



Engineering and Testing for EMC and Safety Compliance



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**Certification Application Report
(Limited Modular Approval)
FCC Part 15.249 & Industry Canada RSS-210**

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FCC ID/IC:	FBRUSB240D/ 1859A-USB240D	Test Report Date:	January 28, 2008
Platform:	N/A	RTL Work Order #:	2008013
Model:	USB240D	RTL Quote #:	QRTL08-108
American National Standard Institute:	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		
FCC Classification:	DXT – Part 15 Low Power Transceiver		
FCC Rule Part(s)/Guidance:	15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz, October 1, 2006		
Industry Canada:	RSS-210 Issue 7: Low Power Device (2400-2483.5 MHz)		
Digital Interface Information:	Digital Interface was found to be compliant		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
2401 – 2475	N/A	N/A	900KFXD

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: 

Date: January 28, 2008

Typed/Printed Name: Desmond A. Fraser

Position: President

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1 General Information

1.1 Scope

This is an original certification application request.

Applicable Standards:

- FCC Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz
- Industry Canada RSS-210: Low Power License-Exempt Communications Devices

1.2 Description of EUT

Equipment Under Test	USB Transceiver
Model	USB240D
Power Supply	USB (5VDC)
Modulation Type	GFSK
Frequency Range	2401 – 2475 MHz
Antenna Connector Type	PCB Inverted F type
Antenna Type	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)

This is an original application for **limited modular approval** for Fleetwood Group, Inc., Model: USB240D, FCC ID: FBRUSB240D, IC: 1859A-USB240D.

1.5 Modifications

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

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. Four power levels were available for testing, and the high and low powers are presented in this report.

2.3 Test Result Summary

Table 2-2: Test Result Summary – FCC Part 15, Subpart C (Section 15.249)

Standard	Test	Pass/Fail or N/A
FCC 15.207	AC Power Conducted Emissions	Pass
FCC 15.209	Radiated Emissions	Pass
FCC 15.249(a)	Field Strength of Fundamental and Harmonics	Pass
RSS-Gen	20 dB Bandwidth	N/A

2.4 Test System Details

The test samples were received on January 22, 2008. 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
USB Transceiver	Fleetwood Group Inc.	USB240D	T1	FBRUSB240D	N/A	18235
USB Transceiver	Fleetwood Group Inc.	USB240D	F2	FBRUSB240D	N/A	18236

