



## MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

33439 WESTERN AVENUE ! UNION CITY, CALIFORNIA 94587 ! PHONE (510) 489-6300 ! FAX (510) 489-6372

January 24, 2007

Advanced RF Technologies  
2607 Colorado Blvd.  
Los Angeles, CA 90041

Dear Sadat Chowdhury,

Enclosed is the EMC test report for compliance testing of the Advanced RF Technologies DUO-i6525 as tested to the requirements of the FCC Certification rules under Title 47 of CFR Part 90 Subpart I.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please contact me.

Sincerely yours,  
MET LABORATORIES, INC.

Boonmanus Seelapasay  
Documentation Department

Reference: (\Advanced RF Technologies\EMCS21515-FCC90)

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**Electromagnetic Compatibility Criteria  
Test Report**

for the

**Advanced RF Technologies  
Model DUO-i6525**

Verified under  
FCC Certification Rules  
Title 47 of the CFR, Part 90 Subpart I

**MET Report: EMCS21515-FCC90**

January 24, 2007

**Prepared For:**

**Advanced RF Technologies  
2607 Colorado Blvd.  
Los Angeles, CA 90041**

**Prepared By:**  
**MET Laboratories, Inc.**  
4855 Patrick Henry Dr., Building 6  
Santa Clara, CA 95054



Advanced RF Technologies  
DUO-i6525

Electromagnetic Compatibility  
CFR Title 47 Part 90 Subpart I & Part 15 Subpart B

## Electromagnetic Compatibility Criteria Test Report

for the

**Advanced RF Technologies  
Model DUO-i6525**

### Tested Under

**FCC Certification Rules  
Title 47 of the CFR, Part 90 Subpart I**



Shawn McMillen, Project Engineer  
Electromagnetic Compatibility Lab



Boonmanus Seelapasay  
Documentation Department

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 90 Subpart I and Part 15 Subpart B of the FCC Rules under normal use and maintenance.



Tony Permsombut, Manager  
Electromagnetic Compatibility Lab



Advanced RF Technologies  
DUO-i6525

Electromagnetic Compatibility  
Report Status  
CFR Title 47 Part 90 Subpart I & Part 15 Subpart B

## Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	January 24, 2007	Initial Issue.



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## List of Terms and Abbreviations

<b>AC</b>	Alternating Current
<b>ACF</b>	Antenna Correction Factor
<b>Cal</b>	Calibration
<i>d</i>	Measurement Distance
<b>dB</b>	Decibels
<b>dB<sub>μ</sub>A</b>	Decibels above one <b>microamp</b>
<b>dB<sub>μ</sub>V</b>	Decibels above one <b>microvolt</b>
<b>dB<sub>μ</sub>A/m</b>	Decibels above one <b>microamp per meter</b>
<b>dB<sub>μ</sub>V/m</b>	Decibels above one <b>microvolt per meter</b>
<b>DC</b>	Direct Current
<b>E</b>	Electric Field
<b>DSL</b>	Digital Subscriber Line
<b>ESD</b>	Electrostatic Discharge
<b>EUT</b>	Equipment Under Test
<i>f</i>	Frequency
<b>FCC</b>	Federal Communications Commission
<b>GR-1089-CORE</b>	( <i>GR</i> ) General Requirement(s) imposed by the NEBS standard, ( <i>CORE</i> ) Central Office Recovery Express (AT&T), ( <i>1089</i> ) specifies various parts of the General Requirements under Bellcore Technical Standard, Requirements for Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment
<b>GRP</b>	Ground Reference Plane
<b>H</b>	Magnetic Field
<b>HCP</b>	Horizontal Coupling Plane
<b>Hz</b>	Hertz
<b>IEC</b>	International Electrotechnical Commission
<b>kHz</b>	kilohertz
<b>kPa</b>	kilopascal
<b>kV</b>	kilovolt
<b>LISN</b>	Line Impedance Stabilization Network
<b>MHz</b>	Megahertz
<b>μH</b>	microhenry
<b>μ</b>	microfarad
<b>μs</b>	microseconds
<b>NEBS</b>	Network Equipment-Building System
<b>PRF</b>	Pulse Repetition Frequency
<b>RF</b>	Radio Frequency
<b>RMS</b>	Root-Mean-Square
<b>TWT</b>	Traveling Wave Tube
<b>V/m</b>	Volts per meter
<b>VCP</b>	Vertical Coupling Plane



Advanced RF Technologies  
DUO-i6525

Executive Summary  
CFR Title 47 Part 90 Subpart I & Part 15 Subpart B

## I. Executive Summary



## A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Advanced RF Technologies DUO-i6525, with the requirements of Part 90 Subpart I and Part 15 Subpart B. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the DUO-i6525. Advanced RF Technologies should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the DUO-i6525, has been permanently discontinued.

## B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 90 Subpart I and Part 15 Subpart B, in accordance with Advanced RF Technologies, purchase order number 1171.

Reference	Description	Compliant
Part 15 Subpart B §15.109(a)	Conducted Emissions	Yes
Part 15 Subpart B §15.107(a)	Radiated Emissions	Yes
§2.1046; §90.205	RF Power Output	Yes
§2.1047; §90.212	Audio Frequency Response	N/A
§2.1047	Modulation Limiting	N/A
§2.1049	Occupied Bandwidth	Yes
§2.1053; §2.1057, §90.210	Spurious Emissions at Antenna Terminals and Inter-Modulation	Yes
§2.1053; §2.1057, §90.210	Radiated Spurious Emissions	Yes
§2.1055; §90.213	Frequency Stability	Yes
2-11-04/EAB/RF	Out of Band Rejection	Yes
1.1307, 1.1310, 2.1091, 2.1093	RF Exposure Limit	See Note

**Table 1 Executive Summary of EMC Compliance Testing**

Note: RF Exposure is addressed at the time of licensing



## II. Equipment Configuration



## A. Overview

MET Laboratories, Inc. was contracted by Advanced RF Technologies to perform testing on the DUO-i6525, under Advanced RF Technologies' purchase order number 1171.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Advanced RF Technologies, DUO-i6525.

The results obtained relate only to the item(s) tested.

<b>Model(s) Tested:</b>	Model DUO-i6525 SMR800; SMR900				
<b>Model(s) Covered:</b>	Model DUO-i6525 SMR800; SMR900				
<b>EUT Specifications:</b>	Primary Power Source: Laptop				
	FCC ID: S2OADRTECH005				
	Type of Modulations:	iDEN (QAM)			
	Emission Designators:	GXW (iDEN)			
	Average Output Power:	Downlink	Uplink		
		Low 24.6 dBm	Low 25.0 dBm		
		Mid 24.9 dBm	Mid 24.9 dBm		
	Equipment Code:	High 24.7 dBm	High 24.8 dBm		
		TNB			
	EUT Frequency Ranges:	SMR800: 806 – 824MHz, 817 – 824MHz, 851 – 869MHz; 862 – 869 MHz SMR900: 896 – 901MHz; 935 – 940MHz			
<b>Analysis:</b>	The results obtained relate only to the item(s) tested.				
<b>Environmental Test Conditions:</b>	Temperature: 15-35° C				
	Relative Humidity: 30-60%				
	Barometric Pressure: 860-1060 mbar				
<b>Evaluated by:</b>	Shawn McMillen				
<b>Date(s):</b>	January 18, 2007				



## B. References

<b>CFR 47, Part 90, Subpart I</b>	General Technical Standards
<b>CFR 47, Part 15, Subpart B</b>	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
<b>ANSI C63.4:2003</b>	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
<b>ANSI/NCSL Z540-1-1994</b>	Calibration Laboratories and Measuring and Test Equipment - General Requirements
<b>ANSI/ISO/IEC 17025:2000</b>	General Requirements for the Competence of Testing and Calibration Laboratories
<b>EIA/TIA-603-Edition C 2004</b>	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards



### C. Test Site

All testing was performed at MET Laboratories, Inc., 4855 Patrick Henry Drive, Building 6, Santa Clara, California 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories. In accordance with §2.948(d), MET Laboratories has been accredited by A2LA (Certificate Number 591.02).

### D. Description of Test Sample

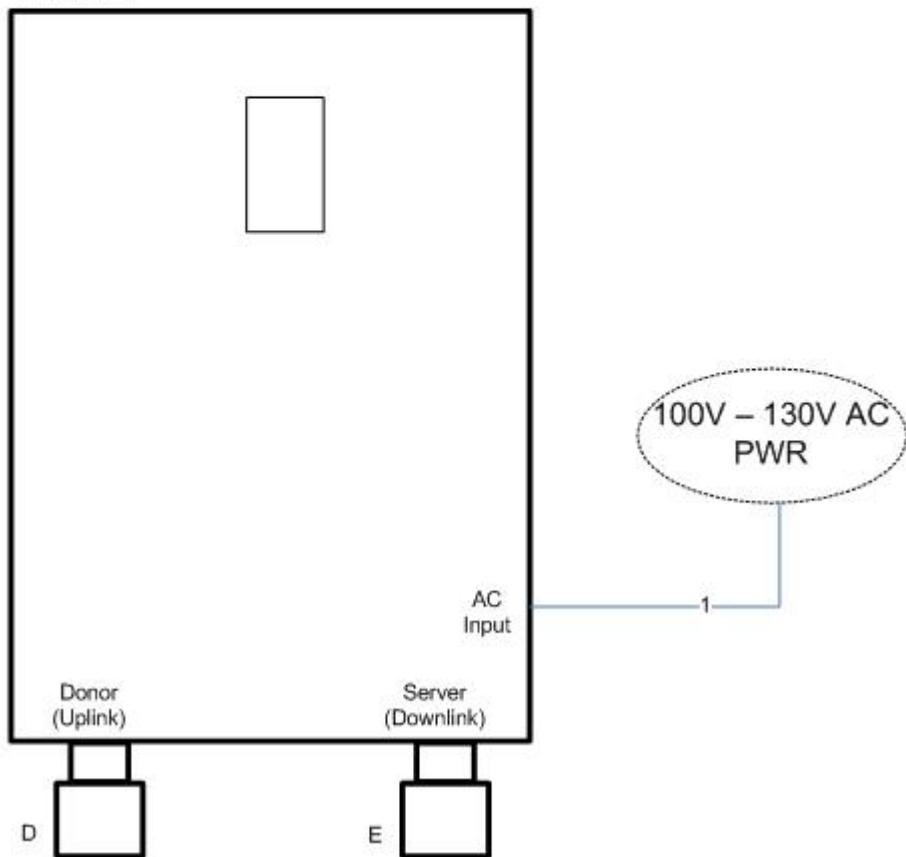
The Advanced RF Technologies DUO-i6525, is an RF signal amplifier system for the wireless 800 and 900 MHz iDEN spectrum. Its main purpose is to extend wireless signal from the base station to shaded areas or to a region of poor wireless coverage within an in-building environment. A repeater is meant to be used in conjunction with a base station.



Photograph 1. Advanced RF Technologies DUO-i6525

## Unintentional Radiated Emission

**A Front**



**Figure 1. Block Diagram of Test Configuration (Radiated Emissions)**

## Conducted Measurement (Up-Link)

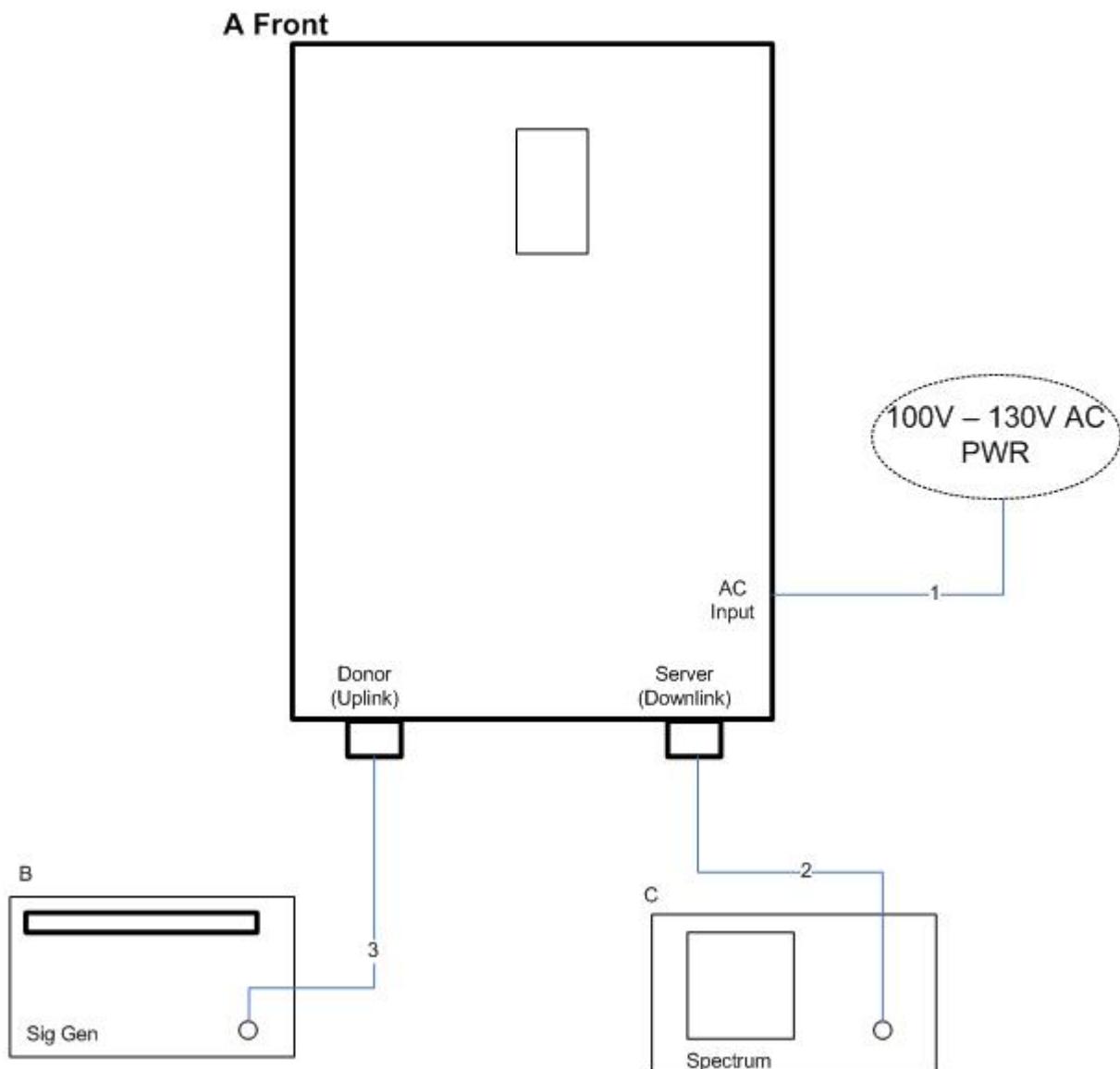
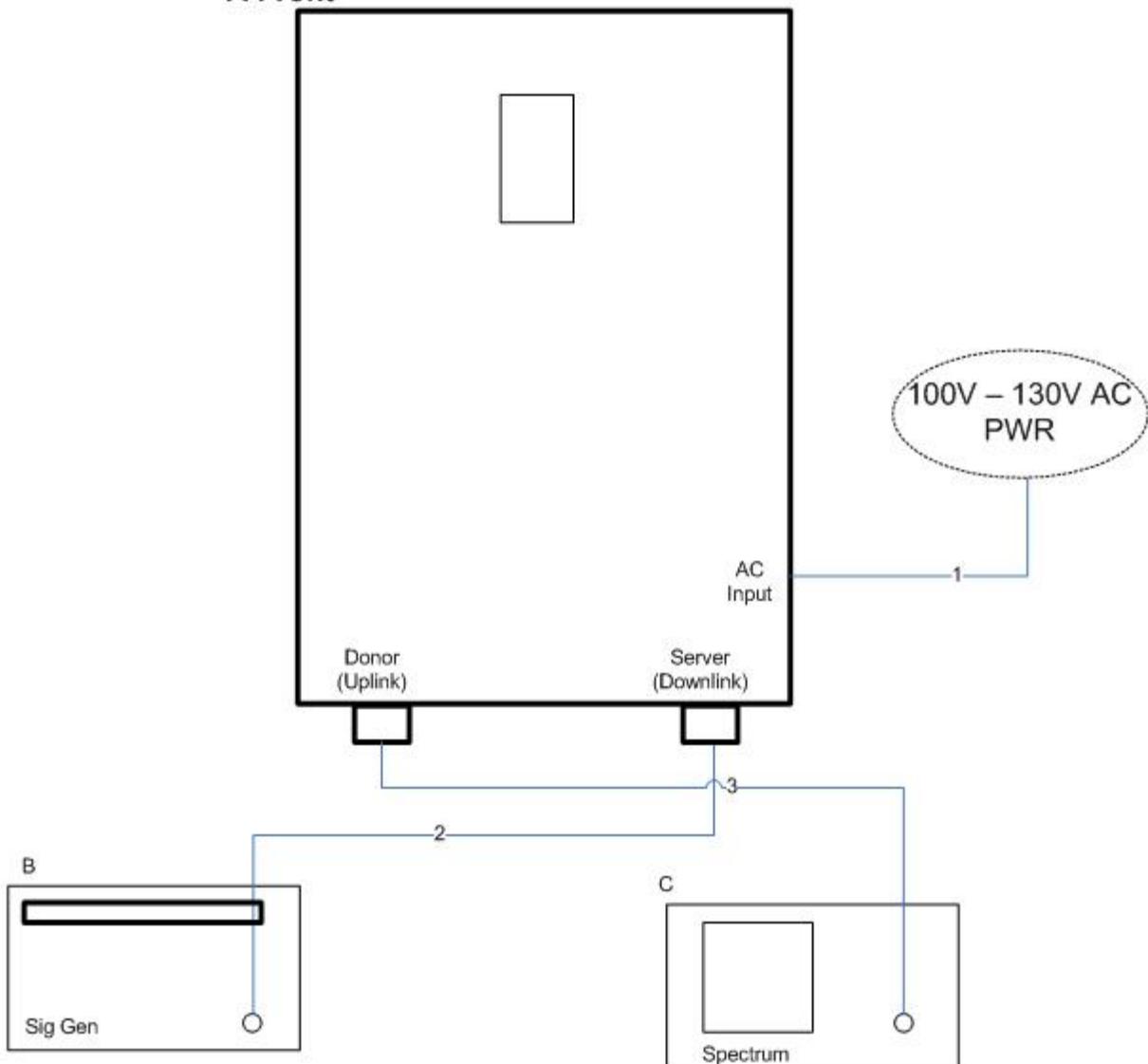


Figure 2. Block Diagram of Test Configuration (Conducted Measurement-Uplink)

## Conducted Measurement (Down-Link)

**A Front**



**Figure 3. Block Diagram of Test Configuration (Conducted Measurement – Downlink)**



## E. Equipment Configuration

The EUT was set up as outlined in Figure 1, Figure 2, and Figure 3. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Part Number	Serial Number	Rev. #
A	DUO-i625	SMR800/SMR900	N/A	N/A	N/A

Table 2. Equipment Configuration

## F. Support Equipment

Advanced RF Technologies supplied support equipment necessary for the operation and testing of the DUO-i6525. All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name / Description	Manufacturer	Model Number	Serial Number
B	Signal Generator	HP	E4432B	US38080117
C	Spectrum Analyzer	HP	E4407B	MY45102898
D	50 Ohms Terminator	Narda	375BNM	07
E	50 Ohms Terminator	Narda	378BNM	53

Table 3. Support Equipment

\* The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.

