June 12, 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, OW10Hx. The Intellian Technologies USA Inc OW10Hx 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 Tarumging
Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: (\Intellian Technologies USA Inc\WIR130826-FCC25 Rev. 2)

Electromagnetic Compatibility Criteria Test Report

For the

Intellian Technologies USA Inc
OW10Hx

Tested under

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

Report: WIR130826-FCC25 Rev. 2

June 12, 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

Electromagnetic Compatibility Criteria
Test Report

For the

Intellian Technologies USA Inc
OW10Hx

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	May 29, 2024	Initial Issue
1	June 7, 2024	Updated EUT name; Added FCC ID; Removed test photographs throughout; Reordered plots to correct tabular data.
2	June 12, 2024	Updated table 10; Updated table 11.

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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**er**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**er**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 OW10Hx 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 OW10Hx. 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 OW10Hx 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 OW10Hx, under Intellian Technologies USA Inc's PO number 415715.

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, OW10Hx.

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

Model Tested:	OW10Hx	
Model Covered:	OW10Hx	
EUT Specifications:	**Primary Power:**	100-240VAC
	FCC ID:	XXZ-OW10HX
	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:	June 12, 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:	Half Duplex User terminal
Description of EUT and Intended Use:	The outdoor Half Duplex User terminal (HD 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 two similar power supplies - PSA 250W and PSA 450W. The unit runs on **56VDC**. The power supplies are already certified. The OW11HD 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 OW11HD enterprise flat panel UT series consists of three product variants, the OW11HL (fixed land), the OW11HM (maritime), and the OW11HV (land mobility). They are designed to meet the use cases for the markets of medium to large enterprise, regional backhaul, carrier trucking and government, maritime for merchant, energy, cruise, leisure, fishing, military/government, land mobile transportation, agriculture, mining, and media. 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 ~180-190W when the HD 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:	21.3” x 16.5” x 4.7”
Weight (lbs):	17.6
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:	V0.8.3.16
Transmitter Parameters	
Description of your unit:	User Terminal Antenna
Modulation Type:	QPSK, 8PSK, 16QAM-
Number of Channels:	24 (20MHz wide) channels / 20 (40MHz wide) channels
Frequency Range (MHz):	14000-14500
Antenna Type:	-
Antenna Gain (dB):	-
PMN:	Compact Flat Panel Series
HVIN:	OW10Hx
FVIN:	V0.8.3.16

HMN:	Compact Flat Panel series
Data Rates:	-
Expected Power Level:	-
Number of Antenna:	0
Number of Intentional Transmitters:	0
Number of Certified Intentional Transmitter Modules:	0
FCC ID:	XXZ-OW10HX
IC ID:	26236-OW10HX

Table 4. Equipment Details

Name/Description	Model Number	Part Number	Serial Number	Rev. #
User Terminal Antenna (Half Duplex UT)	OW10HM	OS-OW10HF-W	P10HM24020001	P2
CNX - WiFi	BL5008	N.A.	5008233800002	V 0.5
250 Watt AC Adapter	ATS250T-P560	N/A	N/A	N/A
450 Watt AC Adapter	ATM450A2-P560	N/A	N/A	N/A
User Terminal Antenna (Half Duplex UT)	OW10HM	OS-OW10HF-W P	1	P3

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

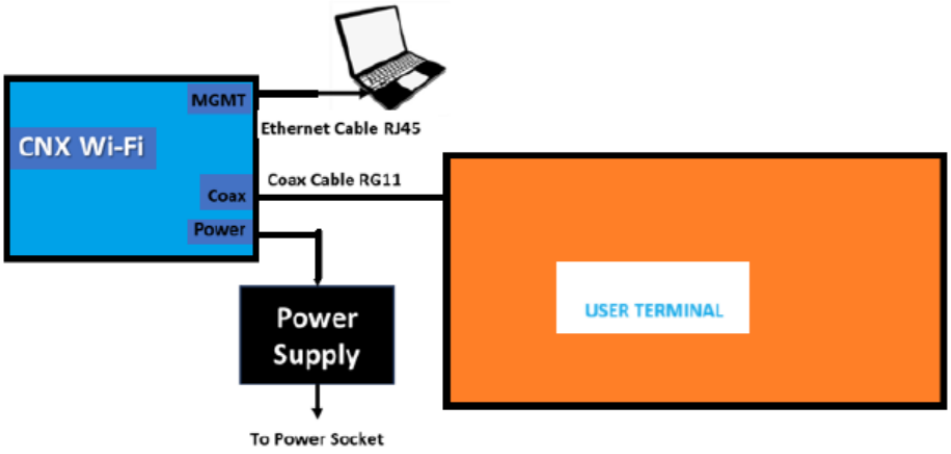

Figure 1. Block Diagram of Test Configuration

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 Procedures:

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: April 25 – April 26, 2024

Modulation	Nominal Bandwidth (MHz)	Center Frequency (GHz)	Conducted Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP (W)
QPSK	20	14.013	15.22	48.5	63.72	2355.05
		14.263	15.18	48.5	63.68	2333.46
		14.487	15.11	48.5	63.61	2296.15
	40	14.0229	18.15	48.5	66.65	4623.81
		14.2729	17.92	48.5	66.42	4385.31
		14.4771	18.07	48.5	66.57	4539.42
8PSK	20	14.013	15.14	48.5	63.64	2312.06
		14.263	15.12	48.5	63.62	2301.44
		14.487	15.08	48.5	63.58	2280.34
	40	14.0229	18.03	48.5	66.53	4497.80
		14.2729	18.19	48.5	66.69	4666.59
		14.4771	18.19	48.5	66.69	4666.59
16QAM	20	14.013	15.08	48.5	63.58	2280.34
		14.263	15.12	48.5	63.62	2301.44
		14.487	15.02	48.5	63.52	2249.05
	40	14.0229	18.12	48.5	66.62	4591.98
		14.2729	18.15	48.5	66.65	4623.81
		14.4771	18.03	48.5	66.53	4497.80

Table 8. EIRP, Test Results

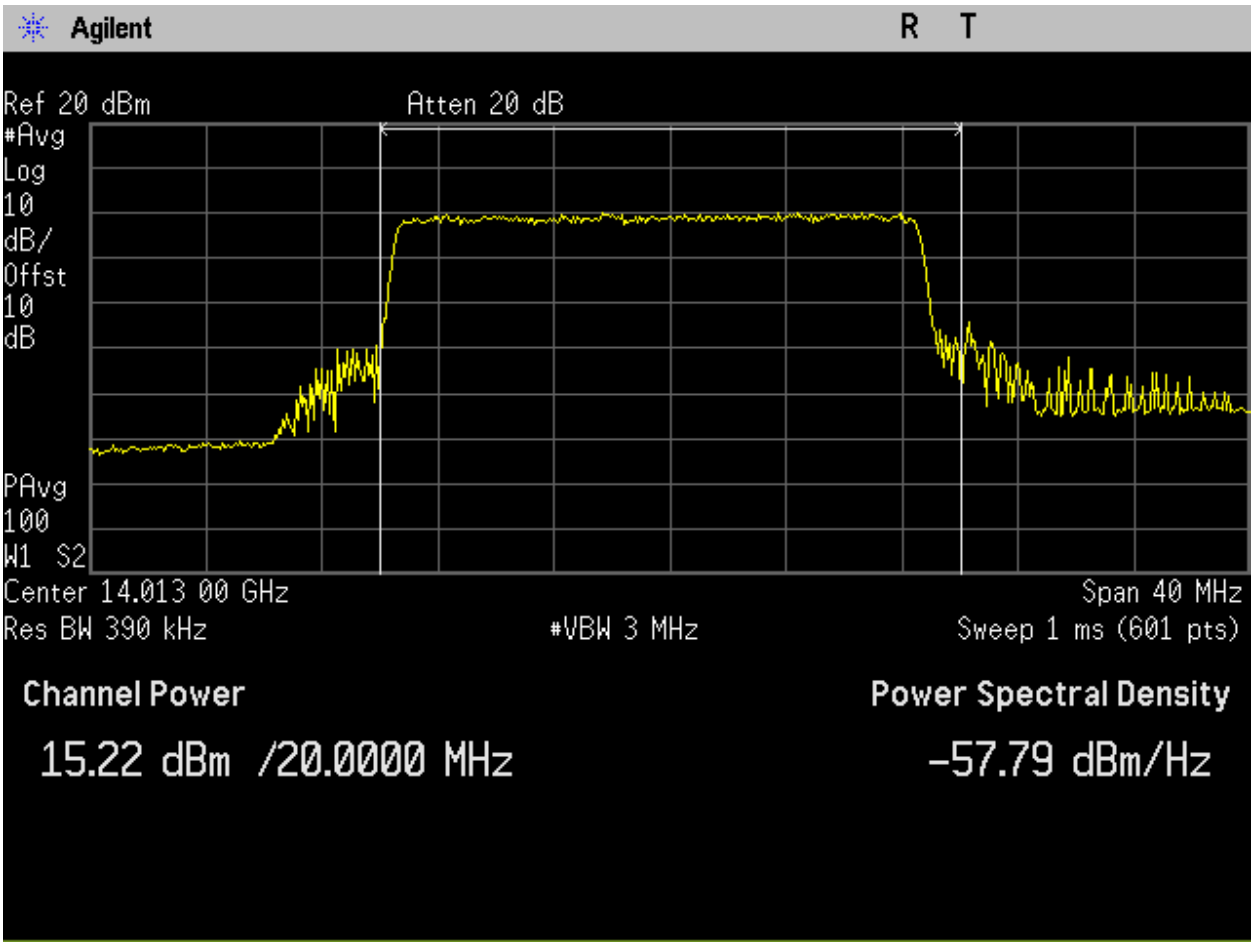

Figure 2. Conducted OP, QPSK, 20MHz Low Channel, 14.013 GHz.

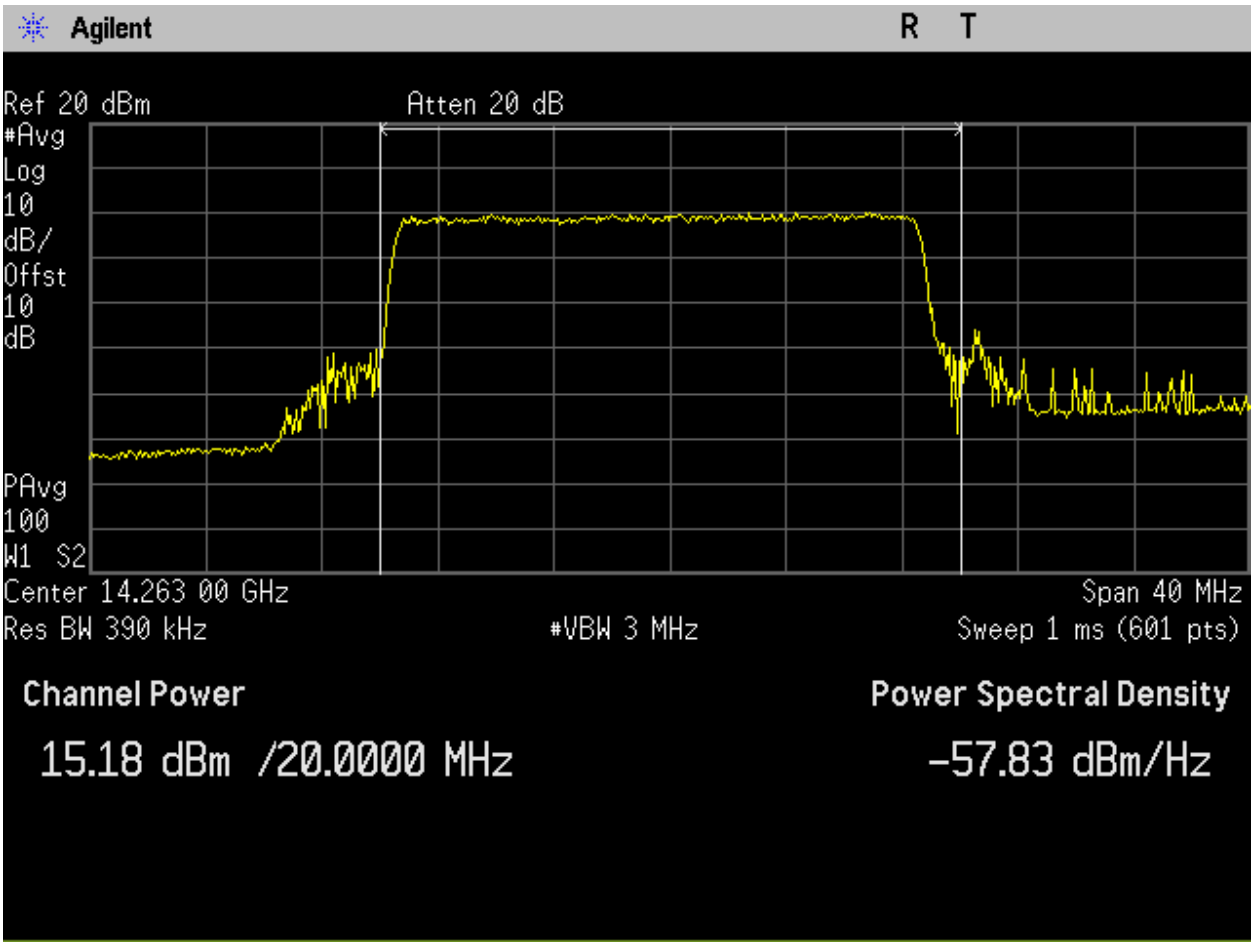

Figure 3. Conducted OP, QPSK, 20MHz Mid Channel, 14.263 GHz.

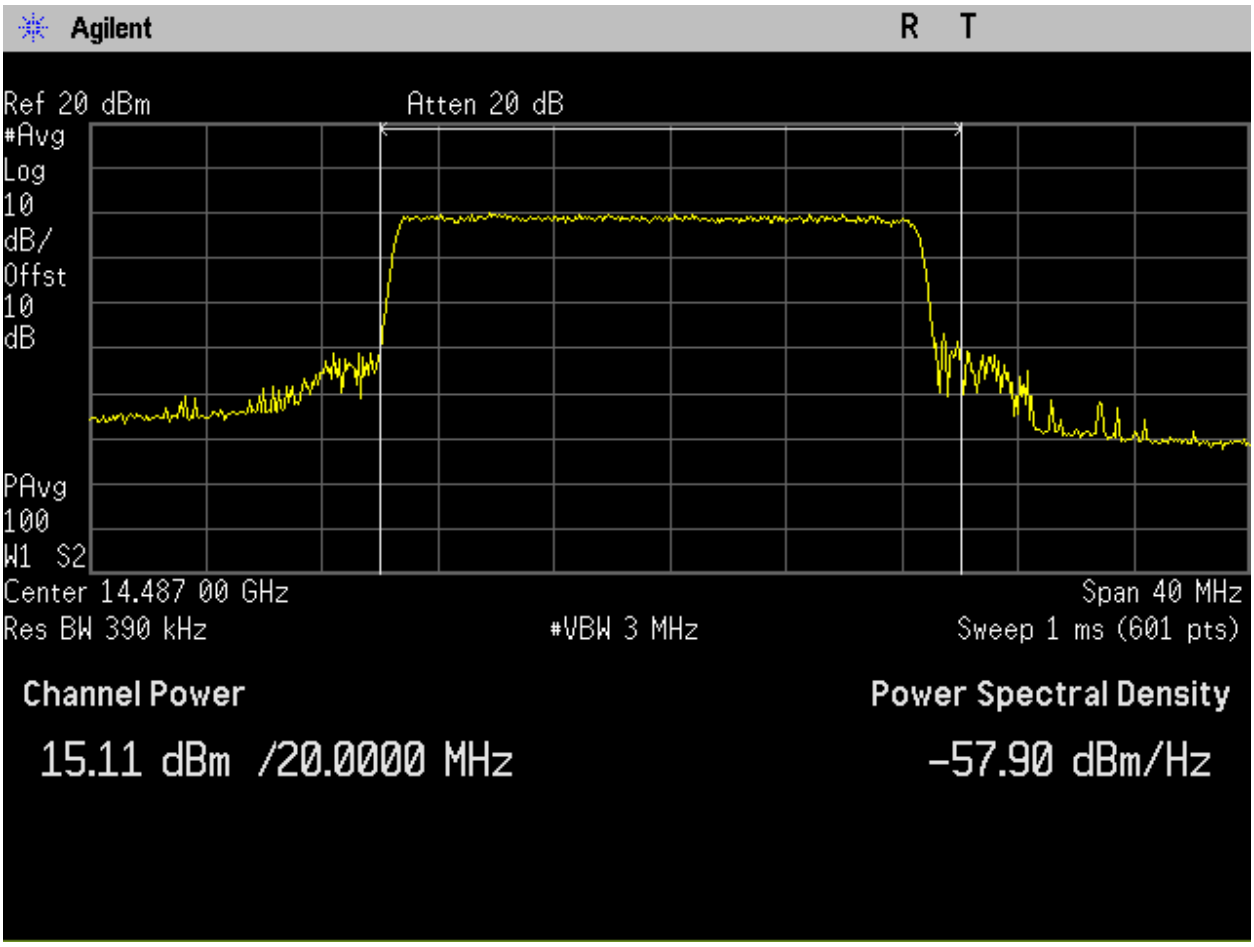

Figure 4. Conducted OP, QPSK, 20MHz High Channel, 14.487 GHz.

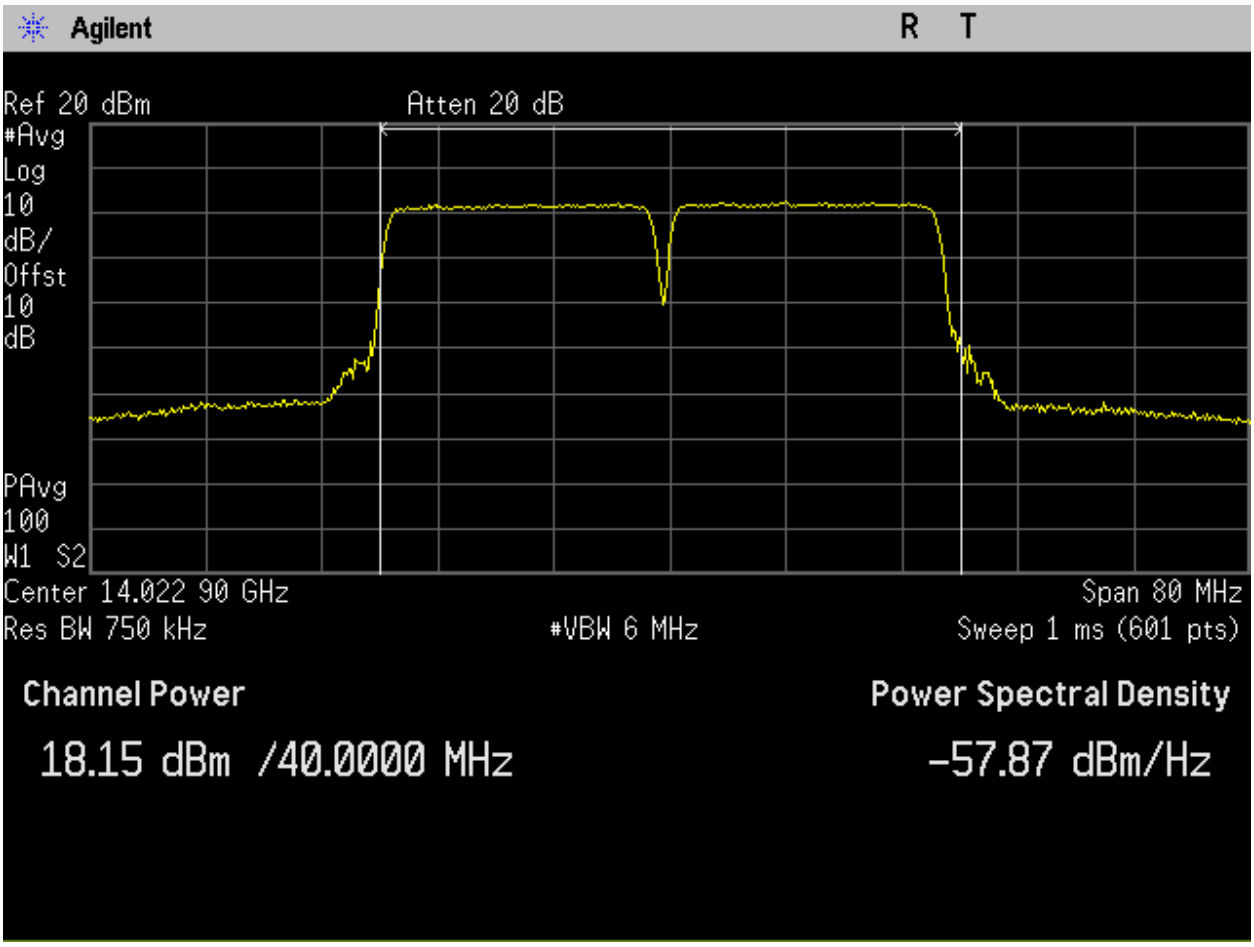

Figure 5. Conducted OP, QPSK, 40MHz Low Channel, 14.0229 GHz.

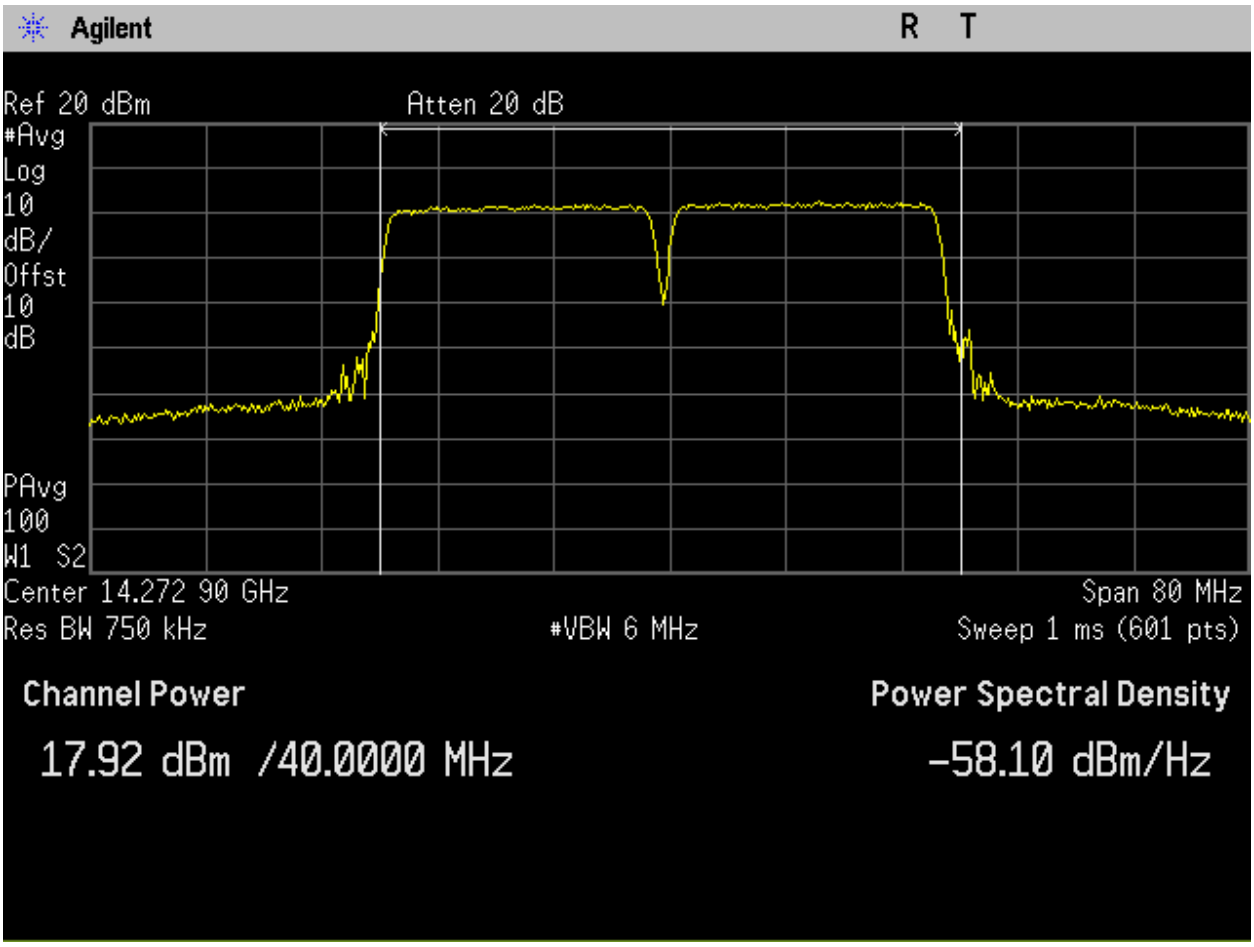

Figure 6. Conducted OP, QPSK, 40MHz Mid Channel, 14.2729 GHz.

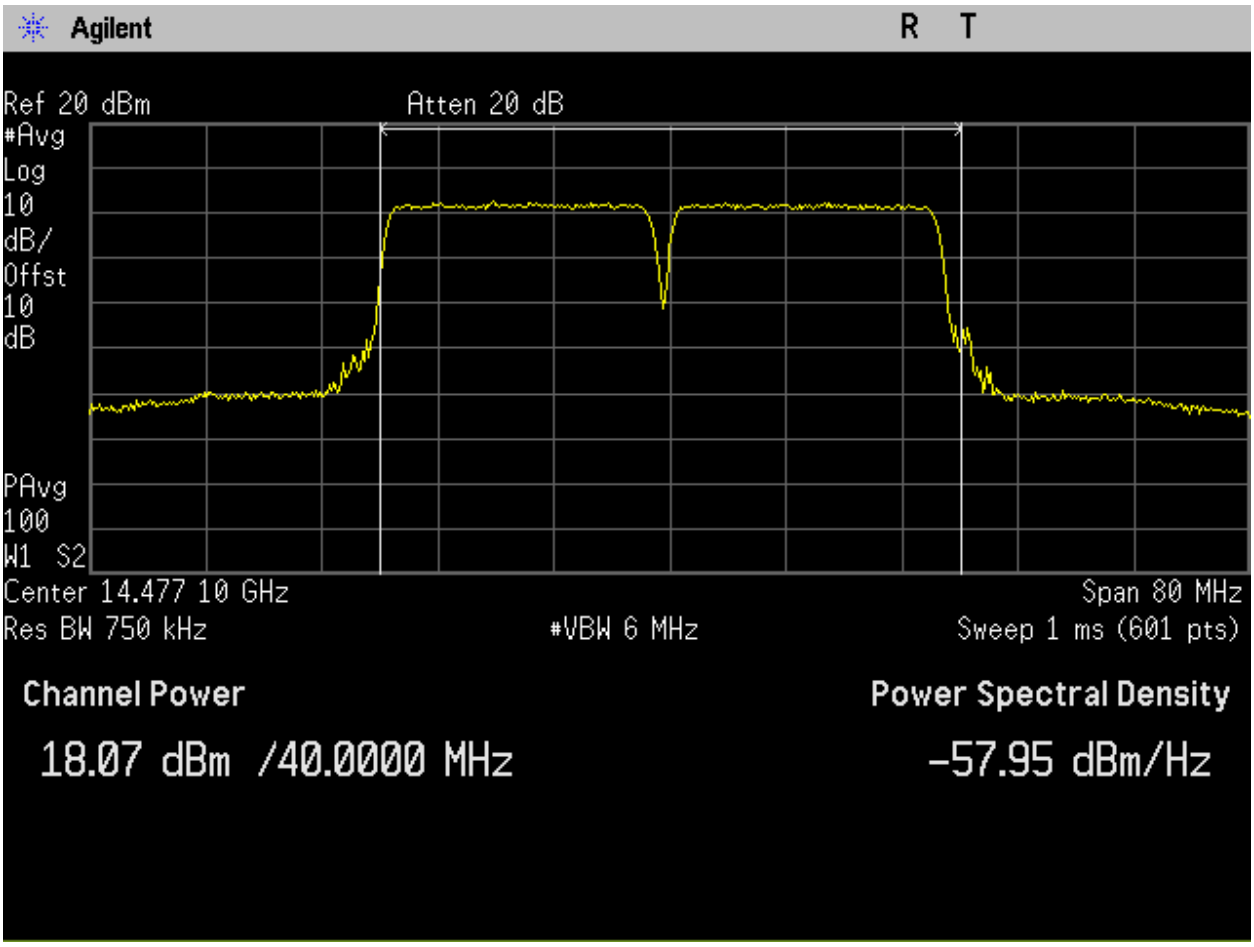

Figure 7. Conducted OP, QPSK, 40MHz High Channel, 14.4771 GHz.

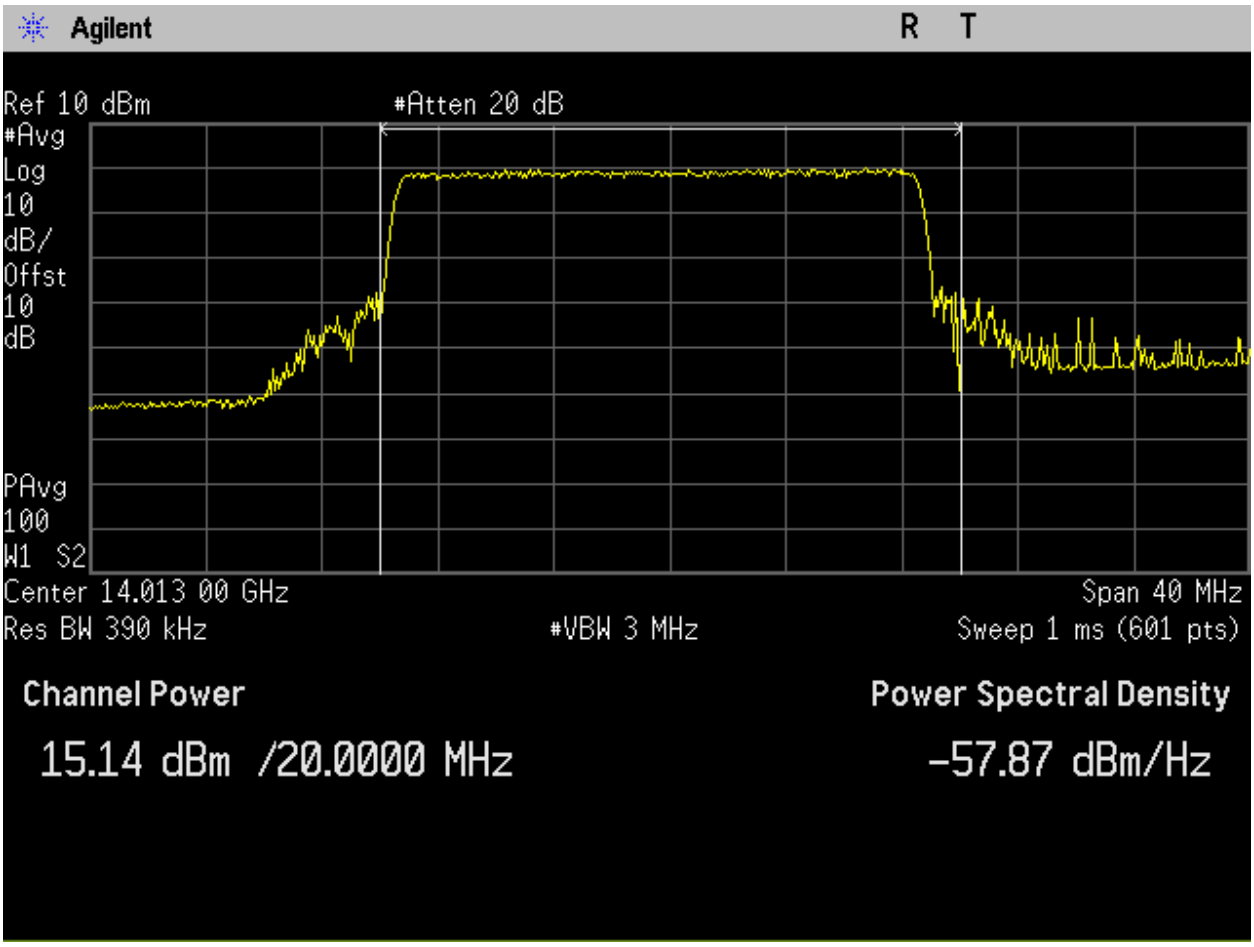

Figure 8. Conducted OP, 8PSK, 20MHz Low Channel, 14.013 GHz.

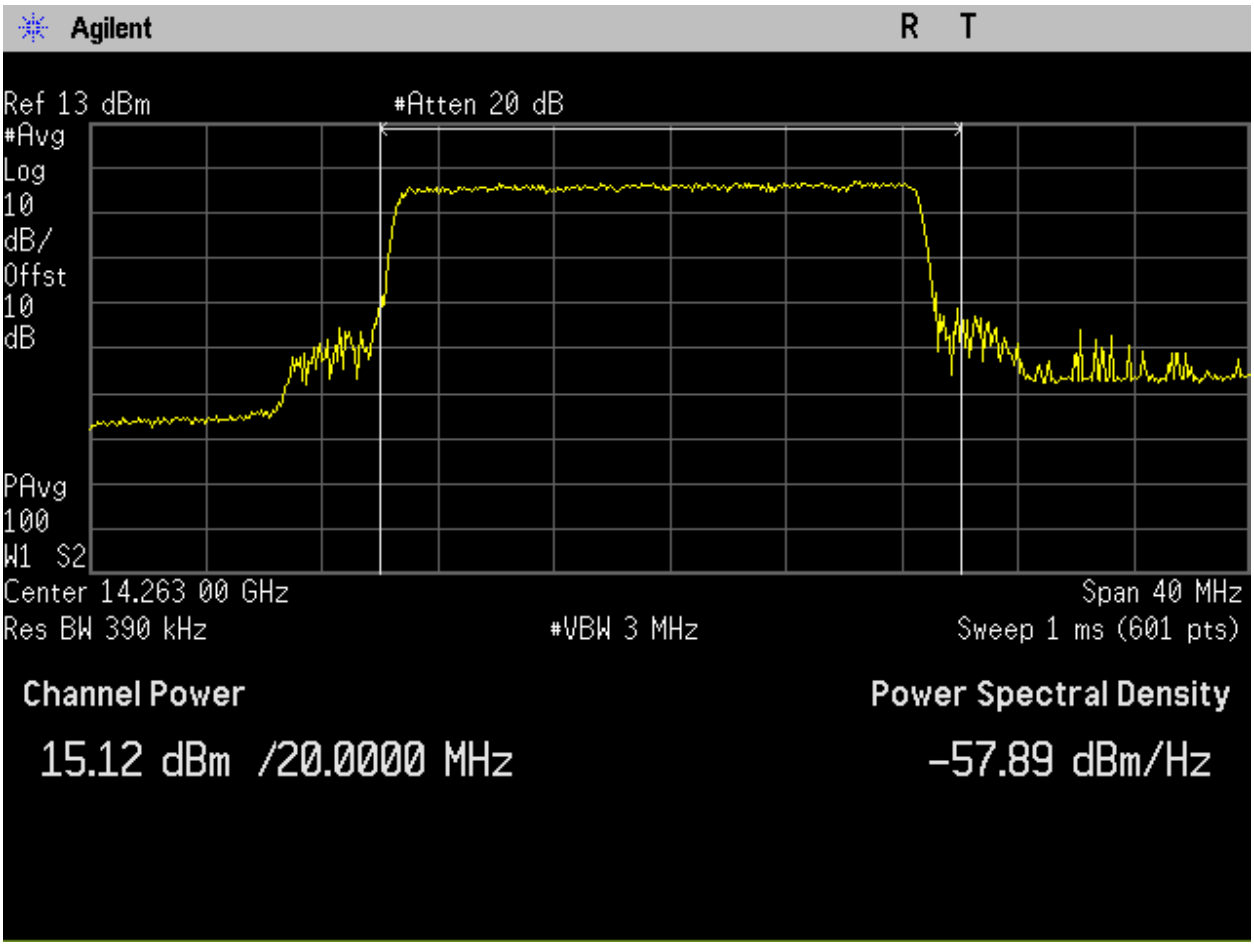

Figure 9. Conducted OP, 8PSK, 20MHz Mid Channel, 14.263 GHz.

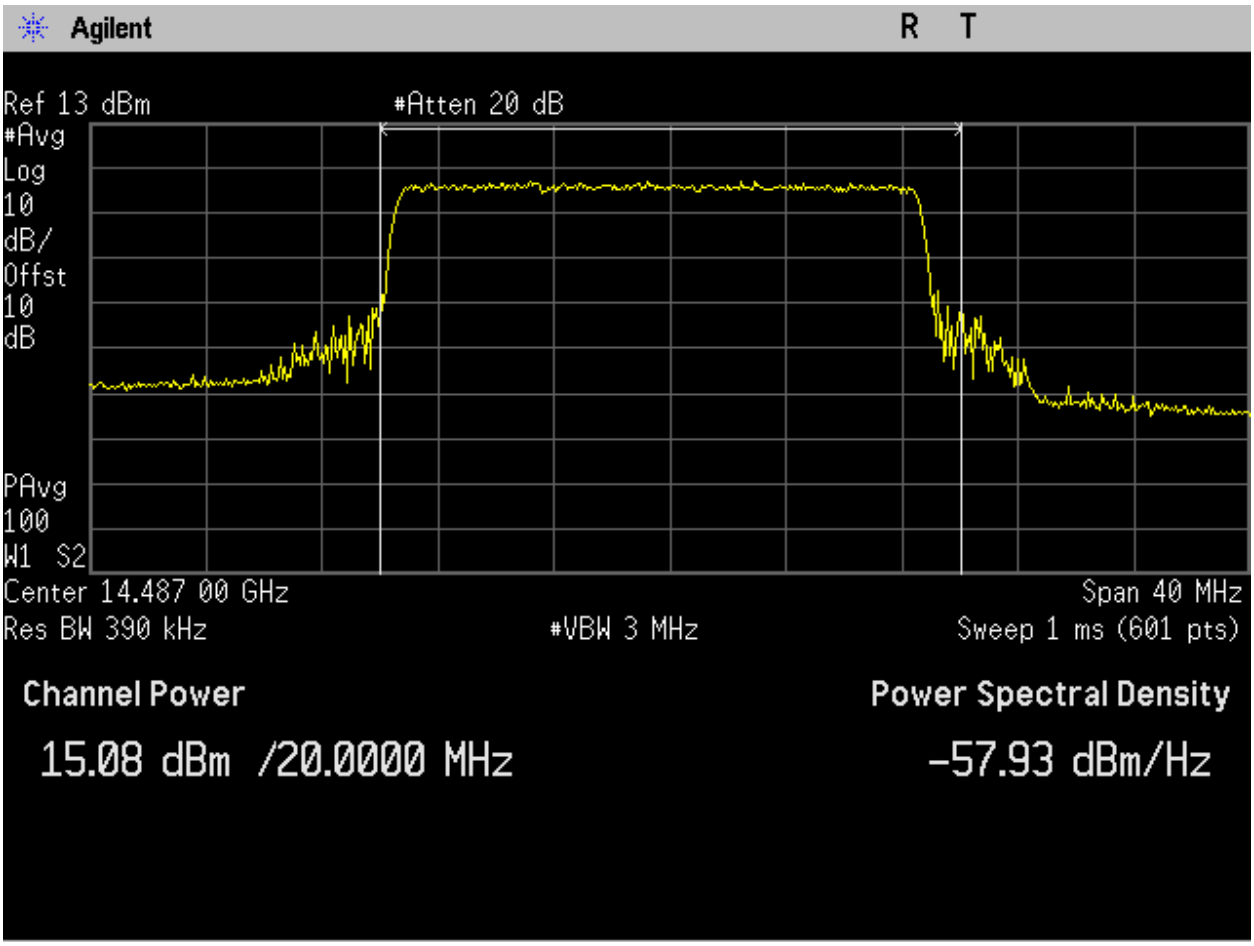

Figure 10. Conducted OP, 8PSK, 20MHz High Channel, 14.487 GHz.

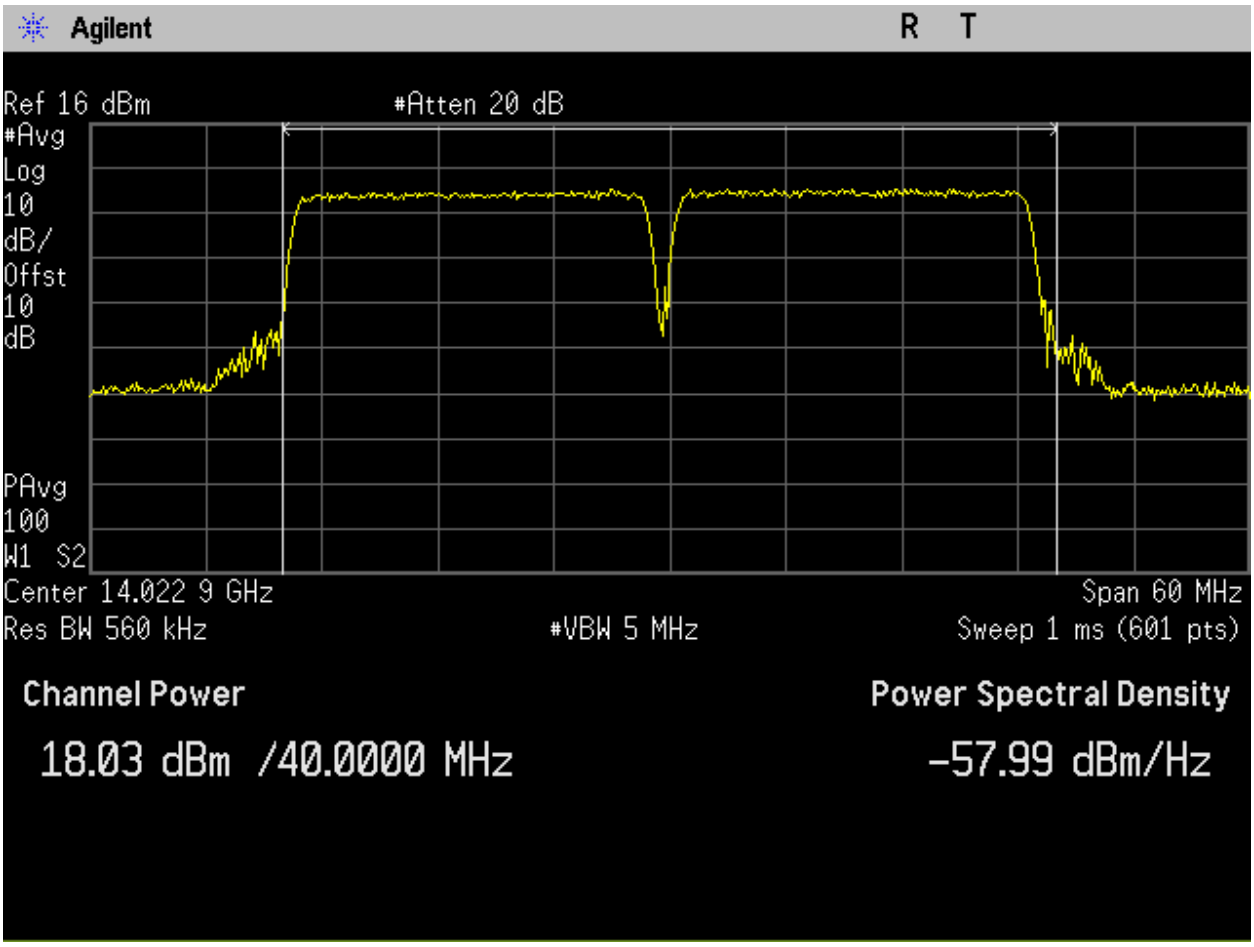

Figure 11. Conducted OP, 8PSK, 40MHz Low Channel, 14.0229 GHz.

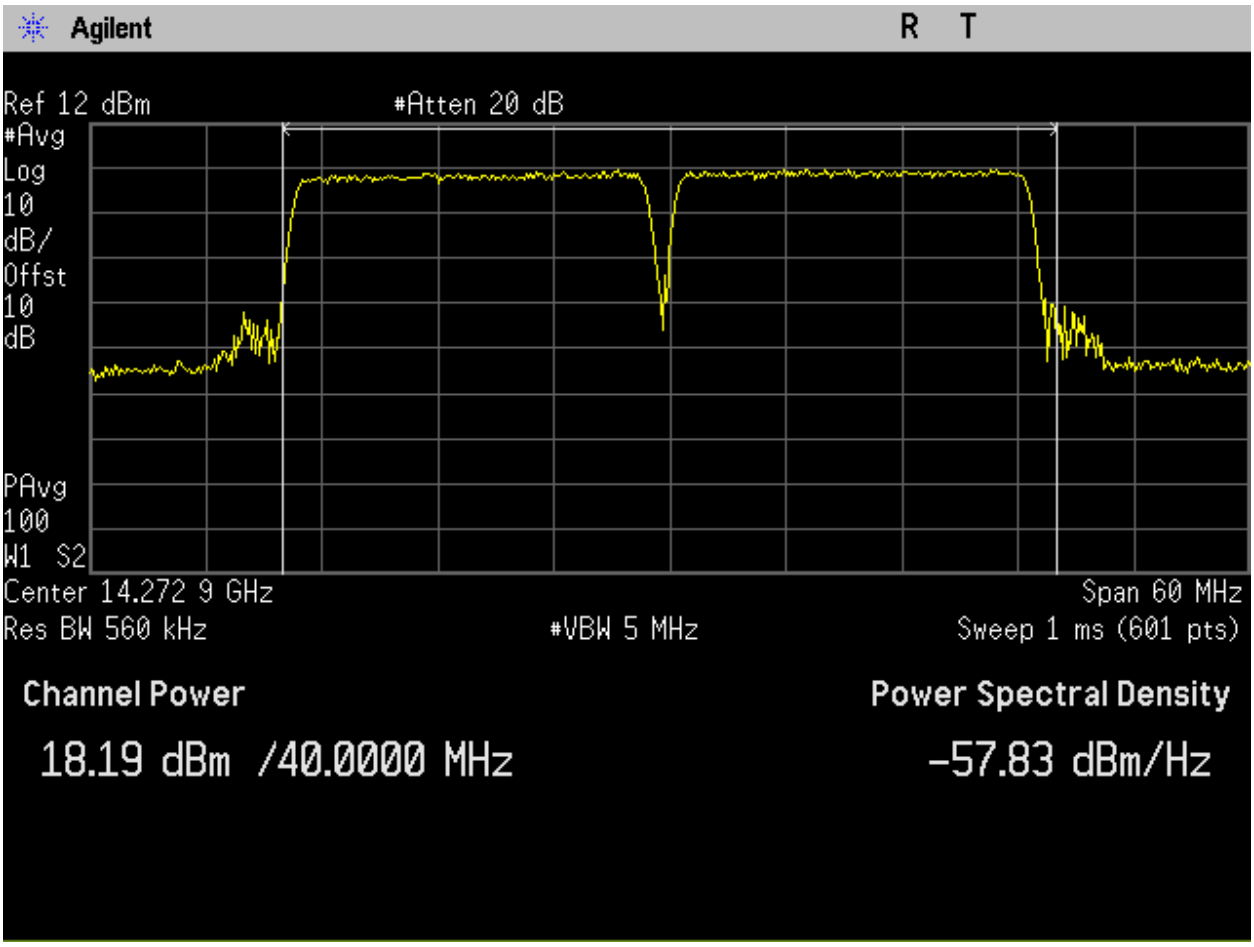

Figure 12. Conducted OP, 8PSK, 40MHz Mid Channel, 14.2729 GHz.

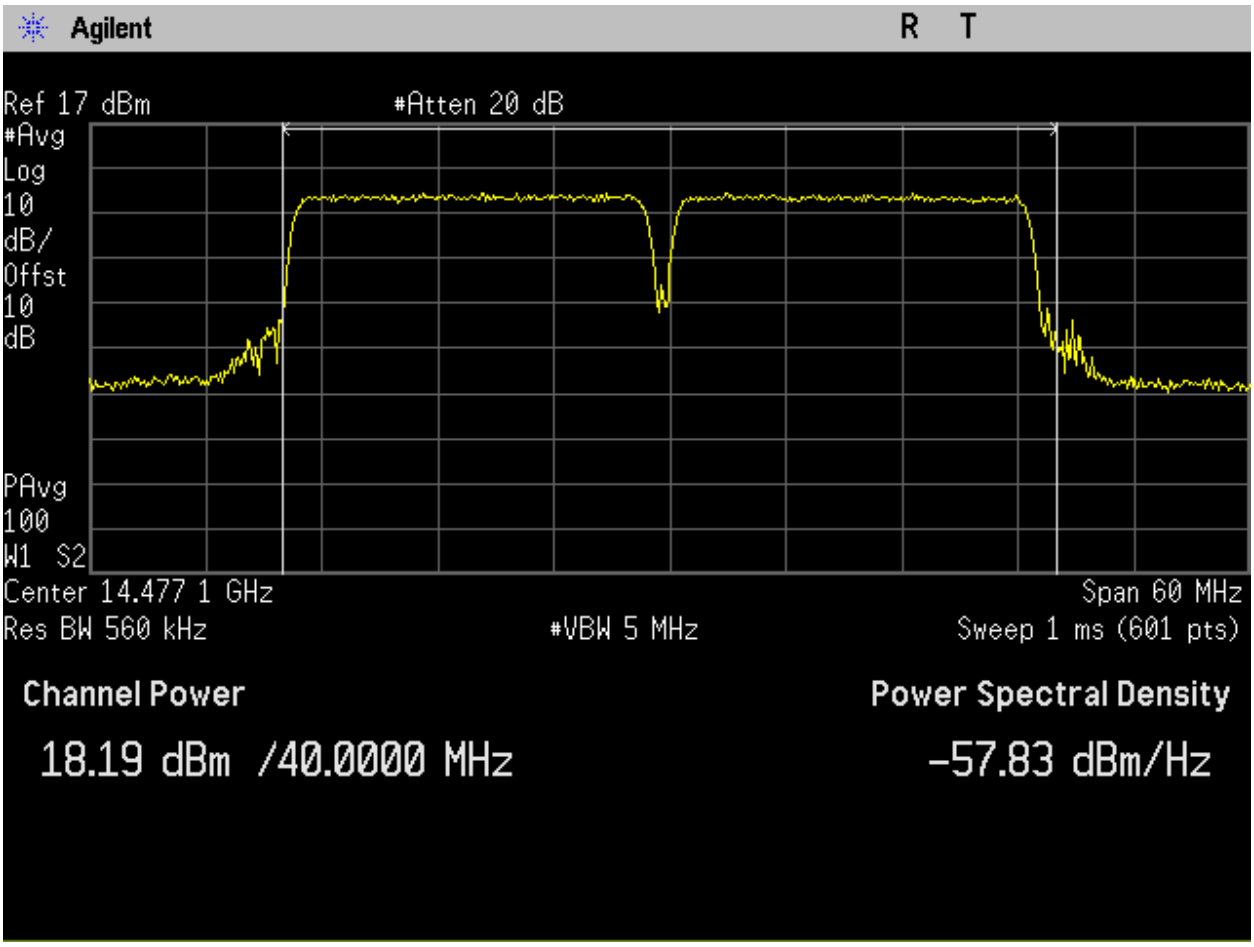

Figure 13. Conducted OP, 8PSK, 40MHz High Channel, 14.4771 GHz.

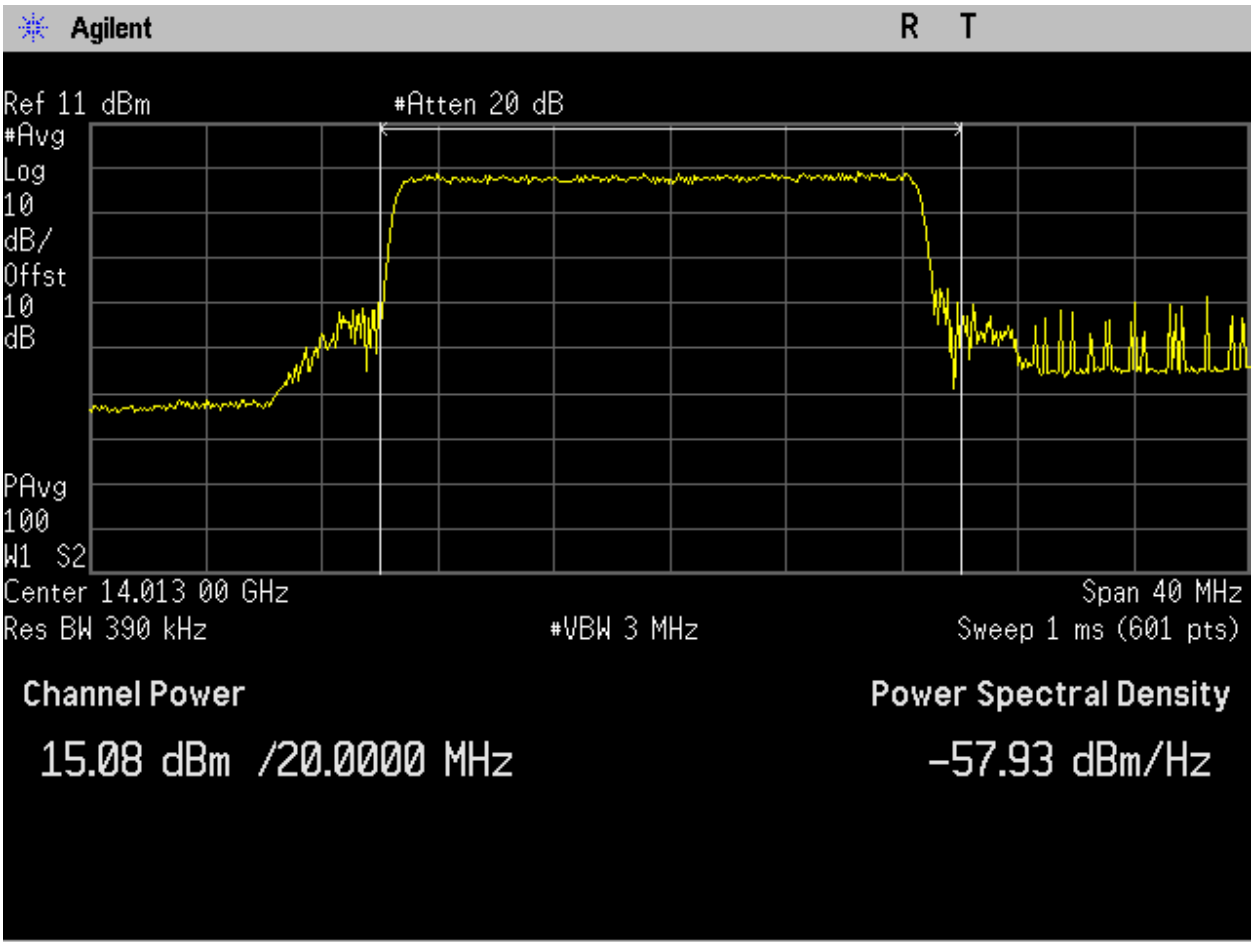

Figure 14. Conducted OP, 16QAM, 20MHz Low Channel, 14.013 GHz.

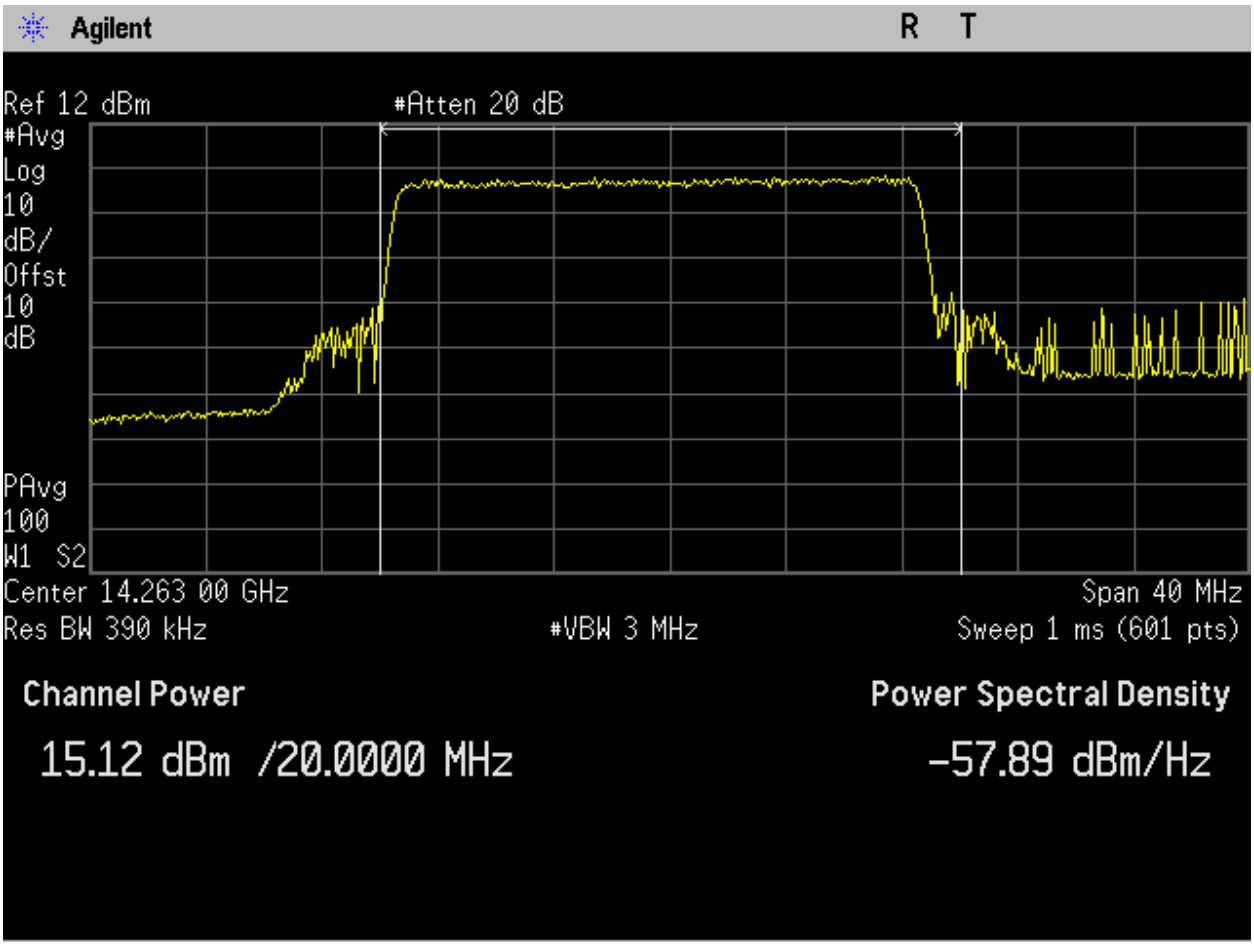

Figure 15. Conducted OP, 16QAM, 20MHz Mid Channel, 14.263 GHz.

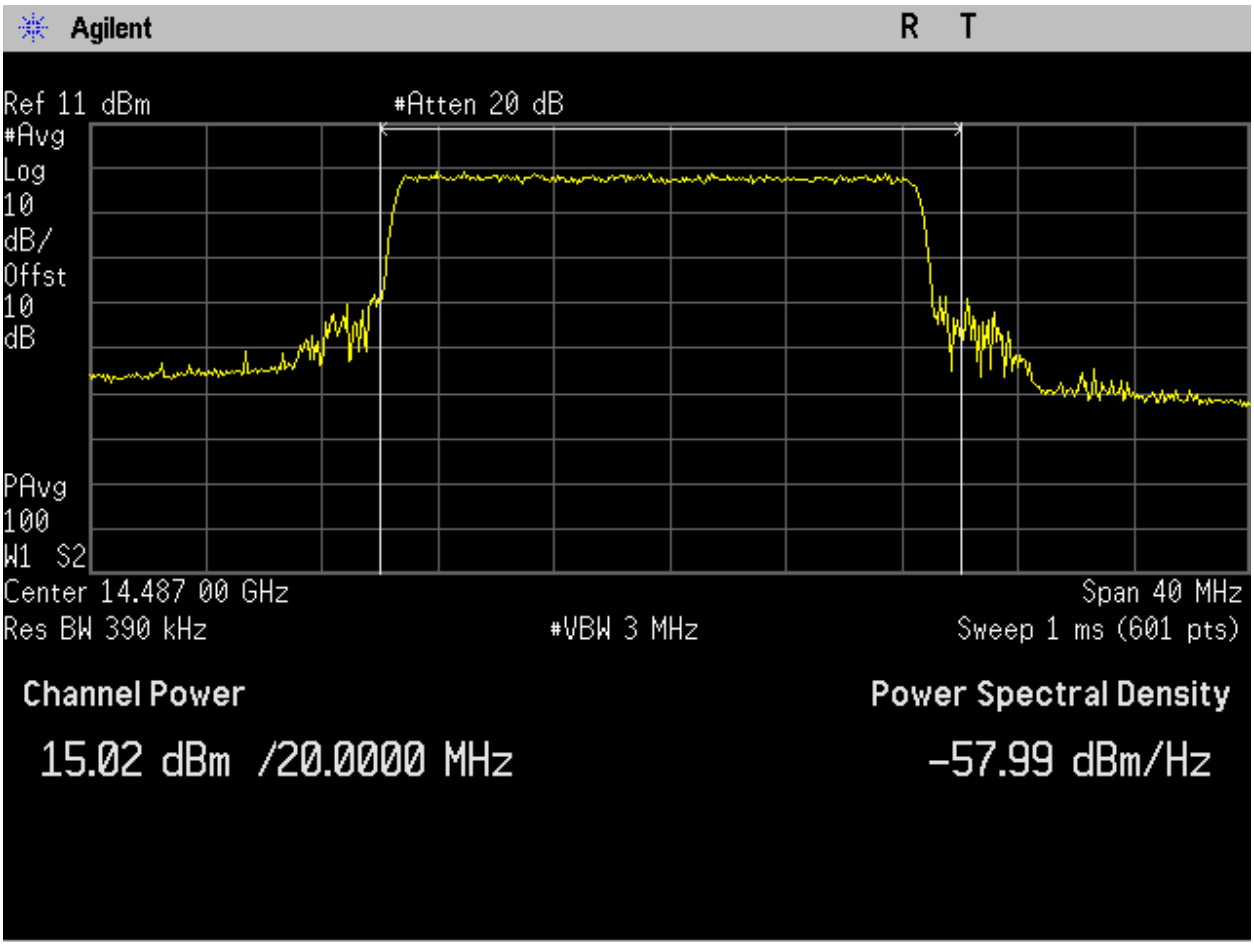

Figure 16. Conducted OP, 16QAM, 20MHz High Channel, 14.487 GHz.

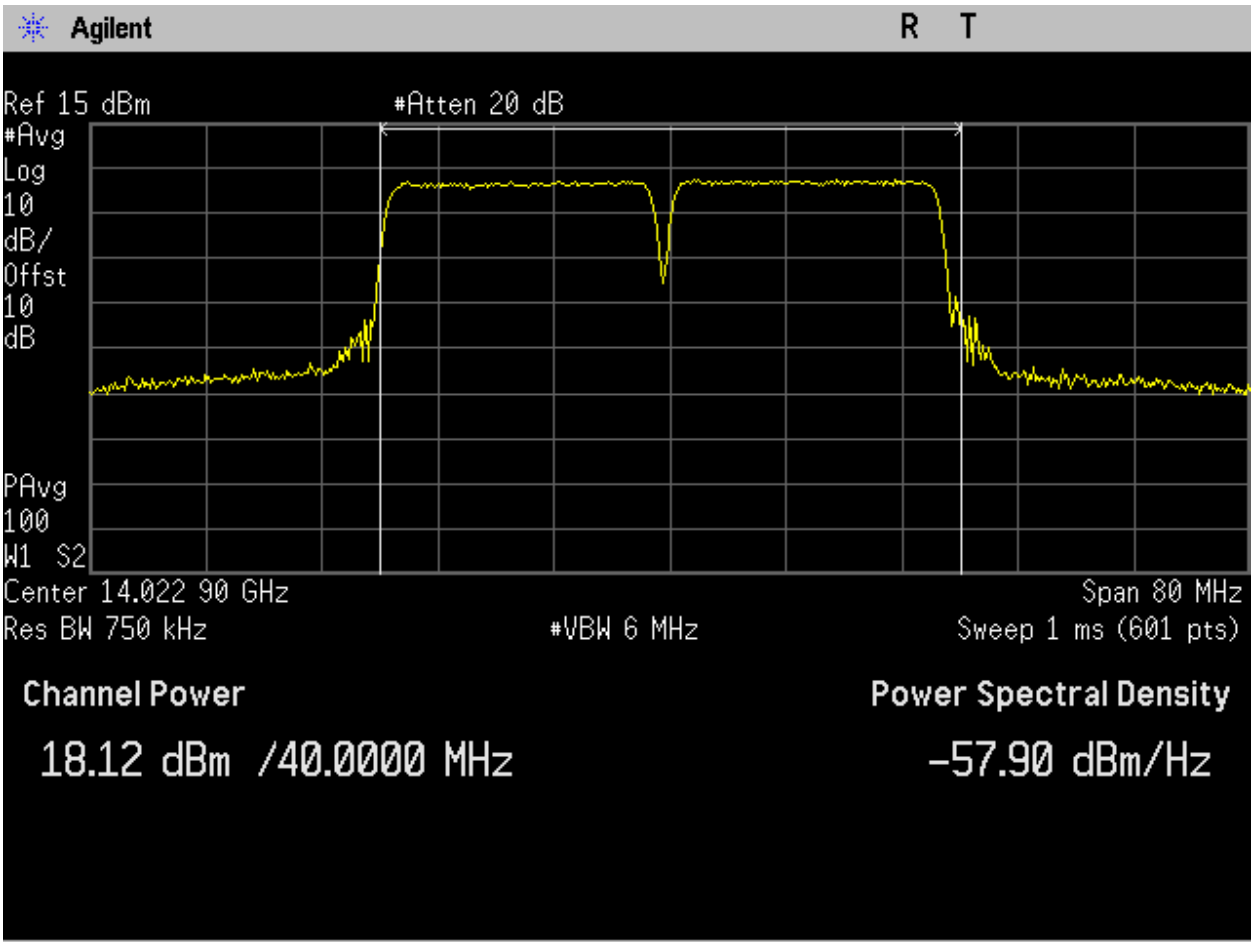

Figure 17. Conducted OP, 16QAM, 40MHz Low Channel, 14.0229 GHz.

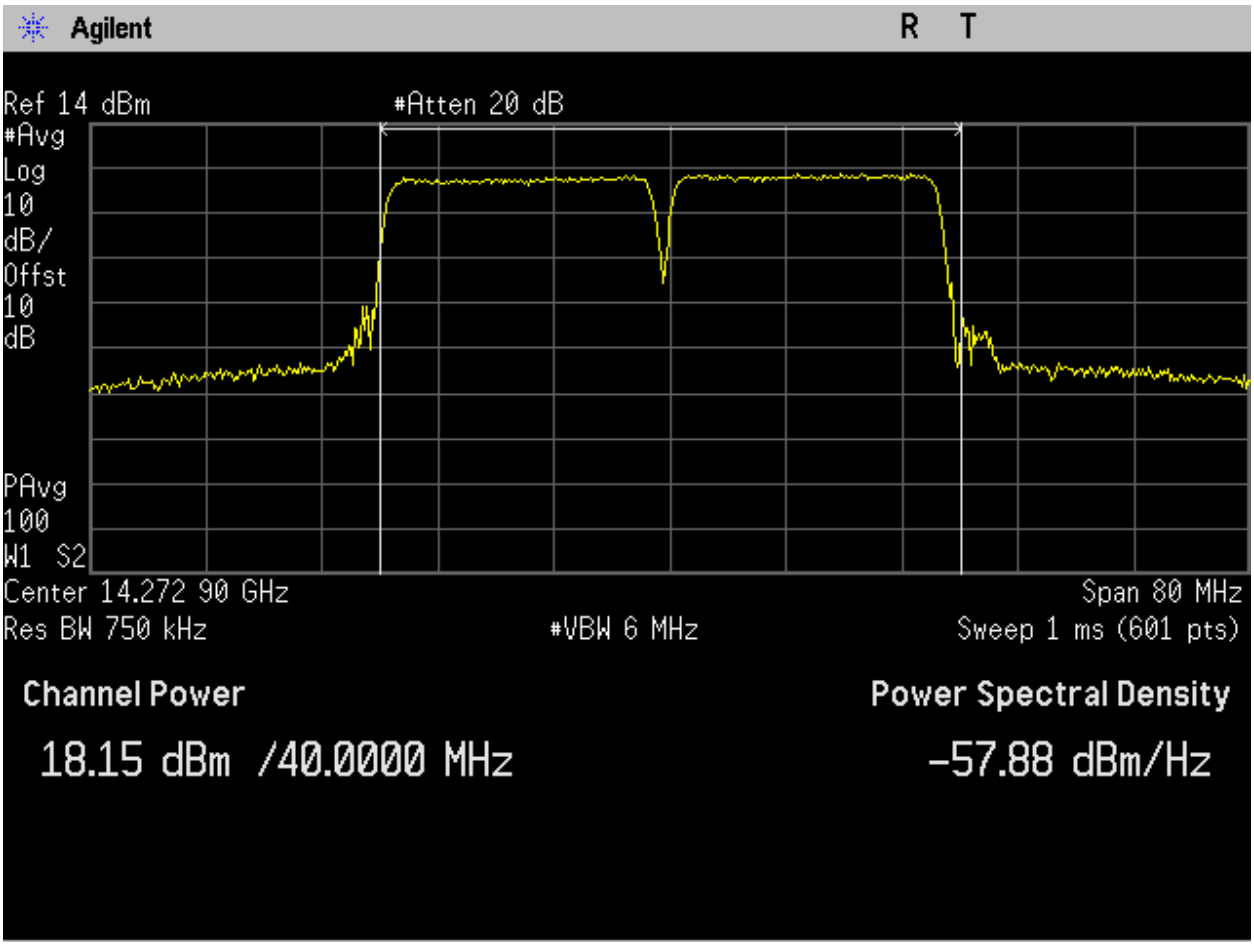

Figure 18. Conducted OP, 16QAM, 40MHz Mid Channel, 14.2729 GHz.

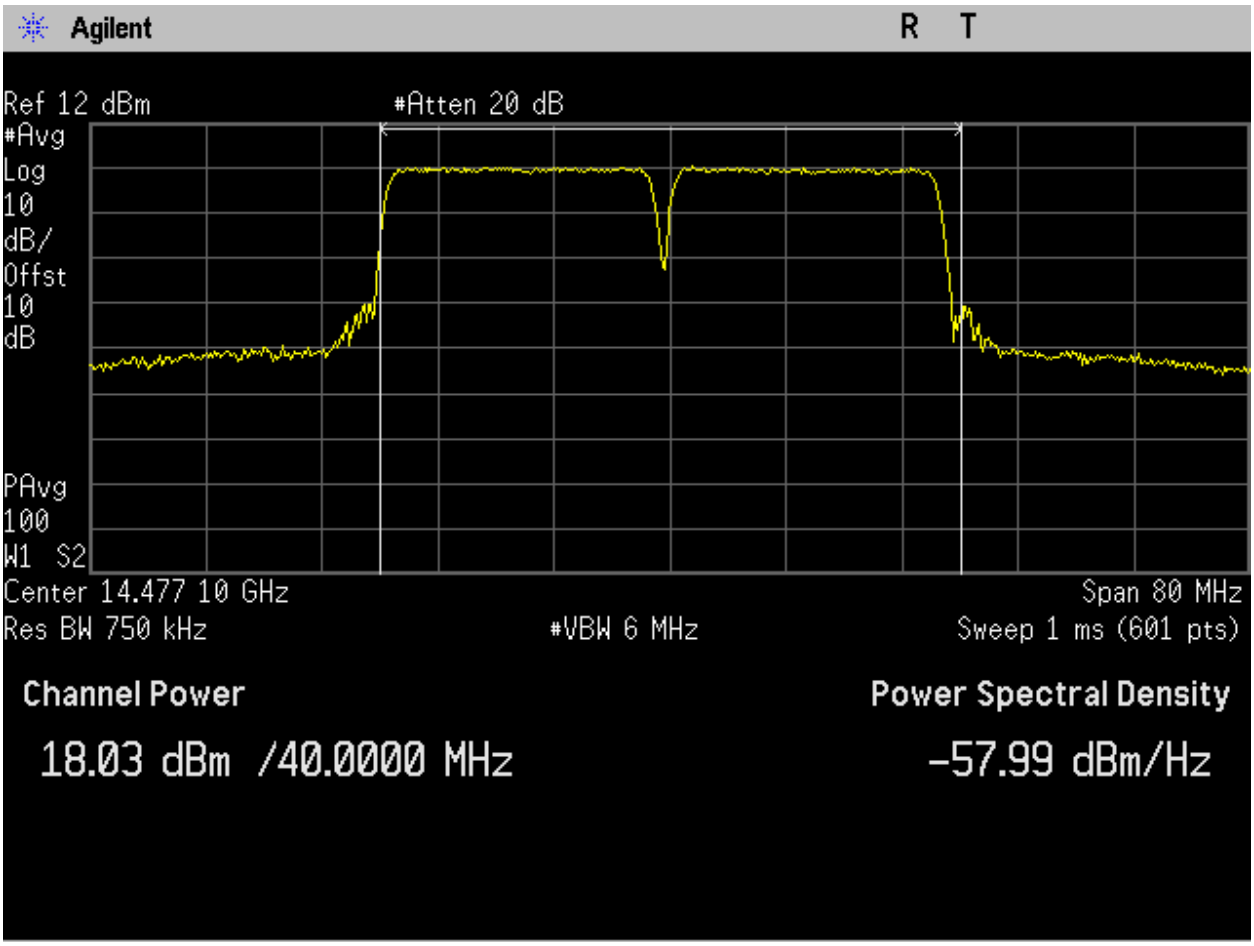

Figure 19. Conducted OP, 16QAM, 40MHz High Channel, 14.4771 GHz.

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	-16.17	0.11	48.5	32.44	70.00
		14.263	-15.61	0.11	48.5	33.00	70.00
		14.487	-15.77	0.11	48.5	32.84	70.00
	40	14.0229	-15.85	0.11	48.5	32.76	70.00
		14.2729	-15.58	0.11	48.5	33.03	70.00
		14.4771	-15.88	0.11	48.5	32.73	70.00
8PSK	20	14.013	-16.63	0.11	48.5	31.98	70.00
		14.263	-16.88	0.11	48.5	31.73	70.00
		14.487	-16.44	0.11	48.5	32.17	70.00
	40	14.0229	-15.14	0.11	48.5	33.47	70.00
		14.2729	-15.42	0.11	48.5	33.19	70.00
		14.4771	-15.52	0.11	48.5	33.09	70.00
16QAM	20	14.013	-16.17	0.11	48.5	32.44	70.00
		14.263	-15.97	0.11	48.5	32.64	70.00
		14.487	-16.51	0.11	48.5	32.10	70.00
	40	14.0229	-15.72	0.11	48.5	32.89	70.00
		14.2729	-16.01	0.11	48.5	32.60	70.00
		14.4771	-16.10	0.11	48.5	32.51	70.00

Table 9. 4kHz EIRP, Test Results

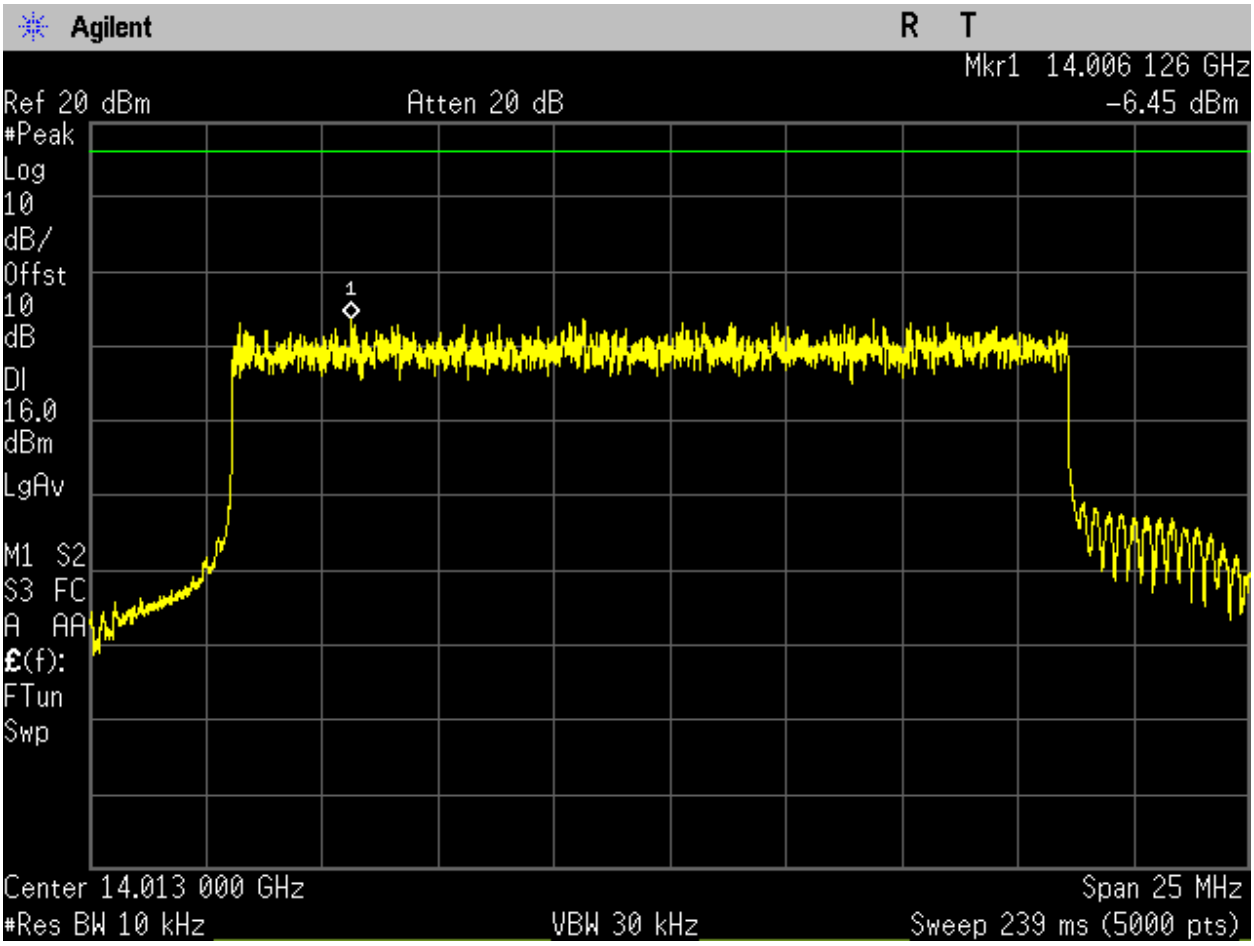

Figure 20. 4KHZ EIRP_QPSK_20MHz_Low Channel, 14.013GHz (PreScan).

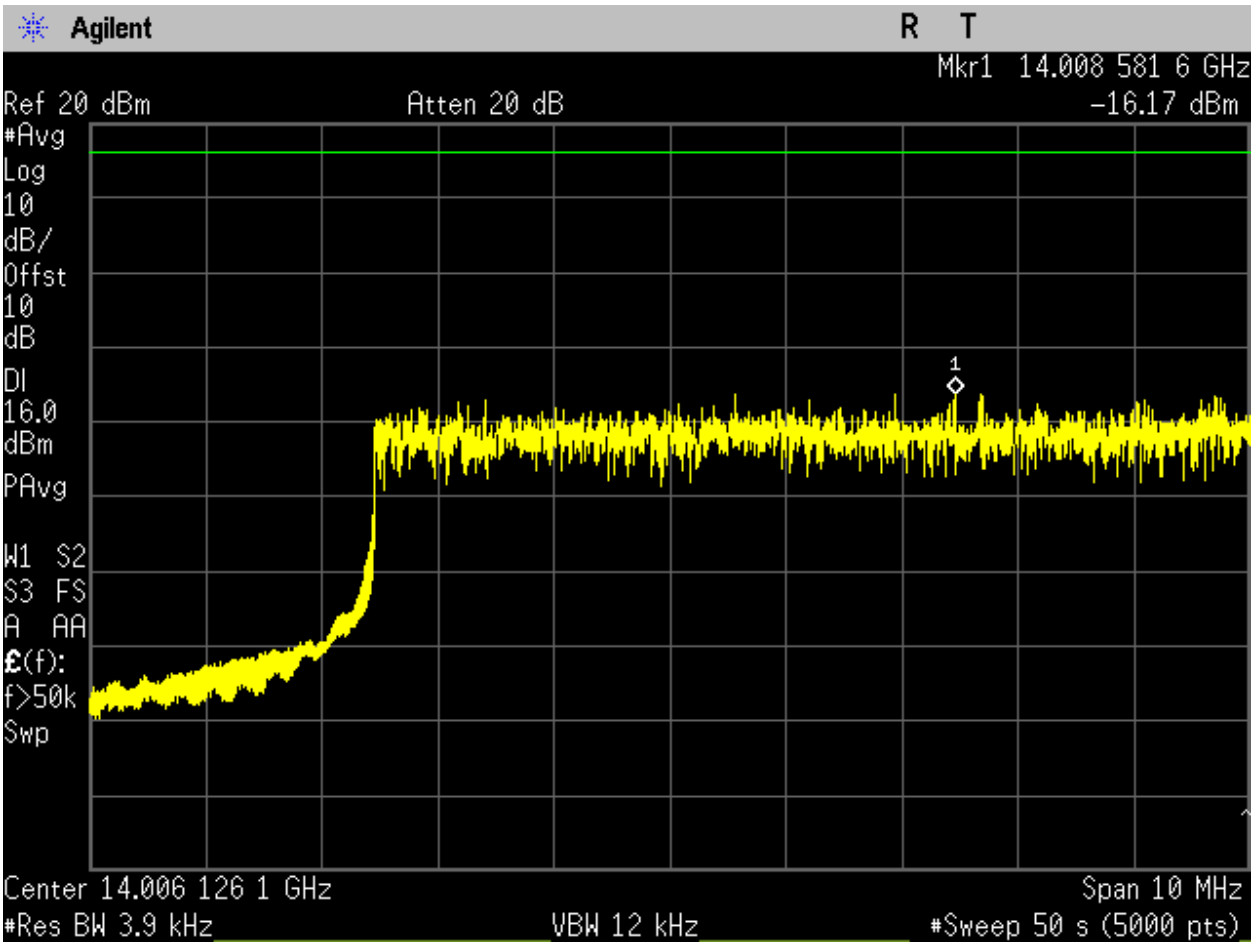

Figure 21. 4KHZ EIRP_QPSK_20MHz_Low Channel, 14.013GHz (Final).

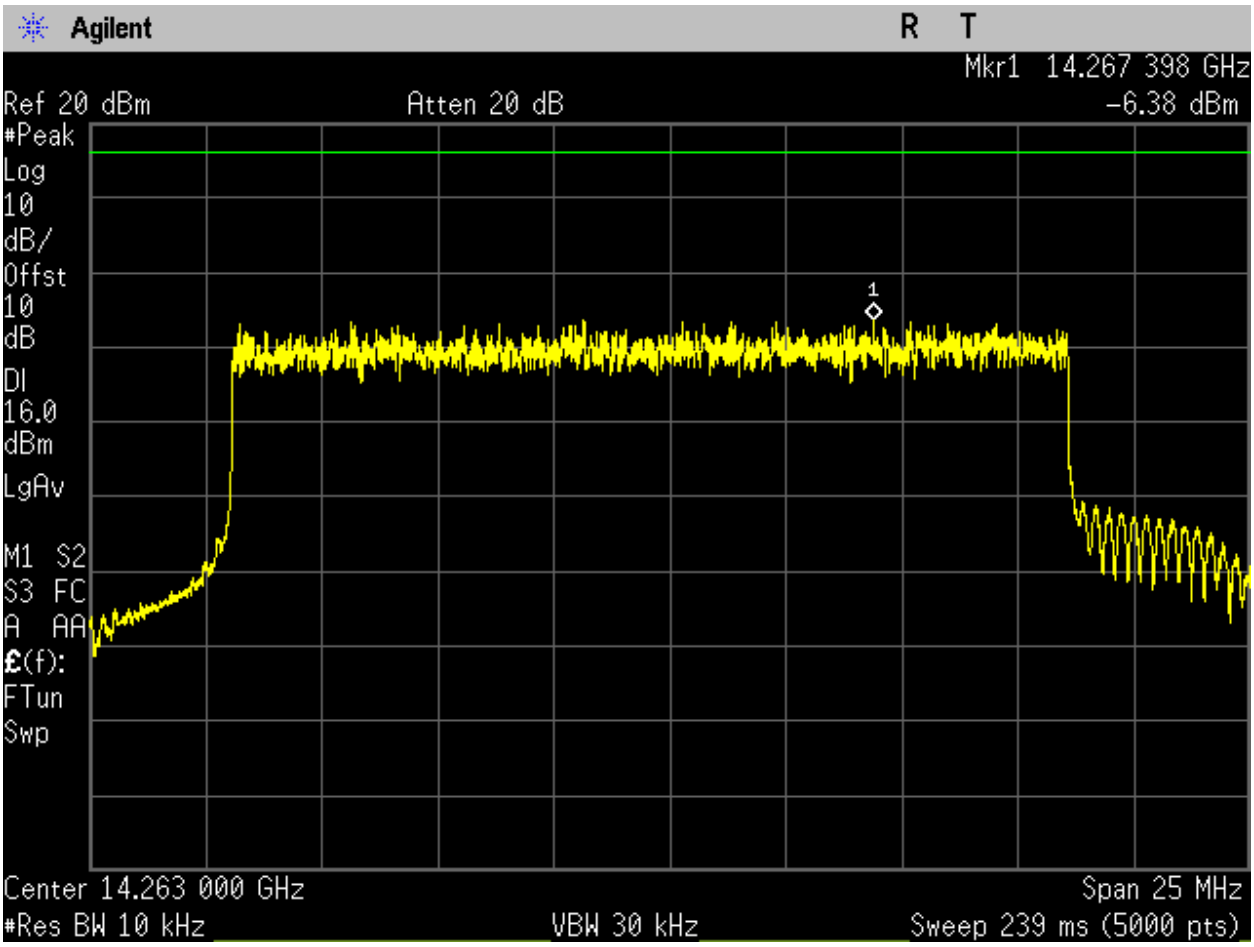

Figure 22. 4KHZ EIRP_QPSK_20MHz_Mid Channel, 14.263GHz (PreScan).

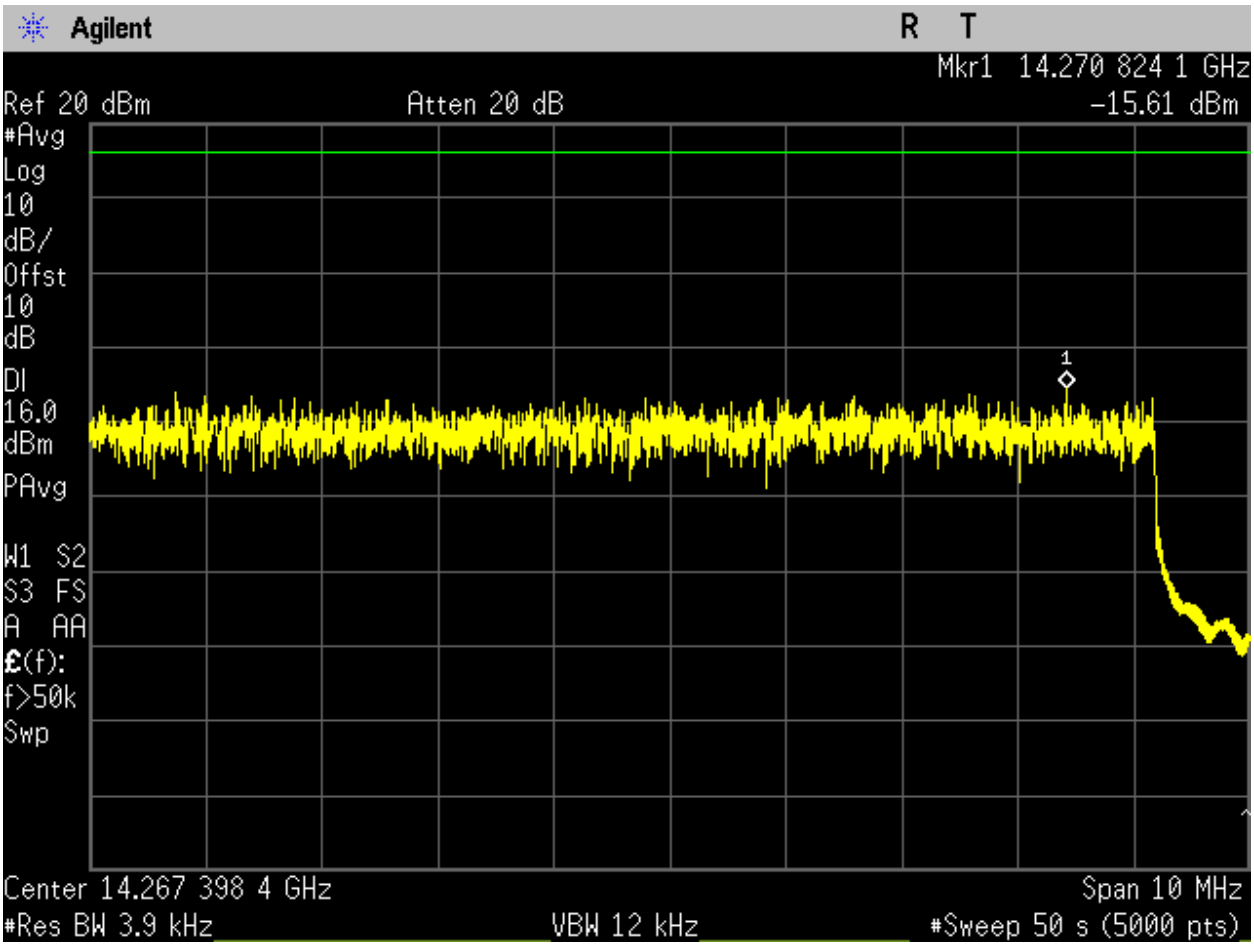

Figure 23. 4KHZ EIRP_QPSK_20MHz_Mid Channel, 14.263GHz (Final).

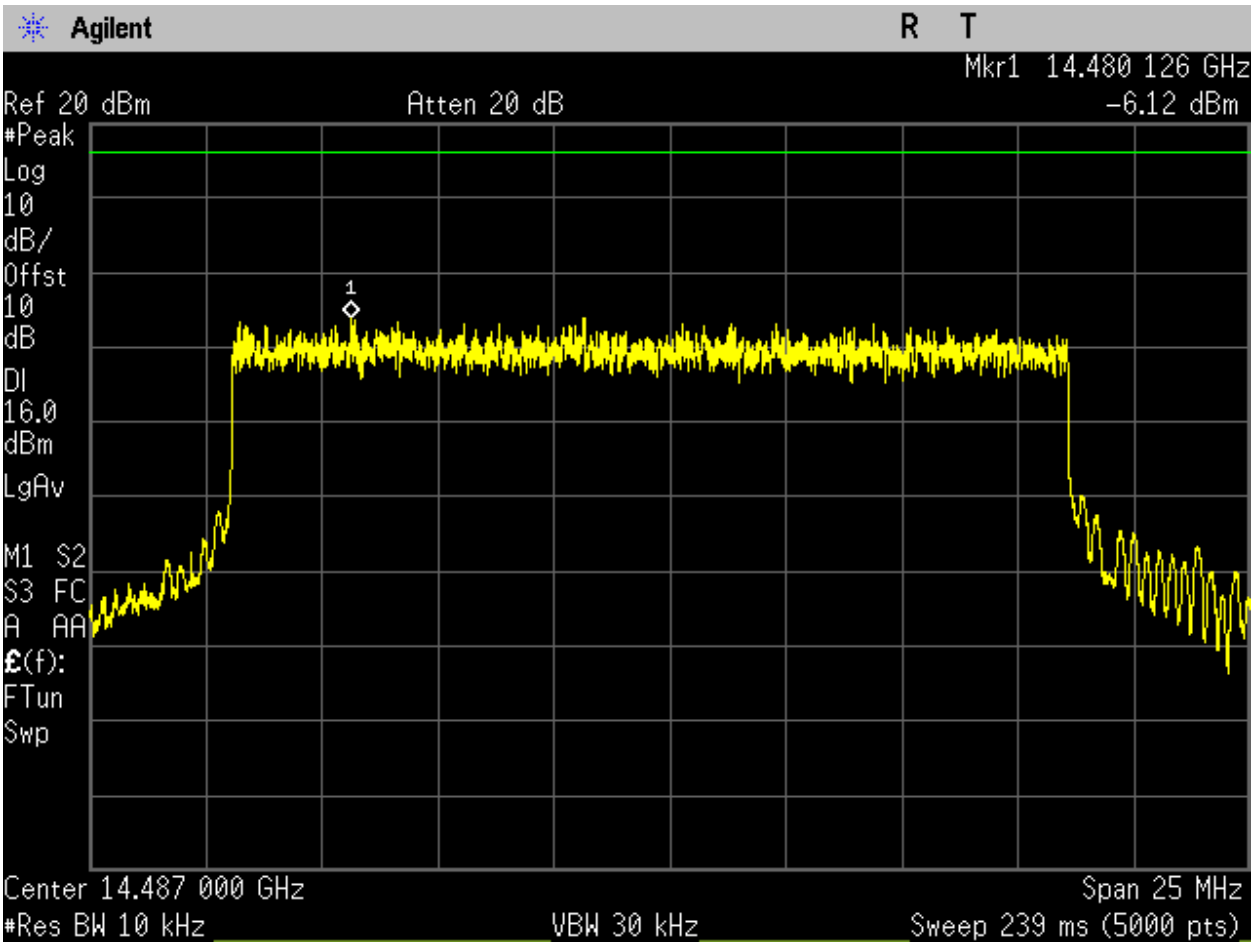

Figure 24. 4KHZ EIRP_QPSK_20MHz_High Channel, 14.487GHz (PreScan).

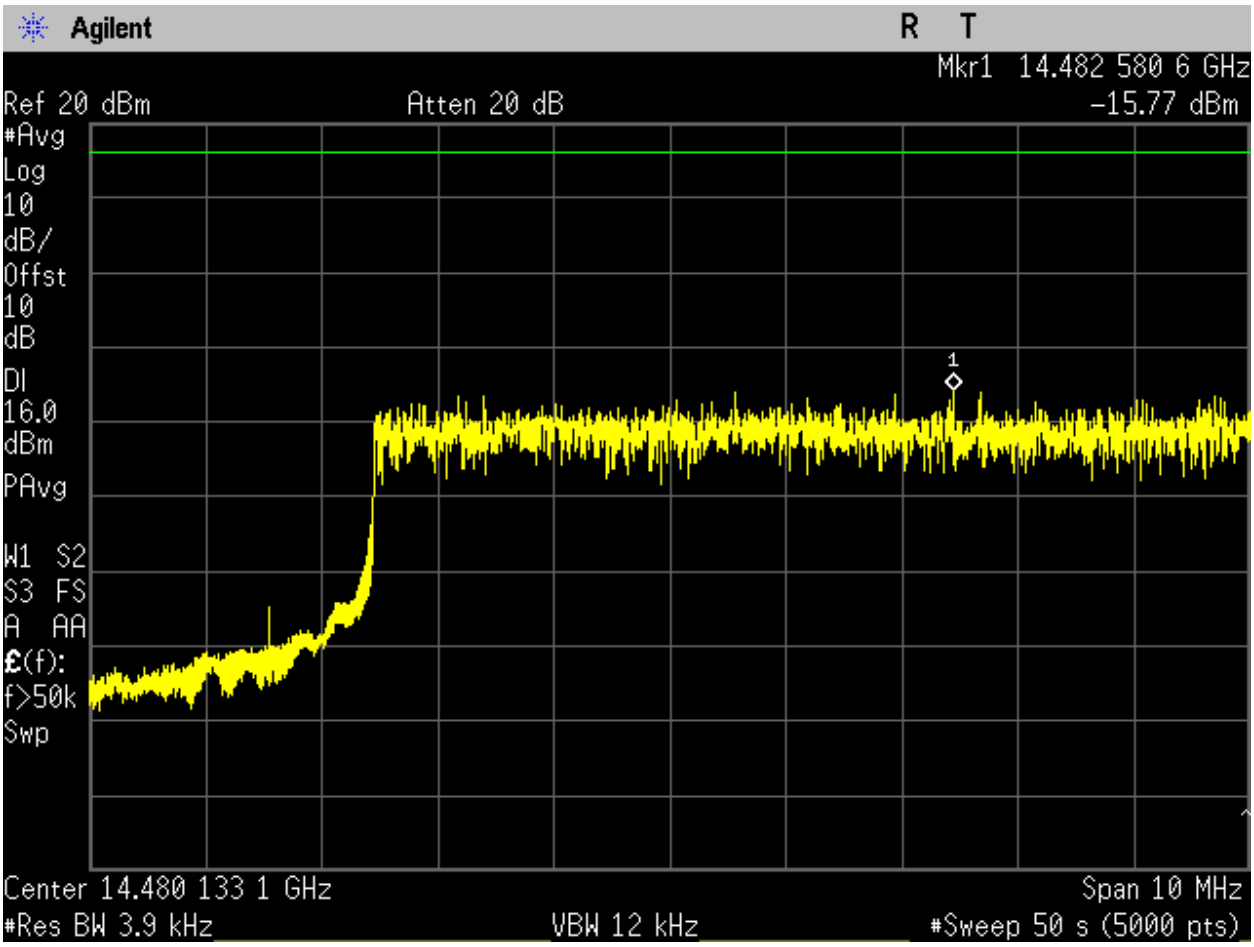

Figure 25. 4KHZ EIRP_QPSK_20MHz_High Channel, 14.487GHz (Final).

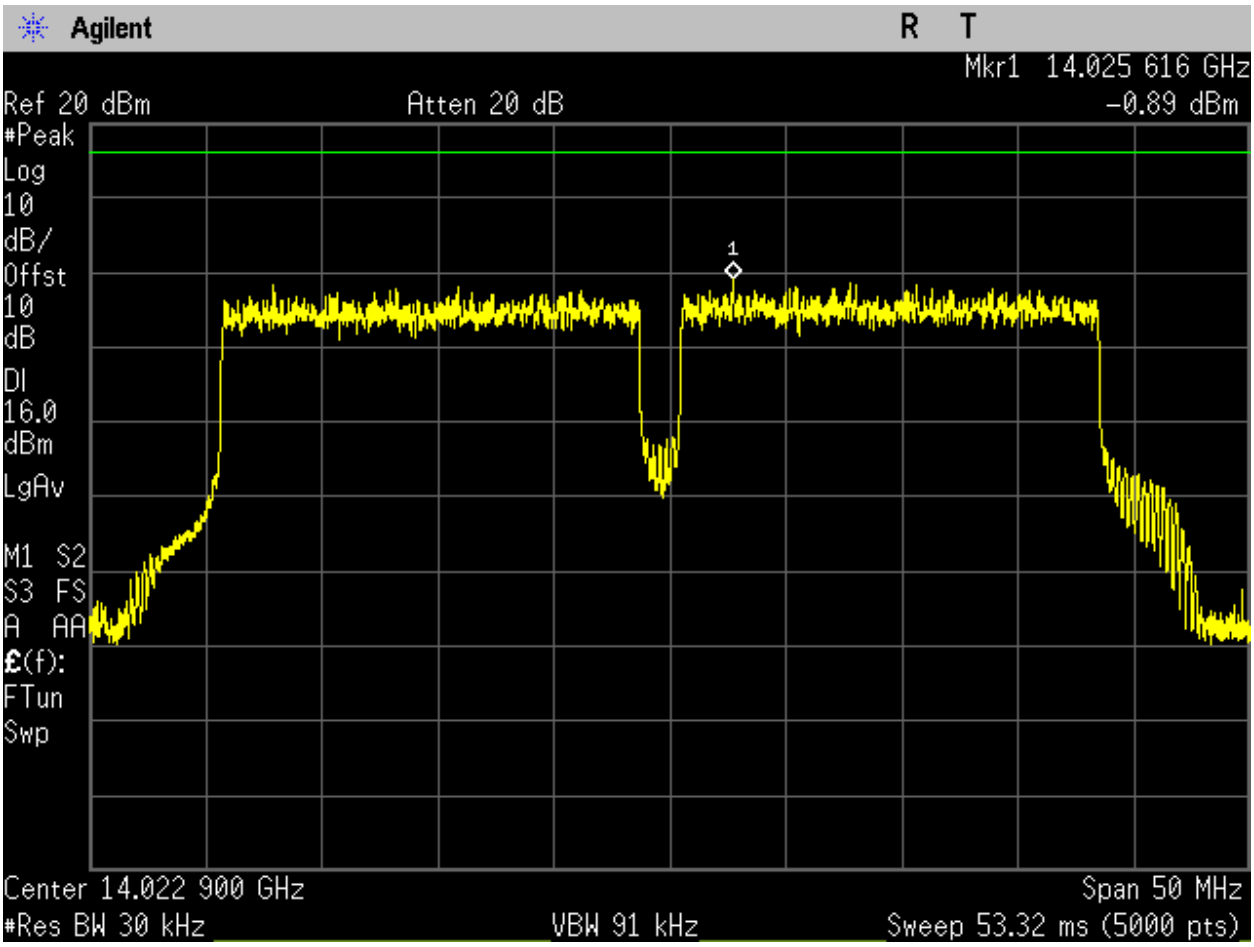

Figure 26. 4KHZ EIRP_QPSK_40MHz_Low Channel, 14.0229GHz (PreScan).

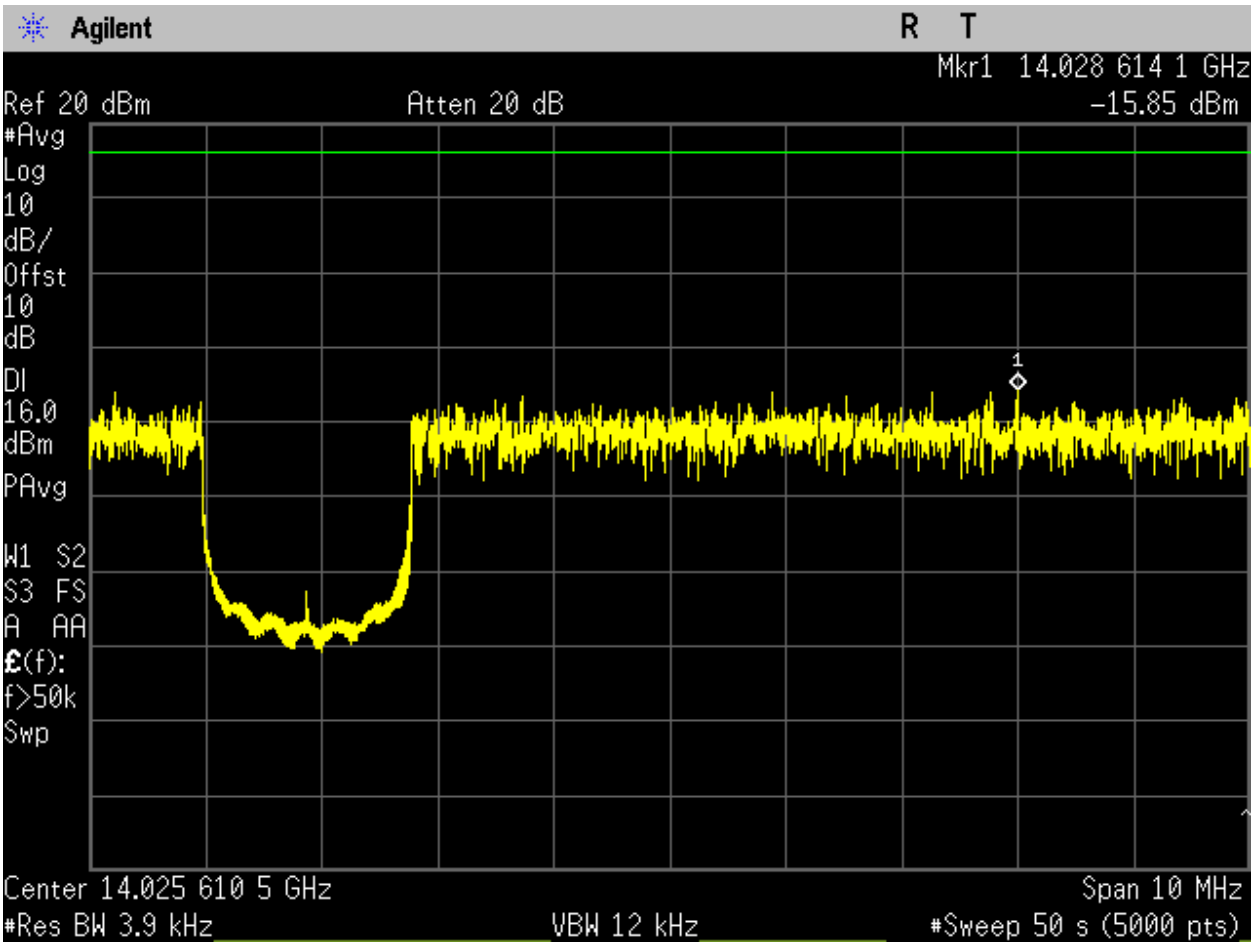

Figure 27. 4KHZ EIRP_QPSK_40MHz_Low Channel, 14.0229GHz (Final).

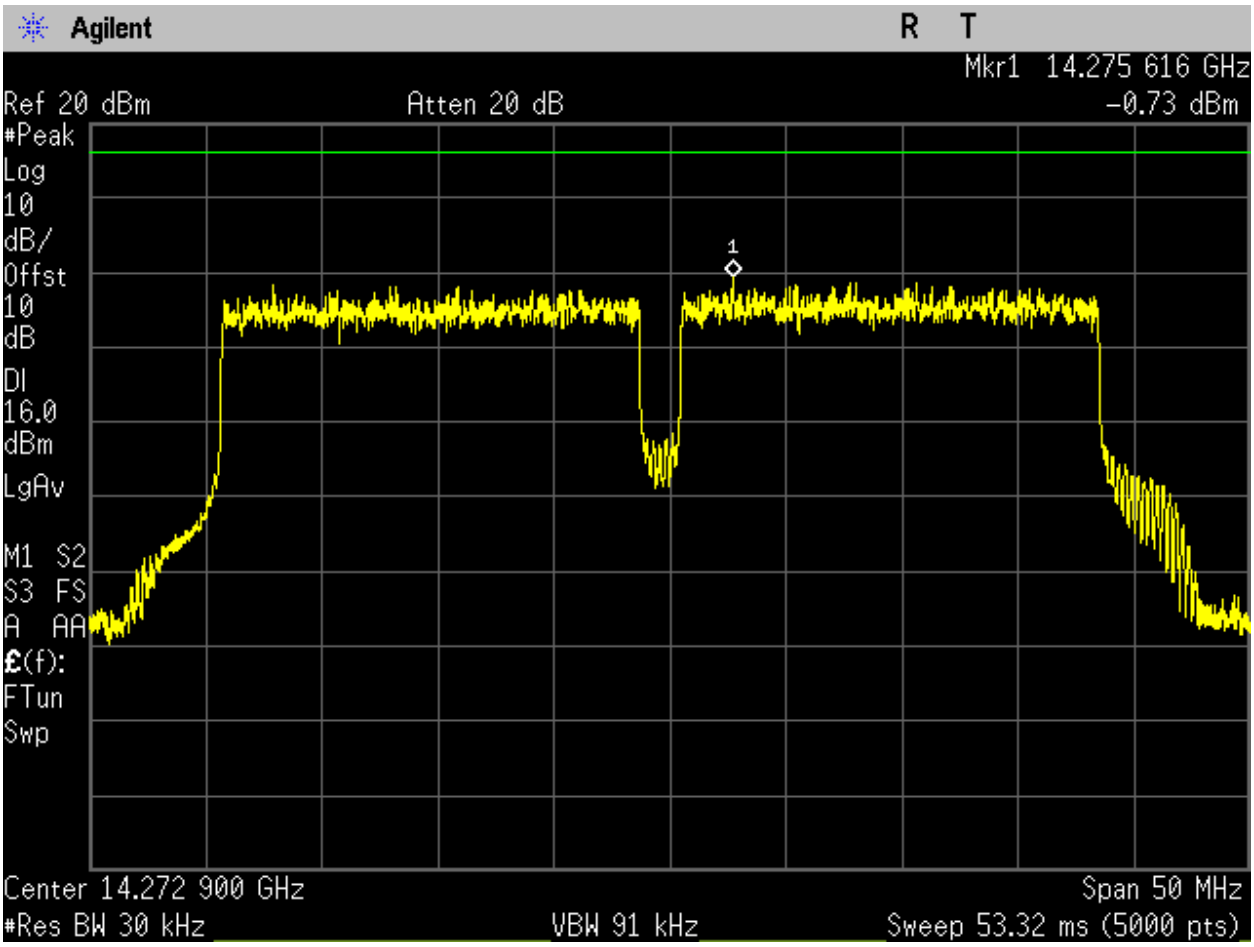

Figure 28. 4KHZ EIRP_QPSK_40MHz_Mid Channel, 14.2729GHz (PreScan).

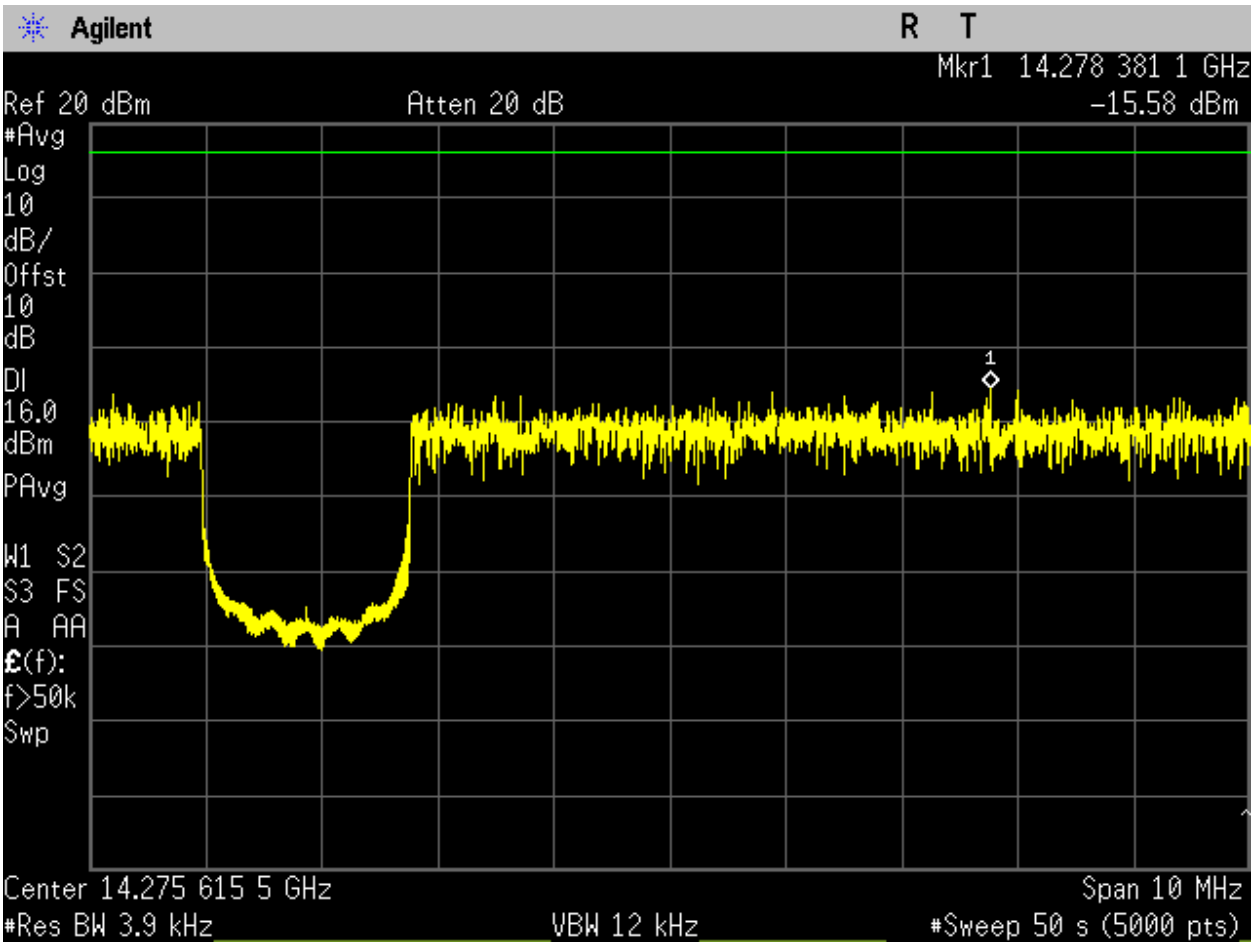

Figure 29. 4KHZ EIRP_QPSK_40MHz_Mid Channel, 14.2729GHz (Final).

