MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
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November 27, 2013

InfiNet Malta LTD
222 Merchants Street
Valletta VLT1170, Malta

Dear Andrey Koynov,

Enclosed is the EMC Wireless test report for compliance testing of the InfiNet Malta LTD, InfiNet Wireless R5000-Smn as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15, Subpart B and ICES-003, Issue 5 August 2012 for a Class A Digital Device, and FCC Part 15 Subpart C and RSS-210, Issue 8, Dec. 2010 for Intentional Radiators.

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.

Jennifer Warnell
Documentation Department

Reference: (\InfiNet Malta LTD\EMC39434B-FCC247 Rev. 1)

Electromagnetic Compatibility Criteria
Test Report

for the

InfiNet Malta LTD
InfiNet Wireless R5000-Smn

Tested under
the FCC Certification Rules
contained in
Title 47 of the CFR, Parts 15 Subpart B & ICES-003
for Class A Digital Devices
&
15.247 Subpart C & RSS-210, Issue 8, Dec. 2010
for Intentional Radiators

MET Report: EMC39434B-FCC247 Rev. 1

November 27, 2013

Prepared For:

InfiNet Malta LTD
222 Merchants Street
Valletta VLT1170, Malta

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

Electromagnetic Compatibility Criteria
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15.247 Subpart C & RSS-210, Issue 8, Dec. 2010
for Intentional Radiators

Surinder Singh, Project Engineer
Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules Parts 15B, 15.247 and Industry Canada standards ICES-003, Issue 5 August 2012, RSS-210, Issue 8, Dec. 2010 under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	October 29, 2013	Initial Issue.
1	November 27, 2013	Revised to reflect engineer corrections.

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List of Terms and Abbreviations

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

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the InfiNet Malta LTD InfiNet Wireless R5000-Smn, with the requirements of Part 15, §15.247. 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 InfiNet Wireless R5000-Smn. InfiNet Malta LTD should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the InfiNet Wireless R5000-Smn, 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, §15.247, in accordance with InfiNet Malta LTD, purchase order number MET-12. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference 47 CFR Part 15.247:2005	IC Reference RSS-210 Issue 8: 2010; RSS-GEN Issue 3: 2010	Description	Compliance
47 CFR Part 15.107 (a)	ICES-003 Issue 5 August 2012	Conducted Emission Limits for a Class A Digital Device	Compliant
47 CFR Part 15.109 (a)	ICES-003 Issue 5 August 2012	Radiated Emission Limits for a Class A Digital Device	Compliant
Title 47 of the CFR, Part 15 §15.203	N/A	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	RSS-GEN (7.2.4)	Conducted Emission Limits	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(2)	RSS-Gen(4.6)	6dB Occupied Bandwidth	Compliant
		99% Occupied Bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.247(b)	RSS-210(A8.4)	Peak Power Output	Compliant
Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205	RSS-210(A8.5)	Radiated Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15 §15.247(d)	RSS-210(A8.5)	RF Conducted Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15 §15.247(d)	RSS-210(A8.5)	RF Conducted Band Edge	Compliant
Title 47 of the CFR, Part 15; §15.247(e)	RSS-210(A8.2)	Peak Power Spectral Density	Compliant
Title 47 of the CFR, Part 15 §15.247(i)	RSS-Gen(5.6)	Maximum Permissible Exposure (MPE)	Compliant

Table 1. Executive Summary of EMC Part 15.247 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by InfiNet Malta LTD to perform testing on the InfiNet Wireless R5000-Smn, under InfiNet Malta LTD's purchase order number MET-12.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the InfiNet Malta LTD, InfiNet Wireless R5000-Smn.

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

Model(s) Tested:	InfiNet Wireless R5000-Smn	
Model(s) Covered:	The following model are covered: **R5000-Smn /5X.300.2x63.2x19, R5000-Smn /5X.300.2x63.2x21, R5000-Smn b/5X.300.2x63.2x16, R5000-Smn /5X.300.2x63.2x23, R5000-Smn /5X.300.2x63.2x28**	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	FCC ID: X8Q-SMN-5X18 IC: 9144A-SMN5X18	
	Type of Modulations:	OFDM
	Equipment Code:	DTS
	Peak RF Output Power:	14.383dBm
	EUT Frequency Ranges:	5740 – 5840 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Surinder Singh	
Report Date(s):	November 27, 2013	

Table 2. EUT Summary Table

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
RSS-210, Issue 8, Dec. 2010	Low-power Licence-exempt Radiocommunications Devices (All Frequency Bands): Category I Equipment
RSS-GEN, Issue 3, Dec. 2010	General Requirements and Information for the Certification of Radio Apparatus
ICES-003, Issue 5 August 2012	Information Technology Equipment (ITE) — Limits and methods of measurement
ANSI C63.4:2003	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 C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References

C. Test Site

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

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

D. Description of Test Sample

The InfiNet Malta LTD InfiNet Wireless R5000-Smn, Equipment Under Test (EUT), is a series of high-performance broadband wireless systems. The only difference between all the models is the gain of the antenna. The EUT operates in a 2x2 MIMO configuration.

Photograph 1. InfiNet Malta LTD InfiNet Wireless R5000-Smn

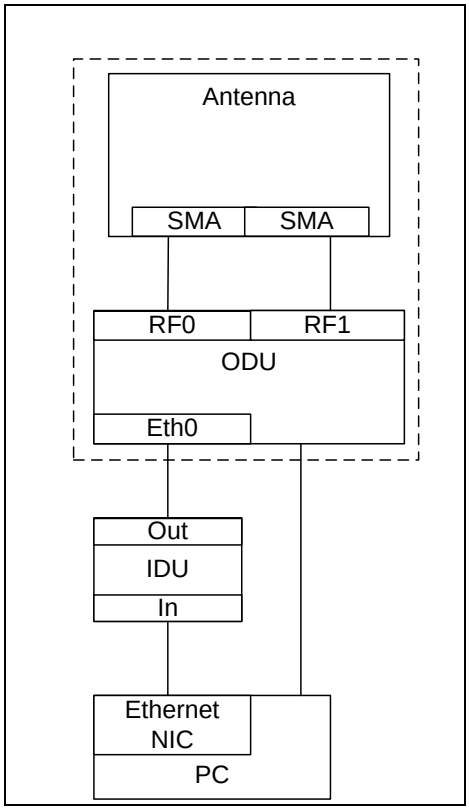


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

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

Serial Number	Name / Description	Model Number
192404	Antenna 1	R5000-Smn /5X.300.2x63.2x19
192414	Antenna 2	R5000-Smn /5X.300.2x63.2x21
192408	Antenna 3	R5000-Smn b/5X.300.2x63.2x16
13944	Antenna 4	R5000-Smn /5X.300.2x63.2x23
6401	Antenna 5	R5000-Smn /5X.300.2x63.2x28

Table 4. Equipment Configuration

F. Support Equipment

The EUT did not require any support equipment for operation or monitoring.

G. Ports and Cabling Information

The EUT did not require any ports or cabling information for operation or monitoring.

H. Mode of Operation

The EUT is intended to operate in point-to-multipoint mode both as a base station sector and as a subscriber terminal unit as well as in point-to-point mode depending on the antenna attached.

I. Method of Monitoring EUT Operation

The EUT is performing according to the manufacturer's intended operation if it is capable to provide data channel with capacity of 1 Mbps or higher measured for TCP traffic as 1 minute average value.

If the unit is not capable to provide such a channel it is not performing according to the manufacturer's intended operation.

J. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to InfiNet Malta LTD upon completion of testing.

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

Electromagnetic Compatibility Criteria

§ 15.107 Conducted Emissions Limits

Test Requirement(s):

15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

15.107 (b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.

Frequency range (MHz)	Class A Conducted Limits (dBµV)		*Class B Conducted Limits (dBµV)	
	Quasi-Peak	Average	Quasi-Peak	Average
* 0.15- 0.45	79	66	66 - 56	56 - 46
0.45 - 0.5	79	66	56	46
0.5 - 30	73	60	60	50
Note 1 — The lower limit shall apply at the transition frequencies. Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz.				

Table 5. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b)

Test Procedures:

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing, test conditions, and test procedures of ANSI C63.4 were used. The EUT was powered through a 50Ω/50µH LISN. An EMI receiver, connected to the measurement port of the LISN, scanned the frequency range from 150 kHz to 30 MHz in order to find the peak conducted emissions. All peak emissions within 6 dB of the limit were re-measured using a quasi-peak and/or average detector as appropriate.

Test Results:

The EUT was compliant with the Class A requirement(s) of this section. Measured emissions were below applicable limits.

Test Engineer(s):

Surinder Singh

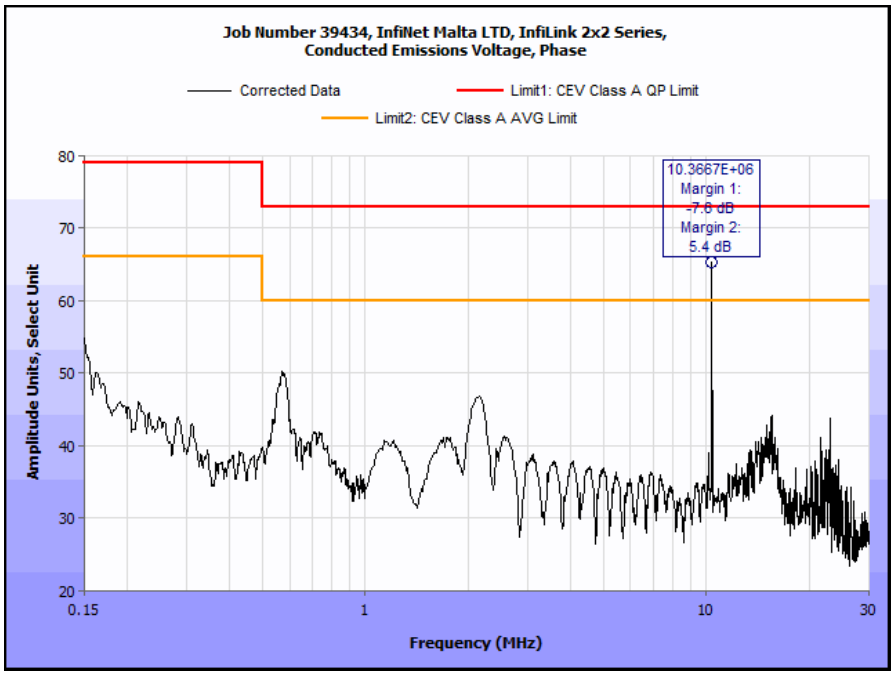
Test Date(s):

09/30/13

Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

Frequency (MHz)	Uncorrected Meter Reading (dBµV) QP	Cable Loss (dB)	Corrected Measurement (dBµV) QP	Limit (dBµV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBµV) Avg.	Cable Loss (dB)	Corrected Measurement (dBµV) AVG	Limit (dBµV) AVG	Margin (dB) AVG
0.156	43.85	0	43.85	79	-35.15	40.03	0	40.03	66	-25.97
0.57	38.79	0	38.79	73	-34.21	32.57	0	32.57	60	-27.43
2.23	44.52	0	44.52	73	-28.48	38.57	0	38.57	60	-21.43
9.83	30.56	0.17	30.73	73	-42.27	24.06	0.17	24.23	60	-35.77
15.56	25.89	0	25.89	73	-47.11	19.45	0	19.45	60	-40.55
23.46	31.72	0	31.72	73	-41.28	24.9	0	24.9	60	-35.1

Table 6. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

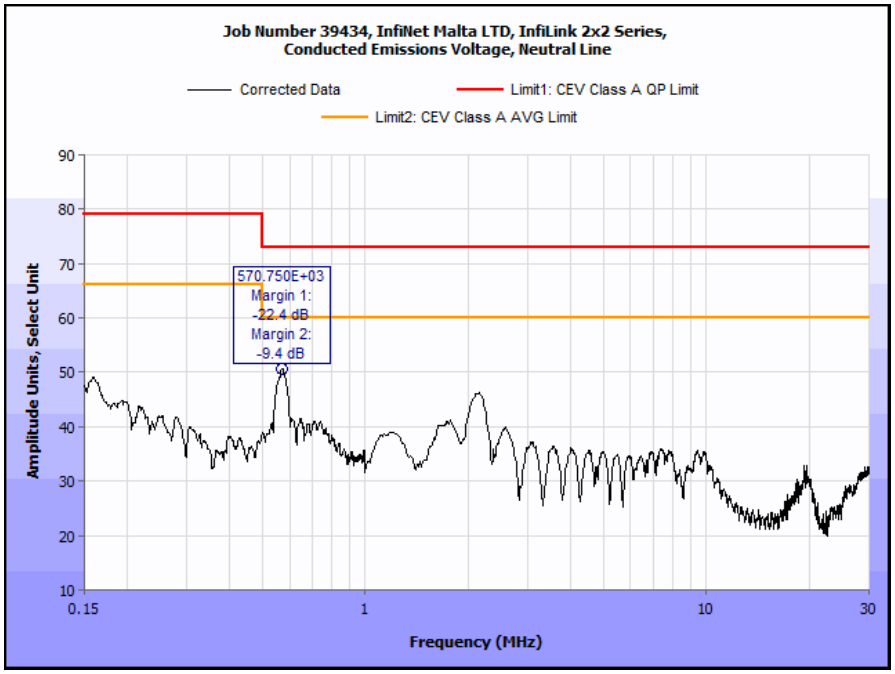


Plot 1. Conducted Emission, Phase Line Plot

Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)

Frequency (MHz)	Uncorrected Meter Reading (dBµV) QP	Cable Loss (dB)	Corrected Measurement (dBµV) QP	Limit (dBµV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBµV) Avg.	Cable Loss (dB)	Corrected Measurement (dBµV) AVG	Limit (dBµV) AVG	Margin (dB) AVG
0.153	44.26	0	44.26	79	-34.74	39.55	0	39.55	66	-26.45
0.57	40.89	0	40.89	73	-32.11	31.58	0	31.58	60	-28.42
2.133	44.5	0	44.5	73	-28.5	31.84	0	31.84	60	-28.16
9.85	31.65	0.17	31.82	73	-41.18	25.48	0.17	25.65	60	-34.35
19.83	34.62	0	34.62	73	-38.38	27.52	0	27.52	60	-32.48
28.38	31.44	0.17	31.61	73	-41.39	22.94	0.17	23.11	60	-36.89

Table 7. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)



Plot 2. Conducted Emission, Neutral Line Plot

Conducted Emission Limits Test Setup

Photograph 2. Conducted Emissions, Test Setup

Radiated Emission Limits

§ 15.109 Radiated Emissions Limits

Test Requirement(s): **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in Table 8.

15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 8.

Frequency (MHz)	Field Strength (dBµV/m)	
	§15.109 (b), Class A Limit (dBµV) @ 10m	§15.109 (a),Class B Limit (dBµV) @ 3m
30 - 88	39.00	40.00
88 - 216	43.50	43.50
216 - 960	46.40	46.00
Above 960	49.50	54.00

Table 8. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)

Test Procedures: The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

Test Results: The EUT was compliant with the Class A requirement(s) of this section. Measured emissions were below applicable limits.

Test Engineer(s): Surinder Singh

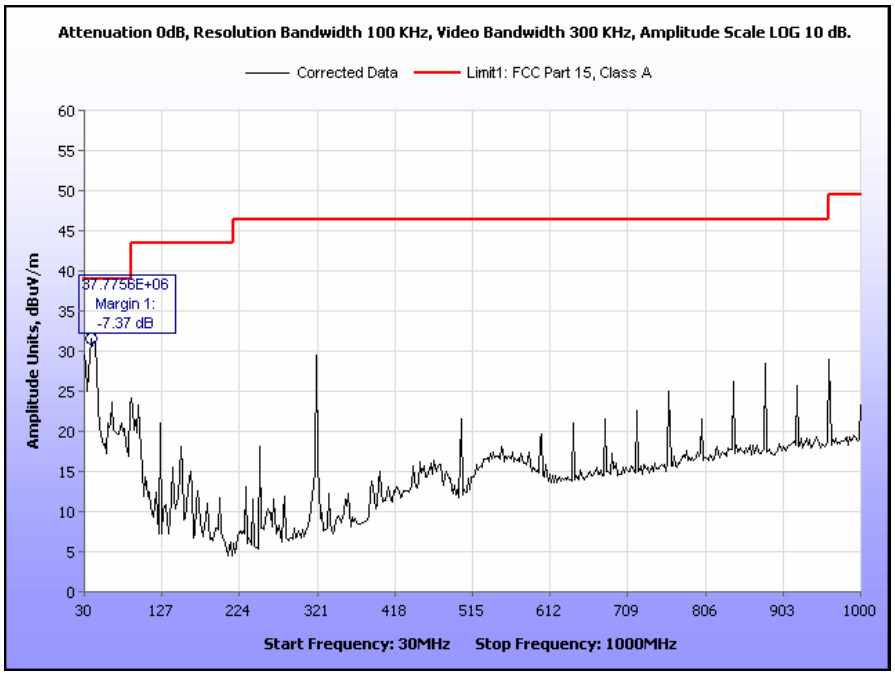
Test Date(s): 09/28/13

Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBµV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
42.313627	31	H	1.18		12.58	0.43	10.46	2.55	39.00	-36.45
42.313627	327	V	1.07	16.17	12.58	0.43	10.46	18.72	39.00	-20.28
127.26	168	H	1.10	5.18	13.90	0.91	10.46	9.53	43.50	-33.97
127.26	25	V	1.10	5.26	13.90	0.91	10.46	9.61	43.50	-33.89
320.00478	49	H	1.11	15.11	14.60	1.30	10.46	20.55	46.40	-25.85
320.00478	167	V	1.09	21.45	14.60	1.30	10.46	26.89	46.40	-19.51
508.60421	215	H	1.06	5.34	18.17	1.88	10.46	14.93	46.40	-31.47
508.60421	135	V	1.08	5.42	18.17	1.88	10.46	15.01	46.40	-31.39
870.264	85	H	1.15	6.59	22.60	2.50	10.46	21.23	46.40	-25.17
870.264	300	V	1.07	7.58	22.60	2.50	10.46	22.22	46.40	-24.18
942.15	42	H	1.11	5.72	23.34	2.84	10.46	21.44	46.40	-24.96
942.15	138	V	1.06	5.96	23.34	2.84	10.46	21.68	46.40	-24.72

Table 9. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz, FCC Limits

Note: The EUT was tested at 3 m.



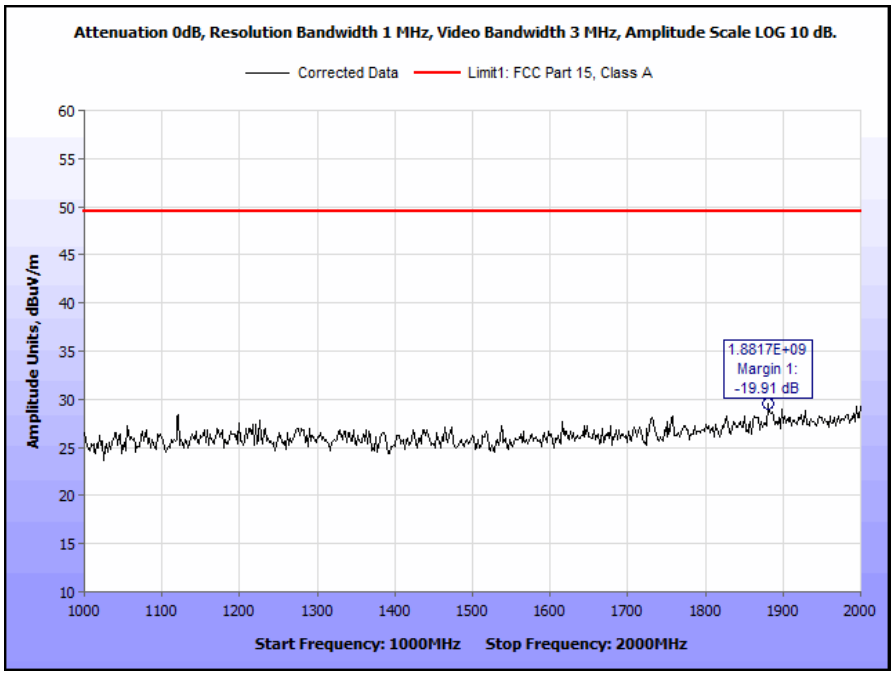
Plot 3. Radiated Emissions, 30 MHz - 1 GHz, FCC Limits

Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBµV)	Antenna Correction Factor (dB) (+)	System Gain (dB) (-)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1.00039	15	H	1.08	9.56	24.31	5.86	-10.45	29.28	49.5	-20.22
1.00039	243	V	1.03	10.45	24.34	5.87	-10.45	30.21	49.5	-19.29
1.233	67	H	1.12	8.335	25.57	6.05	-10.45	29.50	49.5	-20.00
1.233	218	V	1.15	8.335	25.71	6.09	-10.45	29.69	49.5	-19.81
1.427	93	H	1.02	8.485	25.62	7.48	-10.45	31.13	49.5	-18.37
1.427	18	V	1.09	8.478	25.77	7.50	-10.45	31.29	49.5	-18.21
1.619	148	H	1.05	7.567	26.09	8.05	-10.45	31.26	49.5	-18.24
1.619	290	V	1.05	7.673	26.19	8.18	-10.45	31.60	49.5	-17.90
1.834	356	H	1.08	7.225	27.46	7.83	-10.45	32.07	49.5	-17.44
1.834	7	V	1.05	8.382	27.50	7.85	-10.45	33.28	49.5	-16.22
1.984	94	H	1.12	6.378	28.13	8.24	-10.45	32.30	49.5	-17.20
1.984	325	V	1.12	7.249	28.02	8.26	-10.45	33.08	49.5	-16.42

Table 10. Radiated Emissions Limits, Test Results, Above 1 GHz, FCC Limits

Note: The EUT was tested at 3 m.



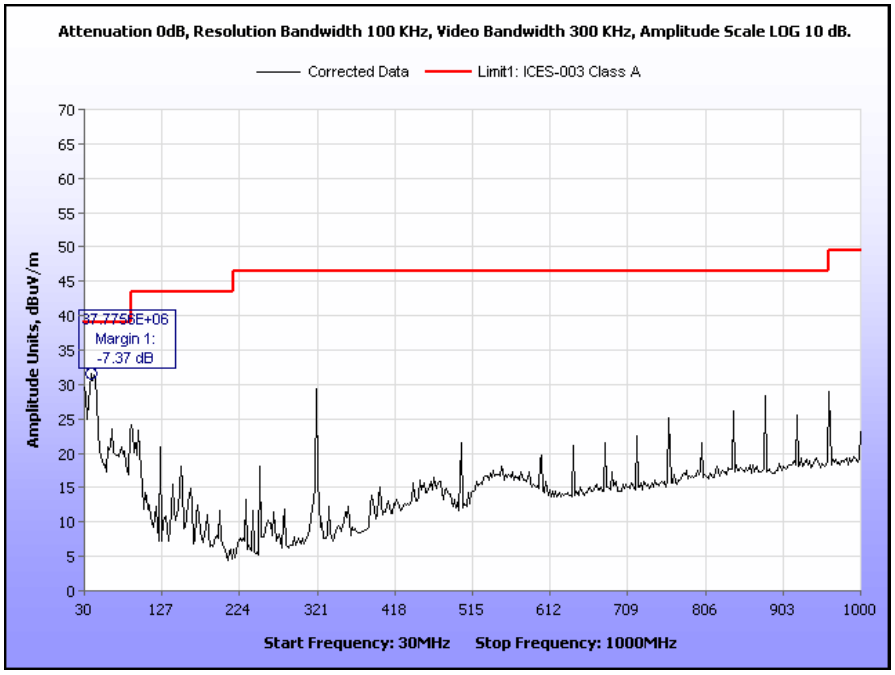
Plot 4. Radiated Emissions, Above 1 GHz, FCC Limits

Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBµV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
42.31363	31	H	1.18	13.45	12.58	0.43	10.46	16.00	39	-23.00
42.31363	327	V	1.0682	16.17	12.58	0.43	10.46	18.72	39	-20.28
127.26	168	H	1.1008	5.18	13.90	0.91	10.46	9.53	43.5	-33.97
127.26	25	V	1.1008	5.26	13.90	0.91	10.46	9.61	43.5	-33.89
320.0048	49	H	1.1052	15.11	14.60	1.30	10.46	20.55	46.4	-25.85
320.0048	167	V	1.0856	21.45	14.60	1.30	10.46	26.89	46.4	-19.51
508.6042	215	H	1.0608	5.34	18.17	1.88	10.46	14.93	46.4	-31.47
508.6042	135	V	1.083	5.42	18.17	1.88	10.46	15.01	46.4	-31.39
870.264	85	H	1.1495	6.59	22.60	2.50	10.46	21.23	46.4	-25.17
870.264	300	V	1.0704	7.58	22.60	2.50	10.46	22.22	46.4	-24.18
942.15	42	H	1.1134	5.72	23.34	2.84	10.46	21.44	46.4	-24.96
942.15	138	V	1.0647	5.96	23.34	2.84	10.46	21.68	46.4	-24.72

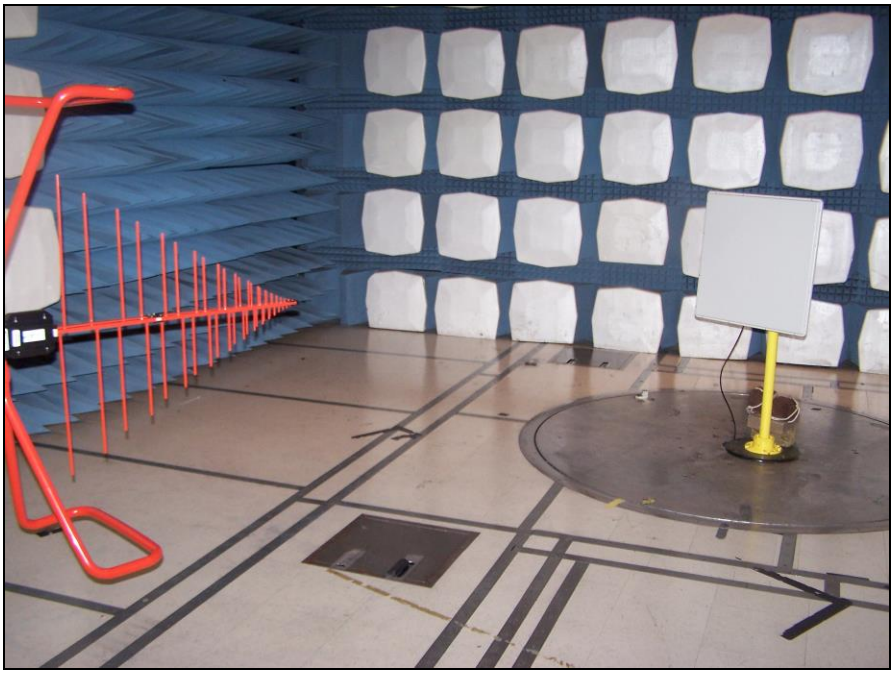
Table 11. Radiated Emissions Limits, Test Results, 30 MHz – 1 GHz, ICES-003 Limits

Note: The EUT was tested at 3 m.

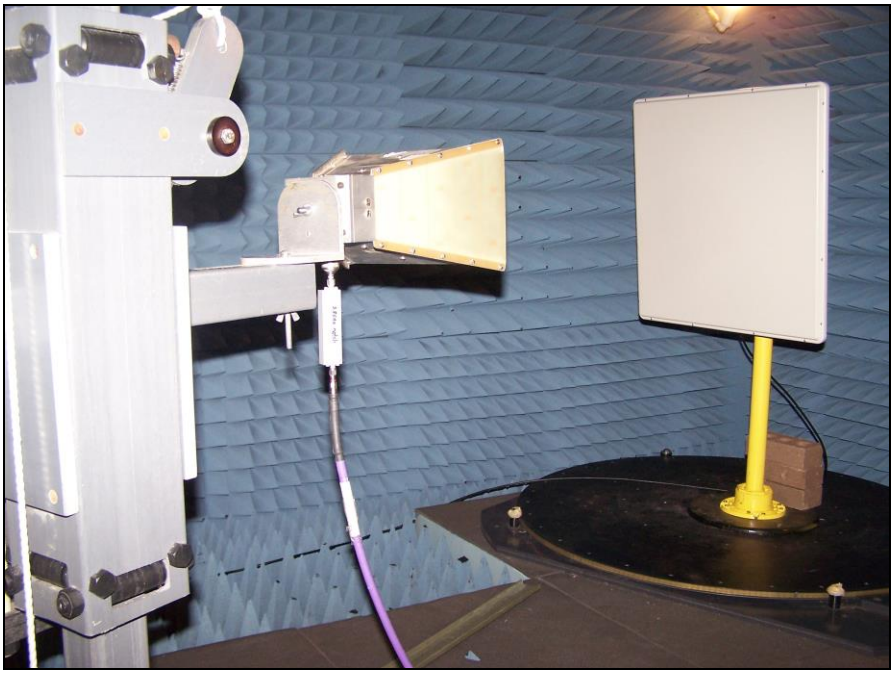


Plot 5. Radiated Emissions, 30 MHz – 1 GHz, ICES-003 Limits

Radiated Emissions Limits Test Setup



Photograph 3. Radiated Emissions, Test Setup, 30 MHz – 1 GHz



Photograph 4. Radiated Emissions, Test Setup, 1 GHz – 2 GHz

IV. 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. The EUT antenna will be installed professionally.

Test Engineer(s): Surinder Singh

Test Date(s): 10/02/13

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207(a) Conducted Emissions Limits

Test Requirement(s): **§ 15.207 (a):** For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Σ line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBμV)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 12. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

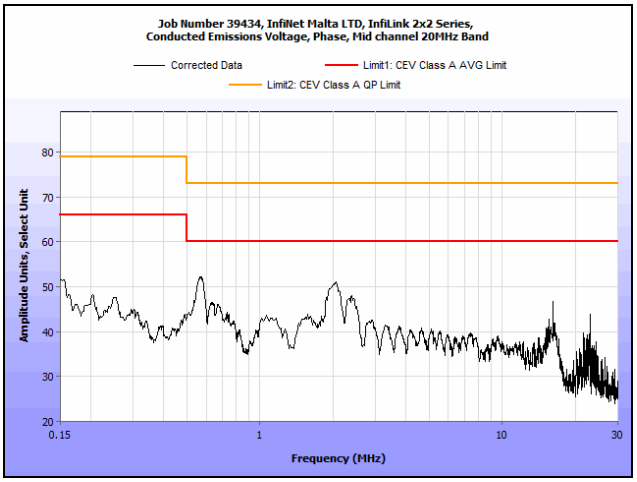
Test Procedure: The EUT was placed on a 0.8 m-high wooden table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-2003 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to an EMC/field intensity meter. For the purpose of this testing, the transmitter was turned on. Scans were performed with the transmitter on.

Test Results: The EUT was compliant with this requirement.

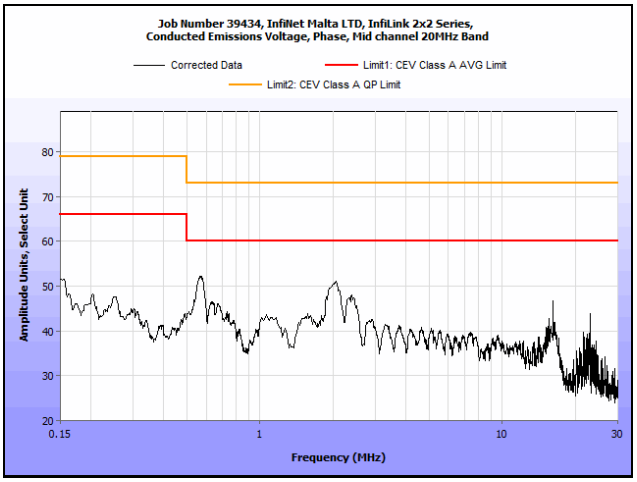
Test Engineer(s): Surinder Singh

Test Date(s): 10/02/13

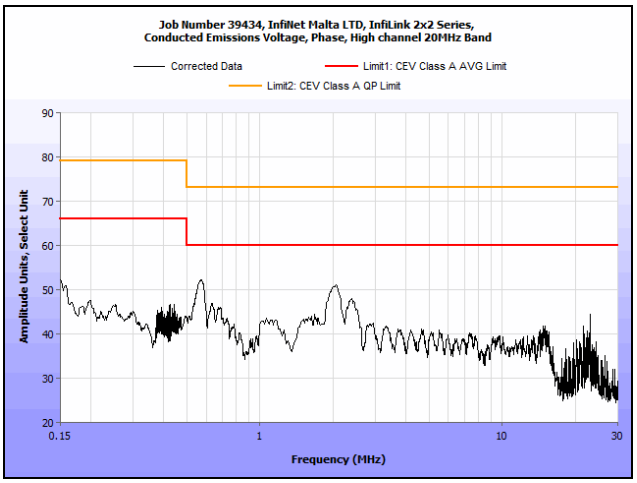
15.207(a) Conducted Emissions Test Results



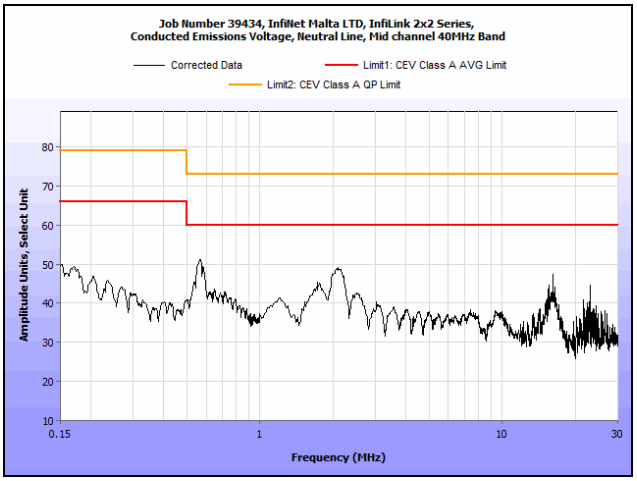
Plot 6. Conducted Emissions, 15.207(a), Phase Line, Low Channel, 20 MHz



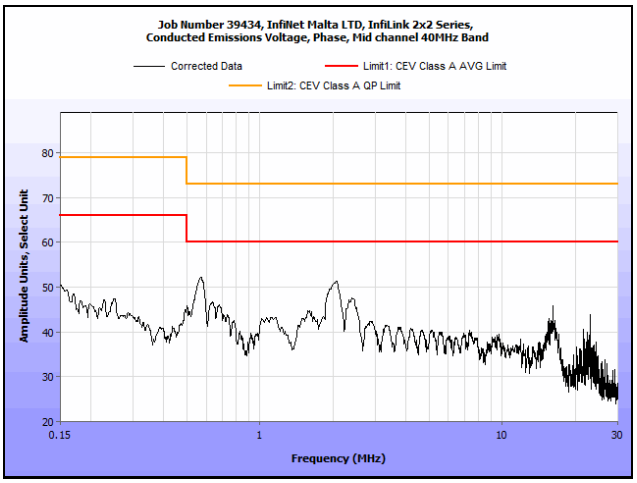
Plot 7. Conducted Emissions, 15.207(a), Phase Line, Mid Channel, 20 MHz



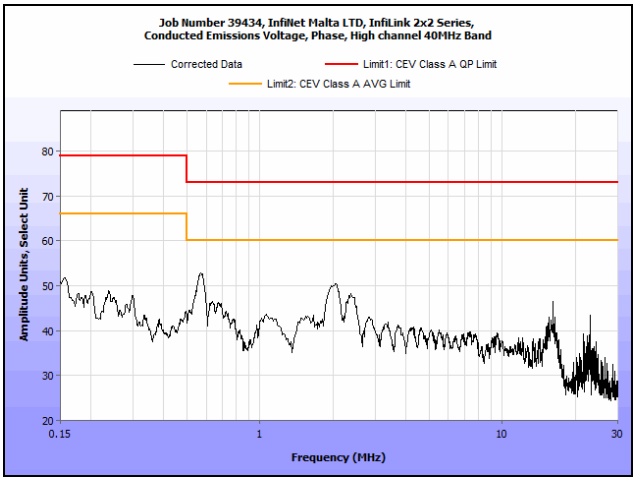
Plot 8. Conducted Emissions, 15.207(a), Phase Line, High Channel, 20 MHz



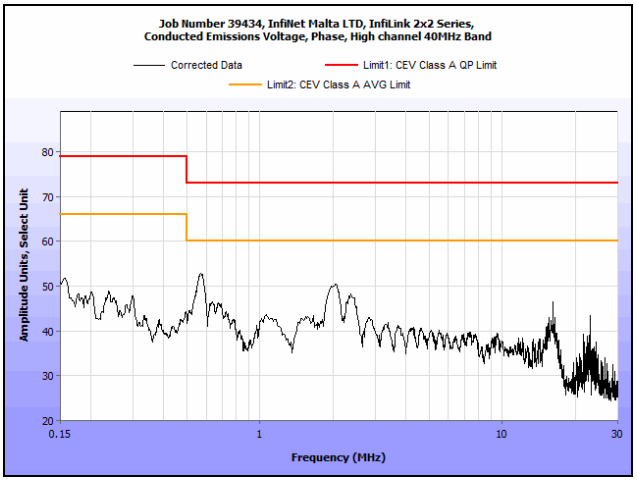
Plot 9. Conducted Emissions, 15.207(a), Phase Line, Low Channel, 40 MHz



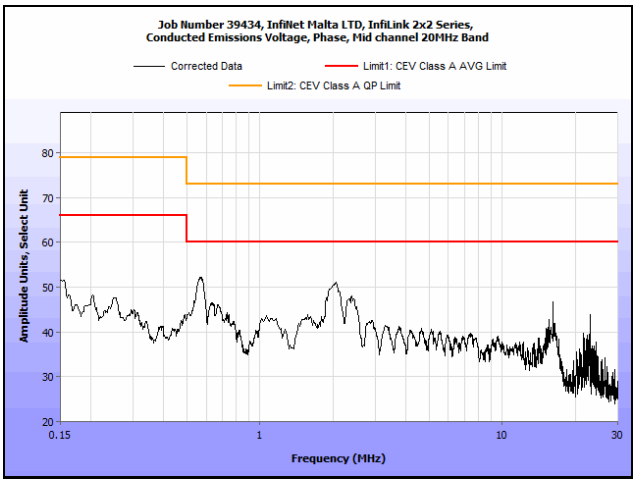
Plot 10. Conducted Emissions, 15.207(a), Phase Line, Mid Channel, 40 MHz



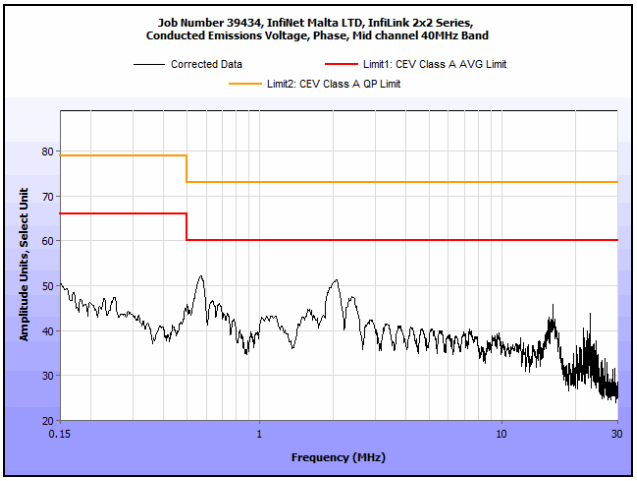
Plot 11. Conducted Emissions, 15.207(a), Phase Line, High Channel, 40 MHz



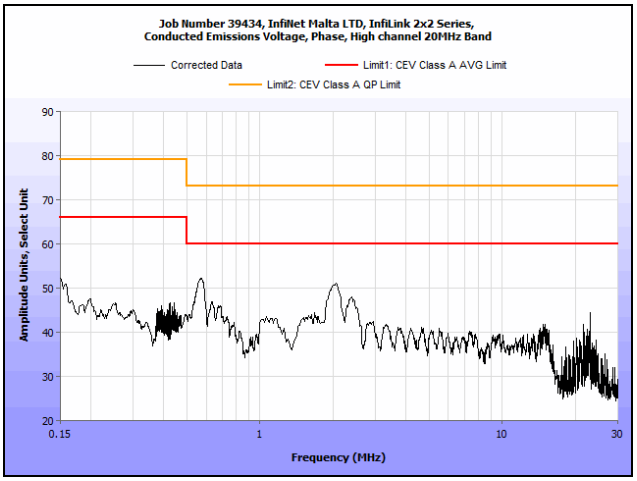
Plot 12. Conducted Emissions, 15.207(a), Neutral Line, Low Channel, 20 MHz



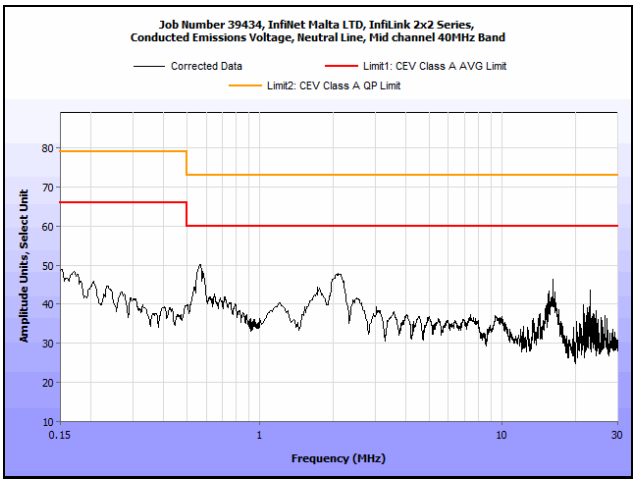
Plot 13. Conducted Emissions, 15.207(a), Neutral Line, Mid Channel, 20 MHz



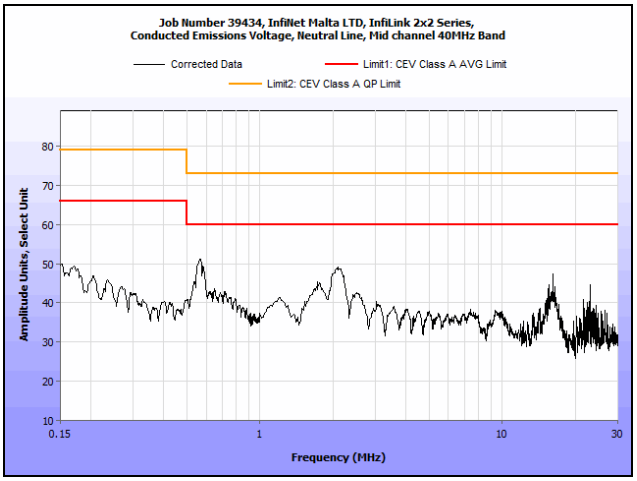
Plot 14. Conducted Emissions, 15.207(a), Neutral Line, High Channel, 20 MHz



Plot 15. Conducted Emissions, 15.207(a), Neutral Line, Low Channel, 40 MHz



Plot 16. Conducted Emissions, 15.207(a), Neutral Line, Mid Channel, 40 MHz



Plot 17. Conducted Emissions, 15.207(a), Neutral Line, High Channel, 40 MHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a)(2) 6 dB and 99% Bandwidth

Test Requirements: **§ 15.247(a)(2):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Procedure: The transmitter was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately 1% of the total emission bandwidth, VBW > RBW. The 6 dB Bandwidth was measured and recorded. The measurements were performed on the low, mid and high channels.

Test Results The EUT was compliant with § 15.247 (a)(2).

The 6 dB and 99% Bandwidth was determined from the plots on the following pages.