\*\* The AC/DC Adapter was used to power the EUT for testing purpose only, will not be sold with radio.



## G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded (Y/N)	Termination Box ID & Port ID
<b>Conducted Measurement (Down-Link)</b>						
1	A, AC Input	AC PWR Cord (18AWG)	1	2	No	AC PWR Outlet
2	A Front, Down link	Coax	1	2	Yes	B
3	A Front, Up link	Coax	1	2	Yes	C
<b>Conducted Measurement (Up-Link)</b>						
1	A, AC Input	AC PWR Cord (18AWG)	1	2	No	AC PWR Outlet
2	A Front, Down link	Coax	1	2	Yes	C
3	A Front, Up link	Coax	1	2	Yes	B
<b>Unintentional Radiated Emission</b>						
1	A, AC Input	AC PWR Cord (18AWG)	1	2	No	AC PWR Outlet

Table 4. Ports and Cabling Information

## H. Mode of Operation

Uplink Mode: Signal flow from the mobile handset to the server antenna to the server port of the repeater to the donor port of the repeater to the donor antenna to the base station.

Down Link Mode: Signal flow from the base station to the donor antenna to donor port of the repeater to the server port of the repeater to the server antenna to the mobile handset.

The carrier applied to the repeater was a Quadrature Amplitude Modulation (QAM) which is a modulation scheme that conveys data by modulating the amplitude of two carriers and having an occupied band width of approximately 14Kb.

## I. Method of Monitoring EUT Operation

A Spectrum Analyzer and a Power Meter was use to monitor the EUT's transmitter channel and power output.

## J. Modifications

### a) Modifications to EUT

No modifications were made to the EUT.

### b) Modifications to Test Standard

No modifications were made to the test standard.

## K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Advanced RF Technologies upon completion of testing.



Advanced RF Technologies  
DUO-i6525

Electromagnetic Compatibility  
Unintentional Radiators  
CFR Title 47 Part 90 Subpart I & Part 15 Subpart B

### III. Electromagnetic Compatibility Criteria for Unintentional Radiators



## Electromagnetic Compatibility Criteria for Unintentional Radiators

### § 15.107 Conducted Emissions Limits

**Test Requirement(s):** **15.107 (a)** “Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.”

**15.107 (b)** “For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.”

Frequency range (MHz)	15.107(b), Class A Limits (dB $\mu$ V)		15.107(a), Class B Limits (dB $\mu$ V)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15- 0.5	79	66	66 - 56	56 - 46
0.5 – 5.0	73	60	56	46
5.0 - 30	73	60	60	50

Note 1 — The lower limit shall apply at the transition frequencies.

**Table 5. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Section 15.107(a) (b)**

**Test Procedures:**

The EUT was placed on a 0.8m-high wooden table inside a semi-anechoic chamber. The method of testing, test conditions, and test procedures of ANSI C63.4 were used. The EUT was powered through a 50 $\Omega$ /50 $\mu$ H LISN. An EMI receiver, connected to the measurement port of the LISN, scanned the frequency range from 150 kHz to 30 MHz in order to find the peak conducted emissions. All peak emissions within 6 dB of the limit were measured using a quasi-peak and/or average detector as appropriate.

**Test Results:**

The EUT was found compliant with the Class A requirement(s) of this section. Measured emissions were below applicable limits.

**Test Engineer(s):** Anderson Soungpanya

**Test Date(s):** January 12, 2007



Advanced RF Technologies  
DUO-i6525

Electromagnetic Compatibility  
Unintentional Radiators  
CFR Title 47 Part 90 Subpart I & Part 15 Subpart B

### Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

Freq. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Results QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Results QP	Margin (dB) AVG
0.179	45.13	79	Pass	-33.87	45.07	66	Pass	-20.93
0.239	31.84	79	Pass	-47.16	31.71	66	Pass	-34.29
10.930	19.63	73	Pass	-53.37	6.68	60	Pass	-53.32
22.020	19.40	73	Pass	-53.6	8.91	60	Pass	-51.09

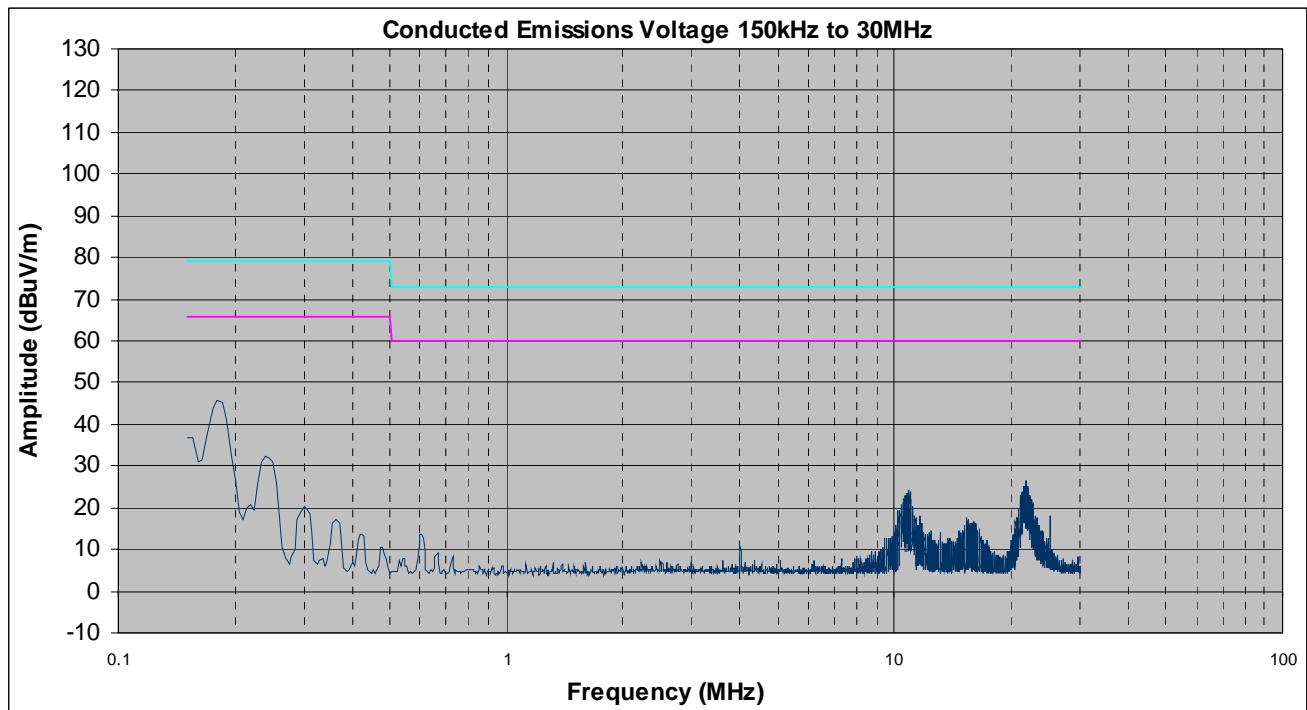
Table 6. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

### Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)

Freq. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Results QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Results AVG	Margin (dB) AVG
0.178	45.58	79	Pass	-33.42	45.48	66	Pass	-20.52
0.238	31.67	79	Pass	-47.33	31.54	66	Pass	-34.46
11.000	20.23	73	Pass	-52.77	5.67	60	Pass	-54.33
22.010	23.14	73	Pass	-49.86	12.45	60	Pass	-47.55

Table 7. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)

## Conducted Emissions - Voltage, Worst Case Emissions, Phase Line Plots

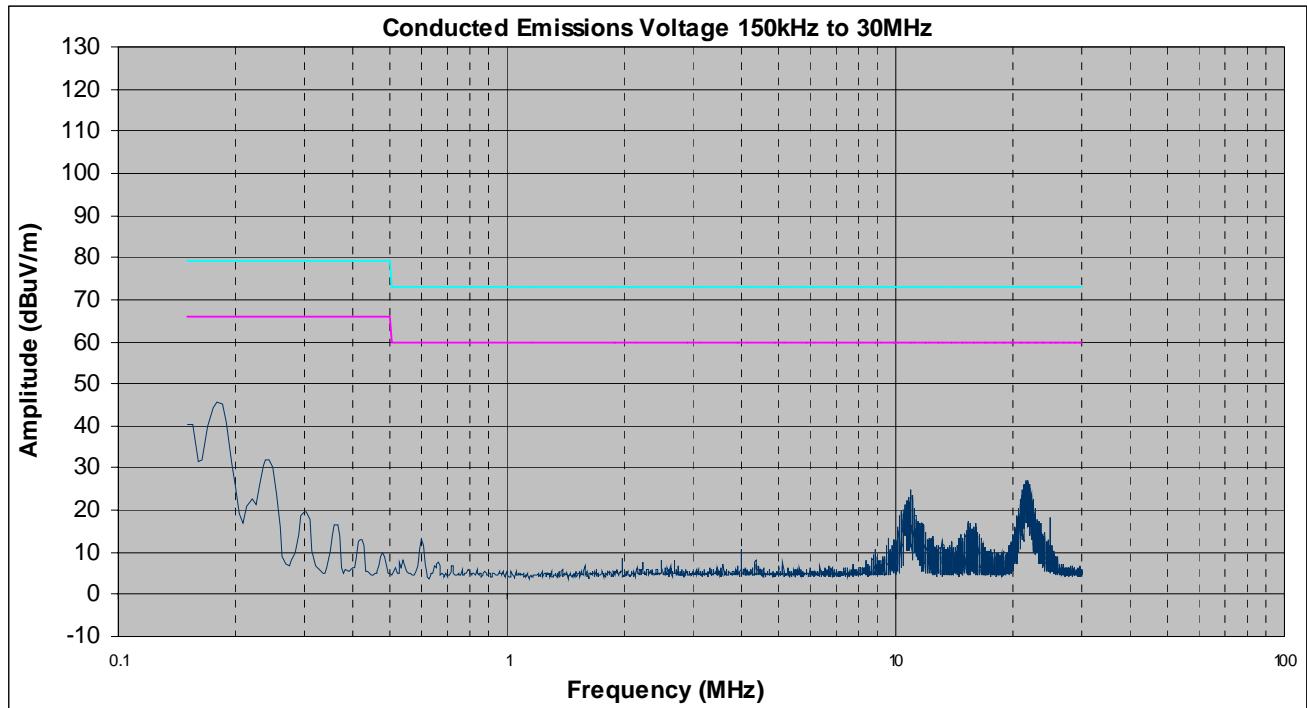




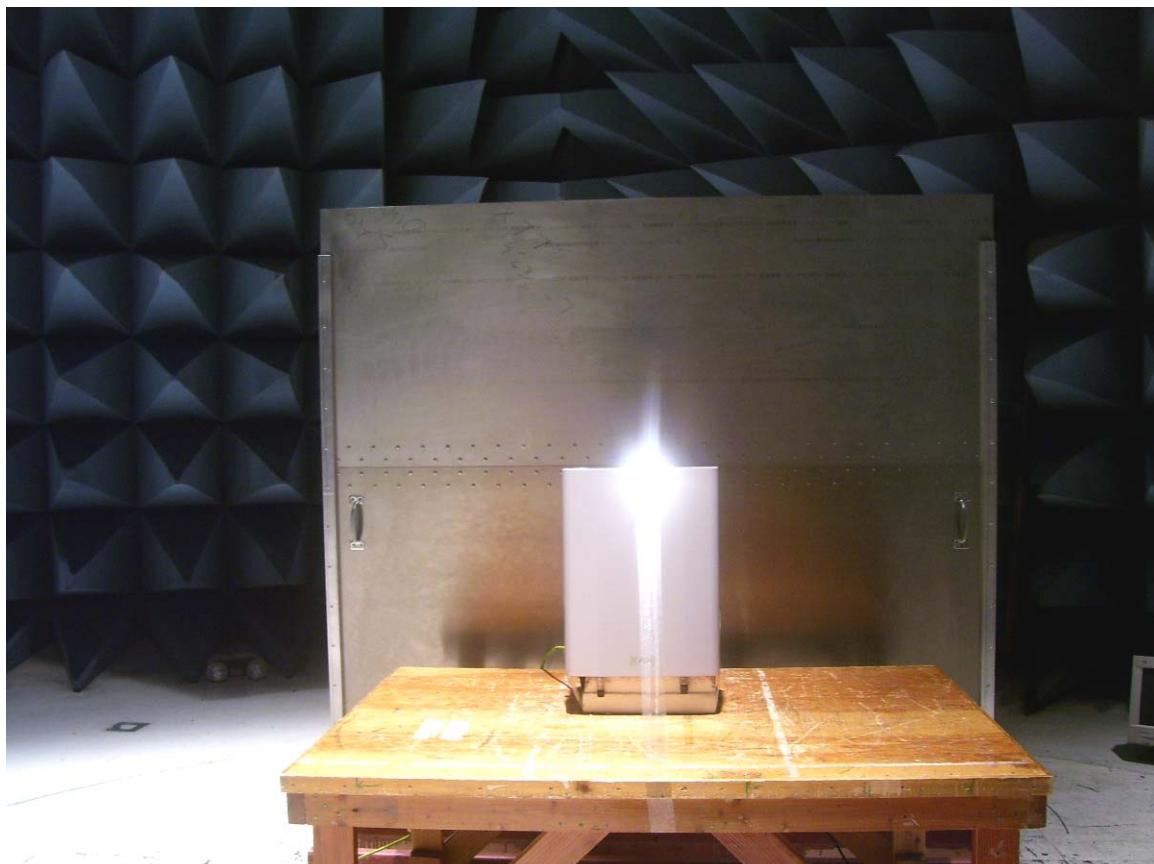
Advanced RF Technologies  
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Unintentional Radiators  
CFR Title 47 Part 90 Subpart I & Part 15 Subpart B

## Conducted Emissions - Voltage, Worst Case Emissions, Neutral Line Plots

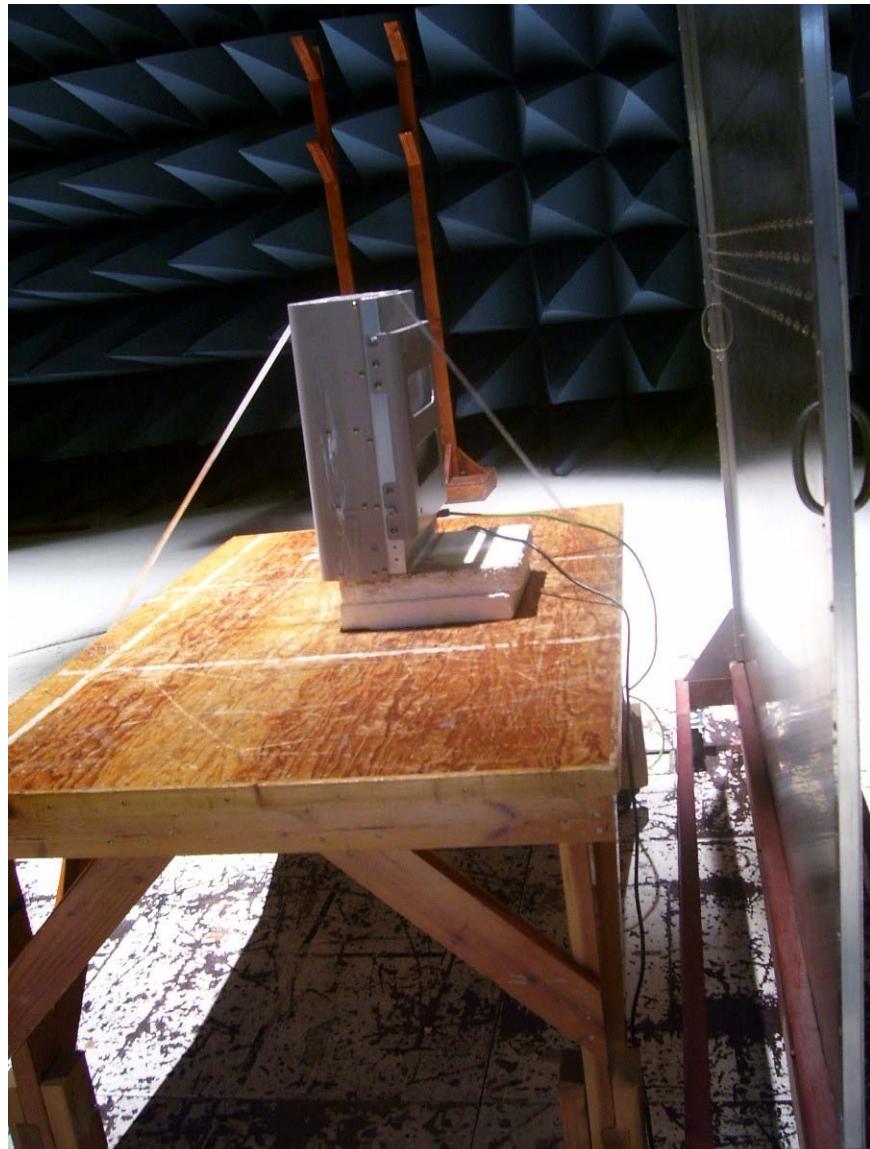


## Conducted Emission Limits Test Setup



Photograph 2. Conducted Emissions Test Setup – Front View

## Conducted Emission Limits Test Setup



Photograph 3. Conducted Emissions Test Setup – Back View



## Electromagnetic Compatibility Criteria for Unintentional Radiators

### § 15.107 Radiated Emission Limits

**Test Requirement(s):** **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in Table 8.

**15.109 (b)** The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 8.

Frequency (MHz)	Field Strength (dB $\mu$ V/m)	
	§15.109 (b), Class A Limit (dB $\mu$ V) @ 10m	§15.109 (a), Class B Limit (dB $\mu$ V) @ 3m
30 - 88	39.00	40.00
88 - 216	43.50	43.50
216 - 960	46.40	46.00
Above 960	49.50	54.00

