

## **FCC Part 15.247 Transmitter Certification**

2.4 GHz ISM Band  
Direct Sequence Spread Spectrum Transmitter

### **Test Report**

FCC ID: TEB-HUNTSU746

FCC Rule Part: 15.247

Test Begin Date: 6/27/2008

Test End Date: 8/5/2008

Report Issue Date: August 11, 2008

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**Additional Exhibits Included In Filing**

**External Photograph  
Internal Photographs  
Product Labeling  
Test Setup Description  
Test Setup Photos**

**Software Defined Radio Statement  
Conducted Emissions Test Report  
Radiated Emissions Test Report  
Operational Statement  
Schematics**

**1.0 GENERAL****1.1 Purpose**

The purpose of this report is to demonstrate compliance with Part 15, Subpart C of the FCC's Code of Federal Regulations.

**1.2 Product Description****1.2.1 General**

Hunt Technologies' FOCUS AX Universal RF endpoint model 0746-0001 consists of a Landis & Gyr solid-state, single phase meter measuring electrical energy consumption integrated with a Hunt Technologies 900 MHz and a separate ZigBee transceiver on a single printed circuit board. The 900 MHz circuit, operating in the 902-928 MHz frequency band, is a frequency hopping spread spectrum transceiver utilizing GFSK modulation. The ZigBee circuit is a direct sequence spread spectrum transmitter operating in the 2400-2485.5 MHz unlicensed band and utilizing O-QPSK modulation.

Exhibits A and B are detailed external and internal photographs of the EUT.

**1.2.2 Intended Use**

The FOCUS AX Universal RF endpoint model 0746-0001 will be a transmitting and receiving meter module that collects and transmits metering data over the 902-928 MHz ISM band for collection by electric utility companies and over the 2400-2485.5 MHz ISM band for in-home "Personal Energy Management" applications. It also can receive and repeat data from other similar meter modules or a central collector module.

**2.0 STATEMENT OF COMPLIANCE****§2.907 Certification**

This is an application for certification.

**§2.911 Application**

- a) This is an application and has been filed electronically with form 731.
- b) All information required has been supplied.
- c) The applicant has signed the application (electronically).
- d) The technical data has been signed.
- e) Applicant signature block on electronic form 731 completed by officer of the company or authorized company personnel.
- f) The appropriate fee has been paid.

**§2.915 Grant**

This application demonstrates that all applicable technical standards have been met and a grant of this application will serve the public interest.

**§2.925 Label**

Each piece of equipment for which authorization will be granted will be uniquely identified with "FCC ID: TEB-HUNTSU746." The required statement will appear with the FCC ID on the outside cover of the product. Exhibit C shows the external label and Exhibit D is the product's ship-sheet (pamphlet) provided to the end-user that contains the required compliance statement as defined by §15.19.

**§2.947 Measurement Procedure**

- a) The scan of the restricted bands was made in a radiated manner. The radiated measurement procedure follows ANSI C63.4 procedure.
- b) All other RF measurements were made in a conducted manner.
- c) Procedural notes are contained in the laboratory report.
- d) A list of test equipment used is contained in the lab report.

**§2.948 Description of Measurement Facilities**

Measurements were performed at TÜV Testing Services Open Test Site. The FCC keeps a full description of the measurement facilities on file. TÜV's acceptance and approval is dated as December 5, 1993 in a letter received from the FCC.

The address of the test facility is:

TÜV Product Service  
19035 Wild Mountain Road  
Taylors Falls, MN 55084-1758

Phone: 651-638-0297  
Contact: Joel Schneider  
Test Engineer in Charge

See Exhibit O, "Radiated Emissions sketch Exhibit O.pdf" for a sketch of radiated measurement setup.

The radiated emissions, the power line conducted emissions, the RF conducted emissions above 1 GHz, and the RF conducted spurious emissions were tested at TÜV.

The RF conducted emissions tests (including 6-dB bandwidth, peak power output, spurious emissions from 30 MHz to 26 GHz, and power spectral density) were done at the following address:

Hunt Technologies  
6436 County Rd. 11  
Pequot Lakes, MN 56472

**§2.1033 Application for Certification**

- a) Form 731 has been electronically filed on 7/9/2008. Items that did not apply were left blank.
- b) This technical report contains the following information where applicable:
  1. Full name and mailing address of manufacturer and applicant for certification:  
**Hunt Technologies, LLC**  
**6436 County Rd. 11**  
**Pequot Lakes, MN 56472**
  2. FCC Identifier:  
**TEB-HUNTSU746**
  3. Brief Description of circuit functions and device operation:

Hunt Technologies, LLC  
6436 County Rd. 11  
Pequot Lakes, MN 56472

8/18/2008

See Exhibit F, "Op Statement Exhibit F.pdf" for operational description  
 See Exhibit G, "Schematic Exhibit G" for schematic

4. Block Diagram:  
     See Exhibit H, "Block Diagram Exhibit H.pdf"
  5. Report of the measurements of conducted and radiated emissions:  
     See figs. in section 6 and Exhibits J, K, N and P shown and discussed later in this report
  6. Photographs  
     External: See Exhibit A, "External Photo Exhibit A.pdf"  
     Internal: See Exhibit B, "Internal Photos Exhibit B.pdf"  
     Test Setup: See Exhibit E, "Test Setup Photos Exhibit E.pdf"
  7. Peripheral or Accessory devices:  
     There are no peripheral or accessory devices designed to operate with this product.
  8. Transition Rules  
     This application is not pursuant to the transition rules of §15.37
  9. Application for scanning receivers:  
     Not applicable to this device.
  10. Application for operation within the 59-64GHz band:  
     Not applicable to this device.
- c) Composite Systems  
     Not applicable to this device.
- d) Software Defined Radio  
     Not applicable to this device. See Exhibit I, "SDR Statement Exhibit I.pdf"

