

*Testing Tomorrow's Technology*

**Application  
For**

**US Code Title 47, Modification of Equipment per Part 2, Section 2.932  
Class 2 Permissive Change Application**

**US Code Title 47, Certification per Part 2, Subpart J, Section 2.907  
And  
Part 15, Subpart C, Intentional Radiator Section 15.247 Intentional Radiator  
Operating within the Band 2400 MHz to 2483.5 MHz**

**For**

**Cirronet Corporation**

**Model: WIT 2450**

**FCC ID: HSW-2450**

**Issue Date: October 1, 2010  
UST Project: 10-0193**

**3505 Francis Circle Alpharetta, GA 30004  
PH: 770-740-0717 Fax: 770-740-1508  
[www.ustech-lab.com](http://www.ustech-lab.com)**

# MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: Cirronet Corporation

MODEL: WIT 2450

FCC ID: HSW-2450

DATE: October 1, 2010

This report concerns (check one): Original grant  
Class II change

Equipment type: Modular Frequency Hopping Spread Spectrum Transceiver

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes \_\_\_\_\_ No

If yes, defer until: \_\_\_\_\_  
date

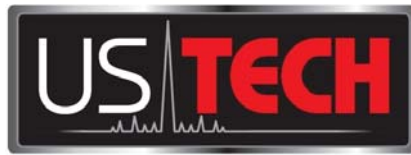
N.A. agrees to notify the Commission by N.A.  
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech  
3505 Francis Circle  
Alpharetta, GA 30004

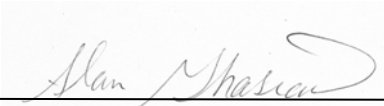
Phone Number: (770) 740-0717  
Fax Number: (770) 740-1508



*Testing Tomorrow's Technology*

I certify that I am authorized to sign for the manufacturer and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

**US Tech Representative.**

By: 

Name: Alan Ghasiani

Title: Compliance Engineer – President

Date: October 1, 2010

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**3505 Francis Circle Alpharetta, GA 30004**  
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# SECTION 1

## GENERAL INFORMATION

## 1.0 GENERAL INFORMATION

### 1.1 Product Description

The Equipment Under Test (EUT) is a Cirronet Corporation, Model WIT 2450, a 2.4 GHz spread spectrum modular transceiver.

The EUT was originally approved for use with 15 different antennas of different types. The EUT was previously approved under FCC ID: HSW-2450 by the FCC on 04/04/2006 and 12/28/2004. Cirronet Corporation desires to apply for a Class II Permissive Change for the reason detailed below:

- 1.) This Application is requested to add a 12 dBi Omni (Dipole) Antenna to be used with this radio.
- 2.) This Application is requested because the power amplifier used in the WIT 2450 has been discontinued by the vendor. This amplifier has been replaced with a different (but equivalent) part.

Per FCC Permissive Change Policy, Section 2c, we declare that:

Cirronet meets every requirement except for the first:

1. The new amp is not pin for pin compatible - RF parts are never pin-for-pin compatible, but the FCC has acknowledged via a KDB# 748159 (copy below) that the Class 2 Permissive Change is acceptable:

***Inquiry: KDB # 748159***

***---Reply from Customer on 05/03/2010---***

*I am formally withdrawing my request to remove the redundant gain control amplifier. This request is now limited to change-out of the PA alone. The gain control amplifier will stay as it is. Mark Tucker*

***Response:***

*You are proposing replacing the PA with a device that has an internal gate bias. The original PA had external gate bias. No external gain controller will be used with the PA replacement. The new PA is functionally equivalent in that it RF IN and RF Out frequencies and signal levels are the same. It has been determined that the PA replacement meets the requirements of KDB 178919 Paragraph 2)b) and thus qualifies for a Class II permissive change.*

For this certification the EUT is only tested with the highest gain of each type of antenna (3 total including the new 12 dbi Omni antenna). The antennas are detailed in Section 2.5, Antenna Description.

US Tech  
Client  
Issue Date  
Model:  
FCC ID:

10-0193  
Cirronet  
10-01-2010  
WIT-2450  
HSW-2450

---

## **1.2 Related Submittal(s)/Grant(s)**

The EUT will be used to send/receive data. The transceiver presented in this report will be used with other like transceivers:

The EUT is subject to the following authorizations:

- a) Certification as a transceiver (modular approval)
- b) Verification as a digital device

The EUT has been previously approved under FCC ID: HSW-2450 by the FCC on 04/04/2006 and 12/28/2004.

The information contained in this report is presented for the re-certification & verification authorization(s) for the EUT.



US Tech  
Client  
Issue Date  
Model:  
FCC ID:

10-0193  
Cirronet  
10-01-2010  
WIT-2450  
HSW-2450

**TCB**

**GRANT OF EQUIPMENT  
AUTHORIZATION**

**TCB**

**Certification  
Issued Under the Authority of the  
Federal Communications Commission  
By:**

**American TCB, Inc.  
6731 Whittier Avenue Suite C110  
McLean, VA 22101**

**Date of Grant: 04/04/2006  
Application Dated: 04/03/2006**

**Cirronet  
5375 Oakbrook Parkway  
Norcross, GA 30093**

**Attention: Mark Tucker , VP of Engineering**

**NOT TRANSFERABLE**

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

**FCC IDENTIFIER: HSW-2450**  
**Name of Grantee: Cirronet**  
**Equipment Class: Part 15 Spread Spectrum Transmitter**  
**Notes: Frequency Hopping Transceiver**

| <u>Grant Notes</u> | <u>FCC Rule Parts</u> | <u>Frequency Range (MHZ)</u> | <u>Output Watts</u> | <u>Frequency Tolerance</u> | <u>Emission Designator</u> |
|--------------------|-----------------------|------------------------------|---------------------|----------------------------|----------------------------|
|                    | 15C                   | 2401.056 - 2474.496          | 0.179               |                            |                            |

Power output listed is conducted. Limited Modular Approval (LMA). Approval is limited to OEM installation only. Marketing to the General Public is prohibited. For Mobile operation, the power must be reduced as shown in original application and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons. For fixed point-to-point operation, the antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meters from all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter. OEM integrators must be provided with installation instructions. OEM integrators and end-users must be provided with transmitter operation conditions for satisfying RF exposure compliance. This grant is valid only when the device is sold to OEM integrators and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device.

**Figure 1. Grant issued in 2006**

US Tech  
Client  
Issue Date  
Model:  
FCC ID:

10-0193  
Cirronet  
10-01-2010  
WIT-2450  
HSW-2450

**TCB**

**GRANT OF EQUIPMENT  
AUTHORIZATION**

**TCB**

**Certification  
Issued Under the Authority of the  
Federal Communications Commission  
By:**

American TCB, Inc.  
6731 Whittier Avenue Suite C110  
McLean, VA 22101  
United States

**Date of Grant: 12/28/2004  
Application Dated: 12/28/2004**

Cirronet  
5375 Oakbrook Parkway  
Norcross, GA 30093  
United States

**Attention: Mark Tucker , VP of Engineering**

**NOT TRANSFERABLE**

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

**FCC IDENTIFIER:** HSW-2450

**Name of Grantee:** Cirronet

**Equipment Class:** Part 15 Spread Spectrum Transmitter  
**Notes:** Frequency Hopping Transceiver

| <u>Grant Notes</u> | <u>FCC Rule Parts</u> | <u>Frequency<br/>Range (MHZ)</u> | <u>Output<br/>Watts</u> | <u>Frequency<br/>Tolerance</u> | <u>Emission<br/>Designator</u> |
|--------------------|-----------------------|----------------------------------|-------------------------|--------------------------------|--------------------------------|
|                    | 15C                   | 2401.056 - 2474.496              | 0.179                   |                                |                                |

Power output listed is conducted. Limited Modular Approval (LMA). Approval is limited to OEM installation only. Marketing to the General Public is prohibited. For Mobile operation, the power must be reduced as shown in this application and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons. For fixed point-to-point operation, the antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures with a separation distance of at least 2 meters from all persons. This device must not be collocated or operating in conjunction with any other antenna or transmitter. OEM integrators must be provided with installation instructions. OEM integrators and end-users must be provided with transmitter operation conditions for satisfying RF exposure compliance. This grant is valid only when the device is sold to OEM integrators and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device.

