



Engineering and Testing for EMC and Safety Compliance



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## FCC Class 2 Permissive Change Report

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**Model: 50289-BAM-8-800-UL  
(806 – 824 MHz)**

**FCC ID: UT650289BAM8800UL**

**May 30, 2008**

Standards Referenced for this Report	
Part 2: 2007	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2007	Private Land Mobile Radio Services
ANSI/TIA-603-C-2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

Frequency Range(MHz)	Transmit Power (W)	Frequency Tolerance (ppm)	Emission Designator
806 - 824	0.6*	Amp	F8E

\* Power listed is conducted per carrier

**Report Prepared by Test Engineer: Daniel Baltzell**

Document Number: 2008096

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## 1 General Information

The following Class 2 Permissive Change Report is prepared on behalf of **Aiorlite Communications, Inc.** in accordance with the Federal Communications Commission Part 90 Rules and Regulations. The Equipment Under Test (EUT) was the **Model 50289-BAM-8-800-UL, FCC ID: UT650289BAM8800UL**. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with the applicable FCC Rules and Regulations in CFR 47. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

### 1.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia, 20170. This site has been fully described in a report submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

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

This is a Class 2 Permissive Change report. The original grant was issued on 2/13/2008.

### 1.3 Description of Change

Bandpass filtering was added to the 52600-02-13 LAN Splitter component, and the first of the three bandpass filters was removed from the intermediate frequency stage of the 52600-02-11 Channel Card component.

These changes will result in slightly wider skirts on the output signal, but will have no impact on the overall output power. The changes do not involve the frequency determining elements.

## 2 Tested System Details

The test sample was received on May 28, 2008. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

**Table 2-1: Test System Details**

<b>Model Tested</b>	50289-BAM-8-800-UL (bi-directional booster (uplink))
<b>Frequency Band</b>	806 - 824 MHz
<b>Maximum Output Power</b>	0.6 W conducted per carrier
<b>Number of Channels</b>	8
<b>Channel Bandwidth</b>	25 kHz nominal
<b>Channel Spacing</b>	25 kHz
<b>Primary Power</b>	95-132 VAC, 45-64 Hz, 15 Amps, Maximum
<b>Duty Cycle</b>	Continuous

**Table 2-2: Equipment Under Test (EUT)**

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Bi-Directional Booster	Airlite Communications, Inc.	50289-BAM-8-800-UL	N/A	UT650289BAM8800UL	18250

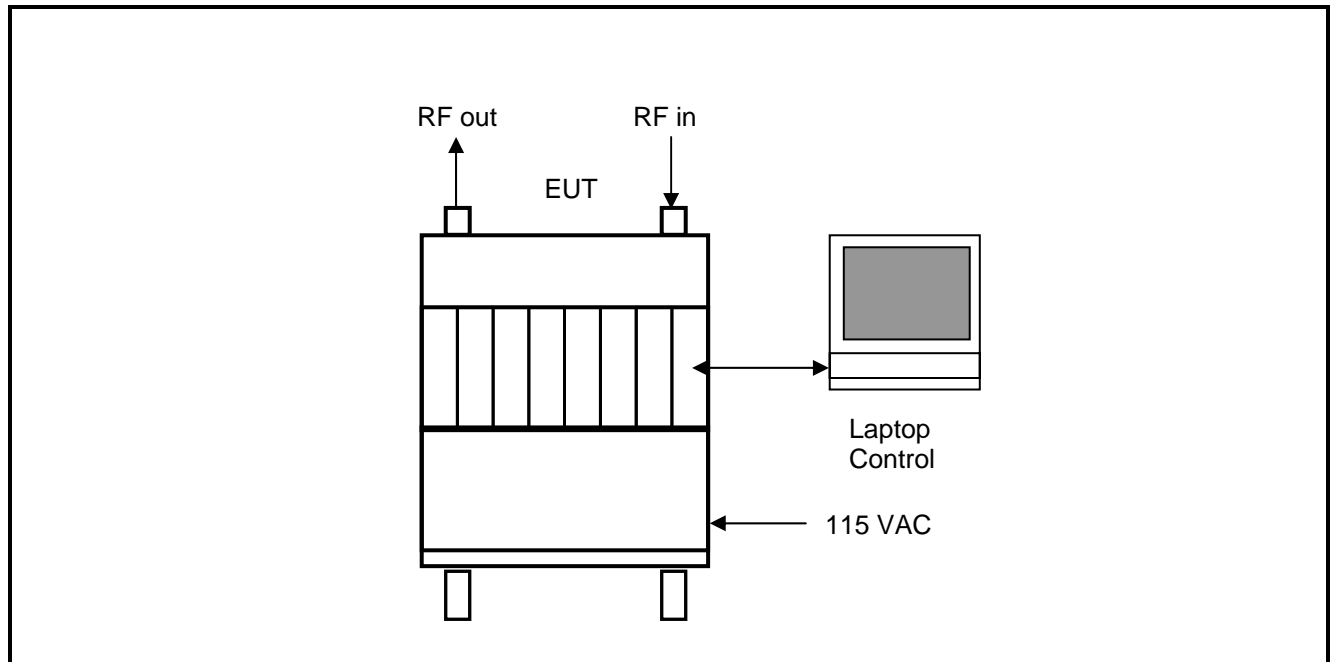
**Table 2-3: Ports and Cabling (EUT)**

Port	Cable Type	Quantity	Length (feet)	Shield
RF In	N type	1	N/A	N/A
RF Out	N type	1	N/A	N/A

**Table 2-4: Support Equipment**

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Notebook Computer	Dell	Inspiron 6400	N/A	N/A	901495
Serial Interface Cable	N/A	DB-9	N/A	N/A	N/A
12VDC power Supply	Airlite Communications, Inc.	50483PS12	N/A	N/A	18252

**Figure 2-1: Configuration of Tested System**



### 3 FCC Rules and Regulations Part 90.219 and Part §2.1046(a): Peak Output Power

#### 3.1 Test Procedure

ANSI TIA-603-2004, section 2.2.1.

The EUT was connected to a coaxial attenuator having a 50  $\Omega$  load impedance. Any cable losses were accounted for. The maximum gain antenna to be used with the system is 11 dBi = 8.9 dBd.

