

*Electromagnetic Emissions Test Report
and
Application for Grant of Equipment Authorization
pursuant to*

*Industry Canada RSS-Gen Issue 2 / RSS 210 Issue 7
FCC Part 15, Subpart E*

*on the
Cascade Networks
Transmitter
Model: Cyclone 5400*

UPN: 4586A-5400UNII
FCC ID: QSX5400UNII

GRANTEE: Cascade Networks
1324 Vandercook Way
Longview, WA 98632

TEST SITE: Elliott Laboratories, Inc.
684 W. Maude Ave
Sunnyvale, CA 94086

REPORT DATE: December 12, 2007

FINAL TEST DATE: November 8, November 9, November 15,
November 16 and November 27, 2007

AUTHORIZED SIGNATORY:



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Principal Engineer



2016-01

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REVISION HISTORY

Rev #	Date	Comments	Modified By
1	January 23, 2008	Initial Release	David Guidotti

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SCOPE

An electromagnetic emissions test has been performed on the Cascade Networks model Cyclone 5400 pursuant to the following rules:

Industry Canada RSS-Gen Issue 2
RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
CC Part 15, Subpart E requirements for UNII Devices (using FCC DA 02-2138, August 30, 2002)

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:

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 Cascade Networks model Cyclone 5400 and therefore apply only to the tested sample. The sample was selected and prepared by Brian Magnuson of Cascade Networks

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.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification 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 Cascade Networks model Cyclone 5400 complied with the requirements of the following regulations:

RSS 210 Issue 7 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
CC Part 15, Subpart E requirements for UNII Devices

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

UNII / LELAN DEVICES

Operation in the 5.47 – 5.725 GHz Band

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
-	-	26dB Bandwidth	> 20MHz	Used to determine maximum permitted PSD	N/A
15.407(a)(2)	A9.2(2)	Output Power	14 dBm (.025W) Highest eirp for all configurations: 24dBm	24 dBm / 250mW (eirp < 30dBm)	Complies
15.407(a)(2))	A9.2(2)	Power Spectral Density	6.8 dBm/MHz	7dBm/MHz	Complies
	A9.5b	Peak Spectral Density		7.7 dBm / MHz ¹	Complies
N/A	A9.4	Non-operation in 5600 – 5650 MHz sub band	Device cannot operate in the 5600 – 5650 MHz band		Complies
15.407(a)(2))	A9.4	Dynamic frequency selection / Transmit power control	Refer to Elliott test report R69859		Complies

¹ Reduced from 11dBm because highest value exceeded the average value by more than 3dB

General requirements for all bands

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
	A9.5a	Modulation	Digital Modulation is used	Digital modulation is required	Complies
	RSP 100	99% bandwidth	18.2 MHz	Information only	-
15.407(b) (5) / 15.209	A9.3	Spurious Emissions below 1GHz ¹	Same as Receiver spurious	15.209	Complies (-1.7dB)
15.407(b) (2)	A9.3	Spurious Emissions above 1GHz	50.0dBμV/m (316.2μV/m) @ 5458.5MHz	-27dBm eirp outside restricted bands, 15.209 in restricted bands	Complies (-4.0dB)
15.407(a)(6)	-	Peak Excursion Ratio	Not applicable – device has constant modulation envelope as it uses FSK modulation		-
	A9.5 (3)	Channel Selection	Device shall be tested on the top, bottom and center channels in each band		N/A
15.407 (c)	A9.5(4)	Operation in the absence of information to transmit	Operation is discontinued in the absence of information	Device shall automatically discontinue operation in the absence of information to transmit	Complies
15.407 (g)	A9.5 (5)	Frequency Stability	Frequency stability is better than 10ppm		Complies
15.407 (h1)	A9.5 (5)	Transmit Power Control	TPC is not required as the device operates at below 500mW eirp	Capability to operate with a mean EIRP lower than 24dBm (250mW)	Complies
	A9.5 (7)	User Manual information	Refer to Exhibit 6 for details		Complies

¹ Spurious emissions below 1GHz were independent of receive vs. transmit mode and operating channel, therefore emissions below 1GHz are the same for both transmit and receive modes.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Professional installation required – refer to attestation letter.		Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	44.3dB μ V/m (164.1 μ V/m) @ 500.044MHz	Refer to standard	Complies (- 1.7 dB)
15.207	RSS GEN Table 2	AC Conducted Emissions	43.5dB μ V @ 17.267MHz (-6.5dB)	Refer to standard	Complies (- 6.5 dB)
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations and RSS 102 declaration and page 169 of installation manual	Refer to OET 65, FCC Part 1 and RSS 102	Complies
	RSP 100 RSS GEN 7.1.5	User Manual	Installation manual - page 493 (FCC) and 495 (Industry Canada)	Statement required regarding non-interference	
	RSP 100 RSS GEN 7.1.5	User Manual	Installation manual - page 496 of 527	Statement required regarding detachable antenna	

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 EUT is an Access Point that is designed for outdoor use. The EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 24Vdc 0.3 Amps and is powered via Power-Over-Ethernet.

The sample was received on November 8, 2007 and tested on November 8, 2007. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Cascade Networks	Cyclone 5400	Access Point	11079904	

ANTENNA SYSTEM

The antenna system used with the Cascade Networks model Cyclone 5400 consists of one of the following antennas: Omni (10dBi), Flat Panel (23dBi), and a Sector Panel (16.5dBi).

ENCLOSURE

The EUT enclosure is primarily constructed of sheet metal. It measures approximately 11 cm wide by 5 cm deep by 30 cm high.

MODIFICATIONS

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

SUPPORT EQUIPMENT

No local support equipment was used during emissions testing. The following equipment was used as remote support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Panasonic	-	Laptop	Not recorded	
Motorola	PSA15R-240(MOT)	POE Power Supply	None	-

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)
POE	Remote power supply	Ethernet	Unshielded	15.0
RF	Antenna (omni, Panel or Sector)	50-ohm coaxial used for panel and sector antennas	Shielded	.5m

Note: The RJ-11 ports were not connected during testing. The manufacturer stated that these are for configuration purposes and therefore would not normally be connected.

EUT OPERATION

During emissions testing the EUT was transmitting continuously a modulated signal at a constant power level. The power level was configured to suit the antenna configuration being tested.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on November 8, November 9, November 15, November 16 and November 27, 2007 at the Elliott Laboratories Open Area Test Site #Chamber 3 or semi anechoic chamber #Chamber 3 located at 684 West Maude Avenue, Sunnyvale, California or 41039 Boyce Road, Fremont, 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.

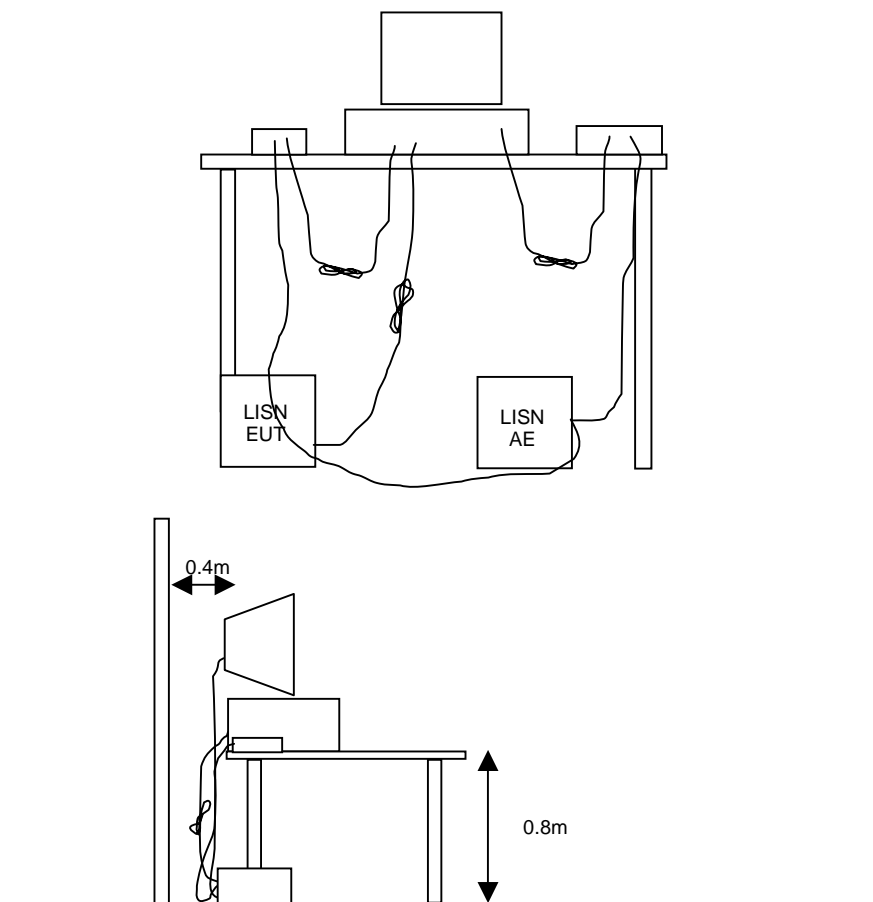
TEST PROCEDURES

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.



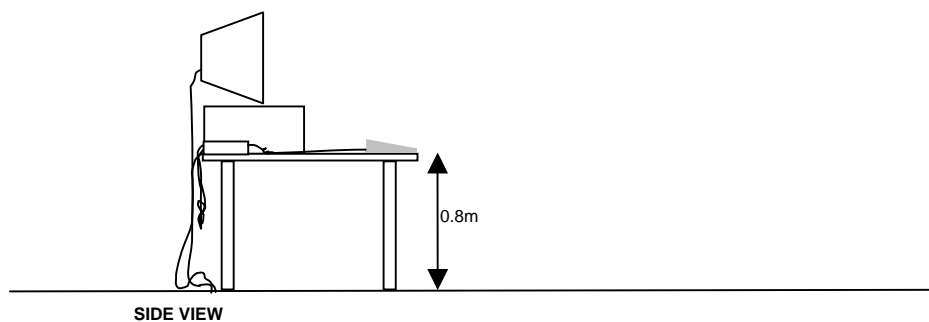
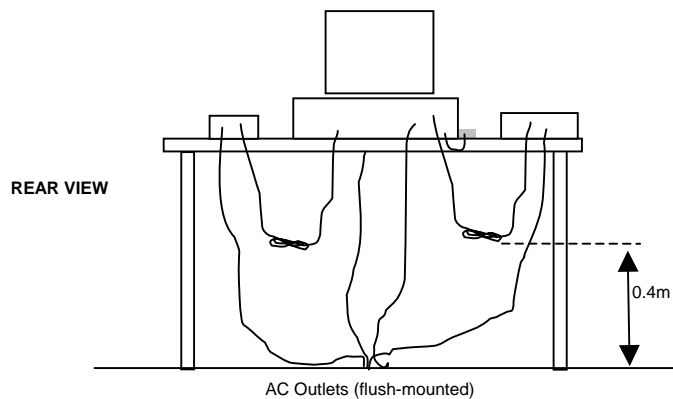
RADIATED EMISSIONS

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.

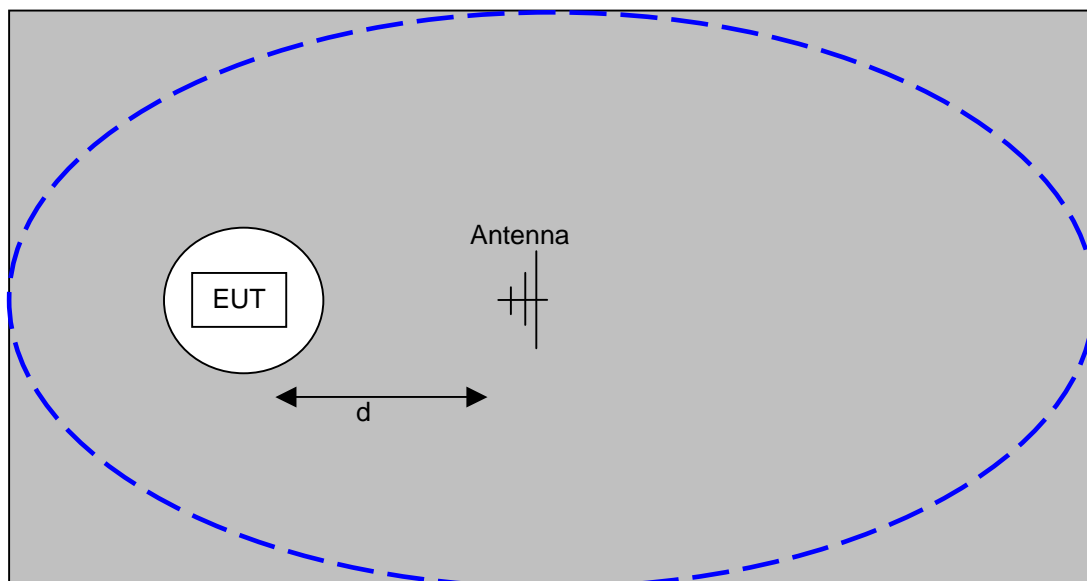
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

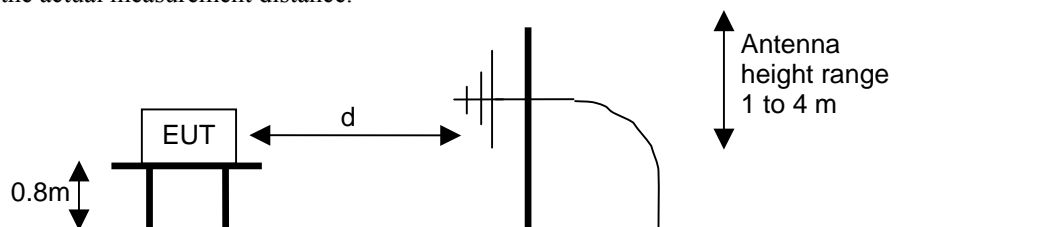
When testing above 18 GHz, the receive antenna is located at 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



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.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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:

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands¹ (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

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

FCC 15.407 (a) OUTPUT POWER LIMITS

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
5150 - 5250	50mW (17 dBm)	4 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

OUTPUT POWER AND SPURIOUS LIMITS –UNII DEVICES

The table below shows the limits for output power and output power density defined by FCC Part 15 Subpart E. 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
5150 - 5250	50mW (17 dBm)	10 dBm/MHz
5250 - 5350	250 mW (24 dBm)	11 dBm/MHz
5470 - 5725	250 mW (24 dBm)	11 dBm/MHz
5725 – 5825	1 Watts (30 dBm)	17 dBm/MHz

The peak excursion envelope is limited to 13dB.

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5825 MHz band may use antennas with gains of up to 23dBi without this limitation. If the gain exceeds 23dBi then the output power limit of 1 Watt is reduced by 1dB for every dB the gain exceeds 23dBi.

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

Radiated Emissions, 30 - 2000 MHz, 08-Nov-07**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	SpecAn 9 KHz-26.5 GHz, Non-Program	8563E	284	21-Jun-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	785	29-May-08
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	12-Apr-08
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	10-May-08
Com-Power Corp.	Preamplifier, 30-1000 MHz	PA-103	1632	25-May-08

Conducted Emissions - AC Power Ports, 08-Nov-07**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	25-Jan-08
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	25-Aug-08
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1593	11-Apr-08

Conducted Emissions - AC Power Ports, 08-Nov-07**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Elliott Laboratories	LISN, FCC / CISPR	LISN-3, OATS	304	18-Jul-08
Hewlett Packard	EMC Spectrum Analyzer, 9 kHz - 6.5 GHz	8595EM	787	21-Dec-07
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	812	05-Feb-08
Rohde & Schwarz	Test Receiver, 9 kHz-2750 MHz	ESCS 30	1337	21-Sep-08

Radiated Emissions, 30 - 18,000 MHz, 09-Nov-07**Engineer: Rafael Varelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	Antenna, Horn, 1-18GHz	3115	868	26-Apr-08
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	15-Nov-07
Hewlett Packard	SpecAn 30 Hz -40 GHz, SV (SA40) Red	8564E (84125C)	1148	08-Oct-08
Hewlett Packard	High Pass filter, 8.2 GHz (Red System)	P/N 84300-80039 (84125C)	1152	15-Oct-08

EXHIBIT 2: Test Measurement Data

62 Pages



EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
		Account Manager:	Dean Eriksen
Contact:	Brian Magnuson		-
Emissions Standard(s):	FCC Part 15.247/RSS-210	Class:	B
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Cascade Networks

Model

Cyclone 5400

Date of Last Test: 11/26/2007



EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
		Account Manger:	Dean Eriksen
Contact:	Brian Magnuson		
Emissions Standard(s):	FCC Part 15.247/RSS-210	Class:	B
Immunity Standard(s):	-	Environment:	-

EUT INFORMATION

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

General Description

The EUT is an Access Point that is designed for outdoor use. The EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 24Vdc 0.3 Amps and is powered via Power-Over-Ethernet.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Cascade Networks	Cyclone 5400	Acces Point	11079904	

Other EUT Details

The following EUT details should be noted: The EUT is powered via POE.

EUT Antenna (Intentional Radiators Only)

The EUT antenna is a Omni (10dBi), Flat Panel (23dBi), and a Sector Panel (16.5dBi).

EUT Enclosure

The EUT enclosure is primarily constructed of sheet metal . It measures approximately 11 cm wide by 5 cm deep by 30 cm high.



EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
		Account Manger:	Dean Eriksen
Contact:	Brian Magnuson		
Emissions Standard(s):	FCC Part 15.247/RSS-210	Class:	B
Immunity Standard(s):	-	Environment:	-

Test Configuration #1

*The following information was collected during the test session(s).
The client agreed to provide the following information after the test session(s).*

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
-	-	-	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Panasonic		Laptop		
Motorola	PSA15R-240(MOT)	POE Power Supply	-	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
POE	Remote power supply	Ethernet	Unshielded	15.0
Coax	Omni antenna	-	-	-

EUT also tested with the following antennas:

Coax	Flat Panel antenna	Coax	Unshielded	0.5
Coax	Sector Panel antenna	-	-	-

Note: The RJ-11 ports was not connected during testing. The manufacturer stated that these are for configuration purposes and therefore would not normally be connected.

EUT Operation During Emissions Tests

During emissions testing the EUT was trasmitting at different power levels, power level was configured depending on the antenna configuration being tested.



EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
		Account Manger:	Dean Eriksen
Contact:	Brian Magnuson		
Emissions Standard(s):	FCC Part 15.247/RSS-210	Class:	B
Immunity Standard(s):	-	Environment:	-

Test Configuration #2

*The following information was collected during the test session(s).
The client agreed to provide the following information after the test session(s).*

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Motorola	PSA15R-240(MOT)	POE Power Supply	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Panasonic	??	Laptop		

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
POE	Power supply	Cat-5	Unshielded	2.0
Power supply	Mains	2Wire	Unshielded	1.0
Coax	Omni antenna	-	-	-

EUT also tested with the following antennas:

Coax	Flat Panel antenna	Coax	Unshielded	0.5
Coax	Sector Panel antenna	-	-	-

Note: The RJ-11 ports was not connected during testing. The manufacturer stated that these are for configuration purposes and therefore would not normally be connected.

EUT Operation During Emissions Tests

During emissions testing the EUT was trasmitting at different power levels, power level was configured depending on the antenna configuration being tested.

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

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: 11/8/2007 17:40
Test Engineer: Rafael Varelas
Test Location: SVOATS #1

Config. Used: 2
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: 11 °C
Rel. Humidity: 80 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	FCC 15.209 / FCC 15.109	Pass	43.5dBµV @ 17.267MHz (-6.5dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

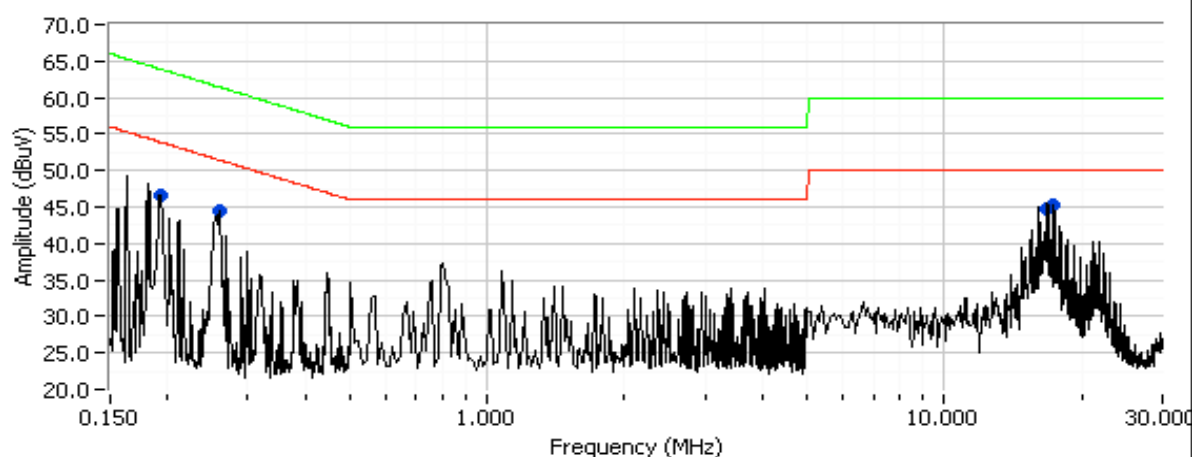
Deviations From The Standard

No deviations were made from the requirements of the standard.

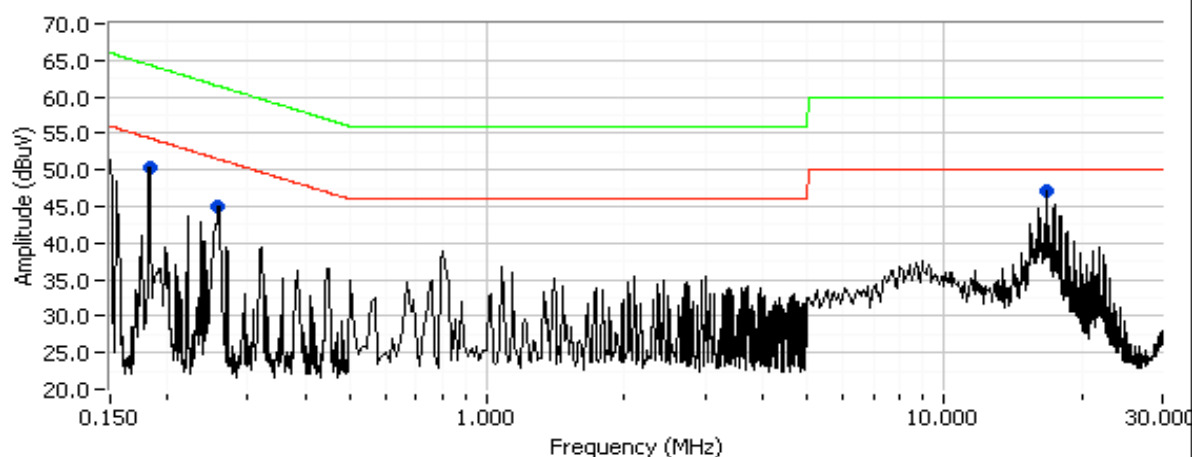
Client: Cascade Networks	Job Number: J69809
Model: Cyclone 5400	T-Log Number: T69846
Contact: Brian Magnuson	Account Manager: Dean Eriksen
Standard: FCC Part 15.247/RSS-210	Class: B

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

.15 - 30 MHz, 120V/60Hz, Neutral



.15 - 30 MHz, 120V/60Hz, Line





EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

Run #1: Continued

Frequency MHz	Level dB μ V	AC Line	FCC 15.109 B		Detector QP/Ave	Comments
			Limit	Margin		
17.267	43.5	Neutral	50.0	-6.5	AVG	
16.804	43.3	Neutral	50.0	-6.7	AVG	
16.801	43.1	Line 1	50.0	-6.9	AVG	
0.191	46.6	Neutral	53.9	-7.3	Peak	
0.255	43.1	Neutral	51.6	-8.5	AVG	
0.257	41.2	Line 1	51.5	-10.3	AVG	
0.255	48.0	Neutral	61.6	-13.6	QP	
17.267	45.2	Neutral	60.0	-14.8	QP	
0.257	46.4	Line 1	61.5	-15.1	QP	
16.801	44.8	Line 1	60.0	-15.2	QP	
16.804	44.4	Neutral	60.0	-15.6	QP	
0.194	48.3	Line 1	63.9	-15.6	QP	
0.194	34.8	Line 1	53.9	-19.1	AVG	

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	

Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

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: 11/8/2007
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #3

Config. Used: 2
Config Change: None
EUT Voltage: POE

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing. Any remote support equipment was located outside the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions: Temperature: 21.7 °C
Rel. Humidity: 39 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	RE, 30 - 1000 MHz, Maximized Emissions	FCC Class A	Pass	37.0dB μ V/m @ 437.500MHz (-10.0dB)
3	RE, 1000 - 2000 MHz, Maximized Emissions	FCC Class A	Pass	37.0dB μ V/m @ 437.500MHz (-9.4dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

