FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

FOR

2.4GHz DSSS RF TRANSCEIVER

MODEL NUMBER: ASY-00006

FCC ID: VAT-FLNXRF1

REPORT NUMBER: 07U10961-1, REVISION B

ISSUE DATE: MAY 17, 2007

Prepared for
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Revision History

Rev.	Issue Date	Revisions	Revised By
--	05/08/07	Initial Issue	T. Chan
B	05/17/07	Added additional antenna info.	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: FIRELINX, INC.
P.O.BOX 8274
STATELINE, NV 89452, U.S.A.

EUT DESCRIPTION: 2.4GHZ DSSS RF TRANSCEIVER

MODEL: ASY-00006

SERIAL NUMBER: 01943

DATE TESTED: APRIL 28-MAY 01, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By: Tested By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

WILLIAM ZHUANG
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COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Radiated Emission, Above 2000 MHz	+/- 4.3 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.15.4 DSSS RF transceiver.

The radio module is manufactured by Firelinx.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2405 - 2475	DSSS	21.37	137.09

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio was tested with a half duplex dipole antenna with a maximum gain of 3.2 dBi. Other possible antennas are listed in the table below.

Antenna Manufacturer / Model Number	Antenna Type (Dipole, Patch, Panel, Yagi, etc.)	Maximum Peak Antenna Gain (dBi)	Operating Mode
Pulse Engineering Inc/ W1027	Dipole	+3.2dBi	☒Point to Point ☒Point to Multipoint
Pulse Engineering Inc/ W1037	Dipole	+3.2dBi	☒Point to Point ☒Point to Multipoint
Nearson Inc/ S131AH-2450S	Dipole	+2dBi	☒Point to Point ☒Point to Multipoint
Nearson Inc/ T145AH-2.4/4.9/5.X-S	Dipole	+2dBi	☒Point to Point ☒Point to Multipoint
Nearson Inc/ S145FL-4-AH-2450S	Dipole	+2dBi	☒Point to Point ☒Point to Multipoint

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was CC2430 Test, rev. 1.0A.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2475 MHz.

The worst-case data rate for this channel is determined to be 250 kb/s, based on previous experience with 2.4GHZ WLAN product design architectures.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	Tamura Group	425A12400P	01944	DoC
Test Fixture	N/A	N/A	N/A	N/A

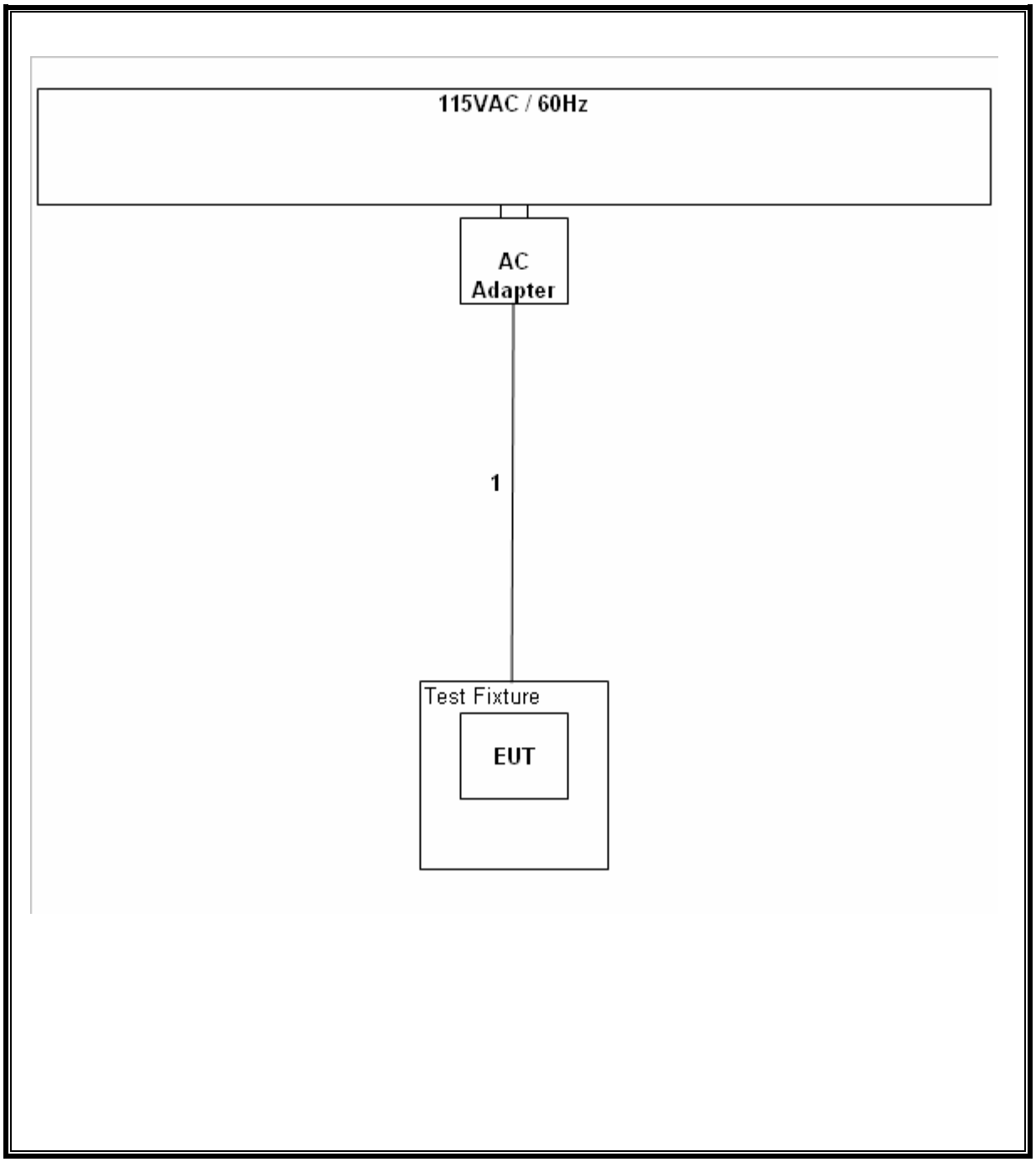
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	DC Input	1	Mini-Jack	Un-Shielded	3m	

TEST SETUP

The EUT was configured as a stand-alone with test fixture device that can be powered by batteries or an external AC adapter. Worst-case emissions were achieved while externally powered. An internal imbedded test software routine exercised the radio

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Description	Manufacturer	Model	Serial Number	Cal Due
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2007
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/21/2007
EMI Test Receiver	R & S	ESHS 20	827129/006	1/27/2008
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	4/15/2008
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00931	8/1/2007
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	US42070220	11/26/2007
2.4-2.5 GHz Reject Filter	Micro-Tronics	BRM50702	1	CNR
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00931	8/1/2007
SA Display Section 2	Agilent / HP	85662A	2816A16696	4/7/2008
SA RF Section, 1.5 GHz	Agilent / HP	85680B	2814A04227	1/7/2008
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A0022704	8/13/2007
Preamplifier, 1300 MHz	Agilent / HP	8447D	1937A02062	1/23/2008
4.0 High Pass Filter	Micro Tronics	HPM13351	3	N/A

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 2400 TO 2483.5 MHz BAND

7.1.1. 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

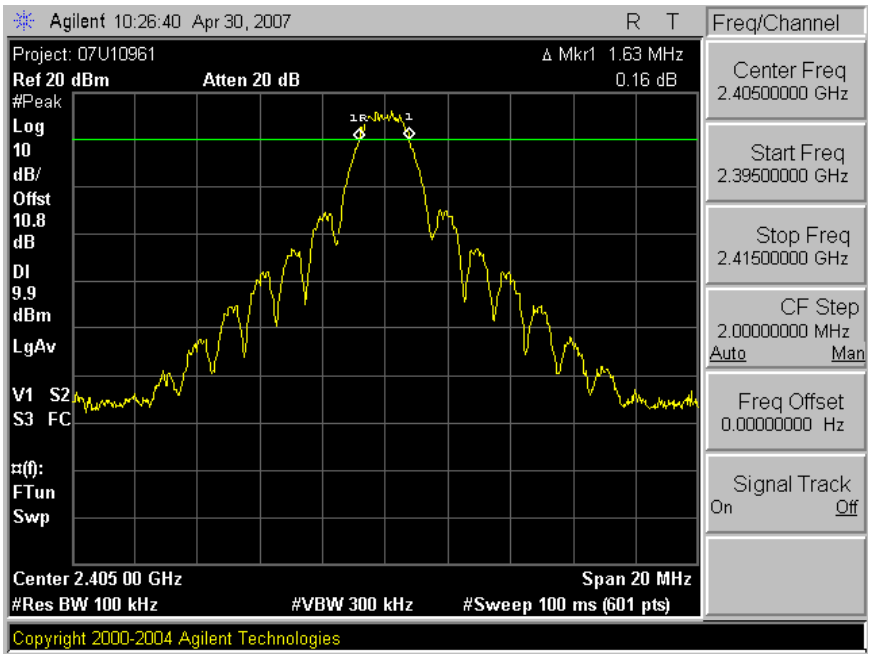
No non-compliance noted:

DSSS Mode

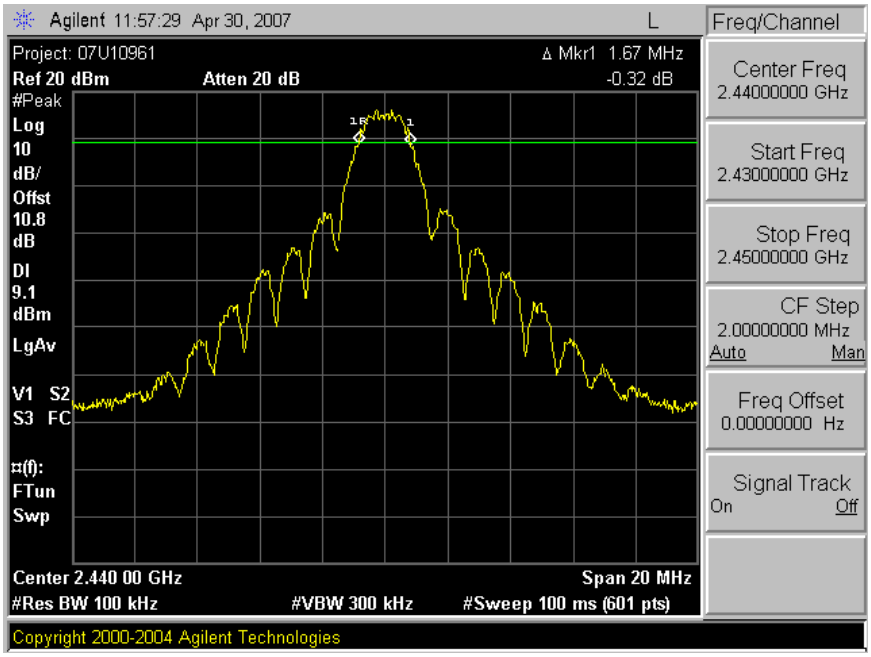
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2405	1633.333	500	1133
Middle	2440	1666.667	500	1167
High	2475	1633.333	500	1133

6 DB BANDWIDTH

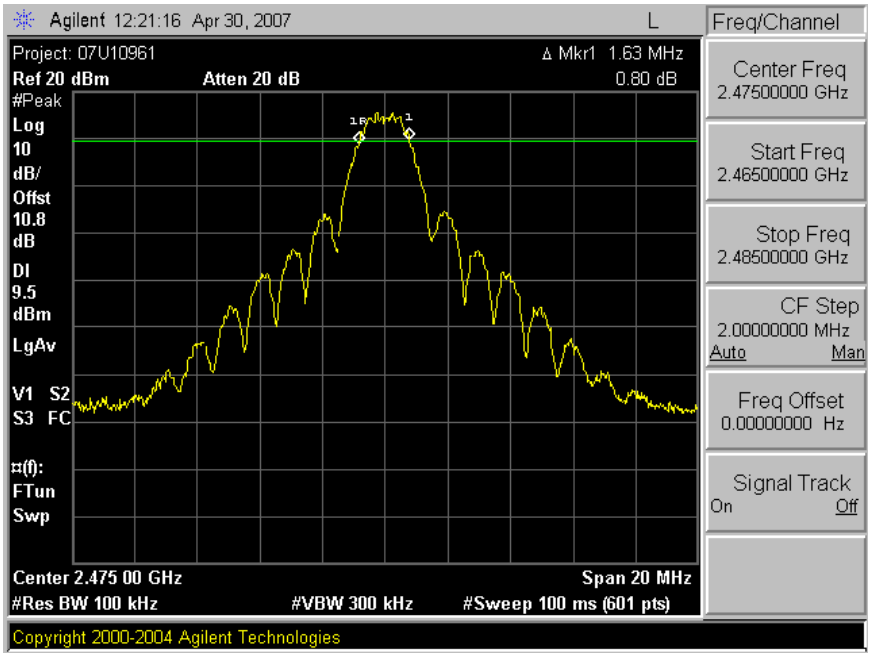
6 DB BANDWIDTH LOW CH



6 DB BANDWIDTH MID CH



6 DB BANDWIDTH HIGH CH



7.1.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

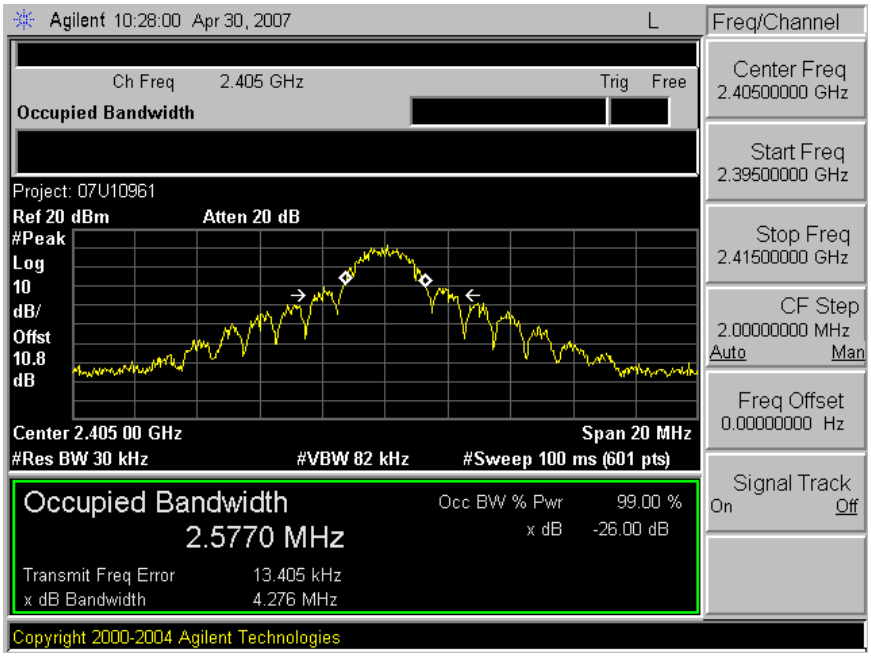
No non-compliance noted:

DSSS Mode

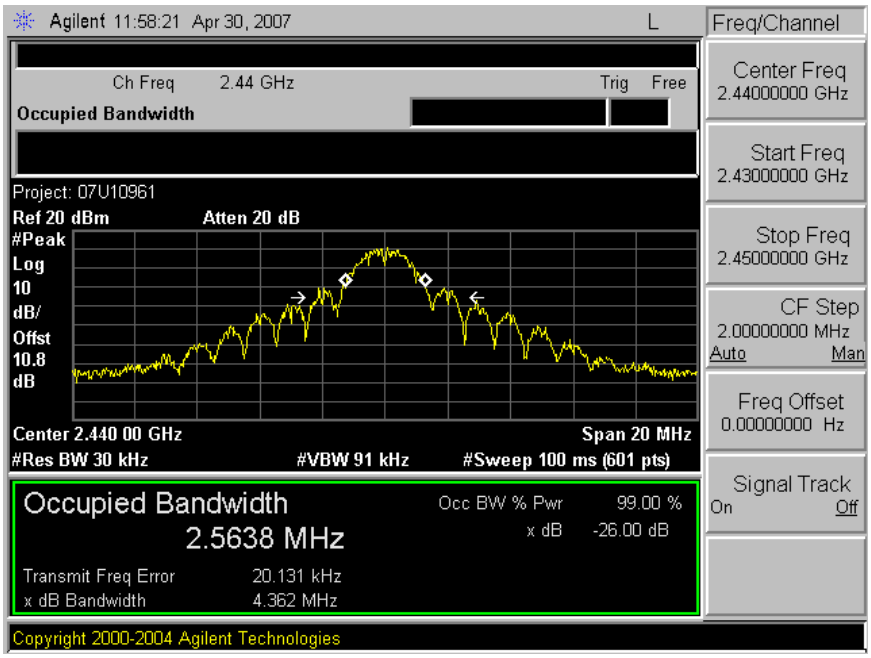
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	2.577
Middle	2440	2.564
High	2475	2.56

99% BANDWIDTH

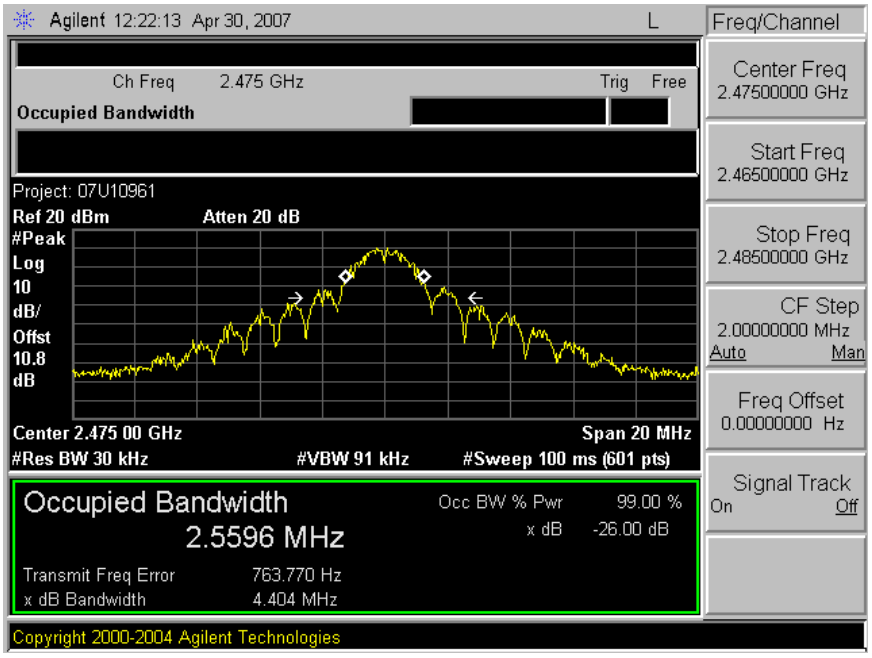
99% BANDWIDTH LOW CH



99% BANDWIDTH MID CH



99% BANDWIDTH HIGH CH



7.1.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

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

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

§15.247 (b) (4) (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations 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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

The maximum antenna gain is 3.2 dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm.