#### 3.2 Test Data

**Table 3-1: RF Power Output: Carrier Output Power**


Frequency (MHz)	Power Level Measured (dBm/carrier)	Antenna Gain (dBd)	ERP (W)	Limit §90.219 (W)
806.2125	23.1	8.9	1.6	5
808.9125	25.7	8.9	2.9	5
821.0750	27.0	8.9	3.9	5

\*Measurement accuracy: +/-0.3 dB

**Table 3-2: Test Equipment for RF Power Output - Conducted**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901184	Agilent Technologies	E4416A	Power Meter	GB41050573	10/24/08
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	10/24/08
901138	Weinschel Corp.	48-40-34 DC-18GHz	Attenuator, 100W 40dB	BK5883	1/13/09
901157	Marconi Instruments	2022D	Signal Generator (10 kHz-1 GHz)	119161/056	12/12/08

#### Test Personnel:

Daniel Baltzell		May 28, 2008
Test Engineer	Signature	Date of Tests

#### 4 FCC Rules and Regulations Part 90.210(b) and Part 2.1049(c): Occupied Bandwidth (Emissions Masks)

##### 4.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.11.

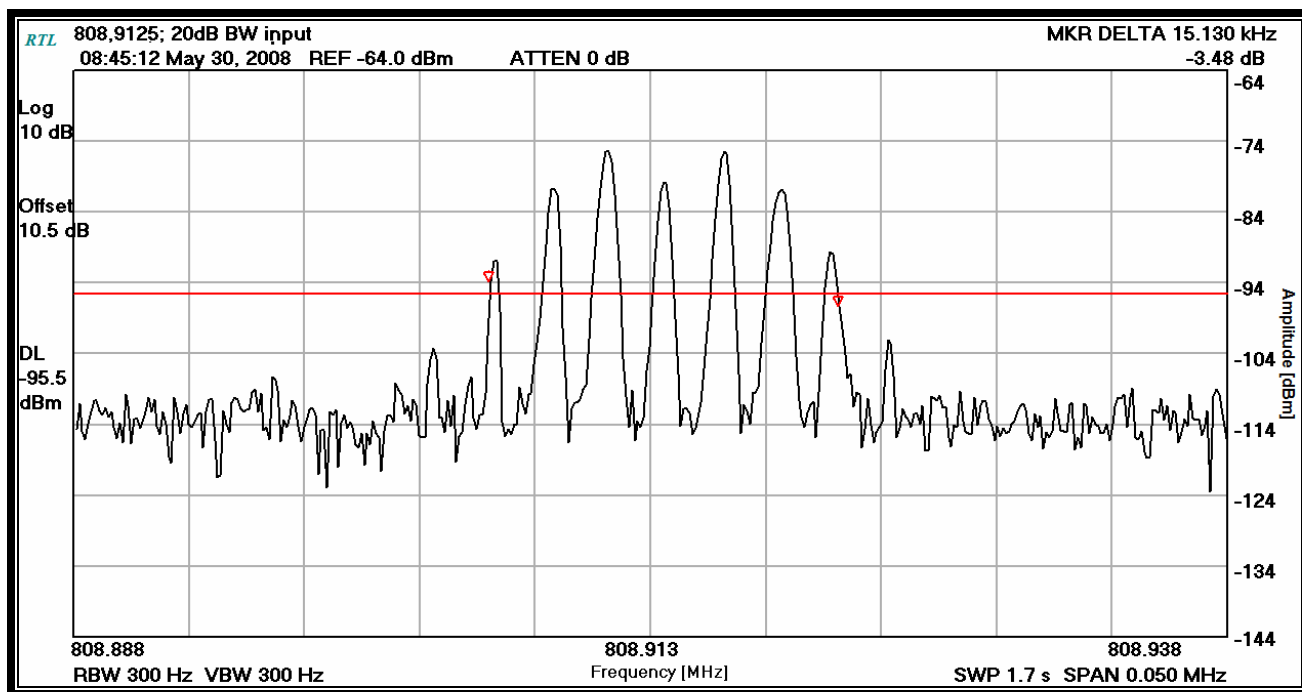
The transmitter is terminated with a 50  $\Omega$  load and interfaced with a spectrum analyzer. Cable losses were accounted for in measurement.

Full modulation was applied with 5 kHz deviation and a 2500 Hz tone.