### 3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

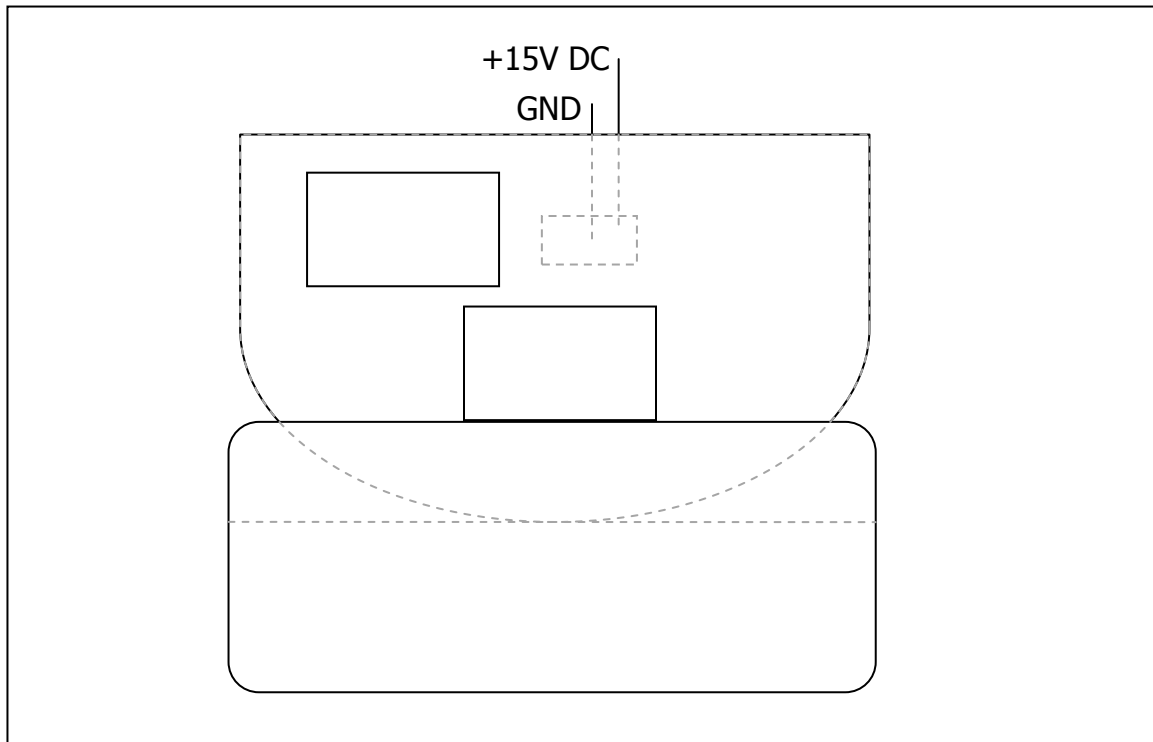
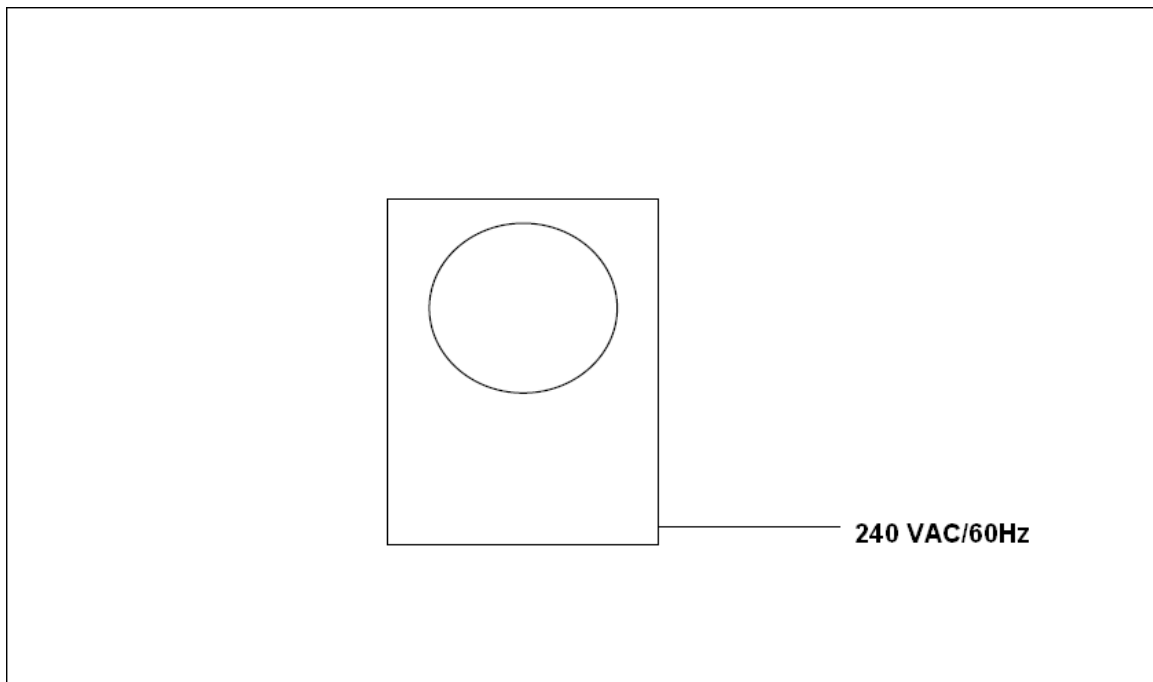
- ☐ ANSI C63.4-1992: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- ☐ US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures (October 2004)
- ☐ US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators (October 2004)
- ☐ FCC OET Bulletin 65 Appendix C - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
- ☐ FCC KDB Publication No. 558074 - Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247), March 2005

### 4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications. The equipment used to do all Radiated testing and Power Line Conducted Emissions is the property of TUV Product Services and is located at their Taylor's Falls facility. The FCC keeps a full description of TUV's measurement facilities on file. The equipment listed below was used at Hunt Technologies' Pequot Lakes, MN facility to do all RF conducted measurements.

**Table 4.0-1: Test Equipment**

| Mfg.    | Equip. Type       | Model  | S/N        | Cal. Due   |
|---------|-------------------|--------|------------|------------|
| Agilent | Spectrum Analyzer | E4404B | MY41440735 | 7/16/2008  |
| Agilent | Spectrum Analyzer | E4407B | MY45106578 | 10/12/2008 |
| Agilent | DC Power Supply   | E3646A | MY40008953 | 7/16/2008  |

**5.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM****Figure 5.0-1 Radiated Emissions Test Setup****Figure 5.0-2 Power Line Conducted Emissions Test Setup**

**6.0 SUMMARY OF TESTS**

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

**6.1 Frequencies to be Examined [§15.31(m)]**

In accordance with the guidelines of §15.31(m), all conducted and radiated measurements were performed at the lowest (2405 MHz), middle (2445 MHz), and highest (2480 MHz) frequencies that the product will transmit.

**6.2 Antenna Requirement [§15.203]**

The transmitter antennas are integral to the circuit board, and therefore comply with the requirement that no other antenna shall be used with the device.

**6.3 Antenna Characteristics [§15.204]**

There are only two antennas proposed for use with this device. These antennas have the following characteristics:

**6.3.1 Antenna Type**

The antenna is approximately a  $\frac{1}{4}$  wave monopole at 2445 MHz.

**6.3.2 Antenna Manufacturer**

None; the antenna is part of the printed circuit board.

**6.3.3 Antenna Gain**

The  $\frac{1}{4}$  wave monopole is a well-known antenna type. The theoretical gain of an ideal  $\frac{1}{4}$  wave monopole is 5.15 dBi. The antenna on this transmitter has some non-ideal characteristics. The finite ground plane is the most significant non-ideal characteristic. Therefore, the antenna gain will be somewhat lower than the ideal number of 5.15 dBi.

**6.4 Power Line Conducted Emissions [§15.207]****6.4.1 Test Methodology**

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150 kHz to 30 MHz.

**6.4.2 Test Results**

The summary of the results are shown below in table 6.4-1. For the complete test report, see Exhibit J, "Conducted Em Exhibit J.pdf"