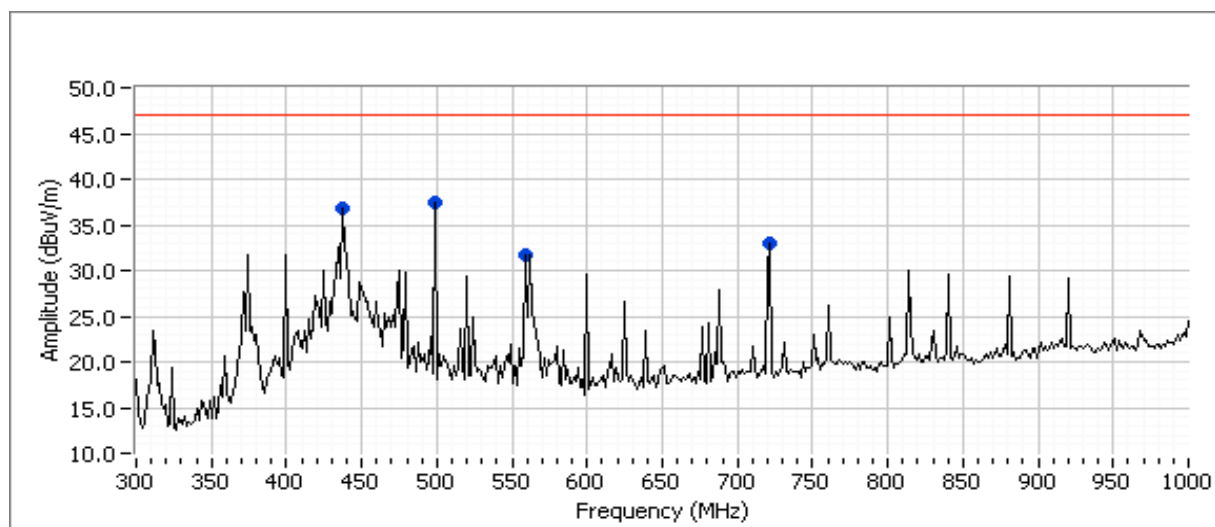
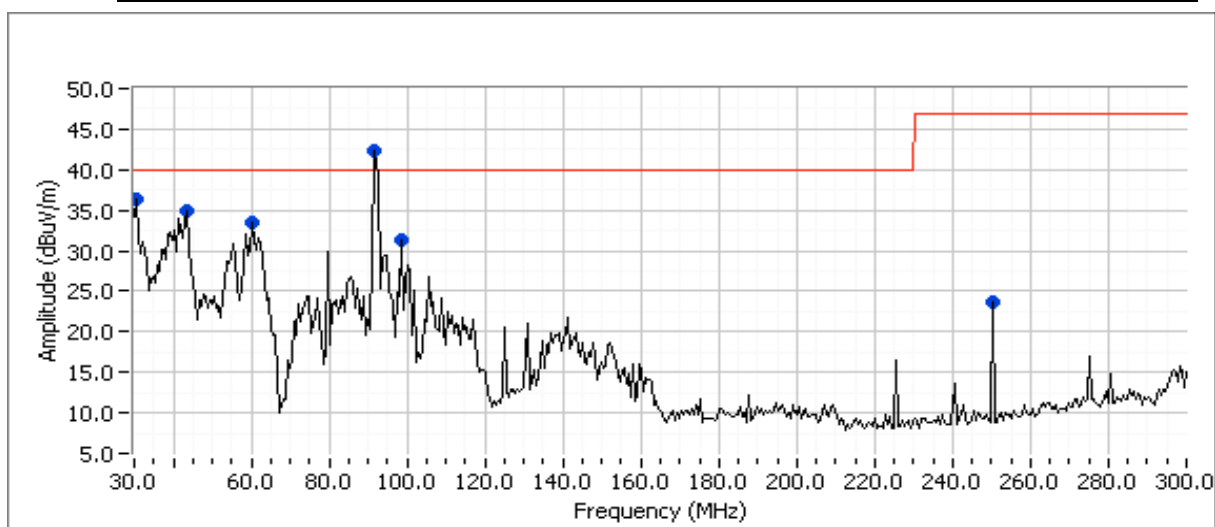
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	10	10	0.0





EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	EN55022 Class A		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
91.102	42.4	V	40.0	2.4	Peak	20	1.0	
31.113	36.3	V	40.0	-3.7	Peak	20	1.0	
43.959	34.9	V	40.0	-5.1	Peak	354	1.0	
59.999	33.4	V	40.0	-6.6	Peak	39	2.0	
100.324	31.3	V	40.0	-8.7	Peak	168	1.0	
499.998	37.4	V	47.0	-9.6	Peak	12	3.5	
437.500	36.8	H	47.0	-10.2	Peak	285	1.5	
720.009	33.0	H	47.0	-14.0	Peak	304	1.0	
560.016	31.8	H	47.0	-15.2	Peak	301	1.5	
250.009	23.7	H	47.0	-23.3	Peak	51	3.0	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	EN55022 Class A		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
437.500	37.0	H	47.0	-10.0	QP	285	1.5	
499.998	36.9	V	47.0	-10.1	QP	11	3.5	
560.016	32.4	H	47.0	-14.6	QP	300	1.5	
720.009	32.1	H	47.0	-14.9	QP	304	1.0	
59.999	23.2	V	40.0	-16.8	QP	39	2.0	
31.113	22.9	V	40.0	-17.1	QP	20	1.0	
91.102	17.1	V	40.0	-22.9	QP	20	1.0	
43.959	15.0	V	40.0	-25.0	QP	354	1.0	
100.324	13.7	V	40.0	-26.3	QP	168	1.0	

Run #2: Maximized Readings From Run #1

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

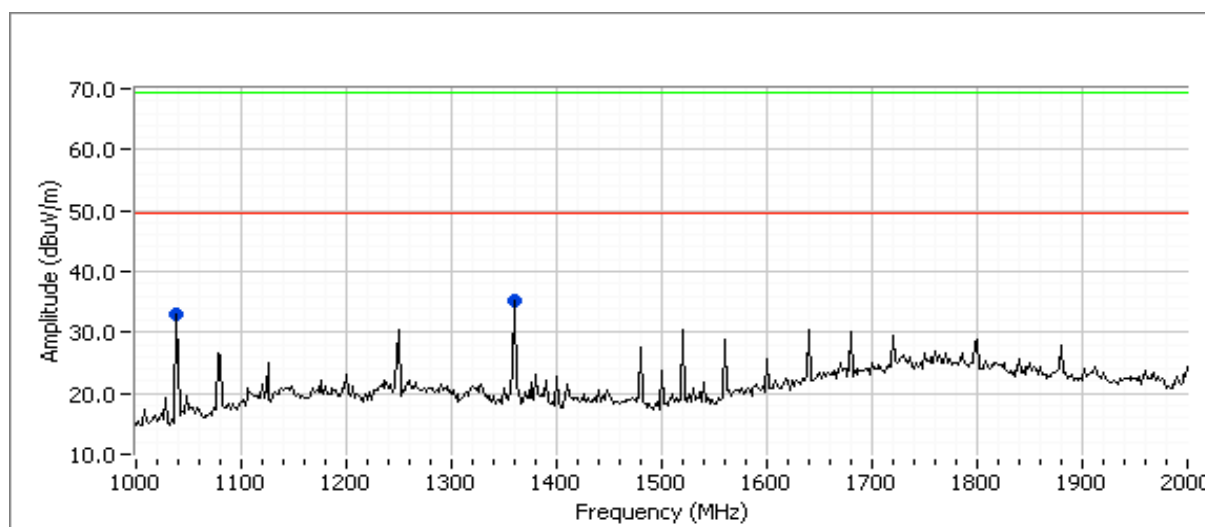
Frequency	Level	Pol	EN55022 Class A		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
437.500	37.0	H	47.0	-10.0	QP	285	1.5	
499.998	36.9	V	47.0	-10.1	QP	11	3.5	
560.016	32.4	H	47.0	-14.6	QP	300	1.5	
720.009	32.1	H	47.0	-14.9	QP	304	1.0	
59.999	23.2	V	40.0	-16.8	QP	39	2.0	
31.113	22.9	V	40.0	-17.1	QP	20	1.0	

Frequency	Level	Pol	FCC Class A		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
437.500	37.0	H	46.4	-9.4	QP	285	1.5	
499.998	36.9	V	46.4	-9.5	QP	11	3.5	
560.016	32.4	H	46.4	-14.0	QP	300	1.5	
720.009	32.1	H	46.4	-14.3	QP	304	1.0	
59.999	23.2	V	39.1	-15.9	QP	39	2.0	
31.113	22.9	V	39.1	-16.2	QP	20	1.0	

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	

Run #3: Maximized Readings, 1000 - 2000 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
1000 - 2000 MHz	3	10	-10.5



Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency	Level	Pol	FCC Class A		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1040.080	33.0	H	49.5	-16.5	Peak	285	1.0	
1360.070	35.2	V	49.5	-14.3	Peak	16	1.0	

Final peak and average readings

Frequency	Level	Pol	FCC Class A		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1359.990	34.5	V	49.5	-15.0	AVG	16	1.0	
1359.990	37.0	V	69.5	-32.5	PK	16	1.0	
1039.880	31.8	H	49.5	-17.7	AVG	285	1.0	
1039.880	34.0	H	69.5	-35.5	PK	285	1.0	

Note 1: Above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

Radiated Emissions - Rx Mode

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: 11/9/2007 5:39
 Test Engineer: Rafael Varelas
 Test Location: Chamber #2 / OATS#1

Config. Used: 1
 Config Change: None
 EUT Voltage: POE

General Test Configuration

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

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature:	13 °C
Rel. Humidity:	80 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
4	RE, 30 - 18,000MHz, Maximized Emissions	FCC Class B	Pass	44.3dB μ V/m (164.1 μ V/m) @ 500.044MHz (-1.7dB)

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.

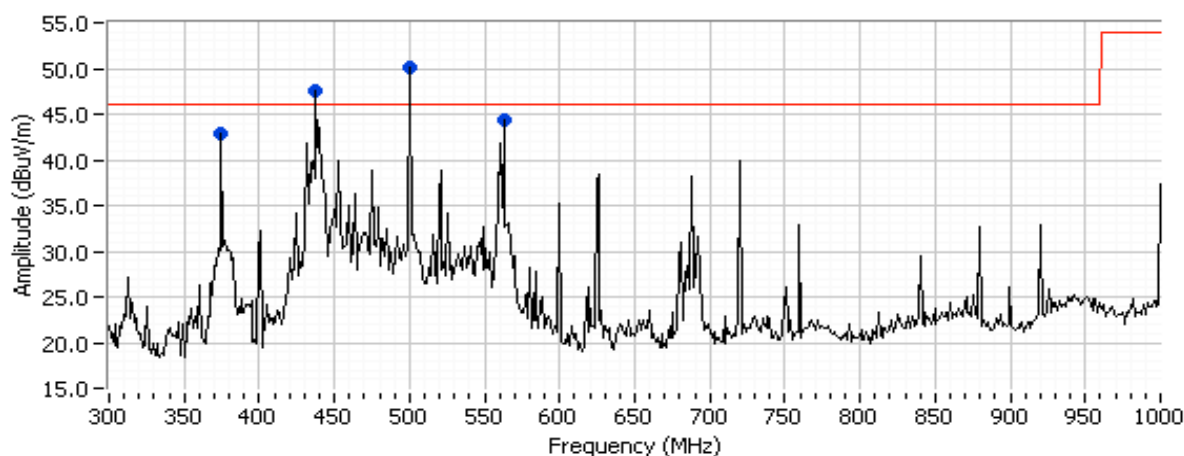
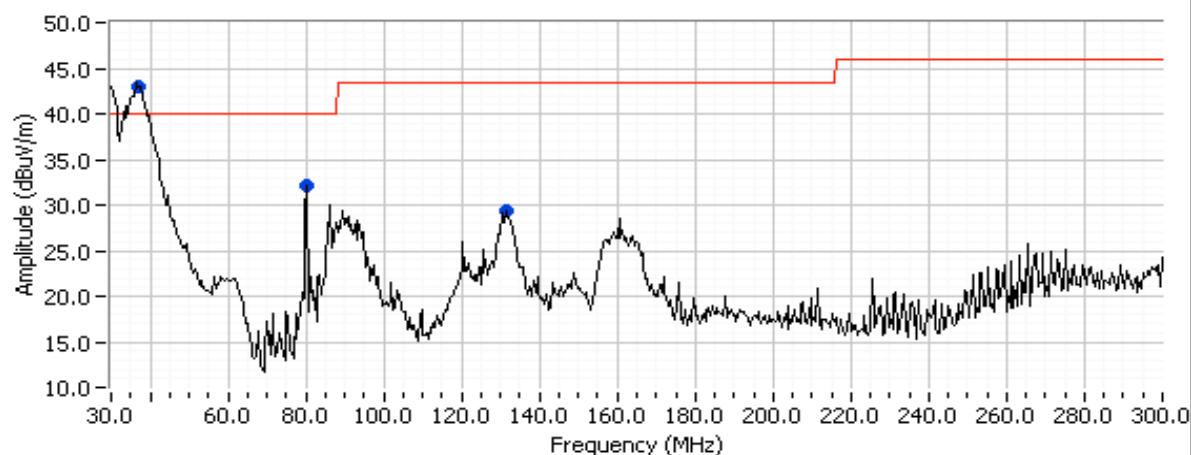
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

Run #1: Preliminary Radiated Emissions, 30-18,000 MHz

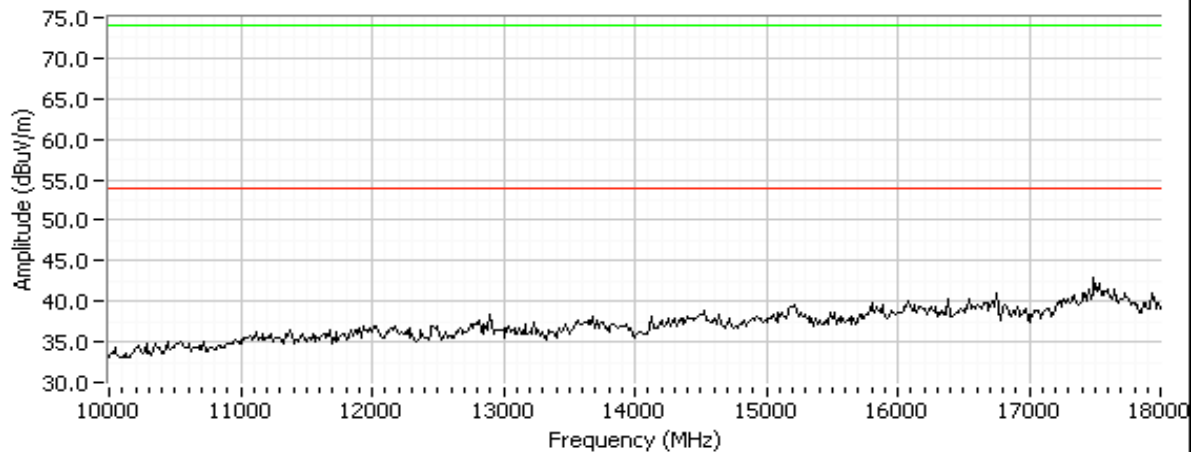
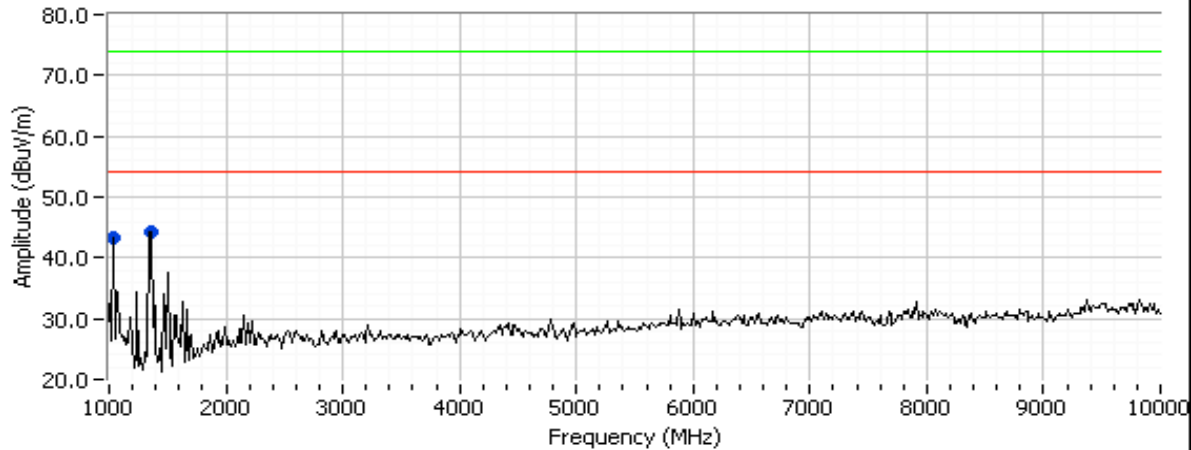
Omni Antenna, Rx mode @ 5600 MHz

Note - emissions below 1GHz were independent of operating frequency and did not change between transmit mode/receive mode. Refer also to the digital device emissions data obtained with the device in transmit/receive mode. Data from 30 - 1000 MHz is considered representative for both transmit and receive mode emissions.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0
1000 - 18000 MHz	1	3	-9.5



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B



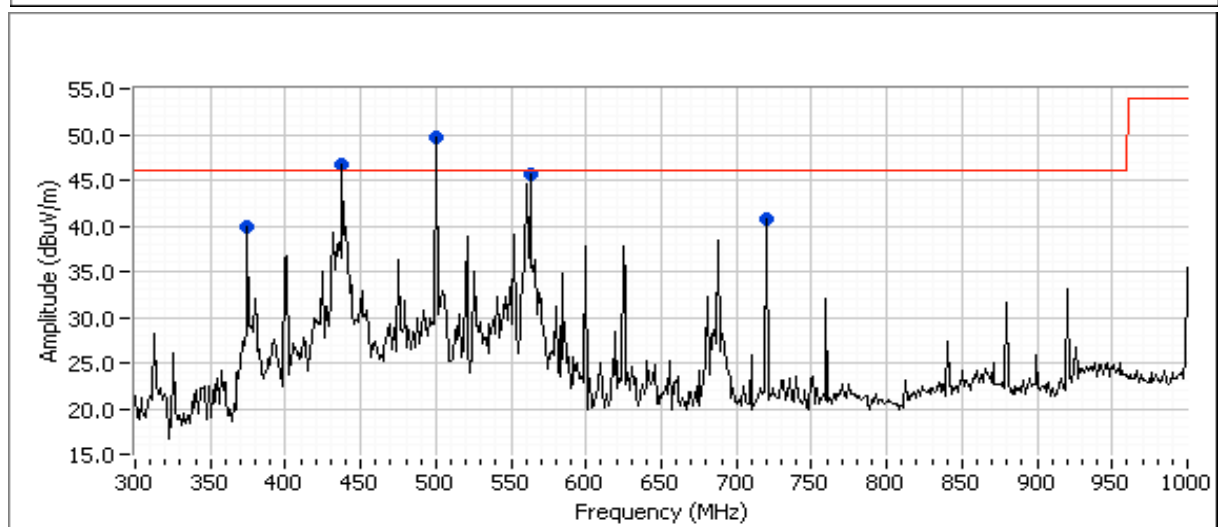
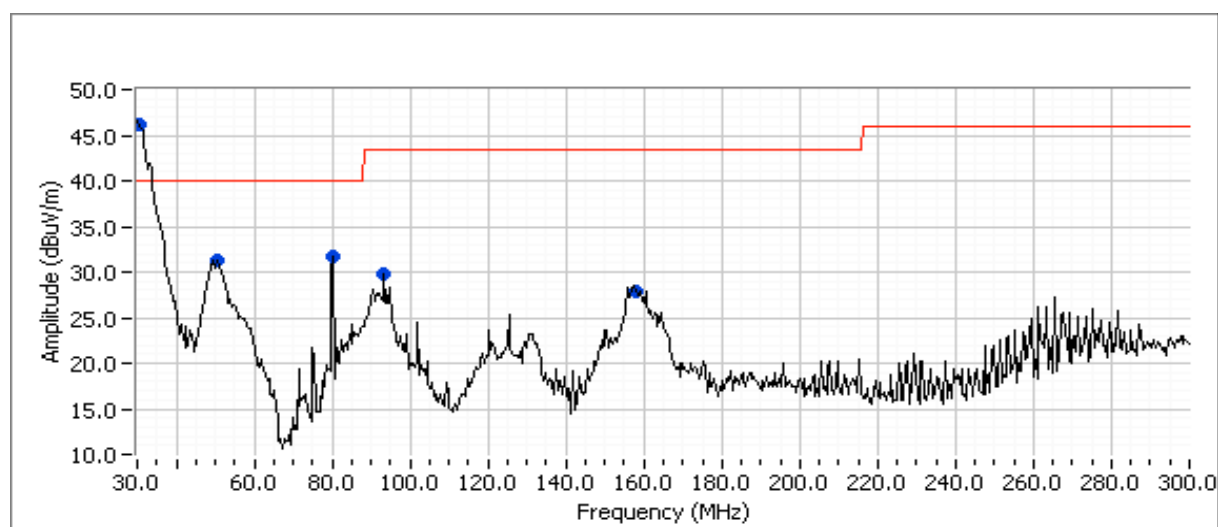
Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
37.332	42.9	V	40.0	2.9	Peak	241	1.7	
80.023	32.1	V	40.0	-7.9	Peak	181	1.7	
131.963	29.4	V	43.5	-14.1	Peak	241	1.7	
437.504	47.5	V	46.0	1.5	Peak	280	1.7	
500.044	50.2	V	46.0	4.2	Peak	164	1.7	
562.527	44.3	V	46.0	-1.7	Peak	198	1.7	
375.020	42.8	V	46.0	-3.2	Peak	48	1.7	
1040.107	43.2	V	54.0	-10.8	Peak	252	1.7	
1359.830	44.2	V	54.0	-9.8	Peak	277	1.7	

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

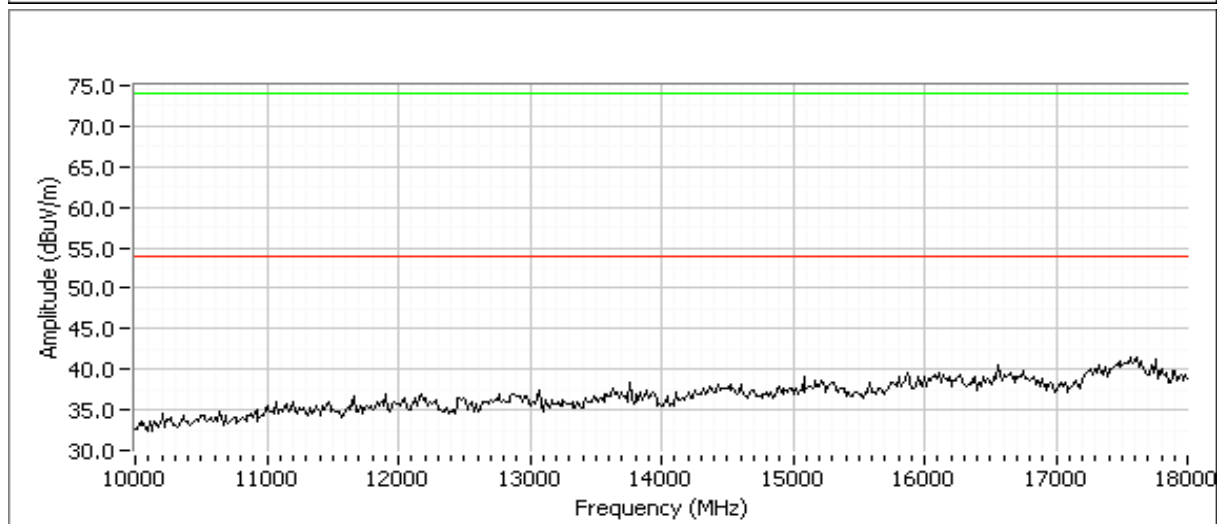
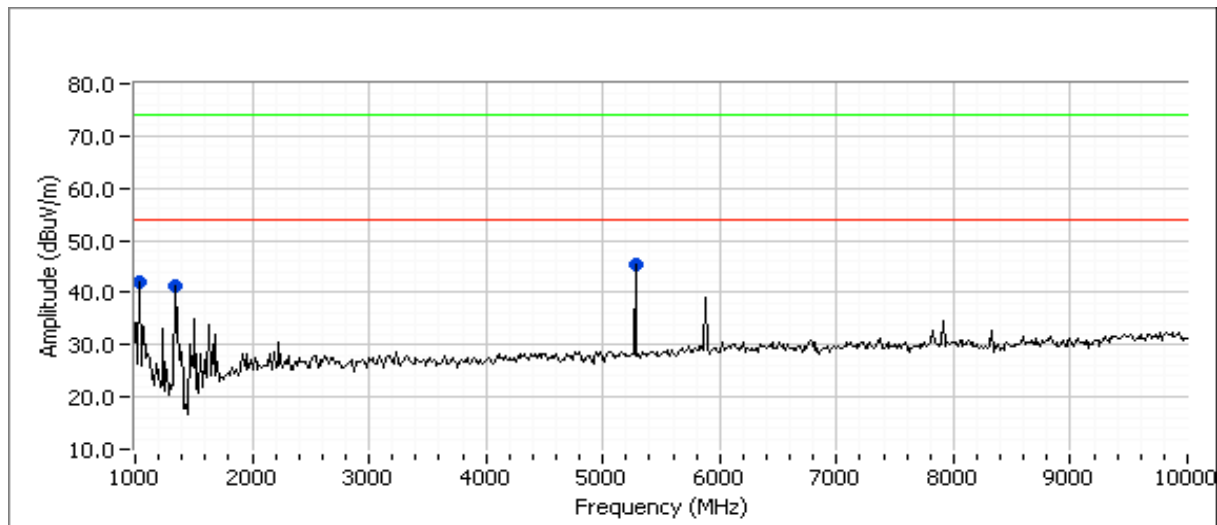
Run #2: Preliminary Radiated Emissions, 30-18,000 MHz