##### 4.2 Test Data

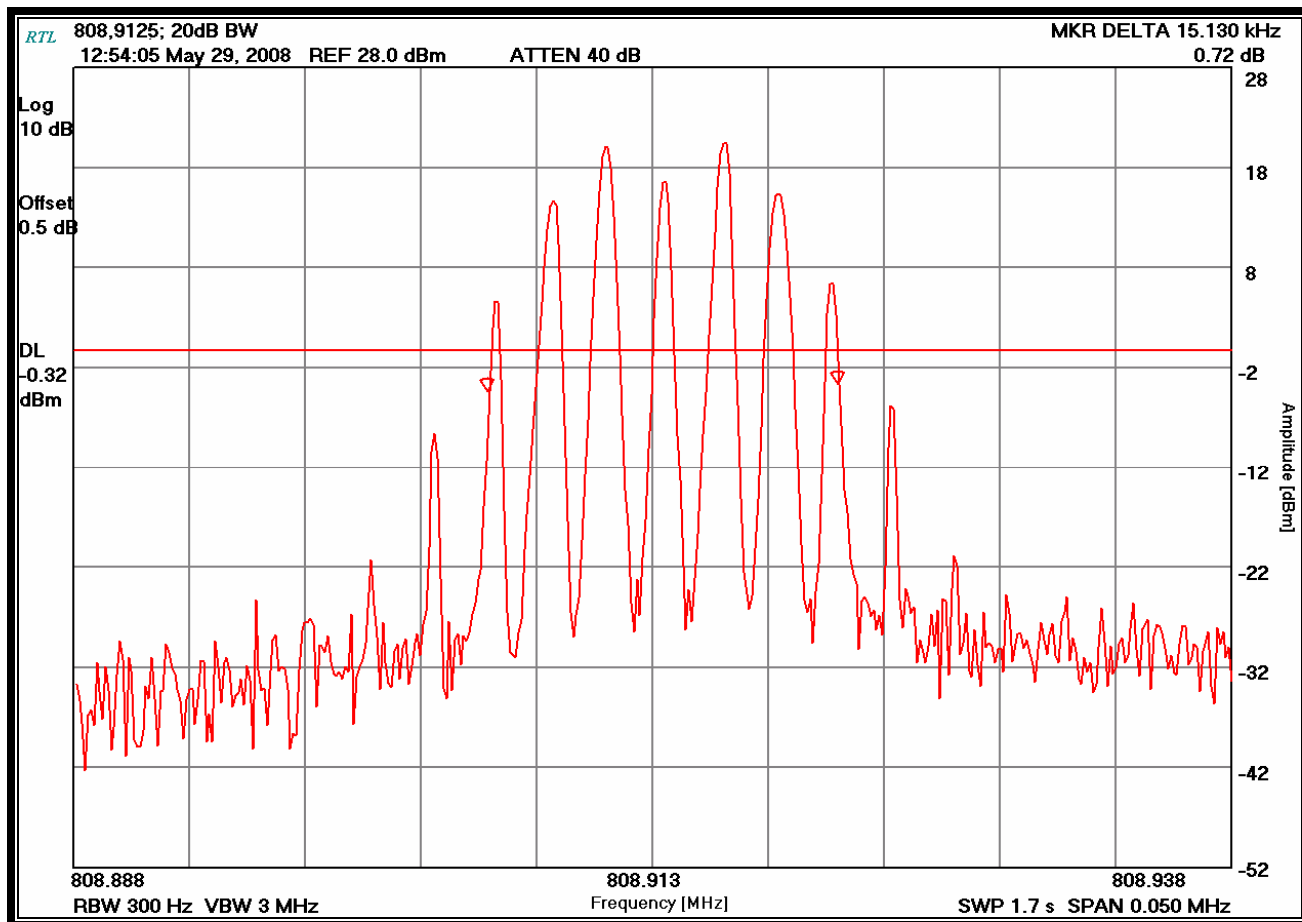
Bandwidth Limit: 1 MHz

Plot 4-1: Occupied Bandwidth: Input to Booster; 20 dB Bandwidth – 808.9125 MHz






**Plot 4-2: Occupied Bandwidth: Booster Output; 20 dB Bandwidth – 808.9125 MHz**



**Table 4-1: Test Equipment for Occupied Bandwidth**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz–12.8 GHz)	3826A00144	10/17/08
901057	Hewlett Packard	3336B	Synthesizer/Level Generator (100 Hz-20 MHz)	2514A02585	12/13/08
901118	Hewlett Packard	HP8901B	Modulation Analyzer (150 kHz-1300 MHz)	2406A00178	8/20/08
901307	Inmet	6N-10dB	Attenuator 10 dB	64671	1/11/09
901157	Marconi Instruments	2022D	Signal Generator (10 kHz-1 GHz)	119161/056	12/12/08

**Test Personnel:**

Daniel Baltzell		May 29-30, 2008
Test Technician/Engineer	Signature	Dates of Tests

## 5 Bandwidth Rejection

### 5.1 Test Procedure

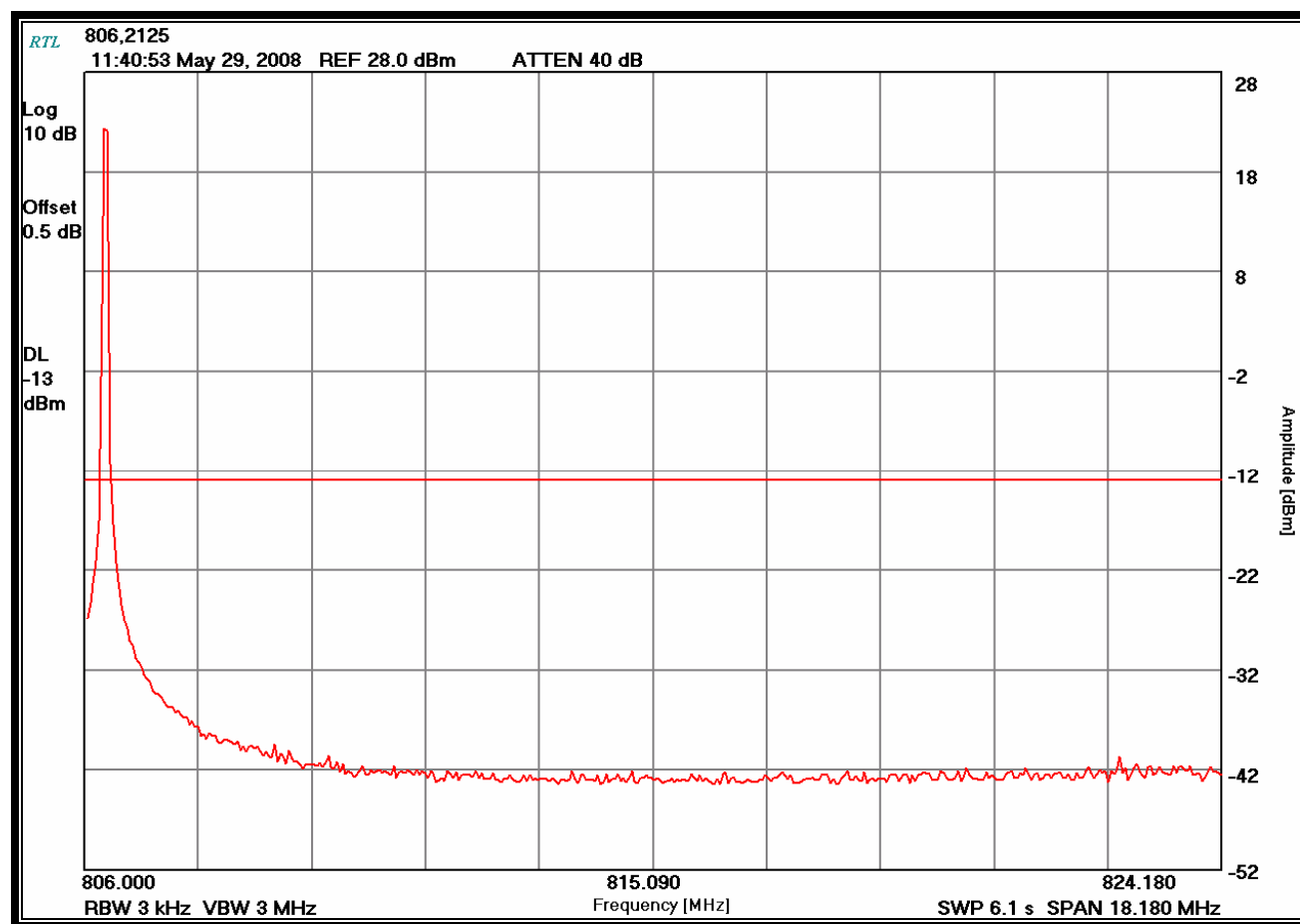
ANSI TIA-603-C-2004, Section 2.2.11.

Bandwidth rejection was performed by sweeping below and through the channel band with the spectrum analyzer on max hold. The transmitter is terminated with a  $50\ \Omega$  load and interfaced with a spectrum analyzer. Cable losses were accounted for in measurement.