Test Engineer(s): Surinder Singh

Test Date(s): 09/17/13

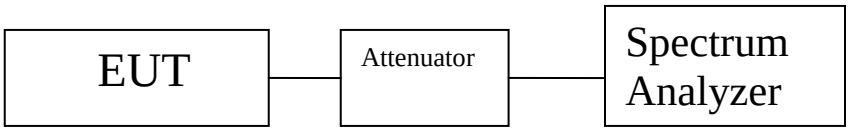


Figure 2. Block Diagram, Occupied Bandwidth Test Setup

Occupied Bandwidth Test Results

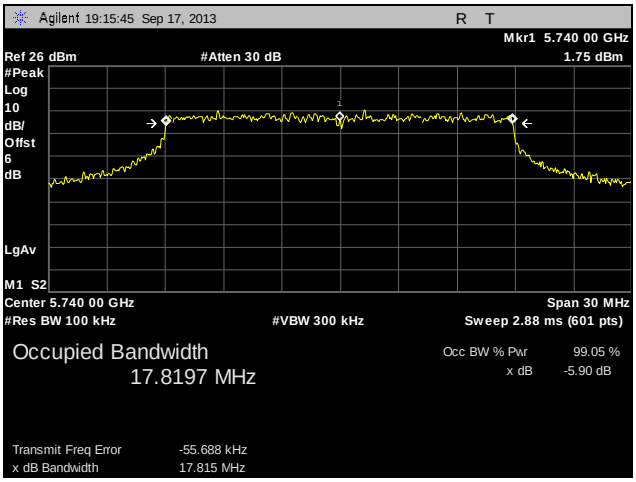
Occupied Bandwidth			
	Carrier Channel	**Frequency (MHz)**	**Measured 6 dB Bandwidth (MHz)**
20 MHz Port 1	Low	5740	17.819
	Mid	5780	17.783
	High	5840	17.804
20 MHz Port 2	Low	5740	17.798
	Mid	5780	17.802
	High	5840	17.797
40 MHz Port 1	Low	5750	36.184
	Mid	5790	36.184
	High	5830	36.186
40 MHz Port 2	Low	5750	36.172
	Mid	5790	36.203
	High	5830	36.176

Table 13. 6 dB Occupied Bandwidth, Test Results

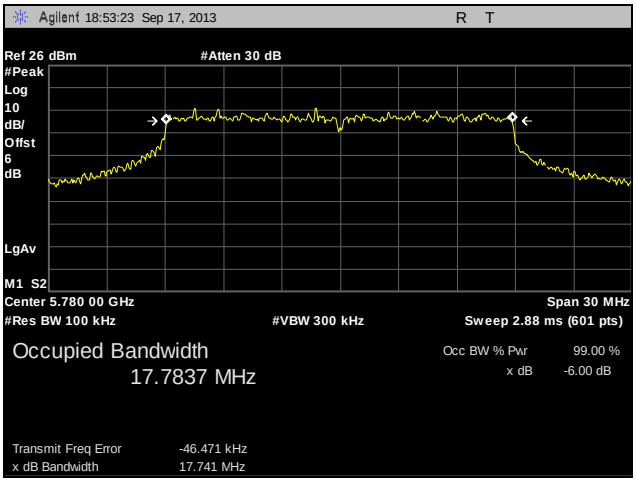
Occupied Bandwidth			
	Carrier Channel	**Frequency (MHz)**	**Measured 99% Bandwidth (MHz)**
20 MHz Port 1	Low	5740	17.698
	Mid	5780	17.793
	High	5840	17.783
20 MHz Port 2	Low	5740	17.667
	Mid	5780	17.799
	High	5840	17.735
40 MHz Port 1	Low	5750	36.294
	Mid	5790	36.315
	High	5830	36.281
40 MHz Port 2	Low	5750	36.158
	Mid	5790	36.202
	High	5830	36.127

Table 14. 99% Occupied Bandwidth, Test Results

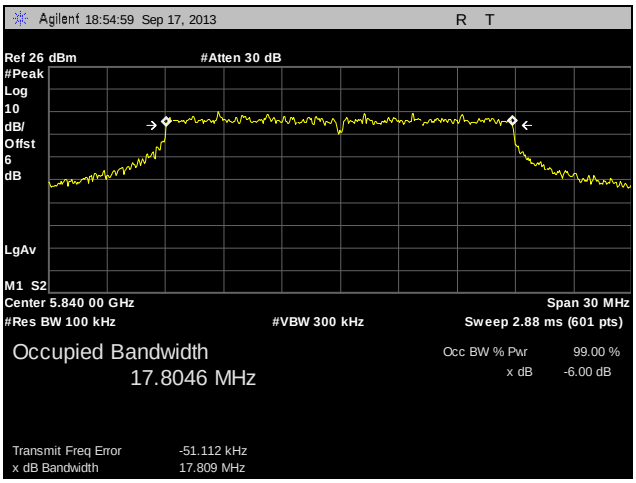
6 dB Occupied Bandwidth Test Results



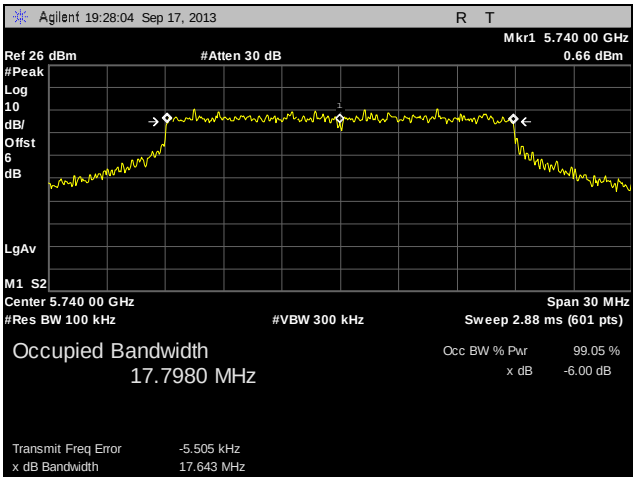
Plot 18. 6 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 1



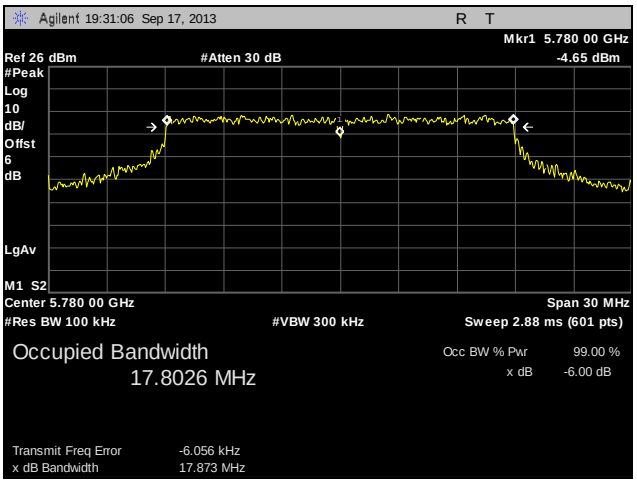
Plot 19. 6 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 1



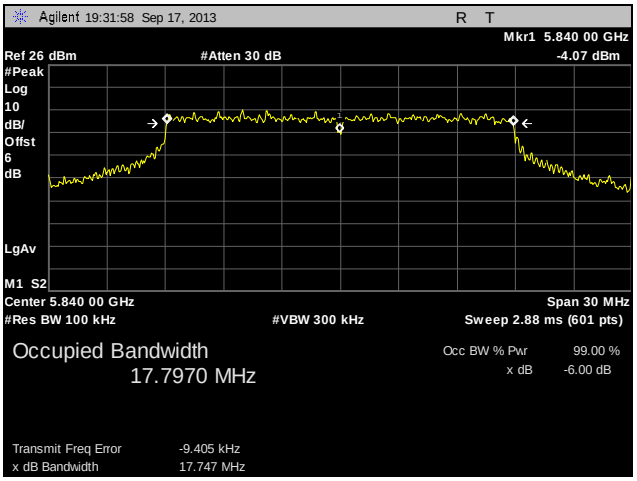
Plot 20. 6 dB Occupied Bandwidth, High Channel, 20 MHz, Port 1



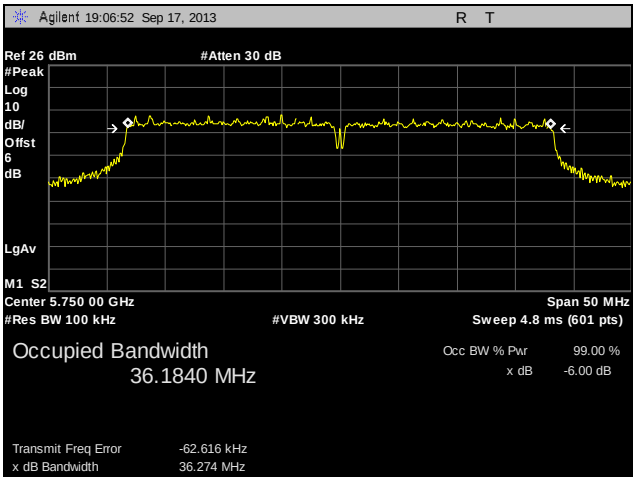
Plot 21. 6 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 2



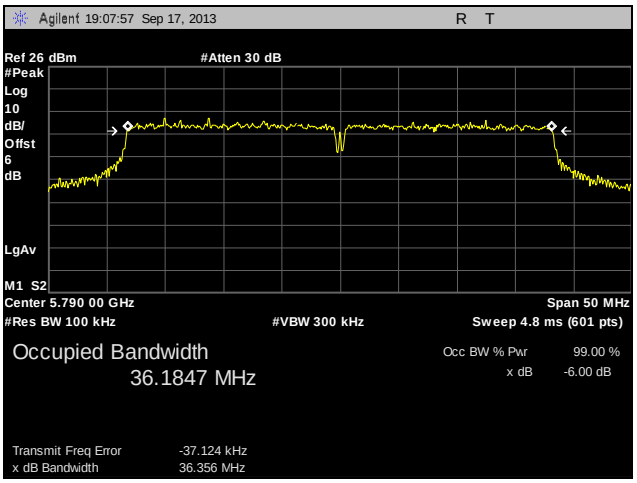
Plot 22. 6 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 2



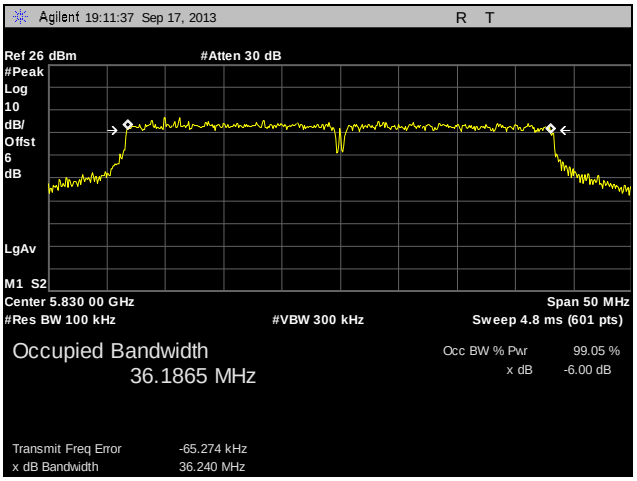
Plot 23. 6 dB Occupied Bandwidth, High Channel, 20 MHz, Port 2



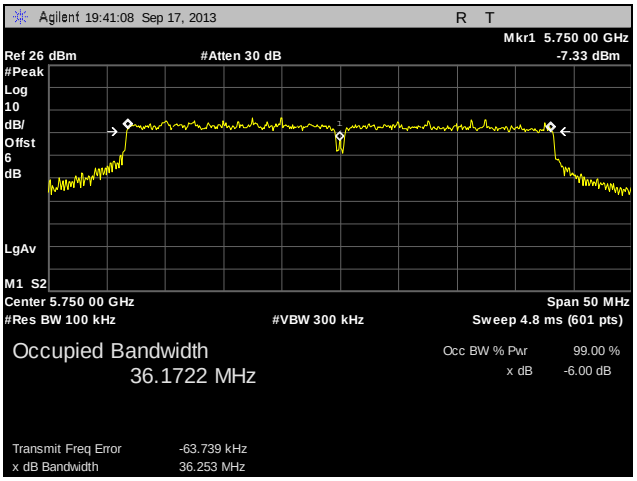
Plot 24. 6 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 1



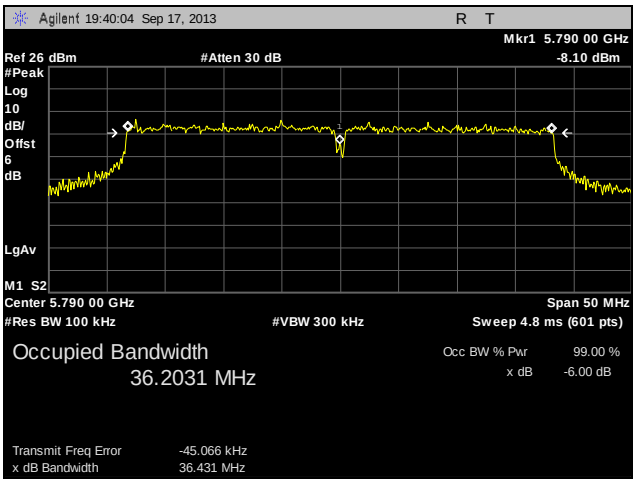
Plot 25. 6 dB Occupied Bandwidth, Mid Channel, 40 MHz, Port 1



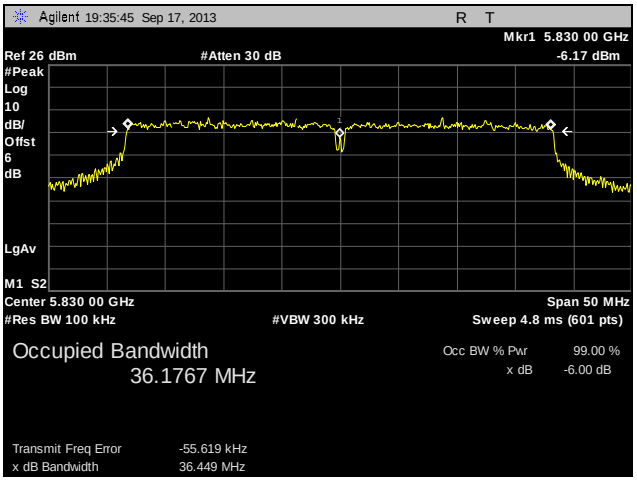
Plot 26. 6 dB Occupied Bandwidth, High Channel, 40 MHz, Port 1



Plot 27. 6 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 2

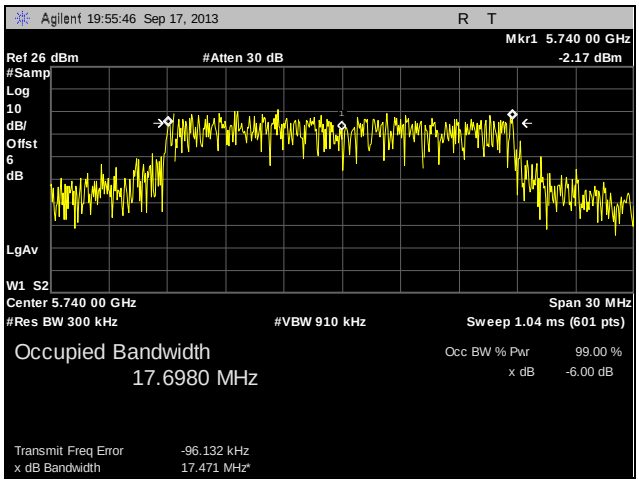


Plot 28. 6 dB Occupied Bandwidth, Mid Channel, 40 MHz, Port 2

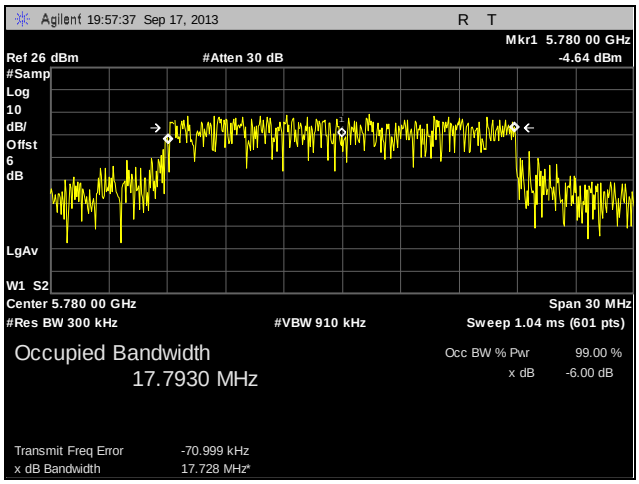


Plot 29. 6 dB Occupied Bandwidth, High Channel, 40 MHz, Port 2

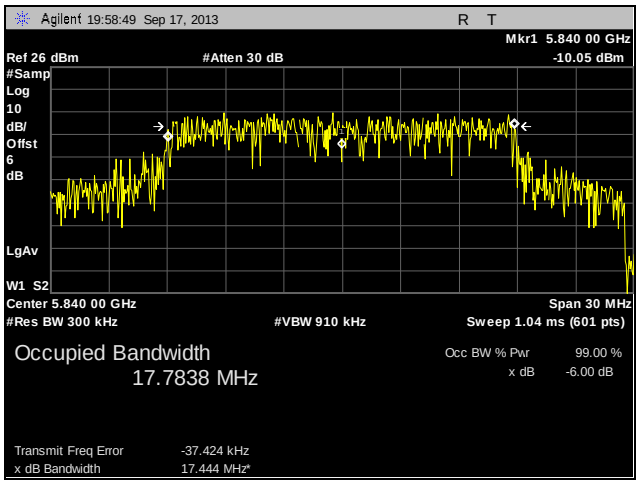
99% Occupied Bandwidth Test Results



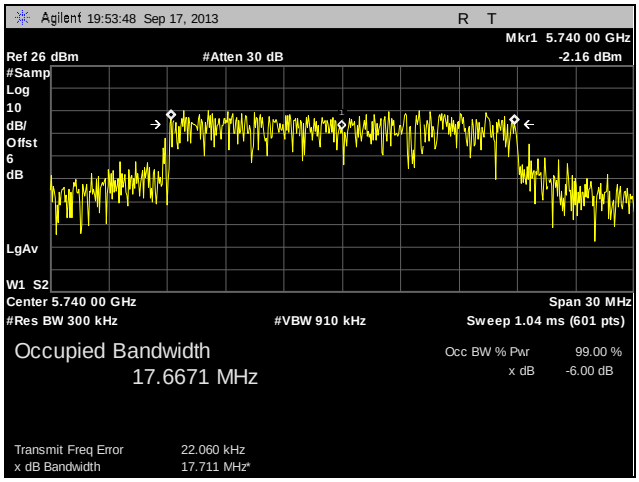
Plot 30. 99% Occupied Bandwidth, Low Channel, 20 MHz, Port 1



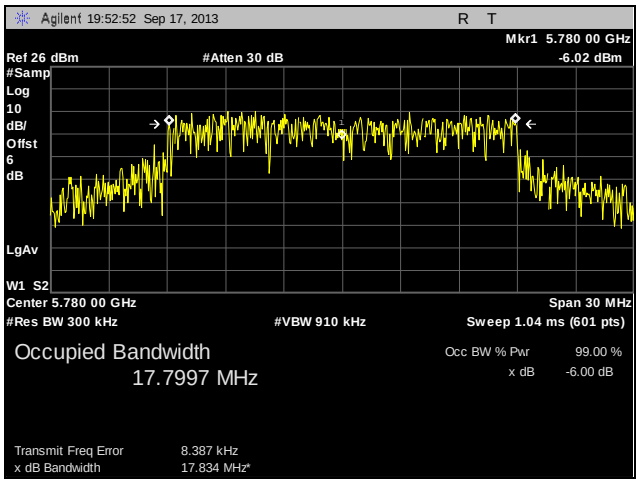
Plot 31. 99% Occupied Bandwidth, Mid Channel, 20 MHz, Port 1



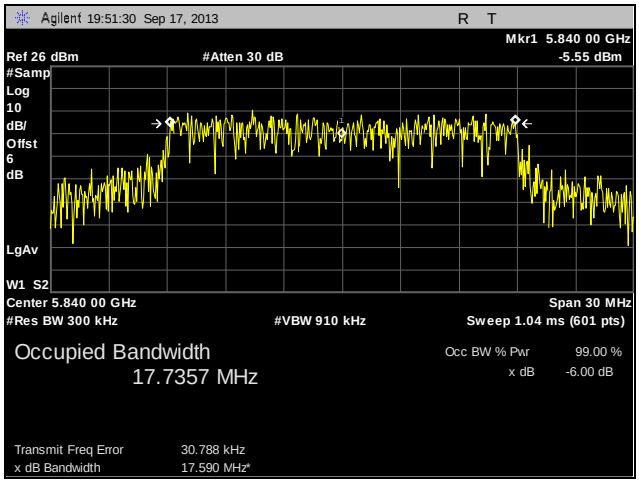
Plot 32. 99% Occupied Bandwidth, High Channel, 20 MHz, Port 1



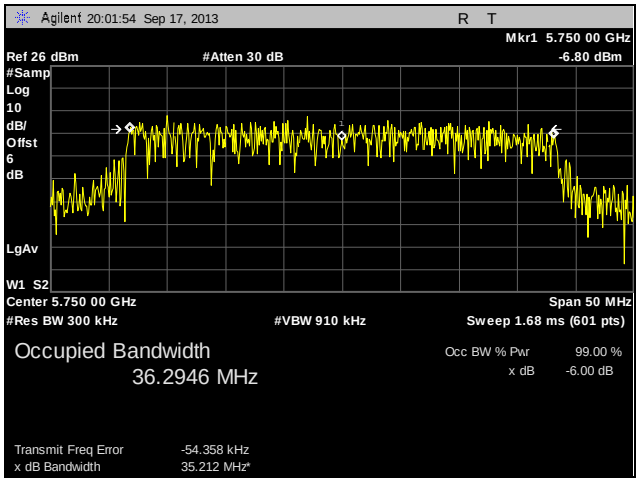
Plot 33. 99% Occupied Bandwidth, Low Channel, 20 MHz, Port 2



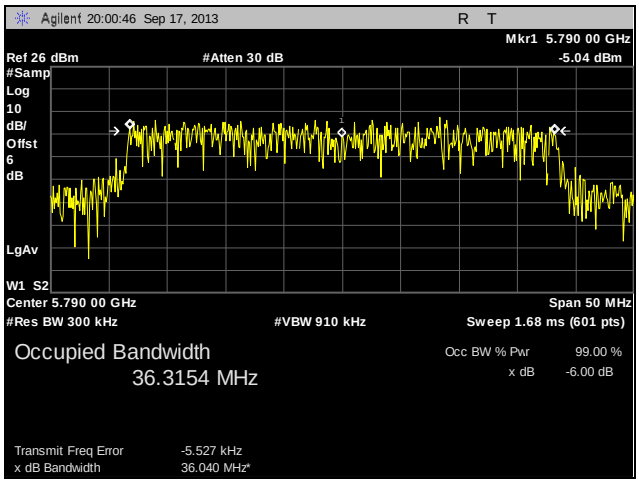
Plot 34. 99% Occupied Bandwidth, Mid Channel, 20 MHz, Port 2



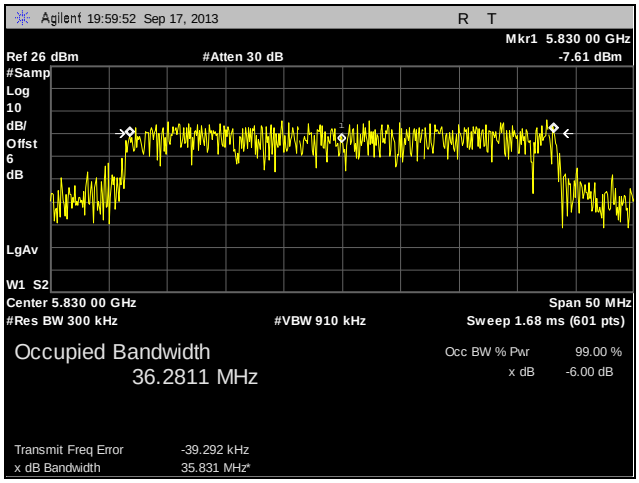
Plot 35. 99% Occupied Bandwidth, High Channel, 20 MHz, Port 2



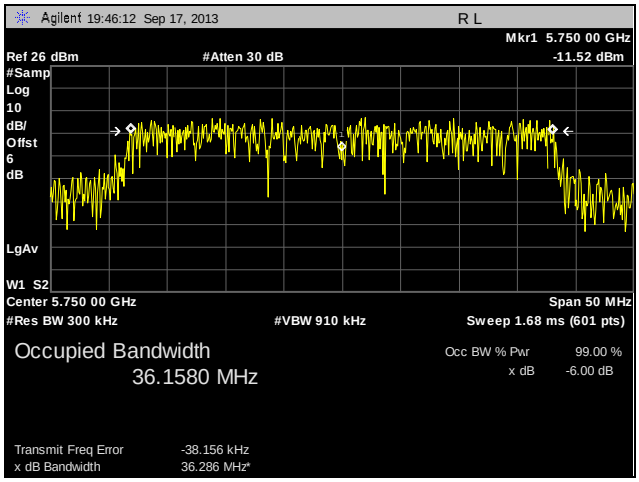
Plot 36. 99% Occupied Bandwidth, Low Channel, 40 MHz, Port 1



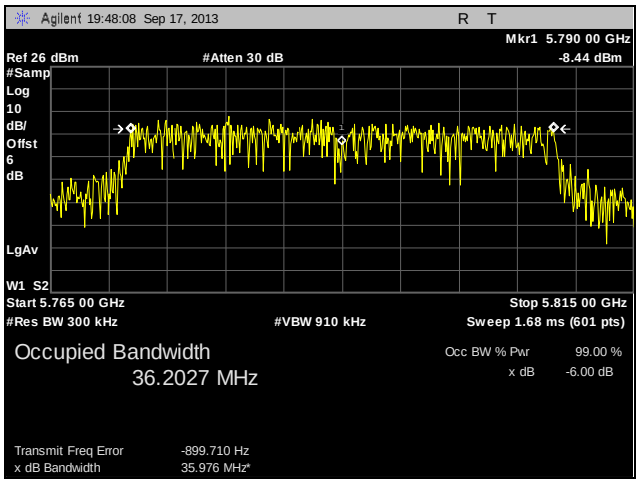
Plot 37. 99% Occupied Bandwidth, Mid Channel, 40 MHz, Port 1



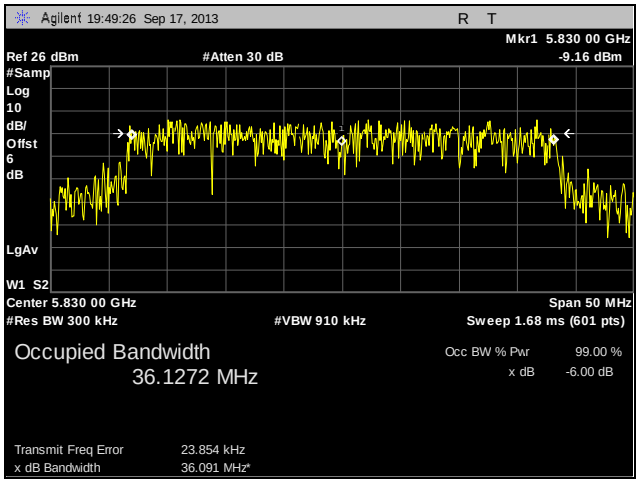
Plot 38. 99% Occupied Bandwidth, High Channel, 40 MHz, Port 1



Plot 39. 99% Occupied Bandwidth, Low Channel, 40 MHz, Port 2



Plot 40. 99% Occupied Bandwidth, Mid Channel, 40 MHz, Port 2



Plot 41. 99% Occupied Bandwidth, High Channel, 40 MHz, Port 2

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output

Test Requirements: **§15.247(b):** The maximum peak output power of the intentional radiator shall not exceed the following:

Digital Transmission Systems (MHz)	Output Limit (Watts)
902-928	1.000
2400–2483.5	1.000
5725– 5850	1.000

Table 15. Output Power Requirements from §15.247(b)

§15.247(b)(4): The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Procedure: The transmitter was connected to a calibrated spectrum analyzer. The EUT was measured at the low, mid and high channels of each band at the maximum power level.

Test Results: The EUT was compliant with the Peak Power Output limits of **§15.247(b)**.

Test Engineer(s): Surinder Singh

Test Date(s): 10/07/13

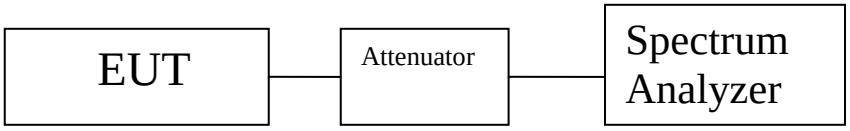


Figure 3. Peak Power Output Test Setup

Point to Point Application

Peak Power Output Test Results

Peak Conducted Output Power							
Chanel Carrier	Frequency GHz	Measured Peak Output Power (dBm)/20MHz Port 1	Measured Peak Output Power (dBm)/20MHz Port 2	Total Output Power (dBm)	Antenna Gain dBi	Power Limit (dBm)	Margin dB
Low	5.74	10.26	11.23	13.78233	16	30	-16.21767
Mid	5.78	10.63	10.35	13.50256	16	30	-16.49744
High	5.845	10.26	11.23	13.78233	16	30	-16.21767
Low	5.74	8.25	10.11	12.28912	19	30	-17.71088
Mid	5.78	8.68	8.35	11.52843	19	30	-18.47157
High	5.84	8.1	7.56	10.84869	19	30	-19.15131
Low	5.74	8.25	10.11	12.28912	21	30	-17.71088
Mid	5.78	8.68	8.35	11.52843	21	30	-18.47157
High	5.84	8.1	7.56	10.84869	21	30	-19.15131
Low	5.74	8.25	10.11	12.28912	23	30	-17.71088
Mid	5.78	8.68	8.35	11.52843	23	30	-18.47157
High	5.84	8.1	7.56	10.84869	23	30	-19.15131
Low	5.74	8.25	10.11	12.28912	28	30	-17.71088
Mid	5.78	8.68	8.35	11.52843	28	30	-18.47157
High	5.84	8.1	7.56	10.84869	28	30	-19.15131

Table 16. Maximum Conducted Output Power, Test Results, Point to Point, 20 MHz

Peak Conducted Output Power							
Chanel Carrier	Frequency GHz	Measured Peak Output Power (dBm)/40MHz Port 1	Measured Peak Output Power (dBm)/40MHz Port 2	Total Output Power (dBm)	Antenna Gain dBi	Power Limit (dBm)	Margin dB
Low	5.75	11.2	11.54	14.38363	16	30	-15.61637
Mid	5.79	11.43	11.1	14.27843	16	30	-15.72157
High	5.83	11.2	11.36	14.29104	16	30	-15.70896
Low	5.75	9.57	9.65	12.62048	19	30	-17.37952
Mid	5.79	9.63	9.49	12.57086	19	30	-17.42914
High	5.83	9.35	9.38	12.37533	19	30	-17.62467
Low	5.75	9.57	9.65	12.62048	21	30	-17.37952
Mid	5.79	9.63	9.49	12.57086	21	30	-17.42914
High	5.83	9.35	9.38	12.37533	21	30	-17.62467
Low	5.75	9.57	9.65	12.62048	23	30	-17.37952
Mid	5.79	9.63	9.49	12.57086	23	30	-17.42914
High	5.83	9.35	9.38	12.37533	23	30	-17.62467
Low	5.75	9.57	9.65	12.62048	28	30	-17.37952
Mid	5.79	9.63	9.49	12.57086	28	30	-17.42914
High	5.83	9.35	9.38	12.37533	28	30	-17.62467

Table 17. Maximum Conducted Output Power, Test Results, Point to Point, 40 MHz

Point to Multi-Point Application

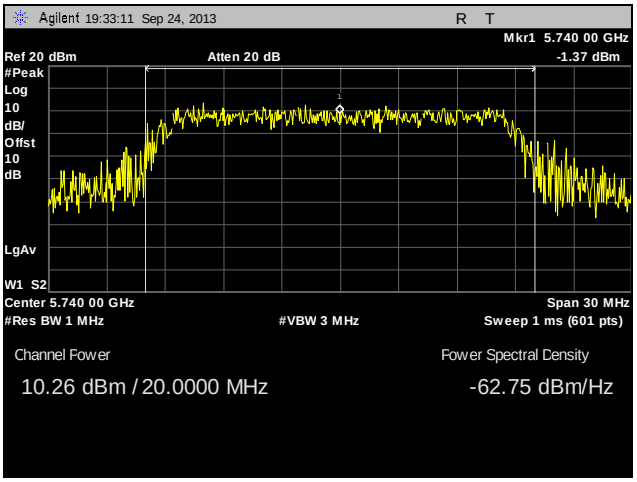
Peak Conducted Output Power							
Chanel Carrier	Frequency GHz	Measured Peak Output Power (dBm)/20MHz Port 1	Measured Peak Output Power (dBm)/20MHz Port 2	Total Output Power (dBm)	Antenna Gain dBi	Power Limit (dBm)	Margin dB
Low	5.74	10.26	11.23	13.78233	16	20	-6.21767
Mid	5.78	10.63	10.35	13.50256	16	20	-6.49744
High	5.845	10.26	11.23	13.78233	16	20	-6.21767
Low	5.74	8.25	10.11	12.28912	19	17	-4.71088
Mid	5.78	8.68	8.35	11.52843	19	17	-5.47157
High	5.84	8.1	7.56	10.84869	19	17	-6.15131
Low	5.74	8.25	10.11	12.28912	21	15	-2.71088
Mid	5.78	8.68	8.35	11.52843	21	15	-3.47157
High	5.84	8.1	7.56	10.84869	21	15	-4.15131
Low	5.74	8.25	10.11	12.28912	23	13	-0.71088
Mid	5.78	8.68	8.35	11.52843	23	13	-1.47157
High	5.84	8.1	7.56	10.84869	23	13	-2.15131
Low	5.74	3.16	4.54	6.914884	28	8	-1.08512
Mid	5.78	4.15	4.58	7.38062	28	8	-0.61938
High	5.84	3.36	2.95	6.170136	28	8	-1.82986

Table 18. Maximum Conducted Output Power, Test Results, Point to Multi-Point, 20 MHz

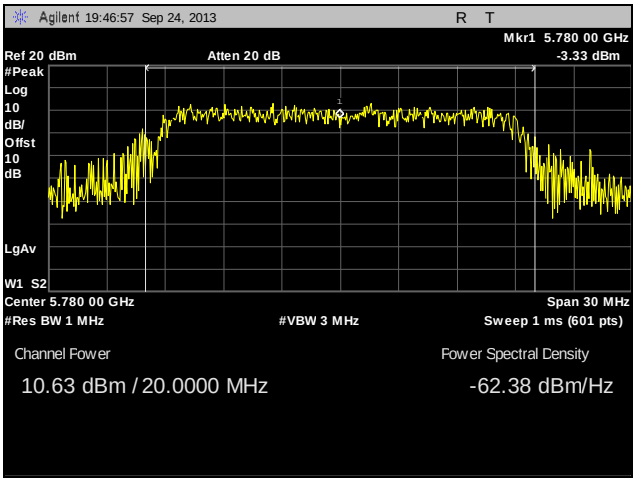
Peak Conducted Output Power							
Chanel Carrier	Frequency GHz	Measured Peak Output Power (dBm)/40MHz Port 1	Measured Peak Output Power (dBm)/40MHz Port 2	Total Output Power (dBm)	Antenna Gain dBi	Power Limit (dBm)	Margin dB
Low	5.75	11.2	11.54	14.38363	16	20	-5.61637
Mid	5.79	11.43	11.1	14.27843	16	20	-5.72157
High	5.83	11.2	11.36	14.29104	16	20	-5.70896
Low	5.75	9.57	9.65	12.62048	19	17	-4.37952
Mid	5.79	9.63	9.49	12.57086	19	17	-4.42914
High	5.83	9.35	9.38	12.37533	19	17	-4.62467
Low	5.75	9.57	9.65	12.62048	21	15	-2.37952
Mid	5.79	9.63	9.49	12.57086	21	15	-2.42914
High	5.83	9.35	9.38	12.37533	21	15	-2.62467
Low	5.75	9.57	9.65	12.62048	23	13	-0.37952
Mid	5.79	9.63	9.49	12.57086	23	13	-0.42914
High	5.83	9.35	9.38	12.37533	23	13	-0.62467
Low	5.75	3.63	3.24	6.449676	28	8	-1.55032
Mid	5.79	3.66	3.3	6.494029	28	8	-1.50597
High	5.83	3.57	3.52	6.555372	28	8	-1.44463

Table 19. Maximum Conducted Output Power, Test Results, Point to Multi-Point, 40 MHz

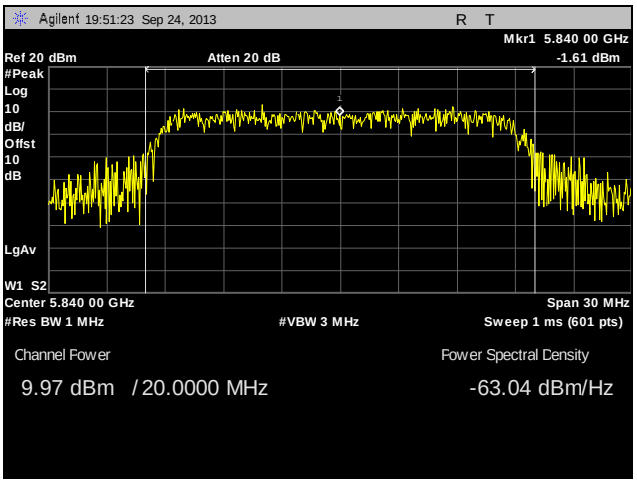
Peak Power Output Test Results, 20 MHz, Port 1, 16 dBi – Point to Multi-Point



Plot 42. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 1, 16 dBi

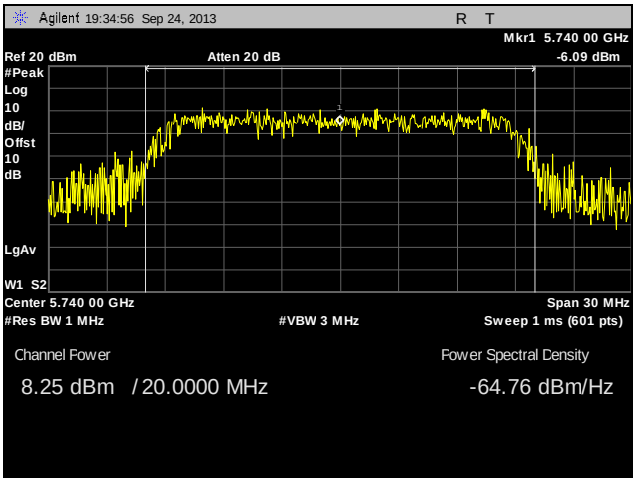


Plot 43. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 1, Port 1, 16 dBi

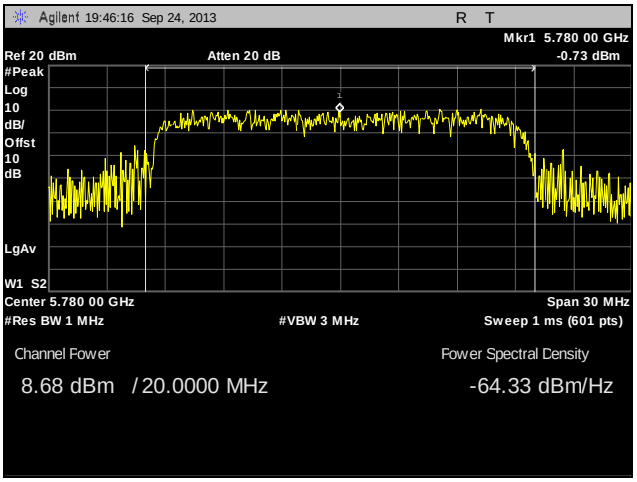


Plot 44. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 1, Port 1, 16 dBi

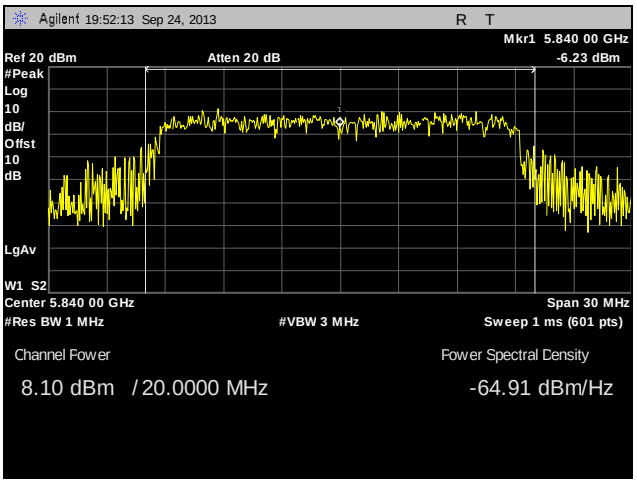
Peak Power Output Test Results, 20 MHz, Port 1, 19 dBi – Point to Multi-Point



Plot 45. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 1, 19 dBi

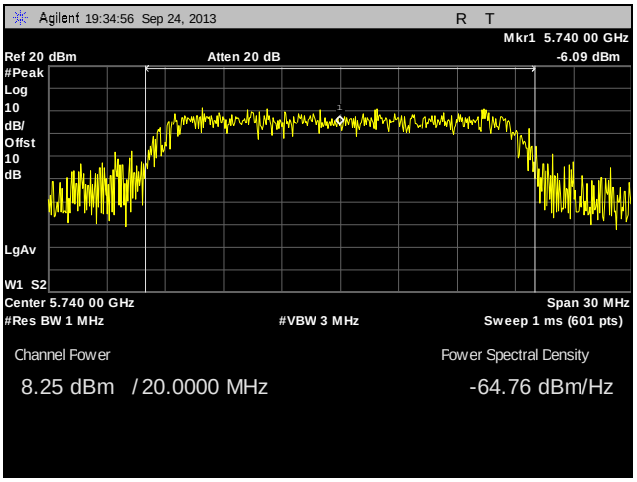


Plot 46. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 1, Port 1, 19 dBi

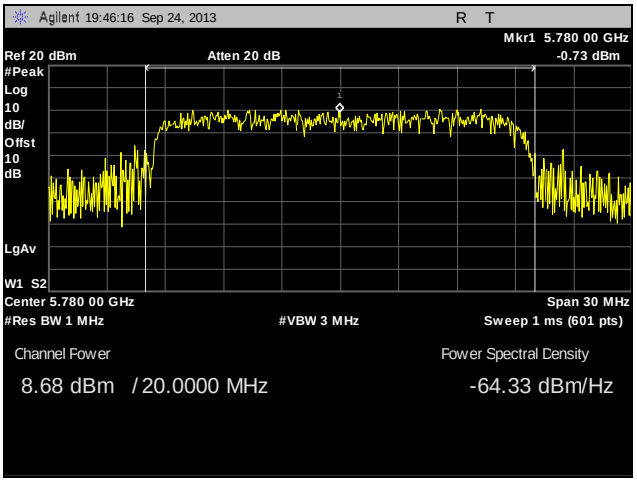


Plot 47. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 1, Port 1, 19 dBi

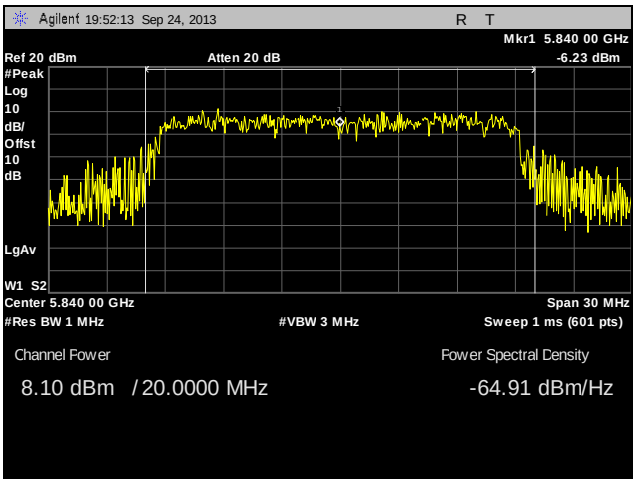
Peak Power Output Test Results, 20 MHz, Port 1, 21 dBi – Point to Multi-Point



Plot 48. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 1, 21 dBi

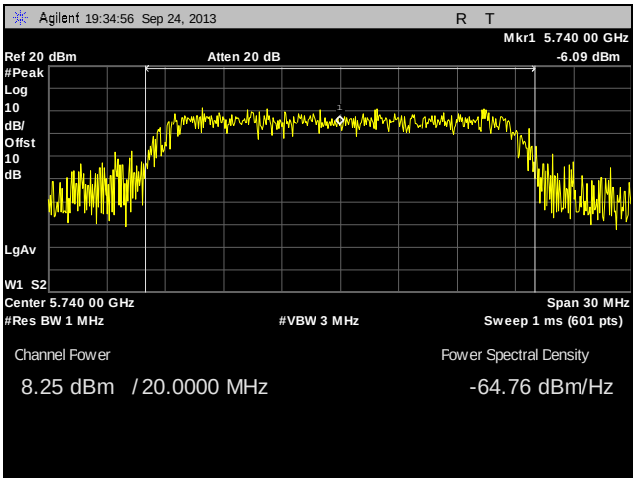


Plot 49. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 1, 21 dBi

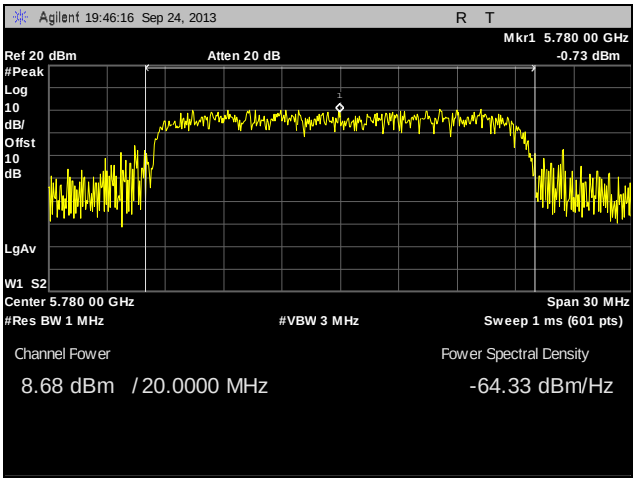


Plot 50. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 1, 21 dBi

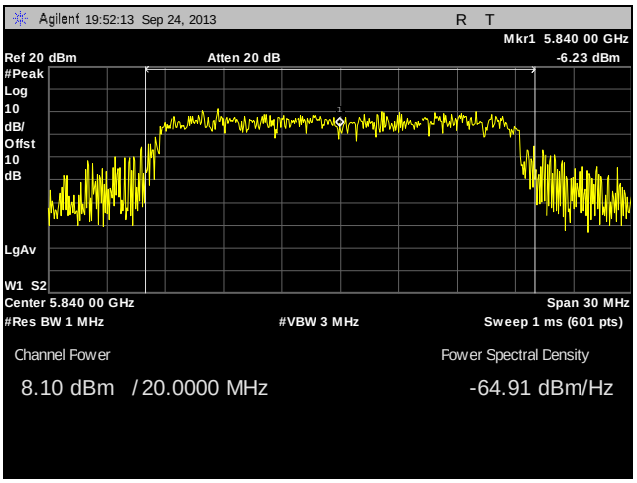
Peak Power Output Test Results, 20 MHz, Port 1, 23 dBi – Point to Multi-Point



Plot 51. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 1, 23 dBi

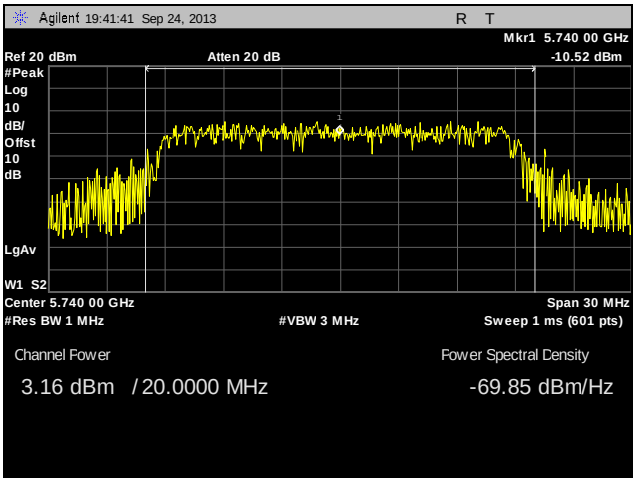


Plot 52. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 1, 23 dBi

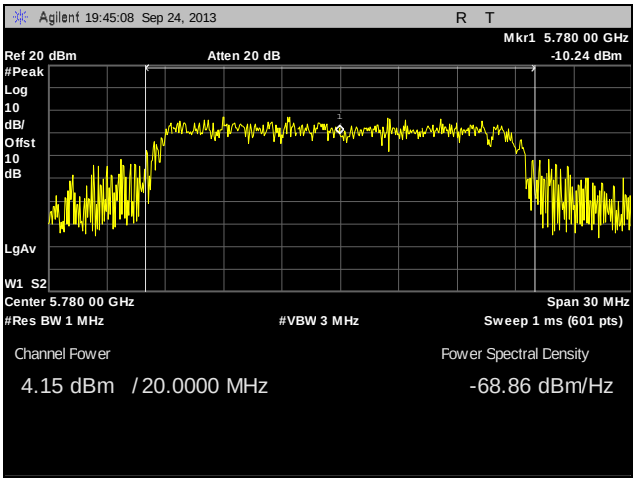


Plot 53. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 1, 23 dBi

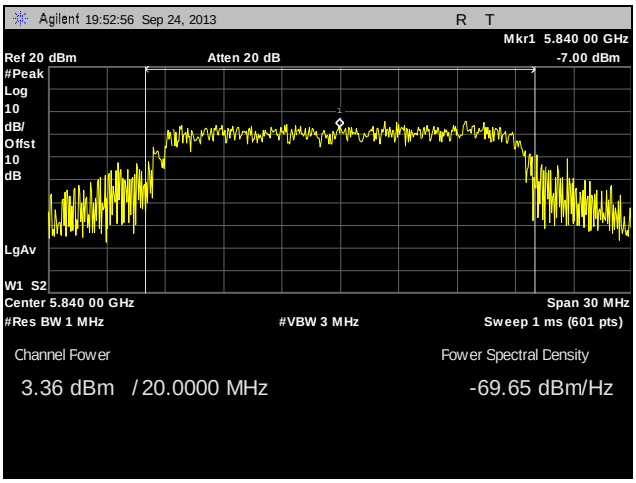
Peak Power Output Test Results, 20 MHz, Port 1, 28 dBi – Point to Multi-Point



Plot 54. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 1, 28 dBi

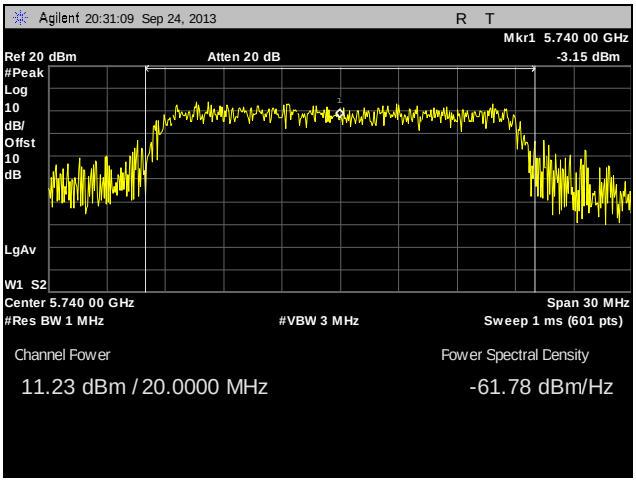


Plot 55. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 1, 28 dBi

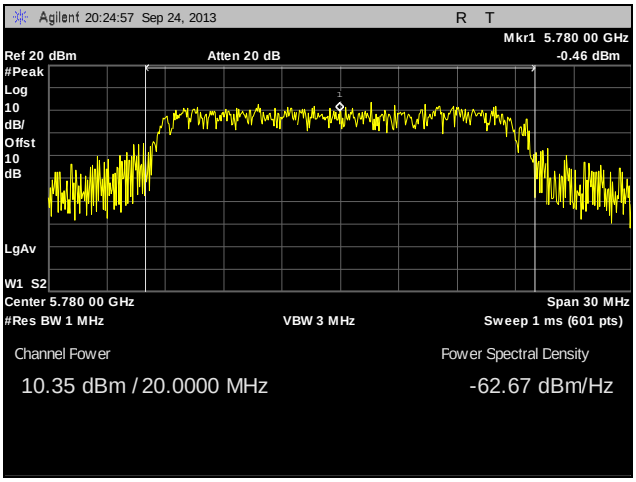


Plot 56. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 1, 28 dBi

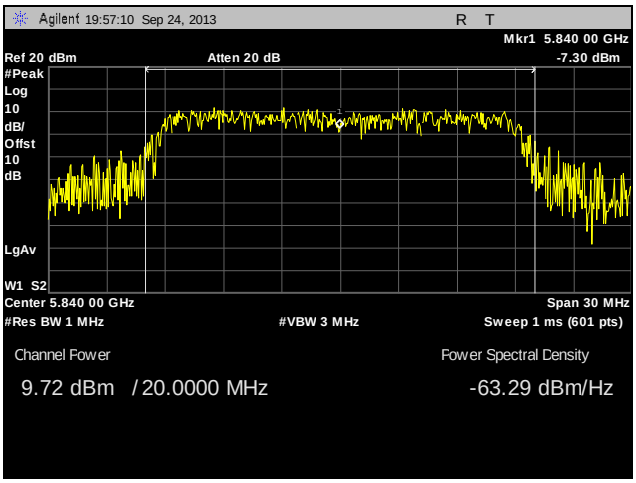
Peak Power Output Test Results, 20 MHz, Port 2, 16 dBi – Point to Multi-Point



Plot 57. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 2, 16 dBi

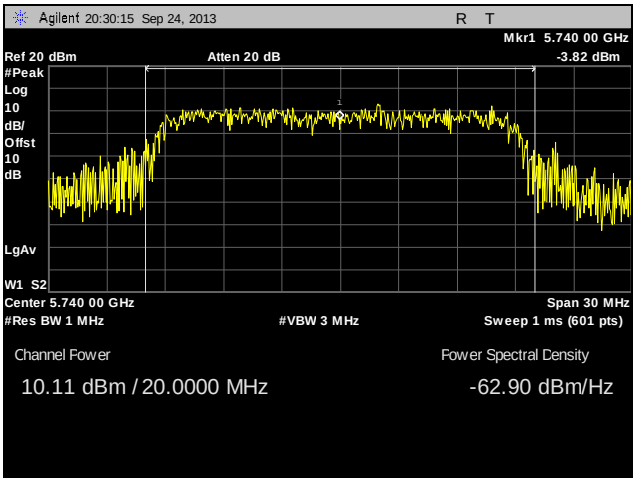


Plot 58. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 2, Port 2, 16 dBi

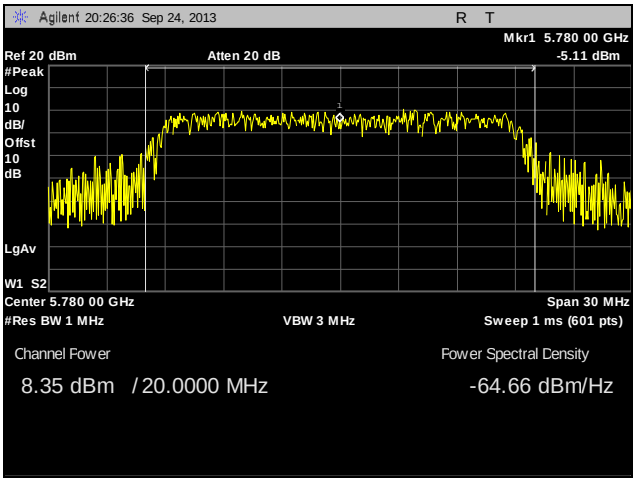


Plot 59. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 2, Port 2, 16 dBi

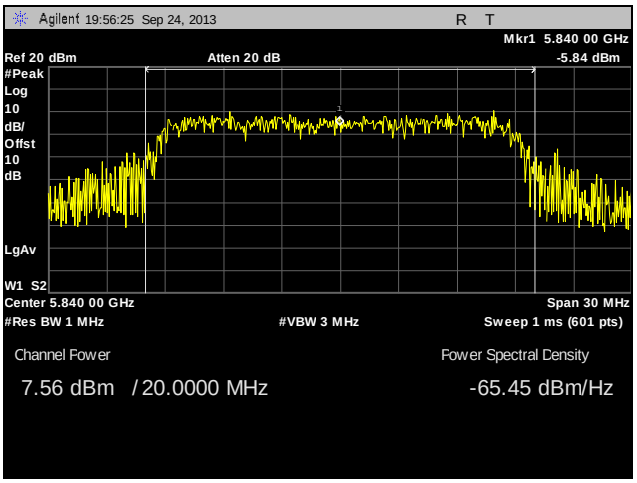
Peak Power Output Test Results, 20 MHz, Port 2, 19 dBi – Point to Multi-Point