**Table 6.4-1: Power Line Conducted Emissions Summary**

| FREQ       | LEVEL<br>(dBuV) | CABLE / ANT / PREAMP /<br>ATTEN<br>(dB) | FINAL<br>(dBuV / m) | EUT Lead | DELTA1<br>EN55022 B Qp | DELTA2<br>EN55022 B<br>Avg |
|------------|-----------------|-----------------------------------------|---------------------|----------|------------------------|----------------------------|
| 150.0 kHz  | 8.53 Qp         | 0.12 / 0.2 / 0.0 / 0.0                  | 8.85                | L1       | -57.15                 | n/a                        |
| 200.2 kHz  | 56.0 Qp         | 0.13 / 0.13 / 0.0 / 0.0                 | 56.26               | L1       | -7.34                  | n/a                        |
| 300.0 kHz  | 12.56 Qp        | 0.15 / 0.1 / 0.0 / 0.0                  | 12.81               | L1       | -47.43                 | n/a                        |
| 418.66 kHz | 14.29 Qp        | 0.18 / 0.1 / 0.0 / 0.0                  | 14.57               | L1       | -42.91                 | n/a                        |
| 750.0 kHz  | 2.7 Qp          | 0.22 / 0.2 / 0.0 / 0.0                  | 3.12                | L1       | -52.88                 | n/a                        |
| 815.08 kHz | 9.78 Qp         | 0.23 / 0.2 / 0.0 / 0.0                  | 10.21               | L1       | -45.79                 | n/a                        |
| 1.4 MHz    | 43.69 Qp        | 0.29 / 0.12 / 0.0 / 0.0                 | 44.1                | L1       | -11.9                  | n/a                        |
| 1.5 MHz    | 27.48 Qp        | 0.3 / 0.1 / 0.0 / 0.0                   | 27.88               | L1       | -28.12                 | n/a                        |
| 2.0 MHz    | 20.45 Qp        | 0.34 / 0.1 / 0.0 / 0.0                  | 20.89               | L1       | -35.11                 | n/a                        |
| 4.0 MHz    | 26.31 Qp        | 0.49 / 0.1 / 0.0 / 0.0                  | 26.9                | L1       | -29.1                  | n/a                        |
| 4.2 MHz    | 36.42 Qp        | 0.5 / 0.1 / 0.0 / 0.0                   | 37.02               | L1       | -18.98                 | n/a                        |
| 7.01 MHz   | 23.86 Qp        | 0.64 / 0.15 / 0.0 / 0.0                 | 24.65               | L1       | -35.35                 | n/a                        |
| 10.05 MHz  | 36.37 Qp        | 0.77 / 0.3 / 0.0 / 0.0                  | 37.44               | L1       | -22.56                 | n/a                        |
| 13.69 MHz  | 31.39 Qp        | 0.88 / 0.48 / 0.0 / 0.0                 | 32.75               | L1       | -27.25                 | n/a                        |
| 22.43 MHz  | 30.58 Qp        | 1.14 / 0.92 / 0.0 / 0.0                 | 32.64               | L1       | -27.36                 | n/a                        |
| 29.43 MHz  | 28.97 Qp        | 1.31 / 0.91 / 0.0 / 0.0                 | 31.19               | L1       | -28.81                 | n/a                        |
| 150.0 kHz  | -1.36 Av        | 0.12 / 0.2 / 0.0 / 0.0                  | -1.04               | L1       | n/a                    | -57.04                     |
| 200.2 kHz  | 52.93 Av        | 0.13 / 0.13 / 0.0 / 0.0                 | 53.19               | L1       | n/a                    | -0.41                      |
| 300.0 kHz  | 7.14 Av         | 0.15 / 0.1 / 0.0 / 0.0                  | 7.39                | L1       | n/a                    | -42.85                     |
| 418.66 kHz | -3.53 Av        | 0.18 / 0.1 / 0.0 / 0.0                  | -3.25               | L1       | n/a                    | -50.73                     |
| 750.0 kHz  | -1.0 Av         | 0.22 / 0.2 / 0.0 / 0.0                  | -0.58               | L1       | n/a                    | -46.58                     |
| 815.08 kHz | 8.44 Av         | 0.23 / 0.2 / 0.0 / 0.0                  | 8.87                | L1       | n/a                    | -37.13                     |
| 1.4 MHz    | 42.62 Av        | 0.29 / 0.12 / 0.0 / 0.0                 | 43.03               | L1       | n/a                    | -2.97                      |
| 1.5 MHz    | 22.51 Av        | 0.3 / 0.1 / 0.0 / 0.0                   | 22.91               | L1       | n/a                    | -23.09                     |
| 2.0 MHz    | 16.33 Av        | 0.34 / 0.1 / 0.0 / 0.0                  | 16.77               | L1       | n/a                    | -29.23                     |
| 4.0 MHz    | 23.23 Av        | 0.49 / 0.1 / 0.0 / 0.0                  | 23.82               | L1       | n/a                    | -22.18                     |
| 4.2 MHz    | 36.3 Av         | 0.5 / 0.1 / 0.0 / 0.0                   | 36.9                | L1       | n/a                    | -9.1                       |
| 7.01 MHz   | 23.39 Av        | 0.64 / 0.15 / 0.0 / 0.0                 | 24.18               | L1       | n/a                    | -25.82                     |
| 10.05 MHz  | 36.3 Av         | 0.77 / 0.3 / 0.0 / 0.0                  | 37.37               | L1       | n/a                    | -12.63                     |
| 13.69 MHz  | 21.19 Av        | 0.88 / 0.48 / 0.0 / 0.0                 | 22.55               | L1       | n/a                    | -27.45                     |
| 22.43 MHz  | 28.69 Av        | 1.14 / 0.92 / 0.0 / 0.0                 | 30.75               | L1       | n/a                    | -19.25                     |
| 29.43 MHz  | 23.47 Av        | 1.31 / 0.91 / 0.0 / 0.0                 | 25.69               | L1       | n/a                    | -24.31                     |
| 300.0 kHz  | 21.92 Qp        | 0.15 / 0.1 / 0.0 / 0.0                  | 22.17               | N        | -38.07                 | n/a                        |
| 750.0 kHz  | 5.51 Qp         | 0.22 / 0.2 / 0.0 / 0.0                  | 5.93                | N        | -50.07                 | n/a                        |
| 815.08 kHz | 11.26 Qp        | 0.23 / 0.2 / 0.0 / 0.0                  | 11.69               | N        | -44.31                 | n/a                        |
| 1.4 MHz    | 44.17 Qp        | 0.29 / 0.12 / 0.0 / 0.0                 | 44.58               | N        | -11.42                 | n/a                        |
| 1.5 MHz    | 28.78 Qp        | 0.3 / 0.1 / 0.0 / 0.0                   | 29.18               | N        | -26.82                 | n/a                        |
| 4.0 MHz    | 27.51 Qp        | 0.49 / 0.1 / 0.0 / 0.0                  | 28.1                | N        | -27.9                  | n/a                        |
| 10.05 MHz  | 37.76 Qp        | 0.77 / 0.3 / 0.0 / 0.0                  | 38.83               | N        | -21.17                 | n/a                        |
| 29.43 MHz  | 30.84 Qp        | 1.31 / 0.91 / 0.0 / 0.0                 | 33.06               | N        | -26.94                 | n/a                        |
| 300.0 kHz  | 16.06 Av        | 0.15 / 0.1 / 0.0 / 0.0                  | 16.31               | N        | n/a                    | -33.93                     |
| 750.0 kHz  | -0.28 Av        | 0.22 / 0.2 / 0.0 / 0.0                  | 0.14                | N        | n/a                    | -45.86                     |
| 815.08 kHz | 9.21 Av         | 0.23 / 0.2 / 0.0 / 0.0                  | 9.64                | N        | n/a                    | -36.36                     |
| 1.4 MHz    | 43.66 Av        | 0.29 / 0.12 / 0.0 / 0.0                 | 44.07               | N        | n/a                    | -1.93                      |
| 1.5 MHz    | 23.91 Av        | 0.3 / 0.1 / 0.0 / 0.0                   | 24.31               | N        | n/a                    | -21.69                     |
| 4.0 MHz    | 23.08 Av        | 0.49 / 0.1 / 0.0 / 0.0                  | 23.67               | N        | n/a                    | -22.33                     |
| 10.05 MHz  | 37.4 Av         | 0.77 / 0.3 / 0.0 / 0.0                  | 38.47               | N        | n/a                    | -11.53                     |
| 29.43 MHz  | 26.06 Av        | 1.31 / 0.91 / 0.0 / 0.0                 | 28.28               | N        | n/a                    | -21.72                     |

## 6.5 Radiated Emissions [§15.109] and Radiated Spurious Emissions (Restricted Bands) [§15.205]

### 6.5.1 Test Methodology

Radiated emissions tests were performed over the frequency range of 30MHz to 1 GHz and in the restricted bands up to 25 GHz, greater than 10 times the highest fundamental frequency. The restricted band tests were done at the lowest, middle, and highest transmit frequencies.

Measurements of the radiated field strength were made at a distance of 3m from the boundary of the equipment under test (EUT) and the receiving antenna. The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth (RBW) of 120 kHz and a video bandwidth (VBW) of 300 kHz. For frequencies above 1000MHz, peak measurements were made using an RBW of 1 MHz and a VBW of 1 MHz. Average values were determined by subtracting the duty cycle correction



factor stated in 6.5.2 from average measurements taken with a 1 MHz RBW and 10 Hz VBW. See Exhibit O, "Radiated Emissions sketch Exhibit O.pdf," for a sketch of the test setup.

