Elliott

**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

| | | | |
|---|---|---|---|
| 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.

| | | | |
|---|---|---|---|
| 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.

| | | | |
|---|---|---|---|
| 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 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| 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

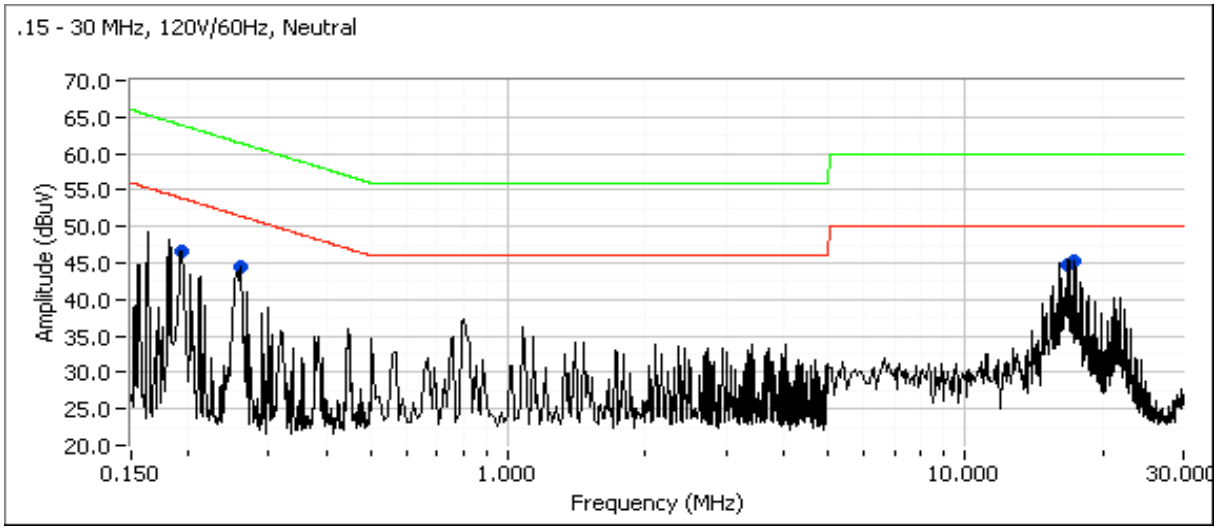
No modifications were made to the EUT during testing

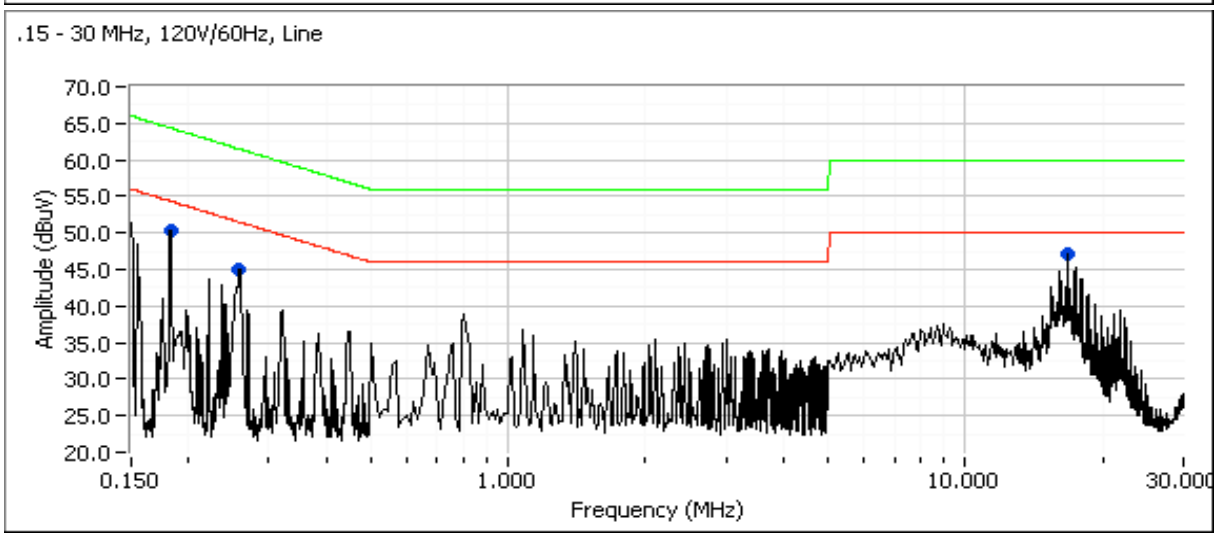
## Deviations From The Standard

No deviations were made from the requirements of the standard.

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

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



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

**Run #1: Continued**

| Frequency | Level | AC | FCC 15.109 B | | Detector | Comments |
|---|---|---|---|---|---|---|
| MHz | dBµV | Line | Limit | Margin | QP/Ave | |
| 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 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| 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 | 44.3dBµV/m (164.1µV/m) @ 500.044MHz (-1.7dB) |

## Modifications Made During Testing

No modifications were made to the EUT during testing

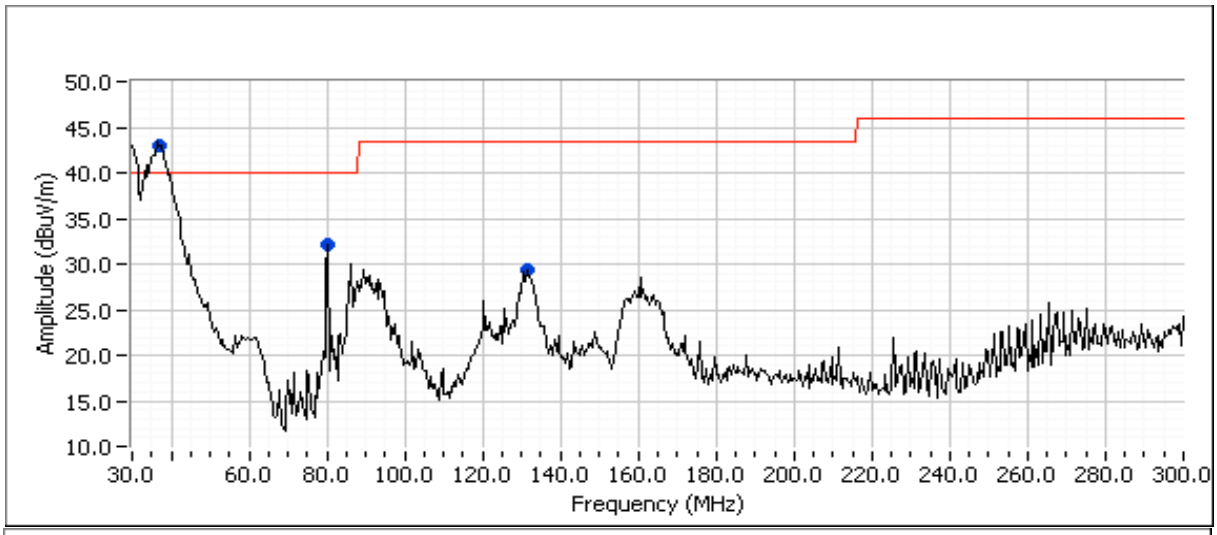
## Deviations From The Standard

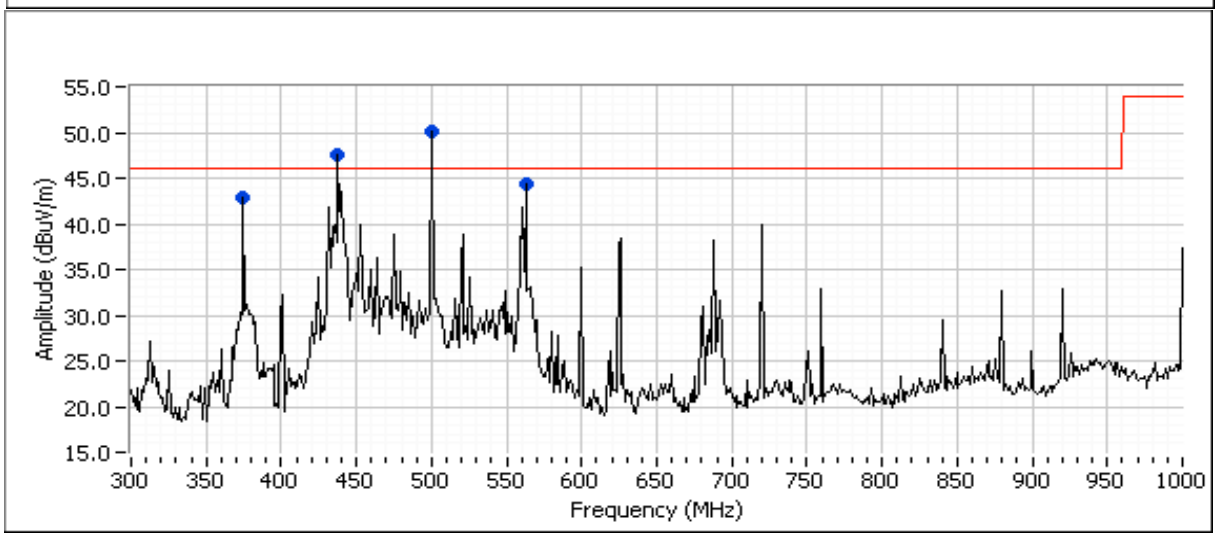
No deviations were made from the requirements of the standard.

