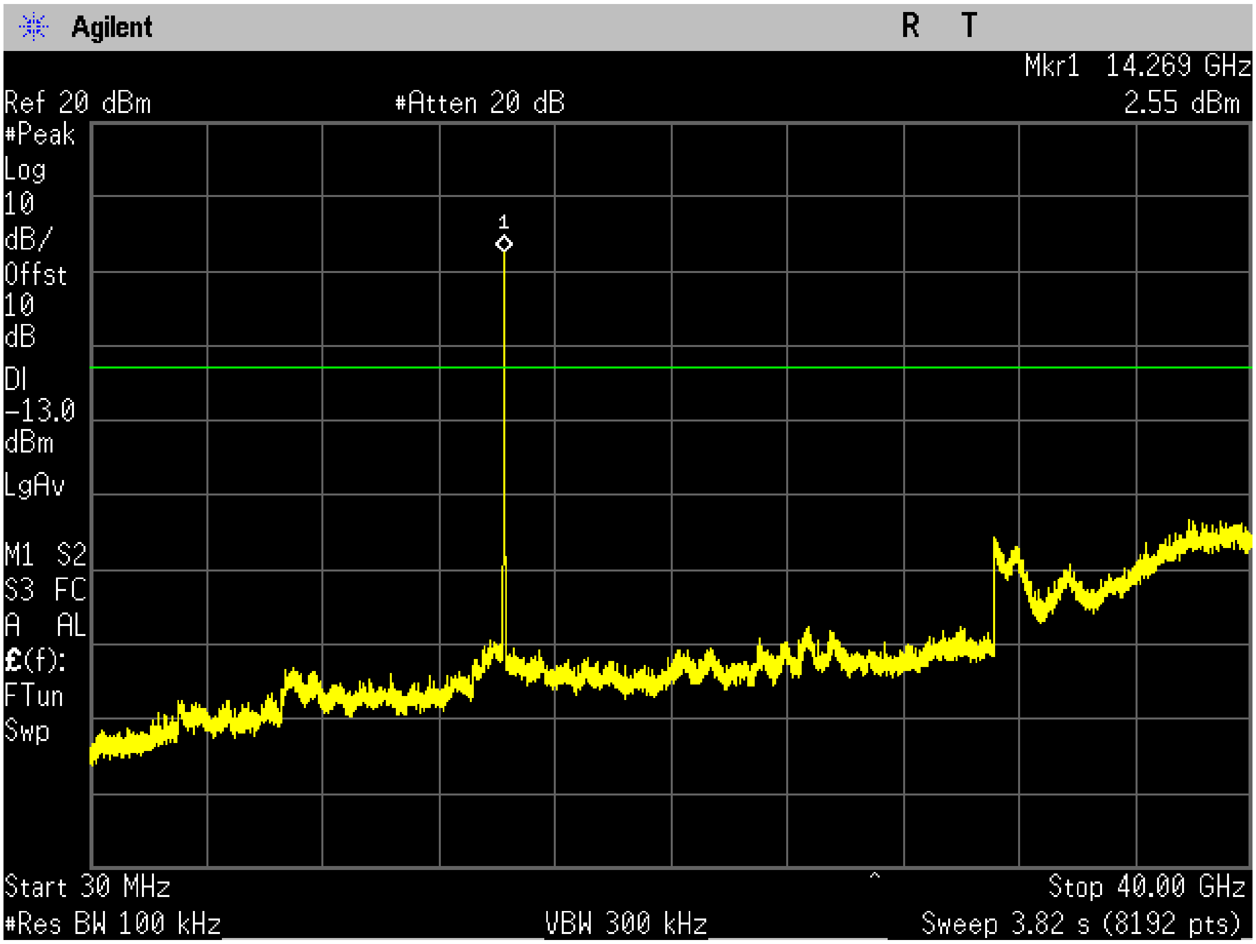


Figure 168. Conducted Spurious, QPSK, 40MHz, Mid Channel, 30MHz - 40GHz.

Electromagnetic Compatibility Criteria for Satellite Communications

§2.1049 Occupied Bandwidth

Test Requirement(s): **§2.1049**

Test Procedure: As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made at the RF output terminals using a Spectrum Analyzer.

A laptop was connected to EUT to control the RF power output and frequency channel. The EUT was connected to a Spectrum Analyzer via attenuator. The measured highest Average Power was set relative to zero dB reference. The RBW of the Spectrum Analyzer was set to 1-5% of the channel bandwidth. The EUT power was adjusted at the maximum output power level.

Test Results: The EUT is **compliant** with the requirements of this section.

Test Engineer: Donald Salguero

Test Date: June 14, 2024

Modulation	Nominal Bandwidth (MHz)	Center Frequency (GHz)	99% Occupied Bandwidth (MHz)
QPSK	20	14.013	18.1022
		14.263	18.4214
		14.487	18.1119
	40	14.0229	37.6505
		14.2729	37.6065
		14.4771	37.6868
8PSK	20	14.013	18.0807
		14.263	18.2717
		14.487	18.1069
	40	14.0229	37.6121
		14.2729	37.5705
		14.4771	37.6134
16QAM	20	14.013	18.1299
		14.263	18.2068
		14.487	18.2538
	40	14.0229	37.5955
		14.2729	37.5325
		14.4771	37.6048

Table 11. OBW, Test Results

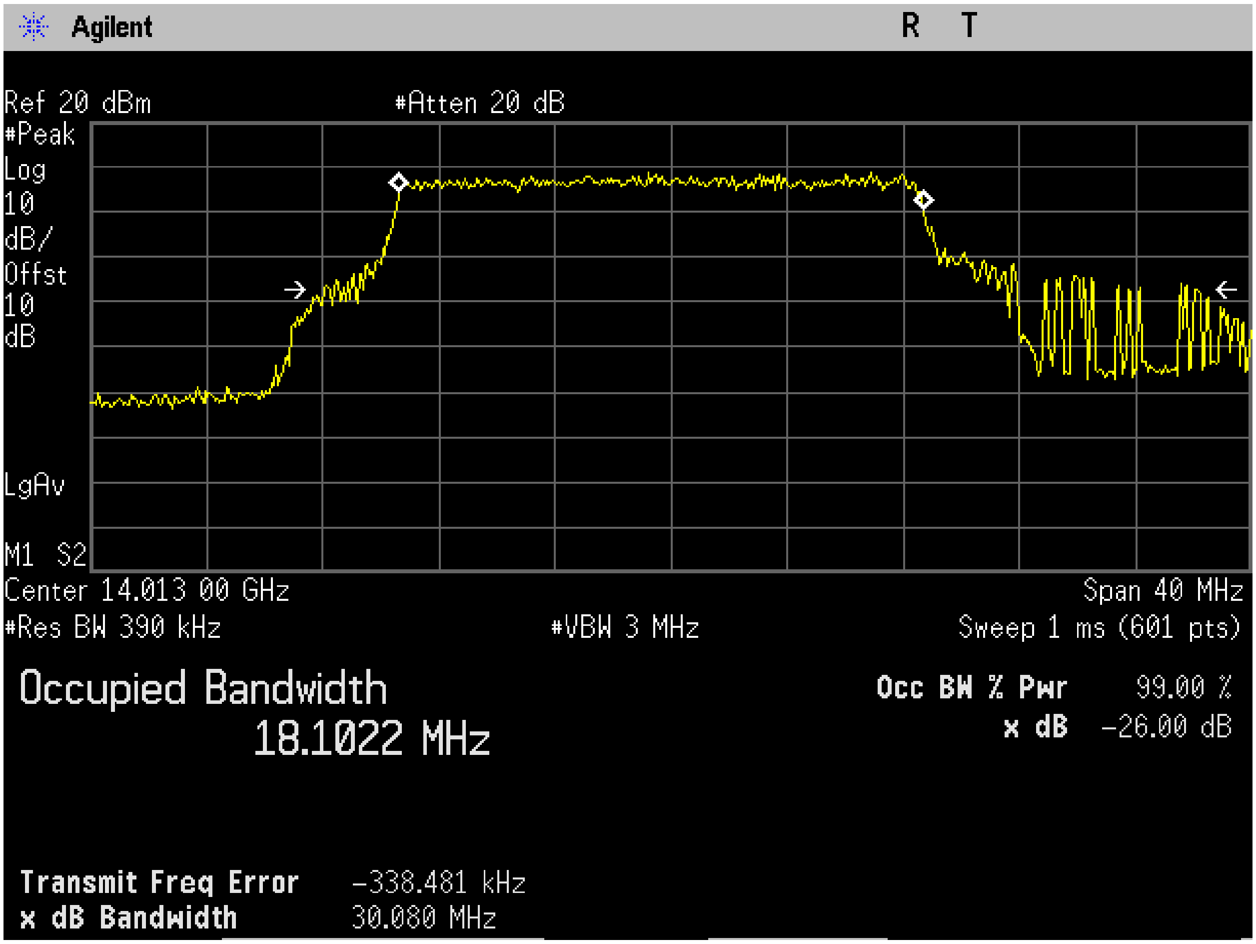


Figure 169. OBW, QPSK, 20MHz, Low Channel.

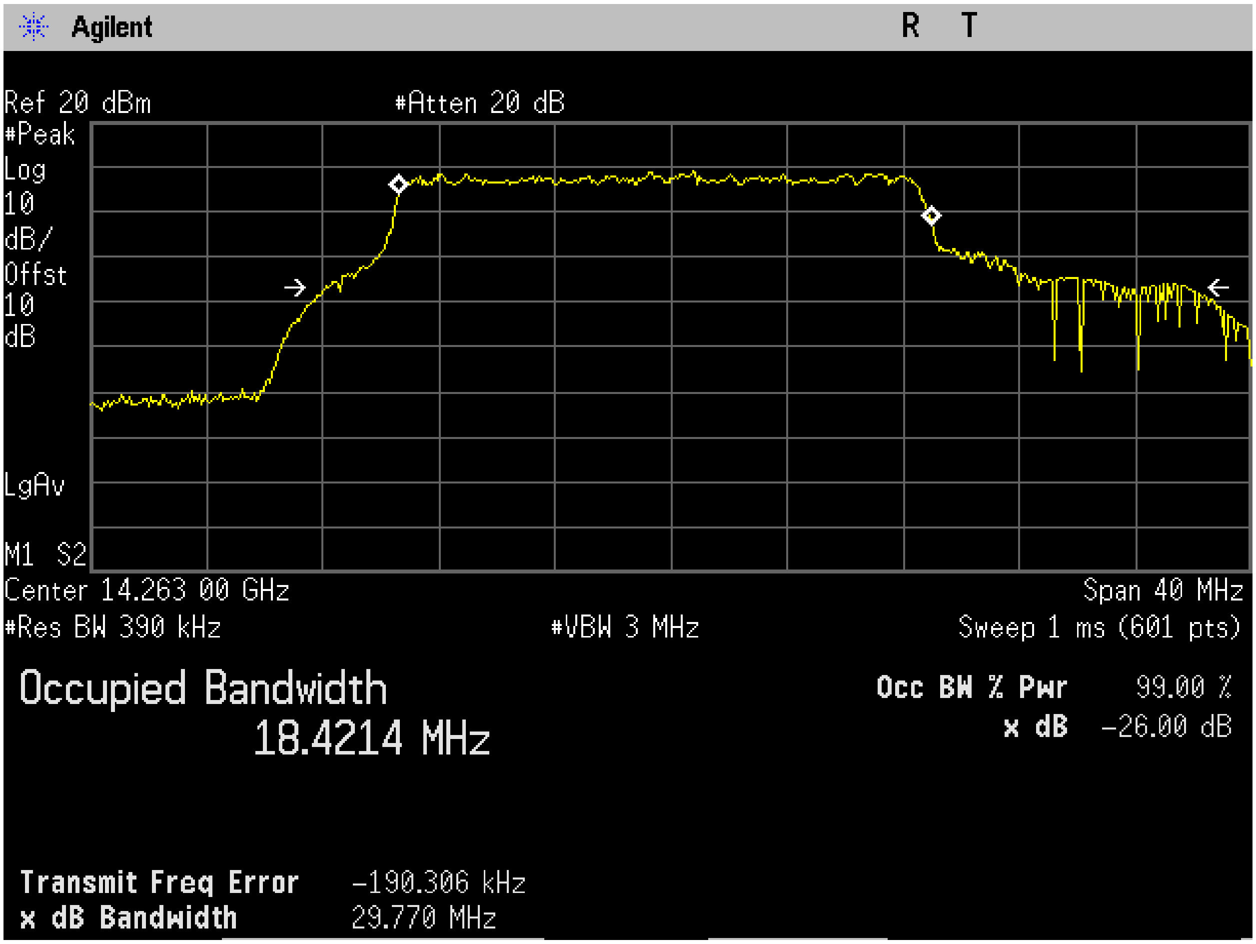


Figure 170. OBW, QPSK, 20MHz, Mid Channel.

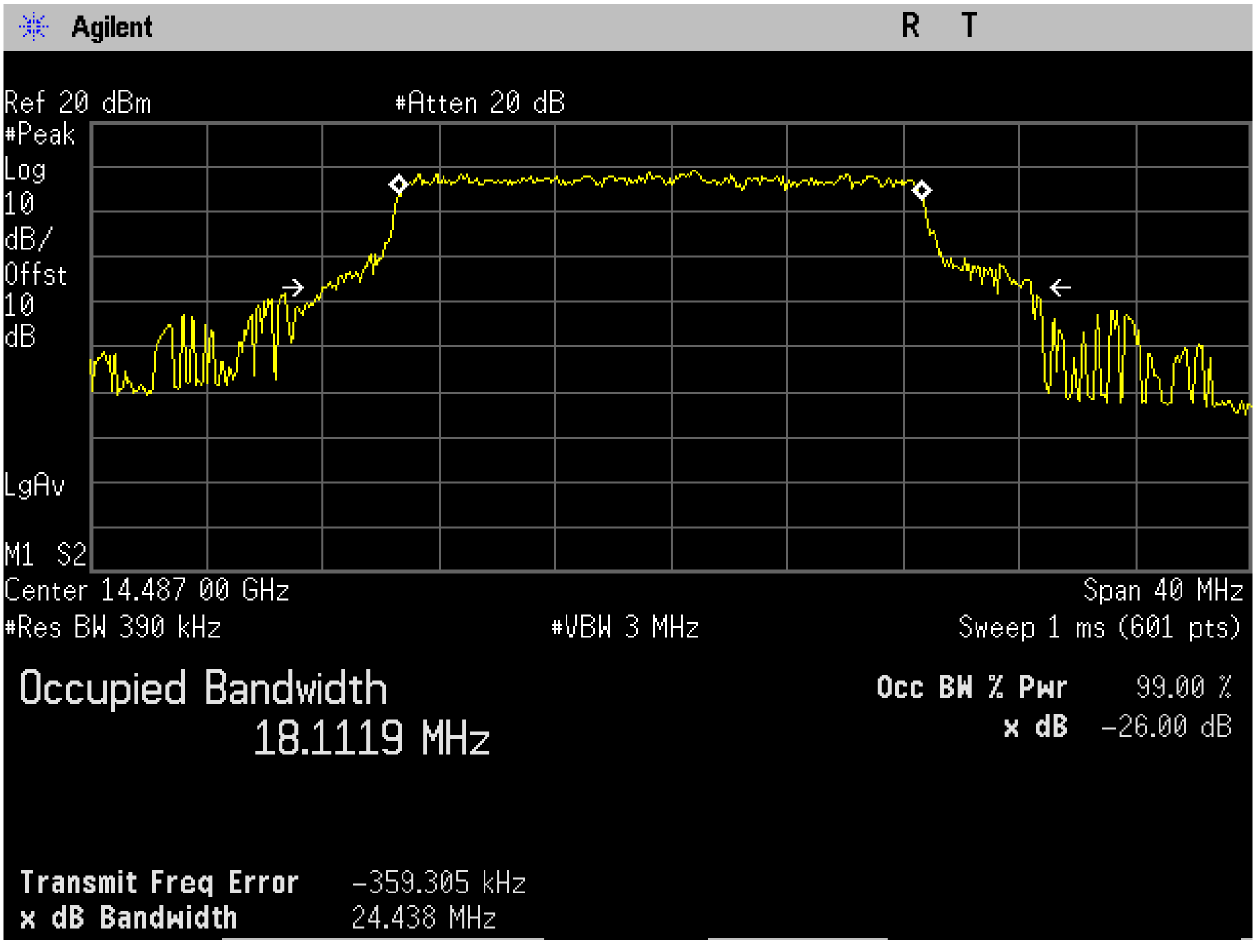


Figure 171. OBW, QPSK, 20MHz, High Channel.

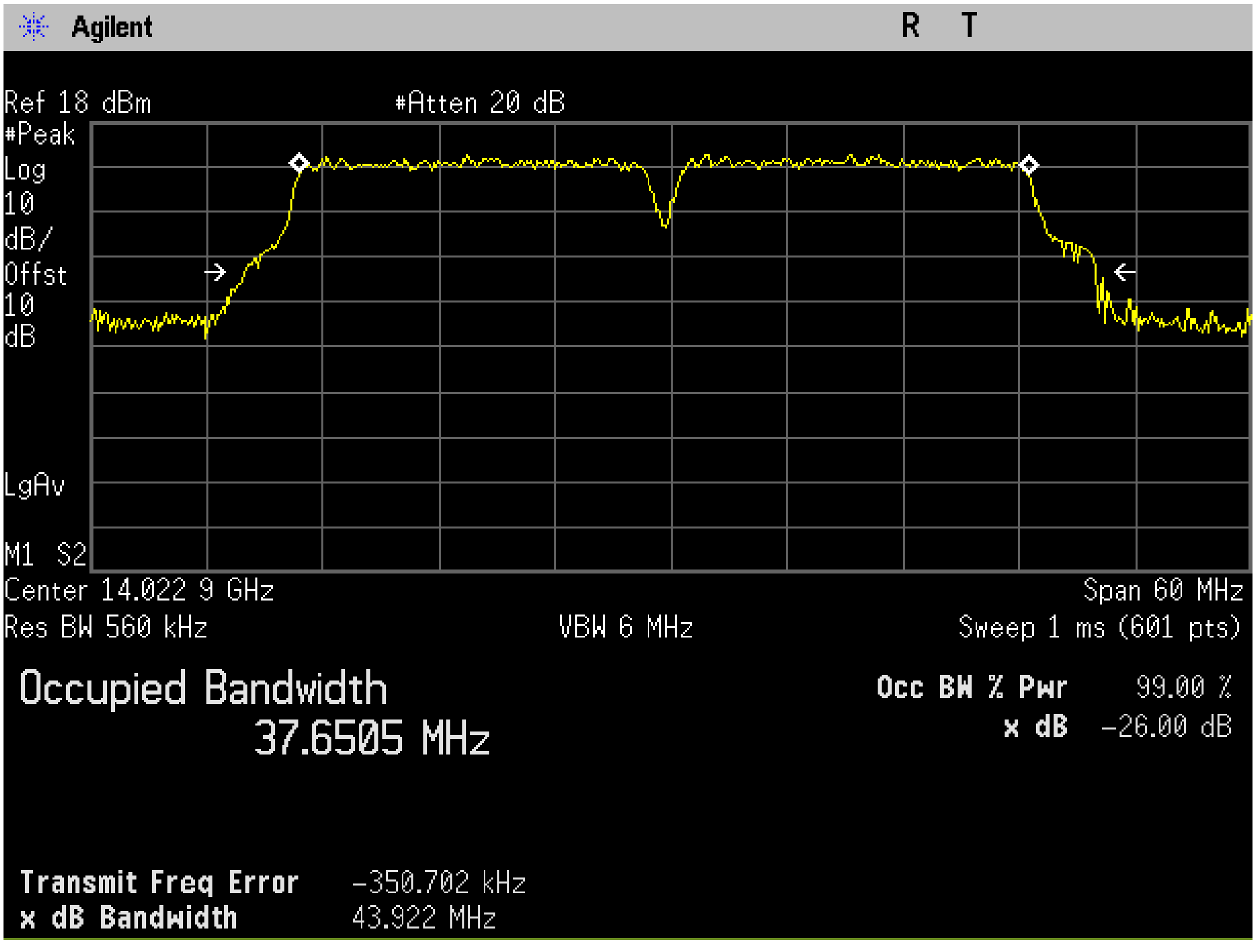


Figure 172. OBW, QPSK, 40MHz, Low Channel.

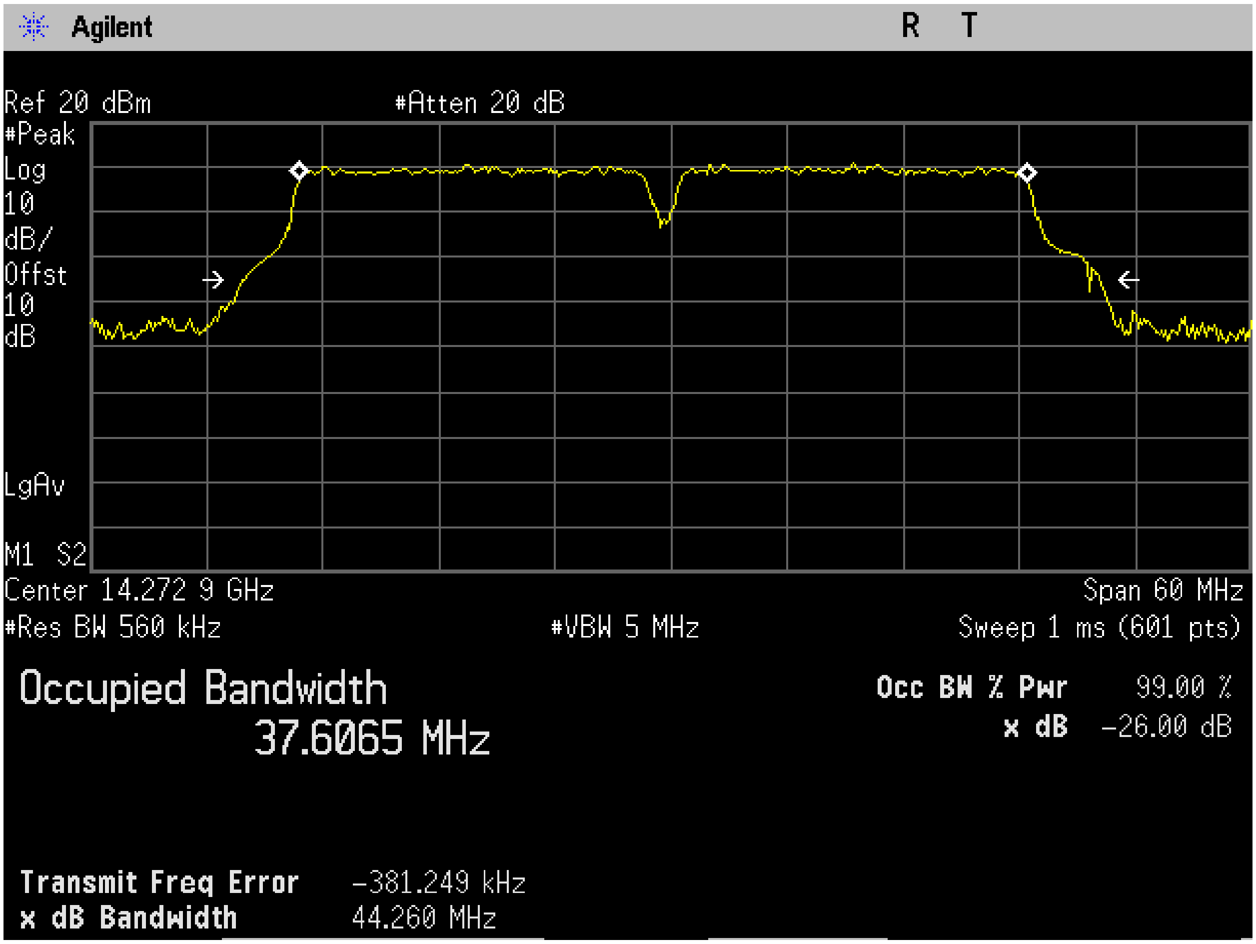


Figure 173. OBW, QPSK, 40MHz, Mid Channel.

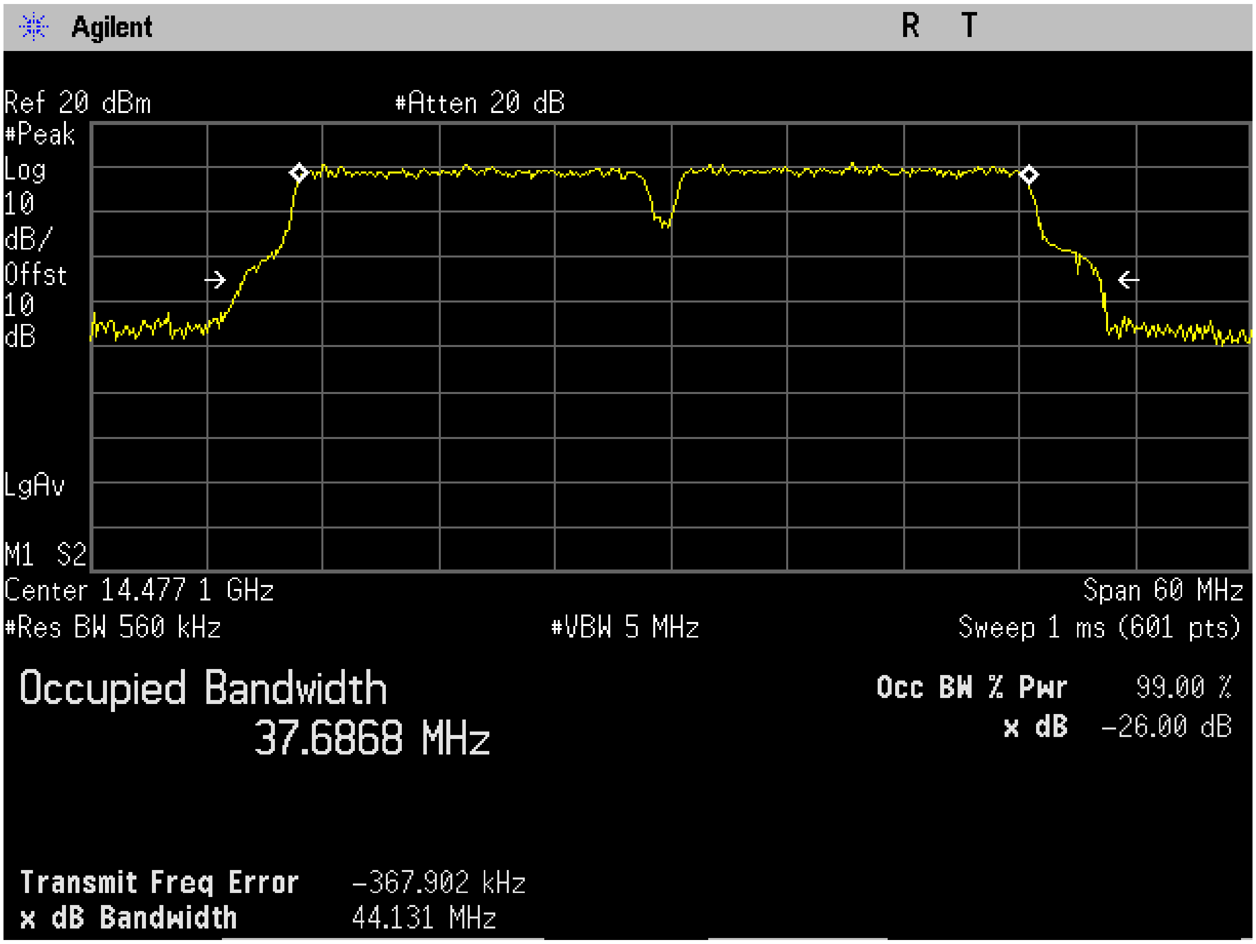


Figure 174. OBW, QPSK, 40MHz, High Channel.

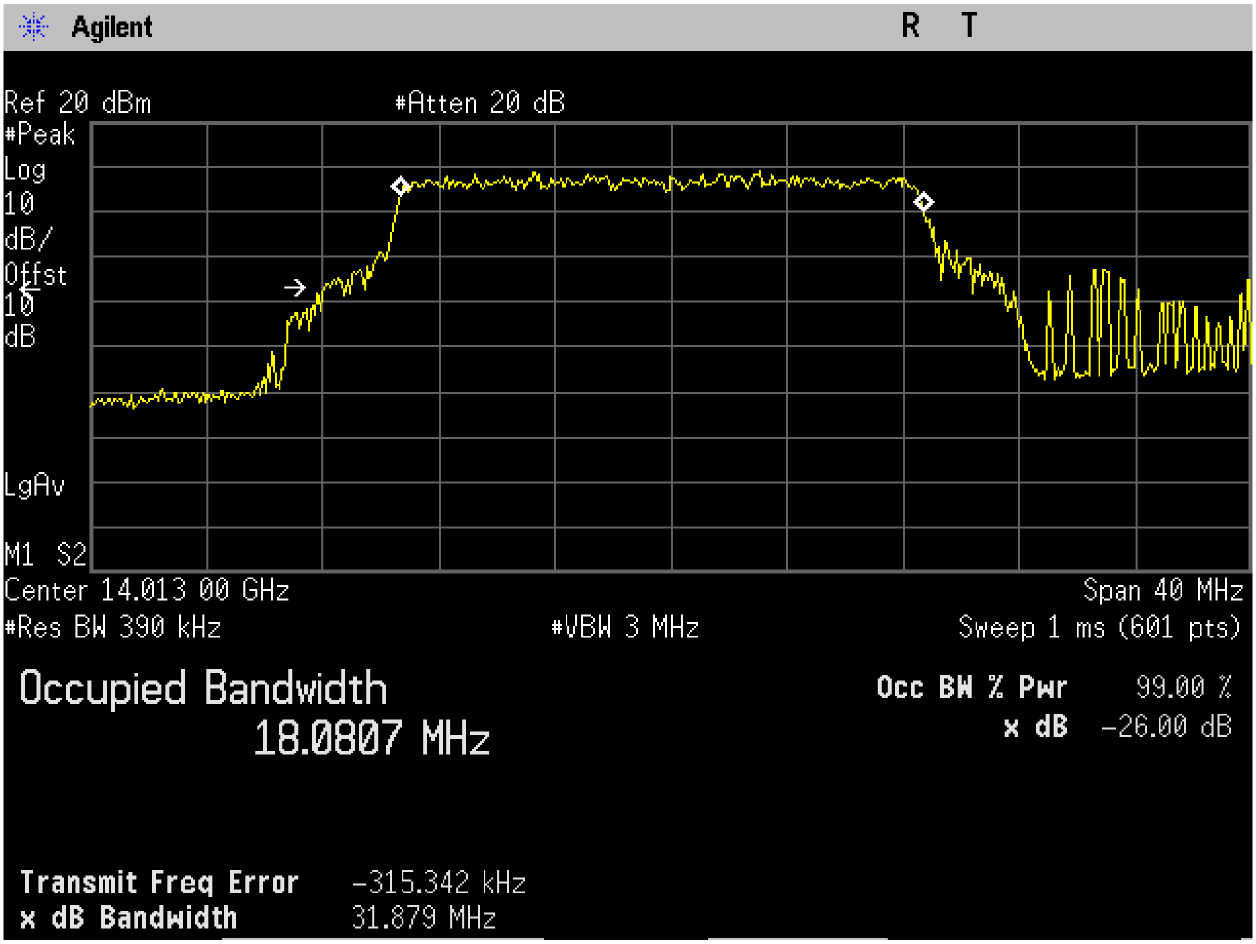


Figure 175. OBW, 8PSK, 20MHz, Low Channel.

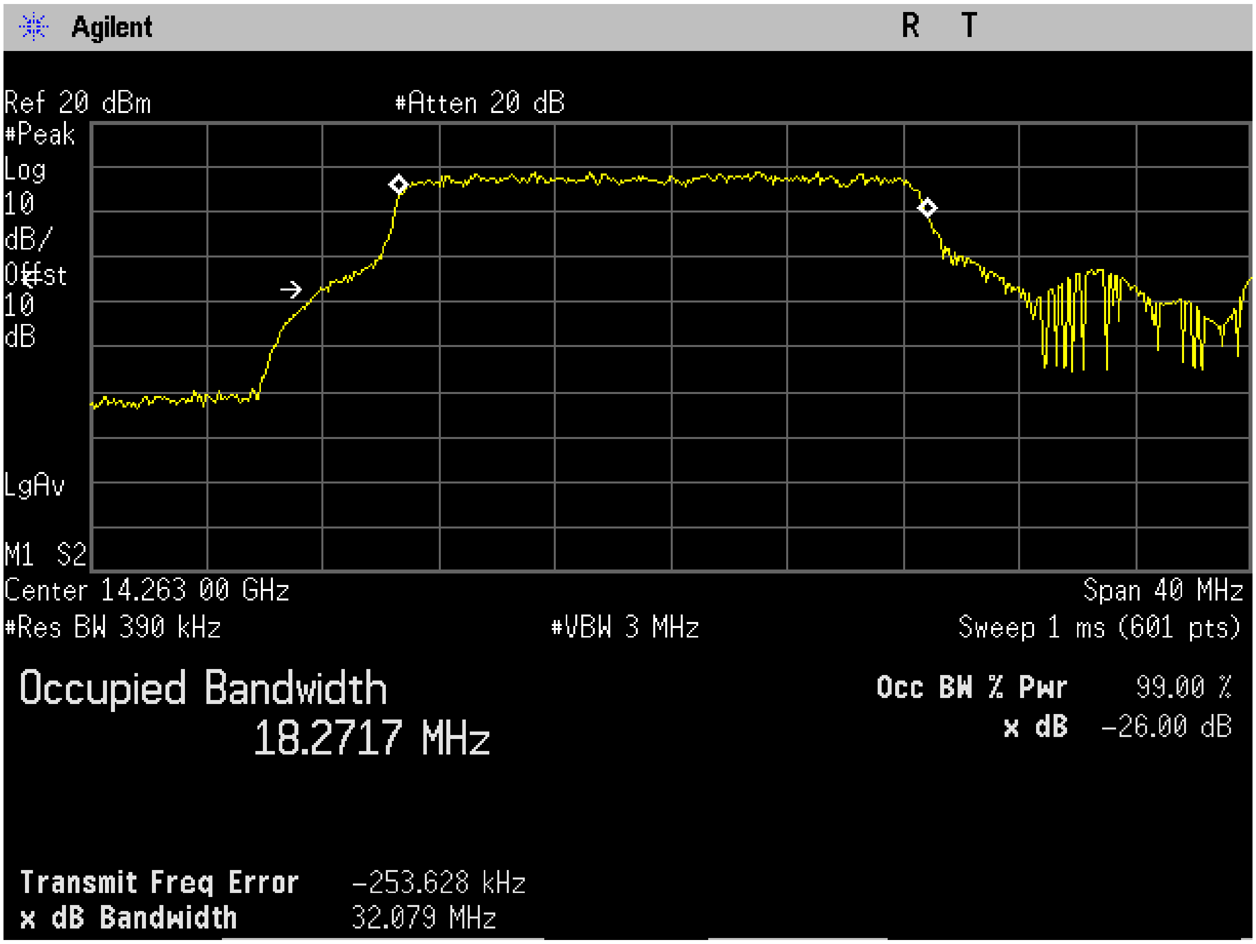


Figure 176. OBW, 8PSK, 20MHz, Mid Channel.