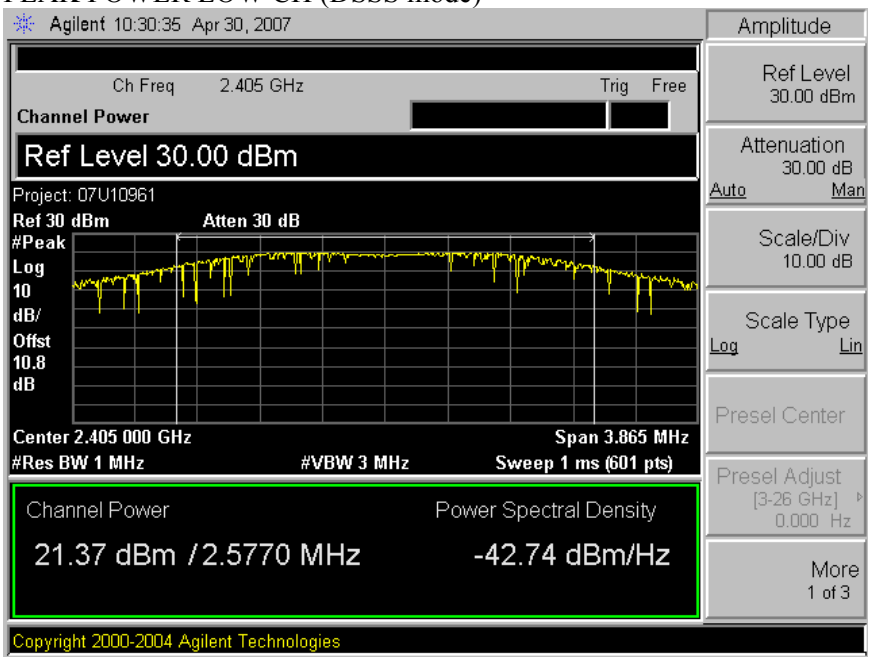
No non-compliance noted:

DSSS Mode

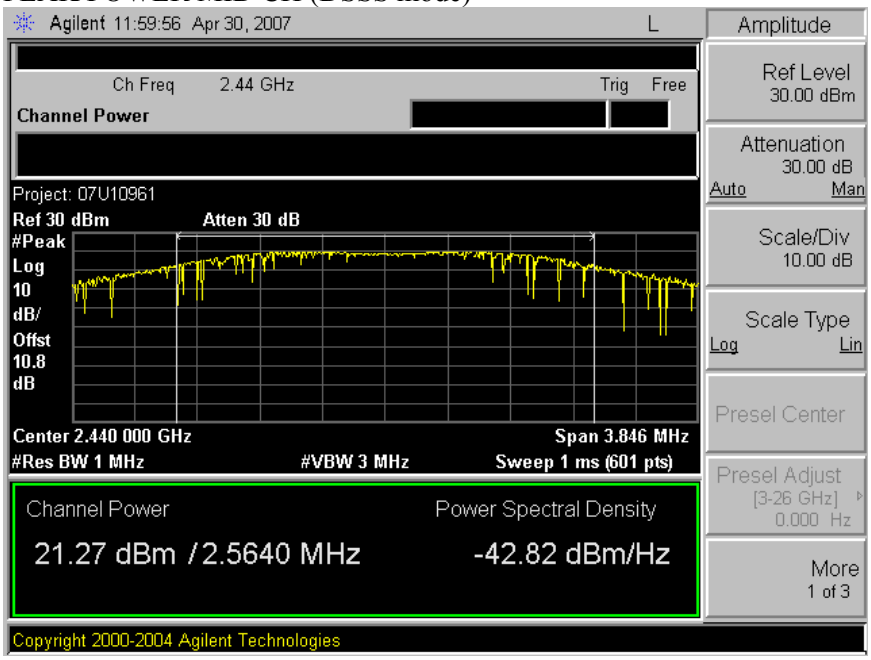
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2405	21.37	30	-8.63
Middle	2440	21.27	30	-8.73
High	2475	21.04	30	-8.96

OUTPUT POWER (DSSS MODE)

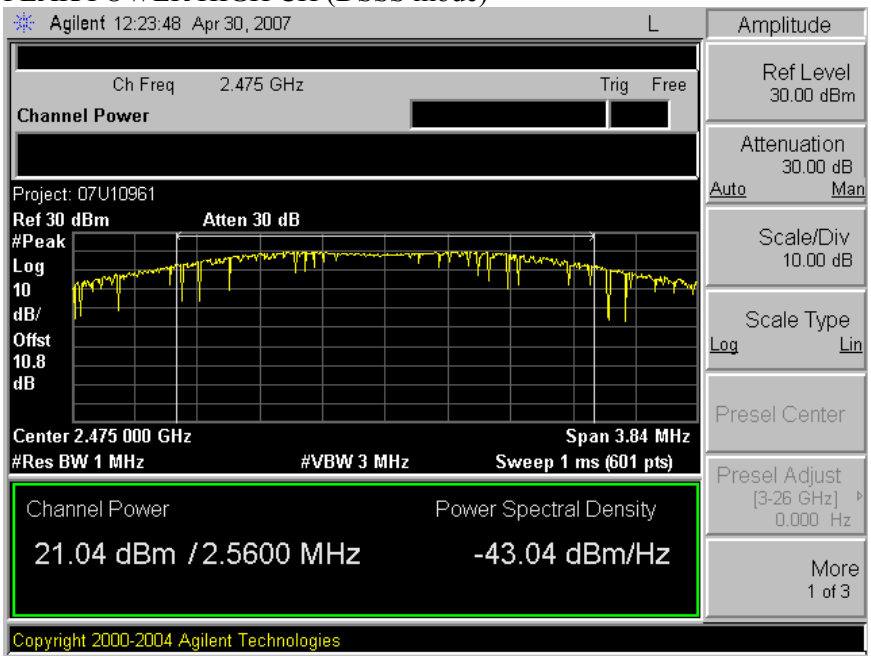
PEAK POWER LOW CH (DSSS mode)



PEAK POWER MID CH (DSSS mode)



PEAK POWER HIGH CH (DSSS mode)



7.1.4. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E \wedge 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 \wedge ((P + G) / 20) / \sqrt{S}$

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 \wedge ((P + G) / 10) / (d^2)$

LIMITS

From §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

RESULTS

No non-compliance noted: (MPE distance equals 20 cm)

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)
DSSS	20.0	21.37	3.20	0.06

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.1.5. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 11dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

DSSS Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2405	19.48
Middle	2440	19.59
High	2475	19.45

7.1.6. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

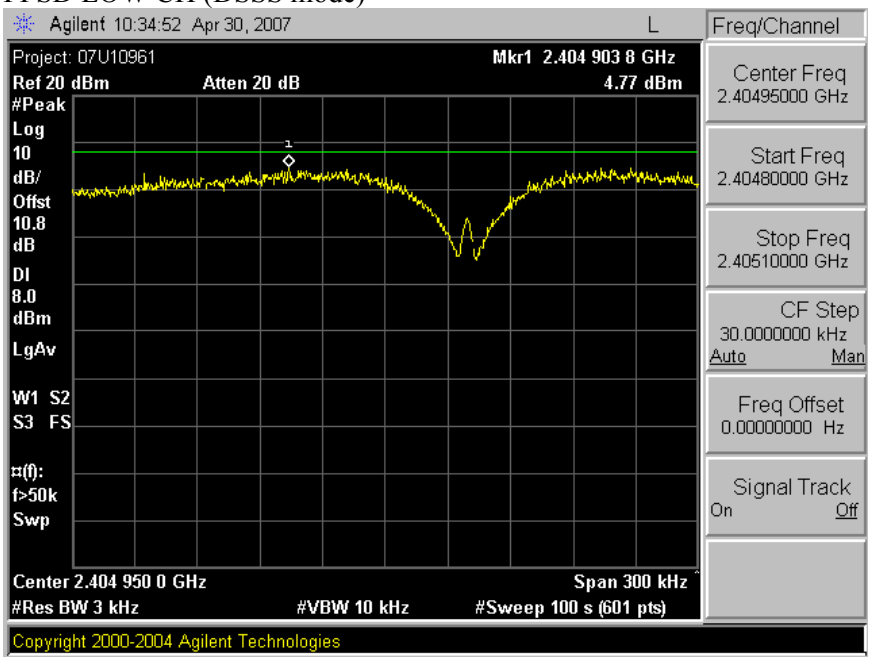
No non-compliance noted:

DSSS Mode

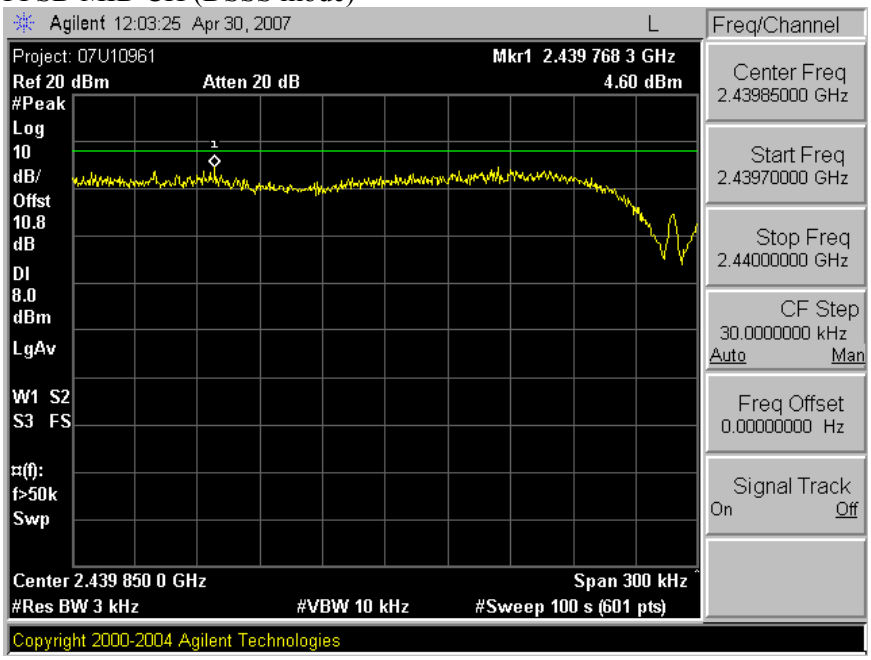
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2405	4.77	8	-3.23
Middle	2440	4.60	8	-3.40
High	2475	4.58	8	-3.42

PEAK POWER SPECTRAL DENSITY (DSSS MODE)

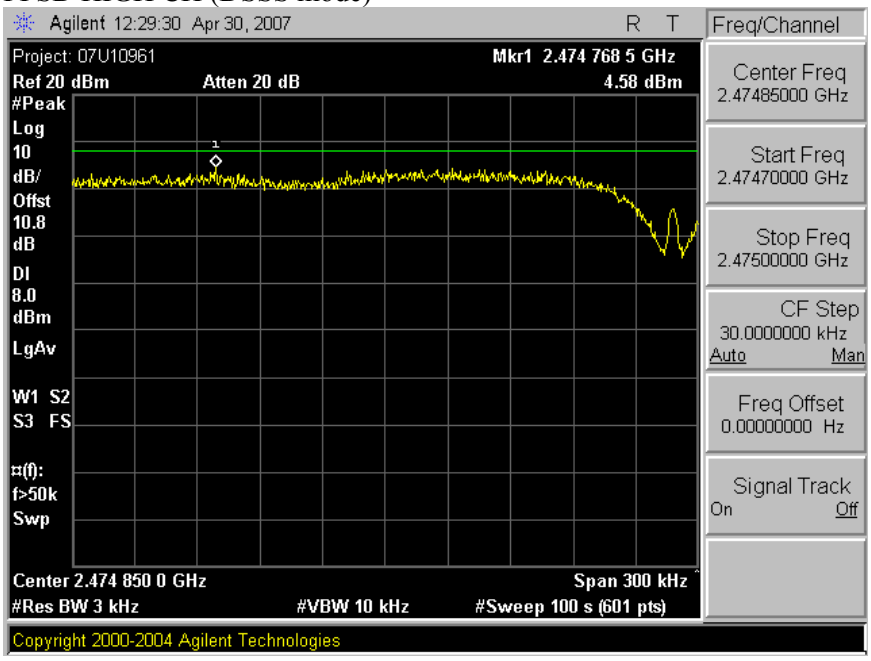
PPSD LOW CH (DSSS mode)



PPSD MID CH (DSSS mode)



PPSD HIGH CH (DSSS mode)



7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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) (see §15.205(c)).

Conducted power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

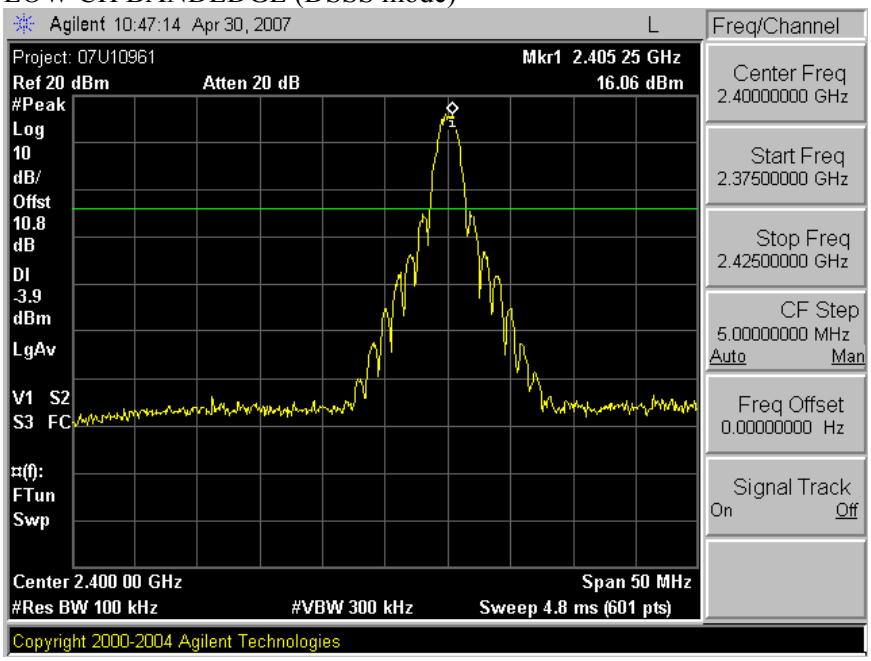
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

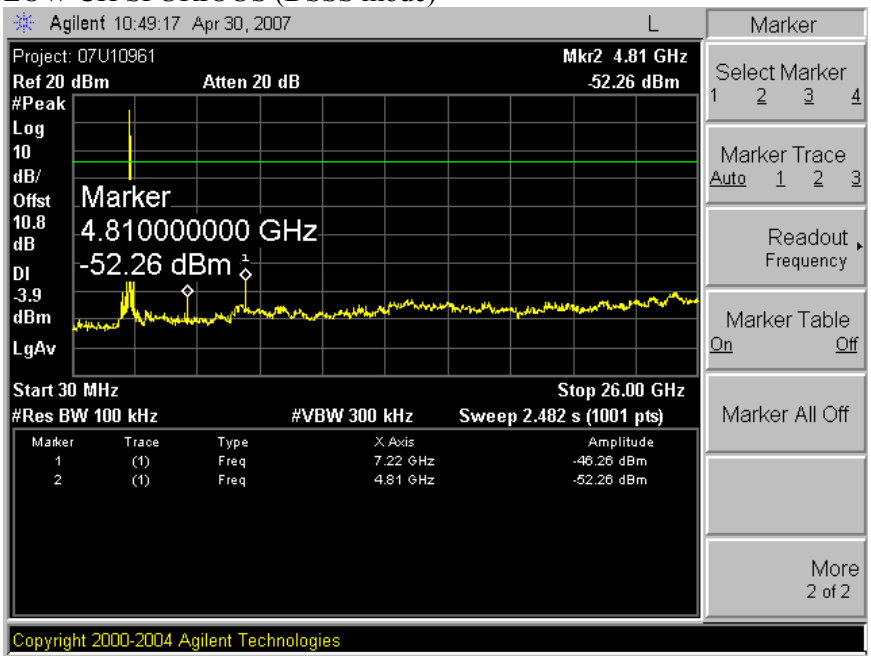
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (DSSS MODE)

LOW CH BANDEDGE (DSSS mode)

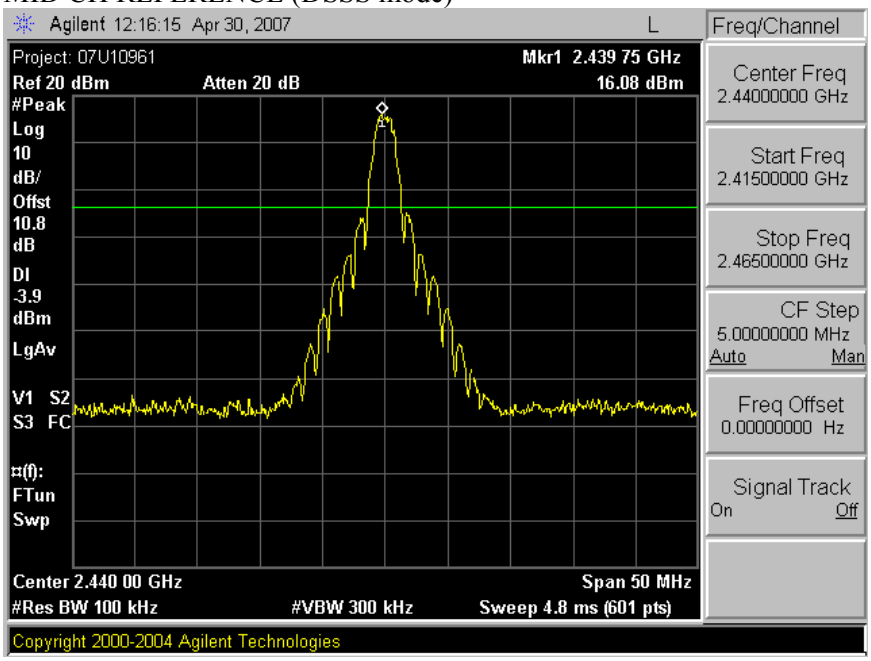


LOW CH SPURIOUS (DSSS mode)

