MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
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3162 BELICK STREET ● SANTA CLARA, CALIFORNIA 95054 ● PHONE (408 748-3585 ● FAX (510) 489-6372

August 18, 2010

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., Wireless R5 000-Lm/58.300.2x63 as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-0 6 ed.), Part 15, Subpart B, ICES-003, Issue 4 February 2004 for a Class A Digital Device and FCC Part 15 Subpart C, RSS-210, Issue 7, June 2007 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.\EMC29262-FCC247)

Electromagnetic Compatibility Criteria
Test Report

for the

InfiNet Malta, Ltd.
Wireless R5000-Lm/58.300.2x63

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 7, June 2007
for Intentional Radiators

MET Report: EMC29262-FCC247

August 18, 2010

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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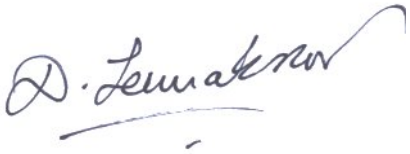

Dusmantha Tennakoon, Project Engineer
Electro magnetic Compatibility Lab Do

Jennifer Warnell
cumentation 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 4 February 2004, RSS-210, Issue 7, June 2007 under normal use and maintenance.

Shawn McMillen,
Wireless Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	August 18, 2010	Initial Issue.

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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**ilovolt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**micro**henry
µF	**micro**farad
µs	**micro**seconds
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. Wireless R5000-Lm/58.300.2x63, 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 Wireless R5000-Lm/58.300.2x63. 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 Wireless R5000-Lm/58.300.2x63, 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 1INF1404R3. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference 47 CFR Part 15.247:2005	IC Reference RSS-210 Issue 7: 2007	Description	Compliance
47 CFR Part 15.107 (a)	ICES-003 Issue 4 February 2004	Conducted Emission Limits for a Class A Digital Device	Compliant
47 CFR Part 15.109 (a)	ICES-003 Issue 4 February 2004	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-210(7.2.2)	Conducted Emission Voltage	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(1)	RSS-210(A8.1)	Occupied Bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.247(b)	RSS-210(A8.4)	RF Output Power	Compliant
Title 47 of the CFR, Part 15 §15.209, §15.247(d)	RSS-210(A8.5)	Radiated Spurious Emissions	Compliant
Title 47 of the CFR, Part 15 §15.205	RSS-210(A8.5)	Emissions at Restricted Band	Compliant
Title 47 of the CFR, Part 15 §15.209, §15.247(d)	RSS-210(A8.5)	Conducted Spurious Emissions	Compliant
Title 47 of the CFR, Part 15; §15.247(e)	RSS-210(A8.3)	Power Spectral Density	Compliant
Title 47 of the CFR, Part 15 §15.247(i)	RSS-Gen(5.5)	Maximum Permissible Exposure	Compliant
N/A	RSS-Gen(4.8)	Receiver Spurious Emissions	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 Wireless R5000-Lm/58.300.2x63, under InfiNet Malta, Ltd.'s purchase order number 1INF1404R3.

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., Wireless R5000-Lm/58.300.2x63.

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

Model(s) Tested:	Wireless R5000-Lm/58.300.2x63				
Model(s) Covered:	Wireless R5000-Lm/58.300.2x63				
EUT Specifications:	Primary Power: 90 – 250 VAC				
	FCC ID: X8Q-LM-5X18 IC: 9144A-LM5X18				
	Type of Modulations:	OFDM			
	Equipment Code:	DTS			
	Bandwidth:	5 MHz	10 MHz	20 MHz	40 MHz
	Frequency Range:	5730 – 5845 MHz	5730 – 5845 MHz	5740 – 5840 MHz	5750 – 5830 MHz
	Peak RF Output Power:	349.0 mW	356.3 mW	361.6 mW	407.0 mW
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:	Dusmantha Tennakoon				
Report Date(s):	August 18, 2010				

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
RSS-210, Issue 7, June 2007	Low-power Licence-exempt Radiocommunications Devices (All Frequency Bands): Category I Equipment
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ICES-003, Issue 4 February 2004	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
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
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025:2000	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. Wireless R5000-Lm/58.300.2x63, Equipment Under Test (EUT), is a high performance broadband wireless system that supports 802.11n (2x2 MIMO). The EUT is only for point-to-point applications.

Photograph 1. InfiNet Malta, Ltd. Wireless R5000-Lm/58.300.2x63

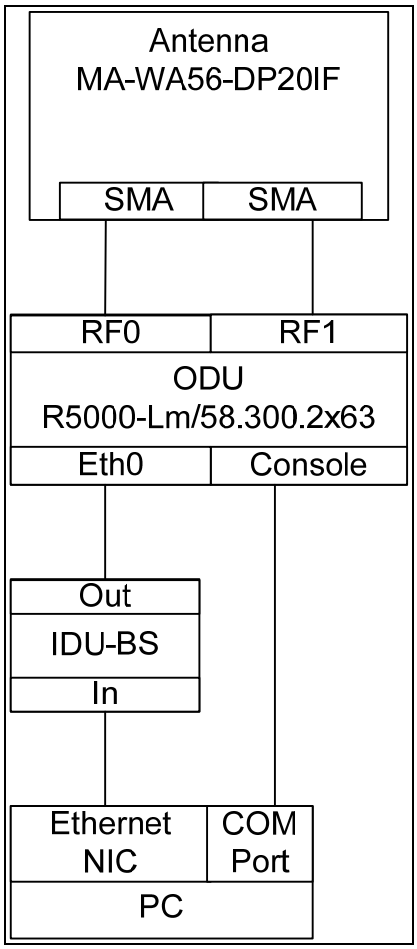


Figure 1. Block Diagram of EUT

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.

Ref. ID	Name / Description	Model Number	Serial Number
1	Outdoor unit	R5000-Lm/58.300.2x63	40303
2	Antenna 21 dBi	MA-WA56-DP20IF	N/A
3	Indoor unit (power supply)	IDU-BS	N/A

Table 4. Equipment Configuration

F. Support Equipment

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

Ref. ID	Name / Description	Manufacturer	Model Number
1	ODU mount kit	InfiNet Wireless	MOUNT-KIT-85

Table 5. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded? (Y/N)	Termination Box ID & Port ID
1	Eth0	RJ-45 cable	1	10	Y	ODU R5000-Lm/58.300.2x63
2	Console	Console cable	1	1.5	N	ODU R5000-Lm/58.300.2x63
3	RF0	RF cable	1	1	Y	ODU R5000-Lm/58.300.2x63
4	RF1	RF cable	1	1	Y	ODU R5000-Lm/58.300.2x63
5	In	RJ-45 cable	1	1	N	IDU-BS
6	Out	RJ-45 cable	1	10	Y	IDU-BS
7	SMA	RF cable	2	1	Y	Antenna

Table 6. Ports and Cabling Information

H. Mode of Operation

The EUT was placed in a continuous transmit mode for testing purposes.

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 7. 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 7. 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. * -- Limits per Subsection 15.207(a).				

Table 7. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b) and 15.207(a)

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

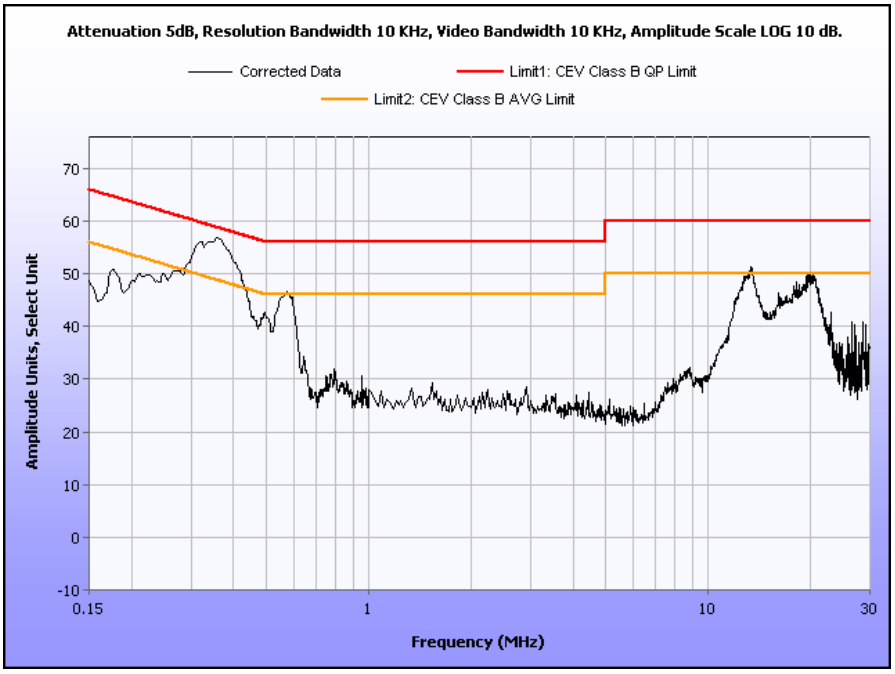
Test Engineer(s): M inh Ly

Test Date(s): 07/ 29/10

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

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.15	49.31	0.085	49.395	79	-29.605	32.58	0.085	32.665	66	-33.335
8.72	42.48	0.26173333	42.74173333	73	-30.2583	36.19	0.26173333	36.45173333	60	-23.5483
20.94	36.85	0.31496	37.16496	73	-35.835	26.15	0.31496	26.46496	60	-33.535

Table 8. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

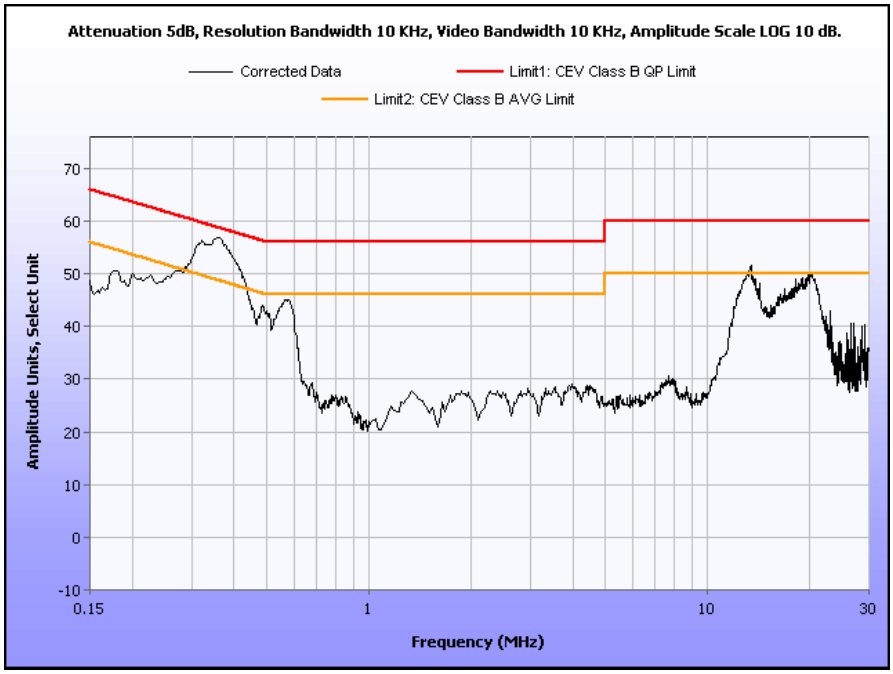


Plot 1. Conducted Emission, Phase Line Plot

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

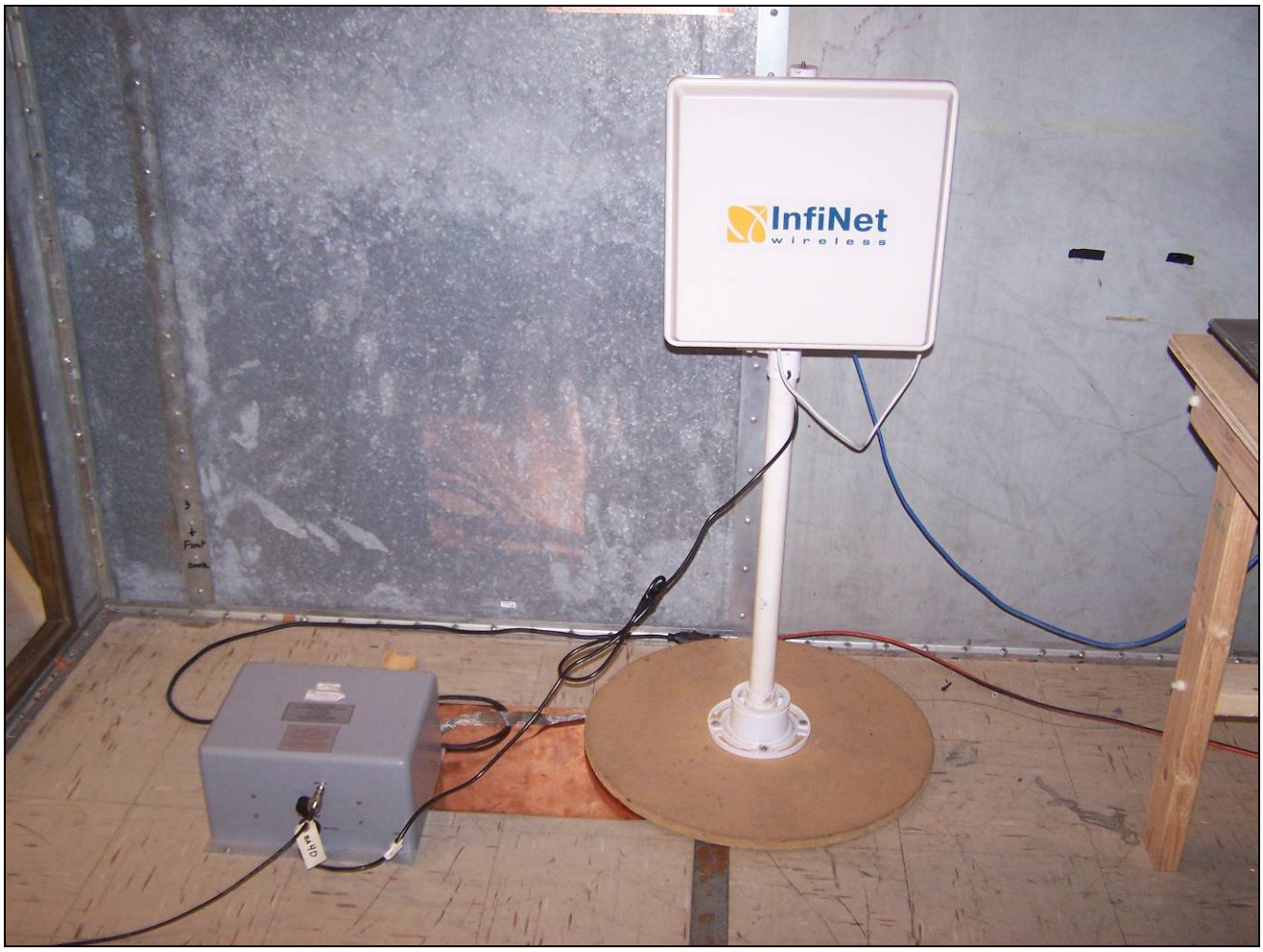
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.153	46.17	0.0901	46.2601	79	-32.7399	32.86	0.0901	32.9501	66	-33.0499
0.341	52.73	0.17	52.9	79	-26.1	47.21	0.17	47.38	66	-18.62
8.65	43.91	0.258	44.168	73	-28.832	38.69	0.258	38.948	60	-21.052
20.26	41.57	0.32584	41.89584	73	-31.1042	36.24	0.32584	36.56584	60	-23.4342

Table 9. 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 10.

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 10.

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

Test Procedures: 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): Minh Ly

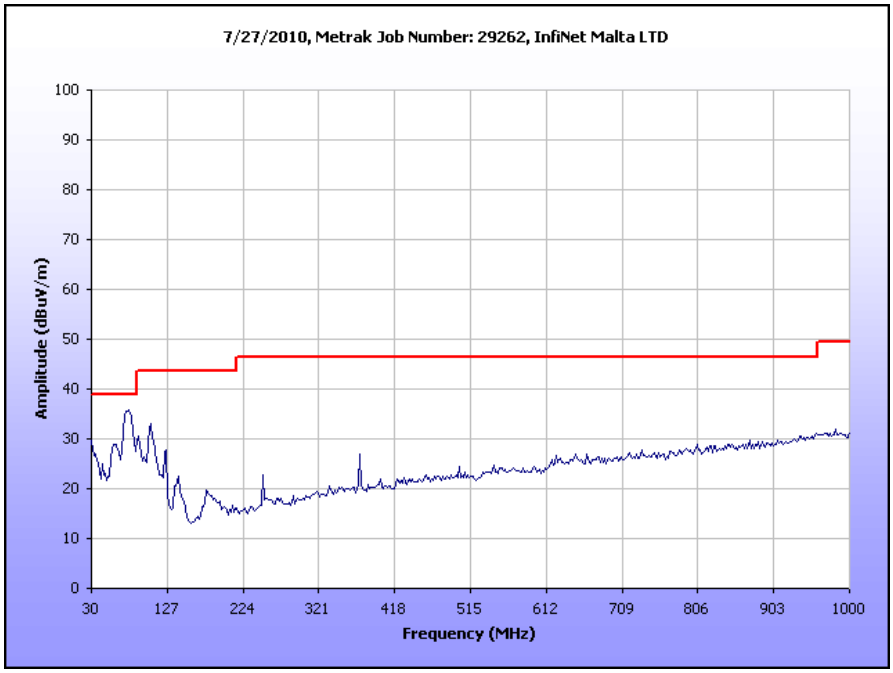
Test Date(s): 07/27/10

Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.000	0	H	1.00	16.90	4.7	0.23	10.46	11.37	39.00	-27.63
30.000	0	V	1.20	28.73	3.7	0.23	10.46	22.20	39.00	-16.80
66.410	361	H	1.60	16.69	10.02	0.23	10.46	16.48	39.00	-22.52
66.410	202	V	1.10	26.23	9.63	0.23	10.46	25.63	39.00	-13.37
75.130	293	H	2.53	22.39	8.47	0.23	10.46	20.63	39.00	-18.37
75.130	261	V	1.50	35.46	7.99	0.23	10.46	33.22	39.00	-5.78
83.530	252	H	3.10	19.40	6.76	0.23	10.46	15.93	39.00	-23.07
83.530	360	V	1.00	33.86	7.15	0.23	10.46	30.78	39.00	-8.22
91.080	0	H	1.30	17.69	6.77	0.23	10.46	14.23	43.50	-29.27
91.080	334	V	1.00	31.32	6.7	0.23	10.46	27.79	43.50	-15.71
106.170	71	H	1.85	20.14	7.35	0.23	10.46	17.26	43.50	-26.24
106.170	0	V	1.00	31.59	7.58	0.23	10.46	28.94	43.50	-14.56
108.520	59	H	2.20	19.55	7.26	0.23	10.46	16.58	43.50	-26.92
108.520	355	V	0.90	30.96	7.53	0.23	10.46	28.26	43.50	-15.24
125.020	104	H	2.06	20.28	7.5	0.23	10.46	17.55	43.50	-25.95
125.020	266	V	1.12	29.96	7.9	0.23	10.46	27.63	43.50	-15.87

Table 11. 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

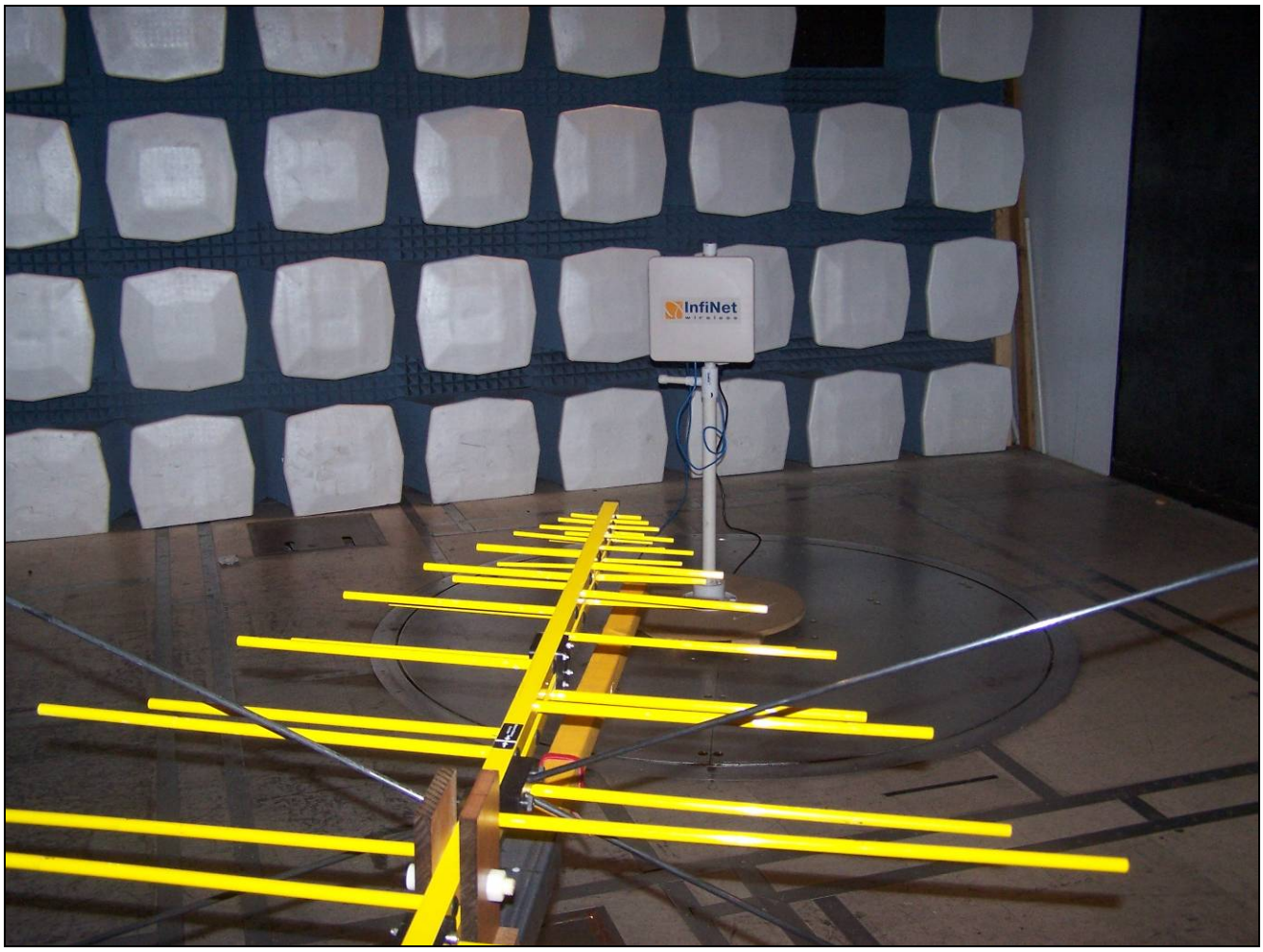
Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.000	0	H	1.00	16.90	4.7	0.23	10.46	11.37	40.00	-28.63
30.000	0	V	1.20	28.73	3.7	0.23	10.46	22.20	40.00	-17.80
66.410	361	H	1.60	16.69	10.02	0.23	10.46	16.48	40.00	-23.52
66.410	202	V	1.10	26.23	9.63	0.23	10.46	25.63	40.00	-14.37
75.130	293	H	2.53	22.39	8.47	0.23	10.46	20.63	40.00	-19.37
75.130	261	V	1.50	35.46	7.99	0.23	10.46	33.22	40.00	-6.78
83.530	252	H	3.10	19.40	6.76	0.23	10.46	15.93	40.00	-24.07
83.530	360	V	1.00	33.86	7.15	0.23	10.46	30.78	40.00	-9.22
91.080	0	H	1.30	17.69	6.77	0.23	10.46	14.23	40.00	-25.77
91.080	334	V	1.00	31.32	6.7	0.23	10.46	27.79	40.00	-12.21
106.170	71	H	1.85	20.14	7.35	0.23	10.46	17.26	40.00	-22.74
106.170	0	V	1.00	31.59	7.58	0.23	10.46	28.94	40.00	-11.06
108.520	59	H	2.20	19.55	7.26	0.23	10.46	16.58	40.00	-23.42
108.520	355	V	0.90	30.96	7.53	0.23	10.46	28.26	40.00	-11.74
125.020	104	H	2.06	20.28	7.5	0.23	10.46	17.55	40.00	-22.45
125.020	266	V	1.12	29.96	7.9	0.23	10.46	27.63	40.00	-12.37

Table 12. Radiated Emissions Limits, Test Results, ICES-003 Limits

Note: The EUT was tested at 3 m.

Radiated Emission Limits Test Setup



Photograph 3. Radiated Emission, Test Setup

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 antenna is a 21 dBi panel antenna; professionally installed.

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 07/23/10

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207 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 Ω 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 13. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: 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 preformed with the transmitter on.

Test Results: The EUT was compliant with this requirement. Measured emissions were below applicable limits.

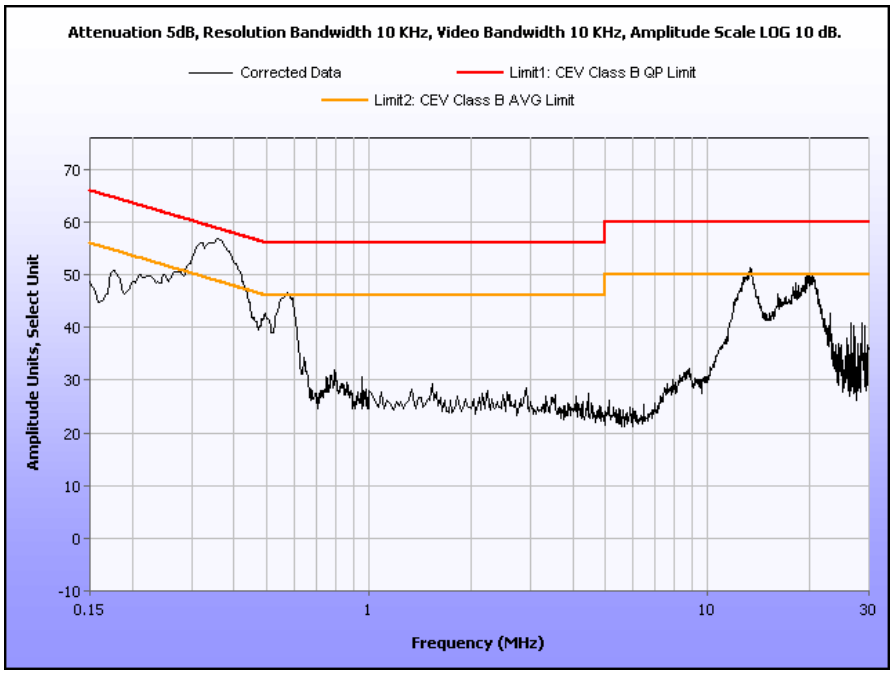
Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 08/03/10

15.207 Conducted Emissions Test Results

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.1789	45.1	0	45.1	64.54	-19.44	32.3	0	32.3	54.54	-22.24
0.362	52.27	0	52.27	58.68	-6.41	40.98	0	40.98	48.68	-7.7
0.575	42.15	0	42.15	56	-13.85	30.73	0	30.73	46	-15.27
8.852	23.91	0.05	23.96	60	-36.04	13.54	0.05	13.59	50	-36.41
13.38	43.64	0.07	43.71	60	-16.29	37.84	0.07	37.91	50	-12.09
20.12	42.14	0.11	42.25	60	-17.75	36.83	0.11	36.94	50	-13.06

Table 14. Conducted Emissions, 15.207, Phase Line, Test Results (120 VAC, 60 Hz)

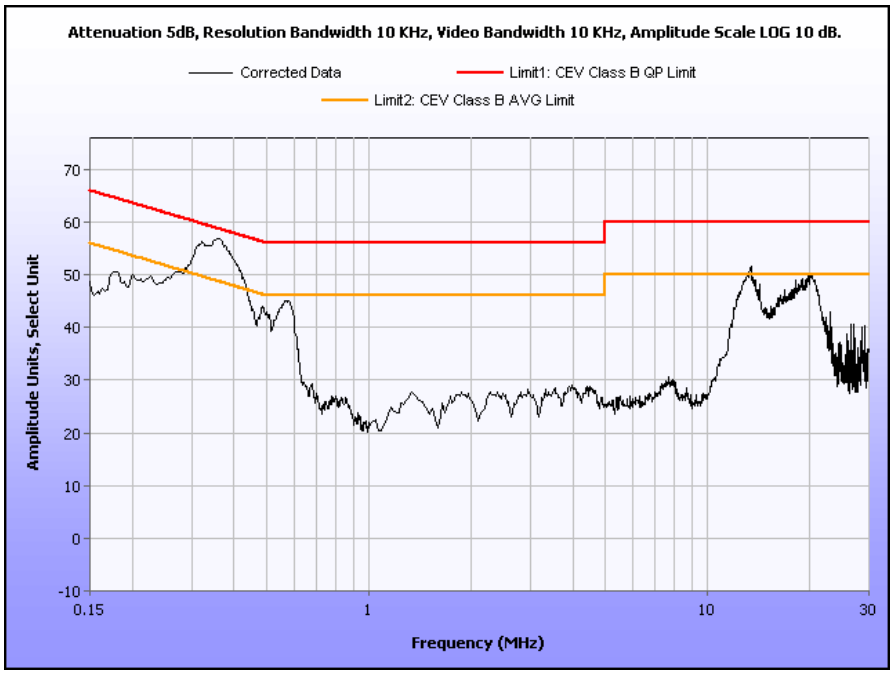


Plot 4. Conducted Emissions, Phase Line

15.207 Conducted Emissions Test Results

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.1785	43.1	0	43.1	64.56	-21.46	31.5	0	31.5	54.56	-23.06
0.362	53.64	0	53.64	58.68	-5.04	41.57	0	41.57	48.68	-7.11
0.578	41.57	0	41.57	56	-14.43	29.84	0	29.84	46	-16.16
8.852	23.81	0.05	23.86	60	-36.14	16.47	0.05	16.52	50	-33.48
13.39	43.52	0.07	43.59	60	-16.41	38.36	0.07	38.43	50	-11.57
20.12	41.68	0.11	41.79	60	-18.21	37.85	0.11	37.96	50	-12.04

Table 15. Conducted Emissions, 15.207, Neutral Line, Test Results (120 VAC, 60 Hz)



Plot 5. Conducted Emissions, Neutral Line

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a) 6 dB and 99% Bandwidth

Test Requirements: **§ 15.247(a):** 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).