Plot 60. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 2, 19 dBi

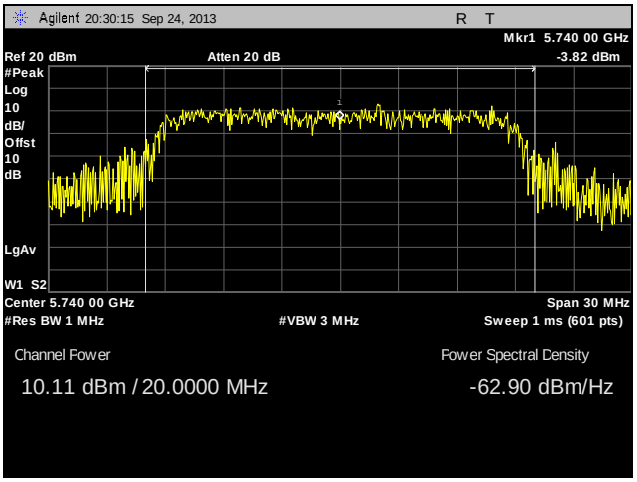


Plot 61. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 2, Port 2, 19 dBi

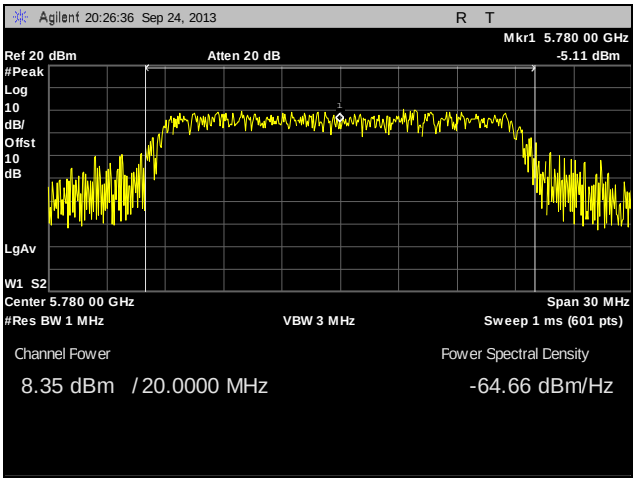


Plot 62. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 2, Port 2, 19 dBi

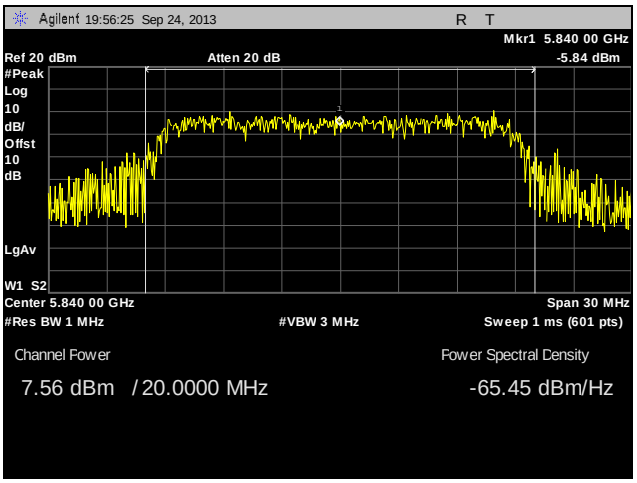
Peak Power Output Test Results, 20 MHz, Port 2, 21 dBi – Point to Multi-Point



Plot 63. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 2, 21 dBi

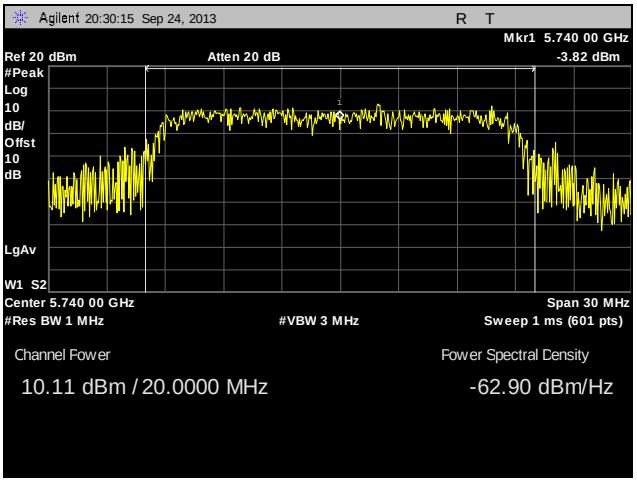


Plot 64. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 2, 21 dBi

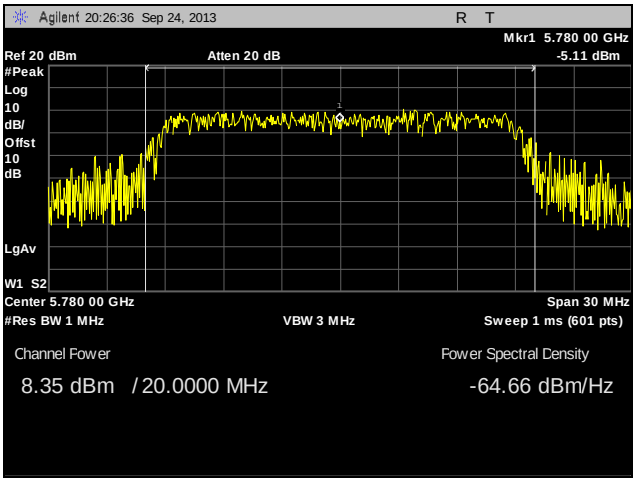


Plot 65. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 2, 21 dBi

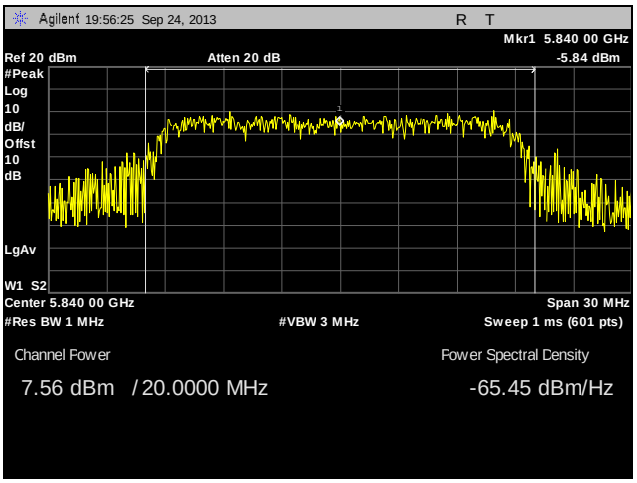
Peak Power Output Test Results, 20 MHz, Port 2, 23 dBi – Point to Multi-Point



Plot 66. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 2, 23 dBi

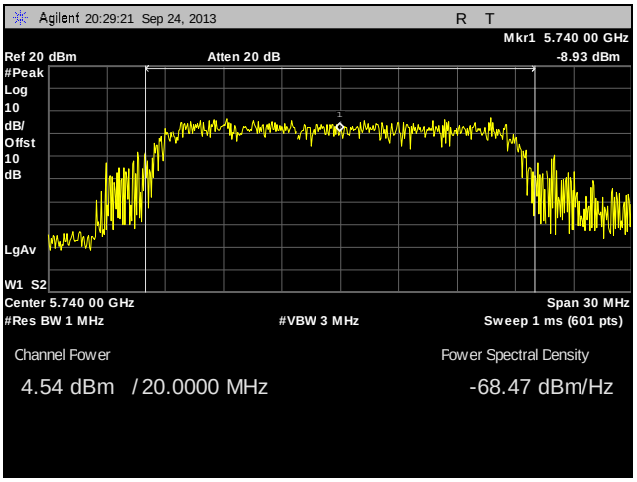


Plot 67. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 2, 23 dBi

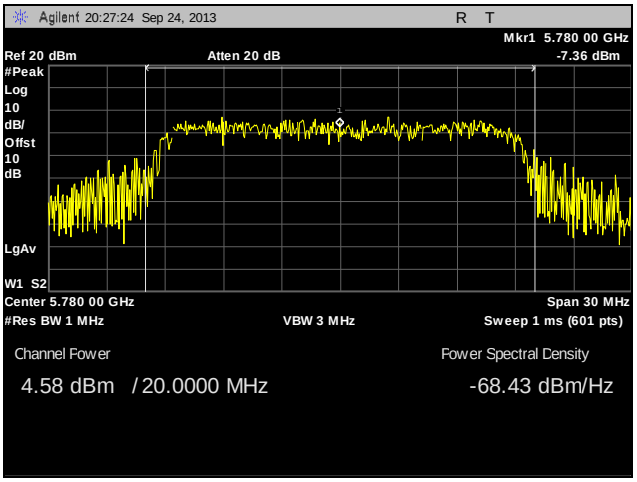


Plot 68. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 2, 23 dBi

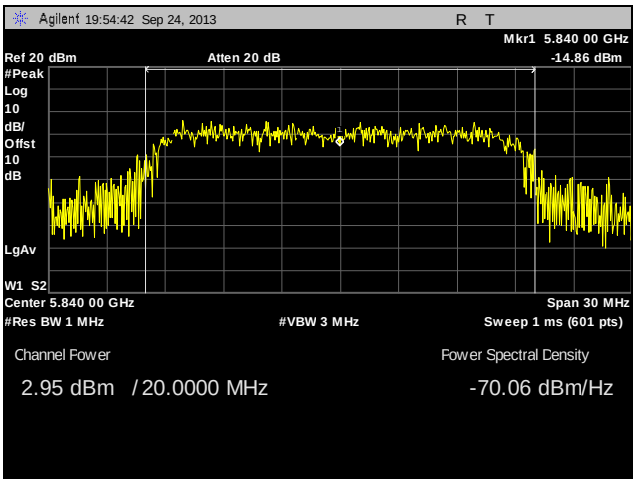
Peak Power Output Test Results, 20 MHz, Port 2, 28 dBi – Point to Multi-Point



Plot 69. Peak Power Output, Point to Multi-Point, Low Channel, 20 MHz, Port 2, 28 dBi

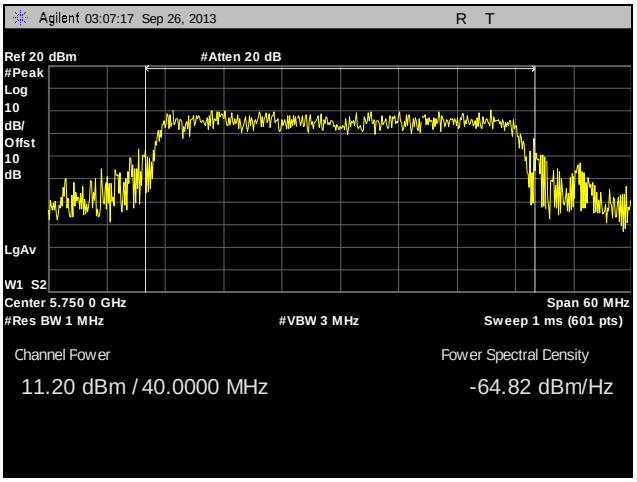


Plot 70. Peak Power Output, Point to Multi-Point, Mid Channel, 20 MHz, Port 2, 28 dBi

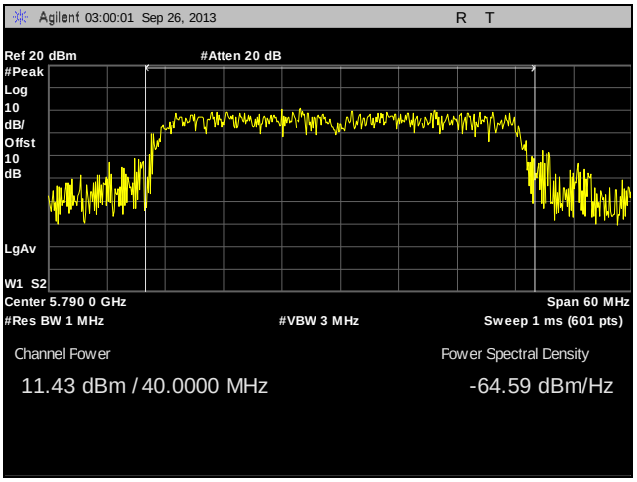


Plot 71. Peak Power Output, Point to Multi-Point, High Channel, 20 MHz, Port 2, 28 dBi

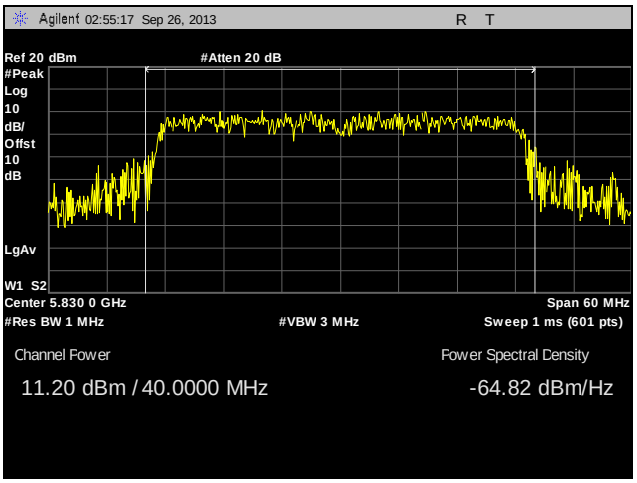
Peak Power Output Test Results, 40 MHz, Port 1, 16 dBi – Point to Multi-Point



Plot 72. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 1, 16 dBi

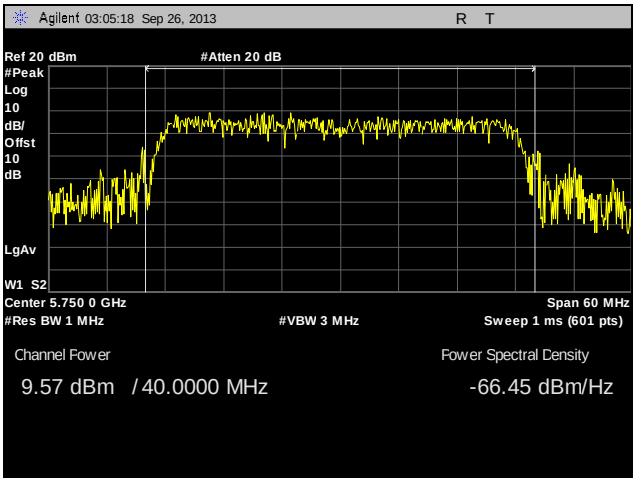


Plot 73. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 1, Port 1, 16 dBi

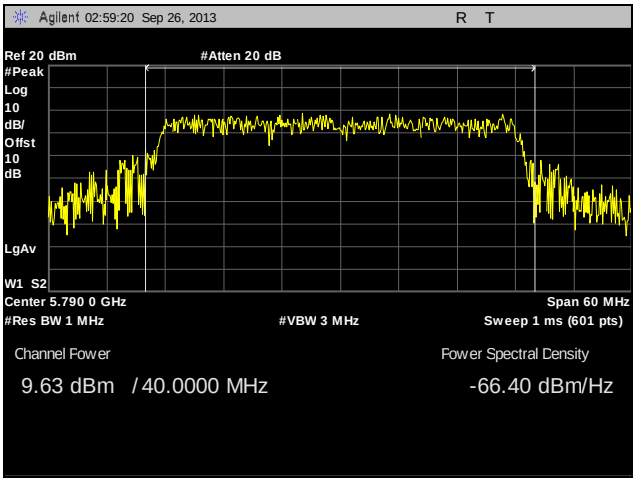


Plot 74. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 1, Port 1, 16 dBi

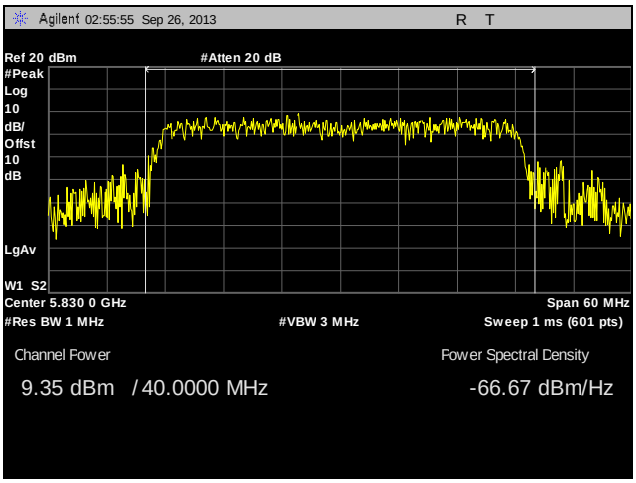
Peak Power Output Test Results, 40 MHz, Port 1, 19 dBi – Point to Multi-Point



Plot 75. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 1, 19 dBi

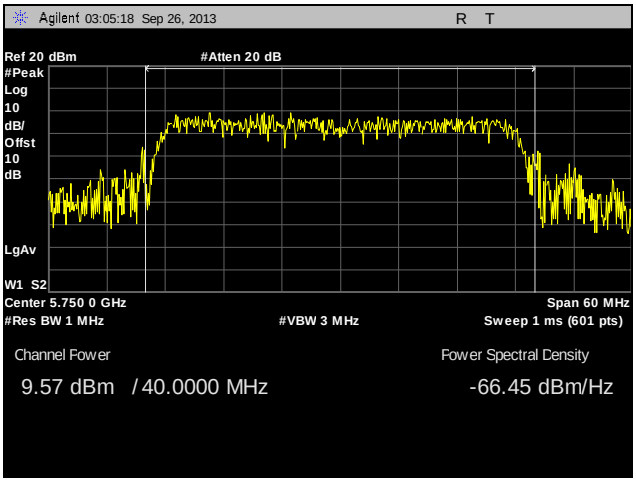


Plot 76. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 1, Port 1, 19 dBi

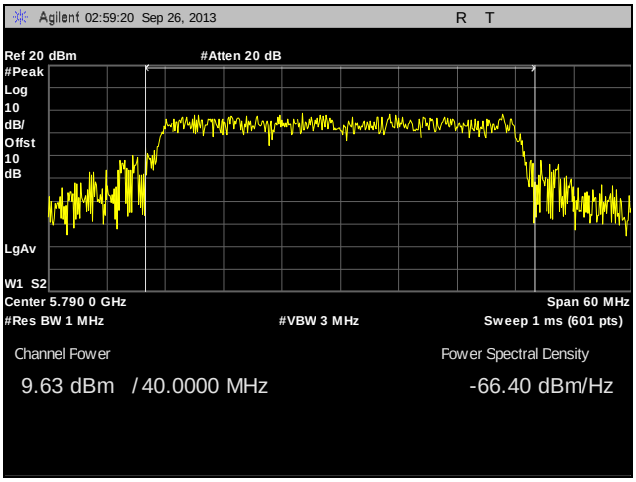


Plot 77. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 1, Port 1, 19 dBi

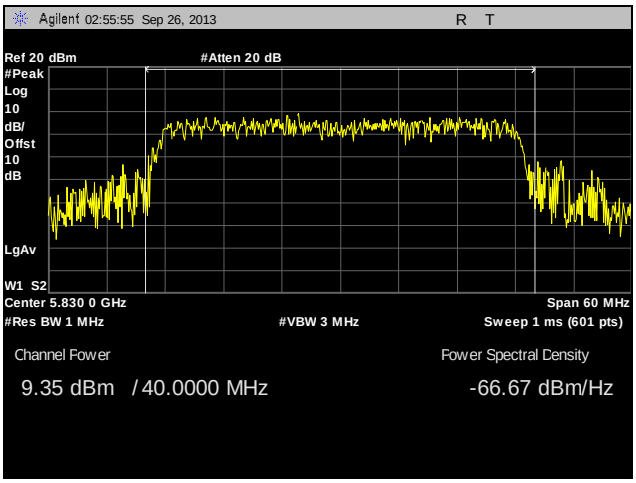
Peak Power Output Test Results, 40 MHz, Port 1, 21 dBi – Point to Multi-Point



Plot 78. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 1, 21 dBi

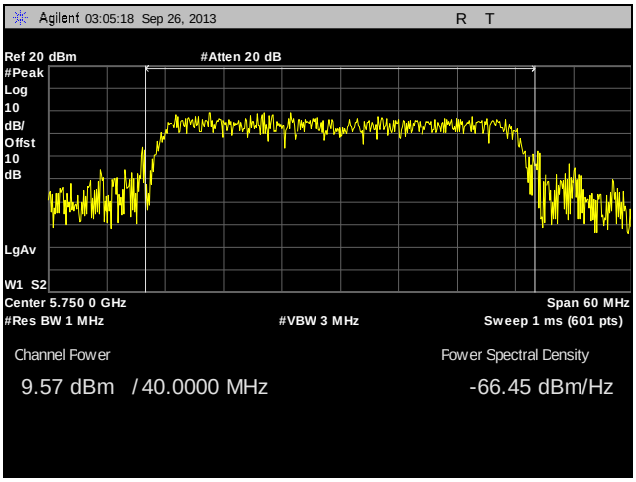


Plot 79. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 1, 21 dBi

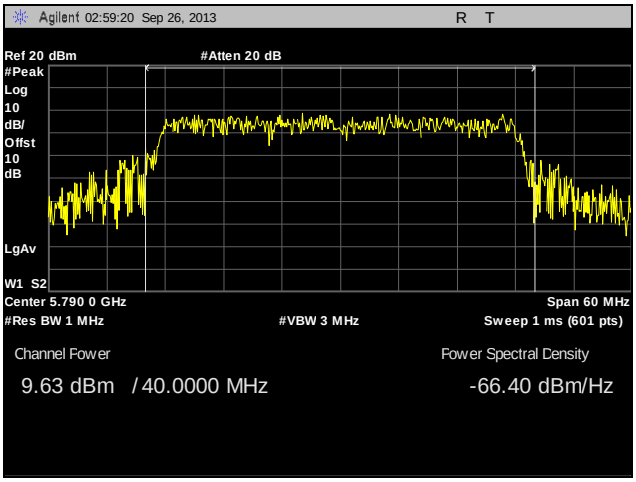


Plot 80. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 1, 21 dBi

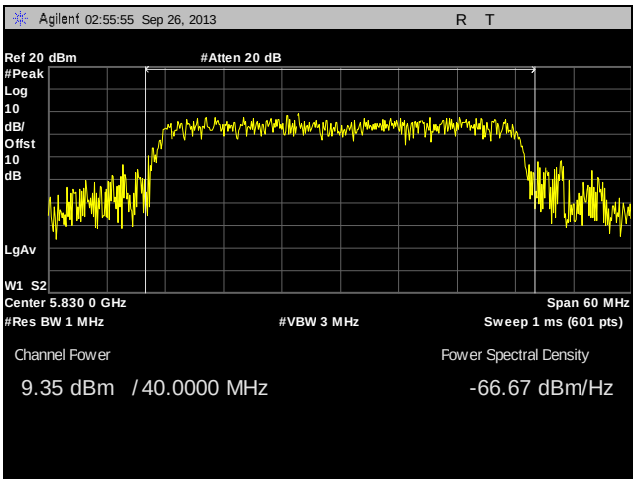
Peak Power Output Test Results, 40 MHz, Port 1, 23 dBi – Point to Multi-Point



Plot 81. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 1, 23 dBi

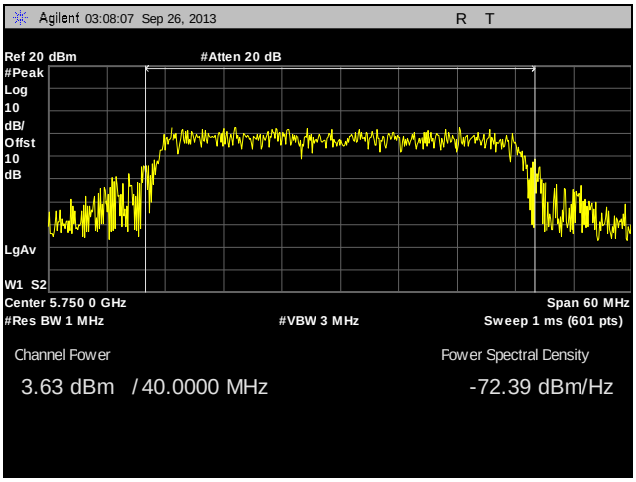


Plot 82. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 1, 23 dBi

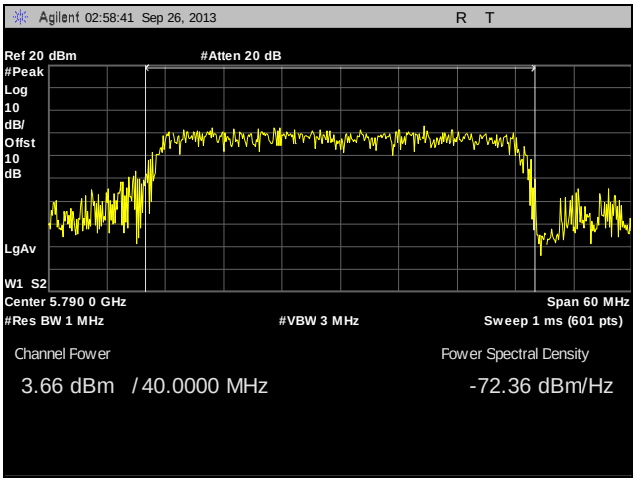


Plot 83. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 1, 23 dBi

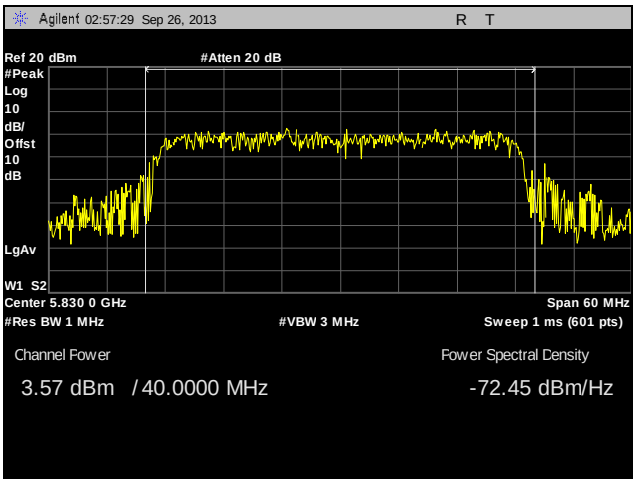
Peak Power Output Test Results, 40 MHz, Port 1, 28 dBi – Point to Multi-Point



Plot 84. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 1, 28 dBi

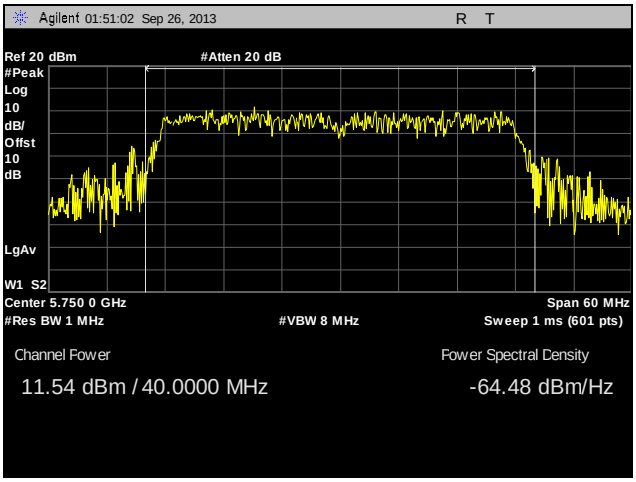


Plot 85. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 1, 28 dBi

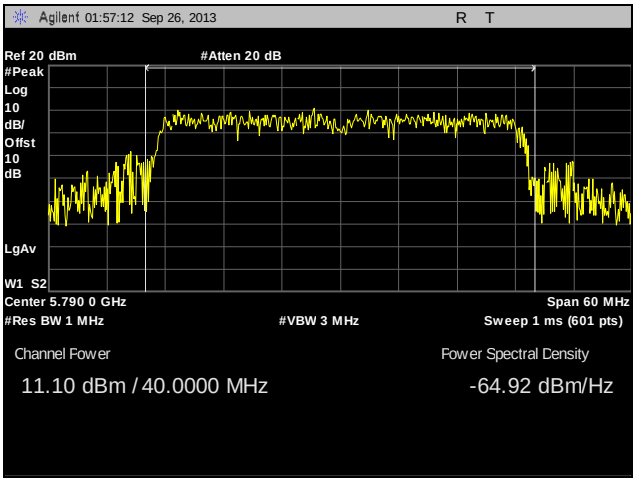


Plot 86. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 1, 28 dBi

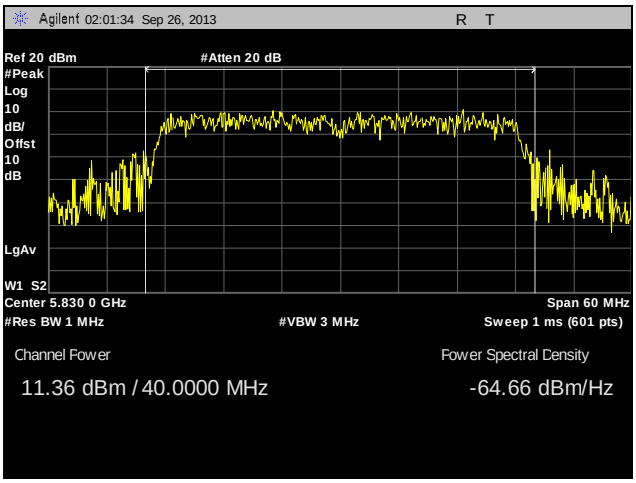
Peak Power Output Test Results, 40 MHz, Port 2, 16 dBi – Point to Multi-Point



Plot 87. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 2, 16 dBi

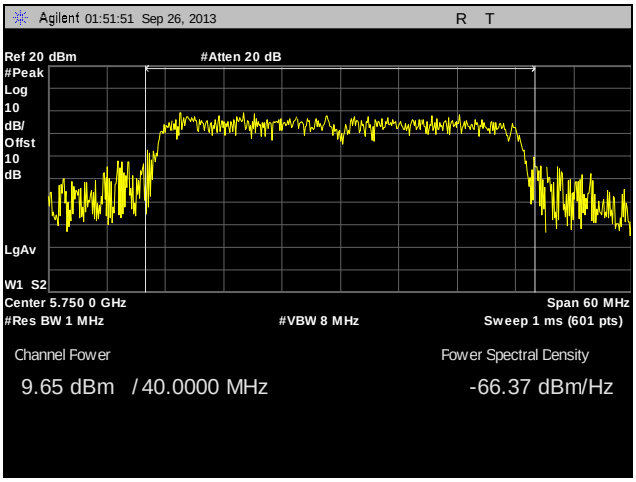


Plot 88. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 2, Port 2, 16 dBi

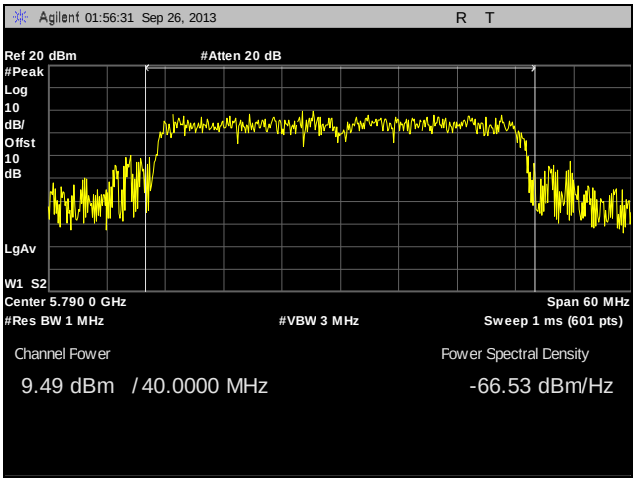


Plot 89. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 2, Port 2, 16 dBi

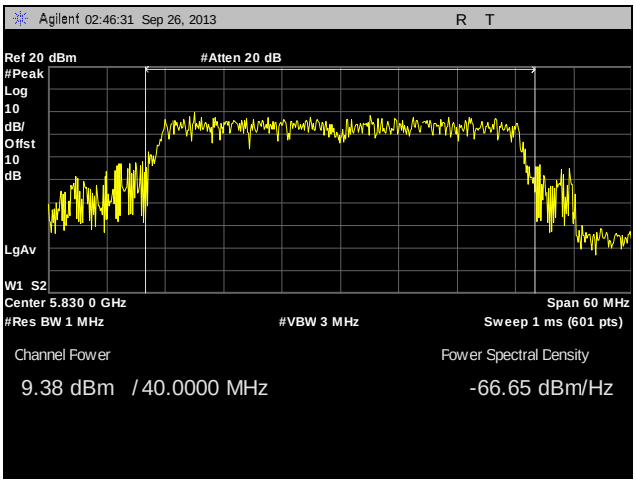
Peak Power Output Test Results, 40 MHz, Port 2, 19 dBi – Point to Multi-Point



Plot 90. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 2, 19 dBi

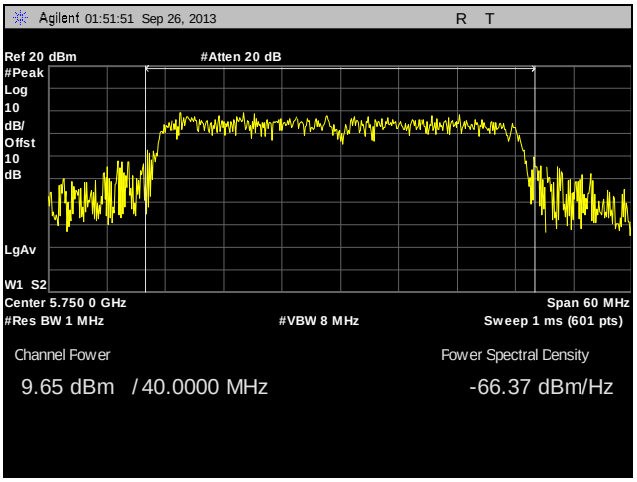


Plot 91. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 2, Port 2, 19 dBi

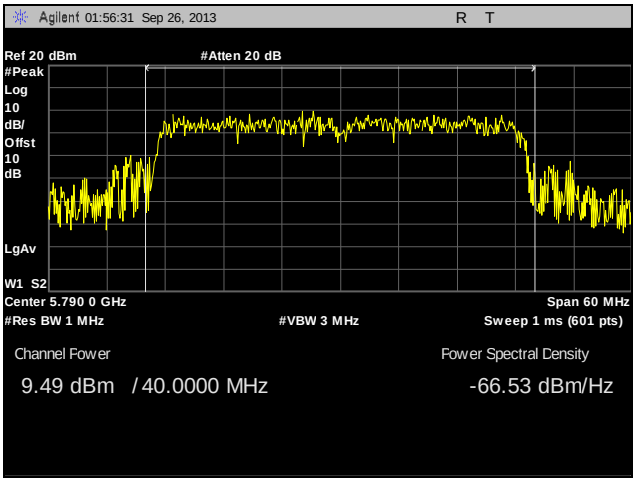


Plot 92. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 2, Port 2, 19 dBi

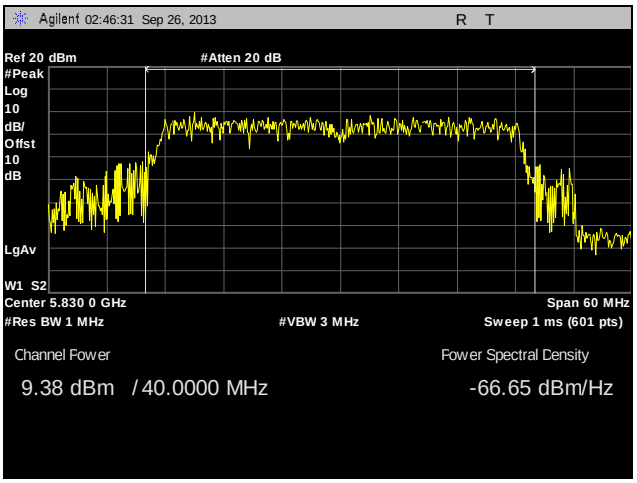
Peak Power Output Test Results, 40 MHz, Port 2, 21 dBi – Point to Multi-Point



Plot 93. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 2, 21 dBi

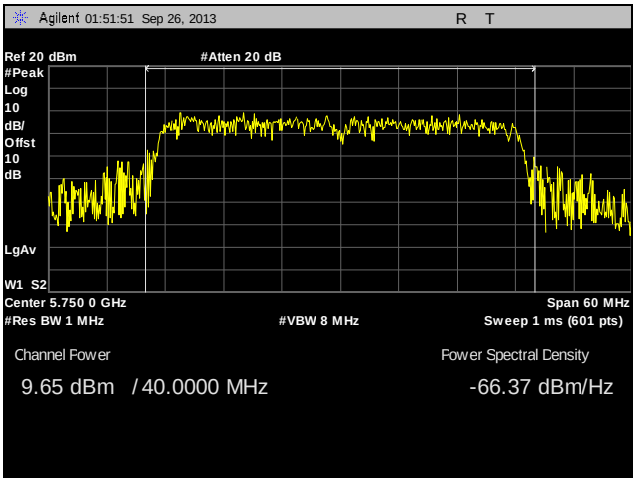


Plot 94. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 2, 21 dBi

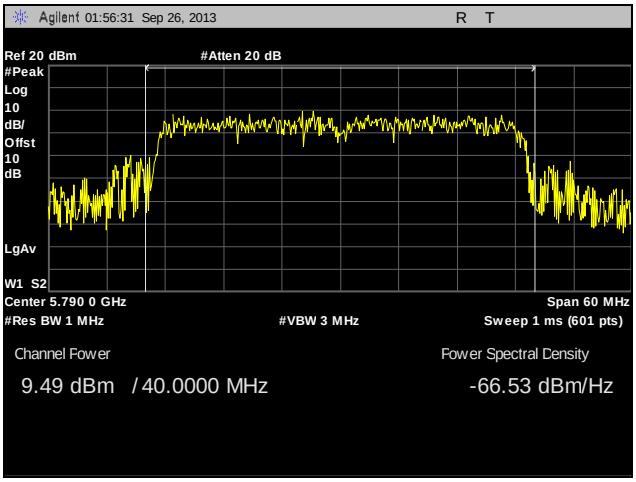


Plot 95. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 2, 21 dBi

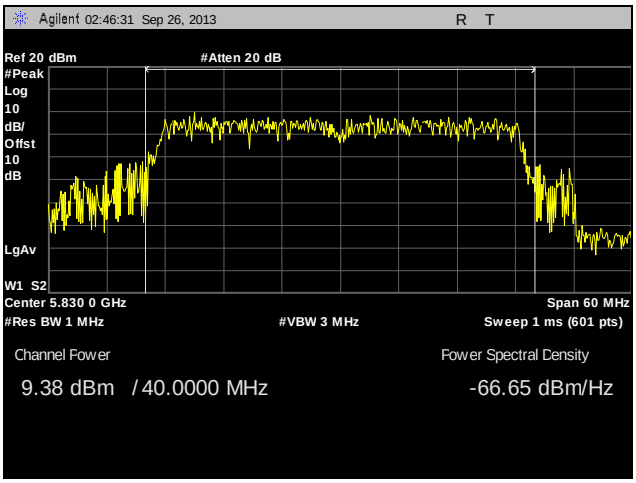
Peak Power Output Test Results, 40 MHz, Port 2, 23 dBi – Point to Multi-Point



Plot 96. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 2, 23 dBi

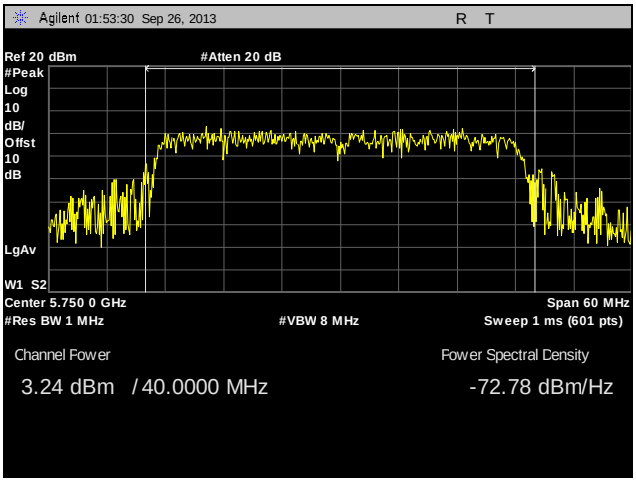


Plot 97. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 2, 23 dBi

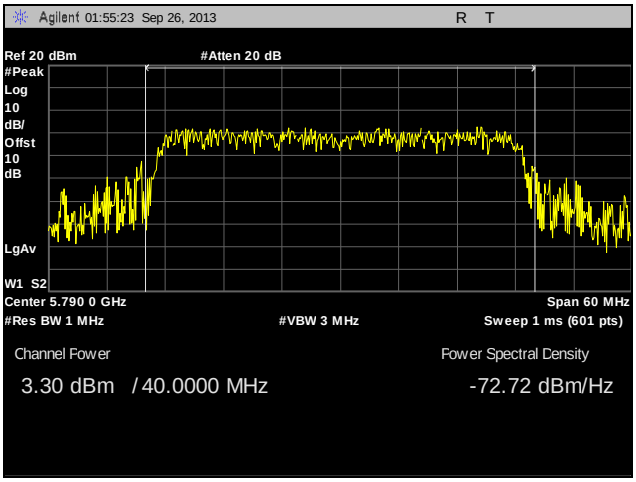


Plot 98. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 2, 23 dBi

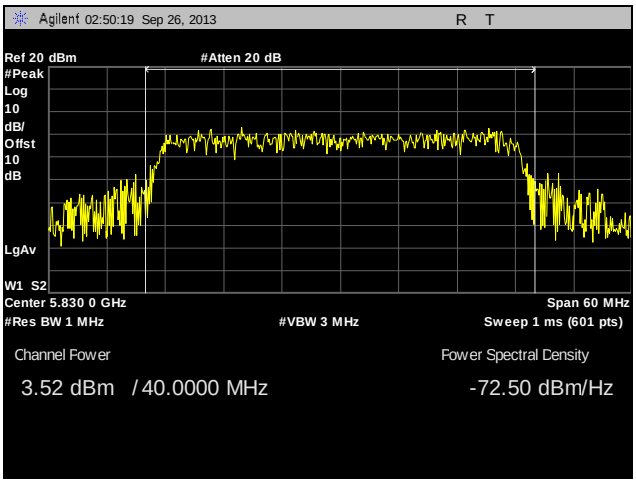
Peak Power Output Test Results, 40 MHz, Port 2, 28 dBi – Point to Multi-Point



Plot 99. Peak Power Output, Point to Multi-Point, Low Channel, 40 MHz, Port 2, 28 dBi



Plot 100. Peak Power Output, Point to Multi-Point, Mid Channel, 40 MHz, Port 2, 28 dBi



Plot 101. Peak Power Output, Point to Multi-Point, High Channel, 40 MHz, Port 2, 28 dBi

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Radiated Spurious Emissions Requirements and Band Edge

Test Requirements: **§15.247(d); §15.205:** Emissions outside the frequency band.

§15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

§15.205(a): Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110----------	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505----------	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905----------	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128----------	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775----------	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775----------	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218----------	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825----------	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225----------	123–138	2200–2300	14.47–14.5
8.291–8.294----------	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366----------	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675----------	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475----------	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293----------	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025----------	240–285	3345.8–3358 36.	43–36.5
12.57675–12.57725----------	322–335.4	3600–4400	([2])

Table 20. Restricted Bands of Operation

[1] Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.
[2] Above 38.6

Test Requirement(s): **§ 15.209 (a):** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 21.

Frequency (MHz)	§ 15.209(a),Radiated Emission Limits (dBµV) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Table 21. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

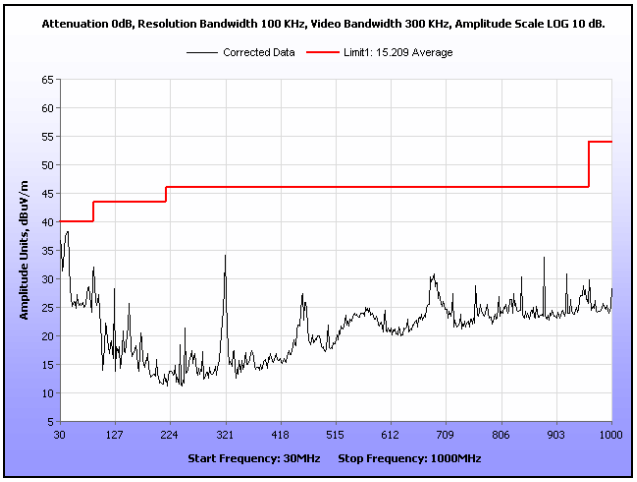
Test Procedures: The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line. Below 1GHz and above 18GHz, testing was conducted only using highest gain antenna with highest power setting.

