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Electromagnetic Emissions Test Report

Application for Grant of Equipment Authorization pursuant to

FCC Part 15 Subpart C

on the 2Wire, Inc. Transmitter Model: 3800HGV-B

FCC ID:	PGR2W3800HP
GRANTEE:	2Wire, Inc. 310 Providence Mine Road Nevada City, CA 95959
TEST SITE:	Elliott Laboratories 684 W. Maude Ave Sunnyvale, CA 94086
REPORT DATE:	August 4, 2008
FINAL TEST DATE:	July 2, July 5, July 17 and July 18, 2008

AUTHORIZED SIGNATORY: _____

Mark E. Hill
Staff Engineer

ACCREDITED

Testing Cert #2016-01

REVISION HISTORY

Rev #	Date	Comments	Modified By
1	August 7, 2008	Initial Release	

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SCOPE

An electromagnetic emissions test has been performed on the 2Wire, Inc. model 3800HGV-B pursuant to the following rules:

FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003
FCC DTS Measurement Procedure KDB558074, March 2005

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the 2Wire, Inc. model 3800HGV-B and therefore apply only to the tested sample. The sample was selected and prepared by Chris Choulos of 2Wire, Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of 2Wire, Inc. model 3800HGV-B complied with the requirements of the following regulations:

FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TEST RESULTS SUMMARY

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM / DSSS techniques	-	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	10.1 MHz – 802.11b 16.4 MHz – 802.11g	>500kHz	Complies
	RSP100	99% Bandwidth	15.7 MHz – 802.11b 16.9 MHz – 802.11g	Information only	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems)	802.11b – 22.2 dBm (0.166 Watts) EIRP= 0.343 W Note 1 802.11g –22.0 dBm (0.156 Watts) EIRP= 0.324 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(d)	RSS 210 A8.2 (2)	Power Spectral Density	-2.8 dBm / 3kHz	8dBm/3kHz	Complies
15.247(c)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions < -30dBc	< -30dBc	Complies
15.247(c) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.1dBµV/m @ 2483.6MHz (-0.9dB)	15.207 in restricted bands, all others < -30dBc	Complies

Note 1: EIRP calculated using antenna gain of 3.15 dBi for the highest EIRP multi-point system.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Antennas are part of the PCB board	N/A	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	37.3dBµV/m @ 12183.8MHz (-16.7dB)	Refer to standard	Complies
15.207	RSS GEN Table 2	AC Conducted Emissions	52.0dBµV @ 0.184MHz (-12.3dB)	Refer to standard	Complies
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding non-interference	Complies
	RSP 100 RSS GEN 7.1.5	User Manual	Antennas are fixed	Statement required regarding detachable antenna	N/A

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The 2Wire model 3800HGV-B is a a VDSL residential gateway, with 802.11bg capabilities, designed to wirelessly interface to a network. The electrical rating of the EUT is 100-120 Volts , 50-60 Hz, 1.0 Amps.

The sample was received on July 3, 2008 and tested on July 3 thru July 18, 2008. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
2Wire	3800HGV-B	VDSL residential gateway	490711012865	PGR2W3800HP

OTHER EUT DETAILS

Testing performed on the 3800HGV-B is considered representative of the 3600HGV. The 3600HGV is a 3800HGV with some features depopulated. Specifically, the 3600HGV has several interfaces removed: HPNA over Coax, Broadband (WAN) port, and the USB port. The ports were removed via depopulating the pcb. The VDSL over twisted pair interface, the wireless and the two Phone lines (SLIC ports for VOIP) are still functional.

ANTENNA SYSTEM

The antenna system used with the 2Wire model 3800HGV-B consists of a flat, PCB type antenna, integral to the device.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 29 cm wide by 24 cm deep by 5.5 cm high.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with emissions specifications.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
2Wire	YM-1031	AC/DC Adapter	N/A	N/A

The following equipment was used as remote support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	Latitude 131L	Laptop	9CBPQC1	-

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Cable line	Not Connected	-	-	-
USB	Not Connected	-	-	-
DC Power	AC-DC adaptor	Coaxial	Unshielded	2.0
Ethernet (4)	Laptop	Cat 5 (x1)	Unshielded	2.0
Phone (3)	Not Connected	-	-	-
Broadband	Not Connected	-	-	-

EUT OPERATION

During emissions testing, the EUT was configured to continuously transmit or receive (depending on the test in question) at a specific channel and power setting.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on July 2, July 5, July 17 and July 18, 2008 at the Elliott Laboratories Open Area Test Site #1 located at 684 West Maude Avenue, Sunnyvale, California. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission.

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

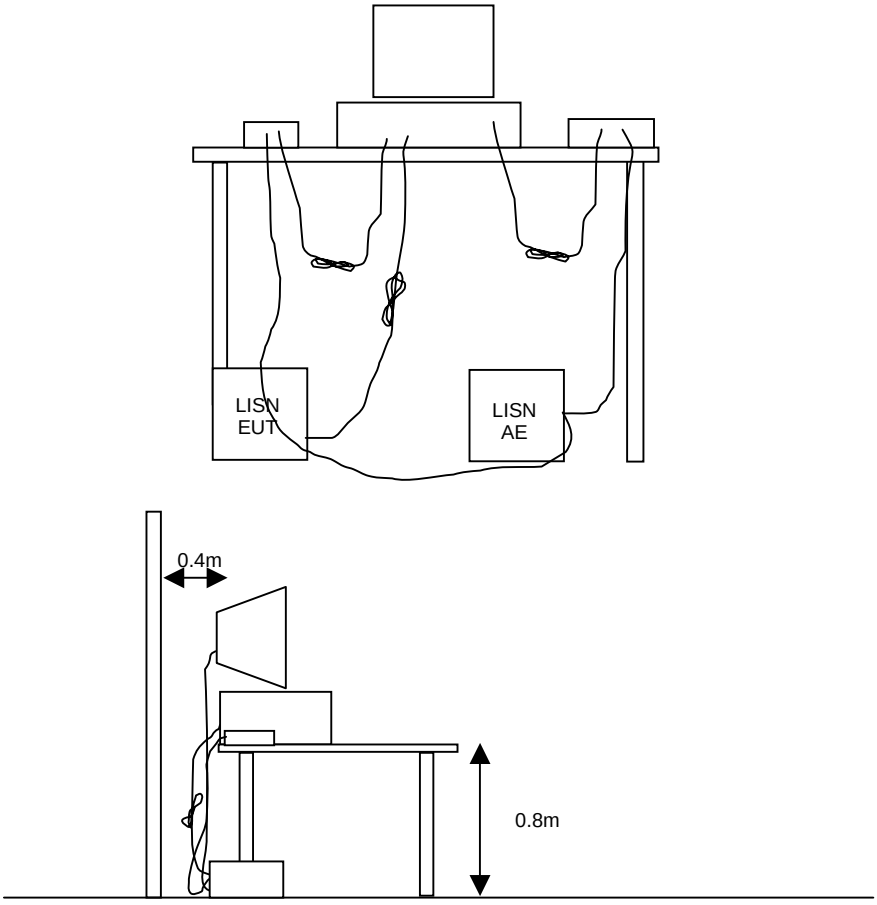
TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

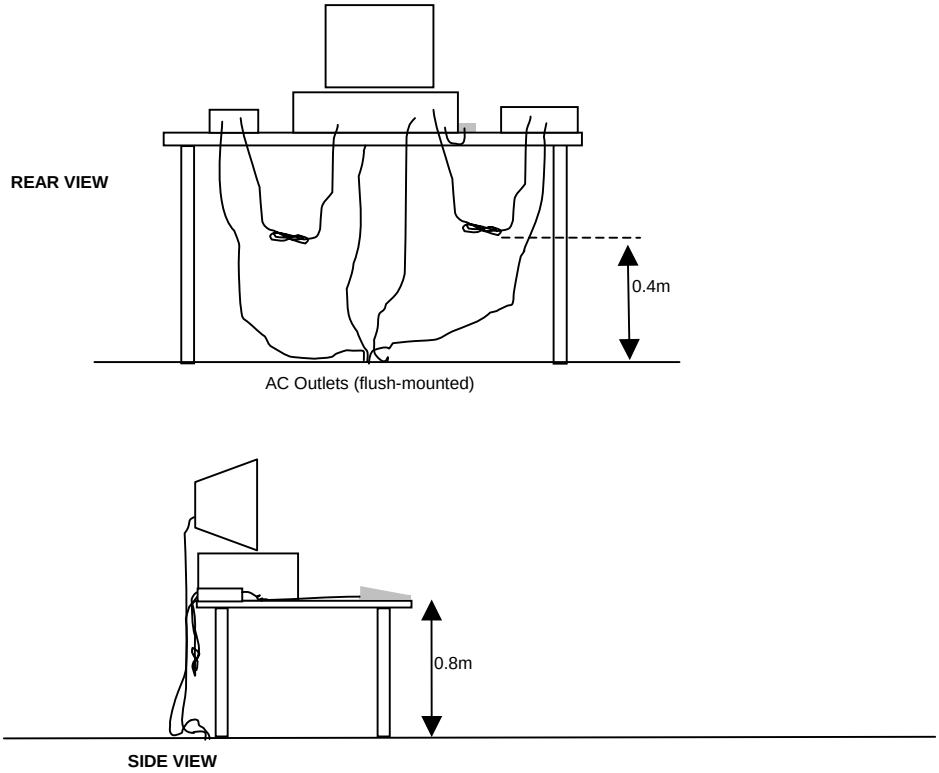


A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360˚, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

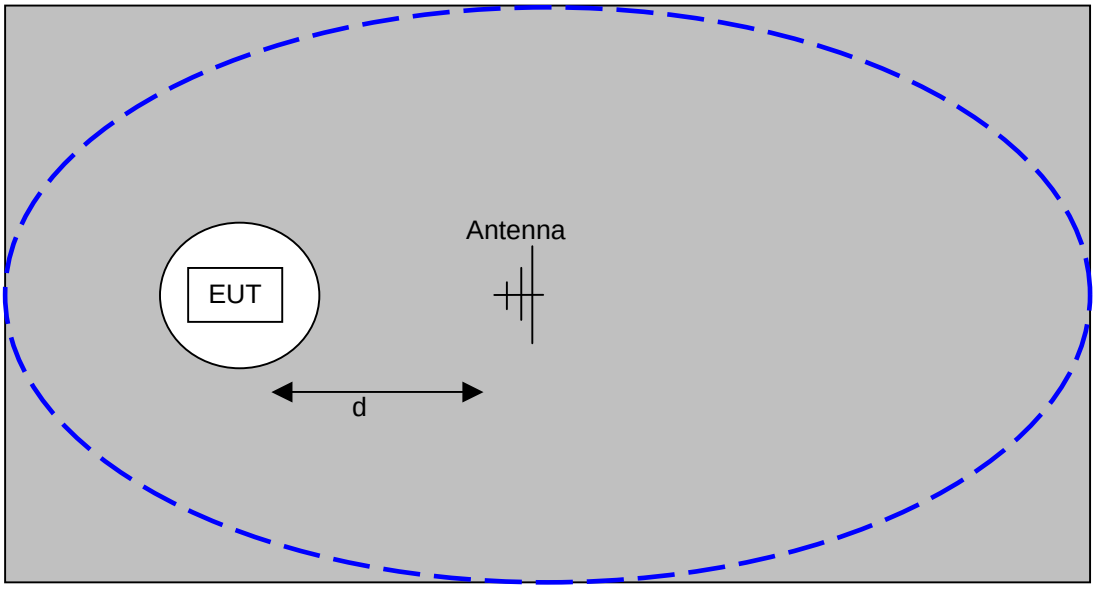
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

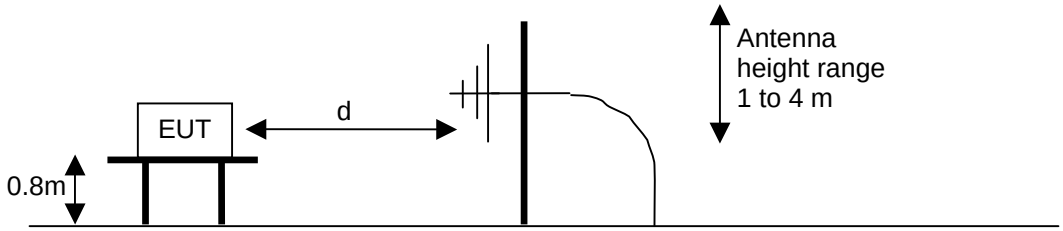
When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



Typical Test Configuration for Radiated Field Strength Measurements



The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.



Test Configuration for Radiated Field Strength Measurements
OATS- Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1] (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{KHz}$ @ 300m	$67.6-20*\log_{10}(F_{KHz})$ @ 300m
0.490-1.705	$24000/F_{KHz}$ @ 30m	$87.6-20*\log_{10}(F_{KHz})$ @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

[1] The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40*LOG_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Conducted Emissions - AC Power Ports, 03-Jul-08
Engineer: Rafael Varelas

Manufacturer	Description	Model #	Asset #	Cal Due
Elliott Laboratories	LISN, FCC / CISPR	LISN-3, OATS	304	18-Jul-08
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	787	19-Feb-09
Rohde & Schwarz	Test Receiver, 0.009-2750 MHz	ESN	1332	29-Jan-09
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	1398	12-Feb-09

Radiated Emissions, 30 - 26,500 MHz, 05-Jul-08
Engineer: Rafael Varelas

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	08-Nov-08
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz-26.5 GHz	8593EM	1141	29-Nov-08
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	11-Aug-08
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts	NRV-Z32	1423	07-Nov-08
Rohde & Schwarz	Power Meter, Dual Channel	NRVD	1539	21-Aug-08
Hewlett Packard	High Pass filter, 3.5 GHz	P/N 84300-80038	1157	15-Oct-08

Radiated Emissions, 30 - 25,000 MHz, July 10, 2008 - July 18, 2008
Engineer: Mehran Birgani / Rafael Varelas

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	08-Nov-08
Hewlett Packard	High Pass filter, 3.5 GHz	P/N 84300-80038	1157	15-Oct-08
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	11-Aug-08
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40)	8564E	CH5273	20-Jul-08

TX Antenna Port Conducted Emissions, 30 - 25,000 MHz, July 18, 2008 - July 19, 2008
Engineer: Rafael Varelas

Manufacturer	Description	Model #	Asset #	Cal Due
Hewlett Packard	EMC Spectrum Analyzer, 9 KHz-26.5 GHz	8593EM	1141	29-Nov-08

EXHIBIT 2: Test Measurement Data

42 Pages

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		-
Emissions Standard(s):	FCC 15.247	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

2Wire

Model

3800HGV-B

Date of Last Test: 7/18/2008

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manger:	Susan Pelzl
Contact:	Mark Rieger		
Emissions Standard(s):	FCC 15.247	Class:	-
Immunity Standard(s):	-	Environment:	-

EUT INFORMATION

The following information was collected during the test session(s).

General Description

The EUT is a VDSL residential gateway designed to wirelessly interface to a network. Since the EUT would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 100-120 Volts , 50-60 Hz, 1.0 Amps.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
2Wire	3800HGV-B	VDSL residential gateway	490711012865	PGR2W3800HP

EUT Antenna (Intentional Radiators Only)

The EUT antenna is a flat, PCB type, integral to the device.

EUT Enclosure

The EUT enclosure is primarily constructed of plastic. It measures approximately 29 cm wide by 24 cm deep by 5.5 cm high.

Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manger:	Susan Pelzl
Contact:	Mark Rieger		
Emissions Standard(s):	FCC 15.247	Class:	-
Immunity Standard(s):	-	Environment:	-

Test Configuration #1

The following information was collected during the test session(s).

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
2Wire	YM-1031	AC/DC Adapter	N/A	N/A

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	Latitude 131L	Laptop	9CBPQC1	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Cable line	Not Connected	-	-	-
USB	Not Connected	-	-	-
DC Power	AC-DC adaptor	Coaxial	Unshielded	2.0
Ethernet (4)	Laptop	Cat 5 (x1)	Unshielded	2.0
Phone (3)	Not Connected	-	-	-
Broadband	Not Connected	-	-	-

Note: Previous testing showed that connection of the interface ports would not effect radio related emissions.

EUT Operation During Emissions Tests

During emissions testing, the EUT was configured to continuously transmit or receive (depending on the test in question) at a specific channel and power setting.