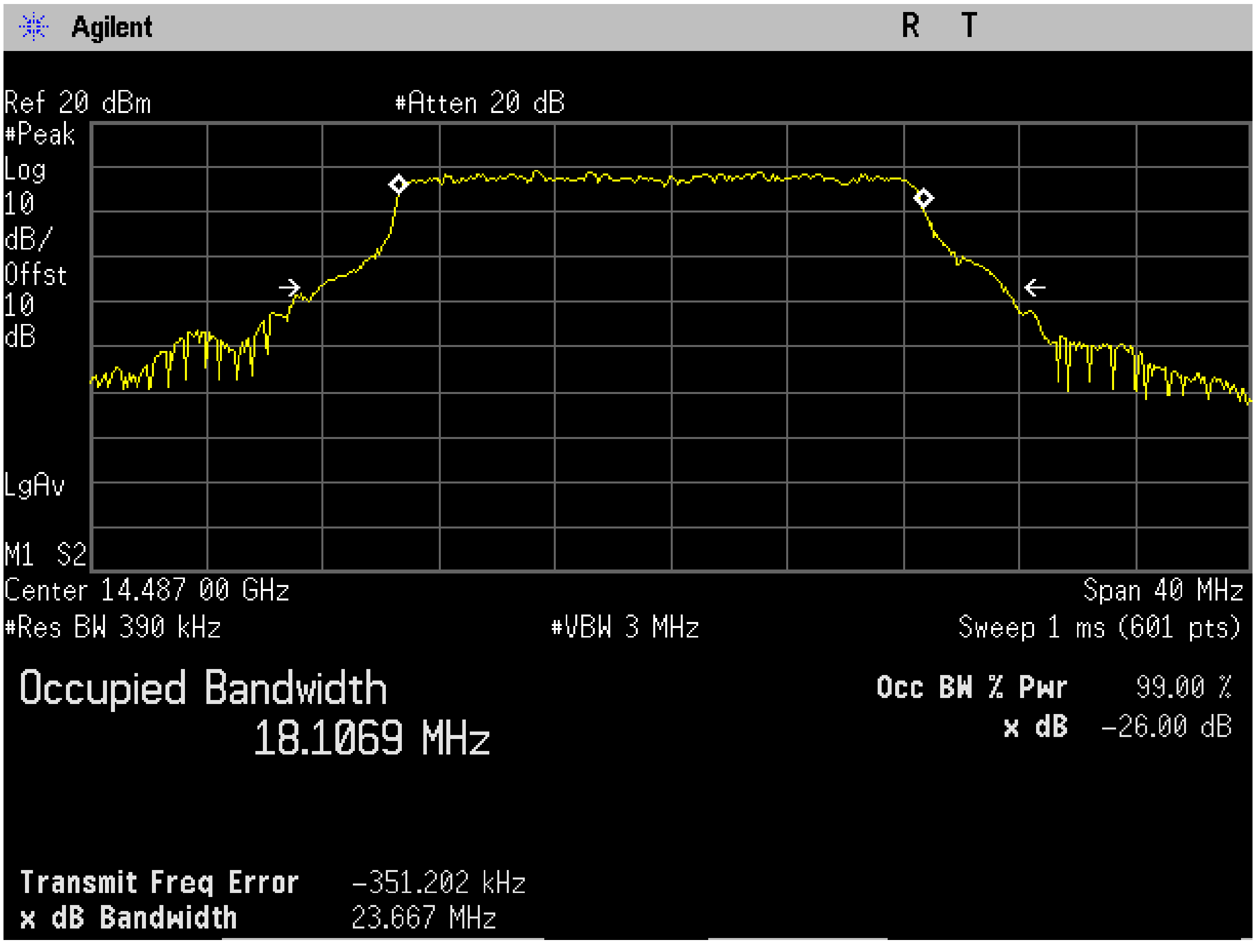


Figure 177. OBW, 8PSK, 20MHz, High Channel.

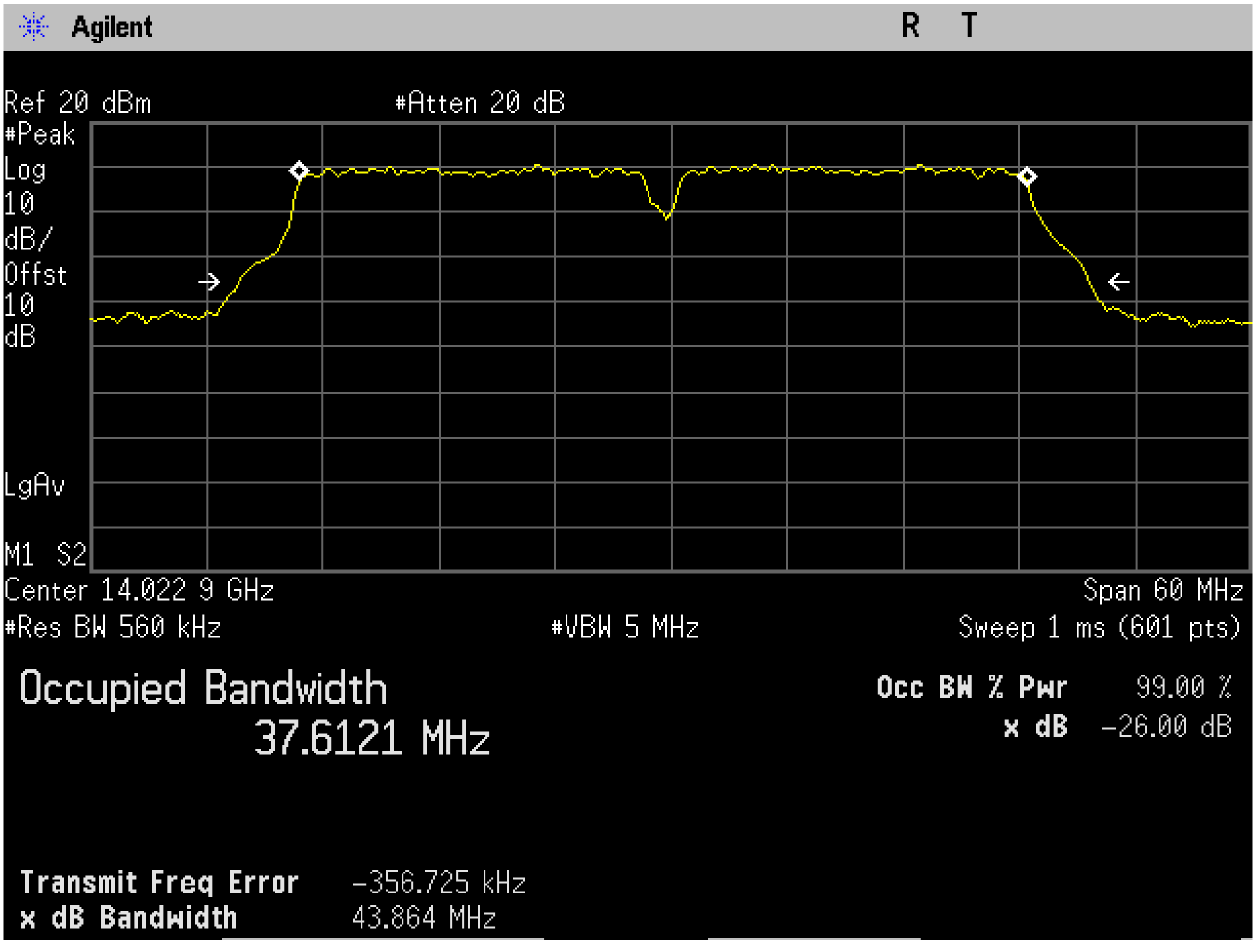


Figure 178. OBW, 8PSK, 40MHz, Low Channel.

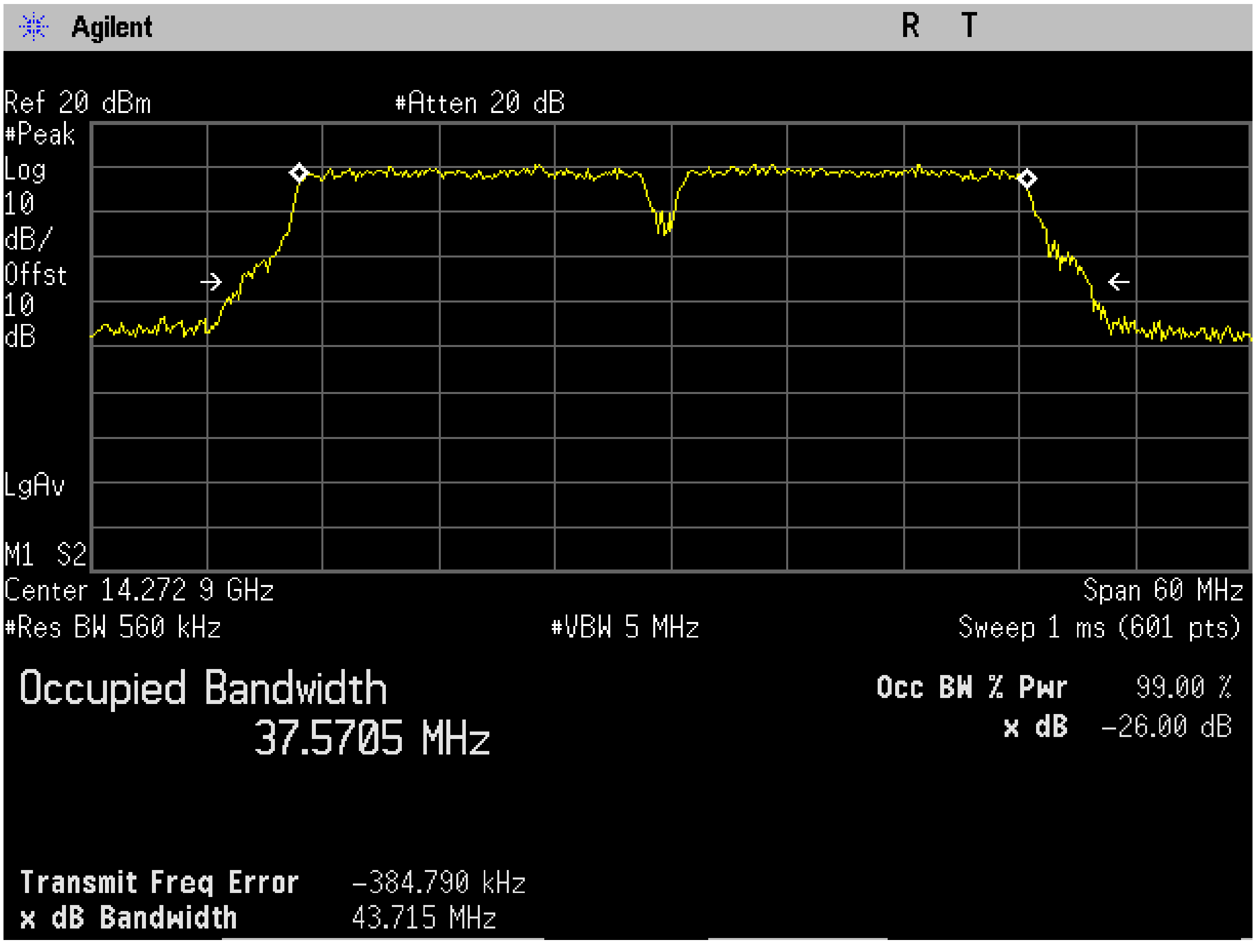


Figure 179. OBW, 8PSK, 40MHz, Mid Channel.

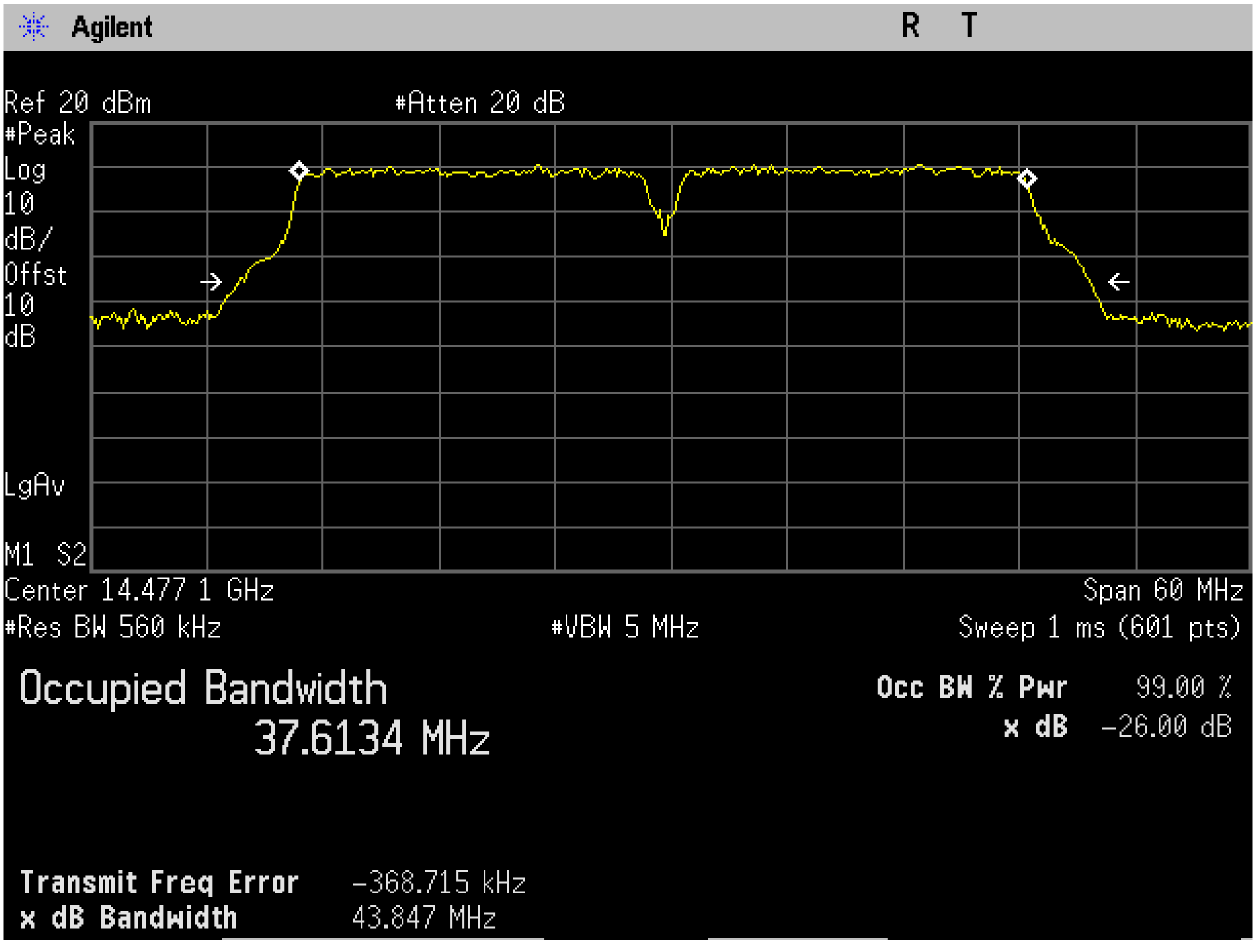


Figure 180. OBW, 8PSK, 40MHz, High Channel.

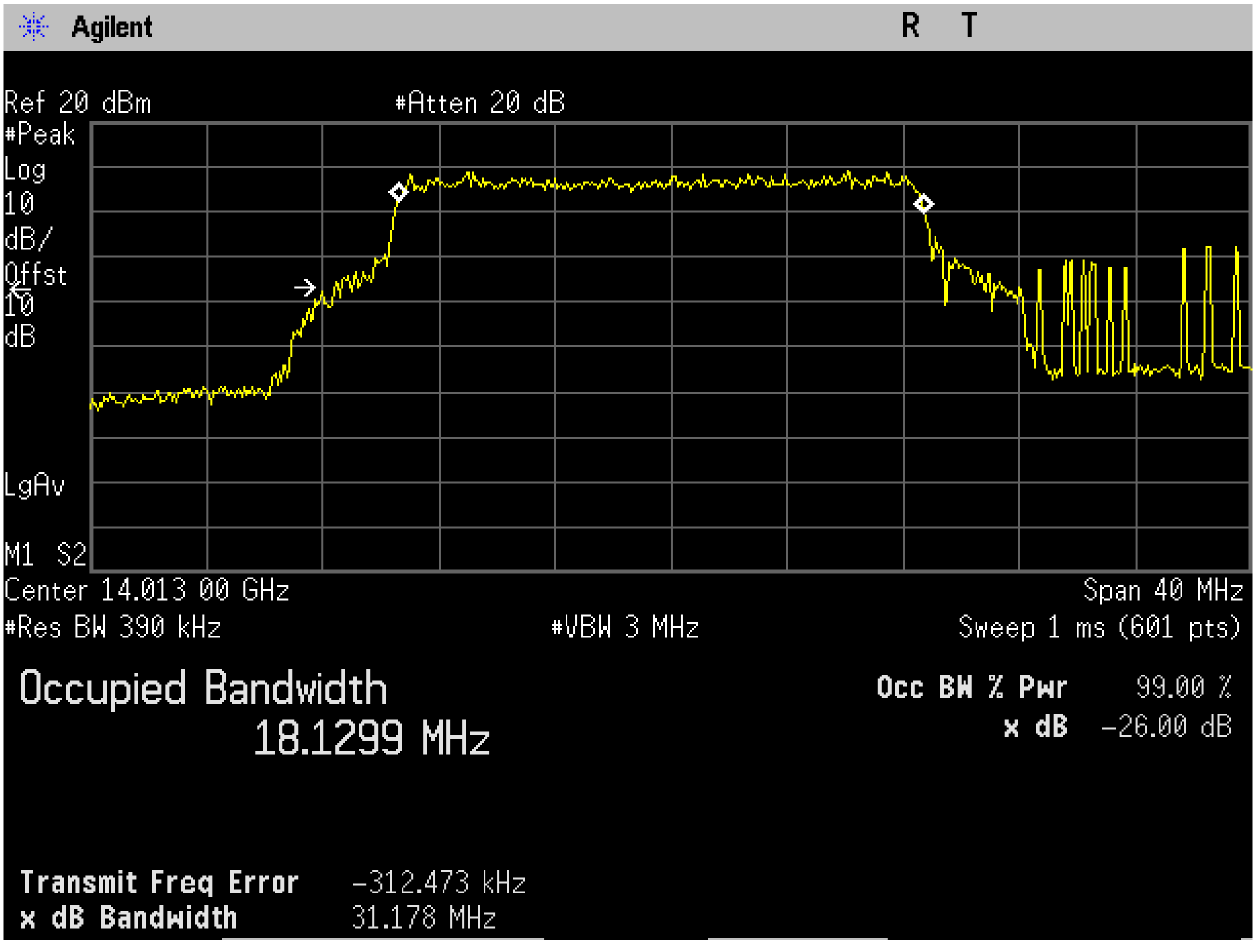


Figure 181. OBW, 16QAM, 20MHz, Low Channel.

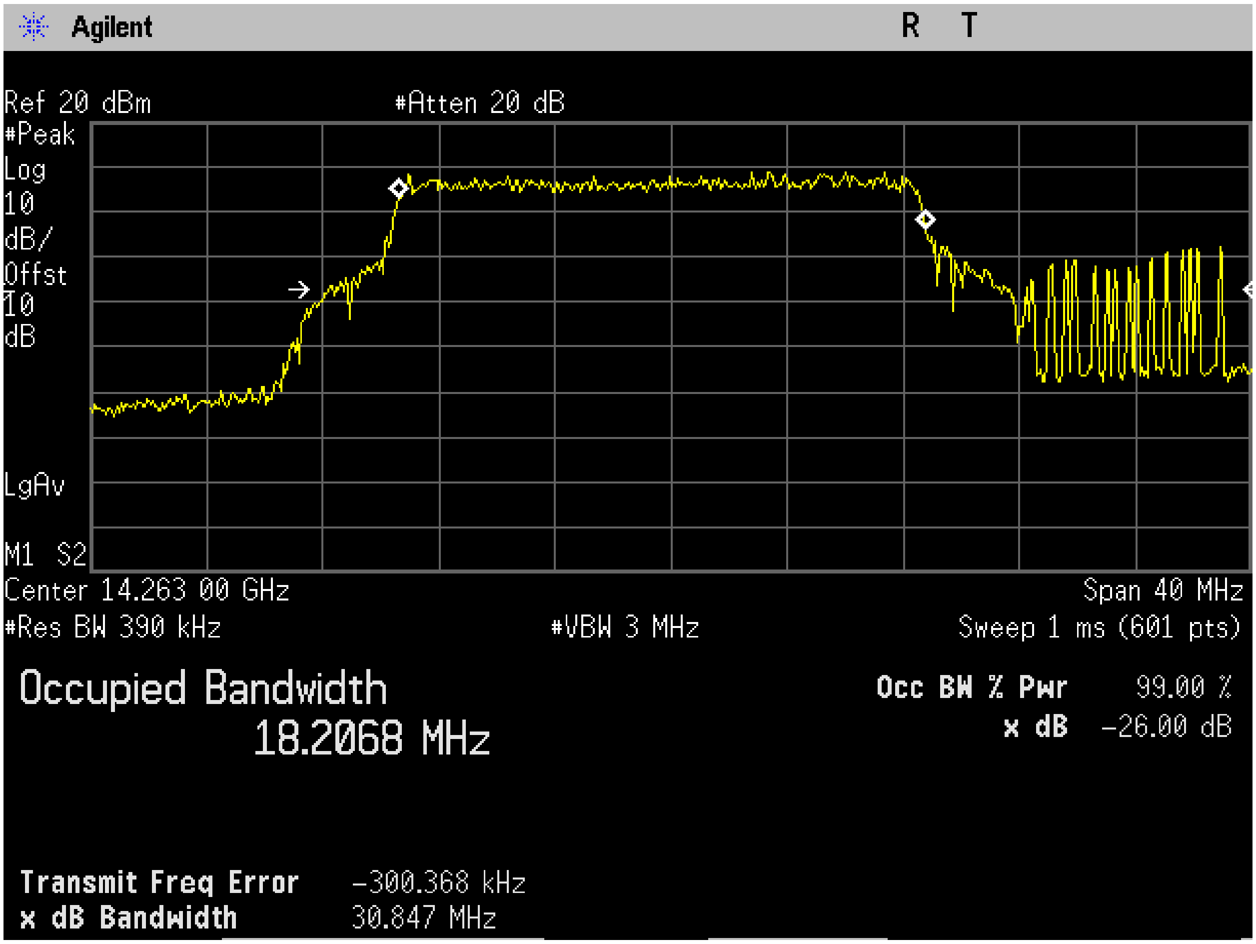


Figure 182. OBW, 16QAM, 20MHz, Mid Channel.

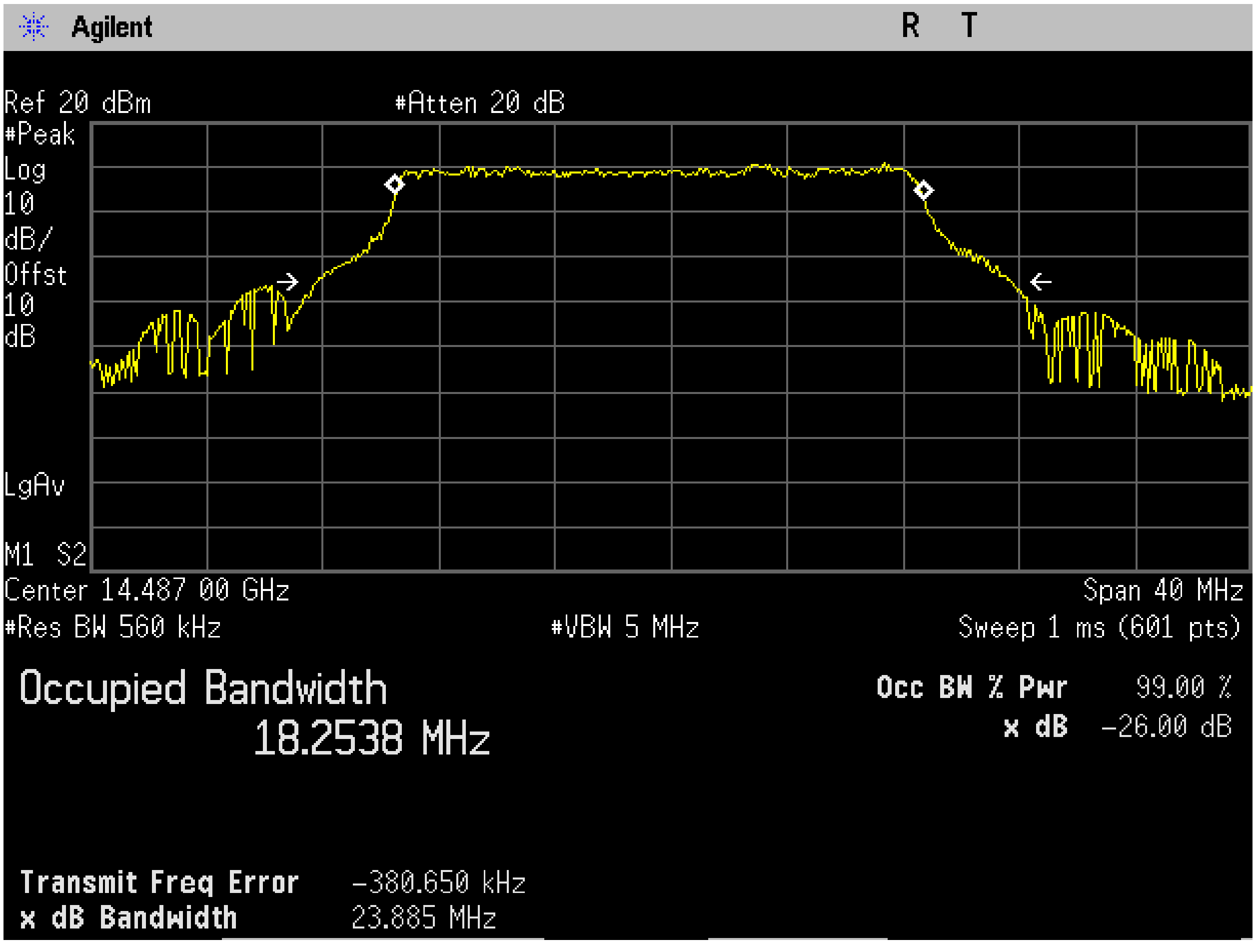


Figure 183. OBW, 16QAM, 20MHz, High Channel.

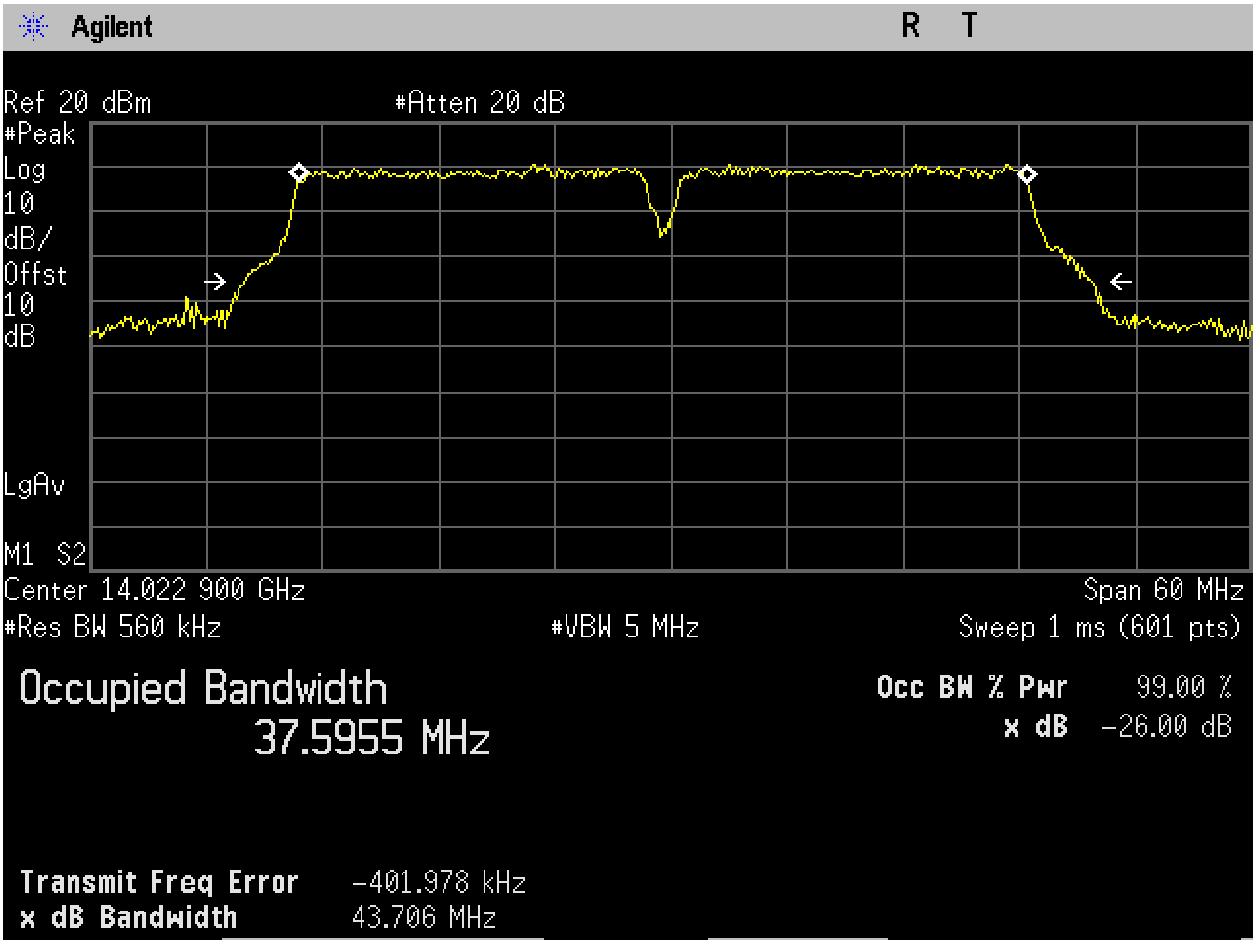


Figure 184. OBW, 16QAM, 40MHz, Low Channel.

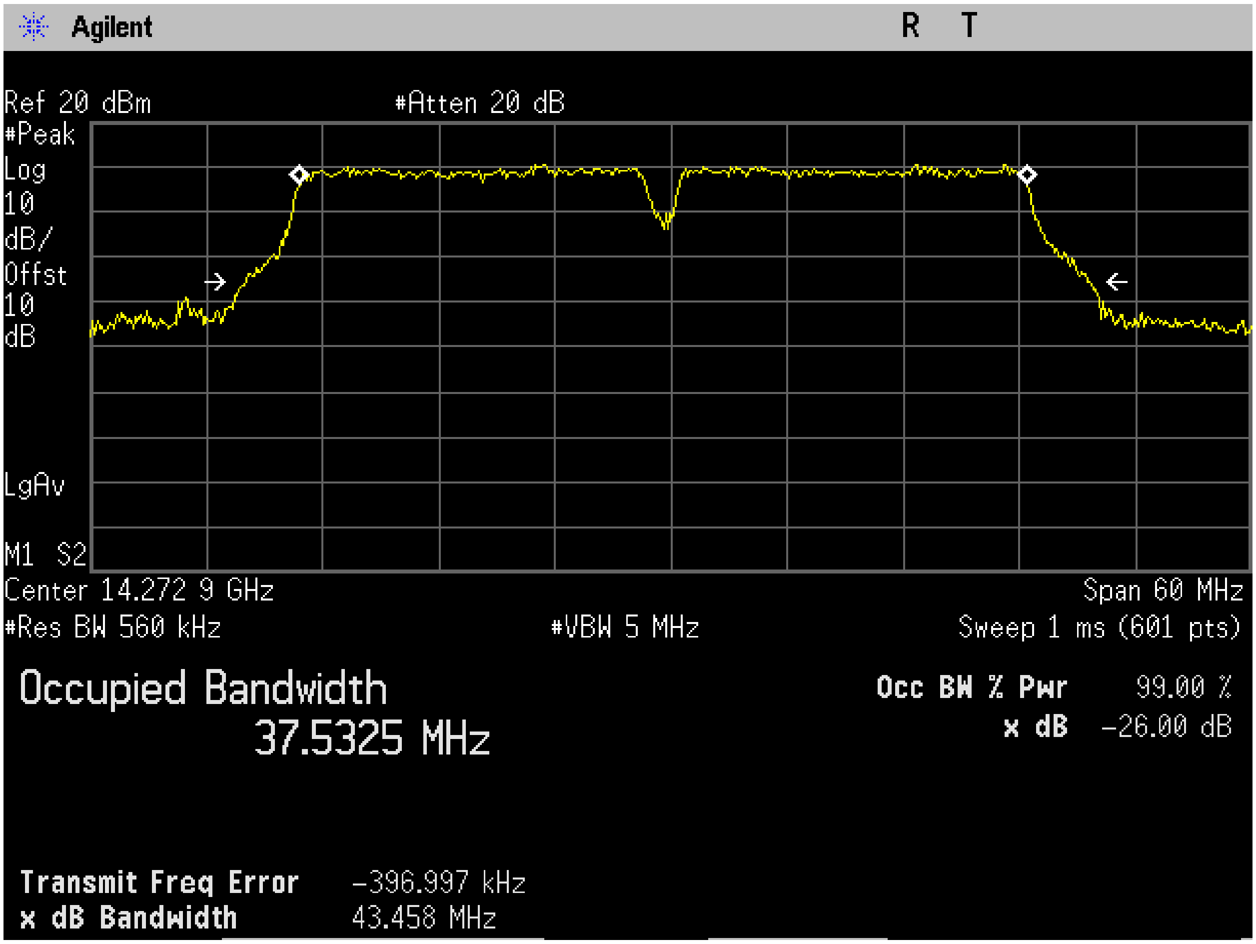


Figure 185. OBW, 16QAM, 40MHz, Mid Channel.