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

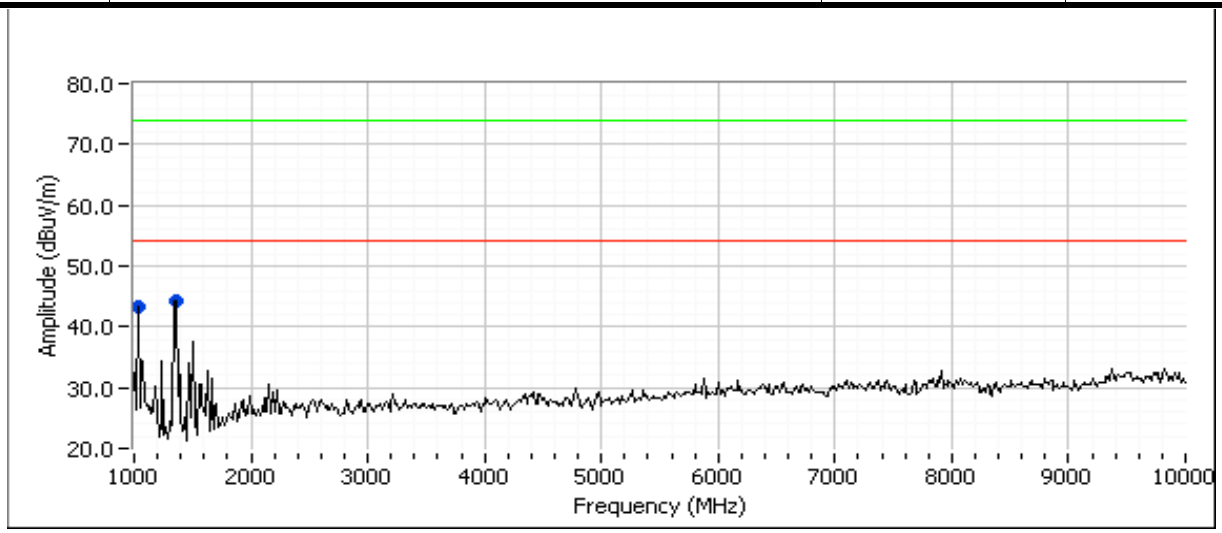
**Run #1: Preliminary Radiated Emissions, 30-18,000 MHz**
**Omni Antenna, Rx mode @ 5600 MHz**
**Note** - emissions below 1GHz were independent of operating frequency and did not change between transmit mode/receive mode. Refer also the to the digital device emissions data obtained with the device in transmit/receive mode. Data from 30 - 1000 MHz is considered representative for both transmit and receive mode emissions.

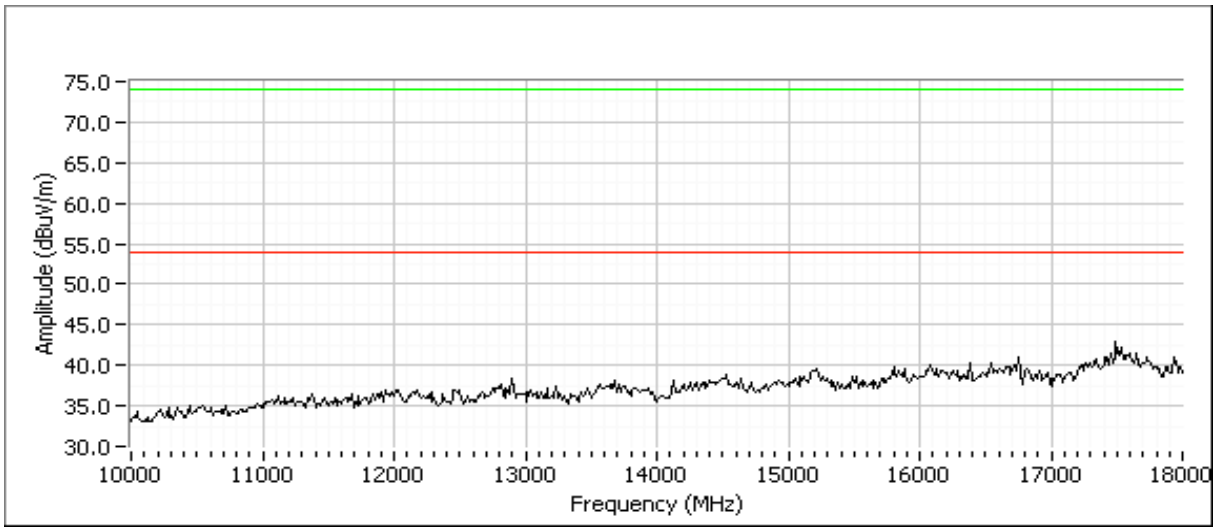
| Frequency Range | Test Distance | Limit Distance | Extrapolation Factor |
|---|---|---|---|
| 30 - 1000 MHz | 3 | 3 | 0.0 |
| 1000 - 18000 MHz | 1 | 3 | -9.5 |



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



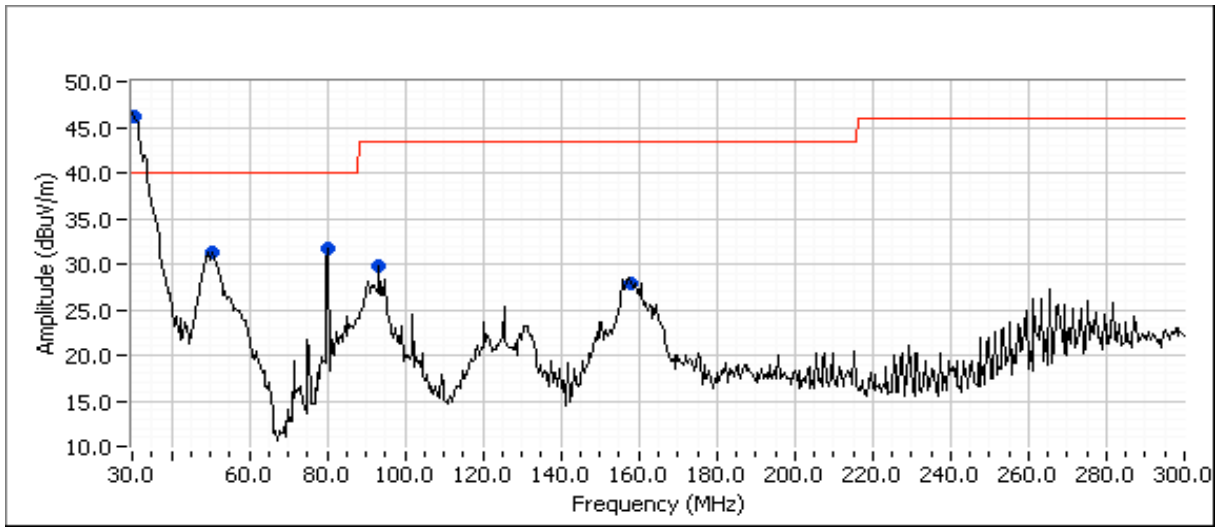



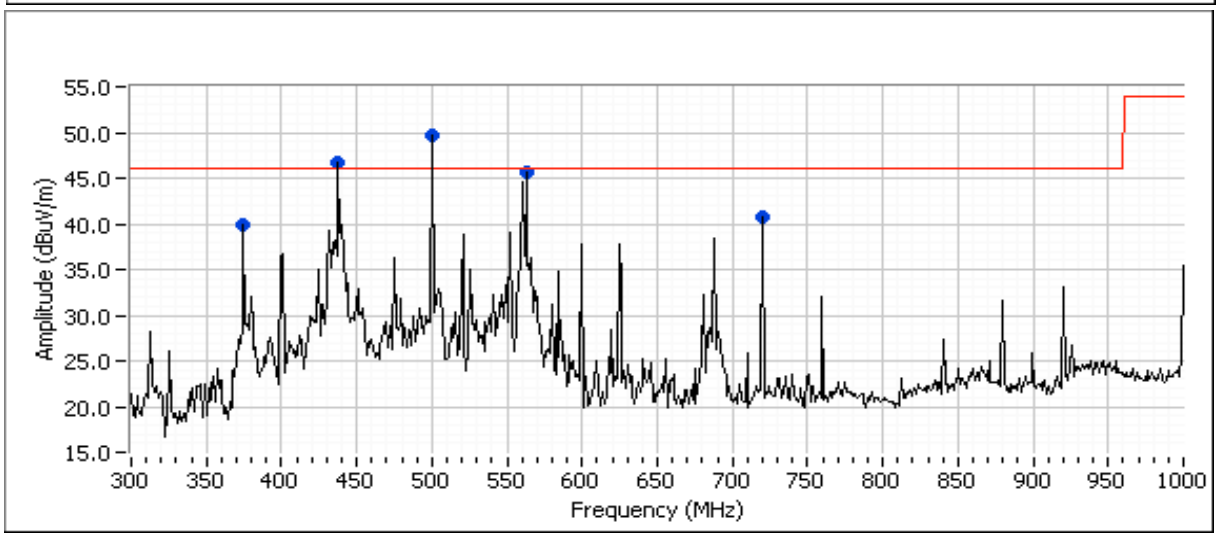

| Frequency | Level | Pol | FCC Class B | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | v/h | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 37.332 | 42.9 | V | 40.0 | 2.9 | Peak | 241 | 1.7 | |
| 80.023 | 32.1 | V | 40.0 | -7.9 | Peak | 181 | 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 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| 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**

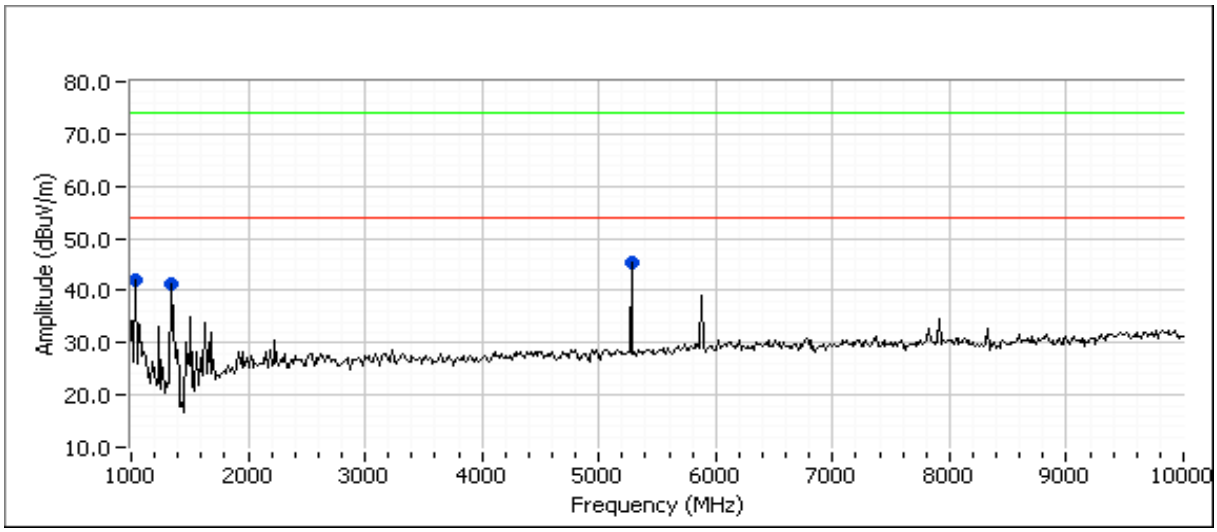
| Frequency Range | Test Distance | Limit Distance | Extrapolation Factor |
|---|---|---|---|
| 30 - 1000 MHz | 3 | 3 | 0.0 |
| 1000 - 18000 MHz | 1 | 3 | -9.5 |