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

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 08/03/10

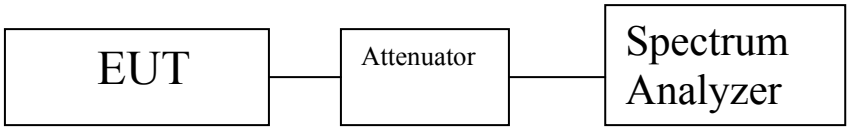


Figure 2. Block Diagram, Occupied Bandwidth Test Setup

Occupied Bandwidth Test Results

6 dB Occupied Bandwidth			
	Carrier Channel	Frequency (MHz)	Measured 6 dB Bandwidth (MHz)
5 MHz	Low	5730	4.381
	Mid	5785	4.341
	High	5845	4.298
10 MHz	Low	5730	8.835
	Mid	5785	8.874
	High	5845	8.864
20 MHz	Low	5740	17.331
	Mid	5780	17.497
	High	5840	17.413
40 MHz	Low	5750	35.827
	Mid	5790	36.564
	High	5830	35.312

Table 16. 6 dB Occupied Bandwidth, Test Results, Port 1, FCC

6 dB Occupied Bandwidth			
	Carrier Channel	Frequency (MHz)	Measured 6 dB Bandwidth (MHz)
5 MHz	Low	5730	4.432
	Mid	5785	4.409
	High	5845	4.465
10 MHz	Low	5730	8.709
	Mid	5785	8.904
	High	5845	8.848
20 MHz	Low	5740	17.603
	Mid	5780	17.185
	High	5840	17.709
40 MHz	Low	5750	36.551
	Mid	5790	35.625
	High	5830	36.425

Table 17. 6 dB Occupied Bandwidth, Test Results, Port 2, FCC

Occupied Bandwidth Test Results

6 dB Occupied Bandwidth			
	Carrier Channel	Frequency (MHz)	Measured 6 dB Bandwidth (MHz)
5 MHz	Low	5730	4.283
	Mid	5785	4.376
	High	5845	4.284
10 MHz	Low	5730	8.680
	Mid	5785	8.644
	High	5845	8.753
20 MHz	Low	5740	17.473
	Mid	5780	17.161
	High	5840	17.300
40 MHz	Low	5750	35.463
	Mid	5790	36.469
	High	5830	35.492

Table 18. 6 dB Occupied Bandwidth, Test Results, Port 1, IC

6 dB Occupied Bandwidth			
	Carrier Channel	Frequency (MHz)	Measured 6 dB Bandwidth (MHz)
5 MHz	Low	5730	4.432
	Mid	5785	4.409
	High	5845	4.465
10 MHz	Low	5730	8.428
	Mid	5785	8.615
	High	5845	8.656
20 MHz	Low	5740	17.366
	Mid	5780	17.448
	High	5840	17.368
40 MHz	Low	5750	36.657
	Mid	5790	36.367
	High	5830	33.888

Table 19. 6 dB Occupied Bandwidth, Test Results, Port 2, IC

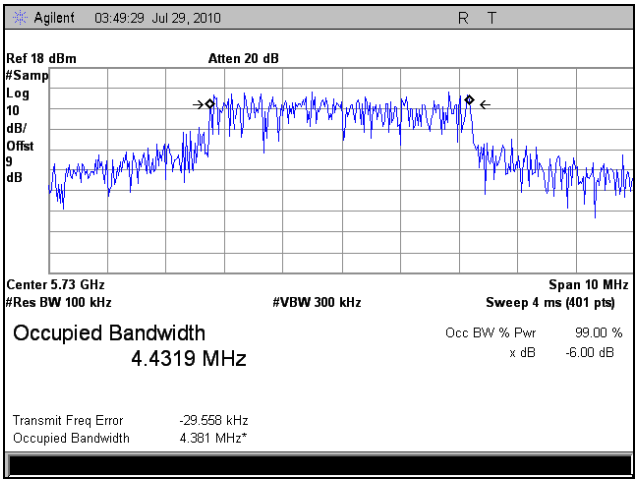
99% Occupied Bandwidth			
	Carrier Channel	Frequency (MHz)	Measured 99% Bandwidth (MHz)
5 MHz	Low	5730	4.4916
	Mid	5785	4.4463
	High	5845	4.5107
10 MHz	Low	5730	8.7848
	Mid	5785	8.7940
	High	5845	8.7545
20 MHz	Low	5740	17.6452
	Mid	5780	17.4611
	High	5840	17.7957
40 MHz	Low	5750	36.7328
	Mid	5790	36.2473
	High	5830	36.9319

Table 20. 99% Occupied Bandwidth, Test Results, Port 1

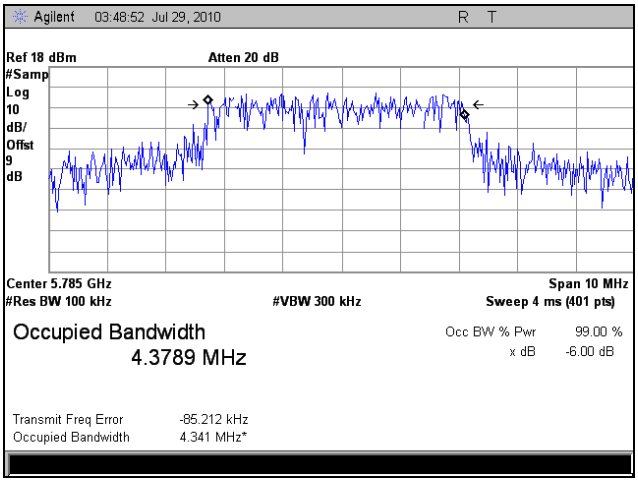
99% Occupied Bandwidth			
	Carrier Channel	Frequency (MHz)	Measured 99% Bandwidth (MHz)
5 MHz	Low	5730	4.4787
	Mid	5785	4.4962
	High	5845	4.4295
10 MHz	Low	5730	8.9055
	Mid	5785	8.8362
	High	5845	8.7266
20 MHz	Low	5740	17.3289
	Mid	5780	17.7085
	High	5840	17.6422
40 MHz	Low	5750	36.9479
	Mid	5790	36.7936
	High	5830	36.7303

Table 21. 99% Occupied Bandwidth, Test Results, Port 2

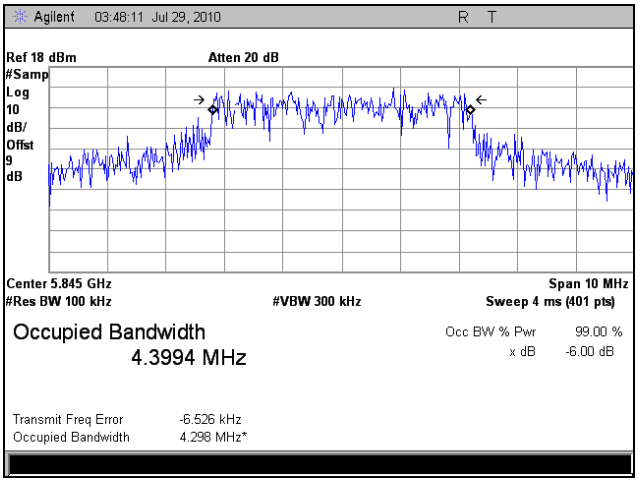
Occupied Bandwidth Test Results, FCC



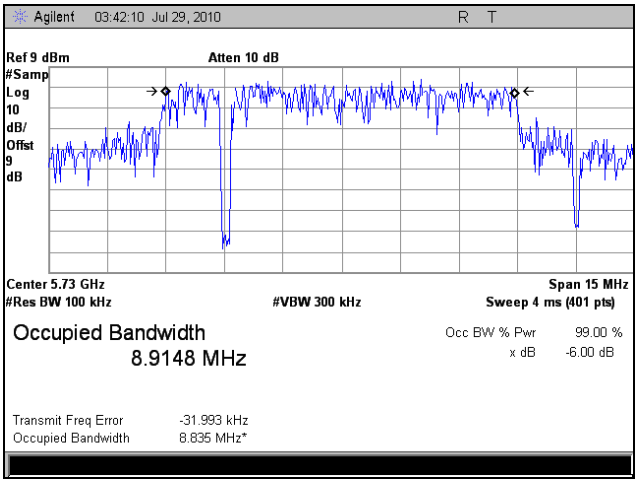
Plot 6. Occupied Band Width, Low Channel (5730 MHz), 5 MHz, Port 1, FCC, 6 dB



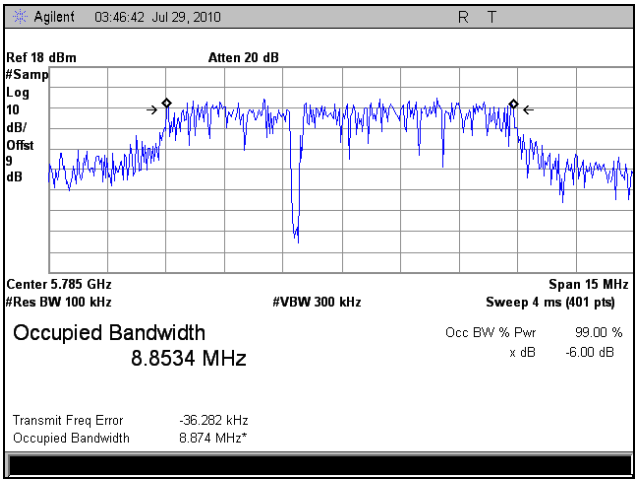
Plot 7. Occupied Band Width, Mid Channel (5785 MHz), 5 MHz, Port 1, FCC, 6 dB



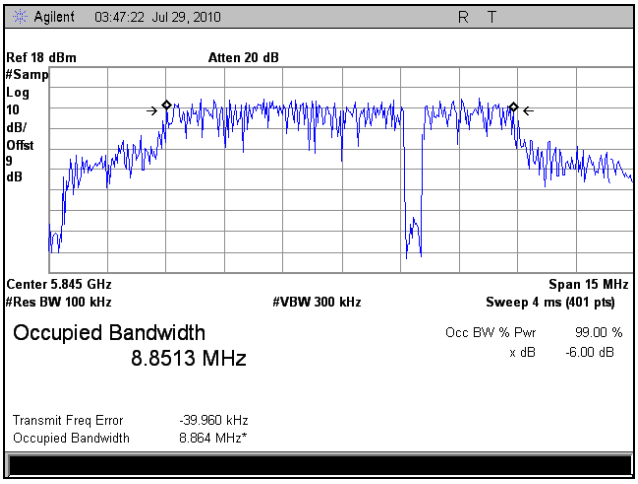
Plot 8. Occupied Band Width, High Channel (5845 MHz), 5 MHz, Port 1, FCC, 6 dB



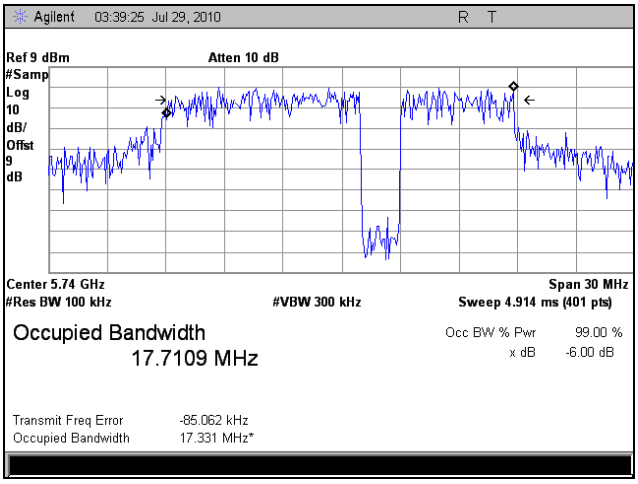
Plot 9. Occupied Band Width, Low Channel (5730 MHz), 10 MHz, Port 1, FCC, 6 dB



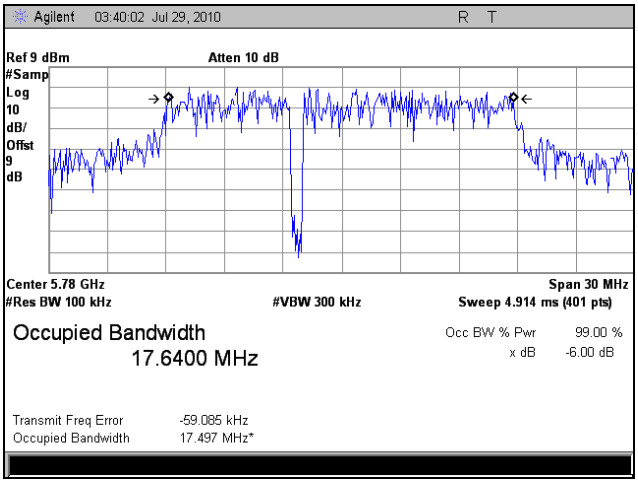
Plot 10. Occupied Band Width, Mid Channel (5785 MHz), 10 MHz, Port 1, FCC, 6 dB



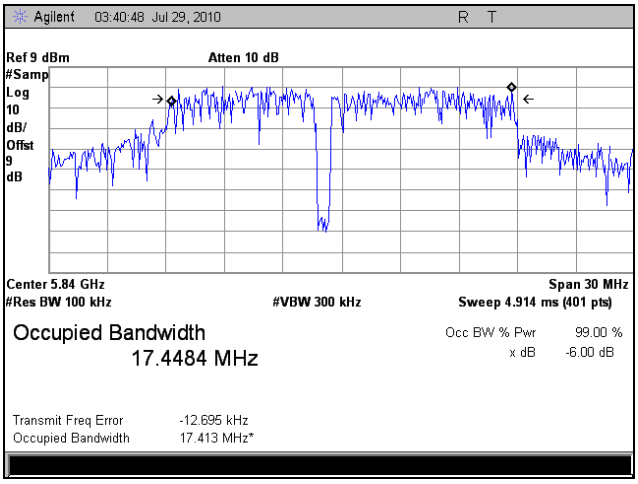
Plot 11. Occupied Band Width, High Channel (5845 MHz), 10 MHz, Port 1, FCC, 6 dB



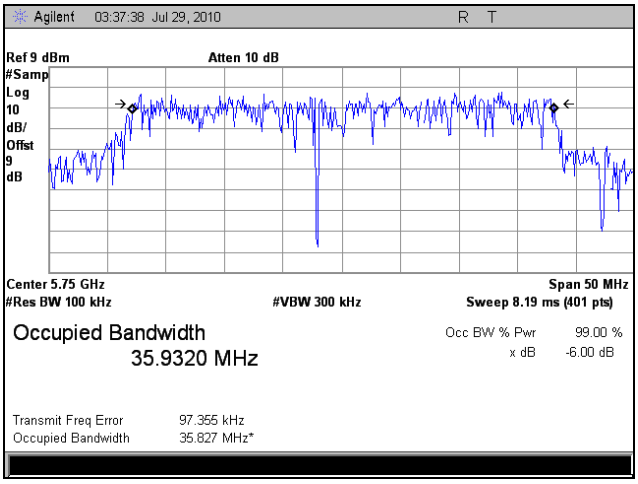
Plot 12. Occupied Band Width, Low Channel (5740 MHz), 20 MHz, Port 1, FCC, 6 dB



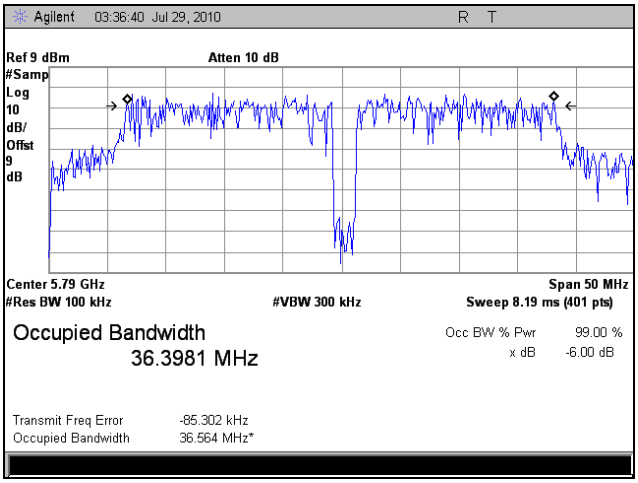
Plot 13. Occupied Band Width, Mid Channel (5780 MHz), 20 MHz, Port 1, FCC, 6 dB



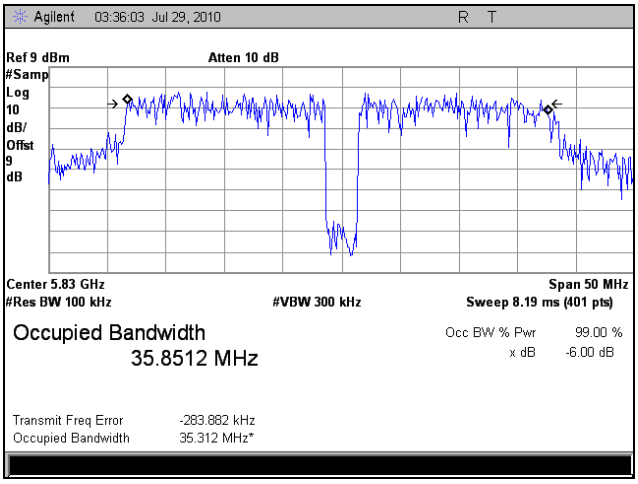
Plot 14. Occupied Band Width, High Channel (5840 MHz), 20 MHz, Port 1, FCC, 6 dB



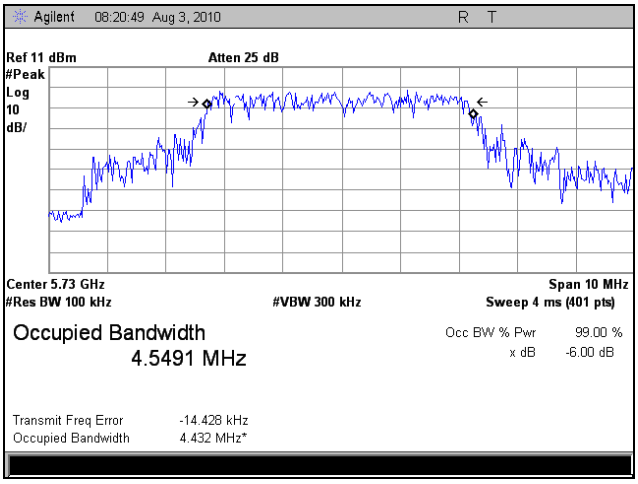
Plot 15. Occupied Band Width, Low Channel (5750 MHz), 40 MHz, Port 1, FCC, 6 dB



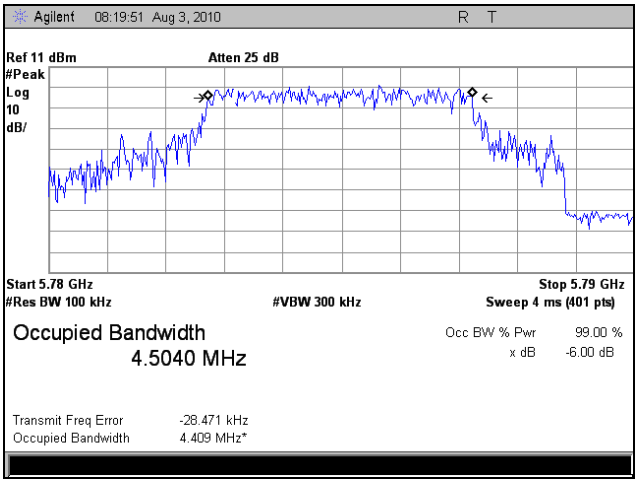
Plot 16. Occupied Band Width, Mid Channel (5790 MHz), 40 MHz, Port 1, FCC, 6 dB



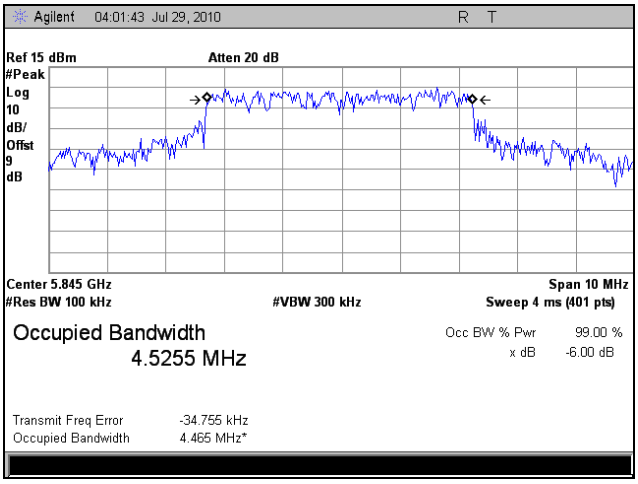
Plot 17. Occupied Band Width, High Channel (5830 MHz), 40 MHz, Port 1, FCC, 6 dB



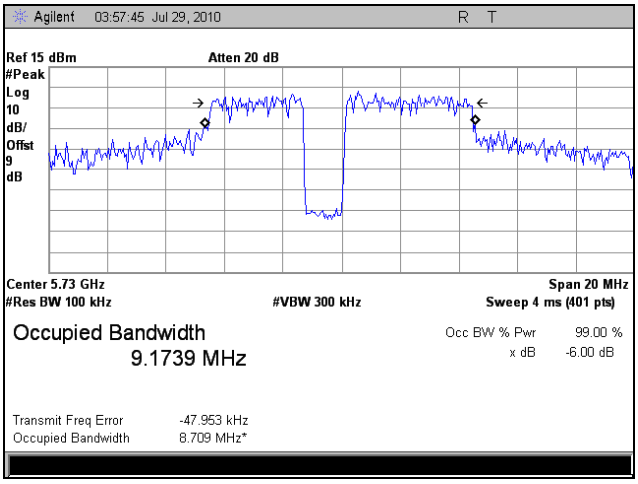
Plot 18. Occupied Band Width, Low Channel (5730 MHz), 5 MHz, Port 2, FCC, 6 dB



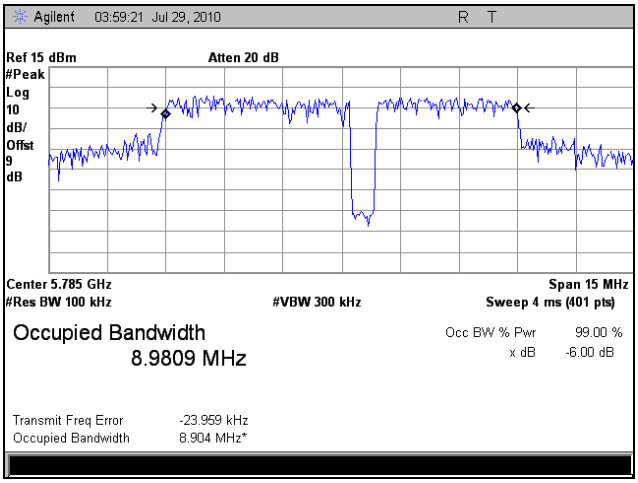
Plot 19. Occupied Band Width, Mid Channel (5785 MHz), 5 MHz, Port 2, FCC, 6 dB



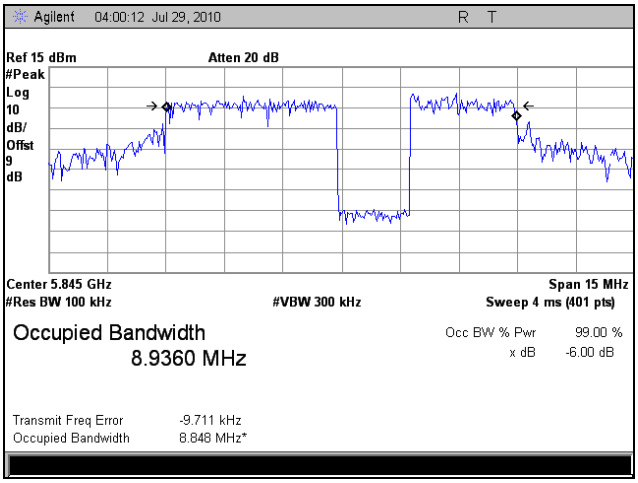
Plot 20. Occupied Band Width, High Channel (5845 MHz), 5 MHz, Port 2, FCC, 6 dB



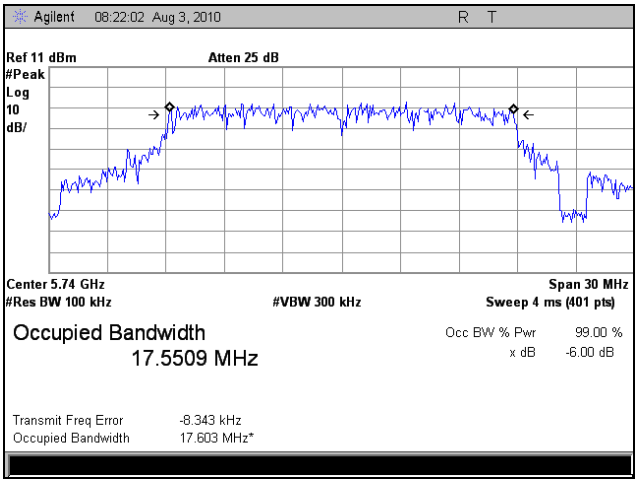
Plot 21. Occupied Band Width, Low Channel (5730 MHz), 10 MHz, Port 2, FCC, 6 dB



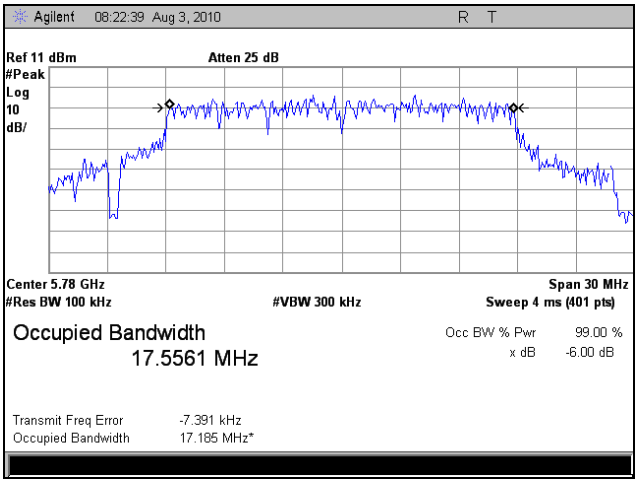
Plot 22. Occupied Band Width, Mid Channel (5785 MHz), 10 MHz, Port 2, FCC, 6 dB



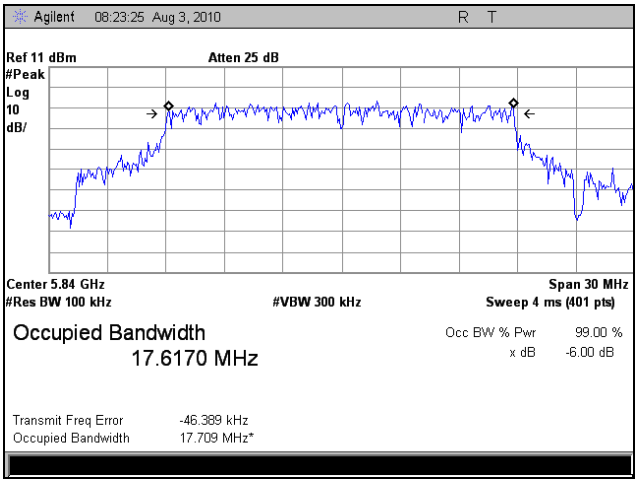
Plot 23. Occupied Band Width, High Channel (5845 MHz), 10 MHz, Port 2, FCC, 6 dB



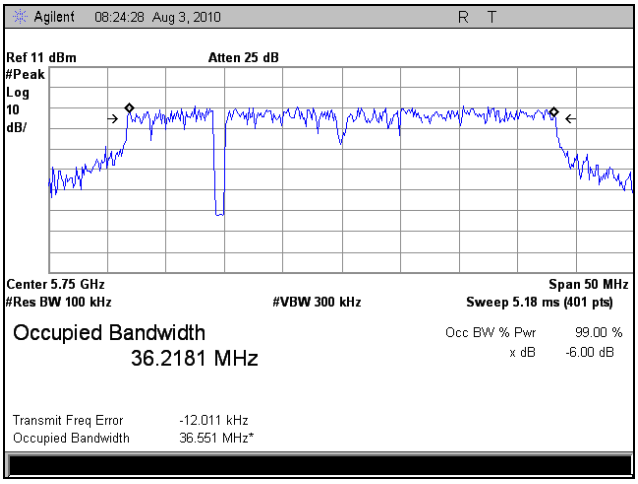
Plot 24. Occupied Band Width, Low Channel (5740 MHz), 20 MHz, Port 2, FCC, 6 dB



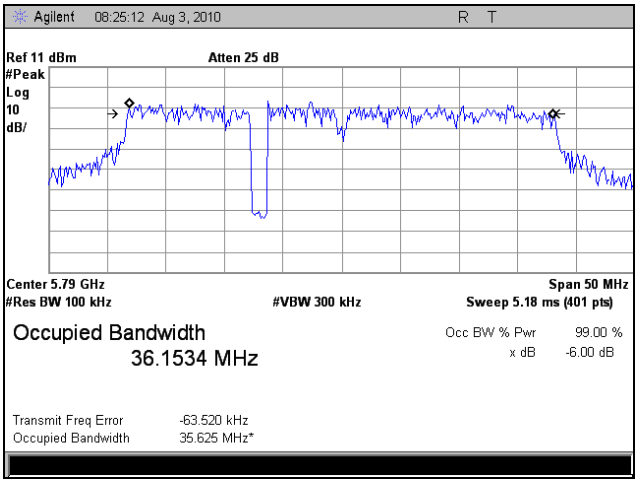
Plot 25. Occupied Band Width, Mid Channel (5780 MHz), 20 MHz, Port 2, FCC, 6 dB



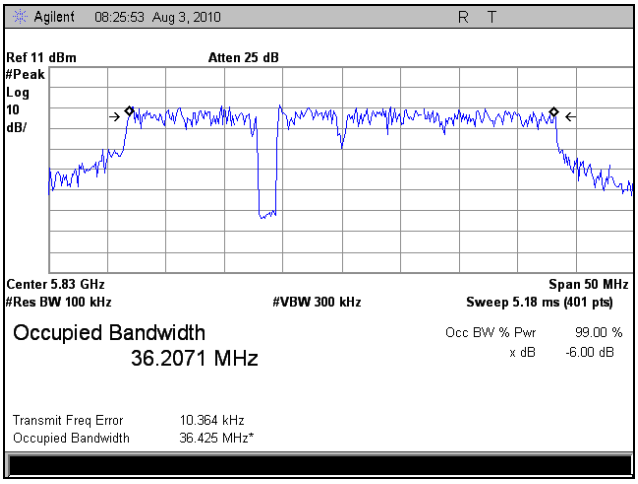
Plot 26. Occupied Band Width, High Channel (5840 MHz), 20 MHz, Port 2, FCC, 6 dB



Plot 27. Occupied Band Width, Low Channel (5750 MHz), 40 MHz, Port 2, FCC, 6 dB

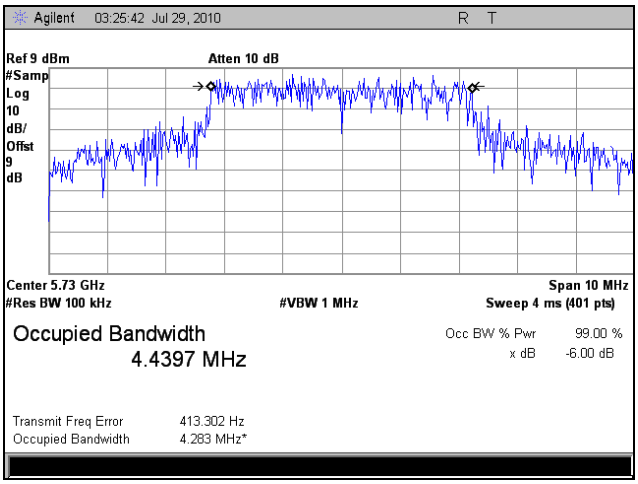


Plot 28. Occupied Band Width, Mid Channel (5790 MHz), 40 MHz, Port 2, FCC, 6 dB

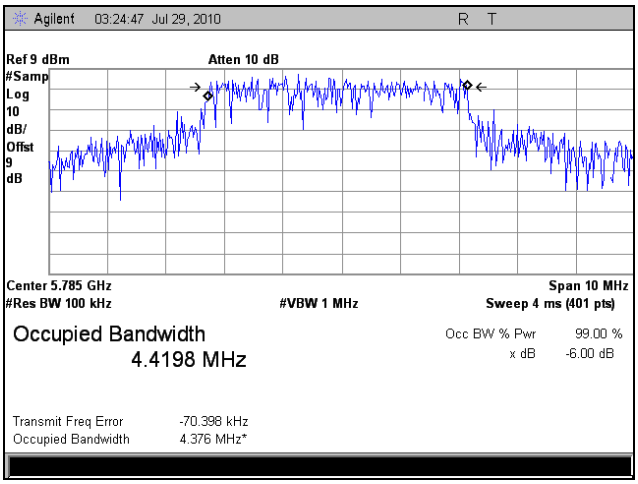


Plot 29. Occupied Band Width, High Channel (5830 MHz), 40 MHz, Port 2, FCC, 6 dB

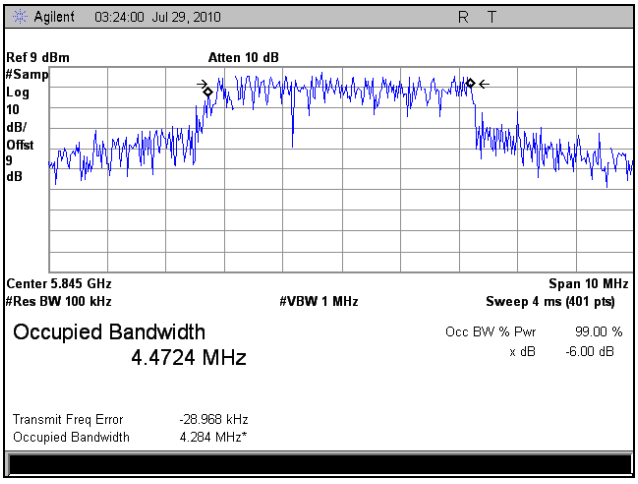
Occupied Bandwidth Test Results, Industry Canada