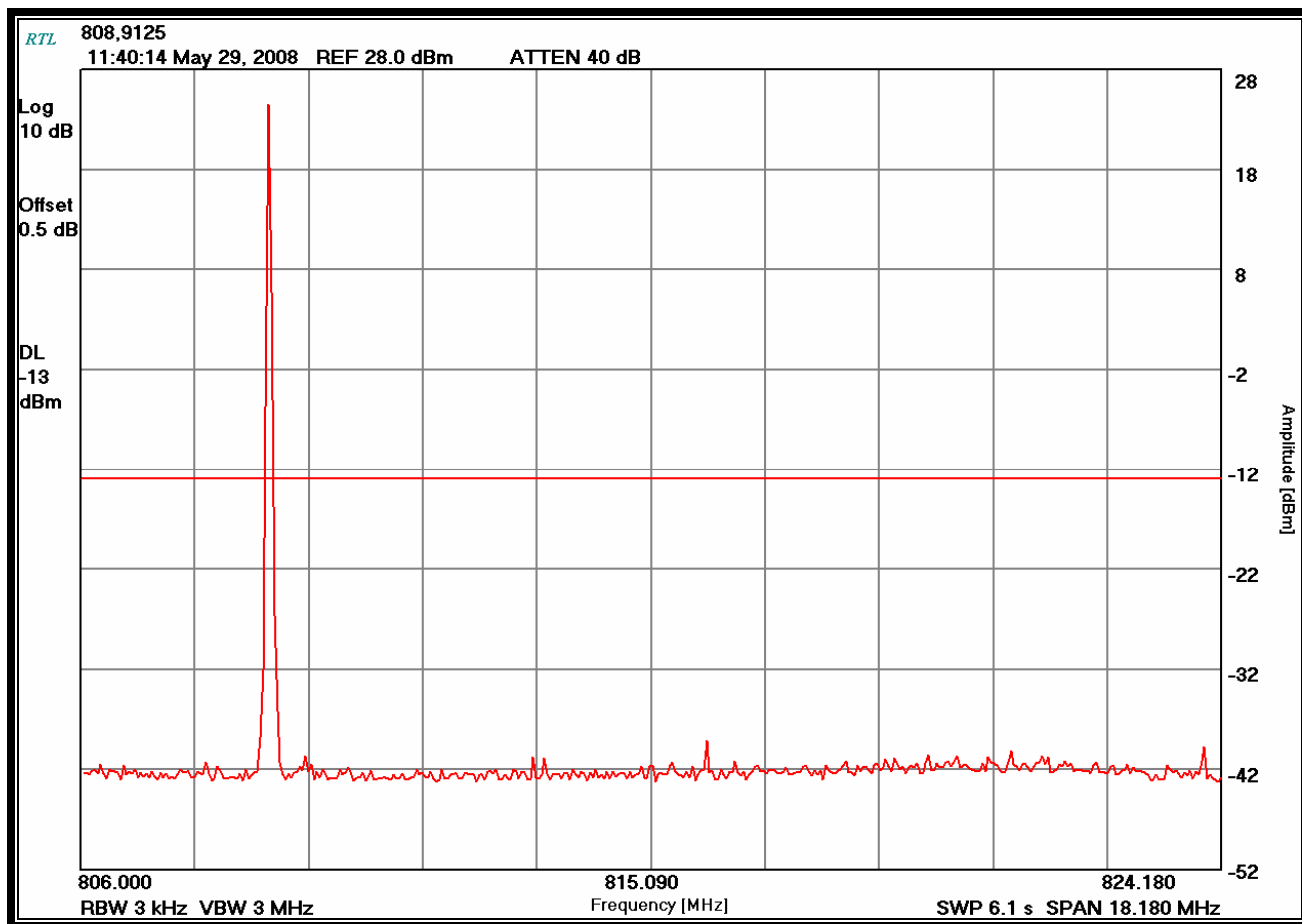
Full modulation was applied with 5 kHz deviation and a 2,500 Hz tone.

### 5.2 Test Data

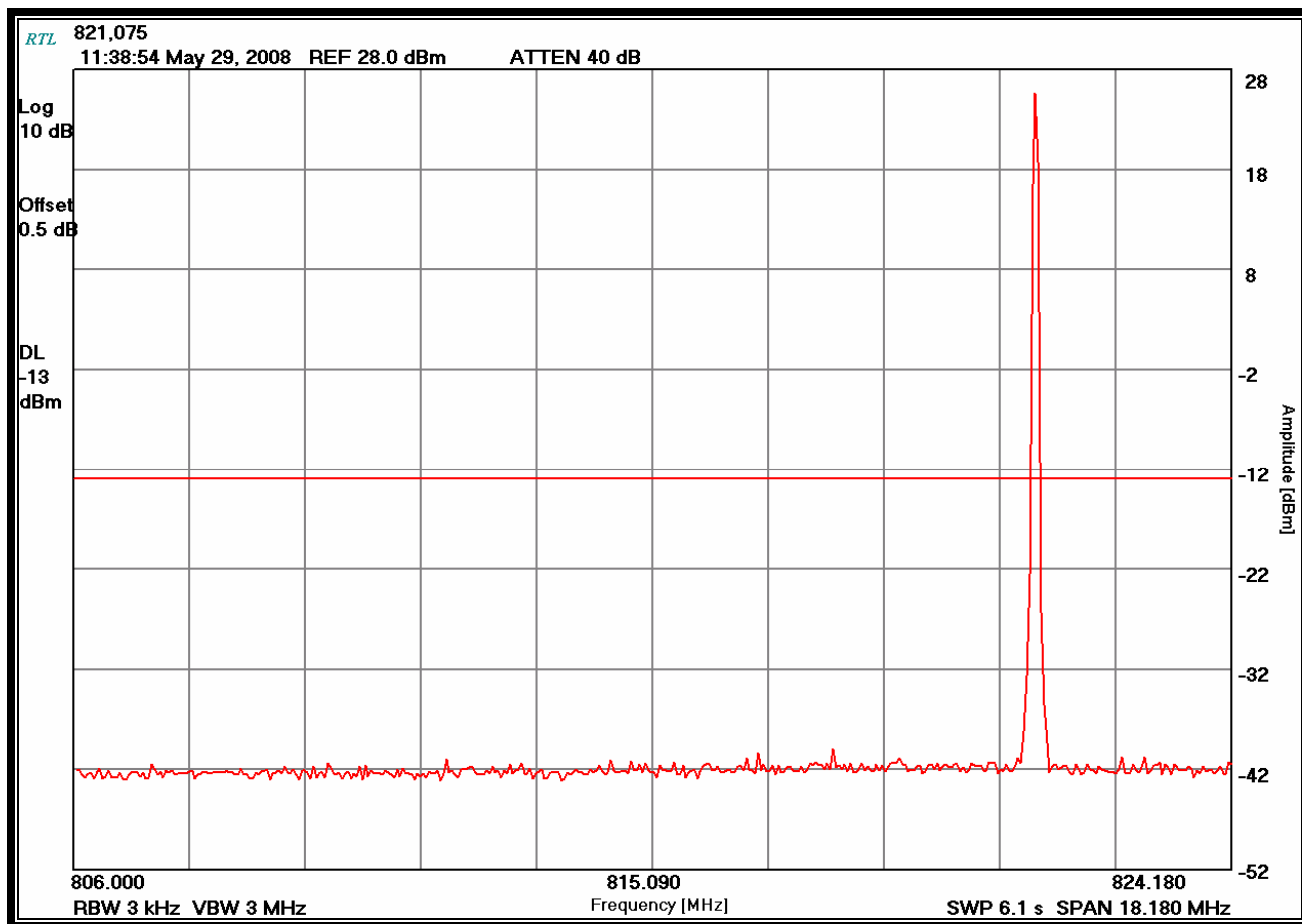
Plot 5-1: Bandwidth Rejection - 806.2125 MHz