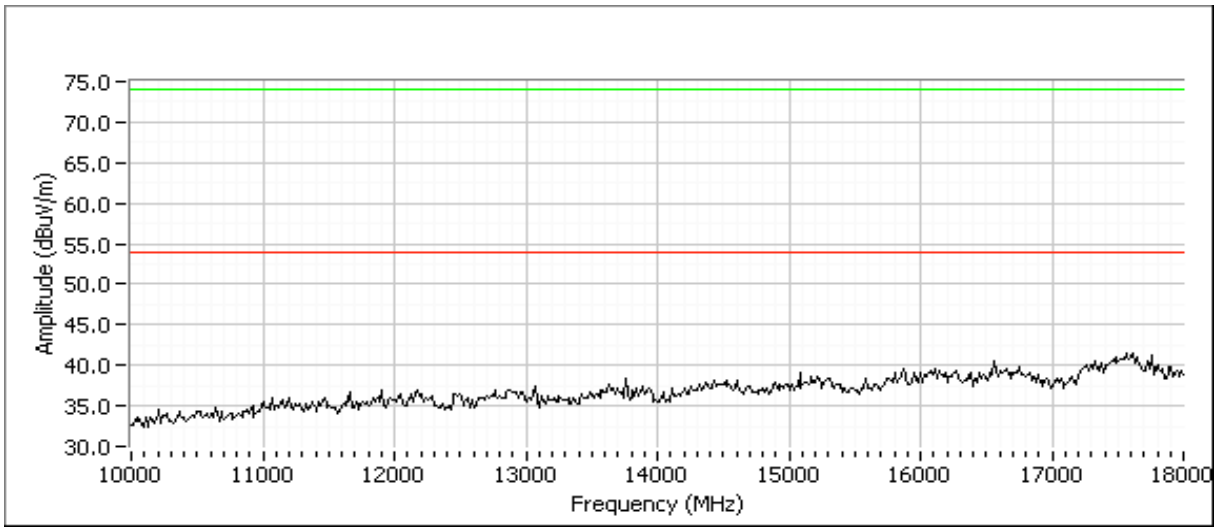


| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| Standard: | FCC Part 15.247/RSS-210 | Class: | B |

**Run #2: Continued**



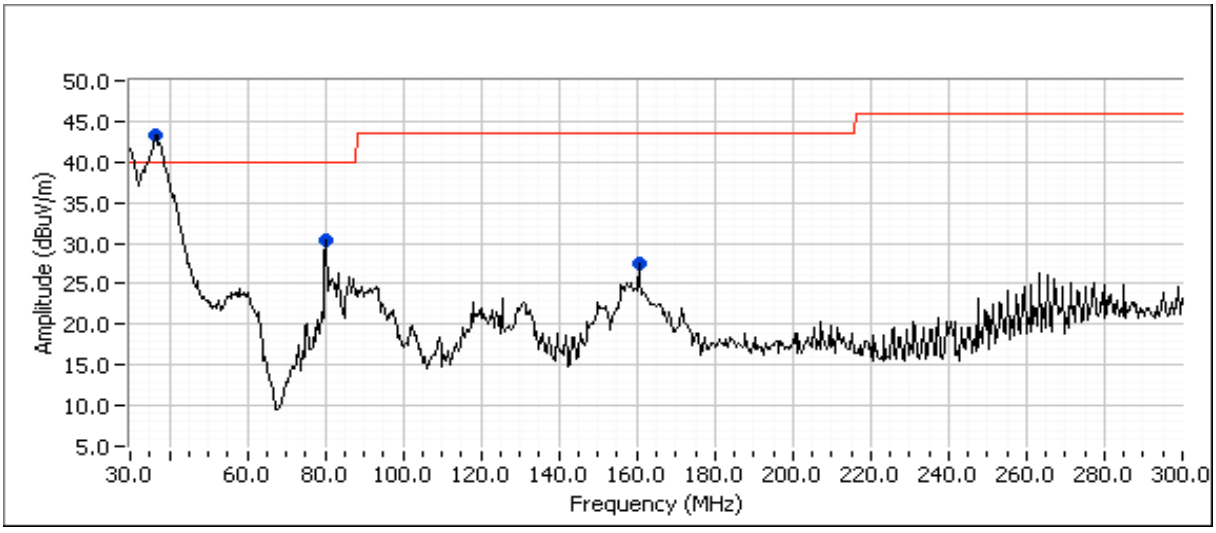
| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| Standard: | FCC Part 15.247/RSS-210 | Class: | B |

**Run #2: Continued**

| Frequency | Level | Pol | FCC Class B | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/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 | |

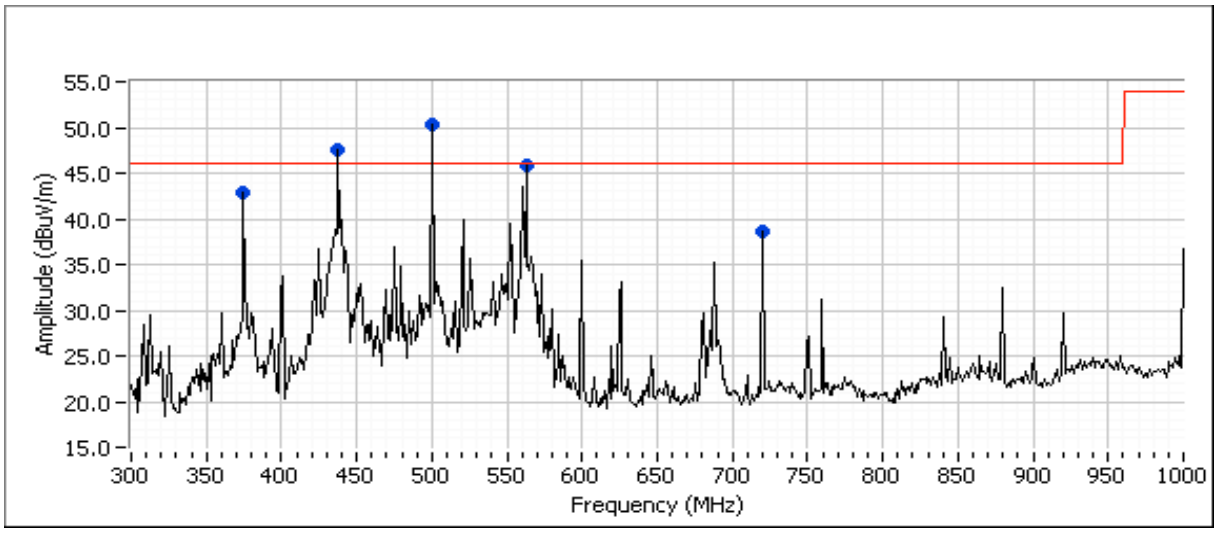
**Run #3: Preliminary Radiated Emissions, 30-18,000 MHz**
**Sector Panel Antenna, Rx mode @ 5600 MHz**

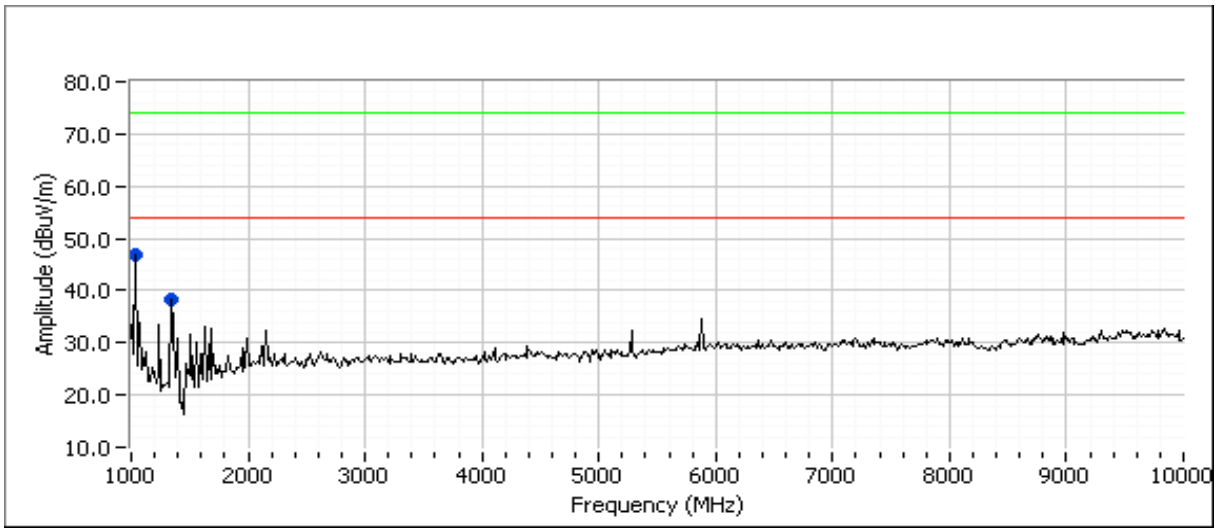
| Frequency Range | Test Distance | Limit Distance | Extrapolation Factor |
|---|---|---|---|
| 30 - 1000 MHz | 3 | 3 | 0.0 |
| 1000 - 18000 MHz | 1 | 3 | -9.5 |



