# COMPLIANCE WORLDWIDE INC.
# TEST REPORT 467-12TX

**In Accordance with the Requirements of**

**Federal Communications Commission CFR Title 47 Part 15.249, Subpart C**
**Industry Canada RSS 210, Issue 8**

**Low Power License-Exempt Radio Communication Devices**
**Intentional Radiators**

**Issued to**

**Fishman Transducers**
**6 Riverside Drive**
**Andover, MA 01810**

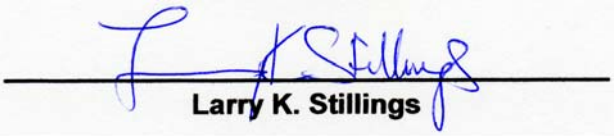
**for the**

**Triple Play Wireless Guitar Controller**

**FCC ID: RMU-PROTRP301**
**IC: 10812A-PROTRP301**

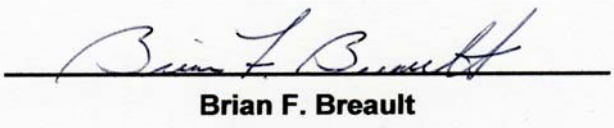
**Report Issued on December 7, 2012**

**Tested by**



Larry K. Stillings

**Reviewed By**



Brian F. Breault

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## 1. Scope

This test report certifies that the Fishman Transducers Triple Play Wireless Guitar Controller, as tested, meets the FCC Part 15, Subpart C and Industry Canada RSS 210, Issue 8 requirements. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

## 2. Product Details

| | |
|---|---|
| **2.1. Manufacturer:** | Fishman Transducers |
| **2.2. Model Number:** | PRO-TRP-301<br>Consisting of Part numbers:<br>Triple Play Wireless Guitar MIDI Controller, Part # 494-000-224 |
| **2.3. Serial Number:** | N/A |
| **2.4. Description:** | Wireless Guitar MIDI Controller |
| **2.5. Power Source:** | 3.7 Volt Lithium Ion Battery (Wireless Guitar Controller) |
| **2.6. Hardware Revs.:** | 3.0 |
| **2.7. Software Rev.:** | N/A |
| **2.8. EMC Modifications:** | Encoder Transmitter:<br>a) Added cap C107=22pF and res R81=100 Ohm to ADC U4 clock line CLK1,<br>b) Removed inductors L1=3.3nH and L2=2.7nH from antenna trace,<br>a) c) Changed caps C71 and C72 from 1pF to 1.2pF, changed inductor L5 from 2.7nH to 3.0nH (bandpass filter on antenna trace). |



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# 3. Product Configuration

## 3.1. Support Equipment

| Device | Manufacturer | Model | Serial No. |
|---|---|---|---|
| Laptop | Dell | Lattitude D620 | 16211603485 |
| Laptop Power Adapter | Dell | LA90PS0-00 | CN0-0DF266-71615-65J-C2D6 |
| Wireless USB Receiver | Fishman | 494-000-220 | N/A |
| Charger[1] | Fishman/GPE | GPE0538-050100-1 | N/A |

## 3.2. Cables

| Cable Type | Length | Shield | From | To |
|---|---|---|---|---|
| USB to Micro USB[1] | 2M | Yes | Charger | Triple Play Wireless Guitar Controller |

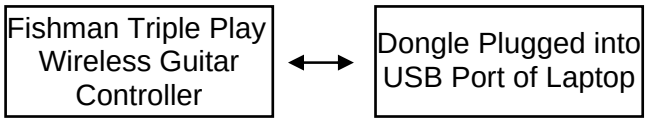
**[1] Used only to charge the device, not when the device is in actual use.**

## 3.3. Operational Characteristics & Software

For fixed transmit frequency operation:

1. Make sure the Wireless USB Receiver dongle has been installed in the laptop and the unit has been paired with the Wireless Guitar Controller.
2. Power the Wireless Guitar Controller off. Hold the down button on the controller and power the unit back on. The pilot LED should blink to confirm it is ready to receive a firmware download.
3. On the laptop, run the GSNTBoot06 utility. Select MIDI: USB Audio Device
4. Select File: Load *.ldr file and select the file that corresponds to the channel to be evaluated. Or select the device firmware for normal operation.
5. The selected file will download into the Wireless Guitar Controller. The LED on the controller will blink rapidly for a few seconds to acknowledge receiving the download.
6. After about 20 seconds, cycle the power on the Wireless Guitar Controller. The pilot LED should remain constant when the firmware is selecting a single channel and there should be a fixed modulated signal at the selected frequency. If the normal operating firmware was selected, the pilot will blink slowly during normal operation.

## 3.4. Block Diagram



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# 4. Measurements Parameters

## 4.1. Measurement Equipment Used to Perform Test

| Device | Manufacturer | Model No. | Serial No. | Cal Due |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4407B | MY45104493 | 12/22/2012 |
| Spectrum Analyzer | Rohde & Schwarz | FSV40 | 100899 | 5/26/2013 |
| Microwave Preamp | Hewlett Packard | 8449B | 3008A01323 | 12/1/2012 |
| Bilog Antenna | Com-Power | AC-220 | 25509 | 8/31/2013 |
| Horn Antenna | Electro-Metrics | EM-6961 | 6337 | 10/19/2013 |
| Horn Antenna | Com-Power | AH-840 | 03075 | 8/27/2014 |
| Loop Antenna | EMCO | 6512 | 9309-1139 | 8/28/2014 |
| 2.4 GHz Notch Filter | Micro-Tronics | BRM50702 | 14 | 2/28/2013 |
| Digital Barometer | Control Company | 4195 | ID236 | 1/4/2013 |

## 4.2. Measurement & Equipment Setup

| | |
|---|---|
| Test Dates: | 11/28/2012 – 12/3/2012 |
| Test Engineer: | Brian Breault |
| Normal Site Temperature (15 - 35°C): | 22.4 |
| Relative Humidity (20 -75%RH): | 32 |
| Frequency Range: | 144 kHz to 25 GHz |
| Measurement Distance: | 3 Meters |
| EMI Receiver IF Bandwidth: | 120 kHz - 30 MHz to 1 GHz<br>1 MHz - Above 1 GHz |
| EMI Receiver Avg/Video Bandwidth: | 300 kHz - 30 MHz to 1 GHz<br>3 MHz - Above 1 GHz |
| Detector Function: | Peak, Quasi-Peak & Average |

## 4.3. Measurement Procedure

Test measurements were made in accordance FCC Part 15.249, IC RSS-210 Annex II: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

The test methods used to generate the data in this test report is in accordance with ANSI C63.4: 2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

## 4.4. Choice of Operating Frequencies

The Fishman Transducers Triple Play Wireless Guitar Controller uses 77 channels from 2404 to 2480 MHz spaced 1 MHz apart.

In accordance with ANSI C63.4, Section 13.1.1, three channels are detailed in this test report:

- Low Channel – 2404 MHz
- Middle Channel – 2441 MHz
- High Channel – 2480 MHz



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## 5. Measurement Summary

| Test Requirement | FCC Requirement | IC Requirement | Test Section | Result | Comment |
|---|---|---|---|---|---|
| Antenna Requirement | 15.203 | RSS-GEN 7.1.2 | 6.1 | Compliant | Unit has internal PCB mount antenna. |
| Radiated Field Strength of Fundamental | 15.249 (a),(c) | RSS-210 A2.9 | 6.2 | Compliant | |
| Radiated Field Strength of Harmonics | 15.249 (a),(c) | RSS-210 A2.9 | 6.3 | Compliant | |
| Fixed, Point-to-Point Operation | 15.249 (b) | N/A | --- | Not Required | |
| Band Edge Measurements | 15.249 (d) 15.209 | RSS GEN 4.9 | 6.4 | Compliant | |
| Spurious Radiated Emissions | 15.249 (d), 15.209 | RSS-210 A2.9(b) | 6.5 | Compliant | |
| Occupied Bandwidth 26 dB & 99% Power Bandwidth | ANSI C63.4 § 13.1.7 | RSS-GEN 4.6.1 | 6.6 | Compliant | |
| Conducted Emissions | 15.207 | RSS-GEN 7.2.2 | 6.7 | Compliant | |
| Public Exposure to Radio Frequency Energy Levels | 1.1307 (b) (1) | N/A | --- | Not Required | |



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# 6. Measurement Data

## 6.1. Antenna Requirement (Section 15.203, RSS-GEN)

Requirement: 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.

Result: The unit under test employs a permanent, internal, non-user accessible antenna.

## 6.2. Radiated Field Strength of Fundamental (15.249, Section (a), (c)), IC RSS-210 A2.9

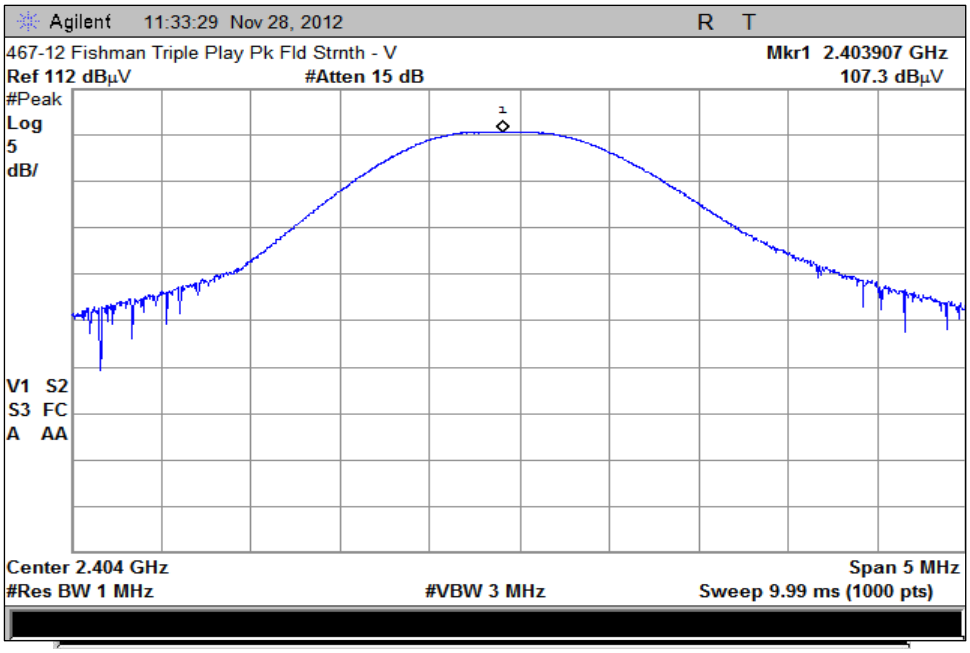
Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operated within the 2400 – 2483.5 MHz frequency band shall comply with the following requirement: 50 millivolts/meter (94 dBµV/m) average mode measurement, (114 dBµV/m) peak mode measurement.

