MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230-3432 • PHONE (410) 354-3300 • FAX (410) 354-3313
33439 WESTERN AVENUE • UNION CITY, CALIFORNIA 94587 • PHONE (510) 489-6300 • FAX (510) 489-6372
3162 BELICK STREET • SANTA CLARA, CA 95054 • PHONE (408) 748-3585 • FAX (510) 489-6372
13501 MCCALLEN PASS • AUSTIN, TEXAS 78753 • PHONE (512) 287-2500 • FAX (512) 287-2513

January 14, 2016

CommScope Technologies LLC
250 Apollo Drive
Chelmsford, MA 01824

Dear Kevin Craig,

Enclosed is the EMC Wireless test report for compliance testing of the CommScope Technologies LLC, OneCell Radio Point as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 27 Subpart L for Broadband Radio Service (BRS) Devices.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\CommScope Technologies LLC\EMC87739-FCC27 Rev. 1)

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Electromagnetic Compatibility Criteria
Test Report

for the

CommScope Technologies LLC
Model OneCell Radio Point

Tested under
FCC Certification Rules
Title 47 of the CFR, Part 27 Subpart L

MET Report: EMC87739-FCC27 Rev. 1

January 14, 2016

Prepared For:

CommScope Technologies LLC
250 Apollo Drive
Chelmsford, MA 01824

Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave
Baltimore, MD 21230

Electromagnetic Compatibility Criteria
Test Report

for the

CommScope Technologies LLC
Model OneCell Radio Point

Tested Under

FCC Certification Rules
Title 47 of the CFR, Part 27 Subpart L

Surinder Singh, Project Engineer
Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. 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 of Part 27 M of the FCC Rules under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	January 8, 2016	Initial Issue.
1	January 14, 2016	Editorial correction.

Table of Contents

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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 was performed to determine compliance of the CommScope Technologies LLC OneCell Radio Point, with the requirements of Part 27. 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 OneCell Radio Point. CommScope Technologies LLC should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the OneCell Radio Point, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 27, in accordance with CommScope Technologies LLC, purchase order number 60032.

Reference	Description	Compliance
§2.1046; §27.50(h)	RF Power Output	Compliant
§2.1047	Modulation Characteristics	Not Applicable
§2.1049	Occupied Bandwidth	Compliant
§27.53	Emissions in GPS Bands	Not Applicable – EUT does not operate in the 700-800 MHz bands.
§2.1051; §27.53(l)	Spurious Emissions at Antenna Terminals	Compliant
§2.1053	Radiated Spurious Emissions	Compliant
	RF Exposure	Compliant

Table 1. Executive Summary of EMC ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by CommScope Technologies LLC to perform testing on the OneCell Radio Point, under CommScope Technologies LLC's purchase order number 60032.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the CommScope Technologies LLC, OneCell Radio Point.

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

Model(s) Tested	OneCell Radio Point	
Model(s) Covered:	OneCell Radio Point	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	Equipment Code:	PCB
	RF Output Power:	25.2dBm 24.14dBm
	EUT Frequency Range:	2117.5-2162.5MHz 736.5-738.5MHz
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:	Surinder Singh	
Date(s):	January 14, 2016	

Table 2. EUT Summary Table

B. References

CFR 47, Part 27	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 27: Rules and Regulations for Advanced Wireless Services
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 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
EIA/TIA-603-A-2001	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards

Table 3. Standard References

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 West Patapsco Ave, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site).

D. Description of Test Sample

The CommScope Technologies LLC OneCell Radio Point, Equipment Under Test (EUT), is an LTE Quad band Radio Access Point. It is used to provide in-build coverage for the LTE cellular users. The unit can be located below the ceiling or in a plenum airspace above a ceiling as it is plenum rated to UL-2043.

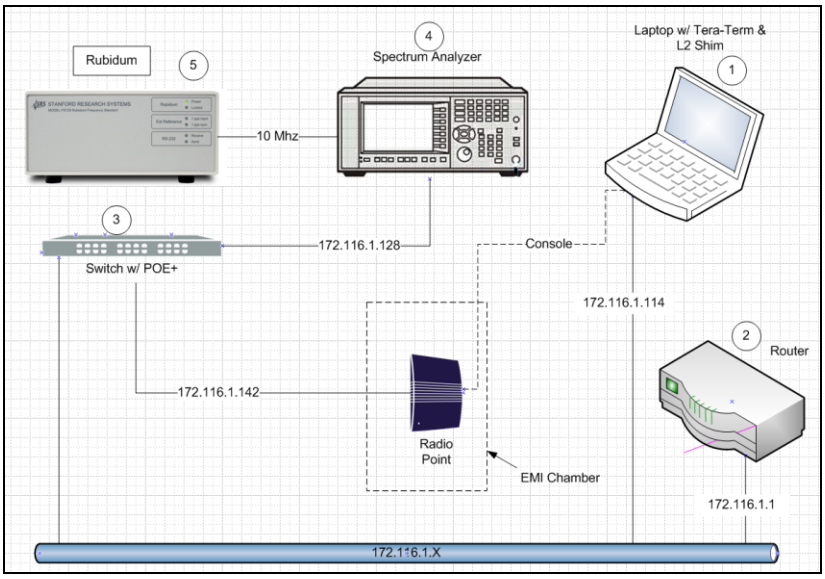


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

Ref. ID	Name / Description	Model Number	Part Number	Serial Number	Revision
1	OneCell® Radio Point	RP-A2014	800245	--	--

Table 4. Equipment Configuration

F. Support Equipment

Ref. ID	Name / Description	Manufacturer	Model Number	Customer Supplied Calibration Data
1	Laptop	--	--	--
2	Ethernet Router	Linksys	EA2700	--
3	Ethernet Switch	Linksys	LG308P	--
4	20 Hz – 26.5 GHz Spectrum Analyzer	Keysight	KT-N9020A-256/B25/P26/CG1	--
5	Rubidium	Stanford Research	FS725	--

Table 5. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)	Termination Point
1	Ethernet/Power	Cat5 cable	1	1	N	Port 1 Ethernet Switch
2	Antenna port J1	Coax	1	2	Y	Spectrum Analyzer
3	Antenna port J2	Coax	1	3	Y	Spectrum Analyzer
4	Console	Signal	1	4	N	--

Table 6. Ports and Cabling Information

H. Mode of Operation

The EUT will be configured to operate in a specific band of interest using Tera Term Scripts and transmit test models supplied by the chip vendor per the 3GPP standard TS 36.141 Release 10.10. The test models will cover all of the test modes, 15 & 20 MHz bandwidth as well as the three modulation types, QPSK, 16QAM & 64 QAM. The EUT transmitter will provide a continuous transmit signal without manual intervention on it has been configured. For conducted testing the EUT will be controlled by a serial interface. For radiated test the EUT will be controlled by the Ethernet. Interface.
The EUT will require a reboot whenever band or bandwidth is changed.

Supported Frequency Bands and Bandwidths						
Frequency Band	Duplex	Uplink RX Frequency (MHz)	Downlink TX Frequency (MHz)	MAX Bandwidth (MHz)	MAX Output Power (dBm)	FCC PART
10	FDD	1710-1770	2110-2170	20	23	27
25	FDD	1850-1915	1930-1995	20	23	24
12	FDD	699-716	729-746	15	23	27
2	FDD	1850-1910	1930-1990	20	23	24
4	FDD	1710-1755	2110-2155	20	23	27

I. Method of Monitoring EUT Operation

The radio transmitter is monitored using a spectrum analyzer. The EUT console will be monitored for error messages via the serial or Ethernet interface.

J. 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.

K. Disposition of EUT

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

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1046 RF Power Output

Test Requirement(s): §2.1046 and §27.50(b)(9) / §27.50(d)(2)

§27.50(b)(9) - Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788 MHz and 805-806 MHz bands are limited to 30 watts ERP.

§27.50(d)(2) - The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz 2155-2180 MHz band, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:

(i) An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;

(ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

Test Procedures: *RF power output measurement* was made at the RF output terminal using a spectrum analyzer for downlink.

Test Results: Equipment complies with 47CFR 2.1046 and 27.50(h). The following page show measurements of RF Power output which is recorded below:

Test Engineer(s): Surinder Singh

Test Date(s): 11/25/15

Band	Center Freq. MHz	BW	Mod.	Max. RMS Power Port 1 dBm	Max. RMS Power Port 2 dBm	Peak Power Port 1 dBm	Peak Power Port 2 dBm	PAPR Port 1 dB (limit:13dB)	PAPR Port 2 dB (limit: 13dB)	Total Max. RMS Output Power	Directional Gain dBi	Limit dBm	EIRP dBm	Margin dB	Result
4	2117.5	15	QPSK	20.2	20.01	23.85	23.4	3.65	3.39	23.2	8	62.1	31.2	-30.9	Pass
4	2117.5	15	16QAM	20.22	20.1	23.98	23.77	3.76	3.67	23.2	8	62.1	31.2	-30.9	Pass
4	2117.5	15	64QAM	20.35	20.23	24.1	23.64	3.75	3.41	23.4	8	62.1	31.4	-30.7	Pass
4	2132.5	15	QPSK	19.68	19.78	23.34	23.31	3.66	3.53	22.8	8	62.1	30.8	-31.3	Pass
4	2132.5	15	16QAM	20.15	19.96	23.41	23.08	3.26	3.12	23.1	8	62.1	31.1	-31	Pass
4	2132.5	15	64QAM	20.16	19.9	23.07	23.09	2.91	3.19	23.1	8	62.1	31.1	-31	Pass
4	2147.5	15	QPSK	20.04	19.93	23.35	23.19	3.31	3.26	23	8	62.1	31	-31.1	Pass
4	2147.5	15	16QAM	20.03	19.87	23.42	22.83	3.39	2.96	23	8	62.1	31	-31.1	Pass
4	2147.5	15	64QAM	20.23	19.6	23.22	22.99	2.99	3.39	23	8	62.1	31	-31.1	Pass
4	2120	20	QPSK	20.69	20.16	24.19	23.56	3.5	3.4	23.5	8	62.1	31.5	-30.6	Pass
4	2120	20	16QAM	20.6	19.95	23.74	23.24	3.14	3.29	23.3	8	62.1	31.3	-30.8	Pass
4	2120	20	64QAM	20.78	19.67	24.02	22.9	3.24	3.23	23.3	8	62.1	31.3	-30.8	Pass
4	2132.5	20	QPSK	20.55	19.54	23.9	23.11	3.35	3.57	23.1	8	62.1	31.1	-31	Pass
4	2132.5	20	16QAM	20.37	19.71	23.57	23.27	3.2	3.56	23.1	8	62.1	31.1	-31	Pass
4	2132.5	20	64QAM	20.31	20.05	23.56	22.92	3.25	2.87	23.2	8	62.1	31.2	-30.9	Pass
4	2145	20	QPSK	20.39	19.72	23.56	22.94	3.17	3.22	23.1	8	62.1	31.1	-31	Pass
4	2145	20	16QAM	20.04	19.87	23.5	23.09	3.46	3.22	23	8	62.1	31	-31.1	Pass
4	2145	20	64QAM	20	19.6	23.31	23.28	3.31	3.68	22.9	8	62.1	30.9	-31.2	Pass

Table 7. RF Output Power, Test Results, Band 4

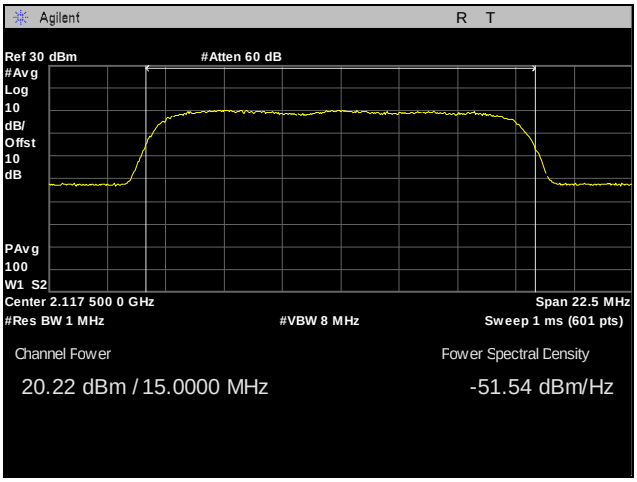
Band	Center Freq. MHz	BW	Mod.	Max. RMS Power Port 1 dBm	Max. RMS Power Port 2 dBm	Peak Power Port 1 dBm	Peak Power Port 2 dBm	PAPR Port 1 dB (limit: 13dB)	PAPR Port 2 dB (limit: 13dB)	Total Max. RMS Output Power	Directional Gain dBi	Limit dBm	EIRP dBm	Margin dB	Result
10	2117.5	15	QPSK	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4
10	2117.5	15	16QAM	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4
10	2117.5	15	64QAM	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4
10	2140	15	QPSK	19.46	19.75	22.82	22.2	3.36	2.45	22.7	8	62.1	30.7	-31.4	Pass
10	2140	15	16QAM	19.42	19.58	22.93	22.82	3.51	3.24	22.6	8	62.1	30.6	-31.5	Pass
10	2140	15	64QAM	20.08	19.45	23.02	22.77	2.94	3.32	22.8	8	62.1	30.8	-31.3	Pass
10	2162.5	15	QPSK	19.84	19.9	23.3	23.05	3.46	3.15	22.9	8	62.1	30.9	-31.2	Pass
10	2162.5	15	16QAM	19.94	19.77	22.9	23.33	2.96	3.56	22.9	8	62.1	30.9	-31.2	Pass
10	2162.5	15	64QAM	19.43	19.67	23.54	23.19	4.11	3.52	22.6	8	62.1	30.6	-31.5	Pass
10	2120	20	QPSK	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4
10	2120	20	16QAM	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4
10	2120	20	64QAM	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4	See Band 4
10	2140	20	QPSK	20.08	19.82	23.4	23.4	3.32	3.58	23	8	62.1	31	-31.1	Pass
10	2140	20	16QAM	20.03	19.24	23.69	23.26	3.66	4.02	22.7	8	62.1	30.7	-31.4	Pass
10	2140	20	64QAM	19.97	19.93	23.4	23.41	3.43	3.48	23	8	62.1	31	-31.1	Pass
10	2160	20	QPSK	20.23	23.39	23.67	23.82	3.44	0.43	25.2	8	62.1	33.2	-28.9	Pass
10	2160	20	16QAM	20.44	20.12	23.91	23.3	3.47	3.18	23.3	8	62.1	31.3	-30.8	Pass
10	2160	20	64QAM	20.48	20.57	23.86	23.67	3.38	3.1	23.6	8	62.1	31.6	-30.5	Pass

Table 8. RF Output Power, Test Results, Band 10

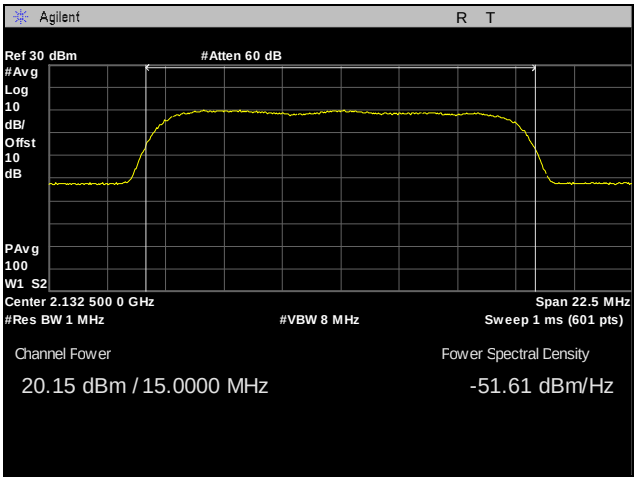
Band	Center Freq. MHz	BW	Mod.	Max. RMS Power Port 1 dBm	Max. RMS Power Port 2 dBm	Peak Power Port 1 dBm	Peak Power Port 2 dBm	PAPR Port 1 dB (limit: 13dB)	PAPR Port 2 dB (limit: 13dB)	Total Max. RMS Output Power	Directional Gain dBi	Limit dBm	EIRP dBm	Margin dB	Result
12	736.5	15	QPSK	21.08	21.04	24.15	24.56	3.07	3.52	24.08	3	44.77	27.08	-17.69	Pass
12	736.5	15	16QAM	21.01	20.9	23.96	24.05	2.95	3.15	23.97	3	44.77	26.97	-17.8	Pass
12	736.5	15	64QAM	21.05	21.03	24.34	24.16	3.29	3.13	24.06	3	44.77	27.06	-17.71	Pass
12	737.5	15	QPSK	21.1	21.14	24.88	24.37	3.78	3.23	24.14	3	44.77	27.14	-17.63	Pass
12	737.5	15	16QAM	20.99	21.09	24.55	24.19	3.56	3.1	24.06	3	44.77	27.06	-17.71	Pass
12	737.5	15	64QAM	21.01	20.58	24.08	24.67	3.07	4.09	23.82	3	44.77	26.82	-17.95	Pass
12	738.5	15	QPSK	21.12	20.95	23.99	24.36	2.87	3.41	24.05	3	44.77	27.05	-17.72	Pass
12	738.5	15	16QAM	20.85	20.68	24.19	24.05	3.34	3.37	23.78	3	44.77	26.78	-17.99	Pass
12	738.5	15	64QAM	20.78	20.56	24.31	24.16	3.53	3.6	23.69	3	44.77	26.69	-18.08	Pass

Table 9. RF Output Power, Test Results, Band 12

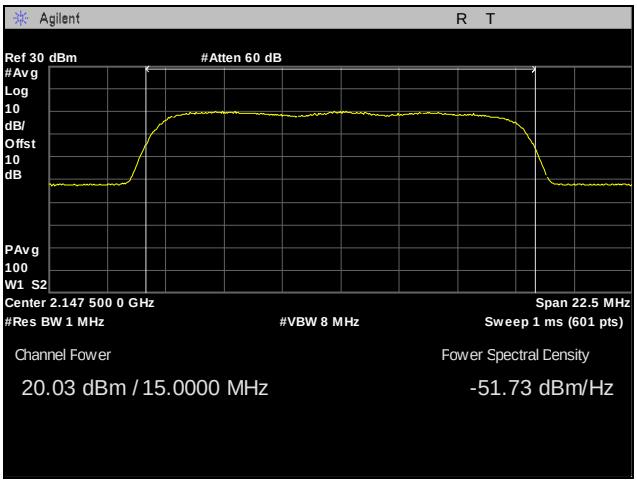
RF Output Power, Band 4, 15 MHz, 16QAM, Average, Port 1



Plot 1. RF Output Power, Low Channel, Band 4, 15 MHz, 16QAM, Average, Port 1

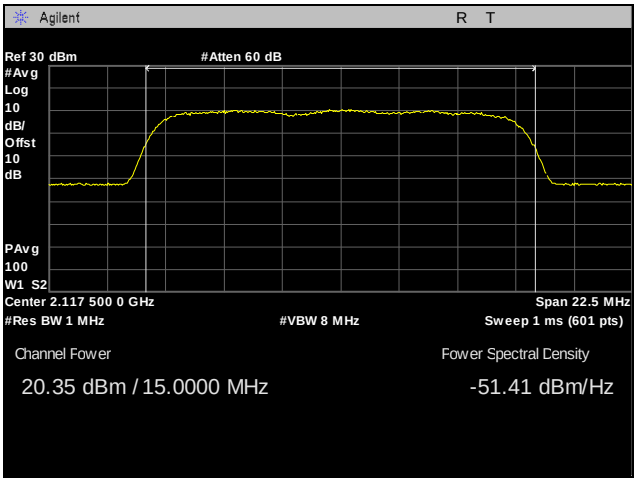


Plot 2. RF Output Power, Mid Channel, Band 4, 15 MHz, 16QAM, Average, Port 1

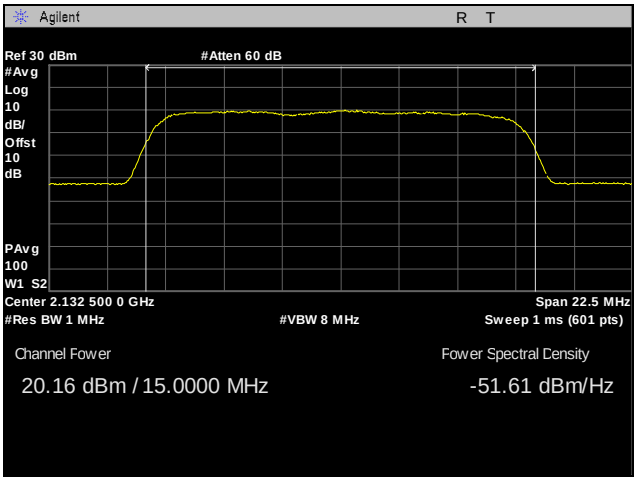


Plot 3. RF Output Power, High Channel, Band 4, 15 MHz, 16QAM, Average, Port 1

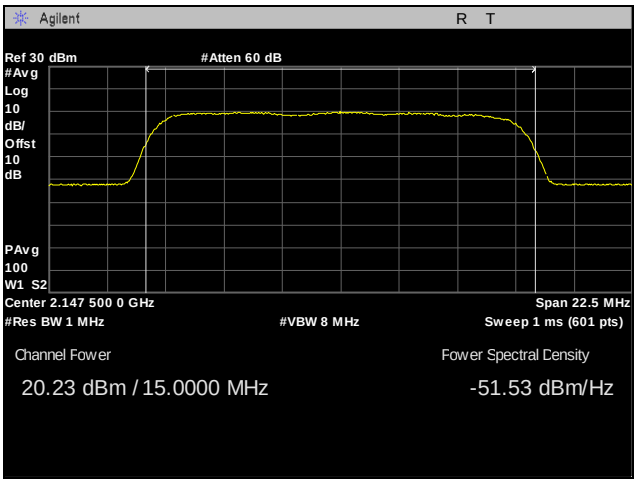
RF Output Power, Band 4, 15 MHz, 64QAM, Average, Port 1



Plot 4. RF Output Power, Low Channel, Band 4, 15 MHz, 64QAM, Average, Port 1

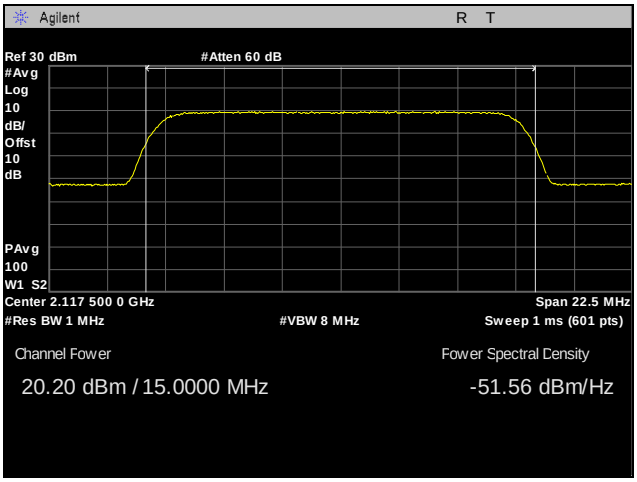


Plot 5. RF Output Power, Mid Channel, Band 4, 15 MHz, 64QAM, Average, Port 1

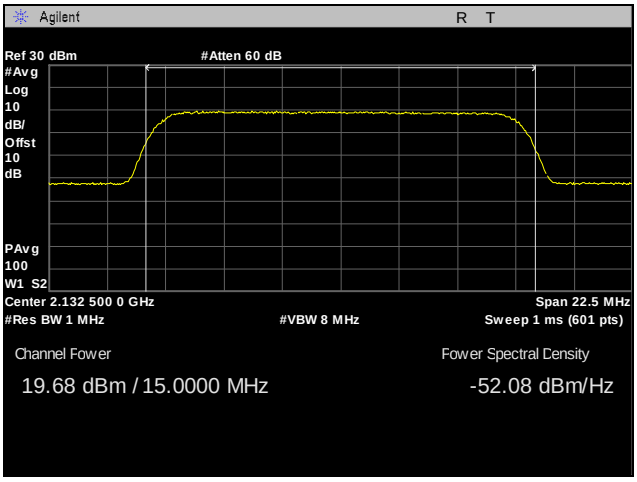


Plot 6. RF Output Power, High Channel, Band 4, 15 MHz, 64QAM, Average, Port 1

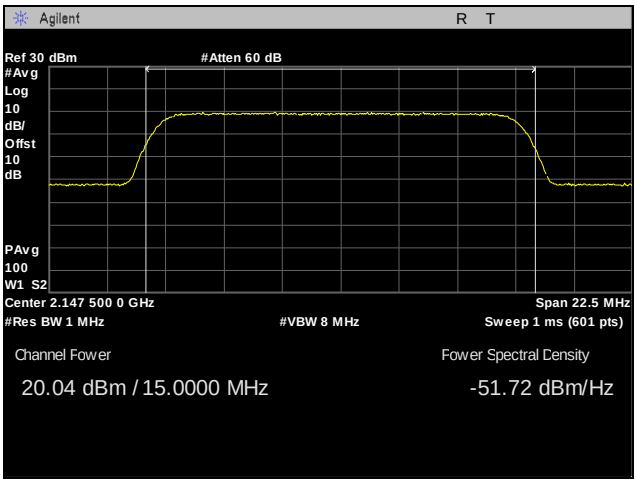
RF Output Power, Band 4, 15 MHz, QPSK, Average, Port 1



Plot 7. RF Output Power, Low Channel, Band 4, 15 MHz, QPSK, Average, Port 1

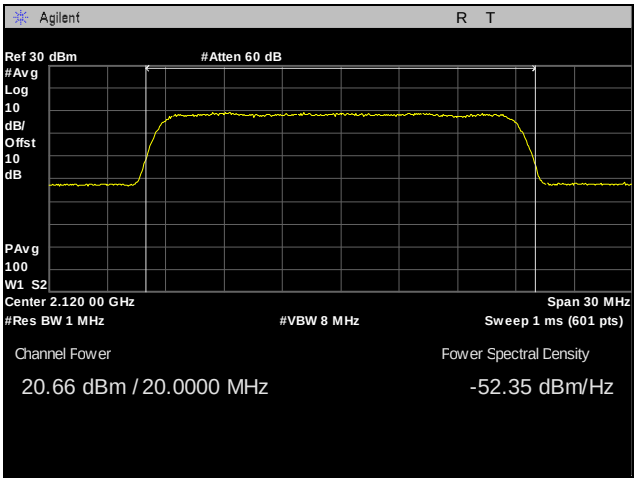


Plot 8. RF Output Power, Mid Channel, Band 4, 15 MHz, QPSK, Average, Port 1

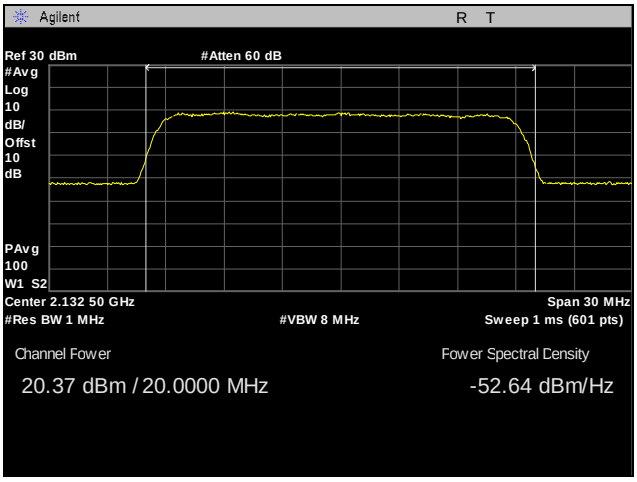


Plot 9. RF Output Power, High Channel, Band 4, 15 MHz, QPSK, Average, Port 1

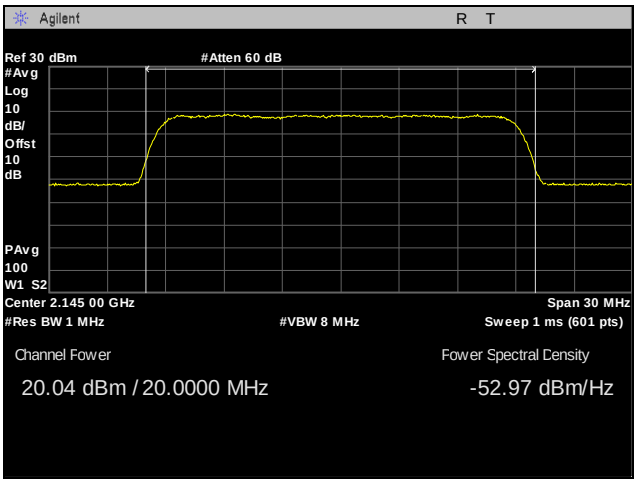
RF Output Power, Band 4, 20 MHz, 16QAM, Average, Port 1



Plot 10. RF Output Power, Low Channel, Band 4, 20 MHz, 16QAM, Average, Port 1

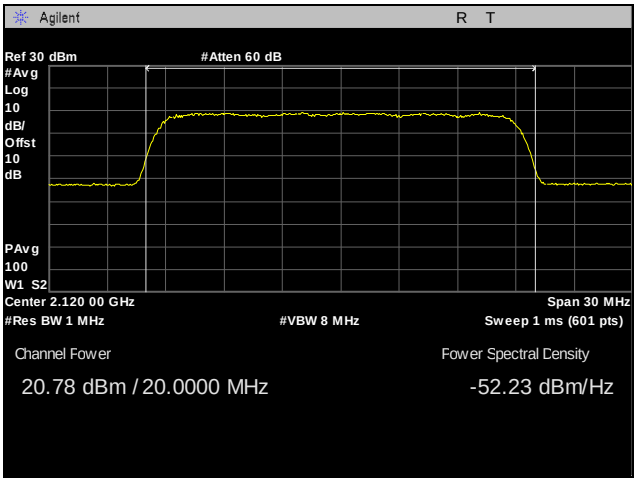


Plot 11. RF Output Power, Mid Channel, Band 4, 20 MHz, 16QAM, Average, Port 1

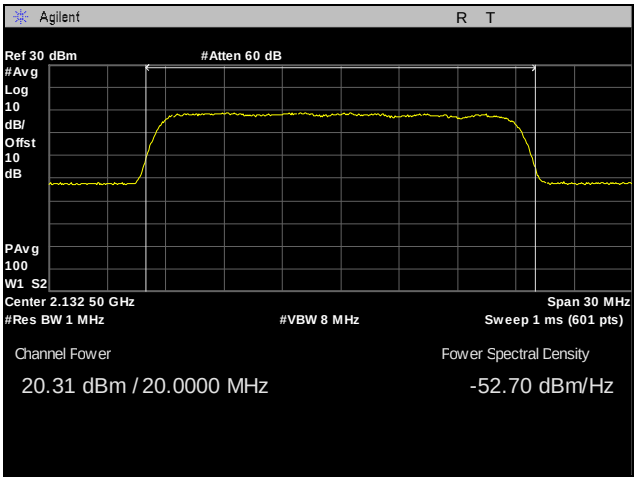


Plot 12. RF Output Power, High Channel, Band 4, 20 MHz, 16QAM, Average, Port 1

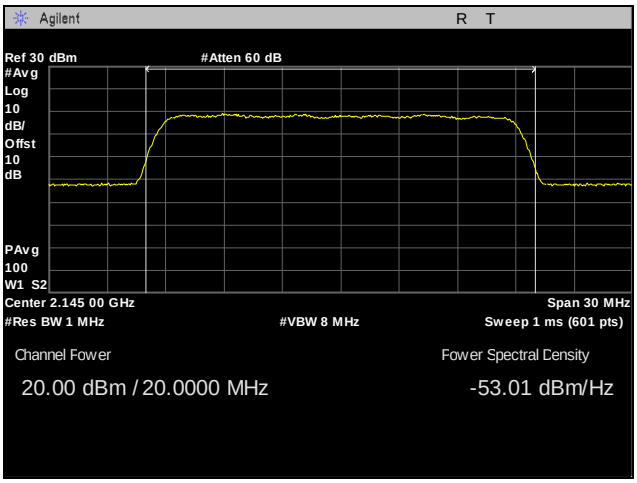
RF Output Power, Band 4, 20 MHz, 64QAM, Average, Port 1



Plot 13. RF Output Power, Low Channel, Band 4, 20 MHz, 64QAM, Average, Port 1

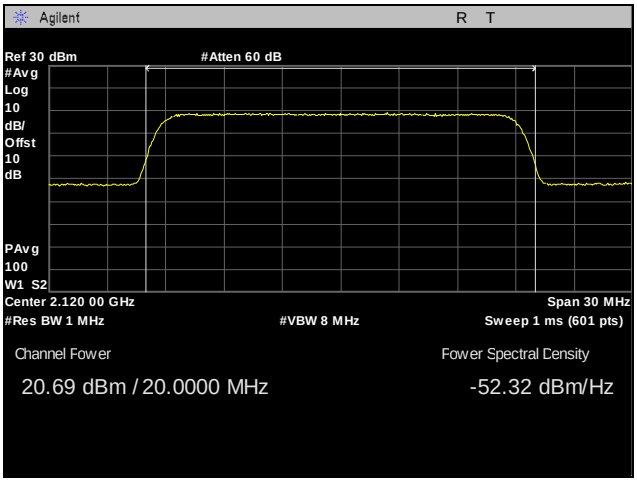


Plot 14. RF Output Power, Mid Channel, Band 4, 20 MHz, 64QAM, Average, Port 1

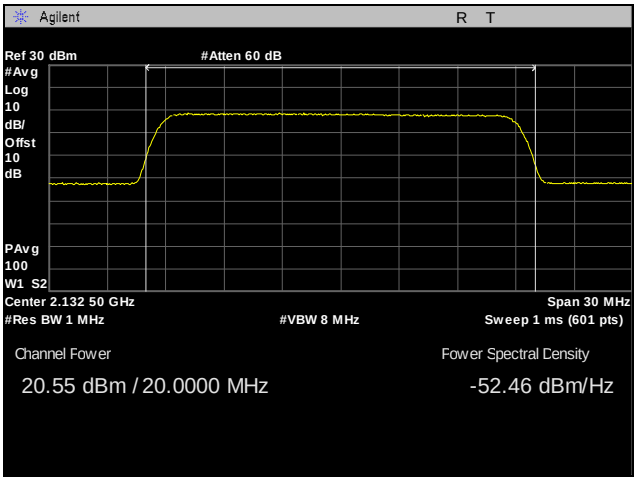


Plot 15. RF Output Power, High Channel, Band 4, 20 MHz, 64QAM, Average, Port 1

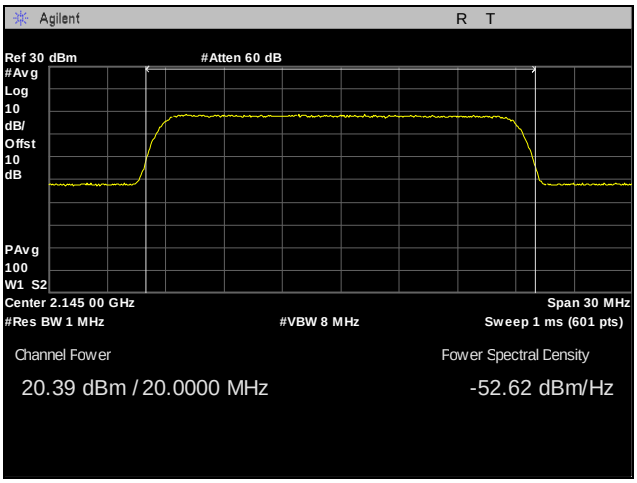
RF Output Power, Band 4, 20 MHz, QPSK, Average, Port 1



Plot 16. RF Output Power, Low Channel, Band 4, 20 MHz, QPSK, Average, Port 1

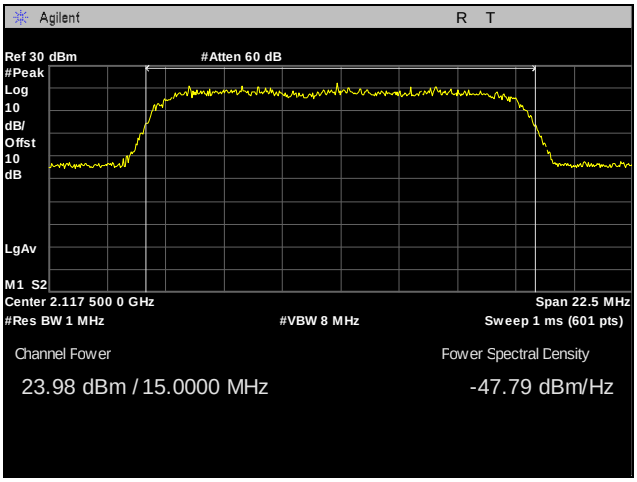


Plot 17. RF Output Power, Mid Channel, Band 4, 20 MHz, QPSK, Average, Port 1

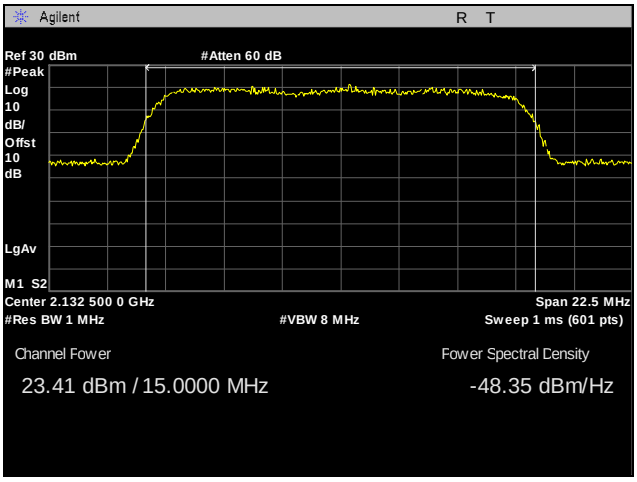


Plot 18. RF Output Power, High Channel, Band 4, 20 MHz, QPSK, Average, Port 1

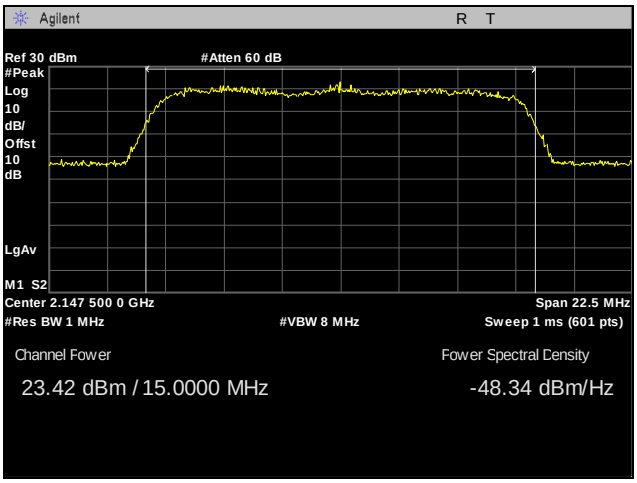
RF Output Power, Band 4, 15 MHz, 16QAM, Peak, Port 1



Plot 19. RF Output Power, Low Channel, Band 4, 15 MHz, 16QAM, Peak, Port 1

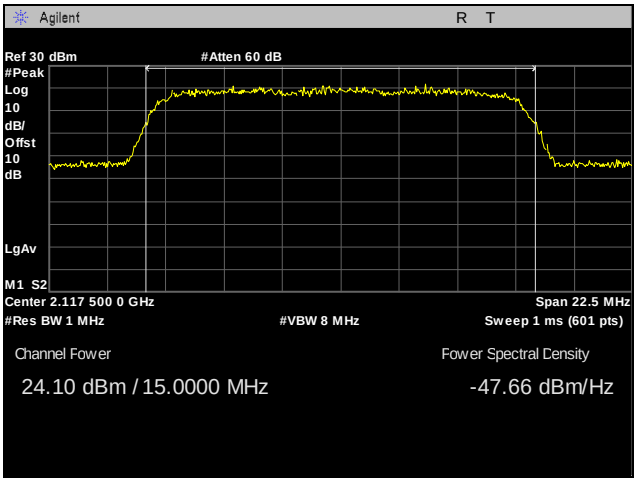


Plot 20. RF Output Power, Mid Channel, Band 4, 15 MHz, 16QAM, Peak, Port 1

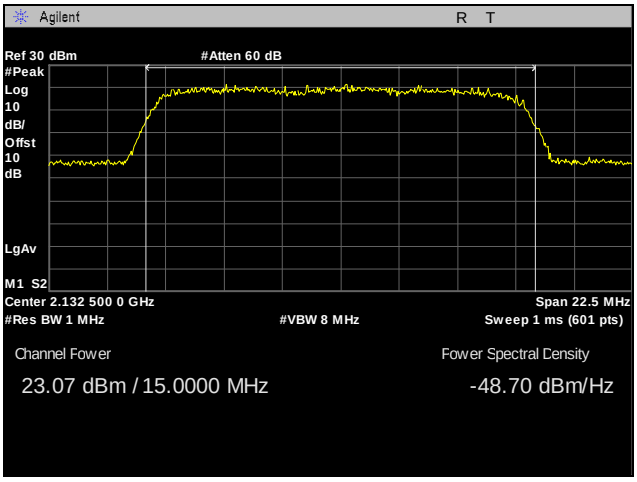


Plot 21. RF Output Power, High Channel, Band 4, 15 MHz, 16QAM, Peak, Port 1

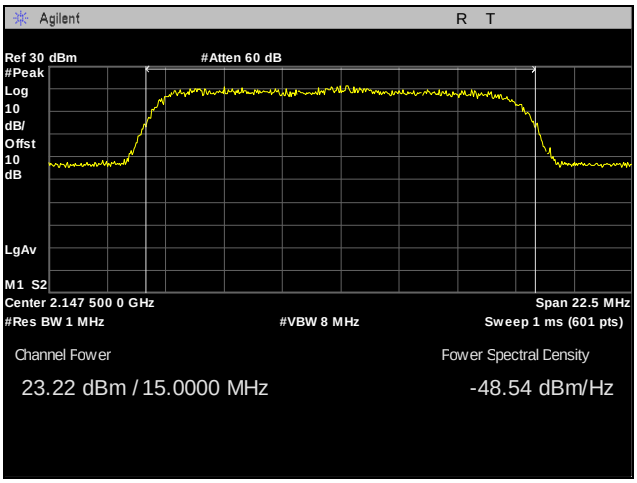
RF Output Power, Band 4, 15 MHz, 64QAM, Peak, Port 1