2.5 Configuration of Tested System

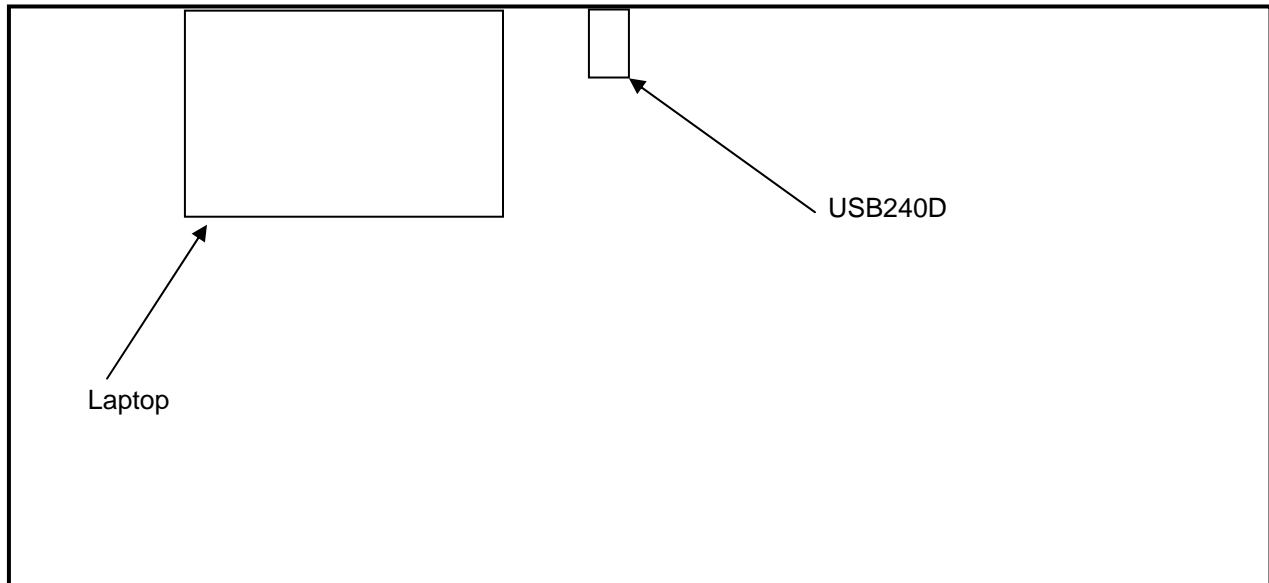


Figure 2-1: Configuration of System Under Test

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

A standard transmission consists of a 1.028 ms data packet, with a 432.5 ms transmission period. Therefore, the aggregate on time within a transmission period of 100 ms is 1.028 ms, or $20\text{Log}(1.028/100) = 39.8$ dB.

The duty cycle correction is 39.8 dB.

4 Radiated Emissions - §15.209, 15.249(a); RSS-210 §6.2.1; ANSI C63.4-2003 Section 8 (Measurement to 1 GHz)

4.1 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.

4.2 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 10th 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 4-1: 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	9/15/09
901364	Rhein Tech Laboratories	PR-1040	Preamplifier (1 - 26.5 GHz)	N/A	10/08/08
901281	Rhein Tech Laboratories	PR-1040	Amplifier (10 MHz - 2 GHz)	1004	1/19/09
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/5/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/5/08
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	3/21/08
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/22/08
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	06/14/10
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	06/14/10
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	06/14/10
900356	EMCO	3160-08	Horn Antenna (12.4 - 18 GHz)	9607-1044	06/14/10
900325	EMCO	3160-9	Horn Antenna (18 - 26.5 GHz)	9605-1051	06/14/10
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	10/17/08

4.3 Radiated Emissions Test Results

Table 4-2: Radiated Emissions Test Data

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Calculated Average (dBuV/m) (-39.8 dB)	Average Limit (dBuV/m)	Average Margin (dB)
2401.0	93.0	-0.9	92.1	114.0	-21.9	52.3	94.0	-41.7
2437.0	95.3	-0.8	94.5	114.0	-19.5	54.7	94.0	-39.3
2475.0	93.7	-0.5	93.2	114.0	-20.8	53.4	94.0	-40.6

* testing performed at 3m

4.4 Radiated Emissions Harmonics/Spurious Test Data

Table 4-3: Radiated Emissions Harmonics/Spurious - 2401 MHz

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Calculated Average (dBuV/m) (-39.8 dB)	Average Limit (dBuV/m)	Average Margin (dB)
4802.0	52.2	6.2	58.4	74.0	-15.6	18.6	54.0	-35.4
7203.0	56.3	8.3	64.6	74.0	-9.4	24.8	54.0	-29.2
9604.0	41.4	13.9	55.3	74.0	-18.7	15.5	54.0	-38.5
12005.0	37.9	15.1	53.0	74.0	-21.0	13.2	54.0	-40.8

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

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Calculated Average (dBuV/m) (-39.8 dB)	Average Limit (dBuV/m)	Average Margin (dB)
4874.0	51.0	6.3	57.3	74.0	-16.7	17.5	54.0	-36.5
7311.0	56.5	7.9	64.4	74.0	-9.6	24.6	54.0	-29.4
9748.0	42.1	14.3	56.4	74.0	-17.6	16.6	54.0	-37.4
12185.0	41.0	15.7	56.7	74.0	-17.3	16.9	54.0	-37.1

Table 4-5: Radiated Emissions Harmonics/Spurious - 2475 MHz

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Calculated Average (dBuV/m) (-39.8 dB)	Average Limit (dBuV/m)	Average Margin (dB)
4950.0	50.1	6.6	56.7	74.0	-17.3	16.9	54.0	-37.1
7425.0	54.6	8.7	63.3	74.0	-10.7	23.5	54.0	-30.5
9900.0	40.6	15.0	55.6	74.0	-18.4	15.8	54.0	-38.2
12375.0	40.1	15.0	55.1	74.0	-18.9	15.3	54.0	-38.7

