MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE ! BALTIMORE, MARYLAND 21230 ! PHONE (410) 354-3300 ! FAX (410) 354-3313

May 20, 2009

Cellvine
6 Yoni Netanyahu St.
Yehuda, 60376

Dear Ziv Shani,

Enclosed is the EMC Wireless test report for compliance testing of the Cellvine, AWS (2 SUB Bands) Mini Repeater, tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 27 Subpart C and RSS-139, Issue 2, February 2009 for Portable Devices, and Part 15 Subpart B and ICES-003, Issue 4 February 2004 for a Class A Digital Device.

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 feel free to contact me.

Sincerely yours,

MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Cellvine\EMC26794-FCC27_Rev2)

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MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
33439 WESTERN AVENUE ! UNION CITY, CALIFORNIA 94587-3201 ! PHONE (510) 489-6300 ! FAX (510) 489-6372

Electromagnetic Compatibility Criteria Test Report

For the

Cellvine
AWS (2 SUB Bands) Mini Repeater

Tested under

FCC Certification Rules
contained in
Title 47 of the CFR, Part 15 Subpart B & ICES-003
for a Class A Digital Device
&
Part 27 Subpart C & RSS-139, Issue 2, February 2009
for Fixed Devices

MET Report: EMC26794-FCC27_Rev2

May 20, 2009

Prepared For:

Cellvine
6 Yoni Netanyahu St.
Yehuda, 60376

Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave.
Baltimore, MD 21230

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Electromagnetic Compatibility Criteria
Test Report

For the

Cellvine
AWS (2 SUB Bands) Mini Repeater

Tested Under

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Title 47 of the CFR, Part 15 Subpart B & ICES-003
for a Class A Digital Device
&
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for Fixed Devices

MET Report: EMC26794-FCC27_Rev2

Jeffrey Hazen
Project Engineer, Electromagnetic Compatibility Lab

Jennifer Warnell
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 the FCC Rule Parts 15B, Part 27 and Industry Canada standards ICES-003, Issue 4 Feb. 2004, RSS-139, Issue 2 Feb. 2009 under normal use and maintenance.

Shawn McMillen,
Wireless Manager, Electromagnetic Compatibility Lab

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Report Status Sheet

Revision	Report Date	Reason for Revision
∅	May 15, 2009	Initial Issue.
1	May 20, 2009	Corrected test procedure in section 3.2.
2	May 21, 2009	Rev 2 – Add Intermodulation Plots

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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
d	Measurement Distance
dB	Decibels
dBµV	dB micro Volts
dBµV/m	dB micro Volt per meter
DC	Direct Current
DCF	Distance Correction Factor
E	Electric Field
EUT	Equipment Under Test
EIRP	Effective Isotropic Radiated Power
f	Frequency
FCC	Federal Communications Commission
GHz	Giga Hertz
Hz	Hertz
IEC	International Electro-technical Commission
kHz	kilohertz
kV	kilo Volt
LISN	Line Impedance Stabilization Network
MHz	Mega Hertz
RF	Radio Frequency
RMS	Root-Mean-Square
SNF	Spectrum Analyzer Noise Floor
V/m	Volts per meter

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1. Testing Summary

Name of Test	FCC Rule Part/Section	IC Reference	Results
Applicable Standard	47 CFR Part 27	RSS-139 Issue 2: 2009	Compliant
RF Power Output	2.1046; 27.50(d)	RSS-139 (6.4)	Compliant
Modulation Characteristics	2.1047	RSS-139 (6.2)	Not Applicable
Occupied Bandwidth	2.1049	RSS-139 (6.5)	Compliant
Band Edge Channel Power	2.1051; 27.53(g)	RSS-139 (6.5)	Not Applicable
Spurious Emissions at Antenna Terminals	2.1051; 27.53(g)	RSS-139 (6.5)	Compliant
Radiated Spurious Emissions	2.1053; 27.53(g)	RSS-139 (6.5)	Compliant
Receiver Spurious Emissions	N/A	RSS-GEN (6)	Compliant
Frequency Stability over Temperature Variations	2.1055; 27.54	RSS-139 (6.3)	Not Applicable
Conducted Emission, Class B	15.107 (a)	ICES-003 Issue 4: 2004	Compliant
Radiated Emission Class B	15.109 (a)	ICES-003 Issue 4: 2004	Compliant

Table 1. Summary of Test Results

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2. Equipment Configuration

2.1. Overview

MET Laboratories, Inc. was contracted by Cellvine to perform testing on AWS (2 SUB Bands) Mini Repeater.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Cellvine, AWS (2 SUB Bands) Mini Repeater.

In accordance with §2.955(a) (3), the following data is presented in support of the verification of the Cellvine, AWS (2 SUB Bands) Mini Repeater.

Cellvine should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the AWS (2 SUB Bands) Mini Repeater has been **permanently** discontinued, as per §2.955(b).

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

Model(s) Tested:	AWS (2 SUB Bands) Mini Repeater BDA-AWS21-26-4UT-AB-JXX	
Model(s) Covered:	AWS (2 SUB Bands) Mini Repeater BDA-AWS21-26-4UT-AB-JXX	
EUT Specifications:	Primary Power: 120 VAC	
	FCC ID: VUVAWS26UNIGW	
	Emission Designators:	F9W
	Equipment Code:	TNB
	EUT Frequency Ranges:	2110-2155 MHz - 1710-1755 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature (15-35º C):	
	Relative Humidity (30-60%):	
	Barometric Pressure (860-1060 mbar):	
Evaluated by:	Jeffrey Hazen	
Date(s):	May 20, 2009	

Table 2. EUT Summary Table

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2.2. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. 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 semi-anechoic chamber. In accordance with §2.948(a) (3), a complete site description is contained at MET Laboratories.

2.3. Description of Test Sample

The AWS (2 SUB Bands) Mini Repeater Equipment Under Test (EUT), is as follows:

The goal of the Repeater system is to improve coverage for T-MOBILE AWS (1710-1755MHz, 2110-2155 MHz) in medium size indoor areas of up to 50,000 sq. ft. The system implements BDA technology to enhance coverage in urban areas. Repeaters are used to fill out uncovered areas in cellular mobile systems, such as base station fringe areas, road tunnels, business and industrial buildings, etc.

2.4. Equipment Configuration

The EUT was set up as outlined in Figure 1 - Figure 4. All equipment incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Serial Number
A	AWS (2 SUB BANDS) MINI REPEATER	BDA-AWS21-26-4UT-AB-JXX	S/N : T7A20001

Table 3. Equipment Configuration

2.5. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number	Serial Number
B	POWER SUPPLY	MEAN WELL	PS-120	RA 69206014

Table 4. Support Equipment

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2.6. 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
1	SERVICE	PORT	1	>1	Y	N-TYPE FEMALE CONNECTOR
2	DONOR	PORT	1	>1	Y	N-TYPE FEMALE CONNECTOR
3	COM	PORT	1	1	Y	RJ 45 FEMALE
4	DC IN	PORT	1	2	Y	LTE PAXE
5	COM	CROSS ETHERNET CABLE	1	5	Y	RJ 45 MALE
6	SNMP	PORT	1	1	Y	RJ 45 FEMALE

Table 5. Ports and Cabling Information

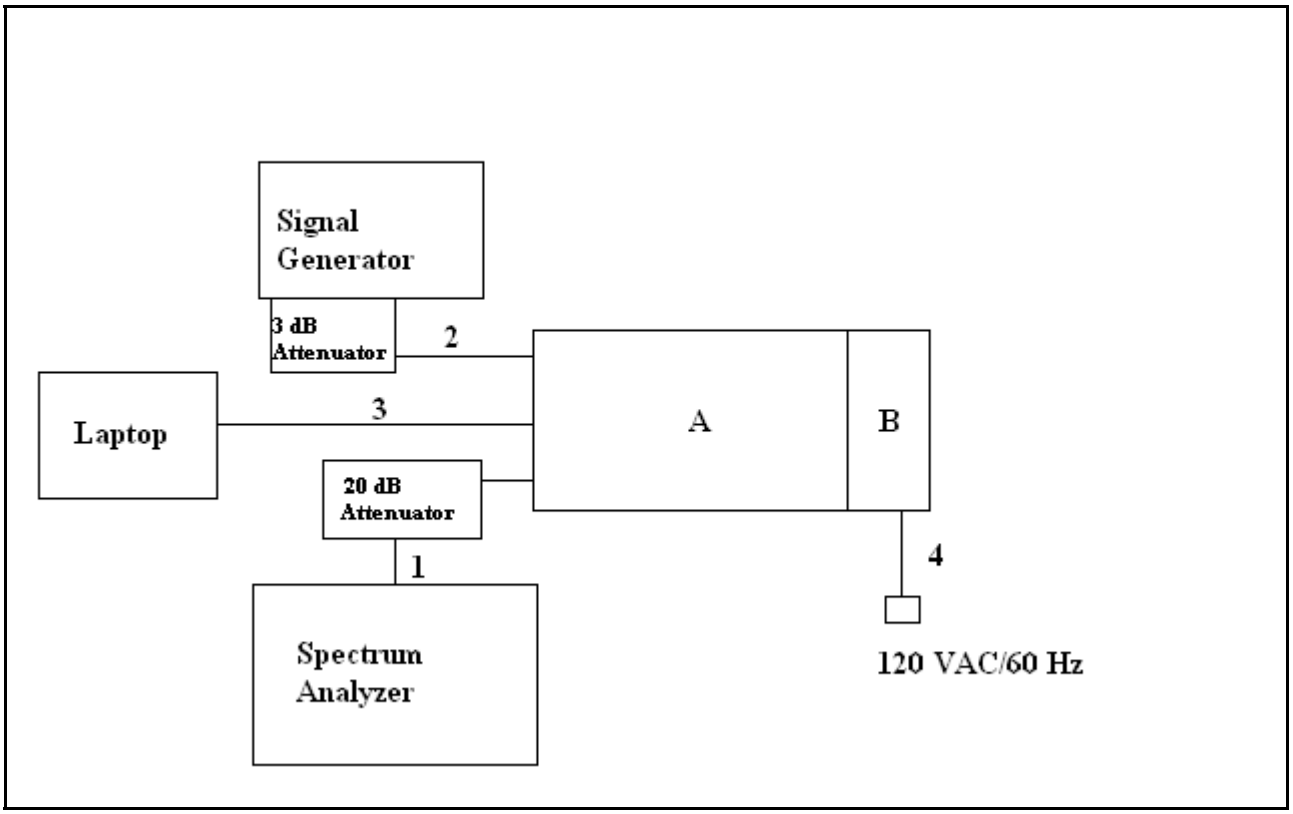

Figure 1. Block Diagram of Test Configuration, Downlink Conducted

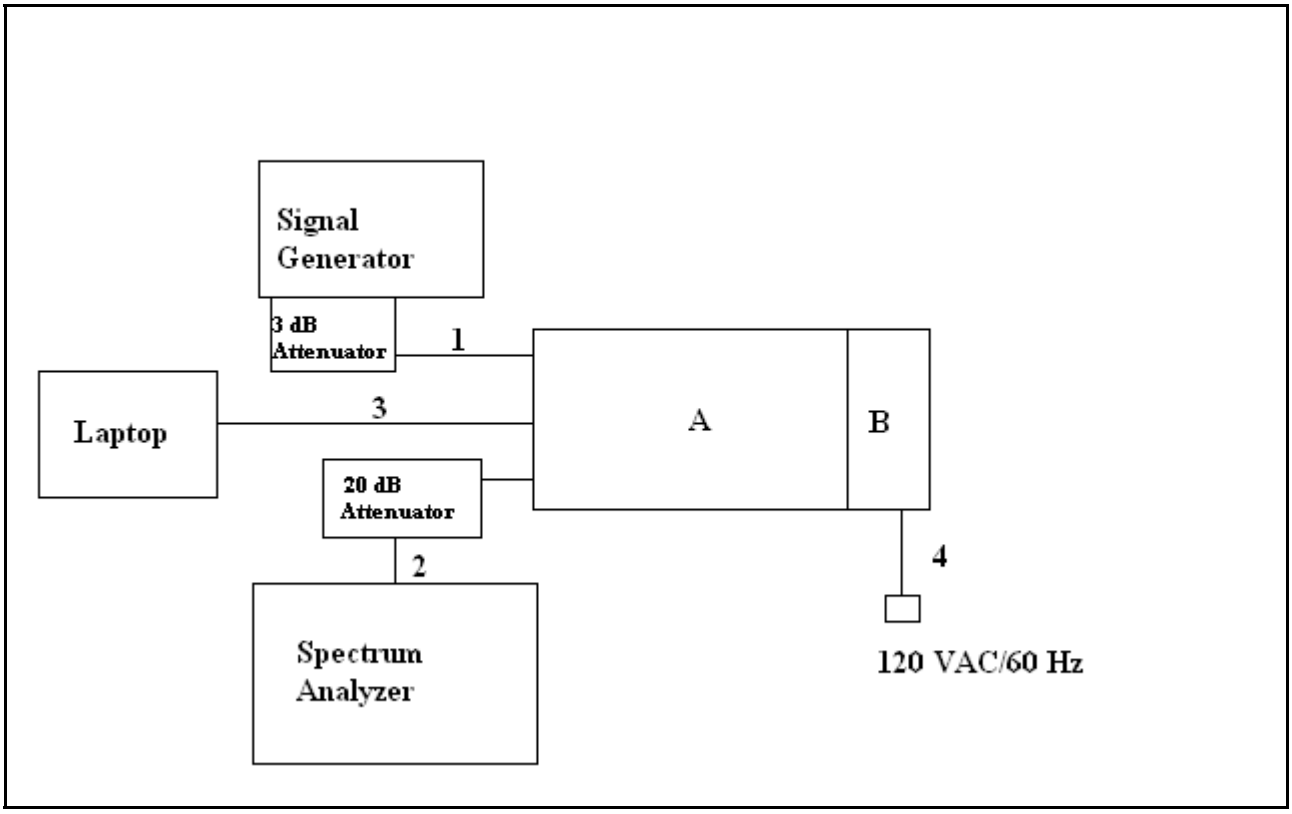

Figure 2. Block Diagram of Test Configuration, Uplink Conducted

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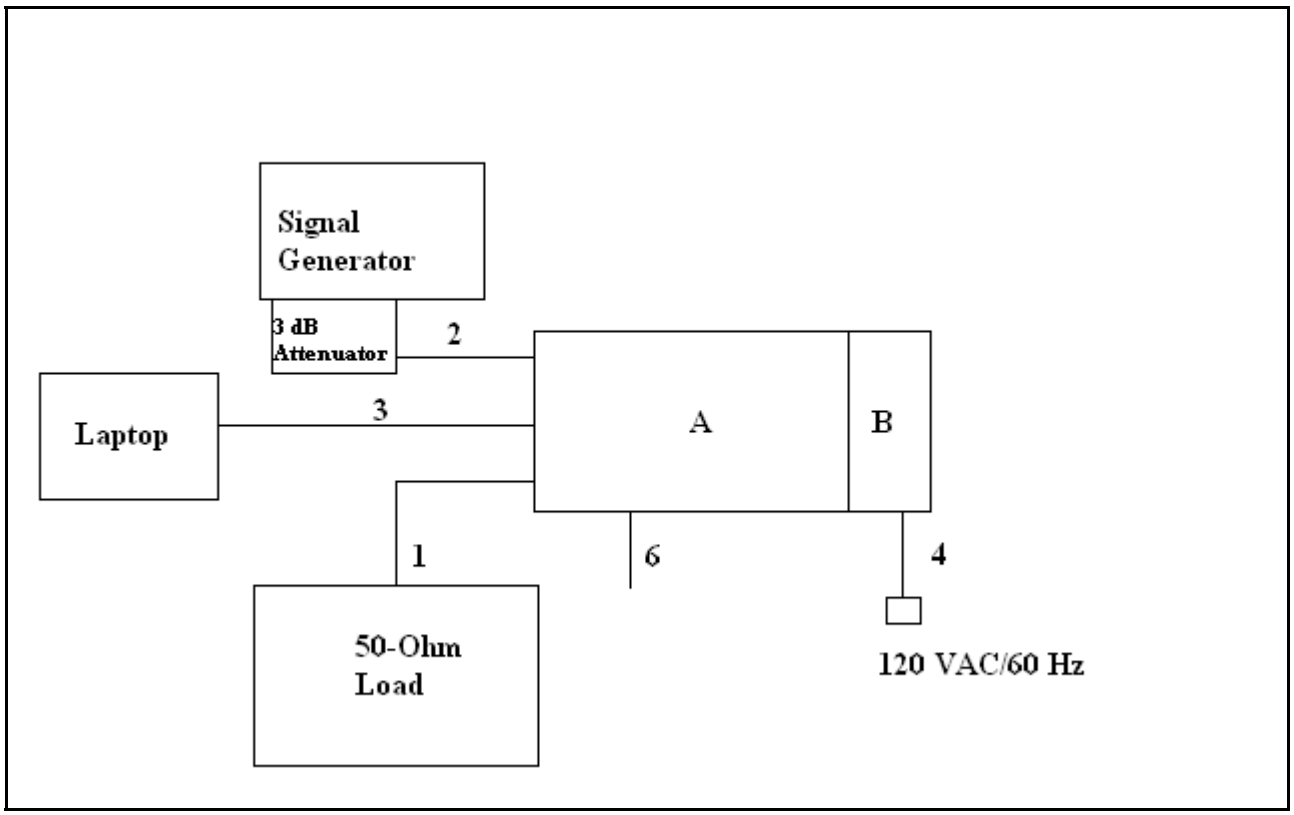

Figure 3. Block Diagram of Test Configuration, Downlink Radiated

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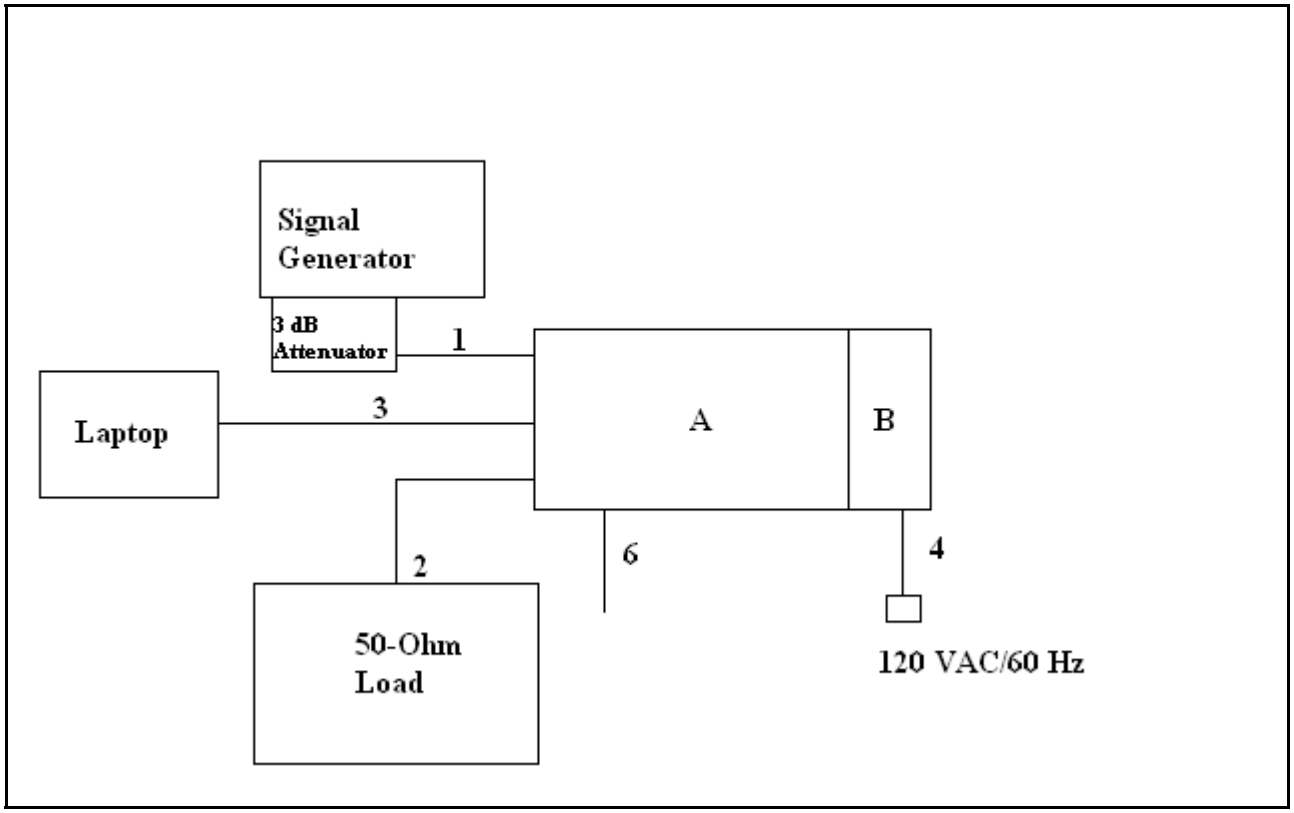

Figure 4. Block Diagram of Test Configuration, Uplink Radiated

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2.7. Mode of Operation

A Repeater receives signals from a base station, amplifies the signals and retransmits them to service area. It also receives, amplifies and retransmits signals in the opposite direction. Both directions are served simultaneously.
In order to receive and transmit signals in both directions, the Repeater is connected to a donor antenna directed towards the base station and to a service antenna directed towards the area to be covered.

2.8. Method of Monitoring EUT Operation

Control of the Repeaters is performed using a desktop or laptop computer equipped with standard browser (no special software) which can communicate with the Repeaters, either locally or remotely via modem (optional).

2.9. Modifications

2.9.1) Modifications to the EUT

No modifications were made to the EUT.

2.9.2) Modifications to the Test Standard

No modifications were made to the test standard.

2.10 Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electro-Magnetic Compatibility Lab for testing was returned Cellvine upon completion of testing.
.

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3. Electromagnetic Compatibility Unintentional Radiators

3.1. Conducted Emission 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 6. 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 6. 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 (dBμV)		15.107(a), Class B Limits (dBμV)	
	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.				
Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz.				

Table 6. 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 50Ω/50μH 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 and the 6 highest emissions were re-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): Jeffrey Hazen

Test Date(s): 05/06/09

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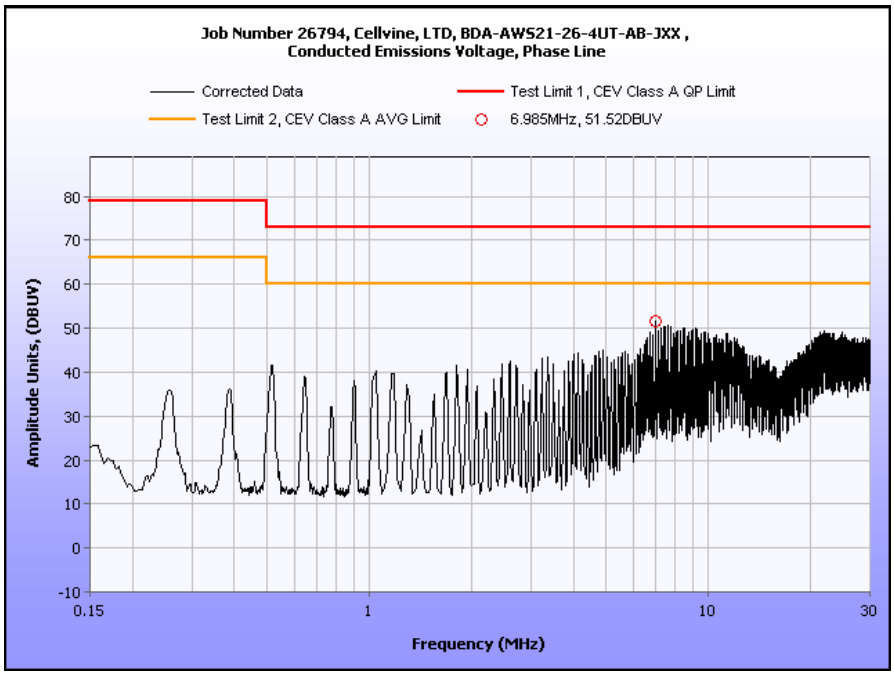
Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC)

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
7.36	49.2	0.17	49.37	73	-23.63	44.8	0.17	44.97	60	-15.03
7.1	48.8	0.17	48.97	73	-24.03	45	0.17	45.17	60	-14.83
7.75	48.3	0.17	48.47	73	-24.53	44	0.17	44.17	60	-15.83

Table 7. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC)



Plot 1. Conducted Emissions, Phase Line Plot

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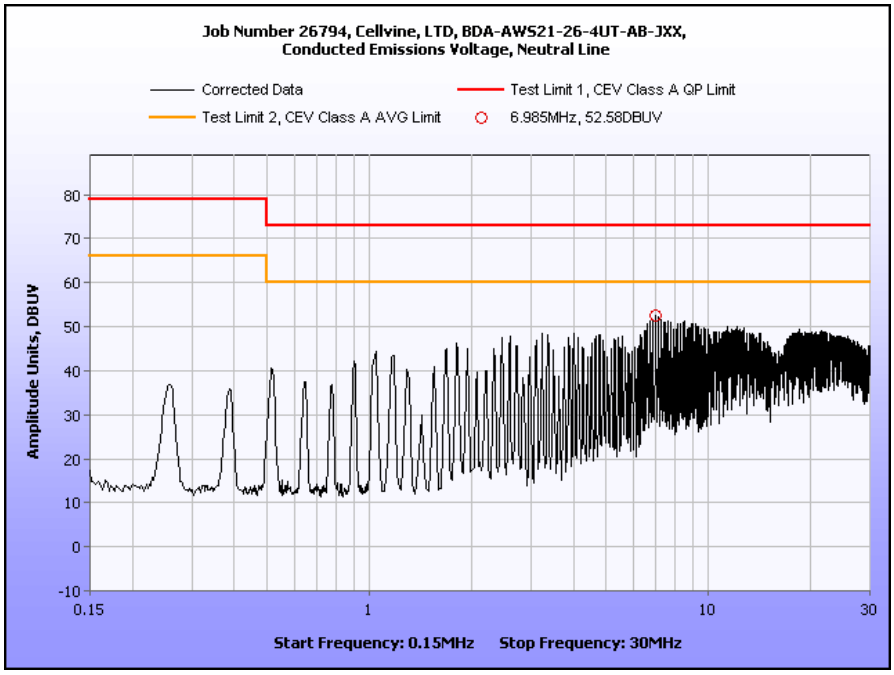
Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC)

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
6.97	49.4	0.17	49.57	73	-23.43	46.63	0.17	46.8	60	-13.2
8.397	50.4	0.17	50.57	73	-22.43	48.6	0.17	48.77	60	-11.23
9.04	49.9	0.17	50.07	73	-22.93	48.5	0.17	48.67	60	-11.33

Table 8. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC)



Plot 2. Conducted Emissions, Neutral Line Plot

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Conducted Emission Limits Test Setup

Photograph 1. Conducted Emissions, Test Setup

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3. Electromagnetic Compatibility Unintentional Radiators

3.2. Radiated Emissions 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 9.

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 9.