Plot 22. RF Output Power, Low Channel, Band 4, 15 MHz, 64QAM, Peak, Port 1

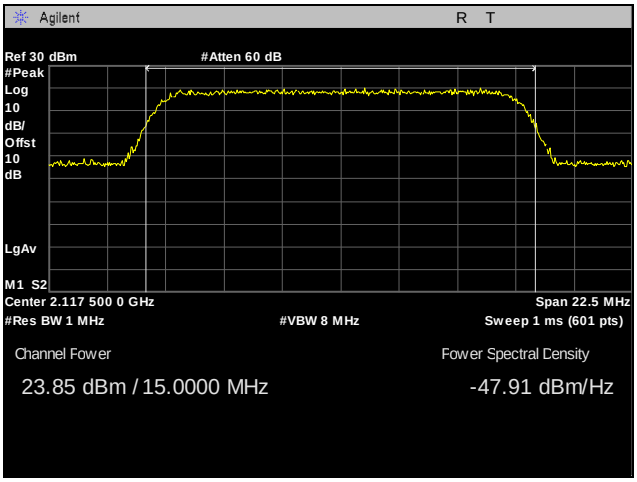


Plot 23. RF Output Power, Mid Channel, Band 4, 15 MHz, 64QAM, Peak, Port 1

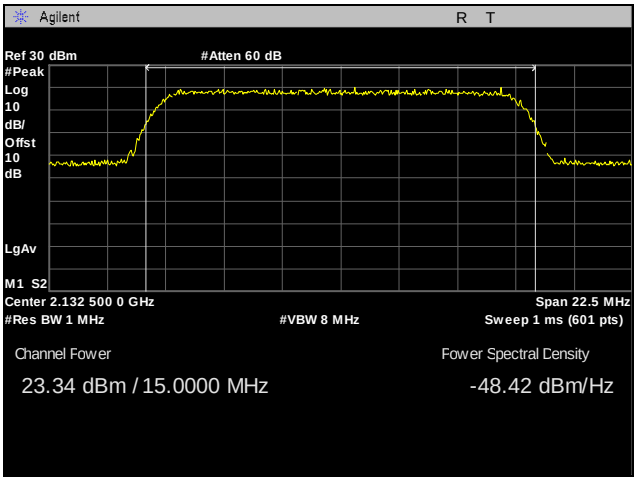


Plot 24. RF Output Power, High Channel, Band 4, 15 MHz, 64QAM, Peak, Port 1

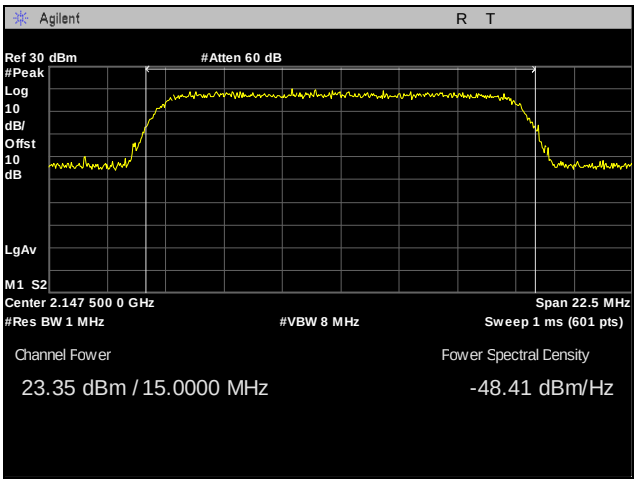
RF Output Power, Band 4, 15 MHz, QPSK, Peak, Port 1



Plot 25. RF Output Power, Low Channel, Band 4, 15 MHz, QPSK, Peak, Port 1

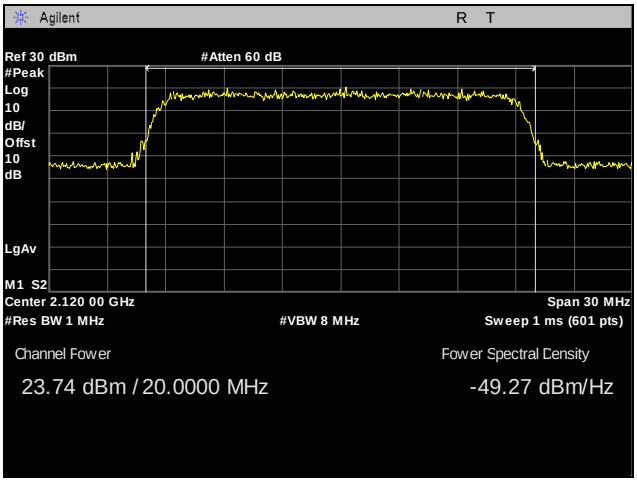


Plot 26. RF Output Power, Mid Channel, Band 4, 15 MHz, QPSK, Peak, Port 1

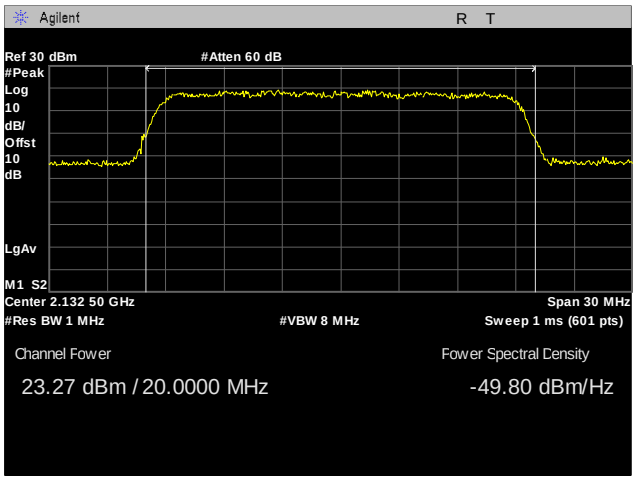


Plot 27. RF Output Power, High Channel, Band 4, 15 MHz, QPSK, Peak, Port 1

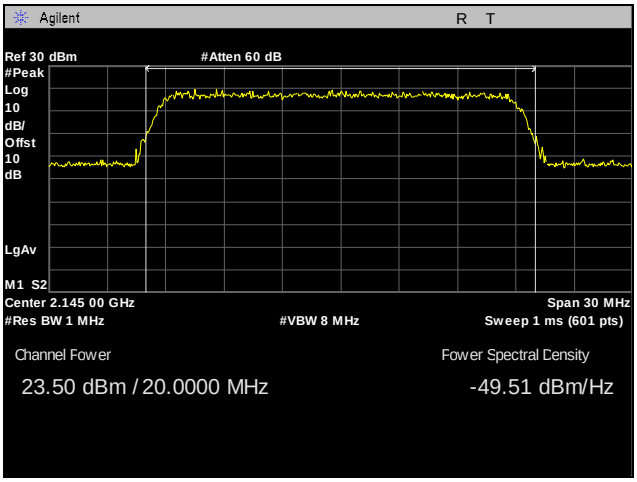
RF Output Power, Band 4, 20 MHz, 16QAM, Peak, Port 1



Plot 28. RF Output Power, Low Channel, Band 4, 20 MHz, 16QAM, Peak, Port 1

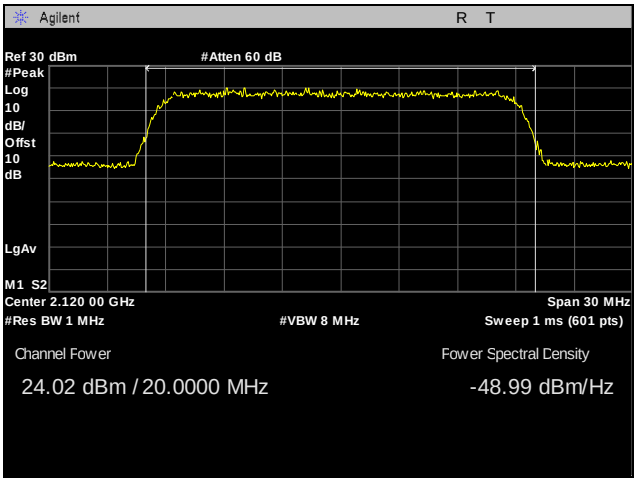


Plot 29. RF Output Power, Mid Channel, Band 4, 20 MHz, 16QAM, Peak, Port 1

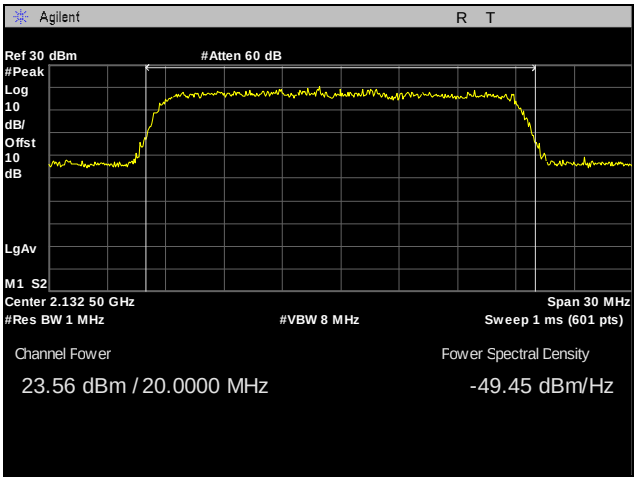


Plot 30. RF Output Power, High Channel, Band 4, 20 MHz, 16QAM, Peak, Port 1

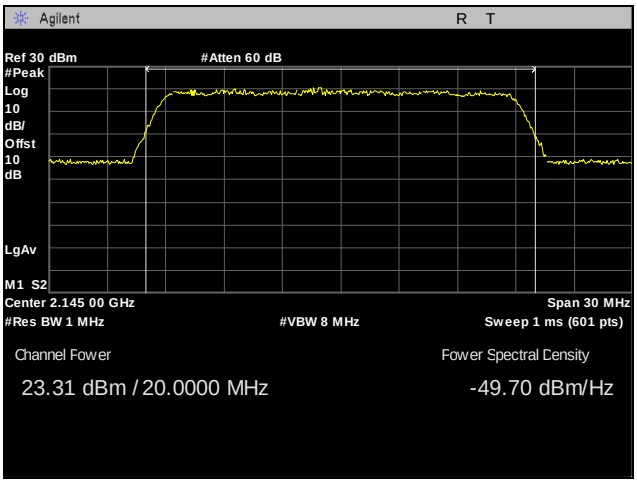
RF Output Power, Band 4, 20 MHz, 64QAM, Peak, Port 1



Plot 31. RF Output Power, Low Channel, Band 4, 20 MHz, 64QAM, Peak, Port 1

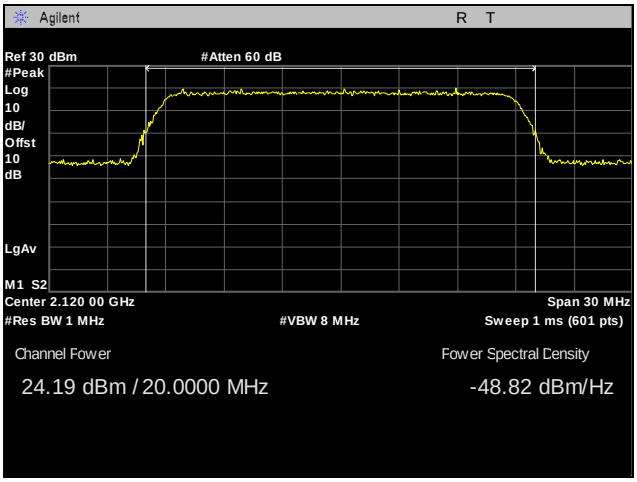


Plot 32. RF Output Power, Mid Channel, Band 4, 20 MHz, 64QAM, Peak, Port 1

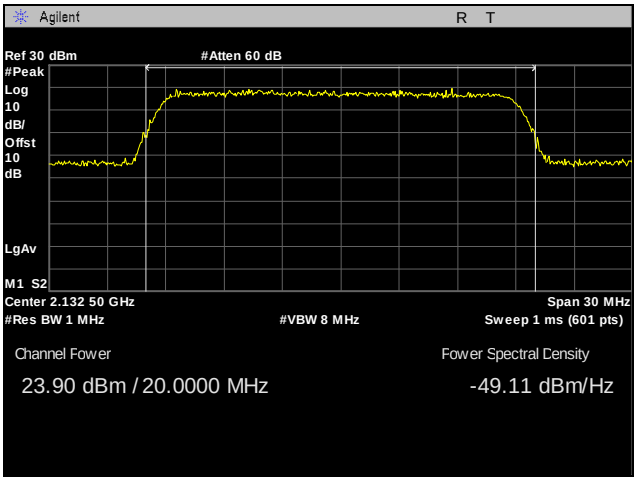


Plot 33. RF Output Power, High Channel, Band 4, 20 MHz, 64QAM, Peak, Port 1

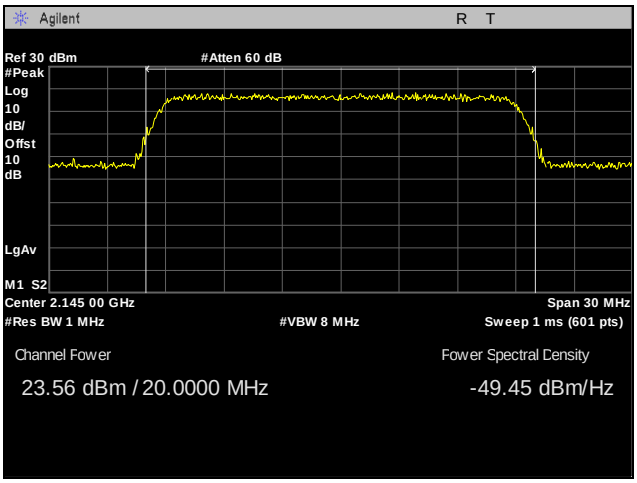
RF Output Power, Band 4, 20 MHz, QPSK, Peak, Port 1



Plot 34. RF Output Power, Low Channel, Band 4, 20 MHz, QPSK, Peak, Port 1

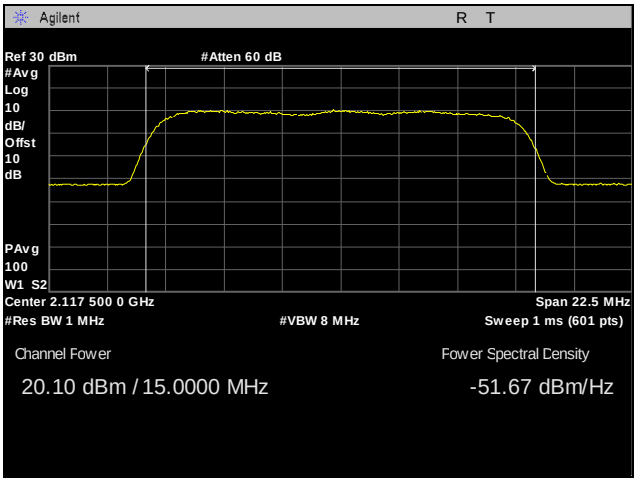


Plot 35. RF Output Power, Mid Channel, Band 4, 20 MHz, QPSK, Peak, Port 1

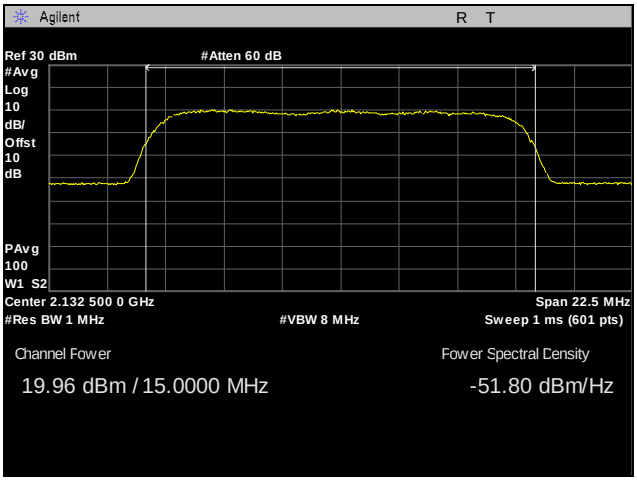


Plot 36. RF Output Power, High Channel, Band 4, 20 MHz, QPSK, Peak, Port 1

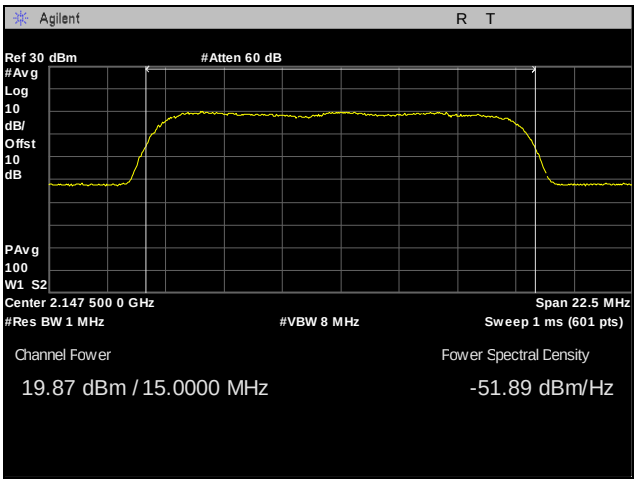
RF Output Power, Band 4, 15 MHz, 16QAM, Average, Port 2



Plot 37. RF Output Power, Low Channel, Band 4, 15 MHz, 16QAM, Average, Port 2

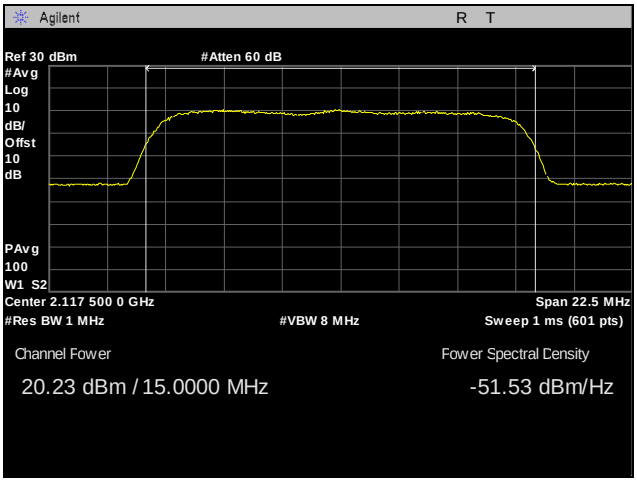


Plot 38. RF Output Power, Mid Channel, Band 4, 15 MHz, 16QAM, Average, Port 2

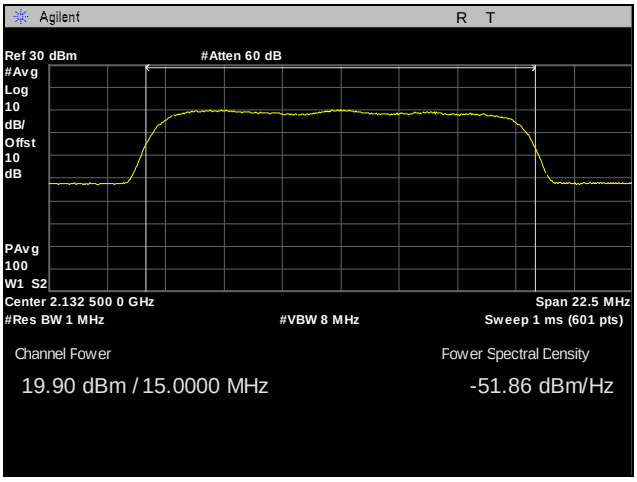


Plot 39. RF Output Power, High Channel, Band 4, 15 MHz, 16QAM, Average, Port 2

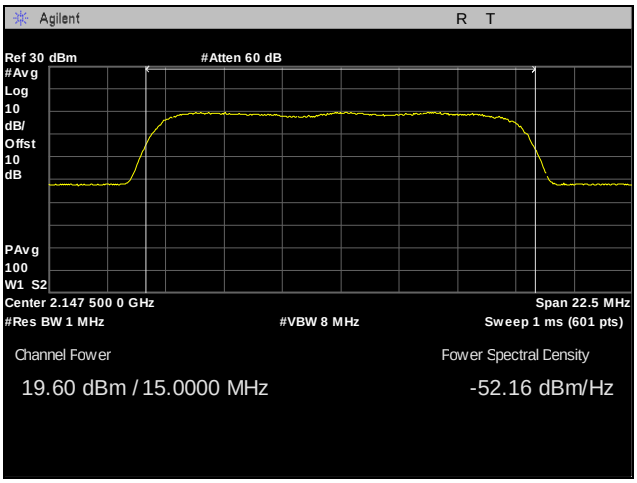
RF Output Power, Band 4, 15 MHz, 64QAM, Average, Port 2



Plot 40. RF Output Power, Low Channel, Band 4, 15 MHz, 64QAM, Average, Port 2

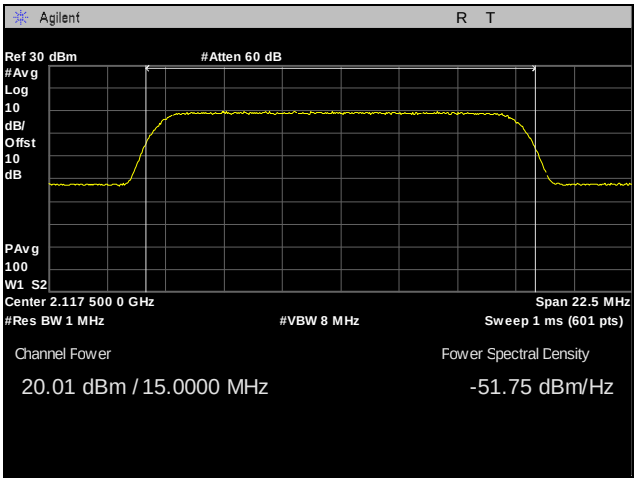


Plot 41. RF Output Power, Mid Channel, Band 4, 15 MHz, 64QAM, Average, Port 2

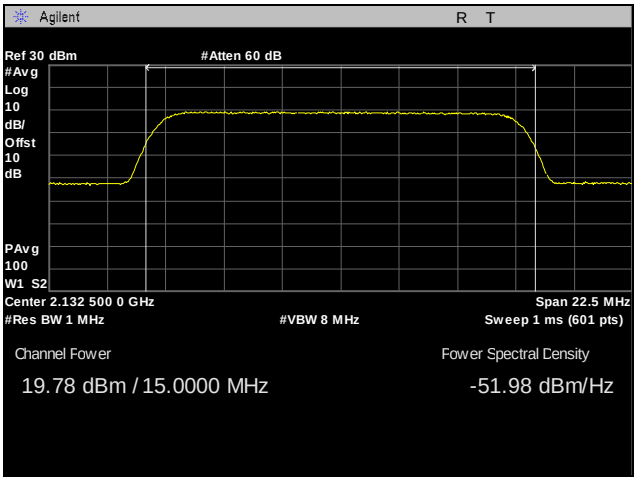


Plot 42. RF Output Power, High Channel, Band 4, 15 MHz, 64QAM, Average, Port 2

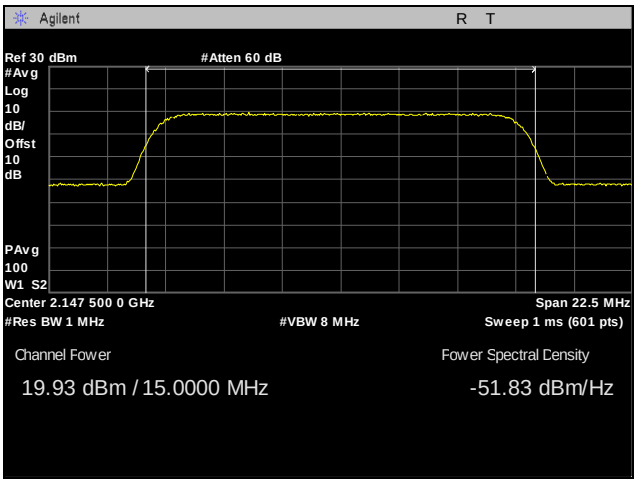
RF Output Power, Band 4, 15 MHz, QPSK, Average, Port 2



Plot 43. RF Output Power, Low Channel, Band 4, 15 MHz, QPSK, Average, Port 2

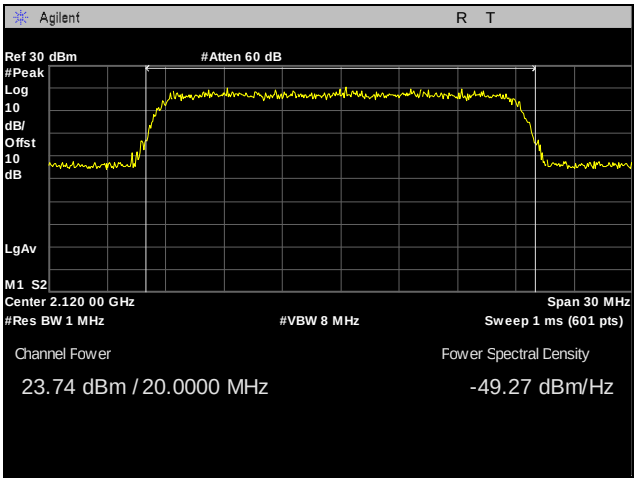


Plot 44. RF Output Power, Mid Channel, Band 4, 15 MHz, QPSK, Average, Port 2

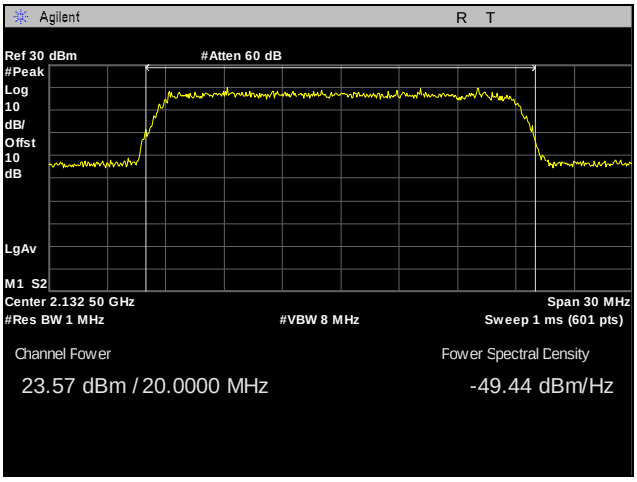


Plot 45. RF Output Power, High Channel, Band 4, 15 MHz, QPSK, Average, Port 2

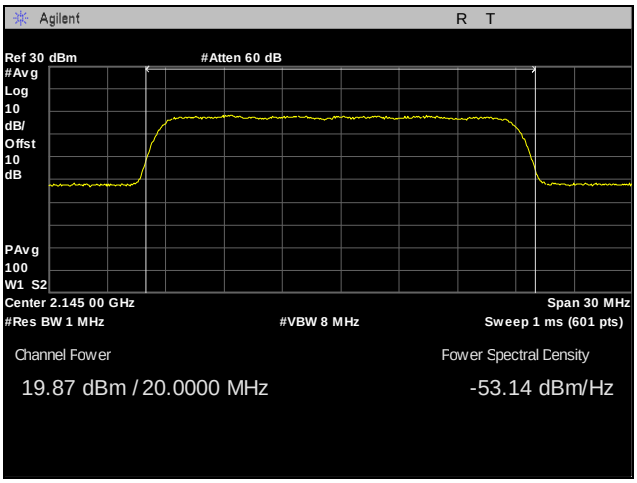
RF Output Power, Band 4, 20 MHz, 16QAM, Average, Port 2



Plot 46. RF Output Power, Low Channel, Band 4, 20 MHz, 16QAM, Average, Port 2

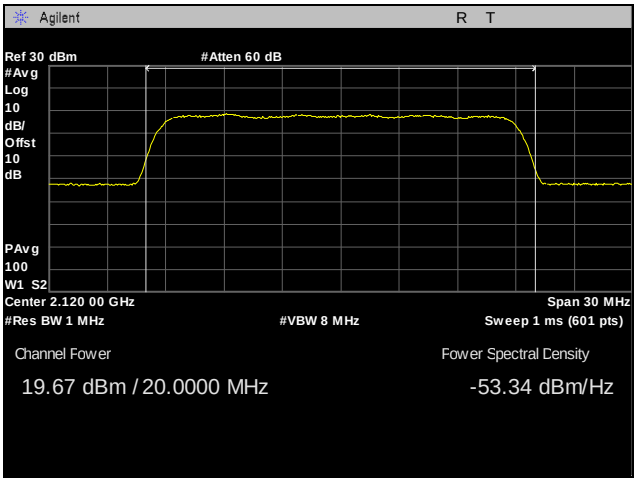


Plot 47. RF Output Power, Mid Channel, Band 4, 20 MHz, 16QAM, Average, Port 2

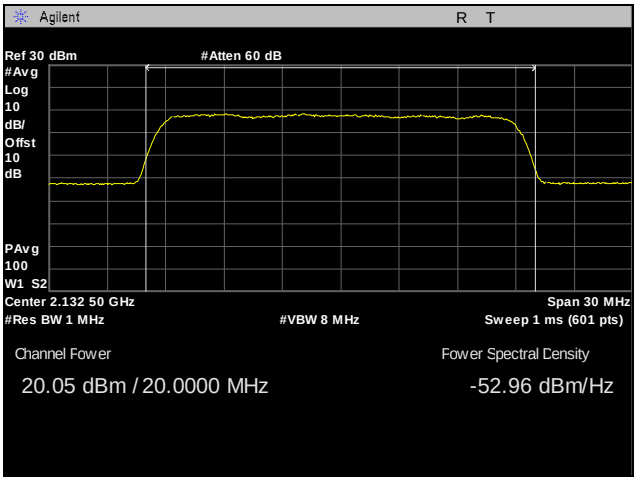


Plot 48. RF Output Power, High Channel, Band 4, 20 MHz, 16QAM, Average, Port 2

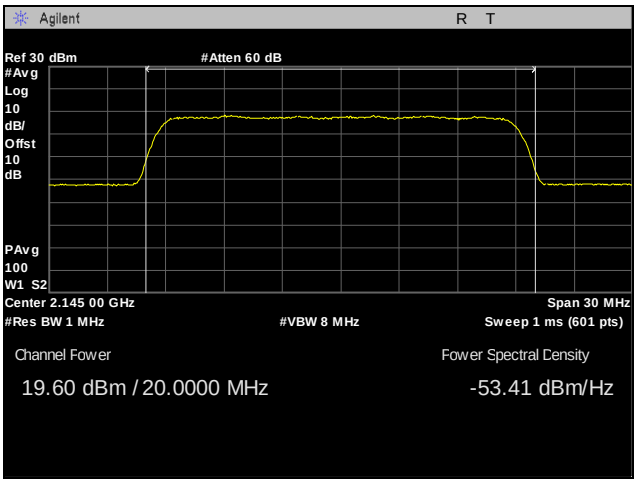
RF Output Power, Band 4, 20 MHz, 64QAM, Average, Port 2



Plot 49. RF Output Power, Low Channel, Band 4, 20 MHz, 64QAM, Average, Port 2

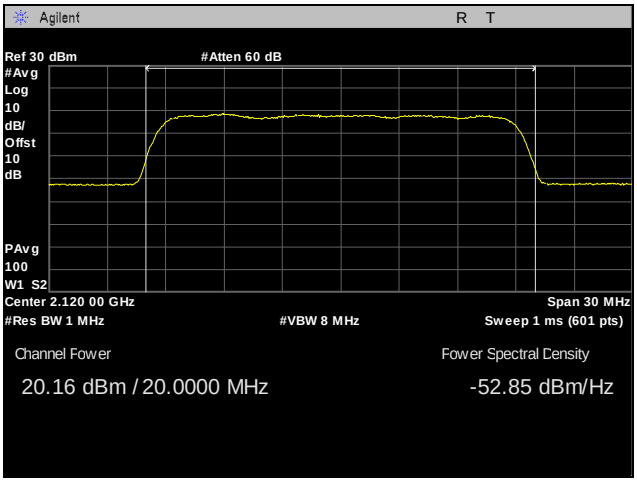


Plot 50. RF Output Power, Mid Channel, Band 4, 20 MHz, 64QAM, Average, Port 2

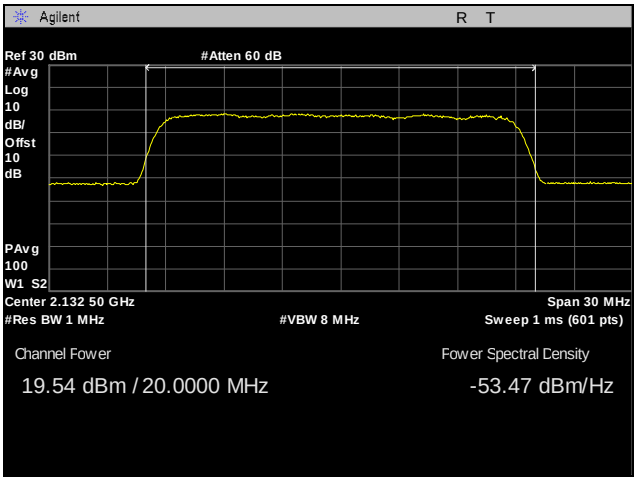


Plot 51. RF Output Power, High Channel, Band 4, 20 MHz, 64QAM, Average, Port 2

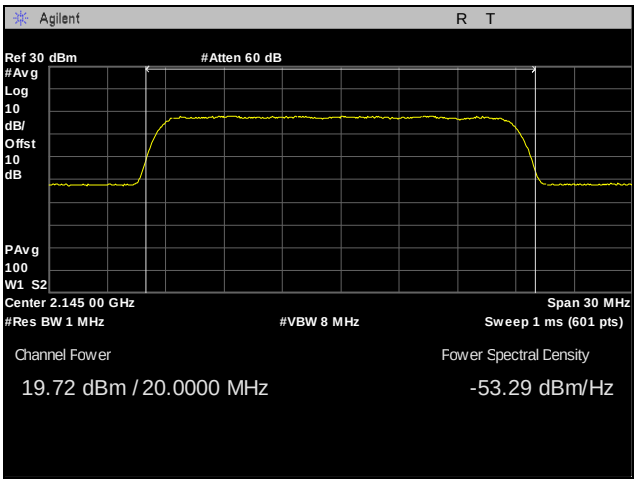
RF Output Power, Band 4, 20 MHz, QPSK, Average, Port 2



Plot 52. RF Output Power, Low Channel, Band 4, 20 MHz, QPSK, Average, Port 2

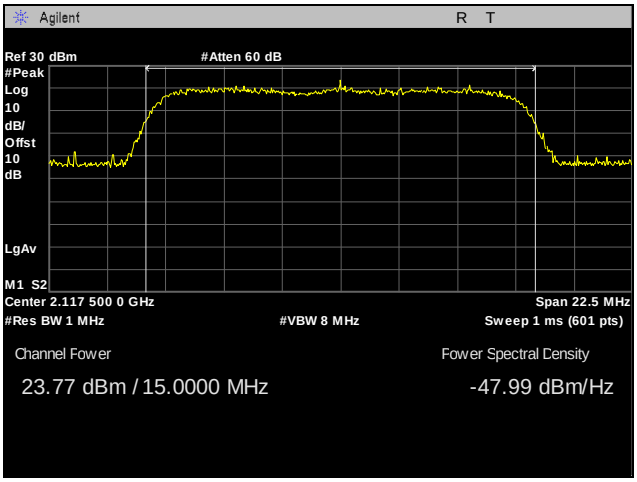


Plot 53. RF Output Power, Mid Channel, Band 4, 20 MHz, QPSK, Average, Port 2

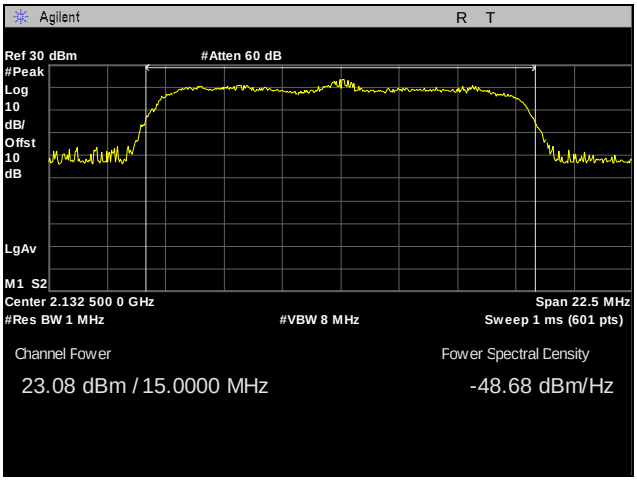


Plot 54. RF Output Power, High Channel, Band 4, 20 MHz, QPSK, Average, Port 2

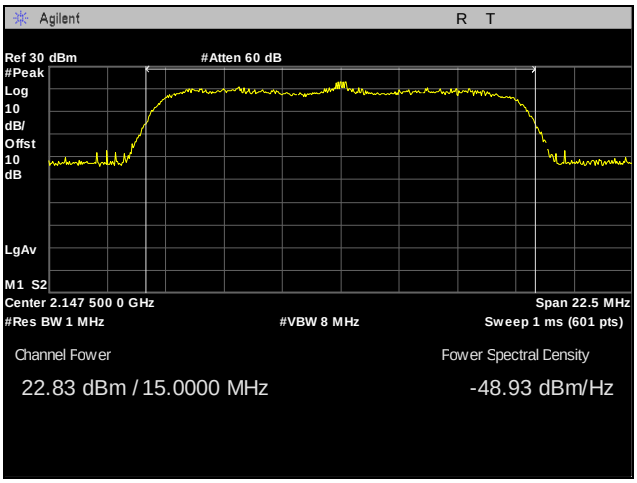
RF Output Power, Band 4, 15 MHz, 16QAM, Peak, Port 2



Plot 55. RF Output Power, Low Channel, Band 4, 15 MHz, 16QAM, Peak, Port 2

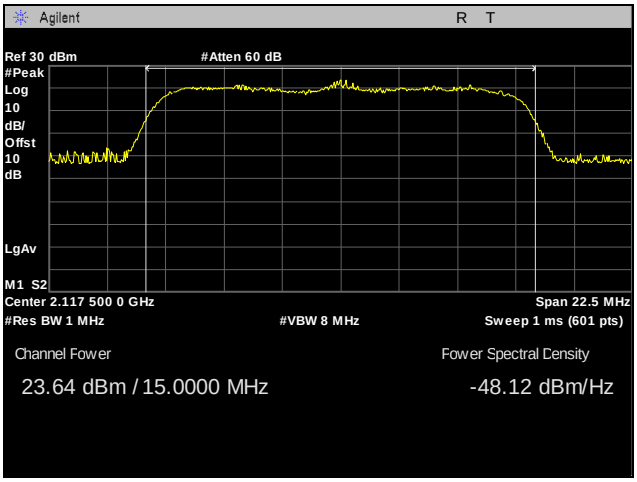


Plot 56. RF Output Power, Mid Channel, Band 4, 15 MHz, 16QAM, Peak, Port 2

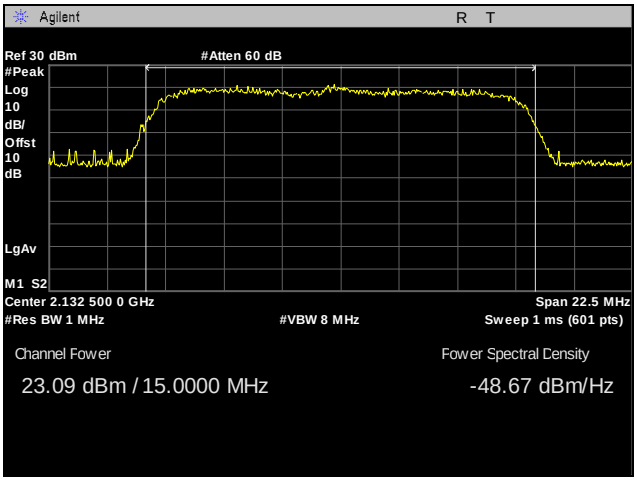


Plot 57. RF Output Power, High Channel, Band 4, 15 MHz, 16QAM, Peak, Port 2

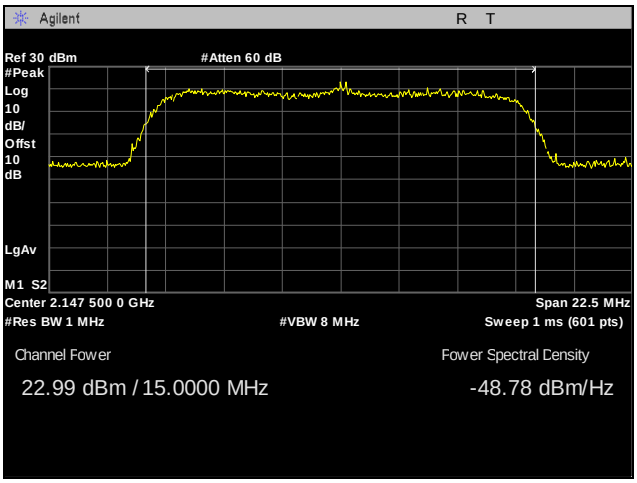
RF Output Power, Band 4, 15 MHz, 64QAM, Peak, Port 2



Plot 58. RF Output Power, Low Channel, Band 4, 15 MHz, 64QAM, Peak, Port 2

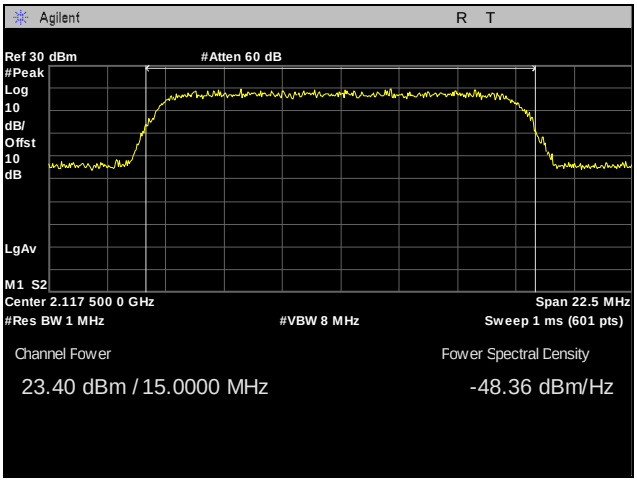


Plot 59. RF Output Power, Mid Channel, Band 4, 15 MHz, 64QAM, Peak, Port 2

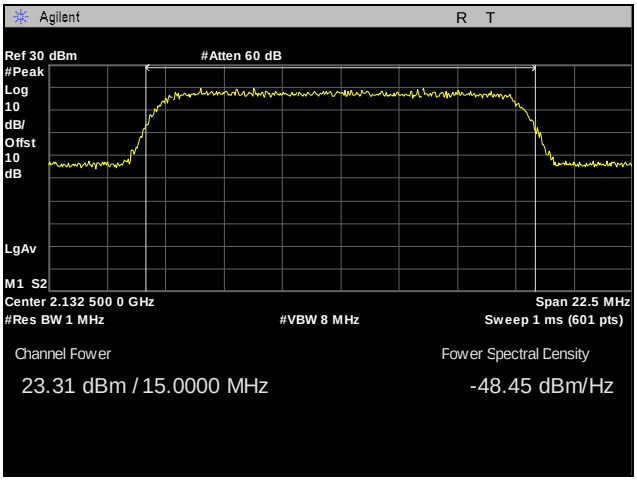


Plot 60. RF Output Power, High Channel, Band 4, 15 MHz, 64QAM, Peak, Port 2

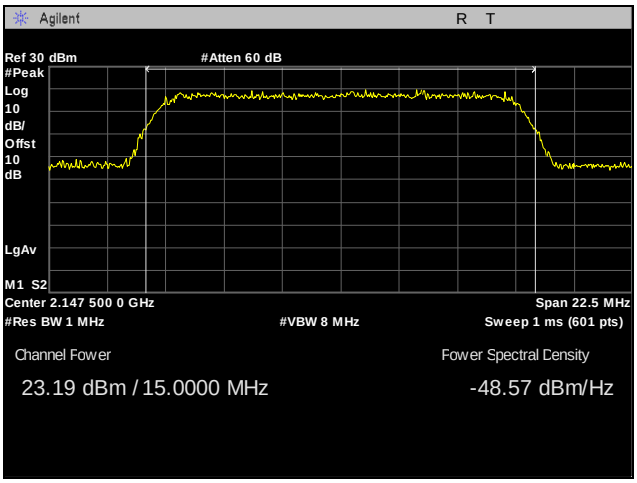
RF Output Power, Band 4, 15 MHz, QPSK, Peak, Port 2