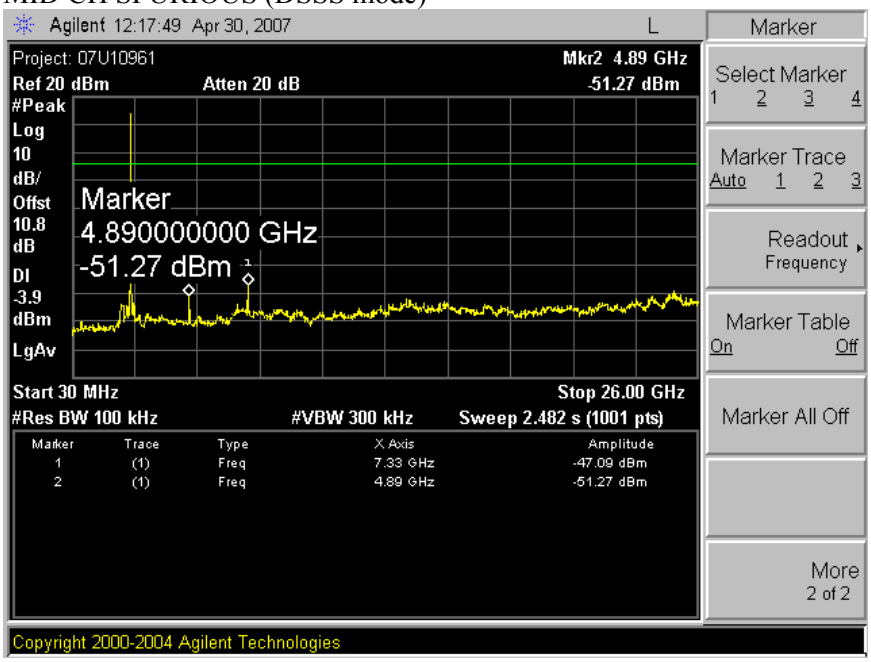


SPURIOUS EMISSIONS, MID CHANNEL (DSSS MODE)

MID CH REFERENCE (DSSS mode)

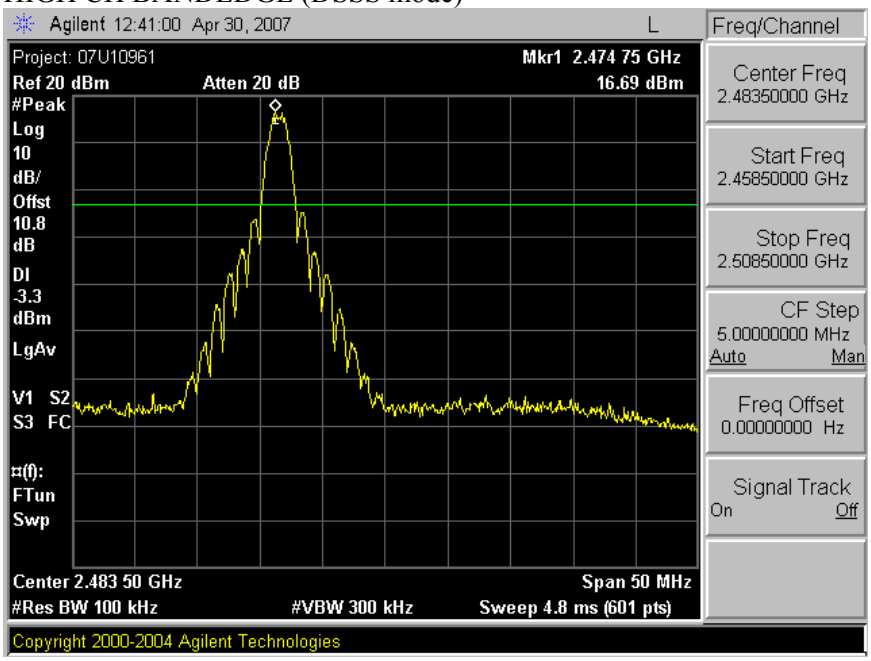


MID CH SPURIOUS (DSSS mode)

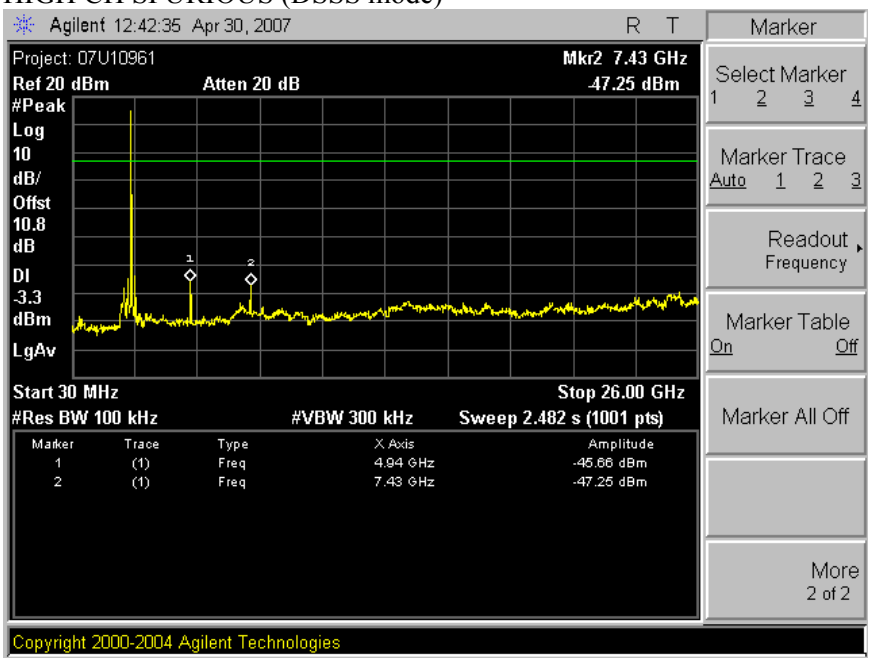


SPURIOUS EMISSIONS, HIGH CHANNEL (DSSS MODE)

HIGH CH BANDEDGE (DSSS mode)



HIGH CH SPURIOUS (DSSS mode)



7.2. RADIATED EMISSIONS

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§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])
13.36 - 13.41			

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

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§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 the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

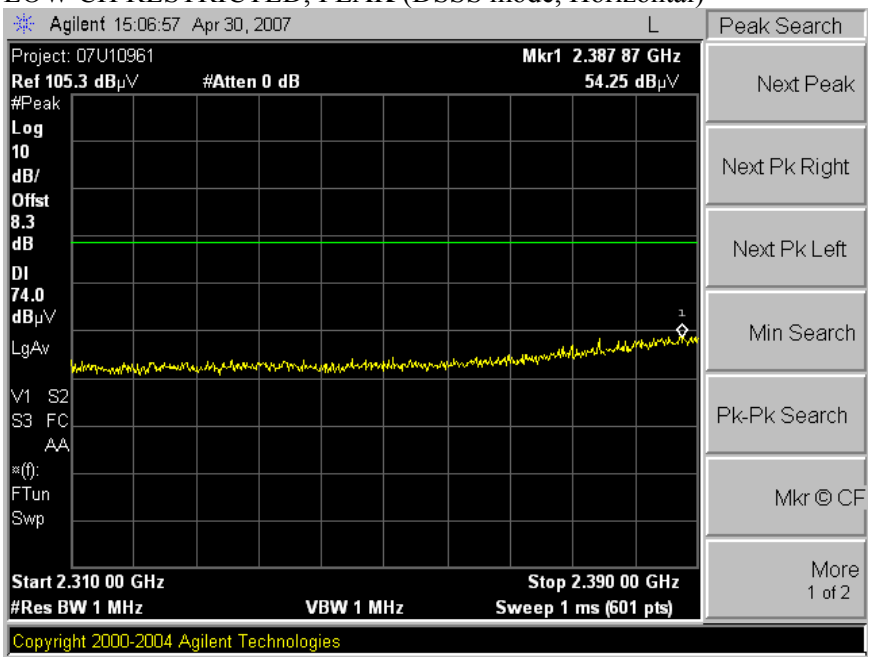
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

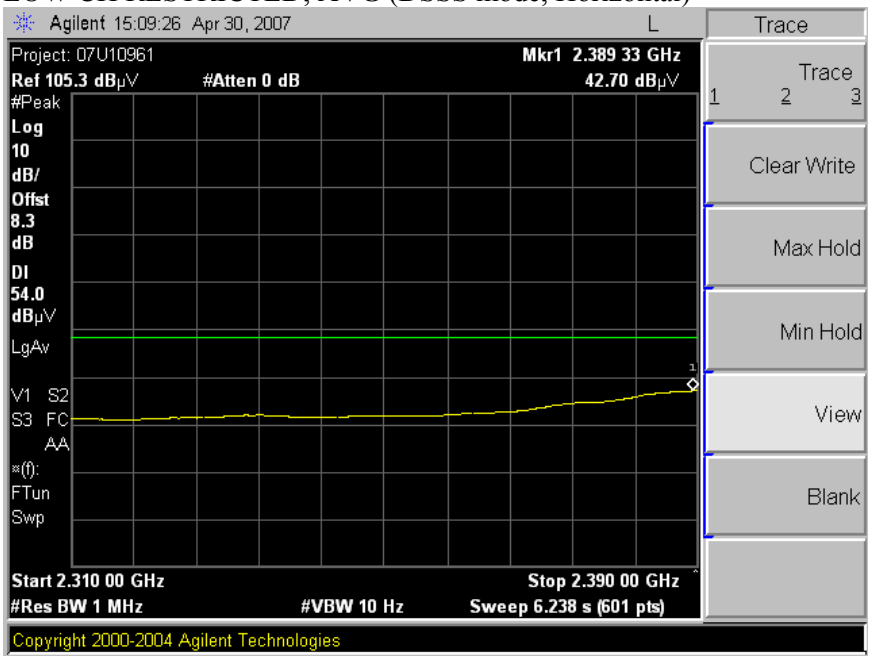
7.2.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