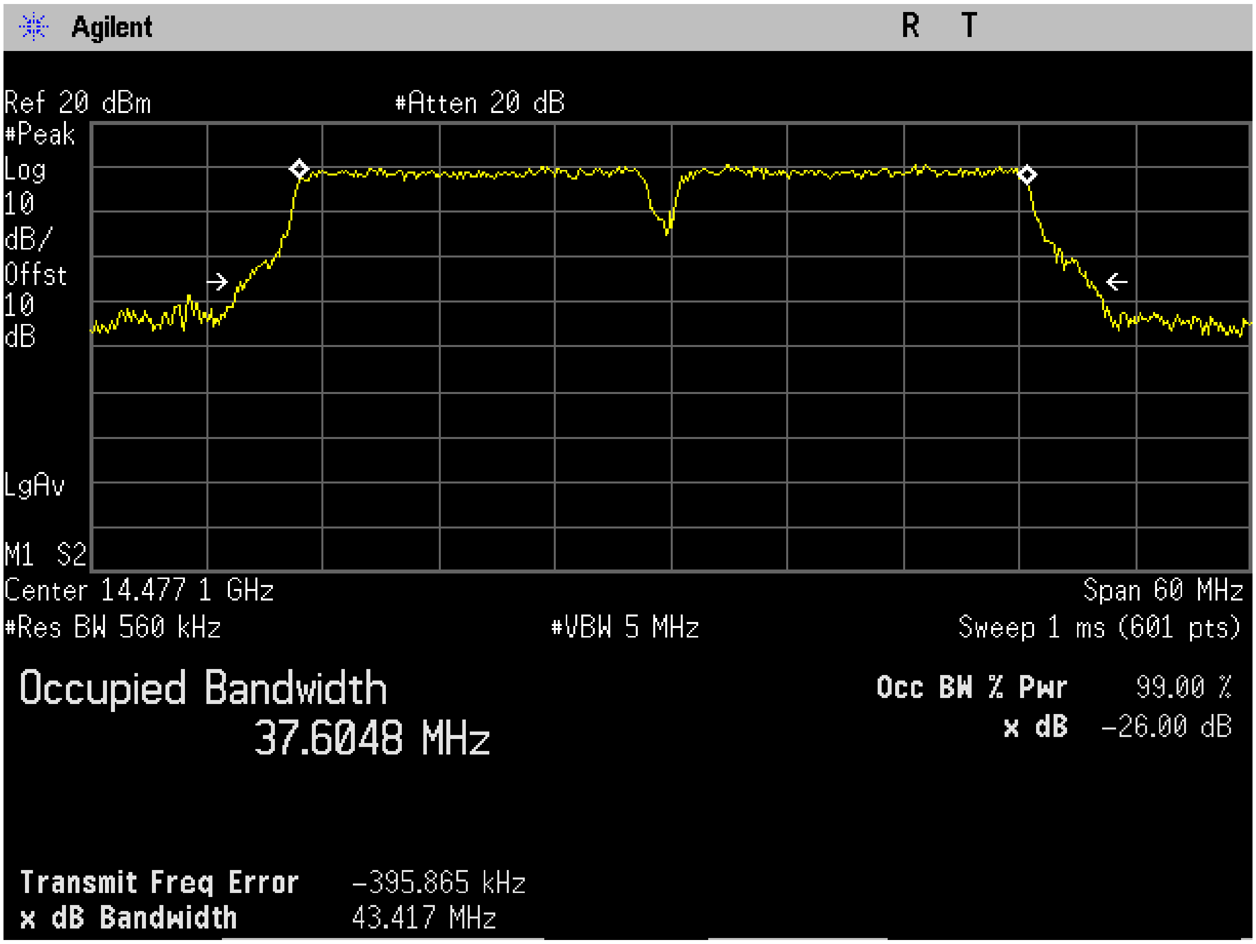


Figure 186. OBW, 16QAM, 40MHz, High Channel.

Electromagnetic Compatibility Criteria for Satellite Communications

§25.202(d) Frequency Stability

Test Requirement(s): **§25.202(d) Frequency Tolerance, Earth Stations –** The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

§2.1055(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

Test Procedure: The frequency stability was measured following subclause 5.6.3 of ANSI C63.26-2015. The EUT was set to transmit at max power. At nominal input voltage and at 20°C, the center frequency of each channel was measured using a frequency counter. At 20°C, the input voltage was varied between 85% and 115% of nominal and the measurement was repeated. The temperature was increased and decreased in increments of no more than 10°C and the center frequency measurement was repeated For each case, the measured center frequency was compared to the reference frequency taken at 20°C and 120vac.

Test Results: The EUT is **compliant** with the requirements of this section.

Test Engineer: Donald Salguero

Test Date: June 20 – June 21, 2024

Temperature [°C]	Voltage [VAC]	Measured Carrier Frequency with Time Elapsed			
		Startup (Hz)	2min (Hz)	5min (Hz)	10min (Hz)
-30	120	14262990437.741	14262991890.226	14262992659.380	14262992662.067
-20	120	14262985874.996	14262985978.920	14262985216.915	14262986204.011
-10	120	14262988325.482	14262988337.012	14262988347.023	14262988101.652
0	120	14262989532.775	14262988978.904	14262989192.801	14262989163.066
10	120	14262990719.961	14262990806.659	14262990495.591	14262990757.018
20	120	14262999478.124	14263003223.234	14263010397.783	14263002717.839
30	120	14262979046.886	14262984551.150	14262982619.504	14262986500.596
40	120	14262985315.379	14262985747.776	14262983424.535	14262986792.054
50	120	14262991196.221	14262992481.693	14262988370.432	14262988191.290

Temperature [°C]	Voltage [VAC]	Frequency Tolerance			
		Startup (ppm)	2min (ppm)	5min (ppm)	10min (ppm)
-30	120	0.670	0.569	0.515	0.514
-20	120	0.990	0.983	1.036	0.967
-10	120	0.819	0.818	0.817	0.834
0	120	0.734	0.773	0.758	0.760
10	120	0.651	0.645	0.666	0.648
20	120	0.037	0.226	0.729	0.191
30	120	1.469	1.083	1.219	0.946
40	120	1.030	0.999	1.162	0.926
50	120	0.617	0.527	0.815	0.828

Table 12. Temperature Variation, Frequency Stability Data

Ref. Freq. (GHz)	Voltage [Vac]	Measured Carrier Frequency with Time Elapsed			
		Startup (Hz)	2min (Hz)	5min (Hz)	10min (Hz)
14.013	85%	14012996703.681	14012996739.146	14012996800.903	14012996934.331
	100%	14012998107.098	14012998260.283	14012998346.771	14012997982.347
	115%	14012996731.500	14012996461.037	14012996823.698	14012996935.068
14.263	85%	14262997065.106	14262996747.197	14262996828.774	14262997141.494
	100%	14262998398.470	14262998378.935	14262998560.564	14262998613.490
	115%	14262996666.120	14262996831.682	14262996904.111	14262997160.974
14.487	85%	14486996097.689	14486995874.696	14486996034.378	14486996272.648
	100%	14486997682.645	14486997550.941	14486997846.016	14486995517.441
	115%	14486996300.878	14486996470.401	14486996370.217	14486995456.375

Ref. Freq. (GHz)	Voltage [Vac]	Frequency Tolerance			
		Startup (Hz)	2min (Hz)	5min (Hz)	10min (Hz)
14.013	85%	0.235	0.233	0.228	0.219
	100%	0.135	0.124	0.118	0.144
	115%	0.233	0.253	0.227	0.219
14.263	85%	0.206	0.228	0.222	0.200
	100%	0.112	0.114	0.101	0.097
	115%	0.234	0.222	0.217	0.199
14.487	85%	0.269	0.285	0.274	0.257
	100%	0.160	0.169	0.149	0.309
	115%	0.255	0.244	0.251	0.314

Table 13. Voltage Variation, Frequency Stability Data

Photograph 1. Frequency Stability Setup

Electromagnetic Compatibility Criteria for Satellite Communications

§2.1053 Cabinet Spurious Radiation

Test Requirement(s): **§2.1053** (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

(2) All equipment operating on frequencies higher than 25 MHz.

(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.

(4) Other types of equipment as required, when deemed necessary by the Commission.

§25.202 (f) Emission limitations. Except for SDARS terrestrial repeaters and as provided for in paragraph (i), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The out-of-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

(4) In any event, when an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraphs (f) (1), (2) and (3) of this section.

Test Procedure: The measurements were made in accordance with subclause 5.5 of ANSI C63.26-2015. The EUT was placed on the support table at height of 80cm (below 1GHz) or 1.5m (above 1GHz) inside the semi anechoic chamber. Low, mid, and high channels were investigated. A biconilog receiving antenna on an antenna mast was positioned at a distance of 3 meter for measurements in the 30-1000MHz range. For measurements between 1GHz – 40GHz, a horn antenna was used at a distance of 3 meters. Between 40GHz – 50GHz, measurements were done at a 1m distance. Above 50GHz, the separation distance was less than 0.5m. Measurements were recorded with both polarizations, using calibrated antennas and spectrum analyzers; no emissions of concern were observed.

Field strength measurements were converted to EIRP values and compared to the -limit using the following formula:

EIRP (dBm) = E (dBμV/m) + 20log(d) – 104.77, where ‘d’ is the measuring distance in meters.

Test Results: The EUT is **compliant** with the requirements of this section. Emissions were investigated up to 10th harmonic. Only noise floor observed on the higher frequencies, noise floor was below applicable limits.

Test Engineer: Donald Salguero

Test Date: June 7 – June 18, 2024

Modulation	Nominal Bandwidth (MHz)	Center Frequency (GHz)	Frequency of Interest (GHz)	Amplitude (dBm/3kHz)	Antenna Factor	Bandwidth Correction (dB)	Measuring Distance (m)	Corrected Amplitude (dBm/4kHz)	Limit (dBm/4kHz)	Margin (dB)
QPSK	20	14.013	52.6273925	-63.85	41.64	1.25	1	-18.73	-13	-5.73
		14.263	52.6227204	-64.06	41.64	1.25	1	-18.94	-13	-5.94
		14.487	52.6878236	-64.85	41.64	1.25	1	-19.73	-13	-6.73
	40	14.0229	52.6216417	-64.35	41.64	1.25	1	-19.23	-13	-6.23
		14.2729	52.6210001	-64.19	41.64	1.25	1	-19.07	-13	-6.07
		14.4771	52.6263209	-64.15	41.64	1.25	1	-19.03	-13	-6.03

Table 14. Radiated Spurious Emissions, Test Results

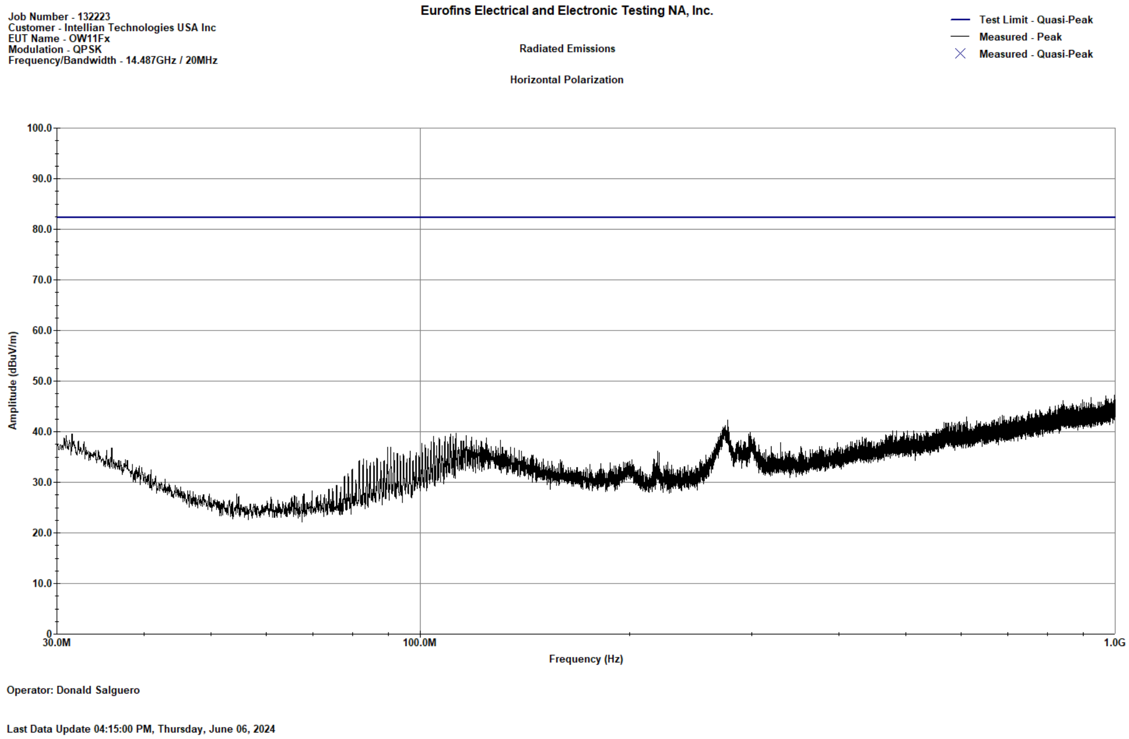


Figure 187. QPSK_20MHz_High Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_H

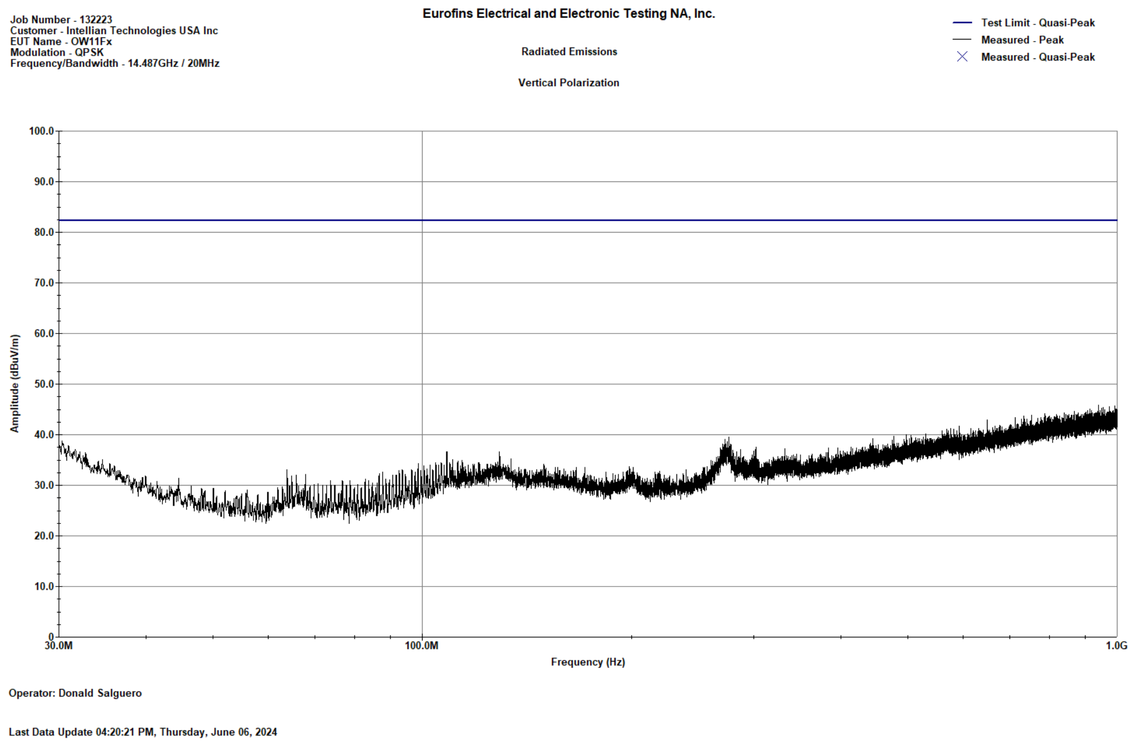


Figure 188. QPSK_20MHz_High Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_V

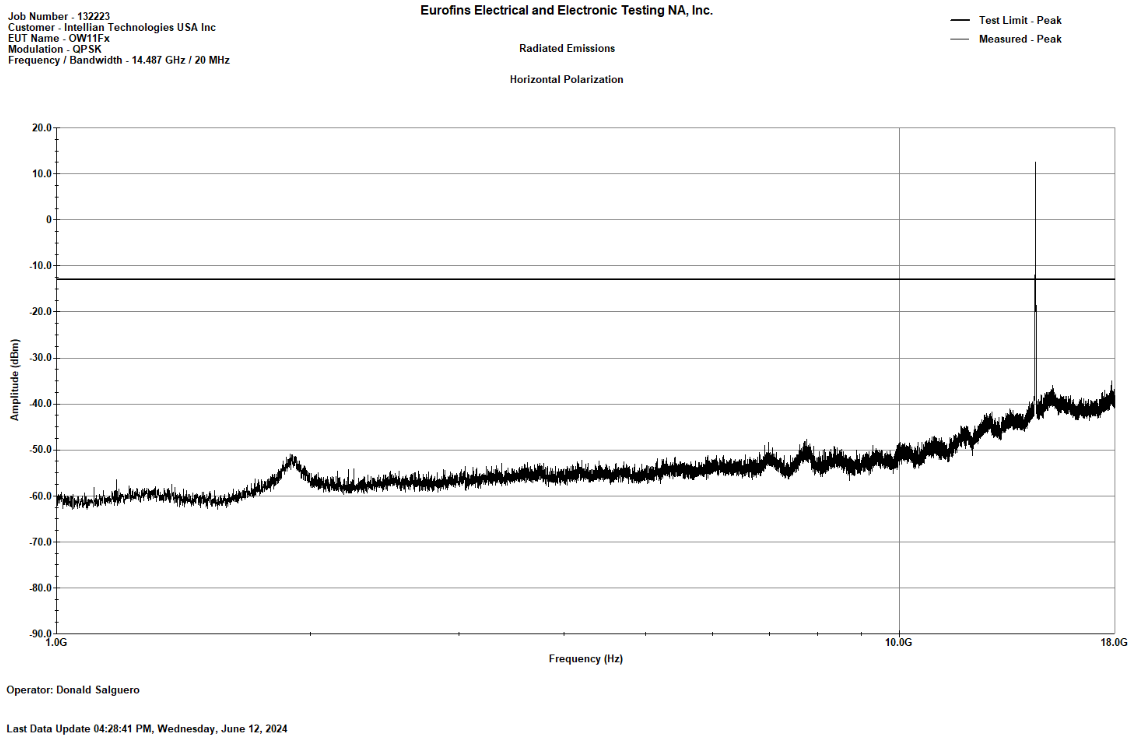


Figure 189. QPSK_20MHz_High Channel_Radiated Emissions, 1 - 18 GHz-_H

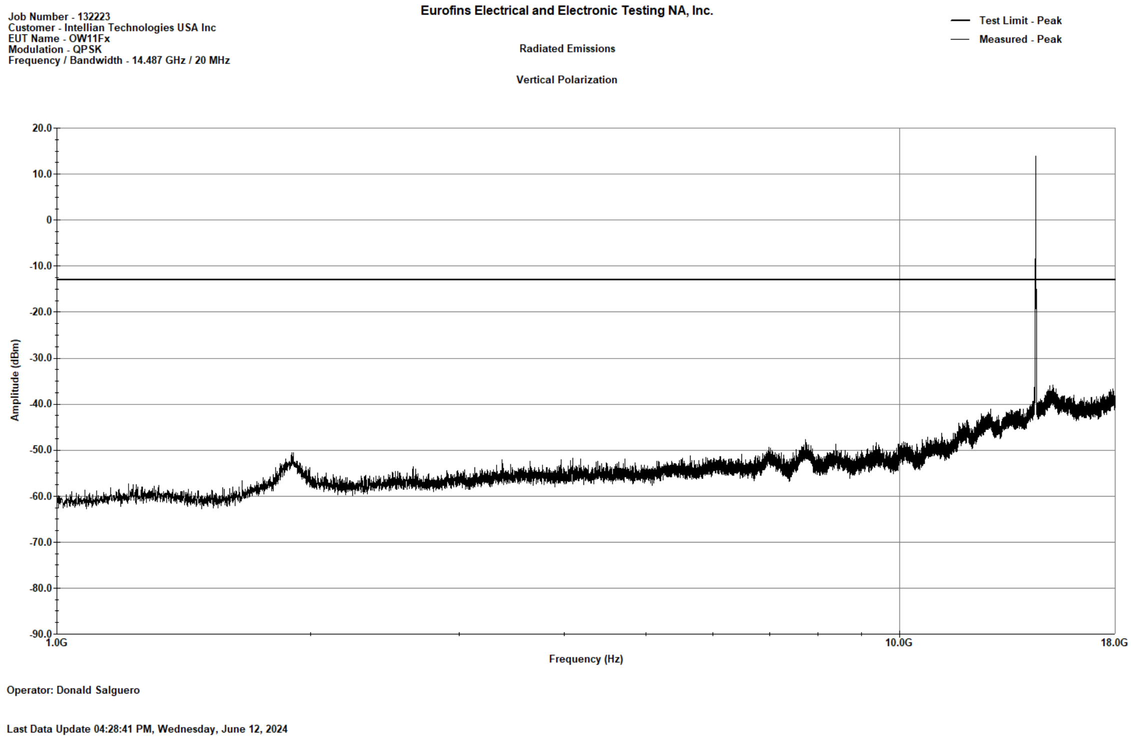


Figure 190. QPSK_20MHz_High Channel_Radiated Emissions, 1 - 18 GHz-_V

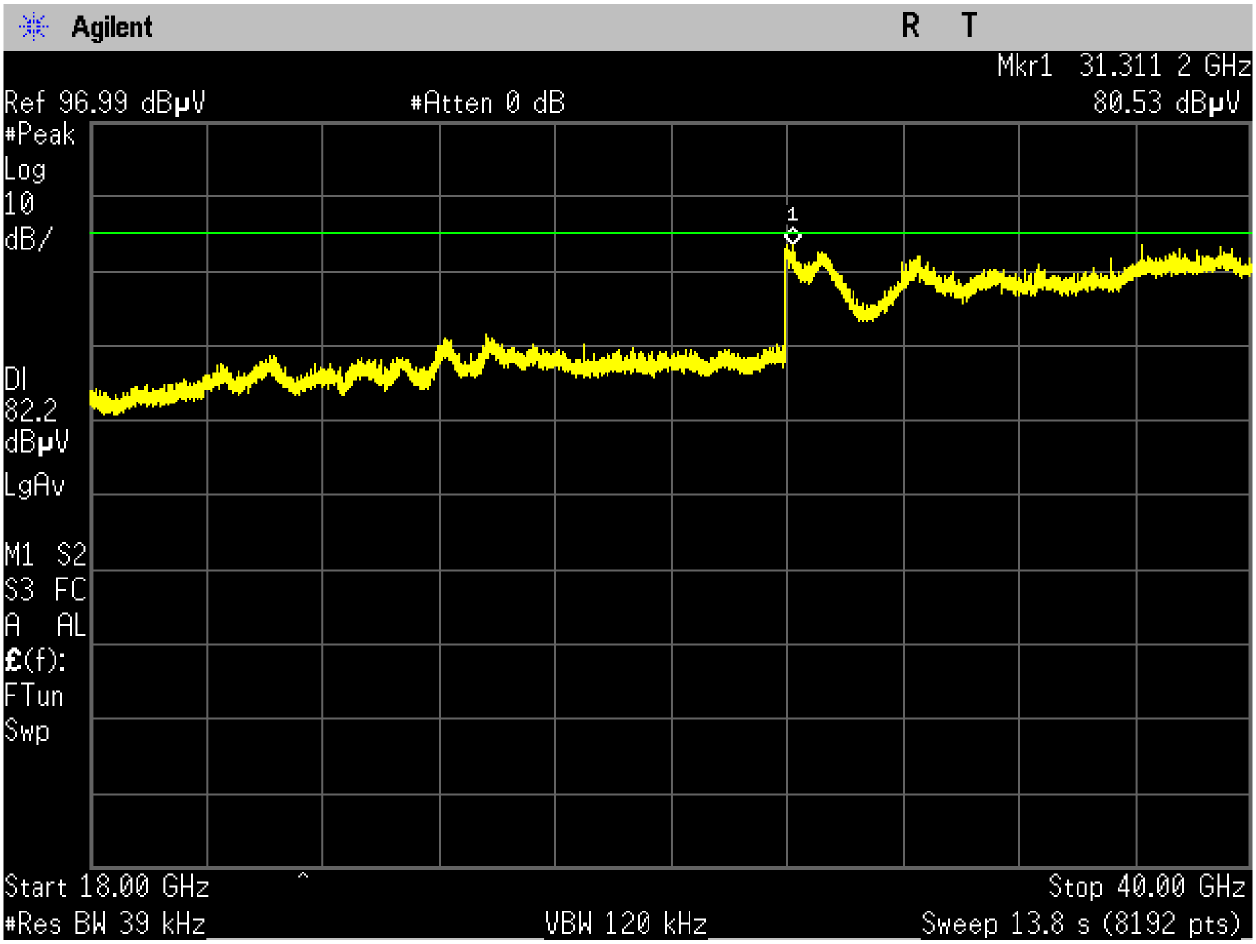


Figure 191. QPSK_20MHz_High Channel_Radiated Emissions, 18GHz - 40GHz_H.

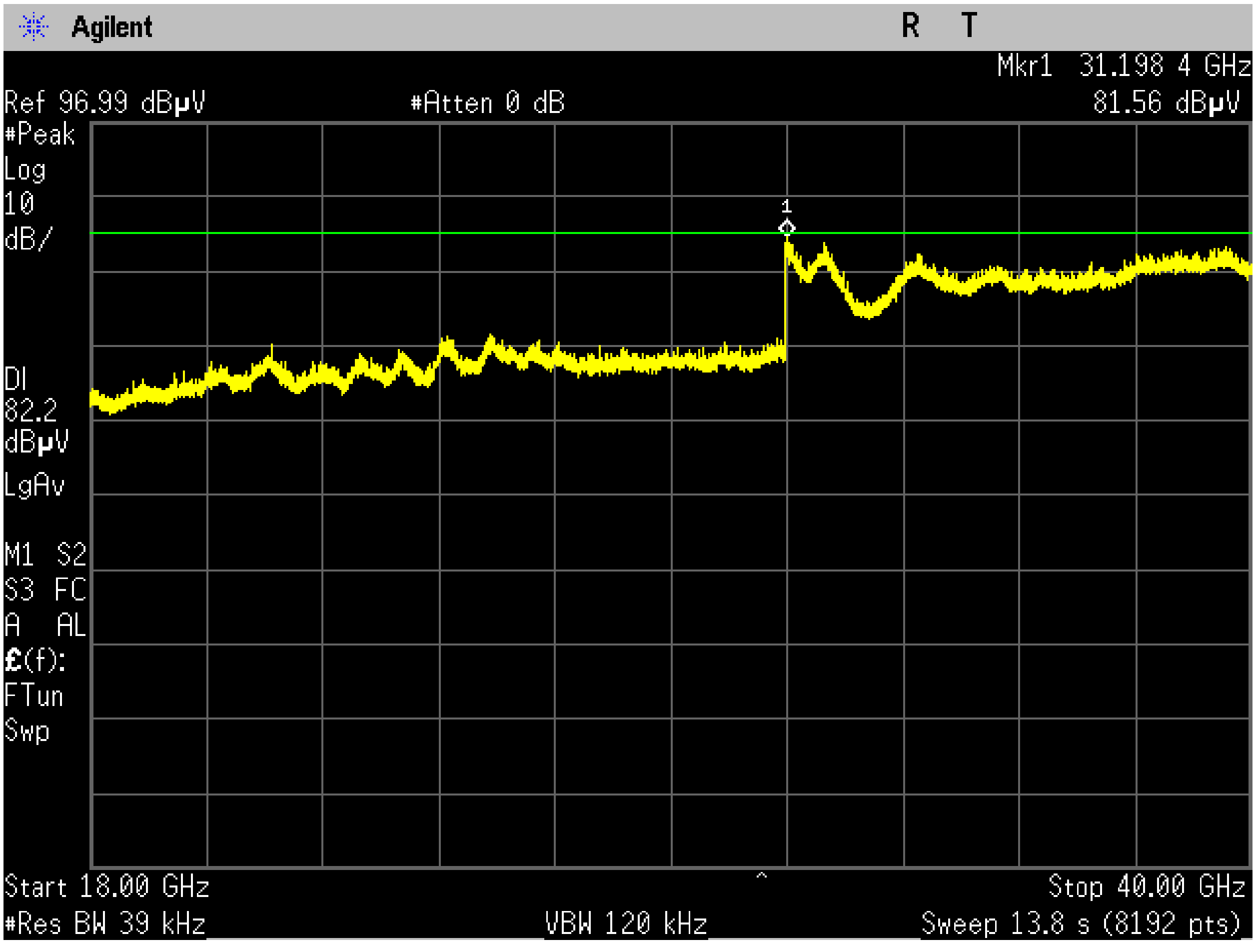


Figure 192. QPSK_20MHz_High Channel_Radiated Emissions, 18GHz - 40GHz_V.

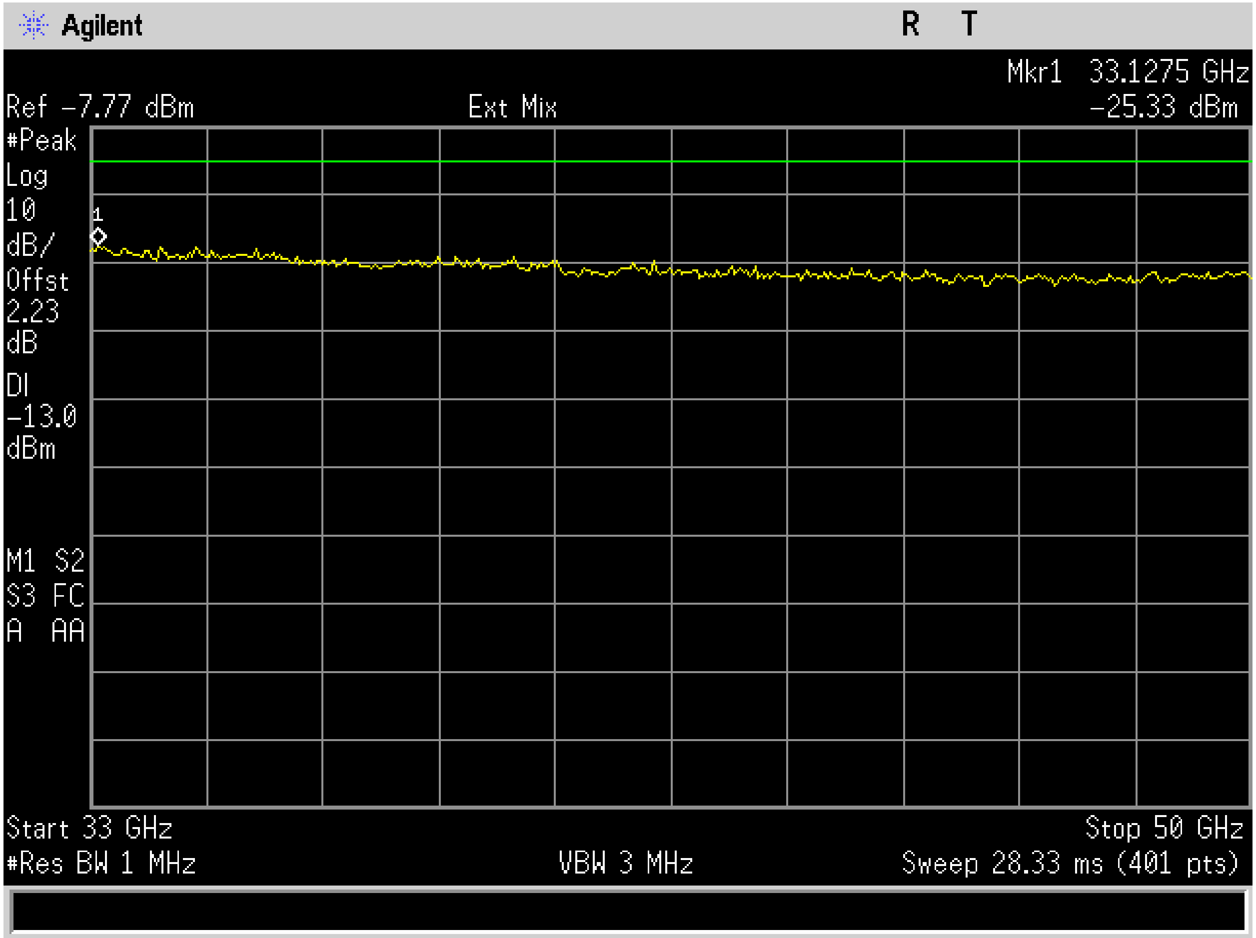


Figure 193. QPSK_20MHz_High Channel_Radiated Emissions, 40 - 50 GHz.