Frequency (MHz)	Field Strength (dBµV/m)	
	§15.109 (b), Class A Limit (dBµV) @ 10m	§15.109 (a),Class B Limit (dBµV) @ 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 9. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)

Test Procedures: The EUT was installed on a non-conductive pole inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3 m from the EUT on an adjustable mast. A pre-scan was first performed using a peak detector 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): Jeffrey Hazen

Test Date(s): 05/05/09

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Radiated Emissions Limits Test Results, 30 MHz to 1 GHz, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36.875	56	H	3.20	20.30	8.05	0.17	10.46	18.06	39.00	-20.94
36.875	80	V	1.00	37.90	6.83	0.17	10.46	34.43	39.00	-4.57
44.200	56	H	2.80	14.60	9.22	0.21	10.46	13.57	39.00	-25.43
44.200	0	V	1.00	33.00	8.12	0.21	10.46	30.87	39.00	-8.13
51.600	239	H	4.00	17.25	9.70	0.22	10.46	16.71	39.00	-22.29
51.600	46.3	V	1.00	31.70	8.76	0.22	10.46	30.22	39.00	-8.78
99.530	167	H	1.65	28.44	7.89	0.23	10.46	26.10	43.50	-17.40
99.530	141	V	1.38	39.20	7.25	0.23	10.46	36.22	43.50	-7.28
110.600	16	H	1.25	28.70	7.20	0.27	10.46	25.71	43.50	-17.79
110.600	148	V	1.00	39.70	7.58	0.27	10.46	37.08	43.50	-6.42
114.250	0	H	1.30	28.80	7.20	0.28	10.46	25.82	43.50	-17.68
114.250	141	V	99.00	39.60	7.43	0.28	10.46	36.85	43.50	-6.65

Table 10. Radiated Emissions Limits Test Results, 30 MHz to 1 GHz, Class A, FCC Limits

Plot 3. Radiated Emissions, Pre-Scan, FCC Limits

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Radiated Emissions Limits Test Results, 30 MHz to 1 GHz, Class A

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuV)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36.875	56	H	3.20	20.30	8.05	0.17	10.46	18.06	40.00	-21.94
36.875	80	V	1.00	37.90	6.83	0.17	10.46	34.43	40.00	-5.57
44.200	56	H	2.80	14.60	9.22	0.21	10.46	13.57	40.00	-26.43
44.200	0	V	1.00	33.00	8.12	0.21	10.46	30.87	40.00	-9.13
51.600	239	H	4.00	17.25	9.70	0.22	10.46	16.71	40.00	-23.29
51.600	46.3	V	1.00	31.70	8.76	0.22	10.46	30.22	40.00	-9.78
99.530	167	H	1.65	28.44	7.89	0.23	10.46	26.10	40.00	-13.90
99.530	141	V	1.38	39.20	7.25	0.23	10.46	36.22	40.00	-3.78
110.600	16	H	1.25	28.70	7.20	0.27	10.46	25.71	40.00	-14.29
*110.600	148	V	1.00	39.70	7.58	0.27	10.46	37.08	40.00	-2.92
114.250	0	H	1.30	28.80	7.20	0.28	10.46	25.82	40.00	-14.18
114.250	141	V	99.00	39.60	7.43	0.28	10.46	36.85	40.00	-3.15

Table 11. Radiated Emissions Limits Test Results, 30 MHz to 1 GHz, Class A, ICES-003 C Limits

Note 1: * - At this frequency, the measured electric-field strength exhibits a margin of compliance that is less than 3 dB below the specification limit. We recommend that every emission measured, have at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

Plot 4. Radiated Emissions, Pre-Scan, ICES-003 Limits

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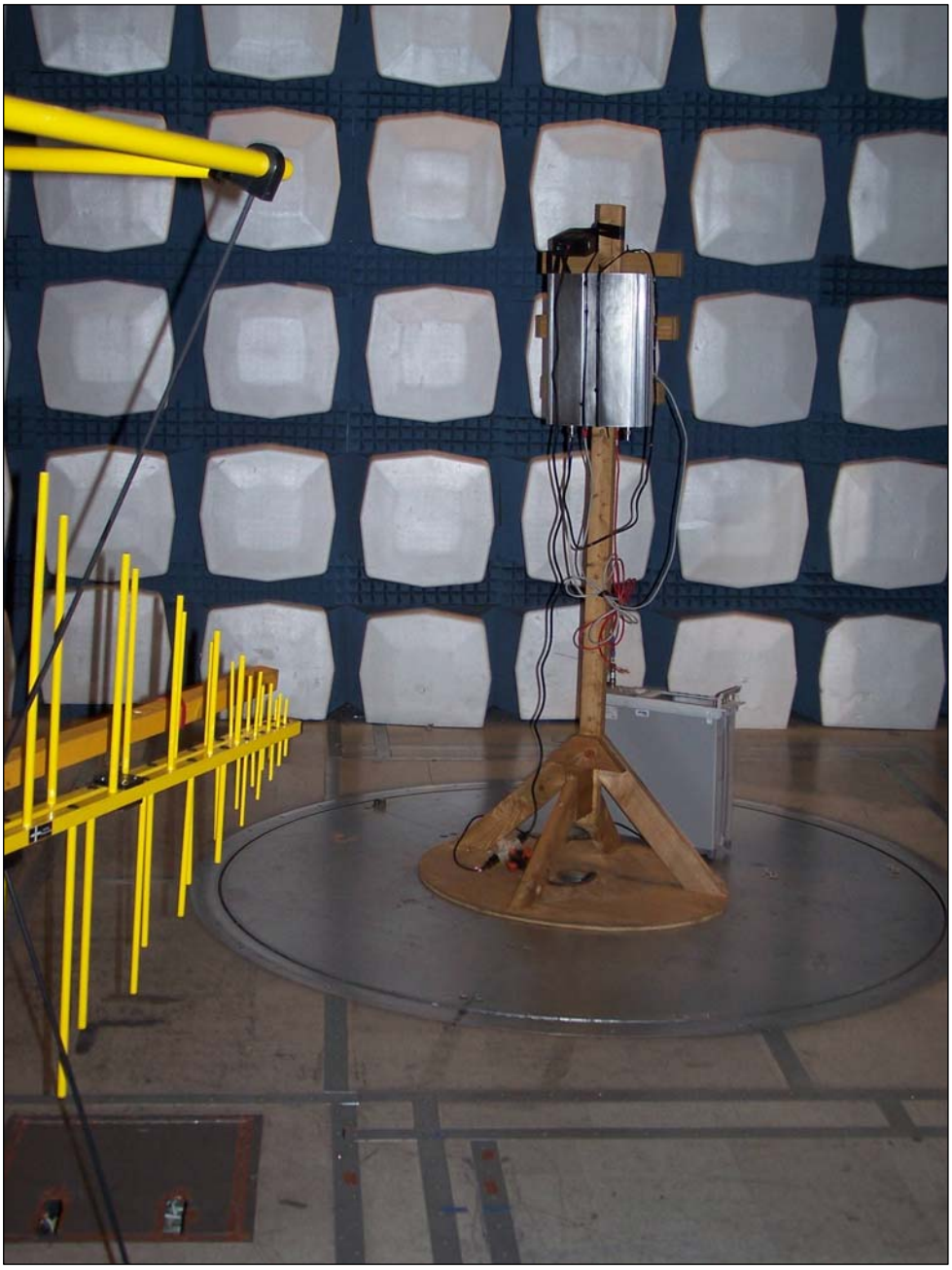
Radiated Emission Limits Test Setup



Photograph 2. Radiated Emission Limits, Test Setup

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4. Electromagnetic Compatibility Criteria Intentional Radiators

4.1. RF Power Output

Test Requirement(s): §2.1046 and §27.50(c)

Test Procedures: As required by 47 CFR 2.1046, *RF power output measurement* was made at the RF output terminal using a spectrum analyzer capable of measuring a modulated carrier.

Test Results: Equipment complies with 47CFR 2.1046 and 27.50(c). The AWS (2 SUB Bands) Mini Repeater does not exceed 1640 Watts peak (EIRP) for the downlink and 1 Watt peak (EIRP) for the uplink at the carrier frequency.

The following page show measurements of RF Power output which is recorded below:

CDMA	Corrected Conducted Output Power				
	Uplink		CDMA	Downlink	
	In (dBm)	Out (dBm)		In (dBm)	Out (dBm)
1710.675	-61.18	18.09	2110.675	-54.5	28.24
1732.5	-67.8	18.85	2132.5	-50.96	28.06
1754.375	-66.04	18.08	2154.375	-56.34	26.1

WCDMA	Corrected Conducted Output Power				
	Uplink		WCDMA	Downlink	
	In (dBm)	Out (dBm)		In (dBm)	Out (dBm)
1712.5	-60.76	18.77	2112.5	-54.88	28.56
1732.5	-68.14	18.67	2132.5	-52.02	27.68
1752.5	-65.8	19.25	2152.5	-51.58	27.82

Test Engineer(s): Jeffrey Hazen

Test Date(s): 05/06/09

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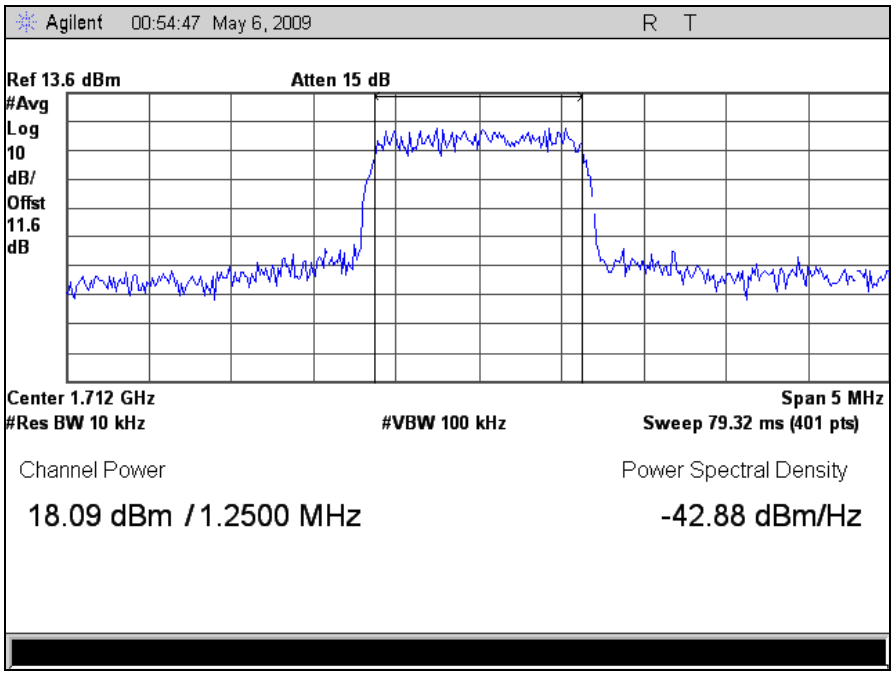
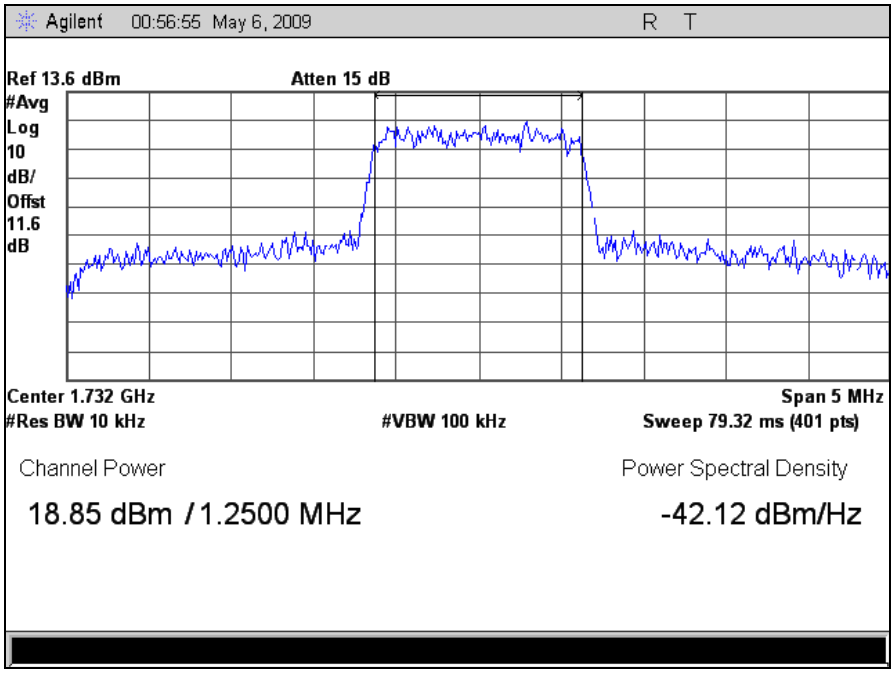


Plot 5. RF Power Output, Uplink, Low Channel, CDMA



Plot 6. RF Power Output, Uplink, Mid Channel, CDMA

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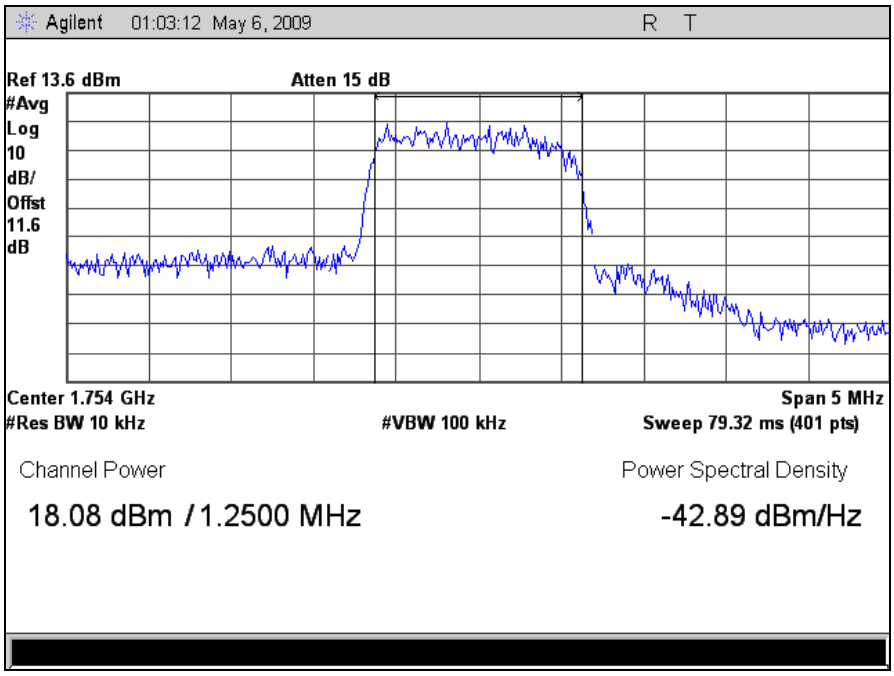
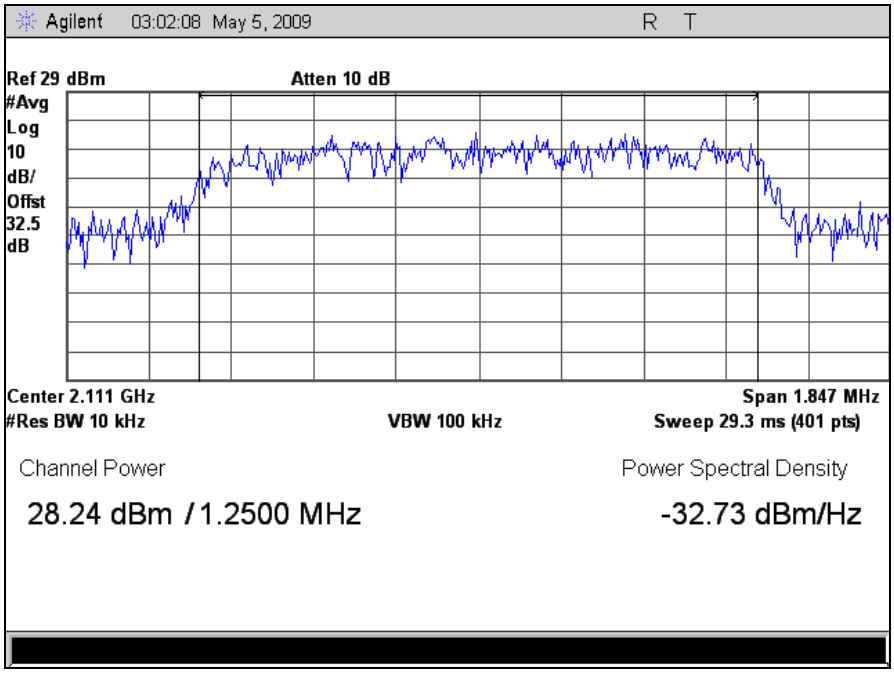


Plot 7. RF Power Output, Uplink, High Channel, CDMA



Plot 8. RF Power Output, Downlink, Low Channel, CDMA

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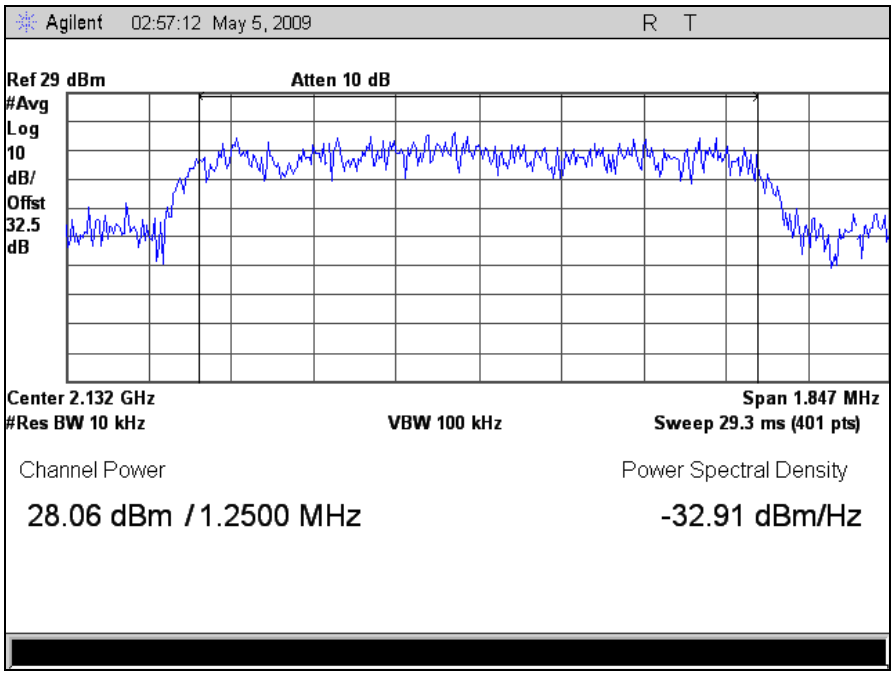
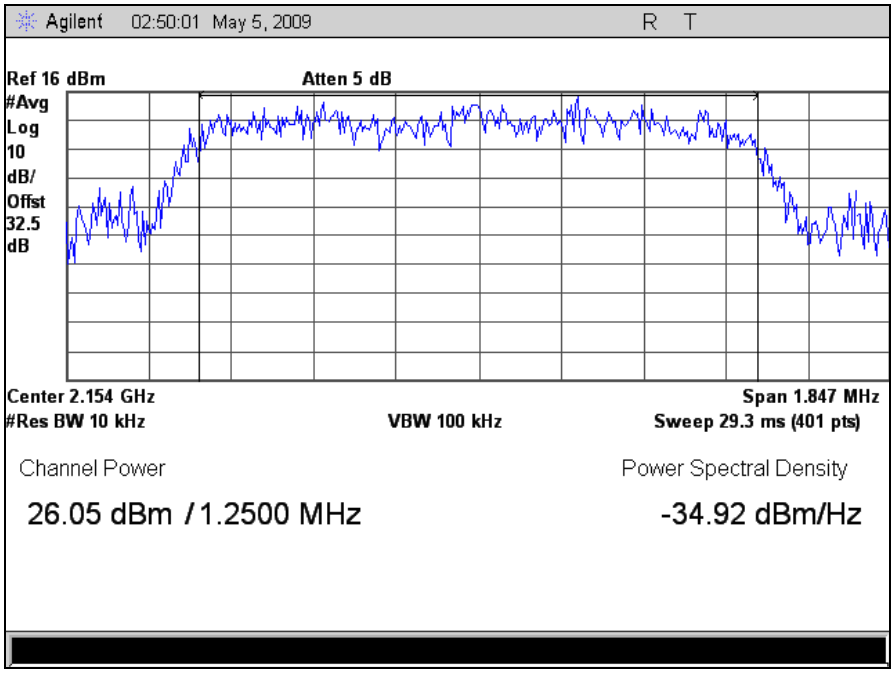


Plot 9. RF Power Output, Downlink, Mid Channel, CDMA



Plot 10. RF Power Output, Downlink, High Channel, CDMA

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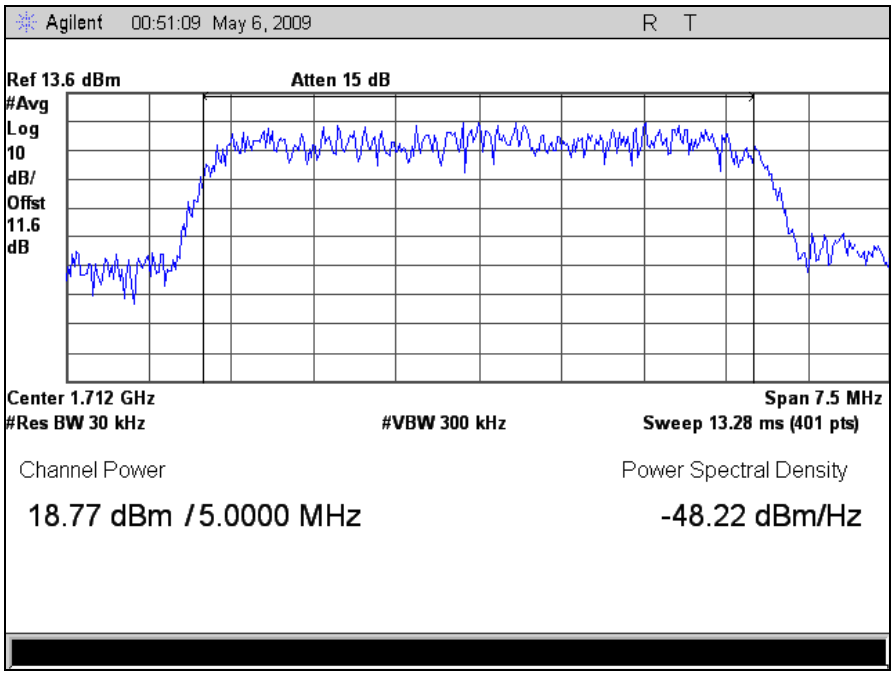
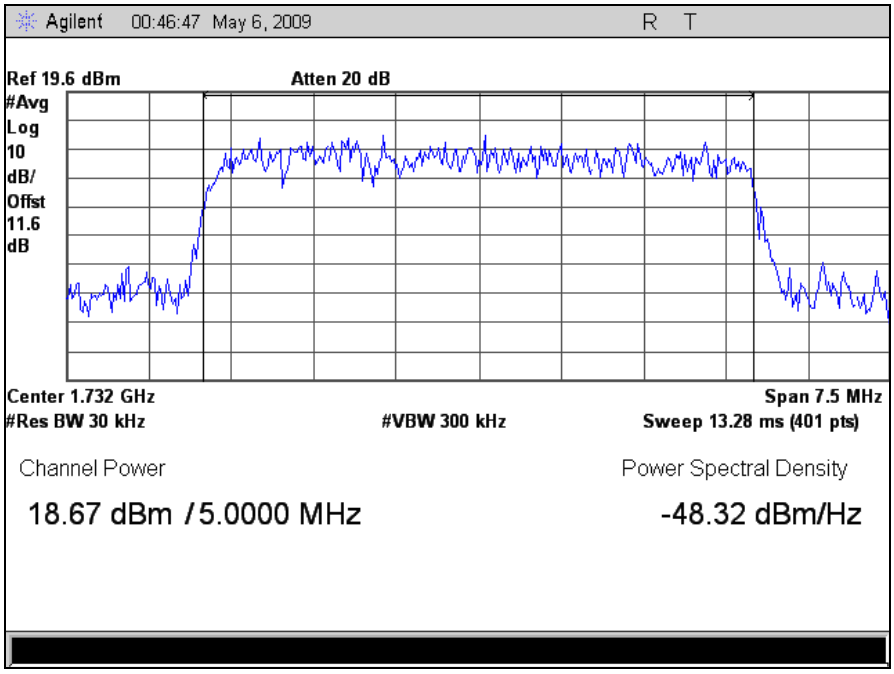