Result: Compliant.

| Frequency (MHz) | Amplitude[1] (dBµV/m) at 3 Meters | | Limit (dBµV/m) at 3 Meters | | Margin (dBµV/m) at 3 Meters | | Ant Polarity | Ant Height | Turntable Azimuth | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| | Peak | Average | Peak | Average | Peak | Average | H/V | cm | Deg | |
| 2404.0 | 107.30 | 80.94 | 114.00 | 94.00 | -6.70 | -13.06 | V | 108 | 265 | Compliant |
| 2441.0 | 108.50 | 81.98 | 114.00 | 94.00 | -5.50 | -12.02 | V | 129 | 265 | Compliant |
| 2480.0 | 111.60 | 85.82 | 114.00 | 94.00 | -2.40 | -8.18 | V | 102 | 260 | Compliant |

[1] All correction factors are included in measurement values

### 6.2.1. Radiated Field Strength of Fundamental – Low Channel, Peak



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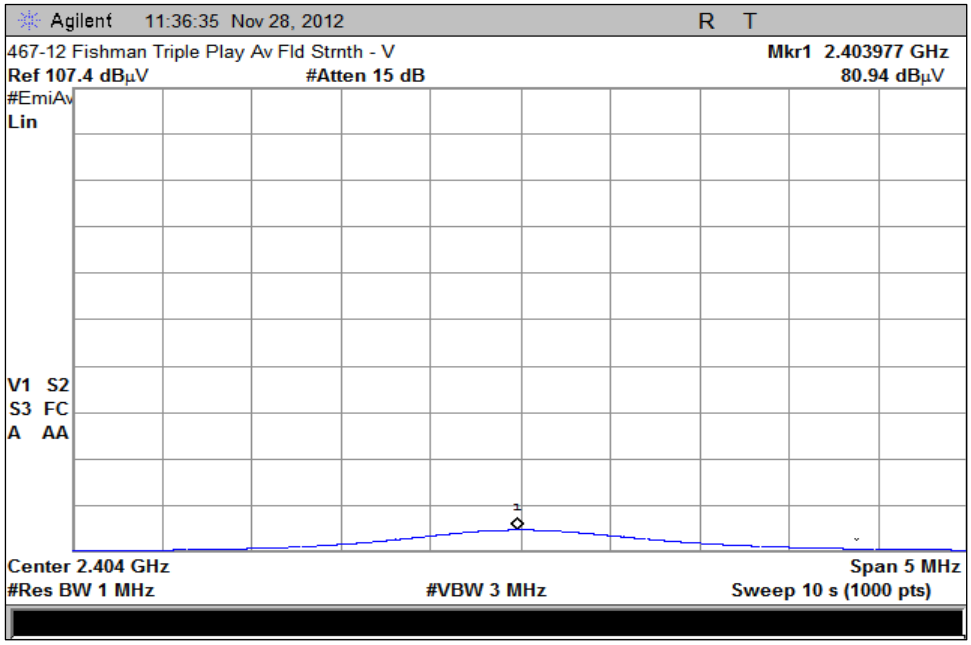
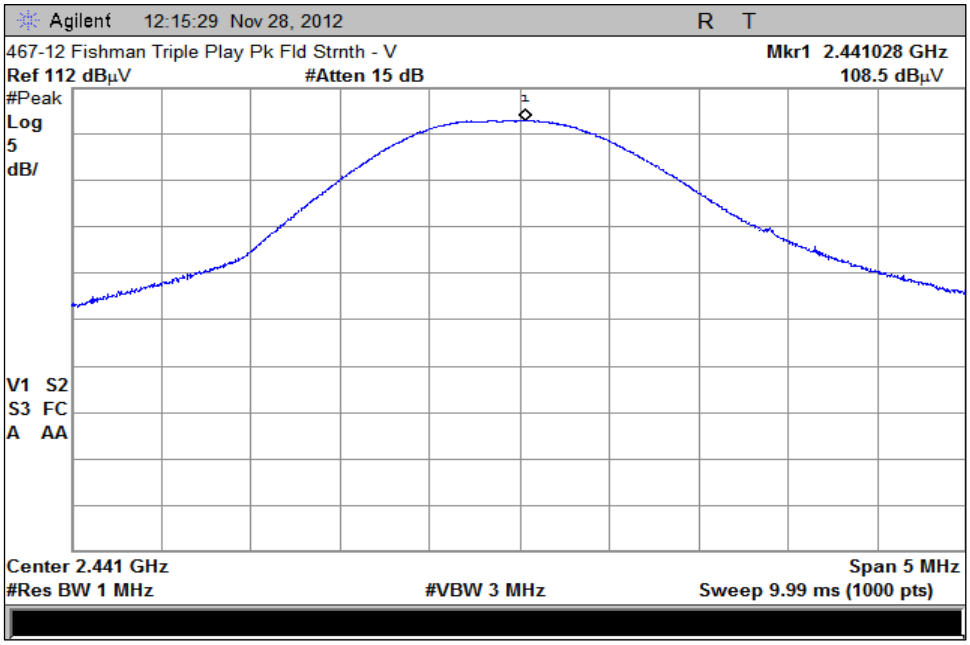
## 6. Measurement Data (continued)

### 6.2. Radiated Field Strength of Fundamental (15.249, Section (a)), IC RSS-210 A2.9

#### 6.2.2. Radiated Field Strength of Fundamental – Low Channel, Average




#### 6.2.3. Radiated Field Strength of Fundamental – Middle Channel, Peak



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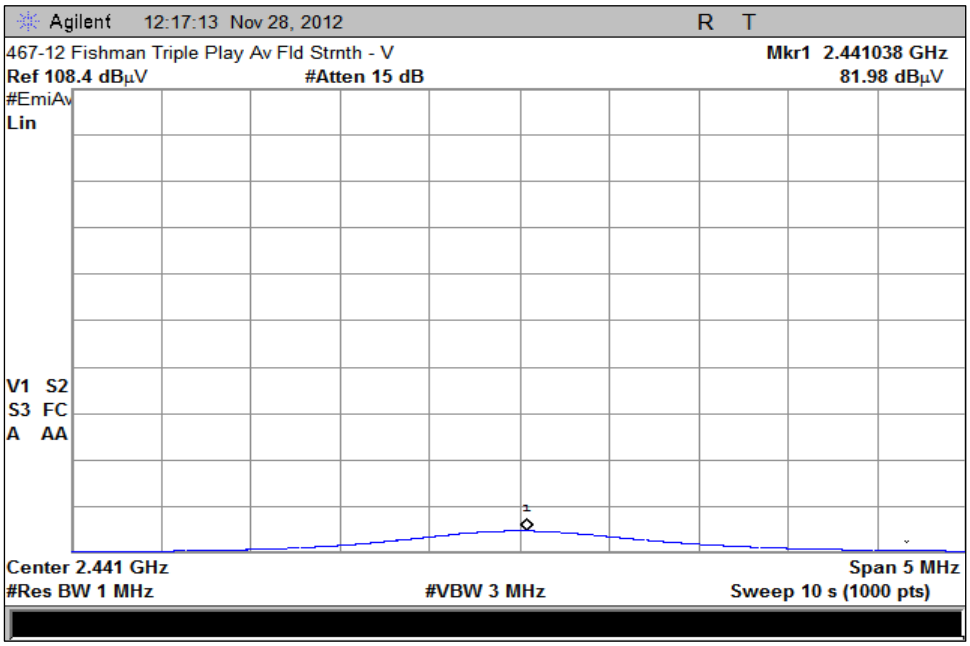
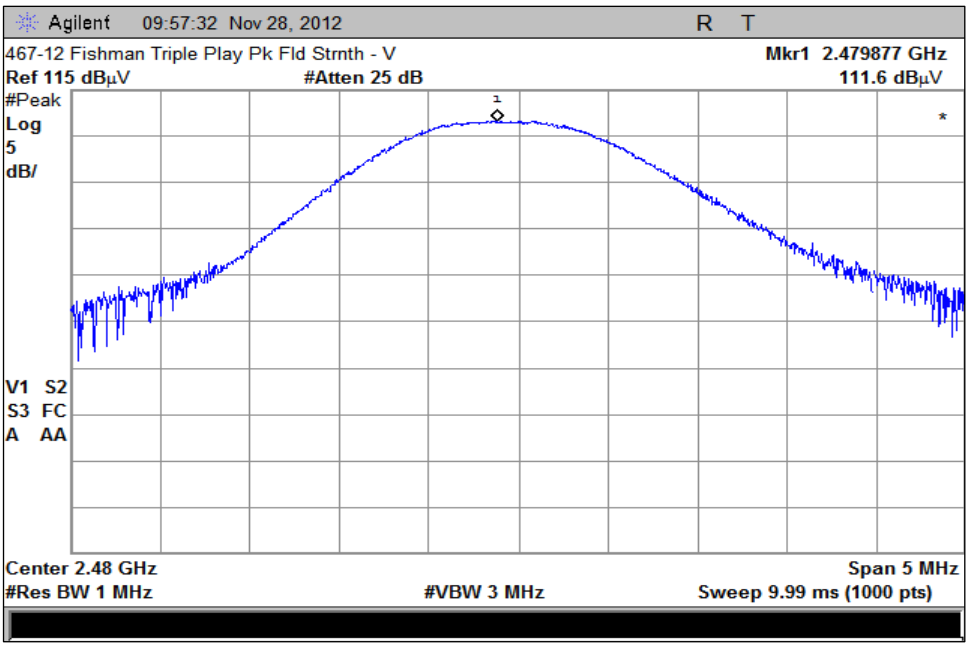
## 6. Measurement Data (continued)

### 6.2. Radiated Field Strength of Fundamental (15.249, Section (a)), IC RSS-210 A2.9

6.2.4. Radiated Field Strength of Fundamental – Middle Channel, Average




6.2.5. Radiated Field Strength of Fundamental – High Channel, Peak



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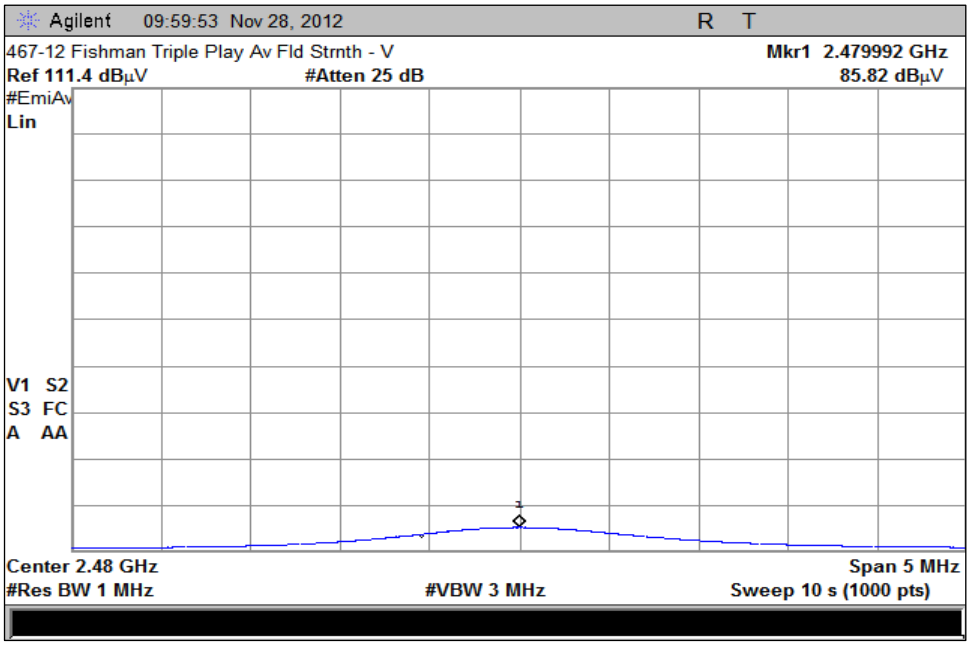
## 6. Measurement Data (continued)

### 6.2. Radiated Field Strength of Fundamental (15.249, Section (a)), IC RSS-210 A2.9

6.2.6. Radiated Field Strength of Fundamental – High Channel, Average



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## 6. Measurement Data (continued)

### 6.3. Radiated Field Strength of Harmonics (15.249, Section (a)), IC RSS-210 A2.9

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operated within the 2400 to 2483.5 MHz frequency bands shall comply with the following: 500 microvolts/meter (54 dBµV/m), average mode measurement. Peak field strength may not be greater than 20 dB above the average limit (74 dBµV/m).