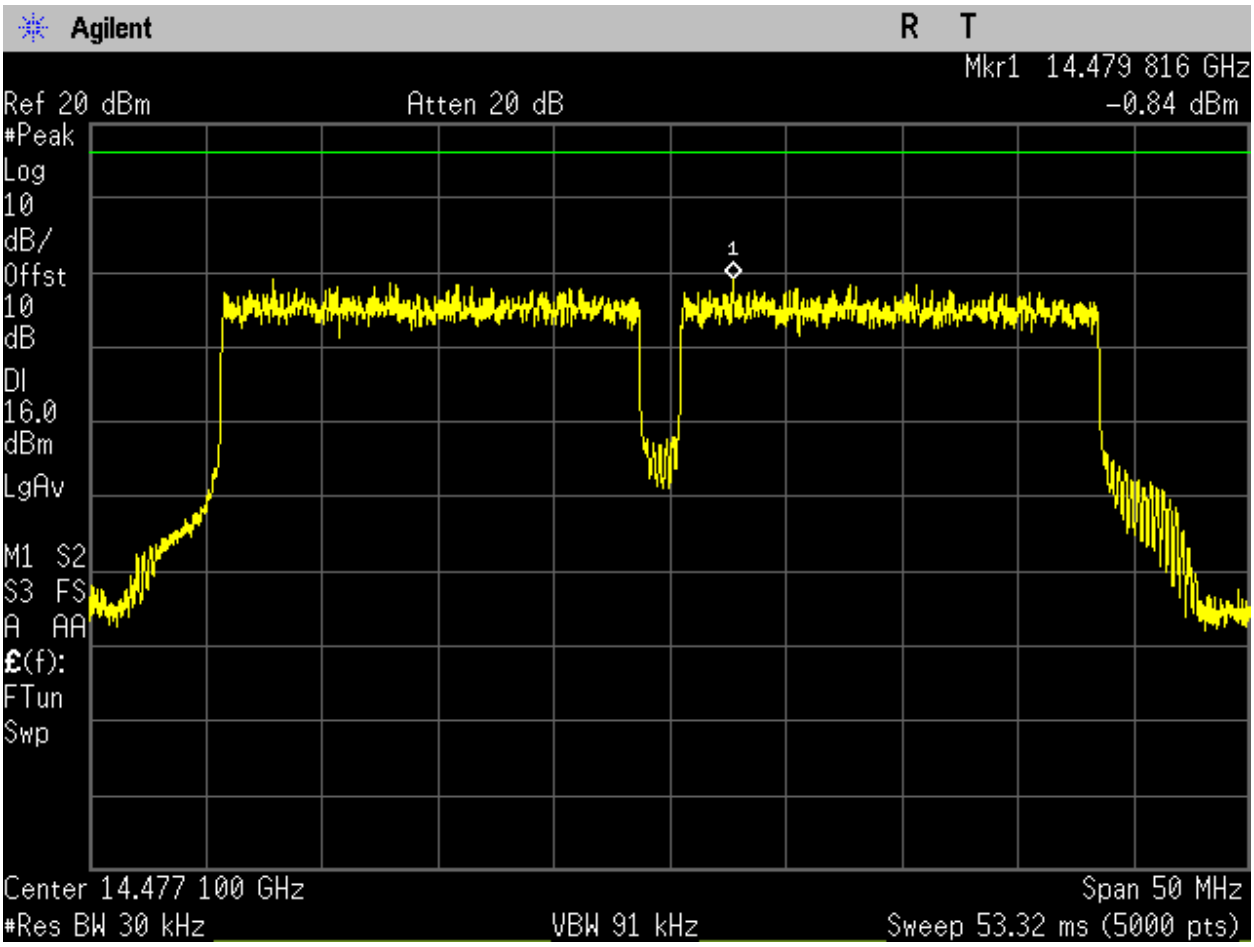

Figure 30. 4KHZ EIRP_QPSK_40MHz_High Channel, 14.4771GHz (PreScan).

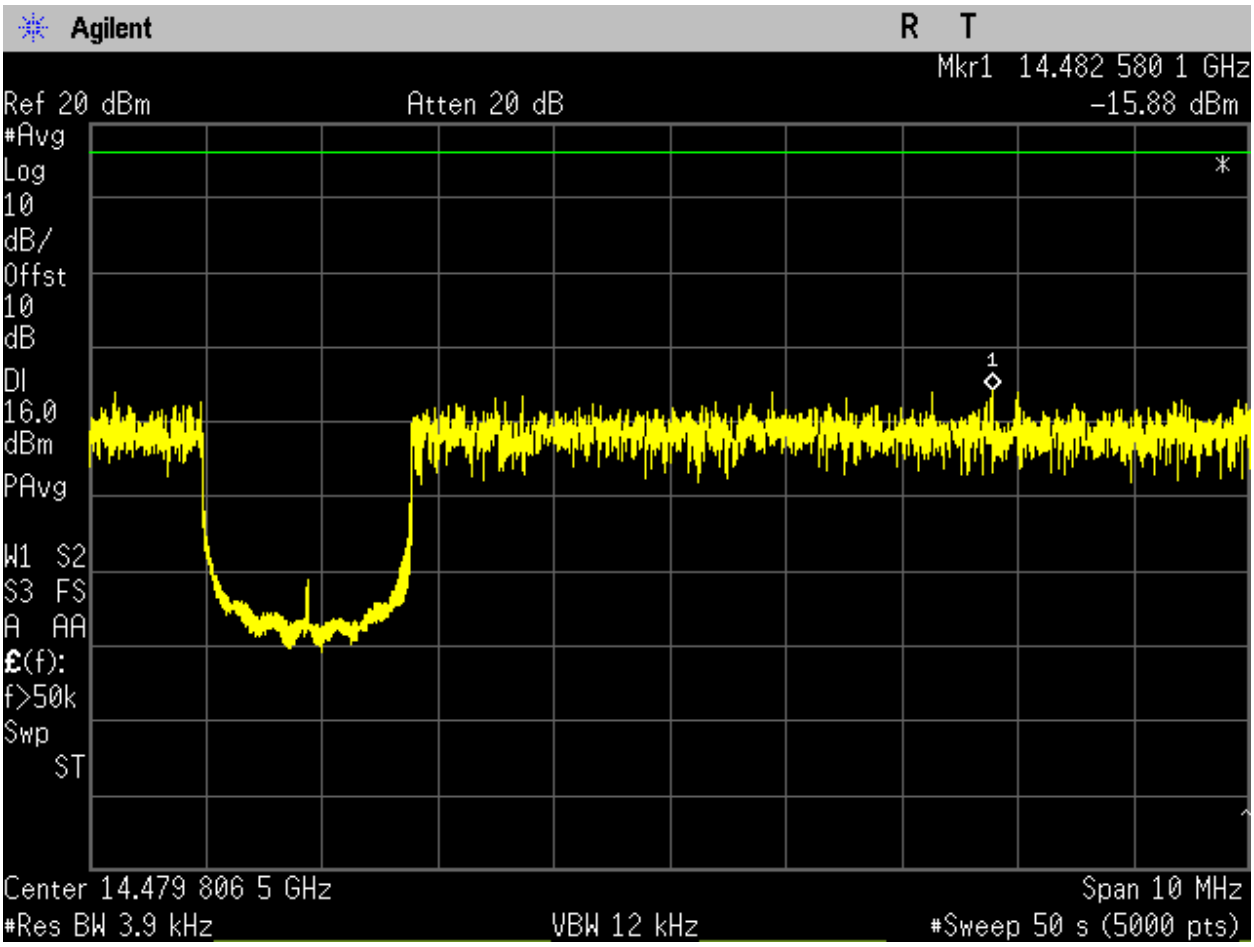

Figure 31. 4KHZ EIRP_QPSK_40MHz_High Channel, 14.4771GHz (Final).

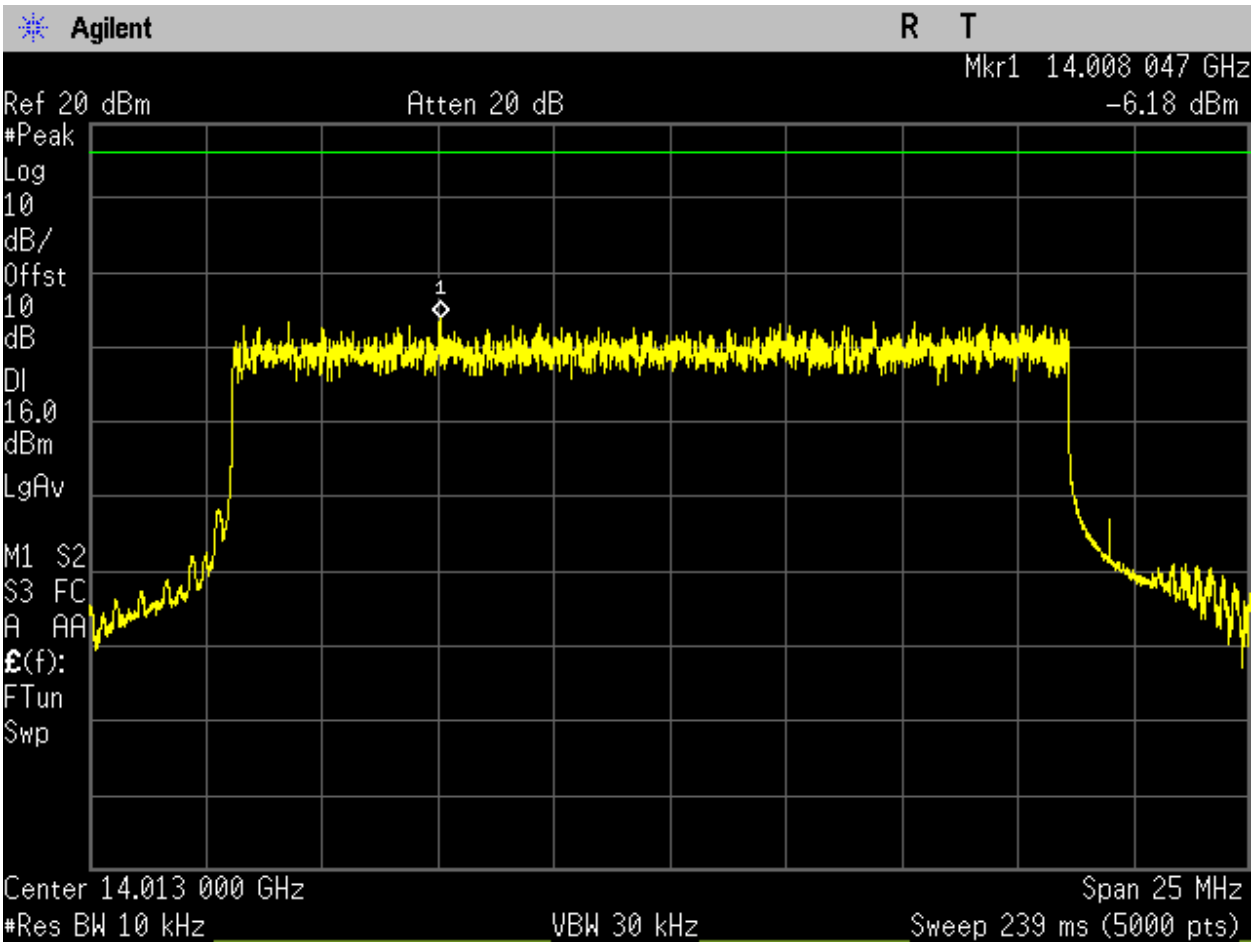

Figure 32. 4KHZ EIRP_8PSK_20MHz_Low Channel, 14.013GHz (PreScan).

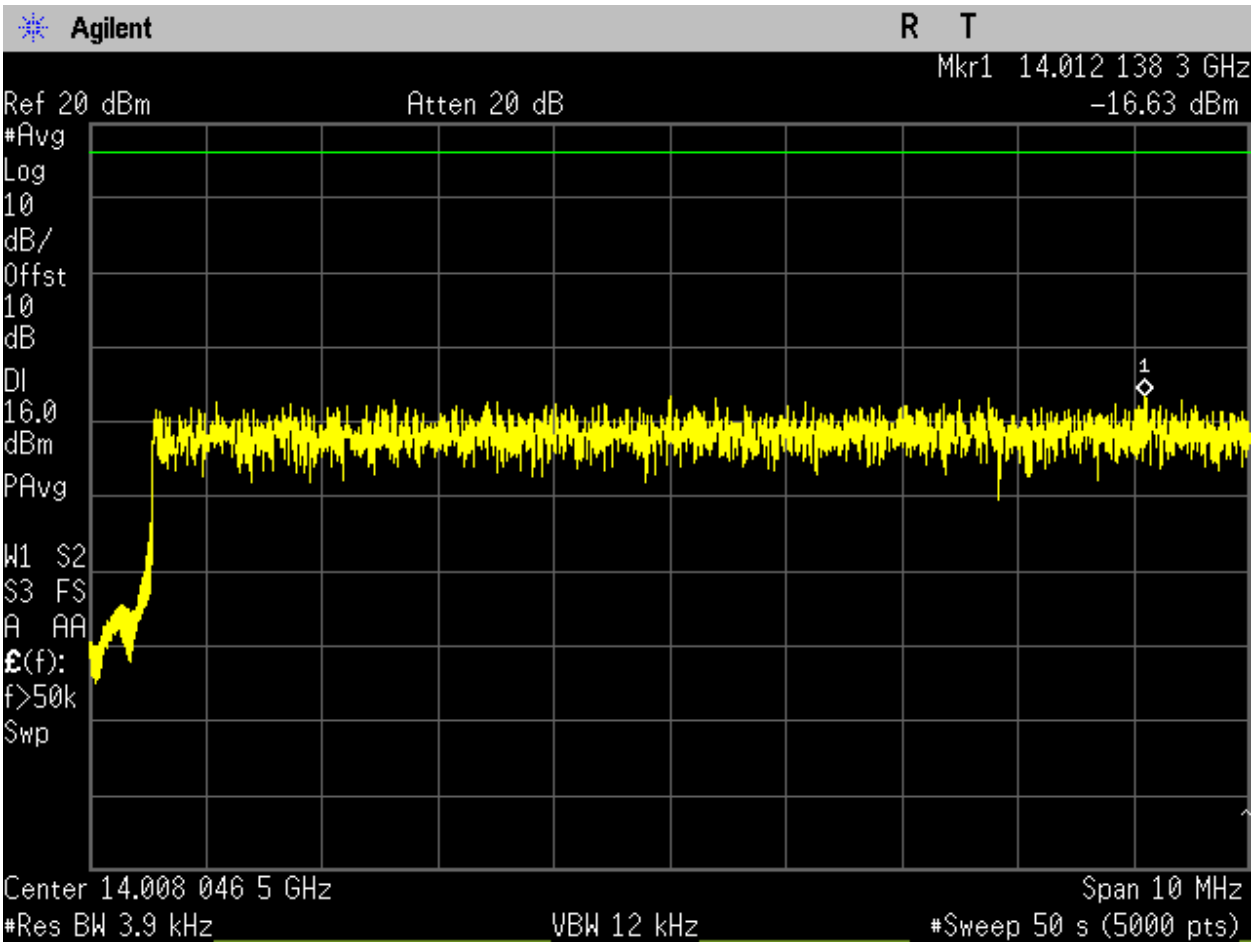

Figure 33. 4KHZ EIRP_8PSK_20MHz_Low Channel, 14.013GHz (Final).

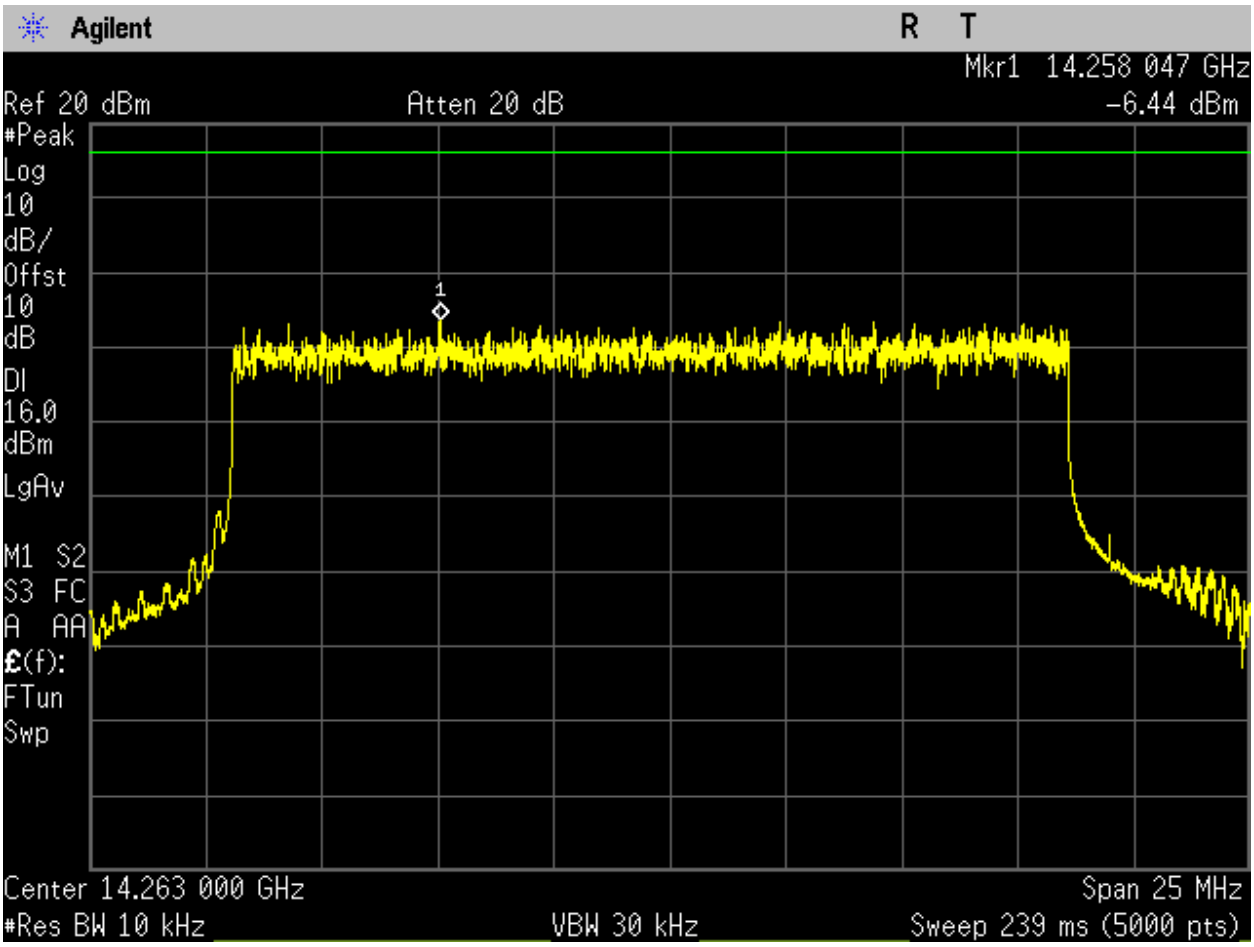

Figure 34. 4KHZ EIRP_8PSK_20MHz_Mid Channel, 14.263GHz (PreScan).

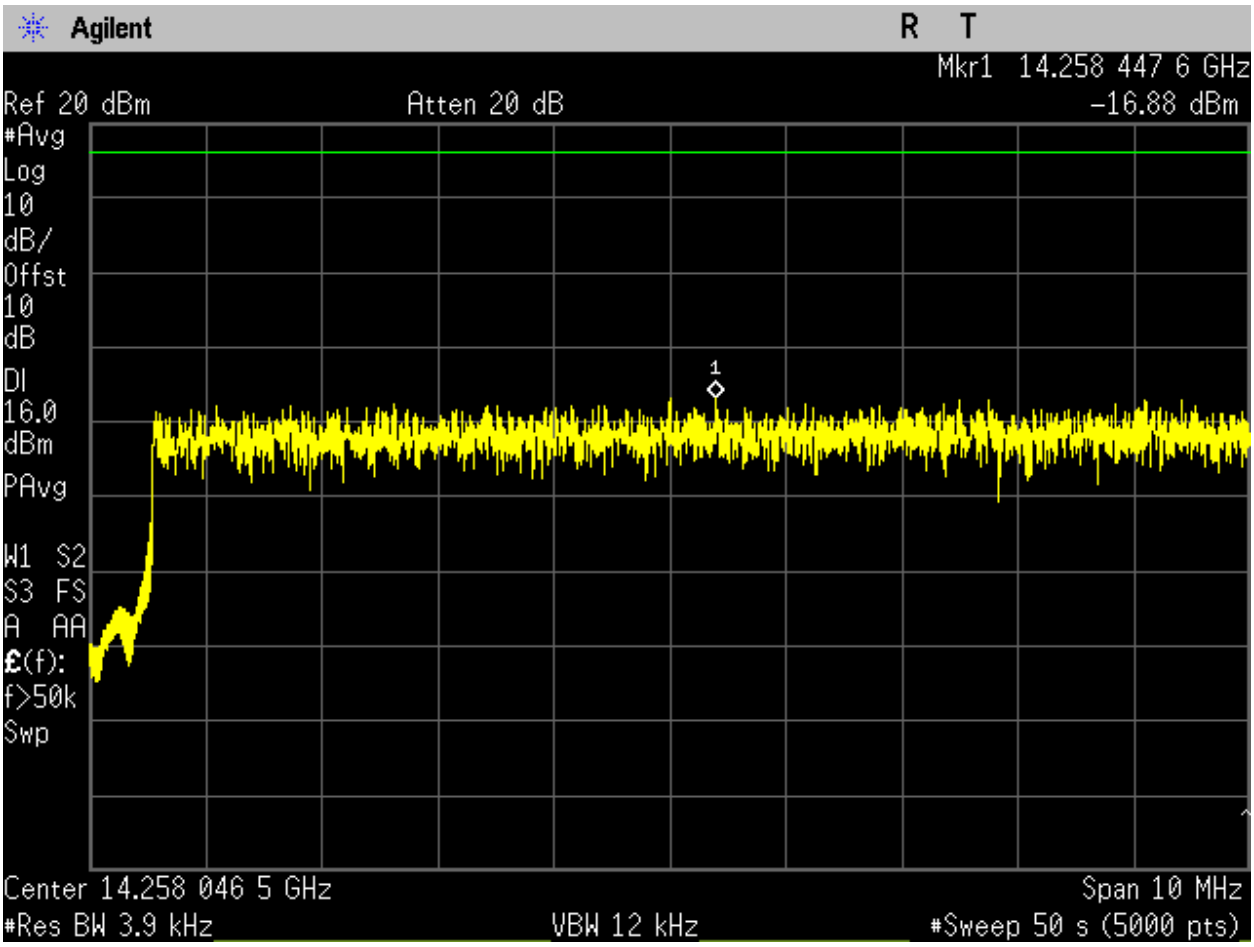

Figure 35. 4KHZ EIRP_8PSK_20MHz_Mid Channel, 14.263GHz (Final).

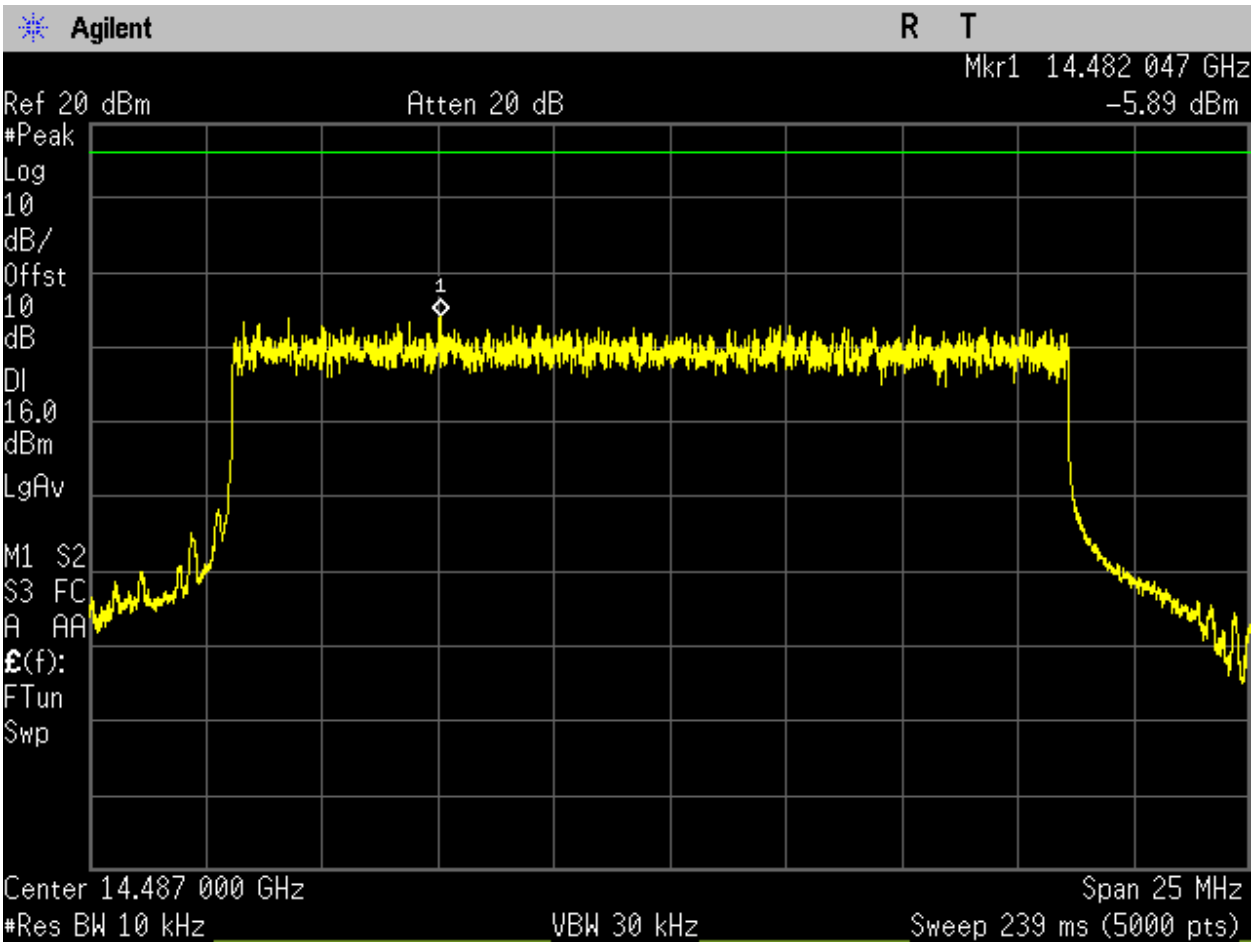

Figure 36. 4KHZ EIRP_8PSK_20MHz_High Channel, 14.487GHz (PreScan).

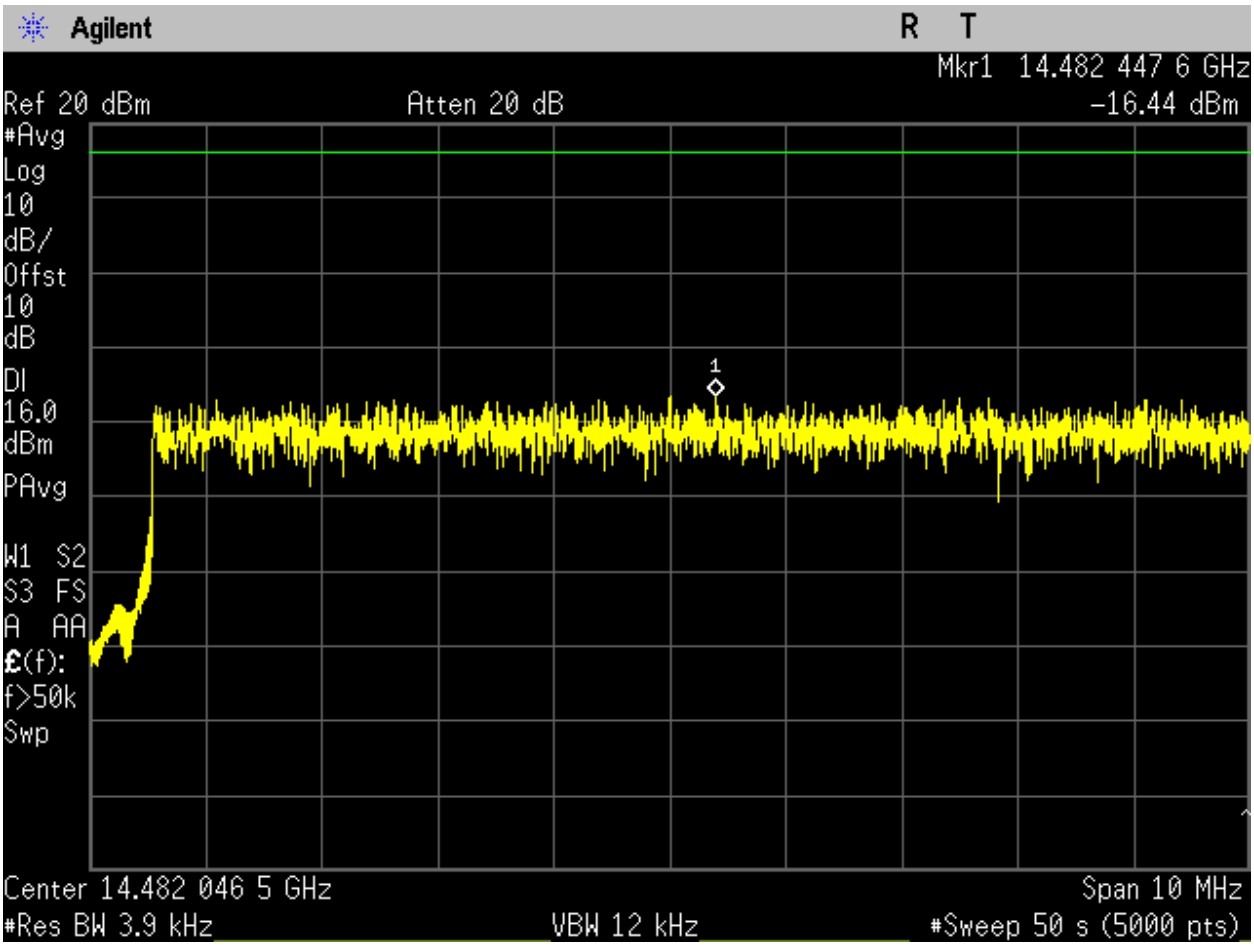

Figure 37. 4KHZ EIRP_8PSK_20MHz_High Channel, 14.487GHz (Final).

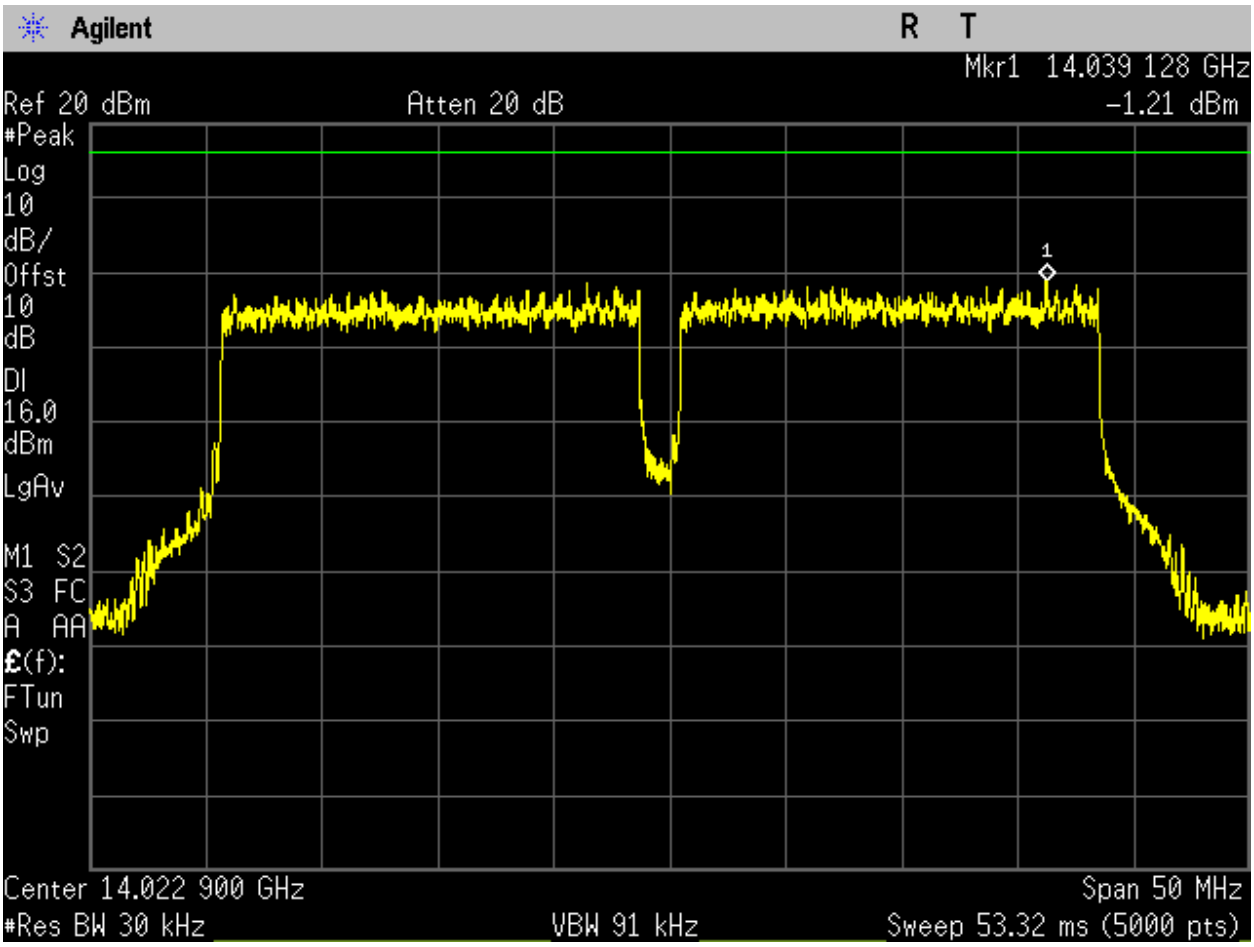

Figure 38. 4KHZ EIRP_8PSK_40MHz_Low Channel, 14.0229GHz (PreScan).

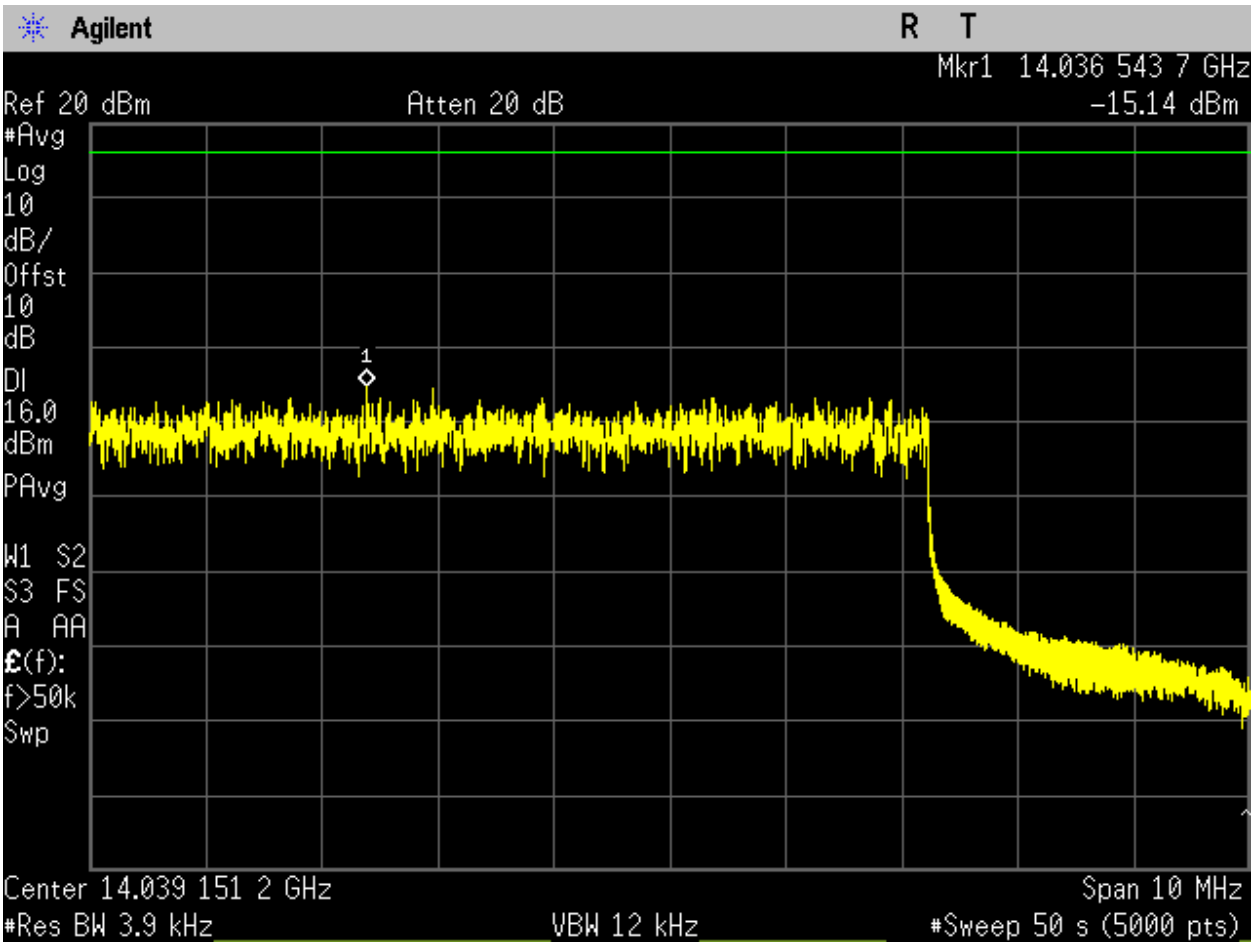

Figure 39. 4KHZ EIRP_8PSK_40MHz_Low Channel, 14.0229GHz (Final).

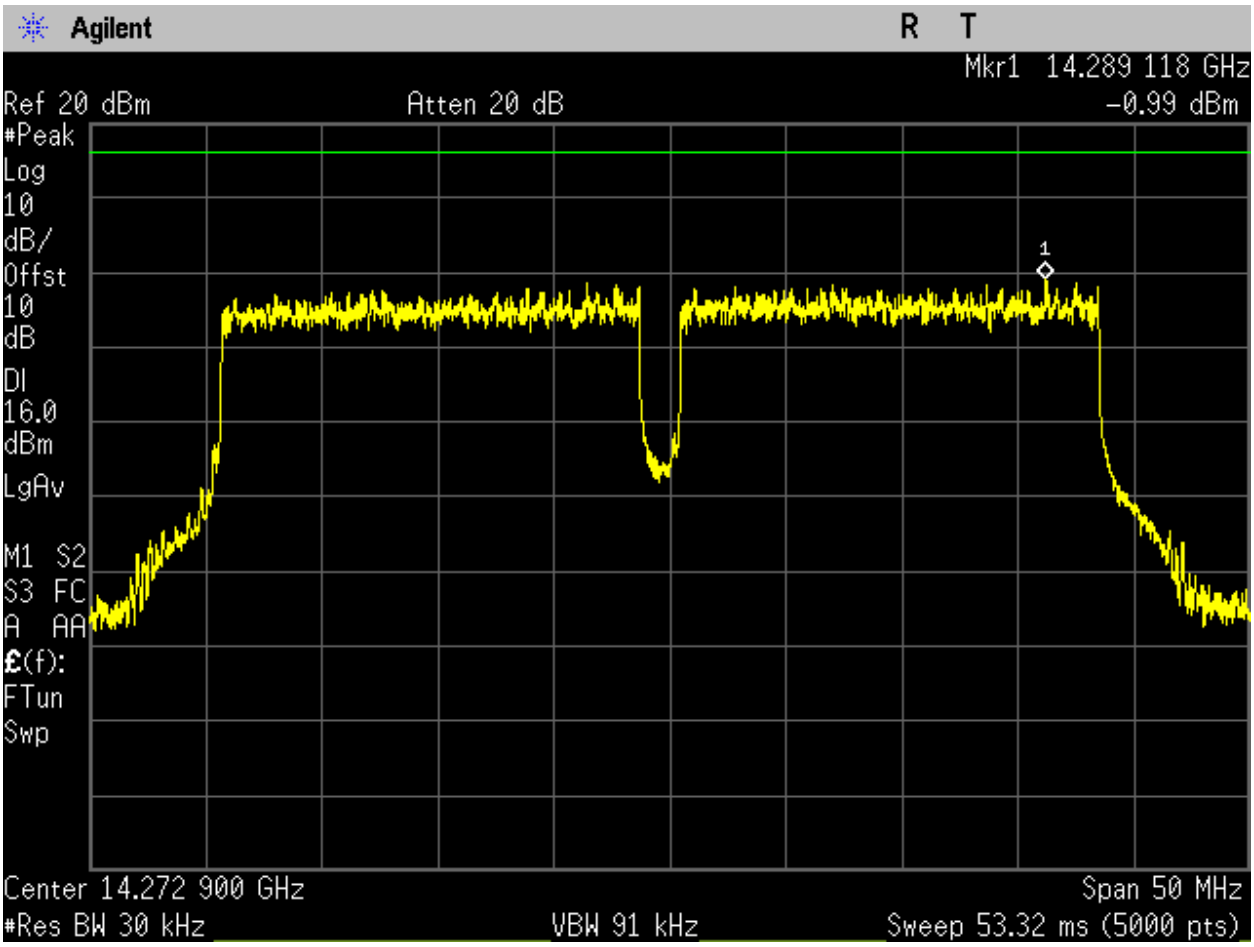

Figure 40. 4KHZ EIRP_8PSK_40MHz_Mid Channel, 14.2729GHz (PreScan).

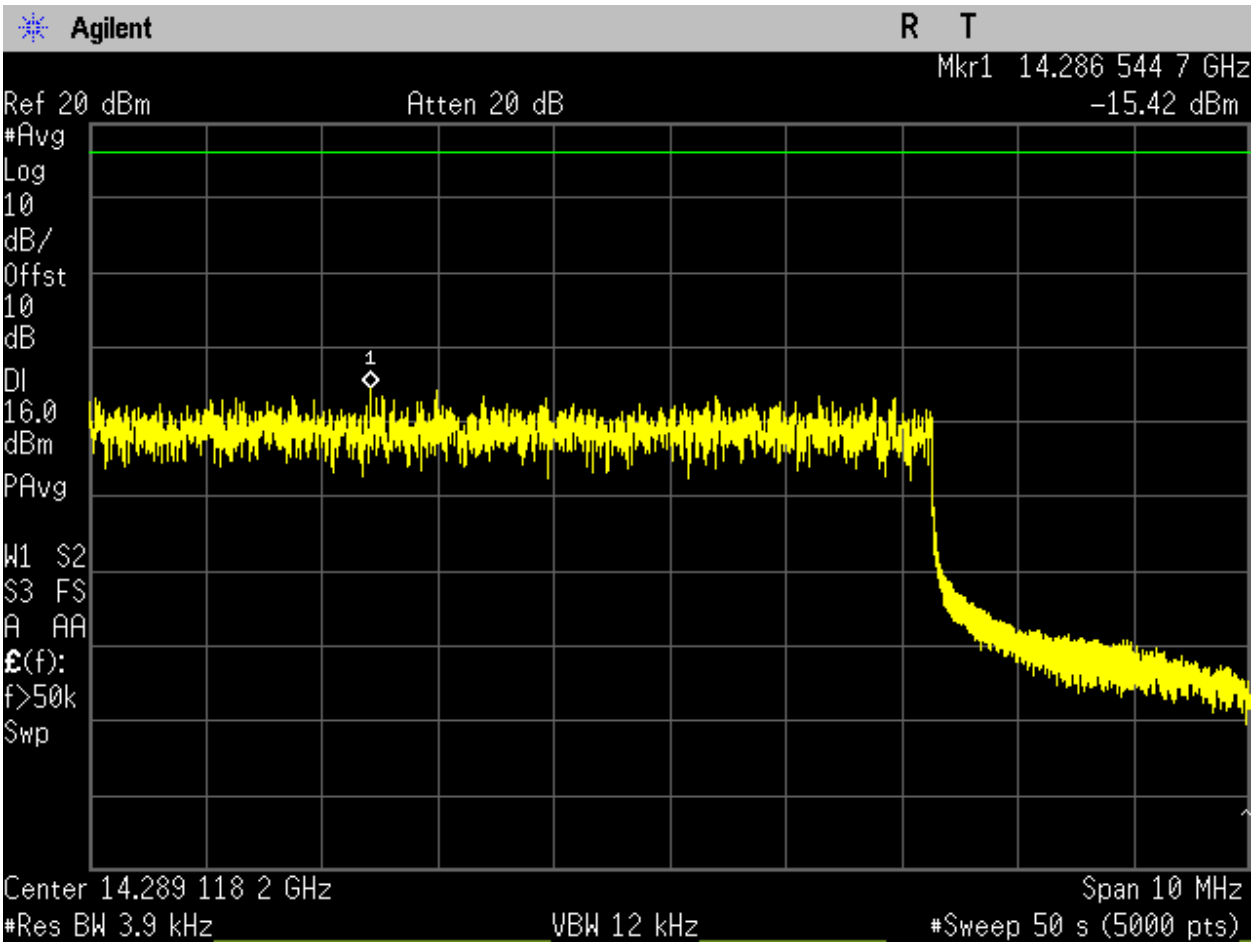

Figure 41. 4KHZ EIRP_8PSK_40MHz_Mid Channel, 14.2729GHz (Final).

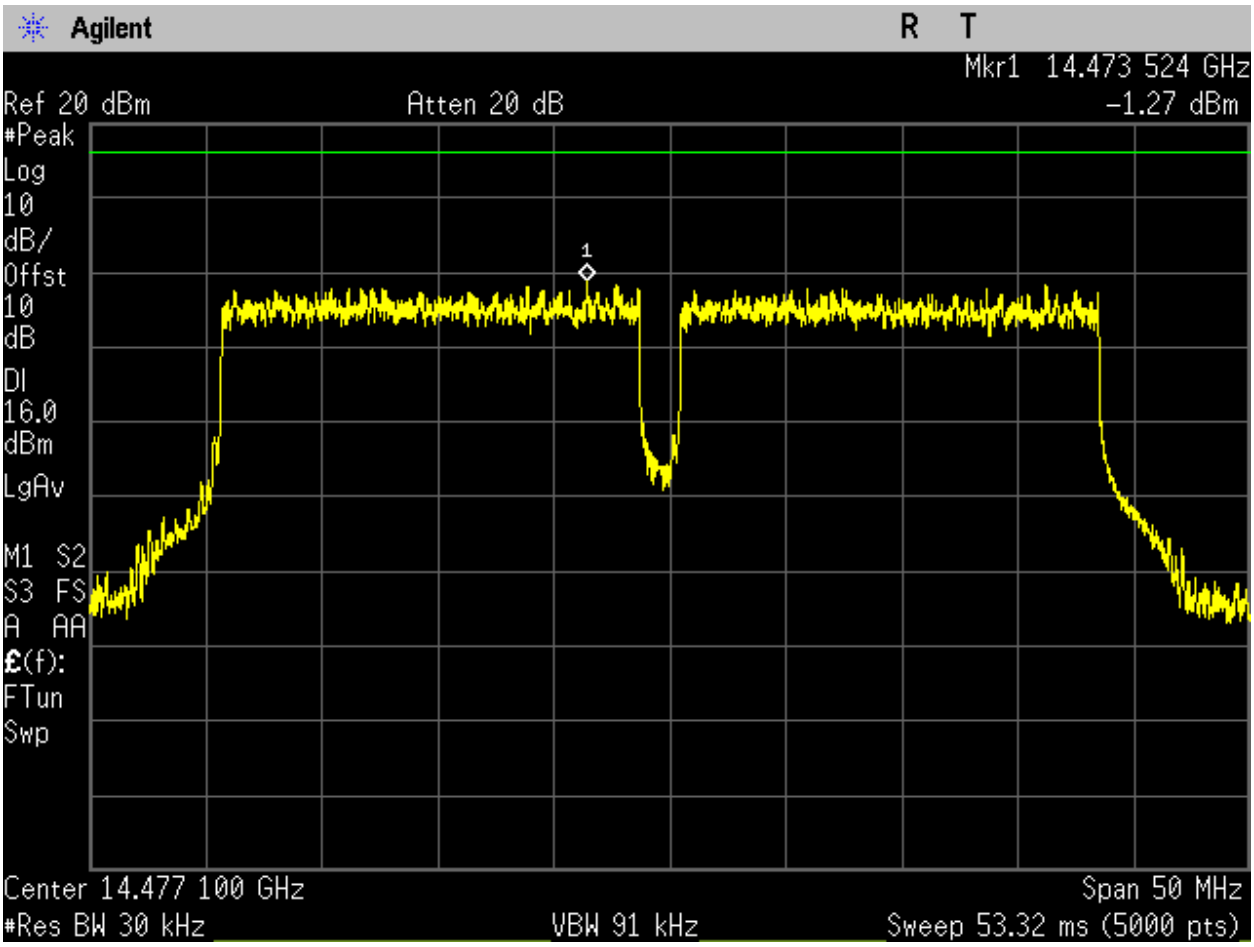

Figure 42. 4KHZ EIRP_8PSK_40MHz_High Channel, 14.4771GHz (PreScan).

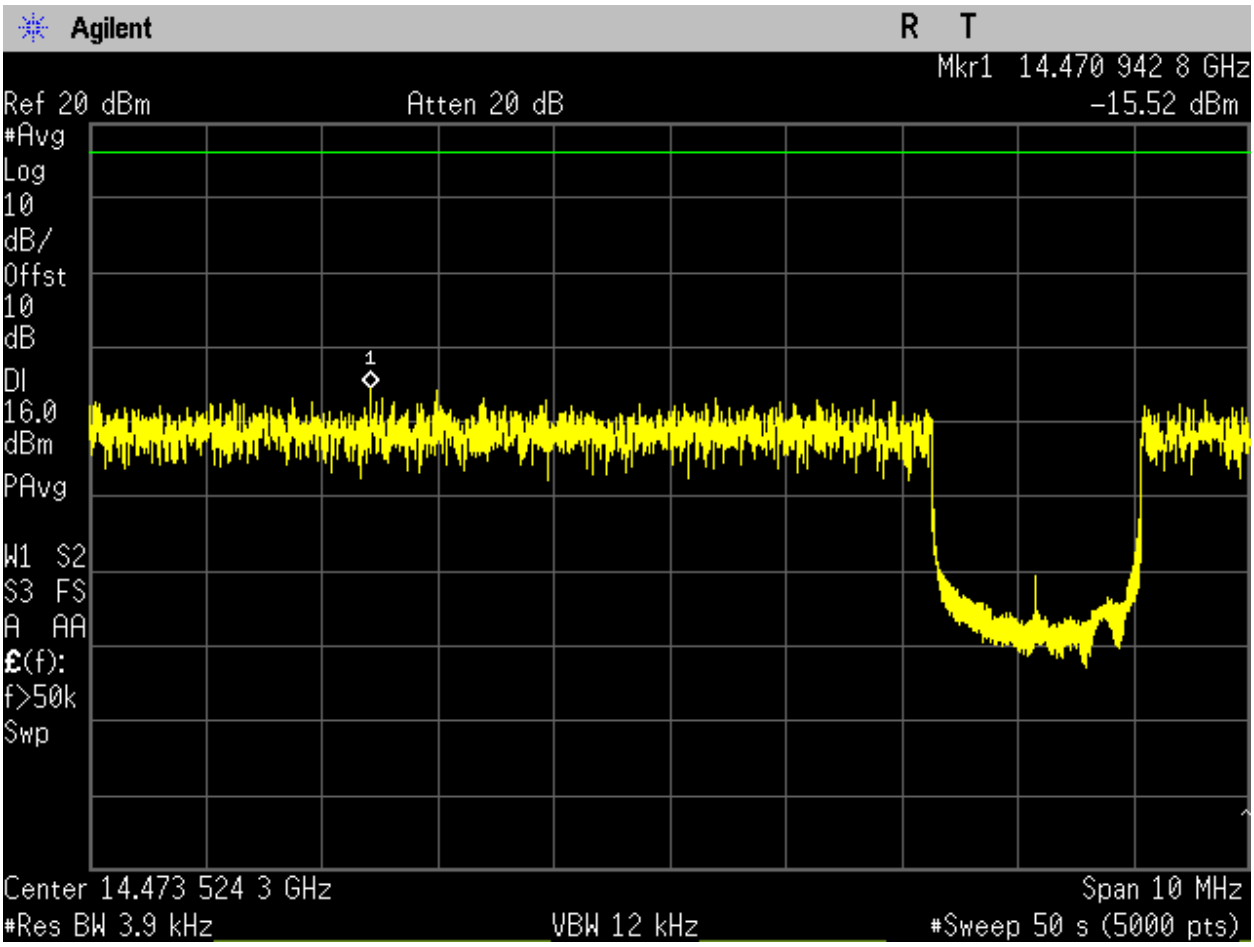

Figure 43. 4KHZ EIRP_8PSK_40MHz_High Channel, 14.4771GHz (Final).

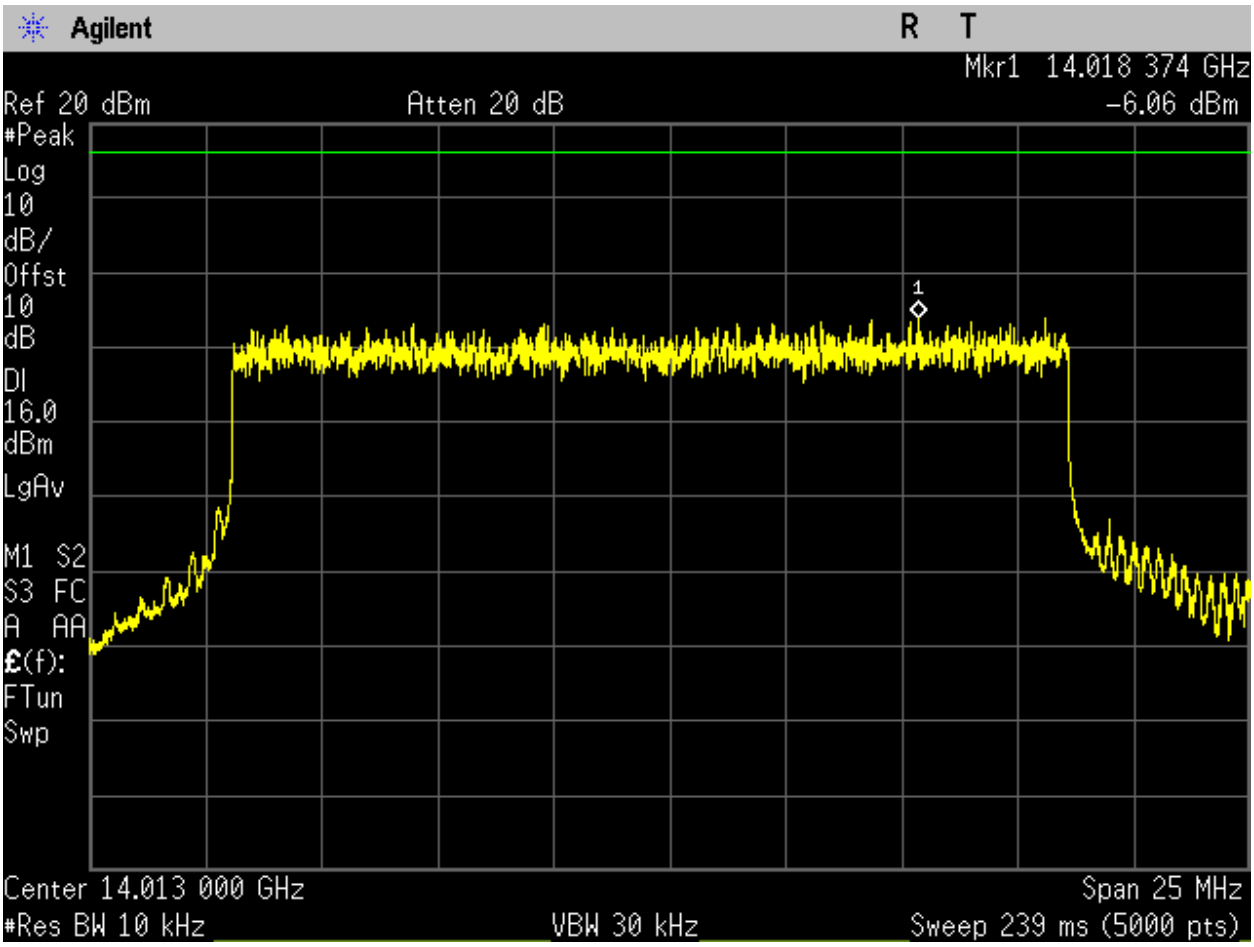

Figure 44. 4KHZ EIRP_16QAM_20MHz_Low Channel, 14.013GHz (PreScan).

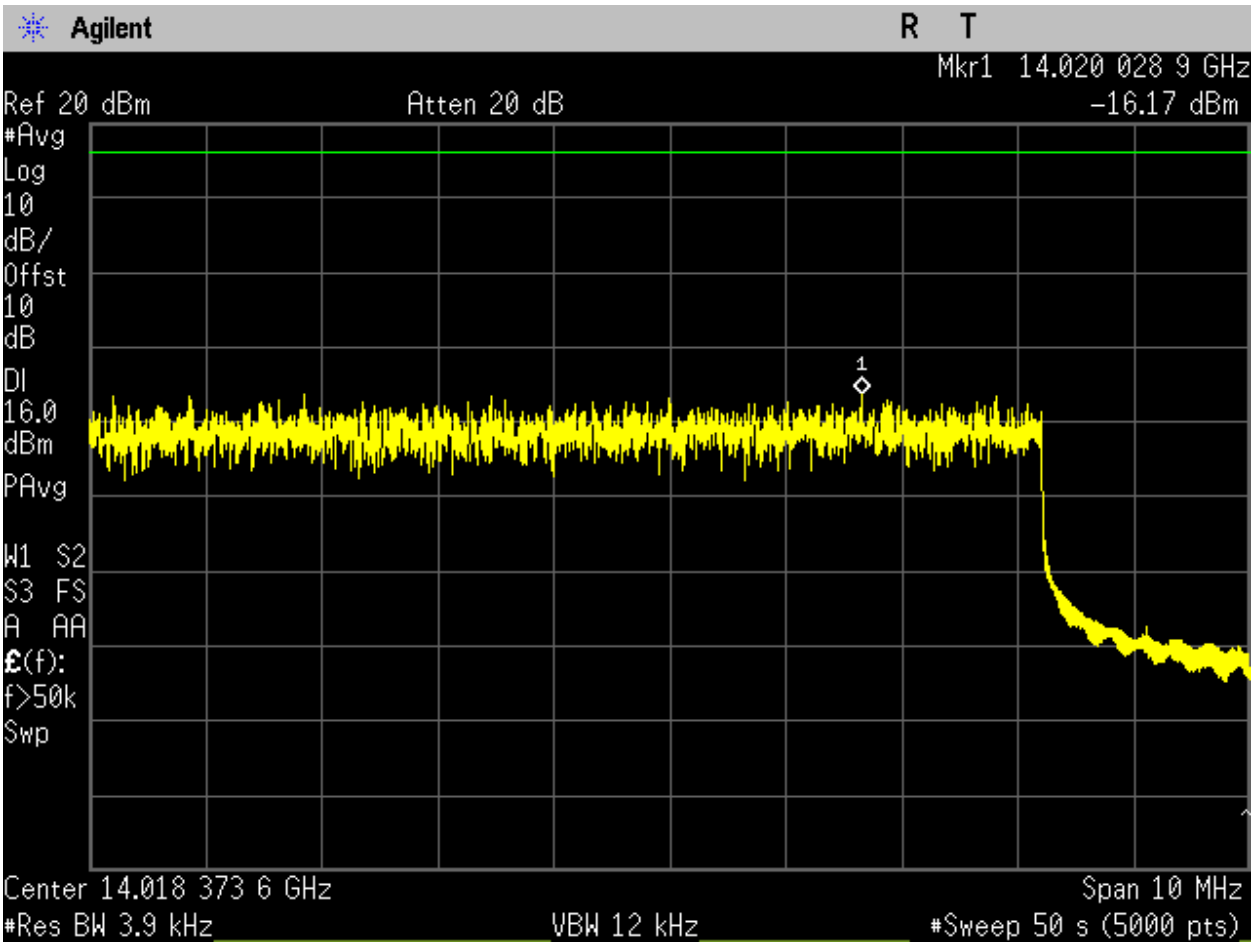

Figure 45. 4KHZ EIRP_16QAM_20MHz_Low Channel, 14.013GHz (Final).

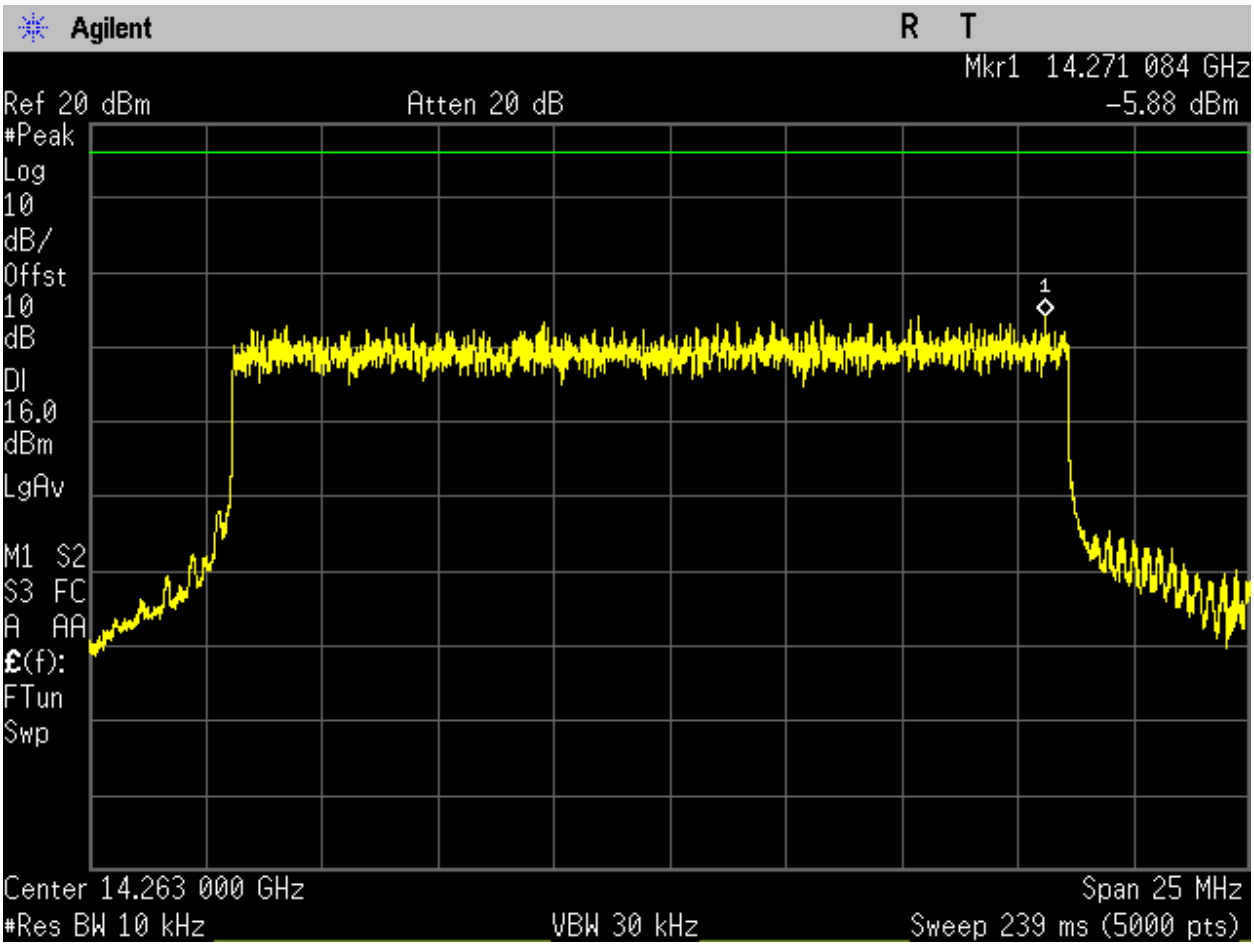

Figure 46. 4KHZ EIRP_16QAM_20MHz_Mid Channel, 14.263GHz (PreScan).

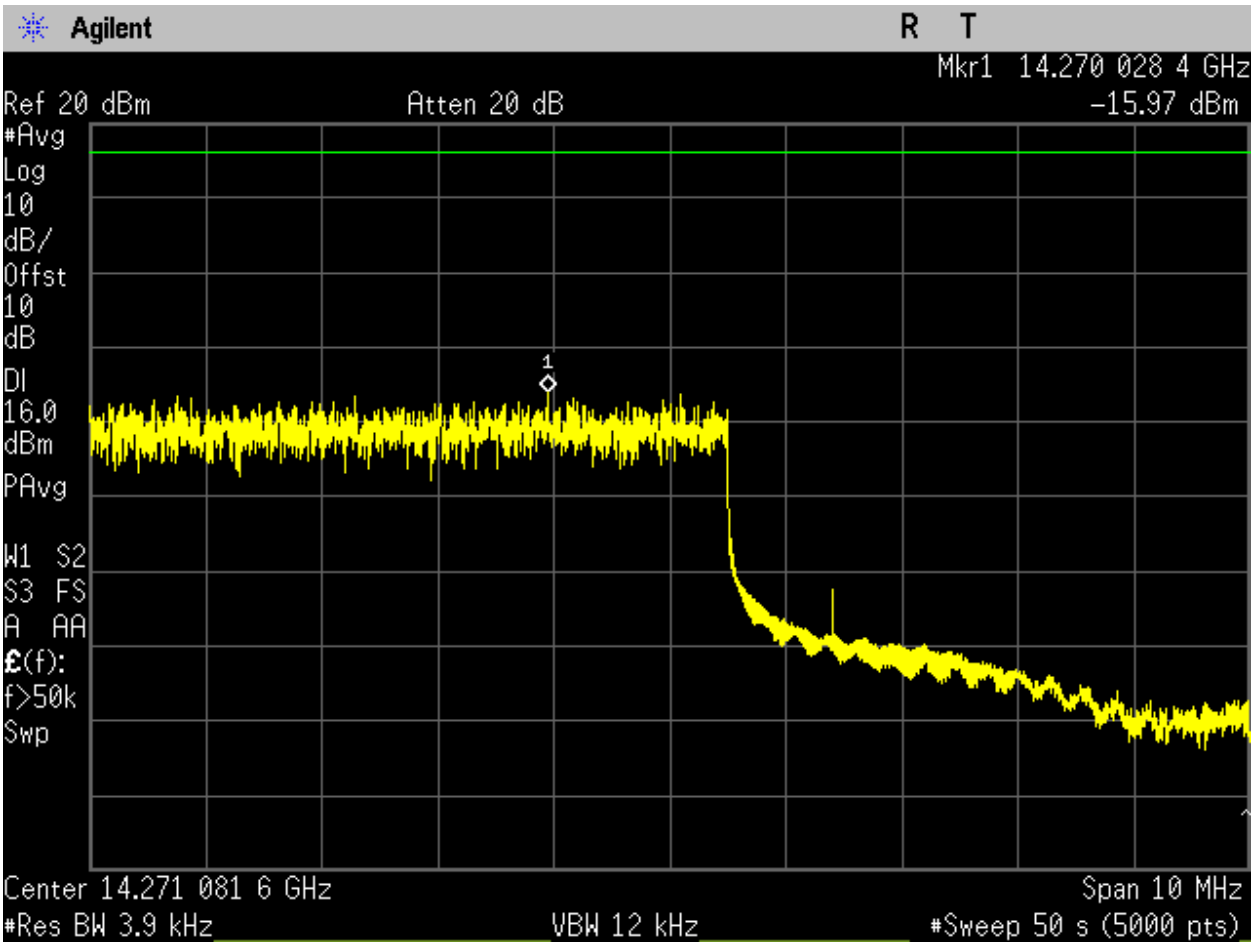

Figure 47. 4KHZ EIRP_16QAM_20MHz_Mid Channel, 14.263GHz (Final).

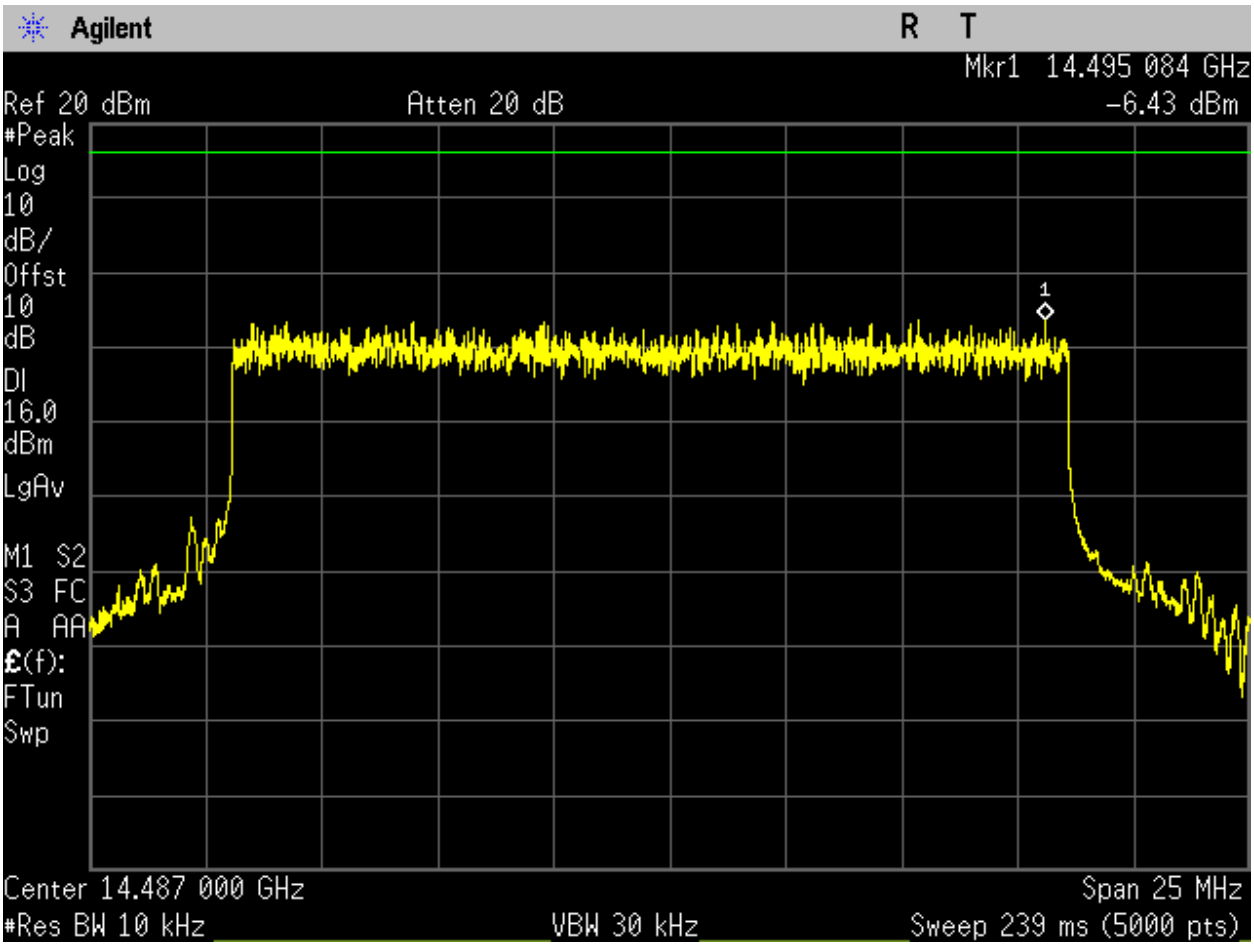

Figure 48. 4KHZ EIRP_16QAM_20MHz_High Channel, 14.487GHz (PreScan).

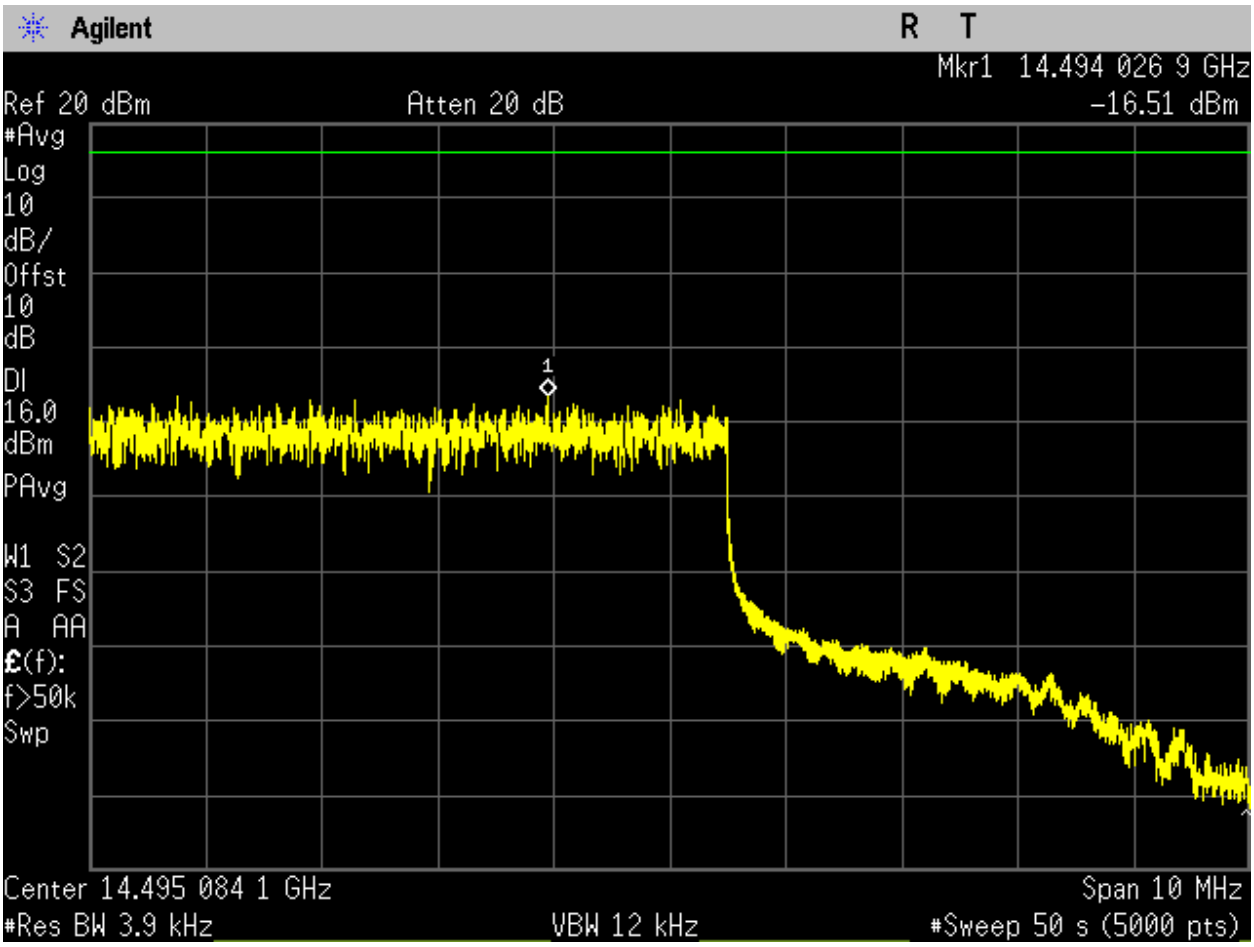

Figure 49. 4KHZ EIRP_16QAM_20MHz_High Channel, 14.487GHz (Final).

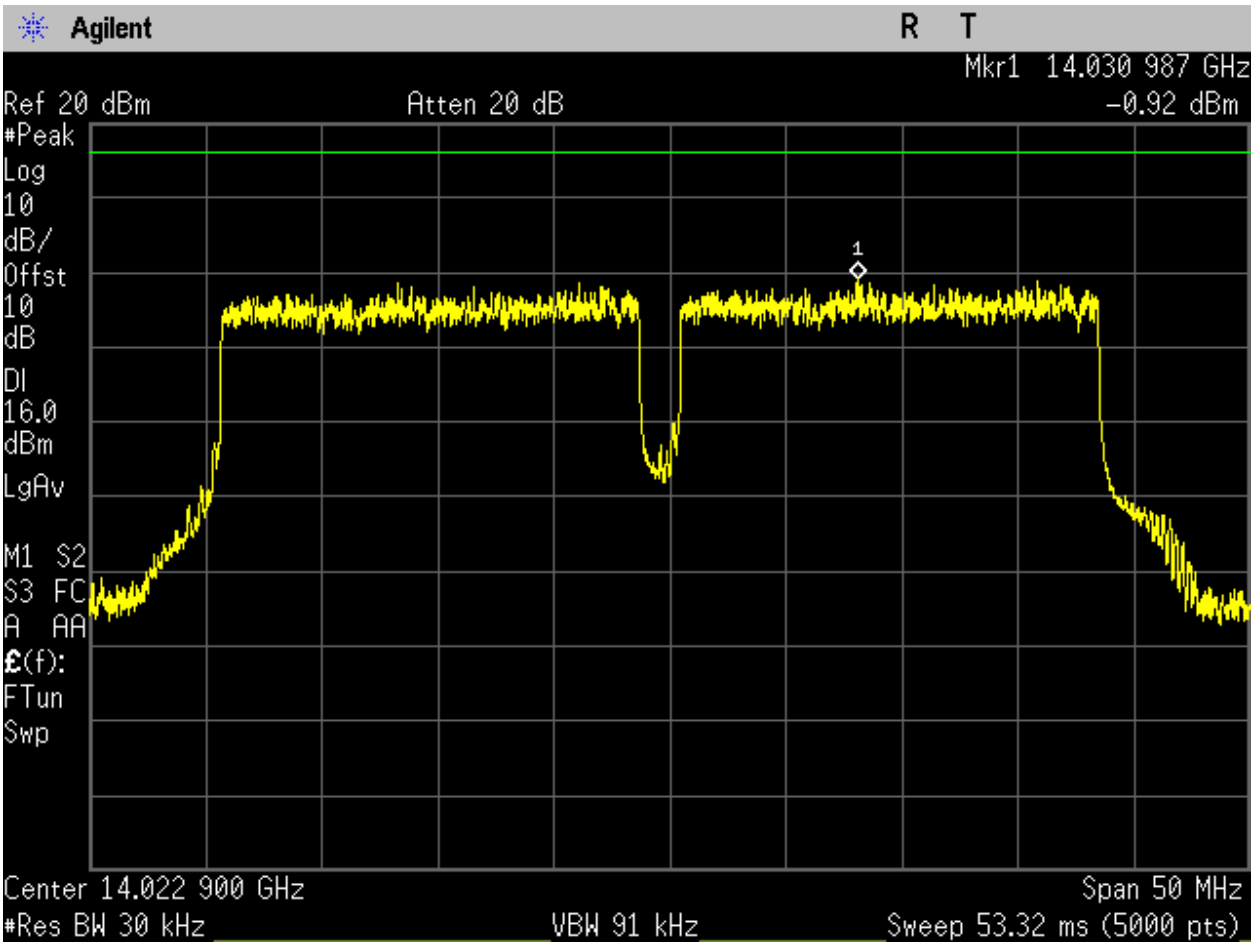

Figure 50. 4KHZ EIRP_16QAM_40MHz_Low Channel, 14.0229GHz (PreScan).

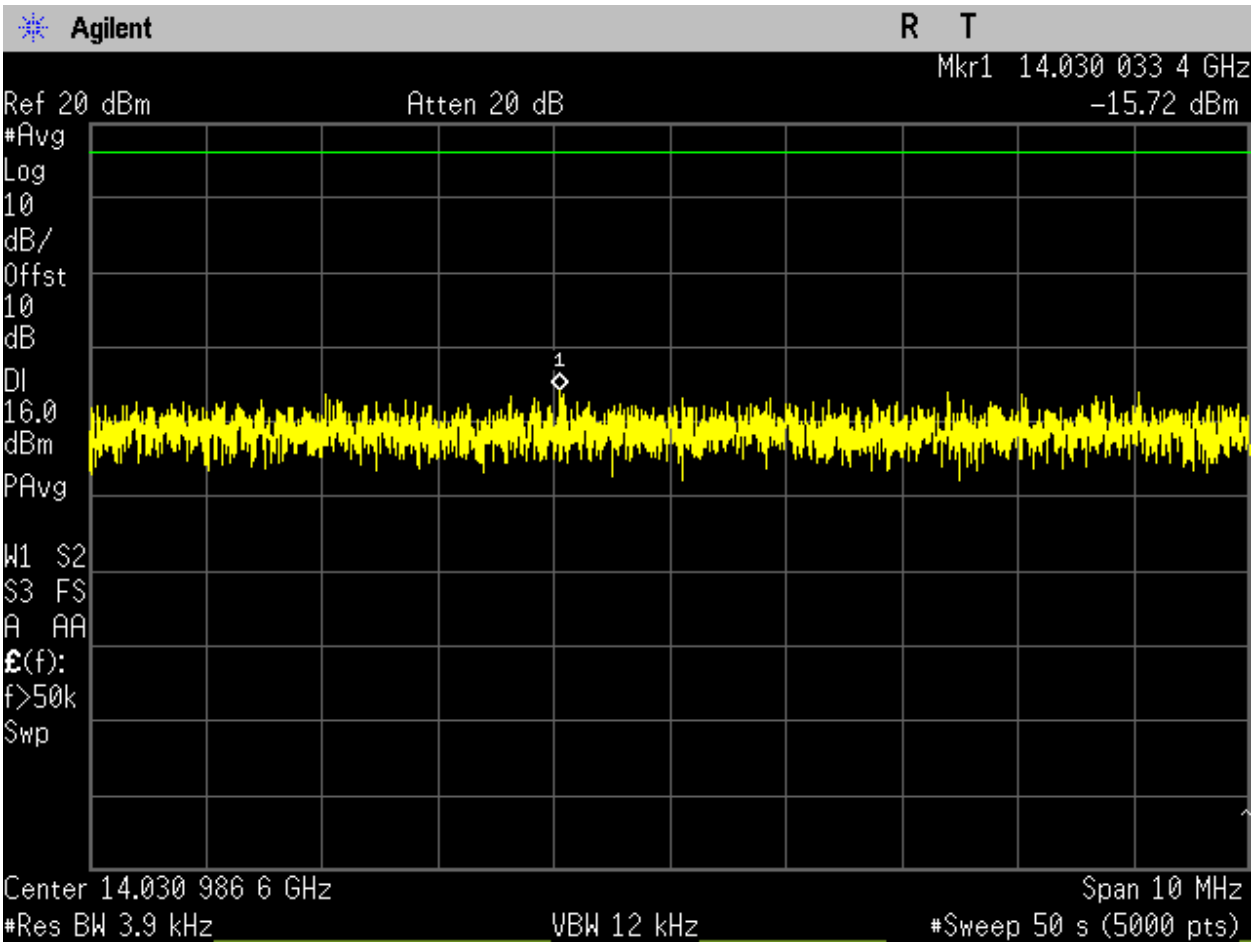

Figure 51. 4KHZ EIRP_16QAM_40MHz_Low Channel, 14.0229GHz (Final).

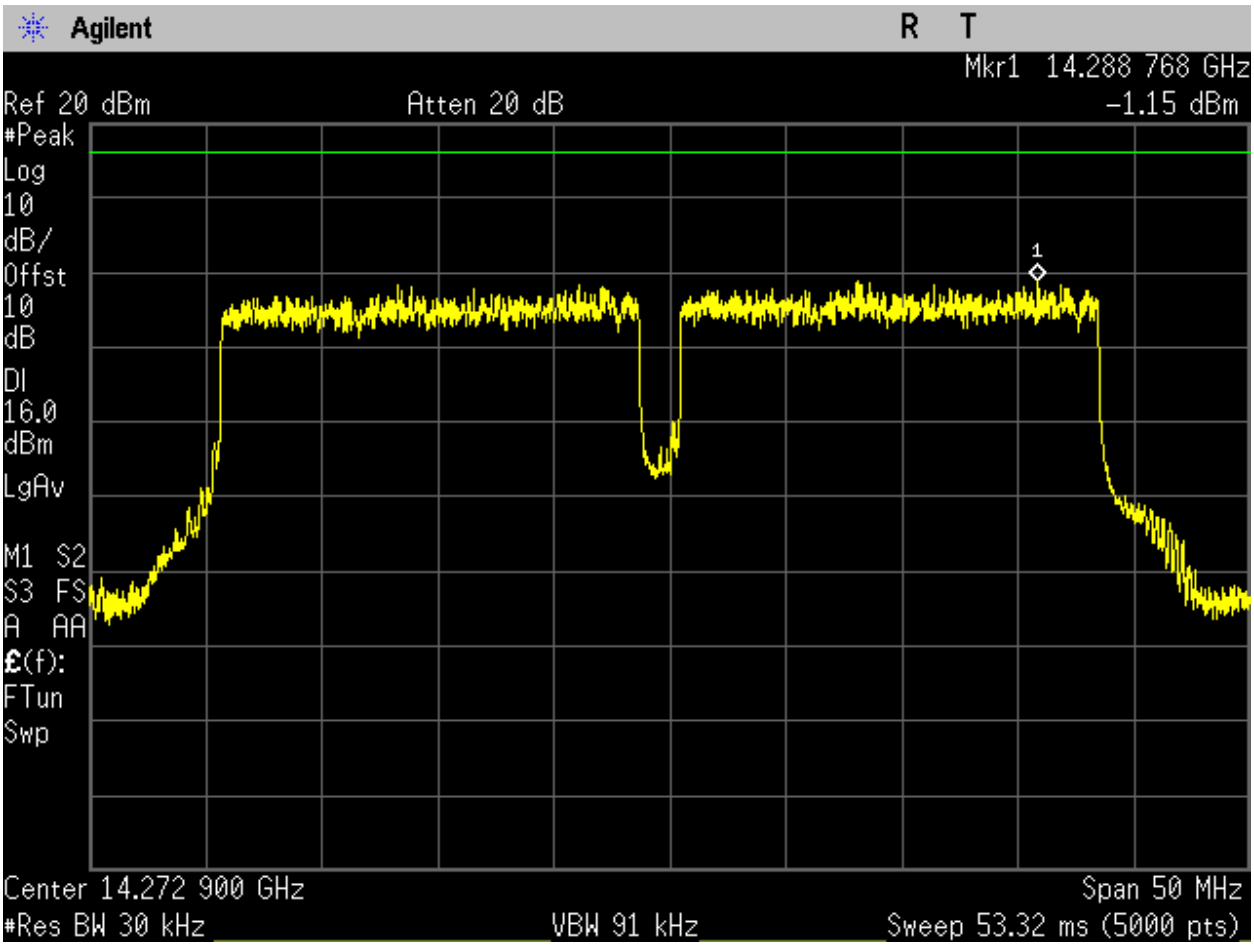

Figure 52. 4KHZ EIRP_16QAM_40MHz_Mid Channel, 14.2729GHz (PreScan).

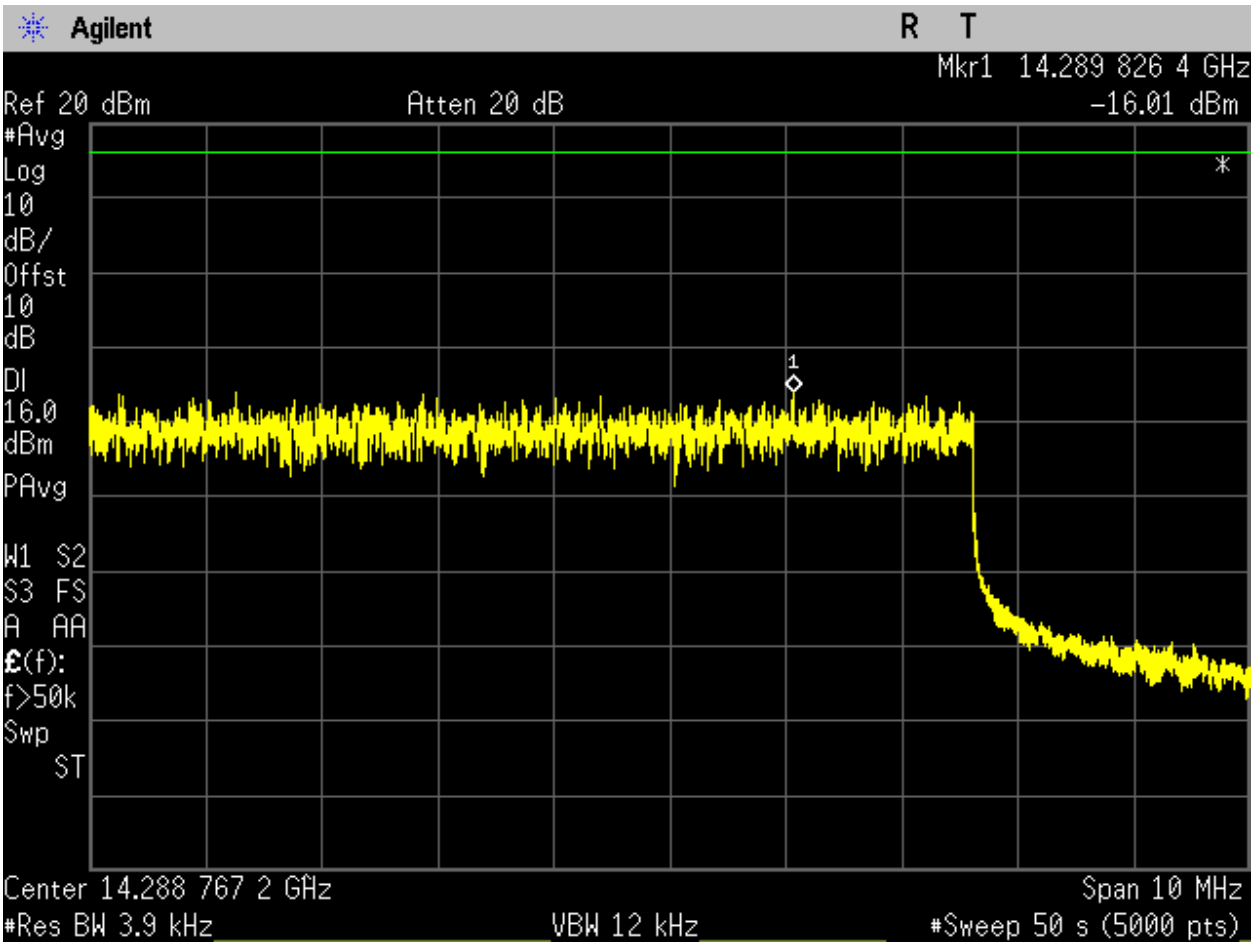

Figure 53. 4KHZ EIRP_16QAM_40MHz_Mid Channel, 14.2729GHz (Final).

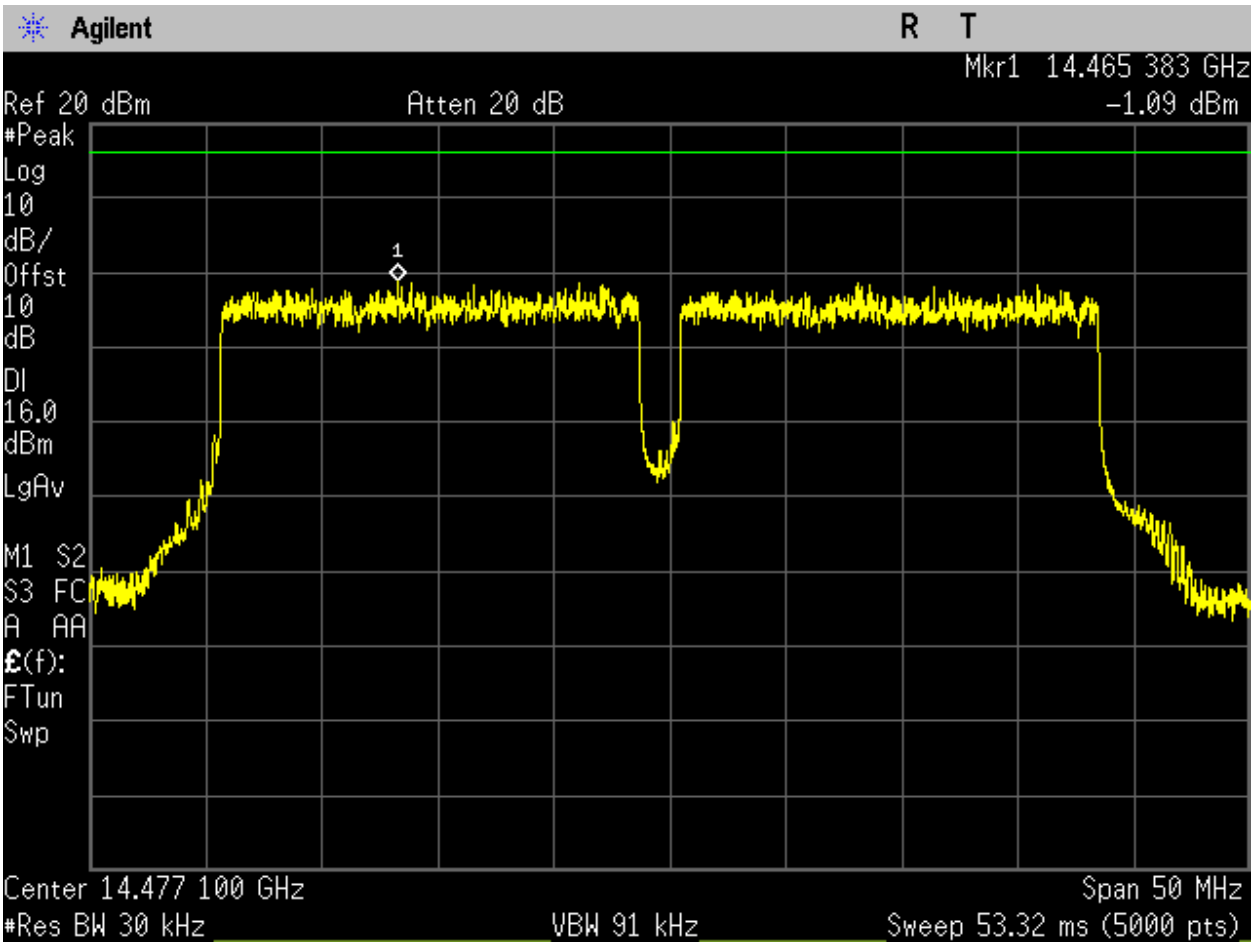

Figure 54. 4KHZ EIRP_16QAM_40MHz_High Channel, 14.4771GHz (PreScan).

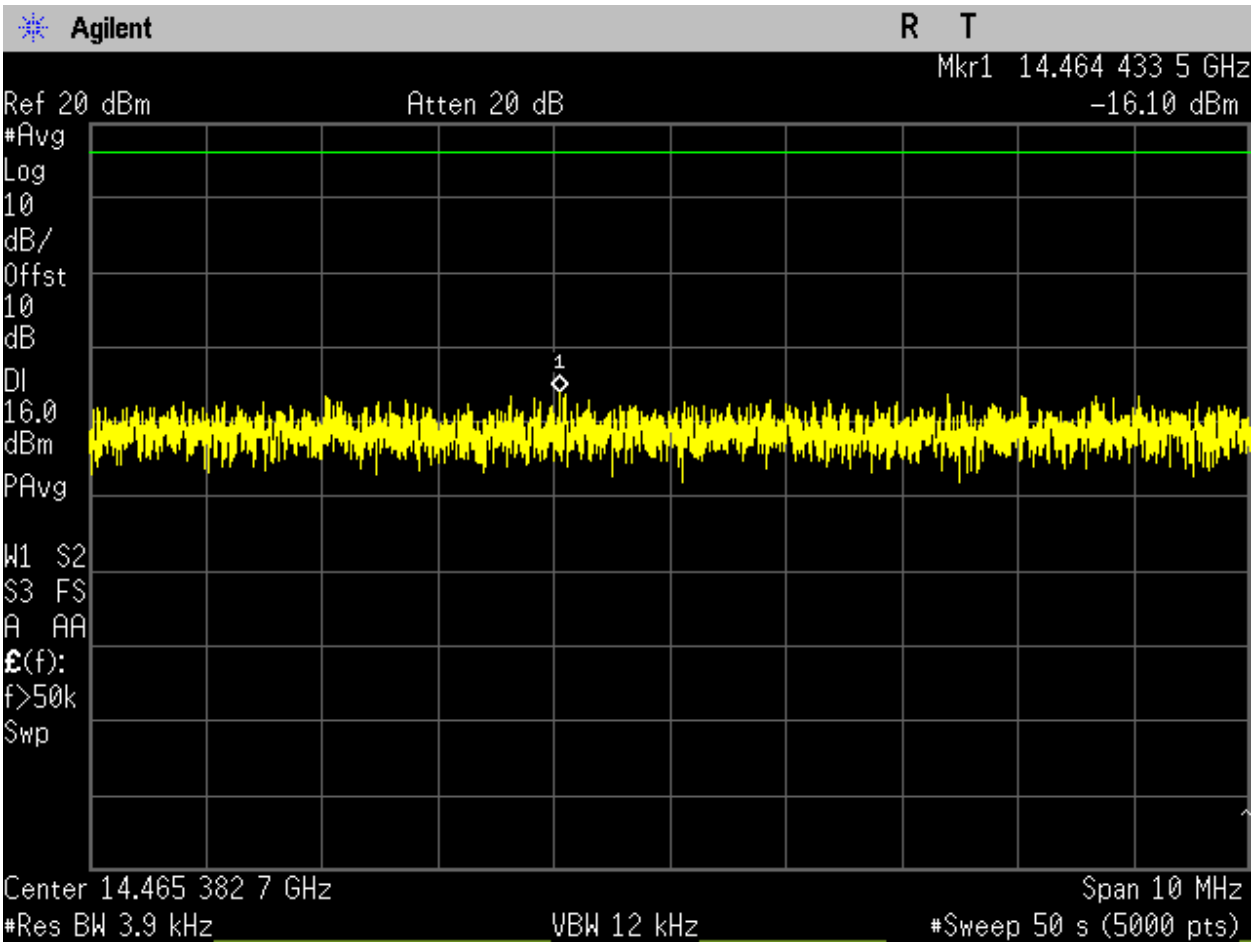

Figure 55. 4KHZ EIRP_16QAM_40MHz_High Channel, 14.4771GHz (Final).

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

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 $3° \le \theta \le 19.1°$.
−14	dBW/4 kHz	for $19.1° < \theta \le 180°$.

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 $1.5° \le \theta \le 7°$.

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 Procedures: 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: April 25 – April 26, 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	-16.17	0.11	0	-16.06	16.00
		14.263	-15.61	0.11	0	-15.50	16.00
		14.487	-15.77	0.11	0	-15.66	16.00
	40	14.0229	-15.85	0.11	0	-15.74	16.00
		14.2729	-15.58	0.11	0	-15.47	16.00
		14.4771	-15.88	0.11	0	-15.77	16.00
8PSK	20	14.013	-16.63	0.11	0	-16.52	16.00
		14.263	-16.88	0.11	0	-16.77	16.00
		14.487	-16.44	0.11	0	-16.33	16.00
	40	14.0229	-15.14	0.11	0	-15.03	16.00
		14.2729	-15.42	0.11	0	-15.31	16.00
		14.4771	-15.52	0.11	0	-15.41	16.00
16QAM	20	14.013	-16.17	0.11	0	-16.06	16.00
		14.263	-15.97	0.11	0	-15.86	16.00
		14.487	-16.51	0.11	0	-16.40	16.00
	40	14.0229	-15.72	0.11	0	-15.61	16.00
		14.2729	-16.01	0.11	0	-15.90	16.00
		14.4771	-16.10	0.11	0	-15.99	16.00

Table 10. Off-Axis EIRP PSD, Test Results

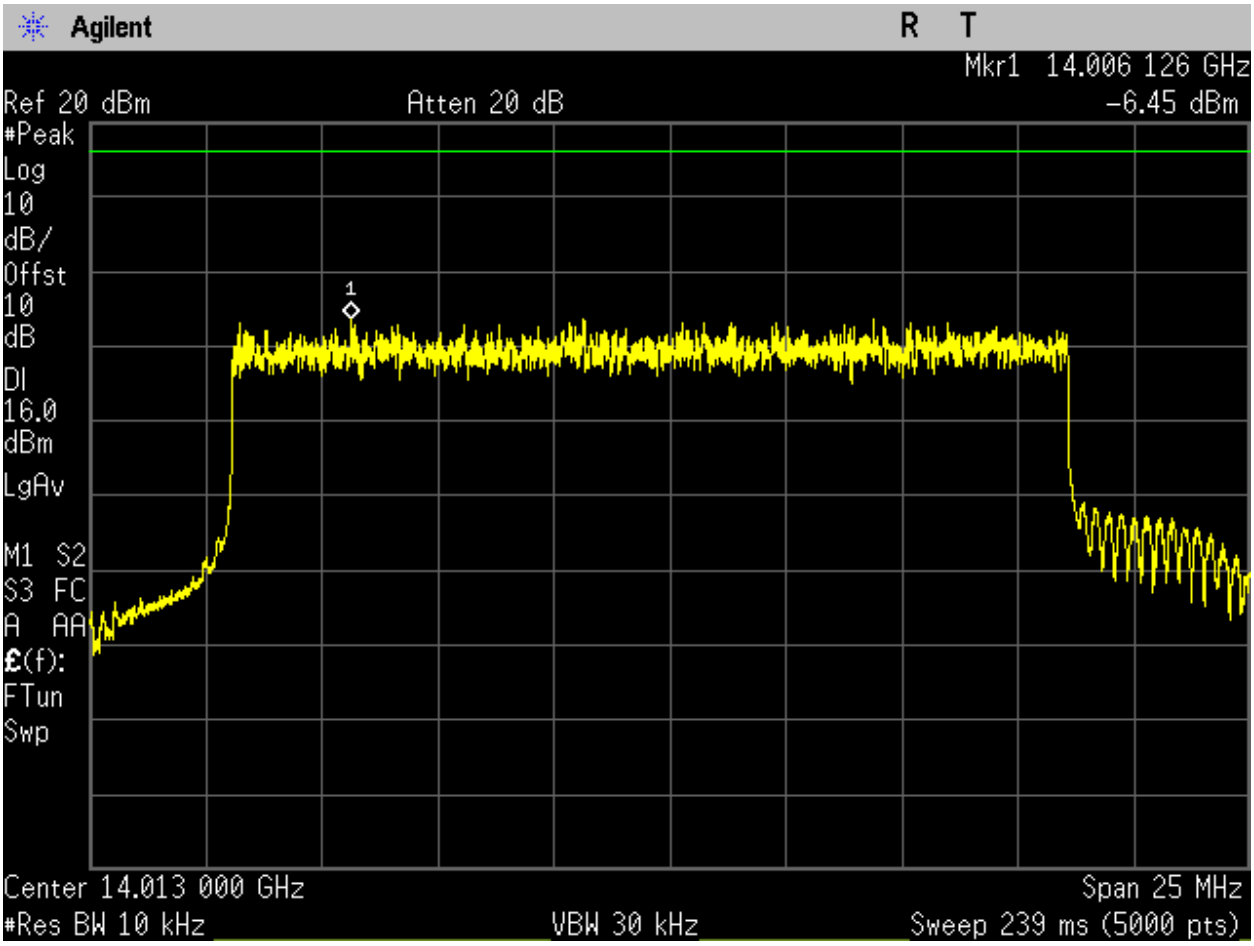

Figure 56. EIRP PSD_QPSK_20MHz_Low Channel, 14.013GHz (PreScan).

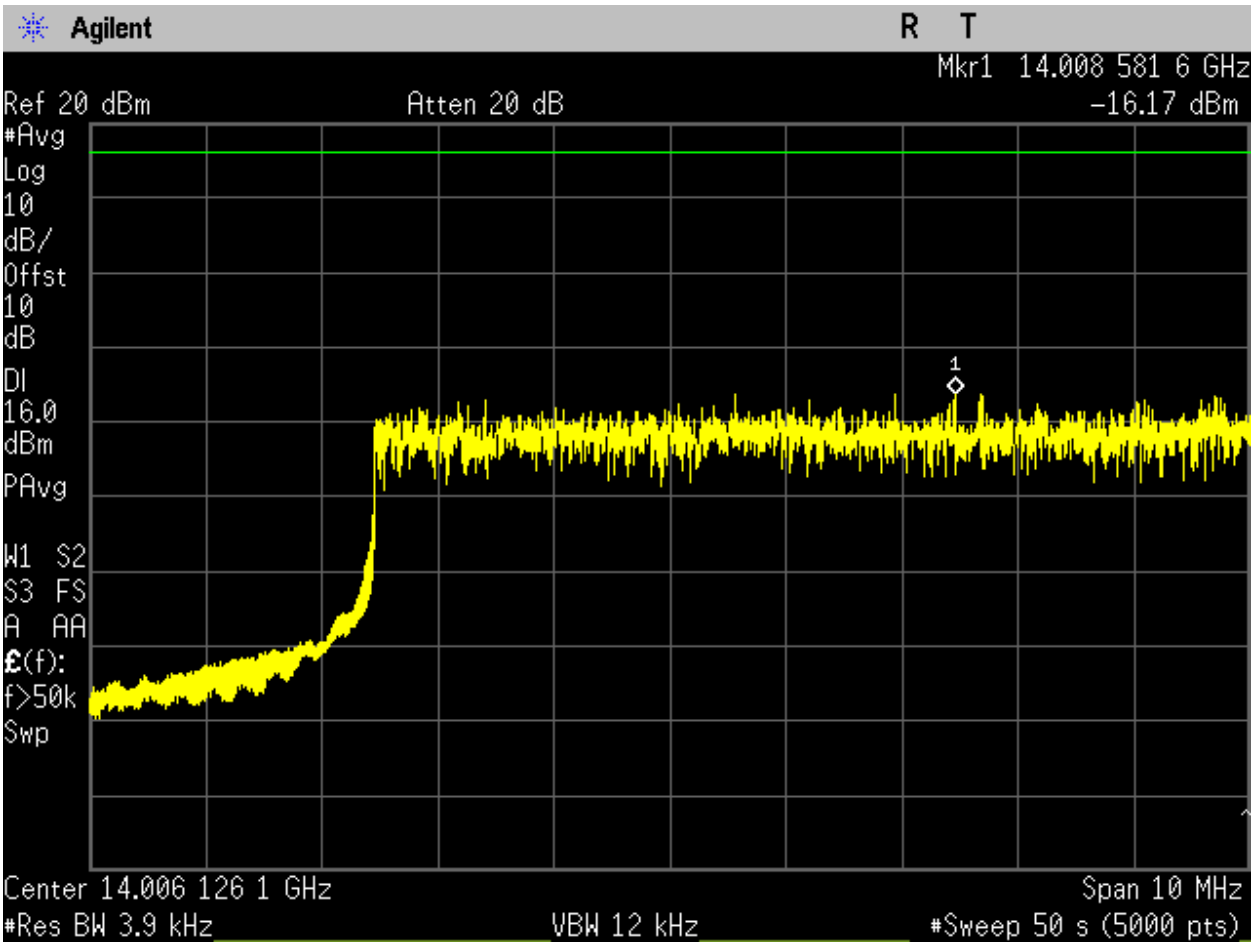

Figure 57. EIRP PSD_QPSK_20MHz_Low Channel, 14.013GHz (Final).

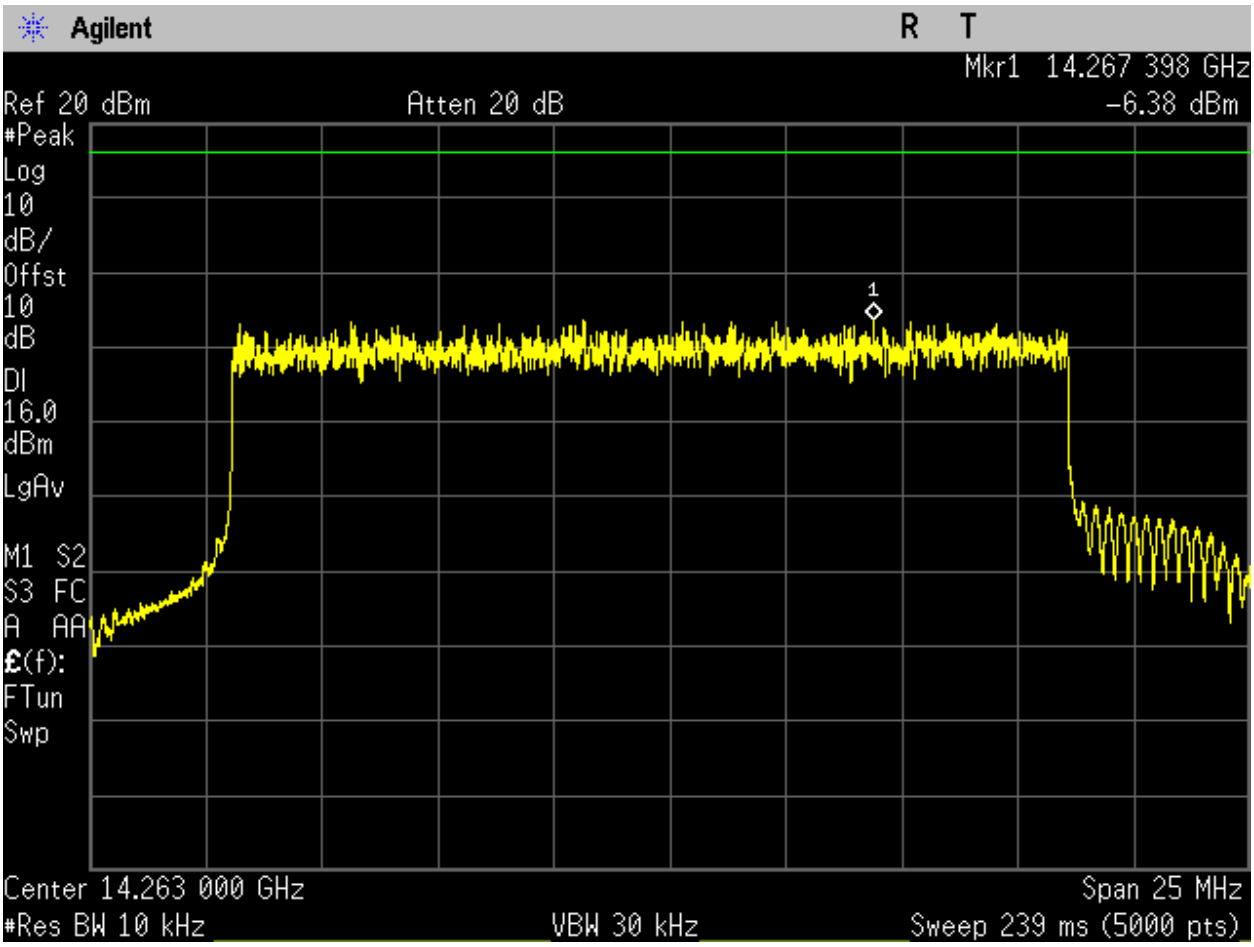

Figure 58. EIRP PSD_QPSK_20MHz_Mid Channel, 14.263GHz (PreScan).