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

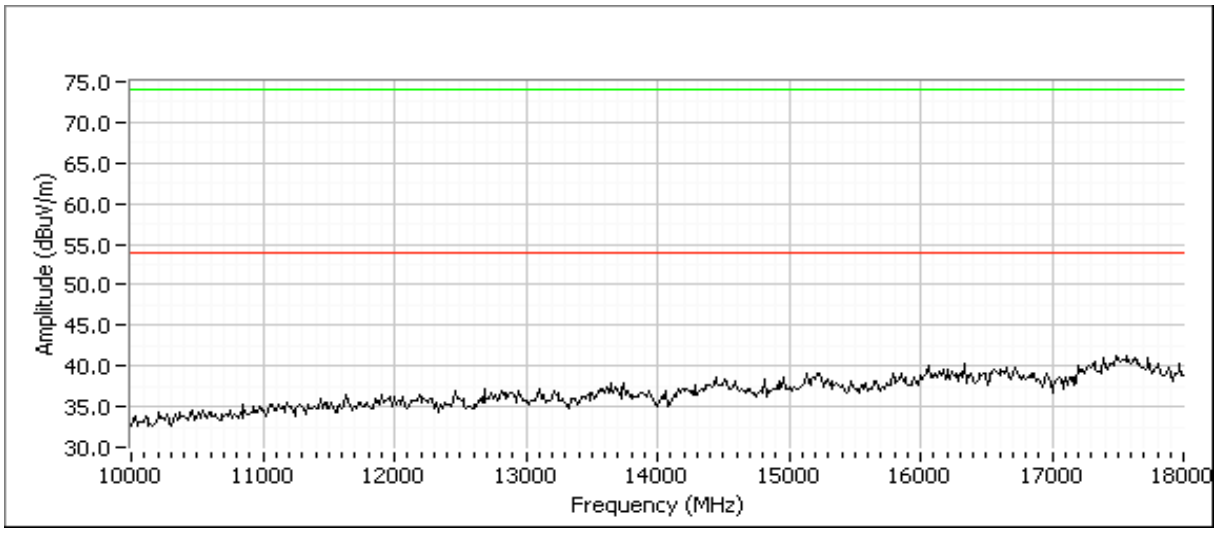
**Run #3: Continued**



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

**Run #3: Continued**




| Frequency | Level | Pol | FCC Class B | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/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 | |

| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| 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 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| 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 | Antenna Conducted - Out of Band Spurious | 15.407(b) | Pass | All emissions below the -27dBm/MHz limit |

## Modifications Made During Testing

No modifications were made to the EUT during testing

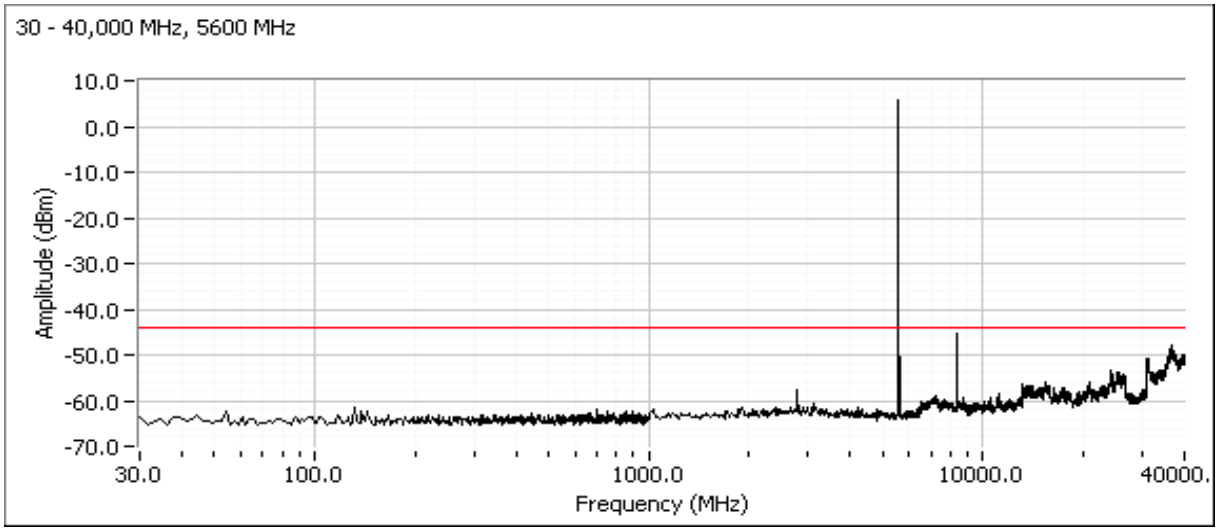
## Deviations From The Standard

No deviations were made from the requirements of the standard.

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

**Run #1a: Out Of Band Spurious Emissions power setting = FC, Center Channel (5600 MHz)**

| | | |
|---|---|---|
| Maximum Antenna Gain: | 16.5 | dBi |
| Spurious Limit: | -27 | dBm/MHz eirp |
| Limit Used On Plots [Note 1]: | -43.5 | dBm/MHz |




**Note** - the plot above was made at the highest power setting and covers both 10dBi and 16.5dBi antenna configurations. 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.
The additional plots were made at different power settings, primarily to show compliance at the band edges.

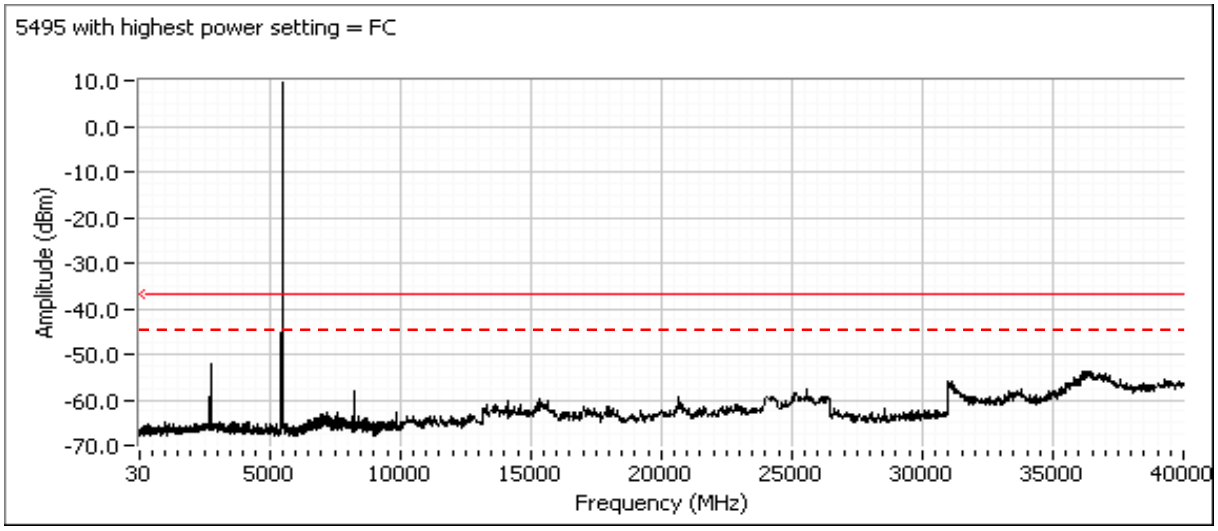
| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| Standard: | FCC Part 15.247/RSS-210 | Class: | N/A |

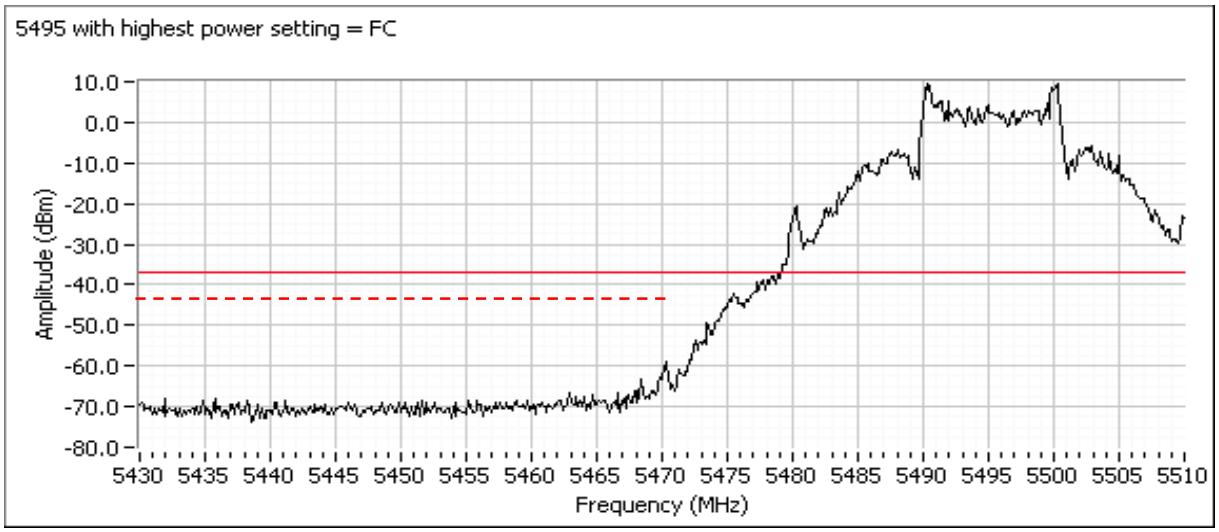
**Run #1b: Out Of Band Spurious Emissions power setting = FC, Low Channel (5495 MHz)**

Plots show limit for 16.5dBi and 10dBi antennas at the highest power setting

| | | |
|---|---|---|
| Maximum Antenna Gain: | 10 dBi | 16.5 dBi |
| Spurious Limit: | -27 dBm/MHz eirp | -27 dBm/MHz eirp |
| Limit Used On Plots [Note 1]: | -37 dBm/MHz solid red line | -43.5 dBm/MHz red dashed line |