Plot 61. RF Output Power, Low Channel, Band 4, 15 MHz, QPSK, Peak, Port 2

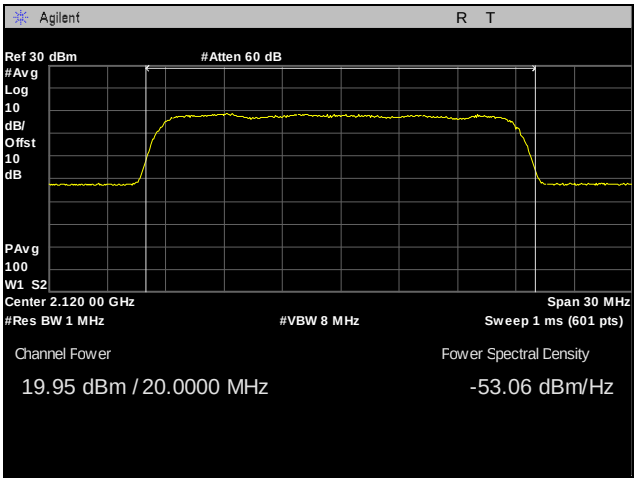


Plot 62. RF Output Power, Mid Channel, Band 4, 15 MHz, QPSK, Peak, Port 2

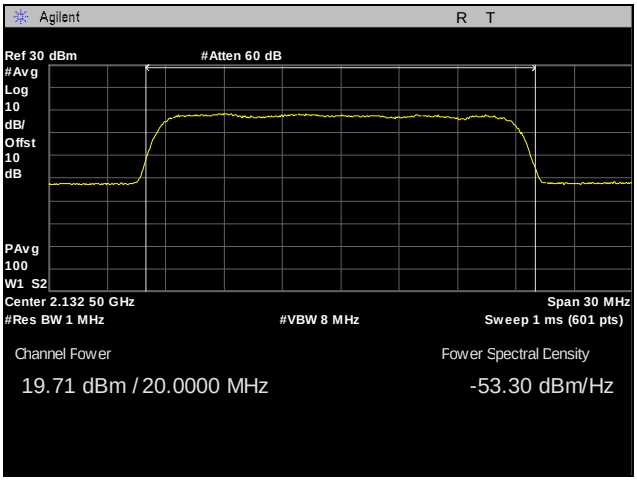


Plot 63. RF Output Power, High Channel, Band 4, 15 MHz, QPSK, Peak, Port 2

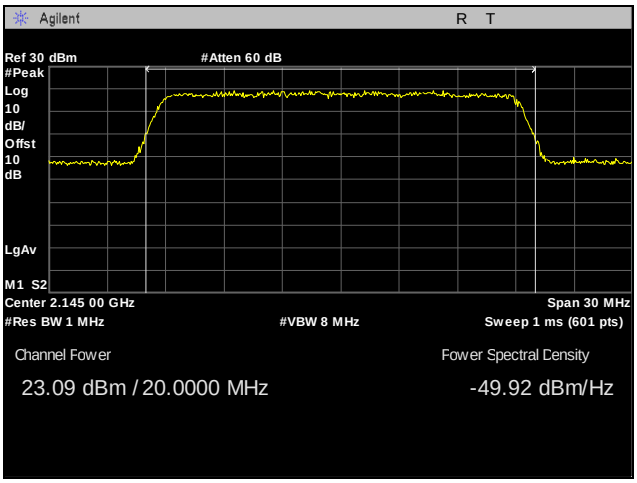
RF Output Power, Band 4, 20 MHz, 16QAM, Peak, Port 2



Plot 64. RF Output Power, Low Channel, Band 4, 20 MHz, 16QAM, Peak, Port 2

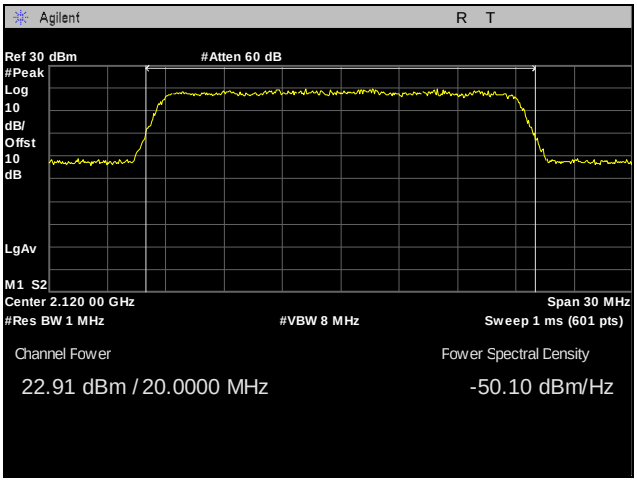


Plot 65. RF Output Power, Mid Channel, Band 4, 20 MHz, 16QAM, Peak, Port 2

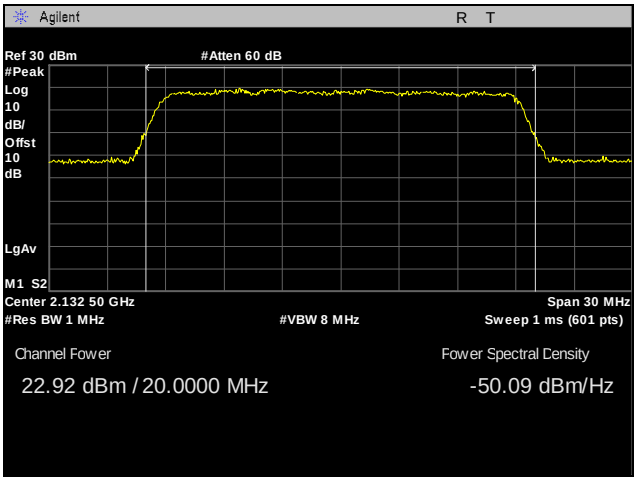


Plot 66. RF Output Power, High Channel, Band 4, 20 MHz, 16QAM, Peak, Port 2

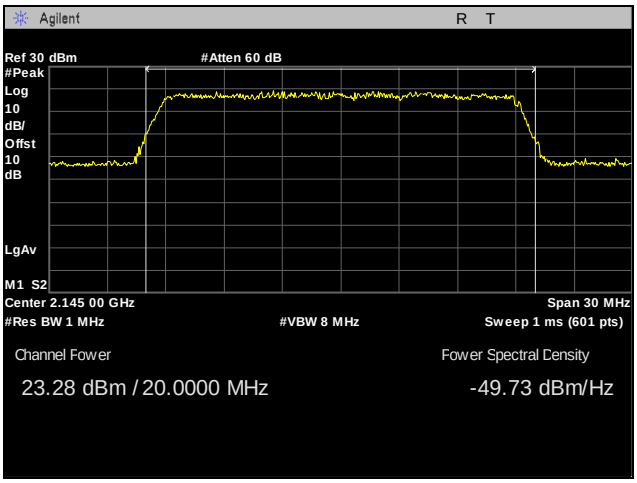
RF Output Power, Band 4, 20 MHz, 64QAM, Peak, Port 2



Plot 67. RF Output Power, Low Channel, Band 4, 20 MHz, 64QAM, Peak, Port 2

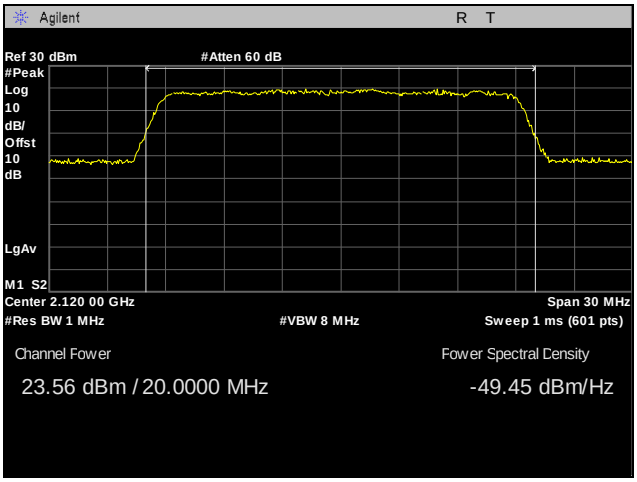


Plot 68. RF Output Power, Mid Channel, Band 4, 20 MHz, 64QAM, Peak, Port 2

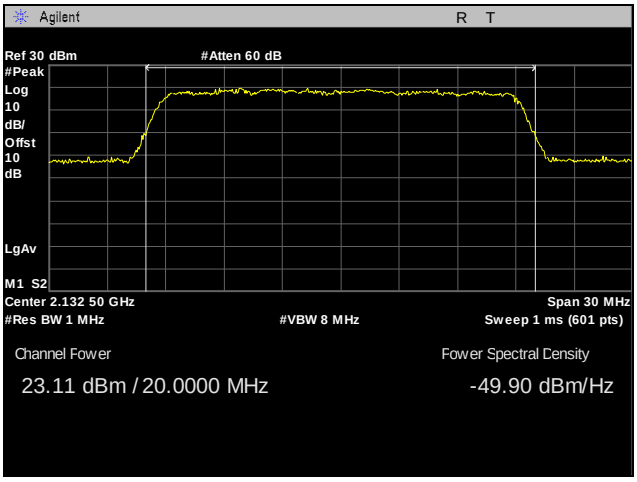


Plot 69. RF Output Power, High Channel, Band 4, 20 MHz, 64QAM, Peak, Port 2

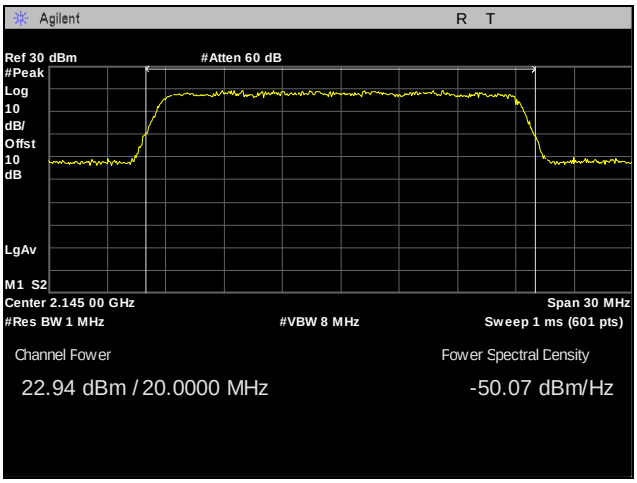
RF Output Power, Band 4, 20 MHz, QPSK, Peak, Port 2