Flat Panel Antenna, Rx mode @ 5600 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0
1000 - 18000 MHz	1	3	-9.5



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

Run #2: Continued


Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

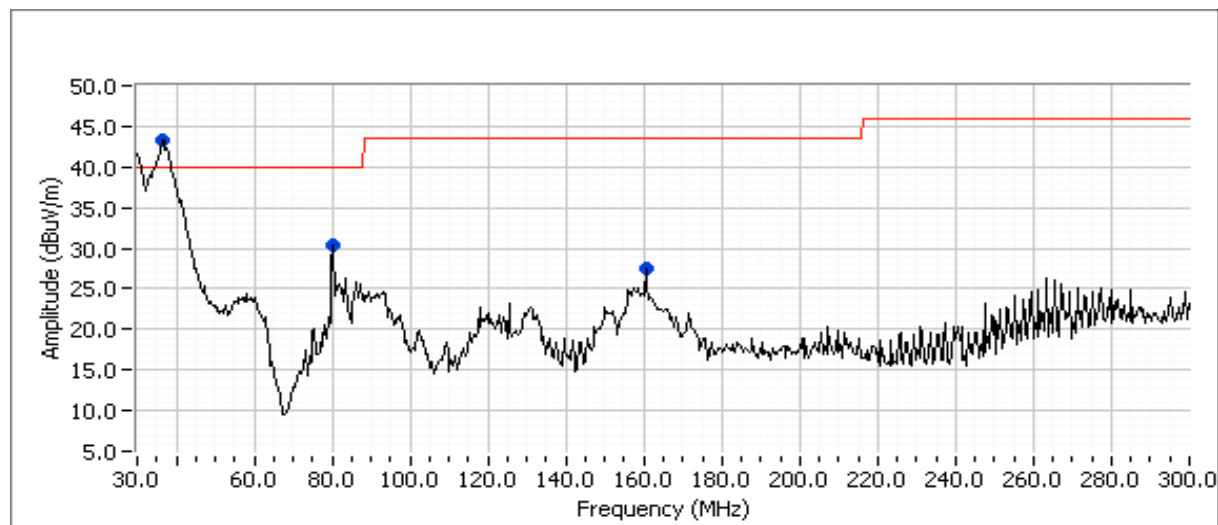
Run #2: Continued

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
30.104	46.2	V	40.0	6.2	Peak	208	1.7	
49.689	31.2	V	40.0	-8.8	Peak	119	1.7	
80.017	31.7	V	40.0	-8.3	Peak	28	1.7	
93.025	29.7	V	43.5	-13.8	Peak	208	1.7	
157.113	27.8	H	43.5	-15.7	Peak	92	1.7	
437.518	46.8	H	46.0	0.8	Peak	94	1.7	
562.527	45.6	V	46.0	-0.4	Peak	195	1.7	
500.030	49.7	V	46.0	3.7	Peak	198	1.7	
375.020	40.0	V	46.0	-6.0	Peak	287	1.7	
720.027	40.8	V	46.0	-5.2	Peak	216	1.7	
1040.107	42.2	V	54.0	-11.8	Peak	301	1.7	
1359.850	41.4	V	54.0	-12.6	Peak	288	1.7	
5269.930	45.2	V	54.0	-8.8	Peak	94	1.7	

Run #3: Preliminary Radiated Emissions, 30-18,000 MHz

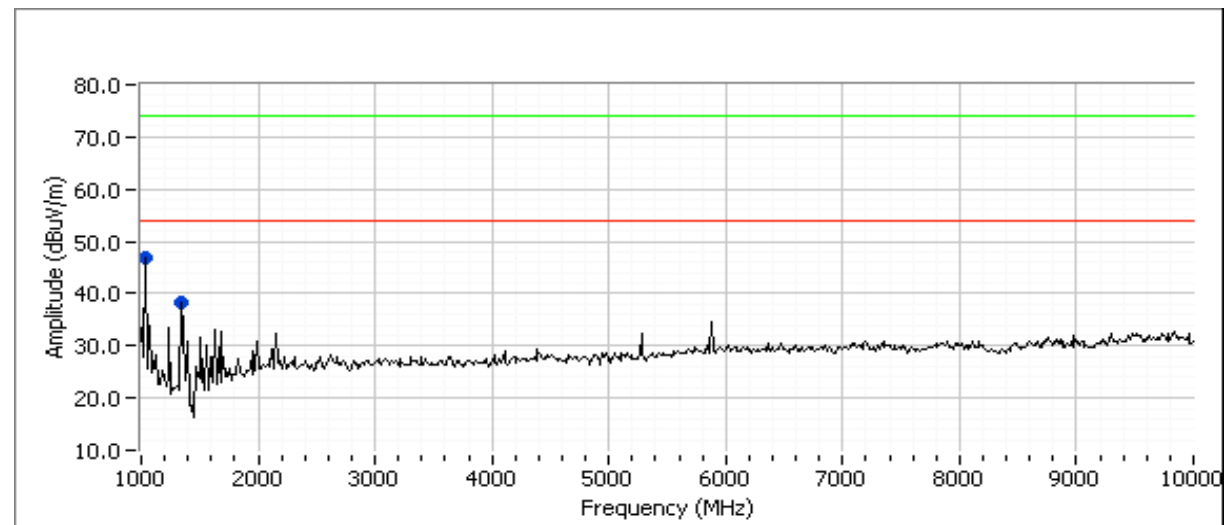
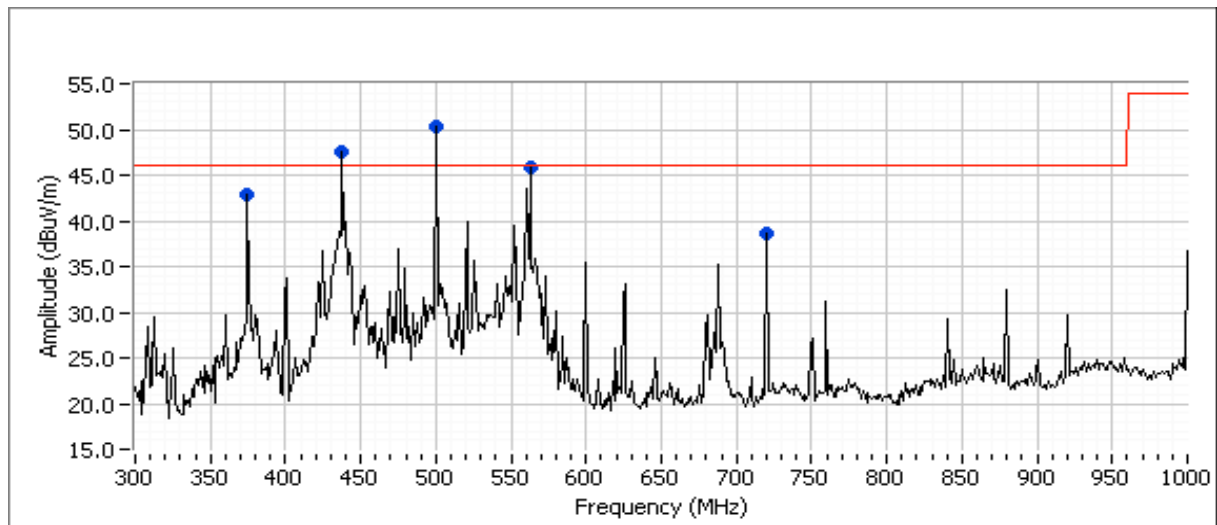
Sector Panel Antenna, Rx mode @ 5600 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0
1000 - 18000 MHz	1	3	-9.5



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

Run #3: Continued

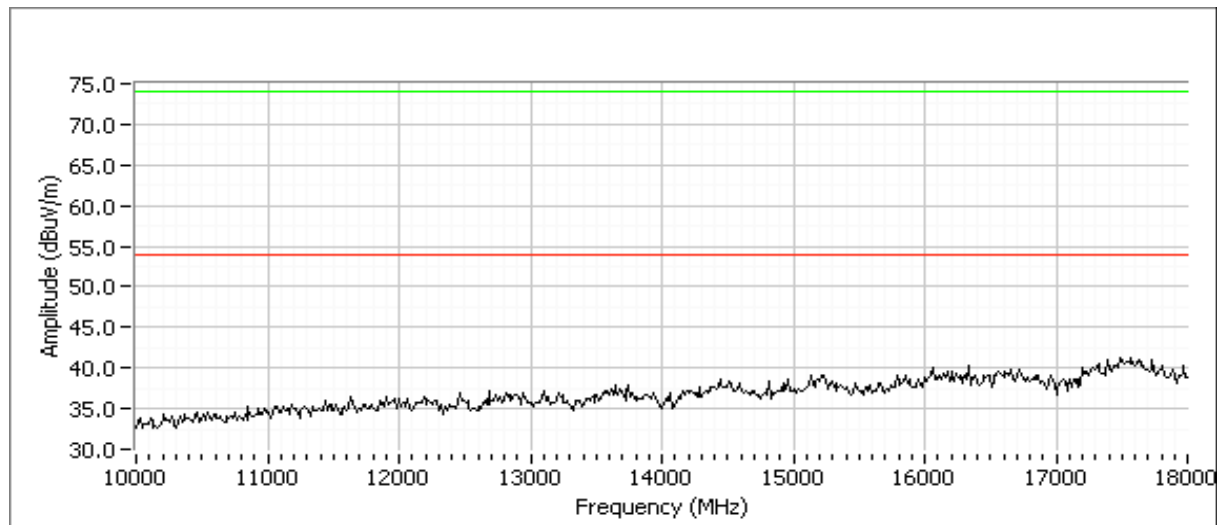




EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

Run #3: Continued



Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
35.970	43.4	V	40.0	3.4	Peak	208	1.7	
80.017	30.4	V	40.0	-9.6	Peak	178	1.7	
160.018	27.4	H	43.5	-16.1	Peak	242	1.7	
375.020	42.8	H	46.0	-3.2	Peak	146	1.7	
437.518	47.5	H	46.0	1.5	Peak	75	1.7	
500.042	50.3	H	46.0	4.3	Peak	226	1.7	
562.541	45.8	H	46.0	-0.2	Peak	235	1.7	
720.041	38.6	V	46.0	-7.4	Peak	154	1.7	
1040.107	46.9	V	54.0	-7.1	Peak	259	1.7	
1359.850	38.4	H	54.0	-15.6	Peak	270	1.7	



EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	B

Run #4: Maximized Readings From Run #1

Maximized the worst EUT and Antenna configuration from prescans using Omni antenna

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 18,000 MHz	3	3	0.0

Frequency	Level	Pol	FCC Class B		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
500.044	44.3	V	46.0	-1.7	QP	345	1.0	
80.023	37.4	V	40.0	-2.6	QP	45	1.1	
562.527	38.3	V	46.0	-7.7	QP	285	1.0	Partial ambient
437.504	38.2	V	46.0	-7.8	QP	45	1.0	
1359.920	45.3	V	54.0	-8.7	AVG	111	1.0	
375.020	36.2	V	46.0	-9.8	QP	85	1.6	
1039.874	41.0	V	54.0	-13.0	AVG	268	1.0	
37.332	26.5	V	40.0	-13.5	QP	160	1.3	Broadband
131.963	24.9	V	43.5	-18.6	QP	215	1.0	Broadband
1359.920	48.5	V	74.0	-25.5	PK	111	1.0	
1039.874	46.5	V	74.0	-27.5	PK	268	1.0	

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

FCC Part 15 Subpart E - RF Port Measurements

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: 11/16/2007
 Test Engineer: Mehran Birgani
 Test Location: 3m Lab

Config. Used: 1
 Config Change: N/A
 EUT Voltage: POE

General Test Configuration

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators and cables used.

Ambient Conditions: Temperature: 22 °C
 Rel. Humidity: 45 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1 (10 dBi Omni Antenna)	Power, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	14 dBm / 25mW
	PSD, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	6.82dBm/MHz
1 (16.5dBi Sector Antenna)	Power, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	7.4dBm/4.8mW
	PSD, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	0.4dBm/MHz
1 (23dBi Patch Antenna)	Power, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	0.2dBm / 1.0mW
	PSD, 5470 - 5725MHz	15.407(a) (1), (2)	Pass	-6.6dBm/MHz
1	26dB Bandwidth	15.407	Pass	> 20 MHz
1	99% Bandwidth	RSS 210	Pass	18.2MHz
2	Antenna Conducted - Out of Band Spurious	15.407(b)	Pass	All emissions below the -27dBm/MHz limit

Highest eirp = 24dBm (14dBm into 10dBi antenna)

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.



EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

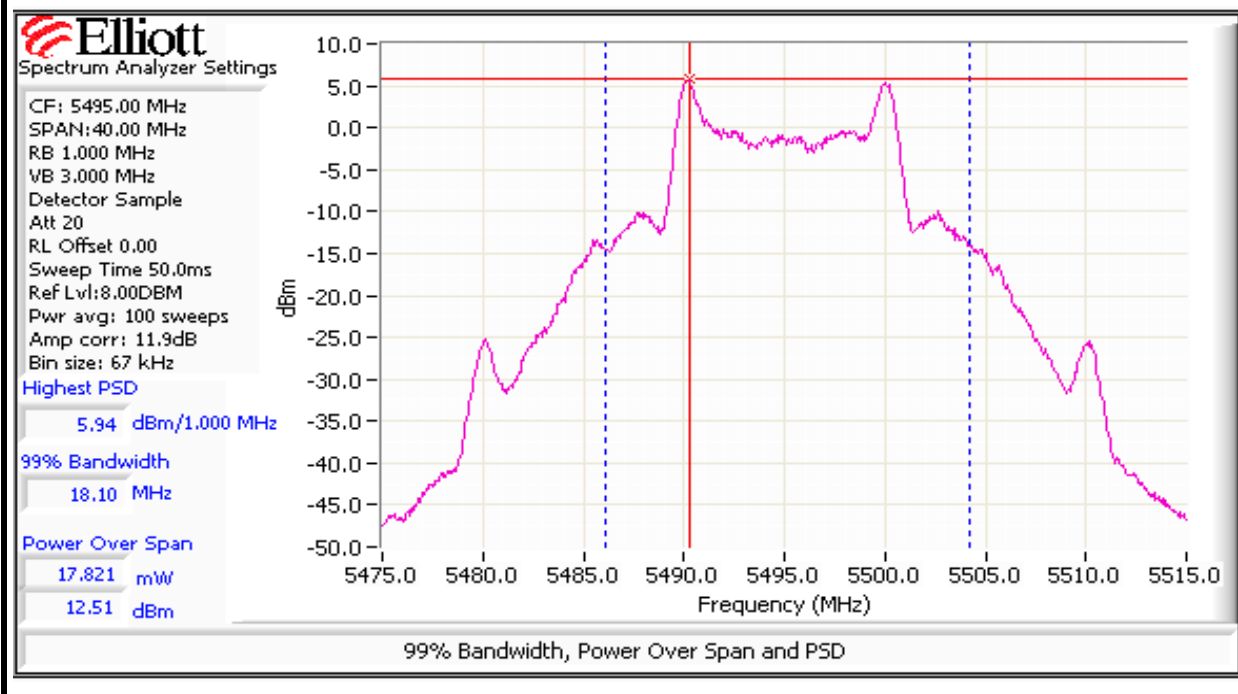
Run #1: Bandwidth, Output Power and Power spectral Density

Run #1a: Bandwidth, Output Power and Power spectral Density

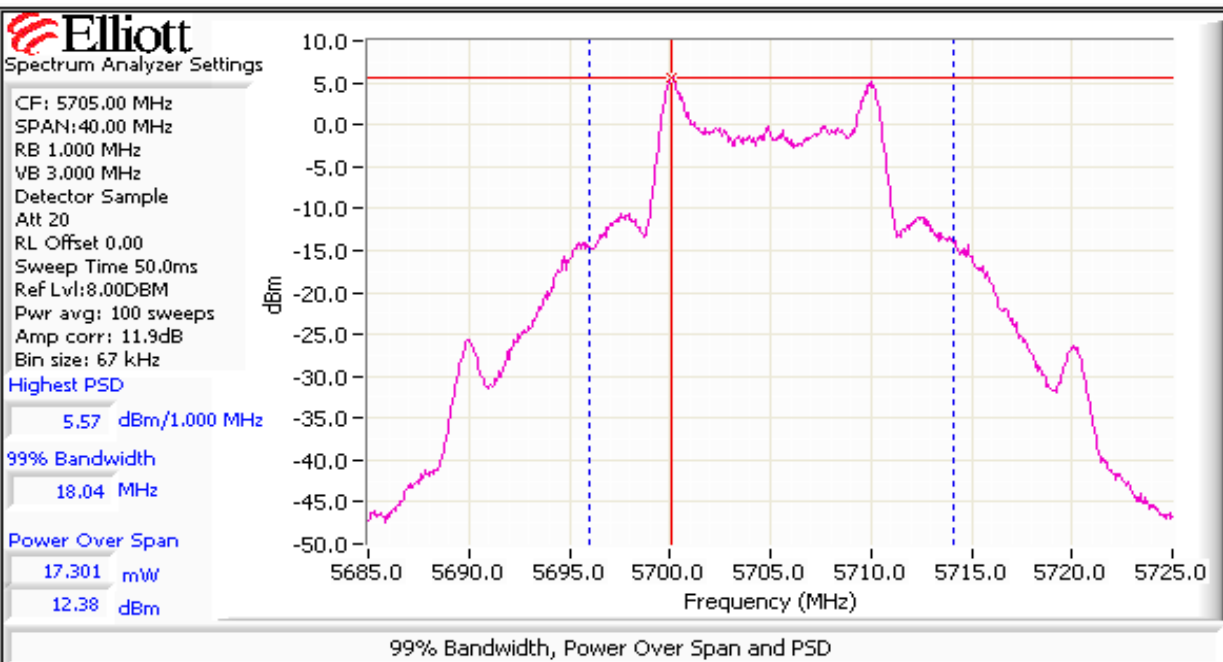
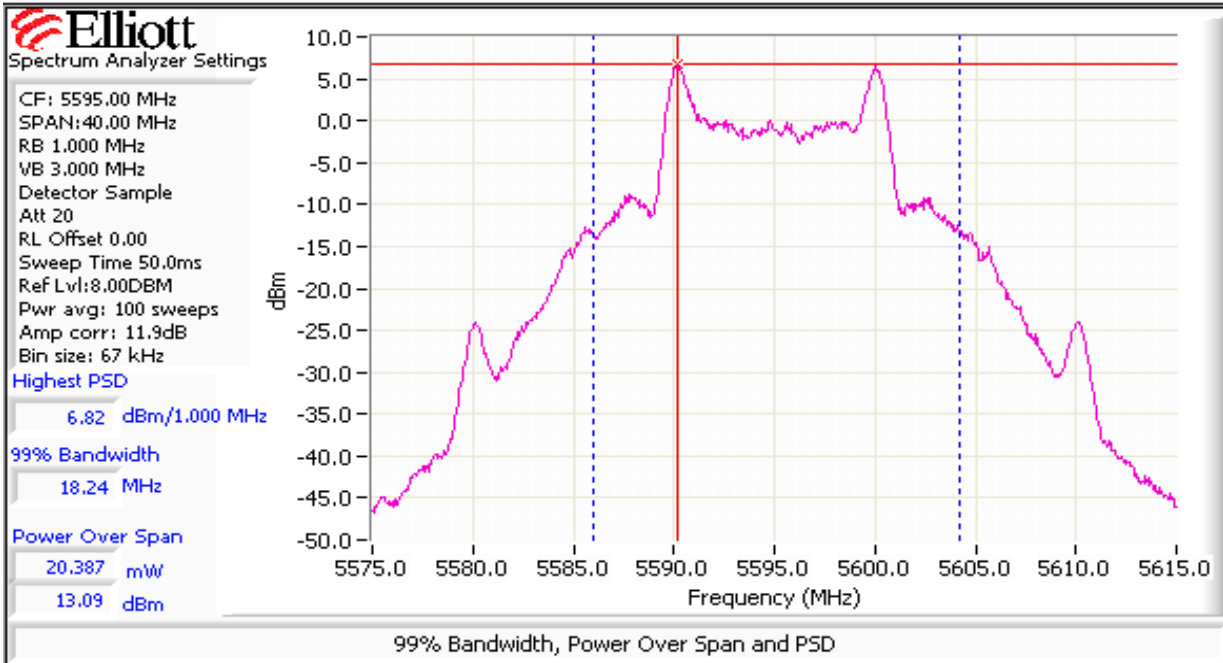
Antenna Gain: 10 dBi

Frequency (MHz)	Software Setting	Bandwidth		Output Power ¹ dBm		Power (Watts)	PSD ² dBm/MHz			Result
		26dB	99% ⁴	Measured	Limit		Measured	FCC Limit	RSS Limit ³	
5495	95	21.6	18.1	14.0	20.0	0.025	5.94	7.0	9.5	Pass
5595	95	21.1	18.2	13.1	20.0	0.020	6.82	7.0	7.7	Pass
5705	95	21.8	18.0	12.4	20.0	0.017	5.57	7.0	8.3	Pass

Note 1:	RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 40 MHz
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >= 3xRB



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A





EMC Test Data

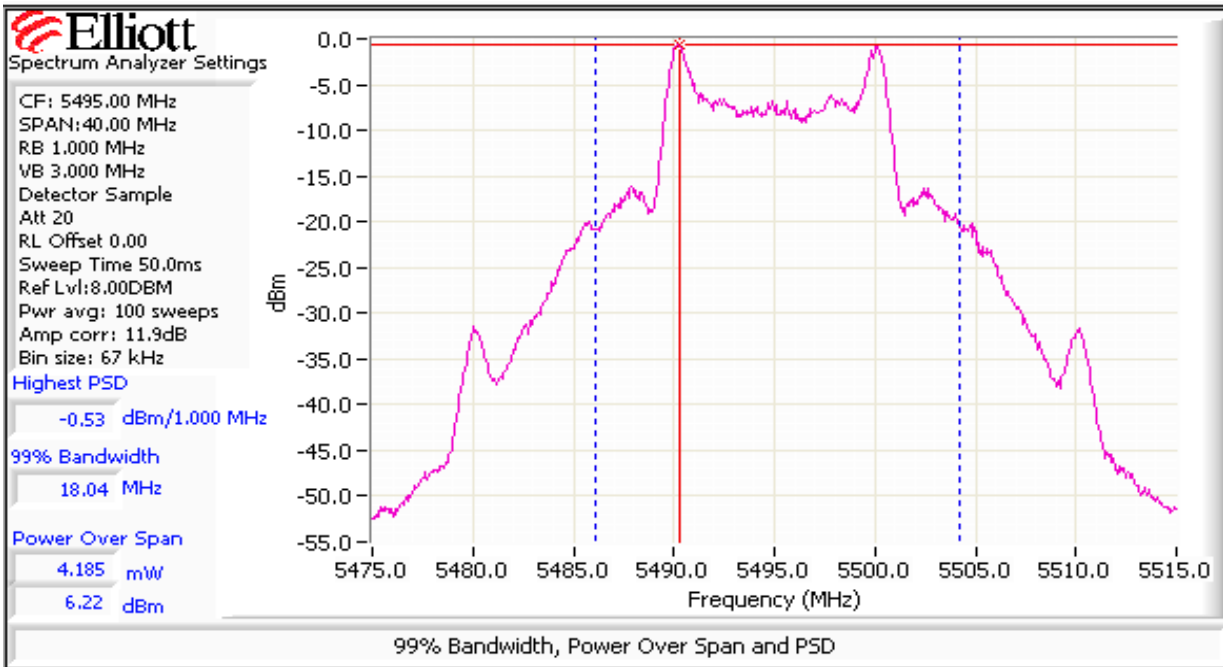
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #1b: Bandwidth, Output Power and Power spectral Density