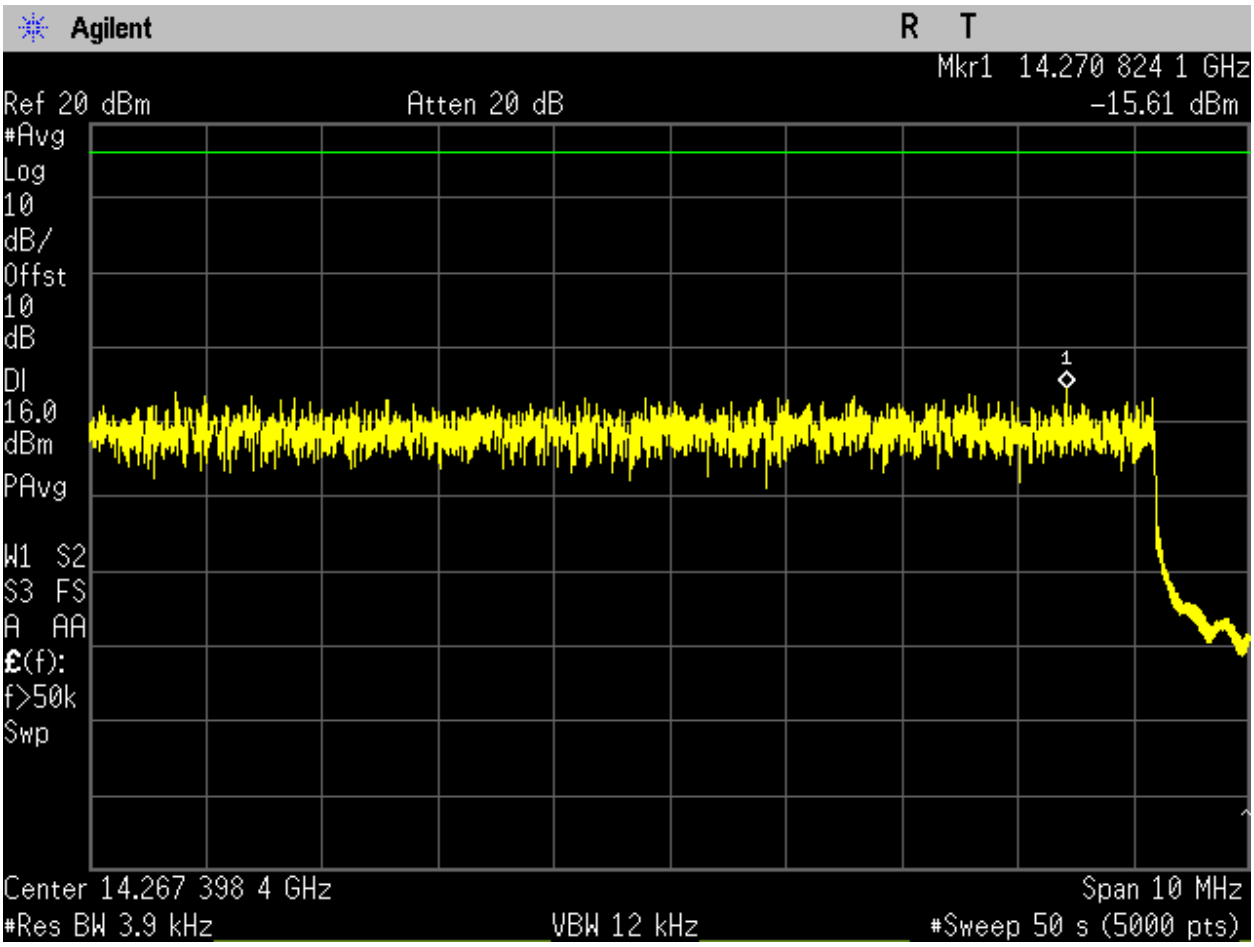

Figure 59. EIRP PSD_QPSK_20MHz_Mid Channel, 14.263GHz (Final).

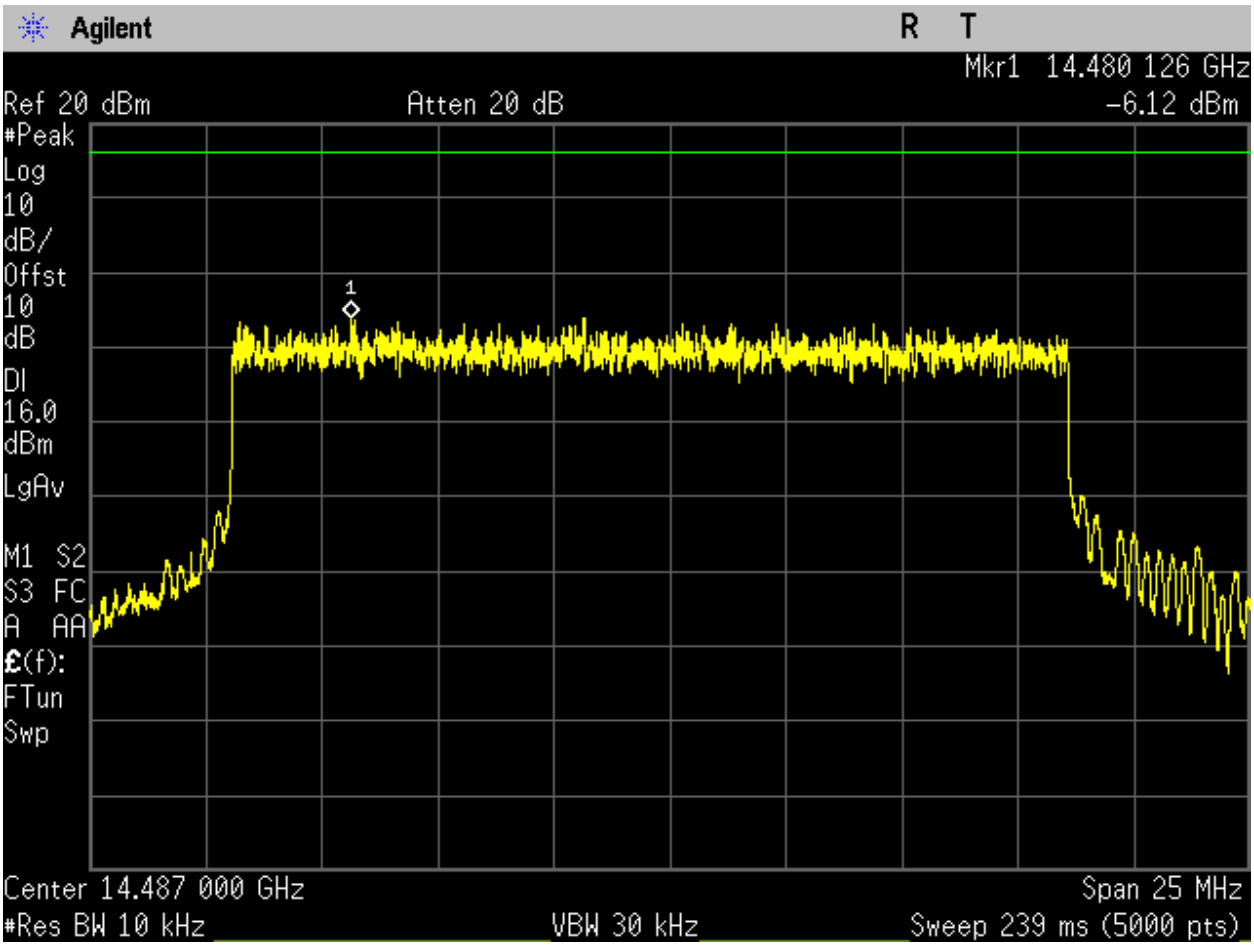

Figure 60. EIRP PSD_QPSK_20MHz_High Channel, 14.487GHz (PreScan).

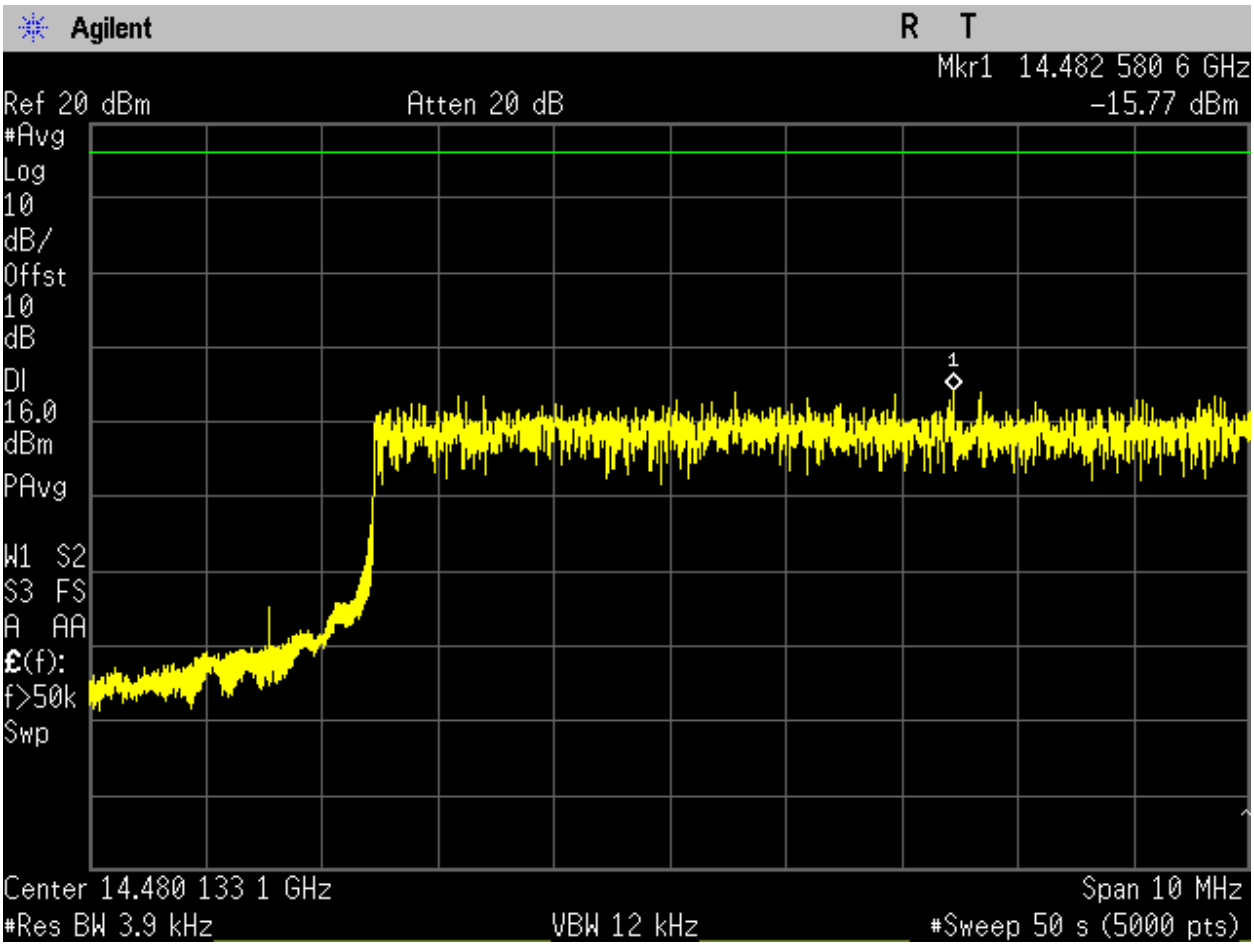

Figure 61. EIRP PSD_QPSK_20MHz_High Channel, 14.487GHz (Final).

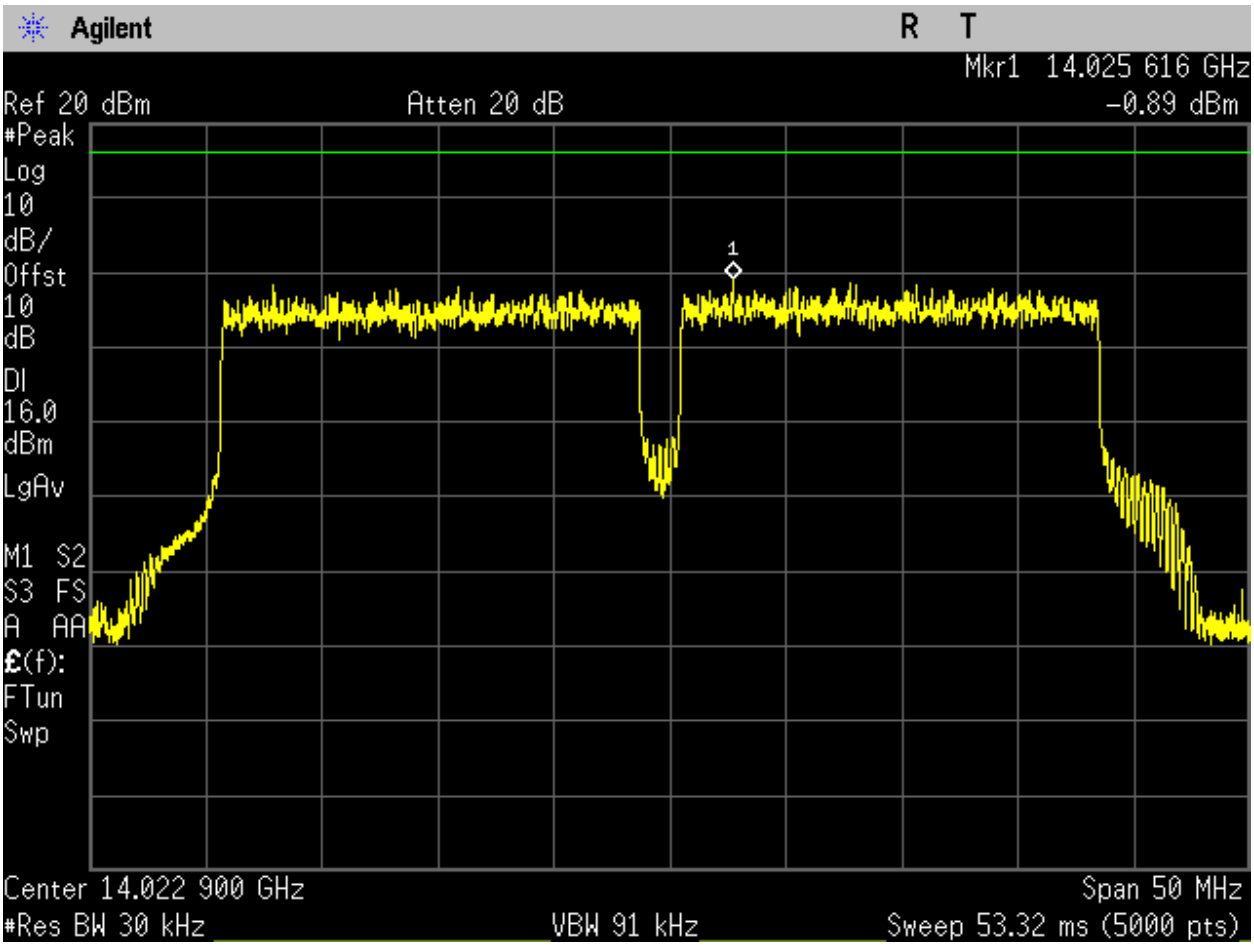

Figure 62. EIRP PSD_QPSK_40MHz_Low Channel, 14.0229GHz (PreScan).

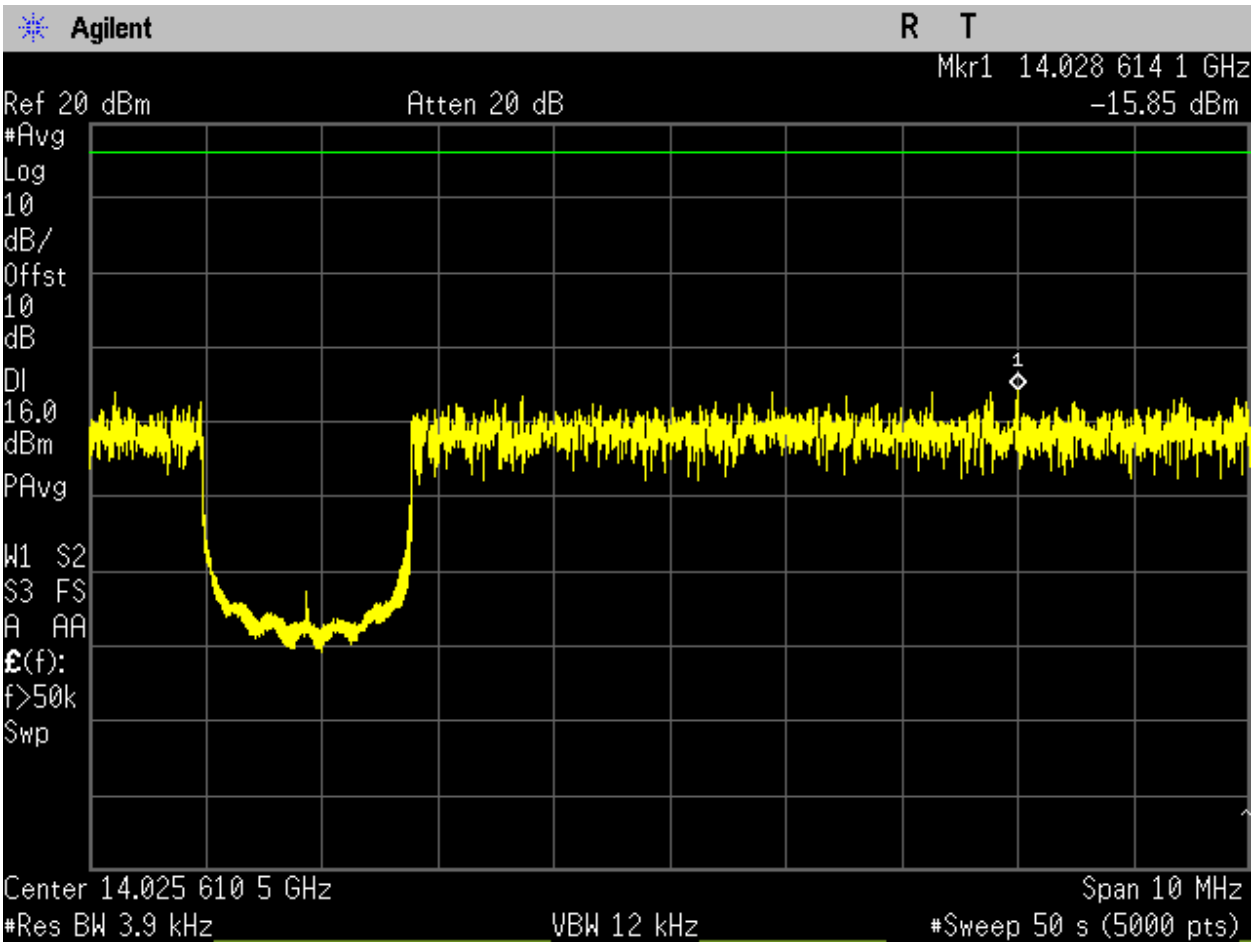

Figure 63. EIRP PSD_QPSK_40MHz_Low Channel, 14.0229GHz (Final).

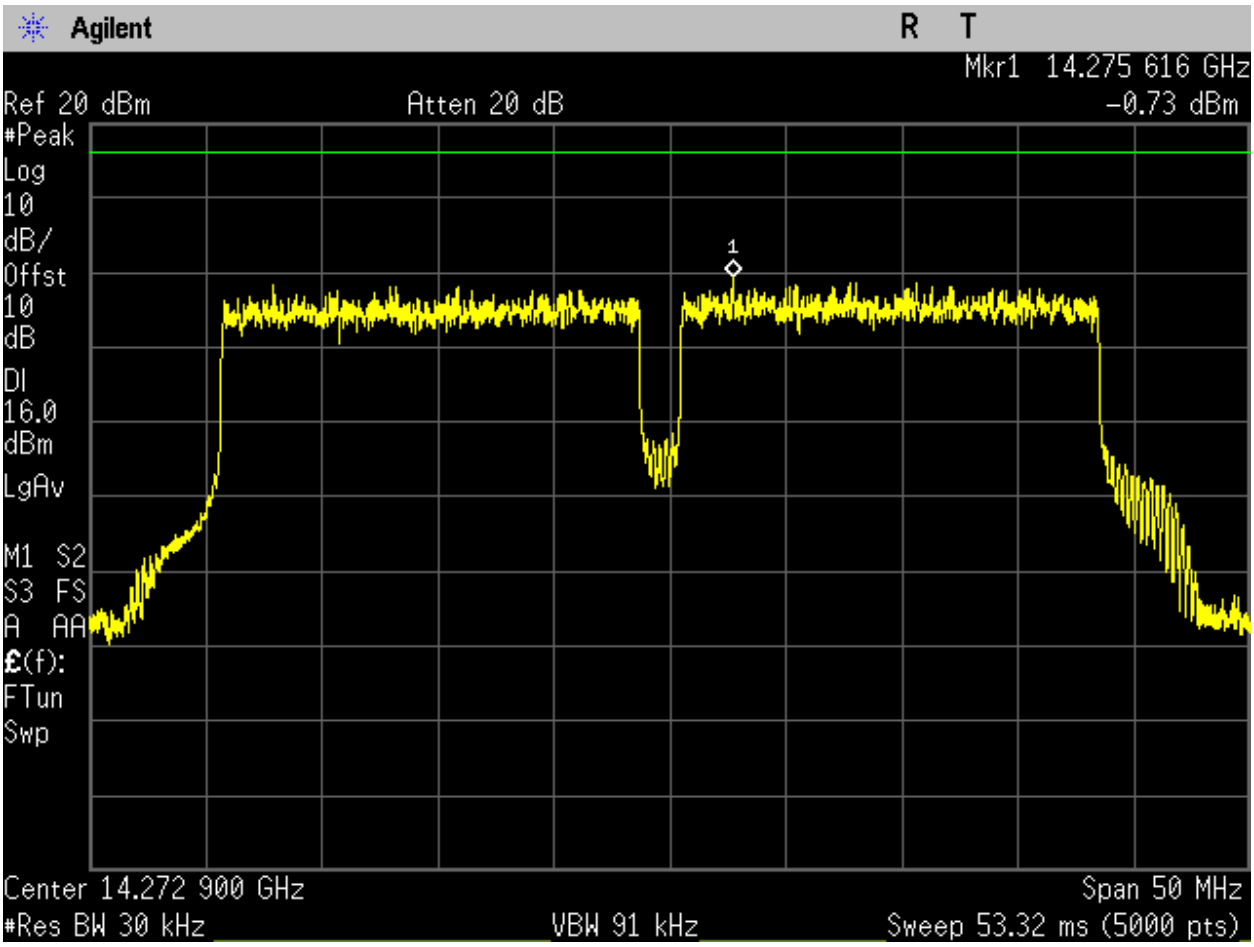

Figure 64. EIRP PSD_QPSK_40MHz_Mid Channel, 14.2729GHz (PreScan).

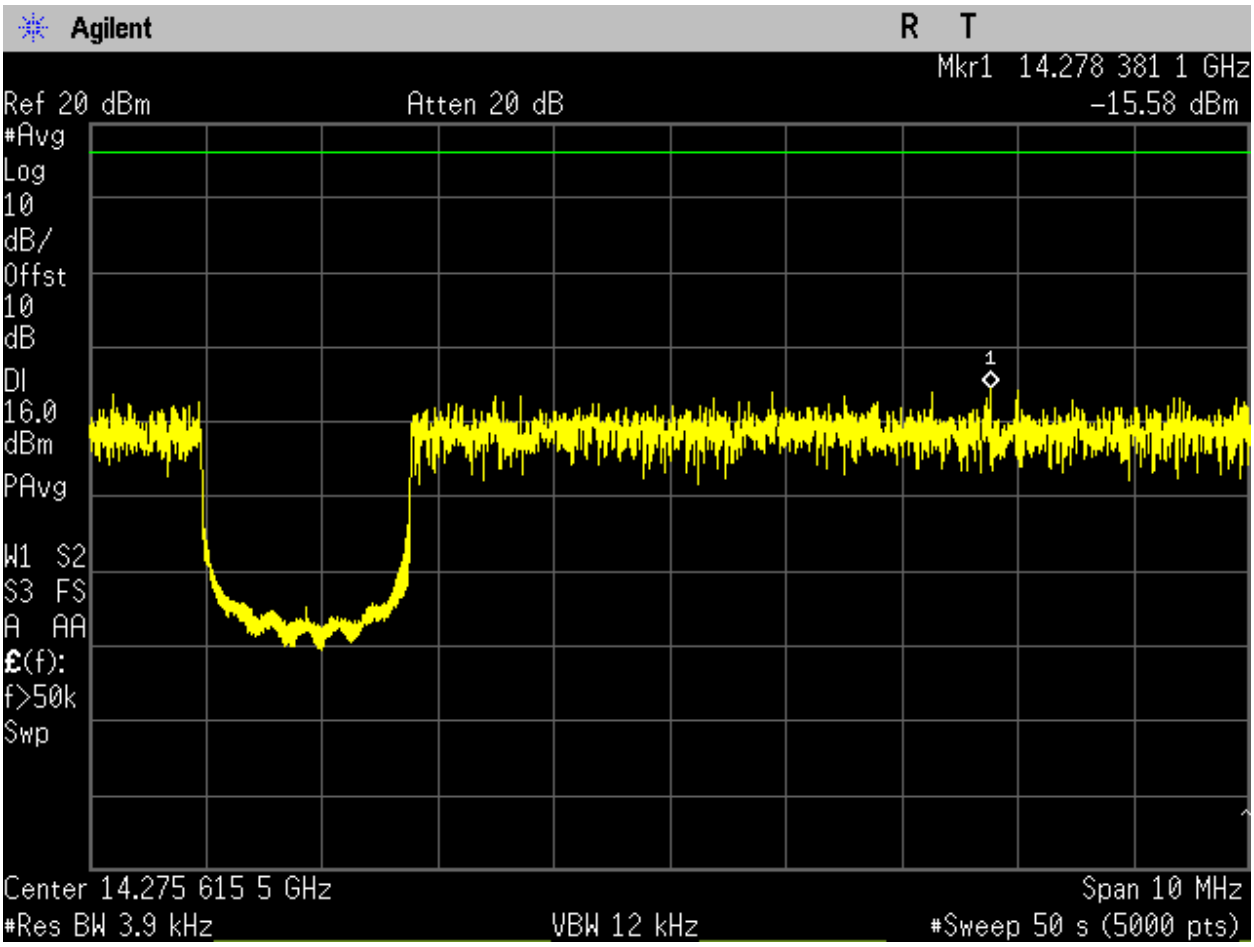

Figure 65. EIRP PSD_QPSK_40MHz_Mid Channel, 14.2729GHz (Final).

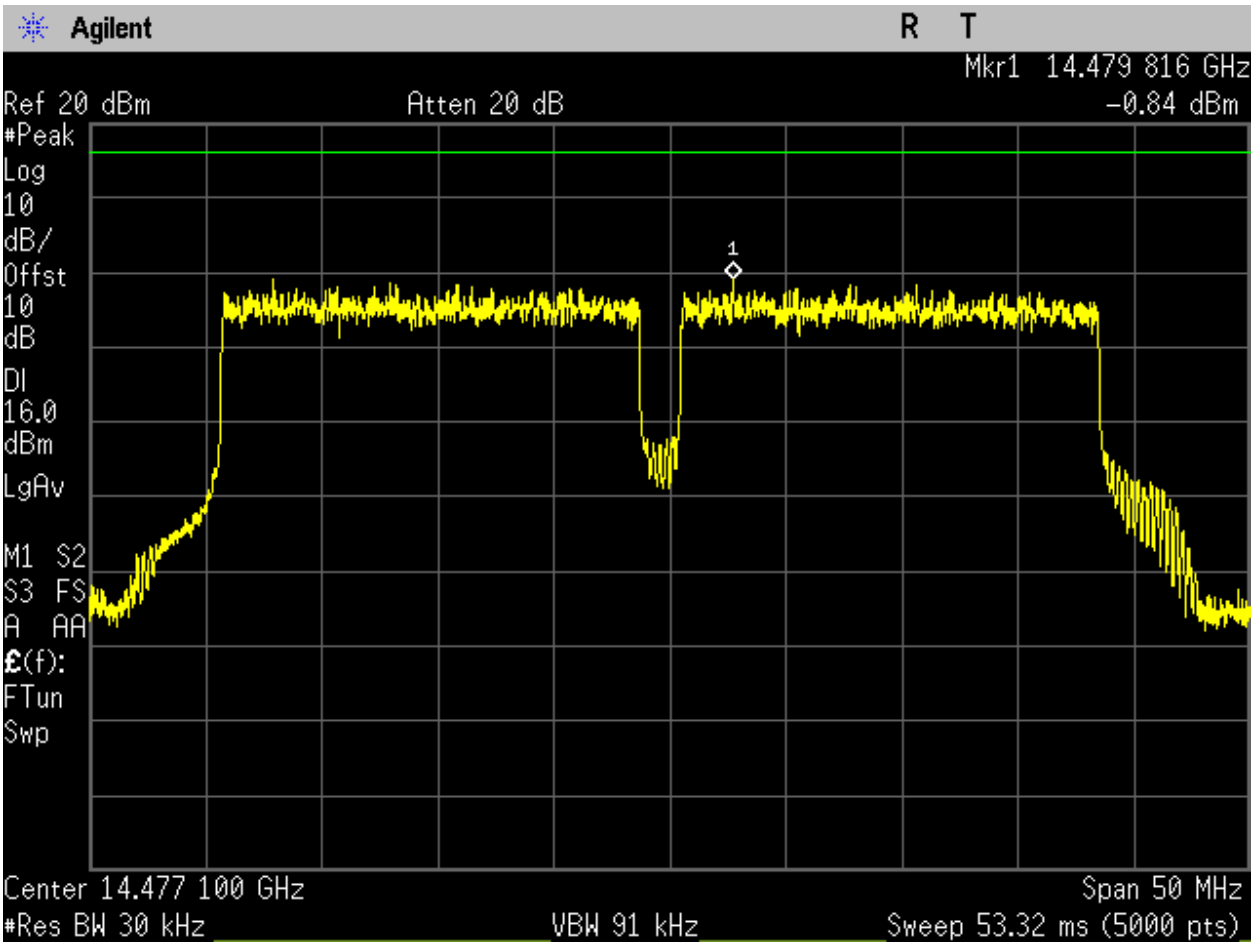

Figure 66. EIRP PSD_QPSK_40MHz_High Channel, 14.4771GHz (PreScan).

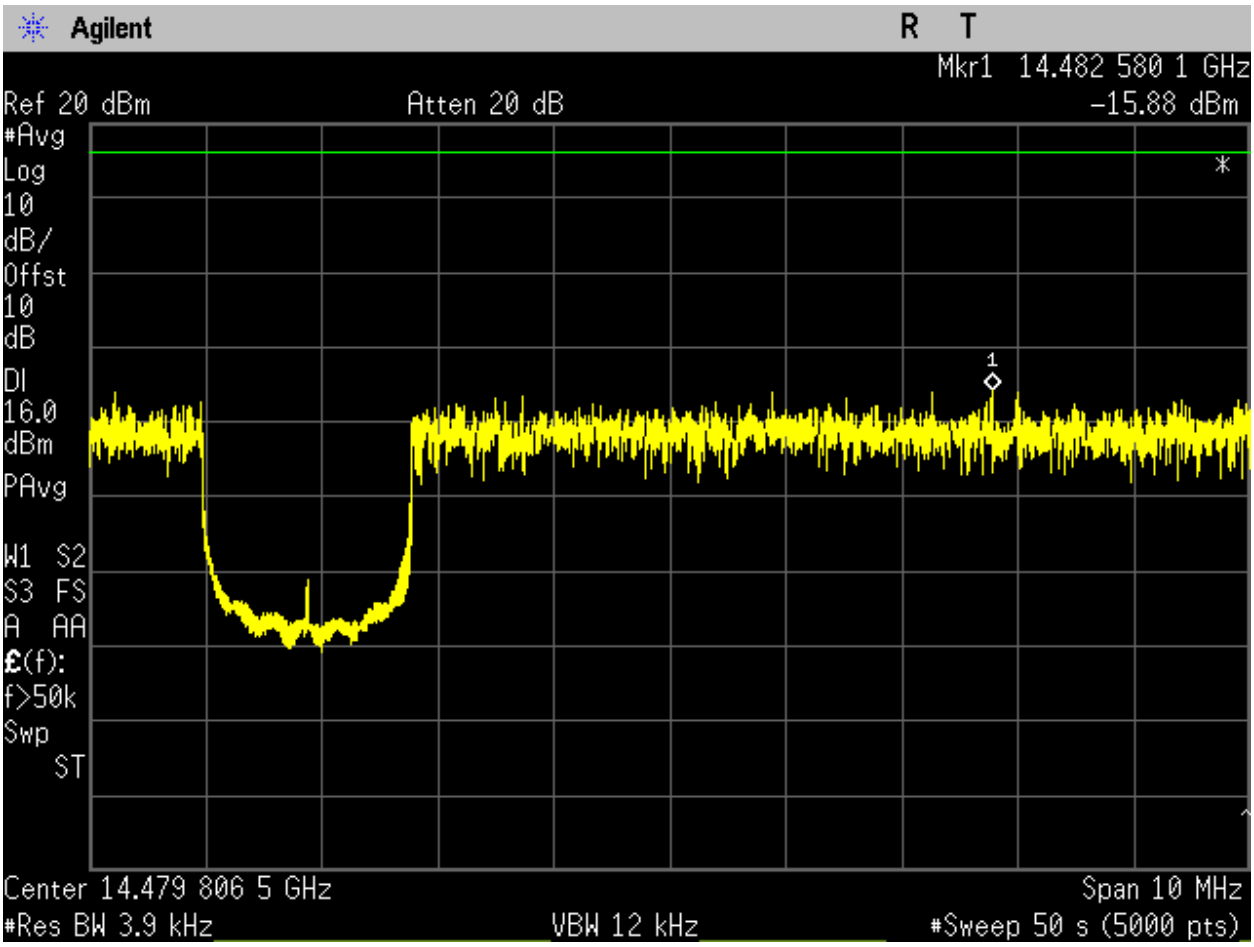

Figure 67. EIRP PSD_QPSK_40MHz_High Channel, 14.4771GHz (Final).

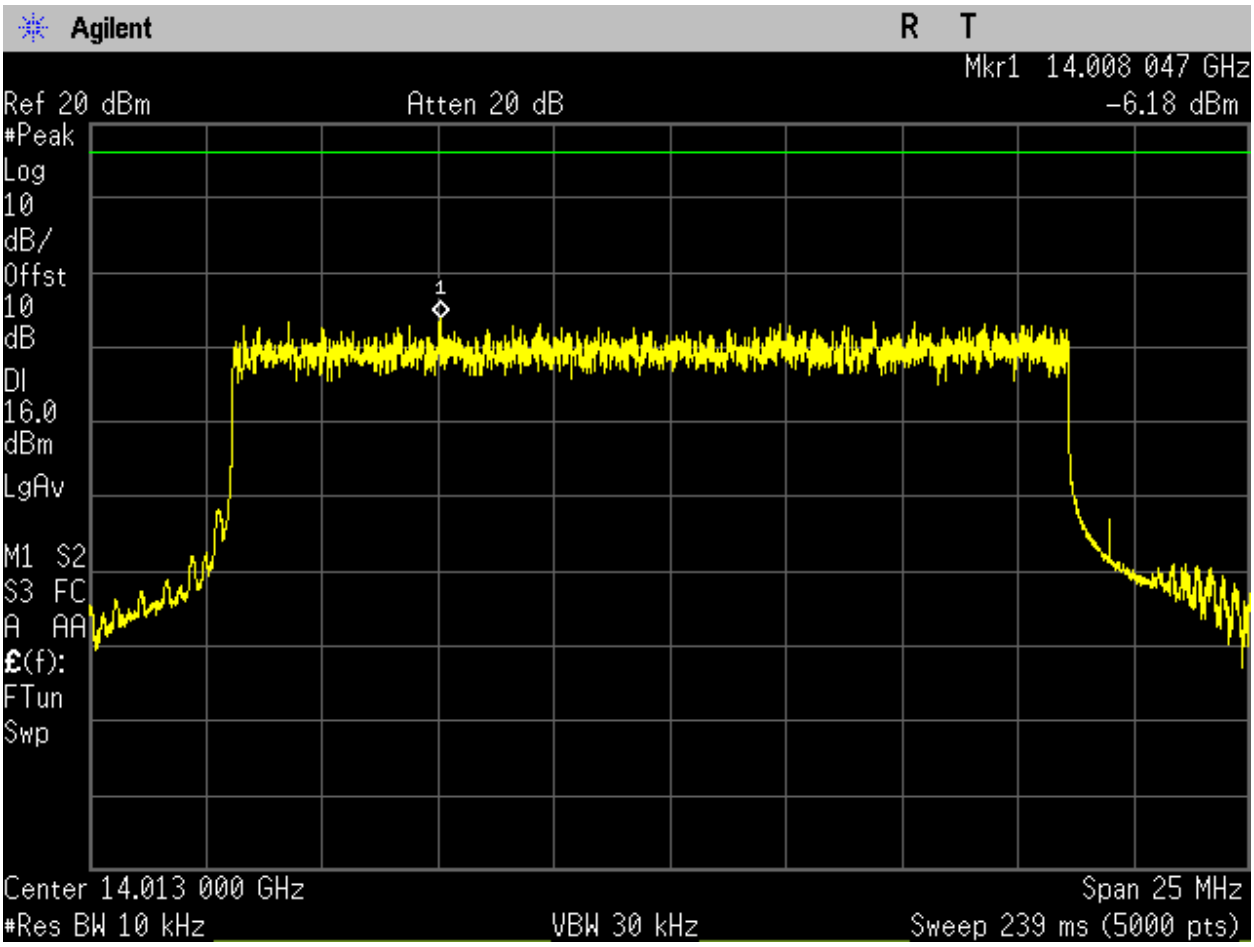

Figure 68. EIRP PSD_8PSK_20MHz_Low Channel, 14.013GHz (PreScan).

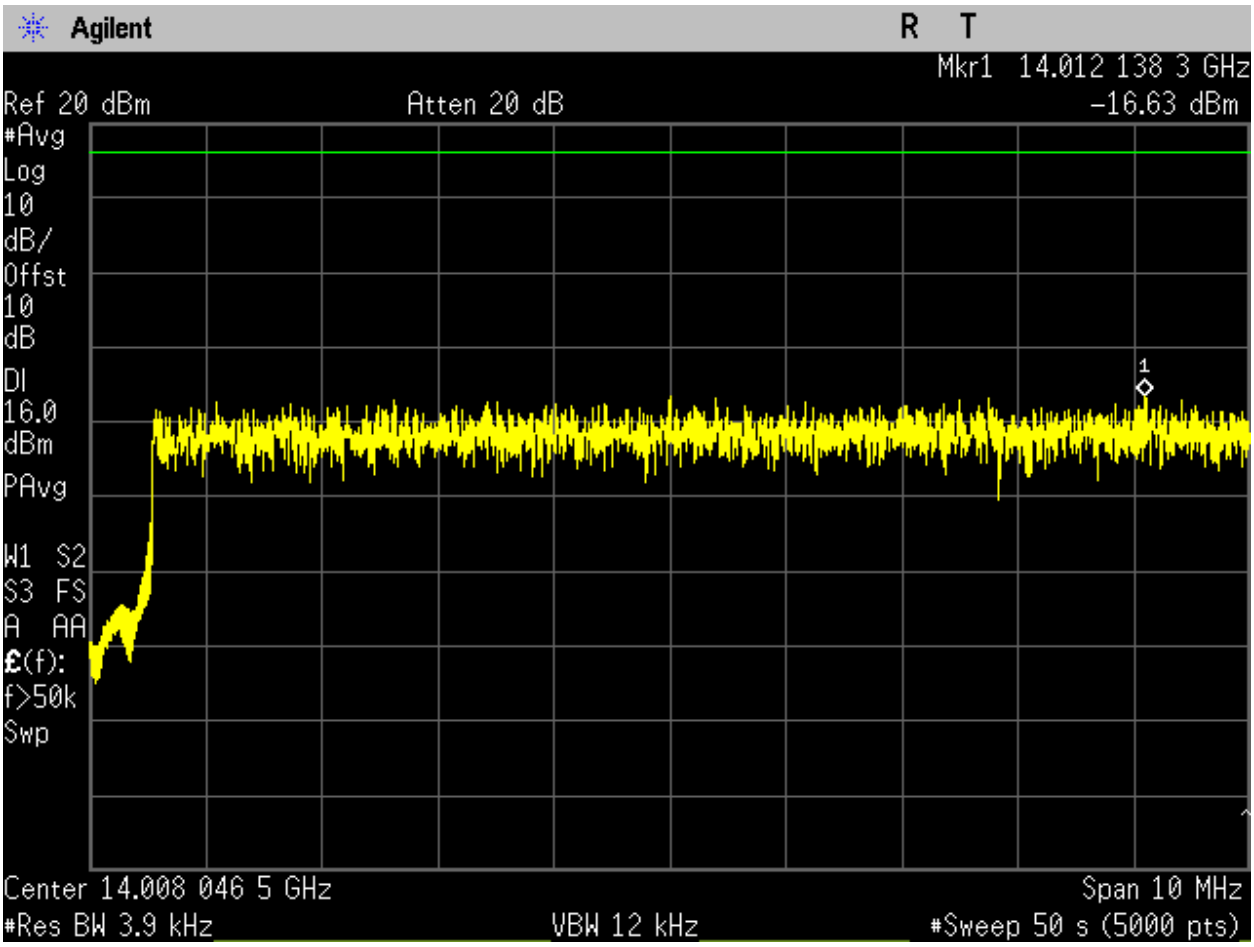

Figure 69. EIRP PSD_8PSK_20MHz_Low Channel, 14.013GHz (Final).

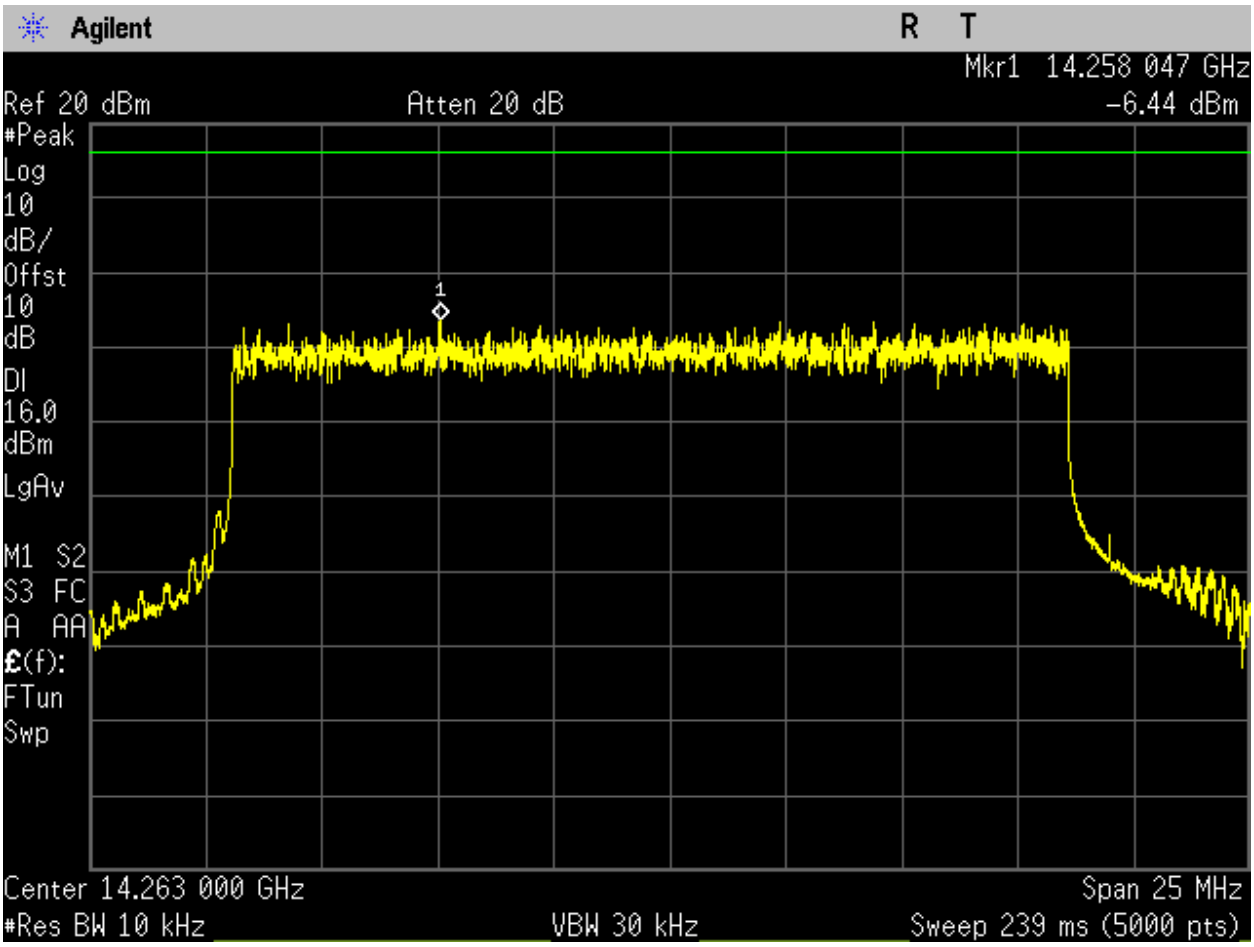

Figure 70. EIRP PSD_8PSK_20MHz_Mid Channel, 14.263GHz (PreScan).

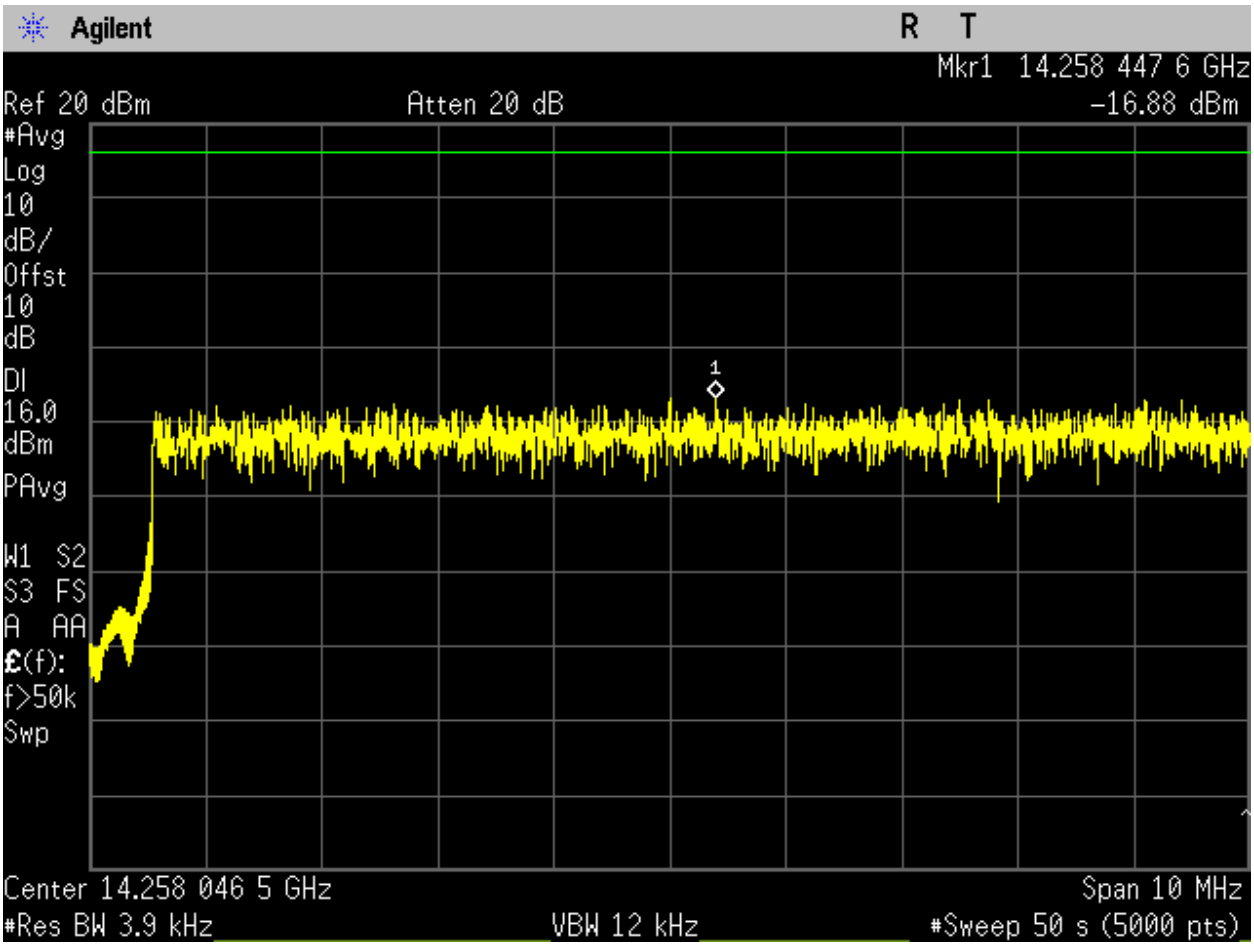

Figure 71. EIRP PSD_8PSK_20MHz_Mid Channel, 14.263GHz (Final).

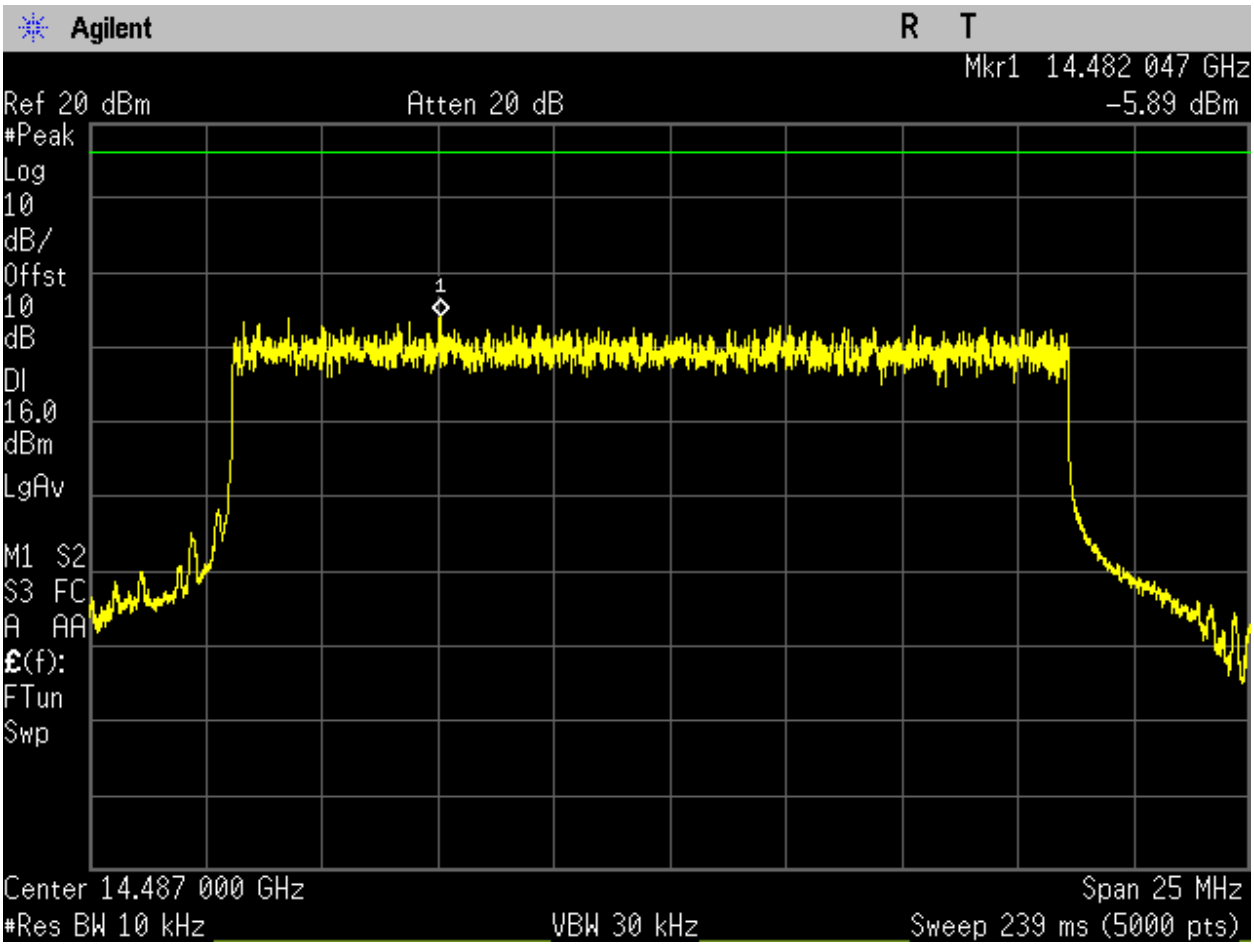

Figure 72. EIRP PSD_8PSK_20MHz_High Channel, 14.487GHz (PreScan).

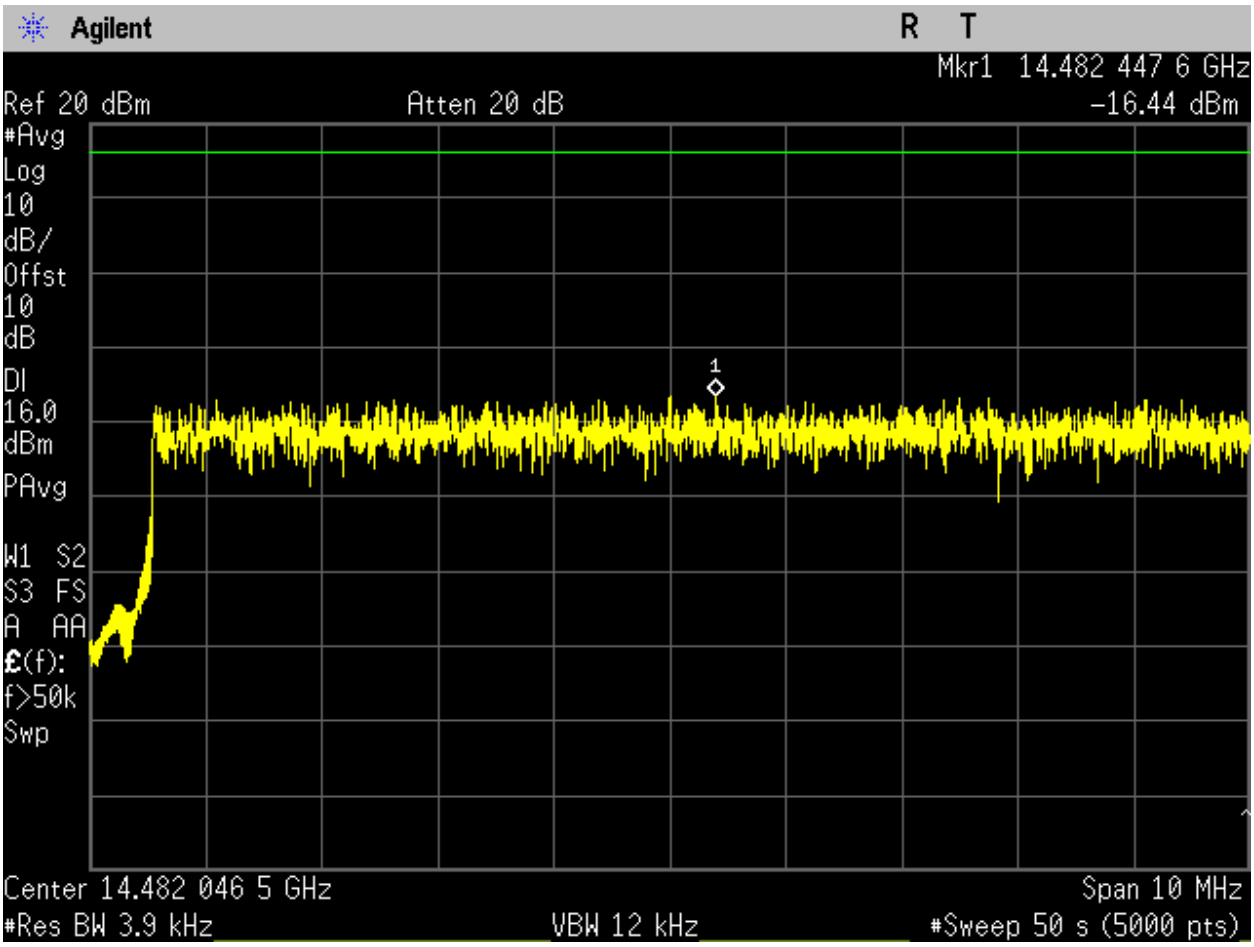

Figure 73. EIRP PSD_8PSK_20MHz_High Channel, 14.487GHz (Final).

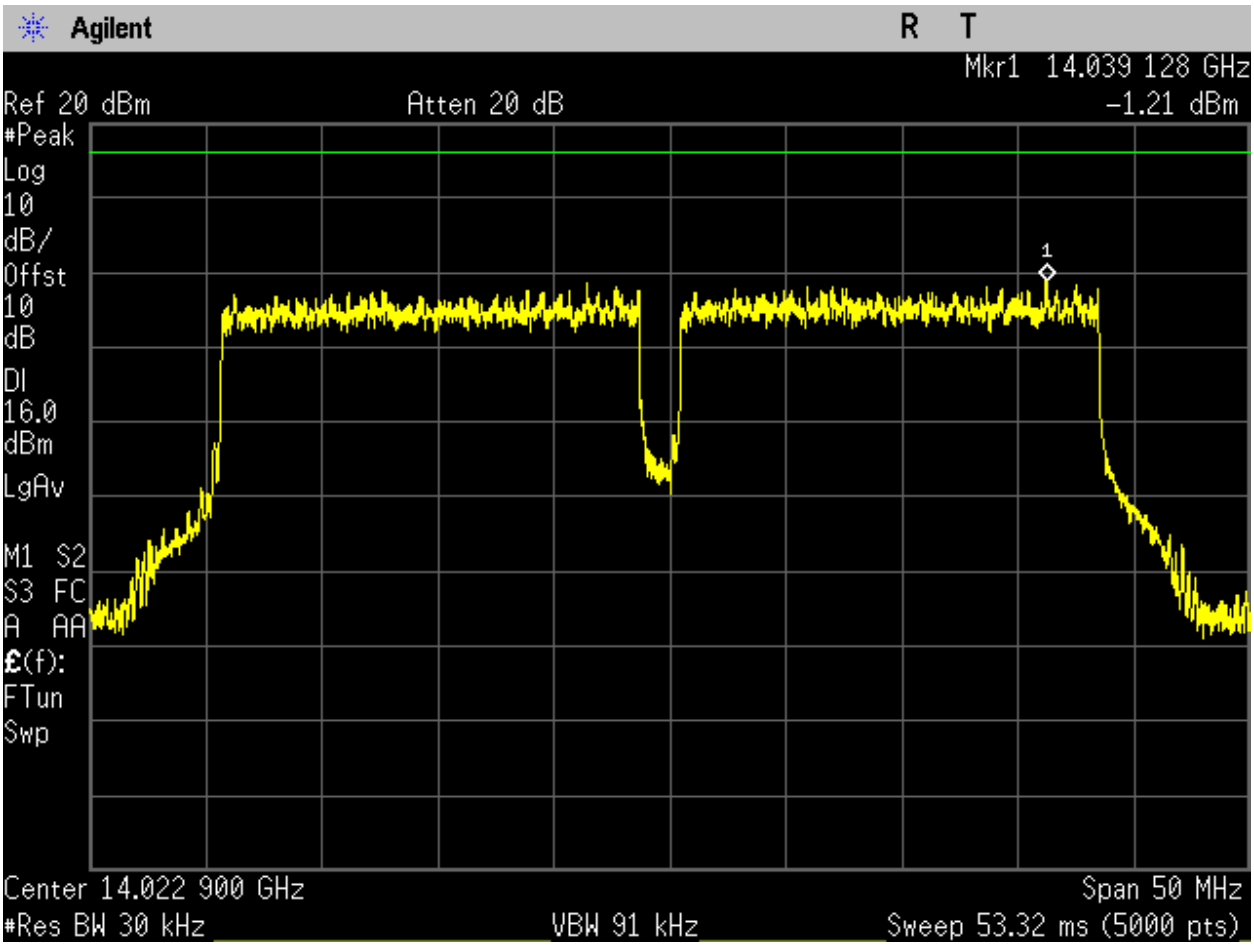

Figure 74. EIRP PSD_8PSK_40MHz_Low Channel, 14.0229GHz (PreScan).

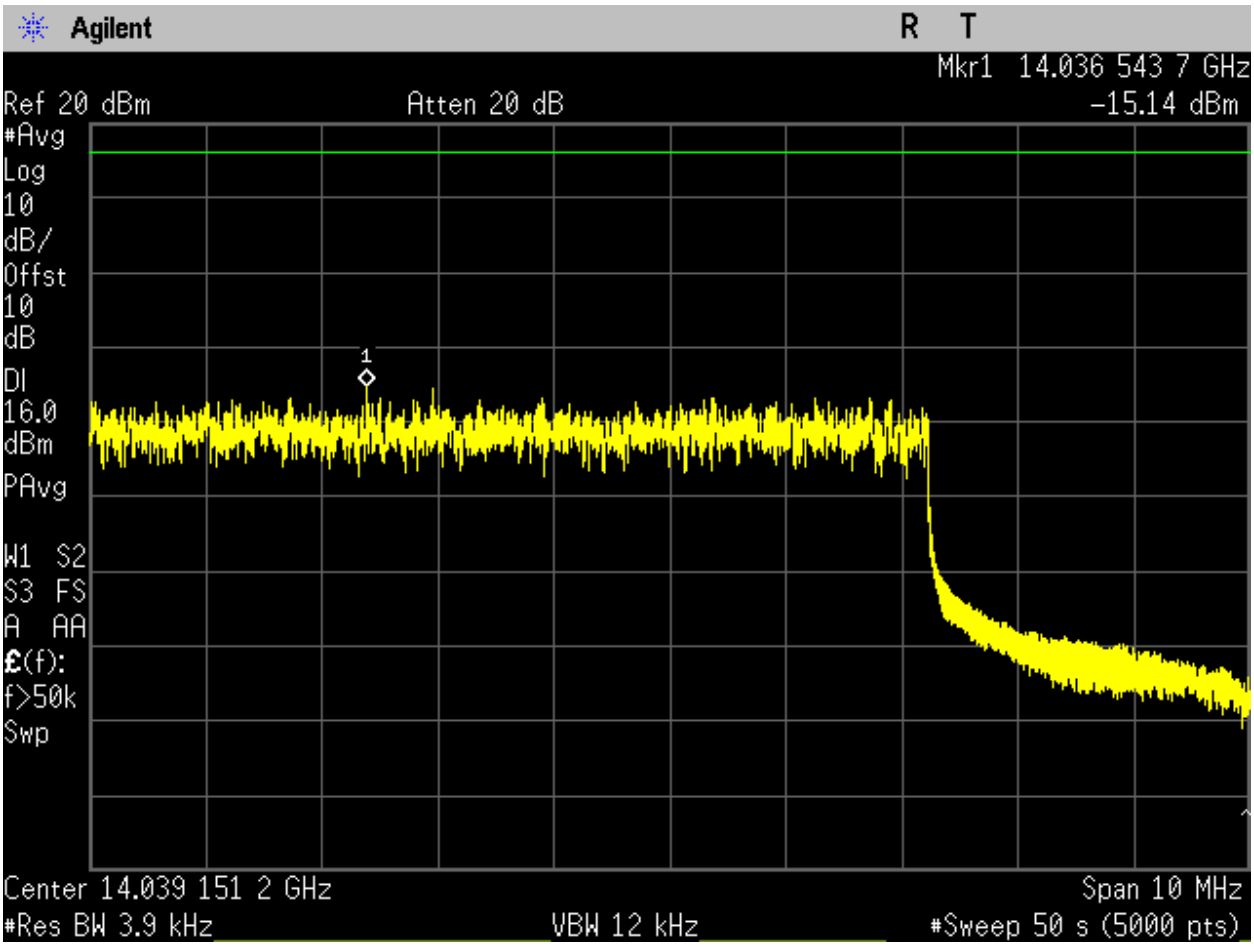

Figure 75. EIRP PSD_8PSK_40MHz_Low Channel, 14.0229GHz (Final).

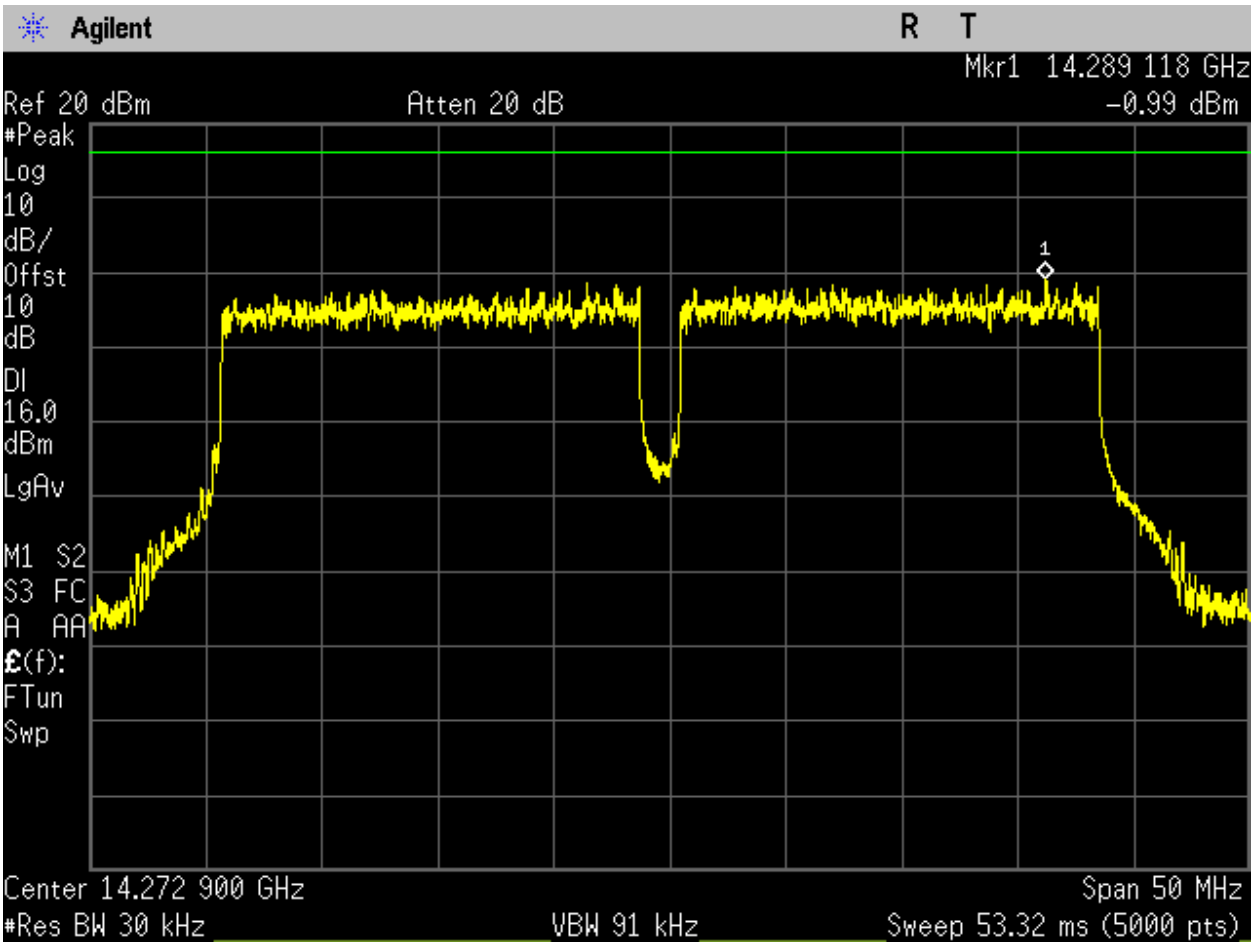

Figure 76. EIRP PSD_8PSK_40MHz_Mid Channel, 14.2729GHz (PreScan).

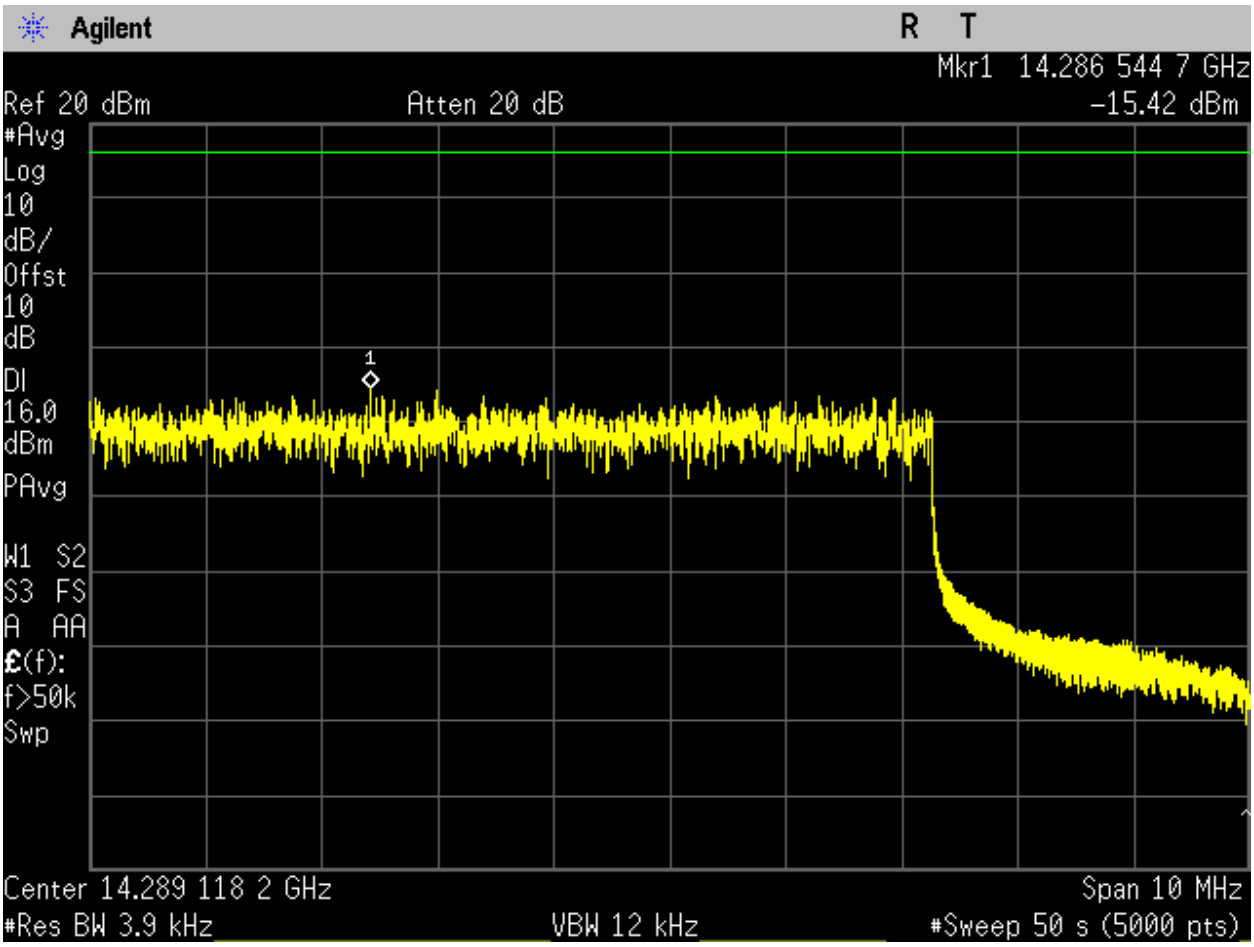

Figure 77. EIRP PSD_8PSK_40MHz_Mid Channel, 14.2729GHz (Final).

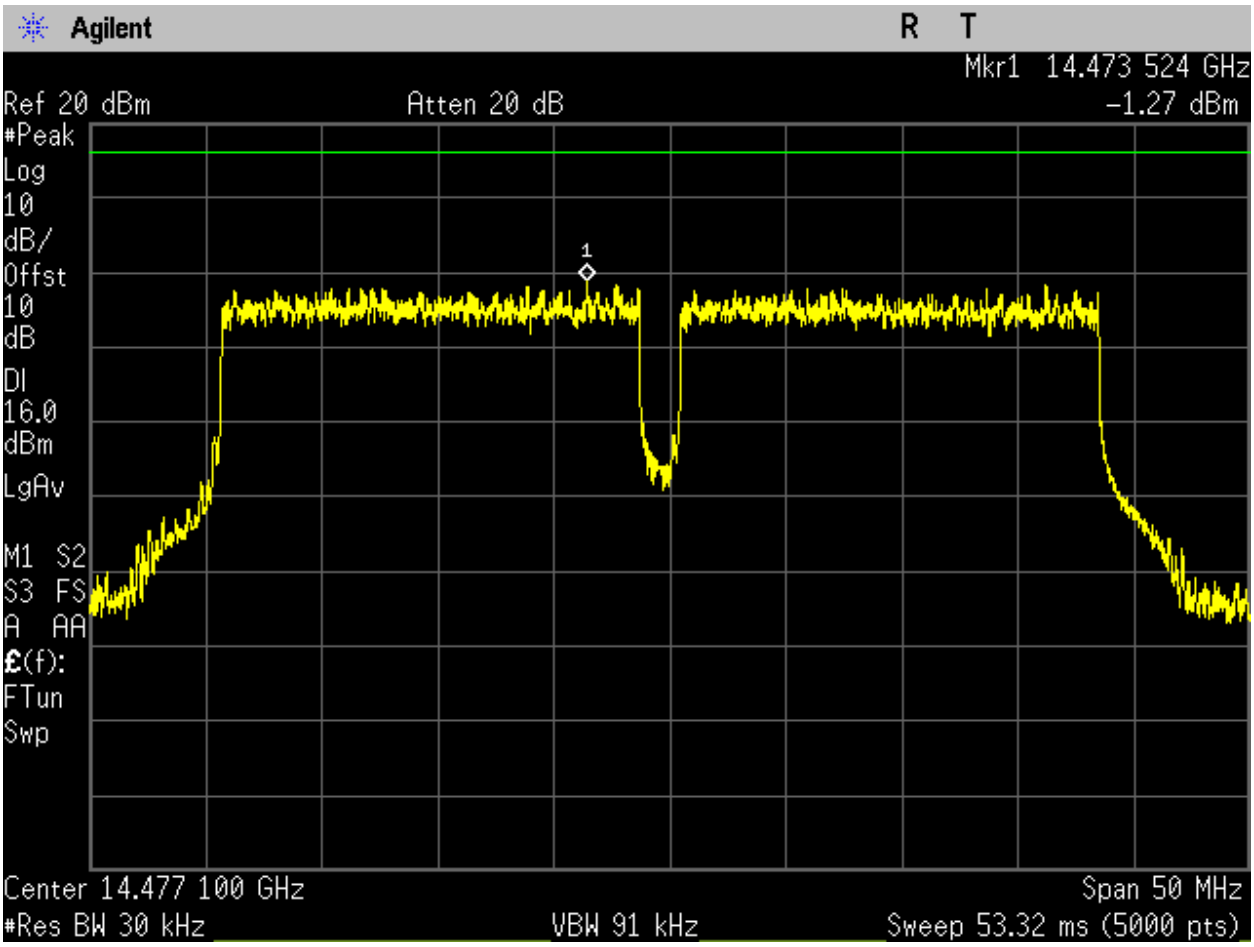

Figure 78. EIRP PSD_8PSK_40MHz_High Channel, 14.4771GHz (PreScan).

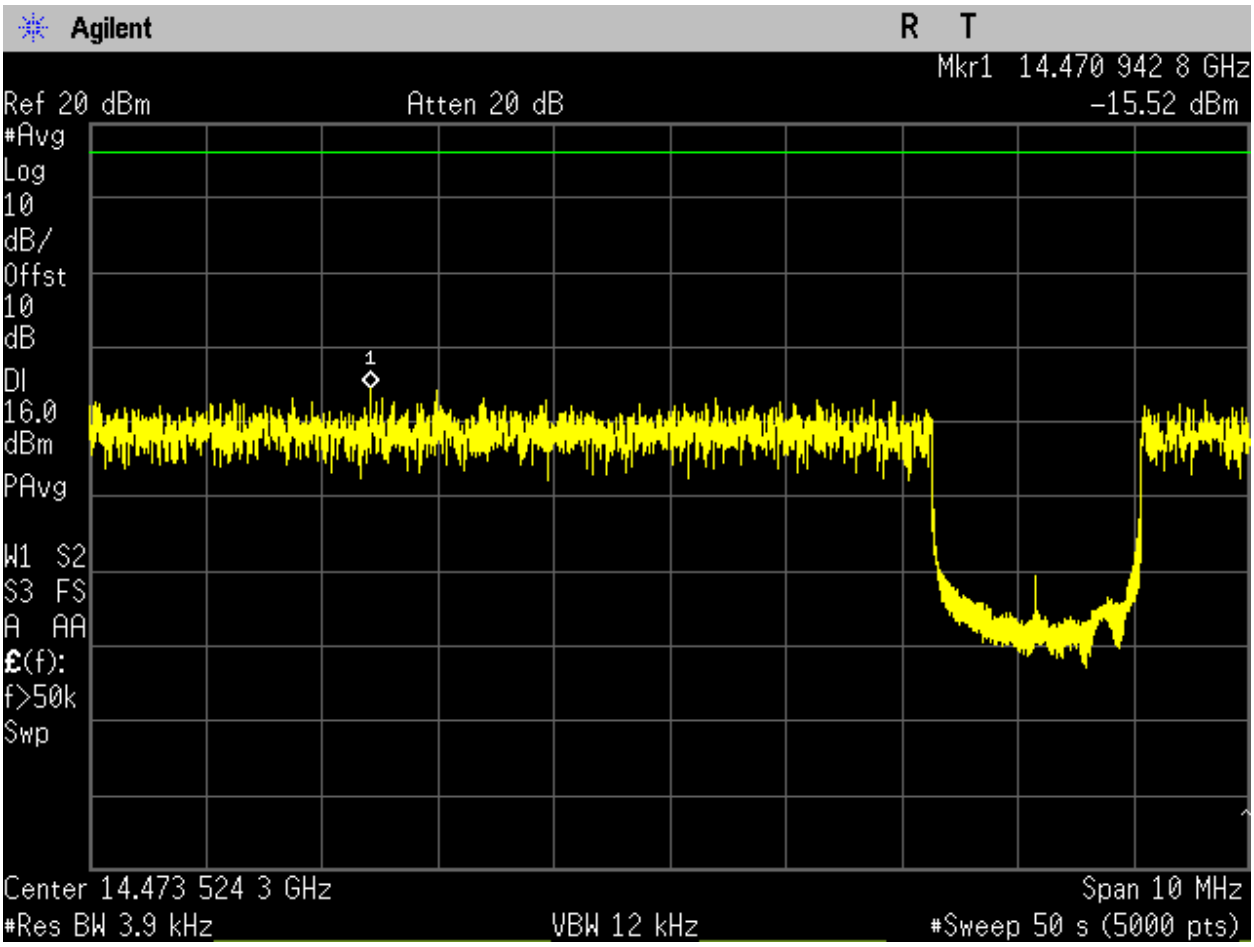

Figure 79. EIRP PSD_8PSK_40MHz_High Channel, 14.4771GHz (Final).

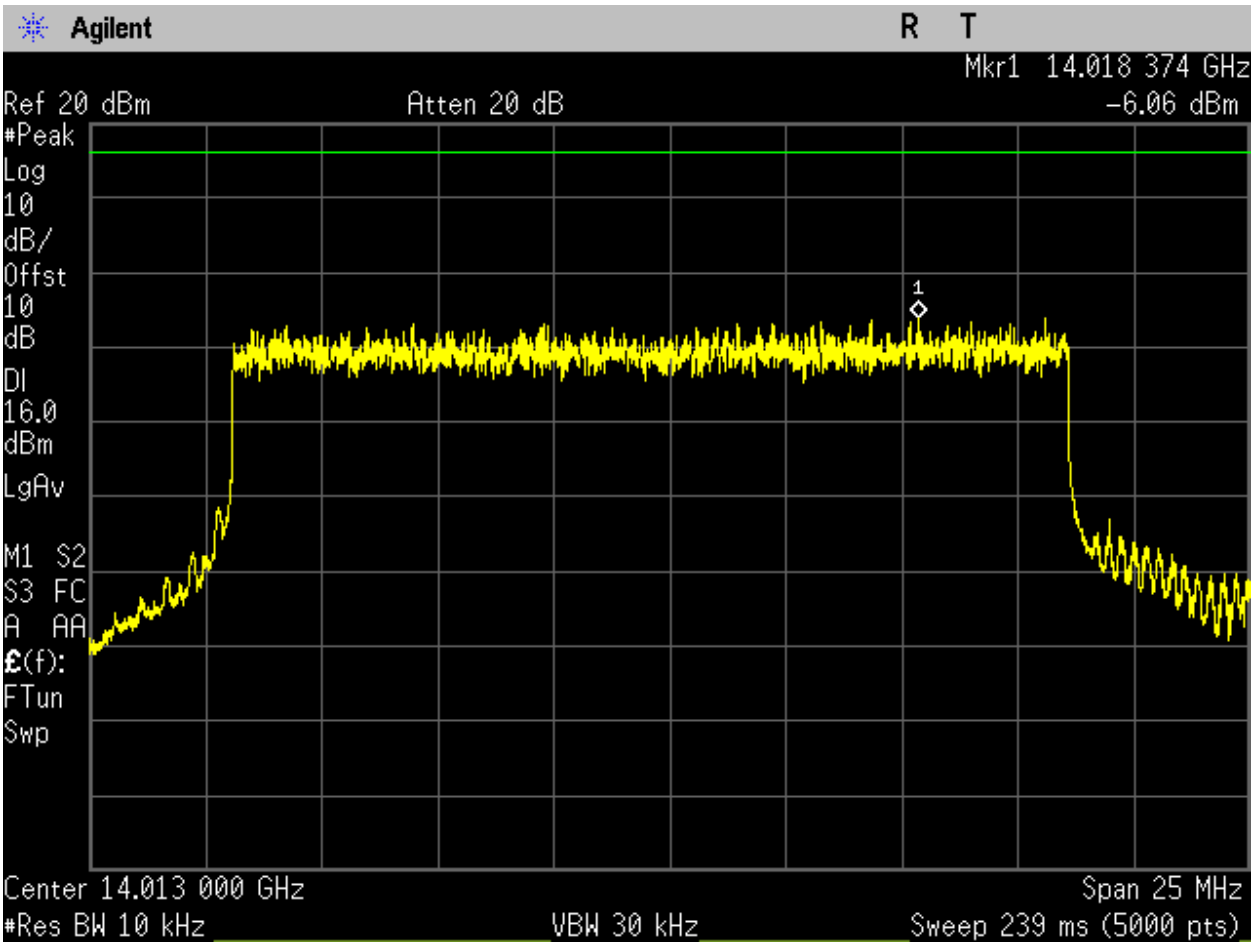

Figure 80. EIRP PSD_16QAM_20MHz_Low Channel, 14.013GHz (PreScan).

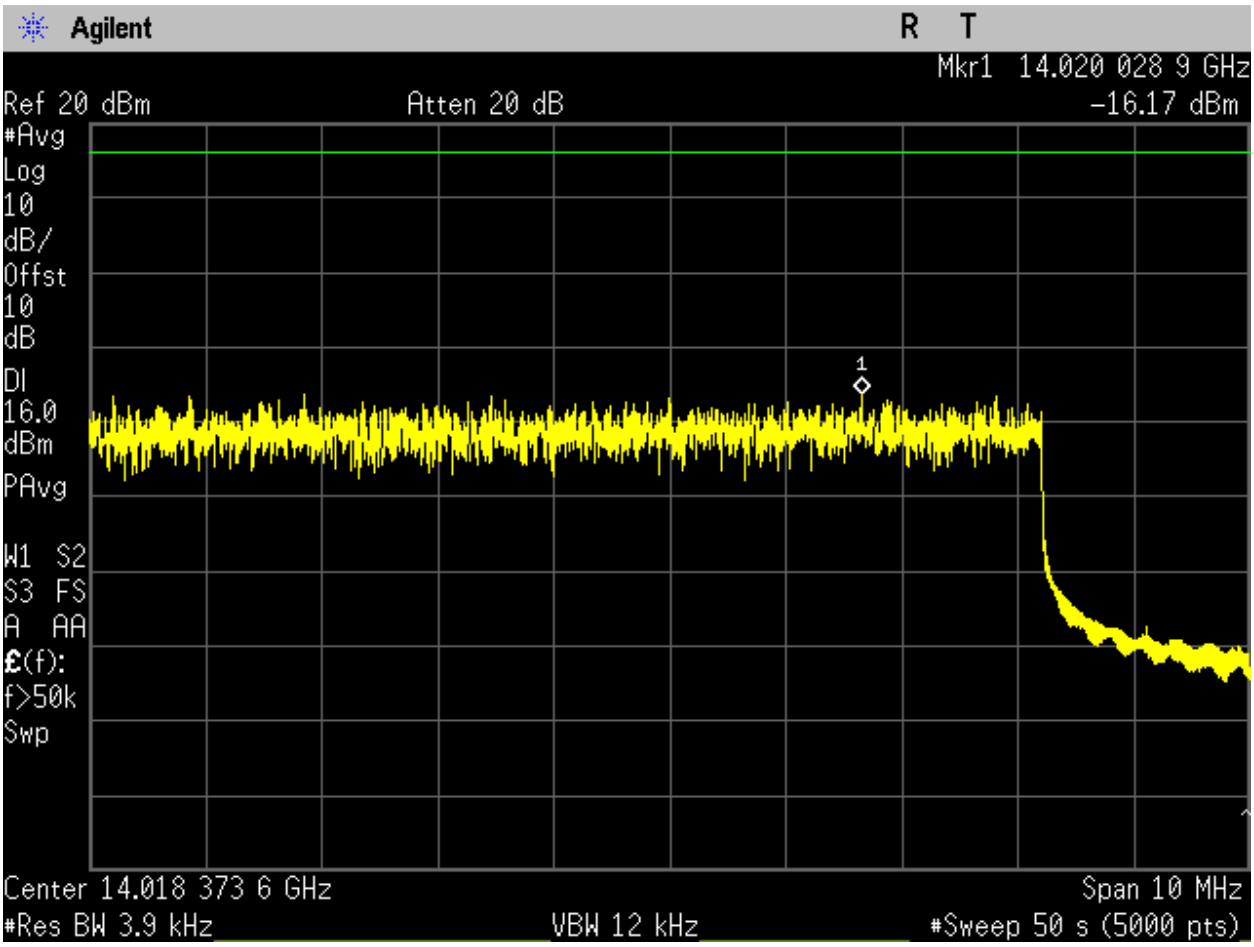

Figure 81. EIRP PSD_16QAM_20MHz_Low Channel, 14.013GHz (Final).

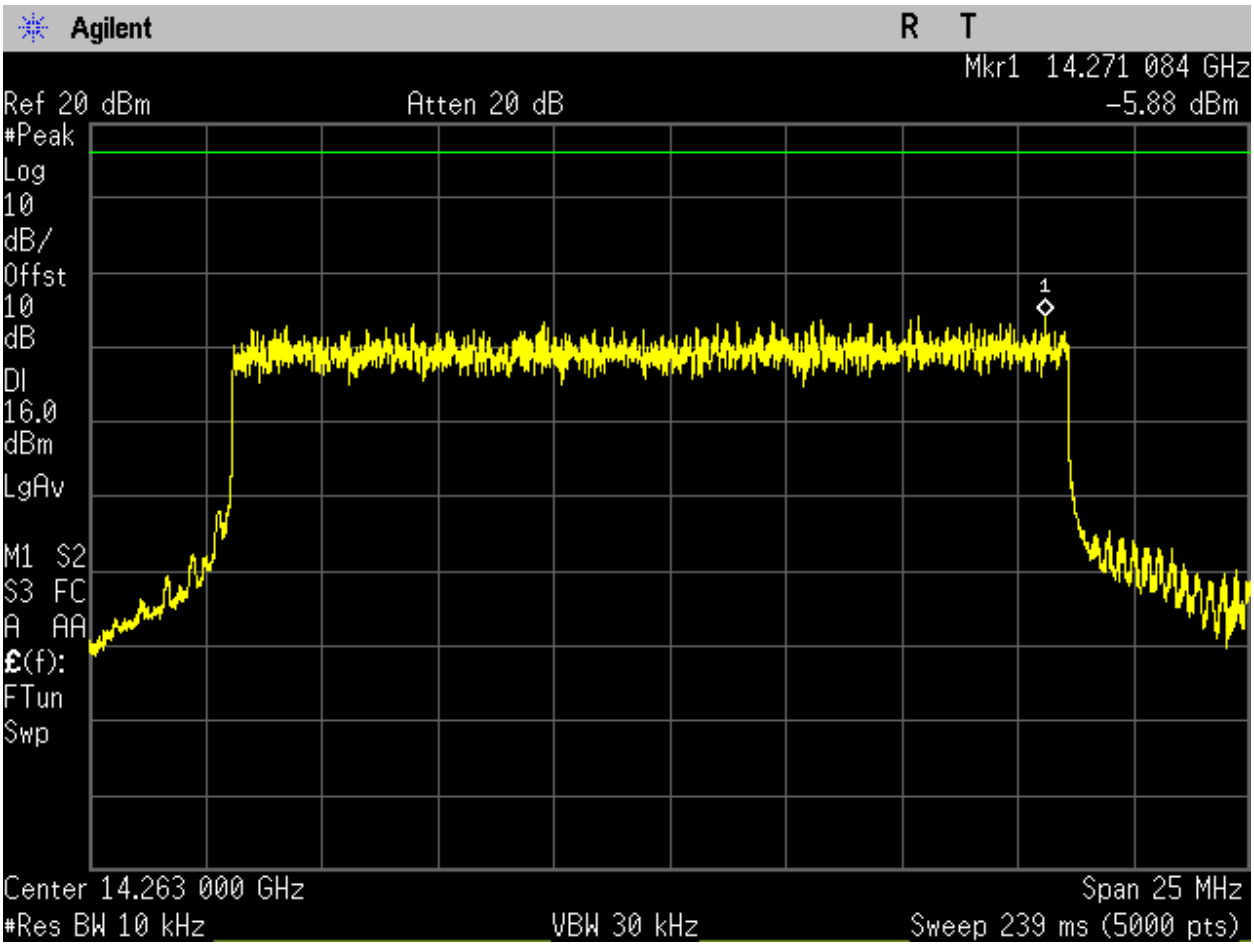

Figure 82. EIRP PSD_16QAM_20MHz_Mid Channel, 14.263GHz (PreScan).

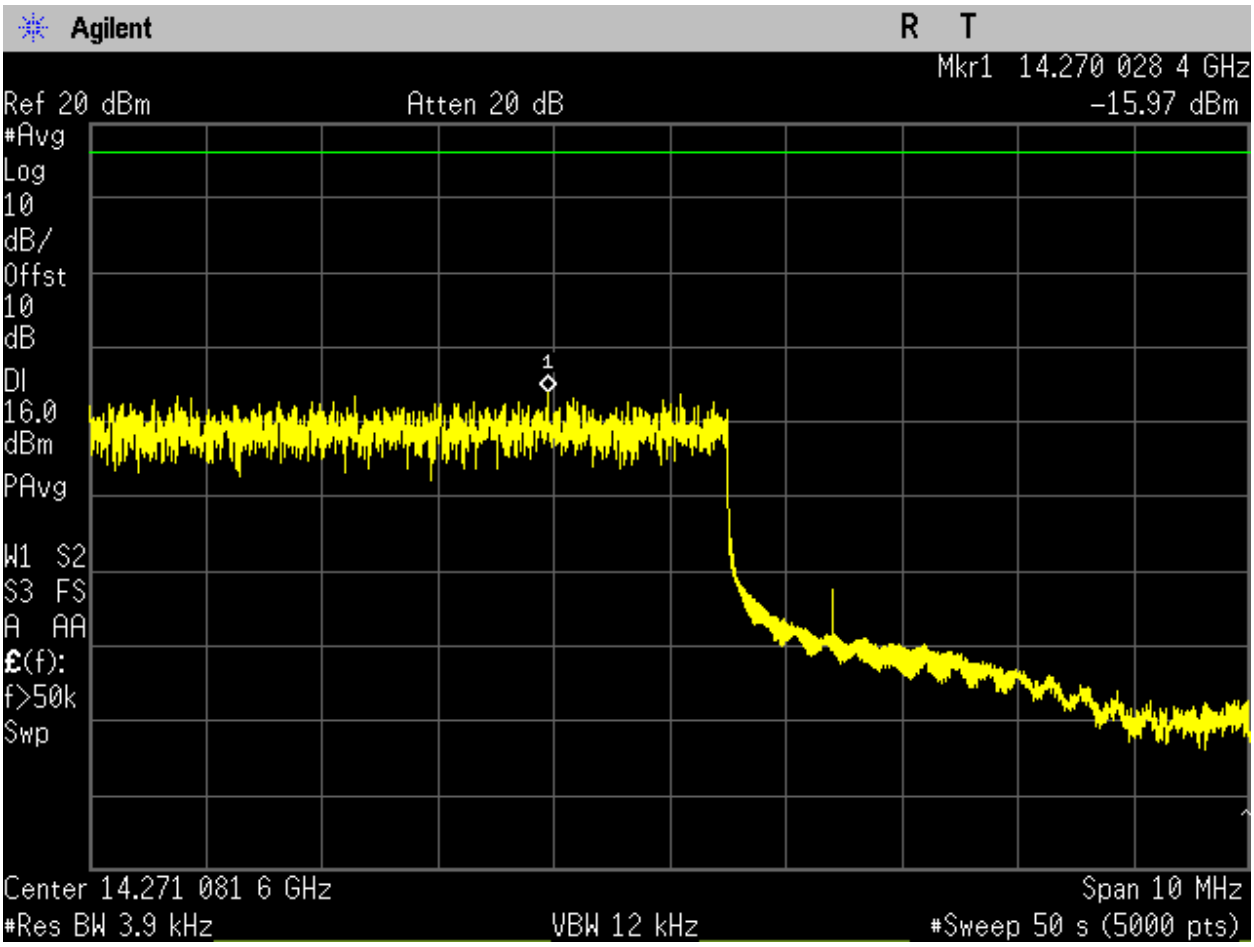

Figure 83. EIRP PSD_16QAM_20MHz_Mid Channel, 14.263GHz (Final).

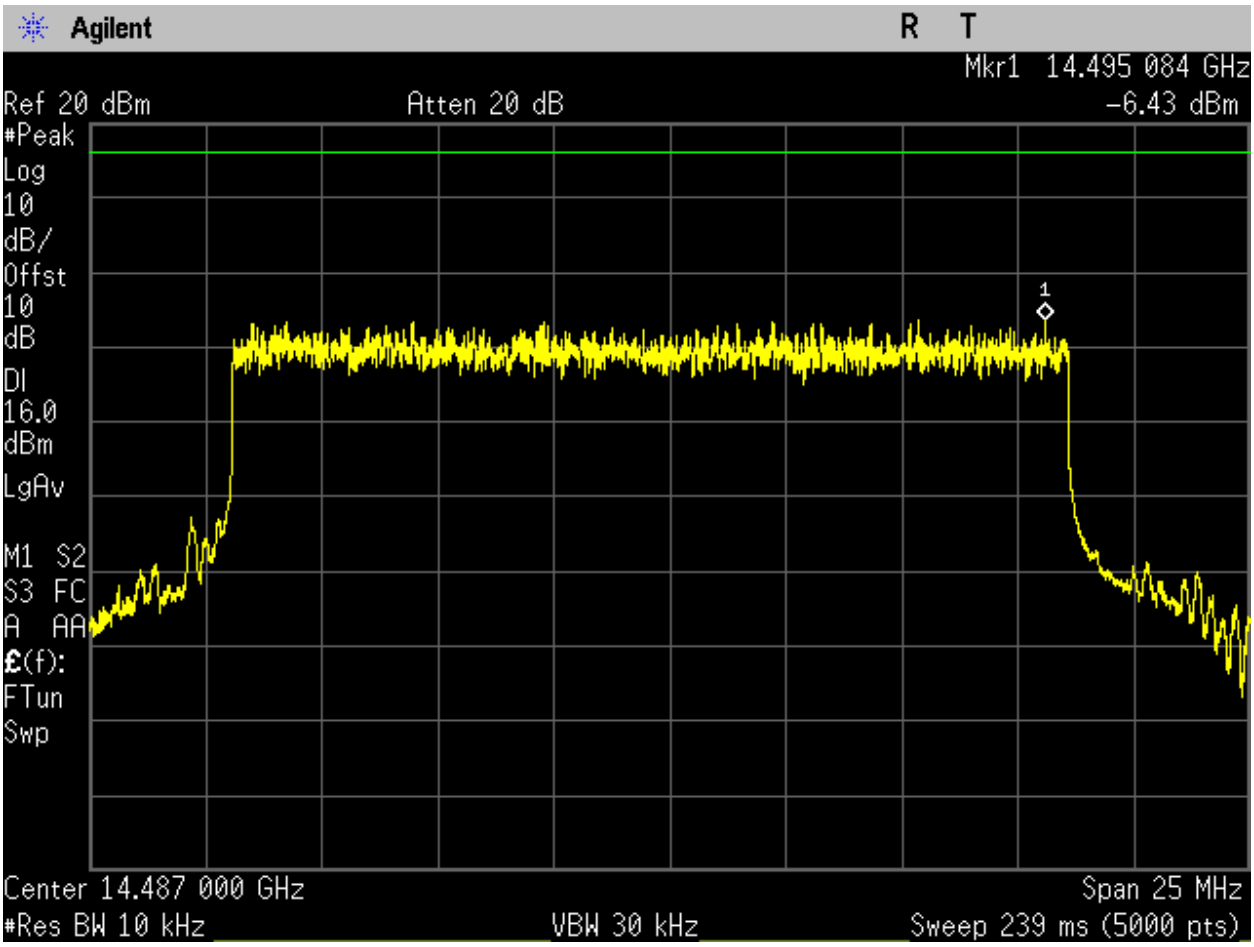

Figure 84. EIRP PSD_16QAM_20MHz_High Channel, 14.487GHz (PreScan).

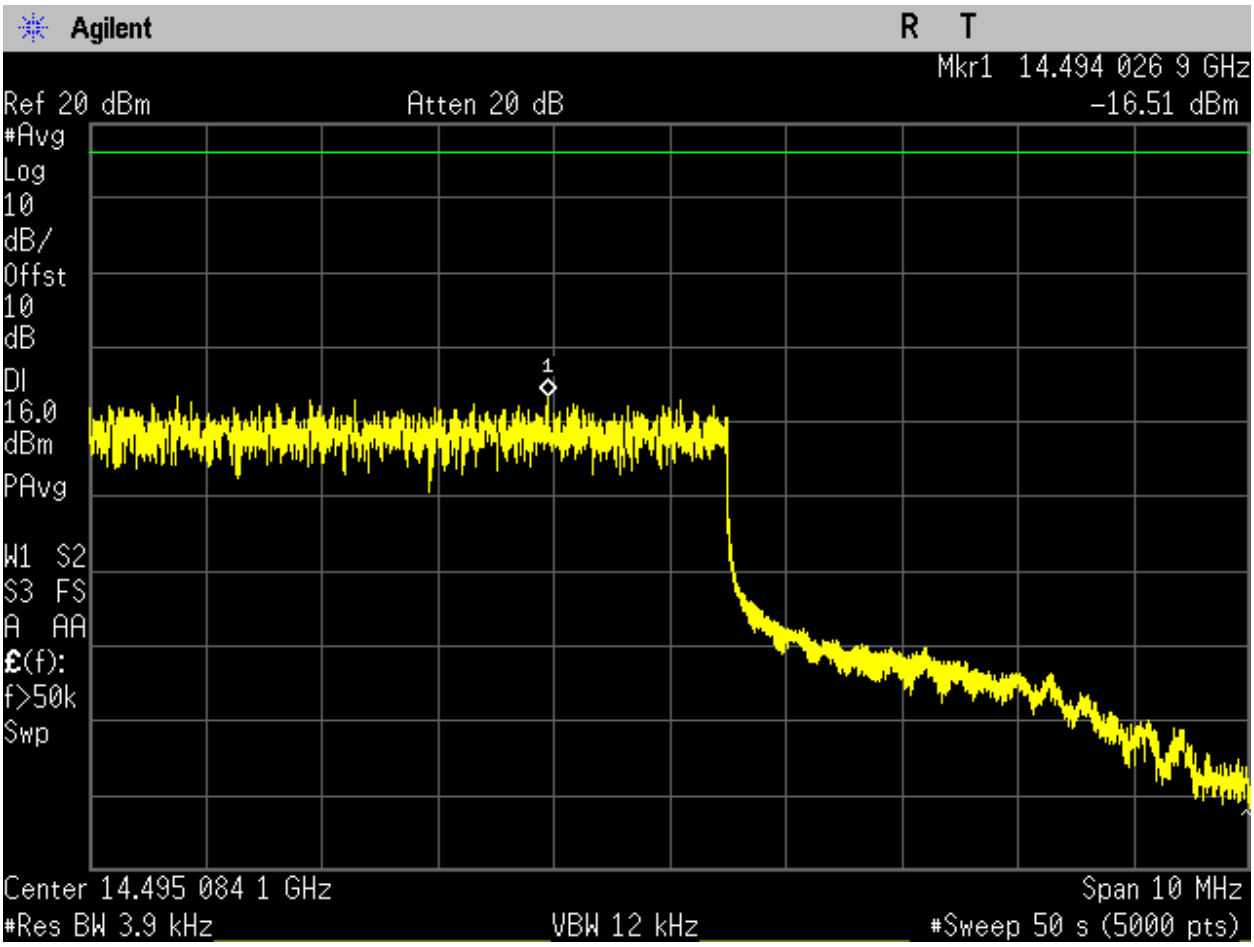

Figure 85. EIRP PSD_16QAM_20MHz_High Channel, 14.487GHz (Final).

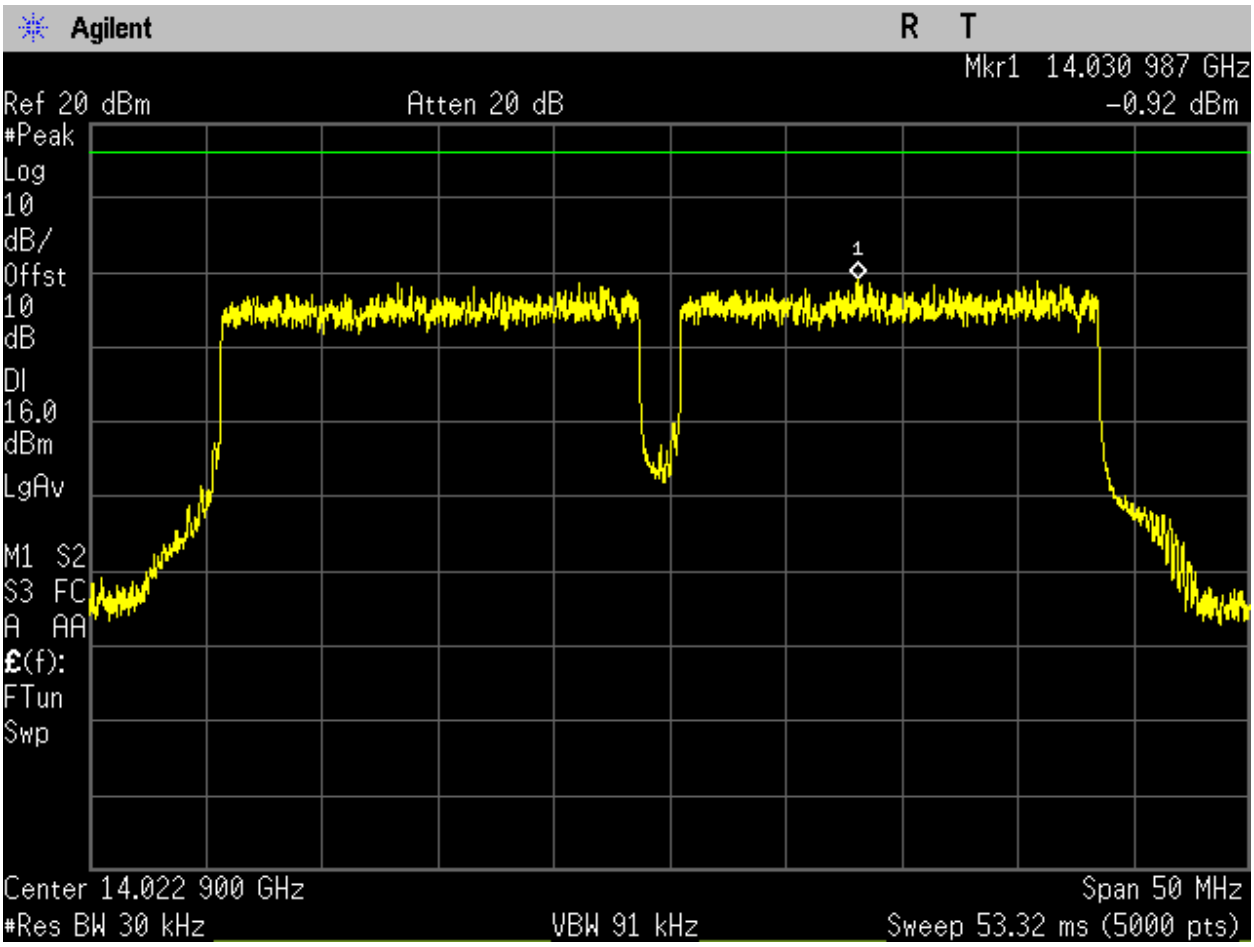

Figure 86. EIRP PSD_16QAM_40MHz_Low Channel, 14.0229GHz (PreScan).

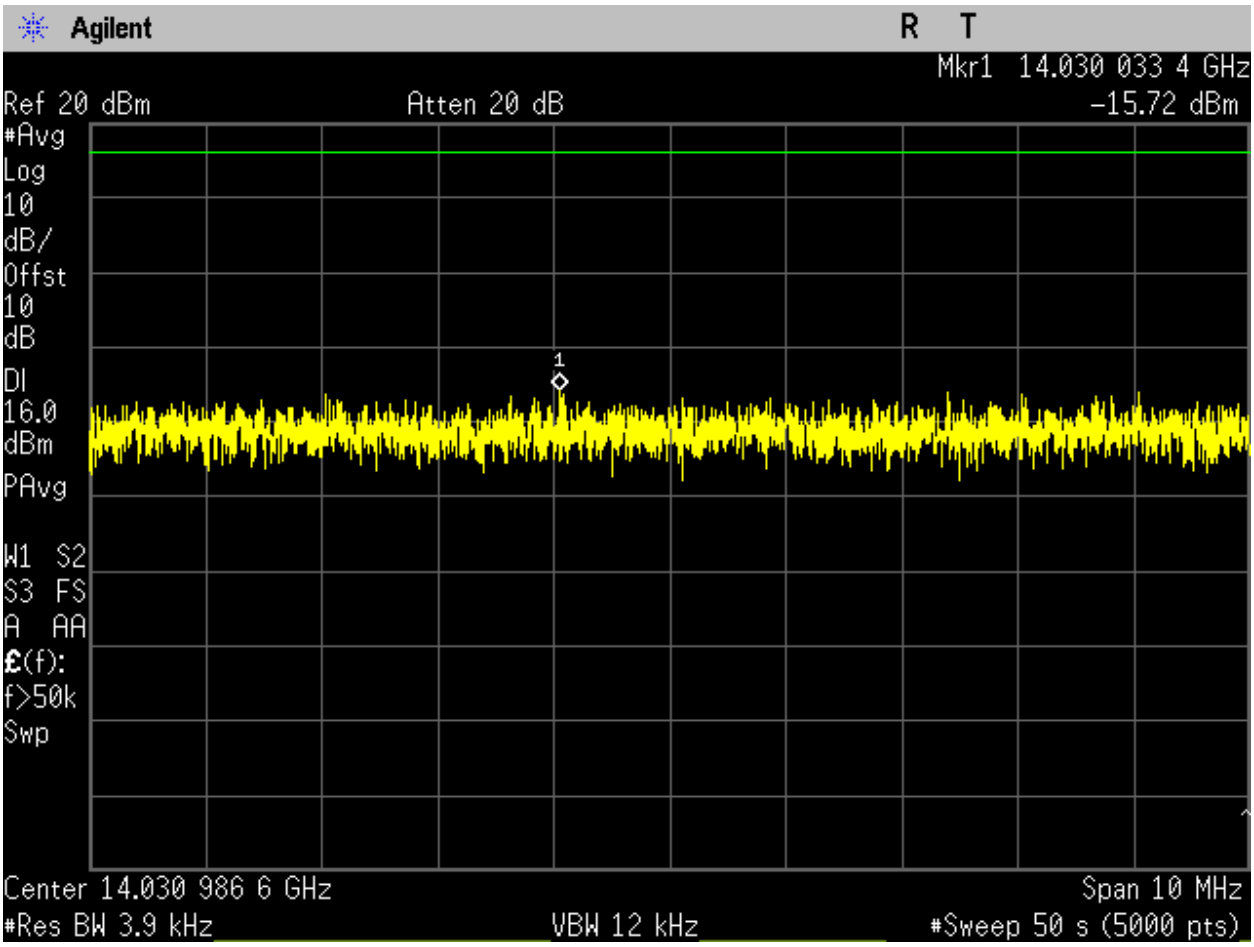

Figure 87. EIRP PSD_16QAM_40MHz_Low Channel, 14.0229GHz (Final).

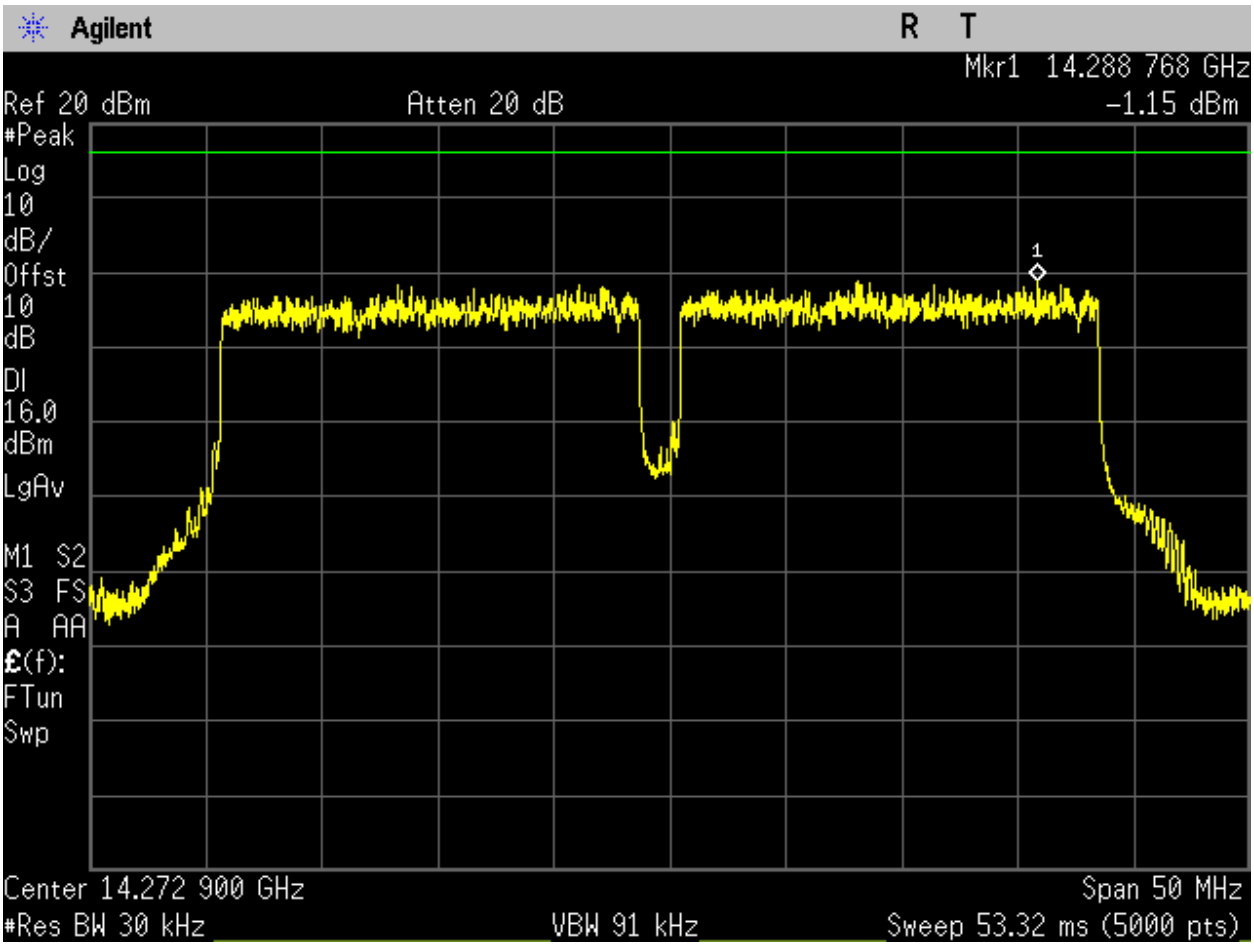

Figure 88. EIRP PSD_16QAM_40MHz_Mid Channel, 14.2729GHz (PreScan).