**Figure 2. Grant issued in 2004**

## **SECTION 2**

# **TESTS AND MEASUREMENTS**

## **2.0 TEST AND MEASUREMENTS**

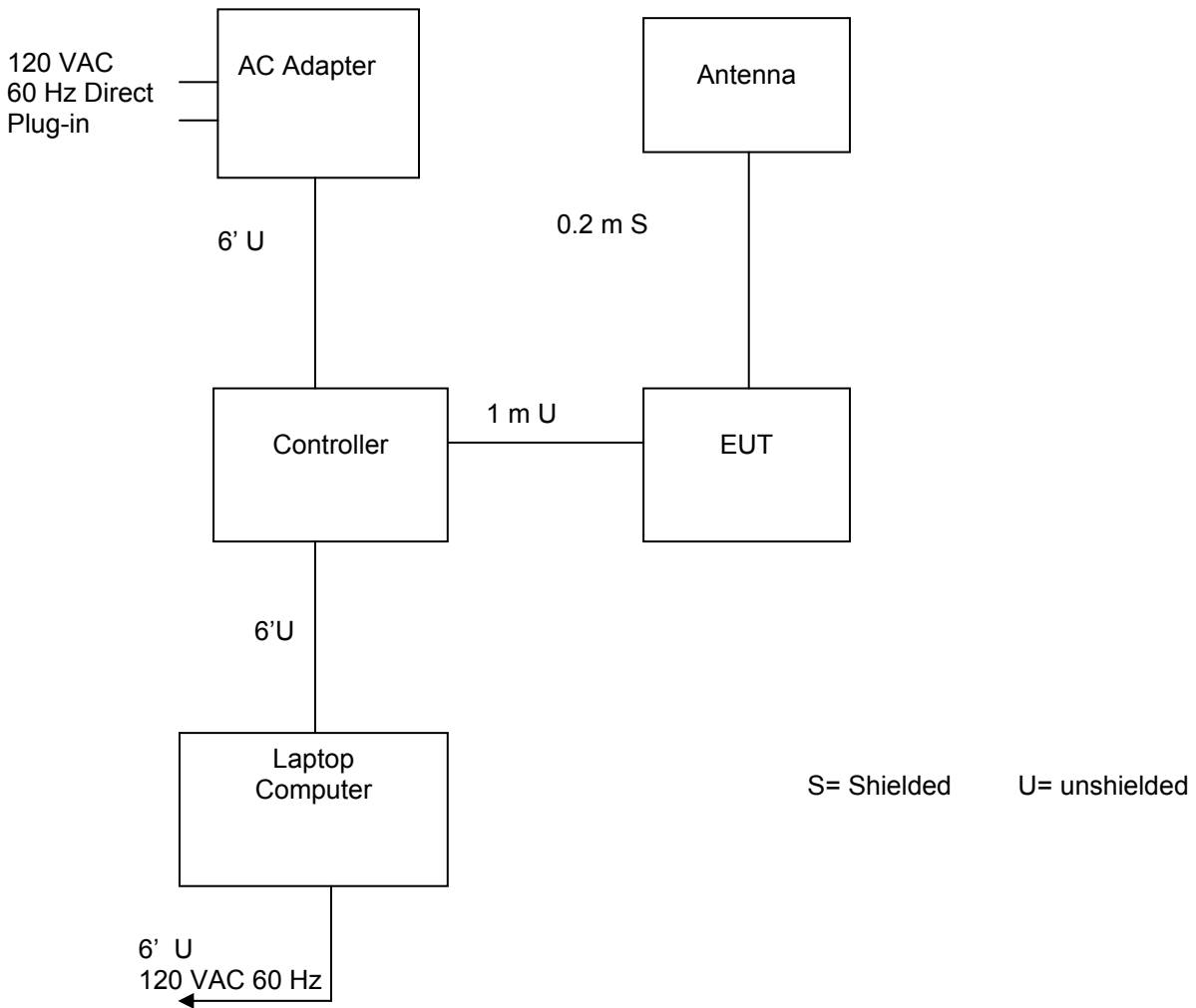
### **2.1 Configuration of Tested System**

The sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2003). Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. Interconnecting cables were manipulated as necessary to maximize emissions. A block diagram of the tested system is shown in Figure 3. Test configuration photographs for spurious and fundamental emissions are shown in Annex 1.

The sample used for testing was received by U.S. Tech on September 21, 2010 in good condition.

The EUT was originally approved for use with 15 different antennas. Cirronet Corporation desires to retest with three (3) antennas. The antenna details can be seen herein.

Since the EUT has been previously tested and approved, only the spurious emissions and Conducted Output Power tests have been repeated.



**Figure 3. Block diagram of Test Configuration**

## 2.2 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is US5117. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 2982A-1.

### 2.3 Test Equipment

Table 1 shows the EUT and peripherals.  
 Table 2 describes test equipment used to evaluate this product.

**Table 1. EUT and Peripherals**

| PERIPHERAL<br>MANU.                                | MODEL<br>NUMBER | SERIAL<br>NUMBER | FCC ID:  | CABLES<br>P/D                            |
|--|-----------------|------------------|----------|--|
| (EUT)<br>Cirronet<br>Corporation                   | WIT 2450        | None             | HSW-2450 | 1 m U                                    |
| Antenna<br>Various, see<br>antenna<br>descriptions | Various         | Various          | None     | 0.2 m S                                  |
| AC Adapter<br>Volgen                               | SPU10R-1        | None             | None     | 6' U<br>120 VAC/ 60 Hz<br>Direct Plug-in |
| Controller<br>Cirronet<br>Corporation              | None            | None             | None     | 6' U serial cable                        |
| Laptop Computer<br>IBM                             | T30             | --               | --       | 6' U<br>120 VAC/ 60 Hz<br>Power Cord     |

S= shielded

U= unshielded

**Table 2. Test Equipment**

| EQUIPMENT           | MODEL NUMBER | MANUFACTURER    | SERIAL NUMBER | DATE OF LAST CALIBRATION     |
|---------------------|--------------|-----------------|---------------|------------------------------|
| SPECTRUM ANALYZER   | 8566B        | HEWLETT-PACKARD | 2410A00109    | 10/14/09                     |
| SPECTRUM ANALYZER   | 8593E        | HEWLETT-PACKARD | 3205A00124    | 10/07/09                     |
| RF PREAMP           | 8447D        | HEWLETT-PACKARD | 2944A06291    | 09/07/10                     |
| BICONICAL ANTENNA   | 3110B        | EMCO            | 9307-1431     | 02/02/10                     |
| LOG PERIODIC        | 3146         | EMCO            | 3110-3236     | 01/22/10 2yrs                |
| HORN ANTENNA        | 3115         | EMCO            | 9107-3723     | 11/04/08 2yrs                |
| PREAMP              | 8449B        | HEWLETT PACKARD | 3008A00480    | 09/11/09<br>Extended 30 days |
| CALCULATION PROGRAM | N/A          | N/A             | Ver. 6.0      | N/A                          |

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

**2.4 Modifications**

No modifications were made by US Tech, to bring the EUT into compliance with FCC Part 15, Class B Limits for the transmitter portion of the EUT.

## 2.5 Antenna Description (Paragraph 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

This Permissive Change has been performed for the following antenna types. Actual testing was conducted using the antennas of the highest gain for each type.

Cirronet Corporation will sell the WIT 2450 with one of the following Cirronet antennas.

**Table 3. Antenna Description**

| Description           | Gain | Part Number | Coupling    |
|-----------------------|------|-------------|-------------|
| 14dB Corner Reflector | 14dB | CORNER2414  | N           |
| 12dB Omnidirectional  | 12dB | OMNI2412    | N           |
| 9dB Omnidirectional   | 9dB  | OMNI249     | N           |
| 9dB Corner Reflector  | 9dB  | CORNER249   | N           |
| 12dB Cirronet Patch   | 12dB | PA2401      | MMCX        |
| 6dB Cirronet Patch    | 6dB  | PA2400      | MMCX        |
| 5dB Mobile Mount      | 5dB  | MAG245      | N           |
| 2dB Cirronet Patch    | 2dB  | PA2410      | MMCX        |
| 2dB Rugged Body Mount | 2dB  | RBM242      | N           |
| Dipole                | 2dB  | RWA249R     | Reverse SMA |

Cirronet Corporation has arranged for the manufacturers of the antennas to provide reverse-sex TNC or N connectors for these antennas. OEM customers wanting to use one of these antennas in their product will first need to obtain a special part number from Cirronet Corporation to give to the antenna manufacturer. The manufacturer, upon receipt of this number, will know to attach the reverse-sex TNC or N connector (or SMA in the case of the dipole) to the end of the antenna cable before shipping.

