



Engineering Solutions & Electromagnetic Compatibility Services

**Class II Permissive Change Report  
FCC Part 15.247 & Industry Canada RSS-210**

Test Lab:		Applicant:	
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<b>FCC ID/IC:</b> FBRWRS7200/1859A-WRS7200			<b>Test Report Date:</b> February 21, 2012
<b>Platform:</b>	N/A	<b>RTL Work Order #:</b>	2012021
<b>Model:</b>	WRS7200	<b>RTL Quote #:</b>	QRTL12-021A
<b>American National Standard Institute:</b>	ANSI C63.4-2003: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
<b>FCC Classification:</b>	DSS – Part 15 Spread Spectrum Transmitter		
<b>FCC Rule Part(s)/Guidance:</b>	FCC Rules Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System October 1, 2006, DA 00-705		
<b>Industry Canada:</b>	RSS-210 Issue 8: Low Power License-Exempt Communications Devices		
<b>Digital Interface Information</b>	Digital Interface was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
2401 – 2475	0.004*	N/A	860KFXD

\* power is conducted as reported on original filing

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the applicable parts of FCC Part 2, FCC Part 15 and ANSI C63.4.

Signature: Desmond A. Fraser

Date: February 21, 2012

Typed/Printed Name: Desmond A. Fraser

Position: President

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*These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACCLASS. Refer to certificate and scope of accreditation AT-1445.*

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## 1 General Information

### 1.1 Scope

This is a Class II Permissive Change test report for Fleetwood Group, Inc. model WRS7200, FCC ID: FBRWRS7200, IC: 1859A-WRS7200. The purpose of this Class II Permissive Change is to verify that a replacement power amplifier meets the requirements of FCC 2.1043(b)(2).

Applicable Standards:

- FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.
- Industry Canada RSS-210: Low Power License-Exempt Communications Devices

### 1.2 Description of EUT

<b>Equipment Under Test</b>	Keypad
<b>Model Name/Number</b>	WRS7200
<b>Power Supply</b>	Battery 2 - AA batteries (3 VDC)
<b>Modulation Type</b>	FHSS
<b>Frequency Range</b>	2401 – 2475 MHz
<b>Antenna Connector Type</b>	PCB F type
<b>Antenna Types</b>	Internal

### 1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4-2003).

### 1.4 Related Submittal(s)/Grant(s)

The original FCC grant was issued July 26, 2007; the original IC certificate was issued July 27, 2007.

### 1.5 Modifications

No modifications were made to the equipment during testing in order to achieve compliance with these standards.

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Client: Fleetwood Group, Inc.  
Model: WRS7200  
Standards: FCC 15.247/IC RSS-210  
ID's: FBRWRS7200/1859A-WRS7200  
Report #: 2012021

## 2 Test Information

### 2.1 Description of Test Modes

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band greater than 10 MHz, the following frequencies were tested:

**Table 2-1: Channels Tested**

Channel	Frequency
Low	2401
Middle	2437
High	2475

### 2.2 Exercising the EUT

The EUT was supplied with test firmware programmed with a high, mid, and low channel for testing. The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT was provided with software to continuously transmit during testing. The carrier was also checked to verify that information was being transmitted. There were no deviations from the test standard(s) and/or methods. The test results reported relate only to the item tested.

### 2.3 Test Result Summary

**Table 2-2: Test Result Summary – FCC Part 15, Subpart C (Section 15.247)**

Standard	Test	Pass/Fail or N/A
FCC 15.209	Radiated Emissions	Pass
FCC 15.247(b)	Maximum Peak Power Output	Pass
FCC 15.247(d)	Antenna Conducted Spurious Emissions	Pass
FCC 15.247(d)	Band Edge Measurement	Pass
FCC 15.247(a)(1)(ii)	20 dB Bandwidth	Pass

### 2.4 Test System Details

The test samples were received on January 23, 2012. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following table.