**Table 8. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)**

**Test Procedures:** The EUT was placed on a 0.8m-high wooden table inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 10 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

**Test Results:** The EUT was found Compliant with the Class A requirement(s) of this section. Measured emissions were below applicable limits

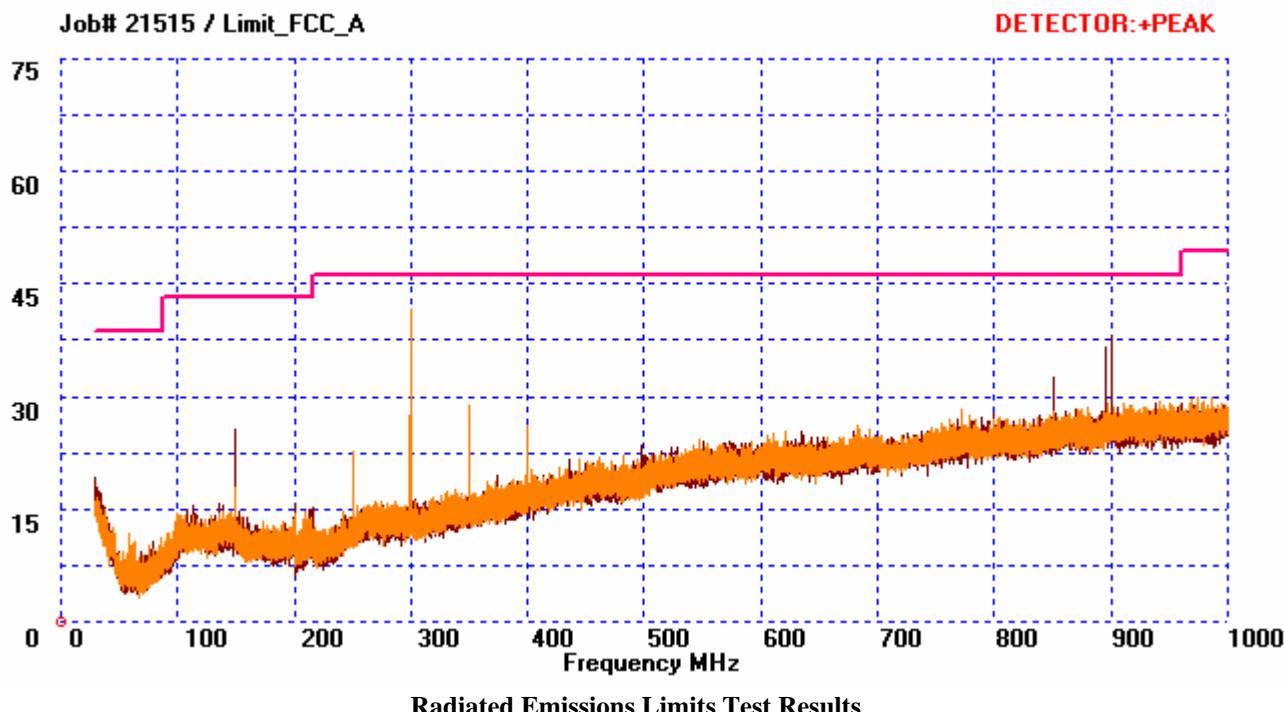
**Test Engineer(s):** Anderson Soungpanya

**Test Date(s):** January 12, 2007

## Radiated Emissions Limits Test Results, Class A

Frequency (MHz)	Antenna Polarity (H/V)	EUT Azimuth (Degrees)	Antenna Height (m)	Uncorrected Amplitude QP Detector (dBuV)	Antenna Correction Factor (dB/m) (+)	Cable Loss (dB) (+)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
150	H	192	3.88	14.32	11.00	2.24	27.56	43.50	-15.94
300	V	338	1.00	25.97	13.30	2.93	42.20	46.40	-4.20
350	H	235	2.51	10.90	14.40	3.20	28.50	46.40	-17.90
350	V	338	1.00	11.10	14.70	3.20	29.00	46.40	-17.40
850	H	82	2.30	9.11	20.60	5.69	35.40	46.40	-11.00
900	H	85	2.15	11.81	20.80	5.91	38.52	46.40	-7.88

Table 9. Radiated Emissions Limits Test Results

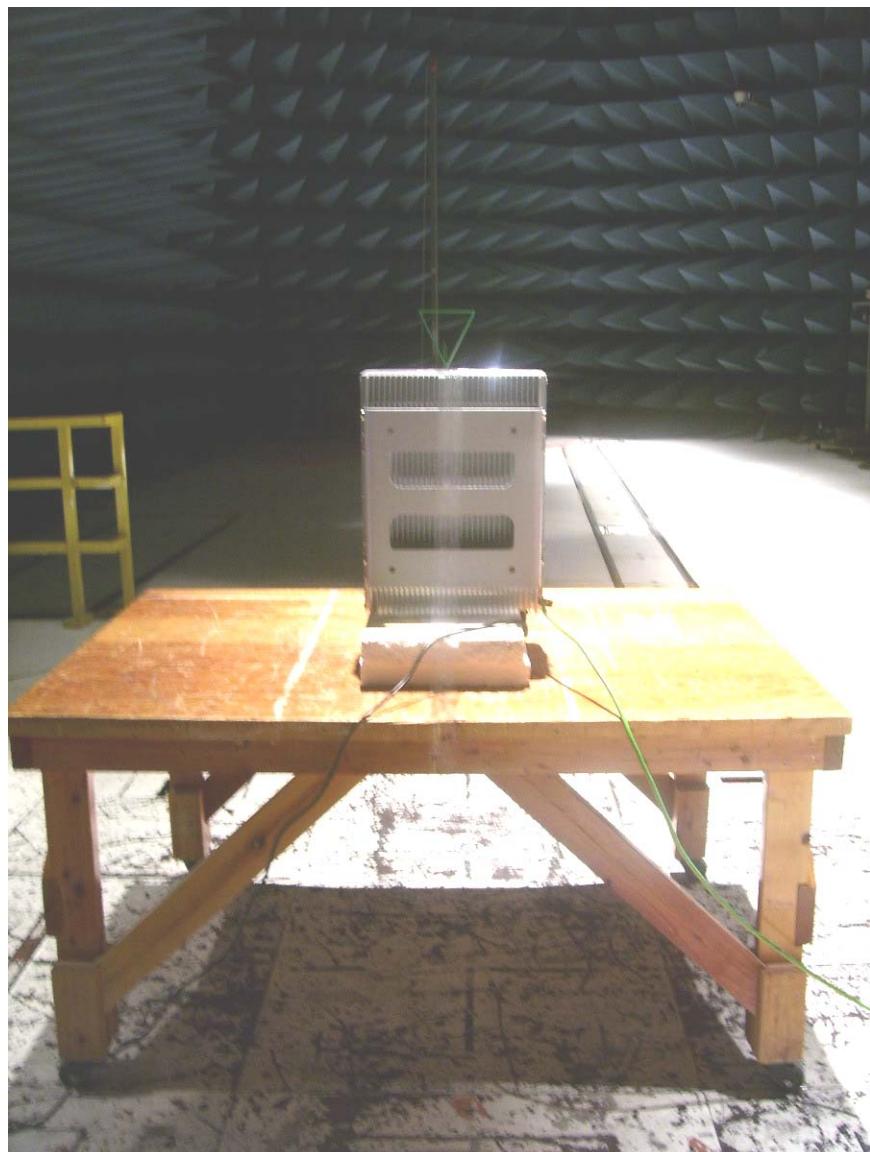


## Radiated Emission Limits Test Setup



Photograph 4. Radiated Emission Limits Test Setup – Front View

## Radiated Emission Limits Test Setup



**Photograph 5. Radiated Emission Limits Test Setup – Back View**



Advanced RF Technologies  
DUO-i6525

Intentional Radiators  
CFR Title 47 Part 90 Subpart I & Part 15 Subpart B

## IV. Electromagnetic Compatibility Criteria for Intentional Radiators



## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 2.1046 RF Power Output

**Test Requirements:** **§ 2.1046 Measurements required: RF power output:**

**§ 2.1046 (a)** For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

**§ 2.1046 (b)** For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

**§ 2.1046 (c)** For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

**§ 90.205** Power and antenna height limits. Refer to § 90.635

**§ 90.635(b):** The Effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

**Test Procedures:** As required by 47 CFR 2.1046, RF power output measurements were made at the RF output terminals using an attenuator and spectrum analyzer or power meter. This test was performed in all applicable modulations.

**Test Results:** The EUT complies with the requirements of this section. The EUT conducted power does not exceed limit at the carrier frequency.

**Test Engineer(s):** Shawn McMillen

**Test Date(s):** January 15, 2007



**Block Diagram 1. RF Power Output Test Setup**



SMR800 DownLink			
Carrier Channel	Frequency (MHz)	Measured Peak Output Power dBm	Measured Average Output Power dBm
Low	851	28.6	24.6
Mid	860	28.7	24.9
High	869	28.7	24.7

SMR800 UpLink			
Carrier Channel	Frequency (MHz)	Measured Peak Output Power dBm	Measured Average Output Power dBm
Low	806	28.9	25.0
Mid	815	28.8	24.9
High	824	28.8	24.8

SMR900 DownLink			
Carrier Channel	Frequency (MHz)	Measured Peak Output Power dBm	Measured Average Output Power dBm
Low	935	27.1	23.2
High	940	27.7	23.8

SMR900 UpLink			
Carrier Channel	Frequency (MHz)	Measured Peak Output Power dBm	Measured Average Output Power dBm
Low	896	27.2	23.2
High	901	27.1	23.1

**Note:** The input power to both Uplink and Downlink ports was -40dBm.



## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 2.1047 Modulation Characteristics

**Test Requirement(s):** **§ 2.1047 Measurements required: Modulation characteristics**

**§ 2.1047 (a):** Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

**Test Procedures:** **This EUT does not support the ability to modulate voice.**

**Test Results:** **N/A**

**Test Engineer(s):** **Shawn McMillen**

**Test Date(s):** **January 15, 2007**



## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 2.1049      Occupied Bandwidth

**Test Requirement(s):**

**§ 2.1049 Measurements required: Occupied bandwidth:** The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

**Test Procedures:**

As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made with a Spectrum Analyzer connected to the RF ports for both Uplink and Downlink

The modulation characteristics of signal generator's carrier was measured first at a maximum RF level prescribed by the OEM. The signal generator was then connected to either the Uplink or Downlink input at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.

**Test Results:**

The EUT complies with the requirements of this section.

**Test Engineer(s):**

Shawn McMillen

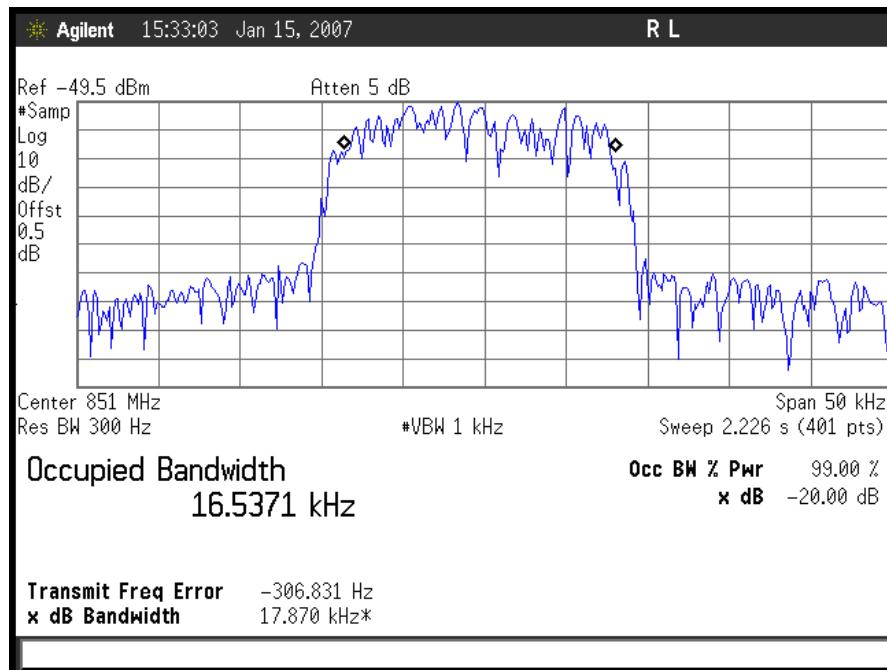
**Test Date(s):**

January 15, 2007

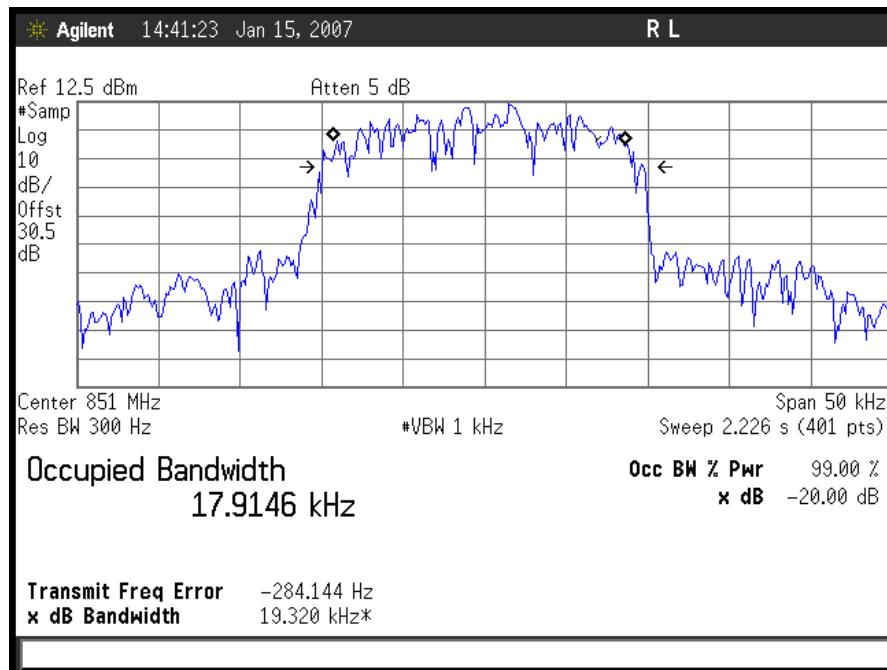


## Electromagnetic Compatibility Criteria for Intentional Radiators

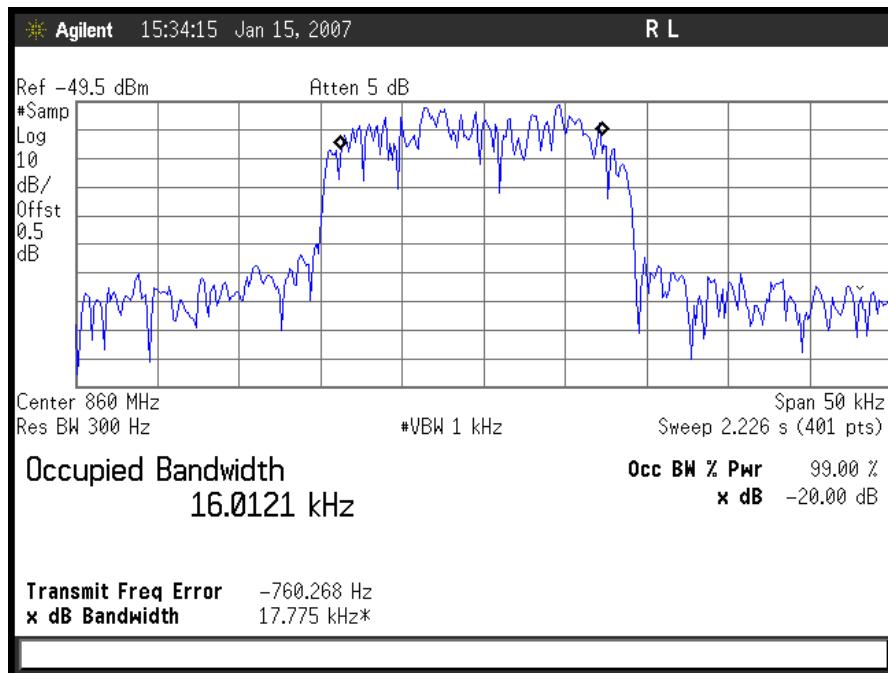
### § 2.1049 Occupied Bandwidth, SMR800



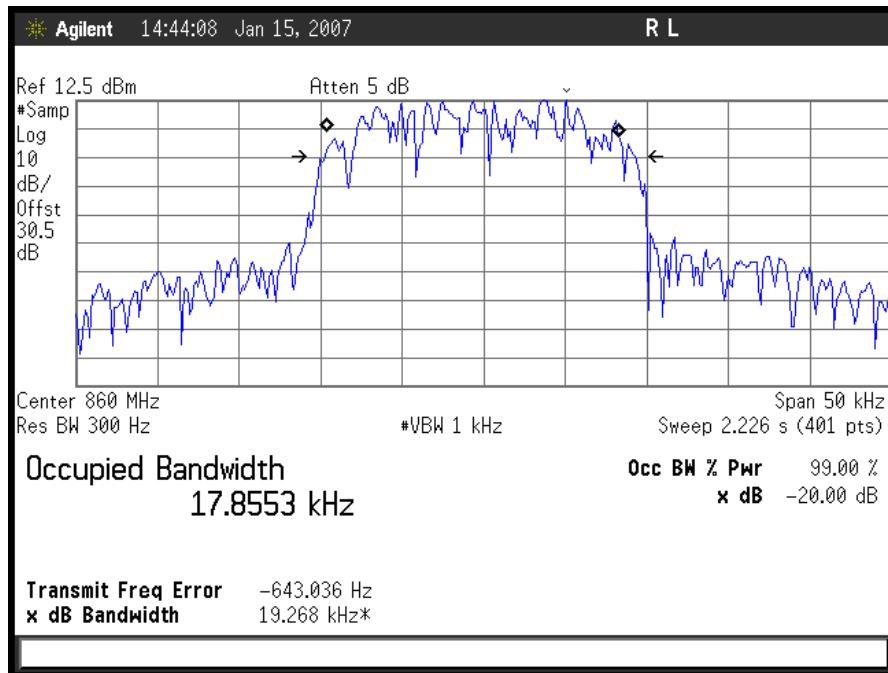
Plot 1. Occupied Bandwidth Input Low CH Downlink