The customer then purchases an adapter cable from Cirronet Corporation that will connect the MMCX port on the module to the reverse-sex connector on the antenna. No other type of commercially available antenna will attach to this reverse-sex TNC or N connector (or SMA for the case of the dipole). Given the nonstandard nature of the interconnect between module and antenna and the difficulty involved in circumventing that connection, Cirronet Corporation feels that this procedure meets the requirements called out in 15.203.



**2.6 Conducted Power (Peak) within the band 2400 – 2483.5 GHz per FCC Section 15.247(b)**

Peak power within the band 2400-2483.5 GHz has been measured with a spectrum analyzer by connecting the spectrum analyzer directly via a short cable to the antenna output terminals or across the antenna leads on the PCB as specified by the manufacturer. The spectrum analyzer was set for a 50  $\Omega$  impedance with the VBW  $\geq$  RBW 6 dB bandwidth. The results of the measurements are given in Table 4 and Figure 4 through Figure 6.

**Table 4. Peak Power Output**

| Frequency of Fundamental (GHz) | Measurement (dBm)* | Measurement (mW)* | FCC Limit* (Watt) |
|--------------------------------|--------------------|-------------------|-------------------|
| 2.401015                       | 22.96              | 197.69            | 1.0               |
| 2.433434                       | 21.20              | 131.82            | 1.0               |
| 2.475903                       | 20.94              | 124.16            | 1.0               |

**Note: The client has stated that there is no intentional increase in power and no degradation of performance was seen with the replacement of this PA.**