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements

Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/18/2008
Test Engineer: Rafael Varelas
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 13 °C
Rel. Humidity: 87 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	26	22.2	Output Power	15.247(b)	Pass	22.2 dBm
2	26	22.2	Power spectral Density (PSD)	15.247(d)	Pass	-2.8 dBm/3kHz
3	20	15.7	Minimum 6dB Bandwidth	15.247(a)	Pass	11 MHz
3	26	22.2	99% Bandwidth	RSS GEN	-	15.7 MHz
4	26	22.2	Spurious emissions	15.247(b)	Pass	All emissions below 30dBc

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

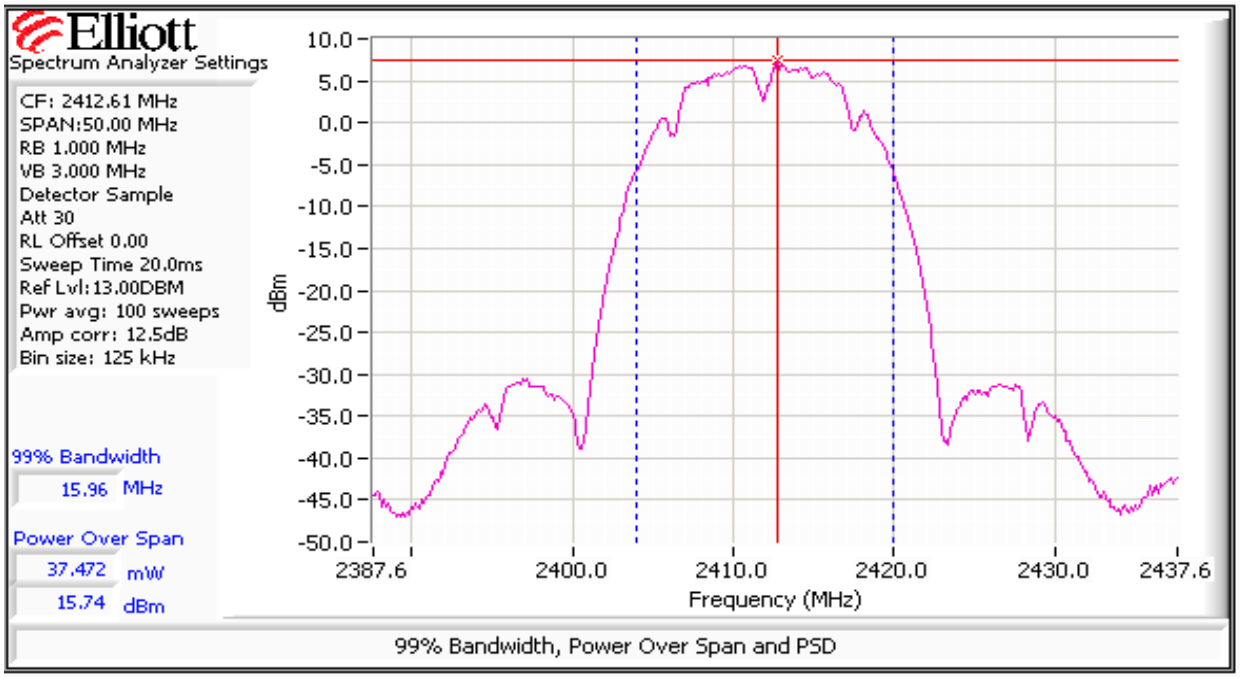
No deviations were made from the requirements of the standard.

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1: Output Power

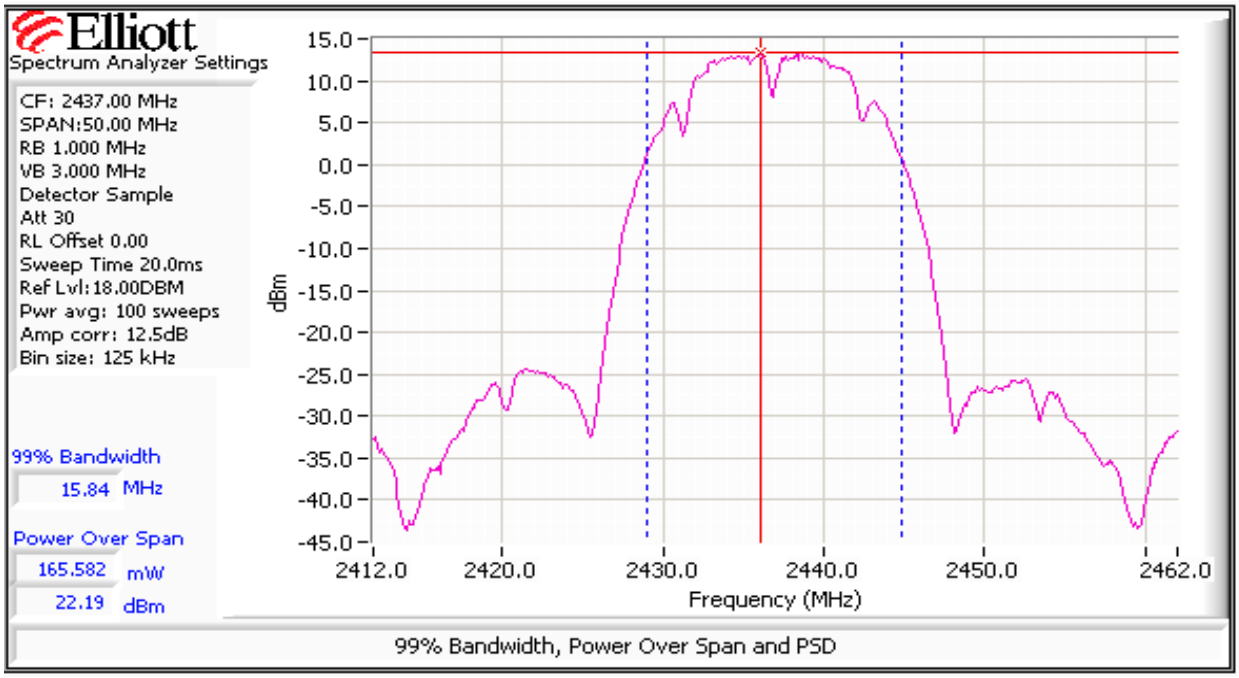
Power Setting[2]	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP [Note 2] dBm	EIRP W	Output Power (dBm) [3]	Output Power mW
20	2412	15.7	37.2	3.15	Pass	18.9	0.077		
26	2437	22.2	166.0	3.15	Pass	25.4	0.343		
20	2462	15.7	37.2	3.15	Pass	18.9	0.077		

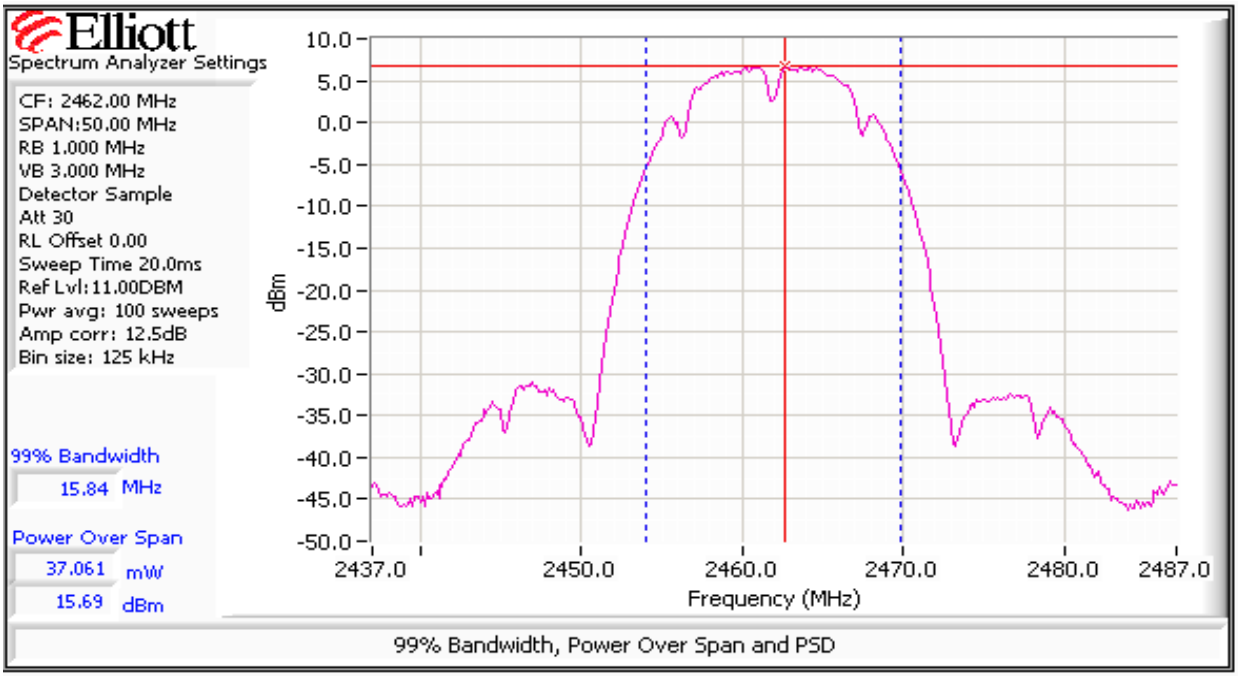
Note 1:	Output power measured using a spectrum analyzer (see plots below): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz. Spurious limit is -30dBc because this method was used. The output power limit is 30dBm
Note 2:	Power setting - the software power setting used during testing, included for reference only.



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1: Continued



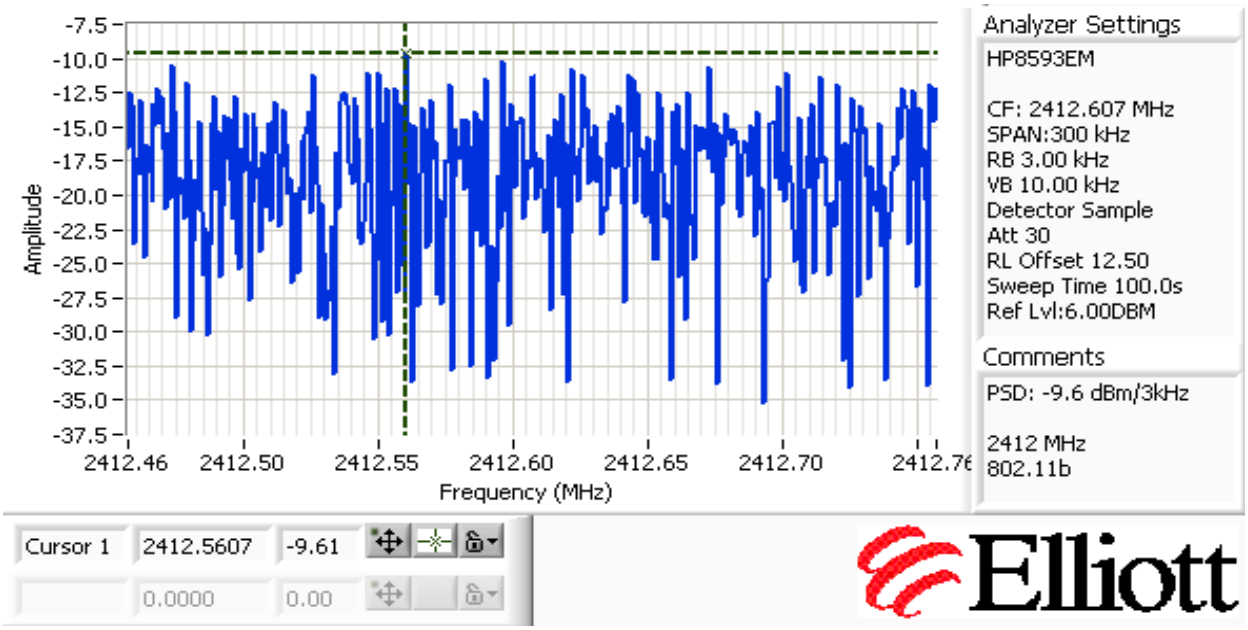


Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #2: Power spectral Density

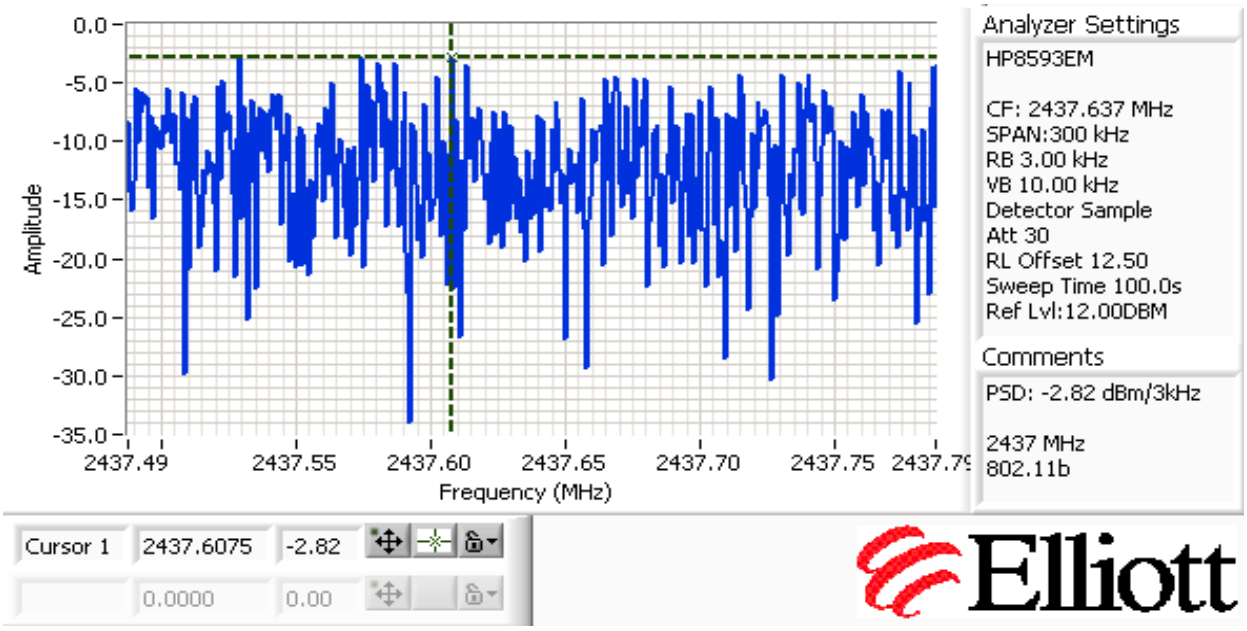
Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1	Limit dBm/3kHz	Result
20	2412	-9.6	8.0	Pass
26	2437	-2.8	8.0	Pass
20	2462	-9.3	8.0	Pass

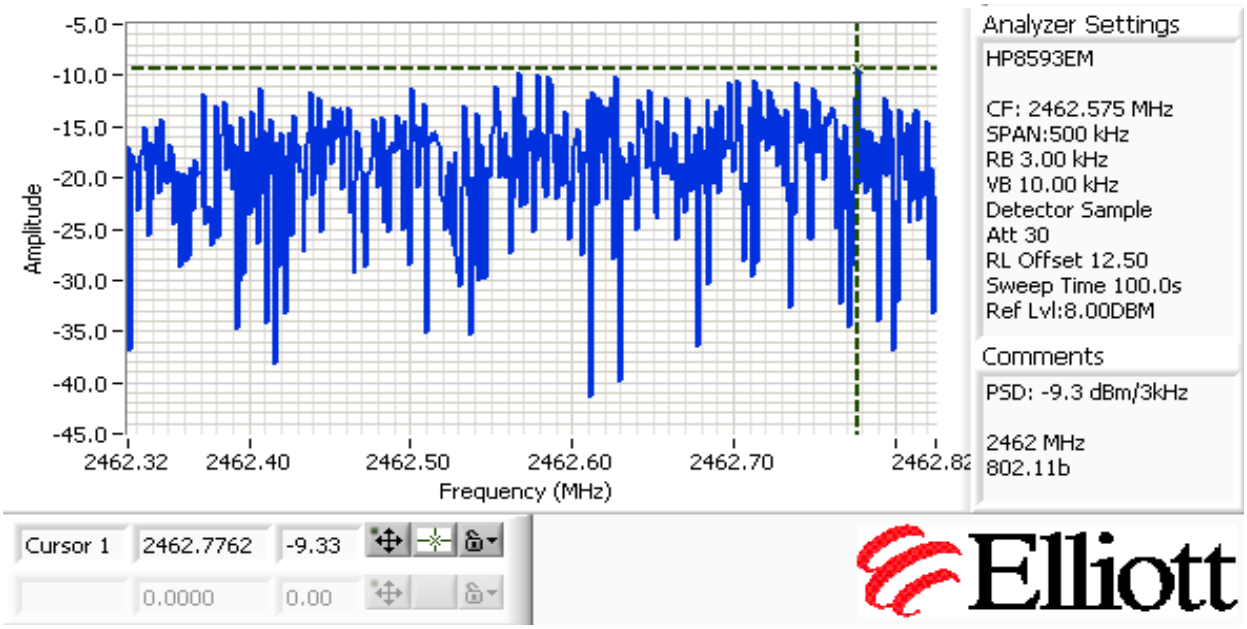
Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #2: Continued