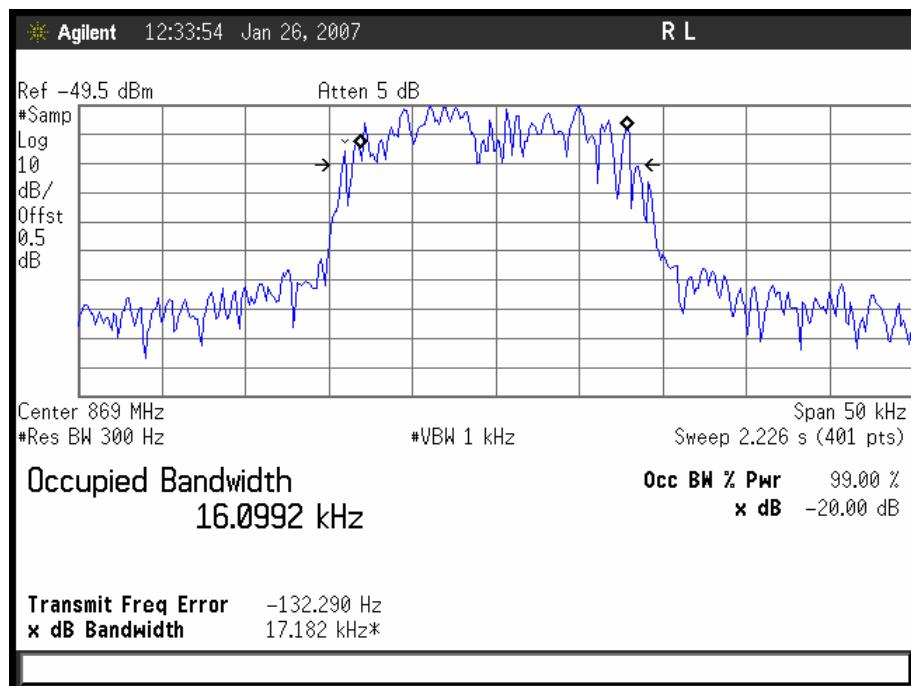
Plot 2. Occupied Bandwidth Output Low CH Downlink



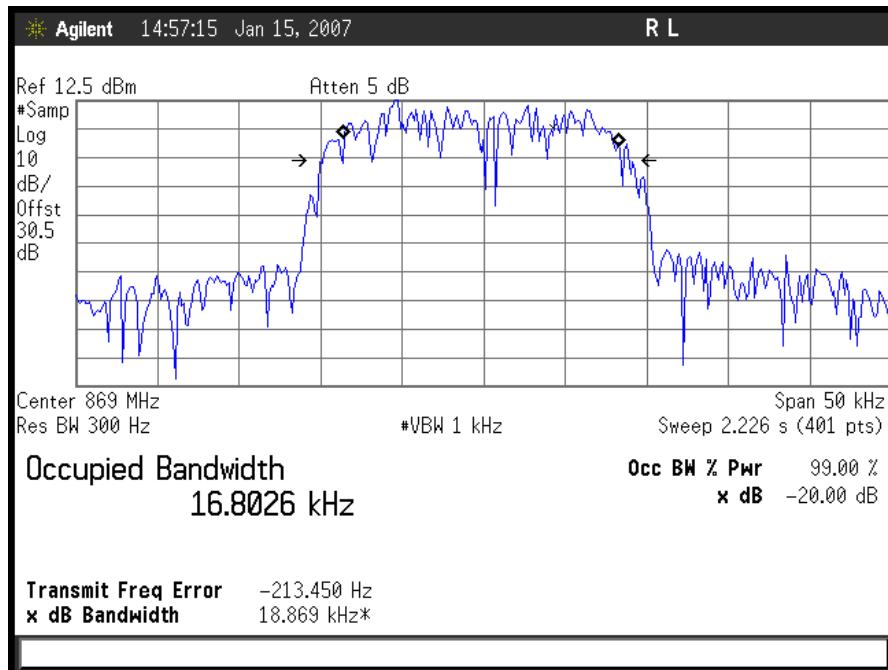
Plot 3. Occupied Bandwidth Input Mid CH Downlink



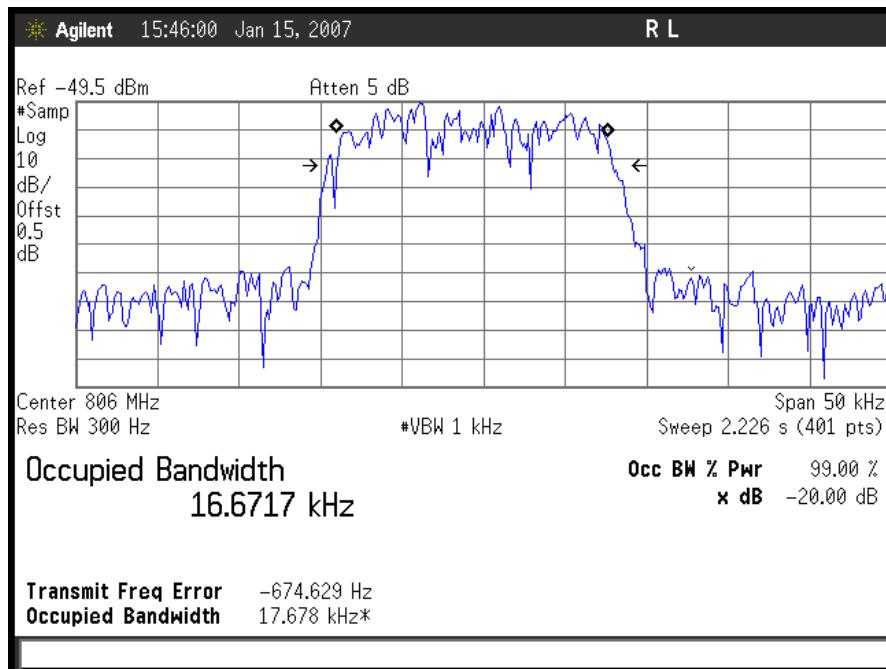
Plot 4. Occupied Bandwidth Output Mid CH Downlink



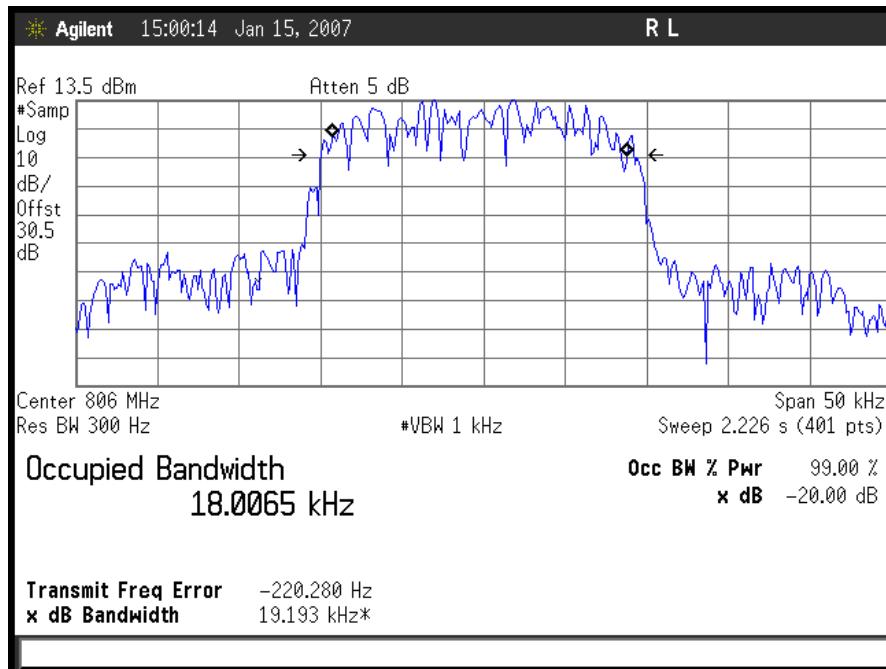
Plot 5. Occupied Bandwidth Input Hi CH Downlink



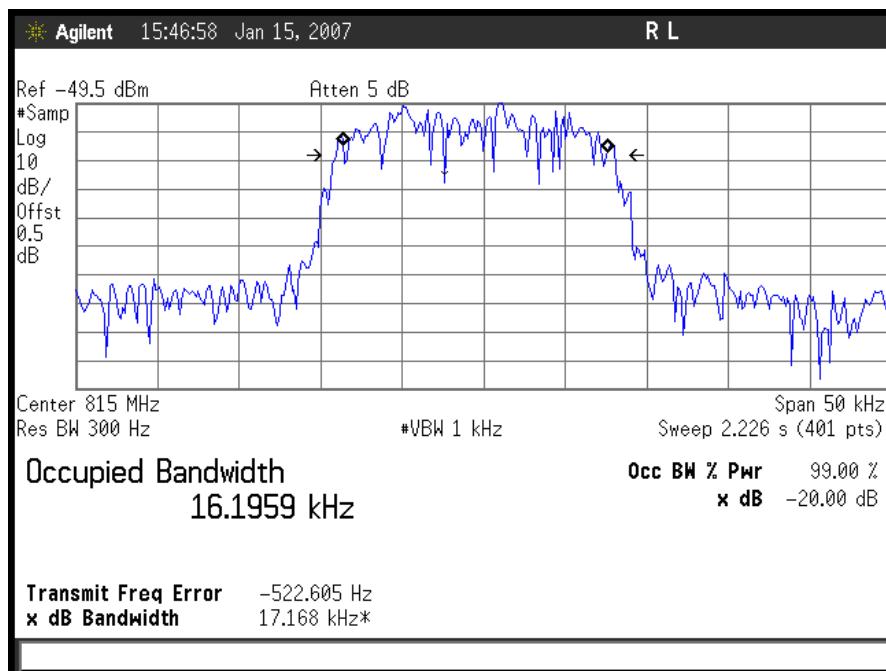
Plot 6. Occupied Bandwidth Output Hi CH Downlink



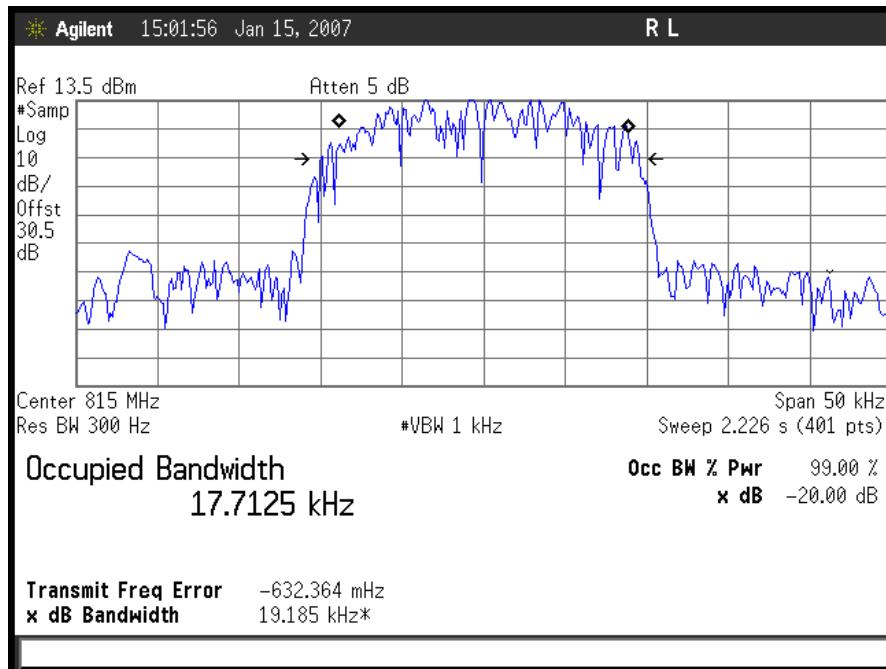
Plot 7. Occupied Bandwidth Input Low CH Uplink



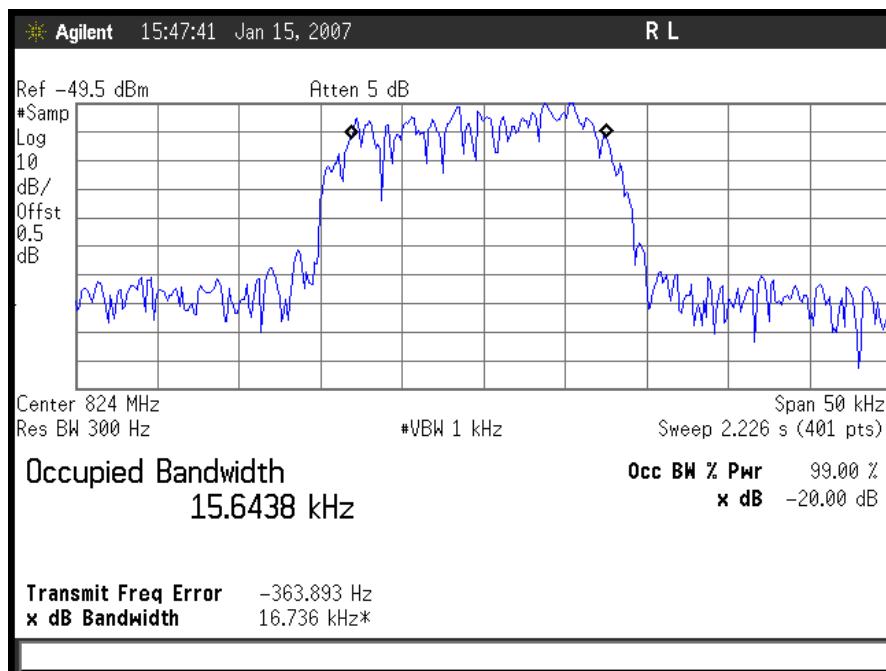
Plot 8. Occupied Bandwidth Output Low CH Uplink



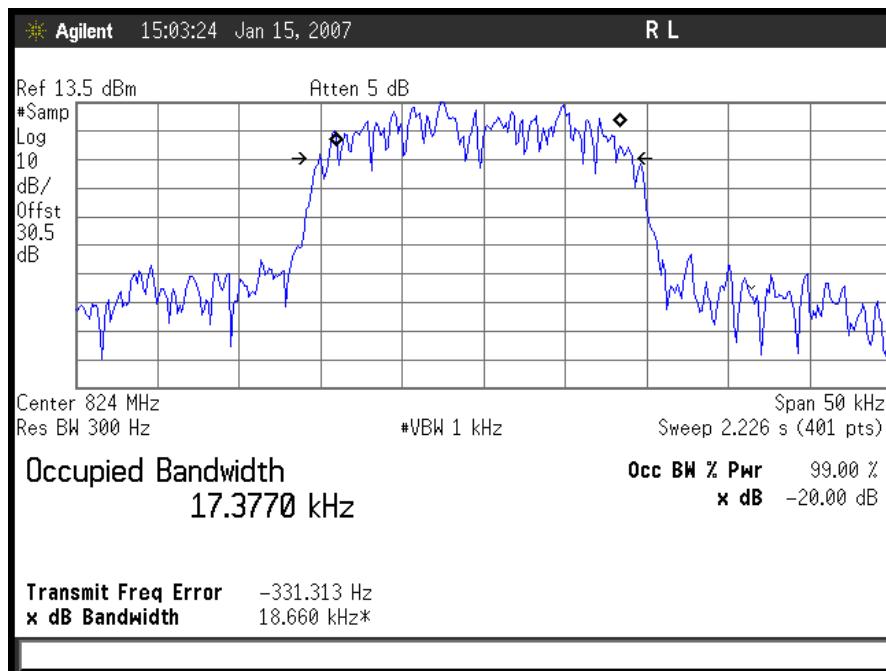
Plot 9. Occupied Bandwidth Input Mid CH Uplink