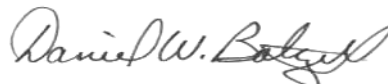
4.5 Radiated Emissions Digital Test Data

Table 4-6: Digital Radiated Emissions Test Data

Temperature: 26°F Humidity: 58%										
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
119.989	Qp	V	120	1.0	42.8	-16.6	26.2	43.5	-17.3	Pass
120.000	Qp	H	95	3.0	45.6	-16.6	29.0	43.5	-14.5	Pass
144.000	Qp	H	150	2.0	42.4	-17.3	25.1	43.5	-18.4	Pass
192.000	Qp	H	90	1.3	46.1	-18.6	27.5	43.5	-16.0	Pass
192.000	Qp	V	190	1.0	45.8	-18.6	27.2	43.5	-16.3	Pass
240.000	Qp	H	270	1.4	53.1	-16.0	37.1	46.0	-8.9	Pass
288.000	Qp	H	20	1.0	44.4	-14.0	30.4	46.0	-15.6	Pass
336.000	Qp	H	0	1.0	44.8	-12.2	32.6	46.0	-13.4	Pass
384.000	Qp	H	95	1.0	47.3	-11.1	36.2	46.0	-9.8	Pass
384.005	Qp	V	180	1.0	38.8	-11.1	27.7	46.0	-18.3	Pass
500.000	Qp	V	120	1.0	43.1	-7.8	35.3	46.0	-10.7	Pass
528.005	Qp	V	90	1.0	42.9	-7.7	35.2	46.0	-10.8	Pass

Test Personnel:

Daniel W. Baltzell
 Test Engineer



Signature

January 24, 2008
 Date Of Test

5 AC Conducted Emissions - FCC Rules and Regulations Part 15 §15.207; RSS-Gen 7.2.2: Conducted Limits; ANSI C63.4-2003 Section 7

5.1 Site and Test Description

The power line conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm/50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable).

The analyzer's 6 dB bandwidth was set to 9 kHz. Video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

5.2 Test Limits

Line-Conducted Emissions		
Limit (dB μ V)		
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

Table 5-1: Conducted Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 kHz – 6.5 GHz)	3325A00159	3/21/08
901084	AFJ International	LS16	16A LISN	16010020082	3/28/08

5.3 Conducted Emissions Test Data

Table 5-2: Conducted Emissions Test Data – Mode TX, Neutral Side Line 1

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.161	Pk	52.7	0.2	52.9	65.4	-12.5	55.4	-2.5	Pass
0.220	Pk	44.8	0.2	45.0	62.8	-17.8	52.8	-7.8	Pass
0.285	Pk	42.1	0.2	42.3	60.7	-18.4	50.7	-8.4	Pass
0.327	Pk	40.3	0.3	40.6	59.5	-18.9	49.5	-8.9	Pass
0.395	Pk	37.8	0.3	38.1	58.0	-19.9	48.0	-9.9	Pass
0.450	Pk	34.6	0.2	34.8	56.9	-22.1	46.9	-12.1	Pass
1.651	Pk	35.8	0.6	36.4	56.0	-19.6	46.0	-9.6	Pass
3.820	Pk	39.4	1.0	40.4	56.0	-15.6	46.0	-5.6	Pass

Table 5-3: Conducted Emissions Test Data – Mode TX, Hot Side Line 2

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.158	Pk	51.1	0.2	51.3	65.6	-14.3	55.6	-4.3	Pass
0.223	Pk	44.2	0.2	44.4	62.7	-18.3	52.7	-8.3	Pass
0.282	Pk	41.6	0.2	41.8	60.8	-19.0	50.8	-9.0	Pass
0.340	Pk	37.3	0.2	37.5	59.2	-21.7	49.2	-11.7	Pass
0.390	Pk	33.1	0.3	33.4	58.1	-24.7	48.1	-14.7	Pass
0.453	Pk	32.9	0.2	33.1	56.8	-23.7	46.8	-13.7	Pass
1.648	Pk	36.9	0.6	37.5	56.0	-18.5	46.0	-8.5	Pass
3.750	Pk	37.8	1.0	38.8	56.0	-17.2	46.0	-7.2	Pass

