HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

July 10, 2019

Harris Corp- Communication Systems
221 Jefferson Ridge Parkway,
Lynchburg, VA 24501

Dear Dave Scherer,

Enclosed is the EMC Wireless test report for compliance testing of the Harris Corp- Communication Systems, Harris RF-7800W Broadband Ethernet Radio as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Title 47 of the CFR, Part 15.407, Subpart E (UNII 1).

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 feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Mae Ramirez
Documentation Department

Reference: (\Harris Corp- Communication Systems\ EMC94059-FCC407 UNII 1 Rev. 4)

Electromagnetic Compatibility Criteria
Test Report

for the

Harris Corp- Communication Systems
Model Harris RF-7800W Broadband Ethernet Radio

Tested under
The FCC Certification Rules
contained in
Title 47 of the CFR
15.407 Subpart E

MET Report: EMC94059-FCC407 UNII 1 Rev. 4

July 10, 2019

Prepared For:

Harris Corp- Communication Systems
221 Jefferson Ridge Parkway,
Lynchburg, VA 24501

Prepared By:
MET Laboratories, Inc.
914 West Patapsco Avenue,
Baltimore, MD 21230

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15.407 Subpart E

Arsalan Hasan, Project Engineer
Electromagnetic Compatibility Lab

Mae Ramirez
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 Parts 15B, 15.407, of the FCC Rules under normal use and maintenance.

Benjamin Taylor,
Wireless Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	July 18, 2019	Initial Issue.
1	September 12, 2019	Added more plots
2	September 16, 2019	Corrected typos
3	October 28, 2019	TCB updates
4	November 3, 2019	TCB updates

Table of Contents

List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**K**ilo**h**ert**z**
kPa	**K**ilo**pa**scal
kV	**K**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**Microh**enry
µ	**Microf**arad
µs	**Micros**econds
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 Harris Corp- Communication Systems Harris RF-7800W Broadband Ethernet Radio, with the requirements of Part 15, §15.407. 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 Harris RF-7800W Broadband Ethernet Radio. Harris Corp- Communication Systems should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Harris RF-7800W Broadband Ethernet Radio, 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 15, §15.407, in accordance with Harris Corp- Communication Systems, purchase order number 67583. All tests were conducted using measurement procedure ANSI C63.4-2014.

FCC Reference	Description	Results
§15.203	Antenna Requirement	Compliant
§15.403(i)	26dB Occupied Bandwidth	Compliant
§15.407 (a)(1)	Maximum Conducted Output Power	Compliant
§15.407 (a)(1)	EIRP Above Elevation Angle	N/A
§15.407 (a)(1)	Maximum Power Spectral Density	Compliant
§15.407 (b)(1)& (6 - 7)	Undesirable Emissions	Compliant
§15.407(b)(6)	Conducted Emission Limits	N/A
§15.407(f)	RF Exposure	Compliant

Table 1. Executive Summary of EMC Part 15.407 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Harris Corp- Communication Systems to perform testing on the Harris RF-7800W Broadband Ethernet Radio, under Harris Corp- Communication Systems' purchase order number 67583.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Harris Corp- Communication Systems Harris RF-7800W Broadband Ethernet Radio.

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

Model(s) Tested:	Harris RF-7800W Broadband Ethernet Radio	
Model(s) Covered:	Harris RF-7800W Broadband Ethernet Radio	
Antennas Tested:	RF-7800W-AT202 RF-7800W-AT203 RF-7800W-AT206 RF-7800W-AT207	
Antennas Covered:	RF-7800W-AT201 RF-7800W-AT246	
EUT Specifications:	Primary Power: 52 VDC	
	FCC ID: AQZ-RF-7800W-RPG2	
	Type of Modulations:	QPSK 1/16, 16-QAM, 64-QAM, 256-QAM
	Equipment Code:	NII
	Max. RF Output Power:	19.14 dBm (8dBi/5dBi Antenna) PTMP 19.19 dBm (13.5dBi Antenna) PTMP 19.14 dBm (26dBi/21dBi Antenna) PTP 18.29 dBm (30dBi Antenna) PTP
	EUT Frequency Ranges:	5150-5250 MHz
	Bandwidths:	5/10/20/40 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Duty Cycle Tested:	100%	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Type of Filing:	Original	
Evaluated by:	Arsalan Hasan	
Report Date(s):	July 10, 2019	

Table 2. EUT Summary

B. References

CFR 47, Part 15, Subpart E	Unlicensed National Information Infrastructure Devices (UNII)
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
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
789033 D02 General UNII Test Procedures New Rules v01	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E

Table 3. References

C. Test Site

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

Radiated Emissions measurements were performed in a 3 semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

Table 4. Uncertainty Calculations Summary

E. Description of Test Sample

The Harris Corp- Communication Systems Harris RF-7800W Broadband Ethernet Radio, Equipment Under Test (EUT), is used to provide long-range, high-throughput Ethernet network backhaul in outdoor point-to-point and point-to-multipoint scenarios.

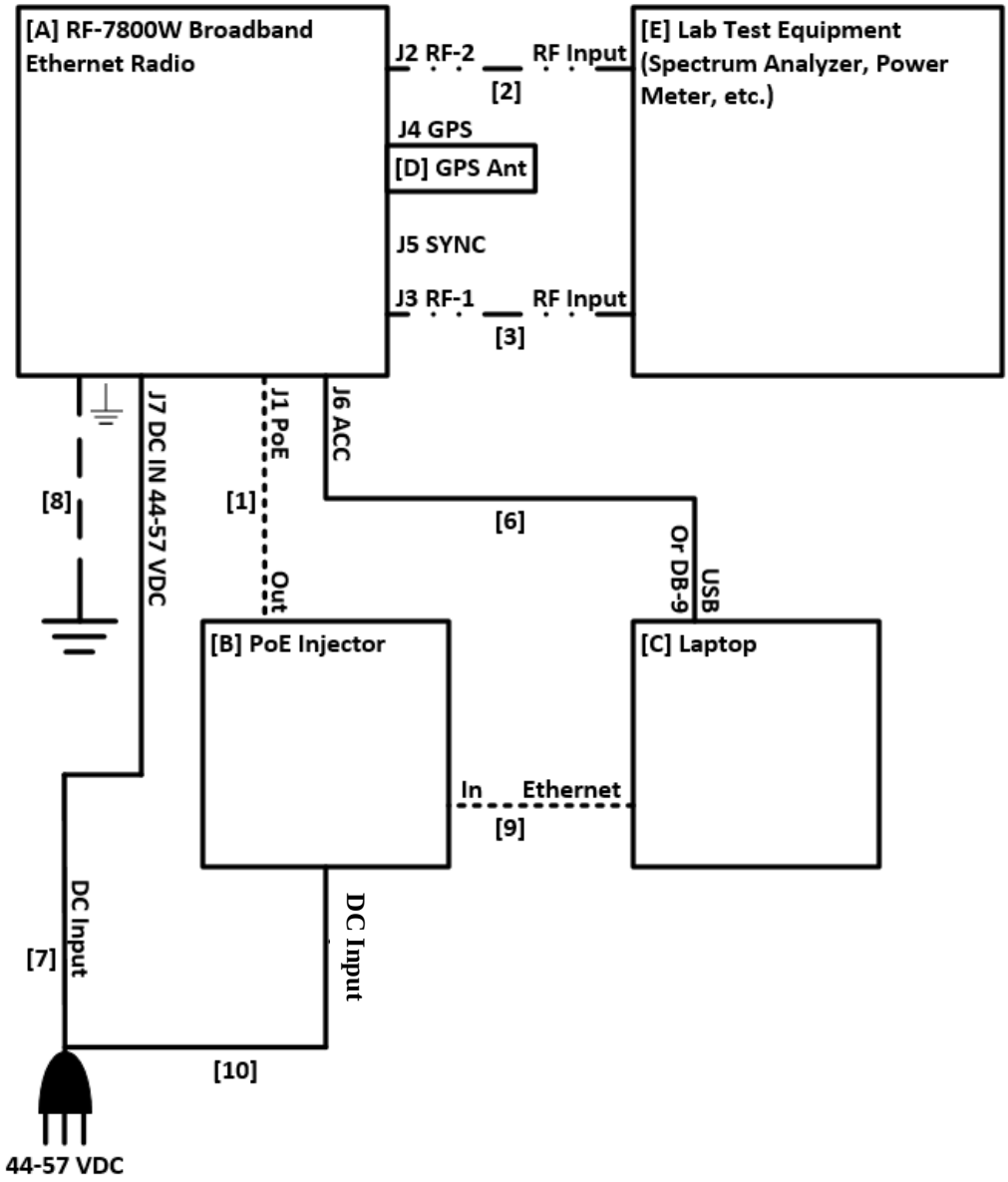


Figure 1. Block Diagram of Test Configuration

F. Equipment Configuration

The EUT was set up as outlined in Figure 1 and 2. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Rev. #
A		Broadband Ethernet Radio	RF-7800W-RP500	12069-5010-01	A01067 or A01056	T502C

Table 5. Equipment Configuration

G. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
B	DC PoE Injector	L-Com		Not Applicable
C	Laptop	Panasonic	CF-29/CF-31	Not Applicable
D	GPS Antenna	Harris	12069-3160-01	Not Applicable
E	Lab Test Equipment (Spectrum Analyzer)			
F	Lab Test Equipment (Signal Generator)			
G	2-way Splitter	Narda	4314B-2	Not Available
H	30 dB Attenuator	Narda	Micro-Pad 4779-30	Not Available
K	N[M]-to-SMA[F] Adaptor			Not Available
L	N[F]-to-SMA[F] Adaptor			Not Available
M	SMA[M]-to-SMA[M] Adaptor			Not Available
N	Circulator	Narda	4924	Not Available
O	50 Ohm Terminator			Not Available

The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.

Table 6. Support Equipment

H. Ports and Cabling Information

I.

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
1	J1 PoE	Power over Ethernet (Cat6)	1	~30	90	Yes	B.Out
2	J2 RF-2	Coaxial RF (SMA[M]-to-SMA[M])	2	0.91	0.5	Yes	E.RF Input
3	J3 RF-1	Coaxial RF (SMA[M]-to-SMA[M])	2	0.91	0.5	Yes	E.RF Input
4	J4 GPS	Direct connection to GPS Antenna (refer to Ref ID *D*)	1	N/A	N/A	N/A	D
5	J5 SYNC	Unused, future use	-	N/A	N/A	N/A	N/A
6	J6 ACC	Configuration/Monitoring (Serial Communications)	1	15	90	Yes	C.USB Or C.DB-9
7	J6 DC IN 44-57 VDC	DC Power	1		90	Yes	
8	⏚	Ground Strap	1	0.5	0.5	N/A	Ground
9	In	Ethernet (Cat6)	1	3	100 minus length of Ref ID *1*	Yes	C.Ethernet
10	N/A	DC Input (Barrel Connector)	1	1.8	2	No	44-57 V
11	N/A	Coaxial RF (SMA[M]-to-SMA[M])	3	1	N/A	Yes	N/A

Table 7. Ports and Cabling Information

J. Mode of Operation

Emissions:

The RF-7800W Broadband Ethernet Radio will be put into constant transmit mode and its RF transmissions will be measured on the lab test equipment (Spectrum Analyzer, Power Meter, etc.).

DFS:
One RF-7800W Broadband Ethernet Radio will be put into Master mode (SPTP SC) and the other will be put into Client mode (SPTP SS).

K. Method of Monitoring EUT Operation

Consistent with the Mode of Operation section above, there needs to be a means of continuously monitoring the operation of the EUT.

Emissions:

1. RF transmissions will be present on the lab test equipment (Spectrum Analyzer, Power Meter, etc.).

2. RF transmissions will not be present on the lab test equipment (Spectrum Analyzer, Power Meter, etc.).

DFS:

1. RF transmissions will not be present on the lab test equipment (Spectrum Analyzer) for the prescribed Non-Occupancy Period, etc., or change to a new operating RF frequency, depending on the configured DFS Action.

2. RF transmissions continue to be present on the lab test equipment (Spectrum Analyzer) during the prescribed Non-Occupancy Period, etc., or do not change to a new operating RF frequency, depending on the configured DFS Action.

L. 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.

M. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Harris Corp- Communication Systems upon completion of testing.

N. Antenna Key

The plots in this report reference the antennas' physical description. This table has been added in order to reference the antennas' model numbers.

Physical Description	Antenna	Type	Gain	Mode of Operation
1' Panel	RF-7800W-AT201	Panel	21 dBi	Point-to-Point (only)
2' Panel	RF-7800W-AT202	Panel	26 dBi	Point-to-Point (only)
3' Parabolic	RF-7800W-AT203	Dish	30 dBi	Point-to-Point (only)
8 Omni	RF-7800W-AT206	Omni	8 dBi	Point-to-Multipoint (only)
5 Omni	RF-7800W-AT246	Omni	5 dBi	Point-to-Multipoint (only)
90 degree sector	RF-7800W-AT207	Sector	13.5 dBi	Point-to-Multipoint (only)

Table 8. Antenna Key

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement: **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The EUT as tested is compliant the criteria of §15.203.

Antenna Requirement is met because the device and its antennas are going to be professionally installed

Physical Description	Antenna	Type	Gain	Mode of Operation
1' Panel	RF-7800W-AT201	Panel	21 dBi	Point-to-Point (only)
2' Panel	RF-7800W-AT202	Panel	26 dBi	Point-to-Point (only)
3' Parabolic	RF-7800W-AT203	Dish	30 dBi	Point-to-Point (only)
8 Omni	RF-7800W-AT206	Omni	8 dBi	Point-to-Multipoint (only)
5 Omni	RF-7800W-AT246	Omni	5 dBi	Point-to-Multipoint (only)
90 degree sector	RF-7800W-AT207	Sector	13.5 dBi	Point-to-Multipoint (only)

Table 9. Antenna Key

Test Engineer(s): Arsalan Hasan

Test Date(s): May 10, 2019

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15. 403(i) 26dB Bandwidth

Test Requirements: **§ 15.403(i):** For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

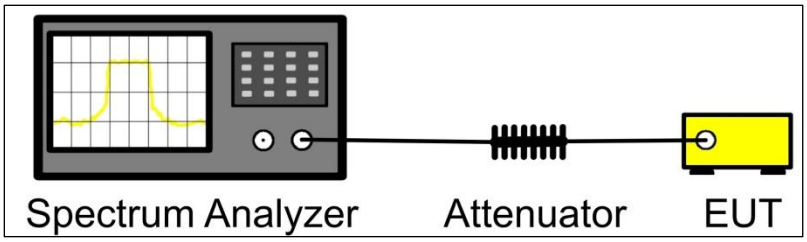
Test Procedure: The transmitter was set to low, mid, and high operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 26 dB Bandwidth was measured and recorded.

Test Results The 26 dB Bandwidth was compliant with the requirements of this section.

No anomalies detected.

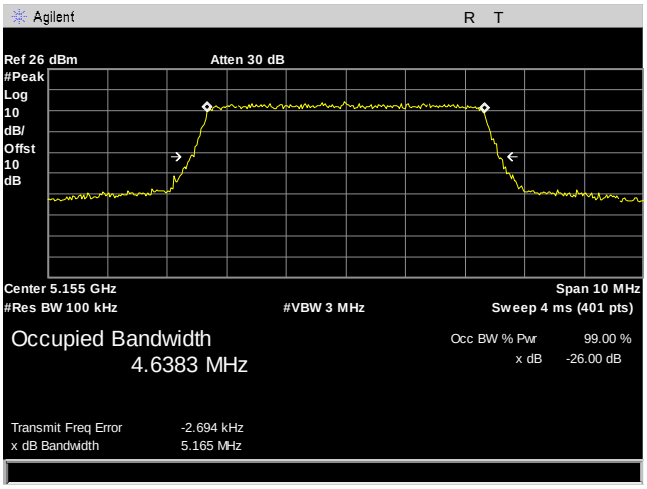
Test Engineer(s): Arsalan Hasan

Test Date(s): June 1, 2019

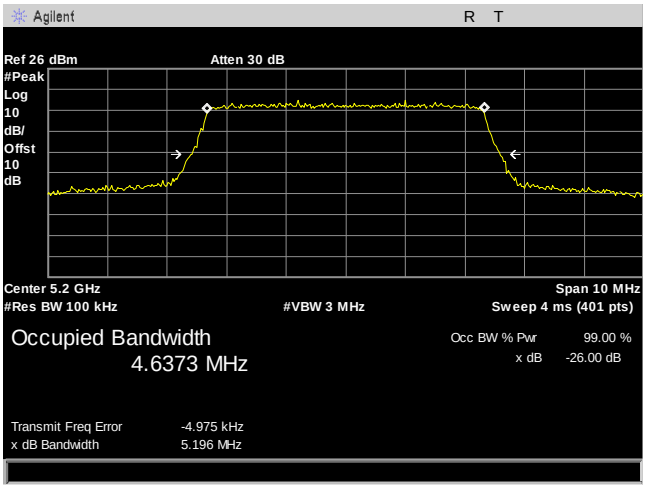


Bandwidth (MHz)	Frequency (MHz)	Occupied bandwidth (MHz)
5	5155.0	5.165
	5200.0	5.196
	5247.5	5.193
10	5160.0	9.872
	5200.0	9.878
	5245.0	10.074
20	5165.0	20.195
	5200.0	20.070
	5240.0	20.198
40	5175.0	39.814
	5200.0	39.629
	5230.0	39.356

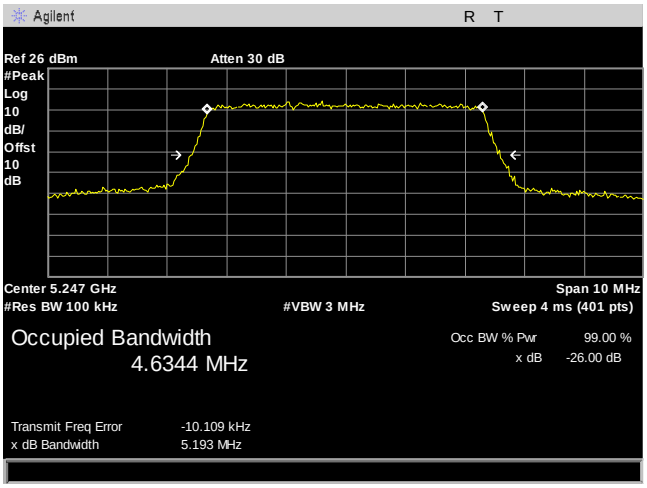
Table 10. 26 dB Occupied Bandwidth, Test Results



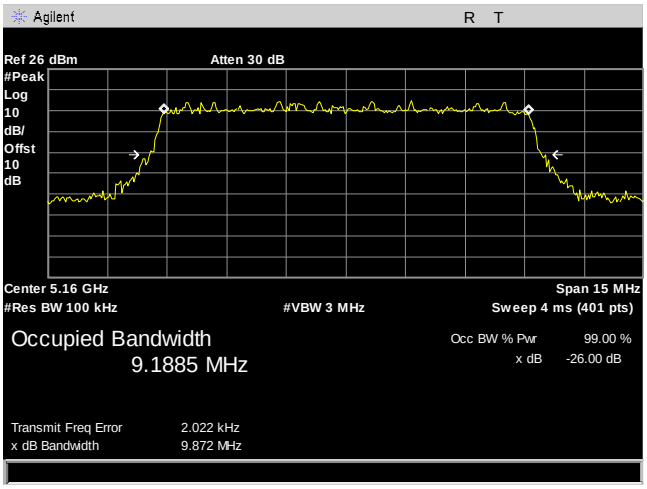
Plot 1. 26 dB Occupied Bandwidth, 5M, 5155



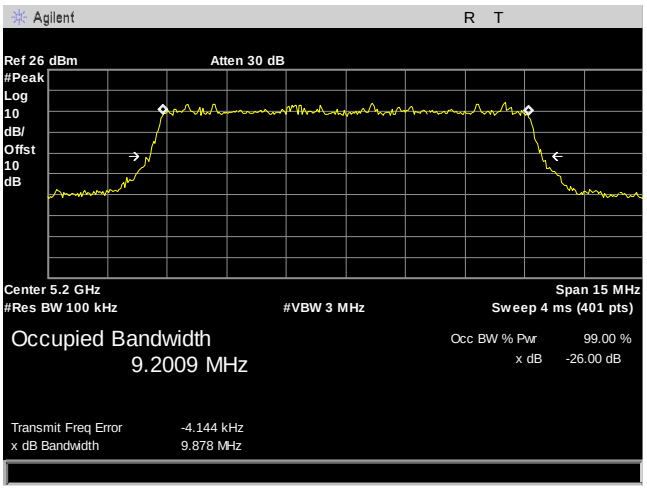
Plot 2. 26 dB Occupied Bandwidth, 5M, 5200



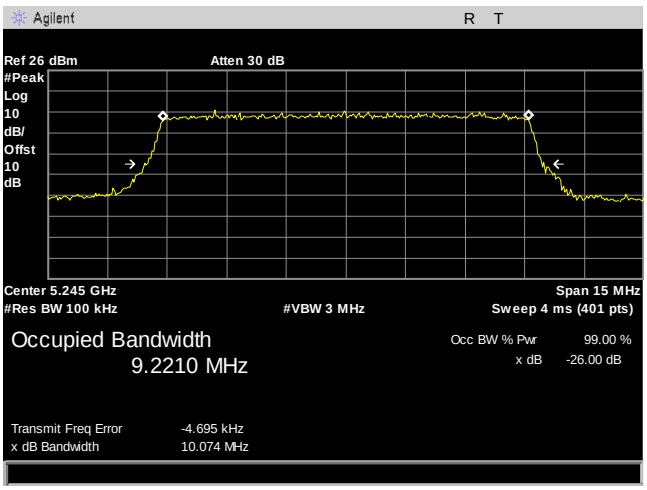
Plot 3. 26 dB Occupied Bandwidth, 5M, 5247.5



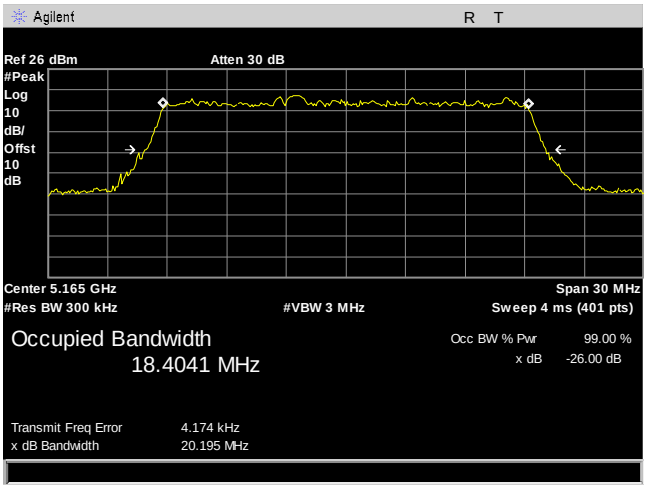
Plot 4. 26 dB Occupied Bandwidth, 10M, 5160



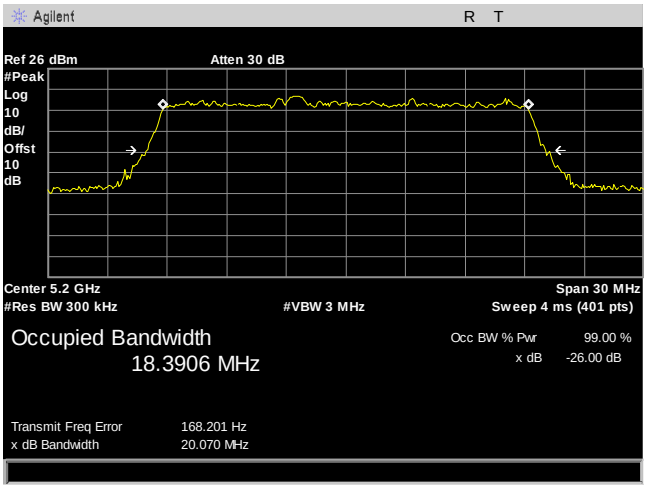
Plot 5. 26 dB Occupied Bandwidth, 10M, 5200



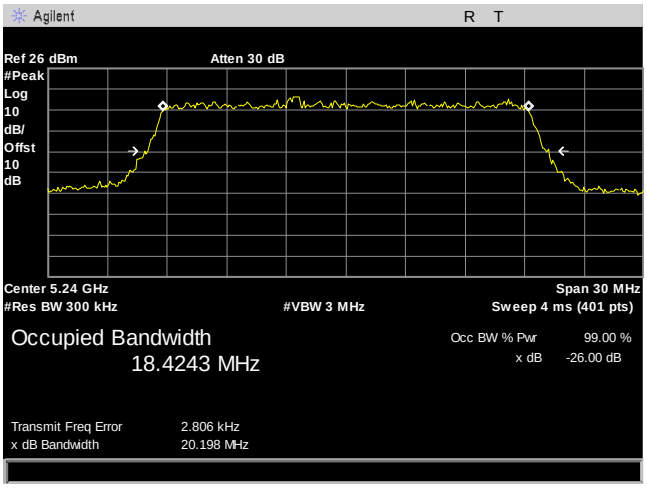
Plot 6. 26 dB Occupied Bandwidth, 10M, 5245



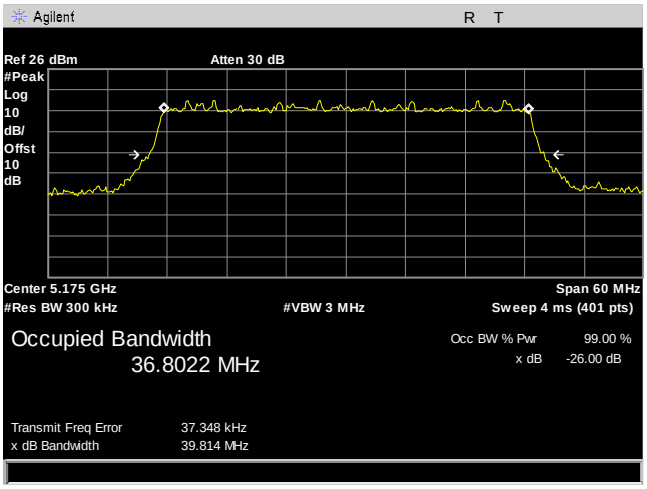
Plot 7. 26 dB Occupied Bandwidth, 20M, 5165



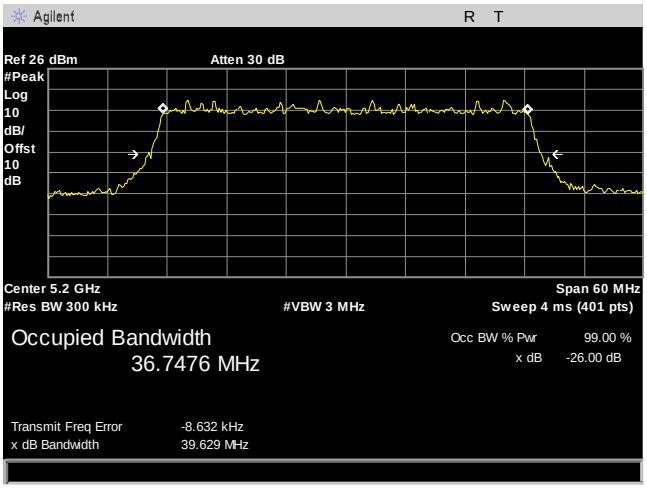
Plot 8. 26 dB Occupied Bandwidth, 20M, 5200



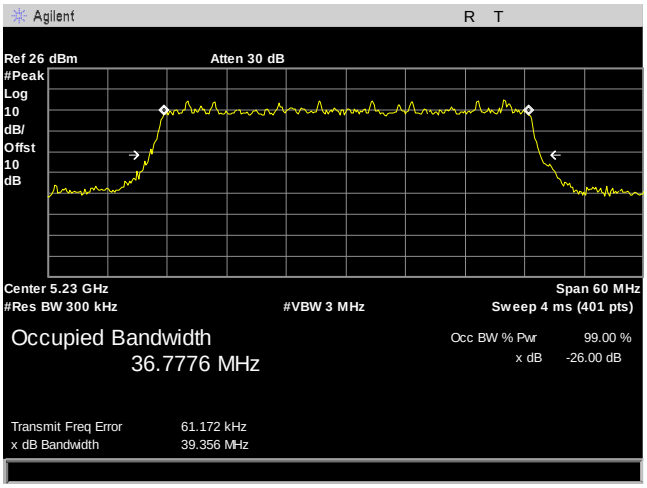
Plot 9. 26 dB Occupied Bandwidth, 20M, 5240



Plot 10. 26 dB Occupied Bandwidth, 40M, 5175



Plot 11. 26 dB Occupied Bandwidth, 40M, 5200



Plot 12. 26 dB Occupied Bandwidth, 40M, 5230

Electromagnetic Compatibility Criteria for Intentional Radiators

§15. 407(a)(1) Maximum Conducted Output Power

Test Requirements:

§15.407(a)(1)(i): For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(a)(1)(ii): For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(a)(1)(iii): For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

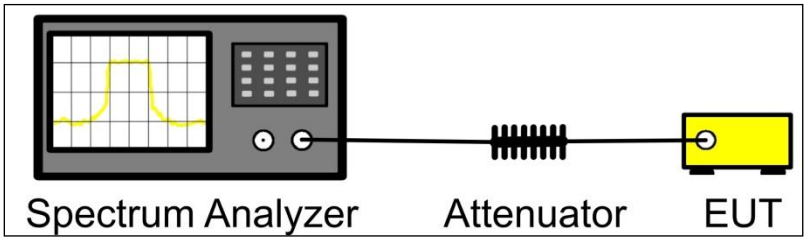
§15.407(a)(1)(iv): For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Procedure: The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels. Its power was measured according to measurement method SA-1, as described in 789033 D02 General UNII Test Procedures v01.

Test Results: The EUT as tested is compliant with the requirements of this section. No anomalies detected.

Test Engineer(s): Arsalan Hasan

Test Date(s): Jun 15, 2019



Frequency (MHz)	Power Port 1 (dBm)	Power Port 2 (dBm)	Sum (dBm)	Limit (dBm)	Antenna Gain (dBi)	Power Limit (dBm)	Power Margin (dB)
5 MHz							
5155.0	12.15	12.05	15.11	30.00	8.00	28.00	-12.89
5200.0	12.79	12.73	15.77	30.00	8.00	28.00	-12.23
5247.5	12.6	12.56	15.59	30.00	8.00	28.00	-12.41
10 MHz							
5160.0	14.4	14.36	17.39	30.00	8.00	28.00	-10.61
5200.0	15	14.93	17.98	30.00	8.00	28.00	-10.02
5245.0	14.88	14.83	17.87	30.00	8.00	28.00	-10.13
20 MHz							
5165.0	15.28	15.24	18.27	30.00	8.00	28.00	-9.73
5200.0	15.92	15.86	18.90	30.00	8.00	28.00	-9.10
5240.0	15.85	15.89	18.88	30.00	8.00	28.00	-9.12
40MHz							
5175.0	15.43	15.37	18.41	30.00	8.00	28.00	-9.59
5200.0	16.11	16.15	19.14	30.00	8.00	28.00	-8.86
5230.0	15.93	15.88	18.92	30.00	8.00	28.00	-9.08

Table 9. Maximum Conducted Transmitter Power, 8 Omni (PTMP) Test Results

Frequency (MHz)	Power Port 1 (dBm)	Power Port 2 (dBm)	Sum (dBm)	Limit (dBm)	Antenna Gain (dBi)	Power Limit (dBm)	Power Margin (dB)
5 MHz							
5155.0	7.15	7.09	10.13	30.00	13.50	22.50	-12.37
5200.0	7.41	7.36	10.40	30.00	13.50	22.50	-12.10
5247.5	7.59	7.53	10.57	30.00	13.50	22.50	-11.93
10 MHz							
5160.0	10.44	10.4	13.43	30.00	13.50	22.50	-9.07
5200.0	10.84	10.88	13.87	30.00	13.50	22.50	-8.63
5245.0	10.97	10.93	13.96	30.00	13.50	22.50	-8.54
20 MHz							
5165.0	12.22	12.28	15.26	30.00	13.50	22.50	-7.24
5200.0	13.04	13.01	16.04	30.00	13.50	22.50	-6.46
5240.0	12.88	12.91	15.91	30.00	13.50	22.50	-6.59
40MHz							
5175.0	15.45	15.39	18.43	30.00	13.50	22.50	-4.07
5200.0	16.15	16.1	19.14	30.00	13.50	22.50	-3.36
5230.0	16.21	16.15	19.19	30.00	13.50	22.50	-3.31

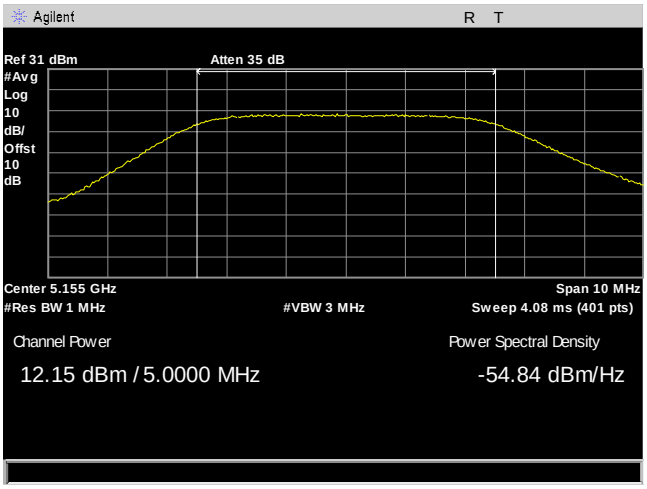
Table 10. Maximum Conducted Transmitter Power, 90 Sector (PTMP), Test Results

Frequency (MHz)	Power Port 1 (dBm)	Power Port 2 (dBm)	Sum (dBm)	Limit (dBm)	Antenna Gain (dBi)	Power Limit (dBm)	Power Margin (dB)
5 MHz							
5155.0	12.15	12.05	15.11	30.00	26.00	27.00	-11.89
5200.0	12.79	12.73	15.77	30.00	26.00	27.00	-11.23
5247.5	12.6	12.56	15.59	30.00	26.00	27.00	-11.41
10 MHz							
5160.0	14.4	14.36	17.39	30.00	26.00	27.00	-9.61
5200.0	15	14.93	17.98	30.00	26.00	27.00	-9.02
5245.0	14.88	14.83	17.87	30.00	26.00	27.00	-9.13
20 MHz							
5165.0	15.28	15.24	18.27	30.00	26.00	27.00	-8.73
5200.0	15.92	15.86	18.90	30.00	26.00	27.00	-8.10
5240.0	15.85	15.89	18.88	30.00	26.00	27.00	-8.12
40MHz							
5175.0	15.43	15.37	18.41	30.00	26.00	27.00	-8.59
5200.0	16.11	16.15	19.14	30.00	26.00	27.00	-7.86
5230.0	15.93	15.88	18.92	30.00	26.00	27.00	-8.08

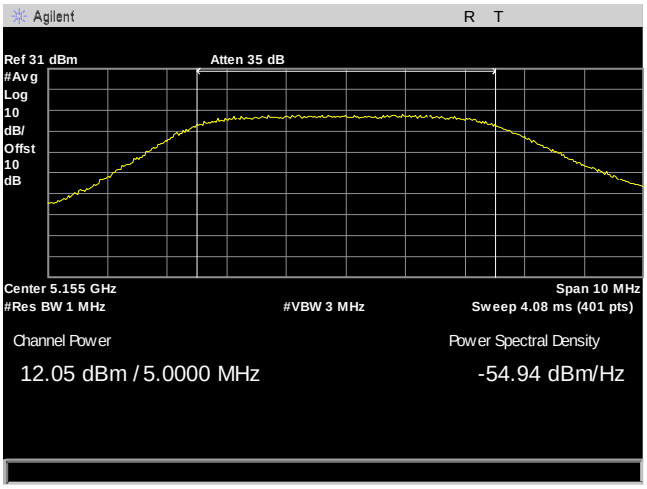
Table 13. Maximum Conducted Transmitter Power, 2' Panel (PTP), Test Results

Frequency (MHz)	Power Port 1 (dBm)	Power Port 2 (dBm)	Sum (dBm)	Limit (dBm)	Antenna Gain (dBi)	Power Limit (dBm)	Power Margin (dB)
5 MHz							
5155.0	11.03	10.96	14.01	30.00	30.00	23.00	-8.99
5200.0	11.77	11.81	14.80	30.00	30.00	23.00	-8.20
5247.5	11.47	11.51	14.50	30.00	30.00	23.00	-8.50
10 MHz							
5160.0	13.27	13.21	16.25	30.00	30.00	23.00	-6.75
5200.0	13.86	13.8	16.84	30.00	30.00	23.00	-6.16
5245.0	13.74	13.7	16.73	30.00	30.00	23.00	-6.27
20 MHz							
5165.0	14.16	14.12	17.15	30.00	30.00	23.00	-5.85
5200.0	15.12	15.09	18.12	30.00	30.00	23.00	-4.88
5240.0	14.77	14.8	17.80	30.00	30.00	23.00	-5.20
40MHz							
5175.0	14.24	14.19	17.23	30.00	30.00	23.00	-5.77
5200.0	15.26	15.3	18.29	30.00	30.00	23.00	-4.71
5230.0	15.01	14.97	18.00	30.00	30.00	23.00	-5.00

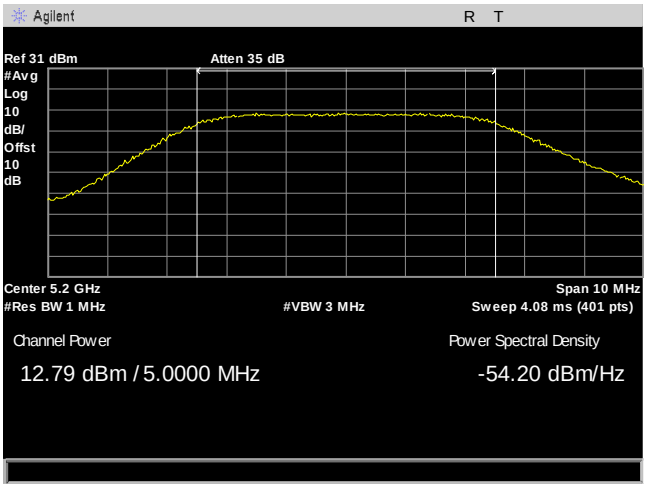
Table 14. Maximum Conducted Transmitter Power, 3' Para (PTP), Test Results



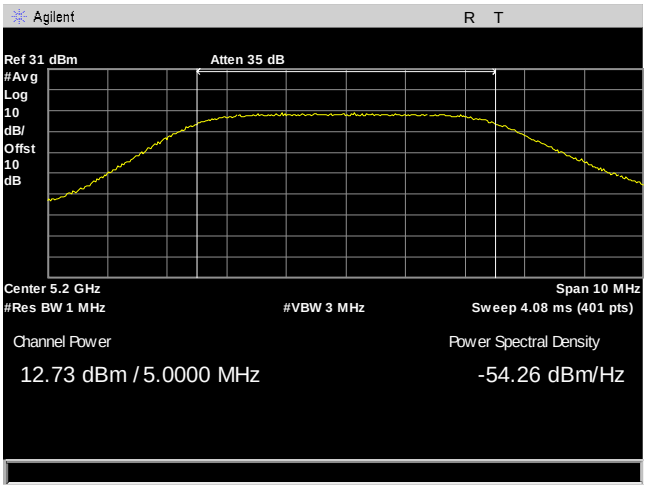
Plot 13. Maximum Conducted Output Power, 5M, 5155, 8Omni, Port 1



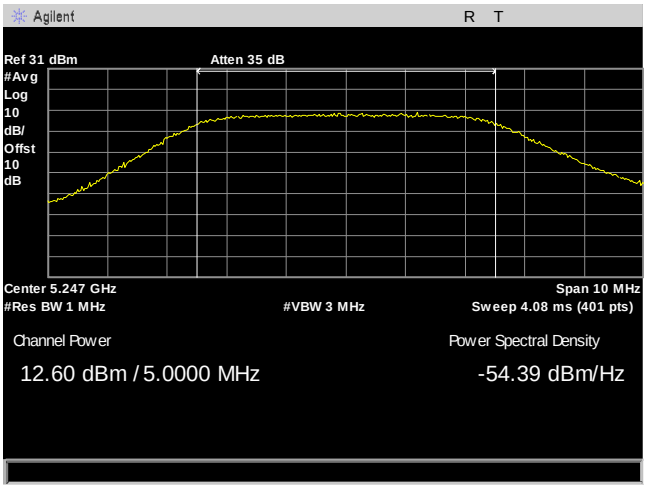
Plot 14. Maximum Conducted Output Power, 5M, 5155, 8Omni, Port 2



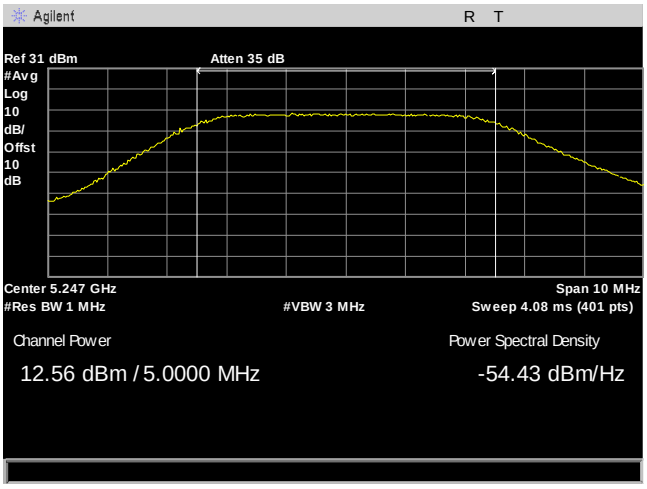
Plot 15. Maximum Conducted Output Power, 5M, 5200, 8Omni, Port 1



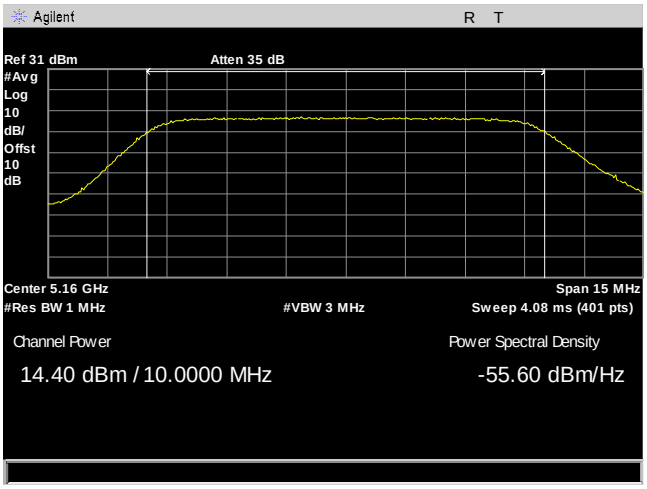
Plot 16. Maximum Conducted Output Power, 5M, 5200, 8Omni, Port 2



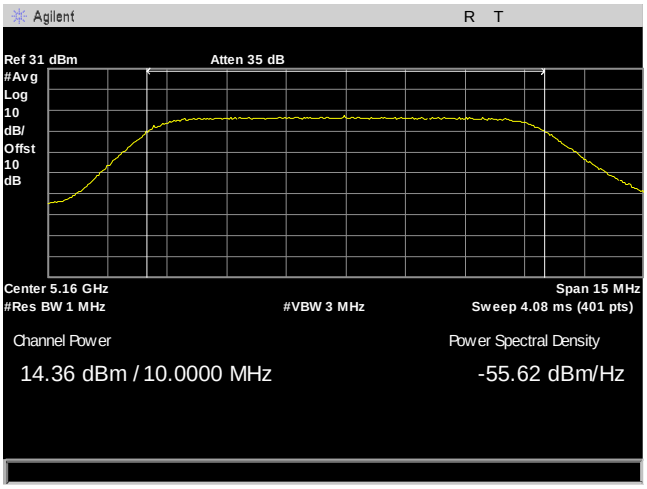
Plot 17. Maximum Conducted Output Power, 5M, 5247.5, 8Omni, Port 1



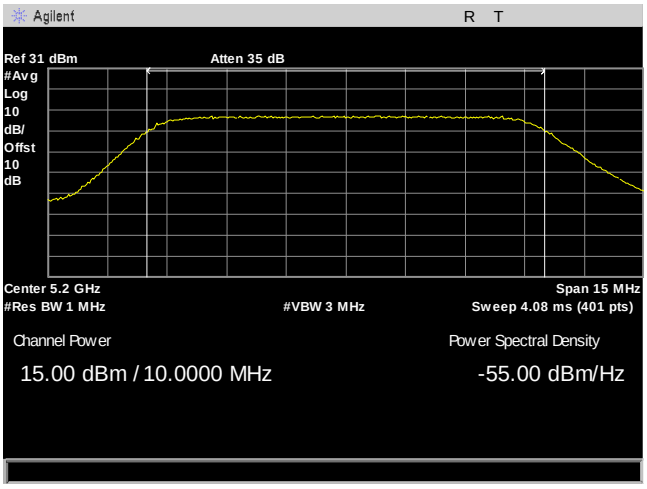
Plot 18. Maximum Conducted Output Power, 5M, 5247.5, 8Omni, Port 2



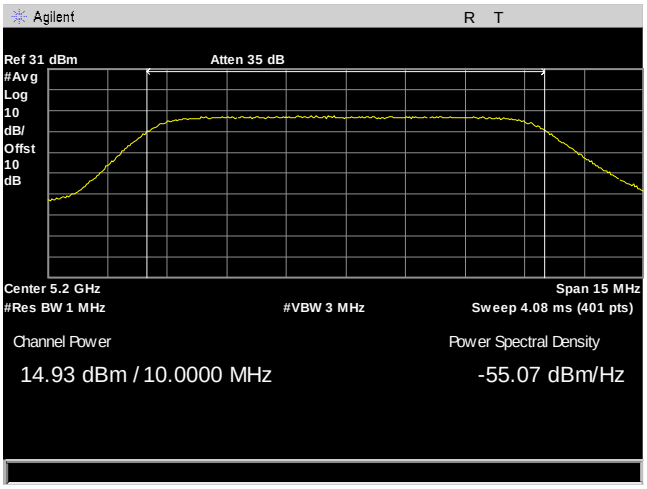
Plot 19. Maximum Conducted Output Power, 10M, 5160, 8Omni, Port 1