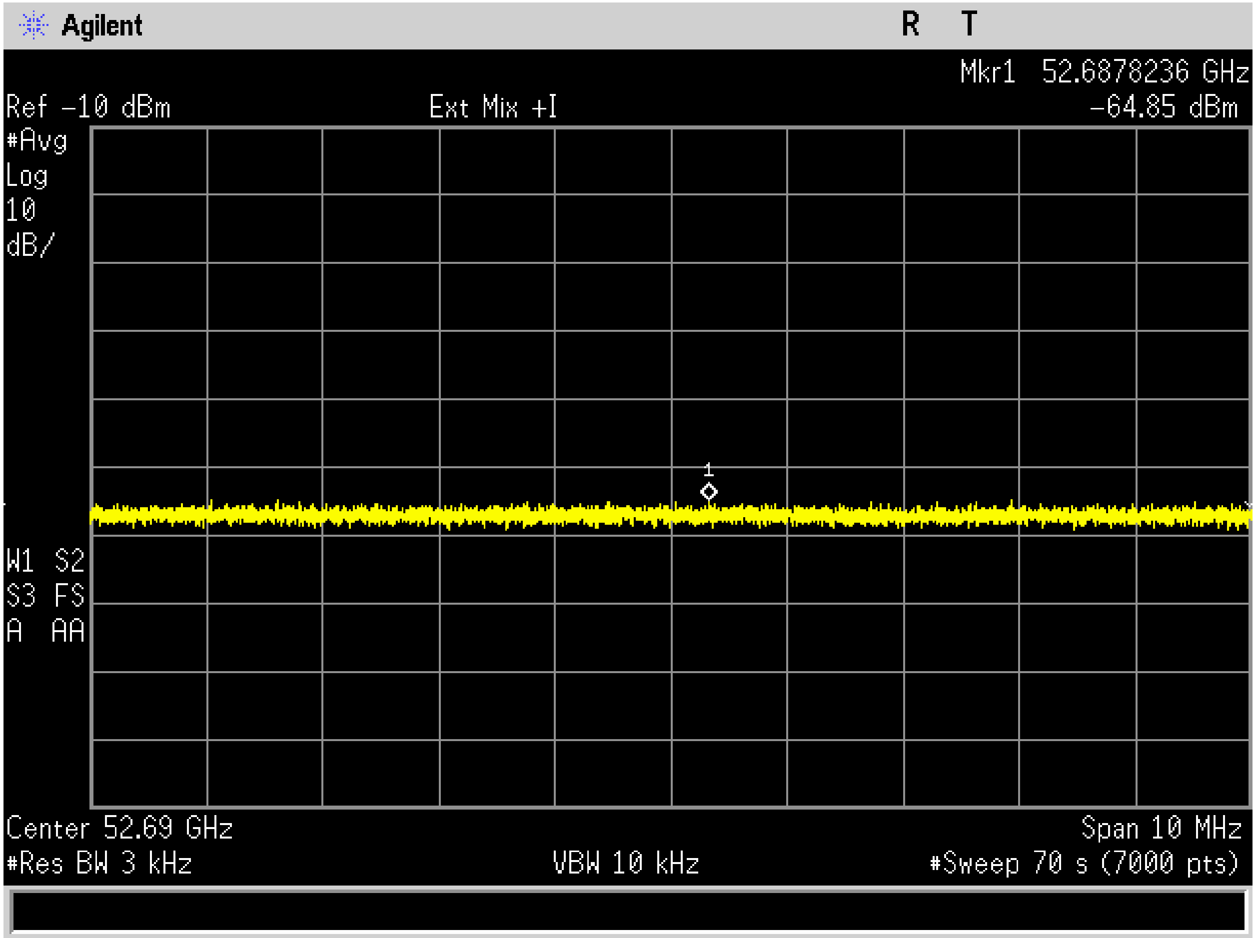


Figure 194. QPSK_20MHz_High Channel_Radiated Emissions, 50 - 75 GHz (Final).

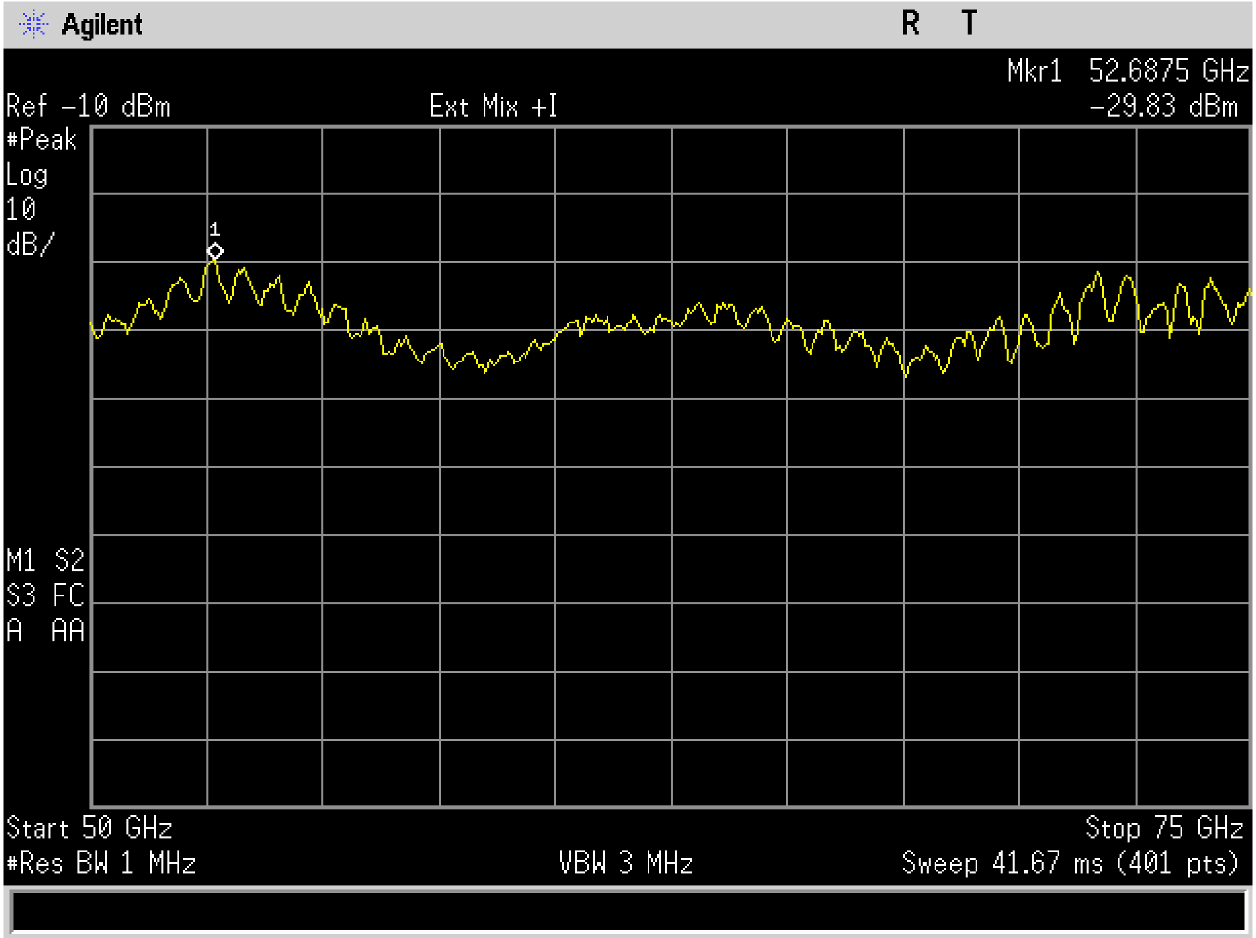


Figure 195. QPSK_20MHz_High Channel_Radiated Emissions, 50 - 75 GHz (Prescan).

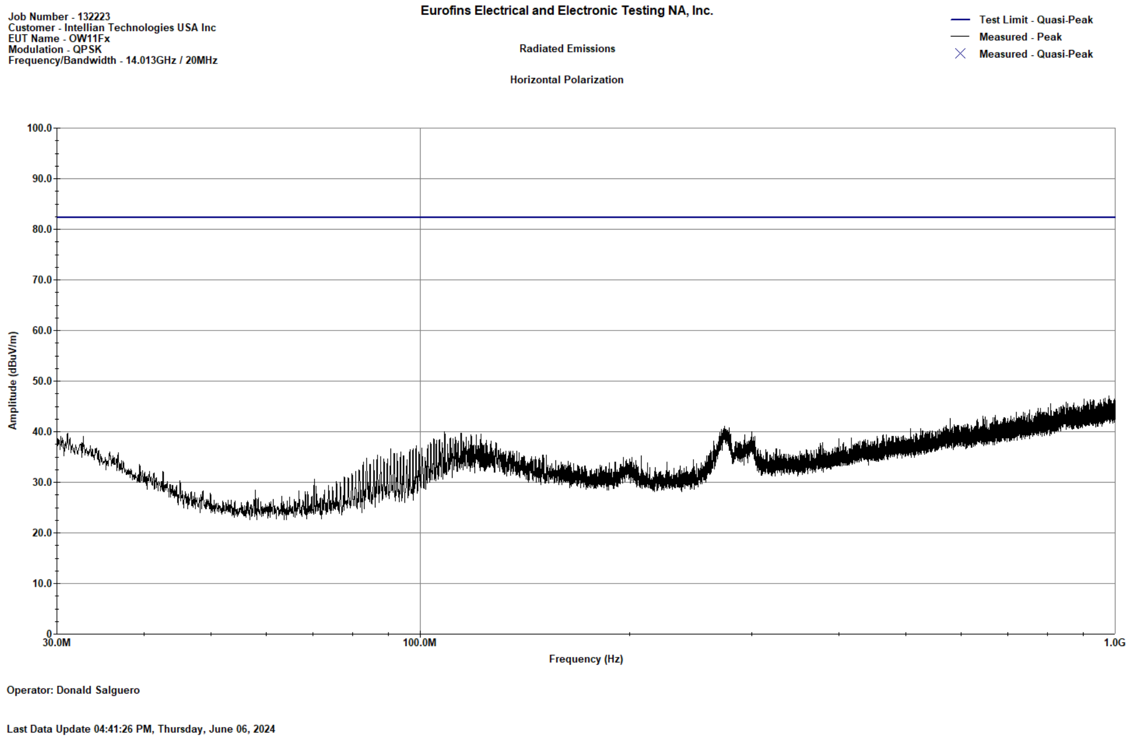


Figure 196. QPSK_20MHz_Low Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_H

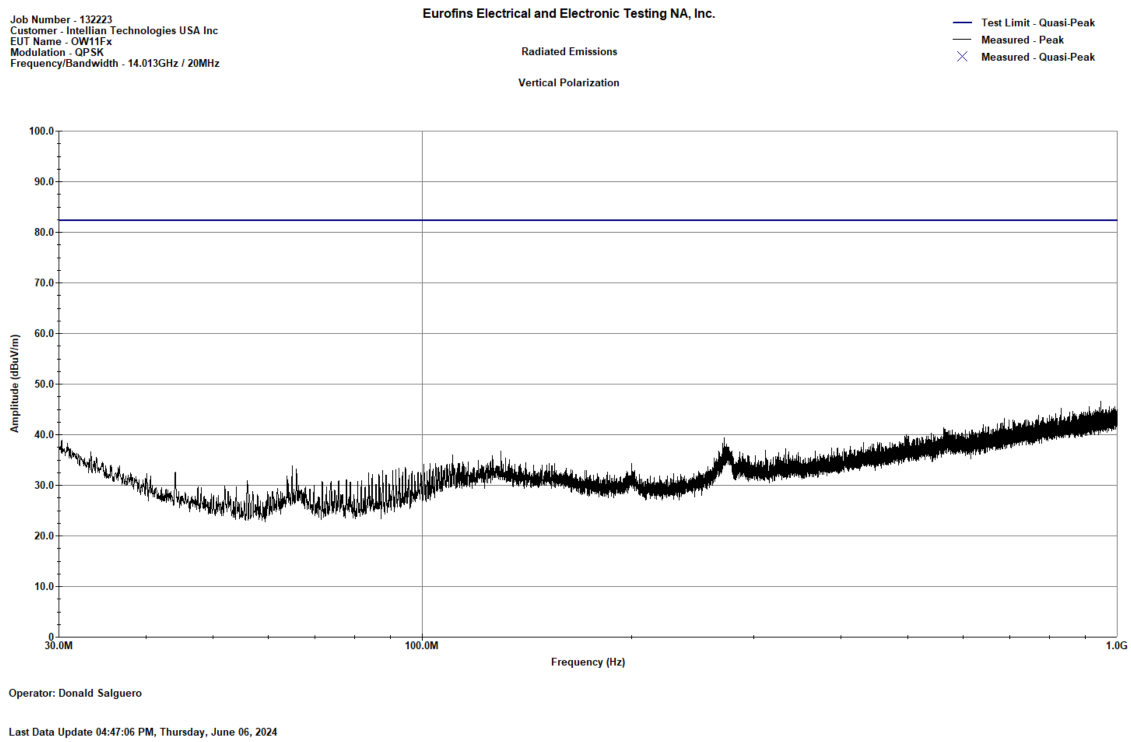


Figure 197. QPSK_20MHz_Low Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_V

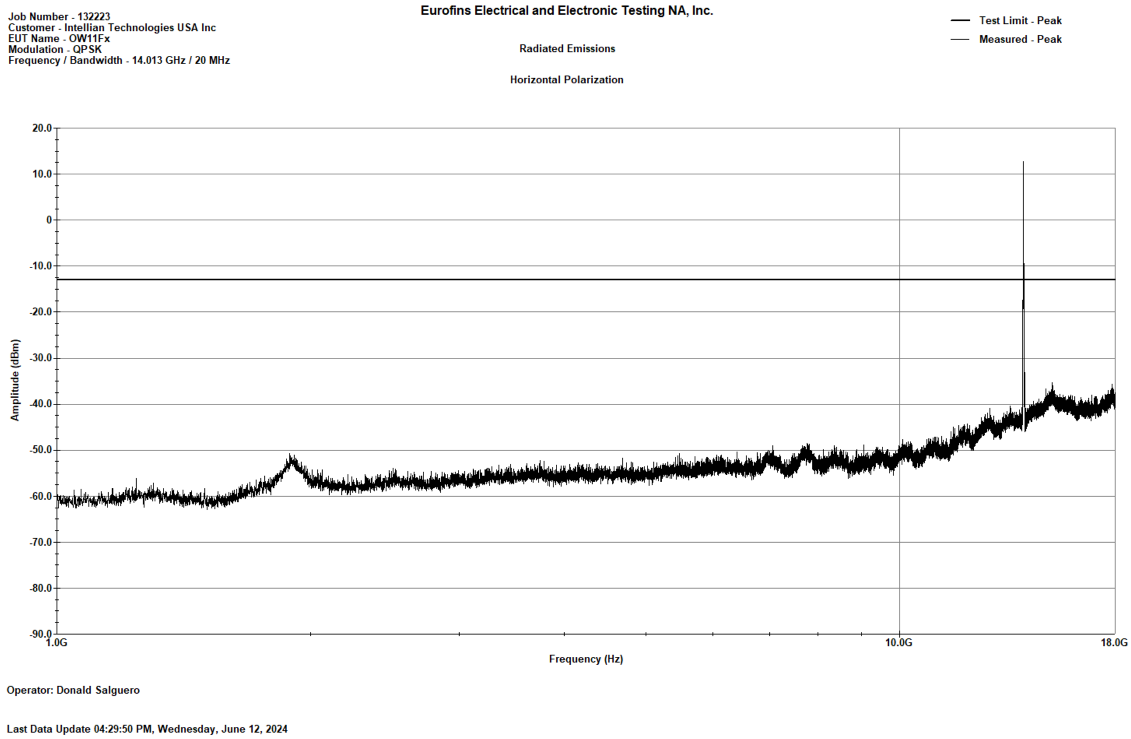


Figure 198. QPSK_20MHz_Low Channel_Radiated Emissions, 1 - 18 GHz-_H

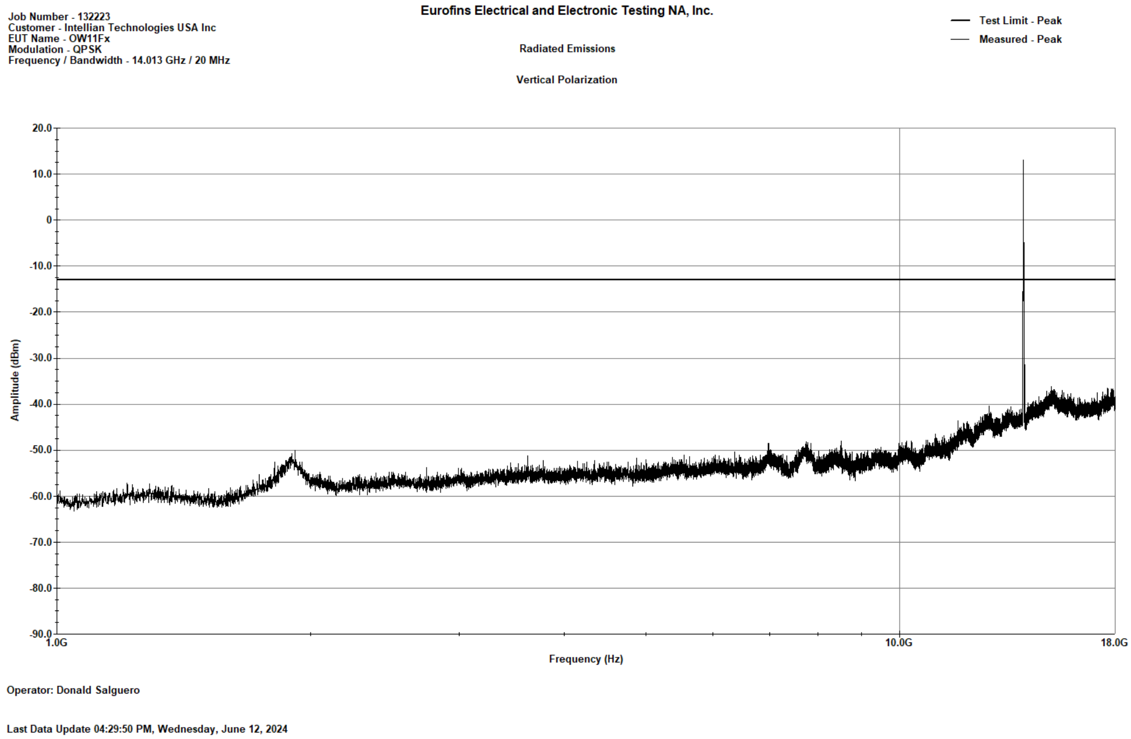


Figure 199. QPSK_20MHz_Low Channel_Radiated Emissions, 1 - 18 GHz-_V

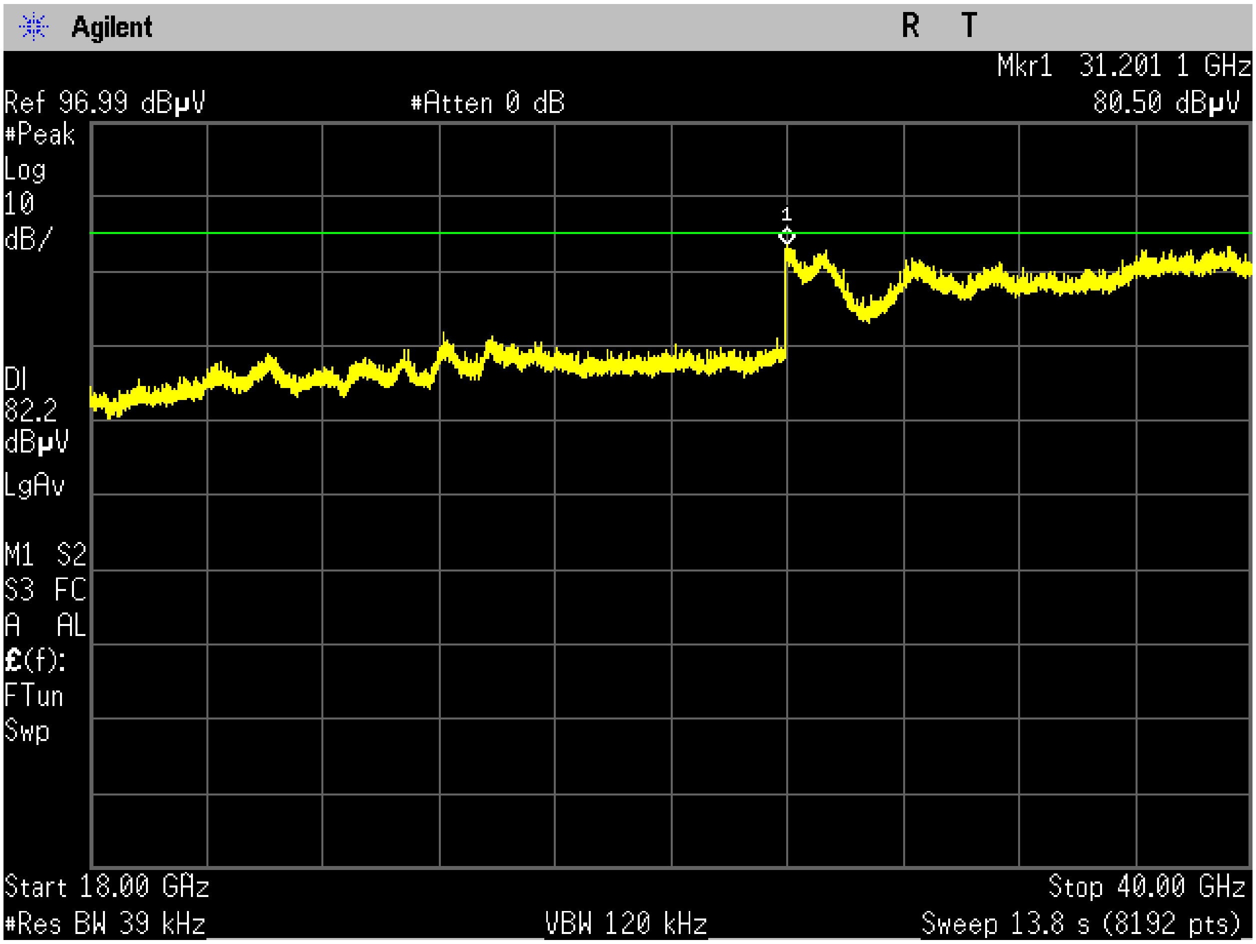


Figure 200. QPSK_20MHz_Low Channel_Radiated Emissions, 18GHz - 40GHz_H.

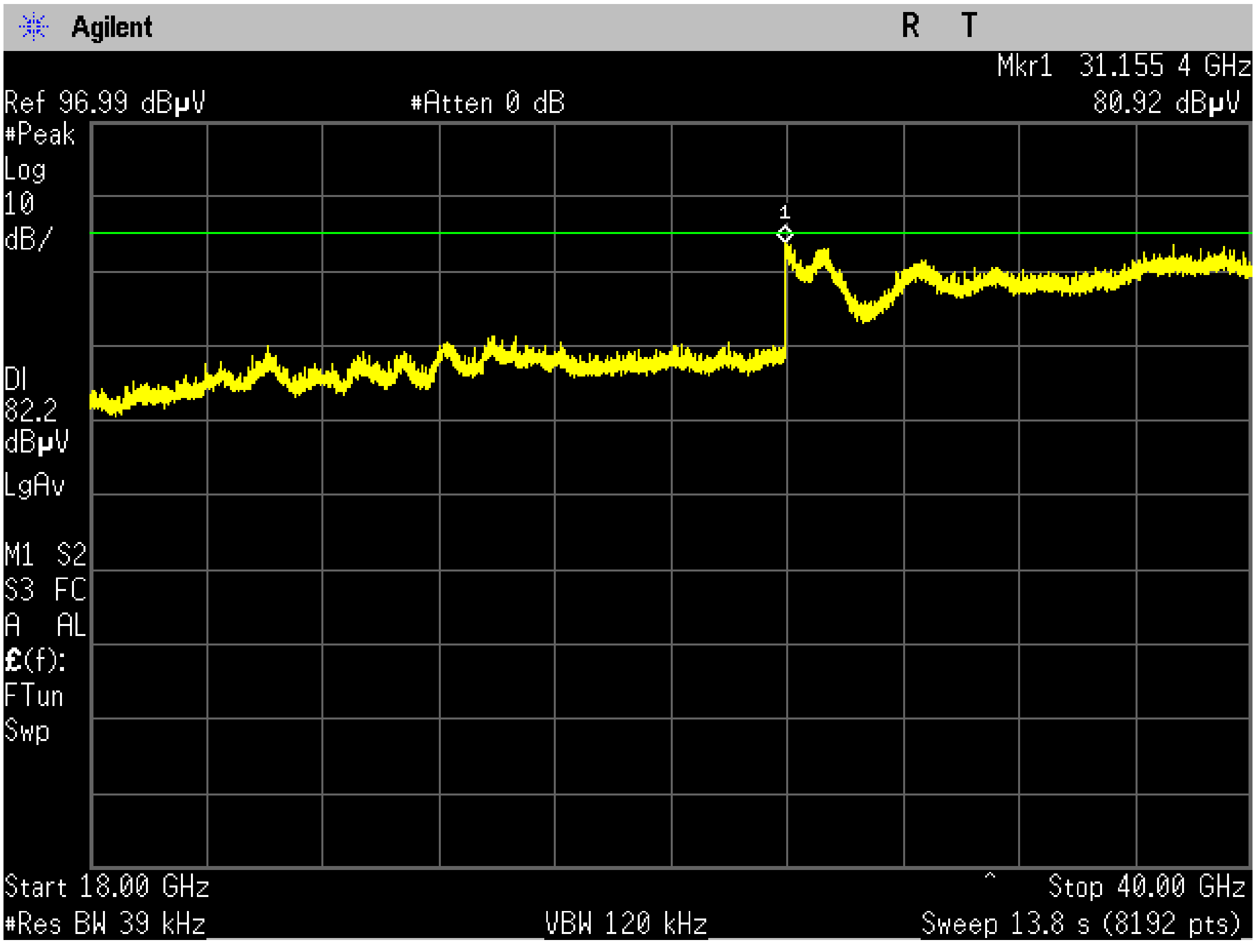


Figure 201. QPSK_20MHz_Low Channel_Radiated Emissions, 18GHz - 40GHz_V.

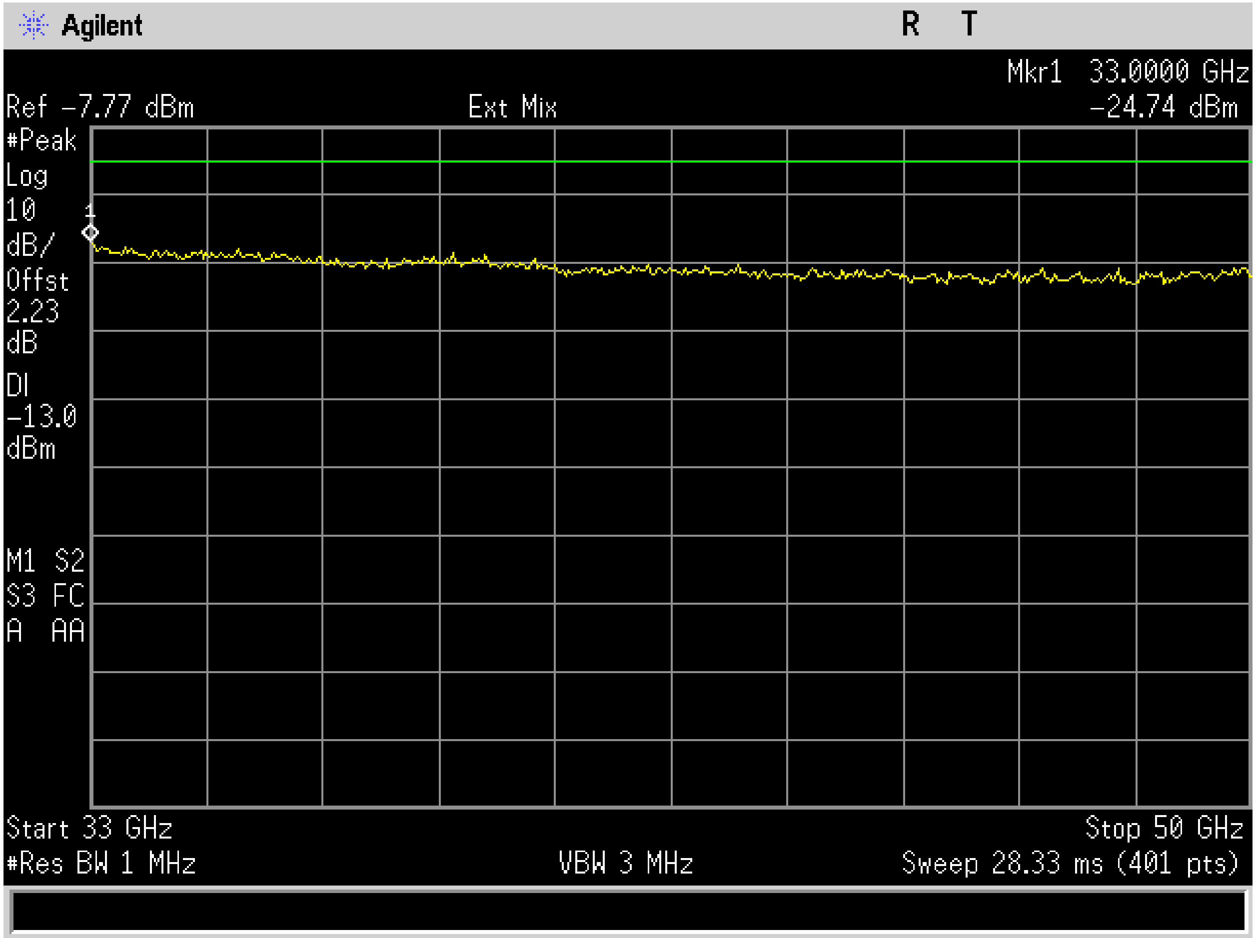


Figure 202. QPSK_20MHz_Low Channel_Radiated Emissions, 40 - 50 GHz.

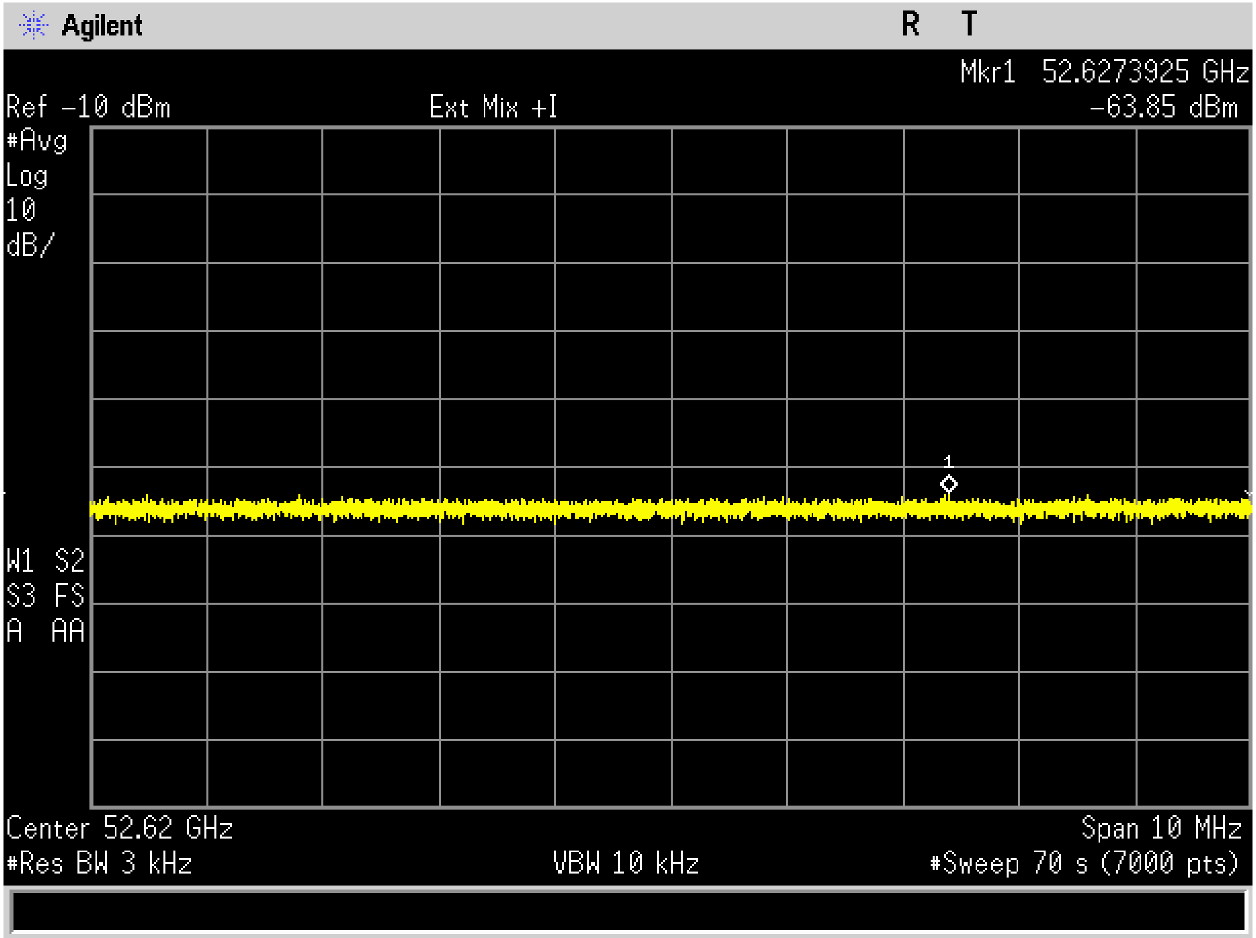


Figure 203. QPSK_20MHz_Low Channel_Radiated Emissions, 50 - 75 GHz (Final).