Test Results: The EUT was compliant with the Radiated Spurious Emission limits of **§ 15.247(d**

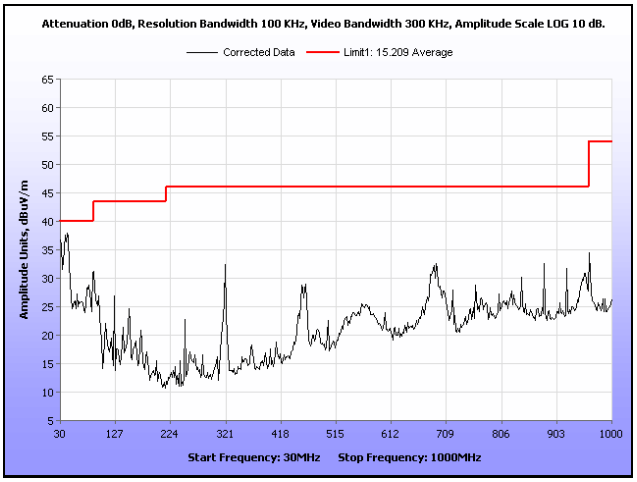
Test Engineer(s): Surinder Singh

Test Date(s): 10/02/13

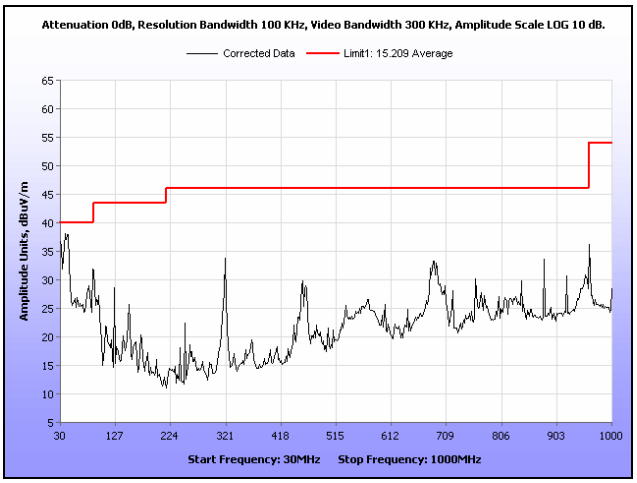
Radiated Spurious Emissions, 20 MHz, 30 MHz – 1 GHz



Plot 102. Radiated Spurious Emissions, Low Channel, 20 MHz, 30 MHz – 1 GHz, Peak

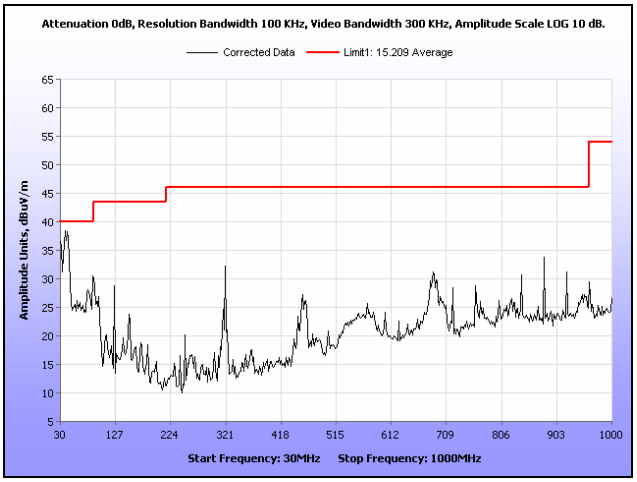


Plot 103. Radiated Spurious Emissions, Mid Channel, 20 MHz, 30 MHz – 1 GHz, Peak

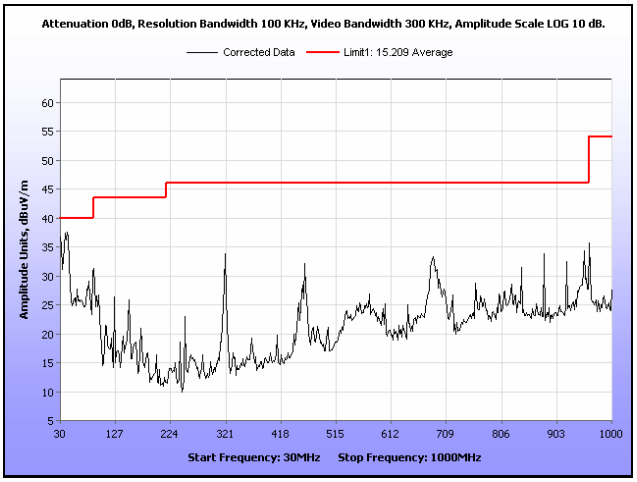


Plot 104. Radiated Spurious Emissions, High Channel, 20 MHz, 30 MHz – 1 GHz, Peak

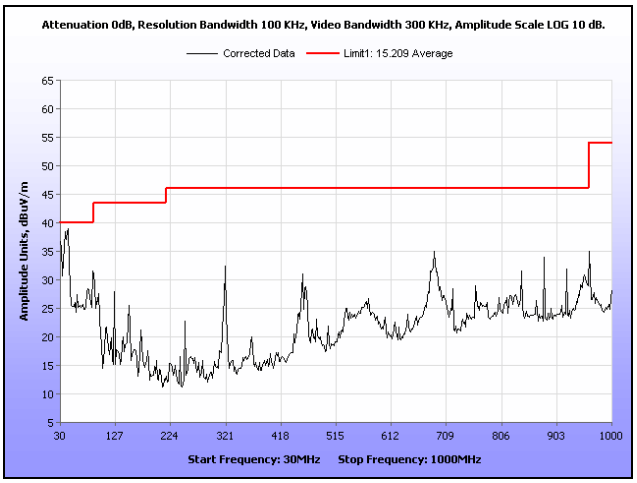
Radiated Spurious Emissions, 40 MHz, 30 MHz – 1 GHz



Plot 105. Radiated Spurious Emissions, Low Channel, 40 MHz, 30 MHz – 1 GHz, Peak

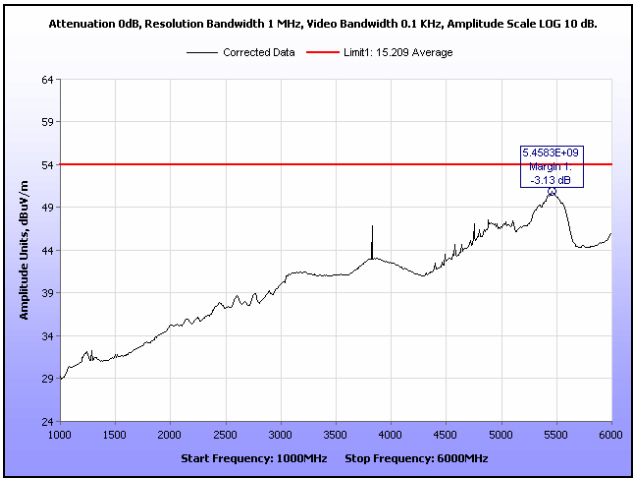


Plot 106. Radiated Spurious Emissions, Mid Channel, 40 MHz, 30 MHz – 1 GHz, Peak

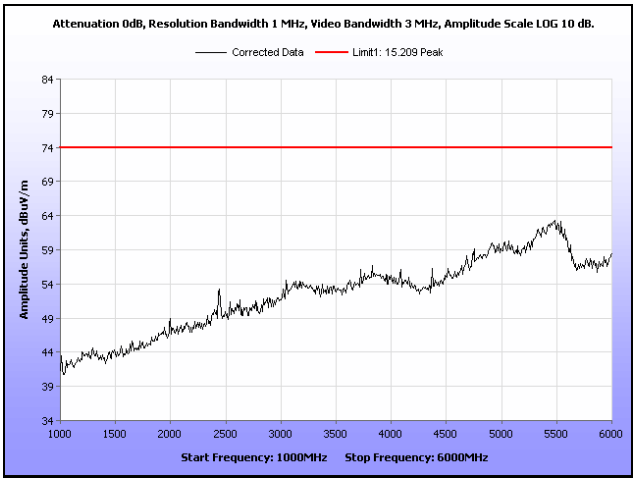


Plot 107. Radiated Spurious Emissions, High Channel, 40 MHz, 30 MHz – 1 GHz, Peak

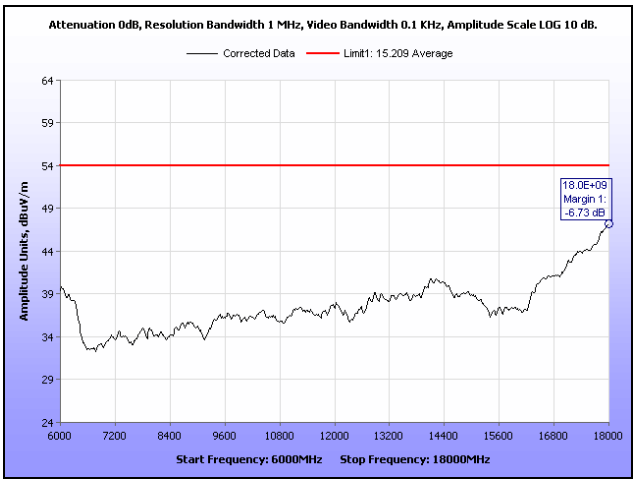
Radiated Spurious Emissions, 20 MHz, 16 dBi



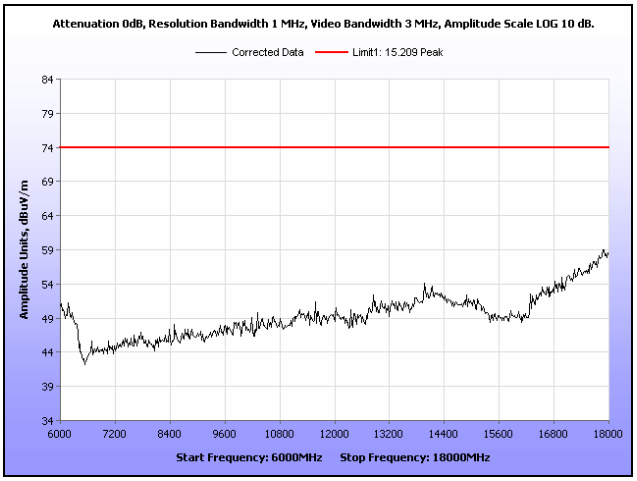
Plot 108. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Average, 16 dBi



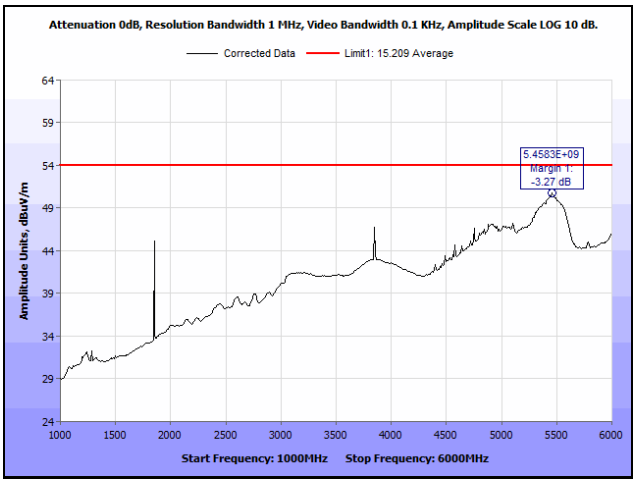
Plot 109. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 16 dBi



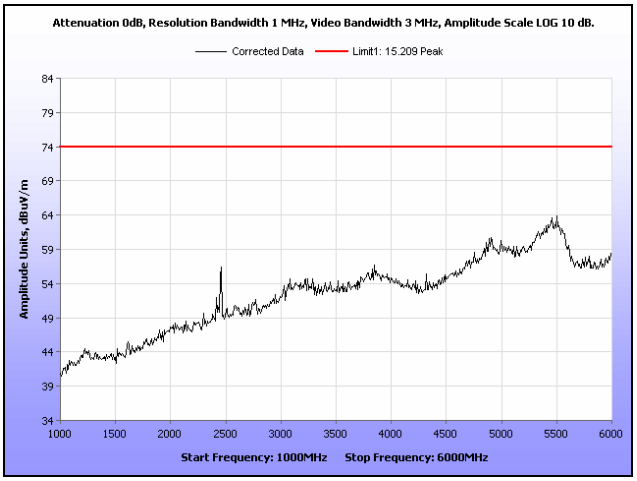
Plot 110. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Average, 16 dBi



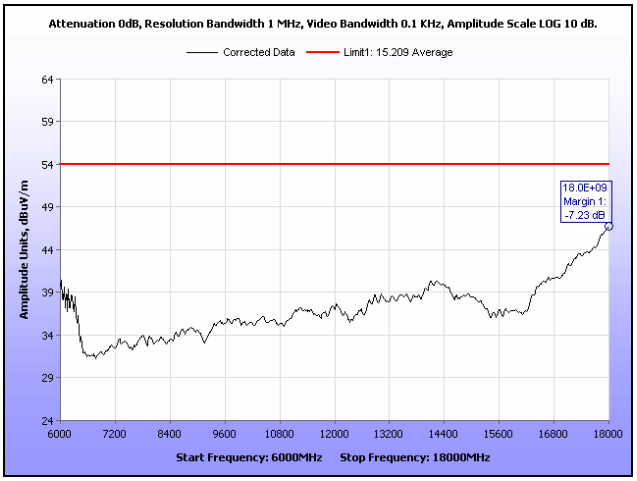
Plot 111. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 16 dBi



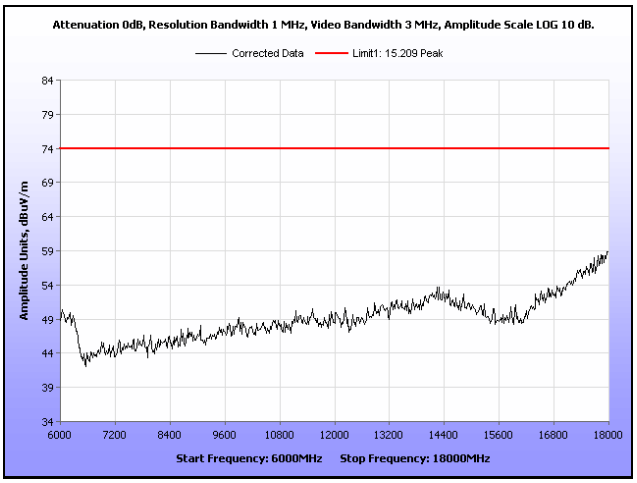
Plot 112. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Average, 16 dBi



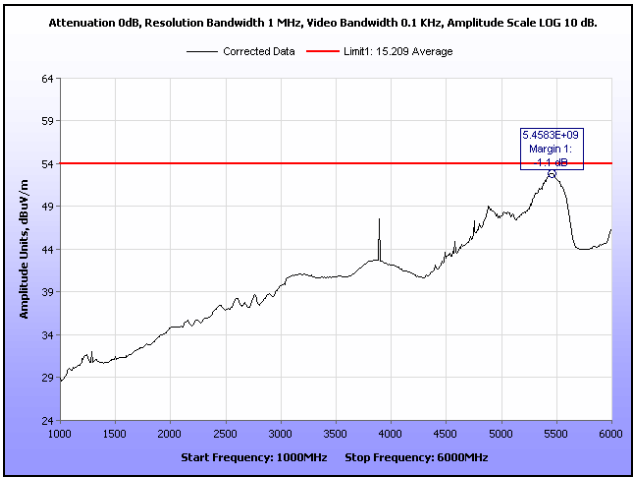
Plot 113. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 16 dBi



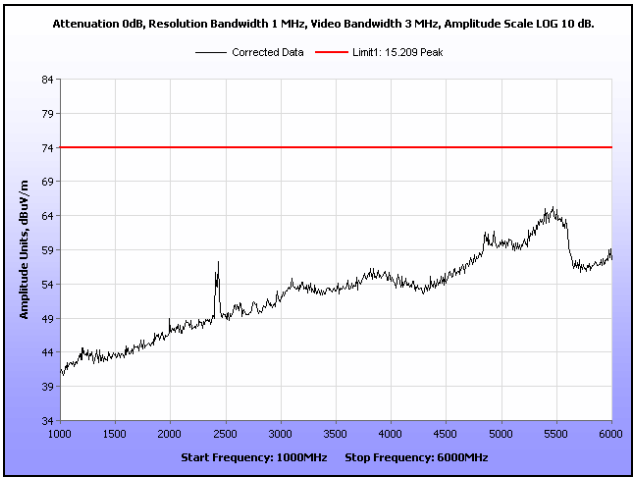
Plot 114. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Average, 16 dBi



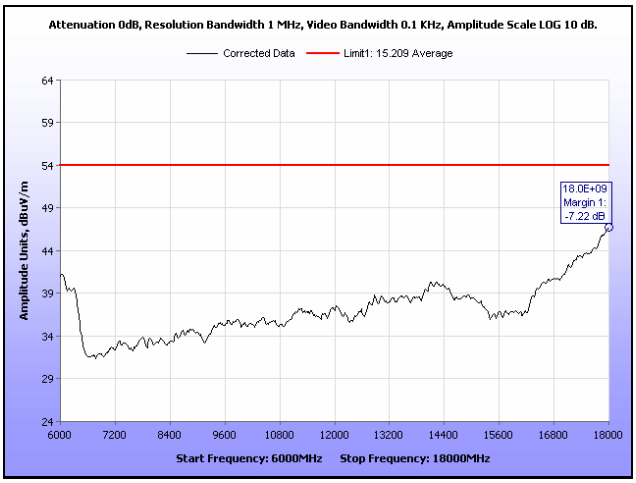
Plot 115. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 16 dBi



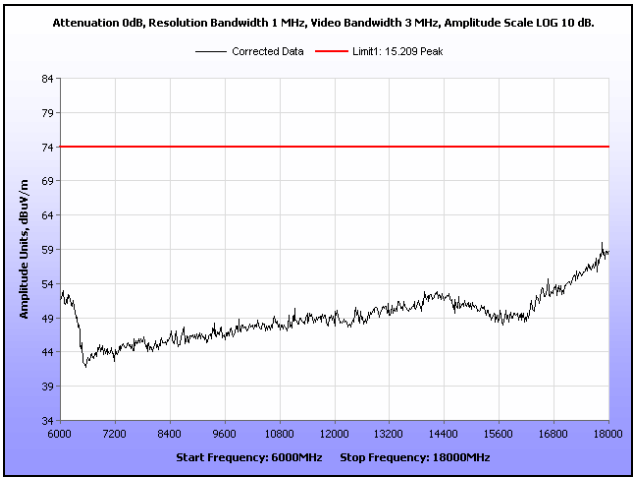
Plot 116. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Average, 16 dBi



Plot 117. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 16 dBi

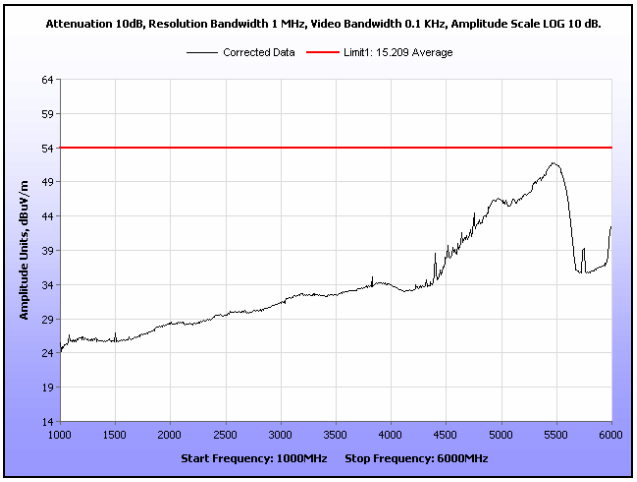


Plot 118. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Average, 16 dBi

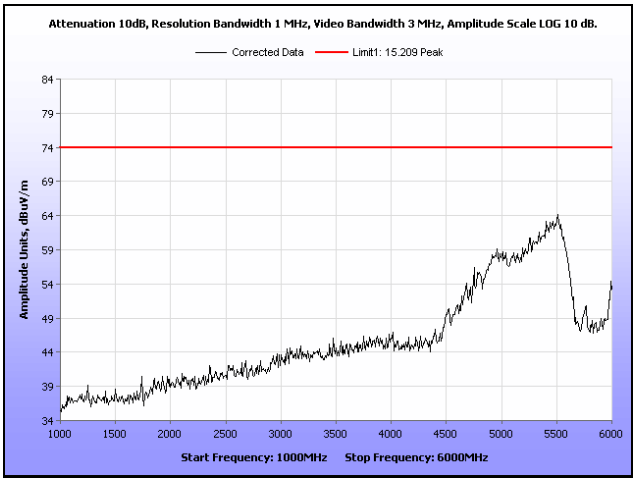


Plot 119. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 16 dBi

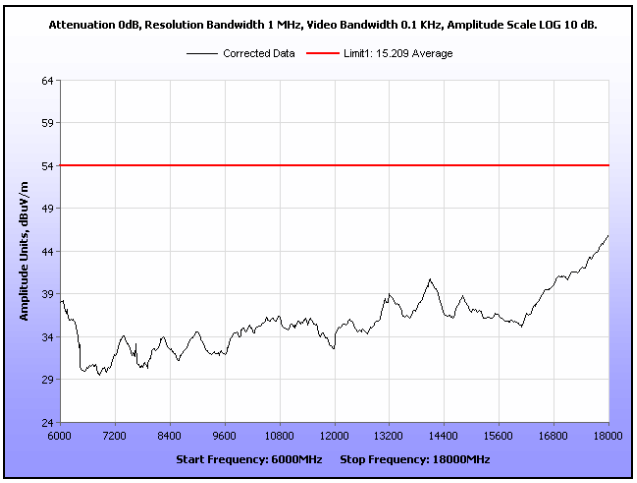
Radiated Spurious Emissions, 20 MHz, 19 dBi



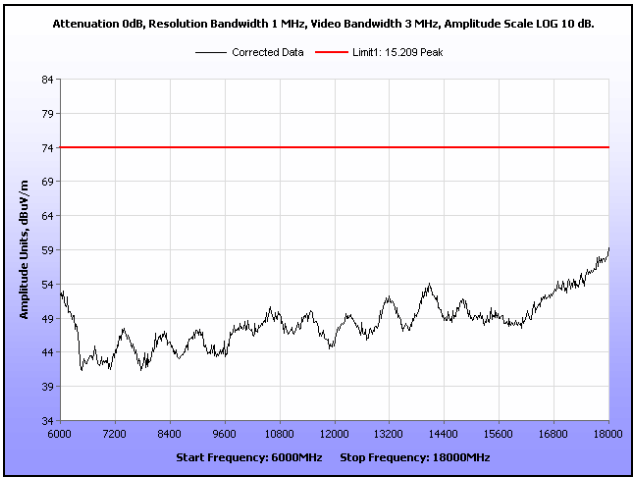
Plot 120. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Average, 19 dBi



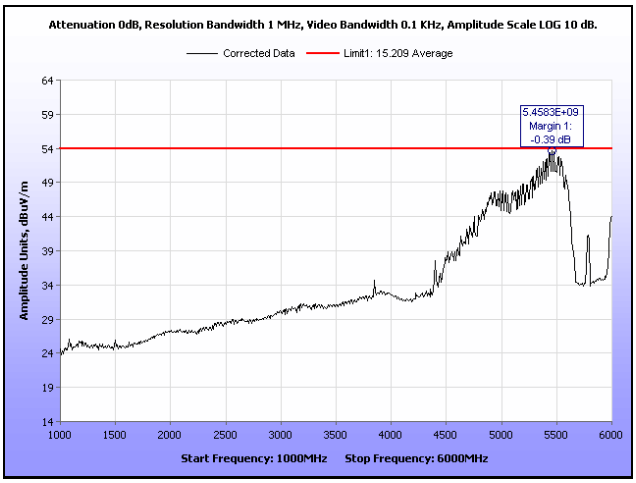
Plot 121. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 19 dBi



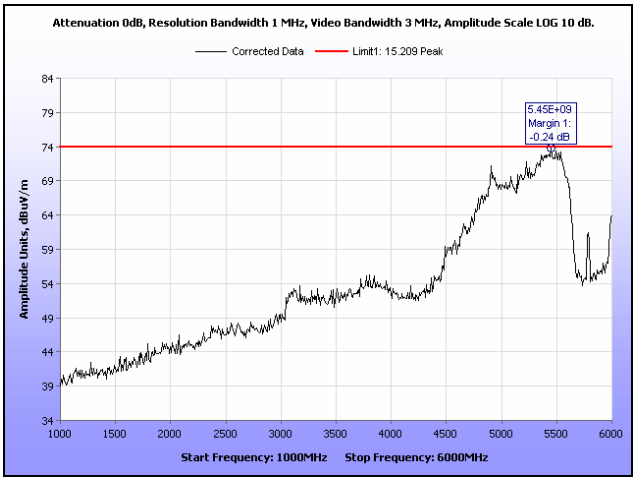
Plot 122. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Average, 19 dBi



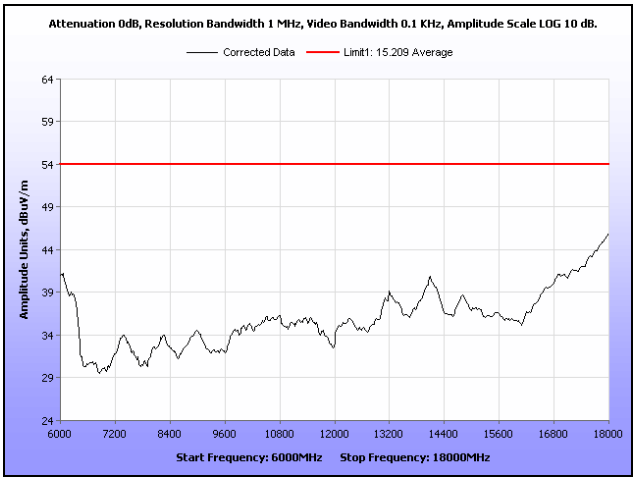
Plot 123. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 19 dBi



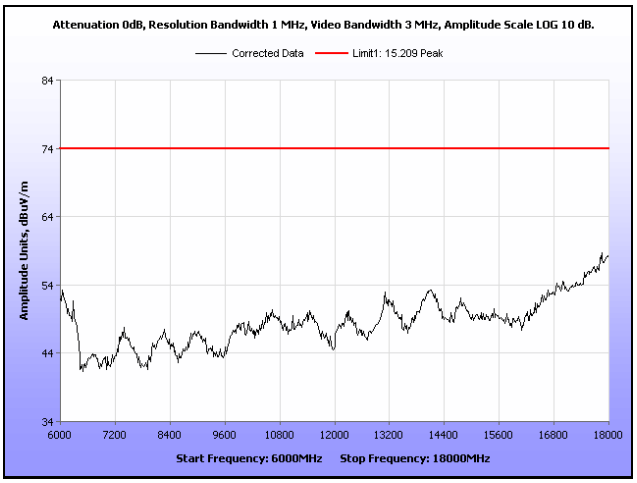
Plot 124. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Average, 19 dBi



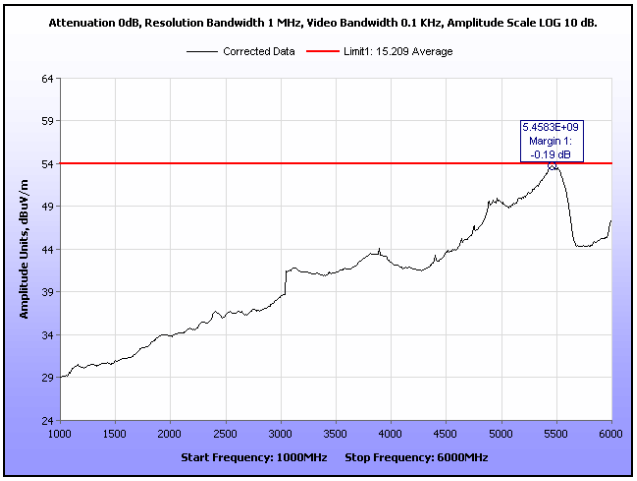
Plot 125. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 19 dBi



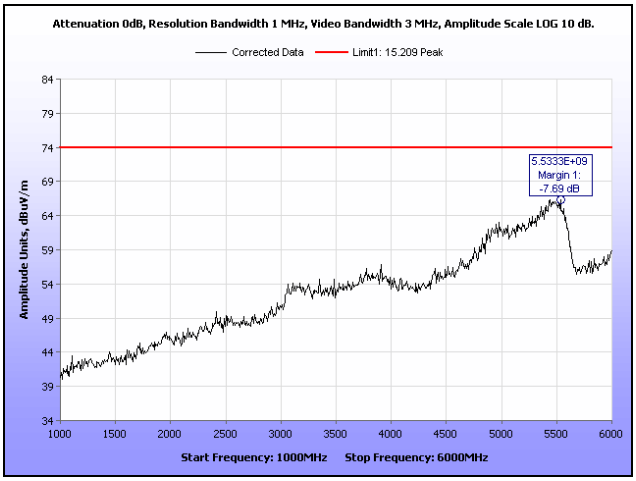
Plot 126. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Average, 19 dBi



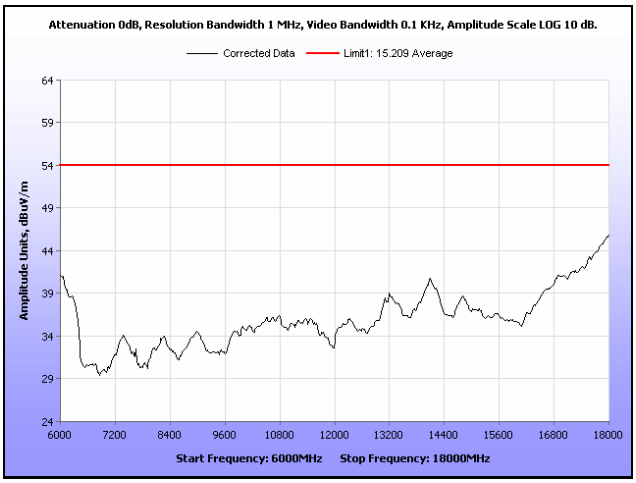
Plot 127. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 19 dBi



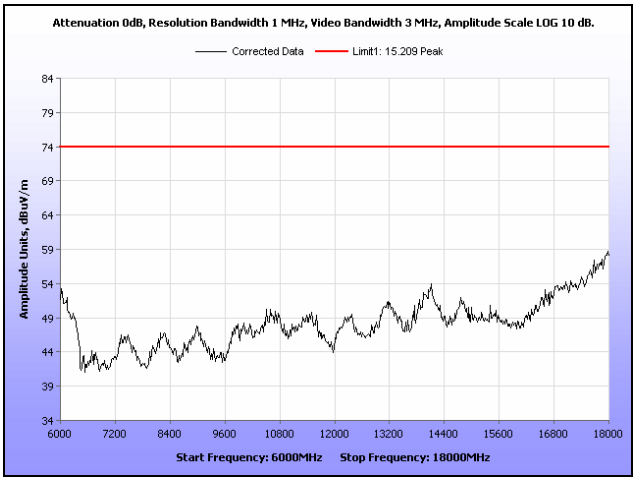
Plot 128. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Average, 19 dBi



Plot 129. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 19 dBi

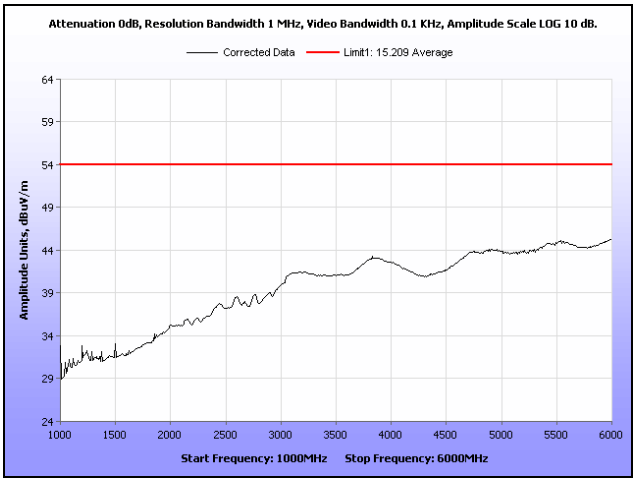


Plot 130. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Average, 19 dBi

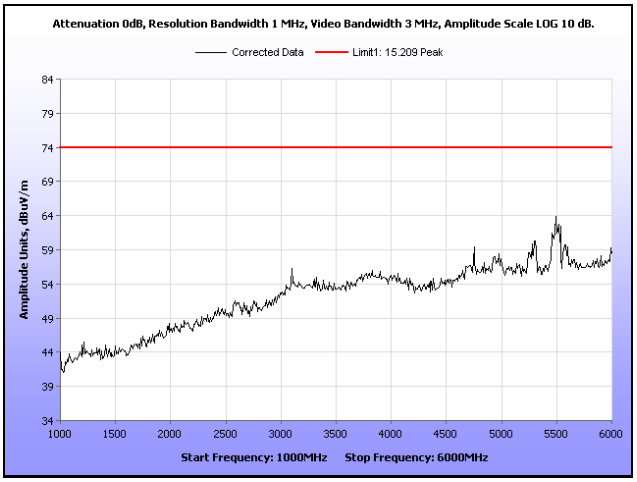


Plot 131. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 19 dBi

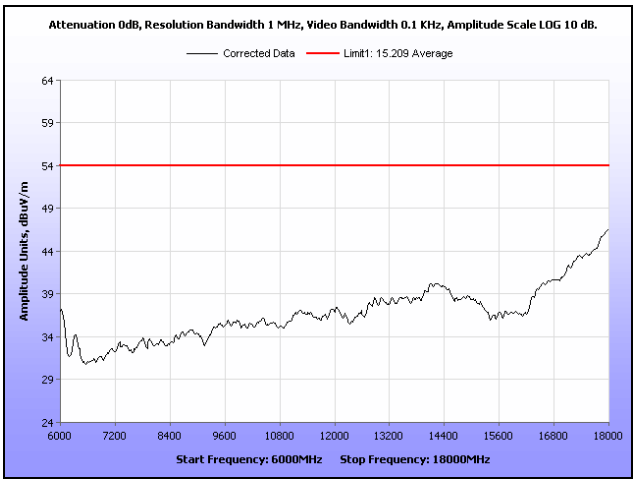
Radiated Spurious Emissions, 20 MHz, 21 dBi



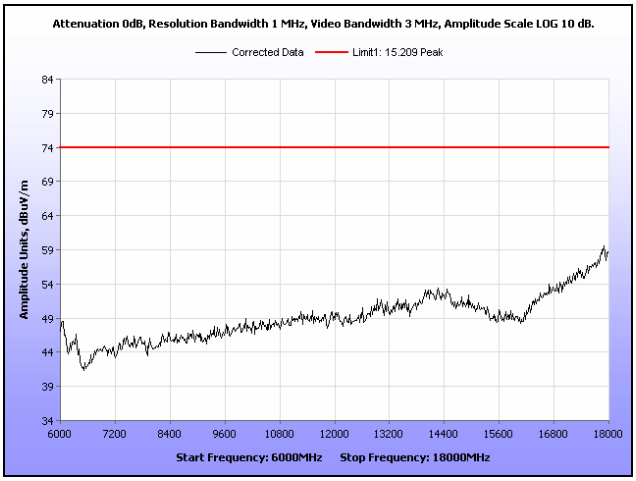
Plot 132. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Average, 21 dBi



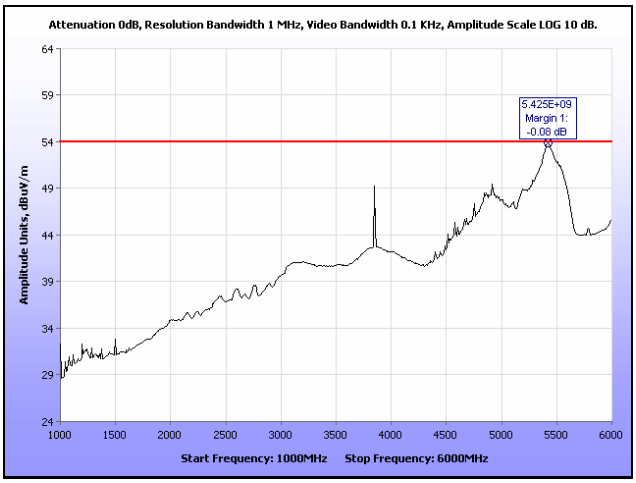
Plot 133. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 21 dBi



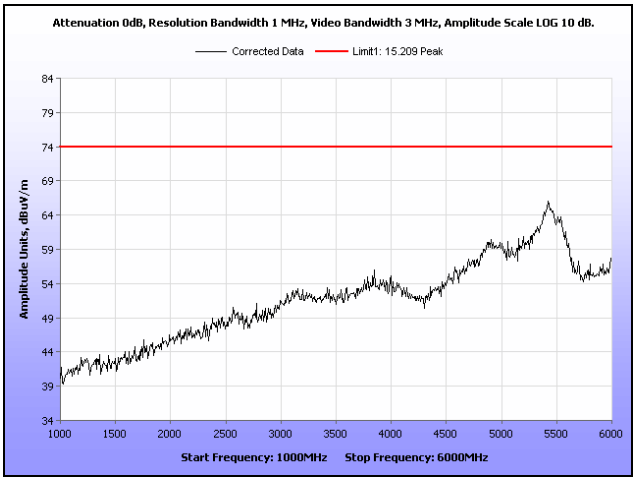
Plot 134. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Average, 21 dBi



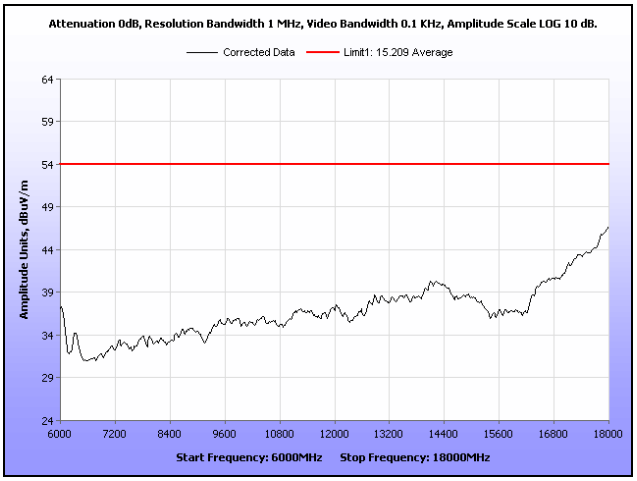
Plot 135. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 21 dBi



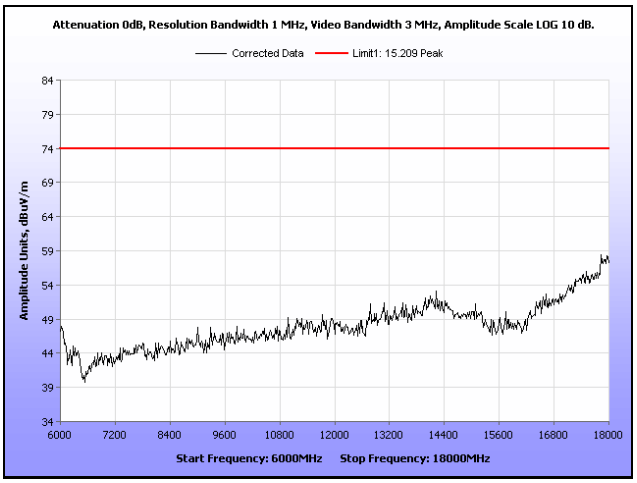
Plot 136. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Average, 21 dBi



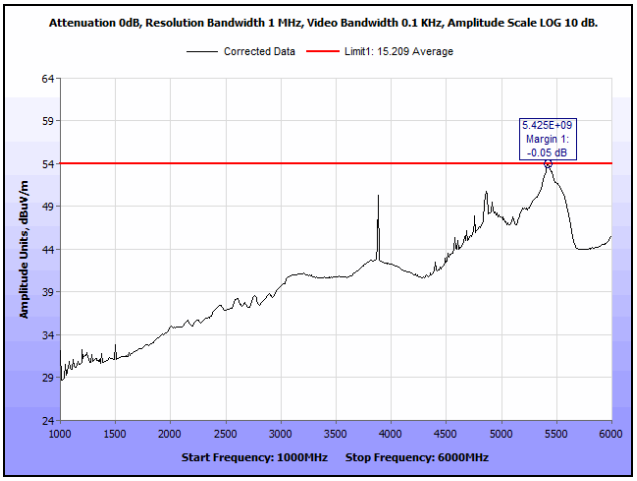
Plot 137. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 21 dBi



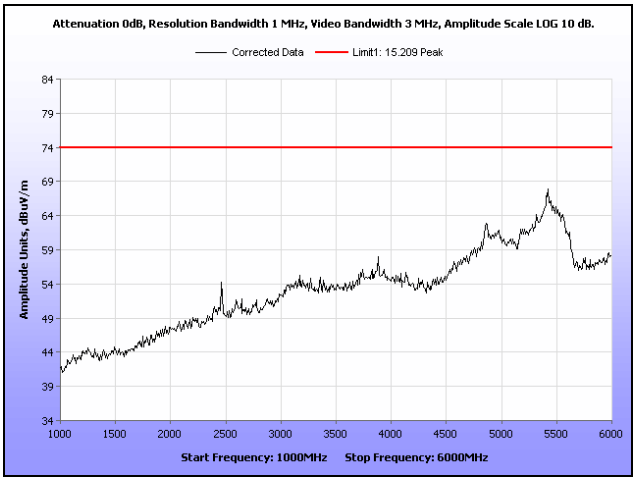
Plot 138. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Average, 21 dBi



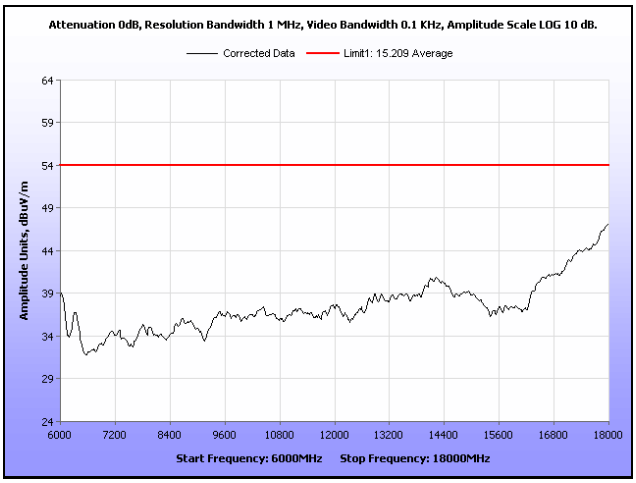
Plot 139. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 21 dBi



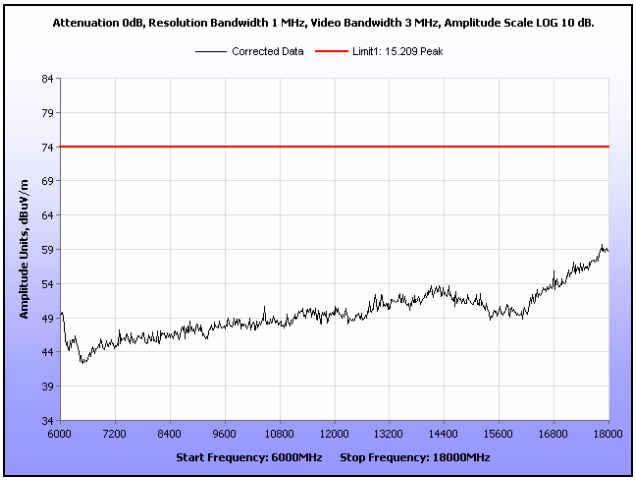
Plot 140. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Average, 21 dBi



Plot 141. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 21 dBi

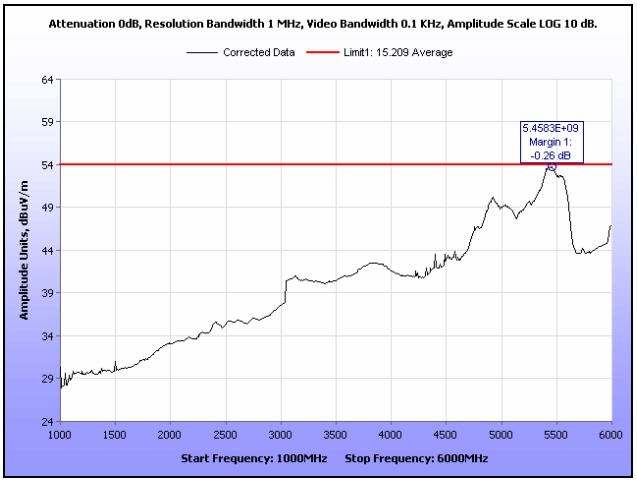


Plot 142. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Average, 21 dBi

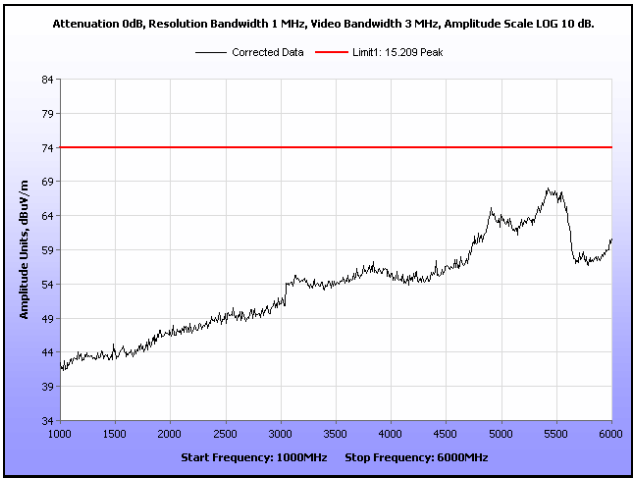


Plot 143. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 21 dBi

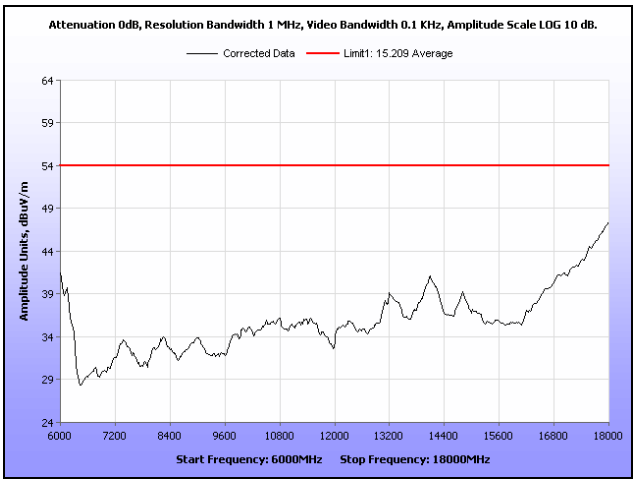
Radiated Spurious Emissions, 20 MHz, 23 dBi



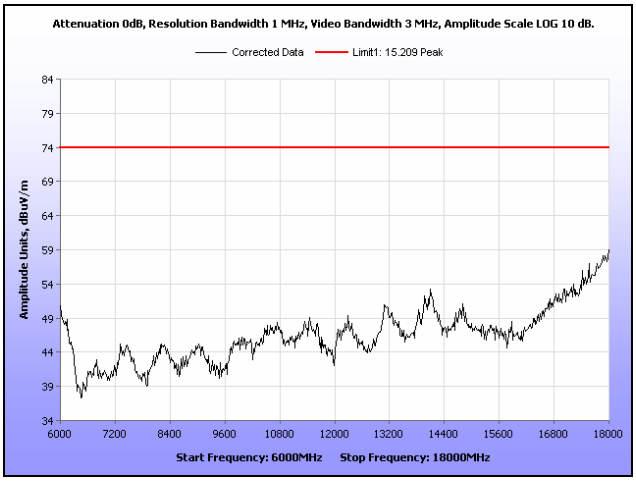
Plot 144. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Average, 23 dBi



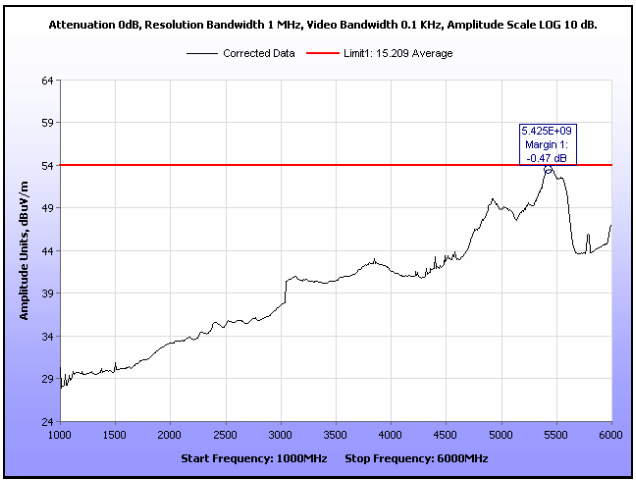
Plot 145. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 23 dBi



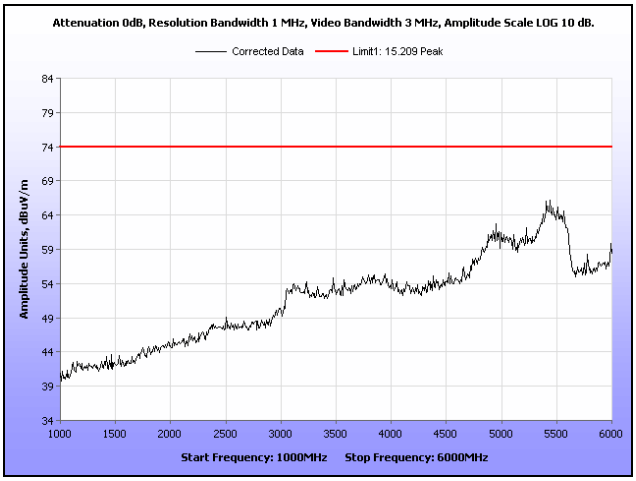
Plot 146. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Average, 23 dBi



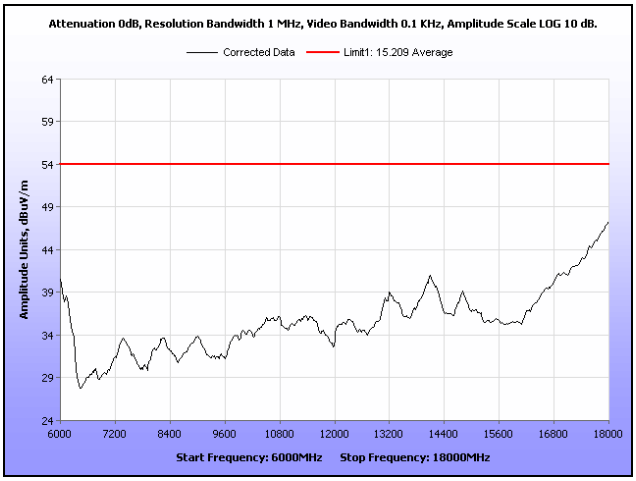
Plot 147. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 23 dBi



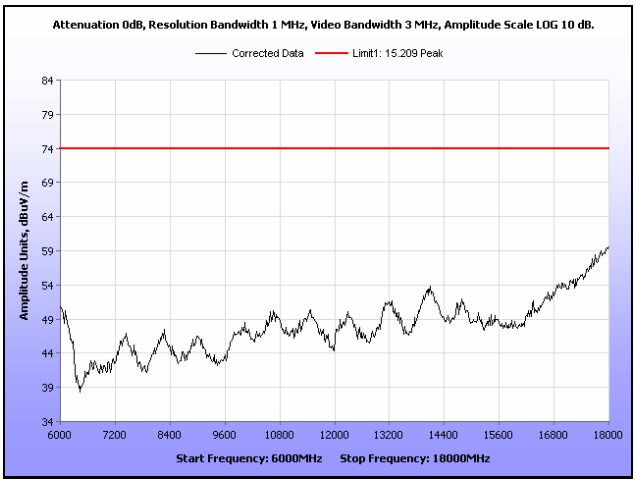
Plot 148. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Average, 23 dBi



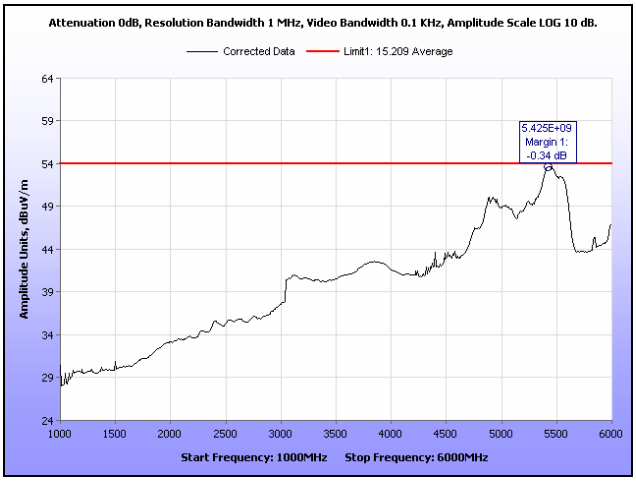
Plot 149. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 23 dBi



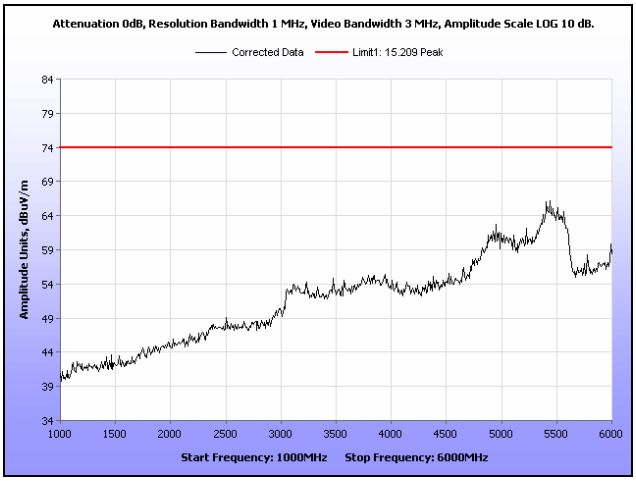
Plot 150. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Average, 23 dBi



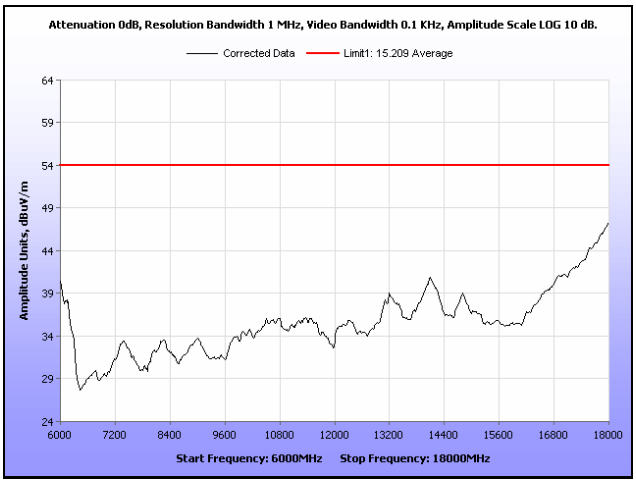
Plot 151. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 23 dBi



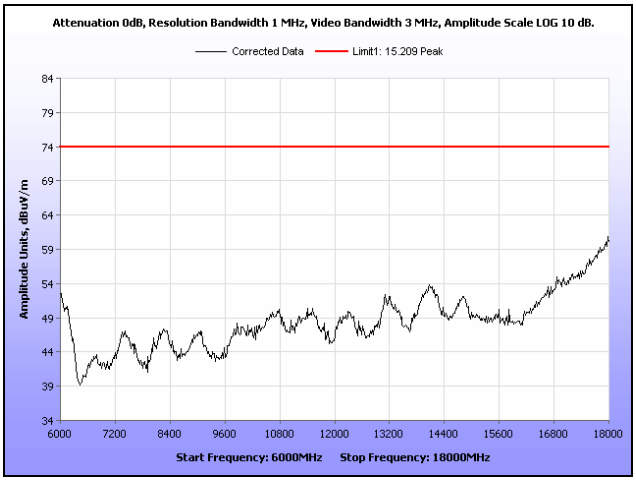
Plot 152. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Average, 23 dBi



Plot 153. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 23 dBi

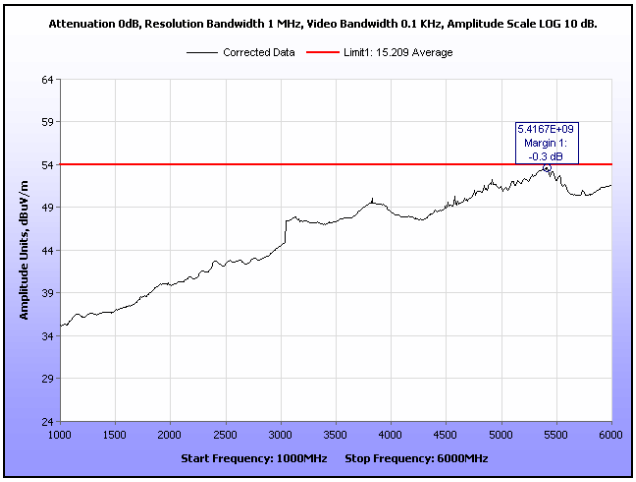


Plot 154. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Average, 23 dBi

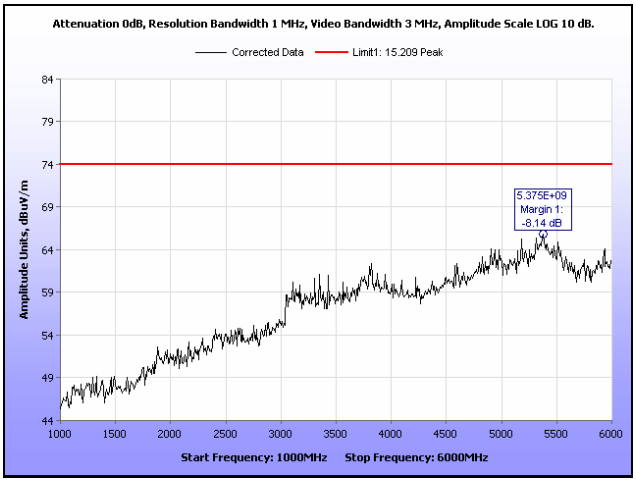


Plot 155. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 23 dBi

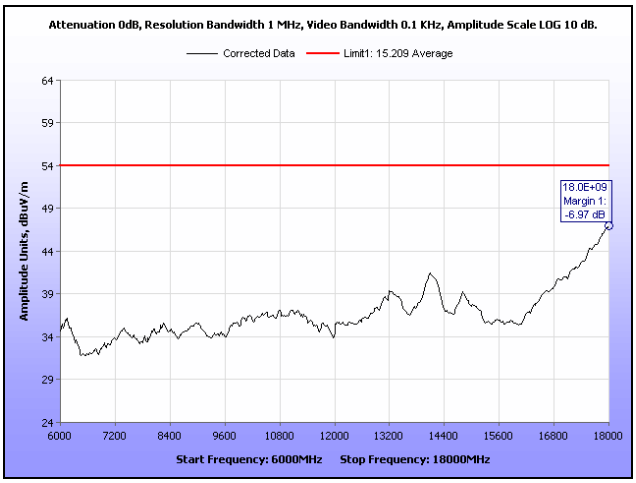
Radiated Spurious Emissions, 20 MHz, 28 dBi