Plot 70. RF Output Power, Low Channel, Band 4, 20 MHz, QPSK, Peak, Port 2

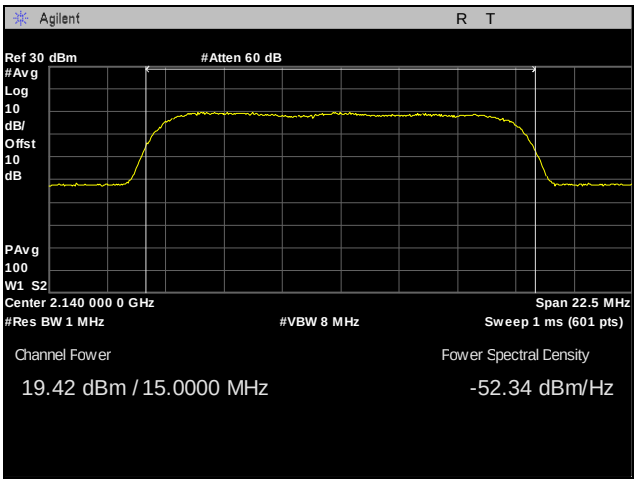


Plot 71. RF Output Power, Mid Channel, Band 4, 20 MHz, QPSK, Peak, Port 2

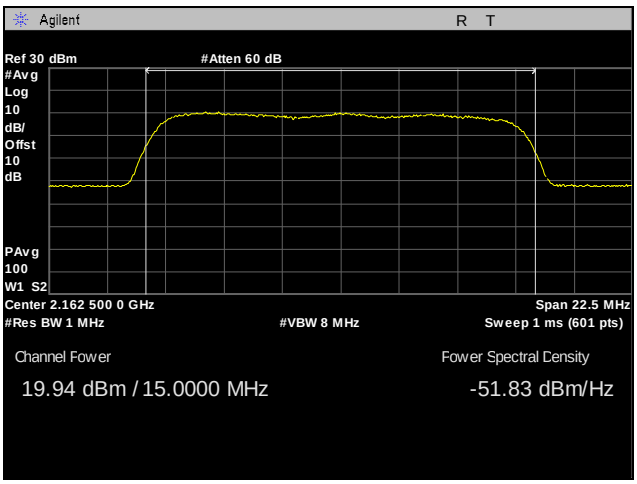


Plot 72. RF Output Power, High Channel, Band 4, 20 MHz, QPSK, Peak, Port 2

RF Output Power, Band 10, 15 MHz, 16QAM, Average, Port 1

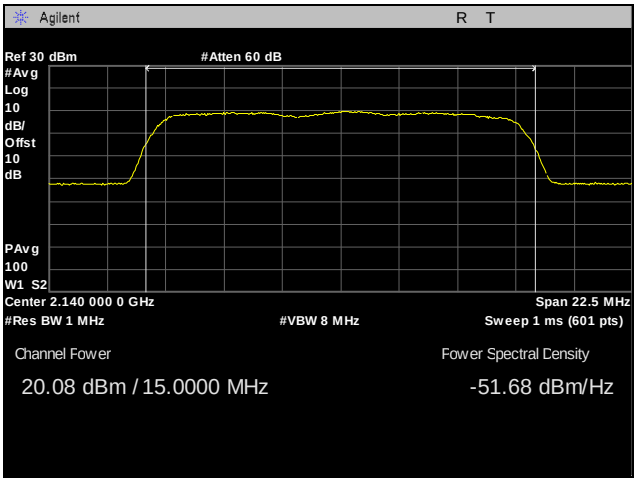


Plot 73. RF Output Power, Mid Channel, Band 10, 15 MHz, 16QAM, Average, Port 1

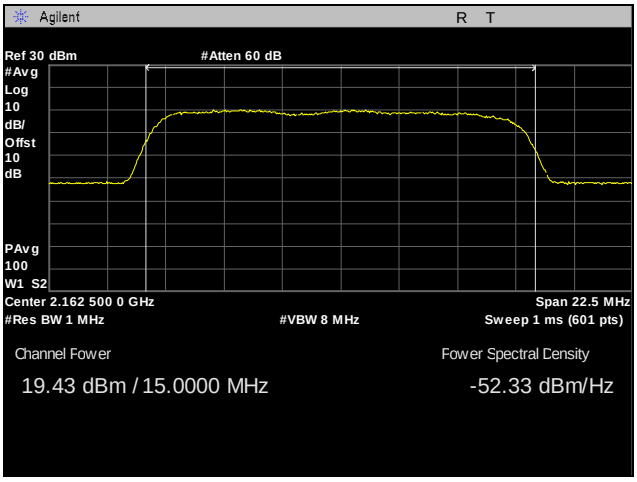


Plot 74. RF Output Power, High Channel, Band 10, 15 MHz, 16QAM, Average, Port 1

RF Output Power, Band 10, 15 MHz, 64QAM, Average, Port 1

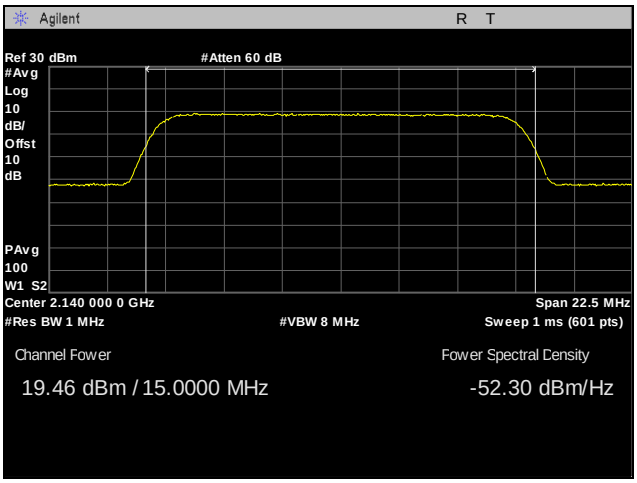


Plot 75. RF Output Power, Mid Channel, Band 10, 15 MHz, 64QAM, Average, Port 1

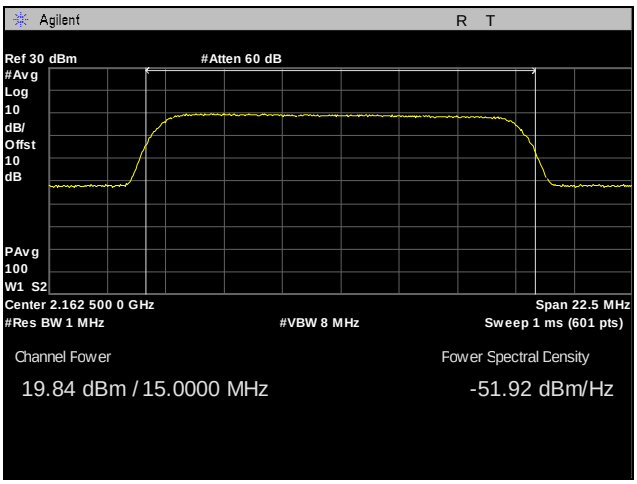


Plot 76. RF Output Power, High Channel, Band 10, 15 MHz, 64QAM, Average, Port 1

RF Output Power, Band 10, 15 MHz, QPSK, Average, Port 1

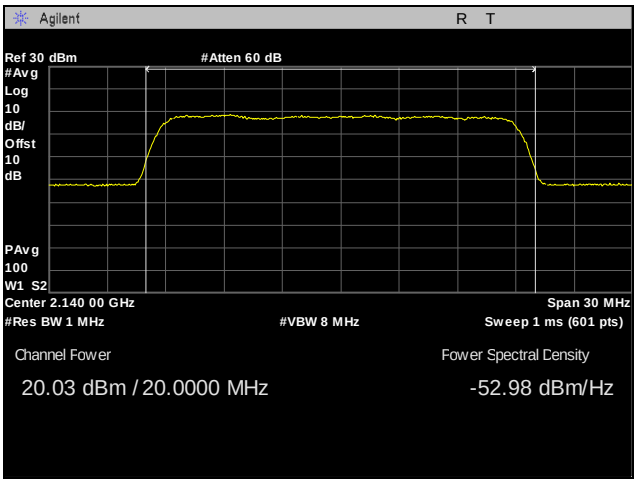


Plot 77. RF Output Power, Mid Channel, Band 10, 15 MHz, QPSK, Average, Port 1

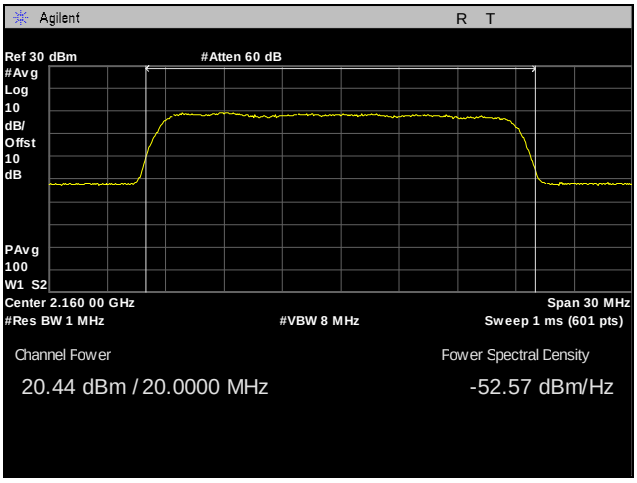


Plot 78. RF Output Power, High Channel, Band 10, 15 MHz, QPSK, Average, Port 1

RF Output Power, Band 10, 20 MHz, 16QAM, Average, Port 1

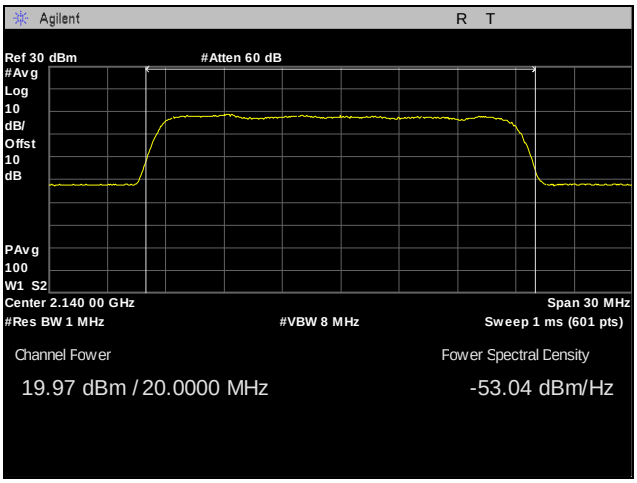


Plot 79. RF Output Power, Mid Channel, Band 10, 20 MHz, 16QAM, Average, Port 1

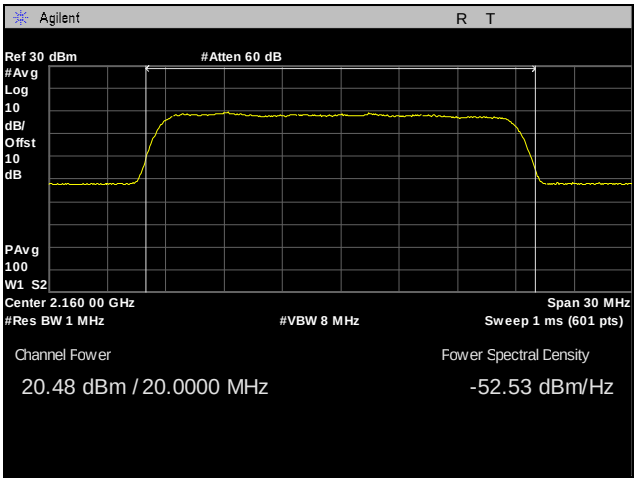


Plot 80. RF Output Power, High Channel, Band 10, 20 MHz, 16QAM, Average, Port 1

RF Output Power, Band 10, 20 MHz, 64QAM, Average, Port 1

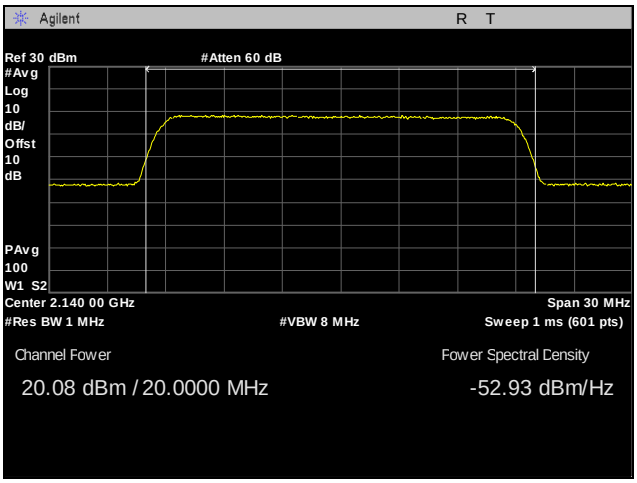


Plot 81. RF Output Power, Mid Channel, Band 10, 20 MHz, 64QAM, Average, Port 1

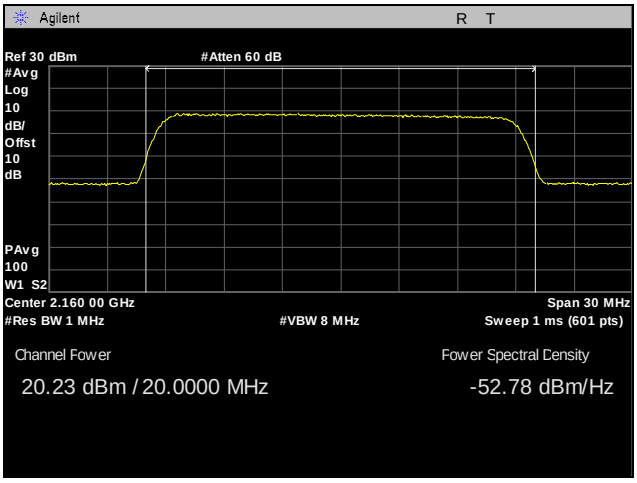


Plot 82. RF Output Power, High Channel, Band 10, 20 MHz, 64QAM, Average, Port 1

RF Output Power, Band 10, 20 MHz, QPSK, Average, Port 1

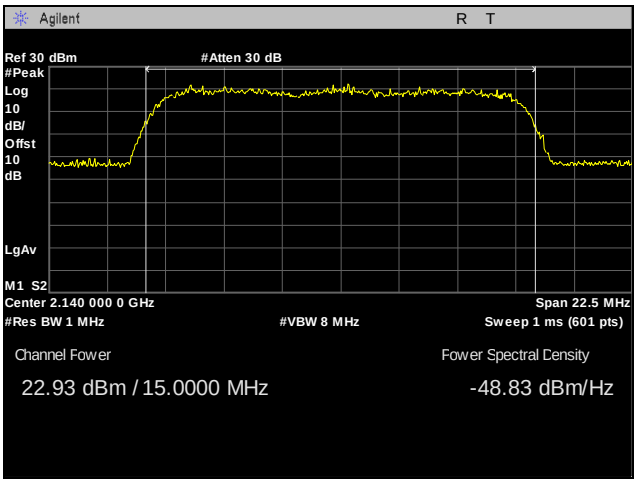


Plot 83. RF Output Power, Mid Channel, Band 10, 20 MHz, QPSK, Average, Port 1

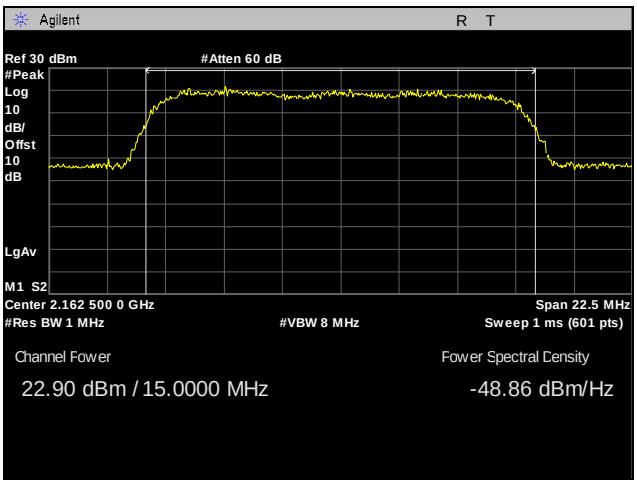


Plot 84. RF Output Power, High Channel, Band 10, 20 MHz, QPSK, Average, Port 1

RF Output Power, Band 10, 15 MHz, 16QAM, Peak, Port 1

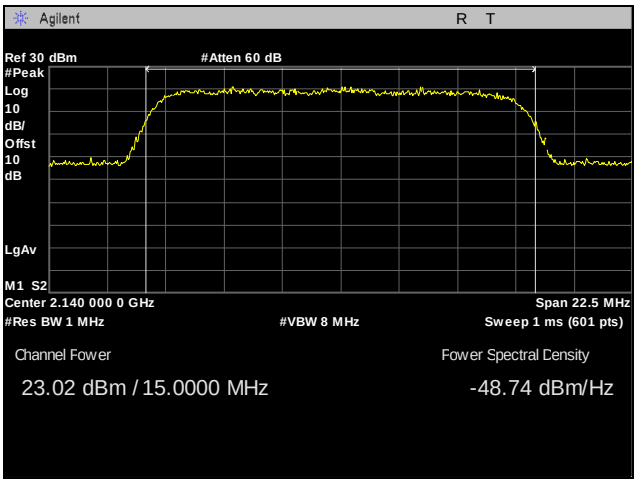


Plot 85. RF Output Power, Mid Channel, Band 10, 15 MHz, 16QAM, Peak, Port 1

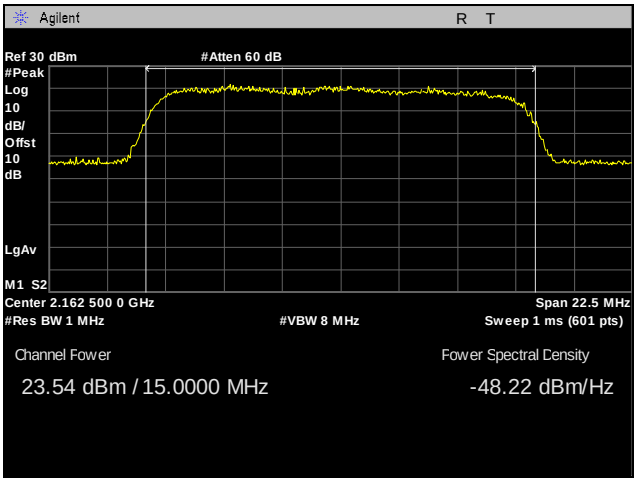


Plot 86. RF Output Power, High Channel, Band 10, 15 MHz, 16QAM, Peak, Port 1

RF Output Power, Band 10, 15 MHz, 64QAM, Peak, Port 1

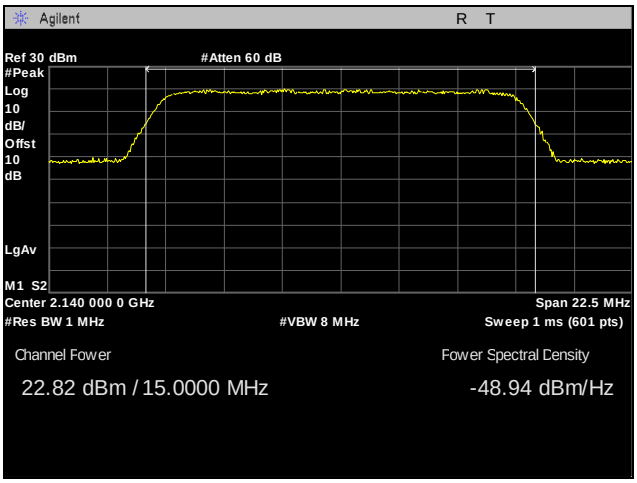


Plot 87. RF Output Power, Mid Channel, Band 10, 15 MHz, 64QAM, Peak, Port 1

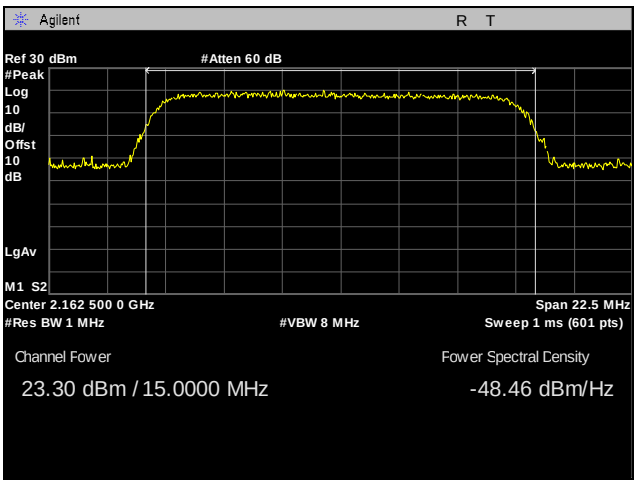


Plot 88. RF Output Power, High Channel, Band 10, 15 MHz, 64QAM, Peak, Port 1

RF Output Power, Band 10, 15 MHz, QPSK, Peak, Port 1

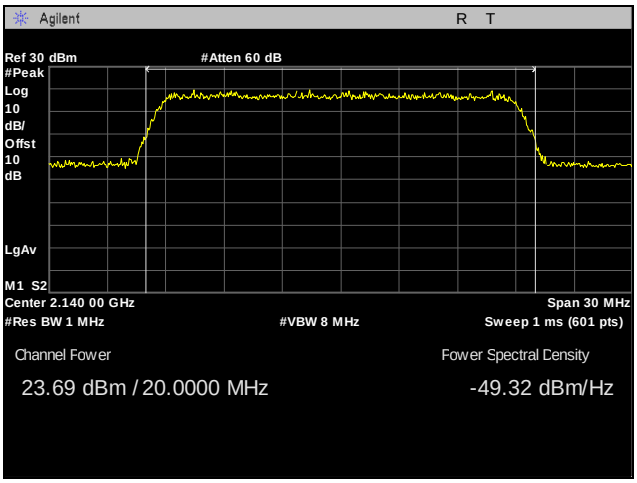


Plot 89. RF Output Power, Mid Channel, Band 10, 15 MHz, QPSK, Peak, Port 1

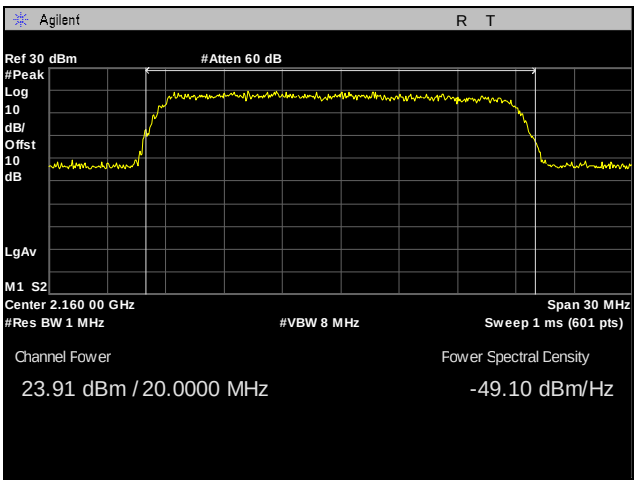


Plot 90. RF Output Power, High Channel, Band 10, 15 MHz, QPSK, Peak, Port 1

RF Output Power, Band 10, 20 MHz, 16QAM, Peak, Port 1

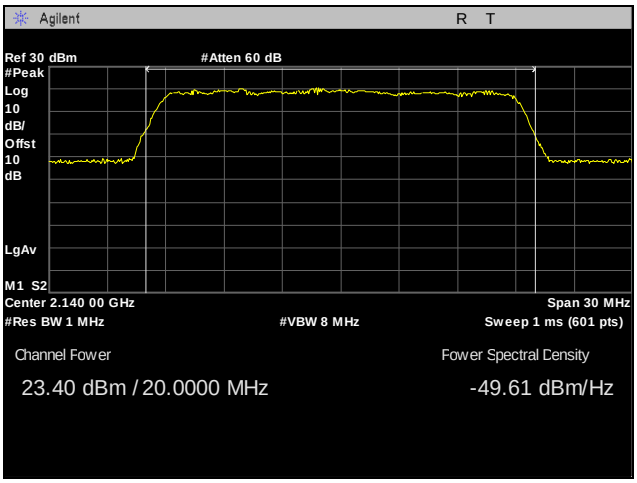


Plot 91. RF Output Power, Mid Channel, Band 10, 20 MHz, 16QAM, Peak, Port 1

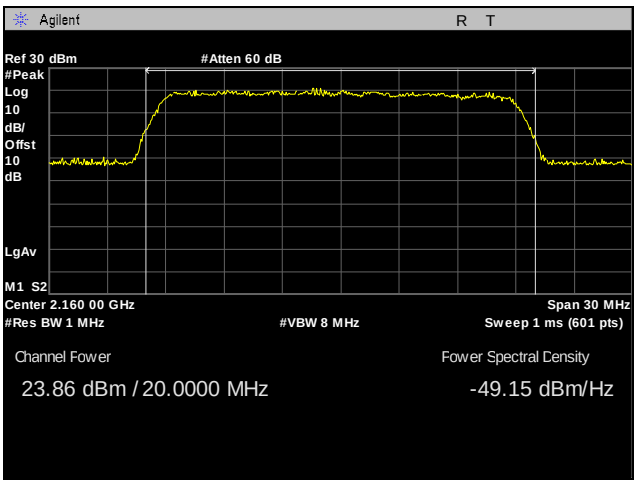


Plot 92. RF Output Power, High Channel, Band 10, 20 MHz, 16QAM, Peak, Port 1

RF Output Power, Band 10, 20 MHz, 64QAM, Peak, Port 1

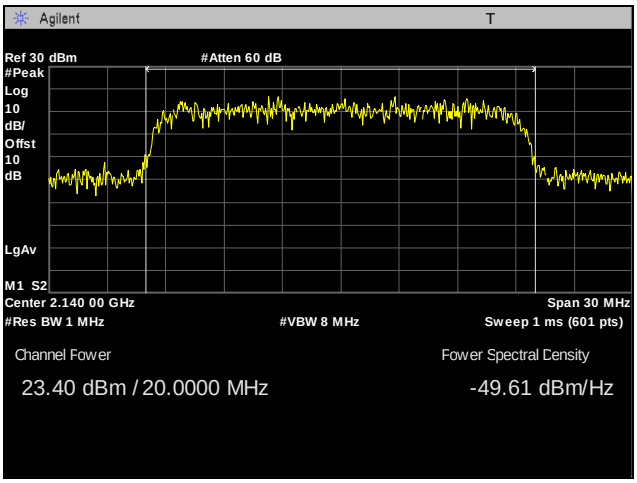


Plot 93. RF Output Power, Mid Channel, Band 10, 20 MHz, 64QAM, Peak, Port 1

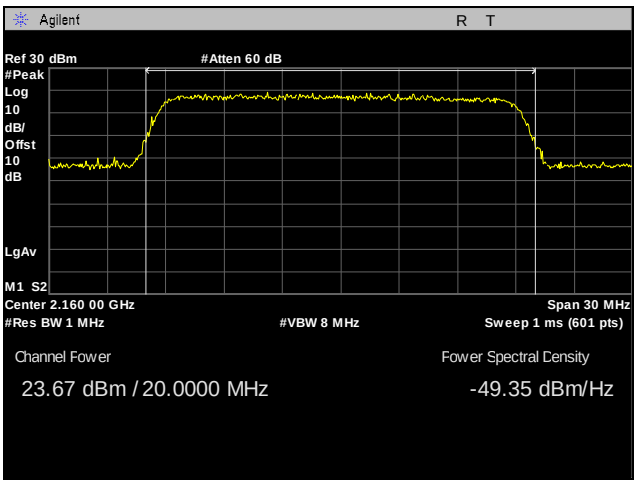


Plot 94. RF Output Power, High Channel, Band 10, 20 MHz, 64QAM, Peak, Port 1

RF Output Power, Band 10, 20 MHz, QPSK, Peak, Port 1

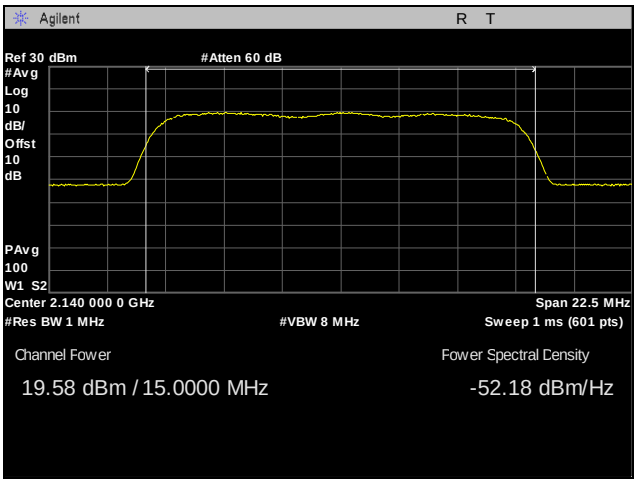


Plot 95. RF Output Power, Mid Channel, Band 10, 20 MHz, QPSK, Peak, Port 1

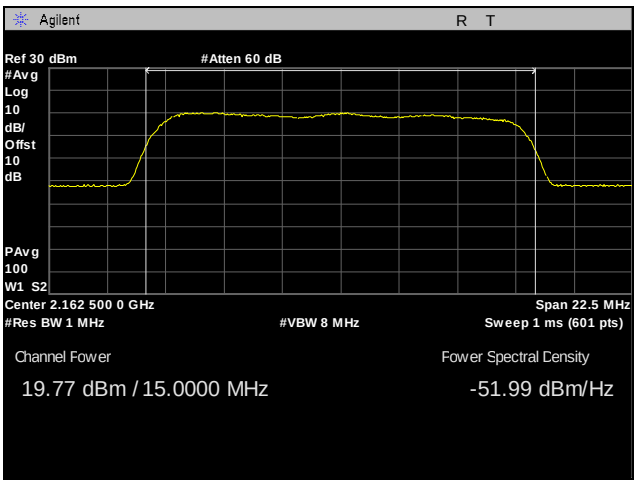


Plot 96. RF Output Power, High Channel, Band 10, 20 MHz, QPSK, Peak, Port 1

RF Output Power, Band 10, 15 MHz, 16QAM, Average, Port 2

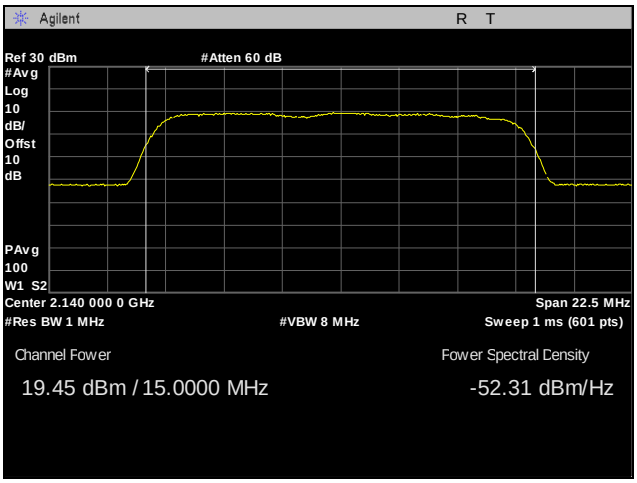


Plot 97. RF Output Power, Mid Channel, Band 10, 15 MHz, 16QAM, Average, Port 2

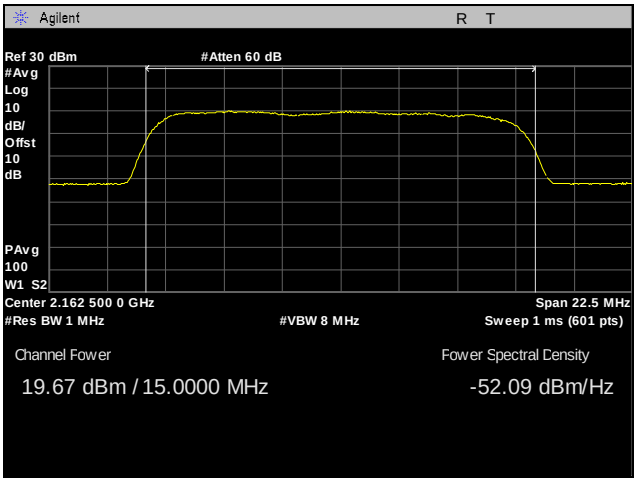


Plot 98. RF Output Power, High Channel, Band 10, 15 MHz, 16QAM, Average, Port 2

RF Output Power, Band 10, 15 MHz, 64QAM, Average, Port 2

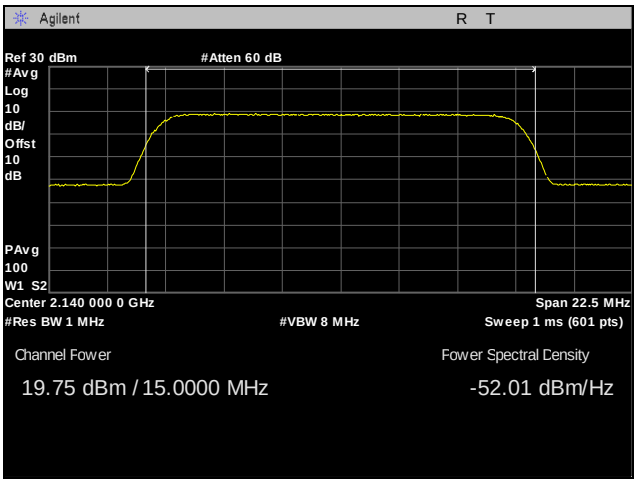


Plot 99. RF Output Power, Mid Channel, Band 10, 15 MHz, 64QAM, Average, Port 2

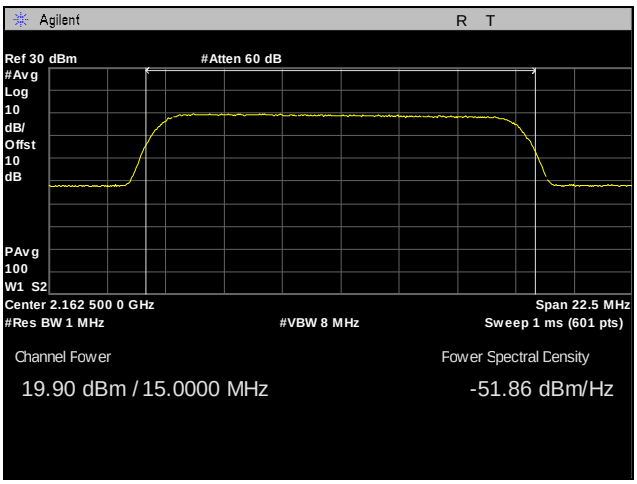


Plot 100. RF Output Power, High Channel, Band 10, 15 MHz, 64QAM, Average, Port 2

RF Output Power, Band 10, 15 MHz, QPSK, Average, Port 2

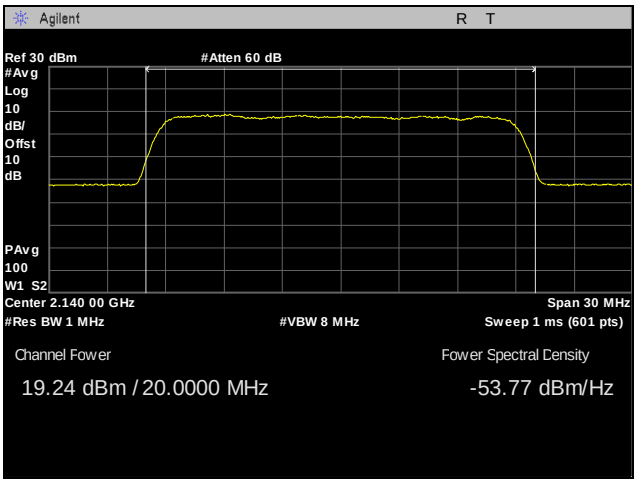


Plot 101. RF Output Power, Mid Channel, Band 10, 15 MHz, QPSK, Average, Port 2

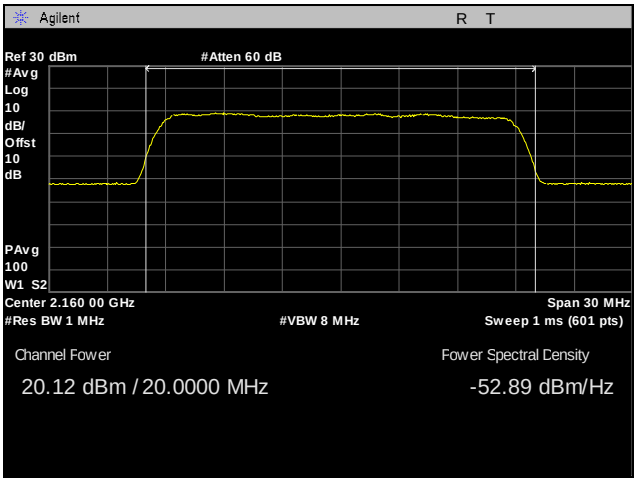


Plot 102. RF Output Power, High Channel, Band 10, 15 MHz, QPSK, Average, Port 2

RF Output Power, Band 10, 20 MHz, 16QAM, Average, Port 2

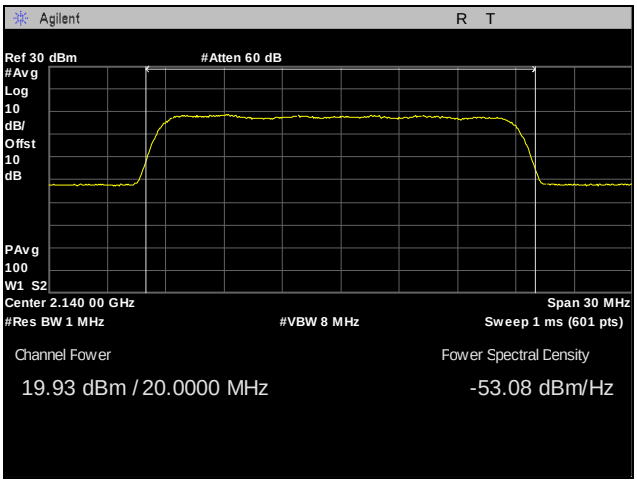


Plot 103. RF Output Power, Mid Channel, Band 10, 20 MHz, 16QAM, Average, Port 2

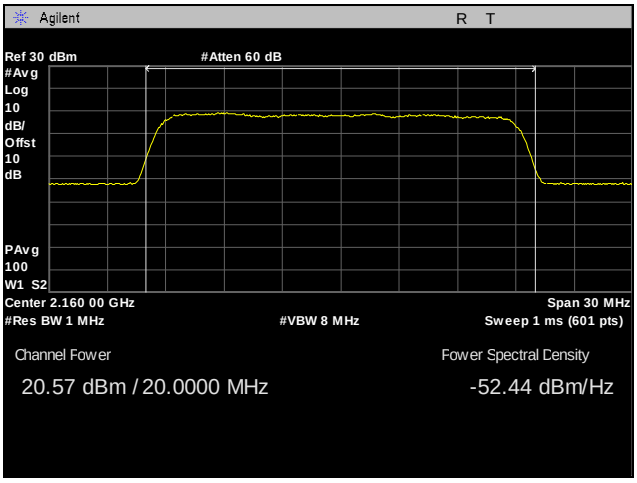


Plot 104. RF Output Power, High Channel, Band 10, 20 MHz, 16QAM, Average, Port 2

RF Output Power, Band 10, 20 MHz, 64QAM, Average, Port 2

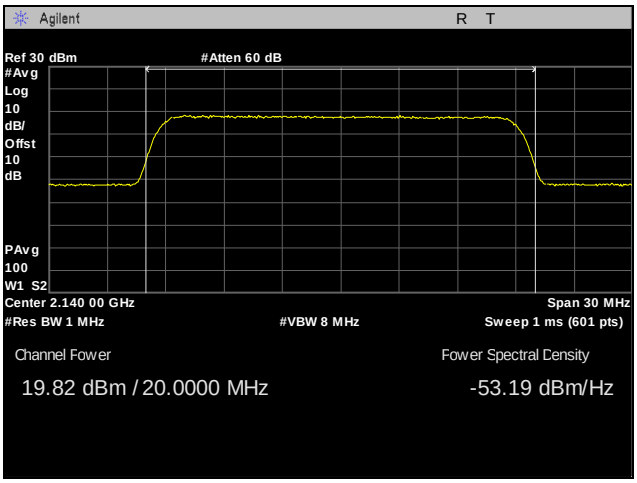


Plot 105. RF Output Power, Mid Channel, Band 10, 20 MHz, 64QAM, Average, Port 2

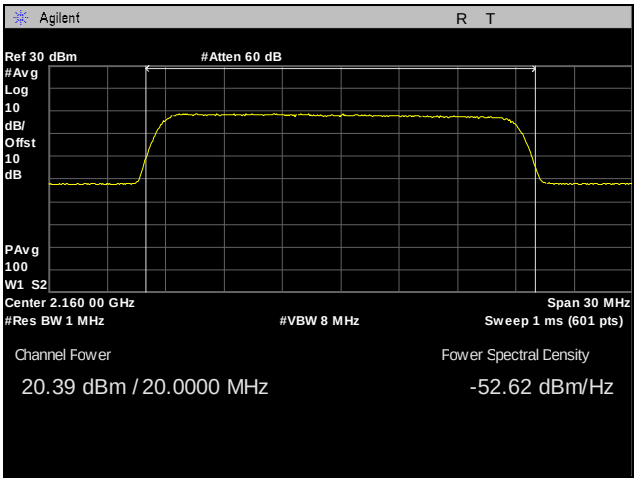


Plot 106. RF Output Power, High Channel, Band 10, 20 MHz, 64QAM, Average, Port 2

RF Output Power, Band 10, 20 MHz, QPSK, Average, Port 2

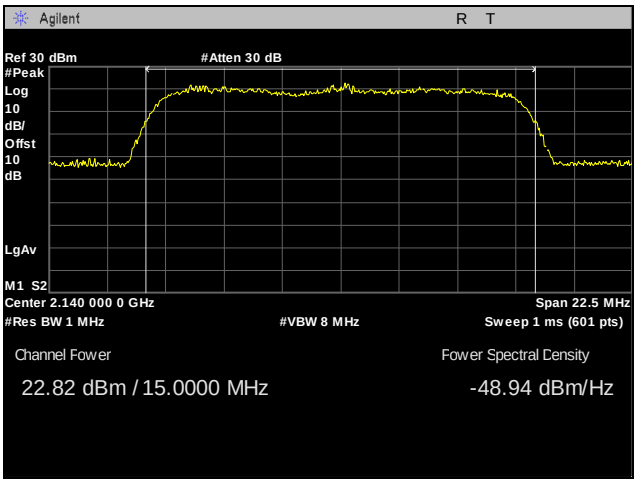


Plot 107. RF Output Power, Mid Channel, Band 10, 20 MHz, QPSK, Average, Port 2

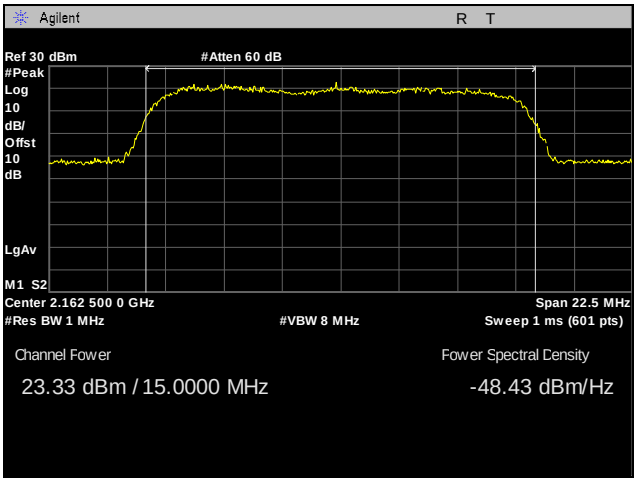


Plot 108. RF Output Power, High Channel, Band 10, 20 MHz, QPSK, Average, Port 2

RF Output Power, Band 10, 15 MHz, 16QAM, Peak, Port 2

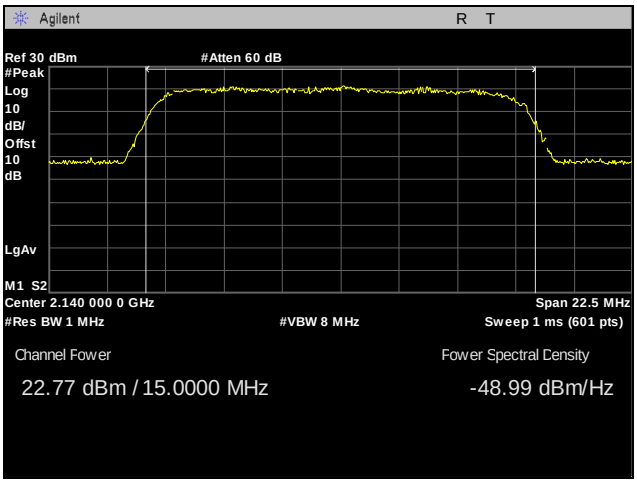


Plot 109. RF Output Power, Mid Channel, Band 10, 15 MHz, 16QAM, Peak, Port 2

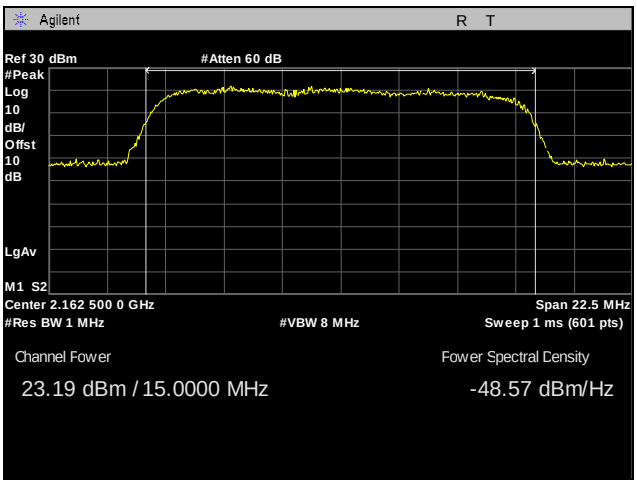


Plot 110. RF Output Power, High Channel, Band 10, 15 MHz, 16QAM, Peak, Port 2

RF Output Power, Band 10, 15 MHz, 64QAM, Peak, Port 2

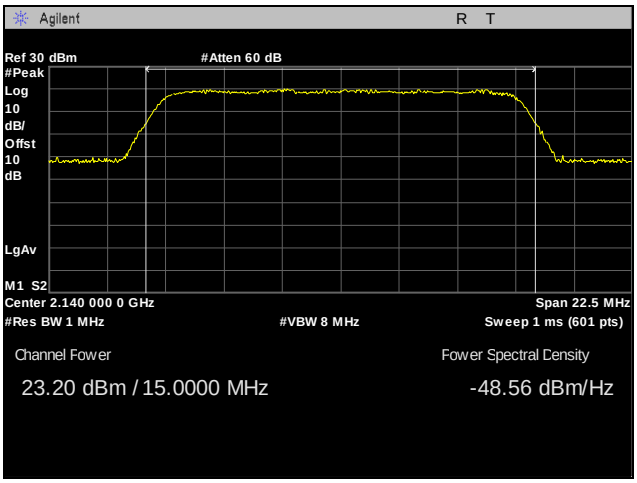


Plot 111. RF Output Power, Mid Channel, Band 10, 15 MHz, 64QAM, Peak, Port 2

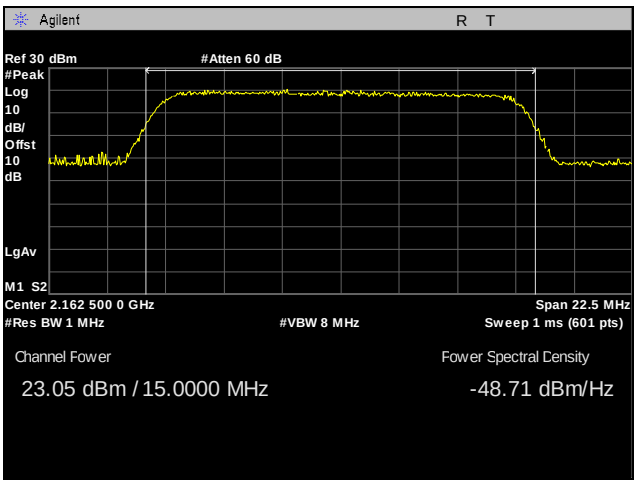


Plot 112. RF Output Power, High Channel, Band 10, 15 MHz, 64QAM, Peak, Port 2

RF Output Power, Band 10, 15 MHz, QPSK, Peak, Port 2

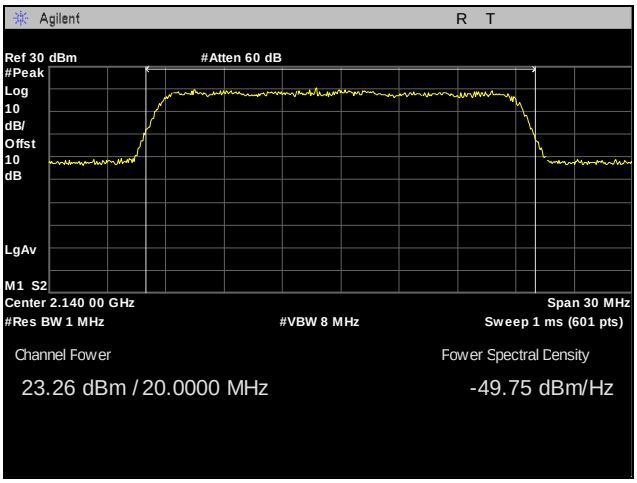


Plot 113. RF Output Power, Mid Channel, Band 10, 15 MHz, QPSK, Peak, Port 2

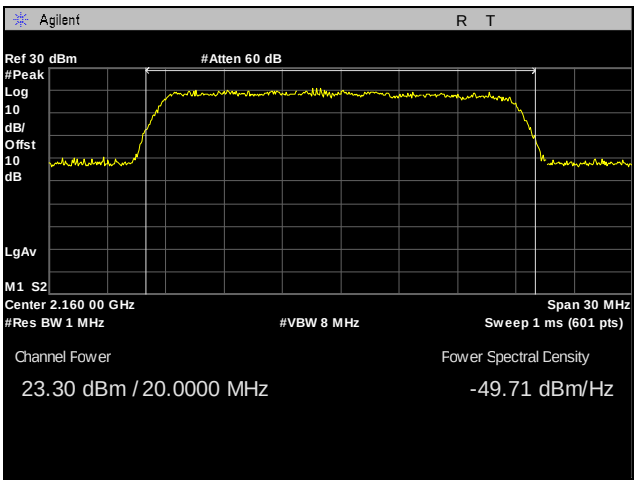


Plot 114. RF Output Power, High Channel, Band 10, 15 MHz, QPSK, Peak, Port 2

RF Output Power, Band 10, 20 MHz, 16QAM, Peak, Port 2

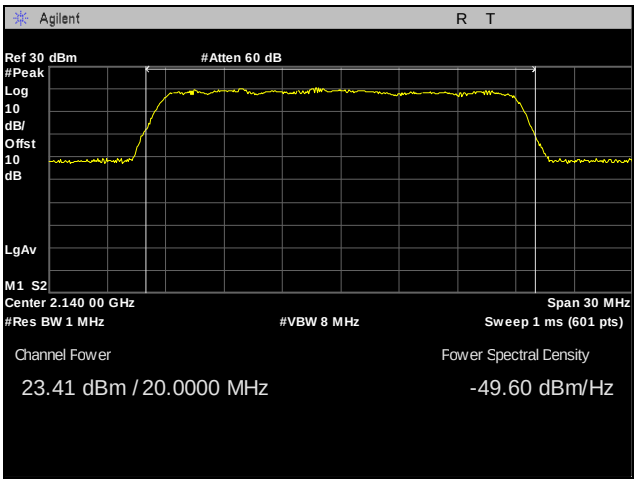


Plot 115. RF Output Power, Mid Channel, Band 10, 20 MHz, 16QAM, Peak, Port 2

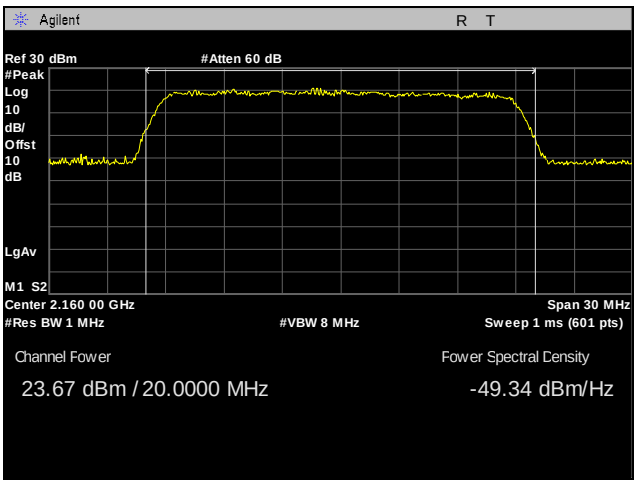


Plot 116. RF Output Power, High Channel, Band 10, 20 MHz, 16QAM, Peak, Port 2

RF Output Power, Band 10, 20 MHz, 64QAM, Peak, Port 2

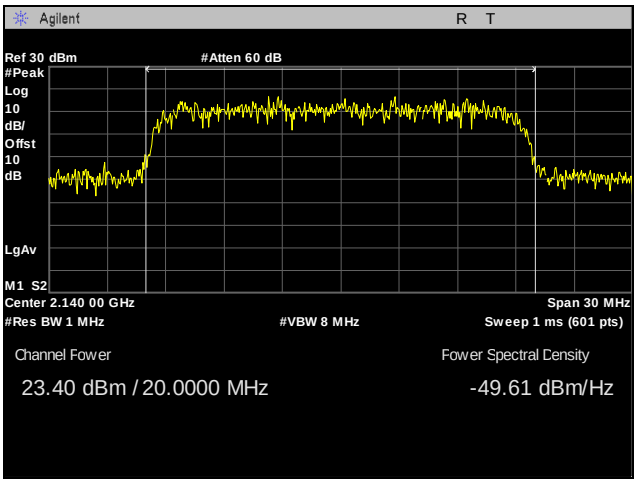


Plot 117. RF Output Power, Mid Channel, Band 10, 20 MHz, 64QAM, Peak, Port 2

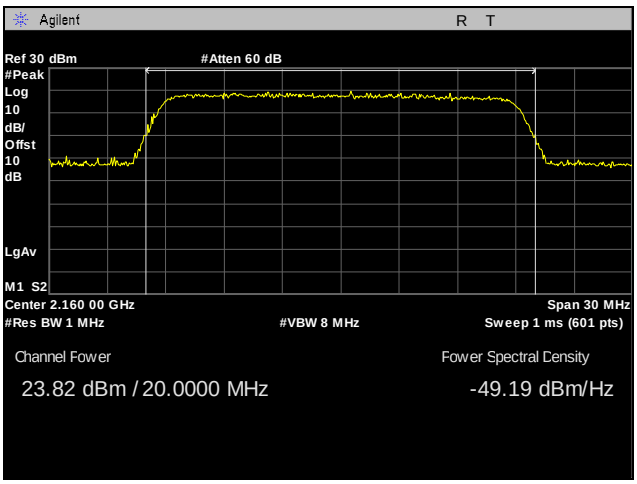


Plot 118. RF Output Power, High Channel, Band 10, 20 MHz, 64QAM, Peak, Port 2

RF Output Power, Band 10, 20 MHz, QPSK, Peak, Port 2

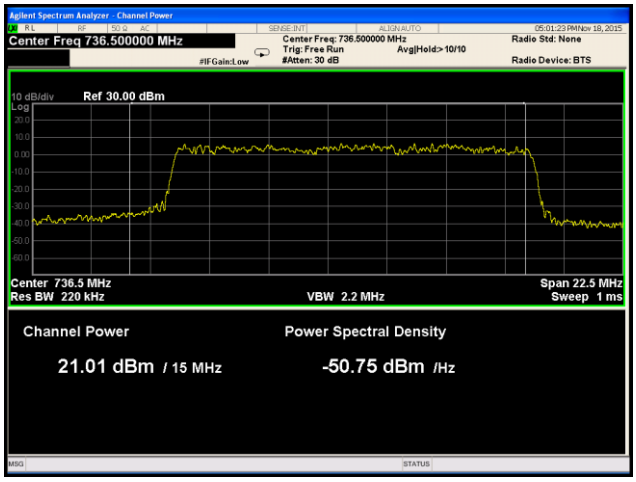


Plot 119. RF Output Power, Mid Channel, Band 10, 20 MHz, QPSK, Peak, Port 2

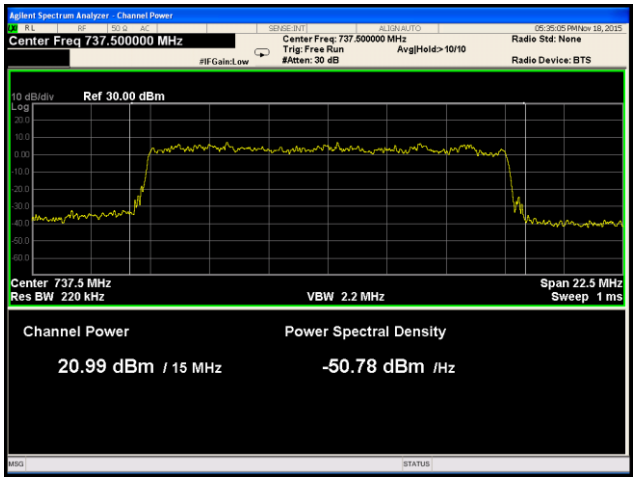


Plot 120. RF Output Power, High Channel, Band 10, 20 MHz, QPSK, Peak, Port 2

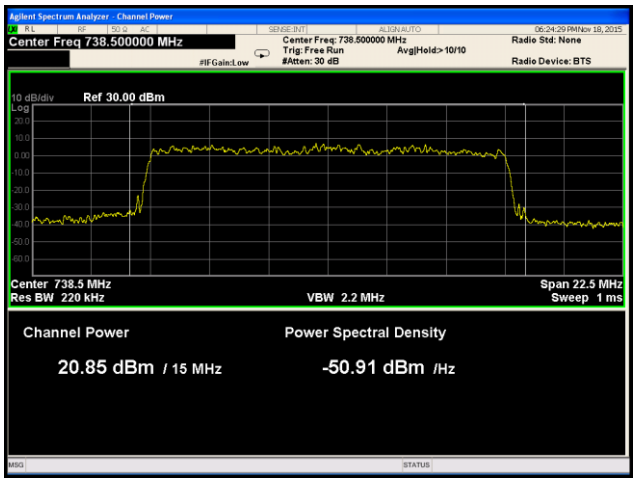
RF Output Power, Band 12, 16QAM, Average, Port 1



Plot 121. RF Output Power, Low Channel, Band 12, 16QAM, Average, Port 1

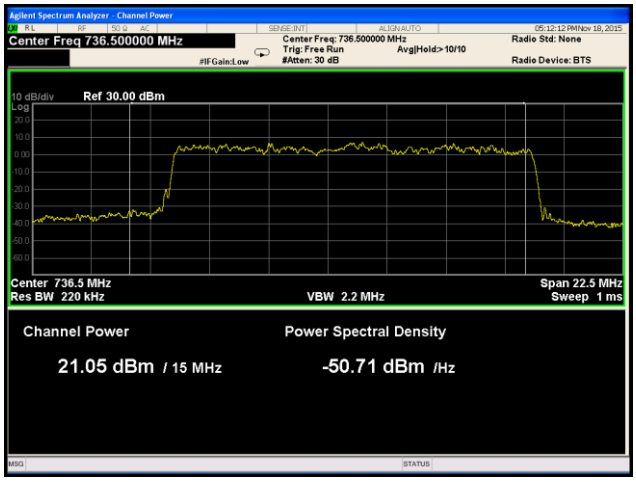


Plot 122. RF Output Power, Mid Channel, Band 12, 16QAM, Average, Port 1

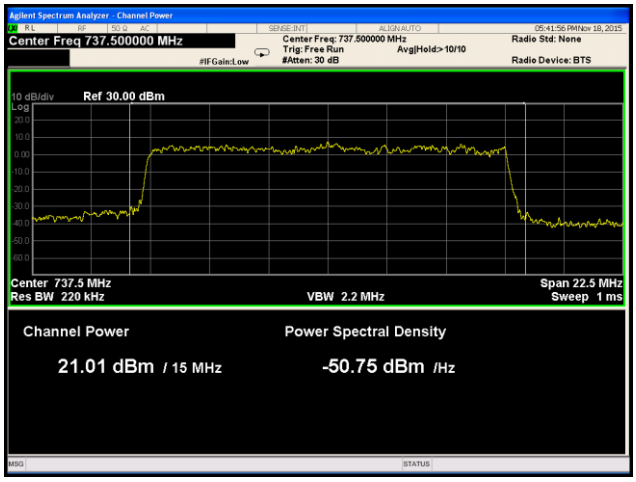


Plot 123. RF Output Power, High Channel, Band 12, 16QAM, Average, Port 1

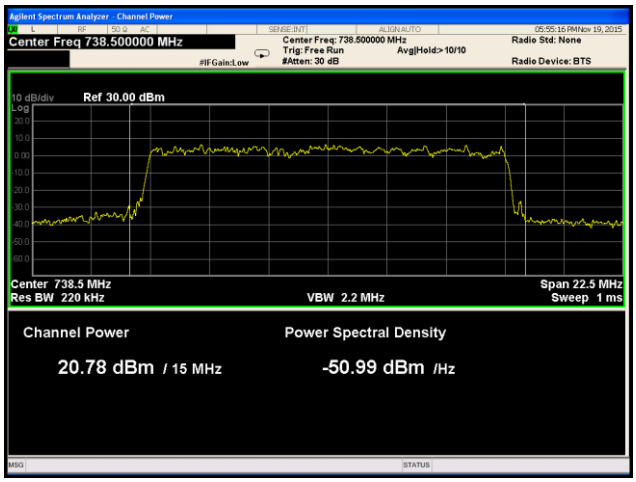
RF Output Power, Band 12, 64QAM, Average, Port 1



Plot 124. RF Output Power, Low Channel, Band 12, 64QAM, Average, Port 1

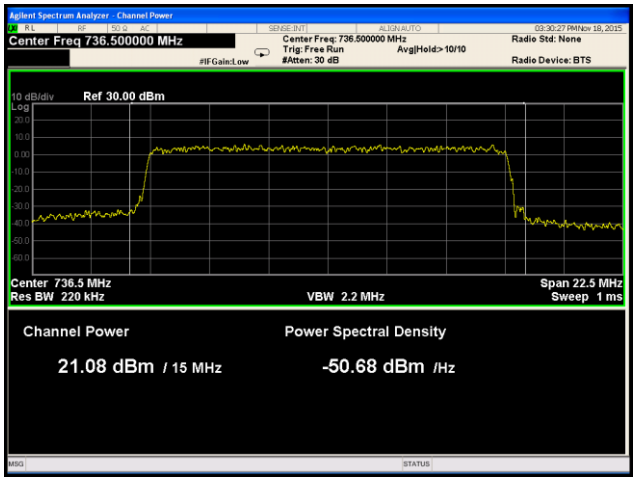


Plot 125. RF Output Power, Mid Channel, Band 12, 64QAM, Average, Port 1

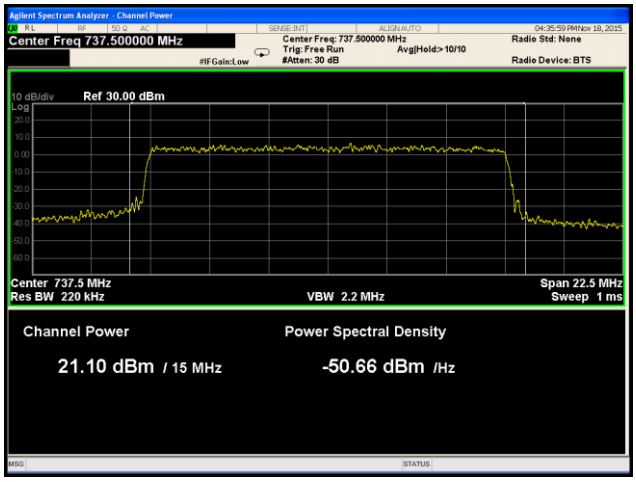


Plot 126. RF Output Power, High Channel, Band 12, 64QAM, Average, Port 1

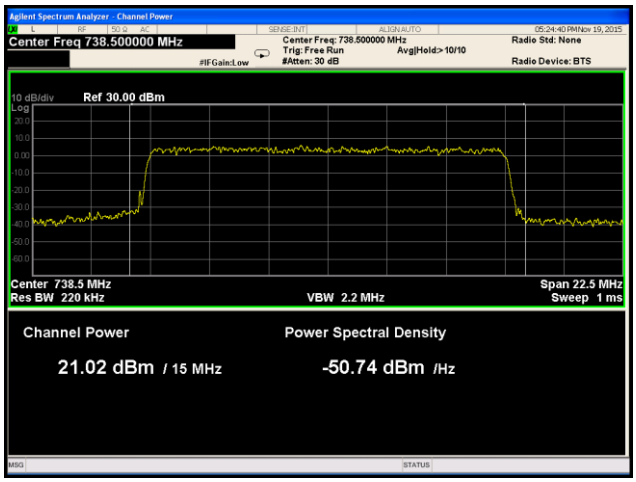
RF Output Power, Band 12, QPSK, Average, Port 1



Plot 127. RF Output Power, Low Channel, Band 12, QPSK, Average, Port 1

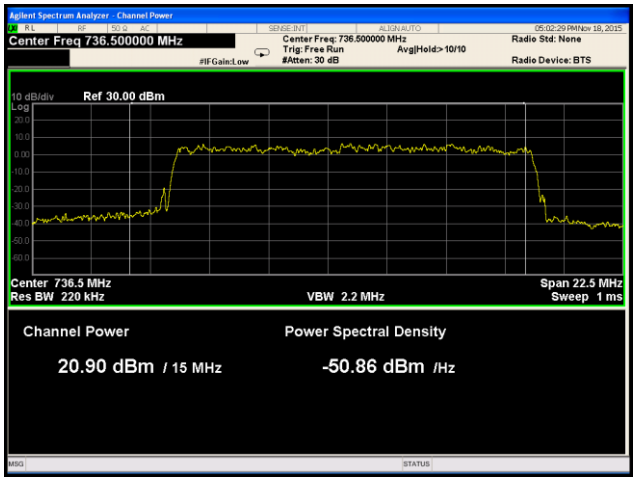


Plot 128. RF Output Power, Mid Channel, Band 12, QPSK, Average, Port 1

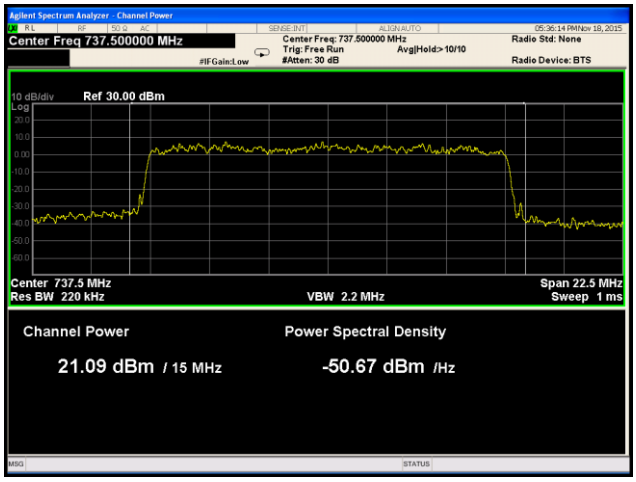


Plot 129. RF Output Power, High Channel, Band 12, QPSK, Average, Port 1

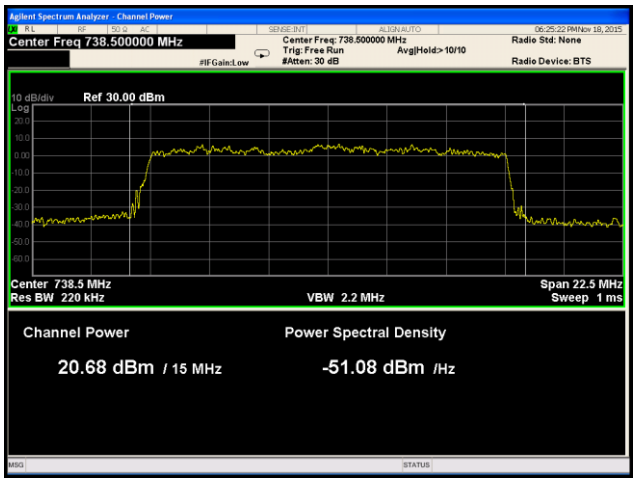
RF Output Power, Band 12, 16QAM, Average, Port 2



Plot 130. RF Output Power, Low Channel, Band 12, 16QAM, Average, Port 2

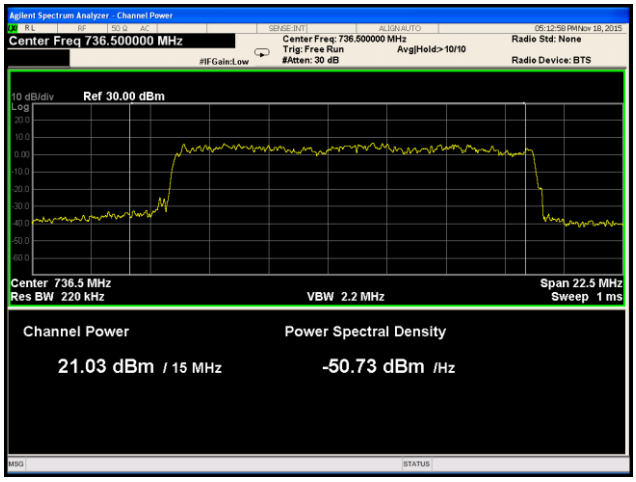


Plot 131. RF Output Power, Mid Channel, Band 12, 16QAM, Average, Port 2

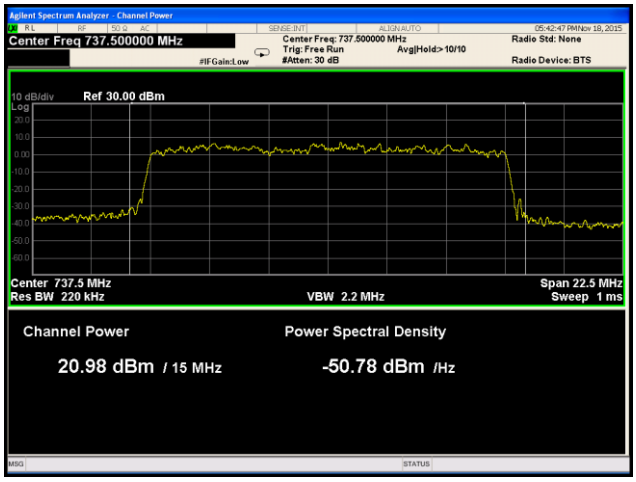


Plot 132. RF Output Power, High Channel, Band 12, 16QAM, Average, Port 2

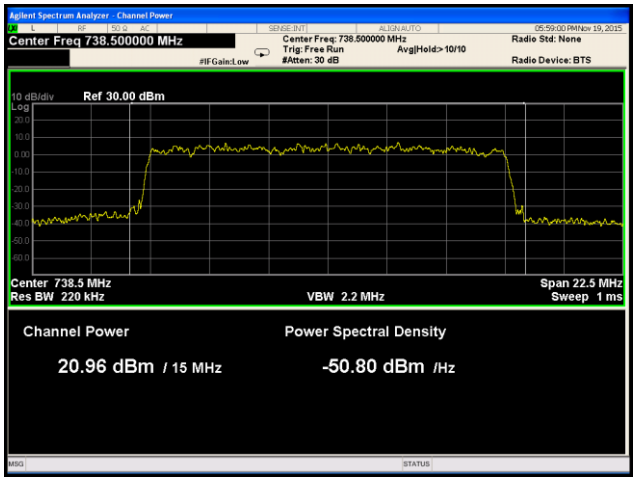
RF Output Power, Band 12, 64QAM, Average, Port 2



Plot 133. RF Output Power, Low Channel, Band 12, 64QAM, Average, Port 2

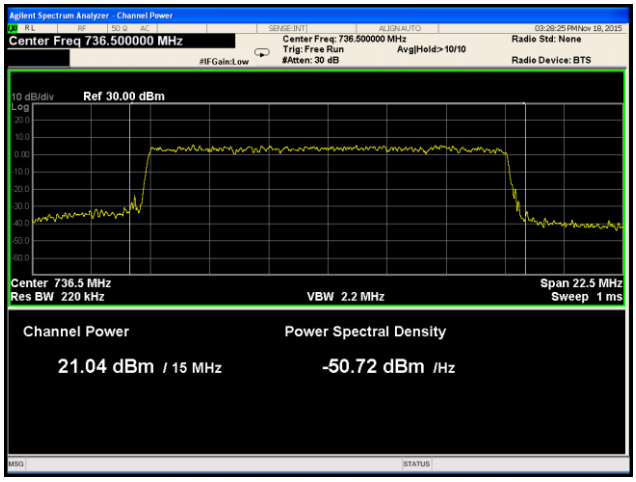


Plot 134. RF Output Power, Mid Channel, Band 12, 64QAM, Average, Port 2

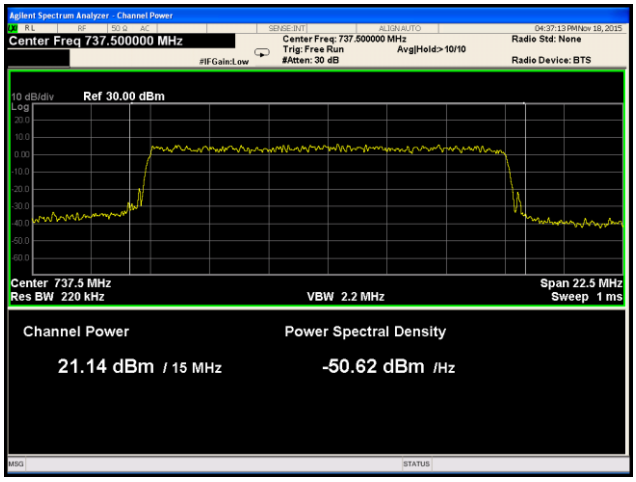


Plot 135. RF Output Power, High Channel, Band 12, 64QAM, Average, Port 2

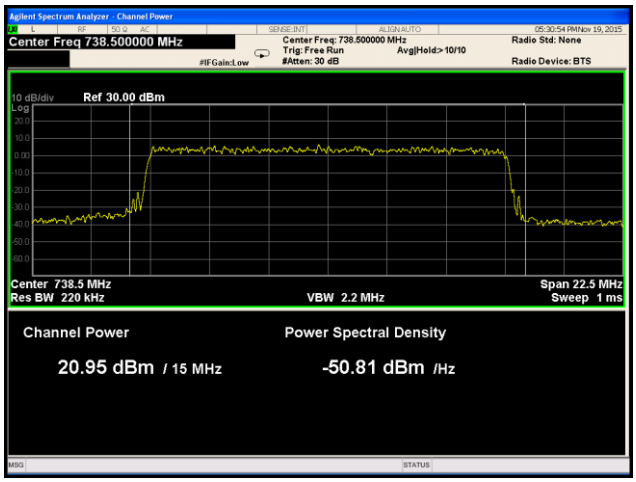
RF Output Power, Band 12, QPSK, Average, Port 2



Plot 136. RF Output Power, Low Channel, Band 12, QPSK, Average, Port 2



Plot 137. RF Output Power, Mid Channel, Band 12, QPSK, Average, Port 2



Plot 138. RF Output Power, High Channel, Band 12, QPSK, Average, Port 2

§ 2.1049 Occupied Bandwidth

Test Requirement(s): **§ 2.1049 Measurements required: Occupied bandwidth:** The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures: As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made with a Spectrum Analyzer connected to the RF ports for both Uplink and Downlink (this only, Downlink only).