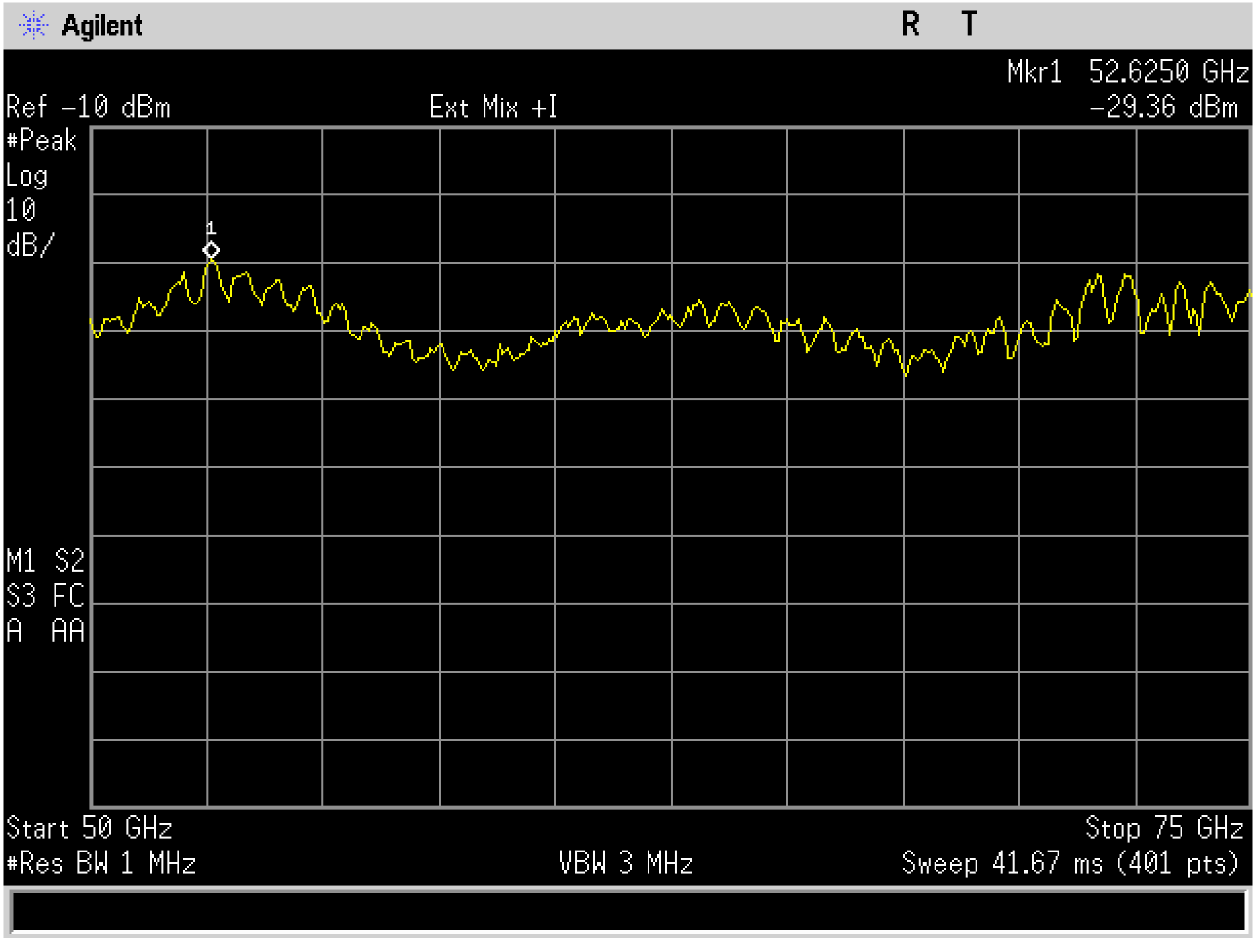


Figure 204. QPSK_20MHz_Low Channel_Radiated Emissions, 50 - 75 GHz (Prescan).

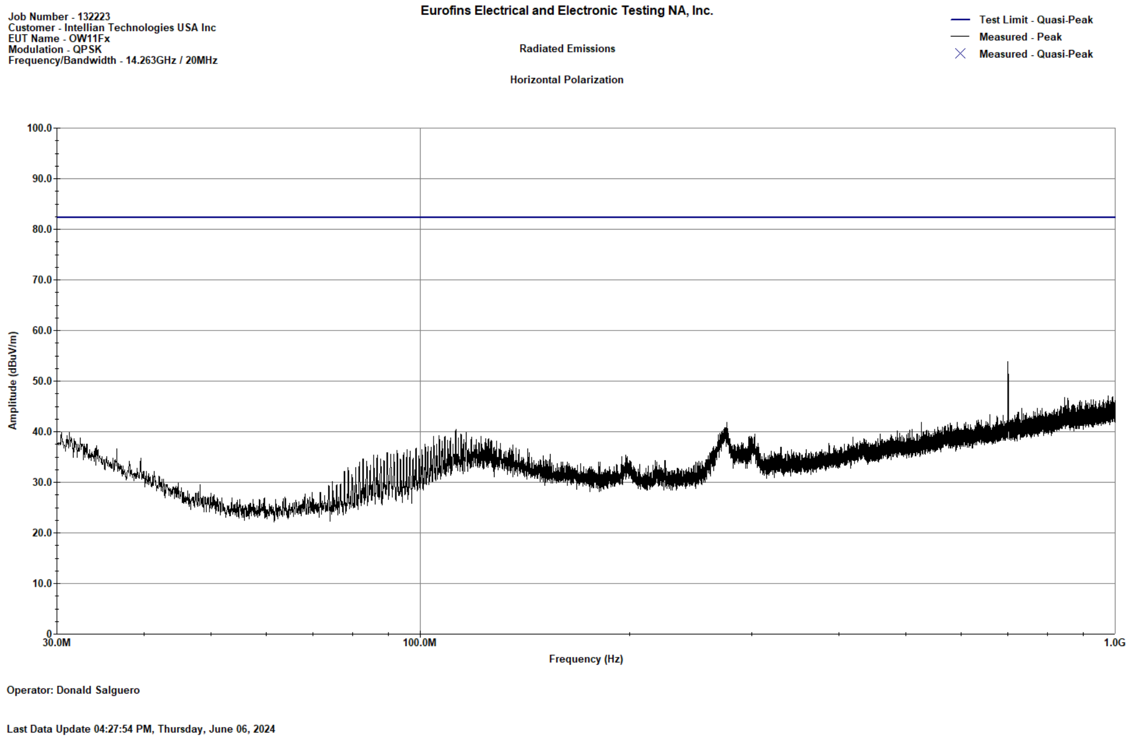


Figure 205. QPSK_20MHz_Mid Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_H

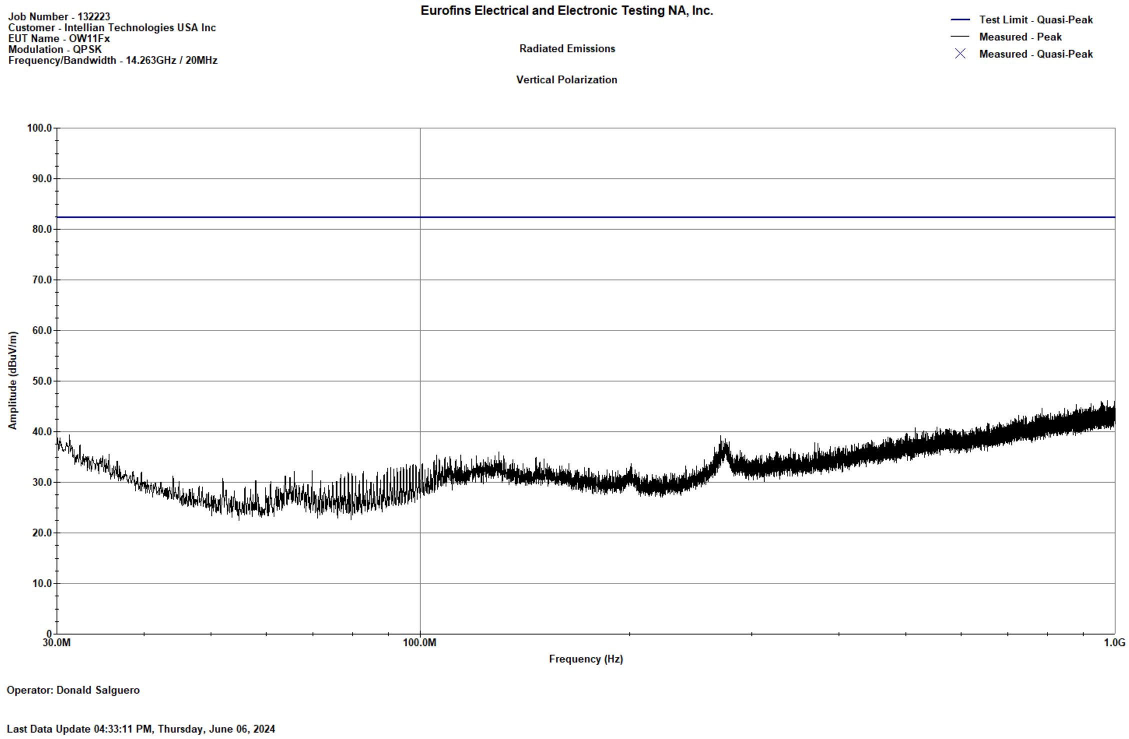


Figure 206. QPSK_20MHz_Mid Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_V

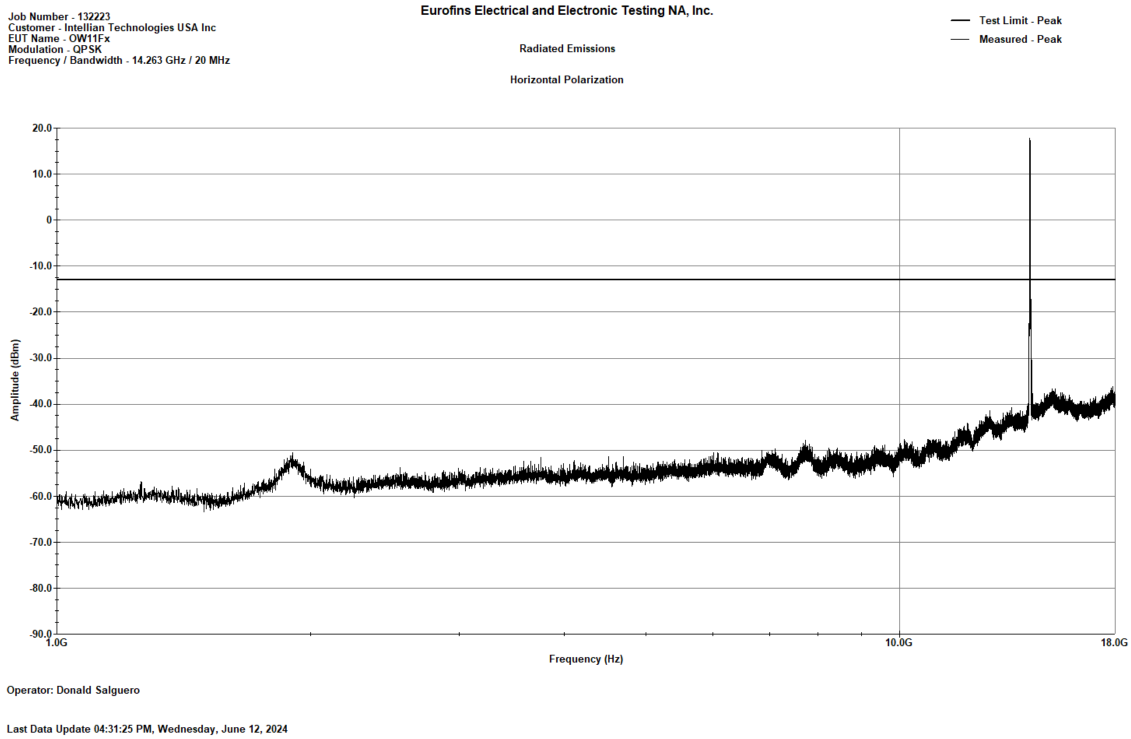


Figure 207. QPSK_20MHz_Mid Channel_Radiated Emissions, 1 - 18 GHz-_H

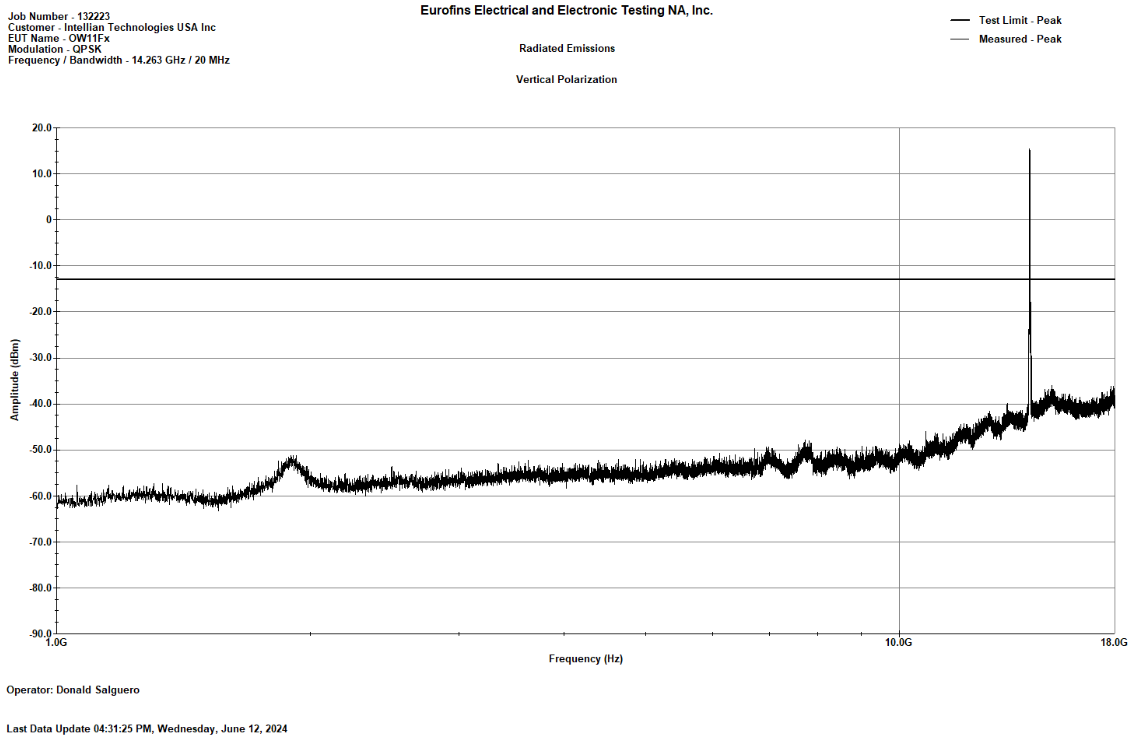


Figure 208. QPSK_20MHz_Mid Channel_Radiated Emissions, 1 - 18 GHz-_V

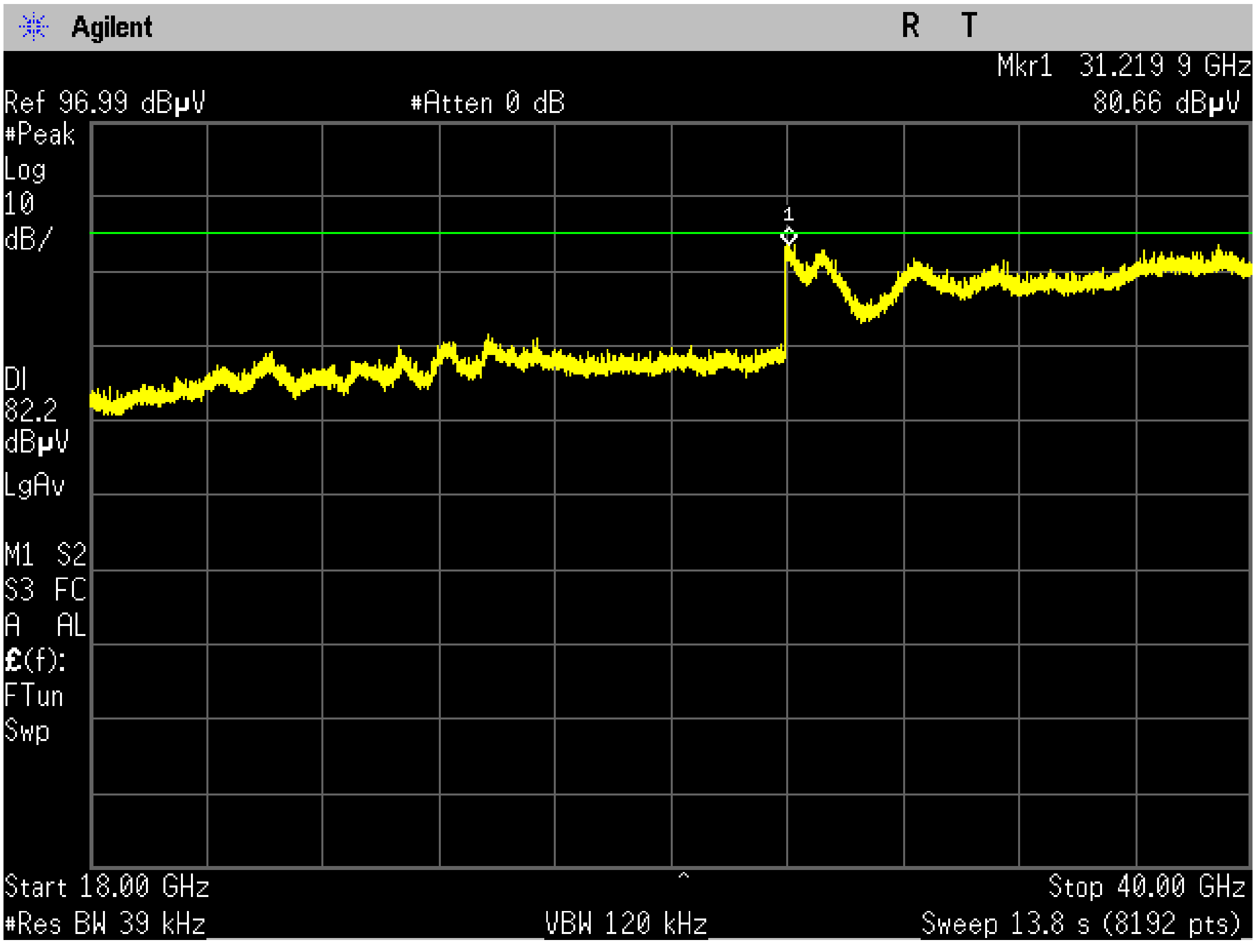


Figure 209. QPSK_20MHz_Mid Channel_Radiated Emissions, 18GHz - 40GHz_H.

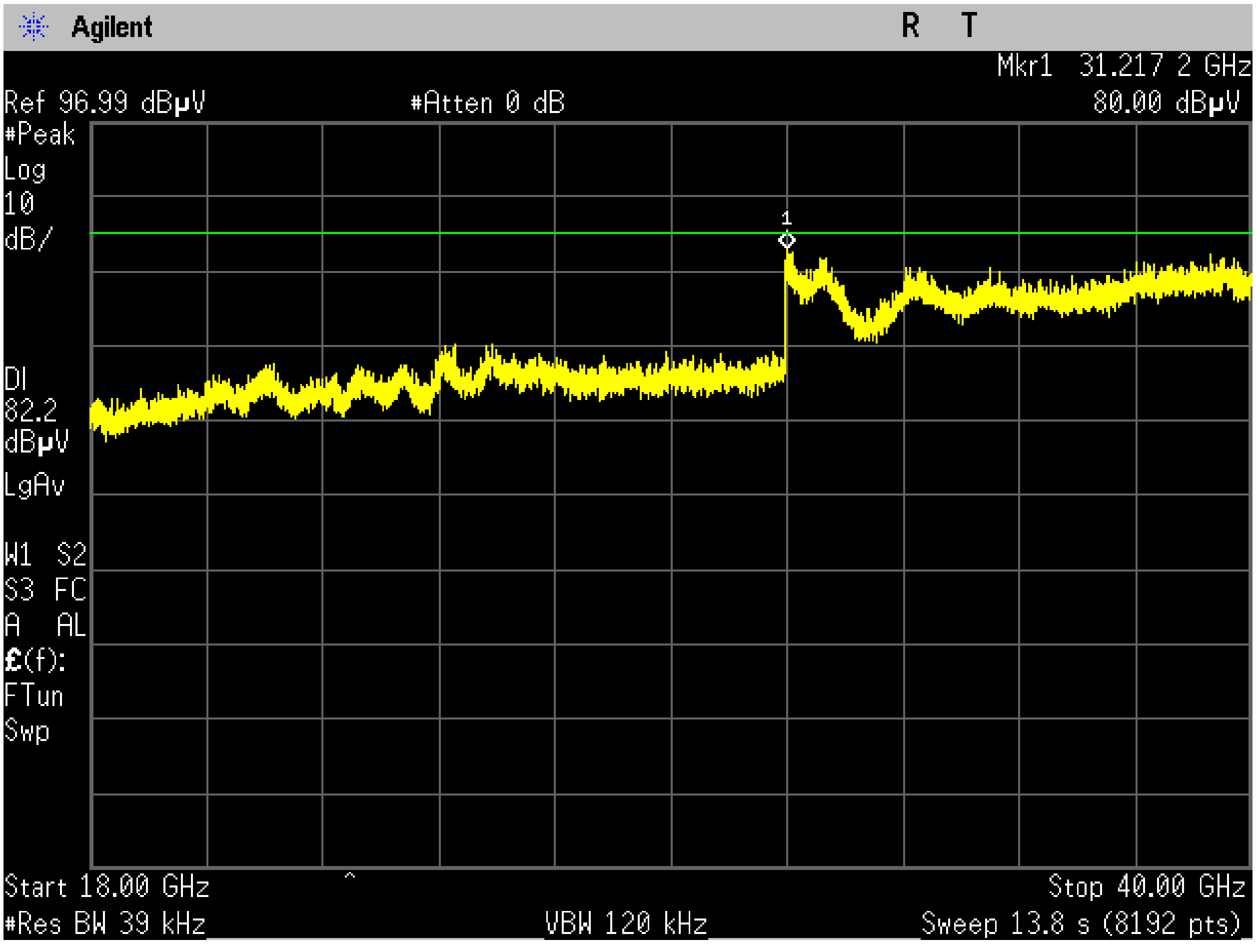


Figure 210. QPSK_20MHz_Mid Channel_Radiated Emissions, 18GHz - 40GHz_V.

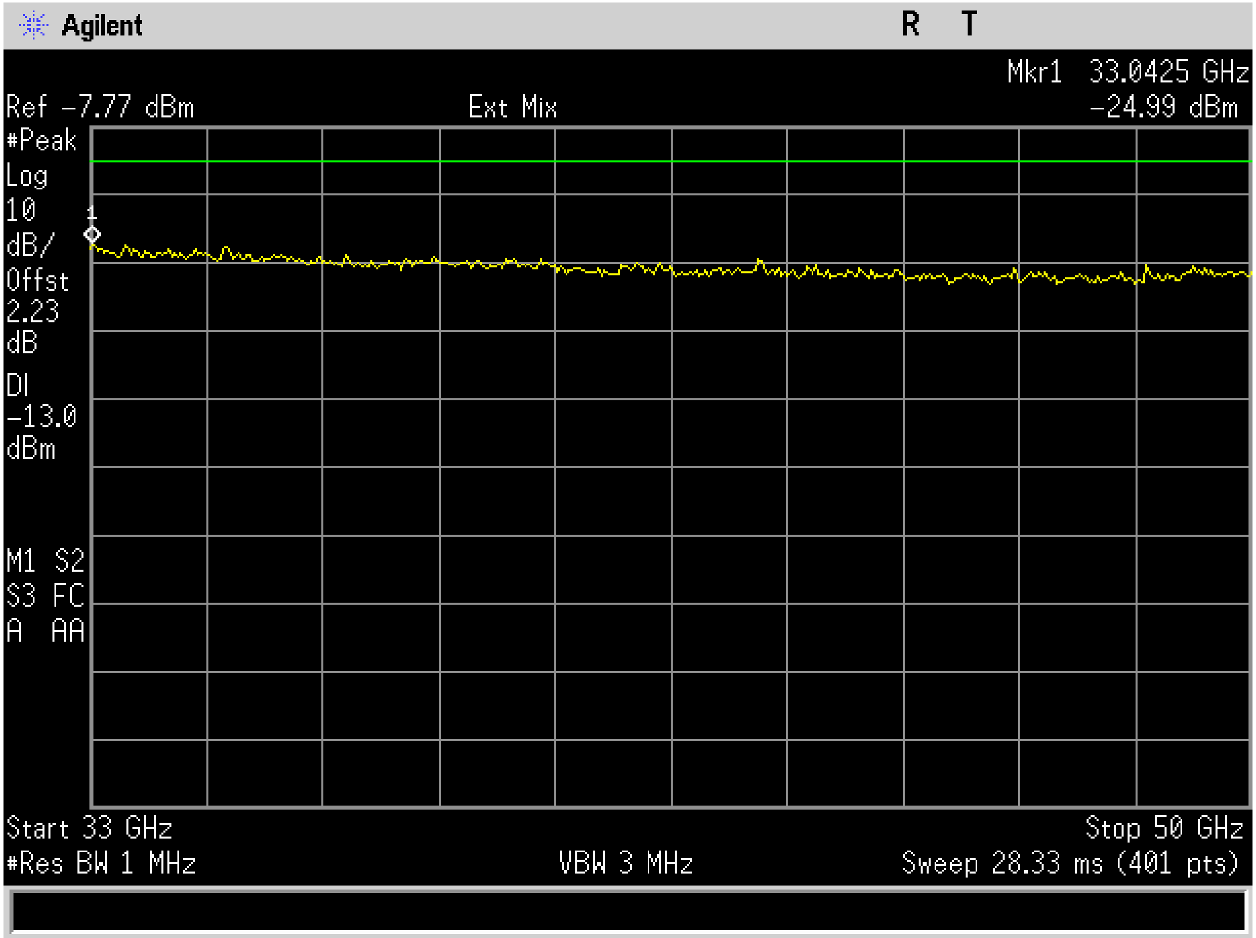


Figure 211. QPSK_20MHz_Mid Channel_Radiated Emissions, 40 - 50 GHz.

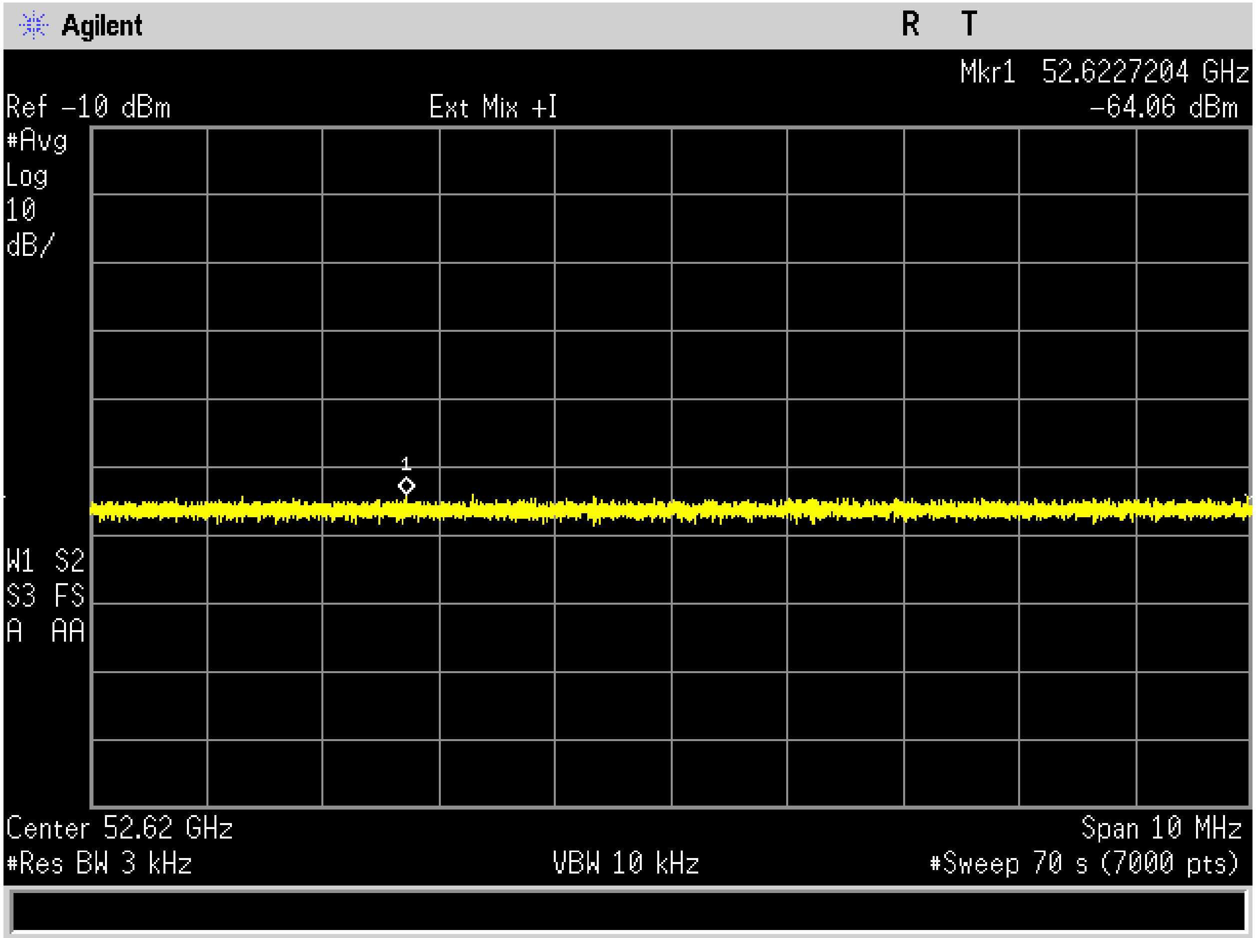


Figure 212. QPSK_20MHz_Mid Channel_Radiated Emissions, 50 - 75 GHz (Final).

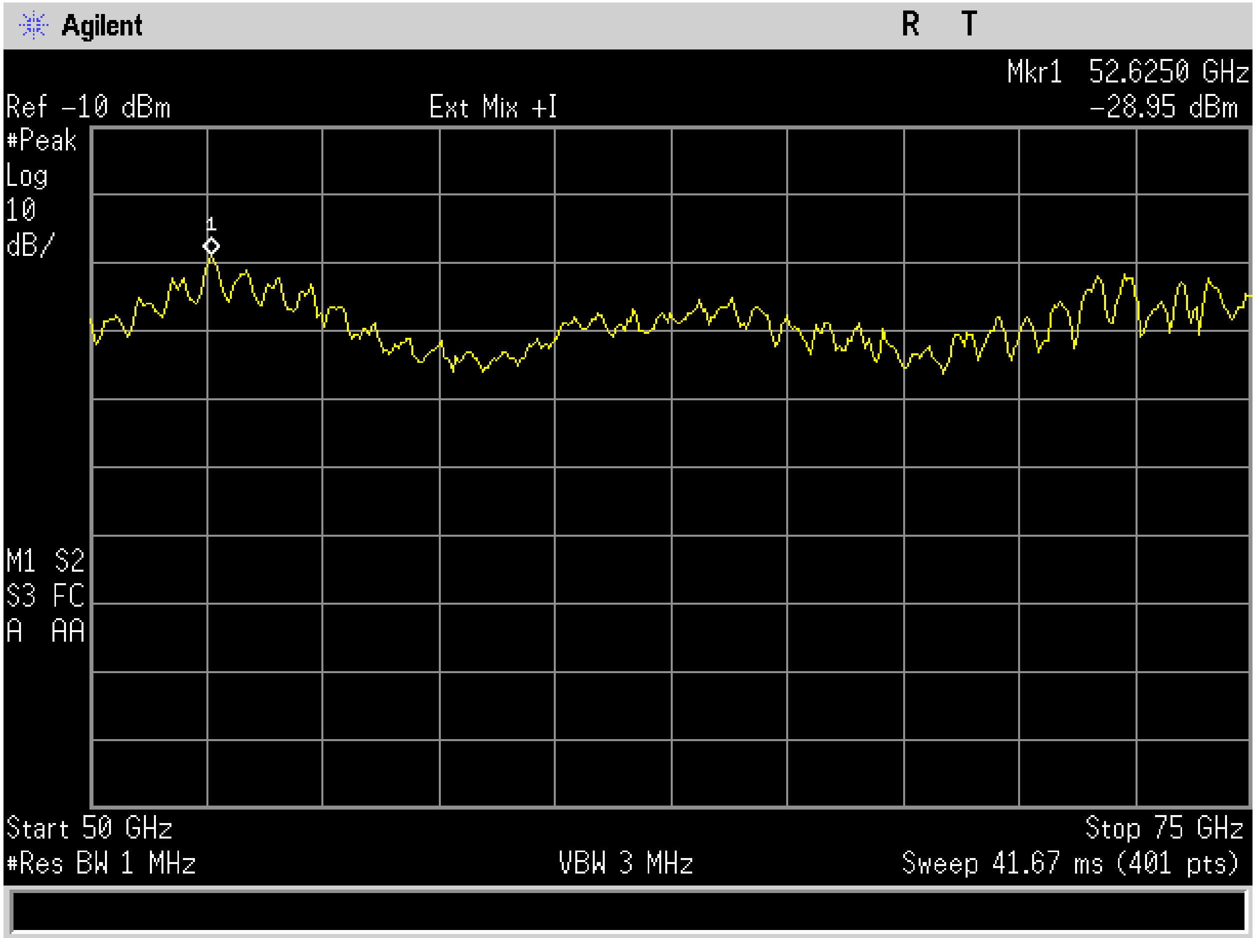


Figure 213. QPSK_20MHz_Mid Channel_Radiated Emissions, 50 - 75 GHz (Prescan).