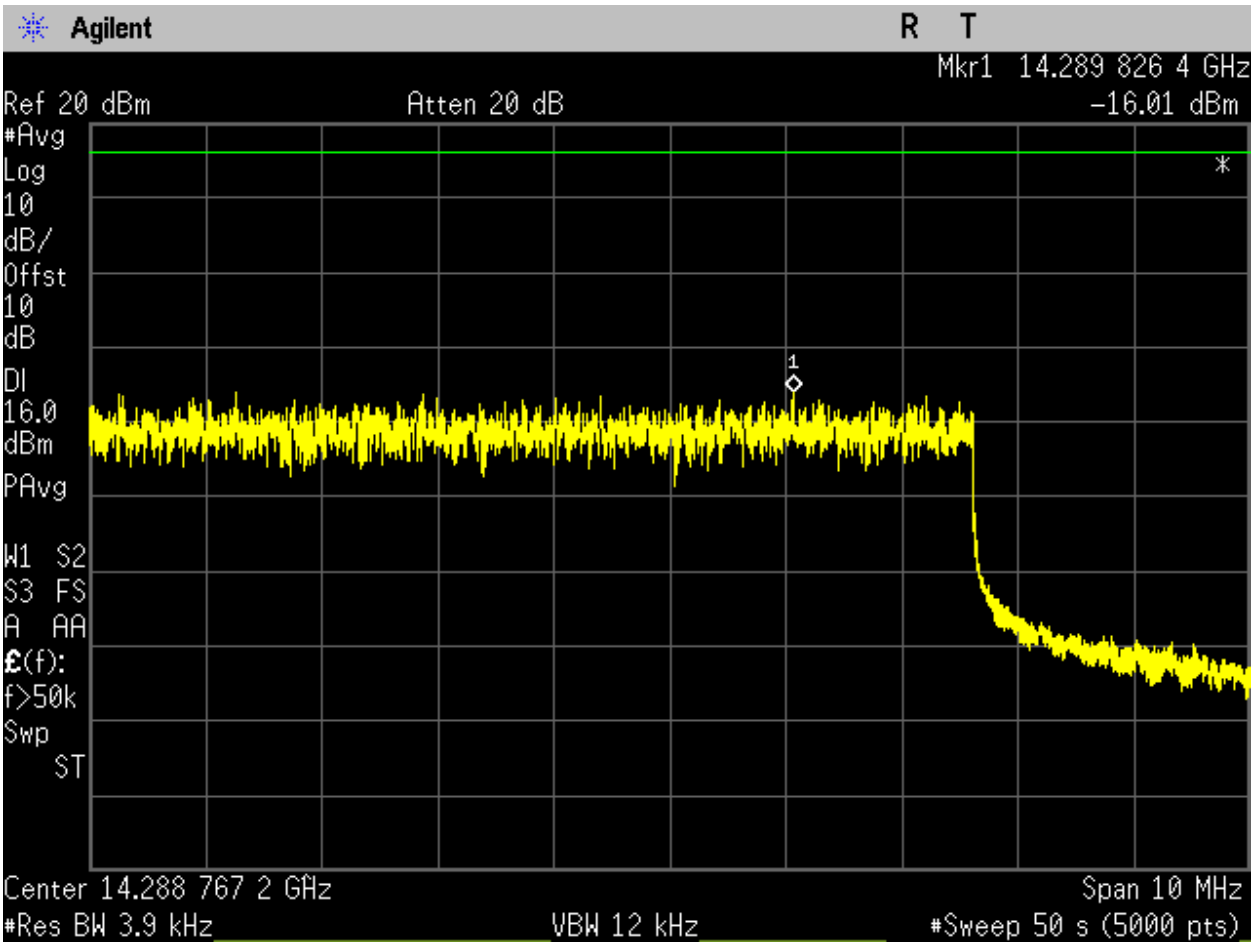

Figure 89. EIRP PSD_16QAM_40MHz_Mid Channel, 14.2729GHz (Final).

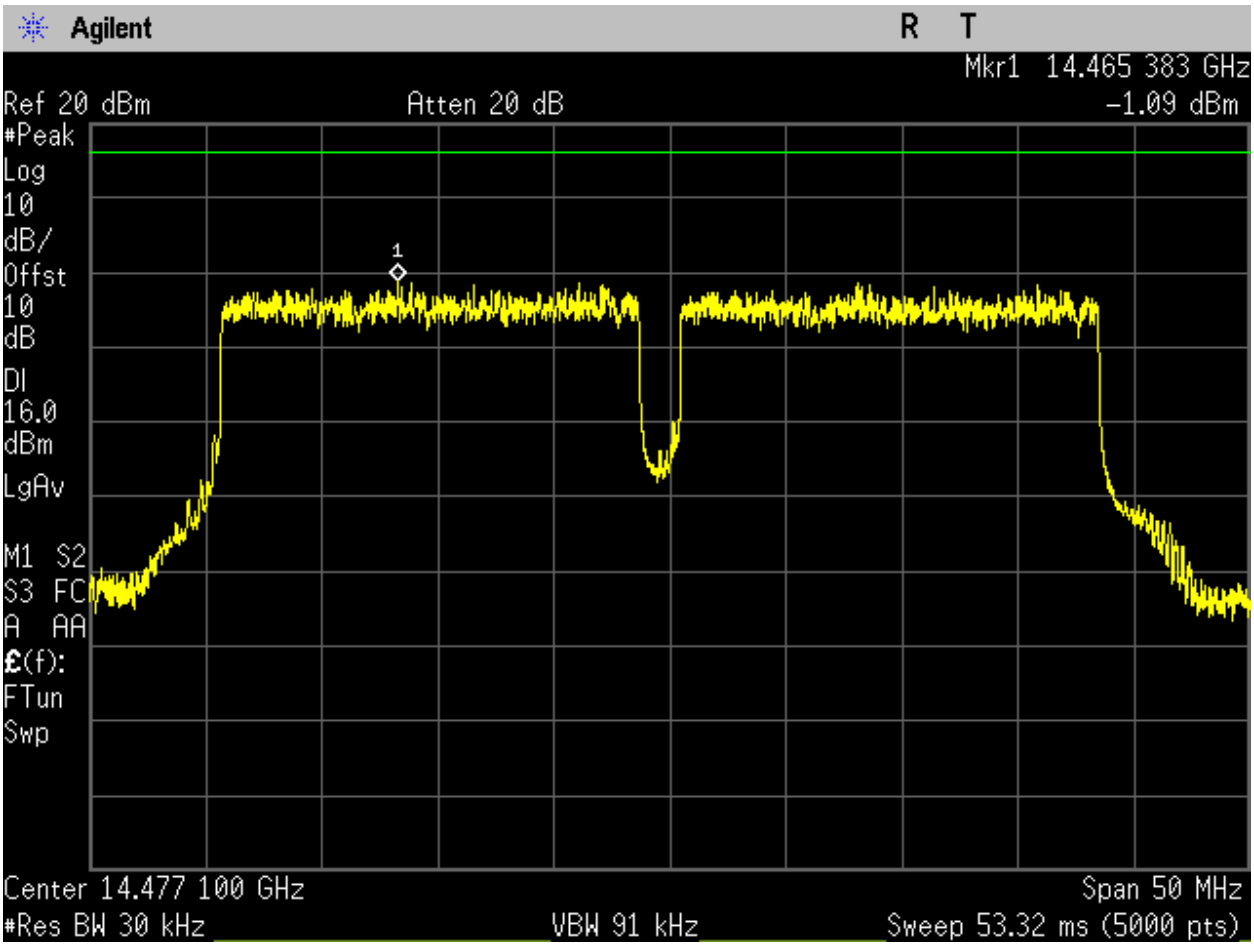

Figure 90. EIRP PSD_16QAM_40MHz_High Channel, 14.4771GHz (PreScan).

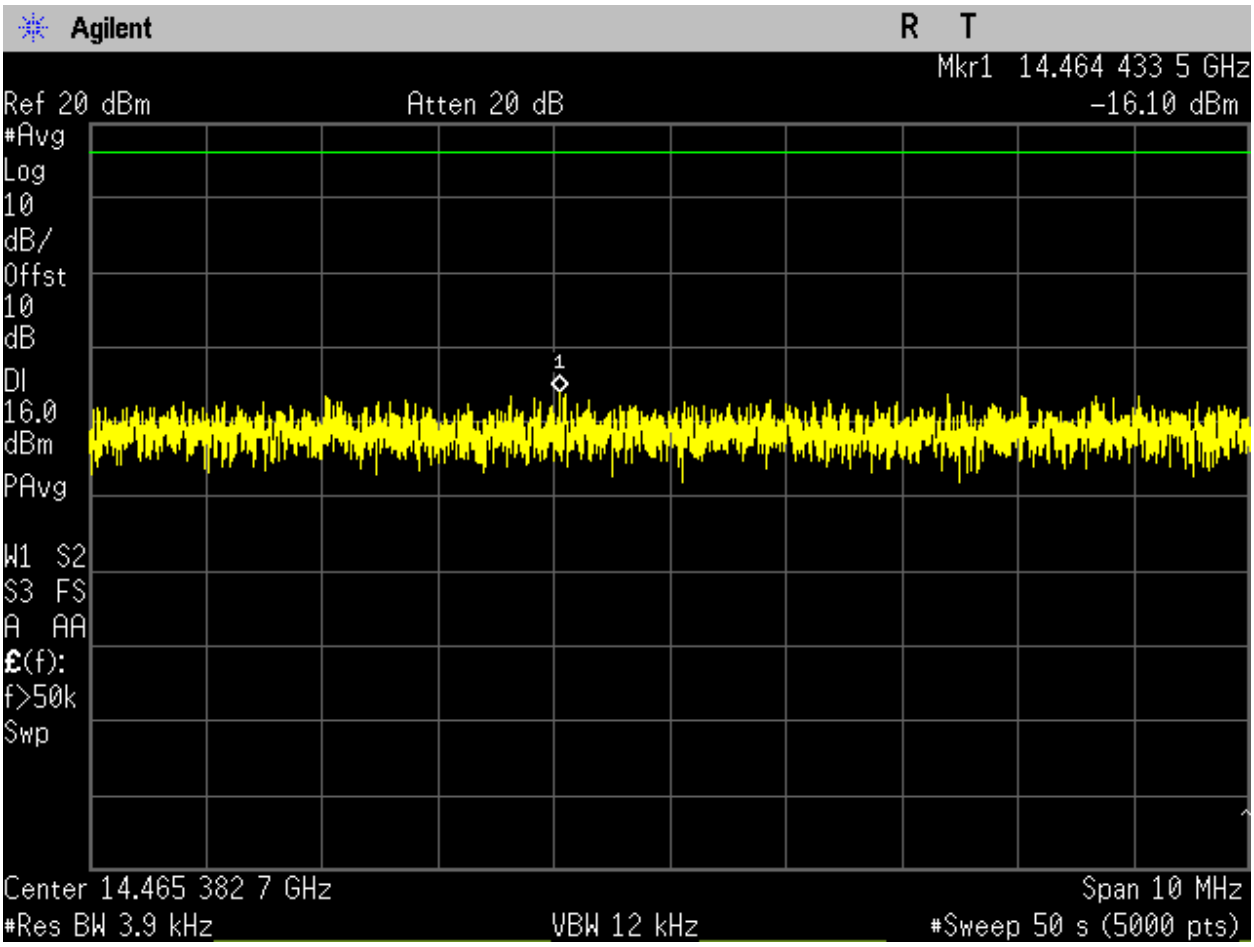

Figure 91. EIRP PSD_16QAM_40MHz_High Channel, 14.4771GHz (Final).

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 Procedures: 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: April 26 – May 13, 2024

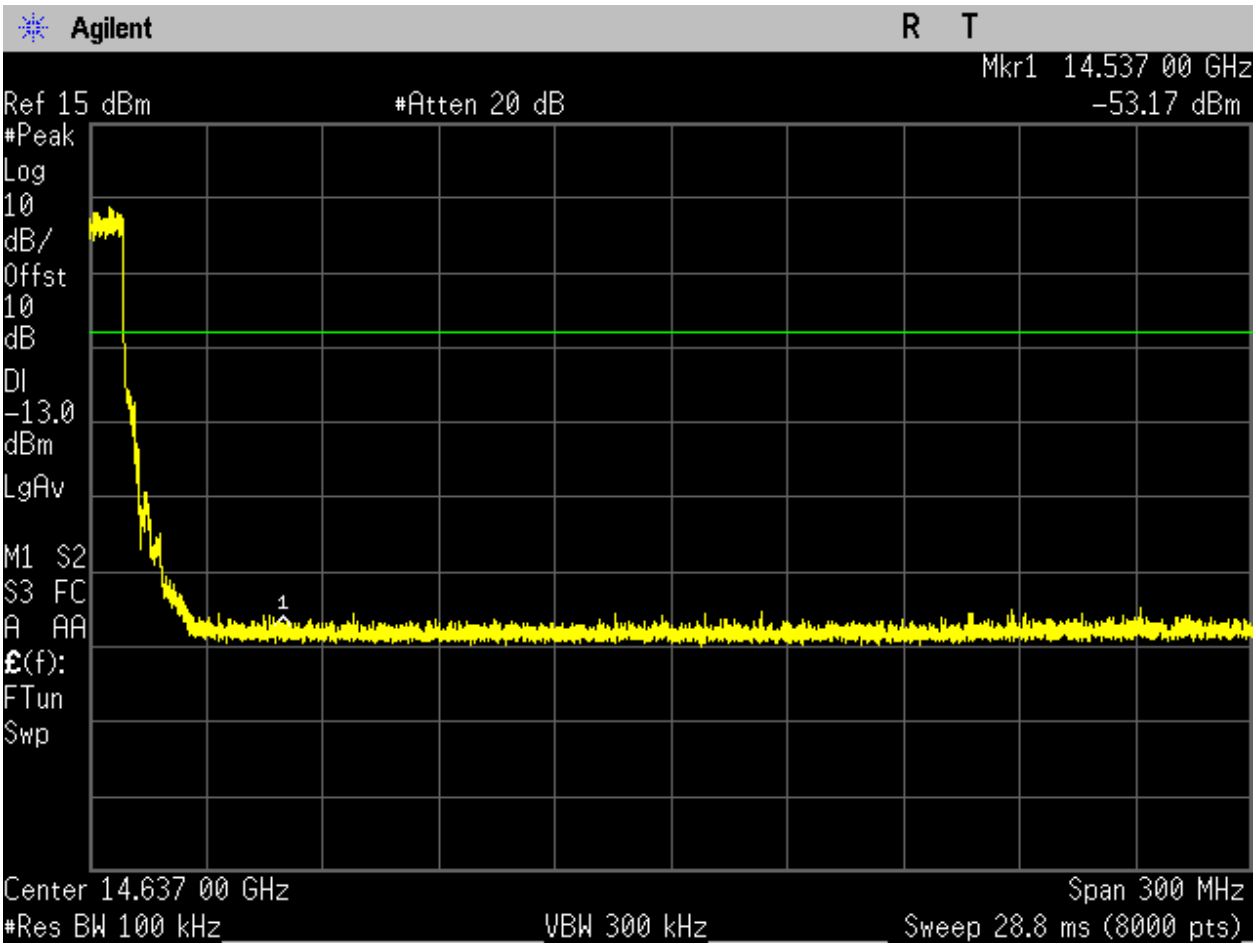

Figure 92. Band Edge (high), 16QAM, 20MHz High Channel, 14.487 GHz.

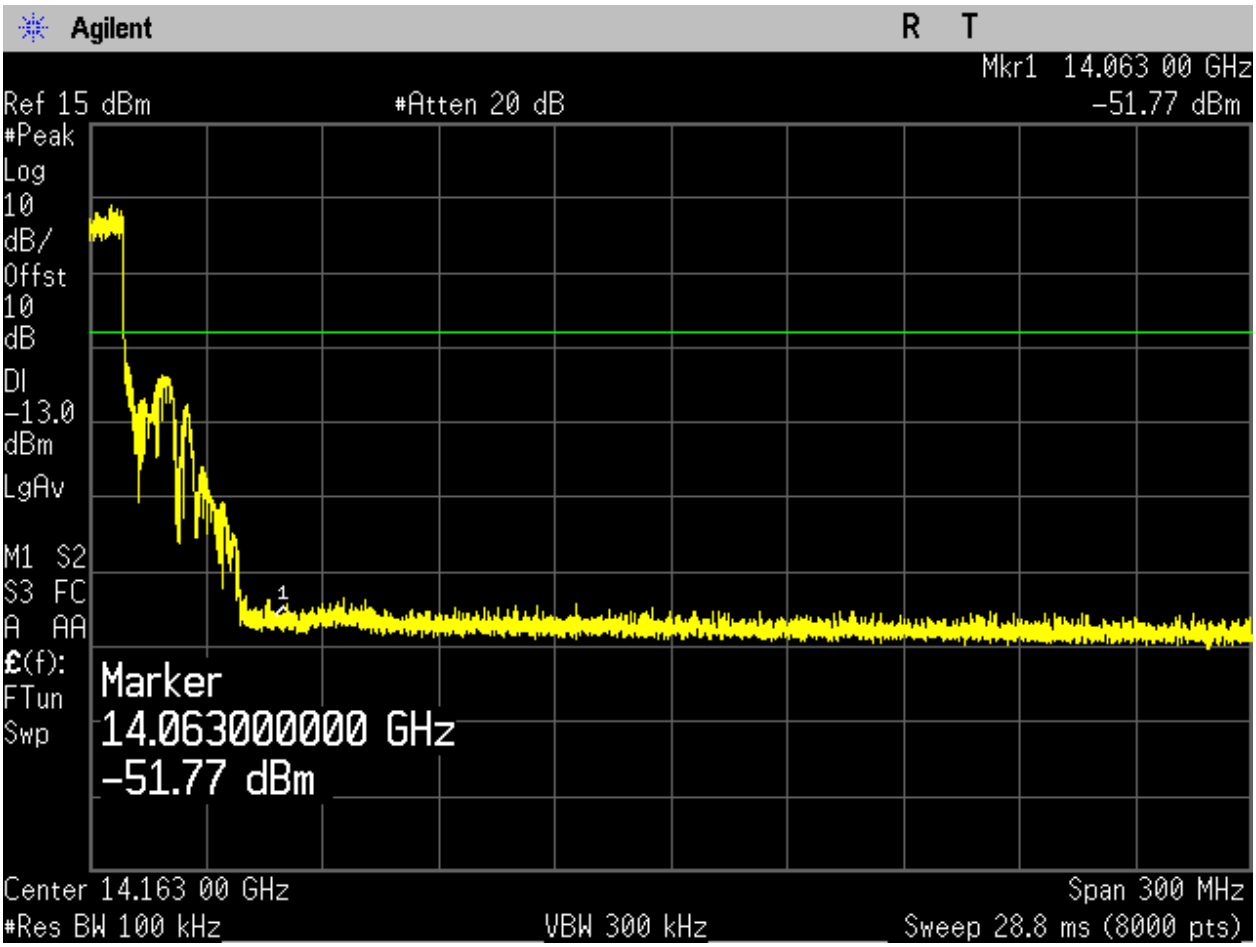

Figure 93. Band Edge (high), 16QAM, 20MHz Low Channel, 14.013 GHz.

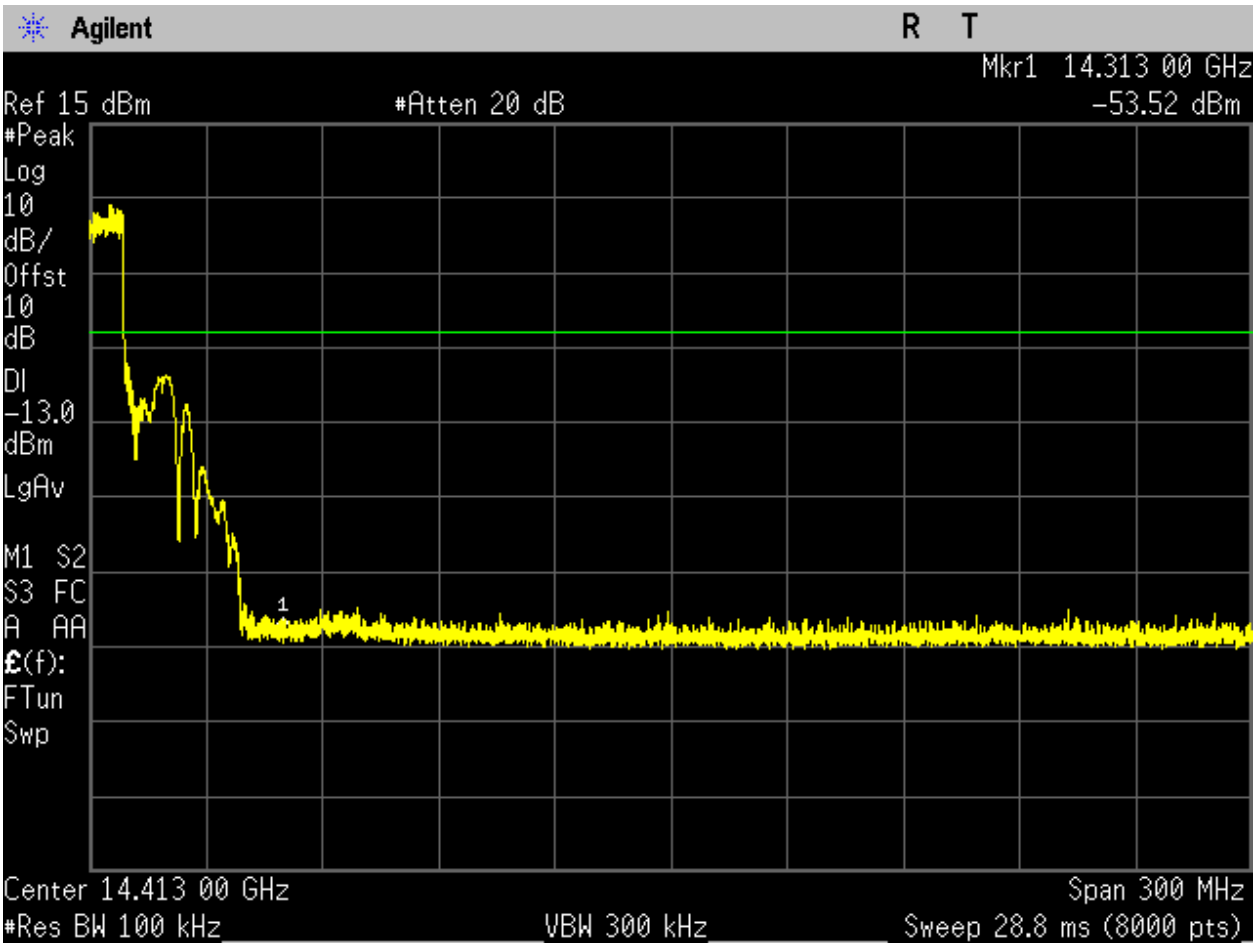

Figure 94. Band Edge (high), 16QAM, 20MHz Mid Channel, 14.263 GHz.

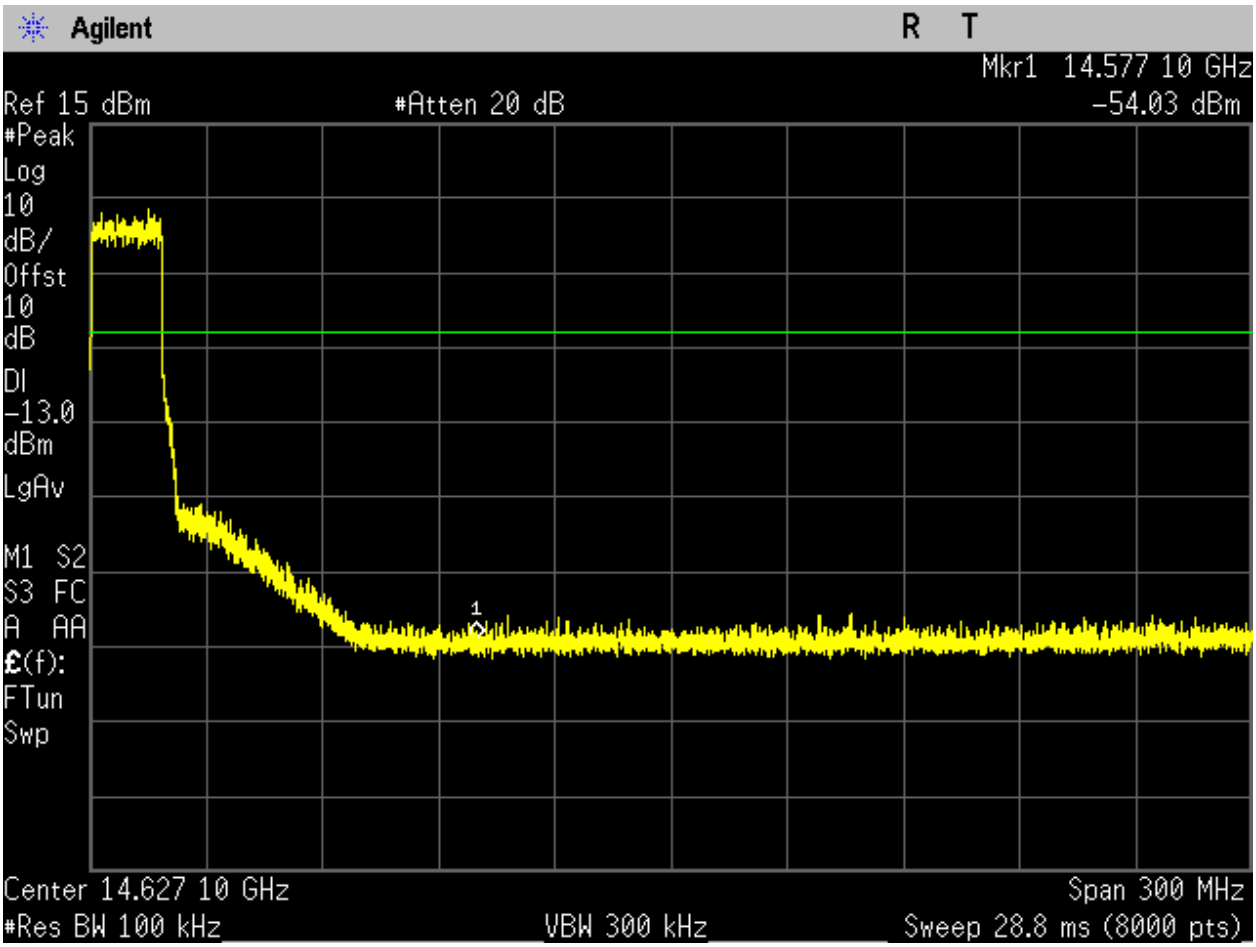

Figure 95. Band Edge (high), 16QAM, 40MHz High Channel, 14.4771 GHz.

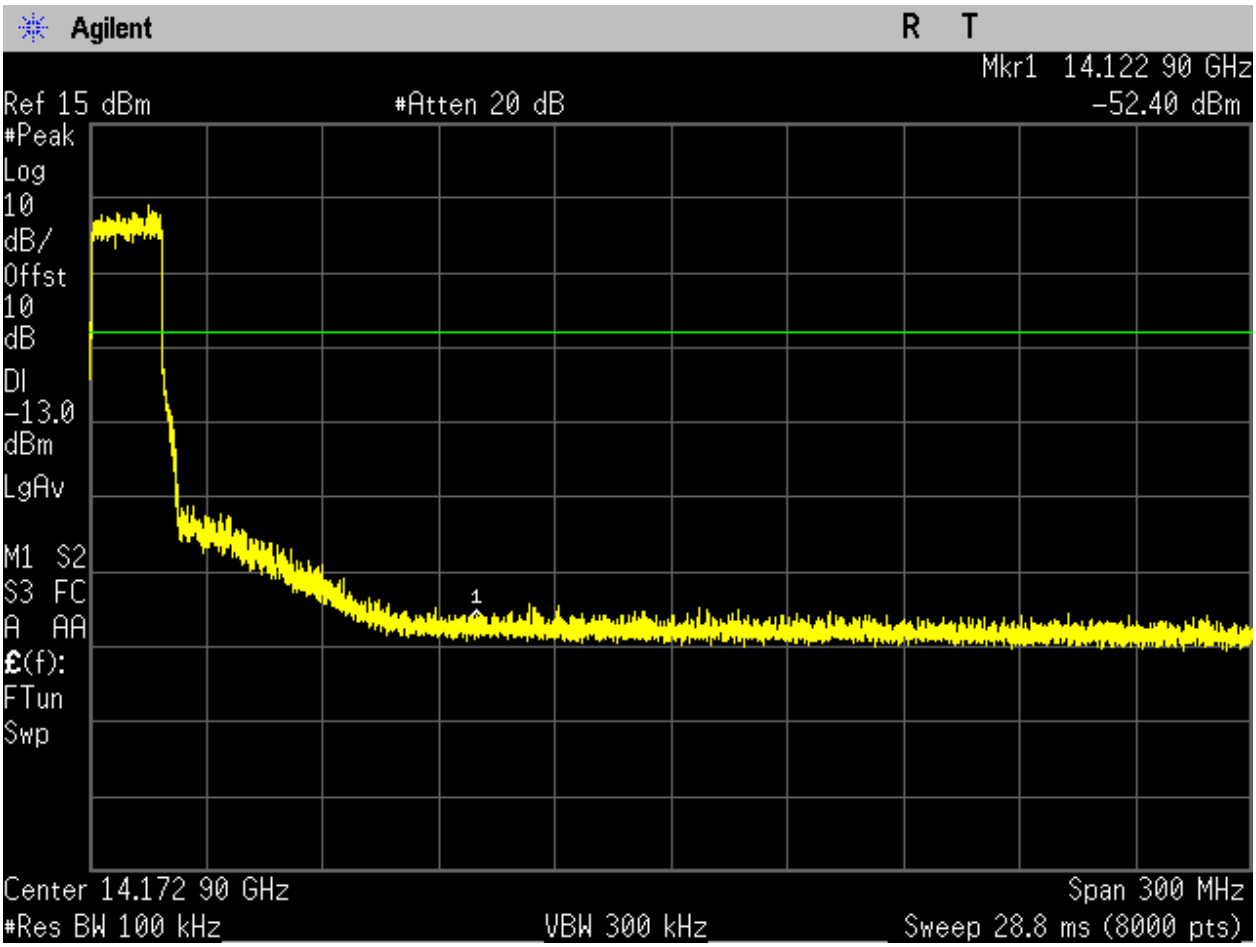

Figure 96. Band Edge (high), 16QAM, 40MHz Low Channel, 14.0229 GHz.

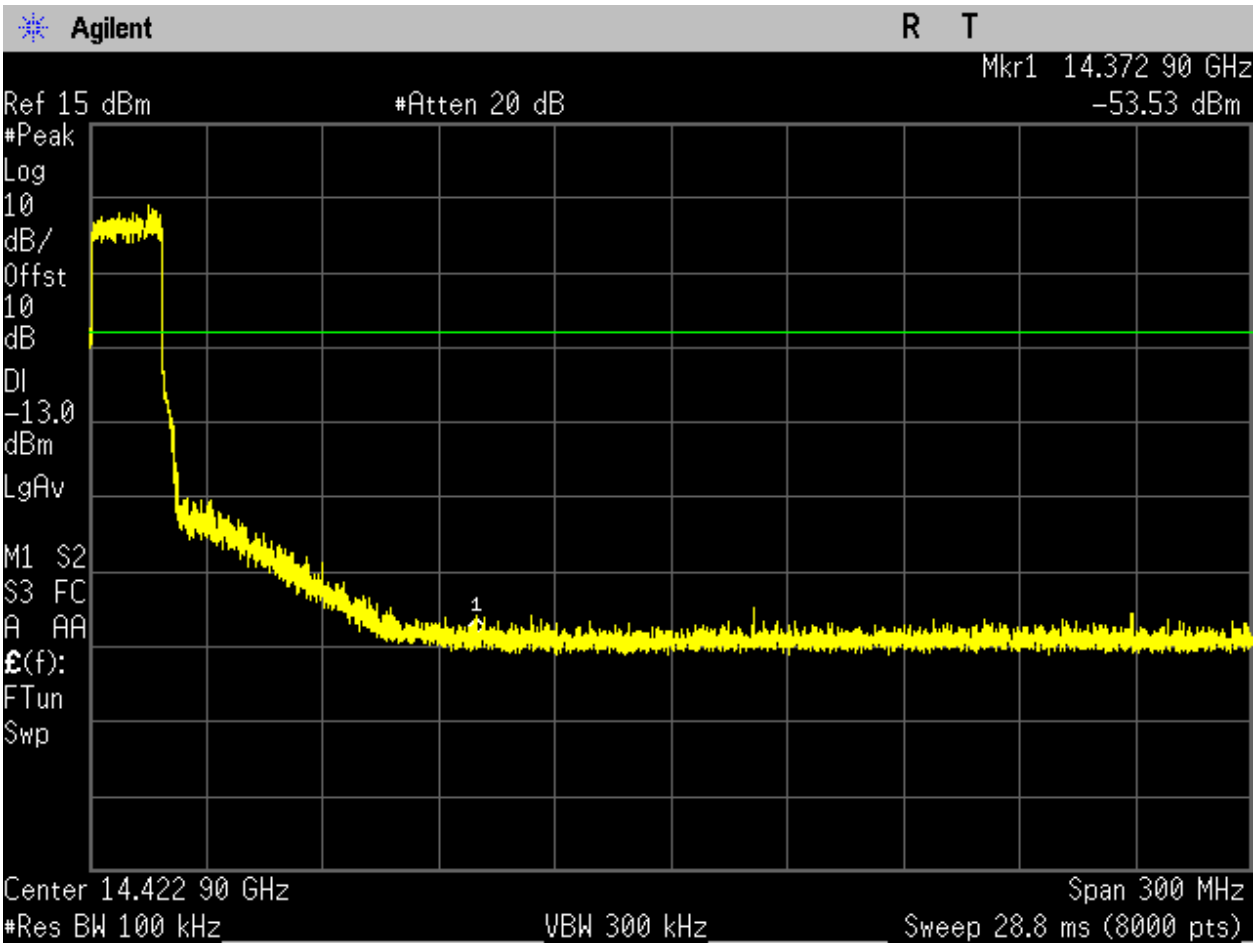

Figure 97. Band Edge (high), 16QAM, 40MHz Mid Channel, 14.2729 GHz.

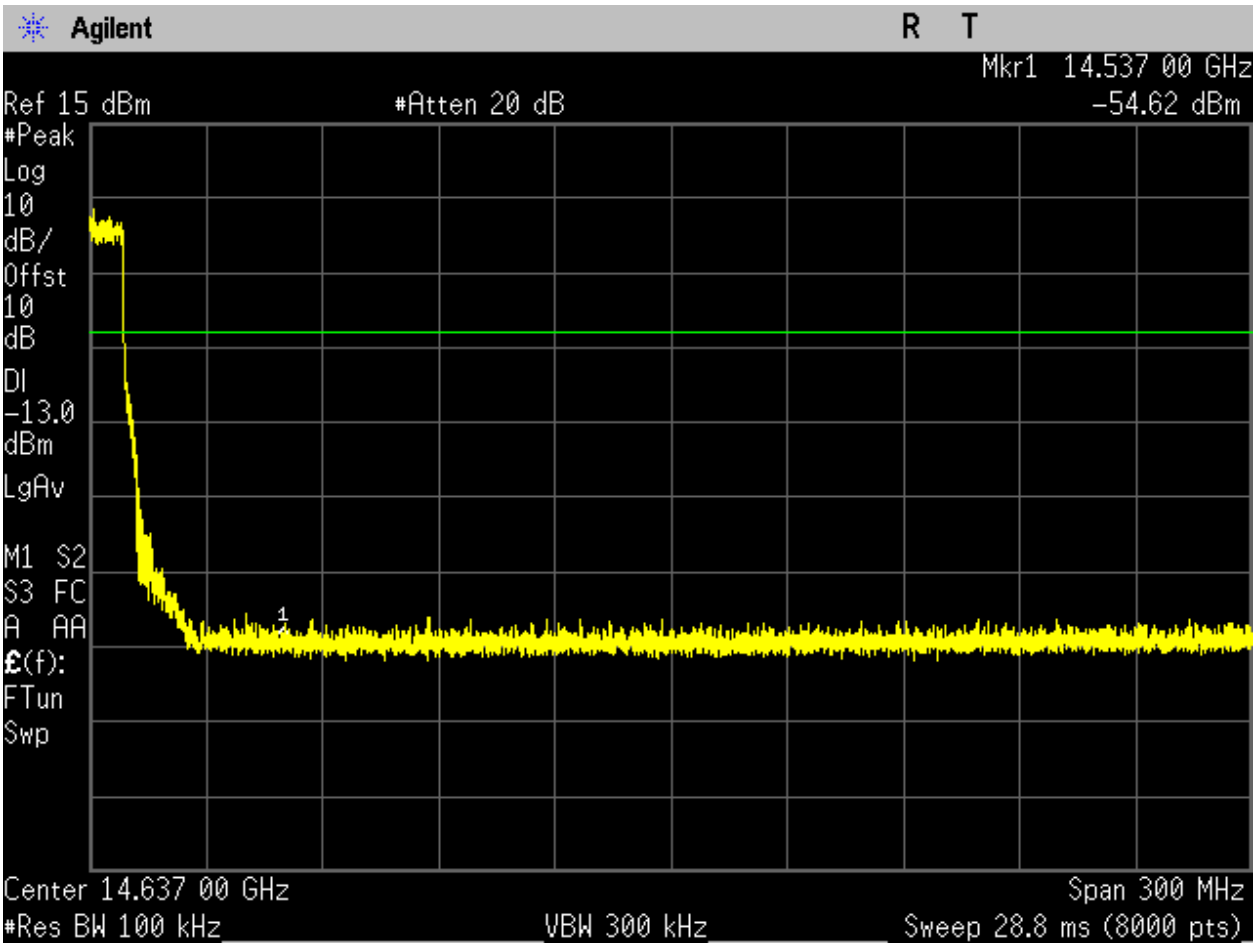

Figure 98. Band Edge (high), 8PSK, 20MHz High Channel, 14.487 GHz.

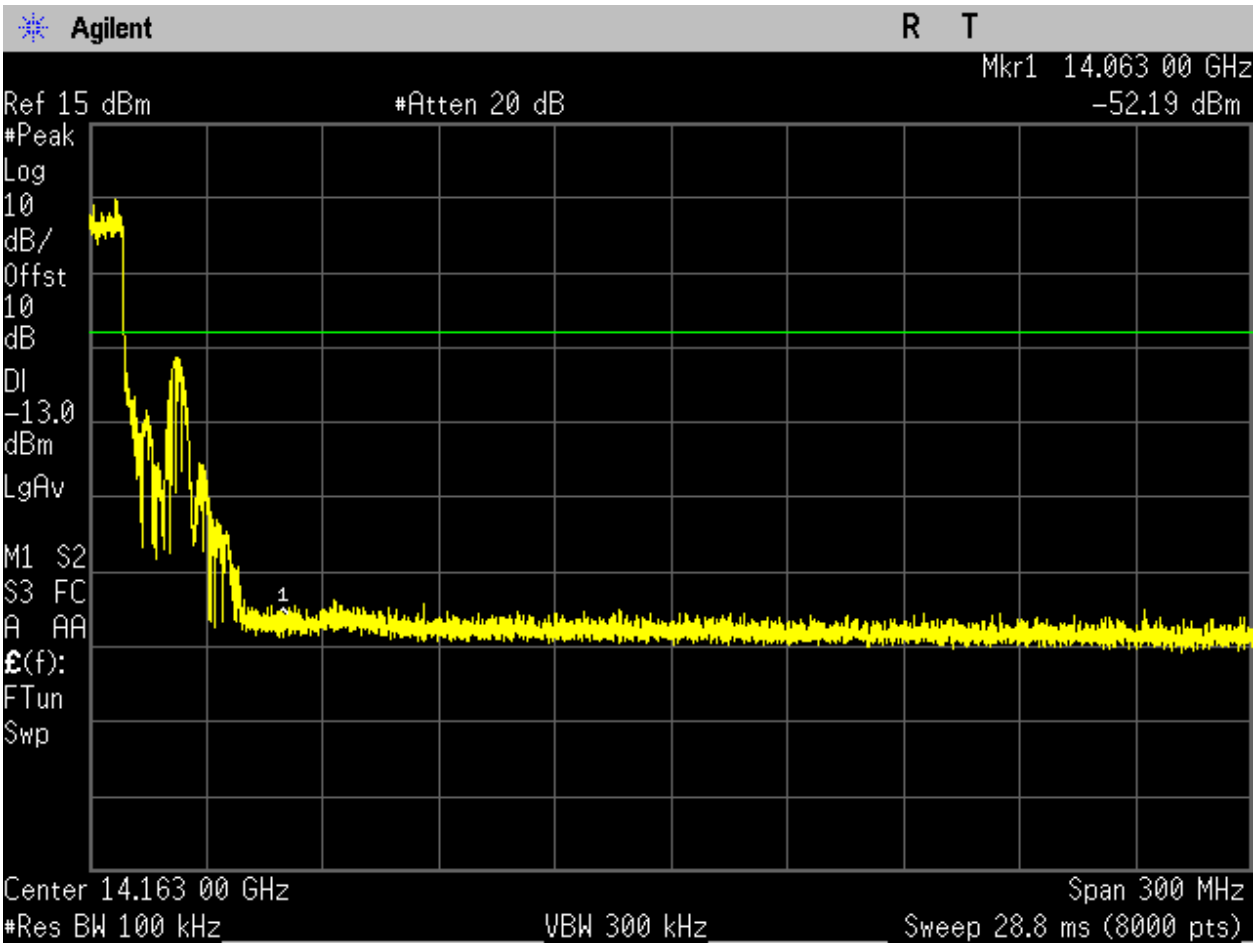

Figure 99. Band Edge (high), 8PSK, 20MHz Low Channel, 14.013 GHz.

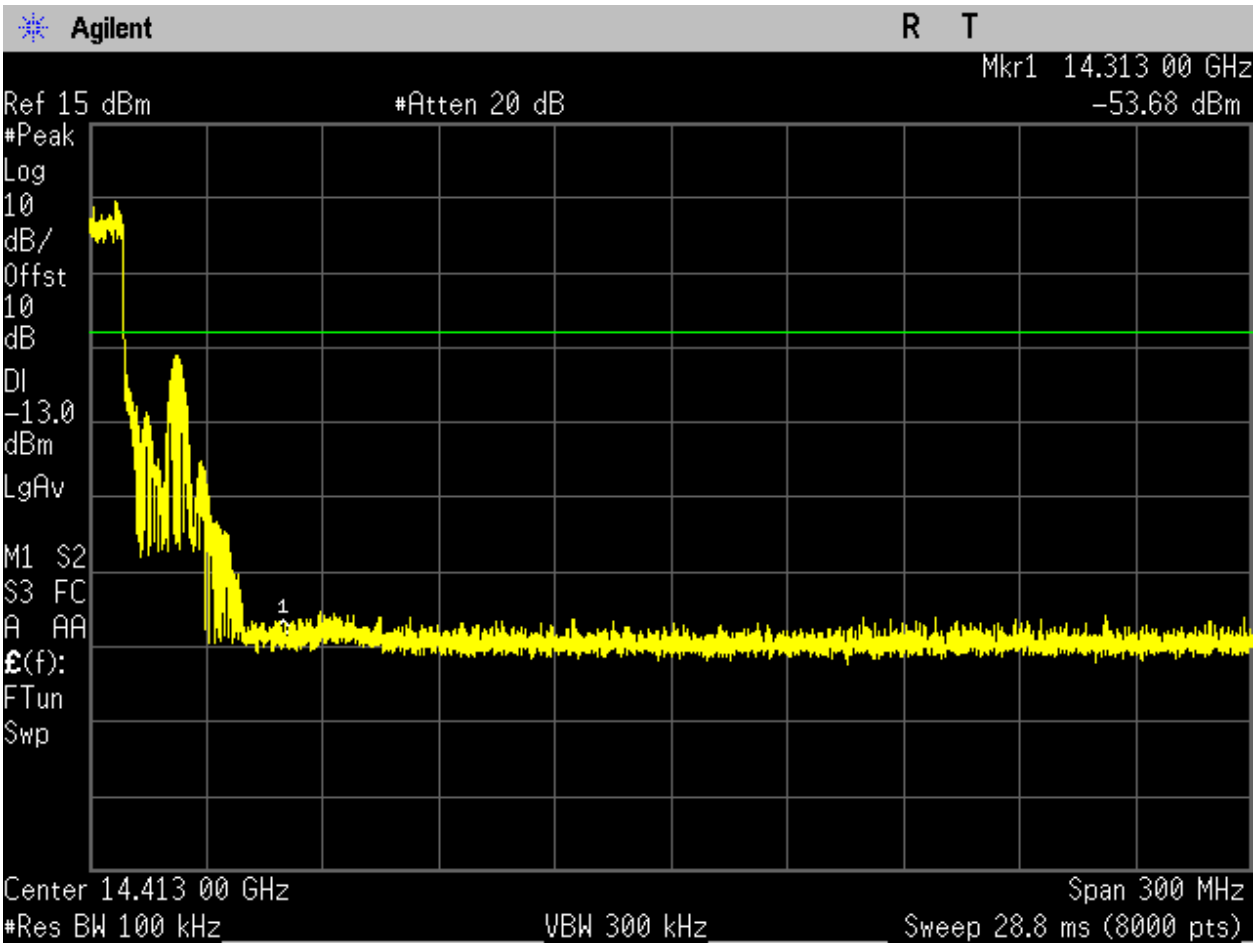

Figure 100. Band Edge (high), 8PSK, 20MHz Mid Channel, 14.263 GHz.

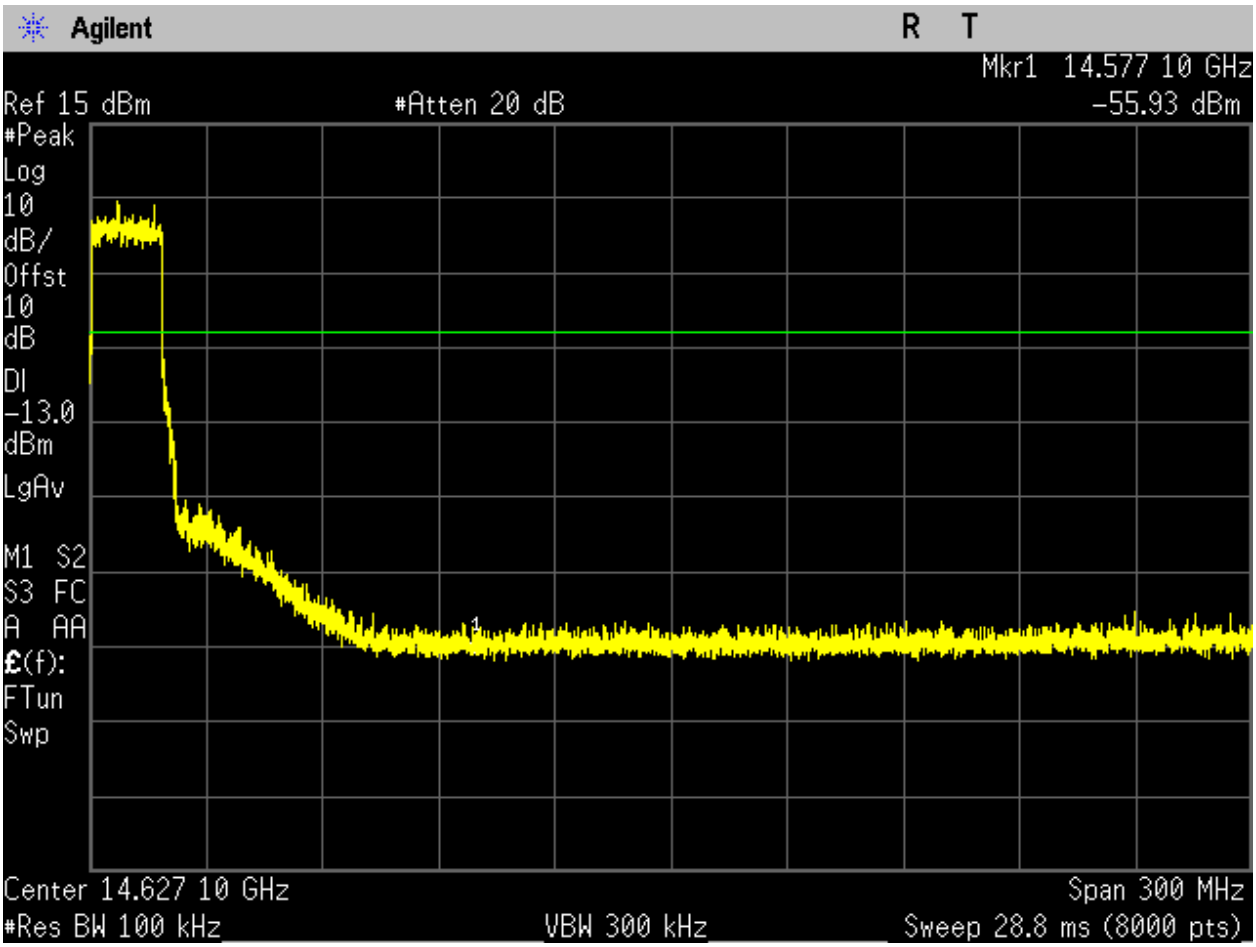

Figure 101. Band Edge (high), 8PSK, 40MHz High Channel, 14.4771 GHz.

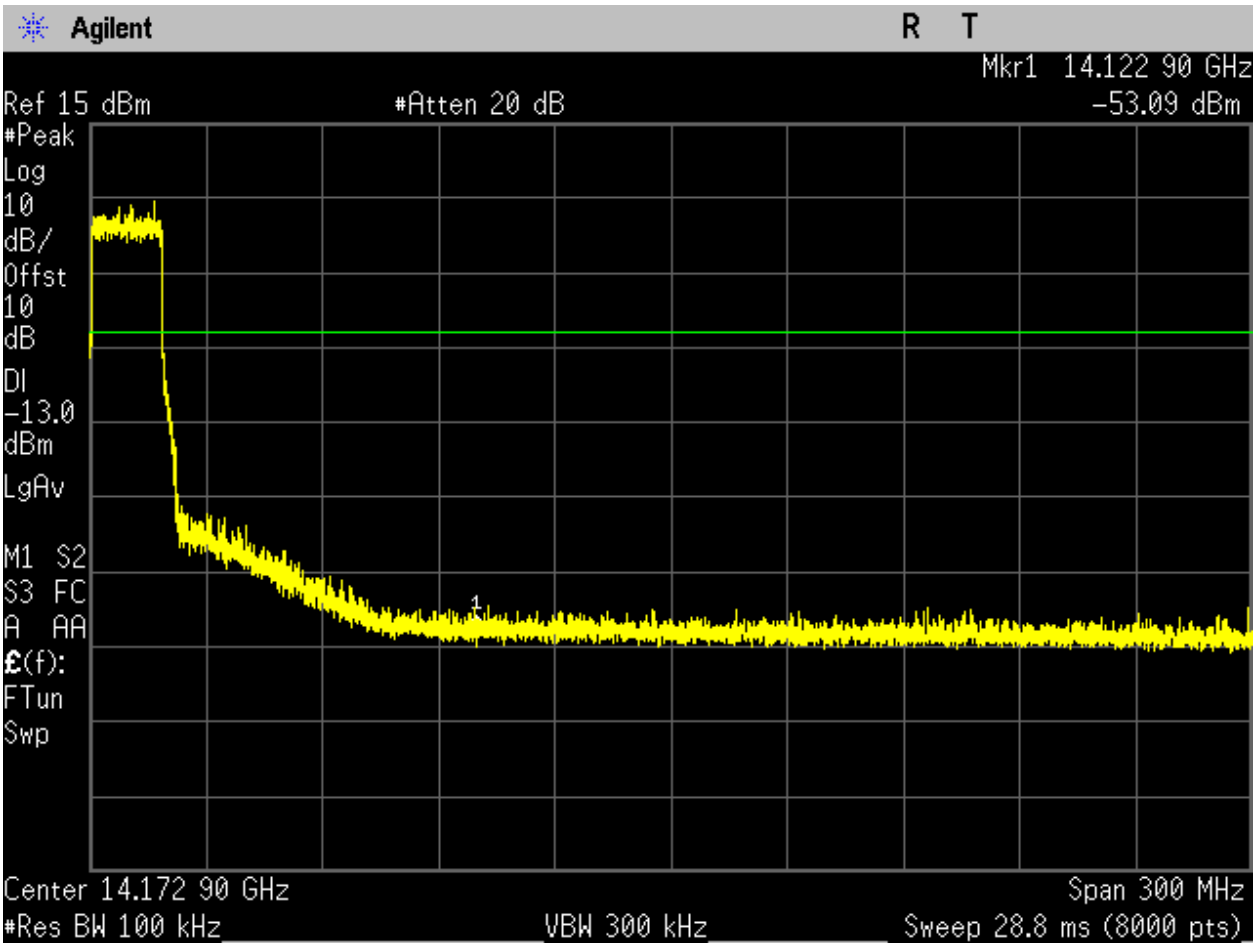

Figure 102. Band Edge (high), 8PSK, 40MHz Low Channel, 14.0229 GHz.

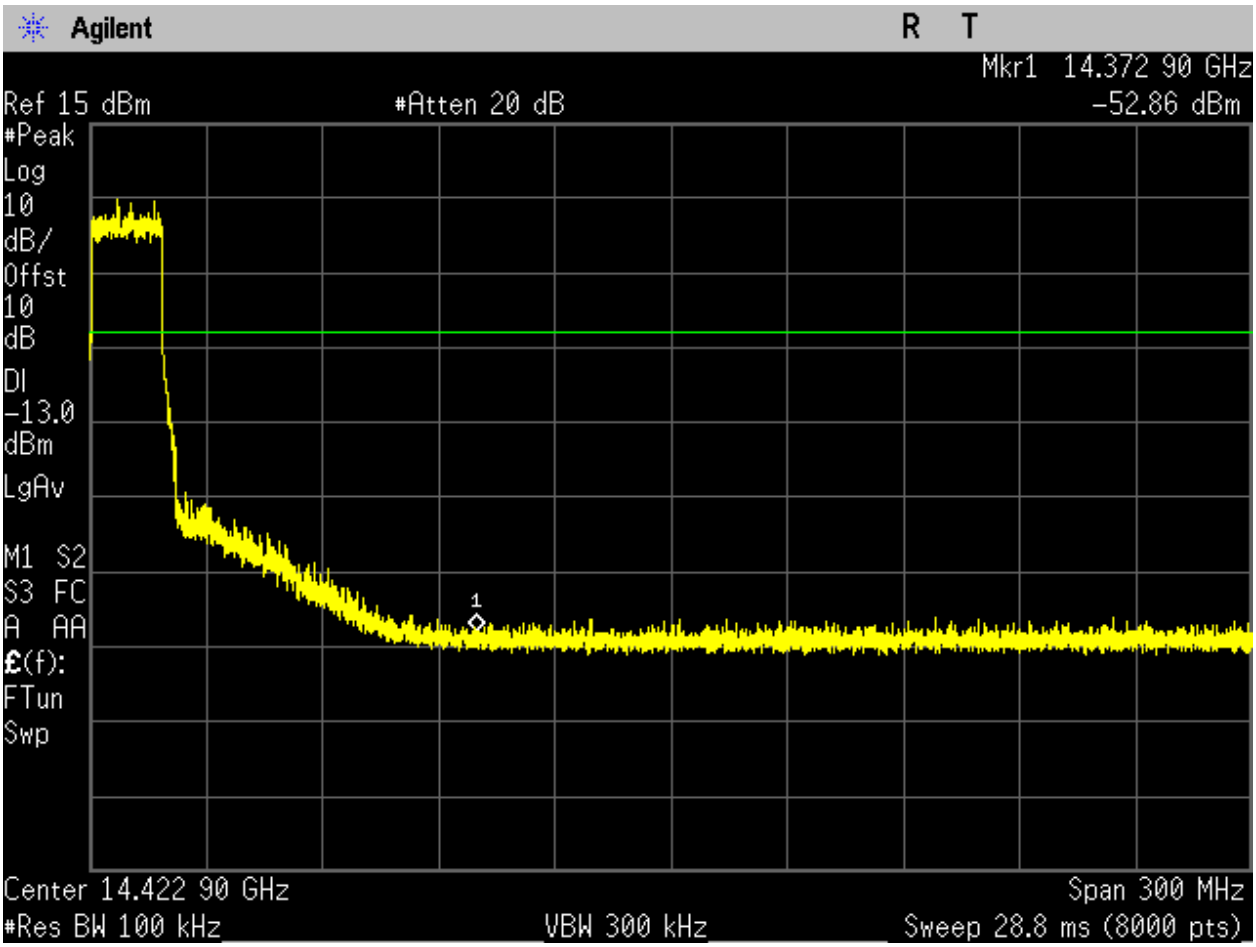

Figure 103. Band Edge (high), 8PSK, 40MHz Mid Channel, 14.2729 GHz.

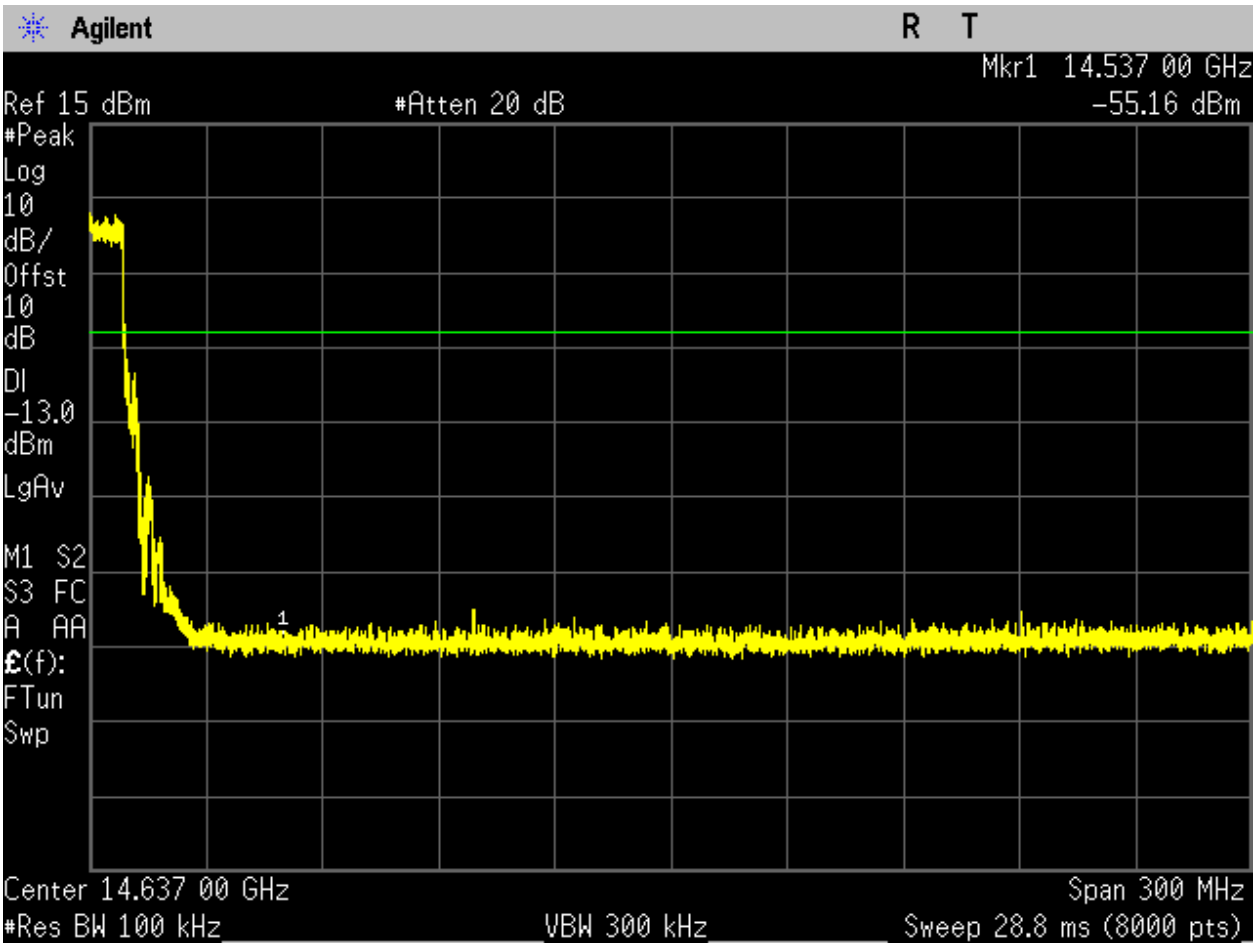

Figure 104. Band Edge (high), QPSK, 20MHz High Channel, 14.487 GHz.

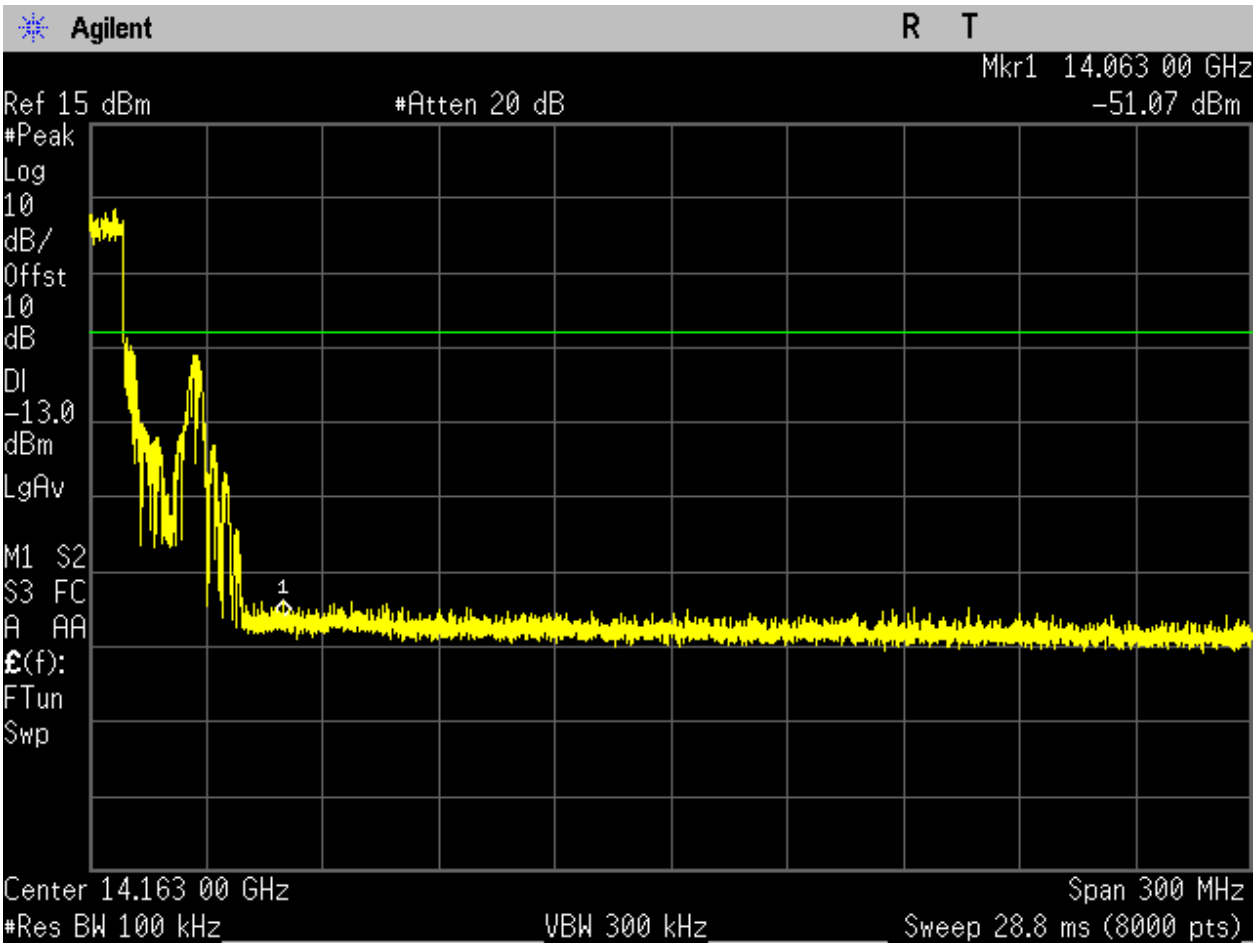

Figure 105. Band Edge (high), QPSK, 20MHz Low Channel, 14.013 GHz.

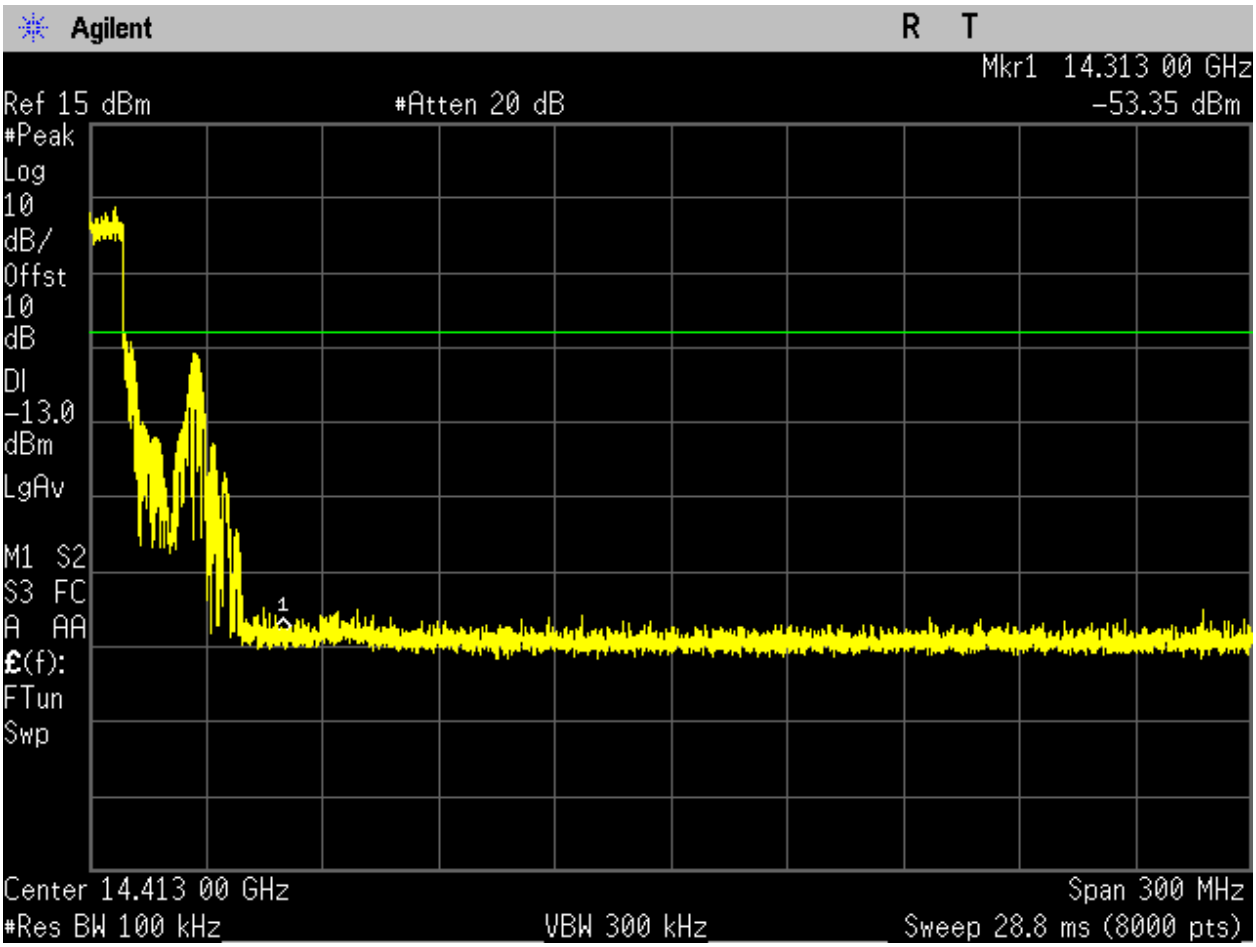

Figure 106. Band Edge (high), QPSK, 20MHz Mid Channel, 14.263 GHz.

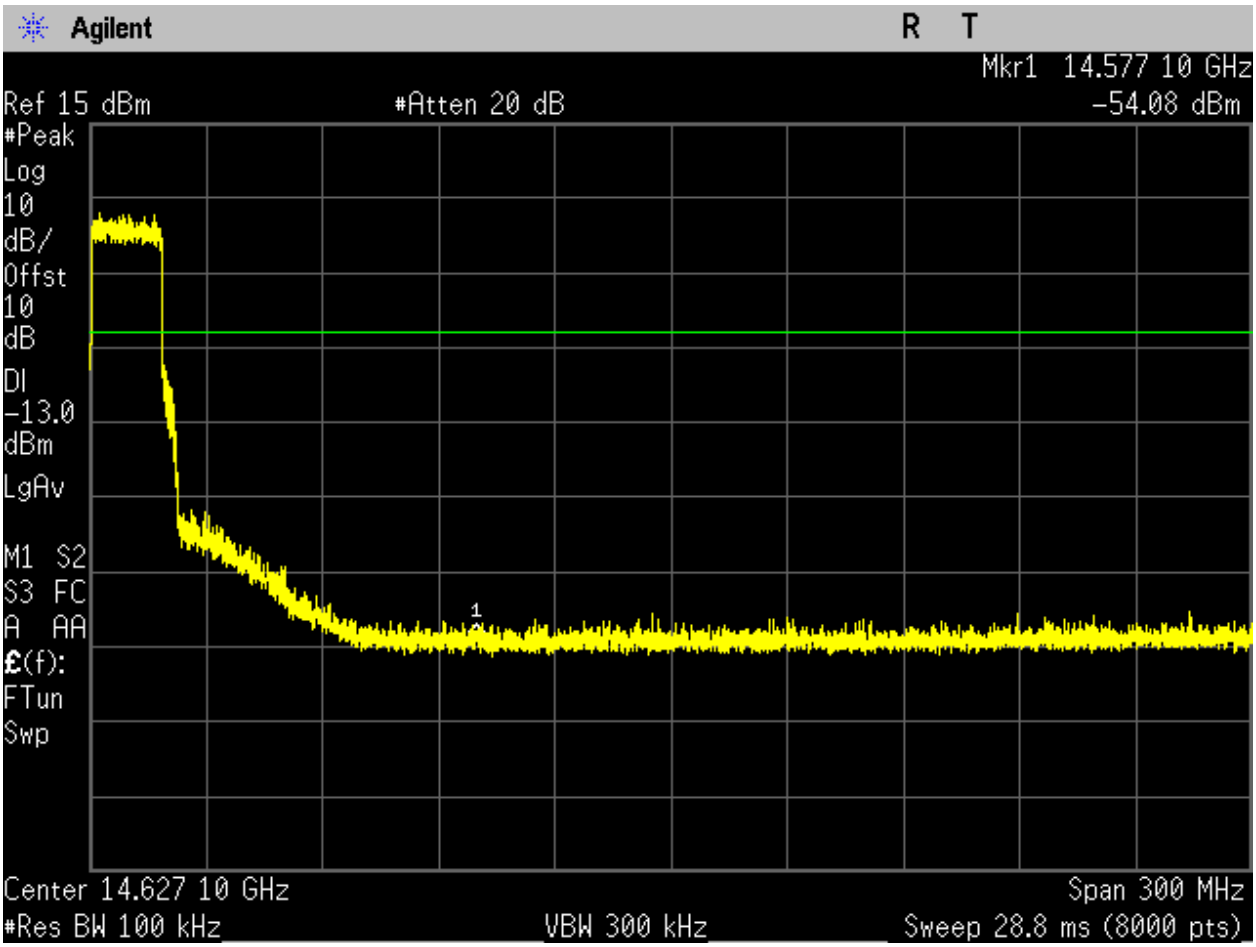

Figure 107. Band Edge (high), QPSK, 40MHz High Channel, 14.4771 GHz.

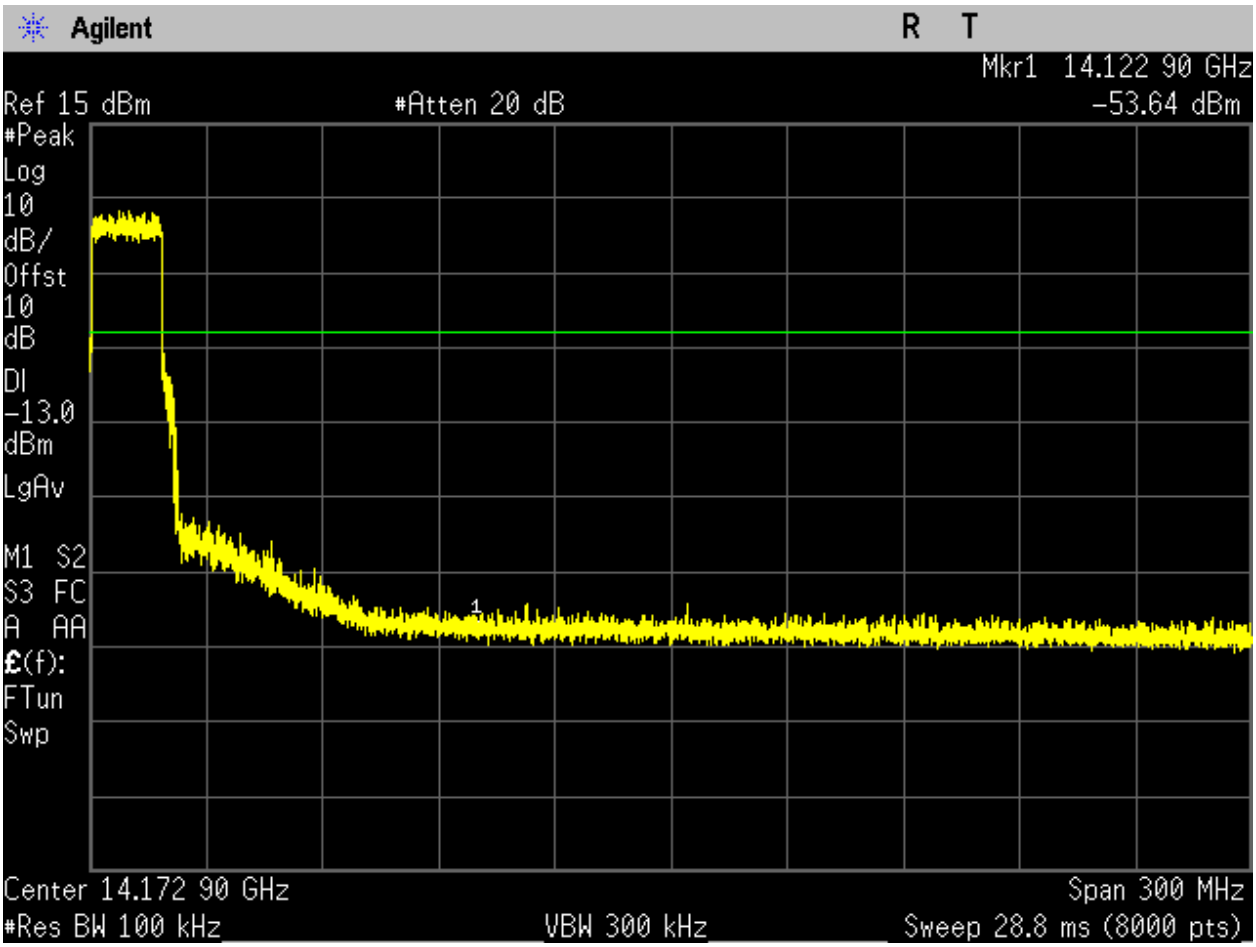

Figure 108. Band Edge (high), QPSK, 40MHz Low Channel, 14.0229 GHz.

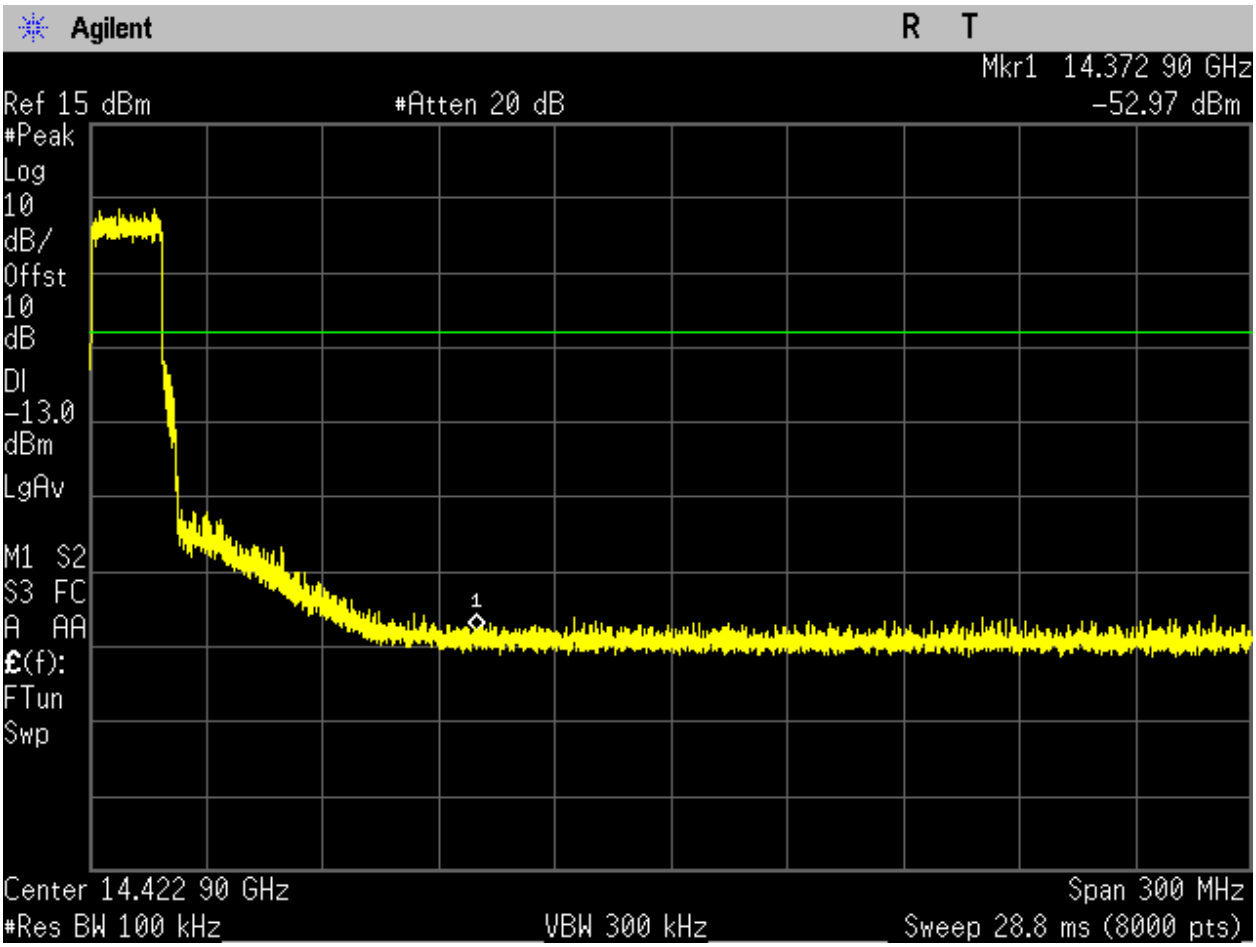

Figure 109. Band Edge (high), QPSK, 40MHz Mid Channel, 14.2729 GHz.

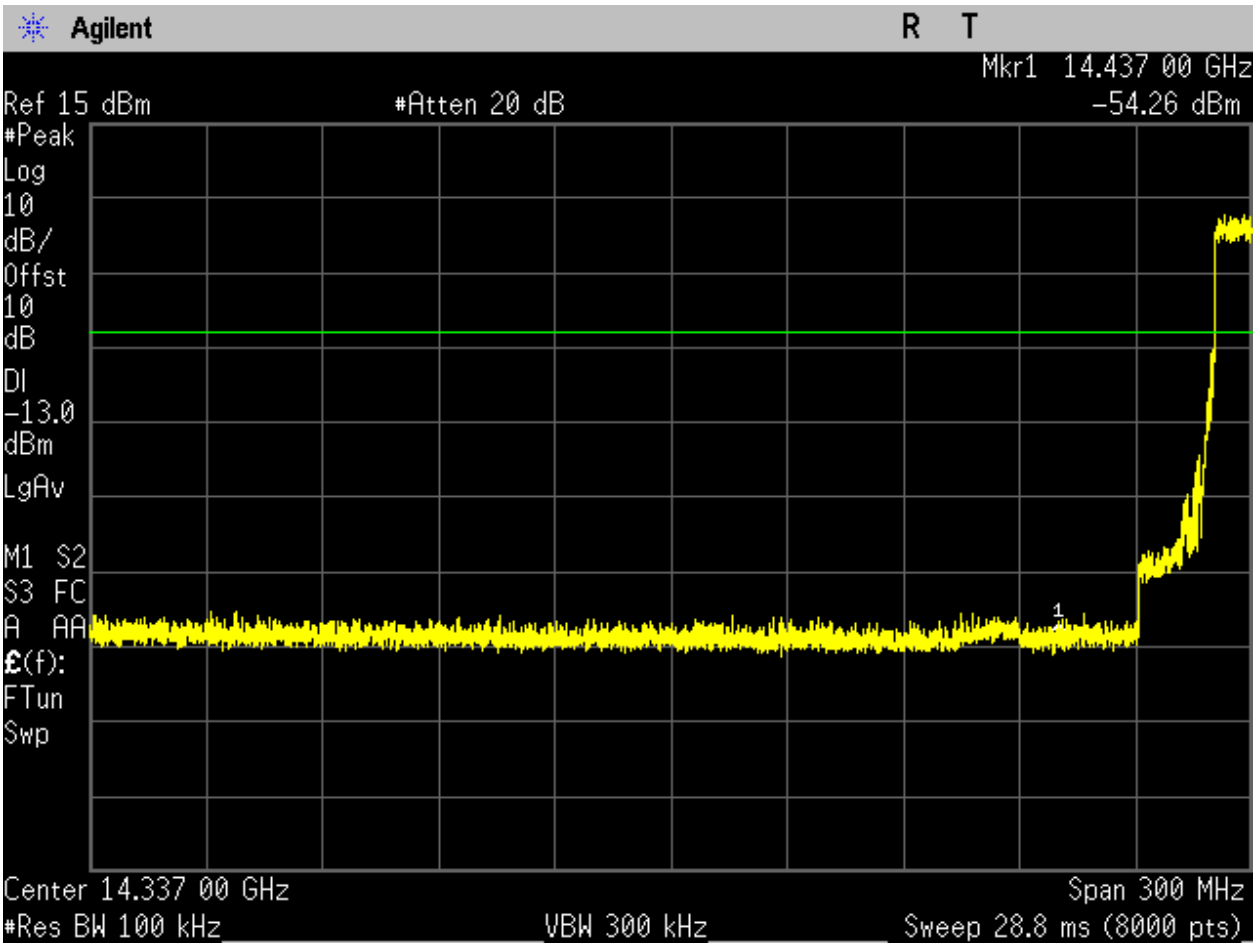

Figure 110. Band Edge (low), 16QAM, 20MHz High Channel, 14.487 GHz.

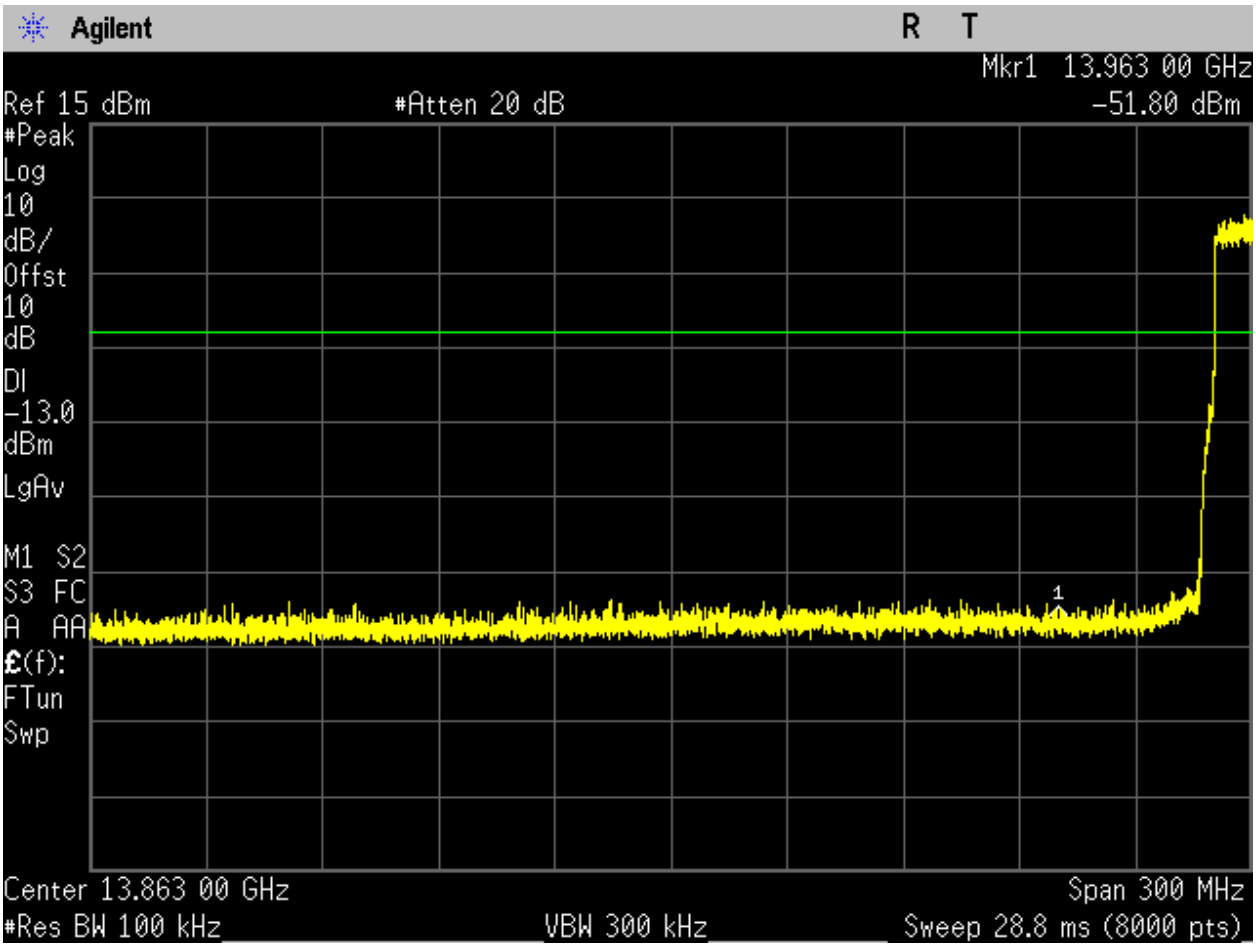

Figure 111. Band Edge (low), 16QAM, 20MHz Low Channel, 14.013 GHz.

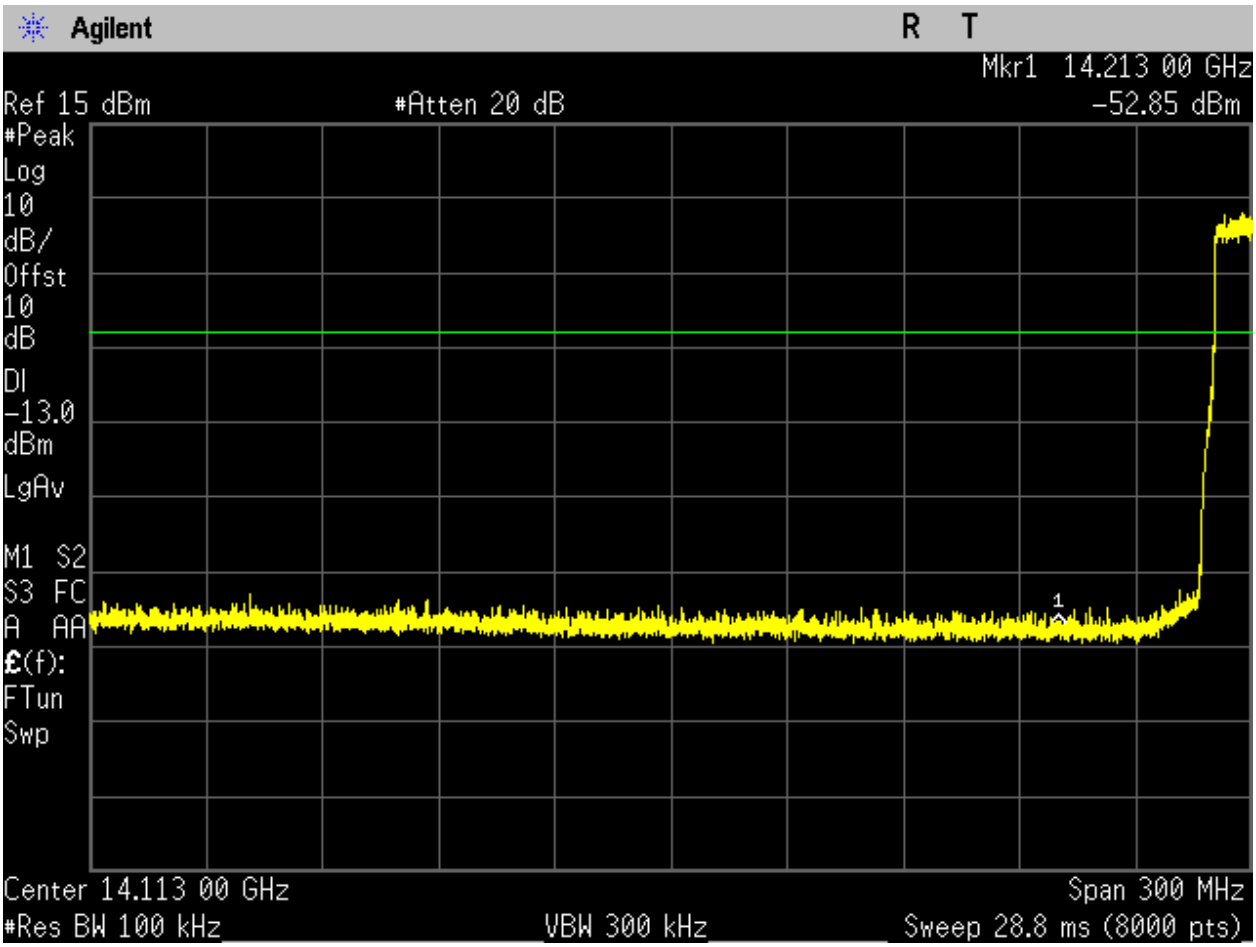

Figure 112. Band Edge (low), 16QAM, 20MHz Mid Channel, 14.263 GHz.

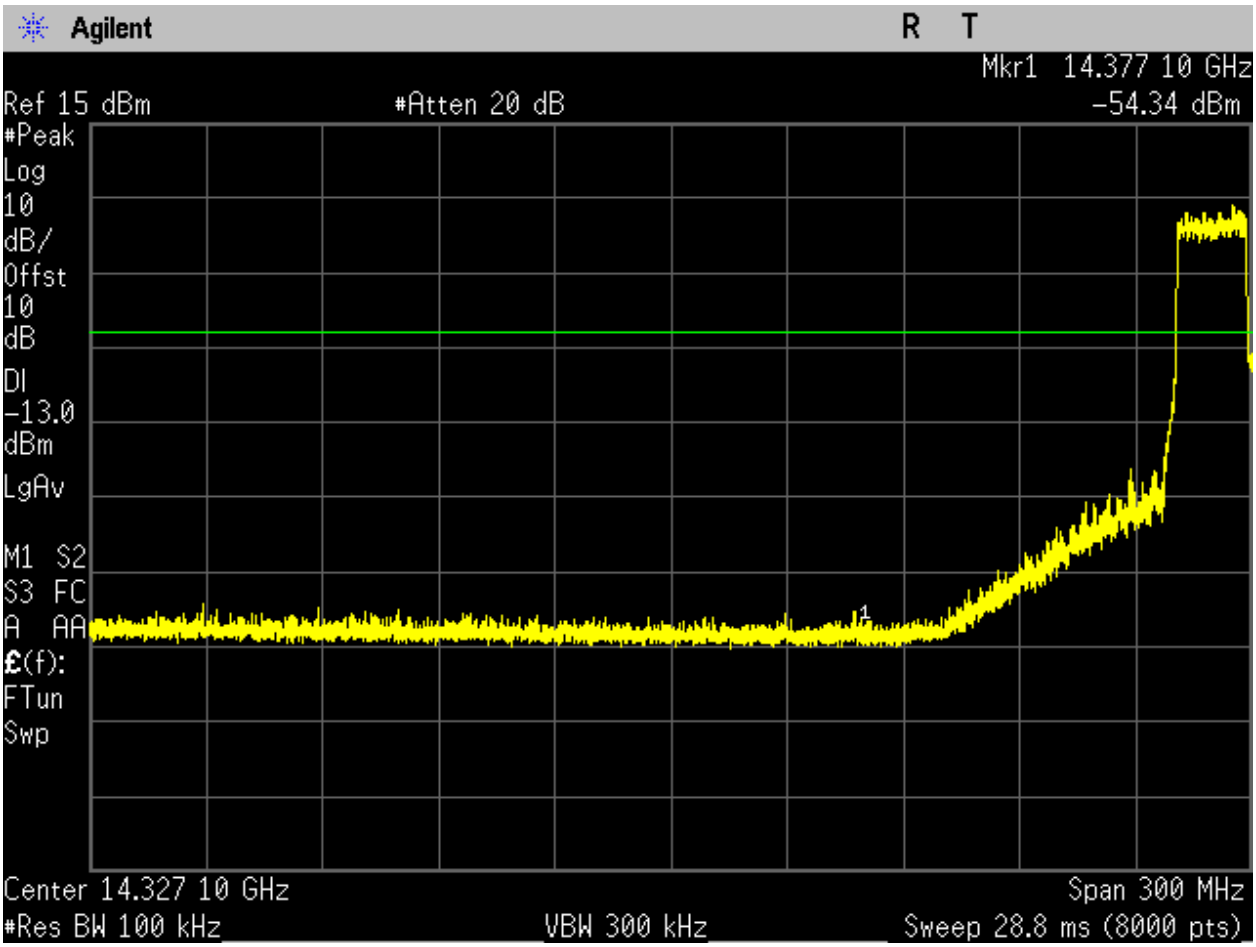

Figure 113. Band Edge (low), 16QAM, 40MHz High Channel, 14.4771 GHz.

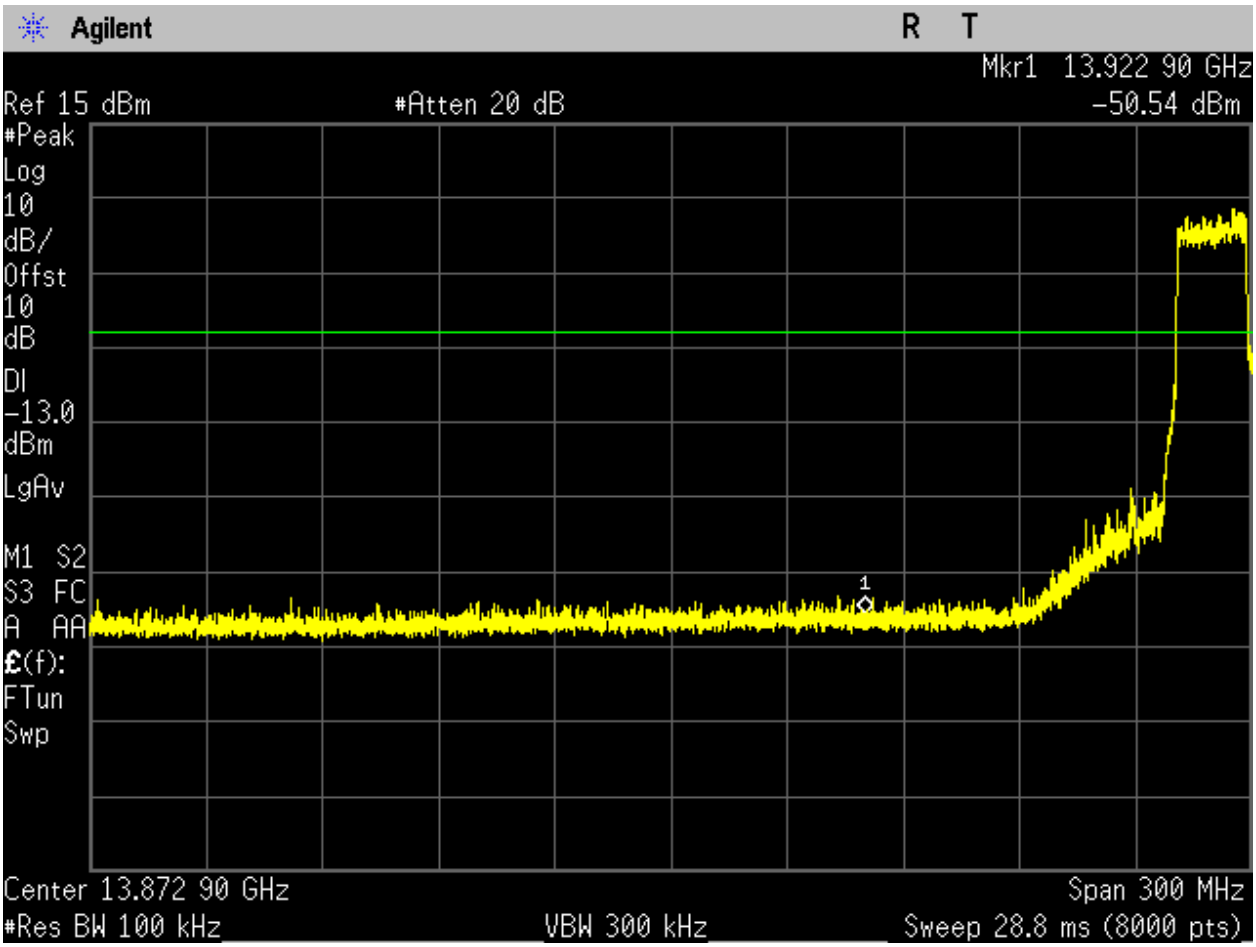

Figure 114. Band Edge (low), 16QAM, 40MHz Low Channel, 14.0229 GHz.

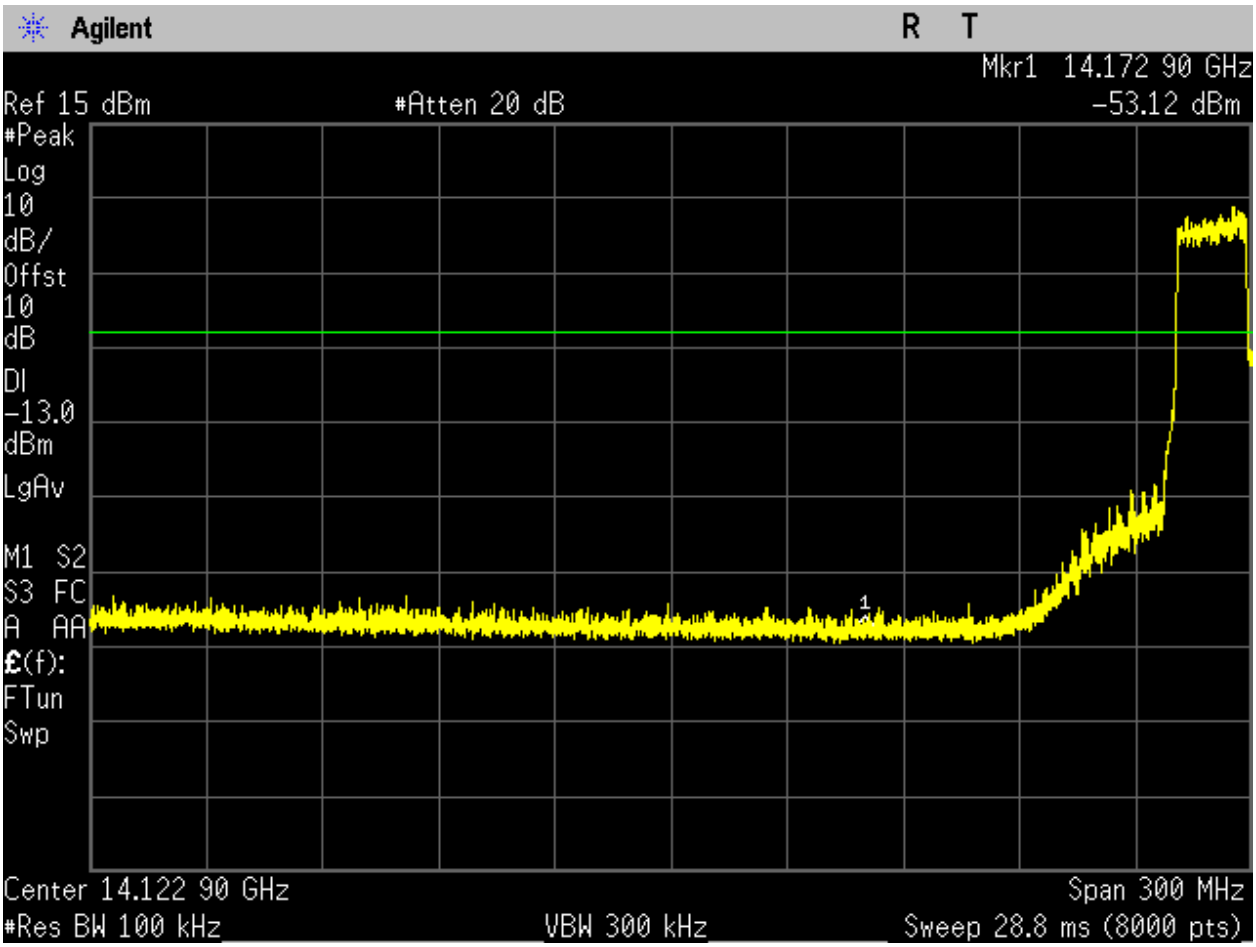

Figure 115. Band Edge (low), 16QAM, 40MHz Mid Channel, 14.2729 GHz.

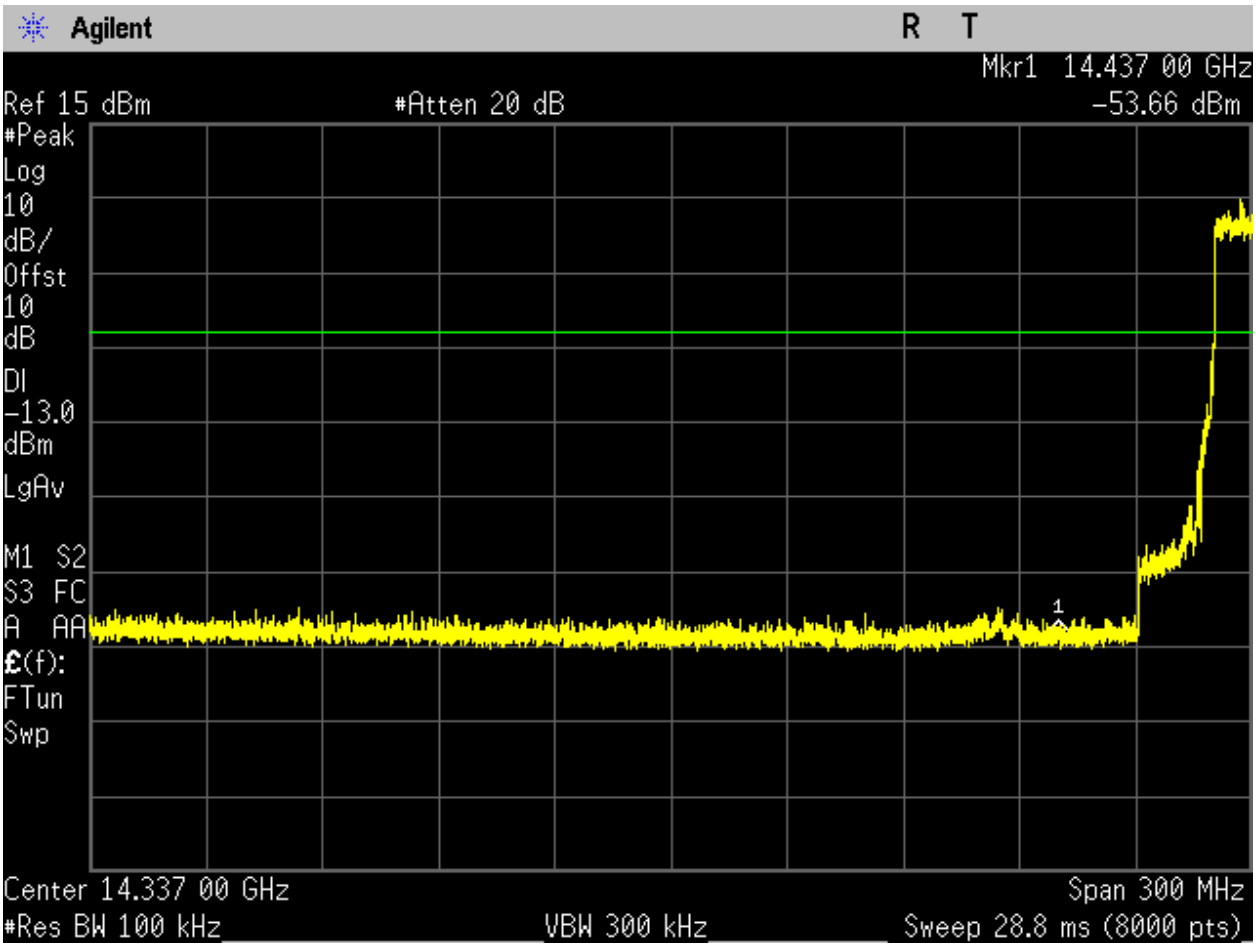

Figure 116. Band Edge (low), 8PSK, 20MHz High Channel, 14.487 GHz.

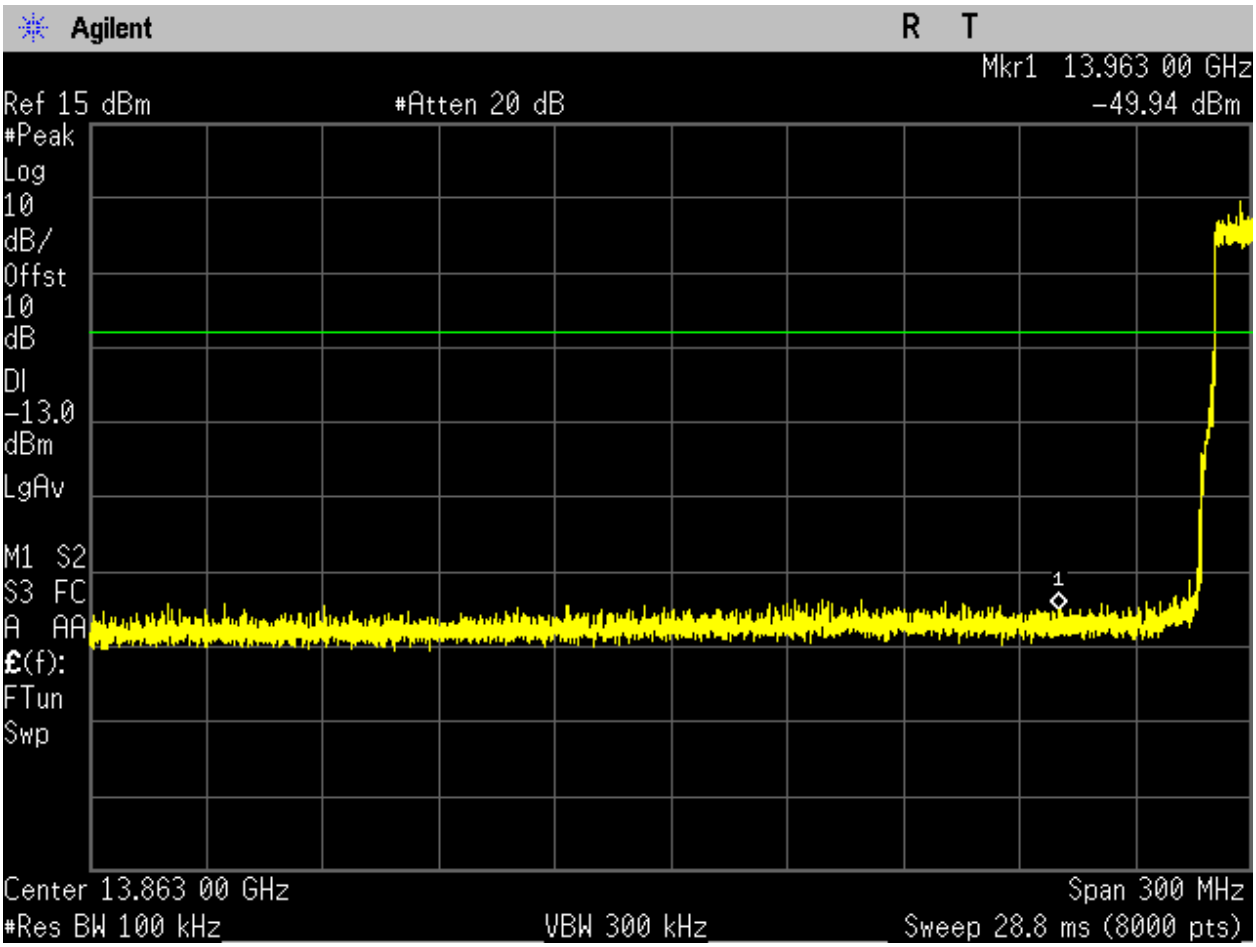

Figure 117. Band Edge (low), 8PSK, 20MHz Low Channel, 14.013 GHz.