**Plot 5-2: Bandwidth Rejection – 808.9125 MHz**




**Plot 5-3: Bandwidth Rejection – 821.075 MHz**



**Table 5-1: Test Equipment for Bandwidth Rejection**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz–12.8 GHz)	3826A00144	10/17/08
901057	Hewlett Packard	3336B	Synthesizer/Level Generator (100 Hz-20 MHz)	2514A02585	12/13/08
901118	Hewlett Packard	HP8901B	Modulation Analyzer (150 kHz-1300 MHz)	2406A00178	8/20/08
901424	Insulated Wire Inc.	KPS-1503- 360-KPS	RF cable 36"	NA	10/5/08
901425	Insulated Wire, Inc.	KPS-1503- 2400-KPS	RF cable, 20'	NA	10/5/08
901157	Marconi Instruments	2022D	Signal Generator	119161/056	12/12/08

**Test Personnel:**

Daniel Baltzell		May 29, 2008
Test Engineer	Signature	Date of Tests

## 6 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 90.210: Emissions Masks

### 6.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.13.

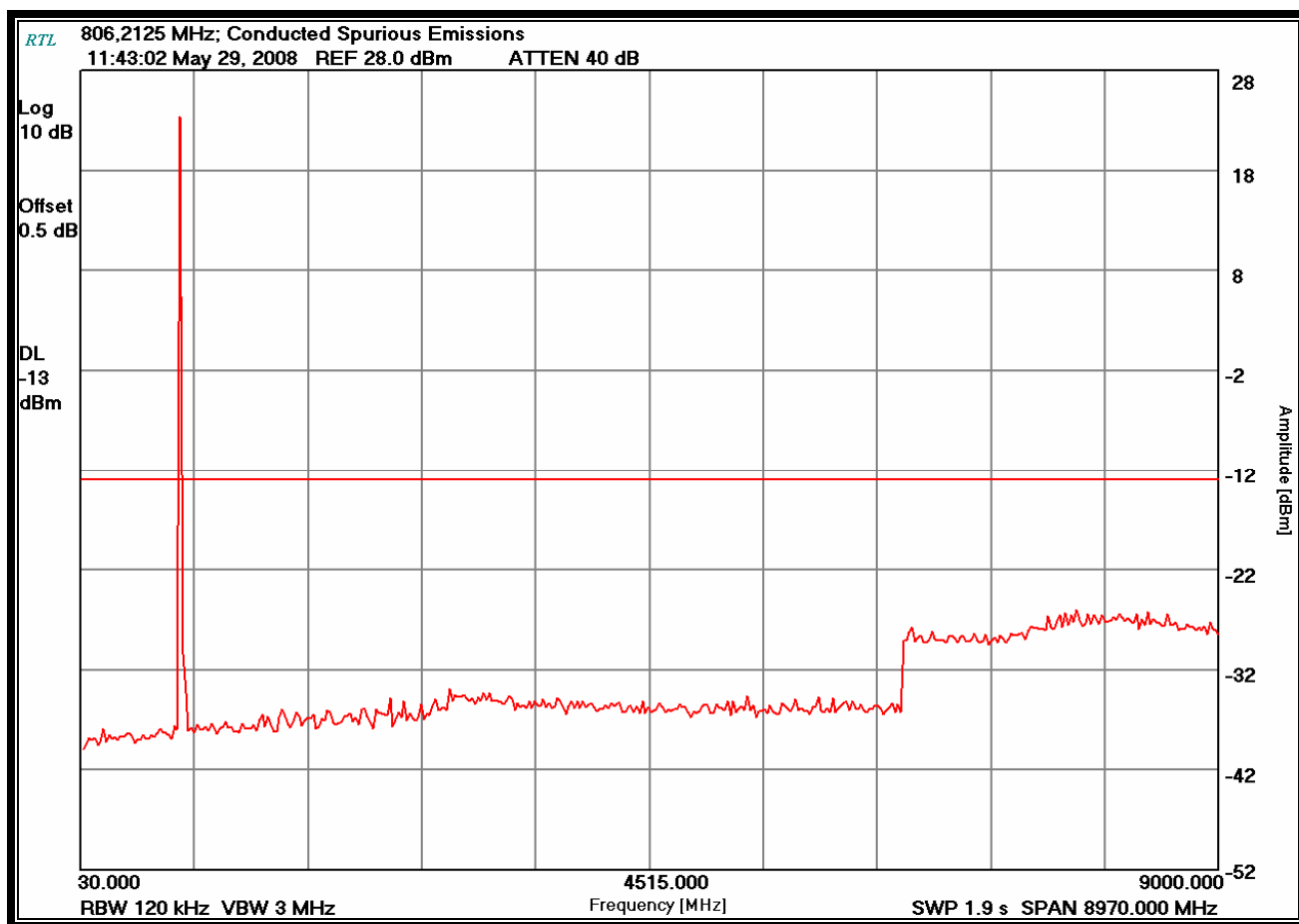
The transmitter is terminated with a 50  $\Omega$  load and interfaced with a spectrum analyzer. Cable losses were accounted for in measurement.