Result: Compliant

Test Note: The harmonic emissions detailed in this section represent the combined worst case emissions of the low, middle and high operating frequencies. Each tabled emission represents the worst case polarity for the specific harmonic frequency. All correction factors are included in the field strength values.

| Frequency (MHz) | Field Strength (dBµV/m) | | Limit (dBµV/m) | | Margin (dB) | | Antenna Polarity (H/V) |
|---|---|---|---|---|---|---|---|
| | Peak | Average | Peak | Average | Peak | Average | |
| 4808 | 53.28 | 35.03 | 74.00 | 54.00 | -20.72 | -18.97 | V |
| 4882 | 54.95 | 36.37 | 74.00 | 54.00 | -19.05 | -17.63 | V |
| 4960 | 58.42 | 38.04 | 74.00 | 54.00 | -15.58 | -15.96 | V |
| 7212 | 55.54 | 43.42 | 74.00 | 54.00 | -18.46 | -10.58 | V |
| 7323 | 56.51 | 40.43 | 74.00 | 54.00 | -17.49 | -13.57 | V |
| 7440 | 59.76 | 41.08 | 74.00 | 54.00 | -14.24 | -12.92 | V |
| 9616 | 55.64 | 40.89 | 74.00 | 54.00 | -18.36 | -13.11 | V |
| 9764 | 58.68 | 42.60 | 74.00 | 54.00 | -15.32 | -11.40 | V |
| 9920 | 61.37 | 43.63 | 74.00 | 54.00 | -12.63 | -10.37 | V |
| 12020 | 56.77 | 44.10 | 74.00 | 54.00 | -17.23 | -9.90 | H |
| 12205 | 57.08 | 43.99 | 74.00 | 54.00 | -16.92 | -10.01 | H |
| 12400 | 58.07 | 44.54 | 74.00 | 54.00 | -15.93 | -9.46 | H |
| 14424 | 61.12 | 47.99 | 74.00 | 54.00 | -12.88 | -6.01 | H |
| 14646 | 60.92 | 48.13 | 74.00 | 54.00 | 53.09 | -5.87 | H |
| 14880 | 60.92 | 47.15 | 74.00 | 54.00 | -13.08 | -6.85 | H |
| 16828 | 63.90 | 50.96 | 74.00 | 54.00 | -10.10 | -3.04 | H |
| 17087 | 56.02 | 43.43 | 74.00 | 54.00 | -17.98 | -10.57 | V |
| 17360 | 58.63 | 45.44 | 74.00 | 54.00 | -15.37 | -8.56 | H |
| 19232 | 57.93 | 45.40 | 74.00 | 54.00 | -16.07 | -8.60 | V |
| 19528 | 58.51 | 44.47 | 74.00 | 54.00 | -15.49 | -9.53 | V |
| 19840 | 56.94 | 44.44 | 74.00 | 54.00 | -17.06 | -9.56 | H |
| 21636 | 59.98 | 45.48 | 74.00 | 54.00 | -14.02 | -8.52 | V |
| 21969 | 58.15 | 45.52 | 74.00 | 54.00 | -15.85 | -8.48 | H |
| 22320 | 58.19 | 44.63 | 74.00 | 54.00 | -15.81 | -9.37 | V |
| 24040 | 59.24 | 46.04 | 74.00 | 54.00 | -14.76 | -7.96 | H |
| 24410 | 60.54 | 46.62 | 74.00 | 54.00 | -13.46 | -7.38 | H |
| 24800 | 58.45 | 45.76 | 74.00 | 54.00 | -15.55 | -8.24 | H |



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# 6. Measurement Data (continued)

## 6.4. Band Edge Measurements

Requirement: Emissions radiated outside of the specified frequency band of 2400 to 2483.5 MHz, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test Note: For the band edge measurements, the procedure detailed in the FCC Office of Engineering and Technology (FCC OET) Publication Number 913591 was used in determining the measurement results.

Measurement Results – Lower Band Edge and Out of Band (OOB)

FCC OET Publication Number KDB 913591 Calculator

| Lowest Channel Frequency (MHz) | Lowest Channel Field Strength (dBµV/m) | | Band Edge & W/C Out of Band Calculator | | Corrected Band Edge & Worst Case Out of Band (dBµV/m) | |
|---|---|---|---|---|---|---|
| | Peak[1] | Average[1] | Freq. (MHz) | 100 kHz BW Offset (dB)[2] | Peak | Average |
| 2404 | 107.30 | 80.94 | 2400 | 40.83 | 66.47 | 40.11 |
| | | | 2363.88 | 40.76 | 66.54 | 40.18 |

Lower Band Edge Measurement Data

| Lowest Channel Frequency | Field Strength (dBµV/m) | | Band Edge & OOB Frequency | Field Strength (dBµV/m) | | Limit (dBµV/m) | | Margin (dB) | | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| (MHz) | Peak | Average | (MHz) | Peak | Average | Peak | Average | Peak | Average | |
| 2404 | 107.30 | 80.94 | 2400 | 66.47 | 40.11 | 74 | 54 | -7.53 | -13.89 | Compliant |
| | | | 2363.88 | 66.54 | 40.18 | 74 | 54 | -7.46 | -13.82 | Compliant |

Measurement Results – Upper Band Edge and Out of Band (OOB)

FCC OET Publication Number KDB 913591 Calculator

| Highest Channel Frequency (MHz) | Highest Channel Field Strength (dBµV/m) | | Band Edge & W/C Out of Band Calculator | | Corrected Band Edge & Worst Case Out of Band (dBµV/m) | |
|---|---|---|---|---|---|---|
| | Peak[1] | Average[1] | Freq. (MHz) | 100 kHz BW Offset (dB)[2] | Peak | Average |
| 2480 | 111.60 | 85.82 | 2483.5 | 40.75 | 70.85 | 45.07 |
| | | | 2363.88 | 39.79 | 71.81 | 46.03 |

Upper Band Edge Measurement Data

| Highest Channel Frequency | Field Strength (dBµV/m) | | Band Edge & OOB Frequency | Field Strength (dBµV/m) | | Limit (dBµV/m) | | Margin (dB) | | Result |
|---|---|---|---|---|---|---|---|---|---|---|
| (MHz) | Peak | Average | (MHz) | Peak | Average | Peak | Average | Peak | Average | |
| 2480 | 111.60 | 85.82 | 2483.5 | 70.85 | 45.07 | 74 | 54 | -3.15 | -8.93 | Compliant |
| | | | 2483.689 | 71.81 | 46.03 | 74 | 54 | -2.19 | -7.97 | Compliant |

Notes: 1 – Taken from the table in section 6.2
2 – Delta values from plot in 6.4
Delta values are subtracted from the peak & average values



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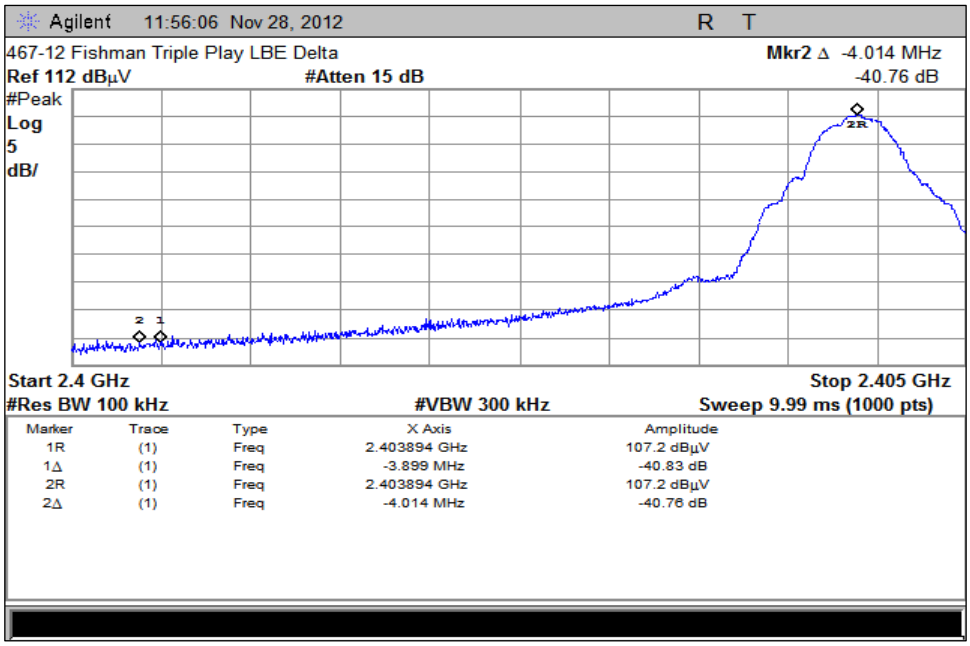
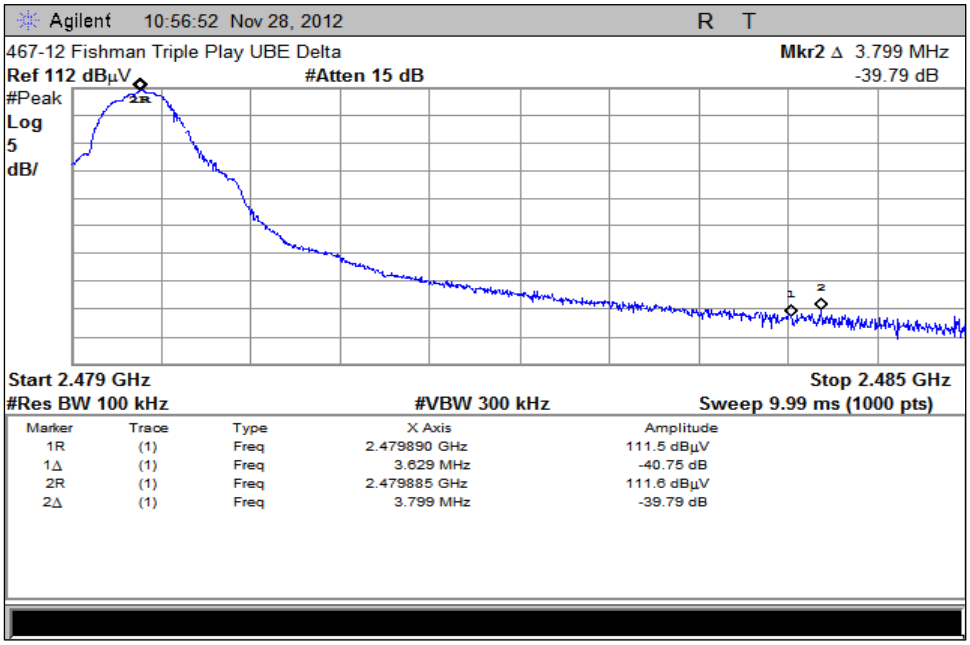
# 6. Measurement Data (continued)