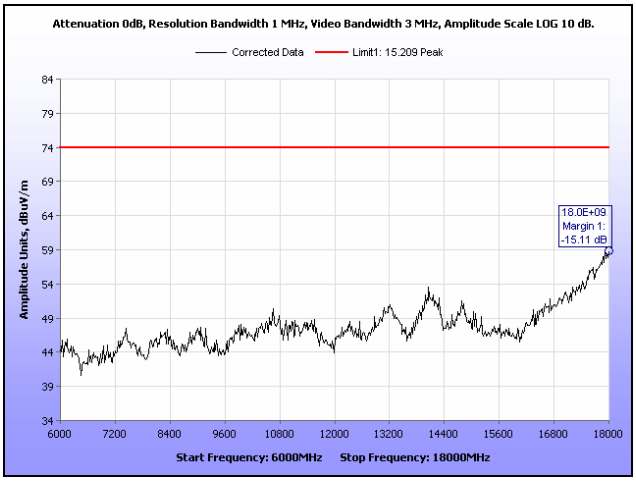
Plot 156. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Average, 28 dBi



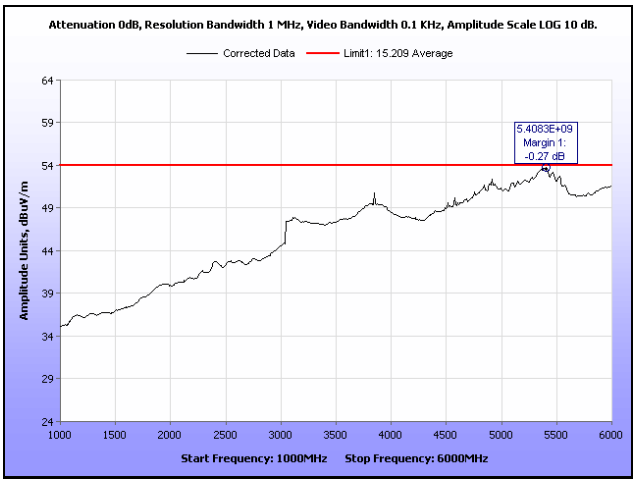
Plot 157. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 28 dBi



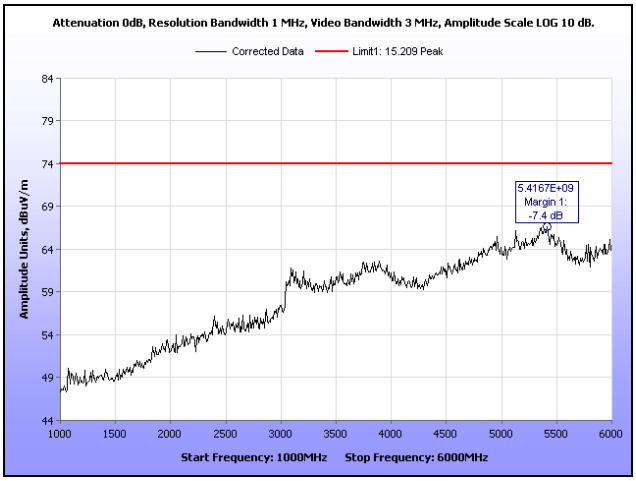
Plot 158. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Average, 28 dBi



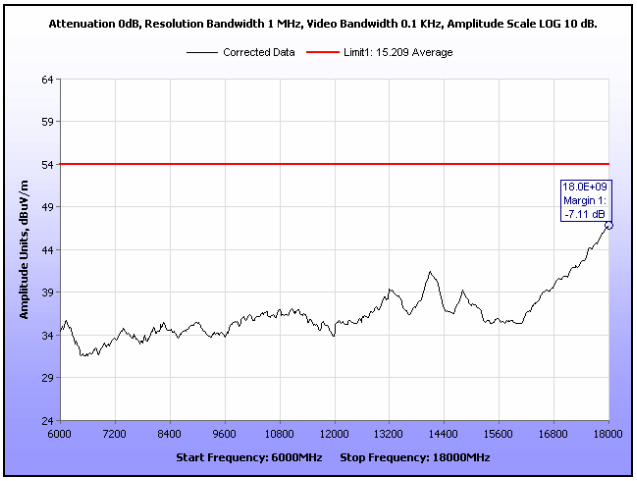
Plot 159. Radiated Spurious Emissions, Low Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 28 dBi



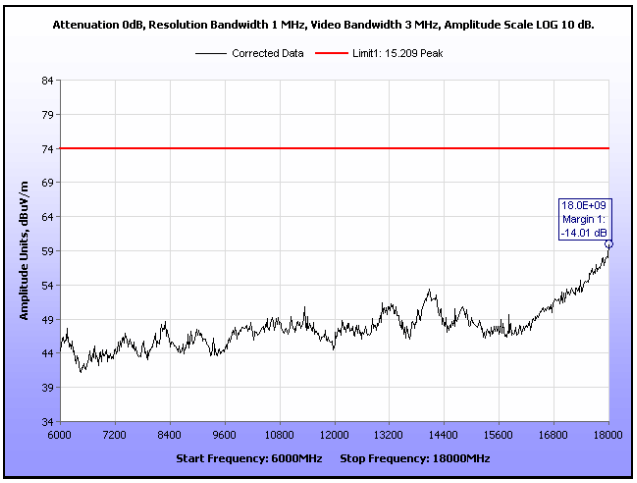
Plot 160. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Average, 28 dBi



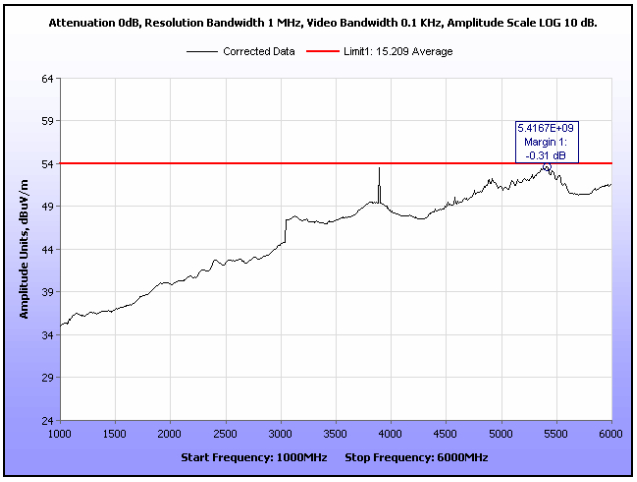
Plot 161. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 28 dBi



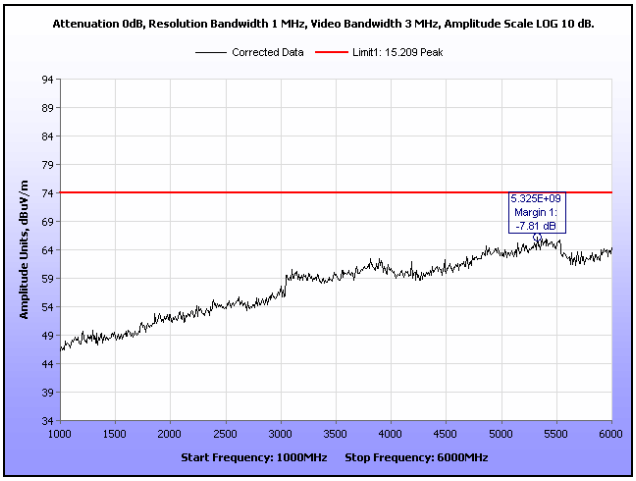
Plot 162. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Average, 28 dBi



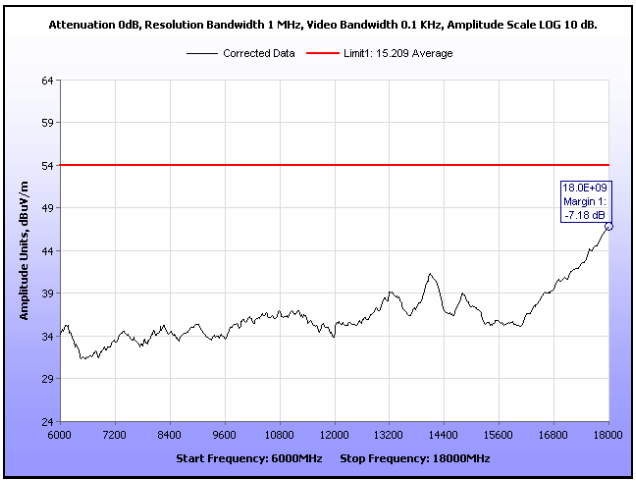
Plot 163. Radiated Spurious Emissions, Mid Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 28 dBi



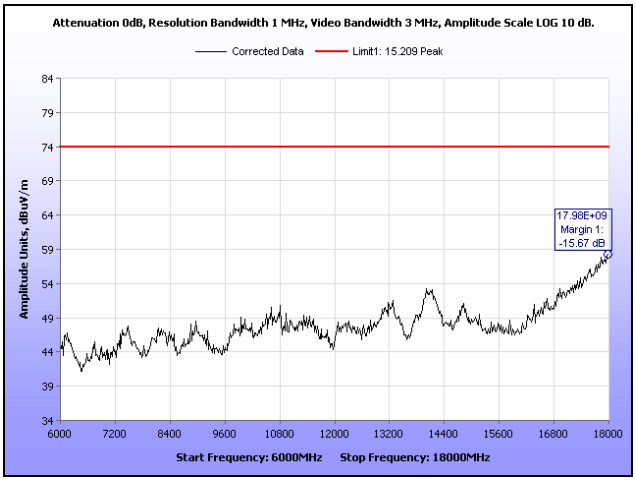
Plot 164. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Average, 28 dBi



Plot 165. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 6 GHz, Peak, 28 dBi

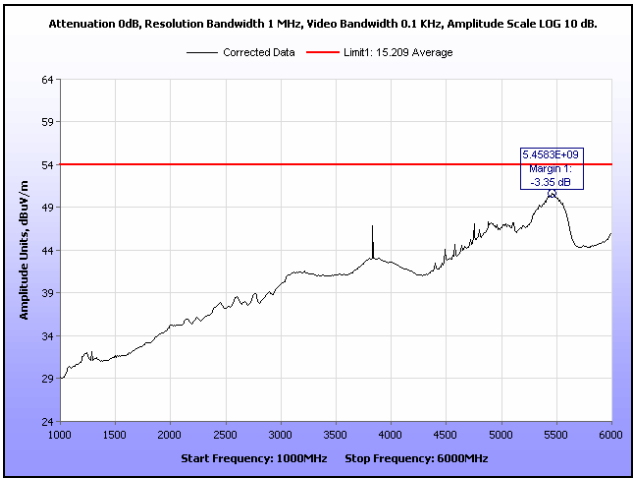


Plot 166. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Average, 28 dBi

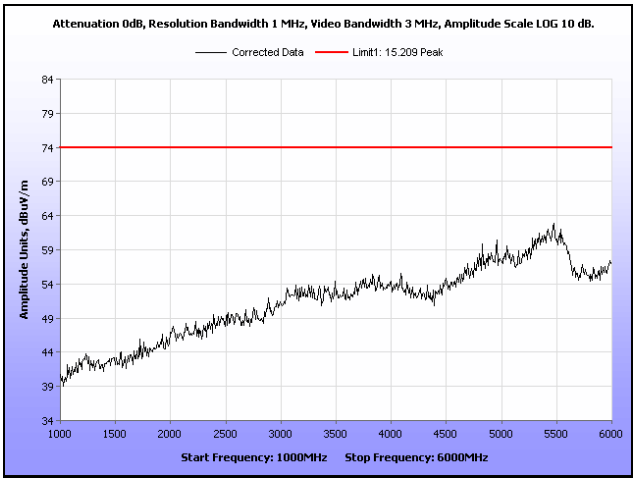


Plot 167. Radiated Spurious Emissions, High Channel, 20 MHz, 6 GHz – 18 GHz, Peak, 28 dBi

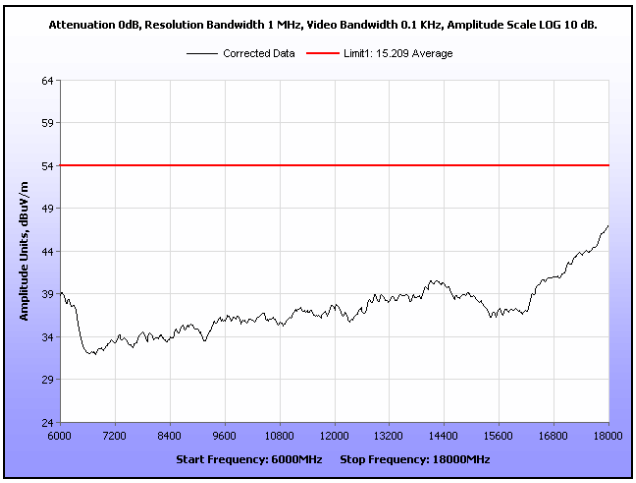
Radiated Spurious Emissions, 40 MHz, 16 dBi



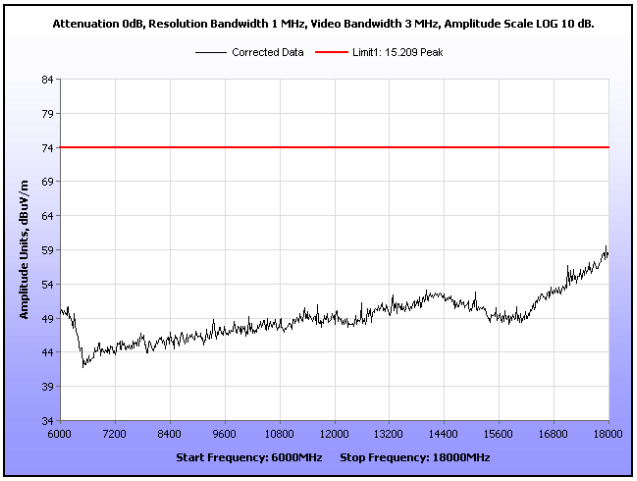
Plot 168. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Average, 16 dBi



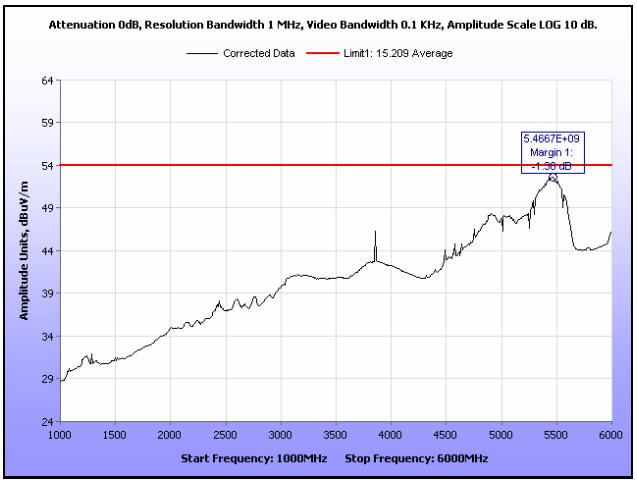
Plot 169. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 16 dBi



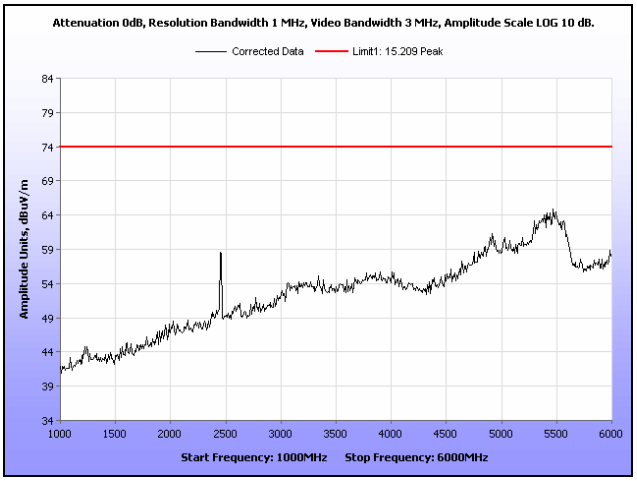
Plot 170. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Average, 16 dBi



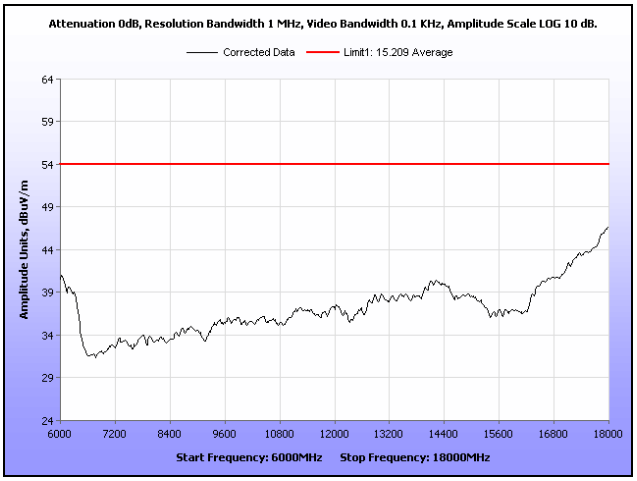
Plot 171. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 16 dBi



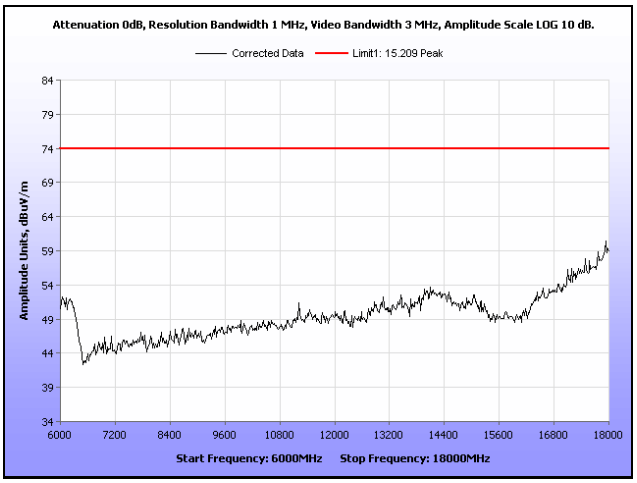
Plot 172. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Average, 16 dBi



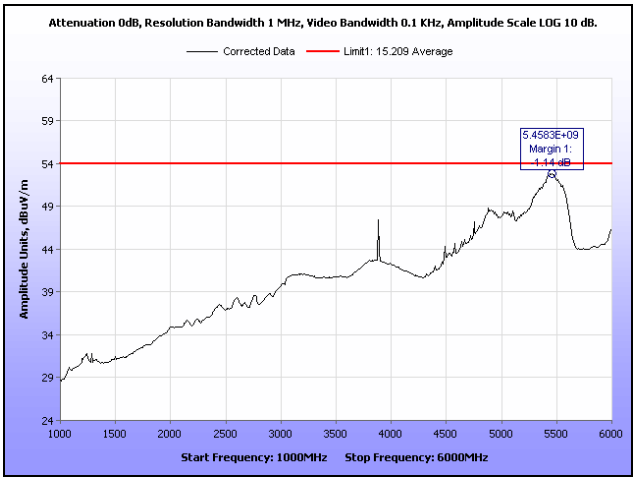
Plot 173. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 16 dBi



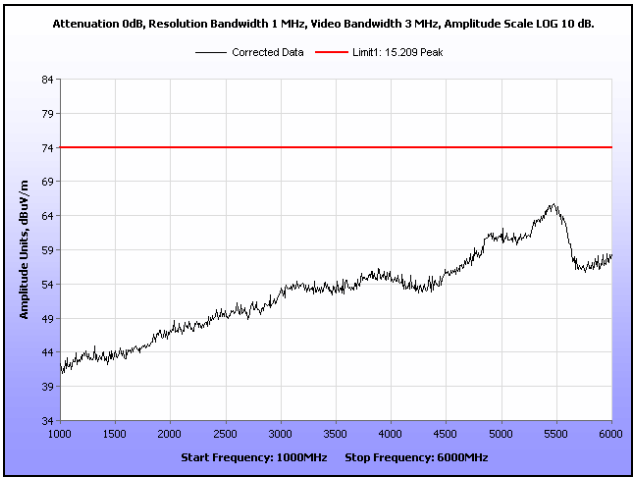
Plot 174. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Average, 16 dBi



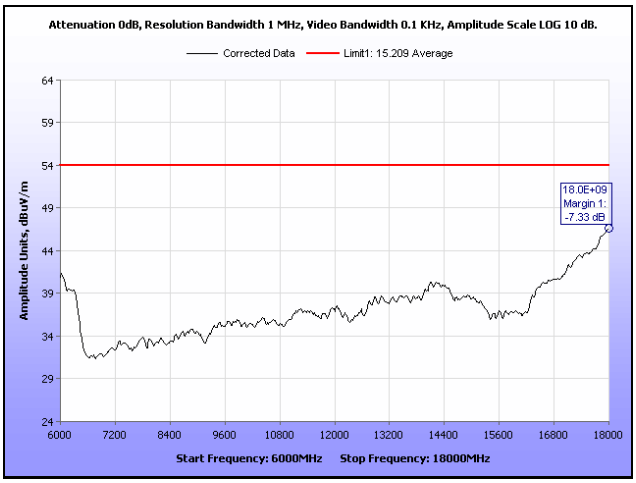
Plot 175. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 16 dBi



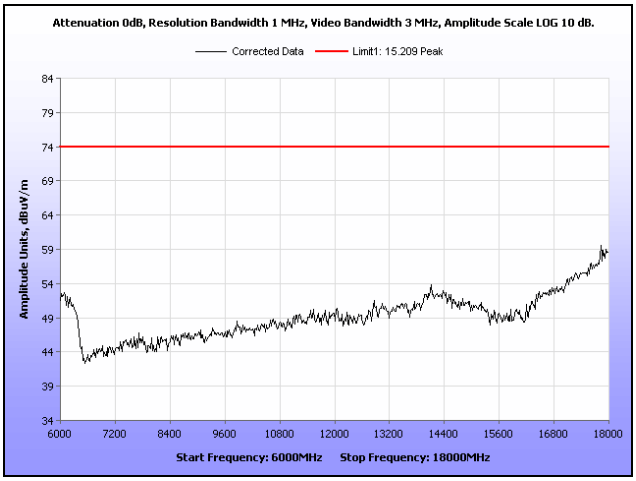
Plot 176. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Average, 16 dBi



Plot 177. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 16 dBi

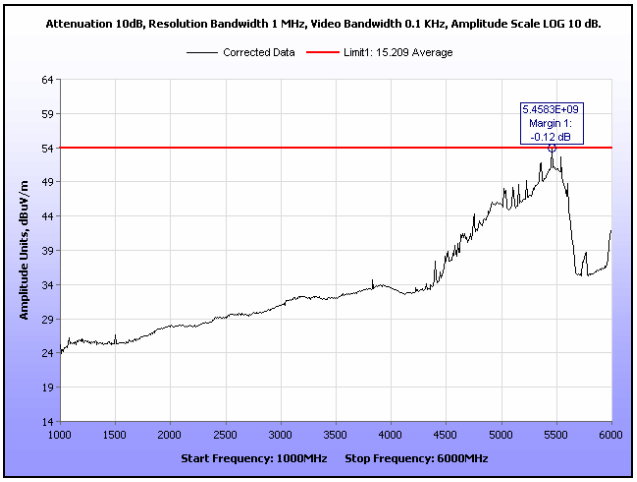


Plot 178. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Average, 16 dBi

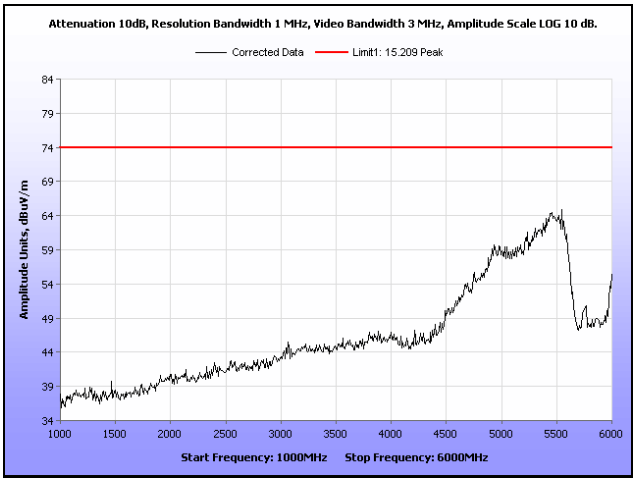


Plot 179. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 16 dBi

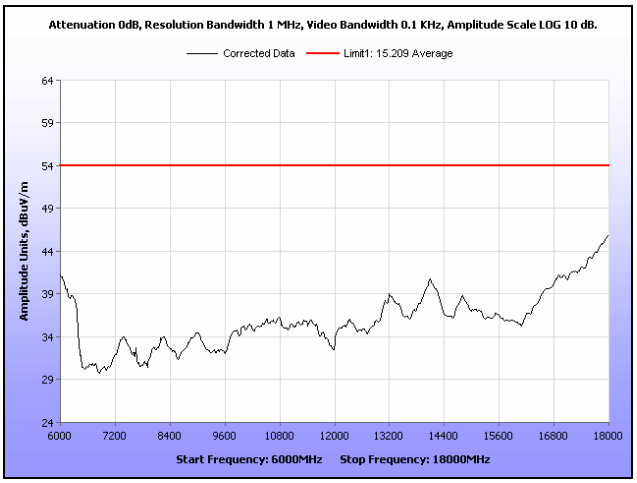
Radiated Spurious Emissions, 40 MHz, 19 dBi



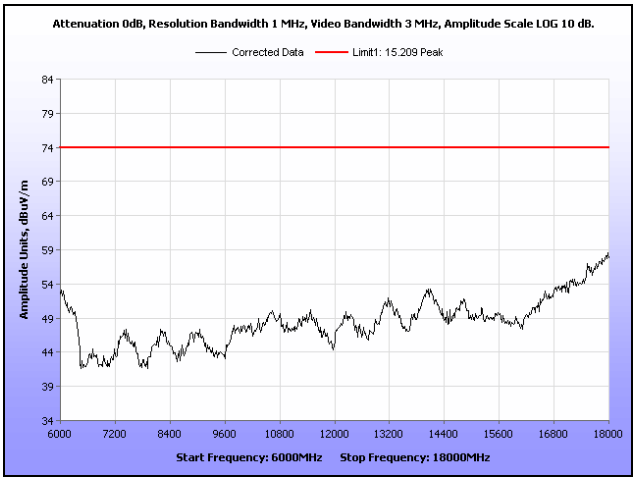
Plot 180. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Average, 19 dBi



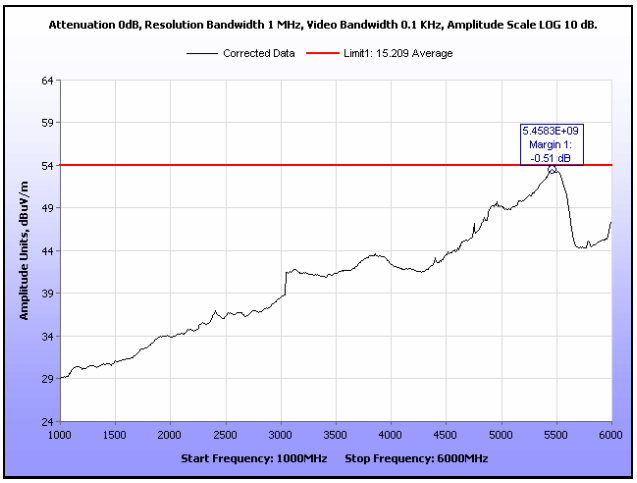
Plot 181. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 19 dBi



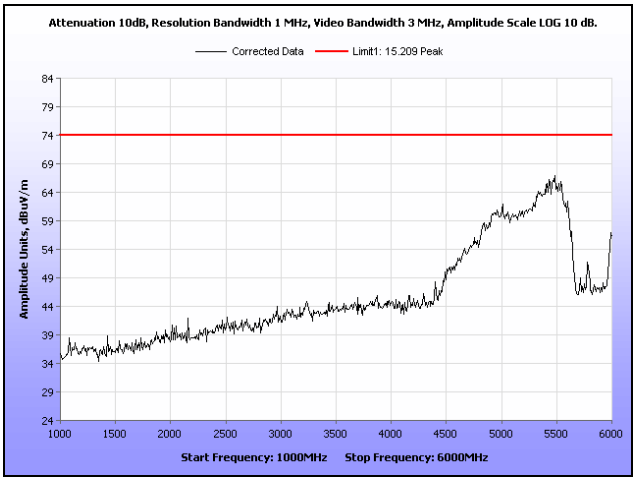
Plot 182. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Average, 19 dBi



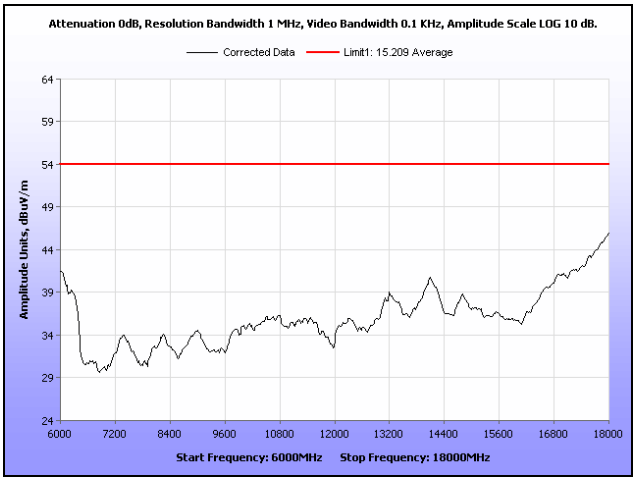
Plot 183. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 19 dBi



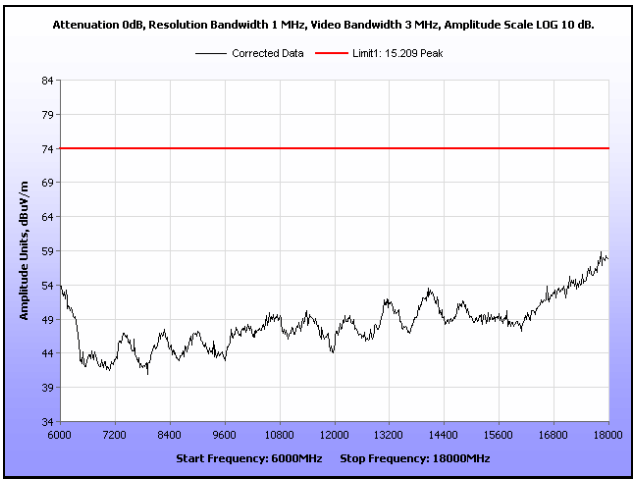
Plot 184. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Average, 19 dBi



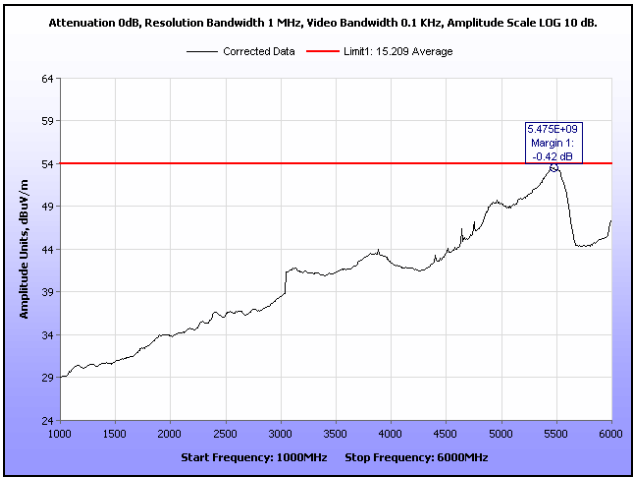
Plot 185. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 19 dBi



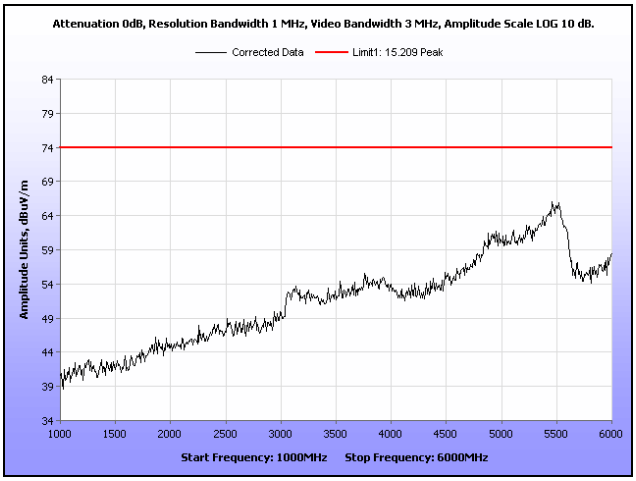
Plot 186. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Average, 19 dBi



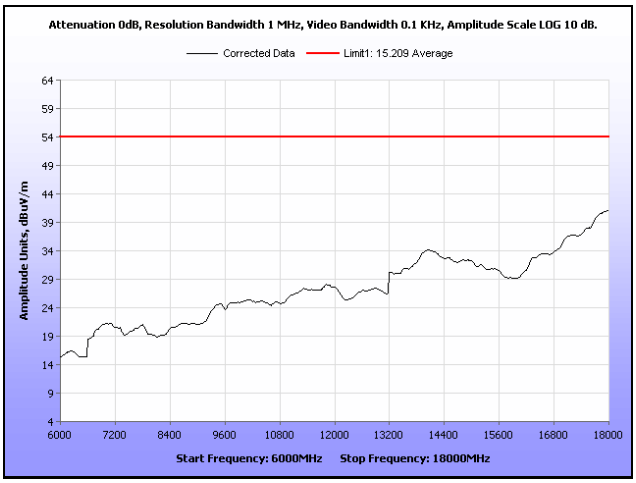
Plot 187. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 19 dBi



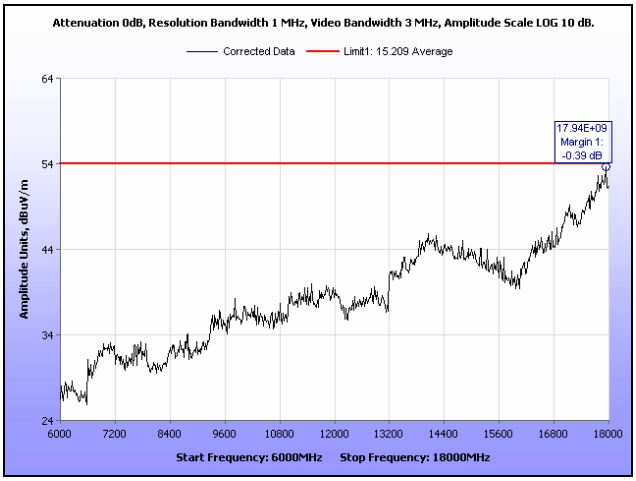
Plot 188. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Average, 19 dBi



Plot 189. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 19 dBi

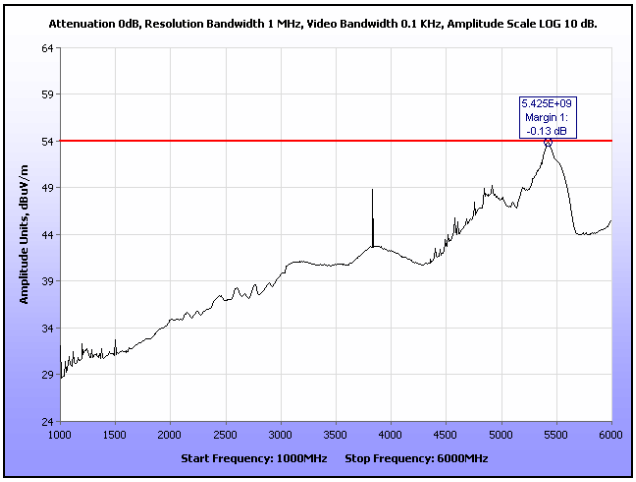


Plot 190. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Average, 19 dBi

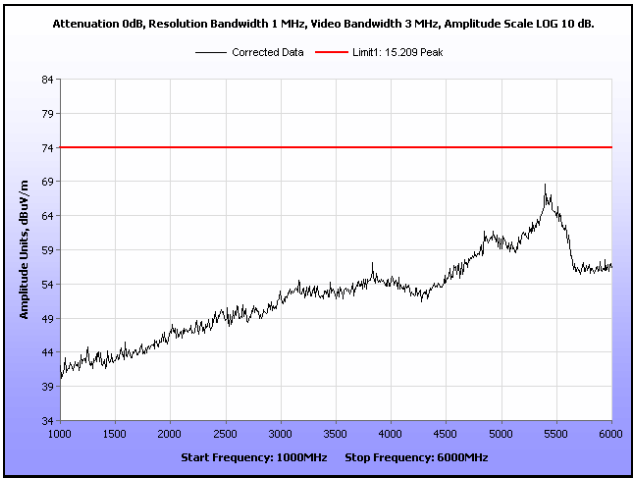


Plot 191. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 19 dBi

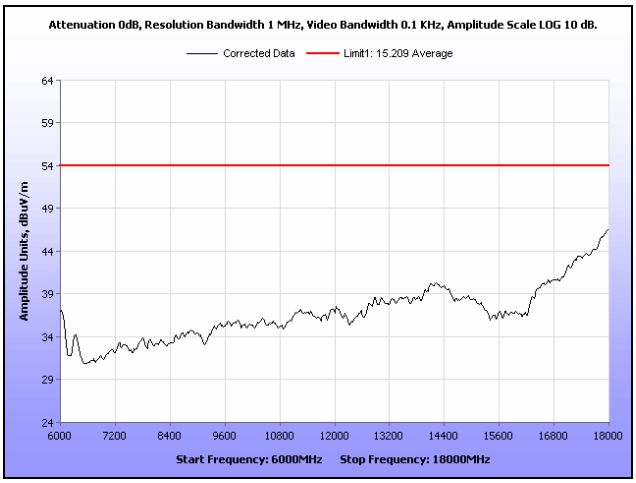
Radiated Spurious Emissions, 40 MHz, 21 dBi



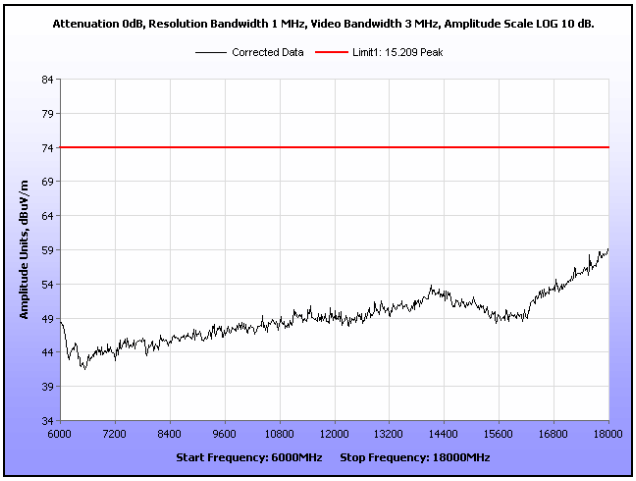
Plot 192. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Average, 21 dBi



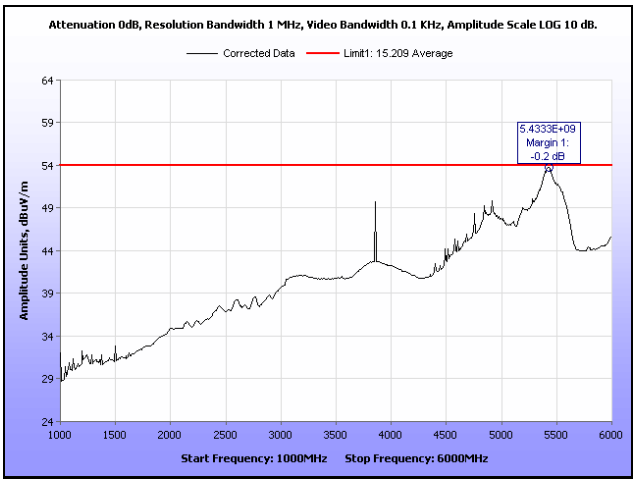
Plot 193. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 21 dBi



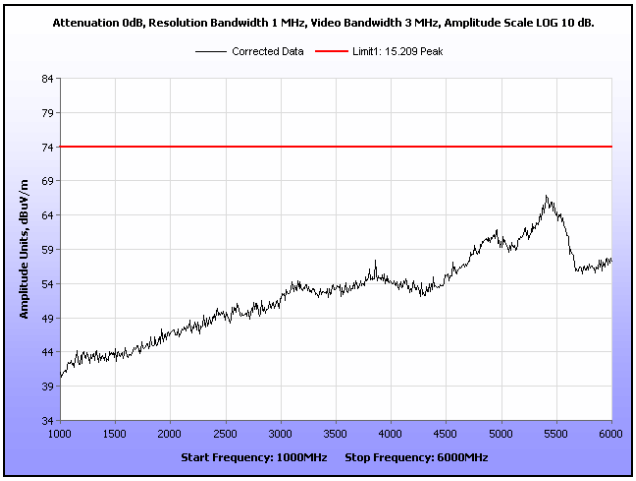
Plot 194. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Average, 21 dBi



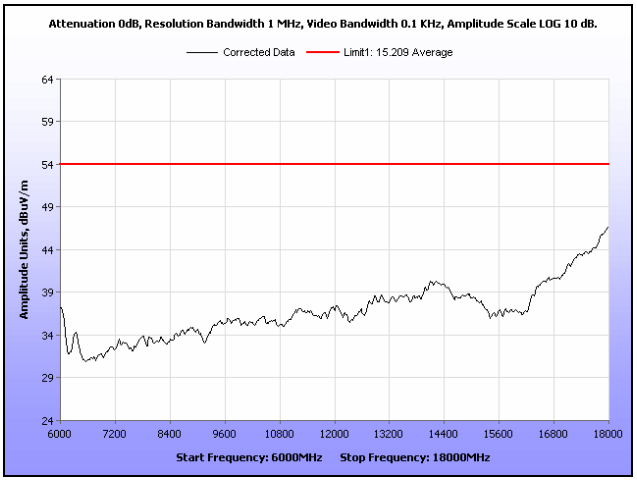
Plot 195. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 21 dBi



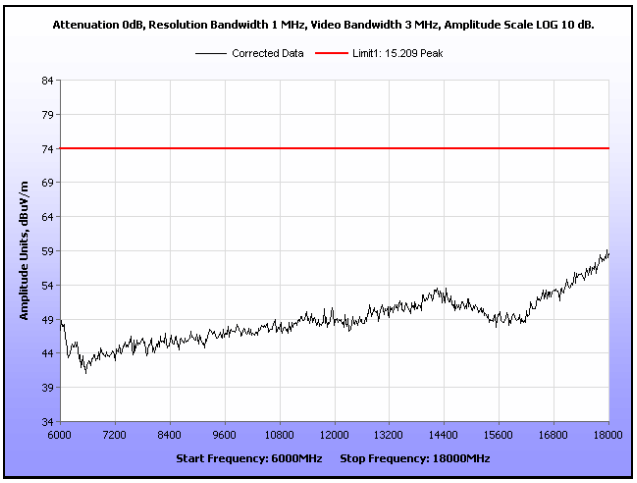
Plot 196. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Average, 21 dBi



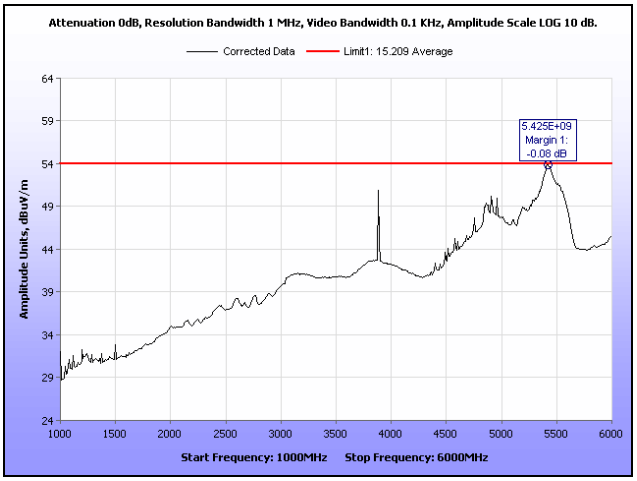
Plot 197. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 21 dBi



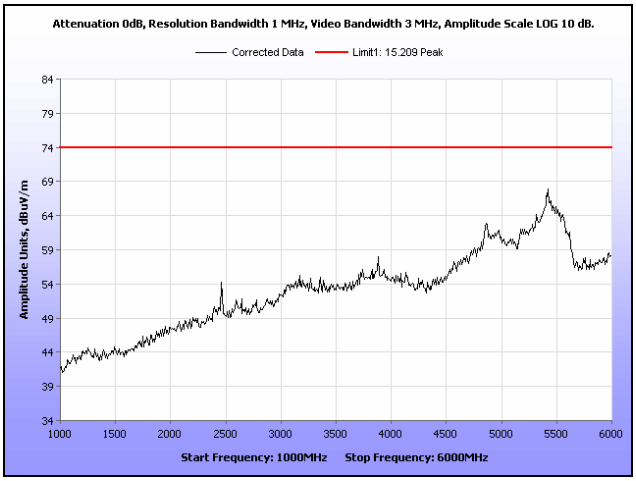
Plot 198. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Average, 21 dBi



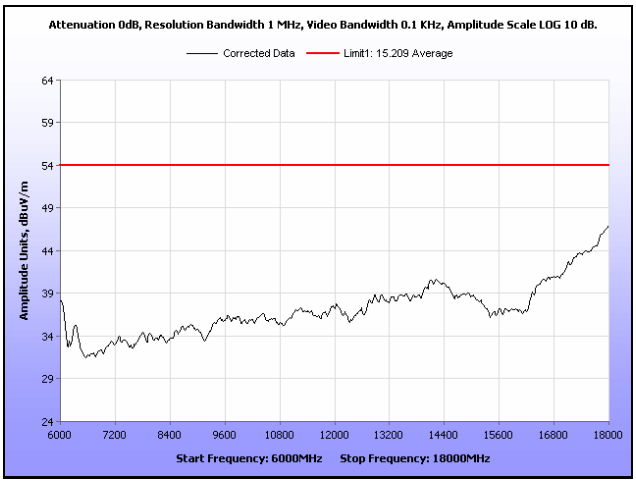
Plot 199. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 21 dBi



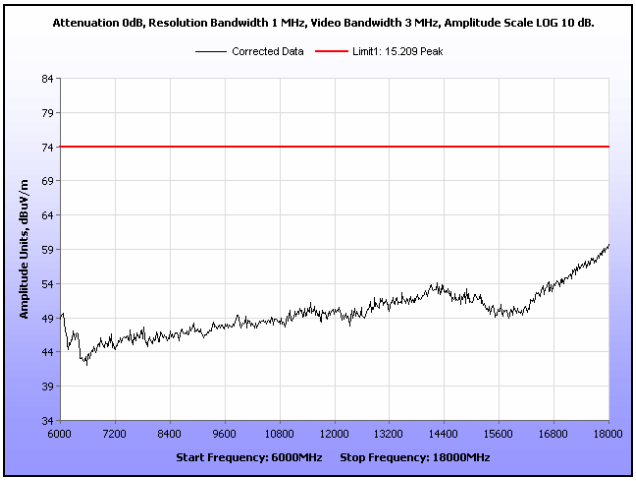
Plot 200. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Average, 21 dBi



Plot 201. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 21 dBi

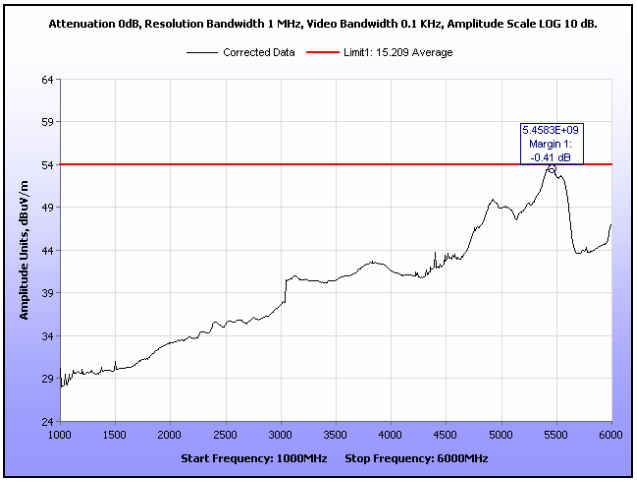


Plot 202. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Average, 21 dBi

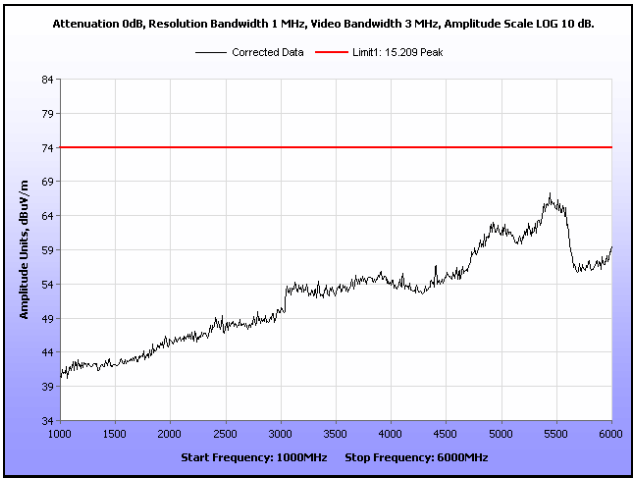


Plot 203. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 21 dBi

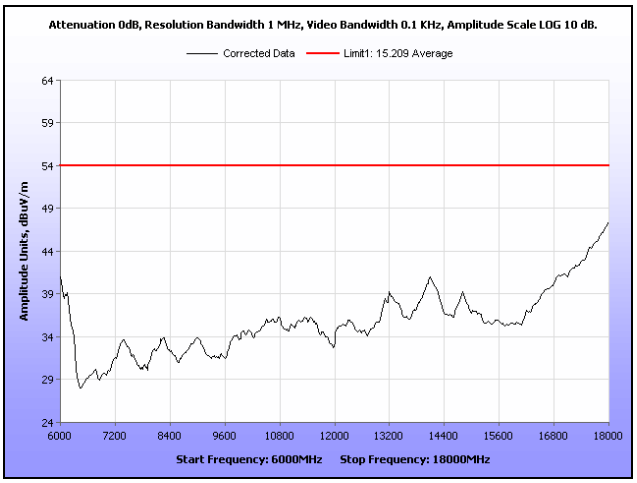
Radiated Spurious Emissions, 40 MHz, 23 dBi