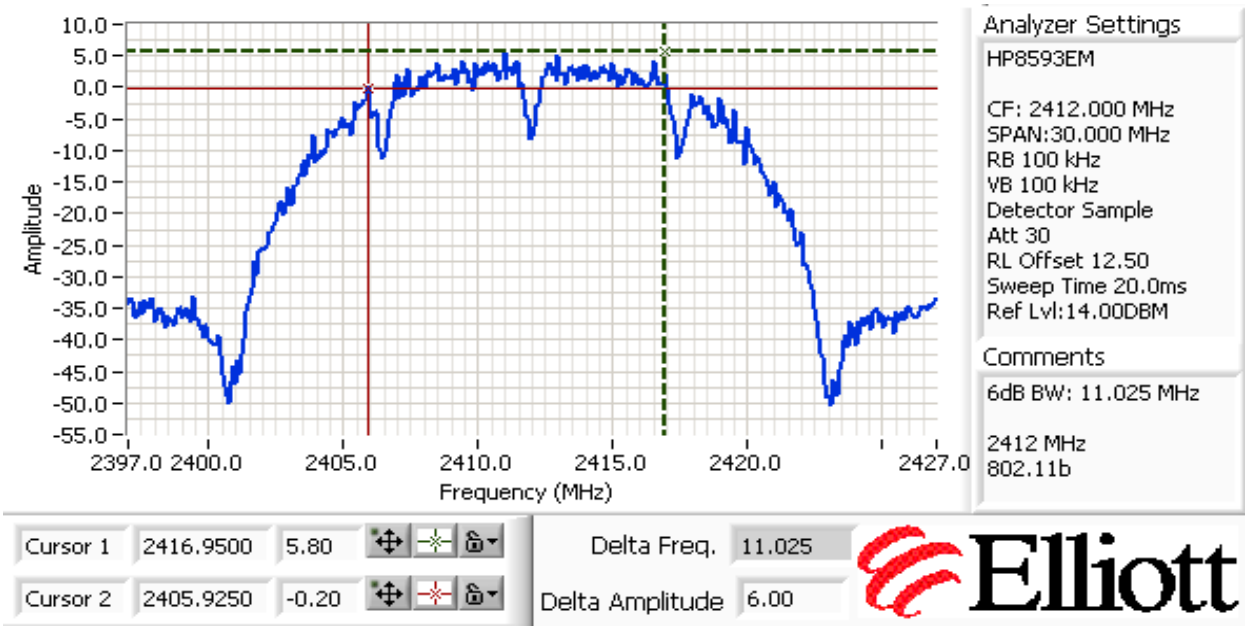


Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #3: Signal Bandwidth

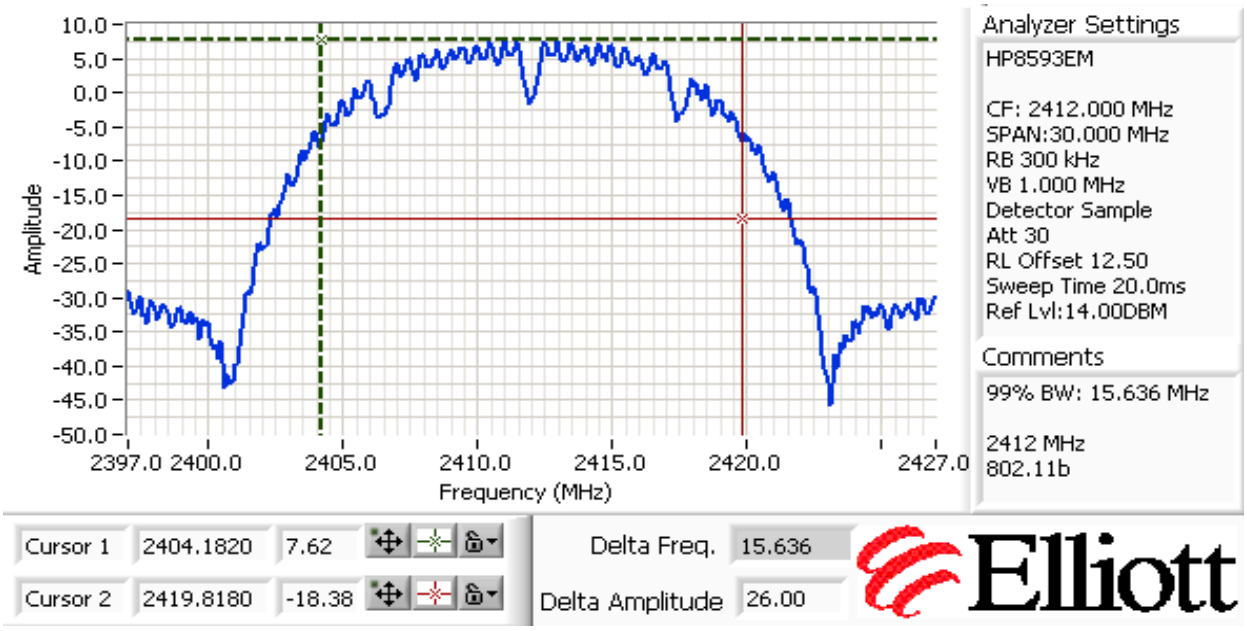
Power Setting	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Resolution Bandwidth	99% Signal Bandwidth
20	2412	100 kHz	11.0	300 kHz	15.6
26	2437	100 kHz	10.1	300 kHz	15.7
20	2462	100 kHz	11.0	300 kHz	15.6

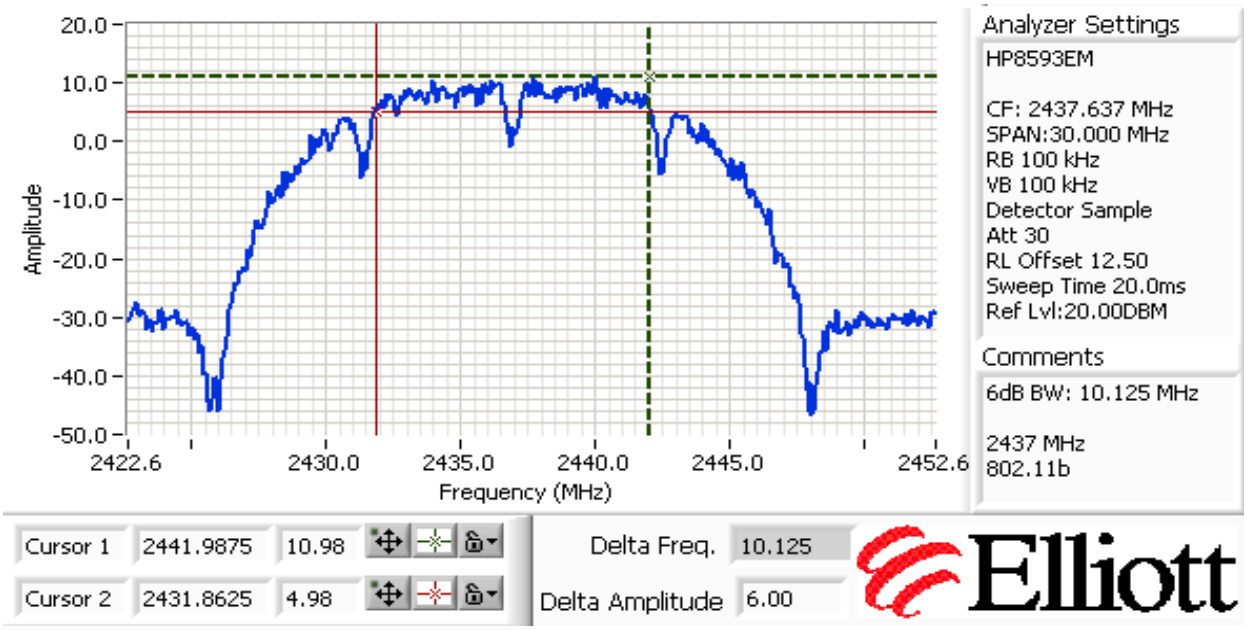
Note 1:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