## 6.4. Band Edge Measurements (continued)

### 6.4.1. Lower Band Edge Measurement Offset




### 6.4.2. Upper Band Edge Measurement Offset



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## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions, 30 MHz to EUT 10th Harmonic (15.249, Section (d)), IC RSS-GEN

Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

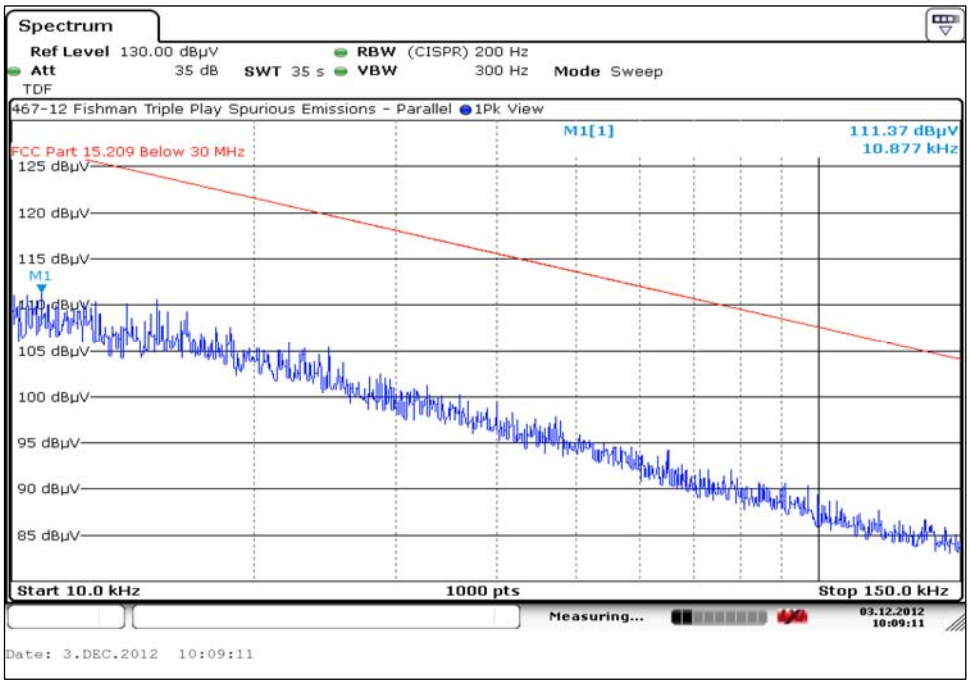
Test Note: The spurious emissions detailed in this section represent the combined worst case emissions of the low, middle and high operating frequencies.

Regulatory Limit: FCC Part 209, Quasi-Peak & Average

| Frequency Range (MHz) | Distance (Meters) | Limit (dBµV/m) |
|---|---|---|
| 0.009 to 0.490 | 3 | 108.5 to 73.8 |
| 0.490 to 1.705 | 3 | 73.8 to 62.9 |
| 1.705 to 30 | 3 | 69.5 |
| 30 to 88 | 3 | 40.0 |
| 88 to 216 | 3 | 43.5 |
| 216 to 960 | 3 | 46.0 |
| Above 960 | 3 | 54.0 |

#### 6.5.1. Spurious Radiated Emissions (10 kHz to 150 kHz) Test Results

##### 6.5.1.1. Measurement Results – Parallel



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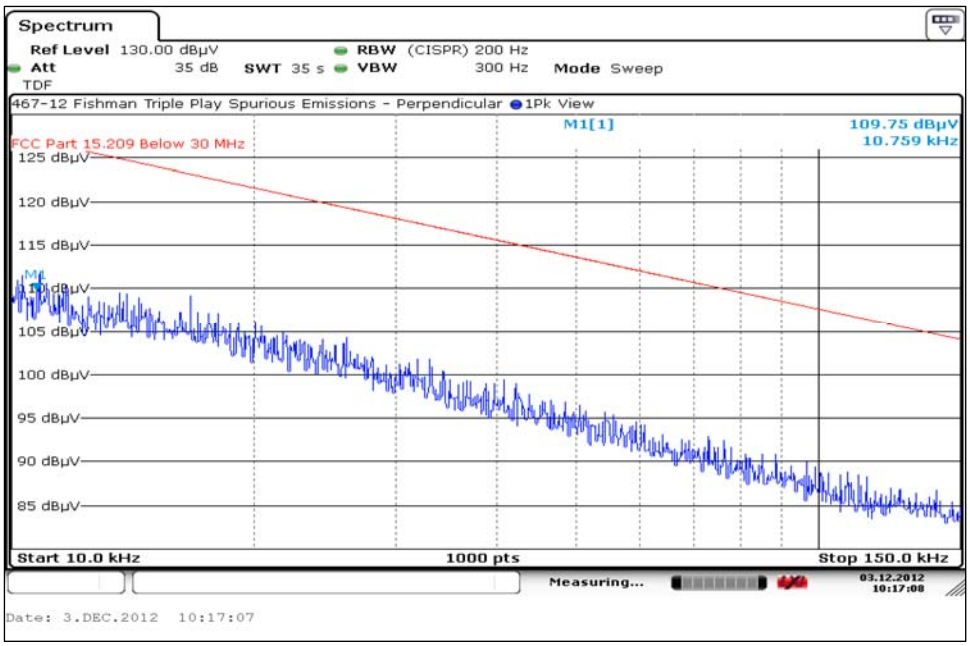
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (18 MHz to 10 GHz) (continued)

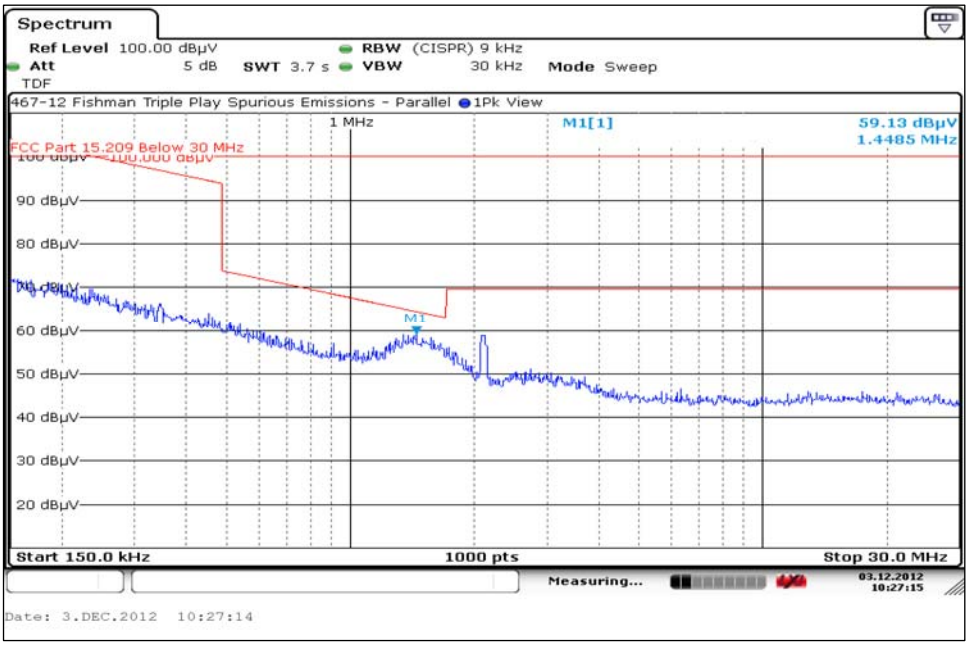
6.5.1. Spurious Radiated Emissions (10 kHz to 150 kHz) Test Results

6.5.1.2. Measurement Results – Perpendicular




6.5.2. Spurious Radiated Emissions (150 kHz to 30 MHz) Test Results

6.5.2.1. Measurement Results – Parallel



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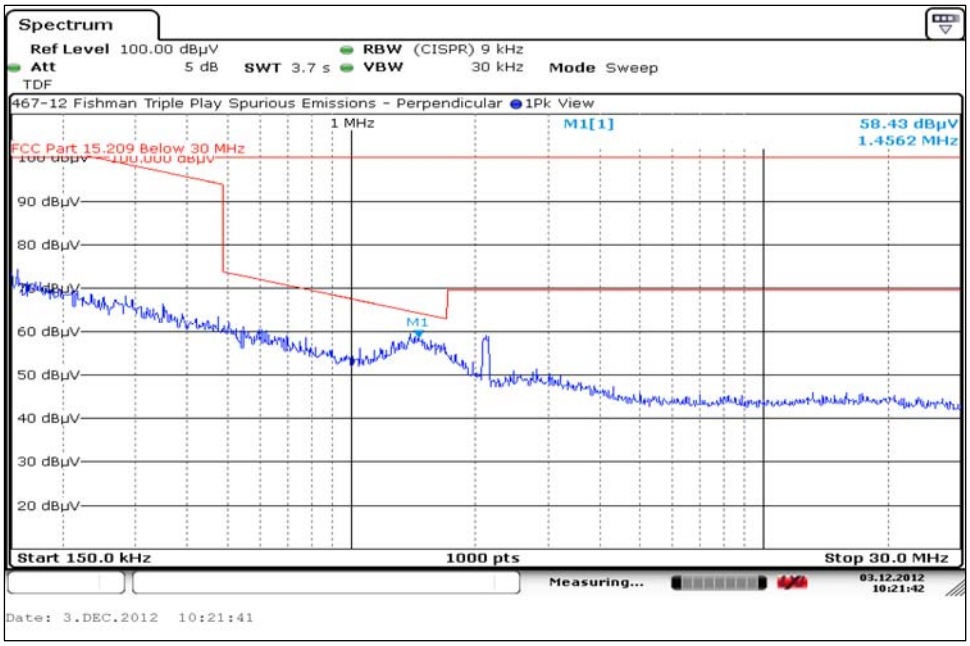
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (18 MHz to 10 GHz) (continued)