**Test Date: September 27, 2010**

**Tester Signature:** 

**Name:** George Yang

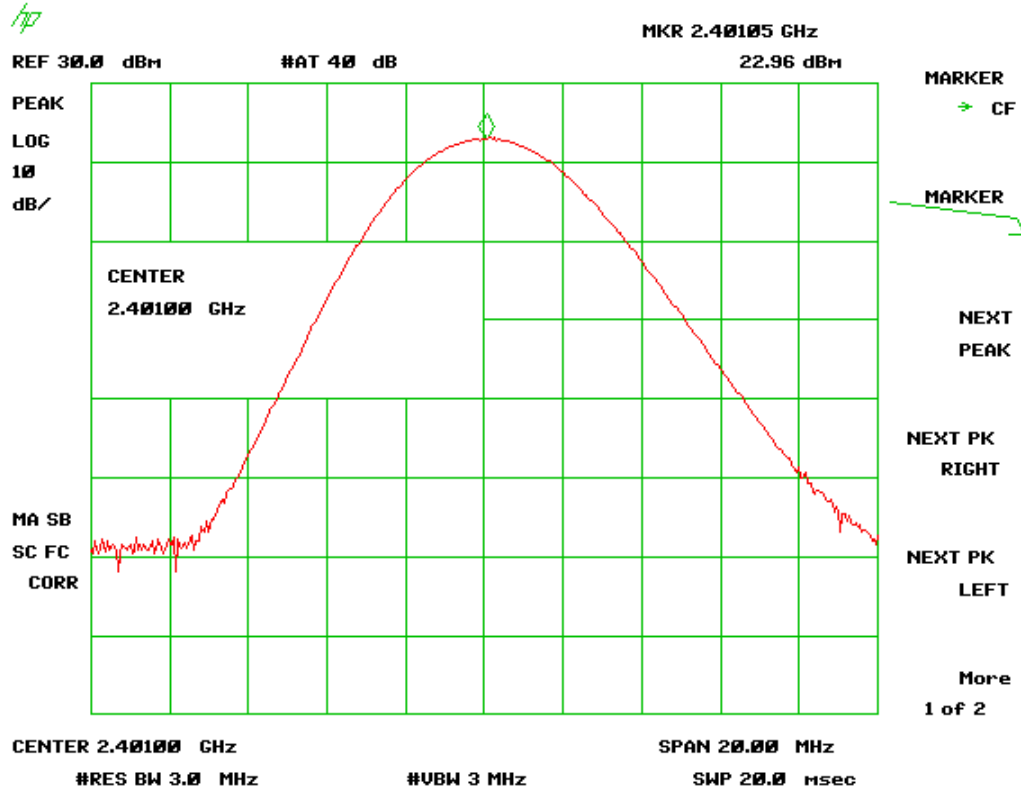


Figure 4  
Conducted Power Peak Low Channel Emission

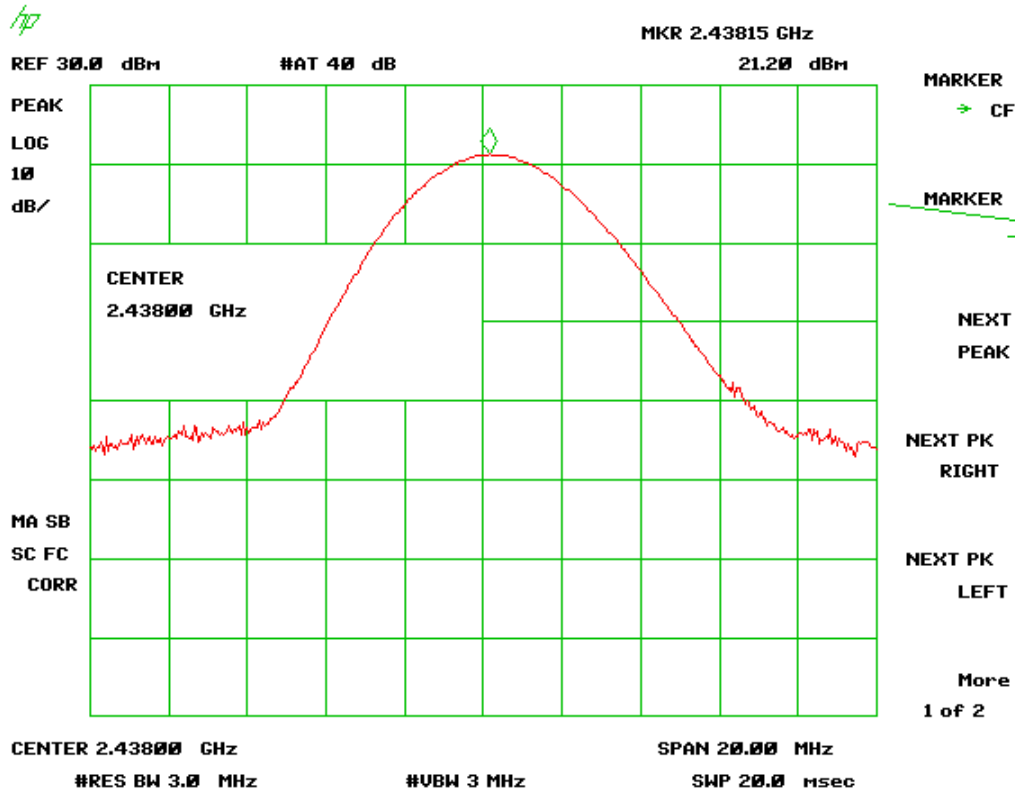


Figure 5  
Conducted Power Peak Mid Channel Emission

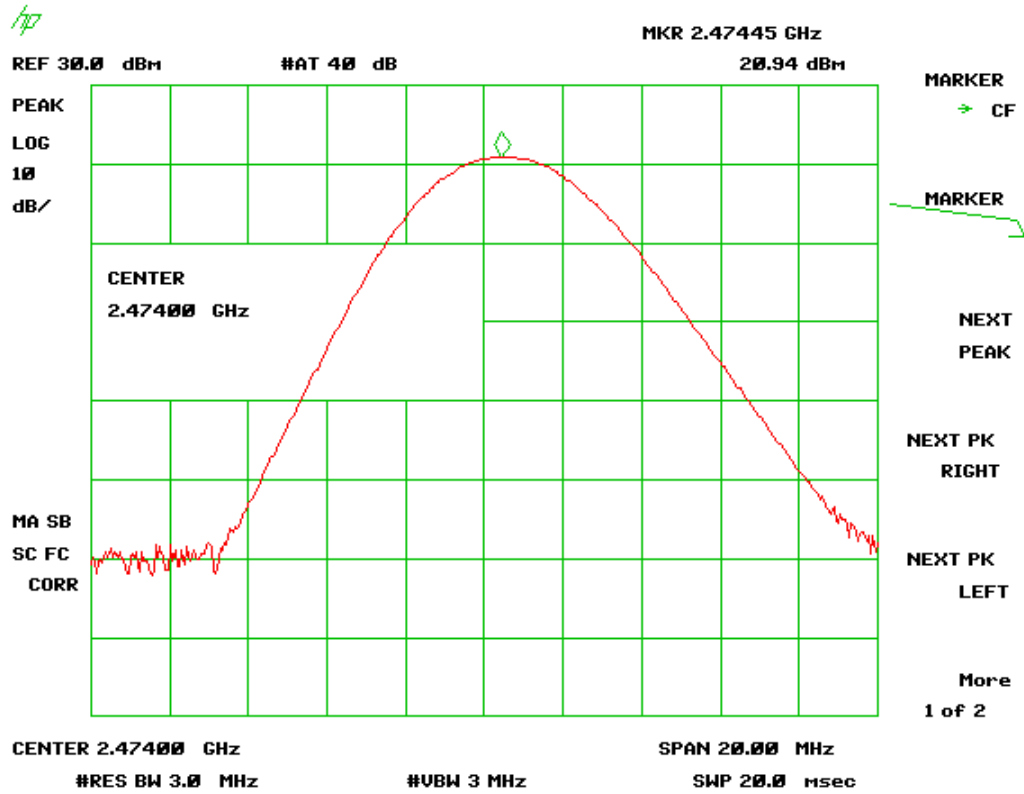


Figure 6  
Conducted Power Peak High Channel Emission

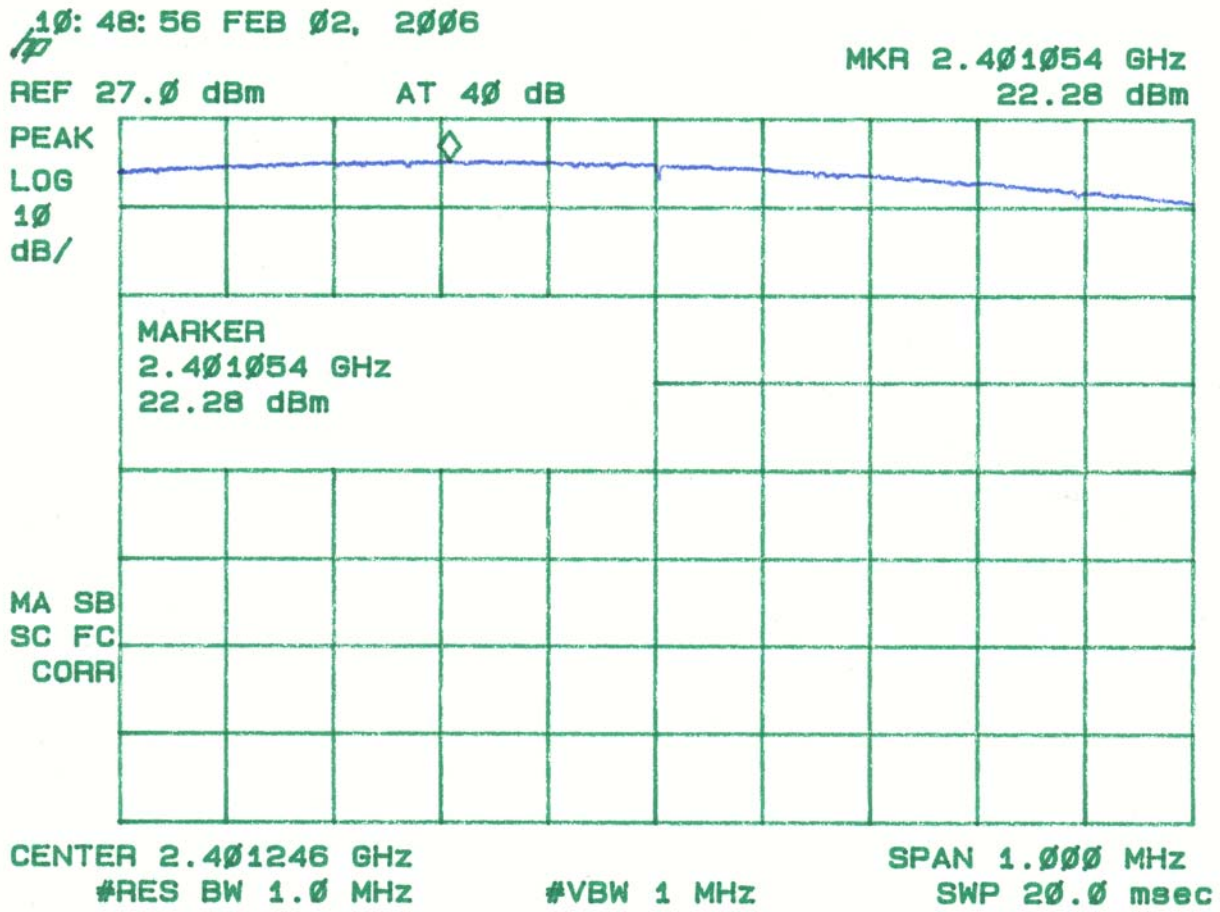


Figure 7  
Conducted Power Highest Output Power Channel Emission from  
Certification Application April 04, 2006

**2.7 Peak Radiated Spurious Emission in the Frequency Range 30-25000 MHz (FCC Section 15.247(c))**

The EUT was set to continuously transmit at a single set channel and when possible placed into a continuous transmit mode of operation. A preliminary scan was performed on the EUT to determine frequencies that were caused by the transmitter portion of the product. Significant emissions that fell within restricted bands were then measured on an OAT's site. Radiated measurements below 1 GHz were tested with a RBW = 120 kHz. Radiated measurements above 1 GHz were measured using a RBW = VBW = 1 MHz. The results of peak radiated spurious emissions are given in Tables 5-7.

**2.7.1 Peak Spurious Emission Test Data**

**Table 5 - Peak Radiated Spurious Emissions (Dipole Antenna 12 dBi)**

| <b>Radiated Spurious Emissions, Antenna 1, Tested from 1GHz – 24 GHz</b> |   |                 |                            |                                     |                         |                  |                   |
|--|---|-----------------|----------------------------|-------------------------------------|-------------------------|------------------|-------------------|
| Tested By:<br>GY   | Test: FCC Part 15, Para 15.247(d)<br>Project: 10-0193 |                 |                            | Client: Cirronet<br>Model: WIT-2450 |                         |                  |                   |
| Frequency (MHz)  | Test Data (dBuV)                                      | AF+CL-PA (dB/m) | Corrected Results (dBuV/m) | Limits (dBuV/m)                     | Distance / Polarization | Pass Margin (dB) | Detector PK / AVG |
| <b>LOW BAND - PEAK</b>   |   |                 |                            |                                     |                         |                  |                   |
| 2401.10  | 94.15   | 32.01           | 126.16                     |                                     | 3m./VERT                |                  | <b>PK</b>         |
| 4802.55*   | 55.78   | 3.77            | 60.55                      | 74.0                                | 3m./VERT                | 13.4             | <b>PK</b>         |
| 7202.57  | 65.75   | 9.16            | 75.91                      | 106.0                               | 3m./VERT                | 30.1             | <b>PK</b>         |
| 9604.93  | 58.45   | 11.59           | 71.04                      | 106.0                               | 3m./VERT                | 34.9             | <b>PK</b>         |
| 12004.45*  | 54.26   | 14.80           | 70.06                      | 74.0                                | 3m./VERT                | 3.9              | <b>PK</b>         |
| <b>MID BAND- PEAK</b>  |   |                 |                            |                                     |                         |                  |                   |
| 2438.23  | 94.83   | 32.23           | 127.06                     |                                     | 3m./VERT                |                  | <b>PK</b>         |
| 4876.40*   | 59.86   | 3.99            | 64.85                      | 74.0                                | 3m./VERT                | 9.2              | <b>PK</b>         |
| 7315.20*   | 55.07   | 9.45            | 65.52                      | 74.0                                | 3m./VERT                | 8.5              | <b>PK</b>         |
| 9753.45  | 55.06   | 11.63           | 67.69                      | 107.0                               | 3m./VERT                | 39.3             | <b>PK</b>         |
| 12192.21*  | 50.57   | 14.91           | 66.48                      | 74.0                                | 3m./VERT                | 7.5              | <b>PK</b>         |
| <b>HIGH BAND- PEAK</b>   |   |                 |                            |                                     |                         |                  |                   |
| 2472.25  | 92.41   | 32.43           | 124.84                     |                                     | 3m./VERT                |                  | <b>PK</b>         |
| 4949.43*   | 57.12   | 4.15            | 62.27                      | 74.0                                | 3m./VERT                | 11.7             | <b>PK</b>         |
| 7424.03*   | 57.32   | 9.47            | 67.79                      | 74.0                                | 3m./VERT                | 6.2              | <b>PK</b>         |
| 9898.75  | 51.61   | 11.93           | 64.54                      | 104.0                               | 3m./VERT                | 39.5             | <b>PK</b>         |
| 12371.59*  | 52.44   | 15.38           | 68.82                      | 74.0                                | 3m./VERT                | 5.2              | <b>PK</b>         |

(\*)= Falls within the restricted bands of CFR 15.205.  
 ND = No other signals detected within 20 dB of specification limit.