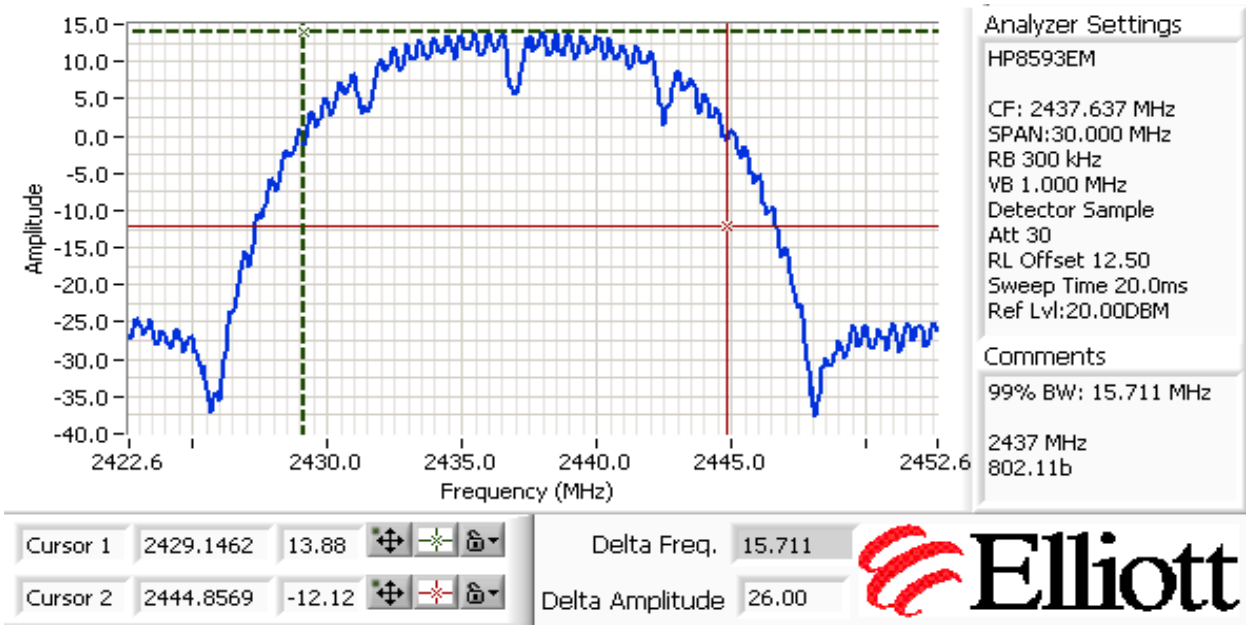
Run #3: Continued

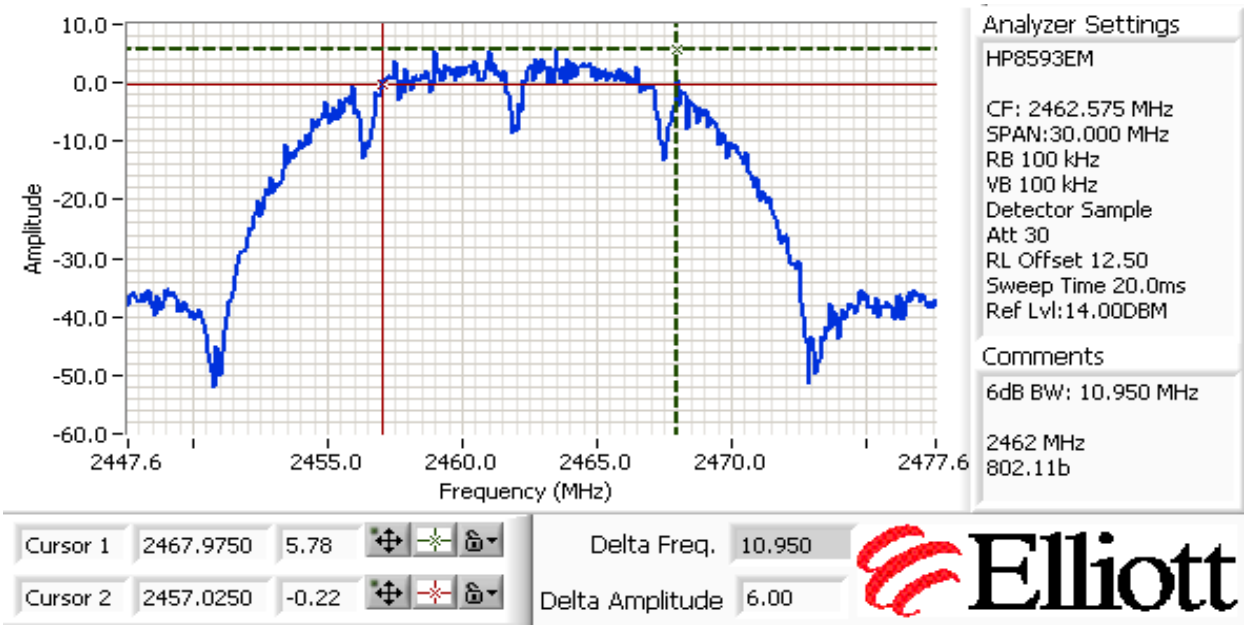




Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

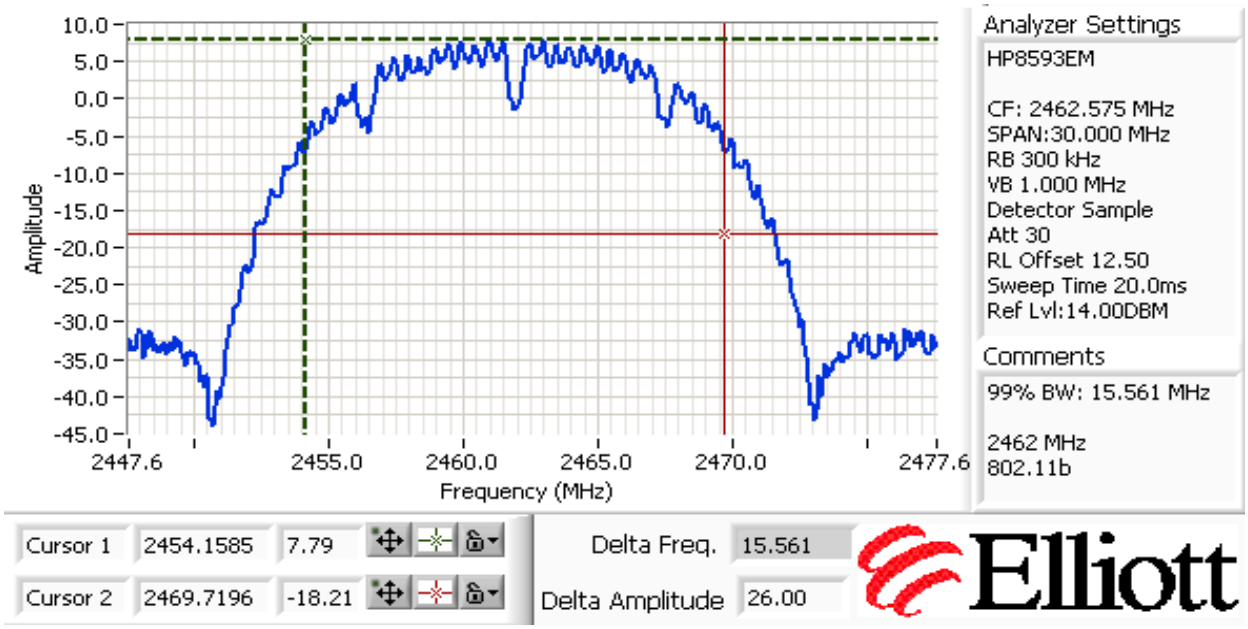
Run #3: Continued





Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #3: Continued

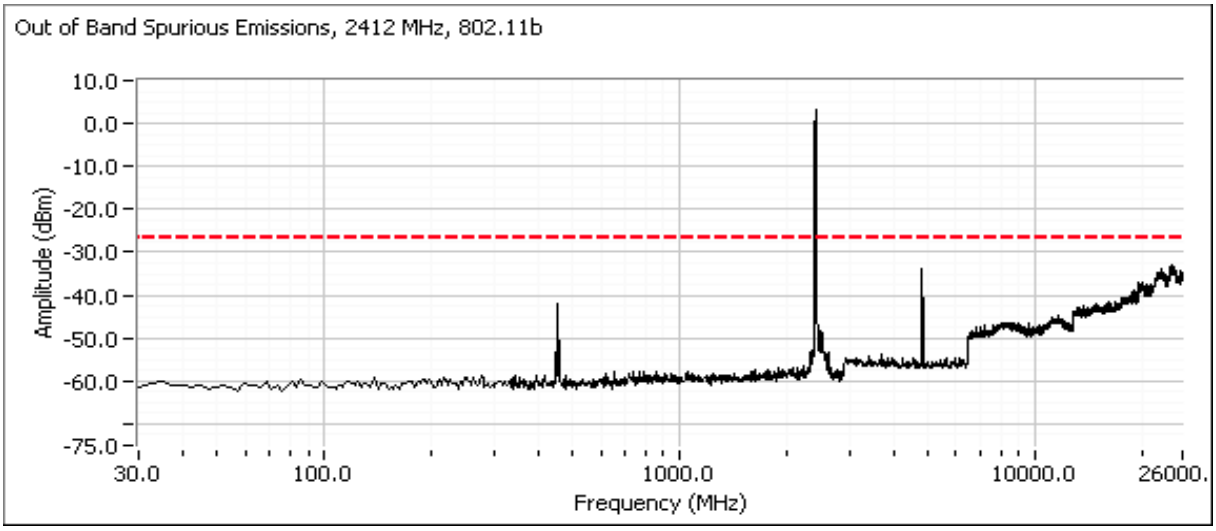


Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

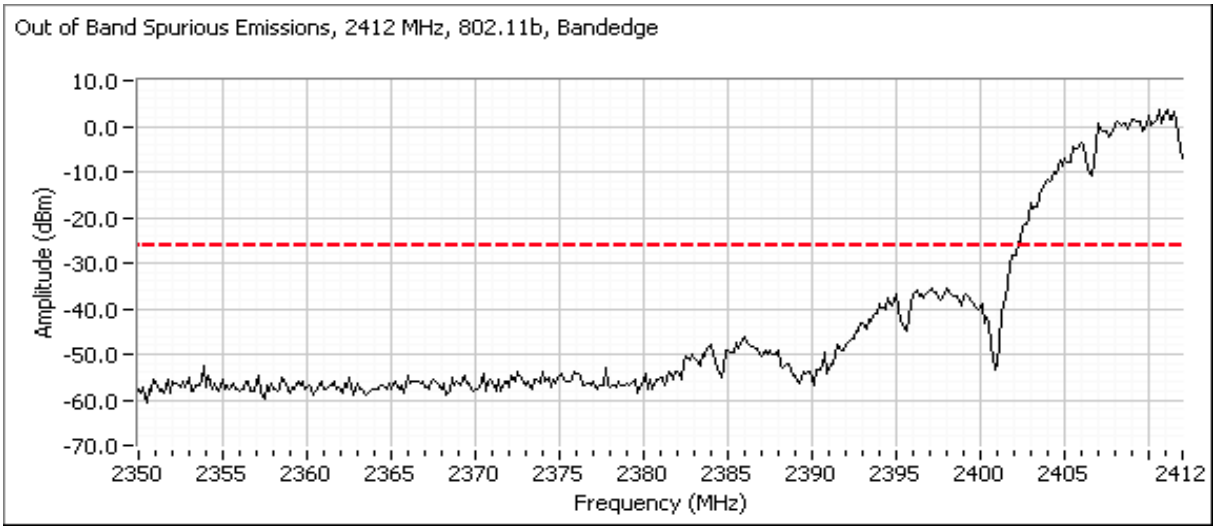
Run #4: Out of Band Spurious Emissions

Frequency (MHz)	Limit	Result
2412	-30dBc	Pass
2437	-30dBc	Pass
2462	-30dBc	Pass

Plots for low channel, power setting(s) = 20



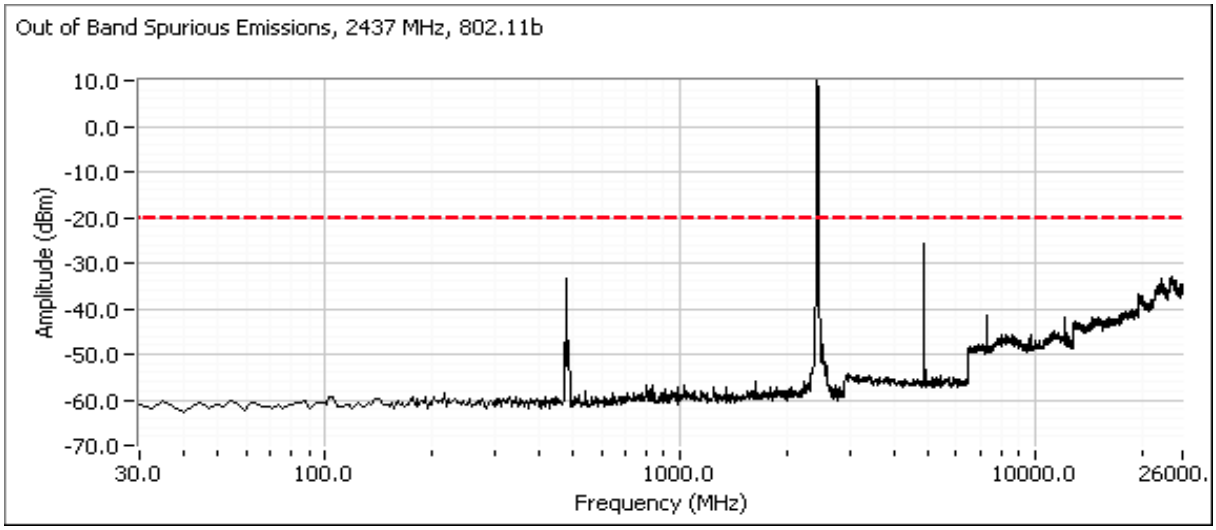
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



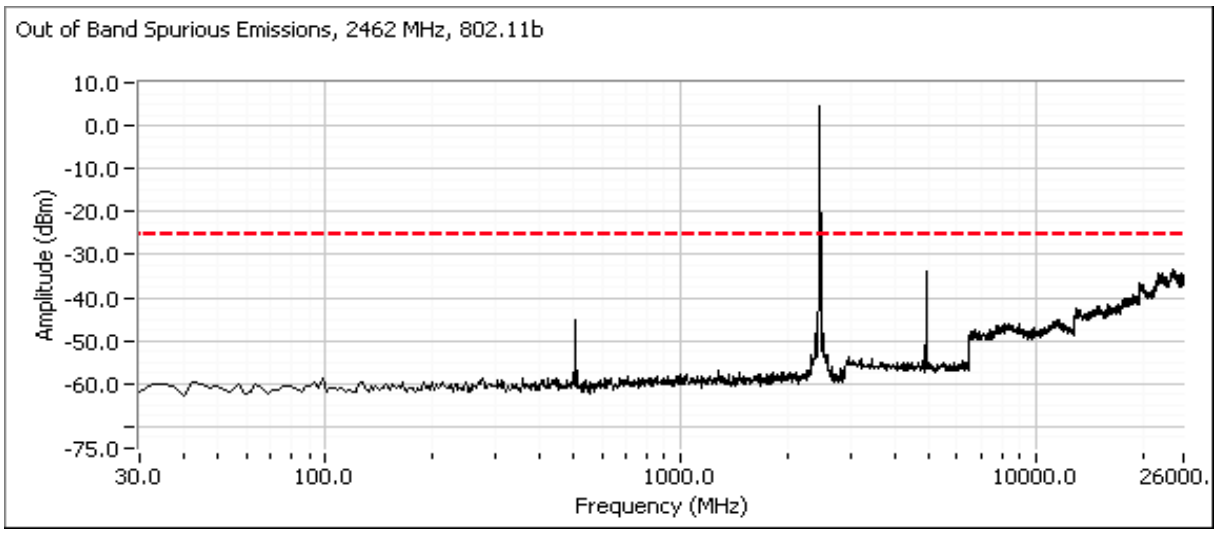
Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #4: Continued

Plots for center channel, power setting(s) = 26



Plots for high channel, power setting(s) = 20



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements

Power, PSD, Bandwidth and Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/18/2008
Test Engineer: Rafael Varelas
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 13 °C
Rel. Humidity: 87 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	26	22	Output Power	15.247(b)	Pass	22 dBm
2	26	22	Power spectral Density (PSD)	15.247(d)	Pass	-3.98 dBm/3kHz
3	20	16	Minimum 6dB Bandwidth	15.247(a)	Pass	16.6 MHz
3	26	22	99% Bandwidth	RSS GEN	-	16.9 MHz
4	26	22	Spurious emissions	15.247(b)	Pass	All emissions below 30dBc

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

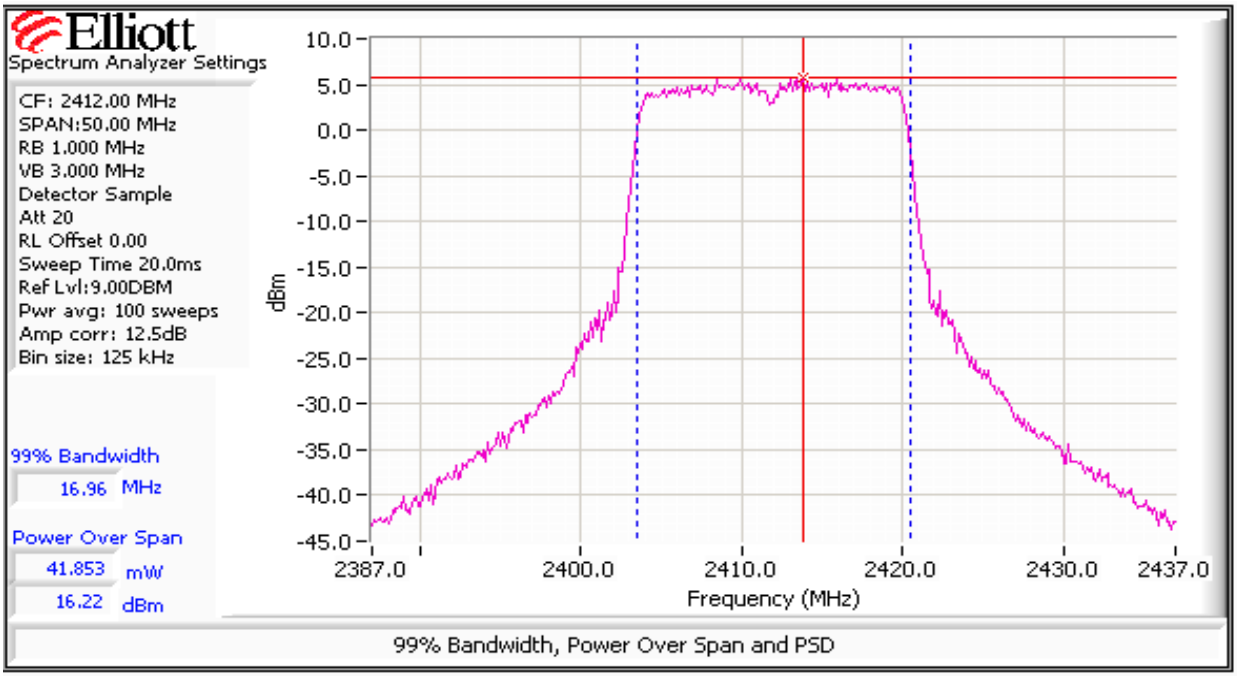
S/N:490711012865

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1: Output Power

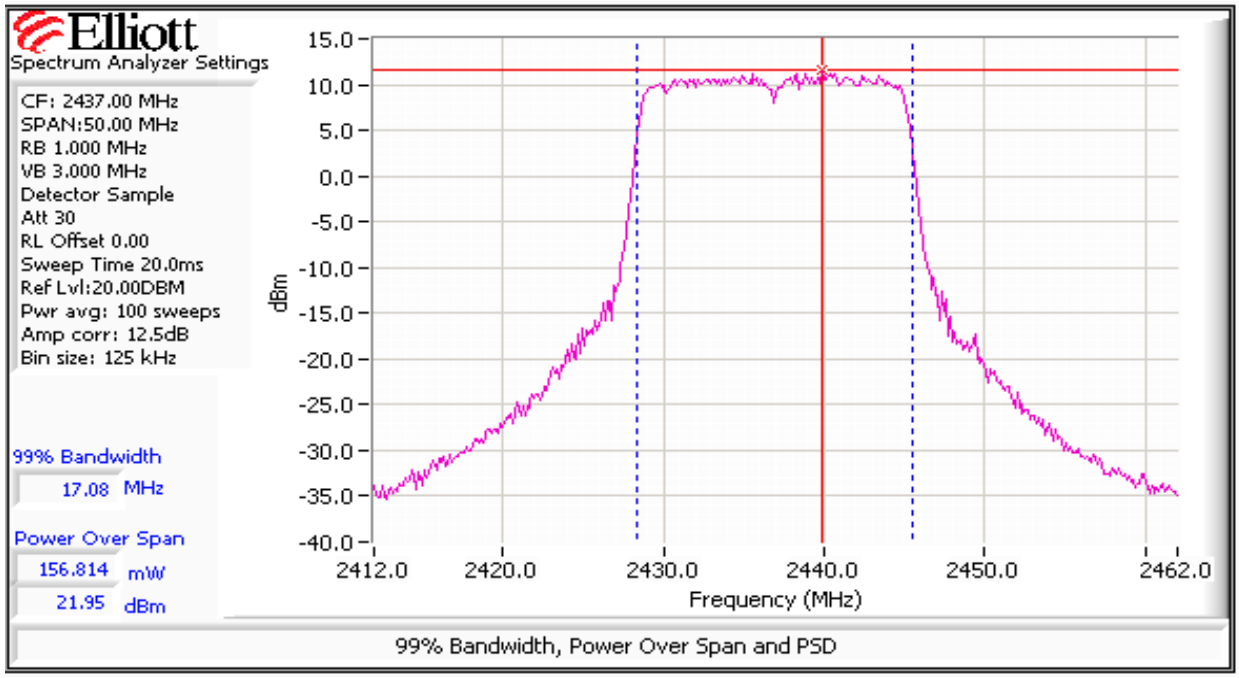
Power Setting[2]	Frequency (MHz)	Output Power (dBm)[1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP[Note 2] dBm	EIRP[Note 2] W	Output Power (dBm)[3]	Output Power mW
20	2412	16.2	41.7	3.15	Pass	19.4	0.086		
26	2437	22.0	156.7	3.15	Pass	25.1	0.324		
20	2462	16.0	39.6	3.15	Pass	19.1	0.082		

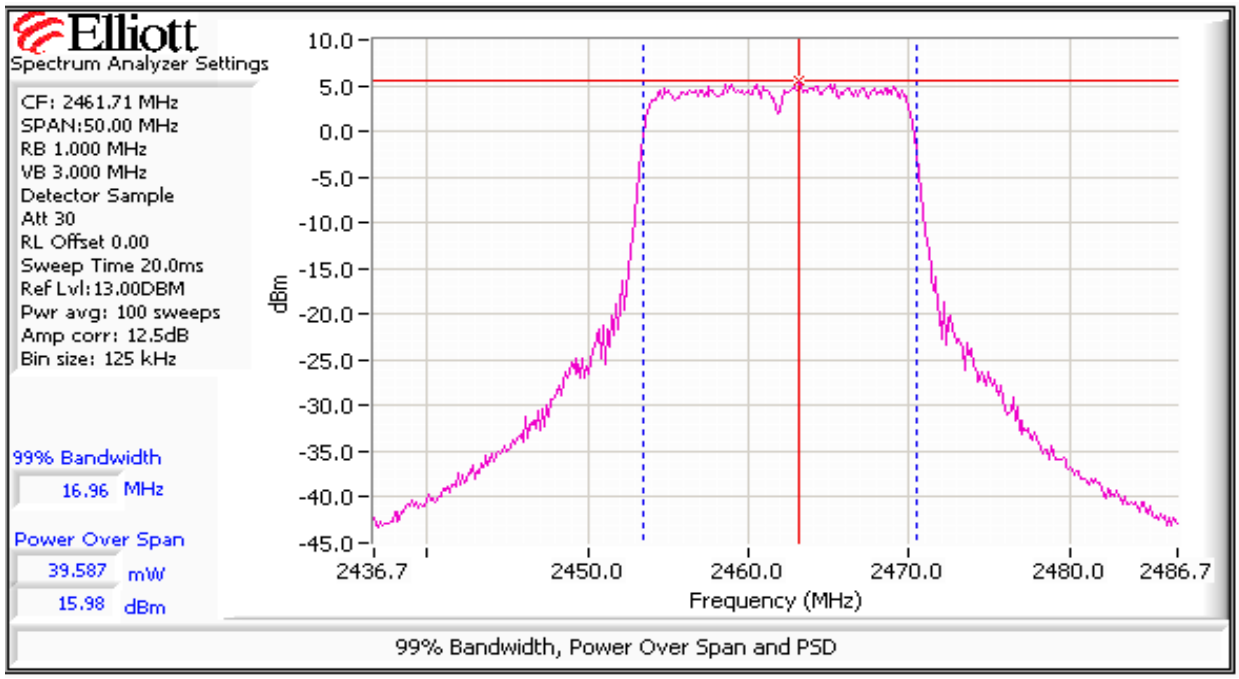
Note 1:	Output power measured using a spectrum analyzer (see plots below): RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 50 MHz. Spurious limit is -30dBc because this method was used. The output power limit is 30dBm
Note 2:	Power setting - the software power setting used during testing, included for reference only.