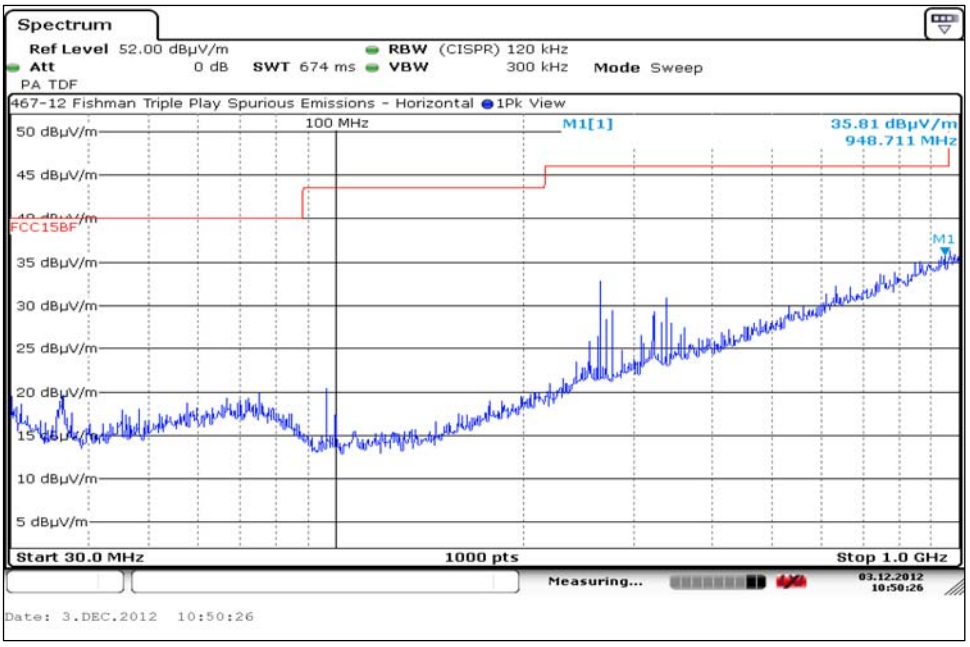
6.5.2. Spurious Radiated Emissions (150 kHz to 30 MHz) Test Results

6.5.2.2. Measurement Results – Perpendicular




6.5.3. Spurious Radiated Emissions (30 MHz to 1 GHz) Test Results

6.5.3.1. Measurement Results – Horizontal



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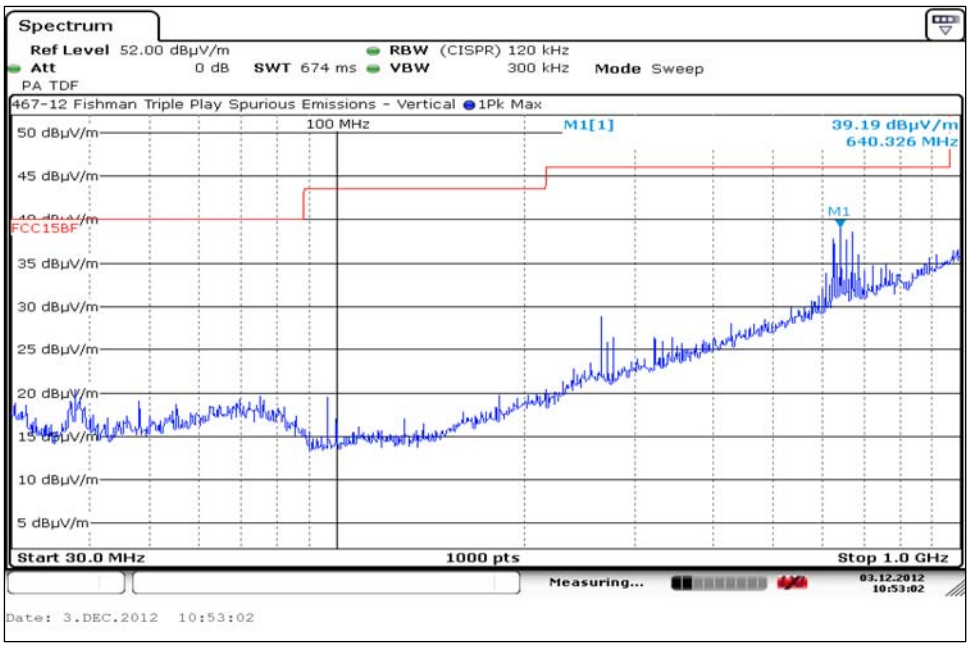
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (18 MHz to 10 GHz) (continued)

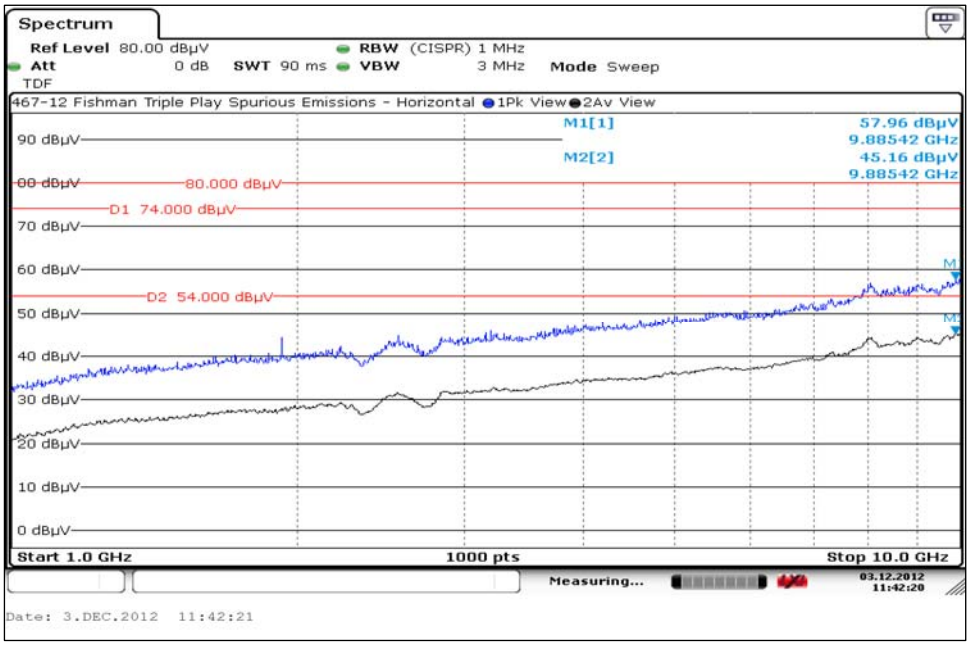
6.5.3. Spurious Radiated Emissions (30 MHz to 1 GHz) Test Results

6.5.3.2. Measurement Results – Vertical




6.5.4. Spurious Radiated Emissions (1 GHz to 10 GHz) Test Results

6.5.4.1. Measurement Results – Horizontal



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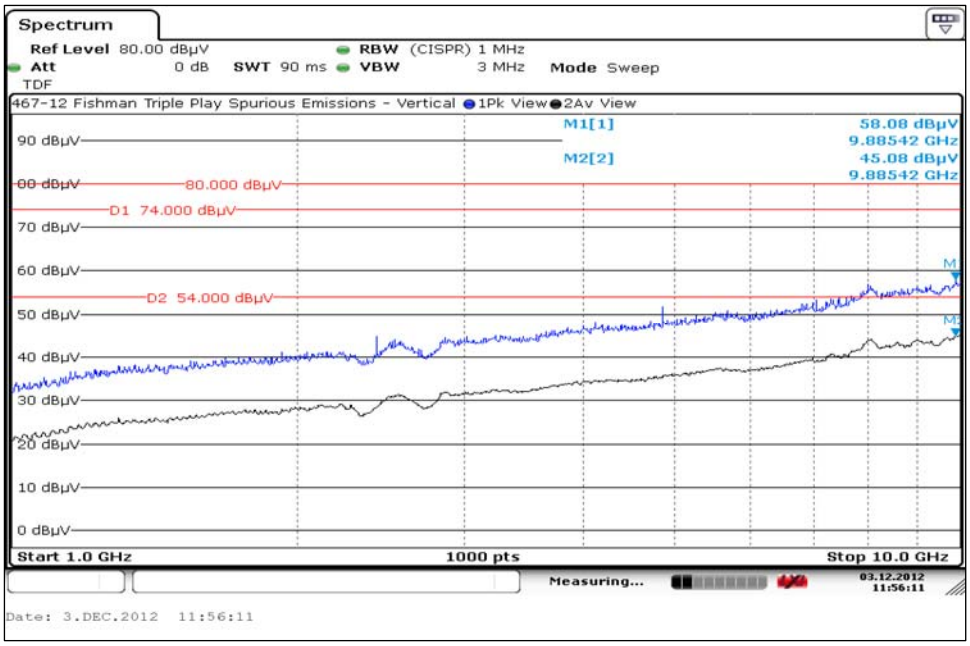
# 6. Measurement Data (continued)

## 6.5. Spurious Radiated Emissions (18 MHz to 10 GHz) (continued)

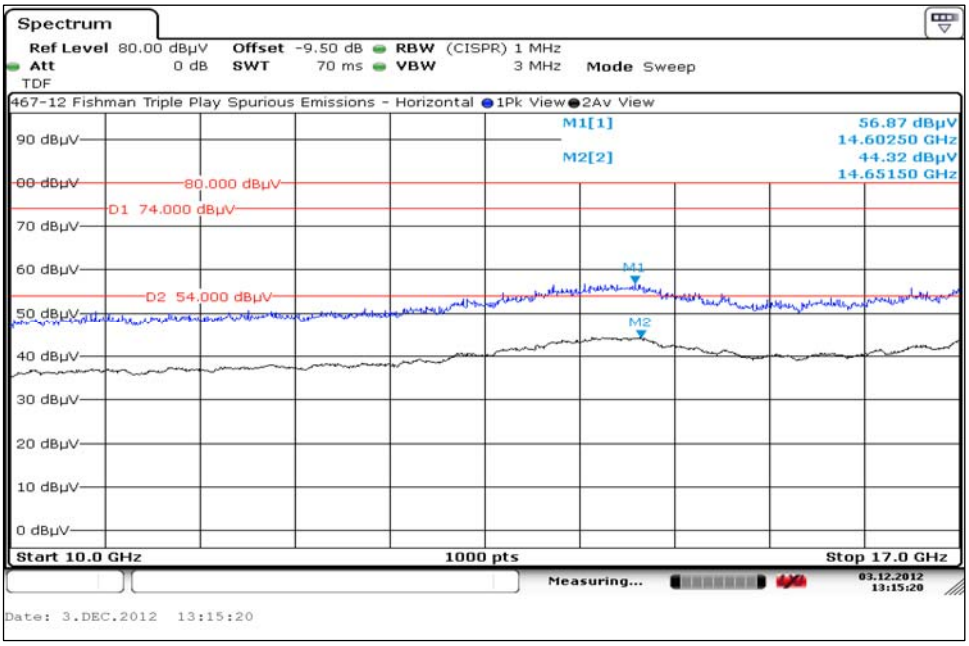
### 6.5.4. Spurious Radiated Emissions (1 GHz to 10 GHz) Test Results