**SAMPLE CALCULATION:**

RESULTS: At 4802.55 MHz: = (55.78 + (1 dB high pass filter loss) + 3.77)) = 60.55 dBuV/m @ 3m  
 Margin = (74.0 – 60.55) = 13.4 dB

Test Date: September 27, 2010

Tested By   
 Signature: \_\_\_\_\_

Name: George Yang

**Table 6 - Peak Radiated Spurious Emissions (Corner Reflective 14dBi)**

| <b>Radiated Spurious Emissions, Antenna 1, Tested from 1GHz – 24 GHz</b> |                                   |                    |                               |                    |                         |                     |                      |
|--|-----------------------------------|--------------------|-------------------------------|--------------------|-------------------------|---------------------|----------------------|
| Tested By:<br>GY   | Test: FCC Part 15, Para 15.247(d) |                    |                               | Client: Cirronet   |                         |                     |                      |
|  | Project: 10-0193                  |                    |                               | Model: WIT-2450    |                         |                     |                      |
| Frequency<br>(MHz)   | Test Data<br>(dBuV)               | AF+CL-PA<br>(dB/m) | Corrected Results<br>(dBuV/m) | Limits<br>(dBuV/m) | Distance / Polarization | Pass Margin<br>(dB) | Detector<br>PK / AVG |
| <b>LOW BAND - PEAK</b>   |                                   |                    |                               |                    |                         |                     |                      |
| 2400.99  | 96.17                             | 32.01              | 128.18                        |                    | 3m./VERT                |                     | <b>PK</b>            |
| 4802.40*   | 58.47                             | 3.77               | 63.24                         | 74.0               | 3m./VERT                | 10.8                | <b>PK</b>            |
| 7203.77  | 60.80                             | 9.16               | 70.96                         | 108.2              | 3m./VERT                | 37.2                | <b>PK</b>            |
| 9603.32  | 57.89                             | 11.59              | 70.48                         | 108.2              | 3m./VERT                | 37.7                | <b>PK</b>            |
| 12004.35*  | 51.74                             | 14.80              | 67.54                         | 74.0               | 3m./VERT                | 6.5                 | <b>PK</b>            |
| <b>MID BAND- PEAK</b>  |                                   |                    |                               |                    |                         |                     |                      |
| 2438.27  | 95.01                             | 32.23              | 127.24                        |                    | 3m./VERT                |                     | <b>PK</b>            |
| 4876.05*   | 59.81                             | 3.99               | 64.80                         | 74.0               | 3m./VERT                | 9.2                 | <b>PK</b>            |
| 7313.92*   | 59.53                             | 9.45               | 69.98                         | 74.0               | 3m./VERT                | 4.0                 | <b>PK</b>            |
| 9752.15  | 54.60                             | 11.63              | 67.23                         | 107.2              | 3m./VERT                | 40.0                | <b>PK</b>            |
| 12195.78*  | 48.74                             | 14.92              | 64.66                         | 74.0               | 3m./VERT                | 9.3                 | <b>PK</b>            |
| <b>HIGH BAND- PEAK</b>   |                                   |                    |                               |                    |                         |                     |                      |
| 2474.65  | 95.29                             | 32.45              | 127.74                        |                    | 3m./VERT                |                     | <b>PK</b>            |
| 4949.27*   | 55.77                             | 4.15               | 60.92                         | 74.0               | 3m./VERT                | 13.1                | <b>PK</b>            |
| 7424.00*   | 59.74                             | 9.47               | 70.21                         | 74.0               | 3m./VERT                | 3.8                 | <b>PK</b>            |
| 9897.27  | 54.44                             | 11.92              | 67.36                         | 107.7              | 3m./VERT                | 40.4                | <b>PK</b>            |
| 12371.69*  | 49.47                             | 15.38              | 65.85                         | 74.0               | 1m./VERT                | 8.1                 | <b>PK</b>            |

(\*)= Falls within the restricted bands of CFR 15.205.  
 ND = No other signals detected within 20 dB of specification limit.

**SAMPLE CALCULATION:**

RESULTS: At 4802.40 MHz: = (58.47 + (1 dB high pass filter loss) + 3.77)) = 63.24 dBuV/m @ 3m  
 Margin = (74.0 – 63.24) = 10.8 dB

Test Date: September 27, 2010

Tested By   
 Signature: \_\_\_\_\_

Name: George Yang



**Table 7 - Peak Radiated Spurious Emissions (Patch Antenna 12 dBi)**


| <b>Radiated Spurious Emissions, Antenna 1, Tested from 1GHz – 24 GHz</b> |                                   |                    |                               |                    |                         |                     |                      |
|--|-----------------------------------|--------------------|-------------------------------|--------------------|-------------------------|---------------------|----------------------|
| Tested By:<br>GY   | Test: FCC Part 15, Para 15.247(d) |                    |                               | Client: Cirronet   |                         |                     |                      |
|  | Project: 10-0193                  |                    |                               | Model: WIT-2450    |                         |                     |                      |
| Frequency<br>(MHz)   | Test Data<br>(dBuV)               | AF+CL-PA<br>(dB/m) | Corrected Results<br>(dBuV/m) | Limits<br>(dBuV/m) | Distance / Polarization | Pass Margin<br>(dB) | Detector<br>PK / AVG |
| <b>LOW BAND - PEAK</b>   |                                   |                    |                               |                    |                         |                     |                      |
| 2401.01  | 94.48                             | 32.01              | 126.49                        |                    | 3m./VERT                |                     | <b>PK</b>            |
| 4802.04*   | 59.00                             | 3.77               | 63.77                         | 74.0               | 3m./VERT                | 10.2                | <b>PK</b>            |
| 7202.70  | 60.15                             | 9.16               | 70.31                         | 106.5              | 3m./VERT                | 36.2                | <b>PK</b>            |
| 9604.97  | 58.65                             | 11.59              | 71.24                         | 106.5              | 3m./VERT                | 35.3                | <b>PK</b>            |
| 12004.70*  | 51.99                             | 14.80              | 67.79                         | 74.0               | 3m./VERT                | 6.2                 | <b>PK</b>            |
| <b>MID BAND- PEAK</b>  |                                   |                    |                               |                    |                         |                     |                      |
| 2438.27  | 95.19                             | 32.23              | 127.42                        |                    | 3m./VERT                |                     | <b>PK</b>            |
| 4876.80*   | 64.66                             | 3.99               | 69.65                         | 74.0               | 3m./VERT                | 4.4                 | <b>PK</b>            |
| 7314.48*   | 58.95                             | 9.45               | 69.40                         | 74.0               | 3m./VERT                | 4.6                 | <b>PK</b>            |
| 9752.02  | 58.40                             | 11.63              | 71.03                         | 107.4              | 3m./VERT                | 36.4                | <b>PK</b>            |
| 12190.15*  | 53.30                             | 14.91              | 69.21                         | 74.0               | 3m./VERT                | 4.8                 | <b>PK</b>            |
| <b>HIGH BAND- PEAK</b>   |                                   |                    |                               |                    |                         |                     |                      |
| 2474.65  | 94.27                             | 32.45              | 126.72                        |                    | 3m./VERT                |                     | <b>PK</b>            |
| 4948.48*   | 59.75                             | 4.14               | 64.89                         | 74.0               | 3m./VERT                | 9.1                 | <b>PK</b>            |
| 7423.98*   | 59.84                             | 9.47               | 70.31                         | 74.0               | 3m./VERT                | 3.7                 | <b>PK</b>            |
| 9898.10  | 53.47                             | 11.92              | 66.39                         | 106.7              | 3m./VERT                | 40.3                | <b>PK</b>            |
| 12373.23*  | 52.89                             | 15.39              | 69.28                         | 74.0               | 1m./VERT                | 4.7                 | <b>PK</b>            |

(\* )= Falls within the restricted bands of CFR 15.205.  
 ND = No other signals detected within 20 dB of specification limit.