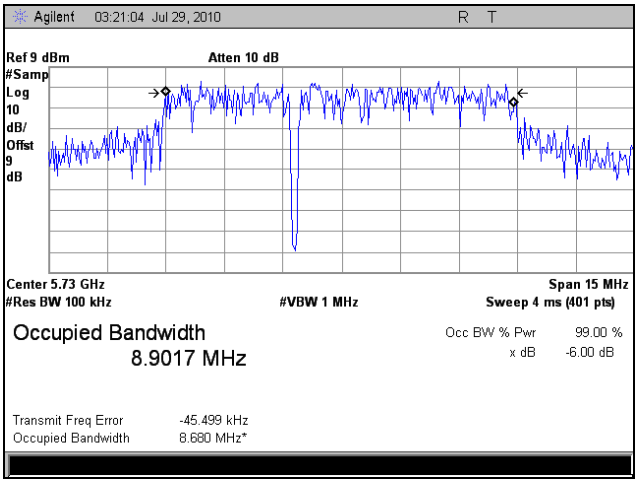
Plot 30. Occupied Band Width, Low Channel (5730 MHz), 5 MHz, Port 1, IC, 6 dB



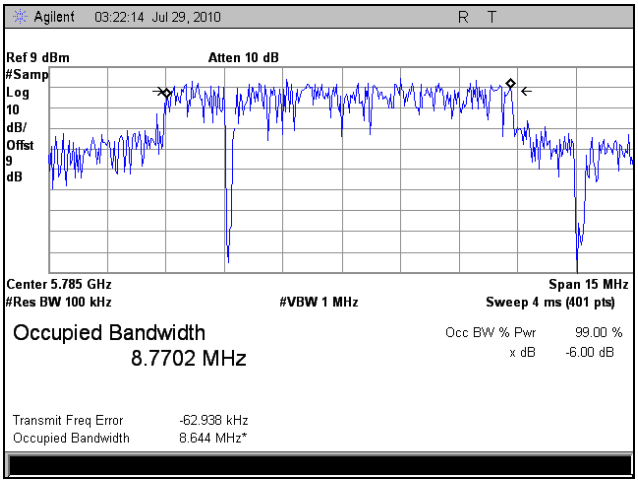
Plot 31. Occupied Band Width, Mid Channel (5785 MHz), 5 MHz, Port 1, IC, 6 dB



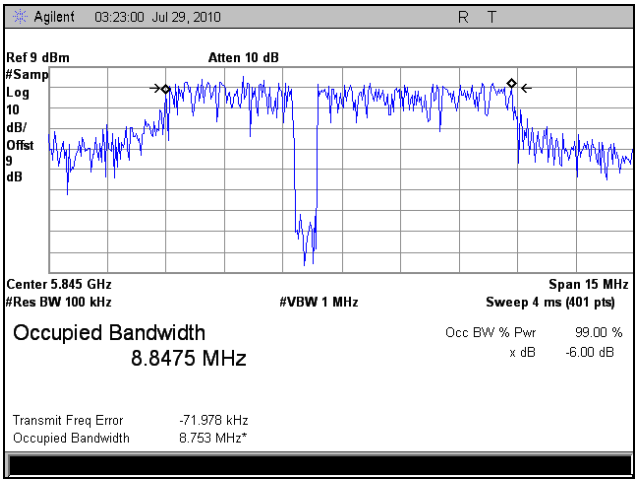
Plot 32. Occupied Band Width, High Channel (5845 MHz), 5 MHz, Port 1, IC, 6 dB



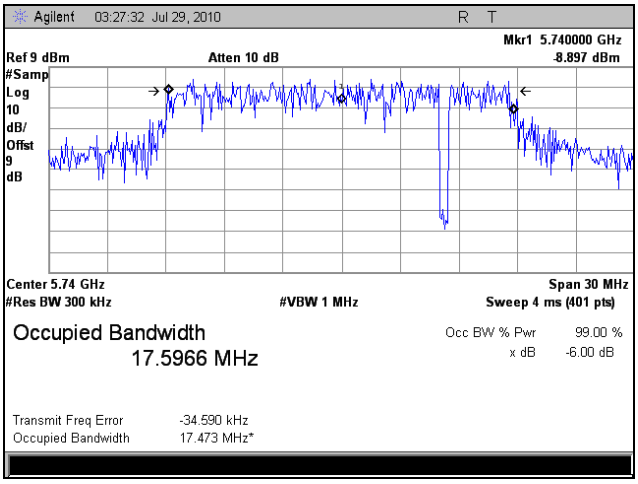
Plot 33. Occupied Band Width, Low Channel (5730 MHz), 10 MHz, Port 1, IC, 6 dB



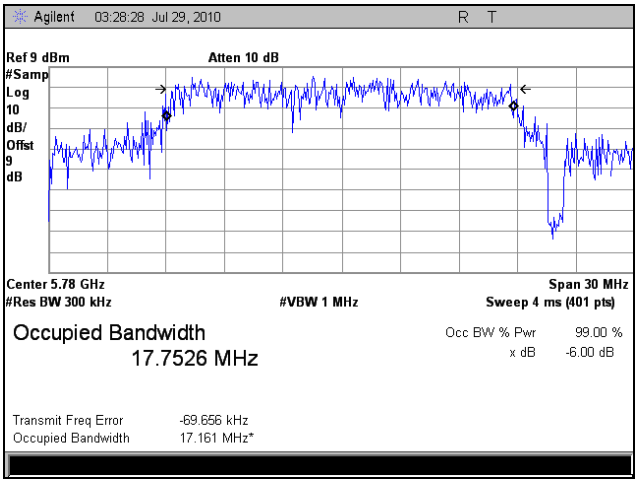
Plot 34. Occupied Band Width, Mid Channel (5785 MHz), 10 MHz, Port 1, IC, 6 dB



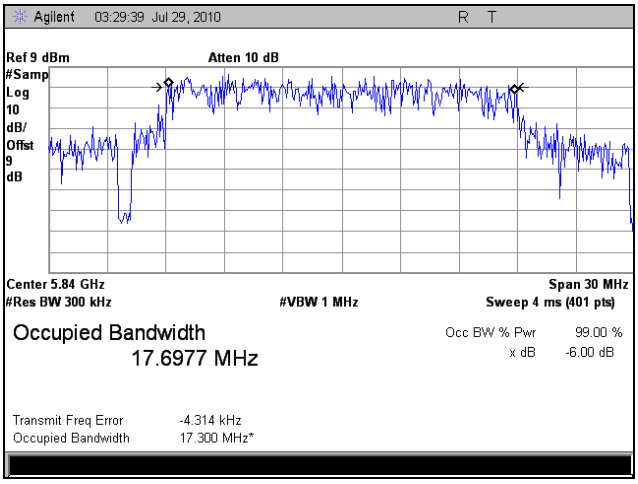
Plot 35. Occupied Band Width, High Channel (5845 MHz), 10 MHz, Port 1, IC, 6 dB



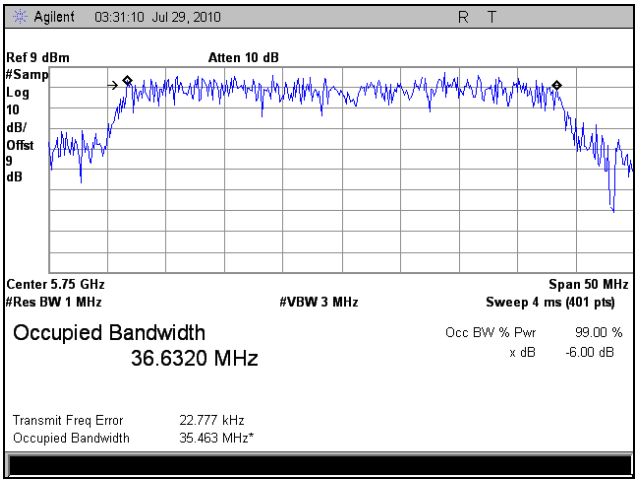
Plot 36. Occupied Band Width, Low Channel (5740 MHz), 20 MHz, Port 1, IC, 6 dB



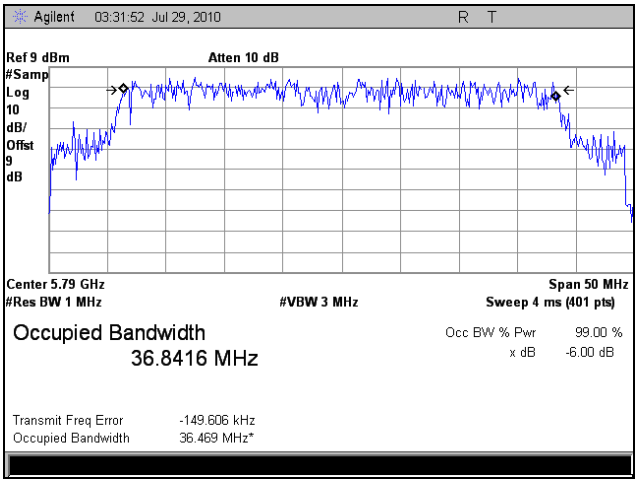
Plot 37. Occupied Band Width, Mid Channel (5780 MHz), 20 MHz, Port 1, IC, 6 dB



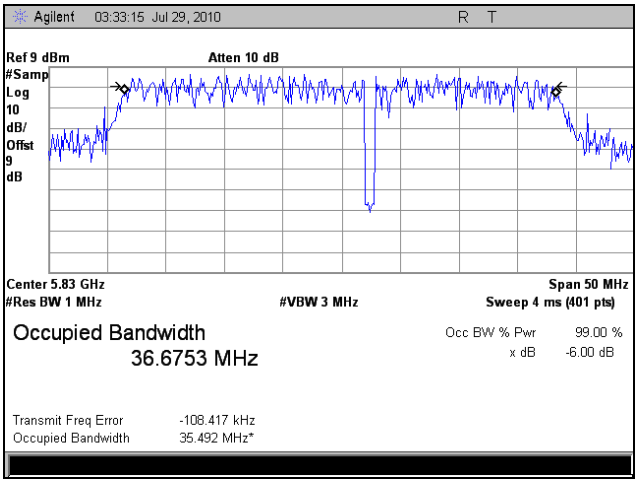
Plot 38. Occupied Band Width, High Channel (5840 MHz), 20 MHz, Port 1, IC, 6 dB



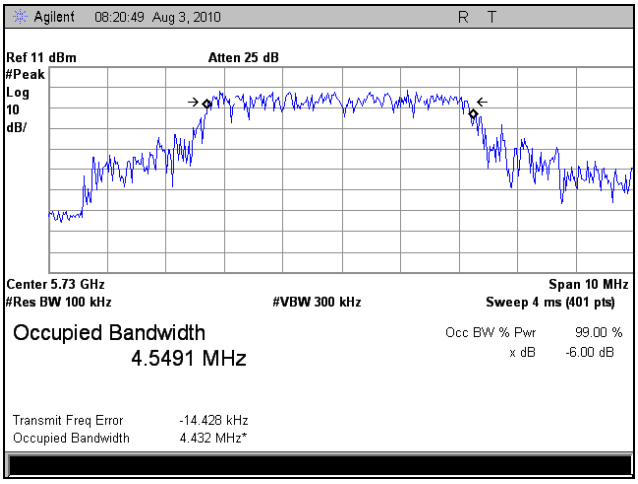
Plot 39. Occupied Band Width, Low Channel (5750 MHz), 40 MHz, Port 1, IC, 6 dB



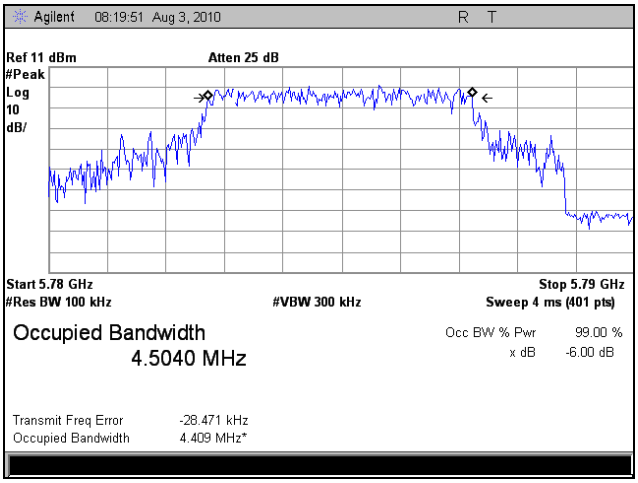
Plot 40. Occupied Band Width, Mid Channel (5790 MHz), 40 MHz, Port 1, IC, 6 dB



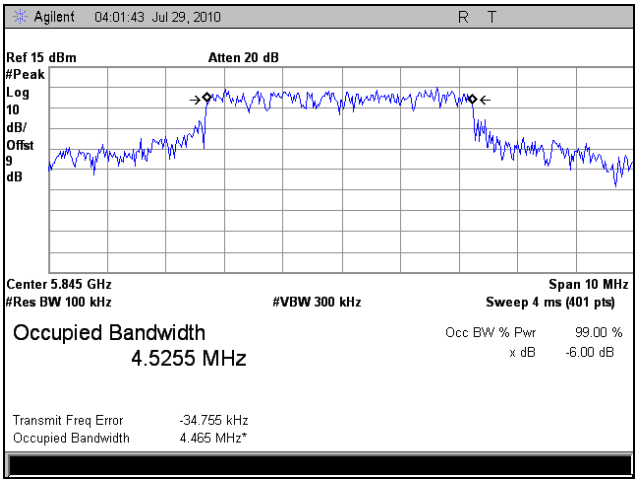
Plot 41. Occupied Band Width, High Channel (5830 MHz), 40 MHz, Port 1, IC, 6 dB



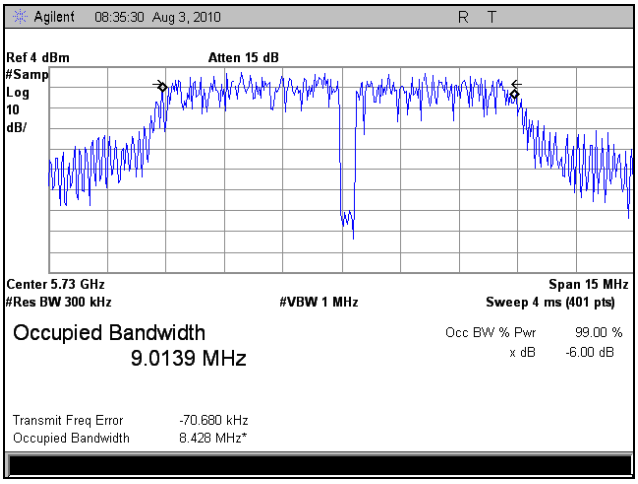
Plot 42. Occupied Band Width, Low Channel (5730 MHz), 5 MHz, Port 2, IC, 6 dB



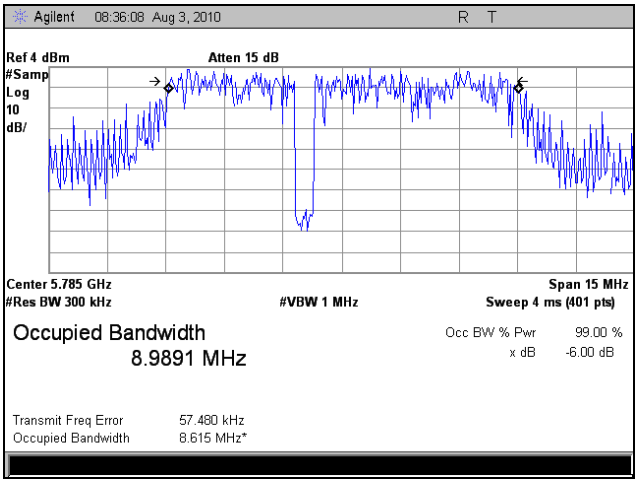
Plot 43. Occupied Band Width, Mid Channel (5785 MHz), 5 MHz, Port 2, IC, 6 dB



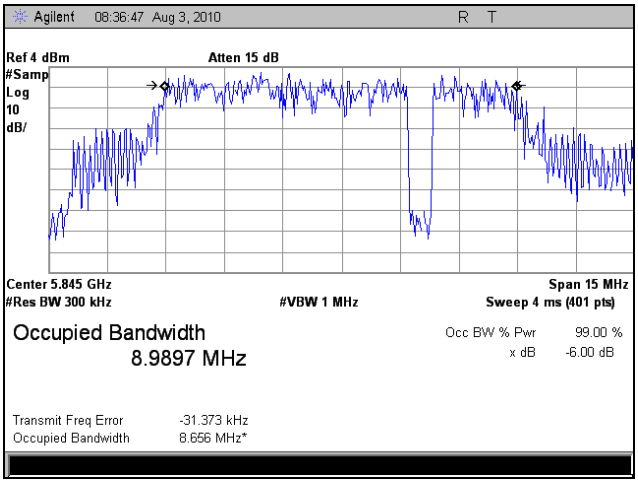
Plot 44. Occupied Band Width, High Channel (5845 MHz), 5 MHz, Port 2, IC, 6 dB



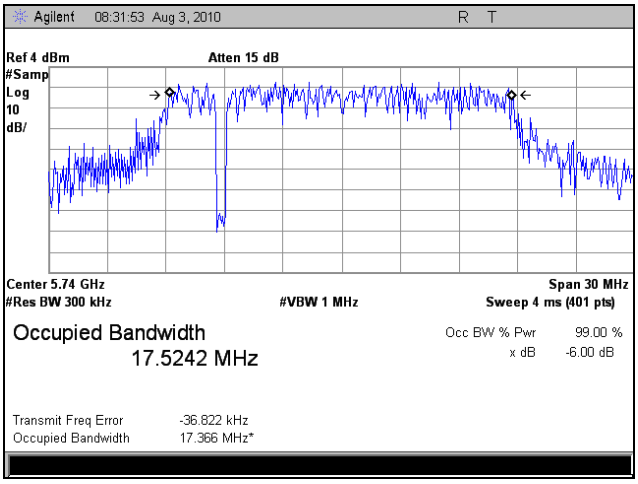
Plot 45. Occupied Band Width, Low Channel (5730 MHz), 10 MHz, Port 2, IC, 6 dB



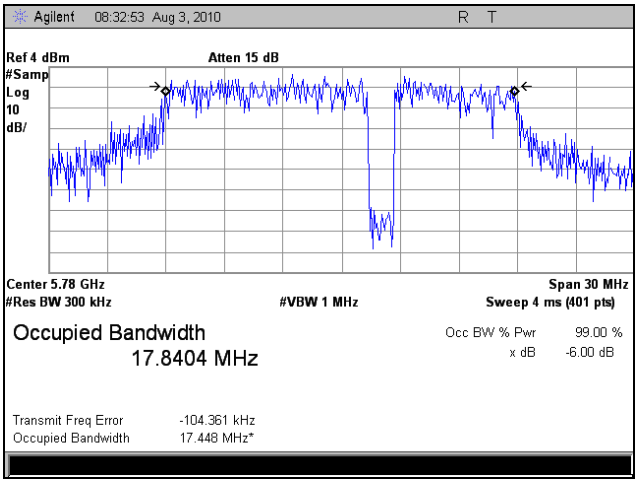
Plot 46. Occupied Band Width, Mid Channel (5785 MHz), 10 MHz, Port 2, IC, 6 dB



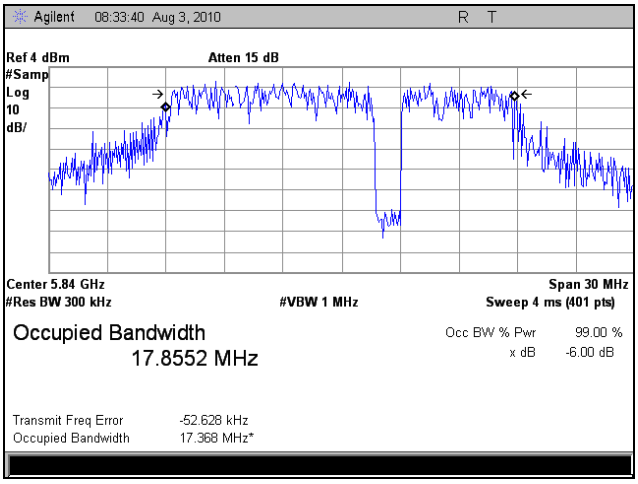
Plot 47. Occupied Band Width, High Channel (5845 MHz), 10 MHz, Port 2, IC, 6 dB



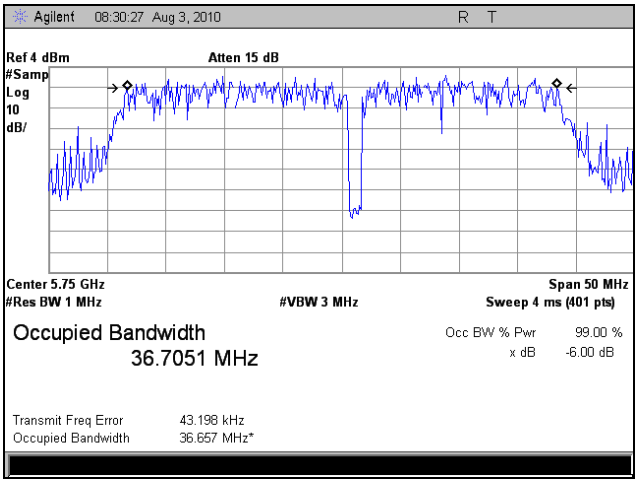
Plot 48. Occupied Band Width, Low Channel (5740 MHz), 20 MHz, Port 2, IC, 6 dB



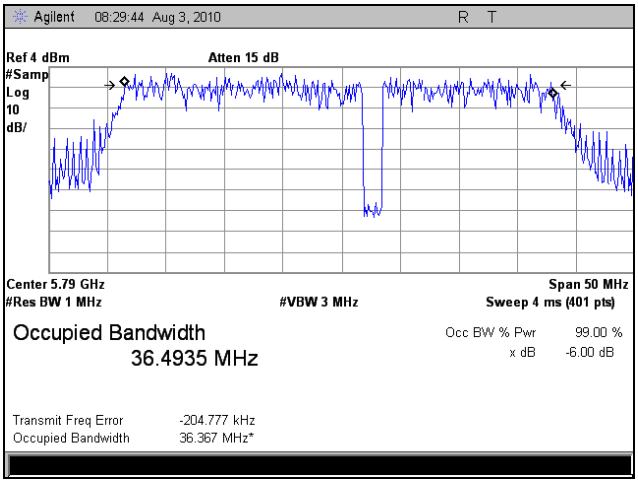
Plot 49. Occupied Band Width, Mid Channel (5780 MHz), 20 MHz, Port 2, IC, 6 dB



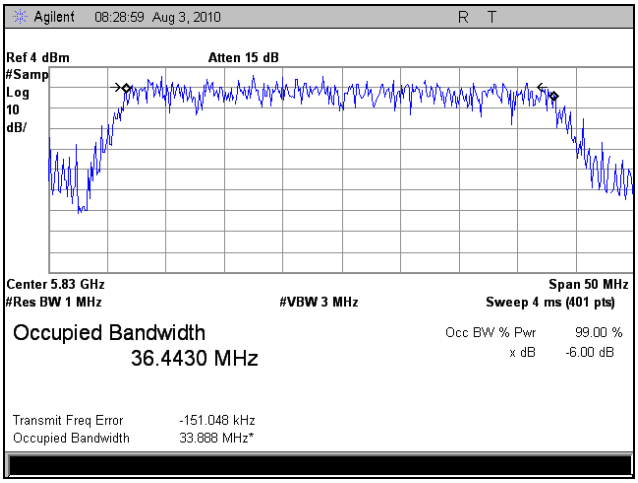
Plot 50. Occupied Band Width, High Channel (5840 MHz), 20 MHz, Port 2, IC, 6 dB



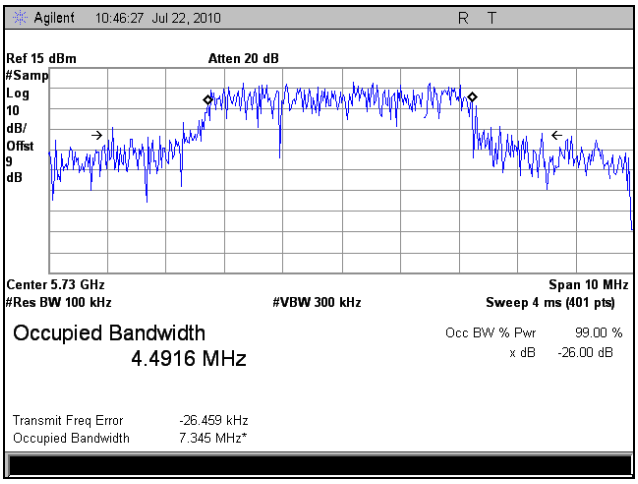
Plot 51. Occupied Band Width, Low Channel (5750 MHz), 40 MHz, Port 2, IC, 6 dB



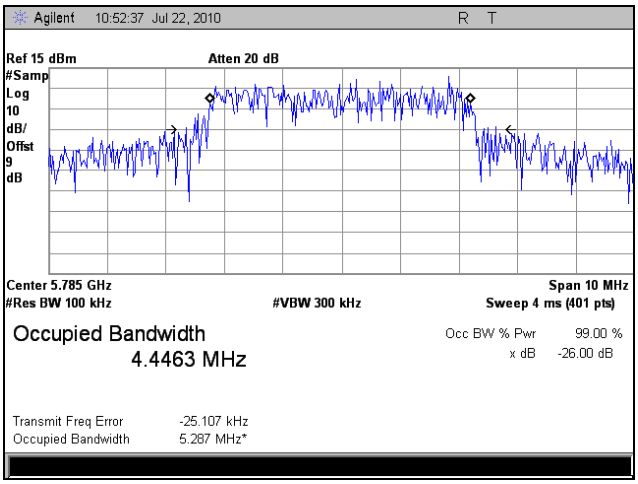
Plot 52. Occupied Band Width, Mid Channel (5790 MHz), 40 MHz, Port 2, IC, 6 dB



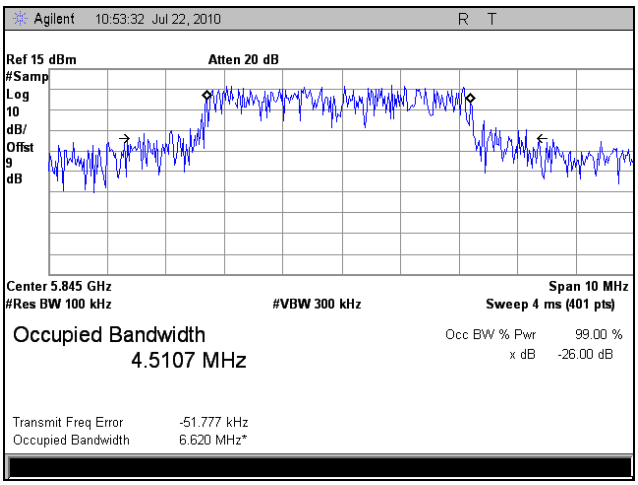
Plot 53. Occupied Band Width, High Channel (5830 MHz), 40 MHz, Port 2, IC, 6 dB



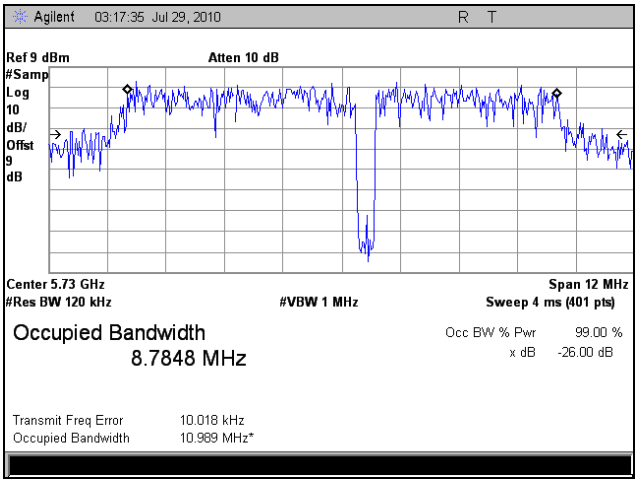
Plot 54. Occupied Band Width, Low Channel (5730 MHz), 5 MHz, Port 1, IC, 99%



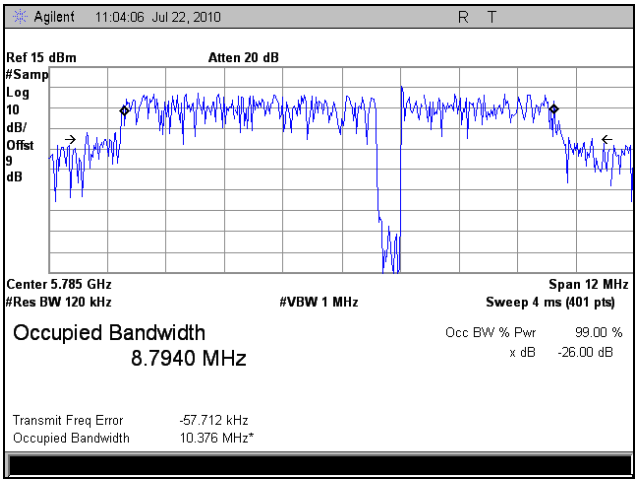
Plot 55. Occupied Band Width, Mid Channel (5785 MHz), 5 MHz, Port 1, IC, 99%



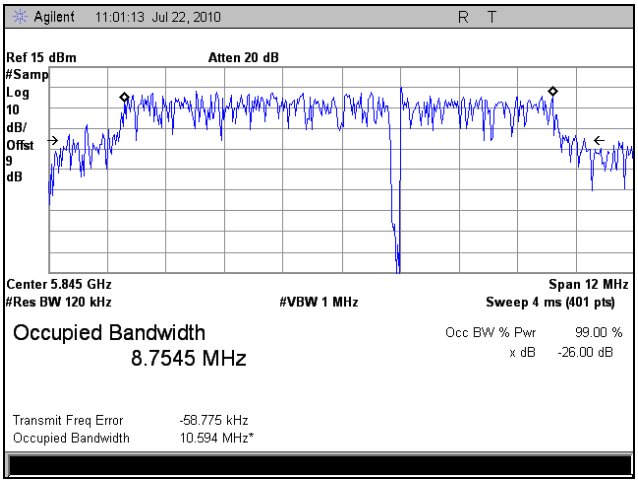
Plot 56. Occupied Band Width, High Channel (5845 MHz), 5 MHz, Port 1, IC, 99%



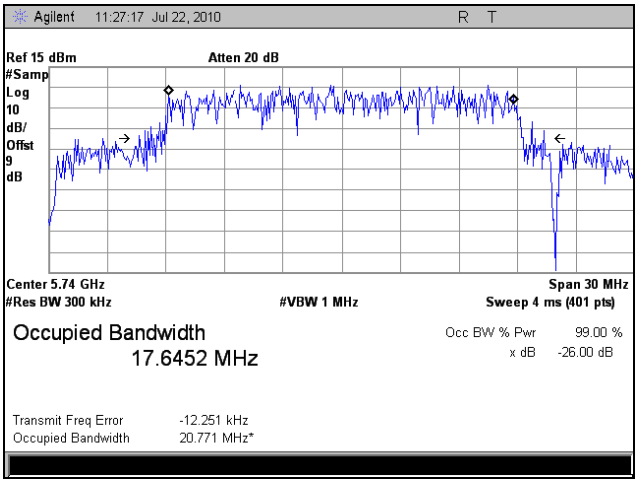
Plot 57. Occupied Band Width, Low Channel (5730 MHz), 10 MHz, Port 1, IC, 99%