### 6.5.2 Calculation of allowed limit for Radiated Spurious Emissions

For spurs above 1000 MHz, §15.205(b) allows duty cycle averaging per §15.35. This device transmits packets for no longer than 27ms in any 100ms period; therefore, 11.37 dB of duty cycle correction applies. The duty cycle correction factor is determined using the formula:  $-20\log(27/100) = 11.37\text{dB}$ .

### 6.5.3 Test Results

Radiated spurious emissions found in the band of 30MHz to 25GHz are all below the applicable limits. Each emission found to be in a restricted band as defined by section 15.205, was compared to the radiated emission limits as defined in section 15.209. Results are shown in Exhibit K, "Radiated Emissions FCCB Exhibit K.pdf" and Exhibit N, "Restricted Bands Exhibit N.pdf" The highest signal in the restricted bands portion of the test was the 7.335 GHz harmonic produced by the mid channel transmission on the primary antenna (antenna 1). This signal was 6.17 dB down from the peak limit of 74 dBuV/m.

## 6.6 Peak Output Power – [§15.247(b)(3)]

### 6.6.1 Test Methodology (Conducted Method)

The Peak Output Power was measured in accordance with the FCC KDB Publication No. 558074 "Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)" Power Option 1. The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer.

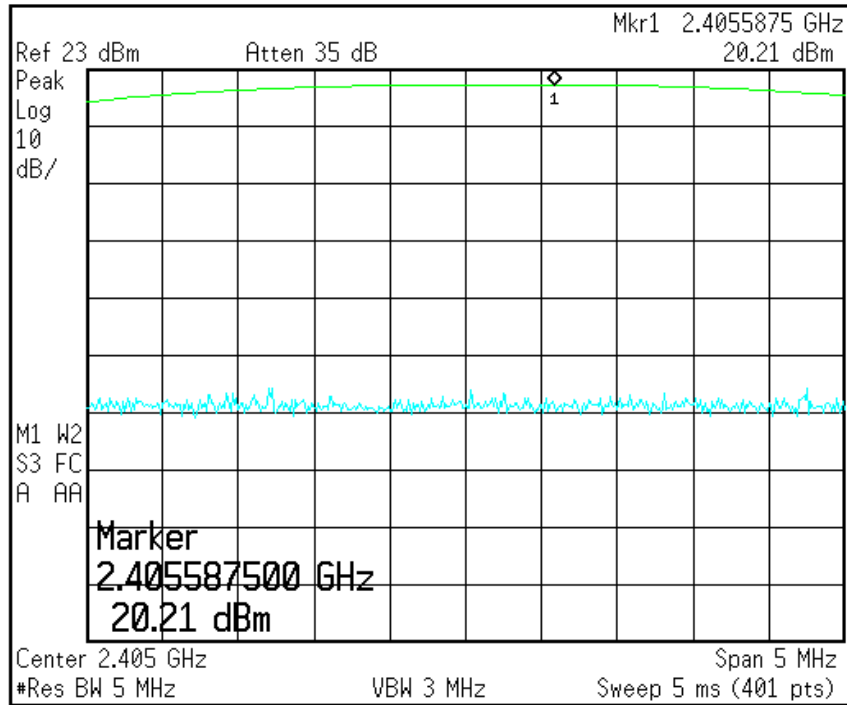
### 6.6.2 Test Results

Results are shown below in table 6.6-1 and the worst case was plotted and shown in figure 6.6-1 to 6.6-3 below:

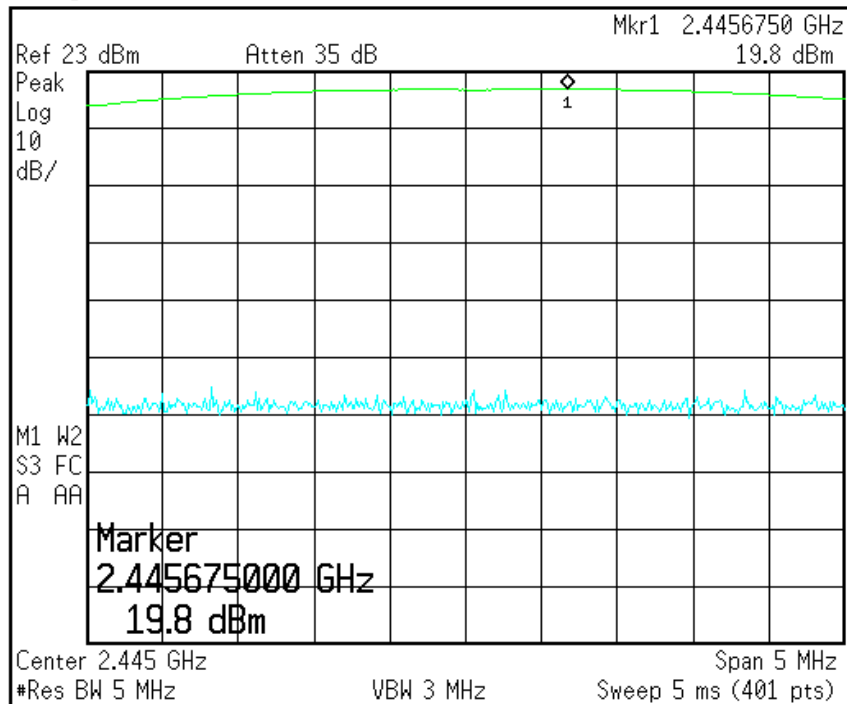
**Table 6.6-1: RF Output Power**

| Frequency<br>(MHz) | Level<br>(dBm) |
|--------------------|----------------|
| 2405               | 20.21          |
| 2445               | 19.8           |
| 2480               | 5.725          |

\* Agilent 09:27:02 Jul 1, 2008

**Figure 6.6-1: Output Power – Low Channel**

\* Agilent 09:28:28 Jul 1, 2008

**Figure 6.6-2: Output Power – Mid Channel**

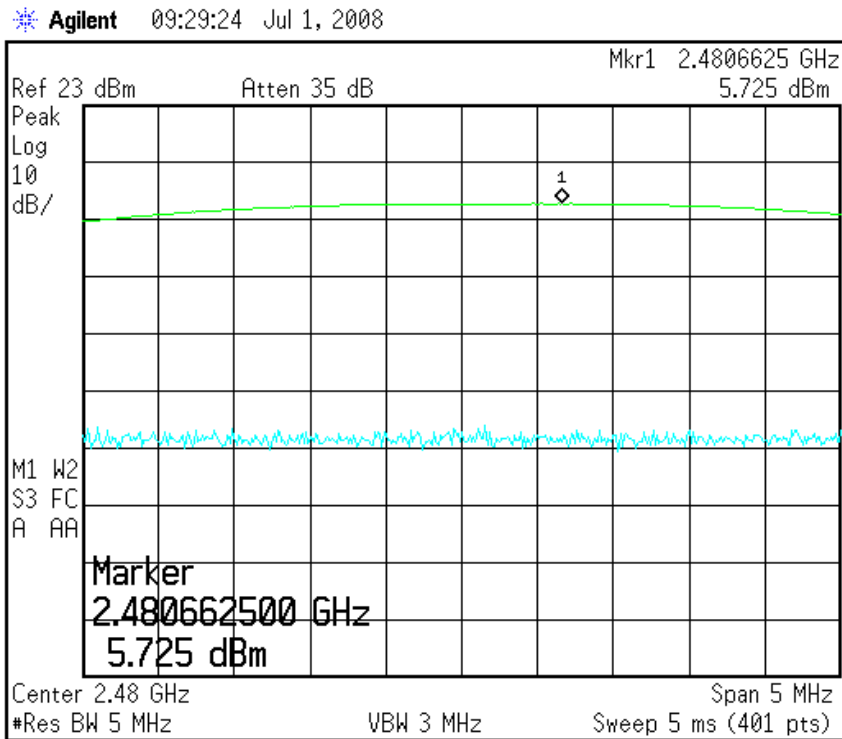


Figure 6.6-3: Output Power – High Channel

### 6.6.3 De Facto EIRP Limit

The gain of the transmit antenna is given earlier in this report. Because the gain of the antenna is less than 6 dBi, the peak output power need not be reduced to comply with this requirement.