Plot 10. Occupied Bandwidth Output Mid CH Uplink



Plot 11. Occupied Bandwidth Input Hi CH Uplink

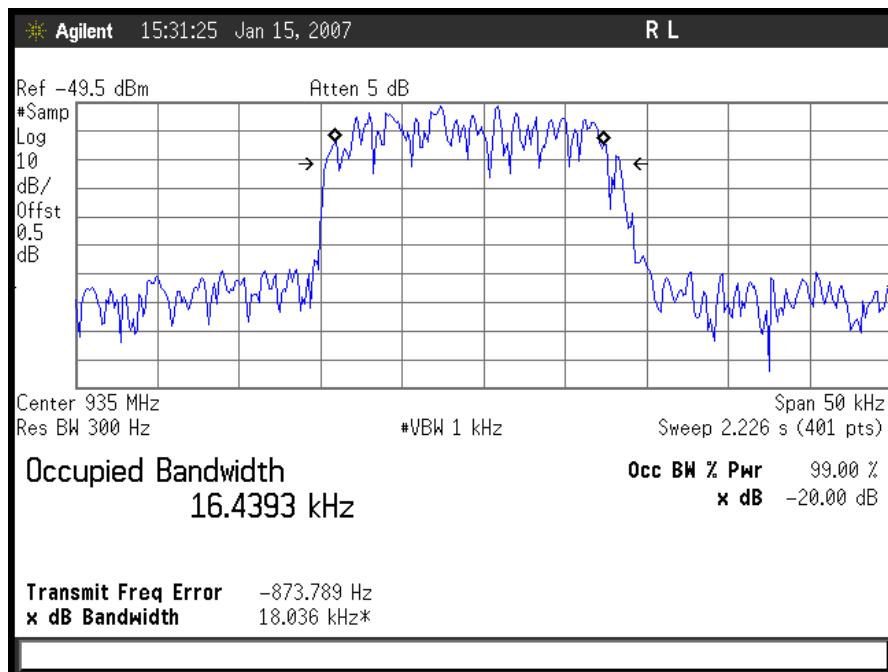


Plot 12. Occupied Bandwidth Output Hi CH Uplink

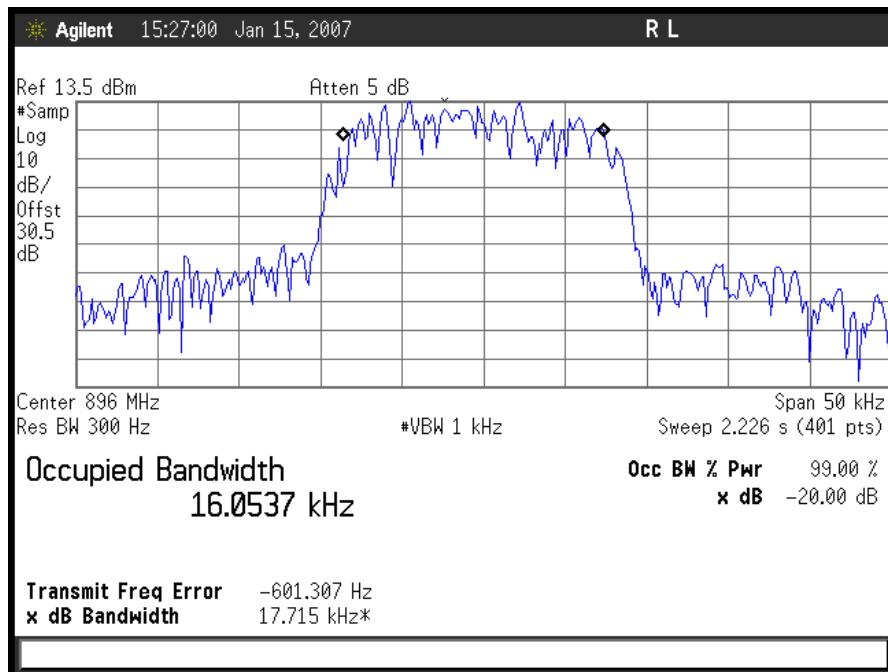


## Electromagnetic Compatibility Criteria for Intentional Radiators

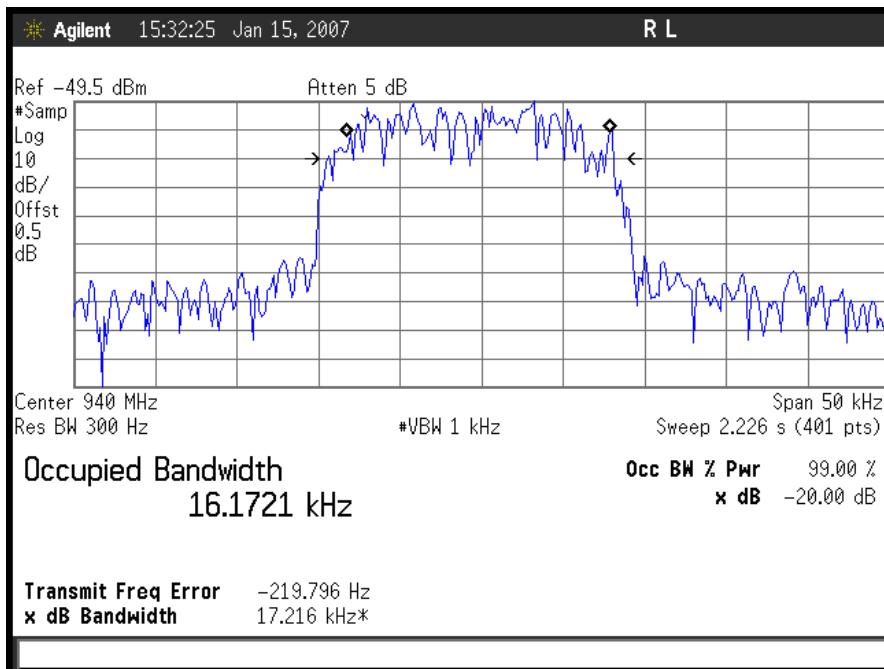
### § 2.1049 Occupied Bandwidth, SMR900



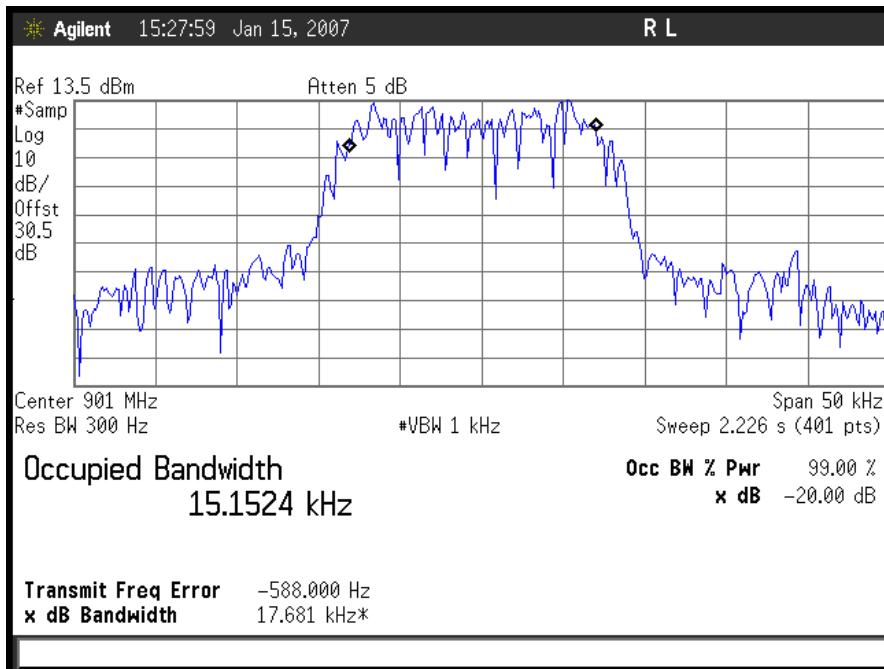
Plot 13. Occupied Bandwidth Input Low CH Downlink



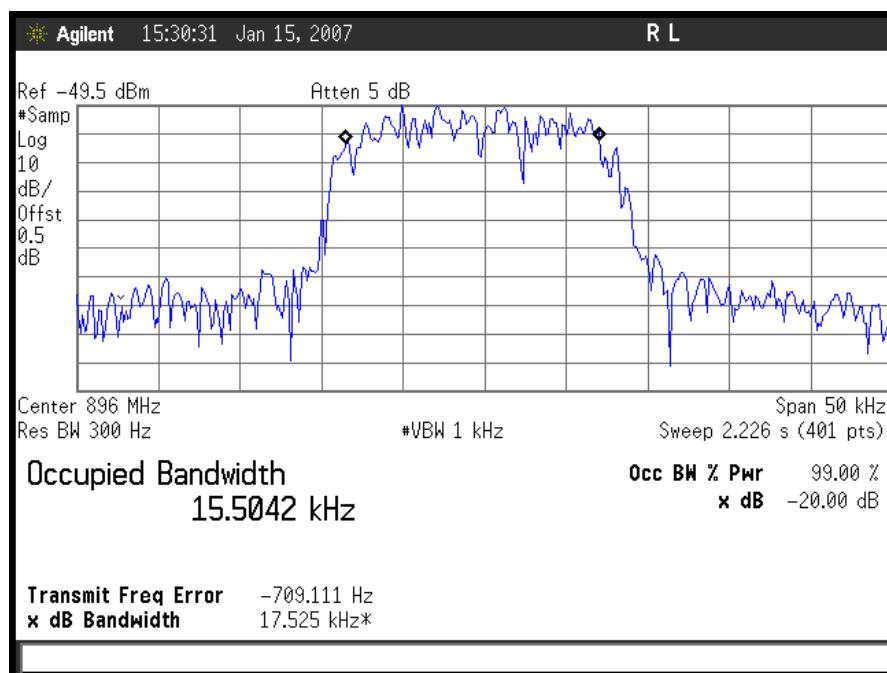
Plot 14. Occupied Bandwidth Output Low CH Downlink



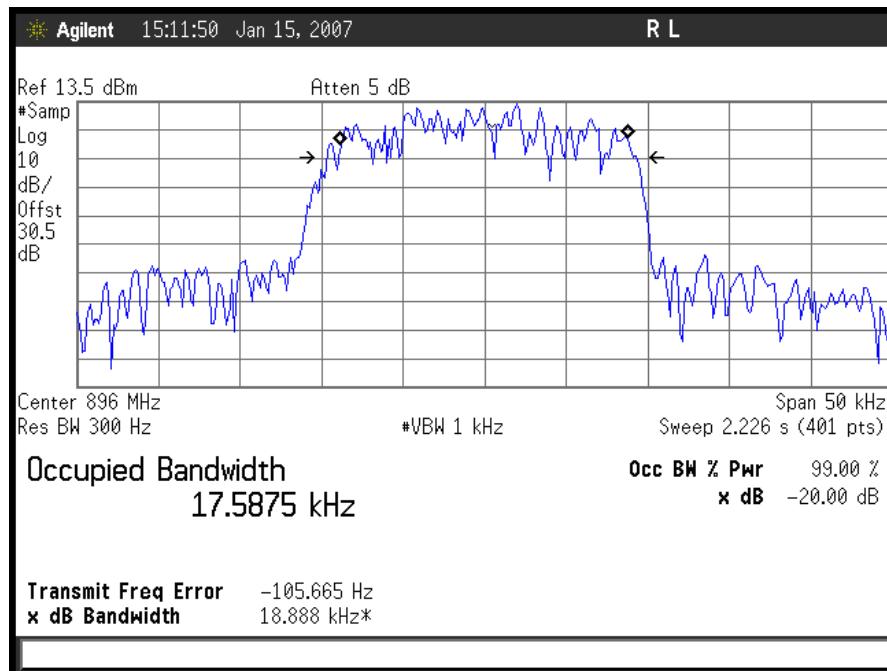
Plot 15. Occupied Bandwidth Input Hi CH Downlink



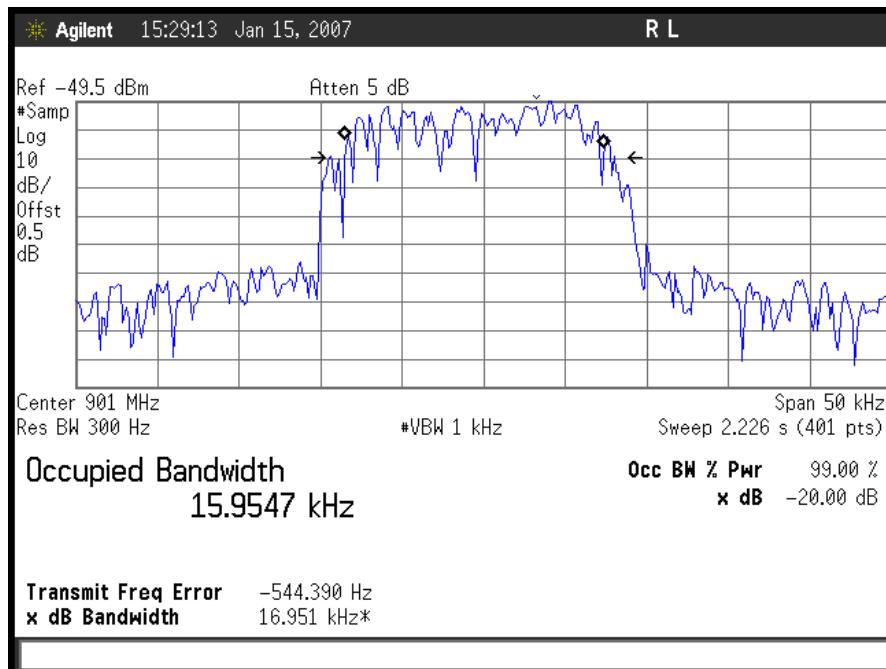
Plot 16. Occupied Bandwidth Output Hi CH Downlink



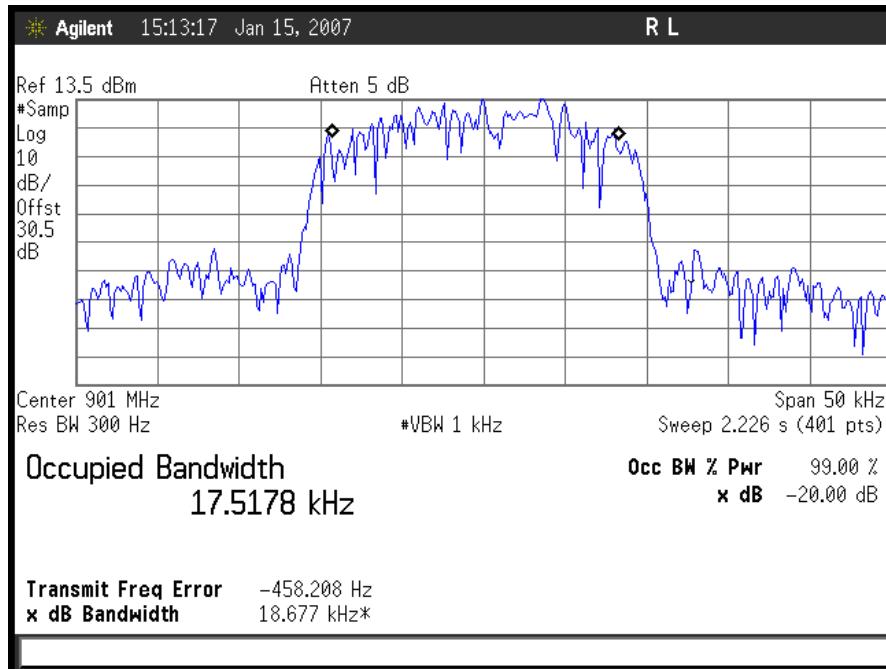
Plot 17. Occupied Bandwidth Input Low CH Uplink



Plot 18. Occupied Bandwidth Output Low CH Uplink



Plot 19. Occupied Bandwidth Input Hi CH Uplink



Plot 20. Occupied Bandwidth Output Hi CH Uplink



## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 2.1053 Radiated Spurious Emissions

**Test Requirement(s): § 2.1053 Measurements required: Field strength of spurious radiation.**

**§ 2.1053 (a)** Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

**§ 2.1053 (b):** The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2) All equipment operating on frequencies higher than 25 MHz.
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
- (4) Other types of equipment as required, when deemed necessary by the Commission.

**§ 90.210 Emission limits:** The rules in this section govern the spectral characteristics of emissions in the Radiotelephone Service. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  or 80 dB whichever is the lesser attenuation.



**Test Procedures:** As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

Radiated emission measurements were performed inside a 10 meter semi-anechoic chamber. The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10<sup>th</sup> or 40GHz, whichever was the lesser, were investigated.

**Test Results:** The EUT complies with the requirements of this section.

**Test Engineer:** Shawn McMillen

**Test Date(s):** January 15, 2007



## Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1053 Measurements required: Field strength of spurious radiation.

Downlink 860 MHz						
Frequency (MHz)	Antenna Polarity (H/V)	Field Strength of Spurious Harmonics (dBm)	Substitution Antenna Gain (dBi)	Power into Substitution Antenna(dBm)	EIRP (dBm)	Detector Type
1720.0	V	-56.0	8.5	-80.2	-71.7	Peak
2580.0	V	-60.0	9.8	-87.6	-77.8	Peak
3440.0	V	-61.0	9.8	-88.2	-78.4	Peak

Uplink 815 MHz						
Frequency (MHz)	Antenna Polarity (H/V)	Field Strength of Spurious Harmonics (dBm)	Substitution Antenna Gain (dBi)	Power into Substitution Antenna(dBm)	EIRP (dBm)	Detector Type
1630.0	V	-55.1	8.5	-82.1	-73.6	Peak
2445.0	V	-60.7	9.8	-88.7	-78.9	Peak
3260.0	V	-64.3	9.8	-87.6	-77.8	Peak

Note: All other emissions were measured at the noise floor of the spectrum analyzer



## Electromagnetic Compatibility Criteria for Intentional Radiators

§ 2.1053 Measurements required: Field strength of spurious radiation.