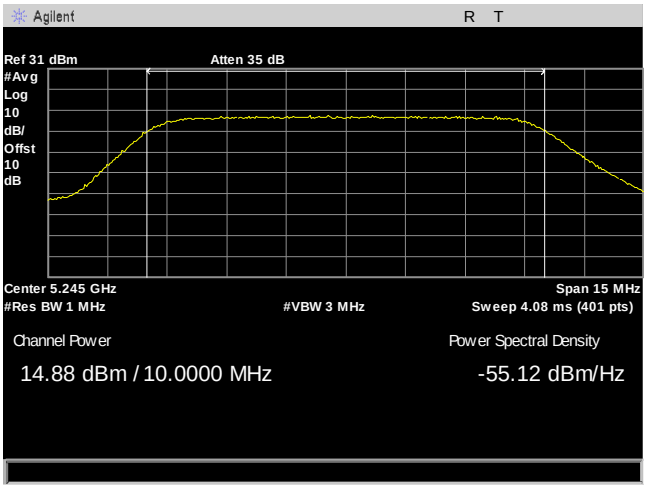
Plot 20. Maximum Conducted Output Power, 10M, 5160, 8Omni, Port 2



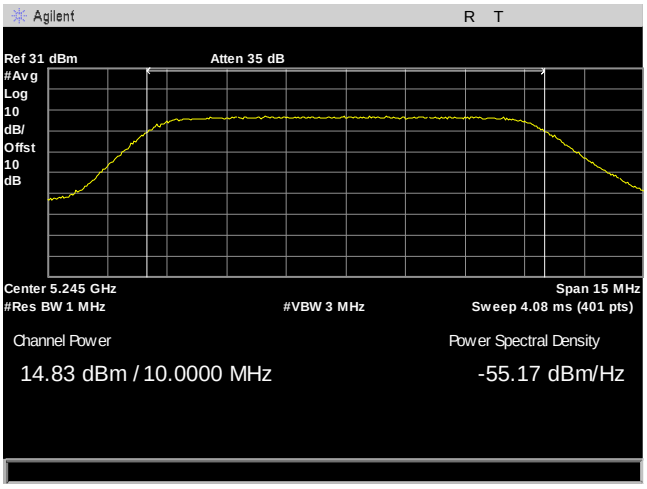
Plot 21. Maximum Conducted Output Power, 10M, 5200, 8Omni, Port 1



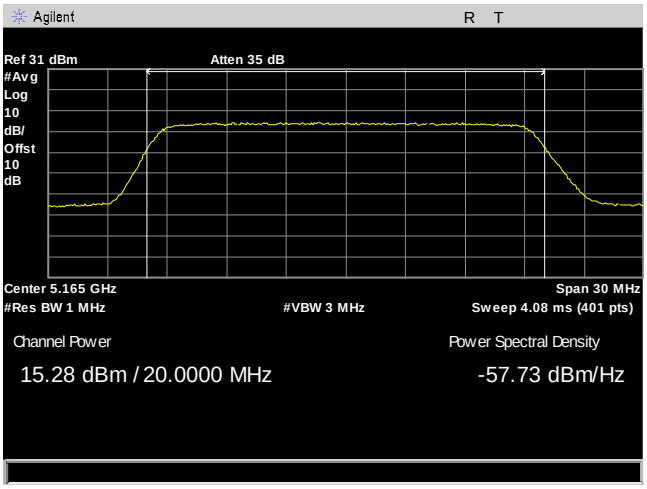
Plot 22. Maximum Conducted Output Power, 10M, 5200, 8Omni, Port 2



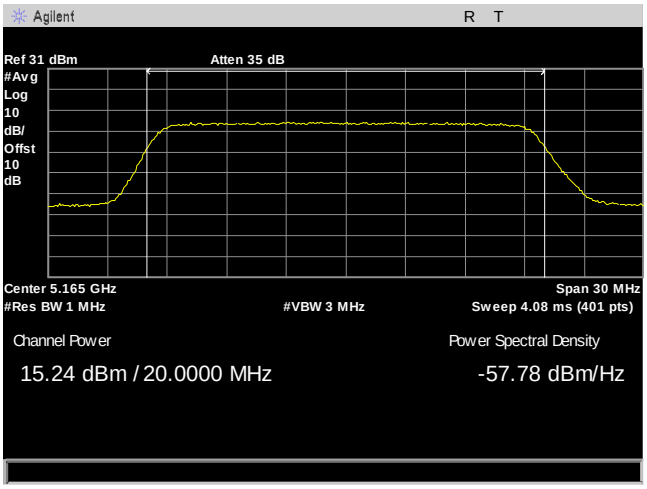
Plot 23. Maximum Conducted Output Power, 10M, 5245, 8Omni, Port 1



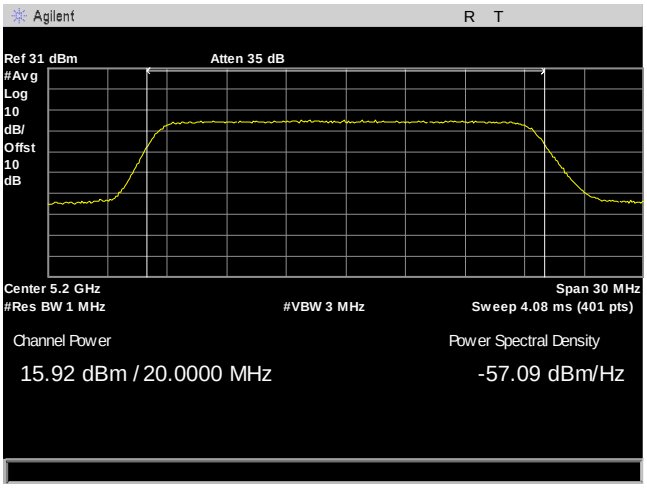
Plot 24. Maximum Conducted Output Power, 10M, 5245, 8Omni, Port 2



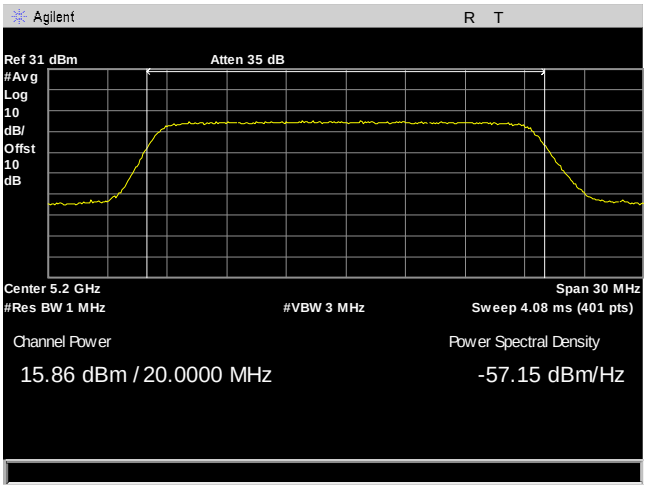
Plot 25. Maximum Conducted Output Power, 20M, 5165, 8Omni, Port 1



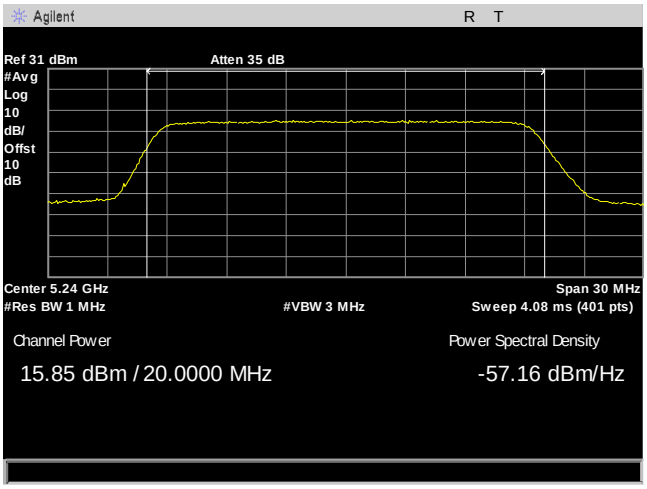
Plot 26. Maximum Conducted Output Power, 20M, 5165, 8Omni, Port 2



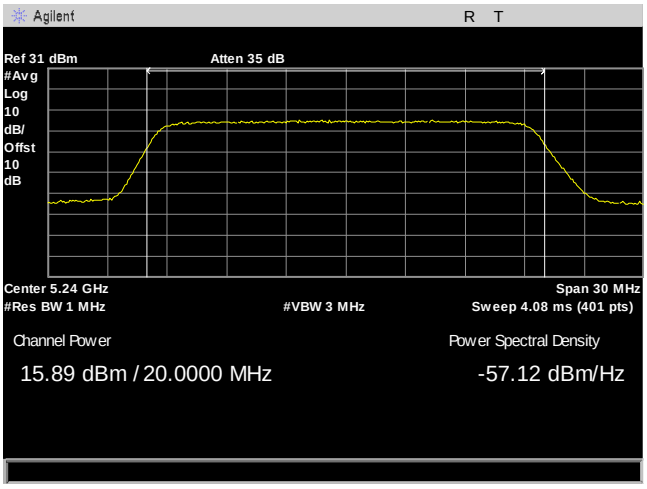
Plot 27. Maximum Conducted Output Power, 20M, 5200, 8Omni, Port 1



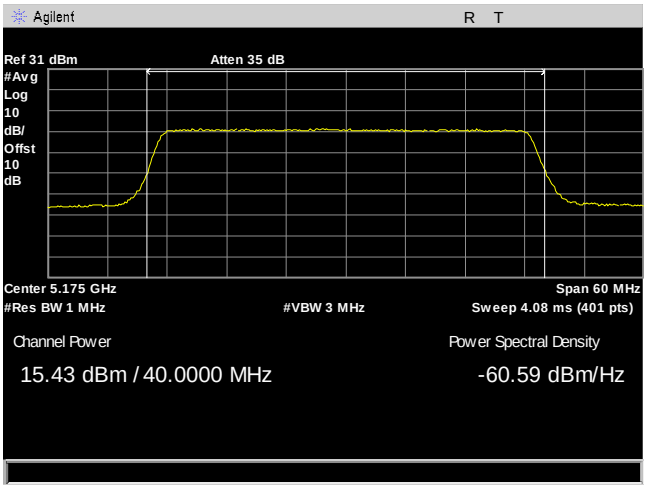
Plot 28. Maximum Conducted Output Power, 20M, 5200, 8Omni, Port 2



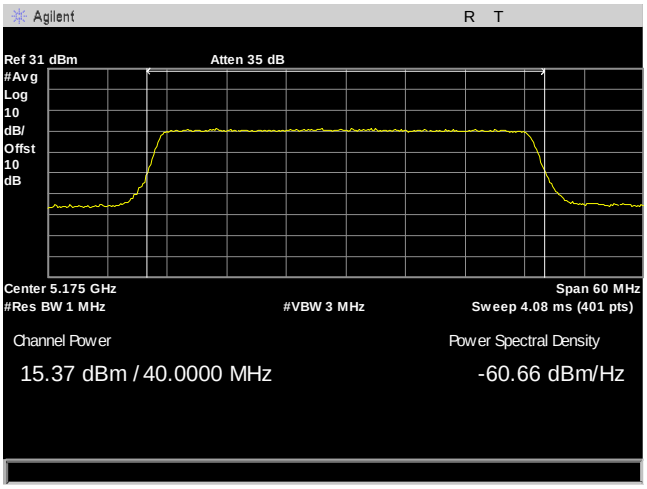
Plot 29. Maximum Conducted Output Power, 20M, 5240, 8Omni, Port 1



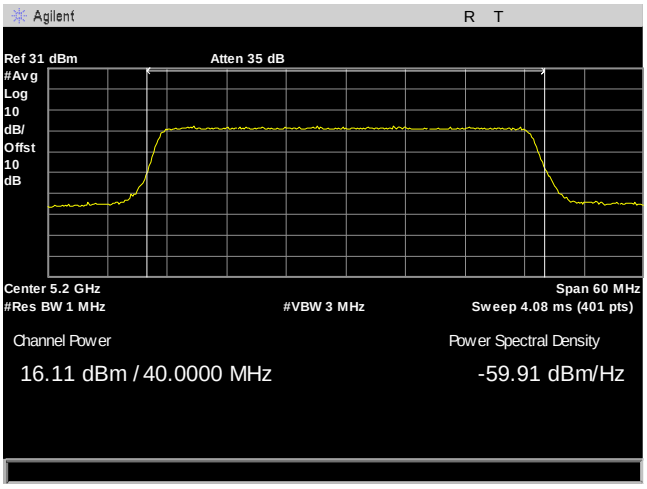
Plot 30. Maximum Conducted Output Power, 20M, 5240, 8Omni, Port 2



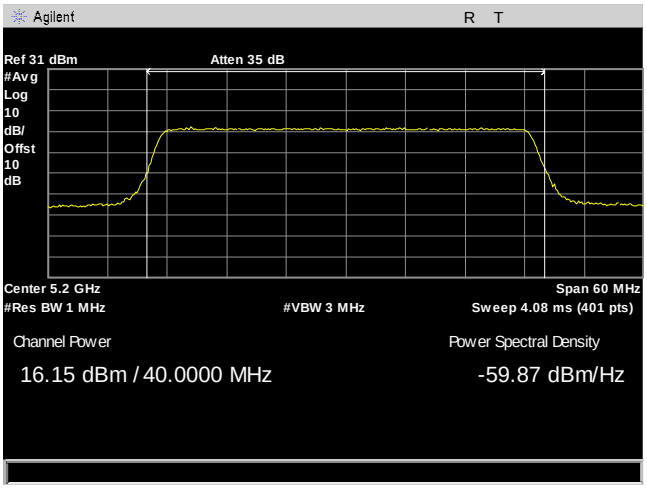
Plot 31. Maximum Conducted Output Power, 40M, 5175, 8Omni, Port 1



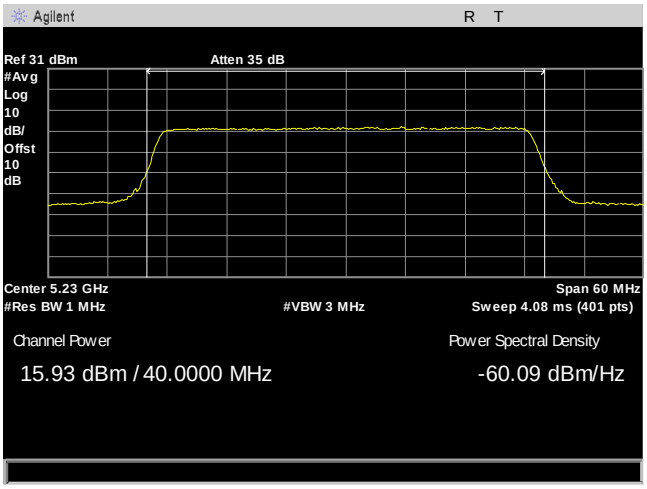
Plot 32. Maximum Conducted Output Power, 40M, 5175, 8Omni, Port 2



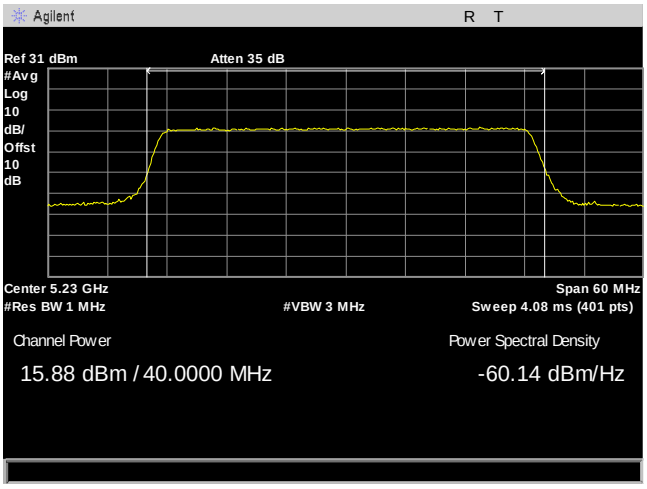
Plot 33. Maximum Conducted Output Power, 40M, 5200, 8Omni, Port 1



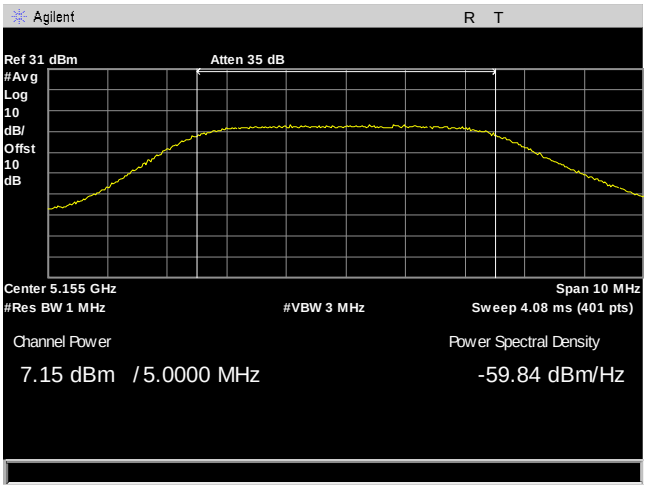
Plot 34. Maximum Conducted Output Power, 40M, 5200, 8Omni, Port 2



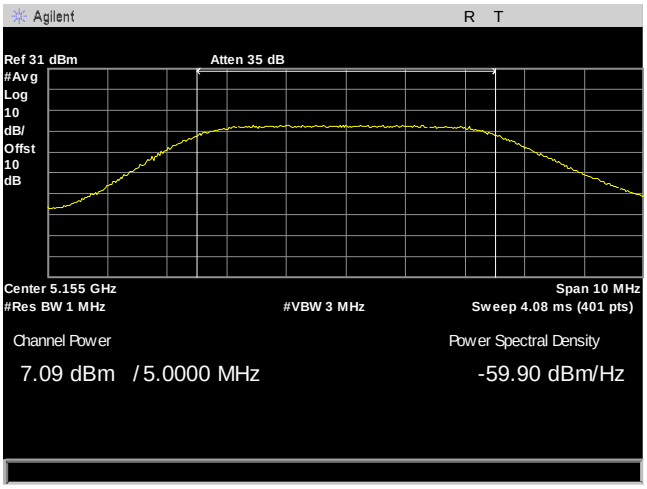
Plot 35. Maximum Conducted Output Power, 40M, 5230, 8Omni, Port 1



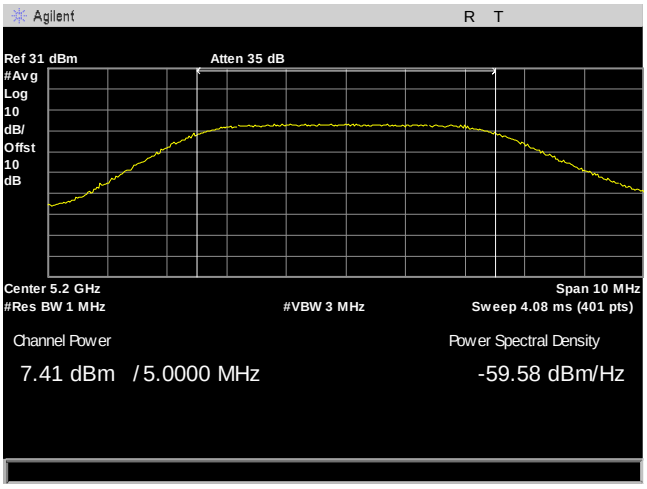
Plot 36. Maximum Conducted Output Power, 40M, 5230, 8Omni, Port 2



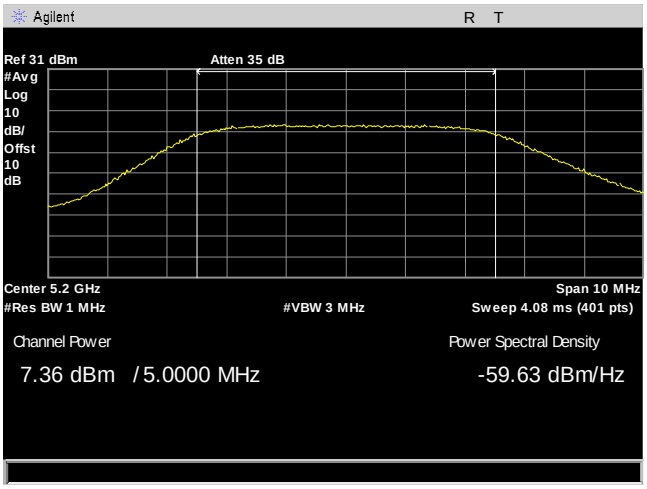
Plot 37. Maximum Conducted Output Power, 5M, 5155, 90Sector, Port 1



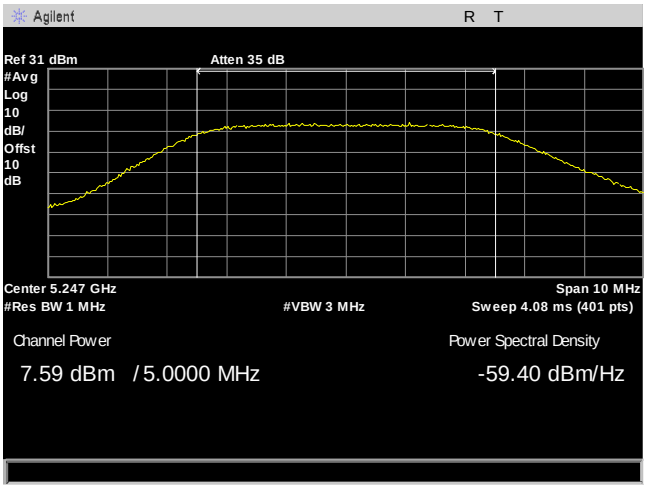
Plot 38. Maximum Conducted Output Power, 5M, 5155, 90Sector, Port 2



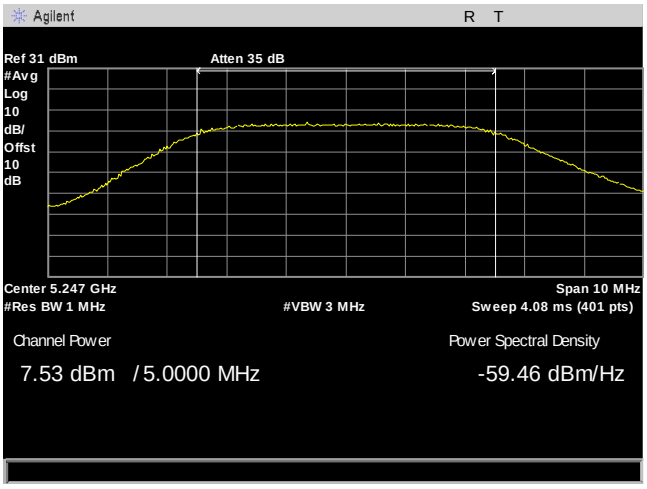
Plot 39. Maximum Conducted Output Power, 5M, 5200, 90Sector, Port 1



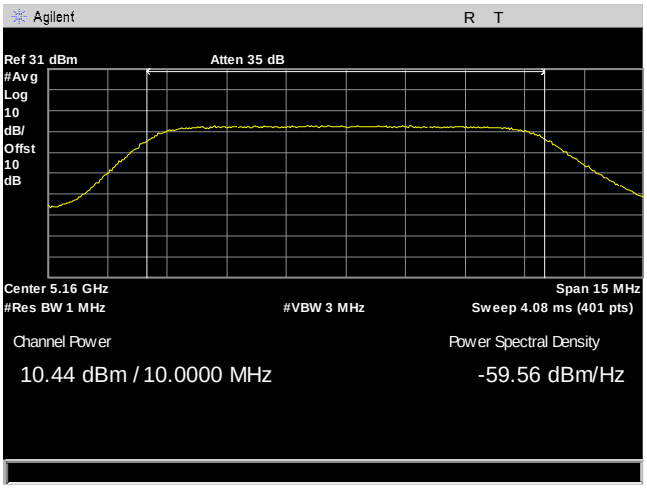
Plot 40. Maximum Conducted Output Power, 5M, 5200, 90Sector, Port 2



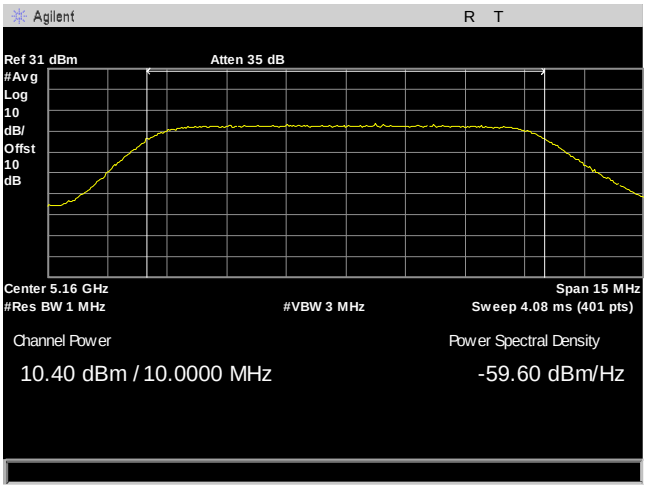
Plot 41. Maximum Conducted Output Power, 5M, 5247.5, 90Sector, Port 1



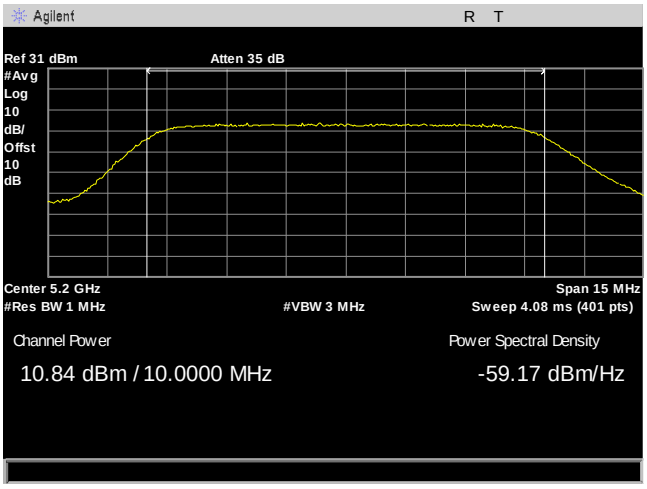
Plot 42. Maximum Conducted Output Power, 5M, 5247.5, 90Sector, Port 2



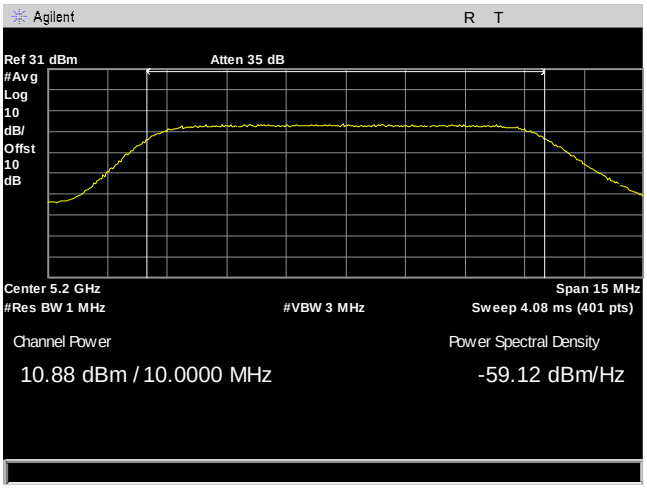
Plot 43. Maximum Conducted Output Power, 10M, 5160, 90Sector, Port 1



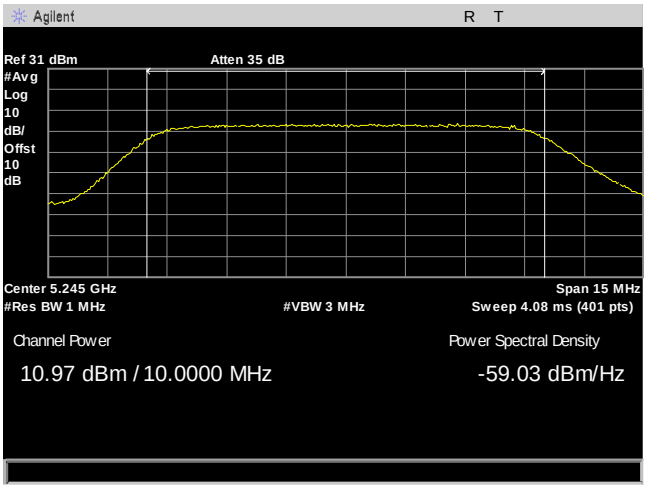
Plot 44. Maximum Conducted Output Power, 10M, 5160, 90Sector, Port 2



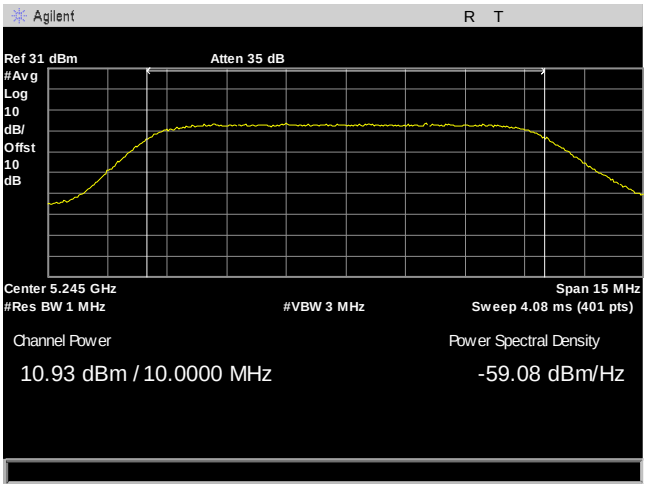
Plot 45. Maximum Conducted Output Power, 10M, 5200, 90Sector, Port 1



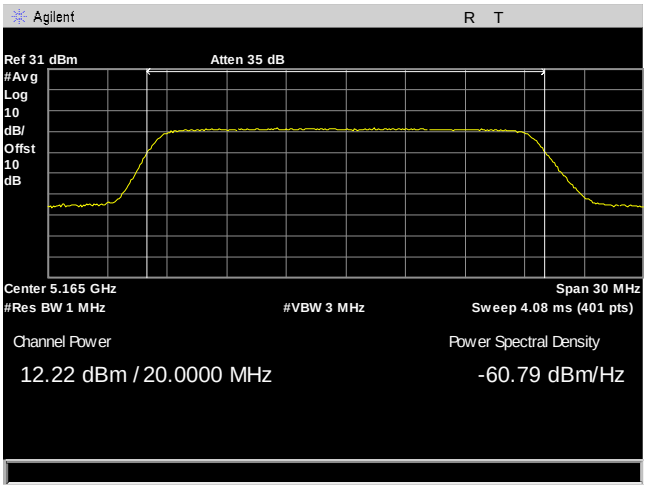
Plot 46. Maximum Conducted Output Power, 10M, 5200, 90Sector, Port 2



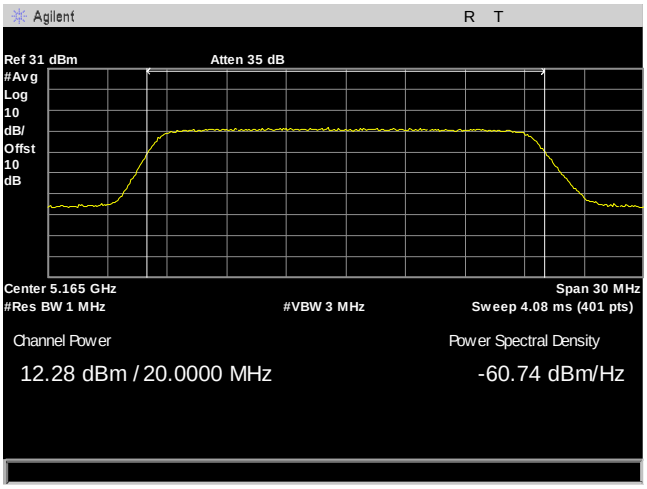
Plot 47. Maximum Conducted Output Power, 10M, 5245, 90Sector, Port 1



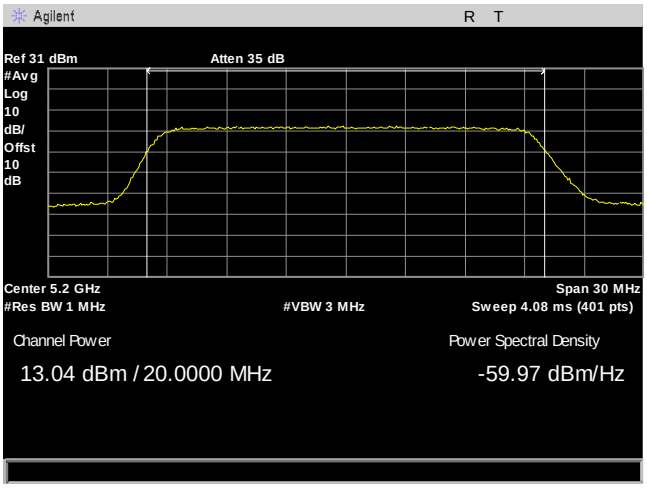
Plot 48. Maximum Conducted Output Power, 10M, 5245, 90Sector, Port 2



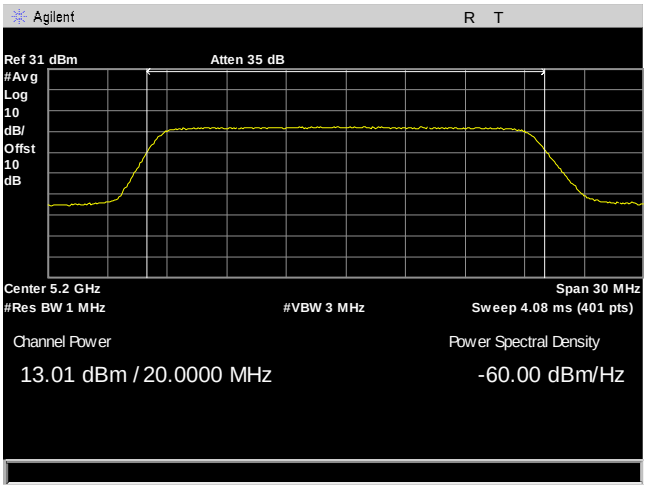
Plot 49. Maximum Conducted Output Power, 20M, 5165, 90Sector, Port 1



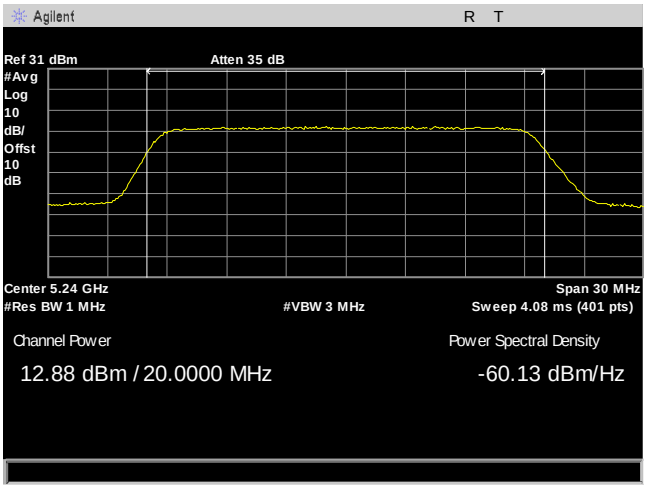
Plot 50. Maximum Conducted Output Power, 20M, 5165, 90Sector, Port 2



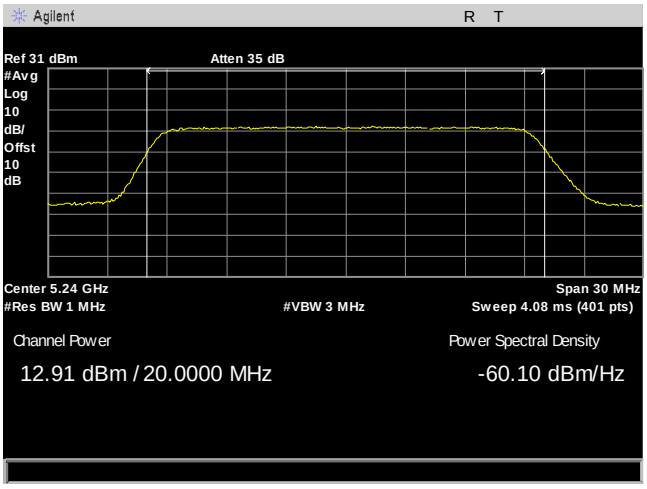
Plot 51. Maximum Conducted Output Power, 20M, 5200, 90Sector, Port 1



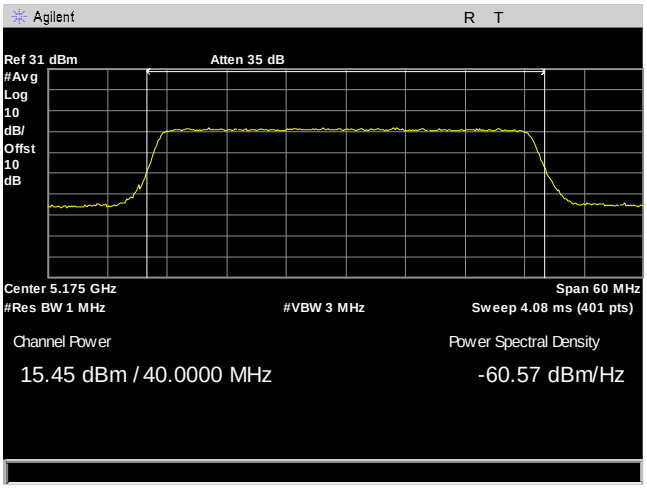
Plot 52. Maximum Conducted Output Power, 20M, 5200, 90Sector, Port 2



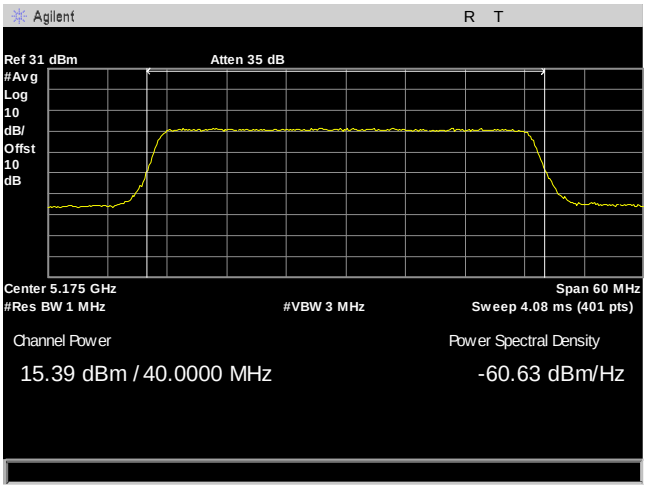
Plot 53. Maximum Conducted Output Power, 20M, 5240, 90Sector, Port 1



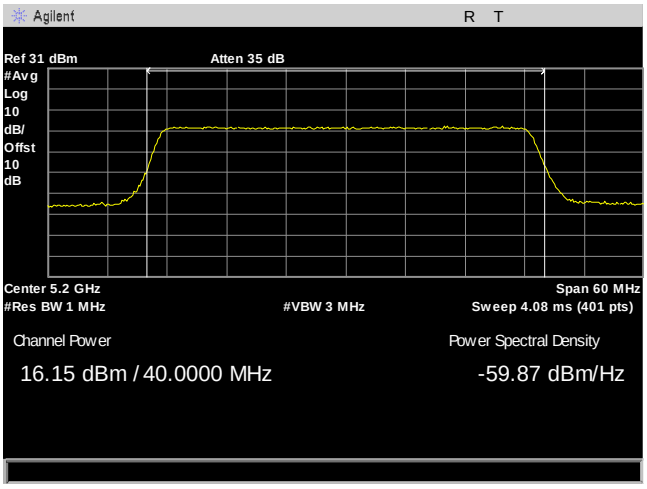
Plot 54. Maximum Conducted Output Power, 20M, 5240, 90Sector, Port 2



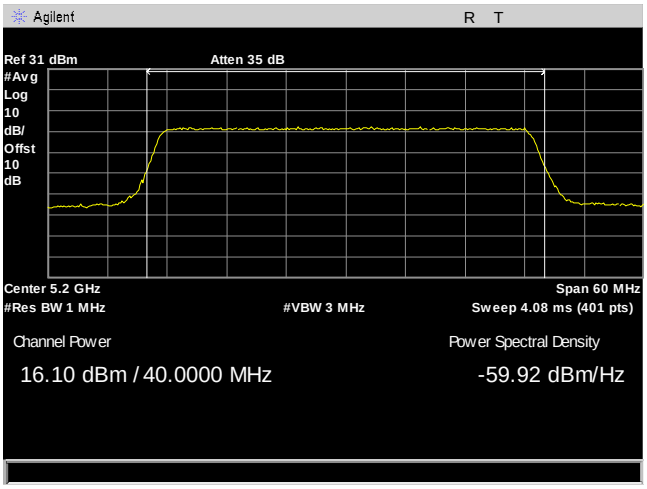
Plot 55. Maximum Conducted Output Power, 40M, 5175, 90Sector, Port 1



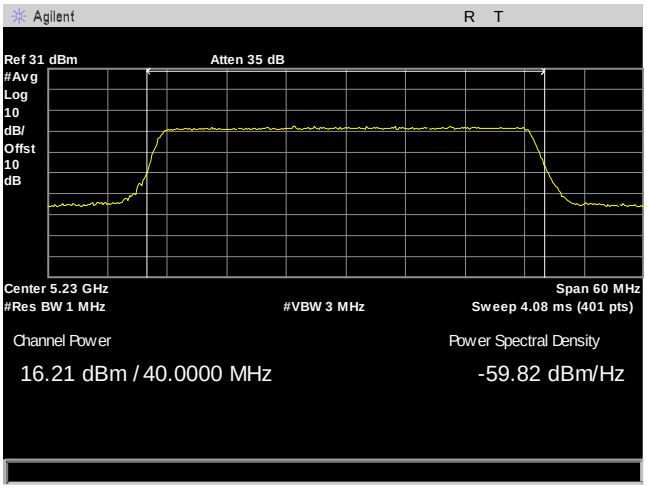
Plot 56. Maximum Conducted Output Power, 40M, 5175, 90Sector, Port 2



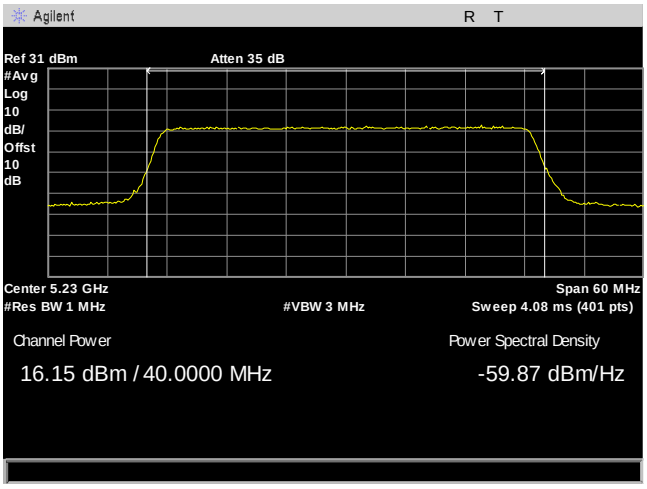
Plot 57. Maximum Conducted Output Power, 40M, 5200, 90Sector, Port 1



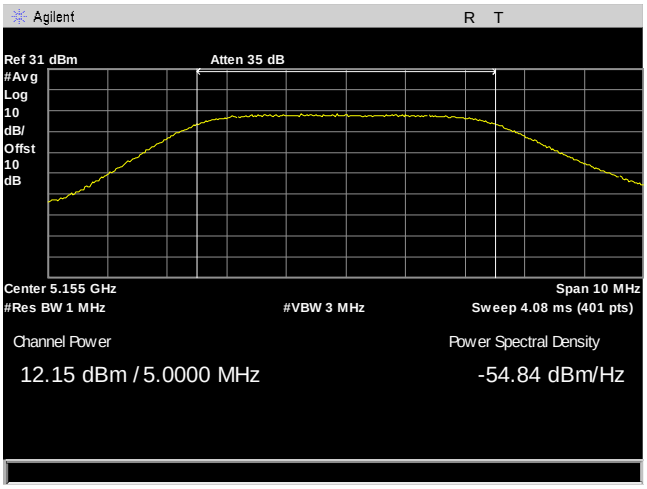
Plot 58. Maximum Conducted Output Power, 40M, 5200, 90Sector, Port 2



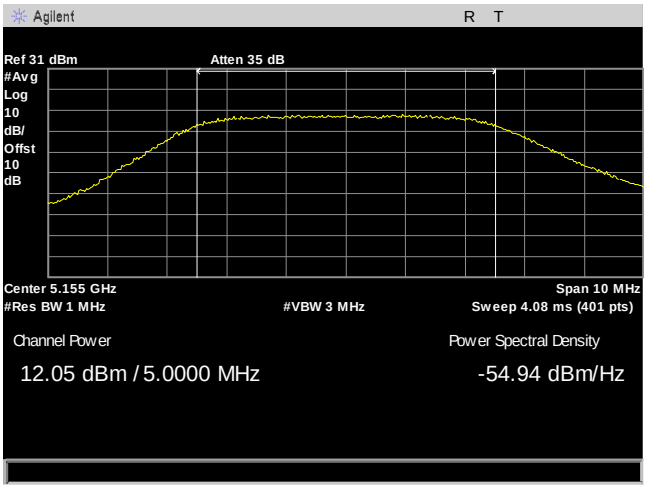
Plot 59. Maximum Conducted Output Power, 40M, 5230, 90Sector, Port 1



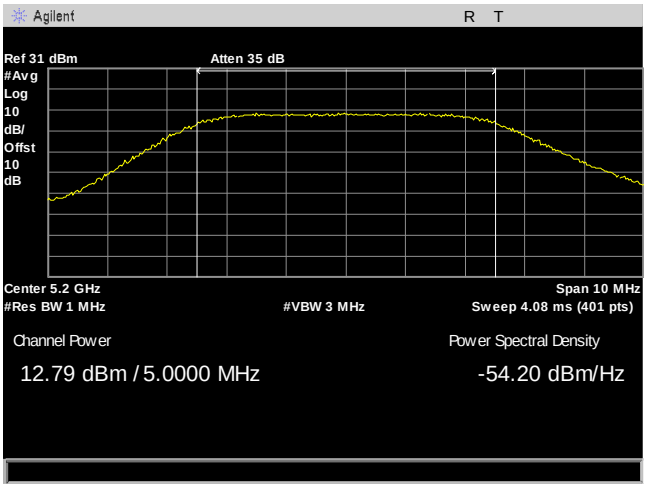
Plot 60. Maximum Conducted Output Power, 40M, 5230, 90Sector, Port 2