Table 5-4: Conducted Emissions Test Data – Mode RX, Neutral Side Line 1

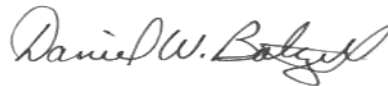
Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.170	Av	41.2	0.2	41.4	65.0	-23.6	55.0	-13.6	Pass
0.170	Qp	51.6	0.2	51.8	65.0	-13.2	55.0	-3.2	Pass
0.227	Pk	45.7	0.2	45.9	62.6	-16.7	52.6	-6.7	Pass
0.287	Pk	43.2	0.3	43.5	60.6	-17.1	50.6	-7.1	Pass
0.341	Pk	39.0	0.2	39.2	59.2	-20.0	49.2	-10.0	Pass
0.398	Pk	36.2	0.3	36.5	57.9	-21.4	47.9	-11.4	Pass
0.456	Pk	35.8	0.2	36.0	56.8	-20.8	46.8	-10.8	Pass
1.820	Pk	37.7	0.6	38.3	56.0	-17.7	46.0	-7.7	Pass
3.890	Pk	39.7	1.0	40.7	56.0	-15.3	46.0	-5.3	Pass

Table 5-5: Conducted Emissions Test Data – Mode RX, Hot Side Line 2

Temperature: 74°F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC 15.207 QP Limit (dBuV)	FCC 15.207 QP Margin (dBuV)	FCC 15.207 AV Limit (dBuV)	FCC 15.207 AV Margin (dBuV)	Pass/Fail
0.150	Pk	53.4	0.2	53.6	66.0	-12.4	56.0	-2.4	Pass
0.171	Pk	49.6	0.2	49.8	64.9	-15.1	54.9	-5.1	Pass
0.227	Pk	44.0	0.2	44.2	62.6	-18.4	52.6	-8.4	Pass
0.279	Pk	41.7	0.2	41.9	60.8	-18.9	50.8	-8.9	Pass
0.341	Pk	36.3	0.2	36.5	59.2	-22.7	49.2	-12.7	Pass
0.397	Pk	34.3	0.3	34.6	57.9	-23.3	47.9	-13.3	Pass
0.454	Pk	34.0	0.2	34.2	56.8	-22.6	46.8	-12.6	Pass
1.816	Pk	36.5	0.6	37.1	56.0	-18.9	46.0	-8.9	Pass
3.540	Pk	39.3	1.0	40.3	56.0	-15.7	46.0	-5.7	Pass

Test Personnel:

Daniel W. Baltzell
 Test Engineer



Signature

January 24, 2008
 Date Of Test

6 20 dB Bandwidth – IC RSS-Gen

6.1 20 dB Bandwidth Test Procedure

The minimum 20 dB bandwidths per RSS-210 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 100 kHz, and the video bandwidth set to 1 MHz. The table below contains the bandwidth measurement results.

Table 6-1: 20 dB Bandwidth Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	5/22/08