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1: Continued



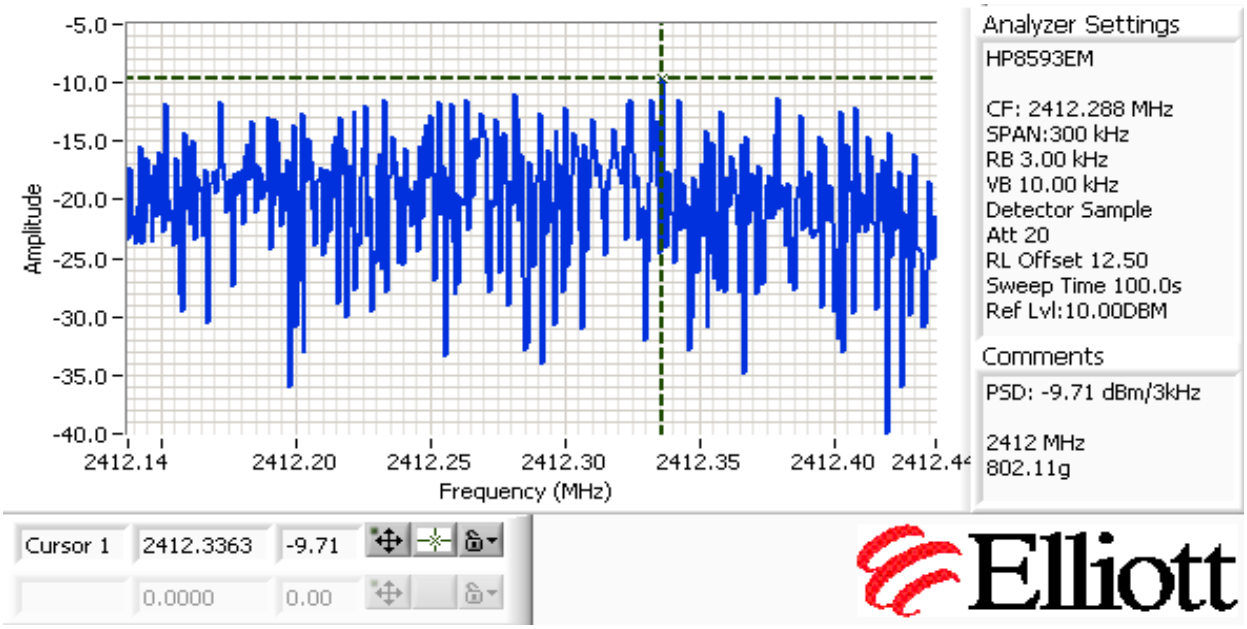


Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #2: Power spectral Density

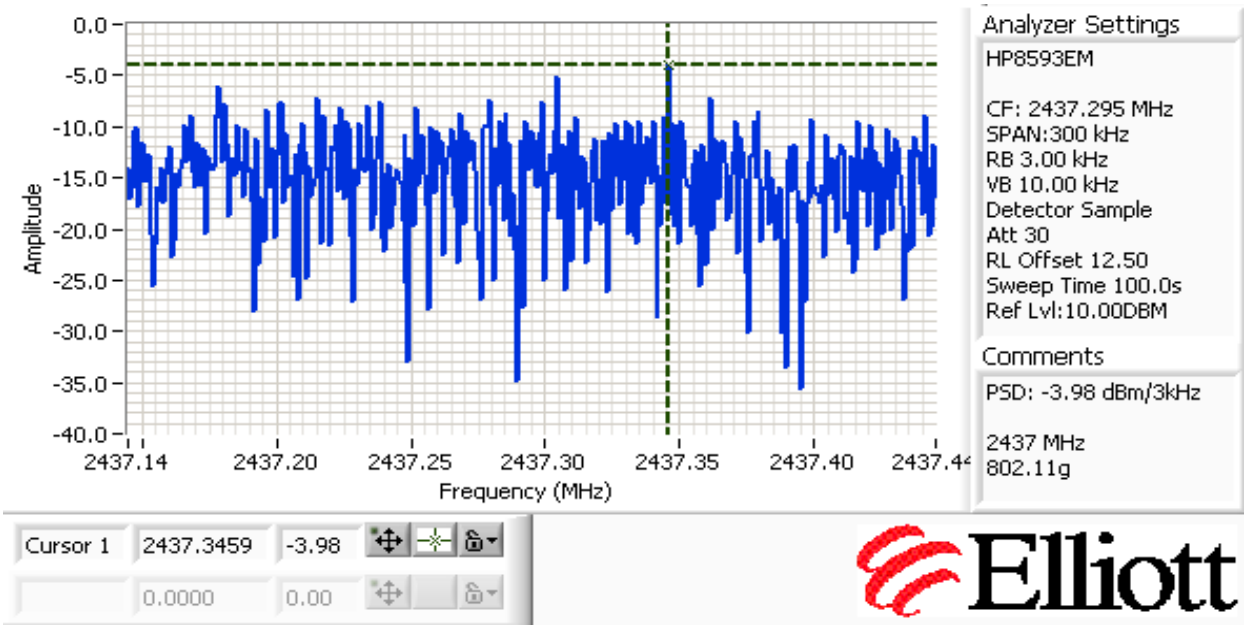
Power Setting	Frequency (MHz)	PSD (dBm/3kHz) Note 1	Limit dBm/3kHz	Result
20	2412	-9.7	8.0	Pass
26	2437	-4.0	8.0	Pass
20	2462	-10.5	8.0	Pass

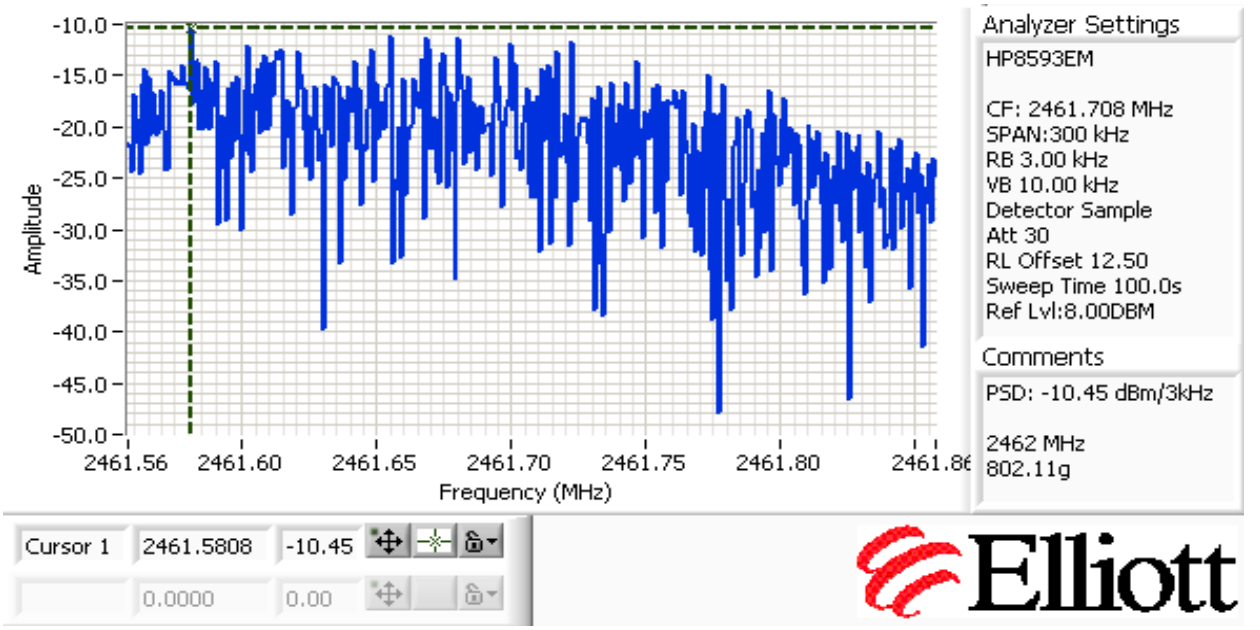
Note 1:	Power spectral density measured using RB=3 kHz, VB=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using RB=3kHz using multiple sweeps at a faster rate over the 6dB bandwidth of the signal.



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #2: Continued



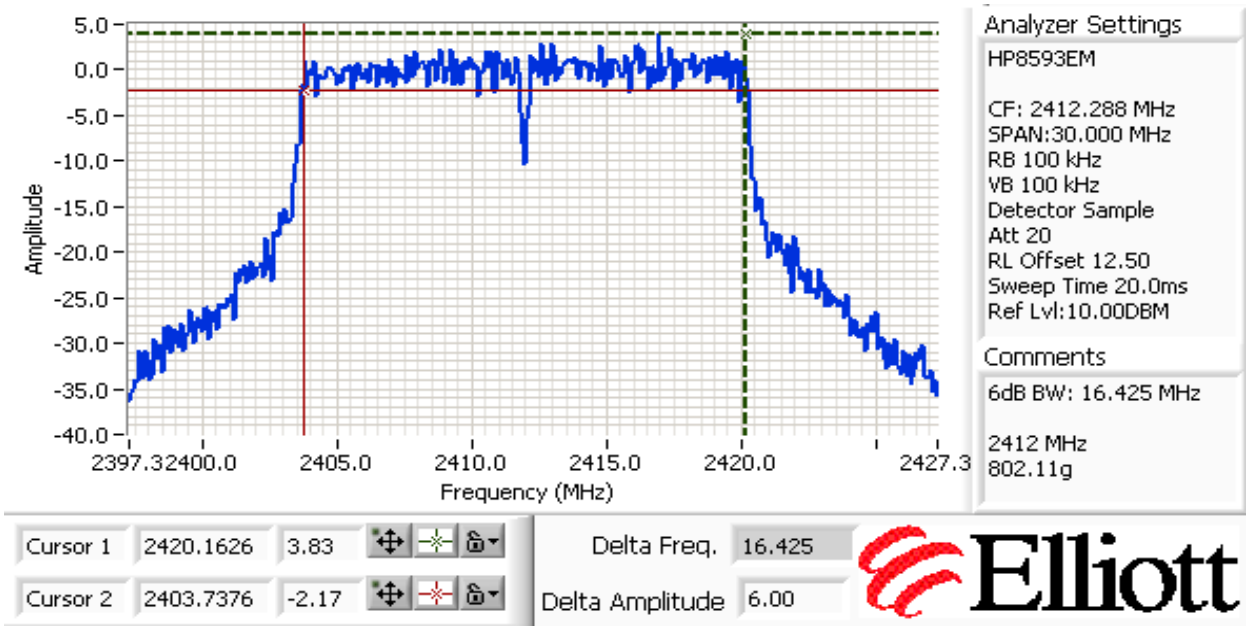


Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #3: Signal Bandwidth

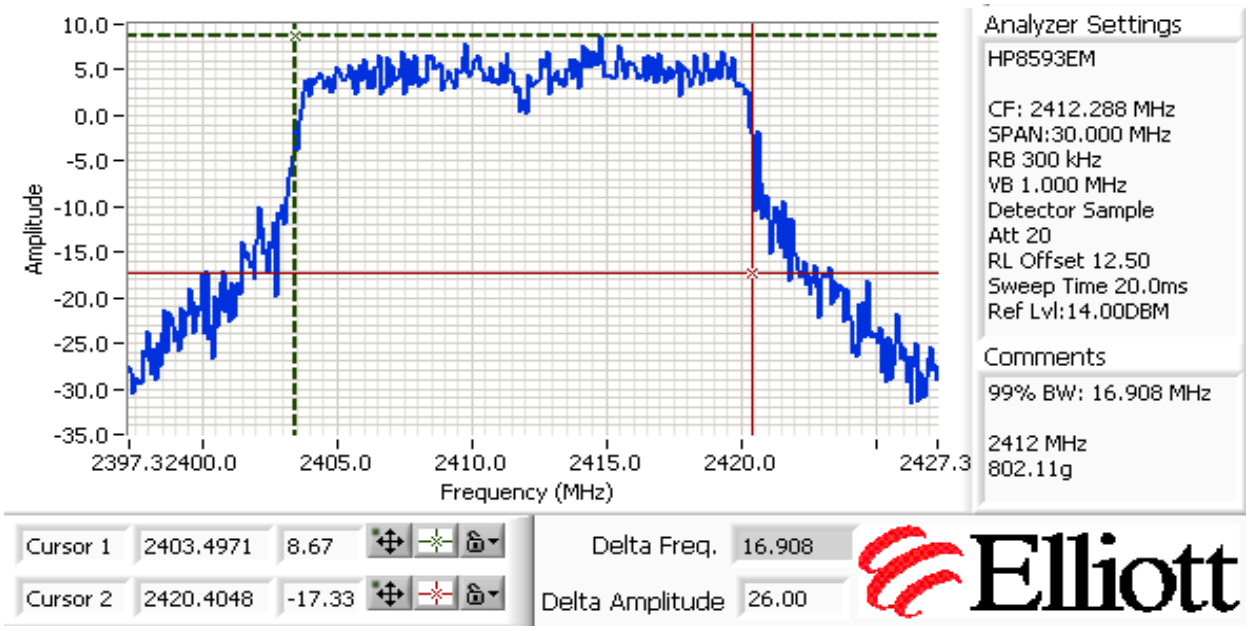
Power Setting	Frequency (MHz)	Resolution Bandwidth	6dB Signal Bandwidth	Resolution Bandwidth	99% Signal Bandwidth
20	2412	100 kHz	16.4	300 kHz	16.9
26	2437	100 kHz	16.5	300 kHz	16.9
20	2462	100 kHz	16.6	300 kHz	16.8

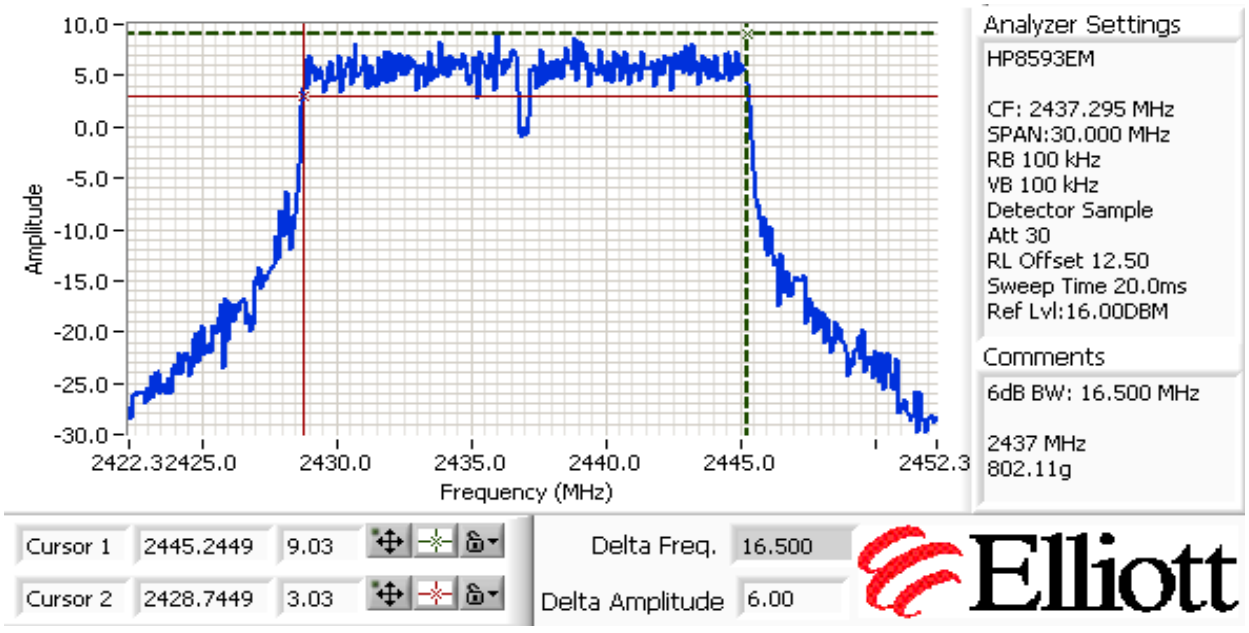
Note 1:	99% bandwidth measured in accordance with RSS GEN, with RB > 1% of the span and VB > 3xRB