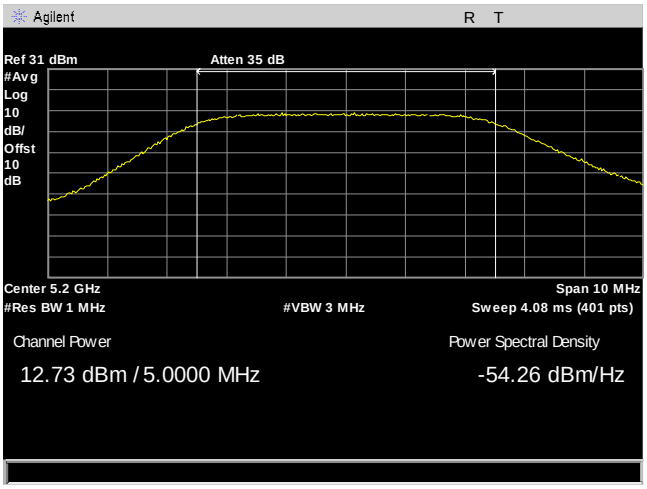
Plot 61. Maximum Conducted Output Power, 5M, 5155, 2Panel, Port 1



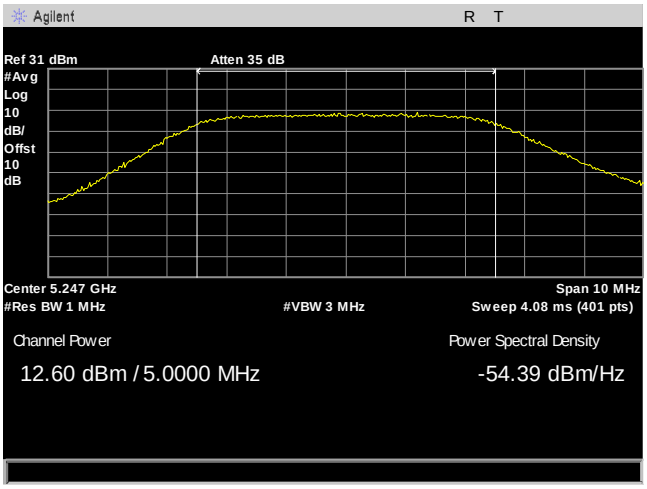
Plot 62. Maximum Conducted Output Power, 5M, 5155, 2Panel, Port 2



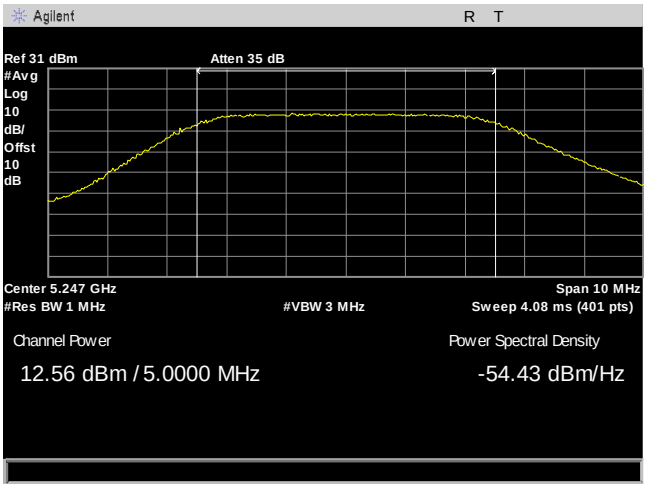
Plot 63. Maximum Conducted Output Power, 5M, 5200, 2Panel, Port 1



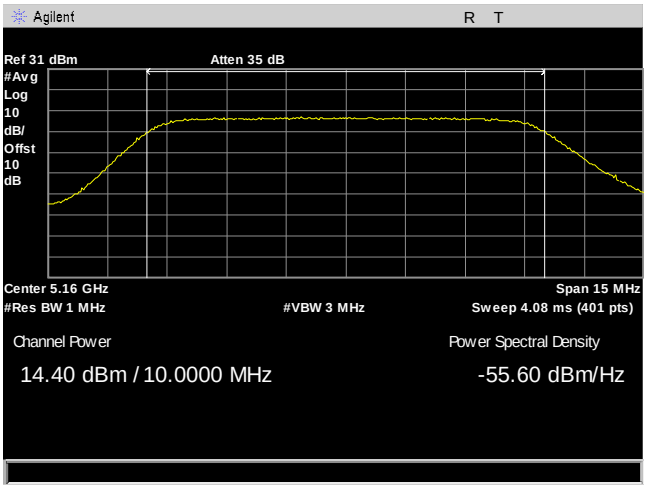
Plot 64. Maximum Conducted Output Power, 5M, 5200, 2Panel, Port 2



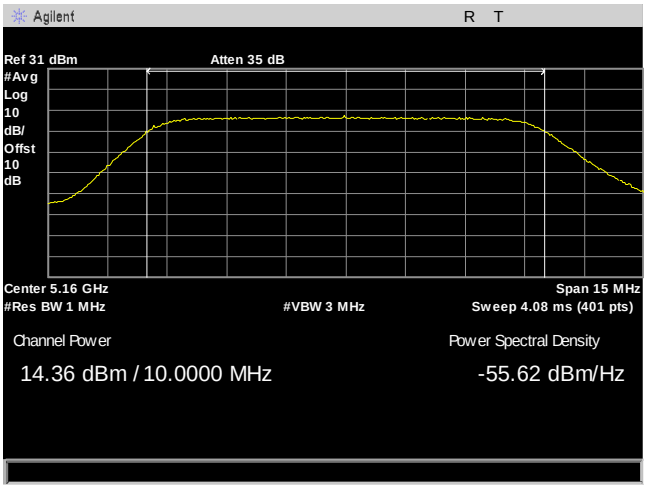
Plot 65. Maximum Conducted Output Power, 5M, 5247.5, 2Panel, Port 1



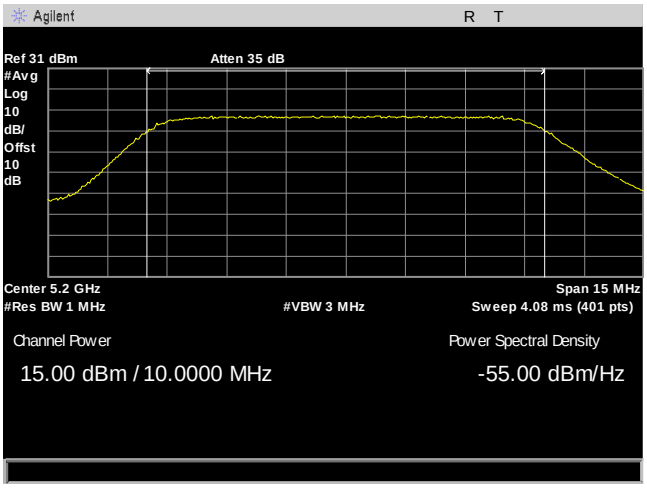
Plot 66. Maximum Conducted Output Power, 5M, 5247.5, 2Panel, Port 2



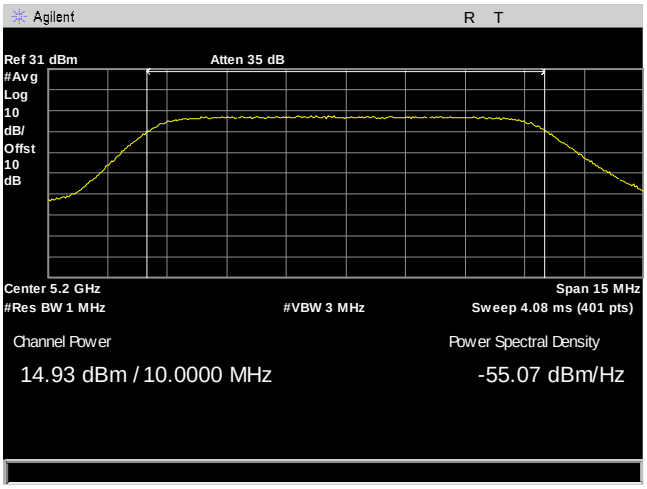
Plot 67. Maximum Conducted Output Power, 10M, 5160, 2Panel, Port 1



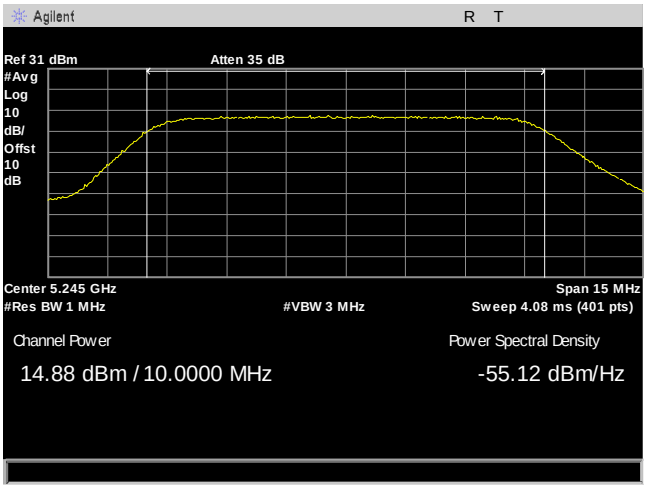
Plot 68. Maximum Conducted Output Power, 10M, 5160, 2Panel, Port 2



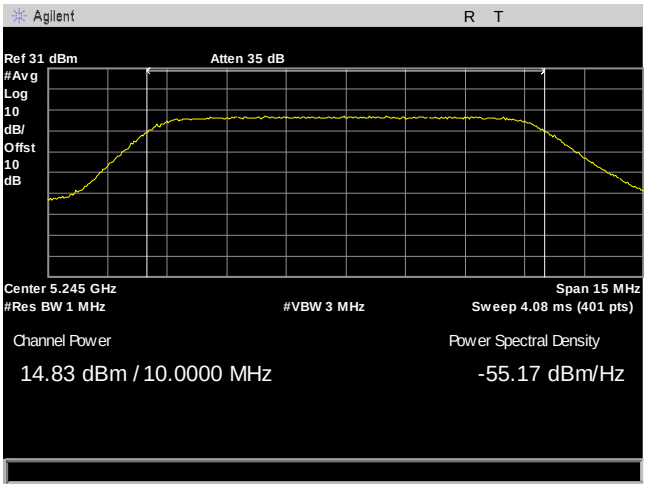
Plot 69. Maximum Conducted Output Power, 10M, 5200, 2Panel, Port 1



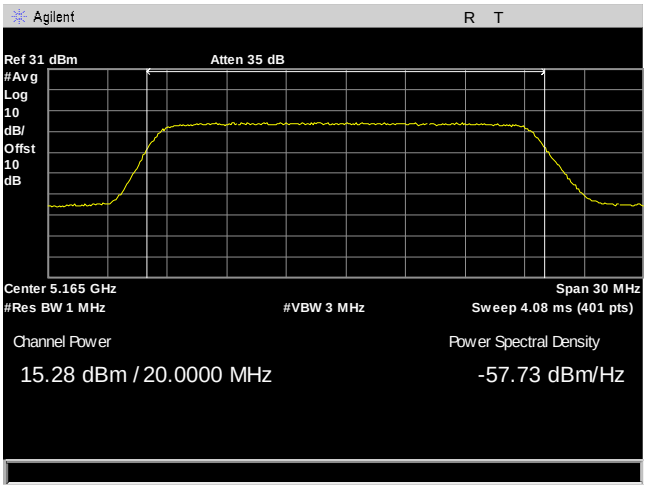
Plot 70. Maximum Conducted Output Power, 10M, 5200, 2Panel, Port 2



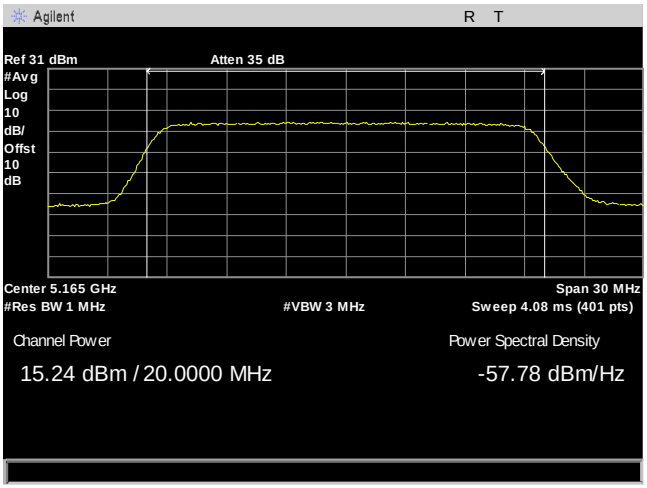
Plot 71. Maximum Conducted Output Power, 10M, 5245, 2Panel, Port 1



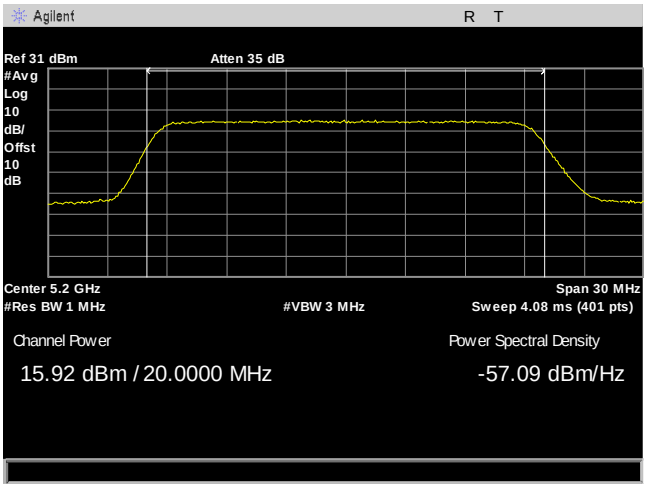
Plot 72. Maximum Conducted Output Power, 10M, 5245, 2Panel, Port 2



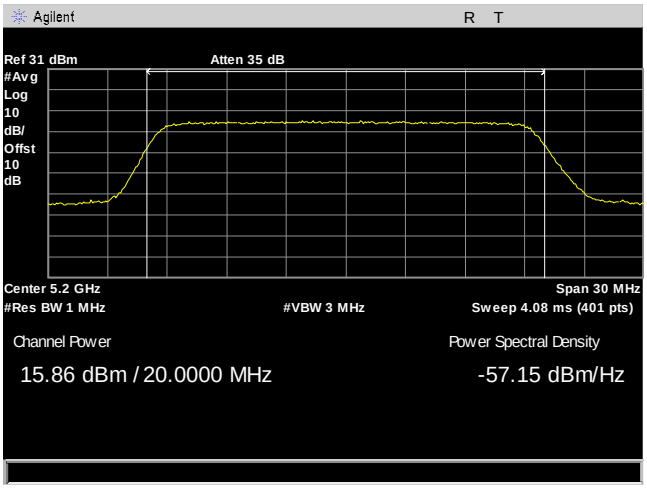
Plot 73. Maximum Conducted Output Power, 20M, 5165, 2Panel, Port 1



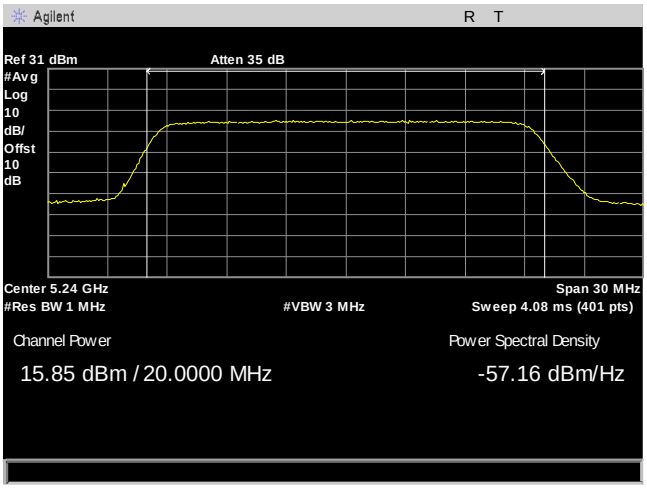
Plot 74. Maximum Conducted Output Power, 20M, 5165, 2Panel, Port 2



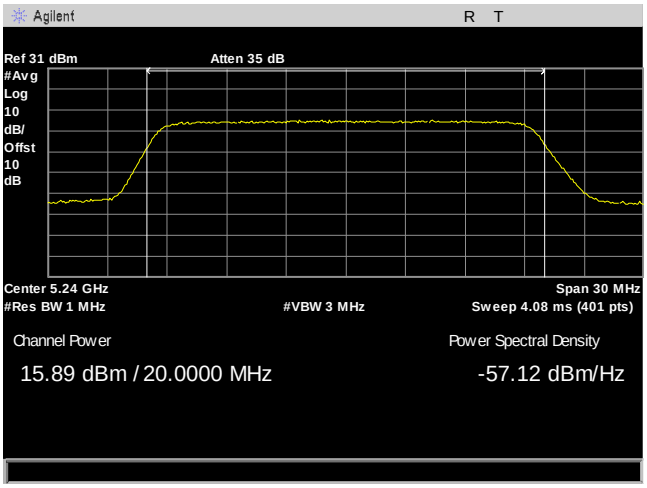
Plot 75. Maximum Conducted Output Power, 20M, 5200, 2Panel, Port 1



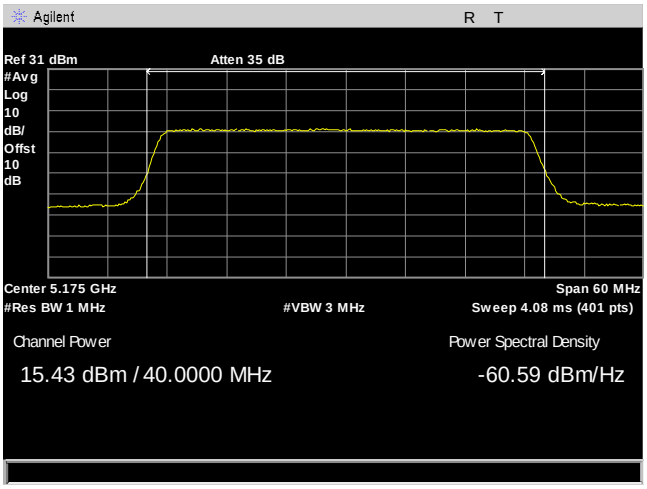
Plot 76. Maximum Conducted Output Power, 20M, 5200, 2Panel, Port 2



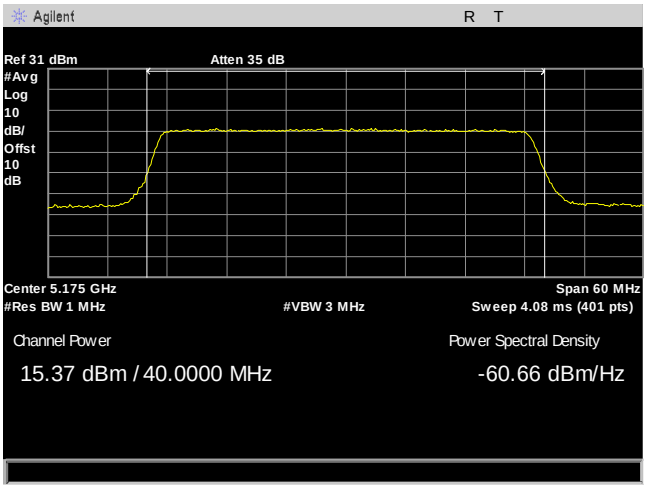
Plot 77. Maximum Conducted Output Power, 20M, 5240, 2Panel, Port 1



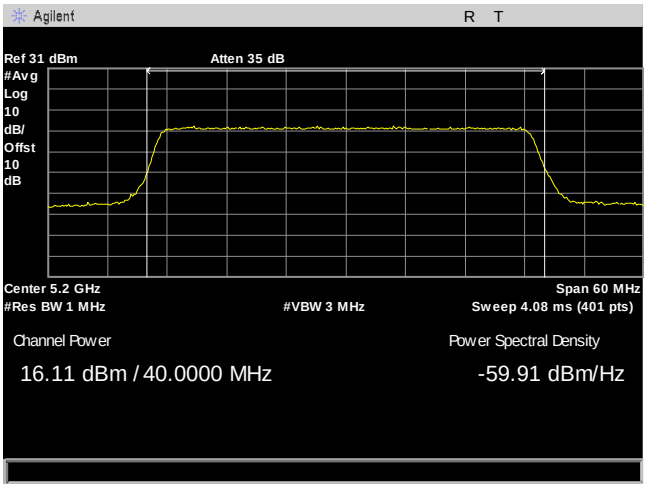
Plot 78. Maximum Conducted Output Power, 20M, 5240, 2Panel, Port 2



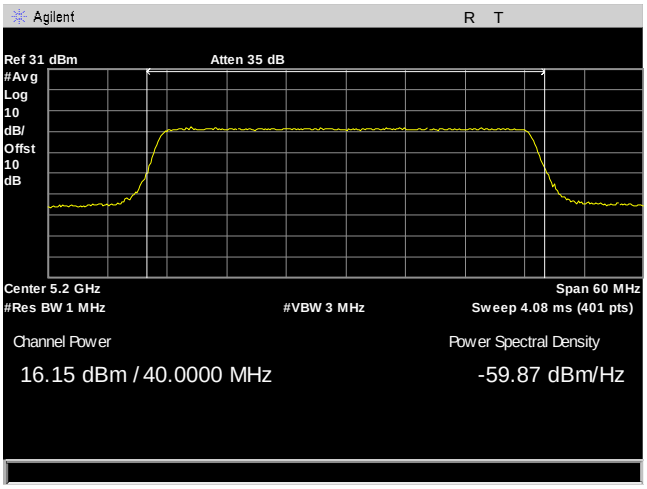
Plot 79. Maximum Conducted Output Power, 40M, 5175, 2Panel, Port 1



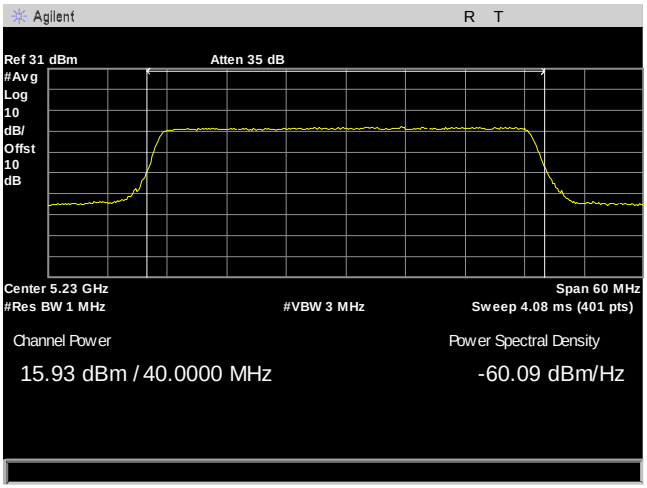
Plot 80. Maximum Conducted Output Power, 40M, 5175, 2Panel, Port 2



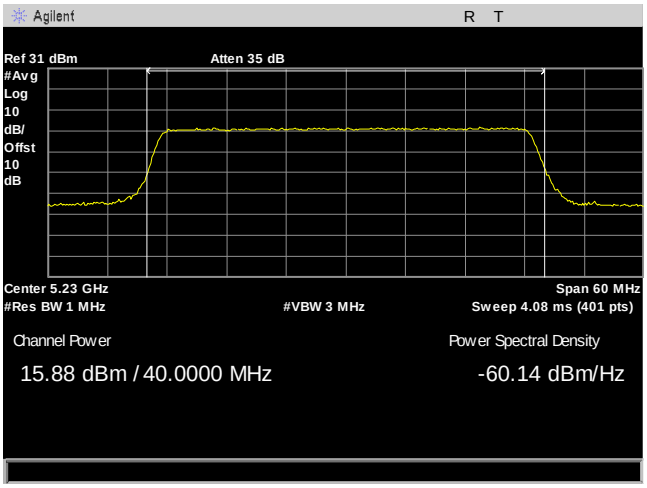
Plot 81. Maximum Conducted Output Power, 40M, 5200, 2Panel, Port 1



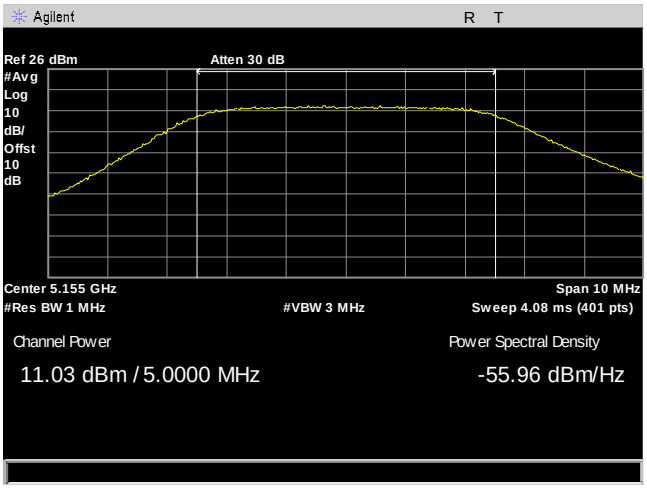
Plot 82. Maximum Conducted Output Power, 40M, 5200, 2Panel, Port 2



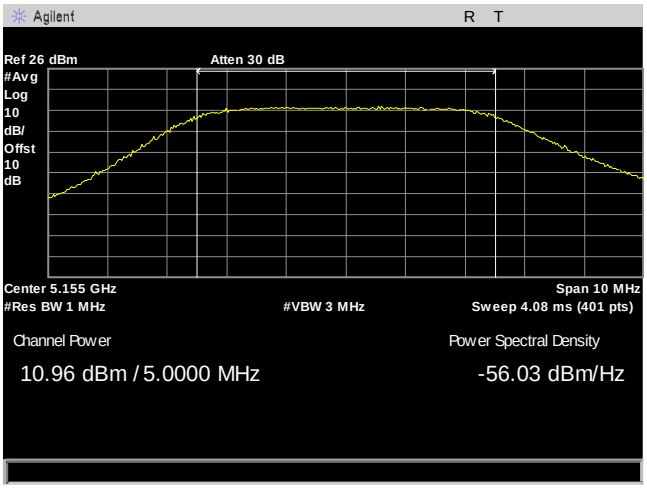
Plot 83. Maximum Conducted Output Power, 40M, 5230, 2Panel, Port 1



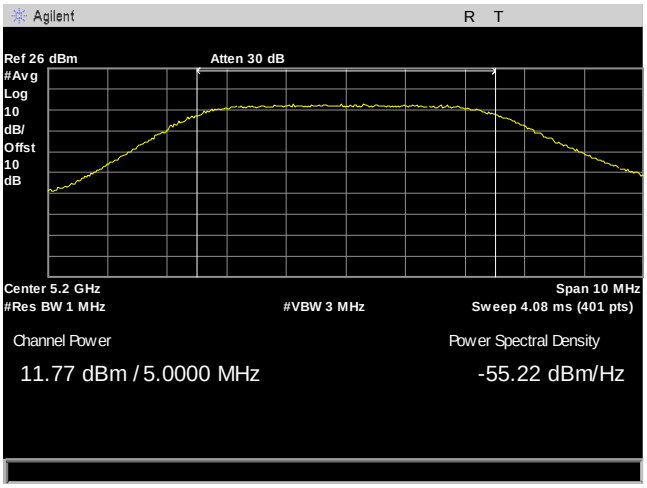
Plot 84. Maximum Conducted Output Power, 40M, 5230, 2Panel, Port 2



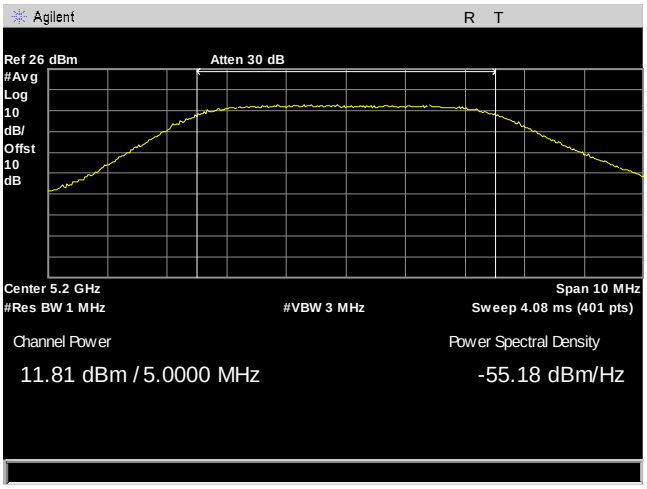
Plot 85. Maximum Conducted Output Power, 5M, 5155, 3Para, Port 1



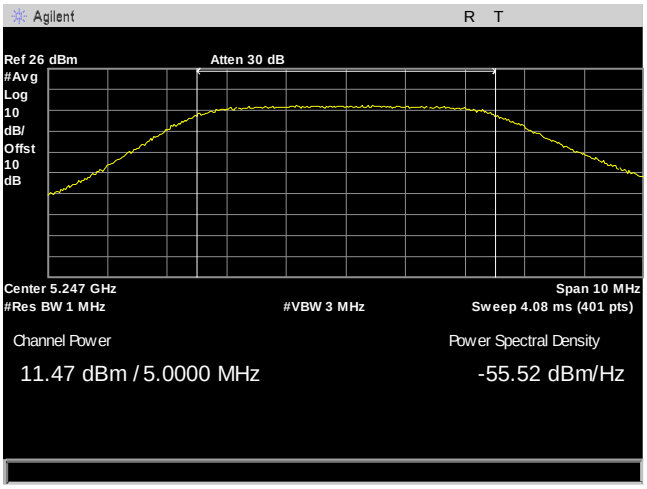
Plot 86. Maximum Conducted Output Power, 5M, 5155, 3Para, Port 2



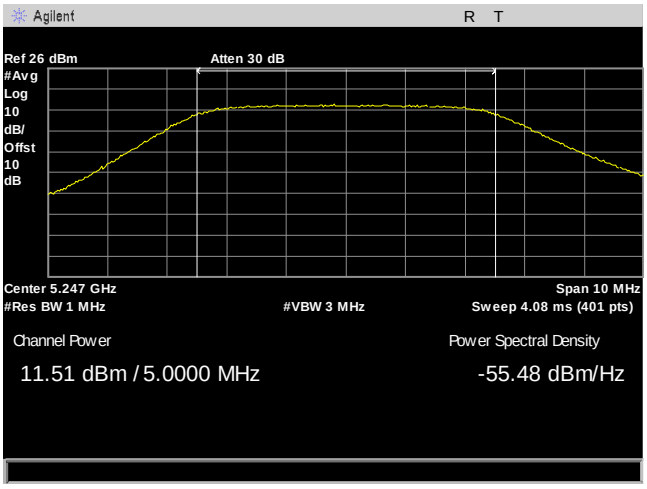
Plot 87. Maximum Conducted Output Power, 5M, 5200, 3Para l, Port 1



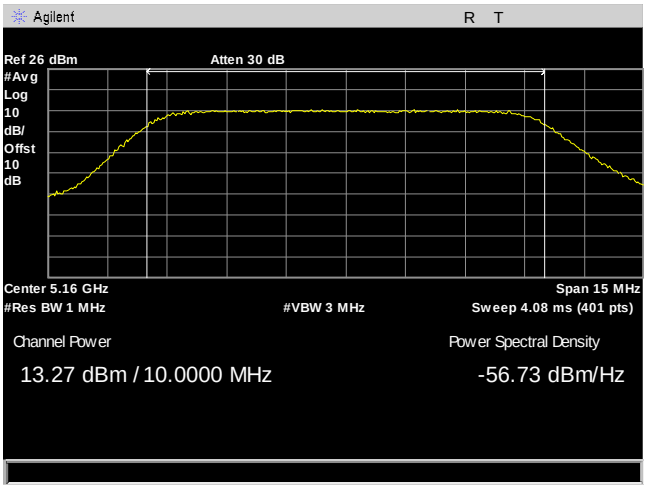
Plot 88. Maximum Conducted Output Power, 5M, 5200, 3Para, Port 2



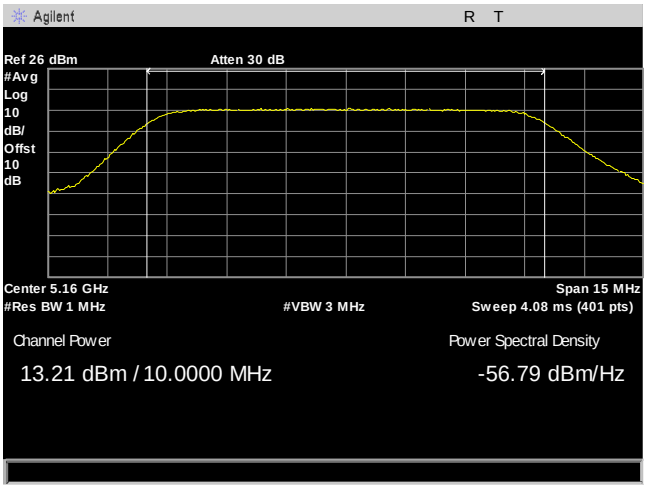
Plot 89. Maximum Conducted Output Power, 5M, 5247.5, 3Para, Port 1



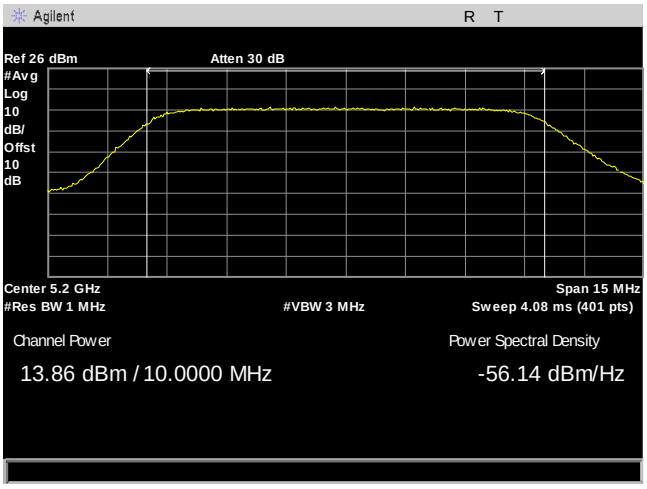
Plot 90. Maximum Conducted Output Power, 5M, 5247.5, 3Para, Port 2



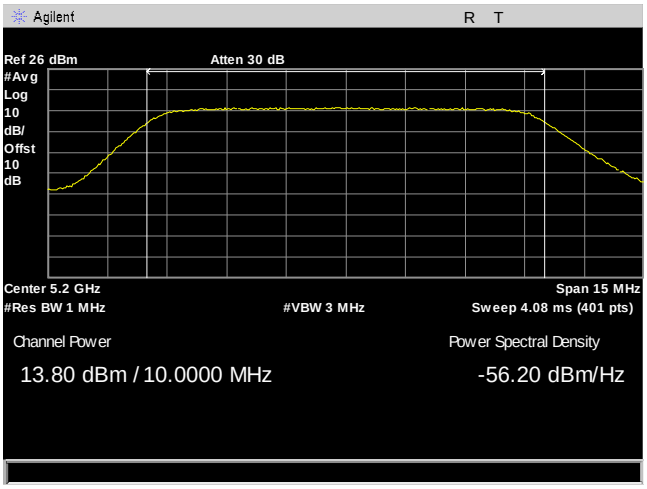
Plot 91. Maximum Conducted Output Power, 10M, 5160, 3Para, Port 1



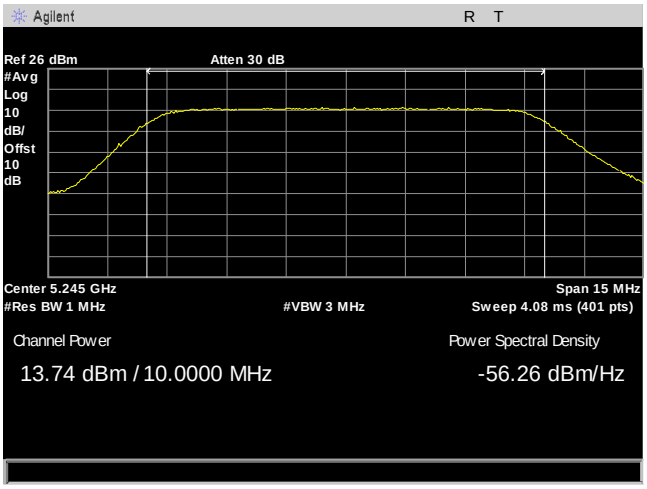
Plot 92. Maximum Conducted Output Power, 10M, 5160, 3Para, Port 2



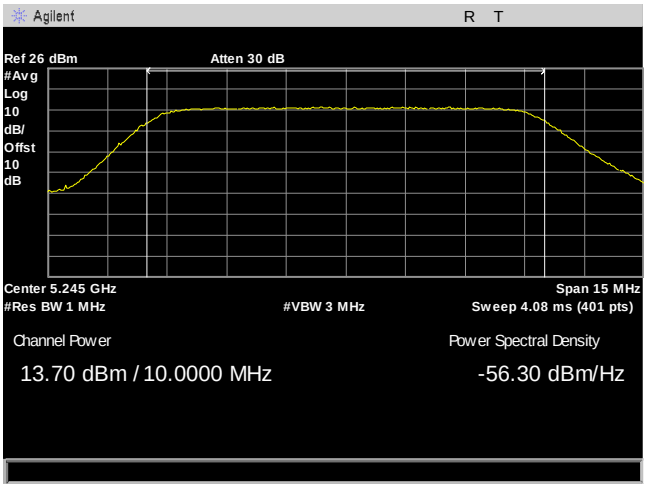
Plot 93. Maximum Conducted Output Power, 10M, 5200, 3Para, Port 1



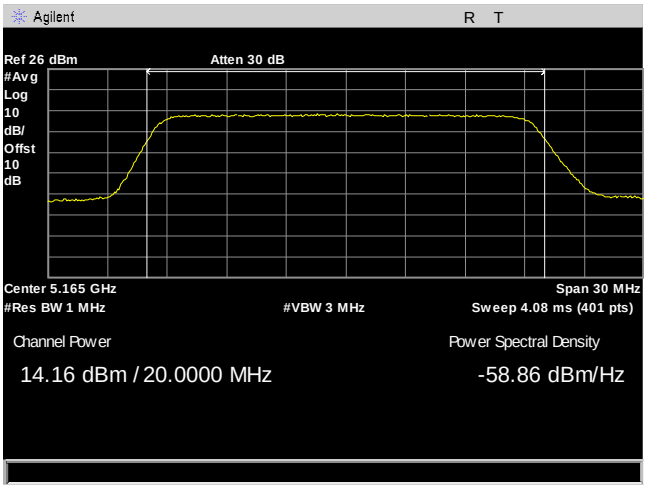
Plot 94. Maximum Conducted Output Power, 10M, 5200, 3Para, Port 2



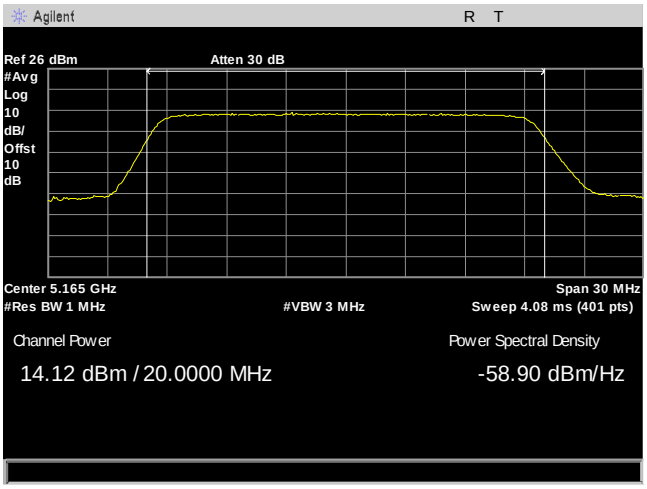
Plot 95. Maximum Conducted Output Power, 10M, 5245, 3Para, Port 1



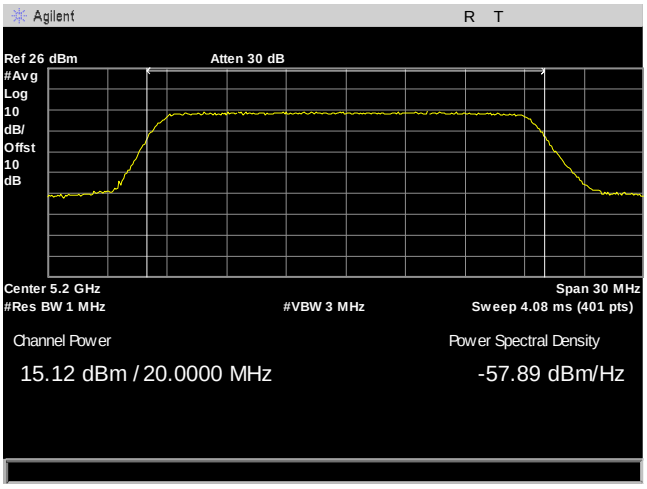
Plot 96. Maximum Conducted Output Power, 10M, 5245, 3Para, Port 2



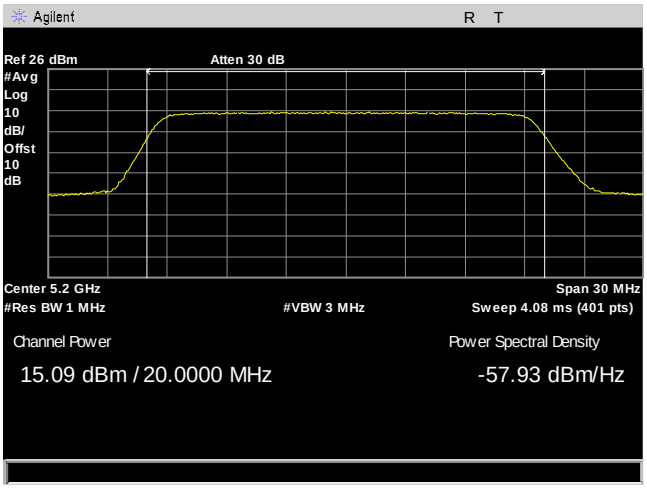
Plot 97. Maximum Conducted Output Power, 20M, 5165, 3Para, Port 1



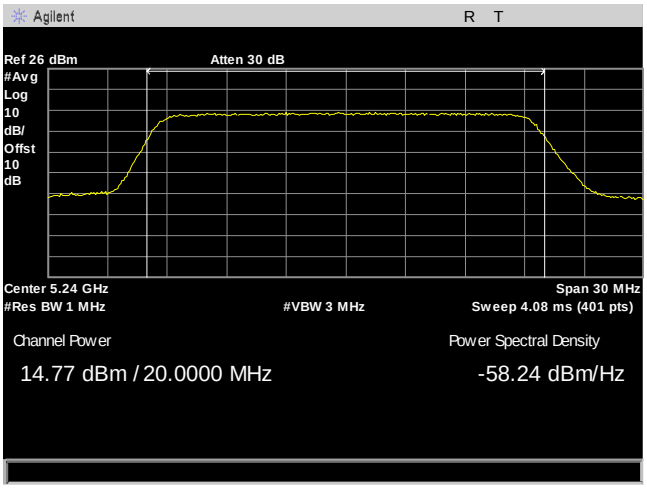
Plot 98. Maximum Conducted Output Power, 20M, 5165, 3Para, Port 2



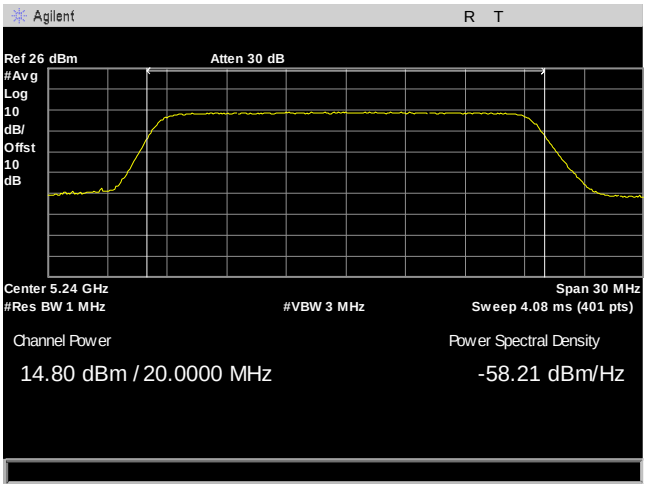
Plot 99. Maximum Conducted Output Power, 20M, 5200, 3Para, Port 1



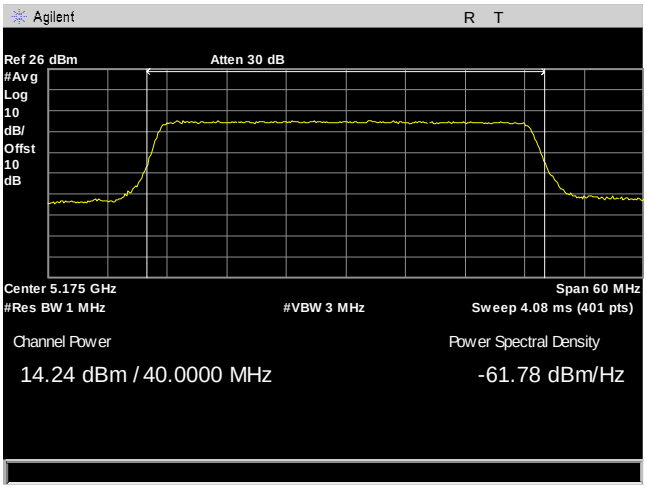
Plot 100. Maximum Conducted Output Power, 20M, 5200, 3Para, Port 2



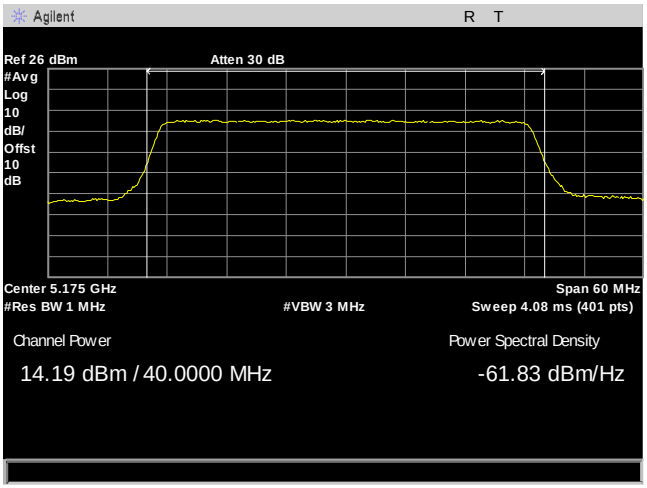
Plot 101. Maximum Conducted Output Power, 20M, 5240, 3Para, Port 1



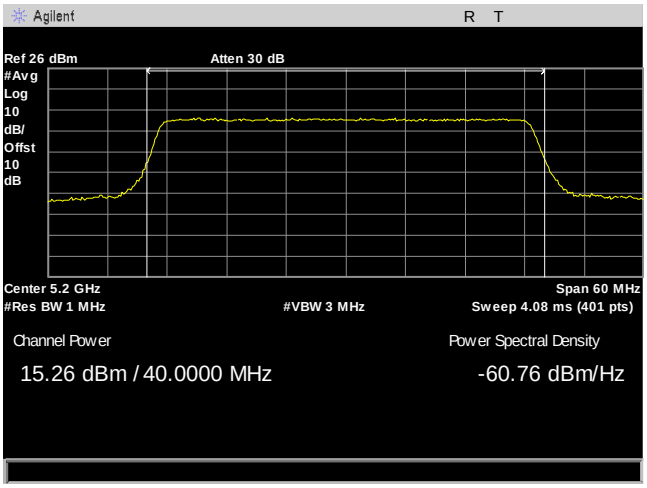
Plot 102. Maximum Conducted Output Power, 20M, 5240, 3Para, Port 2



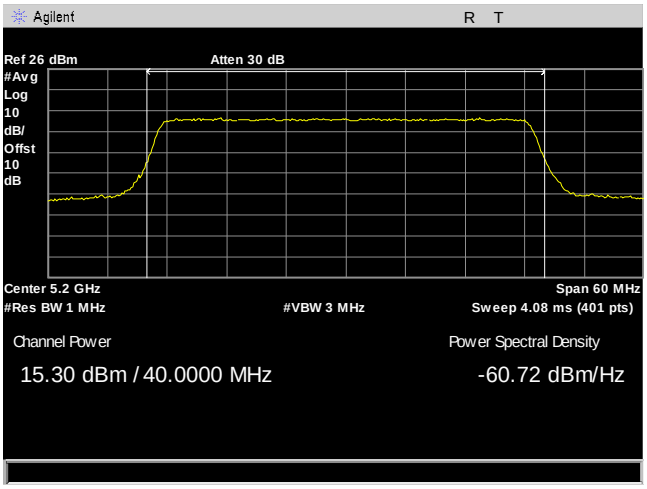
Plot 103. Maximum Conducted Output Power, 40M, 5175, 3Para, Port 1



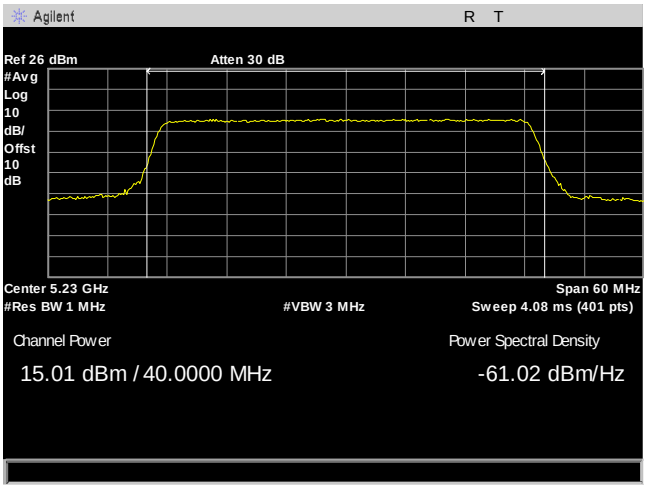
Plot 104. Maximum Conducted Output Power, 40M, 5175, 3Para, Port 2



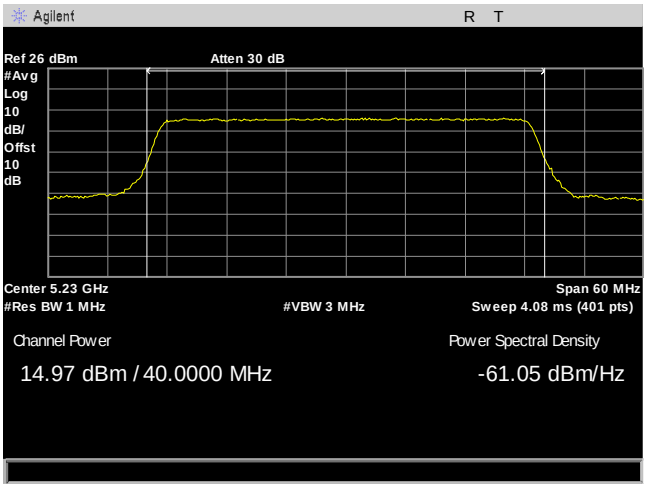
Plot 105. Maximum Conducted Output Power, 40M, 5200, 3Para, Port 1



Plot 106. Maximum Conducted Output Power, 40M, 5200, 3Para, Port 2



Plot 107. Maximum Conducted Output Power, 40M, 5230, 3Para, Port 1



Plot 108. Maximum Conducted Output Power, 40M, 5230, 3Para, Port 2

Electromagnetic Compatibility Criteria for Intentional Radiators

§15.407(a)(1) Maximum Power Spectral Density

Test Requirements:

§15.407(a)(1)(i): For an outdoor access point operating in the band 5.15-5.25 GHz the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(a)(1)(ii): For an indoor access point operating in the band 5.15-5.25 GHz the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.407(a)(1)(iii): In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

§15.407(a)(1)(iv): In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

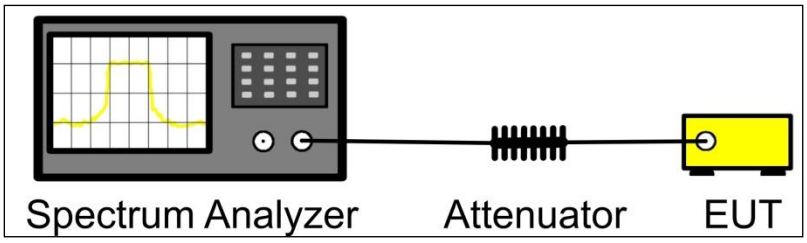
Test Procedure: The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels. Its power was measured according KDB 789033 D02 General UNII Test Procedures v01.