6.2 20 dB Modulated Bandwidth Test Data

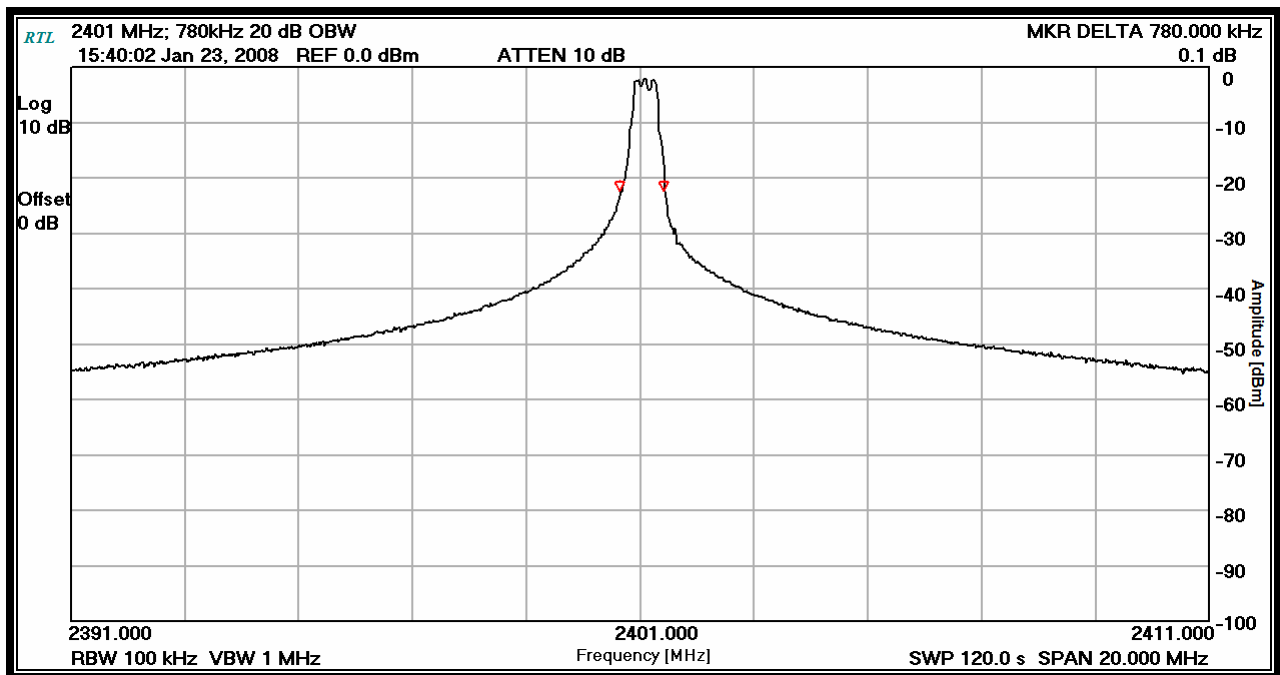
Table 6-2: 20 dB Modulated Bandwidth Test Data

Minimum 20 dB bandwidths	
Channel	20 dB Bandwidth (kHz)
1	780
37	800
75	900

6.3 20 dB Bandwidth Plots

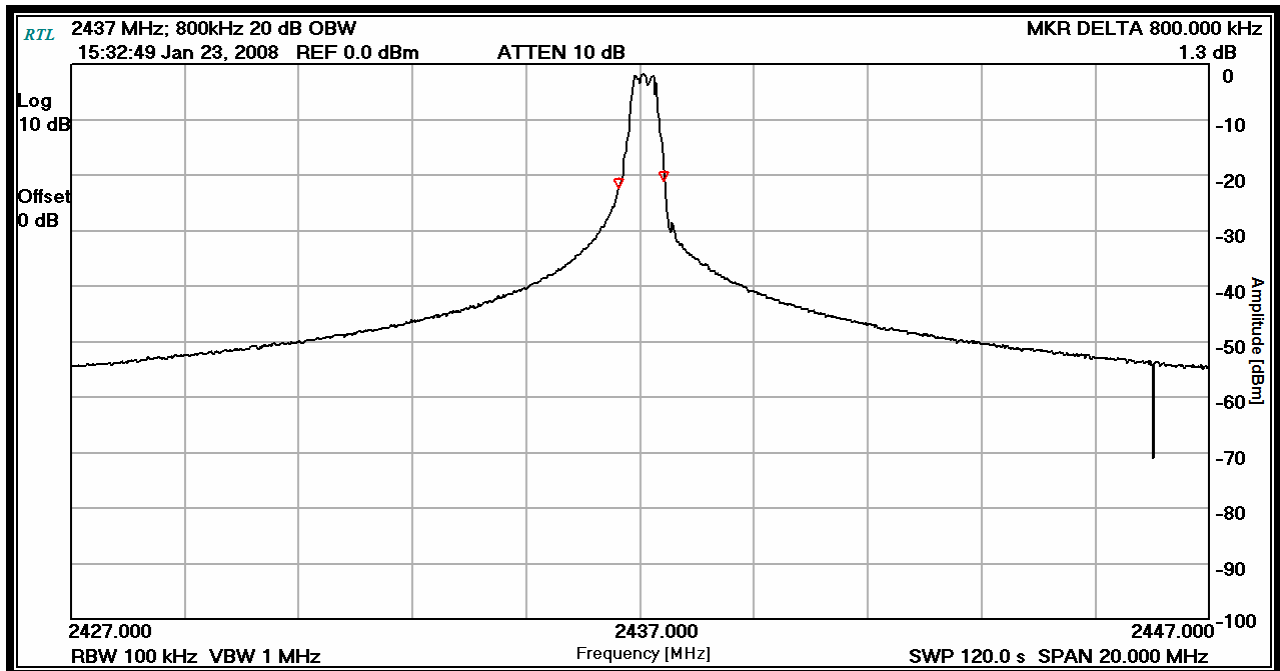
Channel: 1
Channel Frequency (MHz): 2401
Resolution Bandwidth (kHz): 100
Video Bandwidth (MHz): 1
Span (MHz): 20