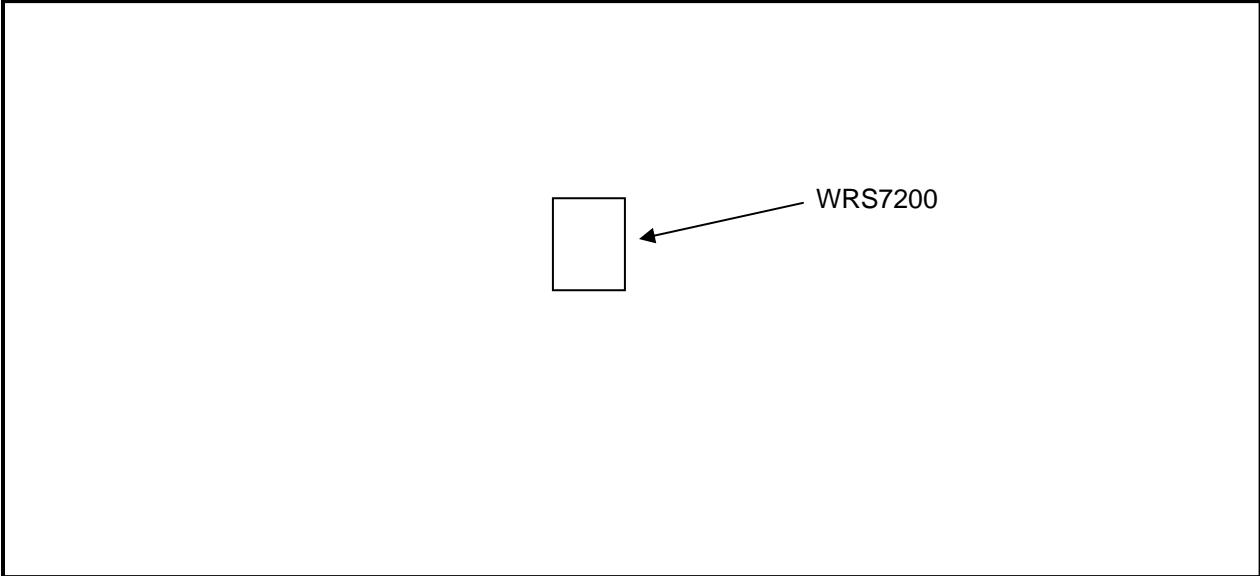
**Table 2-3: Equipment Under Test**

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Keypad	Fleetwood Group, Inc.	WRS7200	DUT1	FBRWRS7200	N/A	20316
Keypad	Fleetwood Group, Inc.	WRS7200	DUT2	FBRWRS7200	N/A	20317

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Report #: 2012021

## 2.5 Configuration of Tested System



**Figure 2-1: Configuration of System Under Test**

## 3 Duty Cycle Calculation - FCC 15.35(c), RSS-Gen 4.3

A standard transmission consists of a 1.1 ms data packet, with a 473.3 ms transmission period. Therefore, the aggregate on time within a transmission period of 100 ms is 1.1 ms, or  $20\log(1.1/100) = 39.2\text{dB}$ .

The duty cycle correction is 39.2 dB.

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Report #: 2012021

#### 4 Peak Output Power – FCC 15.247(b)(1); RSS-210 A8.4(2)

##### 4.1 Power Output Test Procedure

A power measurement of the EUT was taken using a Rohde & Schwarz spectrum analyzer.

**Table 4-1: Power Output Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU50	Spectrum Analyzer	1166-1660K50-200106-XU	1/19/13

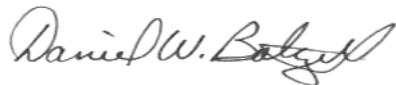
##### 4.2 Power Output Test Data

**Table 4-2: Power Output Test Data**

Frequency (MHz)	Peak Conducted Power (dBm)	Peak Conducted Power (mW)
2401	4.9	3.1
2437	5.2	3.3
2475	5.3	3.4

**Test Personnel:**

Daniel W. Baltzell  
EMC Test Engineer



Signature

January 27, 2012  
Date of Test

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Standards: FCC 15.247/IC RSS-210  
ID's: FBRWRS7200/1859A-WRS7200  
Report #: 2012021

## 5 Antenna Conducted Spurious Emissions – FCC 15.247(d); RSS-210 A8.5

No spurious emissions were found within 20 dB of the limit, therefore no emissions are reported.