Plot 11. RF Power Output, Uplink, Low Channel, WCDMA



Plot 12. RF Power Output, Uplink, Mid Channel, WCDMA

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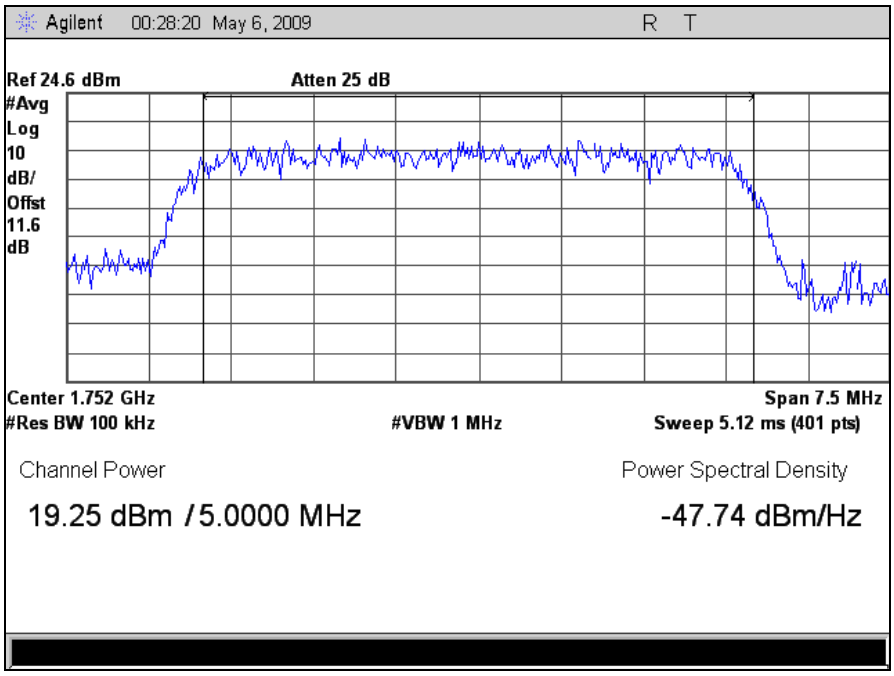
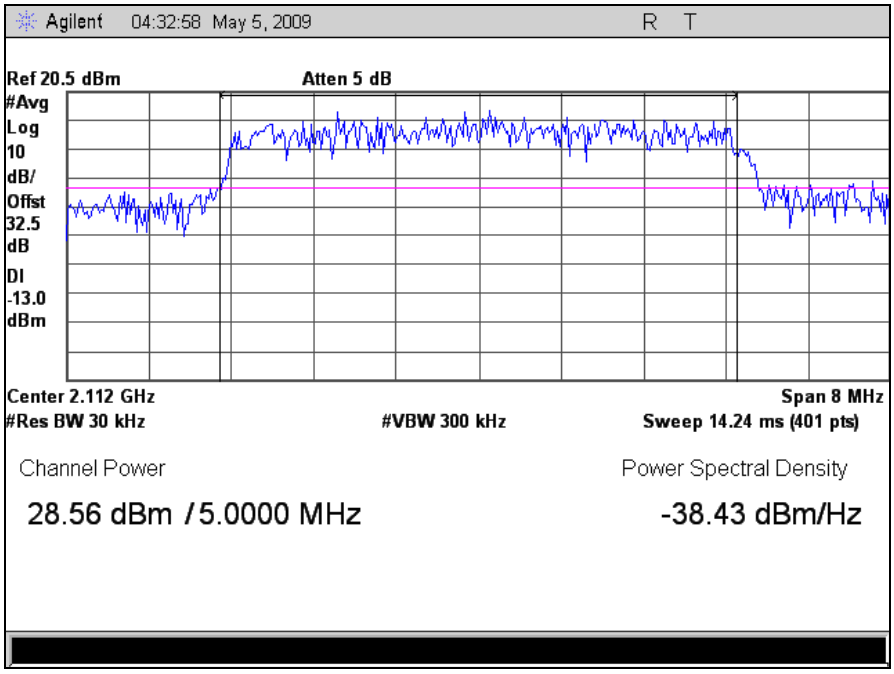


Plot 13. RF Power Output, Uplink, High Channel, WCDMA



Plot 14. RF Power Output, Downlink, Low Channel, WCDMA

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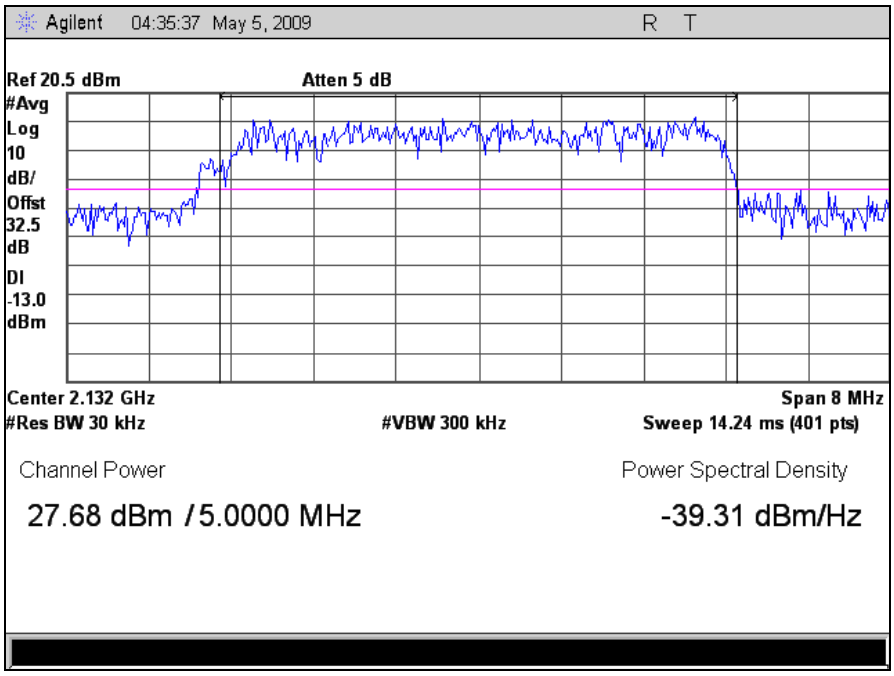
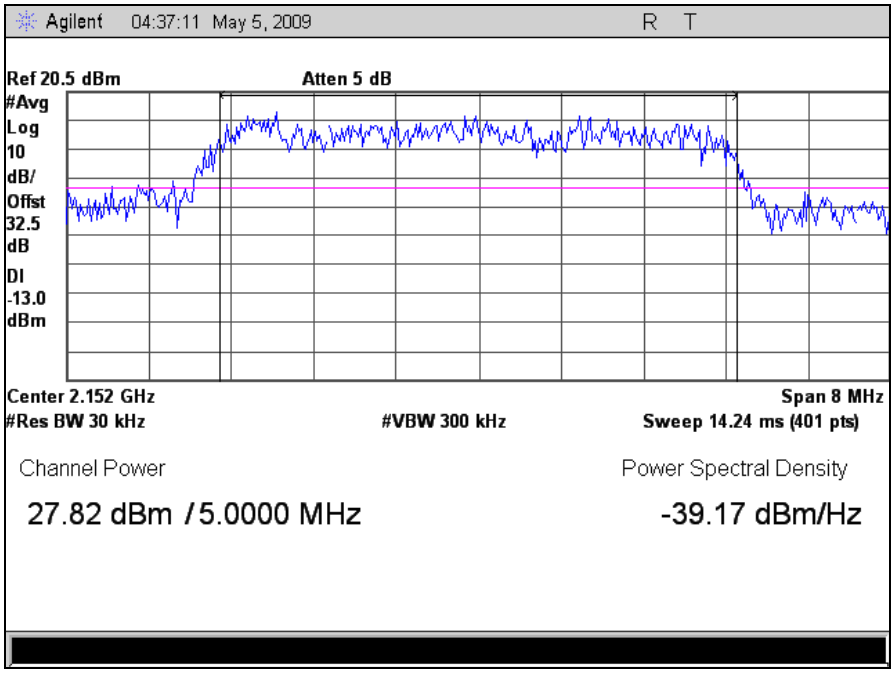


Plot 15. RF Power Output, Downlink, Mid Channel, WCDMA



Plot 16. RF Power Output, Downlink, High Channel, WCDMA

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4. Electromagnetic Compatibility Intentional Radiators

4.2. Modulation Characteristics

Test Requirement(s): §2.1047

Test Procedures: As required by 47 CFR 2.1047, Modulation Characteristics measurements were made at the RF output terminals.

Test Results: The EUT was deemed not applicable with this requirement. The EUT is a repeater that does not modulate signals.

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4. Electromagnetic Compatibility Intentional Radiators

4.3. Occupied Bandwidth

Test Requirement(s): §2.1049

Test Procedures: As required by 47 CFR 2.1049, the occupied bandwidth measurements were made at the RF output terminals using a Spectrum Analyzer.

Test Results: Equipment complies with Section 2.1049. The following pages show measurements of 99% Occupied Bandwidth plots:

CDMA	Occupied Bandwidth				
	Uplink		CDMA	Downlink	
	In (MHz)	Out (MHz)		In (MHz)	Out (MHz)
1710.675	1.28	1.22	2110.675	1.25	1.2
1732.5	1.29	1.22	2132.5	1.24	1.29
1754.375	1.27	1.25	2154.375	1.25	1.24

WCDMA	Occupied Bandwidth				
	Uplink		WCDMA	Downlink	
	In (MHz)	Out (MHz)		In (MHz)	Out (MHz)
1712.5	5.16	4.99	2112.5	5.02	4.96
1732.5	5.45	5.04	2132.5	4.99	4.91
1752.5	5.18	4.94	2152.5	5.1	5.05

Test Engineer(s): Jeffrey Hazen

Test Date(s): 05/08/09

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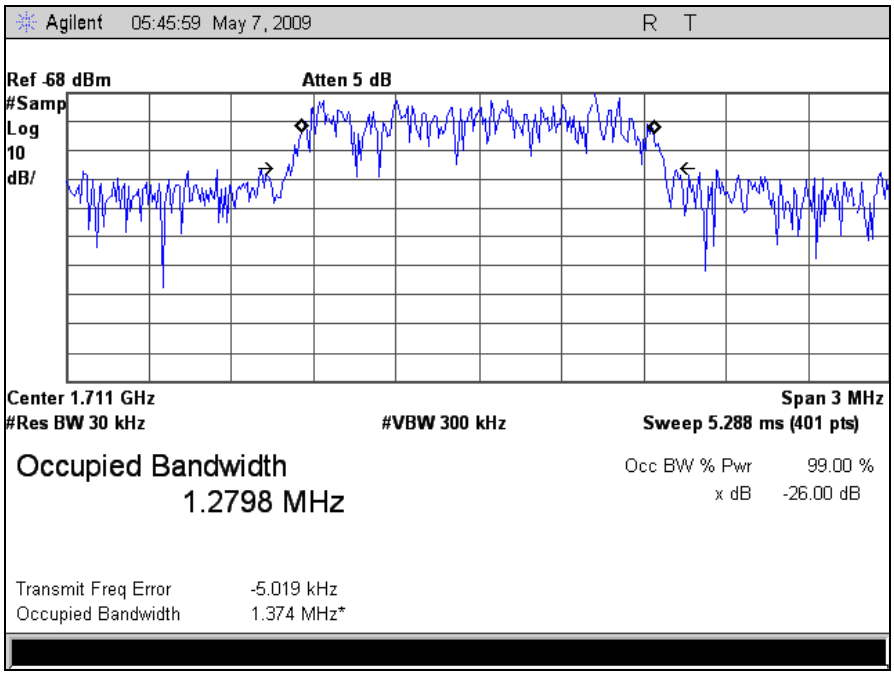
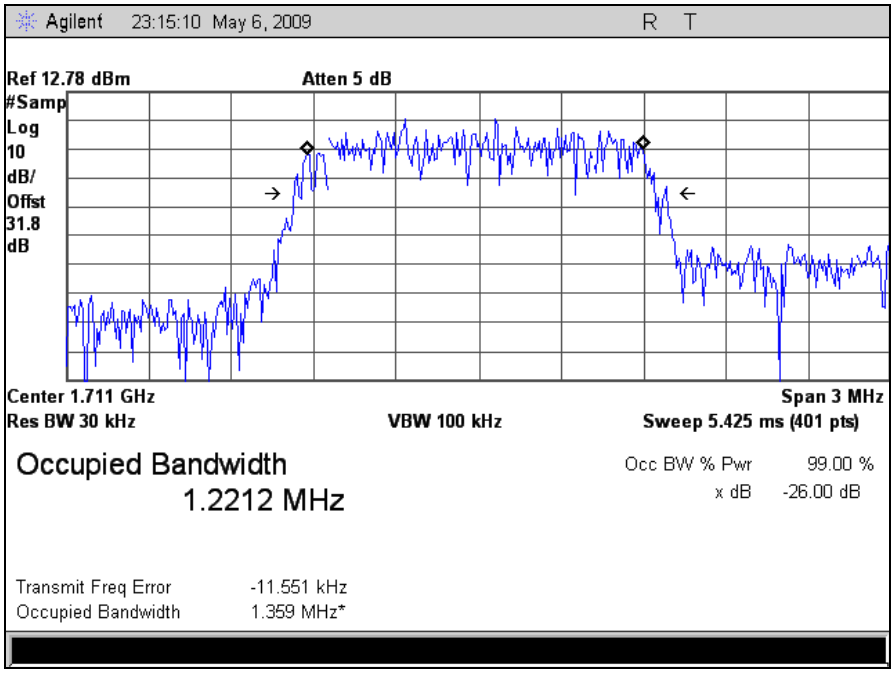


Plot 17. Occupied Bandwidth, Uplink, Low Channel, Output, CDMA



Plot 18. Occupied Bandwidth, Uplink, Low Channel, Output, CDMA

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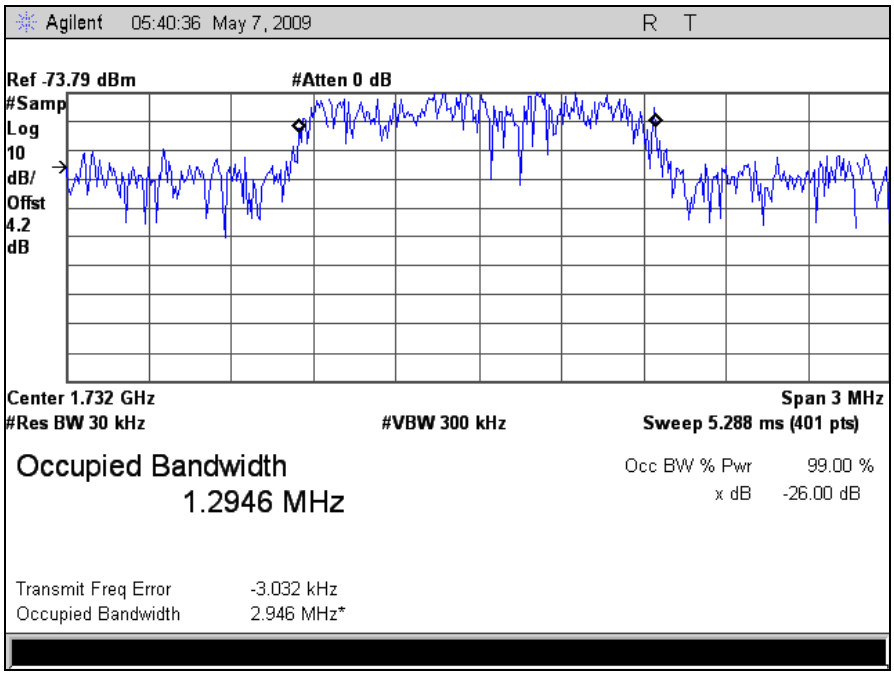
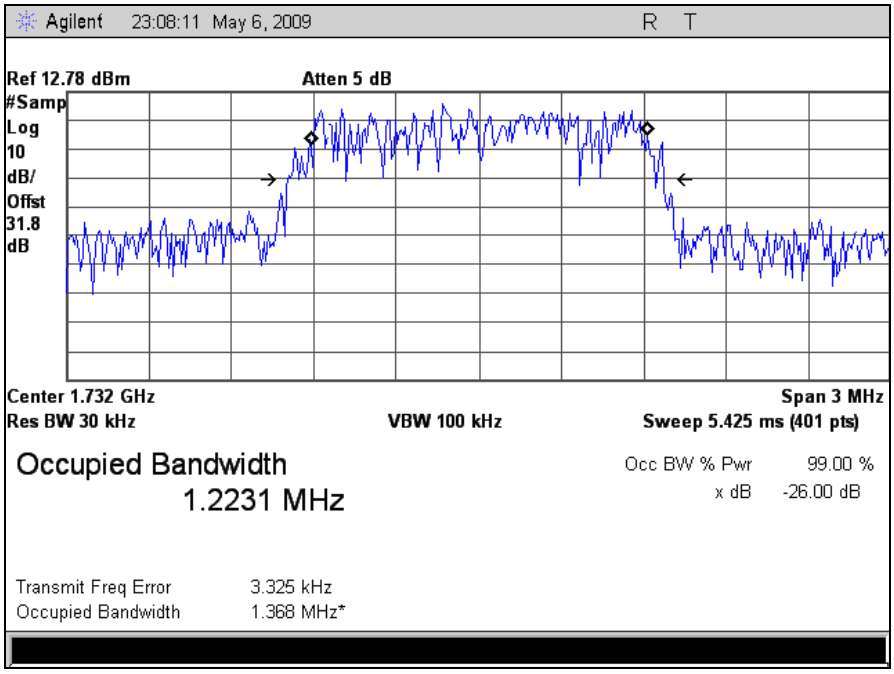


Plot 19. Occupied Bandwidth, Uplink, Mid Channel, Input, CDMA



Plot 20. Occupied Bandwidth, Uplink, Mid Channel, Output, CDMA

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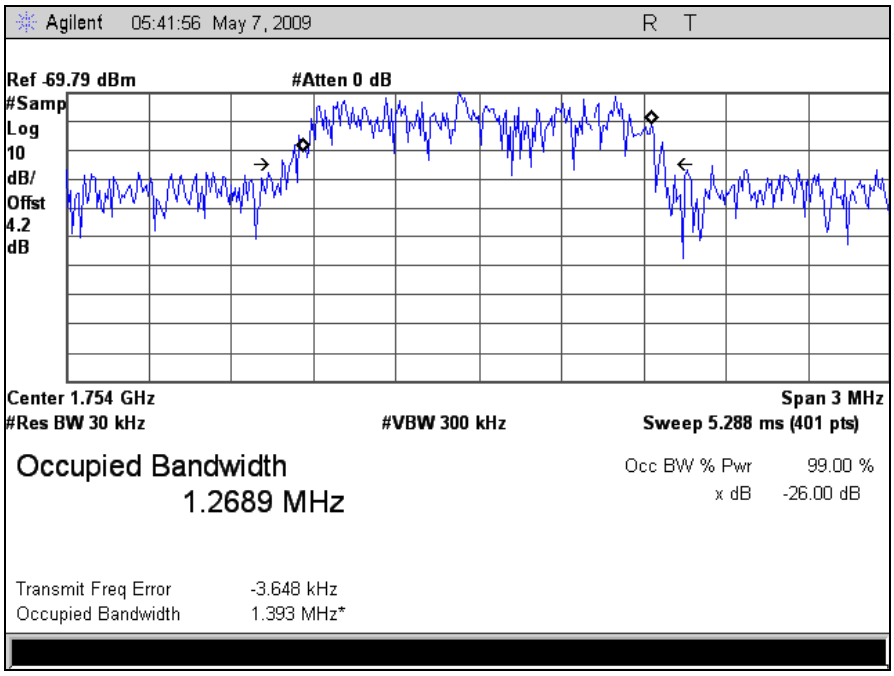
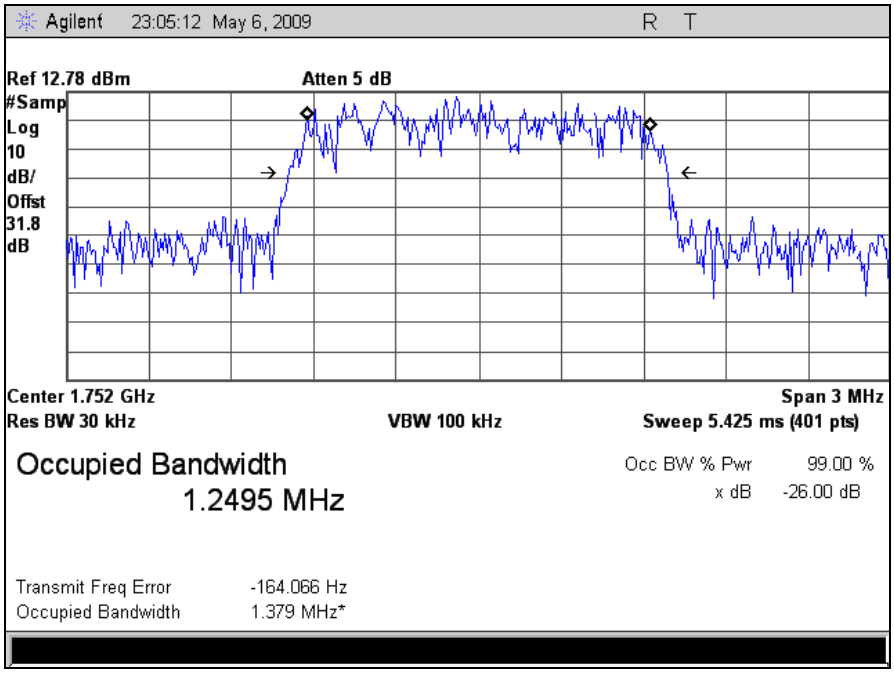


Plot 21. Occupied Bandwidth, Uplink, High Channel, Input, CDMA



Plot 22. Occupied Bandwidth, Uplink, High Channel, Output, CDMA

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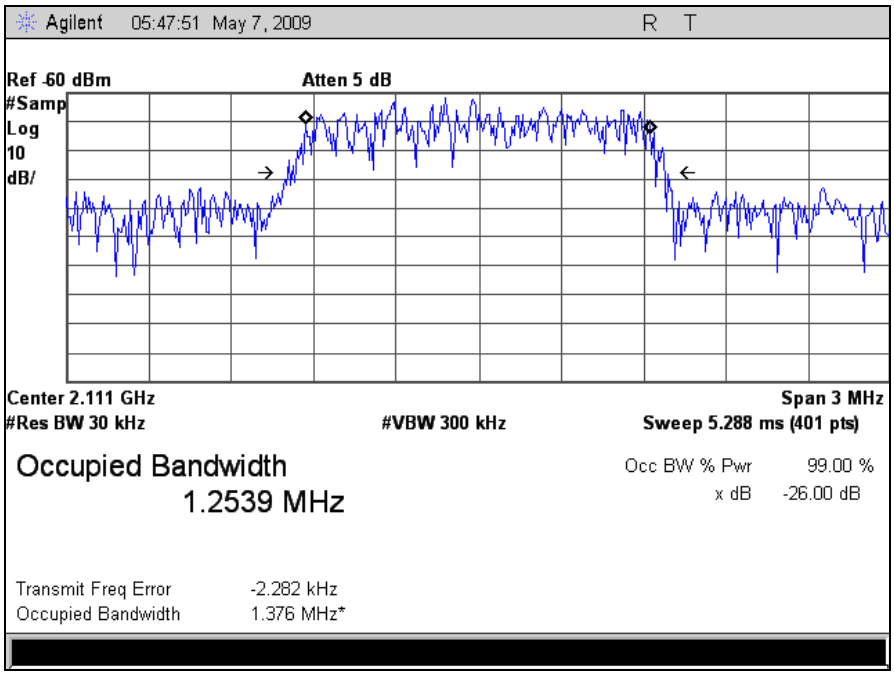
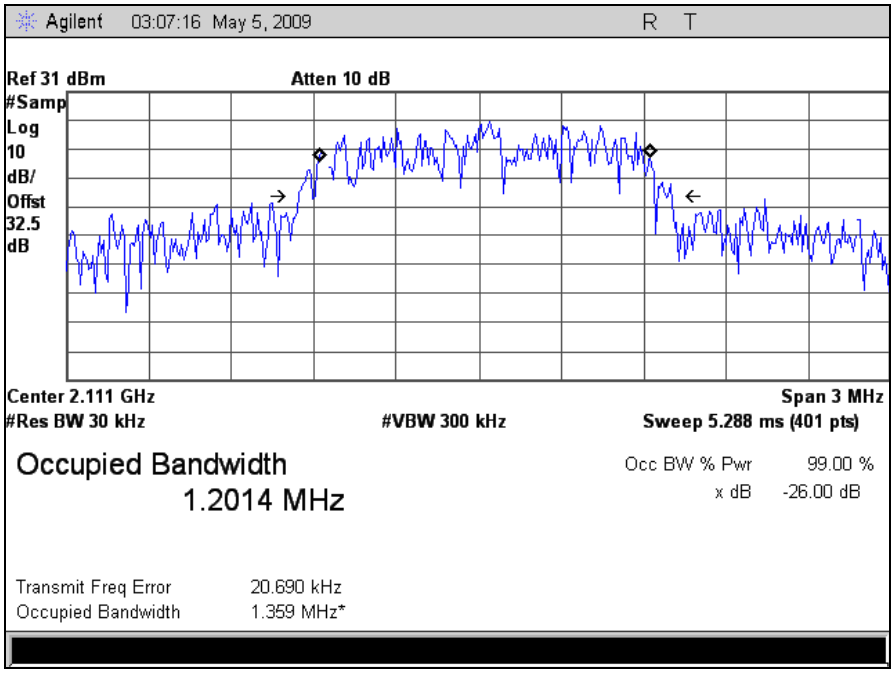


Plot 23. Occupied Bandwidth, Downlink, Low Channel, Input, CDMA



Plot 24. Occupied Bandwidth, Downlink, Low Channel, Output, CDMA

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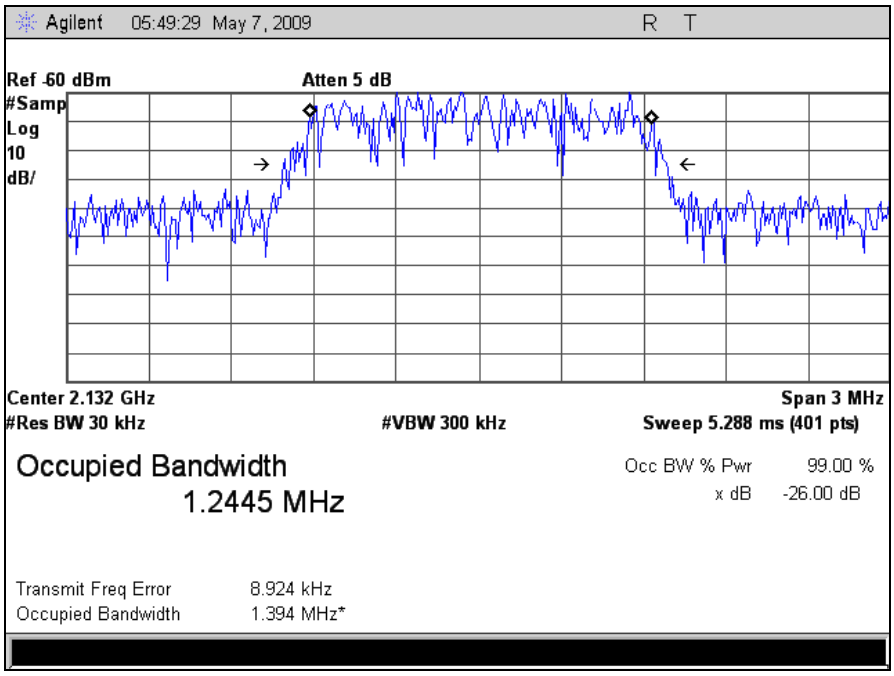
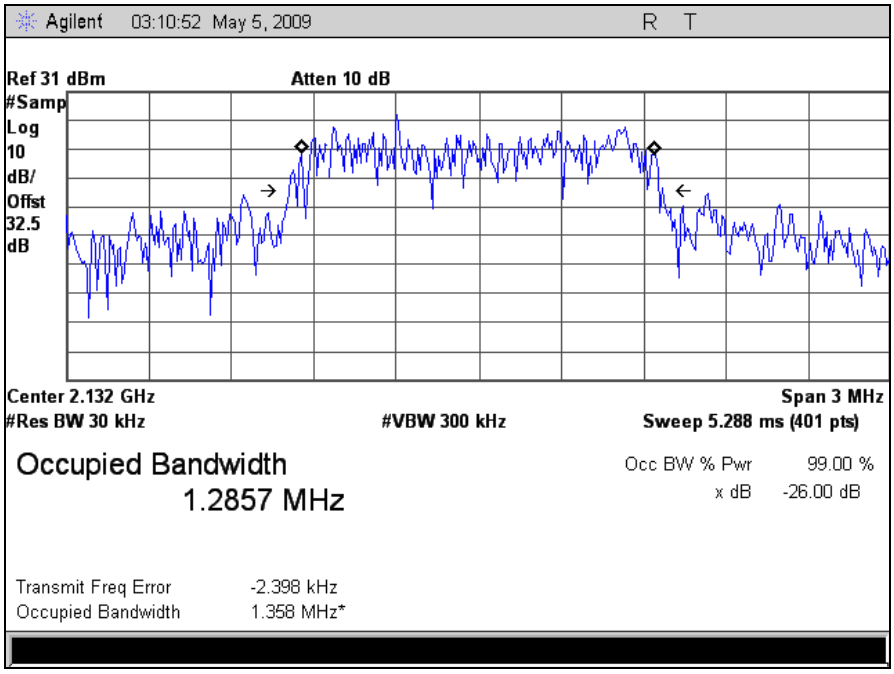