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



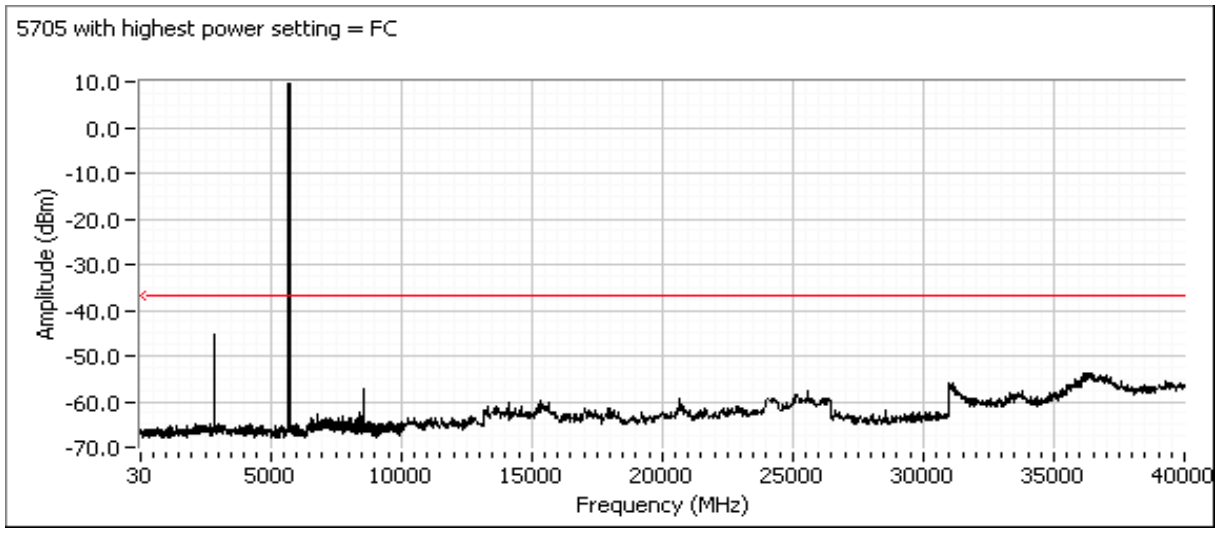
| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| Standard: | FCC Part 15.247/RSS-210 | Class: | N/A |

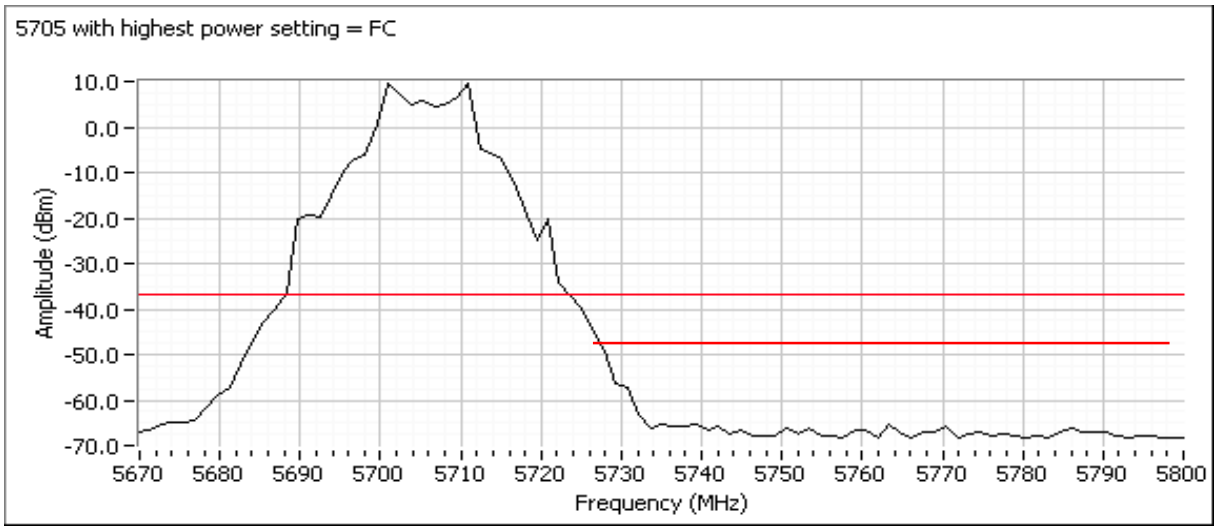
**Run #1c: Out Of Band Spurious Emissions - Antenna Conducted at 5705MHz with power setting = FC**

Plots show limit for 16.5dBi and 10dBi antennas at the highest power setting

| | | | | |
|---|---|---|---|---|
| Maximum Antenna Gain: | 10 | dBi | 16.5 | dBi |
| Spurious Limit: | -27 | dBm/MHz eirp | -27 | dBm/MHz eirp |
| Limit Used On Plots [Note 1]: | -37 | dBm/MHz solid red line | -43.5 | dBm/MHz red dashed line |

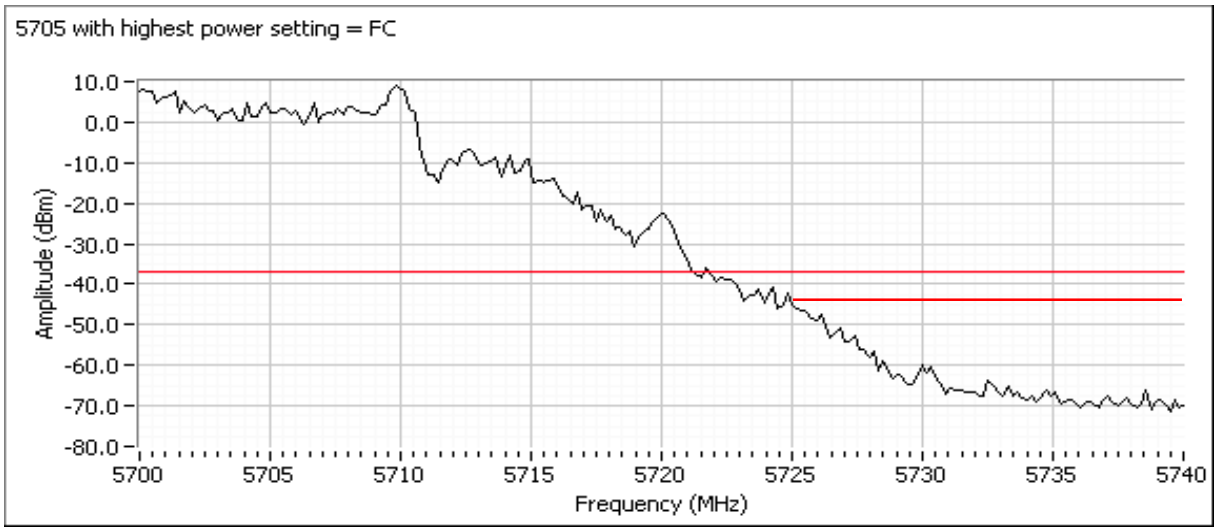
**Plots Showing Out-Of-Band Emissions (RBW=VBW=1MHz)**




***see next plot to confirm compliance at 5725 MHz***

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

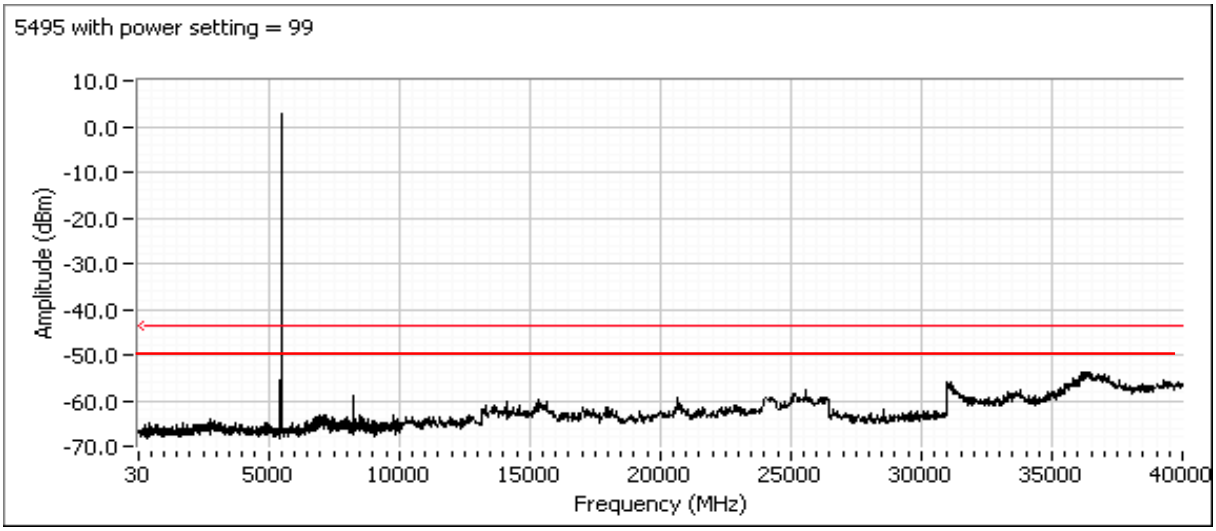


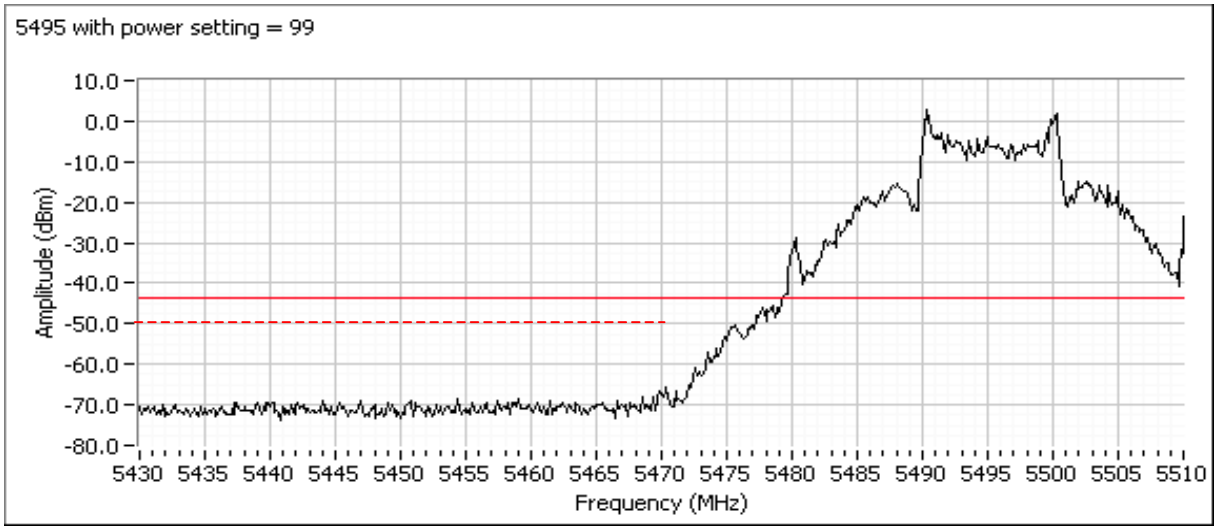
| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| Standard: | FCC Part 15.247/RSS-210 | Class: | N/A |