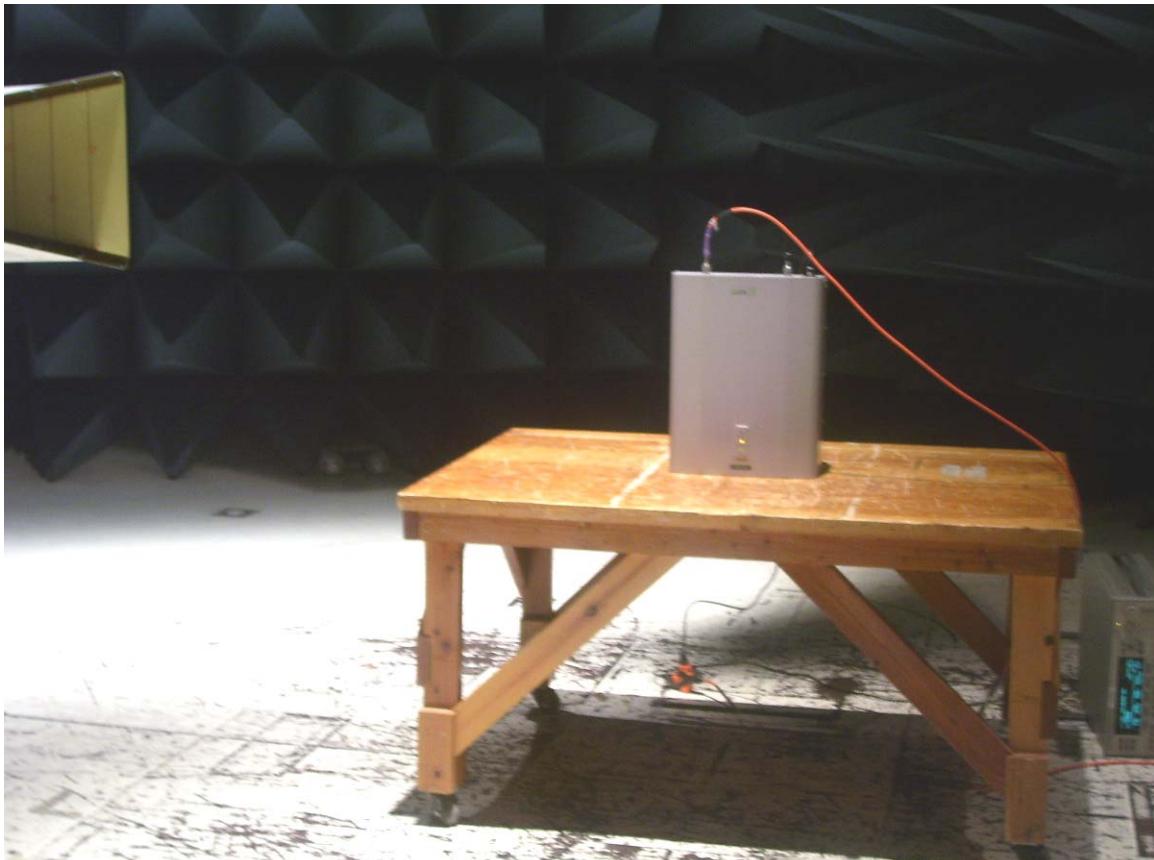
Downlink 940 MHz						
Frequency (MHz)	Antenna Polarity (H/V)	Field Strength of Spurious Harmonics (dBm)	Substitution Antenna Gain (dBi)	Power into Substitution Antenna(dBm)	EIRP (dBm)	Detector Type
1880.0	V	-57.3	8.5	-80.1	-71.6	Peak
2820.0	V	-59.3	9.8	-77.3	-67.5	Peak
3760.0	V	-62.1	9.8	-86.5	-76.7	Peak

Uplink 910 MHz						
Frequency (MHz)	Antenna Polarity (H/V)	Field Strength of Spurious Harmonics (dBm)	Substitution Antenna Gain (dBi)	Power into Substitution Antenna(dBm)	EIRP (dBm)	Detector Type
1802.0	V	-59.8	8.5	-79.3	-70.8	Peak
2703.0	V	-60.2	9.8	-86.6	-76.8	Peak
3604.0	V	-63.7	9.8	-87.3	-77.5	Peak

Note: All other emissions were measured at the noise floor of the spectrum analyzer



## Electromagnetic Compatibility Criteria for Intentional Radiators



Photograph 3. Test Equipment and setup for various Radiated Measurements



## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 2.1051 Spurious Emissions at Antenna Terminals

**Test Requirement(s):** **§ 2.1051 Measurements required: Spurious emissions at antenna terminals:** The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

**§ 90.210 Emission limits:** The rules in this section govern the spectral characteristics of emissions in the Radiotelephone Service. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P \text{ or } 80 \text{ dB})$  whichever is the lesser attenuation.

**Test Procedures:** A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the OEM. A spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured. The spectrum analyzer was set to 1MHz RBW and 3MHz VBW. The spectrum was investigated from 30MHz to the 10<sup>th</sup> harmonic of the carrier.

The inter-modulation requirements were performed in a similar manner as described above. The spectrum analyzer was set to 100KHz RBW and 300KHz VBW. Two modulated carriers were injected into the EUT. One carrier was set at the band edge of either the Uplink or Downlink band and the other at carrier set at 4 MHz deviation from the first carrier. The in band spurious emissions were investigated.

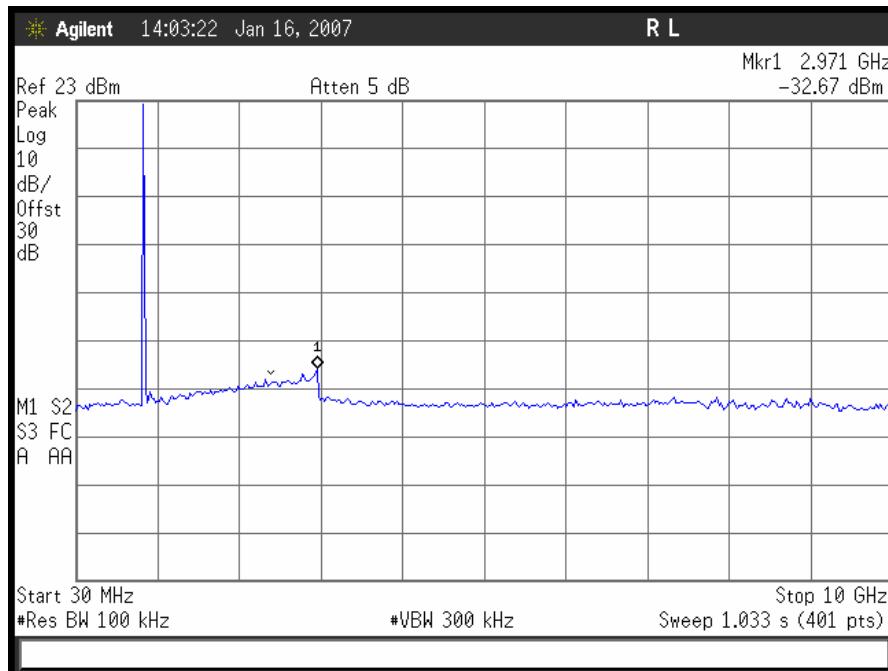
**Test Results:** The EUT complies with the requirements of this section. There were no detectable spurious emissions for this EUT.

**Test Engineer(s):** Shawn McMillen

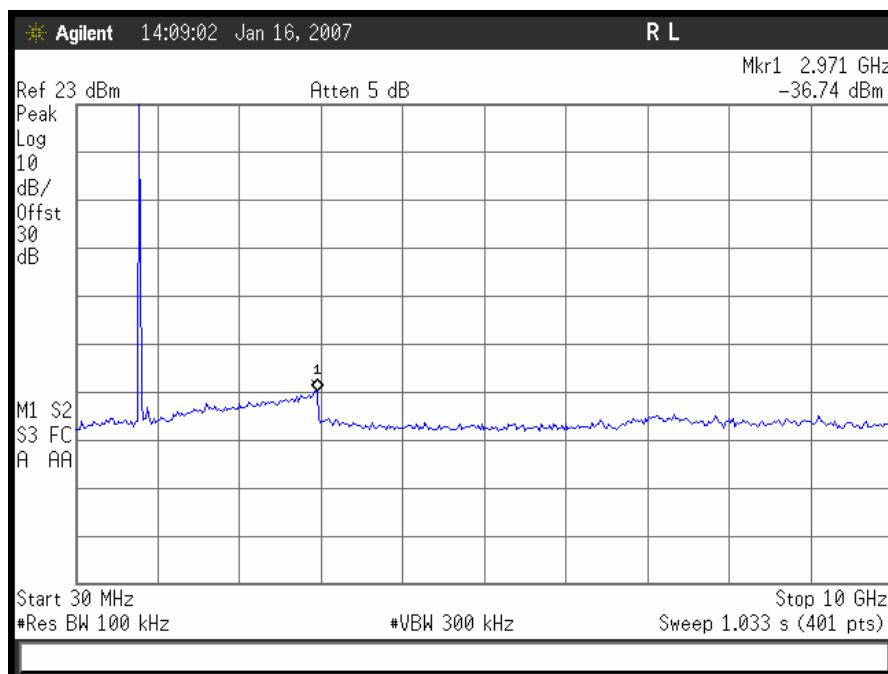
**Test Date(s):** January 16, 2007

## Electromagnetic Compatibility Criteria for Intentional Radiators

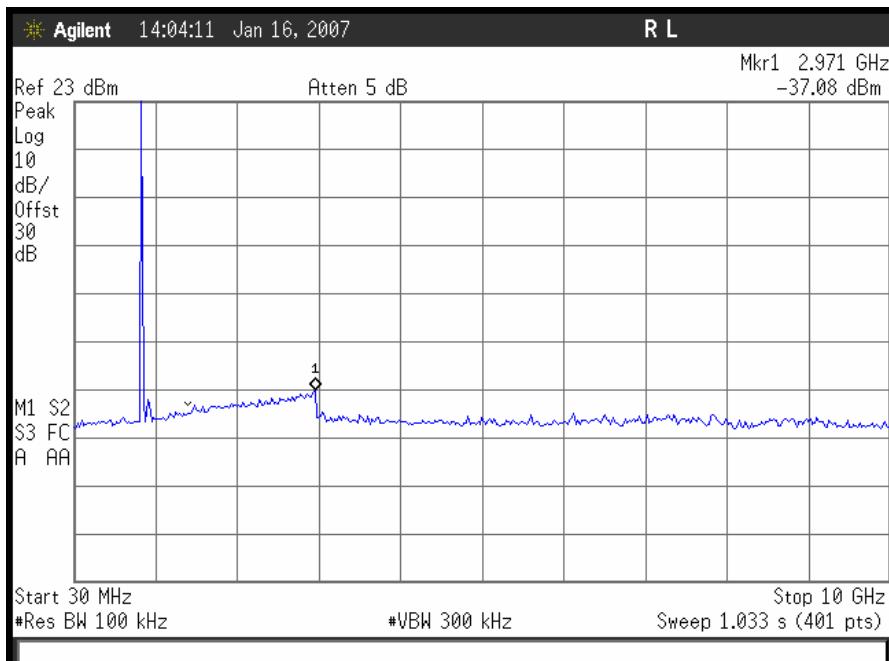
## § 2.1051 Spurious Emissions at Antenna Terminals, SMR800



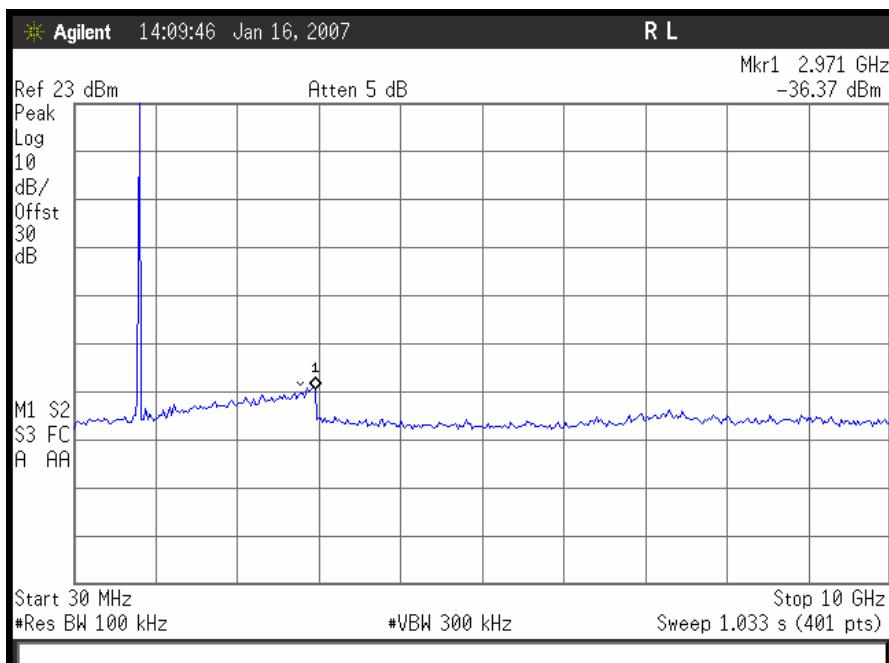
Plot 21. Conducted Spurious Emissions Downlink Low CH (30 MHz – 10 GHz)



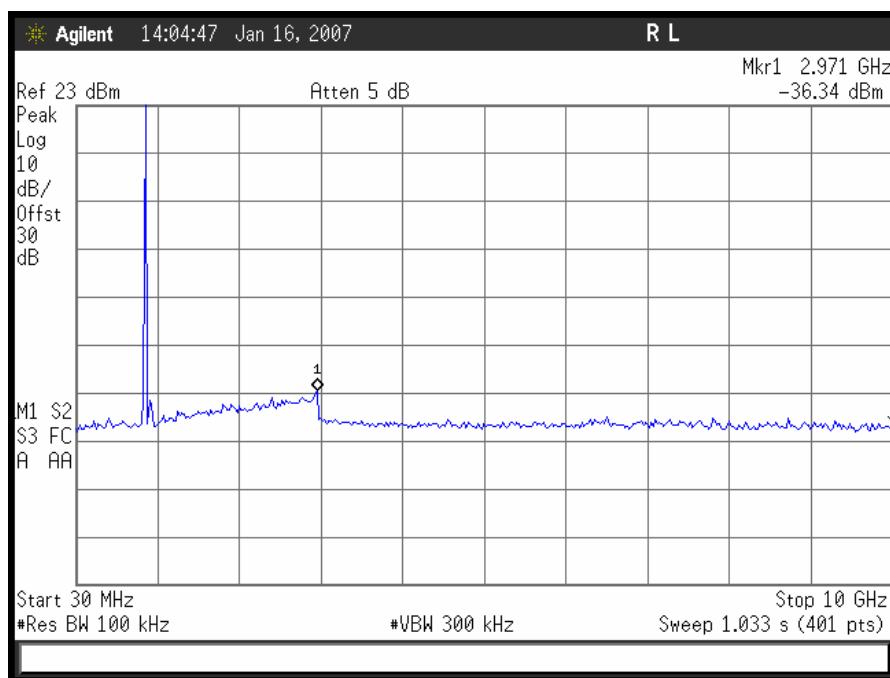
Plot 22. Conducted Spurious Emissions Uplink Low CH (30 MHz – 10 GHz)



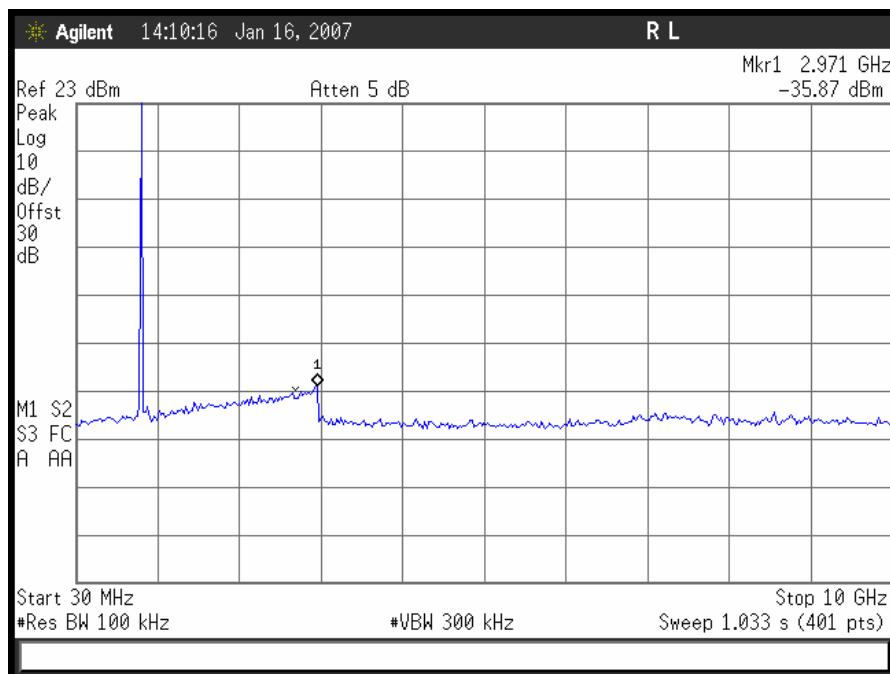
Plot 23. Conducted Spurious Emissions Downlink Mid CH (30 MHz – 10 GHz)



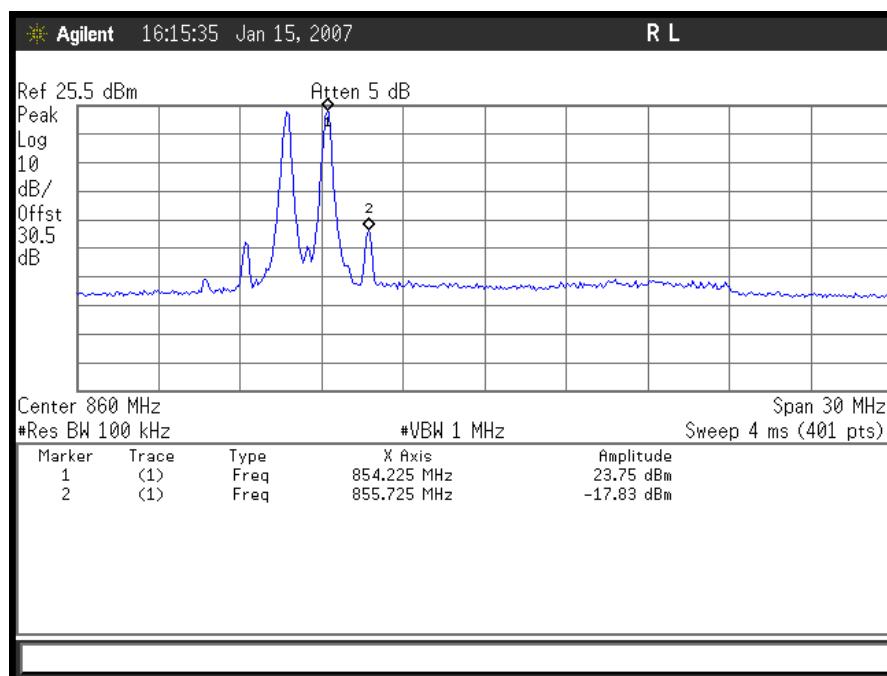
Plot 24. Conducted Spurious Emissions Uplink Mid CH (30 MHz – 10 GHz)