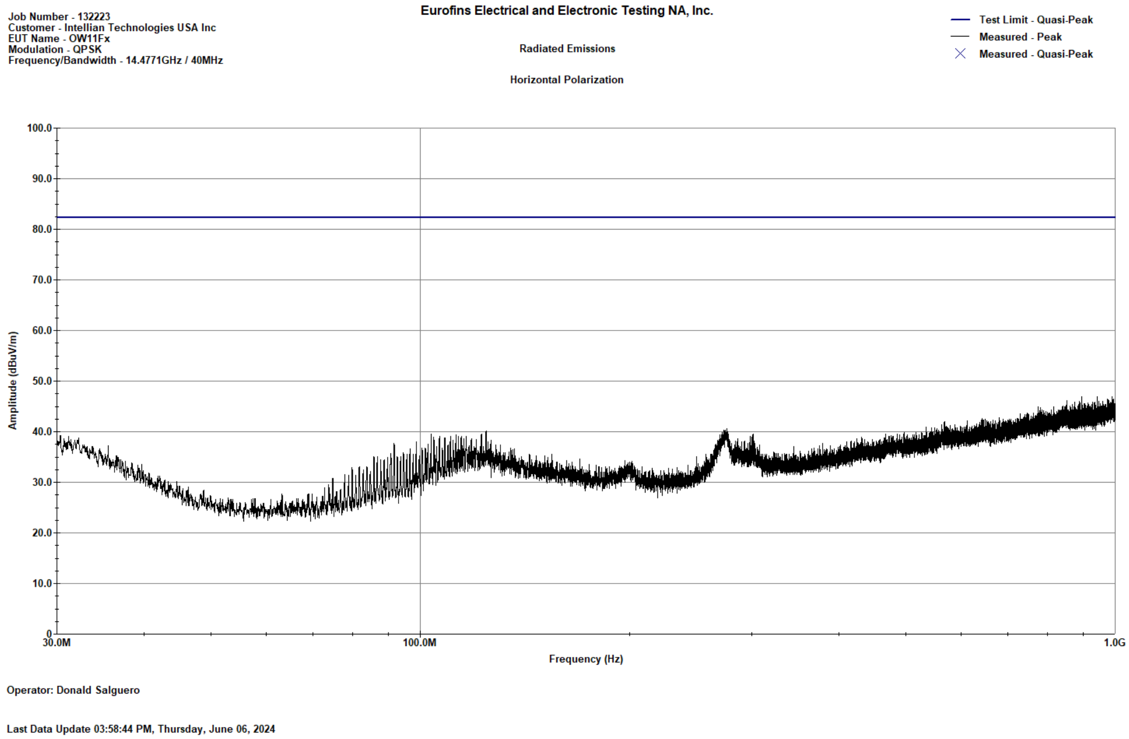


Figure 214. QPSK_40MHz_High Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_H

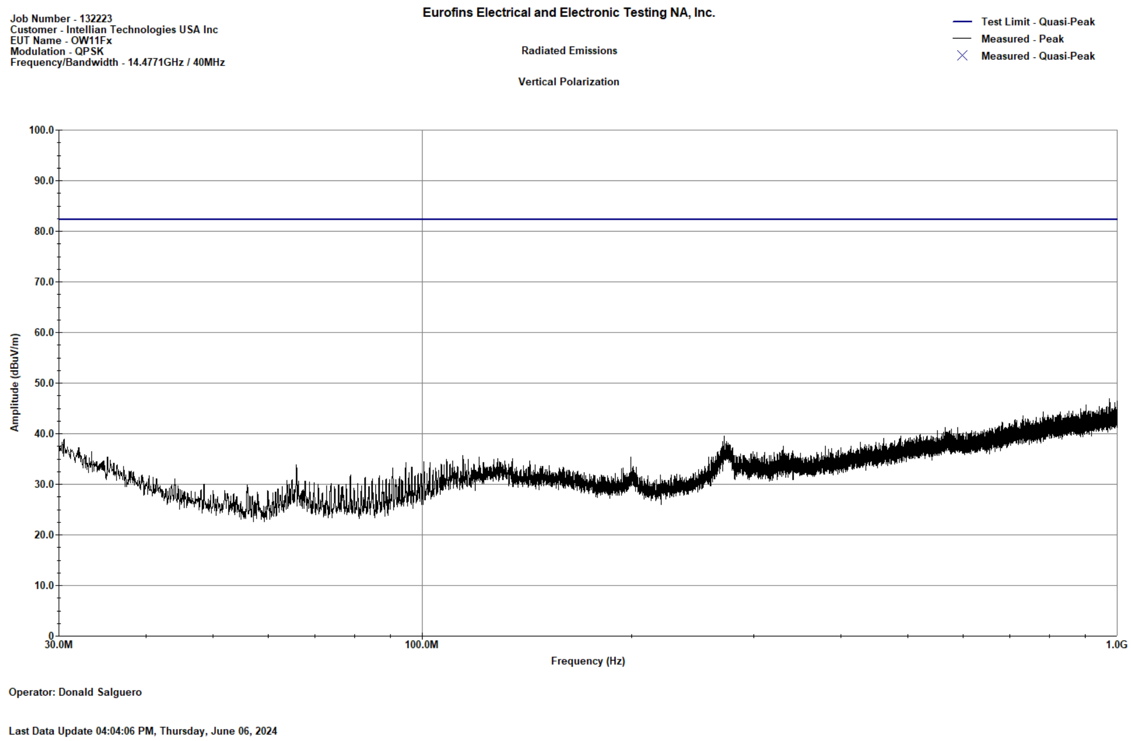


Figure 215. QPSK_40MHz_High Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_V

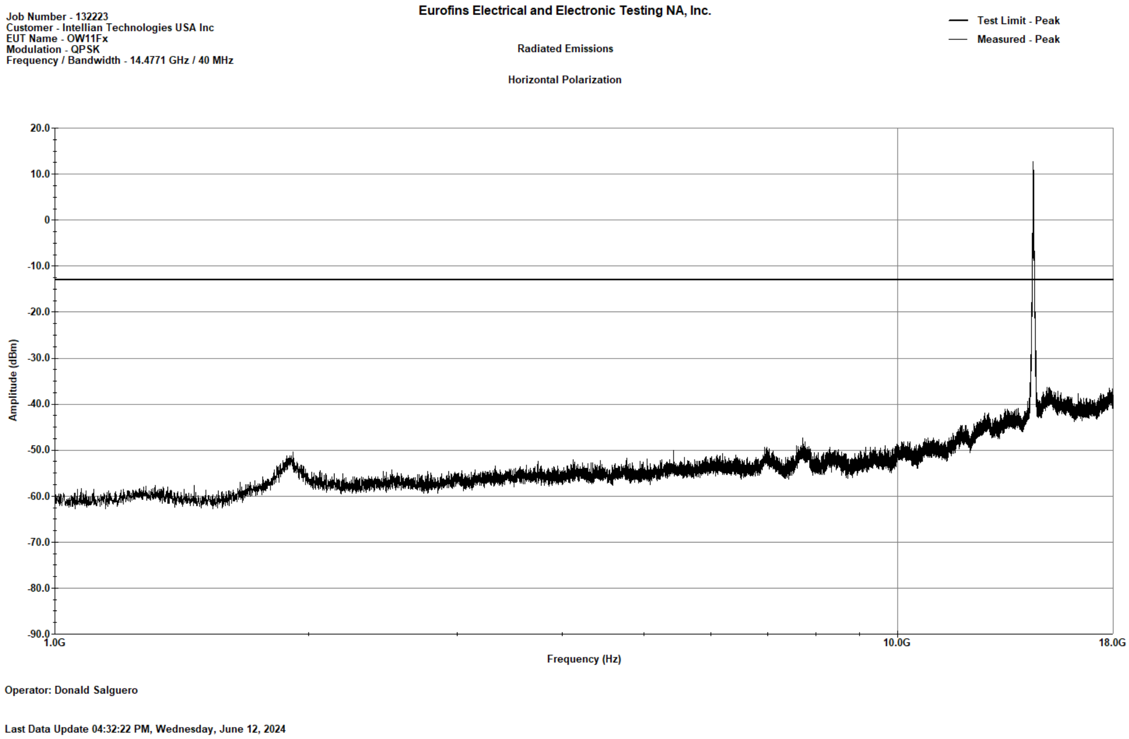


Figure 216. QPSK_40MHz_High Channel_Radiated Emissions, 1 - 18 GHz-_H

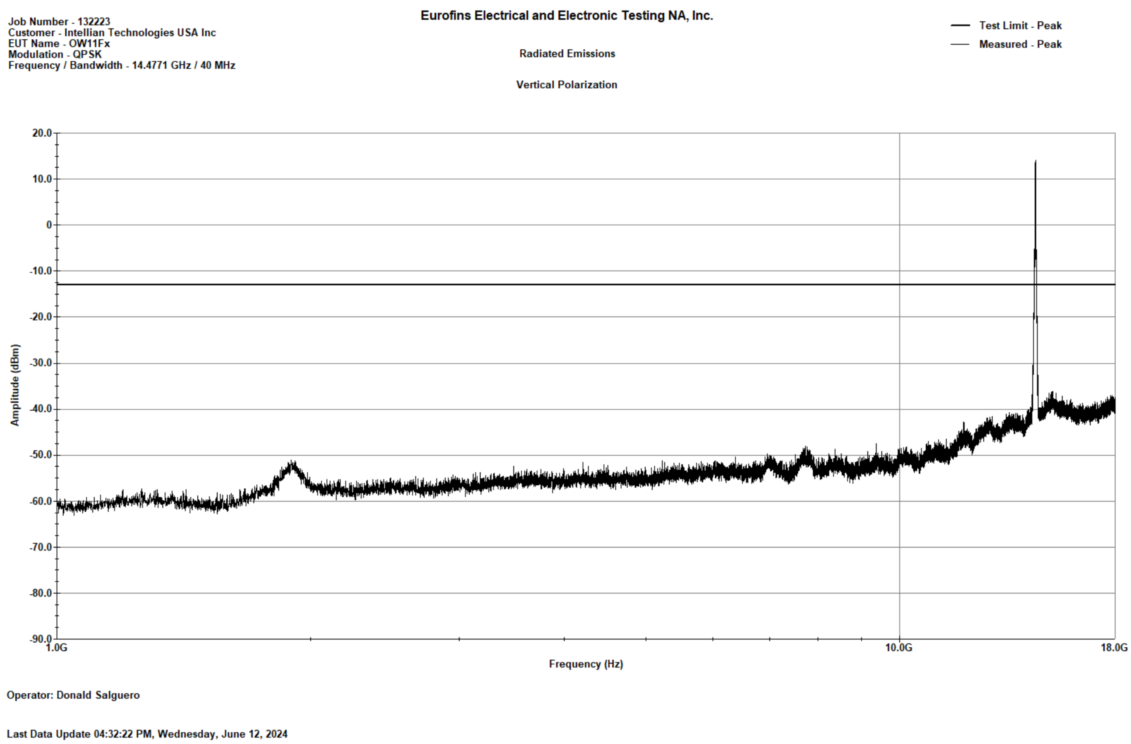


Figure 217. QPSK_40MHz_High Channel_Radiated Emissions, 1 - 18 GHz-_V

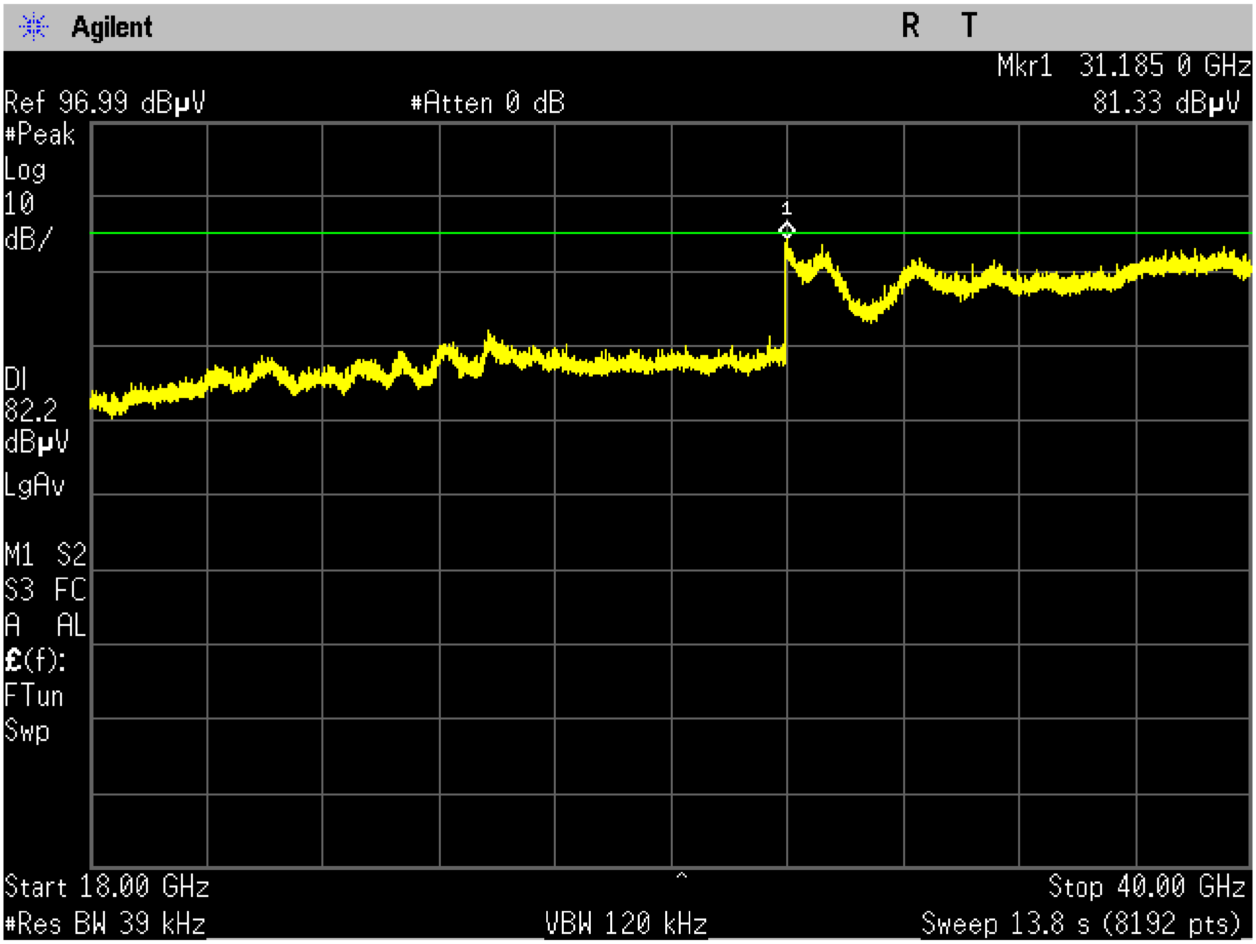


Figure 218. QPSK_40MHz_High Channel_Radiated Emissions, 18GHz - 40GHz_H.

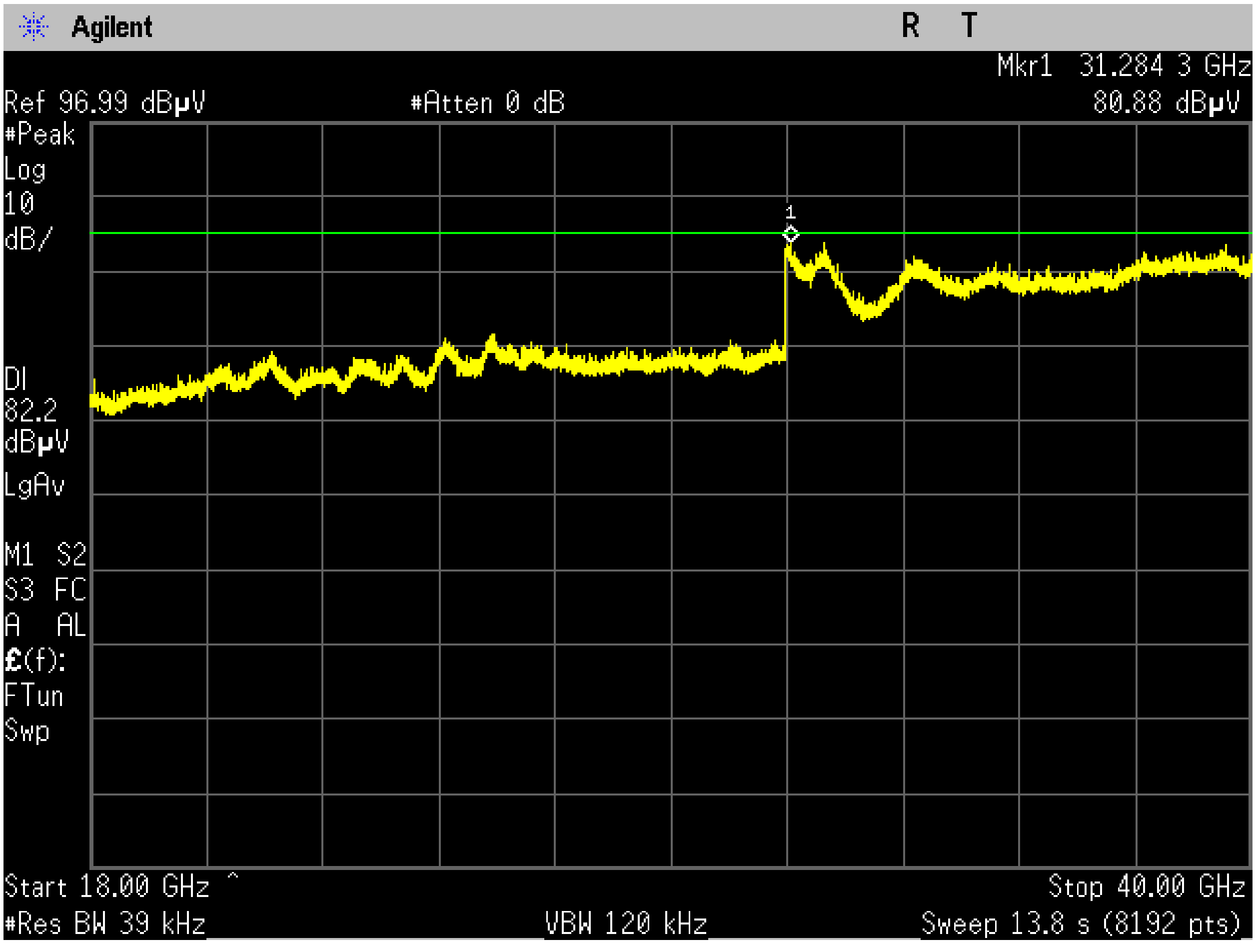


Figure 219. QPSK_40MHz_High Channel_Radiated Emissions, 18GHz - 40GHz_V.

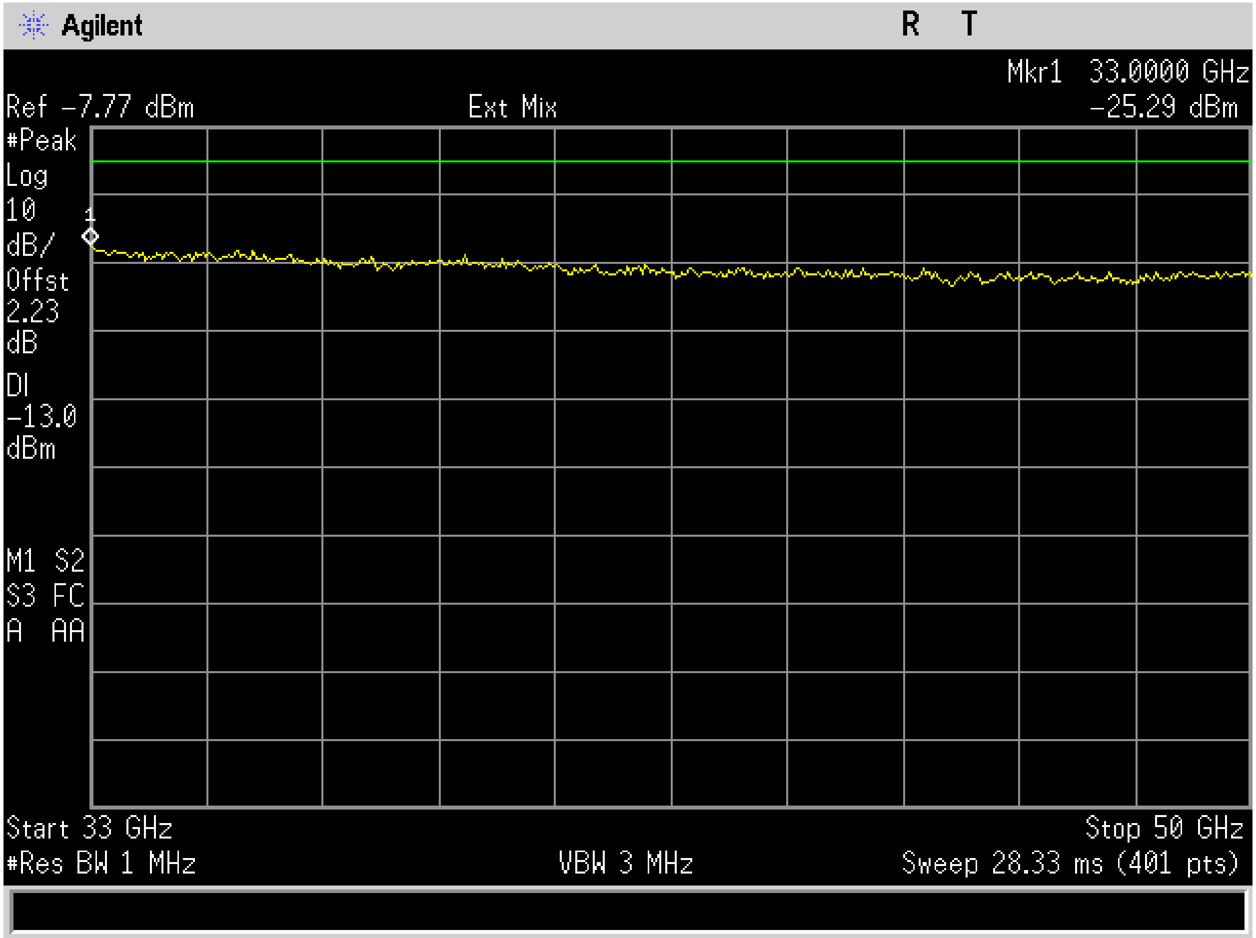


Figure 220. QPSK_40MHz_High Channel_Radiated Emissions, 40 - 50 GHz.

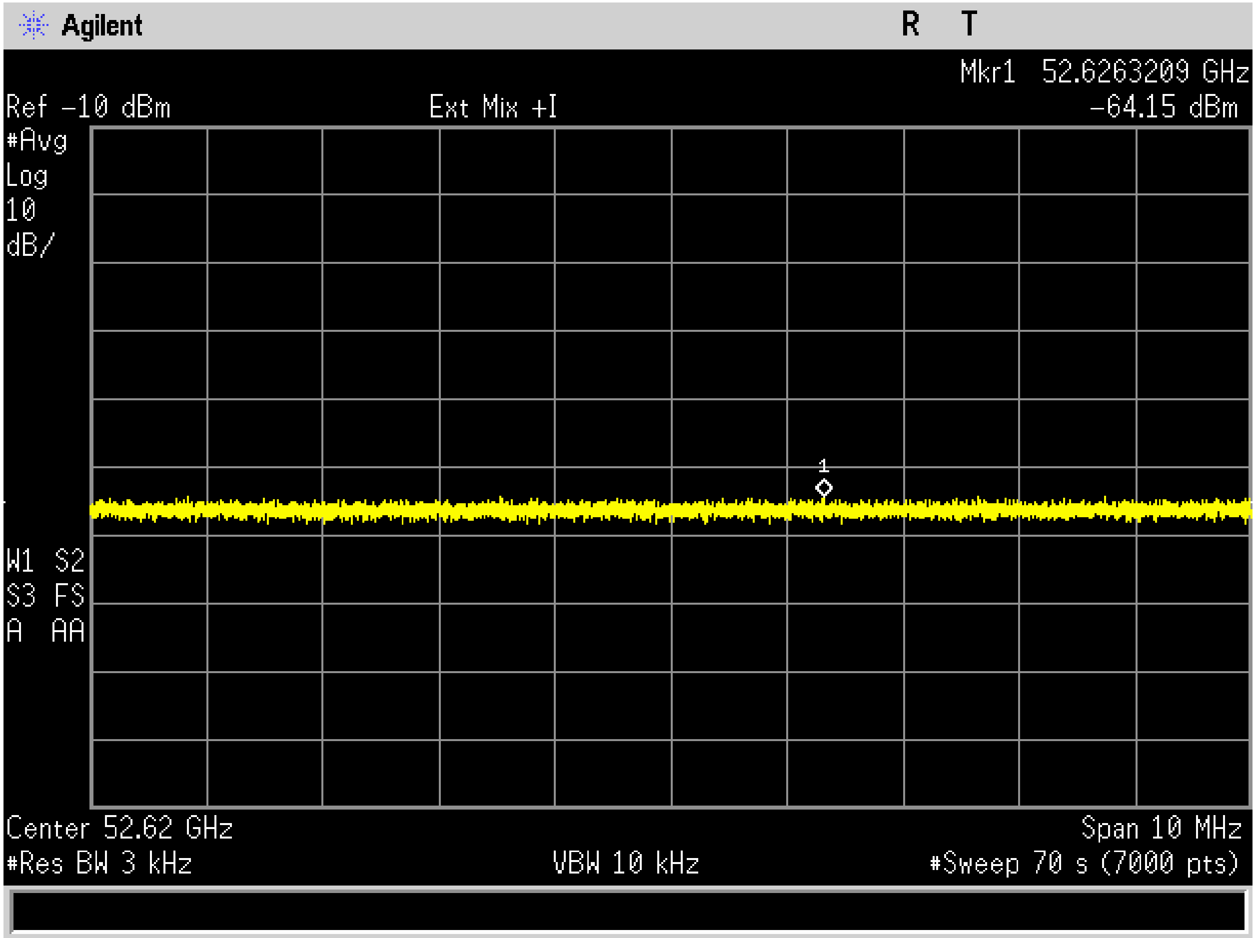


Figure 221. QPSK_40MHz_High Channel_Radiated Emissions, 50 - 75 GHz (Final).

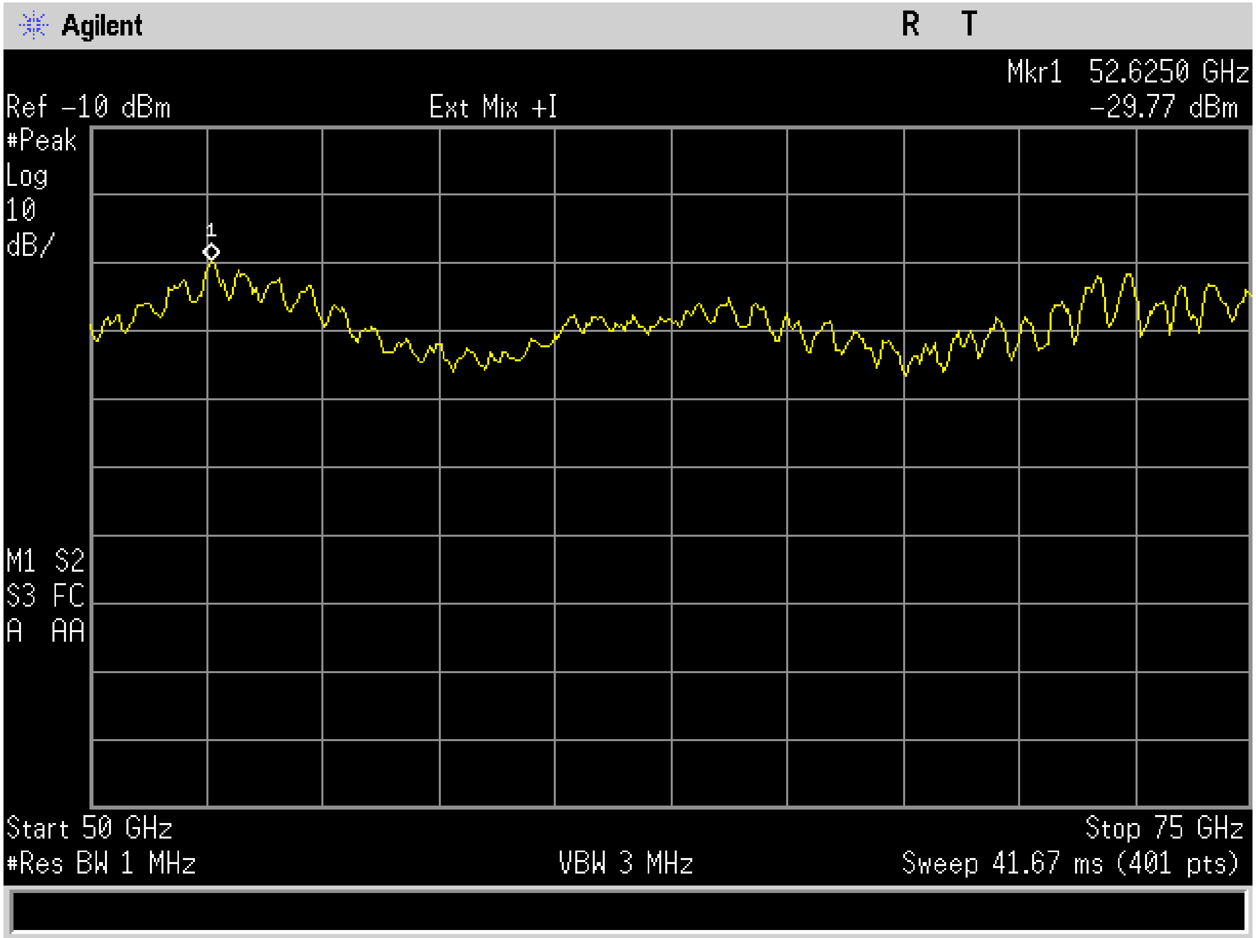


Figure 222. QPSK_40MHz_High Channel_Radiated Emissions, 50 - 75 GHz (Prescan).