**Run #1d: Out Of Band Spurious Emissions - Antenna Conducted at 5495MHz with power setting = 99**

Maximum Antenna Gain: 23 dBi
Spurious Limit: -27 dBm/MHz eirp
Limit Used On Plots [Note 1]: -50 dBm/MHz (Dashed red line on all plots)

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



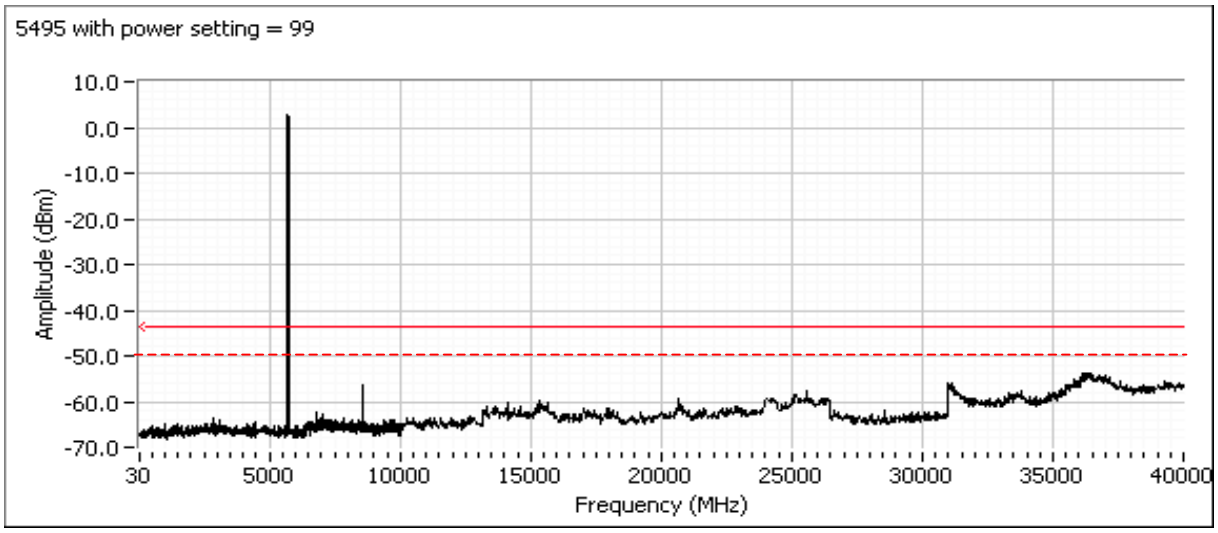



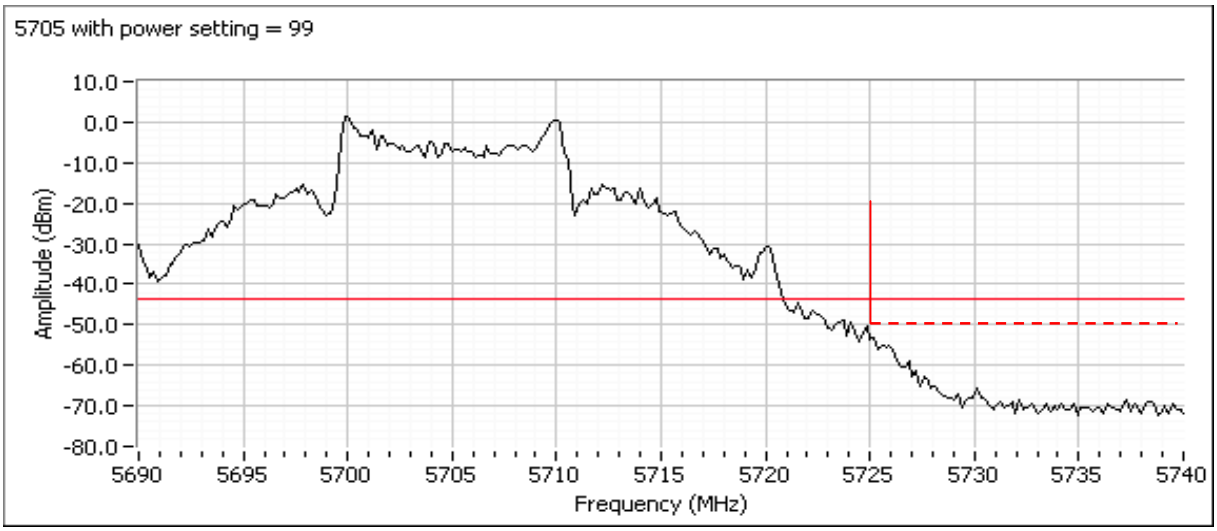
| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| Standard: | FCC Part 15.247/RSS-210 | Class: | N/A |

**Run #1e: Out Of Band Spurious Emissions - Antenna Conducted at 5705MHz with power setting = 99**

Maximum Antenna Gain: 23 dBi
Spurious Limit: -27 dBm/MHz eirp
Limit Used On Plots [Note 1]: -50 dBm/MHz (Dashed red line on all plots)

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



| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| 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.

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

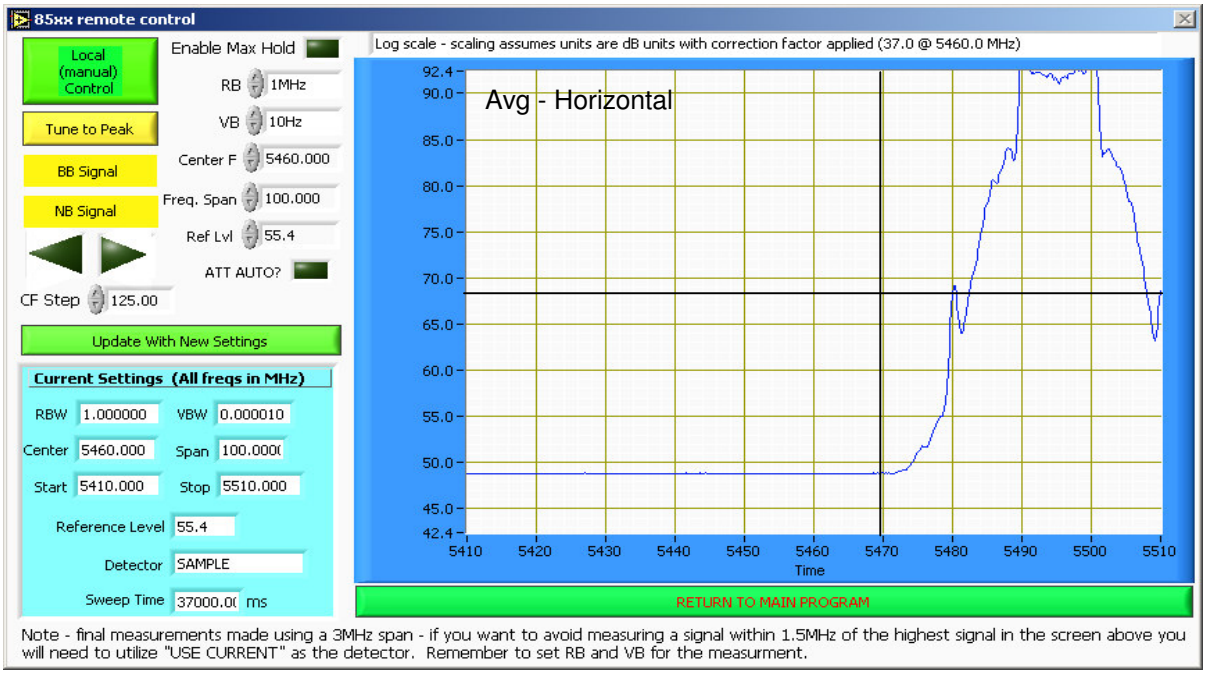
**Run #1: Radiated Spurious Emissions for 5470 to 5725 MHz band, Transmit mode, 30 - 40000 MHz**

**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

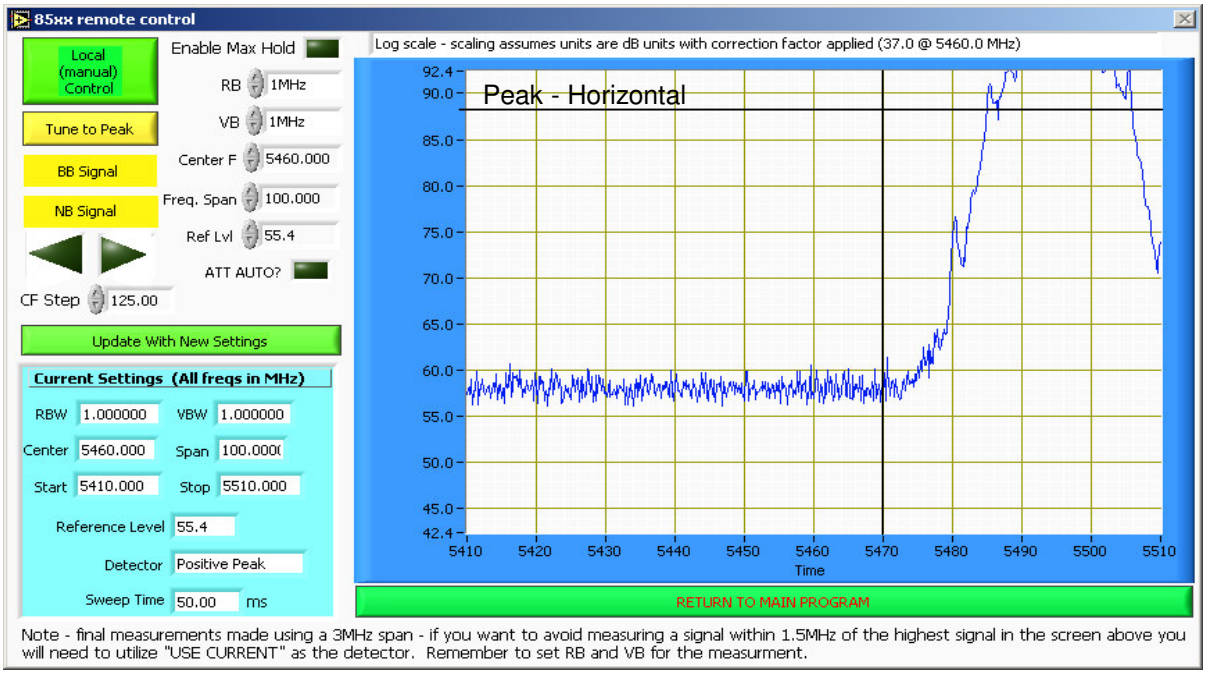
| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | V/H | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5490.400 | 116.7 | V | - | - | AVG | 173 | 1.0 | |
| 5490.400 | 122.9 | V | - | - | PK | 173 | 1.0 | |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