### 6.2 Test Data

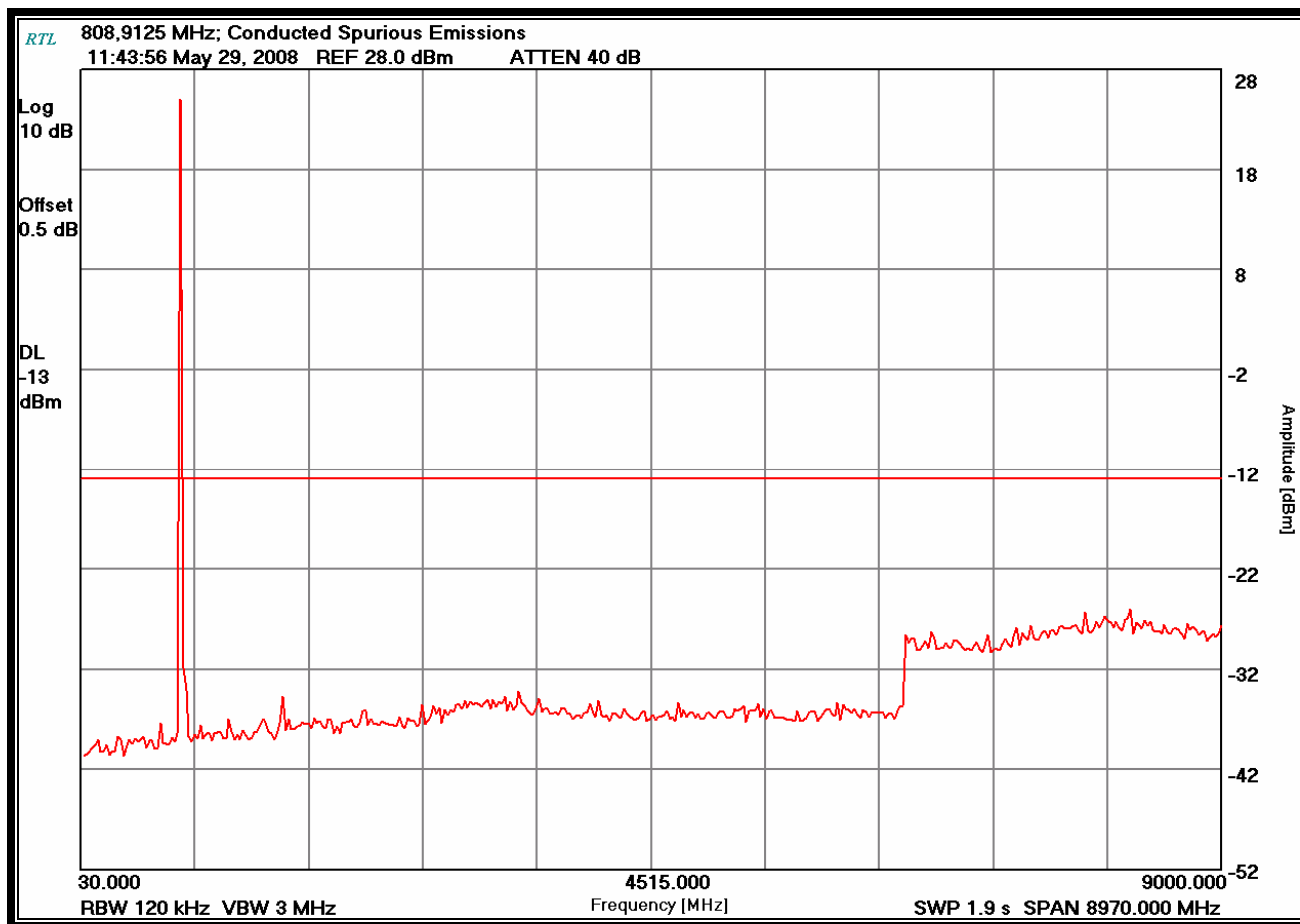
Frequency range of measurement per Part 2.1057: 9 kHz to 10xFc.