**Table 5-1: Antenna Conducted Spurious Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU50	Spectrum Analyzer	1166-1660K50-200106-XU	1/19/13

**Test Personnel:**

Daniel W. Baltzell  
EMC Test Engineer



Signature

February 21, 2012  
Date of Test

## 6 Compliance with the Band Edge – FCC 15.247(d); RSS-GEN

### 6.1 Band Edge Test Procedure

The transmitter output was connected to its appropriate antenna. A conducted antenna port delta measurement was performed from the highest peak in the restricted band to the peak of the fundamental, and subtracted from the radiated field strength; the result was compared to the limit.

**Table 6-1: Band Edge Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter Antenna Mast, polarizing	Outdoor Range 1	Not Required
901517	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	901262	10/14/12
901242	Rhein Tech Laboratories	WRT-000-0003	Wood Rotating Table	N/A	Not Required
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/12
901581	Rohde & Schwarz	FSU50	Spectrum Analyzer	1166-1660K50-200106-XU	1/19/13
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	1/13/13

### 6.2 Band Edge Test Results

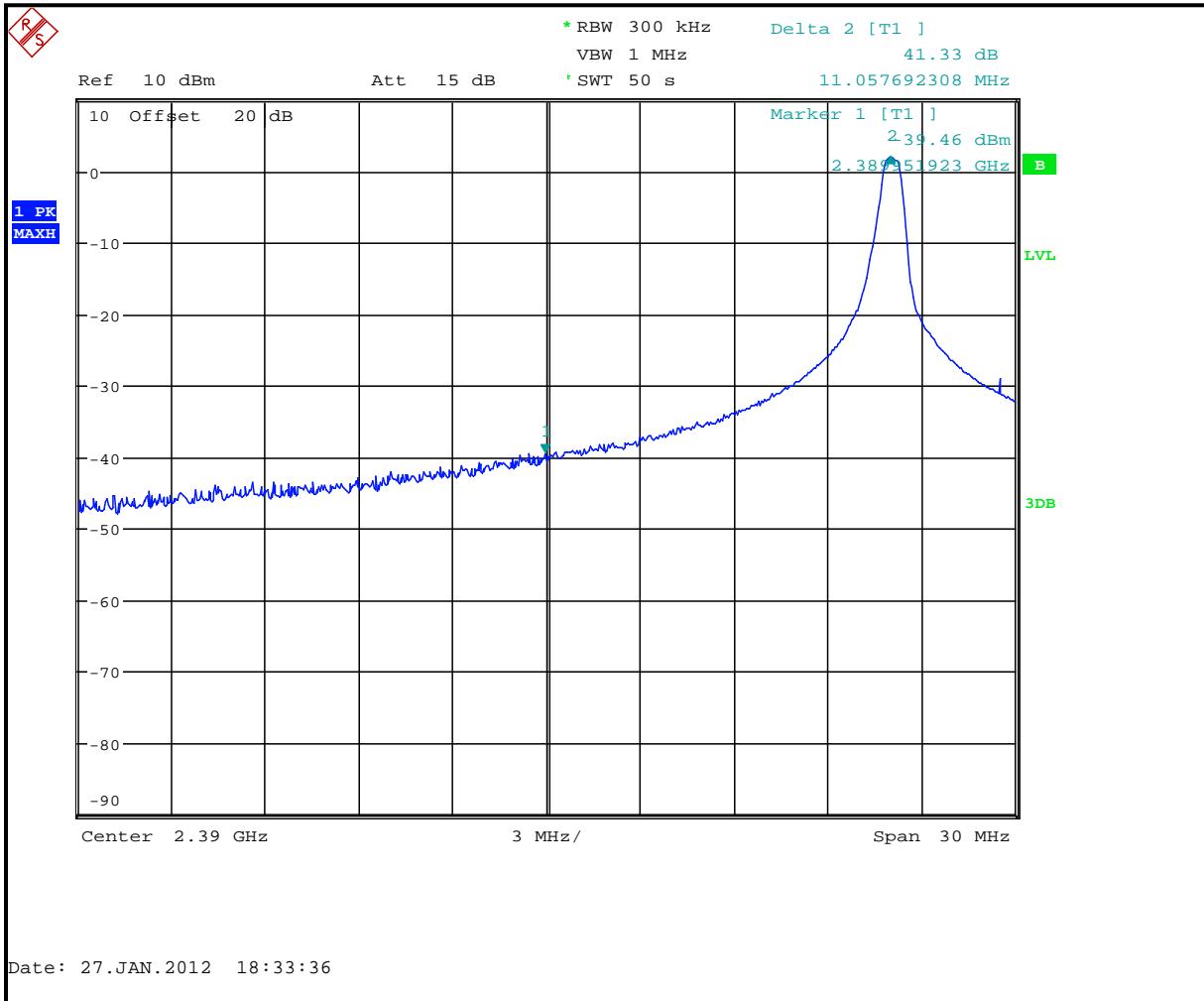
#### 6.2.1 Calculation of Lower Band Edge