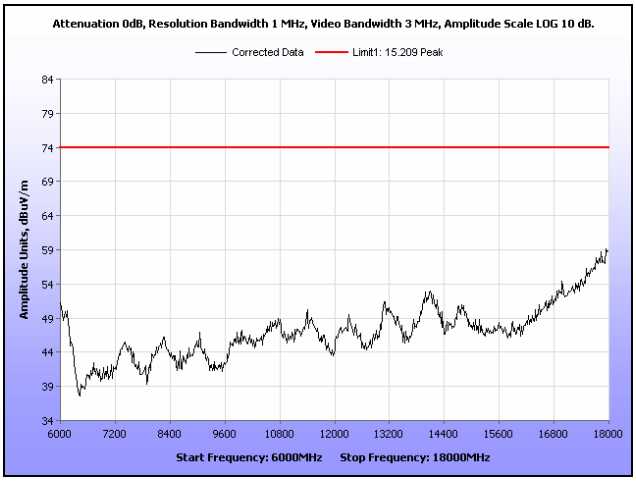
Plot 204. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Average, 23 dBi



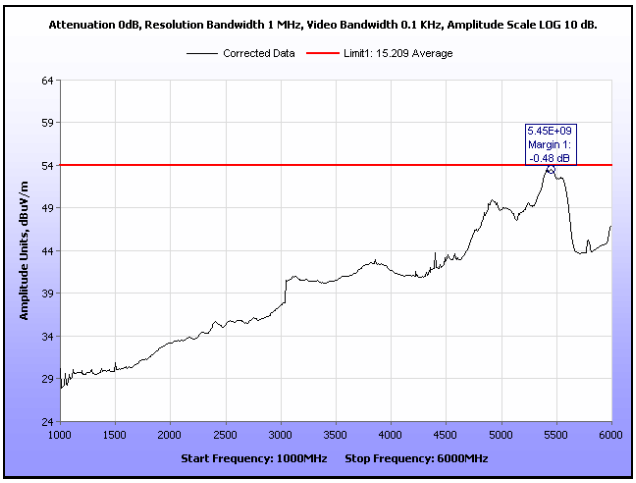
Plot 205. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 23 dBi



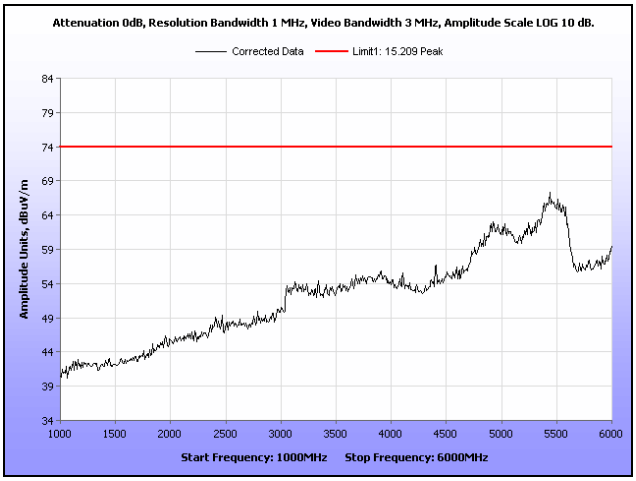
Plot 206. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Average, 23 dBi



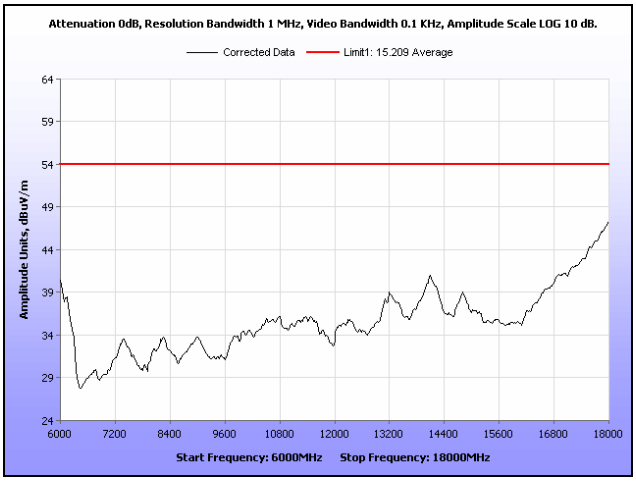
Plot 207. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 23 dBi



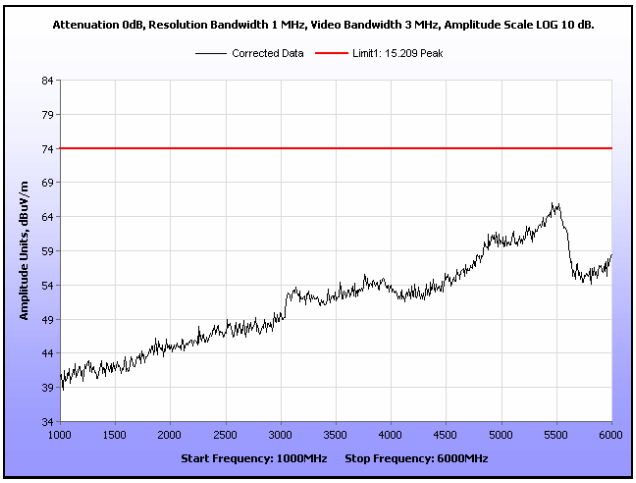
Plot 208. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Average, 23 dBi



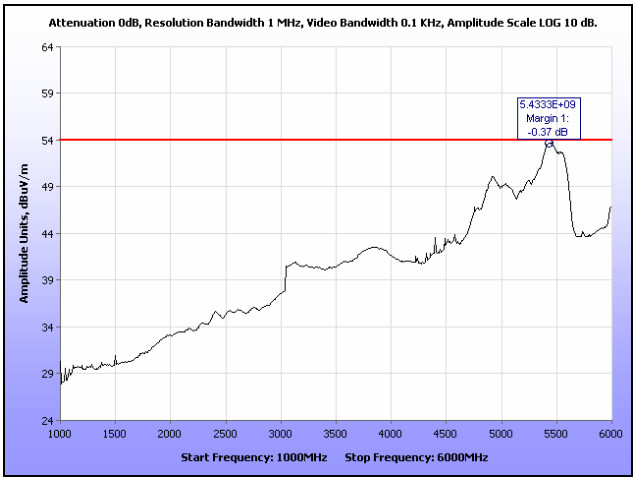
Plot 209. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 23 dBi



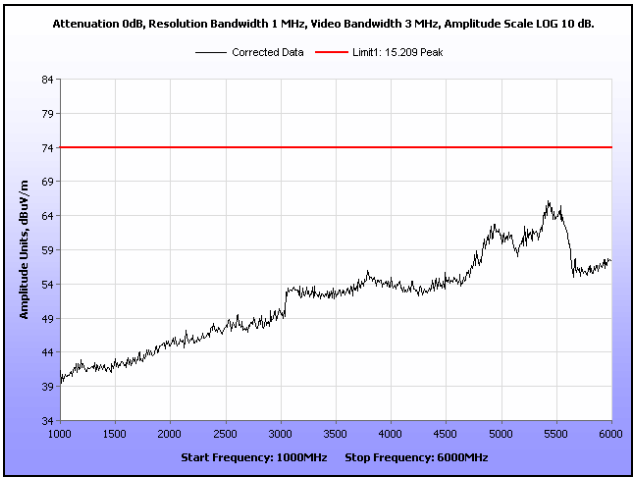
Plot 210. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Average, 23 dBi



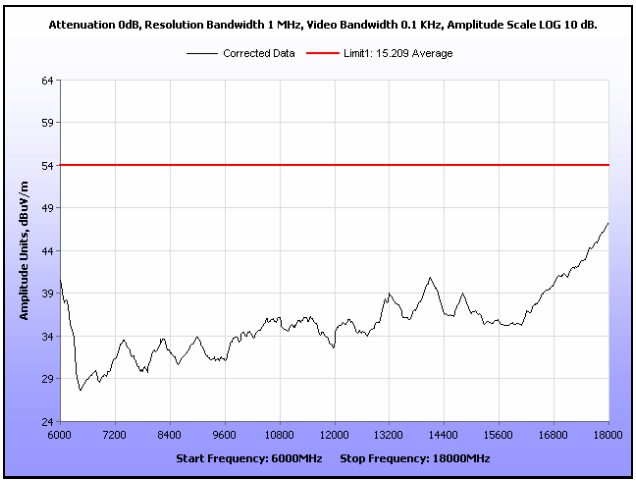
Plot 211. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 23 dBi



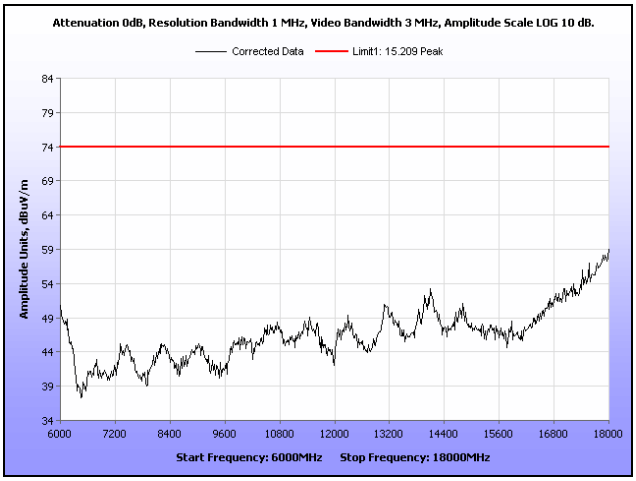
Plot 212. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Average, 23 dBi



Plot 213. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 23 dBi

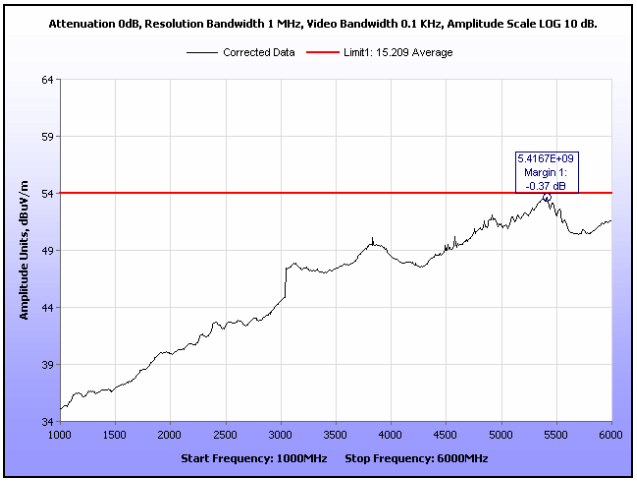


Plot 214. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Average, 23 dBi

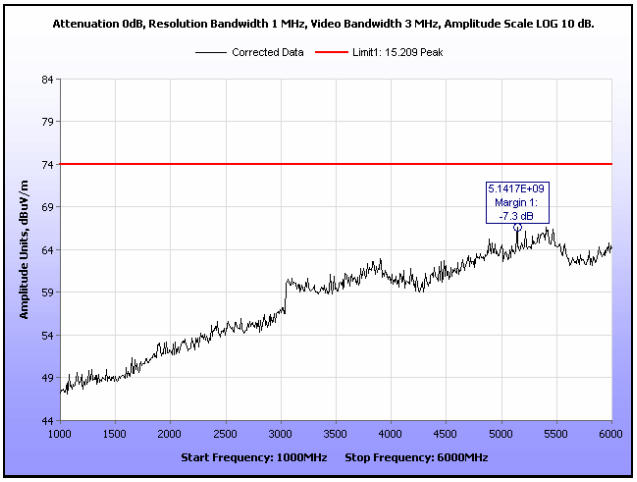


Plot 215. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 23 dBi

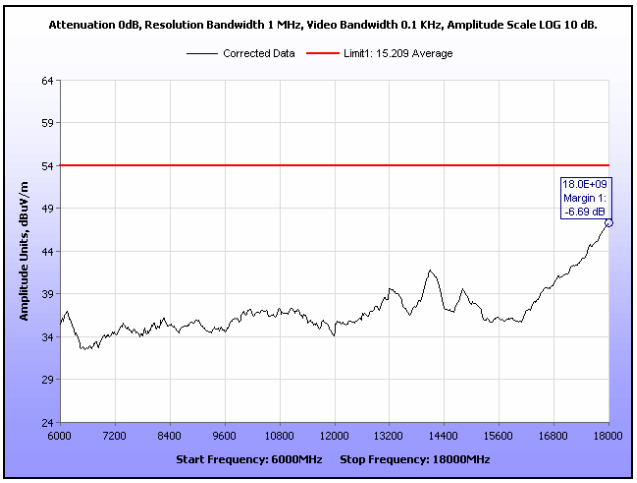
Radiated Spurious Emissions, 40 MHz, 28 dBi



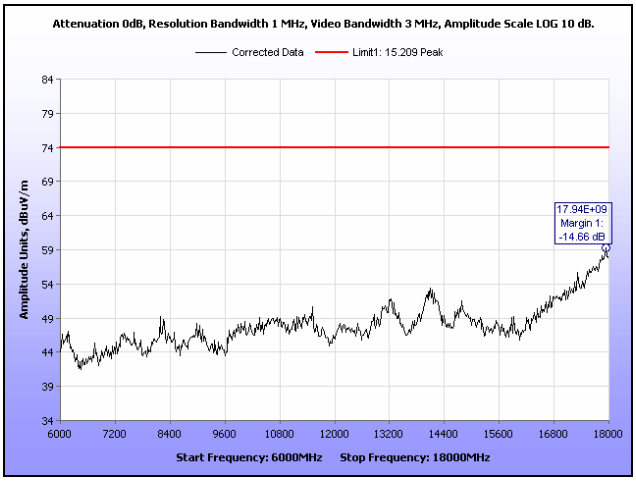
Plot 216. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Average, 28 dBi



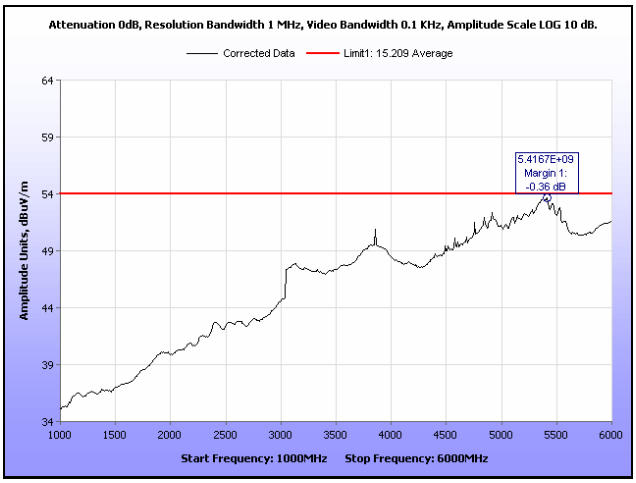
Plot 217. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 28 dBi



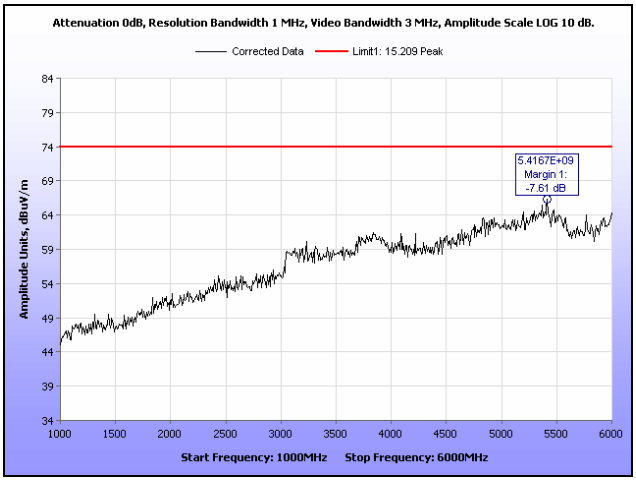
Plot 218. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 28 dBi



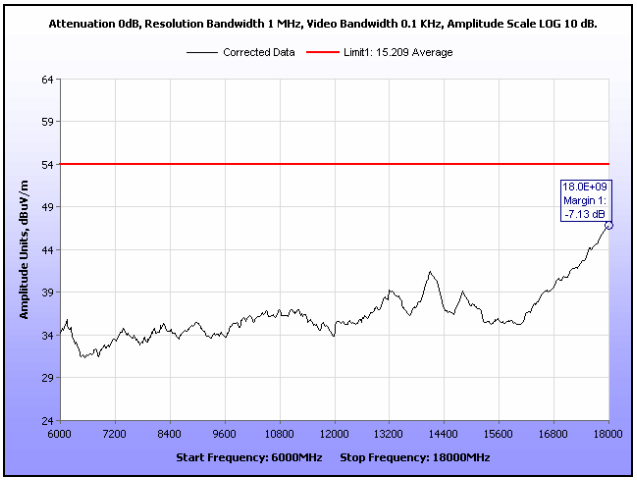
Plot 219. Radiated Spurious Emissions, Low Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 28 dBi



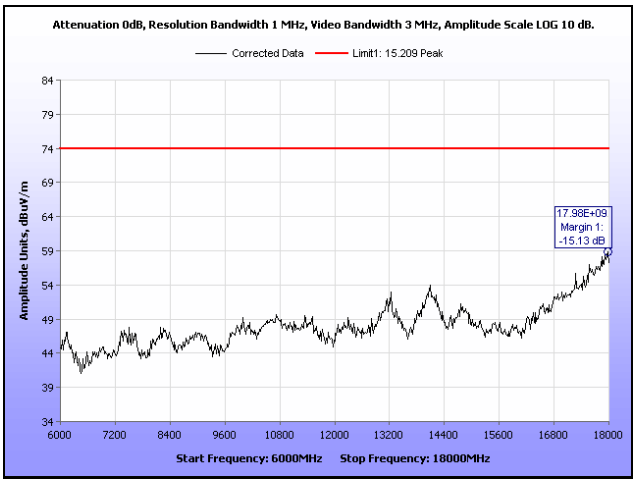
Plot 220. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Average, 28 dBi



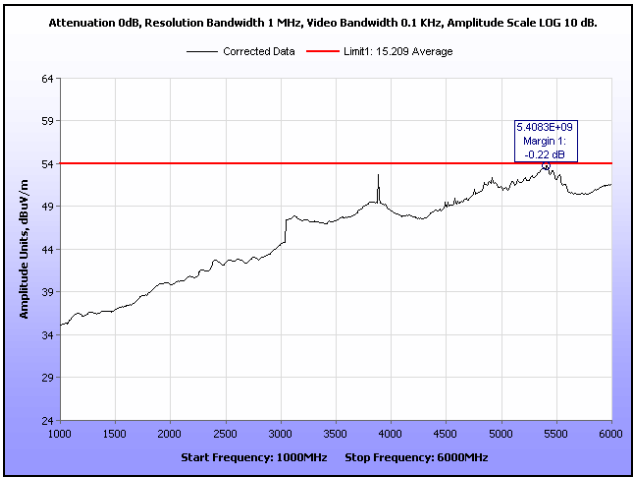
Plot 221. Radiated Spurious Emissions, Mid Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 28 dBi



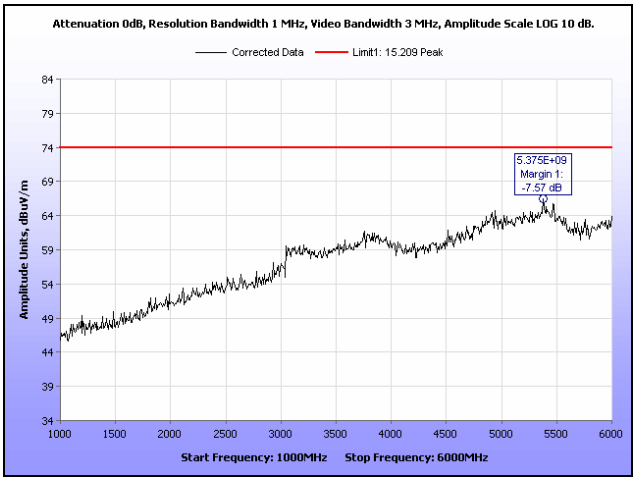
Plot 222. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 28 dBi



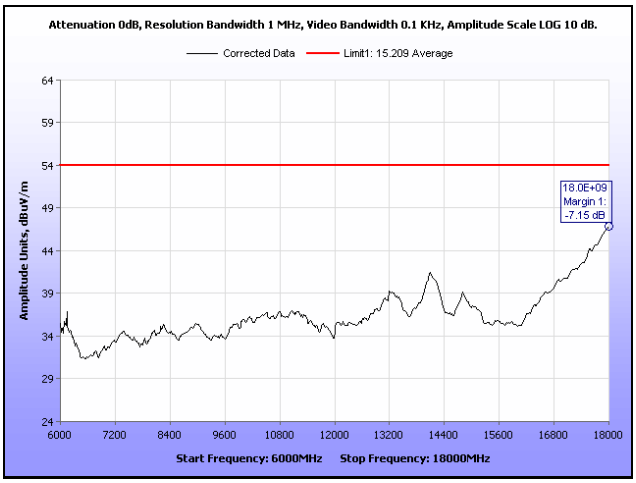
Plot 223. Radiated Spurious Emissions, Mid Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 28 dBi



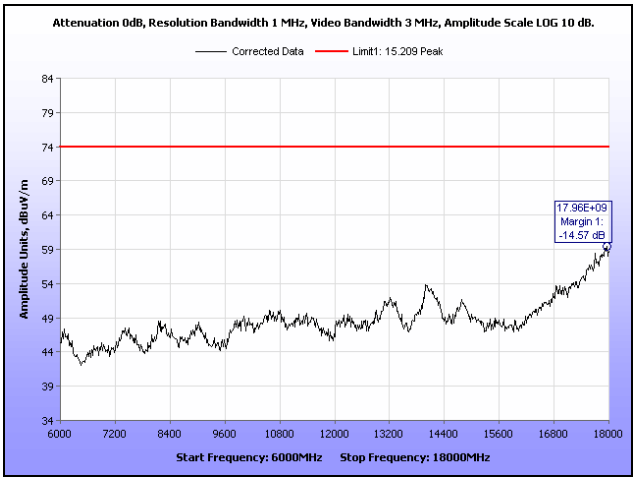
Plot 224. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Average, 28 dBi



Plot 225. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 6 GHz, Peak, 28 dBi

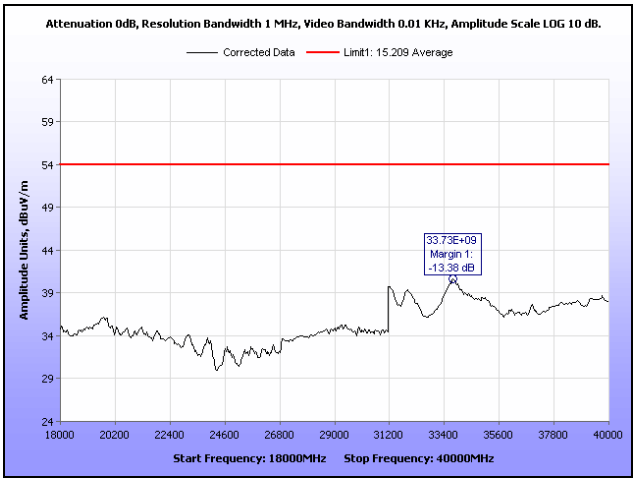


Plot 226. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 28 dBi

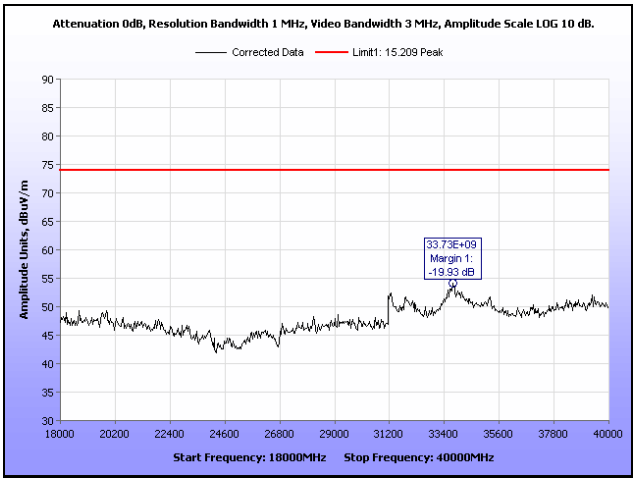


Plot 227. Radiated Spurious Emissions, High Channel, 40 MHz, 6 GHz – 18 GHz, Peak, 28 dBi

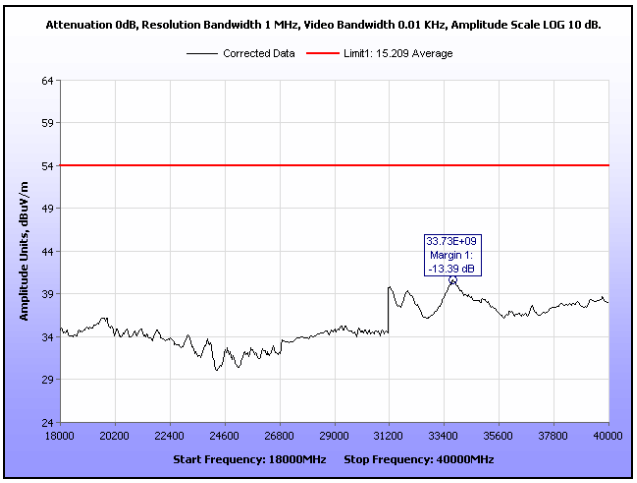
Radiated Spurious Emissions, 20 MHz, 18 GHz – 40 GHz



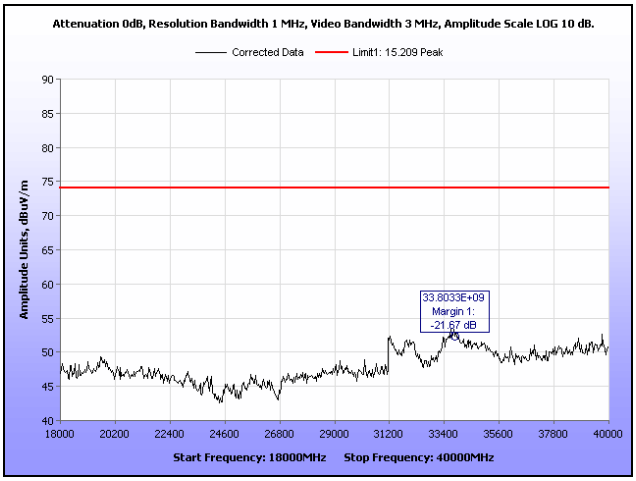
Plot 228. Radiated Spurious Emissions, Low Channel, 20 MHz, 18 GHz – 40 GHz, Average



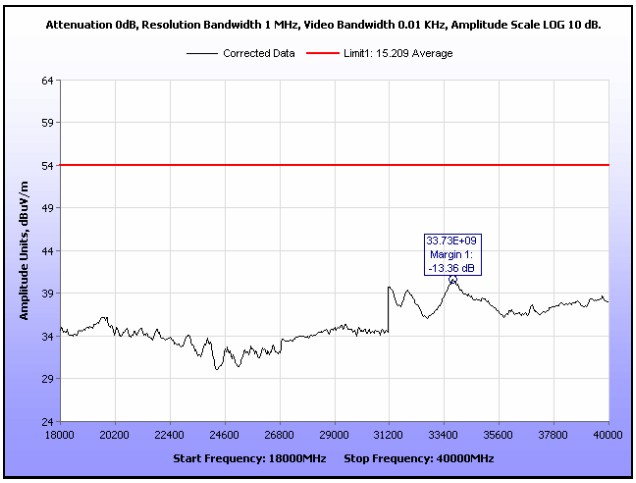
Plot 229. Radiated Spurious Emissions, Low Channel, 20 MHz, 18 GHz – 40 GHz, Peak



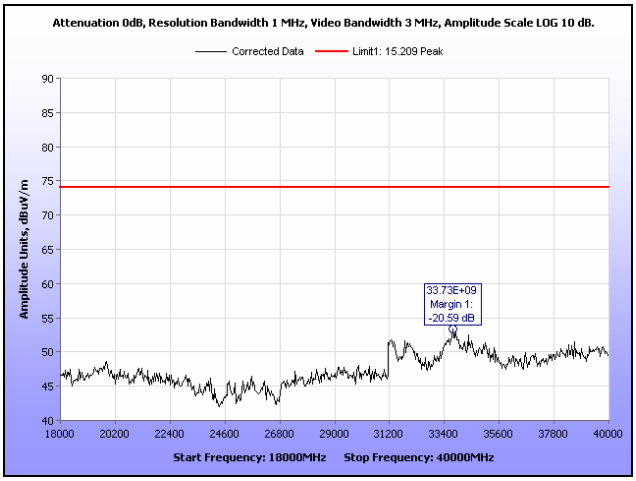
Plot 230. Radiated Spurious Emissions, Mid Channel, 20 MHz, 18 GHz – 40 GHz, Average



Plot 231. Radiated Spurious Emissions, Mid Channel, 20 MHz, 18 GHz – 40 GHz, Peak

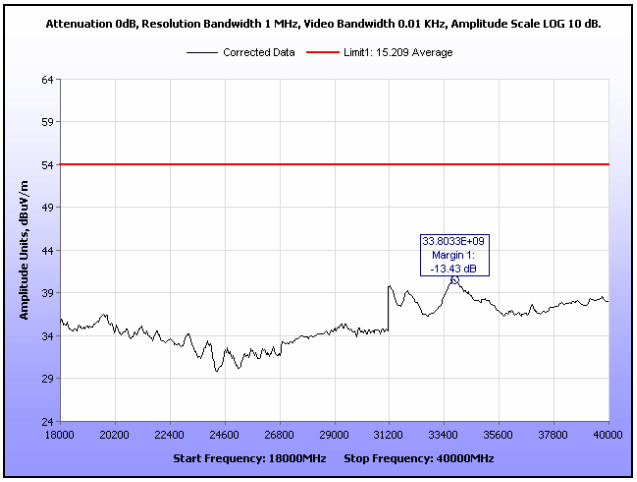


Plot 232. Radiated Spurious Emissions, High Channel, 20 MHz, 18 GHz – 40 GHz, Average

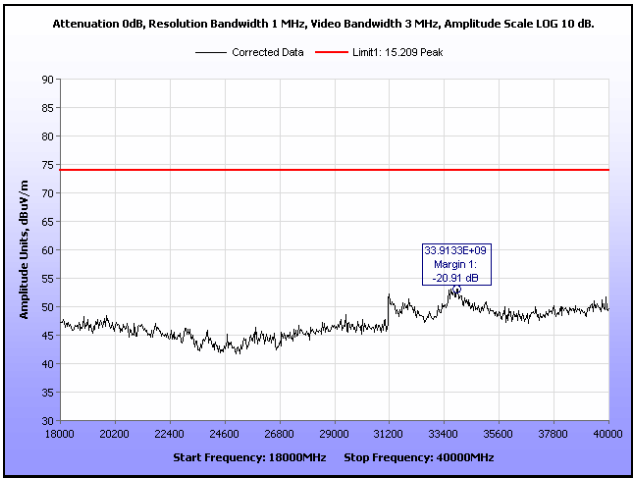


Plot 233. Radiated Spurious Emissions, High Channel, 20 MHz, 18 GHz – 40 GHz, Peak

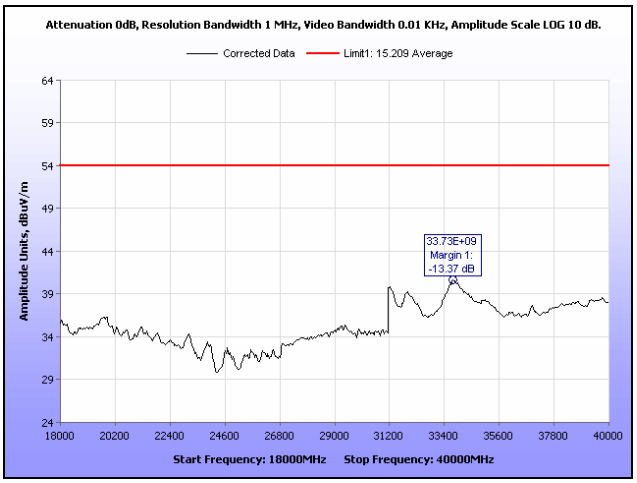
Radiated Spurious Emissions, 40 MHz, 18 GHz – 40 GHz



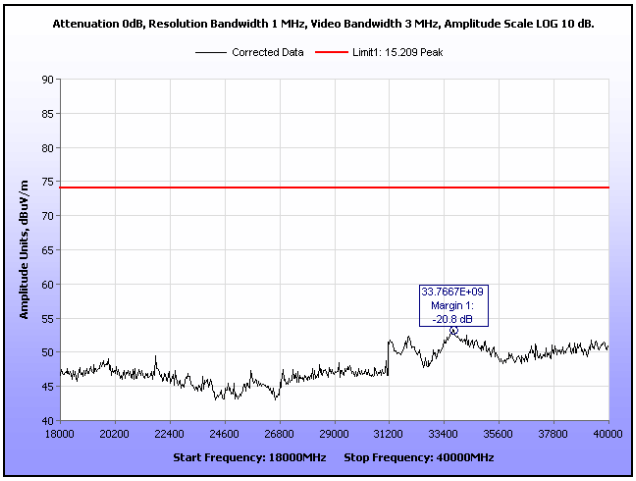
Plot 234. Radiated Spurious Emissions, Low Channel, 40 MHz, 18 GHz – 40 GHz, Average



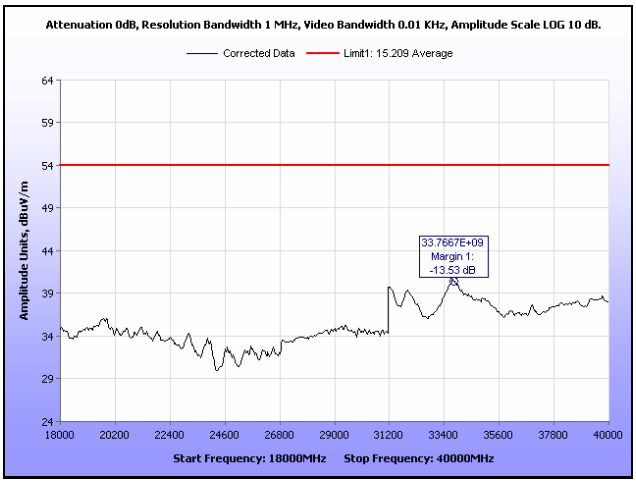
Plot 235. Radiated Spurious Emissions, Low Channel, 40 MHz, 18 GHz – 40 GHz, Peak



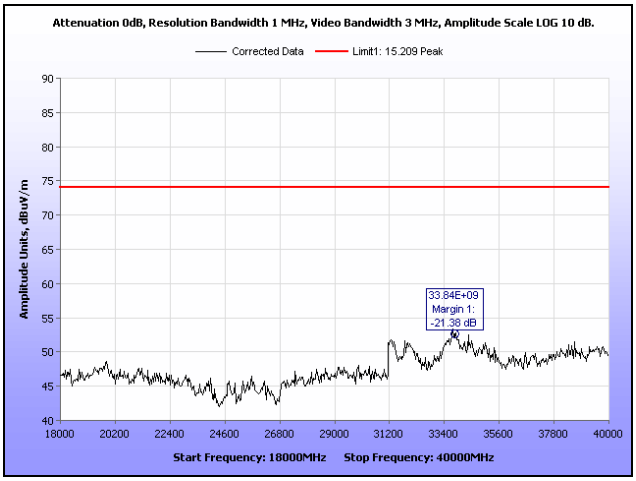
Plot 236. Radiated Spurious Emissions, Mid Channel, 40 MHz, 18 GHz – 40 GHz, Average



Plot 237. Radiated Spurious Emissions, Mid Channel, 40 MHz, 18 GHz – 40 GHz, Peak

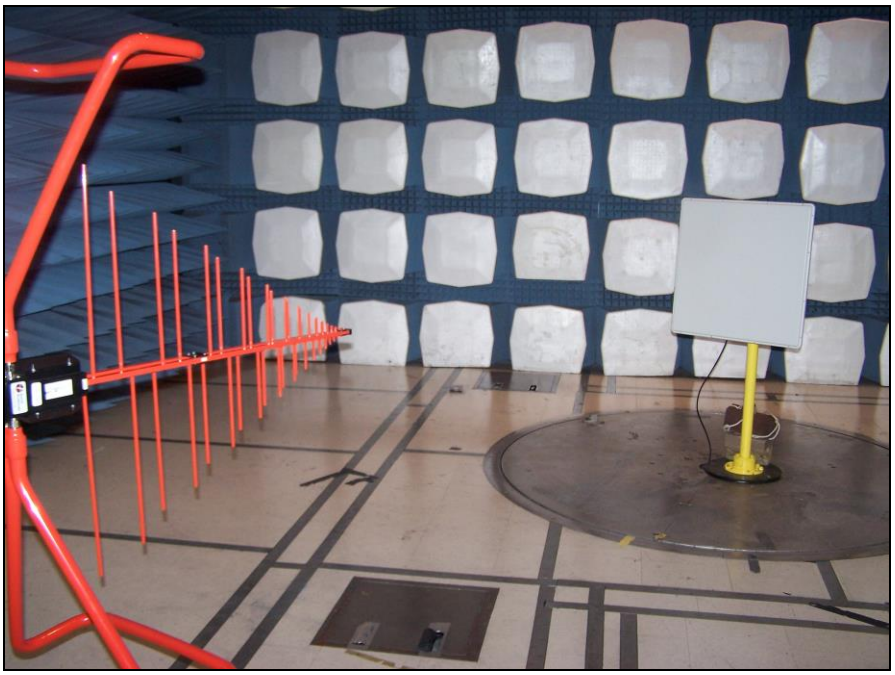


Plot 238. Radiated Spurious Emissions, High Channel, 40 MHz, 18 GHz – 40 GHz, Average

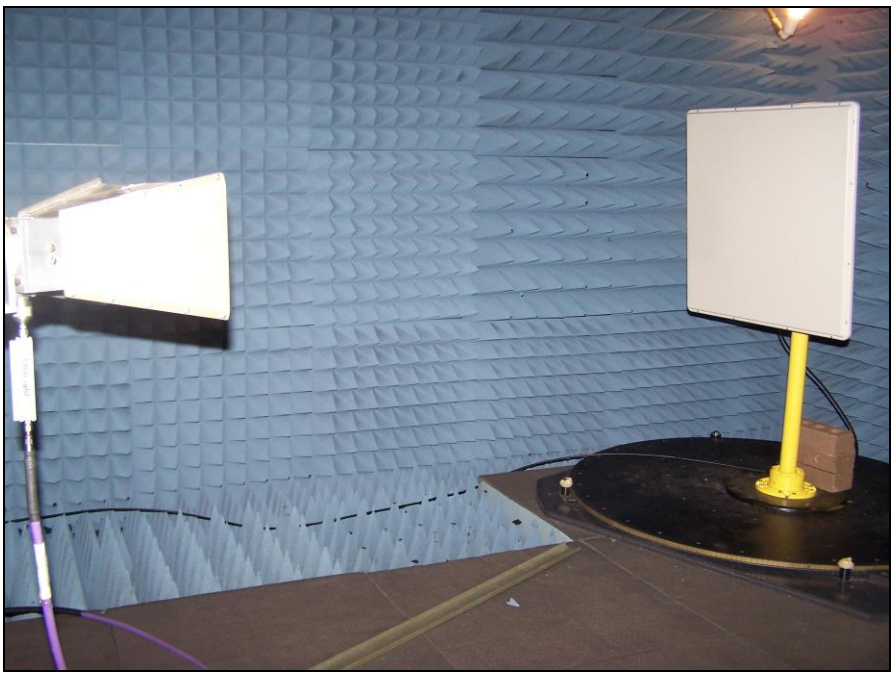


Plot 239. Radiated Spurious Emissions, High Channel, 40 MHz, 18 GHz – 40 GHz, Peak

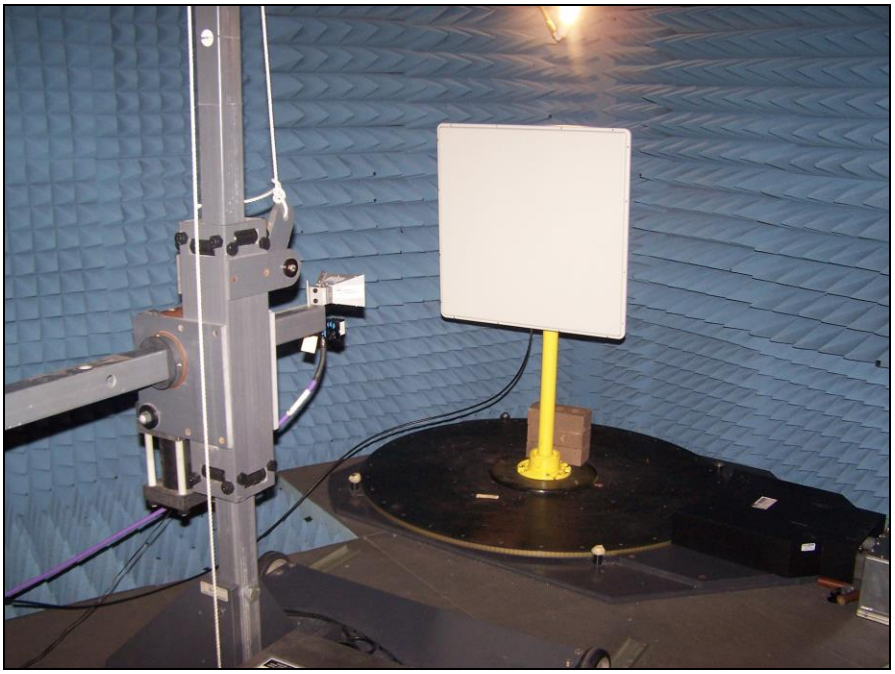
Radiated Spurious Emissions Test Setup



Photograph 5. Radiated Spurious Emissions, Test Setup, 30 MHz – 1 GHz



Photograph 6. Radiated Spurious Emissions, Test Setup, 1 GHz – 18 GHz



Photograph 7. Radiated Spurious Emissions, Test Setup, 18 GHz – 40 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) RF Conducted Spurious Emissions Requirements and Band Edge

Test Requirement: **15.247(d)** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure: For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Since the EUT had an integral antenna, conducted measurements could not be performed. Measurements needed to be taken radiated. An antenna was located 3 m away from the EUT and plots were taken. The EUT was rotated through all three orthogonal axes. The plots were corrected for both antenna correction factor and cable lost.

See following pages for detailed test results with RF Conducted Spurious Emissions.

Test Results: The EUT was compliant with the Conducted Spurious Emission limits of **§15.247(d)**.

Test Engineer(s): Surinder Singh

Test Date(s): 09/26/13

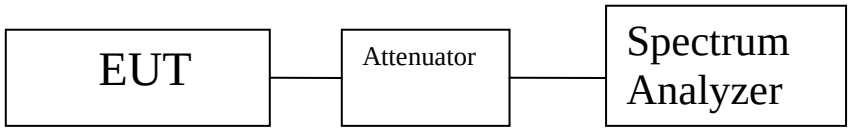
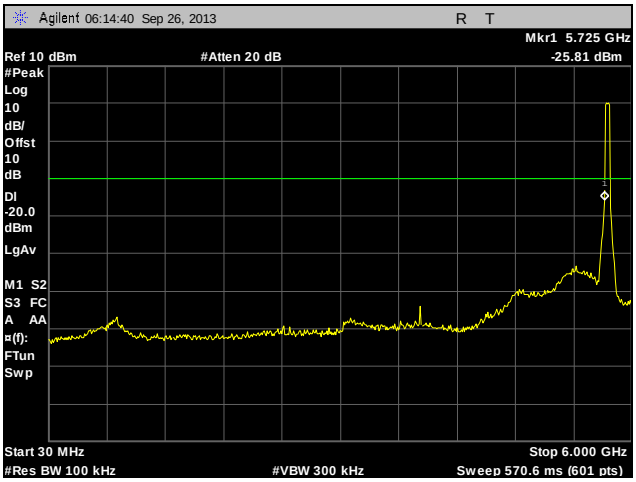
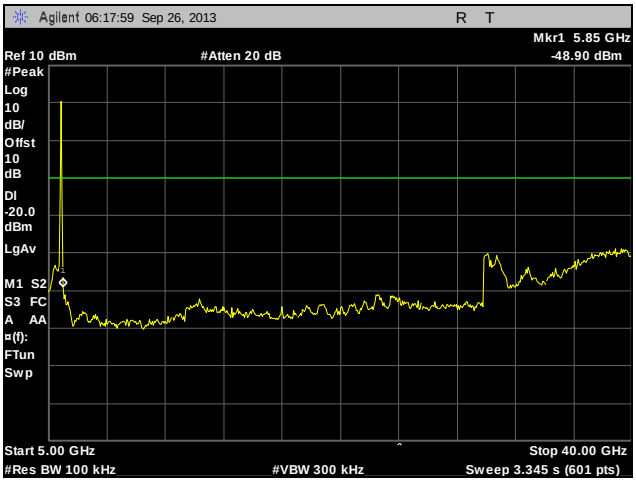


Figure 4. Block Diagram, Conducted Spurious Emissions Test Setup

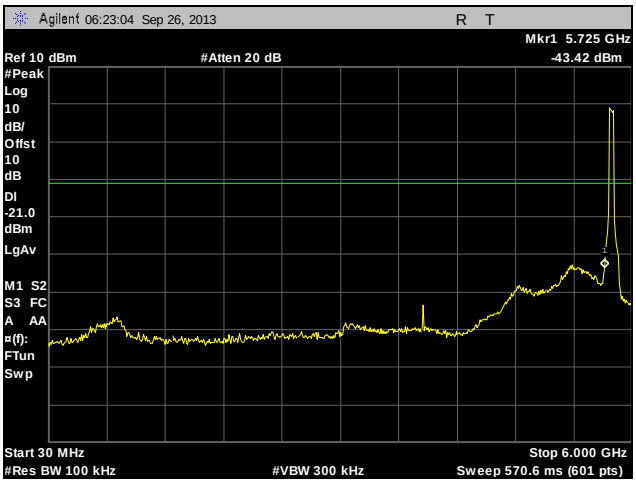
Conducted Spurious Emissions, 20 MHz, Port 1



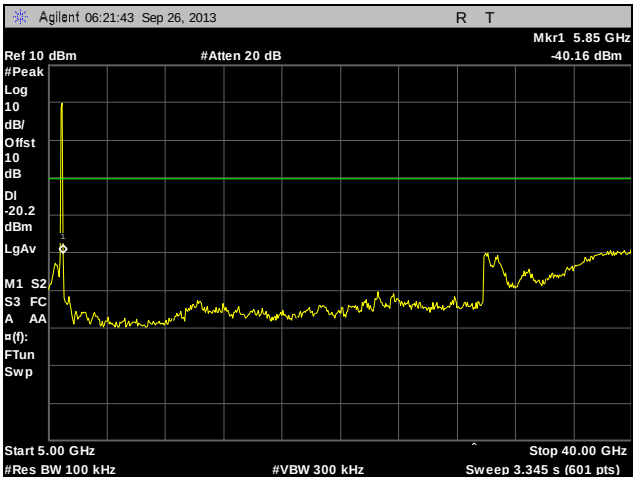
Plot 240. Conducted Spurious Emissions, Low Channel, 20 MHz, Port 1, 30 MHz – 6 GHz



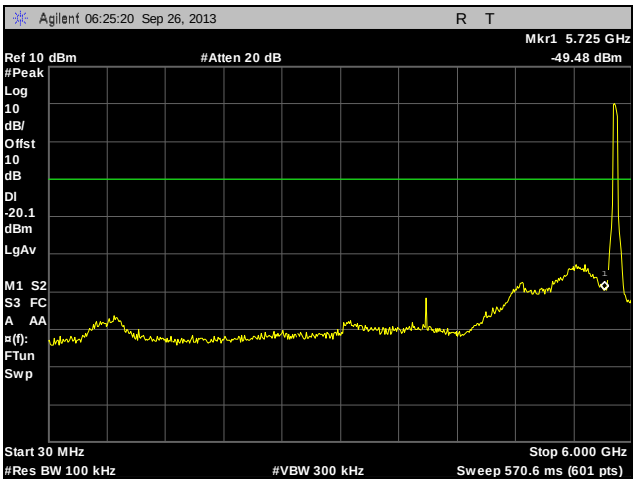
Plot 241. Conducted Spurious Emissions, Low Channel, 20 MHz, Port 1, 5 GHz – 40 GHz



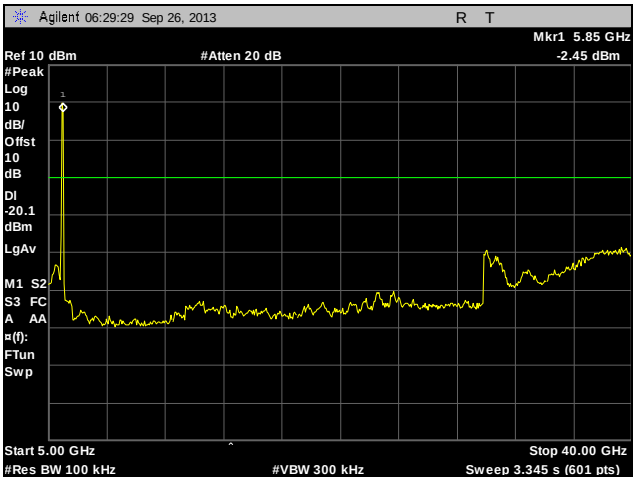
Plot 242. Conducted Spurious Emissions, Mid Channel, 20 MHz, Port 1, 30 MHz – 6 GHz



Plot 243. Conducted Spurious Emissions, Mid Channel, 20 MHz, Port 1, 5 GHz – 40 GHz



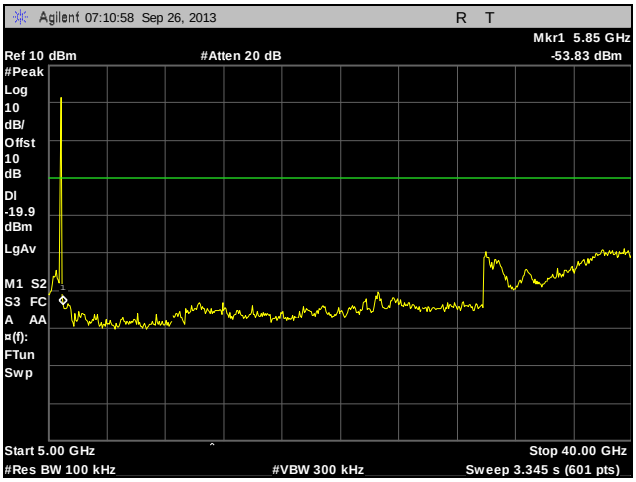
Plot 244. Conducted Spurious Emissions, High Channel, 20 MHz, Port 1, 30 MHz – 6 GHz