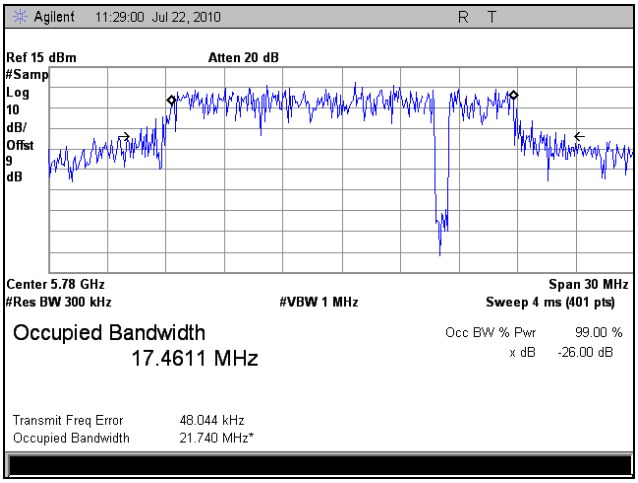
Plot 58. Occupied Band Width, Mid Channel (5785 MHz), 10 MHz, Port 1, IC, 99%



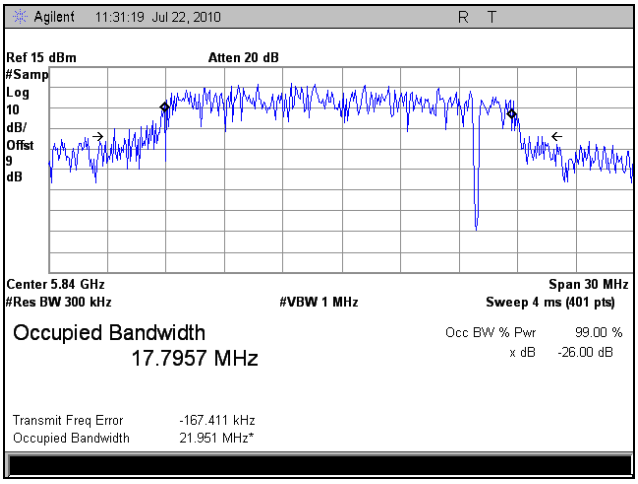
Plot 59. Occupied Band Width, High Channel (5845 MHz), 10 MHz, Port 1, IC, 99%



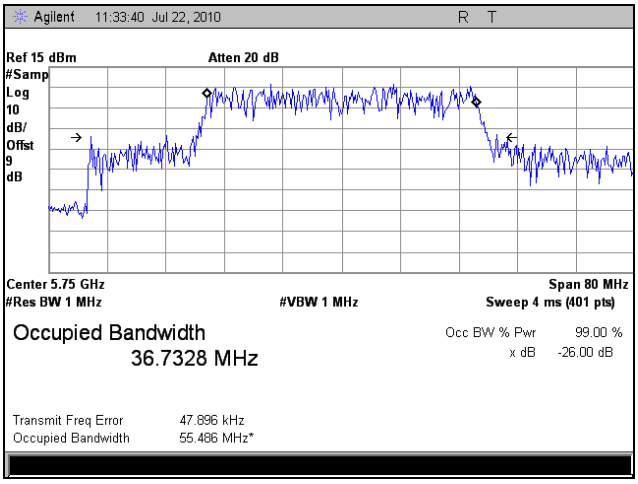
Plot 60. Occupied Band Width, Low Channel (5740 MHz), 20 MHz, Port 1, IC, 99%



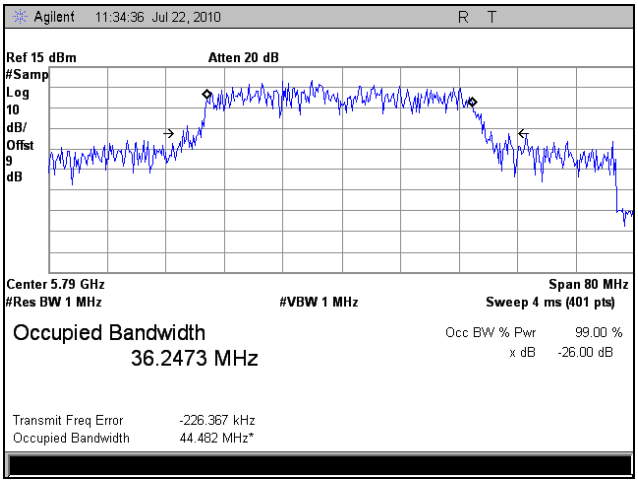
Plot 61. Occupied Band Width, Mid Channel (5780 MHz), 20 MHz, Port 1, IC, 99%



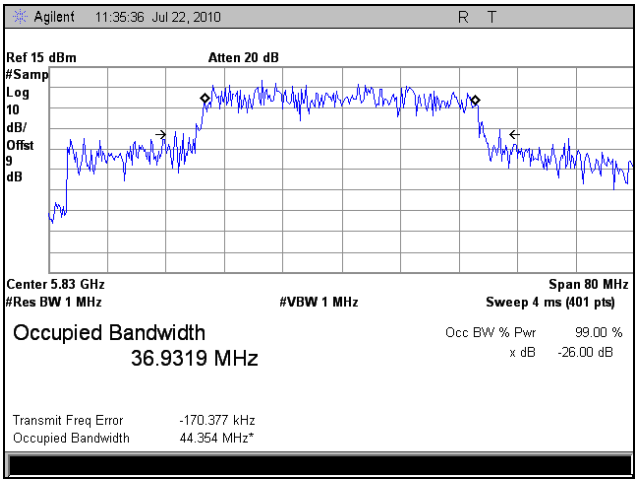
Plot 62. Occupied Band Width, High Channel (5840 MHz), 20 MHz, Port 1, IC, 99%



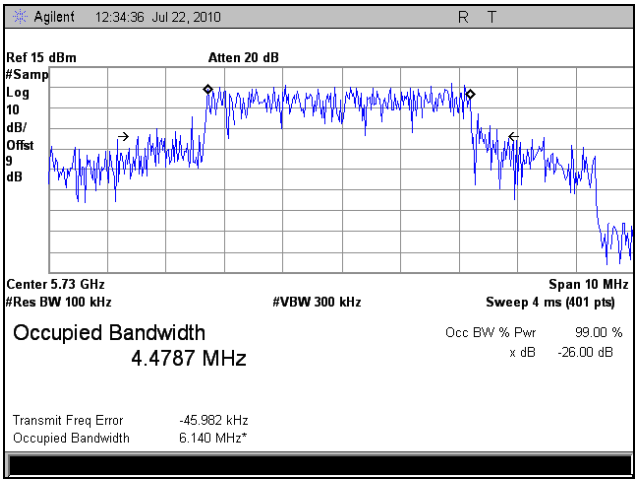
Plot 63. Occupied Band Width, Low Channel (5750 MHz), 40 MHz, Port 1, IC, 99%



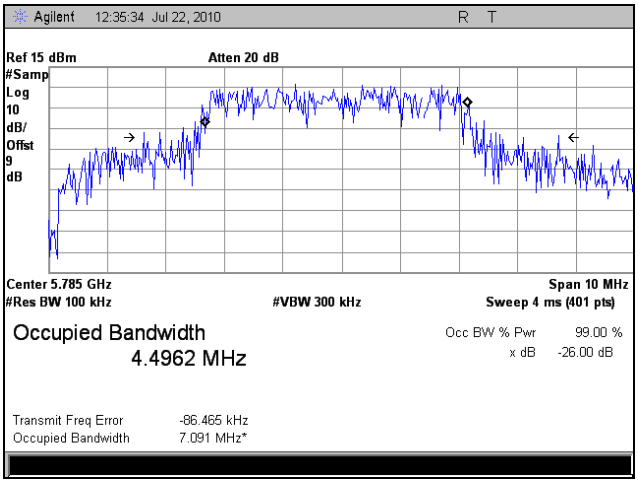
Plot 64. Occupied Band Width, Mid Channel (5790 MHz), 40 MHz, Port 1, IC, 99%



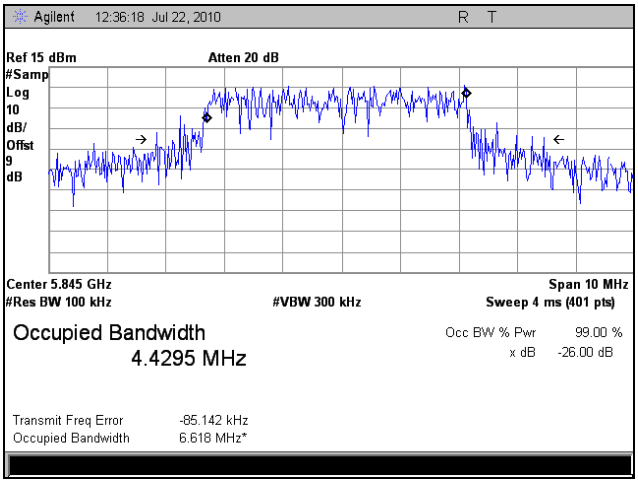
Plot 65. Occupied Band Width, High Channel (5830 MHz), 40 MHz, Port 1, IC, 99%



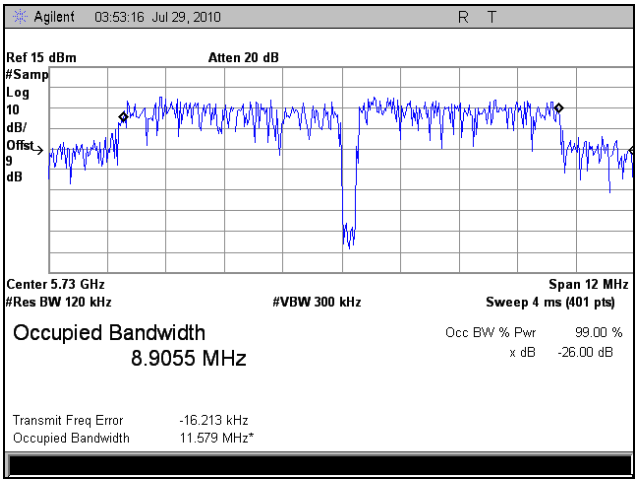
Plot 66. Occupied Band Width, Low Channel (5730 MHz), 5 MHz, Port 2, IC, 99%



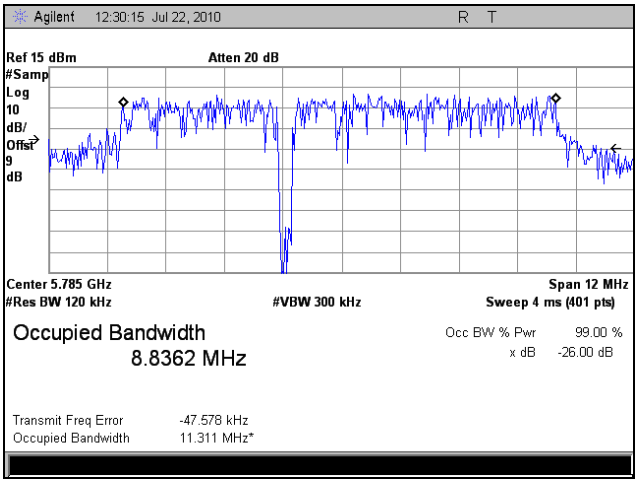
Plot 67. Occupied Band Width, Mid Channel (5785 MHz), 5 MHz, Port 2, IC, 99%



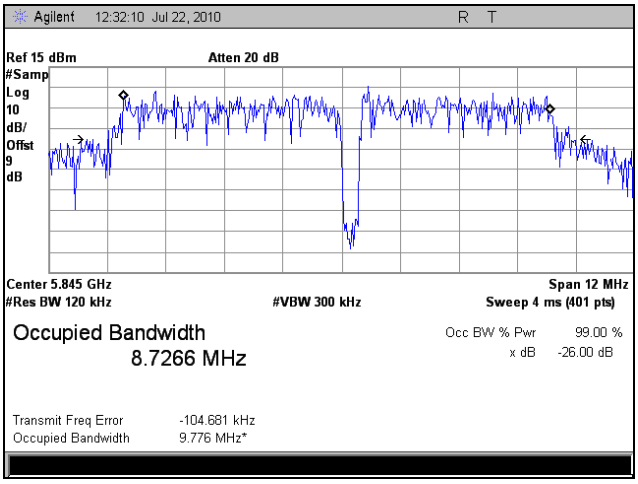
Plot 68. Occupied Band Width, High Channel (5845 MHz), 5 MHz, Port 2, IC, 99%



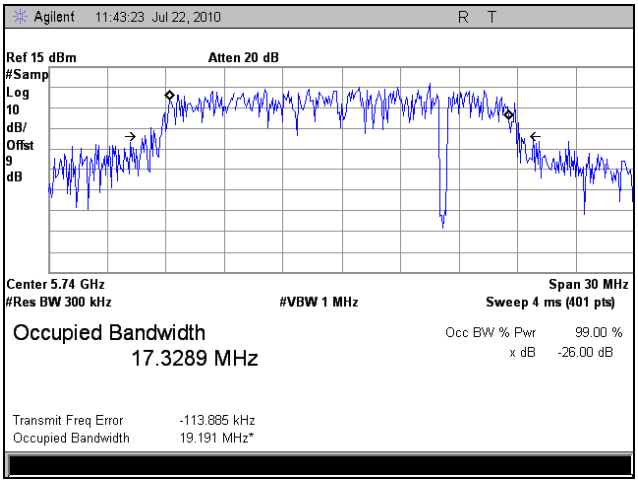
Plot 69. Occupied Band Width, Low Channel (5730 MHz), 10 MHz, Port 2, IC, 99%



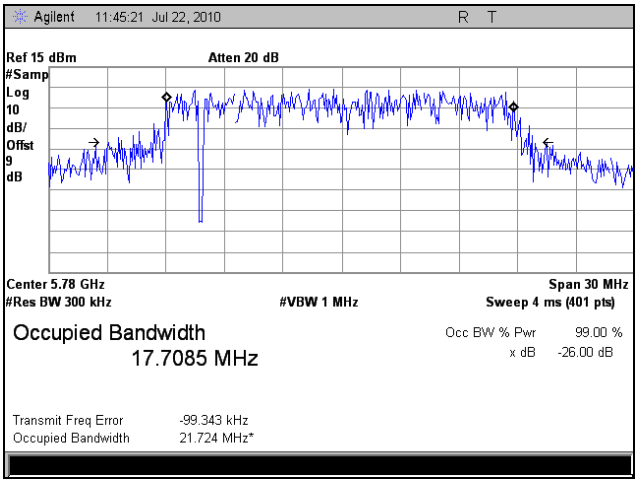
Plot 70. Occupied Band Width, Mid Channel (5785 MHz), 10 MHz, Port 2, IC, 99%



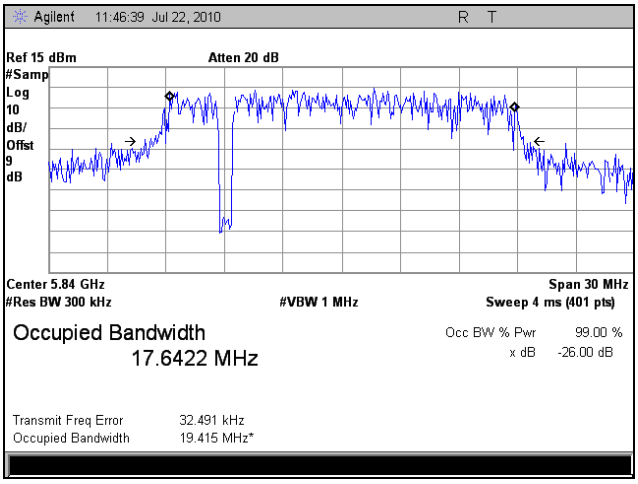
Plot 71. Occupied Band Width, High Channel (5845 MHz), 10 MHz, Port 2, IC, 99%



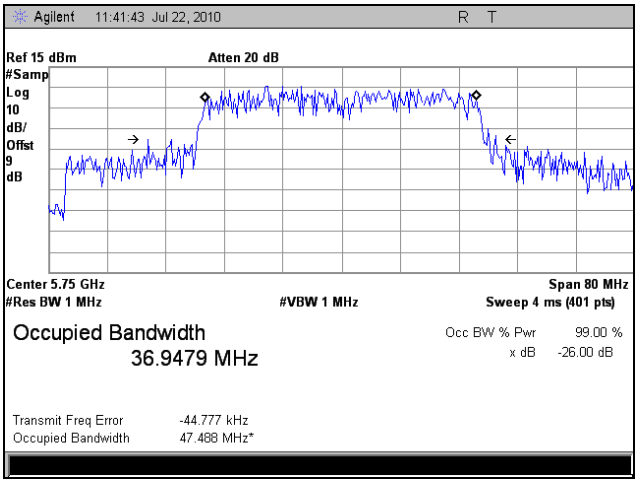
Plot 72. Occupied Band Width, Low Channel (5740 MHz), 20 MHz, Port 2, IC, 99%



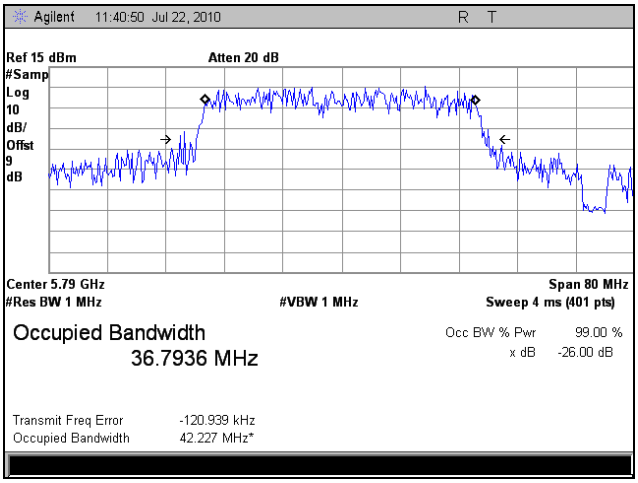
Plot 73. Occupied Band Width, Mid Channel (5780 MHz), 20 MHz, Port 2, IC, 99%



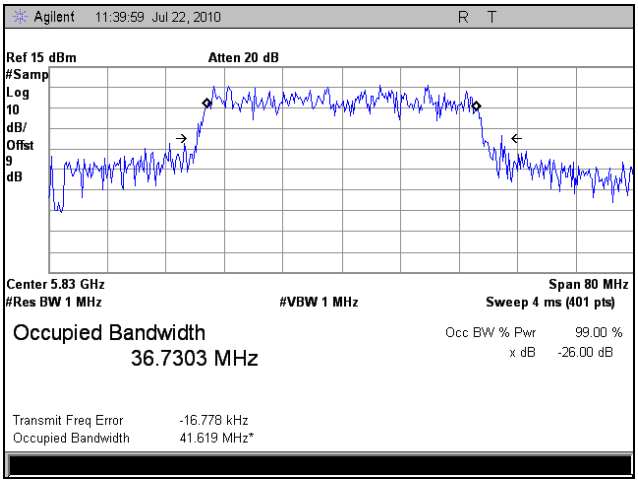
Plot 74. Occupied Band Width, High Channel (5840 MHz), 20 MHz, Port 2, IC, 99%



Plot 75. Occupied Band Width, Low Channel (5750 MHz), 40 MHz, Port 2, IC, 99%



Plot 76. Occupied Band Width, Mid Channel (5790 MHz), 40 MHz, Port 2, IC, 99%



Plot 77. Occupied Band Width, High Channel (5830 MHz), 40 MHz, Port 2, IC, 99%

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output and RF Exposure

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 22. Output Power Requirements from §15.247

§15.247(c): if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in the Table 22, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400 – 2483.5 MHz band and using a point to point application may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Fixed, point-to-point operation excludes the use of point-to-multipoint systems, omni-directional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

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 and on each port.

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

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 08/03/10

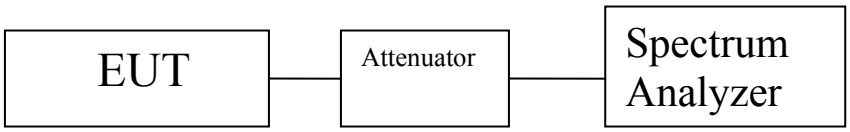


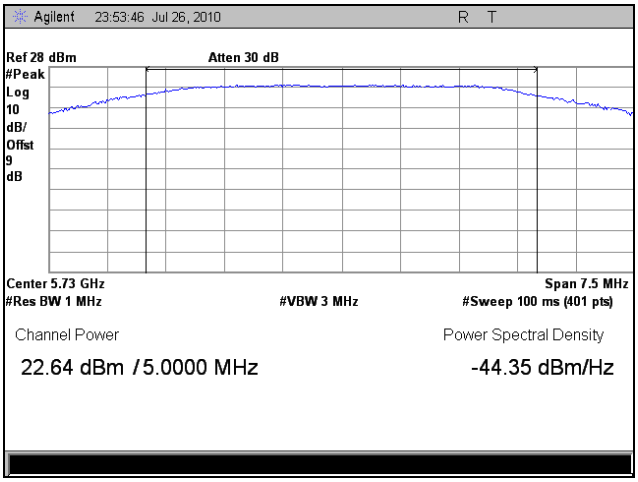
Figure 3. Peak Power Output Test Setup

RF Power Output Test Results

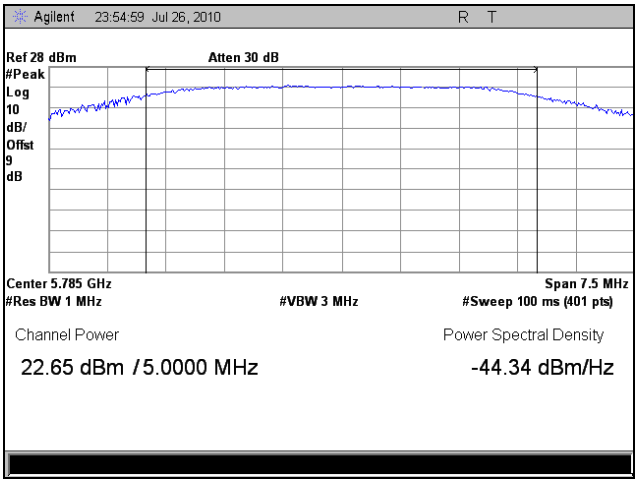
Bandwidth (MHz)	Channel (MHz)	Port 1 Power		Port 2 Power		Combined Power (mW)	Limit (mW)
		dBm	mW	dBm	mW		
5	5730	22.64	183.6	22.01	159.0	342.6	1000.0
	5785	22.65	184.1	21.79	151.0	335.1	1000.0
	5845	22.81	191.0	21.98	158.0	349.0	1000.0
10	5730	22.84	192.3	22.15	164.0	356.3	1000.0
	5785	22.49	177.4	22.11	162.5	339.9	1000.0
	5845	22.43	175.0	22.35	172.0	347.0	1000.0
20	5740	22.92	196.0	22.15	164.0	360.0	1000.0
	5780	22.73	187.5	22.38	173.0	360.5	1000.0
	5840	22.82	191.4	22.31	170.2	361.6	1000.0
40	5750	23.46	222.0	22.67	185.0	407.0	1000.0
	5790	23.38	218.0	22.51	178.2	396.2	1000.0
	5830	23.44	221.0	22.69	186.0	407.0	1000.0

Table 23. RF Output Power, Test Results

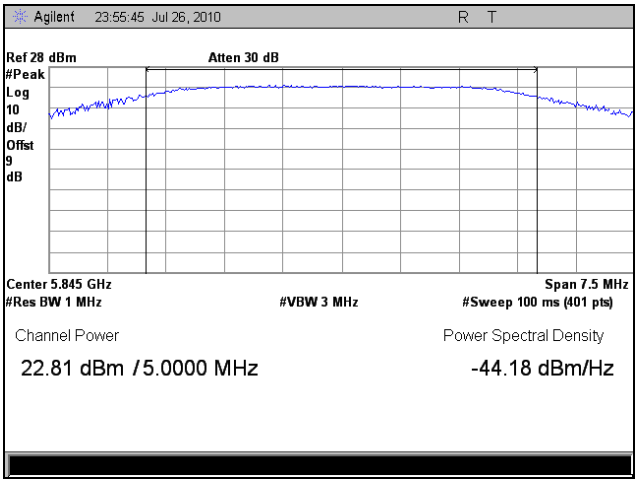
RF Output Power Test Results, Port 1



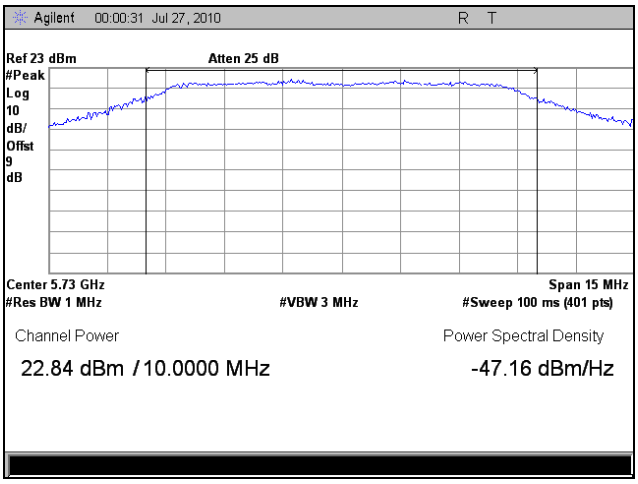
Plot 78. Peak Output Power, Low Channel (5730 MHz), 5 MHz, Port 1



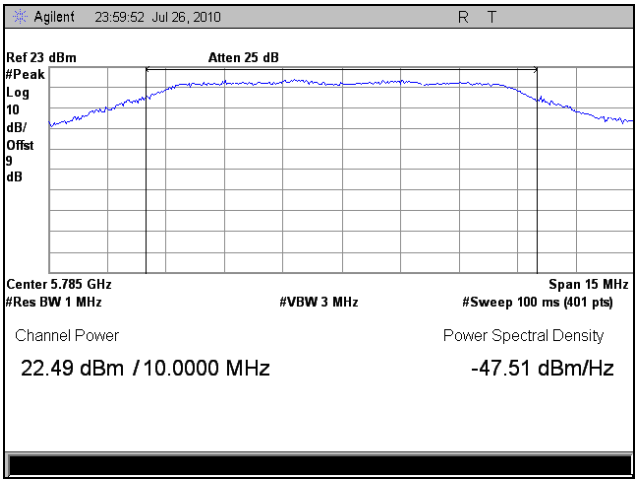
Plot 79. Peak Output Power, Mid Channel (5785 MHz), 5 MHz, Port 1



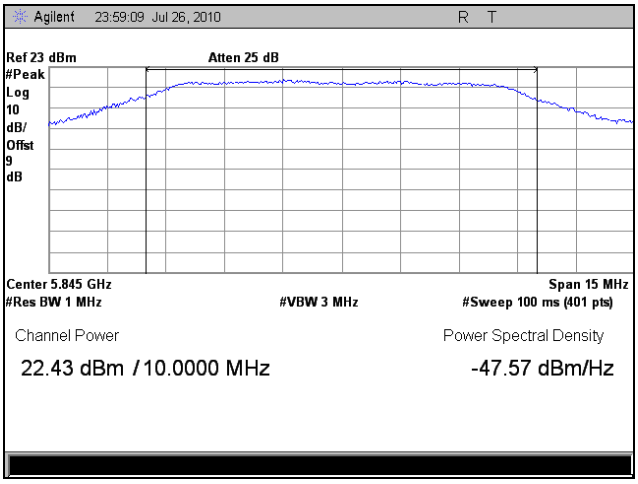
Plot 80. Peak Output Power, High Channel (5845 MHz), 5 MHz, Port 1



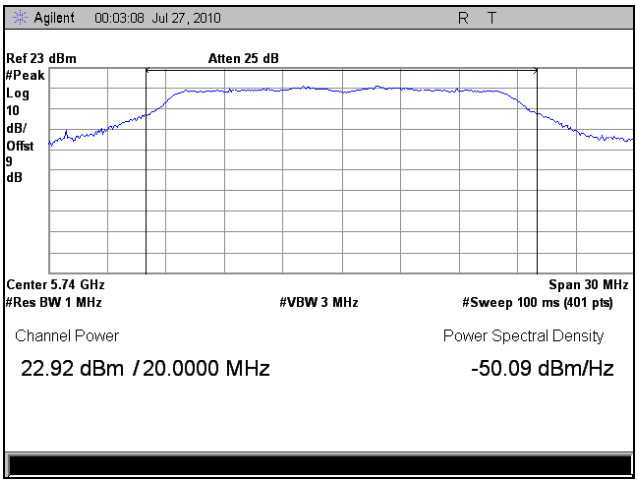
Plot 81. Peak Output Power, Low Channel (5730 MHz), 10 MHz, Port 1



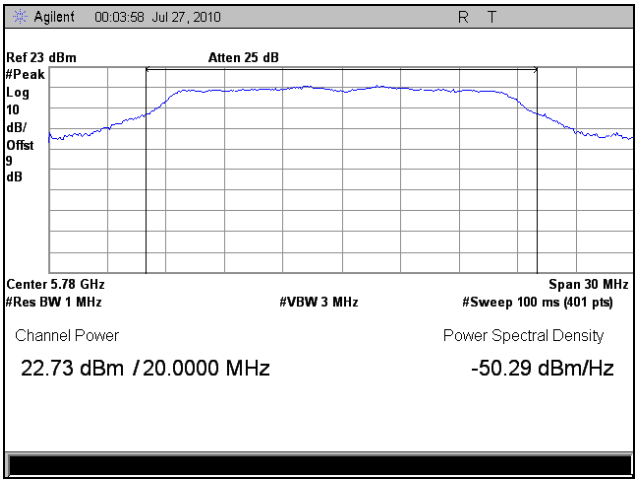
Plot 82. Peak Output Power, Mid Channel (5785 MHz), 10 MHz, Port 1



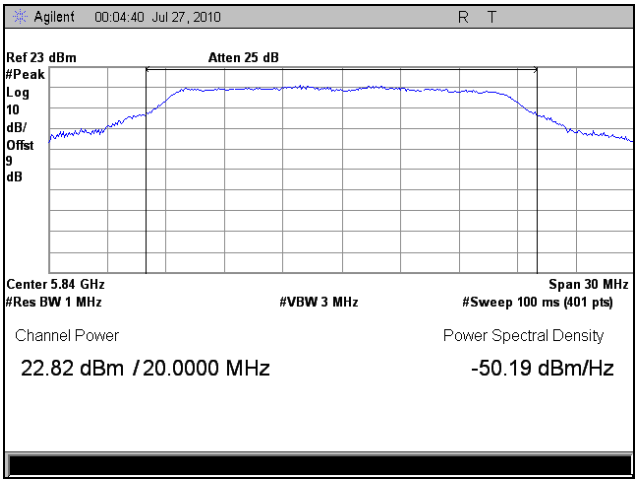
Plot 83. Peak Output Power, High Channel (5845 MHz), 10 MHz, Port 1



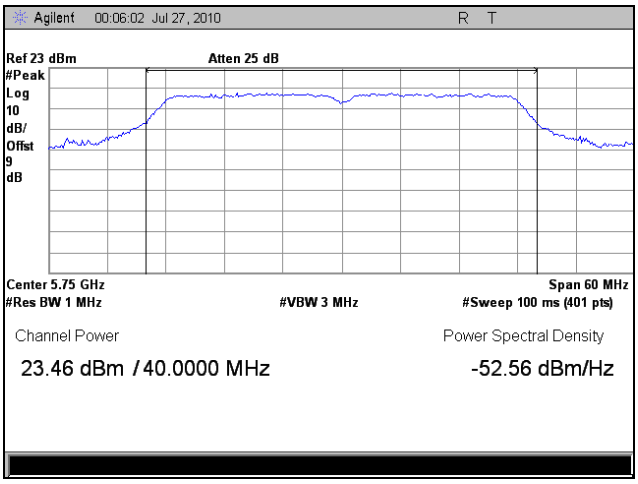
Plot 84. Peak Output Power, Low Channel (5740 MHz), 20 MHz, Port 1