### 6.6.4 RF Exposure Compliance Requirements

This device is not intended to operate within 20 cm of a person's body. Therefore, RF exposure requirements are not applicable to this application for certification.

### 6.7 6-dB Bandwidth [§15.247(a)(2)]

**15.247(a)(2):** Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 6.7.1 Test Methodology

The 6dB bandwidth was measured in accordance with the FCC KDB Publication No. 558074 "Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)". The RBW of the spectrum analyzer was set to 100 kHz and VBW 300 kHz. Span was set large enough to capture the entire emissions and  $\gg$  RBW.

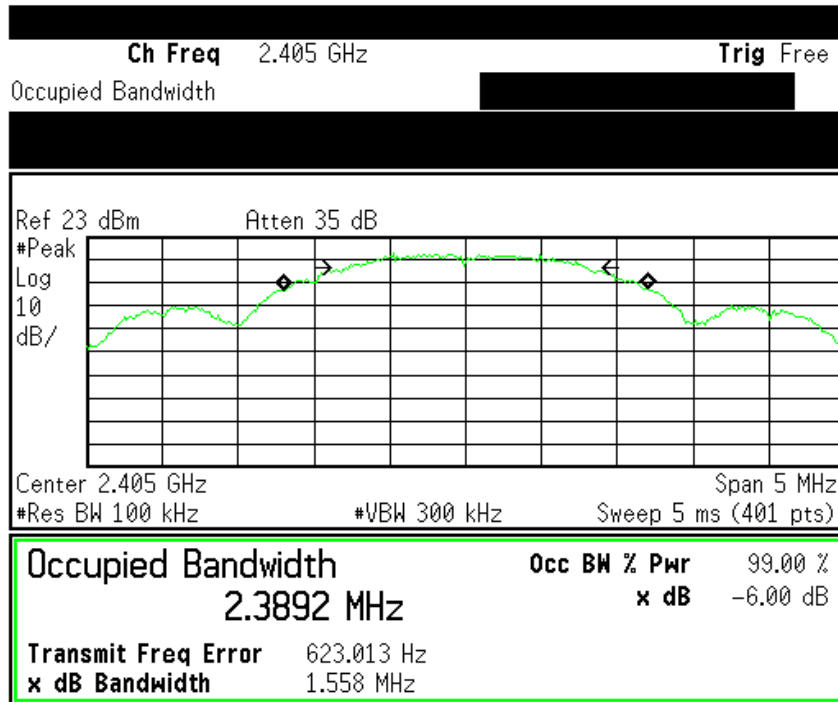
#### 6.7.2 Test Results

Results are shown below in table 6.7-1 and plotted in figures 6.7-1 to 6.7-3 below:

**Table 6.7-1: 6-dB Bandwidth**

| Frequency<br>(MHz) | Bandwidth<br>(MHz) |
|--------------------|--------------------|
| 2405               | 1.558              |
| 2445               | 1.607              |
| 2480               | 1.535              |