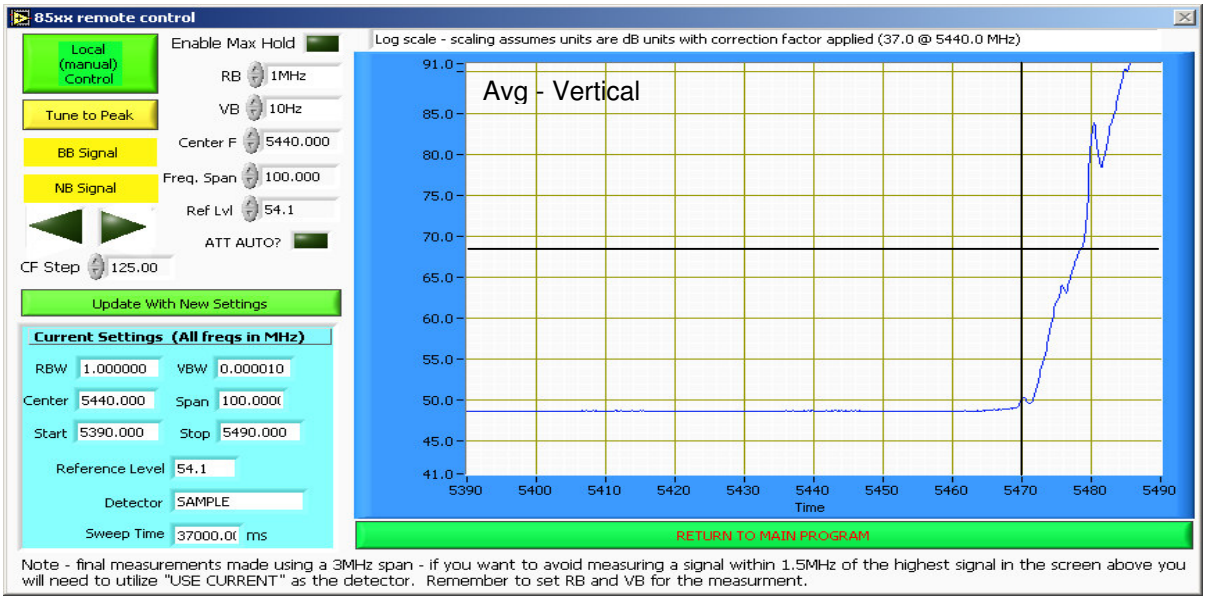



Note - final measurements made using a 3MHz span - if you want to avoid measuring a signal within 1.5MHz of the highest signal in the screen above you will need to utilize "USE CURRENT" as the detector. Remember to set RB and VB for the measurment.

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

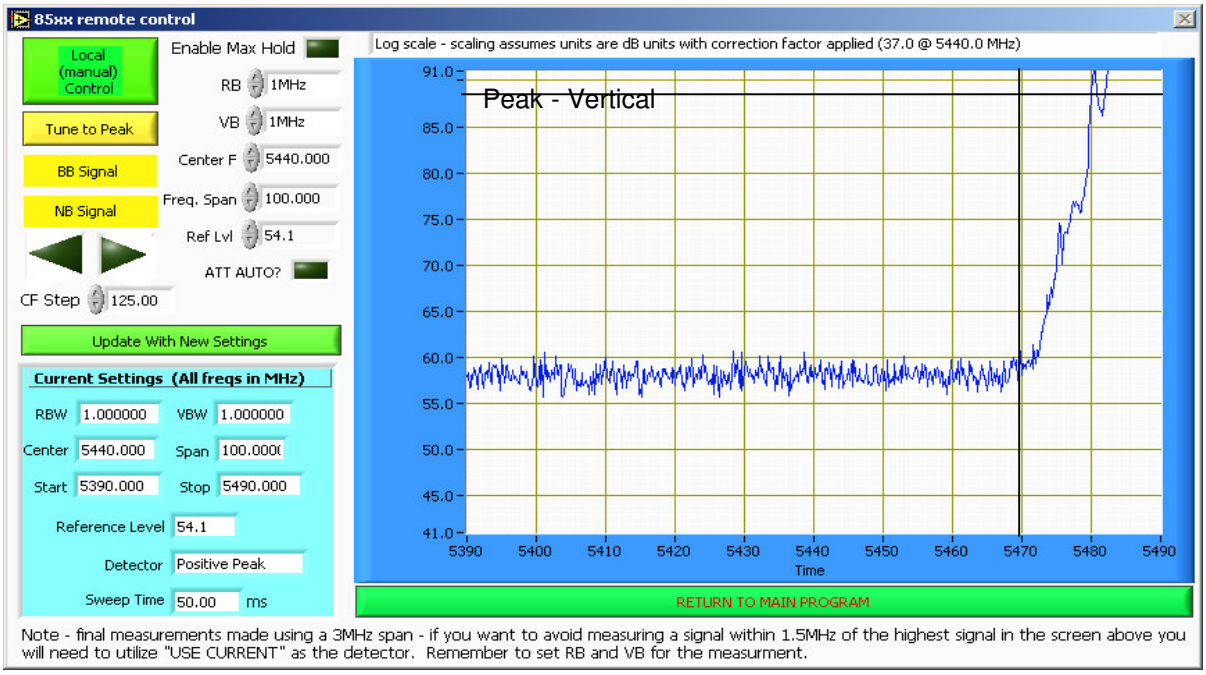
**Run #1a: Continued**



| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| 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. |

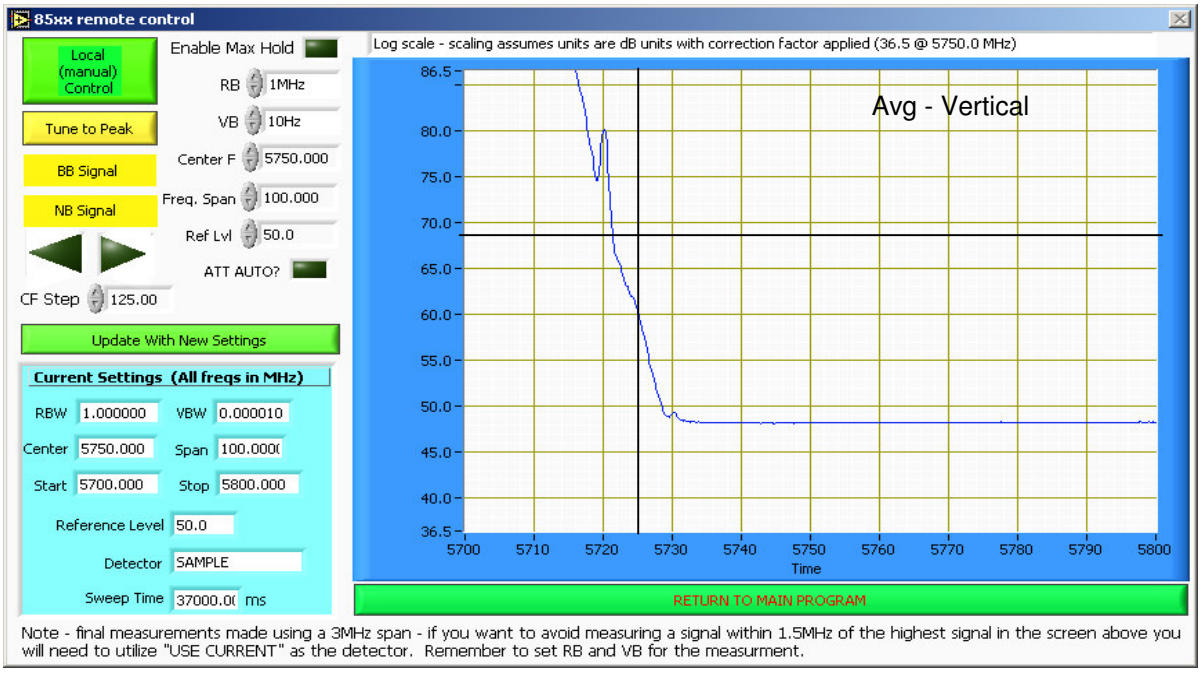
| | | | |
|---|---|---|---|
| Client: | Cascade Networks | Job Number: | J69809 |
| Model: | Cyclone 5400 | T-Log Number: | T69846 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| Standard: | FCC Part 15.247/RSS-210 | Class: | N/A |