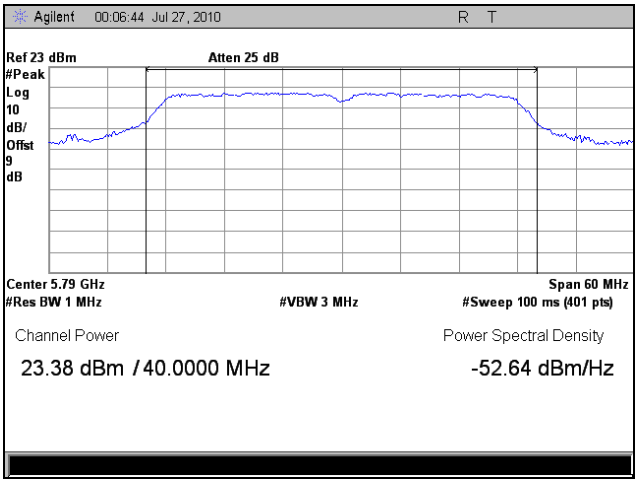
Plot 85. Peak Output Power, Mid Channel (5780 MHz), 20 MHz, Port 1



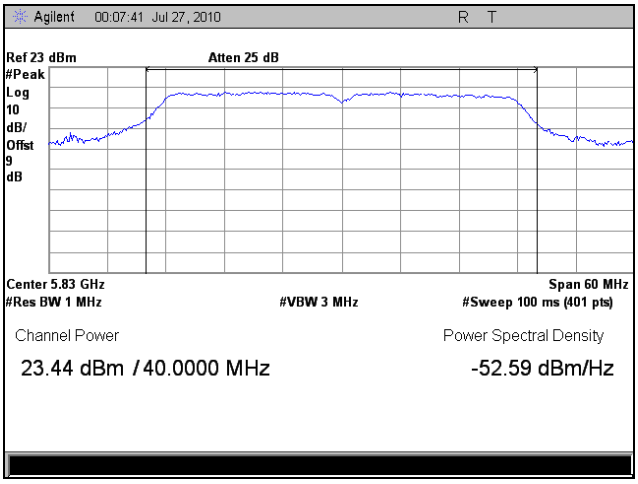
Plot 86. Peak Output Power, High Channel (5840 MHz), 20 MHz, Port 1



Plot 87. Peak Output Power, Low Channel (5750 MHz), 40 MHz, Port 1

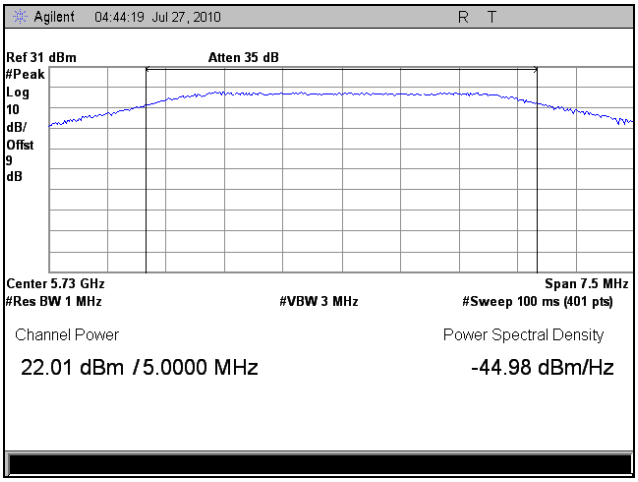


Plot 88. Peak Output Power, Mid Channel (5790 MHz), 40 MHz, Port 1

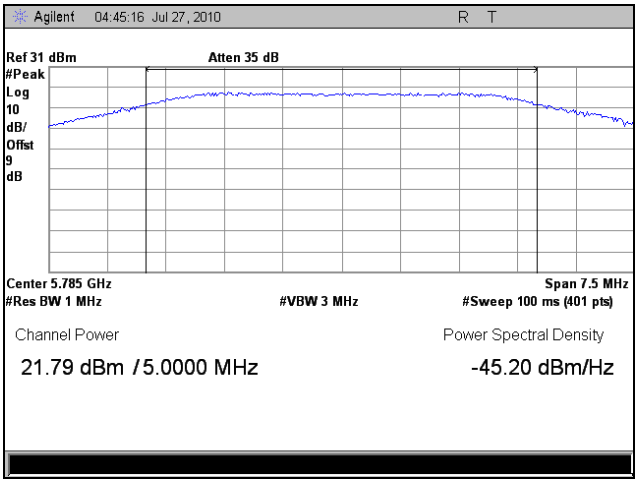


Plot 89. Peak Output Power, High Channel (5830 MHz), 40 MHz, Port 1

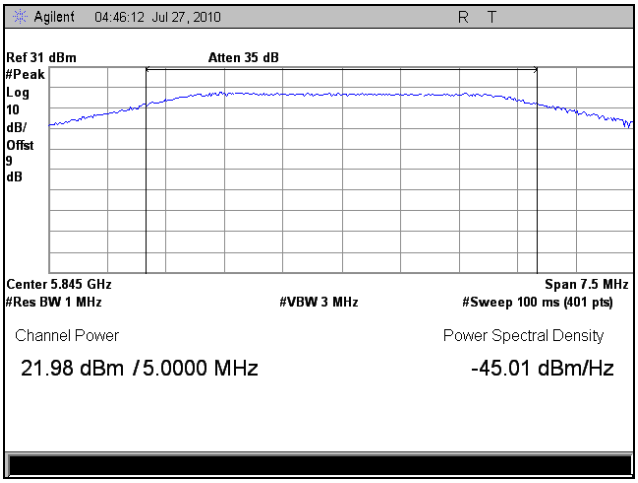
RF Output Power Test Results, Port 2



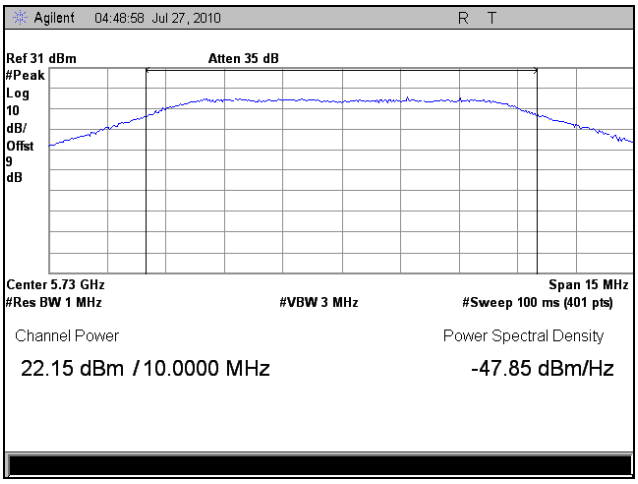
Plot 90. Peak Output Power, Low Channel (5730 MHz), 5 MHz, Port 2



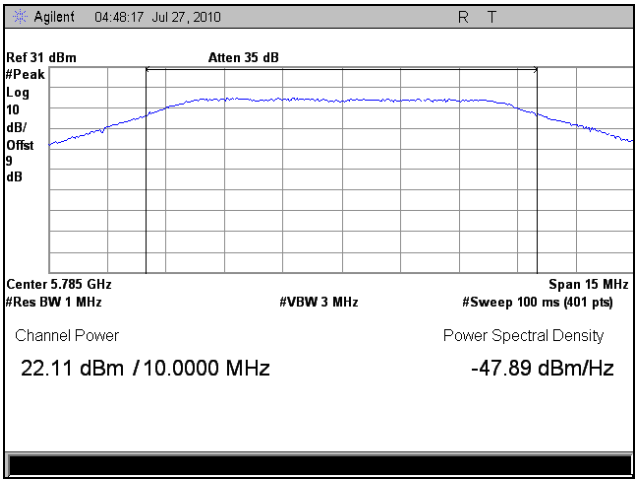
Plot 91. Peak Output Power, Mid Channel (5785 MHz), 5 MHz, Port 2



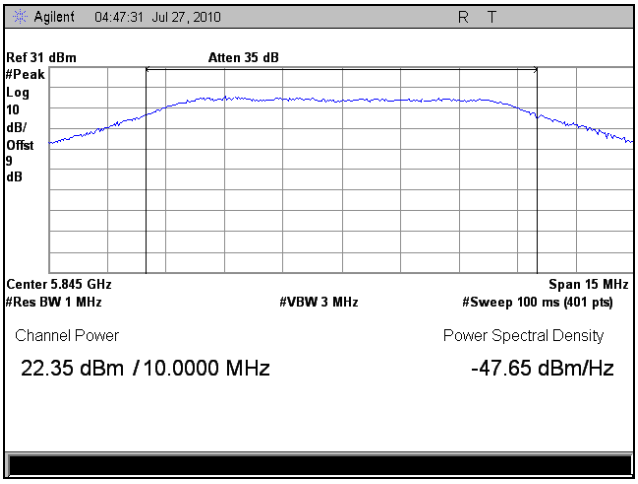
Plot 92. Peak Output Power, High Channel (5845 MHz), 5 MHz, Port 2



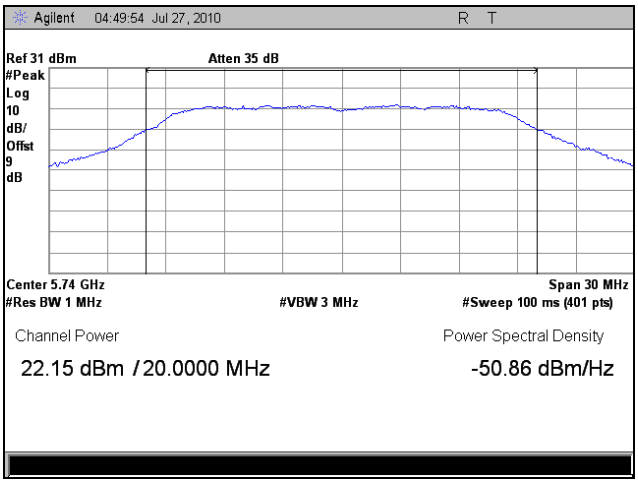
Plot 93. Peak Output Power, Low Channel (5730 MHz), 10 MHz, Port 2



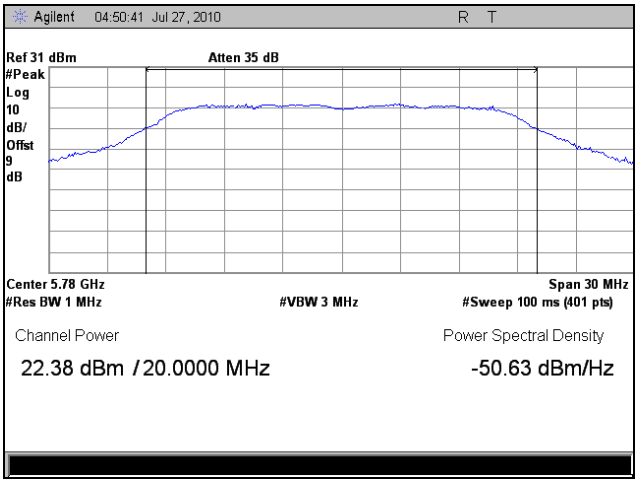
Plot 94. Peak Output Power, Mid Channel (5785 MHz), 10 MHz, Port 2



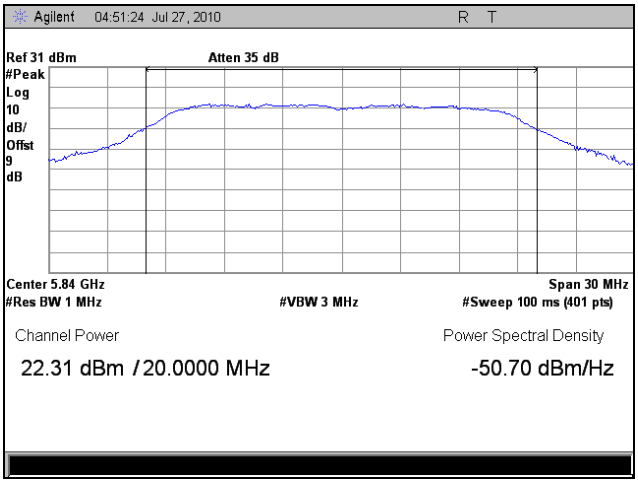
Plot 95. Peak Output Power, High Channel (5845 MHz), 10 MHz, Port 2



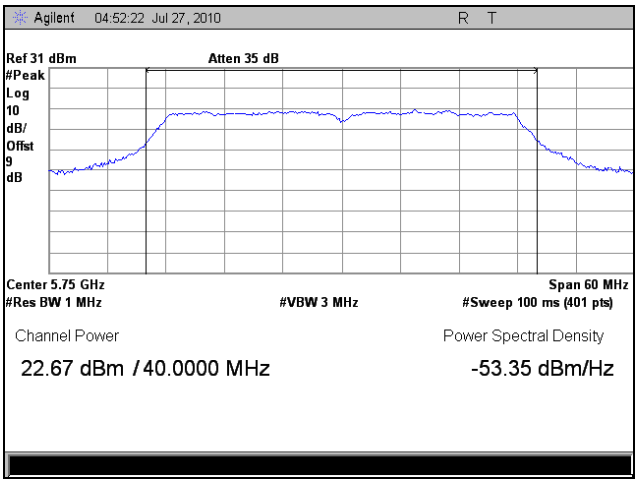
Plot 96. Peak Output Power, Low Channel (5740 MHz), 20 MHz, Port 2



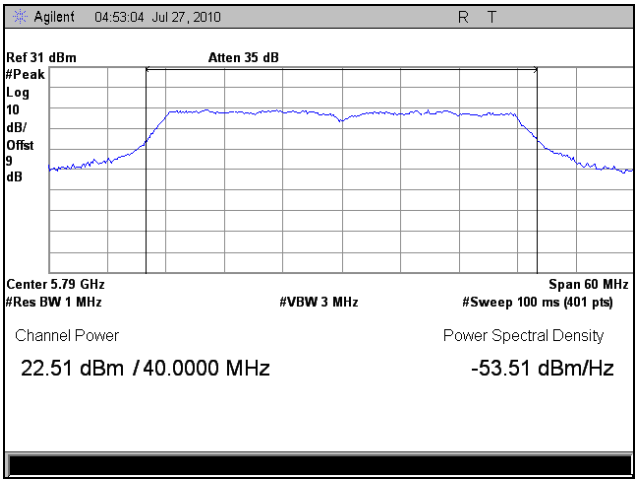
Plot 97. Peak Output Power, Mid Channel (5780 MHz), 20 MHz, Port 2



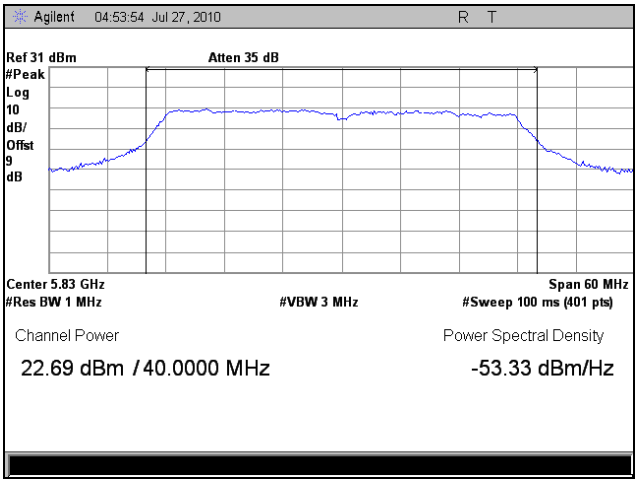
Plot 98. Peak Output Power, High Channel (5840 MHz), 20 MHz, Port 2



Plot 99. Peak Output Power, Low Channel (5750 MHz), 40 MHz, Port 2



Plot 100. Peak Output Power, Mid Channel (5790 MHz), 40 MHz, Port 2



Plot 101. Peak Output Power, High Channel (5830 MHz), 40 MHz, Port 2

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) RF 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.

MPE Limit Calculation: EUT's operating frequency is 5730 - 5845 MHz;. Highest conducted power = 407 mW. Therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2.**

Equation from page 18 of OET 65, Edition 97-01

$$S = P G / 4\pi R^2$$

where,

S = Power Density mW/m^2
P = Power (mW)
R = Distance to the center of radiation of the antenna
G = Maximum antenna gain

Maximum antenna gain for EUT = 21 dBi = 125.9

P = 407 mW
S = 1 mW/cm2
G = 125.9

R = sqrt{407*125.9 / 4(3.1416)(1)}

R = 63.8 cm.

Therefore, EUT meets the Uncontrolled Exposure limit at 63.8 cm.

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 24. 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 25.

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 25. 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. Only noise floor was measured above 18 GHz.

Test Results: The EUT was compliant with the Radiated Spurious Emission limits of **§ 15.247(d)**. Measured emissions were below applicable limits. The emissions seen in the plots below 1 GHz appear to be over the limit, but these emissions are actually from the digital portion of the radio.

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 08/03/10

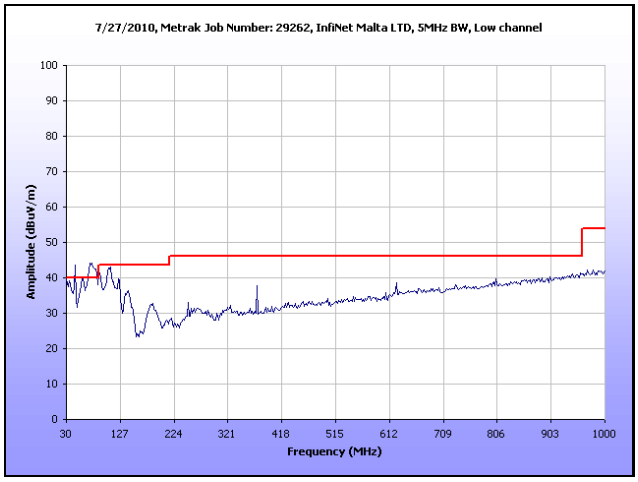
Harmonic Emissions Requirements – Radiated

Bandwidth	Fundamental Frequency (MHz)	Emission Frequency (MHz)	Peak Amplitude (dBuV/m @ 3m)	Ristricted Band	Peak Limit (dBuV/m @ 3m)	Pass
5	5730	11460	44.7	Yes	74	Yes
	5730	17190	52.6	No	<20 dBc	Yes
	5785	11570	45.4	Yes	74	Yes
	5785	17355	49.35	No	<20 dBc	Yes
	5845	11690	50.3	Yes	<20 dBc	Yes
10	5730	11460	40.2	Yes	74	Yes
	5785	11570	40.8	Yes	74	Yes
	5845	11690	39.43	Yes	<20 dBc	Yes
20	5740	11480	40.53	Yes	74	Yes
	5780	11560	39.79	Yes	74	Yes
	5840	11680	39.79	Yes	<20 dBc	Yes
40	5750	11500	41.67	Yes	74	Yes
	5790	11580	39.81	Yes	74	Yes
	5830	11660	38.84	Yes	<20 dBc	Yes

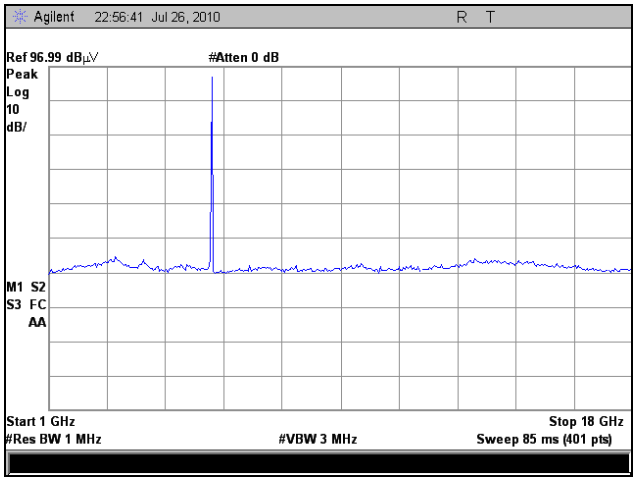
Table 26. Radiated Harmonic Emissions, Test Results

Note: The peak emissions are below the average limit. Therefore, average measurements were not made. All other emissions were measured at the noise floor of the spectrum analyzer.

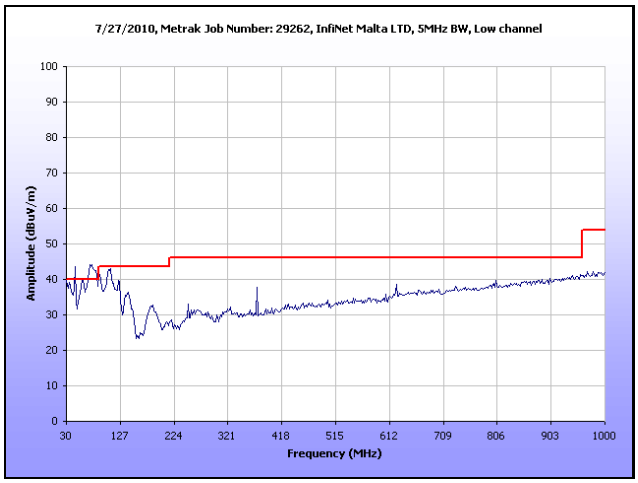
Radiated Spurious Emissions Test Results



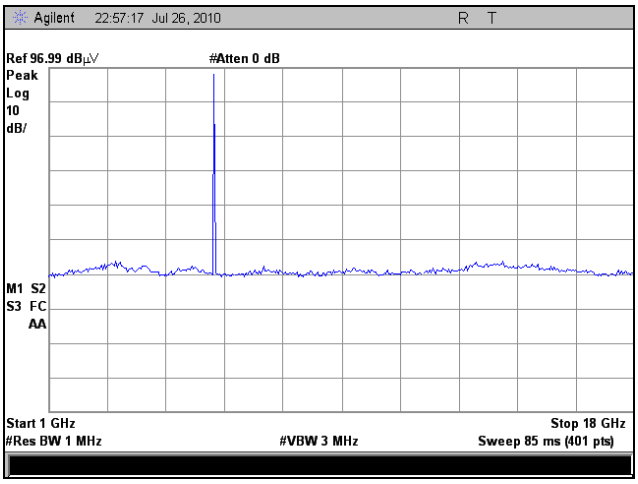
Plot 102. Radiated Spurious Emissions, Low Channel (5730 MHz), 30 MHz – 1 GHz



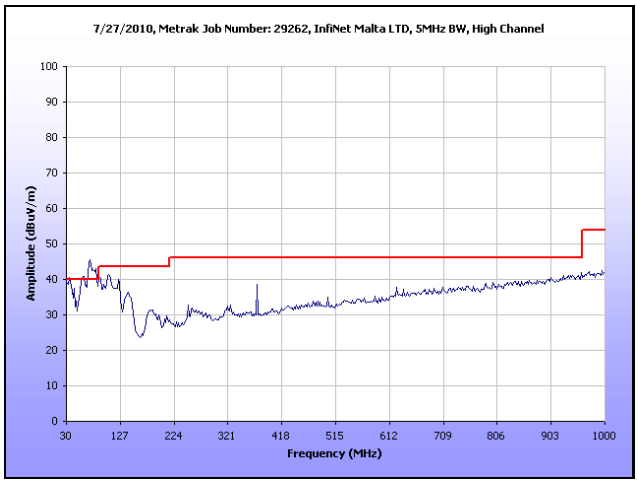
Plot 103. Radiated Spurious Emissions, Low Channel (5730 MHz), 1 GHz – 18 GHz



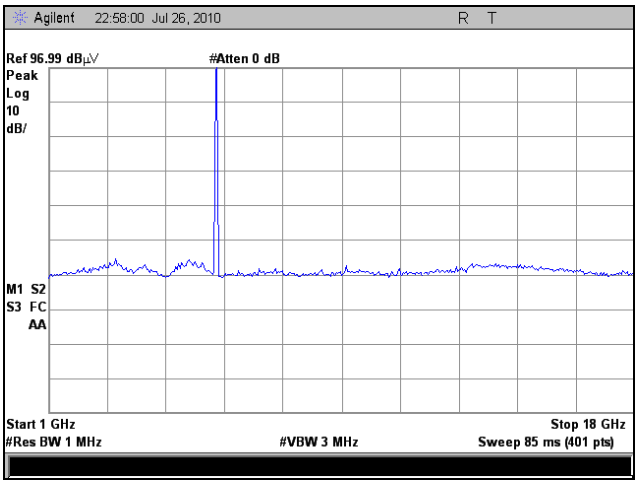
Plot 104. Radiated Spurious Emissions, Mid Channel (5785 MHz), 5 MHz, 30 MHz – 1 GHz



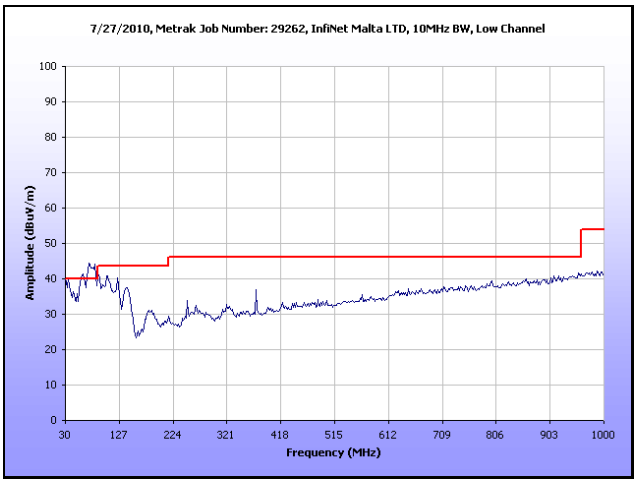
Plot 105. Radiated Spurious Emissions, Mid Channel (5785 MHz), 5 MHz, 1 GHz – 18 GHz



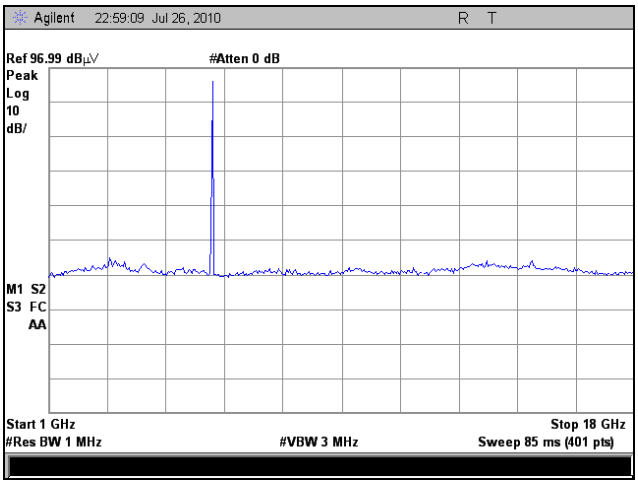
Plot 106. Radiated Spurious Emissions, High Channel (5845 MHz), 30 MHz – 1 GHz



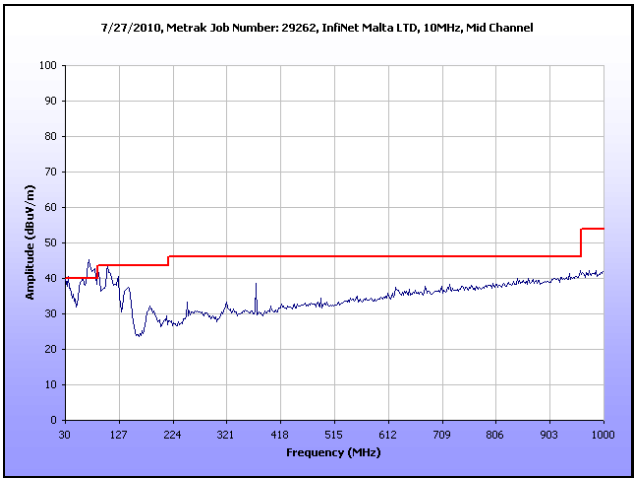
Plot 107. Radiated Spurious Emissions, High Channel (5845 MHz), 1 GHz – 18 GHz



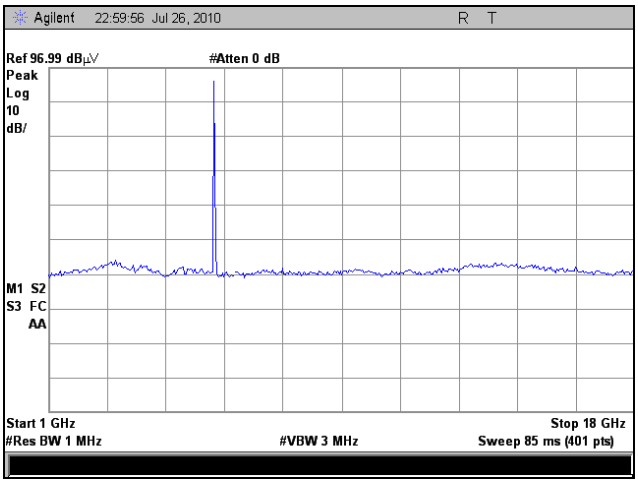
Plot 108. Radiated Spurious Emissions, Low Channel (5730 MHz), 10 MHz, 30 MHz – 1 GHz



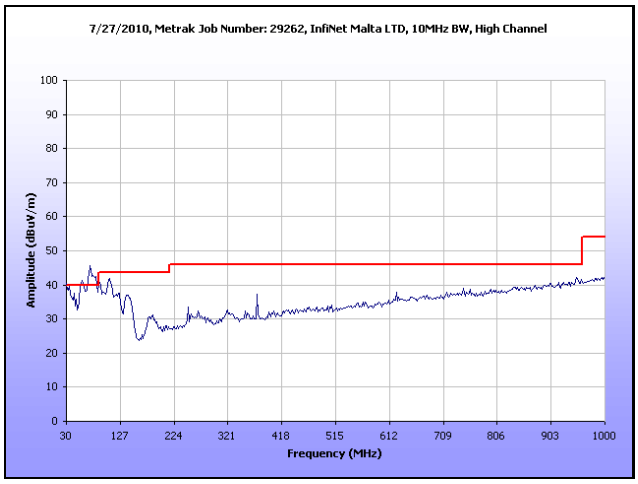
Plot 109. Radiated Spurious Emissions, Low Channel (5730 MHz), 10 MHz, 1 GHz – 18 GHz



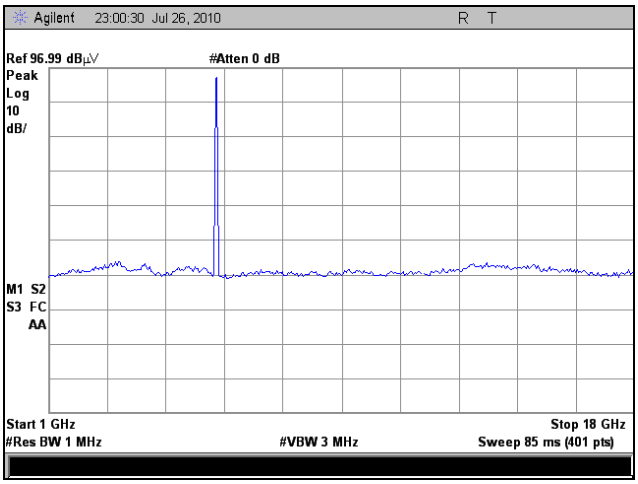
Plot 110. Radiated Spurious Emissions, Mid Channel (5785 MHz), 10 MHz, 30 MHz – 1 GHz