RESTRICTED BANDEDGE (DSSS Mode, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (DSSS mode, Horizontal)

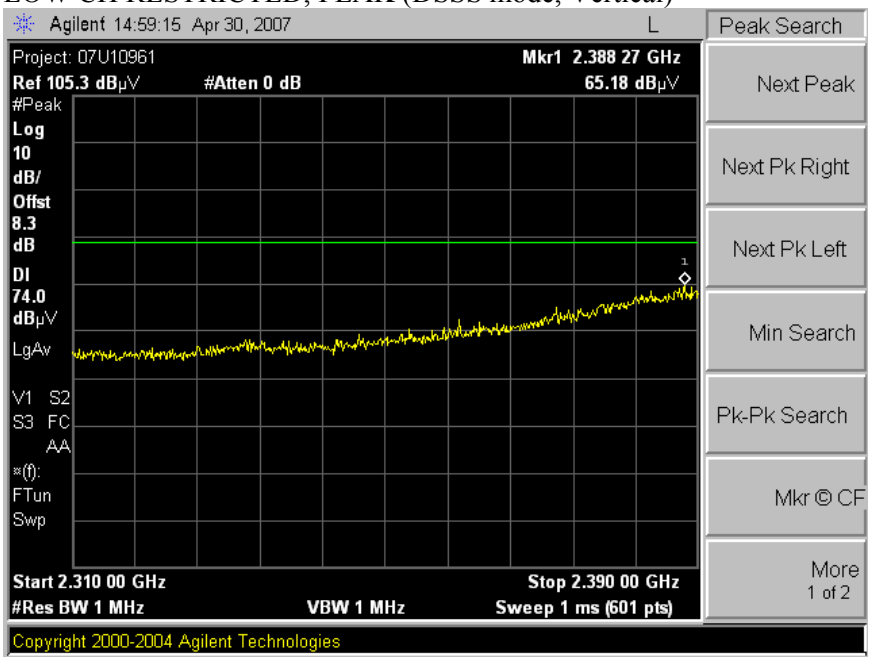


LOW CH RESTRICTED, AVG (DSSS mode, Horizontal)

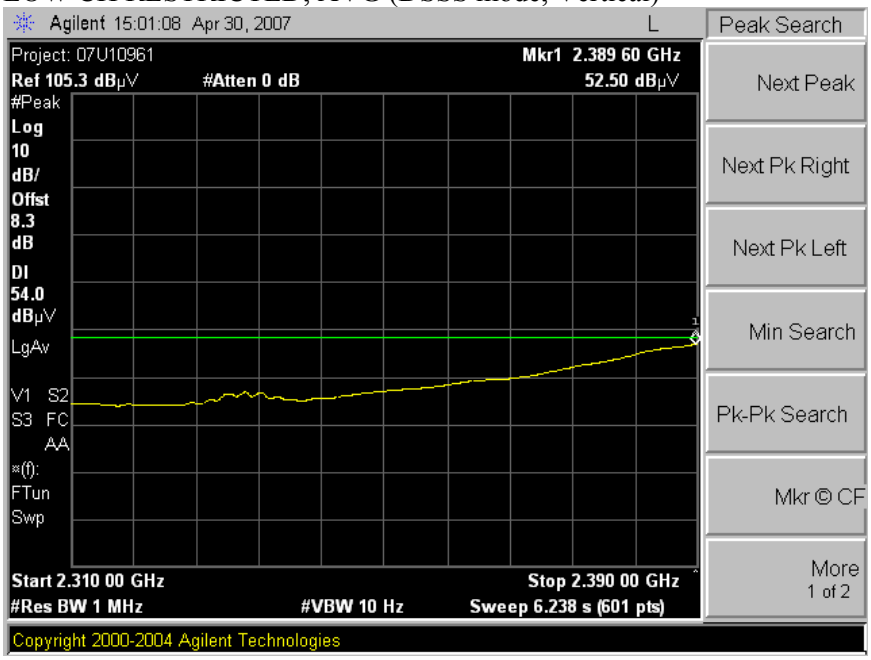


RESTRICTED BANDEDGE (DSSS Mode, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (DSSS mode, Vertical)

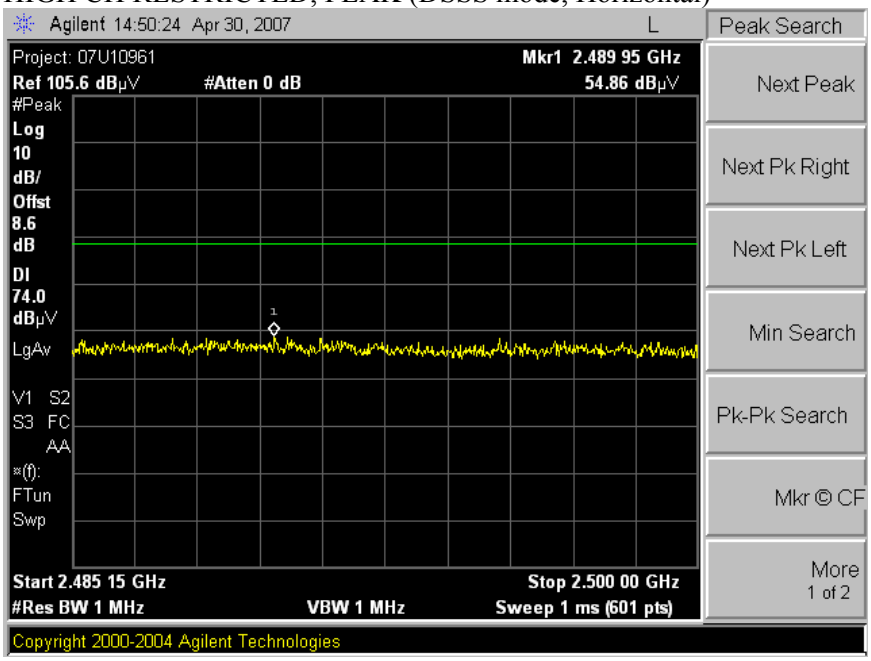


LOW CH RESTRICTED, AVG (DSSS mode, Vertical)

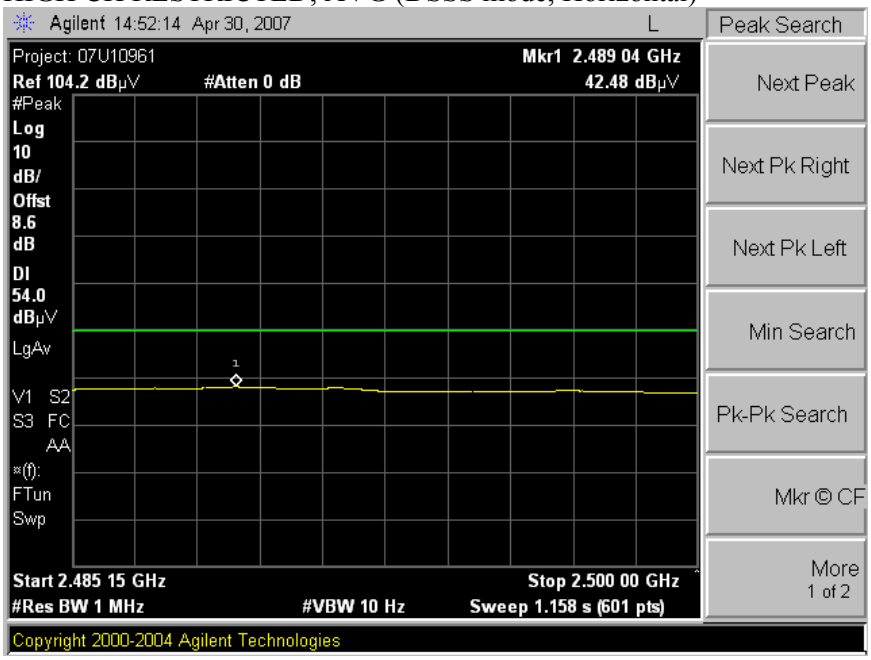


RESTRICTED BANDEDGE (DSSS Mode, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (DSSS mode, Horizontal)