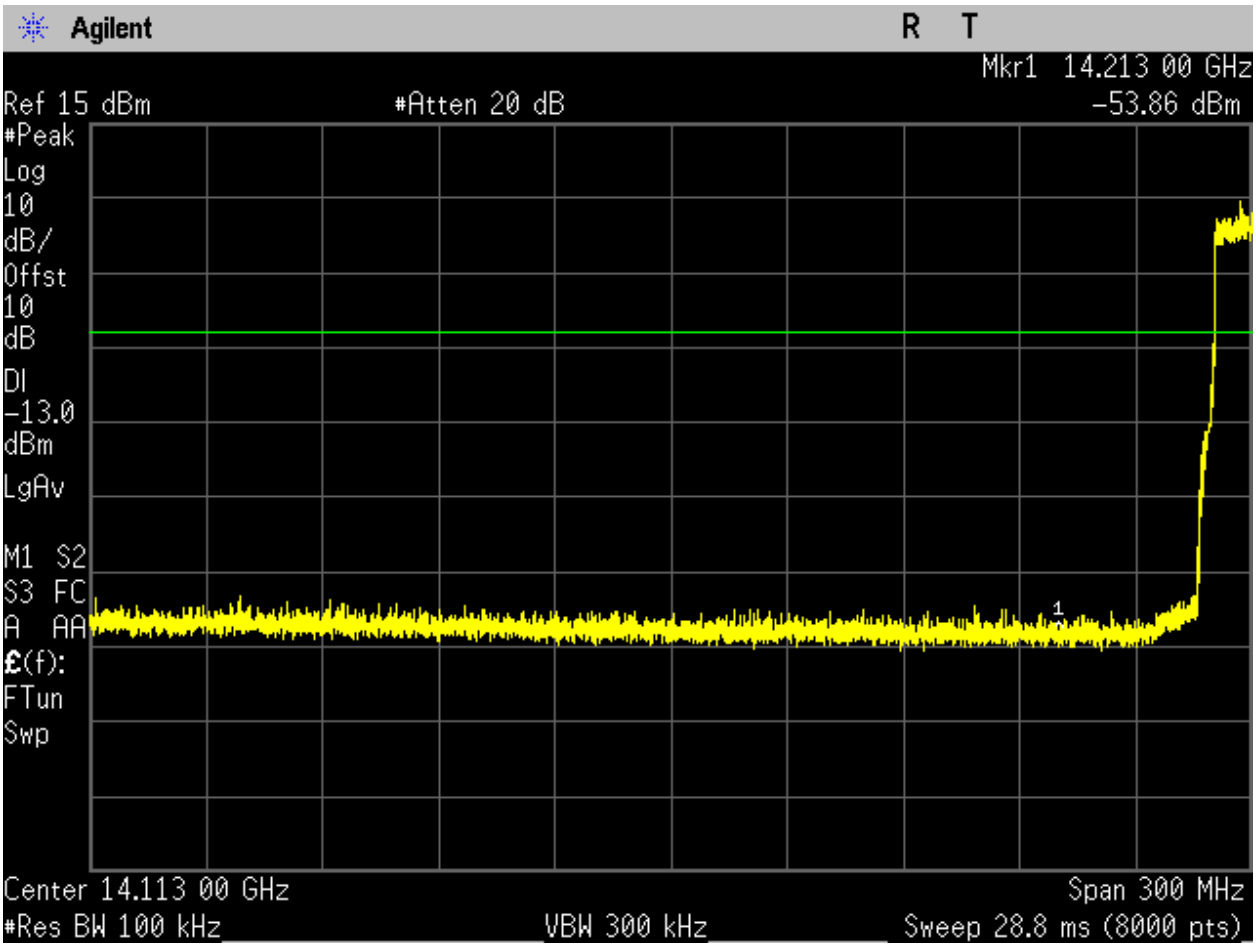

Figure 118. Band Edge (low), 8PSK, 20MHz Mid Channel, 14.263 GHz.

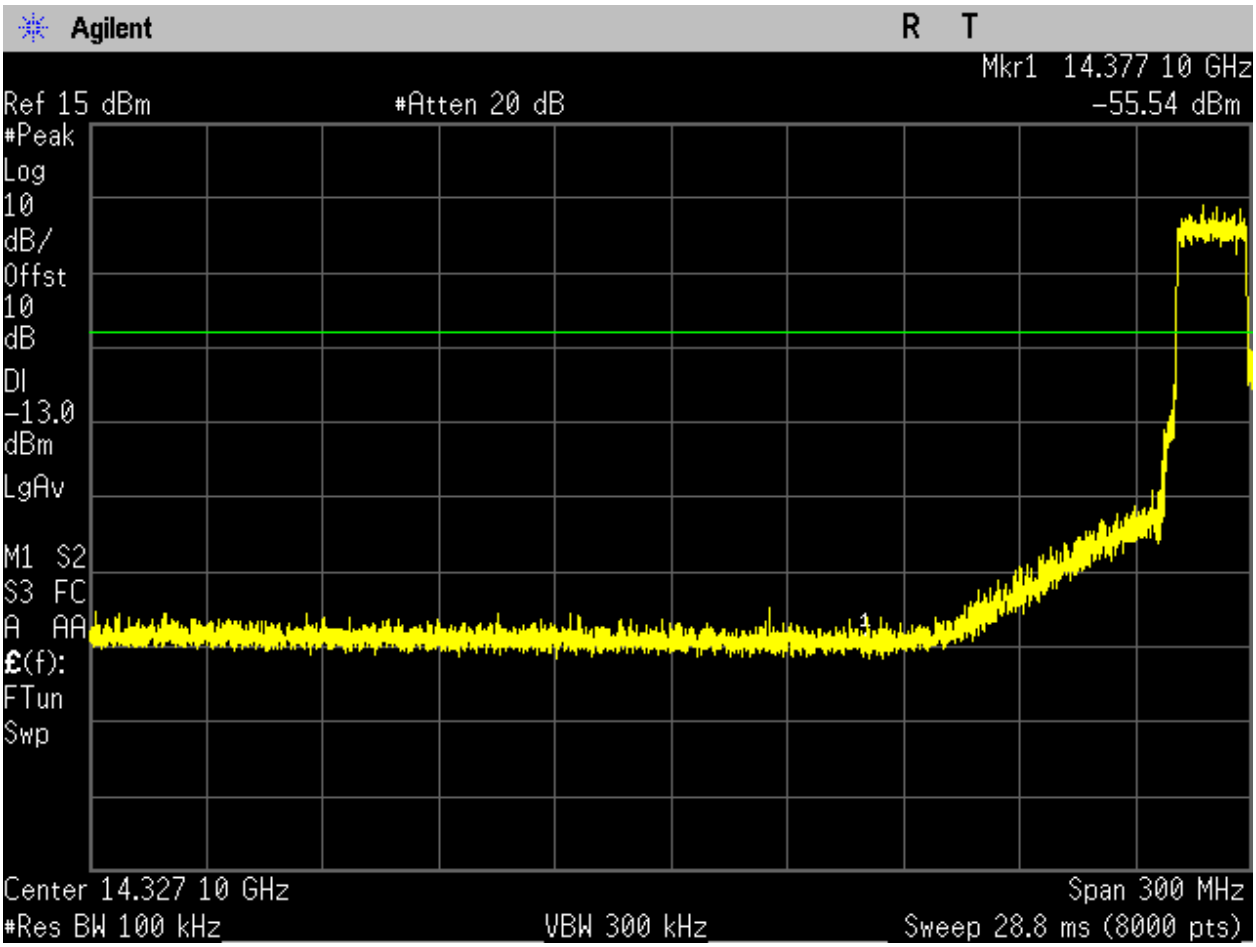

Figure 119. Band Edge (low), 8PSK, 40MHz High Channel, 14.4771 GHz.

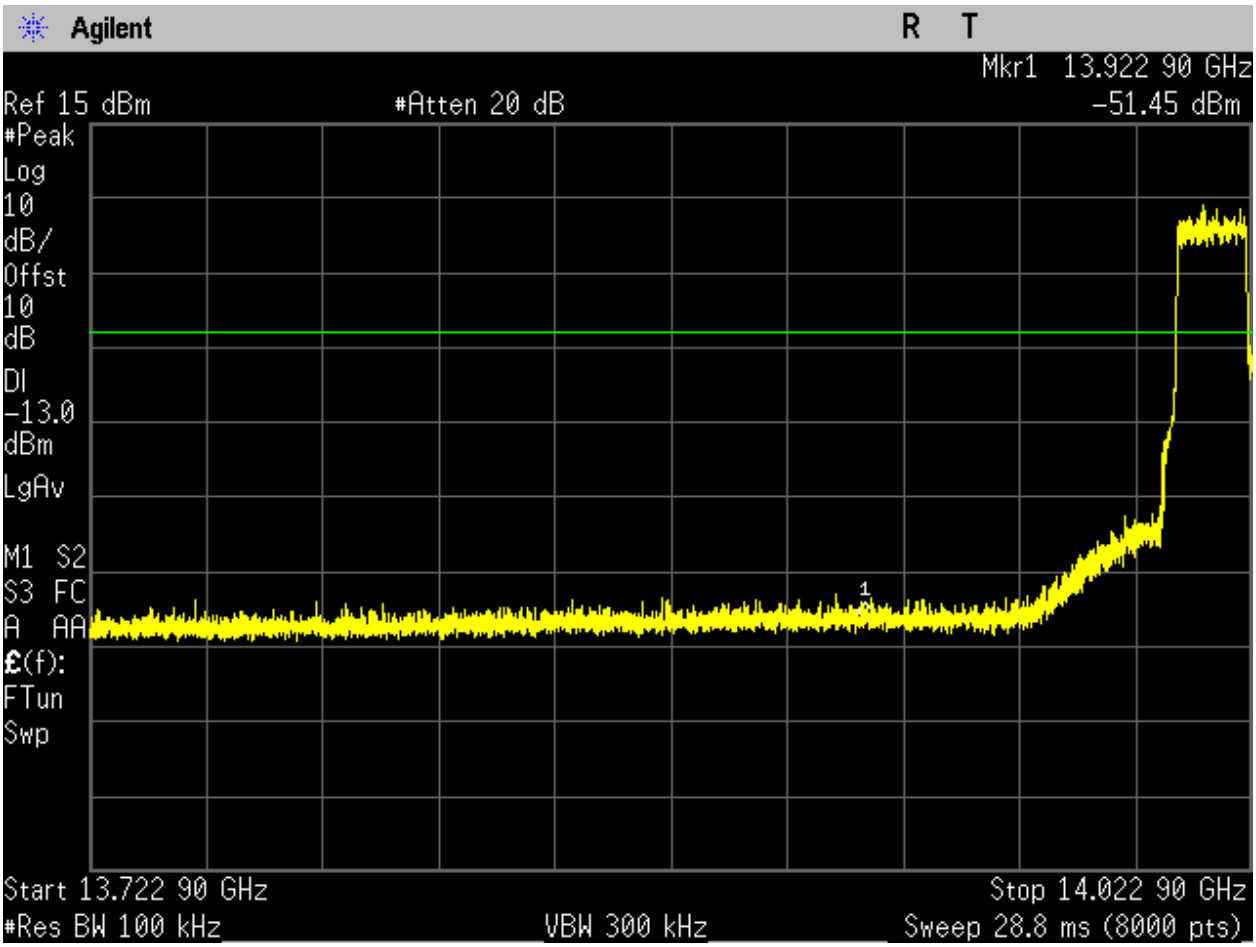

Figure 120. Band Edge (low), 8PSK, 40MHz Low Channel, 14.0229 GHz.

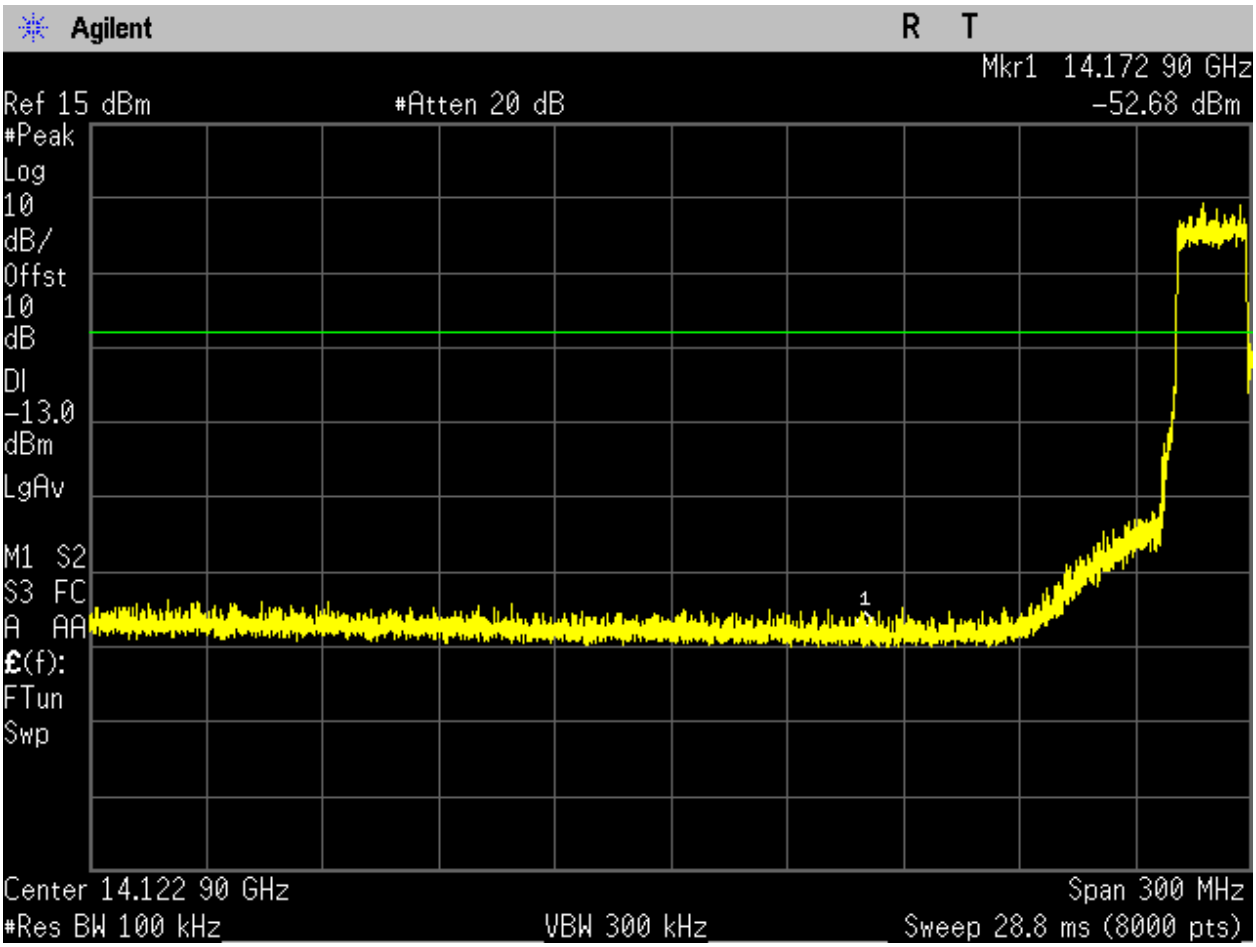

Figure 121. Band Edge (low), 8PSK, 40MHz Mid Channel, 14.2729 GHz.

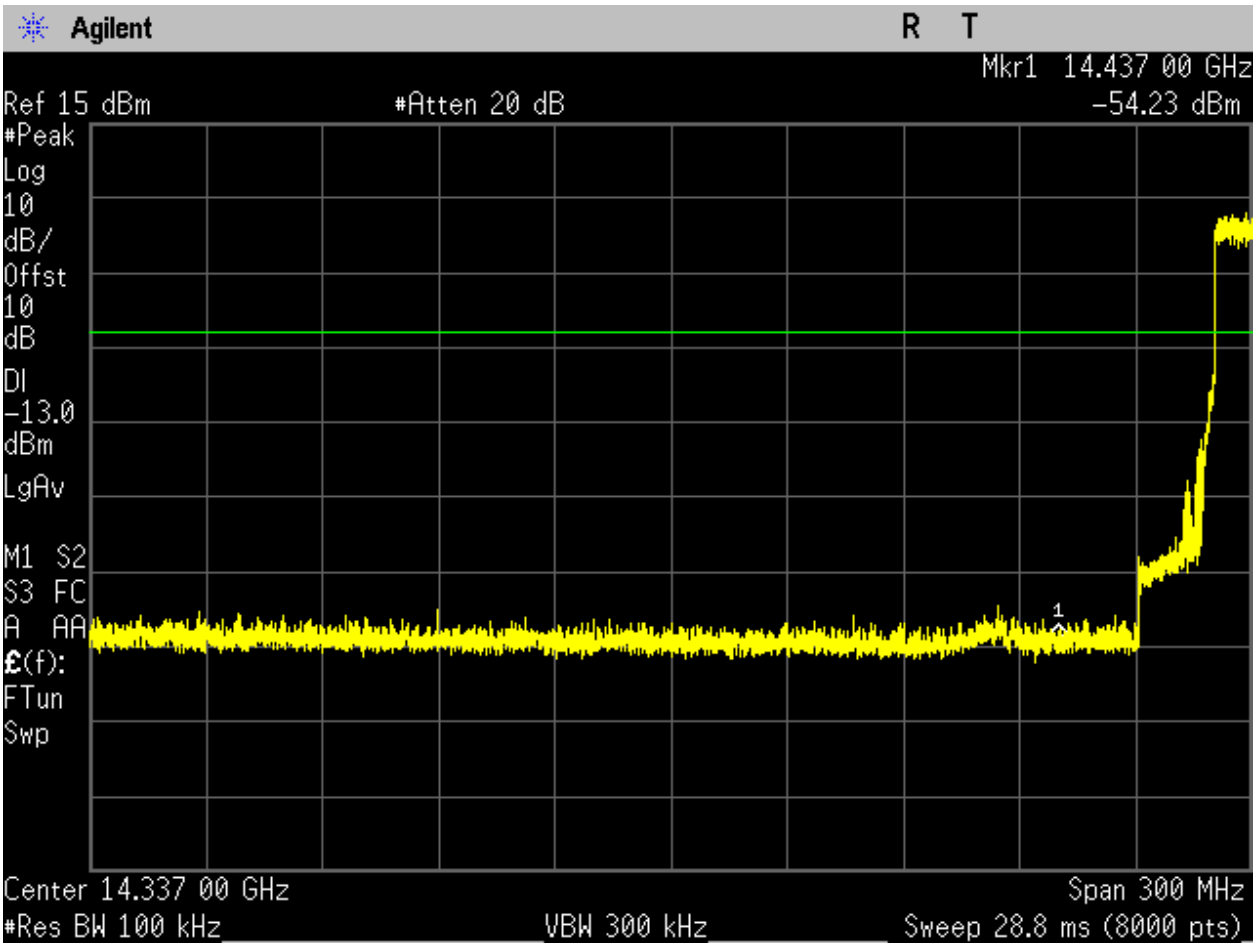

Figure 122. Band Edge (low), QPSK, 20MHz High Channel, 14.487 GHz.

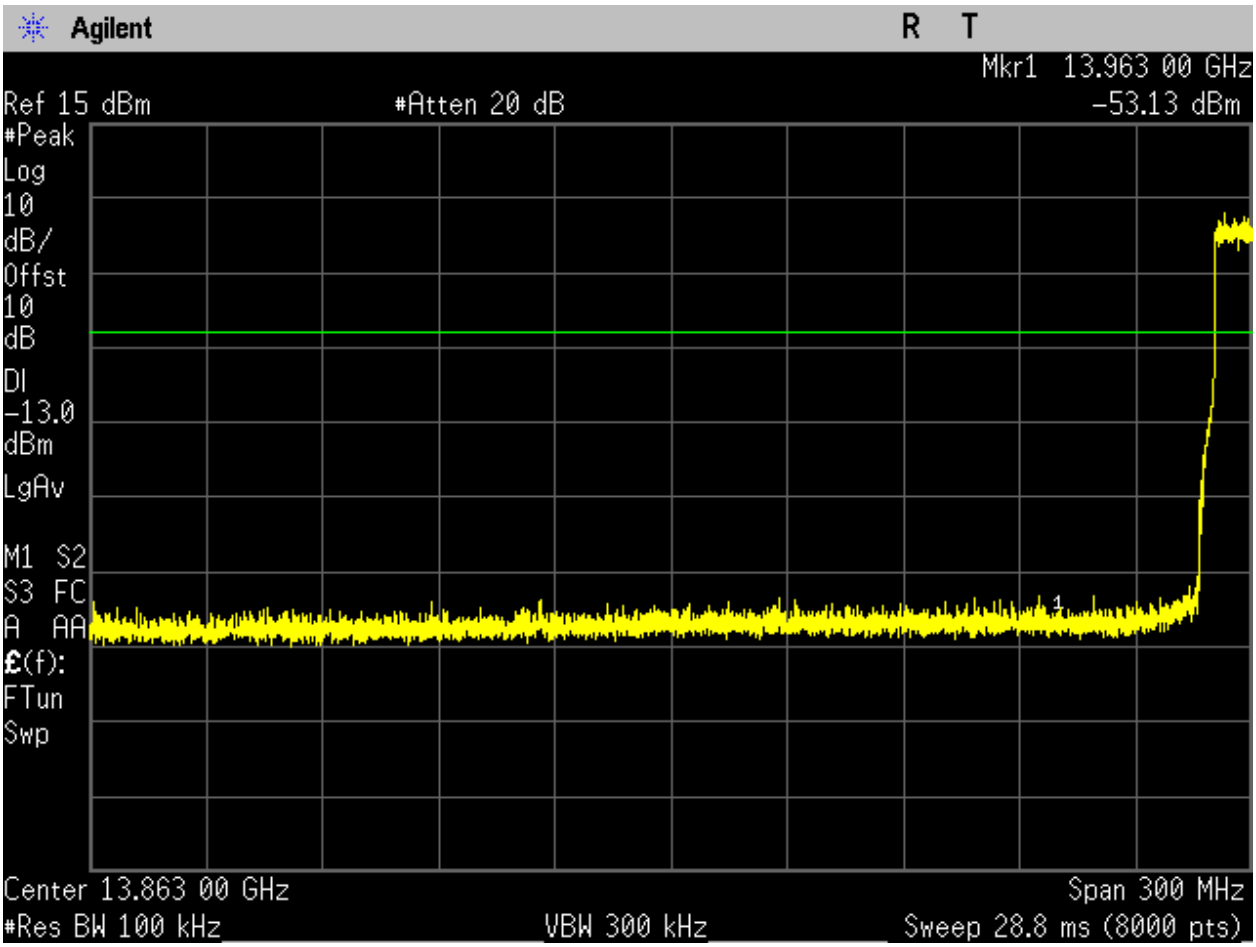

Figure 123. Band Edge (low), QPSK, 20MHz Low Channel, 14.013 GHz.

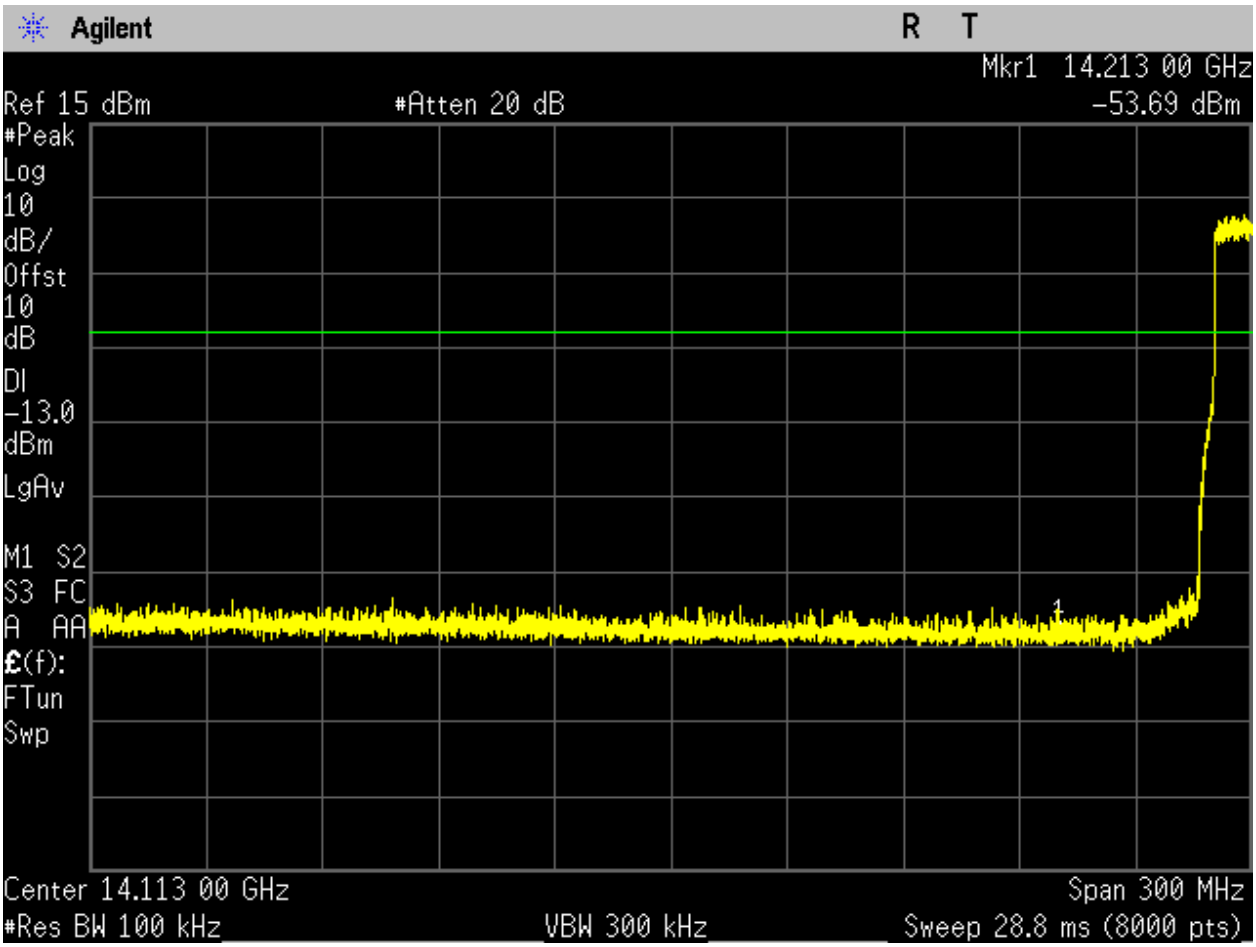

Figure 124. Band Edge (low), QPSK, 20MHz Mid Channel, 14.263 GHz.

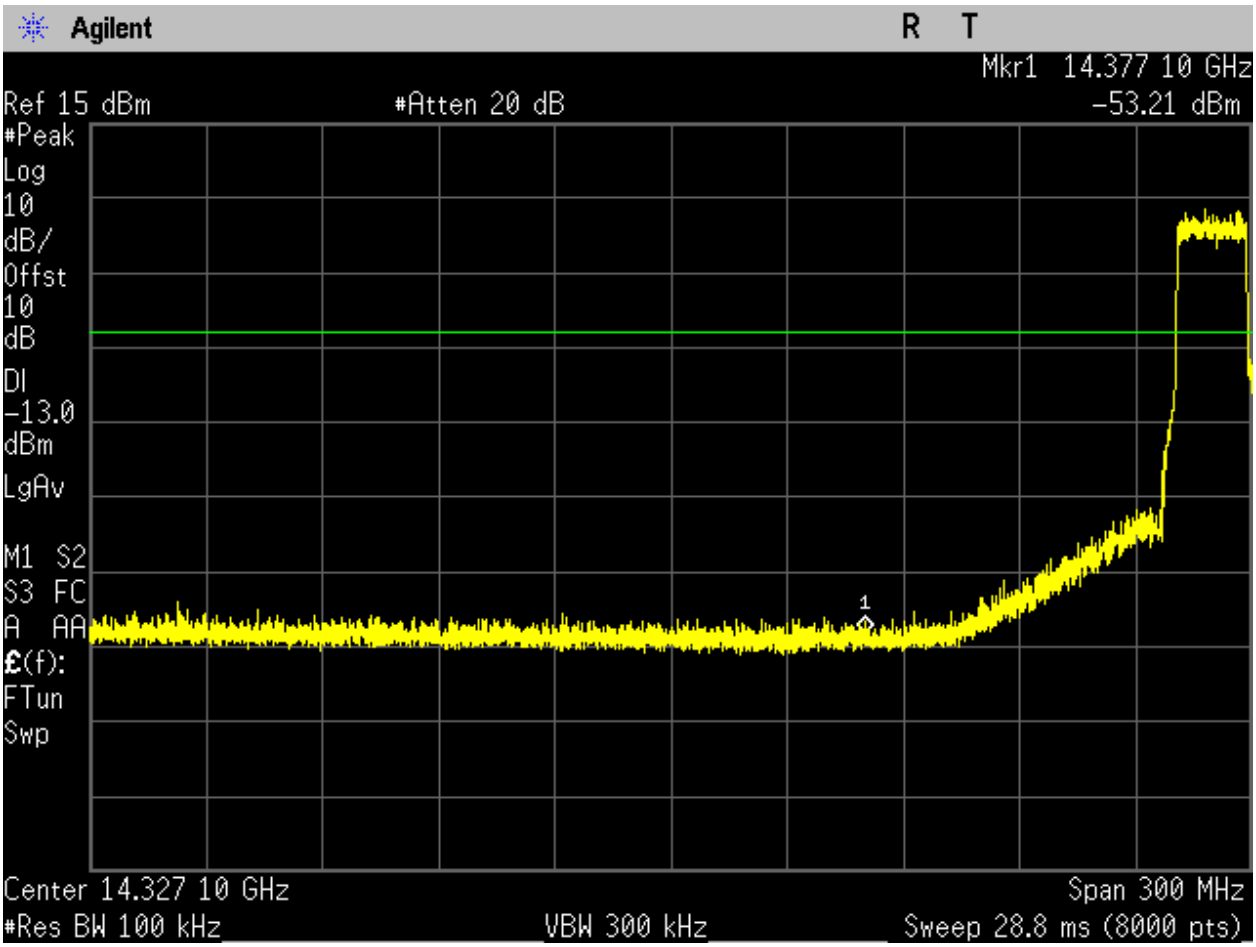

Figure 125. Band Edge (low), QPSK, 40MHz High Channel, 14.4771 GHz.

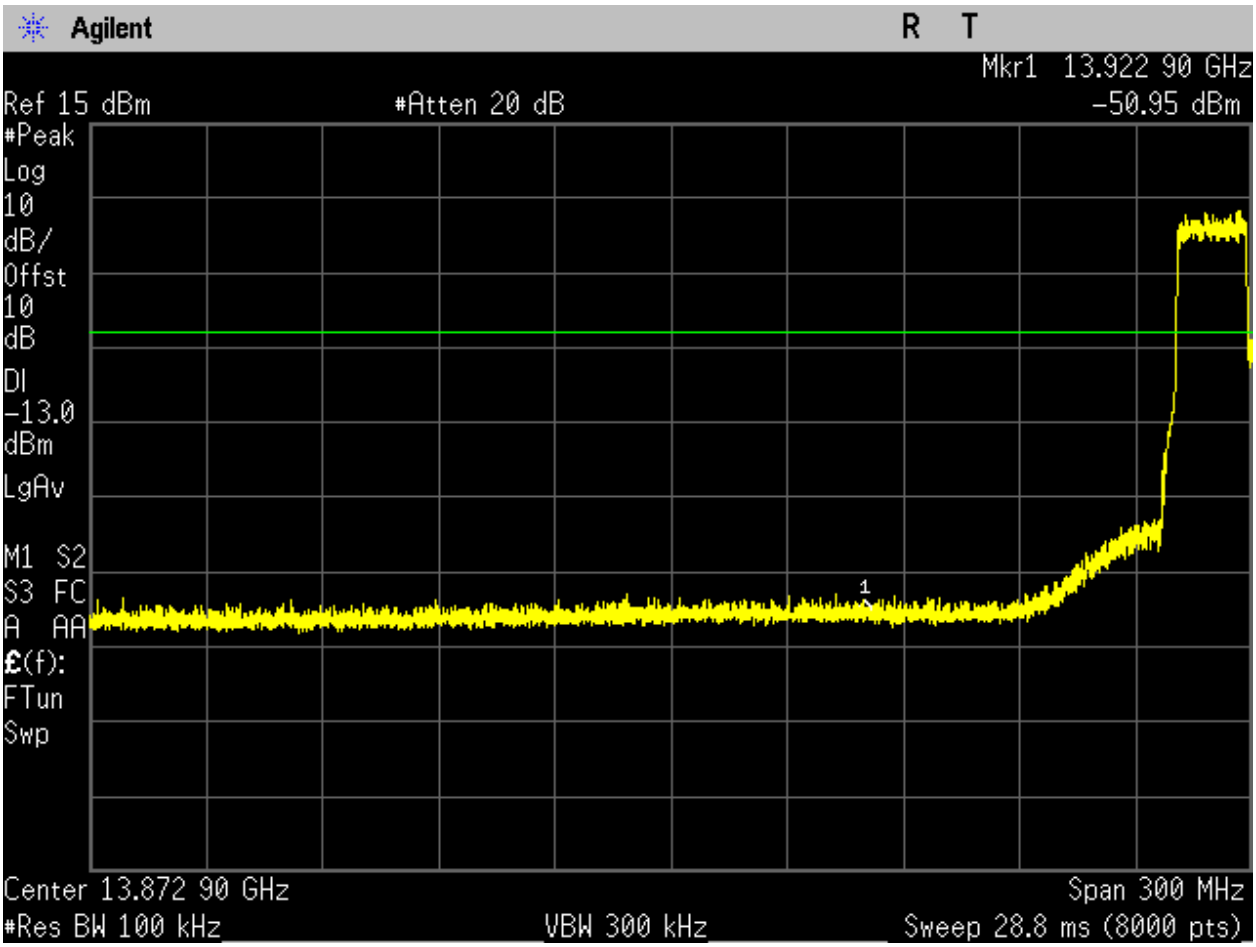

Figure 126. Band Edge (low), QPSK, 40MHz Low Channel, 14.0229 GHz.

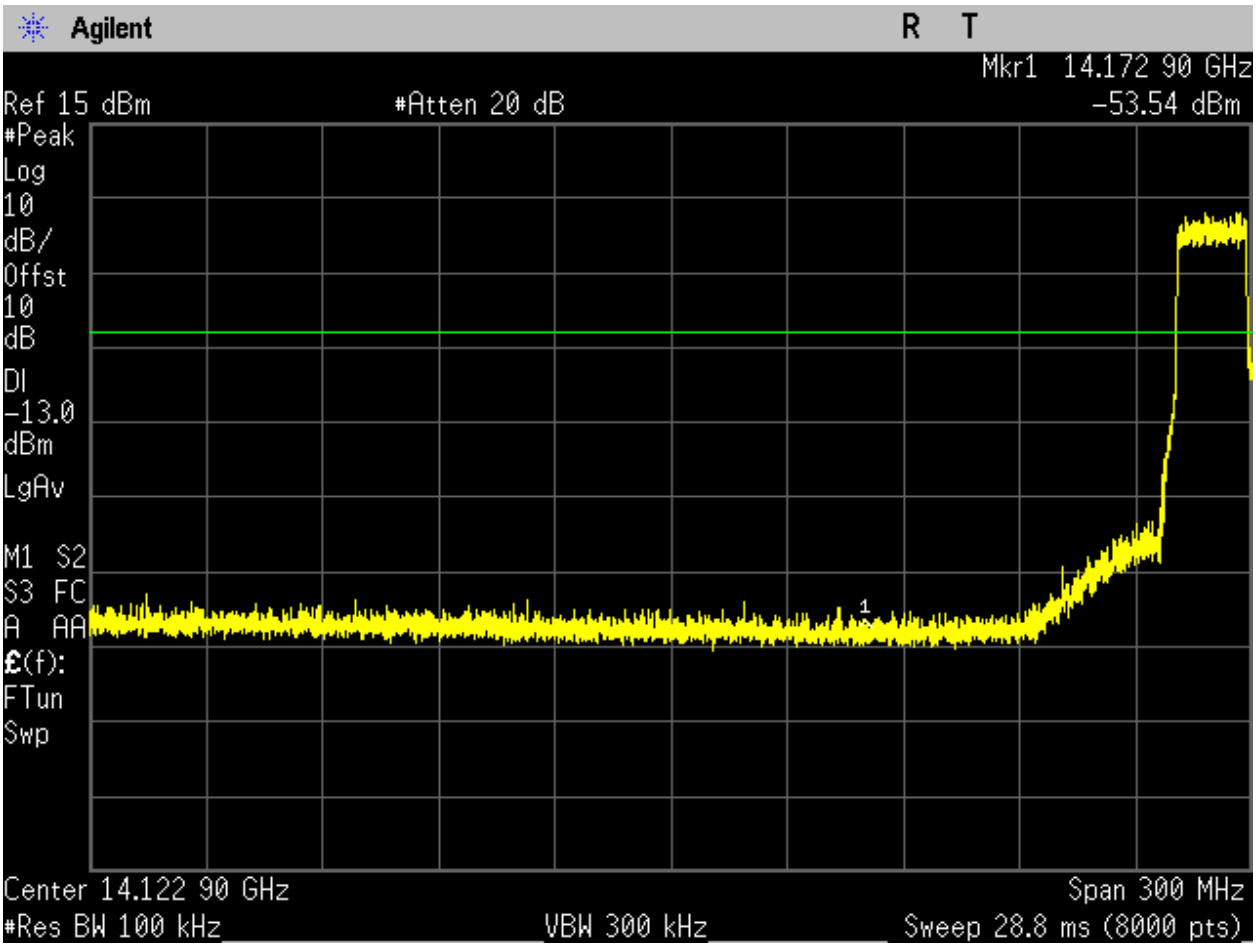

Figure 127. Band Edge (low), QPSK, 40MHz Mid Channel, 14.2729 GHz.

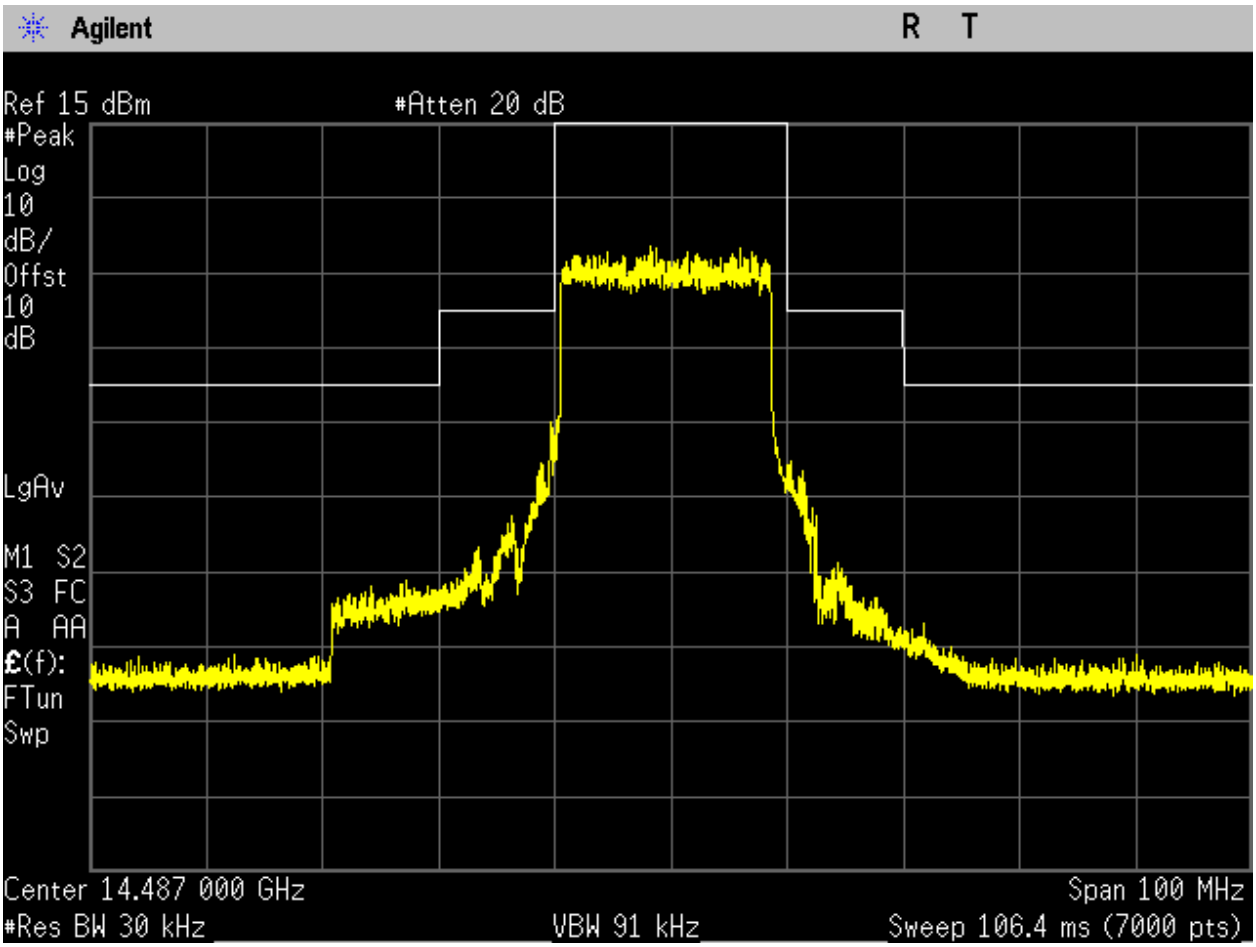

Figure 128. OoB, 16QAM, 20MHz High Channel, 14.487 GHz (PreScan).

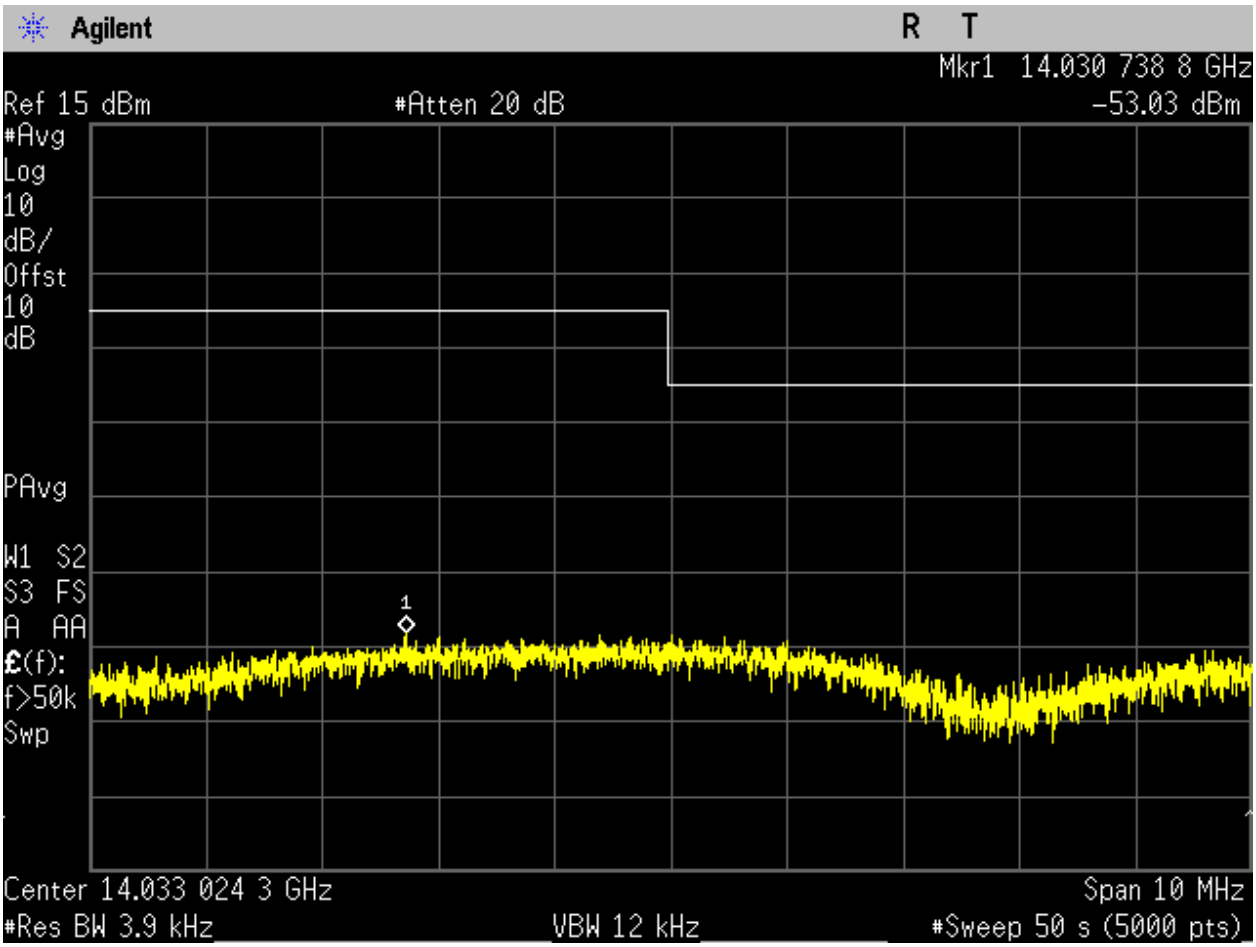

Figure 129. OoB, 16QAM, 20MHz Low Channel, 14.013 GHz (14.03GHz emission).

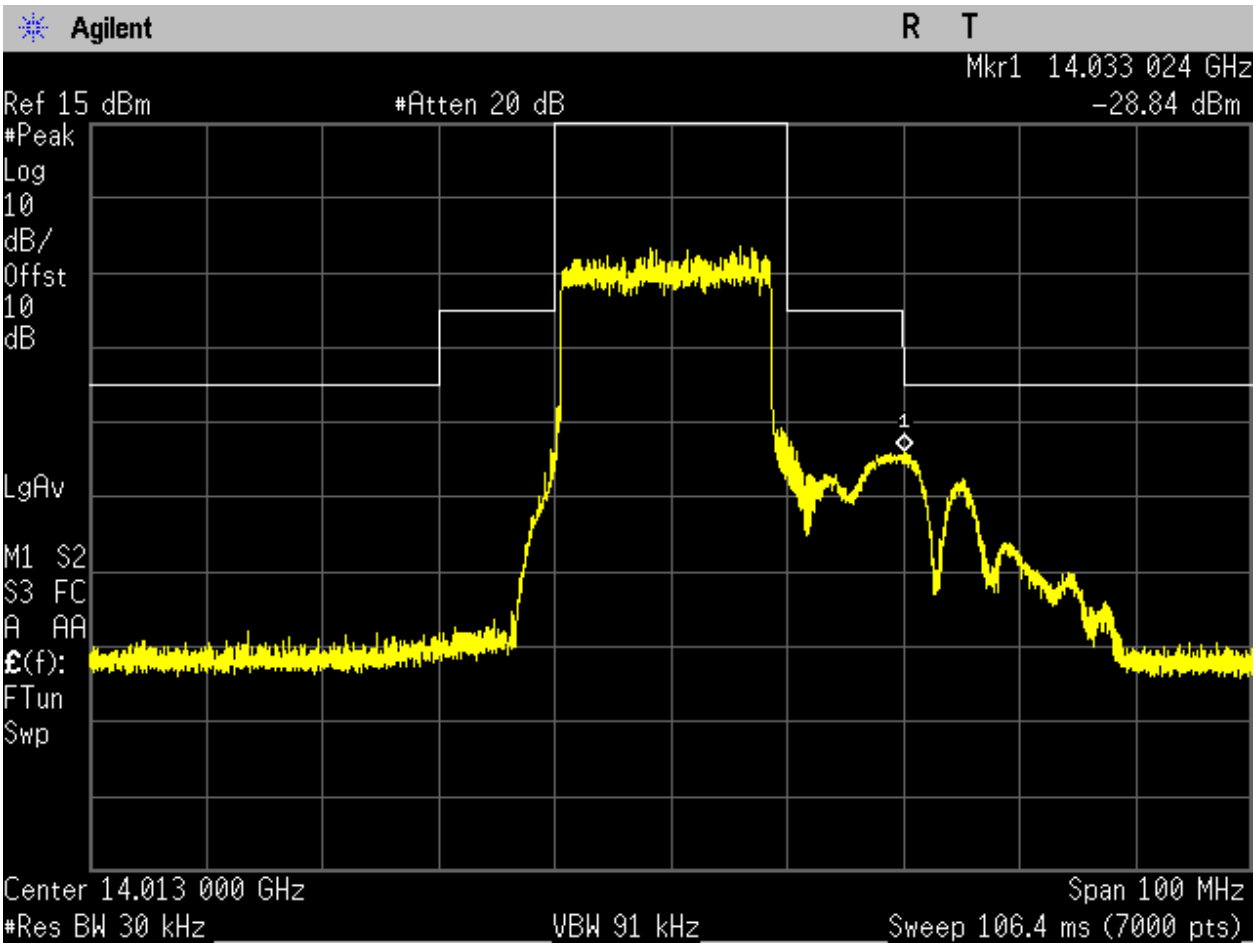

Figure 130. OoB, 16QAM, 20MHz Low Channel, 14.013 GHz (PreScan).

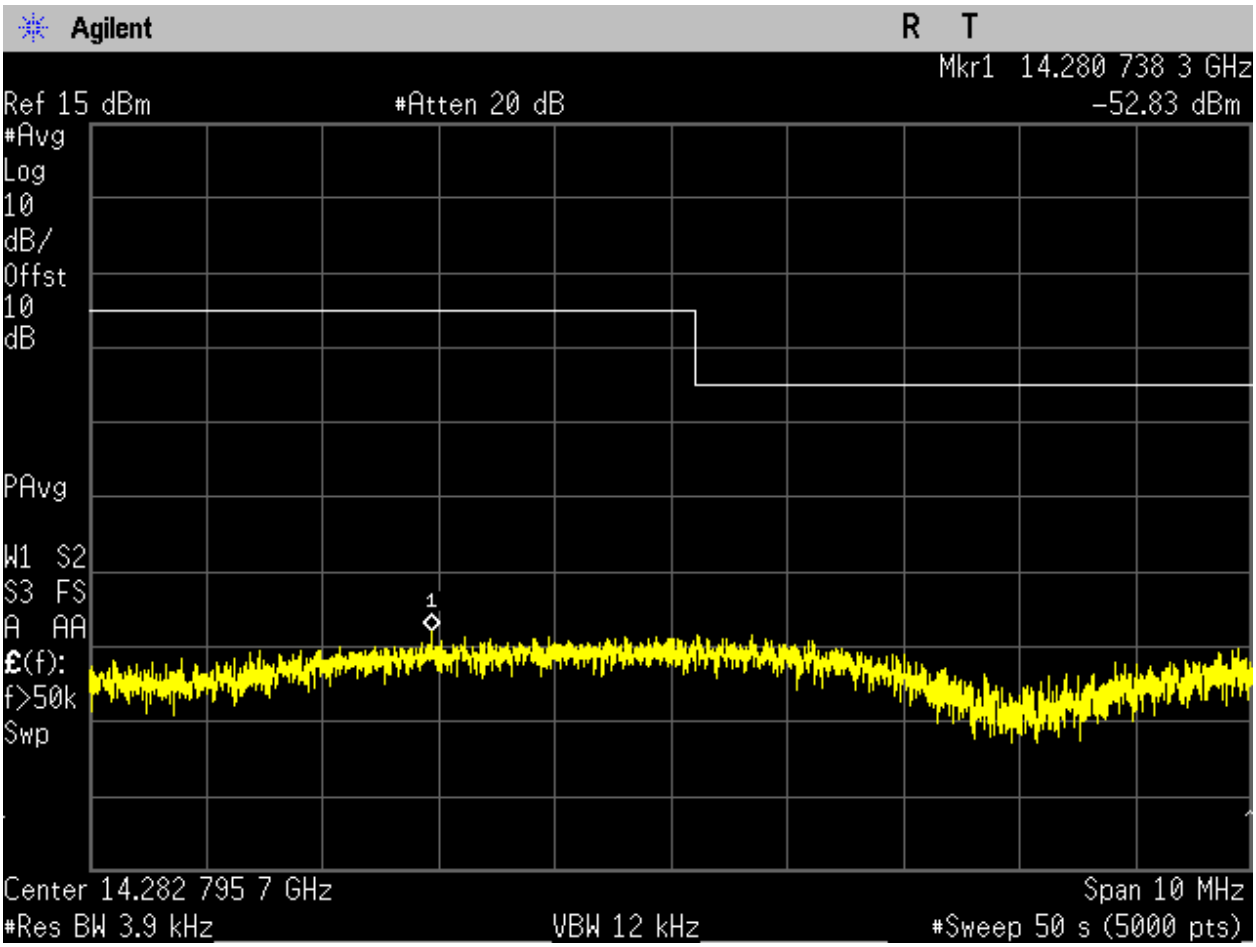

Figure 131. OoB, 16QAM, 20MHz Mid Channel, 14.263 GHz (14.28GHz emission).

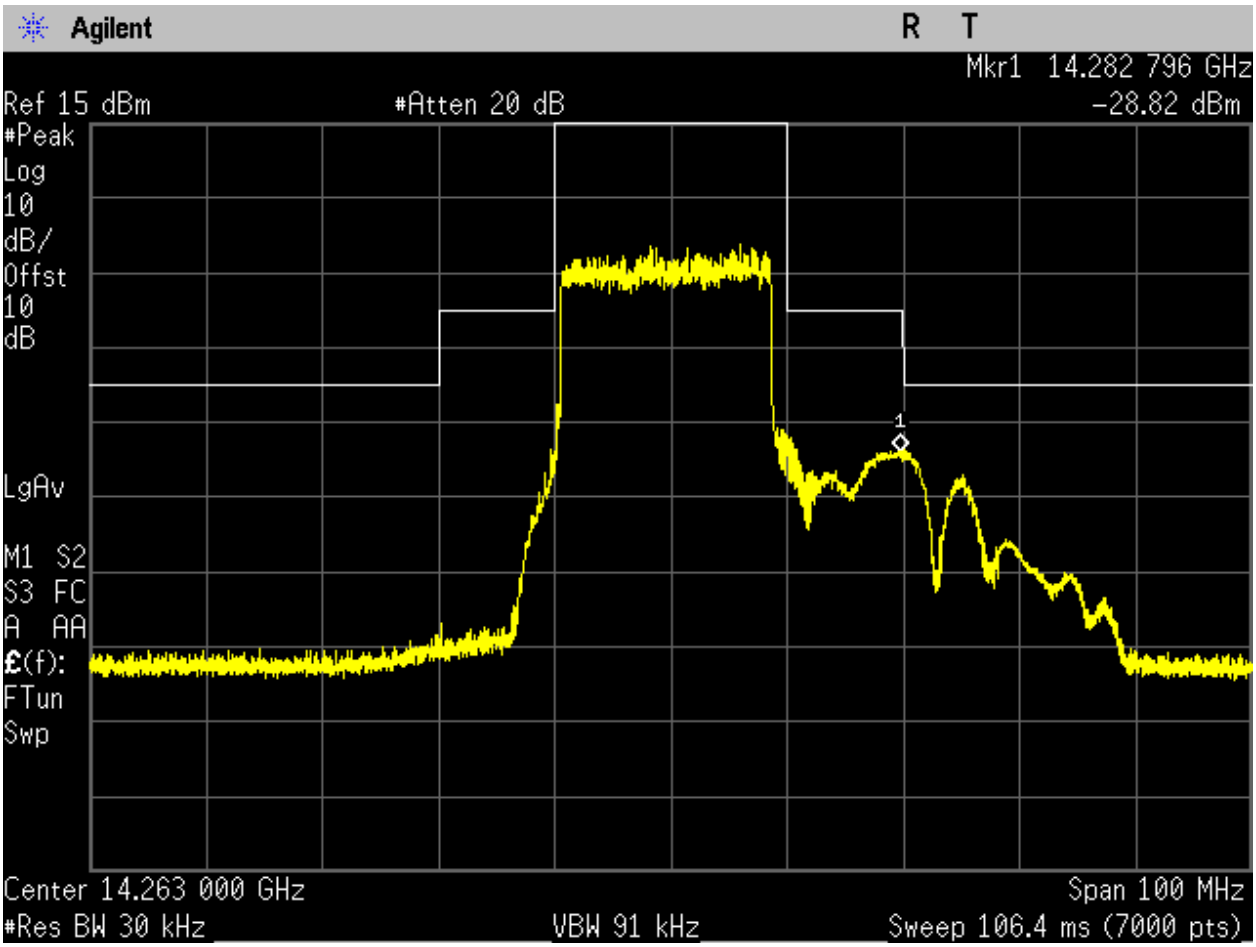

Figure 132. OoB, 16QAM, 20MHz Mid Channel, 14.263 GHz (PreScan).

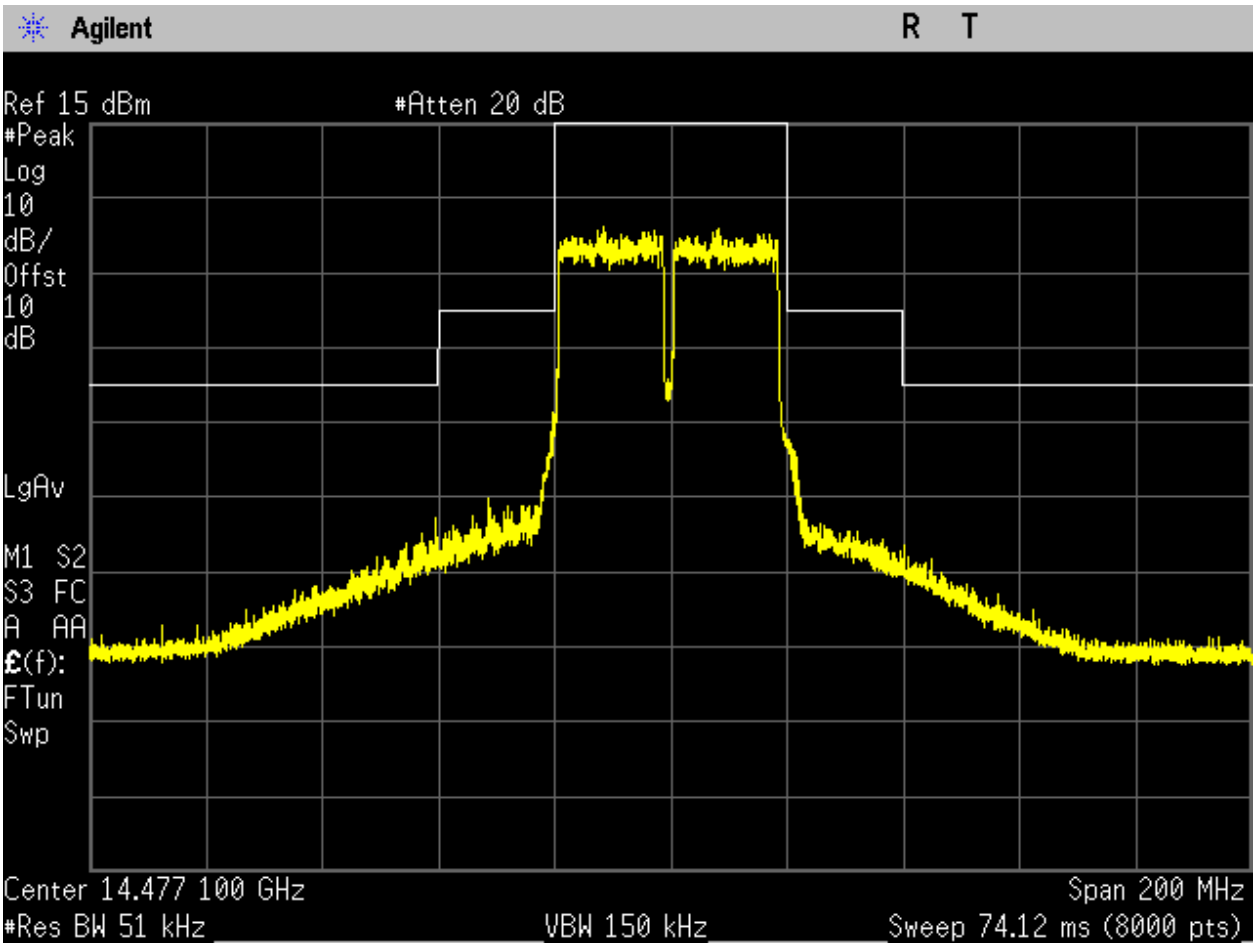

Figure 133. OoB, 16QAM, 40MHz High Channel, 14.4771 GHz (PreScan).

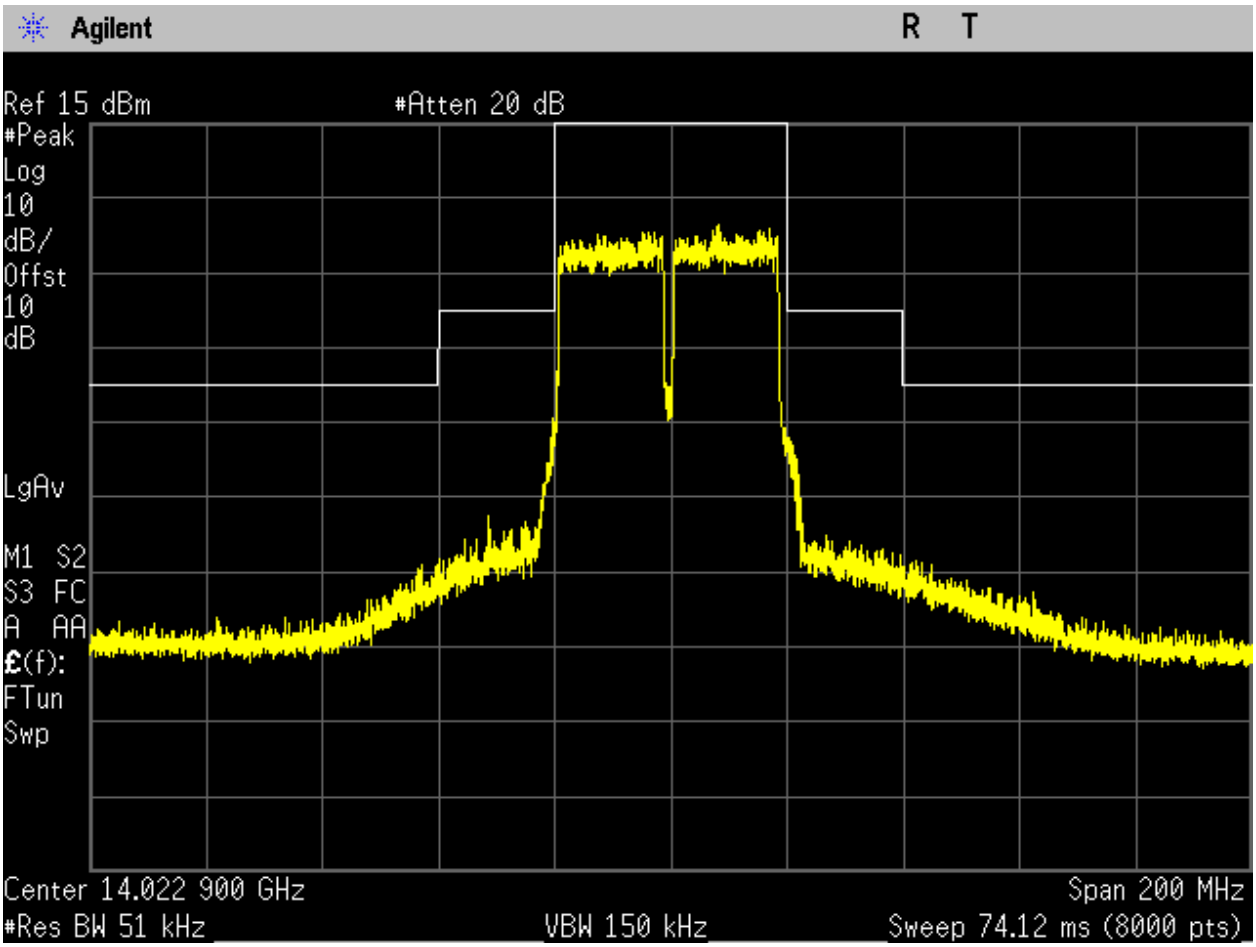

Figure 134. OoB, 16QAM, 40MHz Low Channel, 14.0229 GHz (PreScan).

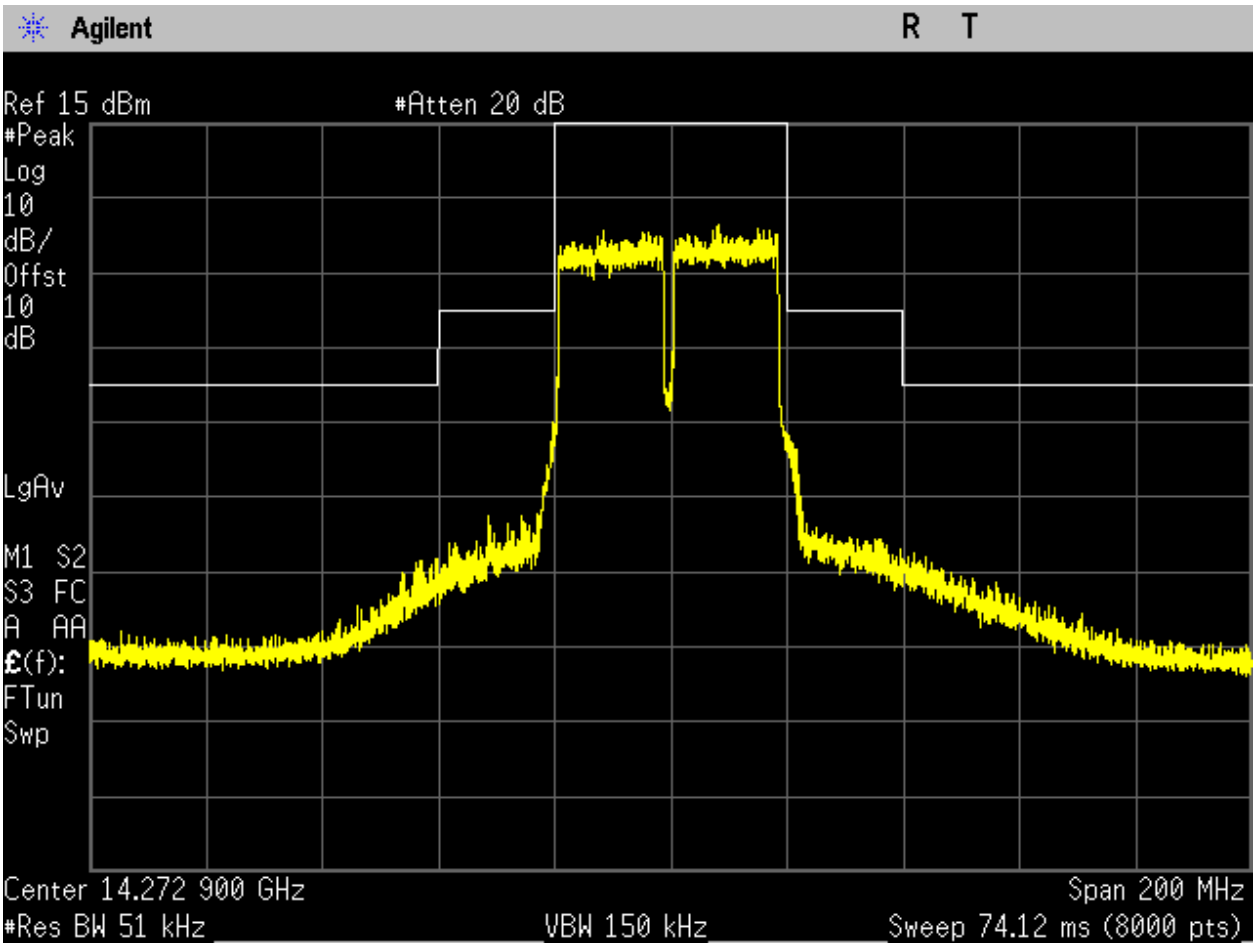

Figure 135. OoB, 16QAM, 40MHz Mid Channel, 14.2729 GHz (PreScan).

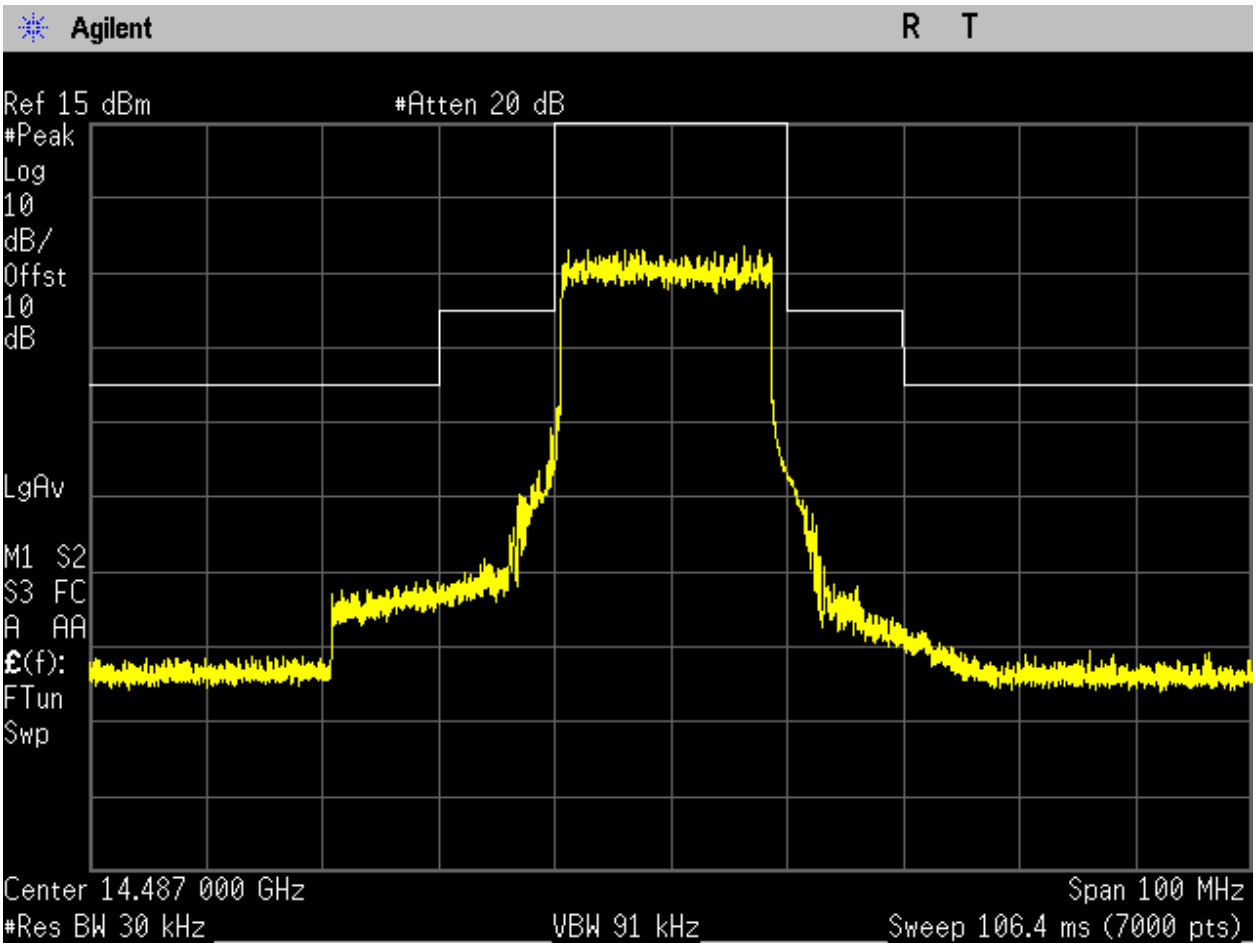

Figure 136. OoB, 8PSK, 20MHz High Channel, 14.487 GHz (PreScan).

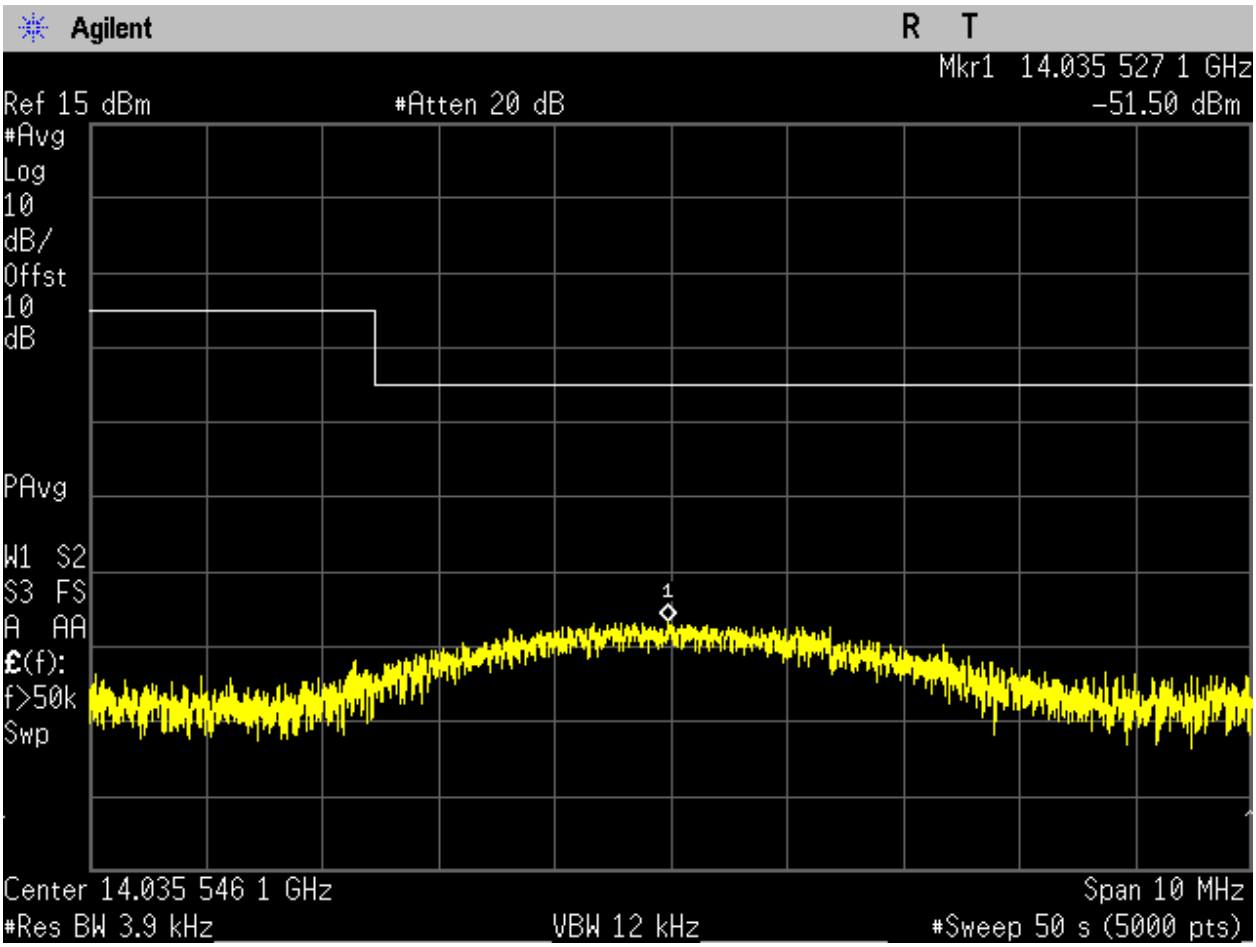

Figure 137. OoB, 8PSK, 20MHz Low Channel, 14.013 GHz (14.035GHz emission).

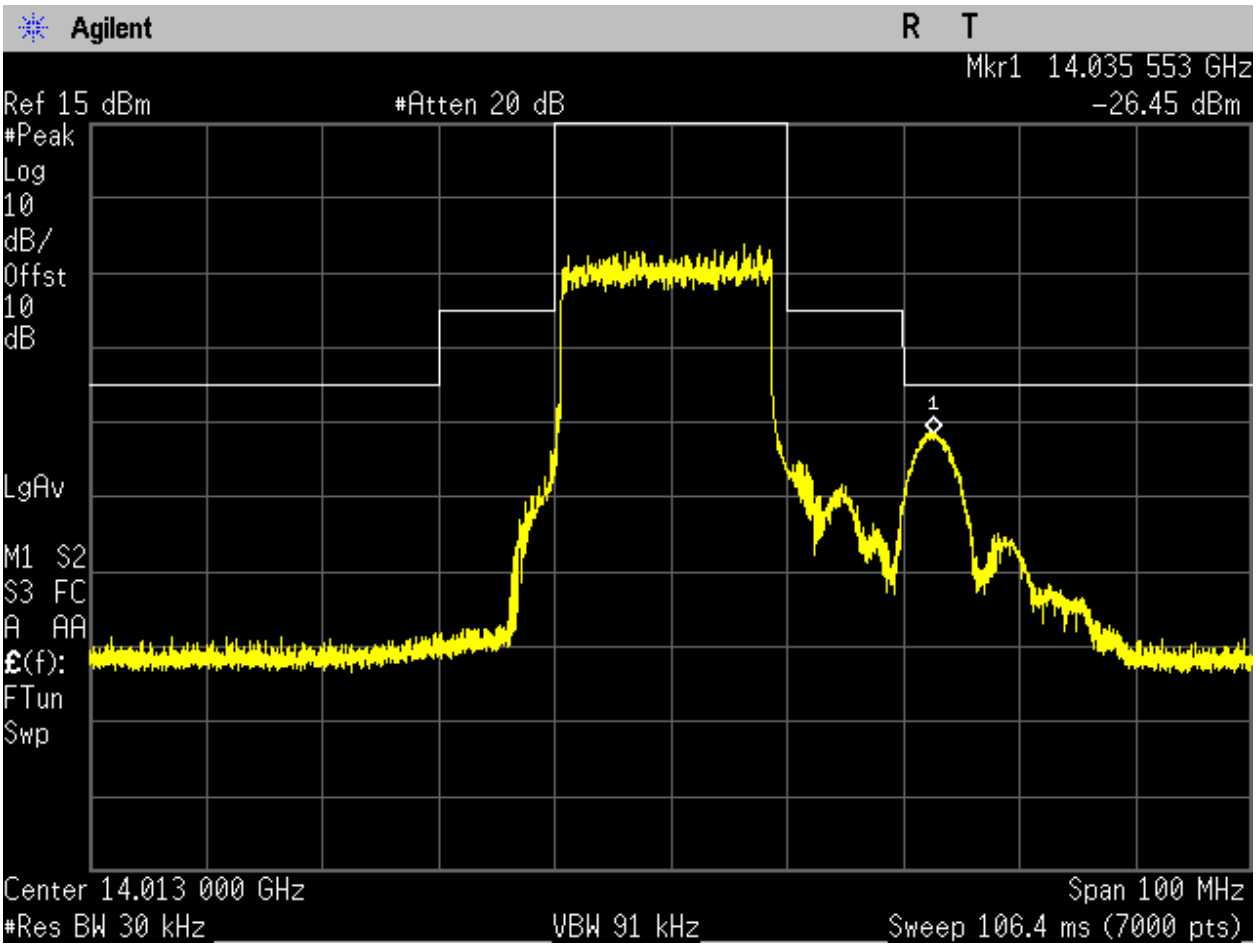

Figure 138. OoB, 8PSK, 20MHz Low Channel, 14.013 GHz (PreScan).

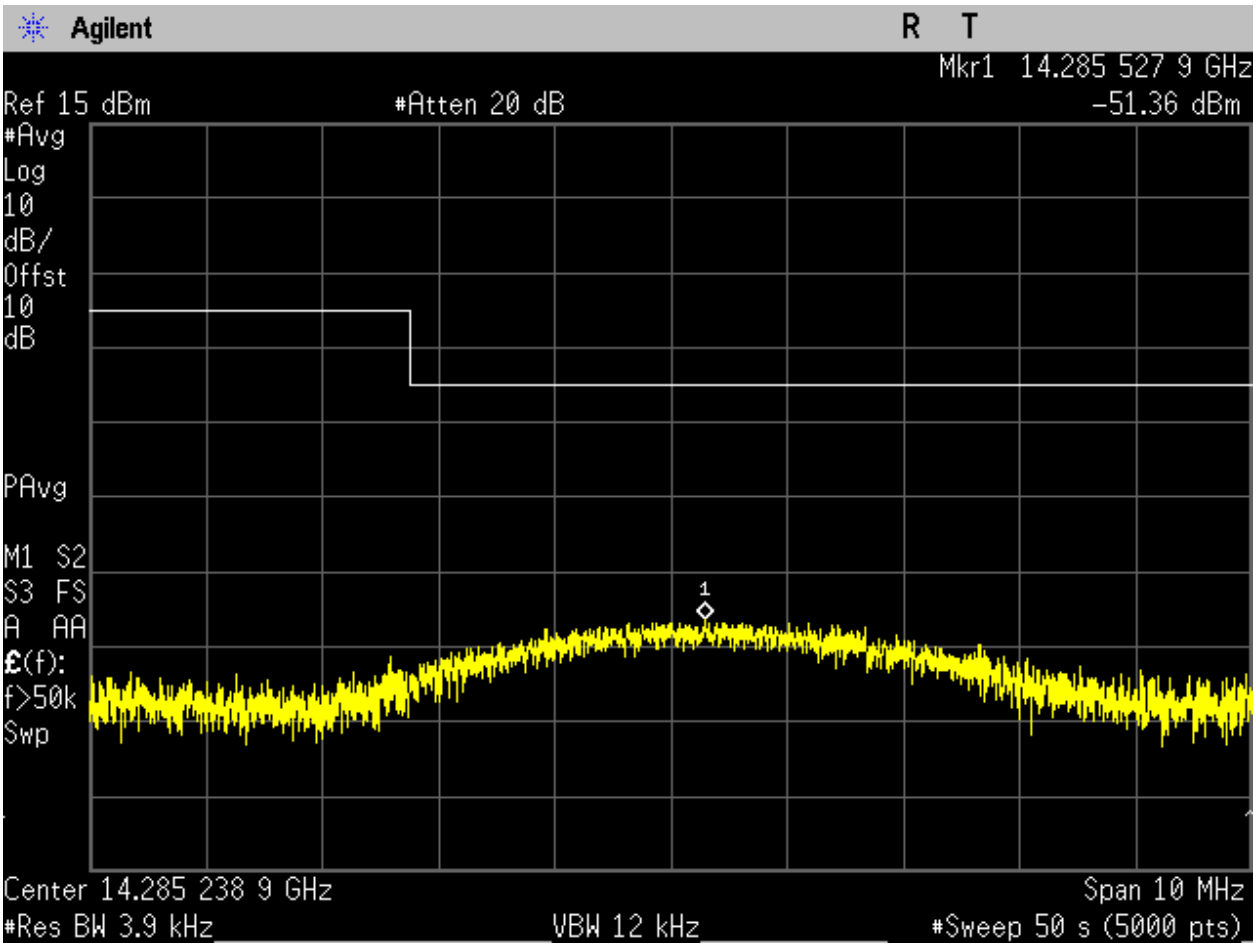

Figure 139. OoB, 8PSK, 20MHz Mid Channel, 14.263 GHz (14.285GHz Emission).

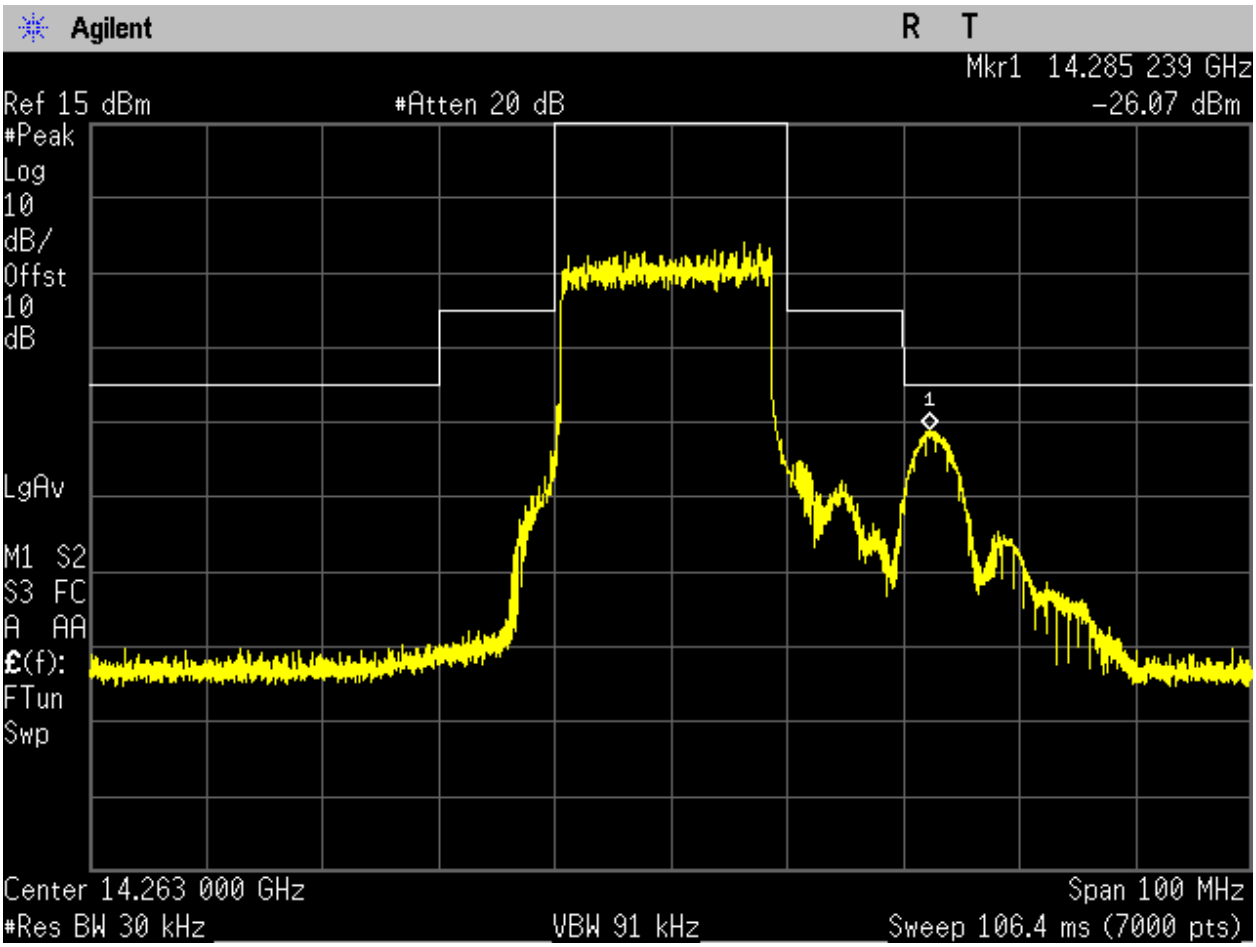

Figure 140. OoB, 8PSK, 20MHz Mid Channel, 14.263 GHz (PreScan).

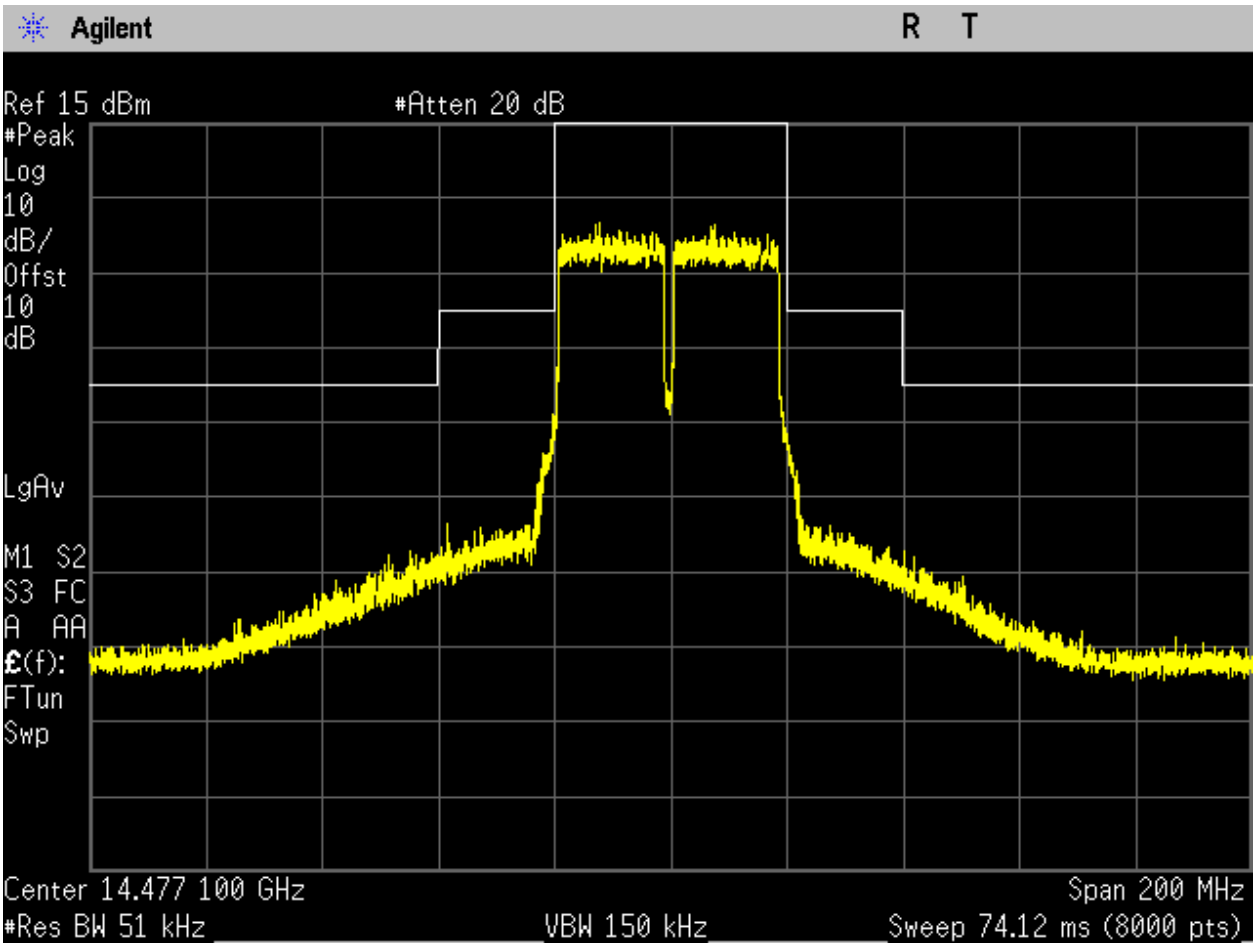

Figure 141. OoB, 8PSK, 40MHz High Channel, 14.4771 GHz (PreScan).

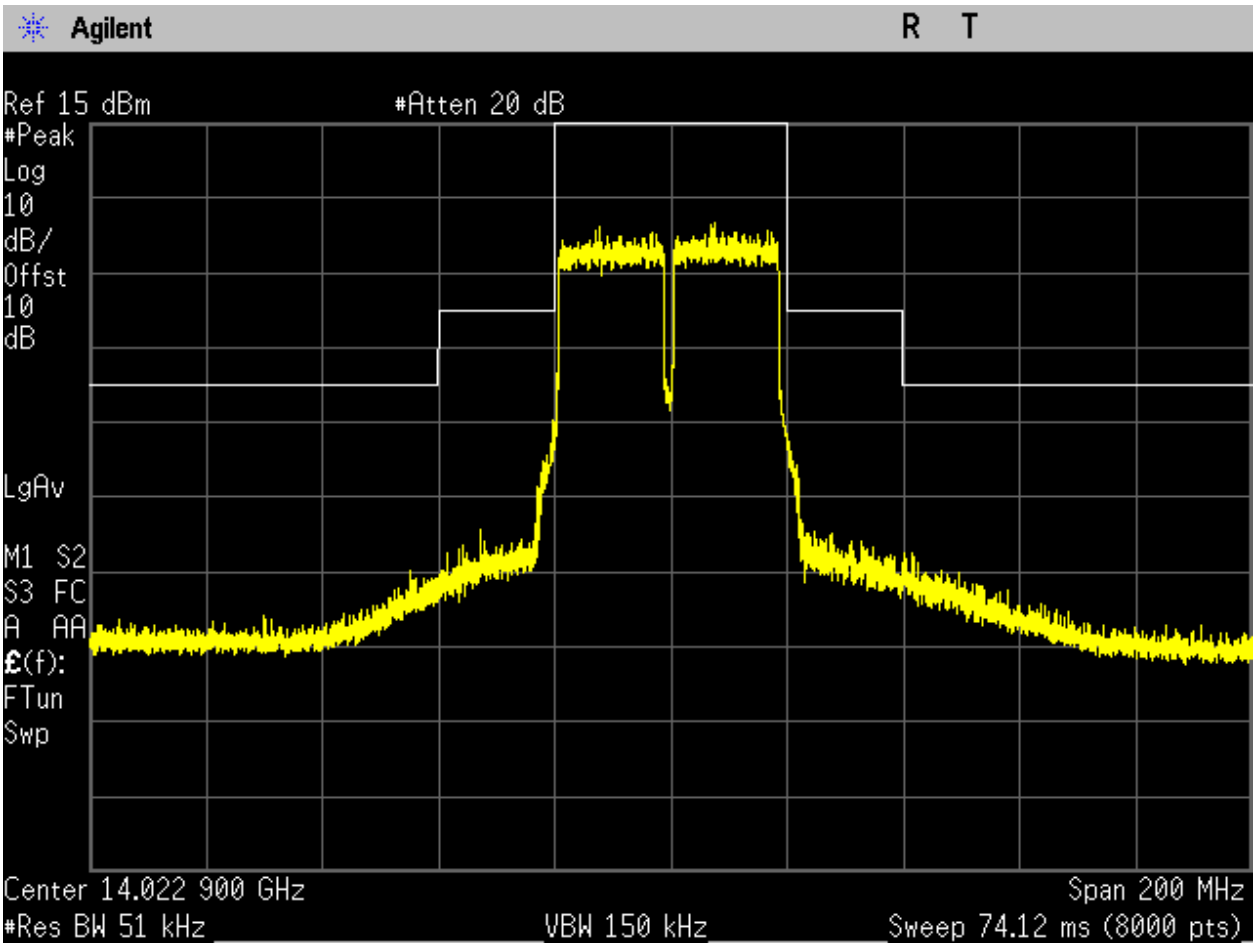

Figure 142. OoB, 8PSK, 40MHz Low Channel, 14.0229 GHz (PreScan).

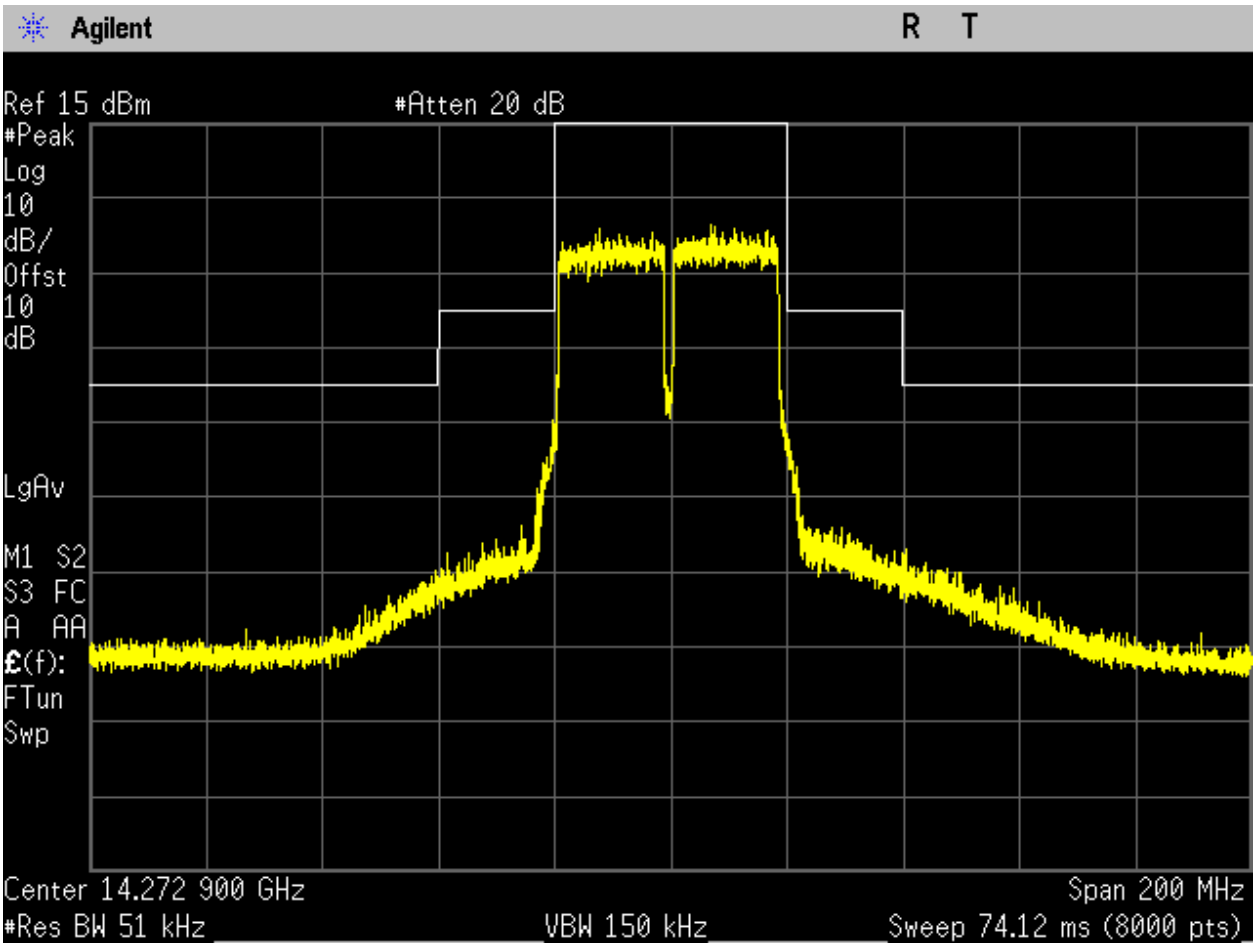

Figure 143. OoB, 8PSK, 40MHz Mid Channel, 14.2729 GHz (PreScan).

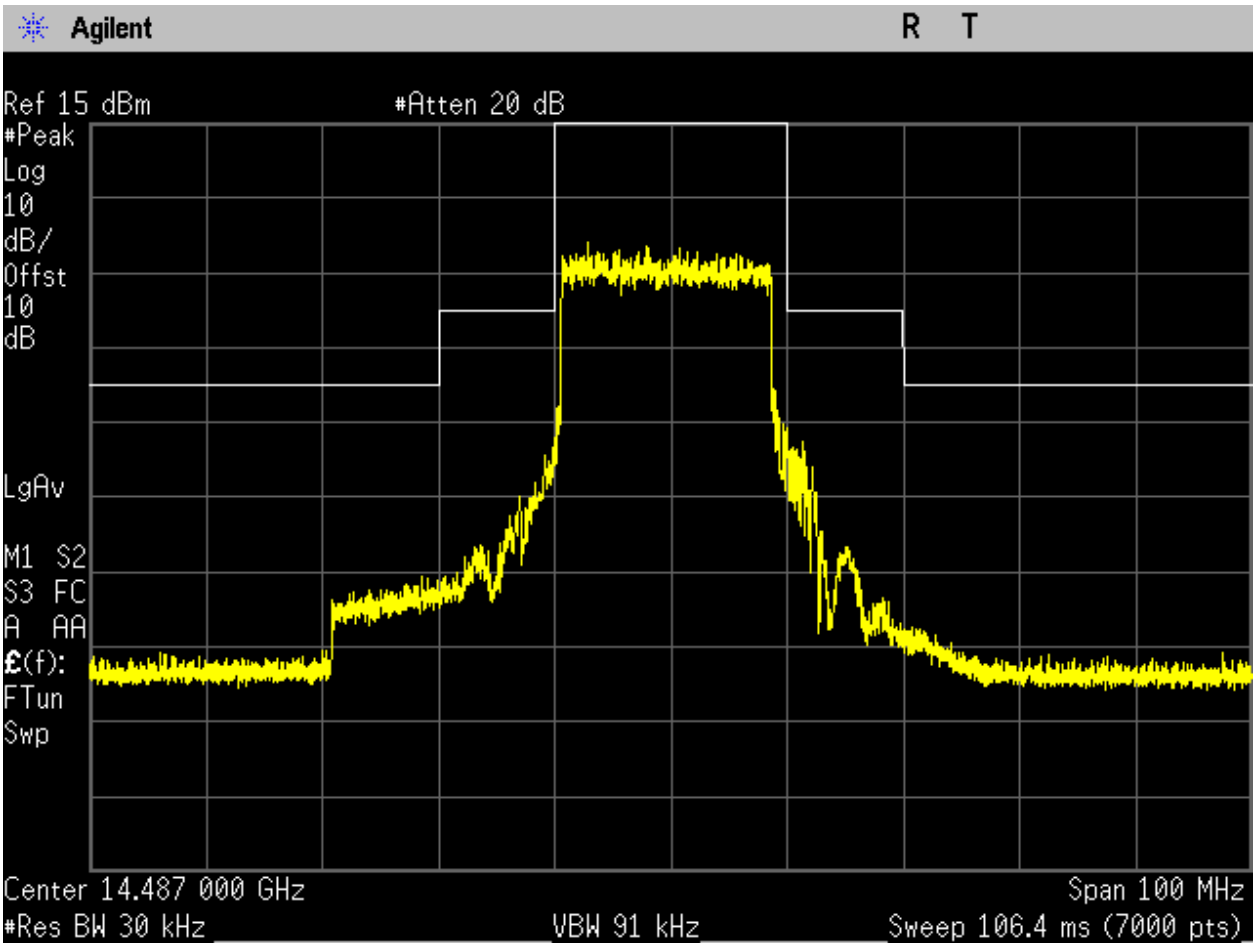

Figure 144. OoB, QPSK, 20MHz High Channel, 14.487 GHz (PreScan).

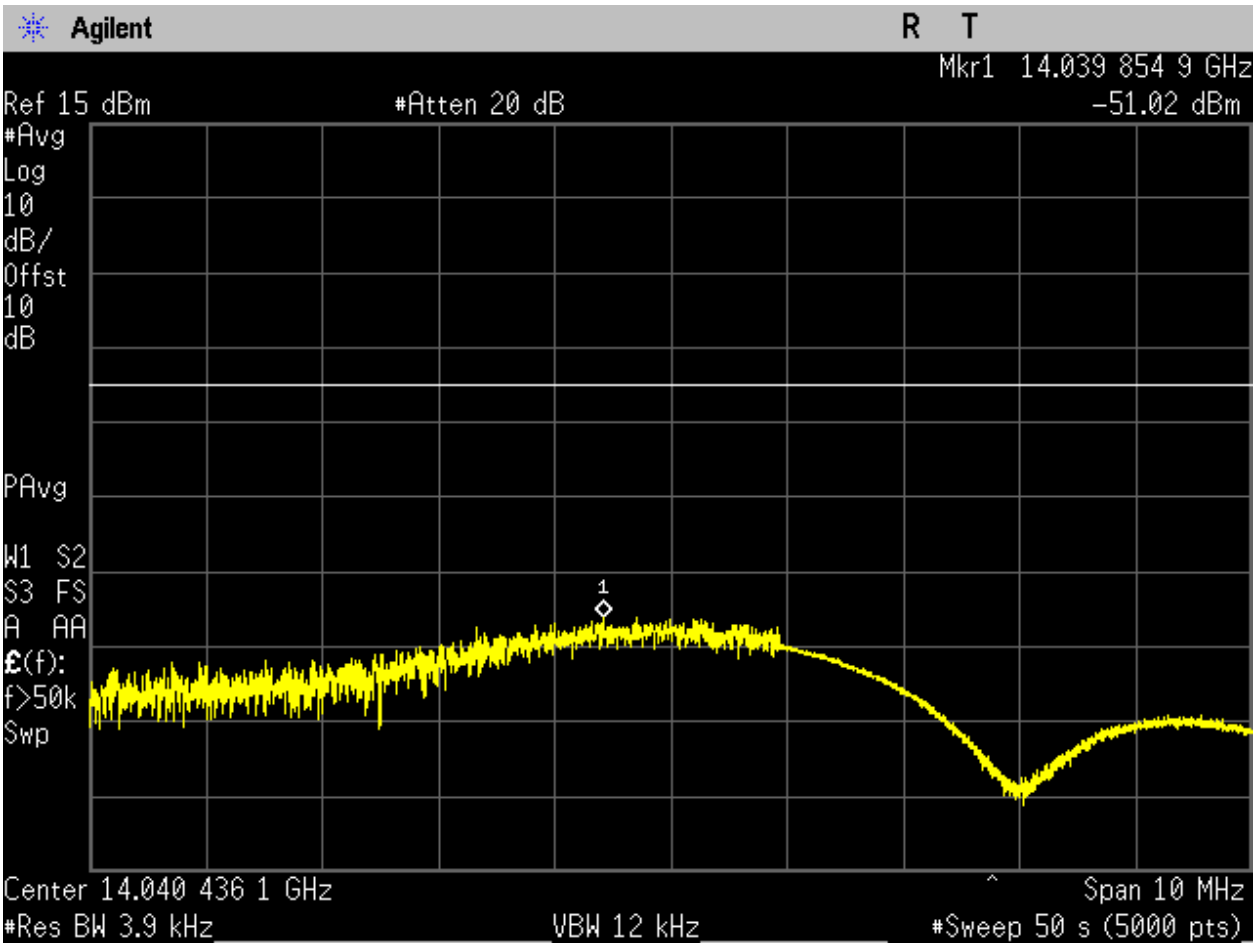

Figure 145. OoB, QPSK, 20MHz Low Channel, 14.013 GHz (14.04GHz emission).

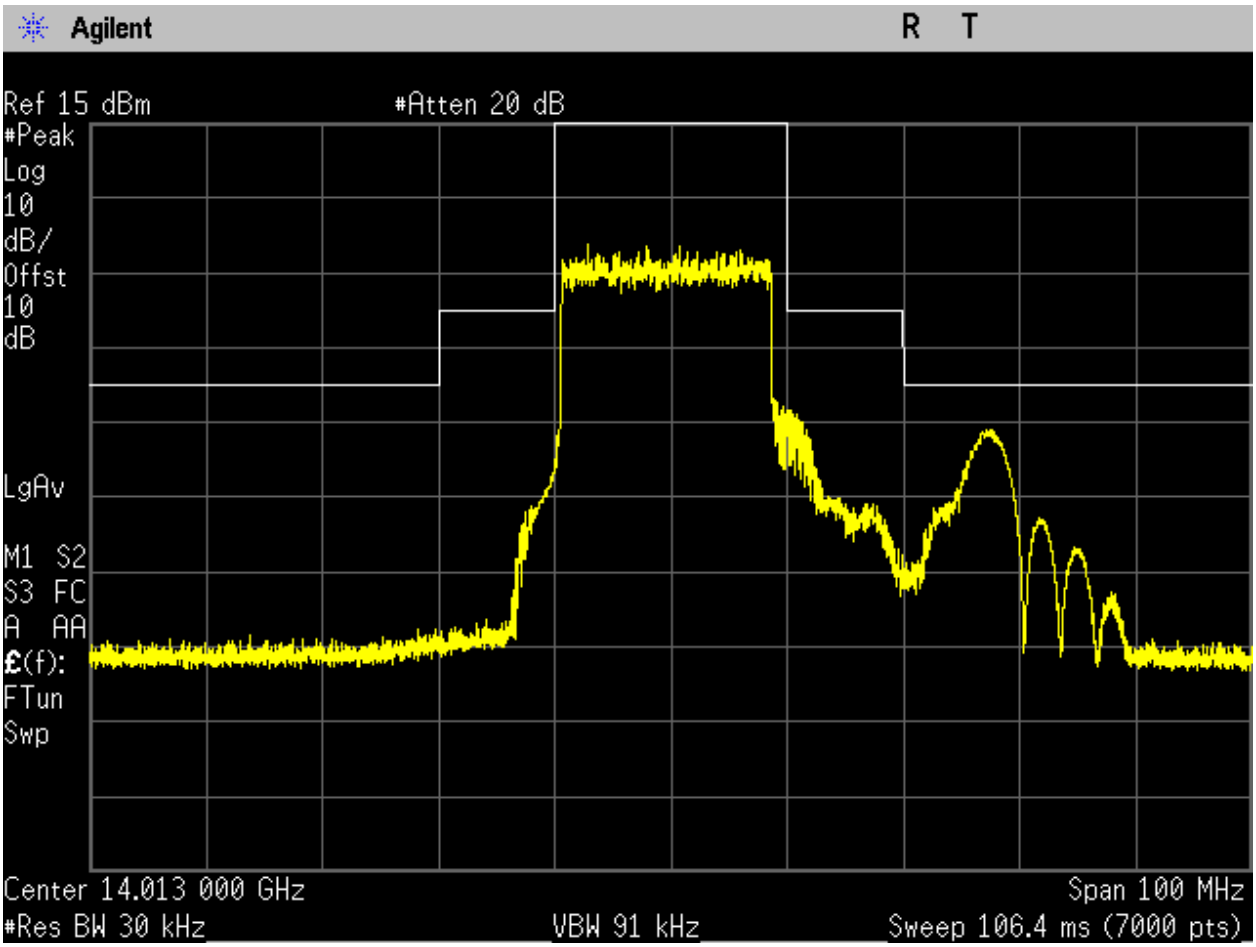

Figure 146. OoB, QPSK, 20MHz Low Channel, 14.013 GHz (PreScan).

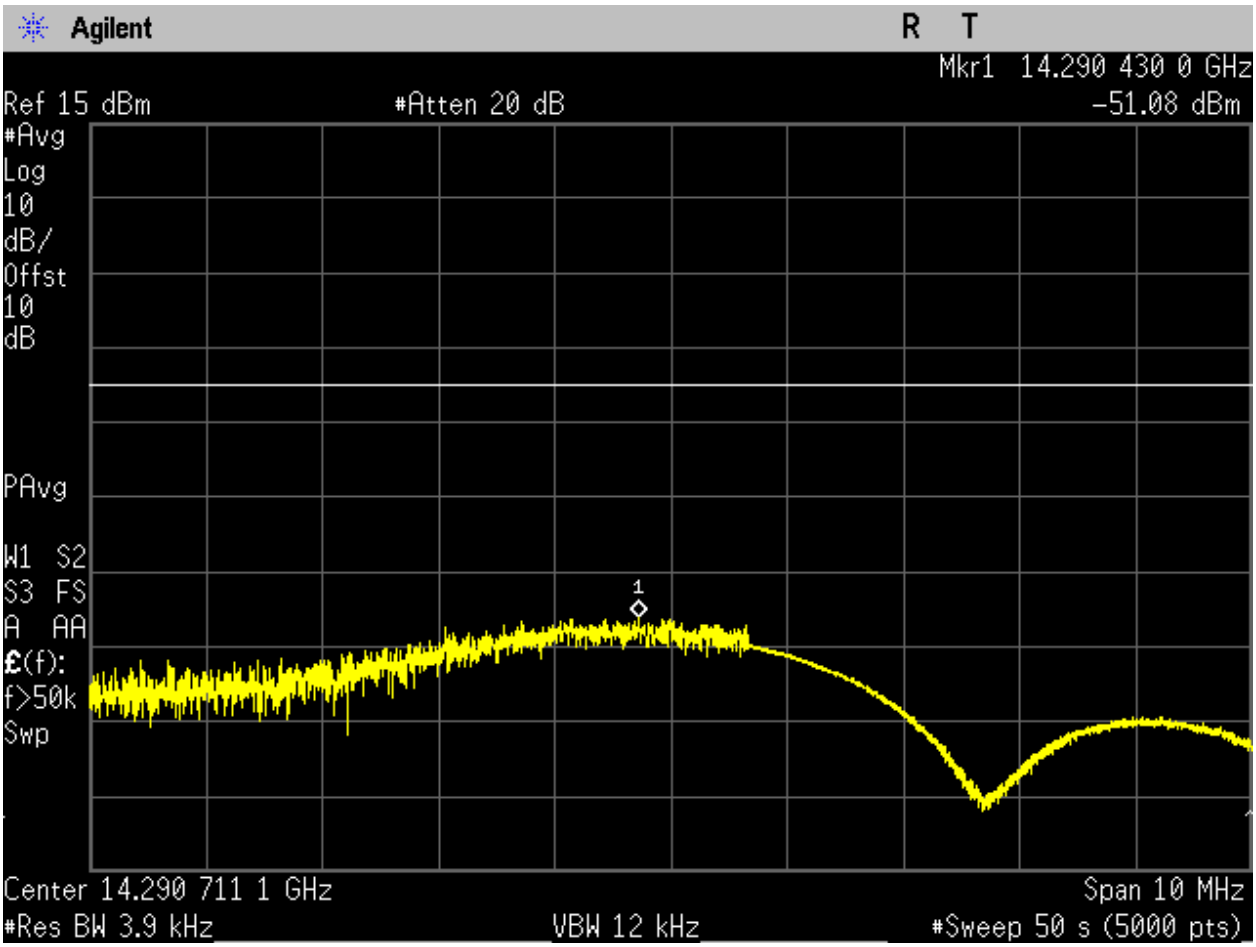

Figure 147. OoB, QPSK, 20MHz Mid Channel, 14.263 GHz (14.29GHz emission).