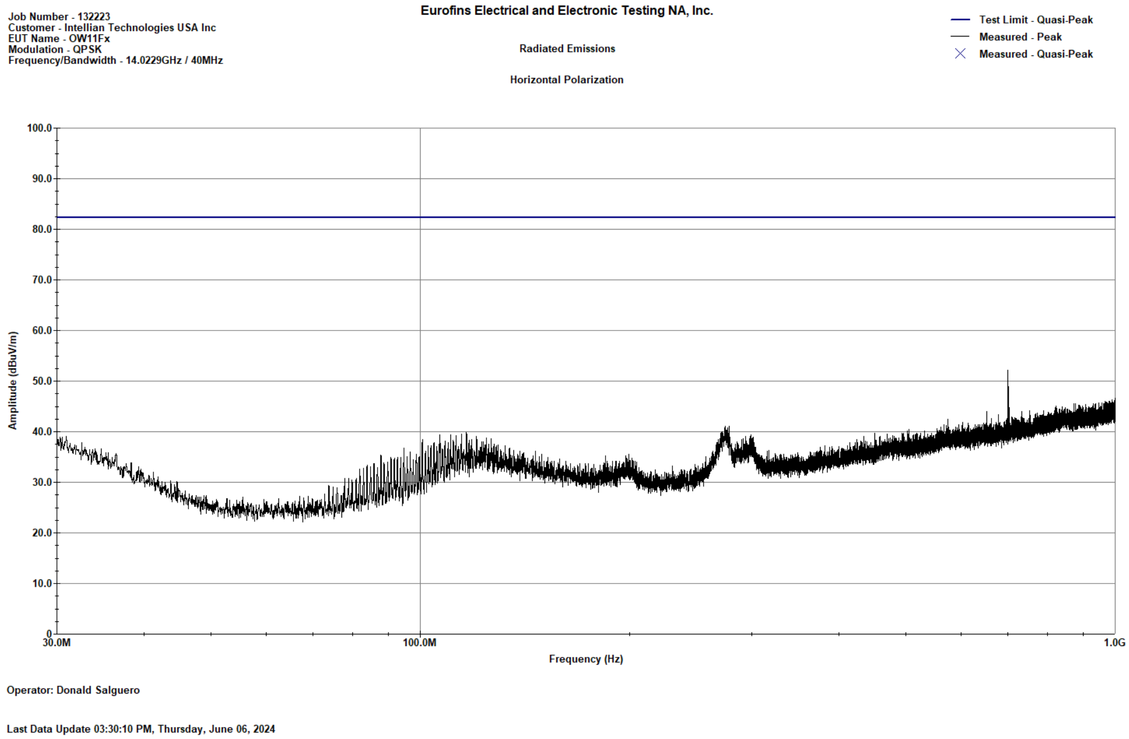


Figure 223. QPSK_40MHz_Low Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_H

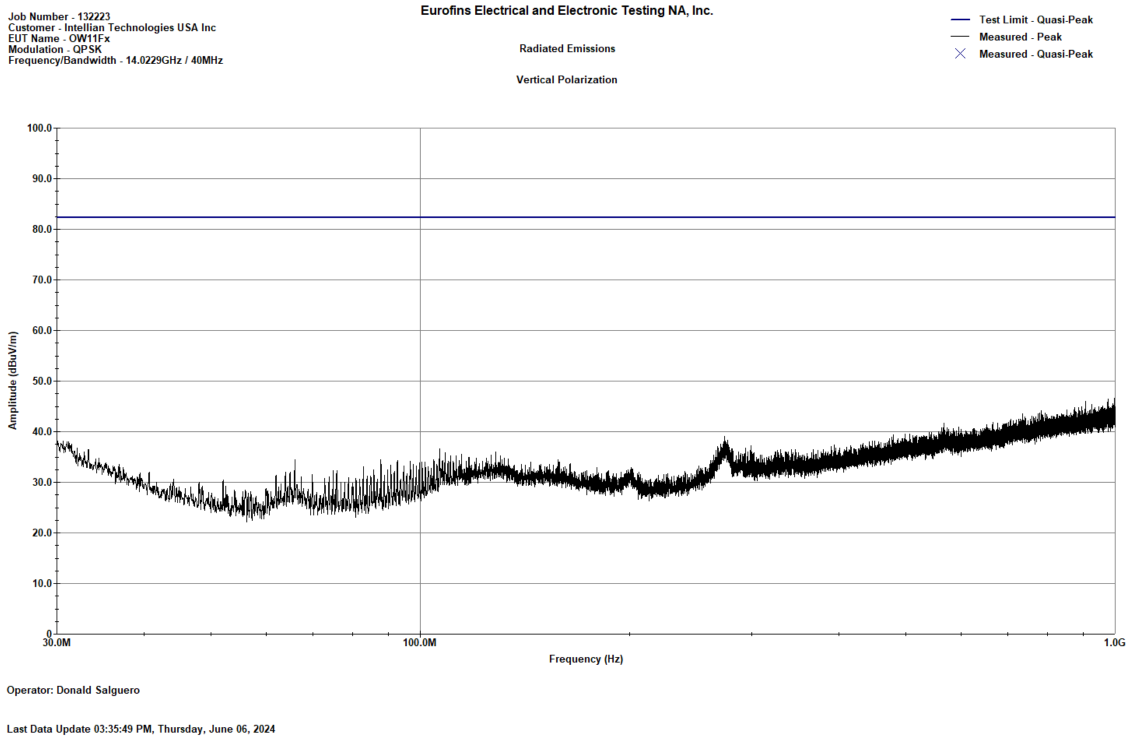


Figure 224. QPSK_40MHz_Low Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_V

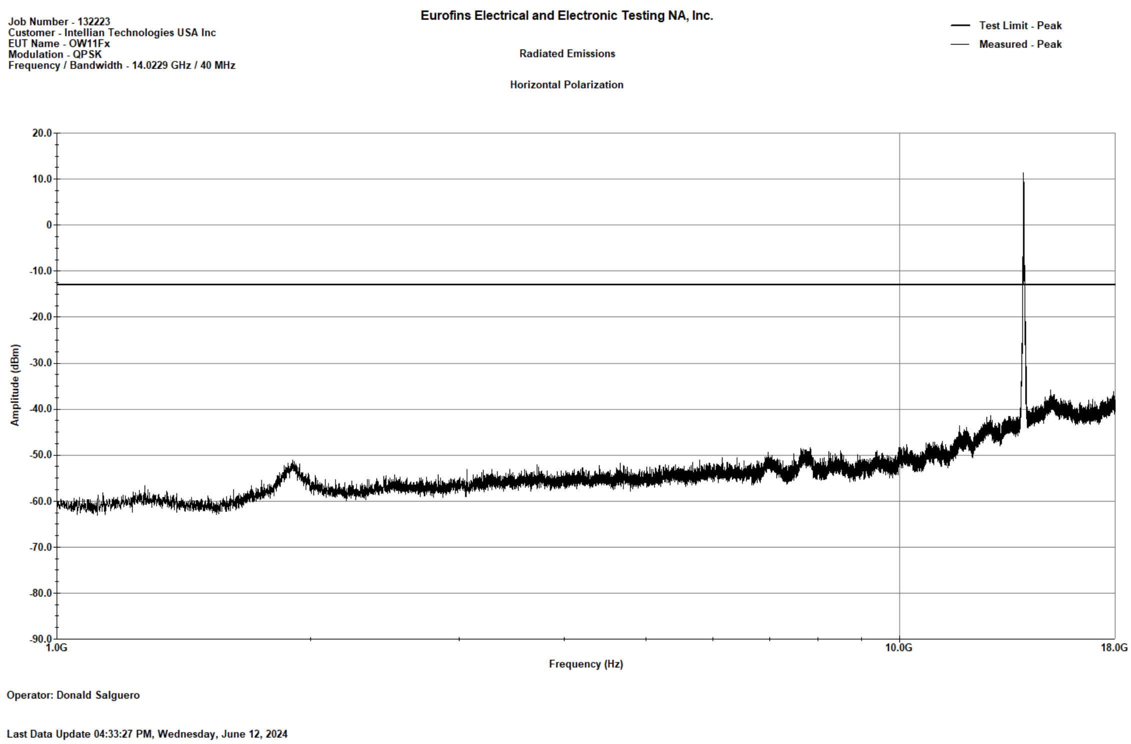


Figure 225. QPSK_40MHz_Low Channel_Radiated Emissions, 1 - 18 GHz-_H

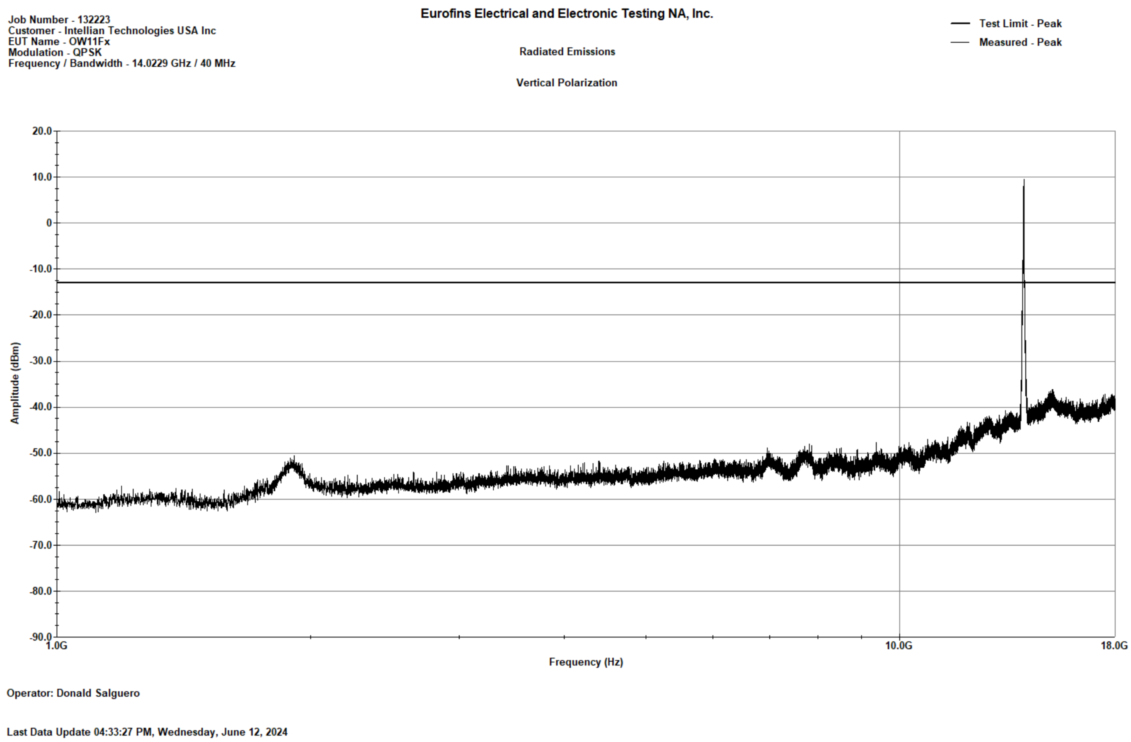


Figure 226. QPSK_40MHz_Low Channel_Radiated Emissions, 1 - 18 GHz-_V

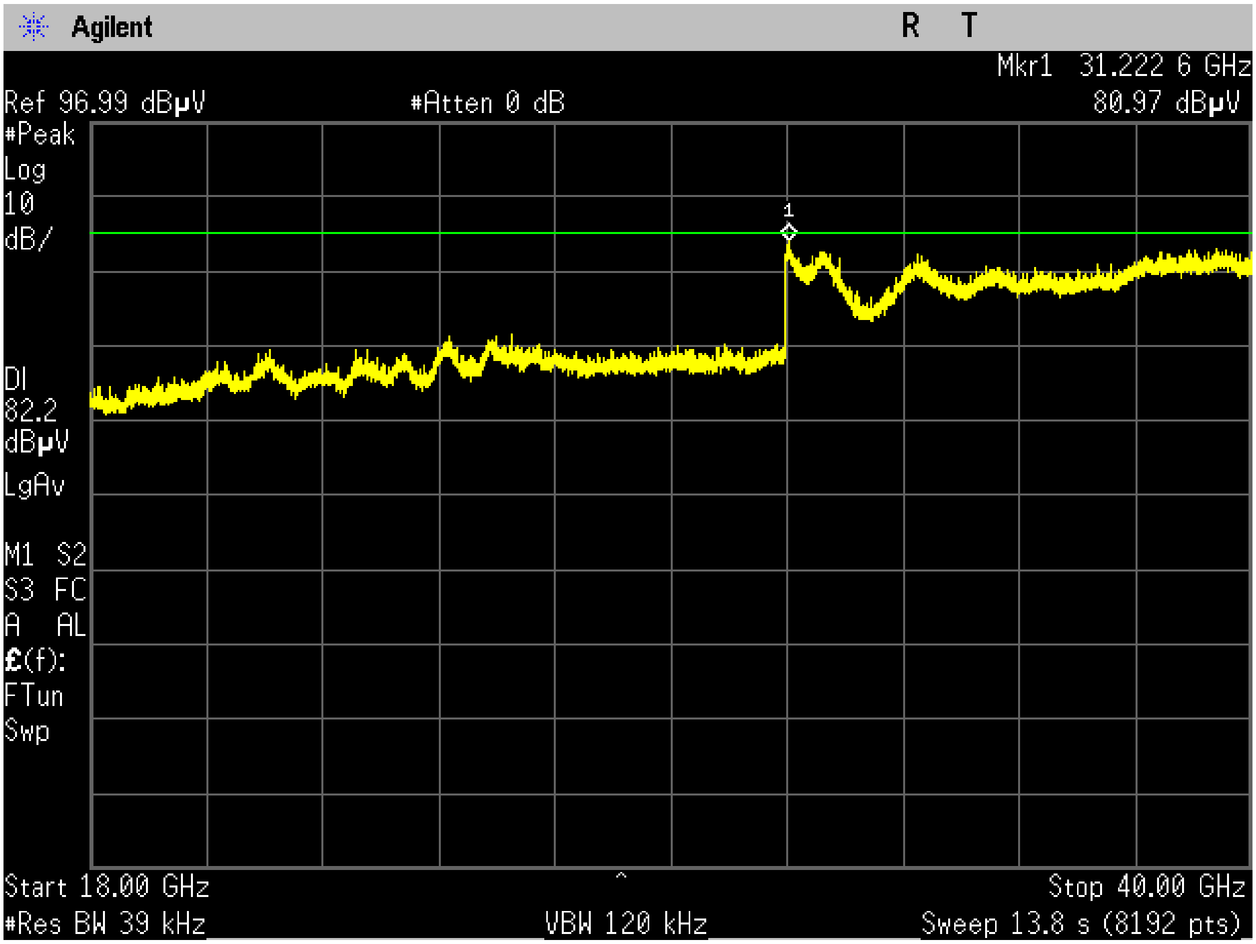


Figure 227. QPSK_40MHz_Low Channel_Radiated Emissions, 18GHz - 40GHz_H.

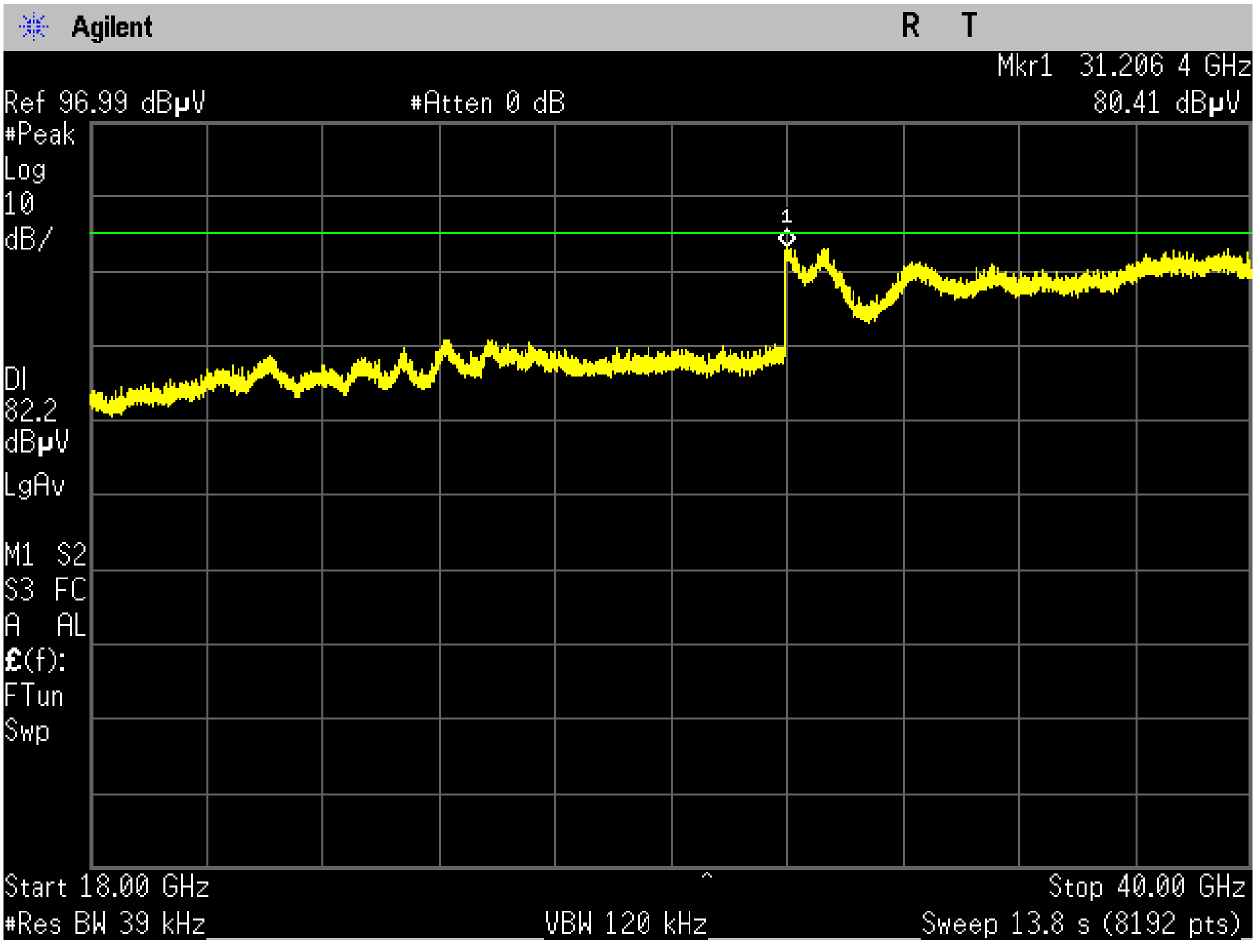


Figure 228. QPSK_40MHz_Low Channel_Radiated Emissions, 18GHz - 40GHz_V.

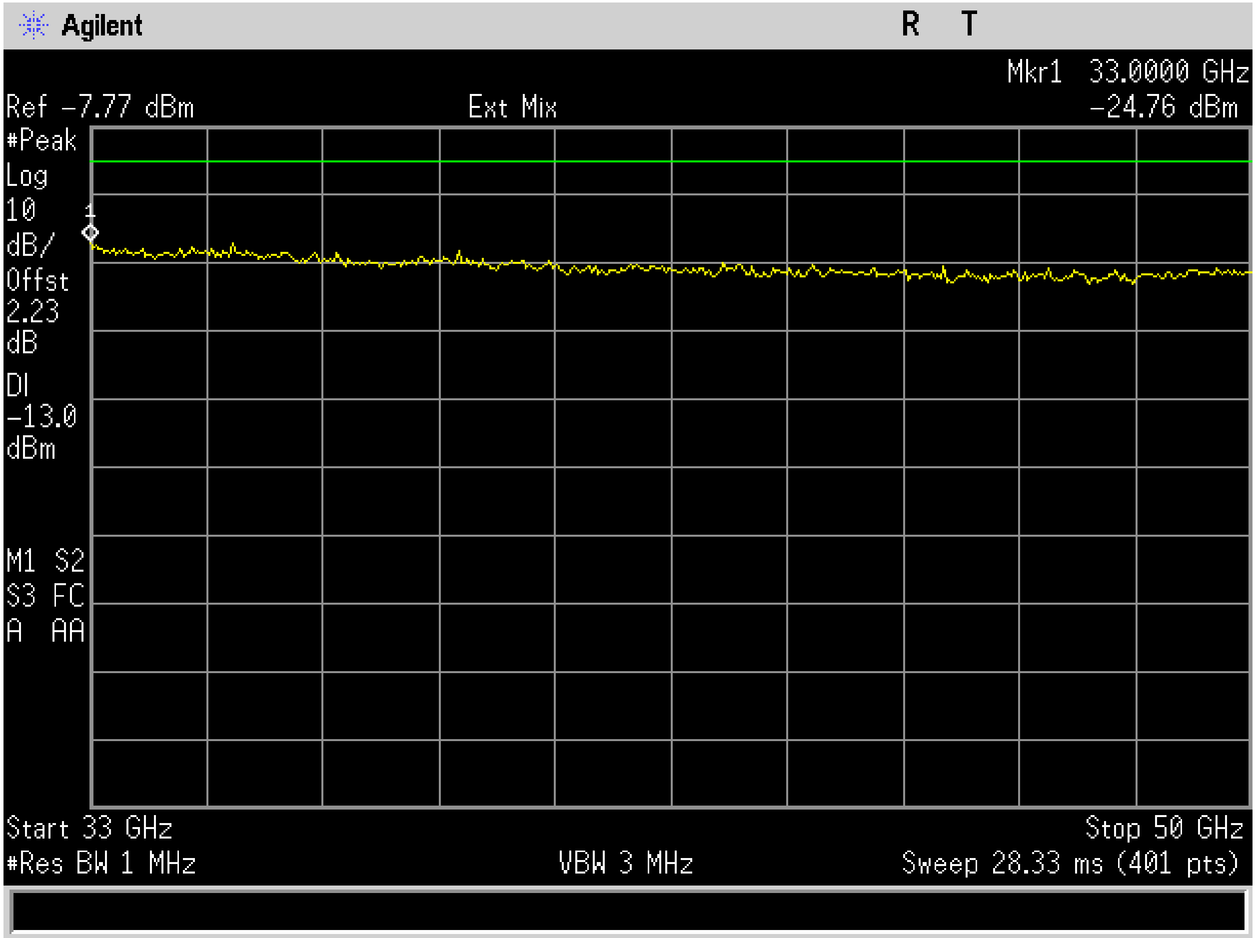


Figure 229. QPSK_40MHz_Low Channel_Radiated Emissions, 40 - 50 GHz.

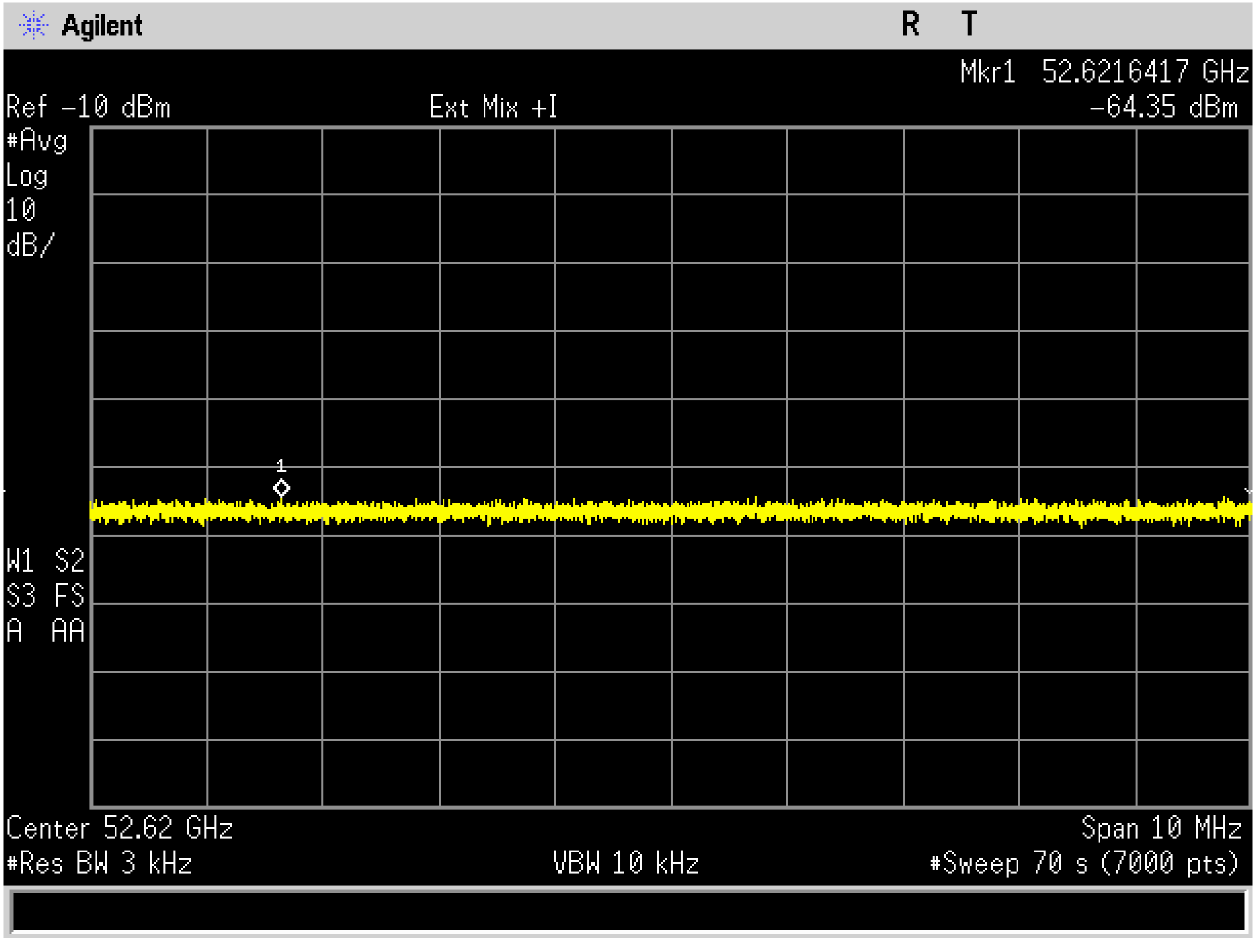


Figure 230. QPSK_40MHz_Low Channel_Radiated Emissions, 50 - 75 GHz (final).

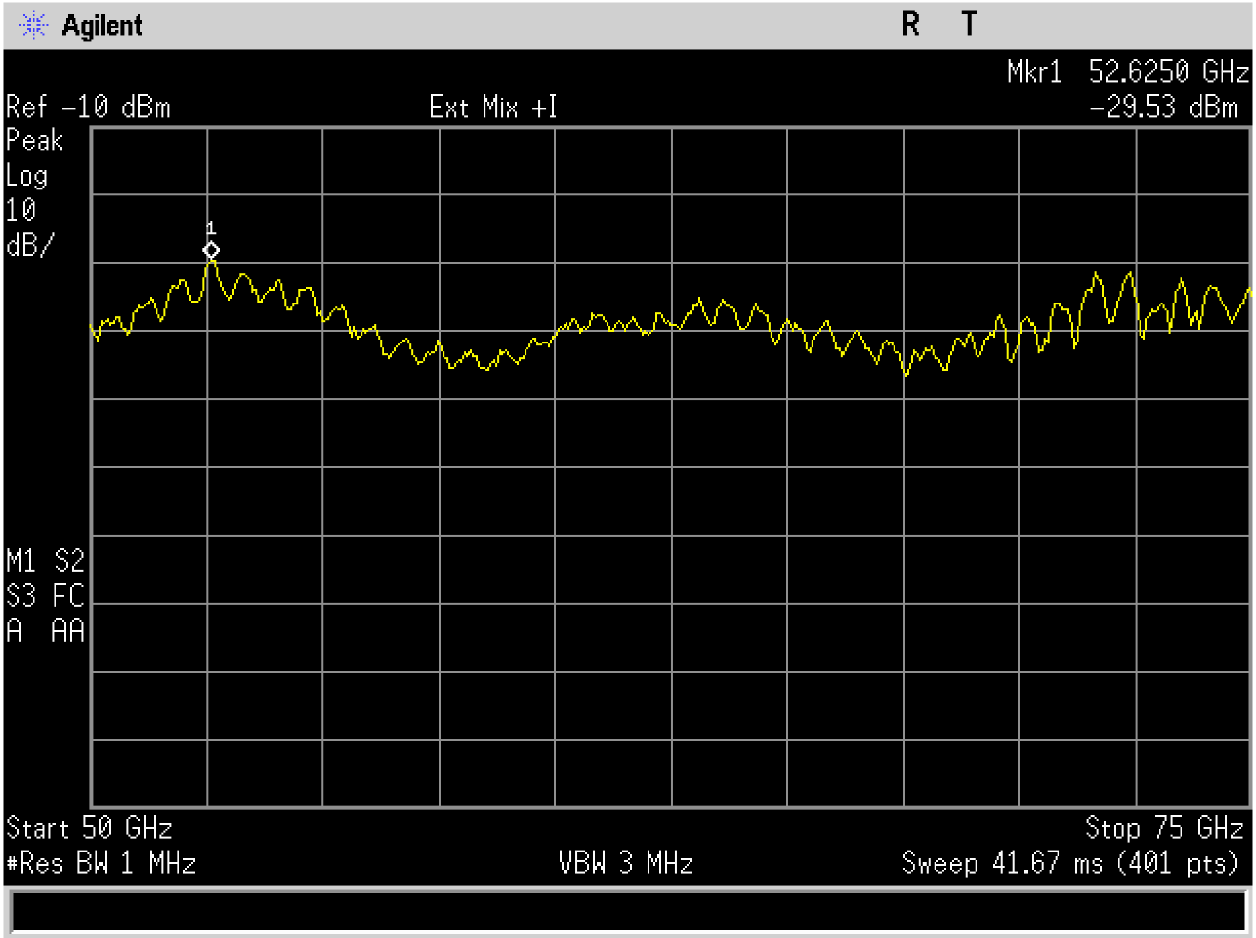


Figure 231. QPSK_40MHz_Low Channel_Radiated Emissions, 50 - 75 GHz (Prescan).

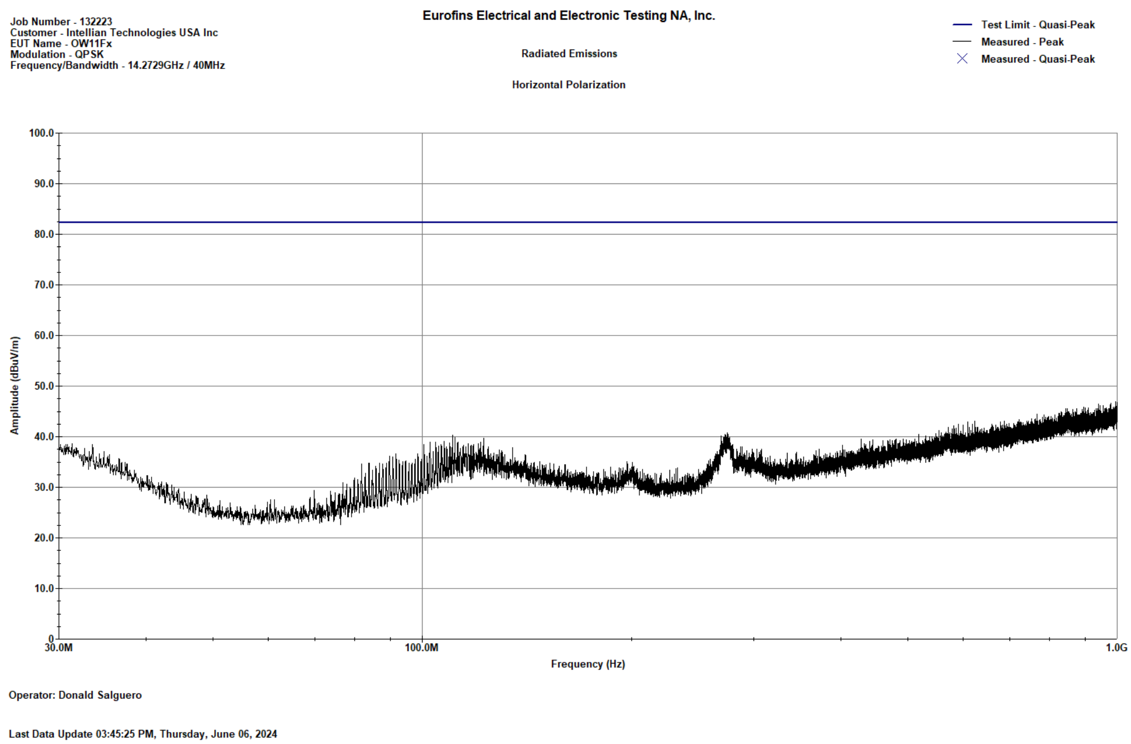


Figure 232. QPSK_40MHz_Mid Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_H