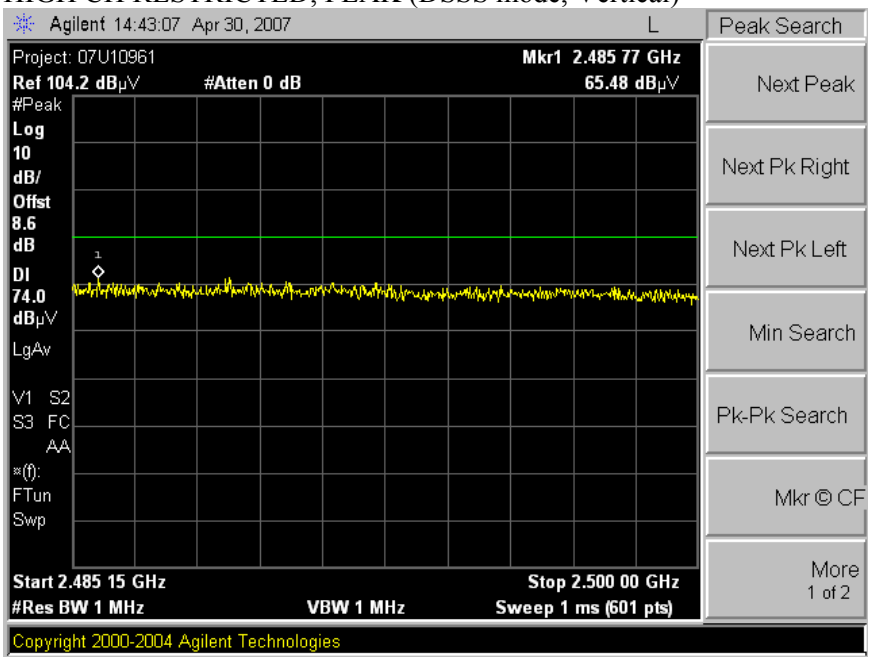


HIGH CH RESTRICTED, AVG (DSSS mode, Horizontal)

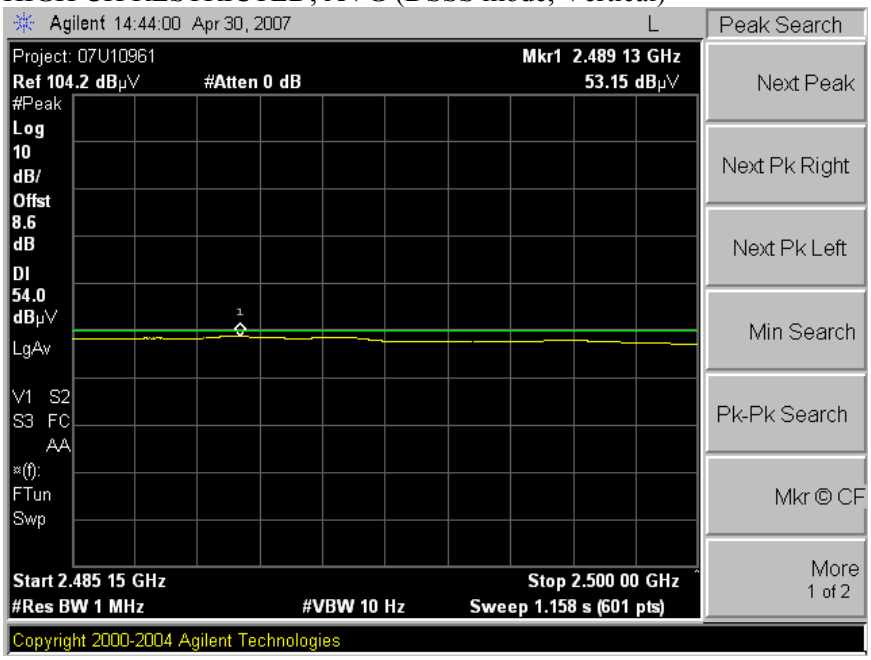


RESTRICTED BANDEDGE (DSSS Mode, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (DSSS mode, Vertical)



HIGH CH RESTRICTED, AVG (DSSS mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (DSSS Mode)

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:	Firelinx
Project #:	07U10961
Date:	04/27/07
Test Engineer:	Frank Ibrahim
Configuration:	Stand-alone EUT
Mode:	TX ON
Duty Cycle:	85.00% -1.4 dB

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn >18GHz	Limit
T73; S/N: 6717 @3m	T144 Miteq 3008A00931			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

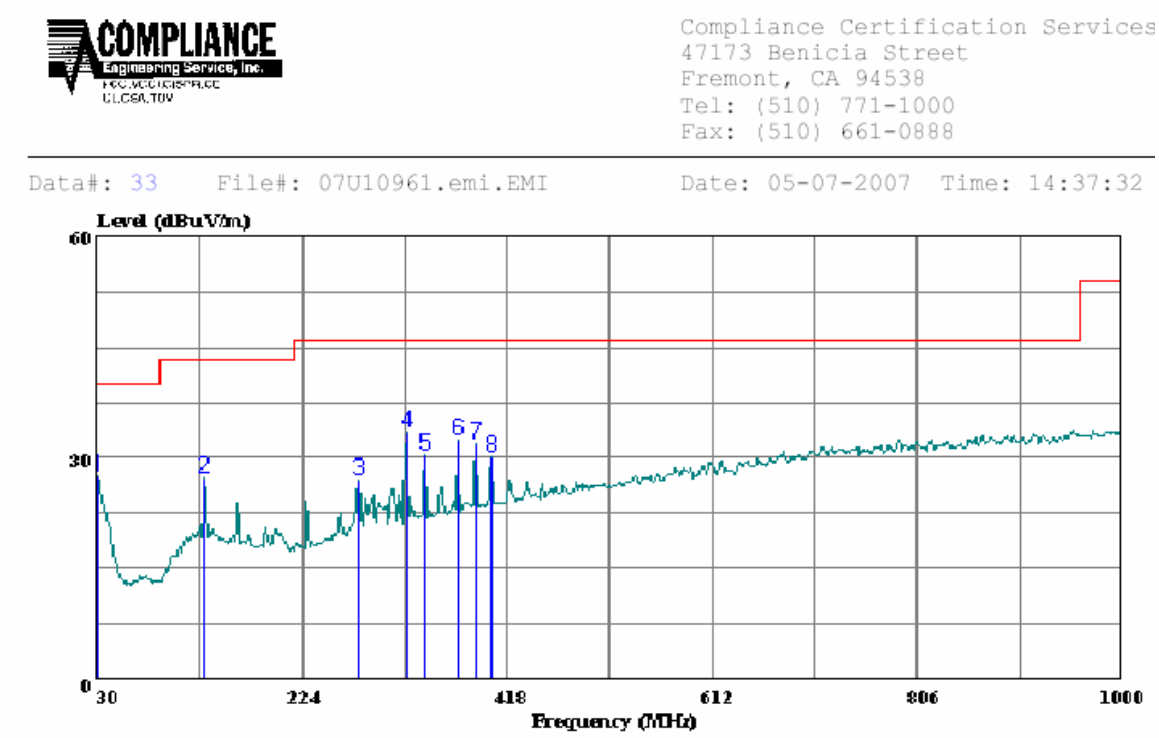
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	Avg. w/ DT dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
Low Channel (2405 MHz)																
4.810	3.0	47.36	37.46	36.05	33.0	7.7	-34.8	0.0	0.6	53.79	42.49	74	54	-20.21	-11.51	V
7.215	3.0	46.05	35.94	34.52	35.4	9.3	-34.7	0.0	0.6	56.64	45.12	74	54	-17.36	-8.88	V
12.025	3.0	48.05	36.85	35.44	37.5	12.3	-32.4	0.0	0.9	66.31	53.70	74	54	-7.70	-0.30	V
2.257	3.0	44.89	39.78	38.37	28.0	4.6	-37.7	0.0	0.0	39.82	33.30	74	54	-34.18	-20.70	H
4.810	3.0	49.49	38.65	37.24	33.3	6.9	-36.5	0.0	0.6	53.78	41.52	74	54	-20.22	-12.48	H
12.025	3.0	46.72	34.93	33.52	37.7	12.2	-35.4	0.0	0.9	62.06	48.86	74	54	-11.94	-5.14	H
Mid Channel (2440 MHz)																
4.880	3.0	47.34	36.76	35.35	33.4	6.9	-36.5	0.0	0.6	51.78	39.79	74	54	-22.22	-14.21	V
7.320	3.0	49.92	39.17	37.76	35.0	8.4	-36.2	0.0	0.6	57.74	45.58	74	54	-16.26	-8.42	V
12.200	3.0	48.54	36.33	34.92	37.6	12.2	-35.4	0.0	0.9	63.83	50.21	74	54	-10.17	-3.79	V
4.880	3.0	47.64	36.99	35.58	33.4	6.9	-36.5	0.0	0.6	52.08	40.02	74	54	-21.92	-13.98	H
7.320	3.0	47.68	36.39	34.98	35.0	8.4	-36.2	0.0	0.6	55.50	42.80	74	54	-18.50	-11.20	H
12.200	3.0	44.95	33.51	32.10	37.6	12.2	-35.4	0.0	0.9	60.24	47.39	74	54	-13.76	-6.61	H
High Channel (2475 MHz)																
2.250	3.0	50.46	40.67	39.26	28.0	4.6	-37.7	0.0	0.0	45.35	34.15	74	54	-28.65	-19.85	V
4.950	3.0	48.13	36.84	35.43	33.4	7.0	-36.5	0.0	0.6	52.72	40.02	74	54	-21.28	-13.98	V
7.425	3.0	49.50	38.22	36.81	35.0	8.5	-36.2	0.0	0.6	57.43	44.74	74	54	-16.57	-9.26	V
12.375	3.0	43.02	32.89	31.48	37.5	12.2	-35.4	0.0	0.9	58.26	46.72	74	54	-15.74	-7.28	V
4.950	3.0	46.57	35.81	34.40	33.4	7.0	-36.5	0.0	0.6	51.16	38.99	74	54	-22.84	-15.01	H
7.425	3.0	46.05	34.75	33.34	35.0	8.5	-36.2	0.0	0.6	53.98	41.27	74	54	-20.02	-12.73	H