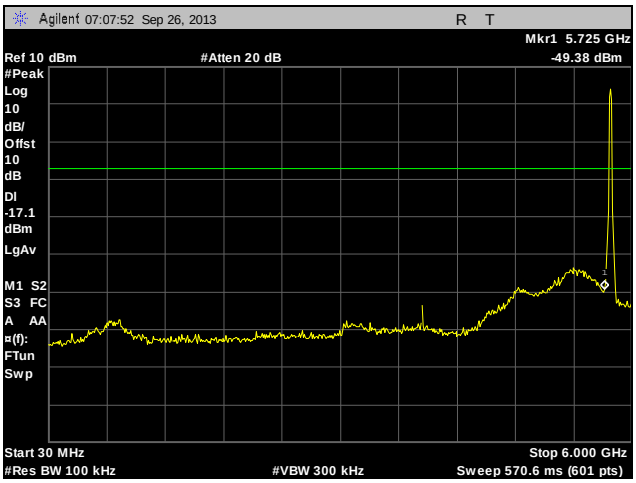
Plot 245. Conducted Spurious Emissions, High Channel, 20 MHz, Port 1, 5 GHz – 40 GHz

Conducted Spurious Emissions, 20 MHz, Port 2

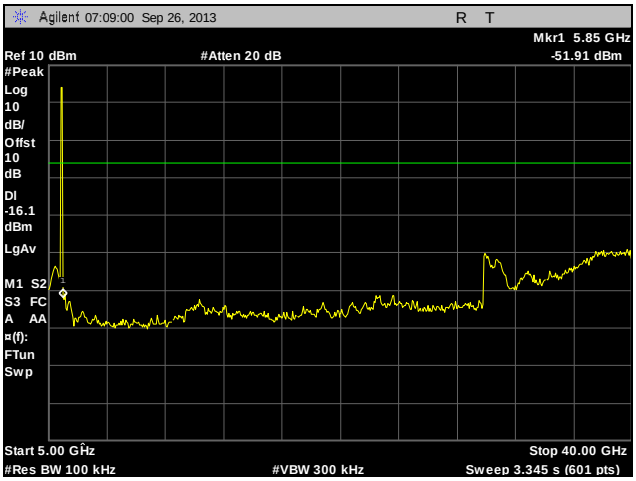
Plot 246. Conducted Spurious Emissions, Low Channel, 20 MHz, Port 2, 30 MHz – 6 GHz



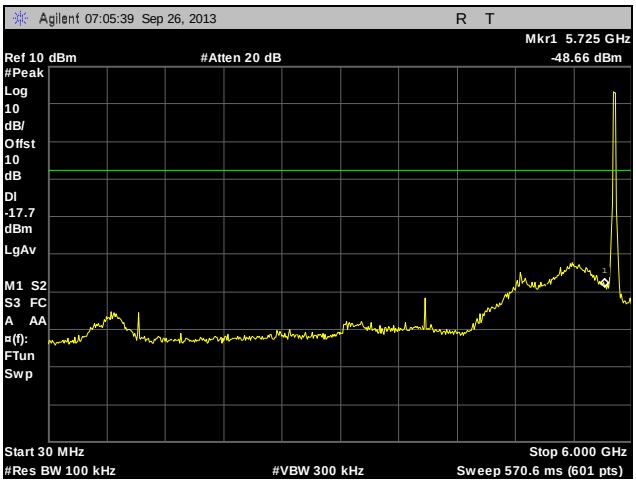
Plot 247. Conducted Spurious Emissions, Low Channel, 20 MHz, Port 2, 5 GHz – 40 GHz



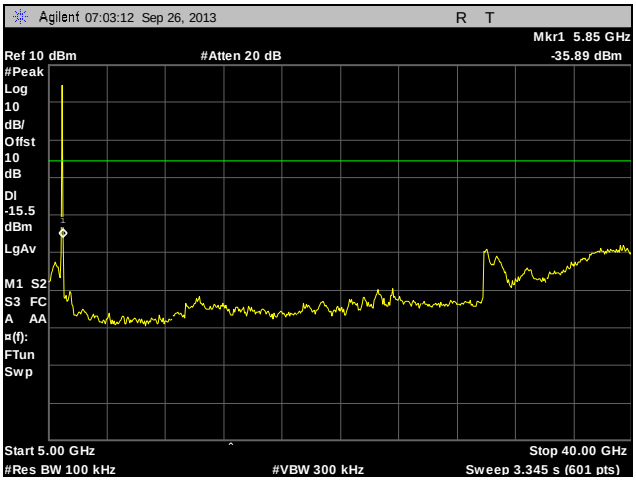
Plot 248. Conducted Spurious Emissions, Mid Channel, 20 MHz, Port 2, 30 MHz – 6 GHz



Plot 249. Conducted Spurious Emissions, Mid Channel, 20 MHz, Port 2, 5 GHz – 40 GHz

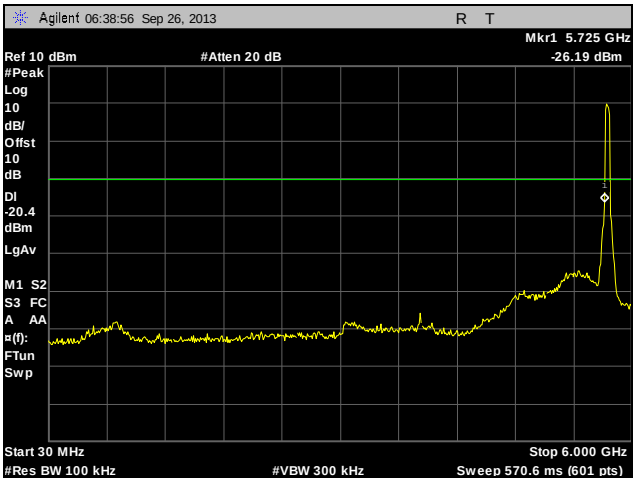


Plot 250. Conducted Spurious Emissions, High Channel, 20 MHz, Port 2, 30 MHz – 6 GHz

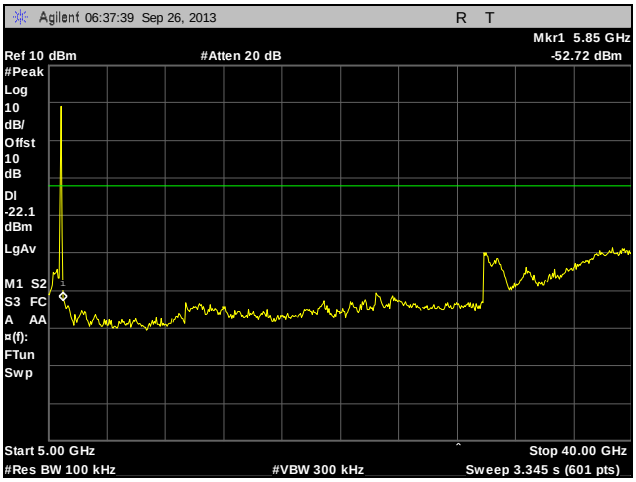


Plot 251. Conducted Spurious Emissions, High Channel, 20 MHz, Port 2, 5 GHz – 40 GHz

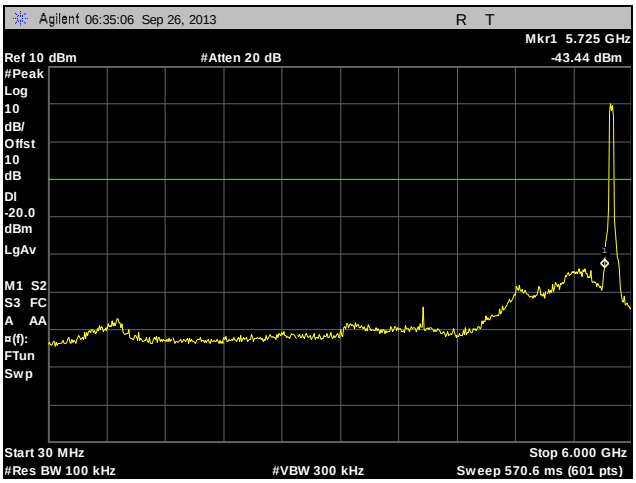
Conducted Spurious Emissions, 40 MHz, Port 1



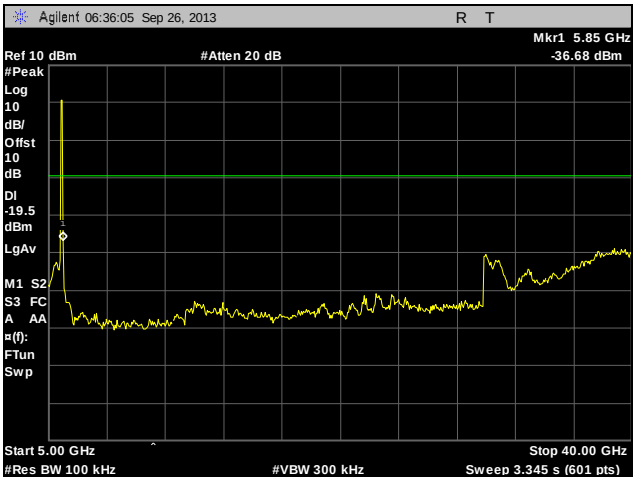
Plot 252. Conducted Spurious Emissions, Low Channel, 40 MHz, Port 1, 30 MHz – 6 GHz



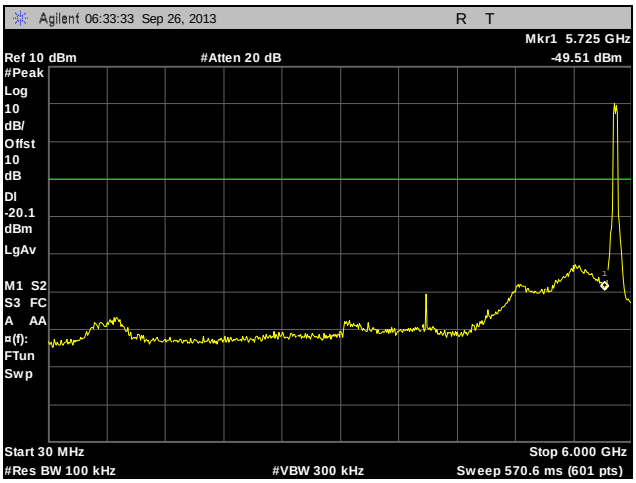
Plot 253. Conducted Spurious Emissions, Low Channel, 40 MHz, Port 1, 5 GHz – 40 GHz



Plot 254. Conducted Spurious Emissions, Mid Channel, 40 MHz, Port 1, 30 MHz – 6 GHz



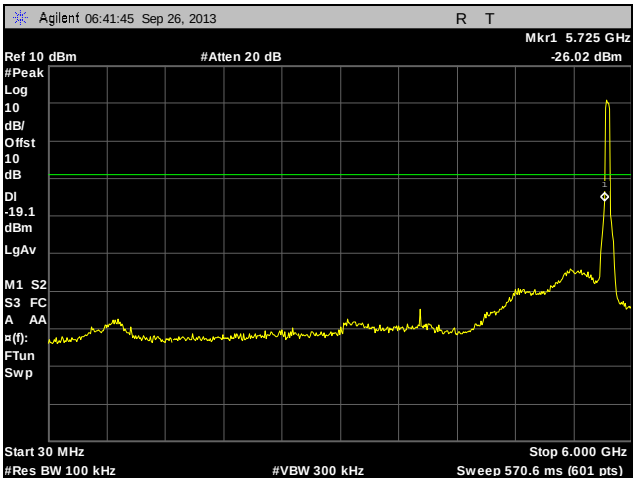
Plot 255. Conducted Spurious Emissions, Mid Channel, 40 MHz, Port 1, 5 GHz – 40 GHz



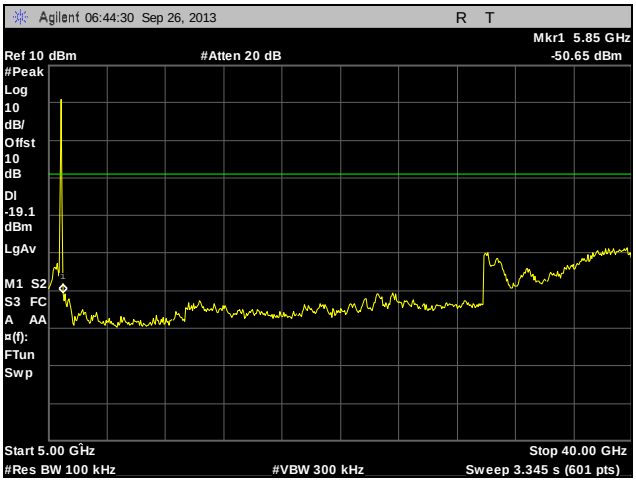
Plot 256. Conducted Spurious Emissions, High Channel, 40 MHz, Port 1, 30 MHz – 6 GHz

Plot 257. Conducted Spurious Emissions, High Channel, 40 MHz, Port 1, 5 GHz – 40 GHz

Conducted Spurious Emissions, 40 MHz, Port 2

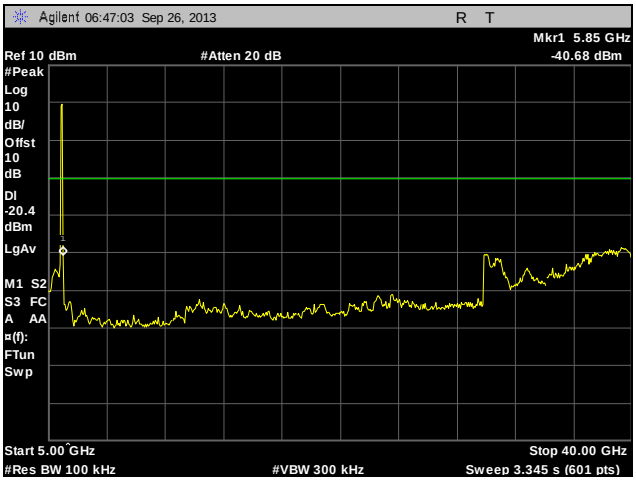


Plot 258. Conducted Spurious Emissions, Low Channel, 40 MHz, Port 2, 30 MHz – 6 GHz

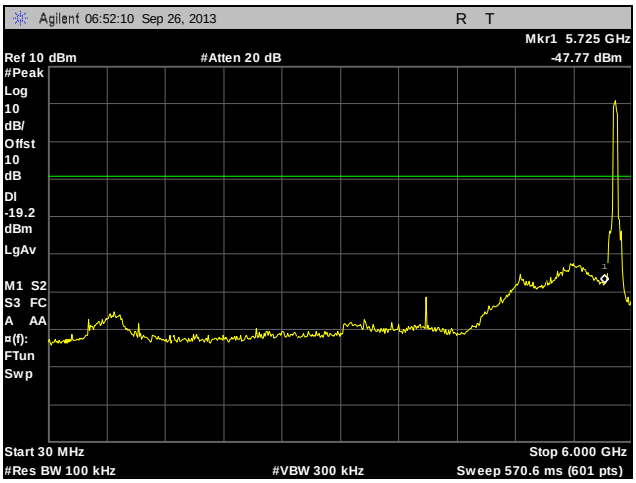


Plot 259. Conducted Spurious Emissions, Low Channel, 40 MHz, Port 2, 5 GHz – 40 GHz

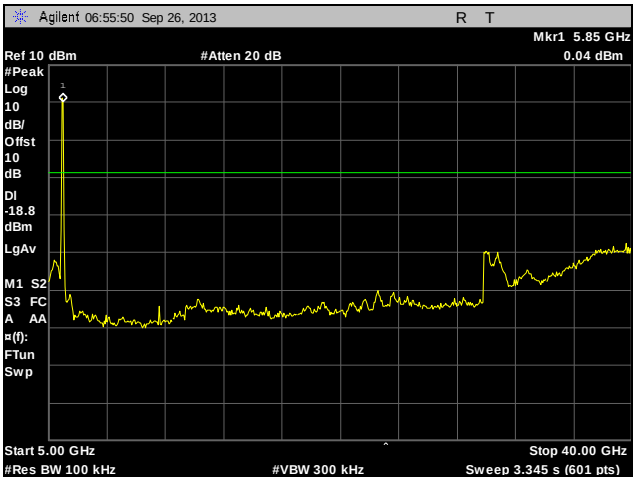
Plot 260. Conducted Spurious Emissions, Mid Channel, 40 MHz, Port 2, 30 MHz – 6 GHz



Plot 261. Conducted Spurious Emissions, Mid Channel, 40 MHz, Port 2, 5 GHz – 40 GHz

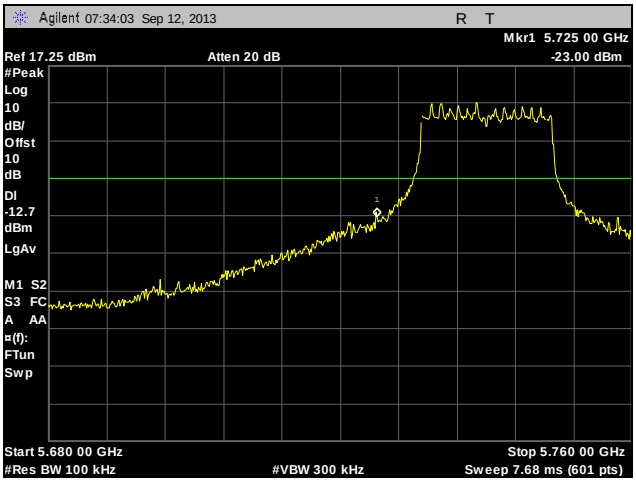


Plot 262. Conducted Spurious Emissions, High Channel, 40 MHz, Port 2, 30 MHz – 6 GHz

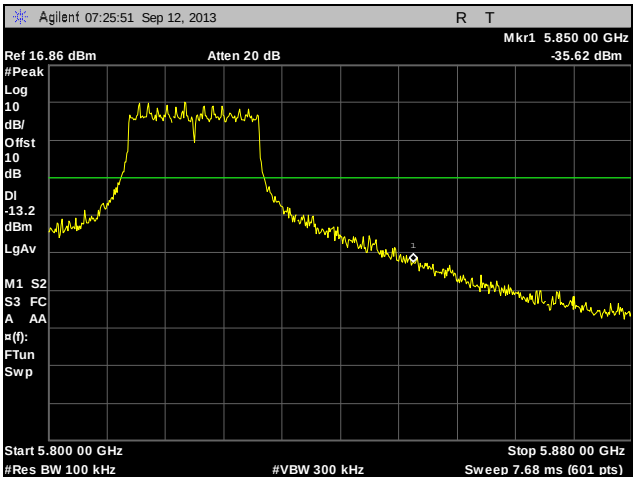


Plot 263. Conducted Spurious Emissions, High Channel, 40 MHz, Port 2, 5 GHz – 40 GHz

Conducted Band Edge, 20 MHz, Port 1

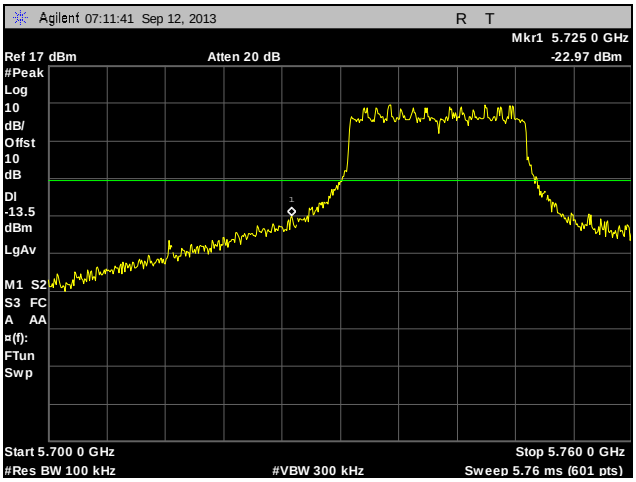


Plot 264. Conducted Band Edge, Low Channel, 20 MHz, Port 1

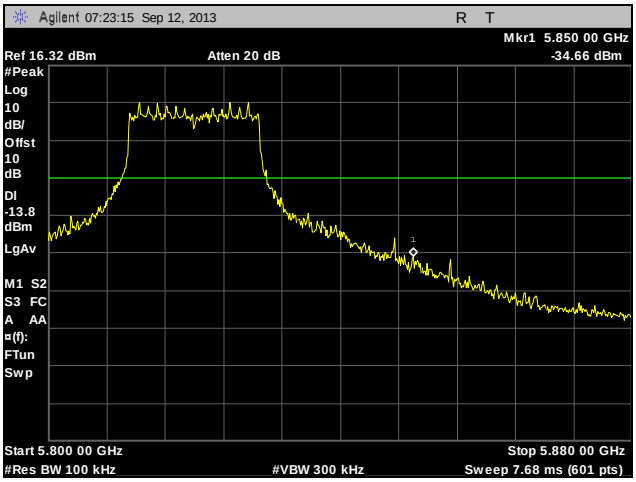


Plot 265. Conducted Band Edge, High Channel, 20 MHz, Port 1

Conducted Band Edge, 20 MHz, Port 2

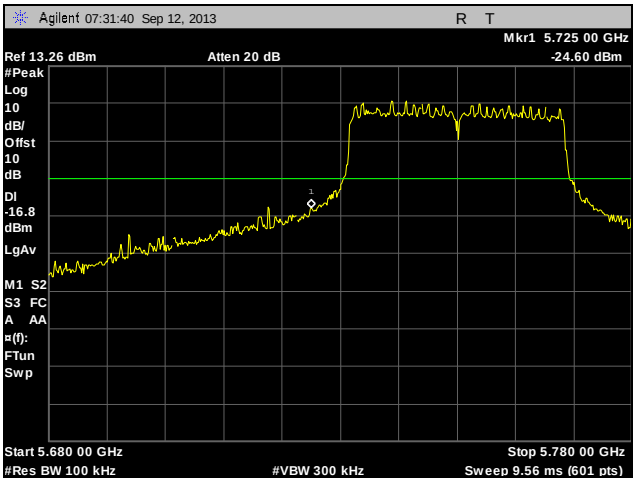


Plot 266. Conducted Band Edge, Low Channel, 20 MHz, Port 2

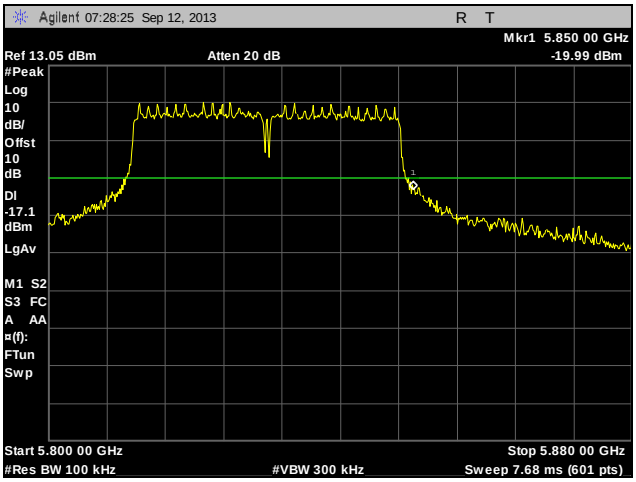


Plot 267. Conducted Band Edge, High Channel, 20 MHz, Port 2

Conducted Band Edge, 40 MHz, Port 1

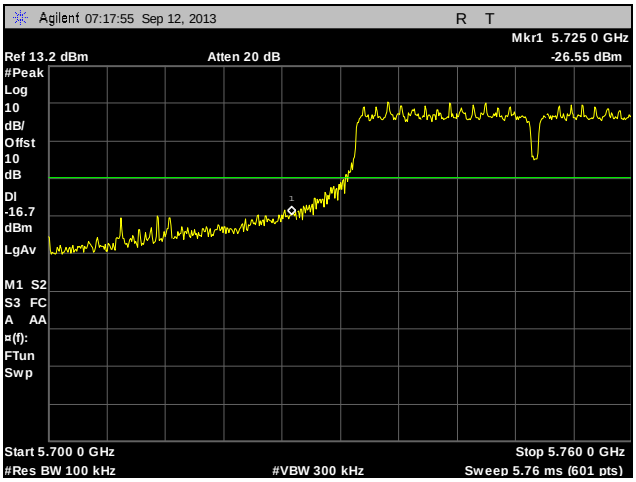


Plot 268. Conducted Band Edge, Low Channel, 40 MHz, Port 1

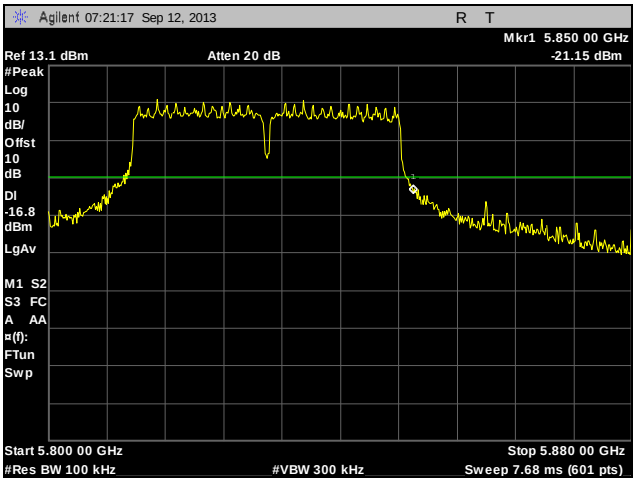


Plot 269. Conducted Band Edge, High Channel, 40 MHz, Port 1

Conducted Band Edge, 40 MHz, Port 2



Plot 270. Conducted Band Edge, Low Channel, 40 MHz, Port 2



Plot 271. Conducted Band Edge, High Channel, 40 MHz, Port 2

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(e) Peak Power Spectral Density

Test Requirements: **§15.247(e):** For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure: The transmitter was connected directly to a Spectrum Analyzer through an attenuator. The power level was set to the maximum level throughout PSD measurement. The RBW was set to 10 kHz and a VBW set to 30 kHz or greater. The spectrum analyzer was set to an auto sweep time and a peak detector was used. Measurements were carried out at the low, mid and high channels.

Test Results: The EUT was compliant with the peak power spectral density limits of **§ 15.247 (e)**.

The peak power spectral density was determined from plots on the following page(s).

Test Engineer: Surinder Singh

Test Date: 09/26/13

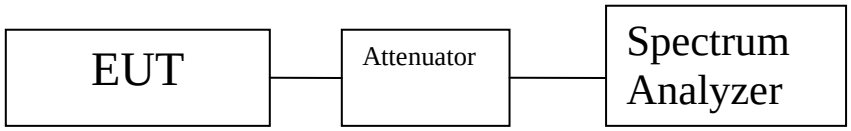


Figure 5. Block Diagram, Peak Power Spectral Density Test Setup

Point to Point Application

Peak Power Spectral Density Test Results

Channel Carrier	Frequency GHz	Measured PPSD (dBm)/20MHz Port 1	Measured PPSD (dBm)/20MHz Port 2	Total PSD dBm	Antenna Gain dBi	PSD Limit dBm	Margin dB
Low	5.742	-8.24	-10.88	-6.3521134	16	8	-14.352113
Mid	5.787	-9.49	-11.42	-7.3383596	16	8	-15.33836
High	5.847	-7.82	-11.26	-6.19765	16	8	-14.19765
Low	5.742	-11.19	-13.14	-9.0461625	19	8	-17.046162
Mid	5.785	-11.82	-13.16	-9.4282222	19	8	-17.428222
High	5.845	-11.49	-12.86	-9.110901	19	8	-17.110901
Low	5.742	-11.19	-13.14	-9.0461625	21	8	-17.046162
Mid	5.782	-11.82	-13.16	-9.4282222	21	8	-17.428222
High	5.842	-11.49	-12.86	-9.110901	21	8	-17.110901
Low	5.742	-11.19	-13.14	-9.0461625	23	8	-17.046162
Mid	5.782	-11.82	-13.16	-9.4282222	23	8	-17.428222
High	5.842	-11.49	-12.86	-9.110901	23	8	-17.110901
Low	5.742	-11.19	-13.14	-9.0461625	28	8	-17.046162
Mid	5.782	-11.82	-13.16	-9.4282222	28	8	-17.428222
High	5.842	-11.49	-12.86	-9.110901	28	8	-17.110901

Table 22. Peak Power Spectral Density, Test Results, Point to Point, 20 MHz

Channel Carrier	Frequency GHz	Measured PPSD (dBm)/40MHz Port 1	Measured PPSD (dBm)/40MHz Port 2	Total PSD dBm	Antenna Gain dBi	PSD Limit dBm	Margin dB
Low	5.75	-11.31	-6.68	-5.3948767	16	8	-13.394877
Mid	5.79	-12.18	-9.09	-7.3554919	16	8	-15.355492
High	5.826	-11.99	-9.03	-7.2522559	16	8	-15.252256
Low	5.75	-13.67	-15.71	-11.561005	19	8	-19.561005
Mid	5.79	-13.94	-15.75	-11.741081	19	8	-19.741081
High	5.821	-14.49	-16.63	-12.419201	19	8	-20.419201
Low	5.735	-13.67	-15.71	-11.561005	21	8	-19.561005
Mid	5.79	-13.94	-15.75	-11.741081	21	8	-19.741081
High	5.83	-14.49	-16.63	-12.419201	21	8	-20.419201
Low	5.746	-13.67	-15.71	-11.561005	23	8	-19.561005
Mid	5.786	-13.94	-15.75	-11.741081	23	8	-19.741081
High	5.816	-14.49	-16.63	-12.419201	23	8	-20.419201
Low	5.75	-13.67	-15.71	-11.561005	28	8	-19.561005
Mid	5.787	-13.94	-15.75	-11.741081	28	8	-19.741081
High	5.816	-14.49	-16.63	-12.419201	28	8	-20.419201

Table 23. Peak Power Spectral Density, Test Results, Point to Point, 40 MHz

Point to Multi Point Application

Peak Power Spectral Density Test Results

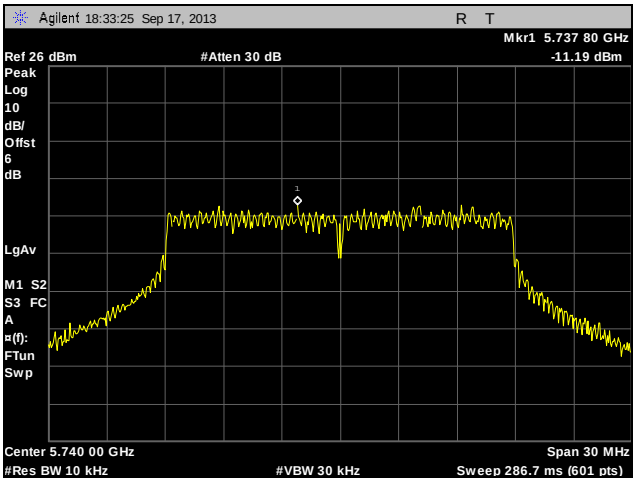
Channel Carrier	Frequency GHz	Measured PPSD (dBm)/20MHz Port 1	Measured PPSD (dBm)/20MHz Port 2	Total PSD dBm	Antenna Gain dBi	PSD Limit dBm	Margin dB
Low	5.742	-8.24	-10.88	-6.352113414	16	-2	-4.352113
Mid	5.787	-9.49	-11.42	-7.338359576	16	-2	-5.33836
High	5.847	-7.82	-11.26	-6.197649996	16	-2	-4.19765
Low	5.742	-11.19	-13.14	-9.046162482	19	-5	-4.046162
Mid	5.785	-11.82	-13.16	-9.428222234	19	-5	-4.428222
High	5.845	-11.49	-12.86	-9.110901034	19	-5	-4.110901
Low	5.742	-11.19	-13.14	-9.046162482	21	-7	-2.046162
Mid	5.782	-11.82	-13.16	-9.428222234	21	-7	-2.428222
High	5.842	-11.49	-12.86	-9.110901034	21	-7	-2.110901
Low	5.742	-11.19	-13.14	-9.046162482	23	-9	-0.046162
Mid	5.782	-11.82	-13.16	-9.428222234	23	-9	-0.428222
High	5.842	-11.49	-12.86	-9.110901034	23	-9	-0.110901
Low	5.742	-19.28	-18.83	-16.03887423	28	-14	-2.038874
Mid	5.782	-18.84	-19.09	-15.9529014	28	-14	-1.952901
High	5.842	-19.2	-19.48	-16.3274439	28	-14	-2.327444

Table 24. Peak Power Spectral Density, Test Results, Point to Multi-Point, 20 MHz

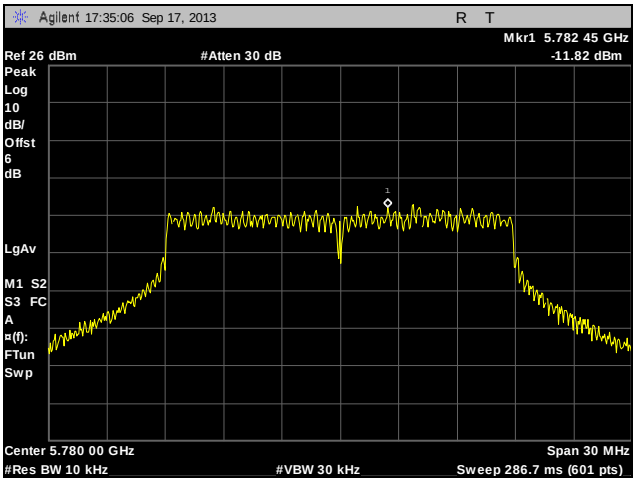
Channel Carrier	Frequency GHz	Measured PPSD (dBm)/40MHz Port 1	Measured PPSD (dBm)/40MHz Port 2	Total PSD dBm	Antenna Gain dBi	PSD Limit dBm	Margin dB
Low	5.75	-11.31	-6.68	-5.394876709	16	-2	-3.394877
Mid	5.79	-12.18	-9.09	-7.35549191	16	-2	-5.355492
High	5.826	-11.99	-9.03	-7.252255944	16	-2	-5.252256
Low	5.75	-13.67	-15.71	-11.56100484	19	-5	-6.561005
Mid	5.79	-13.94	-15.75	-11.74108094	19	-5	-6.741081
High	5.821	-14.49	-16.63	-12.41920089	19	-5	-7.419201
Low	5.735	-13.67	-15.71	-11.56100484	21	-7	-4.561005
Mid	5.79	-13.94	-15.75	-11.74108094	21	-7	-4.741081
High	5.83	-14.49	-16.63	-12.41920089	21	-7	-5.419201
Low	5.746	-13.67	-15.71	-11.56100484	23	-9	-2.561005
Mid	5.786	-13.94	-15.75	-11.74108094	23	-9	-2.741081
High	5.816	-14.49	-16.63	-12.41920089	23	-9	-3.419201
Low	5.75	-21.23	-21.13	-18.16941223	28	-14	-4.169412
Mid	5.787	-20.52	-21	-17.74307197	28	-14	-3.743072
High	5.816	-19.2	-19.48	-16.3274439	28	-14	-2.327444

Table 25. Peak Power Spectral Density, Test Results, Point to Multi-Point, 40 MHz

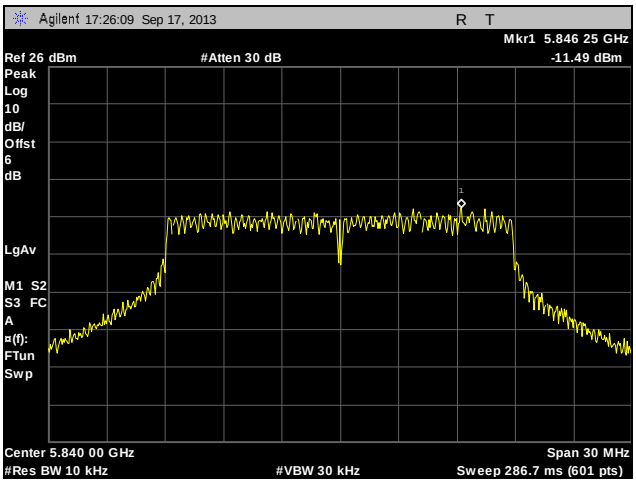
Peak Power Spectral Density, 20 MHz, Port 1, 16 dBi – Point to Multi-Point



Plot 272. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 1, 16 dBi

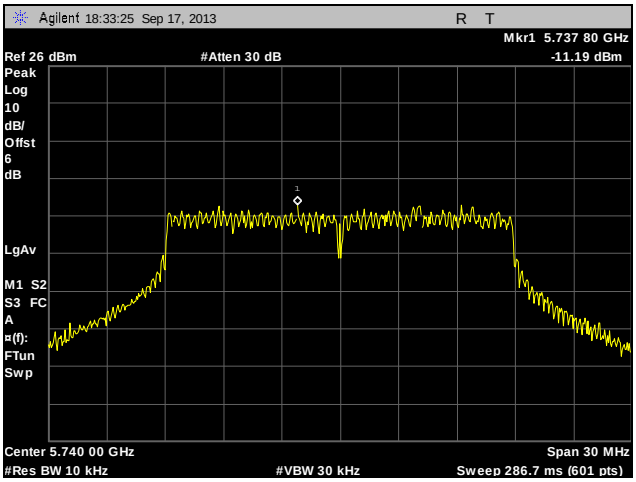


Plot 273. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 1, 16 dBi

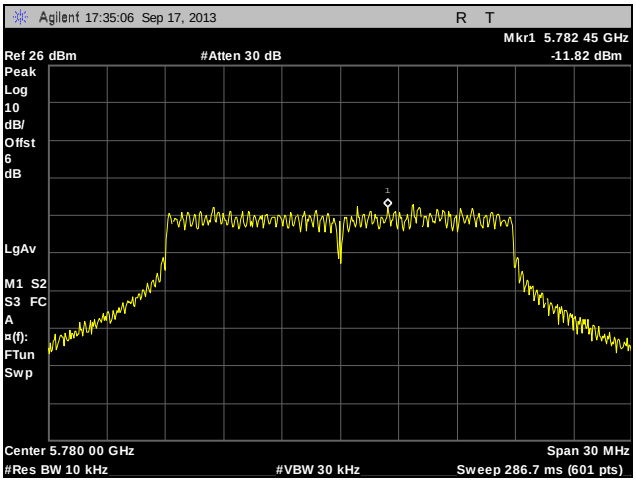


Plot 274. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 1, 16 dBi

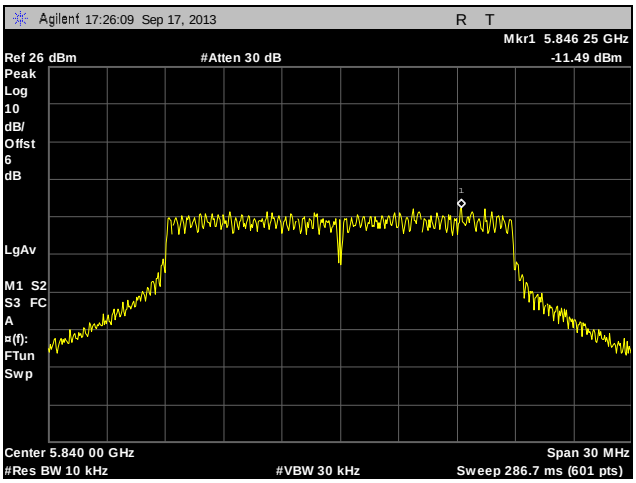
Peak Power Spectral Density, 20 MHz, Port 1, 19 dBi – Point to Multi-Point



Plot 275. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 1, 19 dBi

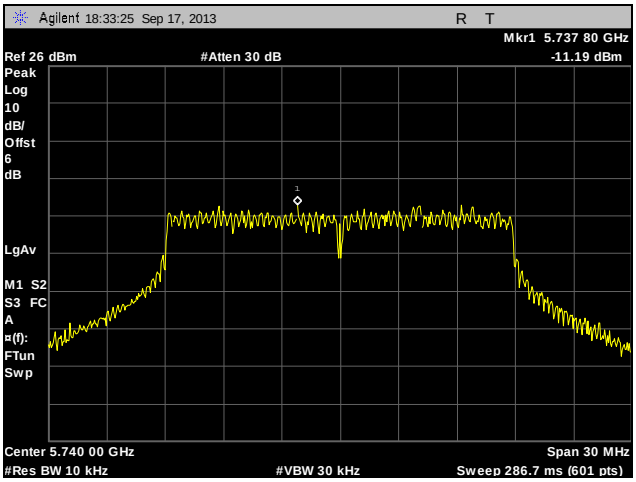


Plot 276. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 1, 19 dBi

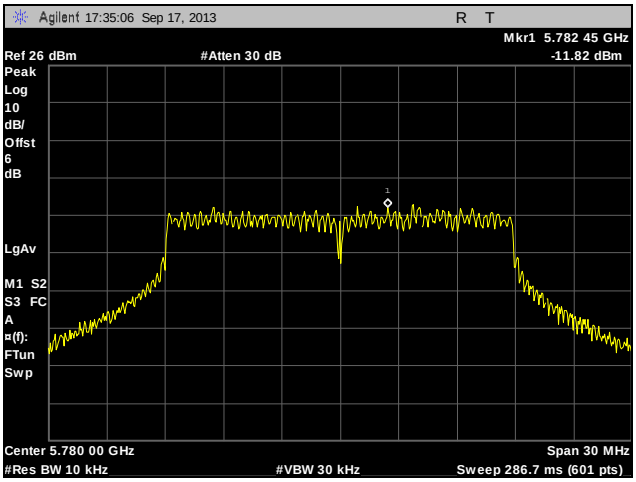


Plot 277. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 1, 19 dBi

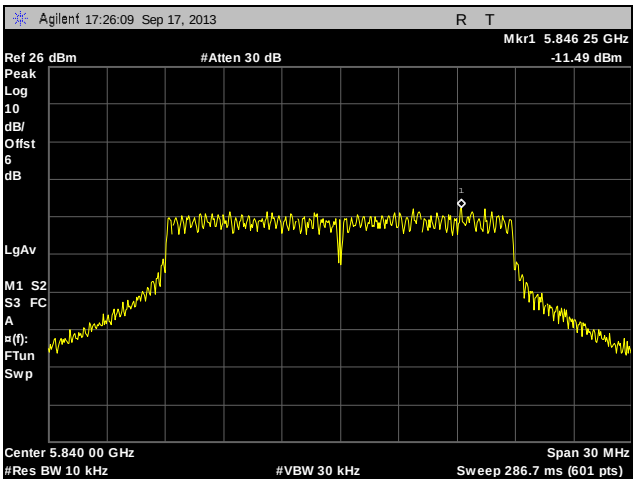
Peak Power Spectral Density, 20 MHz, Port 1, 21 dBi – Point to Multi-Point



Plot 278. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 1, 21 dBi

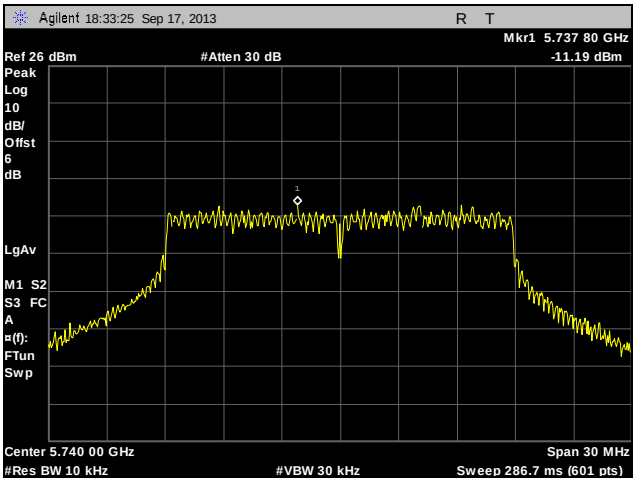


Plot 279. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 1, 21 dBi

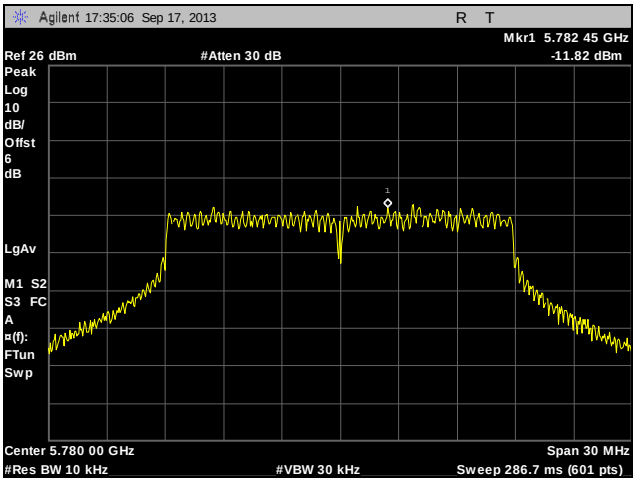


Plot 280. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 1, 21 dBi

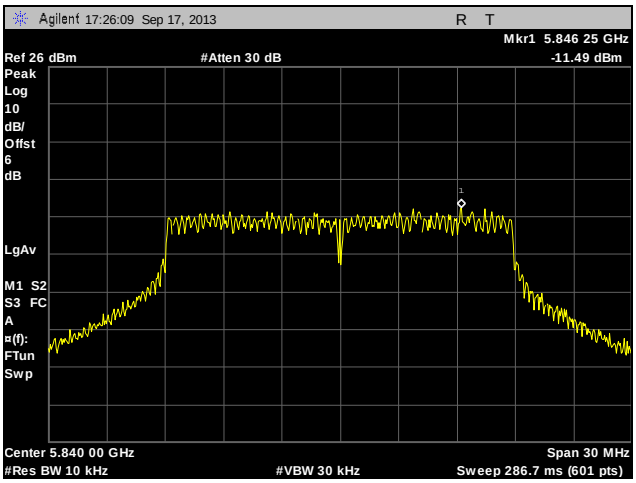
Peak Power Spectral Density, 20 MHz, Port 1, 23 dBi – Point to Multi-Point



Plot 281. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 1, 23 dBi

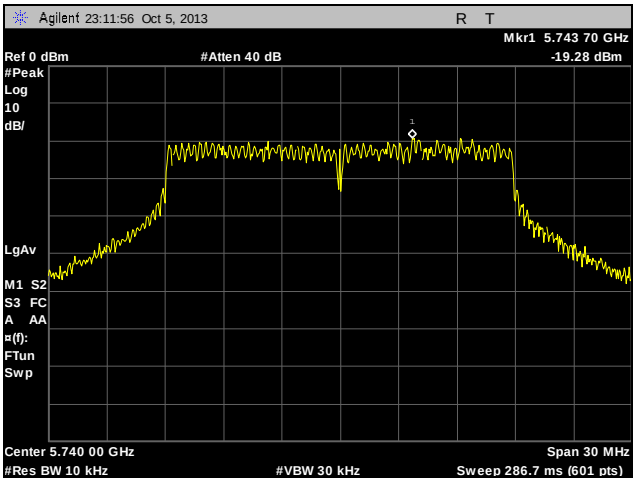


Plot 282. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 1, 23 dBi

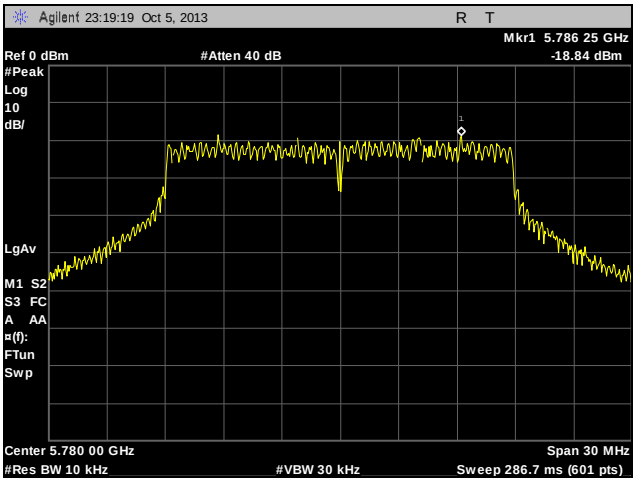


Plot 283. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 1, 23 dBi

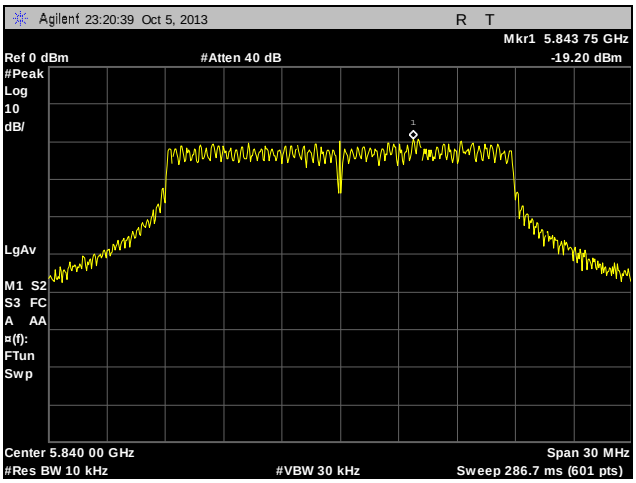
Peak Power Spectral Density, 20 MHz, Port 1, 28 dBi – Point to Multi-Point



Plot 284. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 1, 28 dBi

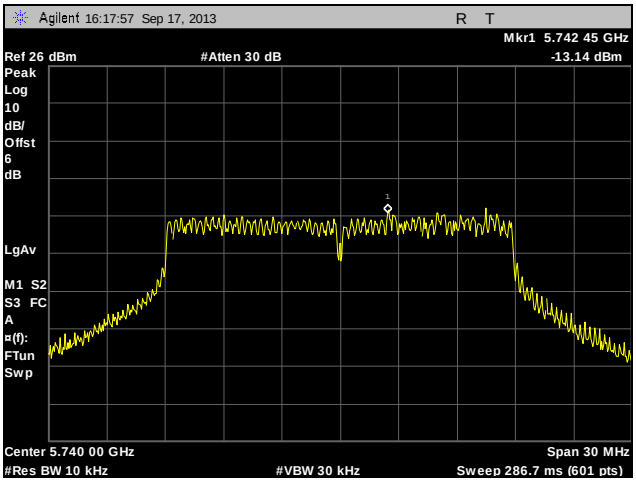


Plot 285. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 1, 28 dBi

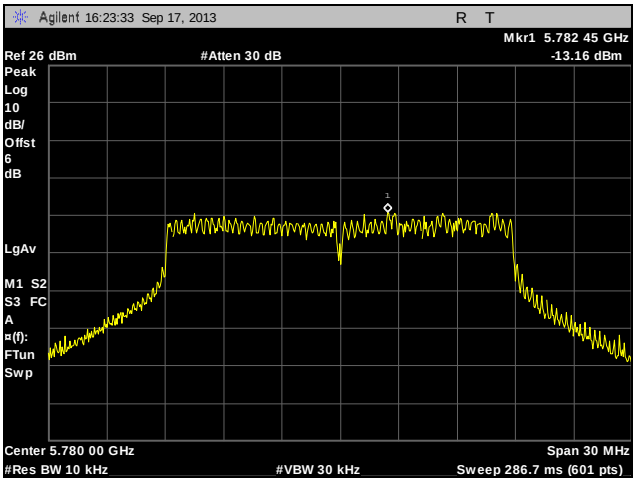


Plot 286. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 1, 28 dBi

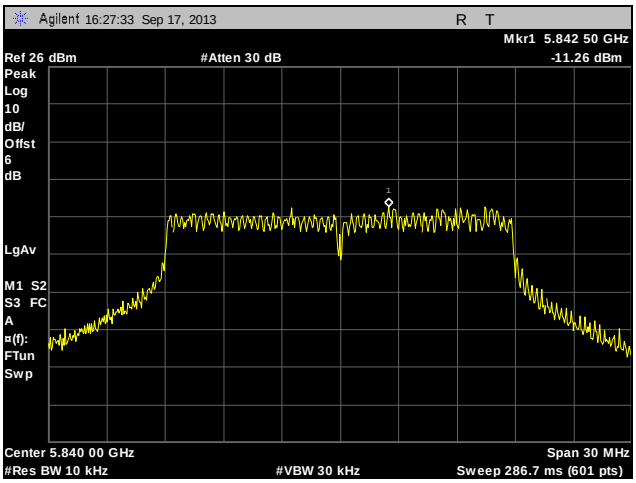
Peak Power Spectral Density, 20 MHz, Port 2, 16 dBi – Point to Multi-Point