Test Results: Equipment complies with Section 2.1049. The following pages show measurements of 99% and -26 dB Occupied Bandwidth plots.

Test Engineer(s): Surinder Singh

Test Date(s): 06/08/15

Band	Center Frequency MHz	Bandwidth	Modulation	26 dB OBW
4	2117.5	15	QPSK	14.59
4	2117.5	15	16QAM	14.54
4	2117.5	15	64QAM	14.3
4	2132.5	15	QPSK	14.62
4	2132.5	15	16QAM	14.56
4	2132.5	15	64QAM	14.46
4	21.47.5	15	QPSK	14.75
4	21.47.5	15	16QAM	14.67
4	21.47.5	15	64QAM	14.54
4	2120	20	QPSK	19.41
4	2120	20	16QAM	19.35
4	2120	20	64QAM	19.35
4	2132.5	20	QPSK	19.87
4	2132.5	20	16QAM	19.45
4	2132.5	20	64QAM	19.11
4	2145	20	QPSK	19.76
4	2145	20	16QAM	19.27
4	2145	20	64QAM	19.33

Table 10. Occupied Bandwidth, Test Results, Band 4

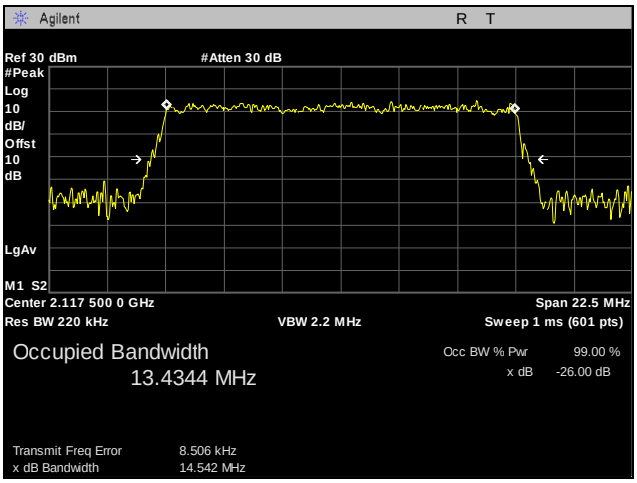
Band	Center Frequency MHz	Bandwidth	Modulation	26 dB OBW
10	2117.5	15	QPSK	14.59
10	2117.5	15	16QAM	14.54
10	2117.5	15	64QAM	14.3
10	2132.5	15	QPSK	14.62
10	2132.5	15	16QAM	14.56
10	2132.5	15	64QAM	14.46
10	21.47.5	15	QPSK	14.75
10	21.47.5	15	16QAM	14.67
10	21.47.5	15	64QAM	14.54
10	2120	20	QPSK	19.41
10	2120	20	16QAM	19.35
10	2120	20	64QAM	19.35
10	2132.5	20	QPSK	19.87
10	2132.5	20	16QAM	19.45
10	2132.5	20	64QAM	19.11
10	2145	20	QPSK	19.76
10	2145	20	16QAM	19.27
10	2145	20	64QAM	19.33

Table 11. Occupied Bandwidth, Test Results, Band 10

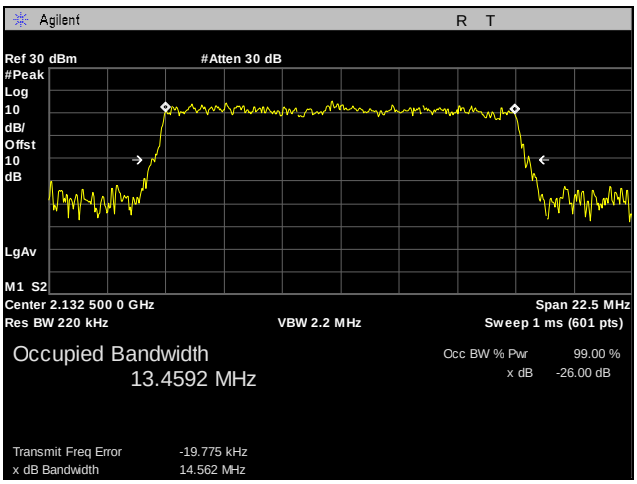
Band	Center Frequency MHz	Bandwidth	Modulation	26 dB OBW
12	736.5	15	QPSK	14.75
12	736.5	15	16QAM	14.66
12	736.5	15	64QAM	14.39
12	737.5	15	QPSK	14.67
12	737.5	15	16QAM	14.62
12	737.5	15	64QAM	14.52
12	738.5	15	QPSK	14.8
12	738.5	15	16QAM	14.64
12	738.5	15	64QAM	14.53

Table 12. Occupied Bandwidth, Test Results, Band 12

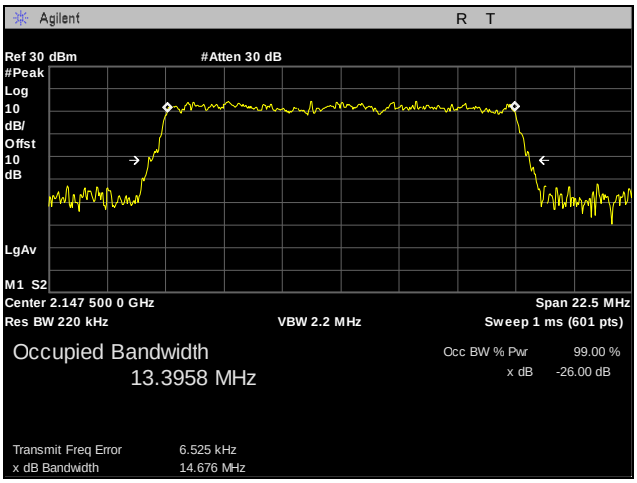
Occupied Bandwidth, Band 4, 15 MHz, 16QAM, Port 1



Plot 139. Occupied Bandwidth, Low Channel, Band 4, 15 MHz, 16QAM, Port 1

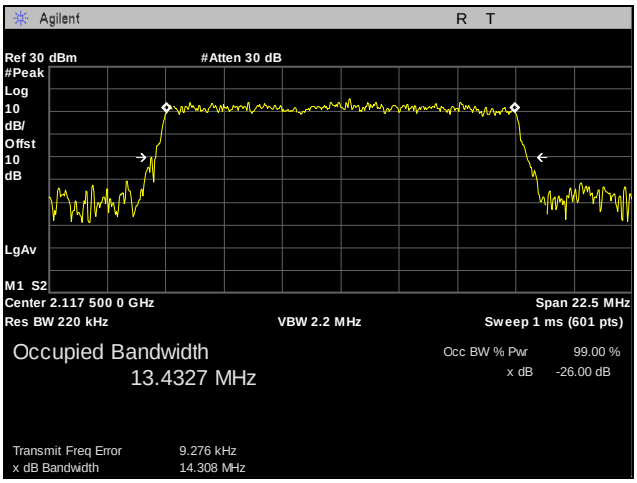


Plot 140. Occupied Bandwidth, Mid Channel, Band 4, 15 MHz, 16QAM, Port 1

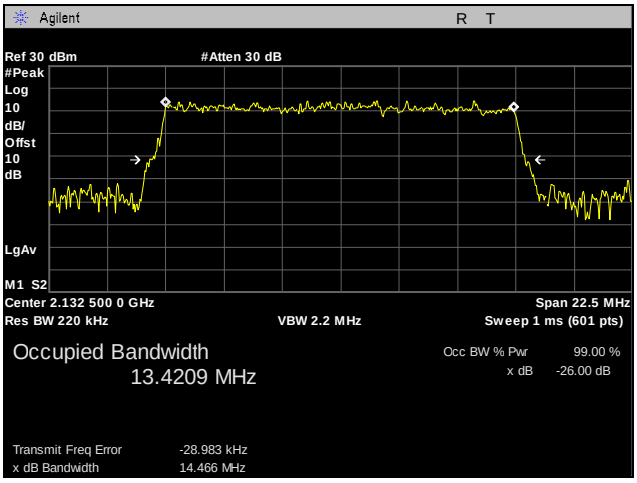


Plot 141. Occupied Bandwidth, High Channel, Band 4, 15 MHz, 16QAM, Port 1

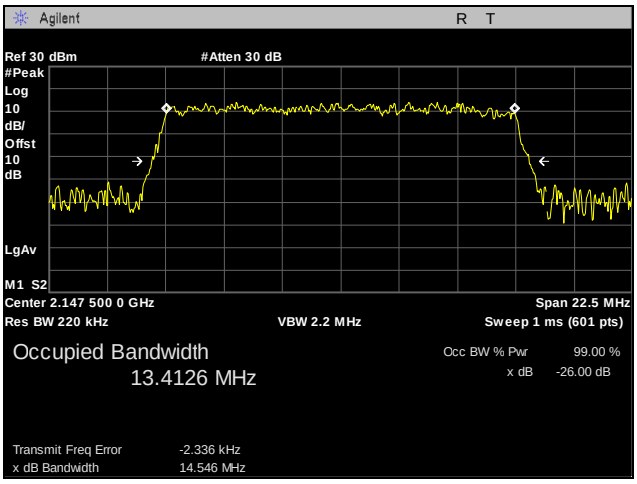
Occupied Bandwidth, Band 4, 15 MHz, 64QAM, Port 1



Plot 142. Occupied Bandwidth, Low Channel, Band 4, 15 MHz, 64QAM, Port 1

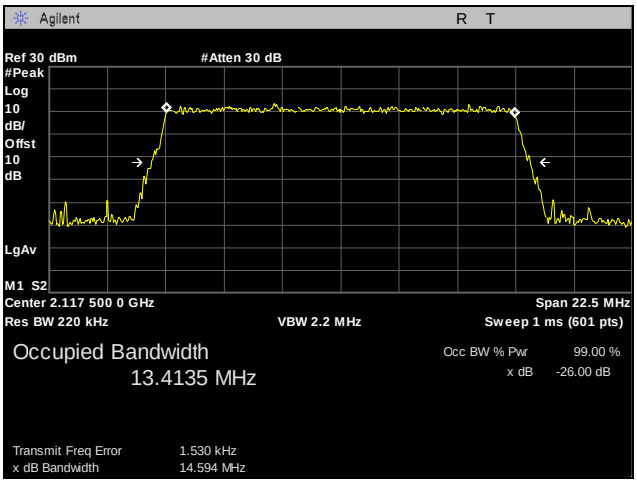


Plot 143. Occupied Bandwidth, Mid Channel, Band 4, 15 MHz, 64QAM, Port 1

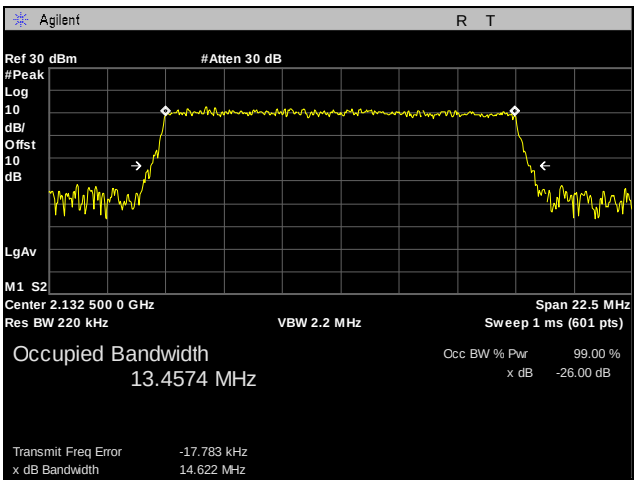


Plot 144. Occupied Bandwidth, High Channel, Band 4, 15 MHz, 64QAM, Port 1

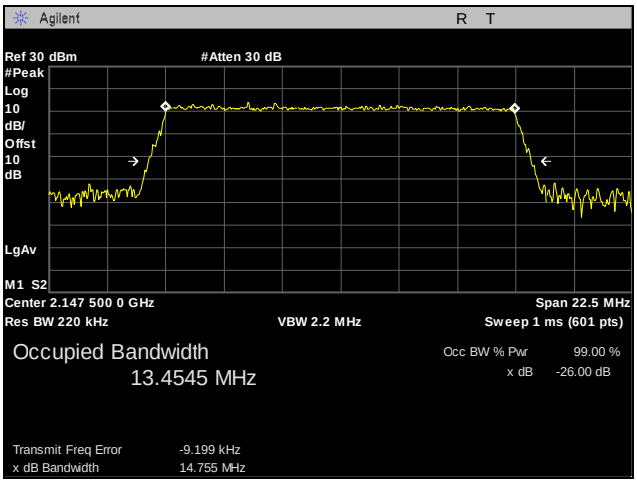
Occupied Bandwidth, Band 4, 15 MHz, QPSK, Port 1



Plot 145. Occupied Bandwidth, Low Channel, Band 4, 15 MHz, QPSK, Port 1

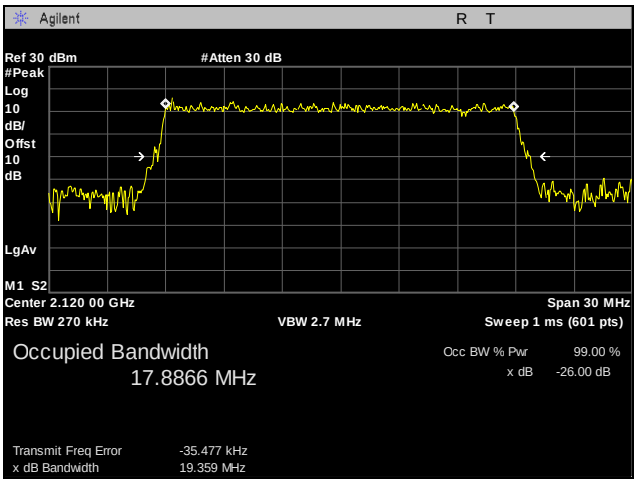


Plot 146. Occupied Bandwidth, Mid Channel, Band 4, 15 MHz, QPSK, Port 1

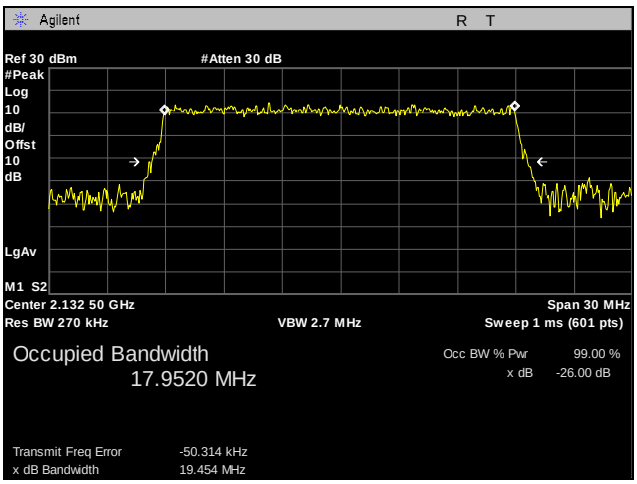


Plot 147. Occupied Bandwidth, High Channel, Band 4, 15 MHz, QPSK, Port 1

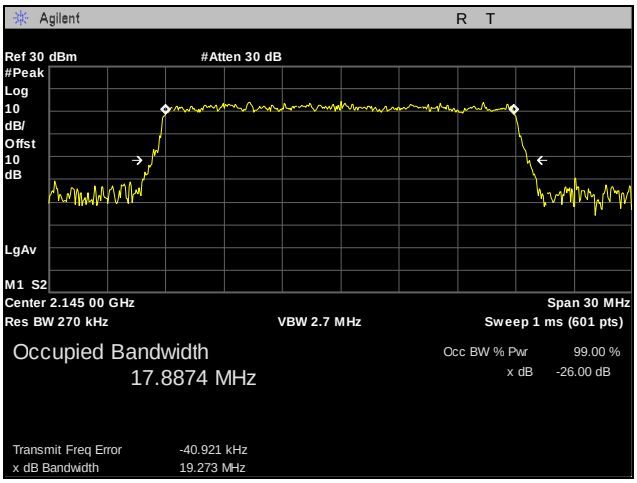
Occupied Bandwidth, Band 4, 20 MHz, 16QAM, Port 1



Plot 148. Occupied Bandwidth, Low Channel, Band 4, 20 MHz, 16QAM, Port 1

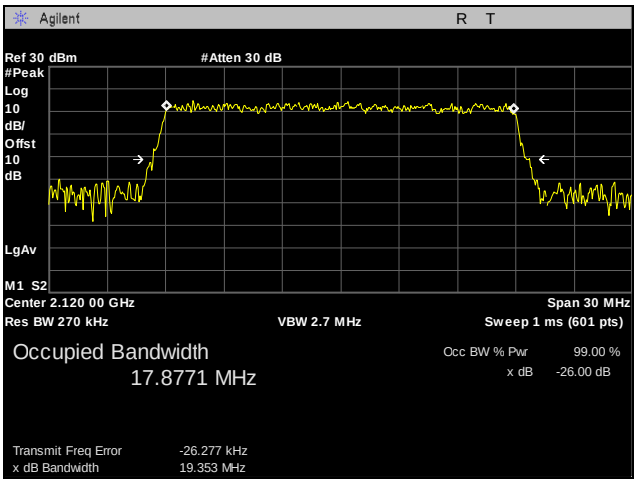


Plot 149. Occupied Bandwidth, Mid Channel, Band 4, 20 MHz, 16QAM, Port 1

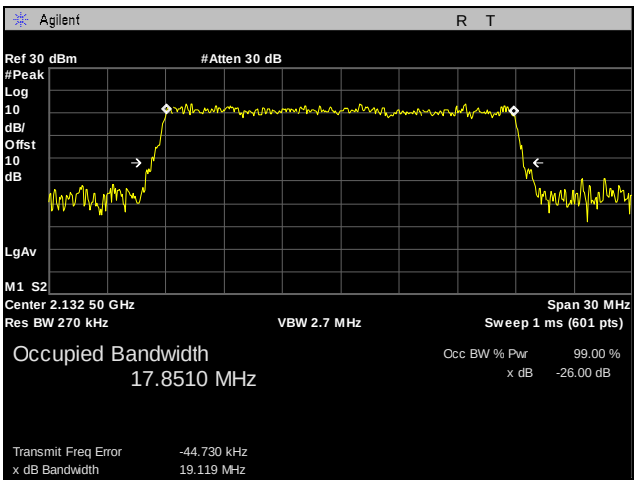


Plot 150. Occupied Bandwidth, High Channel, Band 4, 20 MHz, 16QAM, Port 1

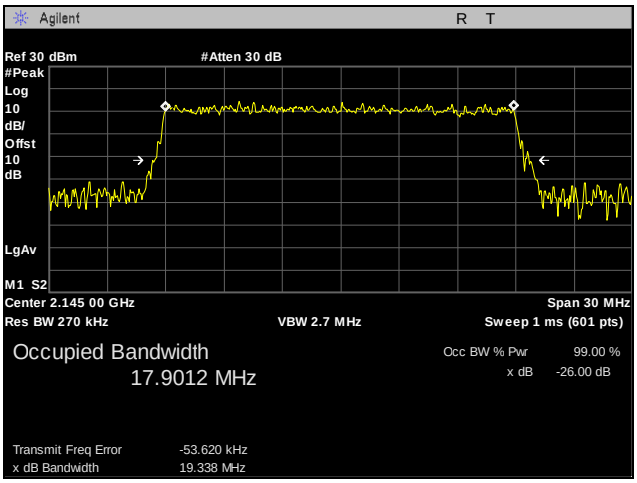
Occupied Bandwidth, Band 4, 20 MHz, 64QAM, Port 1



Plot 151. Occupied Bandwidth, Low Channel, Band 4, 20 MHz, 64QAM, Port 1

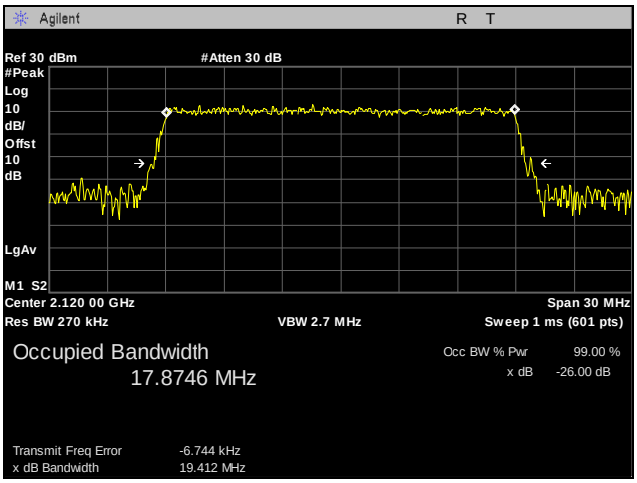


Plot 152. Occupied Bandwidth, Mid Channel, Band 4, 20 MHz, 64QAM, Port 1

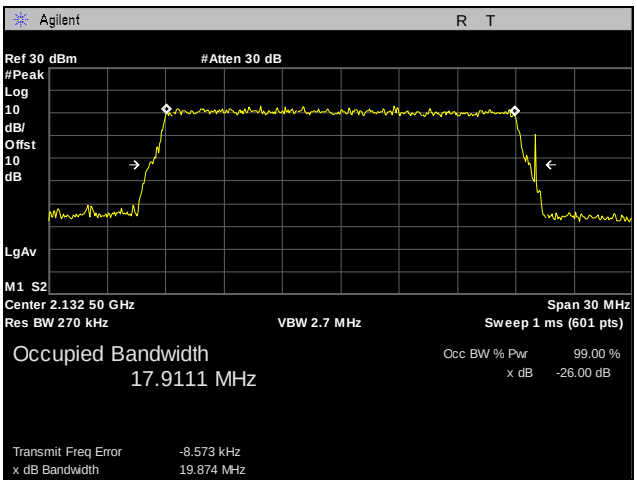


Plot 153. Occupied Bandwidth, High Channel, Band 4, 20 MHz, 64QAM, Port 1

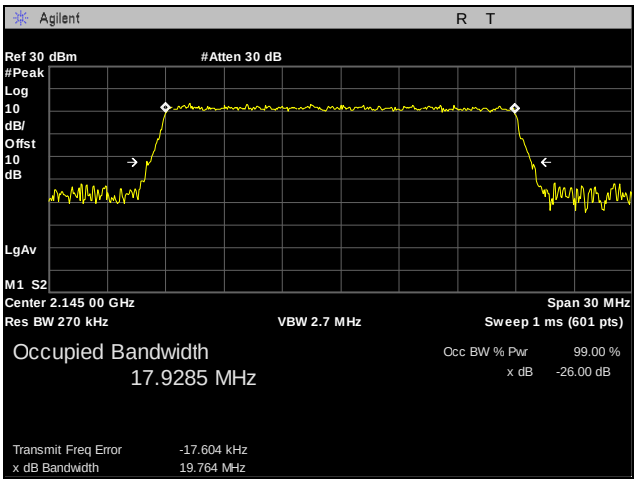
Occupied Bandwidth, Band 4, 20 MHz, QPSK, Port 1



Plot 154. Occupied Bandwidth, Low Channel, Band 4, 20 MHz, QPSK, Port 1

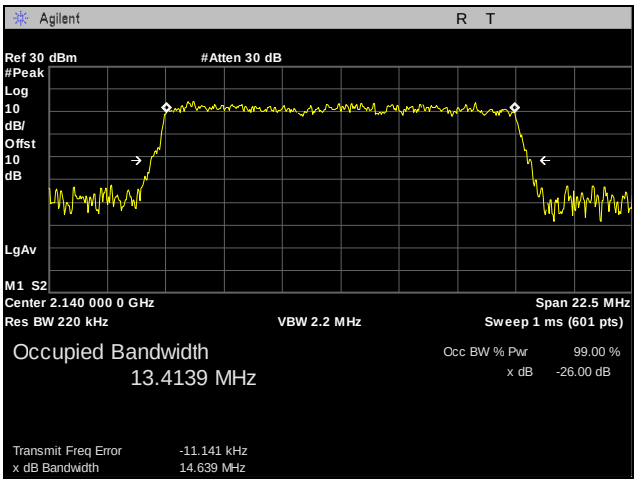


Plot 155. Occupied Bandwidth, Mid Channel, Band 4, 20 MHz, QPSK, Port 1

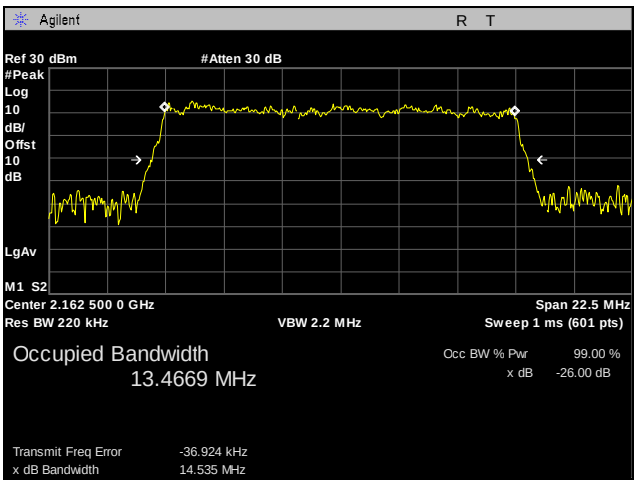


Plot 156. Occupied Bandwidth, High Channel, Band 4, 20 MHz, QPSK, Port 1

Occupied Bandwidth, Band 10, 15 MHz, 16QAM, Port 1

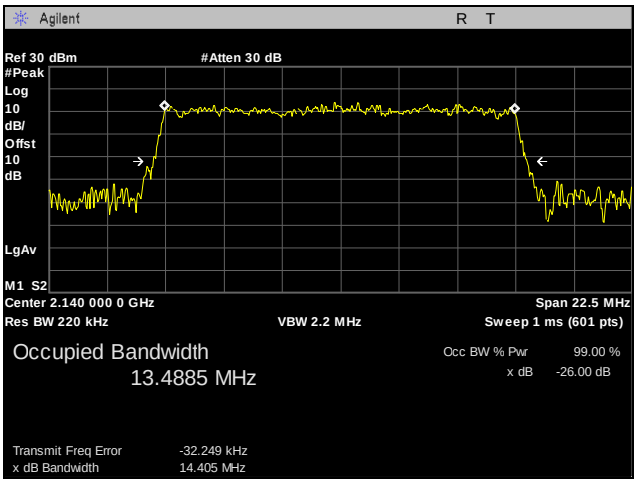


Plot 157. Occupied Bandwidth, Mid Channel, Band 10, 15 MHz, 16QAM, Port 1

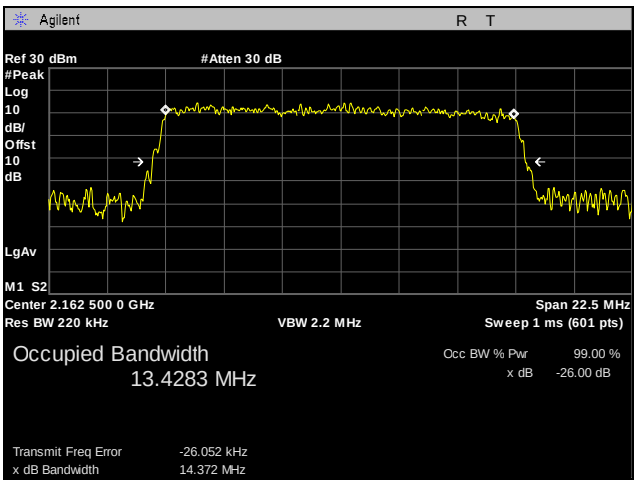


Plot 158. Occupied Bandwidth, High Channel, Band 10, 15 MHz, 16QAM, Port 1

Occupied Bandwidth, Band 10, 15 MHz, 64QAM, Port 1

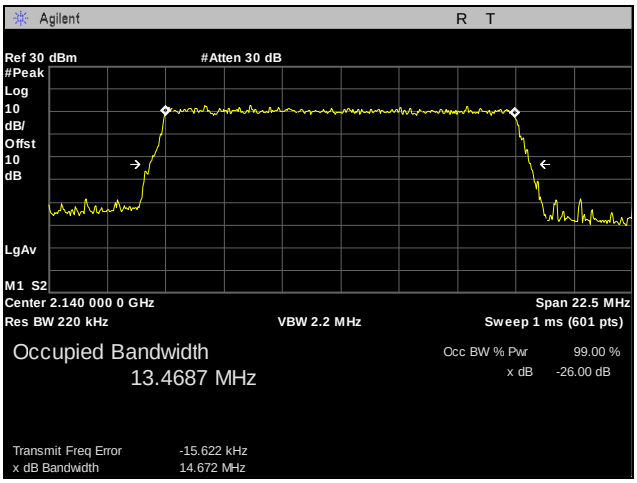


Plot 159. Occupied Bandwidth, Mid Channel, Band 10, 15 MHz, 64QAM, Port 1

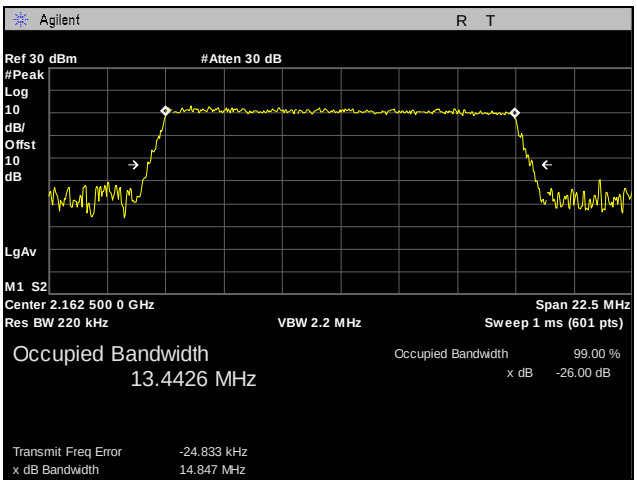


Plot 160. Occupied Bandwidth, High Channel, Band 10, 15 MHz, 64QAM, Port 1

Occupied Bandwidth, Band 10, 15 MHz, QPSK, Port 1

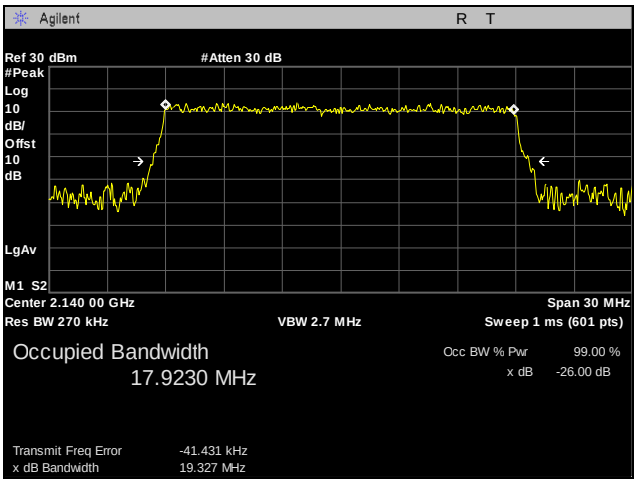


Plot 161. Occupied Bandwidth, Mid Channel, Band 10, 15 MHz, QPSK, Port 1

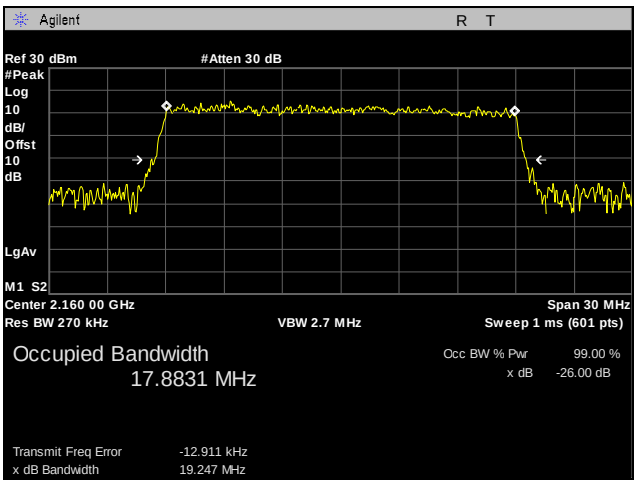


Plot 162. Occupied Bandwidth, High Channel, Band 10, 15 MHz, QPSK, Port 1

Occupied Bandwidth, Band 10, 20 MHz, 16QAM, Port 1

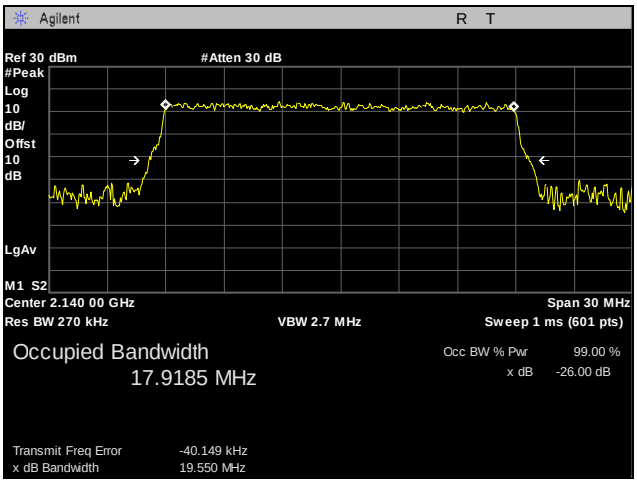


Plot 163. Occupied Bandwidth, Mid Channel, Band 10, 20 MHz, 16QAM, Port 1

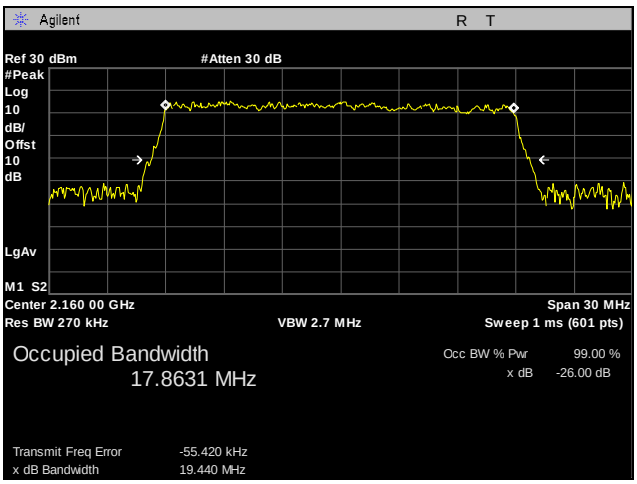


Plot 164. Occupied Bandwidth, High Channel, Band 10, 20 MHz, 16QAM, Port 1

Occupied Bandwidth, Band 10, 20 MHz, 64QAM, Port 1

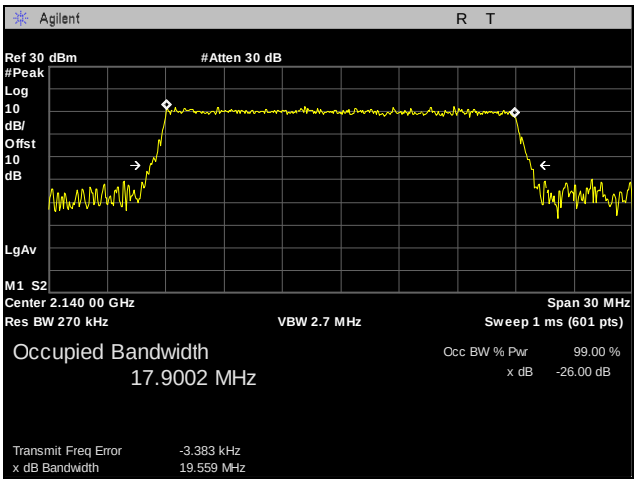


Plot 165. Occupied Bandwidth, Mid Channel, Band 10, 20 MHz, 64QAM, Port 1

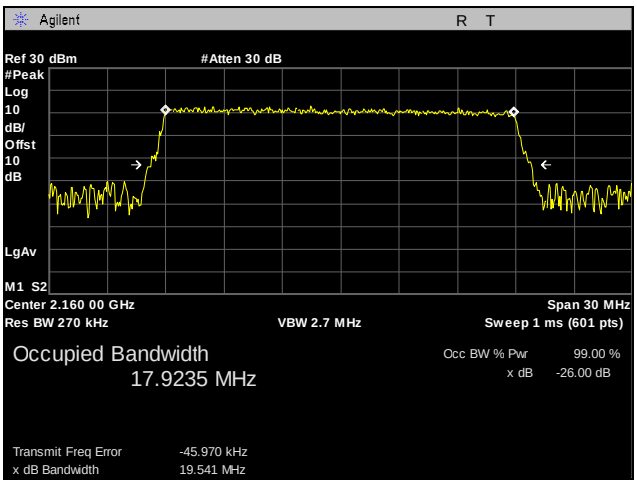


Plot 166. Occupied Bandwidth, High Channel, Band 10, 20 MHz, 64QAM, Port 1

Occupied Bandwidth, Band 10, 20 MHz, QPSK, Port 1

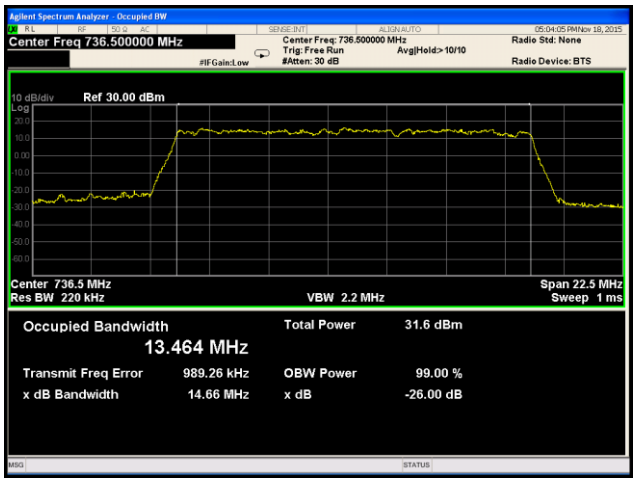


Plot 167. Occupied Bandwidth, Mid Channel, Band 10, 20 MHz, QPSK, Port 1

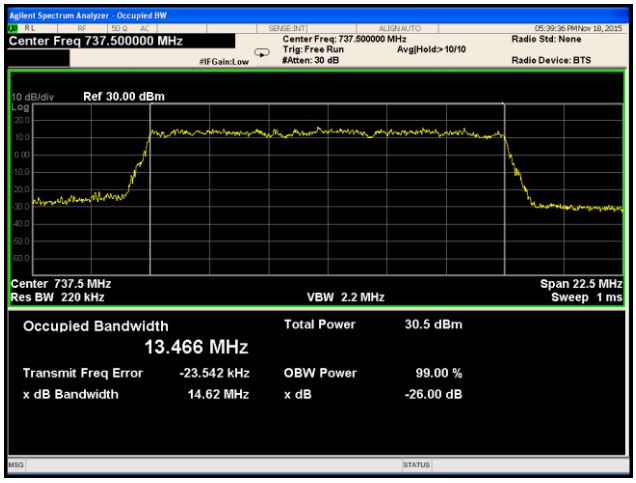


Plot 168. Occupied Bandwidth, High Channel, Band 10, 20 MHz, QPSK, Port 1

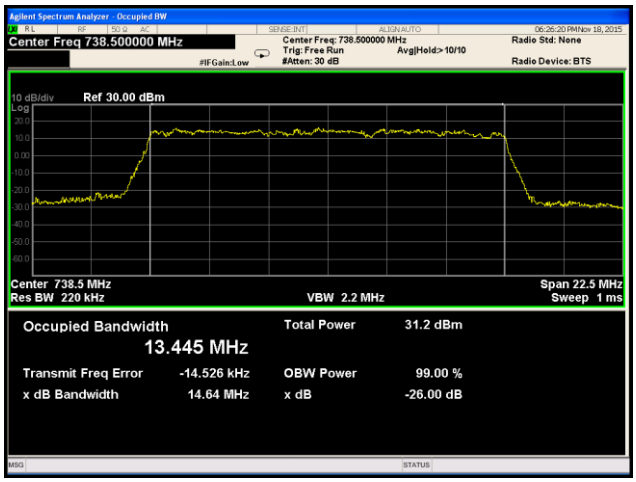
Occupied Bandwidth, Band 12, 16QAM, Port 1



Plot 169. Occupied Bandwidth, Low Channel, Band 12, 16QAM, Port 1

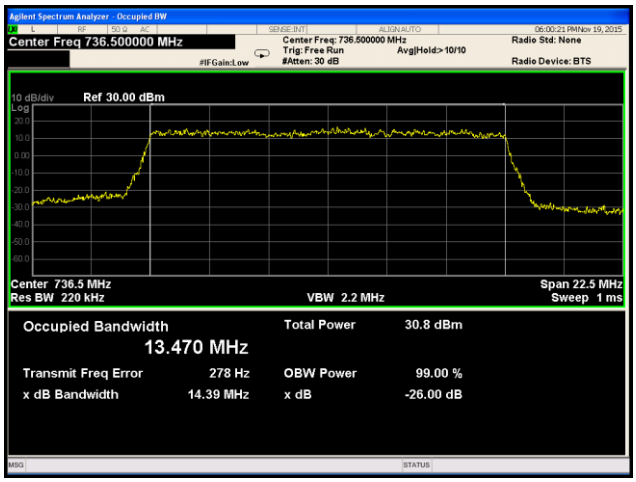


Plot 170. Occupied Bandwidth, Mid Channel, Band 12, 16QAM, Port 1

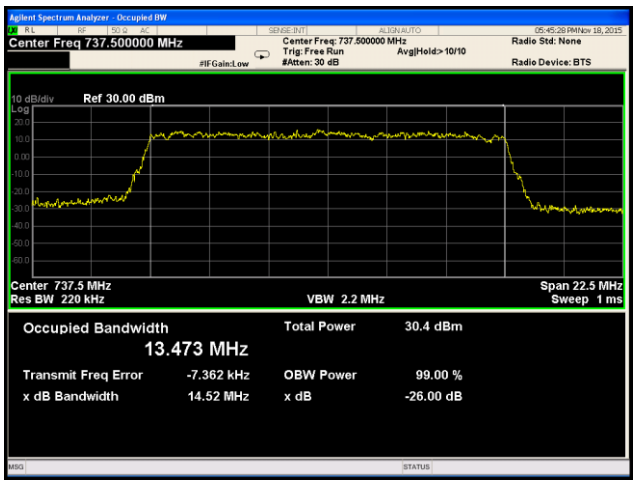


Plot 171. Occupied Bandwidth, High Channel, Band 12, 16QAM, Port 1

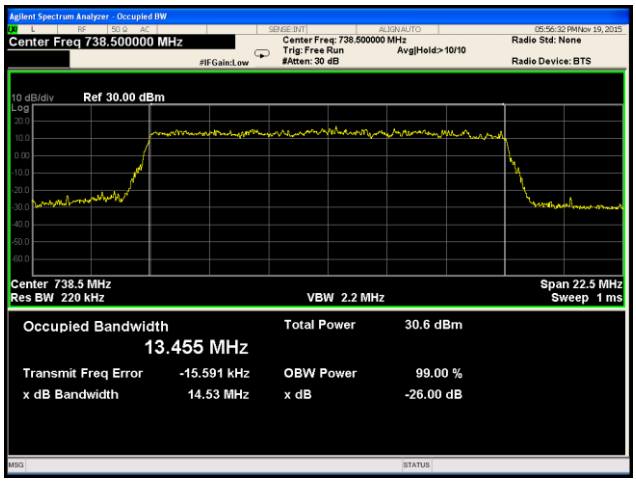
Occupied Bandwidth, Band 12, 64QAM, Port 1



Plot 172. Occupied Bandwidth, Low Channel, Band 12, 64QAM, Port 1

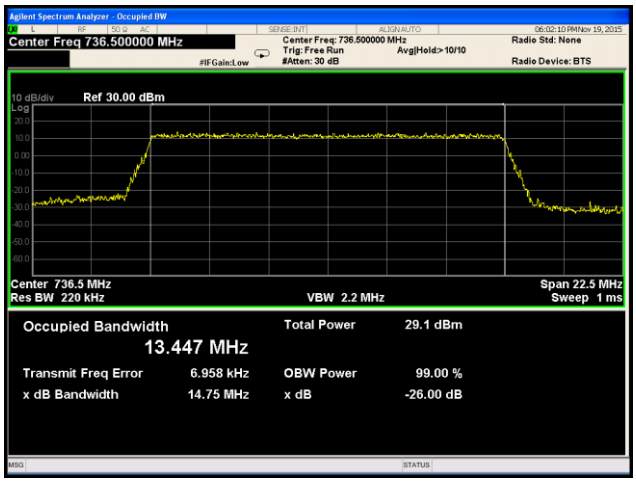


Plot 173. Occupied Bandwidth, Mid Channel, Band 12, 64QAM, Port 1

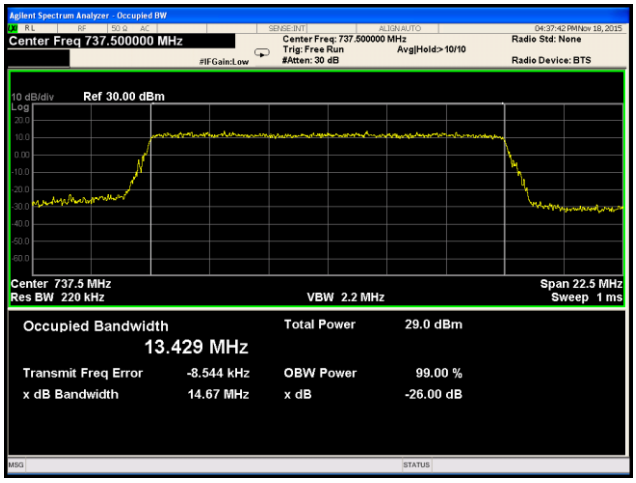


Plot 174. Occupied Bandwidth, High Channel, Band 12, 64QAM, Port 1

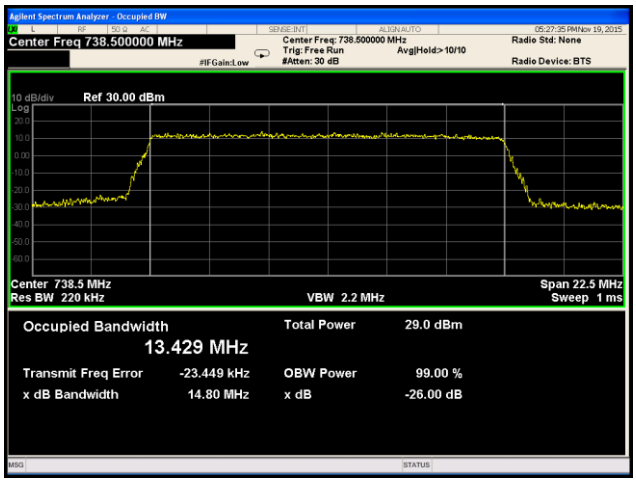
Occupied Bandwidth, Band 12, QPSK, Port 1



Plot 175. Occupied Bandwidth, Low Channel, Band 12, QPSK, Port 1



Plot 176. Occupied Bandwidth, Mid Channel, Band 12, QPSK, Port 1



Plot 177. Occupied Bandwidth, High Channel, Band 12, QPSK, Port 1

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1053 Radiated Spurious Emissions

Test Requirement(s): **§ 2.1053 Measurements required: Field strength of spurious radiation.**

§ 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 half-wave dipole antennas.