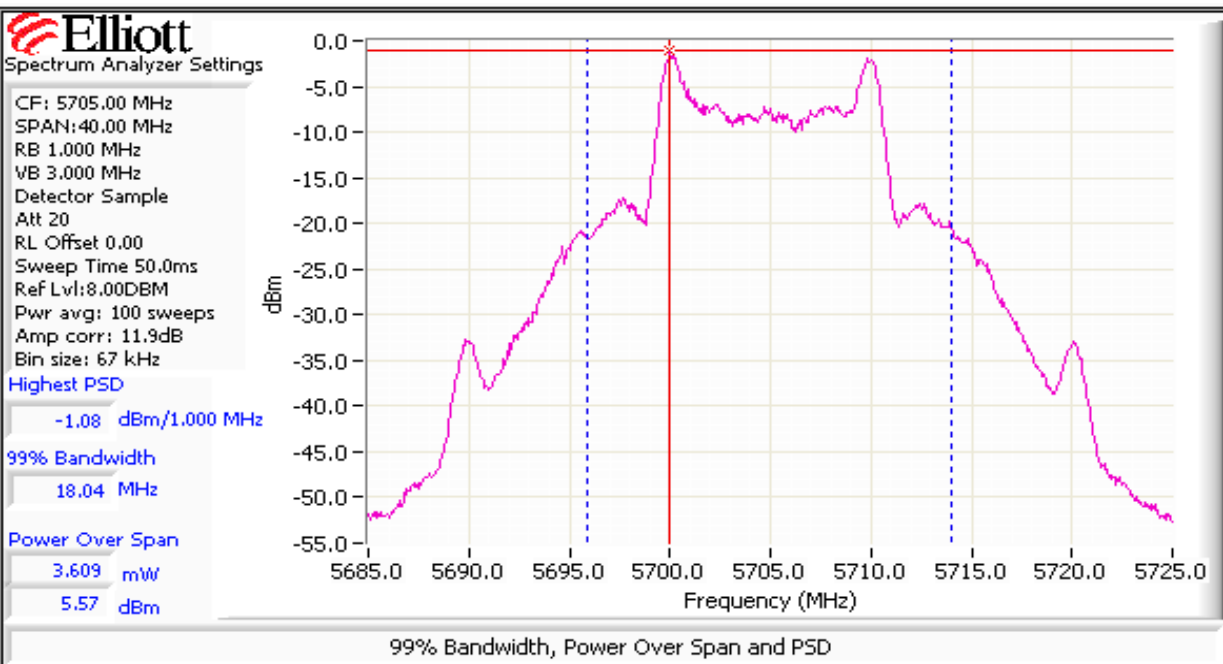
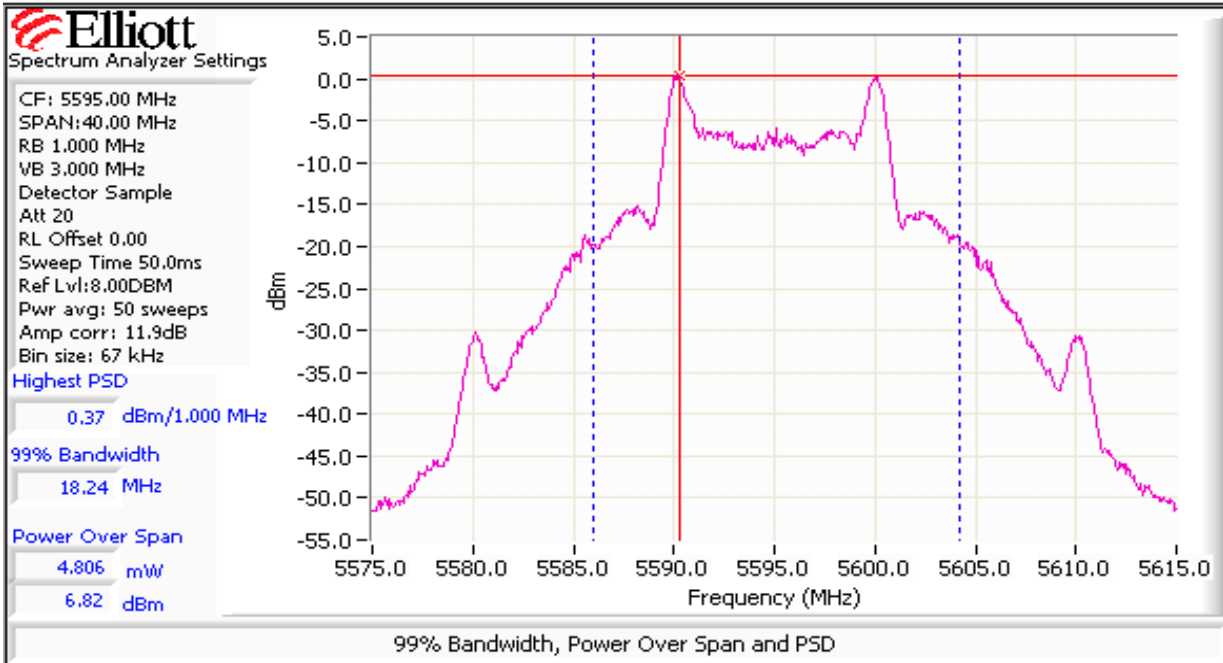
Antenna Gain: 16.5 dBi

Frequency (MHz)	Software Setting	Bandwidth 26dB	99% ⁴	Output Power ¹ dBm Measured	Limit	Power (Watts)	PSD ² dBm/MHz Measured	FCC Limit	RSS Limit ³	Result
5495	67	21.6	18.0	6.2	13.5	0.004	-0.50	0.5	8.1	Pass
5595	67	21.1	18.2	6.8	13.5	0.005	0.37	0.5	7.8	Pass
5705	67	21.8	18.1	7.4	13.5	0.005	0.40	0.5	8.4	Pass

Note 1:	RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 40 MHz
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >= 3xRB



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A





EMC Test Data

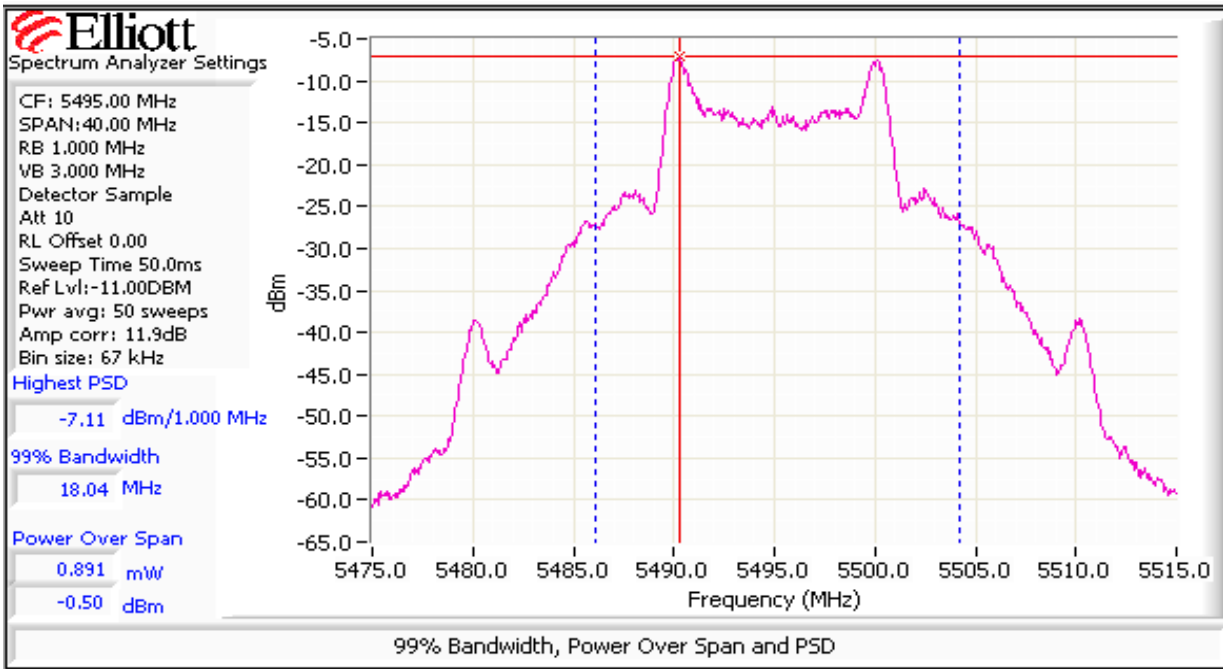
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #1c: Bandwidth, Output Power and Power spectral Density

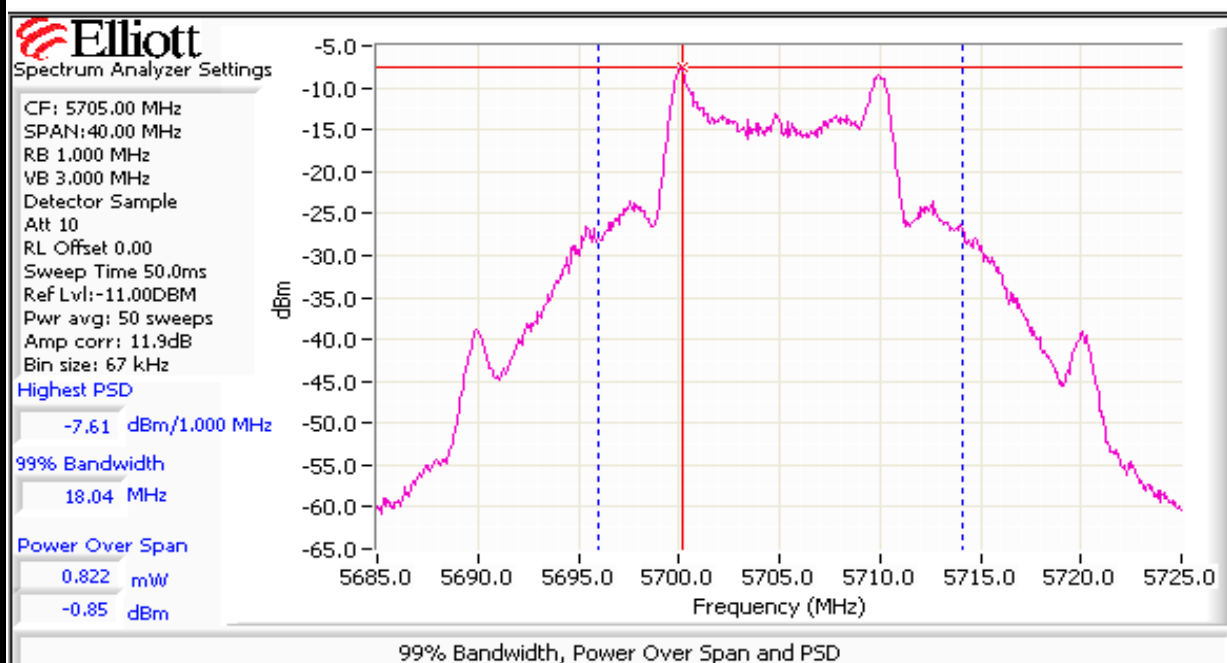
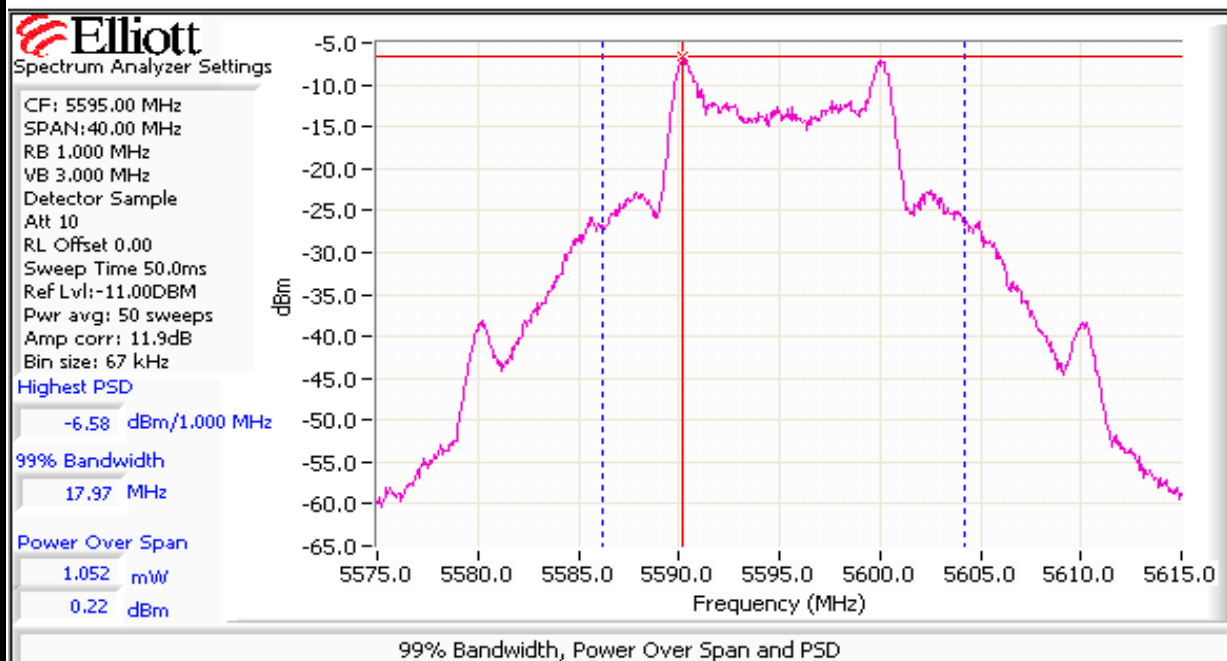
Antenna Gain: 23 dBi

Frequency (MHz)	Software Setting	Bandwidth		Output Power ¹ dBm		Power (Watts)	PSD ² dBm/MHz			Result
		26dB	99% ⁴	Measured	Limit		Measured	FCC Limit	RSS Limit ³	
5495	33	21.6	18.0	-0.5	7.0	0.001	-7.11	-6.0	8.1	Pass
5595	33	21.1	18.0	0.2	7.0	0.001	-6.60	-6.0	8.2	Pass
5705	33	21.8	18.0	-0.9	7.0	0.001	-7.60	-6.0	8.2	Pass

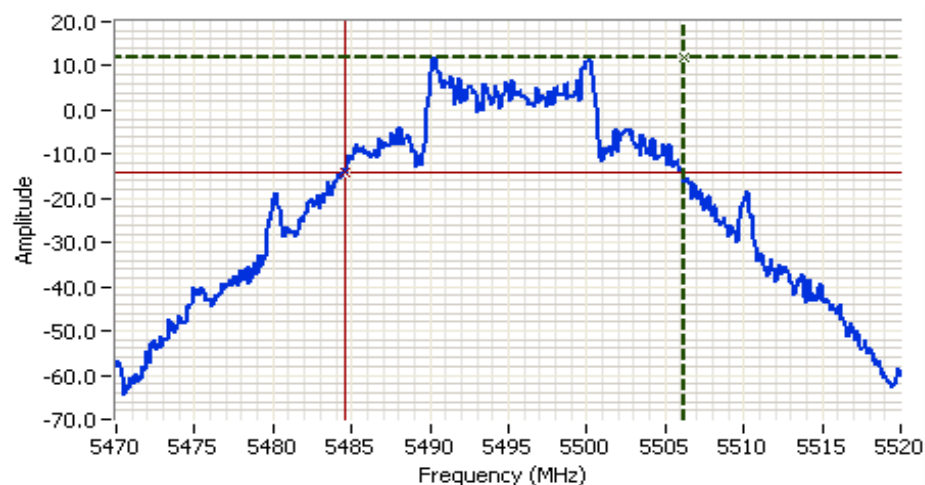
Note 1:	RBW=1MHz, VB=3 MHz, sample detector, power averaging on (transmitted signal was continuous) and power integration over 40 MHz
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-210 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz. The limits are also corrected for instances where the highest measured value of the PSD exceeds the average PSD (calculated from the measured power divided by the measured 99% bandwidth) by more than 3dB by the amount that the measured value exceeds the average by more than 3dB.
Note 4:	99% Bandwidth measured in accordance with RSS GEN - RB > 1% of span and VB >= 3xRB



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A



Client: Cascade Networks	Job Number: J69809
Model: Cyclone 5400	T-Log Number: T69846
Contact: Brian Magnuson	Account Manager: Dean Eriksen
Standard: FCC Part 15.247/RSS-210	Class: N/A



Analyzer Settings

HP8564E,006,EMI,UK6
CF: 5495.00 MHz
SPAN:50.00 MHz
RB 100 kHz
VB 100 kHz
Detector Sample
Att 10
RL Offset 12.00
Sweep Time 50.0ms
Ref Lvl:11.90DBM

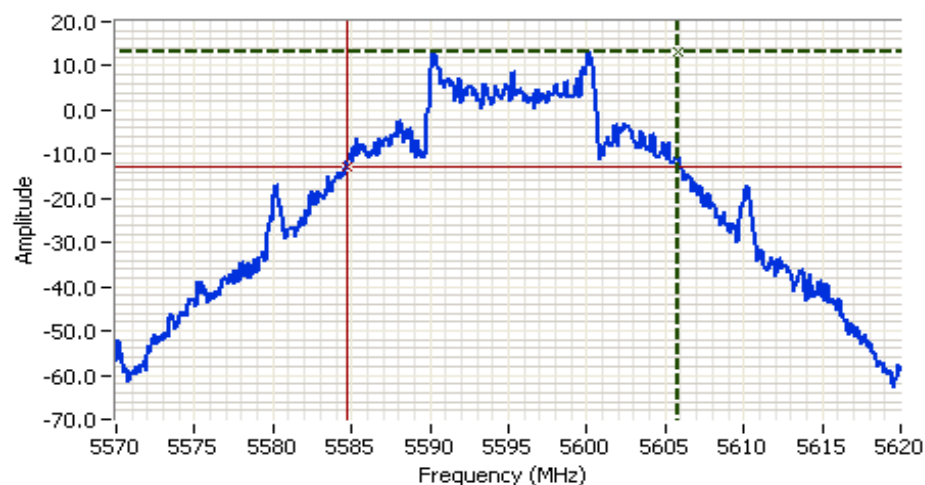
Comments

26dB Bandwidth
Setting = D0

Cursor 1 5506.16: 11.90
Cursor 2 5484.58: -14.10

Delta Freq. 21.58

Delta Amplitude 26.00



Analyzer Settings

HP8564E,006,EMI,UK6
CF: 5595.00 MHz
SPAN:50.00 MHz
RB 100 kHz
VB 100 kHz
Detector Sample
Att 10
RL Offset 12.00
Sweep Time 50.0ms
Ref Lvl:11.90DBM

Comments

26dB Bandwidth
Setting = D0

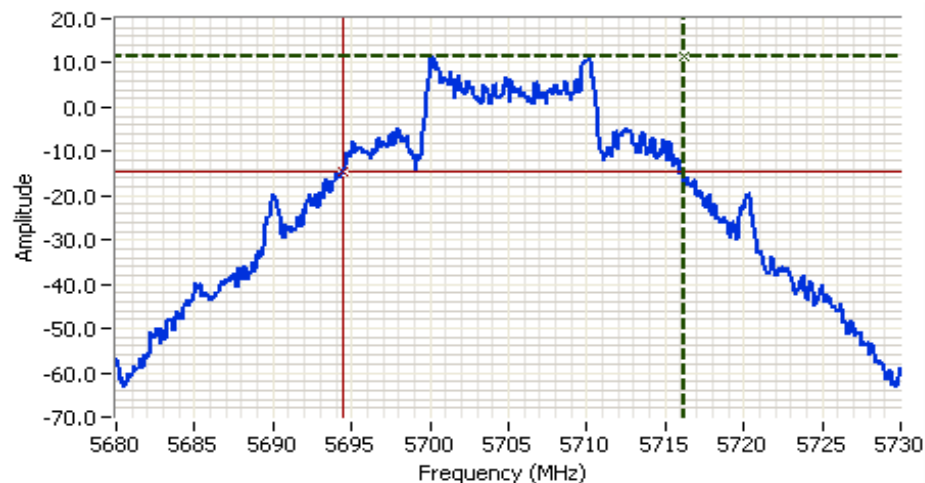
Cursor 1 5605.83: 13.23
Cursor 2 5584.75: -12.77

Delta Freq. 21.08

Delta Amplitude 26.00



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A









Analyzer Settings

HP8564E,006,EMI,UK6
 CF: 5705.00 MHz
 SPAN:50.00 MHz
 RB 100 kHz
 VB 100 kHz
 Detector Sample
 Att 10
 RL Offset 12.00
 Sweep Time 50.0ms
 Ref Lvl:11.90DBM

Comments

26dB Bandwidth
 Setting = D0

Cursor 1	5716.16	11.40			
Cursor 2	5694.41	-14.60			

Delta Freq. 21.75

Delta Amplitude 26.00

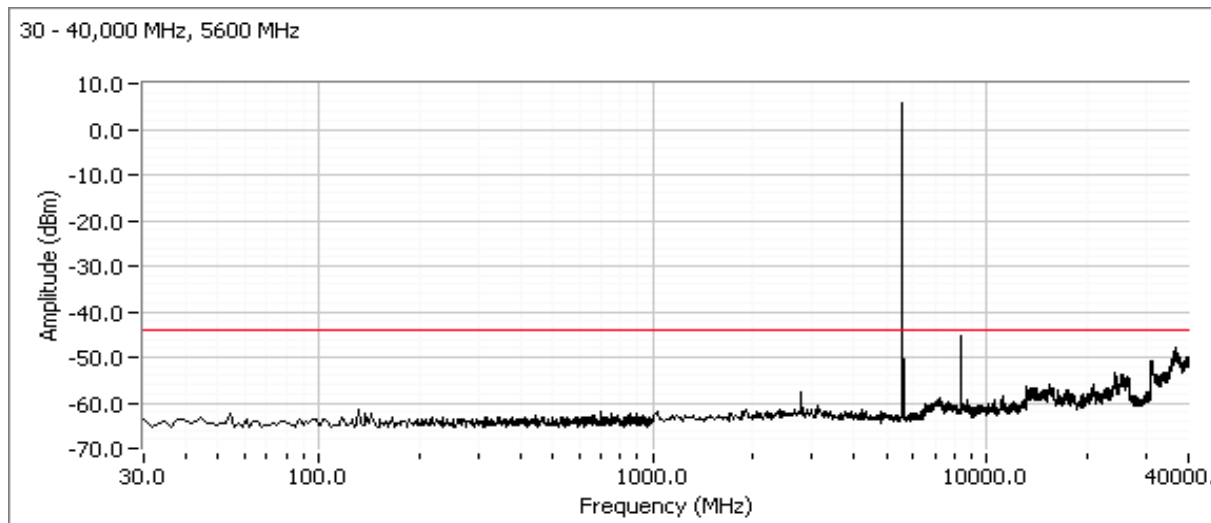
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2: Out Of Band Spurious Emissions - Antenna Conducted

Note 1	The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements are made on signals more than 50MHz from the bands and that are close to the limit or fall in restricted bands to determine compliance as the antenna gain is not known at these frequencies.
Note 2	All spurious signals below 1GHz are measured during digital device radiated emissions test.
Note 3	Plots are provided for the top and bottom channels for each antenna type using a power level equal to or higher than the actual power level to be deployed for that configuration (runs 2b and 2c for the 10dBi omni antenna, 2d and 2e for the 16.5dBi sector and 2f and 2g for the 23dBi panel). Run 2a shows the center channel at the highest power setting with the limit set using the gain of the highest gain antenna. This plot demonstrates compliance for all possible antenna configurations.

Run #2a: Out Of Band Spurious Emissions power setting = FC, Center Channel (5600 MHz)

Maximum Antenna Gain: 23 dBi
 Spurious Limit: -27 dBm/MHz eirp
 Limit Used On Plots ^{Note 1}: -50 dBm/MHz



Note - the plot above was made at the highest power setting and assumed the highest gain antenna (23dBi). This is not an actual product configuration but the data is submitted to demonstrate that, on the center channel, the device will comply at all power settings with all antennas.