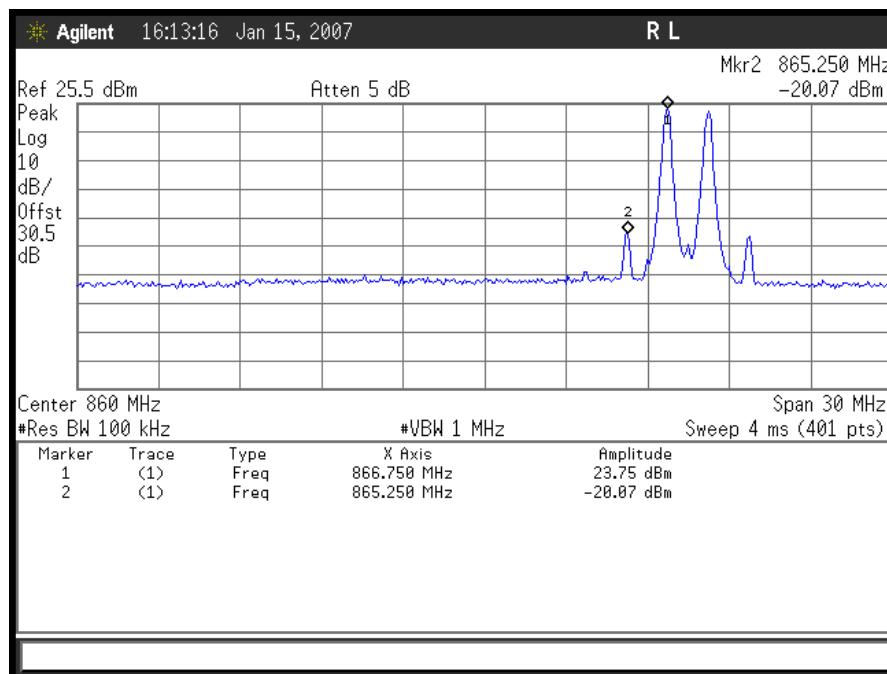
Plot 25. Conducted Spurious Emissions Downlink High CH (30 MHz – 10 GHz)



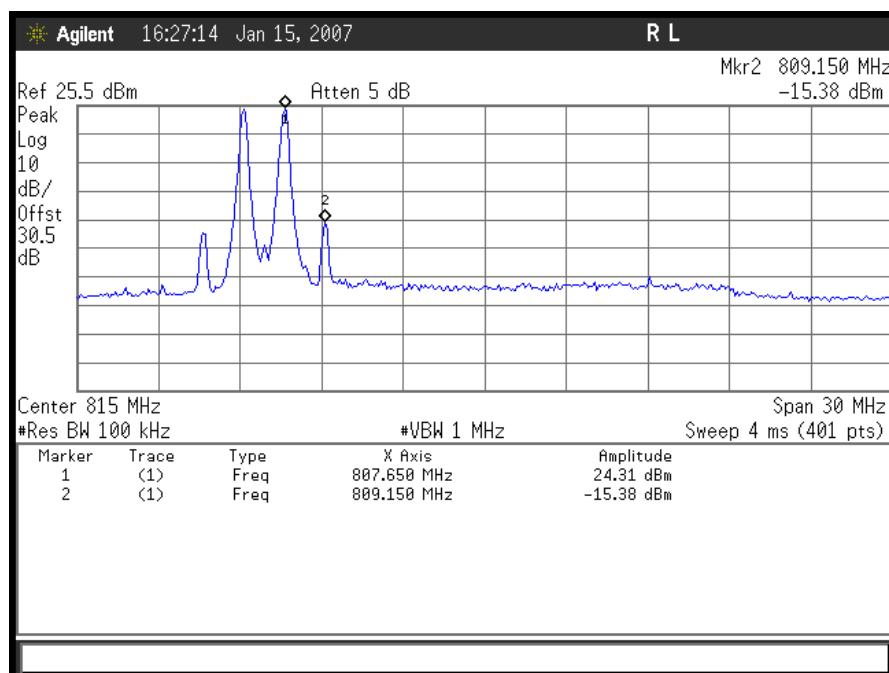
Plot 26. Conducted Spurious Emissions Uplink High CH (30 MHz – 10 GHz)



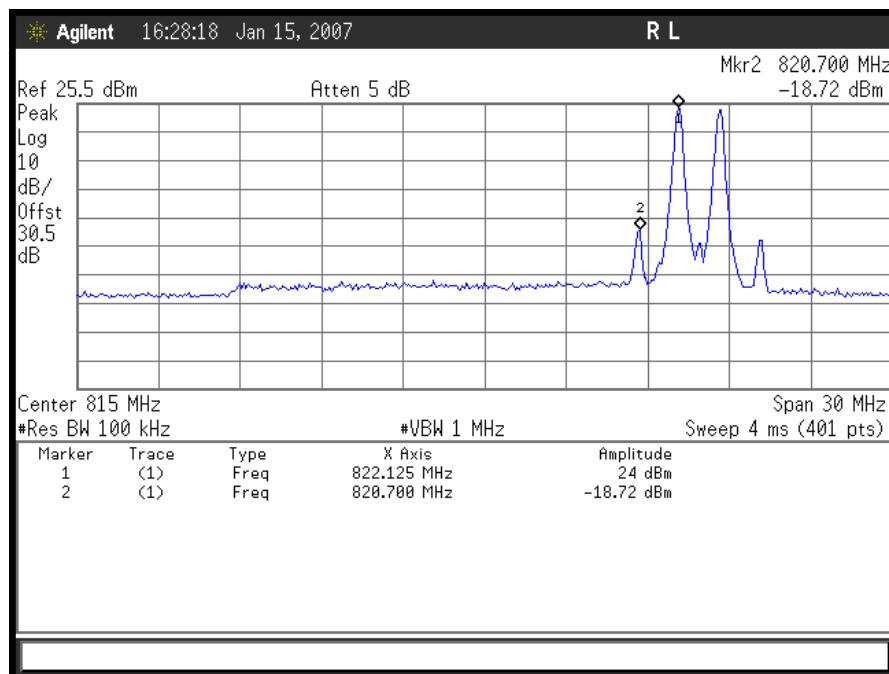
Plot 27. Two Tone Downlink Low End Intermodulation



Plot 28. Two Tone Downlink Hi End Intermodulation



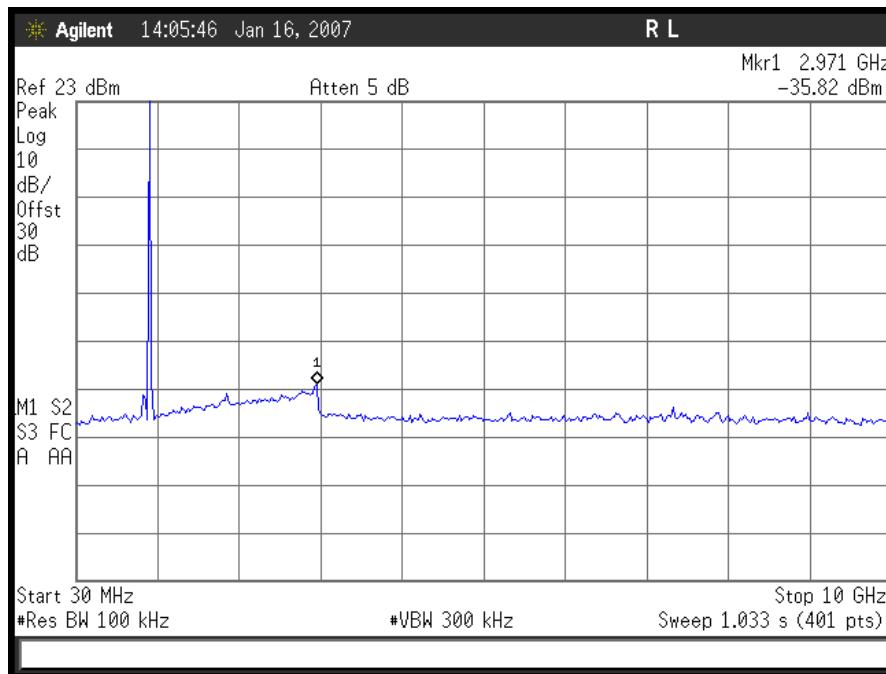
Plot 29. Two Tone Uplink Low End Intermodulation



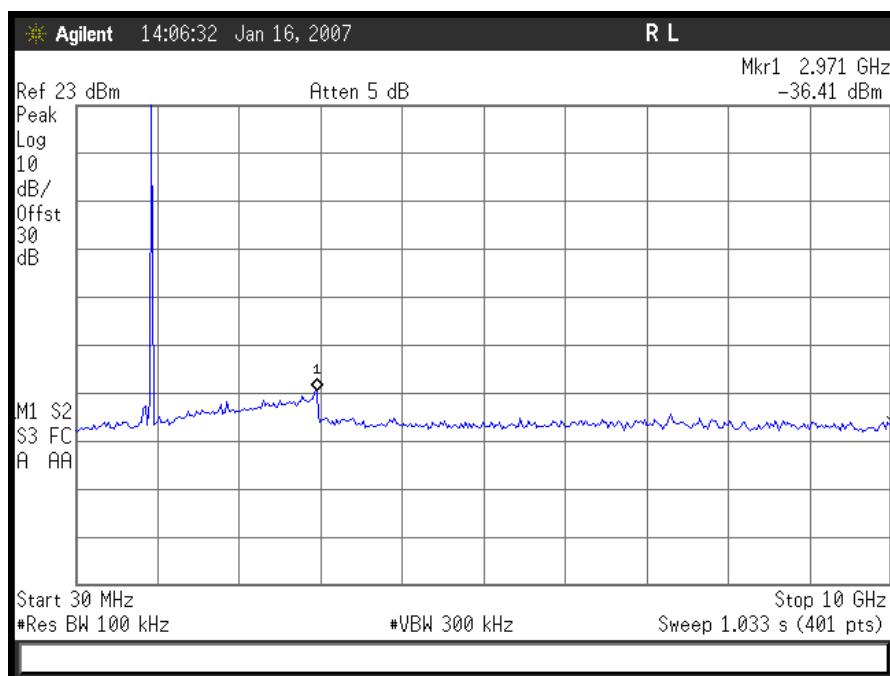
Plot 30. Two Tone Uplink Hi End Intermodulation

## Electromagnetic Compatibility Criteria for Intentional Radiators

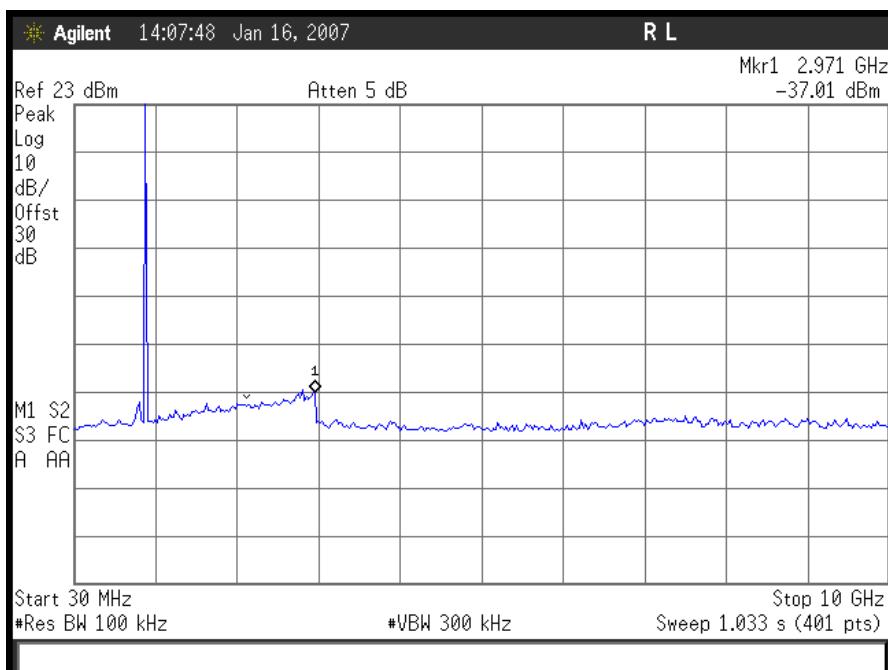
### § 2.1051 Spurious Emissions at Antenna Terminals, SMR900



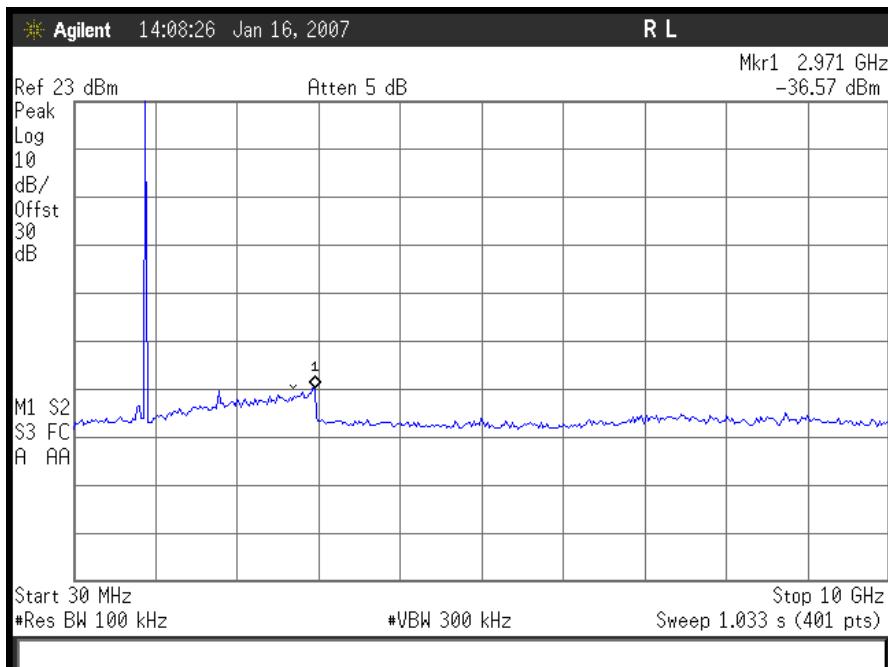
Plot 31. Conducted Spurious Emissions Downlink Low CH (30 MHz – 10 GHz)



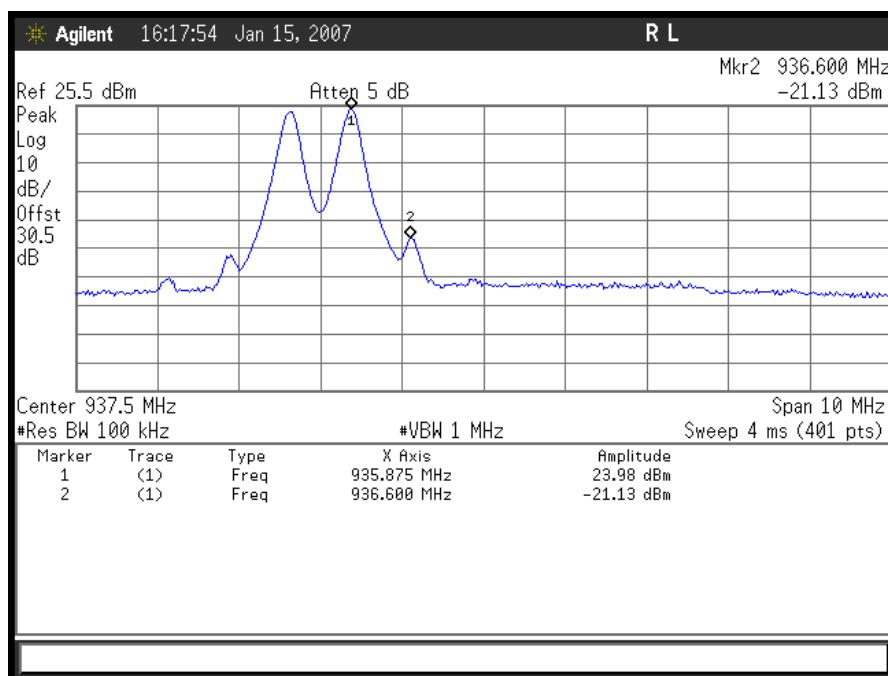
Plot 32. Conducted Spurious Emissions Downlink Hi CH (30 MHz – 10 GHz)



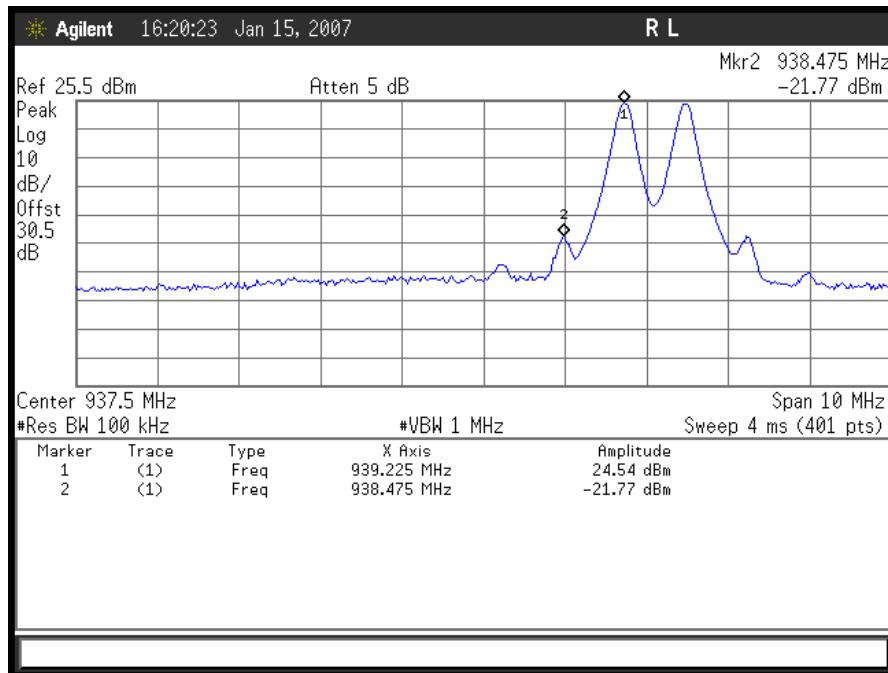
Plot 33. Conducted Spurious Emissions Uplink Low CH (30 MHz – 10 GHz)