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

No anomalies detected.

Test Engineer(s): Arsalan Hasan

Test Date(s): June 29, 2019



Frequency (MHz)	PSD Port 1 (dBm)	PSD Port 2 (dBm)	Sum (dBm)	Limit (dBm)	Antenna Gain (dBi)	PSD Limit (dBm)	PSD Margin (dB)
5 MHz							
5155.0	8.91	9.29	12.11	17.00	8.00	15.00	-2.89
5200.0	9.51	9.526	12.53	17.00	8.00	15.00	-2.47
5247.5	9.181	8.361	11.80	17.00	8.00	15.00	-3.20
10 MHz							
5160.0	8.073	7.862	10.98	17.00	8.00	15.00	-4.02
5200.0	8.094	7.927	11.02	17.00	8.00	15.00	-3.98
5245.0	7.985	7.767	10.89	17.00	8.00	15.00	-4.11
20 MHz							
5165.0	5.514	5.607	8.57	17.00	8.00	15.00	-6.43
5200.0	6.227	6.184	9.22	17.00	8.00	15.00	-5.78
5240.0	6.263	6.019	9.15	17.00	8.00	15.00	-5.85
40MHz							
5175.0	2.36	2.011	5.20	17.00	8.00	15.00	-9.80
5200.0	2.853	2.743	5.81	17.00	8.00	15.00	-9.19
5230.0	2.719	2.896	5.82	17.00	8.00	15.00	-9.18

Table 15. Power Spectral Density, 8 Omni (PTMP), Test Results

Frequency (MHz)	PSD Port 1 (dBm)	PSD Port 2 (dBm)	Sum (dBm)	Limit (dBm)	Antenna Gain (dBi)	PSD Limit (dBm)	PSD Margin (dB)
5 MHz							
5155.0	4.069	4.177	7.13	17.00	13.50	9.50	-2.37
5200.0	4.401	4.862	7.65	17.00	13.50	9.50	-1.85
5247.5	4.33	4.445	7.40	17.00	13.50	9.50	-2.10
10 MHz							
5160.0	3.839	3.753	6.81	17.00	13.50	9.50	-2.69
5200.0	4.379	4.102	7.25	17.00	13.50	9.50	-2.25
5245.0	4.12	4.174	7.16	17.00	13.50	9.50	-2.34
20 MHz							
5165.0	2.44	2.202	5.33	17.00	13.50	9.50	-4.17
5200.0	3.048	3.206	6.14	17.00	13.50	9.50	-3.36
5240.0	2.899	2.8	5.86	17.00	13.50	9.50	-3.64
40MHz							
5175.0	2.303	2.253	5.29	17.00	13.50	9.50	-4.21
5200.0	2.847	2.987	5.93	17.00	13.50	9.50	-3.57
5230.0	2.936	2.97	5.96	17.00	13.50	9.50	-3.54

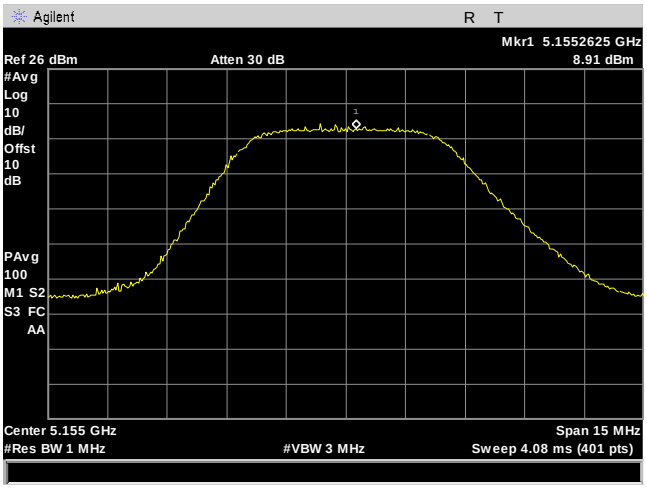
Table 16. Power Spectral Density, 90 Sector (PTMP), Test Results

Frequency (MHz)	PSD Port 1 (dBm)	PSD Port 2 (dBm)	Sum (dBm)	Limit (dBm)	Antenna Gain (dBi)	PSD Limit (dBm)	PSD Margin (dB)
5 MHz							
5155.0	8.91	9.29	12.11	17.00	26.00	14.00	-1.89
5200.0	9.51	9.526	12.53	17.00	26.00	14.00	-1.47
5247.5	9.181	8.361	11.80	17.00	26.00	14.00	-2.20
10 MHz							
5160.0	8.073	7.862	10.98	17.00	26.00	14.00	-3.02
5200.0	8.094	7.927	11.02	17.00	26.00	14.00	-2.98
5245.0	7.985	7.767	10.89	17.00	26.00	14.00	-3.11
20 MHz							
5165.0	5.514	5.607	8.57	17.00	26.00	14.00	-5.43
5200.0	6.227	6.184	9.22	17.00	26.00	14.00	-4.78
5240.0	6.263	6.019	9.15	17.00	26.00	14.00	-4.85
40MHz							
5175.0	2.36	2.011	5.20	17.00	26.00	14.00	-8.80
5200.0	2.853	2.743	5.81	17.00	26.00	14.00	-8.19
5230.0	2.719	2.896	5.82	17.00	26.00	14.00	-8.18

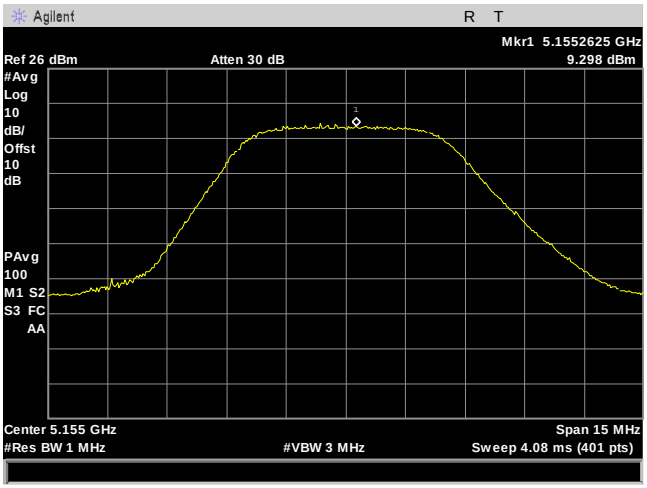
Table 17. Power Spectral Density, 2' Panel (PTP), Test Results

Frequency (MHz)	PSD Port 1 (dBm)	PSD Port 2 (dBm)	Sum (dBm)	Limit (dBm)	Antenna Gain (dBi)	PSD Limit (dBm)	PSD Margin (dB)
5 MHz							
5155.0	4.889	5.185	8.05	17.00	30.00	10.00	-1.95
5200.0	5.498	5.665	8.59	17.00	30.00	10.00	-1.41
5247.5	5.691	5.627	8.67	17.00	30.00	10.00	-1.33
10 MHz							
5160.0	4.258	4.314	7.30	17.00	30.00	10.00	-2.70
5200.0	4.647	4.954	7.81	17.00	30.00	10.00	-2.19
5245.0	4.833	4.718	7.79	17.00	30.00	10.00	-2.21
20 MHz							
5165.0	2.175	2.248	5.22	17.00	30.00	10.00	-4.78
5200.0	2.805	2.706	5.77	17.00	30.00	10.00	-4.23
5240.0	2.678	2.791	5.75	17.00	30.00	10.00	-4.25
40MHz							
5175.0	-0.844	-0.857	2.16	17.00	30.00	10.00	-7.84
5200.0	-0.145	-0.162	2.86	17.00	30.00	10.00	-7.14
5230.0	-0.244	-0.298	2.74	17.00	30.00	10.00	-7.26

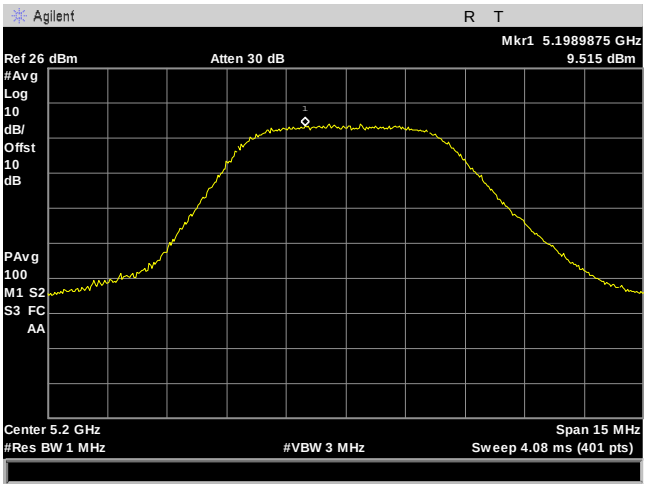
Table 18. Power Spectral Density, 3' Para (PTP), Test Results



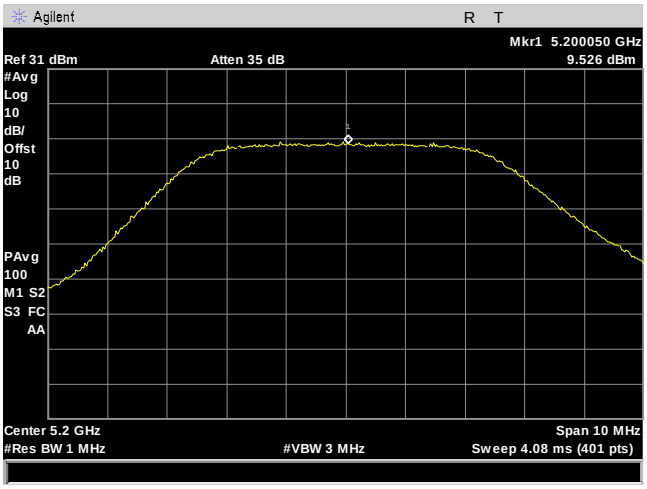
Plot 109. Power Spectral Density, 5M, 5155, 8Omni, Port 1



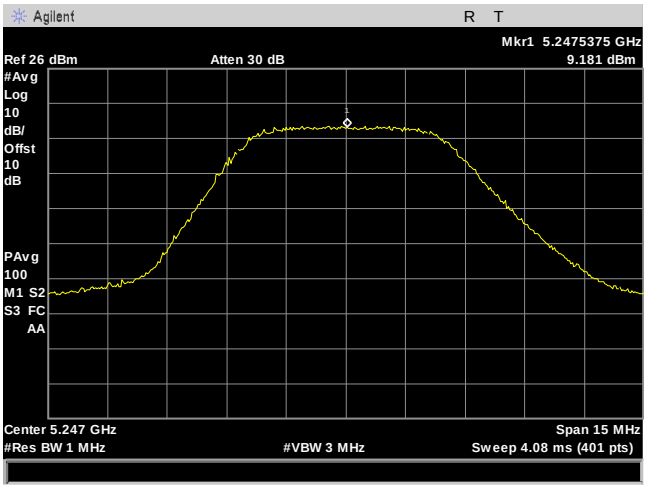
Plot 110. Power Spectral Density, 5M, 5155, 8Omni, Port 2



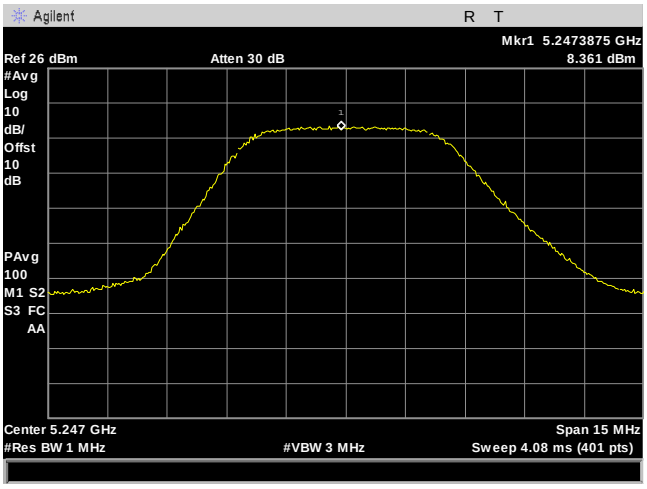
Plot 111. Power Spectral Density, 5M, 5200, 8Omni, Port 1



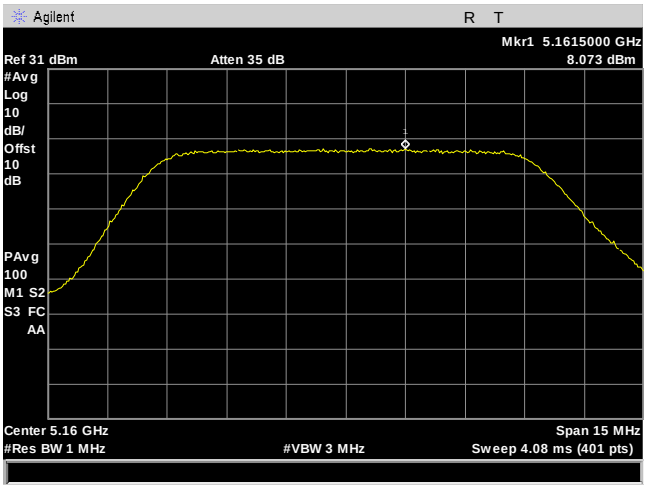
Plot 112. Power Spectral Density, 5M, 5200, 8Omni, Port 2



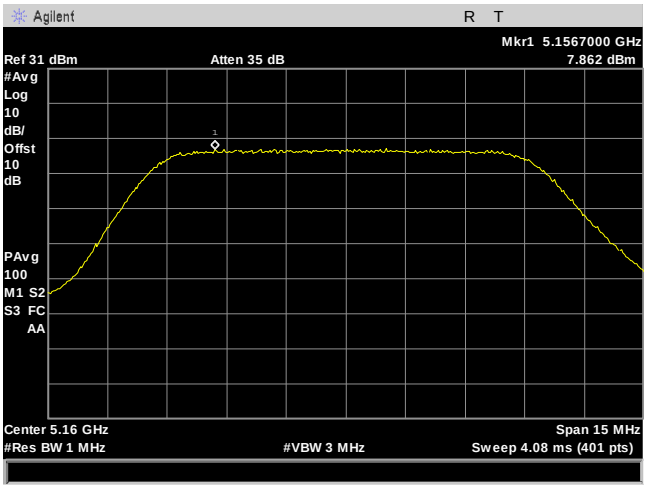
Plot 113. Power Spectral Density, 5M, 5247.5, 8Omni, Port 1



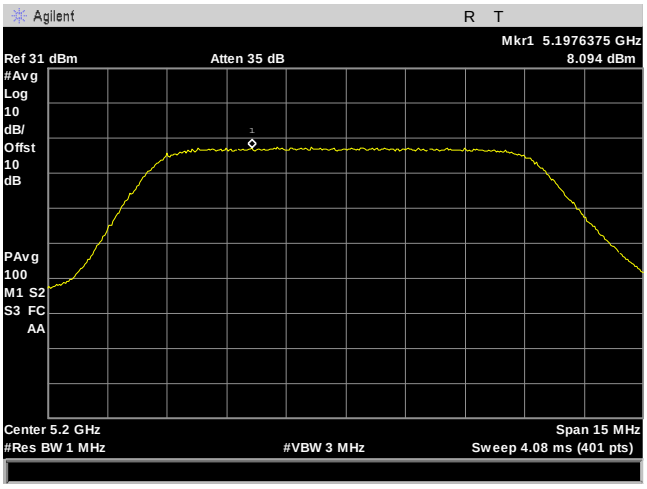
Plot 114. Power Spectral Density, 5M, 5247.5, 8Omni, Port 2



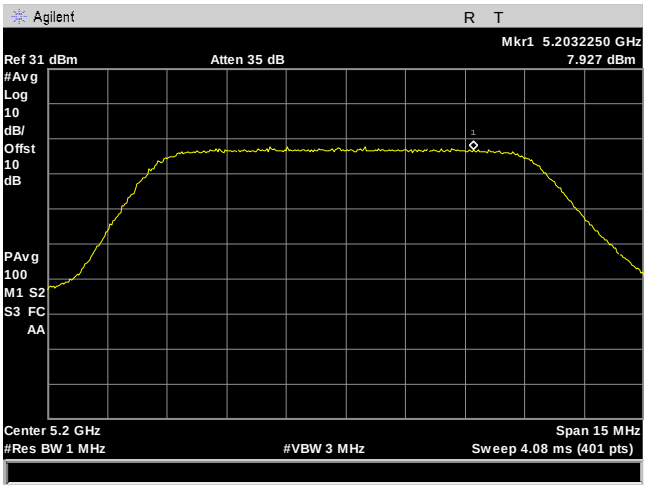
Plot 115. Power Spectral Density, 10M, 5160, 8Omni, Port 1



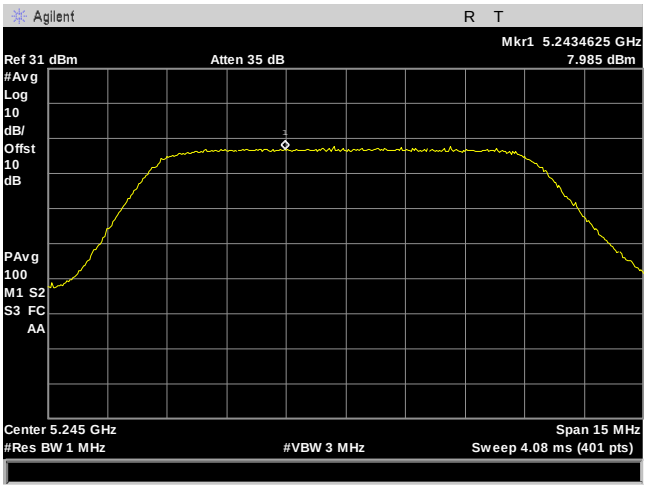
Plot 116. Power Spectral Density, 10M, 5160, 8Omni, Port 2



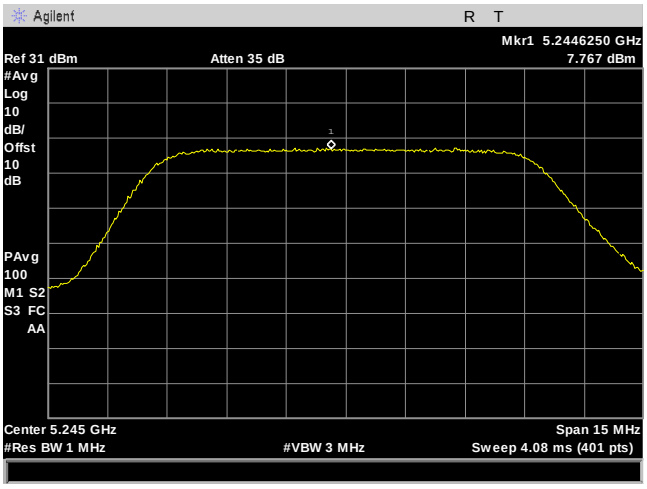
Plot 117. Power Spectral Density, 10M, 5200, 8Omni, Port 1



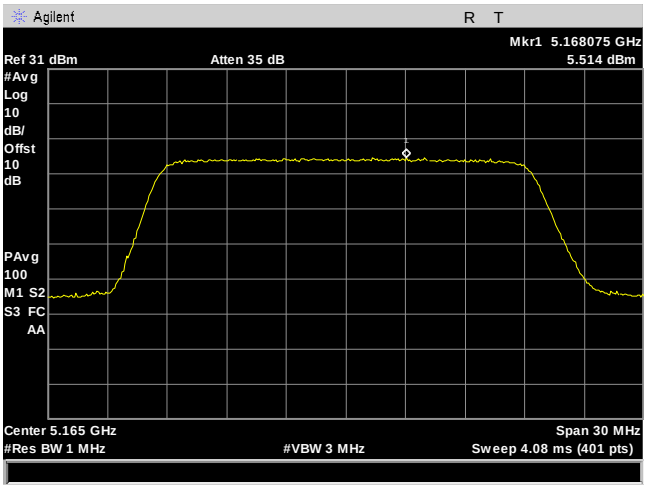
Plot 118. Power Spectral Density, 10M, 5200, 8Omni, Port 2



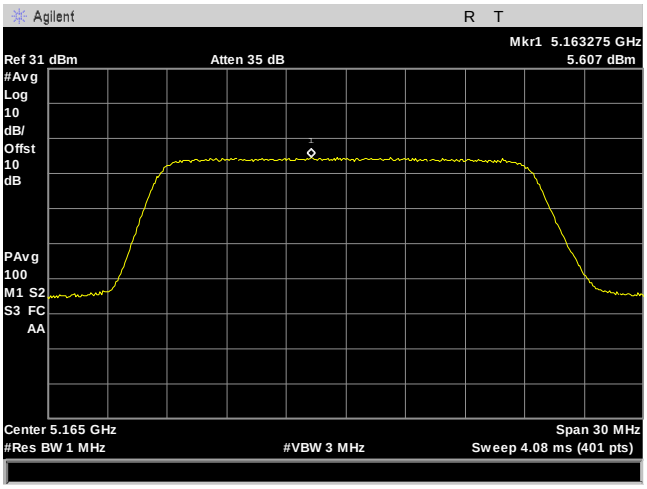
Plot 119. Power Spectral Density, 10M, 5245, 8Omni, Port 1



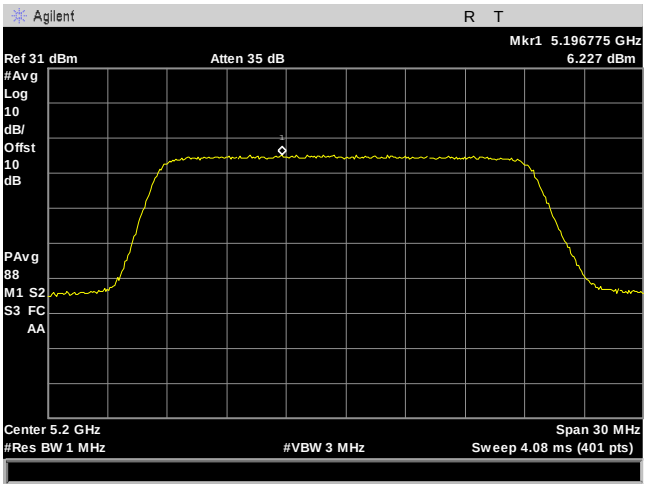
Plot 120. Power Spectral Density, 10M, 5245, 8Omni, Port 2



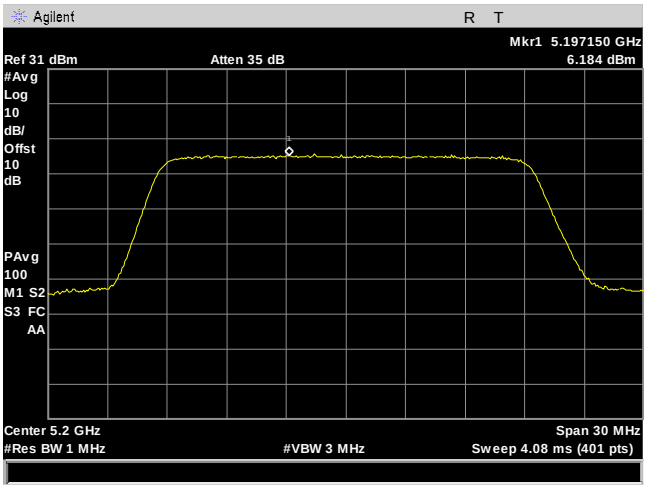
Plot 121. Power Spectral Density, 20M, 5165, 8Omni, Port 1



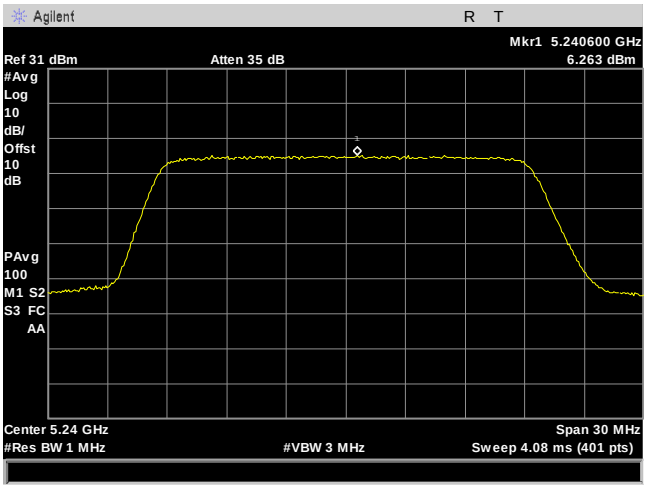
Plot 122. Power Spectral Density, 20M, 5165, 8Omni, Port 2



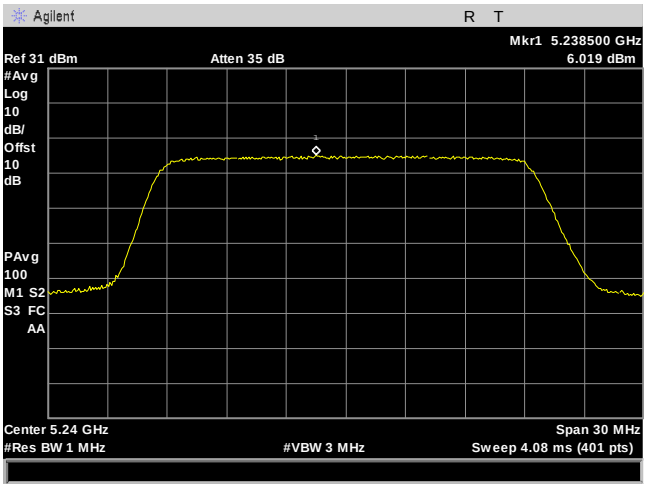
Plot 123. Power Spectral Density, 20M, 5200, 8Omni, Port 1



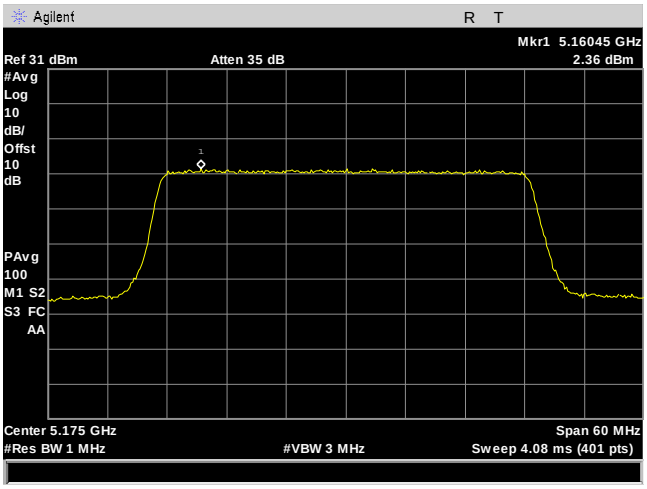
Plot 124. Power Spectral Density, 20M, 5200, 8Omni, Port 2



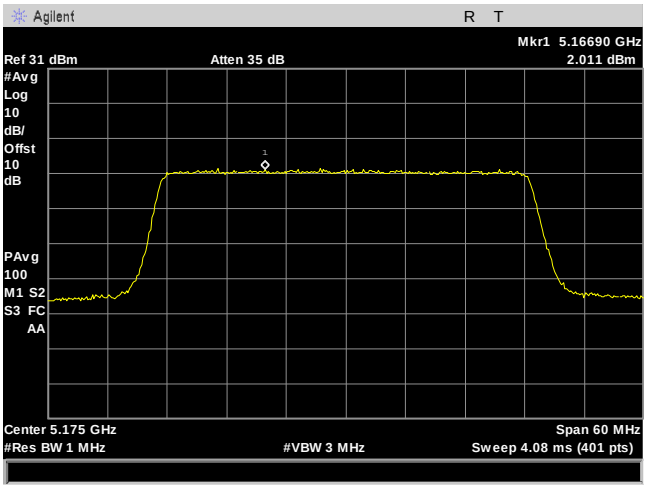
Plot 125. Power Spectral Density, 20M, 5240, 8Omni, Port 1



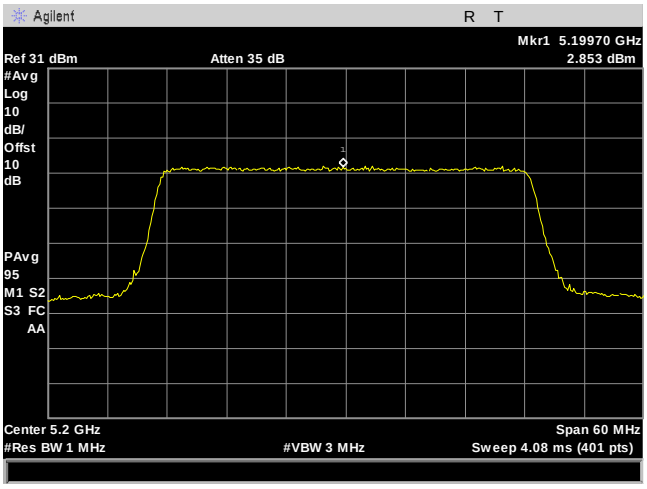
Plot 126. Power Spectral Density, 20M, 5240, 8Omni, Port 2



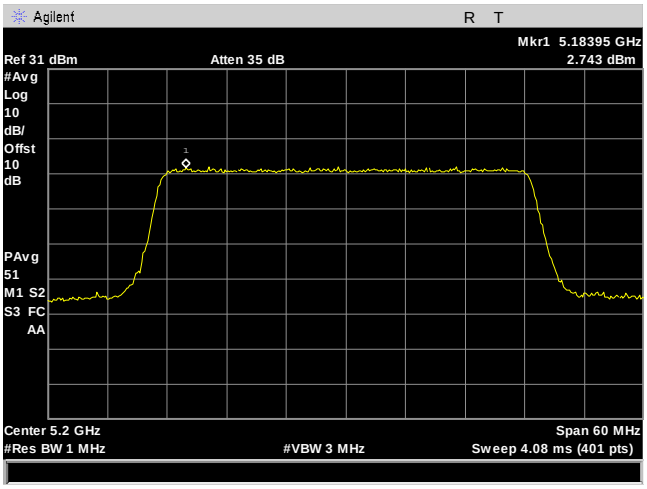
Plot 127. Power Spectral Density, 40M, 5175, 8Omni, Port 1



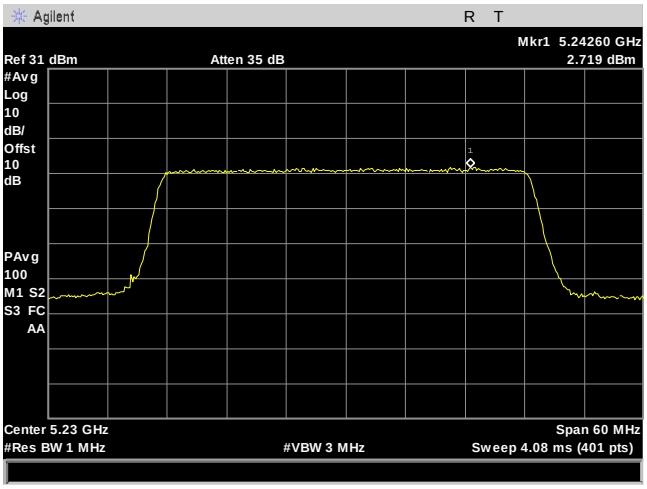
Plot 128. Power Spectral Density, 40M, 5175, 8Omni, Port 2



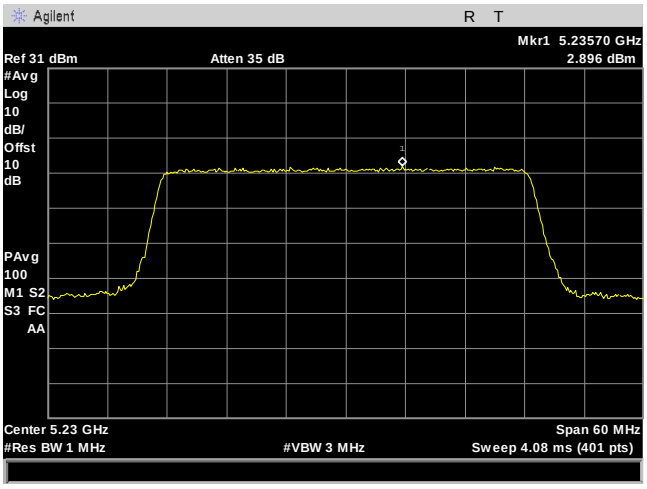
Plot 129. Power Spectral Density, 40M, 5200, 8Omni, Port 1



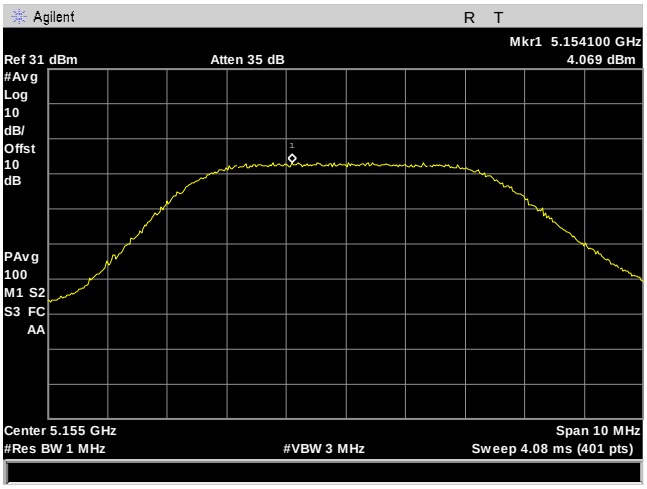
Plot 130. Power Spectral Density, 40M, 5200, 8Omni, Port 2



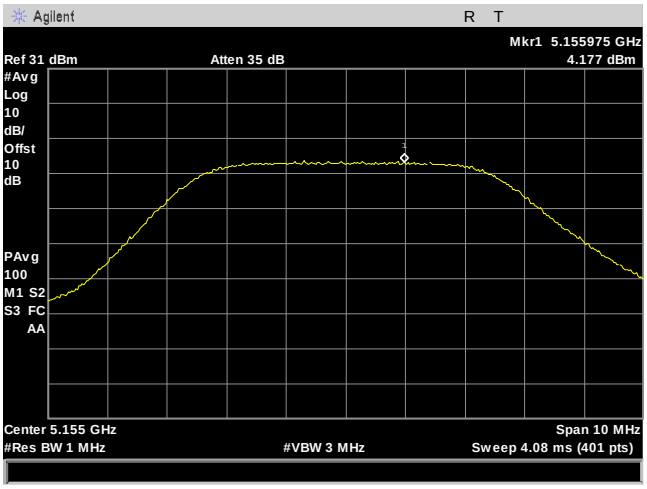
Plot 131. Power Spectral Density, 40M, 5230, 8Omni, Port 1



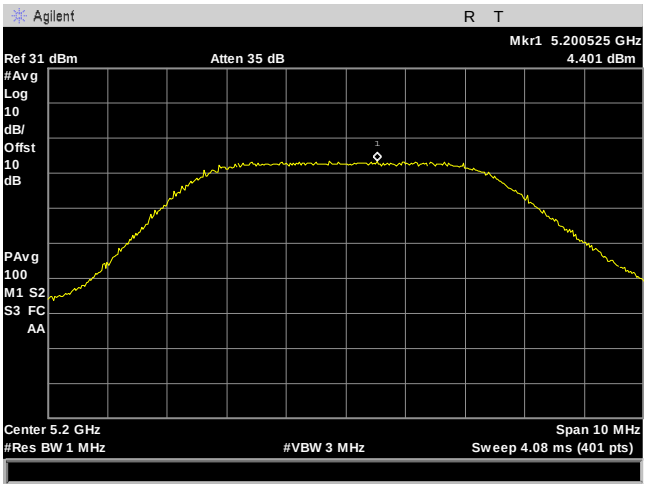
Plot 132. Power Spectral Density, 40M, 5230, 8Omni, Port 2



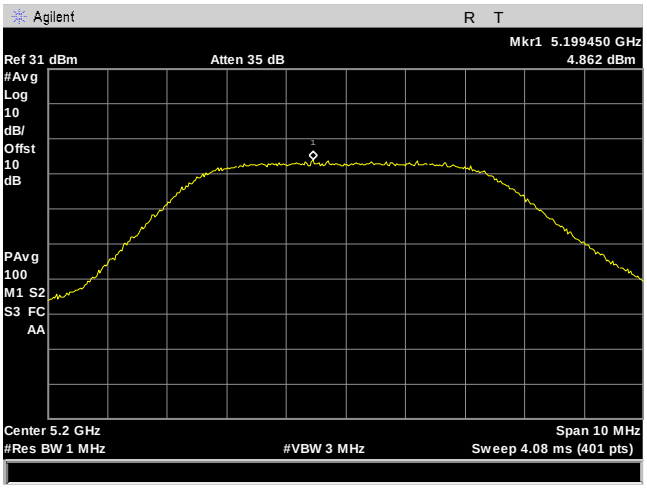
Plot 133. Power Spectral Density, 5M, 5155, 90Sector, Port 1



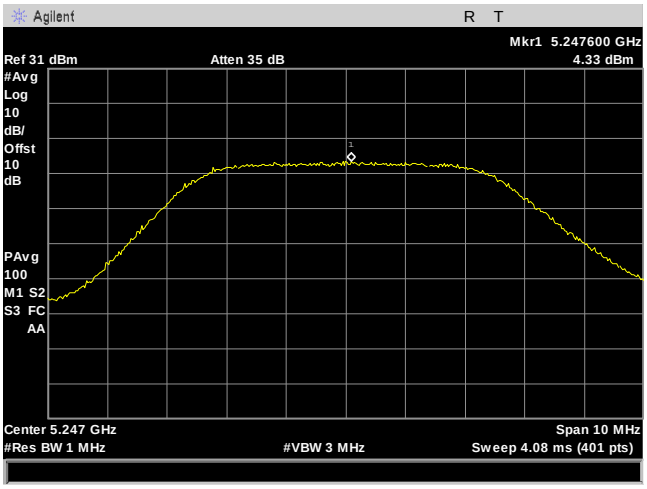
Plot 134. Power Spectral Density, 5M, 5155, 90Sector, Port 2



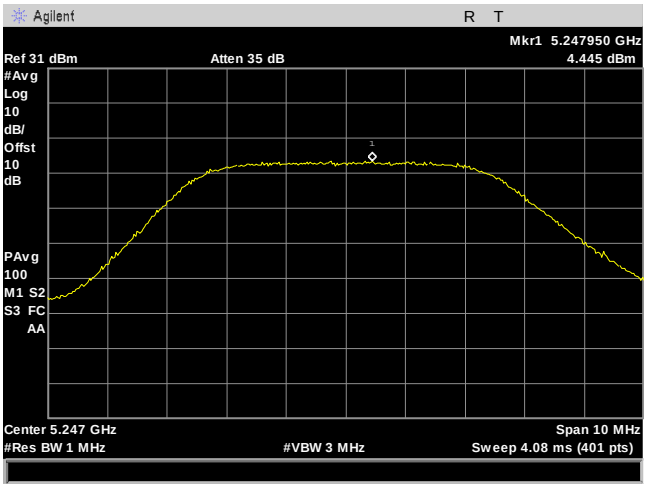
Plot 135. Power Spectral Density, 5M, 5200, 90Sector, Port 1



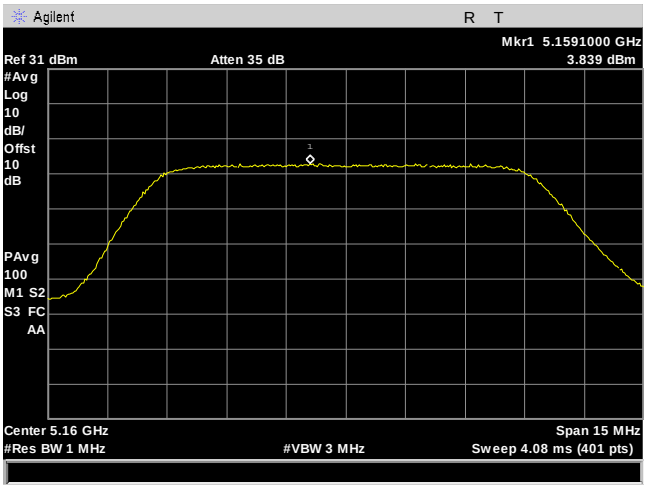
Plot 136. Power Spectral Density, 5M, 5200, 90Sector, Port 2