Plot 287. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 2, 16 dBi

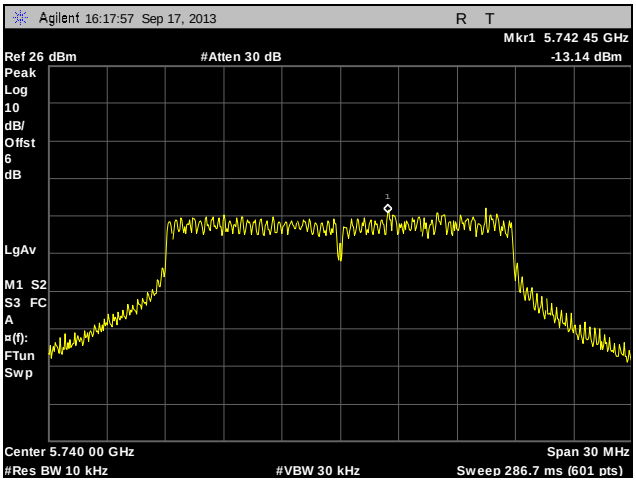


Plot 288. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 2, 16 dBi

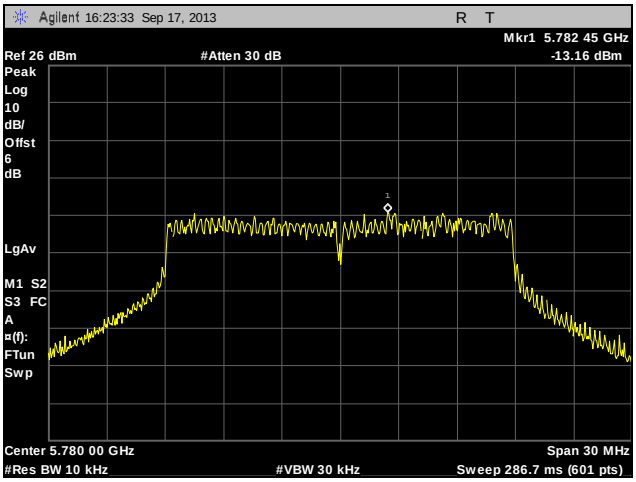


Plot 289. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 2, 16 dBi

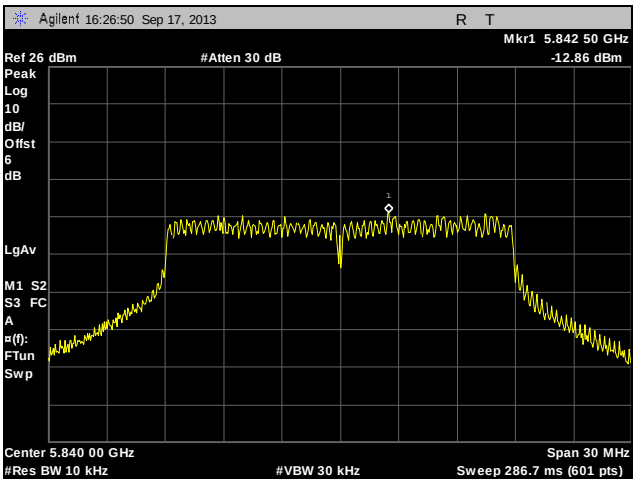
Peak Power Spectral Density, 20 MHz, Port 2, 19 dBi – Point to Multi-Point



Plot 290. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 2, 19 dBi

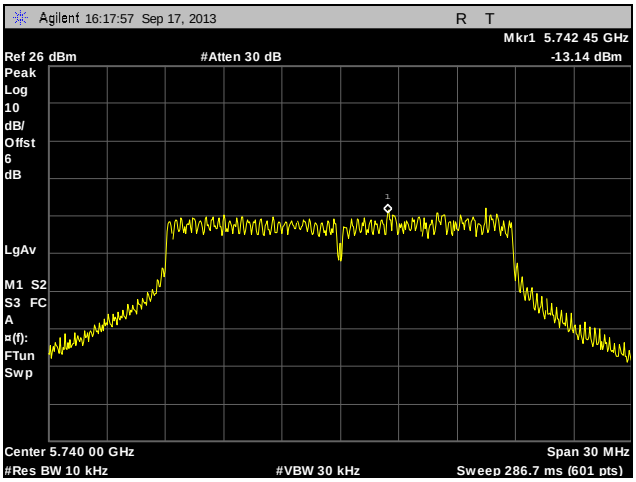


Plot 291. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 2, 19 dBi

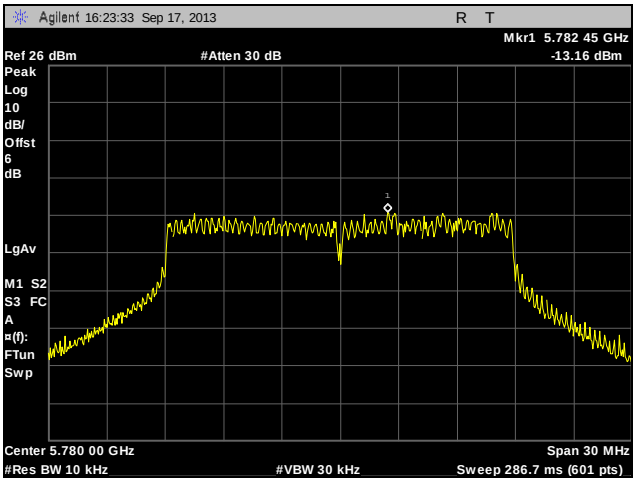


Plot 292. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 2, 19 dBi

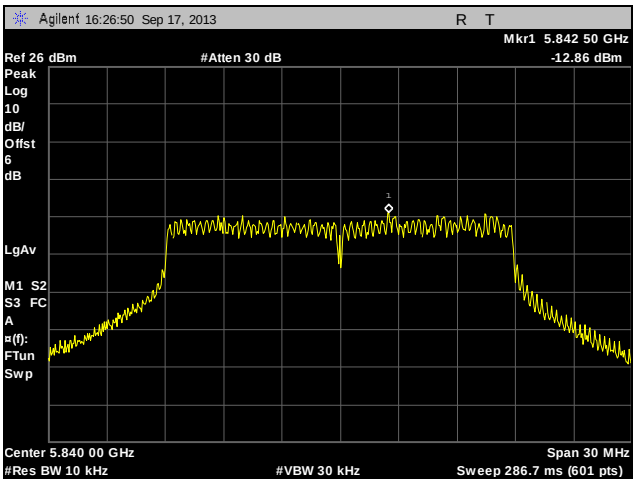
Peak Power Spectral Density, 20 MHz, Port 2, 21 dBi – Point to Multi-Point



Plot 293. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 2, 21 dBi

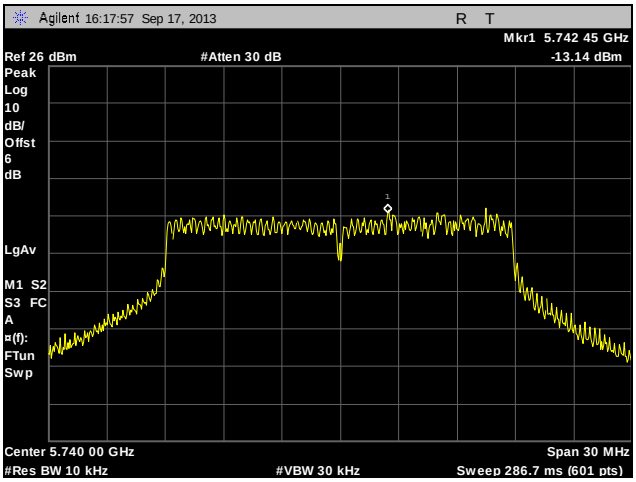


Plot 294. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 2, 21 dBi

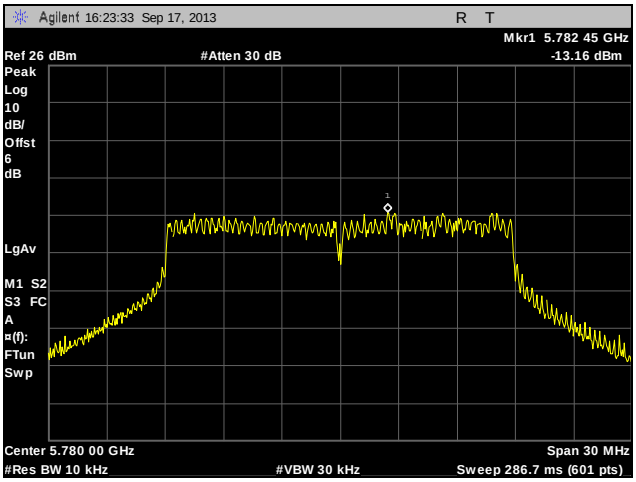


Plot 295. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 2, 21 dBi

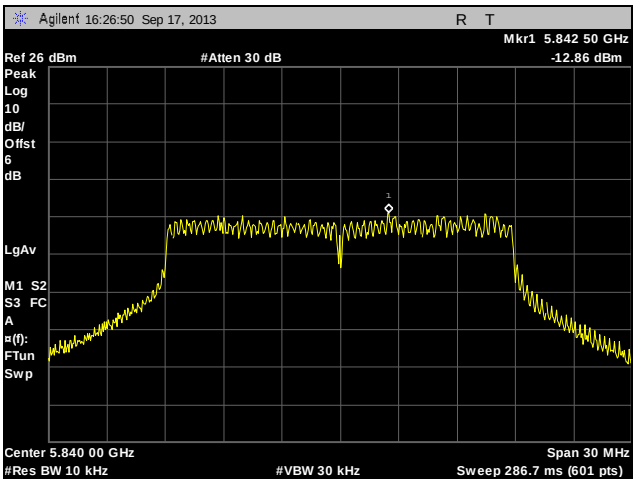
Peak Power Spectral Density, 20 MHz, Port 2, 23 dBi – Point to Multi-Point



Plot 296. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 2, 23 dBi

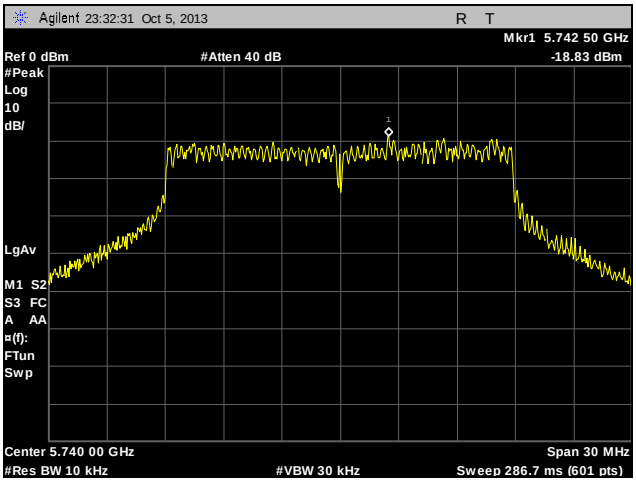


Plot 297. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 2, 23 dBi

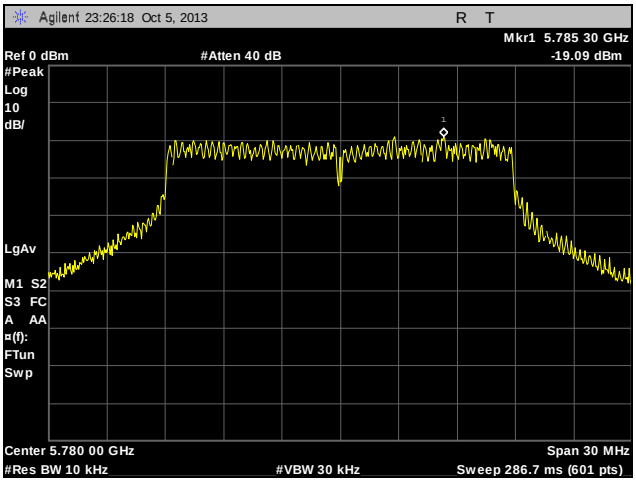


Plot 298. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 2, 23 dBi

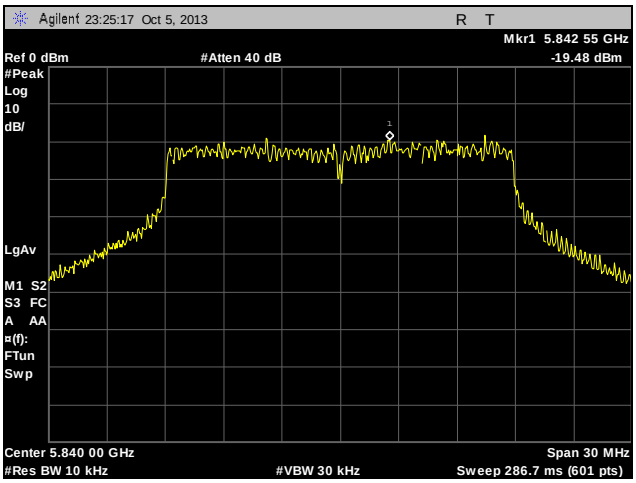
Peak Power Spectral Density, 20 MHz, Port 2, 28 dBi – Point to Multi-Point



Plot 299. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 20 MHz, Port 2, 28 dBi

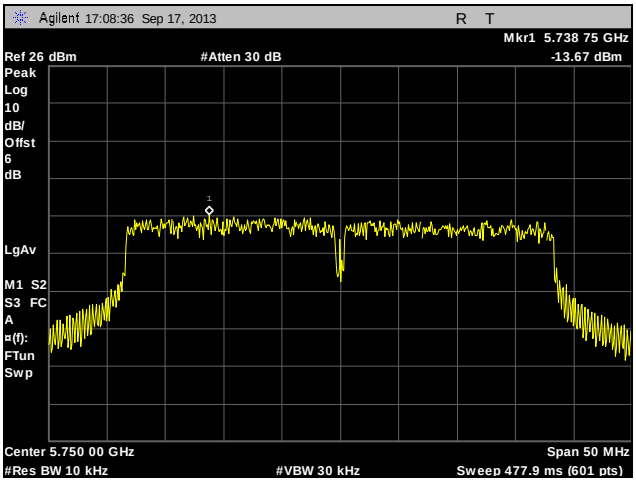


Plot 300. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 20 MHz, Port 2, 28 dBi

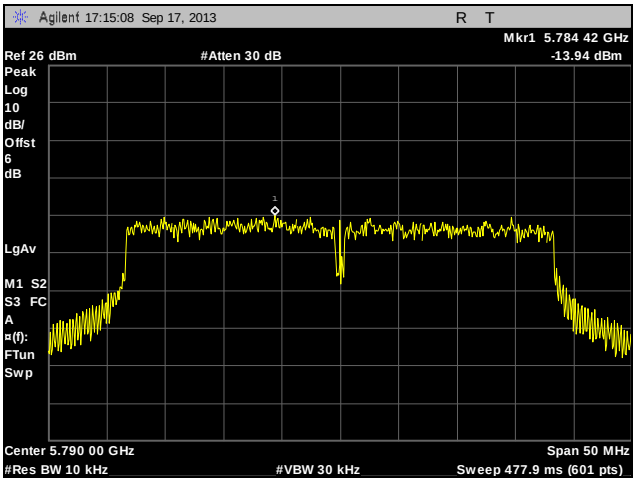


Plot 301. Peak Power Spectral Density, High Channel, Point to Multi-Point, 20 MHz, Port 2, 28 dBi

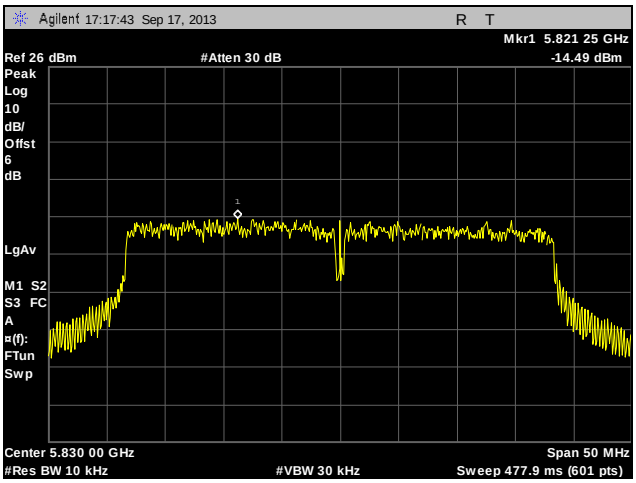
Peak Power Spectral Density, 40 MHz, Port 1, 16 dBi – Point to Multi-Point



Plot 302. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 1, 16 dBi

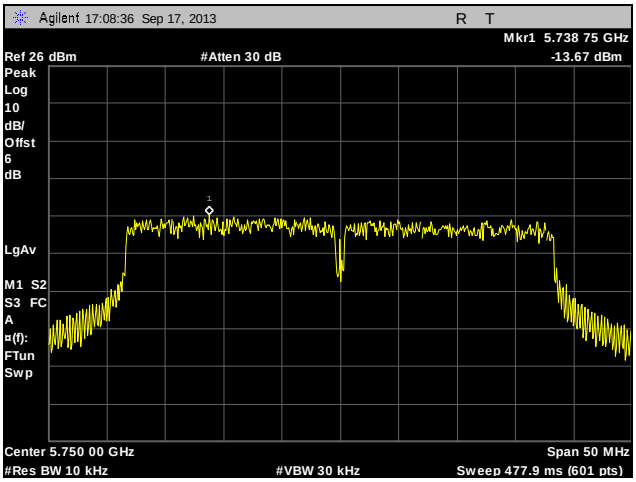


Plot 303. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 1, 16 dBi

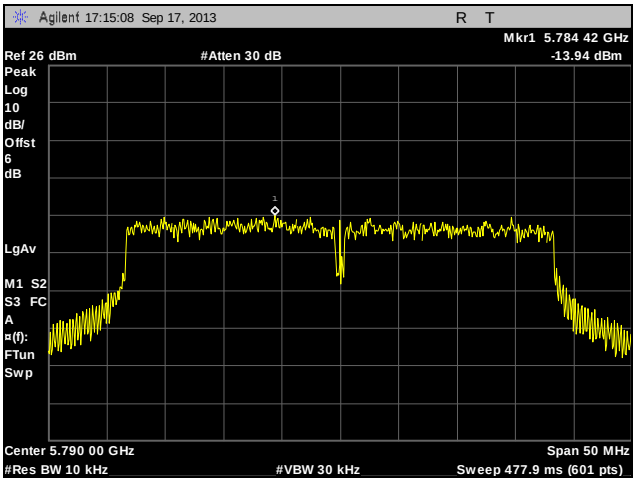


Plot 304. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 1, 16 dBi

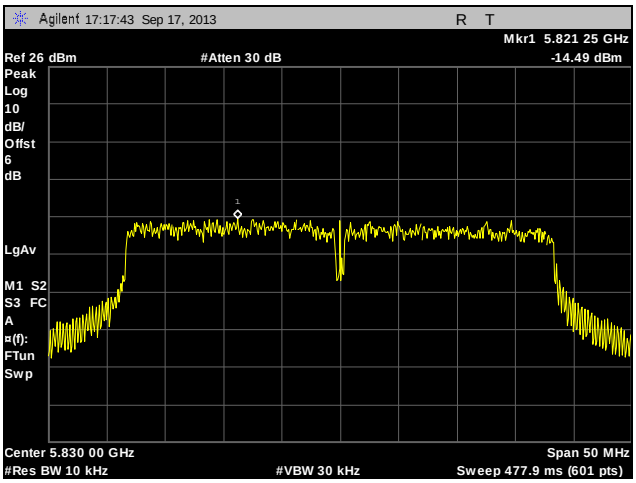
Peak Power Spectral Density, 40 MHz, Port 1, 19 dBi – Point to Multi-Point



Plot 305. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 1, 19 dBi

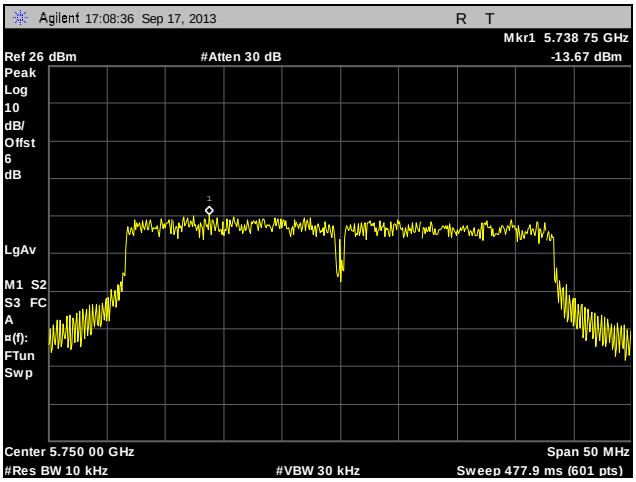


Plot 306. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 1, 19 dBi

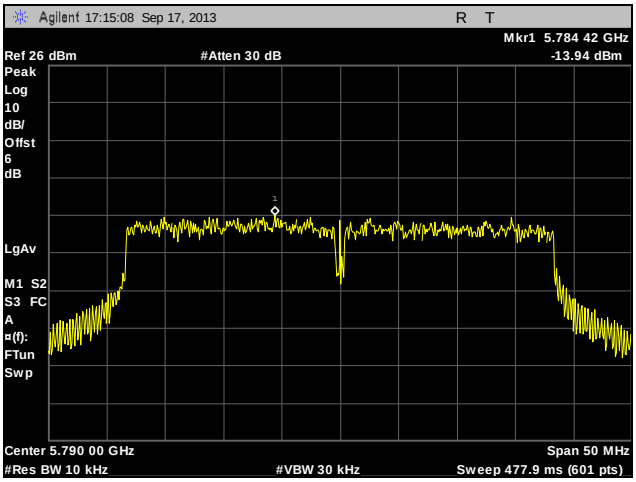


Plot 307. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 1, 19 dBi

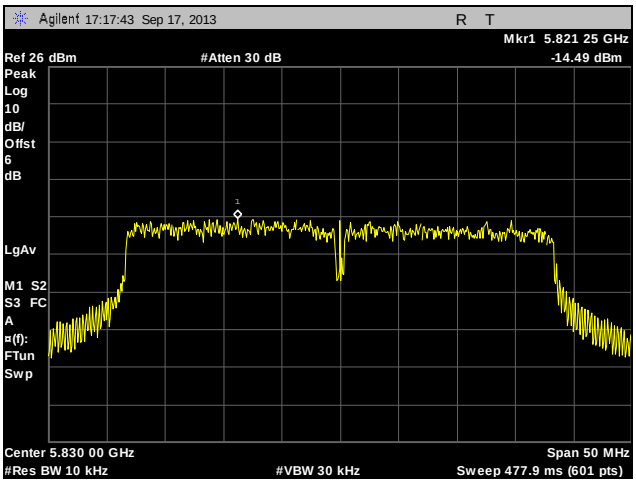
Peak Power Spectral Density, 40 MHz, Port 1, 21 dBi – Point to Multi-Point



Plot 308. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 1, 21 dBi

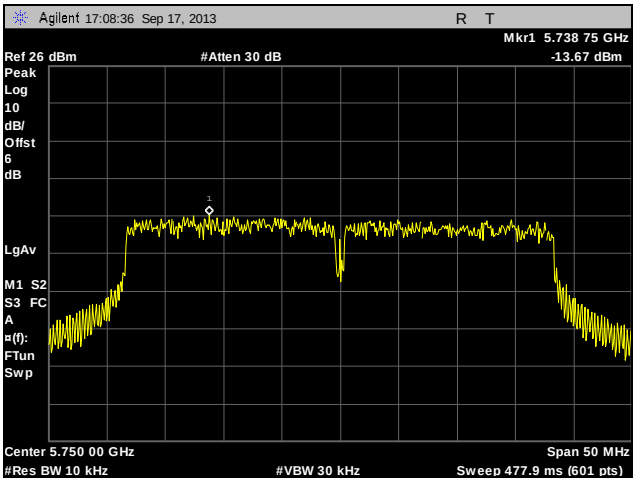


Plot 309. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 1, 21 dBi

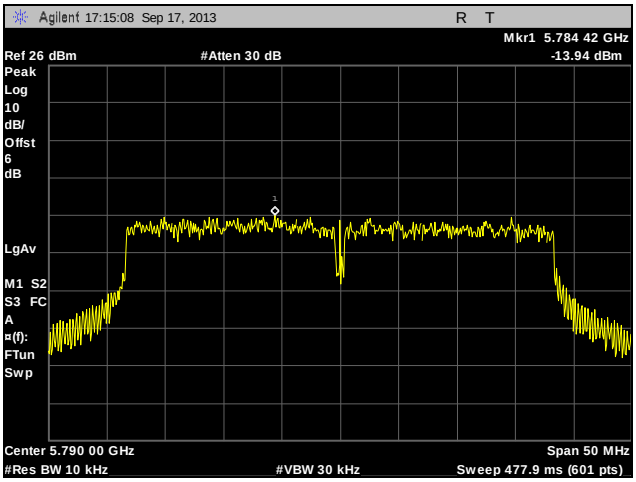


Plot 310. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 1, 21 dBi

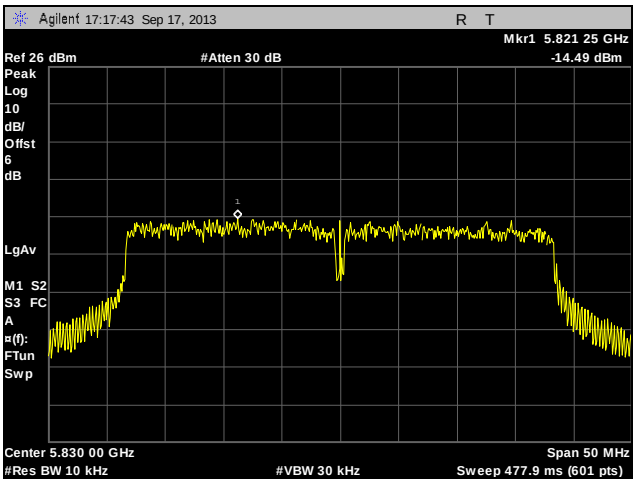
Peak Power Spectral Density, 40 MHz, Port 1, 23 dBi – Point to Multi-Point



Plot 311. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 1, 23 dBi

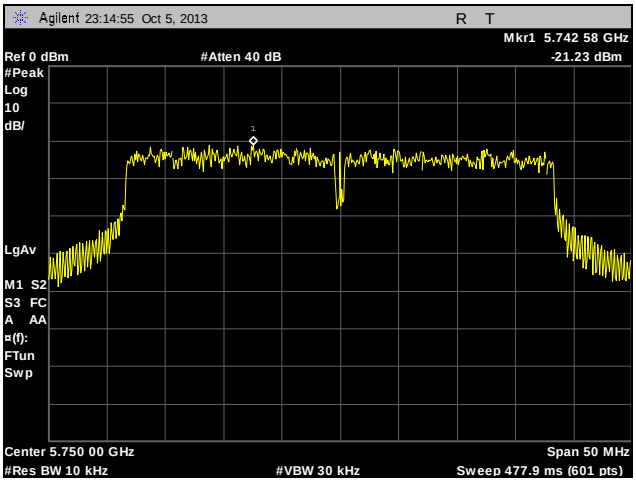


Plot 312. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 1, 23 dBi

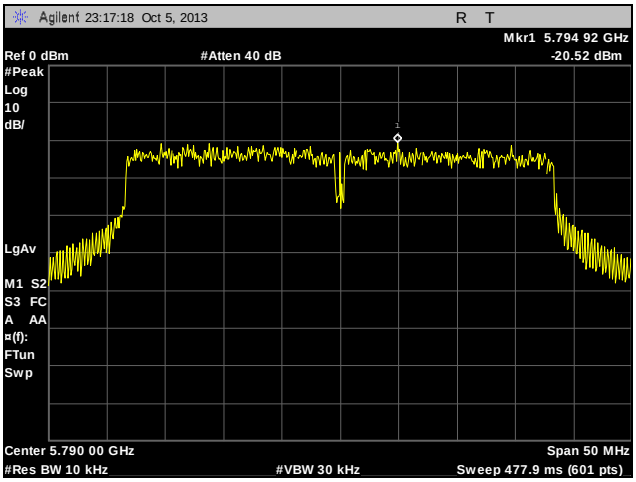


Plot 313. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 1, 23 dBi

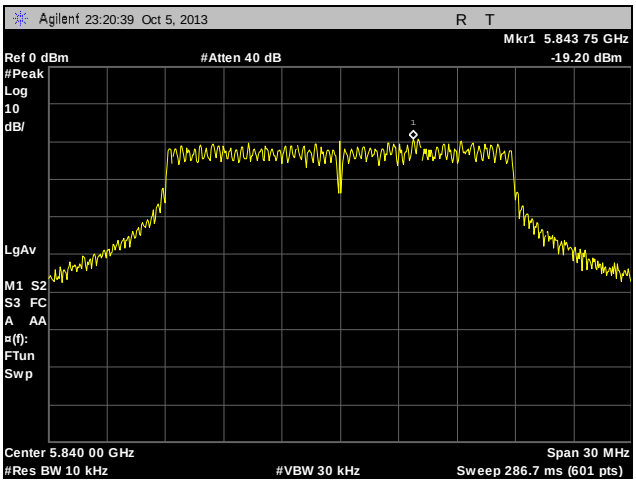
Peak Power Spectral Density, 40 MHz, Port 1, 28 dBi – Point to Multi-Point



Plot 314. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 1, 28 dBi

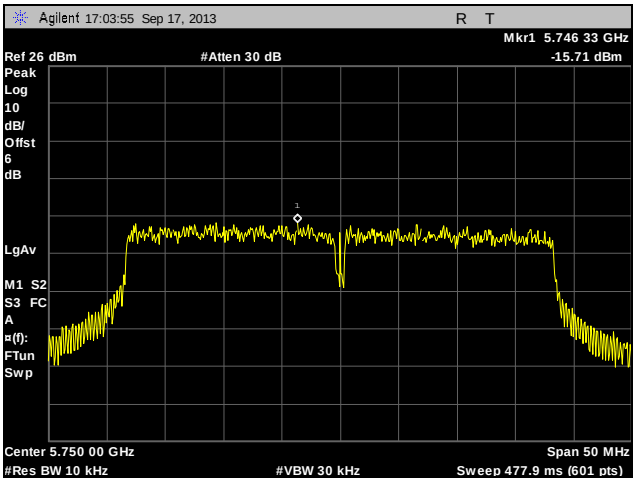


Plot 315. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 1, 28 dBi

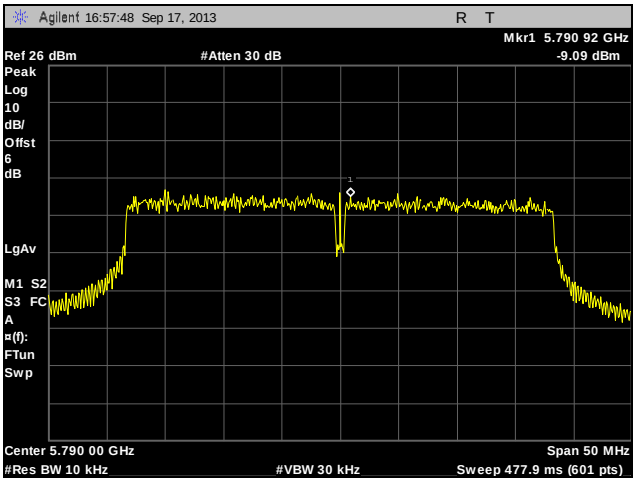


Plot 316. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 1, 28 dBi

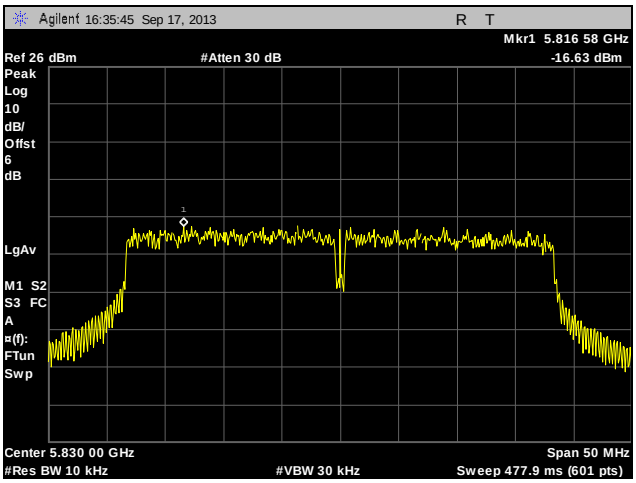
Peak Power Spectral Density, 40 MHz, Port 2, 16 dBi – Point to Multi-Point



Plot 317. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 2, 16 dBi

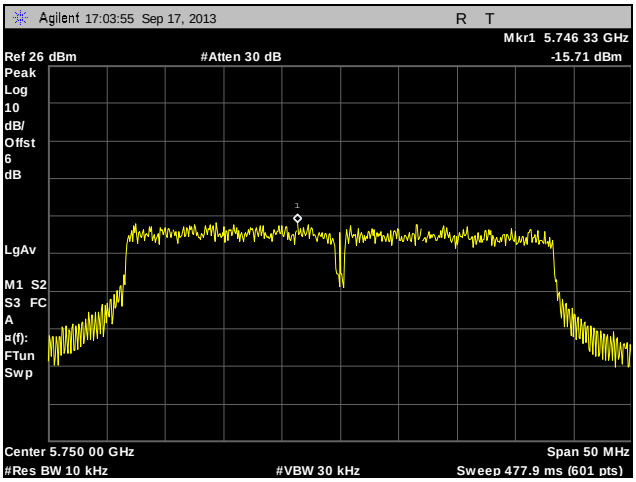


Plot 318. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 2, 16 dBi

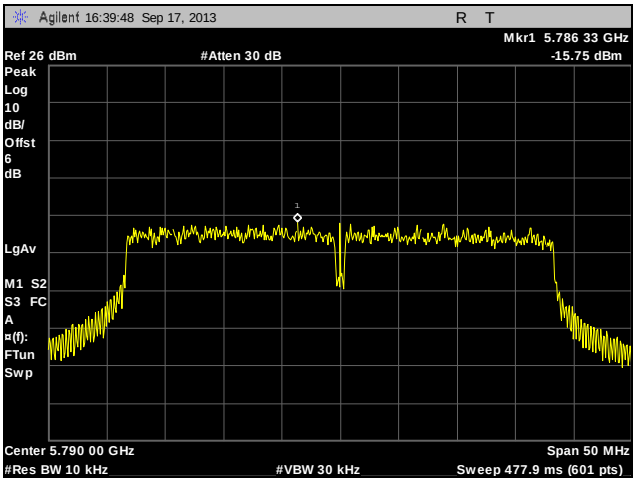


Plot 319. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 2, 16 dBi

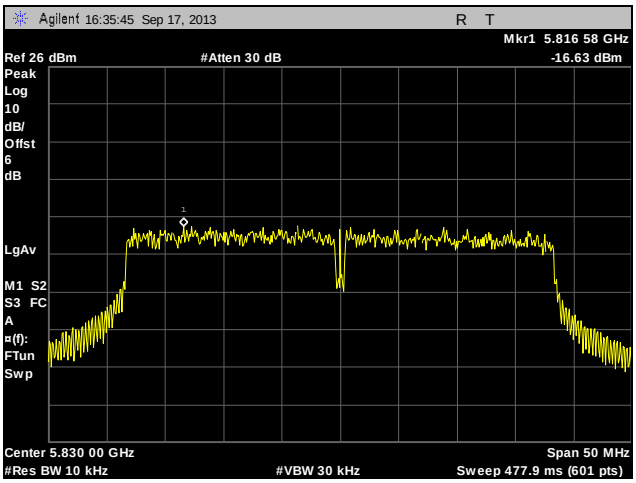
Peak Power Spectral Density, 40 MHz, Port 2, 19 dBi – Point to Multi-Point



Plot 320. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 2, 19 dBi

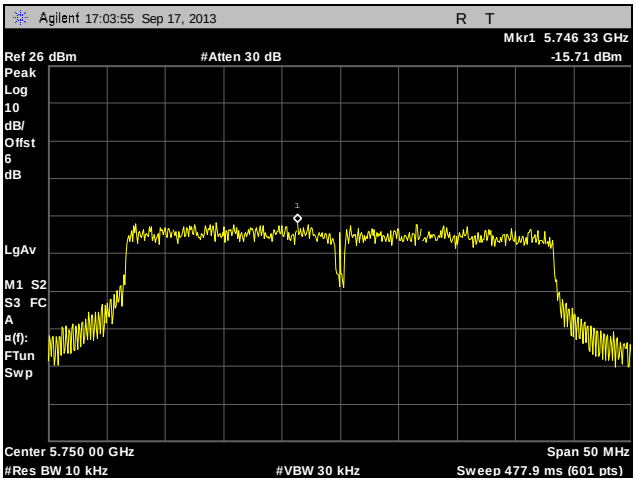


Plot 321. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 2, 19 dBi

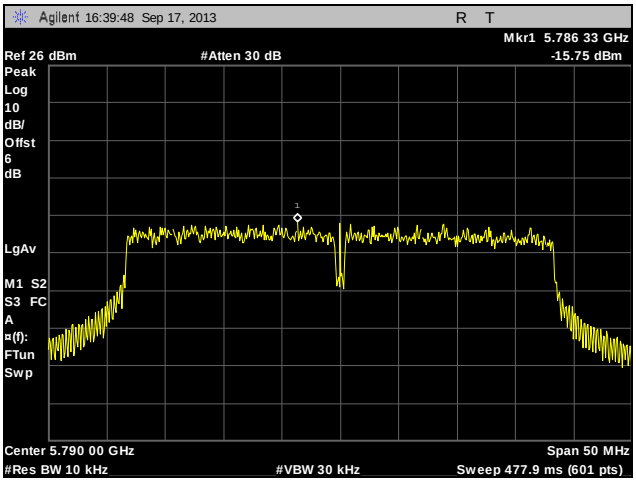


Plot 322. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 2, 19 dBi

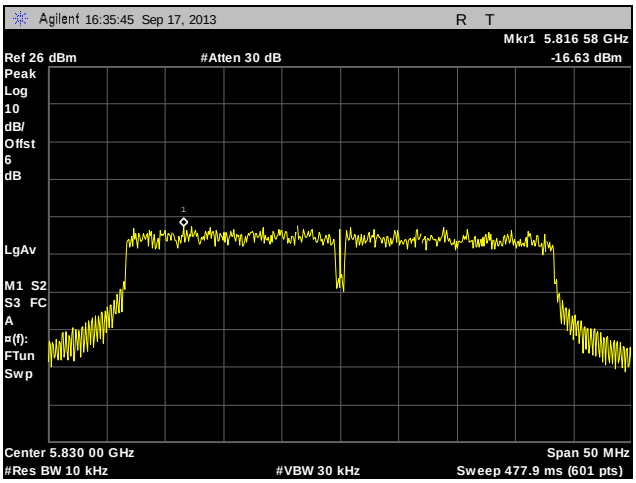
Peak Power Spectral Density, 40 MHz, Port 2, 21 dBi – Point to Multi-Point



Plot 323. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 2, 21 dBi

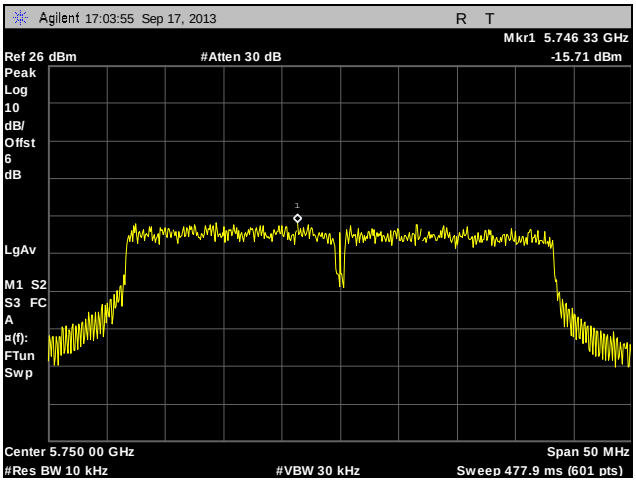


Plot 324. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 2, 21 dBi

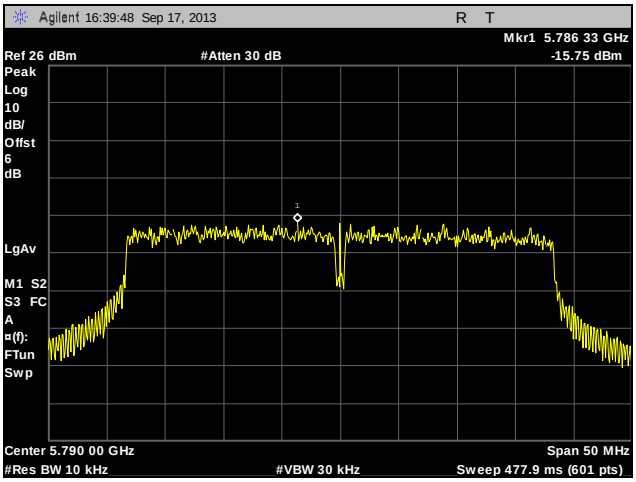


Plot 325. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 2, 21 dBi

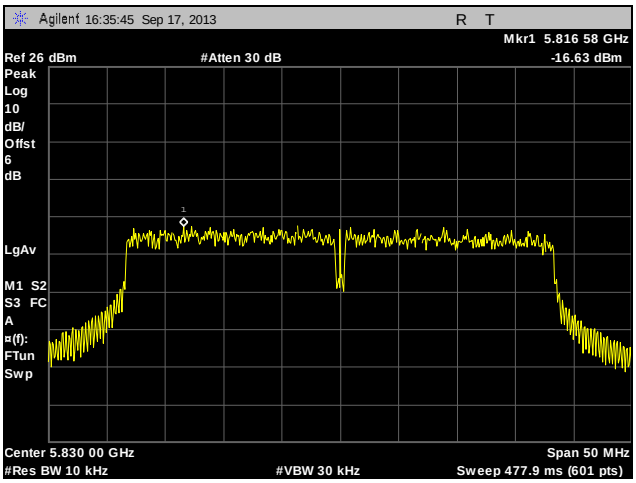
Peak Power Spectral Density, 40 MHz, Port 2, 23 dBi – Point to Multi-Point



Plot 326. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 2, 23 dBi

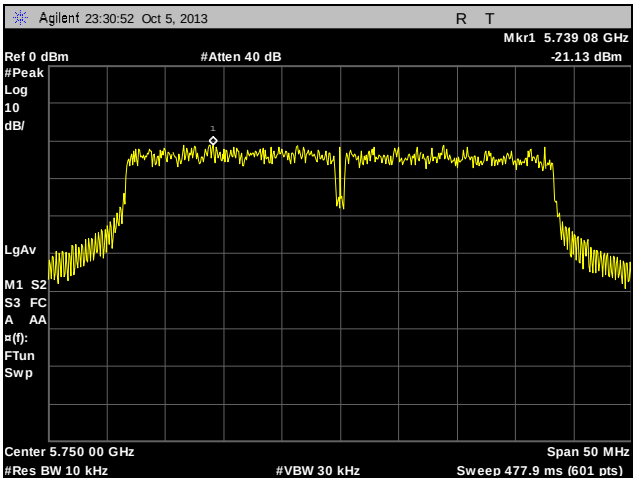


Plot 327. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 2, 23 dBi

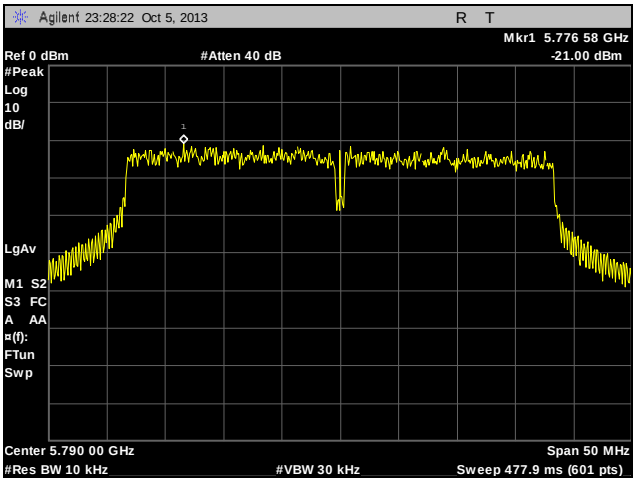


Plot 328. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 2, 23 dBi

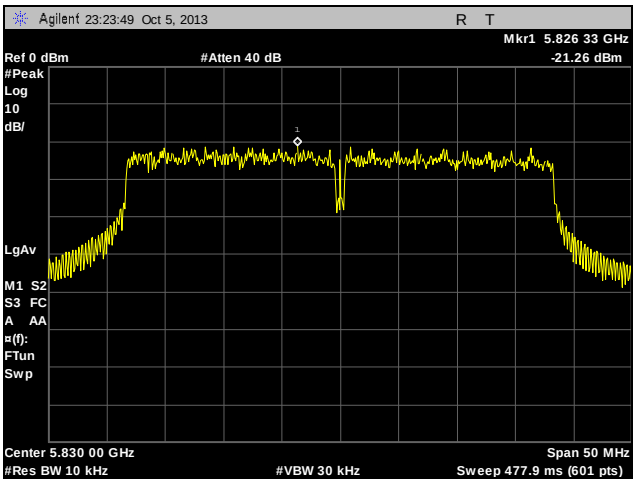
Peak Power Spectral Density, 40 MHz, Port 2, 28 dBi – Point to Multi-Point



Plot 329. Peak Power Spectral Density, Low Channel, Point to Multi-Point, 40 MHz, Port 2, 28 dBi



Plot 330. Peak Power Spectral Density, Mid Channel, Point to Multi-Point, 40 MHz, Port 2, 28 dBi



Plot 331. Peak Power Spectral Density, High Channel, Point to Multi-Point, 40 MHz, Port 2, 28 dBi

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(i) Maximum Permissible Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

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

Peak Conducted Power of 28dBi antenna= 12.62dBm = 18.28mW

28dBi antenna gain in terms of linear value= 630.95

The limit for maximum RF exposure for 5.8GHz device is 1mW/cm^2

The formula for calculating RF exposure is given as $S= \frac{PG}{4\pi R^2}$

P=18.28mW, G= 630.95 & R=20cm, then S comes out to be 2.295mW/cm^2 which was over the limit specified in 1.1310

Distance R at which S= 1mW/cm^2 are given as under:

$R=(PG/4\pi S)^{0.5}$

By inserting all the values in right hand side of above equation we get R=30.30cm

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	8/6/2012	2/6/2014
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4829	SPECTRUM ANALYZER	AGILENT	E4407B	5/14/2013	11/14/2014
1T4565	4409	SOLAR ELECTRONICS	9252-50-R-24-BNC	12/28/2012	6/28/2014
1T4751	ANTENNA - BILOG	SUNOL SCIENCES	JB6	1/8/2013	7/8/2014
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	7/16/2012	7/16/2014
1T4771	PSA SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4446A	2/15/2013	8/15/2014
1T2511	ANTENNA; HORN	EMCO	3115	3/28/2013	9/28/2014
1T4752	PRE-AMPLIFIER	MITEQ	JS44-18004000-35-8P	SEE NOTE	
1T4596	AC POWER SOURCE	CALIFORNIA INSTRUMENTS	2001RP	NOT REQUIRED	
1T4745	ANTENNA, HORN	ETS-LINDGREN	3116	10/19/2012	10/19/2013
1T4300	SEMI-ANECHOIC CHAMBER	EMC TEST SYSTEMS	NONE	7/24/2012	1/24/2014
1T4149	High-Frequency Anechoic Chamber	RAY-PROOF	81	Not Required	Not Required

Table 26. Test Equipment List

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

V. Certification & User's Manual Information

Certification & User's Manual Information

A. Certification Information

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

§ 2.801 Radio-frequency device defined.

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

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

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

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

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

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

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

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

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

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

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

(i) Compliance testing;

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

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

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

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

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

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

Certification & User's Manual Information

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

§ 2.901 Basis and Purpose

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

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

§ 2.907 Certification.

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

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

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

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

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

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

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

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

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

Certification & User's Manual Information

1. Label and User's Manual Information

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

§ 15.19 Labeling requirements.

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

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

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

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

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

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

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

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

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

§ 15.21 Information to user.

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

Verification & User's Manual Information

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

§ 15.105 Information to the user.

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

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

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

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

– Consult the dealer or an experienced radio/TV technician for help.

ICES-003 Procedural & Labeling Requirements

From the Industry Canada Electromagnetic Compatibility Advisory Bulletin entitled, "Implementation and Interpretation of the Interference-Causing Equipment Standard for Digital Apparatus, ICES-003" (EMCAB-3, Issue 2, July 1995):

> "At present, CISPR 22: 2002 and ICES technical requirements are essentially equivalent. Therefore, if you have CISPR 22: 2002 approval by meeting CISPR Publication 22, the only additional requirements are: to attach a note to the report of the test results for compliance, indicating that these results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations; to maintain these records on file for the requisite five year period; and to provide the device with a notice of compliance in accordance with ICES-003."

Procedural Requirements:

According to Industry Canada's Interference Causing Equipment Standard for Digital Apparatus ICES-003 Issue 5 August 2012:

Section 6.1: A record of the measurements and results, showing the date that the measurements were completed, shall be retained by the manufacturer or importer for a period of at least five years from the date shown in the record and made available for examination on the request of the Minister.

Section 6.2: A written notice indicating compliance must accompany each unit of digital apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. Where because of insufficient space or other constraints it is not feasible to affix a label to the apparatus, the notice may be in the form of a statement in the users' manual.

Labeling Requirements:

The suggested text for the notice, in English and in French, is provided below, from the Annex of ICES-003:

> This Class [2] digital apparatus complies with Canadian ICES-003.
>
> Cet appareil numérique de la classe [1] est conforme à la norme NMB-003 du Canada.

[2] Insert either A or B but not both as appropriate for the equipment requirements.

End of Report