Plot 25. Occupied Bandwidth, Downlink, Mid Channel, Input, CDMA



Plot 26. Occupied Bandwidth, Downlink, Mid Channel, Output, CDMA

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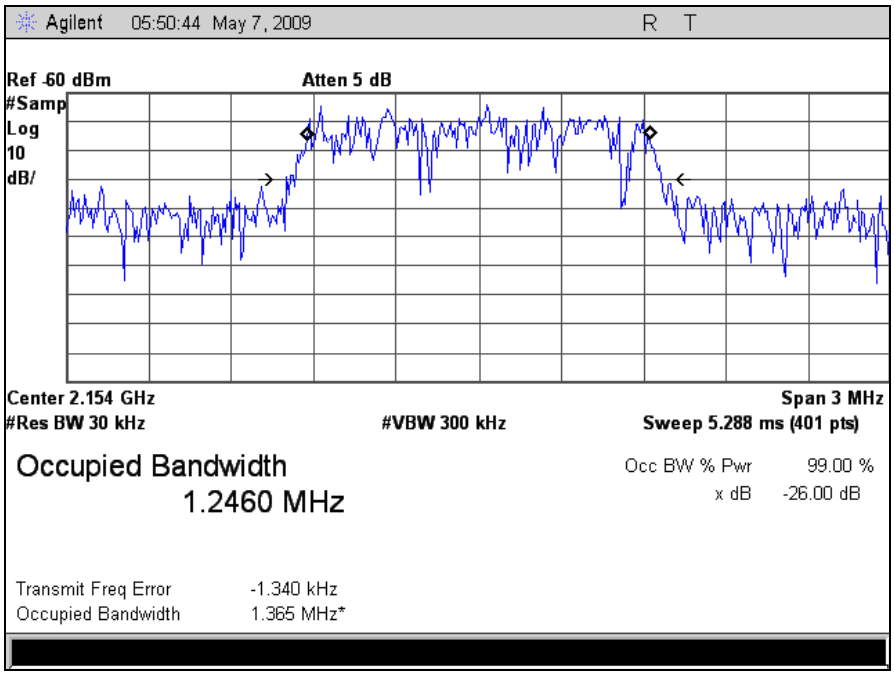
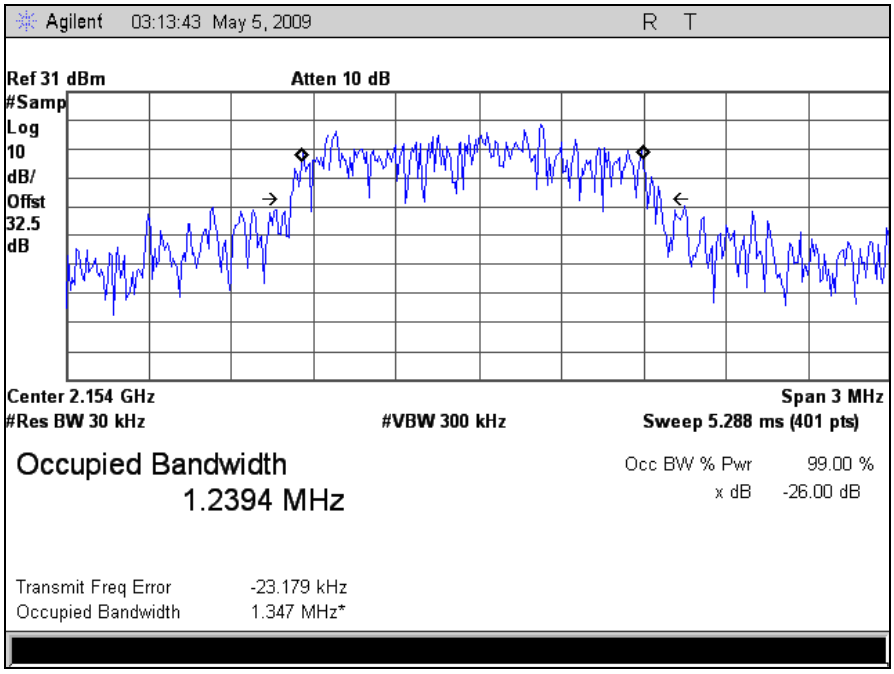


Plot 27. Occupied Bandwidth, Downlink, High Channel, Input, CDMA



Plot 28. Occupied Bandwidth, Downlink, High Channel, Output, CDMA

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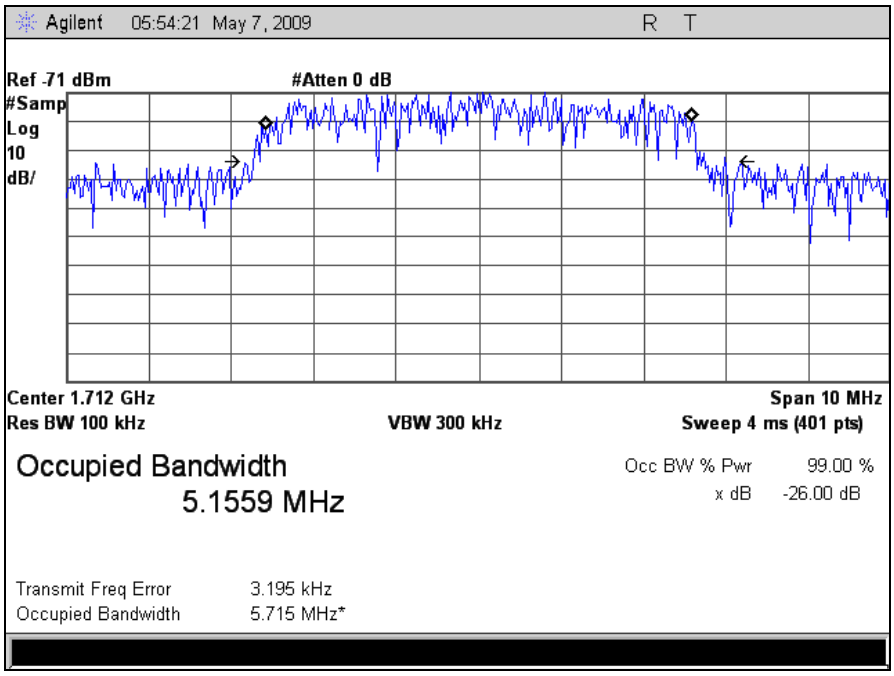
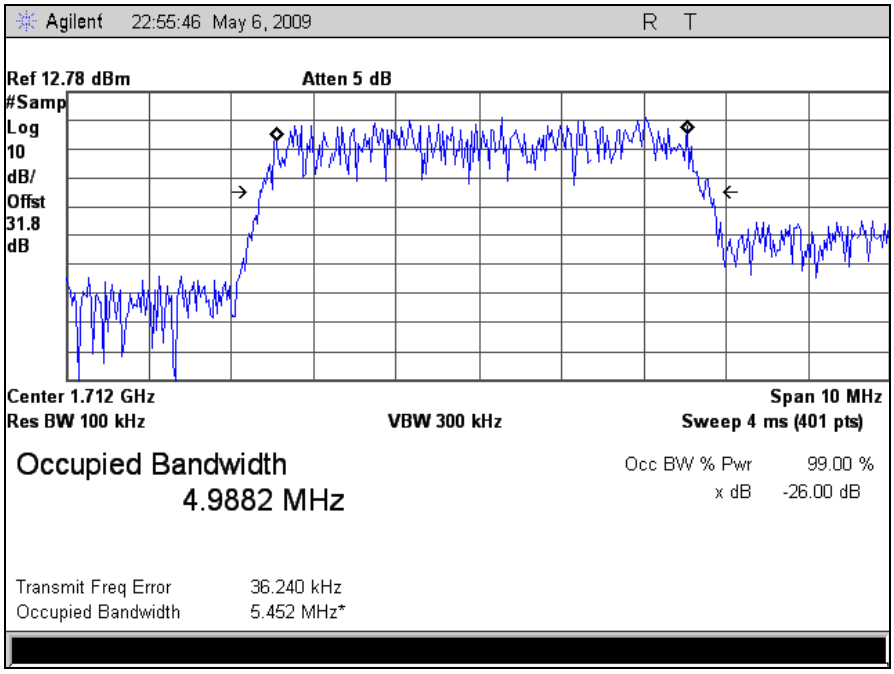


Plot 29. Occupied Bandwidth, Uplink, Low Channel, Input, WCDMA



Plot 30. Occupied Bandwidth, Uplink, Low Channel, Output, WCDMA

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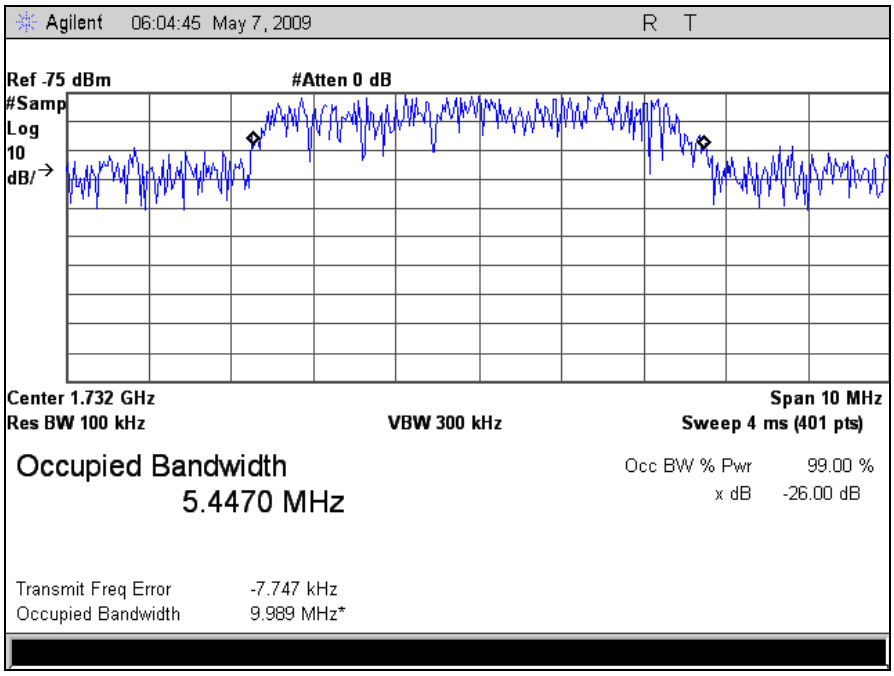
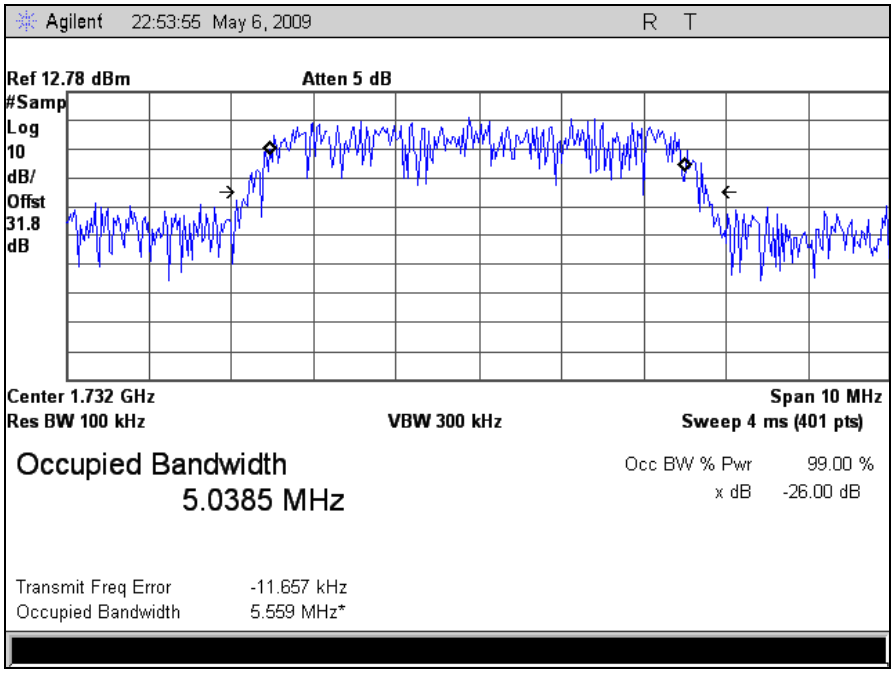


Plot 31. Occupied Bandwidth, Uplink, Mid Channel, Input, WCDMA



Plot 32. Occupied Bandwidth, Uplink, Mid Channel, Output, WCDMA

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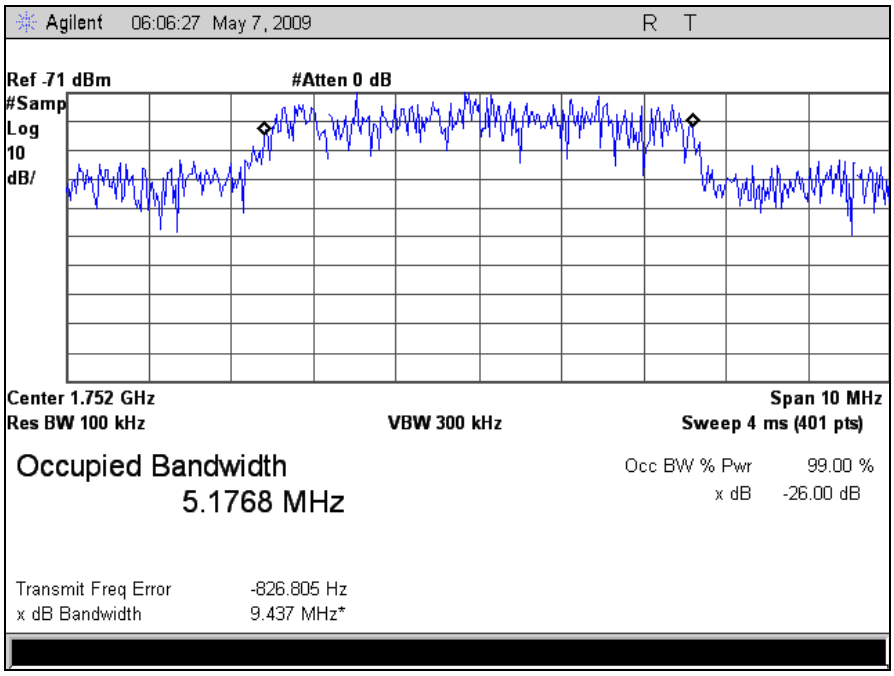
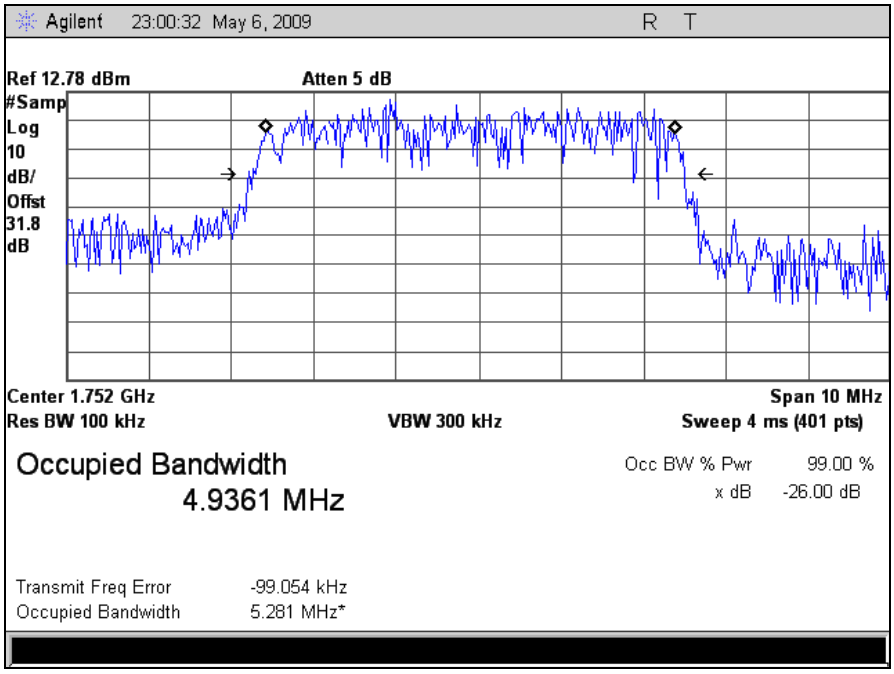


Plot 33. Occupied Bandwidth, Uplink, High Channel, Input, WCDMA



Plot 34. Occupied Bandwidth, Uplink, High Channel, Output, WCDMA

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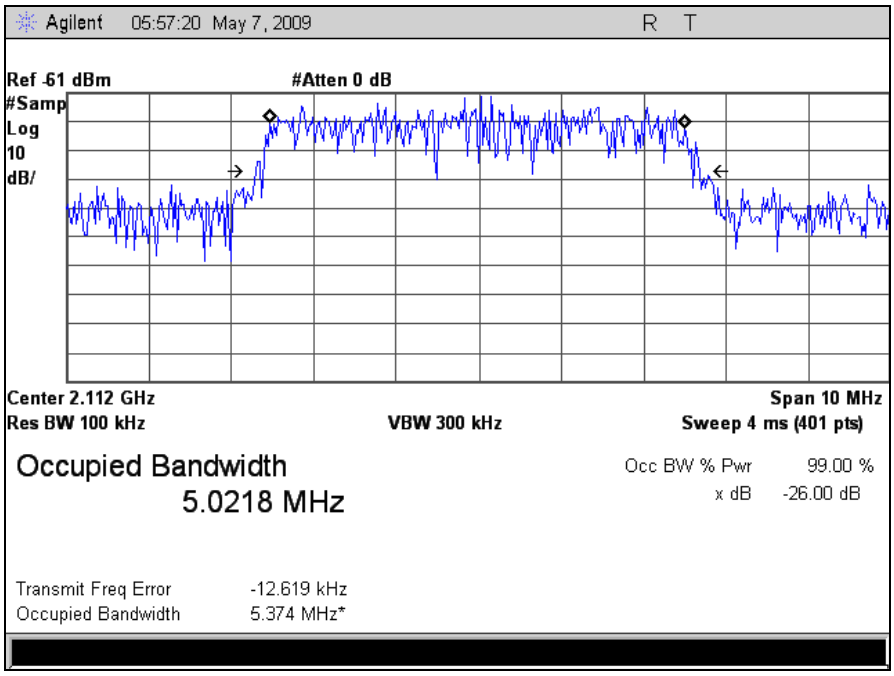
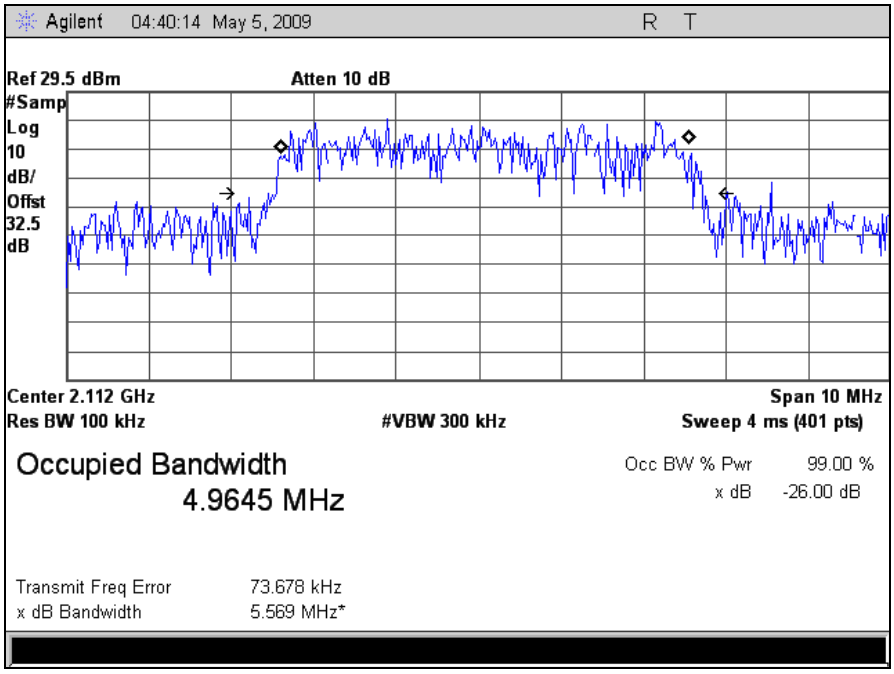


Plot 35. Occupied Bandwidth, Downlink, Low Channel, Input, WCDMA



Plot 36. Occupied Bandwidth, Downlink, Low Channel, Output, WCDMA

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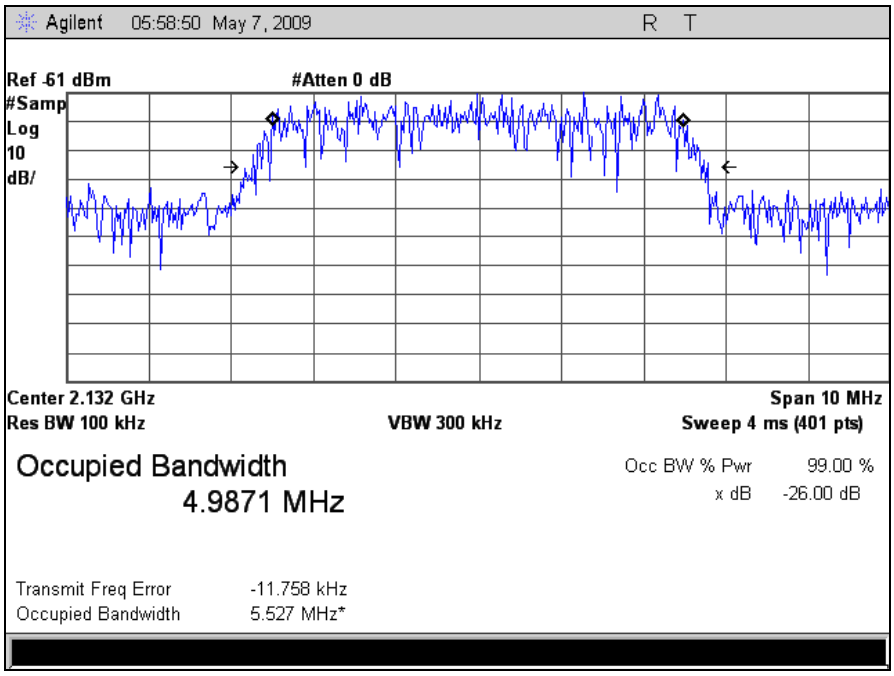
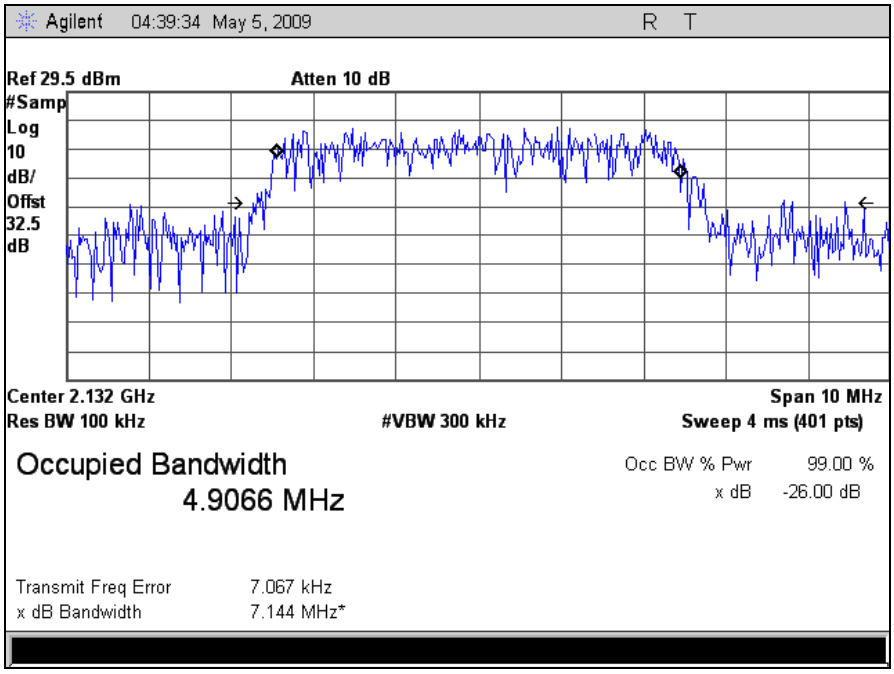


Plot 37. Occupied Bandwidth, Downlink, Mid Channel, Input, WCDMA



Plot 38. Occupied Bandwidth, Downlink, Mid Channel, Output, WCDMA

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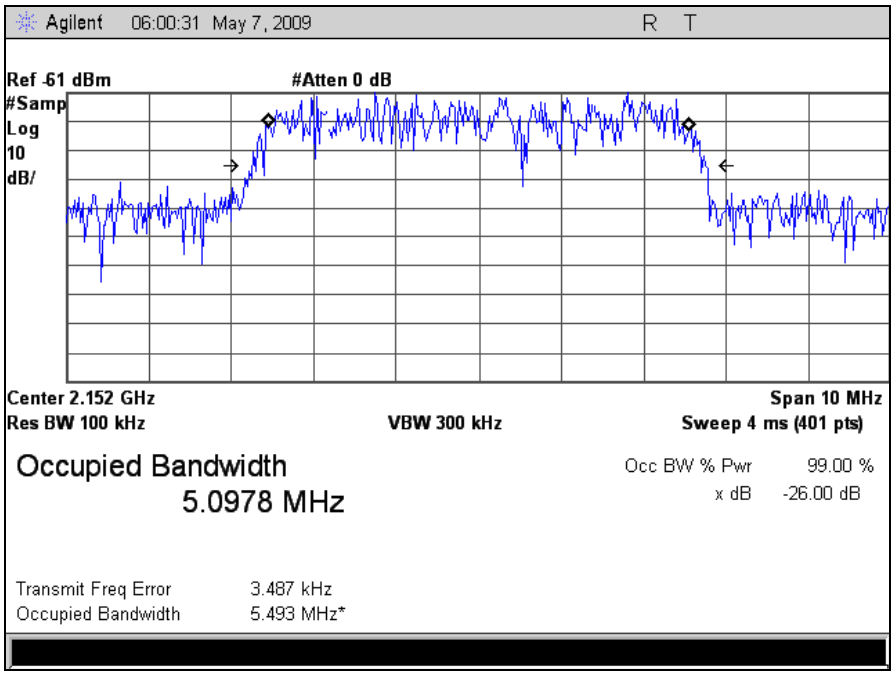
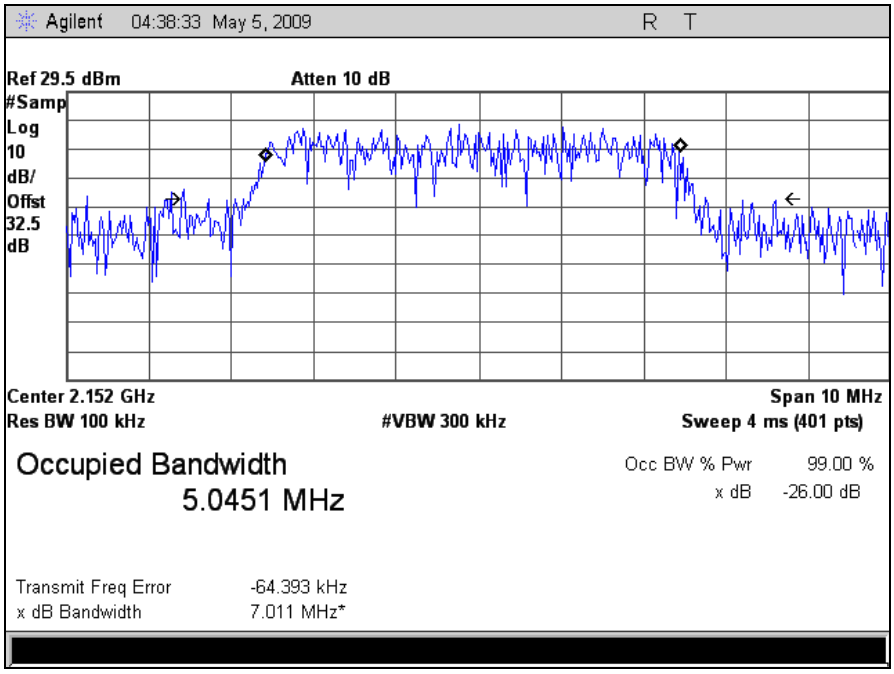


Plot 39. Occupied Bandwidth, Downlink, High Channel, Input, WCDMA



Plot 40. Occupied Bandwidth, Downlink, High Channel, Output, WCDMA

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4. Electromagnetic Compatibility Intentional Radiators

4.4. Spurious Emissions at Antenna Terminals

Test Requirement(s): §2.1051 and §27.53(f)

Test Procedures: As required by 47 CFR 2.1051, *spurious emissions at antenna terminal measurements* were made at the RF output terminals using a Spectrum Analyzer.