#### 6.5.4.2. Measurement Results – Vertical




### 6.5.5. Spurious Radiated Emissions (10 GHz to 17 GHz) Test Results

#### 6.5.5.1. Measurement Results – Horizontal



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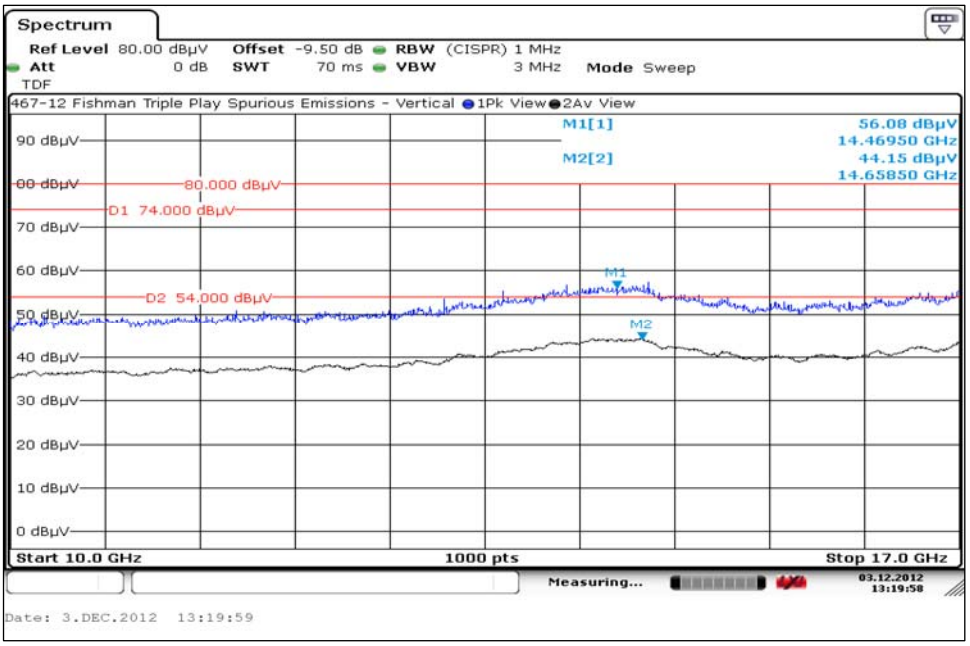
# 6. Measurement Data (continued)

## 6.5. Spurious Radiated Emissions (18 MHz to 10 GHz) (continued)

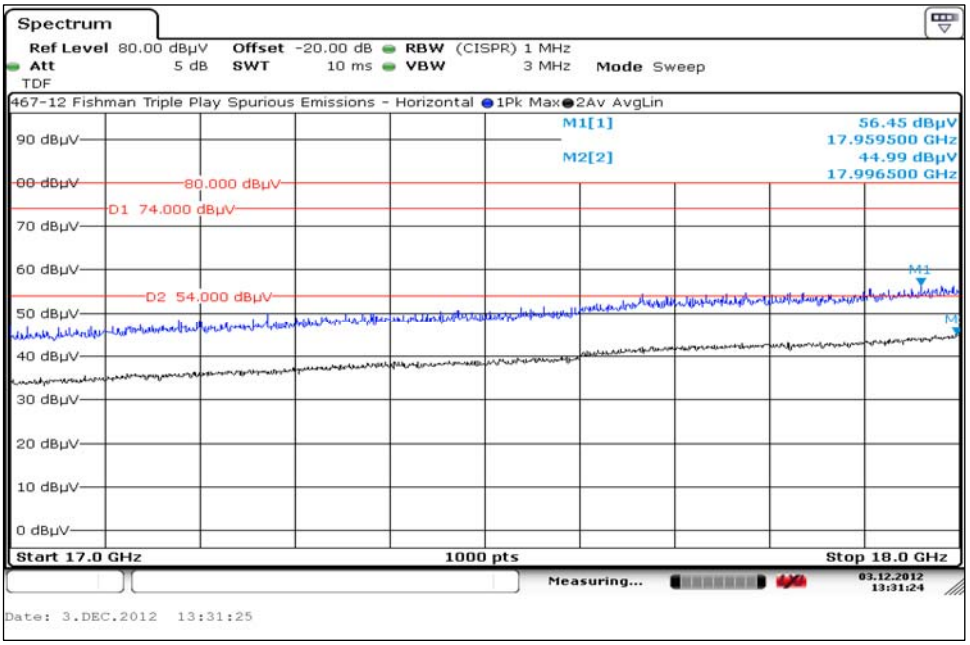
### 6.5.5. Spurious Radiated Emissions (10 GHz to 17 GHz) Test Results

#### 6.5.5.2. Measurement Results – Vertical




### 6.5.6. Spurious Radiated Emissions (17 GHz to 18 GHz) Test Results

#### 6.5.6.1. Measurement Results – Horizontal



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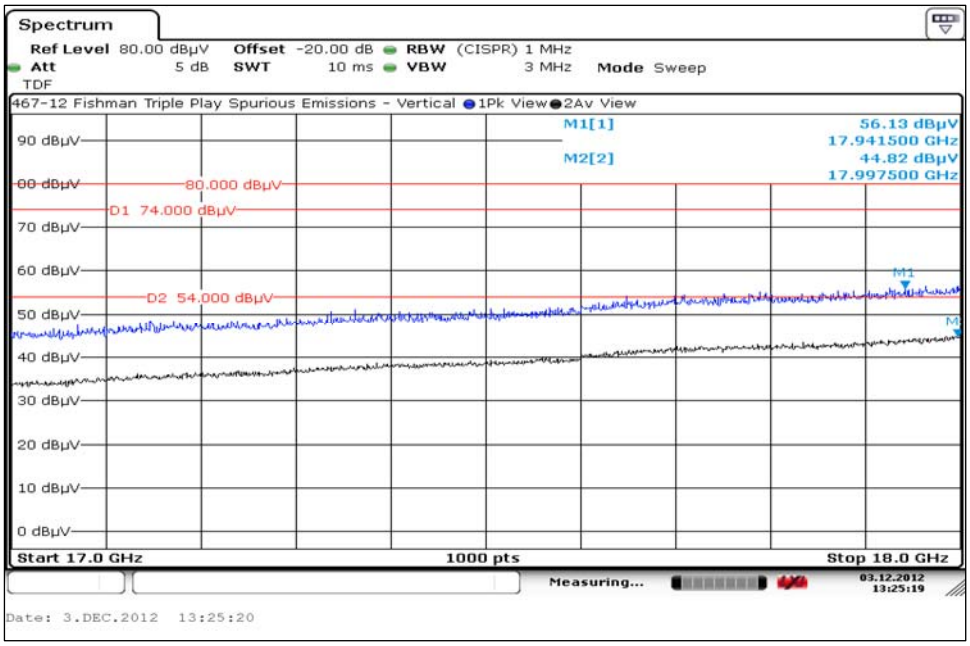
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (18 MHz to 10 GHz) (continued)

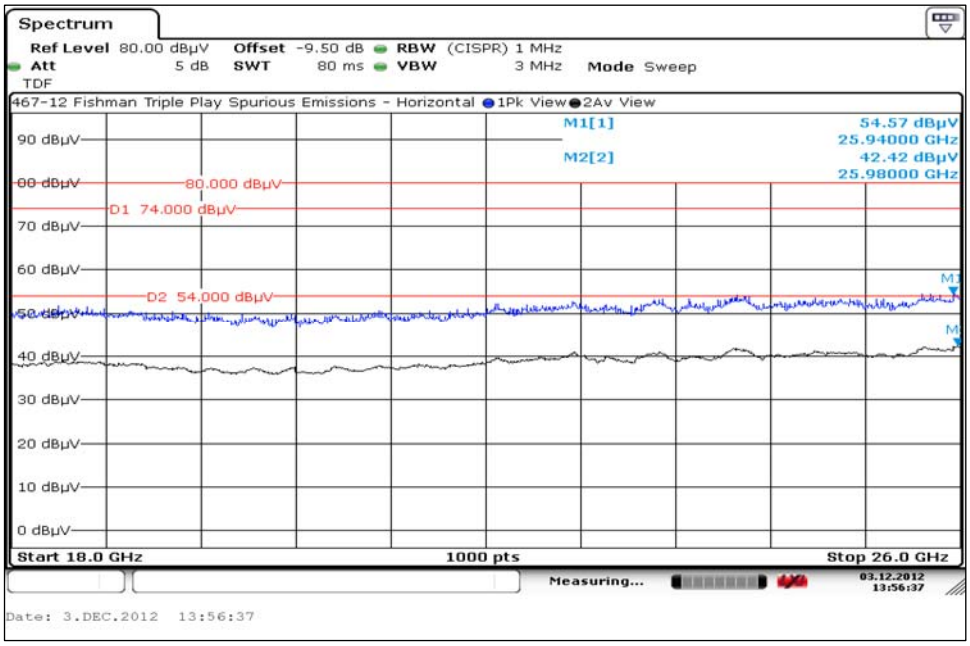
6.5.6. Spurious Radiated Emissions (17 GHz to 18 GHz) Test Results

6.5.6.2. Measurement Results – Vertical




6.5.7. Spurious Radiated Emissions (18 GHz to 26 GHz) Test Results

6.5.7.1. Measurement Results – Horizontal



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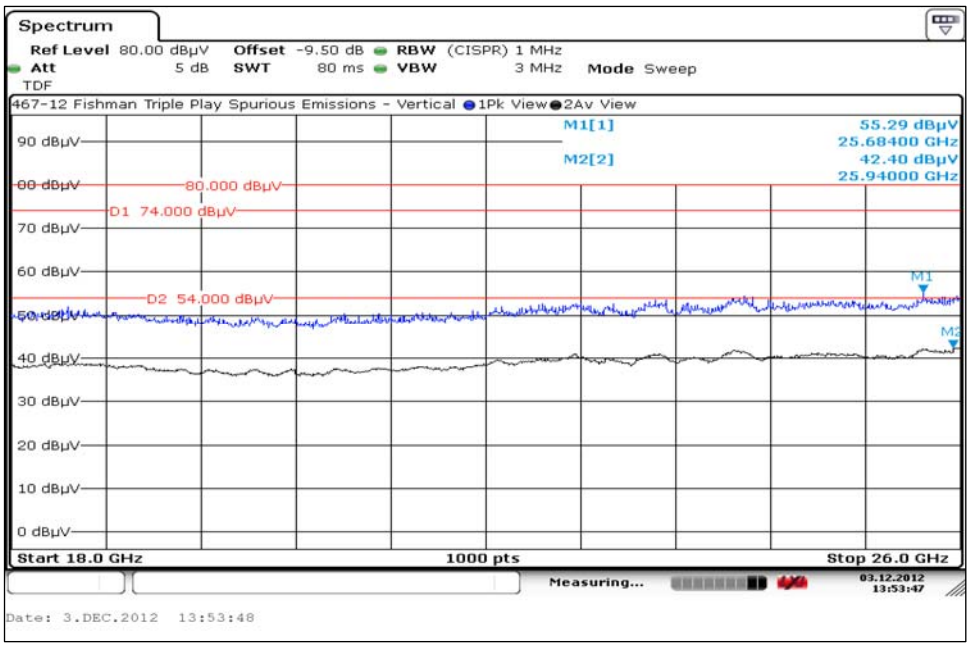
## 6. Measurement Data (continued)