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

7.2.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT

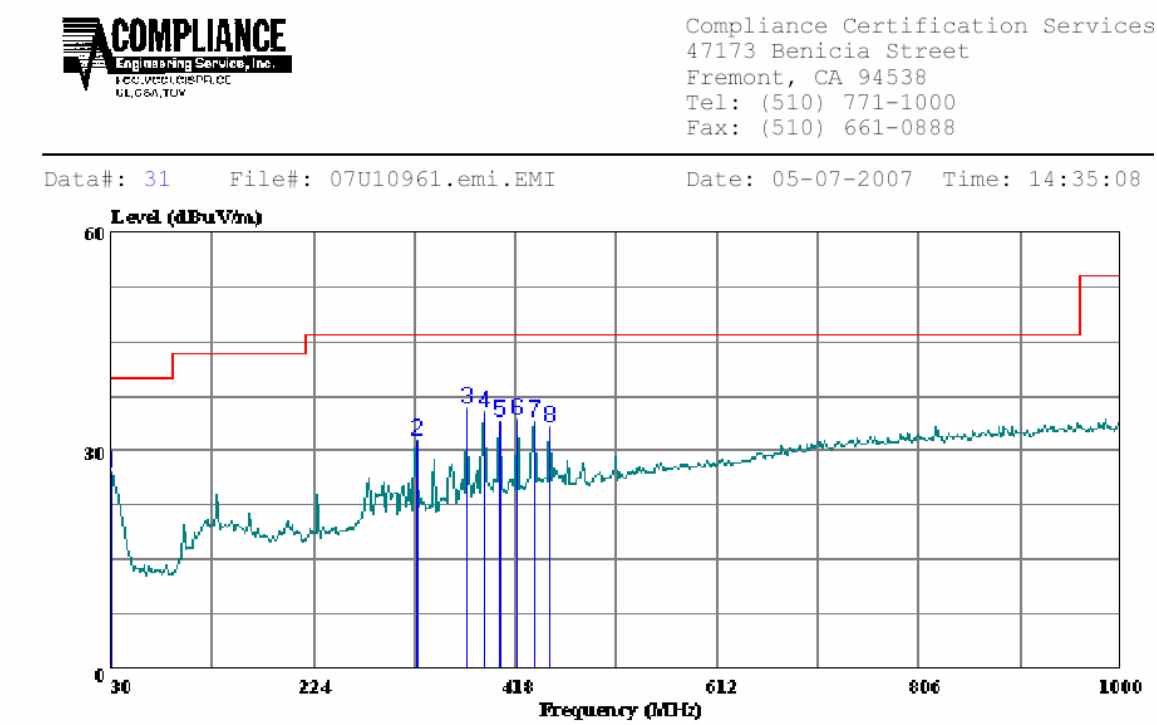


HORIZONTAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.970	33.16	-5.76	27.40	40.00	-12.60	Peak
2	130.880	40.50	-13.10	27.40	43.50	-16.10	Peak
3	276.380	40.29	-13.15	27.14	46.00	-18.86	Peak
4	322.940	45.12	-11.67	33.45	46.00	-12.55	Peak
5	339.430	41.71	-11.29	30.42	46.00	-15.58	Peak
6	371.440	43.05	-10.53	32.52	46.00	-13.48	Peak
7	387.930	42.15	-10.16	31.99	46.00	-14.01	Peak
8	402.480	40.06	-9.86	30.20	46.00	-15.80	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.970	32.72	-5.76	26.96	40.00	-13.04	Peak
2	322.940	43.19	-11.67	31.52	46.00	-14.48	Peak
3	371.440	46.43	-10.53	35.90	46.00	-10.10	Peak
4	387.930	45.52	-10.16	35.36	46.00	-10.64	Peak
5	402.480	43.97	-9.86	34.11	46.00	-11.89	Peak
6	419.940	43.74	-9.35	34.39	46.00	-11.61	Peak
7	436.430	42.87	-8.90	33.97	46.00	-12.03	Peak
8	450.980	41.81	-8.51	33.30	46.00	-12.70	Peak

7.3. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, 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 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms 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 of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

No non-compliance noted:

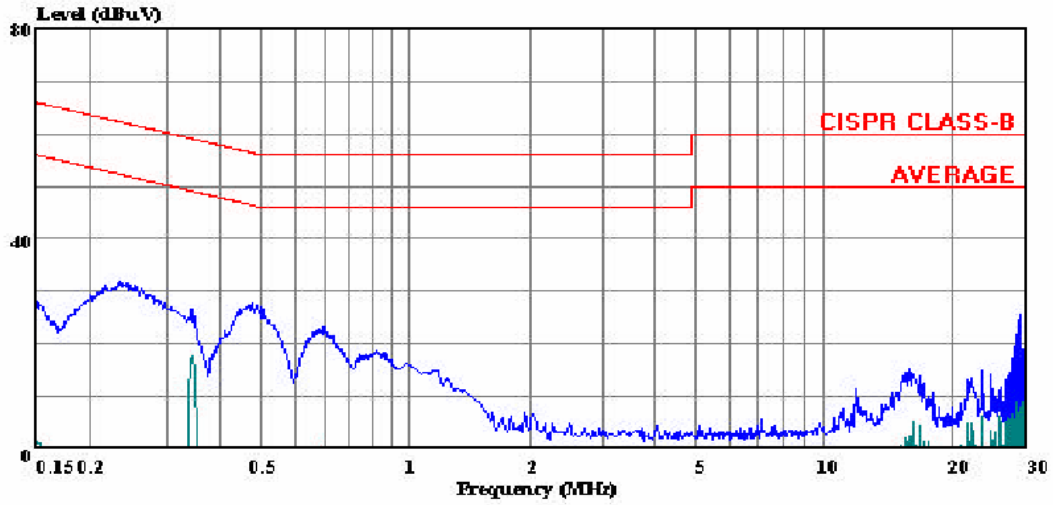
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.24	31.86	--	--	0.00	62.27	52.27	-30.41	-20.41	L1
0.25	31.20	--	--	0.00	61.86	51.86	-30.66	-20.66	L1
0.26	31.06	--	--	0.00	61.43	51.43	-30.37	-20.37	L1
0.22	28.76	--	--	0.00	62.82	52.82	-34.06	-24.06	L2
0.50	22.89	--	--	0.00	56.00	46.00	-33.11	-23.11	L2
29.06	34.26	--	30.73	0.00	60.00	50.00	-25.74	-19.27	L2
6 Worst Data									

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: 07U10961LC.EMI Date: 05-03-2007 Time: 16:25:28



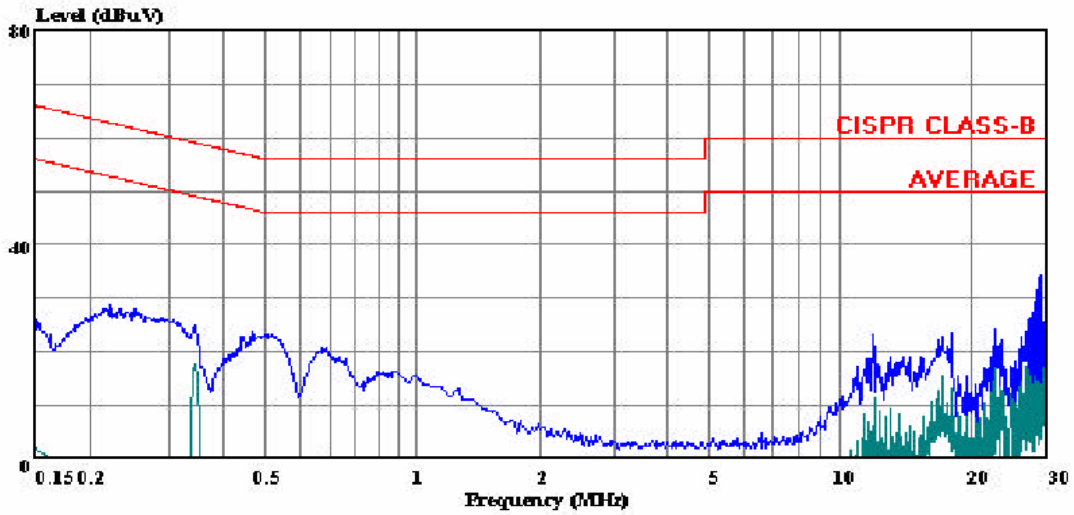
Trace: 5 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Doug Anderson
Project #: : 07U10961
Company: : Firelinx
Configuration : EUT
Mode of Operation:: RX / Mid-Channel
Power Source: : 115 VAC / 60 Hz
Target : FCC Class B
: L1: Peak (Blue), Avg (Green)

LINE 2 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: 07U10961LC.EMI Date: 05-03-2007 Time: 16:52:13



Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator: : Doug Anderson
Project #: : 07U10961
Company: : Firelinx
Configuration : EUT
Mode of Operation:: RX / Mid-Channel
Power Source: : 115 VAC / 60 Hz
Target : FCC Class B
: L2: Peak (Blue), Avg (Green)