The Spectrum Analyzer was set with a RBW of 100KHz and a VBW ≥300 kHz. The EUT was set to transmit in the operating frequency range at its maximum rated output power. Frequencies were swept from 30 MHz to the 10th harmonic of the fundamental. Any emission outside the authorized frequency band must be attenuated by 43 + 10log(P) dB where P is the power of the carrier.

Test Results: Equipment complies with Section 2.1051 and 27.53(f). The following pages show measurements of Spurious Emission plots

The following analysis and plots are included below to illustrate compliance with the required rule parts.

Test Engineer(s): Jeffrey Hazen

Test Date(s): 05/06/09

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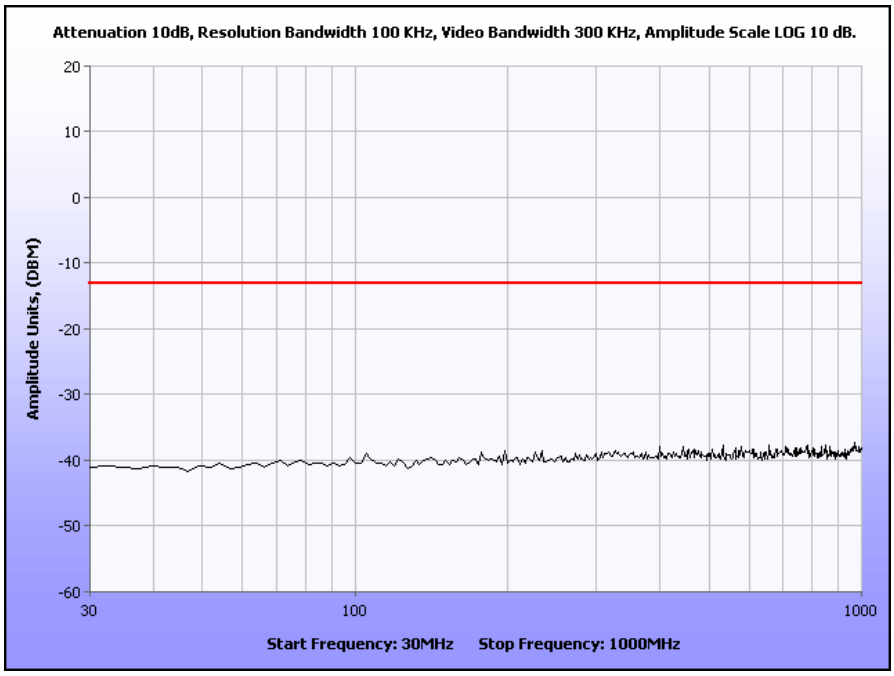
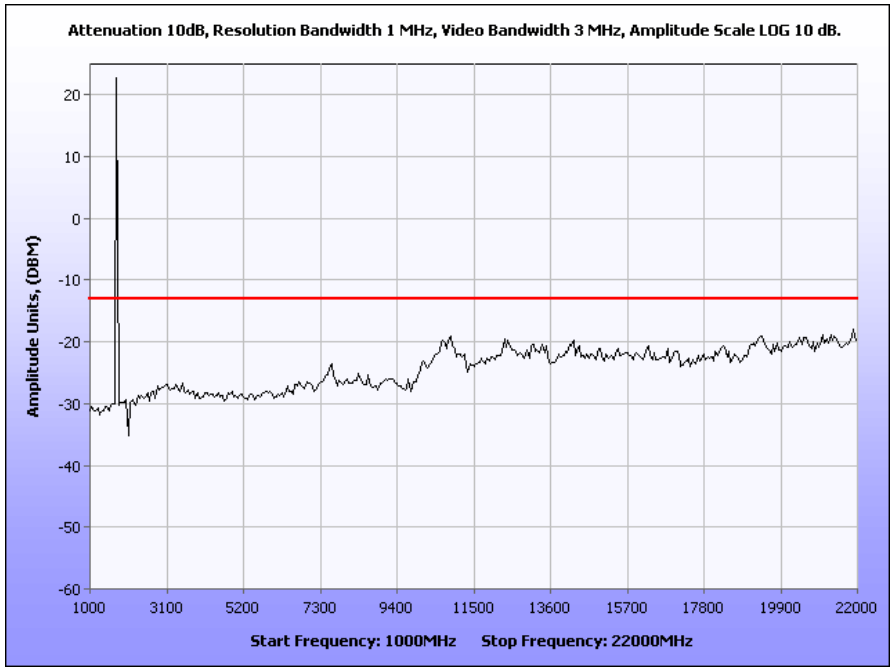


Plot 41. Conducted Spurious Emissions, Uplink, Low Channel, 30 MHz – 1 GHz, 100 kHz RBW, CDMA



Plot 42. Conducted Spurious Emissions, Uplink, Low Channel, 1 GHz – 22 GHz, CDMA

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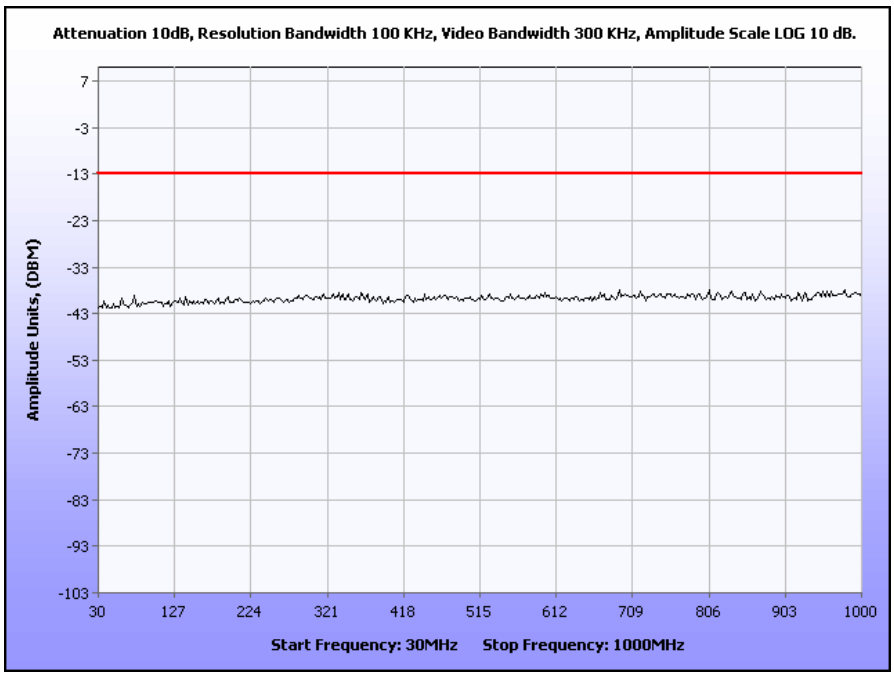
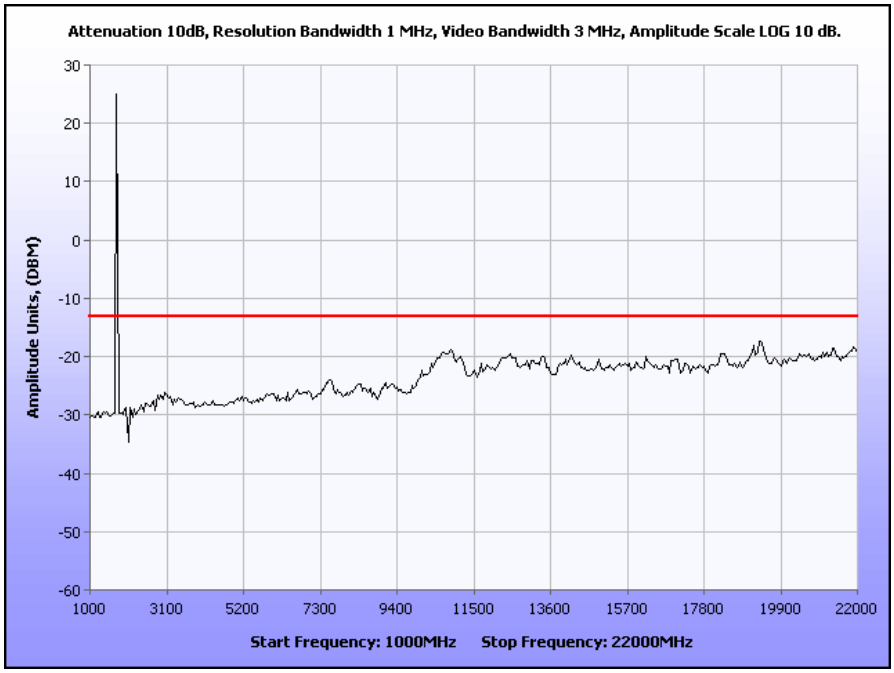


Plot 43. Conducted Spurious Emissions, Uplink, Mid Channel, 30 MHz – 1 GHz, 100 kHz RBW, CDMA



Plot 44. Conducted Spurious Emissions, Uplink, Mid Channel, 1 GHz – 22 GHz, CDMA

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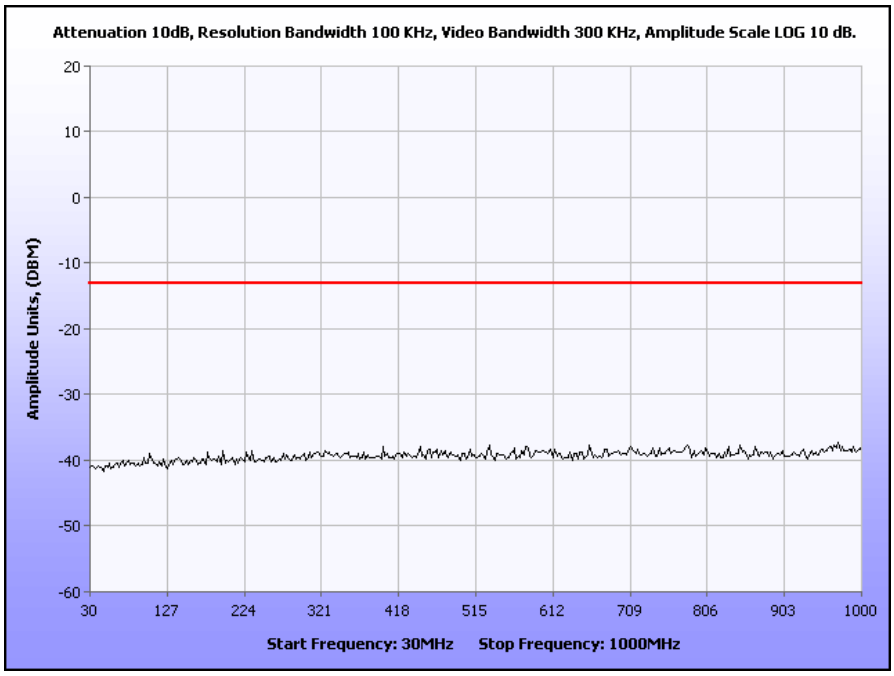
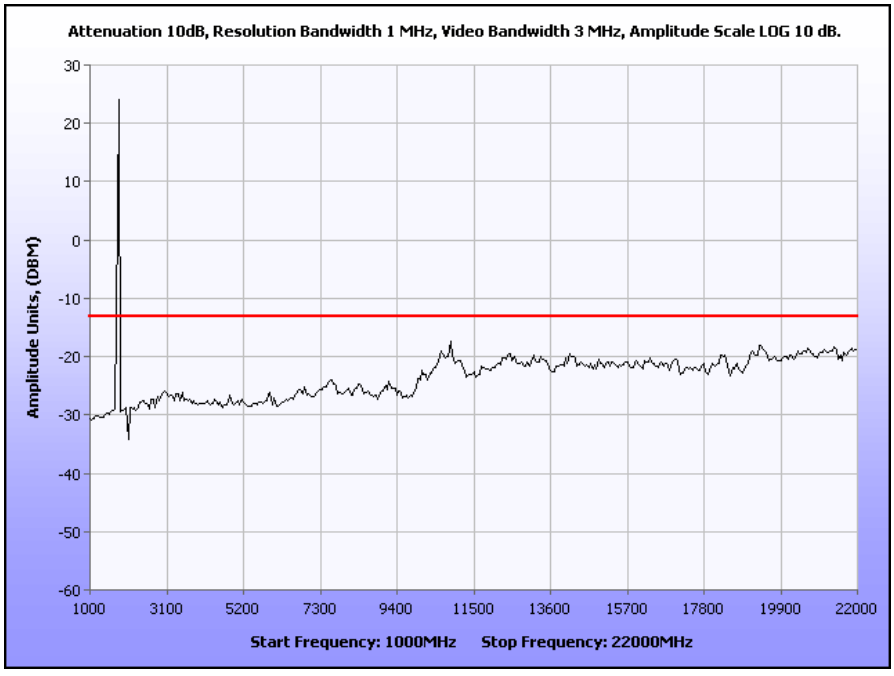


Plot 45. Conducted Spurious Emissions, Uplink, High Channel, 30 MHz – 1 GHz, 100 kHz RBW, CDMA



Plot 46. Conducted Spurious Emissions, Uplink, High Channel, 1 GHz – 22 GHz, CDMA

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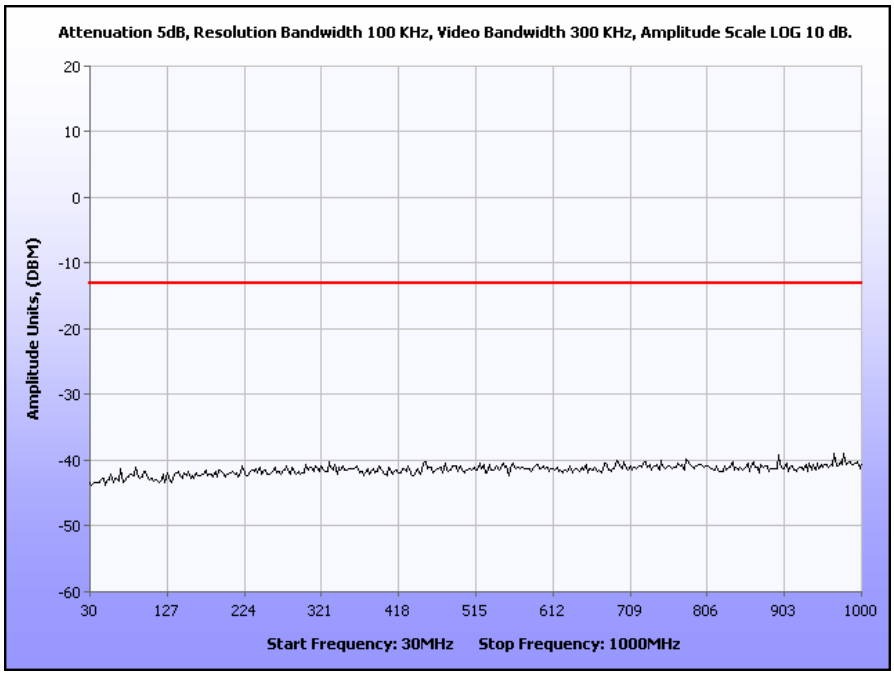
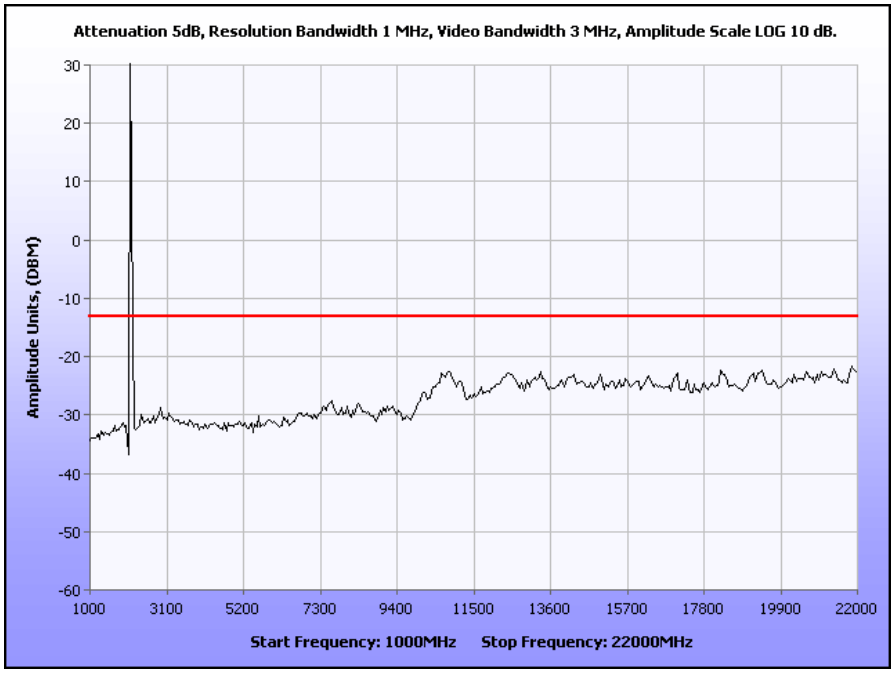


Plot 47. Conducted Spurious Emissions, Downlink, Low Channel, 30 MHz – 1 GHz, 100 kHz RBW, CDMA



Plot 48. Conducted Spurious Emissions, Downlink, Low Channel, 1 GHz – 22 GHz, CDMA

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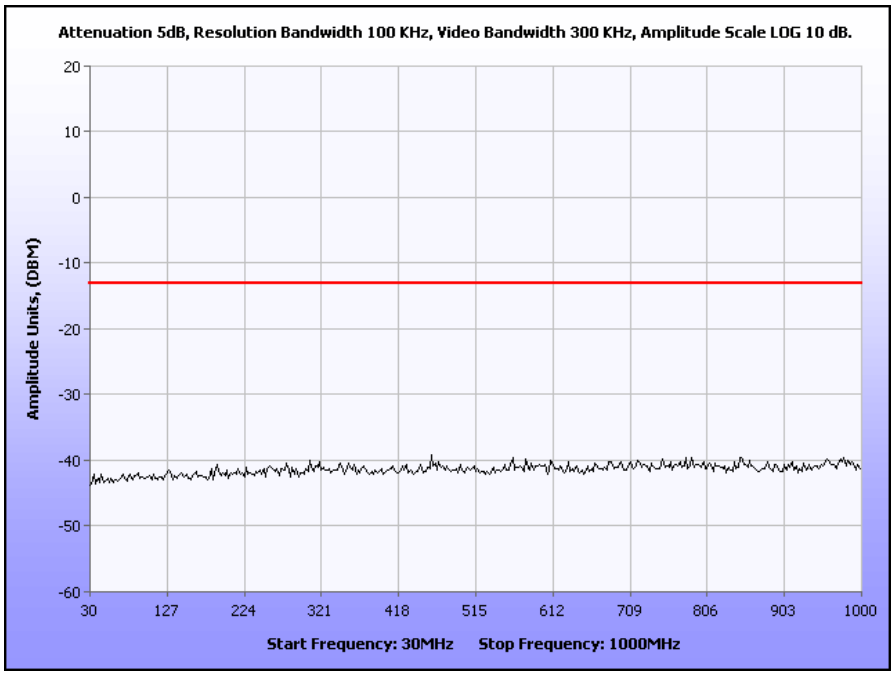
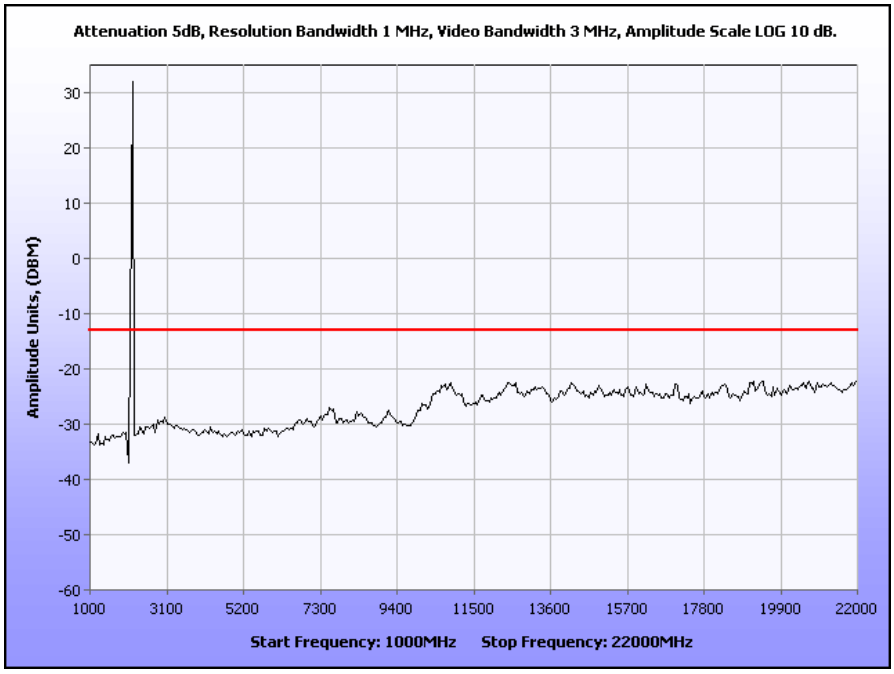


Plot 49. Conducted Spurious Emissions, Downlink, Mid Channel, 30 MHz – 1 GHz, 100 kHz RBW, CDMA



Plot 50. Conducted Spurious Emissions, Downlink, Mid Channel, 1 GHz – 22 GHz, CDMA

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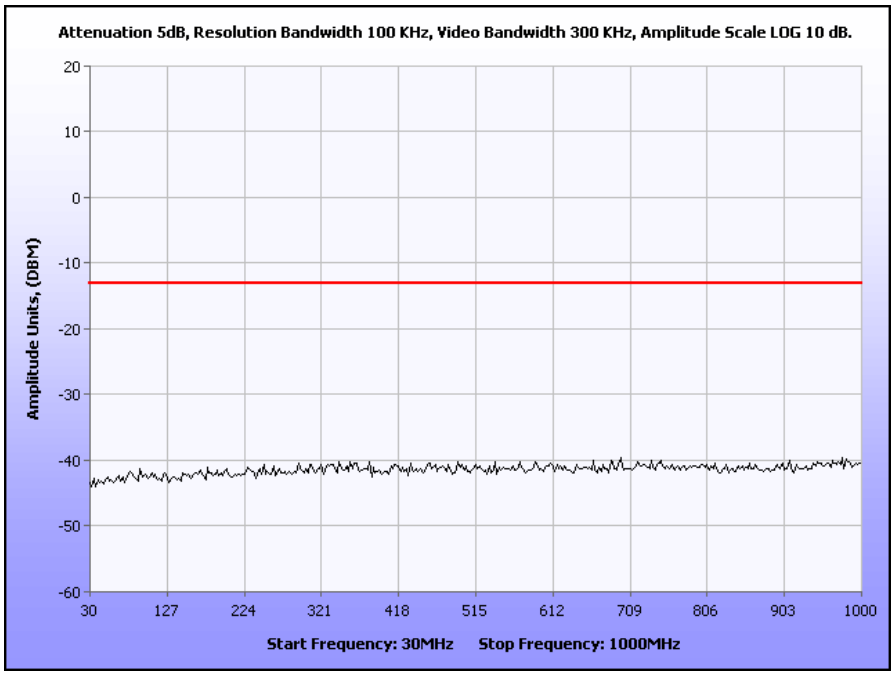
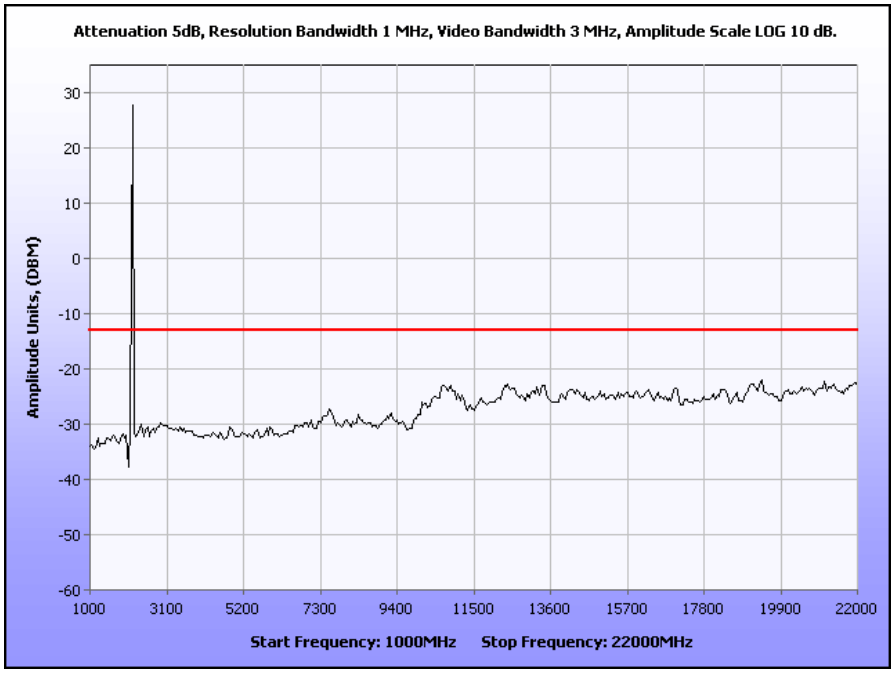