**SAMPLE CALCULATION:**

RESULTS: At 4802.04 MHz: = (59.00 + (1 dB high pass filter loss) + 3.77)) = 63.77 dBuV/m @ 3m  
 Margin = (74.0 – 63.77) = 10.2 dB

Test Date: September 27, 2010

Tested By:   
 Signature: \_\_\_\_\_

Name: George Yang

## 2.8 Average Spurious Emission in the Frequency Range 30 - 25000 MHz (FCC Section 15.247(c))

The results of average radiated spurious emissions are given in Table 8-10. Due to the functionality of the transmitter and the complexity of the test setup in order to measure worse case duty cycle, Cirronet Corporation provided an explanation of the worse case duty cycle of the transmitter.

### 2.8.1 Worst Case Transmit Duty Cycle for WIT 2450

The duty cycle de-rating factor used in the calculation of average radiated limits (per 15.209) is described below. This factor was calculated by first determining the worst case scenario for system operation - worst case being defined as the scenario when the WIT 2450 would be transmitting the longest period during a dwell.

This worst case operating scenario is as follows:

- 1) Point-to-point operation  
(Only two units communicating with one another)
- 2) Data flow is almost completely unidirectional  
(That is, one radio is relaying a large amount of data to the other radio with only synchronization data being passed back the other direction)
- 3) The amount of data being fed to the sending radio is exactly portioned out to fit the maximum packet size allowable (280 bytes). The radio cannot send more than 280 bytes on a single channel – additional data must be sent on the next hop.

For this example, a remote unit is transferring a large data file to a base unit.

Maximum transmit time by Remote on a single channel:

$$= 280 \text{ bytes} * 8 \text{ bits/byte} * (1/460.8\text{Kbps}) = 4.86\text{ms}$$

The minimum hop duration for this scenario would be 6.94ms. Given that we have 86 channels in our hop set, it takes 521ms to go through the entire hop table and repeat a transmission on the same channel. Therefore, only 4.86milliseconds worth of data can be transmitted on a single channel in any 100ms time period.

The transmission duty cycle correction factor is then calculated as:

$$20 * \text{Log}_{10}(4.86\text{ms}/100\text{ms}) = \mathbf{-26.3 \text{ dB}}$$

US Tech  
 Client  
 Issue Date  
 Model:  
 FCC ID:

10-0193  
 Cirronet  
 10-01-2010  
 WIT-2450  
 HSW-2450

**2.8.2 Average Spurious Emissions Test Data**

All Average values were calculated using the peak measurements + Duty Factor.

**Table 8 - Average Radiated Spurious (Dipole Antenna)**

| Radiated Spurious Emissions, Antenna 1, Tested from 1GHz – 24 GHz |   |                       |                               |                                     |                         |                     |                      |
|---|---|-----------------------|-------------------------------|-------------------------------------|-------------------------|---------------------|----------------------|
| Tested By:<br>GY  | Test: FCC Part 15, Para 15.247(d)<br>Project: 10-0193 |                       |                               | Client: Cirronet<br>Model: WIT-2450 |                         |                     |                      |
| Frequency<br>(MHz)  | Test Data<br>(dBuV)                                   | AF+CL-PA+DC<br>(dB/m) | Corrected Results<br>(dBuV/m) | Limits<br>(dBuV/m)                  | Distance / Polarization | Pass Margin<br>(dB) | Detector<br>PK / AVG |
| <b>LOW BAND - PEAK</b>  |   |                       |                               |                                     |                         |                     |                      |
| 2401.10   | 94.15   | 5.71                  | 99.86                         |                                     | 3m./VERT                |                     | <b>AVG</b>           |
| 4802.55*  | 55.78   | -22.53                | 34.25                         | 54.0                                | 3m./VERT                | 19.7                | <b>AVG</b>           |
| 7202.57   | 61.96   | -17.14                | 45.82                         | 54.0                                | 3m./VERT                | 8.2                 | <b>AVG</b>           |
| 9604.93   | 58.45   | -14.71                | 44.74                         | 54.0                                | 3m./VERT                | 9.3                 | <b>AVG</b>           |
| 12004.45*   | 54.26   | -11.50                | 43.76                         | 54.0                                | 3m./VERT                | 10.2                | <b>AVG</b>           |
| <b>MID BAND- PEAK</b>   |   |                       |                               |                                     |                         |                     |                      |
| 2438.23   | 94.83   | 5.93                  | 100.76                        |                                     | 3m./VERT                |                     | <b>AVG</b>           |
| 4876.40*  | 59.86   | -22.31                | 38.55                         | 54.0                                | 3m./VERT                | 15.5                | <b>AVG</b>           |
| 7315.20*  | 55.07   | -16.85                | 39.22                         | 54.0                                | 3m./VERT                | 14.8                | <b>AVG</b>           |
| 9753.45   | 55.06   | -14.67                | 41.39                         | 54.0                                | 3m./VERT                | 12.6                | <b>AVG</b>           |
| 12192.21*   | 50.57   | -11.39                | 40.18                         | 54.0                                | 3m./VERT                | 13.8                | <b>AVG</b>           |
| <b>HIGH BAND- PEAK</b>  |   |                       |                               |                                     |                         |                     |                      |
| 2474.25   | 92.41   | 6.15                  | 98.56                         |                                     | 3m./VERT                |                     | <b>AVG</b>           |
| 4949.43*  | 57.12   | -22.15                | 35.97                         | 54.0                                | 3m./VERT                | 18.0                | <b>AVG</b>           |
| 7424.03*  | 57.32   | -16.83                | 41.49                         | 54.0                                | 3m./VERT                | 12.5                | <b>AVG</b>           |
| 9898.75   | 51.61   | -14.37                | 38.24                         | 54.0                                | 3m./VERT                | 15.8                | <b>AVG</b>           |
| 12371.59*   | 52.44   | -10.92                | 42.52                         | 54.0                                | 3m./VERT                | 11.5                | <b>AVG</b>           |

(\*)= Falls within the restricted bands of CFR 15.205.

ND = No other signals detected within 20 dB of specification limit. No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.

Note: Duty Cycle, DC = -26.3 dB factored into the loss column

SAMPLE CALCULATION:

RESULTS: At 4802.55 MHz: = (55.78) + (1 dB high pass filter loss) + (-22.53)) =34.25 dBuV/m @ 3m

Margin = (54.0 – 34.25) = 19.7 dB

Test Date: September 27, 2010

Tested By  
 Signature: 

Name: George Yang

US Tech  
 Client  
 Issue Date  
 Model:  
 FCC ID:

10-0193  
 Cirronet  
 10-01-2010  
 WIT-2450  
 HSW-2450

All Average values were calculated using the peak measurements + Duty Factor.