69.8 dBuV/m is the field strength measurement, from which the delta measurement of 41.3 dB is subtracted, resulting in a level of 28.5 dB. This level has a margin of 25.5 dB below the limit of 54 dBuV/m.

Calculation:  $69.8 \text{ dBuV/m} - 41.3 \text{ dB} - 54 \text{ dBuV/m} = -25.5 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/8 MHz VBW) = 109.0 dBuV/m  
 Average Field Strength of Lower Band Edge (1 MHz RBW/10 Hz VBW) = 69.8 dBuV/m  
 Delta measurement = 41.3 dB

### 6.2.2 Lower Band Edge Plot



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Standards: FCC 15.247/IC RSS-210  
ID's: FBRWRS7200/1859A-WRS7200  
Report #: 2012021

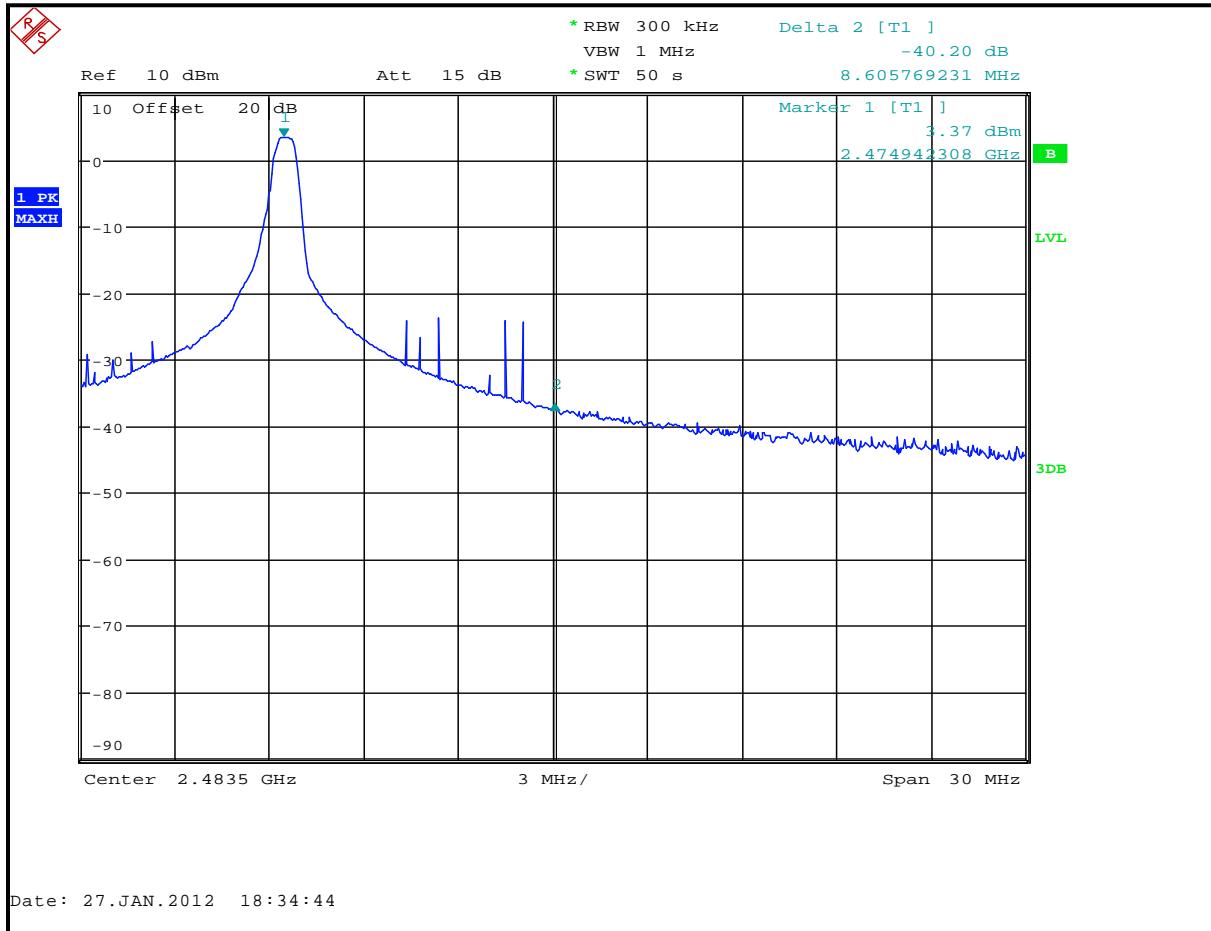
### 6.2.3 Calculation of Upper Band Edge