\* Agilent 09:20:48 Jul 1, 2008

**Figure 6.7-1: 6-dB Bandwidth Plot – Low Channel**

\* Agilent 09:22:23 Jul 1, 2008

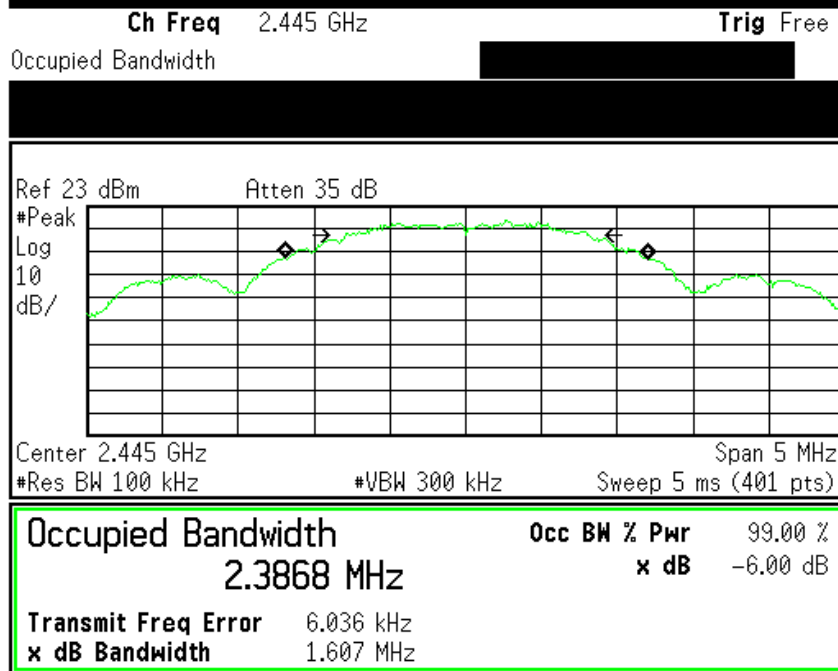


Figure 6.7-2: 6-dB Bandwidth Plot – Mid Channel

\* Agilent 09:23:43 Jul 1, 2008

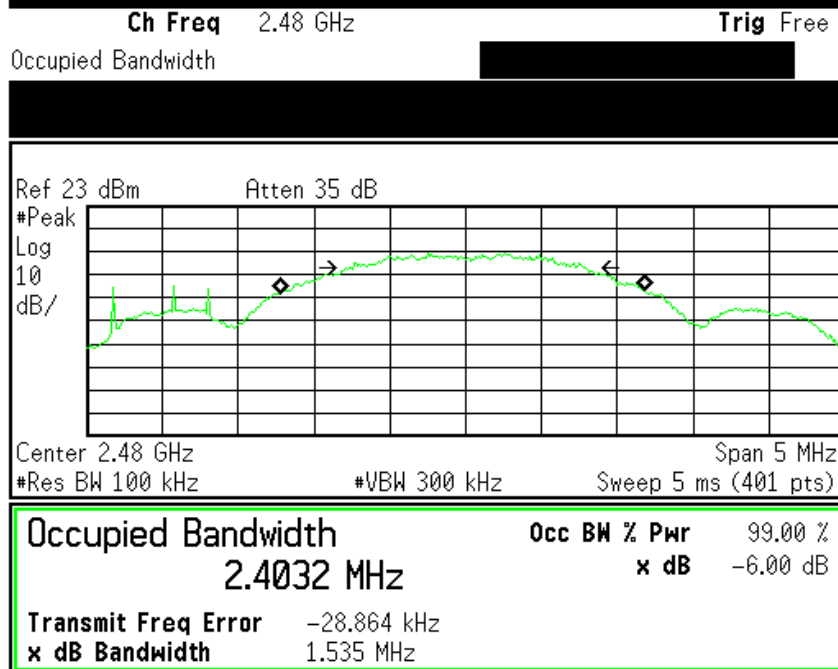


Figure 6.7-3: 6-dB Bandwidth Plot – High Channel

**6.8 Peak Power Spectral Density [§15.247(e)]**

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

**6.8.1 Test Methodology**

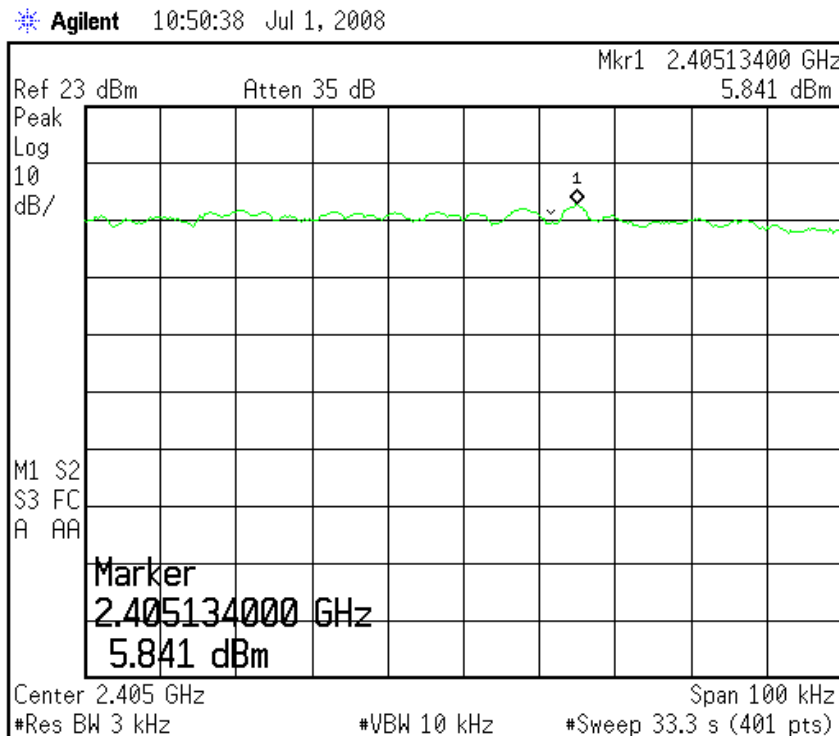
The power spectral density was measured in accordance with the FCC KDB Publication No. 558074 "Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)". The emission peaks within the pass band were located and zoomed in on. The spectrum analyzer RBW was set to 3 kHz and VBW 10 kHz. Span was adjusted to 100 kHz and the sweep time was calculated to be 34s (Span/3 kHz).

**6.8.2 Test Results**

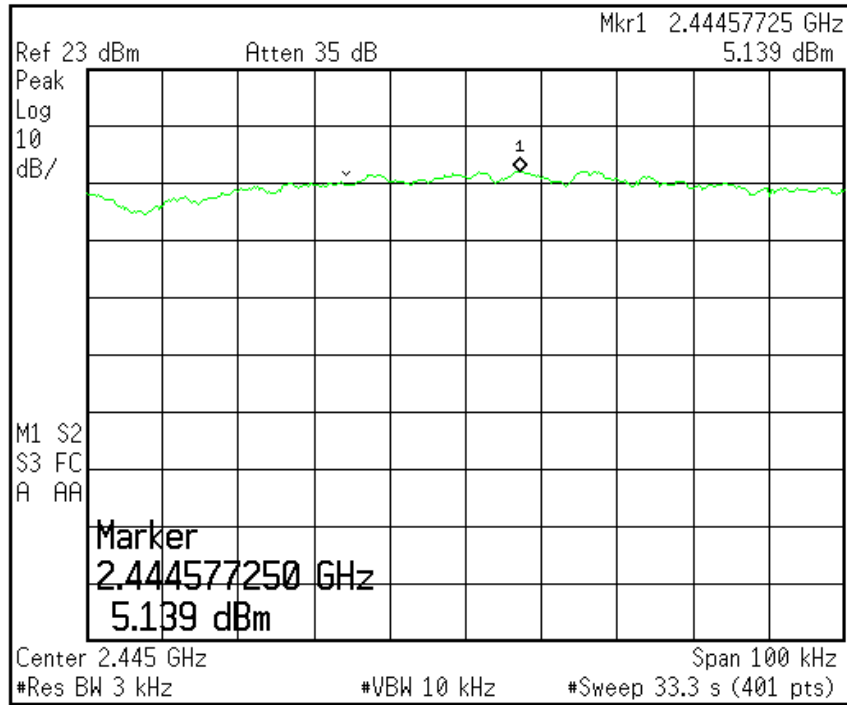
Results are shown below in table 6.8-1 and figures 6.8-1 – 6.8-3:

**Table 6.8-1: Peak Power Spectral Density**

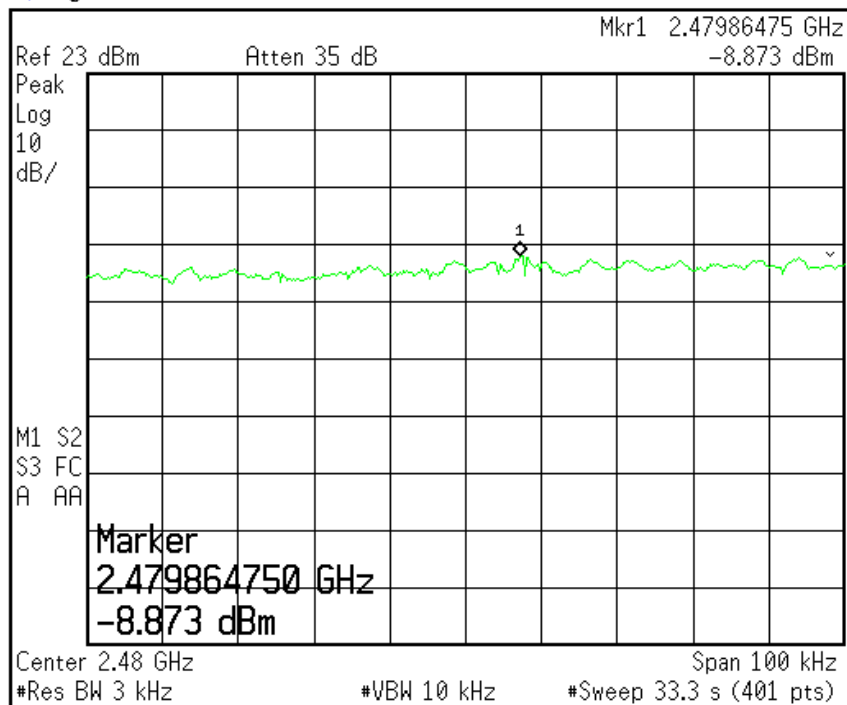
| Frequency (MHz) | Level (dBm) |
|-----------------|-------------|
| 2405            | 5.841       |
| 2445            | 5.139       |
| 2480            | -8.873      |

**Figure 6.8-1: Power Spectral Density Plot – Low Channel**

\* Agilent 11:37:29 Jul 1, 2008

**Figure 6.8-2: Power Spectral Density Plot – Mid Channel**

\* Agilent 11:51:22 Jul 1, 2008

**Figure 6.8-3: Power Spectral Density Plot – High Channel**

**6.9 Band-Edge Compliance and Spurious Emissions [§15.247(d)]****6.9.1 Band-Edge Compliance of RF Emissions****6.9.1.1 Test Methodology**

The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. At the lower band-edge, a conducted measurement was used to determine compliance. The lower band-edge measurement was performed with the spectrum analyzer's RBW set to 100 kHz, which is  $\geq 1\%$  of the span, and VBW set to 300 kHz.

Because the upper band-edge coincides with a restricted band, band-edge compliance was determined using the radiated marker-delta method, as outlined in FCC DA 00-705. The radiated field strength of the fundamental emission was first determined; then the marker-delta method was used to determine the field strength of the band-edge emissions.

**6.9.1.2 Test Results**

In a 100 kHz bandwidth at the lower band-edge, the radio frequency power that was produced by the EUT is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power. Lower band-edge compliance is displayed in Figure 6.9-1.

The worst-case radiated emissions within the restricted band, beginning at 2483.5 MHz, were found to be 1.79 dB below the peak limit of 74 dBuV/m and, using the marker-delta method, 0.1 dB below the average limit of 54 dBuV/m. The peak emission within the restricted band was determined by measuring the peak power at the edge of the restricted band using a 1 MHz RBW and VBW.