Plot 51. Conducted Spurious Emissions, Downlink, High Channel, 30 MHz – 1 GHz, 100 kHz RBW, CDMA



Plot 52. Conducted Spurious Emissions, Downlink, High Channel, 1 GHz – 22 GHz, CDMA

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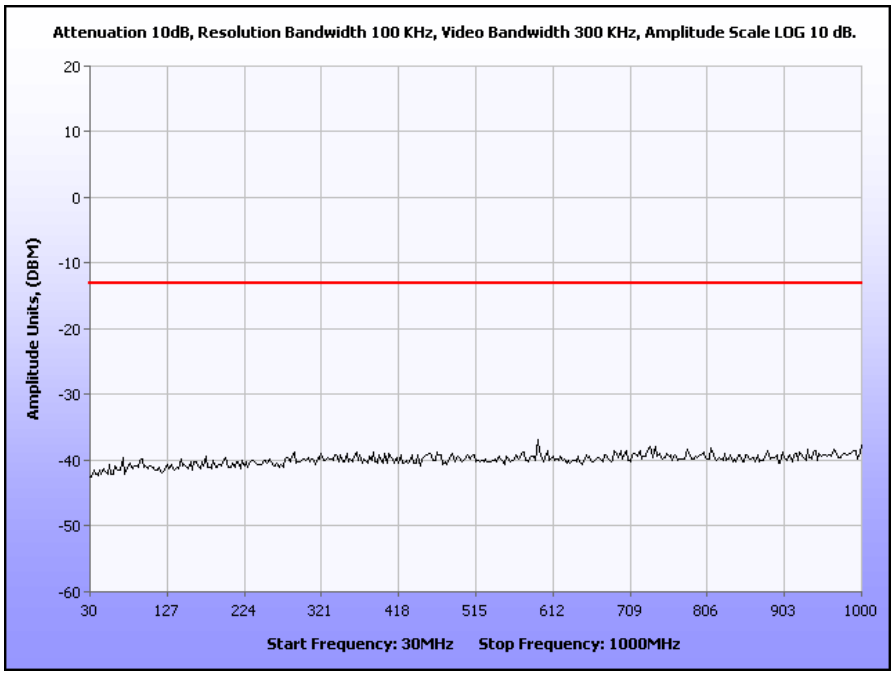
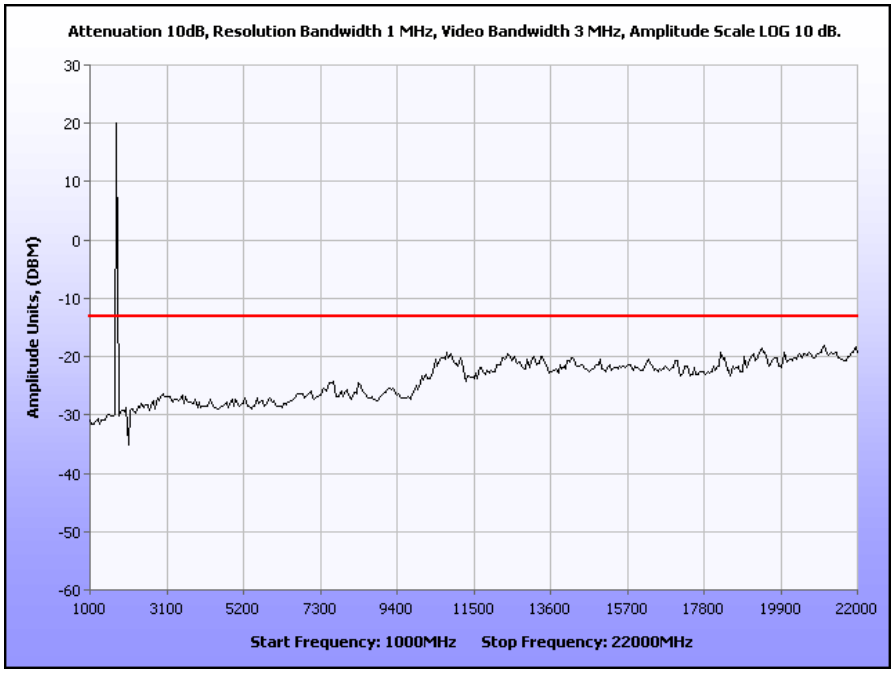


Plot 53. Conducted Spurious Emissions, Uplink, Low Channel, 30 MHz – 1 GHz, 100 kHz RBW, WCDMA



Plot 54. Conducted Spurious Emissions, Uplink, Low Channel, 1 GHz – 22 GHz, WCDMA

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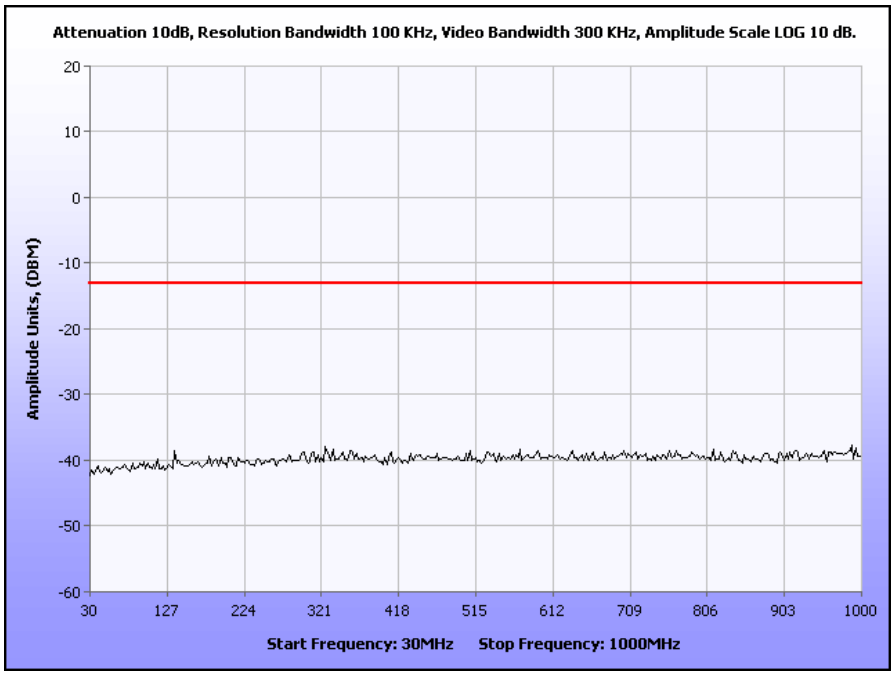
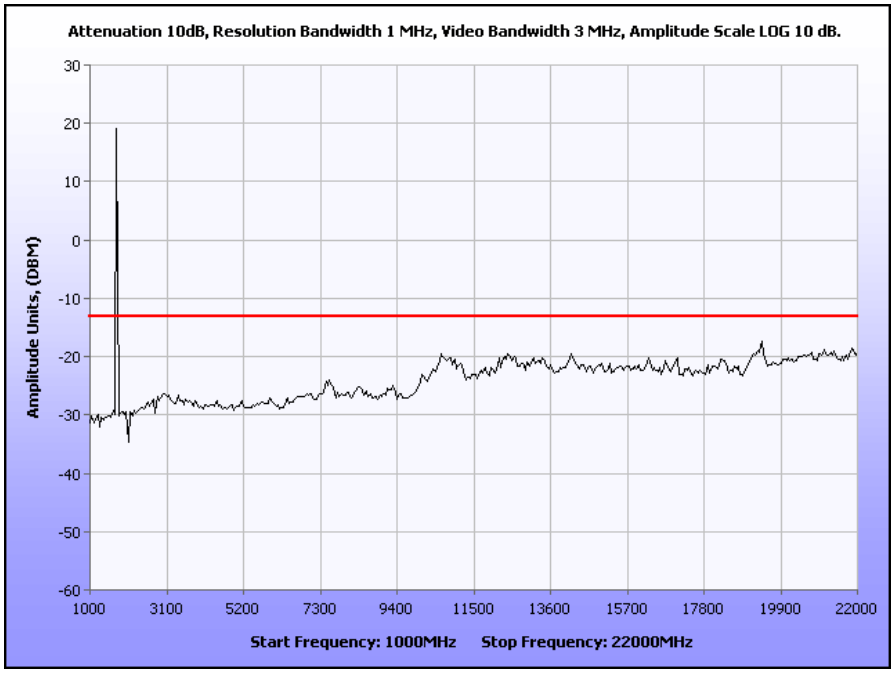


Plot 55. Conducted Spurious Emissions, Uplink, Mid Channel, 30 MHz – 1 GHz, 100 kHz RBW, WCDMA



Plot 56. Conducted Spurious Emissions, Uplink, Mid Channel, 1 GHz – 22 GHz, WCDMA

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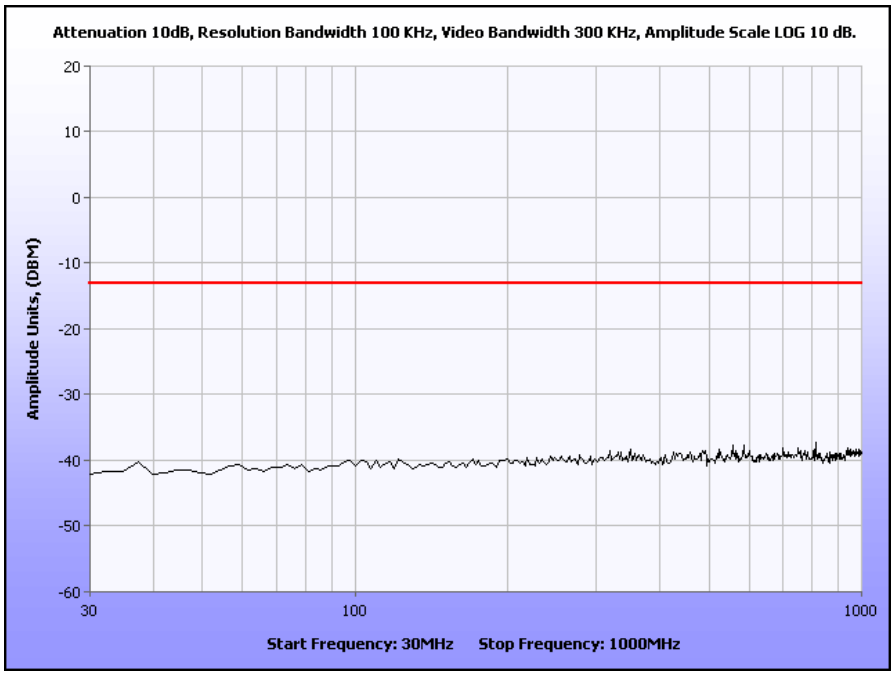
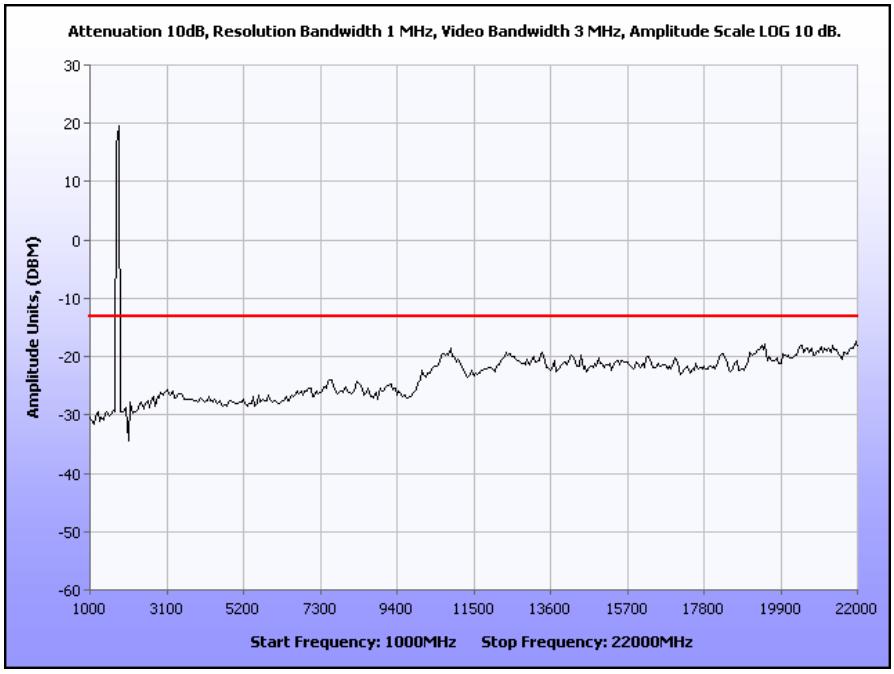


Plot 57. Conducted Spurious Emissions, Uplink, High Channel, 30 MHz – 1 GHz, 100 kHz RBW, WCDMA



Plot 58. Conducted Spurious Emissions, Uplink, High Channel, 1 GHz – 22 GHz, WCDMA

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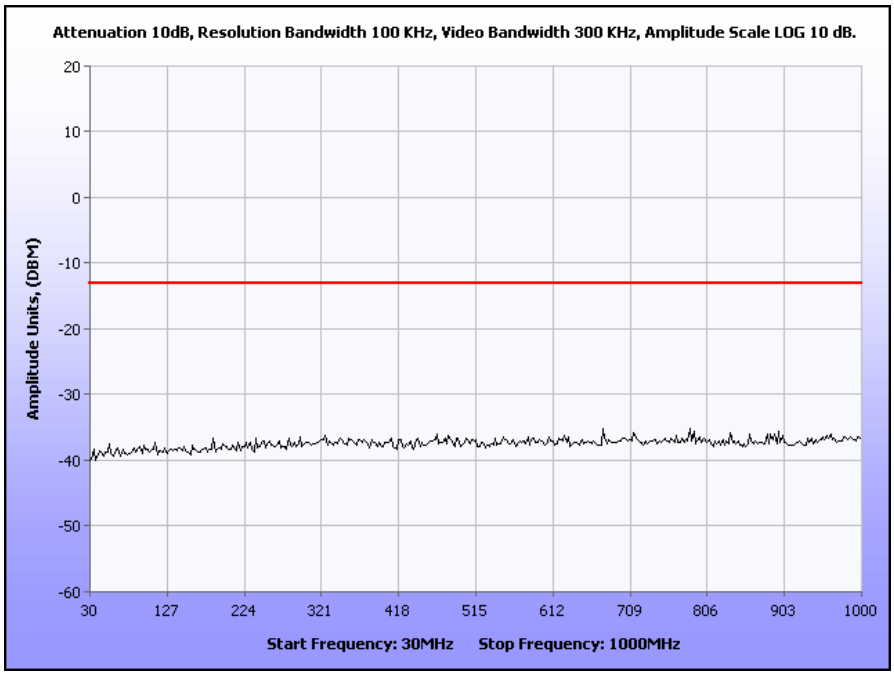
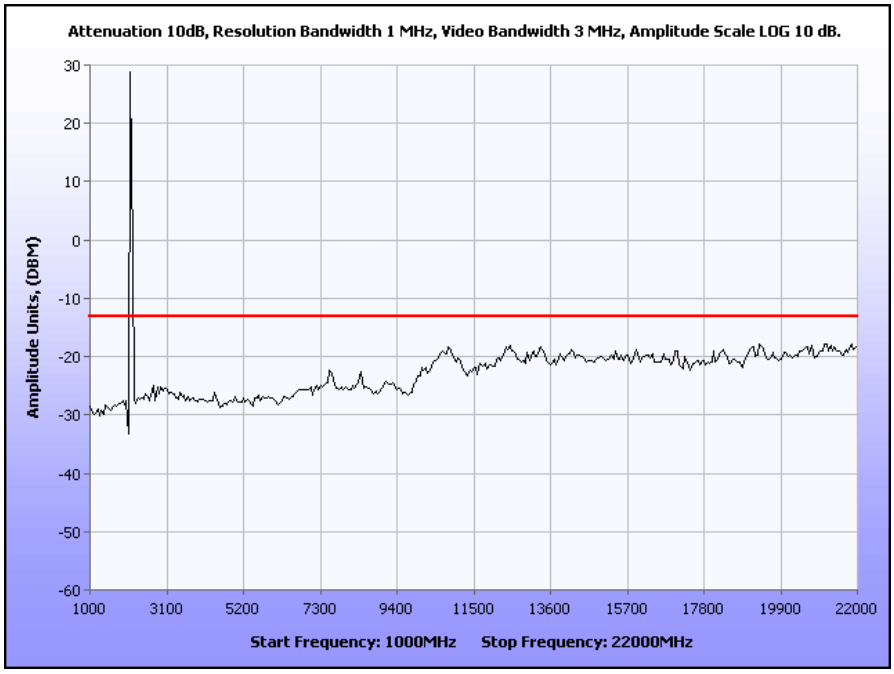


Plot 59. Conducted Spurious Emissions, Downlink, Low Channel, 30 MHz – 1 GHz, 100 kHz RBW, WCDMA



Plot 60. Conducted Spurious Emissions, Downlink, Low Channel, 1 GHz – 22 GHz, WCDMA

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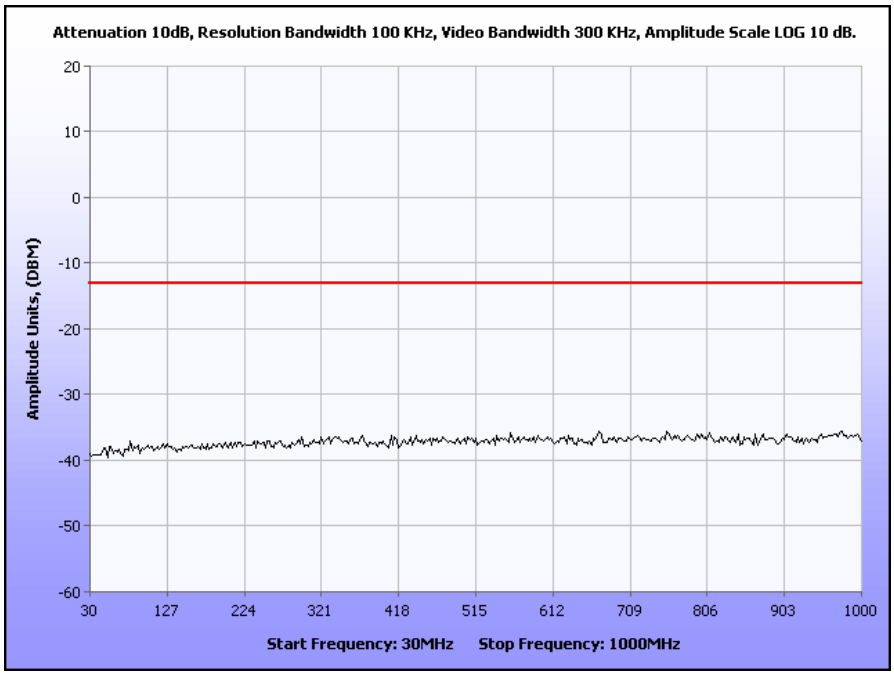
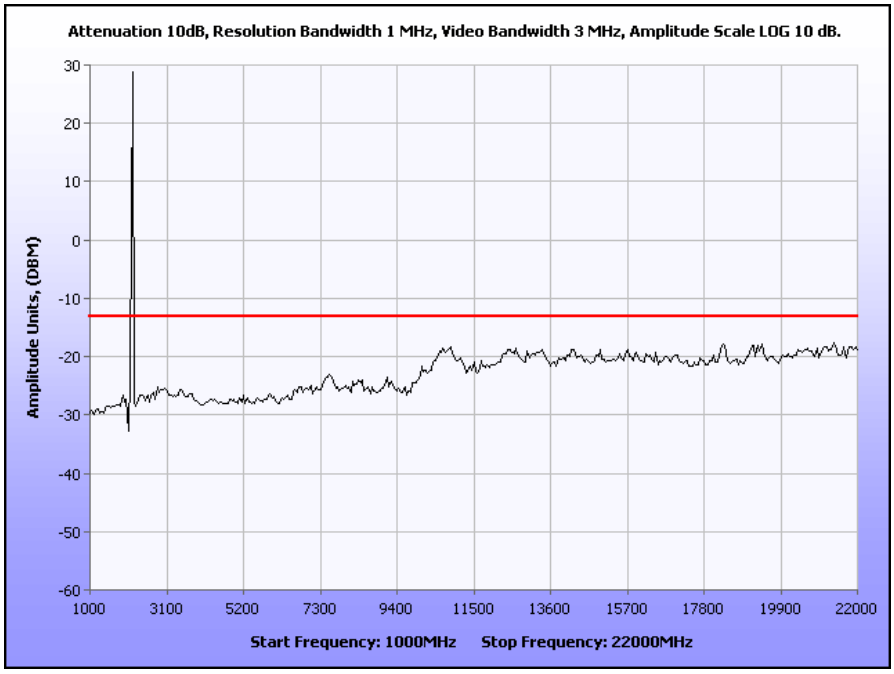


Plot 61. Conducted Spurious Emissions, Downlink, Mid Channel, 30 MHz – 1 GHz, 100 kHz RBW, WCDMA



Plot 62. Conducted Spurious Emissions, Downlink, Mid Channel, 1 GHz – 22 GHz, WCDMA

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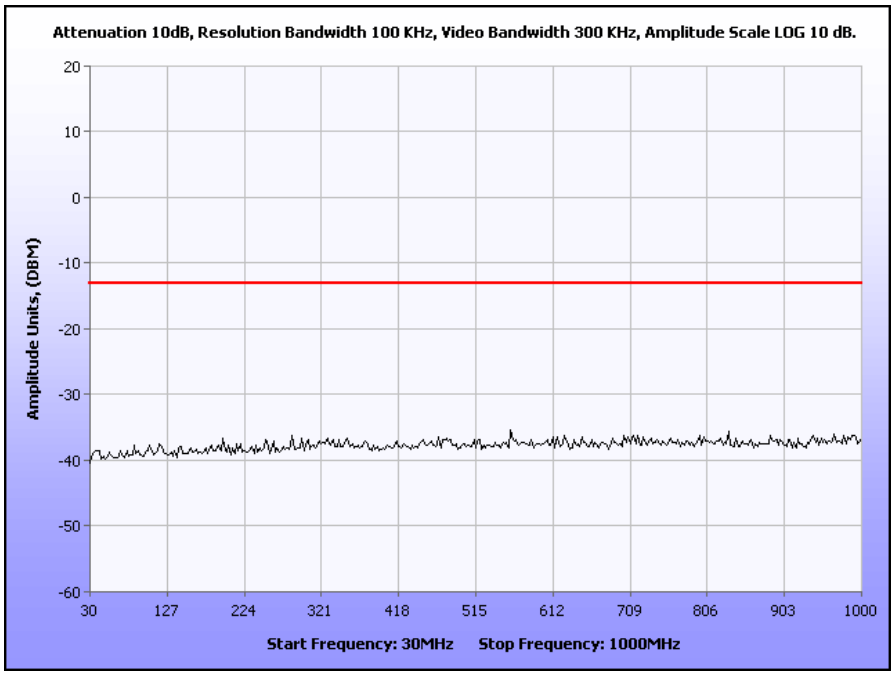
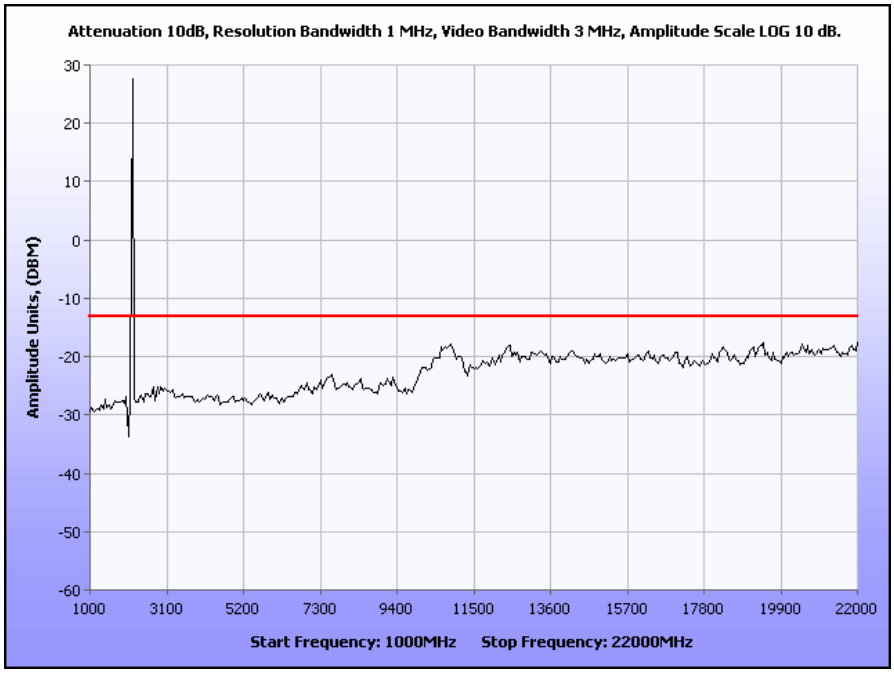


Plot 63. Conducted Spurious Emissions, Downlink, High Channel, 30 MHz – 1 GHz, 100 kHz RBW, WCDMA



Plot 64. Conducted Spurious Emissions, Downlink, High Channel, 1 GHz – 22 GHz, WCDMA