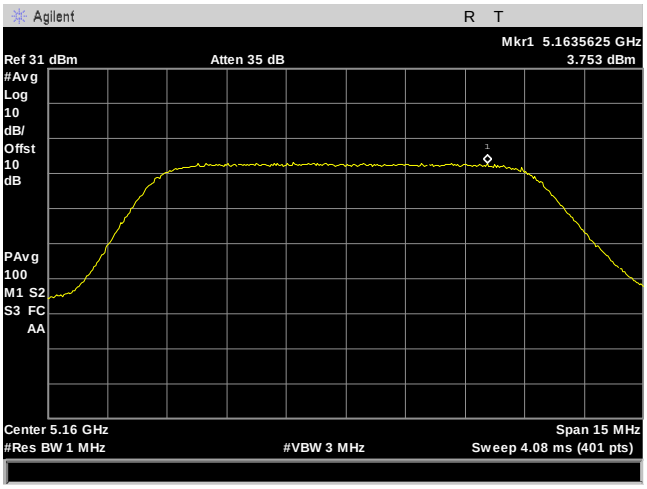
Plot 137. Power Spectral Density, 5M, 5247.5, 90Sector, Port 1



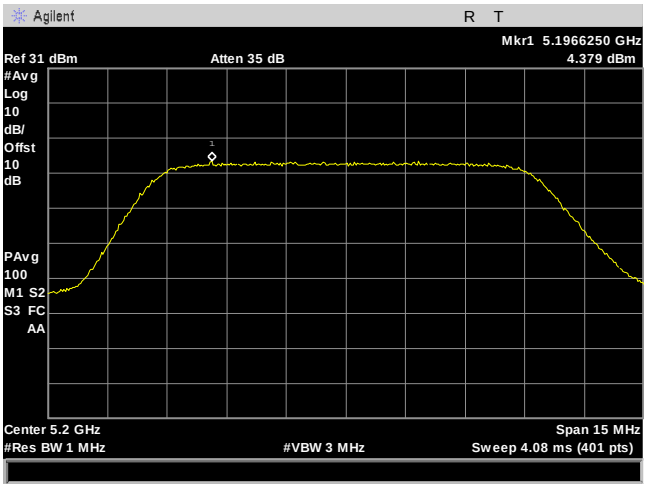
Plot 138. Power Spectral Density, 5M, 5247.5, 90Sector, Port 2



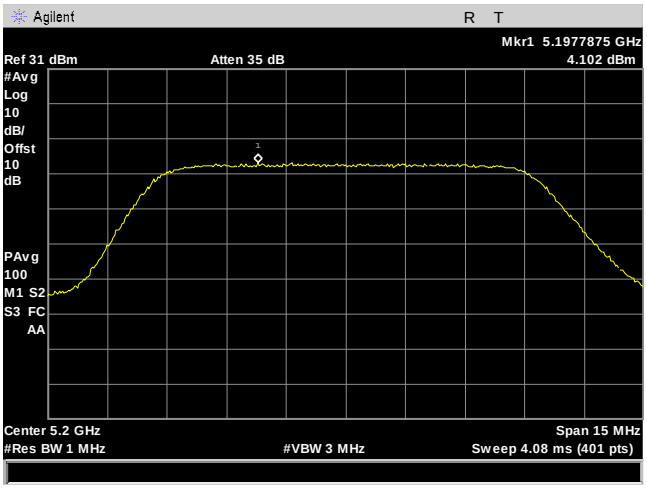
Plot 139. Power Spectral Density, 10M, 5160, 90Sector, Port 1



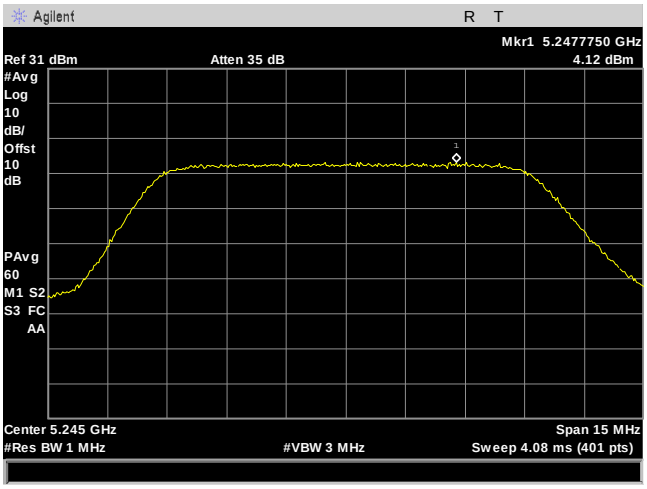
Plot 140. Power Spectral Density, 10M, 5160, 90Sector, Port 2



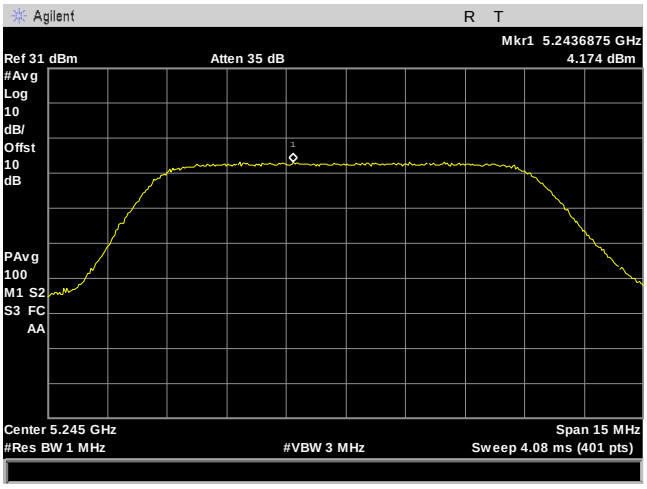
Plot 141. Power Spectral Density, 10M, 5200, 90Sector, Port 1



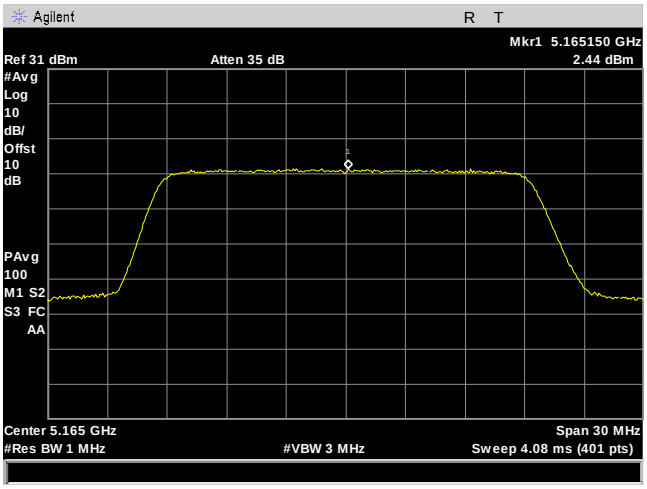
Plot 142. Power Spectral Density, 10M, 5200, 90Sector, Port 2



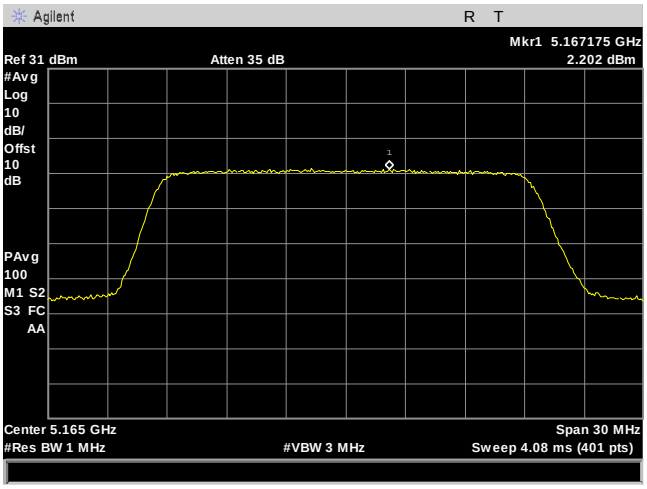
Plot 143. Power Spectral Density, 10M, 5245, 90Sector, Port 1



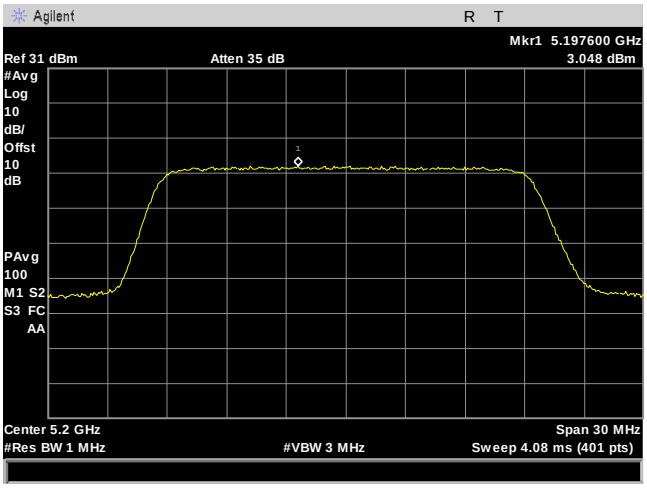
Plot 144. Power Spectral Density, 10M, 5245, 90Sector, Port 2



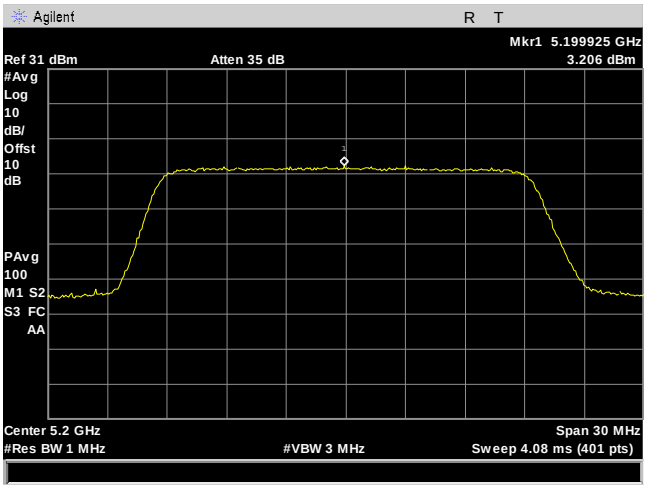
Plot 145. Power Spectral Density, 20M, 5165, 90Sector, Port 1



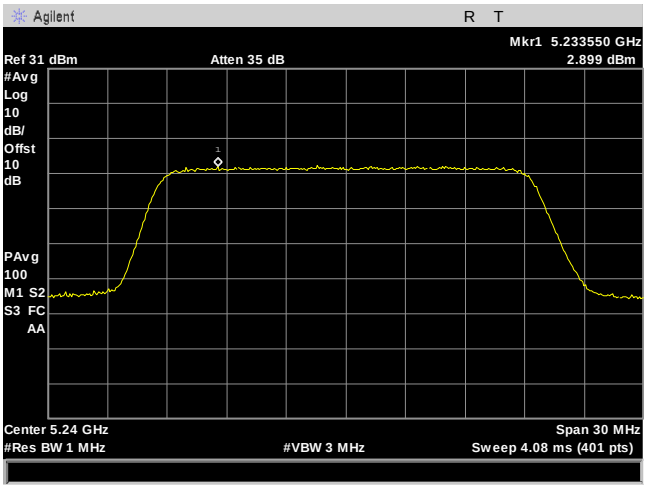
Plot 146. Power Spectral Density, 20M, 5165, 90Sector, Port 2



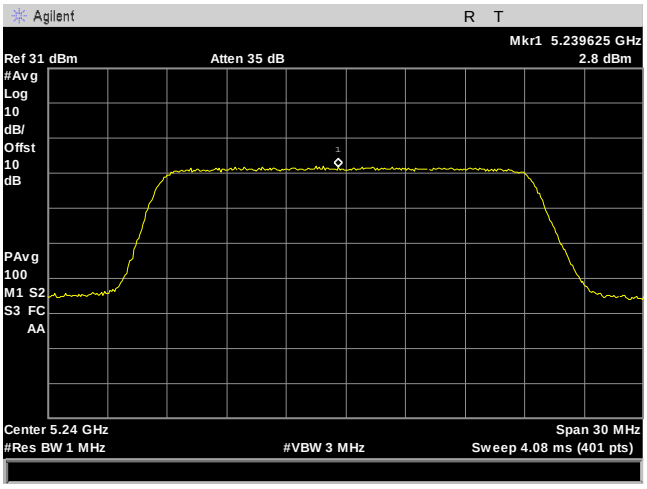
Plot 147. Power Spectral Density, 20M, 5200, 90Sector, Port 1



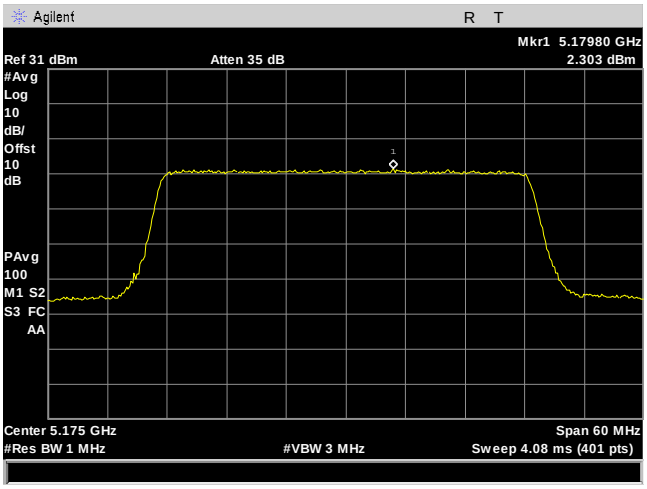
Plot 148. Power Spectral Density, 20M, 5200, 90Sector, Port 2



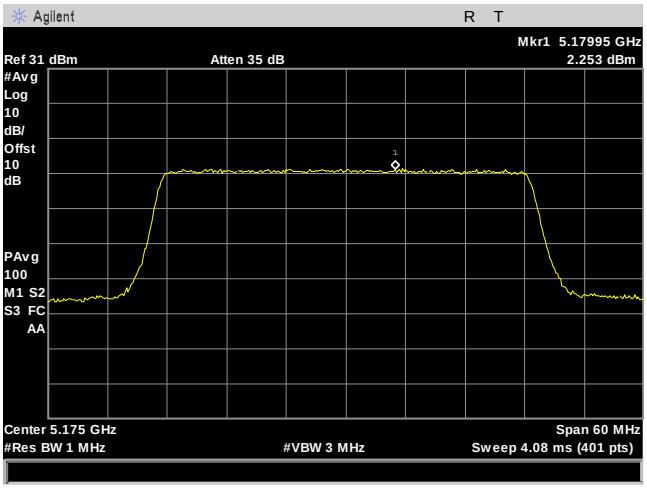
Plot 149. Power Spectral Density, 20M, 5240, 90Sector, Port 1



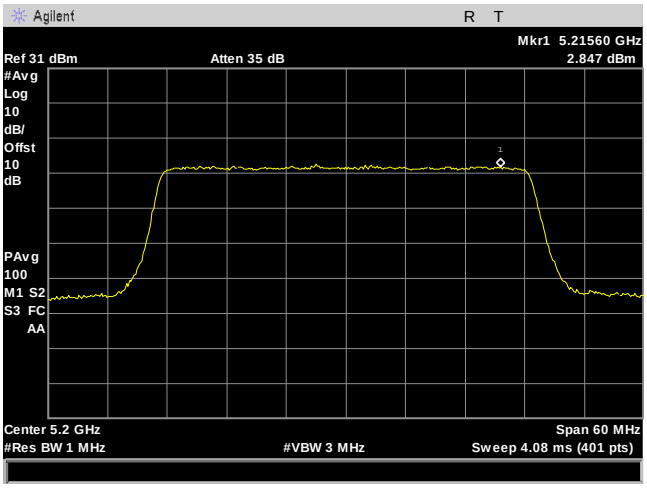
Plot 150. Power Spectral Density, 20M, 5240, 90Sector, Port 2



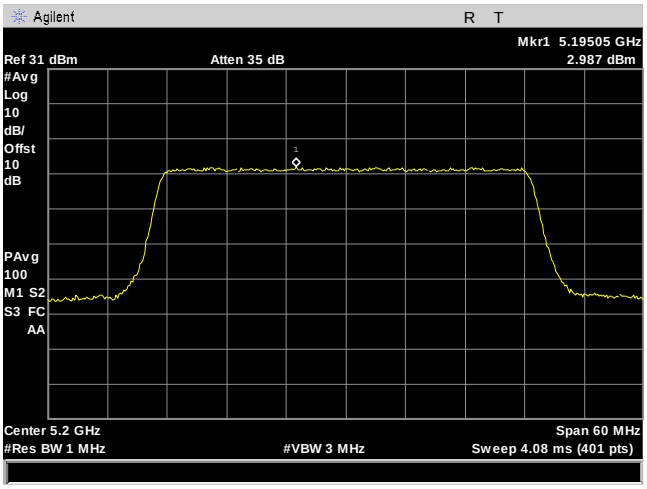
Plot 151. Power Spectral Density, 40M, 5175, 90Sector, Port 1



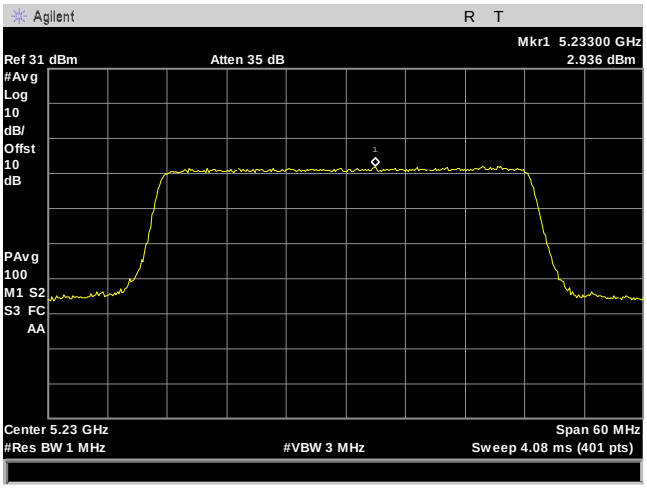
Plot 152. Power Spectral Density, 40M, 5175, 90Sector, Port 2



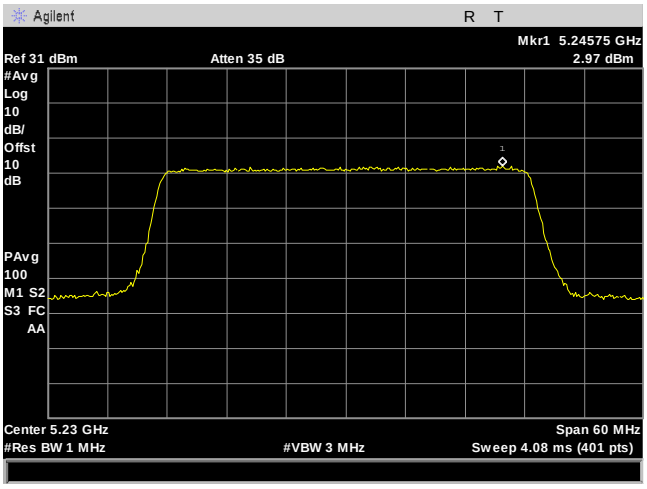
Plot 153. Power Spectral Density, 40M, 5200, 90Sector, Port 1



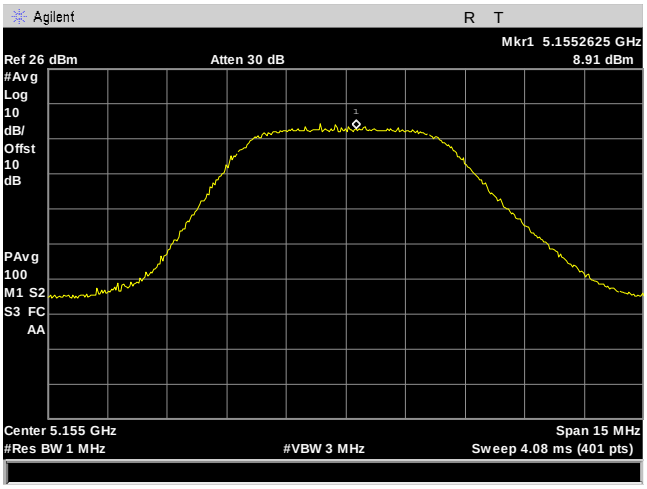
Plot 154. Power Spectral Density, 40M, 5200, 90Sector, Port 2



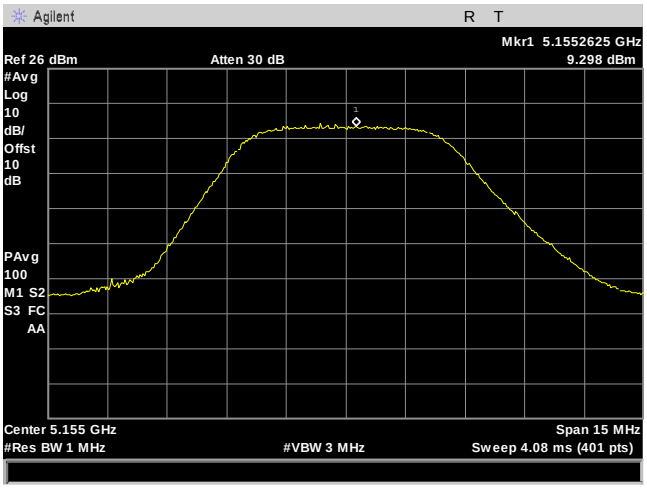
Plot 155. Power Spectral Density, 40M, 5230, 90Sector, Port 1



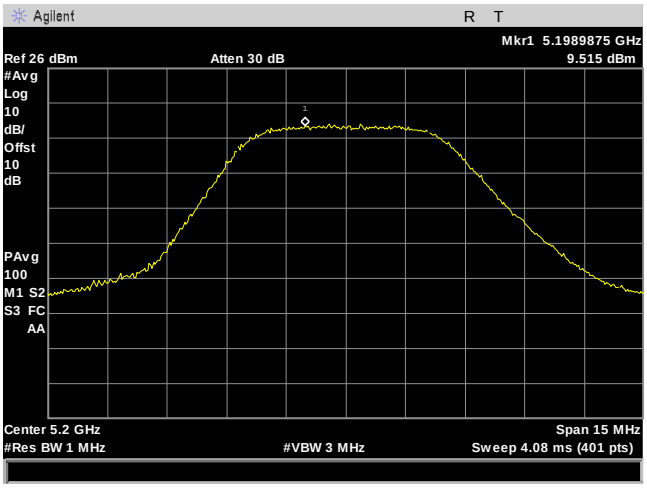
Plot 156. Power Spectral Density, 40M, 5230, 90Sector, Port 2



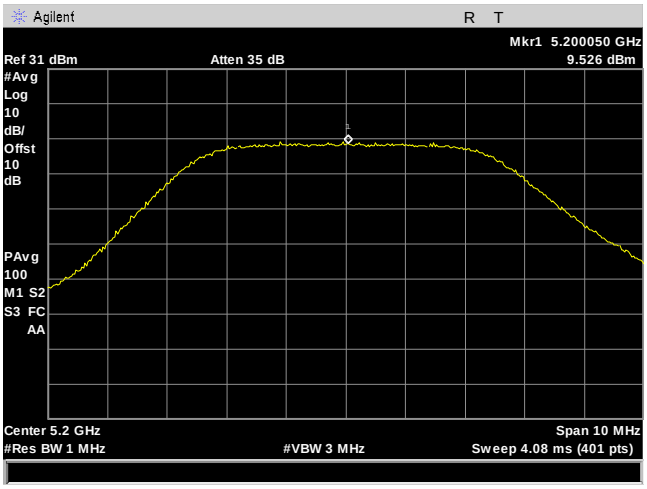
Plot 157. Power Spectral Density, 5M, 5155, 2Panel, Port 1



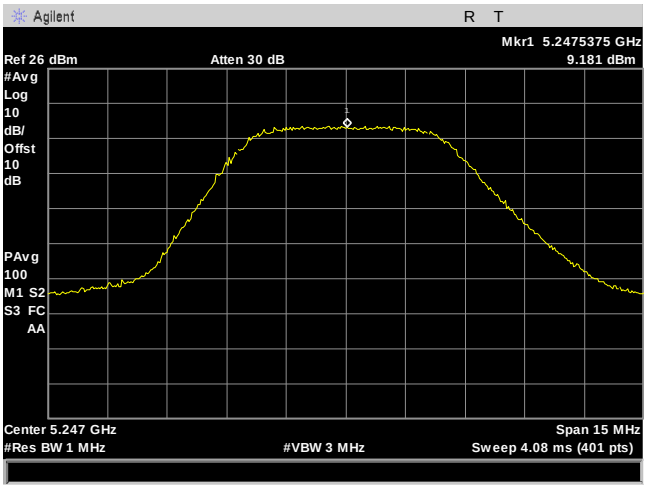
Plot 158. Power Spectral Density, 5M, 5155, 2Panel, Port 2



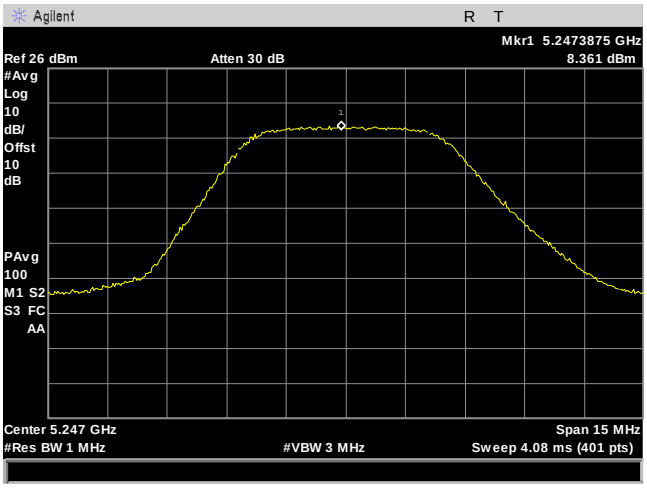
Plot 159. Power Spectral Density, 5M, 5200, 2Panel, Port 1



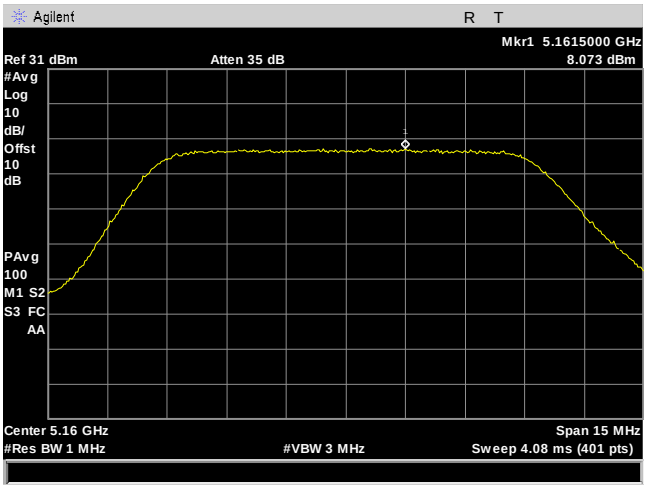
Plot 160. Power Spectral Density, 5M, 5200, 2Panel, Port 2



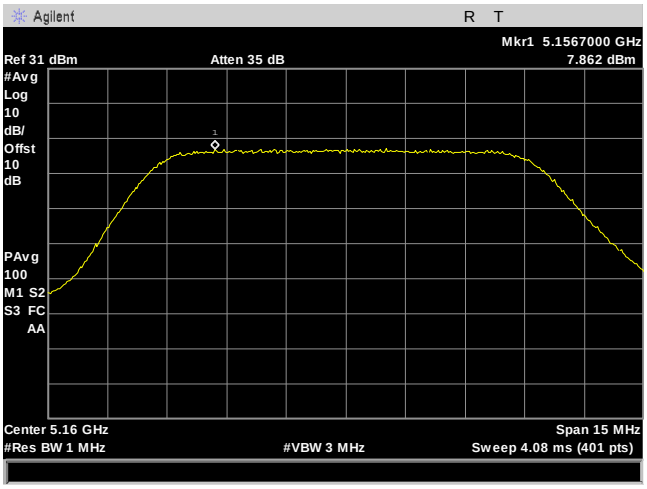
Plot 161. Power Spectral Density, 5M, 5247.5, 2Panel, Port 1



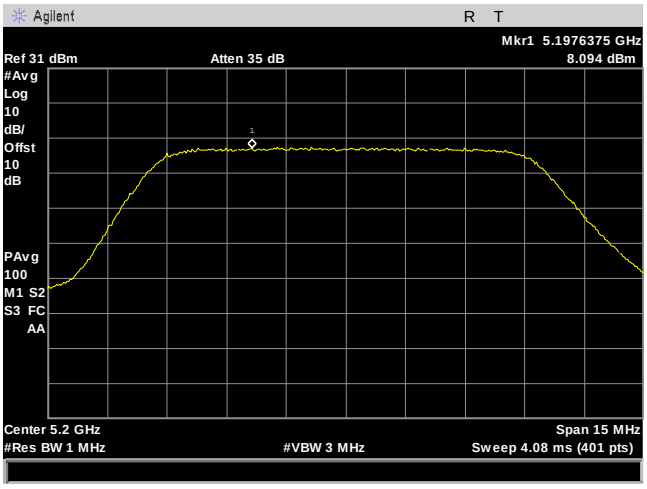
Plot 162. Power Spectral Density, 5M, 5247.5, 2Panel, Port 2



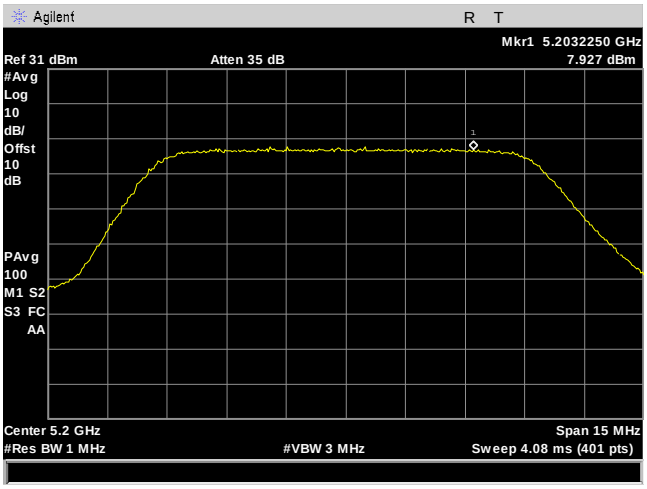
Plot 163. Power Spectral Density, 10M, 5160, 2Panel, Port 1



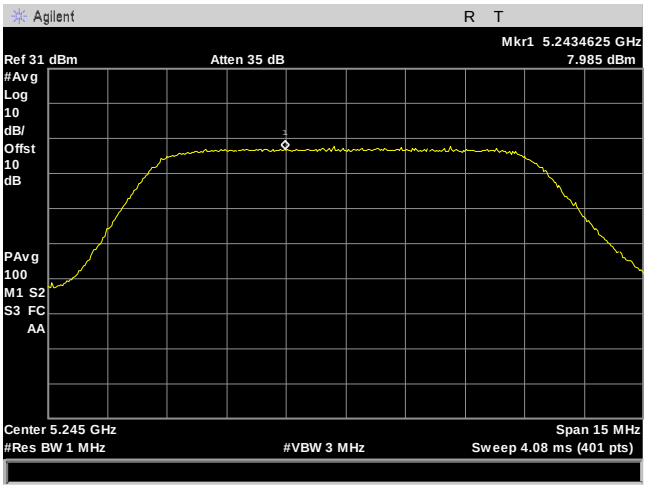
Plot 164. Power Spectral Density, 10M, 5160, 2Panel, Port 2



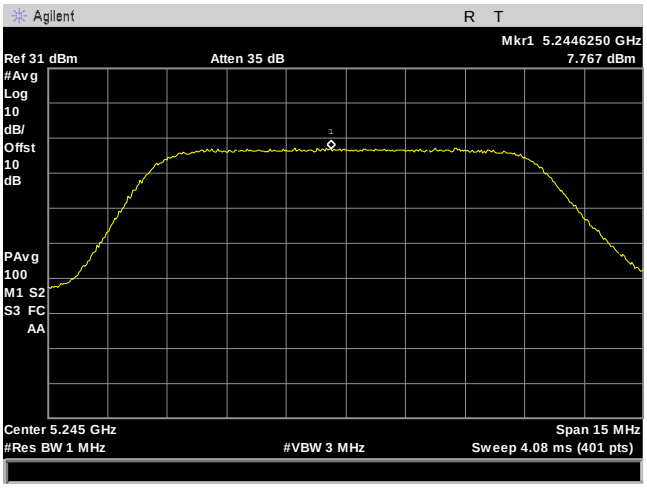
Plot 165. Power Spectral Density, 10M, 5200, 2Panel, Port 1



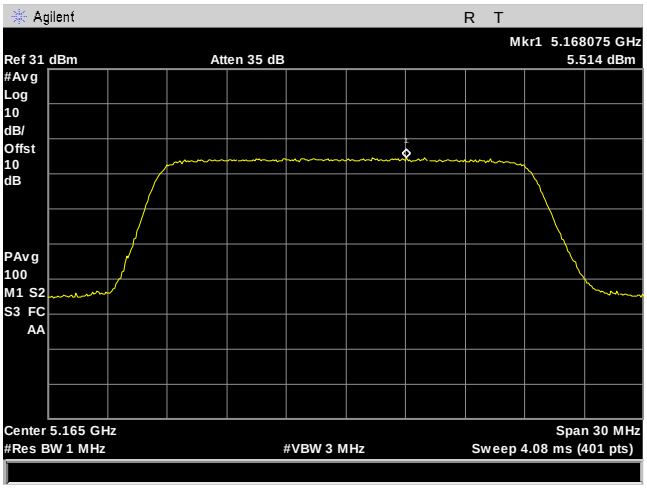
Plot 166. Power Spectral Density, 10M, 5200, 2Panel, Port 2



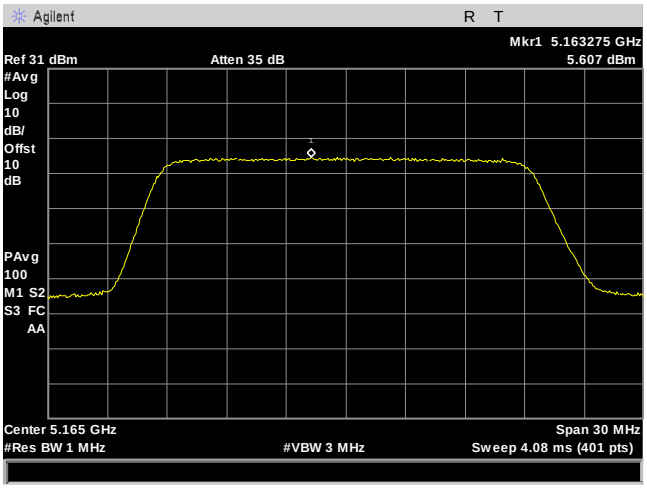
Plot 167. Power Spectral Density, 10M, 5245, 2Panel, Port 1



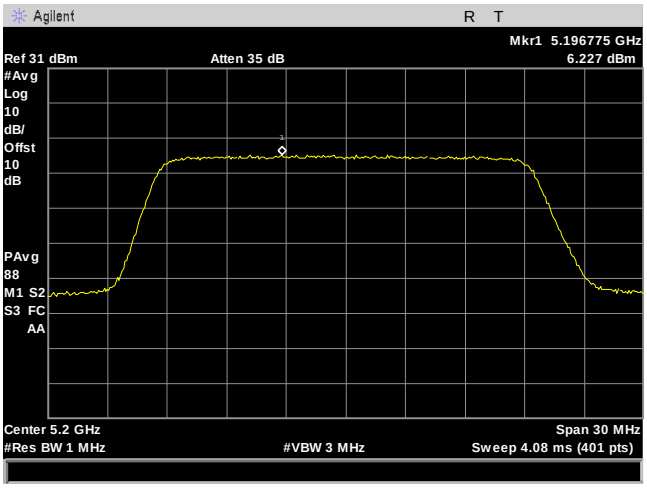
Plot 168. Power Spectral Density, 10M, 5245, 2Panel, Port 2



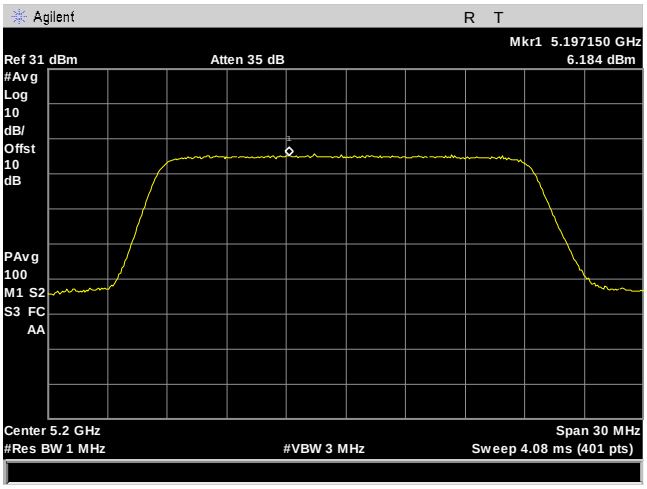
Plot 169. Power Spectral Density, 20M, 5165, 2Panel, Port 1



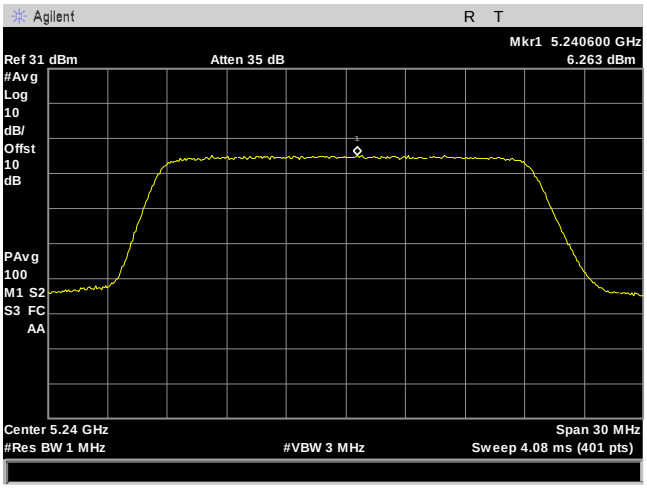
Plot 170. Power Spectral Density, 20M, 5165, 2Panel, Port 2



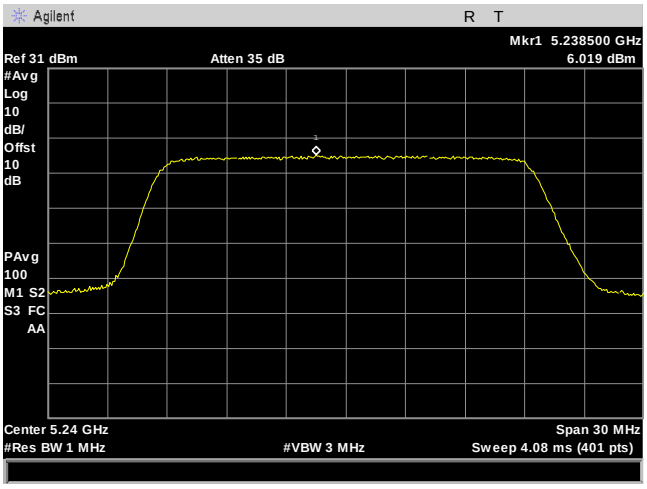
Plot 171. Power Spectral Density, 20M, 5200, 2Panel, Port 1



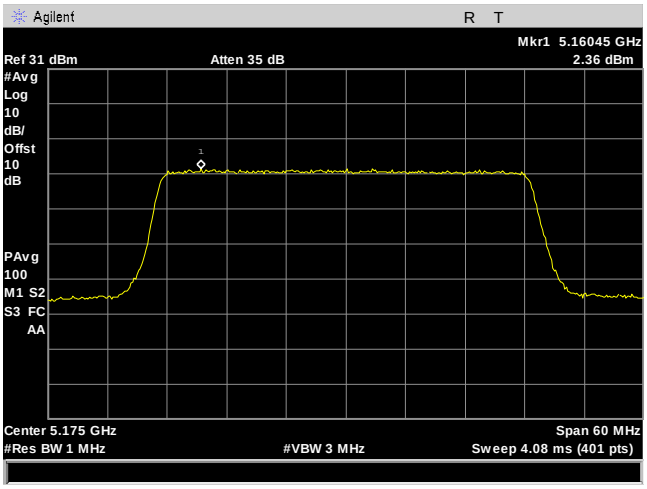
Plot 172. Power Spectral Density, 20M, 5200, 2Panel, Port 2



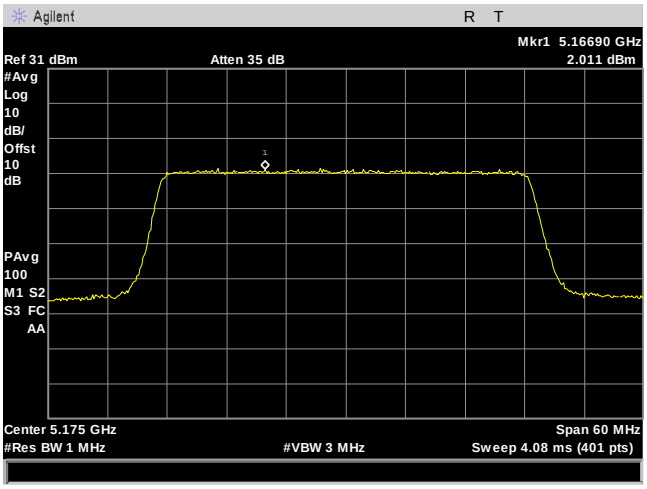
Plot 173. Power Spectral Density, 20M, 5240, 2Panel, Port 1



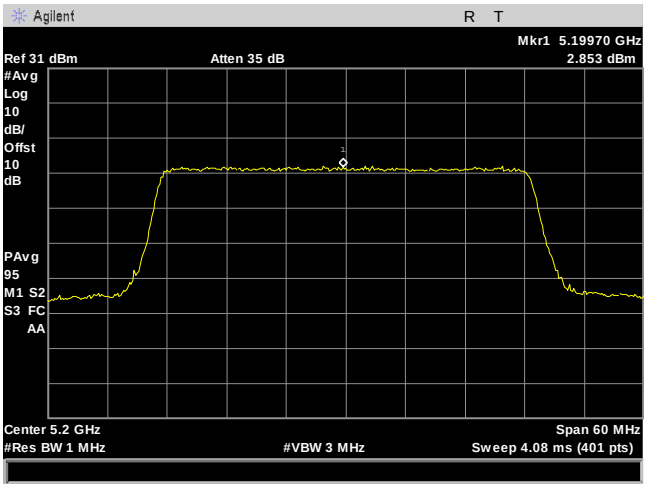
Plot 174. Power Spectral Density, 20M, 5240, 2Panel, Port 2



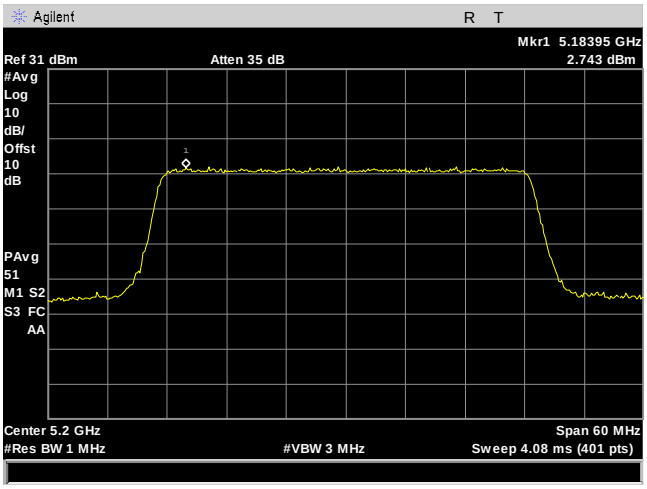
Plot 175. Power Spectral Density, 40M, 5175, 2Panel, Port 1



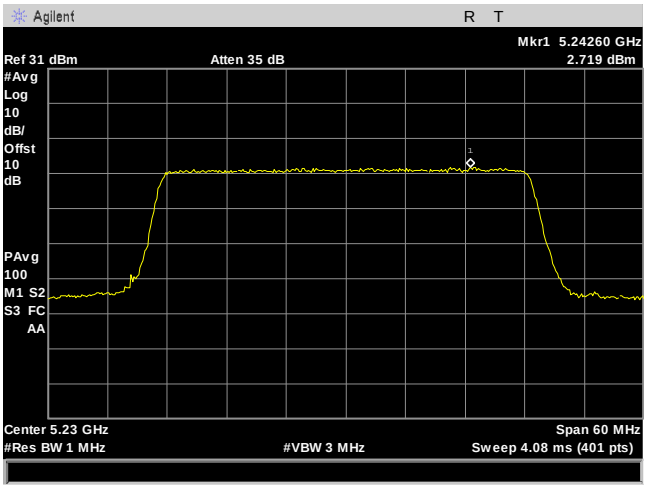
Plot 176. Power Spectral Density, 40M, 5175, 2Panel, Port 2



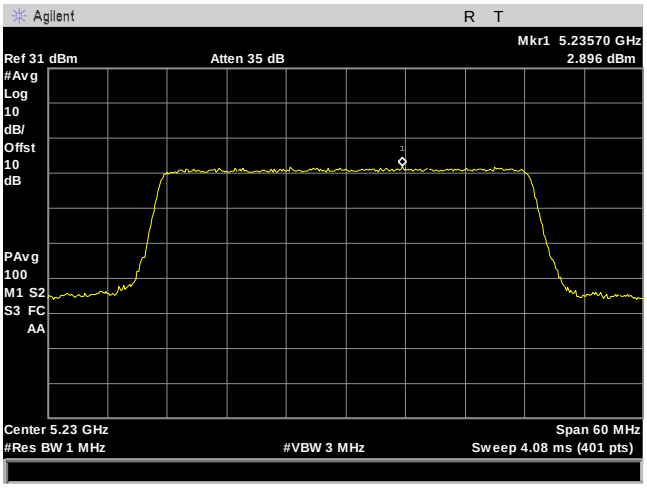
Plot 177. Power Spectral Density, 40M, 5200, 2Panel, Port 1