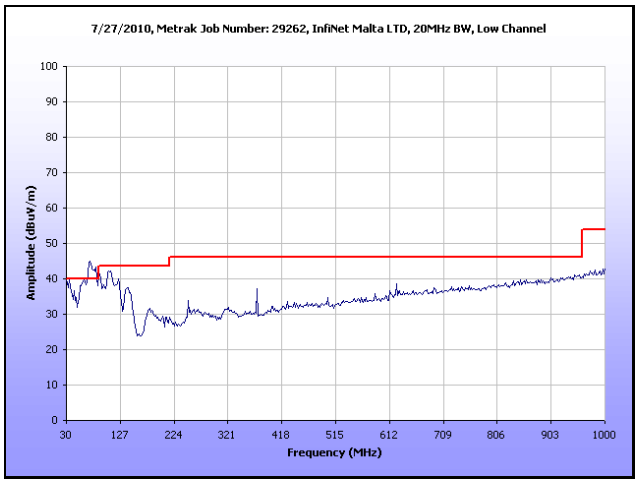
Plot 111. Radiated Spurious Emissions, Mid Channel (5785 MHz), 10 MHz, 1 GHz – 18 GHz



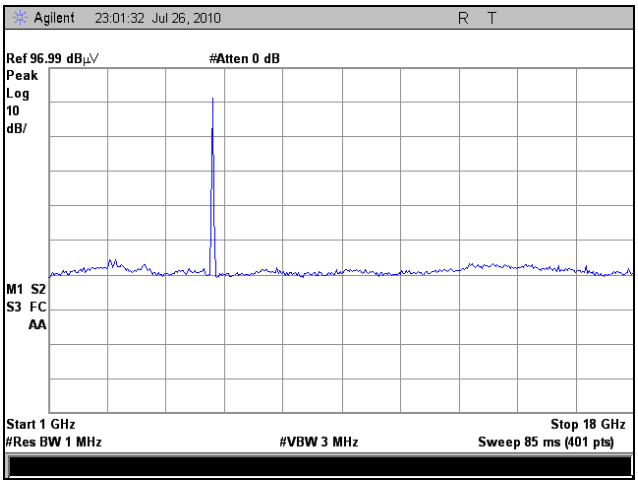
Plot 112. Radiated Spurious Emissions, High Channel (5845 MHz), 10 MHz, 30 MHz – 1 GHz



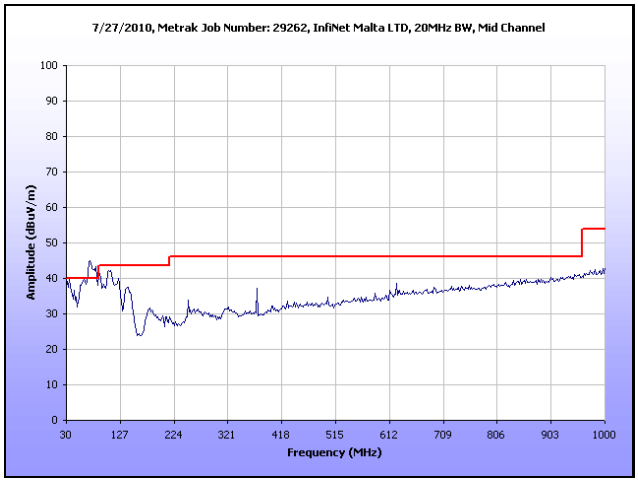
Plot 113. Radiated Spurious Emissions, High Channel (5845 MHz), 10 MHz, 1 GHz – 18 GHz



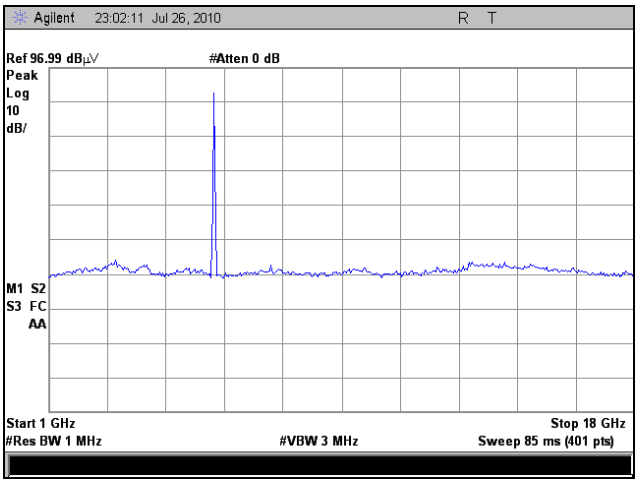
Plot 114. Radiated Spurious Emissions, Low Channel (5740 MHz), 20 MHz, 30 MHz – 1 GHz



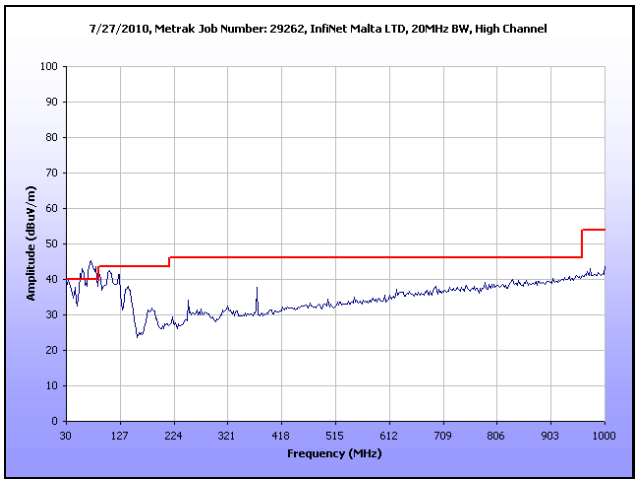
Plot 115. Radiated Spurious Emissions, Low Channel (5740 MHz), 20 MHz, 1 GHz – 18 GHz



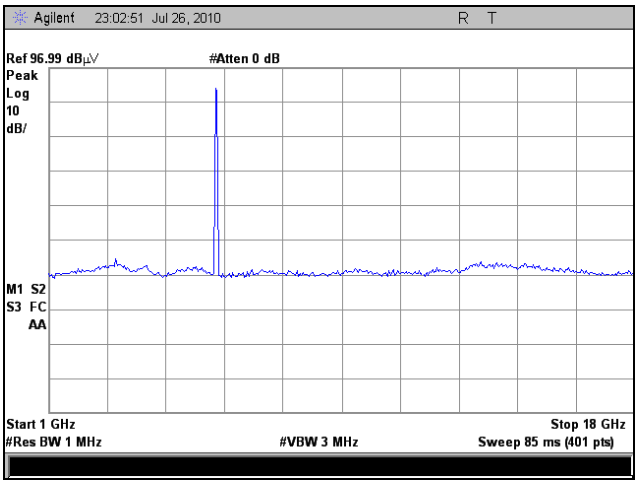
Plot 116. Radiated Spurious Emissions, Mid Channel (5780 MHz), 20 MHz, 30 MHz – 1 GHz



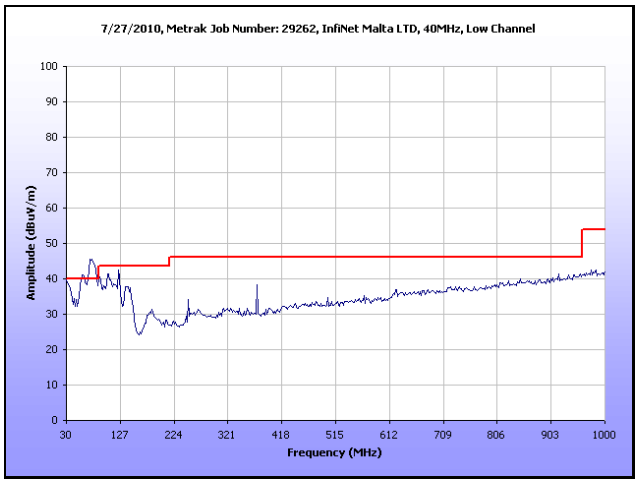
Plot 117. Radiated Spurious Emissions, Mid Channel (5780 MHz), 20 MHz, 1 GHz – 18 GHz



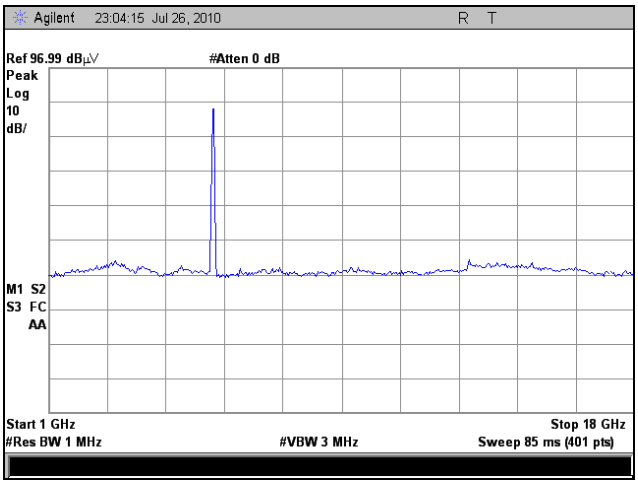
Plot 118. Radiated Spurious Emissions, High Channel (5840 MHz), 20 MHz, 30 MHz – 1 GHz



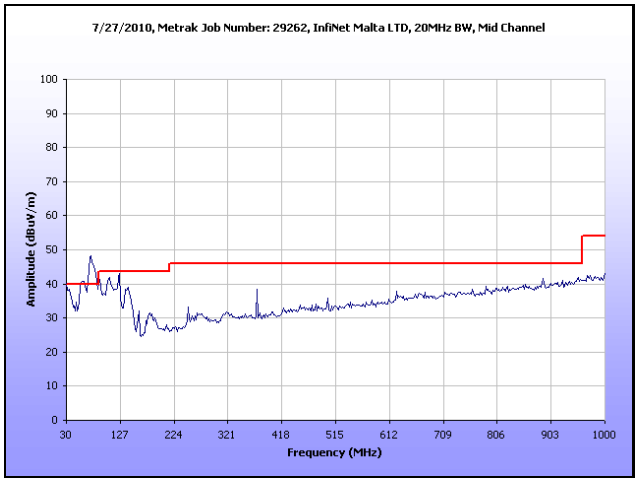
Plot 119. Radiated Spurious Emissions, High Channel (5840 MHz), 20 MHz, 1 GHz – 18 GHz



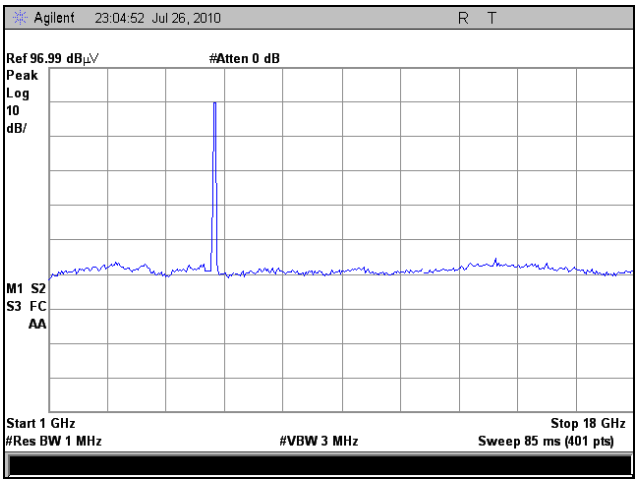
Plot 120. Radiated Spurious Emissions, Low Channel (5750 MHz), 40 MHz, 30 MHz – 1 GHz



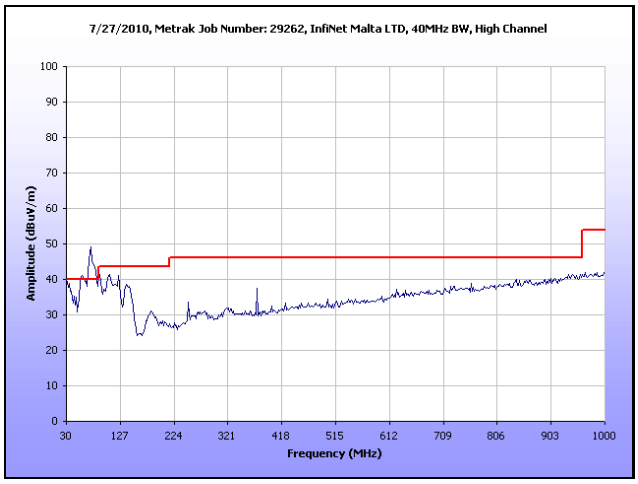
Plot 121. Radiated Spurious Emissions, Low Channel (5750 MHz), 40 MHz, 1 GHz – 18 GHz



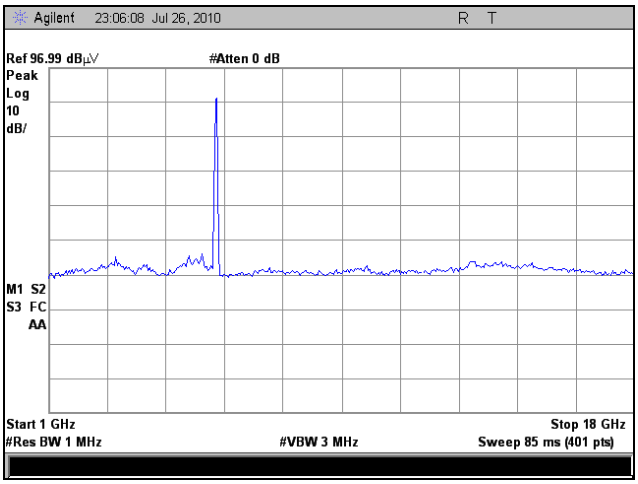
Plot 122. Radiated Spurious Emissions, Mid Channel (5790 MHz), 40 MHz, 30 MHz – 1 GHz



Plot 123. Radiated Spurious Emissions, Mid Channel (5790 MHz), 40 MHz, 1 GHz – 18 GHz



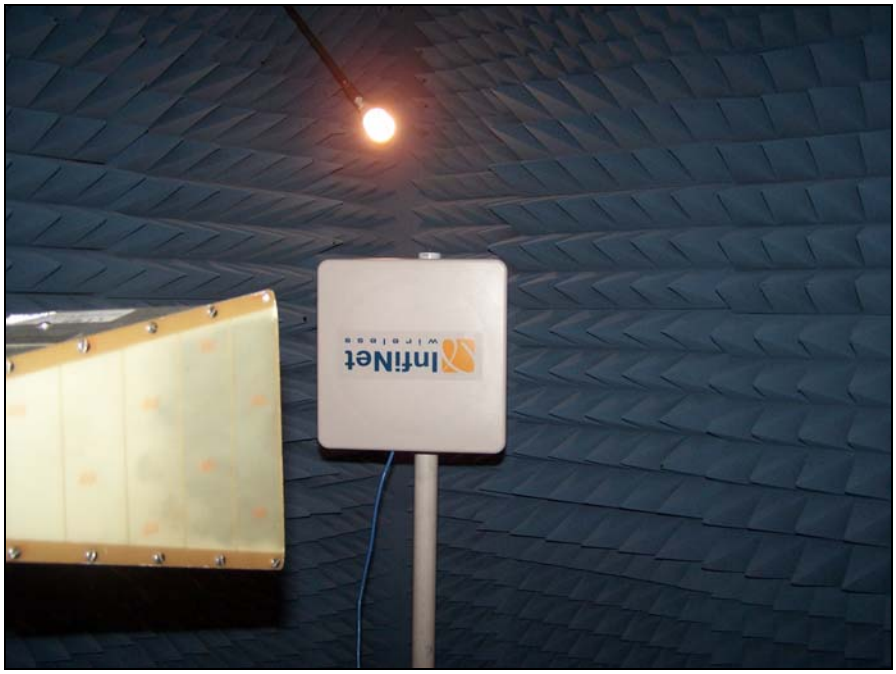
Plot 124. Radiated Spurious Emissions, High Channel (5830 MHz), 40 MHz, 30 MHz – 1 GHz



Plot 125. Radiated Spurious Emissions, High Channel (5830 MHz), 40 MHz, 1 GHz – 18 GHz

Radiated Spurious Emissions Test Setup

Photograph 4. Radiated Spurious Emissions, Test Setup, Below 1 GHz



Photograph 5. Radiated Spurious Emissions, Test Setup, Above 1 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

RSS-GEN Receiver Spurious Emissions Requirements

Test Requirements: The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 27.

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 27. Spurious Emission Limits for Receivers

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

Test Procedures: The EUT was programmed for receive mode only. Conducted measurements were taken at the antenna port of the EUT. All plots are corrected for cable loss.

Test Results: Equipment is compliant with the Receiver Spurious Emissions Requirements of RSS-GEN. Measured emissions were below applicable limits.

Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 08/10/10

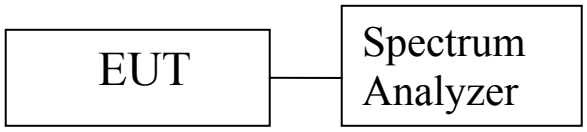
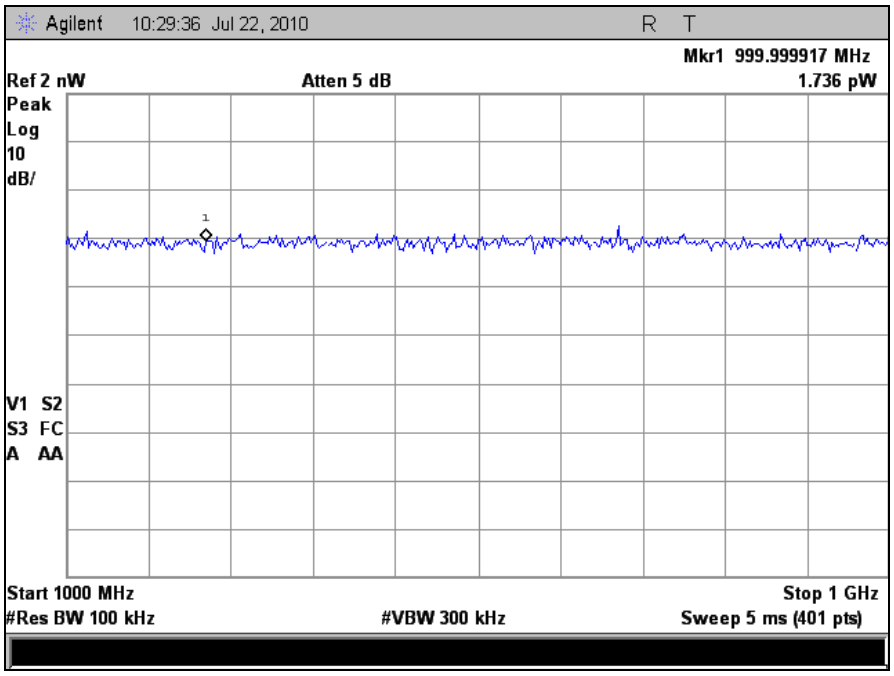
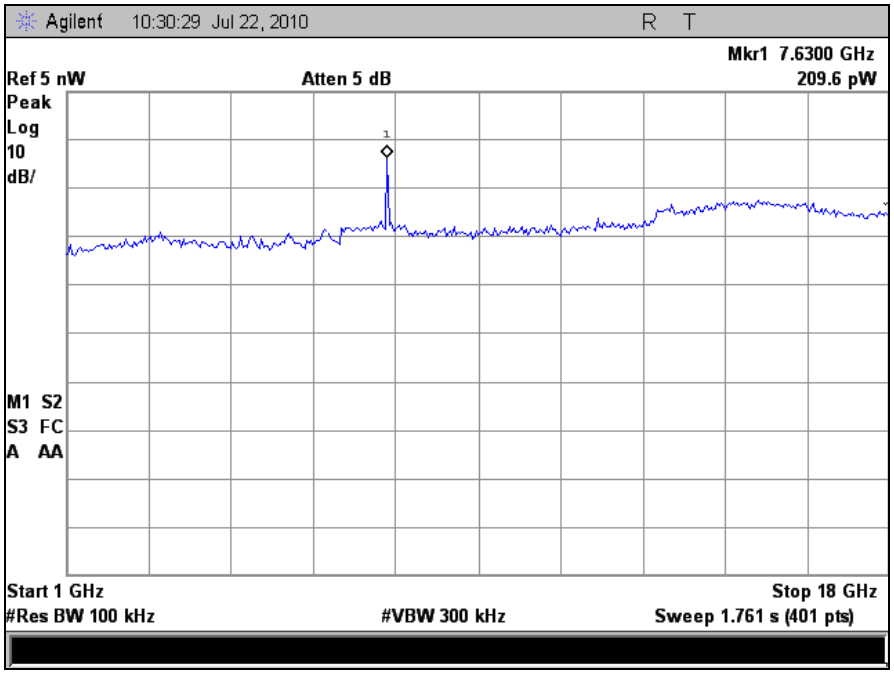


Figure 4. Block Diagram, Conducted Receiver Spurious Emissions Test Setup

Conducted Receiver Spurious Emissions



Plot 126. Receiver Spurious Emission, 30 MHz – 1 GHz



Plot 127. Receiver Spurious Emission, 1 GHz – 18 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.

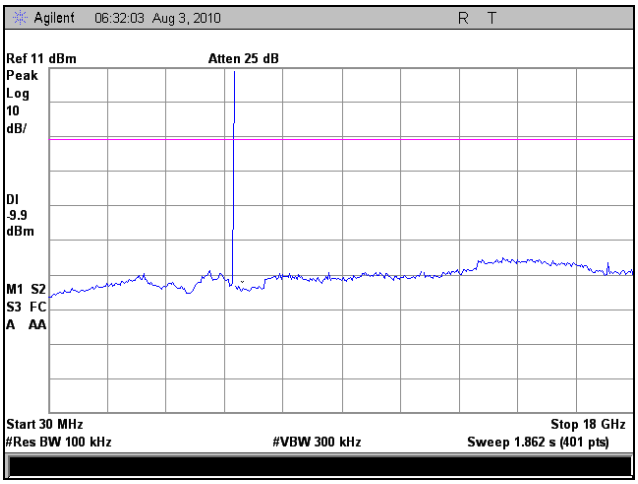
See following pages for detailed test results with RF Conducted Spurious Emissions.

Test Results: The EUT was compliant with the Conducted Spurious Emission limits of **§15.247(d)**. Measured emissions were below applicable limits. A combiner was used from 30 MHz to 18 GHz for making measurements.

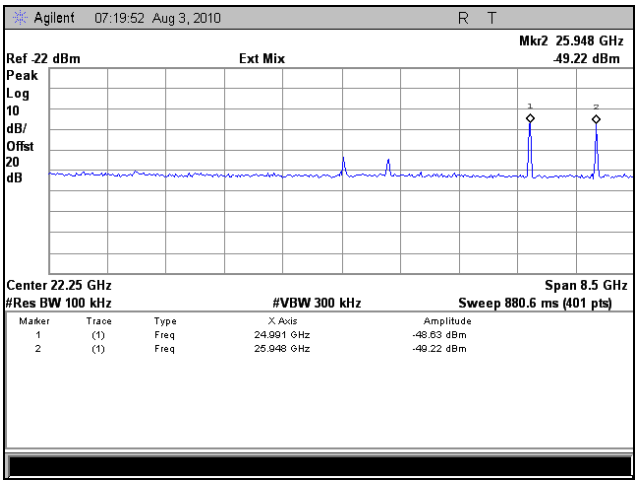
Test Engineer(s): Dusmantha Tennakoon

Test Date(s): 08/04/10

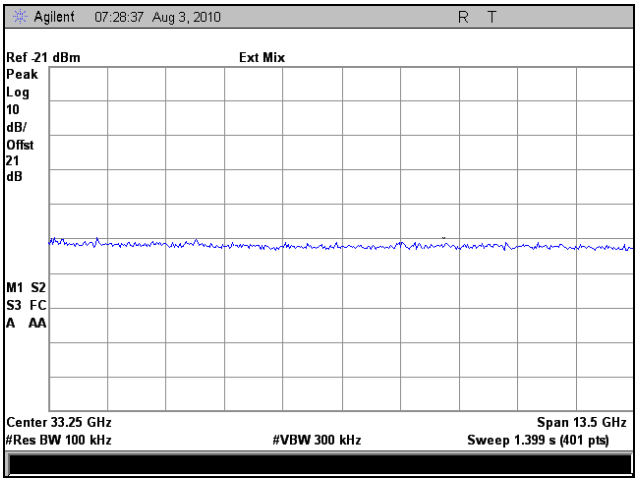
Conducted Spurious Emissions Test Results



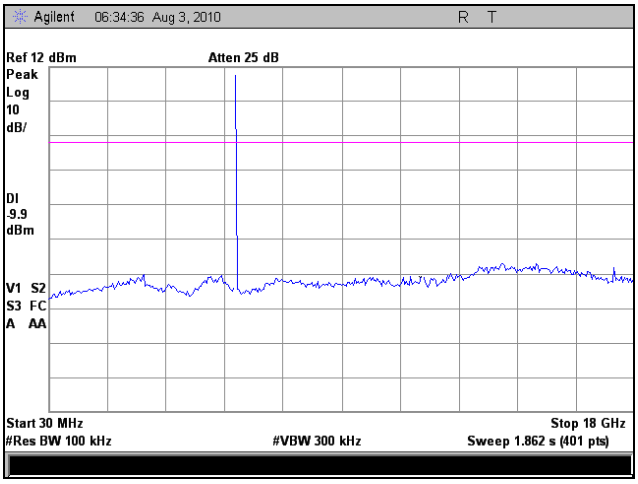
Plot 128. Conducted Emissions, Low Channel (5730 MHz) 5 MHz, 30 MHz – 18 GHz



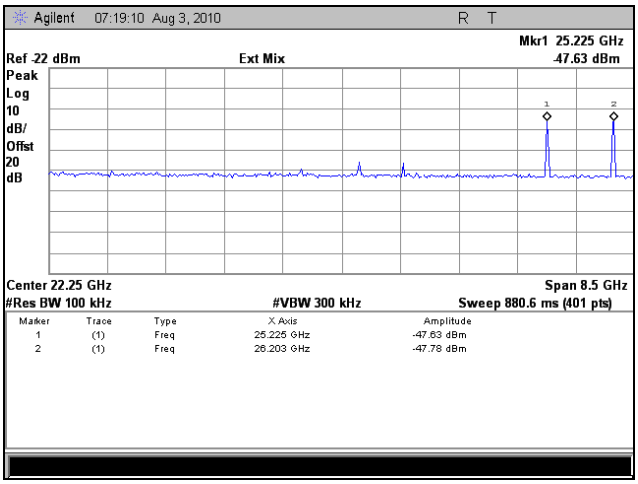
Plot 129. Conducted Emissions, Low Channel (5730 MHz) 5 MHz, 18 GHz – 26.5 GHz



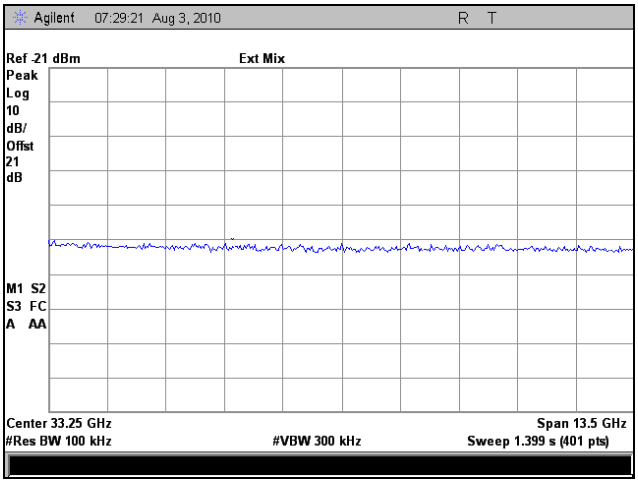
Plot 130. Conducted Emissions, Low Channel (5730 MHz) 5 MHz, 26.5 GHz – 40 GHz



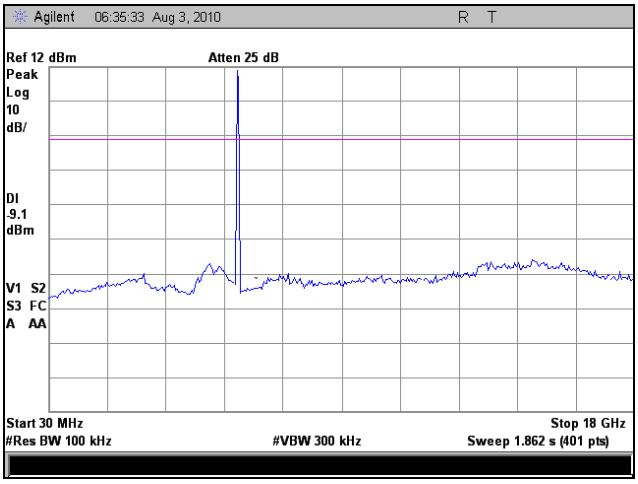
Plot 131. Conducted Emissions, Mid Channel (5785 MHz) 5 MHz, 30 MHz – 18 GHz



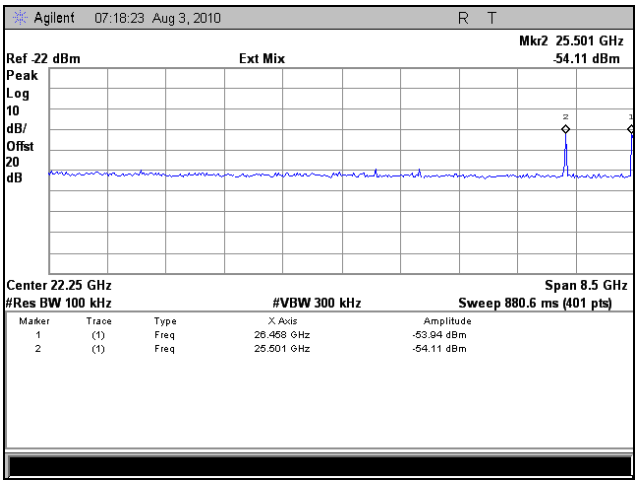
Plot 132. Conducted Emissions, Mid Channel (5785 MHz) 5 MHz, 18 GHz – 26.5 GHz



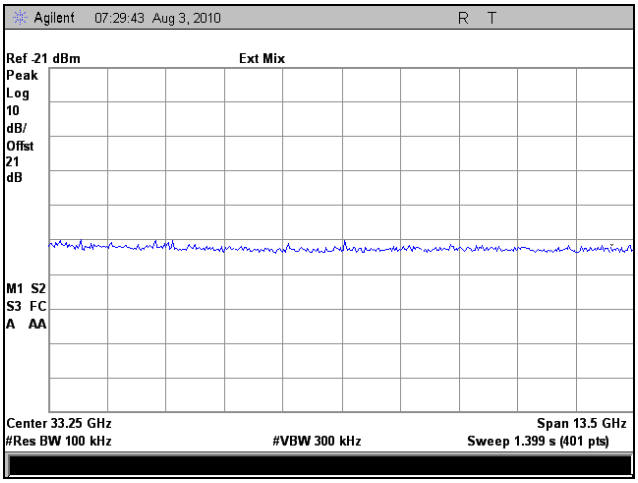
Plot 133. Conducted Emissions, Mid Channel (5785 MHz) 5 MHz, 26.5 GHz – 40 GHz



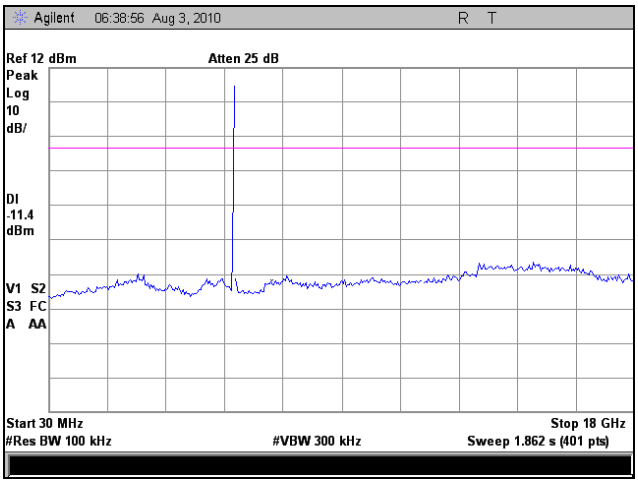
Plot 134. Conducted Emissions, High Channel (5845 MHz) 5 MHz, 30 MHz – 18 GHz