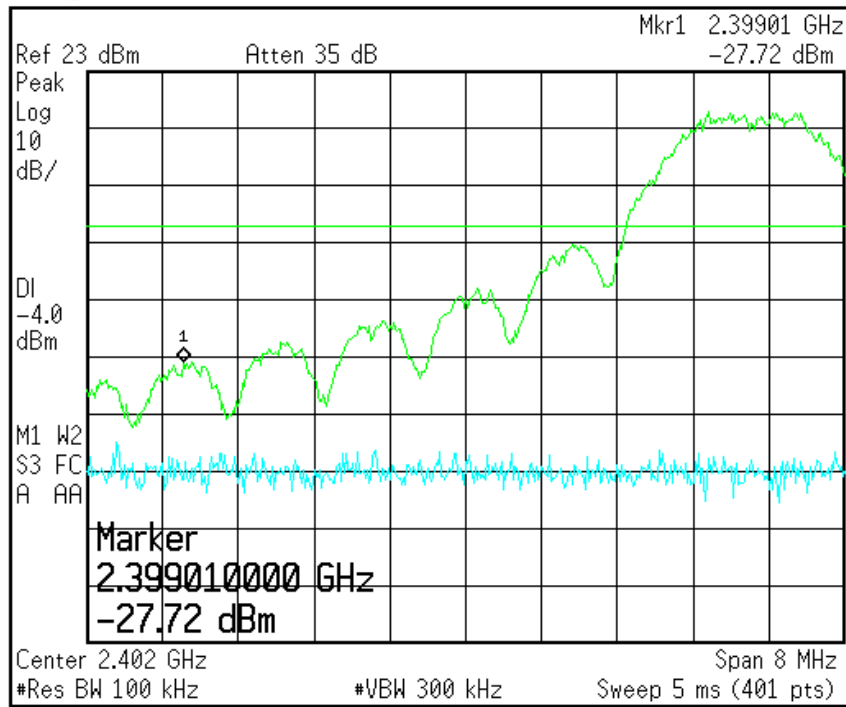
The average emission within the restricted band was determined by measuring the maximum in-band average emission and subtracting the amplitude delta (delta from maximum in-band to highest emission in restricted band using 30 kHz RBW and 100 KHz VBW), with an additional 11.37 dB subtraction due to the duty-cycle correction factor as stated in 6.5.2.

[Average Restricted Band Emission] = [Maximum Average In-Band Field Strength] - [Amplitude Delta] - [Duty Cycle Correction Factor]

These results are shown in Exhibit P, "Radiated Restricted Band Edge Exhibit P."



\* Agilent 10:18:13 Jul 3, 2008

**Figure 6.9-1: Lower Band-Edge (Conducted)****6.9.2 RF Conducted Spurious Emissions****6.9.2.1 Test Methodology**

The EUT was investigated for conducted spurious emissions from 30MHz to 26GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer's VBW was set to 100kHz and the RBW was set to 300kHz. A peak detector function was used with the trace set to max hold.

**6.9.2.2 Test Results**

All emission found were greater than 20dB down from the fundamental carrier. The RF conducted spurious emissions were measured in the band of 30MHz to 26GHz. Results are shown below in Figure 6.9-3 through 6.9-8.