71.6 dBuV/m is the field strength measurement, from which the delta measurement of 40.2 dB is subtracted, resulting in a level of 31.4 dB. This level has a margin of 22.6 dB below the limit of 54 dBuV/m.

Calculation:  $71.6 \text{ dBuV/m} - 40.2 \text{ dB} - 54 \text{ dBuV/m} = -22.6 \text{ dB}$

Peak Field Strength of Upper Band Edge (1 MHz RBW/8 MHz VBW) = 110.8 dBuV/m  
Average Field Strength of Upper Band Edge (1 MHz RBW/10 Hz VBW) = 71.6 dBuV/m  
Delta measurement = 40.2 dB

#### 6.2.4 Upper Band Edge Plot



Plot 6-2: Upper Band Edge – Fixed High Channel Operation

**Test Personnel:**

Daniel W. Baltzell  
 Test Engineer

*Daniel W. Baltzell*

Signature

January 27, 2012  
 Date of Test

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Standards: FCC 15.247/IC RSS-210  
ID's: FBRWRS7200/1859A-WRS7200  
Report #: 2012021

## 7 20 dB Bandwidth – FCC 15.247(a)(1); IC RSS-Gen

### 7.1 20 dB Bandwidth Test Procedure

The minimum 20 dB bandwidths per RSS-Gen were measured using a 50 ohm spectrum analyzer. The modulated carrier was adjusted on the analyzer so that it was displayed entirely on the spectrum analyzer. The sweep time was auto and allowed through several sweeps with the max hold function used in peak detector mode. The resolution bandwidth was set to 30 kHz, and the video bandwidth set to 300 kHz. The spectrum analyzer auto-measurement was set to -20 dB for x dB. The table below contains the bandwidth measurement results.