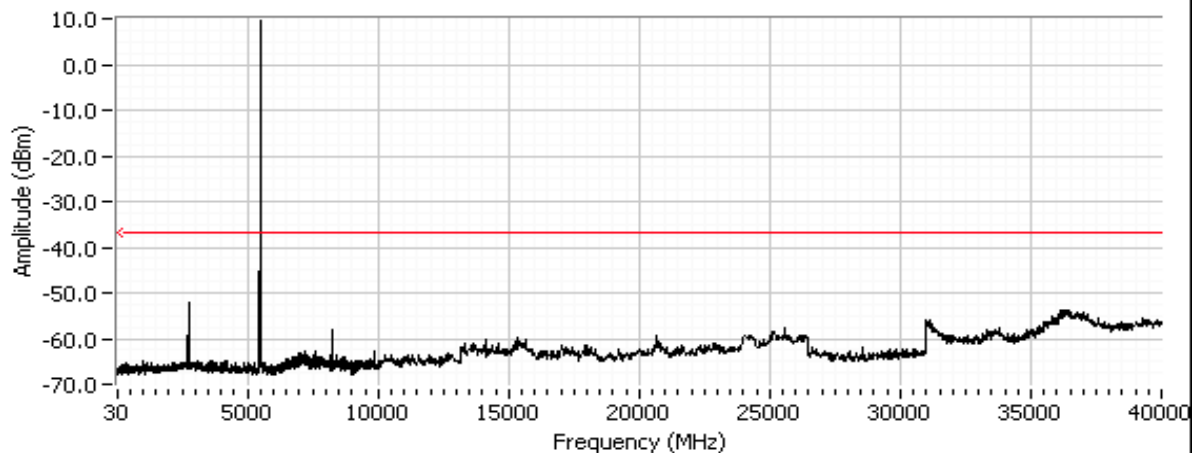
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2b: Out Of Band Spurious Emissions power setting = FC, Low Channel (5495 MHz)

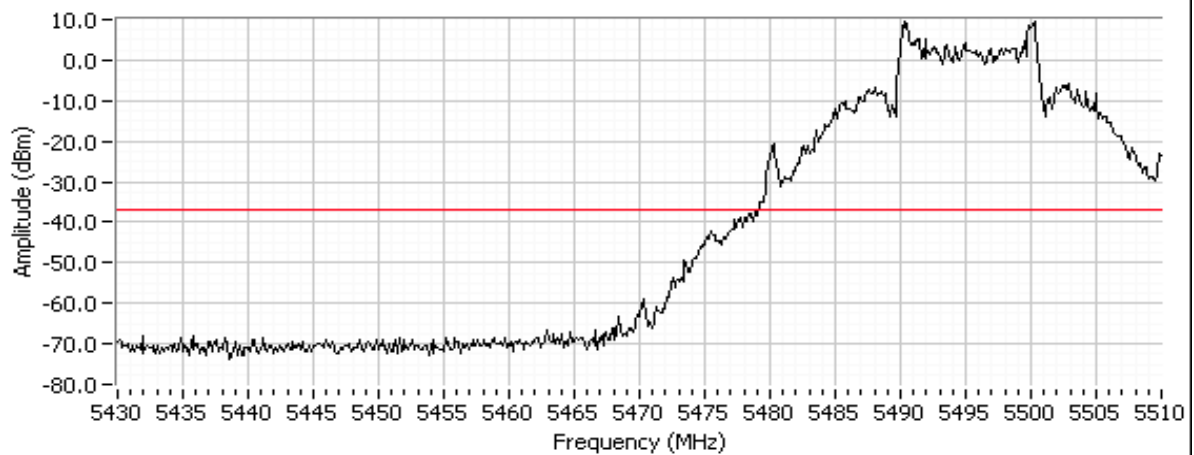
Maximum Antenna Gain: 10 dBi
 Spurious Limit: -27 dBm/MHz eirp
 Limit Used On Plots ^{Note 1}: -37 dBm/MHz

Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

5495 with highest power setting = FC



5495 with highest power setting = FC



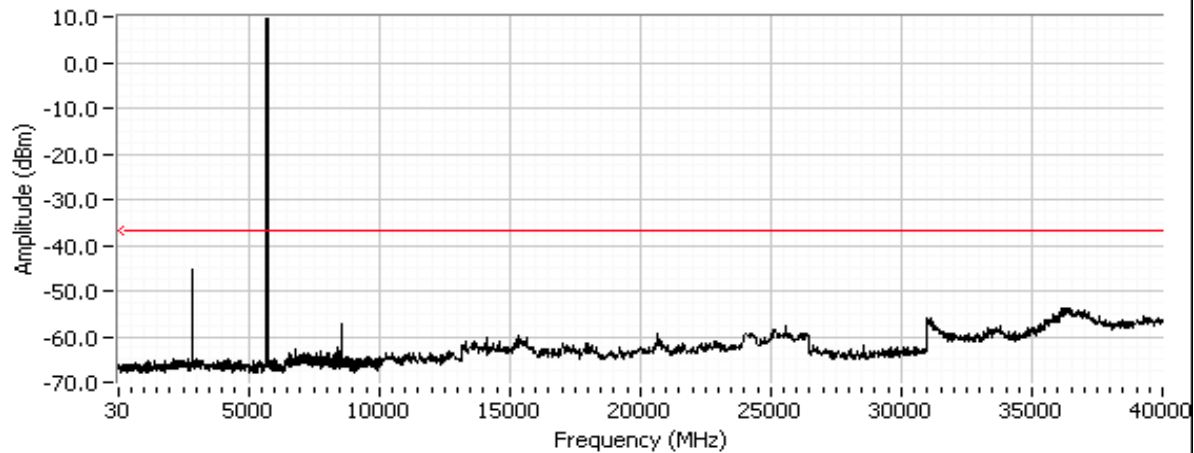
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2c: Out Of Band Spurious Emissions - Antenna Conducted at 5705MHz with power setting = FC

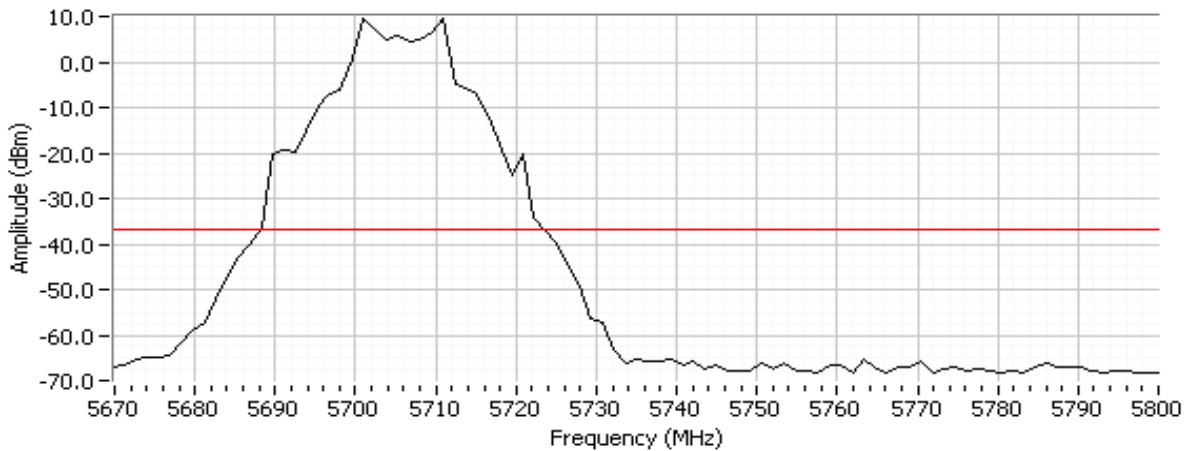
Maximum Antenna Gain: 10 dBi
 Spurious Limit: -27 dBm/MHz eirp
 Limit Used On Plots ^{Note 1}: -37 dBm/MHz

Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

5705 with highest power setting = FC



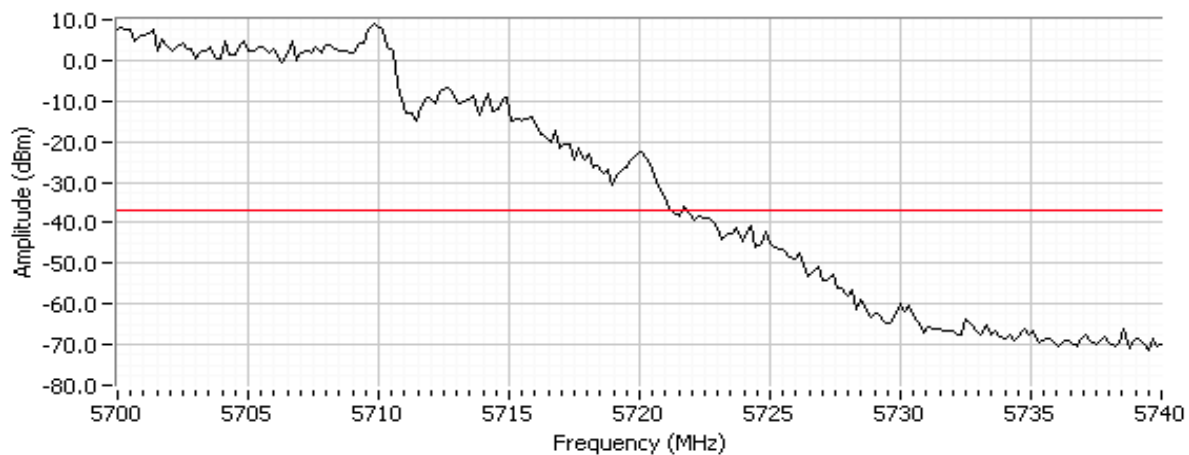
5705 with highest power setting = FC



see next plot to confirm compliance at 5725 MHz

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

5705 with highest power setting = FC



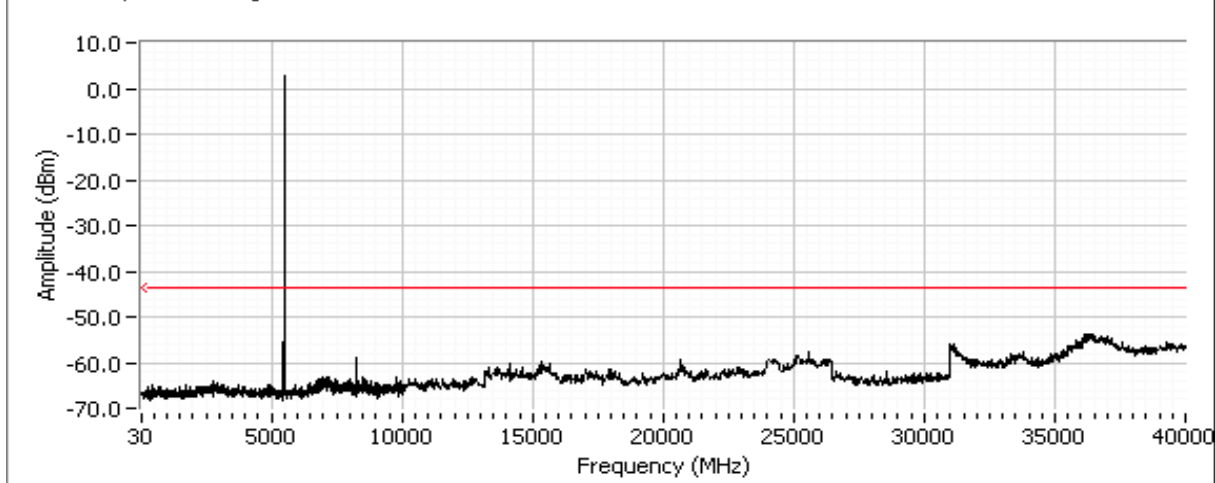
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2d: Out Of Band Spurious Emissions - Antenna Conducted at 5495MHz with power setting = 99

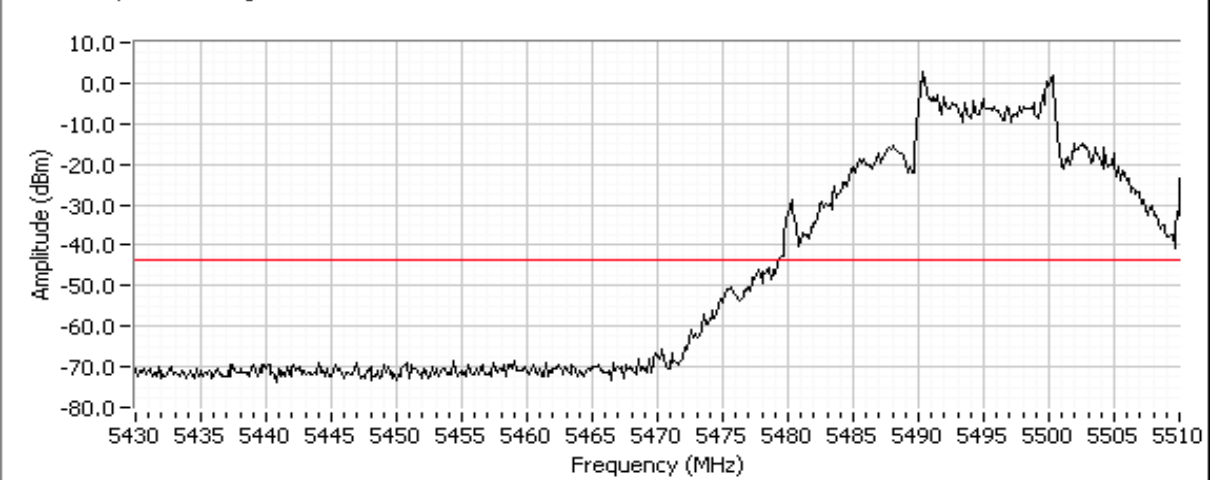
Maximum Antenna Gain: 16.5 dBi
 Spurious Limit: -27 dBm/MHz eirp
 Limit Used On Plots ^{Note 1}: -43.5 dBm/MHz

Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

5495 with power setting = 99



5495 with power setting = 99



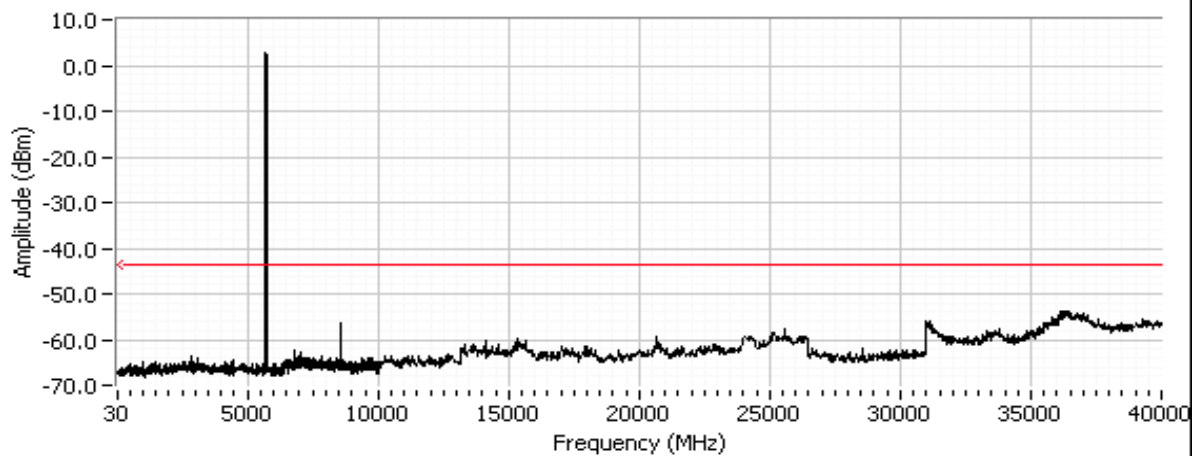
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2e: Out Of Band Spurious Emissions - Antenna Conducted at 5705MHz with power setting = 99

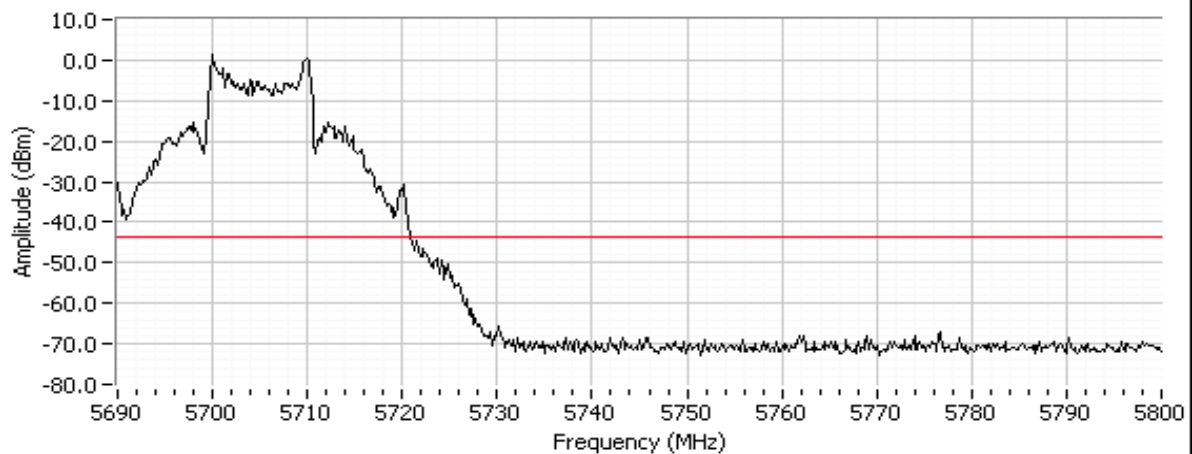
Maximum Antenna Gain: 16.5 dBi
 Spurious Limit: -27 dBm/MHz eirp
 Limit Used On Plots ^{Note 1}: -43.5 dBm/MHz

Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

5495 with power setting = 99

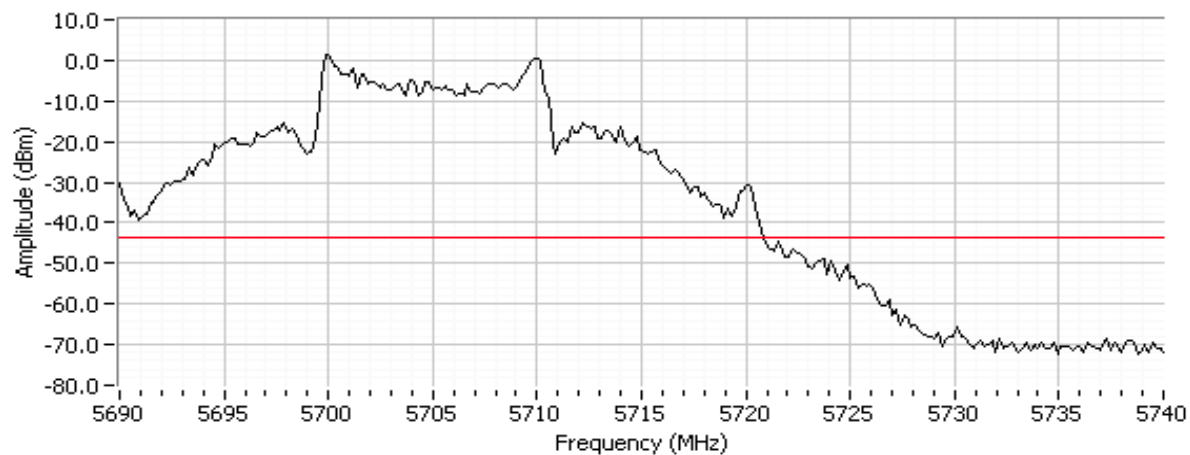


5705 with power setting = 99



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

5705 with power setting = 99



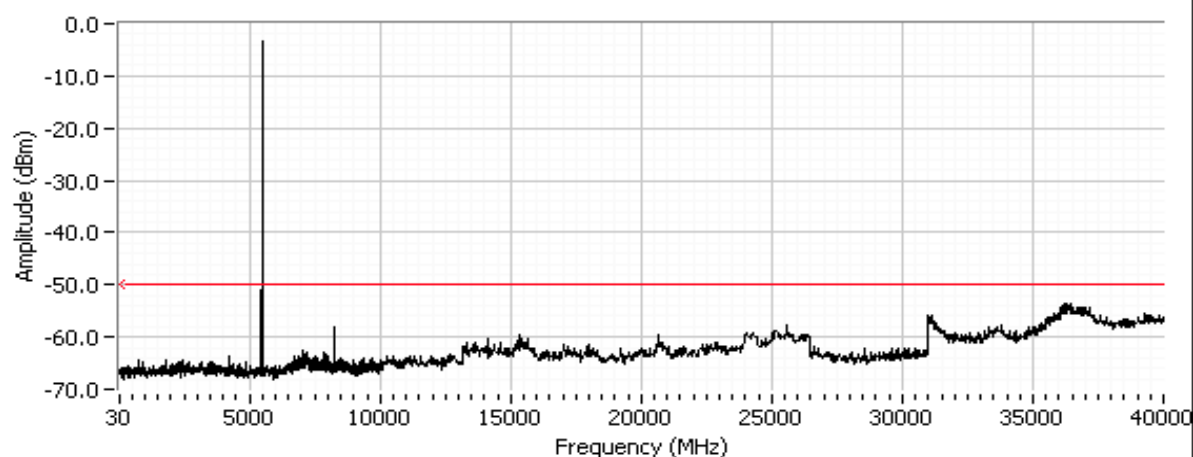
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2f: Out Of Band Spurious Emissions - Antenna Conducted at 5495MHz with power setting = 67

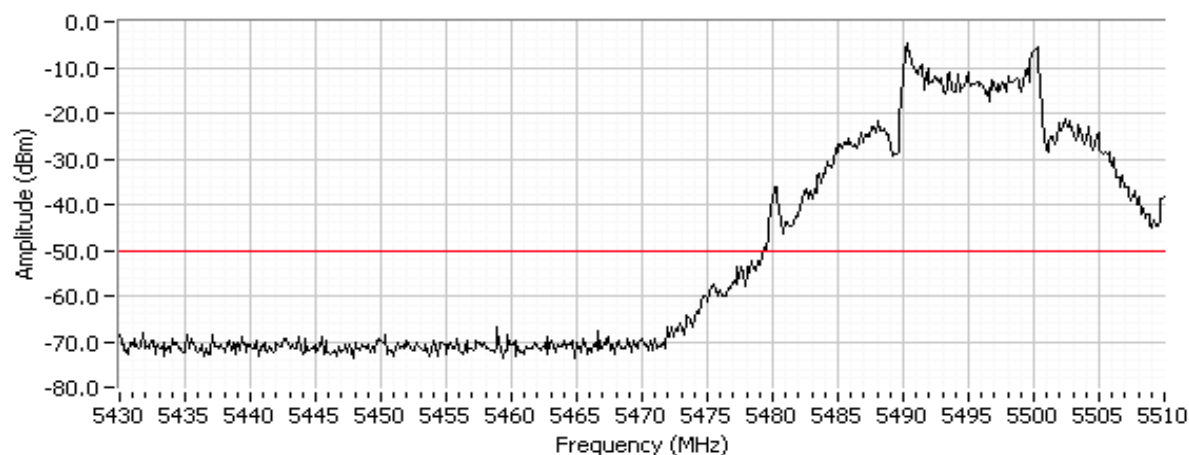
Maximum Antenna Gain: 23 dBi
 Spurious Limit: -27 dBm/MHz eirp
 Limit Used On Plots ^{Note 1}: -50 dBm/MHz

Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

54905 with power setting = 67



5495 with power setting = 67



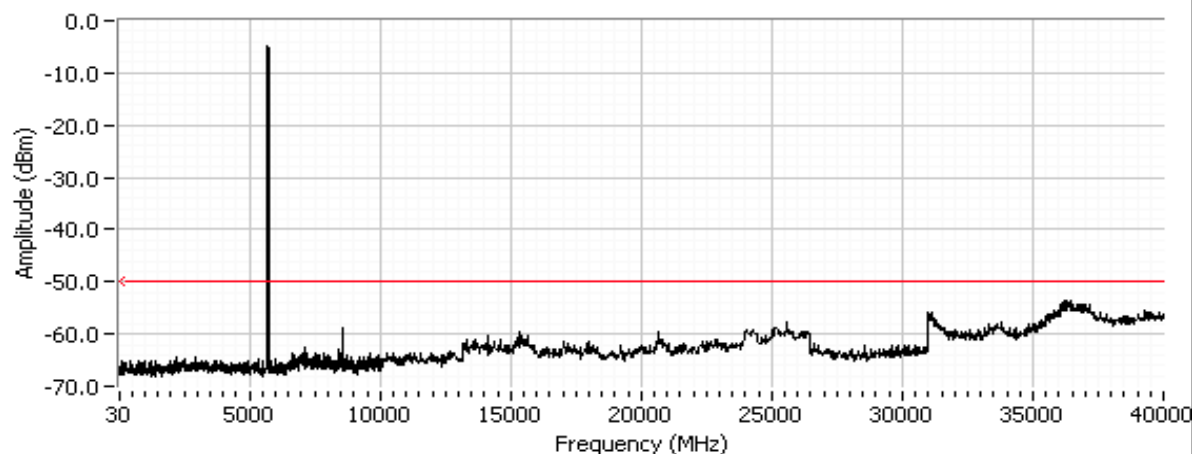
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2g: Out Of Band Spurious Emissions - Antenna Conducted at 5705MHz with power setting = 67

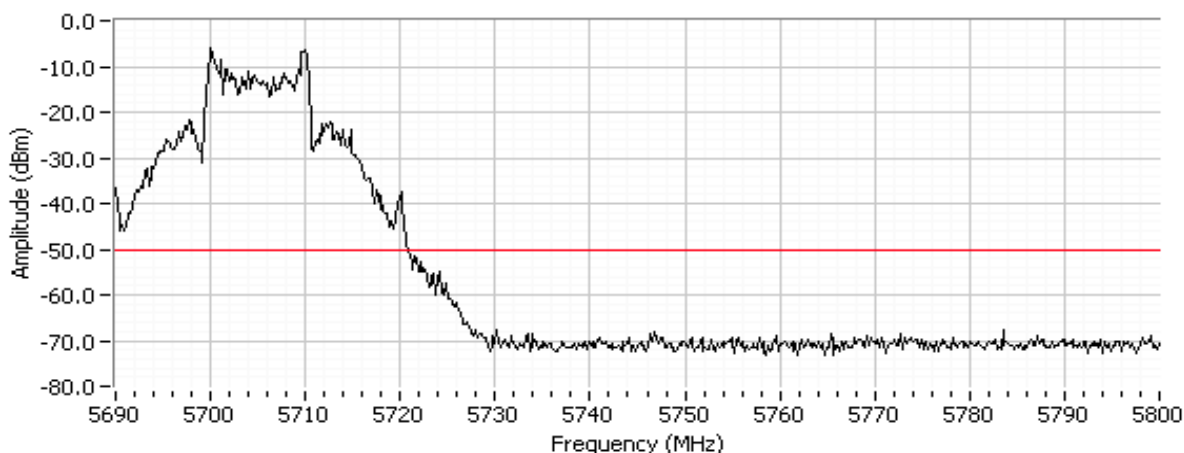
Maximum Antenna Gain: 23 dBi
 Spurious Limit: -27 dBm/MHz eirp
 Limit Used On Plots ^{Note 1}: -50 dBm/MHz

Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

5705 with power setting = 67

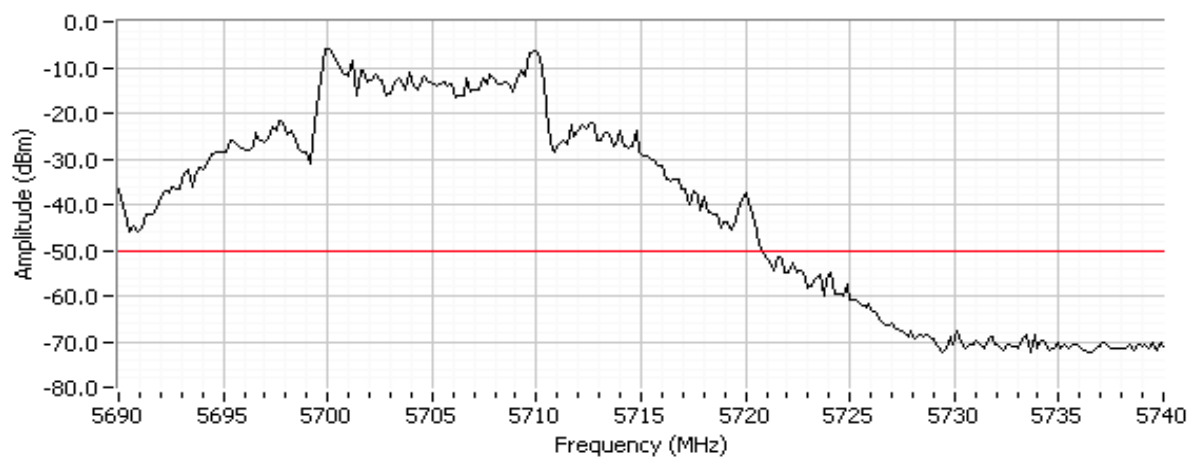


5705 with power setting = 67



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

5705 with power setting = 67



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Radiated Emissions

5470 - 5725 MHz Band-Edges and 5460 MHz Restricted Band

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: 11/15/2007 16:09
 Test Engineer: Suhaila Khushzad/Rafael
 Test Location: SVOATS #2

Config. Used: 2
 Config Change: None
 EUT Voltage: POE

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:	16 °C
Rel. Humidity:	78 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1a - b	RE, 30 - 40000 MHz Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	50.0dBμV/m (316.2μV/m) @ 5458.5MHz (-4.0dB)
2a - b	RE, 30 - 40000 MHz Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	49.6dBμV/m @ 5459.4MHz (-4.4dB)
3a - b	RE, 30 - 40000 MHz Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	49.6dBμV/m @ 5459.9MHz (-4.4dB)

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.



EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

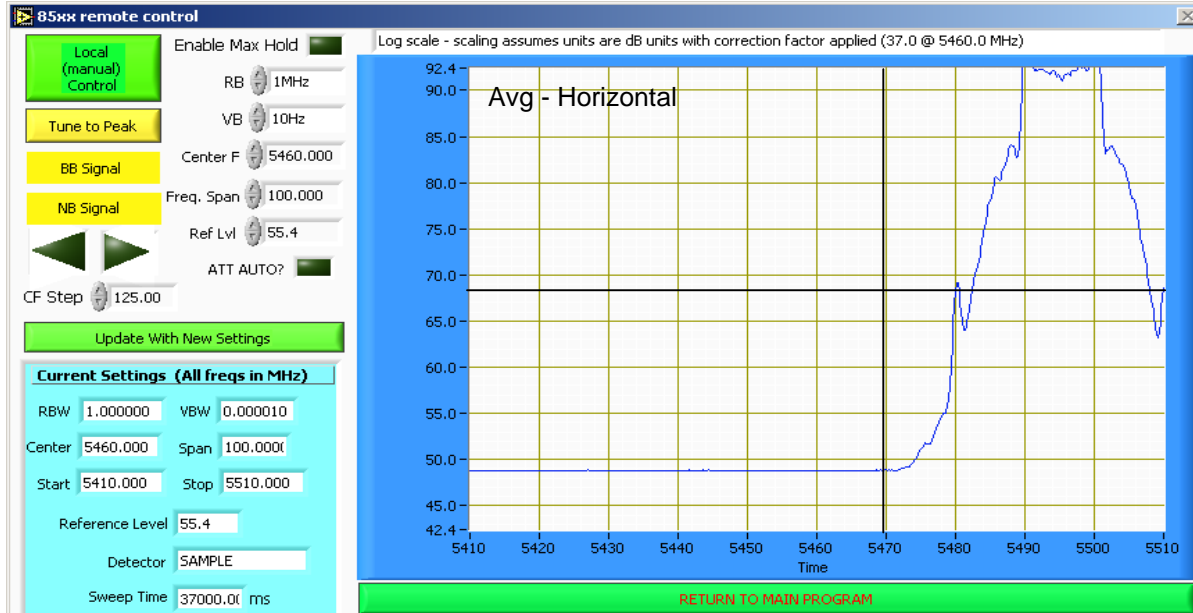
Run #1: Radiated Spurious Emissions for 5470 to 5725 MHz band, Transmit mode, 30 - 40000 MHz

Run #1a: Low Channel @ 5495 MHz with Omni Antenna (10dBi), Power Setting = fc

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	108.6	122.9	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	102.9	116.7	Average Measurement (RB=1MHz, VB=10Hz)

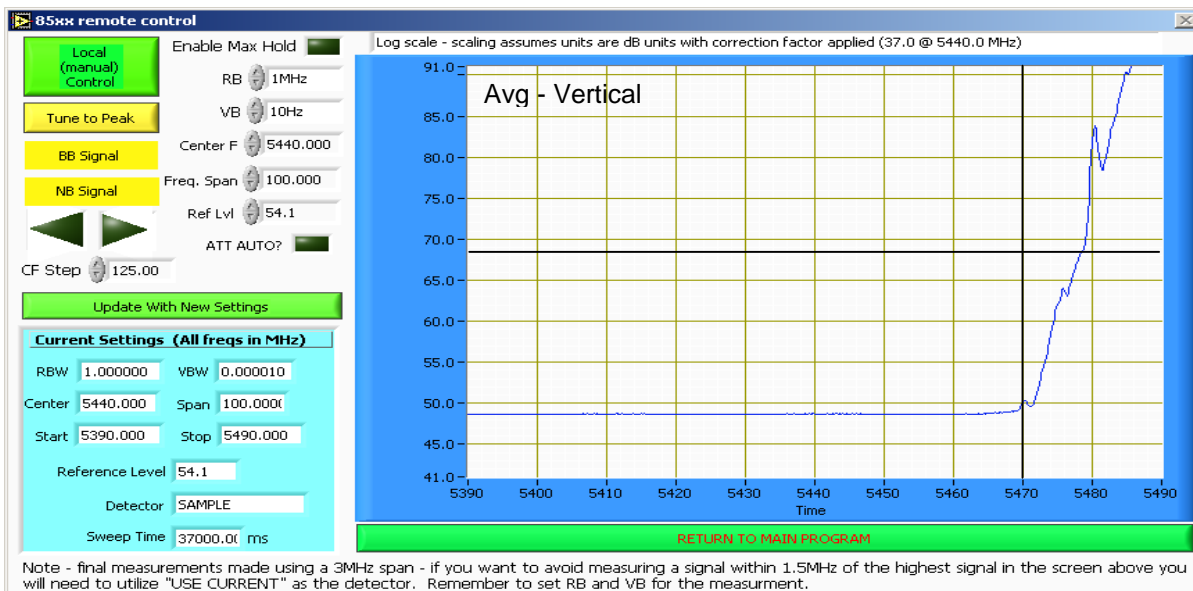
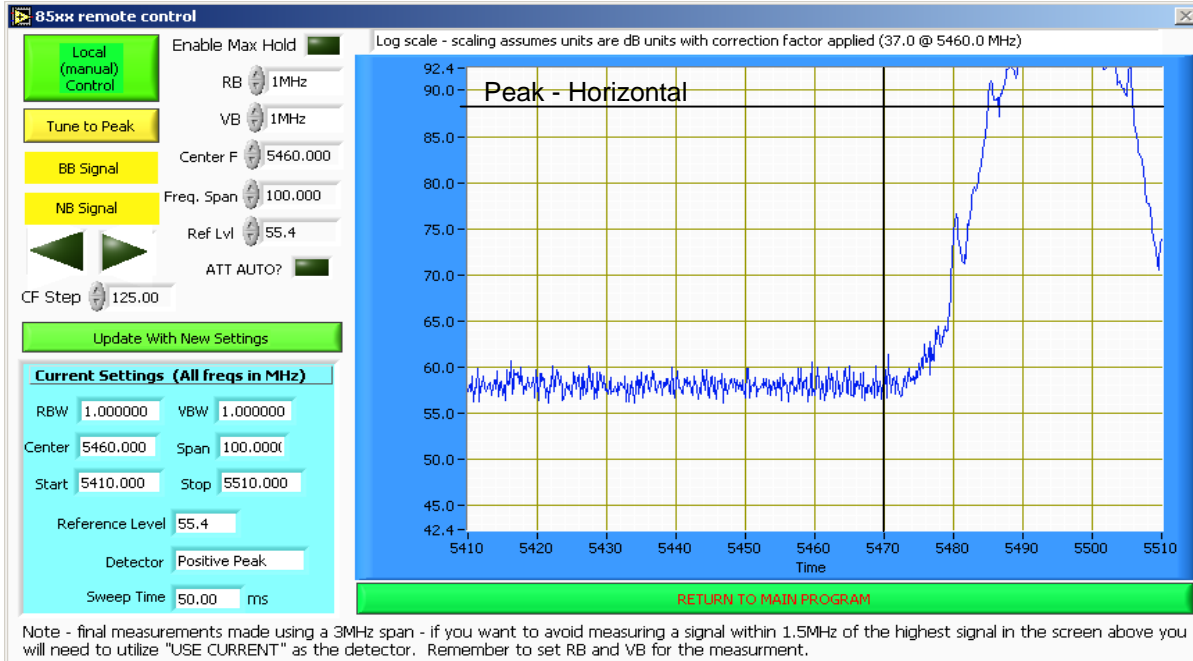
Fundamental Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5490.400	116.7	V	-	-	AVG	173	1.0	
5490.400	122.9	V	-	-	PK	173	1.0	
5500.050	102.9	H	-	-	AVG	142	1.0	
5500.050	108.6	H	-	-	PK	142	1.0	



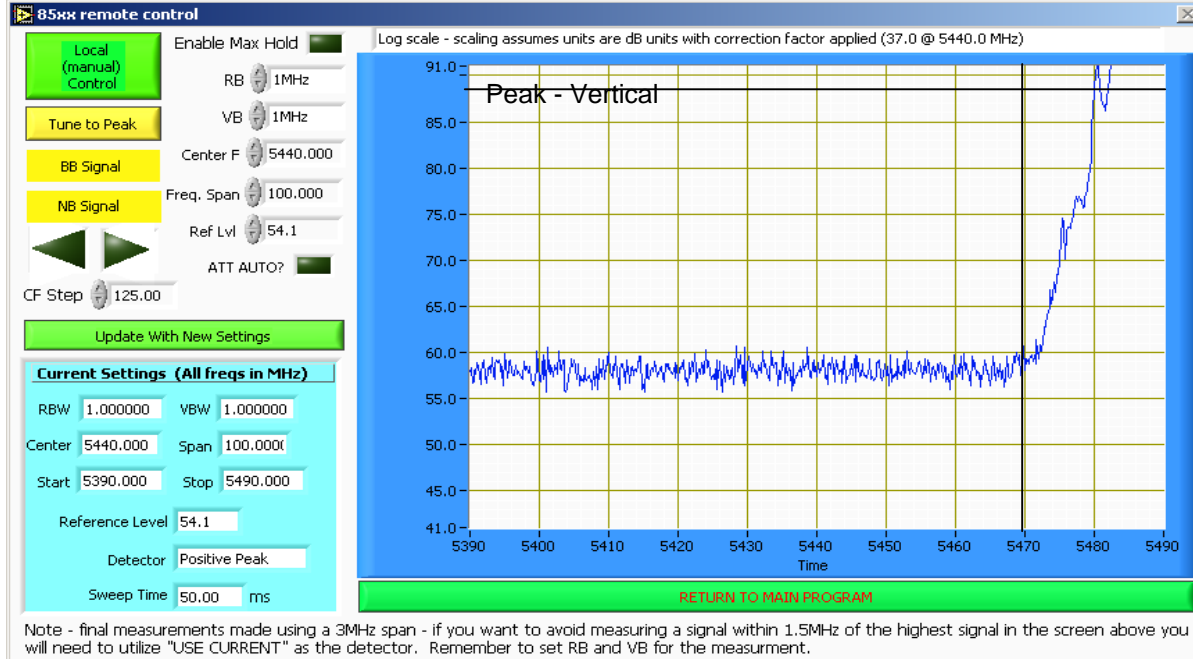
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #1a: Continued



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #1a: Continued



Restricted Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5458.480	50.0	V	54.0	-4.0	AVG	174	1.0	
5458.480	61.7	V	74.0	-12.3	PK	174	1.0	
5458.910	49.8	H	54.0	-4.2	AVG	142	1.0	
5458.910	61.3	H	74.0	-12.7	PK	142	1.0	

Allocated Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5470.000	50.5	V	68.3	-17.8	AVG	174	1.0	
5470.000	61.8	V	88.3	-26.5	PK	174	1.0	
5470.000	48.3	H	68.3	-20.0	AVG	142	1.0	
5470.000	60.2	H	88.3	-28.1	PK	142	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

Note 2: Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.



EMC Test Data

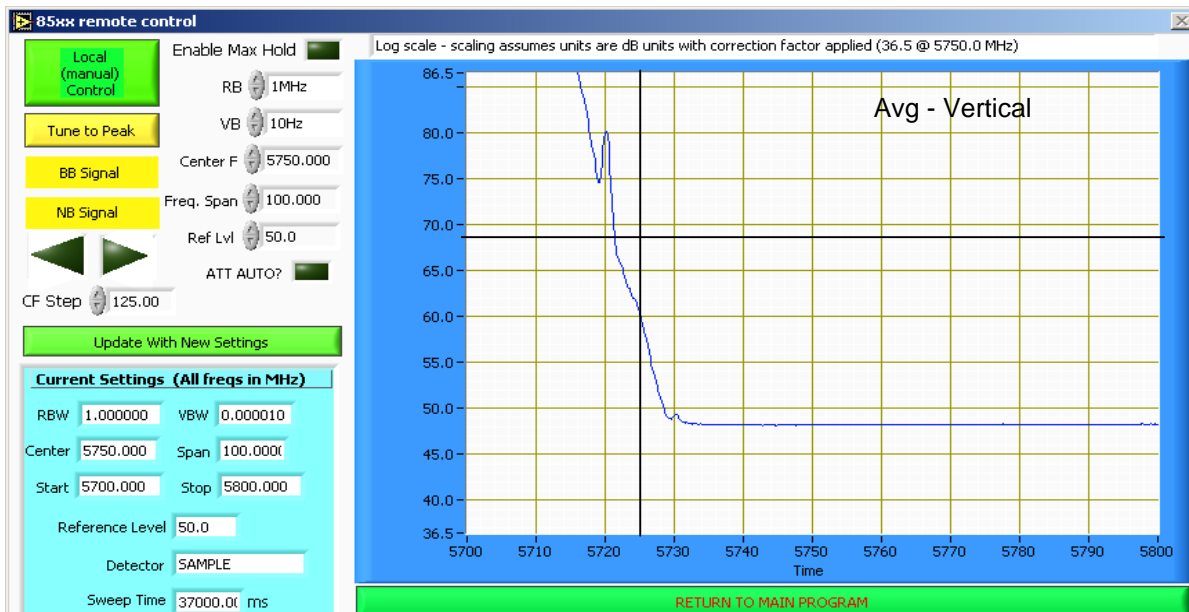
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #1b: High Channel @ 5705 MHz with Omni Antenna (10dBi), Power Setting = fc

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	106.3	120.5	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	99.8	113.8	Average Measurement (RB=1MHz, VB=10Hz)

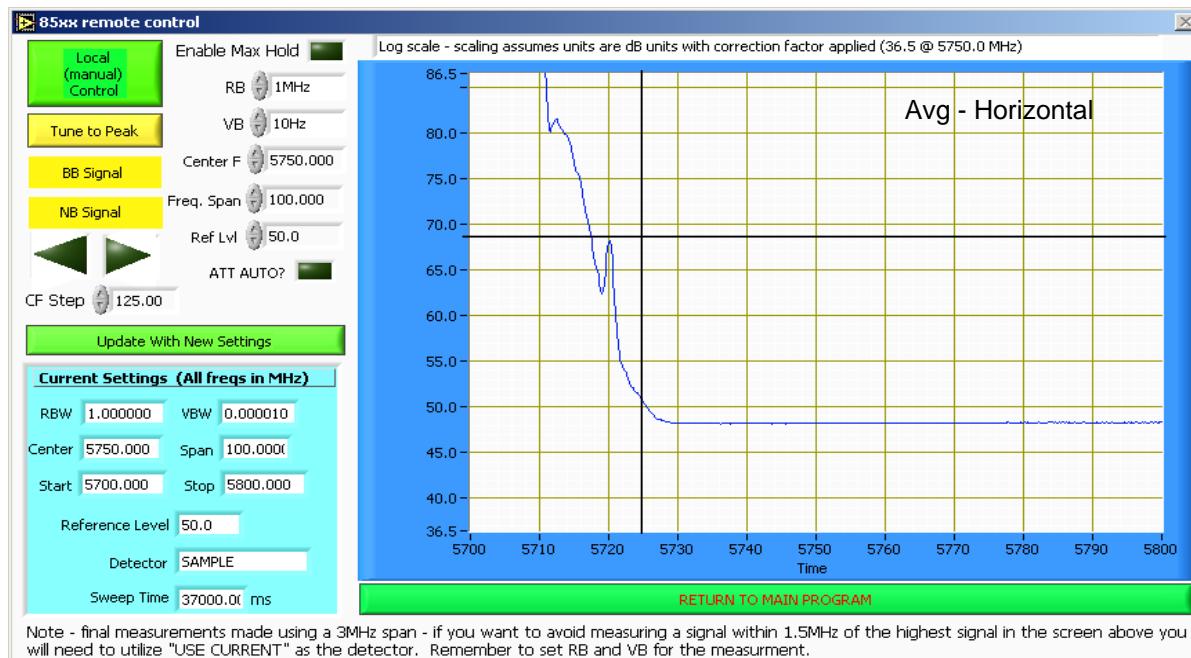
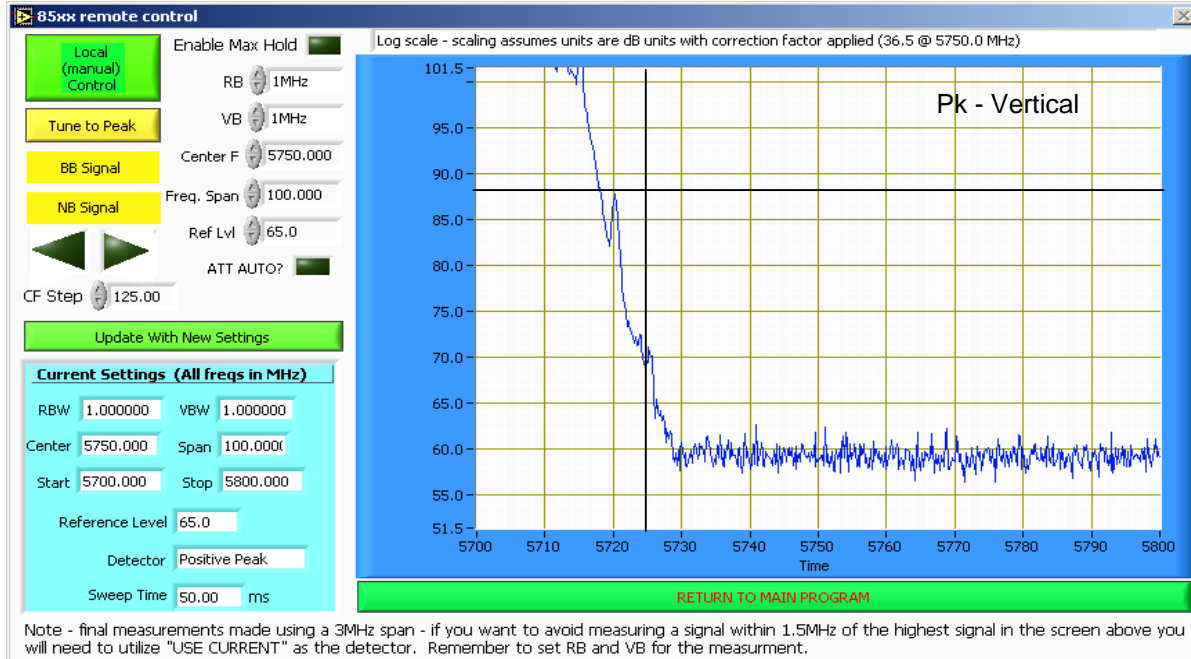
Fundamental Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5700.150	113.8	V	-	-	AVG	335	2.0	
5700.150	120.5	V	-	-	PK	335	2.0	
5700.200	99.8	H	-	-	AVG	143	1.0	
5700.200	106.3	H	-	-	PK	143	1.0	



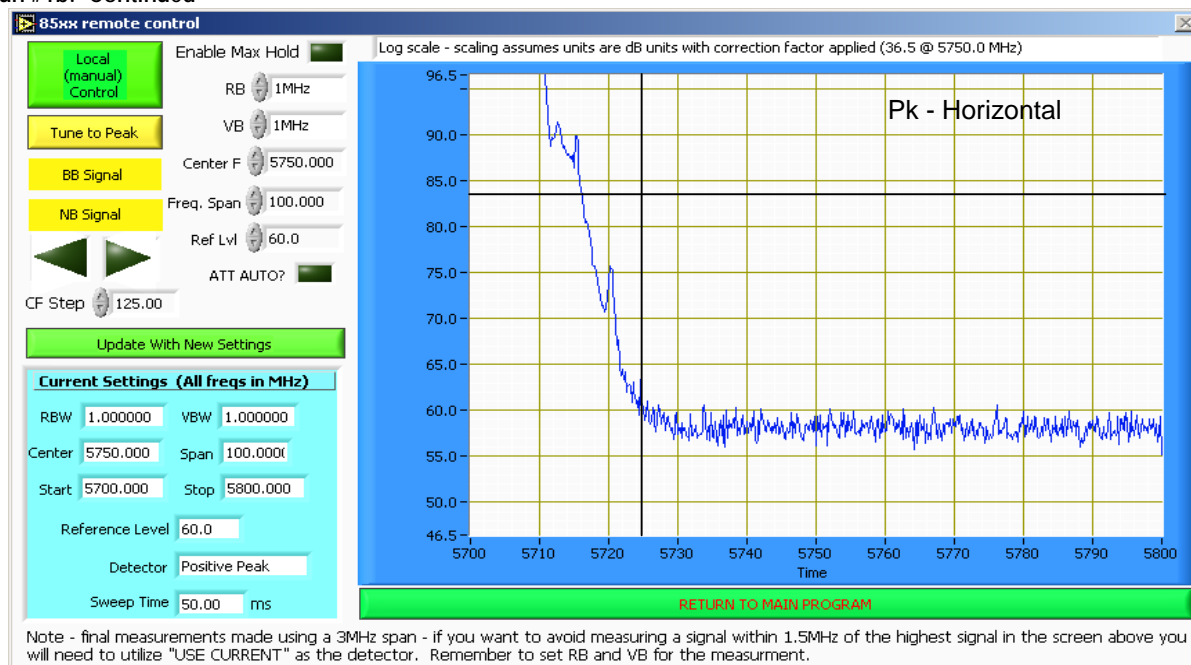
Client: Cascade Networks	Job Number: J69809
Model: Cyclone 5400	T-Log Number: T69846
Contact: Brian Magnuson	Account Manager: Dean Eriksen
Standard: FCC Part 15.247/RSS-210	Class: N/A

Run #1b: Continued



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #1b: Continued



Spurious Radiated Emissions: Bandedge at 5725 MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5725.000	60.1	V	68.3	-8.2	AVG	335	2.0	
5725.453	71.8	V	88.3	-16.5	PK	335	2.0	
5725.000	52.6	H	68.3	-15.7	AVG	144	1.0	
5725.000	63.2	H	88.3	-25.1	PK	144	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

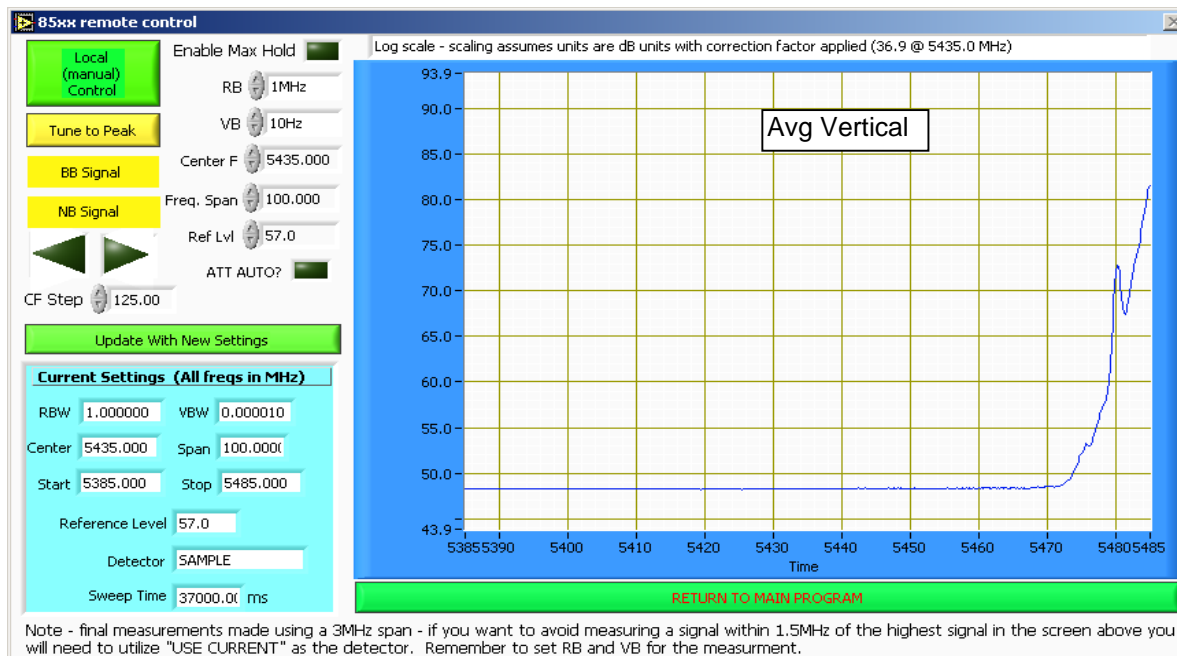
Run #2: Radiated Spurious Emissions for 5470 to 5725 MHz band, Transmit mode, 30 - 40000 MHz