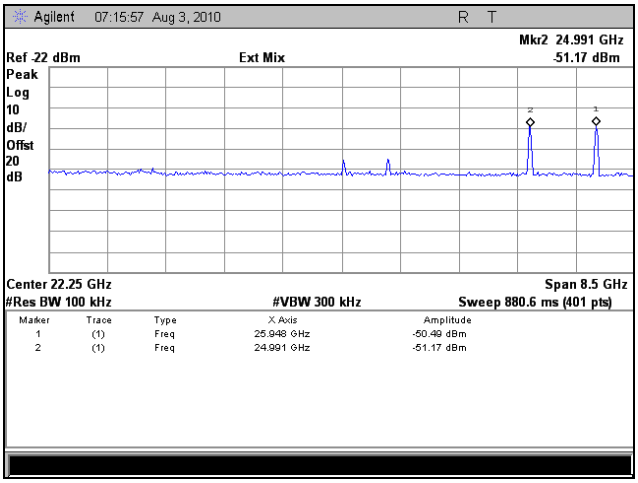
Plot 135. Conducted Emissions, High Channel (5845 MHz) 5 MHz, 18 GHz – 26.5 GHz



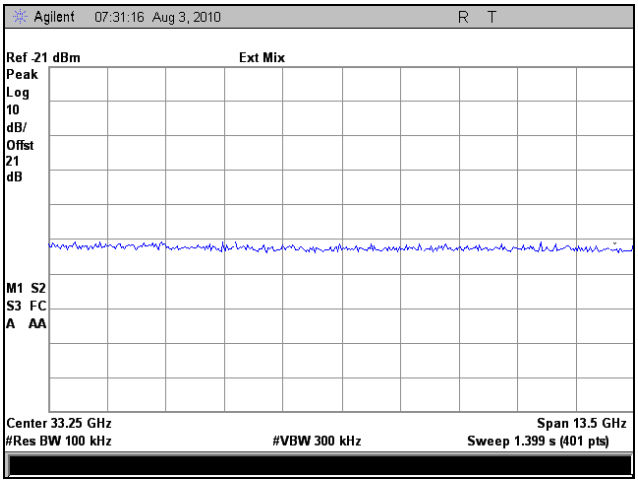
Plot 136. Conducted Emissions, High Channel (5845 MHz) 5 MHz, 26.5 GHz – 40 GHz



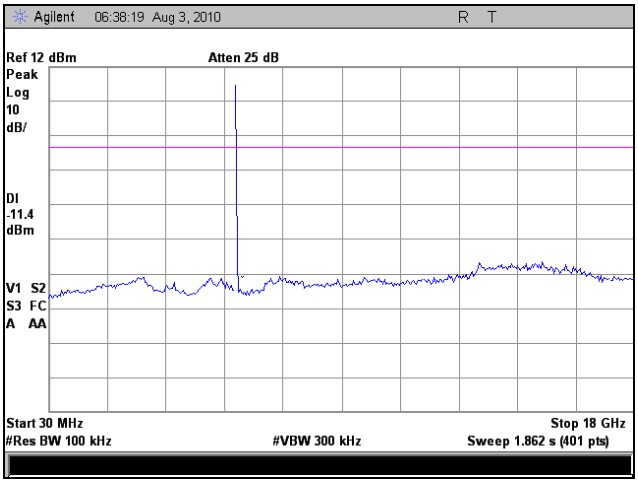
Plot 137. Conducted Emissions, Low Channel (5730 MHz) 10 MHz, 30 MHz – 18 GHz



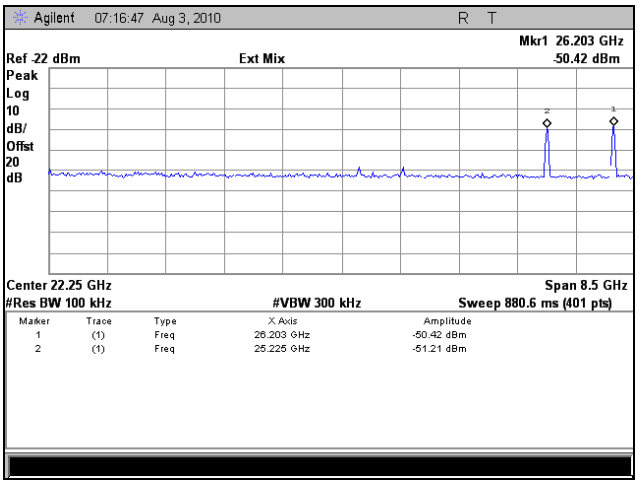
Plot 138. Conducted Emissions, Low Channel (5730 MHz) 10 MHz, 18 GHz – 26.5 GHz



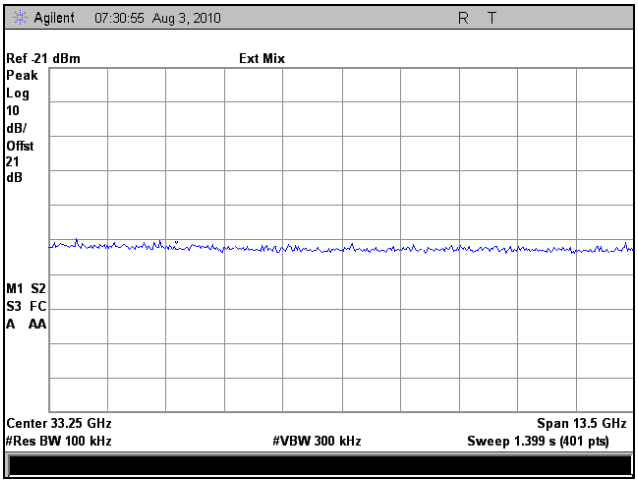
Plot 139. Conducted Emissions, Low Channel (5730 MHz) 10 MHz, 26.5 GHz – 40 GHz



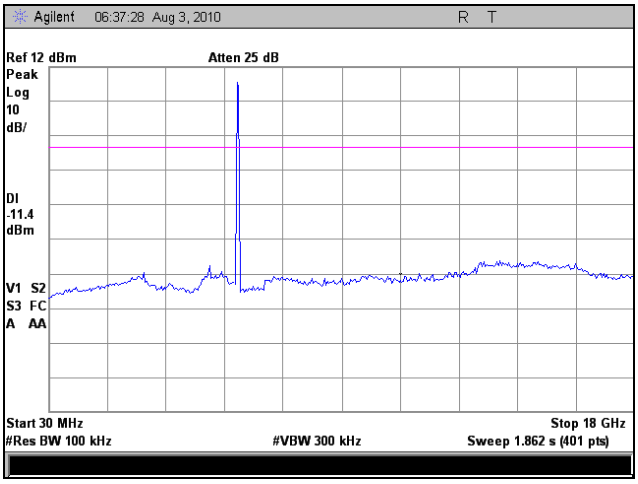
Plot 140. Conducted Emissions, Mid Channel (5785 MHz) 10 MHz, 30 MHz – 18 GHz



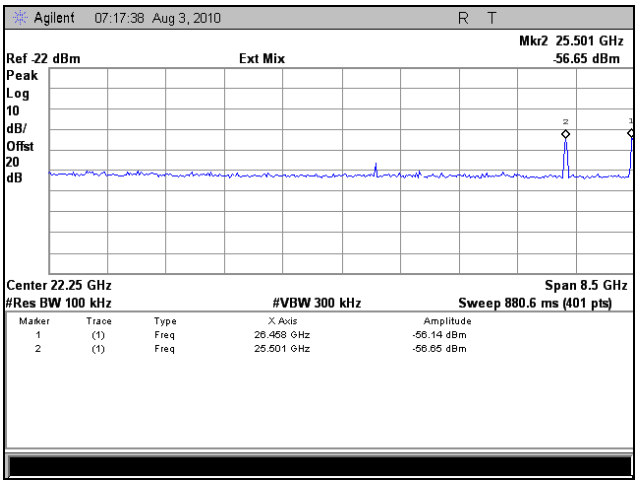
Plot 141. Conducted Emissions, Mid Channel (5785 MHz) 10 MHz, 18 GHz – 26.5 GHz



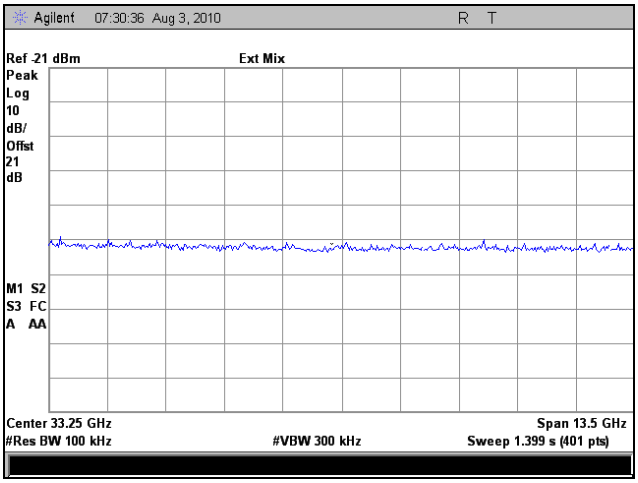
Plot 142. Conducted Emissions, Mid Channel (5785 MHz) 10 MHz, 26.5 GHz – 40 GHz



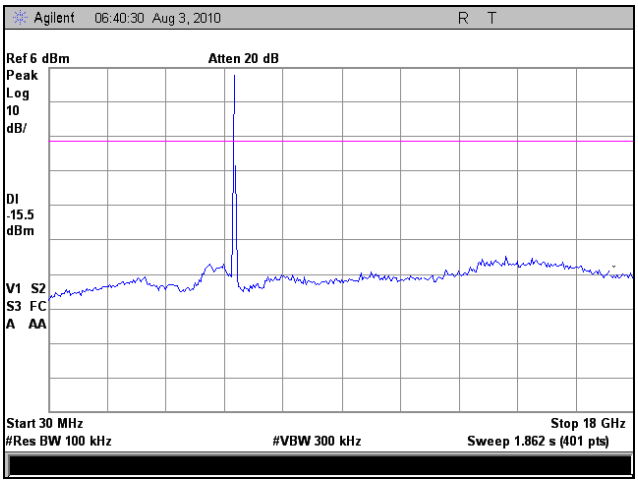
Plot 143. Conducted Emissions, High Channel (5845 MHz) 10 MHz, 30 MHz – 18 GHz



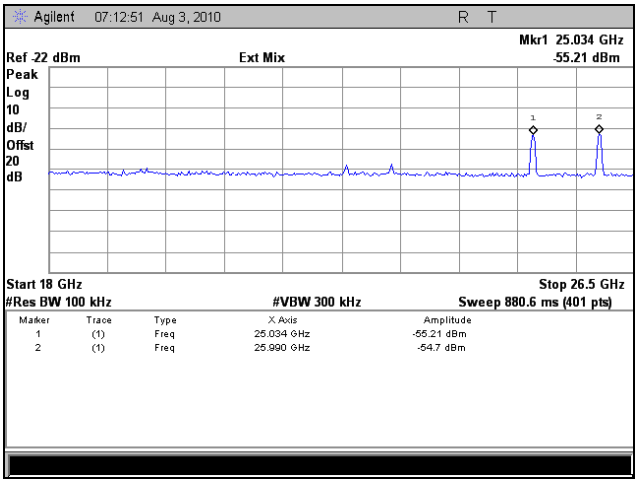
Plot 144. Conducted Emissions, High Channel (5845 MHz) 10 MHz, 18 GHz – 26.5 GHz



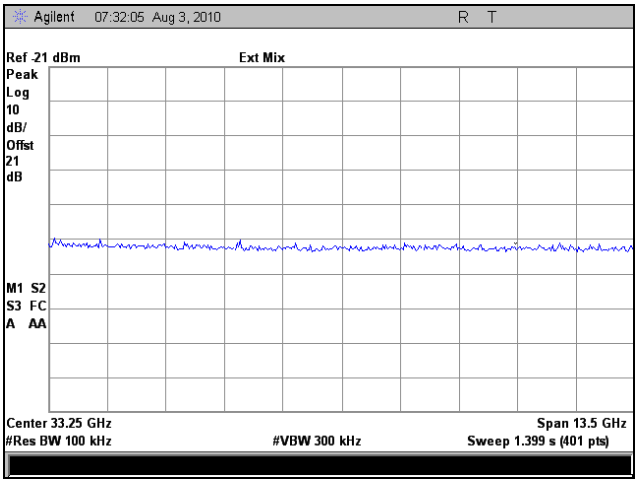
Plot 145. Conducted Emissions, High Channel (5845 MHz) 10 MHz, 26.5 GHz – 40 GHz



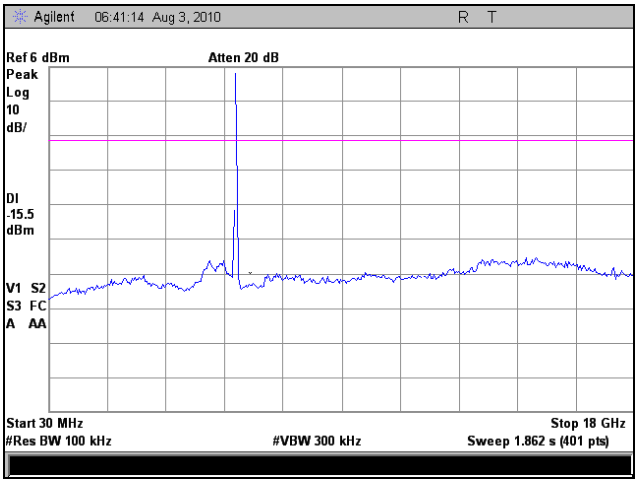
Plot 146. Conducted Emissions, Low Channel (5740 MHz) 20 MHz, 30 MHz – 18 GHz



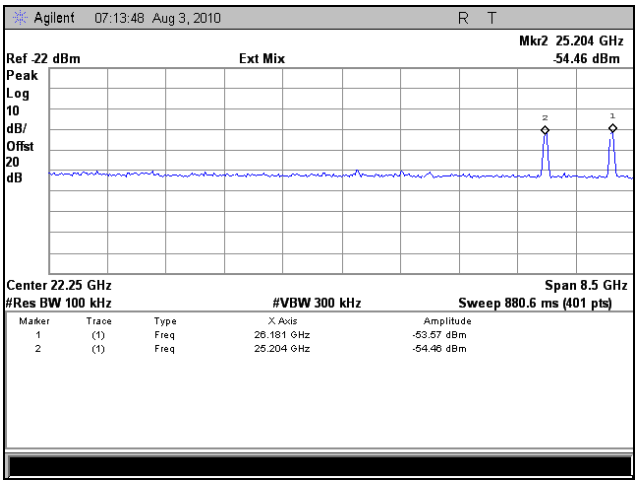
Plot 147. Conducted Emissions, Low Channel (5740 MHz) 20 MHz, 18 GHz – 26.5 GHz



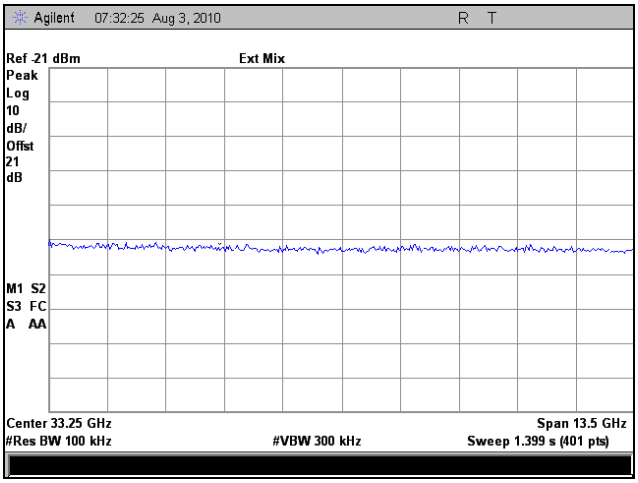
Plot 148. Conducted Emissions, Low Channel (5740 MHz) 20 MHz, 26.5 GHz – 40 GHz



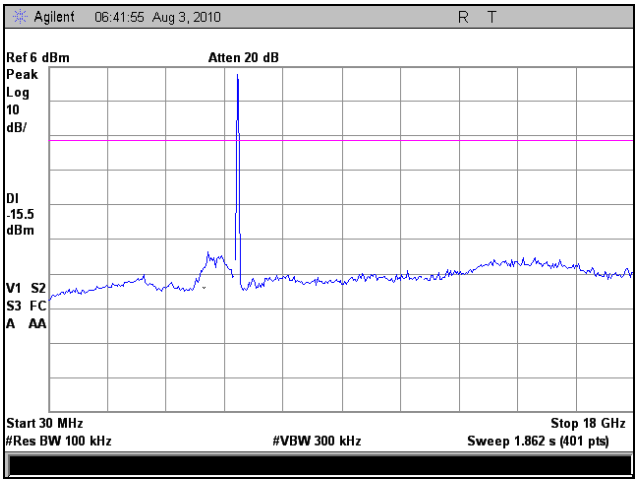
Plot 149. Conducted Emissions, Mid Channel (5780 MHz) 20 MHz, 30 MHz – 18 GHz



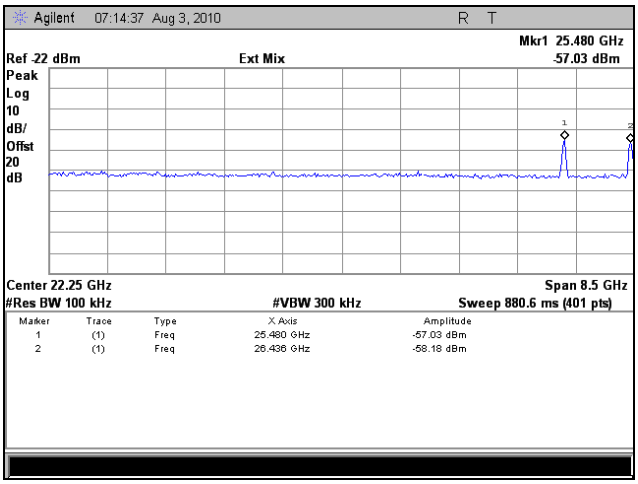
Plot 150. Conducted Emissions, Mid Channel (5780 MHz) 20 MHz, 18 GHz – 26.5 GHz



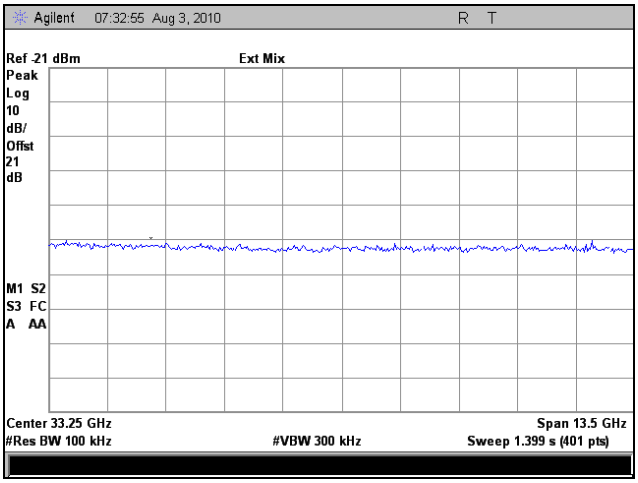
Plot 151. Conducted Emissions, Mid Channel (5780 MHz) 20 MHz, 26.5 GHz – 40 GHz



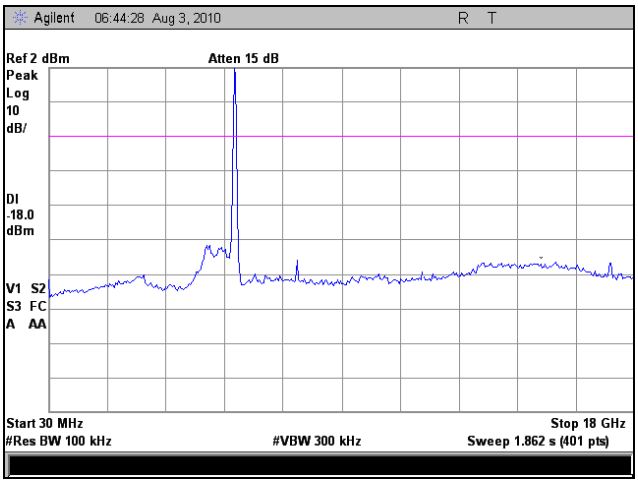
Plot 152. Conducted Emissions, High Channel (5840 MHz) 20 MHz, 30 MHz – 18 GHz



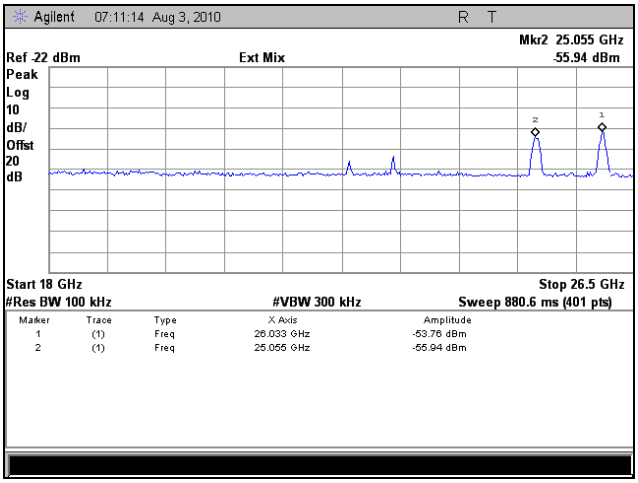
Plot 153. Conducted Emissions, High Channel (5840 MHz) 20 MHz, 18 GHz – 26.5 GHz



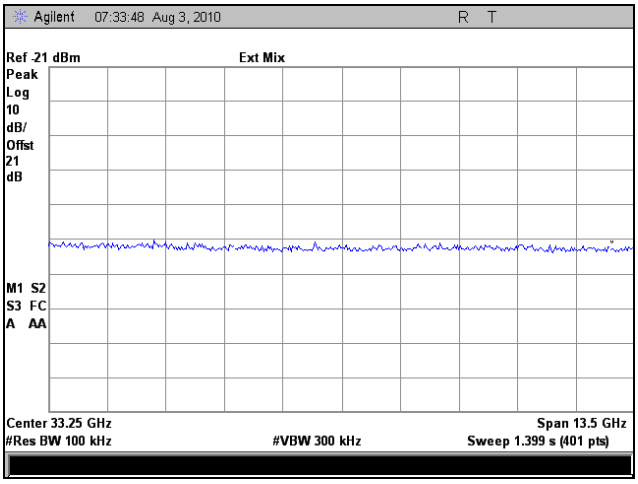
Plot 154. Conducted Emissions, High Channel (5840 MHz) 20 MHz, 26.5 GHz – 40 GHz



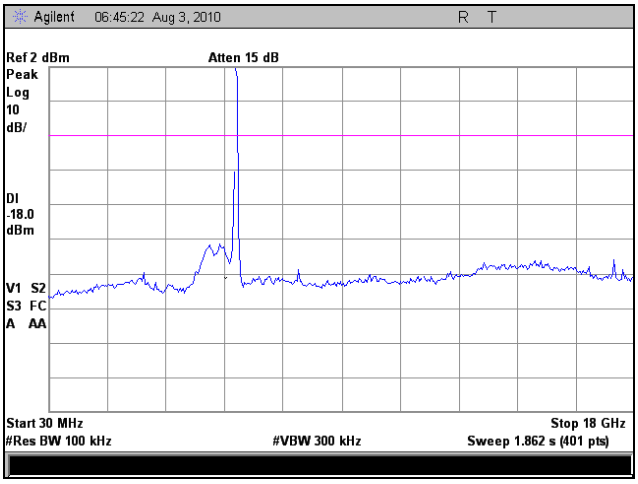
Plot 155. Conducted Emissions, Low Channel (5750 MHz) 40 MHz, 30 MHz – 18 GHz



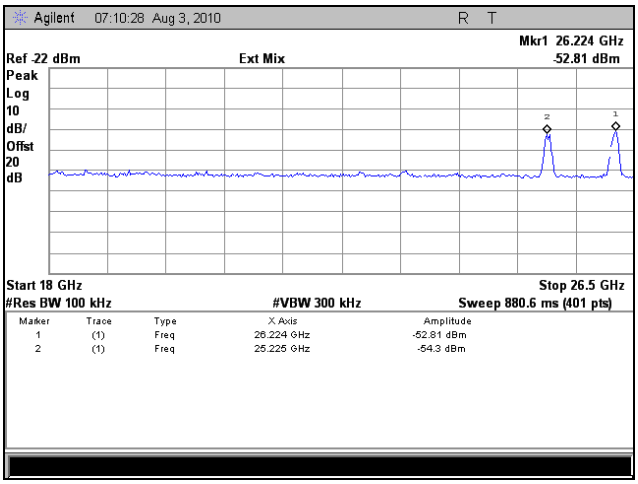
Plot 156. Conducted Emissions, Low Channel (5750 MHz) 40 MHz, 18 GHz – 26.5 GHz



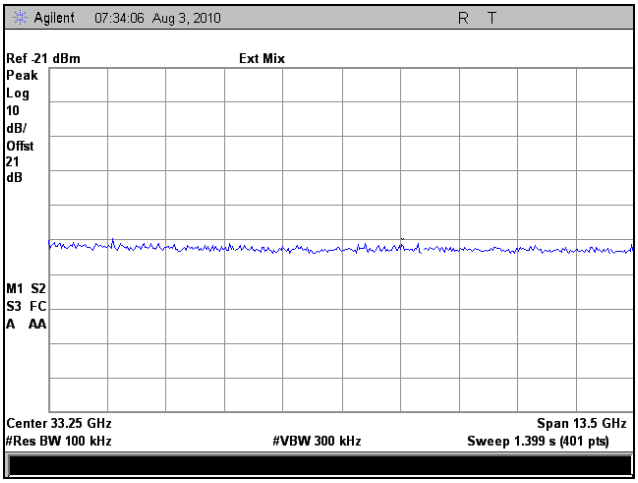
Plot 157. Conducted Emissions, Low Channel (5750 MHz) 40 MHz, 26.5 GHz – 40 GHz



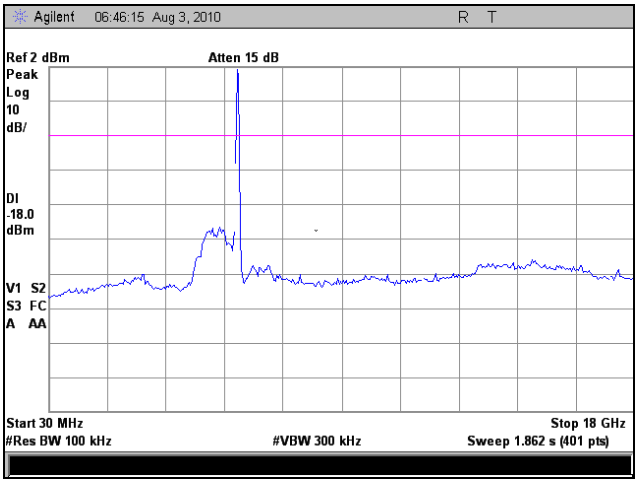
Plot 158. Conducted Emissions, Mid Channel (5790 MHz) 40 MHz, 30 MHz – 18 GHz



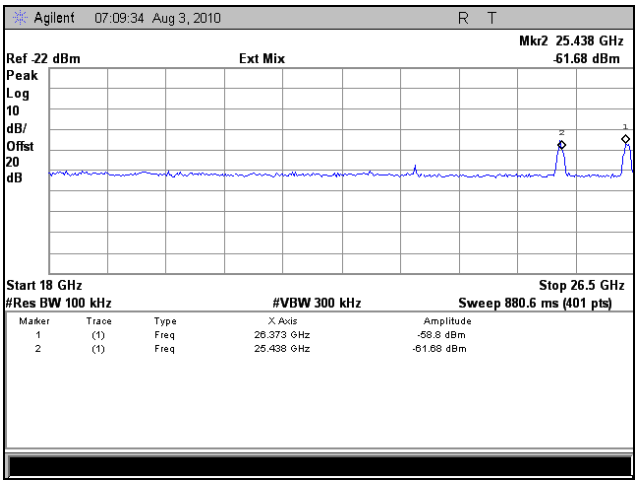
Plot 159. Conducted Emissions, Mid Channel (5790 MHz) 40 MHz, 18 GHz – 26.5 GHz



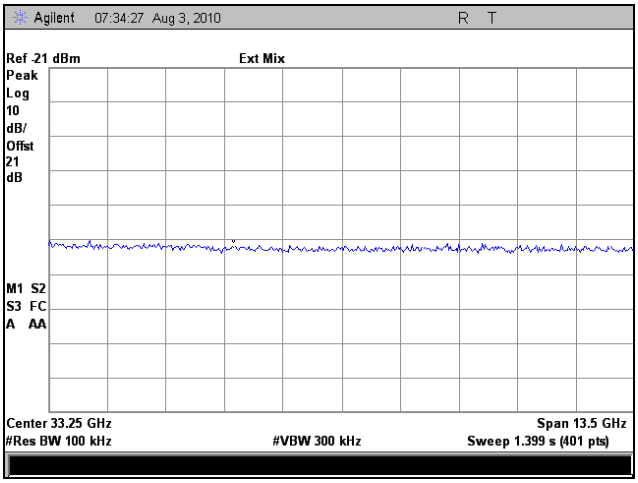
Plot 160. Conducted Emissions, Mid Channel (5790 MHz) 40 MHz, 26.5 GHz – 40 GHz



Plot 161. Conducted Emissions, High Channel (5830 MHz) 40 MHz, 30 MHz – 18 GHz

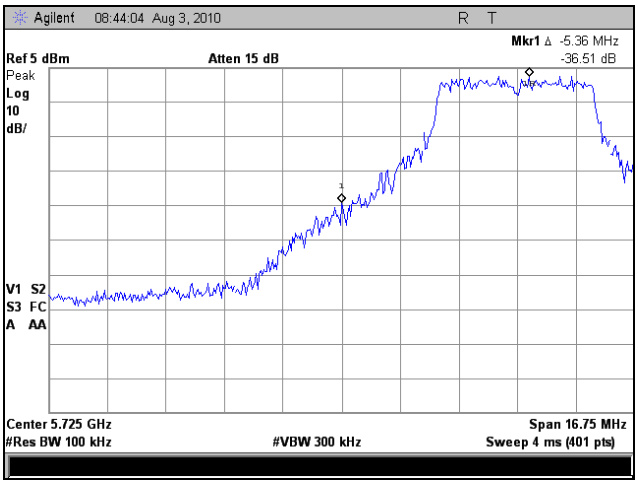


Plot 162. Conducted Emissions, High Channel (5830 MHz) 40 MHz, 18 GHz – 26.5 GHz

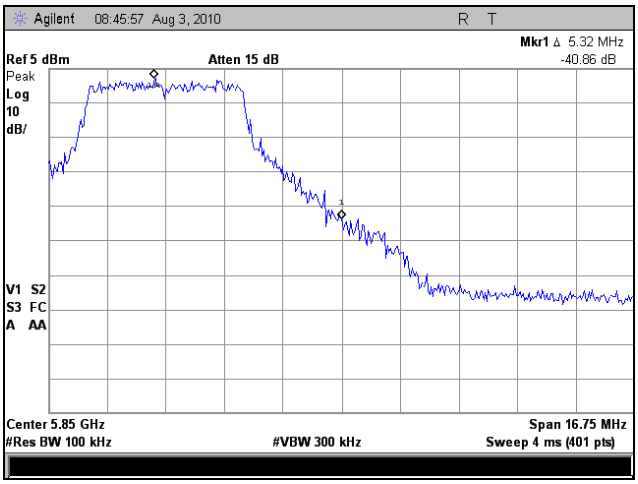


Plot 163. Conducted Emissions, High Channel (5830 MHz) 40 MHz, 26.5 GHz – 40 GHz

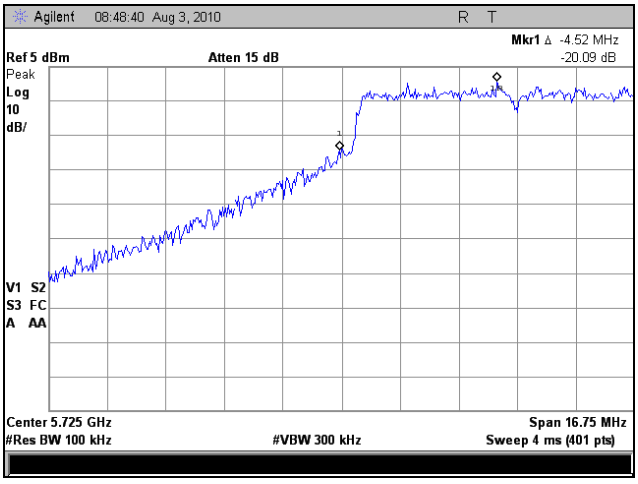
Conducted Band Edge Test Results



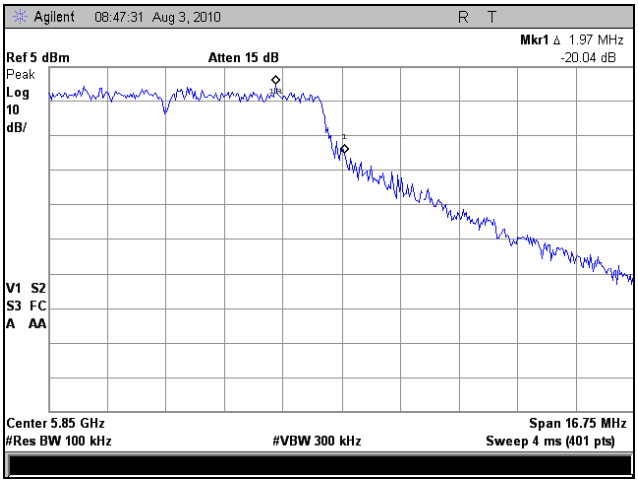
Plot 164. Conducted Band Edge, Low Channel (5730 MHz) 5 MHz, Port 1