\* Agilent 12:21:51 Jul 1, 2008

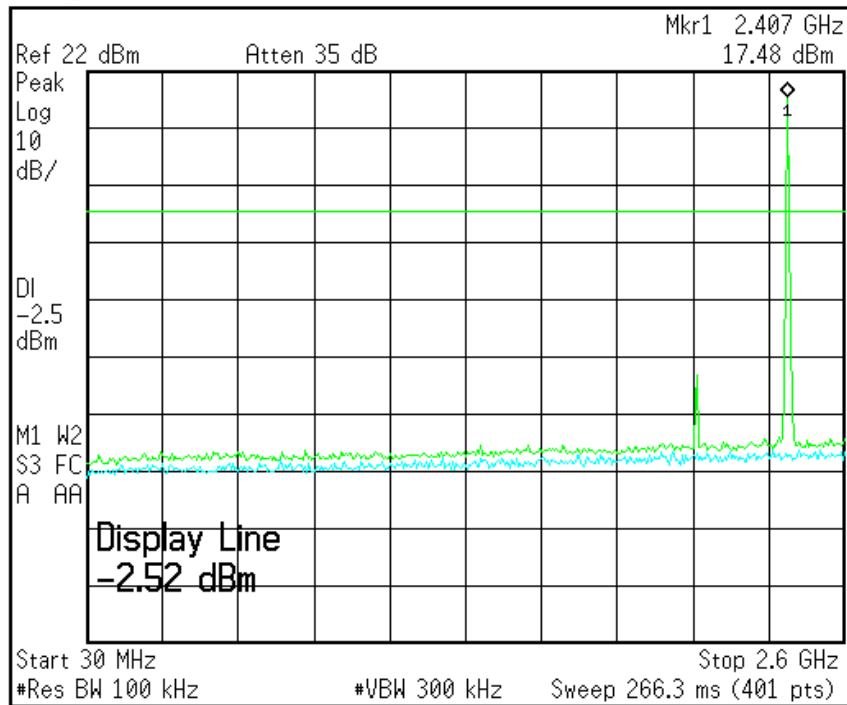


Figure 6.9-3: RF Conducted Spurious Emissions – Low Channel

\* Agilent 12:23:54 Jul 1, 2008

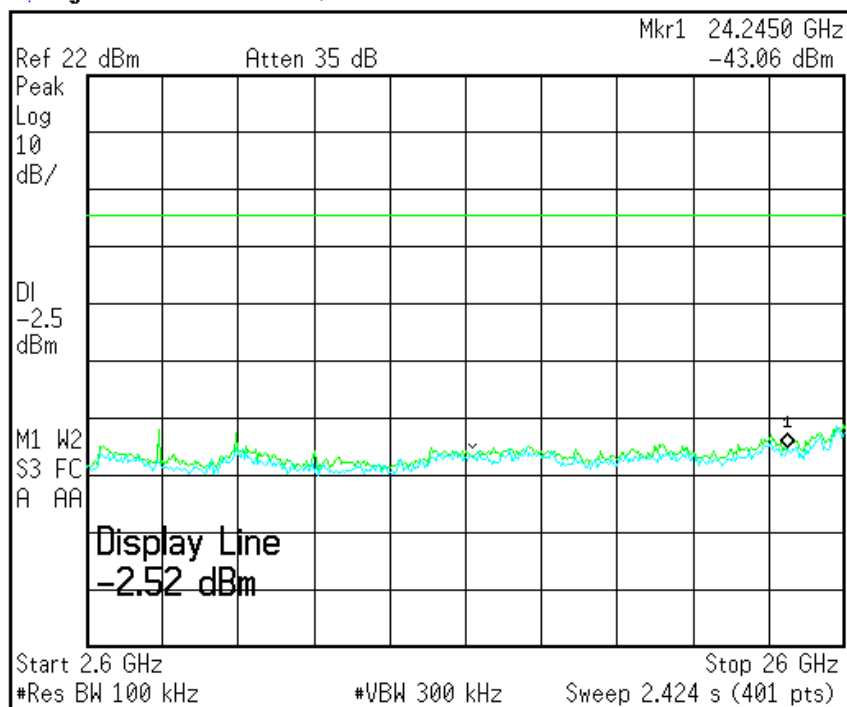
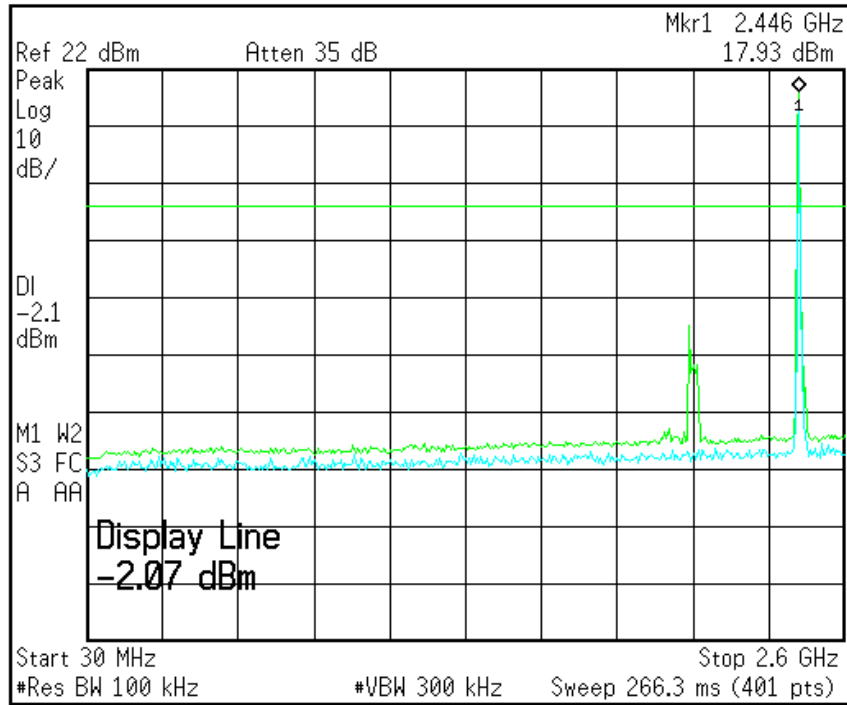
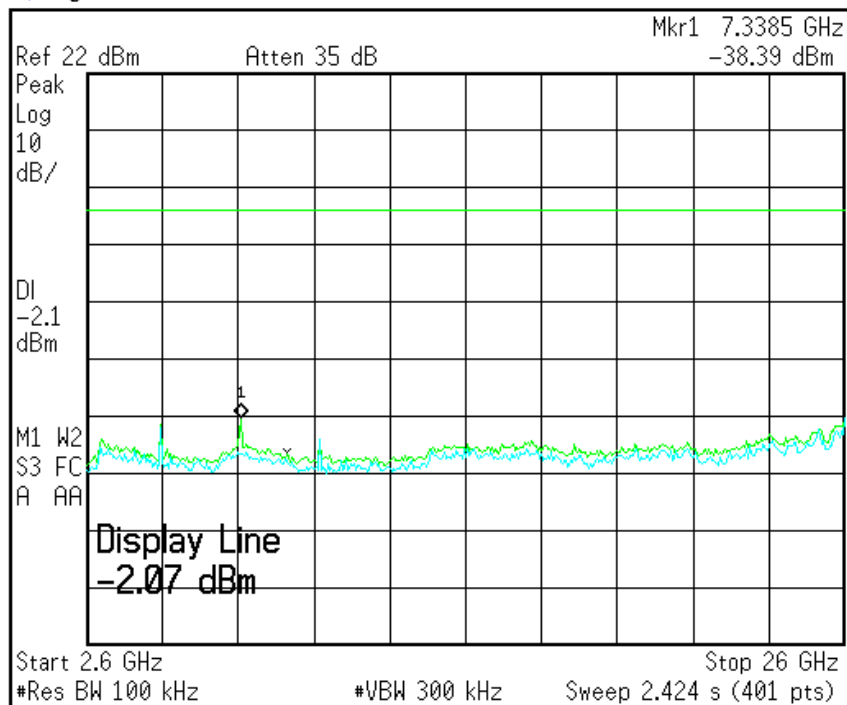


Figure 6.9-4: RF Conducted Spurious Emissions – Low Channel

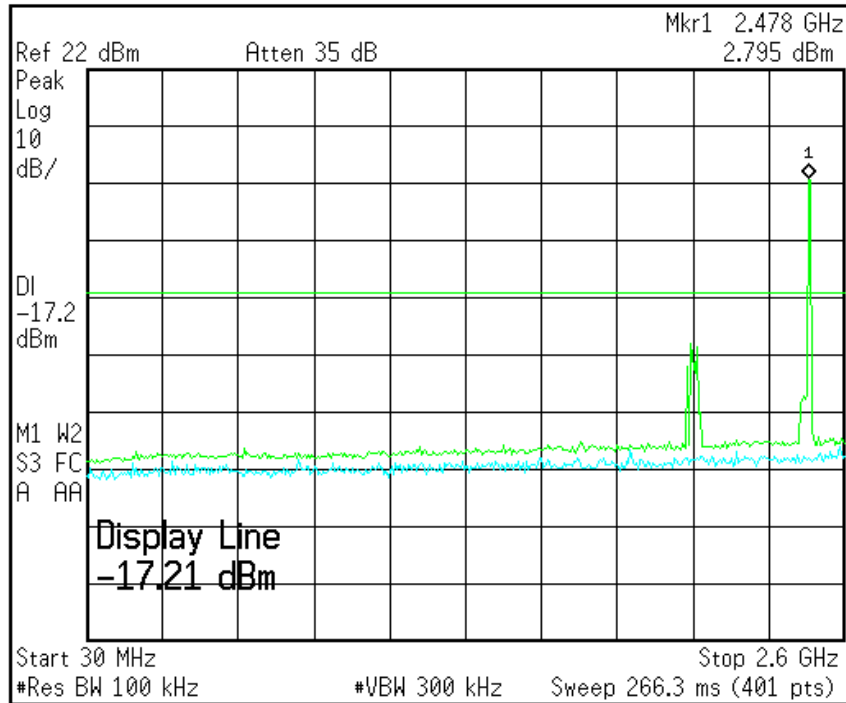
Agilent 12:35:01 Jul 1, 2008

**Figure 6.9-5: RF Conducted Spurious Emissions – Mid Channel**

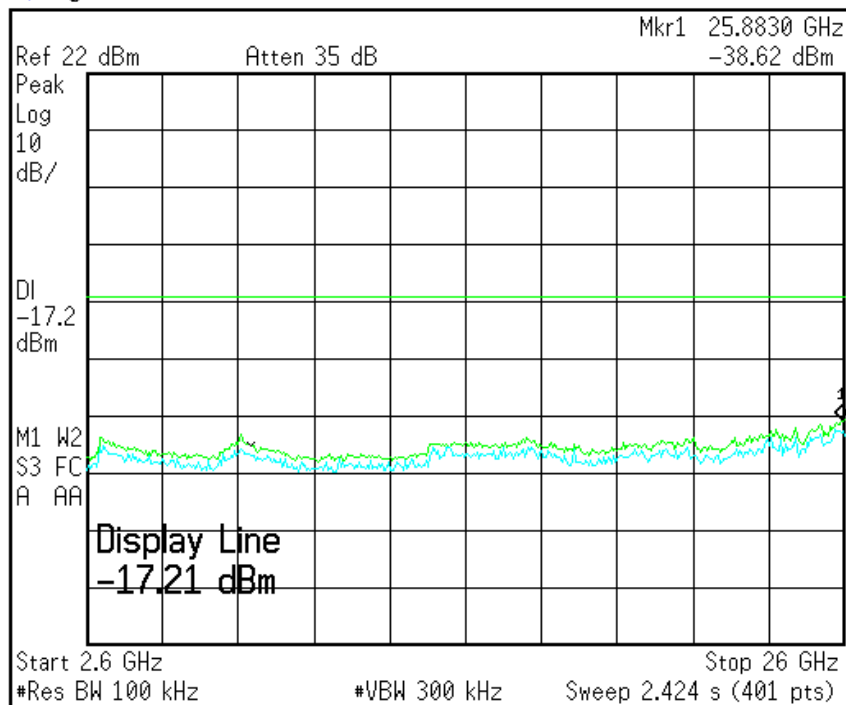
Agilent 12:38:25 Jul 1, 2008

**Figure 6.9-6: RF Conducted Spurious Emissions – Mid Channel**

\* Agilent 12:52:47 Jul 1, 2008

**Figure 6.9-7: RF Conducted Spurious Emissions – High Channel**

\* Agilent 13:04:28 Jul 1, 2008

**Figure 6.9-8: RF Conducted Spurious Emissions – High Channel**

## 7.0 CONCLUSION

The FOCUS AX Universal RF endpoint model 0746-0001, manufactured by Hunt Technologies, LLC, meets the requirements of FCC Part 15 subpart C.

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8/18/2008