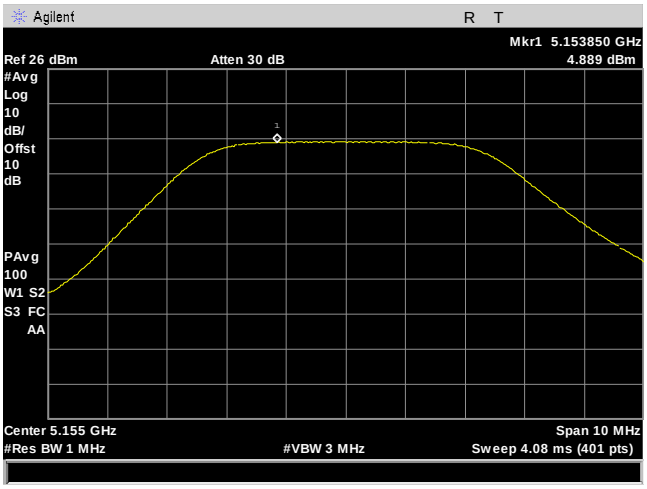
Plot 178. Power Spectral Density, 40M, 5200, 2Panel, Port 2



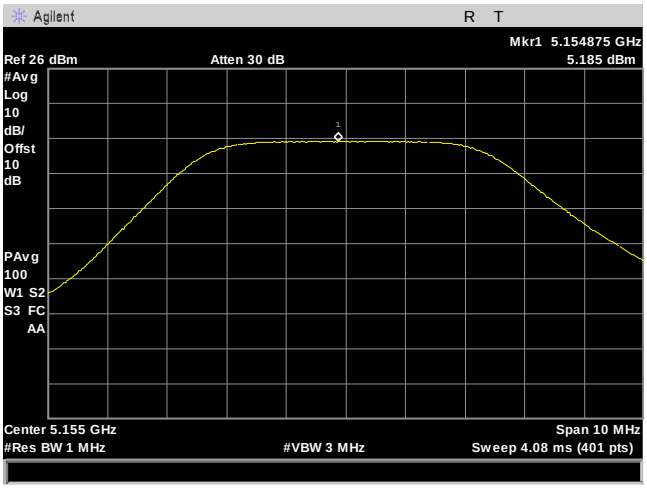
Plot 179. Power Spectral Density, 40M, 5230, 2Panel, Port 1



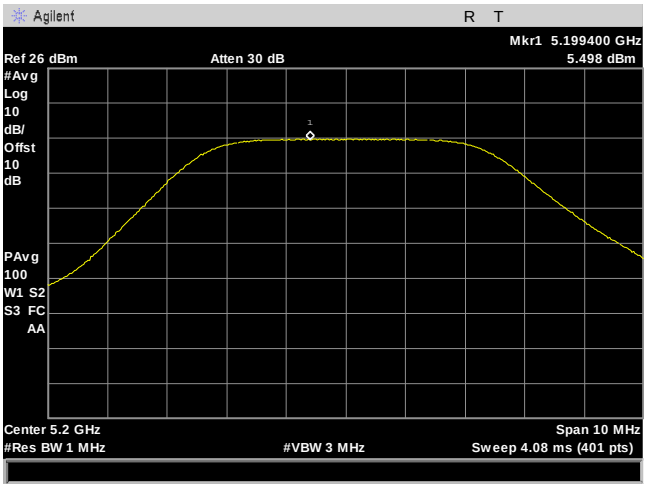
Plot 180. Power Spectral Density, 40M, 5230, 2Panel, Port 2



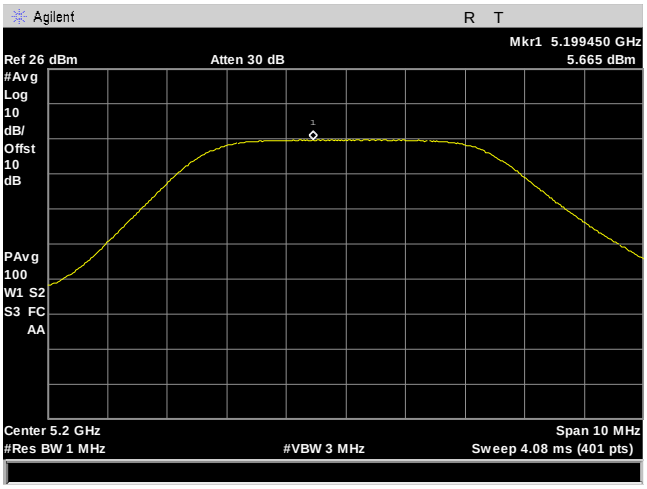
Plot 181. Power Spectral Density, 5M, 5155, 3Para, Port 1



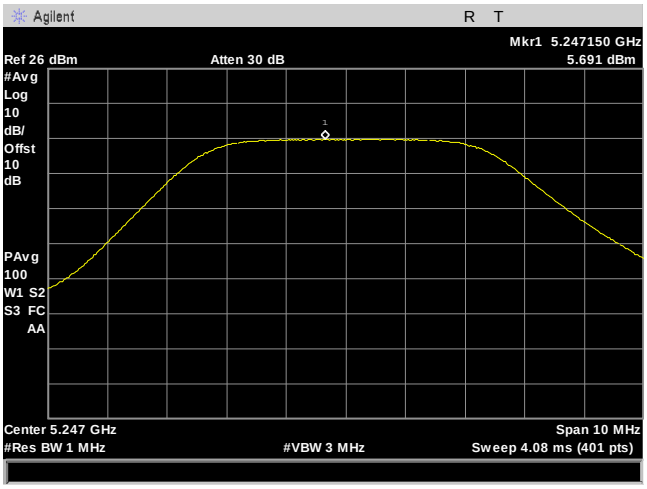
Plot 182. Power Spectral Density, 5M, 5155, 3Para, Port 2



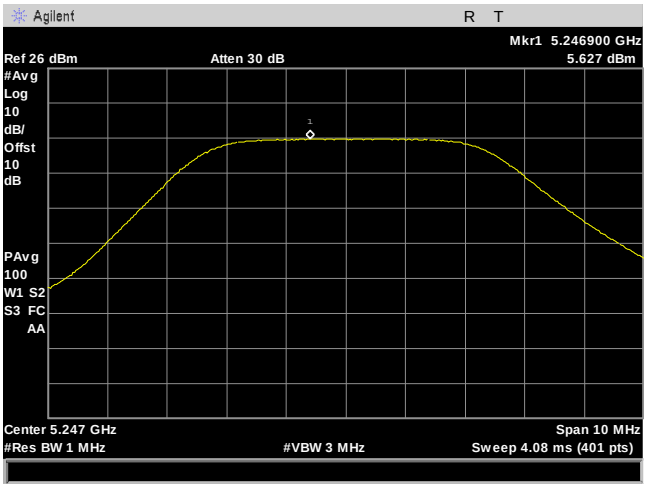
Plot 183. Power Spectral Density, 5M, 5200, 3Para l, Port 1



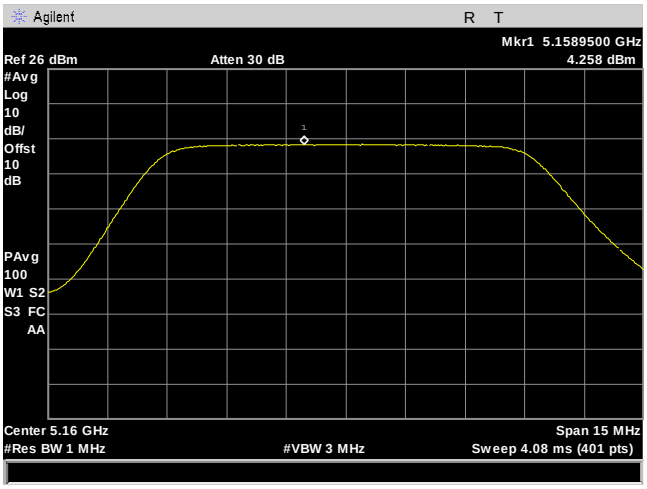
Plot 184. Power Spectral Density, 5M, 5200, 3Para, Port 2



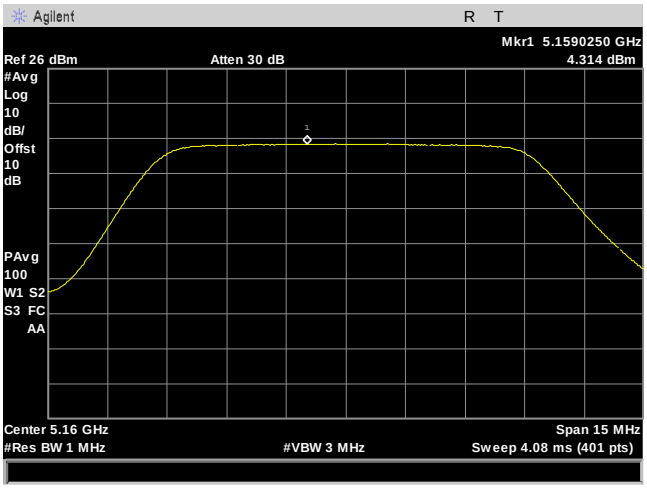
Plot 185. Power Spectral Density, 5M, 5247.5, 3Para, Port 1



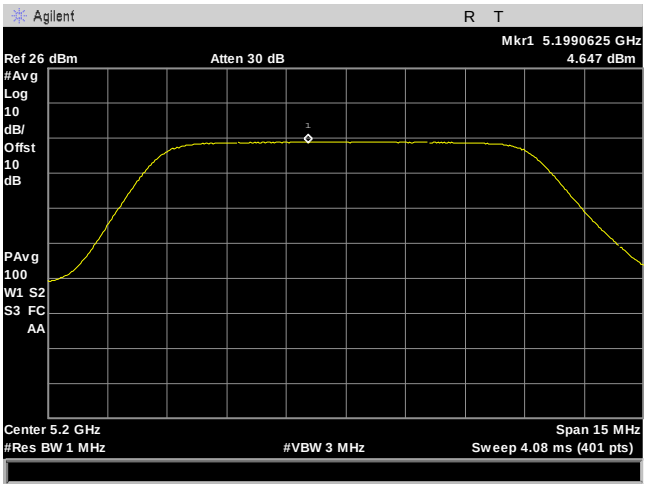
Plot 186. Power Spectral Density, 5M, 5247.5, 3Para, Port 2



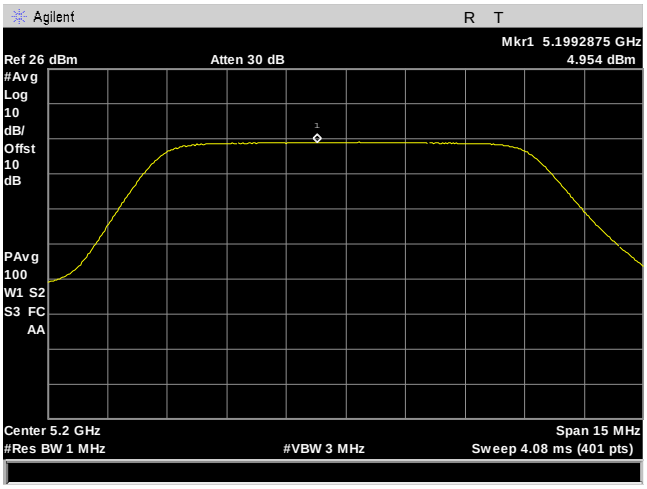
Plot 187. Power Spectral Density, 10M, 5160, 3Para, Port 1



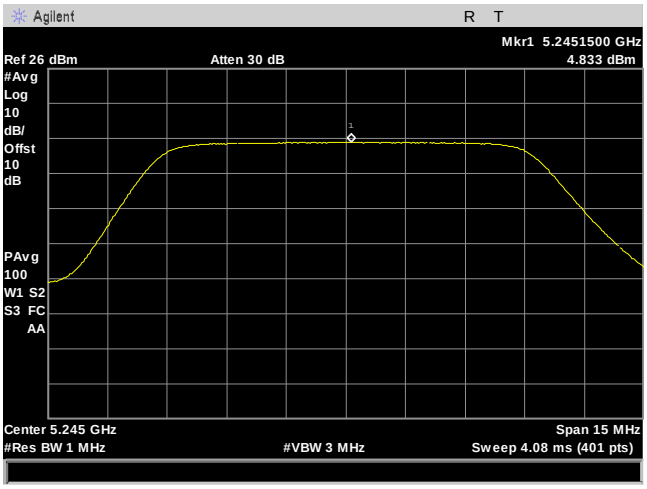
Plot 188. Power Spectral Density, 10M, 5160, 3Para, Port 2



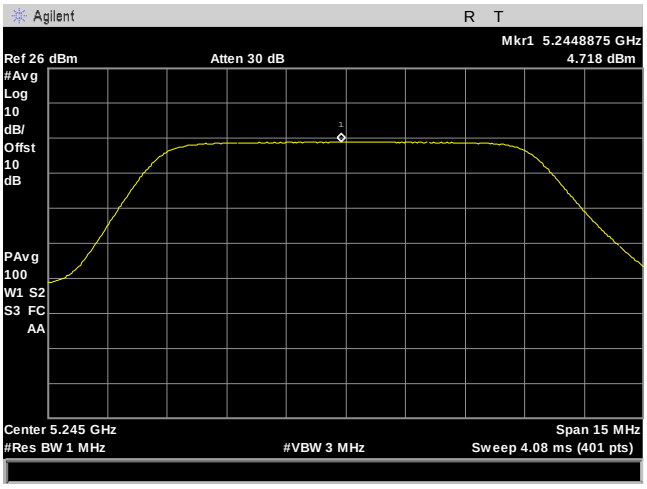
Plot 189. Power Spectral Density, 10M, 5200, 3Para, Port 1



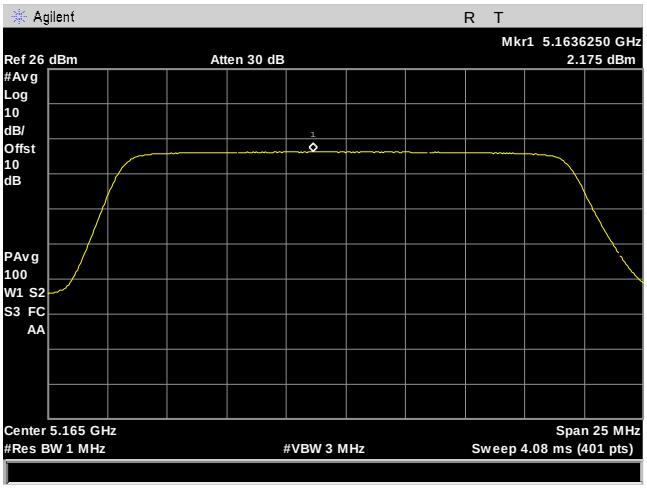
Plot 190. Power Spectral Density, 10M, 5200, 3Para, Port 2



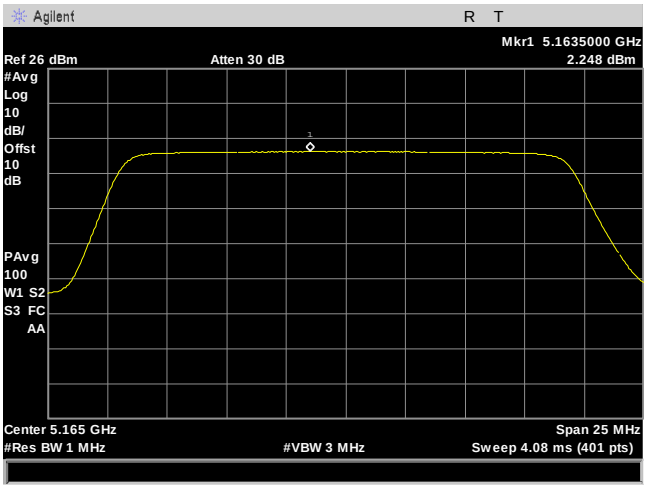
Plot 191. Power Spectral Density, 10M, 5245, 3Para, Port 1



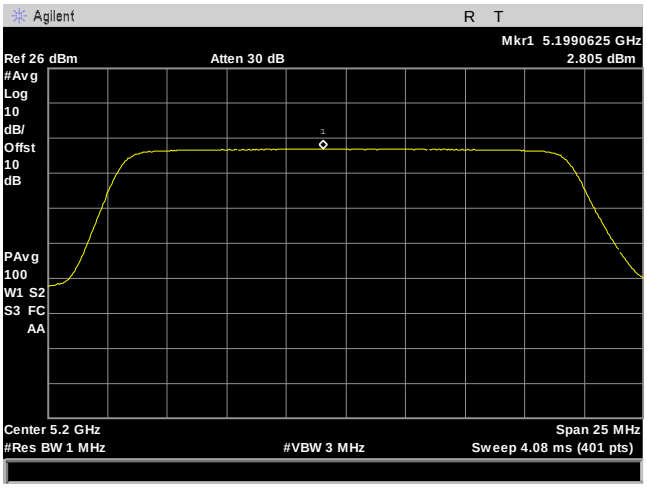
Plot 192. Power Spectral Density, 10M, 5245, 3Para, Port 2



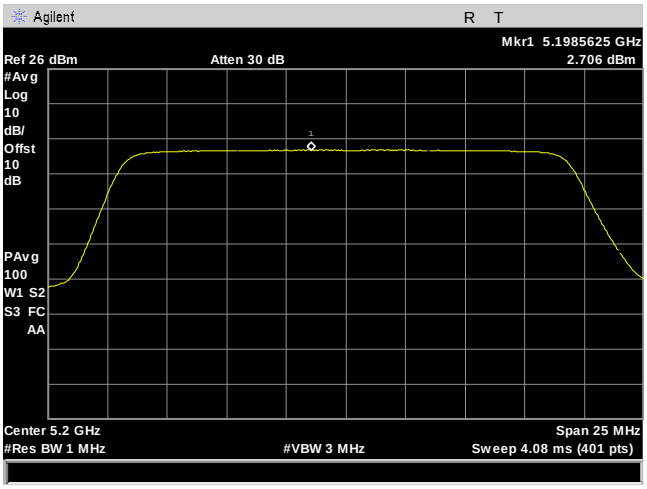
Plot 193. Power Spectral Density, 20M, 5165, 3Para, Port 1



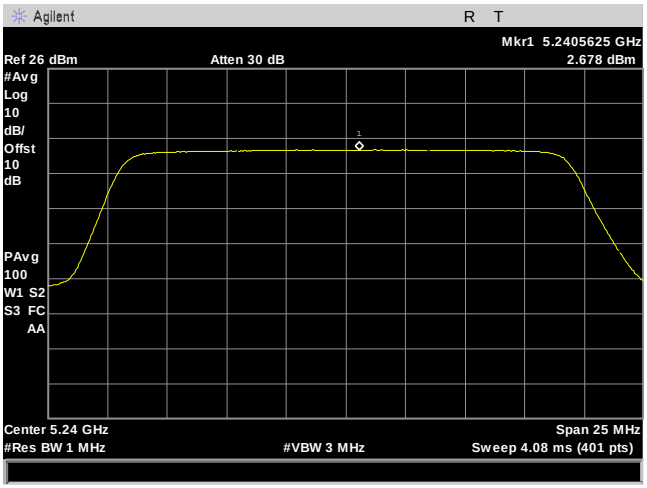
Plot 194. Power Spectral Density, 20M, 5165, 3Para, Port 2



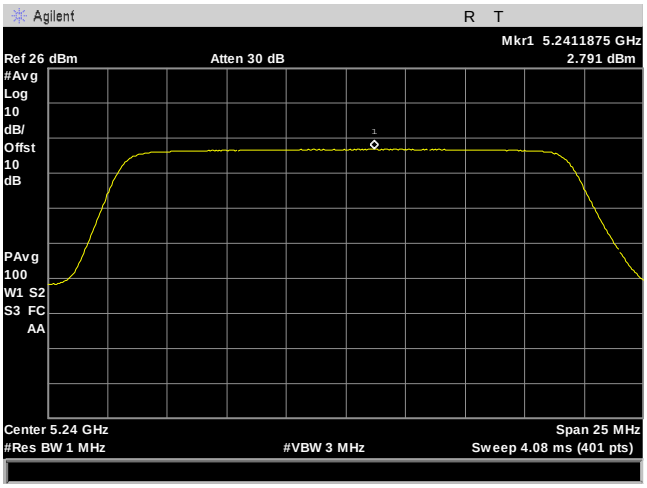
Plot 195. Power Spectral Density, 20M, 5200, 3Para, Port 1



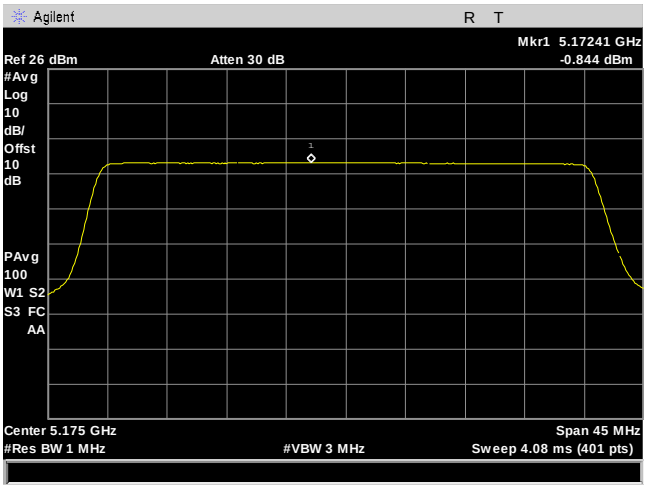
Plot 196. Power Spectral Density, 20M, 5200, 3Para, Port 2



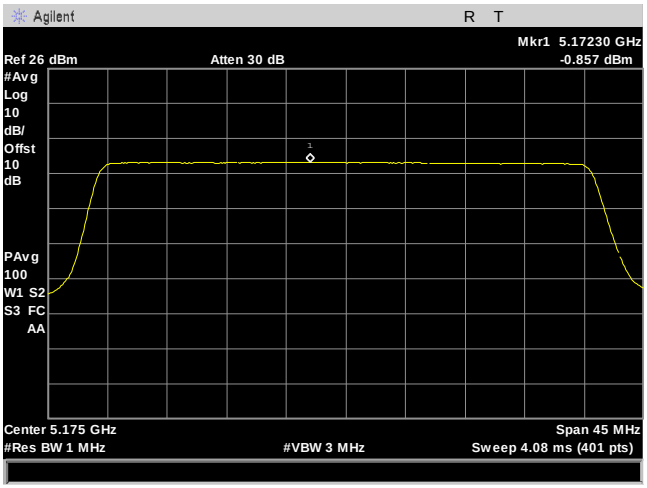
Plot 197. Power Spectral Density, 20M, 5240, 3Para, Port 1



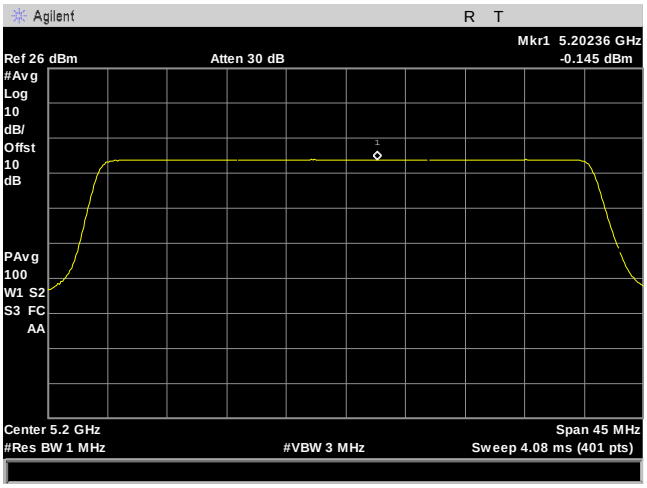
Plot 198. Power Spectral Density, 20M, 5240, 3Para, Port 2



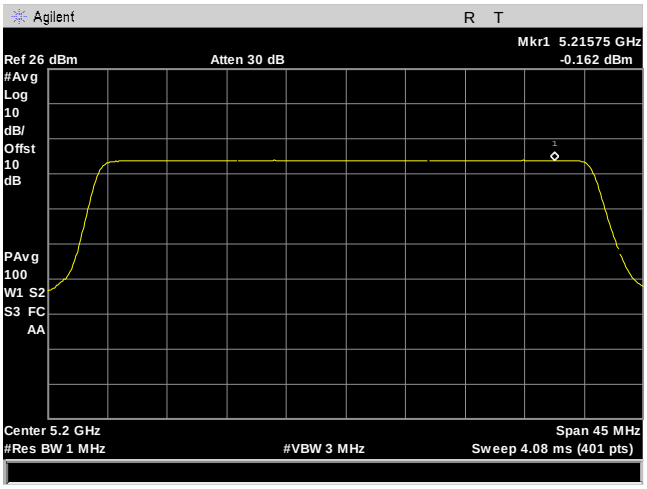
Plot 199. Power Spectral Density, 40M, 5175, 3Para, Port 1



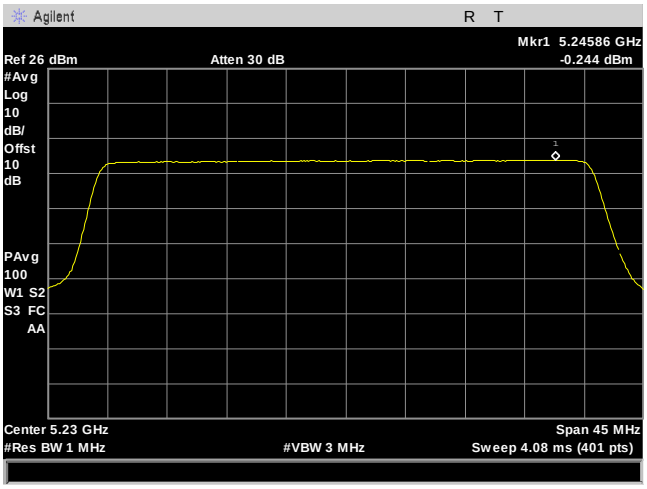
Plot 200. Power Spectral Density, 40M, 5175, 3Para, Port 2



Plot 201. Power Spectral Density, 40M, 5200, 3Para, Port 1



Plot 202. Power Spectral Density, 40M, 5200, 3Para, Port 2



Plot 203. Power Spectral Density, 40M, 5230, 3Para, Port 1

Electromagnetic Compatibility Criteria for Intentional Radiators

§15.407(b)(1) & (6 – 7) Undesirable Emissions

Test Requirements:

§ 15.407(b)(1): For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.

§ 15.407(b)(6): Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

§ 15.407(b)(7): The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Test Procedure:

The EUT was placed on a non-conducting stand on a turntable in a chamber. To find the maximum emission the EUT was set to transmit on low, mid, and high channels. Additionally, the turntable was rotated 360 degrees, the EUT was oriented through its three orthogonal axes, and the receive antenna height was varied in order to maximize emissions.

For frequencies from 30 MHz to 1 GHz, measurements were first made using a peak detector with a 100 kHz resolution bandwidth. Emissions which exceeded the limits were re-measured using a quasi-peak detector with a 120 kHz resolution bandwidth.

Above 1 GHz, measurements were made pursuant the method described in FCC KDB 789033 D02 General UNII Test Procedure New Rules v01. The equation, **EIRP= E + 20 log D – 104.8** was used to convert field strength to EIRP (**E** = field strength (dBµV/m) and **D** = Reference measurement distance**).**

For emissions above 1 GHz and in restricted bands, measurements of the field strength were made with a peak detector and an average detector and compared with the limits of 15.209.

As an alternative, according to FCC KDB 789033 D02 General UNII Test Procedure New Rules v01, all emissions above 1 GHz that comply with the peak and average limits of 15.209 satisfy the requirements of unwanted emissions in 15.407.

Test Results:

For below 1 GHz, the EUT was compliant with the requirements of this section.

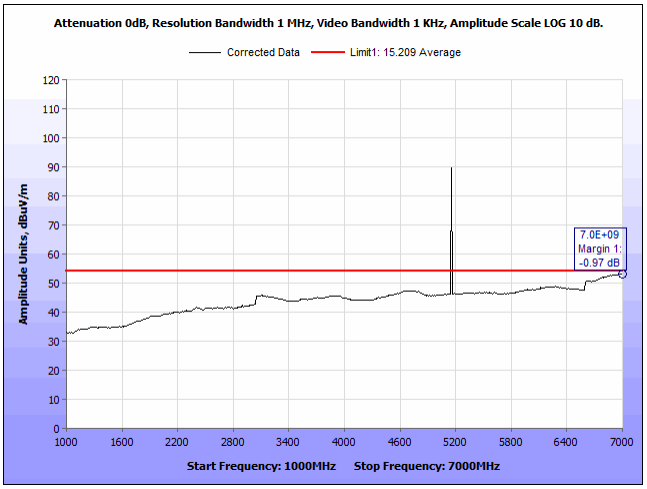
For above 1 GHz, the EUT was compliant with the requirements of this section.

Measured emissions were within applicable limits.

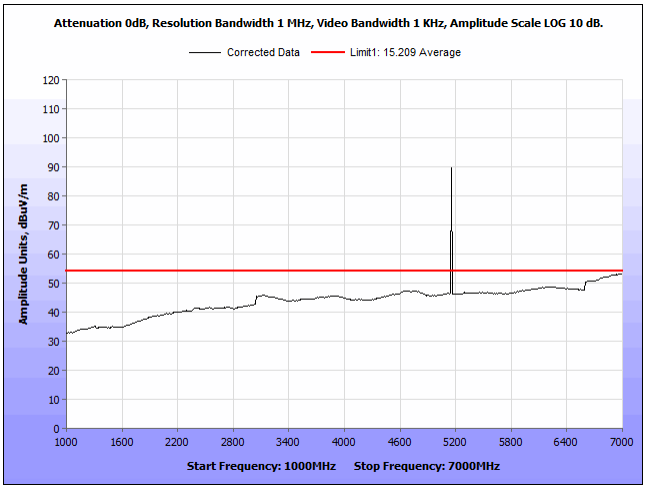
Test Engineer(s): Arsalan Hasan

Test Date(s): July 1, 2019

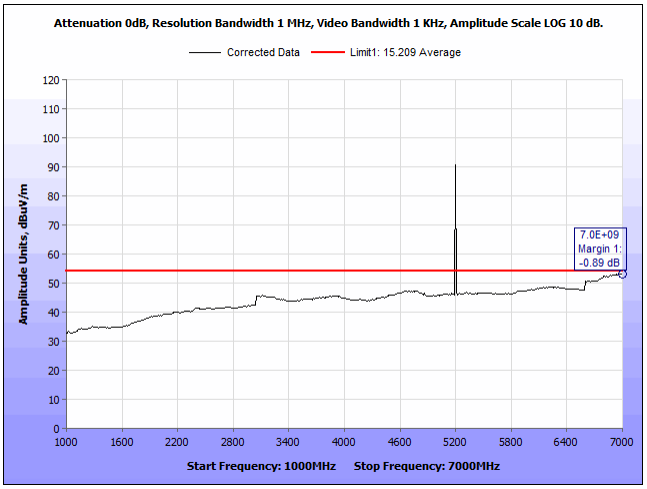
Undesirable Emissions



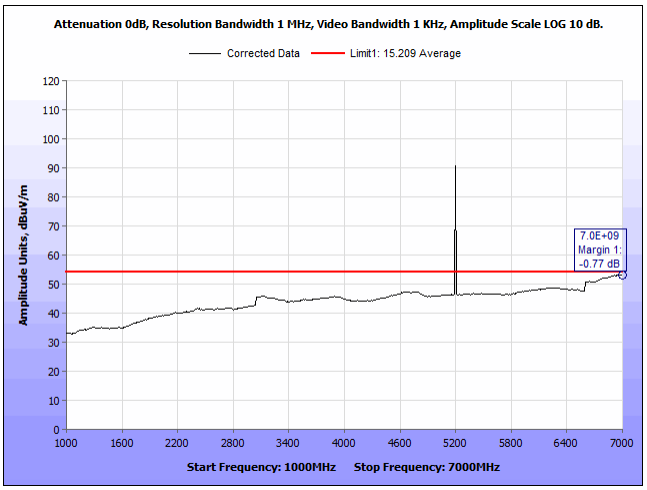
Plot 205. Undesirable Emissions, 1-7MHz Average, 5M, 5155, 8Omni, Port 1



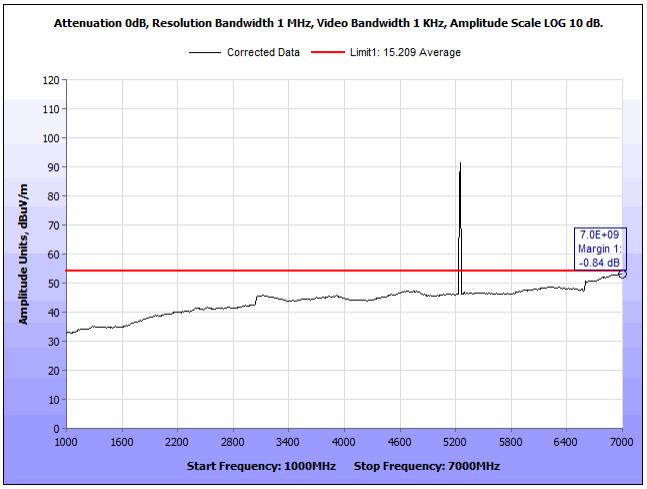
Plot 206. Undesirable Emissions, 1-7MHz Average, 5M, 5155, 8Omni, Port 2



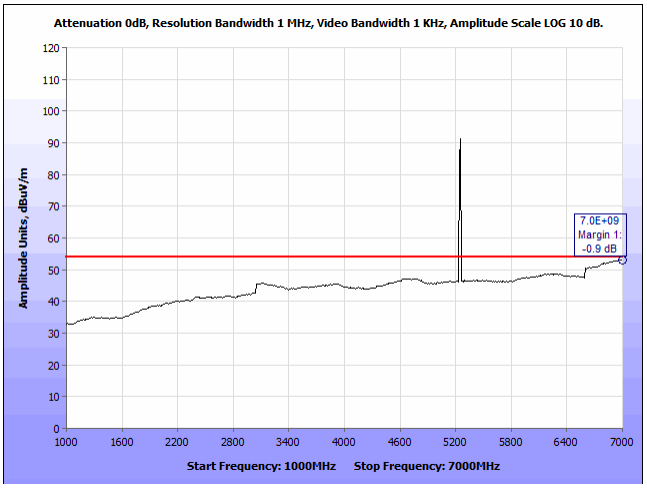
Plot 207. Undesirable Emissions, 1-7MHz Average, 5M, 5200, 8Omni, Port 1



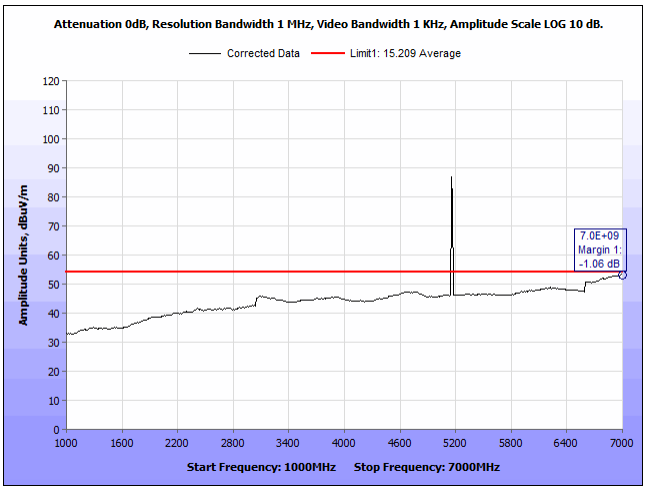
Plot 208. Undesirable Emissions, 1-7MHz Average, 5M, 5200, 8Omni, Port 2



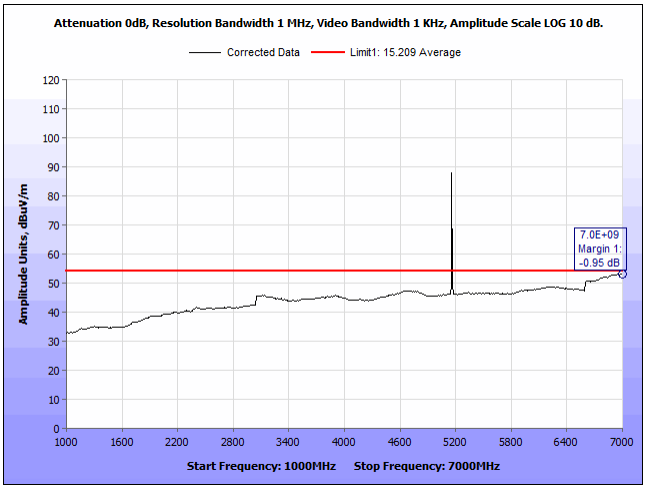
Plot 209. Undesirable Emissions, 1-7MHz Average, 5M, 5247.5, 8Omni, Port 1



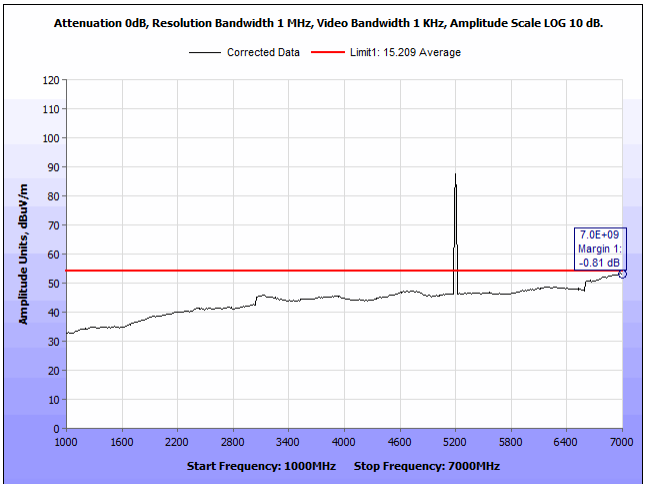
Plot 210. Undesirable Emissions, 1-7MHz Average, 5M, 5247.5, 8Omni, Port 2



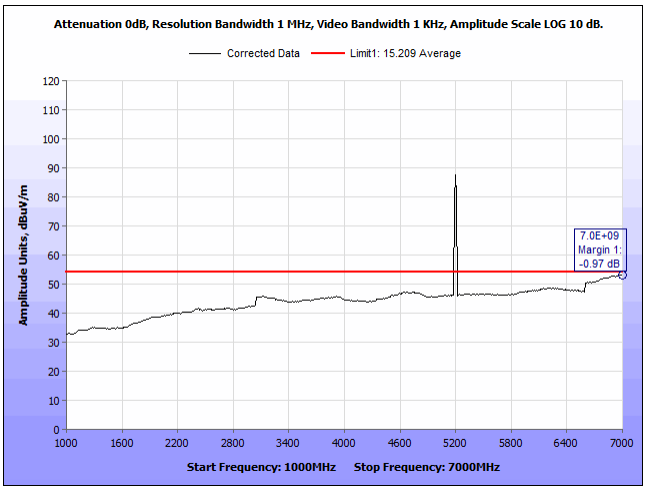
Plot 211. Undesirable Emissions, 1-7MHz Average, 10M, 5160, 8Omni, Port 1



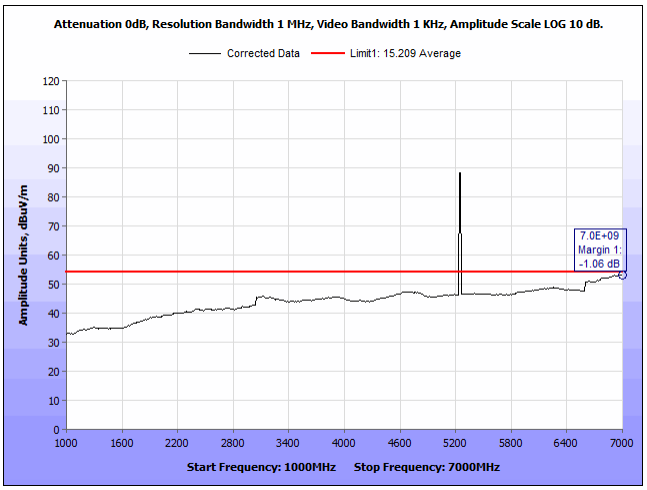
Plot 212. Undesirable Emissions, 1-7MHz Average, 10M, 5160, 8Omni, Port 2



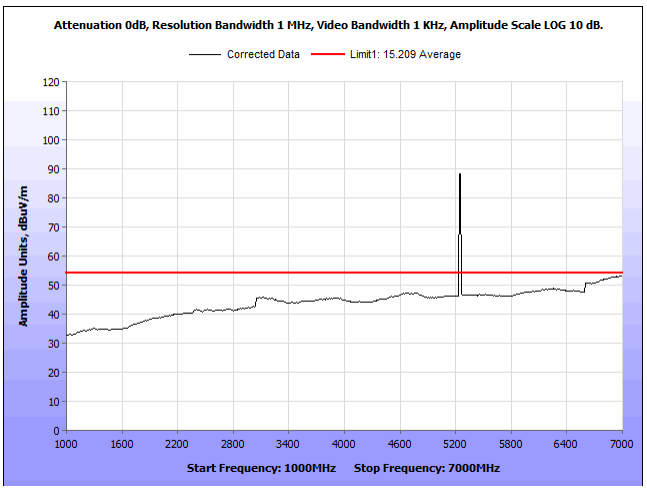
Plot 213. Undesirable Emissions, 1-7MHz Average, 10M, 5200, 8Omni, Port 1



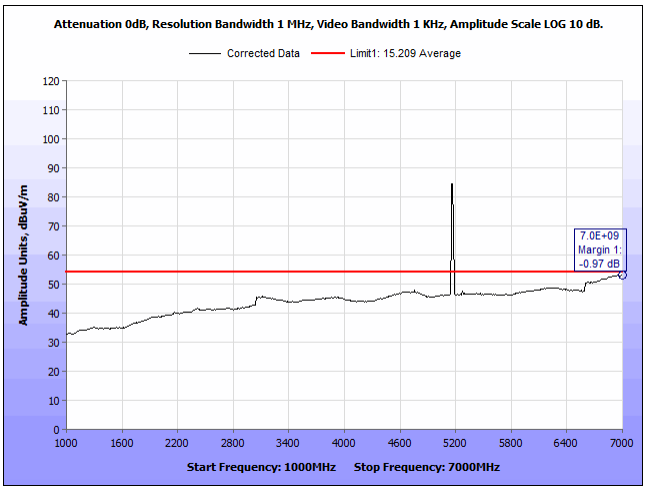
Plot 214. Undesirable Emissions, 1-7MHz Average, 10M, 5200, 8Omni, Port 2



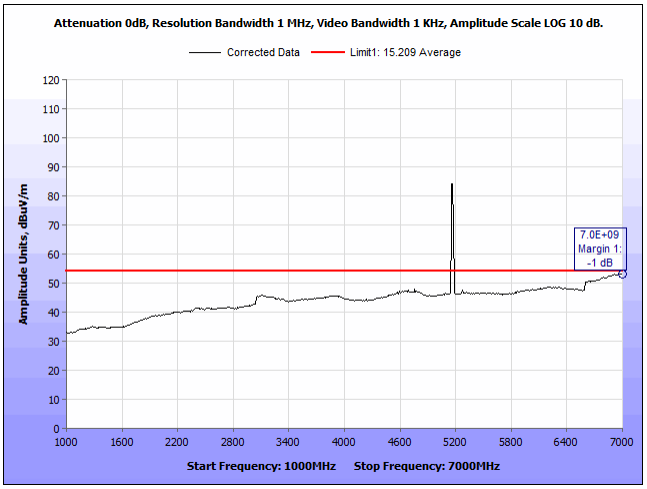
Plot 215. Undesirable Emissions, 1-7MHz Average, 10M, 5245, 8Omni, Port 1



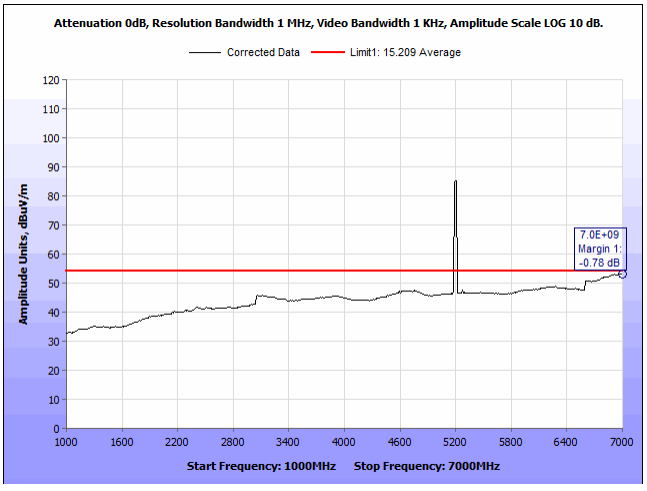
Plot 216. Undesirable Emissions, 1-7MHz Average, 10M, 5245, 8Omni, Port 2



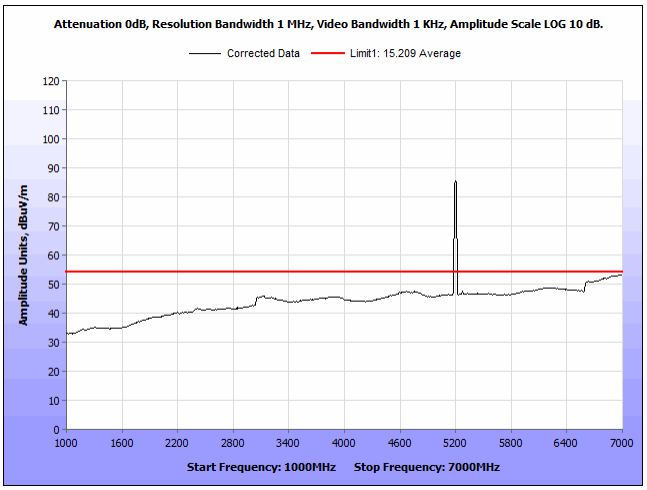
Plot 217. Undesirable Emissions, 1-7MHz Average, 20M, 5165, 8Omni, Port 1