**Table 9 - Average Radiated Spurious (Corner Reflective)**

| Radiated Spurious Emissions, Antenna 1, Tested from 1GHz – 24 GHz |                                   |                       |                               |                    |                         |                     |                      |
|---|-----------------------------------|-----------------------|-------------------------------|--------------------|-------------------------|---------------------|----------------------|
| Tested By:<br>GY  | Test: FCC Part 15, Para 15.247(d) |                       |                               | Client: Cirronet   |                         |                     |                      |
|   | Project: 10-0193                  |                       |                               | Model: WIT-2450    |                         |                     |                      |
| Frequency<br>(MHz)  | Test Data<br>(dBuV)               | AF+CL-PA+DC<br>(dB/m) | Corrected Results<br>(dBuV/m) | Limits<br>(dBuV/m) | Distance / Polarization | Pass Margin<br>(dB) | Detector<br>PK / AVG |
| <b>LOW BAND - PEAK</b>  |                                   |                       |                               |                    |                         |                     |                      |
| 2400.99   | 96.17                             | 5.71                  | 101.88                        |                    | 3m./VERT                |                     | 5.71                 |
| 4802.04*  | 58.47                             | -22.53                | 36.94                         | 54.0               | 3m./VERT                | 17.1                | -22.53               |
| 7203.77   | 60.80                             | -17.14                | 44.66                         | 54.0               | 3m./VERT                | 9.3                 | -17.14               |
| 9604.97   | 57.89                             | -14.71                | 44.18                         | 54.0               | 3m./VERT                | 9.8                 | -14.71               |
| 12004.95*   | 51.74                             | -11.50                | 41.24                         | 54.0               | 3m./VERT                | 12.8                | -11.50               |
| <b>MID BAND- PEAK</b>   |                                   |                       |                               |                    |                         |                     |                      |
| 2438.27   | 95.01                             | 5.93                  | 100.94                        |                    | 3m./VERT                |                     | <b>AVG</b>           |
| 4876.05*  | 59.81                             | -22.31                | 38.50                         | 54.0               | 3m./VERT                | 15.5                | <b>AVG</b>           |
| 7315.12*  | 59.53                             | -16.85                | 43.68                         | 54.0               | 3m./VERT                | 10.3                | <b>AVG</b>           |
| 9752.02   | 54.60                             | -14.67                | 40.93                         | 54.0               | 3m./VERT                | 13.1                | <b>AVG</b>           |
| 12190.25*   | 48.74                             | -11.39                | 38.35                         | 54.0               | 3m./VERT                | 15.6                | <b>AVG</b>           |
| <b>HIGH BAND- PEAK</b>  |                                   |                       |                               |                    |                         |                     |                      |
| 2474.65   | 95.29                             | 6.15                  | 101.44                        |                    | 3m./VERT                |                     | <b>AVG</b>           |
| 4948.62*  | 55.77                             | -22.16                | 34.61                         | 54.0               | 3m./VERT                | 19.4                | <b>AVG</b>           |
| 7422.97*  | 59.74                             | -16.83                | 43.91                         | 54.0               | 3m./VERT                | 10.1                | <b>AVG</b>           |
| 9898.90   | 54.44                             | -14.37                | 41.07                         | 54.0               | 3m./VERT                | 12.9                | <b>AVG</b>           |
| 12370.93*   | 49.47                             | -10.92                | 39.55                         | 54.0               | 3m./VERT                | 14.4                | <b>AVG</b>           |

(\*)= Falls within the restricted bands of CFR 15.205.

ND = No other signals detected within 20 dB of specification limit. No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.

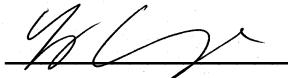
Note: Duty Cycle, DC = -26.3 dB factored into the loss column

SAMPLE CALCULATION:

RESULTS: At 4802.04 MHz: = (58.47 + (1 dB high pass filter loss) + (-22.53)) =36.94 dBuV/m @ 3m

Margin = (54.0 – 36.94) = 17.06 dB

Test Date: September 27, 2010

Tested By  
 Signature: 

Name: George Yang

US Tech  
 Client  
 Issue Date  
 Model:  
 FCC ID:

10-0193  
 Cirronet  
 10-01-2010  
 WIT-2450  
 HSW-2450

All Average values were calculated using the peak measurements + Duty Factor.

**Table 10 - Average Radiated Spurious (Patch Antenna)**

| Radiated Spurious Emissions, Antenna 1, Tested from 1GHz – 24 GHz |   |                       |                               |                                     |                         |                     |                      |
|---|---|-----------------------|-------------------------------|-------------------------------------|-------------------------|---------------------|----------------------|
| Tested By:<br>GY  | Test: FCC Part 15, Para 15.247(d)<br>Project: 10-0193 |                       |                               | Client: Cirronet<br>Model: WIT-2450 |                         |                     |                      |
| Frequency<br>(MHz)  | Test Data<br>(dBuV)                                   | AF+CL-PA+DC<br>(dB/m) | Corrected Results<br>(dBuV/m) | Limits<br>(dBuV/m)                  | Distance / Polarization | Pass Margin<br>(dB) | Detector<br>PK / AVG |
| <b>LOW BAND - PEAK</b>  |   |                       |                               |                                     |                         |                     |                      |
| 2401.01   | 94.48   | 5.71                  | 100.19                        |                                     | 3m./VERT                |                     | <b>AVG</b>           |
| 4802.04*  | 59.00   | -22.53                | 37.47                         | 54.0                                | 3m./VERT                | 16.5                | <b>AVG</b>           |
| 7202.70   | 60.15   | -17.14                | 44.01                         | 54.0                                | 3m./VERT                | 10.0                | <b>AVG</b>           |
| 9604.97   | 58.65   | -14.71                | 44.94                         | 54.0                                | 3m./VERT                | 9.1                 | <b>AVG</b>           |
| 12004.70*   | 51.99   | -11.50                | 41.49                         | 54.0                                | 3m./VERT                | 12.5                | <b>AVG</b>           |
| <b>MID BAND- PEAK</b>   |   |                       |                               |                                     |                         |                     |                      |
| 2438.27   | 95.19   | 5.93                  | 101.12                        |                                     | 3m./VERT                |                     | <b>AVG</b>           |
| 4876.80*  | 64.66   | -22.31                | 43.35                         | 54.0                                | 3m./VERT                | 10.7                | <b>AVG</b>           |
| 7314.48*  | 58.95   | -16.85                | 43.10                         | 54.0                                | 3m./VERT                | 10.9                | <b>AVG</b>           |
| 9752.02   | 58.40   | -14.67                | 44.73                         | 54.0                                | 3m./VERT                | 9.3                 | <b>AVG</b>           |
| 12190.15*   | 53.30   | -11.39                | 42.91                         | 54.0                                | 3m./VERT                | 11.1                | <b>AVG</b>           |
| <b>HIGH BAND- PEAK</b>  |   |                       |                               |                                     |                         |                     |                      |
| 2474.65   | 94.27   | 6.15                  | 100.42                        |                                     | 3m./VERT                |                     | <b>AVG</b>           |
| 4948.48*  | 59.75   | -22.16                | 38.59                         | 54.0                                | 3m./VERT                | 15.4                | <b>AVG</b>           |
| 7423.98*  | 59.84   | -16.83                | 44.01                         | 54.0                                | 3m./VERT                | 10.0                | <b>AVG</b>           |
| 9898.10   | 53.47   | -14.38                | 40.09                         | 54.0                                | 3m./VERT                | 13.9                | <b>AVG</b>           |
| 12373.23*   | 52.89   | -10.91                | 42.98                         | 54.0                                | 3m./VERT                | 11.0                | <b>AVG</b>           |

(\*)= Falls within the restricted bands of CFR 15.205.

ND = No other signals detected within 20 dB of specification limit. No other emissions detected within 20 dB of the Part 15.209 limits for spurious emissions within Restricted Bands.

Note: Duty Cycle, DC = -26.3 dB factored into the loss column

SAMPLE CALCULATION:

RESULTS: At 4802.04 MHz: = (59.00 + (1 dB high pass filter loss) + (-22.53)) = 37.47 dBuV/m @ 3m

Margin = (54.0 – 34.47) = 16.53 dB

Test Date: September 27, 2010

Tested By  
 Signature: 

Name: George Yang

US Tech  
 Client  
 Issue Date  
 Model:  
 FCC ID:

10-0193  
 Cirronet  
 10-01-2010  
 WIT-2450  
 HSW-2450

**2.9 Radiated Emissions for Digital Device & Receiver (47 CFR 15.109) and (47 CFR 15.209)**

Radiated emissions were evaluated from 30 to 12500 MHz while the EUT was placed into a Receive mode of operation. Measurements were made with the analyzer's bandwidth set to 120 kHz measurements made less than 1 GHz and 1 MHz for measurements made greater than or equal to 1 GHz. The results for are shown in Table 11.