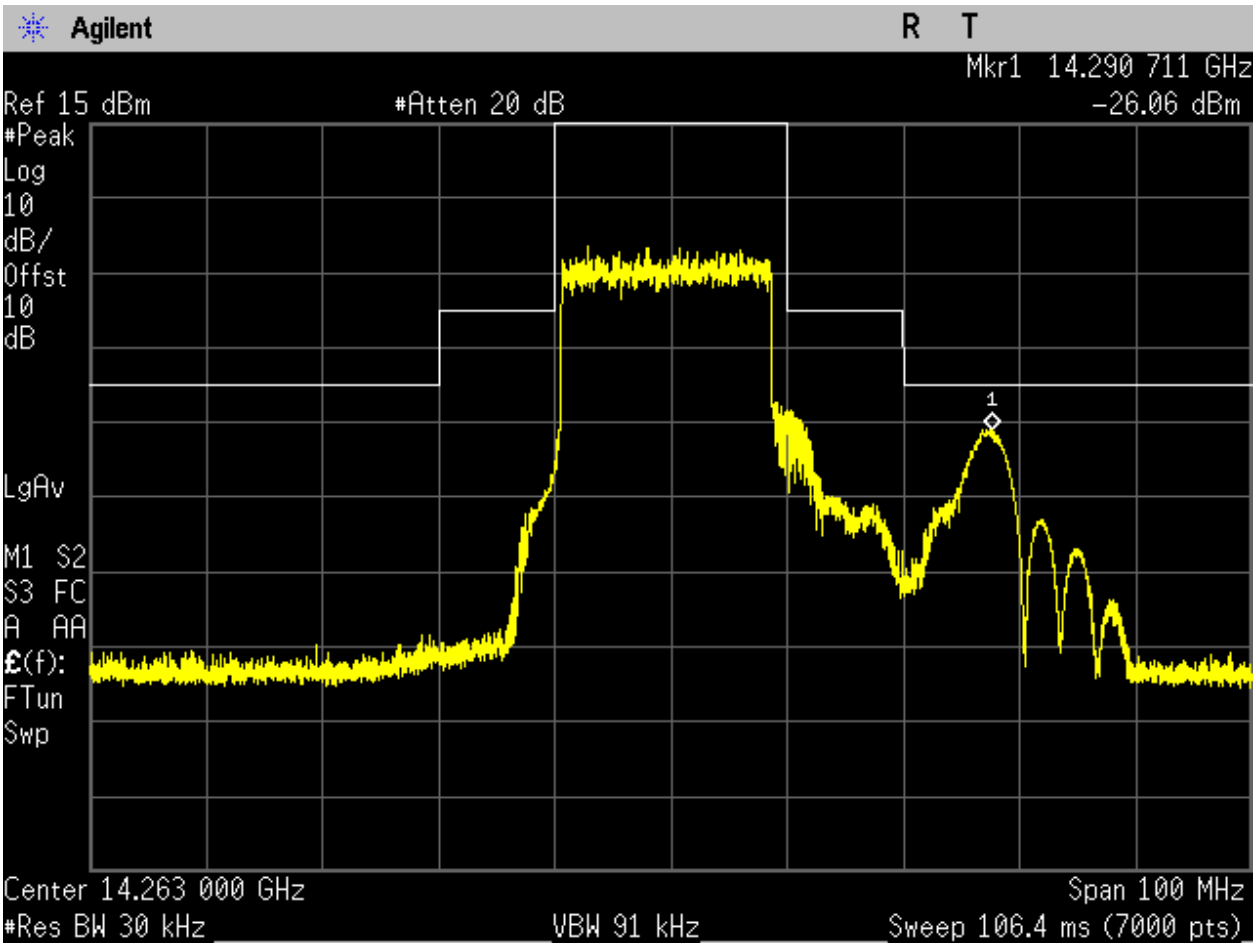

Figure 148. OoB, QPSK, 20MHz Mid Channel, 14.263 GHz (PreScan).

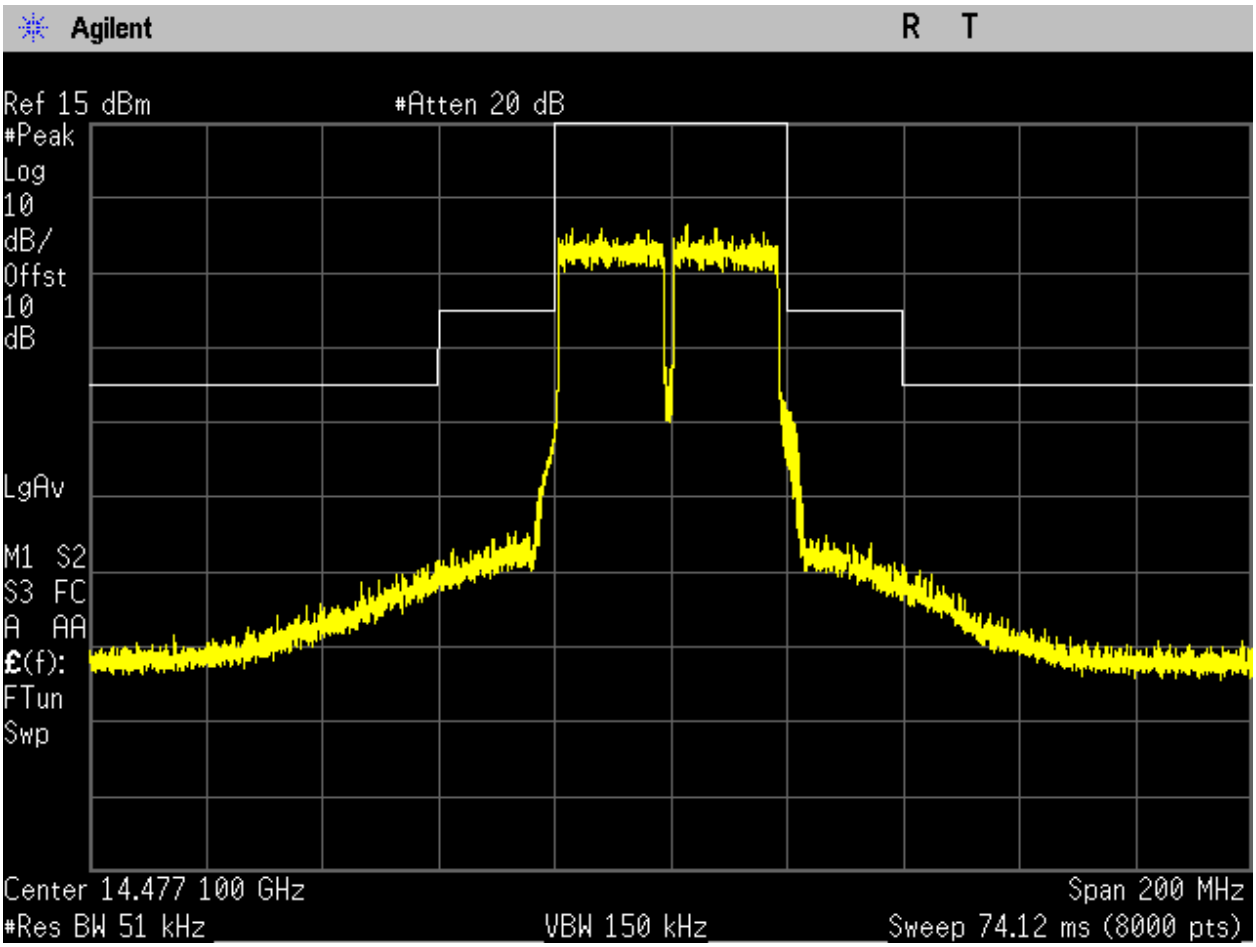

Figure 149. OoB, QPSK, 40MHz High Channel, 14.4771 GHz (PreScan).

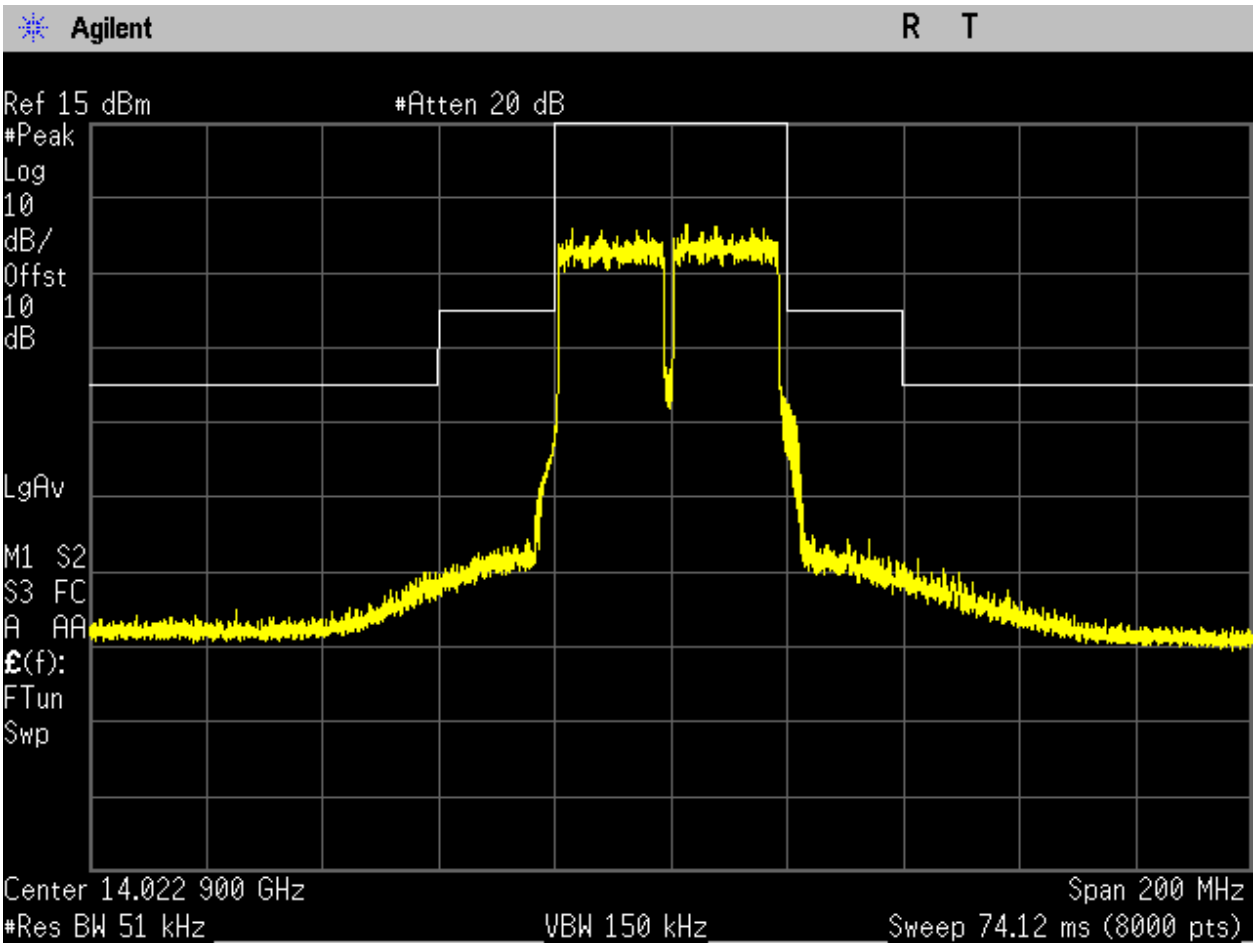

Figure 150. OoB, QPSK, 40MHz Low Channel, 14.0229 GHz (PreScan).

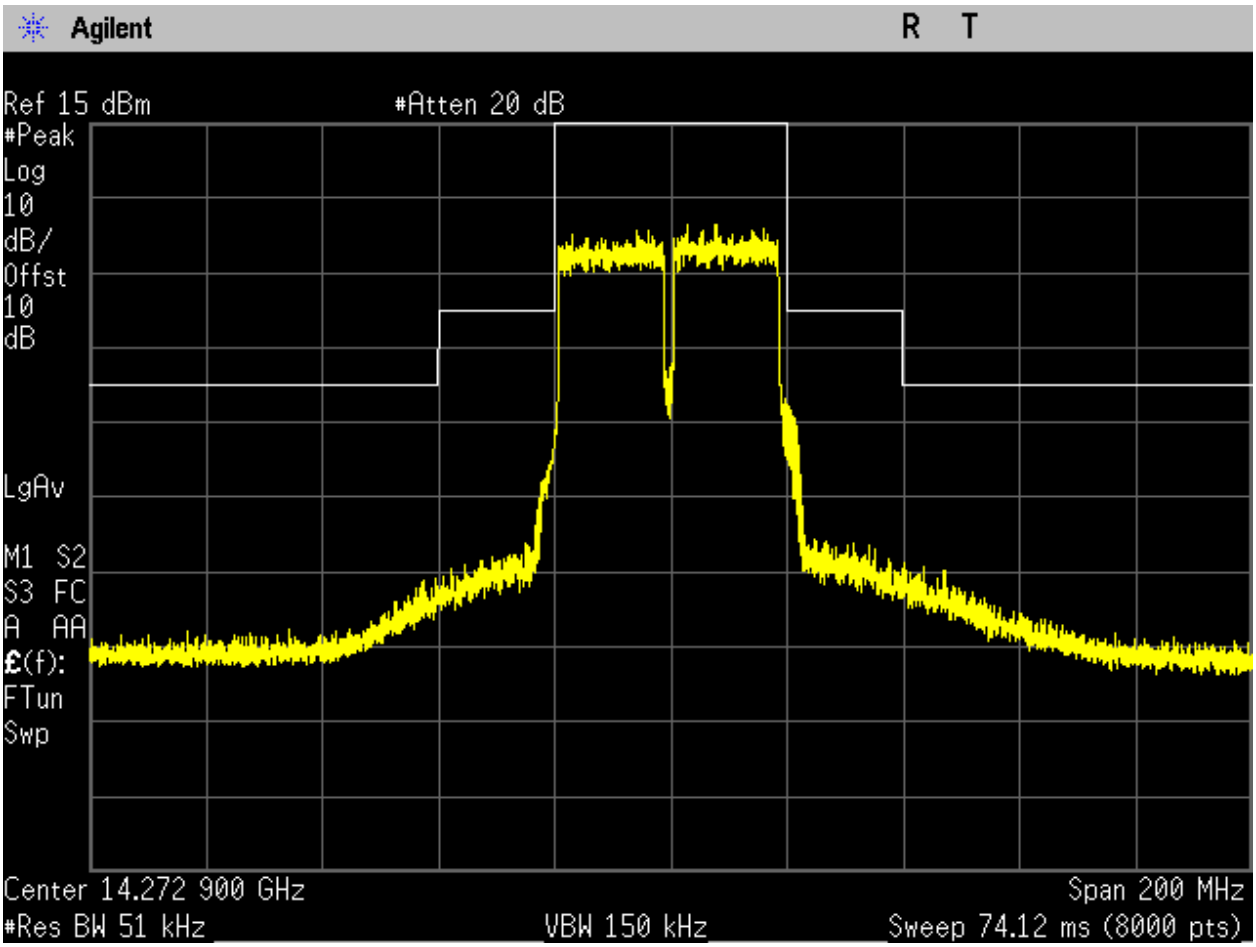

Figure 151. OoB, QPSK, 40MHz Mid Channel, 14.2729 GHz (PreScan).

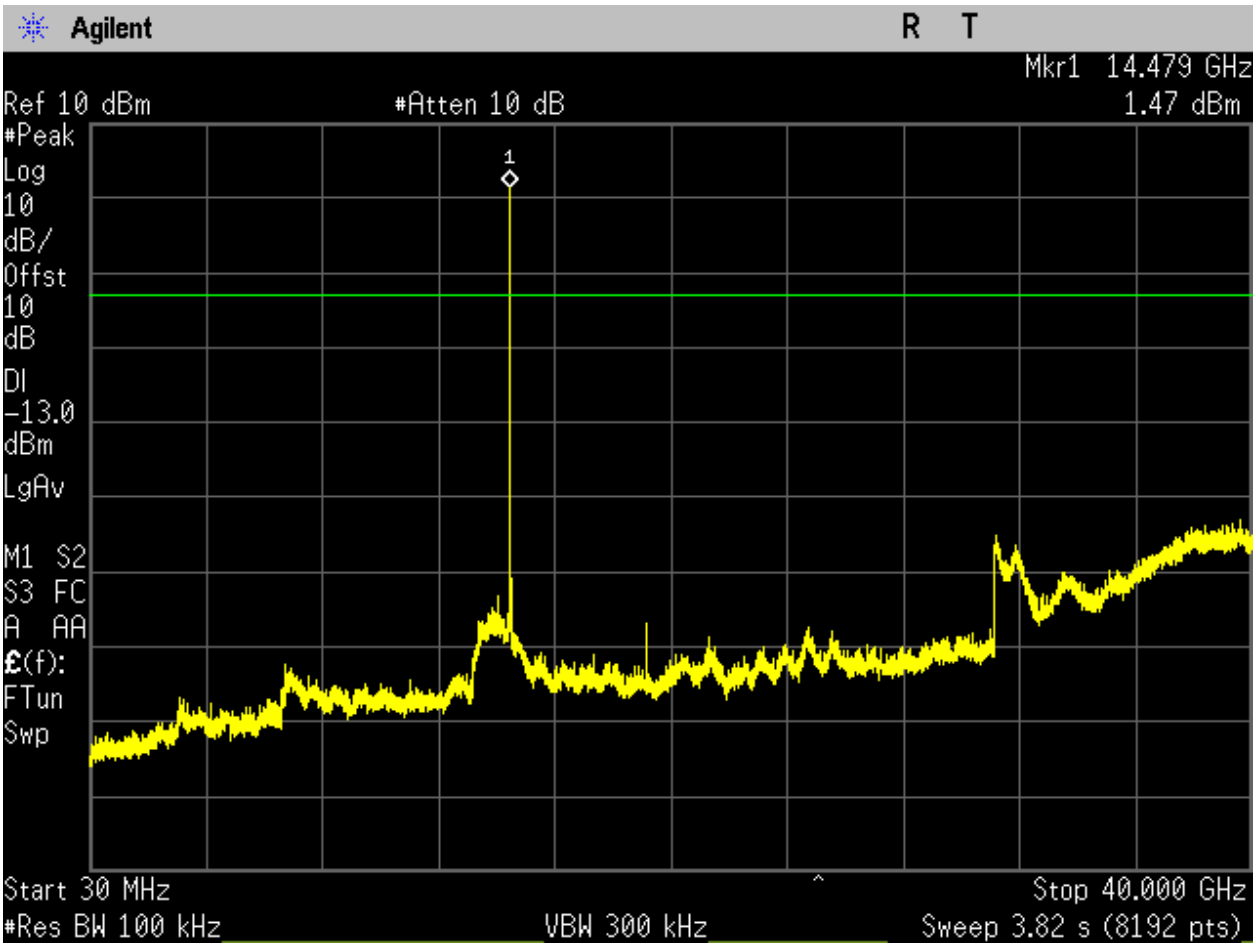

Figure 152. Conducted Spurious_16QAM_20MHz_High Channel, 30MHz-40GHz.

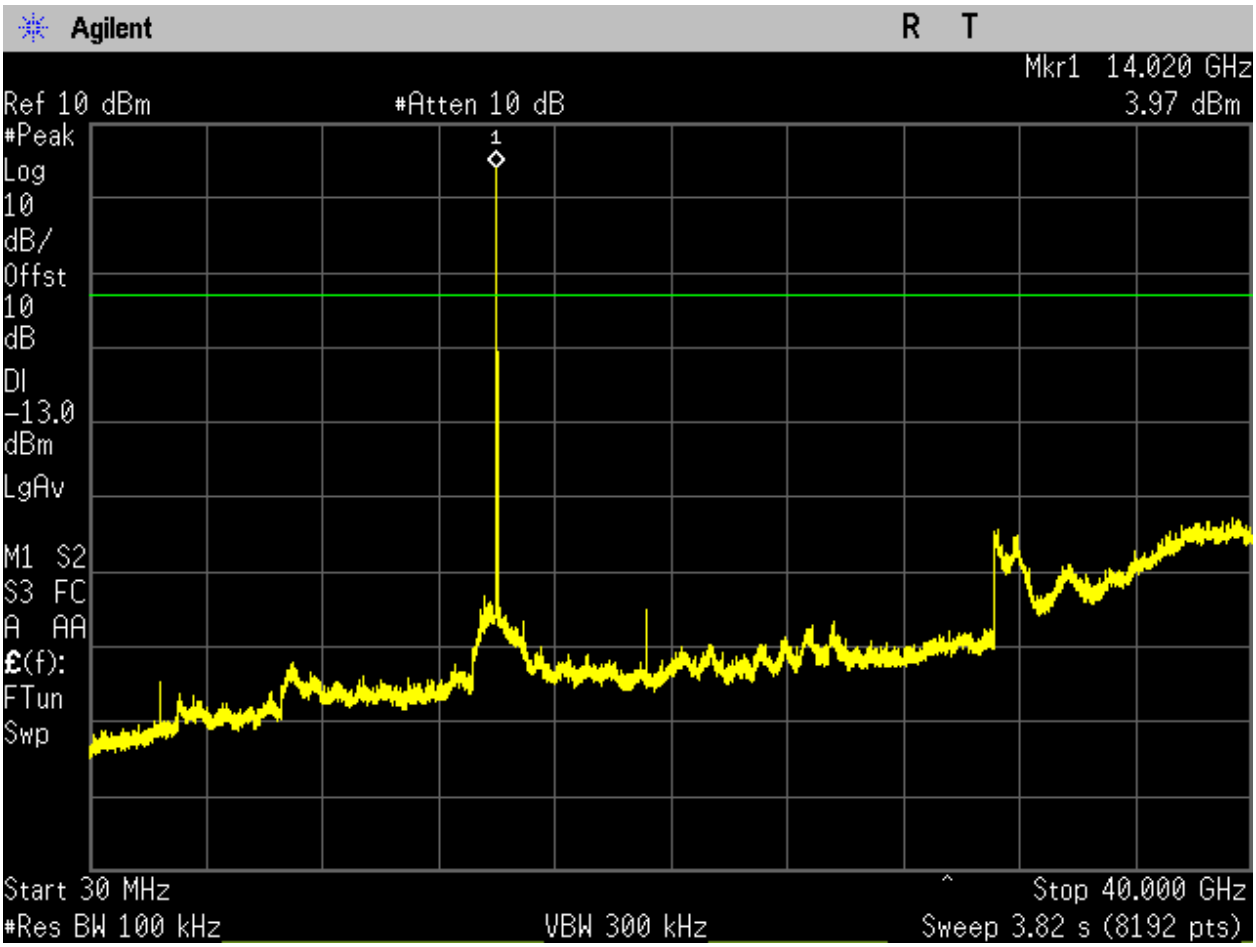

Figure 153. Conducted Spurious_16QAM_20MHz_Low Channel, 30MHz-40GHz.

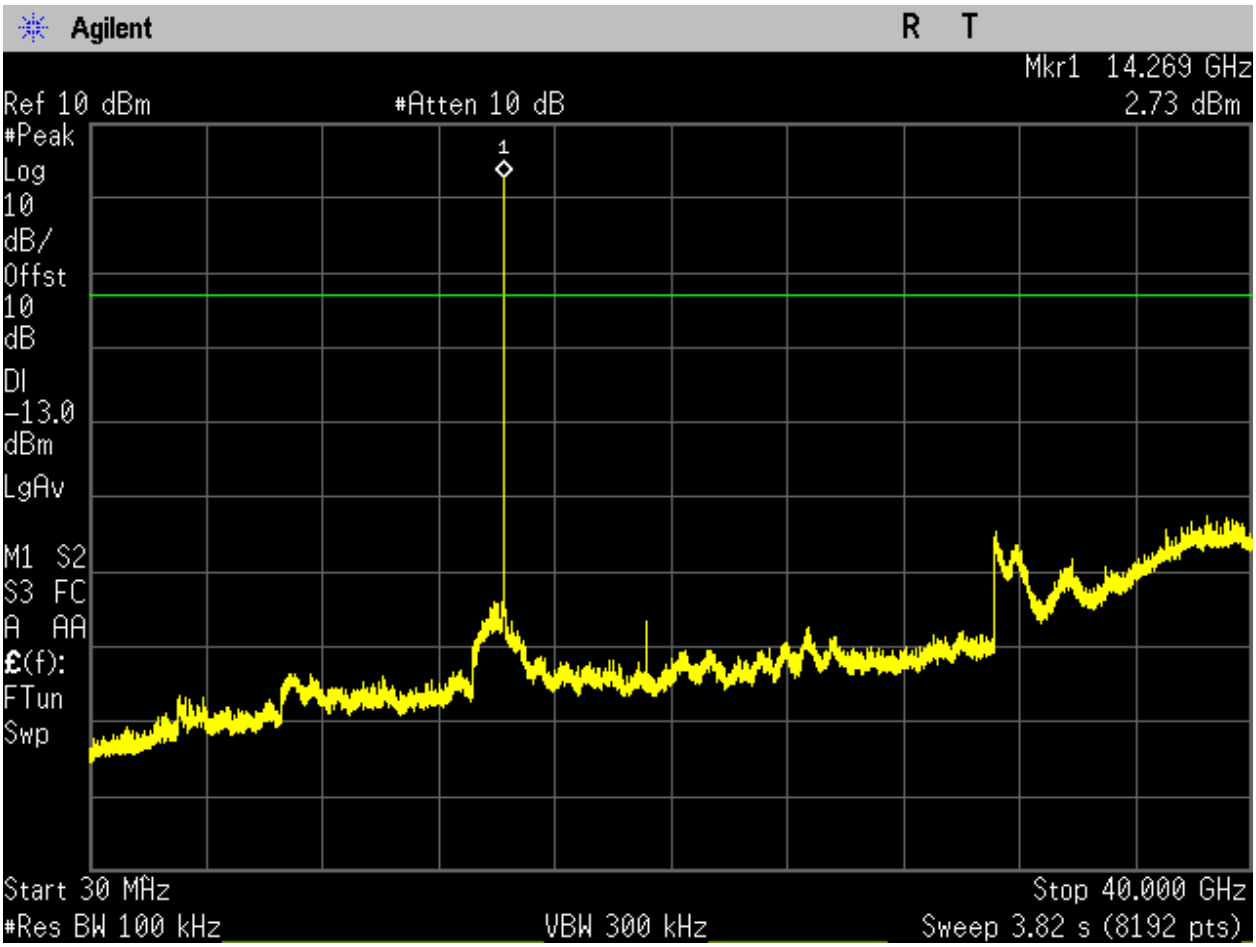

Figure 154. Conducted Spurious_16QAM_20MHz_Mid Channel, 30MHz-40GHz.

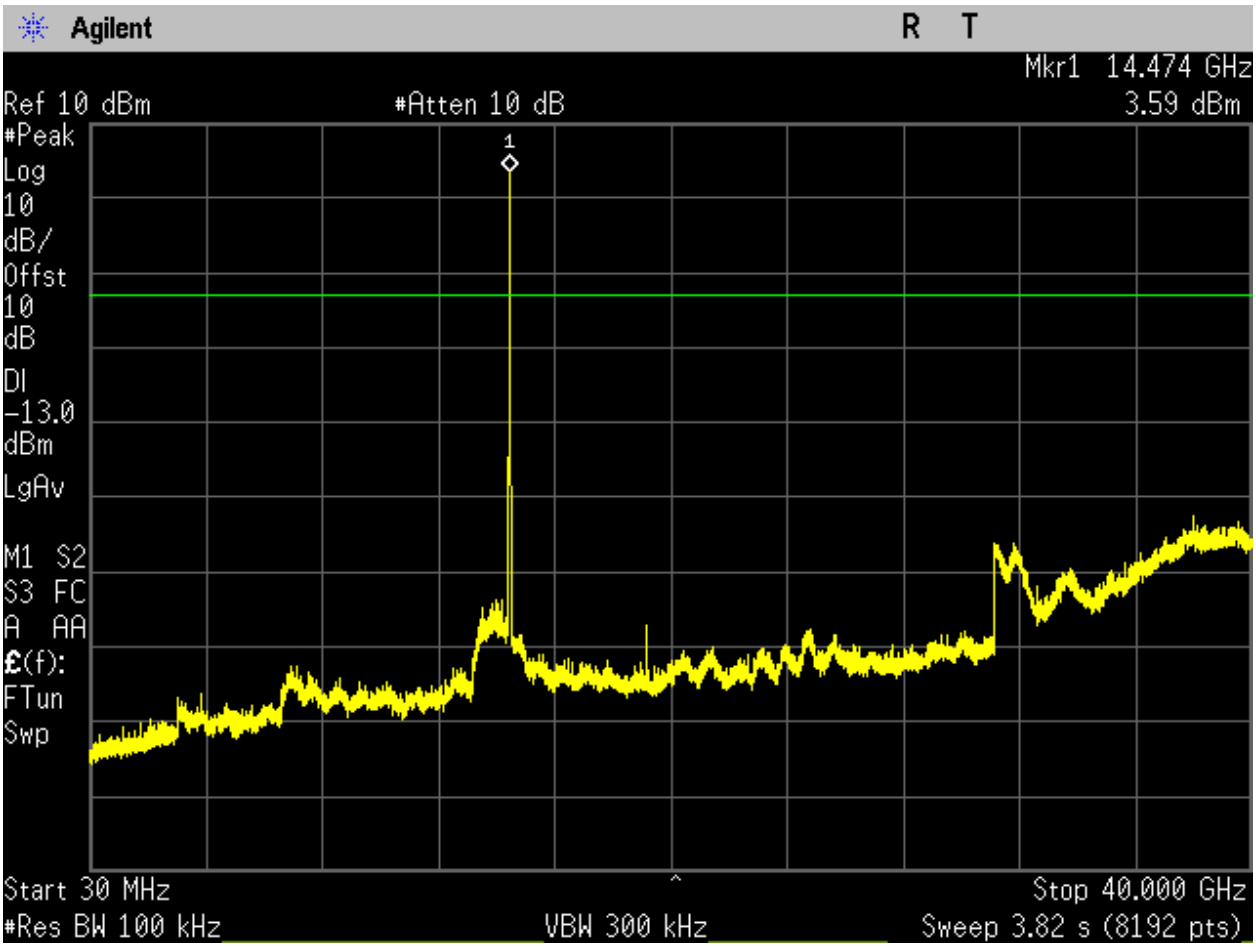

Figure 155. Conducted Spurious_16QAM_40MHz_High Channel, 30MHz-40GHz.

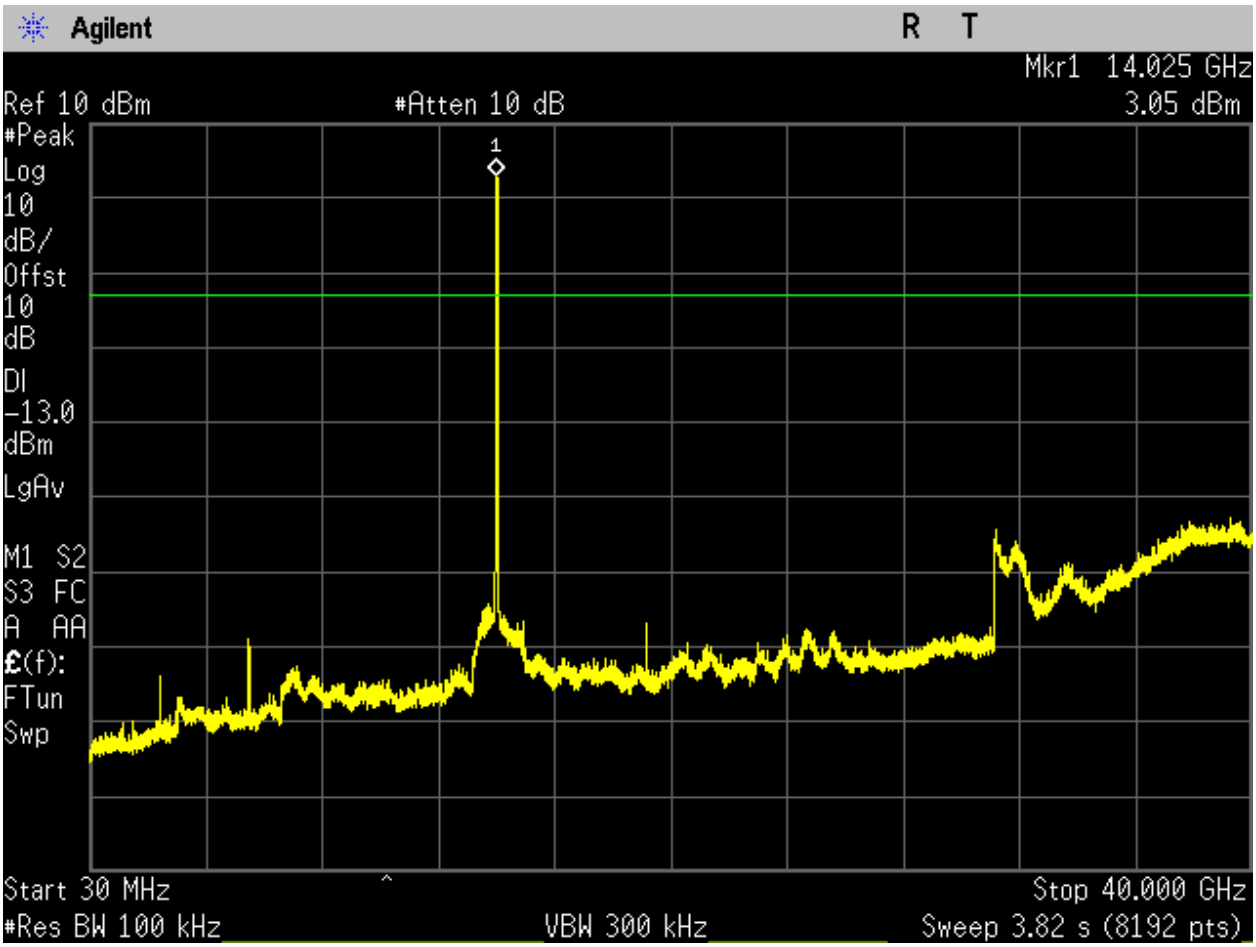

Figure 156. Conducted Spurious_16QAM_40MHz_Low Channel, 30MHz-40GHz.

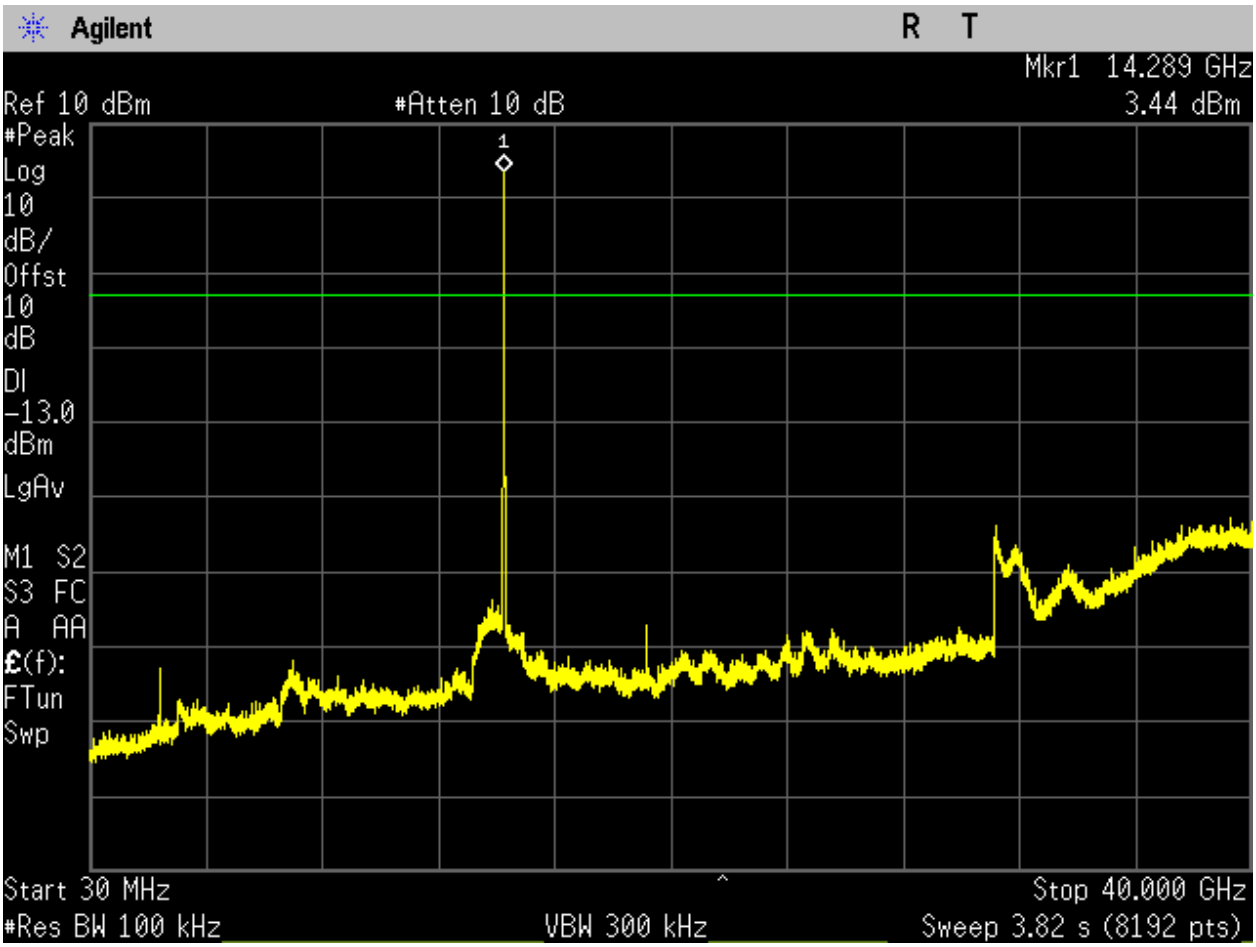

Figure 157. Conducted Spurious_16QAM_40MHz_Mid Channel, 30MHz-40GHz.

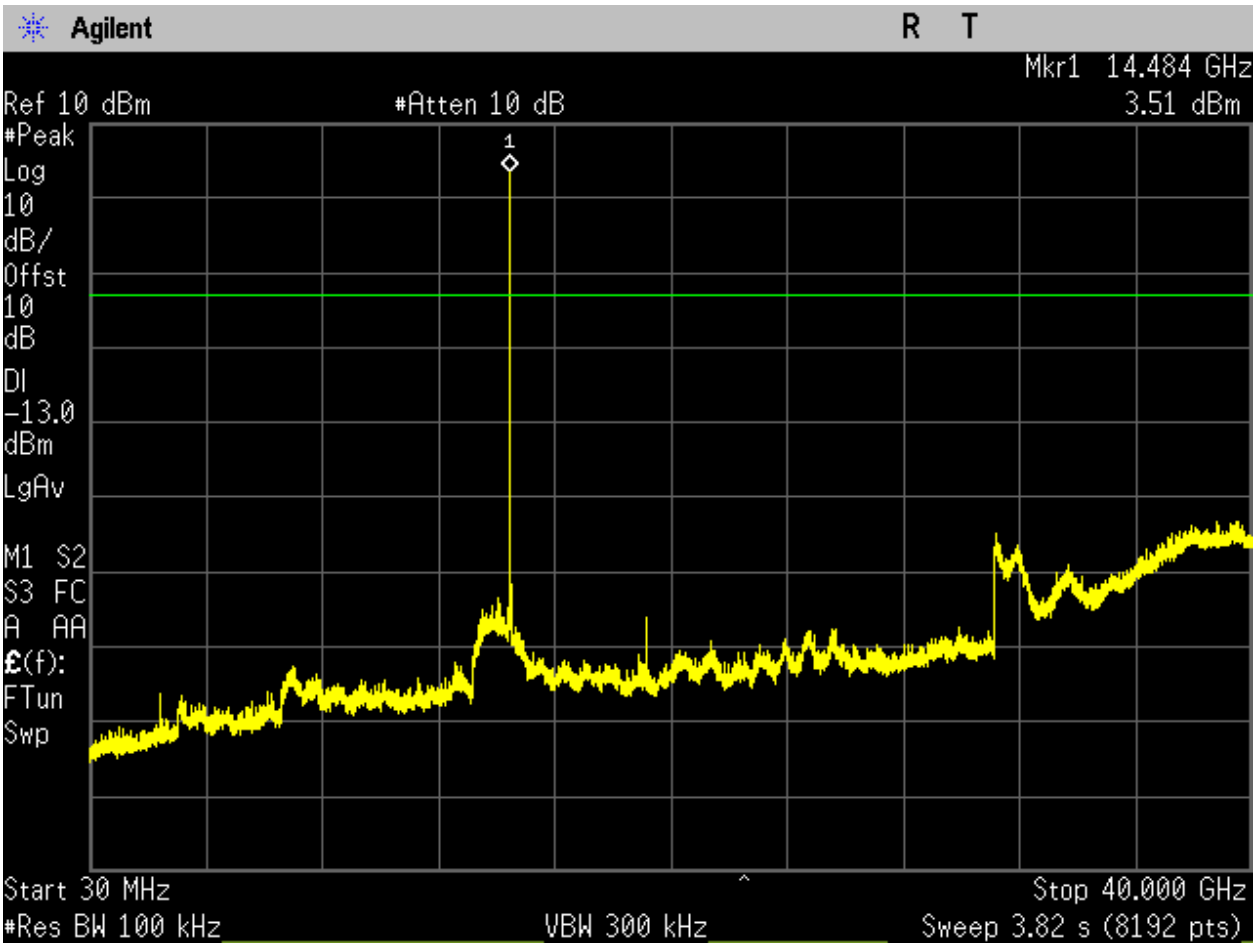

Figure 158. Conducted Spurious_8PSK_20MHz_High Channel, 30MHz-40GHz.

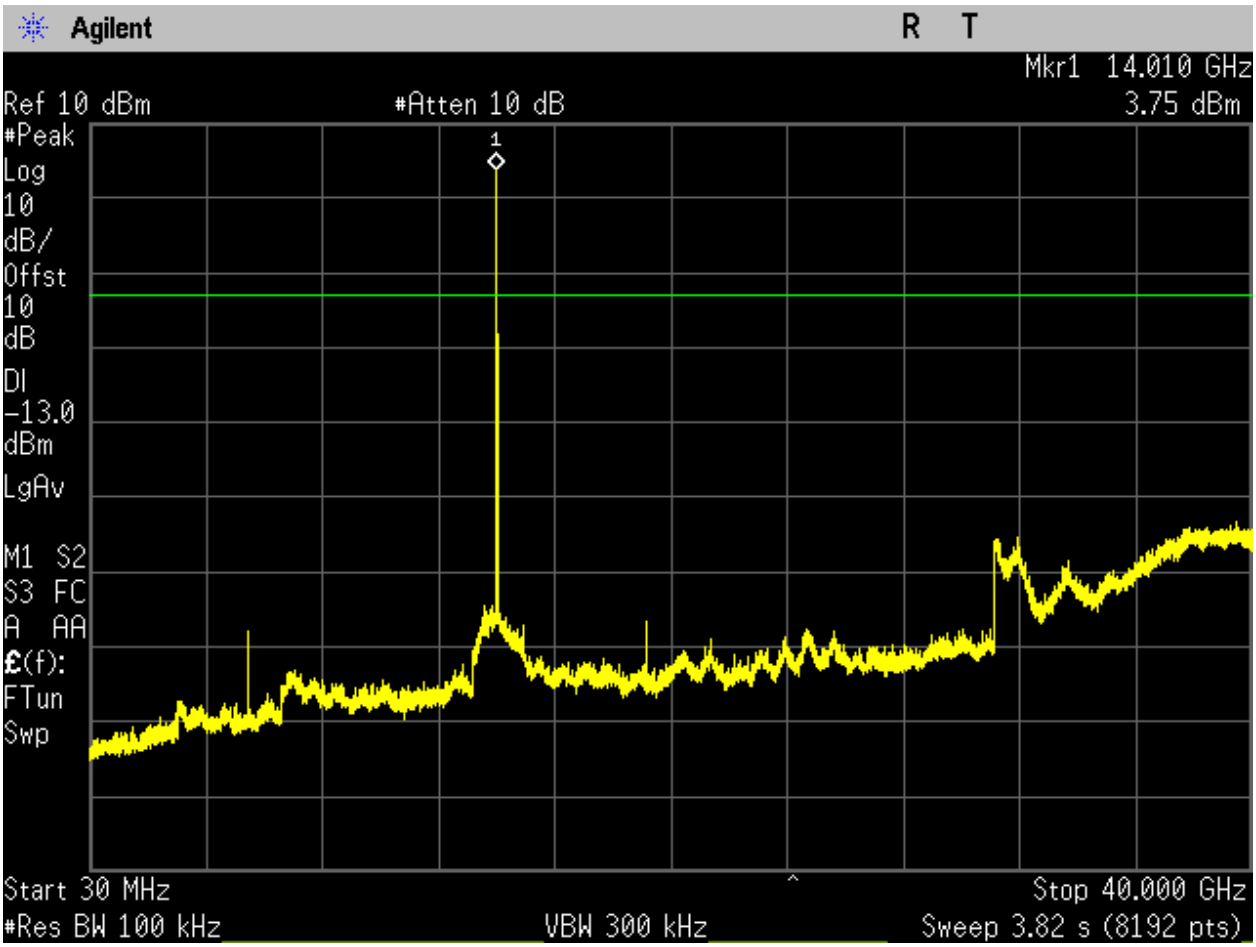

Figure 159. Conducted Spurious_8PSK_20MHz_Low Channel, 30MHz-40GHz.

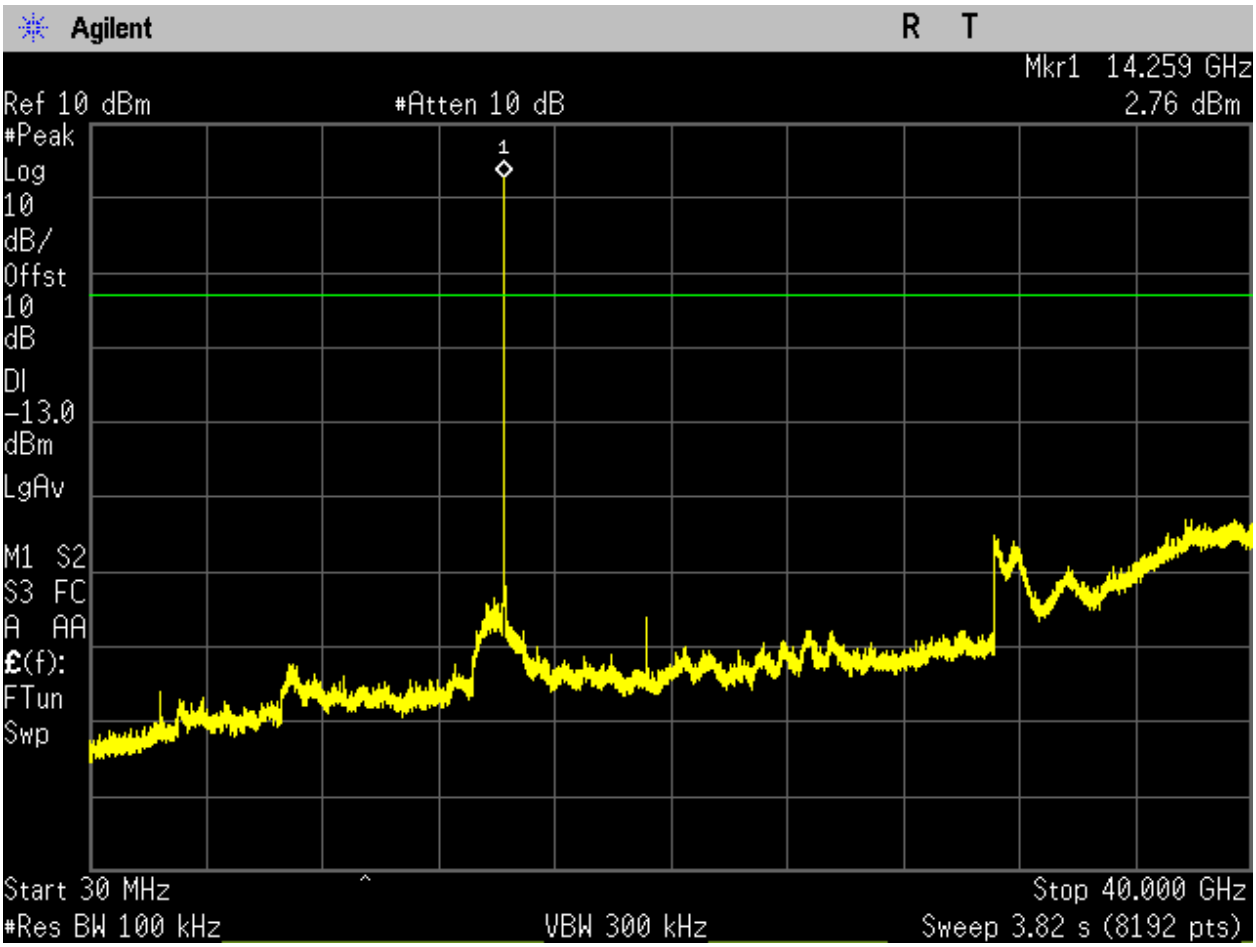

Figure 160. Conducted Spurious_8PSK_20MHz_Mid Channel, 30MHz-40GHz.

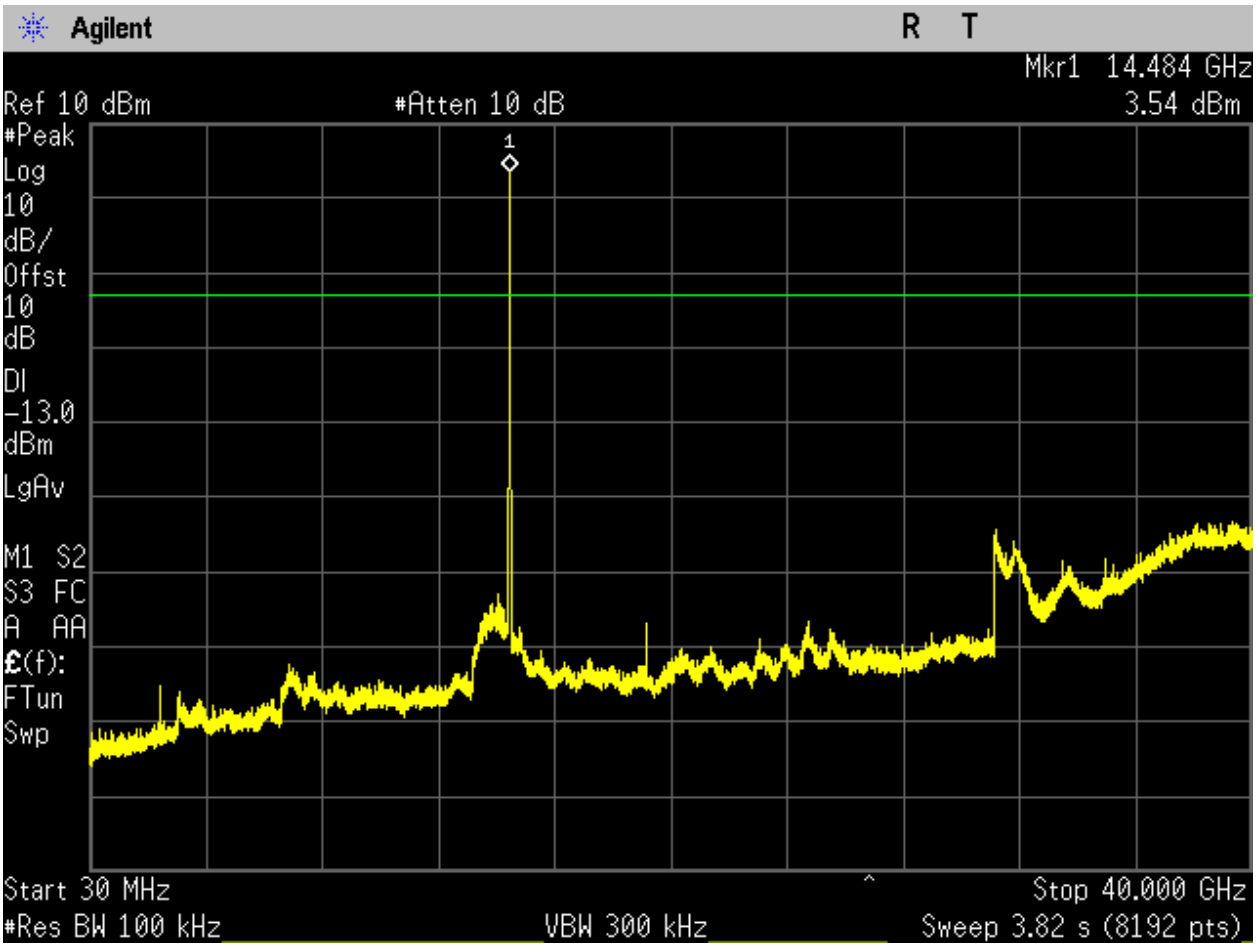

Figure 161. Conducted Spurious_8PSK_40MHz_High Channel, 30MHz-40GHz.

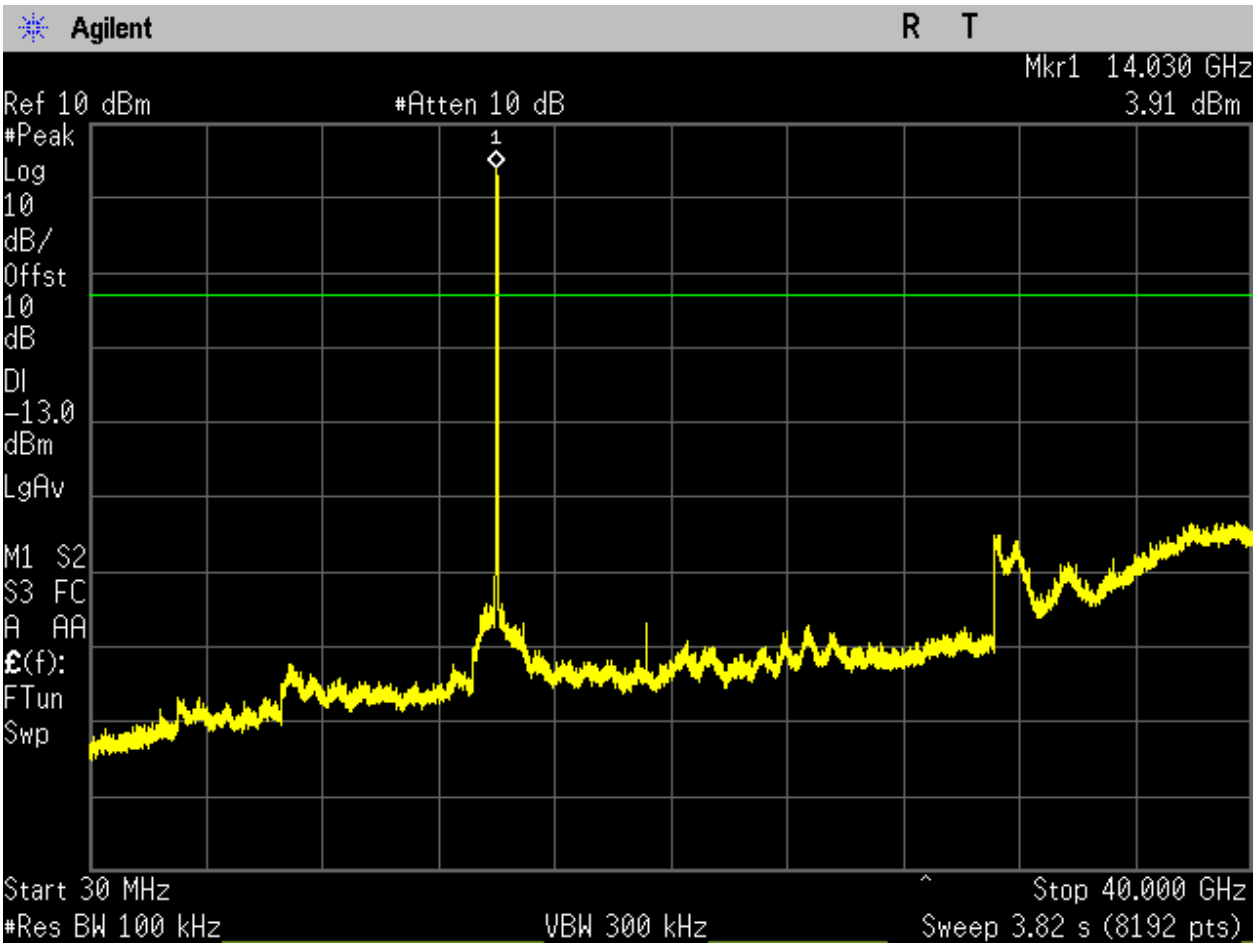

Figure 162. Conducted Spurious_8PSK_40MHz_Low Channel, 30MHz-40GHz.

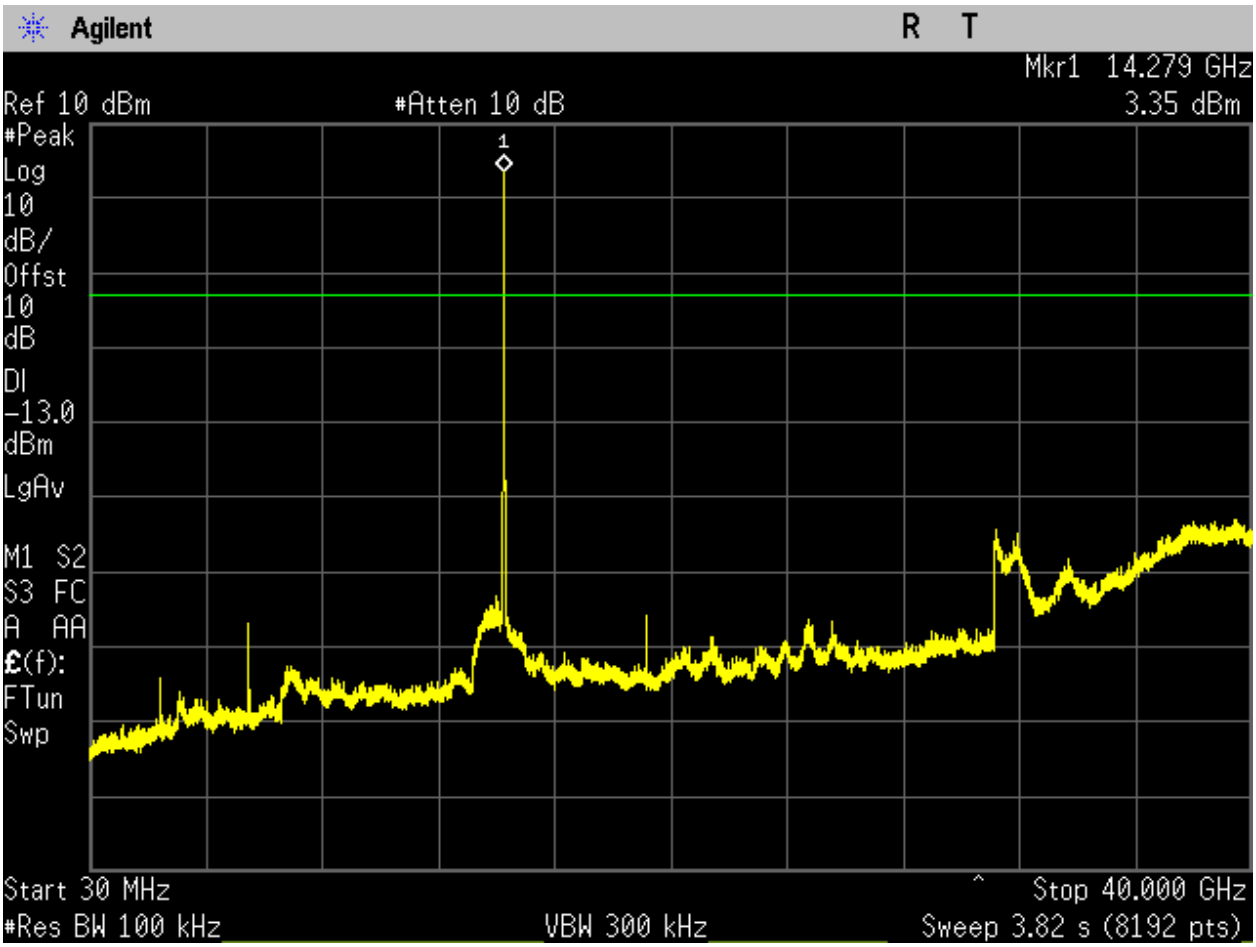

Figure 163. Conducted Spurious_8PSK_40MHz_Mid Channel, 30MHz-40GHz.

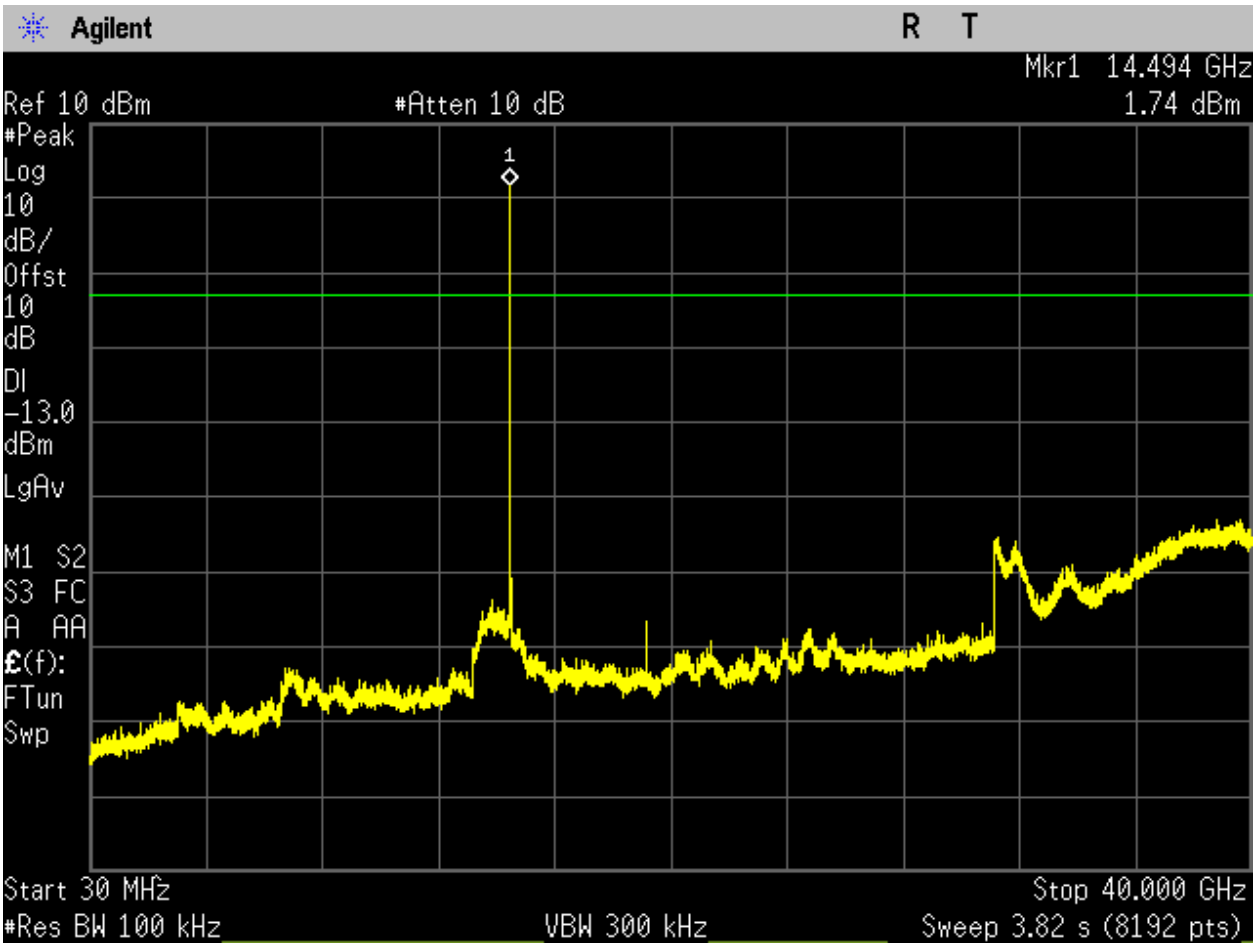

Figure 164. Conducted Spurious_QPSK_20MHz_High Channel, 30MHz-40GHz.

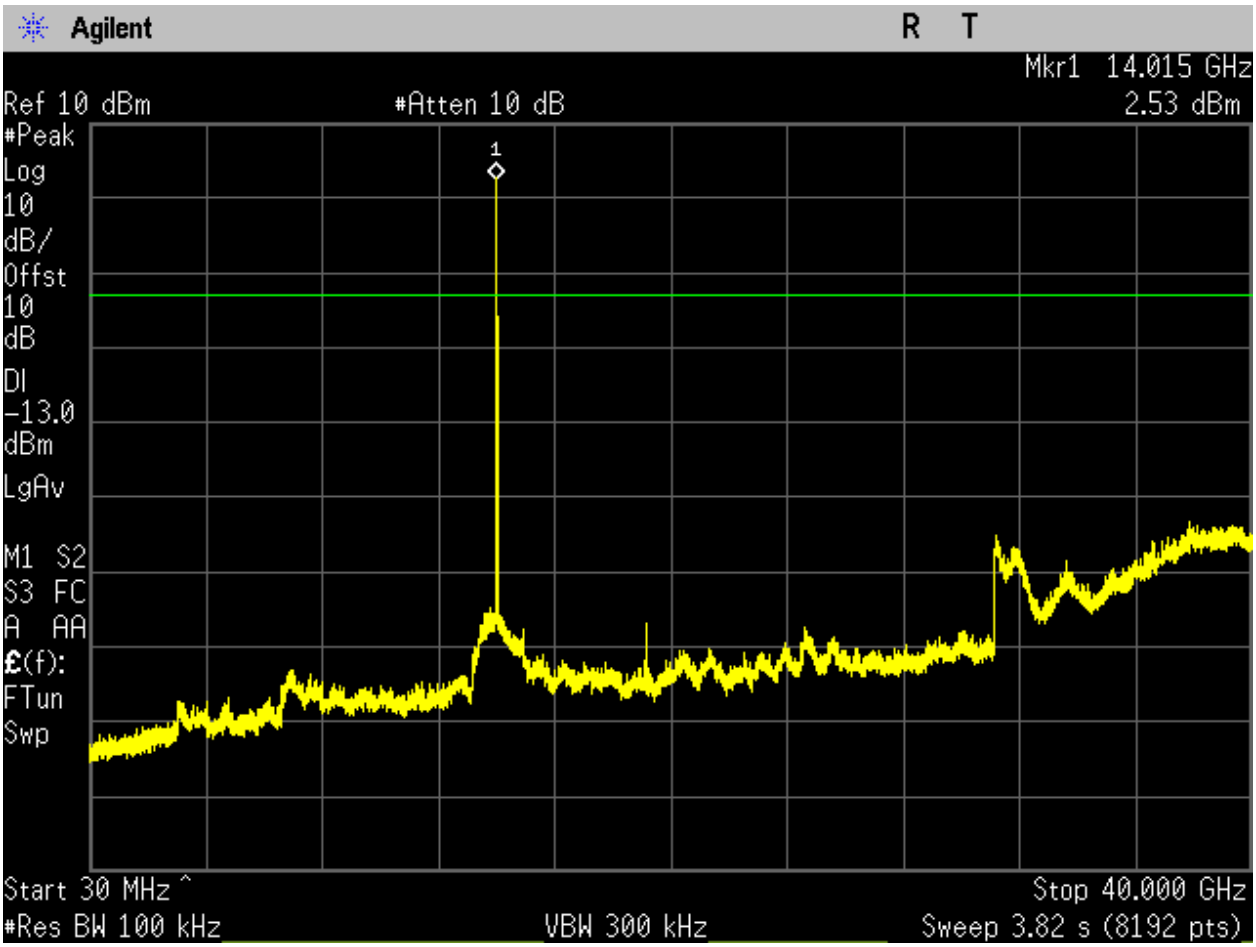

Figure 165. Conducted Spurious_QPSK_20MHz_Low Channel, 30MHz-40GHz.

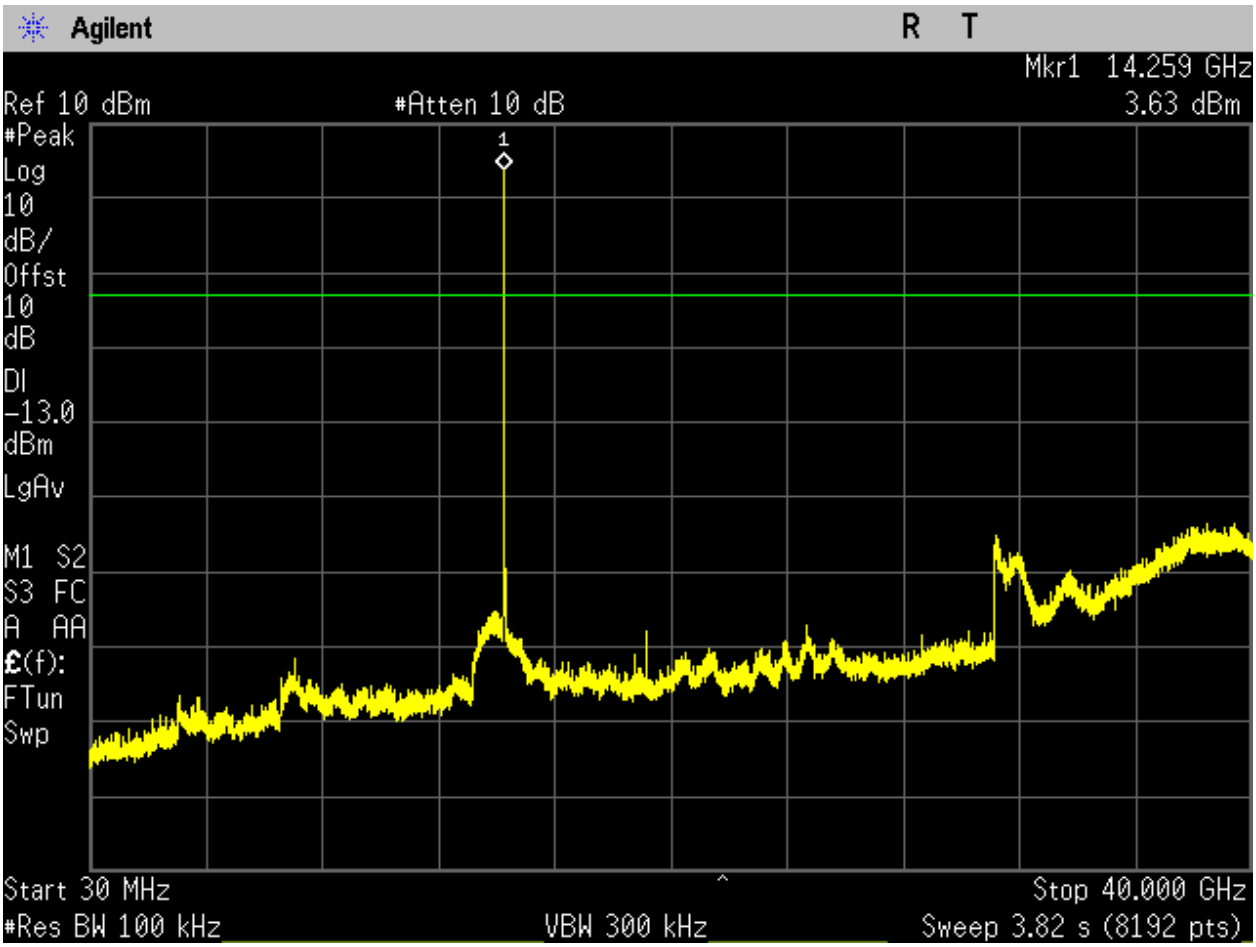

Figure 166. Conducted Spurious_QPSK_20MHz_Mid Channel, 30MHz-40GHz.

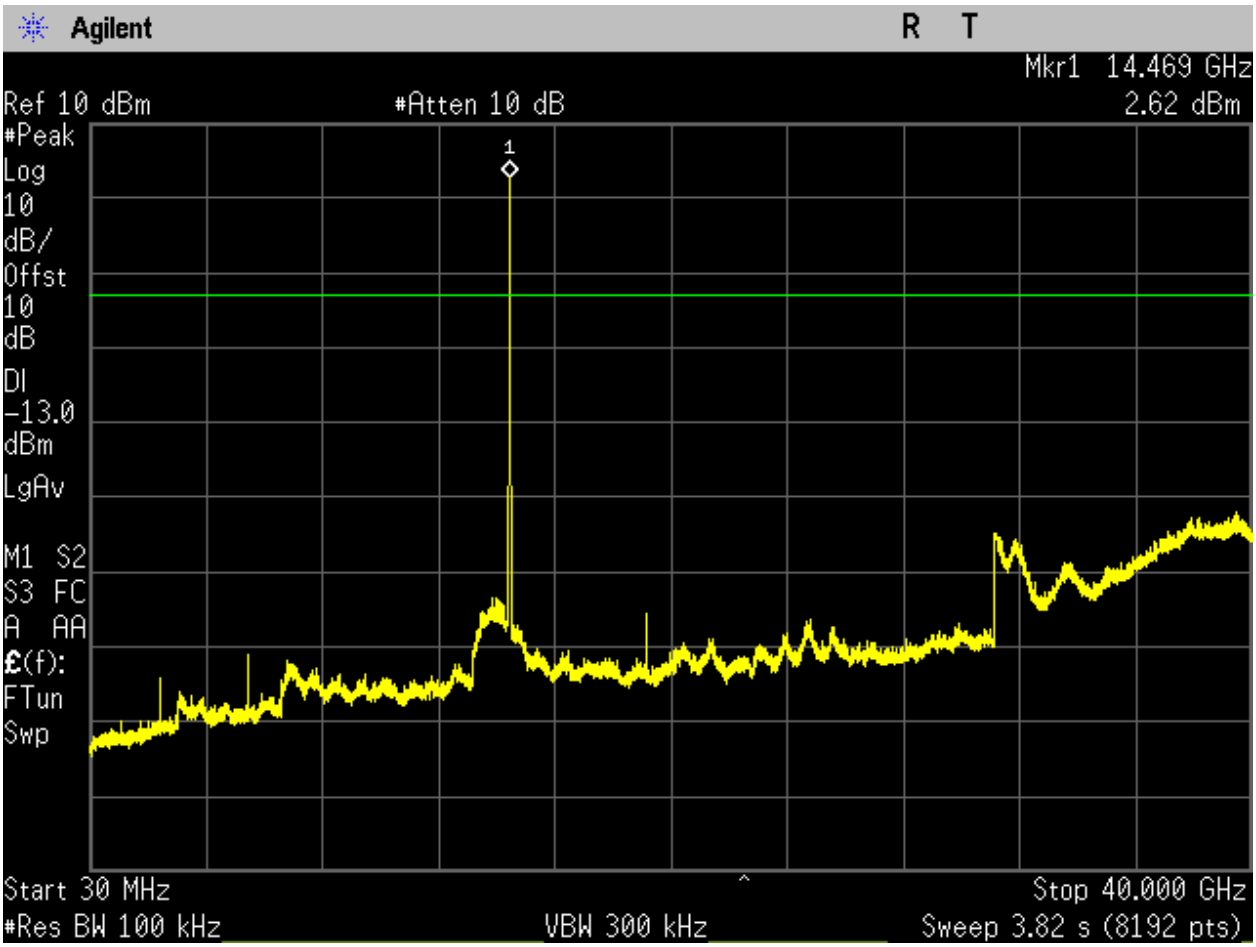

Figure 167. Conducted Spurious_QPSK_40MHz_High Channel, 30MHz-40GHz.

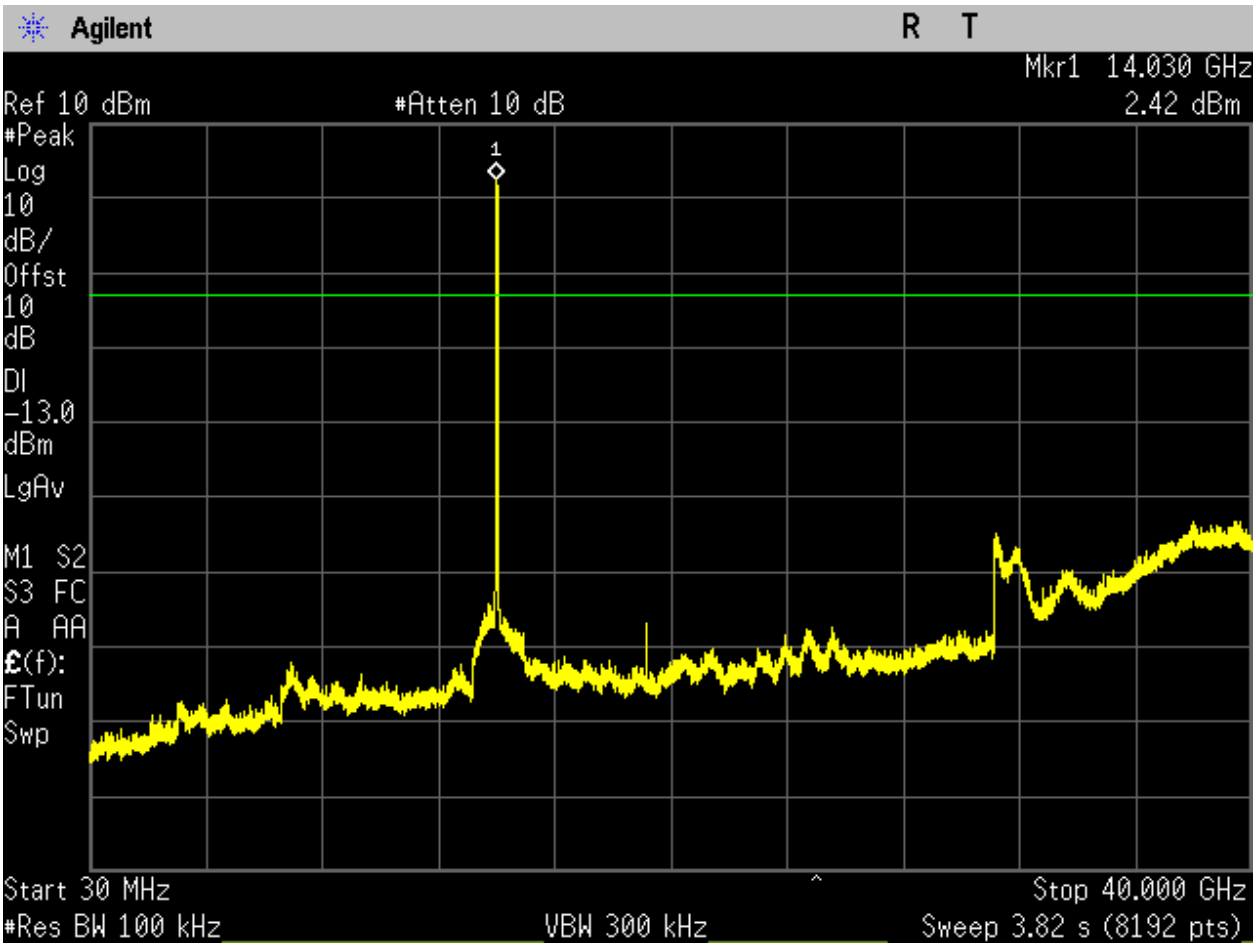

Figure 168. Conducted Spurious_QPSK_40MHz_Low Channel, 30MHz-40GHz.

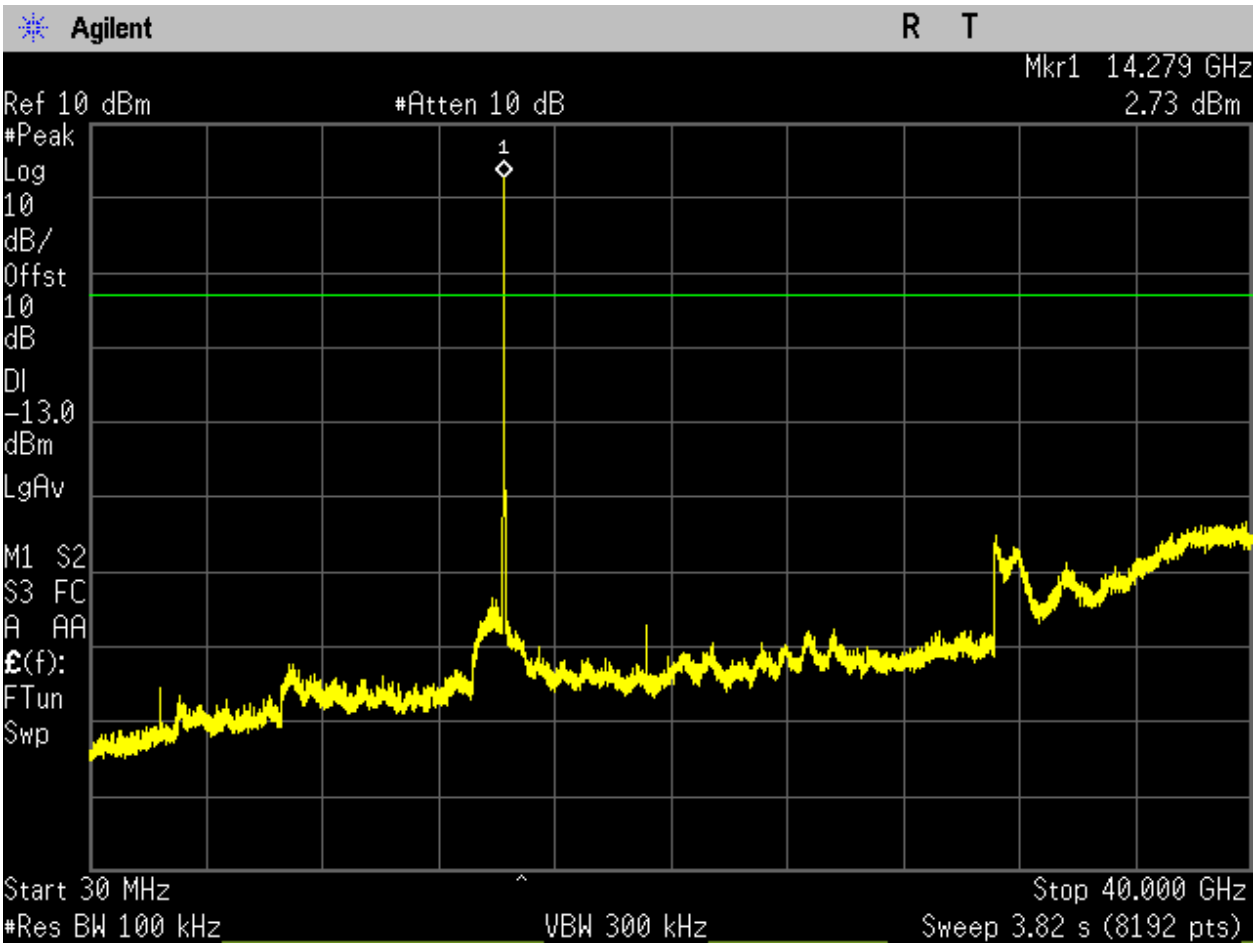

Figure 169. Conducted Spurious_QPSK_40MHz_Mid Channel, 30MHz-40GHz.

Electromagnetic Compatibility Criteria for Satellite Communications

§2.1049 Occupied Bandwidth

Test Requirement(s): **§2.1049**

Test Procedures: 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: April 25, 2024

Modulation	Nominal Bandwidth (MHz)	Center Frequency (GHz)	99% Occupied Bandwidth (MHz)
QPSK	20	14.013	18.3941
		14.263	18.5253
		14.487	18.1805
	40	14.0229	37.6888
		14.2729	37.6712
		14.4771	37.6309
8PSK	20	14.013	18.9879
		14.263	18.3023
		14.487	18.1253
	40	14.0229	37.6843
		14.2729	37.7244
		14.4771	37.7394
16QAM	20	14.013	18.1273
		14.263	18.1314
		14.487	18.0947
	40	14.0229	37.5777
		14.2729	37.7551
		14.4771	37.7447

Table 11. OBW, Test Results

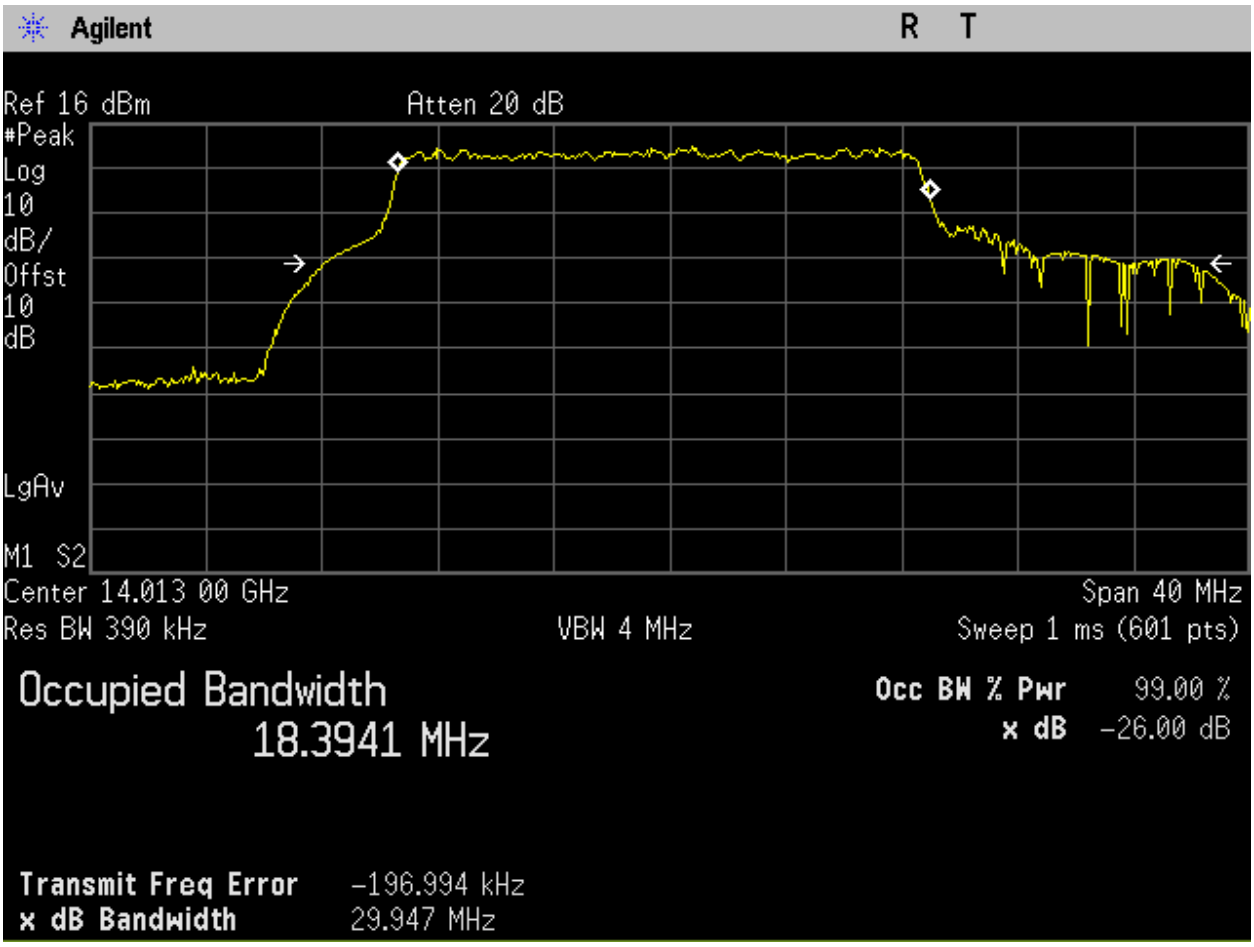

Figure 170. 99% OBW, QPSK, 20MHz Low Channel, 14.013 GHz.

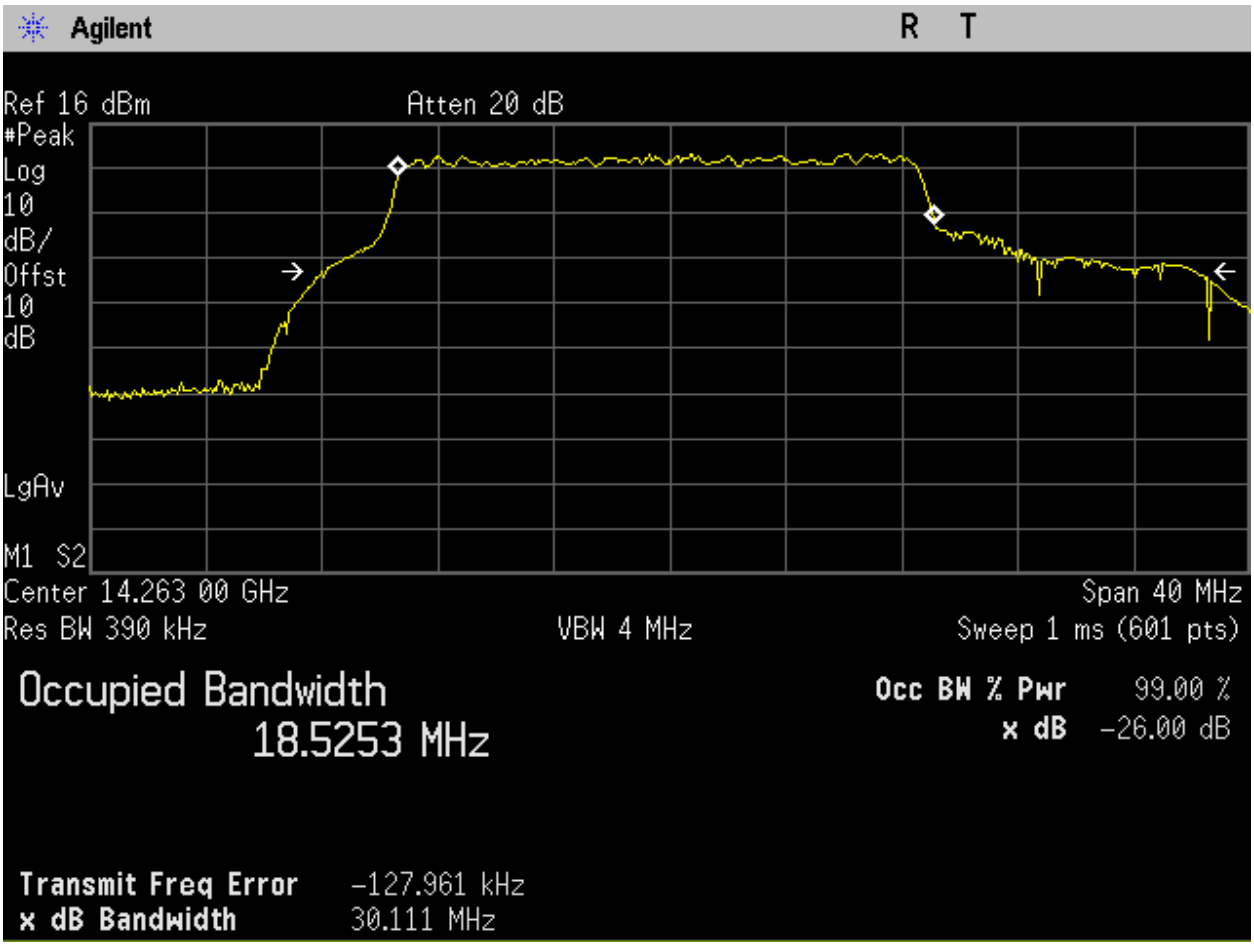

Figure 171. 99% OBW, QPSK, 20MHz Mid Channel, 14.263 GHz.

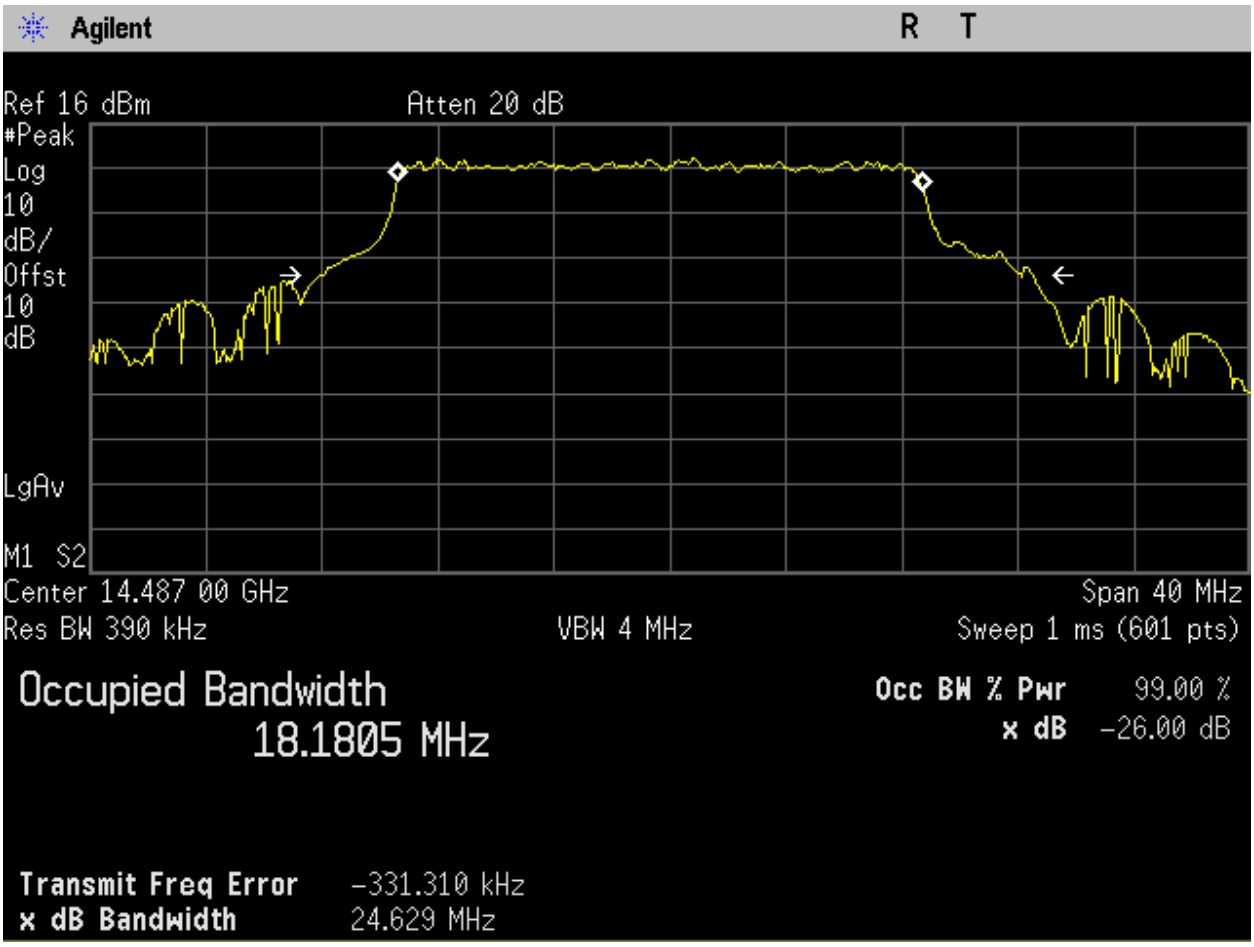

Figure 172. 99% OBW, QPSK, 20MHz High Channel, 14.487 GHz.

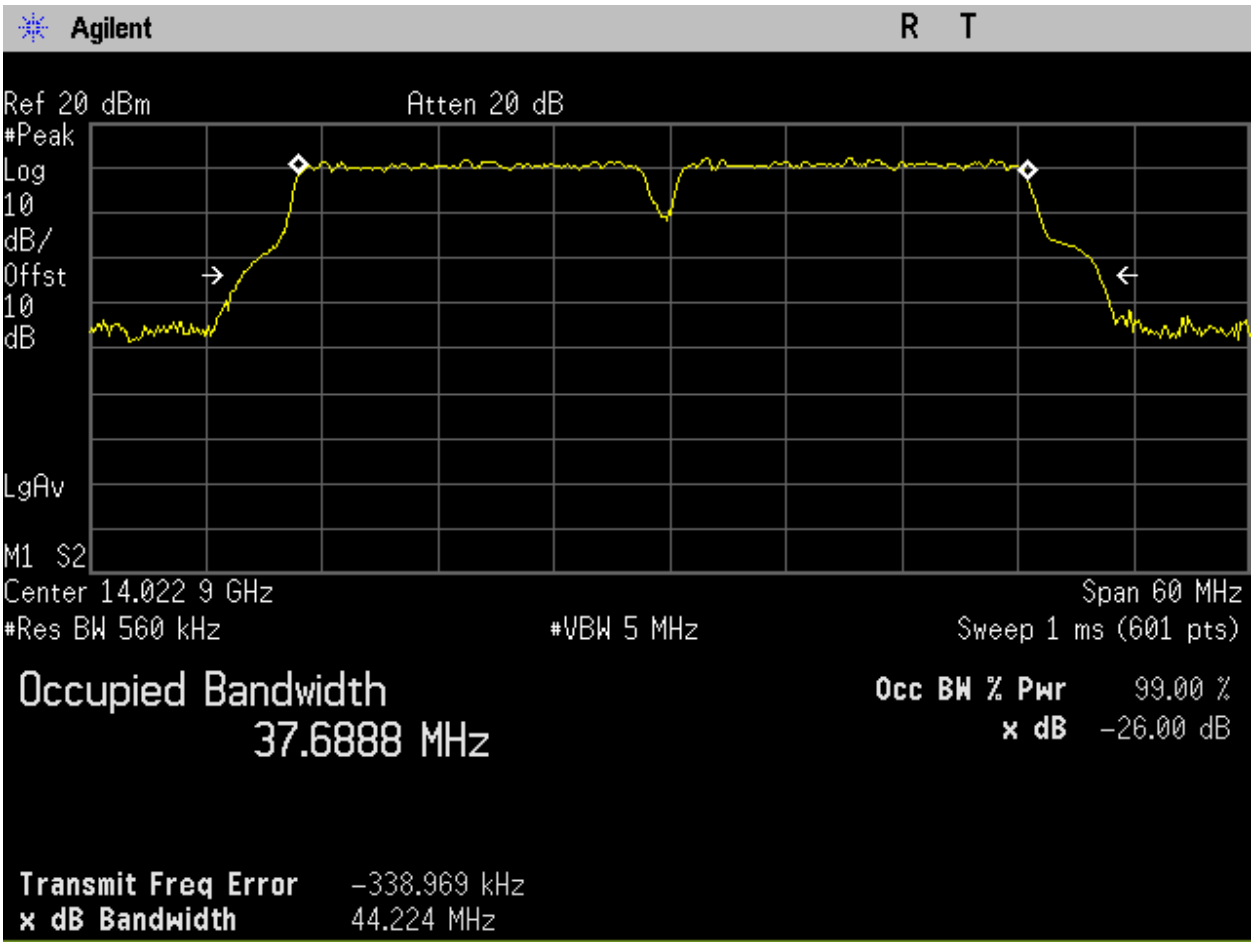

Figure 173. 99% OBW, QPSK, 40MHz Low Channel, 14.0229 GHz.

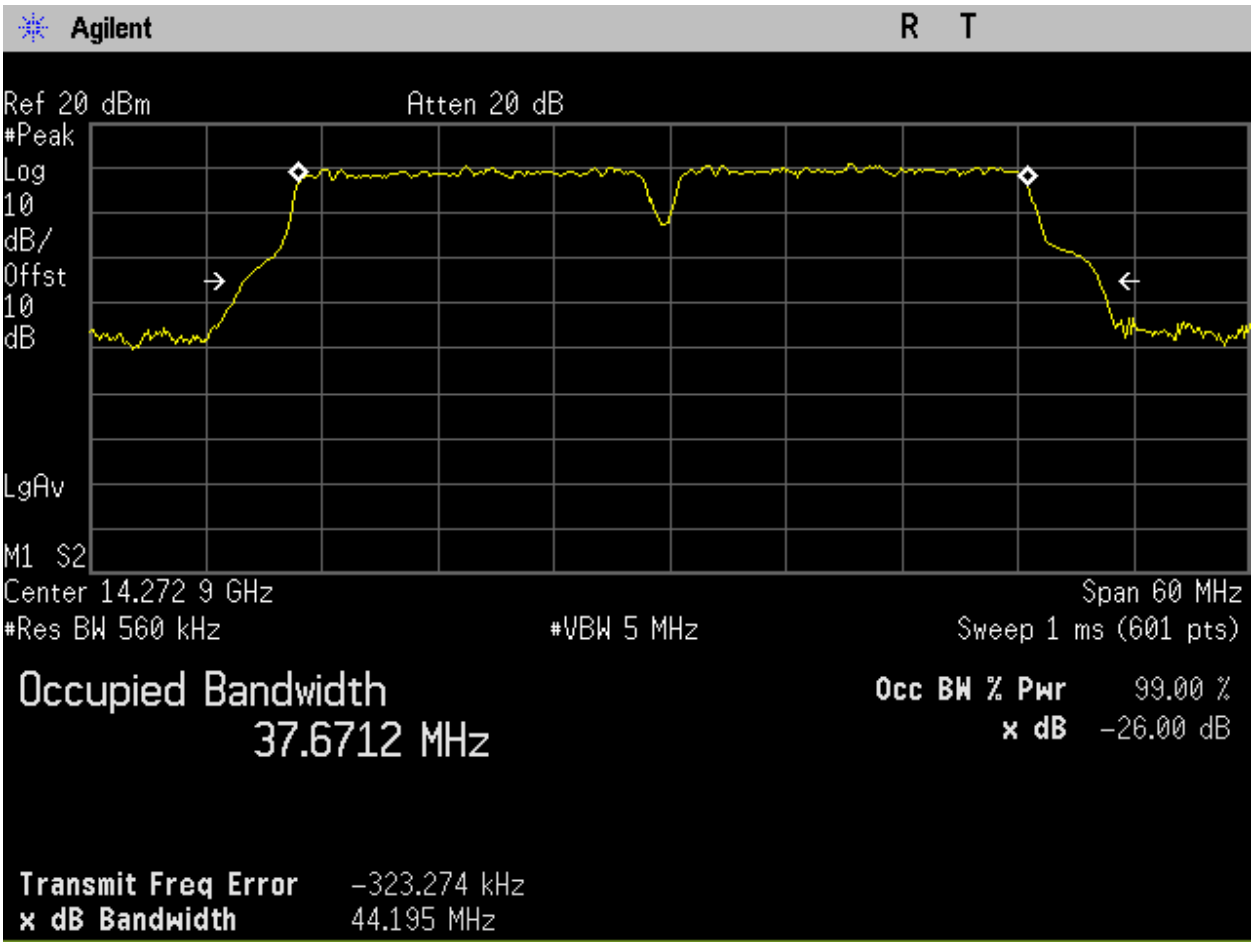

Figure 174. 99% OBW, QPSK, 40MHz Mid Channel, 14.2729 GHz.

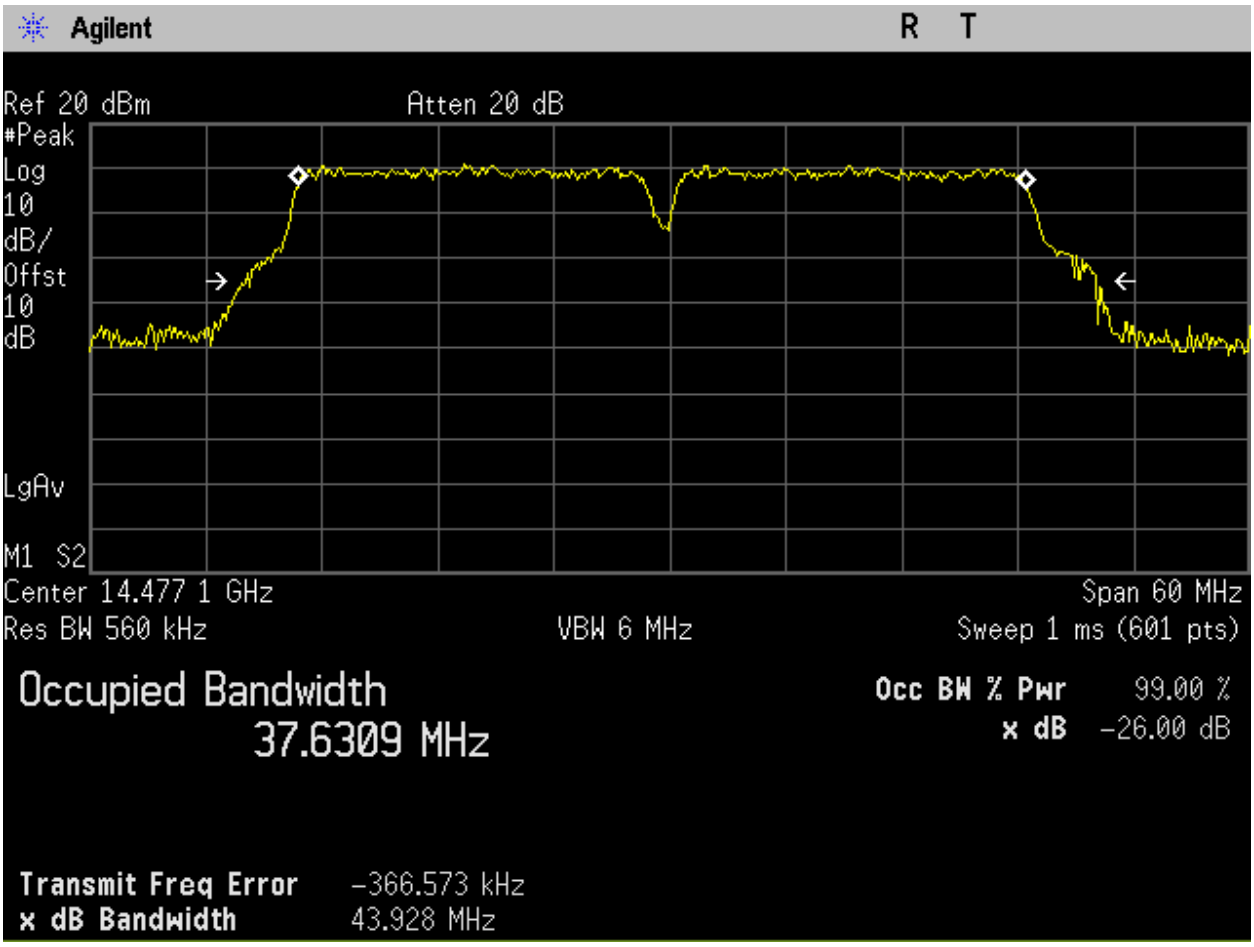

Figure 175. 99% OBW, QPSK, 40MHz High Channel, 14.4771 GHz.

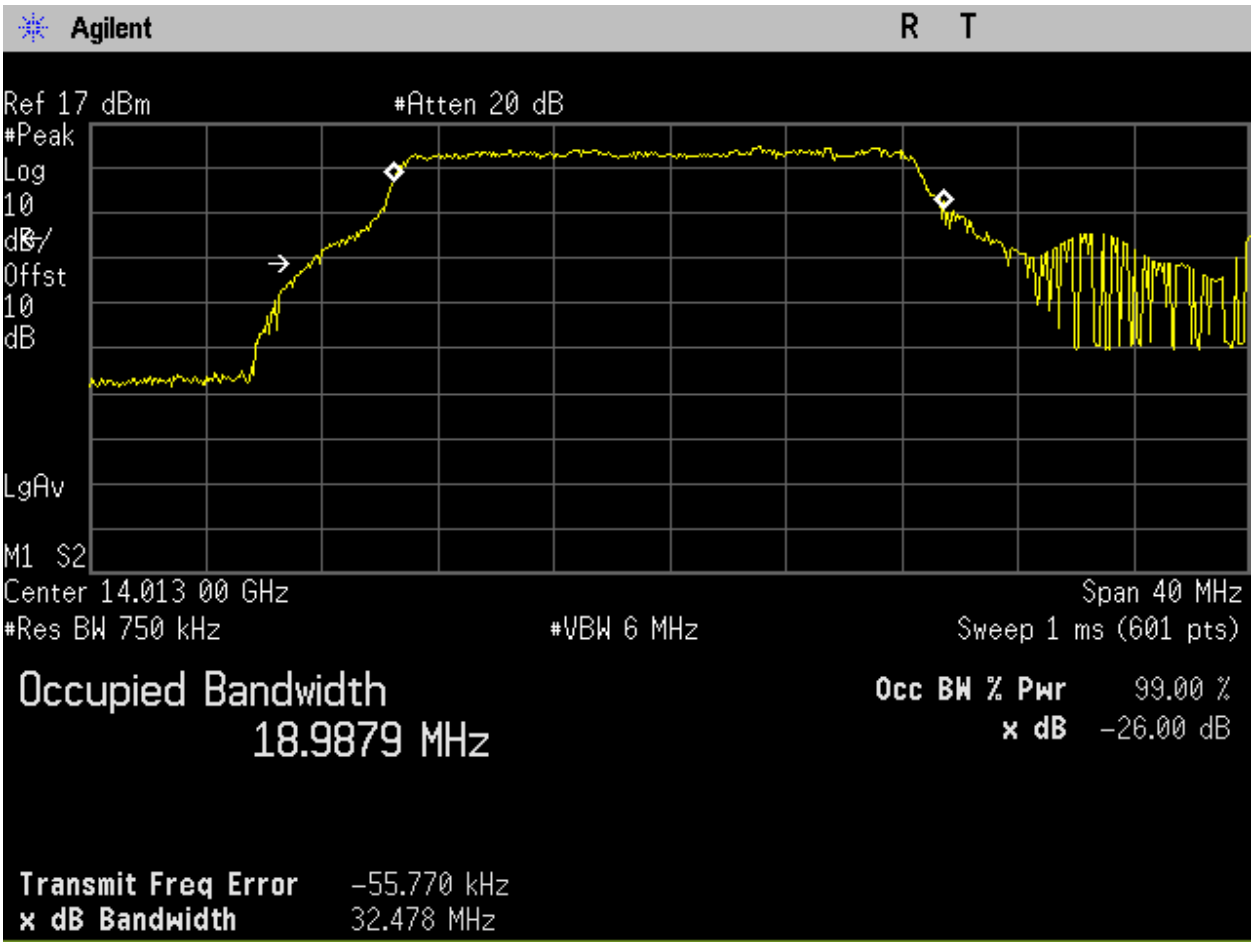

Figure 176. 99% OBW, 8PSK, 20MHz Low Channel, 14.013 GHz.