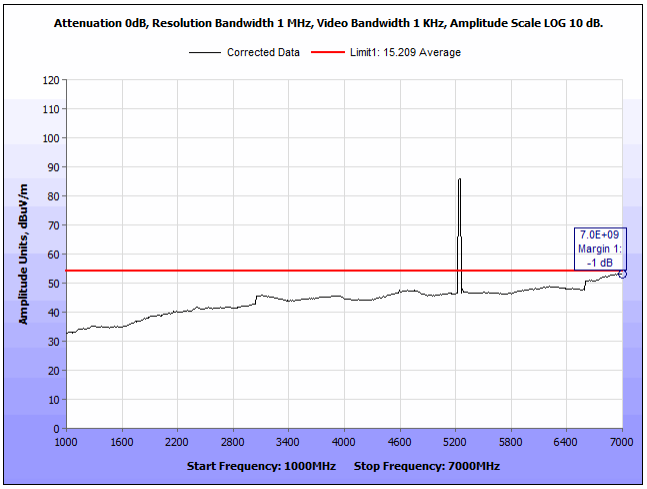
Plot 218. Undesirable Emissions, 1-7MHz Average, 20M, 5165, 8Omni, Port 2



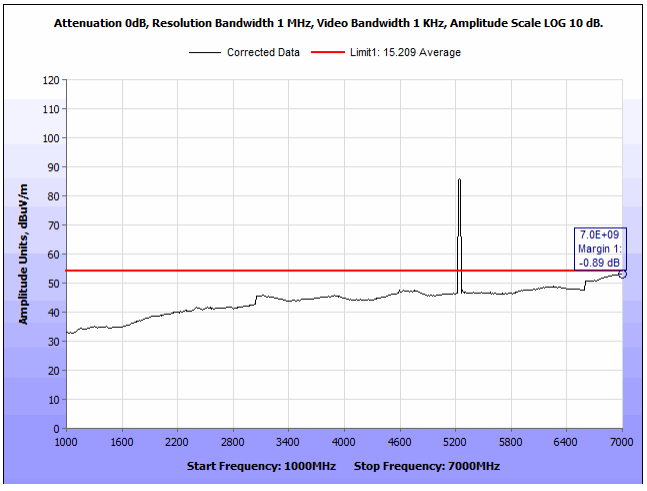
Plot 219. Undesirable Emissions, 1-7MHz Average, 20M, 5200, 8Omni, Port 1



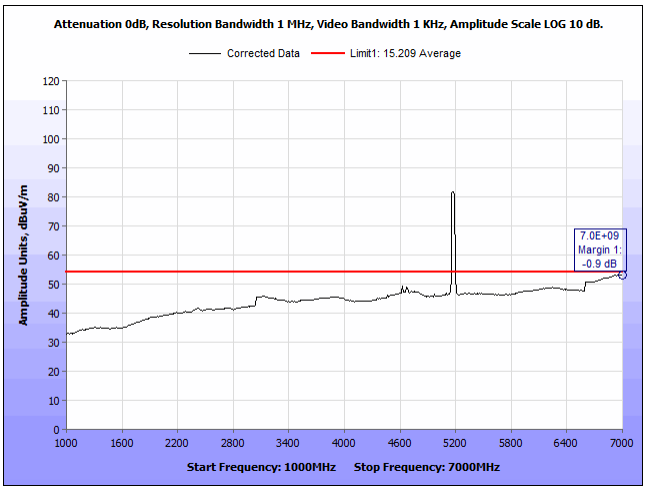
Plot 220. Undesirable Emissions, 1-7MHz Average, 20M, 5200, 8Omni, Port 2



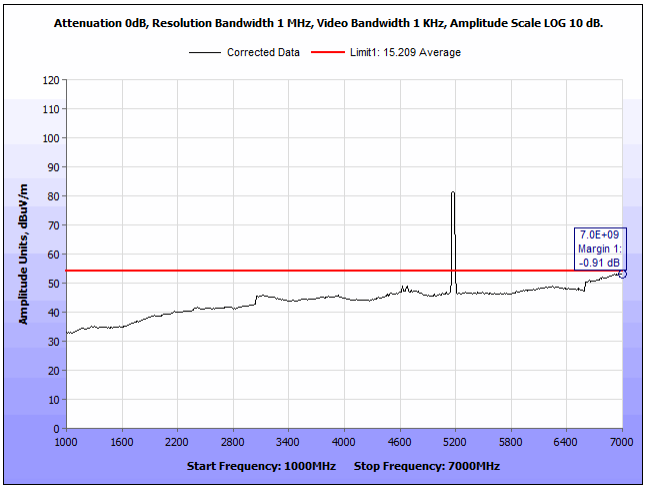
Plot 221. Undesirable Emissions, 1-7MHz Average, 20M, 5240, 8Omni, Port 1



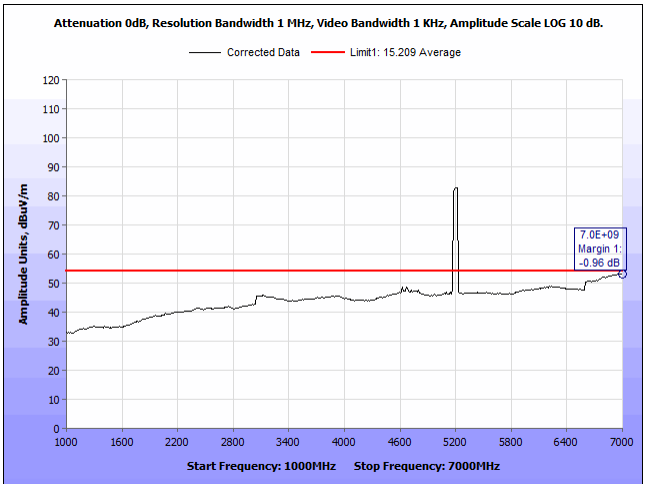
Plot 222. Undesirable Emissions, 1-7MHz Average, 20M, 5240, 8Omni, Port 2



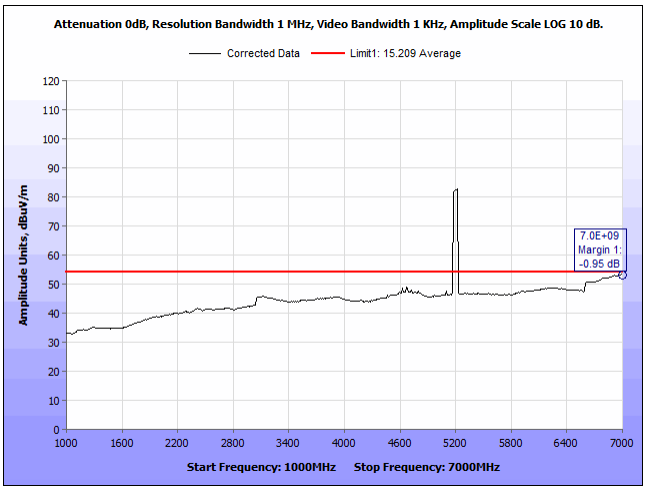
Plot 223. Undesirable Emissions, 1-7MHz Average, 40M, 5175, 8Omni, Port 1



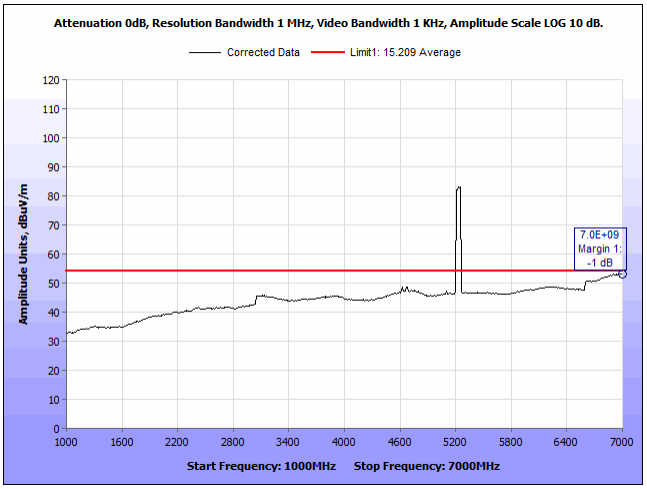
Plot 224. Undesirable Emissions, 1-7MHz Average, 40M, 5175, 8Omni, Port 2



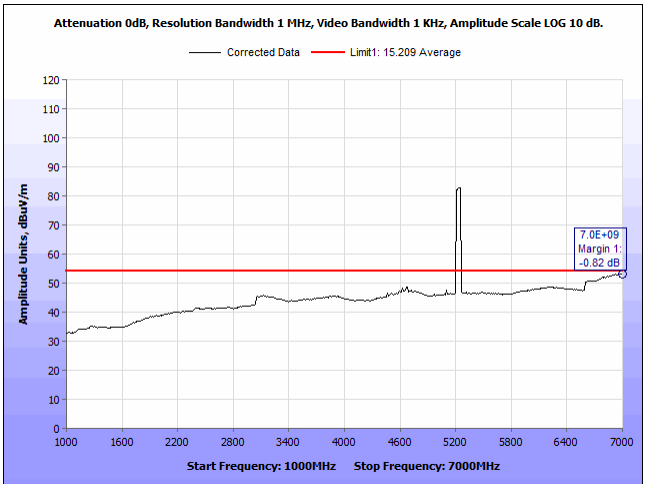
Plot 225. Undesirable Emissions, 1-7MHz Average, 40M, 5200, 8Omni, Port 1



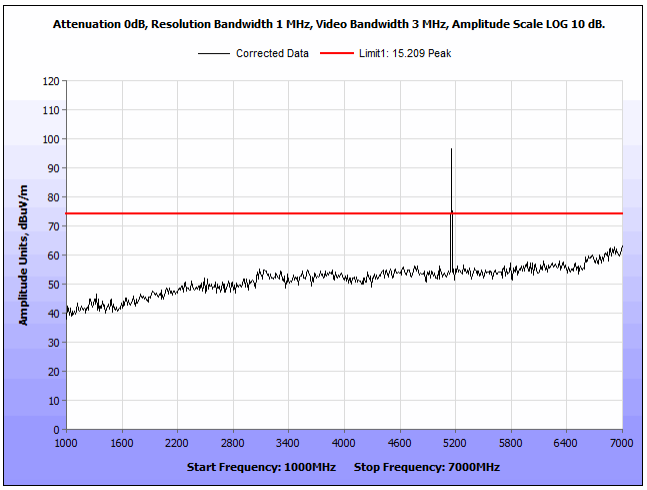
Plot 226. Undesirable Emissions, 1-7MHz Average, 40M, 5200, 8Omni, Port 2



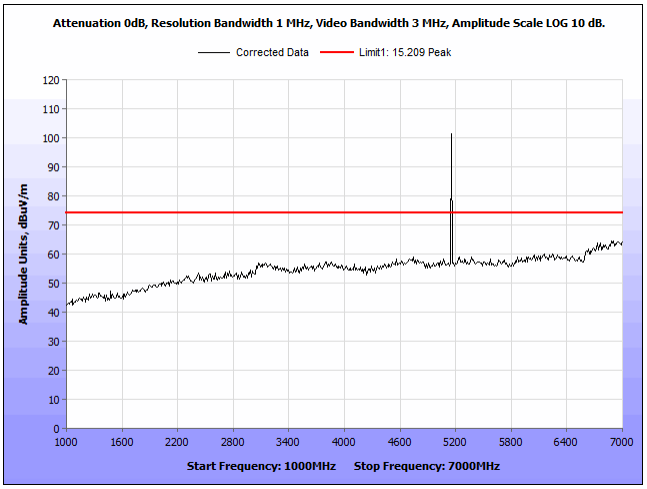
Plot 227. Undesirable Emissions, 1-7MHz Average, 40M, 5230, 8Omni, Port 1



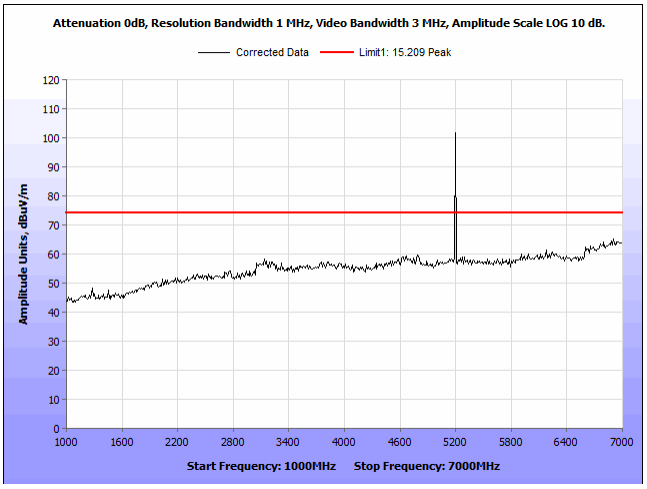
Plot 228. Undesirable Emissions, 1-7MHz Average, 40M, 5230, 8Omni, Port 2



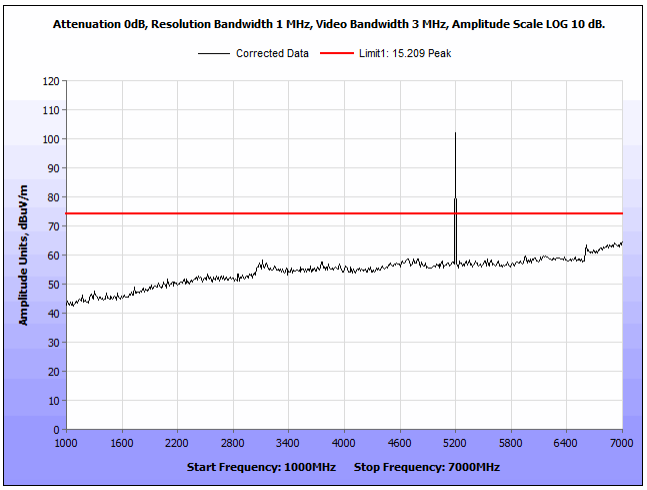
Plot 229. Undesirable Emissions, 1-7MHz Peak, 5M, 5155, 8Omni, Port 1



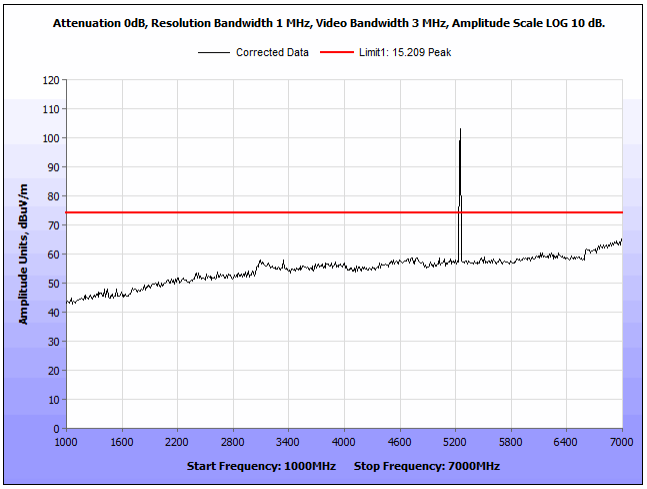
Plot 230. Undesirable Emissions, 1-7MHz Peak, 5M, 5155, 8Omni, Port 2



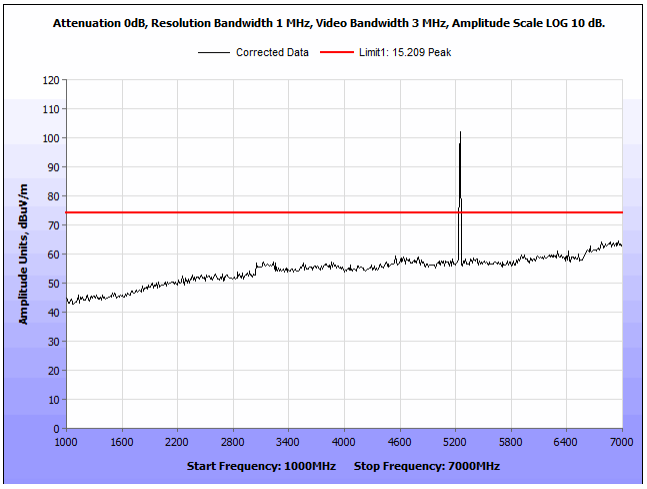
Plot 231. Undesirable Emissions, 1-7MHz Peak, 5M, 5200, 8Omni, Port 1



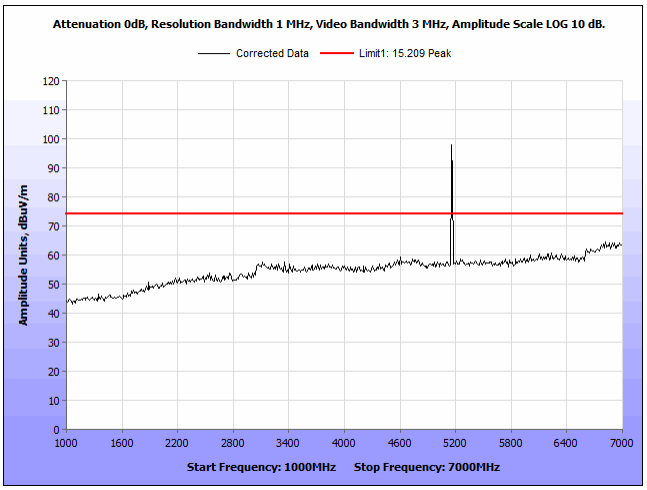
Plot 232. Undesirable Emissions, 1-7MHz Peak, 5M, 5200, 8Omni, Port 2



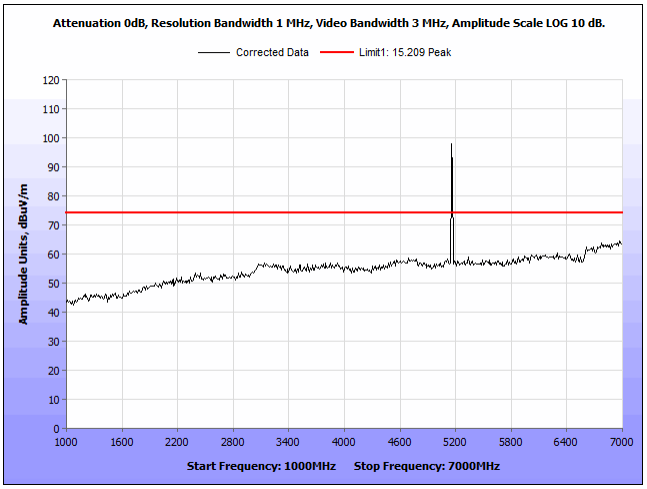
Plot 233. Undesirable Emissions, 1-7MHz Peak, 5M, 5247.5, 8Omni, Port 1



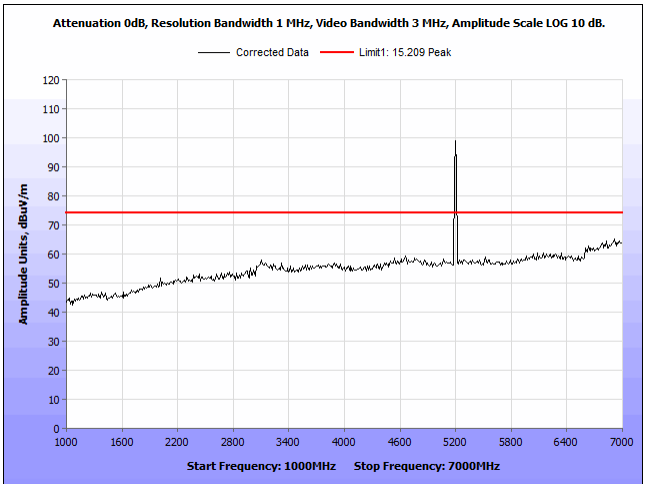
Plot 234. Undesirable Emissions, 1-7MHz Peak, 5M, 5247.5, 8Omni, Port 2



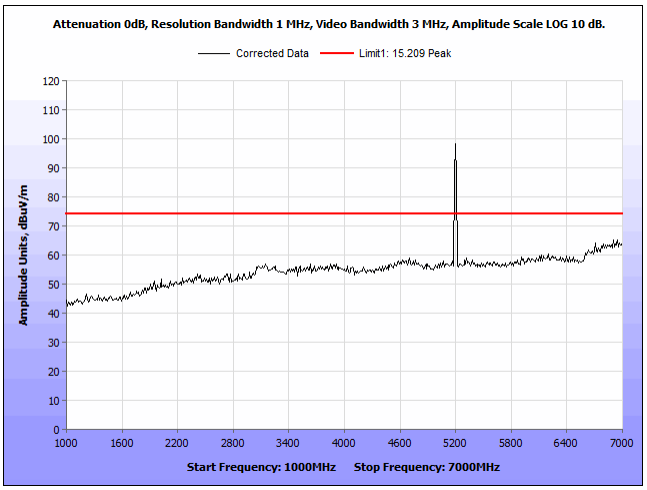
Plot 235. Undesirable Emissions, 1-7MHz Peak, 10M, 5160, 8Omni, Port 1



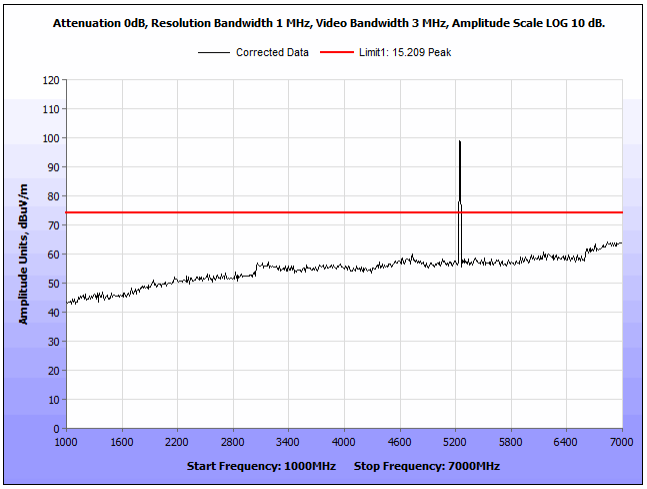
Plot 236. Undesirable Emissions, 1-7MHz Peak, 10M, 5160, 8Omni, Port 2



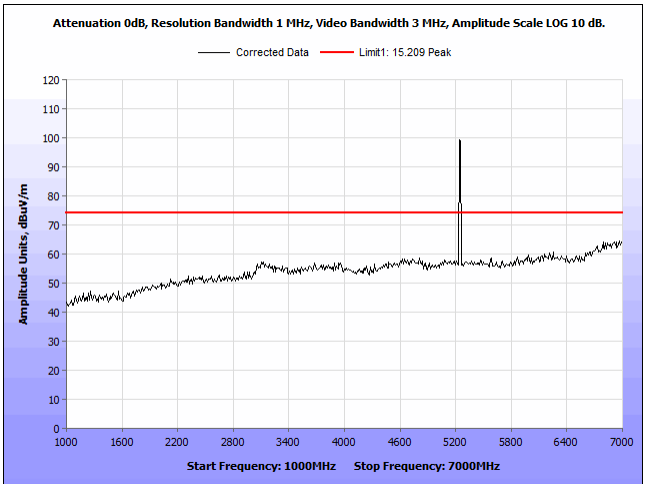
Plot 237. Undesirable Emissions, 1-7MHz Peak, 10M, 5200, 8Omni, Port 1



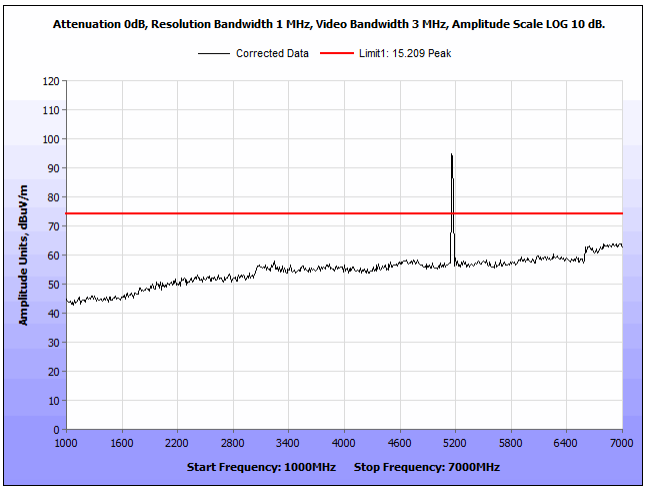
Plot 238. Undesirable Emissions, 1-7MHz Peak, 10M, 5200, 8Omni, Port 2



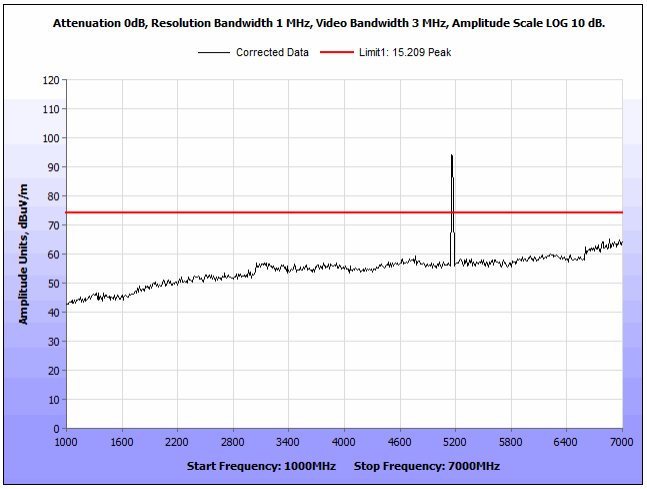
Plot 239. Undesirable Emissions, 1-7MHz Peak, 10M, 5245, 8Omni, Port 1



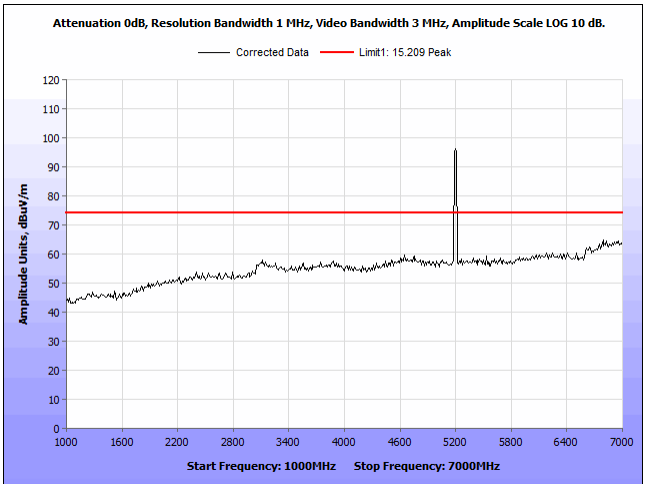
Plot 240. Undesirable Emissions, 1-7MHz Peak, 10M, 5245, 8Omni, Port 2



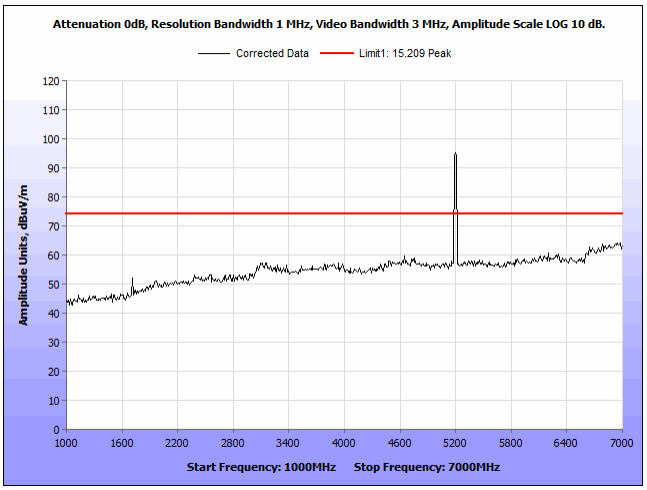
Plot 241. Undesirable Emissions, 1-7MHz Peak, 20M, 5165, 8Omni, Port 1



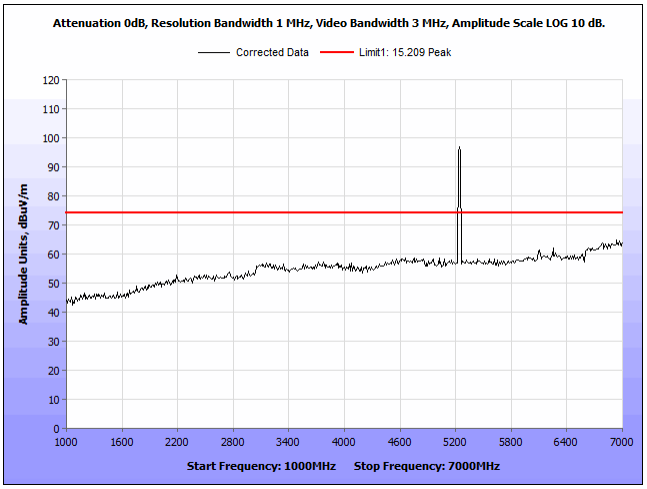
Plot 242. Undesirable Emissions, 1-7MHz Peak, 20M, 5165, 8Omni, Port 2



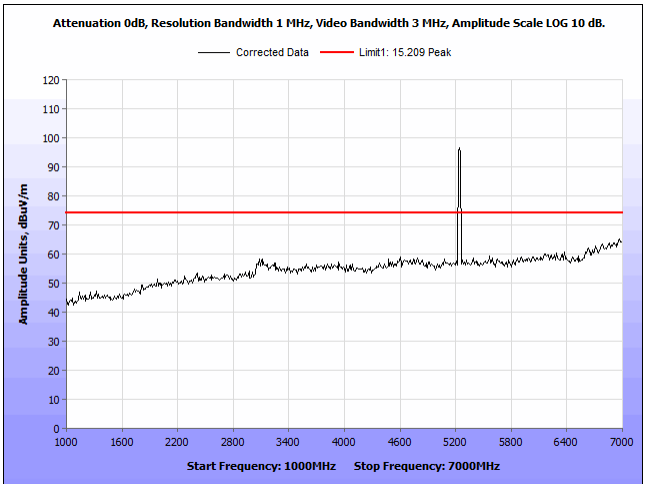
Plot 243. Undesirable Emissions, 1-7MHz Peak, 20M, 5200, 8Omni, Port 1



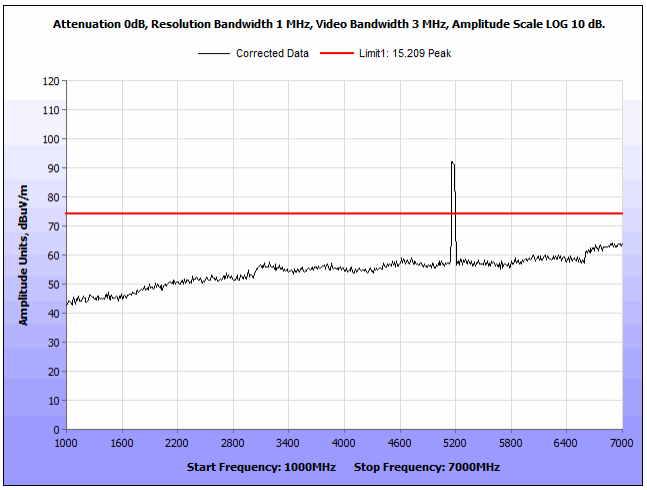
Plot 244. Undesirable Emissions, 1-7MHz Peak, 20M, 5200, 8Omni, Port 2



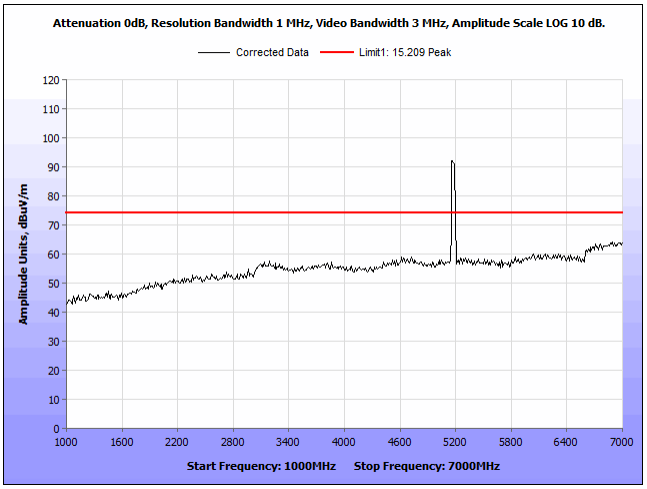
Plot 245. Undesirable Emissions, 1-7MHz Peak, 20M, 5240, 8Omni, Port 1



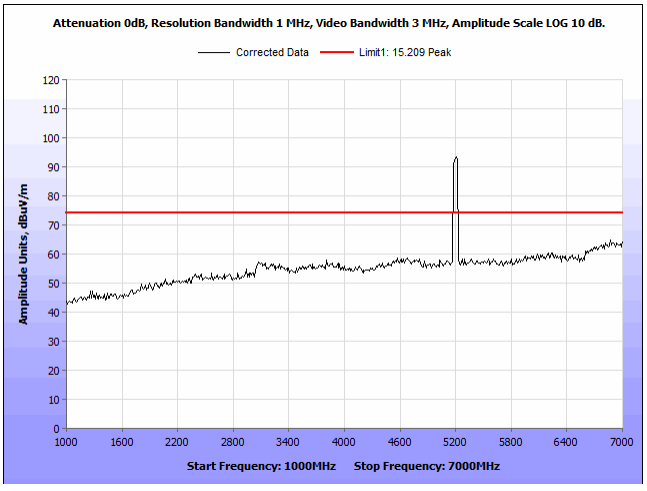
Plot 246. Undesirable Emissions, 1-7MHz Peak, 20M, 5240, 8Omni, Port 2



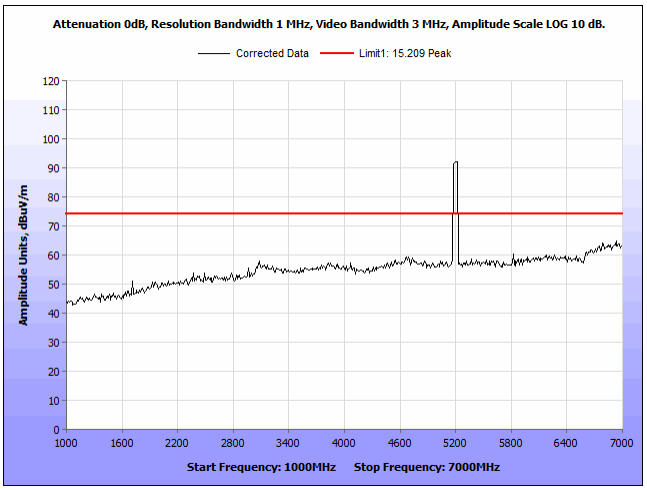
Plot 247. Undesirable Emissions, 1-7MHz Peak, 40M, 5175, 8Omni, Port 1



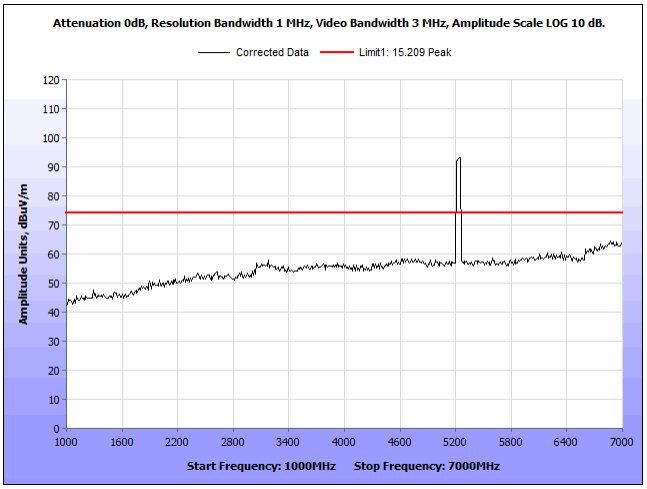
Plot 248. Undesirable Emissions, 1-7MHz Peak, 40M, 5175, 8Omni, Port 2



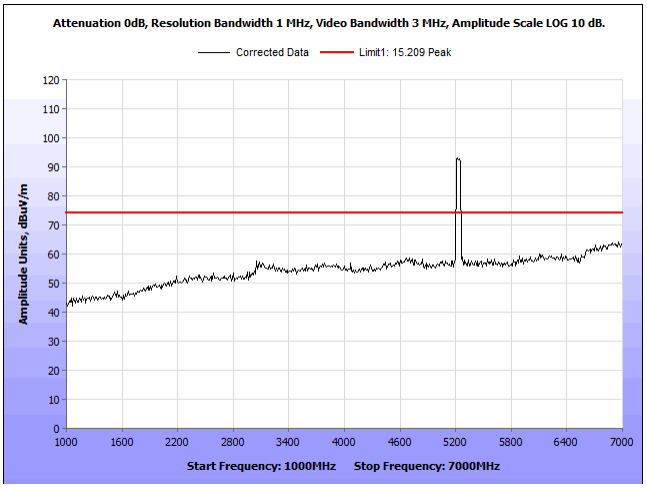
Plot 249. Undesirable Emissions, 1-7MHz Peak, 40M, 5200, 8Omni, Port 1



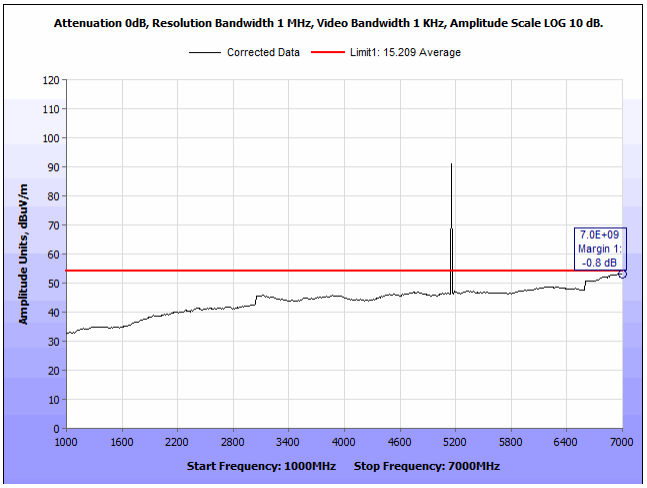
Plot 250. Undesirable Emissions, 1-7MHz Peak, 40M, 5200, 8Omni, Port 2



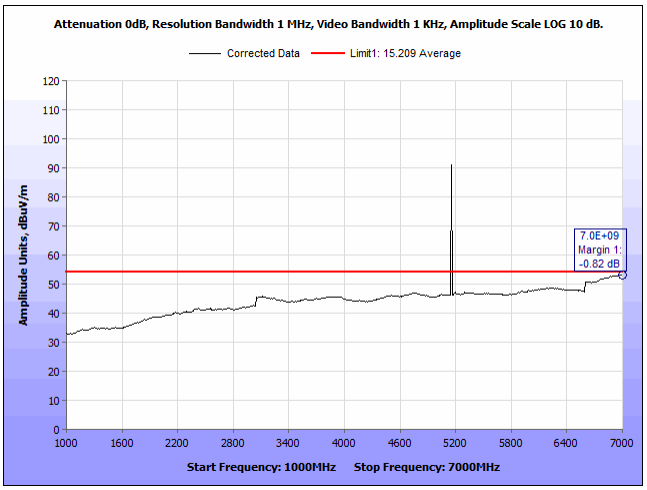
Plot 251. Undesirable Emissions, 1-7MHz Peak, 40M, 5230, 8Omni, Port 1



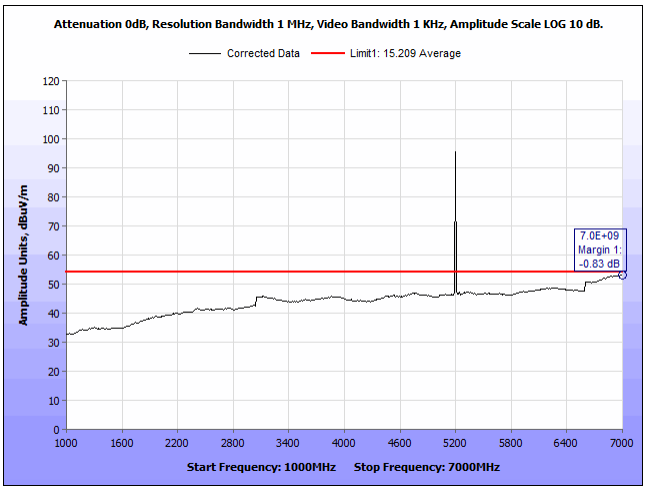
Plot 252. Undesirable Emissions, 1-7MHz Peak, 40M, 5230, 8Omni, Port 2



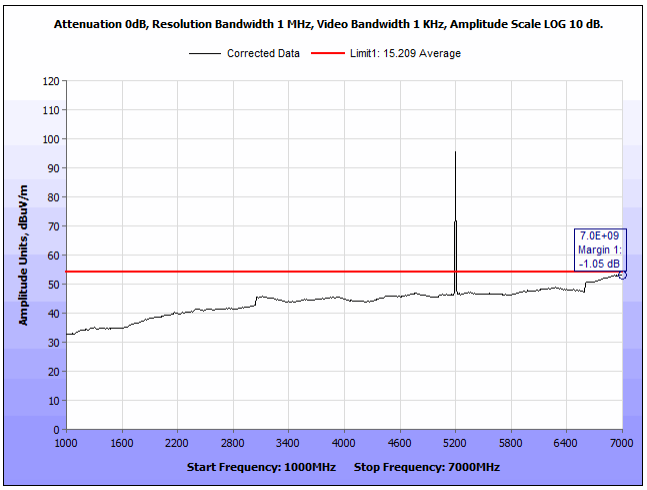
Plot 253. Undesirable Emissions, 1-7MHz Average, 5M, 5155, 2Panel, Port 1



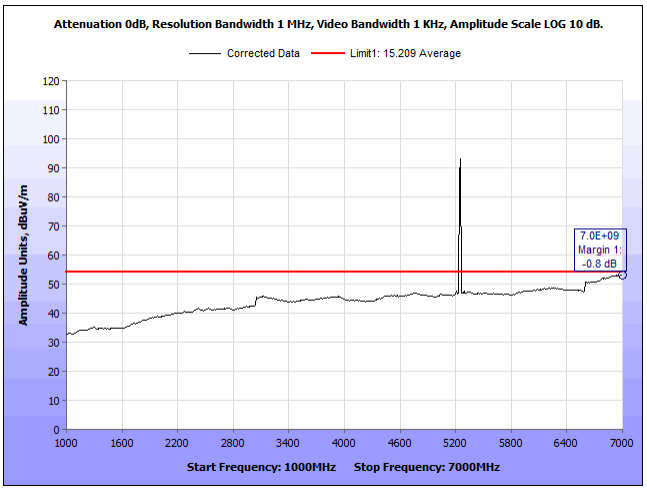
Plot 254. Undesirable Emissions, 1-7MHz Average, 5M, 5155, 2Panel, Port 2



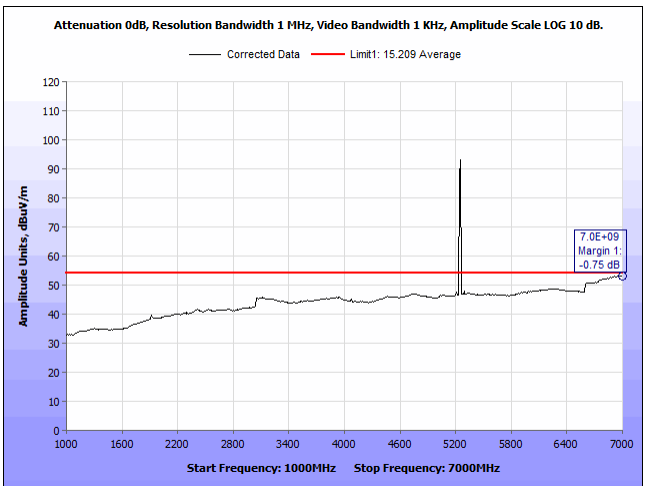
Plot 255. Undesirable Emissions, 1-7MHz Average, 5M, 5200, 2Panel, Port 1



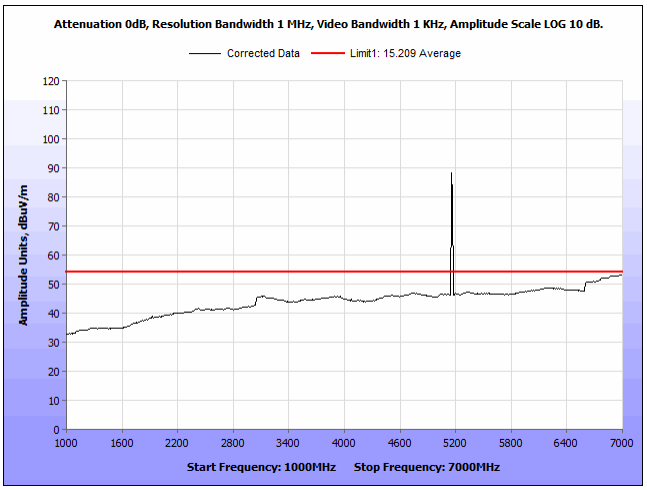
Plot 256. Undesirable Emissions, 1-7MHz Average, 5M, 5200, 2Panel, Port 2



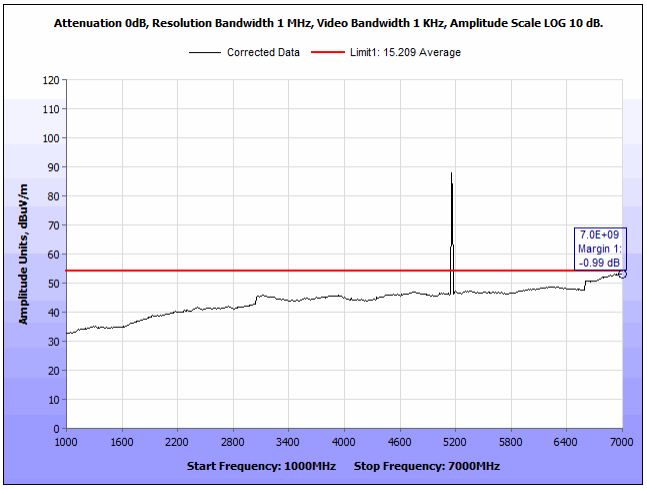
Plot 257. Undesirable Emissions, 1-7MHz Average, 5M, 5247.5, 2Panel, Port 1