§ 2.1053 (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.

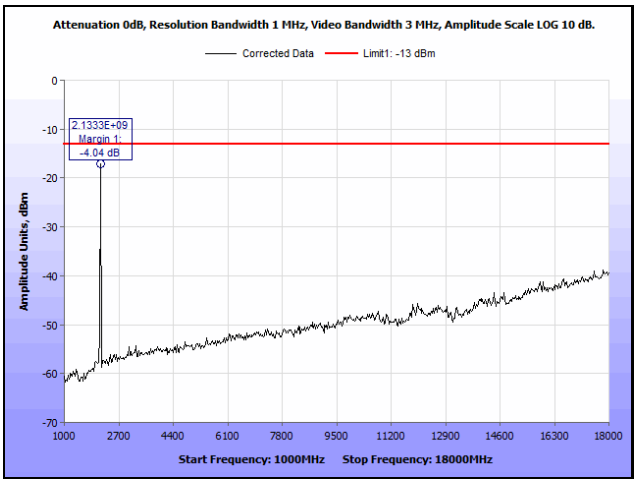
Test Procedures: As required by 47 CFR 2.1053, the *field strengths of radiated spurious emissions* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). The distance between the EUT and the test antenna was 3 meters for below 1 GHz and 1m for frequencies above 1 GHz. The EUT's RF port was connected to a dummy load. The intensities of the radiated emissions were maximized by rotating the turntable 360 degrees and varying the receive antenna from 1 to 4m. Measurements were made with the receive antenna in both horizontal and vertical polarizations.

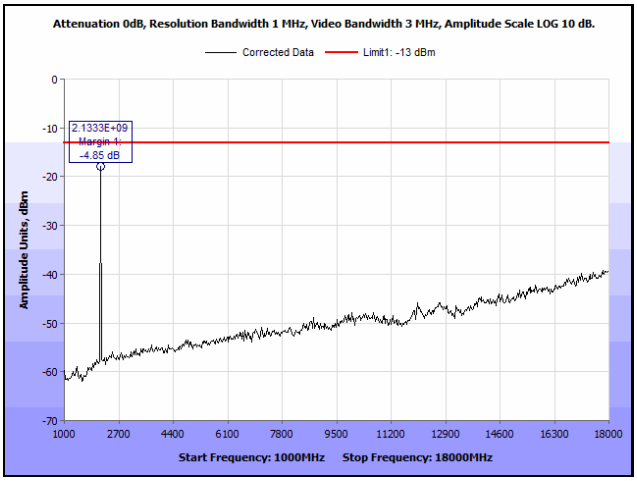
Test Results: Equipment complies with Section 2.1053. The limit for spurs is -13dBm. Measurements revealed that no spurs came even close to this limit. Therefore, measurements using substitution method were not performed. Measurements were made with a pre-amp for above 1 GHz. Only noise floor was measured below 1GHz and above 18 GHz.

Test Engineer: Surinder Singh

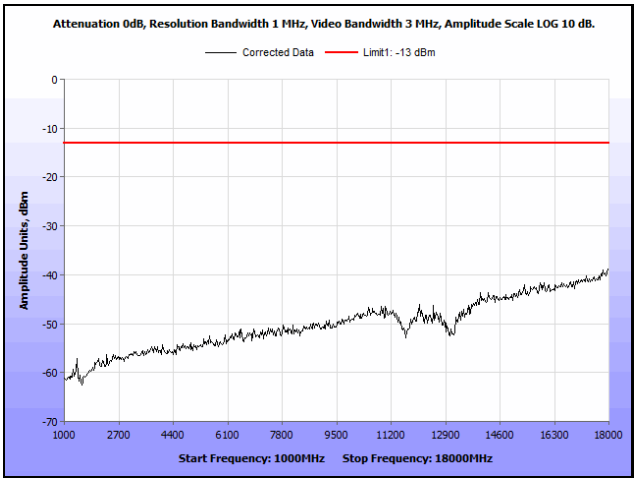
Test Date(s): 11/25/15



Plot 178. Radiated Spurious Emissions, Band 4, 1 GHz – 18 GHz, Cabinet Emission

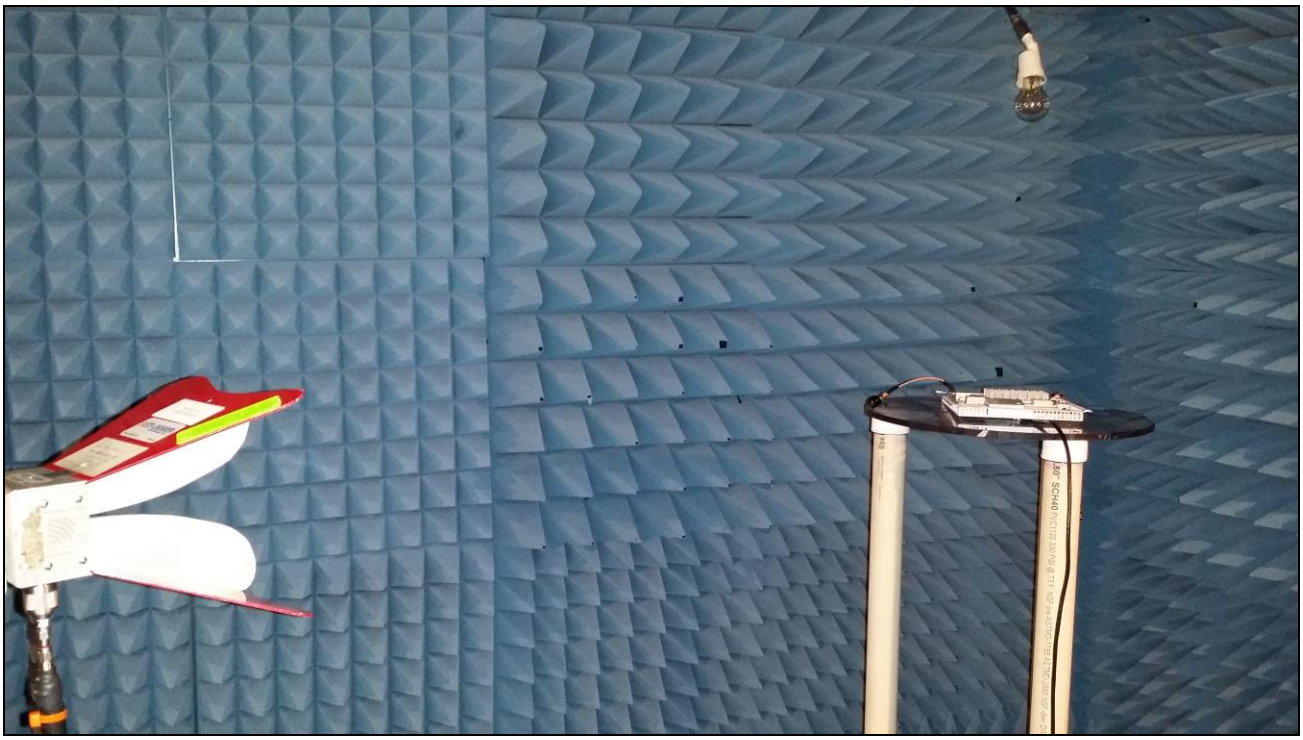


Plot 179. Radiated Spurious Emissions, Band 10, 1 GHz – 18 GHz, Cabinet Emission



Plot 180. Radiated Spurious Emissions, Band 12, 1 GHz – 18 GHz, Cabinet Emission

Electromagnetic Compatibility Criteria for Intentional Radiators



Photograph 1. Radiated Spurious Emissions, Above 1 GHz, Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1051 Spurious Emissions at Antenna Terminals

Test Requirement(s): **§ 2.1051and 27.53(l) Measurements required: Spurious emissions at antenna terminals:** The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate.

Test Procedures: A modulated carrier generated by the EUT/its support equipment; a spectrum analyzer was connected to the Downlink RF port. The spectrum analyzer was set to 1MHz RBW and 3MHz VBW. The spectrum was investigated from 30MHz to the 10th harmonic of the carrier.

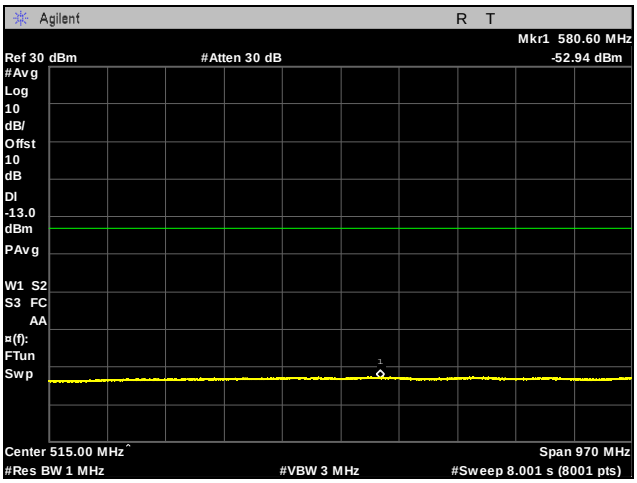
Test Results: Equipment complies with Section 2.1051 and 27.53(g). The following pages show measurements of Spurious Emission plots. All Spurious Emissions are below -13dBm

The following analysis and plots are included below to illustrate compliance with the required rule parts.

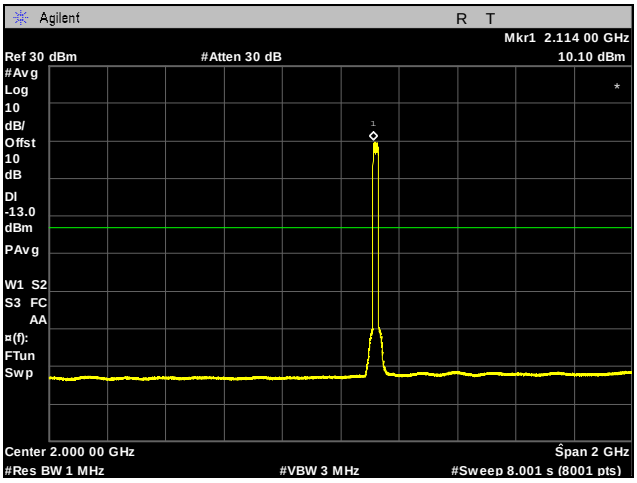
Test Engineer(s): Surinder Singh

Test Date(s): 11/25/15

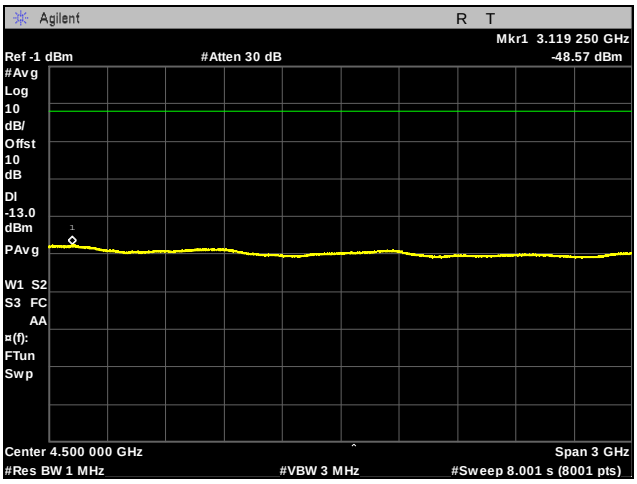
Spurious Emissions at Antenna Terminal, Band 4, Low Channel



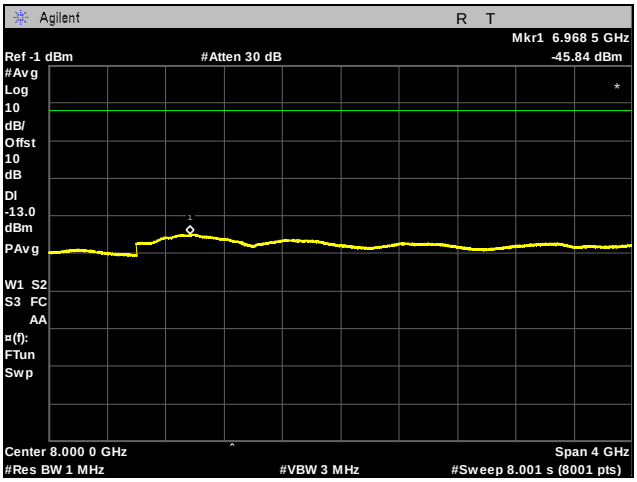
Plot 181. Spurious Emissions at Antenna Terminal, Low Channel, Band 4, 30 MHz – 1 GHz



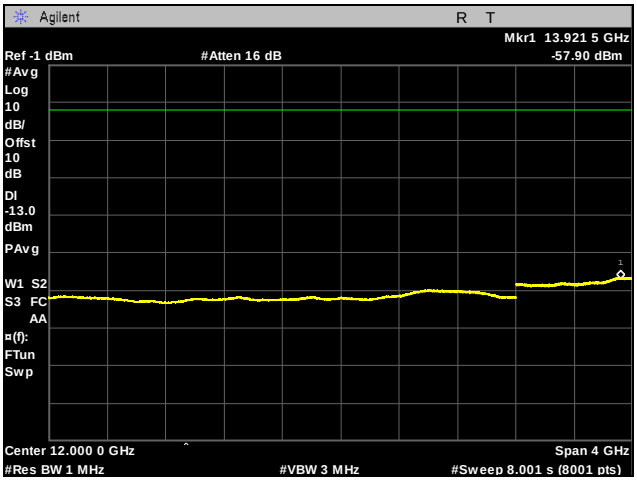
Plot 182. Spurious Emissions at Antenna Terminal, Low Channel, Band 4, 1 GHz – 3 GHz



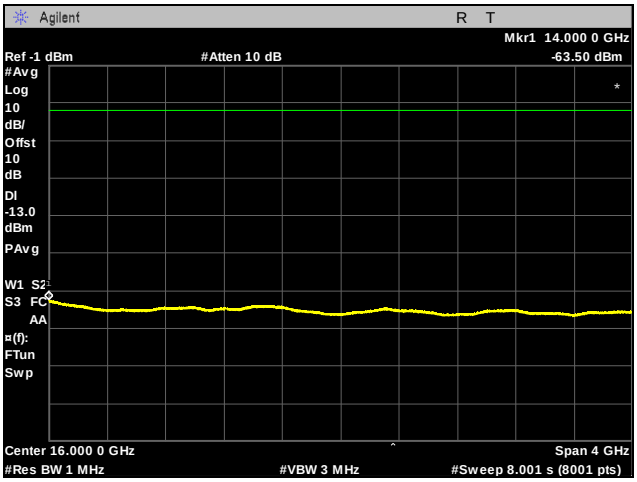
Plot 183. Spurious Emissions at Antenna Terminal, Low Channel, Band 4, 3 GHz – 6 GHz



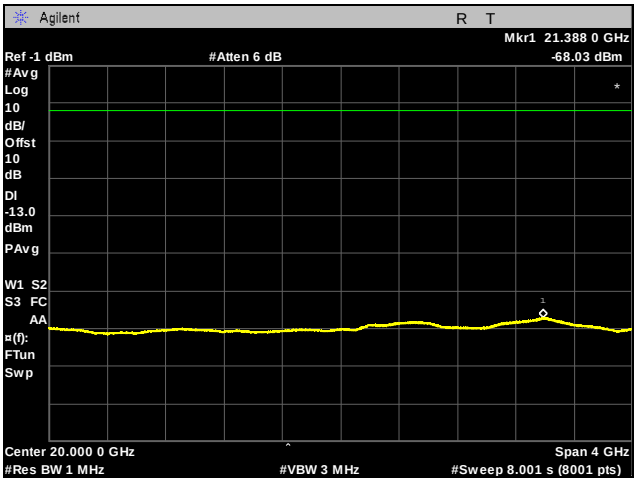
Plot 184. Spurious Emissions at Antenna Terminal, Low Channel, Band 4, 6 GHz – 10 GHz



Plot 185. Spurious Emissions at Antenna Terminal, Low Channel, Band 4, 10 GHz – 14 GHz

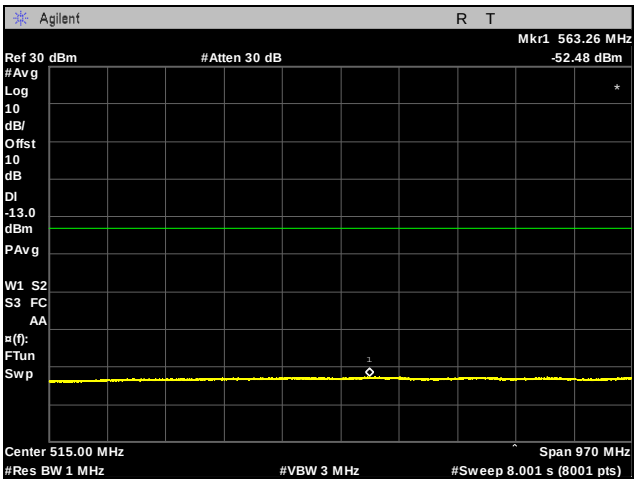


Plot 186. Spurious Emissions at Antenna Terminal, Low Channel, Band 4, 14 GHz – 18 GHz

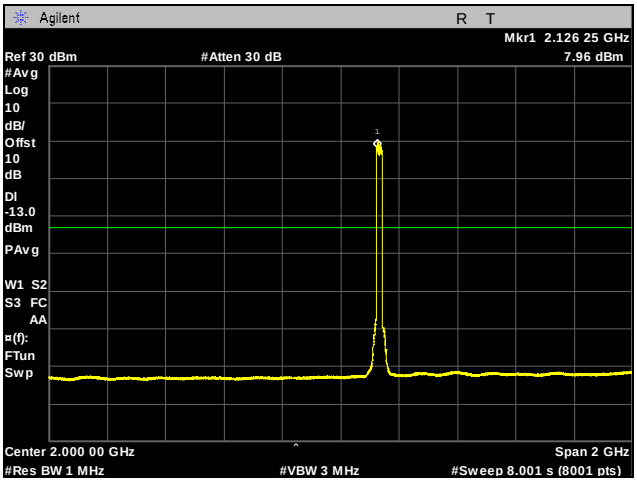


Plot 187. Spurious Emissions at Antenna Terminal, Low Channel, Band 4, 18 GHz – 22 GHz

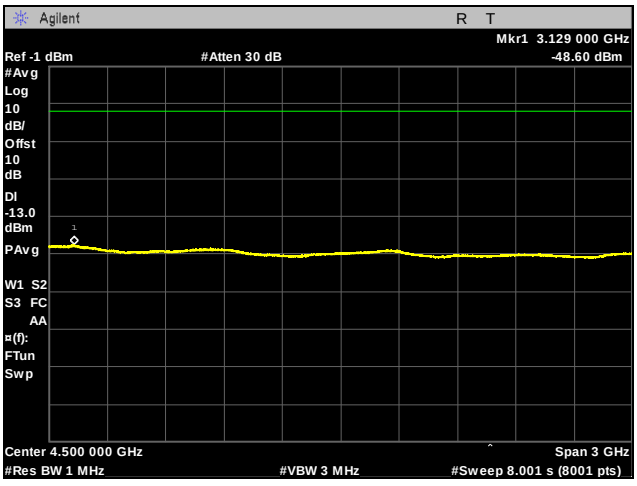
Spurious Emissions at Antenna Terminal, Band 4, Mid Channel



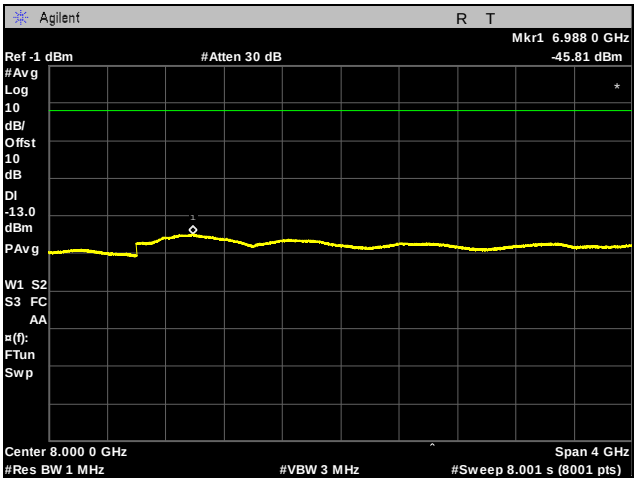
Plot 188. Spurious Emissions at Antenna Terminal, Mid Channel, Band 4, 30 MHz – 1 GHz



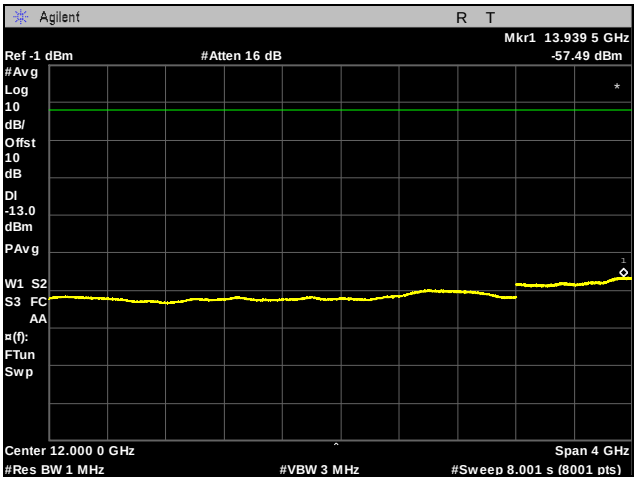
Plot 189. Spurious Emissions at Antenna Terminal, Mid Channel, Band 4, 1 GHz – 3 GHz



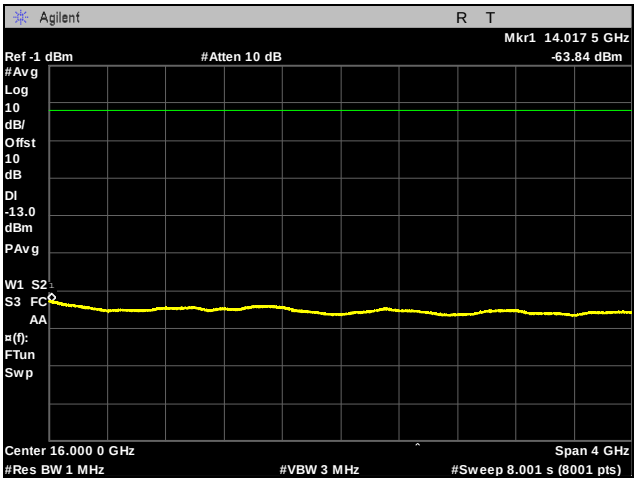
Plot 190. Spurious Emissions at Antenna Terminal, Mid Channel, Band 4, 3 GHz – 6 GHz



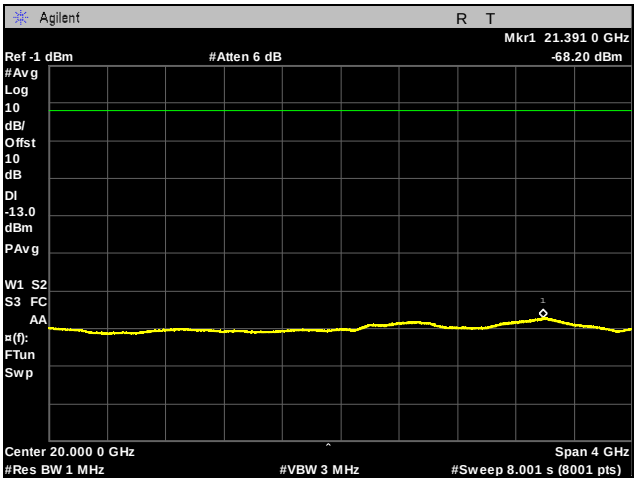
Plot 191. Spurious Emissions at Antenna Terminal, Mid Channel, Band 4, 6 GHz – 10 GHz



Plot 192. Spurious Emissions at Antenna Terminal, Mid Channel, Band 4, 10 GHz – 14 GHz

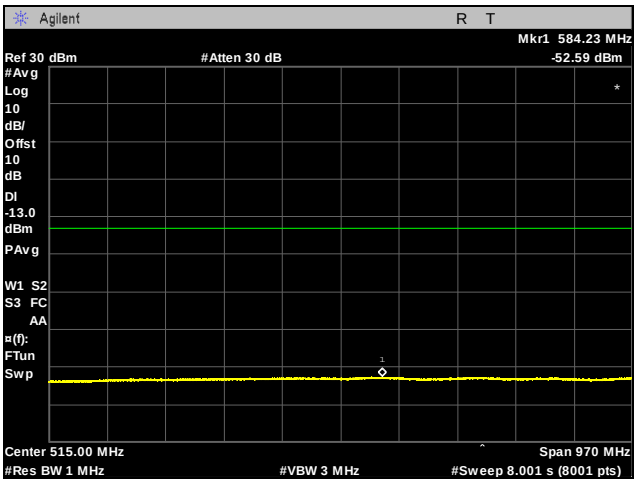


Plot 193. Spurious Emissions at Antenna Terminal, Mid Channel, Band 4, 14 GHz – 18 GHz

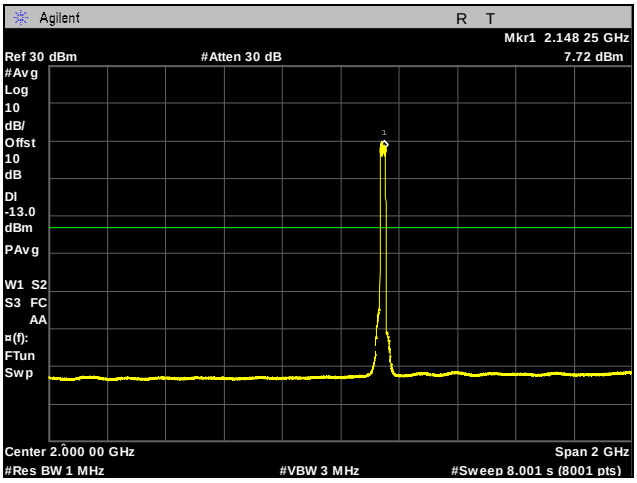


Plot 194. Spurious Emissions at Antenna Terminal, Mid Channel, Band 4, 18 GHz – 22 GHz

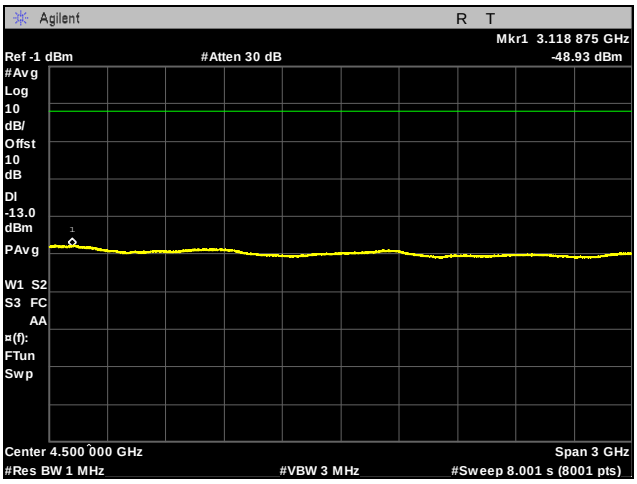
Spurious Emissions at Antenna Terminal, Band 4, High Channel



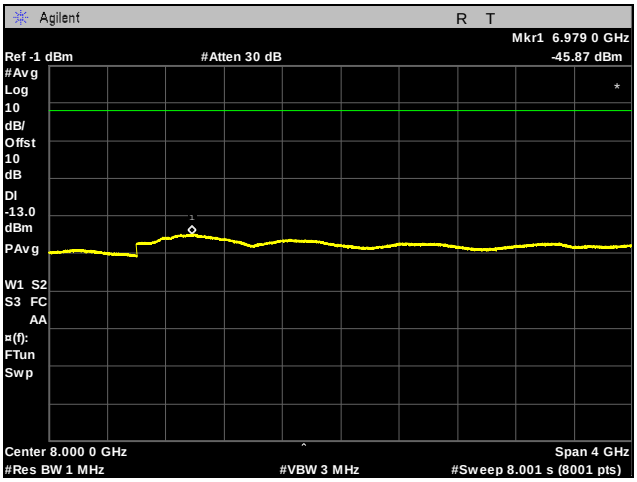
Plot 195. Spurious Emissions at Antenna Terminal, High Channel, Band 4, 30 MHz – 1 GHz



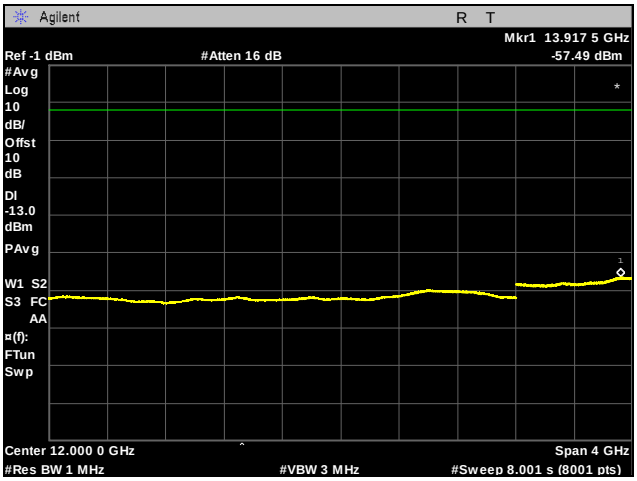
Plot 196. Spurious Emissions at Antenna Terminal, High Channel, Band 4, 1 GHz – 3 GHz



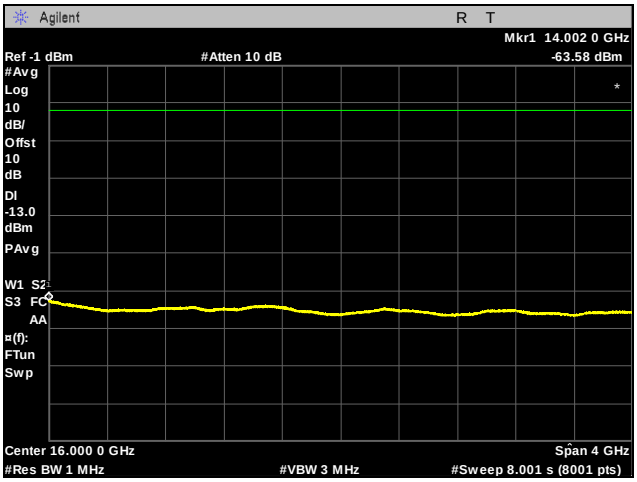
Plot 197. Spurious Emissions at Antenna Terminal, High Channel, Band 4, 3 GHz – 6 GHz



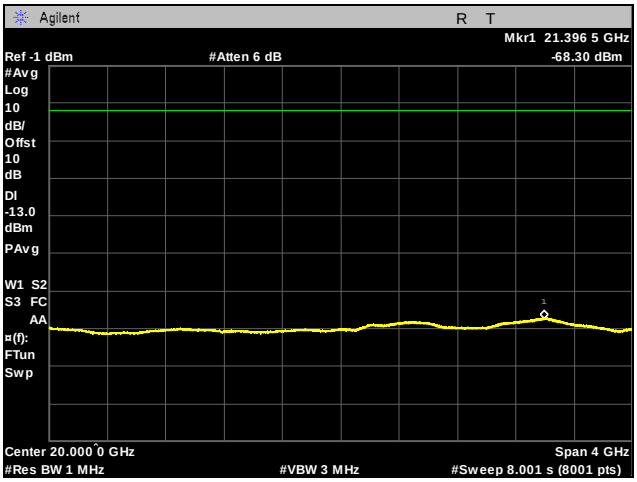
Plot 198. Spurious Emissions at Antenna Terminal, High Channel, Band 4, 6 GHz – 10 GHz



Plot 199. Spurious Emissions at Antenna Terminal, High Channel, Band 4, 10 GHz – 14 GHz

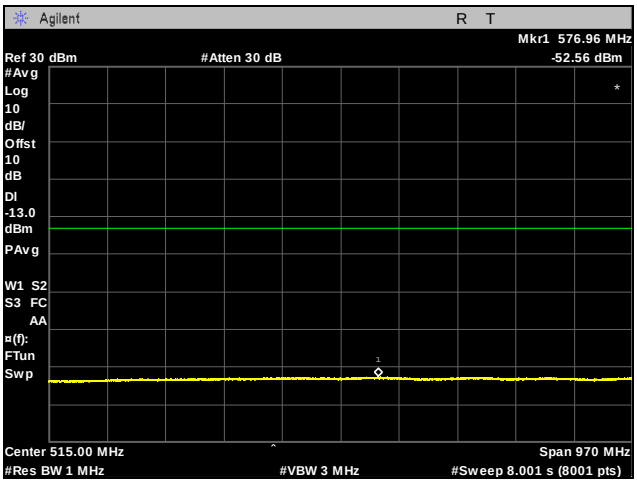


Plot 200. Spurious Emissions at Antenna Terminal, High Channel, Band 4, 14 GHz – 18 GHz

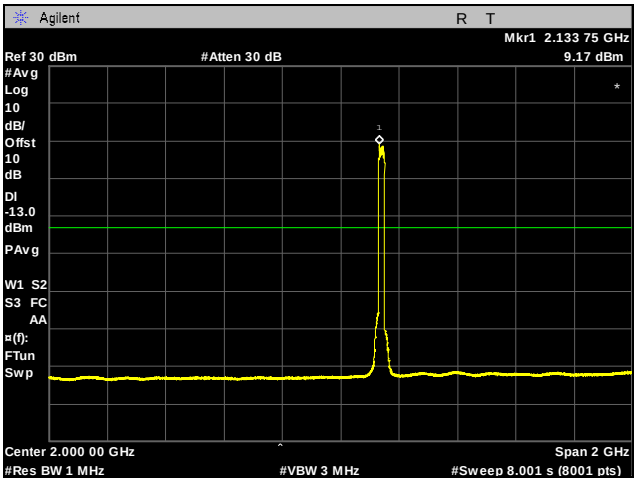


Plot 201. Spurious Emissions at Antenna Terminal, High Channel, Band 4, 18 GHz – 22 GHz

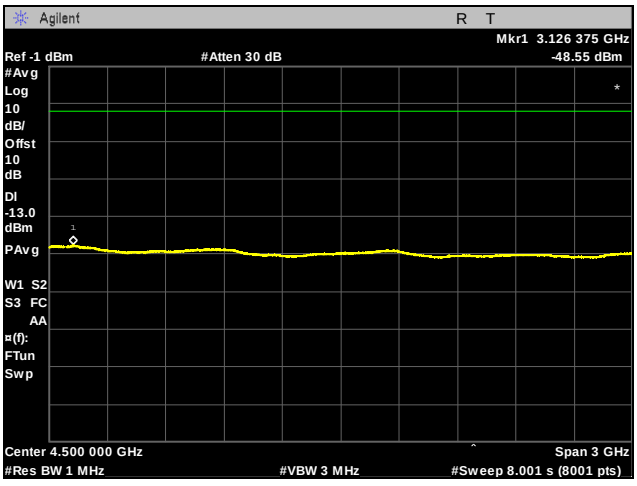
Spurious Emissions at Antenna Terminal, Band 10, Mid Channel



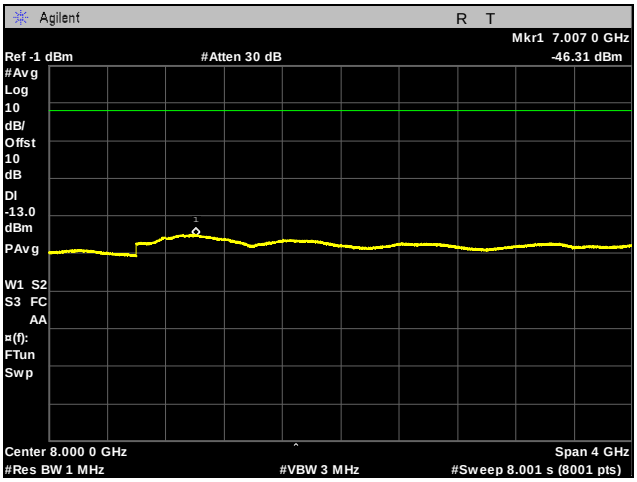
Plot 202. Spurious Emissions at Antenna Terminal, Mid Channel, Band 10, 30 MHz – 1 GHz