Plot 6-1: 20 dB Bandwidth Channel 1



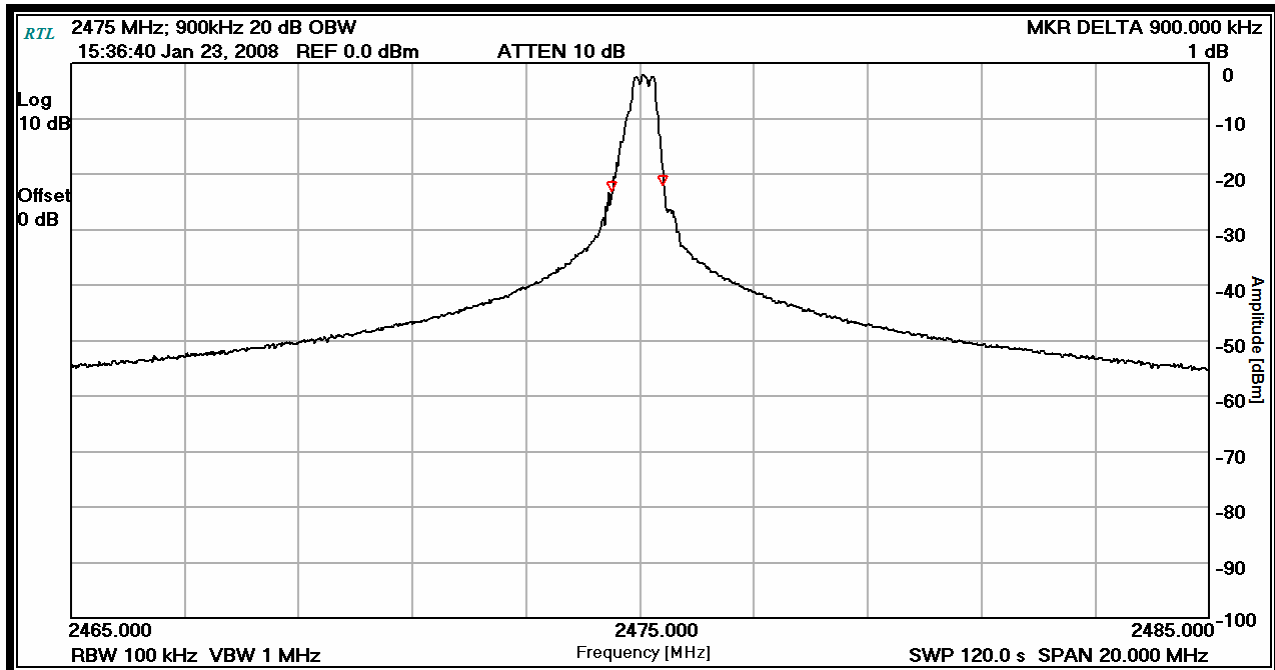
Channel: 37
Channel Frequency (MHz): 2437
Resolution Bandwidth (kHz): 100
Video Bandwidth (MHz): 1
Span (MHz): 20

Plot 6-2: 20 dB Bandwidth Channel 37



Channel: 75
Channel Frequency (MHz): 2475
Resolution Bandwidth (kHz): 100
Video Bandwidth (MHz): 1
Span (MHz): 20

Plot 6-3: 20 dB Bandwidth Channel 75



Test Personnel:

Daniel W. Baltzell
Test Engineer

Signature

January 23, 2008
Date Of Test

7 Conclusion

The data in this measurement report shows that the EUT as tested, Fleetwood Group, Inc., Model: USB240D, FCC ID: FBRUSB240D, IC: 1859A-USB240D, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations and IC RSS-210.