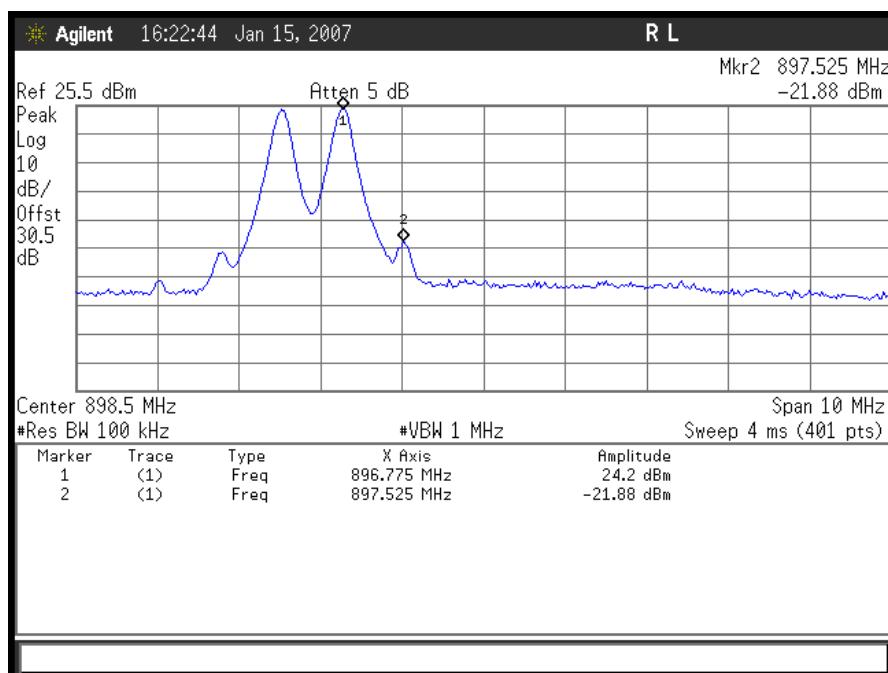
Plot 34. Conducted Spurious Emissions Uplink Hi CH (30 MHz – 10 GHz)



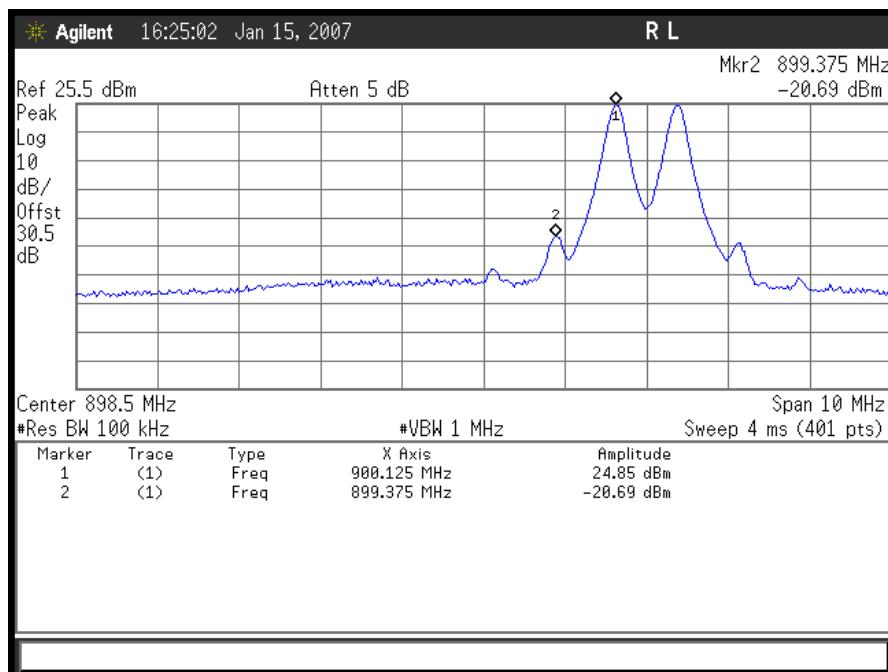
Plot 35. Two Tone Downlink Low End Intermodulation



Plot 36. Two Tone Downlink Hi End Intermodulation



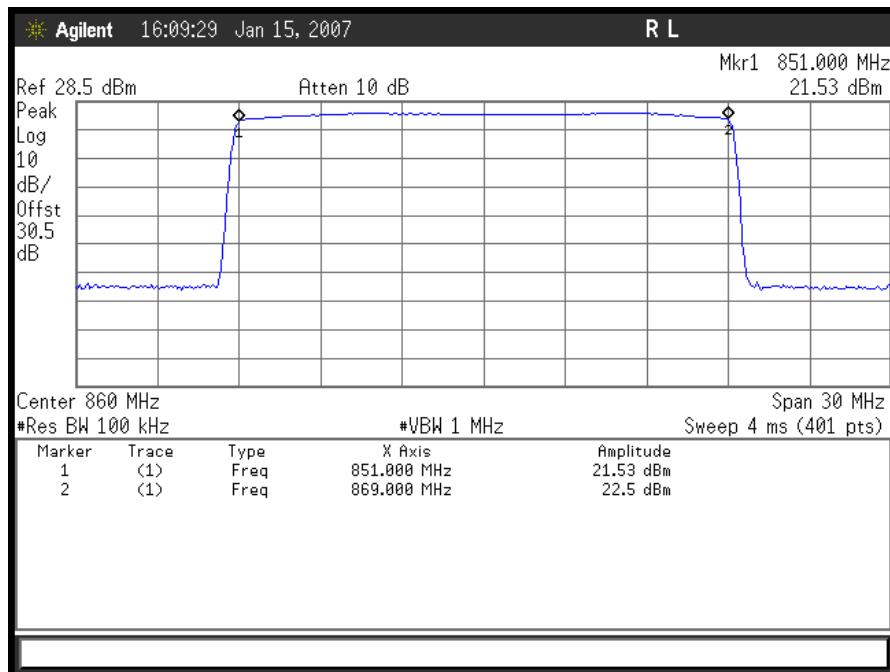
Plot 37. Two Tone Uplink Low End Intermodulation



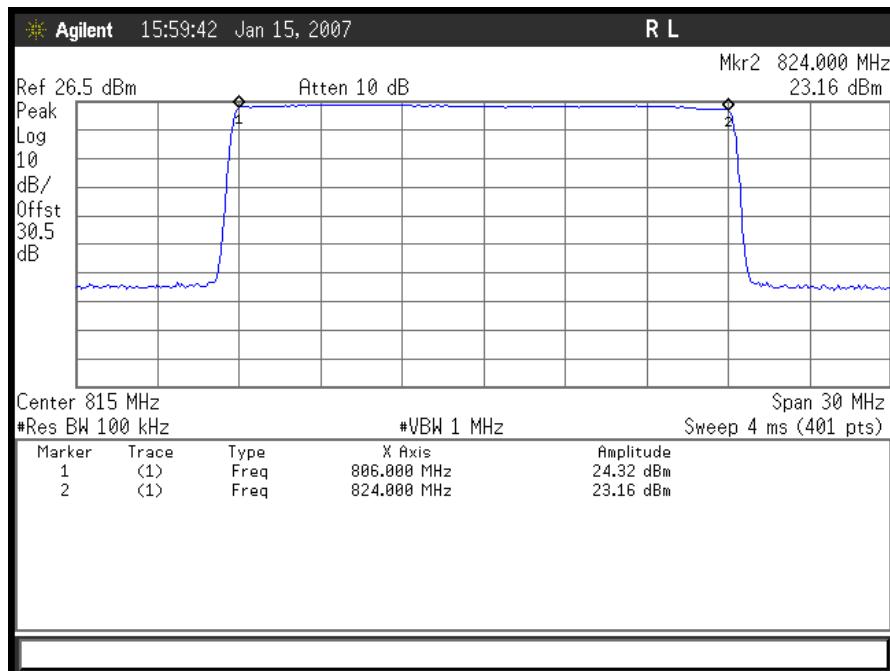
Plot 38. Two Tone Uplink Hi End Intermodulation

## Electromagnetic Compatibility Criteria for Intentional Radiators

## 2-11-04/EAB/RF Out of Band Rejection, SMR800



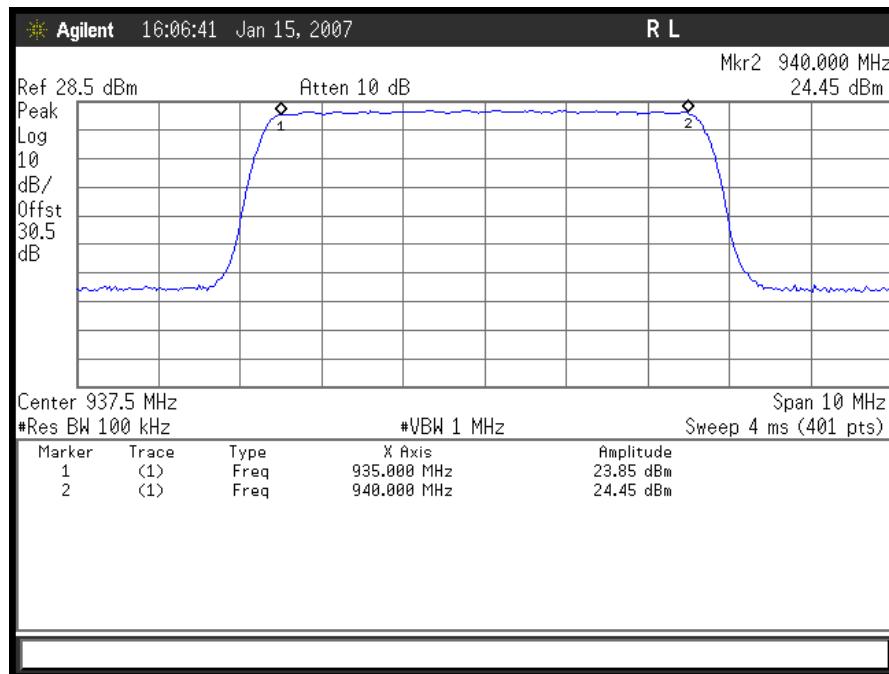
Plot 39. Out of Band Rejection Downlink



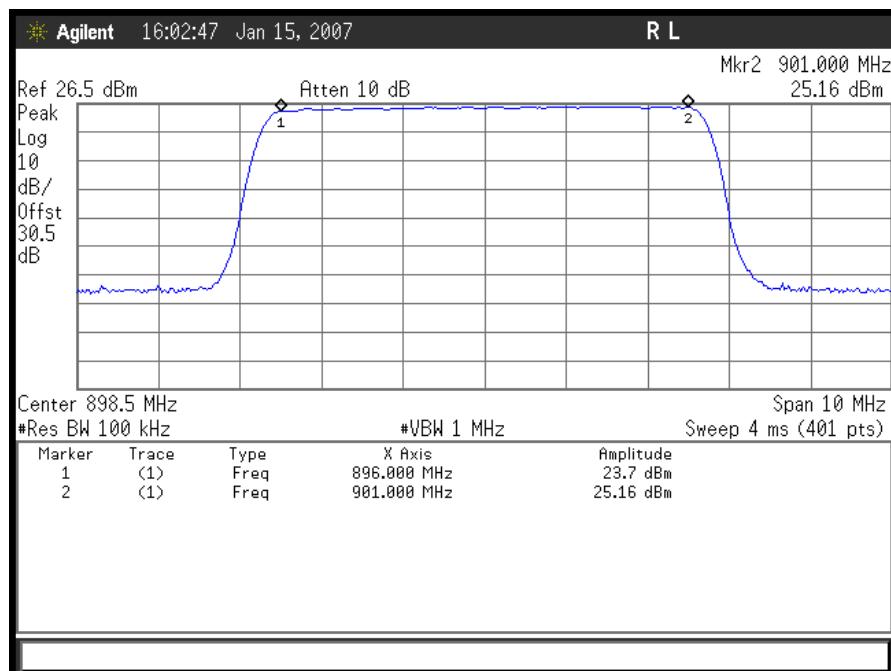
Plot 40. Out of Band Rejection Uplink

## Electromagnetic Compatibility Criteria for Intentional Radiators

## 2-11-04/EAB/RF Out of Band Rejection, SMR900



Plot 41. Out of Band Rejection Downlink



Plot 42. Out of Band Rejection Uplink



## Electromagnetic Compatibility Criteria for Intentional Radiators

### §2.1055 Frequency Stability over Temperature and Voltage Variations

**Test Requirement(s):** §2.1055(a)(1) §90.213

**Test Procedures:** As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Directional Coupler through a Spectrum Analyzer and Power Meter.

The EUT was placed in the Environmental Chamber and support equipments are outside the chamber on a table. A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations. The frequency drift was investigated for every  $10^{\circ}\text{C}$  increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of  $-30$  to  $50^{\circ}\text{C}$ .

Voltage supplied to EUT is 120 VAC reference temperature was done at  $20^{\circ}\text{C}$ . The voltage was varied by  $\pm 15\%$  of nominal

**Test Results:** Equipment complies with Section 2.1055 and 90.213

**Test Engineer(s):** Shawn McMillen

**Test Date(s):** January 15, 2007



## Frequency Stability Test Results

**Reference:** 120Vac at 20°C **Freq.** = 814.999984MHz

Temperature	Measured	Drift
(Celsius)	Freq (MHz)	ppm
50	814.999982	-0.002
40	814.999981	-0.004
30	814.999982	-0.002
20	Reference	
10	814.999985	0.001
0	814.999984	0.000
-10	814.999983	-0.001
-20	814.999981	-0.004
-30	814.999974	-0.012

**Reference:** 120Vac at 20°C **Freq.** = 814.999984MHz

Voltage(dc)	Measured	Drift
+/-15% Ref	Freq (MHz)	(Hz)
102	814.999988	0.003
138	814.999989	0.004

Table 10. Frequency vs. Voltage Test Results, SMR800

**Reference:** 120Vac at 20°C **Freq.** = 897.999982MHz

Temperature	Measured	Drift
(Celsius)	Freq (MHz)	ppm
50	897.999981	-0.001
40	897.999983	0.001
30	897.999980	-0.002
20	Reference	
10	897.999979	-0.003
0	897.999982	0.000
-10	897.999981	-0.001
-20	897.999979	-0.003
-30	897.999943	-0.043

**Reference:** 120Vac at 20°C **Freq.** = 897.999982MHz

Voltage(dc)	Measured	Drift
+/-15% Ref	Freq (MHz)	(Hz)
102	897.999977	-0.006
138	897.999988	0.007

Table 11. Frequency vs. Voltage Test Results, SMR900



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Test Equipment  
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## IV. Test Equipment



## Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2421	EMI RECEIVER	ROHDE&SCHWARZ	ESIB 7	02/09/2006	02/09/2007
1S2184	BILOG ANTENNA	CHASE	CBL6112A	01/12/2006	01/12/2007
1S2121	PRE-AMPLIFIER	HEWLETT PACKARD	8449B	11/28/2006	11/28/2007
1S2198	ANTENNA, HORN	EMCO	3115	08/17/2006	08/17/2007
1S2202	ANTENNA, HORN, 1 METER	EMCO	3116	03/23/2004	03/23/2007
N/A	HIGH PASS FILTER	MICRO-TRONICS	HPM13146	See Note	
1S2263	CHAMBER, 10 METER	RANTEC	N2-14	08/15/2006	08/15/2007
1S2430	WIDEBAND POWER METER	ANRITSU COMPANY	ML2488A	01/12/2006	01/12/2007
1S2432	WIDEBAND POWER SENSOR	ANRITSU COMPANY	MA2491A	01/12/2006	01/12/2007
1S2034	COUPLER, DIRECTIONAL 1-20 GHz	KRYTAR	101020020	See Note	
1S2041	COUPLER, BI DIRECTIONALCOAXIAL	NARDA	N/A	See Note	
1S2460	Analyzer, Spectrum 9 kHz-40GHz	Agilent	E4407B	07/06/2005	07/06/2008
1S2430	WIDEBAND POWER METER	ANRITSU COMPANY	ML2488A	01/12/2006	01/12/2007
1S2432	WIDEBAND POWER SENSOR	ANRITSU COMPANY	MA2491A	01/12/2006	01/12/2007
1S2034	COUPLER, DIRECTIONAL 1-20 GHz	KRYTAR	101020020	See Note	
1S2041	COUPLER, BI DIRECTIONALCOAXIAL	NARDA	N/A	See Note	
1S2128	Harmonic Mixer	Hewlett Packard	11970A	10/26/2006	10/26/2008
1S2129	Harmonic Mixer	Hewlett Packard	11970K	10/26/2006	10/26/2008

**Note:** Functionally tested equipment is verified using calibrated instrumentation at the time of testing.



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## V. Certification & User's Manual Information



## Certification & User's Manual Information

### A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

#### § 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) *The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.*
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

#### § 2.803 Marketing of radio frequency devices prior to equipment authorization.

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
  - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
  - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.



(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

- (i) *Compliance testing;*
- (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
- (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
- (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or
- (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.



## Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

### § 2.901 Basis and Purpose

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.<sup>1</sup> *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer*, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.
- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

### § 2.907 Certification.

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

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<sup>1</sup> In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.



## Certification & User's Manual Information

### § 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) *If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.



## Certification & User's Manual Information

### B. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

#### § 15.19 Labeling requirements.

(a) *In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

- (3) All other devices shall bear the following statement in a conspicuous location on the device:

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

#### § 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



## Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

### § 15.105 Information to the user.

(a) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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## VI. Exhibits



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## Exhibit A, Hopping Capability Requirements



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## Exhibit B, Non-Coordination Requirements



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