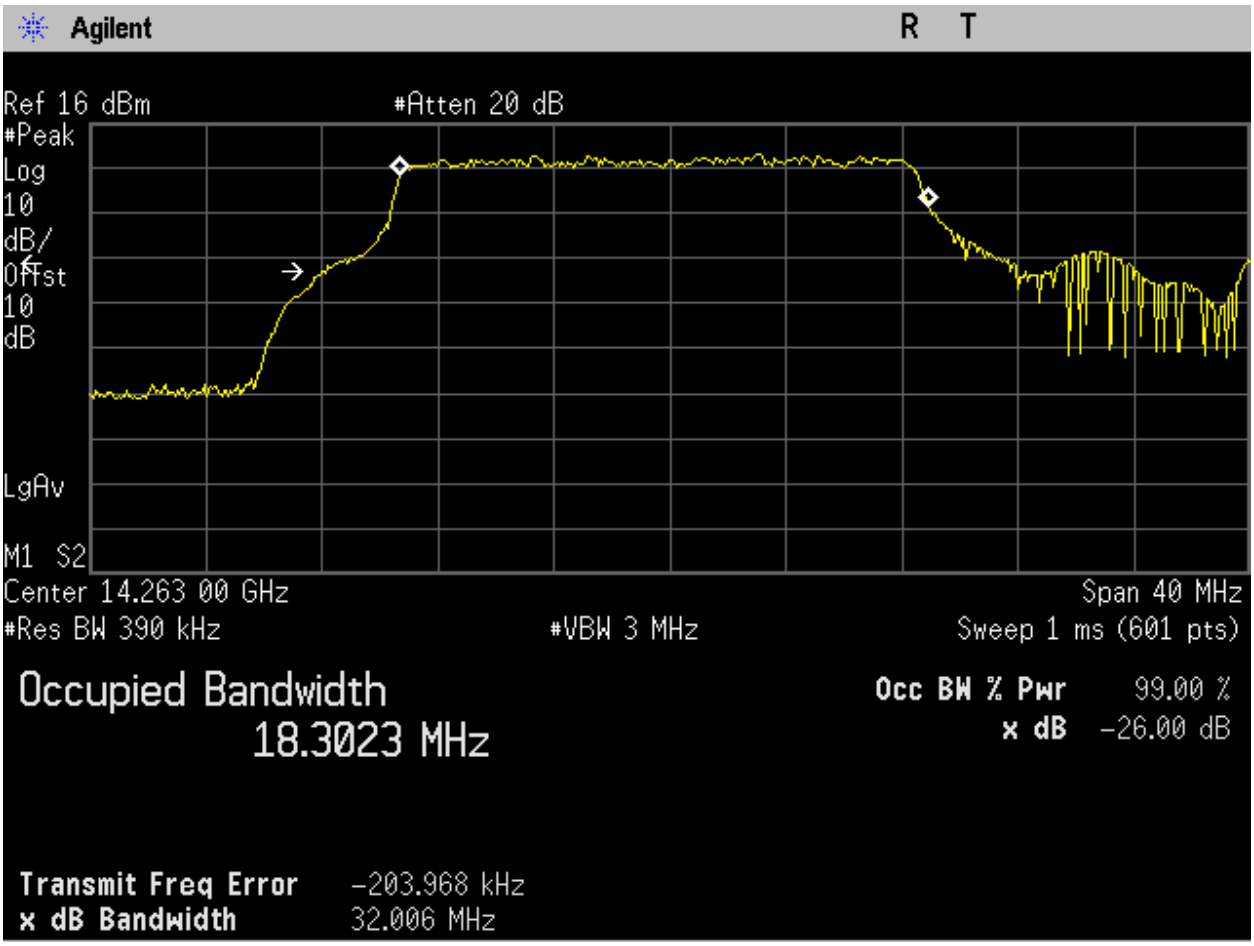

Figure 177. 99% OBW, 8PSK, 20MHz Mid Channel, 14.263 GHz.

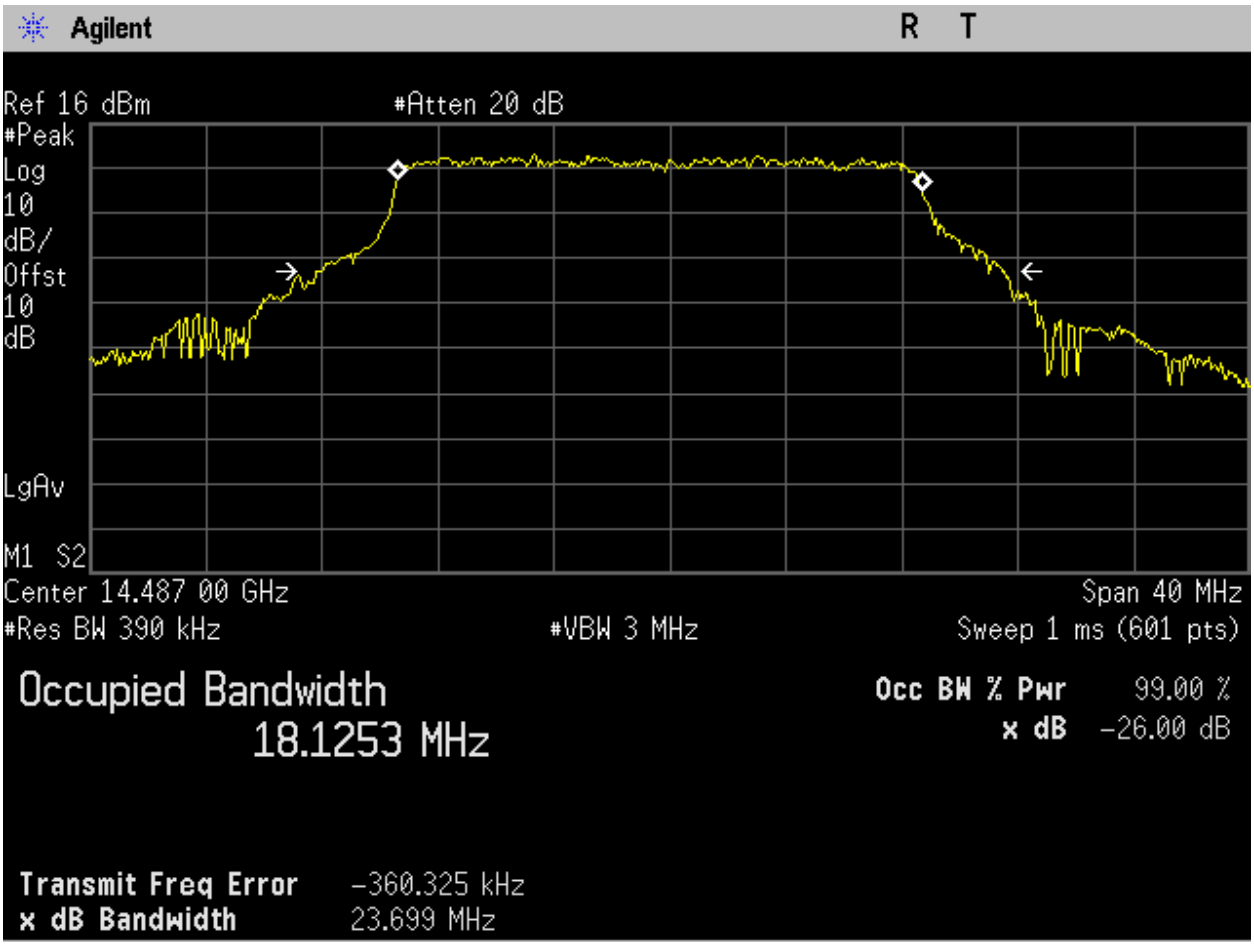

Figure 178. 99% OBW, 8PSK, 20MHz High Channel, 14.487 GHz.

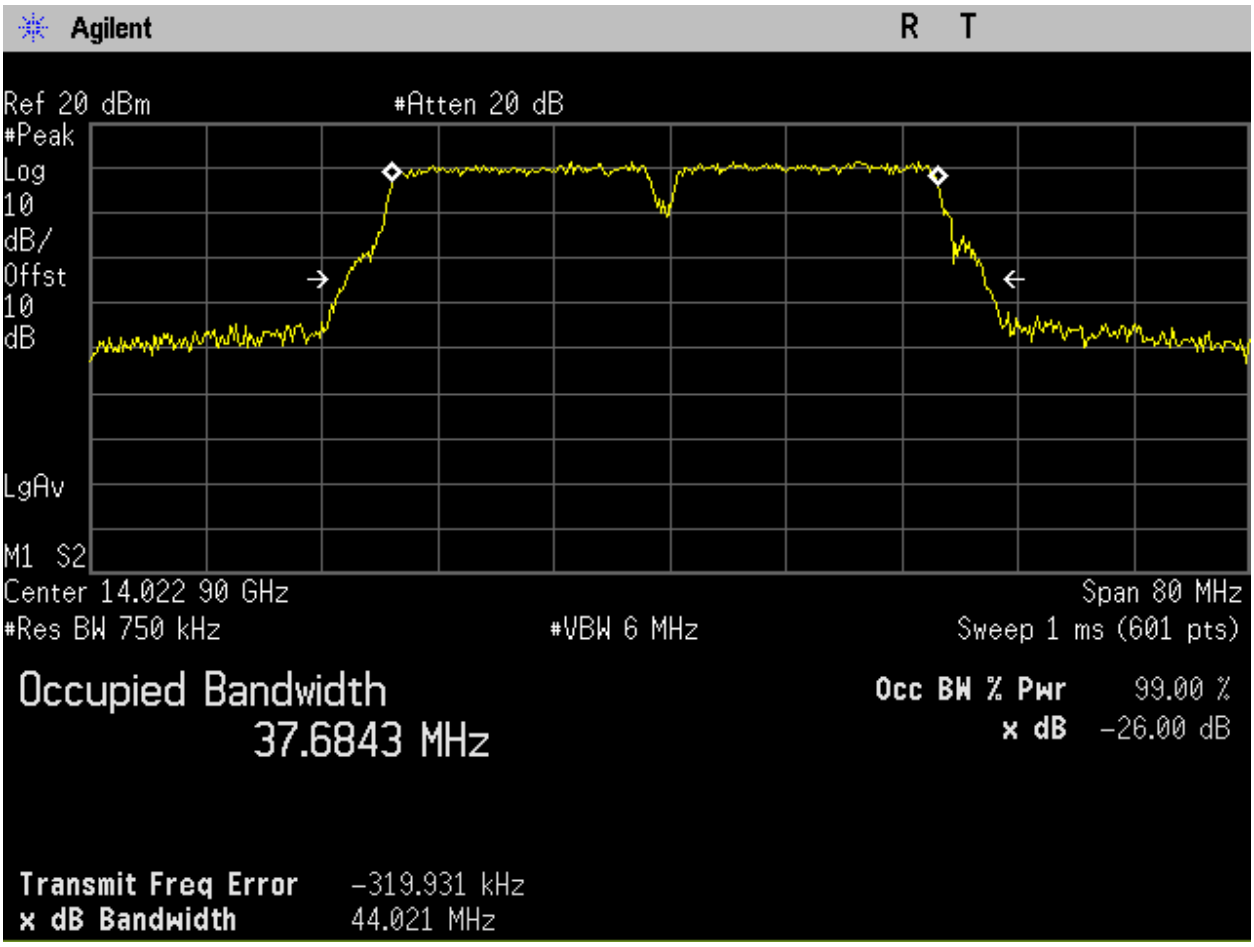

Figure 179. 99% OBW, 8PSK, 40MHz Low Channel, 14.0229 GHz.

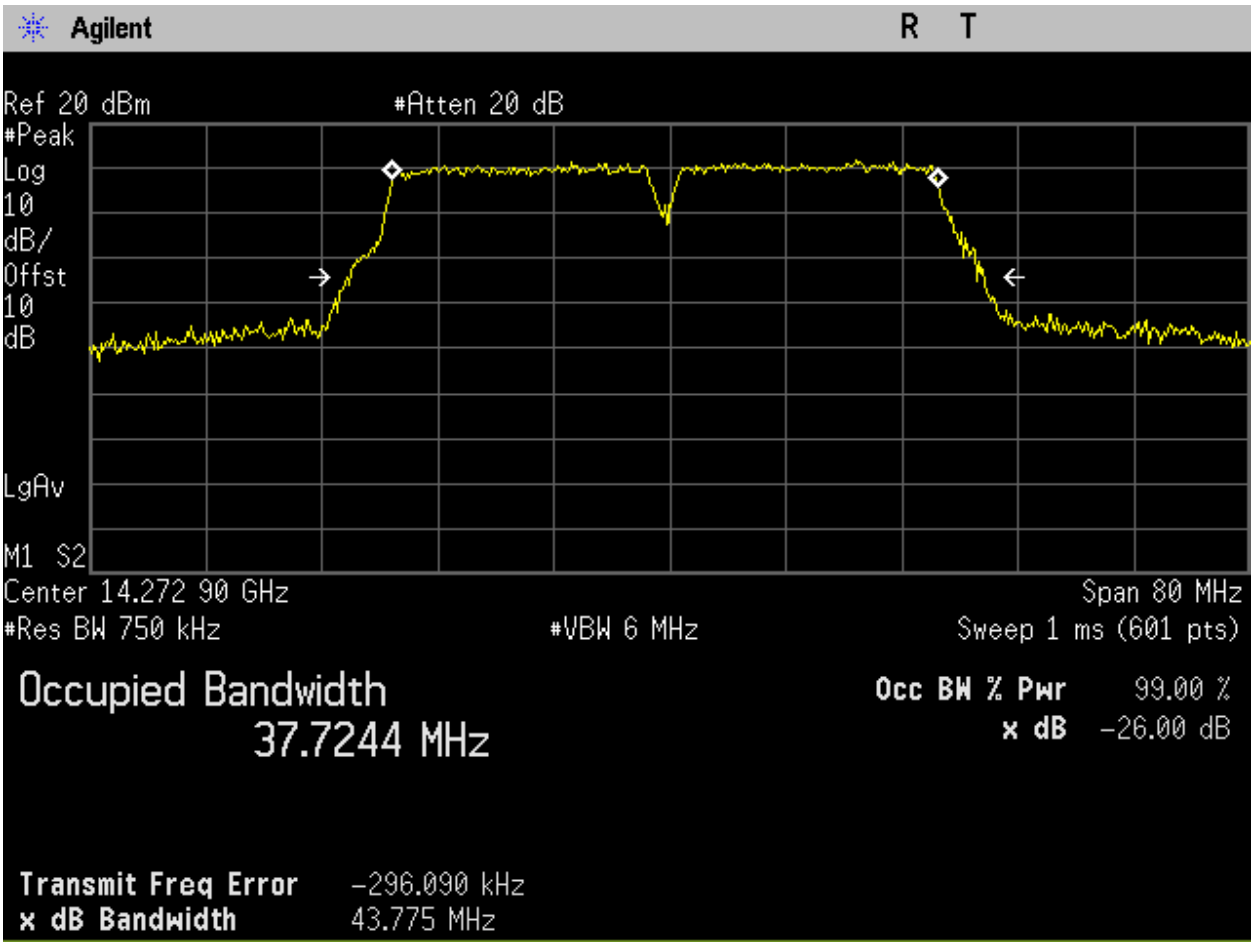

Figure 180. 99% OBW, 8PSK, 40MHz Mid Channel, 14.2729 GHz.

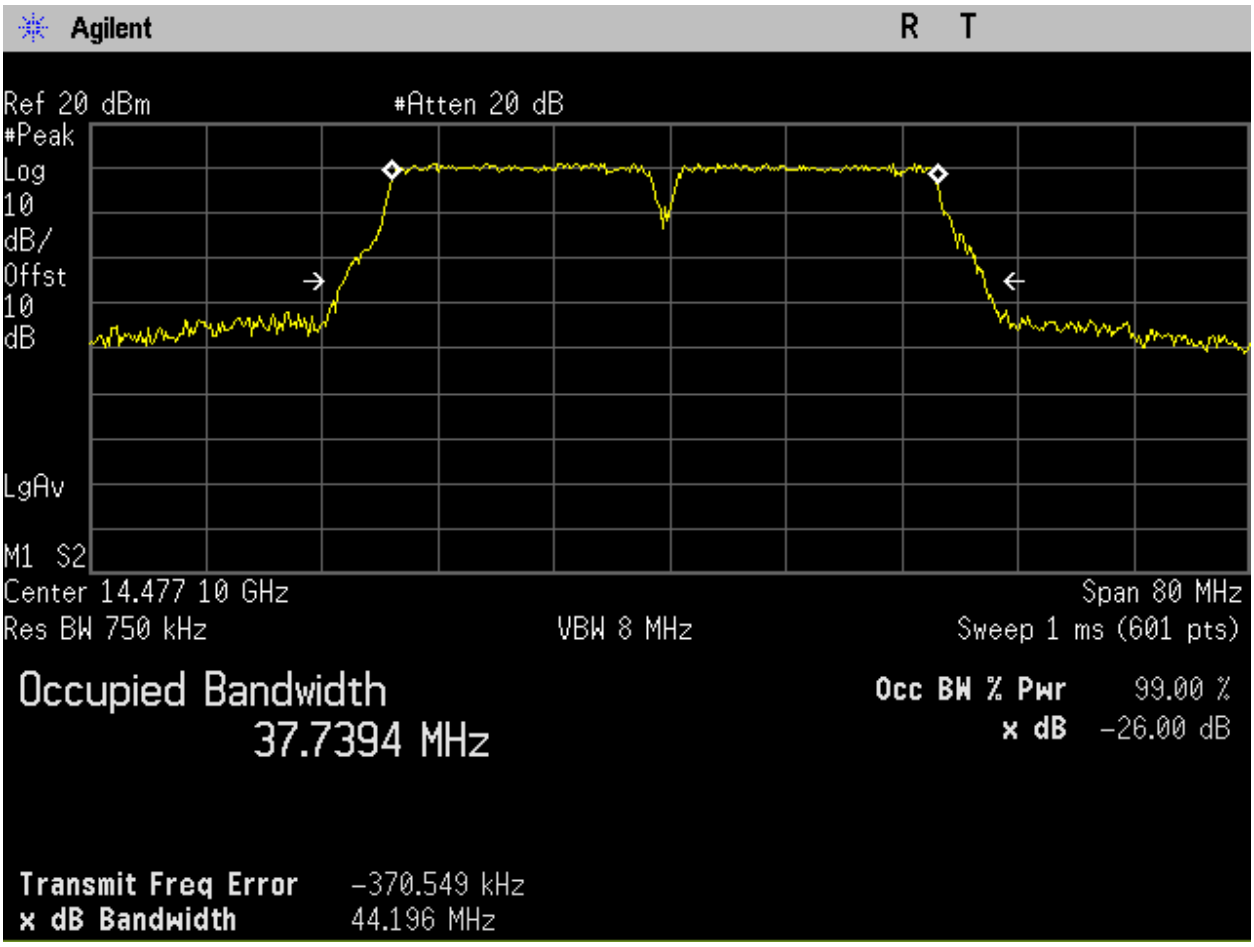

Figure 181. 99% OBW, 8PSK, 40MHz High Channel, 14.4771 GHz.

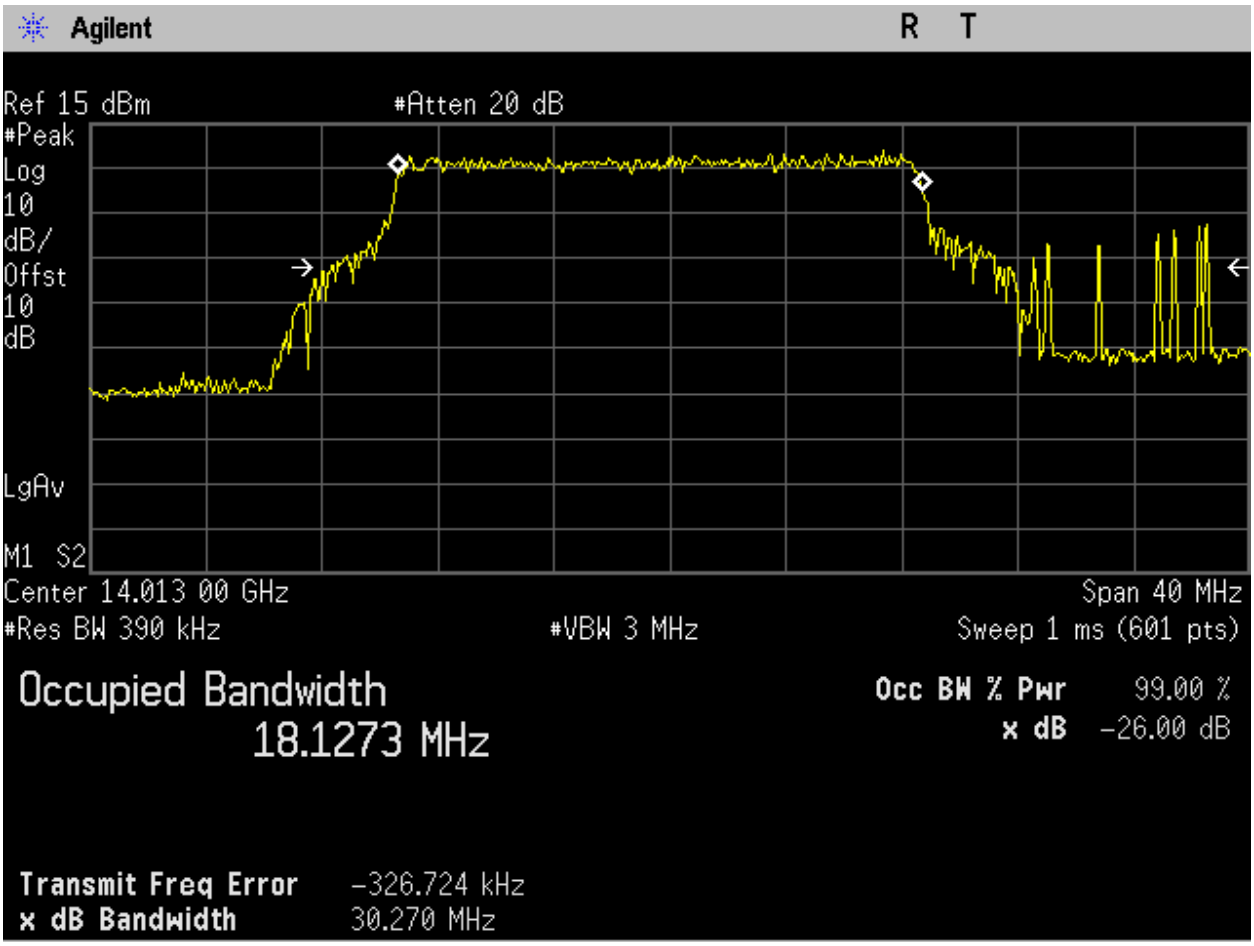

Figure 182. 99% OBW, 16QAM, 20MHz Low Channel, 14.013 GHz.

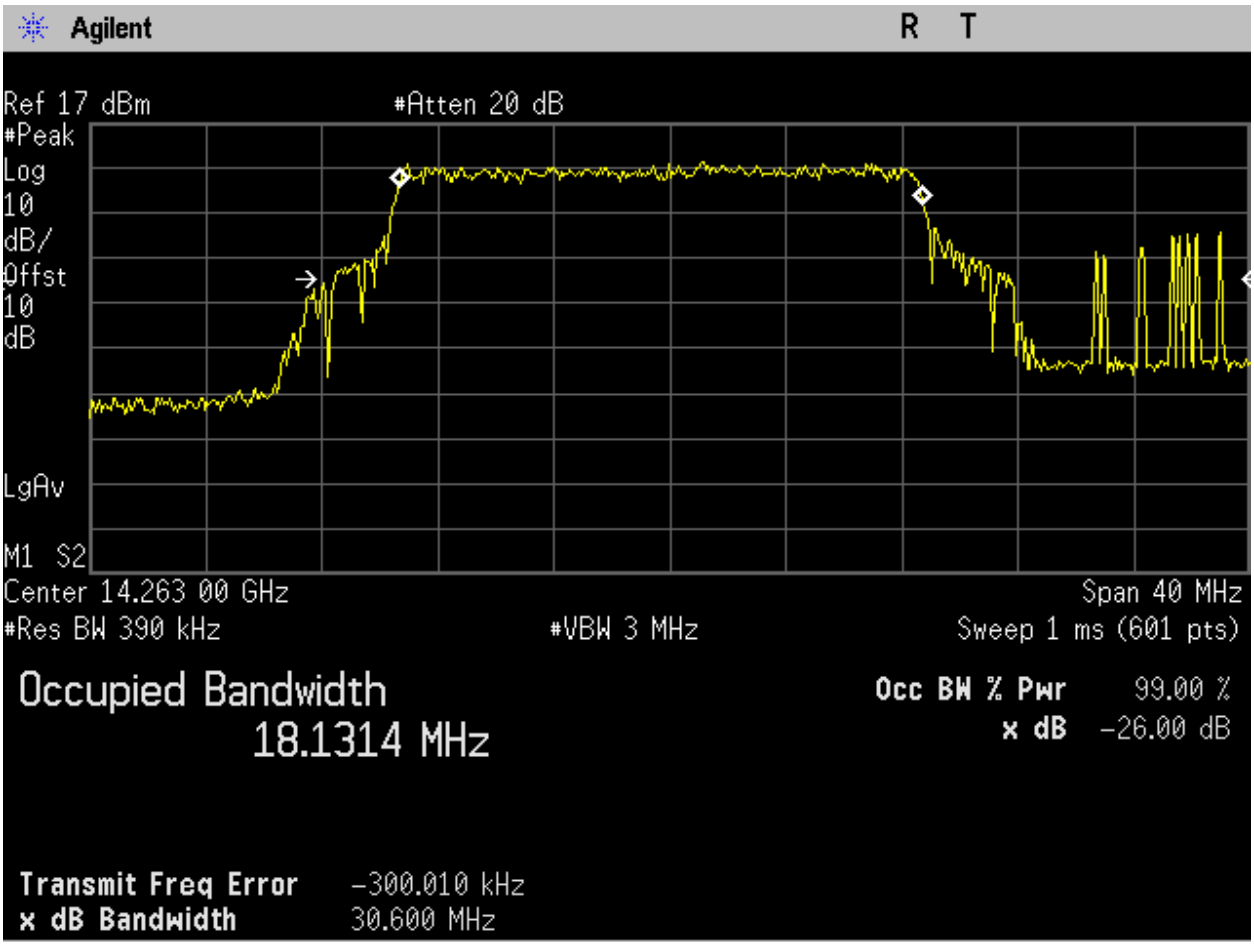

Figure 183. 99% OBW, 16QAM, 20MHz Mid Channel, 14.263 GHz.

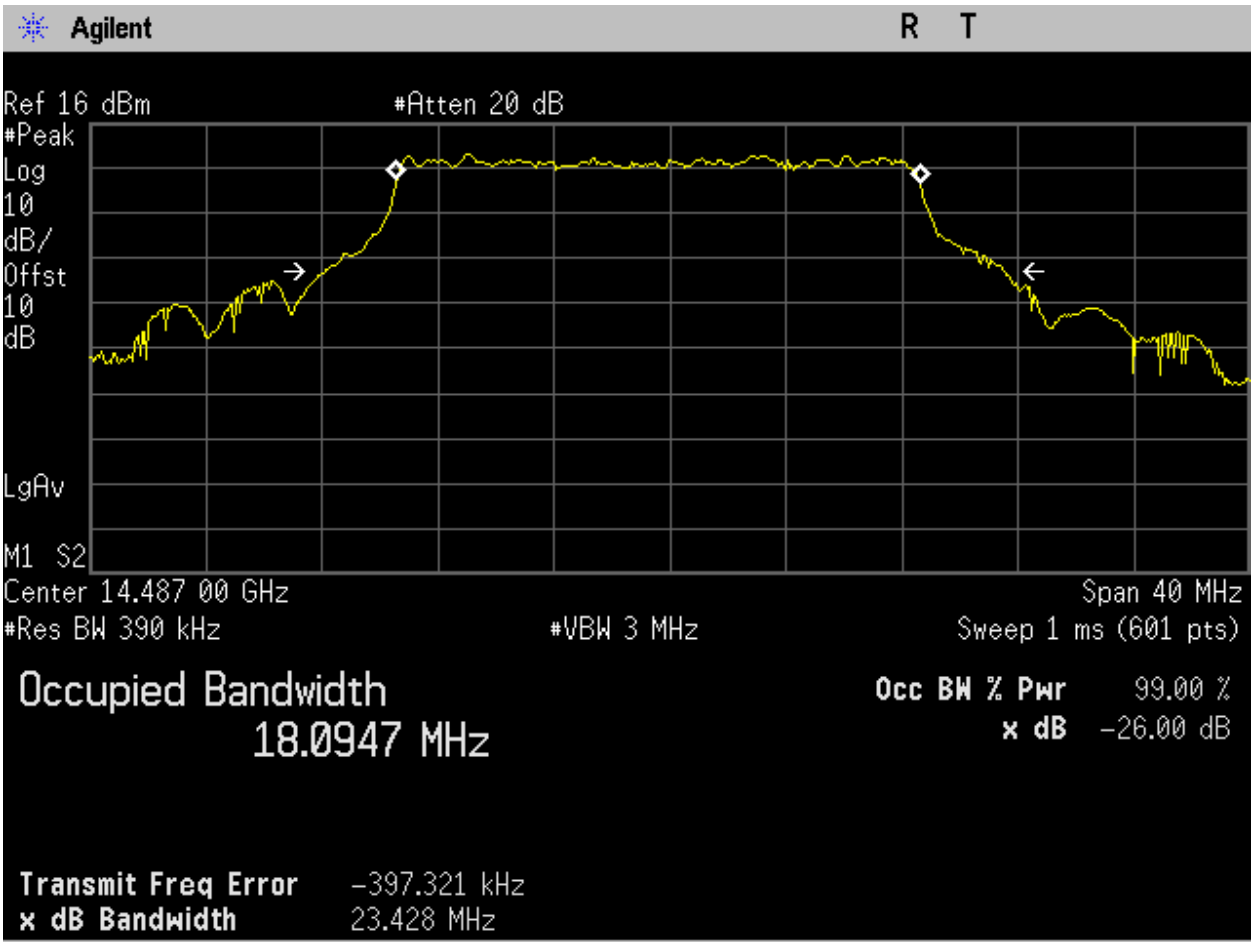

Figure 184. 99% OBW, 16QAM, 20MHz High Channel, 14.487 GHz.

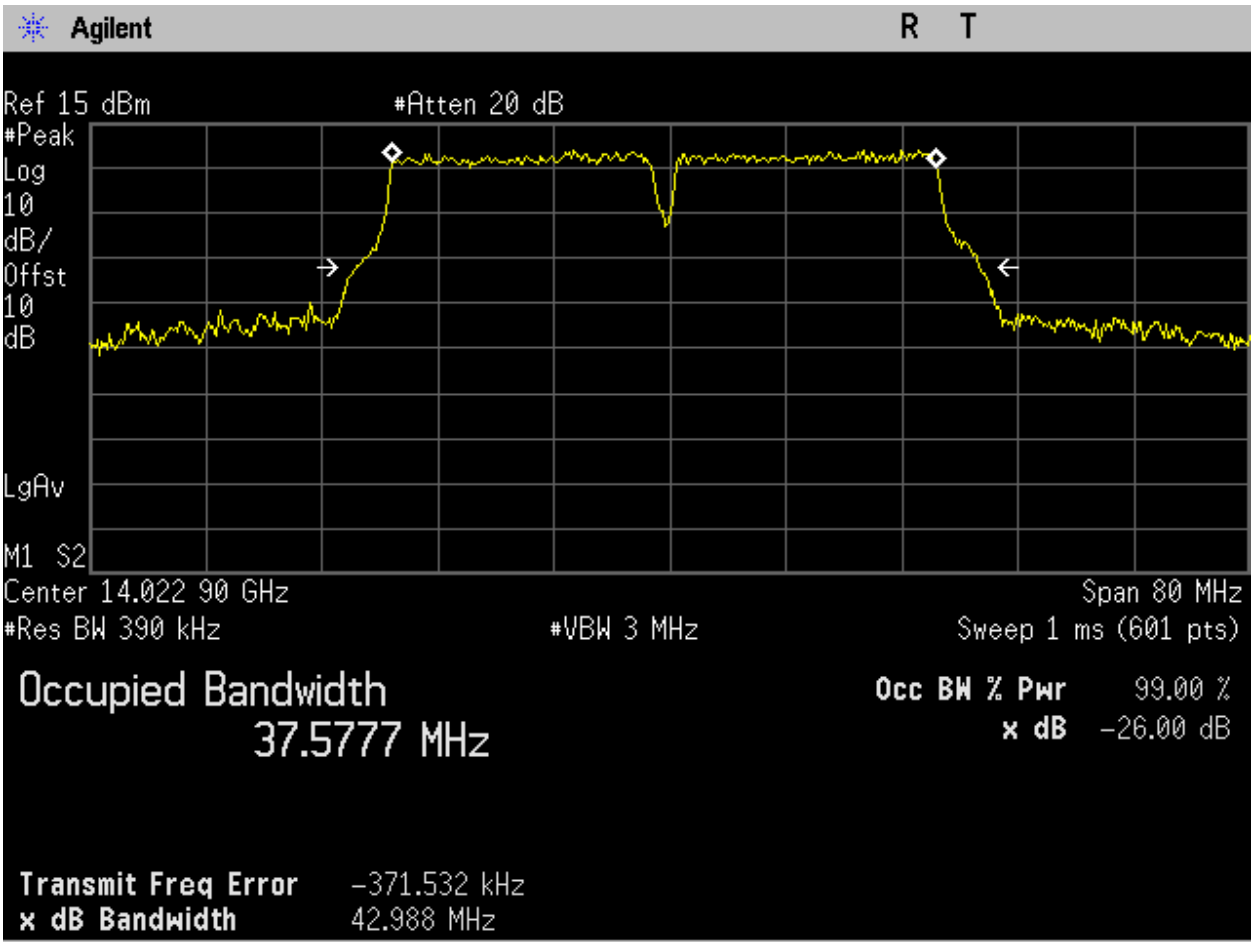

Figure 185. 99% OBW, 16QAM, 40MHz Low Channel, 14.0229 GHz.

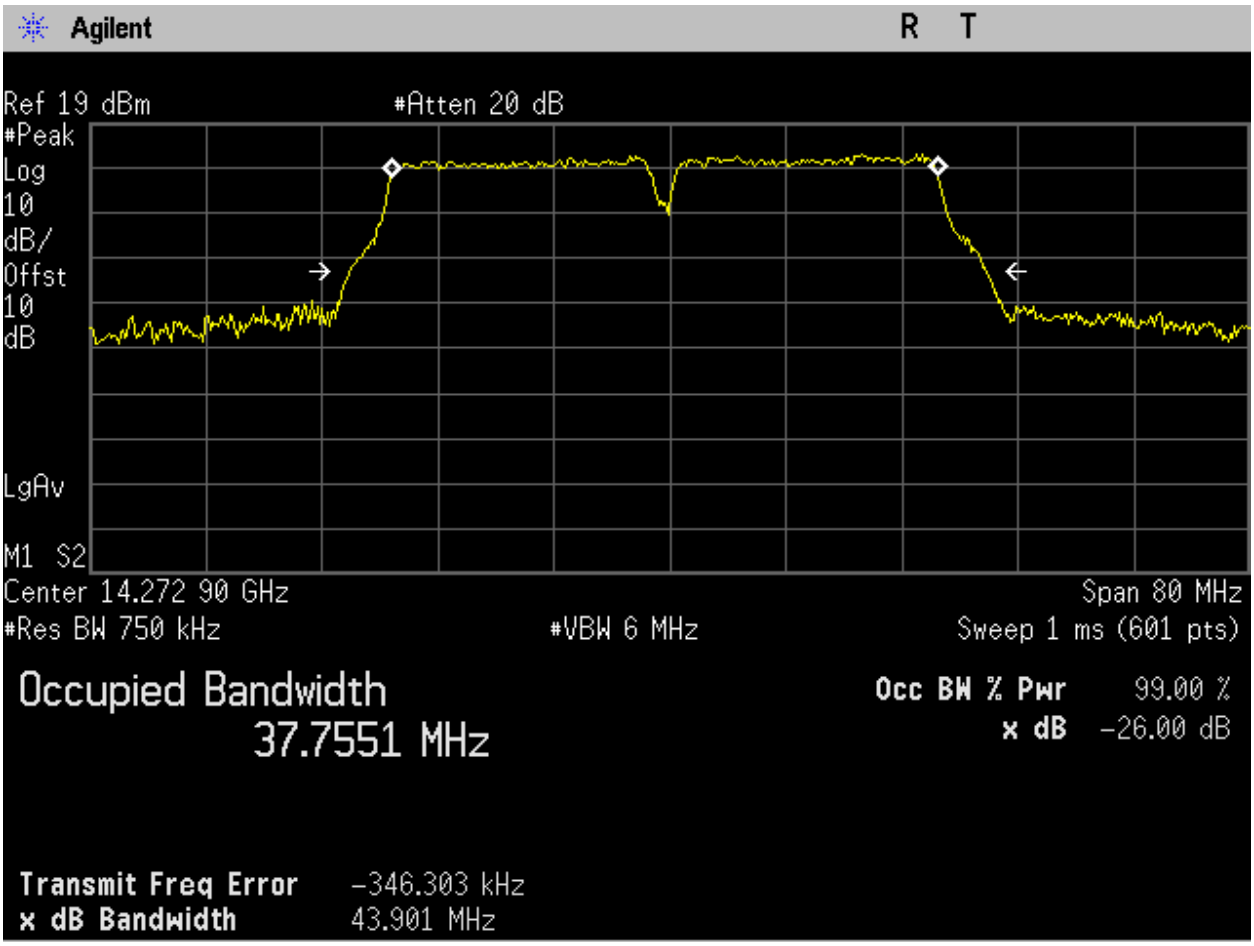

Figure 186. 99% OBW, 16QAM, 40MHz Mid Channel, 14.2729 GHz.

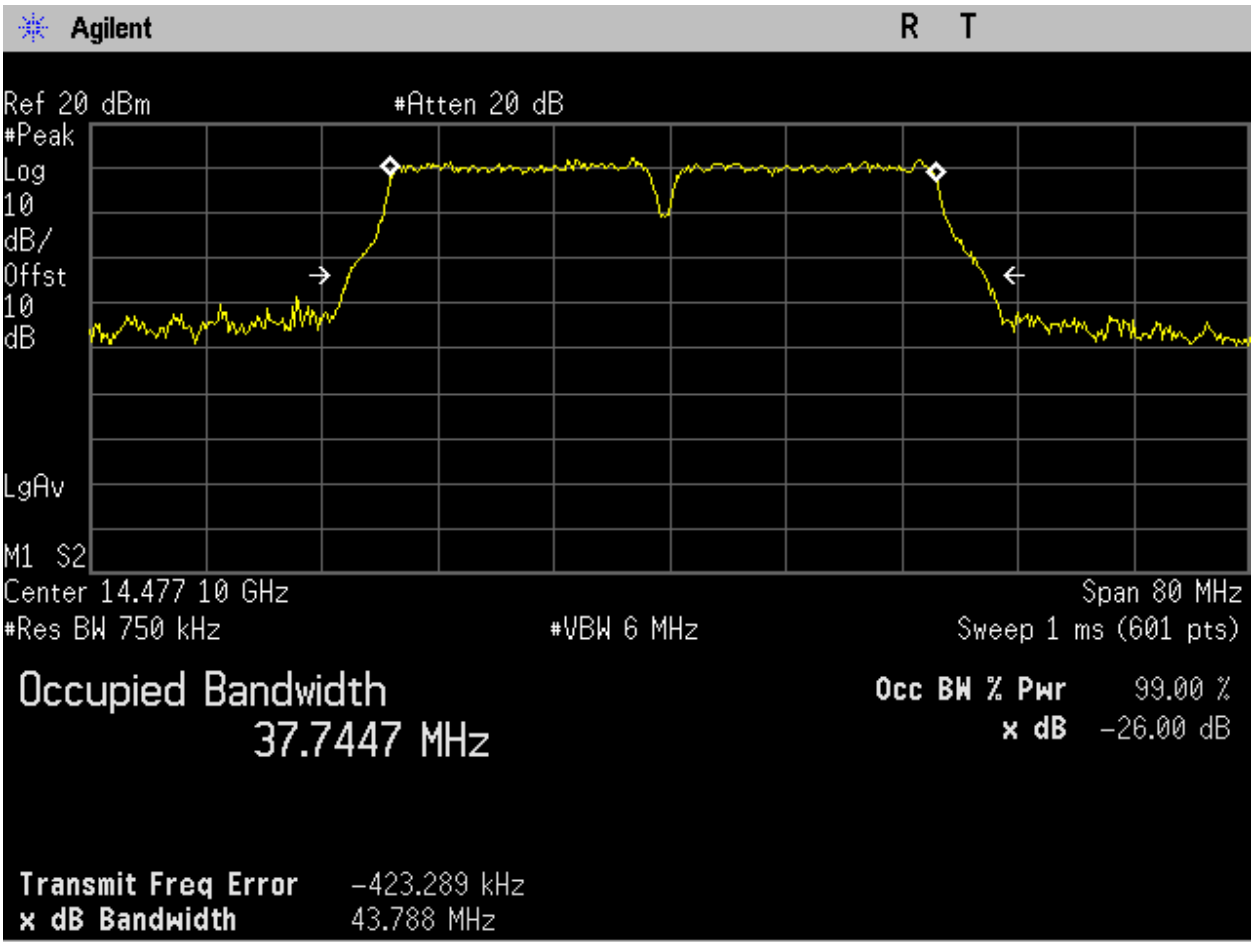

Figure 187. 99% OBW, 16QAM, 40MHz High Channel, 14.4771 GHz.

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 Procedures: 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: May 8 – May 10, 2024

Temperature [°C]	Voltage [VAC]	Measured Carrier Frequency with Time Elapsed			
		Startup (Hz)	2min (Hz)	5min (Hz)	10min (Hz)
-30	120	14263083813.237	14262950511.857	14262951807.412	14262952431.405
-20	120	14263083981.570	14262929867.974	14262929766.165	14262963422.511
-10	120	14263083808.125	14262929831.377	14262930576.041	14263082434.024
0	120	14262950471.361	14263062445.631	14262957570.584	14262996273.773
10	120	14263094908.413	14262950453.964	14262951764.769	14262930582.498
20	120	14262976866.703	14262930215.870	14262950338.923	14262956126.261
30	120	14263083462.312	14262963180.480	14262930822.310	14262963109.377
40	120	14262950058.169	14262949991.297	14263082964.302	14262963180.492
50	120	14262929331.837	14262950226.932	14262950852.366	14262950081.694

Temperature [°C]	Voltage [VAC]	Frequency Tolerance			
		Startup (ppm)	2min (ppm)	5min (ppm)	10min (ppm)
-30	120	5.876	3.470	3.379	3.335
-20	120	5.888	4.917	4.924	2.565
-10	120	5.876	4.920	4.867	5.780
0	120	3.473	4.378	2.975	0.261
10	120	6.654	3.474	3.382	4.867
20	120	1.622	4.893	3.482	3.076
30	120	5.852	2.581	4.850	2.586
40	120	3.501	3.506	5.817	2.581
50	120	4.955	3.490	3.446	3.500

Table 12. Temperature Variation, Frequency Stability

Ref. Freq. (GHz)	Voltage [Vac]	Measured Carrier Frequency with Time Elapsed			
		Startup (Hz)	2min (Hz)	5min (Hz)	10min (Hz)
14.013	85%	14012921559.591	14013054080.097	14012921576.540	14012921572.157
	100%	14012920902.729	14013054525.390	14013053614.625	14013054684.475
	115%	14013064598.182	14012921598.141	14013053773.163	14012921617.738
14.263	85%	14262921199.452	14262921289.023	14262921216.343	14263053252.033
	100%	14263054064.126	14263054094.121	14263053927.615	14263054566.242
	115%	14262921330.596	14262921294.238	14263054814.056	14262921281.478
14.487	85%	14487052856.666	14487052776.274	14486920881.023	14486920892.060
	100%	14487054243.890	14487054230.865	14486920819.811	14486920847.686
	115%	14487053968.075	14486921032.243	14486920889.184	14486921044.437

Ref. Freq. (GHz)	Voltage [Vac]	Frequency Tolerance			
		Startup (Hz)	2min (Hz)	5min (Hz)	10min (Hz)
14.013	85%	5.598	3.859	5.596	5.597
	100%	5.645	3.891	3.826	3.902
	115%	4.610	5.595	3.837	5.594
14.263	85%	5.525	5.519	5.524	3.734
	100%	3.791	3.793	3.781	3.826
	115%	5.516	5.518	3.843	5.519
14.487	85%	3.649	3.643	5.461	5.461
	100%	3.744	3.743	5.466	5.464
	115%	3.725	5.451	5.461	5.450

Table 13. Voltage Variation, Frequency Stability

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 Procedures: 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: April 26 – May 13, 2024

Modulation	Nominal Bandwidth (MHz)	Center Frequency (MHz)	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 (worst-case)	20	14013	52.63	-64.66	41.64	1.25	0.2	-33.52	-13	-20.52
		14263	52.58	-64.59	41.64	1.25	0.2	-33.45	-13	-20.45
		14857	52.58	-64.54	41.64	1.25	0.2	-33.4	-13	-20.4
	40	14022.7	52.54	-65.12	41.64	1.25	0.2	-33.98	-13	-20.98
		14272.7	52.63	-64.6	41.64	1.25	0.2	-33.46	-13	-20.46
		14477.1	52.54	-64.85	41.64	1.25	0.2	-33.71	-13	-20.71

Table 14. Test Result at frequencies above 50GHz.

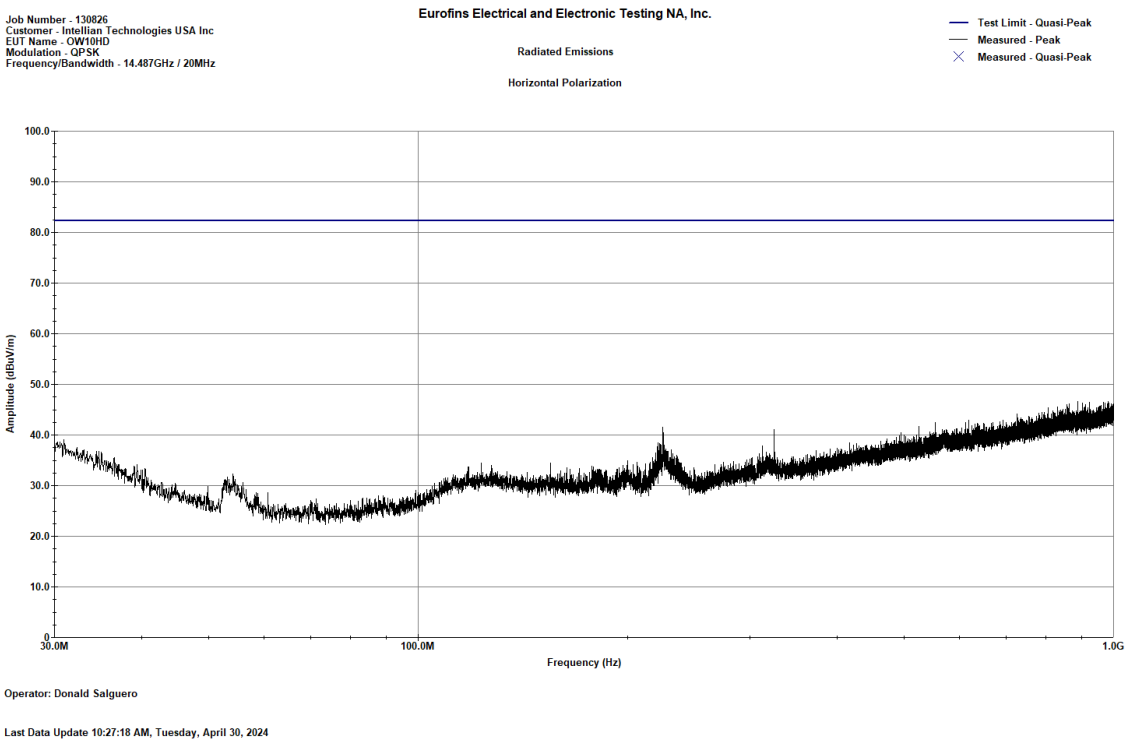

Figure 188. Radiated Emissions, QPSK_20MHz_High Channel, 30 MHz - 1 GHz-_H

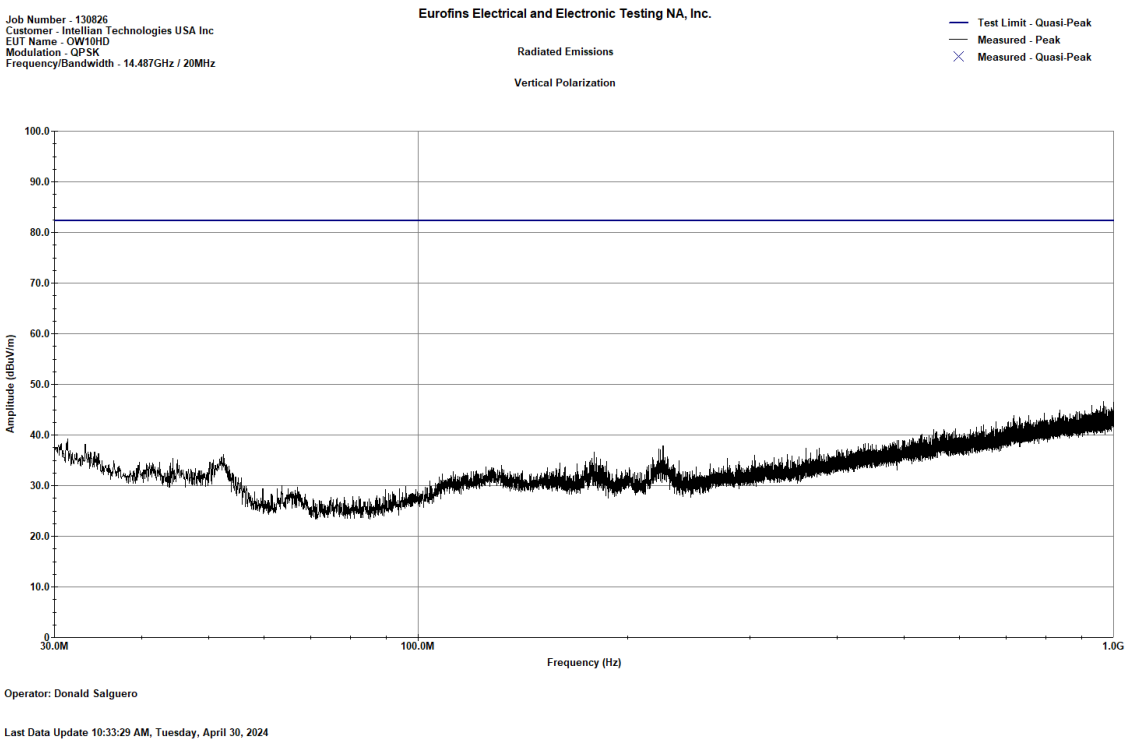

Figure 189. Radiated Emissions, QPSK_20MHz_High Channel, 30 MHz - 1 GHz-_V

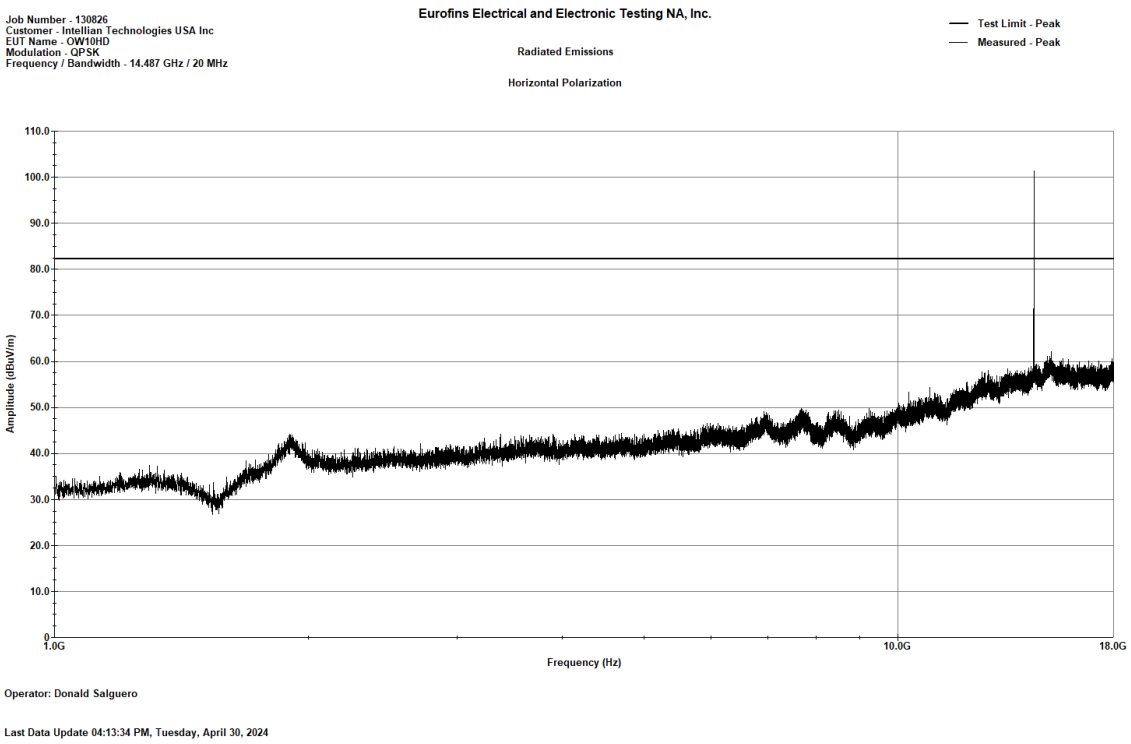

Figure 190. Radiated Emissions, QPSK_20MHz_High Channel, 1 - 18 GHz-_H

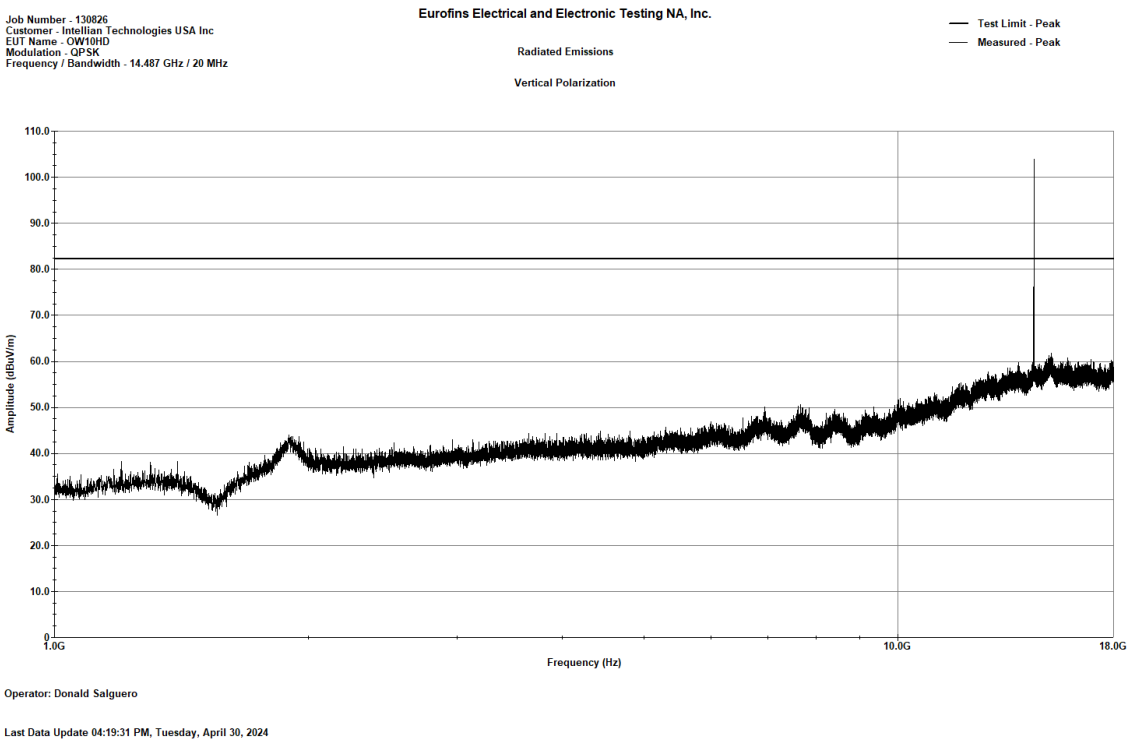

Figure 191. Radiated Emissions, QPSK_20MHz_High Channel, 1 - 18 GHz-_V

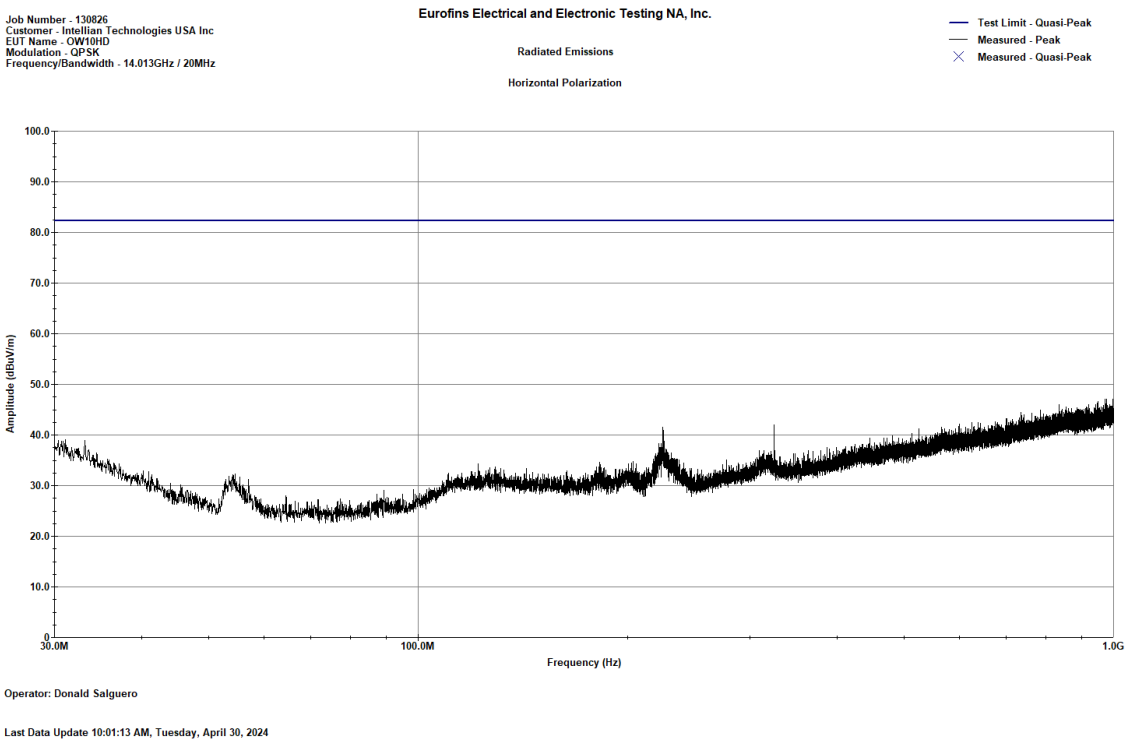

Figure 192. Radiated Emissions, QPSK_20MHz_Low Channel, 30 MHz - 1 GHz-_H

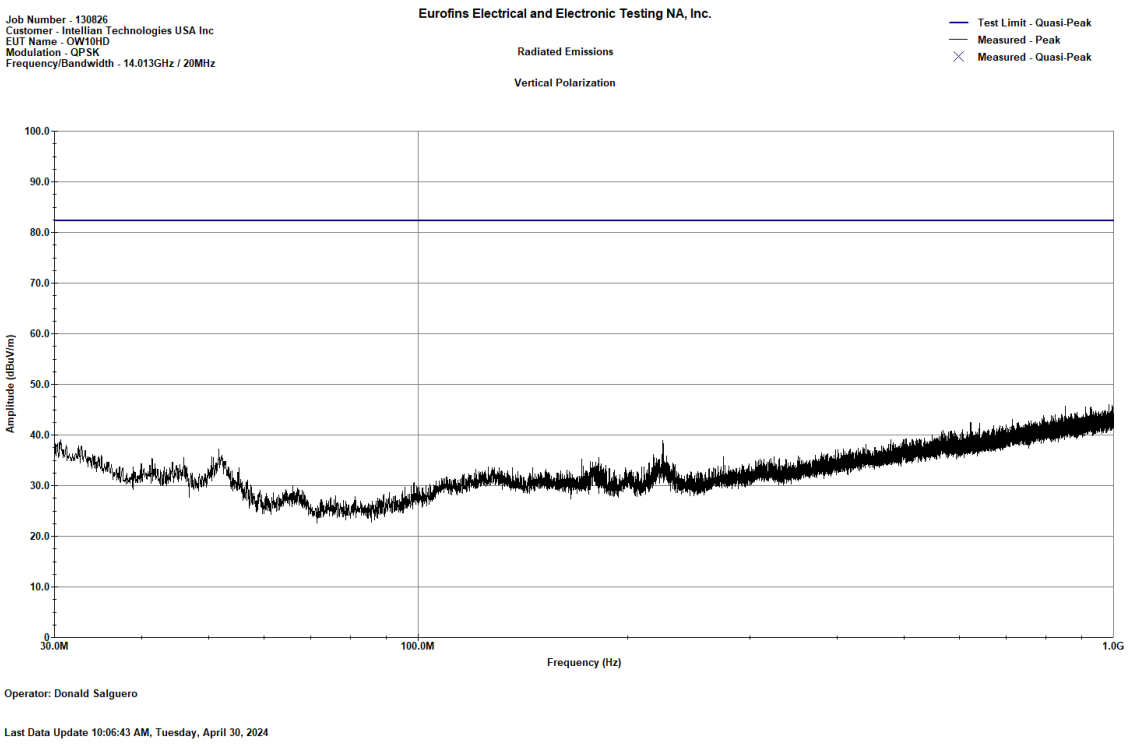

Figure 193. Radiated Emissions, QPSK_20MHz_Low Channel, 30 MHz - 1 GHz-_V

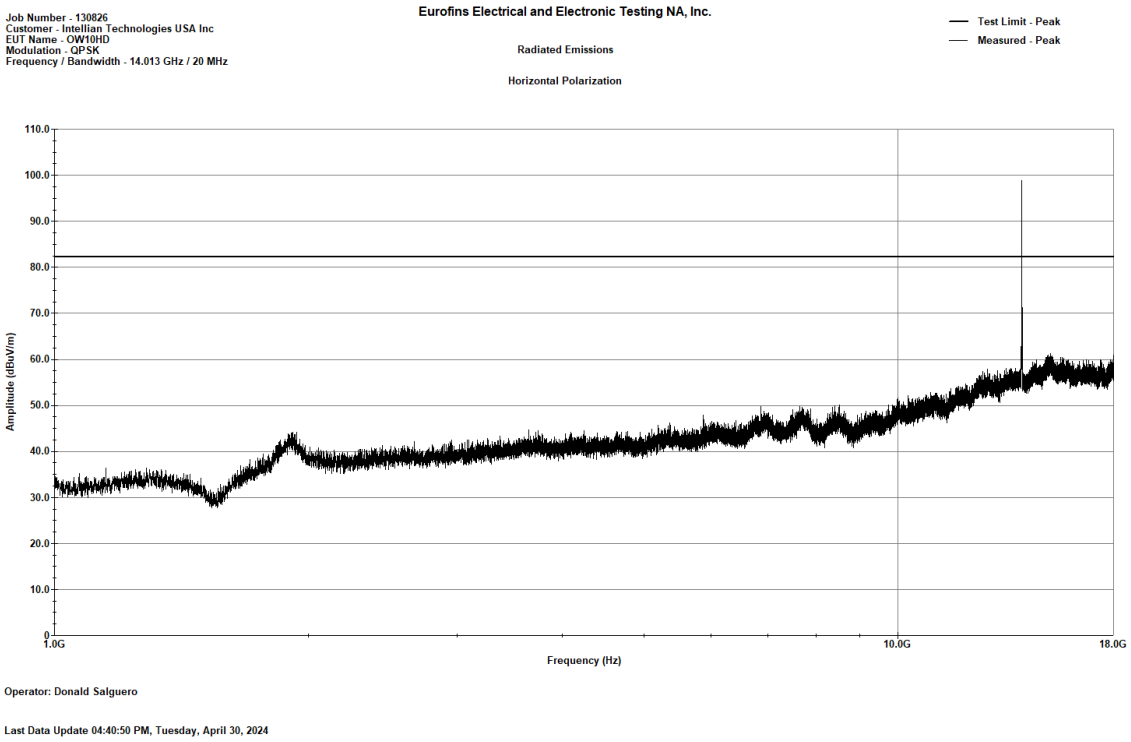

Figure 194. Radiated Emissions, QPSK_20MHz_Low Channel, 1 - 18 GHz-_H

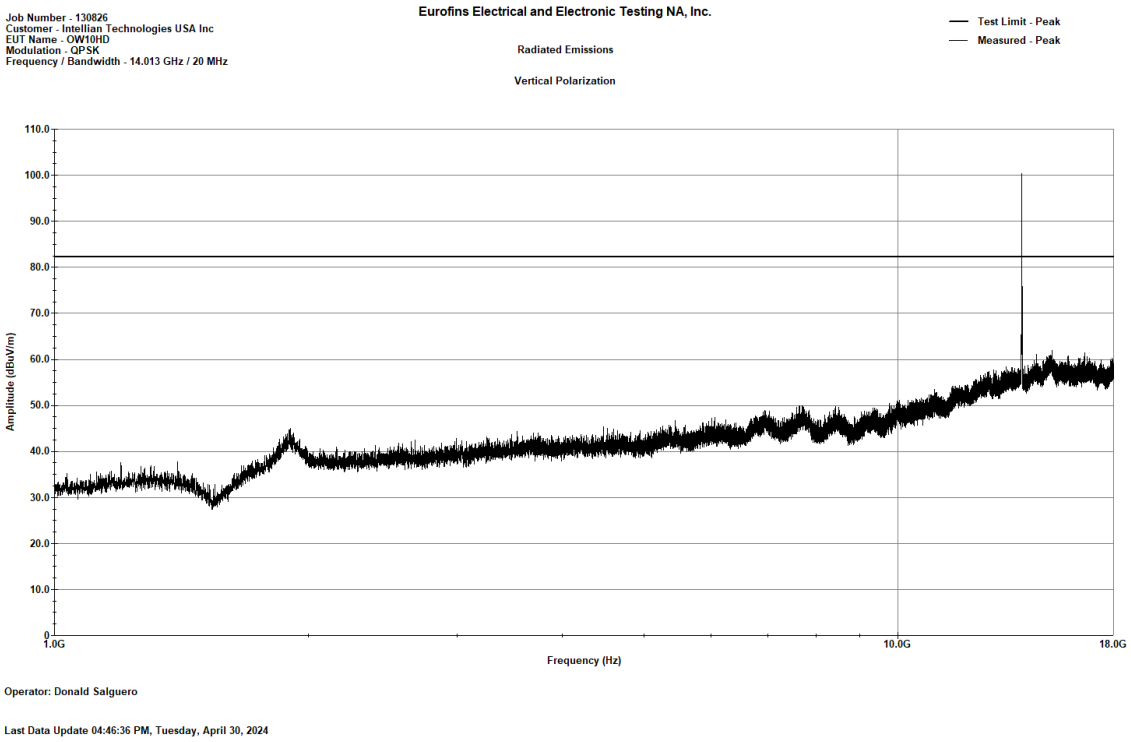

Figure 195. Radiated Emissions, QPSK_20MHz_Low Channel, 1 - 18 GHz-_V

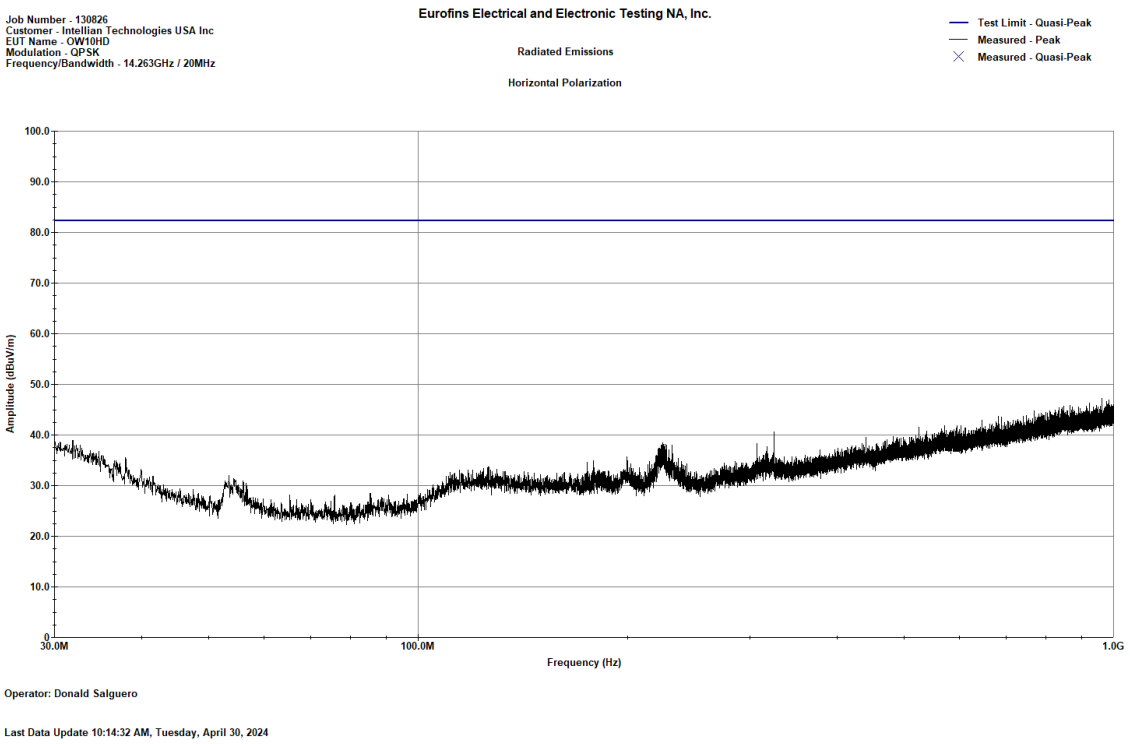

Figure 196. Radiated Emissions, QPSK_20MHz_Mid Channel, 30 MHz - 1 GHz-_H

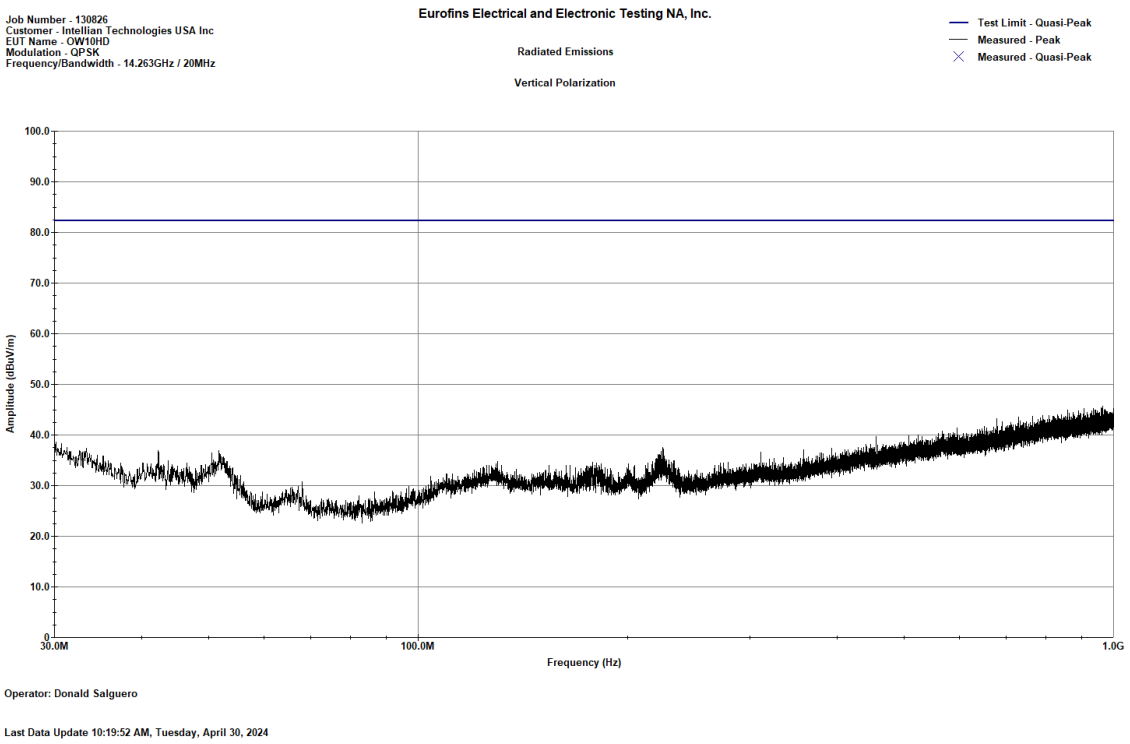

Figure 197. Radiated Emissions, QPSK_20MHz_Mid Channel, 30 MHz - 1 GHz-_V

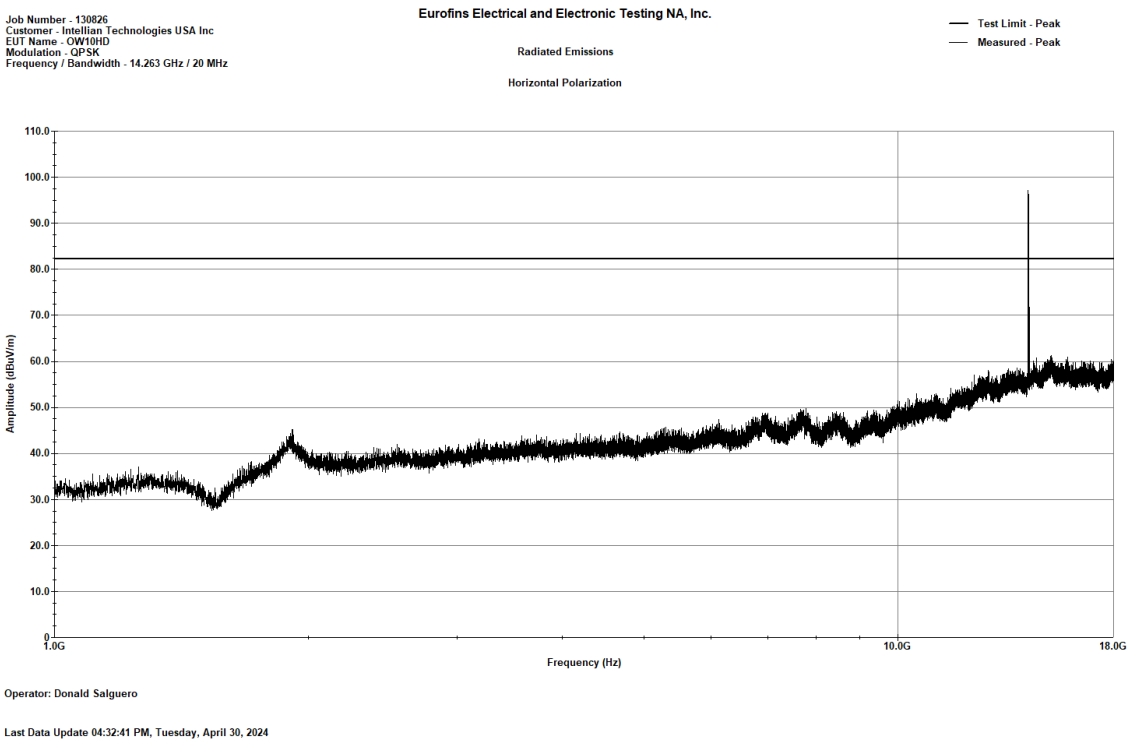

Figure 198. Radiated Emissions, QPSK_20MHz_Mid Channel, 1 - 18 GHz-_H

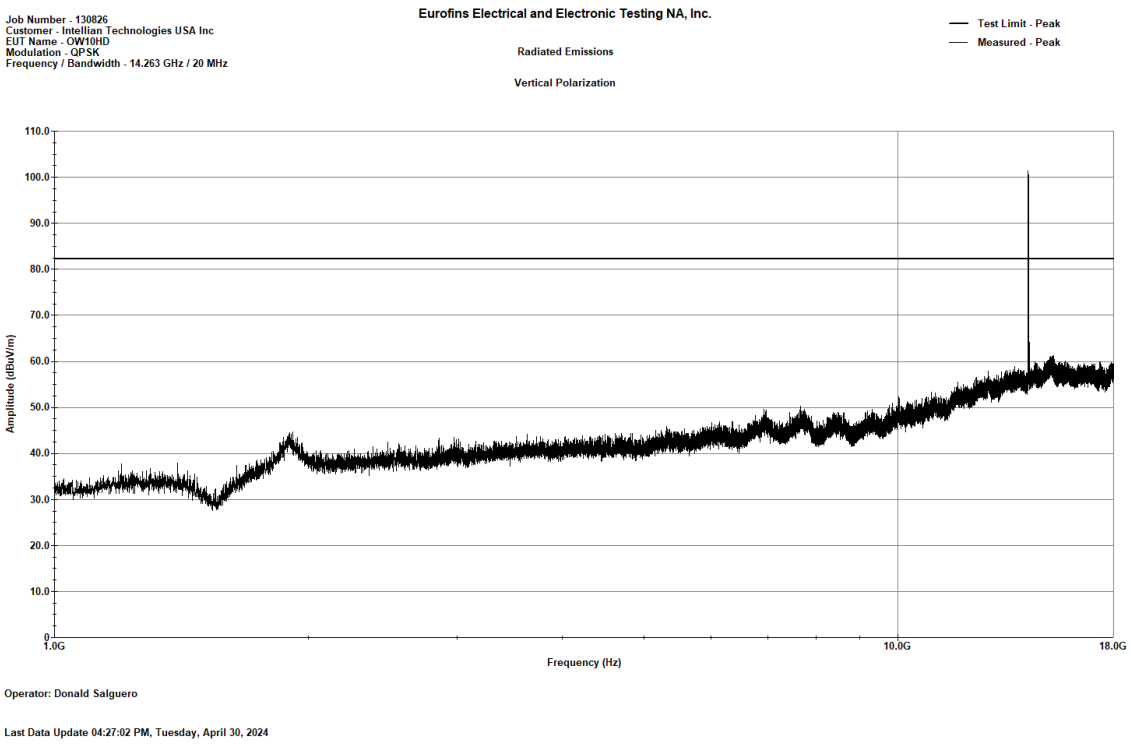

Figure 199. Radiated Emissions, QPSK_20MHz_Mid Channel, 1 - 18 GHz-_V

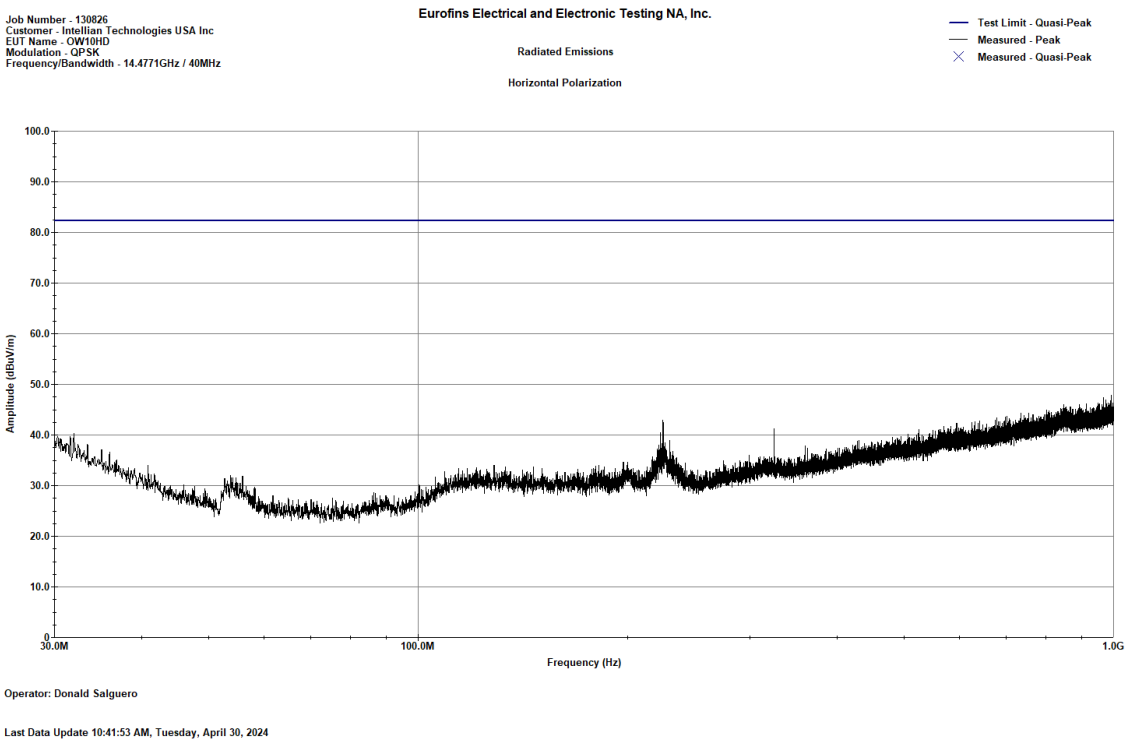

Figure 200. Radiated Emissions, QPSK_40MHz_High Channel, 30 MHz - 1 GHz-_H

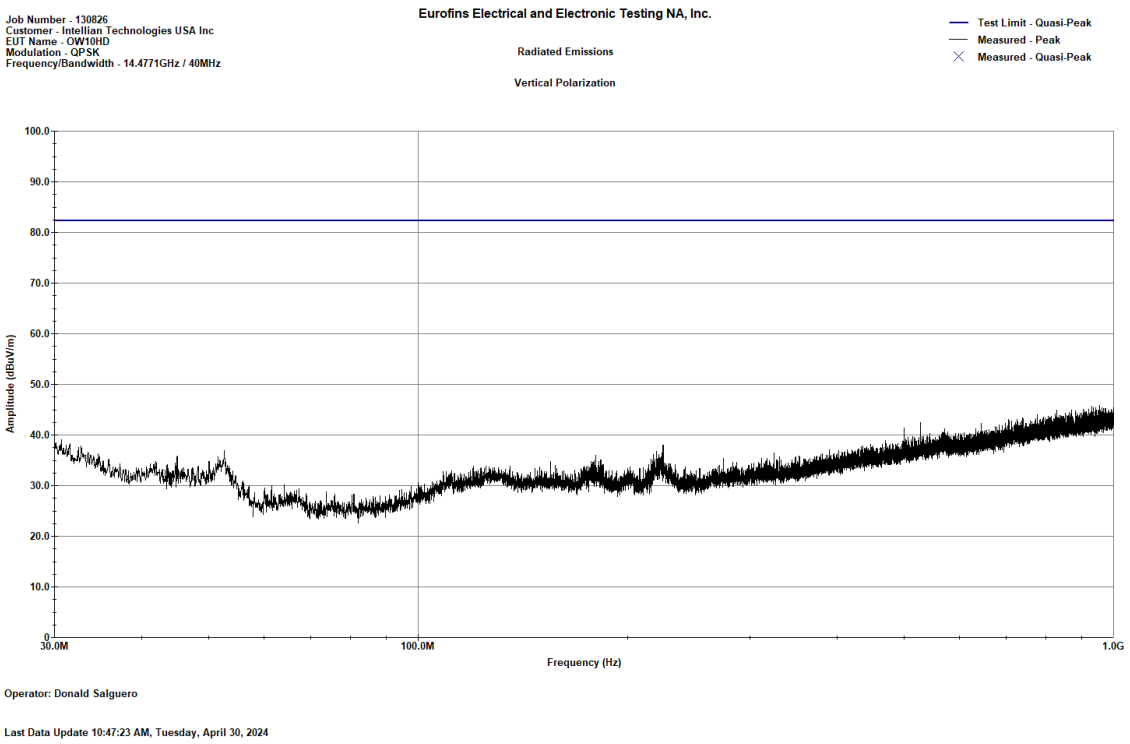

Figure 201. Radiated Emissions, QPSK_40MHz_High Channel, 30 MHz - 1 GHz-_V

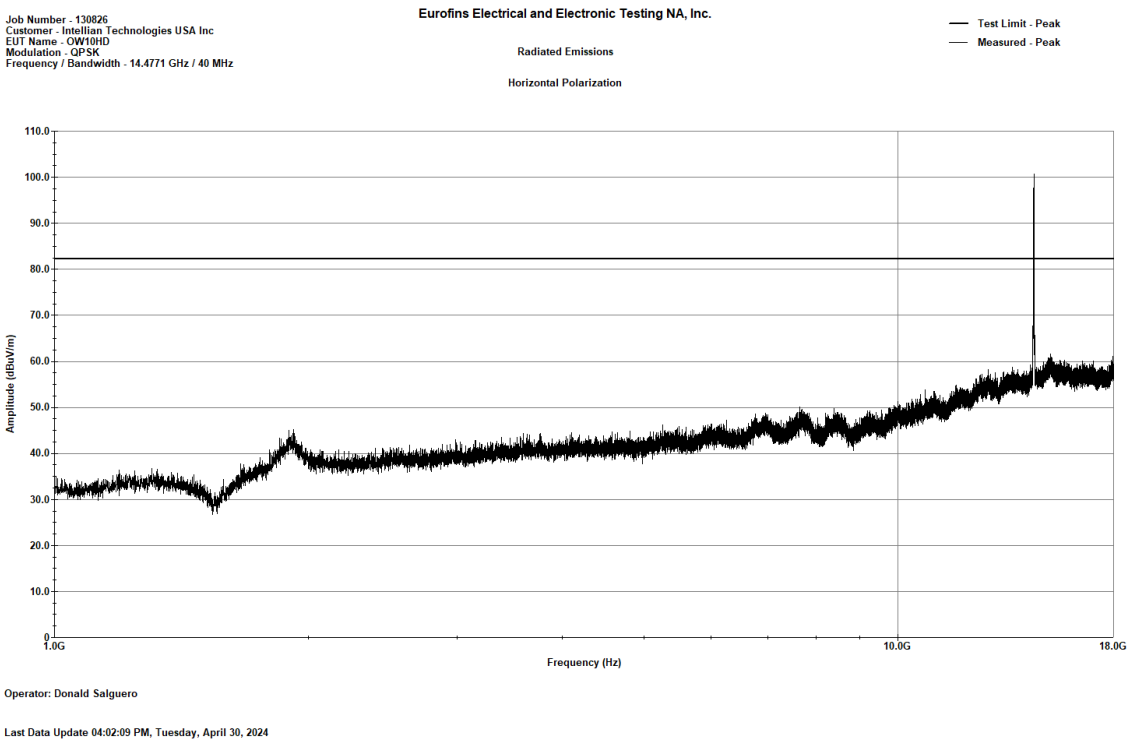

Figure 202. Radiated Emissions, QPSK_40MHz_High Channel, 1 - 18 GHz-_H

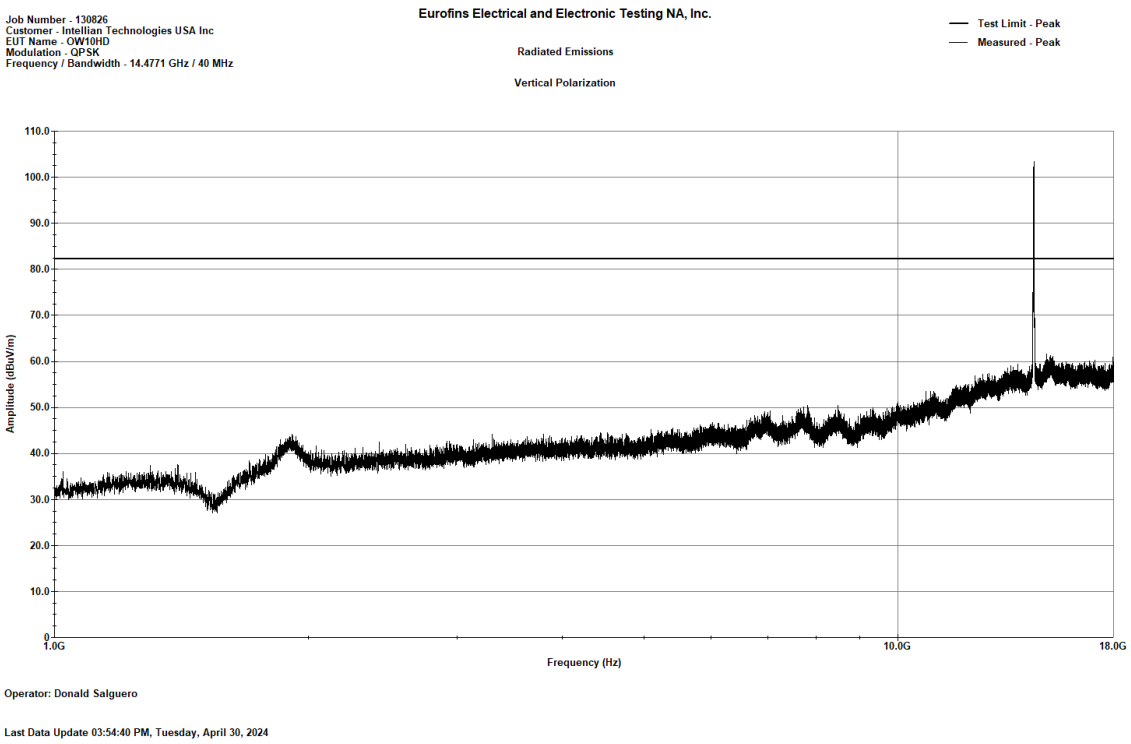

Figure 203. Radiated Emissions, QPSK_40MHz_High Channel, 1 - 18 GHz-_V

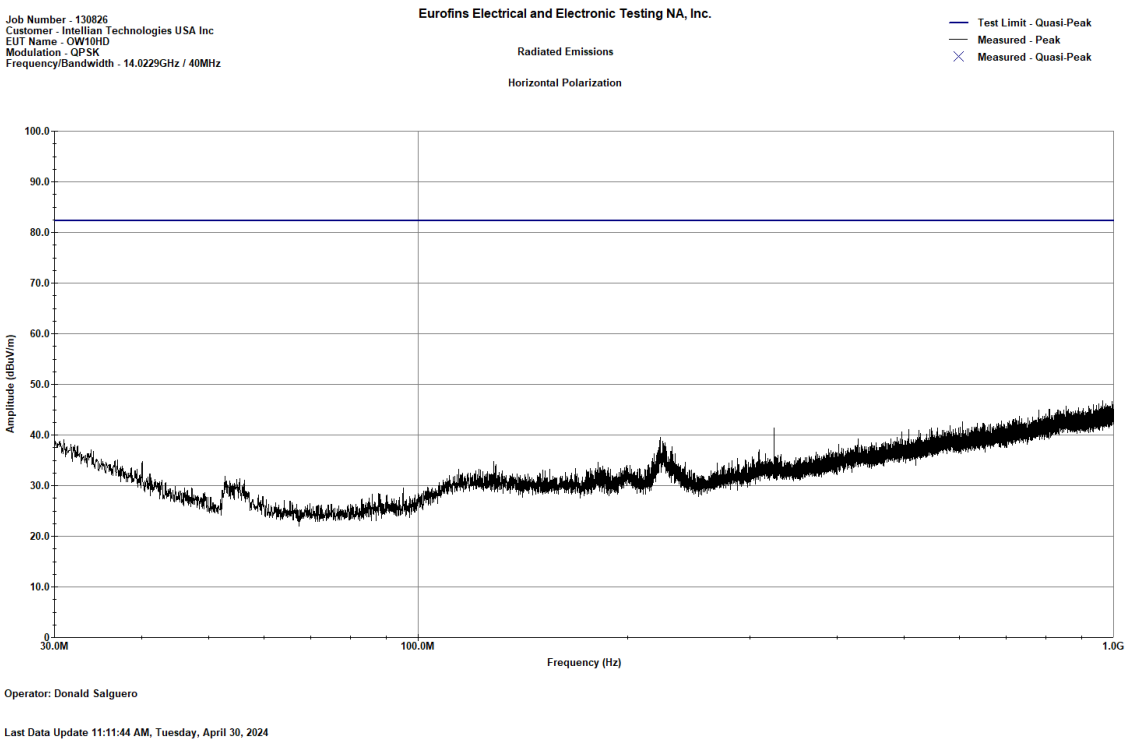

Figure 204. Radiated Emissions, QPSK_40MHz_Low Channel, 30 MHz - 1 GHz-_H

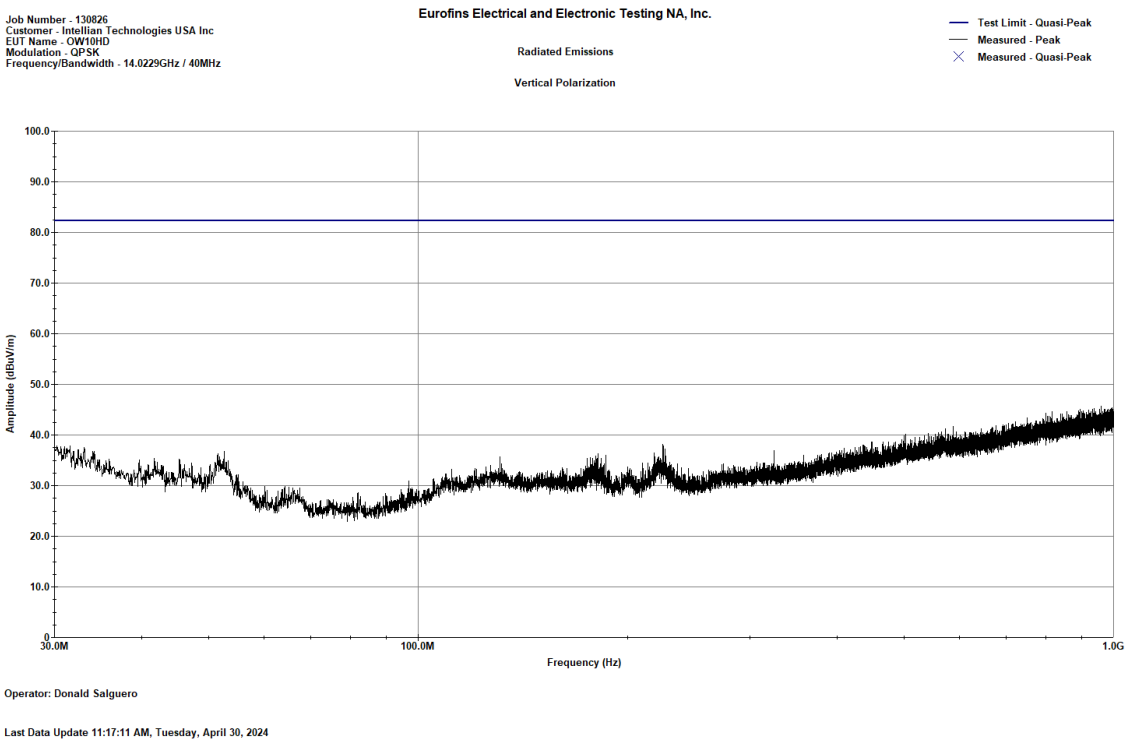

Figure 205. Radiated Emissions, QPSK_40MHz_Low Channel, 30 MHz - 1 GHz-_V

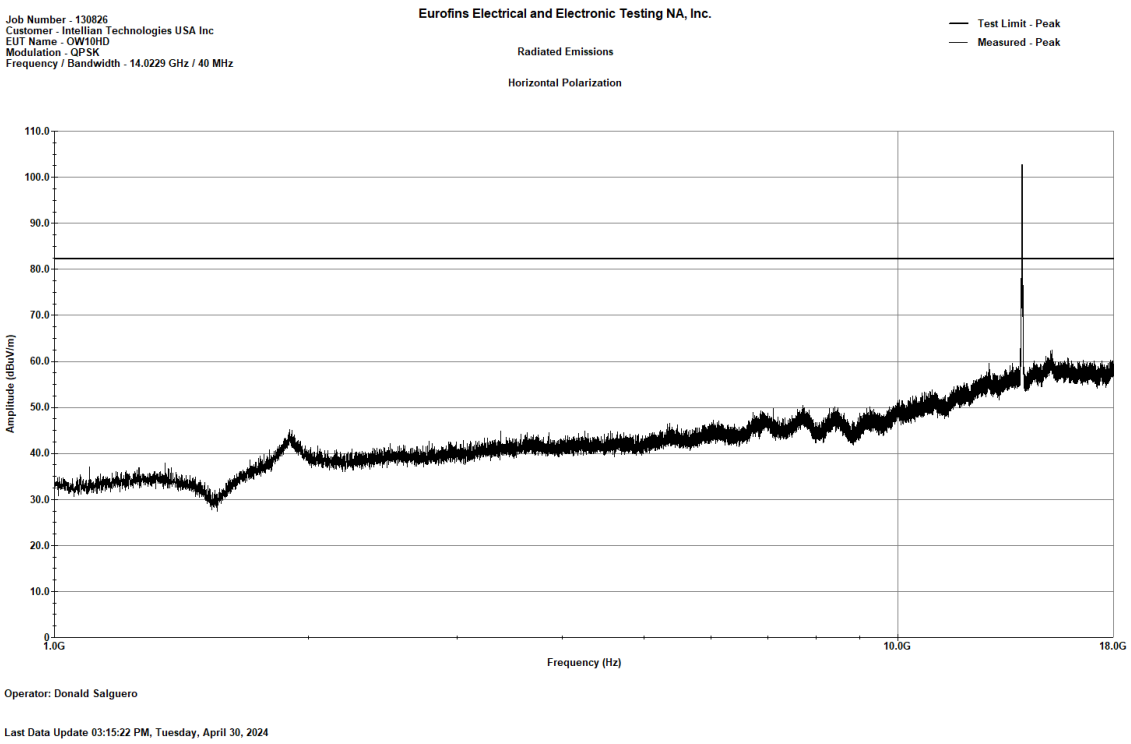

Figure 206. Radiated Emissions, QPSK_40MHz_Low Channel, 1 - 18 GHz-_H

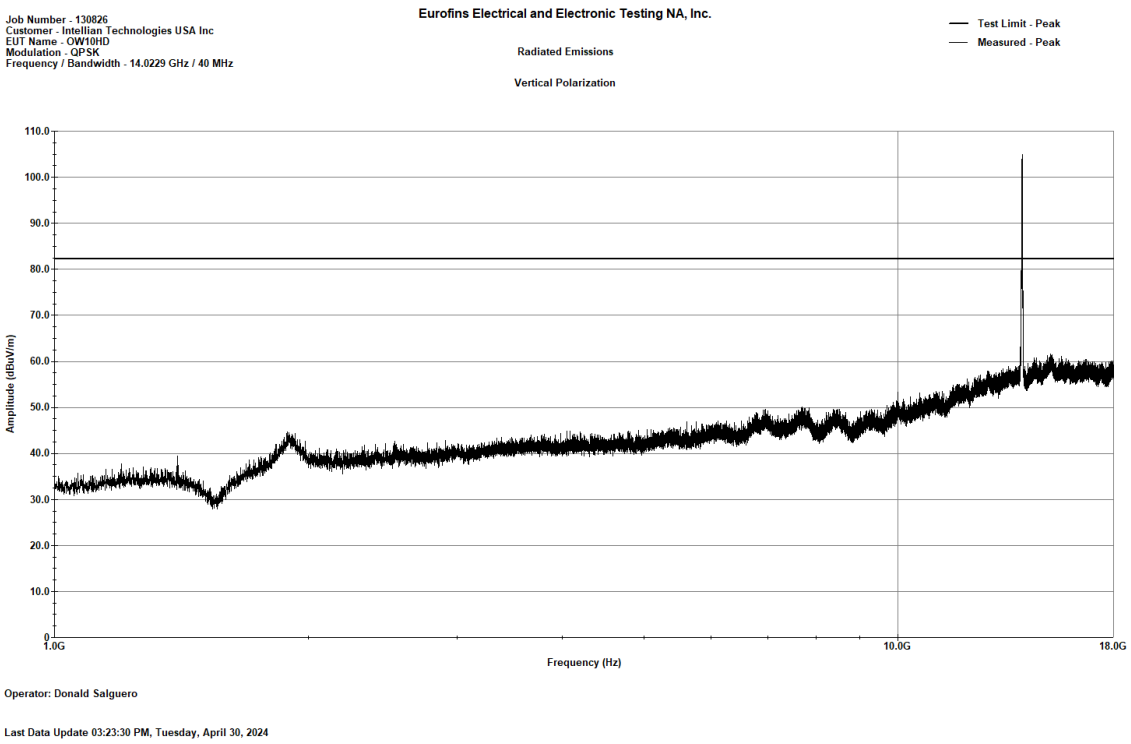

Figure 207. Radiated Emissions, QPSK_40MHz_Low Channel, 1 - 18 GHz-_V

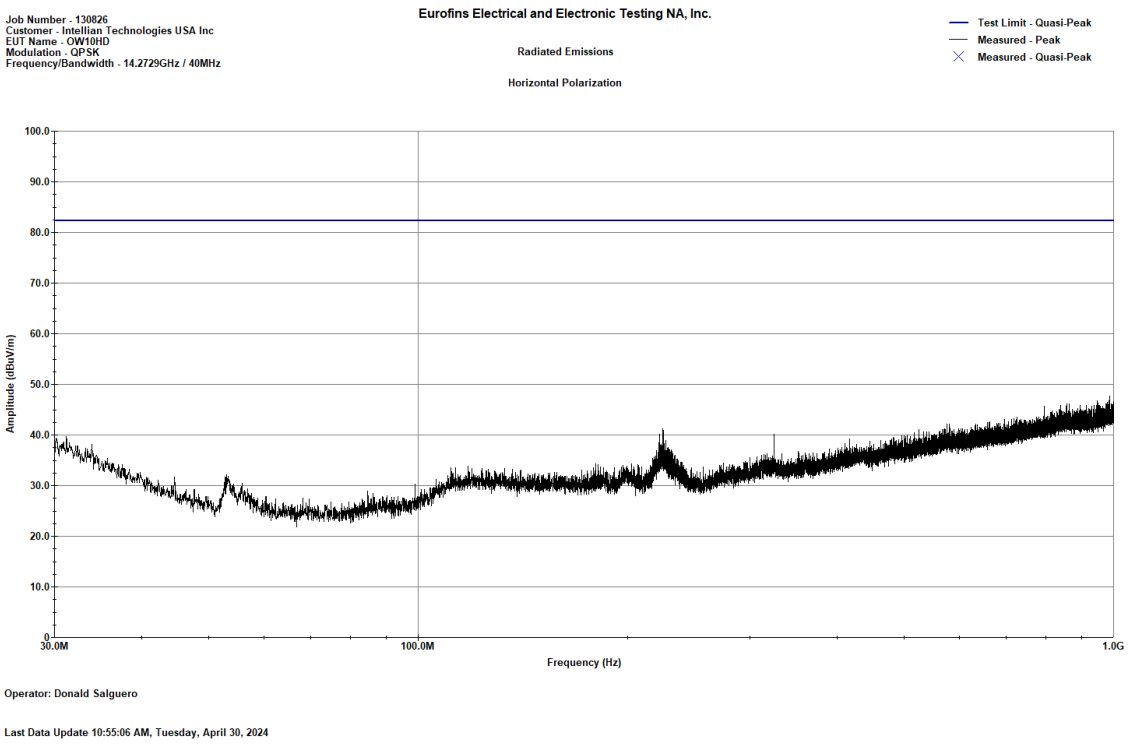

Figure 208. Radiated Emissions, QPSK_40MHz_Mid Channel, 30 MHz - 1 GHz-_H

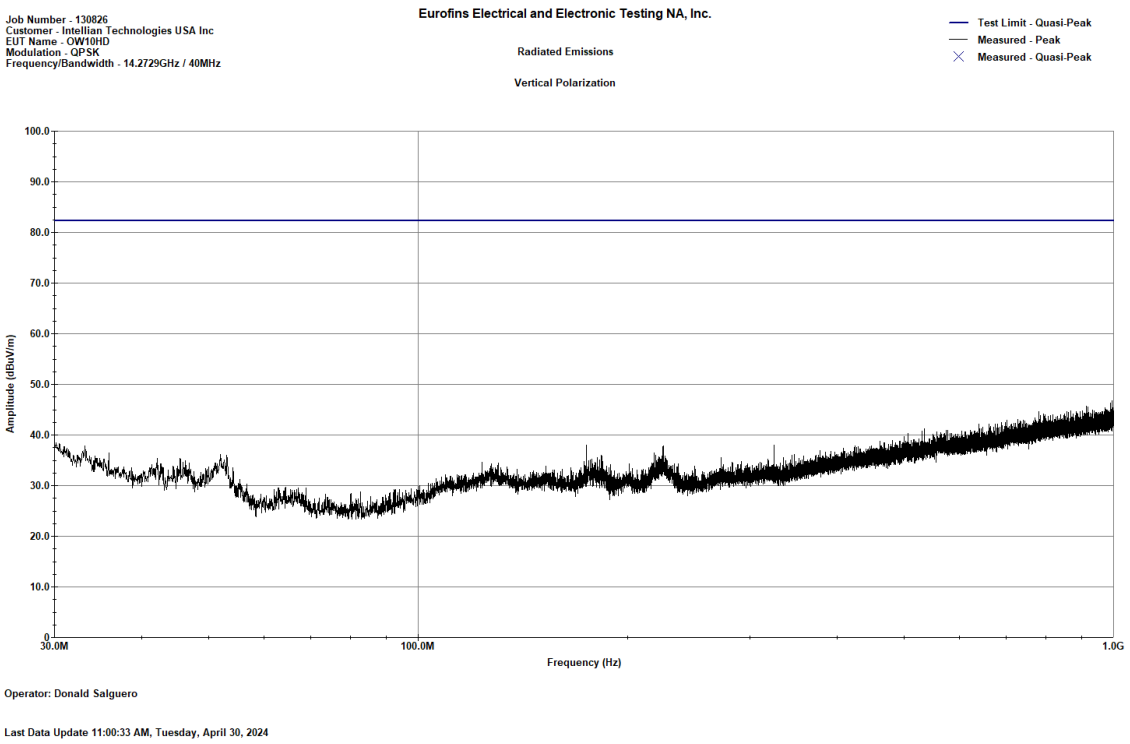

Figure 209. Radiated Emissions, QPSK_40MHz_Mid Channel, 30 MHz - 1 GHz-_V

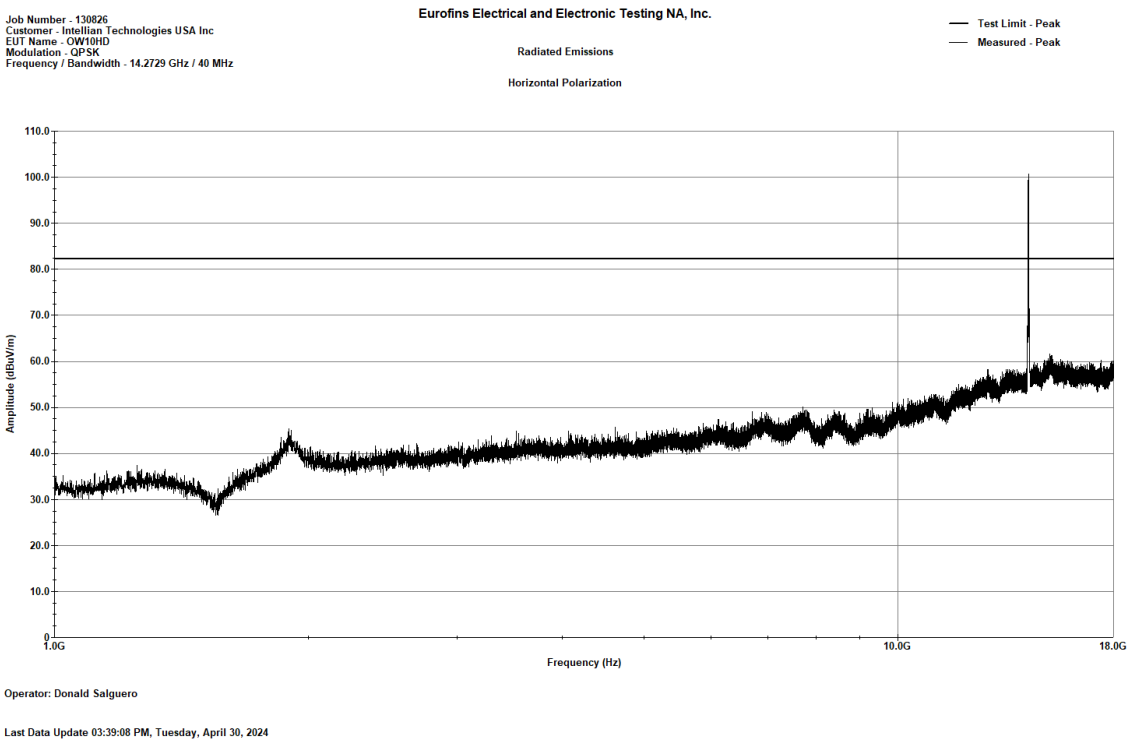

Figure 210. Radiated Emissions, QPSK_40MHz_Mid Channel, 1 - 18 GHz-_H

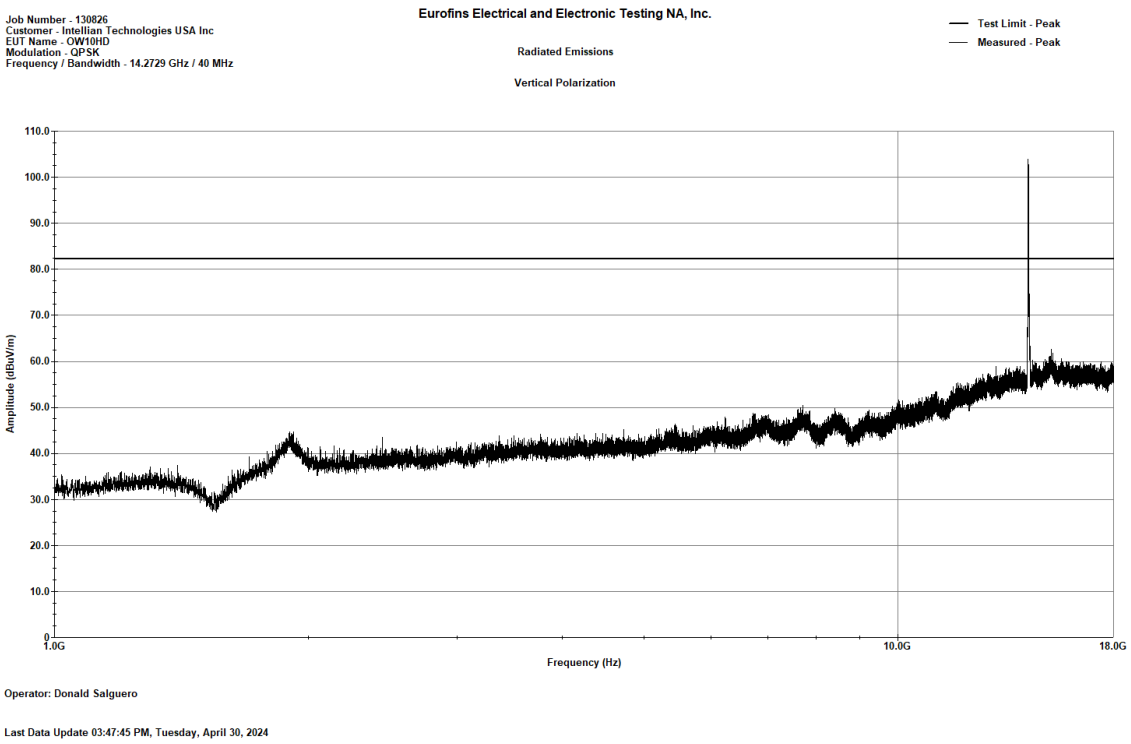

Figure 211. Radiated Emissions, QPSK_40MHz_Mid Channel, 1 - 18 GHz-_V

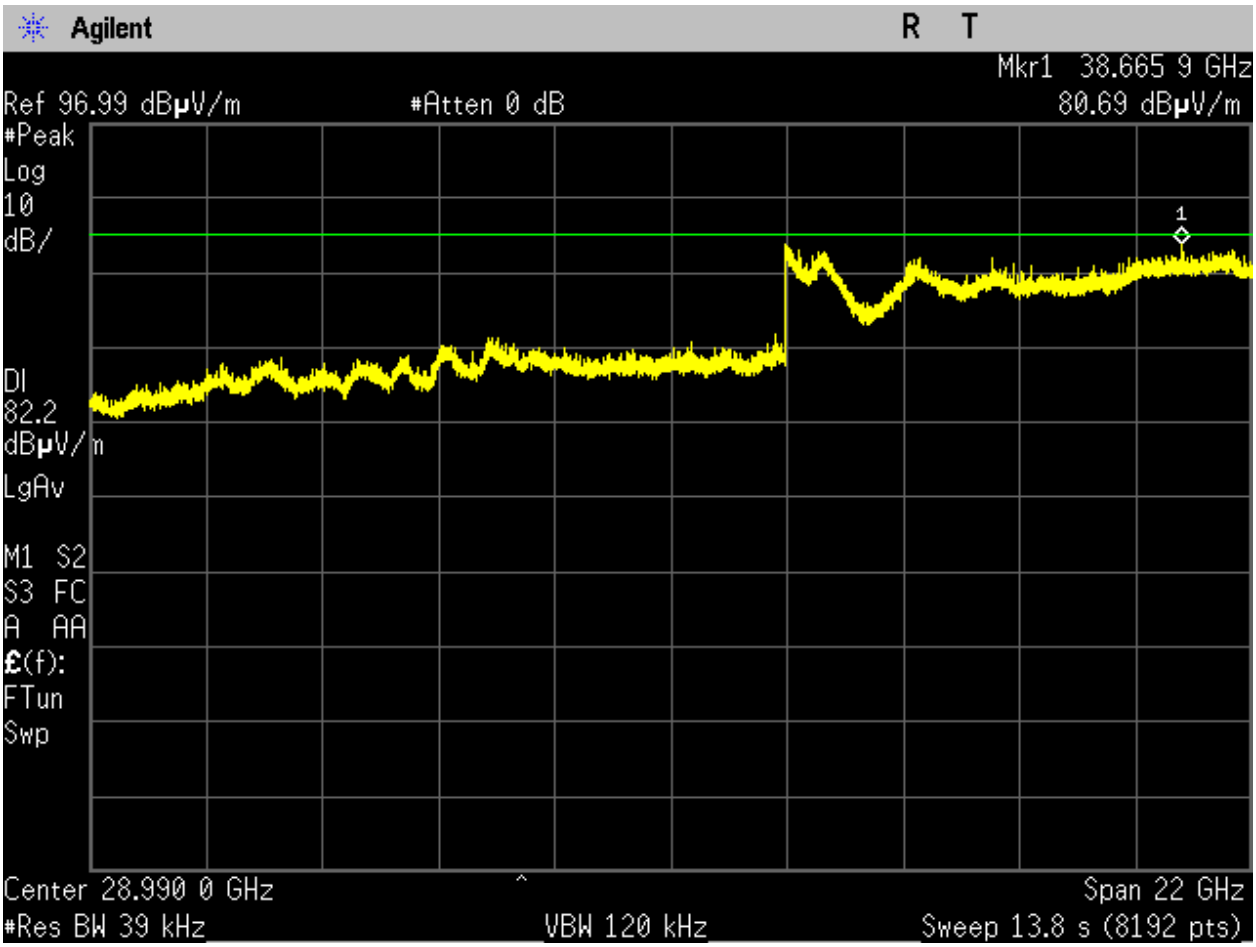

Figure 212. Radiated Spurious_QPSK_20MHz_High Channel, 18GHz-40GHz_H.