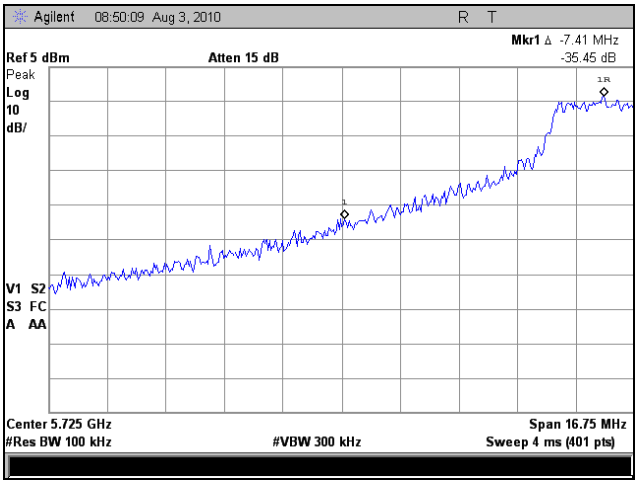
Plot 165. Conducted Band Edge, High Channel (5845 MHz) 5 MHz, Port 1



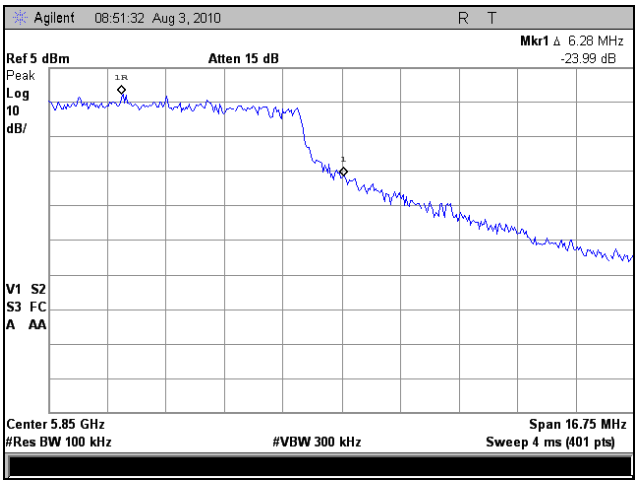
Plot 166. Conducted Band Edge, Low Channel (5730 MHz) 10 MHz, Port 1



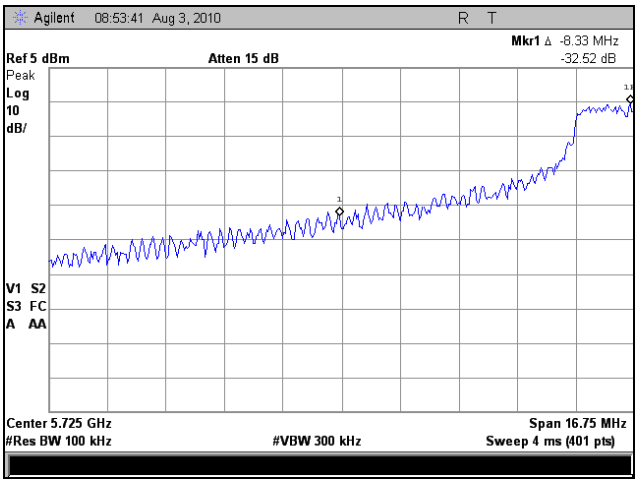
Plot 167. Conducted Band Edge, High Channel (5845 MHz) 10 MHz, Port 1



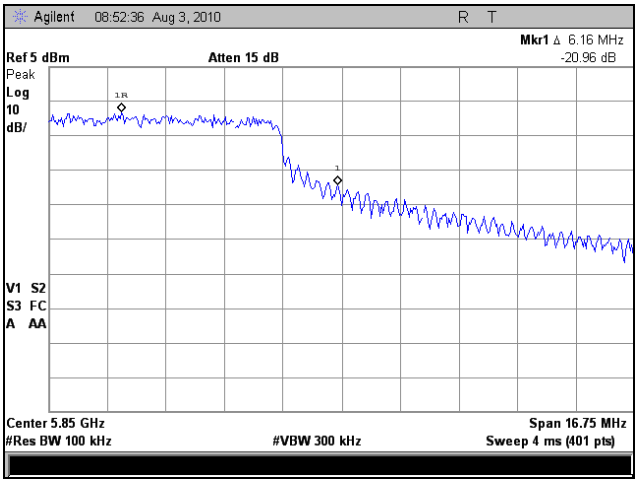
Plot 168. Conducted Band Edge, Low Channel (5740 MHz) 20 MHz, Port 1



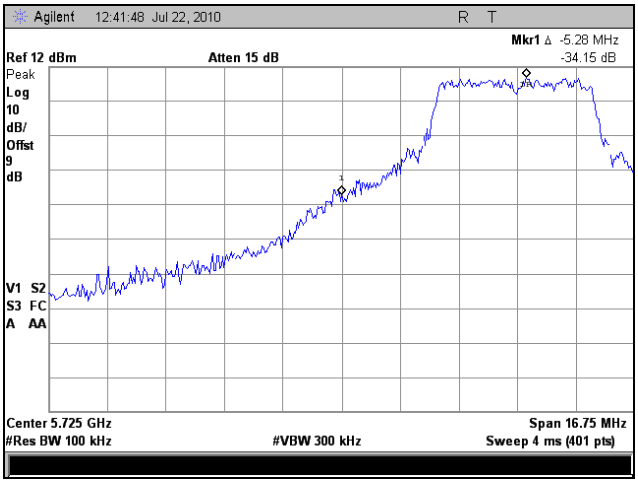
Plot 169. Conducted Band Edge, High Channel (5840 MHz) 20 MHz, Port 1



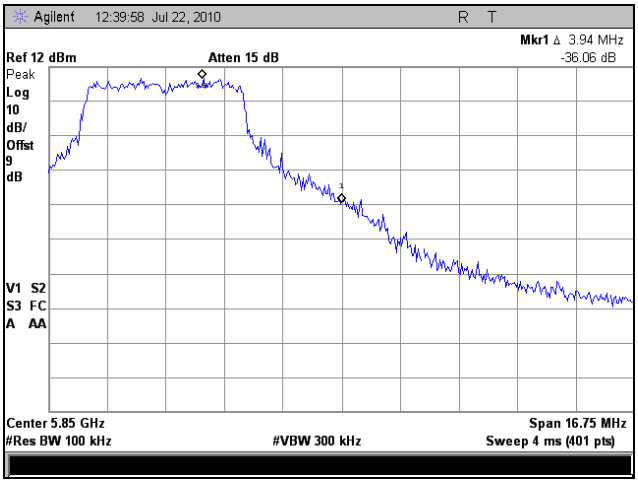
Plot 170. Conducted Band Edge, Low Channel (5750 MHz) 40 MHz, Port 1



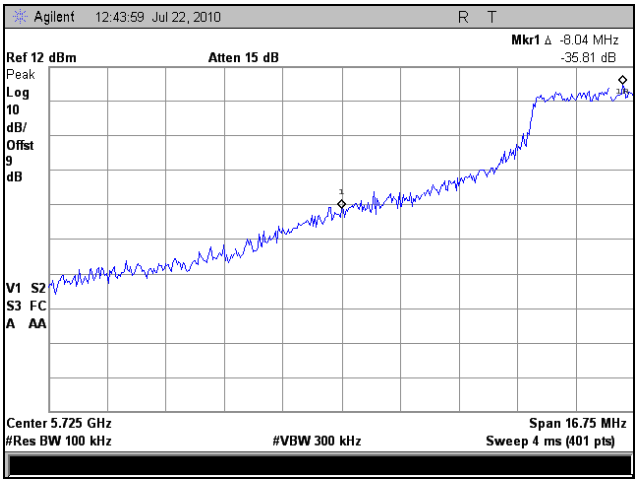
Plot 171. Conducted Band Edge, High Channel (5830 MHz) 40 MHz, Port 1



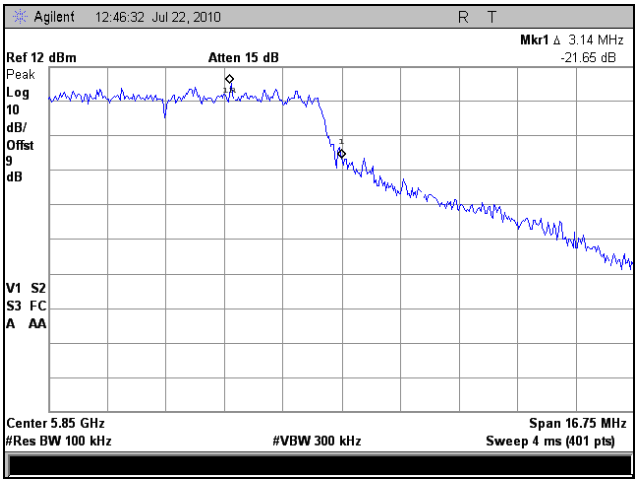
Plot 172. Conducted Band Edge, Low Channel (5730 MHz) 5 MHz, Port 2



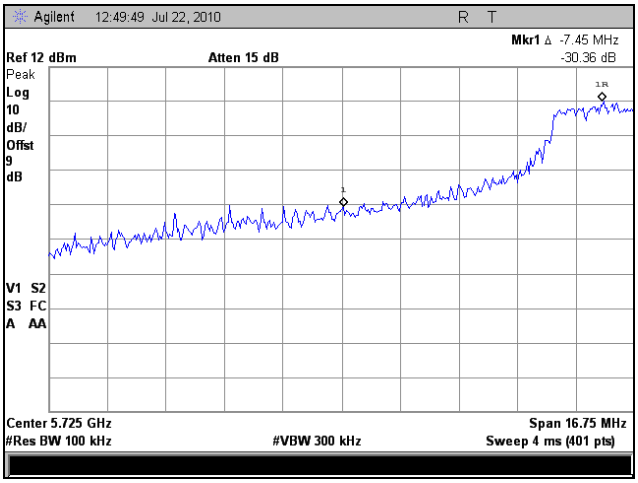
Plot 173. Conducted Band Edge, High Channel (5845 MHz) 5 MHz, Port 2



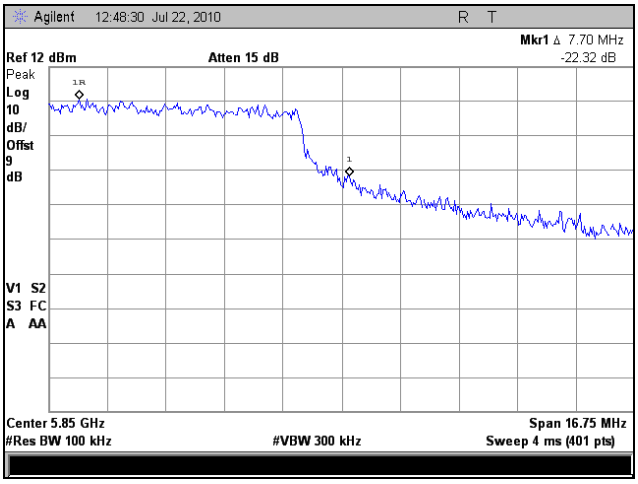
Plot 174. Conducted Band Edge, Low Channel (5730 MHz) 10 MHz, Port 2



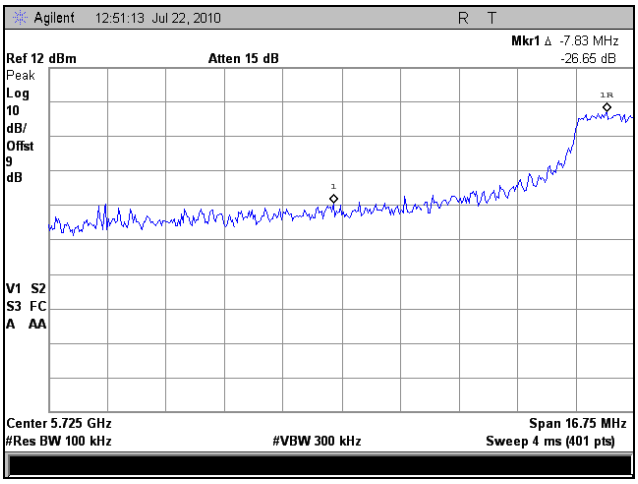
Plot 175. Conducted Band Edge, High Channel (5845 MHz) 10 MHz, Port 2



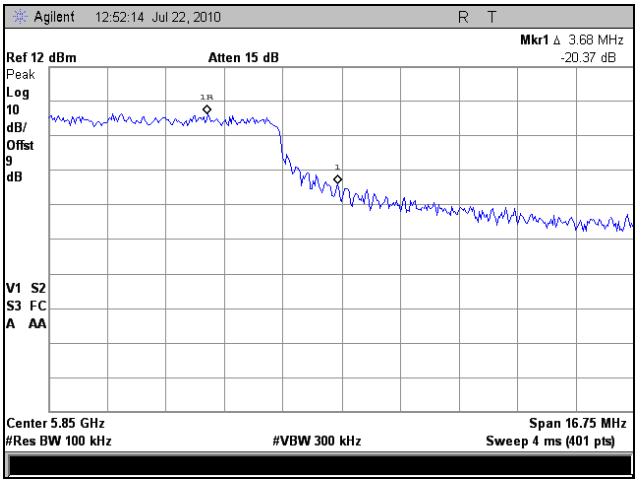
Plot 176. Conducted Band Edge, Low Channel (5740 MHz) 20 MHz, Port 2



Plot 177. Conducted Band Edge, High Channel (5840 MHz) 20 MHz, Port 2



Plot 178. Conducted Band Edge, Low Channel (5750 MHz) 40 MHz, Port 2



Plot 179. Conducted Band Edge, High Channel (5830 MHz) 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 each of the 100 sweeps of power averaging. The RBW was set to 3 kHz and a VBW set to 9 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)**. A combiner was used to make measurements.
The peak power spectral density was determined from plots on the following page(s).

Test Engineer: Dusmantha Tennakoon

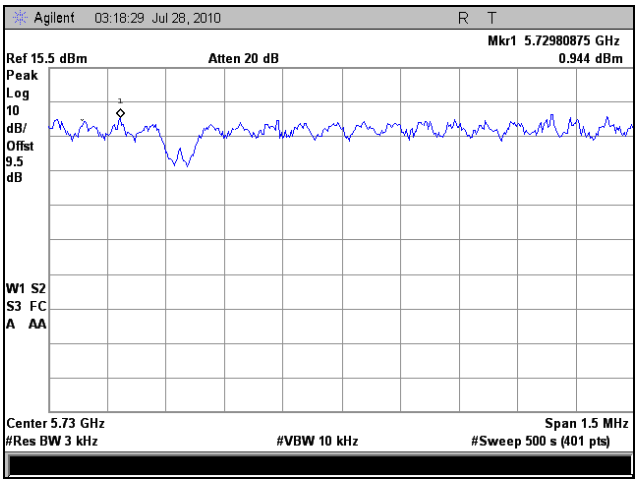
Test Date: 08/03/10

Peak Power Spectral Density Test Results

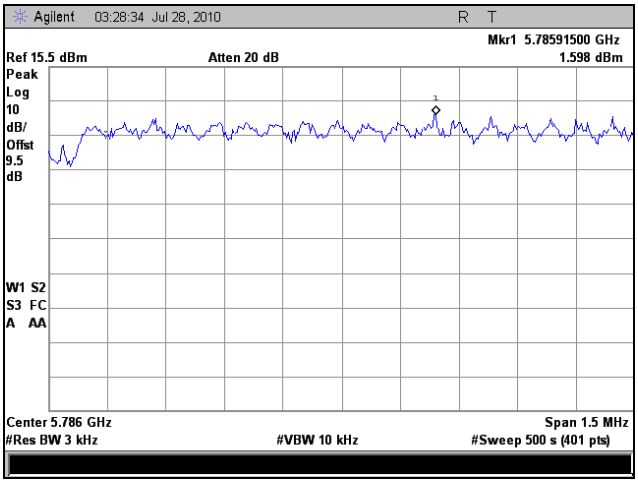
Bandwidth (MHz)	Frequency (MHz)	Measured PSD (dBm)	Limit (dBm)	Margin (dB)
5	5730	0.994	8	-7.006
	5785	1.598	8	-6.402
	5845	1.029	8	-6.971
10	5730	-1.454	8	-9.454
	5785	-2.311	8	-10.311
	5845	-2.903	8	-10.903
20	5740	-5.046	8	-13.046
	5780	-2.481	8	-10.481
	5840	-2.775	8	-10.775
40	5750	-7.892	8	-15.892
	5790	-7.659	8	-15.659
	5830	-6.966	8	-14.966

Table 28. Spectral Density, Test Results

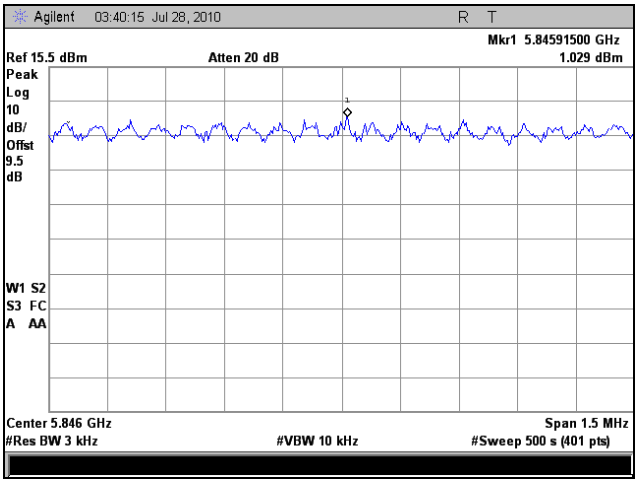
Peak Power Spectral Density



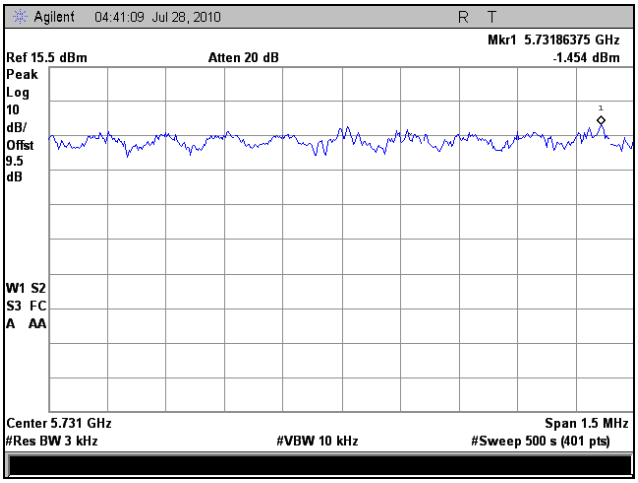
Plot 180. Peak Power Spectral Density, Low Channel (5730 MHz), 5 MHz



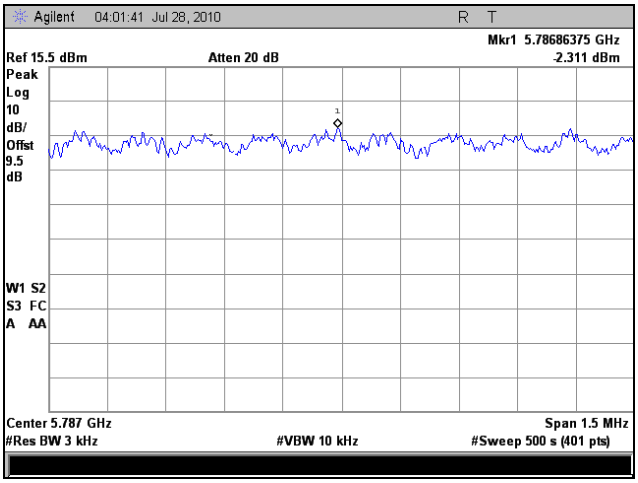
Plot 181. Peak Power Spectral Density, Mid Channel (5785 MHz), 5 MHz



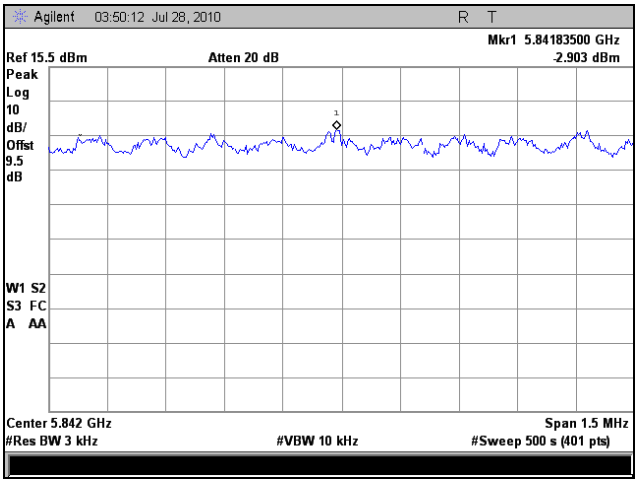
Plot 182. Peak Power Spectral Density, High Channel (5845 MHz), 5 MHz



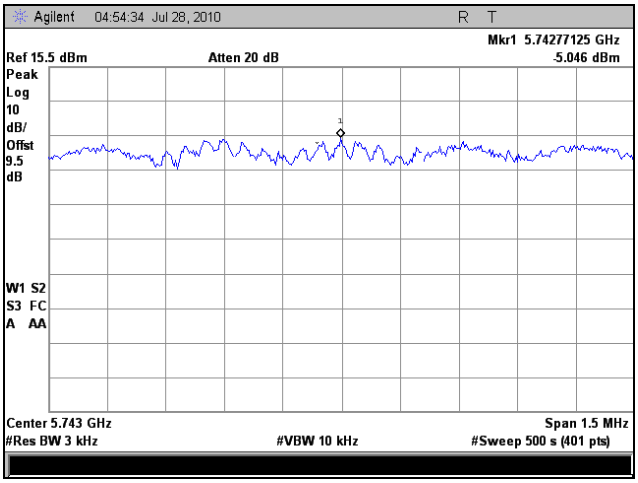
Plot 183. Peak Power Spectral Density, Low Channel (5730 MHz), 10 MHz



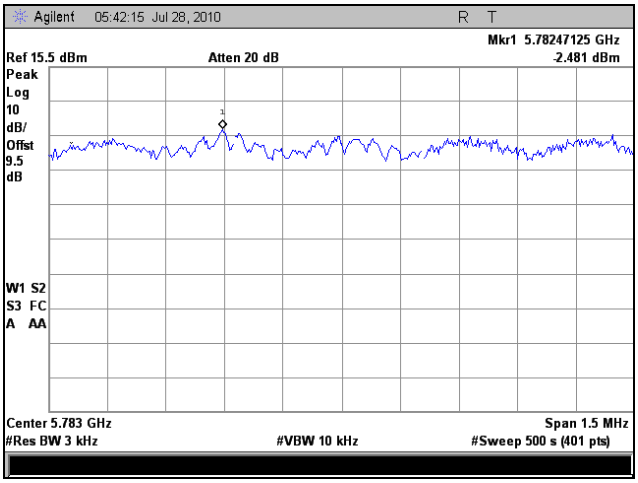
Plot 184. Peak Power Spectral Density, Mid Channel (5785 MHz), 10 MHz



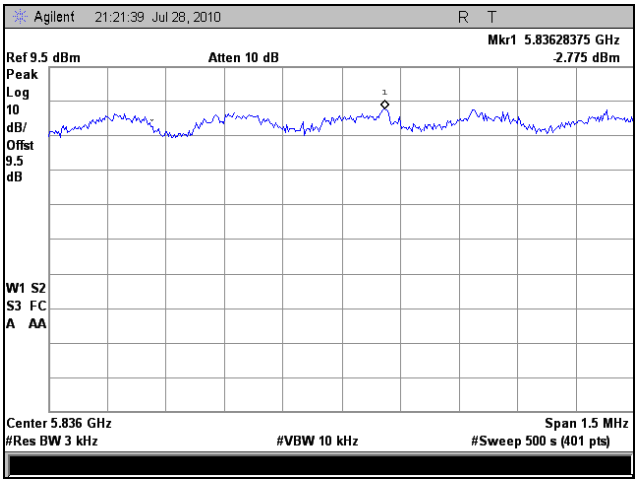
Plot 185. Peak Power Spectral Density, High Channel (5845 MHz), 10 MHz



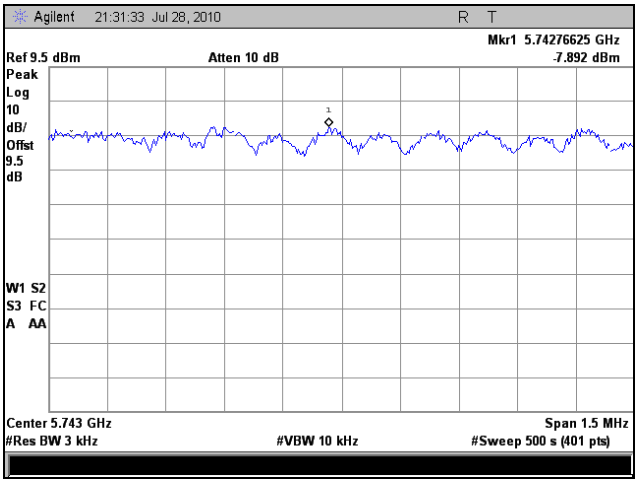
Plot 186. Peak Power Spectral Density, Low Channel (5740 MHz), 20 MHz



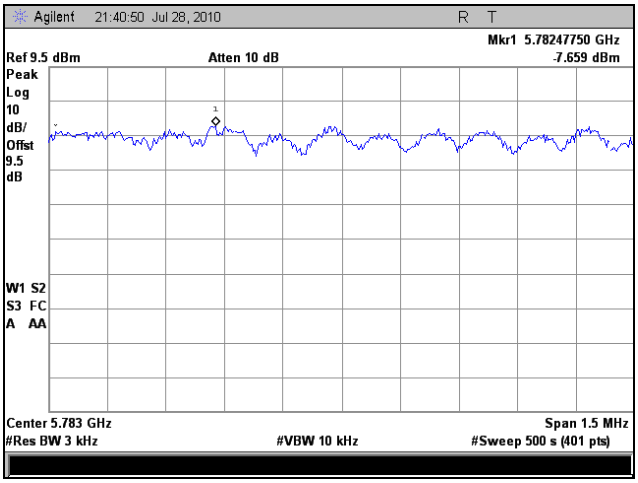
Plot 187. Peak Power Spectral Density, Mid Channel (5780 MHz), 20 MHz



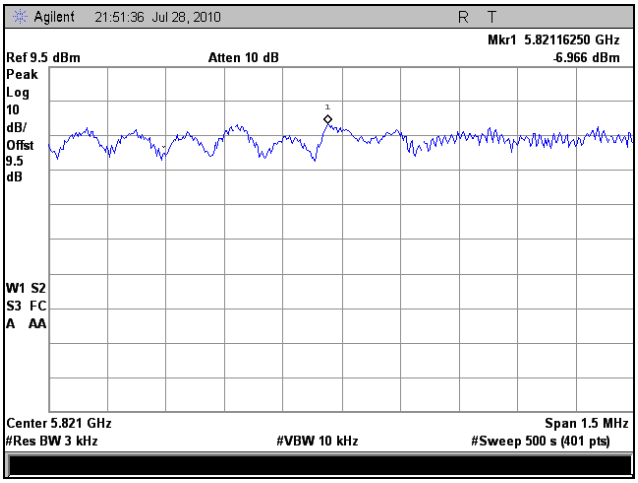
Plot 188. Peak Power Spectral Density, High Channel (5840 MHz), 20 MHz



Plot 189. Peak Power Spectral Density, Low Channel (5750 MHz), 40 MHz



Plot 190. Peak Power Spectral Density, Mid Channel (5790 MHz), 40 MHz



Plot 191. Peak Power Spectral Density, High Channel (5830 MHz), 40 MHz

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4354	SIGNAL GENERATOR	HEWLETT PACKARD	83752A	03/11/2010	03/11/2011
1T4592	RF FILTER KIT	VARIOUS	N/A	SEE NOTE	
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	08/24/2007	08/24/2010
1T2511	ANTENNA; HORN	EMCO	3115	08/21/2009	08/21/2010
1T4612	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4407B	09/09/2009	09/09/2010
1T4668	HARMONIC MIXER 26.5 TO 40 GHZ	HEWLETT PACKARD	11970A	06/02/2010	06/02/2011
1T4323	HARMONIC MIXER 18 TO 26.5 GHZ	HEWLETT PACKARD	11970K	07/14/2009	08/14/2010
1T4621	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4402B	05/10/2010	05/10/2011
1T4563	LISN (10 AMP)	SOLAR ELECTRONICS	9322-50-R-10-BNC	10/14/2009	10/14/2010
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	05/25/2010	05/25/2011
1T4303	ANTENNA; BILOG	SCHAFNER - CHASE EMC	CBL6140A	07/29/2009	07/29/2010
1T4619	THERMO-HYGROMETER	CONTROL COMPANY	S6-627-9	11/07/2008	11/07/2010
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4609	4-PORT MICROWAVE SIGNAL COMBINER/SPLITTER	MINI-CIRCUITS	ZN4PD1-63-S+	SEE NOTE	
1T4214	SHIELD ROOM #4	UNIVERSAL SHIELD INC	N/A	SEE NOTE	
1T4568	RADIATING NOISE SOURCE	MET LABORATORIES	N/A	SEE NOTE	
SN:F326600817	DC-18 GHZ COMBINER	MINI-CIRCUITS	ZFRSC-183-S+	SEE NOTE	

Table 29. 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 responsi bilities under the Com munications Act and the va rious 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 a n e quipment authorization from the Commission by one of t he follo wing procedures: ce rtification or registration.

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

§ 2.907 Certification.

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

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

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

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

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

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

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

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

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

Certification & User's Manual Information

Label and User's Manual Information

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

§ 15.19 Labeling requirements.

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

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

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

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

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

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

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

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

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

§ 15.21 Information to user.

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

Verification & User's Manual Information

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

§ 15.105 Information to the user.

(a) For a Class 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 4, February 2004:

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 user's 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