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

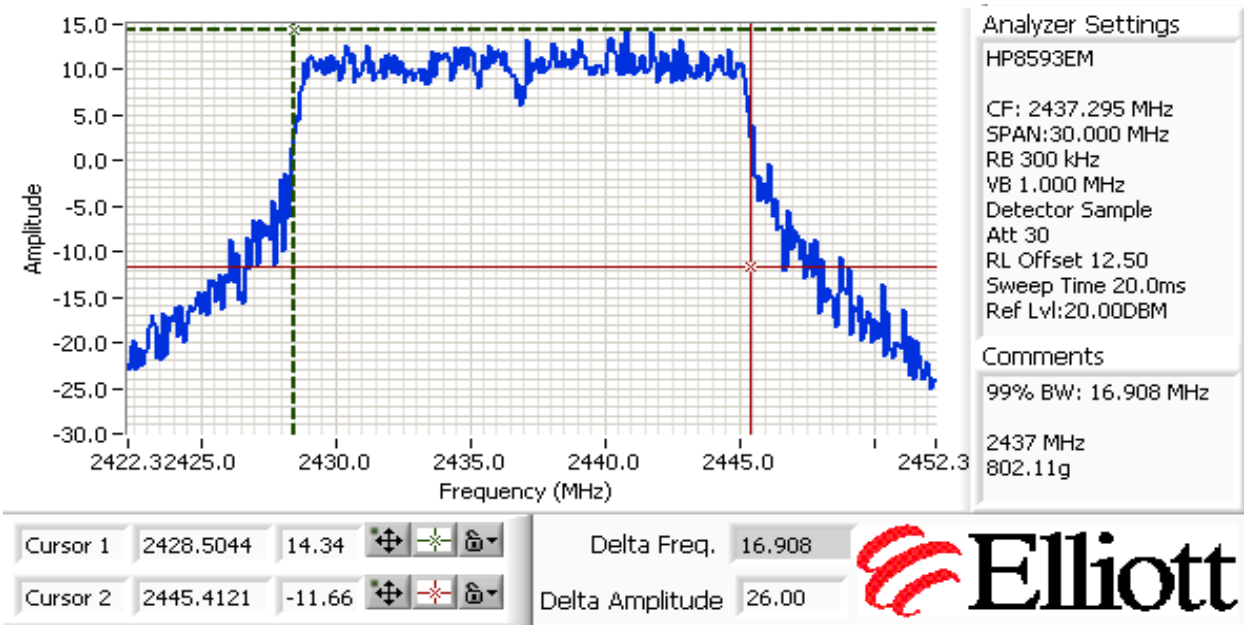
Run #3: Continued

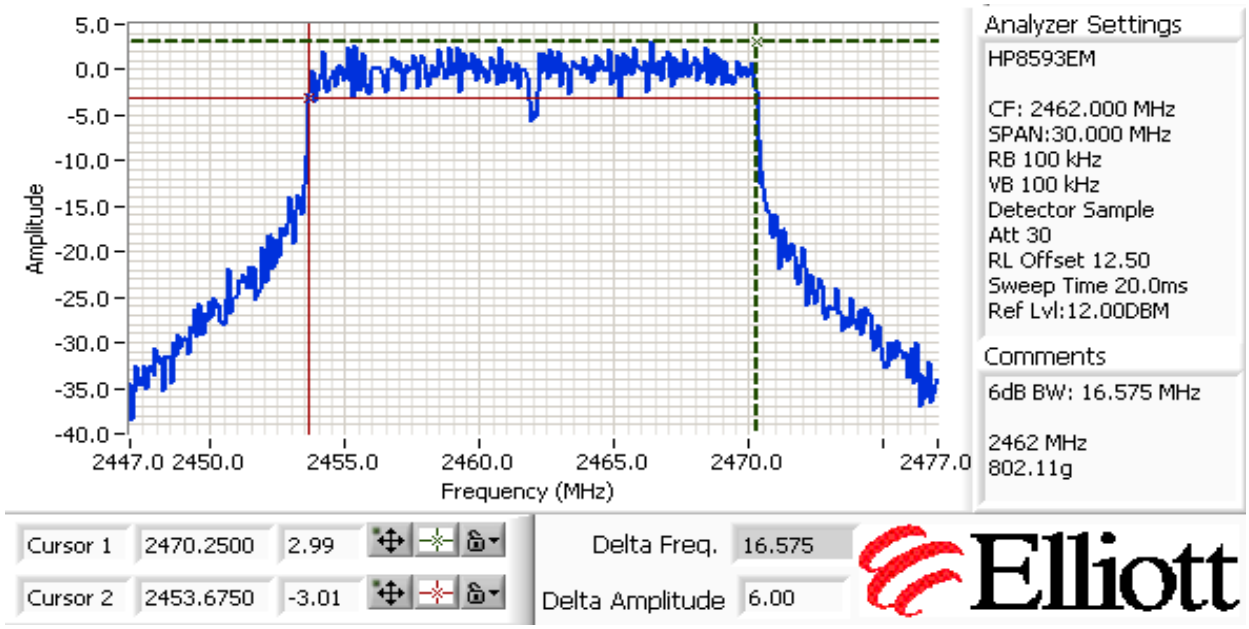




Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

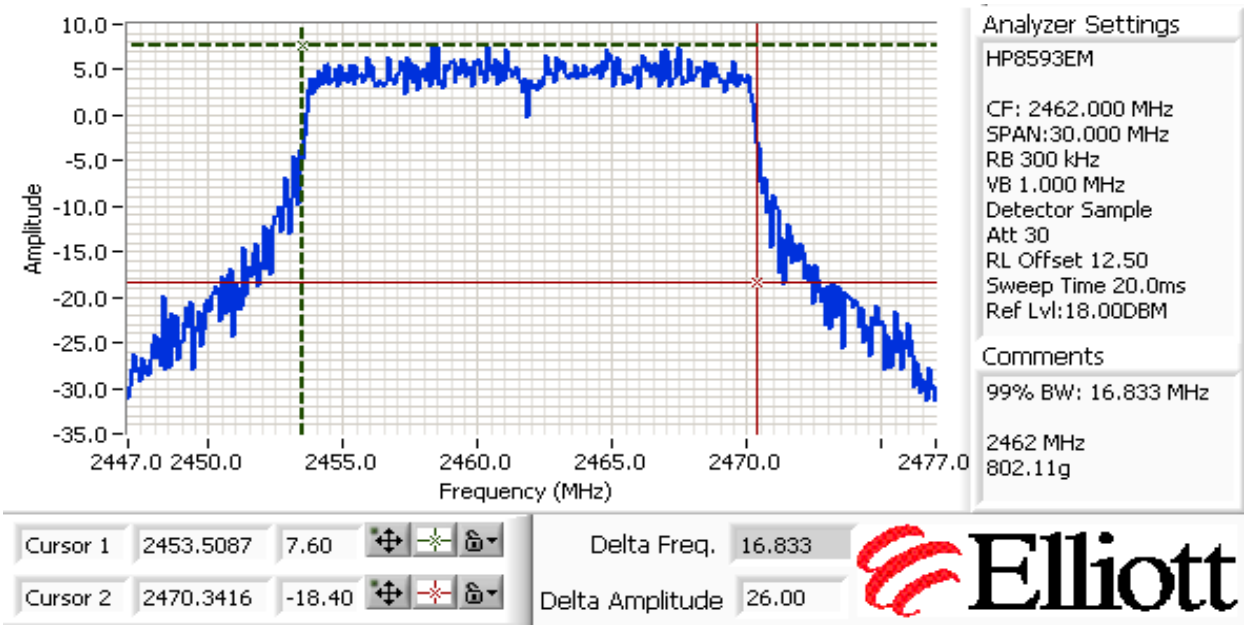
Run #3: Continued





Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #3: Continued

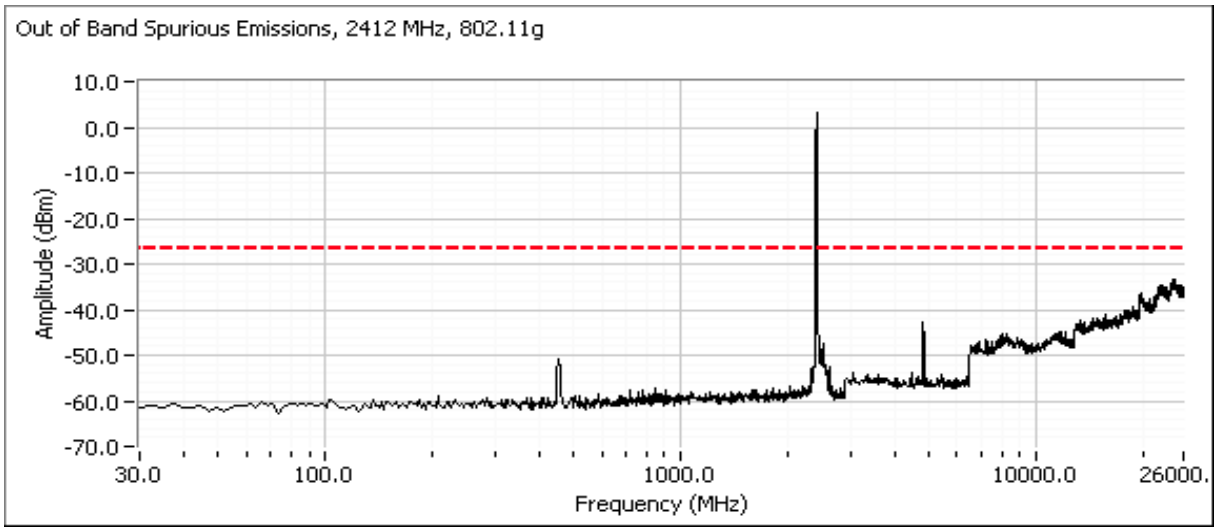


Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

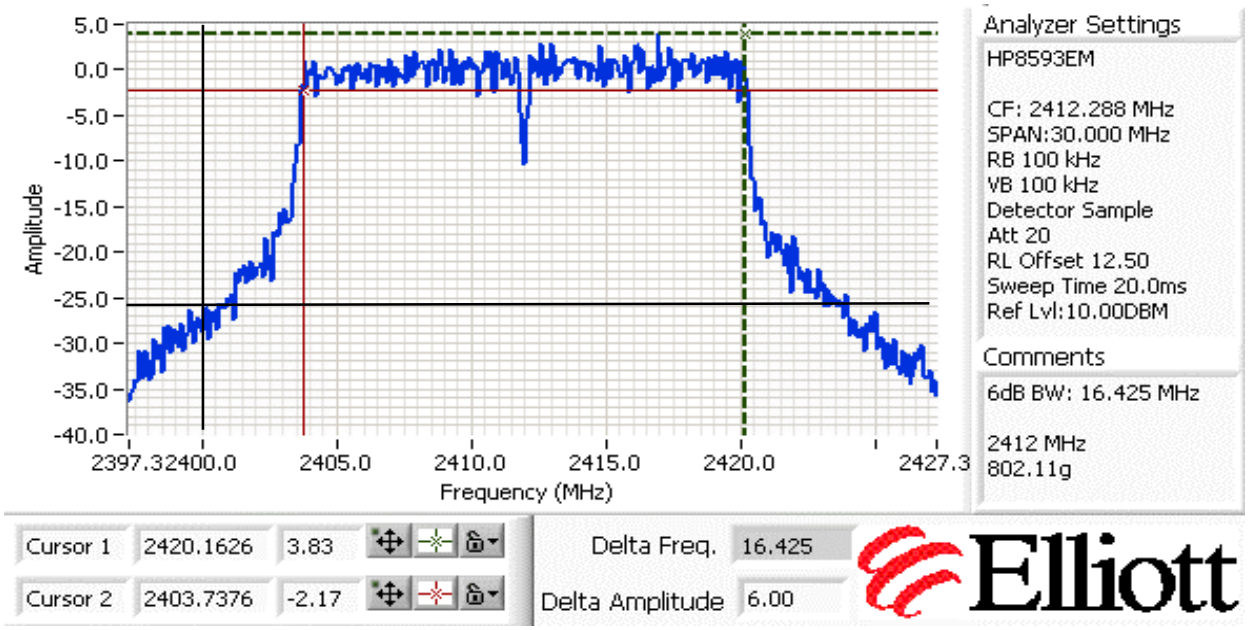
Run #4: Out of Band Spurious Emissions

Frequency (MHz)	Limit	Result
2412	-30dBc	Pass
2437	-30dBc	Pass
2462	-30dBc	Pass

Plots for low channel, power setting(s) = 20



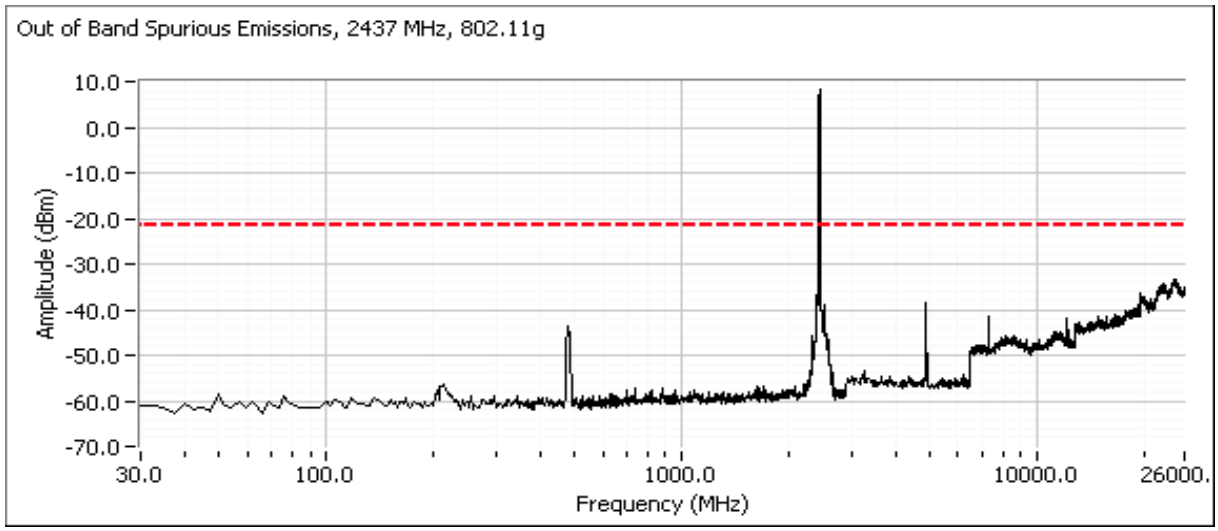
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



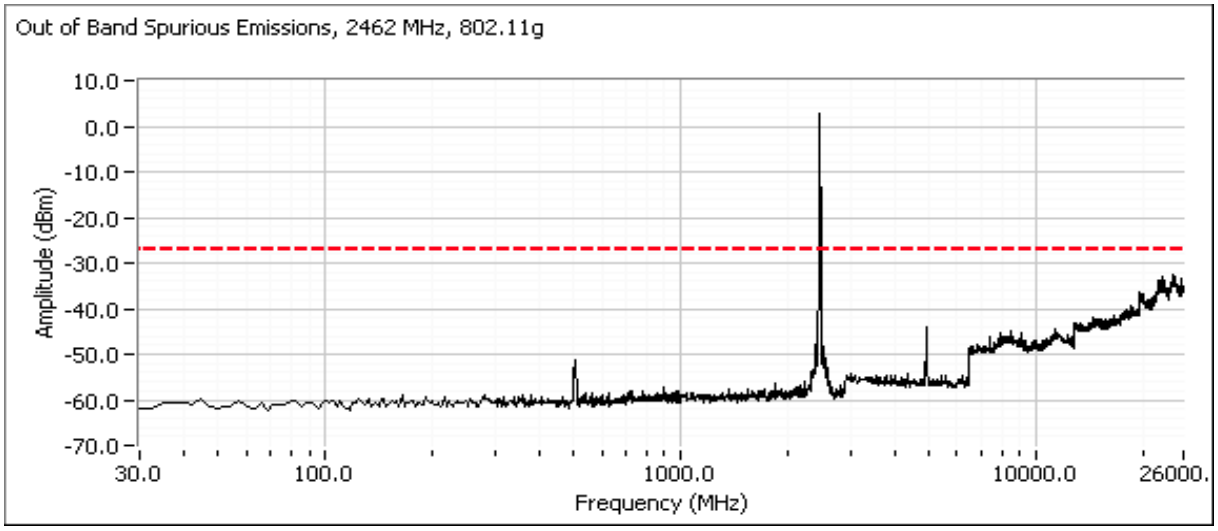
Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #4: Continued

Plots for center channel, power setting(s) = 26



Plots for high channel, power setting(s) = 20



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 7/17/2008
Test Engineer: Rafael Varelas
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 14 °C
Rel. Humidity: 83 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11b	low	20	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	51.2dBµV/m @ 2387.1MHz (-2.8dB)
			20	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	35.6dBµV/m @ 7236.6MHz (-18.4dB)
1b	802.11b	center	26	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	45.5dBµV/m @ 7309.4MHz (-8.5dB)
1c	802.11b	high	20	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	50.3dBµV/m @ 2487.8MHz (-3.7dB)
			20	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	37.2dBµV/m @ 7387.4MHz (-16.8dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

S/N:490711012865

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26,000 MHz. Operating Mode: 802.11b, 1mbps

Run #1a: Low Channel @ 2412 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Setting 20								
ob=7, db=7								
2413.850	104.9	H	-	-	AVG	55	1.0	
2413.850	108.3	H	-	-	PK	55	1.0	
2411.350	102.4	V	-	-	AVG	266	1.0	
2411.350	105.9	V	-	-	PK	266	1.0	

Band Edge Signal Field Strength

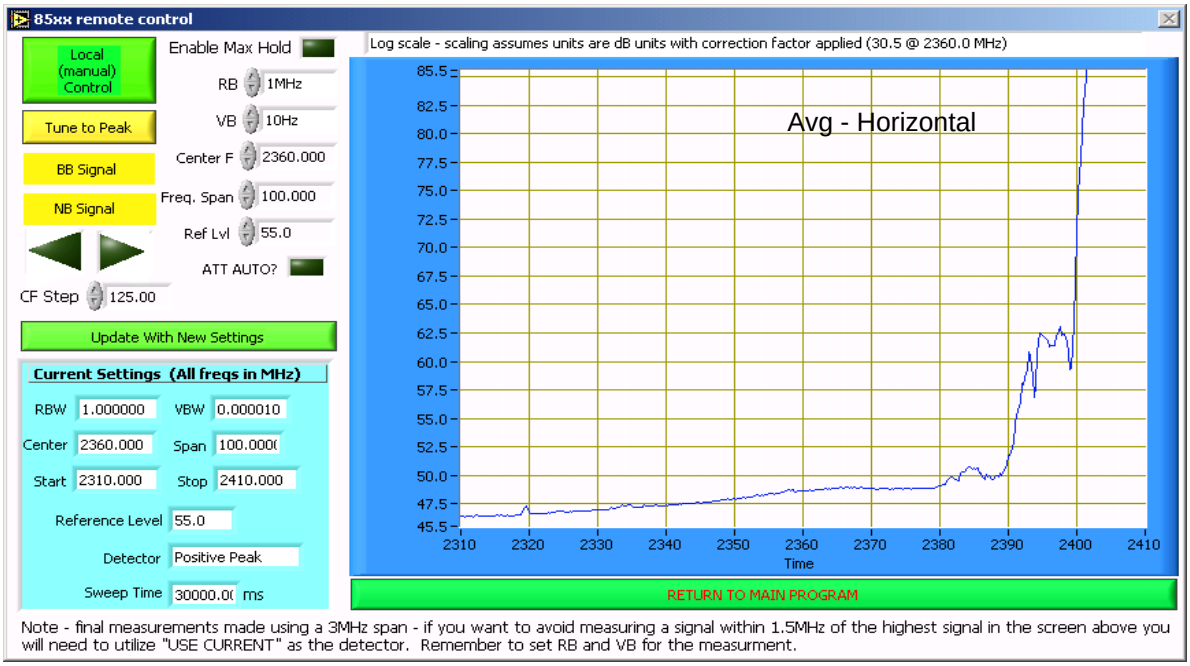
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2387.060	51.2	H	54.0	-2.8	Avg	55	1.0	
2386.200	62.8	H	74.0	-11.2	PK	55	1.0	
2387.200	50.1	V	54.0	-3.9	Avg	266	1.0	
2388.780	61.6	V	74.0	-12.4	PK	266	1.0	