**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

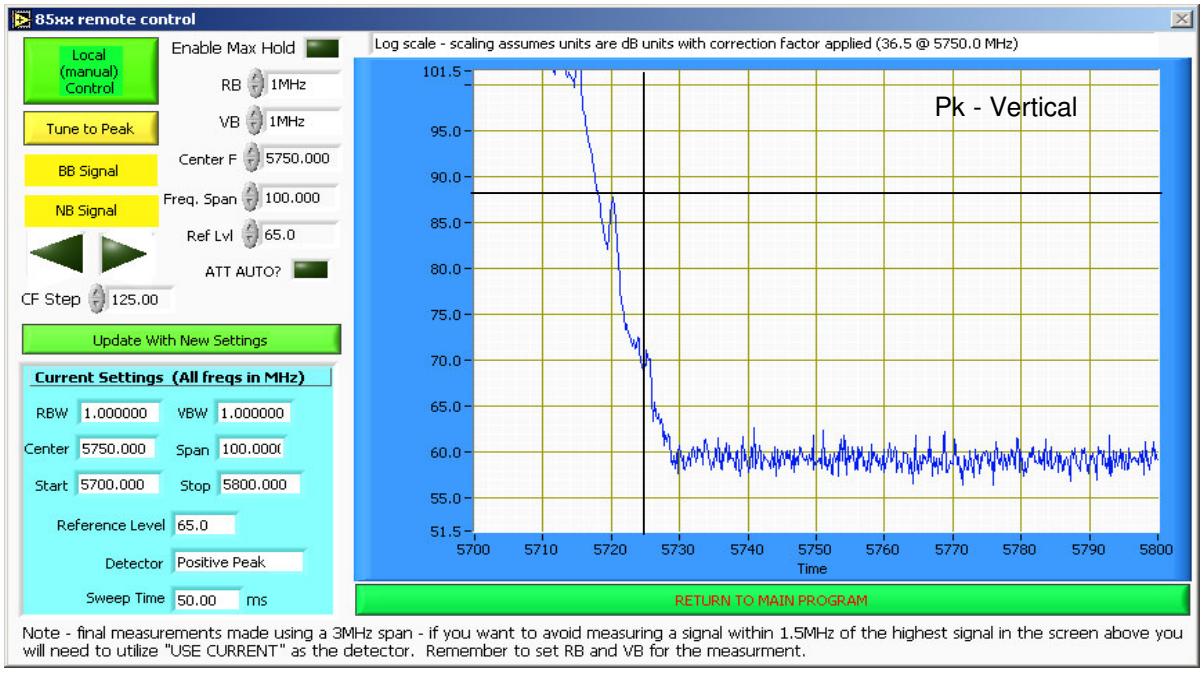
| Frequency | Level | Pol | 15.209 / 15E | | Detector | Azimuth | Height | Comments |
|---|---|---|---|---|---|---|---|---|
| MHz | dBµV/m | V/H | Limit | Margin | Pk/QP/Avg | degrees | meters | |
| 5700.150 | 113.8 | V | - | - | AVG | 335 | 2.0 | |
| 5700.150 | 120.5 | V | - | - | PK | 335 | 2.0 | |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

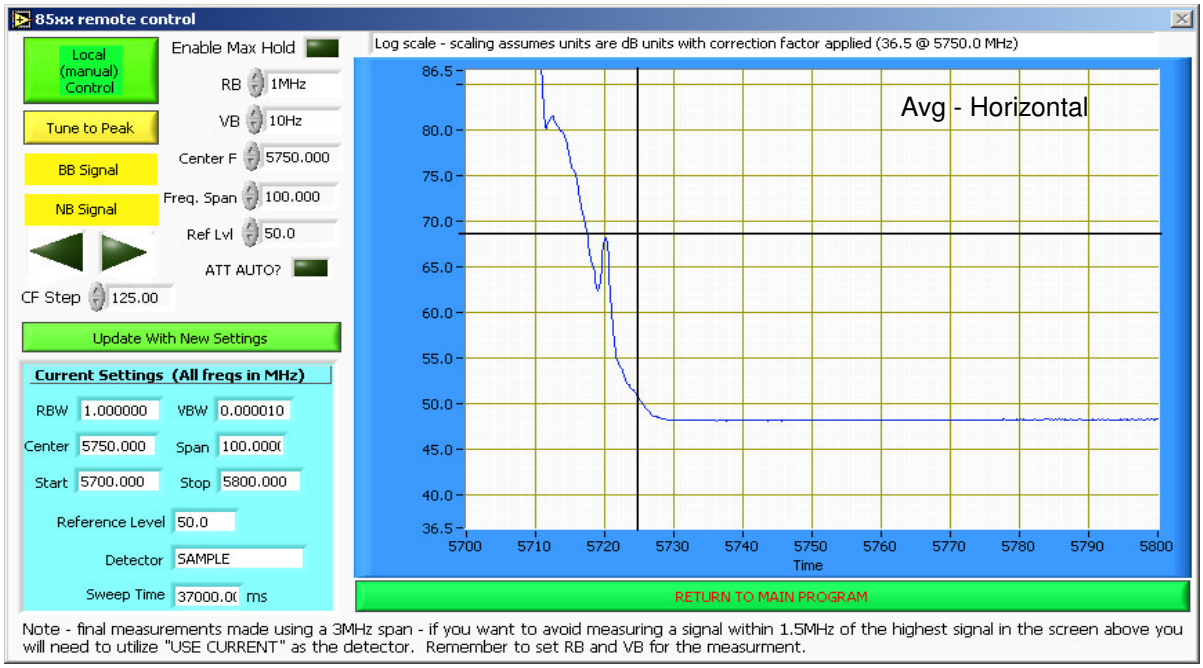



Note - final measurements made using a 3MHz span - if you want to avoid measuring a signal within 1.5MHz of the highest signal in the screen above you will need to utilize "USE CURRENT" as the detector. Remember to set RB and VB for the measurment.

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

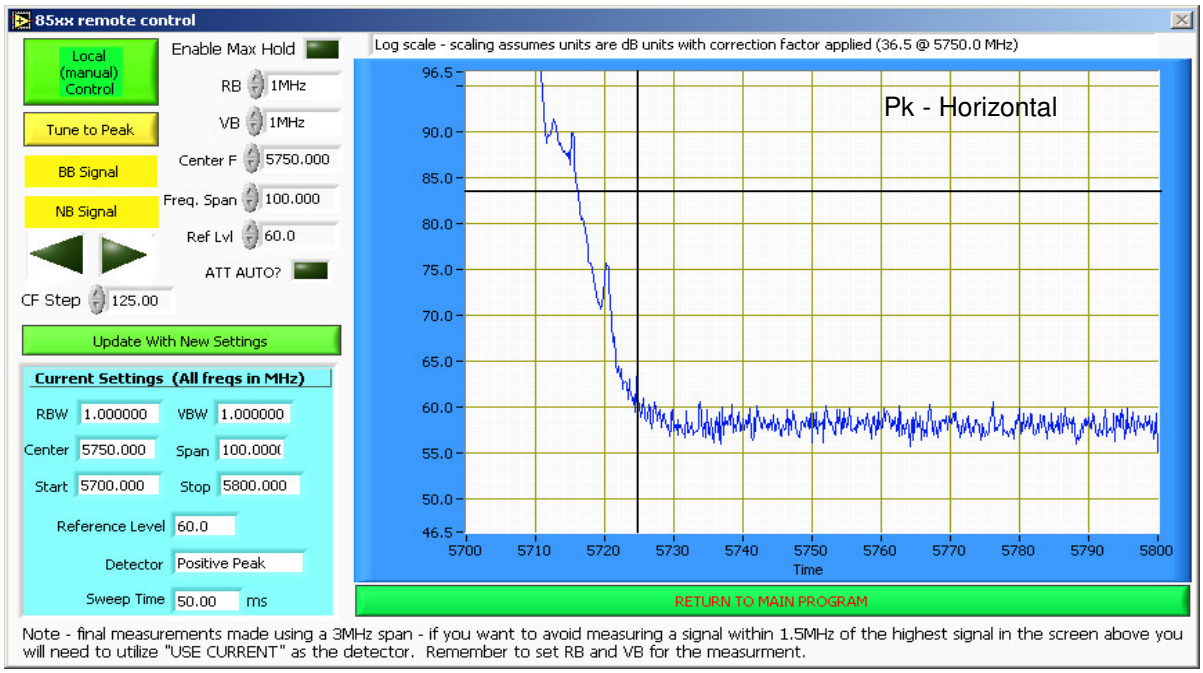
**Run #1b: Continued**



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

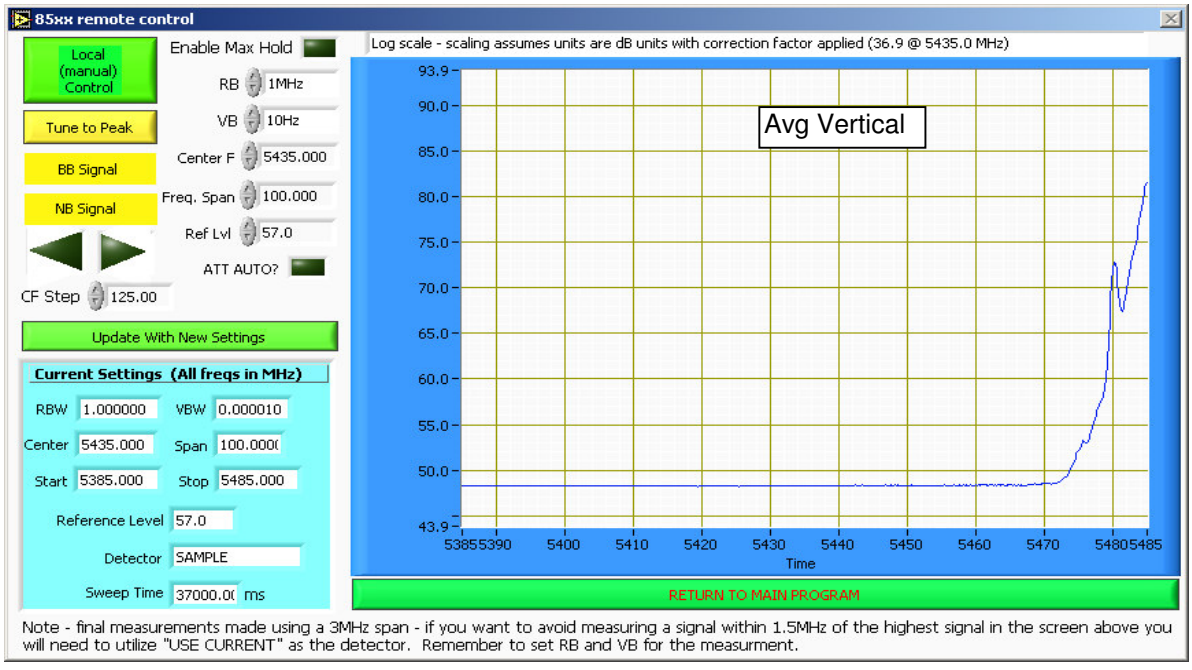
**Run #2: Radiated Spurious Emissions for 5470 to 5725 MHz band, Transmit mode, 30 - 40000 MHz**

**Run #2a: Low Channel @ 5495 MHz with Sector Antenna (16.5dBi), Power Setting = A0**

| | 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 | dBµV/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 |
| | | Account Manager: | Dean Eriksen |
| Contact: | Brian Magnuson | | |
| Standard: | FCC Part 15.247/RSS-210 | Class: | N/A |

**Run #2a: Continued**