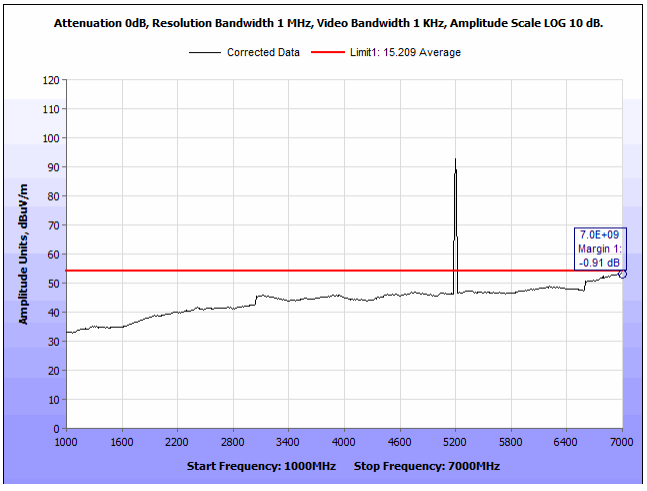
Plot 258. Undesirable Emissions, 1-7MHz Average, 5M, 5247.5, 2Panel, Port 2



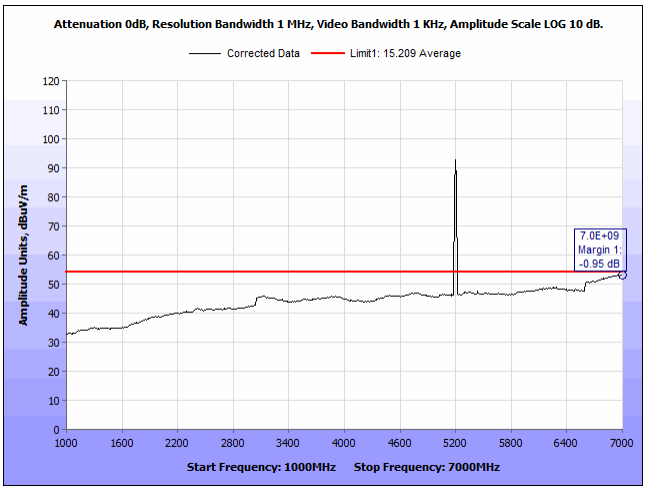
Plot 259. Undesirable Emissions, 1-7MHz Average, 10M, 5160, 2Panel, Port 1



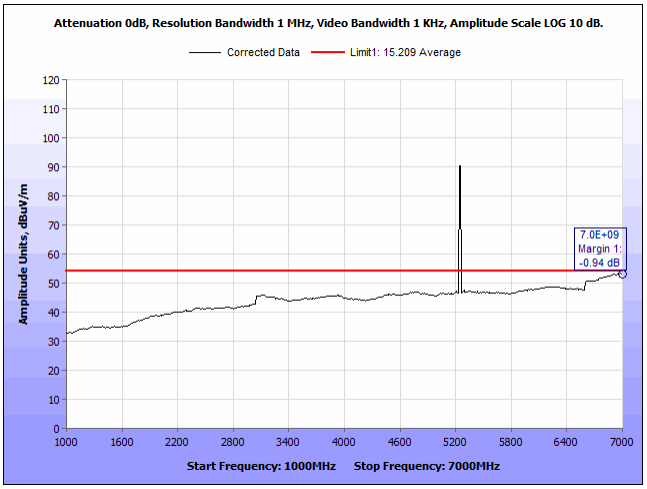
Plot 260. Undesirable Emissions, 1-7MHz Average, 10M, 5160, 2Panel, Port 2



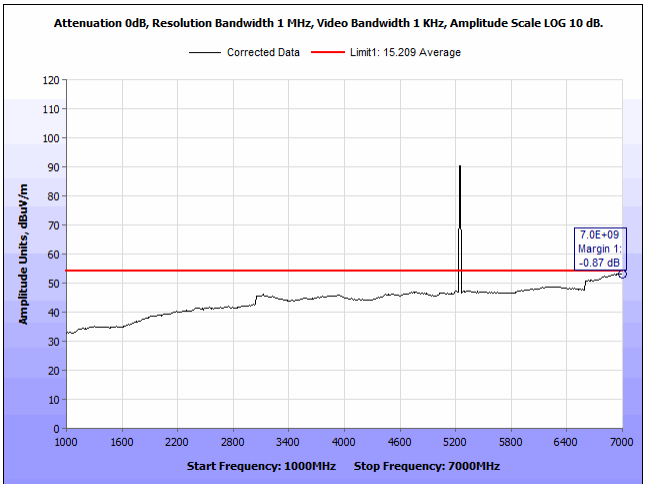
Plot 261. Undesirable Emissions, 1-7MHz Average, 10M, 5200, 2Panel, Port 1



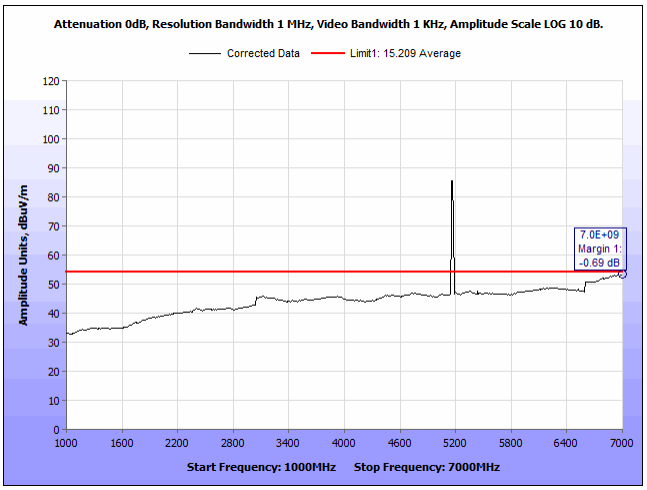
Plot 262. Undesirable Emissions, 1-7MHz Average, 10M, 5200, 2Panel, Port 2



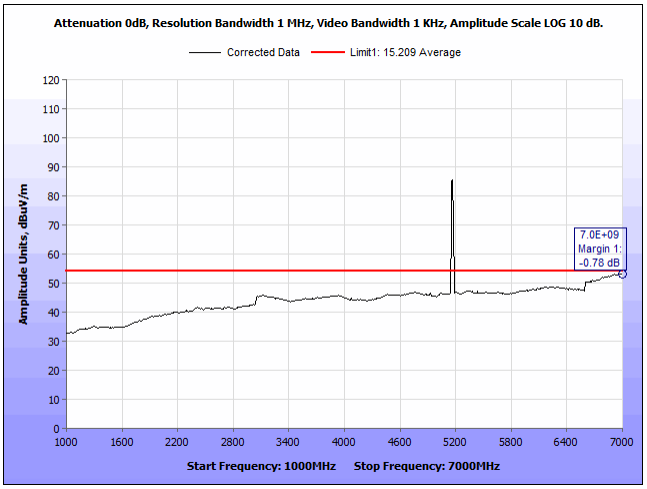
Plot 263. Undesirable Emissions, 1-7MHz Average, 10M, 5245, 2Panel, Port 1



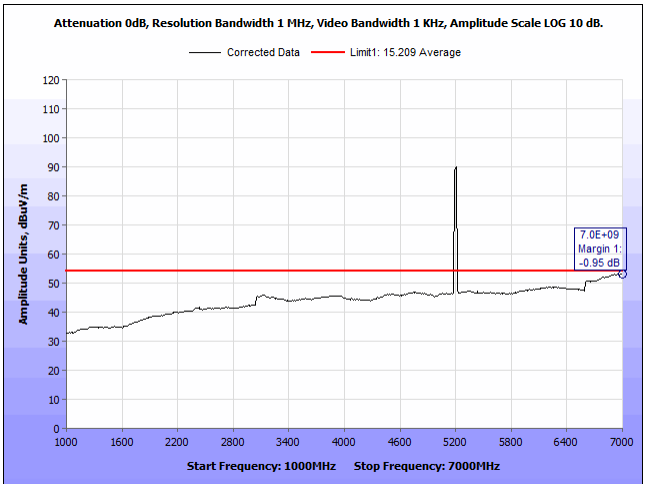
Plot 264. Undesirable Emissions, 1-7MHz Average, 10M, 5245, 2Panel, Port 2



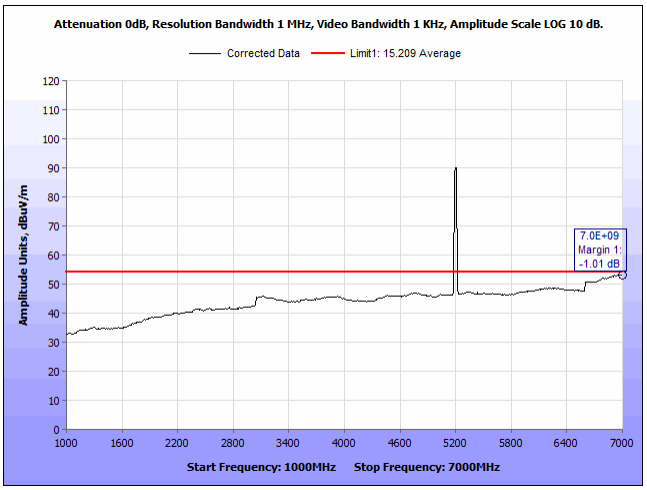
Plot 265. Undesirable Emissions, 1-7MHz Average, 20M, 5165, 2Panel, Port 1



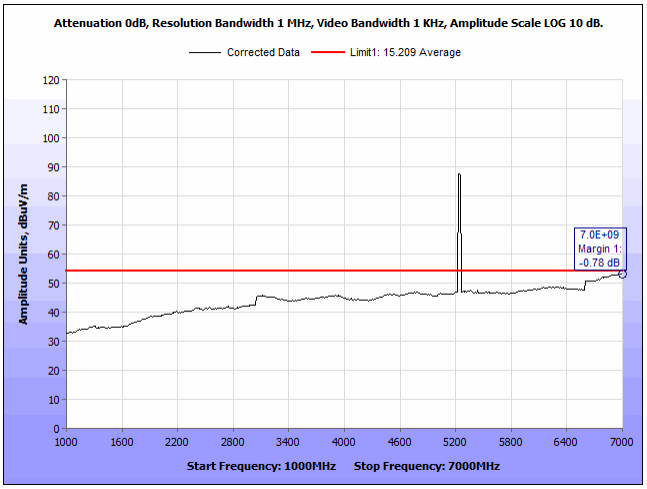
Plot 266. Undesirable Emissions, 1-7MHz Average, 20M, 5165, 2Panel, Port 2



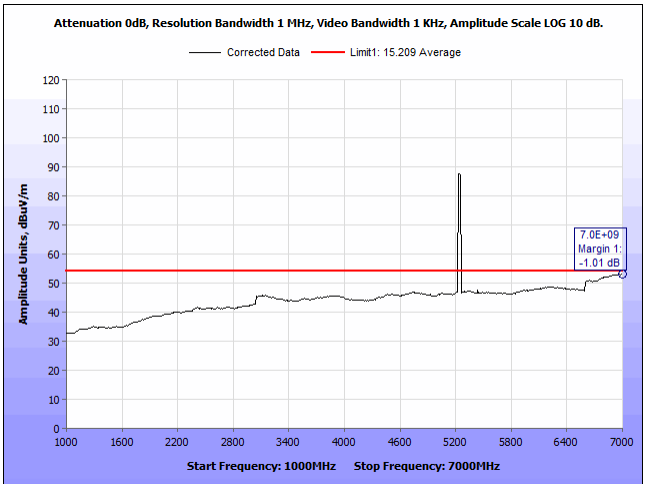
Plot 267. Undesirable Emissions, 1-7MHz Average, 20M, 5200, 2Panel, Port 1



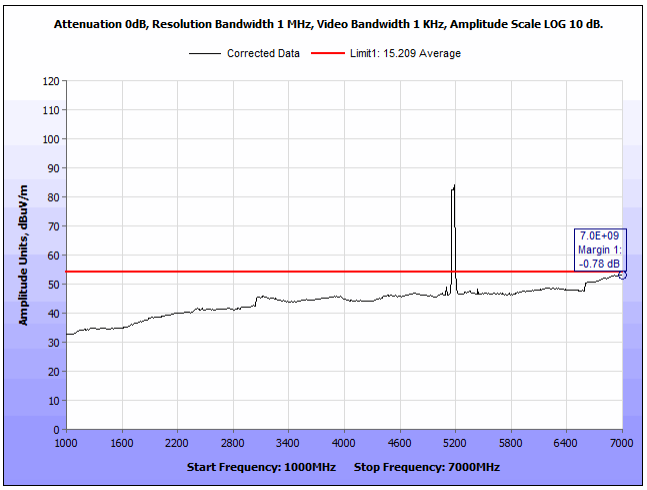
Plot 268. Undesirable Emissions, 1-7MHz Average, 20M, 5200, 2Panel, Port 2



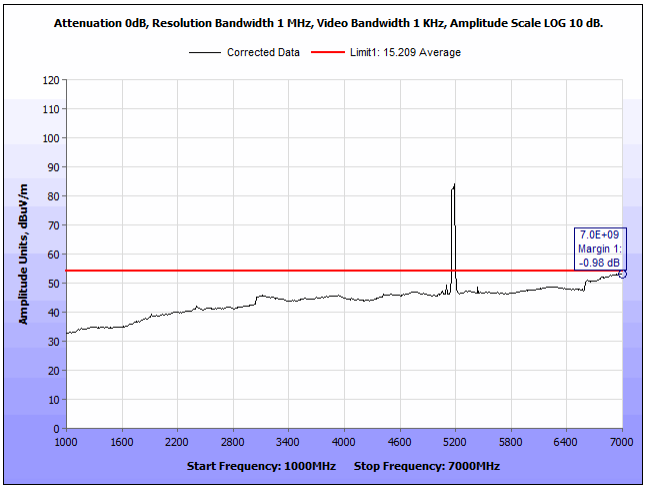
Plot 269. Undesirable Emissions, 1-7MHz Average, 20M, 5240, 2Panel, Port 1



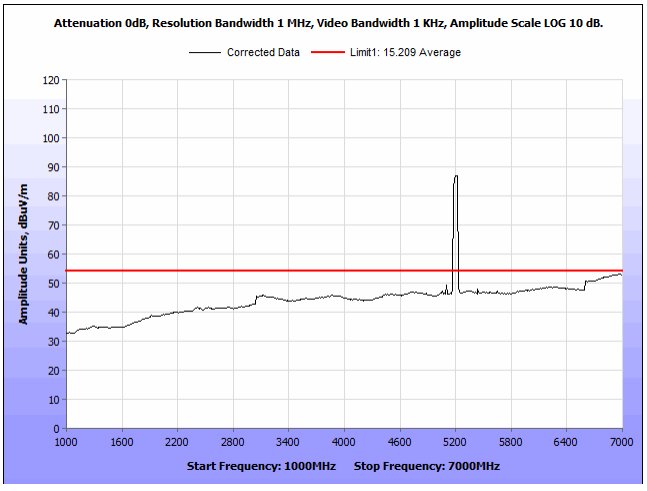
Plot 270. Undesirable Emissions, 1-7MHz Average, 20M, 5240, 2Panel, Port 2



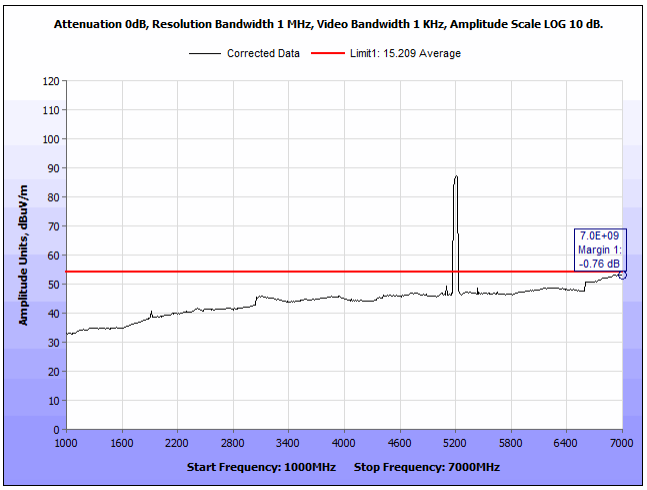
Plot 271. Undesirable Emissions, 1-7MHz Average, 40M, 5175, 2Panel, Port 1



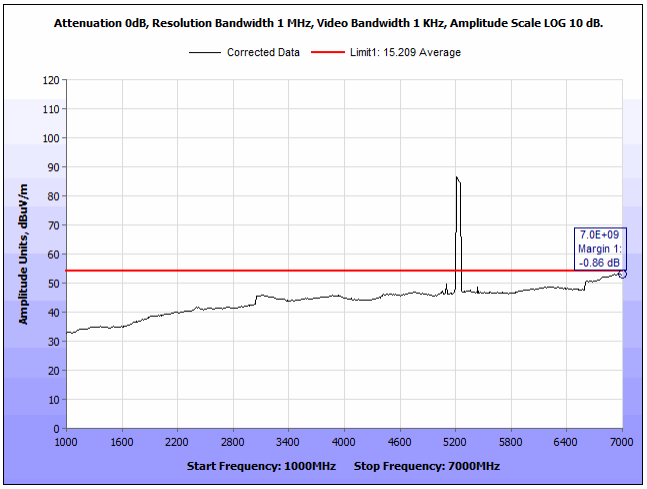
Plot 272. Undesirable Emissions, 1-7MHz Average, 40M, 5175, 2Panel, Port 2



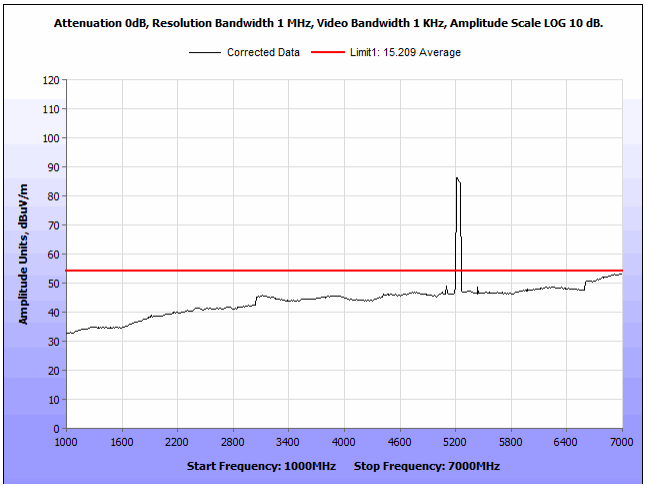
Plot 273. Undesirable Emissions, 1-7MHz Average, 40M, 5200, 2Panel, Port 1



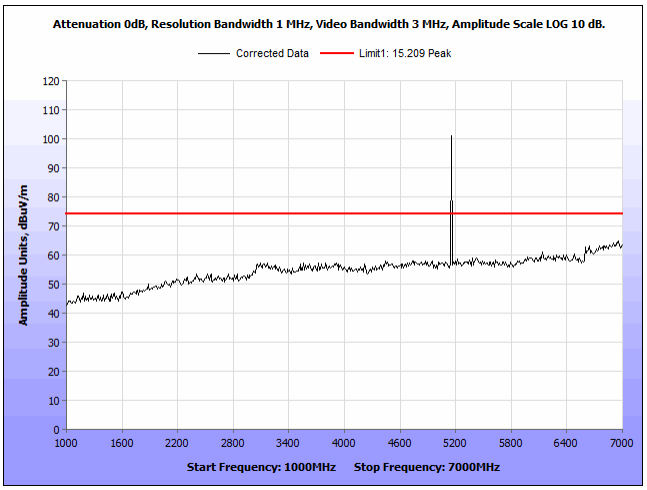
Plot 274. Undesirable Emissions, 1-7MHz Average, 40M, 5200, 2Panel, Port 2



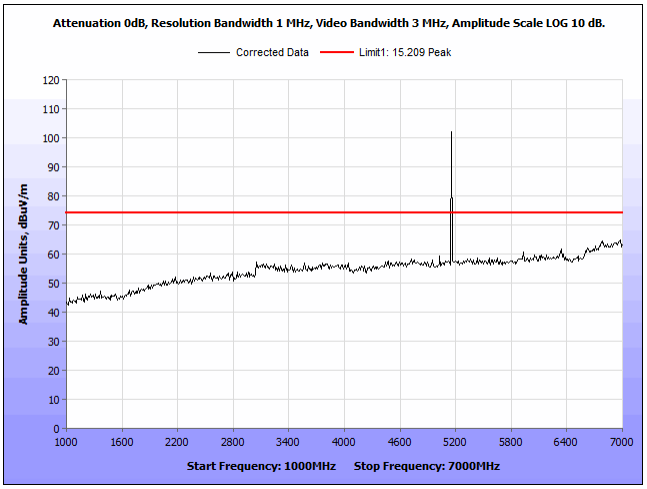
Plot 275. Undesirable Emissions, 1-7MHz Average, 40M, 5230, 2Panel, Port 1



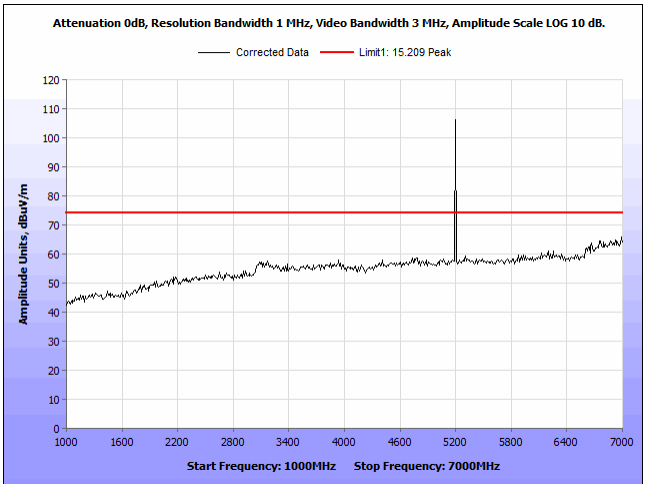
Plot 276. Undesirable Emissions, 1-7MHz Average, 40M, 5230, 2Panel, Port 2



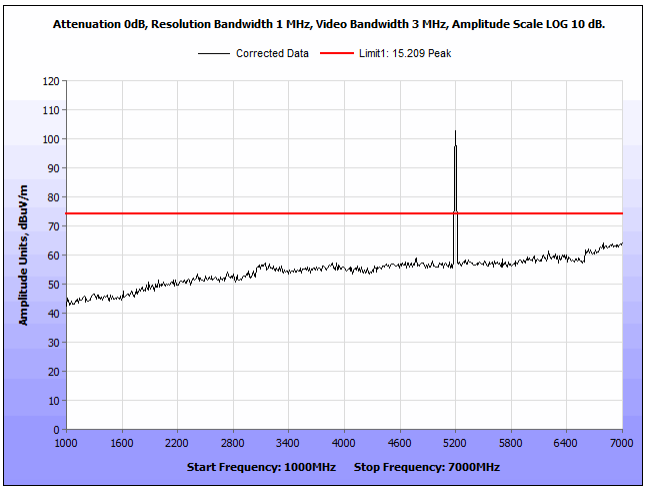
Plot 277. Undesirable Emissions, 1-7MHz Peak, 5M, 5155, 2Panel, Port 1



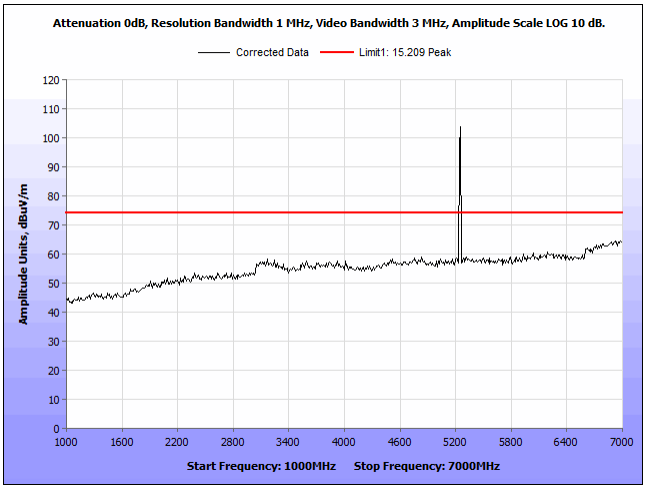
Plot 278. Undesirable Emissions, 1-7MHz Peak, 5M, 5155, 2Panel, Port 2



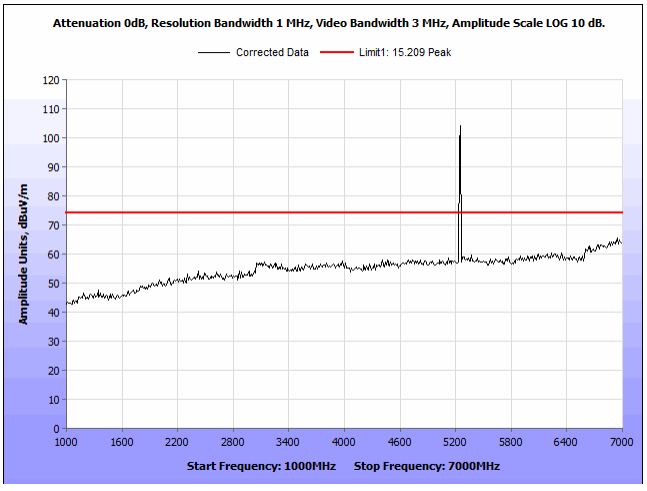
Plot 279. Undesirable Emissions, 1-7MHz Peak, 5M, 5200, 2Panel, Port 1



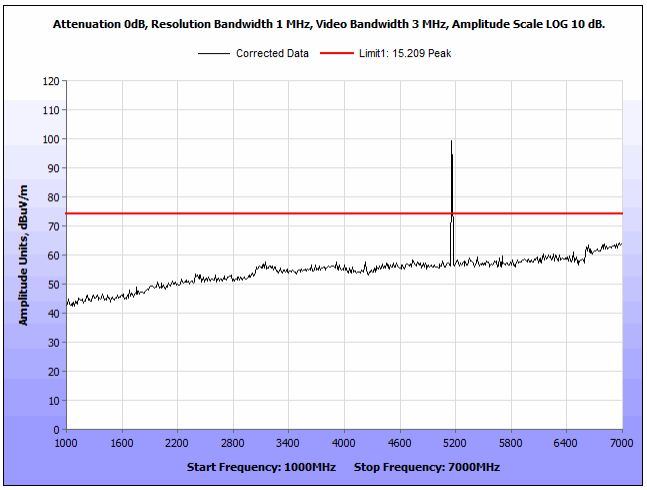
Plot 280. Undesirable Emissions, 1-7MHz Peak, 5M, 5200, 2Panel, Port 2



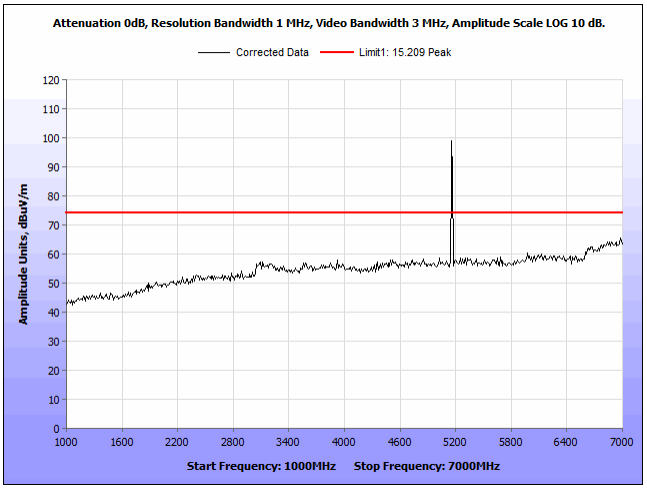
Plot 281. Undesirable Emissions, 1-7MHz Peak, 5M, 5247.5, 2Panel, Port 1



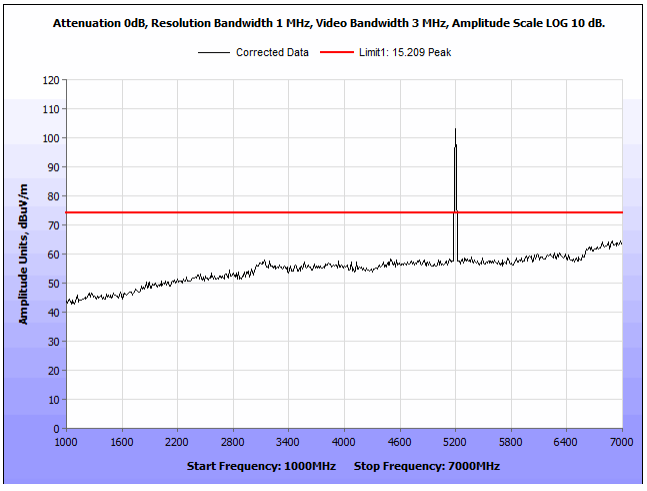
Plot 282. Undesirable Emissions, 1-7MHz Peak, 5M, 5247.5, 2Panel, Port 2



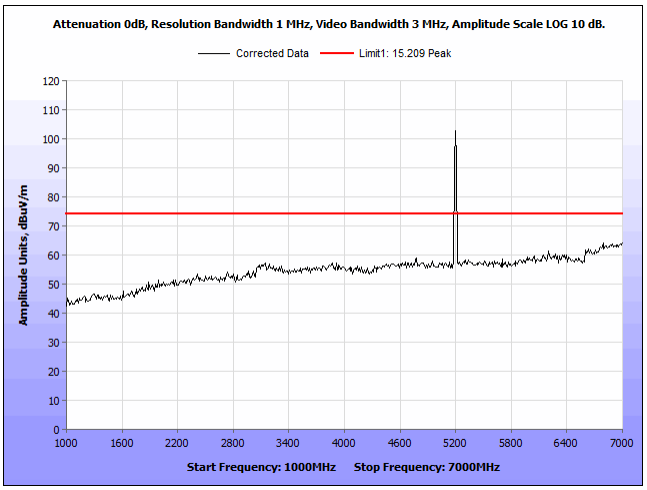
Plot 283. Undesirable Emissions, 1-7MHz Peak, 10M, 5160, 2Panel, Port 1



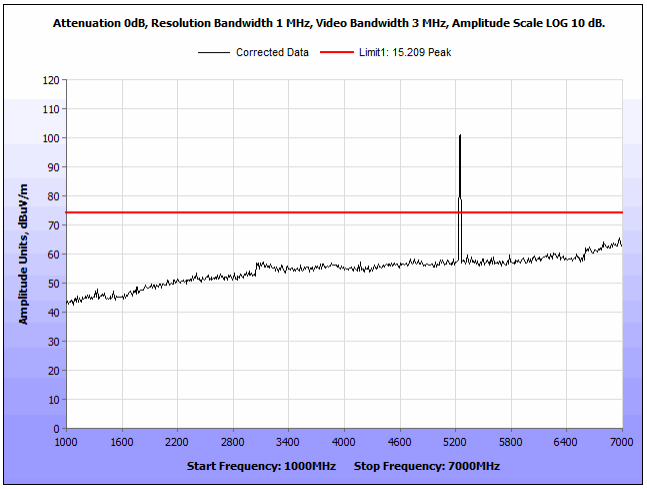
Plot 284. Undesirable Emissions, 1-7MHz Peak, 10M, 5160, 2Panel, Port 2



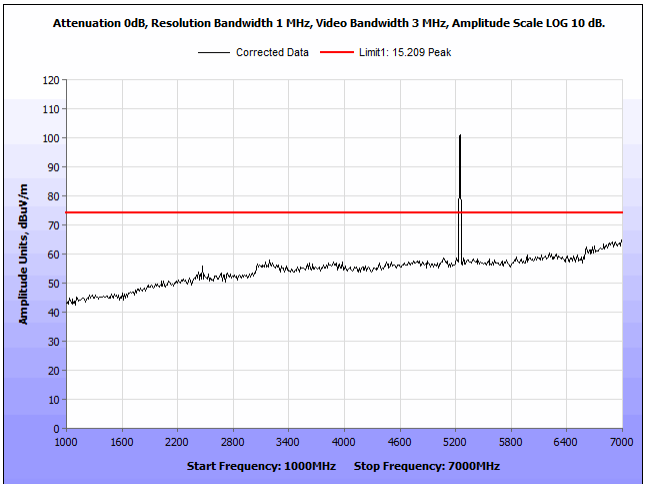
Plot 285. Undesirable Emissions, 1-7MHz Peak, 10M, 5200, 2Panel, Port 1



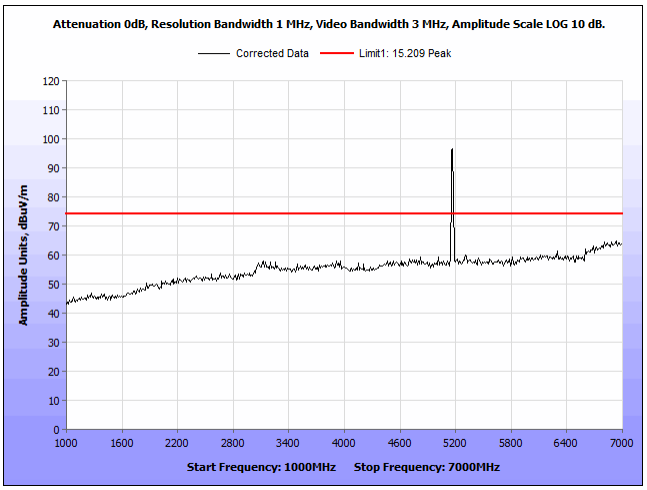
Plot 286. Undesirable Emissions, 1-7MHz Peak, 10M, 5200, 2Panel, Port 2



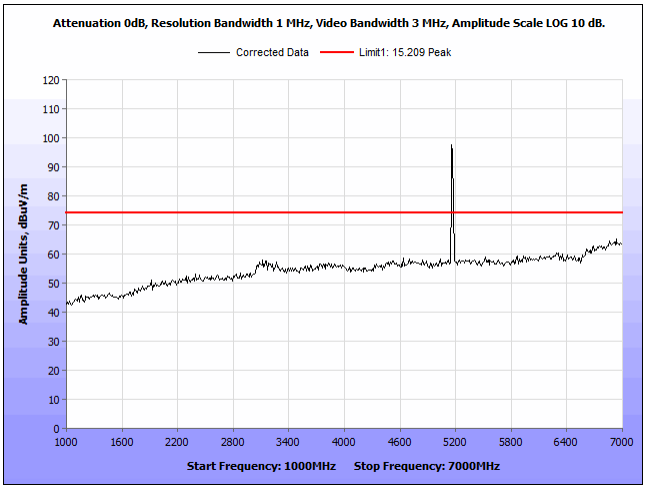
Plot 287. Undesirable Emissions, 1-7MHz Peak, 10M, 5245, 2Panel, Port 1



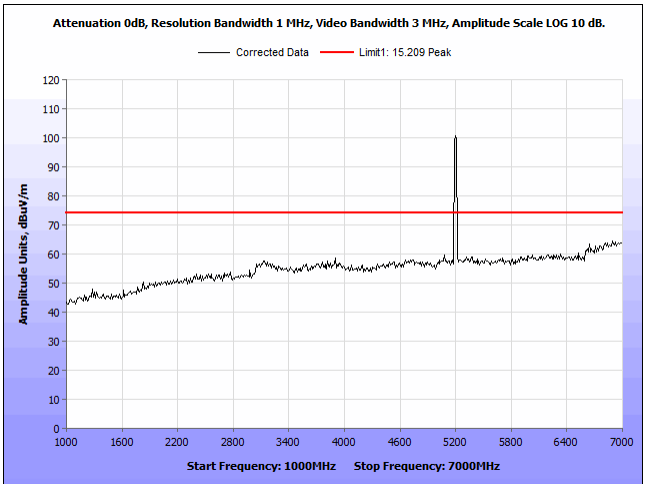
Plot 288. Undesirable Emissions, 1-7MHz Peak, 10M, 5245, 2Panel, Port 2



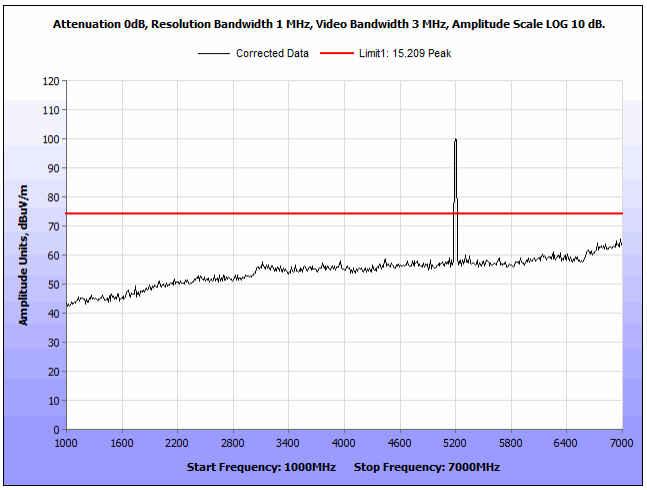
Plot 289. Undesirable Emissions, 1-7MHz Peak, 20M, 5165, 2Panel, Port 1



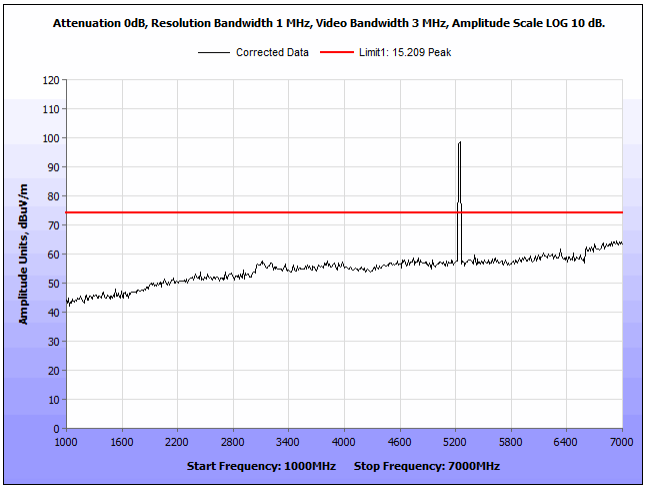
Plot 290. Undesirable Emissions, 1-7MHz Peak, 20M, 5165, 2Panel, Port 2



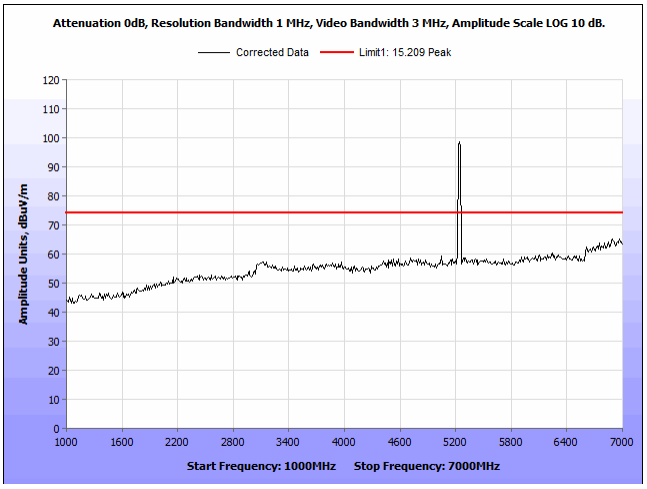
Plot 291. Undesirable Emissions, 1-7MHz Peak, 20M, 5200, 2Panel, Port 1



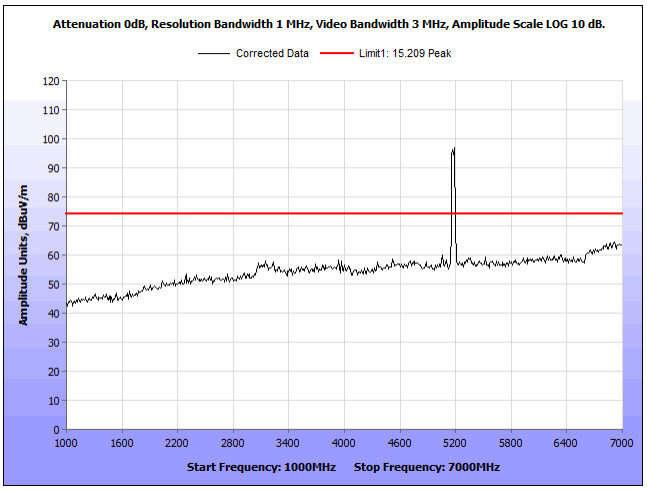
Plot 292. Undesirable Emissions, 1-7MHz Peak, 20M, 5200, 2Panel, Port 2



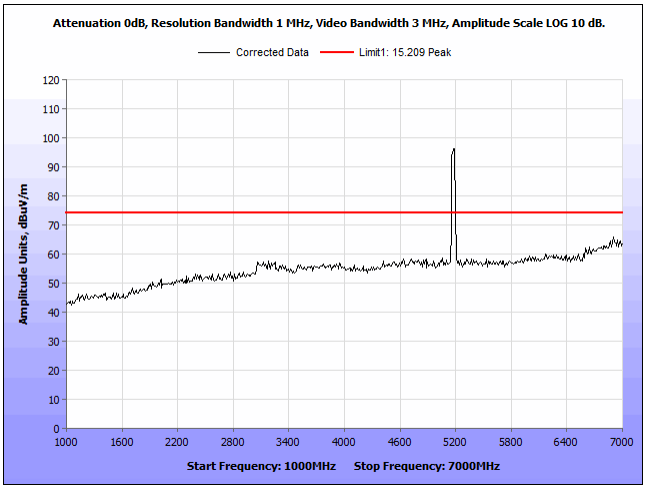
Plot 293. Undesirable Emissions, 1-7MHz Peak, 20M, 5240, 2Panel, Port 1



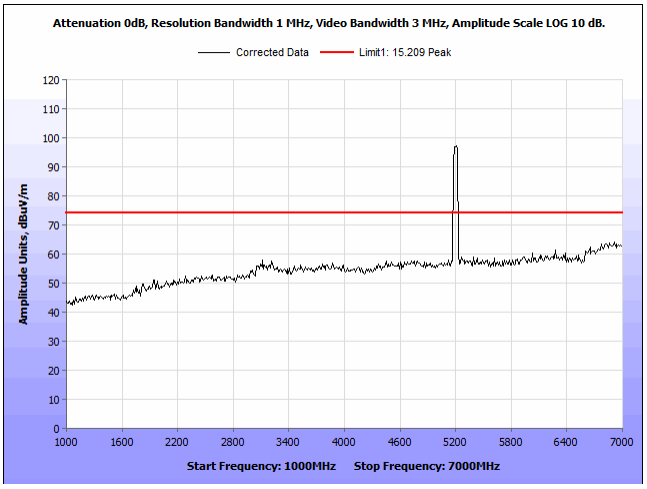
Plot 294. Undesirable Emissions, 1-7MHz Peak, 20M, 5240, 2Panel, Port 2



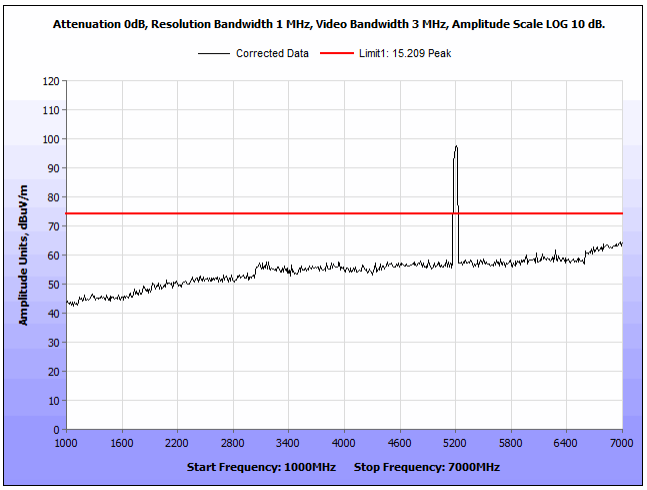
Plot 295. Undesirable Emissions, 1-7MHz Peak, 40M, 5175, 2Panel, Port 1



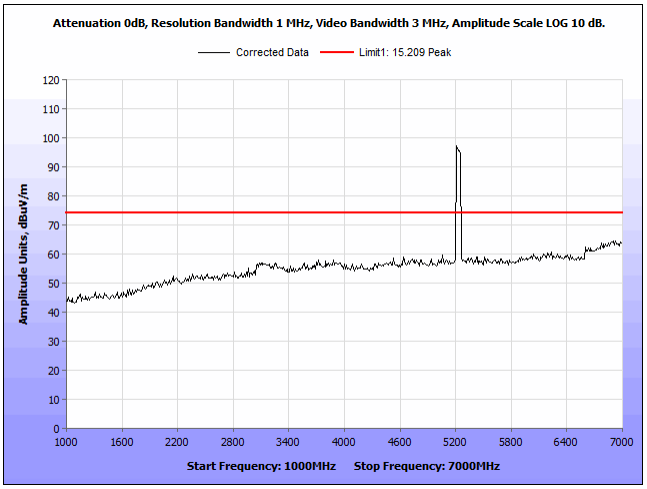
Plot 296. Undesirable Emissions, 1-7MHz Peak, 40M, 5175, 2Panel, Port 2



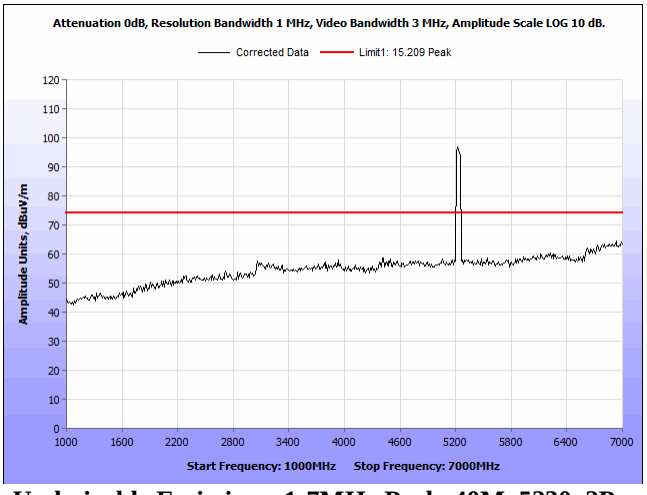
Plot 297. Undesirable Emissions, 1-7MHz Peak, 40M, 5200, 2Panel, Port 1



Plot 298. Undesirable Emissions, 1-7MHz Peak, 40M, 5200, 2Panel, Port 2



Plot 299. Undesirable Emissions, 1-7MHz Peak, 40M, 5230, 2Panel, Port 1



Plot 300. Undesirable Emissions, 1-7MHz Peak, 40M, 5230, 2Panel, Port 2

Continued to

EMC94059-FCC407 UNII-1 Rev4 Part 2