**Table 7-1: 20 dB Bandwidth Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	12/29/12

### 7.2 20 dB Modulated Bandwidth Test Data

**Table 7-2: 20 dB Modulated Bandwidth Test Data**

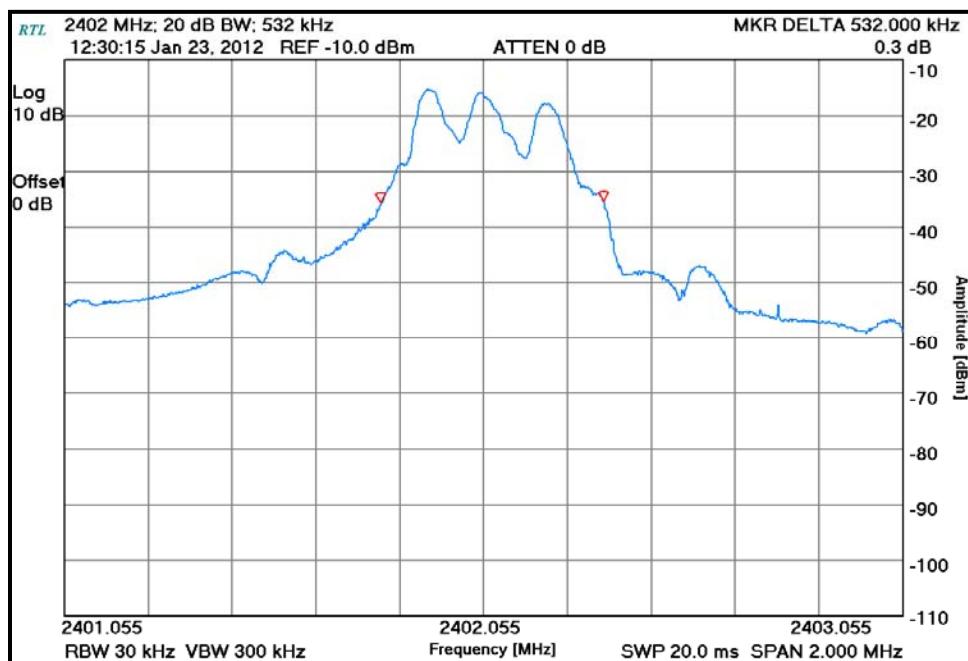
#### Minimum 20 dB bandwidths

Channel	20 dB Bandwidth (kHz)
1	532
37	526
75	536

### 7.3 20 dB Bandwidth Plots

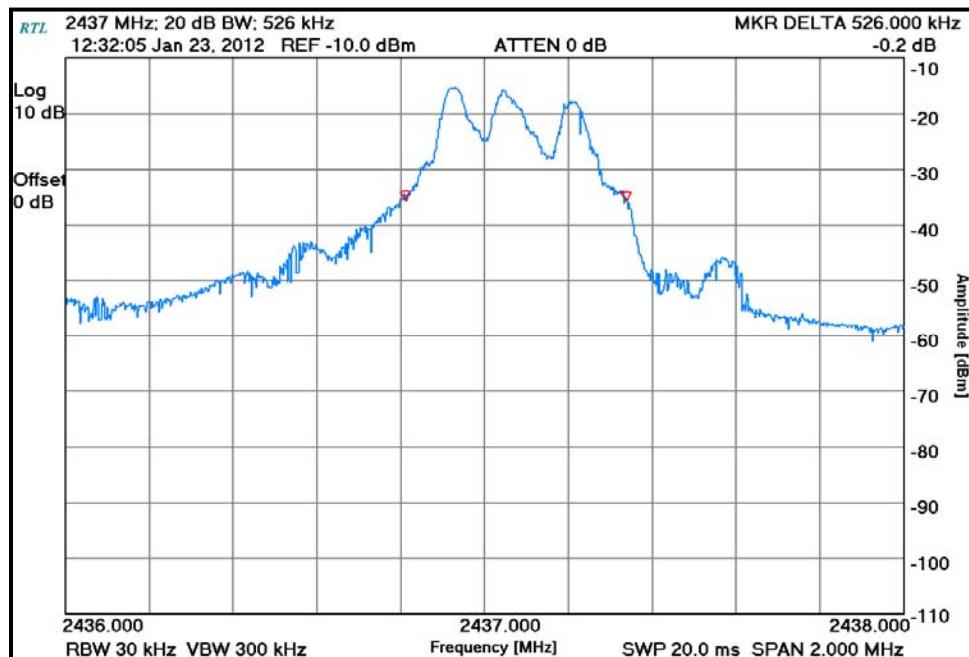
**Channel:** 1  
**Channel Frequency (MHz):** 2401  
**Resolution Bandwidth (kHz):** 30  
**Video Bandwidth (kHz):** 300  
**Span (MHz):** 2