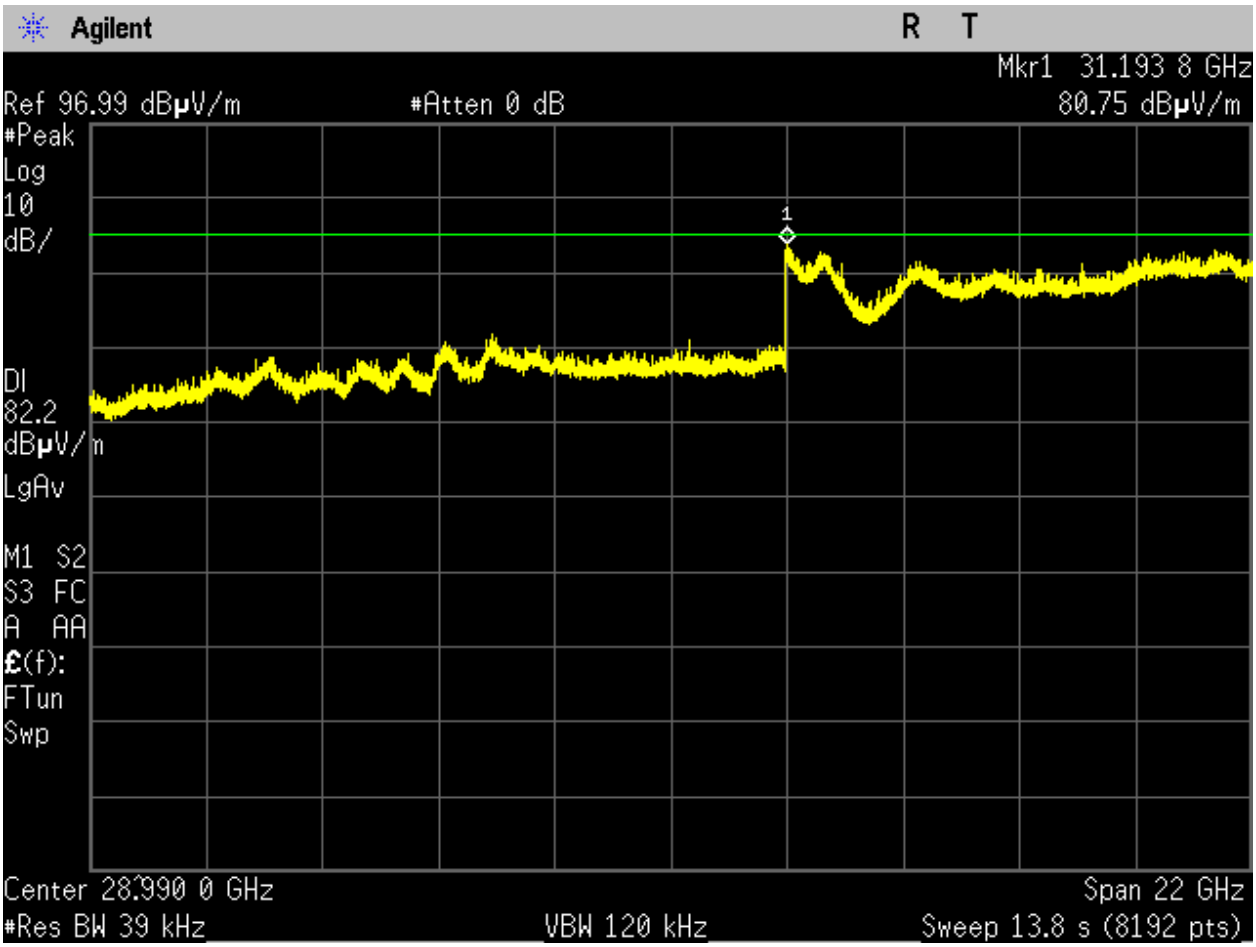

Figure 213. Radiated Spurious_QPSK_20MHz_High Channel, 18GHz-40GHz_V.

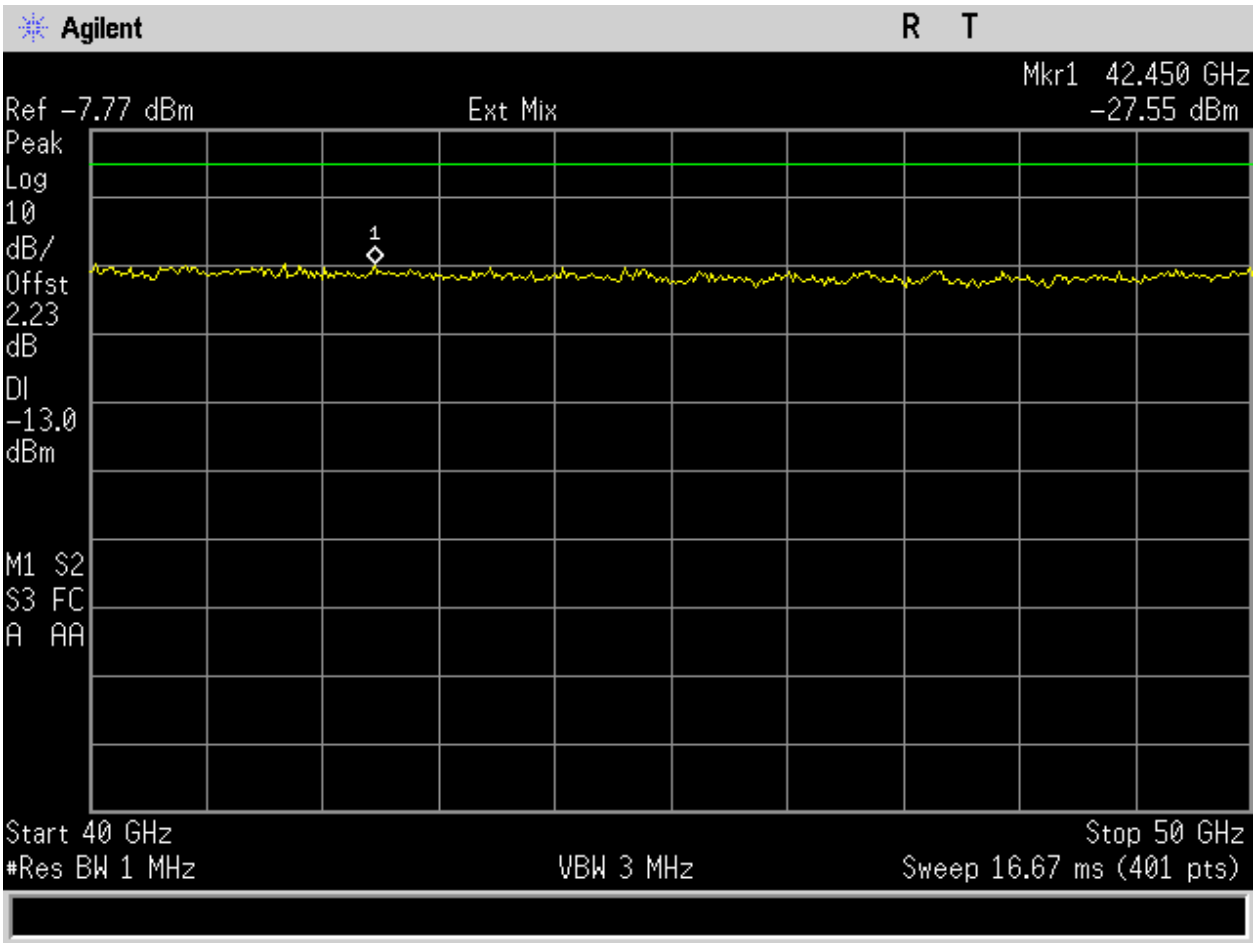

Figure 214. Radiated Spurious_QPSK_20MHz_High Channel, 40GHz - 50GHz.

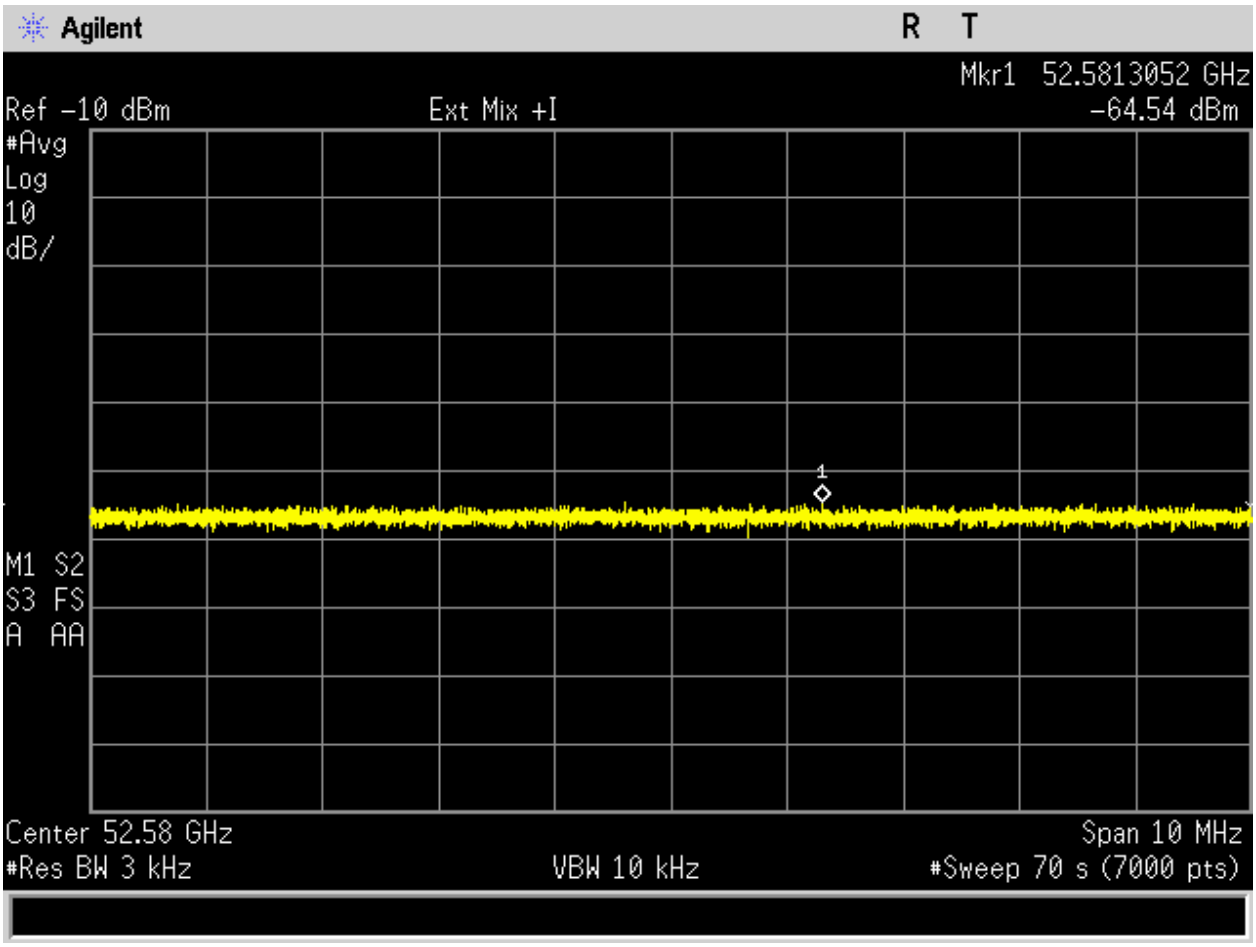

Figure 215. Radiated Spurious_QPSK_20MHz_High Channel, 50GHz - 75GHz, AVG (52.58GHz).

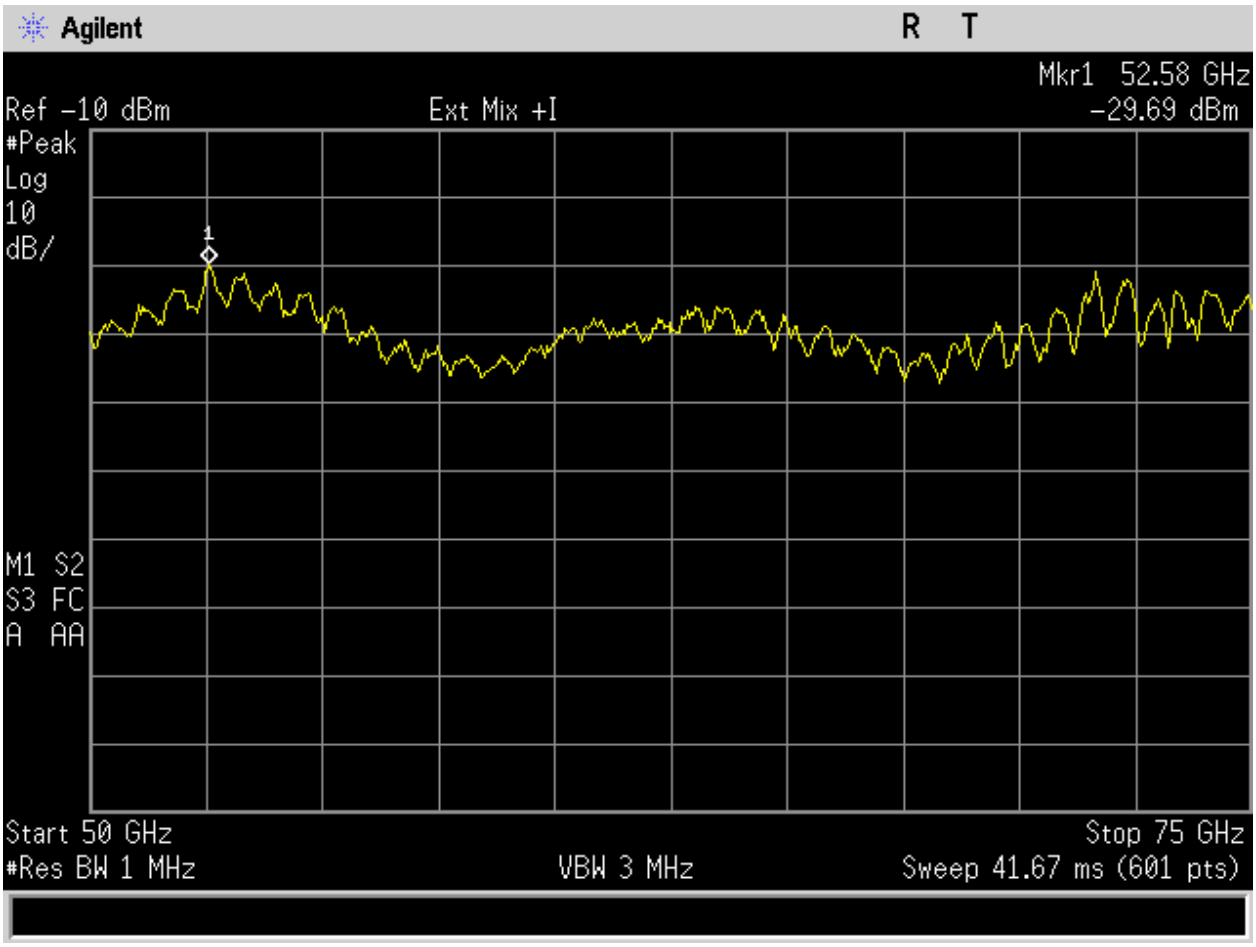

Figure 216. Radiated Spurious_QPSK_20MHz_High Channel, 50GHz - 75GHz.

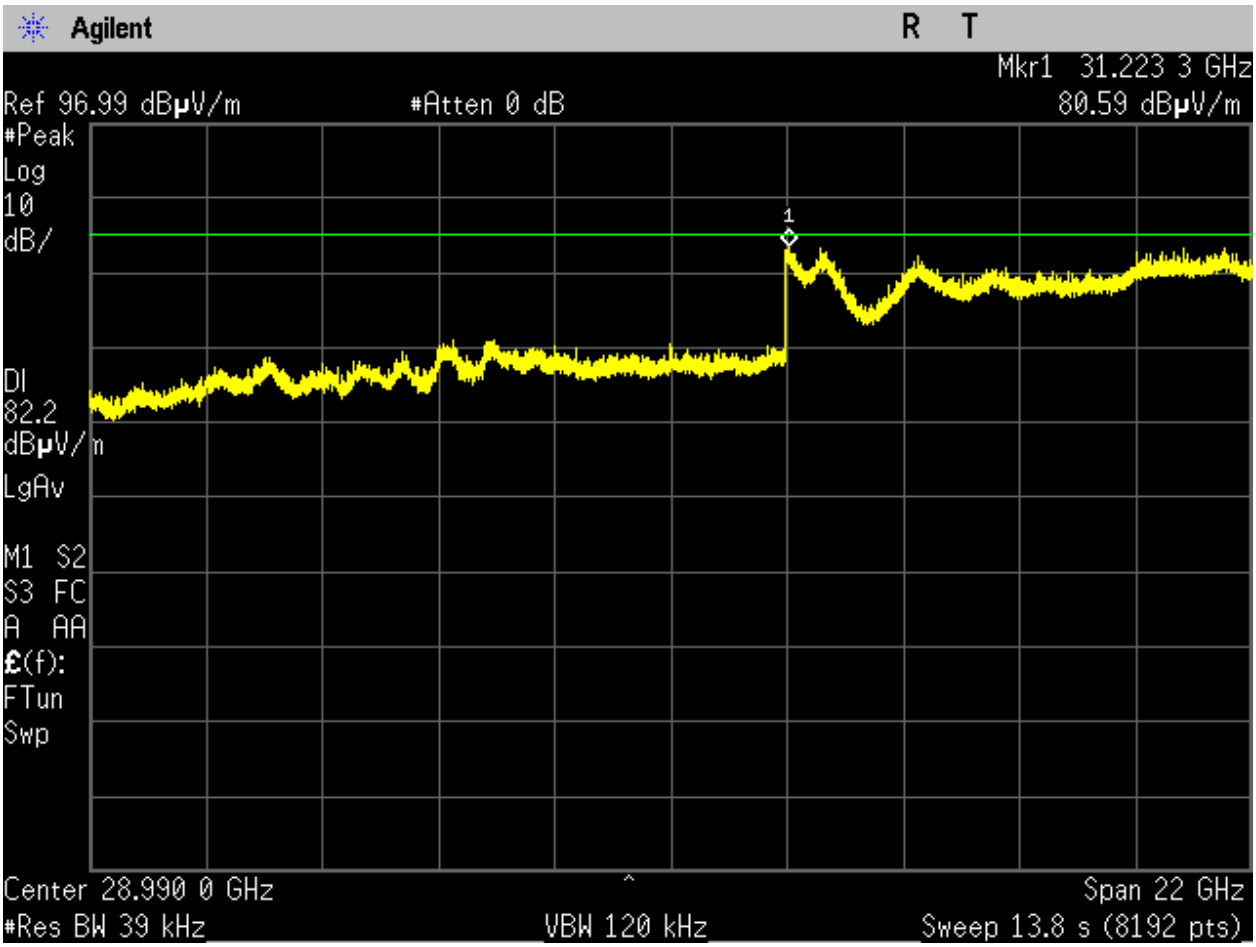

Figure 217. Radiated Spurious_QPSK_20MHz_Low Channel, 18GHz-40GHz_H.

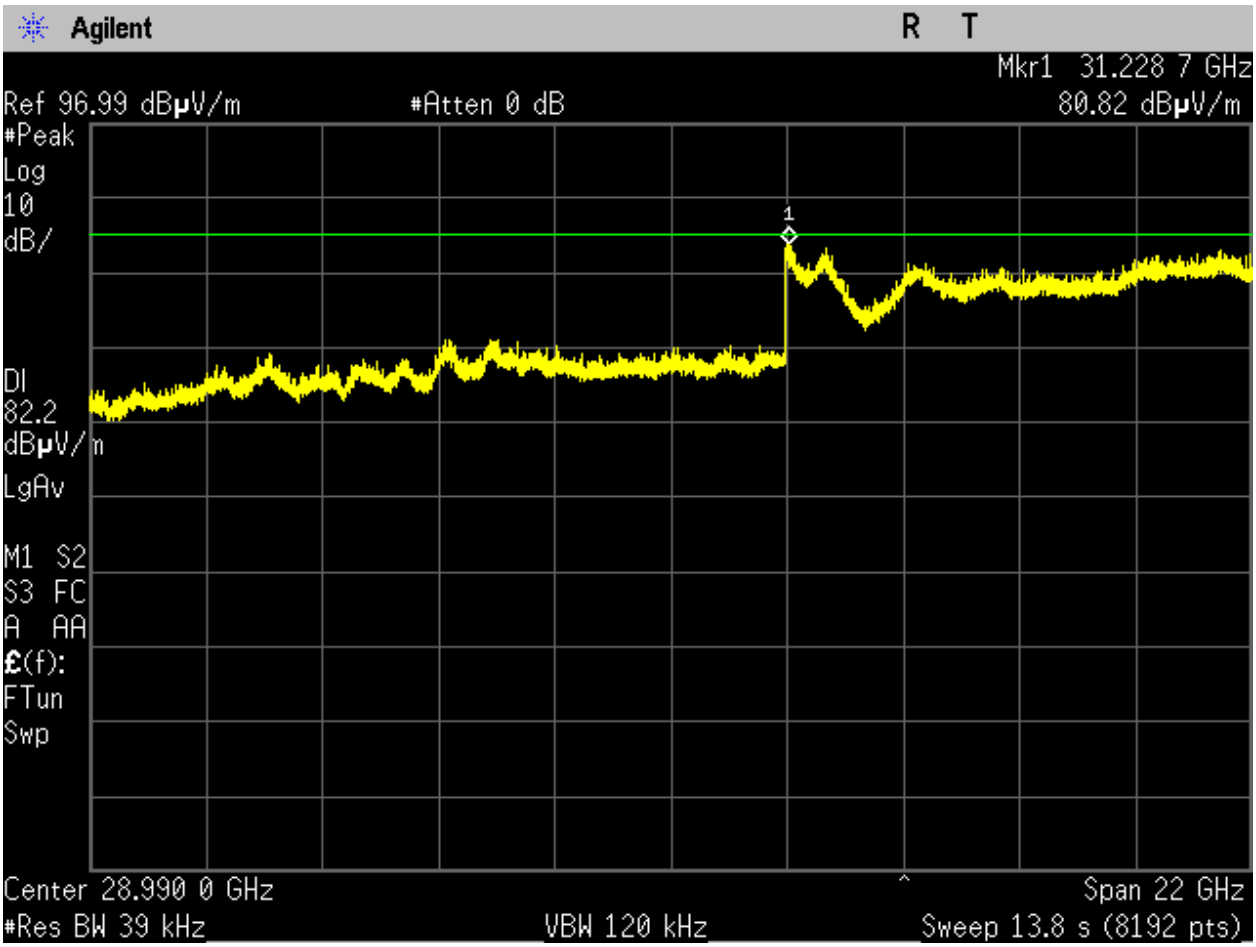

Figure 218. Radiated Spurious_QPSK_20MHz_Low Channel, 18GHz-40GHz_V.

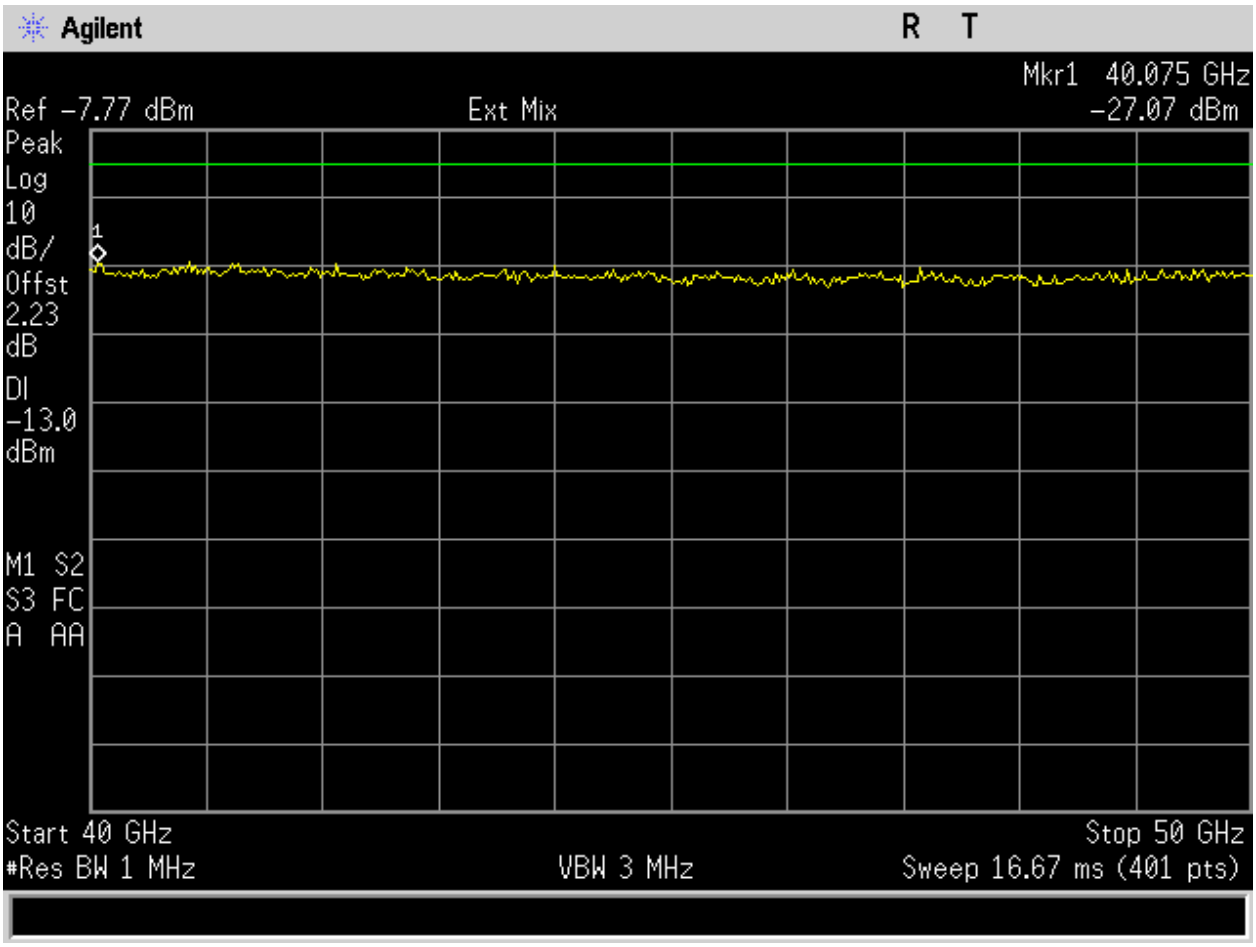

Figure 219. Radiated Spurious_QPSK_20MHz_Low Channel, 40GHz - 50GHz.

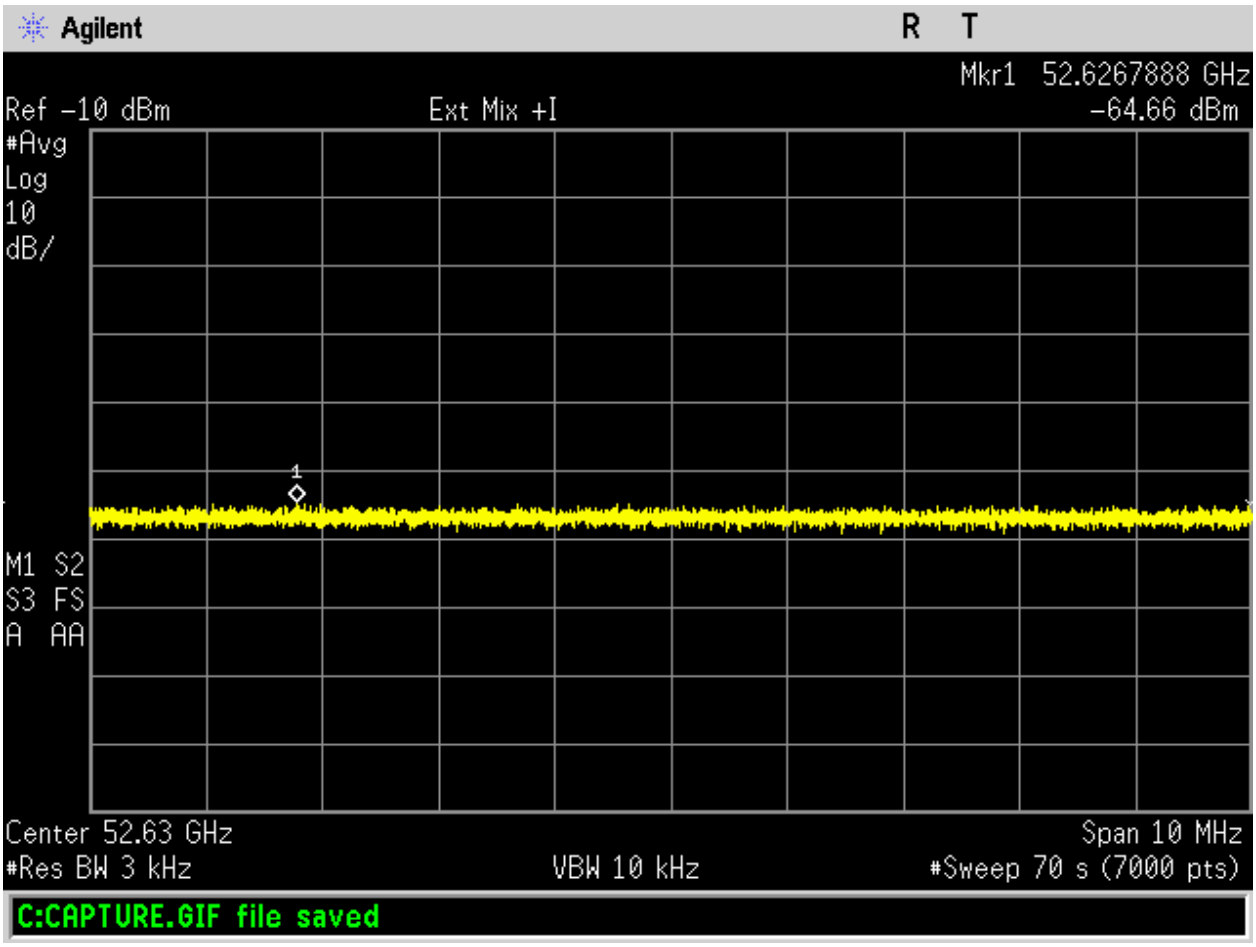

Figure 220. Radiated Spurious_QPSK_20MHz_Low Channel, 50GHz - 75GHz, AVG (52.63GHz).

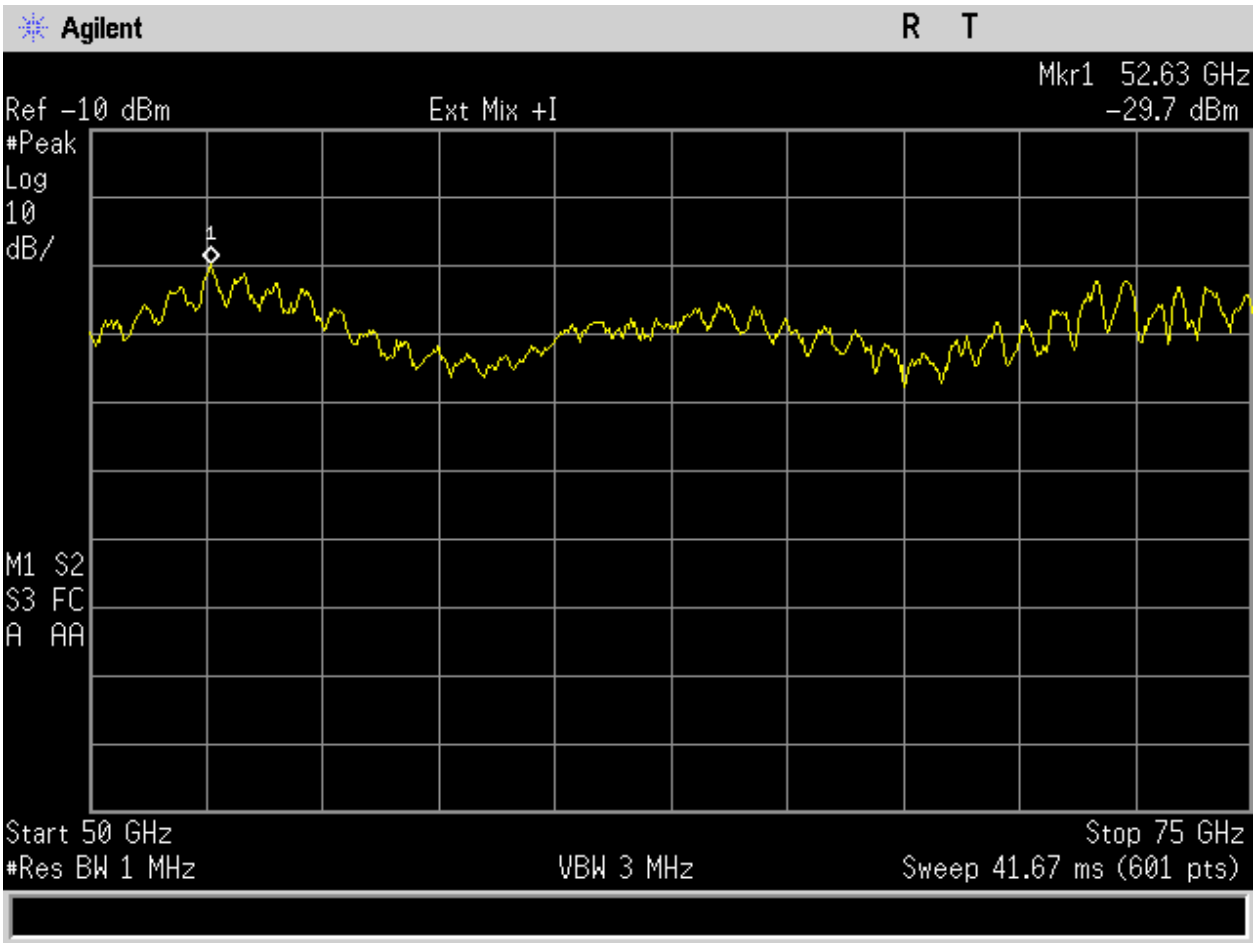

Figure 221. Radiated Spurious_QPSK_20MHz_Low Channel, 50GHz - 75GHz.

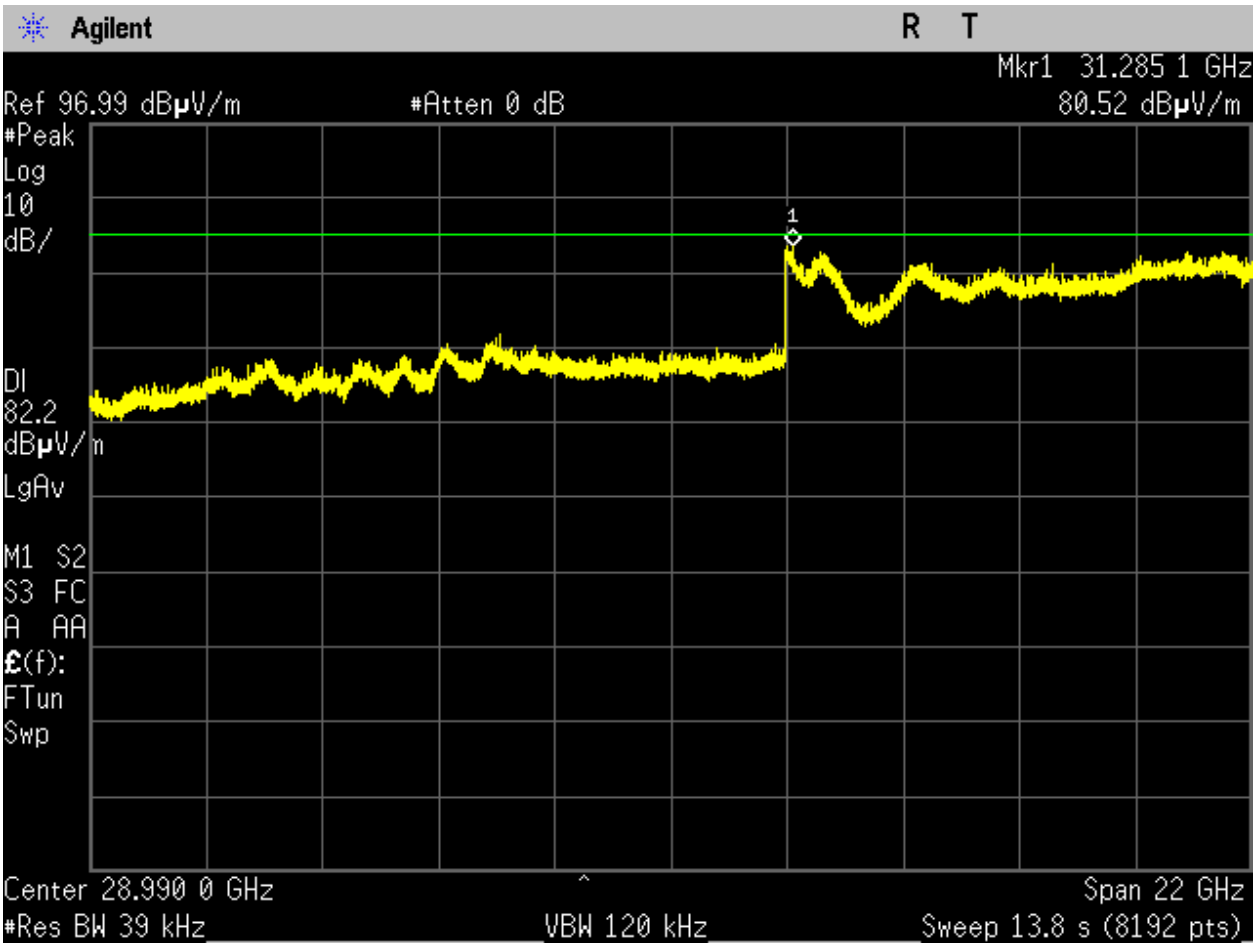

Figure 222. Radiated Spurious_QPSK_20MHz_Mid Channel, 18GHz-40GHz_H.

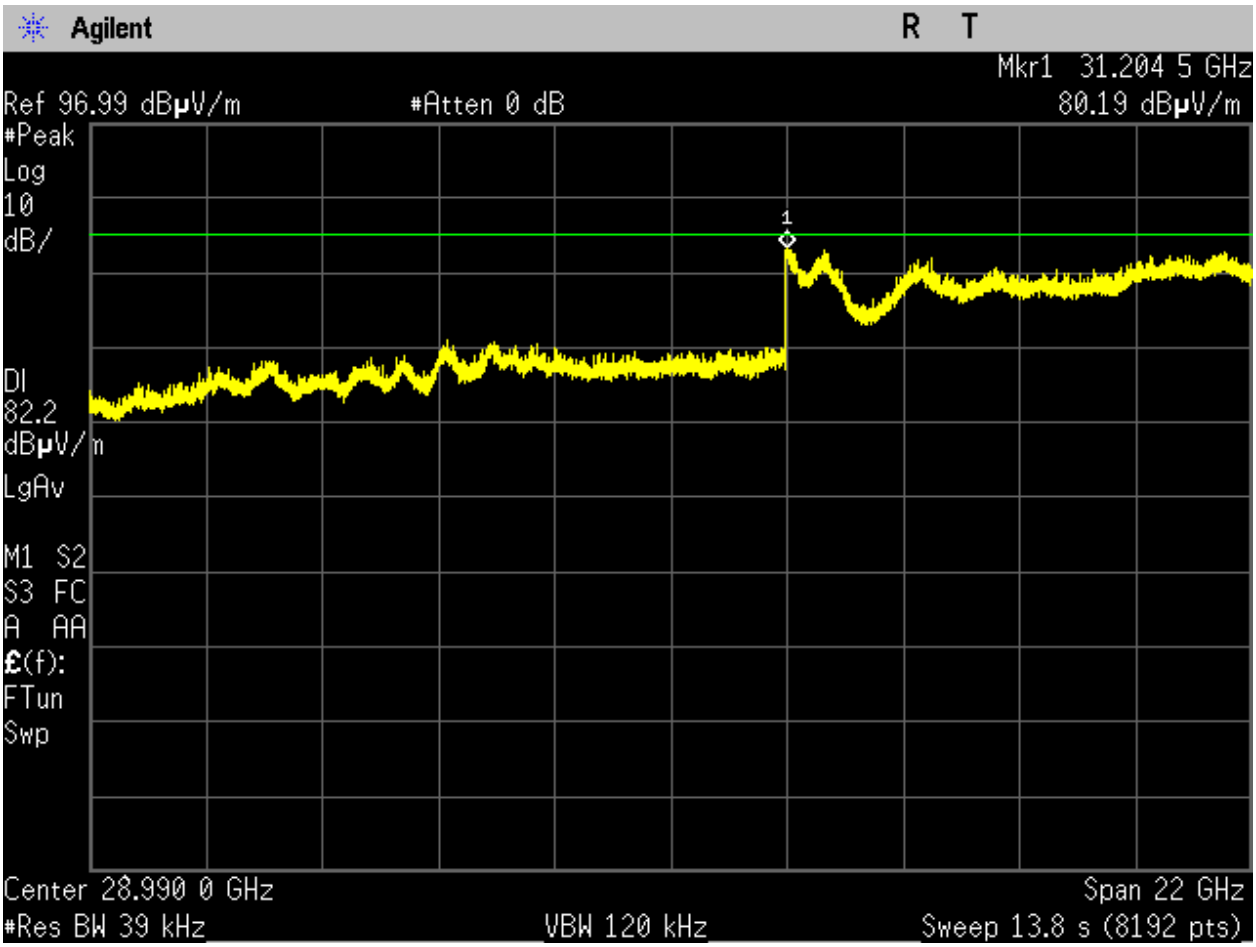

Figure 223. Radiated Spurious_QPSK_20MHz_Mid Channel, 18GHz-40GHz_V.

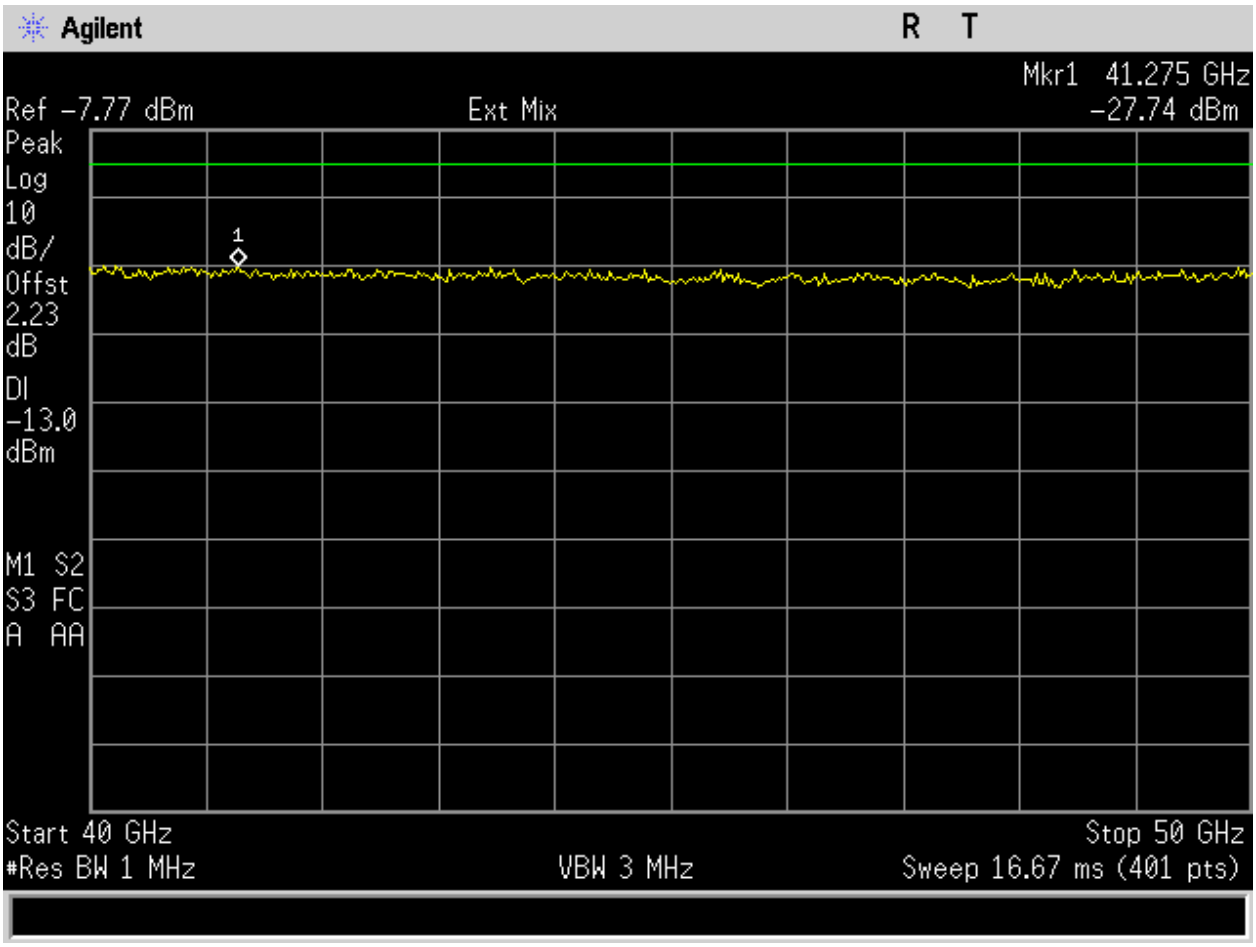

Figure 224. Radiated Spurious_QPSK_20MHz_Mid Channel, 40GHz - 50GHz.

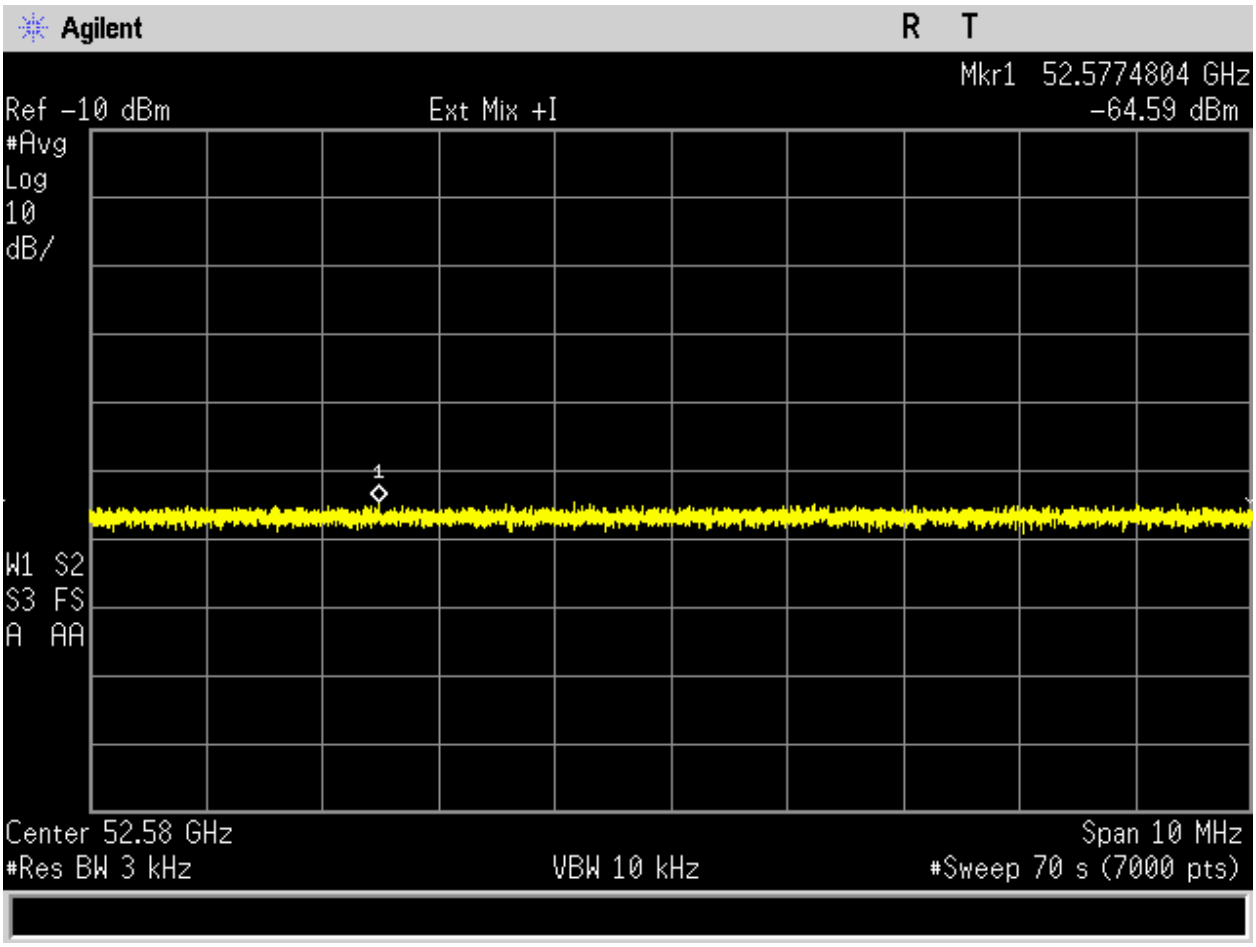

Figure 225. Radiated Spurious_QPSK_20MHz_Mid Channel, 50GHz - 75GHz, AVG (52.58GHz).

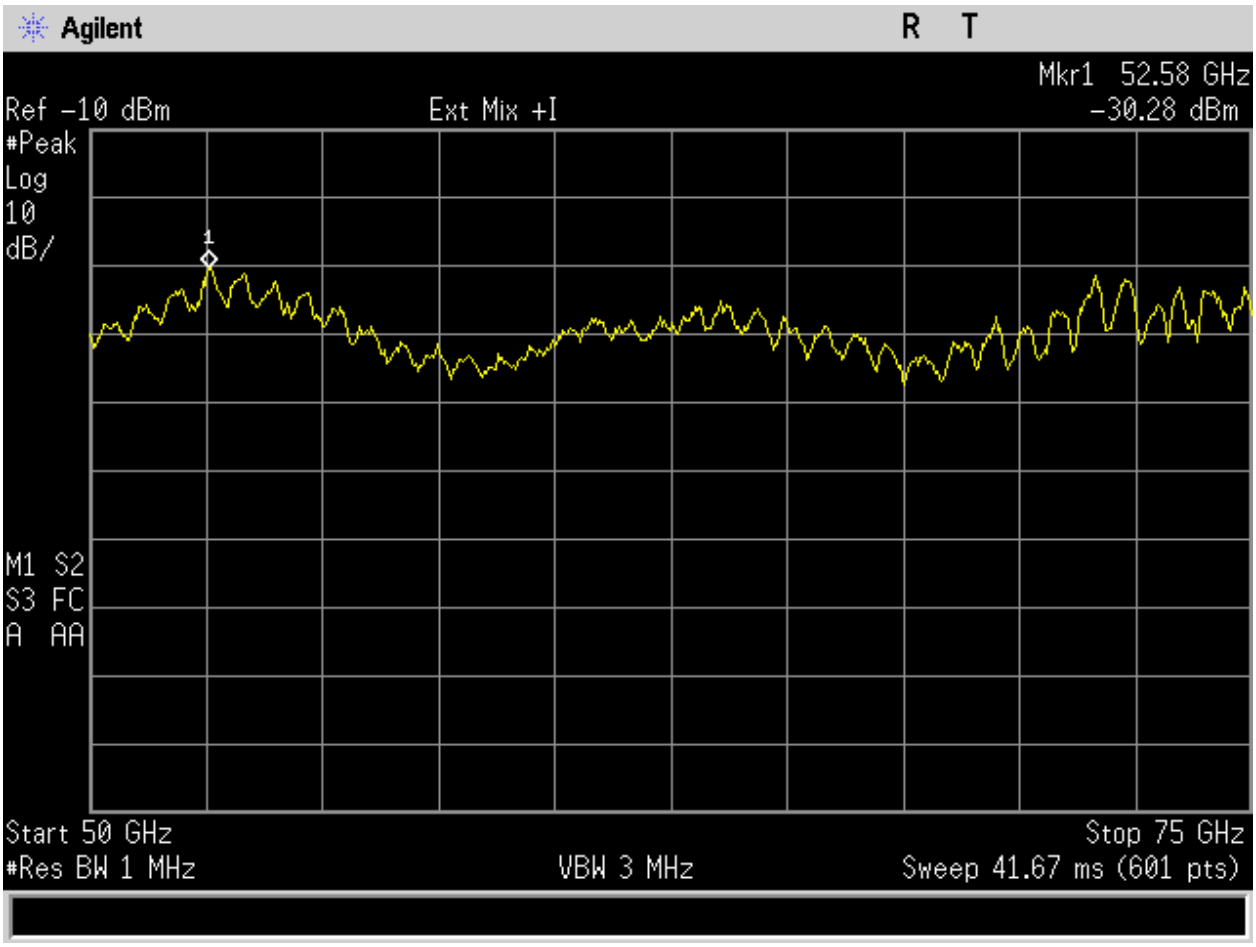

Figure 226. Radiated Spurious_QPSK_20MHz_Mid Channel, 50GHz - 75GHz.

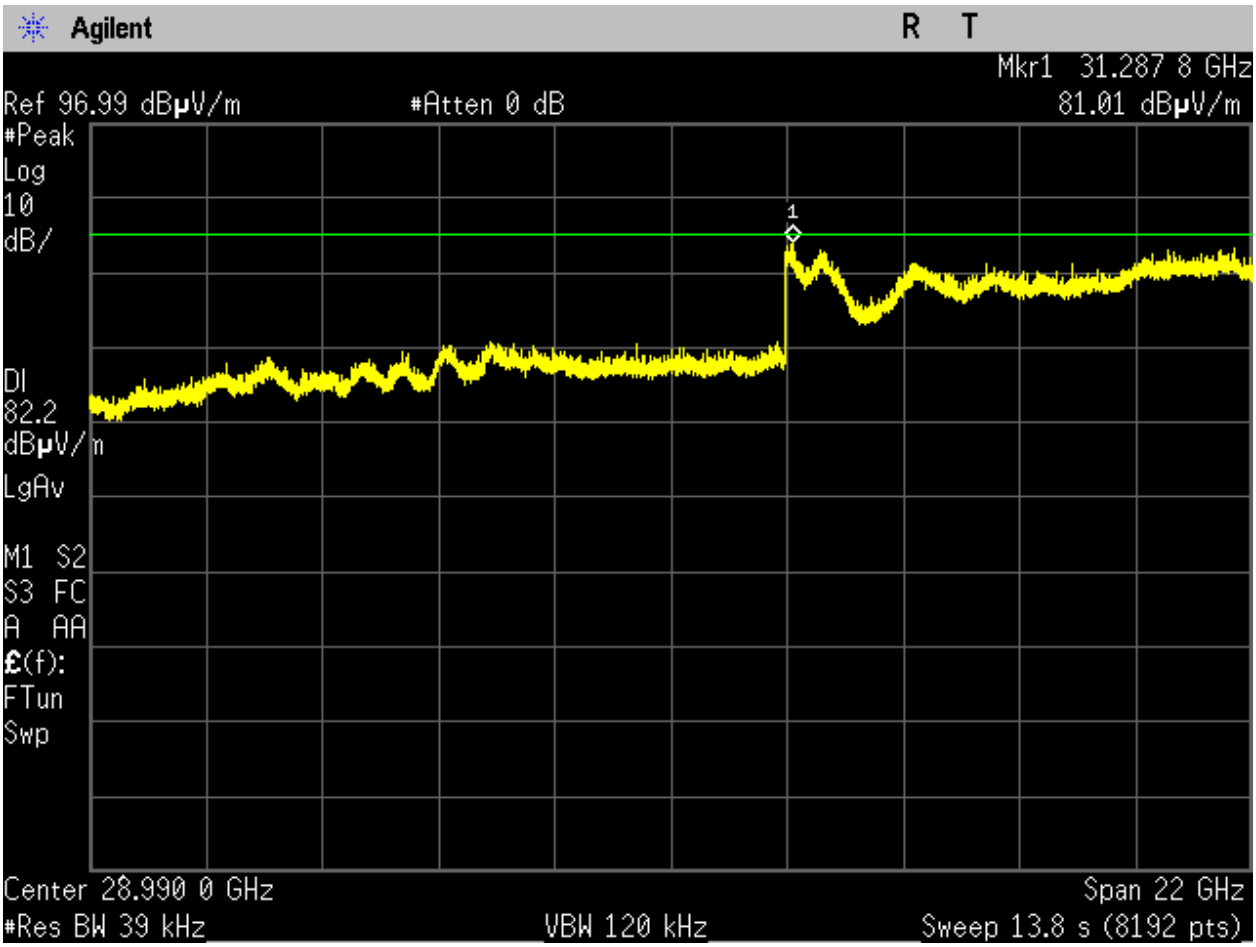

Figure 227. Radiated Spurious_QPSK_40MHz_High Channel, 18GHz-40GHz_H.

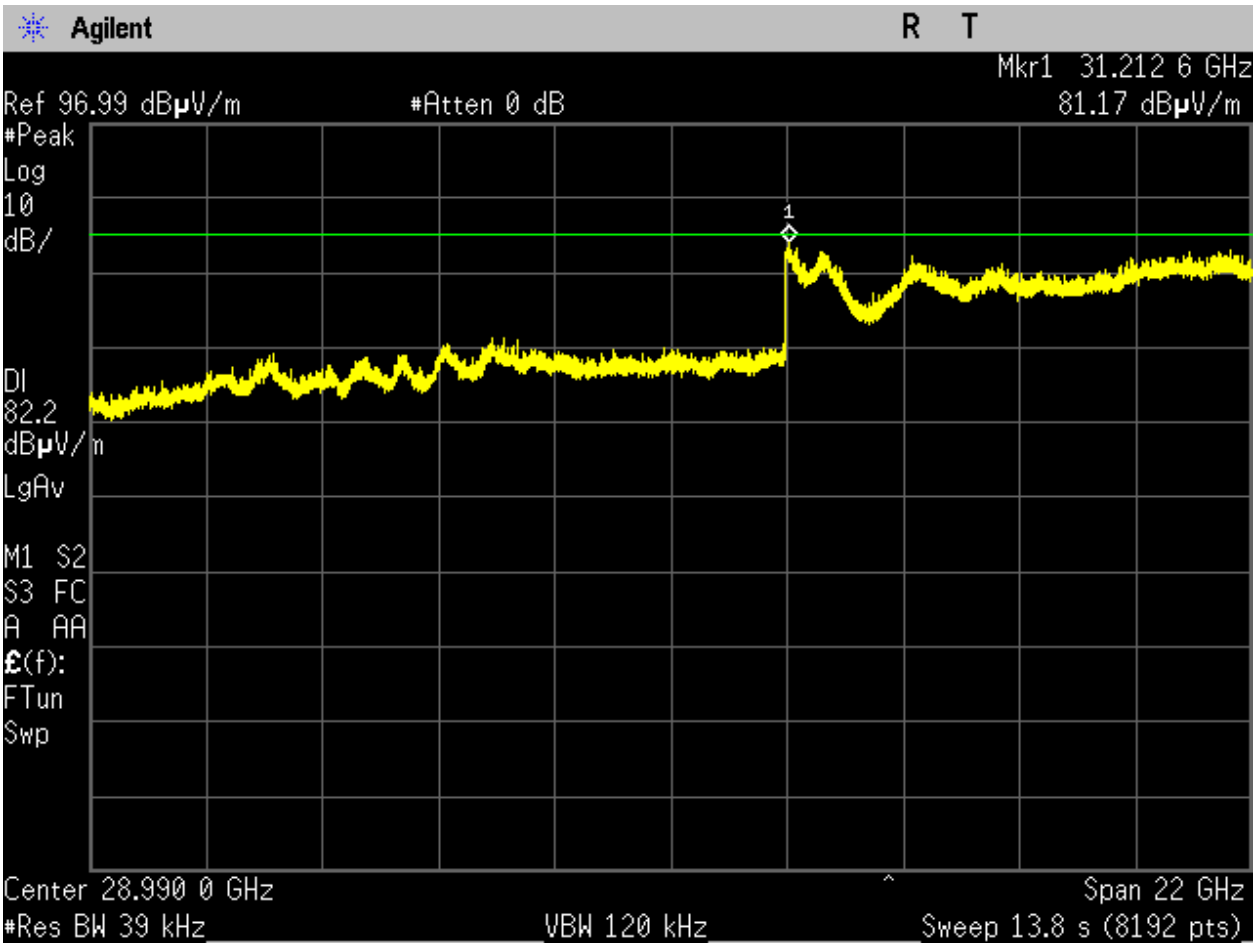

Figure 228. Radiated Spurious_QPSK_40MHz_High Channel, 18GHz-40GHz_V.

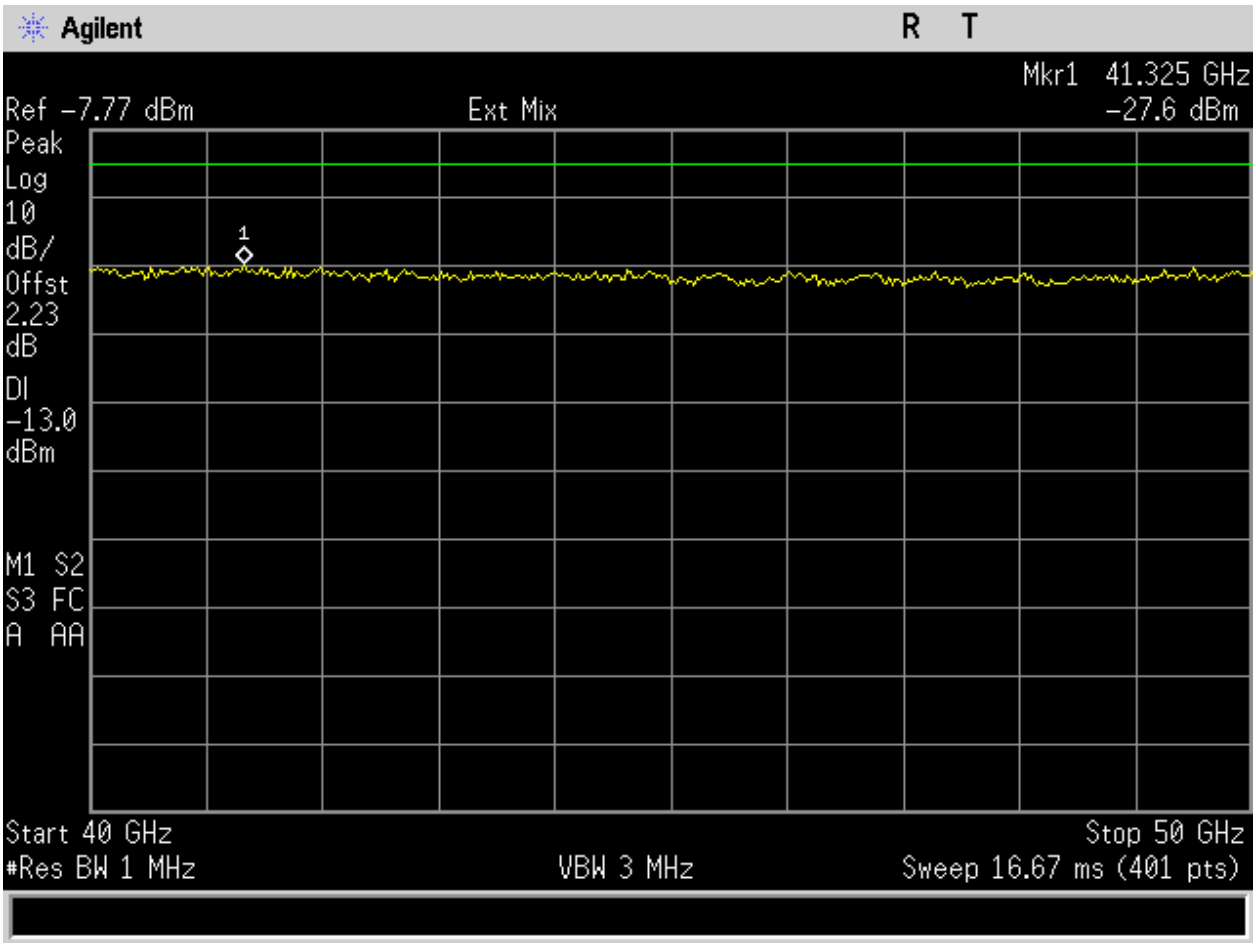

Figure 229. Radiated Spurious_QPSK_40MHz_High Channel, 40GHz - 50GHz.

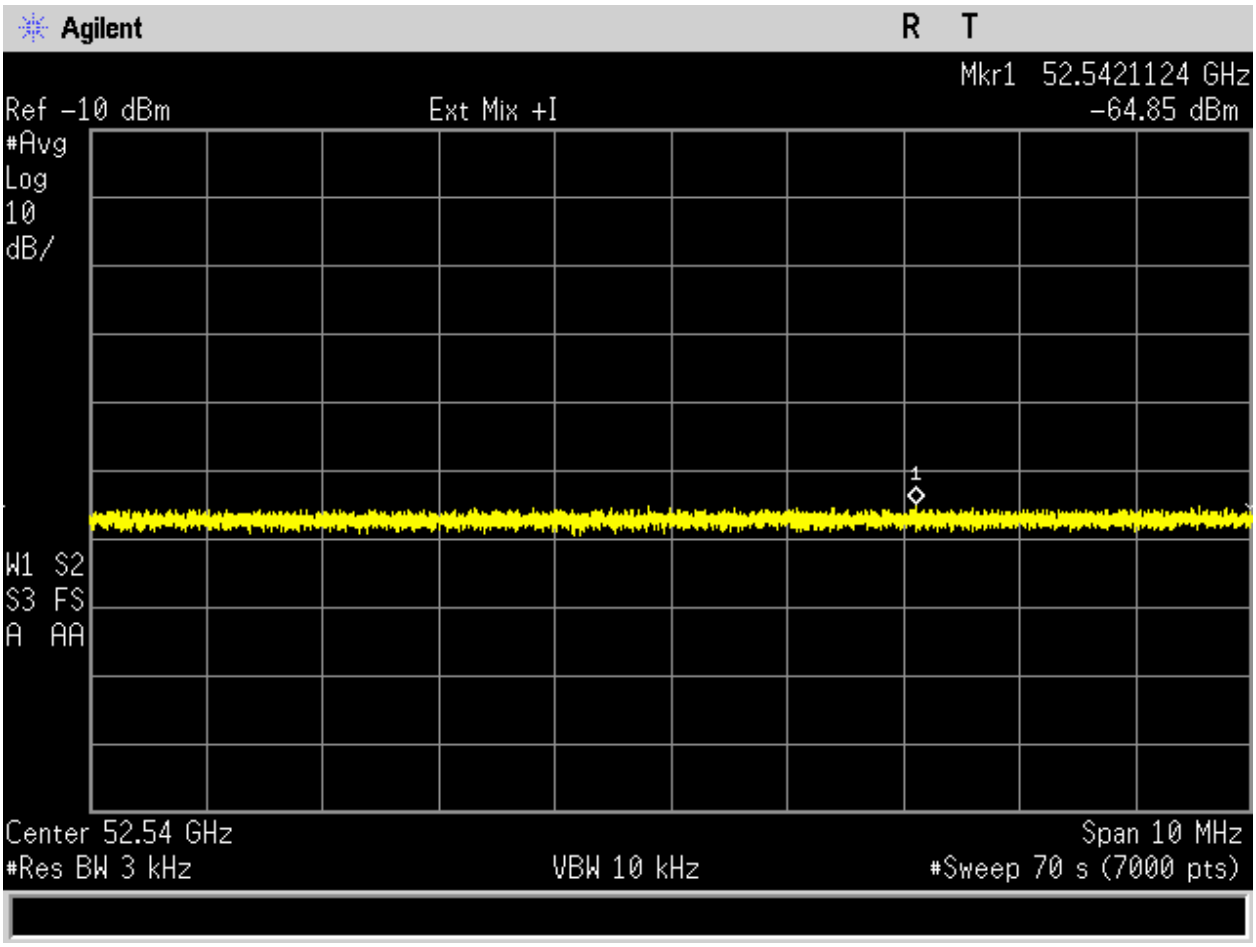

Figure 230. Radiated Spurious_QPSK_40MHz_High Channel, 50GHz - 75GHz, AVG (52.54GHz).

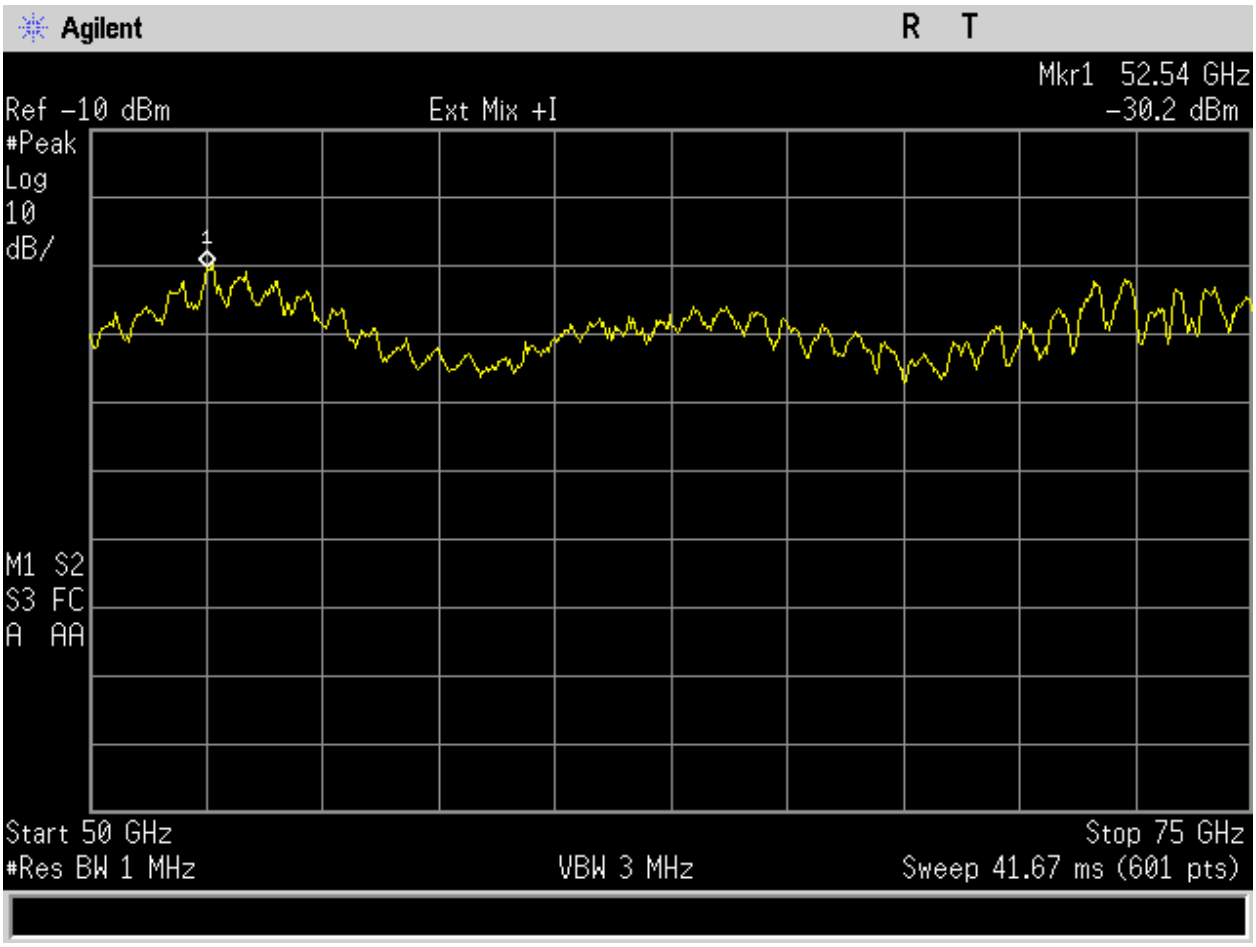

Figure 231. Radiated Spurious_QPSK_40MHz_High Channel, 50GHz - 75GHz.

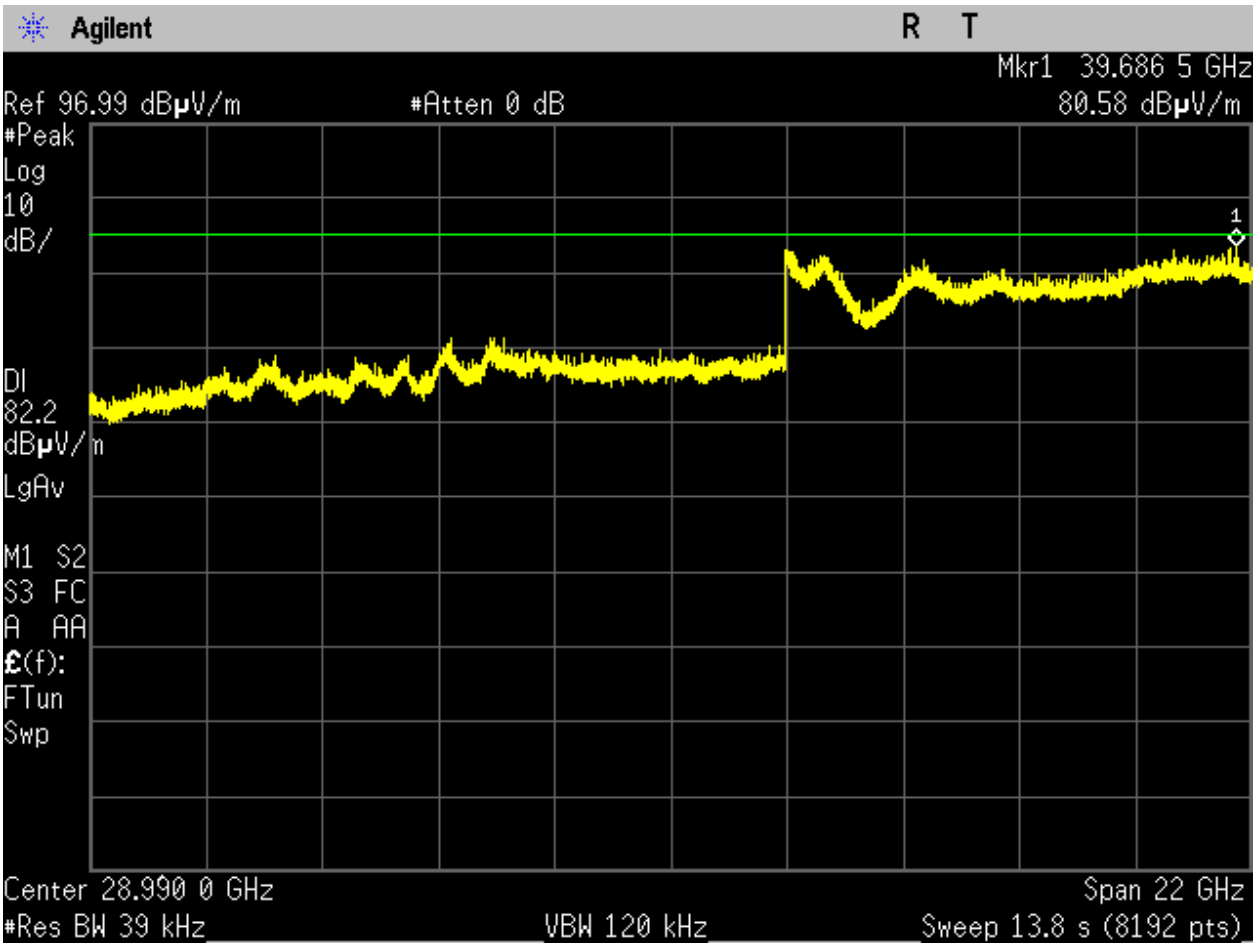

Figure 232. Radiated Spurious_QPSK_40MHz_Low Channel, 18GHz-40GHz_H.

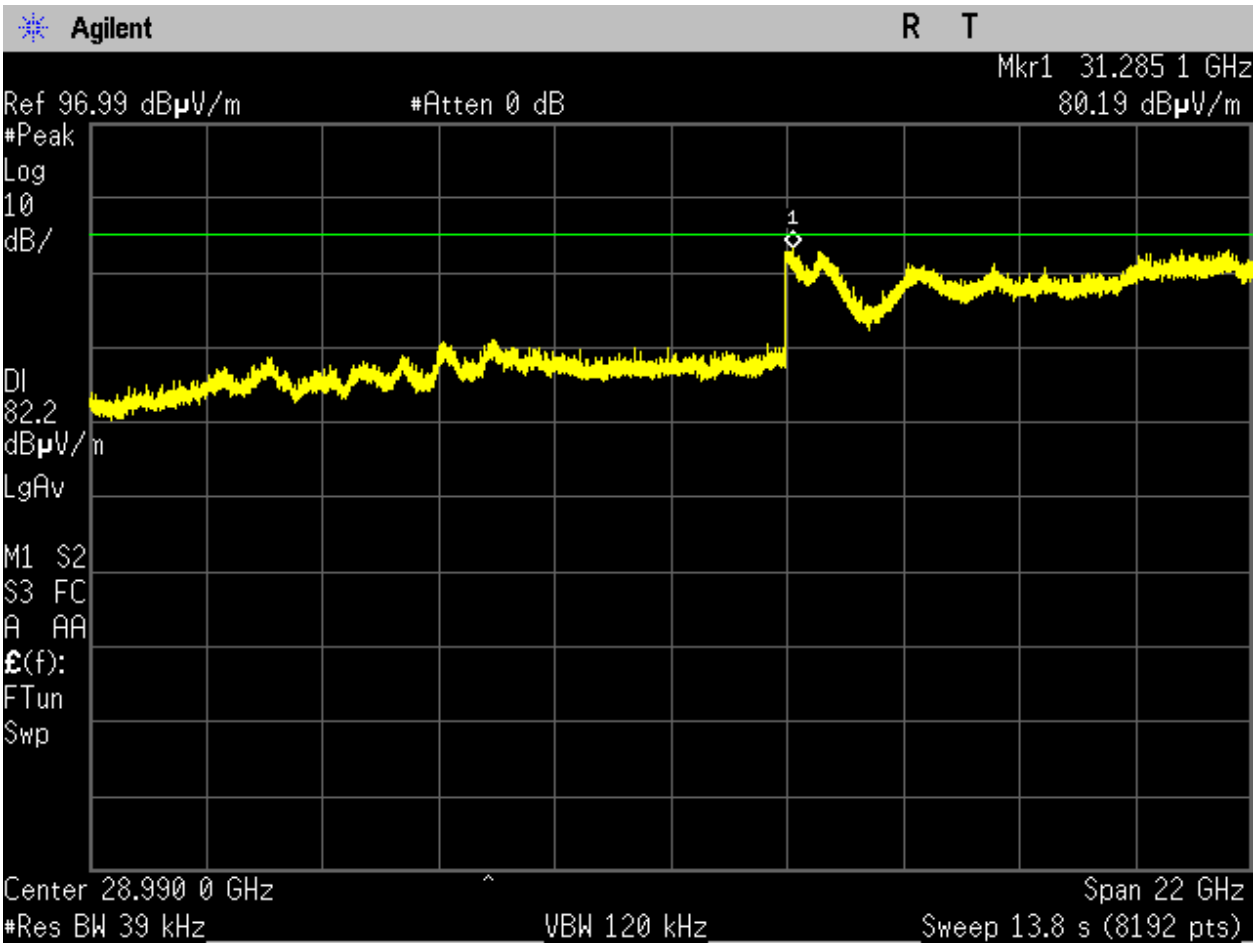

Figure 233. Radiated Spurious_QPSK_40MHz_Low Channel, 18GHz-40GHz_V.

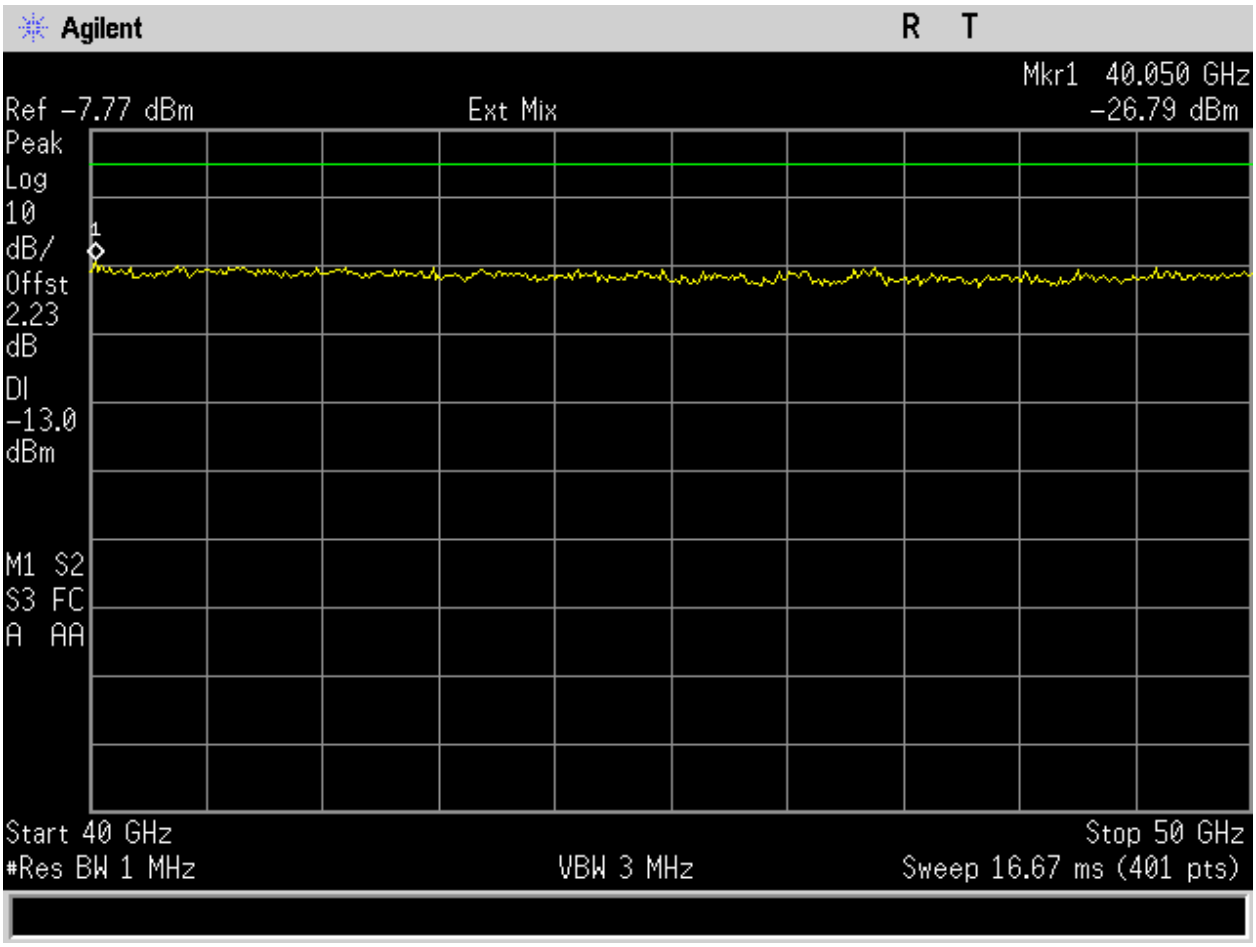

Figure 234. Radiated Spurious_QPSK_40MHz_Low Channel, 40GHz - 50GHz.

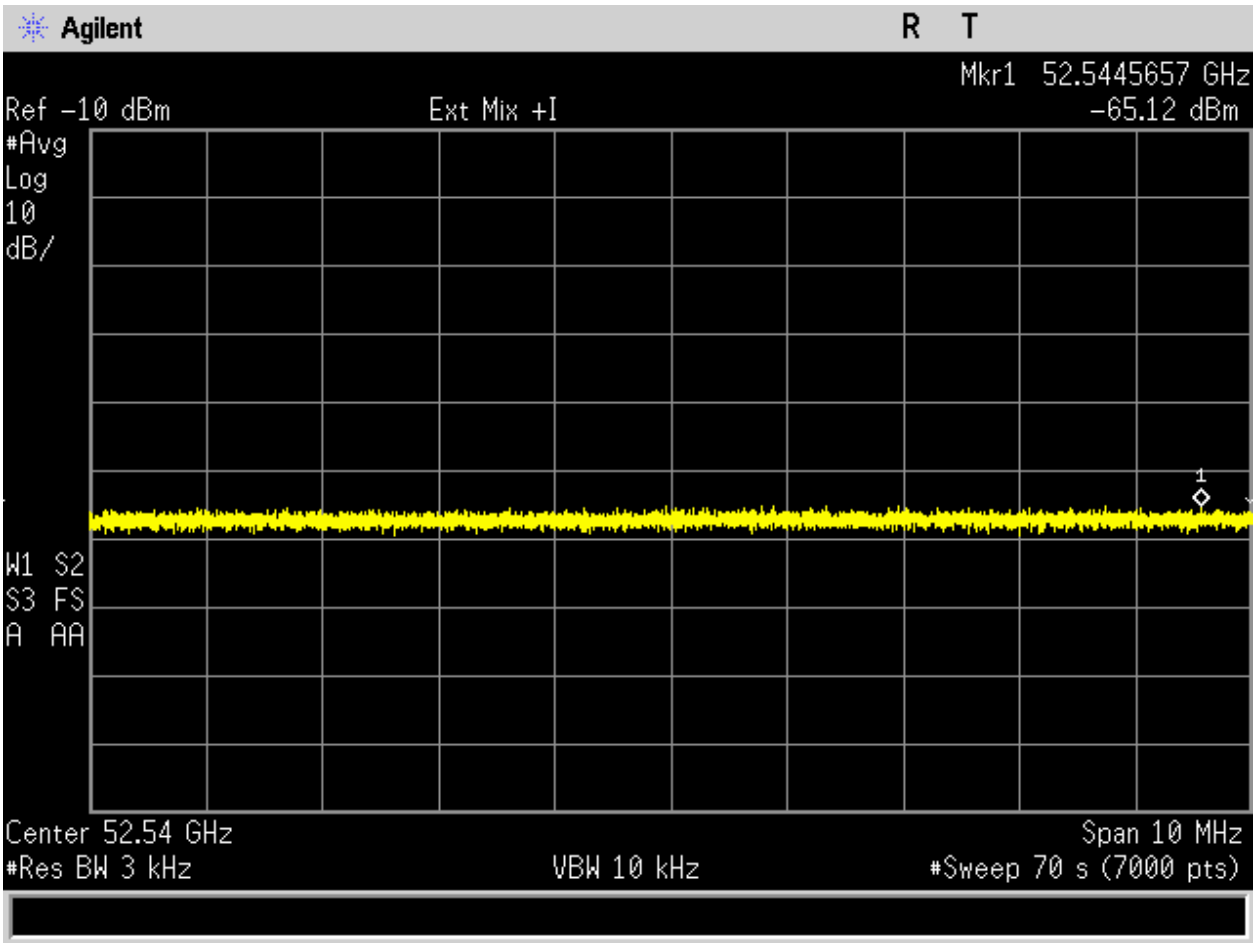

Figure 235. Radiated Spurious_QPSK_40MHz_Low Channel, 50GHz - 75GHz, AVG (52.54GHz).

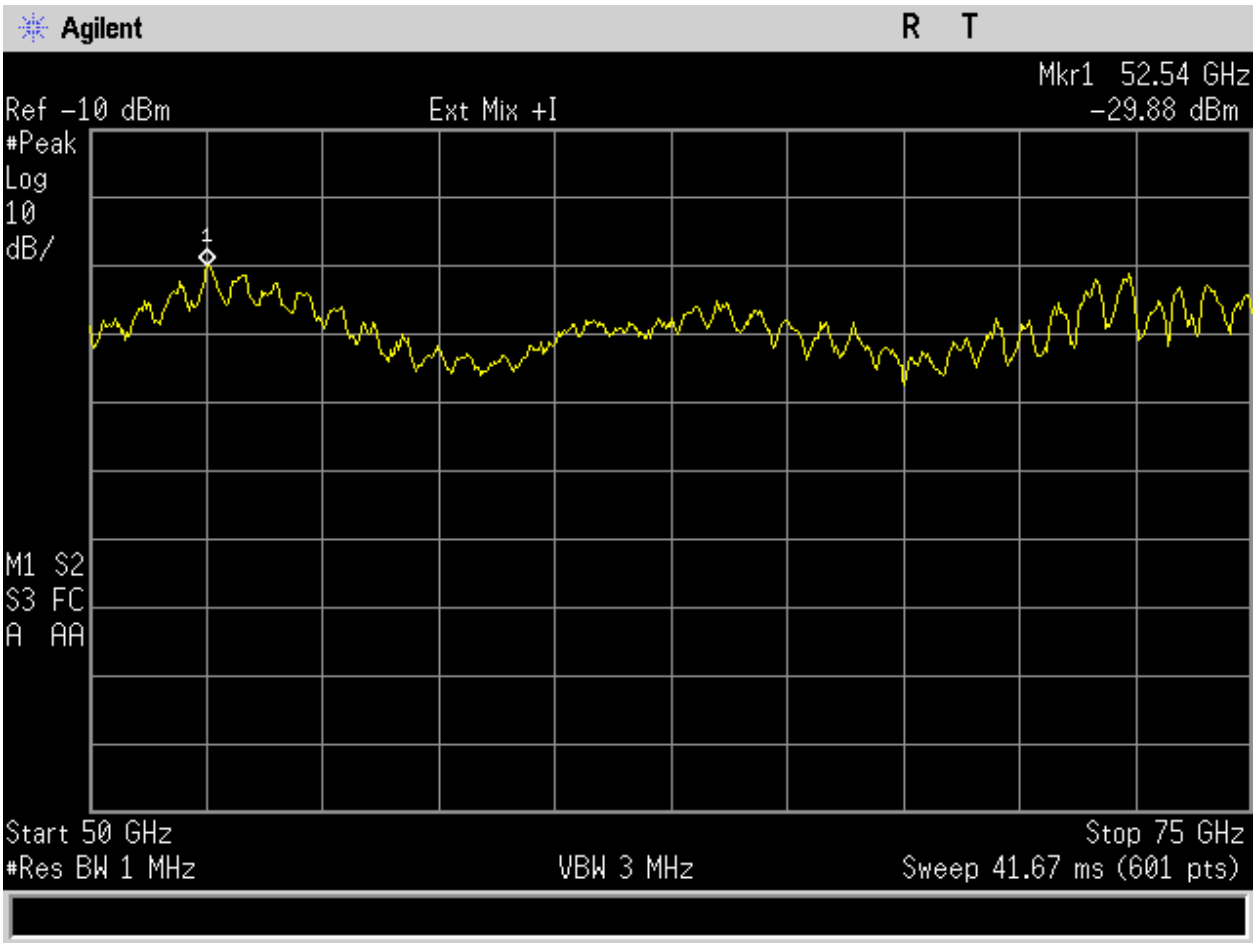

Figure 236. Radiated Spurious_QPSK_40MHz_Low Channel, 50GHz - 75GHz.

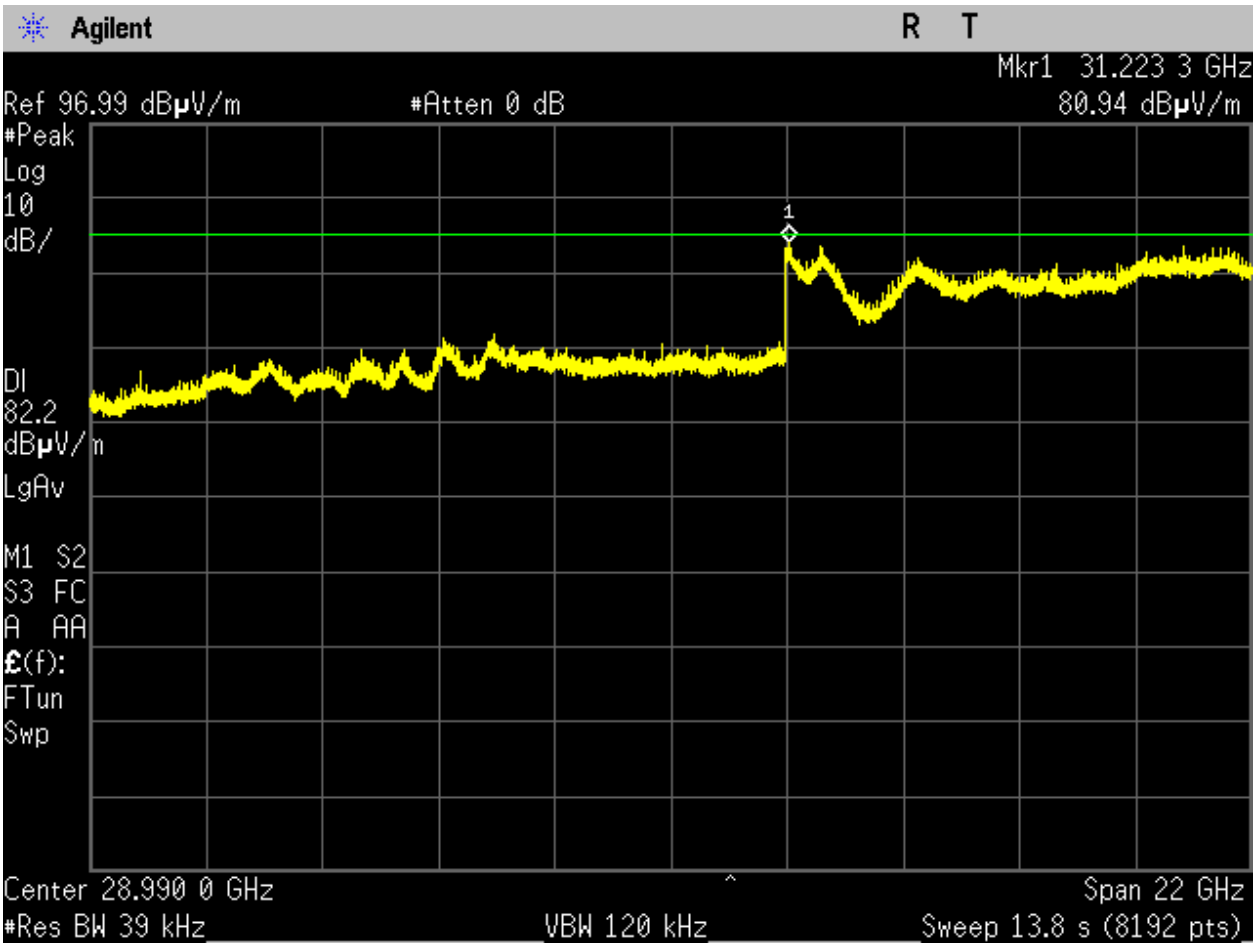

Figure 237. Radiated Spurious_QPSK_40MHz_Mid Channel, 18GHz-40GHz_H.

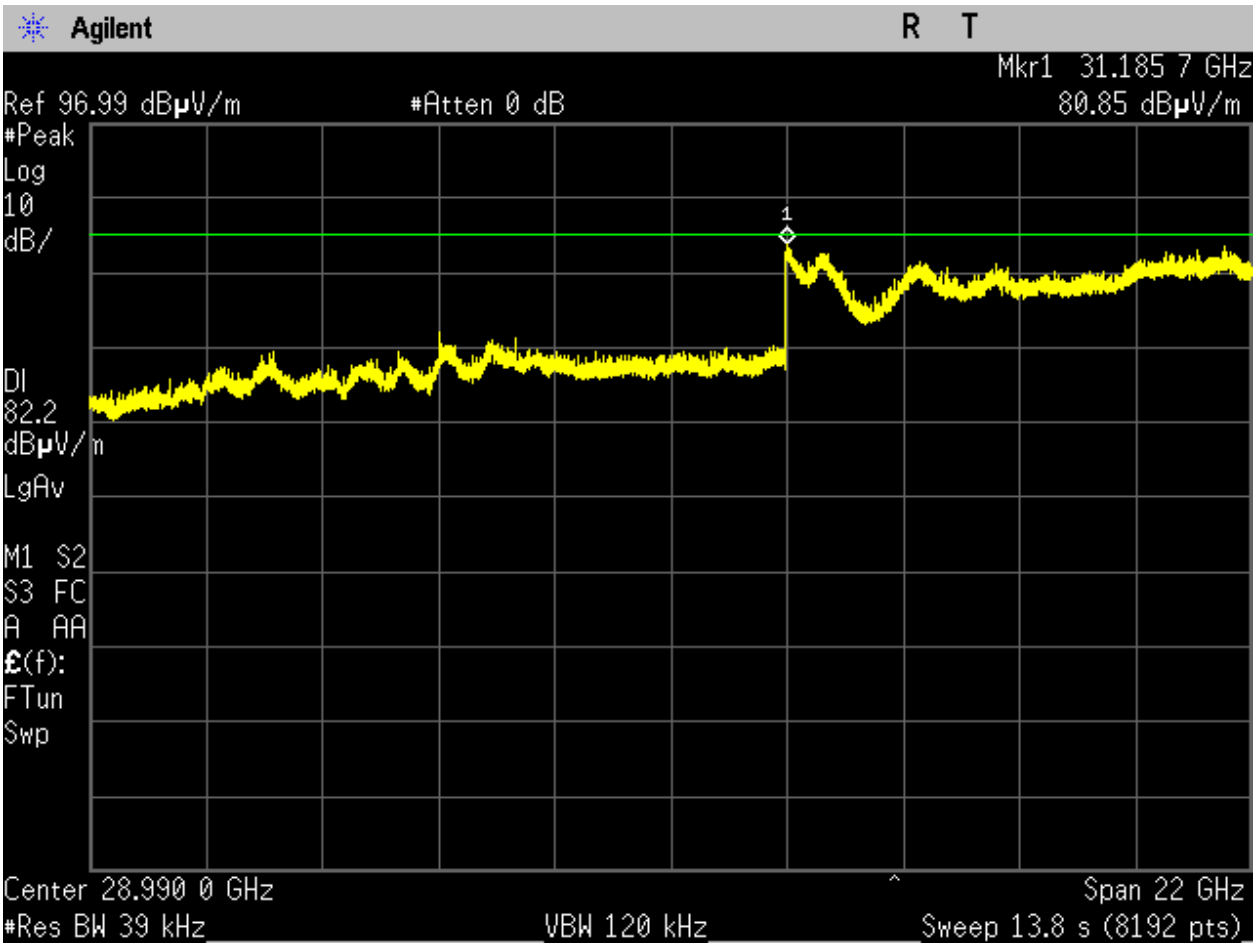

Figure 238. Radiated Spurious_QPSK_40MHz_Mid Channel, 18GHz-40GHz_V.

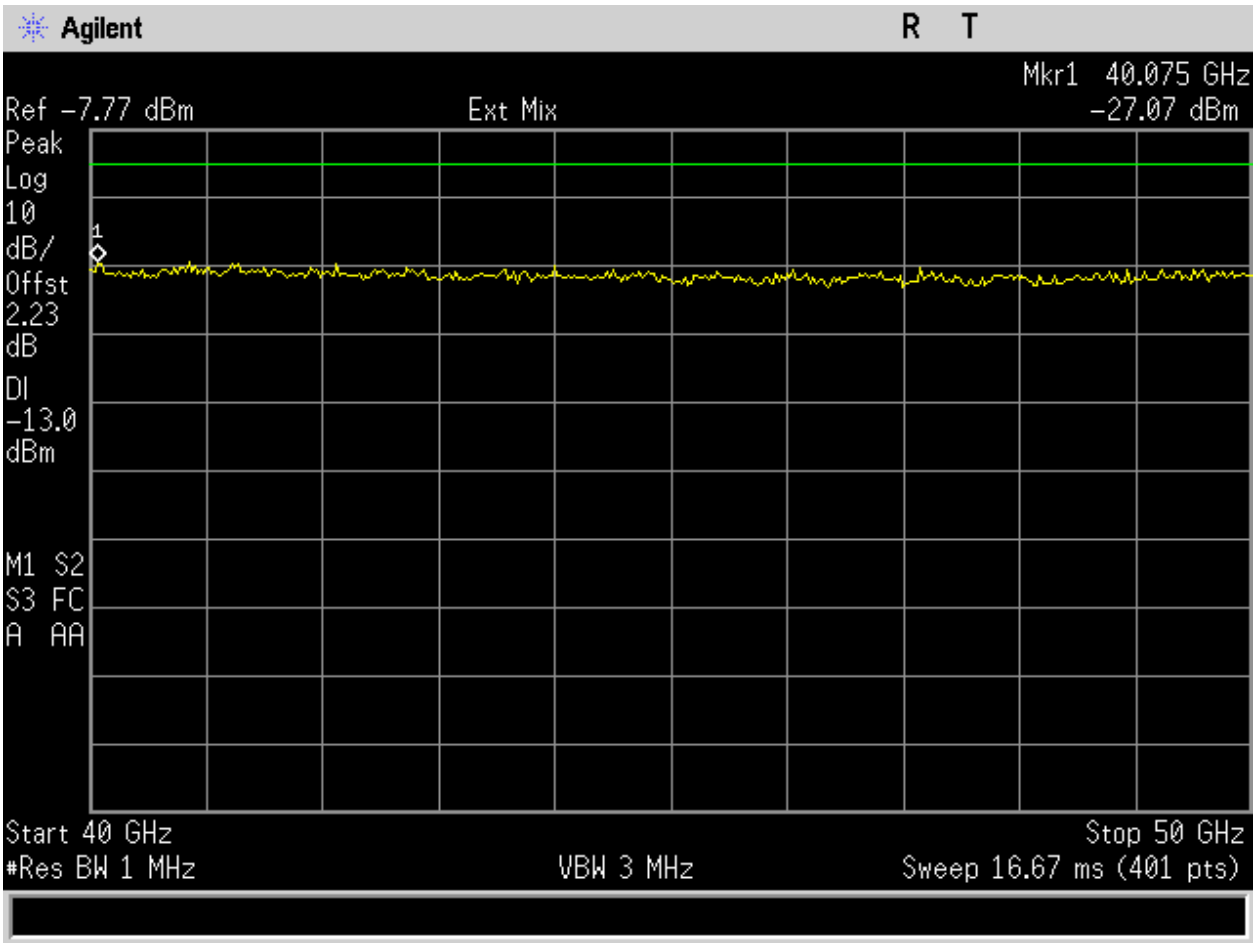

Figure 239. Radiated Spurious_QPSK_40MHz_Mid Channel, 40GHz - 50GHz.

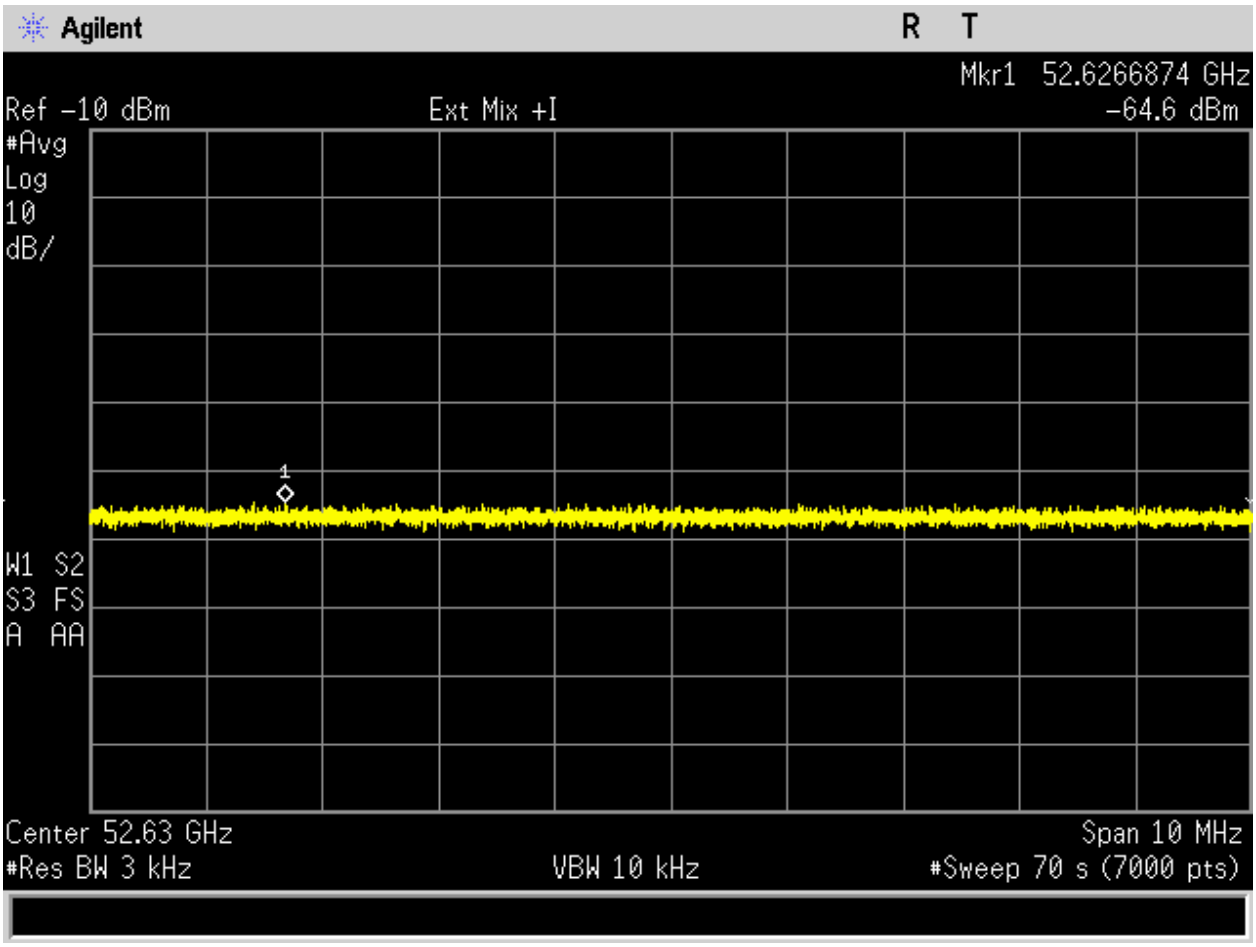

Figure 240. Radiated Spurious_QPSK_40MHz_Mid Channel, 50GHz - 75GHz, AVG (52.63GHz).

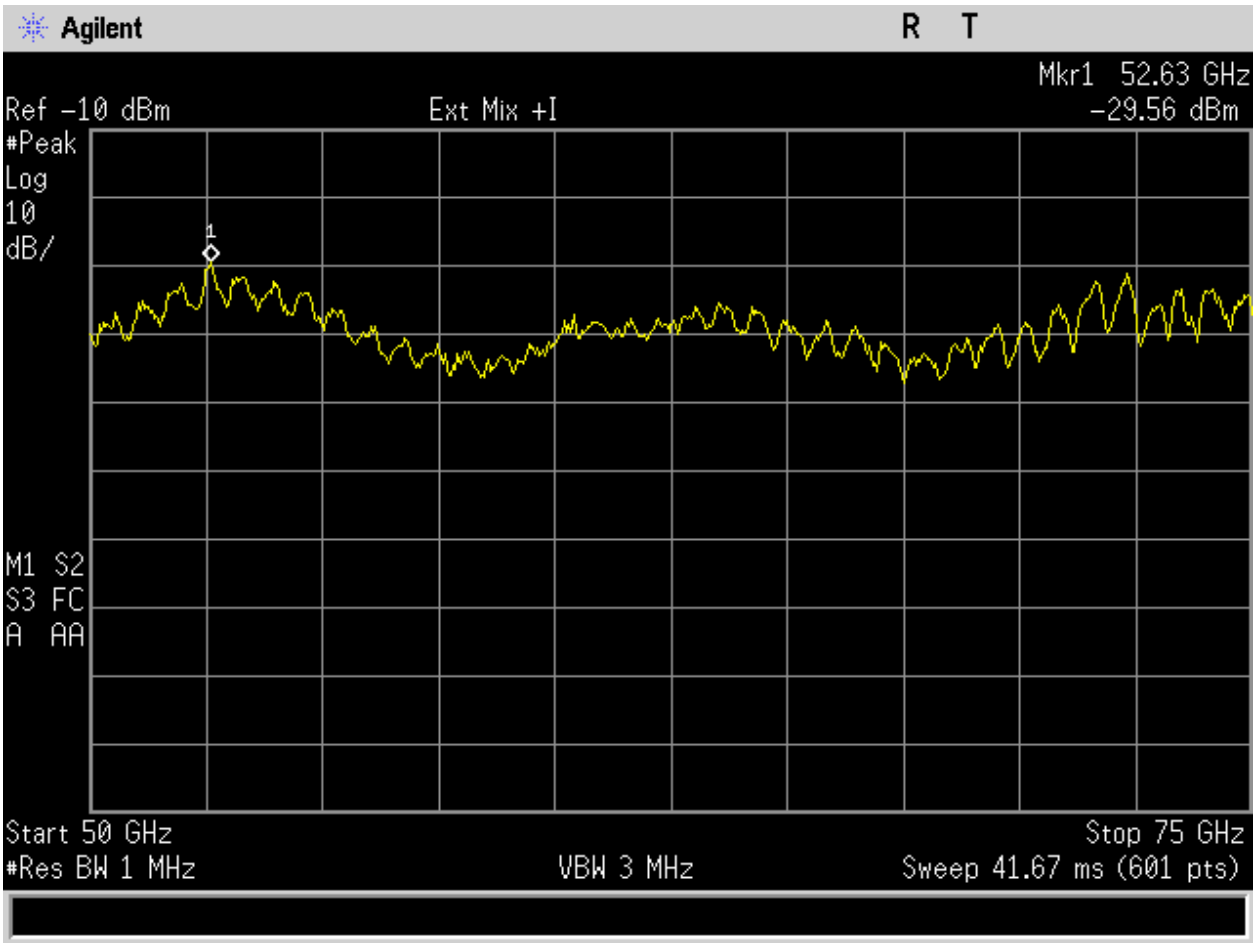

Figure 241. Radiated Spurious_QPSK_40MHz_Mid Channel, 50GHz - 75GHz.

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
2T4001	Temperature and Humidity Chamber (H11)	ESPEC North America, Inc.	EPX-4H	01IC927	7/22/2023	7/22/2024
1T4596	AC Power Source	California Instruments	2001RP	11765	Func. Verify	Func. Verify

Table 15. Equipment List

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.

End of Report