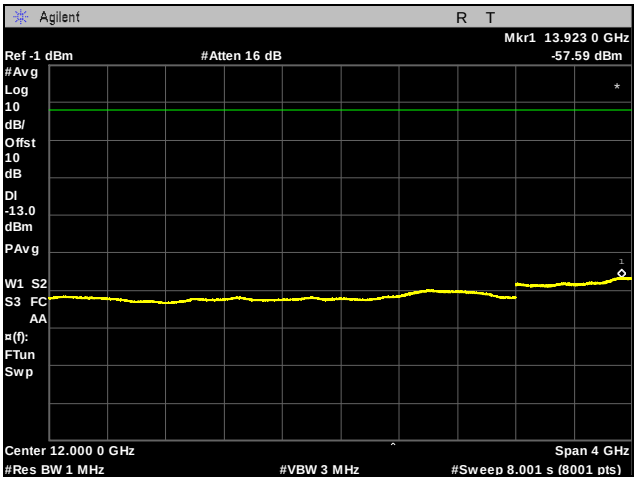
Plot 203. Spurious Emissions at Antenna Terminal, Mid Channel, Band 10, 1 GHz – 3 GHz



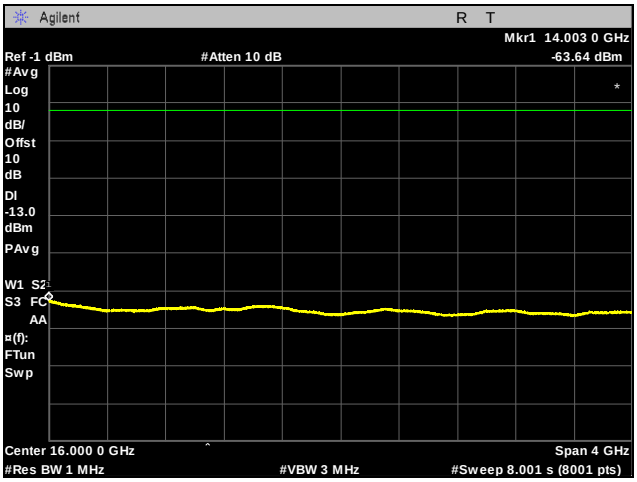
Plot 204. Spurious Emissions at Antenna Terminal, Mid Channel, Band 10, 3 GHz – 6 GHz



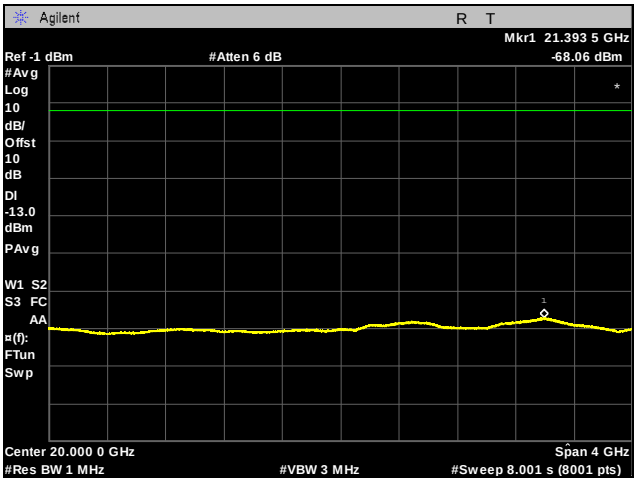
Plot 205. Spurious Emissions at Antenna Terminal, Mid Channel, Band 10, 6 GHz – 10 GHz



Plot 206. Spurious Emissions at Antenna Terminal, Mid Channel, Band 10, 10 GHz – 14 GHz

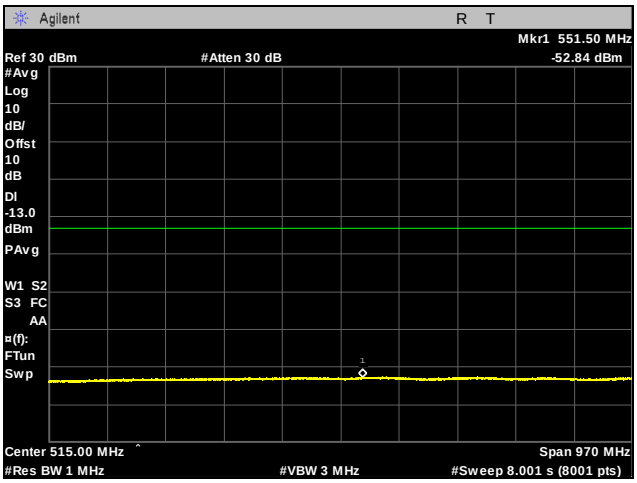


Plot 207. Spurious Emissions at Antenna Terminal, Mid Channel, Band 10, 14 GHz – 18 GHz

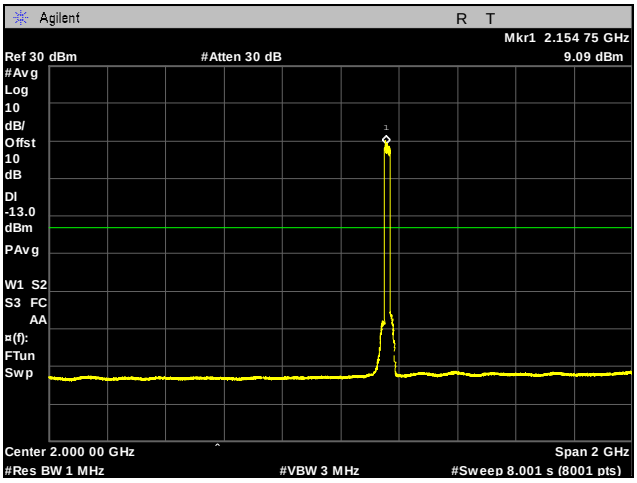


Plot 208. Spurious Emissions at Antenna Terminal, Mid Channel, Band 10, 18 GHz – 22 GHz

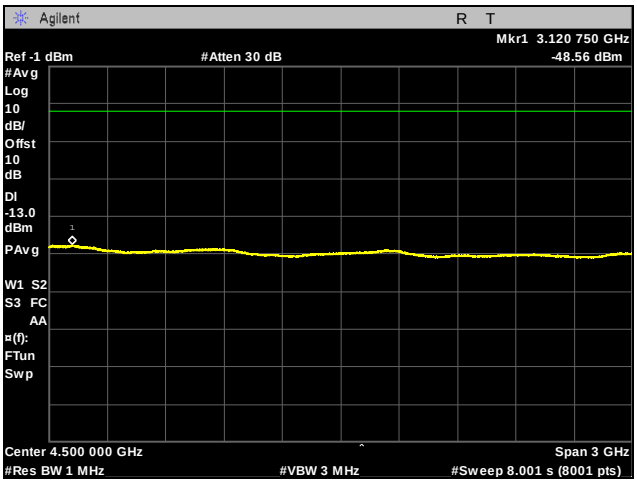
Spurious Emissions at Antenna Terminal, Band 10, High Channel



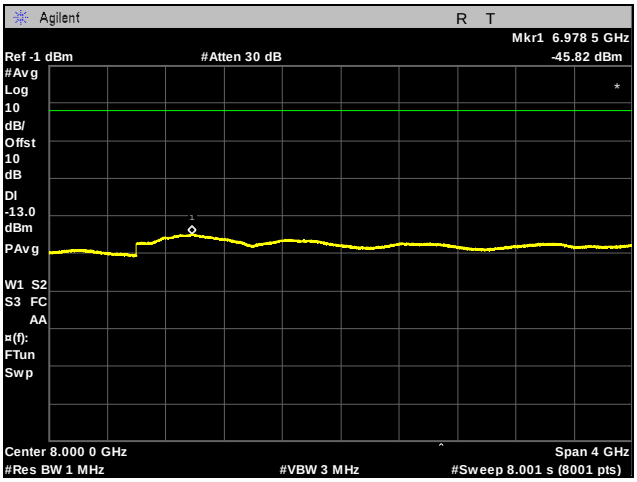
Plot 209. Spurious Emissions at Antenna Terminal, High Channel, Band 10, 30 MHz – 1 GHz



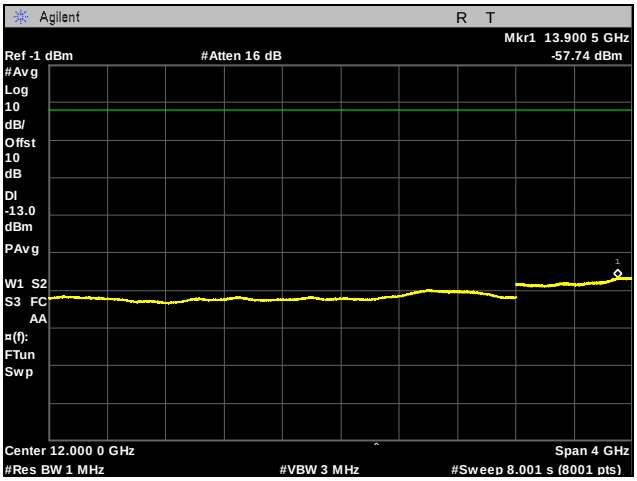
Plot 210. Spurious Emissions at Antenna Terminal, High Channel, Band 10, 1 GHz – 3 GHz



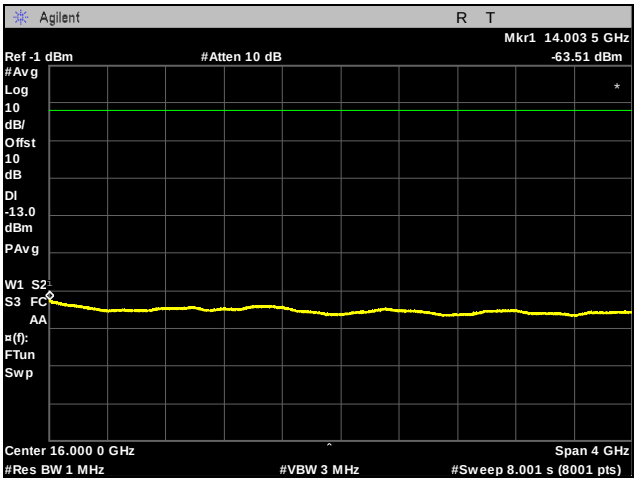
Plot 211. Spurious Emissions at Antenna Terminal, High Channel, Band 10, 3 GHz – 6 GHz



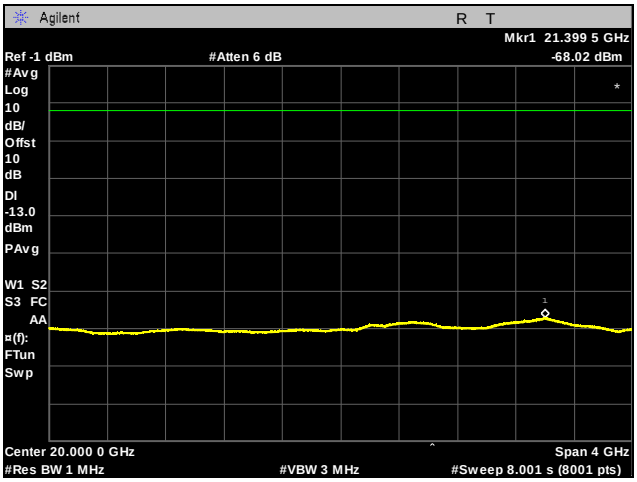
Plot 212. Spurious Emissions at Antenna Terminal, High Channel, Band 10, 6 GHz – 10 GHz



Plot 213. Spurious Emissions at Antenna Terminal, High Channel, Band 10, 10 GHz – 14 GHz

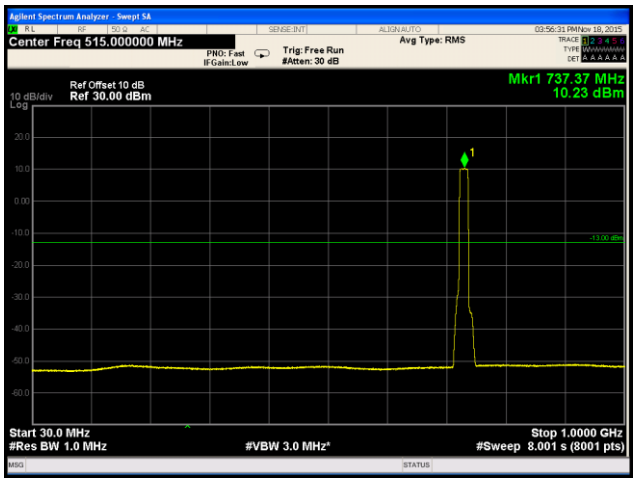


Plot 214. Spurious Emissions at Antenna Terminal, High Channel, Band 10, 14 GHz – 18 GHz

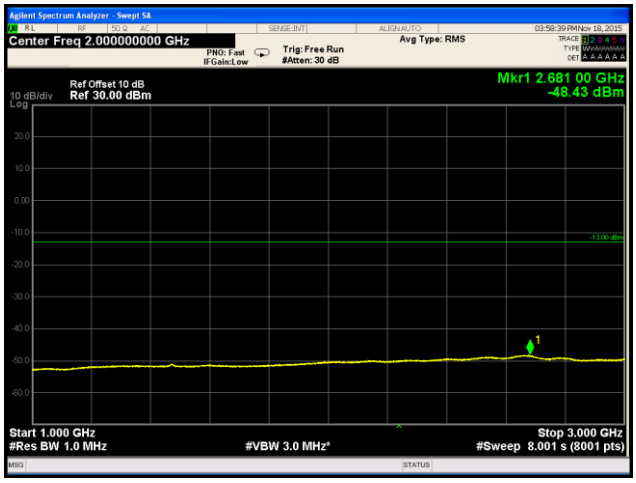


Plot 215. Spurious Emissions at Antenna Terminal, High Channel, Band 10, 18 GHz – 22 GHz

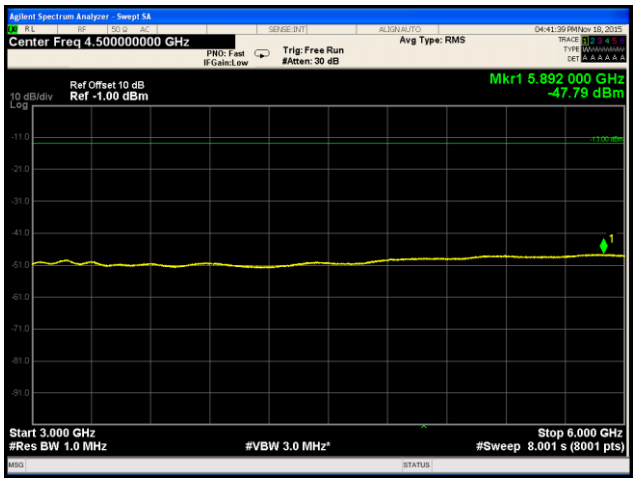
Spurious Emissions at Antenna Terminal, Band 12, Low Channel



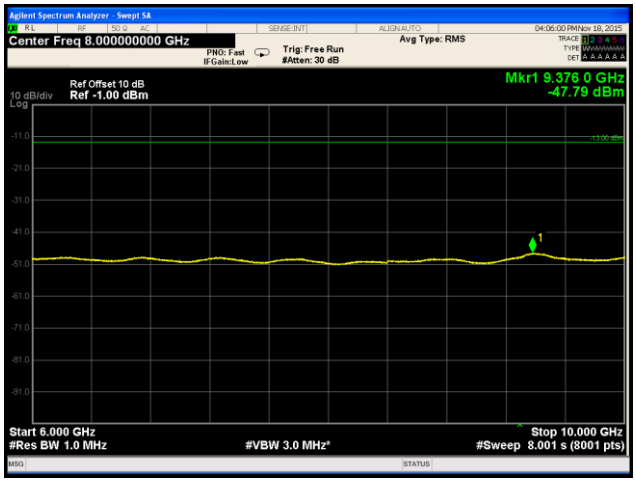
Plot 216. Spurious Emissions at Antenna Terminal, Low Channel, Band 12, 30 MHz – 1 GHz



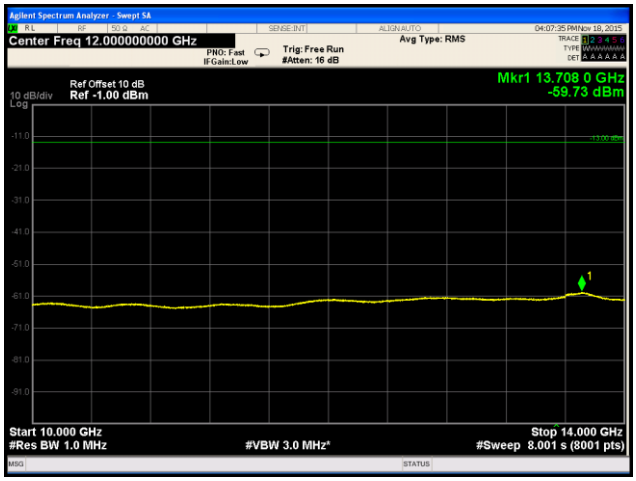
Plot 217. Spurious Emissions at Antenna Terminal, Low Channel, Band 12, 1 GHz – 3 GHz



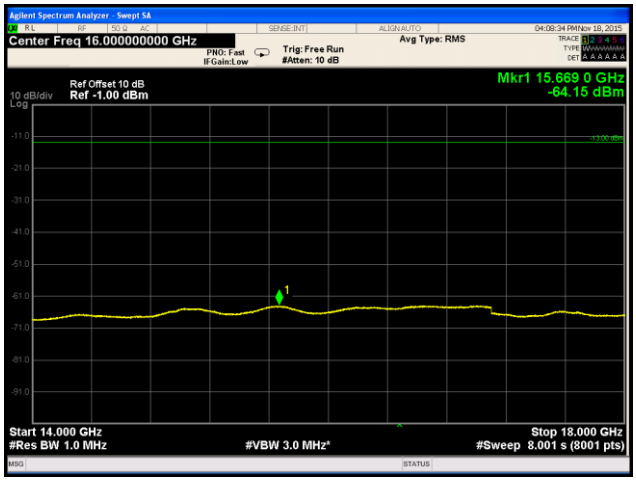
Plot 218. Spurious Emissions at Antenna Terminal, Low Channel, Band 12, 3 GHz – 6 GHz



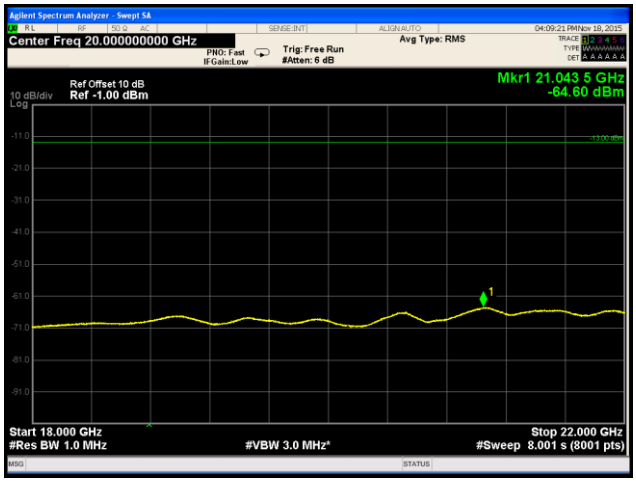
Plot 219. Spurious Emissions at Antenna Terminal, Low Channel, Band 12, 6 GHz – 10 GHz



Plot 220. Spurious Emissions at Antenna Terminal, Low Channel, Band 12, 10 GHz – 14 GHz

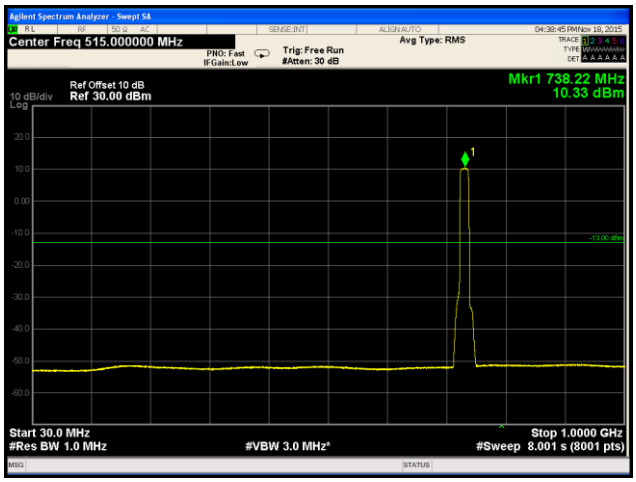


Plot 221. Spurious Emissions at Antenna Terminal, Low Channel, Band 12, 14 GHz – 18 GHz

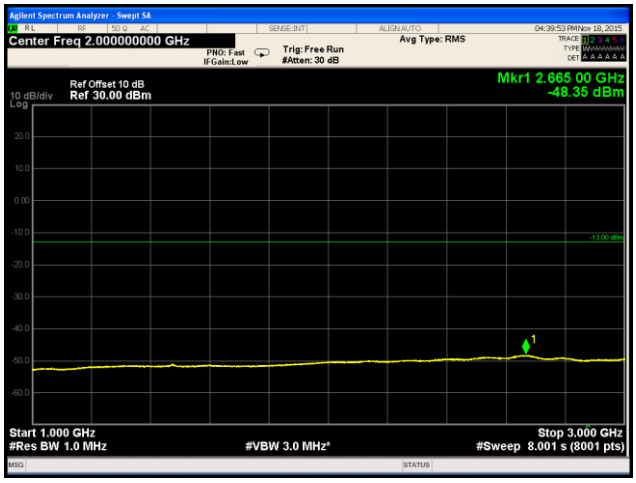


Plot 222. Spurious Emissions at Antenna Terminal, Low Channel, Band 12, 18 GHz – 22 GHz

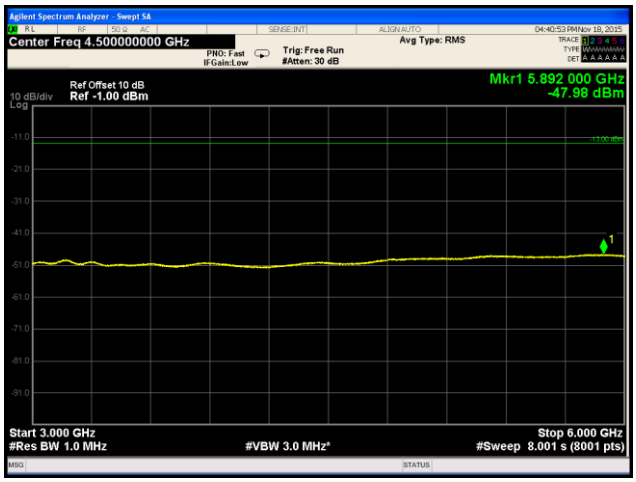
Spurious Emissions at Antenna Terminal, Band 12, Mid Channel



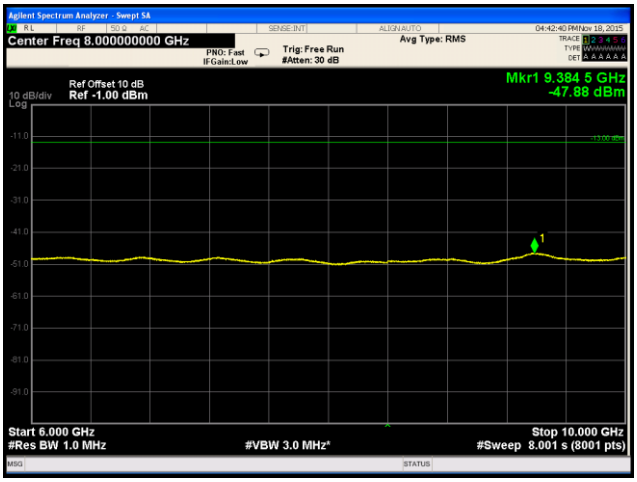
Plot 223. Spurious Emissions at Antenna Terminal, Mid Channel, Band 12, 30 MHz – 1 GHz



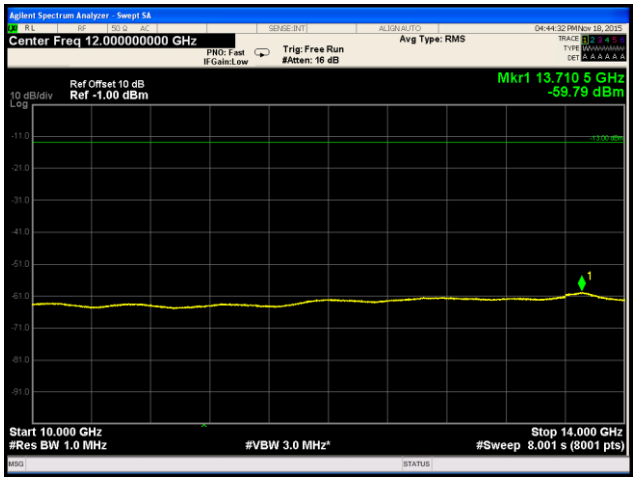
Plot 224. Spurious Emissions at Antenna Terminal, Mid Channel, Band 12, 1 GHz – 3 GHz



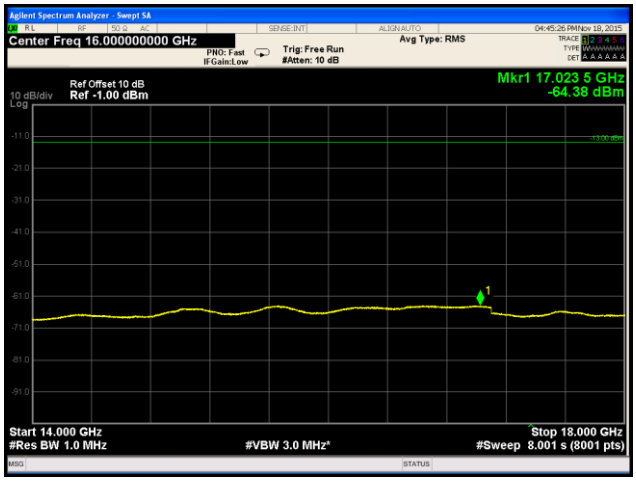
Plot 225. Spurious Emissions at Antenna Terminal, Mid Channel, Band 12, 3 GHz – 6 GHz



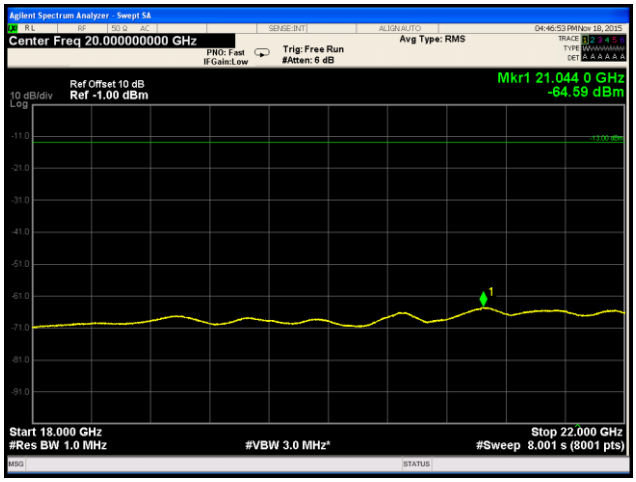
Plot 226. Spurious Emissions at Antenna Terminal, Mid Channel, Band 12, 6 GHz – 10 GHz



Plot 227. Spurious Emissions at Antenna Terminal, Mid Channel, Band 12, 10 GHz – 14 GHz

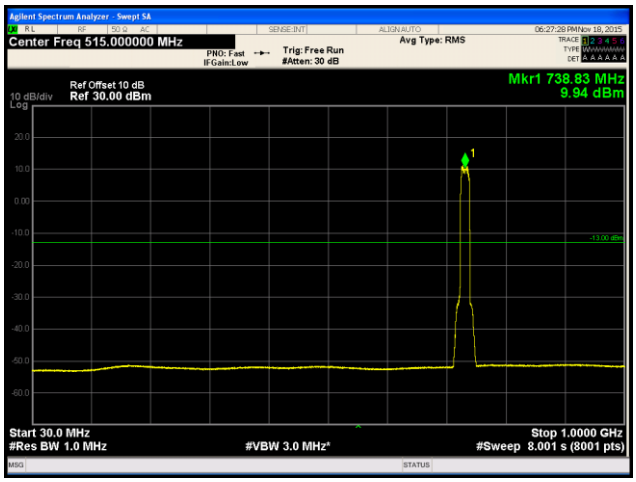


Plot 228. Spurious Emissions at Antenna Terminal, Mid Channel, Band 12, 14 GHz – 18 GHz

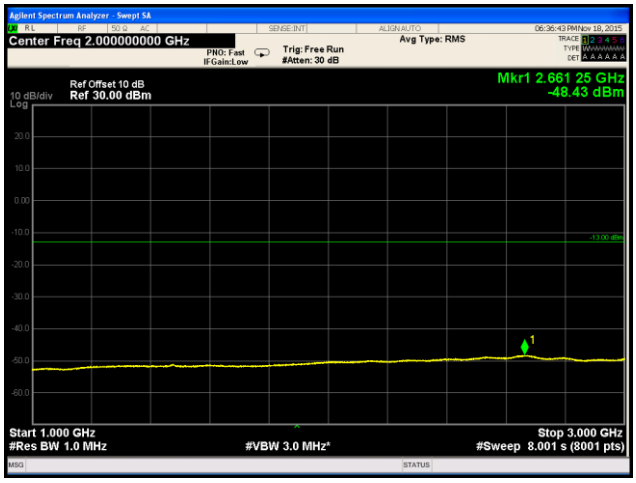


Plot 229. Spurious Emissions at Antenna Terminal, Mid Channel, Band 12, 18 GHz – 22 GHz

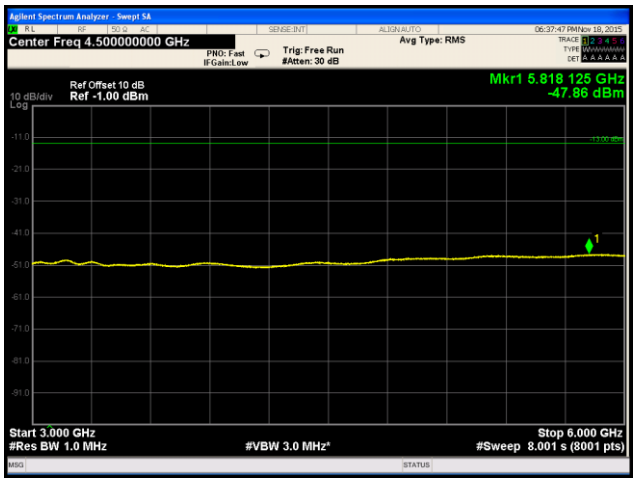
Spurious Emissions at Antenna Terminal, Band 12, High Channel



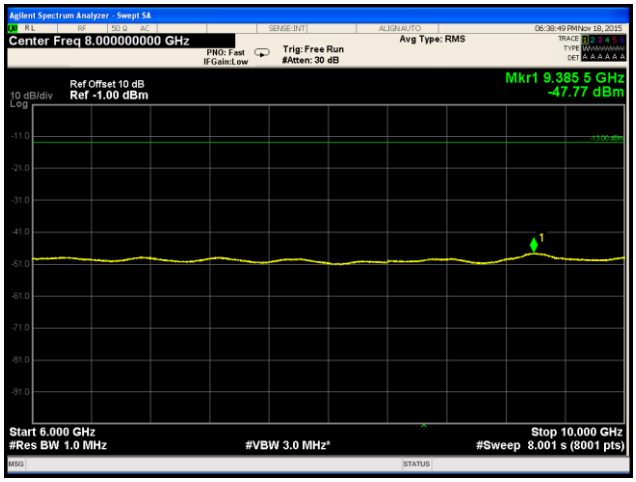
Plot 230. Spurious Emissions at Antenna Terminal, High Channel, Band 12, 30 MHz – 1 GHz



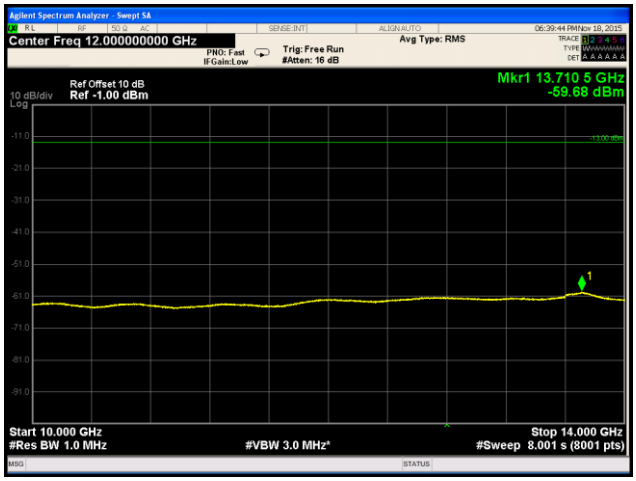
Plot 231. Spurious Emissions at Antenna Terminal, High Channel, Band 12, 1 GHz – 3 GHz



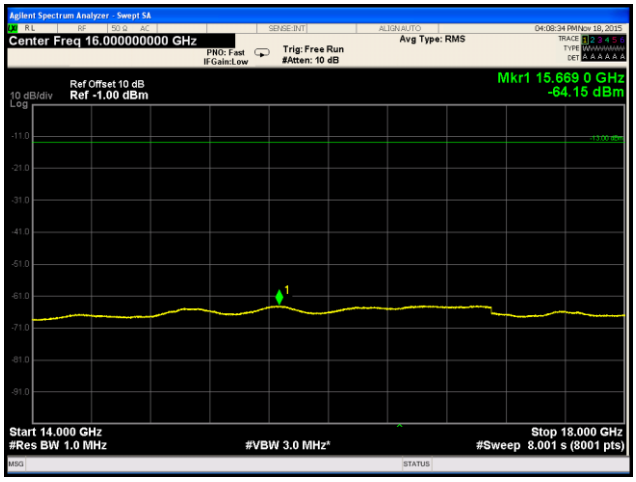
Plot 232. Spurious Emissions at Antenna Terminal, High Channel, Band 12, 3 GHz – 6 GHz



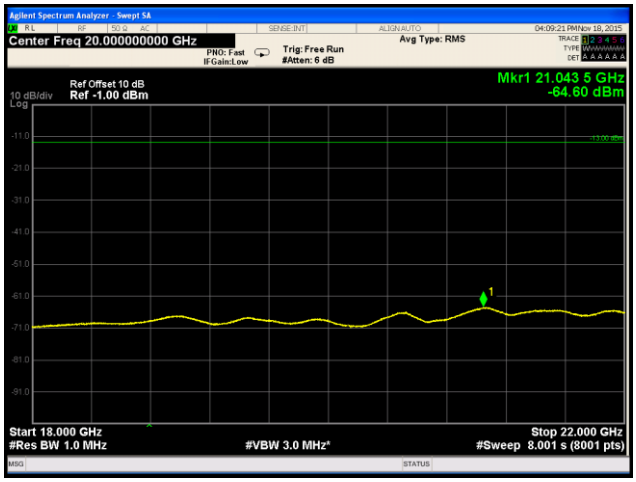
Plot 233. Spurious Emissions at Antenna Terminal, High Channel, Band 12, 6 GHz – 10 GHz



Plot 234. Spurious Emissions at Antenna Terminal, High Channel, Band 12, 10 GHz – 14 GHz



Plot 235. Spurious Emissions at Antenna Terminal, High Channel, Band 12, 14 GHz – 18 GHz

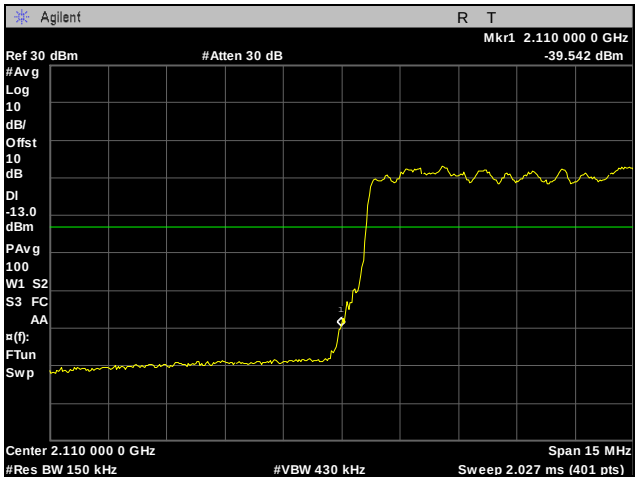


Plot 236. Spurious Emissions at Antenna Terminal, High Channel, Band 12, 18 GHz – 22 GHz

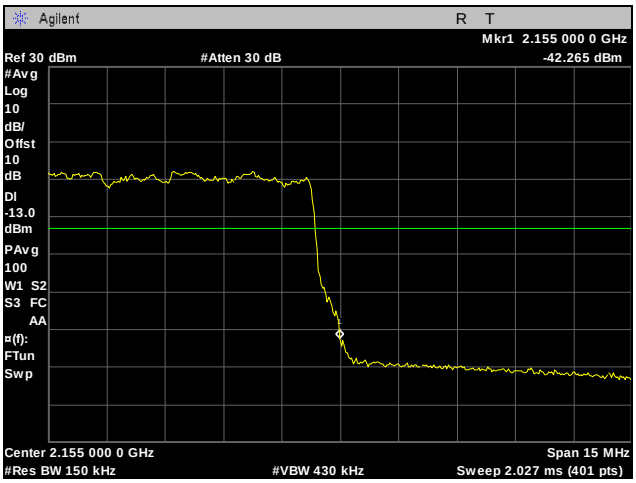
Band Edge Measurements

Test Procedures: The transmitter was turned on. Measurements were performed of the low and high Channels. The plots shown demonstrated that the EUT Emissions at the Band's Edges are below -13dBm.