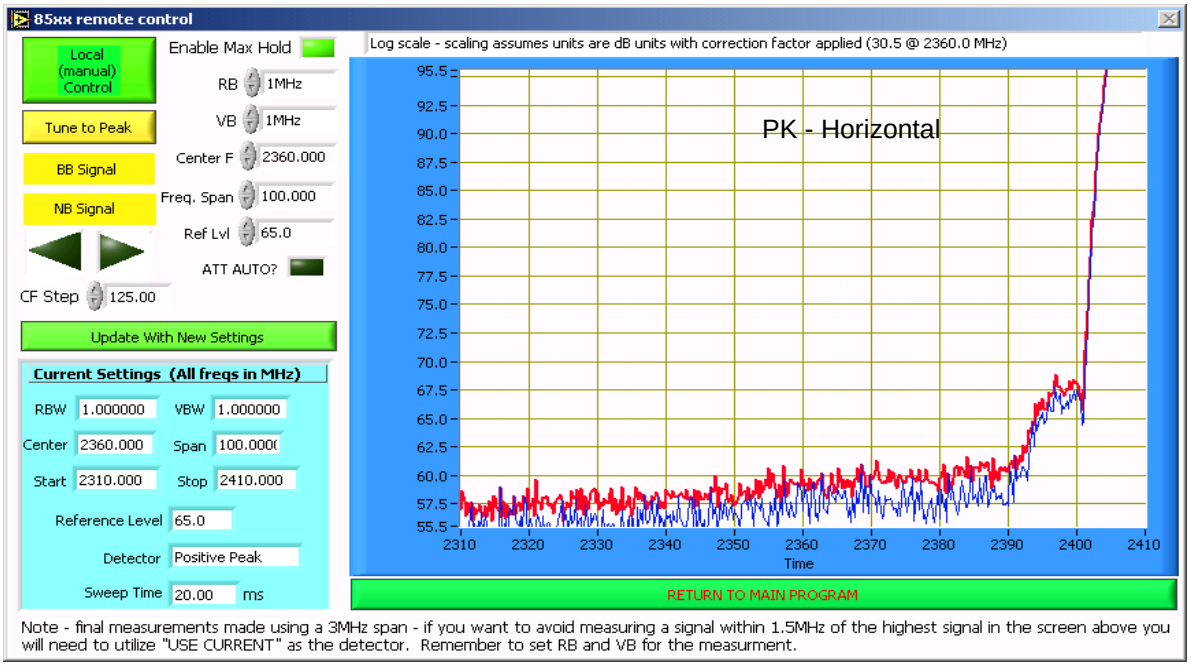
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4824.020	31.9	H	54.0	-22.1	AVG	196	1.3	
4824.020	42.2	H	74.0	-31.8	PK	196	1.3	
7236.620	35.6	H	54.0	-18.4	AVG	12	1.2	
7236.620	47.4	H	74.0	-26.6	PK	12	1.2	
4823.790	30.5	V	54.0	-23.5	AVG	360	1.0	
4823.790	41.5	V	74.0	-32.5	PK	360	1.0	
7236.200	34.4	V	54.0	-19.6	AVG	21	1.0	
7236.200	46.5	V	74.0	-27.5	PK	21	1.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A





Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1b: Center Channel @ 2437 MHz

Fundamental emission level @ 3m in 100kHz RBW:	108.8	dBµV/m	
Limit for emissions outside of restricted bands:	88.8	dBµV/m	Limit is -20dBc (Peak power measurement)
Limit for emissions outside of restricted bands:	78.8	dBµV/m	Limit is -30dBc (UNII power measurement)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Setting 26								
ob=7, db=7								
4874.000	38.6	H	54.0	-15.4	AVG	44	1.5	
4874.000	45.3	H	74.0	-28.7	PK	44	1.5	
7309.400	45.5	H	54.0	-8.5	AVG	224	1.3	
7309.400	52.7	H	74.0	-21.3	PK	224	1.3	
9747.820	51.6	V	78.8	-27.2	PK	78	1.1	Note 1
9747.890	51.8	H	78.8	-27.0	PK	0	1.4	Note 1
4873.960	36.3	V	54.0	-17.7	AVG	352	1.2	
4873.960	44.6	V	74.0	-29.4	PK	352	1.2	
7309.700	45.5	V	54.0	-8.5	AVG	188	1.7	
7309.700	52.2	V	74.0	-21.8	PK	188	1.7	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Run #1c: High Channel @ 2462 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Setting 20								
ob=7, db=7								
2463.850	102.5	V	-	-	AVG	15	1.0	
2463.850	105.8	V	-	-	PK	15	1.0	
2463.900	104.0	H	-	-	AVG	229	1.1	
2463.900	107.3	H	-	-	PK	229	1.1	

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

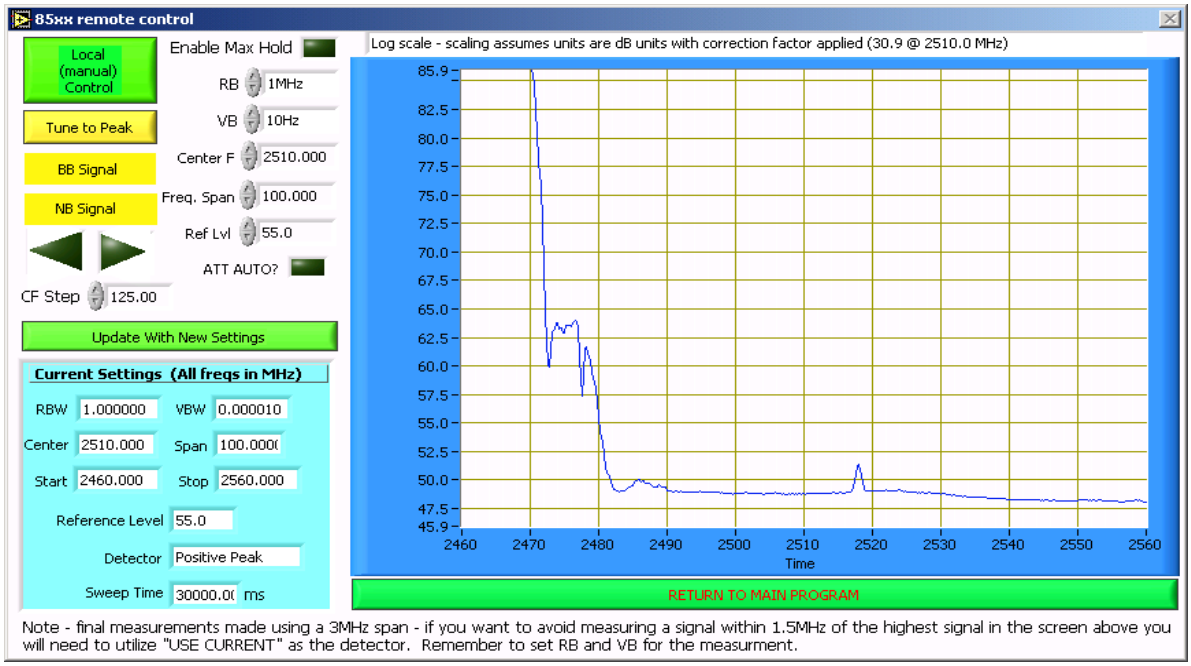
Band Edge Signal Field Strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2487.150	49.5	V	54.0	-4.5	Avg	15	1.0	
2486.340	60.5	V	74.0	-13.5	PK	15	1.0	
2487.810	50.3	H	54.0	-3.7	Avg	229	1.1	
2487.150	62.5	H	74.0	-11.5	PK	229	1.1	

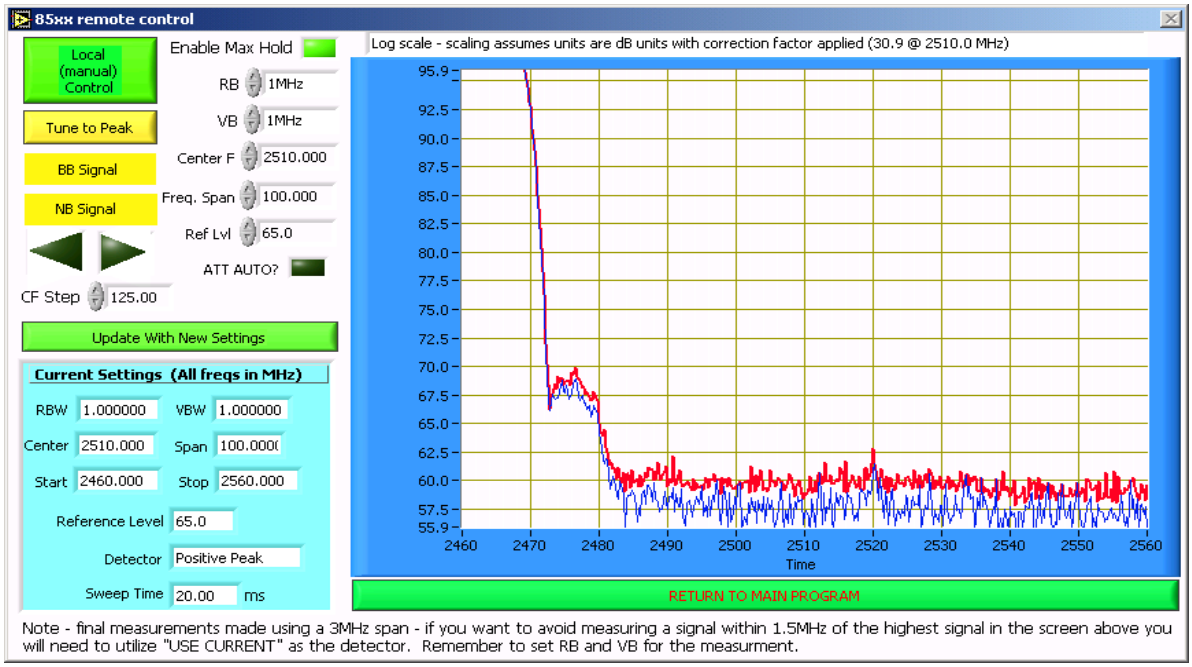
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4923.920	31.5	V	54.0	-22.5	AVG	273	1.0	
4923.920	42.4	V	74.0	-31.6	PK	273	1.0	
7387.390	37.2	V	54.0	-16.8	AVG	100	1.2	
7387.390	48.0	V	74.0	-26.0	PK	100	1.2	
4922.830	30.5	H	54.0	-23.5	AVG	360	1.0	
4922.830	41.9	H	74.0	-32.1	PK	360	1.0	
7387.120	35.6	H	54.0	-18.4	AVG	25	1.4	
7387.120	47.2	H	74.0	-26.8	PK	25	1.4	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A



Note - final measurements made using a 3MHz span - if you want to avoid measuring a signal within 1.5MHz of the highest signal in the screen above you will need to utilize "USE CURRENT" as the detector. Remember to set RB and VB for the measurment.

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 7/17/2008
Test Engineer: Rafael Varelas
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 14 °C
Rel. Humidity: 83 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Power Setting	Measured Power	Test Performed	Limit	Result / Margin
1a	802.11g	low	20	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.7dBuV/m @ 2390.02MHz (-1.3dB)
			20	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	35.7dBuV/m @ 7238.7MHz (-18.3dB)
1b	802.11g	center	26	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	43.4dBµV/m @ 7313.6MHz (-10.6dB)
1c	802.11g	high	20	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.1dBµV/m @ 2483.6MHz (-0.9dB)
			20	-	Radiated Emissions, 1 - 26 GHz	FCC Part 15.209 / 15.247(c)	36.8dBµV/m @ 7386.6MHz (-17.2dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

S/N:490711012865

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 26,000 MHz. Operating Mode: 802.11g, 6mbps

Run #1a: Low Channel @ 2412 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Setting 20								
ob=7, db=7								
2405.200	99.7	V	-	-	AVG	270	1.0	
2405.200	107.6	V	-	-	PK	270	1.0	
2418.250	101.9	H	-	-	AVG	235	1.0	
2418.250	109.6	H	-	-	PK	235	1.0	

Band Edge Signal Field Strength

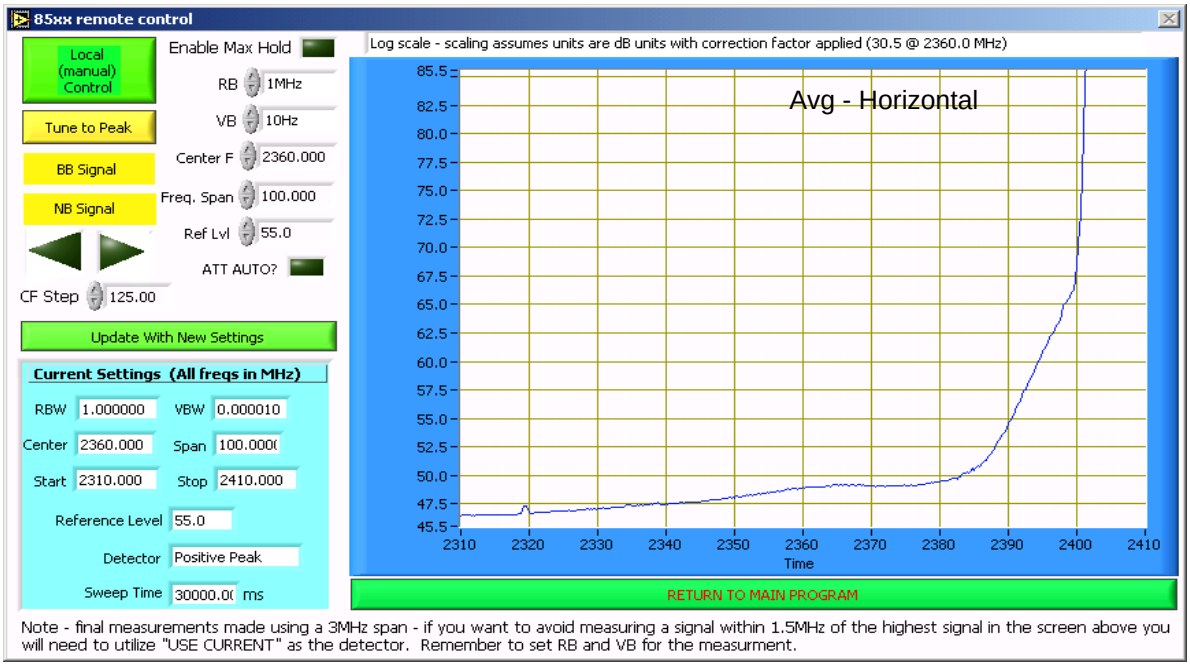
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2389.990	51.2	V	54.0	-2.8	Avg	270	1.0	
2389.960	64.1	V	74.0	-9.9	PK	270	1.0	
2389.990	52.7	H	54.0	-1.3	Avg	235	1.0	
2389.930	65.8	H	74.0	-8.2	PK	235	1.0	

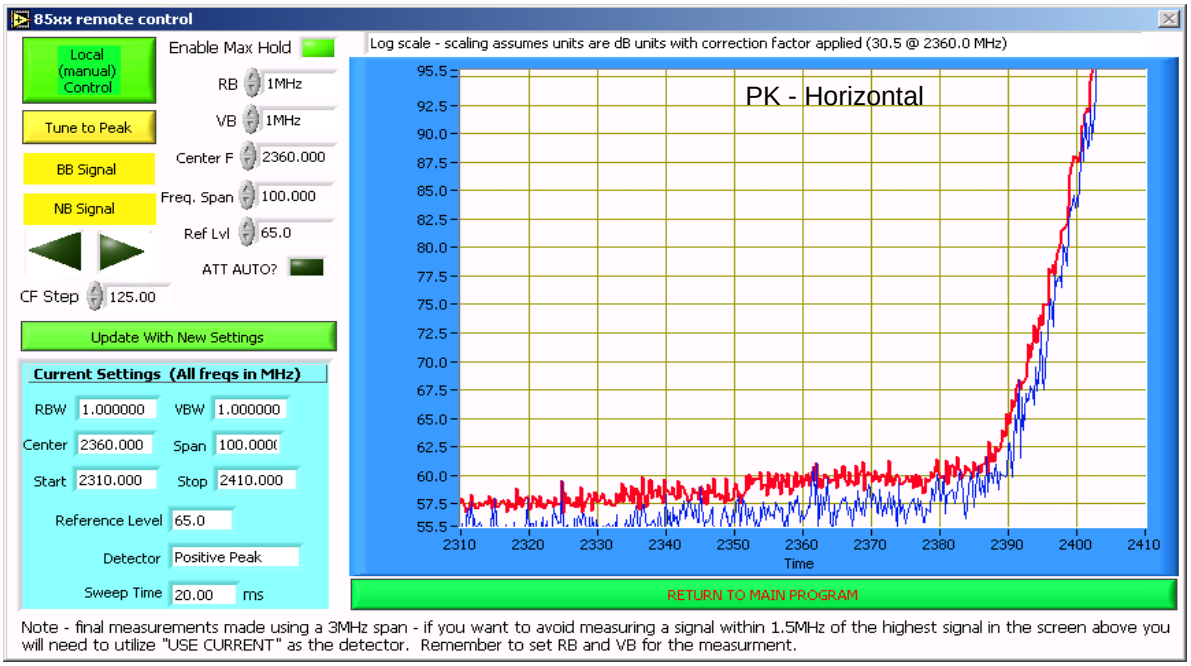
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4824.060	31.2	V	54.0	-22.8	AVG	333	1.0	
4824.060	43.1	V	74.0	-30.9	PK	333	1.0	
7238.650	35.7	V	54.0	-18.3	AVG	260	1.2	
7238.650	48.0	V	74.0	-26.0	PK	260	1.2	
4824.990	31.2	H	54.0	-22.8	AVG	26	1.0	
4824.990	42.9	H	74.0	-31.1	PK	26	1.0	
7238.900	35.6	H	54.0	-18.4	AVG	34	1.5	
7238.900	47.1	H	74.0	-26.9	PK	34	1.5	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A





Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1b: Center Channel @ 2437 MHz

Fundamental emission level @ 3m in 100kHz RBW:		dBµV/m	
Limit for emissions outside of restricted bands:	-20	dBµV/m	Limit is -20dBc (Peak power measurement)
Limit for emissions outside of restricted bands:	-30	dBµV/m	Limit is -30dBc (UNII power measurement)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7313.600	43.4	V	54.0	-10.6	AVG	8	1.6	
7313.600	55.6	V	74.0	-18.4	PK	8	1.6	
4873.250	32.5	V	54.0	-21.5	AVG	111	1.4	
4873.250	43.9	V	74.0	-30.1	PK	111	1.4	
9747.290	39.4	H	54.0	-14.6	AVG	177	1.0	
9747.290	52.3	H	74.0	-21.7	PK	177	1.0	
9747.380	35.6	V	54.0	-18.4	AVG	75	1.7	
9747.380	48.0	V	74.0	-26.0	PK	75	1.7	
7313.300	40.7	H	54.0	-13.3	AVG	215	1.1	
7313.300	54.5	H	74.0	-19.5	PK	215	1.1	
4874.880	32.0	H	54.0	-22.0	AVG	0	1.1	
4874.880	44.1	H	74.0	-29.9	PK	0	1.1	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.