The worst case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

**Plot 6-1: Conducted Spurious Emissions - 806.2125 MHz**

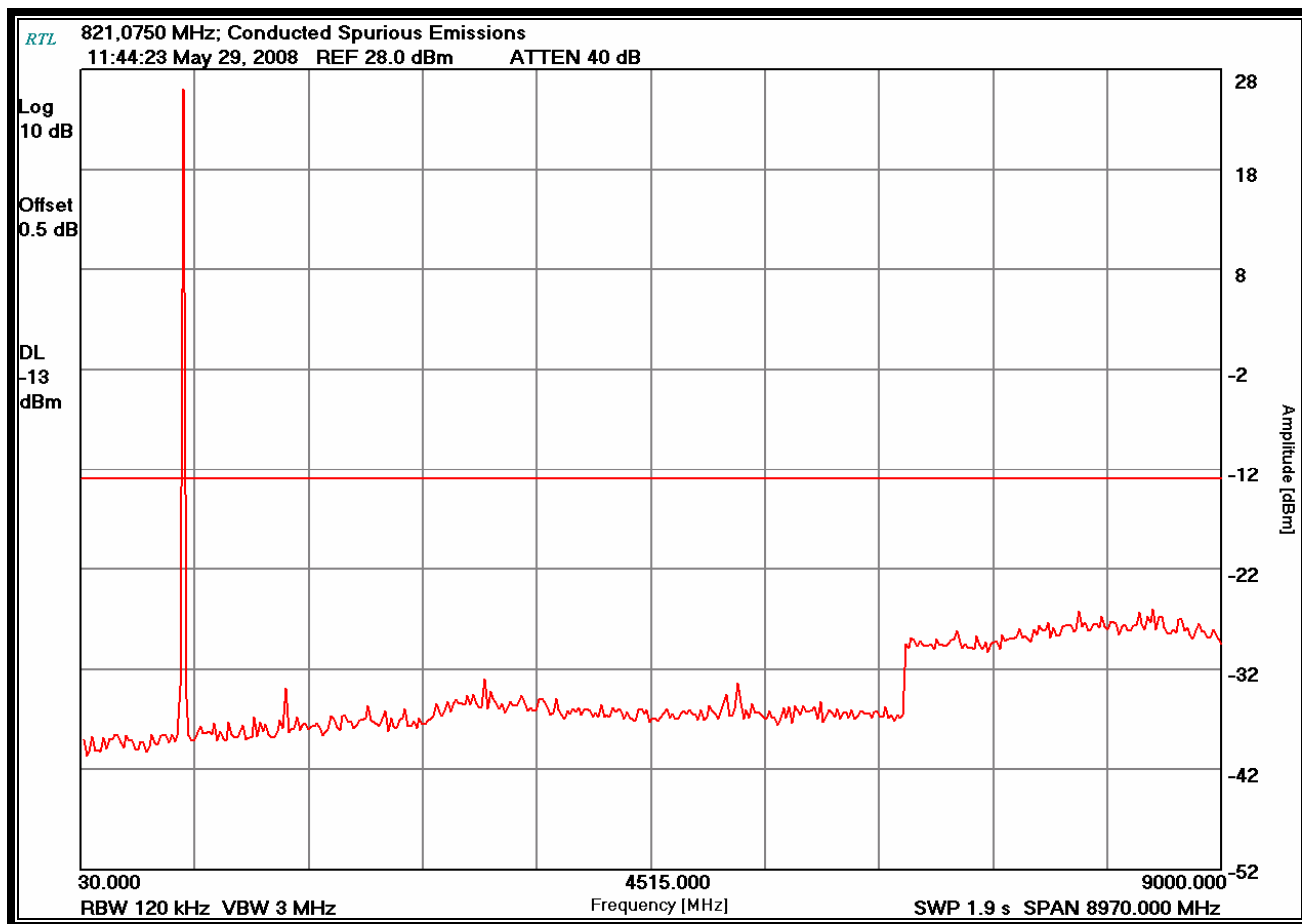


**Plot 6-2: Conducted Spurious Emissions – 808.9125 MHz**






**Plot 6-3: Conducted Spurious Emissions – 821.075 MHz**



**Table 6-1: Test Equipment for Conducted Spurious Emissions**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901057	Hewlett Packard	3336B	Synthesizer/Level Generator (100 Hz-20 MHz)	2514A02585	12/13/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/5/08
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/5/08
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz–12.8 GHz)	3826A00144	10/17/08
901157	Marconi Instruments	2022D	Signal Generator	119161/056	12/12/08

**Test Personnel:**

Daniel Baltzell		May 29, 2007
Test Engineer	Signature	Date of Tests

## **7 Intermodulated Spurious Emissions**

### **7.1 Test Procedure**

The transmitter is terminated with a 50  $\Omega$  load and interfaced with a spectrum analyzer. Cable losses were accounted for in measurement. Two signal generators were used to produce interference signals. Two signals were injected on the low end of band and two signals were injected on the high end of band.