Plot 7-1: 20 dB Bandwidth Channel 1



**Channel:** 37  
**Channel Frequency (MHz):** 2437  
**Resolution Bandwidth (kHz):** 30  
**Video Bandwidth (kHz):** 300  
**Span (MHz):** 2

**Plot 7-2: 20 dB Bandwidth Channel 37**

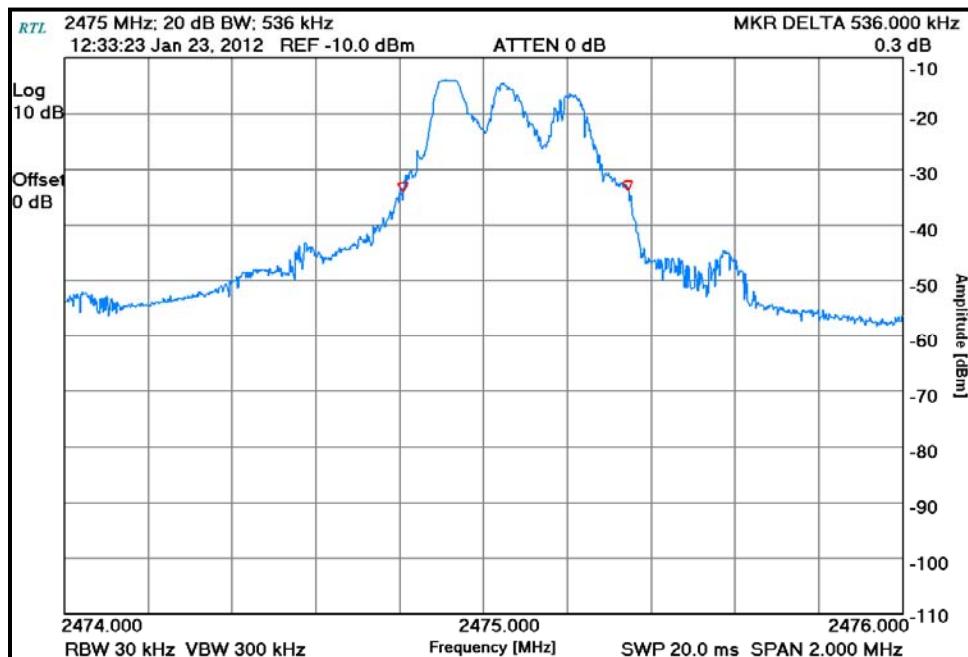


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**Channel:** 75  
**Channel Frequency (MHz):** 2475  
**Resolution Bandwidth (kHz):** 30  
**Video Bandwidth (kHz):** 300  
**Span (MHz):** 2

**Plot 7-3: 20 dB Bandwidth Channel 75**



**Test Personnel:**

Daniel W. Baltzell  
Test Engineer

Signature

January 23, 2012  
Date of Test

## 8 Radiated Emissions - 15.209; RSS-210 6.2.1

### 8.1 Limits of Radiated Emissions Measurement

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009-0.490	2400/f (kHz)	300
0.490-1.705	2400/f (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any circumstances of modulation.