**Table 11. Radiated Emissions Test Data, 30 MHz to 12.5 GHz.**

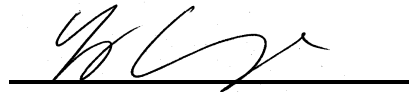
| Radiated Emissions |                       |                     |                     |                                  |                    |                           |              |              |
|--------------------|-----------------------|---------------------|---------------------|----------------------------------|--------------------|---------------------------|--------------|--------------|
| Test By:<br>G.Y.   | Test: Part 15 Class B |                     |                     |                                  | Client: Cirronet   |                           |              |              |
|                    | Project: 10-0193      |                     |                     |                                  | Model: WIT-2450    |                           |              |              |
| Frequency<br>(MHz) | Test Data<br>(dBuV)   | Transducer<br>Table | AF+CL- PA<br>(dB/m) | Corrected<br>Results<br>(dBuV/m) | Limits<br>(dBuV/m) | Distance/<br>Polarization | Margin<br>dB | DET<br>Pk/QP |
| 82.2990            | 22.20                 | 1BI3mH              | 10.80               | 33.00                            | 40.0               | 3m./HORZ                  | 7.0          | PK           |
| 130.4880           | 21.00                 | 1BI3mH              | 14.09               | 35.09                            | 43.5               | 3m./HORZ                  | 8.4          | PK           |
| 53.0100            | 21.50                 | 1BI3mV              | 11.11               | 32.61                            | 40.0               | 3m./VERT                  | 7.4          | PK           |
| 130.4960           | 17.10                 | 1BI3mV              | 14.08               | 31.18                            | 43.5               | 3m./VERT                  | 12.3         | PK           |
| 233.0480           | 20.70                 | 1LP3mH              | 15.00               | 35.70                            | 46.0               | 3m./HORZ                  | 10.3         | PK           |
| 299.6030           | 15.50                 | 1LP3mH              | 18.88               | 34.38                            | 46.0               | 3m./HORZ                  | 11.6         | QP           |
| 729.0430           | 11.90                 | 1LP3mH              | 26.67               | 38.57                            | 46.0               | 3m./HORZ                  | 7.4          | QP           |
| 479.9500           | 8.20                  | 1LP3mV              | 21.83               | 30.03                            | 46.0               | 3m./VERT                  | 16.0         | PK           |
| 729.0040           | 11.70                 | 1LP3mV              | 26.44               | 38.14                            | 46.0               | 3m./VERT                  | 7.9          | QP           |

**SAMPLE CALCULATIONS: at 82.299MHz, 22.20 dBuV + 10.80 dB/m  
 = 33.00 dBuV/m**

**Test Date: September 21, 2010**

**Tested by**

**Signature:**



**Name: George Yang**

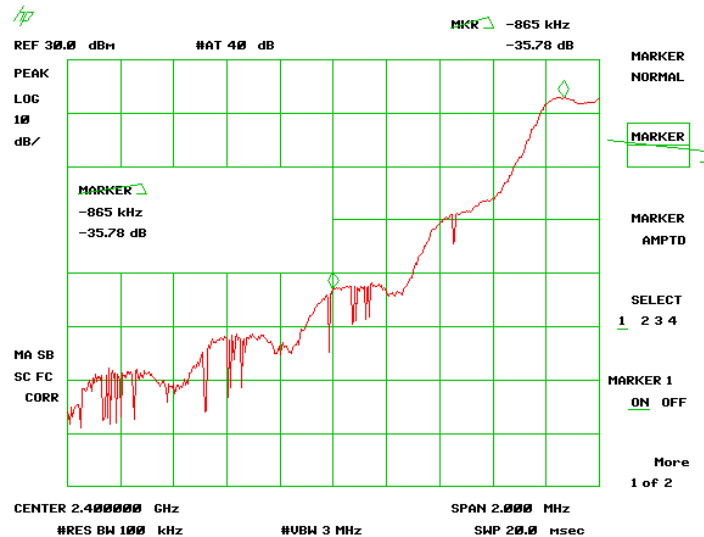
**2.10 Band Edge Measurements – (CFR 15.247 (d))**  
**2.10.1 Band Edge and Restricted Bands**

Band Edge measurements were made with the EUT operating at the Low Channel and High Channel. Conducted measurements were performed to demonstrate compliance with the requirement of 15.247(d) that all emissions be attenuated by 20 dB outside the band. Radiated measurements were performed at the upper band edge to demonstrate compliance with the radiated emission limits of 15.209 that fall within restricted bands as defined in section 15.205.

The emission of greatest magnitude outside of the band was marked, and then a delta measurement between that emission and the peak fundamental emission was taken. That value was subtracted from the value of the fundamental frequency of the highest operating channel to compute the field strength.

**2.10.2 Lower Band Edge**

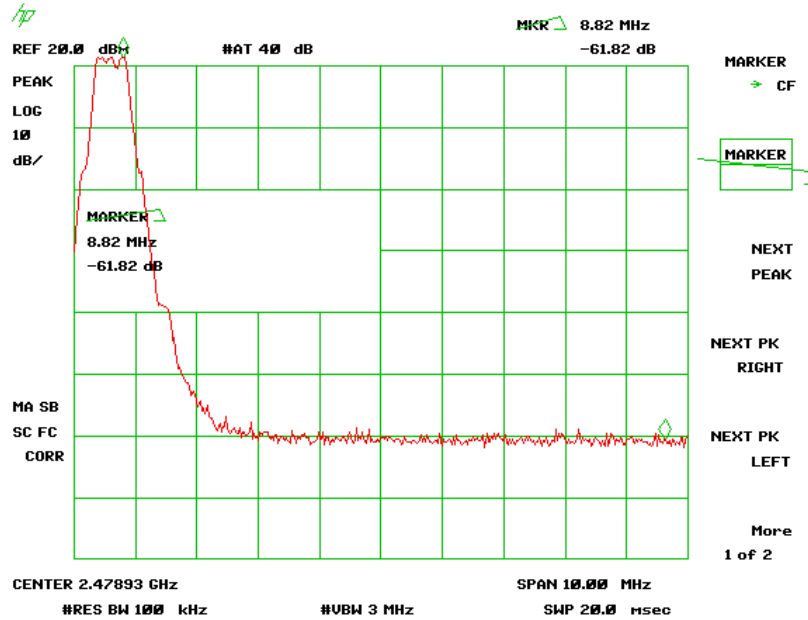
With the transmitter set to 2.401 GHz, Figure 8, the signal level at 2.400 GHz, the lower band edge, is more than 20 dB but less than 50 dB down from the peak. The limit is that it be at least 20 dB down from the fundamental peak. The measurement was performed using conducted measurement techniques.



**Figure 8**  
**Conducted Low Channel Band Edge**

### 2.10.3 High Band Edge

Compliance with the conducted band edge measurement is shown in Figure 9. Spurious components outside the band are attenuated by at least 20 dB. Measurements were conducted based on OET Publication Number: 913591



**Figure 9**  
**Conducted High Channel Band Edge**

To compute the average values of the band edge emissions, the duty cycle correction factor of -20.0 dB is applied to the values in the Corrected Results column. After this correction the EUT is found to have met the restrictions placed on average radiated emissions in Restricted Bands. The worst-case measurement for each of the antenna type is computed below.



**CALCULATION OF WORST-CASE AVERAGE RADIATED UPPER BAND  
 EDGE MEASUREMENT:**

**Table 12-Average Radiated fundamental measurements of High channel**

| Frequency | AF     | Test Data | AF+CA-AMP+DC | Results  | Antenna                         |
|-----------|--------|-----------|--------------|----------|---------------------------------|
| (MHz)     | Table  | (dBuV)    | (dB/m)       | (dBuV/m) | Type                            |
| 2474.25   | 1hn3mV | 92.41     | 6.15         | 98.56    | Dipole<br>Antenna               |
| 2474.65   | 1hn3mV | 94.27     | 6.15         | 100.42   | Patch<br>Antenna                |
| 2474.65   | 1hn3mV | 95.29     | 6.15         | 101.44   | Corner<br>Reflective<br>Antenna |

Dipole Antenna:

Results = Peak Corrected Results + Duty Cycle Correction Factor  
 Results = 92.41 + (6.15) = 98.56 dBuV/m  
 Margin = Limit – (Δ between Peak and band edge)  
 98.56 – 61.82 = 36.74 dB  
 Average Margin = 54 - (36.74)dB= 17.26

Patch Antenna:

Results = Peak Corrected Results + Duty Cycle Correction Factor  
 Results = 94.27 + (6.15) = 100.42 dBuV/m  
 Margin = Limit – (Δ between Peak and band edge)  
 100.42 – 61.82 = 38.6 dB  
 Average Margin = 54 - (38.60)dB= 15.40

Corner Reflective Antenna:

Results = Peak Corrected Results + Duty Cycle Correction Factor  
 Results = 95.29 + (6.15) = 101.44 dBuV/m  
 Margin = Limit – (Δ between Peak and band edge)  
 101.44 – 61.82 = 39.62 dB  
 Average Margin = 54 - (39.62)dB= 14.38