Run #2a: Low Channel @ 5495 MHz with Sector Antenna (16.5dBi), Power Setting = 99

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	102.9	112.8	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	96.3	106.1	Average Measurement (RB=1MHz, VB=10Hz)

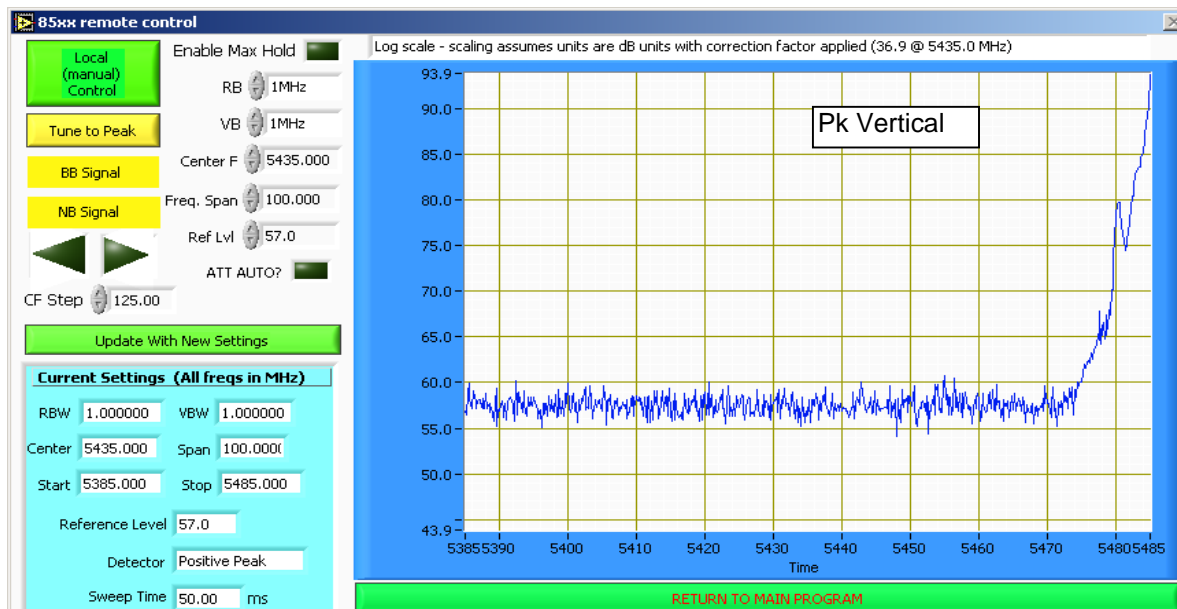
Fundamental Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5490.300	106.1	V	-	-	AVG	294	1.1	
5490.300	112.8	V	-	-	PK	294	1.1	
5490.170	96.3	H	-	-	AVG	49	1.2	
5490.170	102.9	H	-	-	PK	49	1.2	

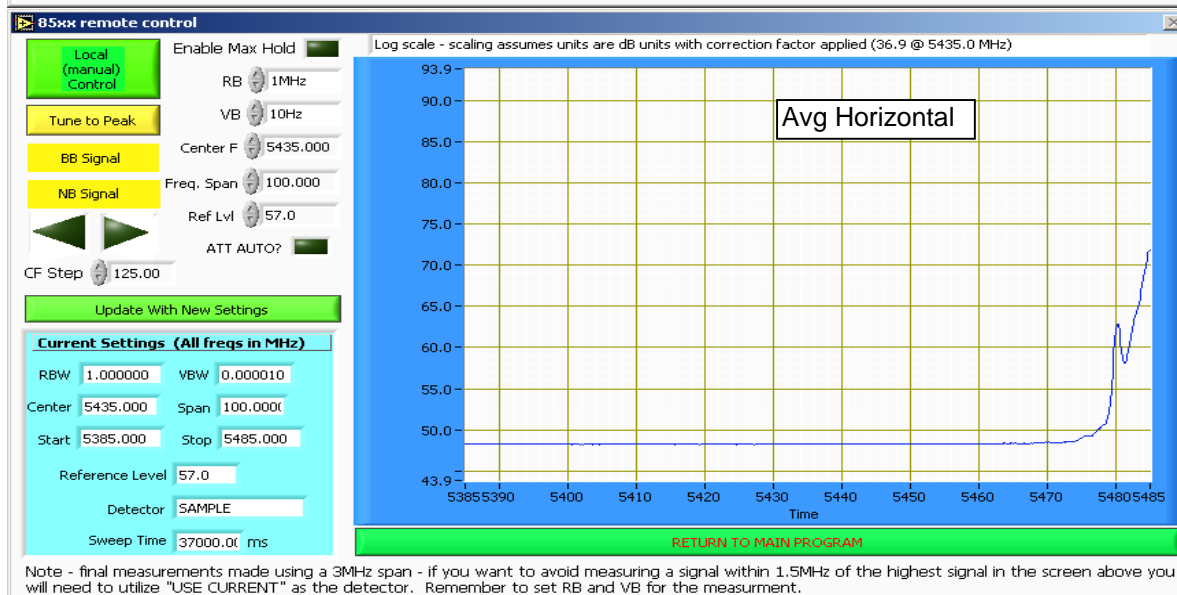


Client: Cascade Networks	Job Number: J69809
Model: Cyclone 5400	T-Log Number: T69846
Contact: Brian Magnuson	Account Manager: Dean Eriksen
Standard: FCC Part 15.247/RSS-210	Class: N/A

Run #2a: Continued



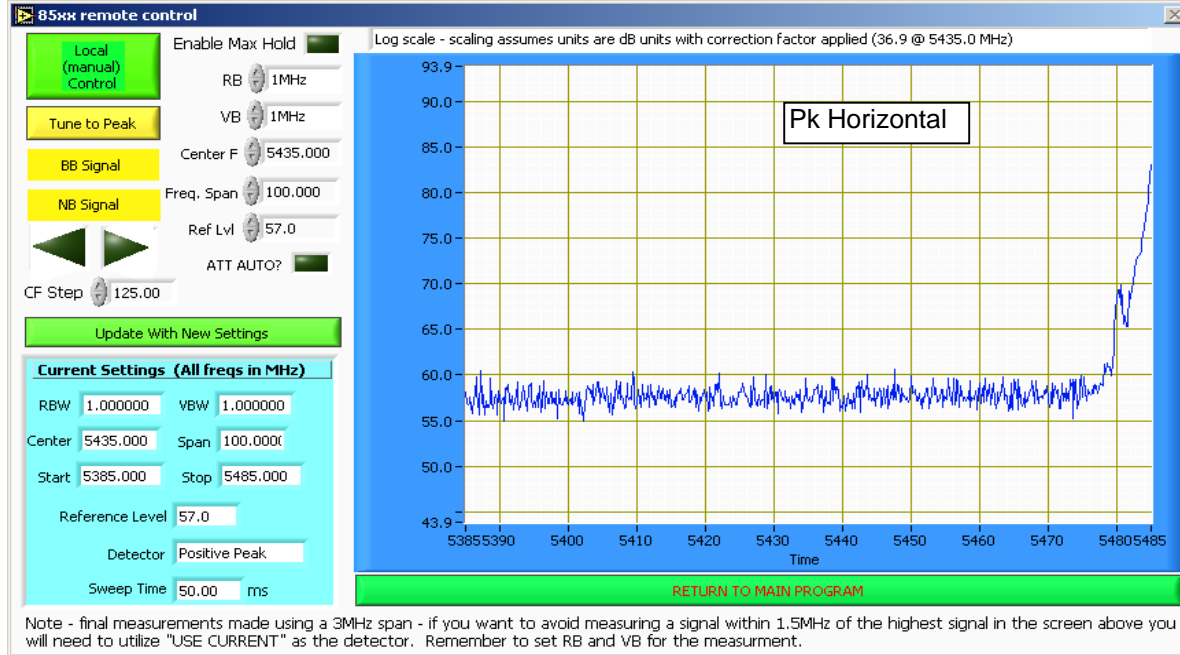
Note - final measurements made using a 3MHz span - if you want to avoid measuring a signal within 1.5MHz of the highest signal in the screen above you will need to utilize "USE CURRENT" as the detector. Remember to set RB and VB for the measurement.



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 measurement.

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2a: Continued



Band Edge Signal Radiated Field Strength at 5460 MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5459.400	49.6	V	54.0	-4.4	AVG	294	1.1	
5459.400	61.2	V	74.0	-12.8	PK	294	1.1	
5458.500	49.5	H	54.0	-4.5	AVG	49	1.2	
5458.500	60.4	H	74.0	-13.6	PK	49	1.2	

Band Edge Signal Radiated Field Strength at 5470 MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5469.110	49.7	V	68.3	-18.6	AVG	294	1.1	
5469.110	60.8	V	88.3	-27.5	PK	294	1.1	
5468.560	49.6	H	68.3	-18.7	AVG	49	1.2	
5468.560	61.2	H	88.3	-27.1	PK	49	1.2	

Note 1:	For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).
Note 2:	Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.



EMC Test Data

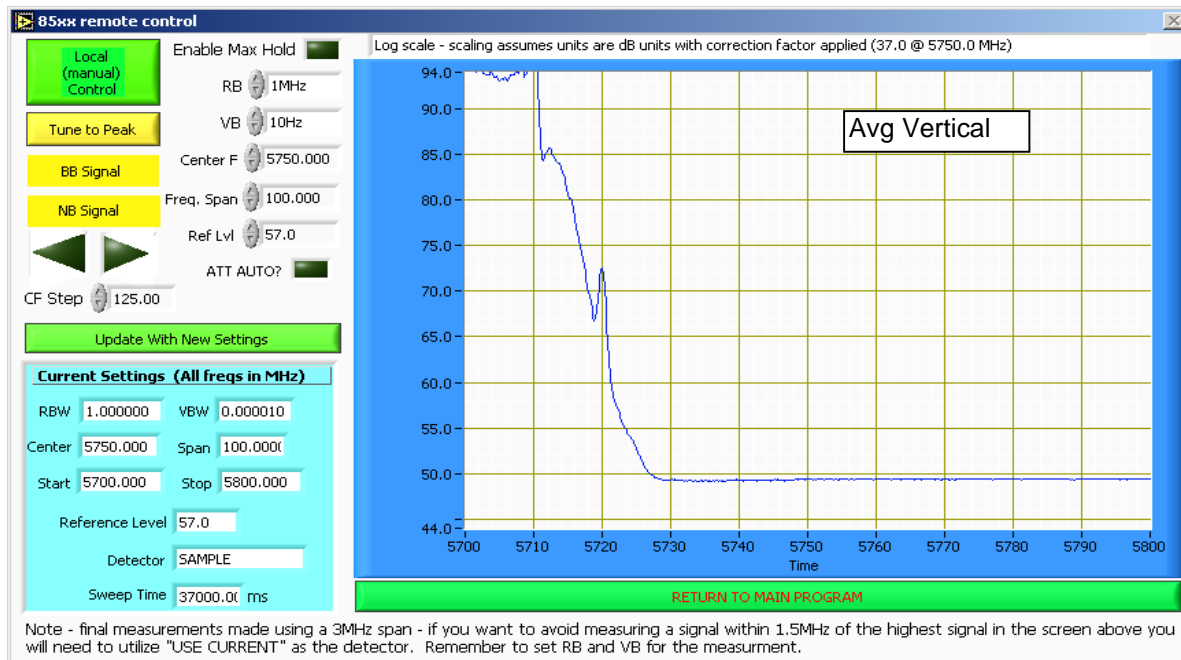
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2b: High Channel @ 5705 MHz with Sector Antenna (16.5dBi), Power Setting = 99

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	98.1	112.8	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	91.2	105.9	Average Measurement (RB=1MHz, VB=10Hz)

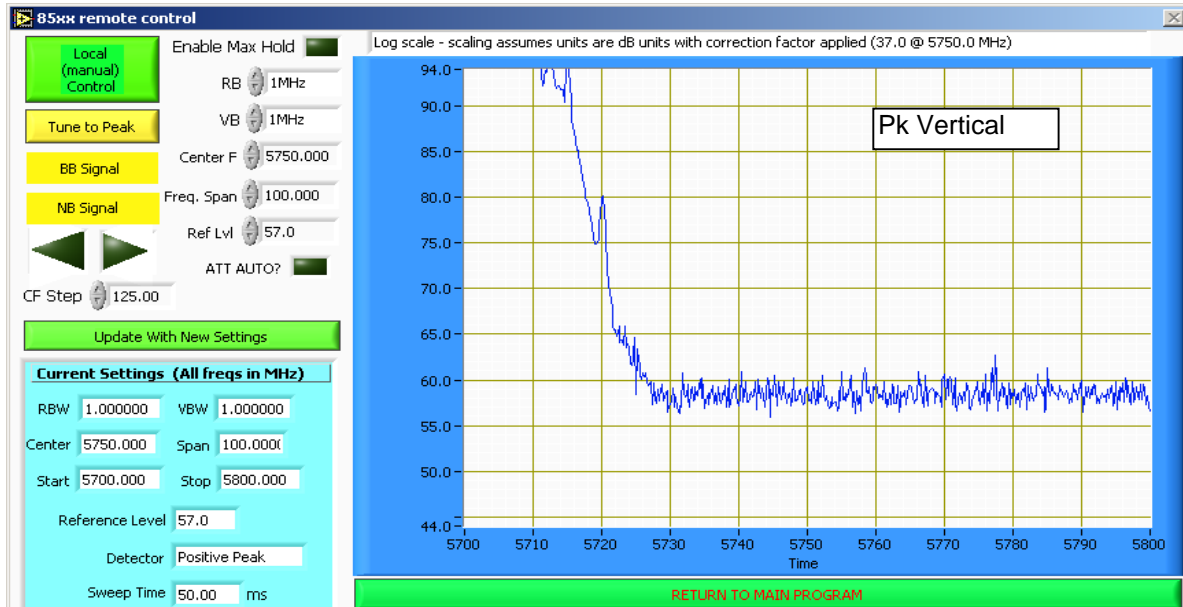
Fundamental Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5700.130	105.9	V	-	-	AVG	294	1.2	
5700.130	112.8	V	-	-	PK	294	1.2	
5700.070	91.2	H	-	-	AVG	29	1.1	
5700.070	98.1	H	-	-	PK	29	1.1	

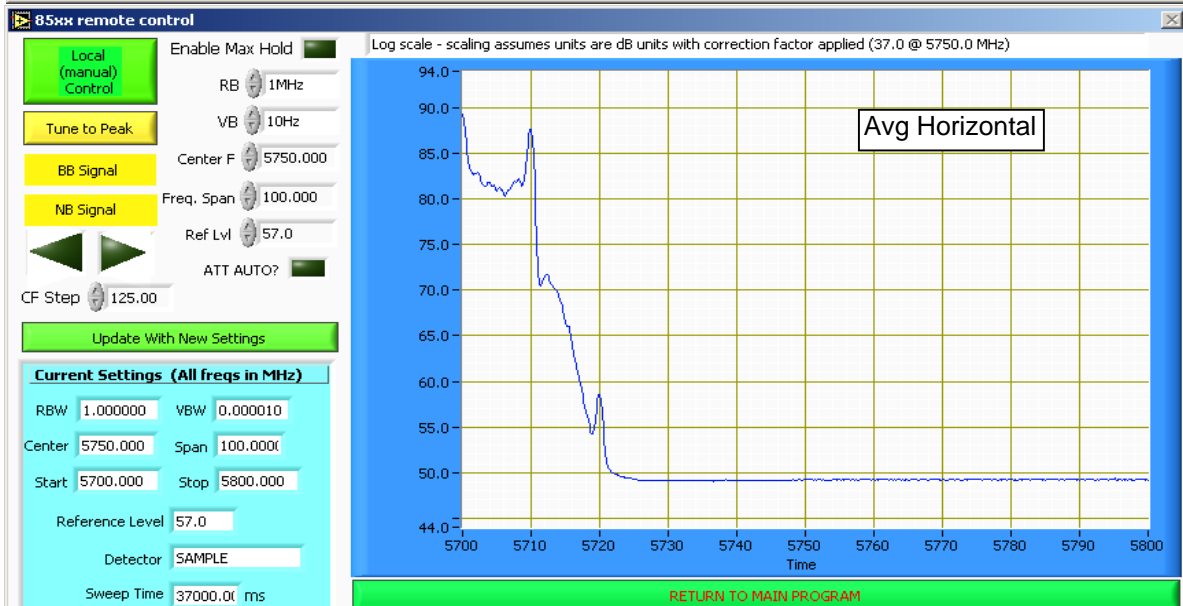


Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2b: Continued



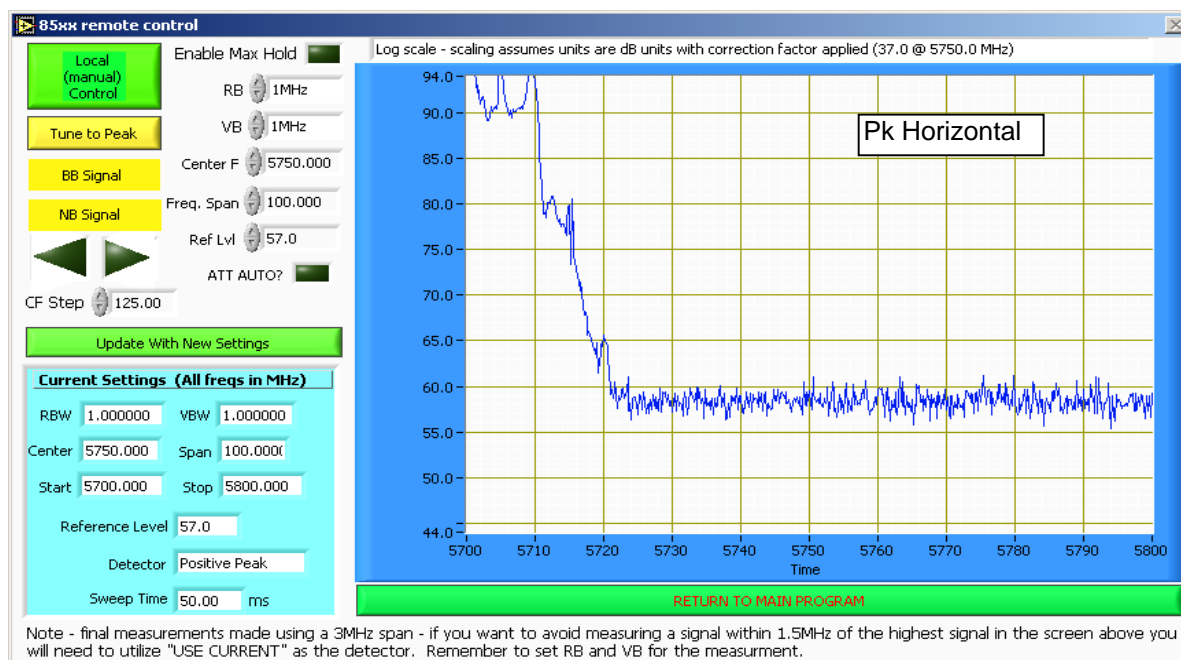
Note - final measurements made using a 3MHz span - if you want to avoid measuring a signal within 1.5MHz of the highest signal in the screen above you will need to utilize "USE CURRENT" as the detector. Remember to set RB and VB for the measurement.



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 measurement.

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2b: Continued



Spurious Radiated Emissions: Bandedge at 5725 MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/OP/Avg	degrees	meters	
5725.080	55.7	V	68.3	-12.6	AVG	294	1.2	
5725.080	65.8	V	88.3	-22.5	PK	294	1.2	
5726.100	50.4	H	68.3	-17.9	AVG	29	1.1	
5726.100	62.7	H	88.3	-25.6	PK	29	1.1	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).



EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

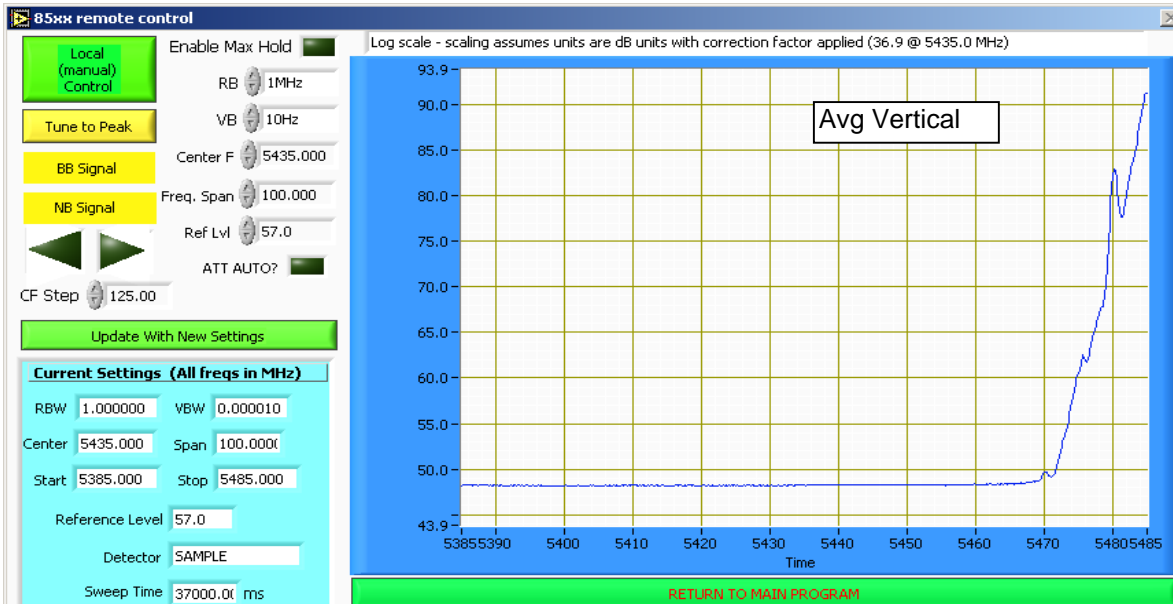
Run #3: Radiated Spurious Emissions for 5470 to 5725 MHz band, Transmit mode, 30 - 40000 MHz

Run #3a: Low Channel @ 5495 MHz with Patch Antenna (23dBi), Power Setting = 65

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:		122.5	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:		109.7	Average Measurement (RB=1MHz, VB=10Hz)

Fundamental Radiated Field Strength

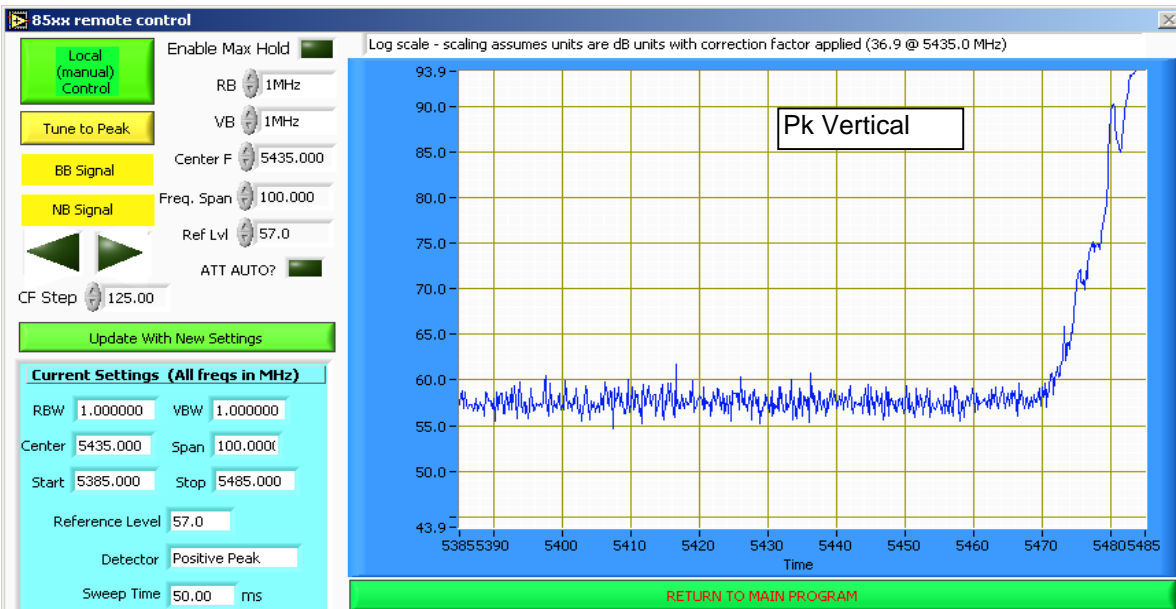
Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBuV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5494.710	109.7	V	-	-	AVG	2	1.0	
5494.710	122.5	V	-	-	PK	2	1.0	
5494.770	89.0	H	-	-	AVG	295	1.0	
5494.770	101.7	H	-	-	PK	295	1.0	



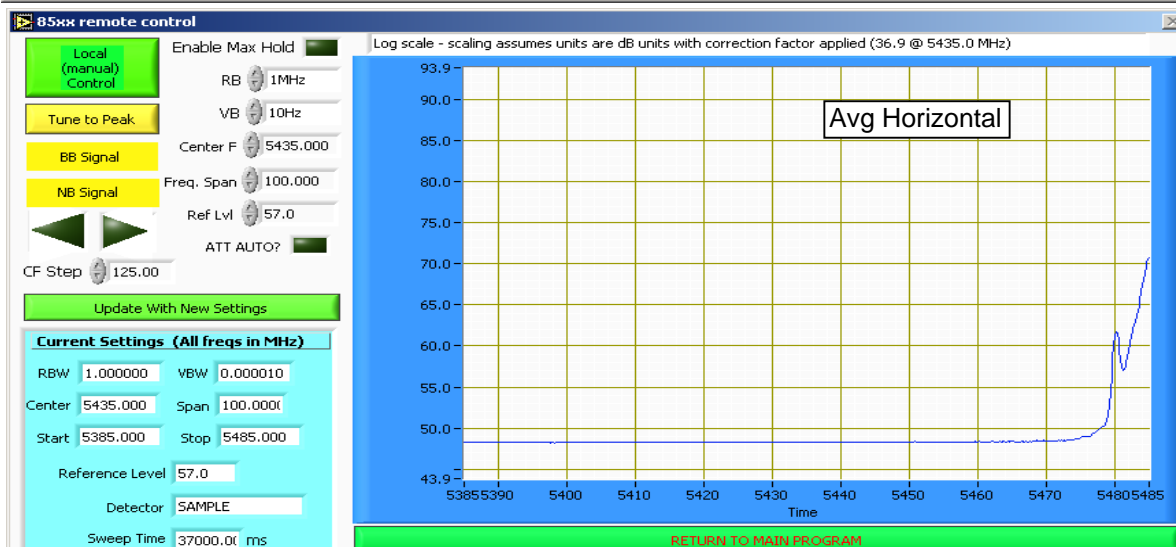
Note - final measurements made using a 3MHz span - if you want to avoid measuring a signal within 1.5MHz of the highest signal in the screen above you will need to utilize "USE CURRENT" as the detector. Remember to set RB and VB for the measurement.