### 6.5. Spurious Radiated Emissions (18 MHz to 10 GHz) (continued)

6.5.7. Spurious Radiated Emissions (18 GHz to 26 GHz) Test Results

6.5.7.2. Measurement Results – Vertical



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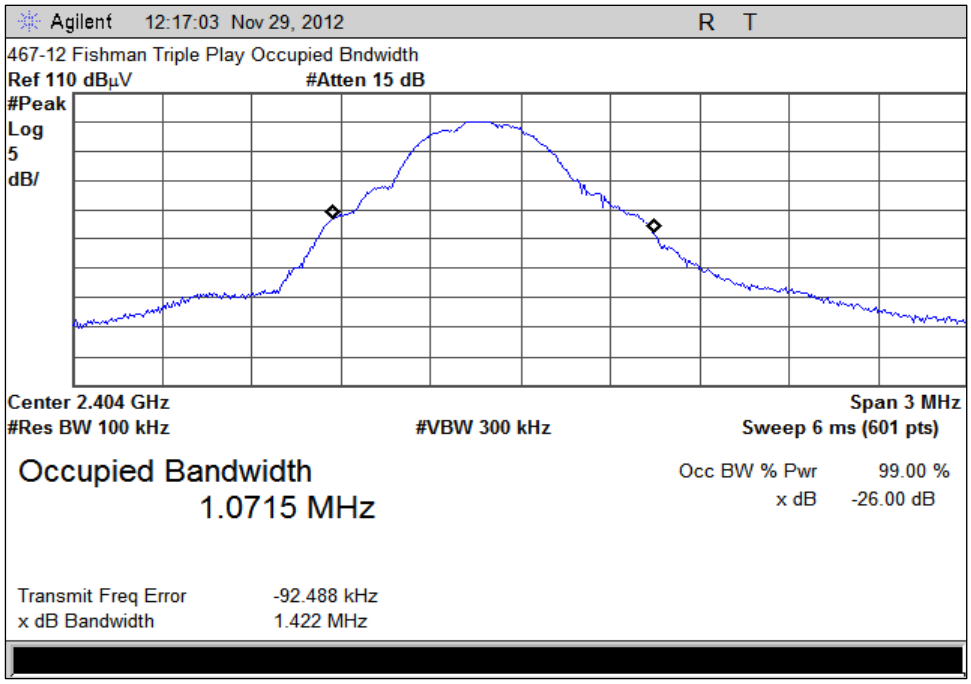
## 6. Measurement Data (continued)

### 6.6 Occupied Bandwidth (ANSI C63.4, Section 13.1.7 & IC RSS-GEN)

Requirement: The occupied bandwidth measurements on an intentional radiator shall be made in accordance with the requirements outlined in ANSI C63.4-2003, Section 13.1.7. If no bandwidth requirement is specified by the procuring or regulatory agency, measure the bandwidth at –26 dB with respect to the reference level.

| Channel | Frequency (MHz) | -26 dB Bandwidth (MHz) | 99% Power Bandwidth (MHz) | Result |
|---|---|---|---|---|
| Low | 2404 | 1.4220 | 1.0715 | Compliant |
| Middle | 2441 | 1.4020 | 1.0711 | Compliant |
| High | 2480 | 1.4100 | 1.0639 | Compliant |

6.6.1. Occupied Bandwidth – Low Frequency



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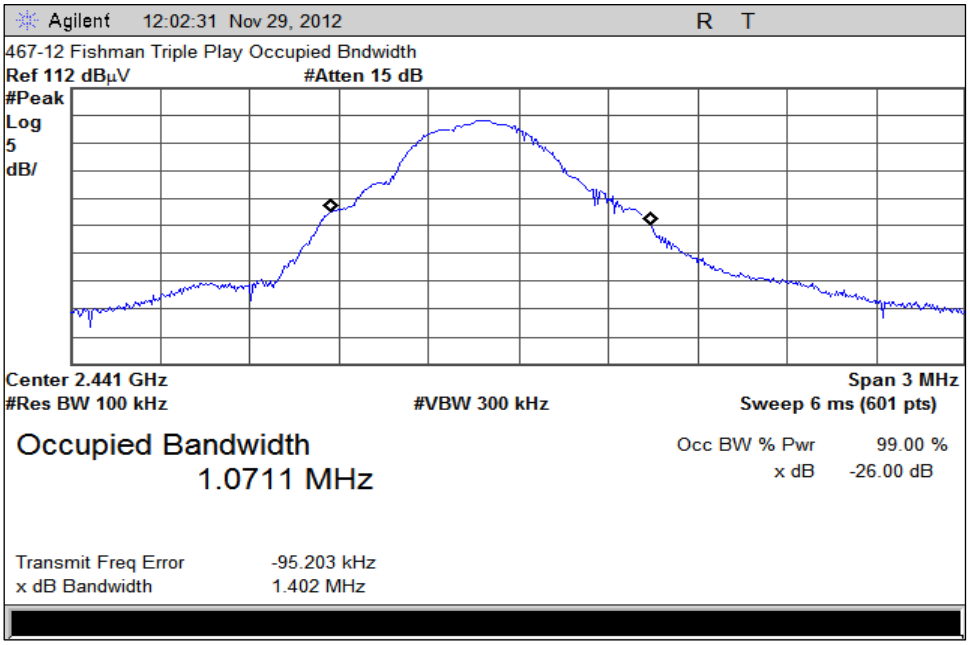
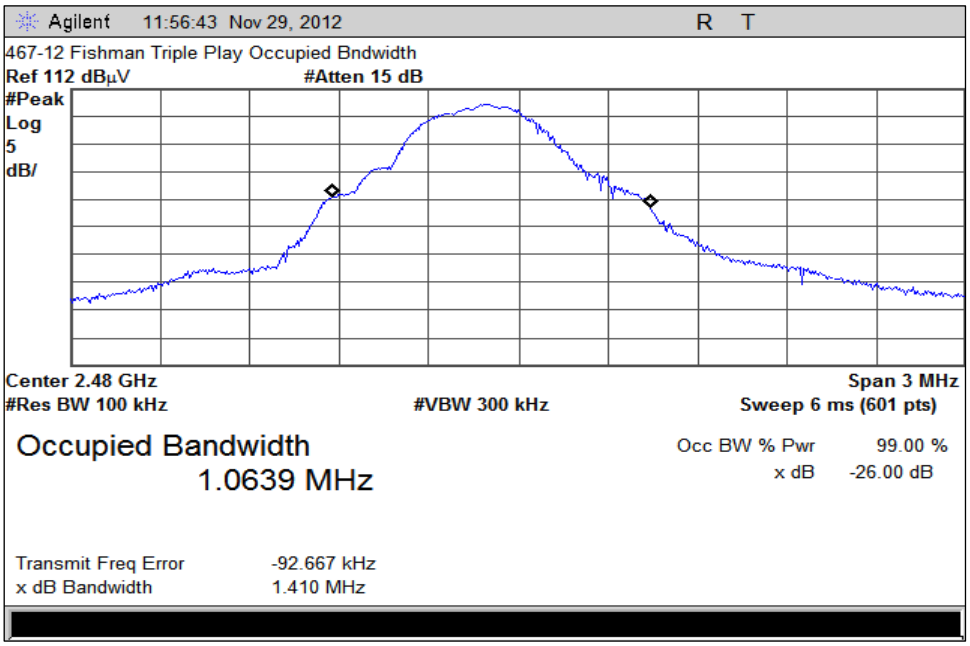
## 6. Measurement Data (continued)

### 6.6 Occupied Bandwidth (ANSI C63.4, Section 13.1.7) (continued)

6.6.2. Occupied Bandwidth – Middle Frequency




6.6.3. Occupied Bandwidth – High Frequency



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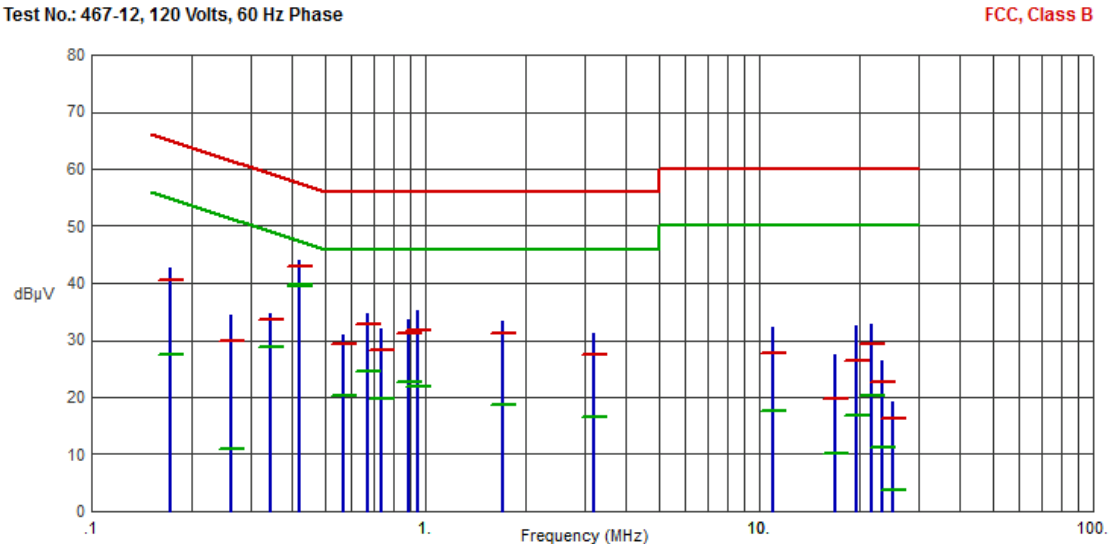
## 6. Measurement Data (continued)