Band Edge, Band 4, 15 MHz, 16QAM, Port 1

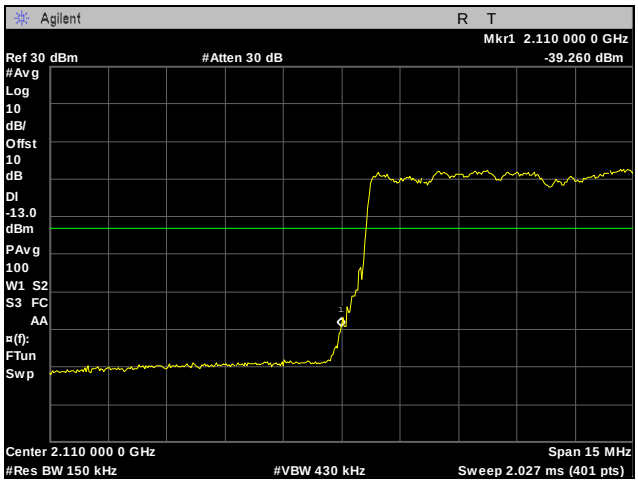


Plot 237. Band Edge, Low Channel, Band 4, 15 MHz, 16QAM, Port 1

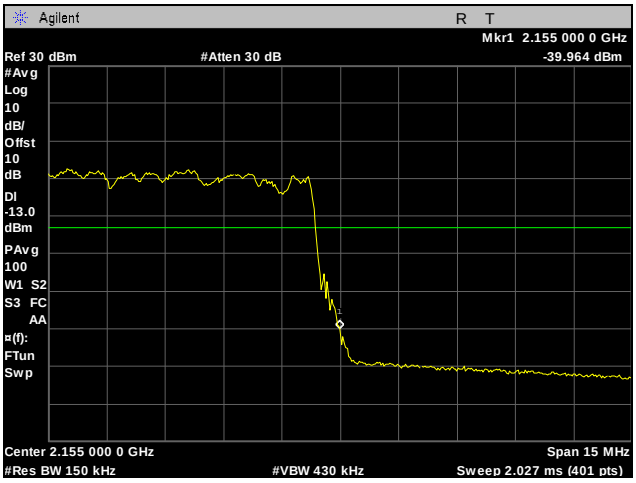


Plot 238. Band Edge, High Channel, Band 4, 15 MHz, 16QAM, Port 1

Band Edge, Band 4, 15 MHz, 64QAM, Port 1

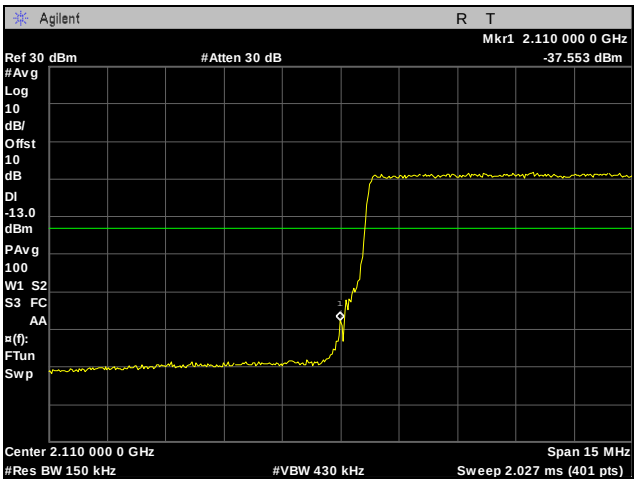


Plot 239. Band Edge, Low Channel, Band 4, 15 MHz, 64QAM, Port 1

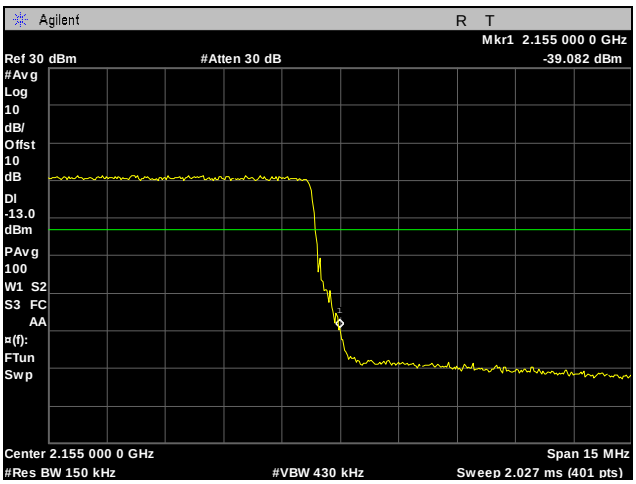


Plot 240. Band Edge, High Channel, Band 4, 15 MHz, 64QAM, Port 1

Band Edge, Band 4, 15 MHz, QPSK, Port 1

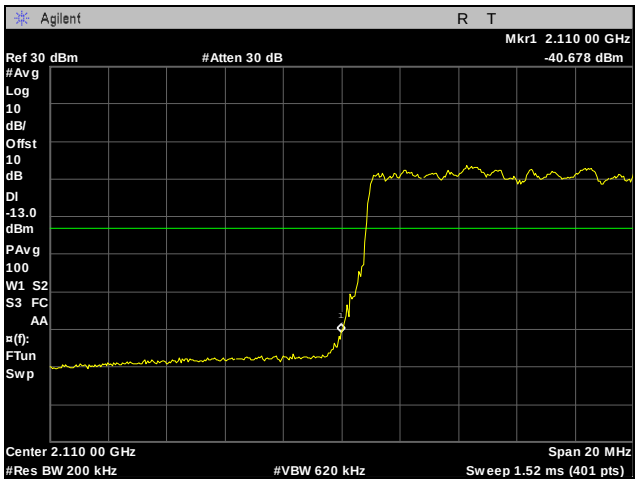


Plot 241. Band Edge, Low Channel, Band 4, 15 MHz, QPSK, Port 1

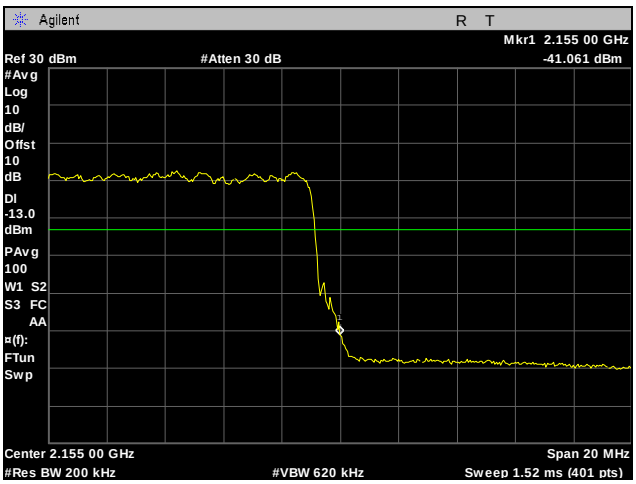


Plot 242. Band Edge, High Channel, Band 4, 15 MHz, QPSK, Port 1

Band Edge, Band 4, 20 MHz, 16QAM, Port 1

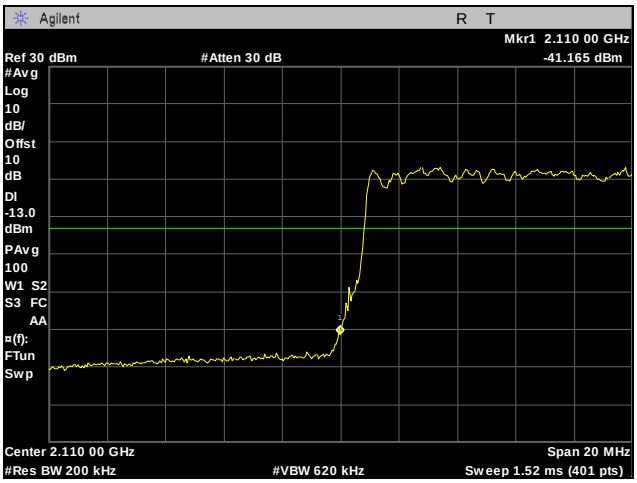


Plot 243. Band Edge, Low Channel, Band 4, 20 MHz, 16QAM, Port 1

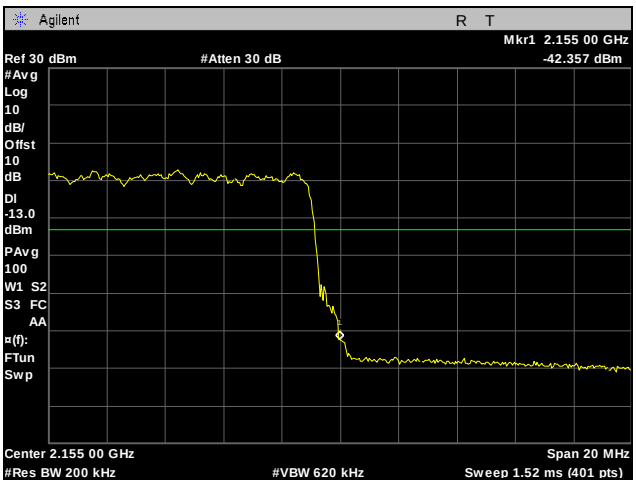


Plot 244. Band Edge, High Channel, Band 4, 20 MHz, 16QAM, Port 1

Band Edge, Band 4, 20 MHz, 64QAM, Port 1

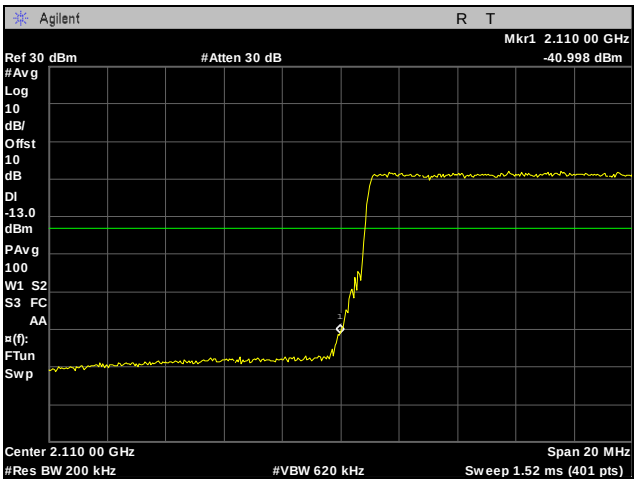


Plot 245. Band Edge, Low Channel, Band 4, 20 MHz, 64QAM, Port 1

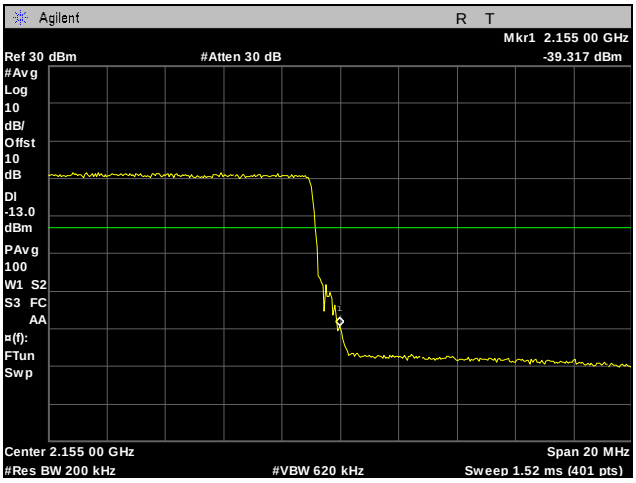


Plot 246. Band Edge, High Channel, Band 4, 20 MHz, 64QAM, Port 1

Band Edge, Band 4, 20 MHz, QPSK, Port 1

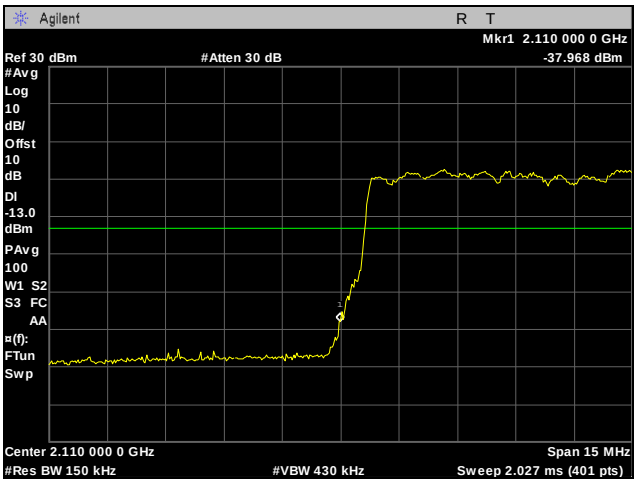


Plot 247. Band Edge, Low Channel, Band 4, 20 MHz, QPSK, Port 1

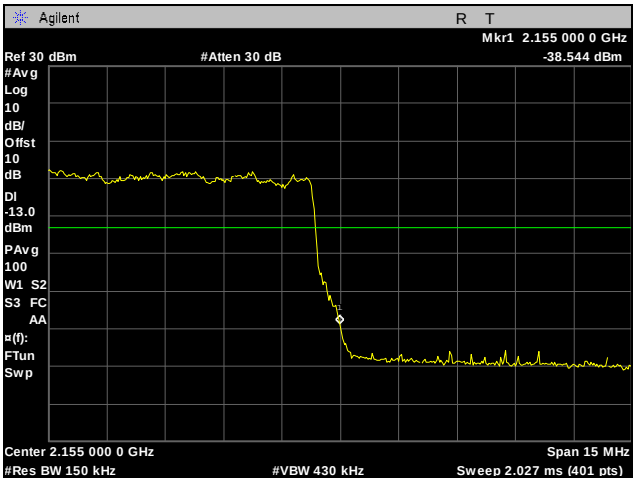


Plot 248. Band Edge, High Channel, Band 4, 20 MHz, QPSK, Port 1

Band Edge, Band 4, 15 MHz, 16QAM, Port 2

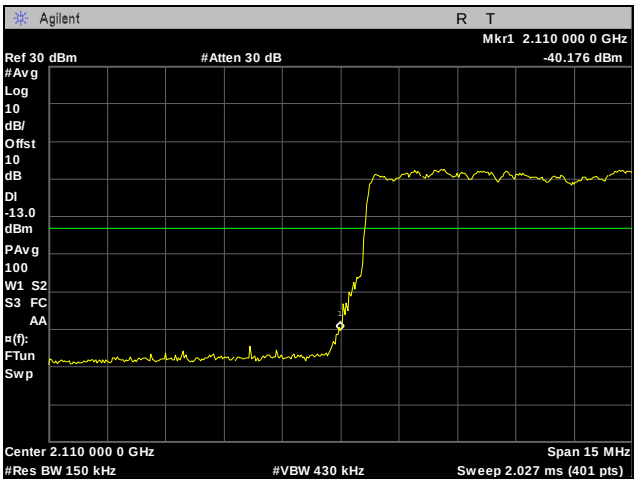


Plot 249. Band Edge, Low Channel, Band 4, 15 MHz, 16QAM, Port 2

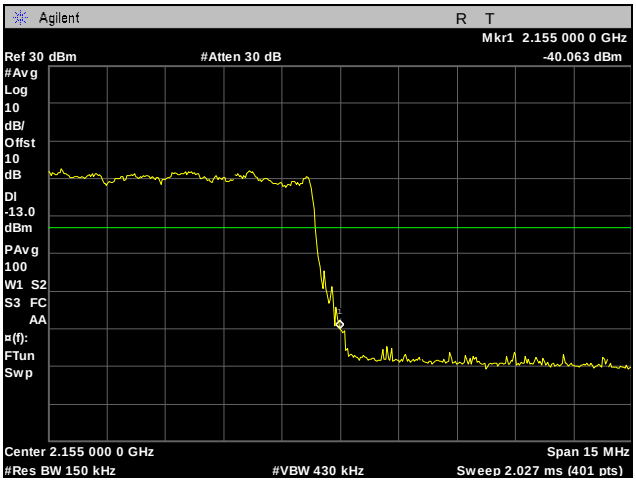


Plot 250. Band Edge, High Channel, Band 4, 15 MHz, 16QAM, Port 2

Band Edge, Band 4, 15 MHz, 64QAM, Port 2

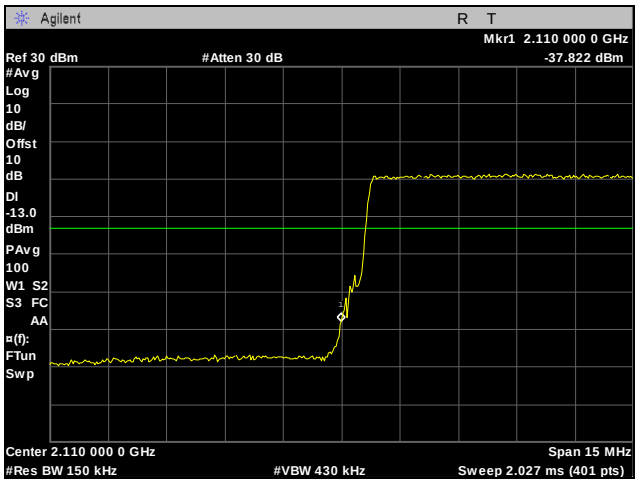


Plot 251. Band Edge, Low Channel, Band 4, 15 MHz, 64QAM, Port 2

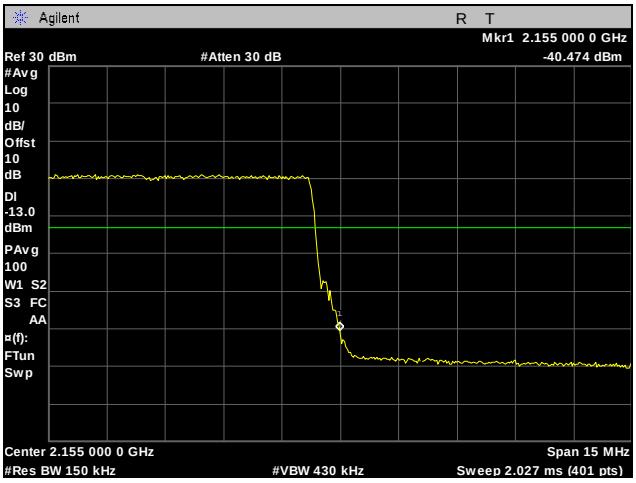


Plot 252. Band Edge, High Channel, Band 4, 15 MHz, 64QAM, Port 2

Band Edge, Band 4, 15 MHz, QPSK, Port 2

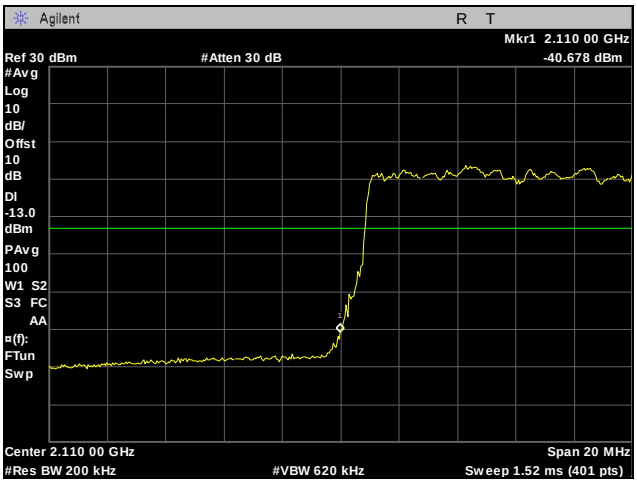


Plot 253. Band Edge, Low Channel, Band 4, 15 MHz, QPSK, Port 2

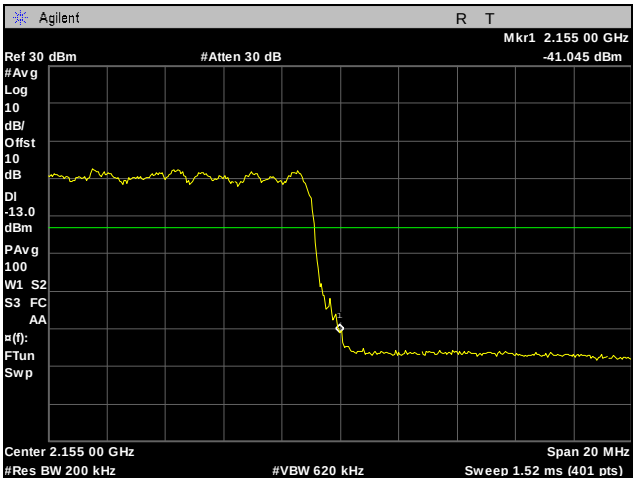


Plot 254. Band Edge, High Channel, Band 4, 15 MHz, QPSK, Port 2

Band Edge, Band 4, 20 MHz, 16QAM, Port 2

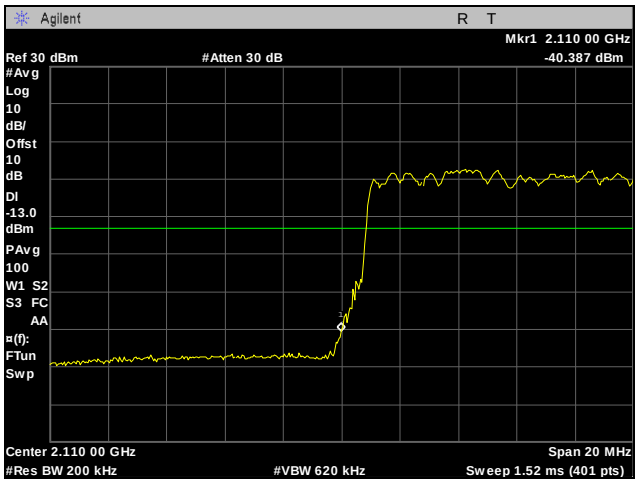


Plot 255. Band Edge, Low Channel, Band 4, 20 MHz, 16QAM, Port 2

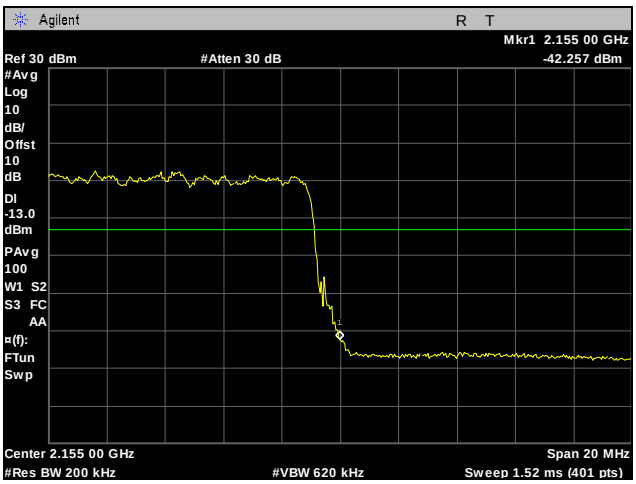


Plot 256. Band Edge, High Channel, Band 4, 20 MHz, 16QAM, Port 2

Band Edge, Band 4, 20 MHz, 64QAM, Port 2

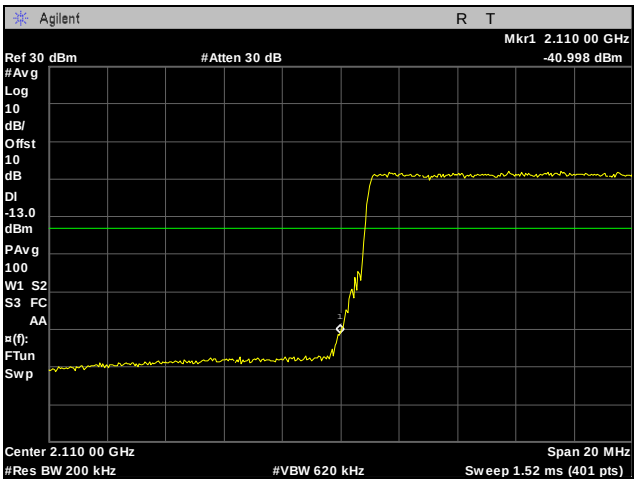


Plot 257. Band Edge, Low Channel, Band 4, 20 MHz, 64QAM, Port 2

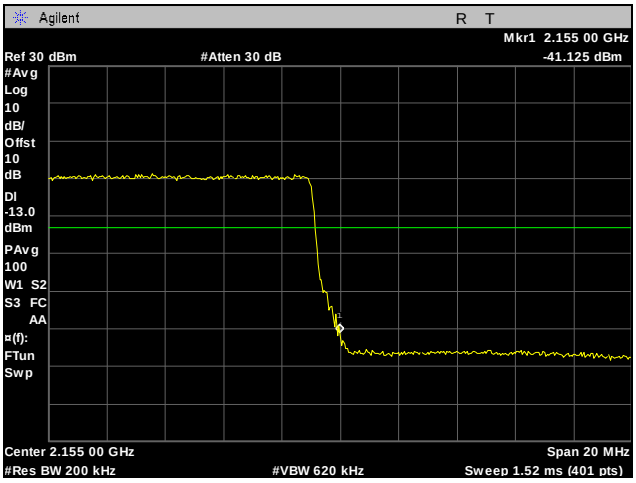


Plot 258. Band Edge, High Channel, Band 4, 20 MHz, 64QAM, Port 2

Band Edge, Band 4, 20 MHz, QPSK, Port 2

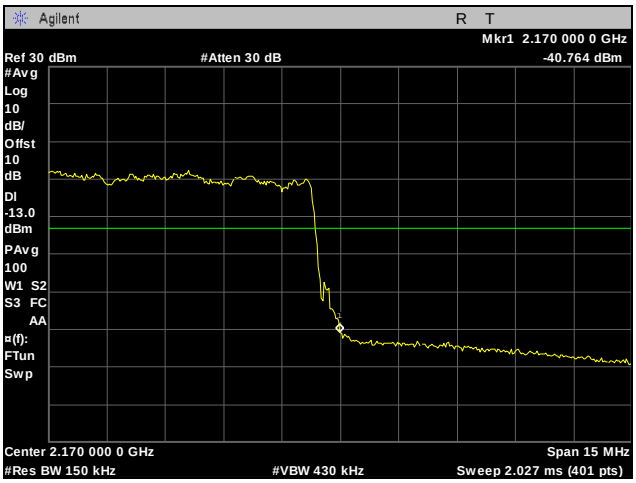


Plot 259. Band Edge, Low Channel, Band 4, 20 MHz, QPSK, Port 2



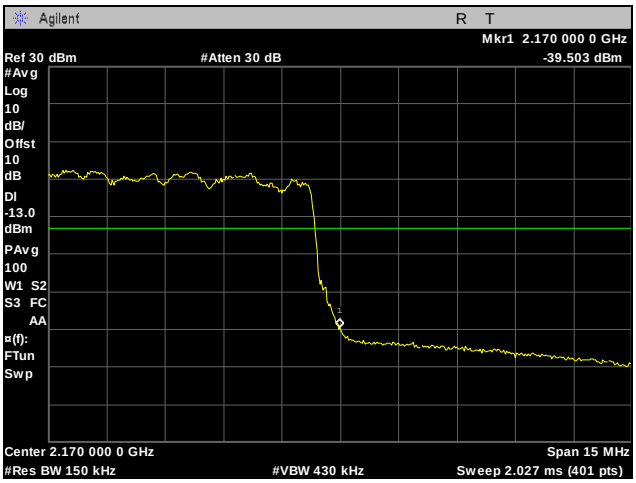
Plot 260. Band Edge, High Channel, Band 4, 20 MHz, QPSK, Port 2

Band Edge, Band 10, 15 MHz, 16QAM, Port 1



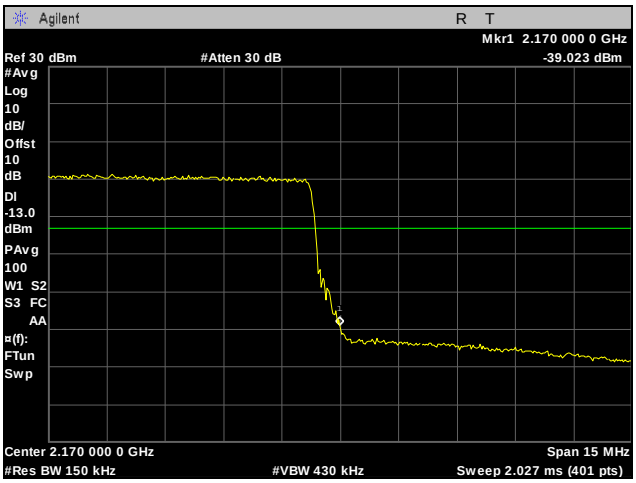
Plot 261. Band Edge, High Channel, Band 10, 15 MHz, 16QAM, Port 1

Band Edge, Band 10, 15 MHz, 64QAM, Port 1



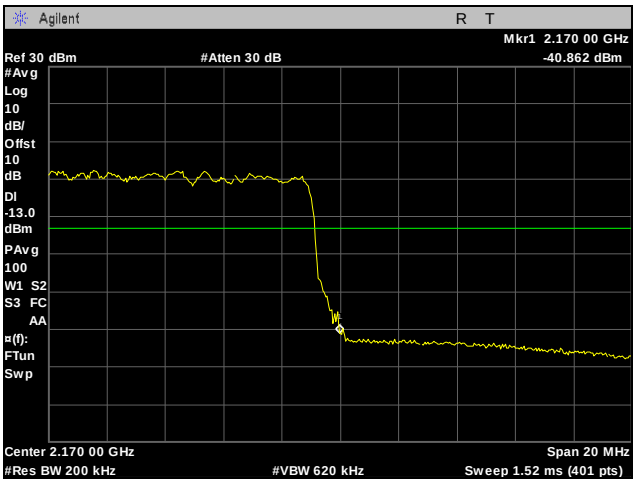
Plot 262. Band Edge, High Channel, Band 10, 15 MHz, 64QAM, Port 1

Band Edge, Band 10, 15 MHz, QPSK, Port 1



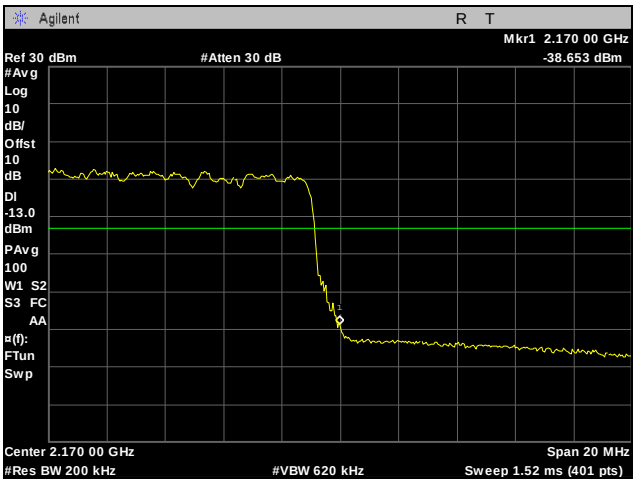
Plot 263. Band Edge, High Channel, Band 10, 15 MHz, QPSK, Port 1

Band Edge, Band 10, 20 MHz, 16QAM, Port 1



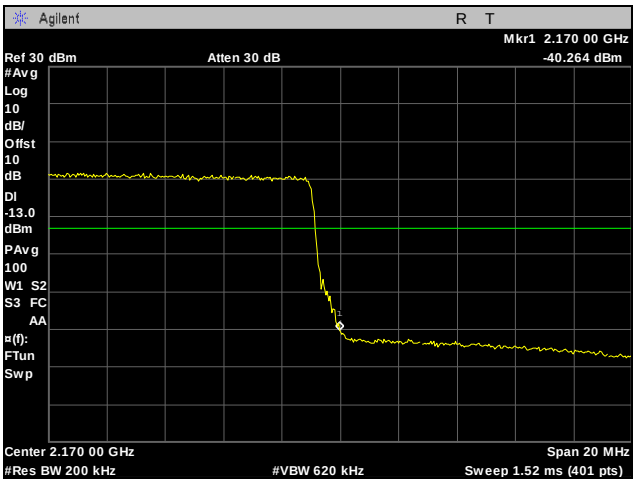
Plot 264. Band Edge, High Channel, Band 10, 20 MHz, 16QAM, Port 1

Band Edge, Band 10, 20 MHz, 64QAM, Port 1



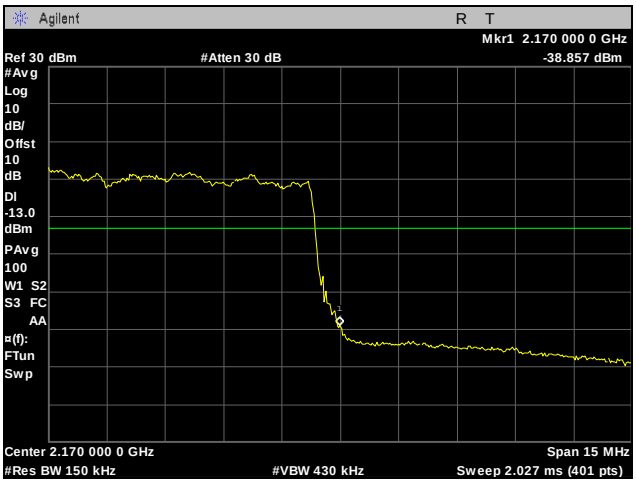
Plot 265. Band Edge, High Channel, Band 10, 20 MHz, 64QAM, Port 1

Band Edge, Band 10, 20 MHz, QPSK, Port 1



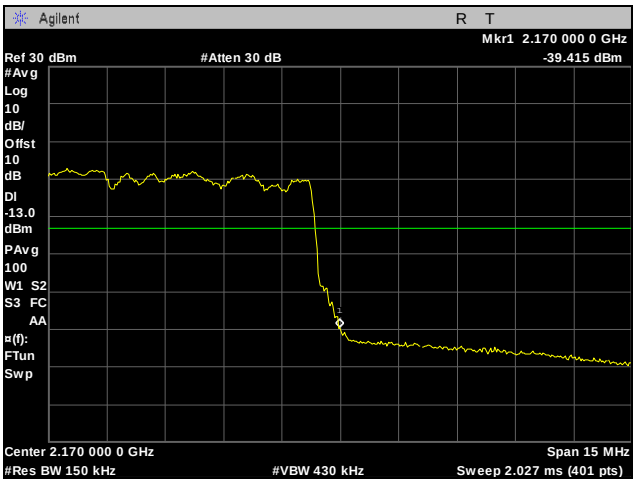
Plot 266. Band Edge, High Channel, Band 10, 20 MHz, QPSK, Port 1

Band Edge, Band 10, 15 MHz, 16QAM, Port 2



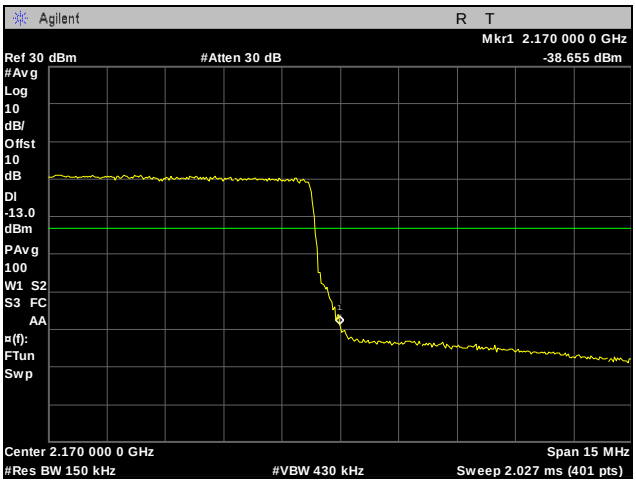
Plot 267. Band Edge, High Channel, Band 10, 15 MHz, 16QAM, Port 2

Band Edge, Band 10, 15 MHz, 64QAM, Port 2



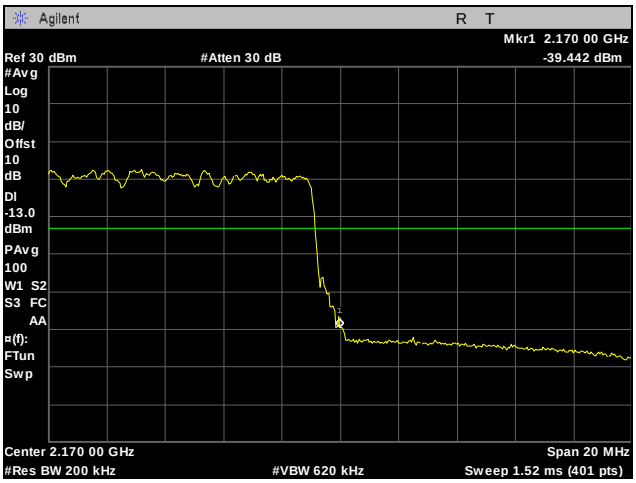
Plot 268. Band Edge, High Channel, Band 10, 15 MHz, 64QAM, Port 2

Band Edge, Band 10, 15 MHz, QPSK, Port 2



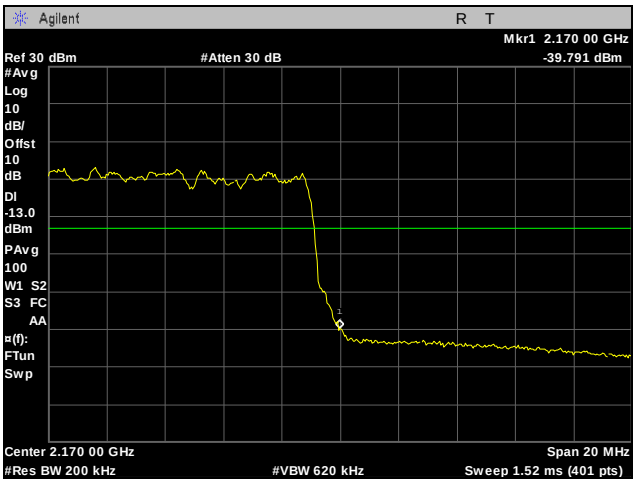
Plot 269. Band Edge, High Channel, Band 10, 15 MHz, QPSK, Port 2

Band Edge, Band 10, 20 MHz, 16QAM, Port 2



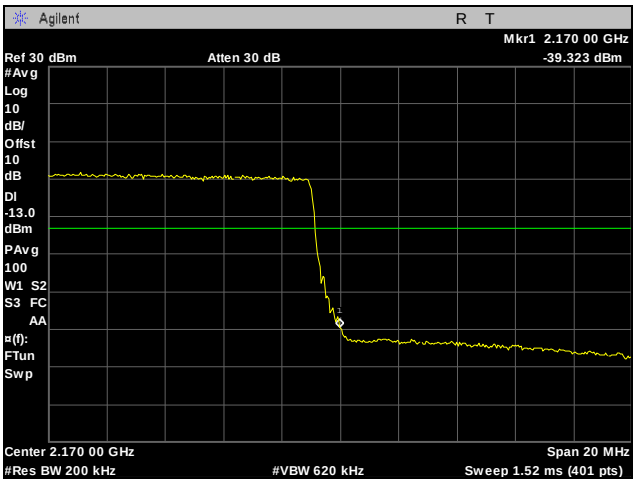
Plot 270. Band Edge, High Channel, Band 10, 20 MHz, 16QAM, Port 2

Band Edge, Band 10, 20 MHz, 64QAM, Port 2



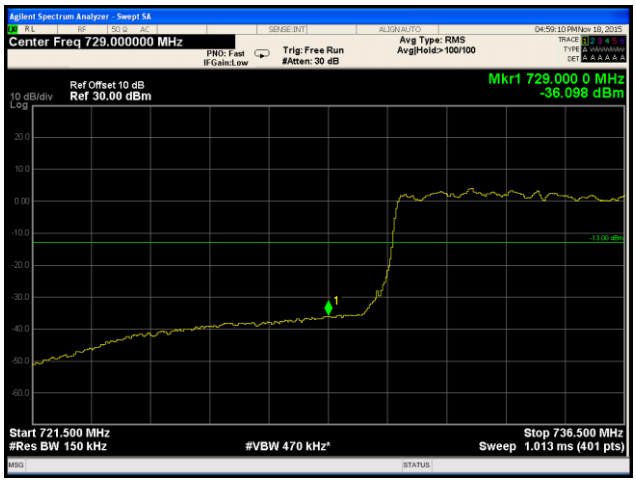
Plot 271. Band Edge, High Channel, Band 10, 20 MHz, 64QAM, Port 2

Band Edge, Band 10, 20 MHz, QPSK, Port 2



Plot 272. Band Edge, High Channel, Band 10, 20 MHz, QPSK, Port 2

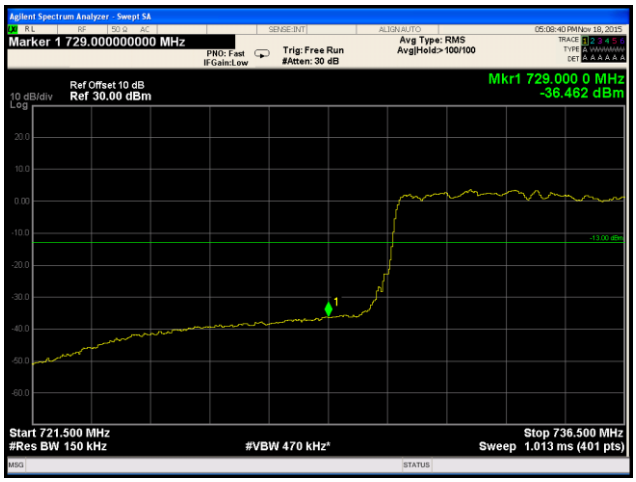
Band Edge, Band 12, 16QAM, Port 1



Plot 273. Band Edge, Low Channel, Band 12, 16QAM, Port 1

Plot 274. Band Edge, High Channel, Band 12, 16QAM, Port 1

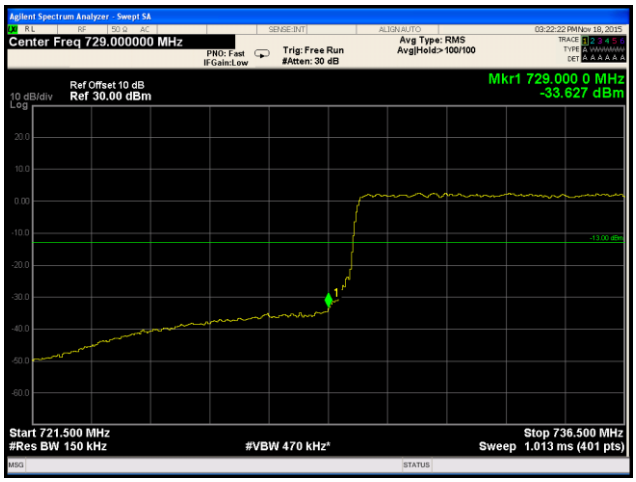
Band Edge, Band 12, 64QAM, Port 1



Plot 275. Band Edge, Low Channel, Band 12, 64QAM, Port 1

Plot 276. Band Edge, High Channel, Band 12, 64QAM, Port 1

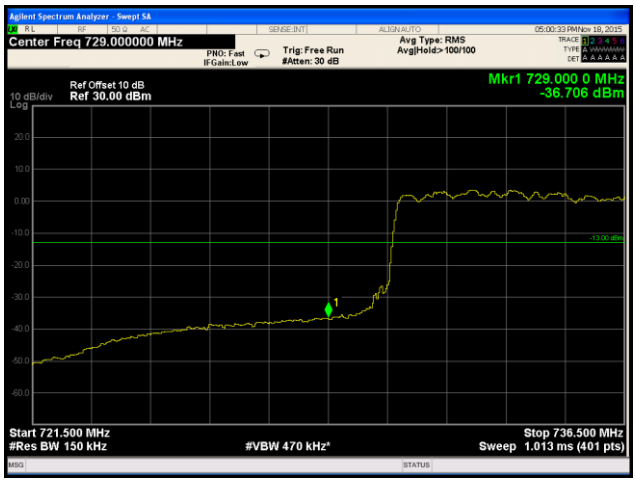
Band Edge, Band 12, QPSK, Port 1



Plot 277. Band Edge, Low Channel, Band 12, QPSK, Port 1

Plot 278. Band Edge, High Channel, Band 12, QPSK, Port 1

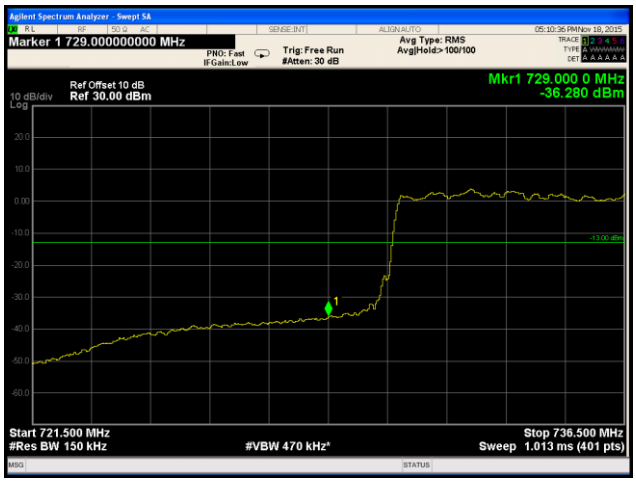
Band Edge, Band 12, 16QAM, Port 2



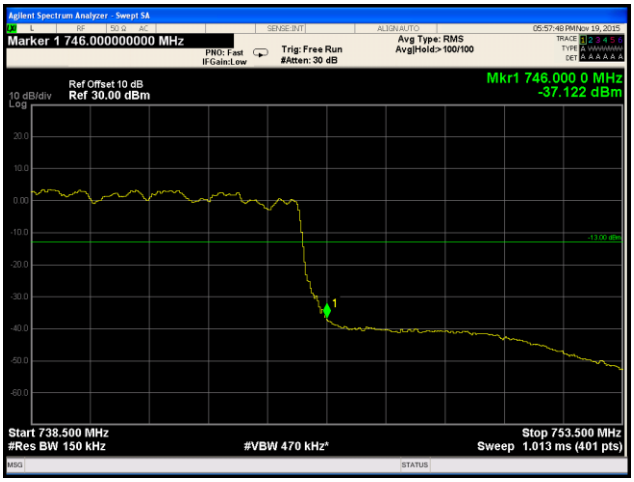
Plot 279. Band Edge, Low Channel, Band 12, 16QAM, Port 2

Plot 280. Band Edge, High Channel, Band 12, 16QAM, Port 2

Band Edge, Band 12, 64QAM, Port 2



Plot 281. Band Edge, Low Channel, Band 12, 64QAM, Port 2



Plot 282. Band Edge, High Channel, Band 12, 64QAM, Port 2

Band Edge, Band 12, QPSK, Port 2

Plot 283. Band Edge, Low Channel, Band 12, QPSK, Port 2

Plot 284. Band Edge, High Channel, Band 12, QPSK, Port 2

Electromagnetic Compatibility Criteria for Intentional Radiators

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

Band 4 and Band 10:
Output Power= 25.2dBm
Antenna Gain= 8dBi
Power density= 0.416mW/cm^2 at a distance of 20cm

Band 12:
Output Power= 24.14dBm
Antenna Gain= 3dBi
Power density= 0.1mW/cm^2 at a distance of 20cm

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 17025:2005.

MET #	Equipment	Manufacturer	Model#	Cal Date	Cal Due
RENTAL	10HZ-26.5GHZ MXA SPECTRUM/SIGNAL ANALYZER	AGILENT	MXA N9020A-526	04/09/2015	04/09/2016
1T4300A	SEMI-ANECHOIC CHAMBER # 1 (FCC)	EMC TEST SYSTEMS	NONE	07/24/2012	07/24/2015
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	07/29/2014	01/29/2016
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	10/29/2014	10/29/2016
1T4149	HIGH-FREQUENCY ANECHOIC CHAMBER	RAY-PROOF	81	NOT REQUIRED	
1T4771	PSA SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4446A	11/25/2014	05/25/2016
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	02/28/2014	08/28/2015
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4505	TEMPERATURE CHAMBER	TEST EQUITY	115	02/11/2015	02/11/2016
1T4859	DIGITAL BAROMETER, HYGROMETER, THERMOMETER	CONTROL COMPANY	15-078-198, FB70423, 245CD	12/19/2013	12/19/2015

Table 13. Test Equipment List

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

V. Certification & User's Manual Information

Certification & User's Manual Information

A. 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.

Certification & User's Manual Information

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.

Certification & User's Manual Information

§ 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.

Certification & User's Manual Information

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 users 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.

Verification & User's Manual Information

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