### 8.2 Radiated Emissions Measurement Test Procedure

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to the 10<sup>th</sup> harmonic of the highest fundamental transmitter frequency (24.8 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

**Table 8-1: Radiated Emissions Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900151	Rohde and Schwarz	HFH2-Z2	Loop Antenna (9 kHz - 30 MHz)	827525/019	10/1/12
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	2/22/12
900905	Rhein Tech Laboratories	PR-1040	OATS 1 Preamplifier 40dB (30 MHz - 2 GHz)	1006	7/14/12
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901516	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/14/12
901517	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	901262	10/14/12
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	Not Required
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 kHz - 6.5 GHz)	3325A00159	8/17/12
900914	Hewlett Packard	8546OA	RF Filter Section (100 kHz - 6.5 GHz)	3330A00107	8/17/12
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	1/13/12
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	9/13/12
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	9/13/12
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	06/14/12
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	06/14/12
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	06/14/12
900356	EMCO	3160-08	Horn Antenna (12.4 - 18 GHz)	9607-1044	06/14/12
900325	EMCO	3160-9	Horn Antennas (18 - 26.5 GHz)	9605-1051	06/14/12

### 8.3 Radiated Emissions Test Results

#### 8.3.1 Radiated Emissions Digital/Receiver Test Data

Table 8-2: Digital/Receiver Radiated Emissions Test Data

Temperature: 46°F      Humidity: 49%										
Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/Fail
32.000	Qp	H	0	1.0	33.7	-11.8	21.9	40.0	-18.1	Pass
48.000	Qp	H	0	1.0	35.6	-19.8	15.8	40.0	-24.2	Pass
64.000	Qp	H	0	1.0	36.6	-23.3	13.3	40.0	-26.7	Pass
86.699	Qp	H	0	1.0	41.1	-20.3	20.8	40.0	-19.2	Pass
148.000	Qp	H	0	1.0	34.1	-18.4	15.7	43.5	-27.8	Pass
1201.023	Av	H	0	1.0	34.2	1.9	36.1	54.0	-17.9	Pass
1218.582	Av	V	0	1.0	33.3	2.1	35.4	54.0	-18.6	Pass
1237.468	Av	V	0	1.0	34.0	2.3	36.3	54.0	-17.7	Pass

#### 8.3.2 Radiated Emissions Harmonics/Spurious Test Data

Table 8-3: Radiated Emissions Harmonics/Spurious - 2401 MHz

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV) (1 MHz RBW/ VBW)	Calculated Average (dBuV) (Duty Cycle Correction Factor -39.2 dB)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4802.000	47.2	8.0	12.7	20.7	54.0	-33.3
12005.000	41.6	2.4	17.6	20.0	54.0	-34.0
19208.000	26.6	-12.6	26.7	14.1	54.0	-39.9

Table 8-4: Radiated Emissions Harmonics/Spurious - 2437 MHz

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV) (1 MHz RBW/ VBW)	Calculated Average (dBuV) (Duty Cycle Correction Factor -39.2 dB)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4874.000	46.8	7.6	12.6	20.2	54.0	-33.8
7311.000	48.0	8.8	12.9	21.7	54.0	-32.3
12185.000	41.9	2.7	17.5	20.2	54.0	-33.8
19496.000	27.8	-11.4	26.5	15.1	54.0	-38.9

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Client: Fleetwood Group, Inc.  
Model: WRS7200  
Standards: FCC 15.247/IC RSS-210  
ID's: FBRWRS7200/1859A-WRS7200  
Report #: 2012021

**Table 8-5: Radiated Emissions Harmonics/Spurious - 2475 MHz**

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV) (1 MHz RBW/ VBW)	Calculated Average (dBuV) (Duty Cycle Correction Factor -39.2 dB)	Site Correction Factor (dB/m)	Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4950.000	42.4	3.2	12.6	15.8	54.0	-38.2
7425.000	47.5	8.3	12.8	21.1	54.0	-32.9
12375.000	42.8	3.6	17.6	21.2	54.0	-32.8
19800.000	25.8	-13.4	26.8	13.4	54.0	-40.6
22275.000	27.0	-12.2	28.1	15.9	54.0	-38.1
24750.000	26.4	-12.8	29.3	16.5	54.0	-37.5

**Test Personnel:**

Daniel W. Baltzell  
Test Engineer



Signature

January 25, 2012  
Date of Test

**9 Conclusion**

The data in this measurement report shows that the EUT as tested, Fleetwood Group, Inc., Model WRS7200, FCC ID: FBRWRS7200, IC: 1859A-WRS7200, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations and IC RSS-210 & RSS-Gen.