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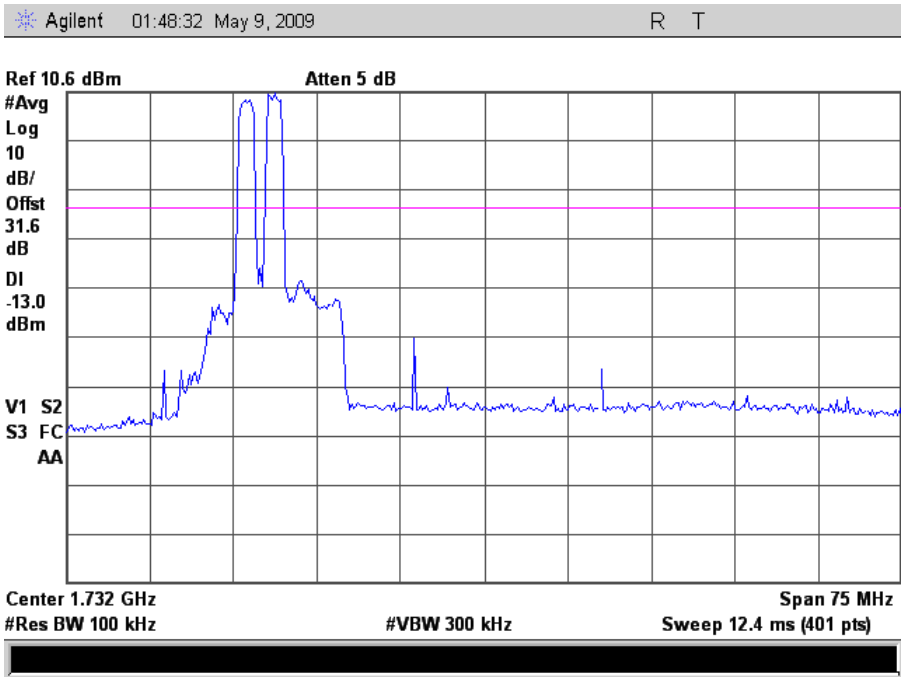
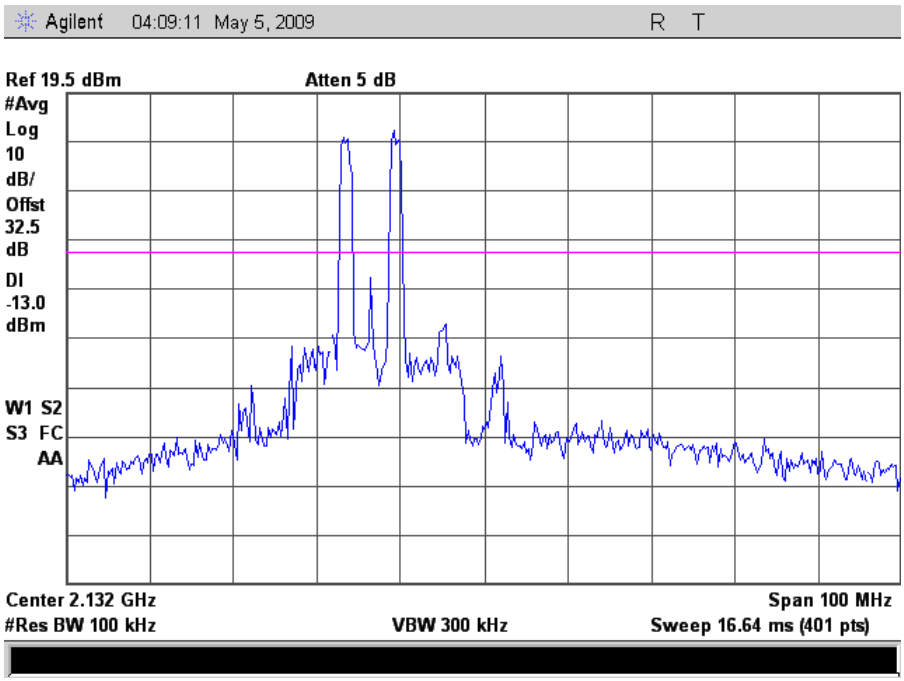
Intermodulation Test Results - CDMA



Plot 65. Intermodulation – Low Channel Uplink (CDMA)



Plot 66. Intermodulation – Low Channel Downlink (CDMA)

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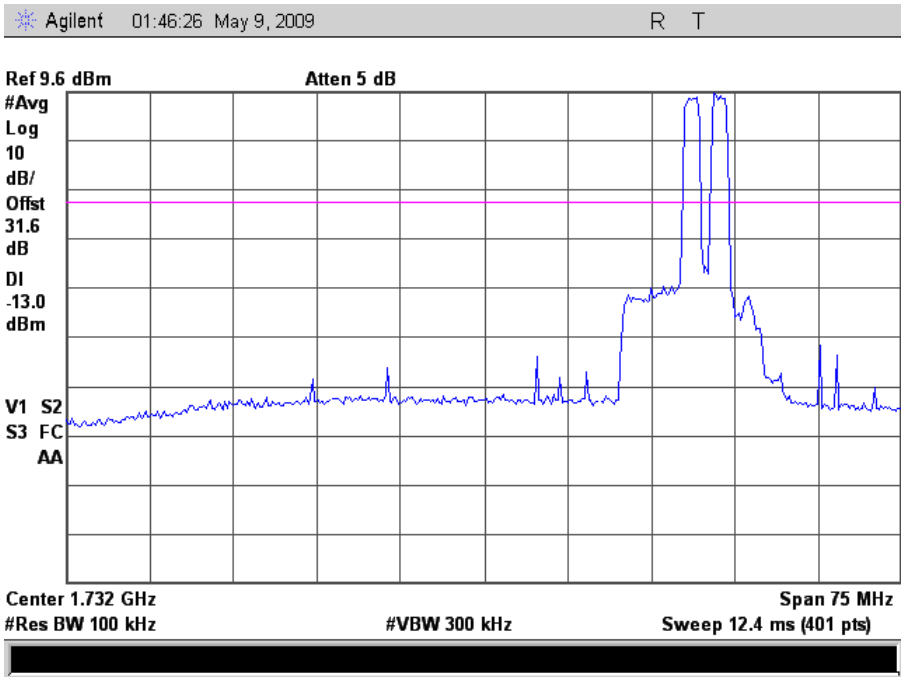
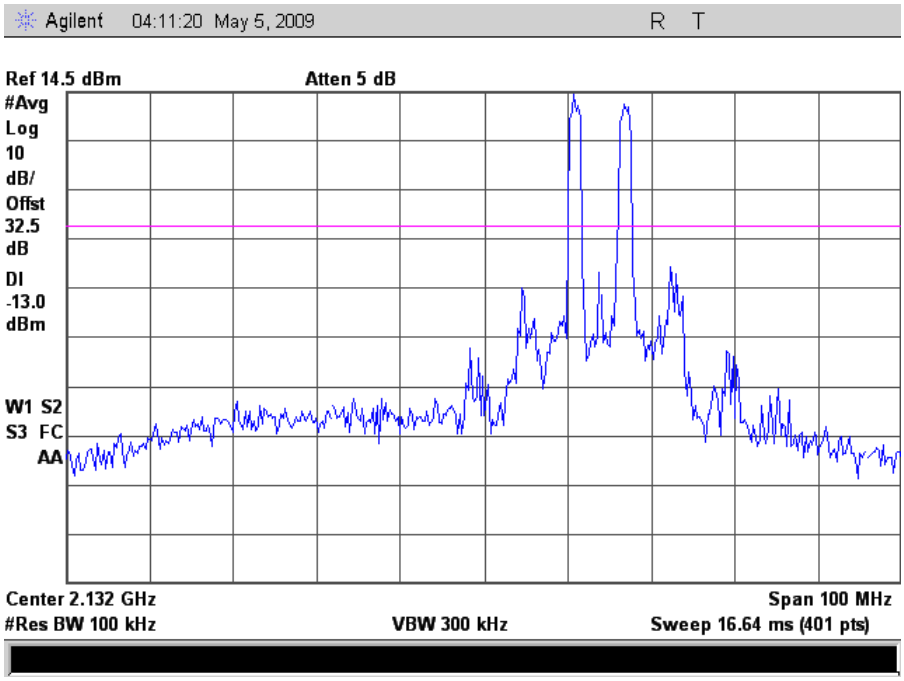
Intermodulation Test Results - CDMA



Plot 67. Intermodulation – High Channel Uplink (CDMA)



Plot 68. Intermodulation – High Channel Downlink (CDMA)

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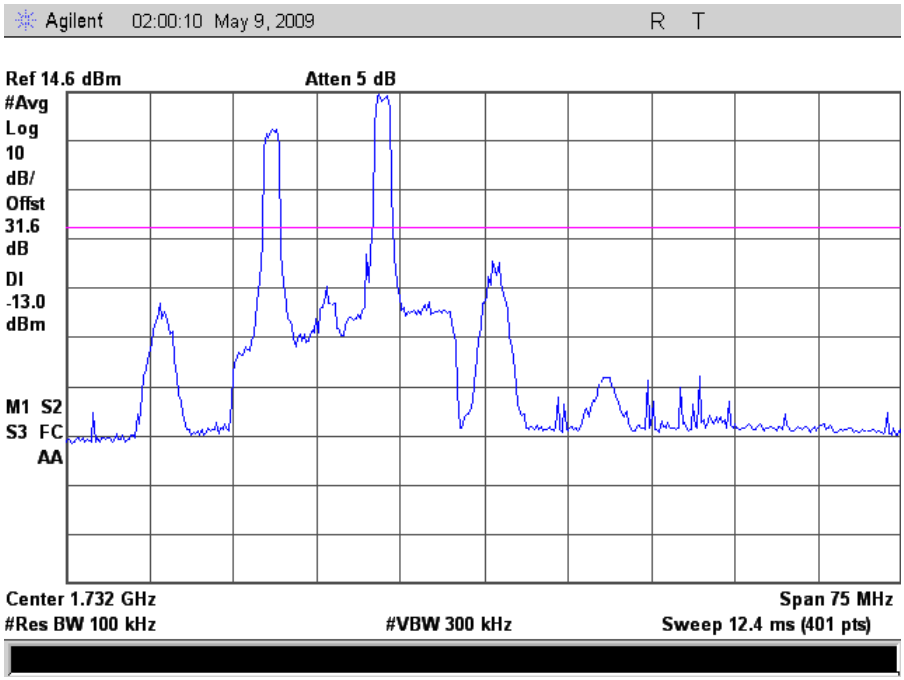
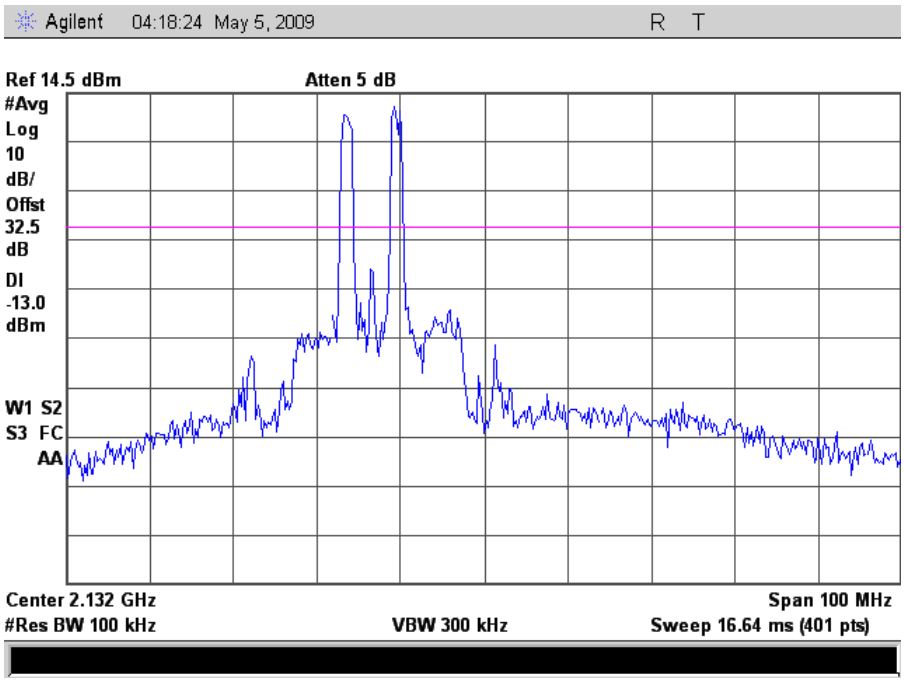
Intermodulation Test Results - WCDMA

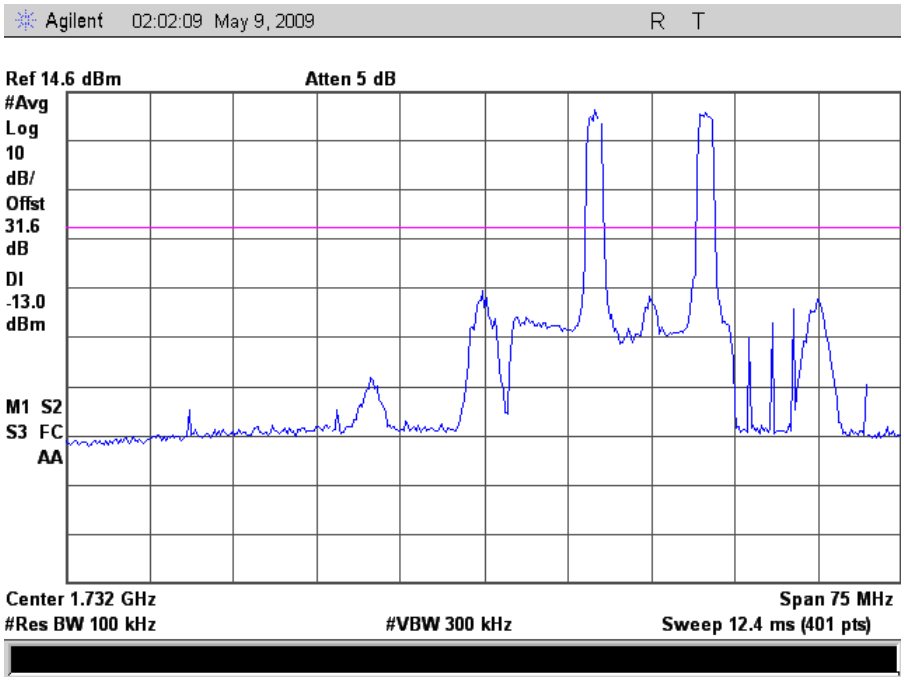


Plot 69. Intermodulation – Low Channel Uplink (WCDMA)

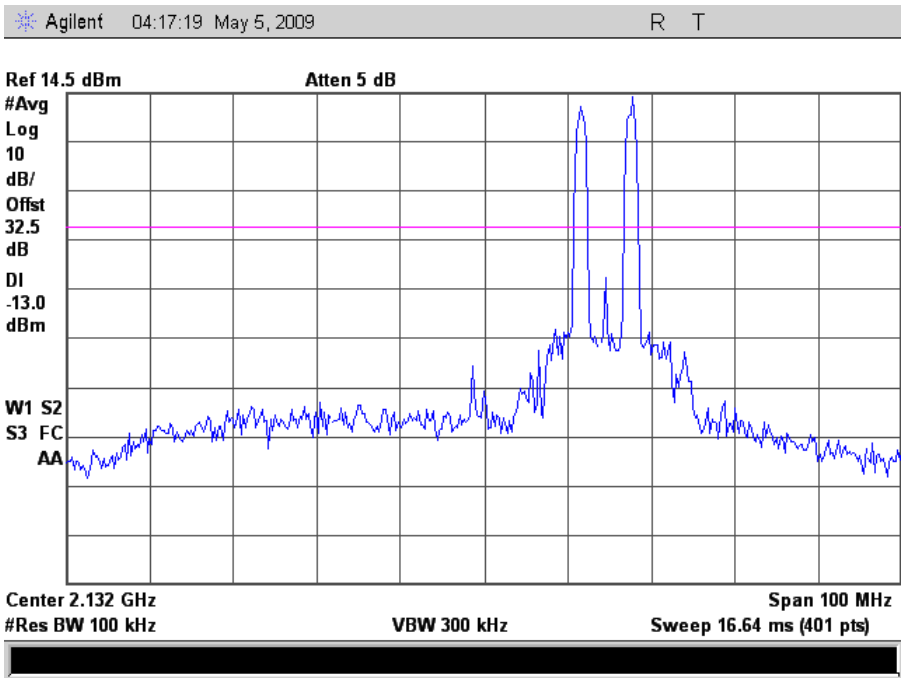


Plot 70. Intermodulation – Low Channel Downlink (WCDMA

Intermodulation Test Results - WCDMA



Plot 71. Intermodulation – High Channel Uplink (WCDMA)



Plot 72. Intermodulation – High Channel Downlink (WCDMA

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4. Electromagnetic Compatibility Intentional Radiators

4.5. Radiated Emissions (Substitution Method)

Test Requirement(s): §2.1053

Test Procedures: As required by 47 CFR 2.1053, the *field strengths of radiated spurious emissions* 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 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). The distance between the EUT and the test antenna was 1 meter. The EUT's RF port was connected to a dummy load. The EUT was set to transmit at its designated operating frequency range and at its maximum output power level. The intensities of the radiated emissions were maximized by rotating the turntable 360 degrees and varying the receive antenna from 1 to 4m. Measurements were made with the receive antenna in both horizontal and vertical polarizations.

Since the corrected measured radiated emissions were greater than 6 dB from the limit, the substitution method was not used to acquire the EIRP of the spurious emissions. The equivalent EIRP was calculated using the formula as follows:

EIRP (dBm) = E (dBµV/m) -104.8

Where EIRP is the Effective Isotropic Radiated Power, and E is the electric field strength at 1 meter from the EUT.

The Radiated Spurious Emissions *Limit* is 43 + 10log(P) dB EIRP, or 91.8 dBµV/m, as displayed on the plots in this section. Also, testing was performed using a CW signal with a 1.25 MHz Occupied Bandwidth for the CDMA modulation and 5 MHz Occupied Bandwidth for the WCDMA modulation. Measurements were made with a pre-amp. Both Transmit and Receive Spurious Emissions are provided in this section.

Note: All other emissions besides what are given here were at the noise floor of the spectrum analyzer. The polarization of the receive antenna which produced the highest emission was reported.

Test Results: Equipment complies with Section 2.1055.

Test Engineer(s): Jeffrey Hazen

Test Date(s): 05/08/09

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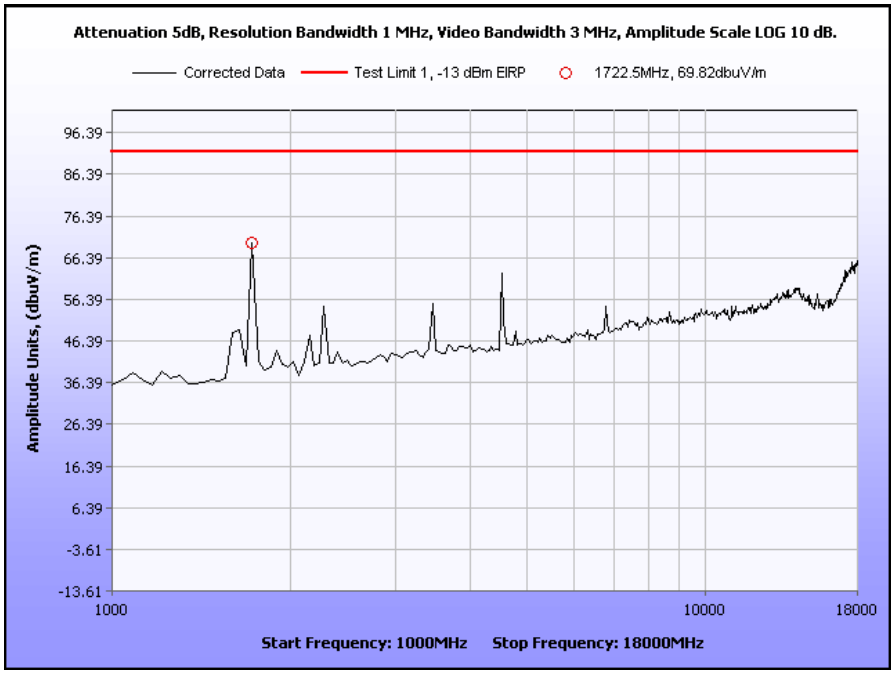
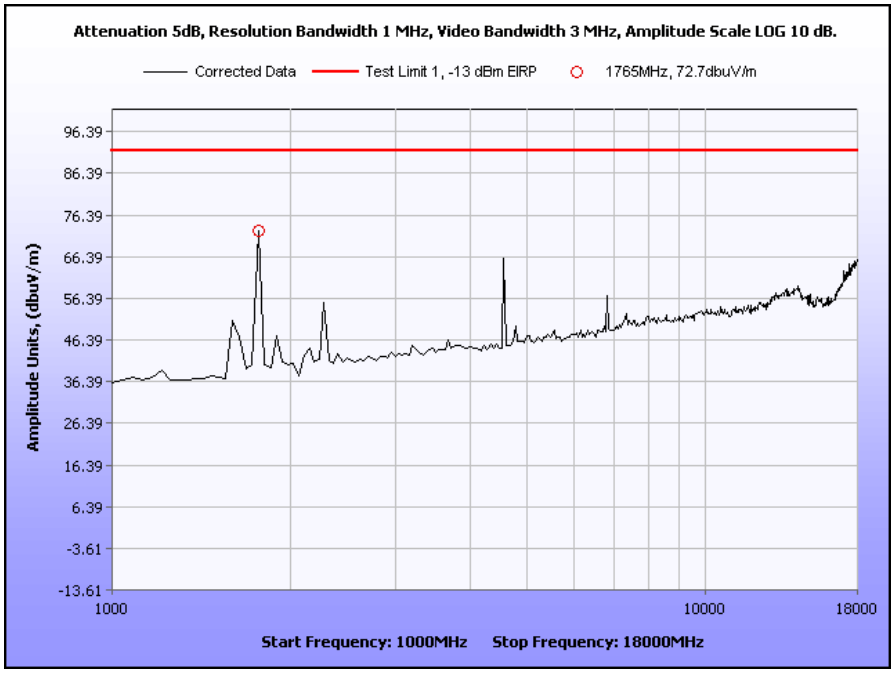
Radiated Emissions (Substitution Method) Test Results



Plot 73. Radiated Spurious Emissions, Uplink, Low Channel, 1 GHz – 18 GHz, Vertical, CDMA



Plot 74. Radiated Spurious Emissions, Uplink, Low Channel, 1 GHz – 18 GHz, Vertical, CDMA

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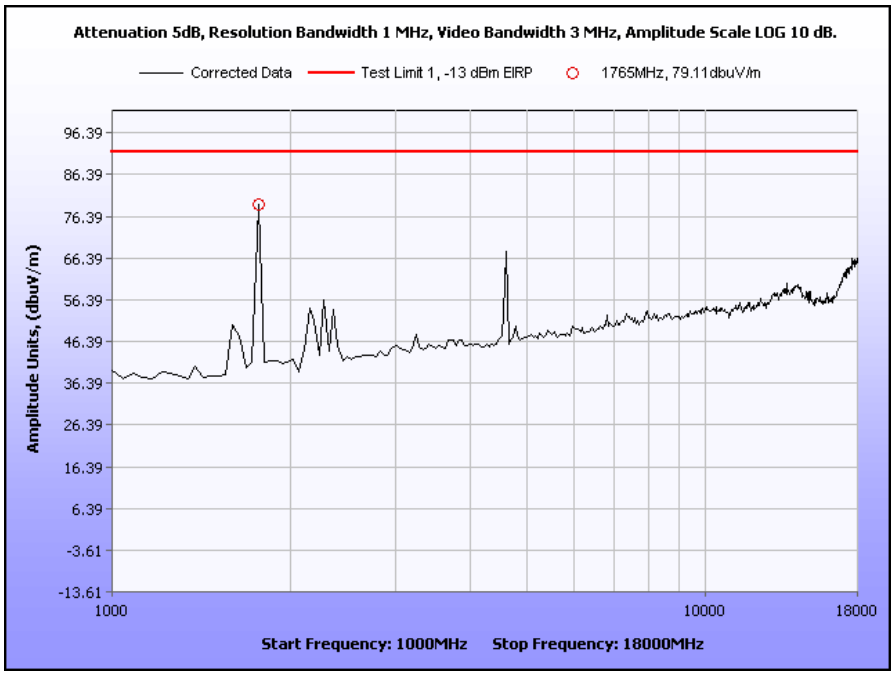
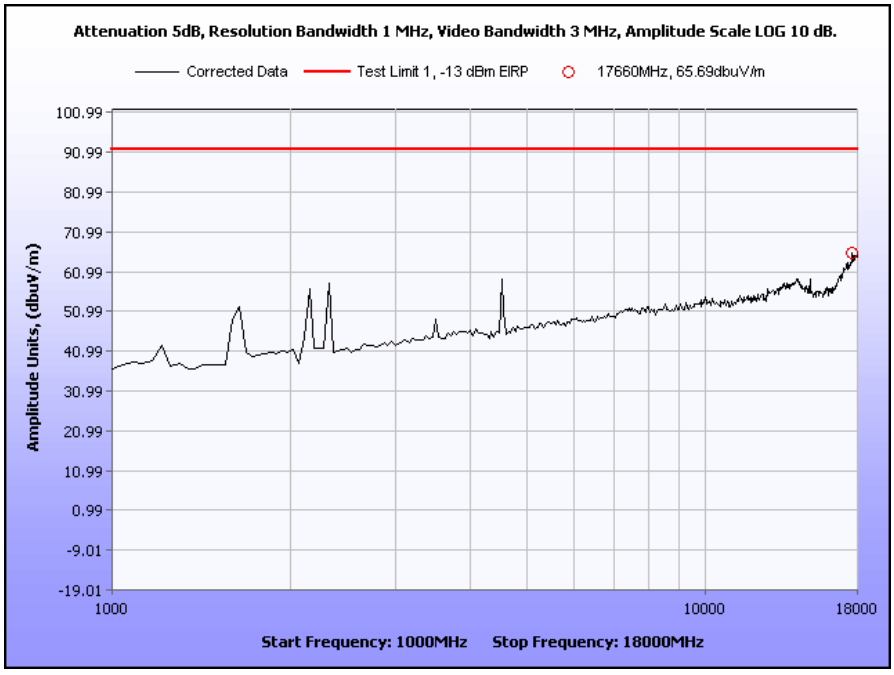


Plot 75. Radiated Spurious Emissions, Uplink, High Channel, 1 GHz – 18 GHz, Vertical, CDMA



Plot 76. Radiated Spurious Emissions, Downlink, Low Channel, 1 GHz – 18 GHz, Horizontal, CDMA