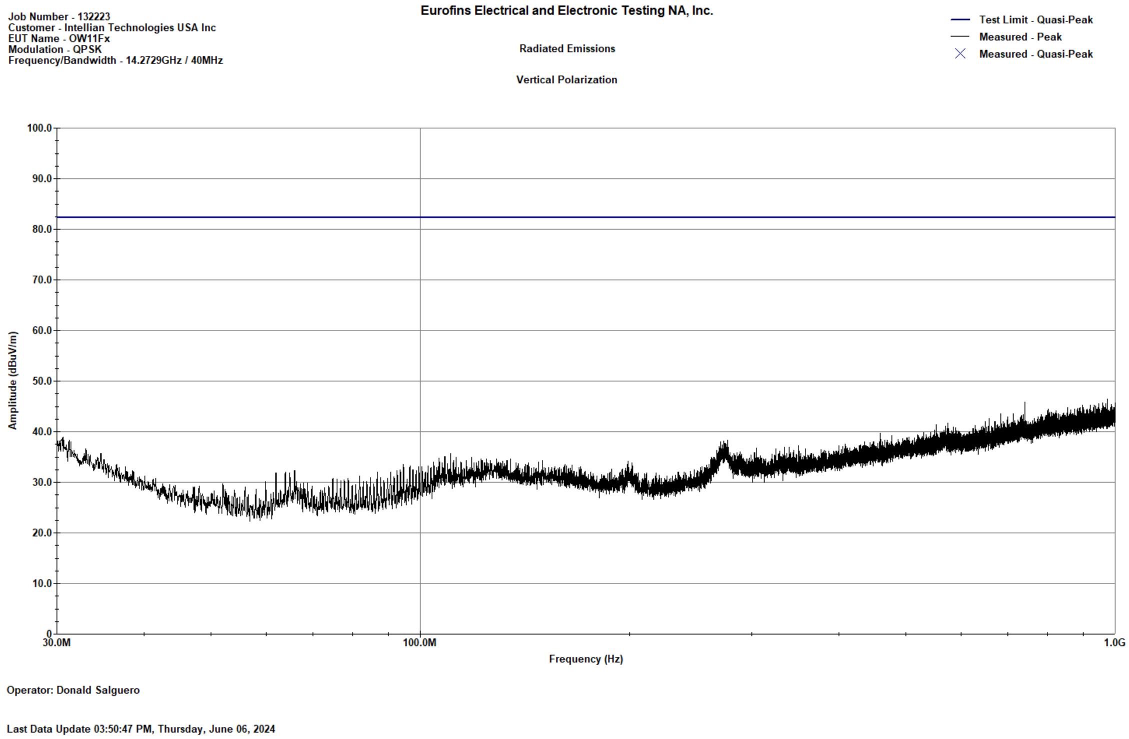


Figure 233. QPSK_40MHz_Mid Channel_Radiated Emissions, 0.030 GHz - 1 GHz-_V

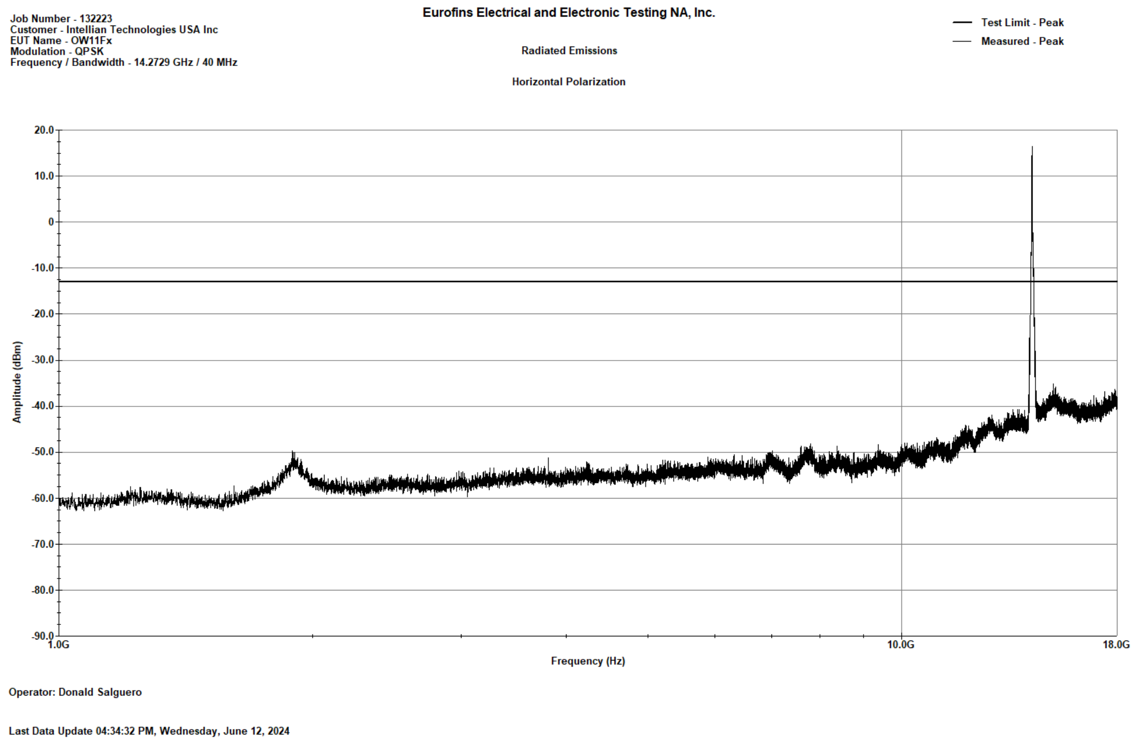


Figure 234. QPSK_40MHz_Mid Channel_Radiated Emissions, 1 - 18 GHz-_H

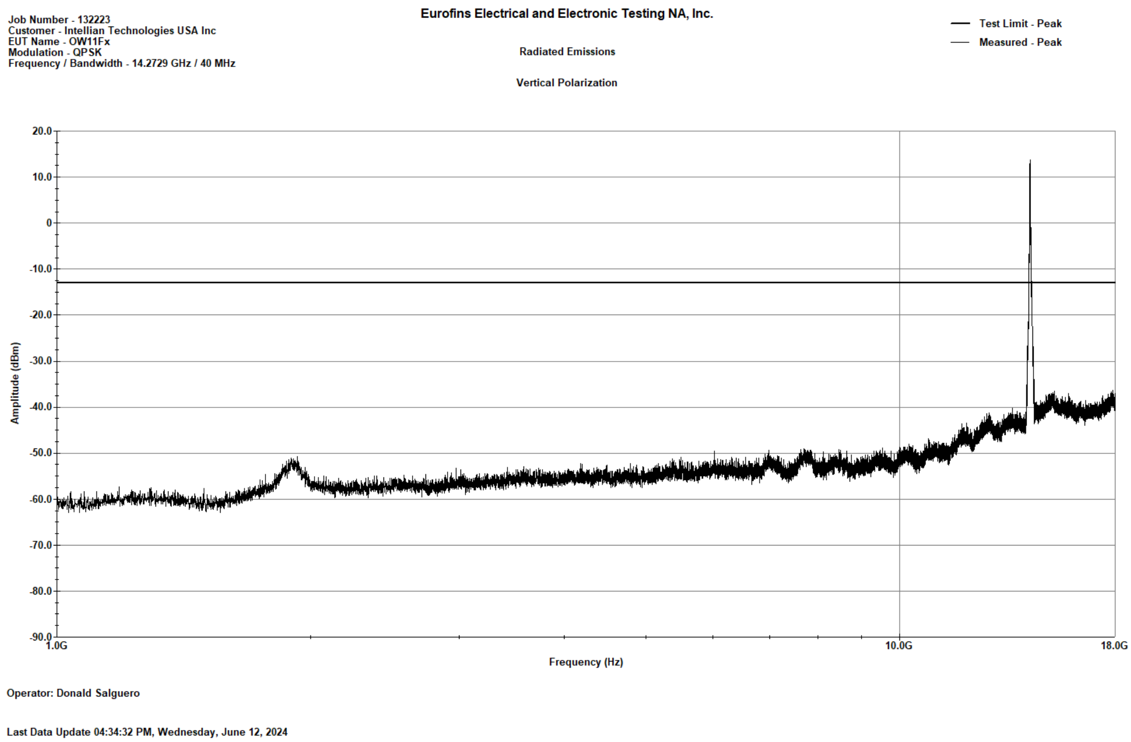


Figure 235. QPSK_40MHz_Mid Channel_Radiated Emissions, 1 - 18 GHz-_V

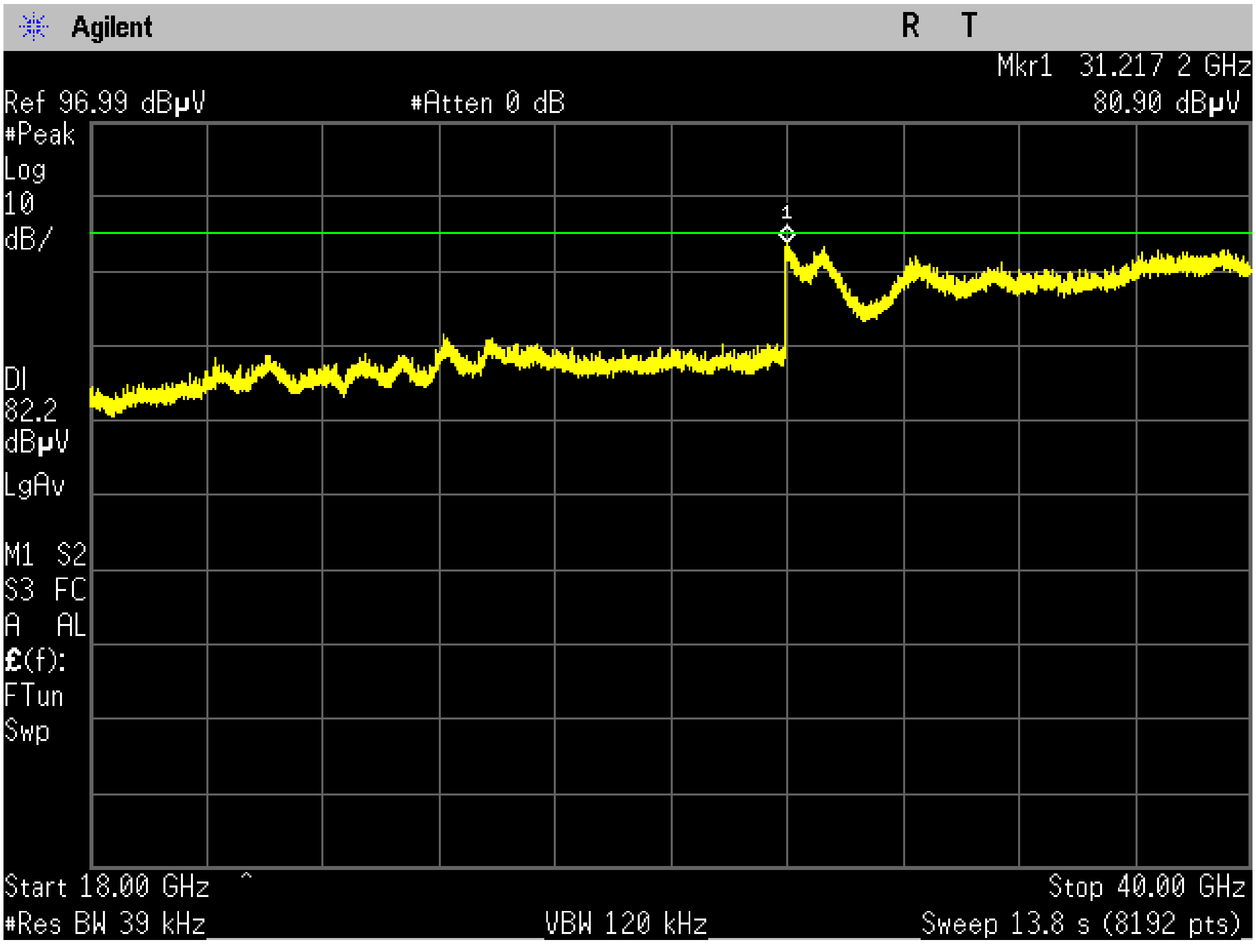


Figure 236. QPSK_40MHz_Mid Channel_Radiated Emissions, 18GHz - 40GHz_H.

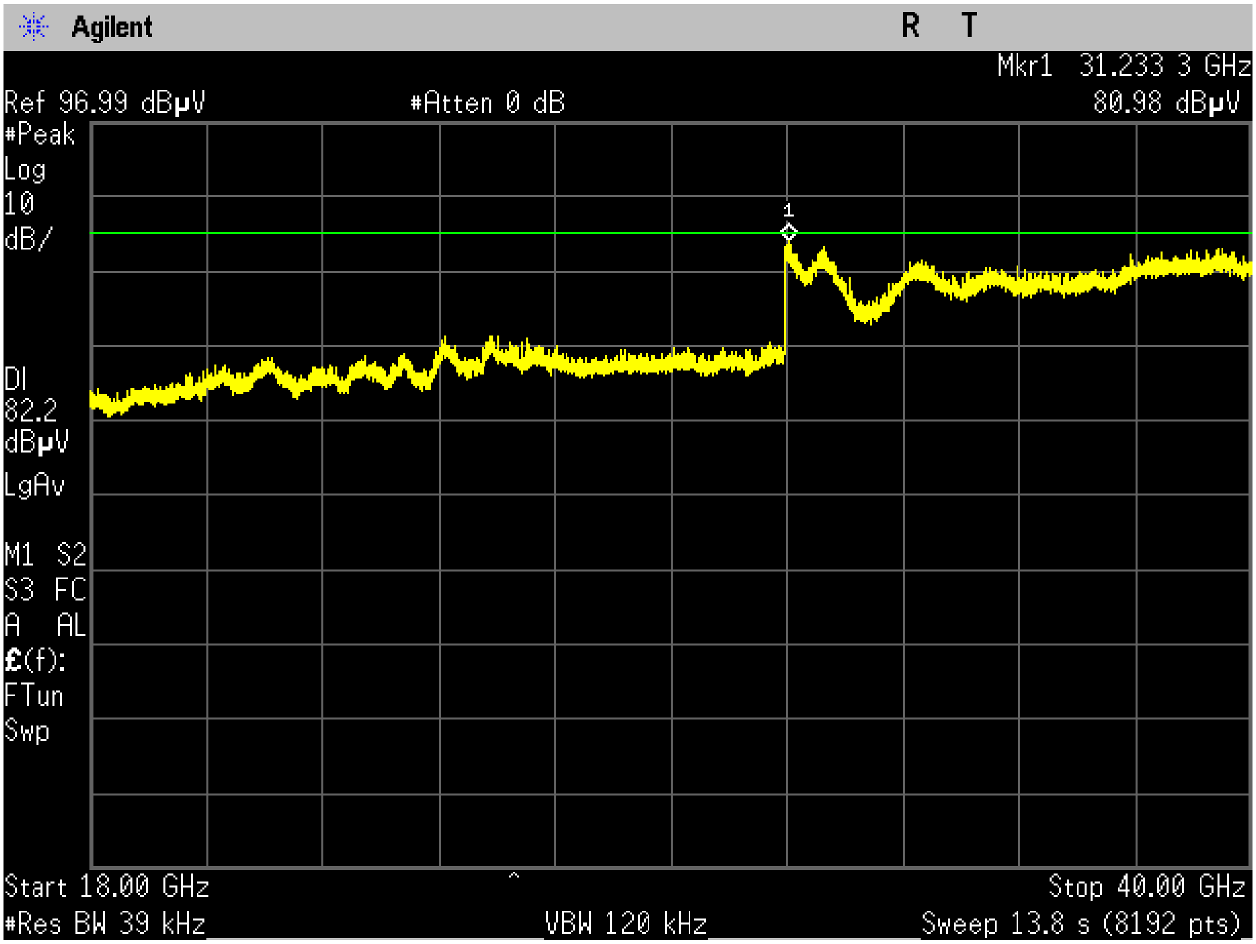


Figure 237. QPSK_40MHz_Mid Channel_Radiated Emissions, 18GHz - 40GHz_V.

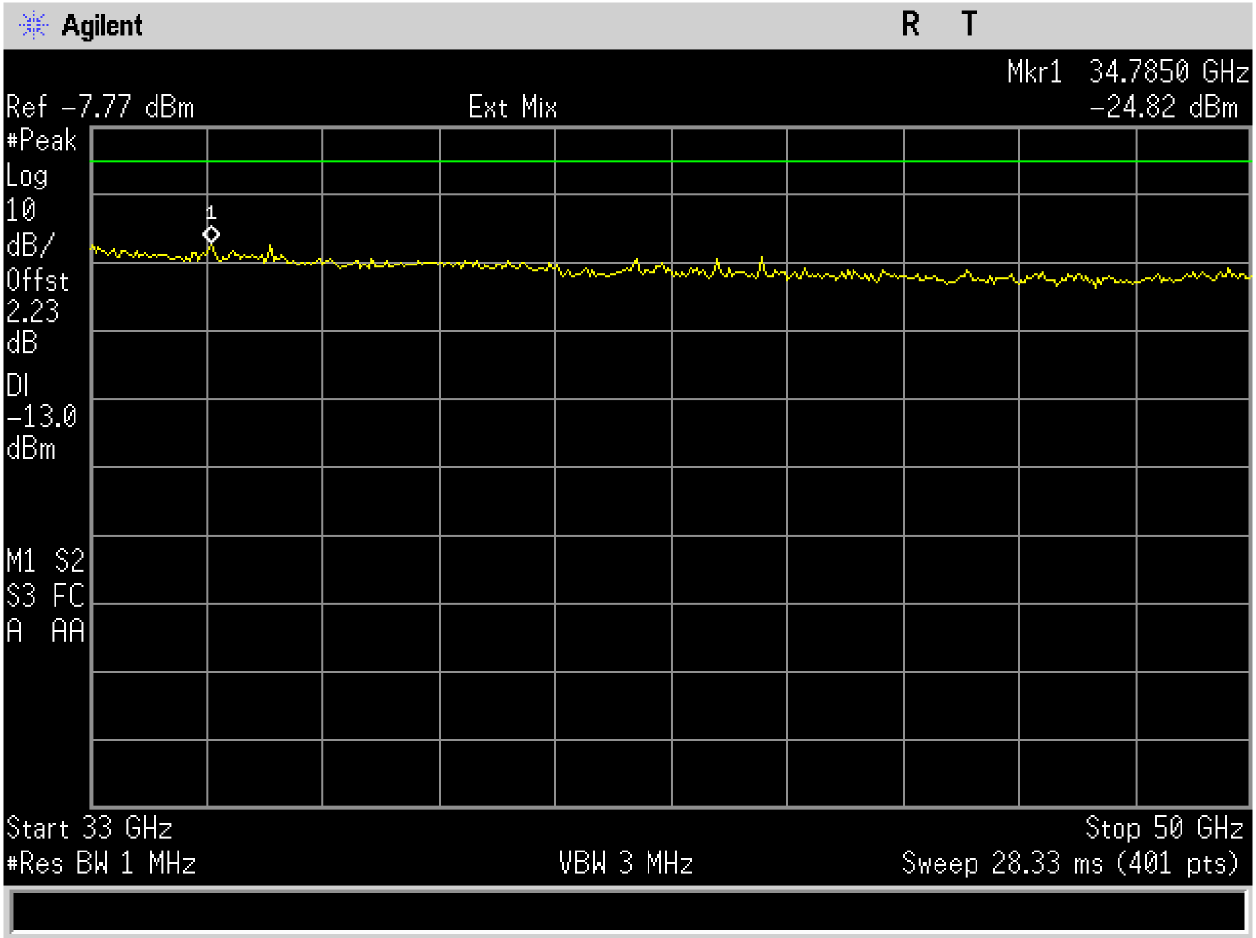


Figure 238. QPSK_40MHz_Mid Channel_Radiated Emissions, 40 - 50 GHz.

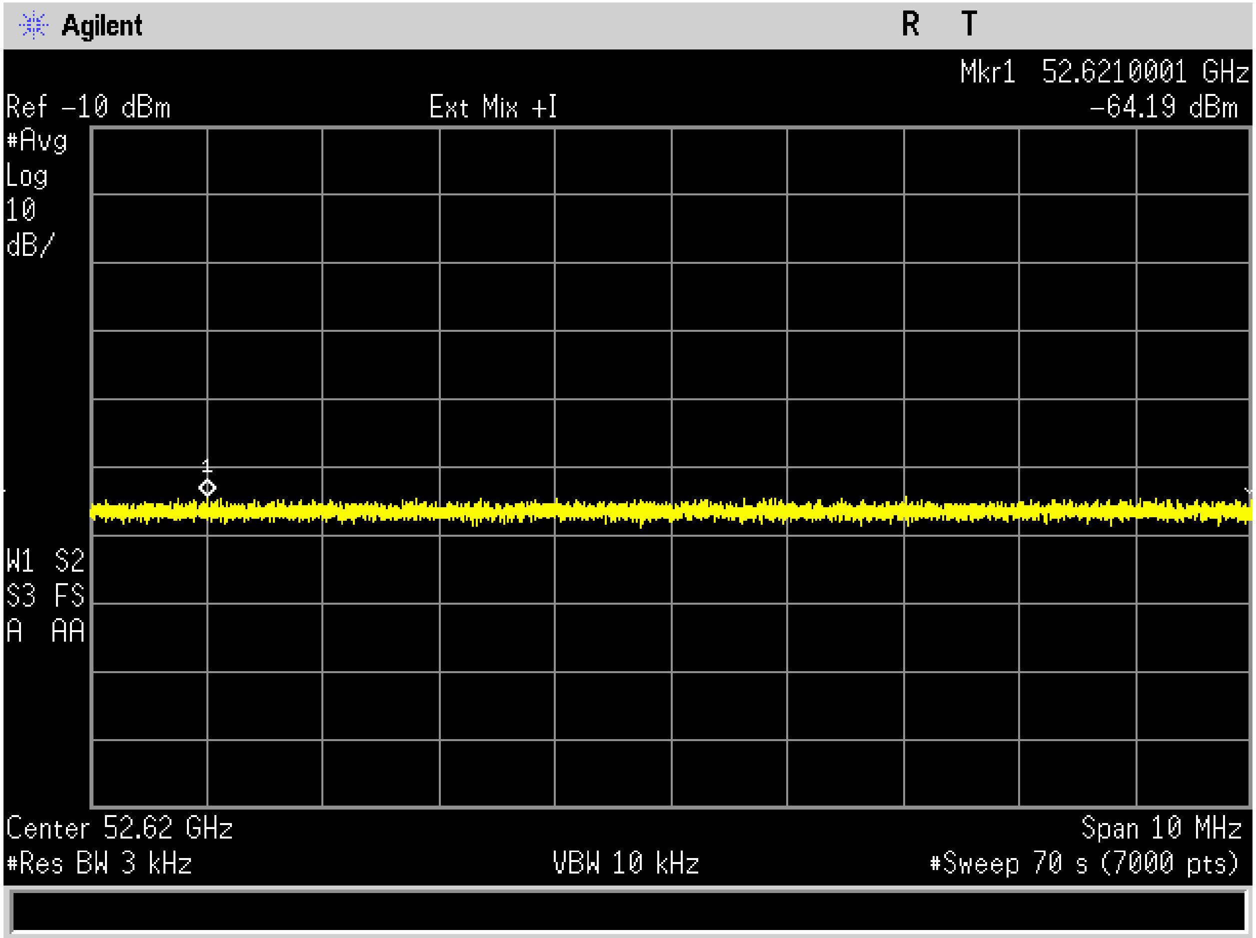


Figure 239. QPSK_40MHz_Mid Channel_Radiated Emissions, 50 - 75 GHz (Final).

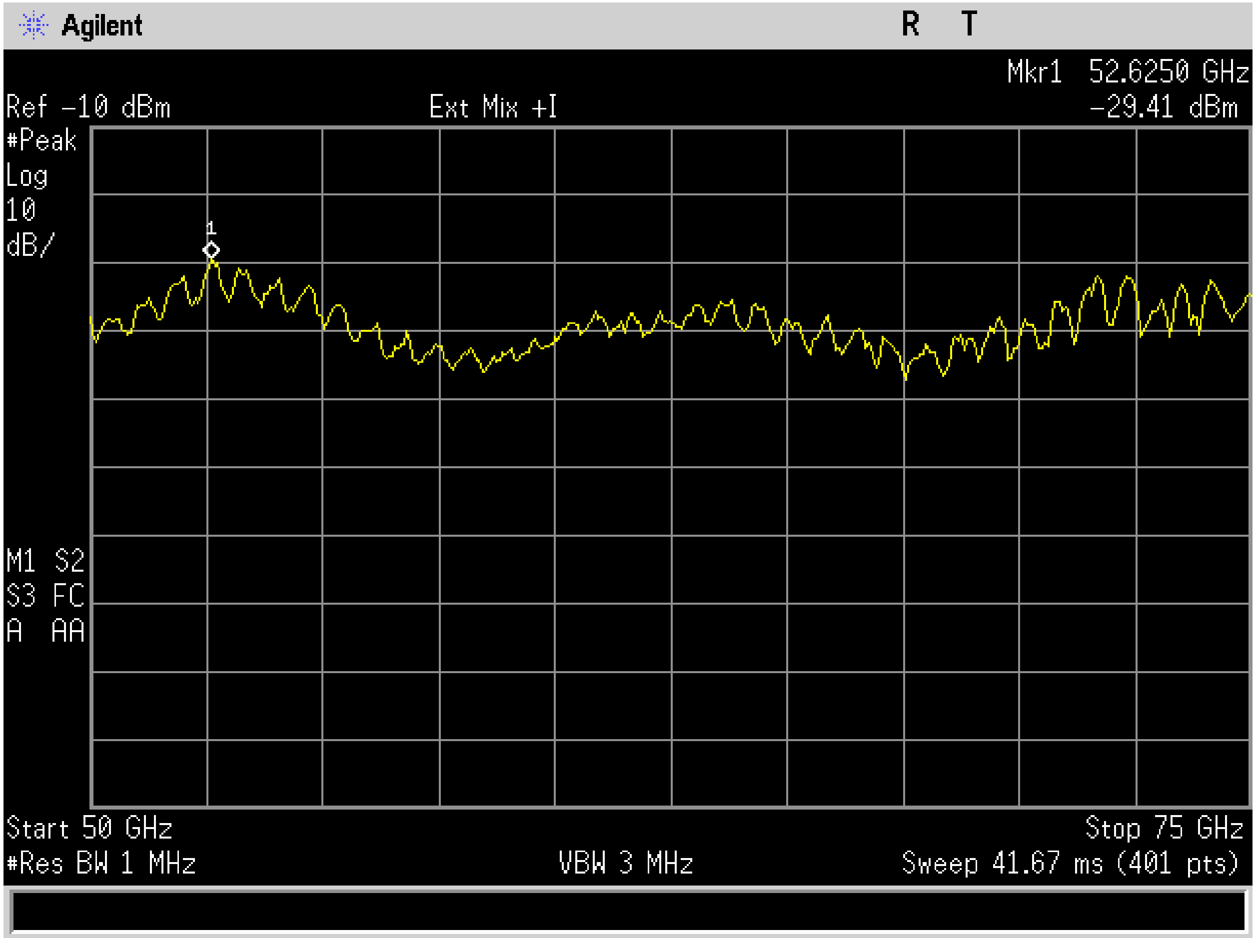
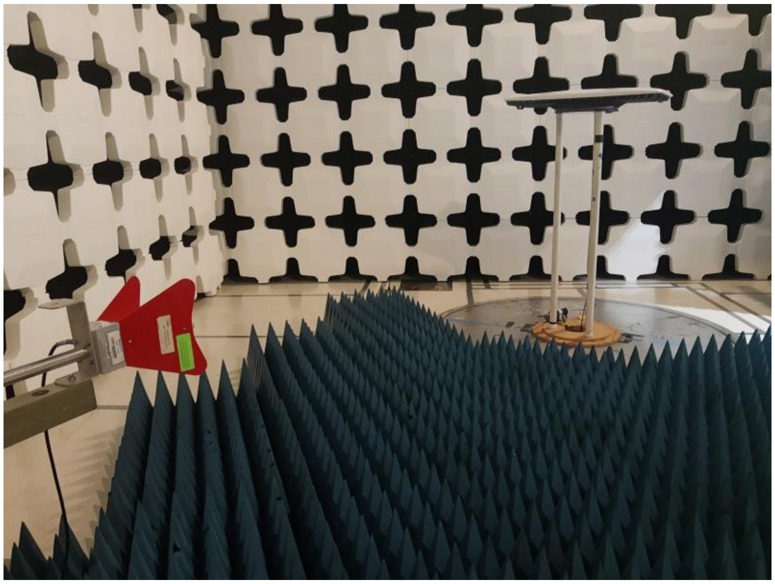


Figure 240. QPSK_40MHz_Mid Channel_Radiated Emissions, 50 - 75 GHz (Prescan).

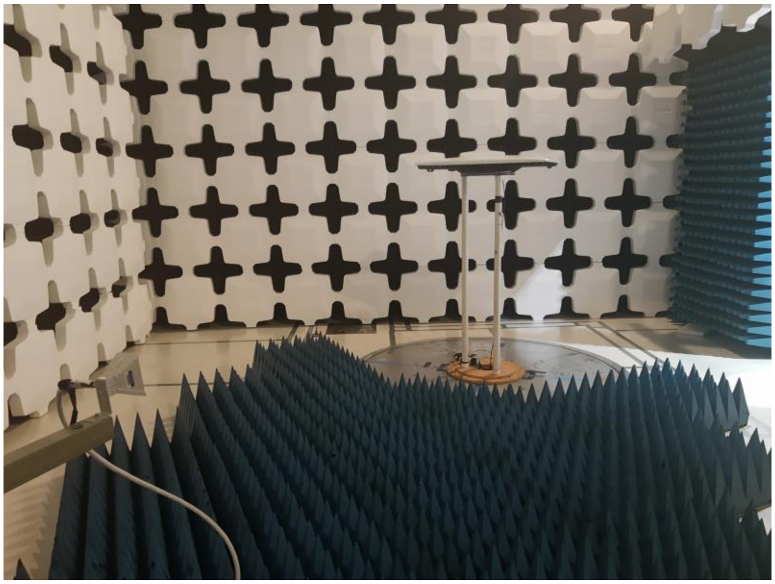
Modulation	Nominal Bandwidth (MHz)	Center Frequency (GHz)	Frequency of Interest (GHz)	Amplitude (dBm/3kHz)	Antenna Factor	Bandwidth Correction (dB)	Measuring Distance (m)	Corrected Amplitude (dBm/4kHz)	Limit (dBm/4kHz)	Margin (dB)
QPSK	20	14.013	52.6273925	-63.85	41.64	1.25	1	-18.73	-13	-5.73
		14.263	52.6227204	-64.06	41.64	1.25	1	-18.94	-13	-5.94
		14.487	52.6878236	-64.85	41.64	1.25	1	-19.73	-13	-6.73
	40	14.0229	52.6216417	-64.35	41.64	1.25	1	-19.23	-13	-6.23
		14.2729	52.6210001	-64.19	41.64	1.25	1	-19.07	-13	-6.07
		14.4771	52.6263209	-64.15	41.64	1.25	1	-19.03	-13	-6.03

Table 15. Radiated Spurious Emissions, Test Results

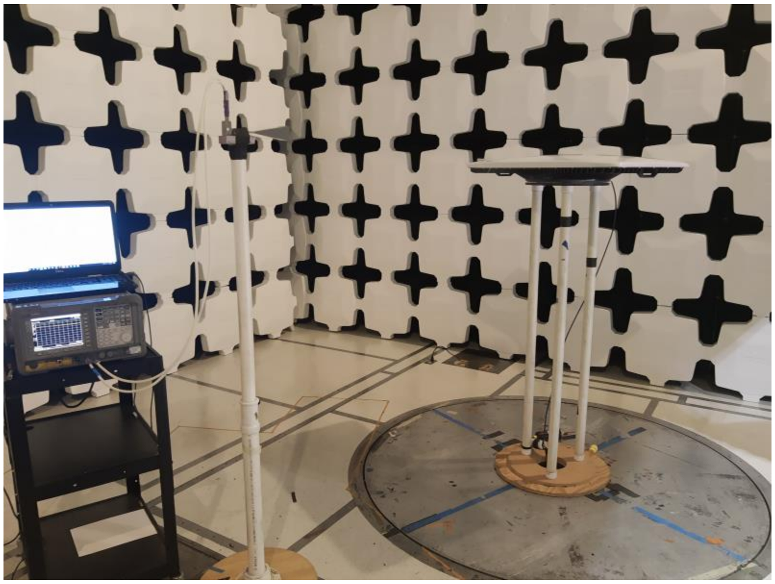
Photograph 2. RE Setup [0.03 GHz - 1 GHz]



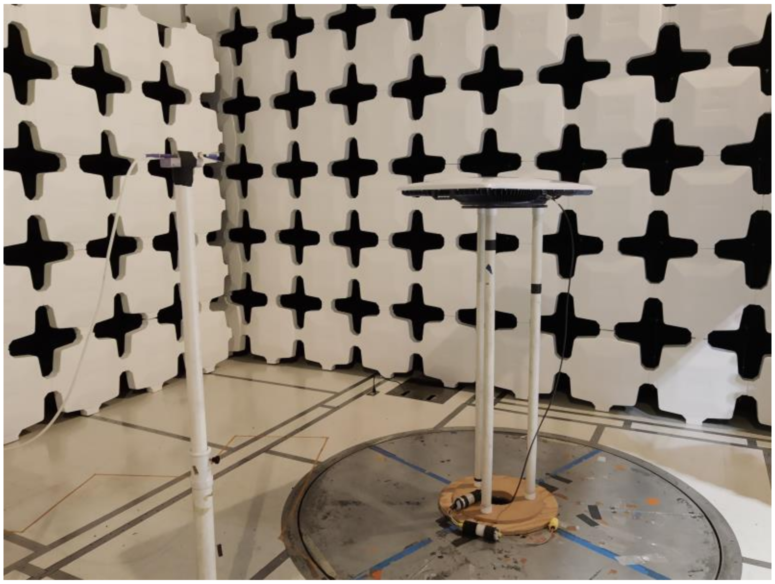
Photograph 3. RE Setup [1 GHz - 18 GHz]



Photograph 4. RE Setup [18 GHz - 40 GHz]



Photograph 5. RE Setup [40 GHz - 50 GHz]



Photograph 6. RE Setup [50 GHz - 75 GHz]

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Asset Number	Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
1T4300	SEMI-ANECHOIC CHAMBER (NSA)	EMC TEST SYSTEMS	NONE	NONE	8/31/2023	8/31/2025
1T4300B	Semi-Anechoic 3m Chamber sVSWR	EMC TEST SYSTEMS	NONE	NONE	2/12/2024	2/12/2026
1T4753	Antenna - Bilog	Sunol Sciences	JB6	A110310	12/5/2023	6/30/2025
1T4757	Antenna; Horn	ETS-Lindgren	3117	123516	7/24/2023	1/31/2025
1T4744	Antenna, Horn	ETS-Lindgren	3116	126519	12/16/2022	6/16/2022
1T8743	Preamplifier	A.H. Systems, Inc.	PAM-0118P	419	Func. Verify	Func. Verify
1T4752	Pre-Amplifier	Miteq	JS44-18004000-35-8P	1594792	Func. Verify	Func. Verify
1T4612	Spectrum Analyzer	Agilent Technologies	E4407B	MY45104199	5/7/2024	11/30/2025
1T4771	PSA Spectrum Analyzer	Agilent Technologies	E4446A	MY51100015	11/2/2023	5/31/2025
1T4409	EMI Receiver	Rohde & Schwarz	ESIB7	100207	11/2/2023	11/30/2024
1T4853	WR-15 Harmonic Mixer with Horn Antenna	OML, Inc.	M15HWA	140124-1	Func. Verify	Func. Verify
1T4857	Diplexer	OML, Inc.	DPL26 Diplexer	n/a	Func. Verify	Func. Verify
1T4664	Harmonic Mixer	HP	11970Q	3003A01200	Func. Verify	Func. Verify
2T9991	Temperature and Humidity Chamber (H8)	ESPEC North America, Inc.	EPX-4H	01IC1289	12/20/2023	12/20/2024
1T4596	AC Power Source	California Instruments	2001RP	11765	Func. Verify	Func. Verify

Table 16. Equipment Table

Note: Functionally verified test equipment is verified using calibrated instrumentation at time of testing.

V. Certification & User's Manual Information

Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.[1] *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer*, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

[1] In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

§ 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

G. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) *In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

(a) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

> Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
>
> – Reorient or relocate the receiving antenna.
>
> – Increase the separation between the equipment and receiver.
>
> – Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
>
> – Consult the dealer or an experienced radio/TV technician for help.

VI. Appendix

Intellian

Subject: Intellian Flat Panel Enterprise Series (OW11Fx)

To Whom it May Concern:

This letter is intended as formal communication that Intellian's Flat Panel Enterprise Series (OW11Fx) utilizes the same hardware, firmware and software across all three variants of the portfolio.

There are no variations or modifications between the OW11FL, OW11FM and OW11FV. The capabilities required to support the associated use cases within each market are managed through software.

Please do not hesitate to reach out if you have any questions or require further clarification.

Sincerely,

Toni Kousiafes

VP of Product Management | Advanced Development Center

Intellian Technologies