Run #1c: High Channel @ 2462 MHz

Fundamental Signal Field Strength: Peak and average values measured in 1 MHz, and peak value measured in 100kHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Setting 20								
ob=7, db=7								
2460.800	101.8	H	-	-	AVG	59	1.1	
2460.800	110.5	H	-	-	PK	59	1.1	
2463.900	99.0	V	-	-	AVG	22	1.0	
2463.900	107.4	V	-	-	PK	22	1.0	

Band Edge Signal Field Strength

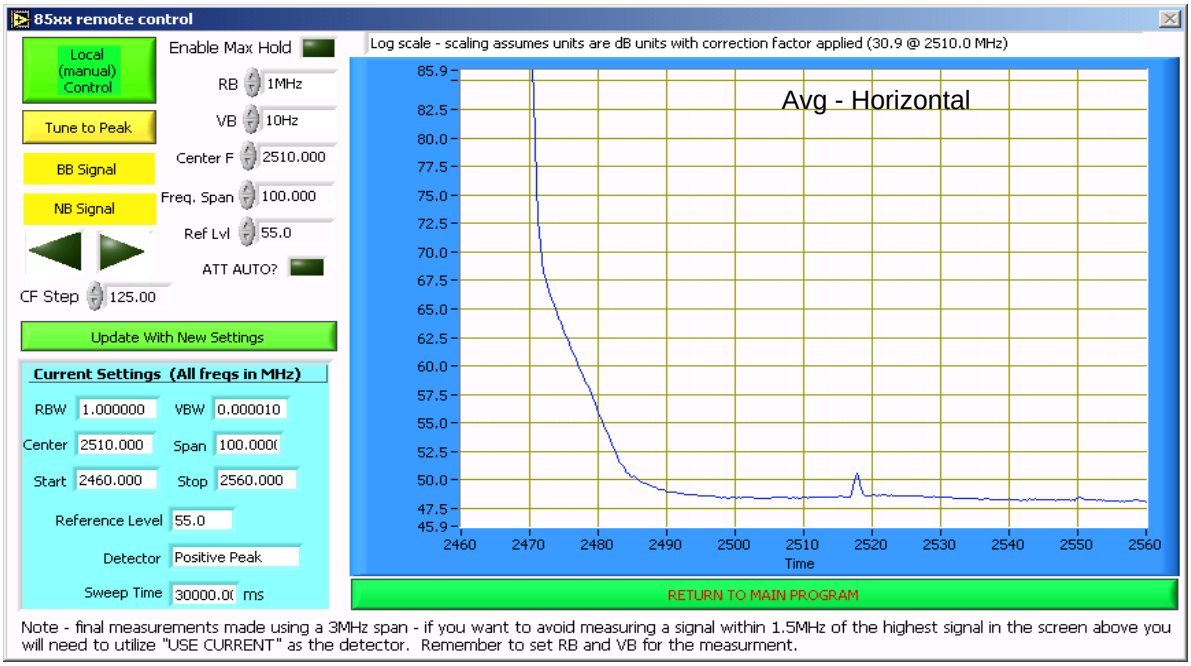
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.600	53.1	H	54.0	-0.9	Avg	59	1.1	
2483.860	68.9	H	74.0	-5.1	PK	59	1.1	
2483.780	51.9	V	54.0	-2.1	Avg	22	1.0	
2483.940	66.2	V	74.0	-7.8	PK	22	1.0	

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

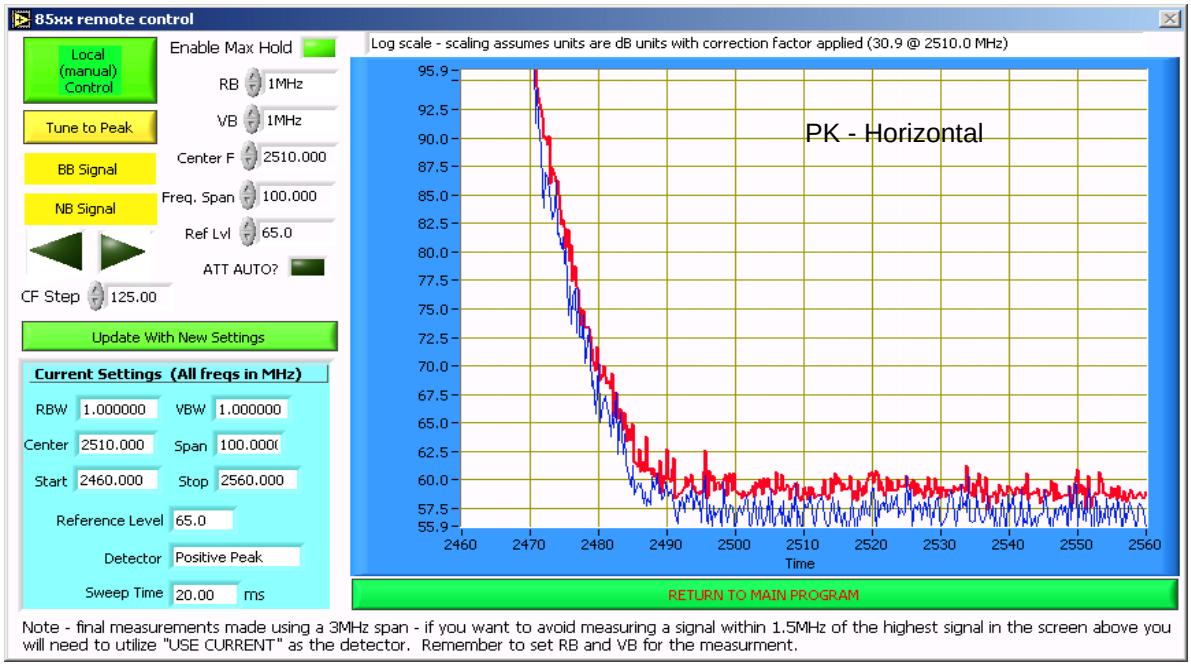
Other Spurious Emissions

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4922.800	30.7	H	54.0	-23.3	AVG	19	1.0	
4922.800	42.8	H	74.0	-31.2	PK	19	1.0	
7386.600	36.8	H	54.0	-17.2	AVG	154	1.3	
7386.600	48.8	H	74.0	-25.2	PK	154	1.3	
4923.650	30.6	V	54.0	-23.4	AVG	280	1.0	
4923.650	42.1	V	74.0	-31.9	PK	280	1.0	
7387.060	35.5	V	54.0	-18.5	AVG	200	2.0	
7387.060	48.2	V	74.0	-25.8	PK	200	2.0	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Signal is not in a restricted band but the more stringent restricted band limit was used.



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A



Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	-

Conducted Emissions - Power Ports

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/3/2008 1:17
Test Engineer: Rafael Varelas
Test Location: SVOATS #2

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. Remote support equipment was located approximately 30 meters from the test area. All I/O connections were routed overhead.

Ambient Conditions:

Temperature: 15 °C
Rel. Humidity: 83 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz	EN55022 Class B	Pass	52.0dBµV @ 0.184MHz (-12.3dB)

Modifications Made During Testing

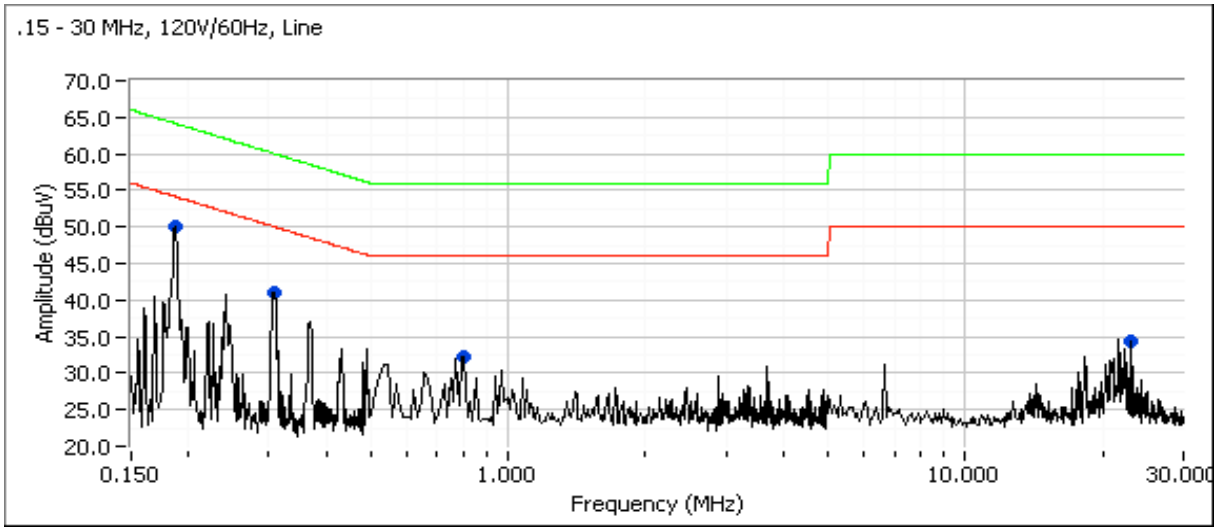
No modifications were made to the EUT during testing

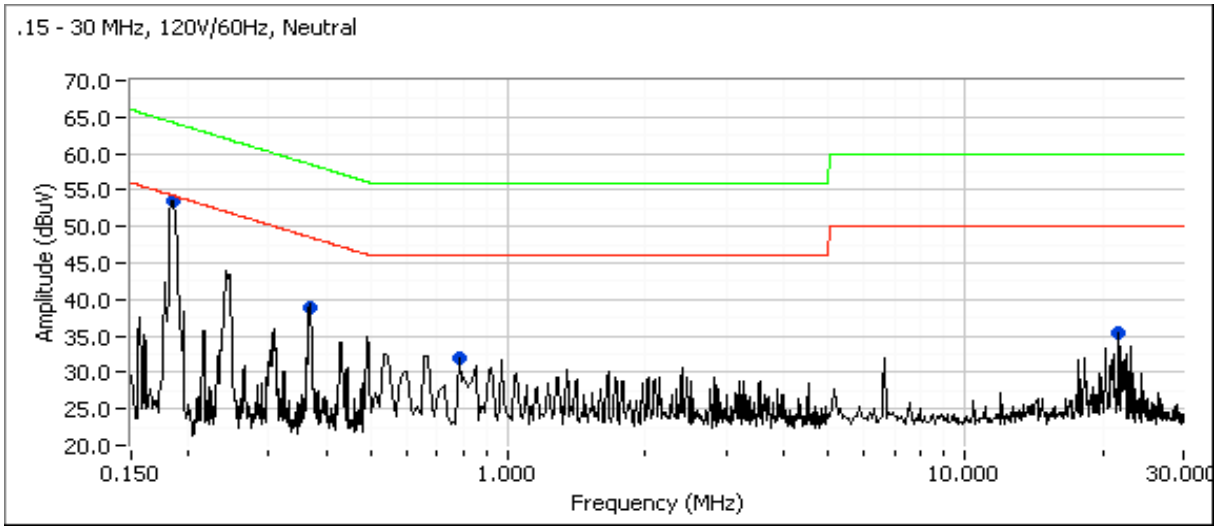
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz





Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	-

Run #1: Continued

Frequency	Level	AC	EN55022 Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.184	52.0	Neutral	64.3	-12.3	QP	
0.184	41.7	Neutral	54.3	-12.6	AVG	
0.184	50.8	Line 1	64.3	-13.5	QP	
0.184	40.5	Line 1	54.3	-13.8	AVG	
21.664	35.4	Neutral	50.0	-14.6	Peak	
0.368	33.8	Neutral	48.5	-14.7	AVG	
23.132	34.4	Line 1	50.0	-15.6	Peak	
0.306	29.9	Line 1	50.1	-20.2	AVG	
0.306	39.6	Line 1	60.1	-20.5	QP	
0.810	25.5	Line 1	46.0	-20.5	AVG	
0.368	37.6	Neutral	58.5	-20.9	QP	
0.811	23.8	Neutral	46.0	-22.2	AVG	
0.810	28.2	Line 1	56.0	-27.8	QP	
0.811	27.0	Neutral	56.0	-29.0	QP	

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 7/5/2008
Test Engineer: Rafael Varelas
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing. All remote support equipment was located approximately 30 meters from the EUT with all I/O connections running on top of the groundplane or routed in overhead in the GR-1089 test configuration.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions:

Temperature: 28 °C
Rel. Humidity: 46 %

Run #	Test Performed	Limit	Result	Margin
1	RE, 30 - 13,000 MHz, Receiver Emissions	IC RSS-210	Pass	37.3dBµV/m @ 12183.8MHz (-16.7dB)
2	RE, 30 - 13,000 MHz, Receiver Emissions	IC RSS-210	Pass	37.2dBµV/m @ 12186.2MHz (-16.8dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	2Wire	Job Number:	J72573
Model:	3800HGV-B	T-Log Number:	T72620
		Account Manager:	Susan Pelzl
Contact:	Mark Rieger		
Standard:	FCC 15.247	Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 13,000 MHz. Operating Mode: 802.11b
Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12183.840	37.3	V	54.0	-16.7	AVG	315	1.0	
12184.660	37.2	H	54.0	-16.8	AVG	214	1.0	
7312.150	32.9	V	54.0	-21.1	AVG	254	1.0	
7310.510	32.8	H	54.0	-21.2	AVG	360	1.5	
4875.410	28.9	V	54.0	-25.1	AVG	338	1.0	
4873.800	28.8	H	54.0	-25.2	AVG	0	1.3	
12183.840	48.5	V	74.0	-25.5	PK	315	1.0	
12184.660	48.4	H	74.0	-25.6	PK	214	1.0	
7312.150	44.3	V	74.0	-29.7	PK	254	1.0	
7310.510	43.6	H	74.0	-30.4	PK	360	1.5	
4873.800	40.2	H	74.0	-33.8	PK	0	1.3	
4875.410	39.8	V	74.0	-34.2	PK	338	1.0	

Run #2: Radiated Spurious Emissions, 30 - 13,000 MHz. Operating Mode: 802.11g
Center Channel @ 2437 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12186.190	37.2	H	54.0	-16.8	AVG	0	1.0	
12183.750	37.2	V	54.0	-16.8	AVG	33	1.7	
7311.680	32.8	H	54.0	-21.2	AVG	346	1.0	
7310.030	32.6	V	54.0	-21.4	AVG	156	1.0	
4875.310	28.9	H	54.0	-25.1	AVG	71	1.0	
4875.220	28.7	V	54.0	-25.3	AVG	345	2.0	
12186.190	48.3	H	74.0	-25.7	PK	0	1.0	
12183.750	48.1	V	74.0	-25.9	PK	33	1.7	
7311.680	43.8	H	74.0	-30.2	PK	346	1.0	
7310.030	43.6	V	74.0	-30.4	PK	156	1.0	
4875.220	40.2	V	74.0	-33.8	PK	345	2.0	
4875.310	40.0	H	74.0	-34.0	PK	71	1.0	

EXHIBIT 3: Photographs of Test Configurations

EXHIBIT 4: Proposed FCC ID Label & Label Location

EXHIBIT 5: Detailed Photographs of 2Wire, Inc. Model 3800HGV-B Construction

EXHIBIT 6: Operator's Manual for 2Wire, Inc. Model 3800HGV-B

EXHIBIT 7: Block Diagram of 2Wire, Inc. Model 3800HGV-B

EXHIBIT 8: Schematic Diagrams for 2Wire, Inc. Model 3800HGV-B

EXHIBIT 9: Theory of Operation for 2Wire, Inc. Model 3800HGV-B

EXHIBIT 10: RF Exposure Information