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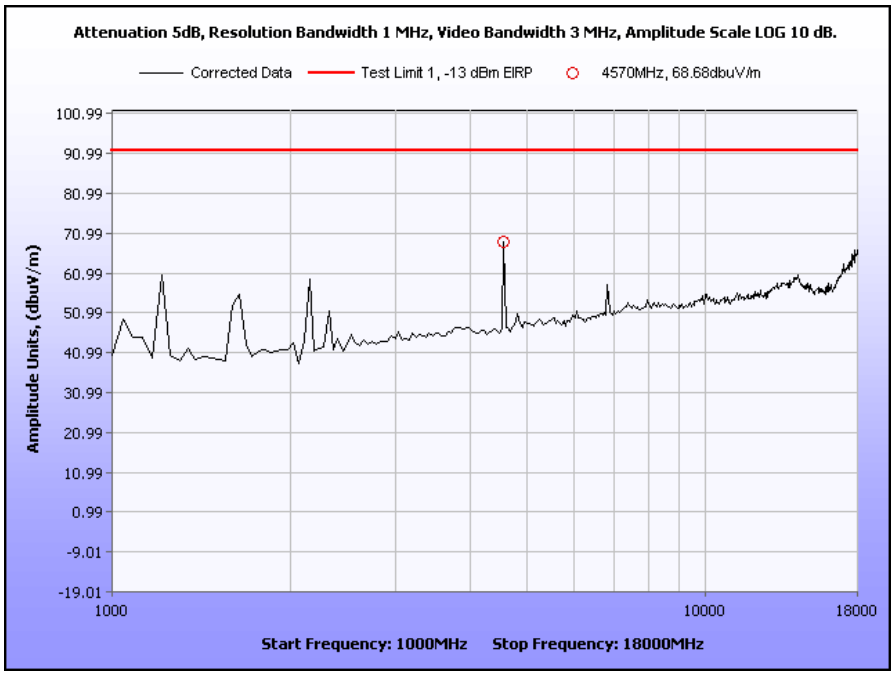
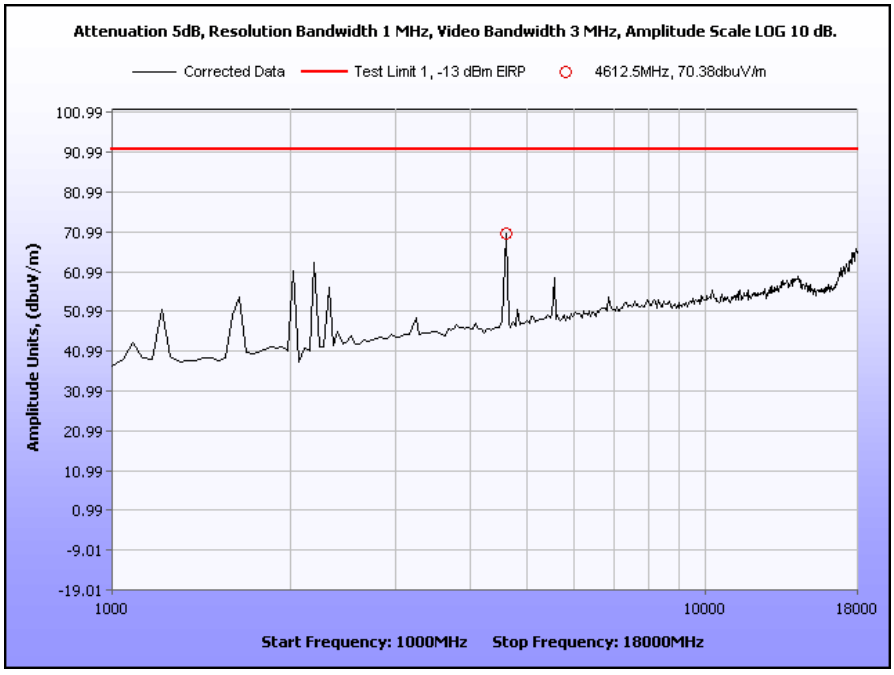


Plot 77. Radiated Spurious Emissions, Downlink, Mid Channel, 1 GHz – 18 GHz, Vertical, CDMA



Plot 78. Radiated Spurious Emissions, Downlink, High Channel, 1 GHz – 18 GHz, Vertical, CDMA

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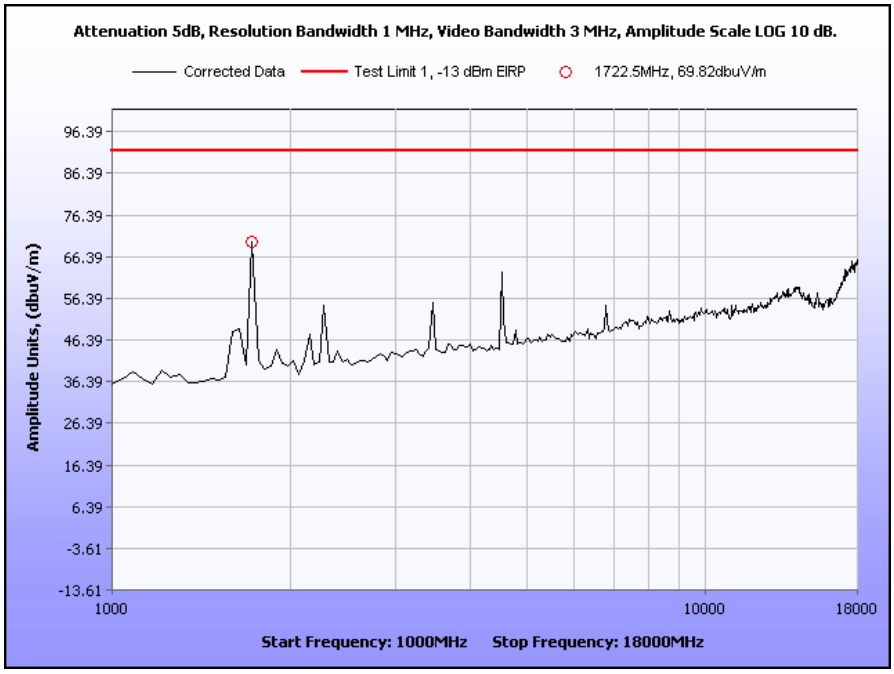
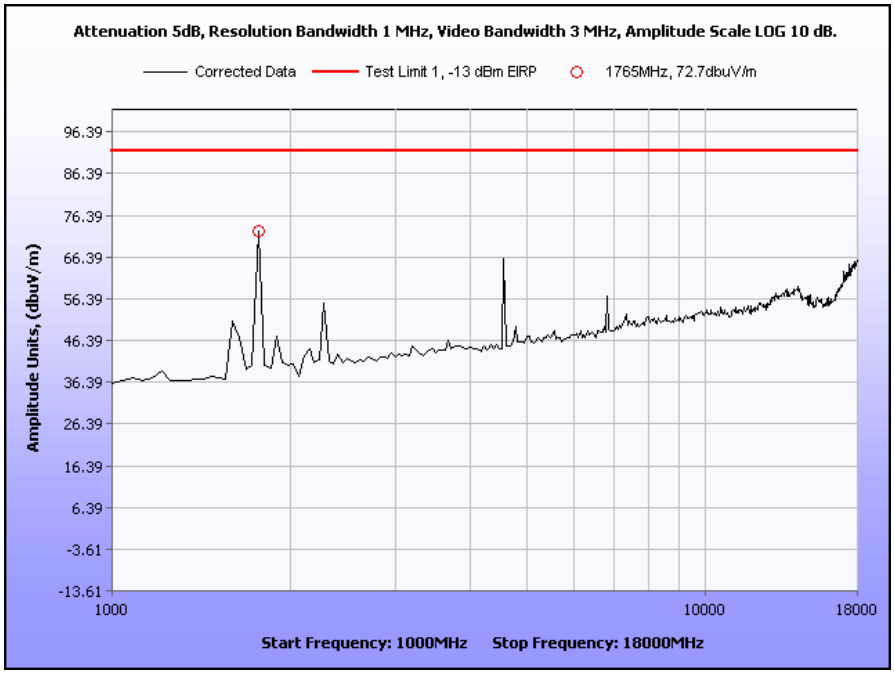


Plot 79. Radiated Spurious Emissions, Uplink, Low Channel, 1 GHz – 18 GHz, Vertical, WCDMA



Plot 80. Radiated Spurious Emissions, Uplink, Mid Channel, 1 GHz – 18 GHz, Vertical, WCDMA

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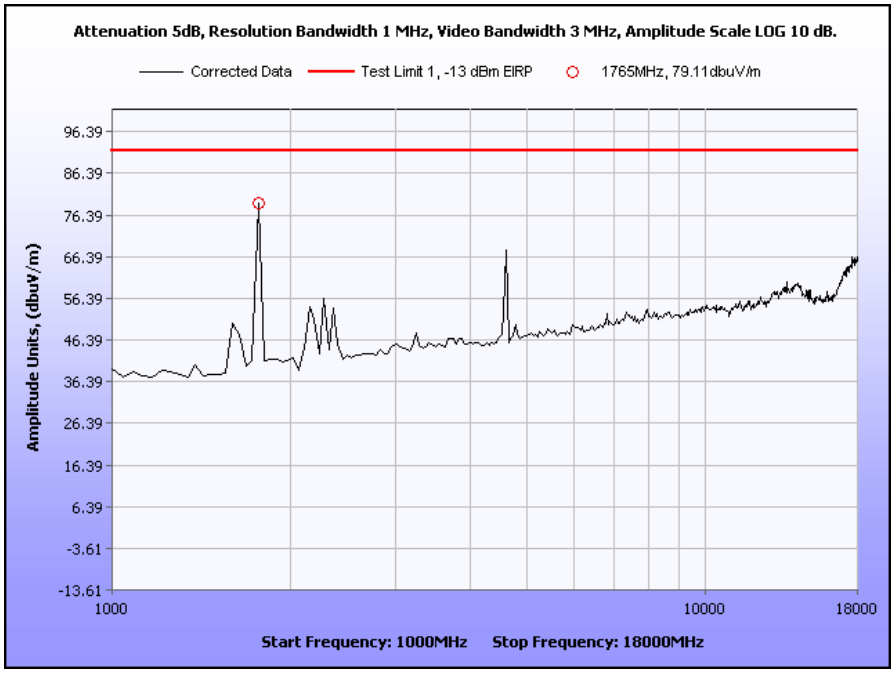
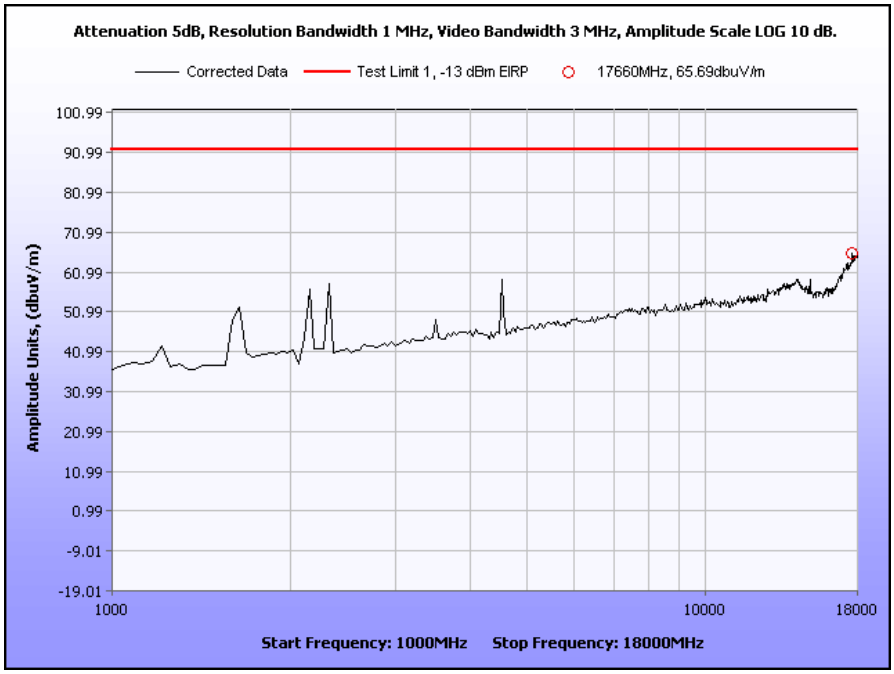


Plot 81. Radiated Spurious Emissions, Uplink, High Channel, 1 GHz – 18 GHz, Vertical, WCDMA



Plot 82. Radiated Spurious Emissions, Downlink, Low Channel, 1 GHz – 18 GHz, Horizontal, WCDMA

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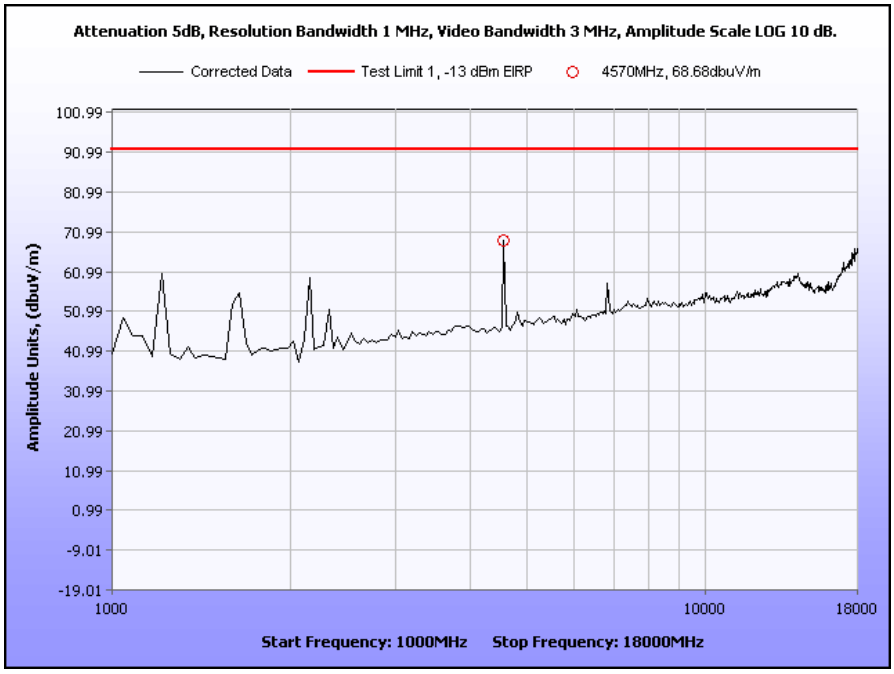
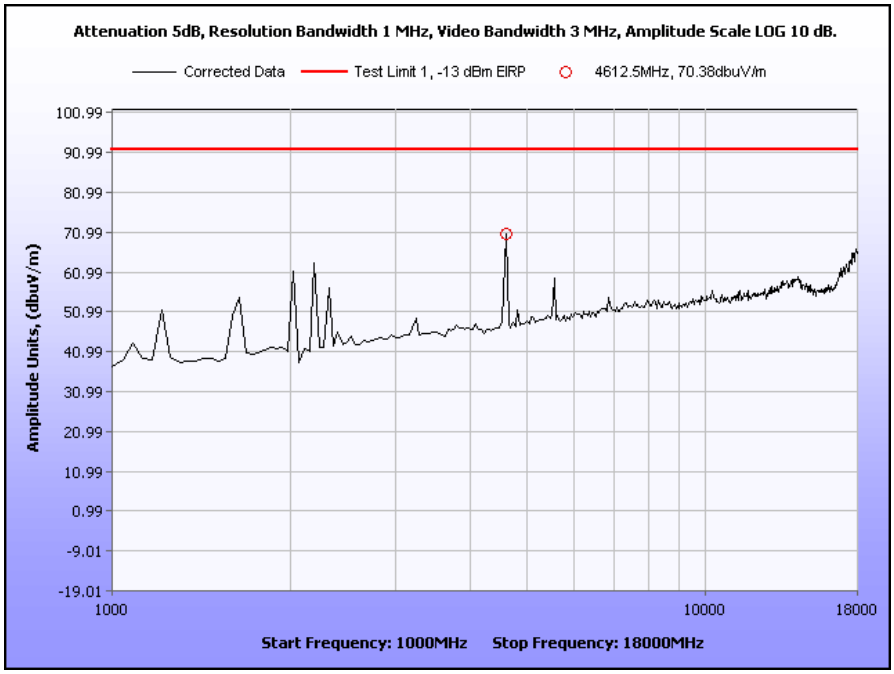


Plot 83. Radiated Spurious Emissions, Downlink, Mid Channel, 1 GHz – 18 GHz, Vertical, WCDMA



Plot 84. Radiated Spurious Emissions, Downlink, High Channel, 1 GHz – 18 GHz, Vertical, WCDMA

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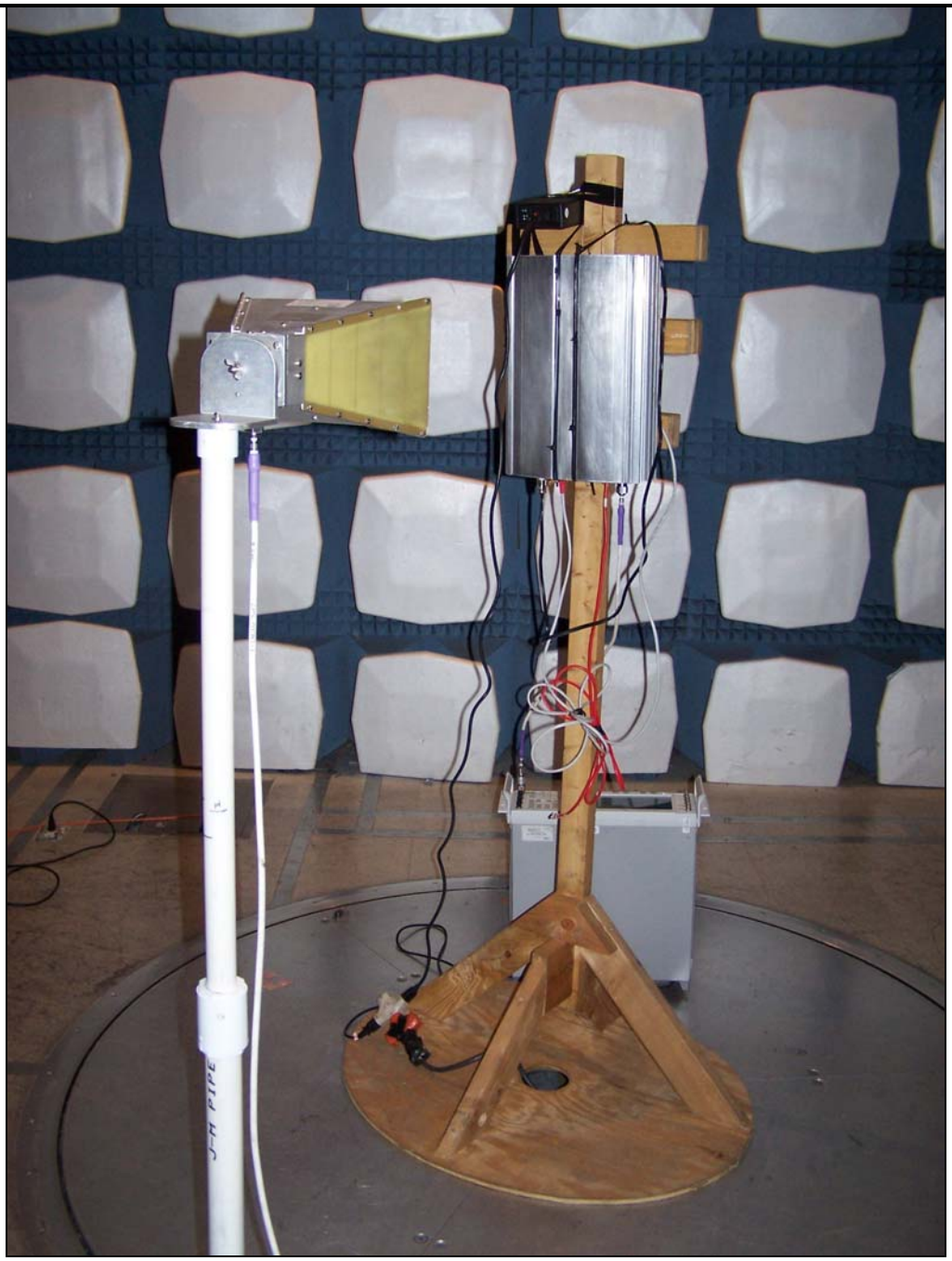

Photograph 3. Radiated Emissions, Test Setup

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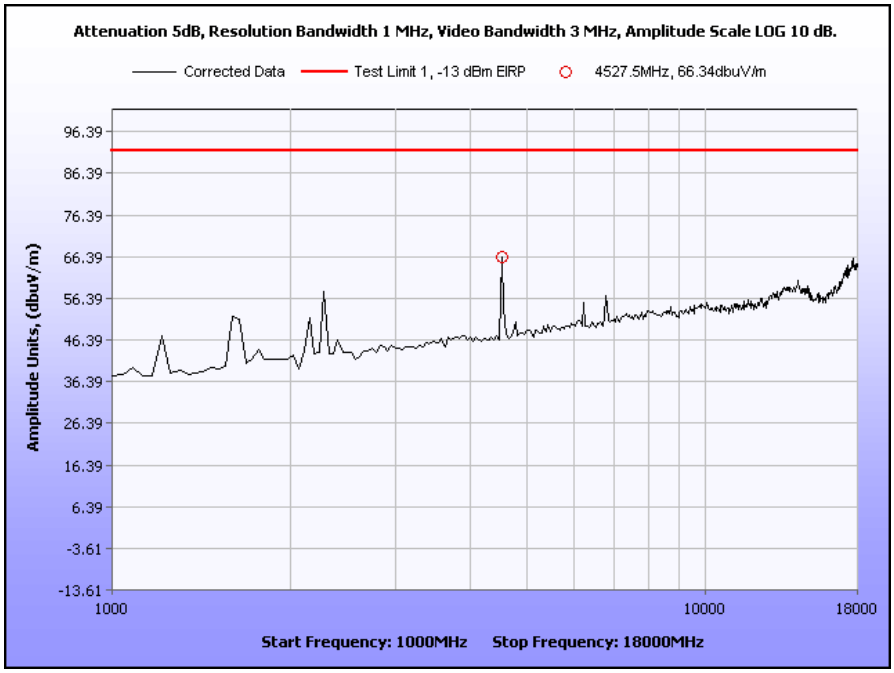
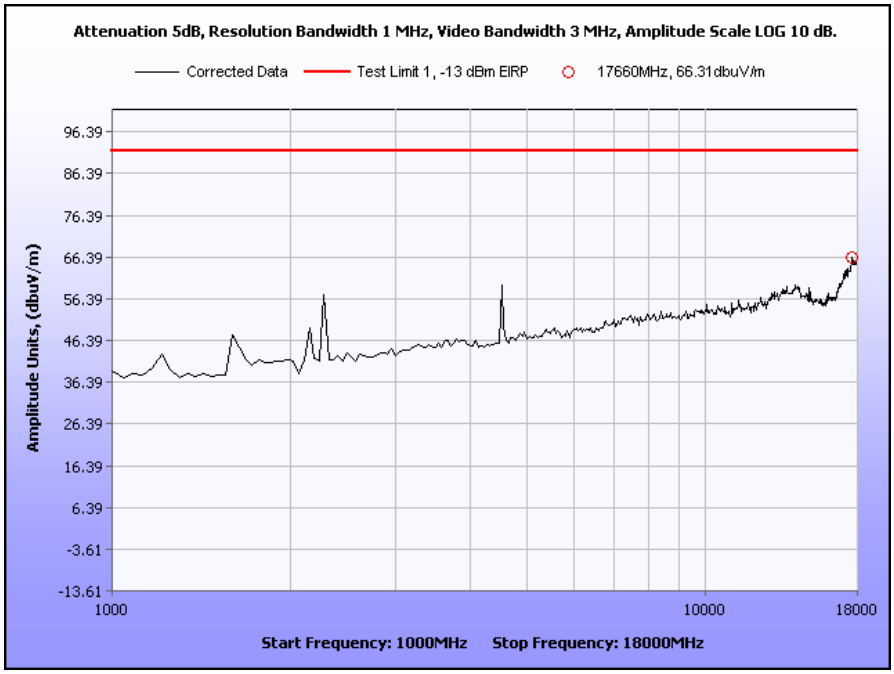
4. Electromagnetic Compatibility Intentional Radiators

4.6 Receiver Spurious Emissions



Plot 85. Receiver Spurious Emissions, 1 GHz – 18 GHz, Vertical, CDMA



Plot 86. Receiver Spurious Emissions, 1 GHz – 18 GHz, Horizontal, WCDMA

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4. Electromagnetic Compatibility Intentional Radiators

4.7 Frequency Stability

Test Requirement(s): §2.1055 and §27.54

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

The EUT was incapable of generating a CW signal in order to use a frequency counter. As a result alternative measures were taken in order to demonstrate that the fundamental emissions stayed within the authorized frequency block.

The EUT was placed in the Environmental Chamber and the support equipment was placed outside the chamber. The temperature chamber was set from -30 to 50^{C} in 10^{C} increment. The EUT was allowed sufficient time at each temperature setting in order to stabilize. At each temperature level the transmitter was set to the lowest and highest frequencies to the transmit band. The resulting carriers were captured on a spectrum analyzer in order to detect if fundamental emissions remained within the authorized frequency block.

In addition, the voltage supplied to EUT was varied by ± 15 % of nominal voltage. These tests were carried out at normal room temperatures.

Test Results: Equipment was not applicable with Section 2.1055 and 27.54. The EUT does not regulate transmitter frequency stability.

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5. 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
1T4565	LISN (24 AMP)	SOLAR ELECTRONICS	9252-50-R-24-BNC	09/25/2008	09/25/2009
1T4612	ESA-E SERIES SPECTRUM ANALYZER	AGILENT	E4407B	02/17/2009	02/17/2010
1T4299	SIGNAL GENERATOR	HEWLETT PACKARD	E4432B	11/17/2008	11/17/2009
1T2665	HORN ANTENNA	EMCO	3115	05/07/2008	05/17/2009
1T4414	MICROWAVE PRE-AMPLIFIER	AH SYSTEMS	PAM-0118	SEE NOTE	
1T4300	SEMI-ANECHOIC CHAMBER # 1	EMC TEST SYSTEMS	NONE	04/11/2006	06/28/2009
1T4302	EMI RECEIVER	HEWLETT PACKARD	85462A	06/11/2008	06/11/2009
1T4303	ANTENNA; BILOG	SCHAFNER - CHASE EMC	CBL6140A	07/07/2008	07/07/2009
SN:968620	SIGNAL GENERATOR	AGILENT	83752B	10/19/2008	10/19/2009

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

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6. Certification Label & User's Manual Information

6.2. 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.

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.

[1] 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, or the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant, whichever is applicable.

§ 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.

§ 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

[1] In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart C (of Part 15), which deals with intentional radiators.

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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

6.2. 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:

(ii 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.

(ii 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.

(ii 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.

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