Low end: Plot 7-1

806.2125 MHz – 5 kHz deviation, 2.5 kHz tone at -50 dBm

807.2125 MHz - 5 kHz deviation, 2.5 kHz tone at -50 dBm

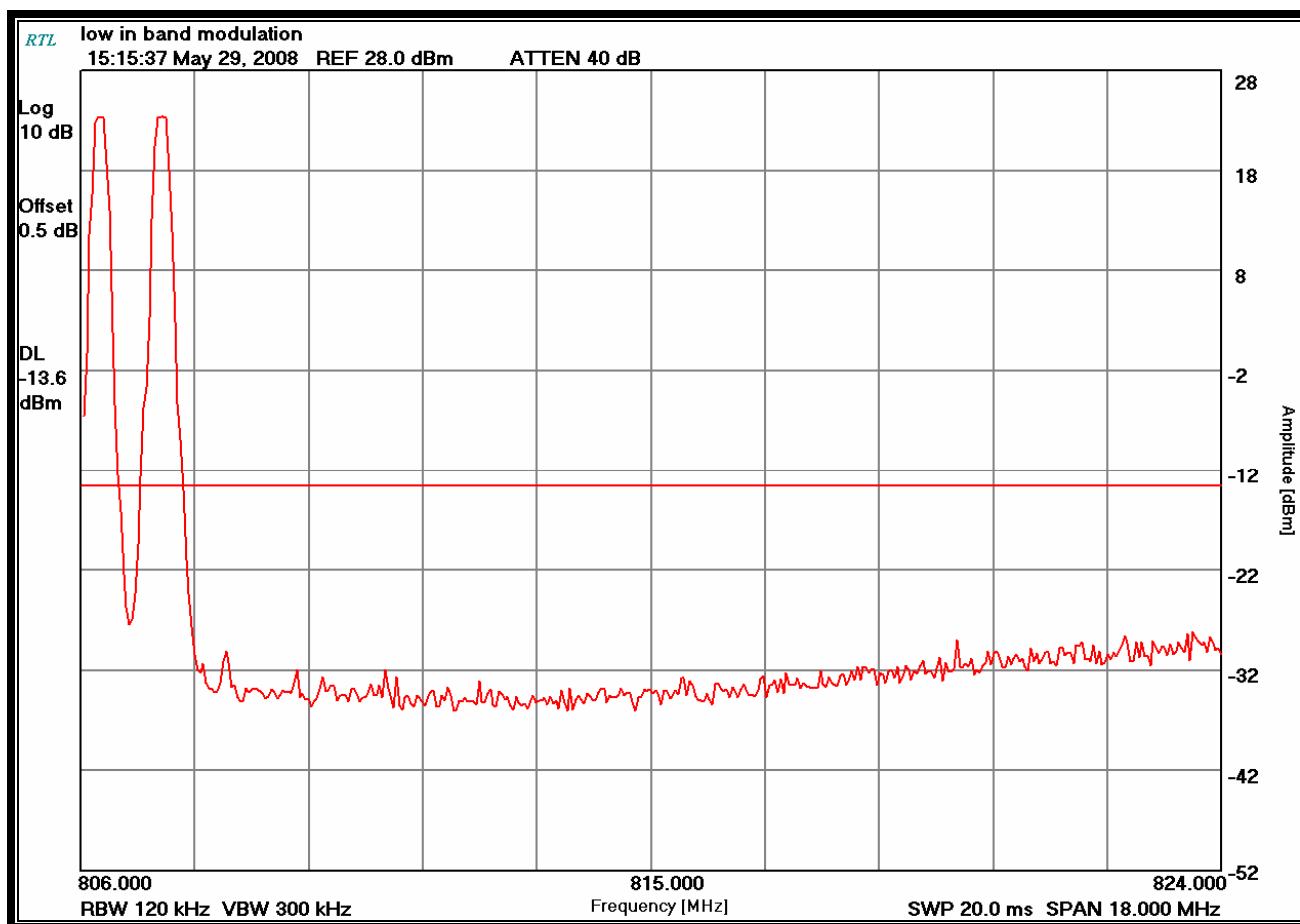
High end: Plot 7-2

821.075 MHz – 5 kHz deviation, 2.5 kHz tone at -50 dBm

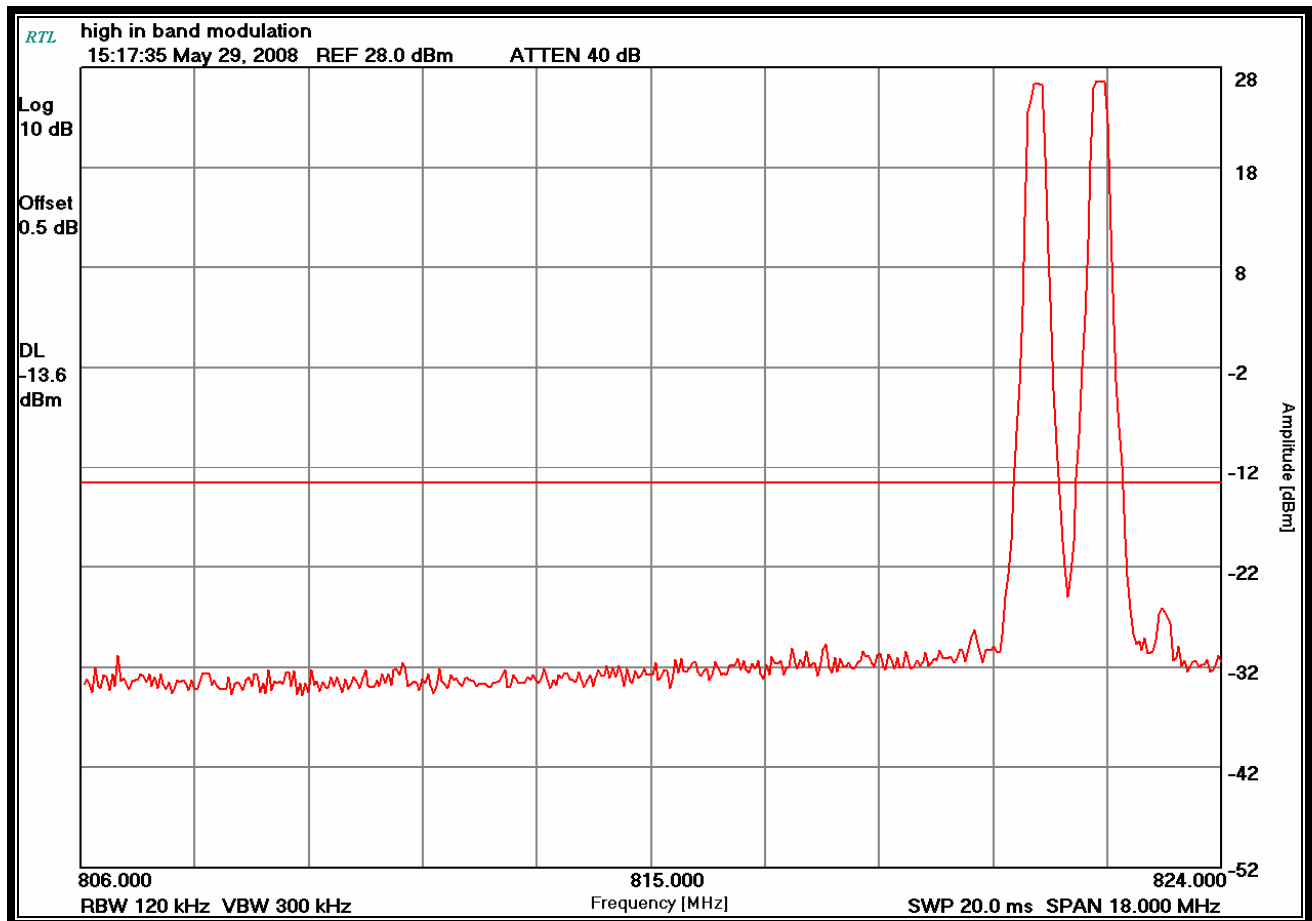
822.075 MHz - 5 kHz deviation, 2.5 kHz tone at -50 dBm

## 7.2 Test Data

Plot 7-1: Intermodulated Spurious Emissions - Low Channels In-Band Intermodulation




**Plot 7-2: Intermodulated Spurious Emissions - High Channels In-Band Intermodulation**



**Table 7-1: Test Equipment for Intermodulated Spurious Emissions**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz–12.8 GHz)	3826A00144	10/17/08
900352	Werlatone	C1795	Directional Coupler	4989	06/06/08
901157	Marconi Instruments	2022D	Signal Generator	119161/056	N/A
900917	Hewlett Packard	8648C	Signal Generator	3537A01741	9/5/08
901057	Hewlett Packard	3336B	Synthesizer/Level Generator (100 Hz-20 MHz)	2514A02585	12/13/08
901118	Hewlett Packard	HP8901B	Modulation Analyzer (150 kHz–1300 MHz)	2406A00178	8/20/08
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

**Test Personnel:**

Daniel Baltzell		May 29, 2008
Test Engineer	Signature	Date of Tests

## 8 FCC Rules and Regulations Part 90.210 and Part 2.1053(a): Field Strength of Spurious Radiation

### 8.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.12.

The EUT was placed on a floor-mounted turntable at a distance of 3 meters from the receiving antenna. The receiving antenna was varied between 1–4 meters to maximize emissions. The spurious emissions levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half wave dipole.

The output was terminated with 50  $\Omega$  load.

### 8.2 Test Data

#### 8.2.1 CFR 47 Part 90.210 Requirements


No emissions were found within 20 dB of the limit; per 2.1057, no data is being reported.

Limit:  $P(\text{dBm}) - (43 + 10 \times \text{LOG } P(\text{W}))$

**Table 8-1: Test Equipment for Field Strength of Spurious Radiation**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz–2 GHz)	2648	12/20/08
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	10/8/08
901215	Hewlett Packard	8596EM	Portable Spectrum Analyzer (9 kHz–12.8 GHz)	3826A00144	10/17/08
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01–20 GHz)	3610A00866	12/7/08
900772	EMCO	3161-02	Horn Antenna (2–4 GHz)	9504-1044	6/14/10
900321	EMCO	3161-03	Horn Antenna (4–8 GHz)	9508-1020	6/14/10
900323	EMCO	3160-07	Horn Antenna (8.2-12.4 GHz)	9605-1054	6/14/10
900814	Electrometrics	RGA-60	Double Ridge Horn Antenna (1–18 GHz)	2310	3/30/09
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/5/08
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/5/08
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF cable, 30'	NA	10/5/08

#### Test Personnel:

Daniel Baltzell		May 28, 2008
Test Engineer	Signature	Date of Tests

## 9 Conclusion

The data in this measurement report shows that the **Airlite Communications, Inc. Model 50289-BAM-8-800-UL, FCC ID: UT650289BAM8800UL**, complies with all the applicable requirements of FCC Parts 90 and 2.