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #3a: Continued



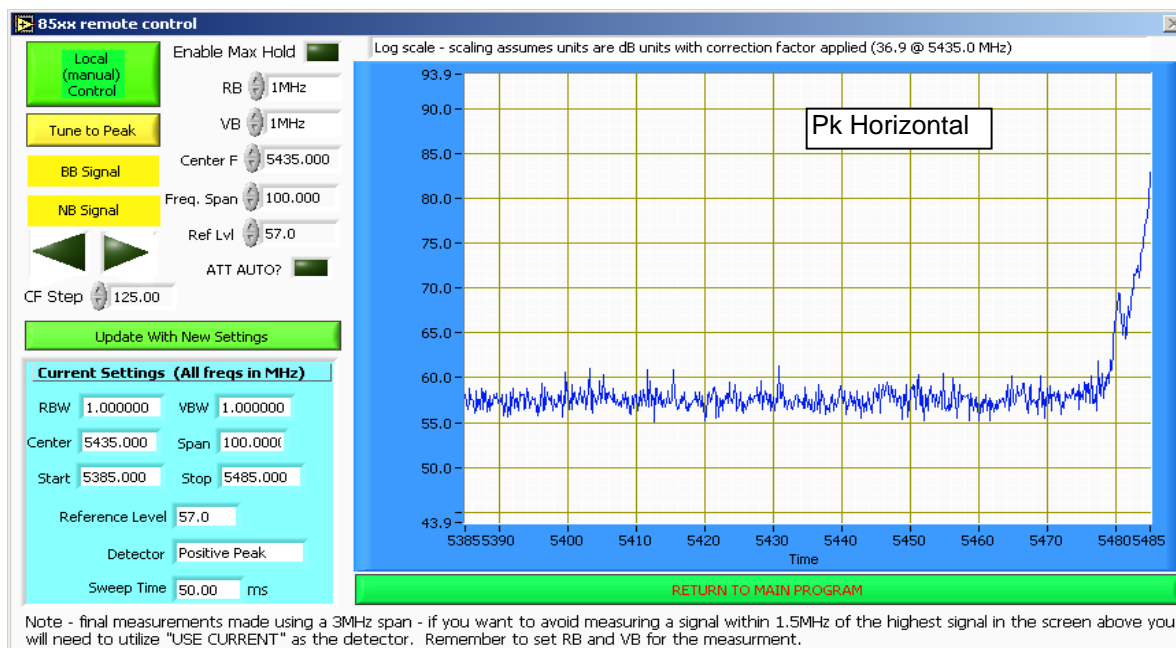
Note - final measurements made using a 3MHz span - if you want to avoid measuring a signal within 1.5MHz of the highest signal in the screen above you will need to utilize "USE CURRENT" as the detector. Remember to set RB and VB for the measurement.



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 measurement.

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #3a: Continued



Band Edge Signal Radiated Field Strength at 5460 MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5459.860	49.6	V	54.0	-4.4	AVG	0	1.0	
5459.860	61.1	V	74.0	-12.9	PK	0	1.0	
5458.960	49.6	H	54.0	-4.4	AVG	295	1.0	
5458.960	61.5	H	74.0	-12.5	PK	295	1.0	

Band Edge Signal Radiated Field Strength at 5470 MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
5469.540	51.0	V	68.3	-17.3	AVG	0	1.0	
5469.540	61.6	V	88.3	-26.7	PK	0	1.0	
5467.650	49.6	H	68.3	-18.7	AVG	295	1.0	
5467.650	61.5	H	88.3	-26.8	PK	295	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).

Note 2: Band-edge measurement calculated from the fundamental field strength (peak or average) minus the band edge delta marker measurement.



EMC Test Data

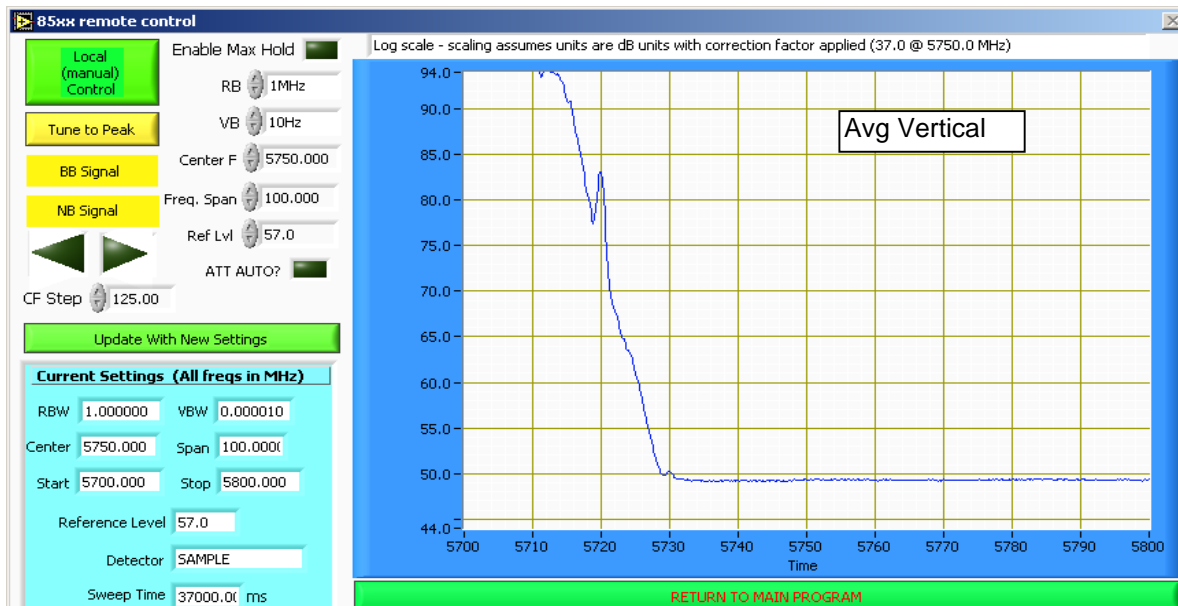
Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #3b: High Channel @ 5705 MHz with Patch Antenna (23dBi), Power Setting = 65

	H	V	
Fundamental emission level @ 3m in 1MHz RBW:	104	123	Peak Measurement (RB=VB=1MHz)
Fundamental emission level @ 3m in 1MHz RBW:	96.4	116.1	Average Measurement (RB=1MHz, VB=10Hz)

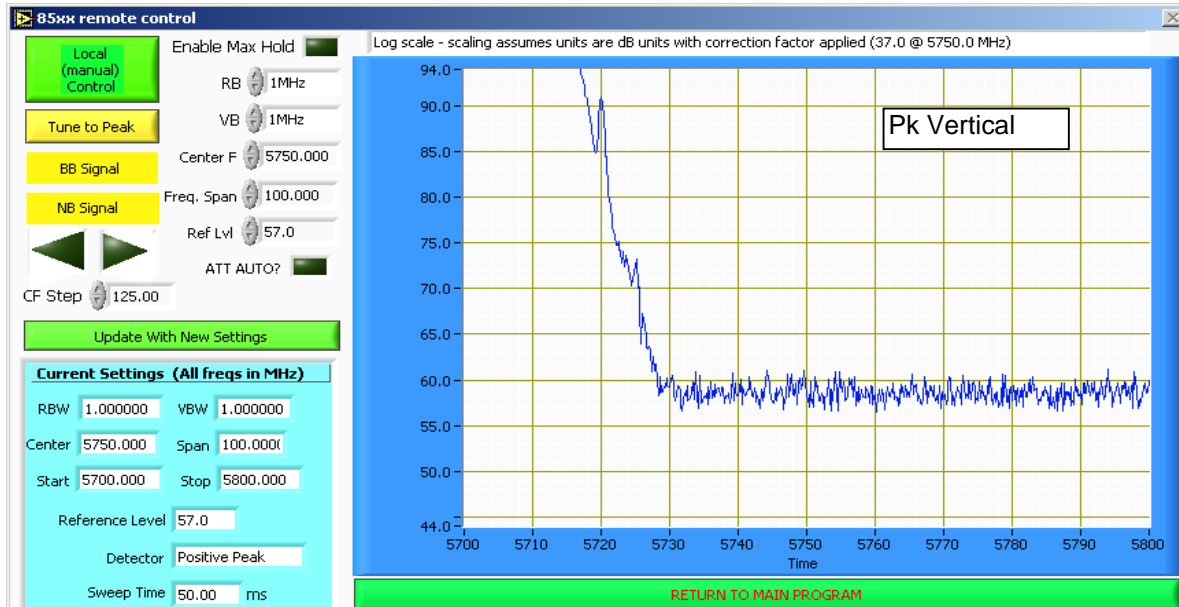
Fundamental Radiated Field Strength

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5699.980	116.1	V	-	-	AVG	0	1.0	
5699.980	123.0	V	-	-	PK	0	1.0	
5700.070	96.9	H	-	-	AVG	299	1.0	
5700.070	104.0	H	-	-	PK	299	1.0	

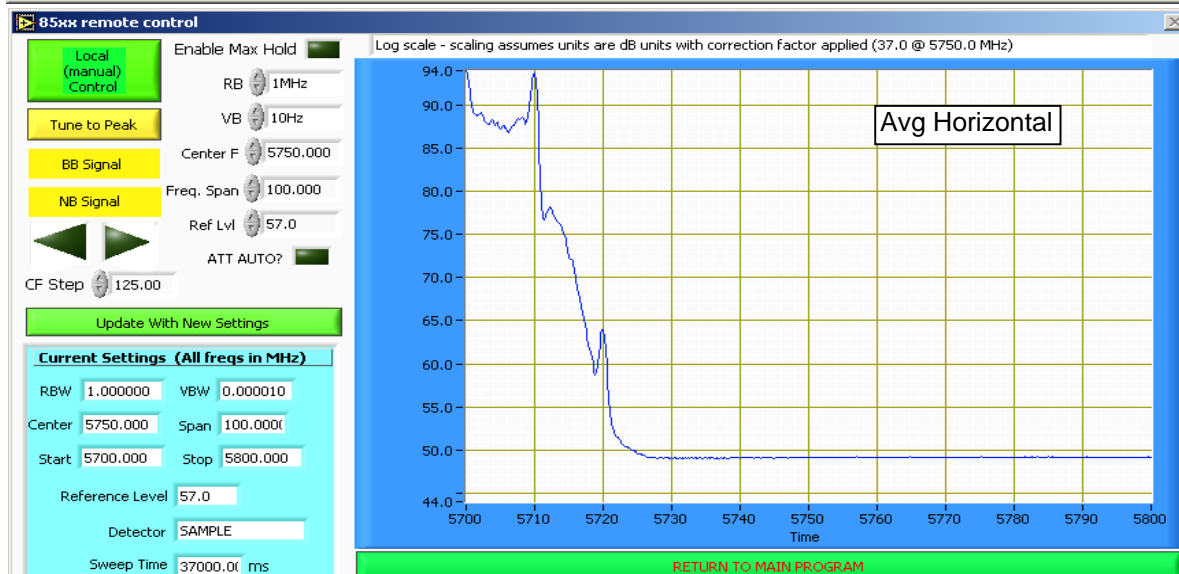


Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #3b: Continued



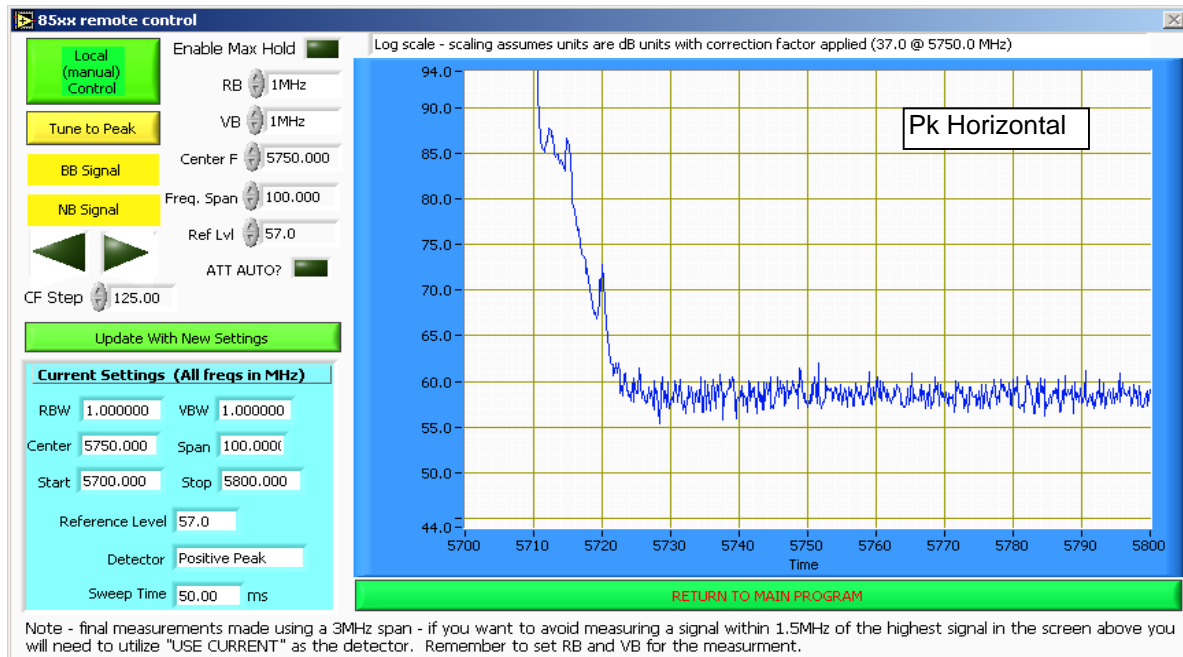
Note - final measurements made using a 3MHz span - if you want to avoid measuring a signal within 1.5MHz of the highest signal in the screen above you will need to utilize "USE CURRENT" as the detector. Remember to set RB and VB for the measurement.



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 measurement.

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

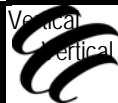
Run #3b: Continued



Spurious Radiated Emissions: Bandedge at 5725 MHz

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBμV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5725.000	60.6	V	68.3	-7.7	AVG	0	1.0	
5725.010	74.8	V	88.3	-13.5	PK	0	1.0	
5725.300	51.2	H	68.3	-17.1	AVG	299	1.0	
5725.300	62.3	H	88.3	-26.0	PK	299	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

RSS 210 and FCC 15.247 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: 11/8/2007
Test Engineer: Rafael Varelas
Test Location: SVOATS #1

Config. Used: 1
Config Change: None
EUT Voltage: POE

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 routed in overhead.

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

Ambient Conditions:
Temperature: 11 °C
Rel. Humidity: 80 %

Summary of Results

Run #	Freq MHz	Mode	Antenna	Power Setting	Limit	Margin/Result
1	5600	-	Omni (10dBi)	Full Power	15.407, 15.209, RSS-210	47.2dBμV/m (229.1μV/m) @ 39901.1MHz (-6.8dB)
2	5600	-	Flat Panel (23dBi)	7dB		41.0dBμV/m (112.2μV/m) @ 16799.9MHz (-13.0dB)
3	5705	-	Sector Panel (16.5dBi)	13.5dB		42.8dBμV/m (138.0μV/m) @ 17098.6MHz (-11.2dB)

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.

Elliott *EMC Test Data*

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #1: TX Radiated Spurious Emissions for 5470 to 5725 MHz band, 30 - 40000 MHz, Omni Antenna (10dBi)

Run #1a: TX Radiated Spurious Emissions, 30 - 40000 MHz. Low Channel @ 5495 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
16499.590	40.0	V	54.0	-14.0	AVG	0	1.0	
16500.210	39.9	H	54.0	-14.1	AVG	0	1.0	
10999.370	37.6	H	54.0	-16.4	AVG	360	1.0	
11000.700	37.6	V	54.0	-16.4	AVG	360	1.5	
16499.590	51.7	V	74.0	-22.3	PK	0	1.0	
16500.210	51.1	H	74.0	-22.9	PK	0	1.0	
11000.700	49.5	V	74.0	-24.5	PK	360	1.5	
10999.370	48.9	H	74.0	-25.1	PK	360	1.0	

Run #1b: Center Channel @ 5600 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
16799.320	41.2	V	54.0	-12.8	AVG	0	1.0	
16799.910	40.9	H	54.0	-13.1	AVG	0	1.0	
11200.690	38.2	V	54.0	-15.8	AVG	0	1.0	
11199.170	38.0	H	54.0	-16.0	AVG	360	1.4	
16799.320	52.4	V	74.0	-21.6	PK	0	1.0	
16799.910	52.2	H	74.0	-21.8	PK	0	1.0	
11199.170	50.0	H	74.0	-24.0	PK	360	1.4	
11200.690	49.7	V	74.0	-24.3	PK	0	1.0	

Run #1c: High Channel @ 5705 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
39901.070	47.2	V	54.0	-6.8	AVG	360	1.0	
28500.210	45.1	V	54.0	-8.9	AVG	0	1.0	
34199.220	45.0	V	54.0	-9.0	AVG	360	1.3	
17099.870	43.2	V	54.0	-10.8	AVG	225	1.0	
17101.490	42.8	H	54.0	-11.2	AVG	360	1.3	
39901.070	58.2	V	74.0	-15.8	PK	360	1.0	
11400.220	38.1	V	54.0	-15.9	AVG	360	1.2	
11400.490	38.1	H	54.0	-15.9	AVG	0	1.6	
28500.210	57.0	V	74.0	-17.0	PK	0	1.0	
34199.220	57.0	V	74.0	-17.0	PK	360	1.3	
17099.870	54.6	V	74.0	-19.4	PK	225	1.0	
17101.490	53.6	H	74.0	-20.4	PK	360	1.3	
11400.490	50.0	H	74.0	-24.0	PK	0	1.6	
11400.220	49.2	V	74.0	-24.8	PK	360	1.2	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).



Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #2: TX Radiated Spurious Emissions for 5470 to 5725 MHz band, 30 - 40000 MHz
Flat Panel Antenna (23dBi)

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
16498.970	40.1	H	54.0	-13.9	AVG	175	1.0	
16499.550	39.9	V	54.0	-14.1	AVG	251	1.0	
11001.040	37.6	H	54.0	-16.4	AVG	156	1.3	
10999.710	37.5	V	54.0	-16.5	AVG	100	1.0	
16499.550	52.4	V	74.0	-21.6	PK	251	1.0	
16498.970	51.2	H	74.0	-22.8	PK	175	1.0	
10999.710	49.4	V	74.0	-24.6	PK	100	1.0	
11001.040	48.8	H	74.0	-25.2	PK	156	1.3	

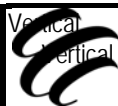
Run #2b: Center Channel @ 5600 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
16799.850	41.0	H	54.0	-13.0	AVG	296	1.0	
16800.670	40.8	V	54.0	-13.2	AVG	0	1.0	
11201.140	38.0	V	54.0	-16.0	AVG	52	1.5	
11201.330	37.9	H	54.0	-16.1	AVG	223	1.0	
16800.670	52.8	V	74.0	-21.2	PK	0	1.0	
16799.850	52.2	H	74.0	-21.8	PK	296	1.0	
11201.330	49.5	H	74.0	-24.5	PK	223	1.0	
11201.140	48.9	V	74.0	-25.1	PK	52	1.5	

Run #2c: High Channel @ 5705 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
16499.500	40.0	H	54.0	-14.0	AVG	62	1.9	
16499.680	39.9	V	54.0	-14.1	AVG	352	1.4	
10999.950	37.7	V	54.0	-16.3	AVG	120	1.0	
10998.920	37.7	H	54.0	-16.3	AVG	360	1.0	
16499.500	51.5	H	74.0	-22.5	PK	62	1.9	
16499.680	51.1	V	74.0	-22.9	PK	352	1.4	
10998.920	49.6	H	74.0	-24.4	PK	360	1.0	
10999.950	49.2	V	74.0	-24.8	PK	120	1.0	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).



Elliott

EMC Test Data

Client:	Cascade Networks	Job Number:	J69809
Model:	Cyclone 5400	T-Log Number:	T69846
Contact:	Brian Magnuson	Account Manager:	Dean Eriksen
Standard:	FCC Part 15.247/RSS-210	Class:	N/A

Run #3: TX Radiated Spurious Emissions for 5470 to 5725 MHz band, 30 - 40000 MHz
Sector Panel Antenna (16.5dBi)

Run #3a: TX Radiated Spurious Emissions, 30 - 40000 MHz. Low Channel @ 5495 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
16498.800	40.2	V	54.0	-13.8	AVG	25	1.0	
16498.830	40.1	H	54.0	-13.9	AVG	324	1.0	
11000.120	37.7	V	54.0	-16.3	AVG	20	1.2	
10999.370	37.7	H	54.0	-16.3	AVG	169	1.0	
16498.800	51.9	V	74.0	-22.1	PK	25	1.0	
16498.830	51.5	H	74.0	-22.5	PK	324	1.0	
11000.120	49.5	V	74.0	-24.5	PK	20	1.2	
10999.370	49.5	H	74.0	-24.5	PK	169	1.0	

Run #3b: Center Channel @ 5600 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
16798.810	40.9	H	54.0	-13.1	AVG	87	1.5	
16800.160	40.9	V	54.0	-13.1	AVG	303	1.0	
11201.470	38.0	H	54.0	-16.0	AVG	157	1.1	
11200.120	37.8	V	54.0	-16.2	AVG	76	1.0	
16800.160	52.6	V	74.0	-21.4	PK	303	1.0	
16798.810	51.8	H	74.0	-22.2	PK	87	1.5	
11200.120	49.5	V	74.0	-24.5	PK	76	1.0	
11201.470	49.4	H	74.0	-24.6	PK	157	1.1	

Run #3c: High Channel @ 5705 MHz

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
17098.560	42.8	V	54.0	-11.2	AVG	334	1.0	
17098.880	42.8	H	54.0	-11.2	AVG	343	1.0	
11400.170	38.0	V	54.0	-16.0	AVG	13	1.4	
11401.110	38.0	H	54.0	-16.0	AVG	7	1.9	
17098.560	54.1	V	74.0	-19.9	PK	334	1.0	
17098.880	53.6	H	74.0	-20.4	PK	343	1.0	
11401.110	50.0	H	74.0	-24.0	PK	7	1.9	
11400.170	49.7	V	74.0	-24.3	PK	13	1.4	

Note 1: For emissions in restricted bands, the limit of 15.209 was used. For all other emissions, the limit was set to -27dBm/MHz (~68dBuV/m).