### 6.7. Conducted Emissions (15.207)

6.7.1. 120 Volts, 60 Hz Phase




| Frequency (MHz) | Pk Amp (dBµV) | QP Amp (dBµV) | QP Limit (dBµV) | QP Margin (dB) | Avg Amp (dBµV) | Avg Limit (dBµV) | Avg Margin (dB) | Comments |
|---|---|---|---|---|---|---|---|---|
| .1726 | 42.55 | 40.59 | 64.83 | -24.24 | 27.35 | 54.83 | -27.48 | |
| .2613 | 34.52 | 29.84 | 61.39 | -31.55 | 10.86 | 51.39 | -40.53 | |
| .3448 | 34.77 | 33.63 | 59.09 | -25.46 | 28.72 | 49.09 | -20.37 | |
| .4181 | 43.96 | 42.97 | 57.49 | -14.52 | 39.60 | 47.49 | -7.89 | |
| .4188 | 43.91 | 43.04 | 57.47 | -14.43 | 39.62 | 47.47 | -7.85 | |
| .5670 | 30.87 | 29.33 | 56.00 | -26.67 | 20.35 | 46.00 | -25.65 | |
| .6687 | 34.79 | 32.91 | 56.00 | -23.09 | 24.58 | 46.00 | -21.42 | |
| .7369 | 31.91 | 28.25 | 56.00 | -27.75 | 19.76 | 46.00 | -26.24 | |
| .8901 | 33.47 | 31.29 | 56.00 | -24.71 | 22.65 | 46.00 | -23.35 | |
| .9478 | 35.21 | 31.84 | 56.00 | -24.16 | 21.94 | 46.00 | -24.06 | |
| 1.7083 | 33.33 | 31.08 | 56.00 | -24.92 | 18.66 | 46.00 | -27.34 | |
| 3.1928 | 31.28 | 27.43 | 56.00 | -28.57 | 16.54 | 46.00 | -29.46 | |
| 10.9320 | 32.26 | 27.81 | 60.00 | -32.19 | 17.49 | 50.00 | -32.51 | |
| 16.8423 | 27.53 | 19.60 | 60.00 | -40.40 | 10.18 | 50.00 | -39.82 | |
| 19.5242 | 32.40 | 26.27 | 60.00 | -33.73 | 16.92 | 50.00 | -33.08 | |
| 21.6501 | 32.82 | 29.46 | 60.00 | -30.54 | 20.36 | 50.00 | -29.64 | |
| 23.2590 | 26.38 | 22.75 | 60.00 | -37.25 | 11.30 | 50.00 | -38.70 | |
| 25.0228 | 19.18 | 16.31 | 60.00 | -43.69 | 3.80 | 50.00 | -46.20 | |



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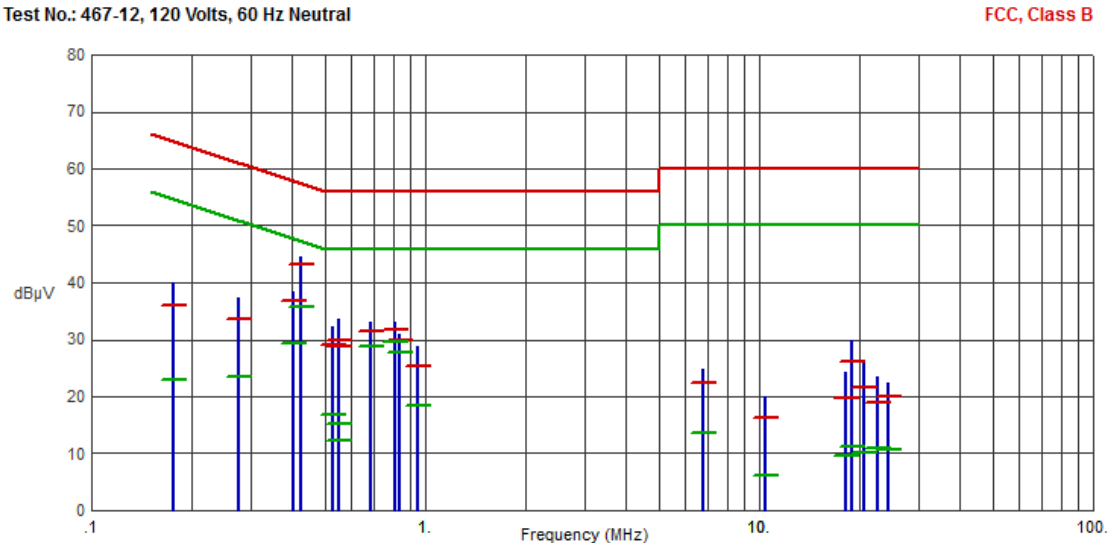
## 6. Measurement Data (continued)

### 6.7. Conducted Emissions (15.207)

6.7.2. 120 Volts, 60 Hz Neutral




| Frequency (MHz) | Pk Amp (dBµV) | QP Amp (dBµV) | QP Limit (dBµV) | QP Margin (dB) | Avg Amp (dBµV) | Avg Limit (dBµV) | Avg Margin (dB) | Comments |
|---|---|---|---|---|---|---|---|---|
| .1755 | 40.05 | 36.06 | 64.70 | -28.64 | 22.88 | 54.70 | -31.82 | |
| .2754 | 37.22 | 33.55 | 60.95 | -27.40 | 23.43 | 50.95 | -27.52 | |
| .4010 | 38.46 | 36.70 | 57.83 | -21.13 | 29.30 | 47.83 | -18.53 | |
| .4252 | 44.44 | 43.10 | 57.35 | -14.25 | 35.66 | 47.35 | -11.69 | |
| .5265 | 32.18 | 28.98 | 56.00 | -27.02 | 16.71 | 46.00 | -29.29 | |
| .5509 | 32.95 | 29.74 | 56.00 | -26.26 | 15.08 | 46.00 | -30.92 | |
| .5512 | 33.47 | 28.92 | 56.00 | -27.08 | 12.15 | 46.00 | -33.85 | |
| .6864 | 33.04 | 31.55 | 56.00 | -24.45 | 28.78 | 46.00 | -17.22 | |
| .8080 | 32.95 | 31.85 | 56.00 | -24.15 | 29.58 | 46.00 | -16.42 | |
| .8332 | 31.01 | 29.88 | 56.00 | -26.12 | 27.74 | 46.00 | -18.26 | |
| .9520 | 28.70 | 25.42 | 56.00 | -30.58 | 18.40 | 46.00 | -27.60 | |
| 6.7883 | 24.92 | 22.35 | 60.00 | -37.65 | 13.72 | 50.00 | -36.28 | |
| 10.3940 | 19.93 | 16.14 | 60.00 | -43.86 | 6.19 | 50.00 | -43.81 | |
| 18.1192 | 24.19 | 19.78 | 60.00 | -40.22 | 9.58 | 50.00 | -40.42 | |
| 18.8939 | 29.84 | 26.04 | 60.00 | -33.96 | 11.29 | 50.00 | -38.71 | |
| 20.5426 | 26.24 | 21.56 | 60.00 | -38.44 | 10.19 | 50.00 | -39.81 | |
| 22.5869 | 23.36 | 19.06 | 60.00 | -40.94 | 10.95 | 50.00 | -39.05 | |
| 24.3500 | 22.49 | 19.88 | 60.00 | -40.12 | 10.79 | 50.00 | -39.21 | |



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## 7. Test Setup Photographs

7.1. Radiated Emissions Front View



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## 7. Test Setup Photographs

7.2 Radiated Emissions Rear View



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## 7. Test Setup Photographs

7.3. Conducted Emissions Front View



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## 7. Test Setup Photographs

7.4. Conducted Emissions Rear View



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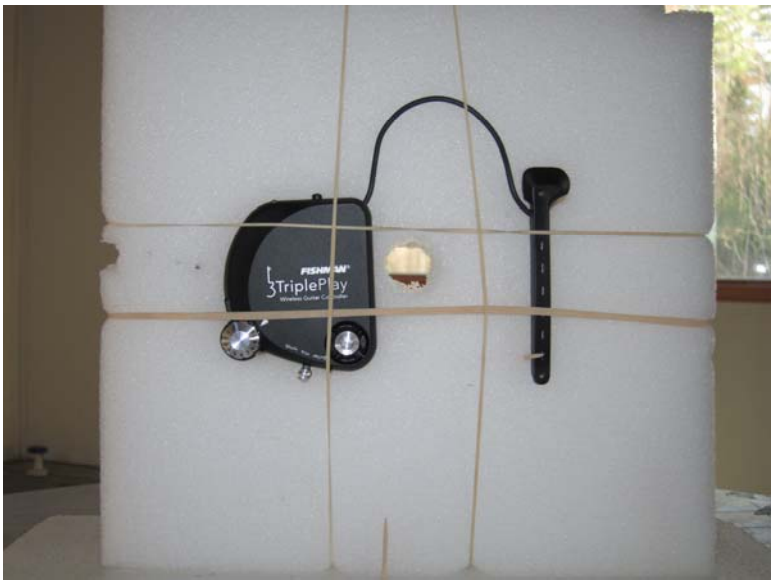
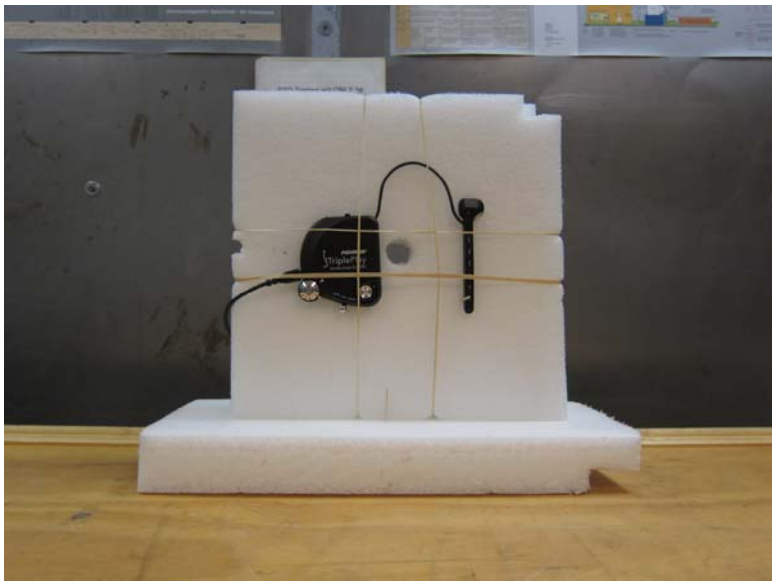
## 7. Test Setup Photographs

7.5. Product Test Setup – Radiated Emissions




7.6. Product Test Setup – Conducted Emissions





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## 8. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC), Industry Canada, and Voluntary Control Council Interference (VCCI) standards. A description of the test sites is on file with the FCC (registration number 96392), Industry Canada (file number IC 3023A-1), and VCCI (Member number 3168), Registration numbers C-3673, G-167, R-3305 & T-1809.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 22, Chinese-Taipei (Taiwan) BSMI CNS 13438 and Korea (RRA) KN 22.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.



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