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

September 5, 2006

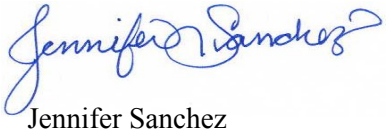
LGC Wireless
2540 Junction Avenue
San Jose, CA 95134

Dear Tom Macall,

Enclosed is the EMC test report for compliance testing of the LGC Wireless, InterReach Fusion FSN-1-MH-1 Main Hub, FSN-EH-1 Expansion Hub, FSN-8519-1 Remote Unit as tested to the requirements of the FCC Class II Permissive Change Certification rules under Title 47 of the CFR Part 22 Subpart H for Cellular Devices and Part 24 Subpart E for Broadband PCS Devices.

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.



Jennifer Sanchez
Documentation Department

Reference: (\EMCS20646-FCC22H24E)

Electromagnetic Compatibility Criteria
Class II Permissive Change
Test Report

for the

LGC Wireless
Model InterReach Fusion FSN-1-MH-1 Main Hub, FSN-EH-1 Expansion Hub, FSN-8519-1 Remote Unit

Verified under
FCC Certification Rules
Title 47 of the CFR, Part 22 Subpart H & Part 24 Subpart E
for Broadband PCS &Cellular Devices

MET Report: EMCS20646-FCC22H24E

September 5, 2006

Prepared For:

LGC Wireless
2540 Junction Avenue
San Jose, CA 95134

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

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for Broadband PCS Devices & Cellular Devices

Shawn McMillen, Project Engineer
Electromagnetic Compatibility Lab

Jennifer Sanchez
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 22 Subpart H, Part 24 Subpart E and Part 15 Subpart B of the FCC Rules under normal use and maintenance.

Tony Permsombut, Manager
Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	September 5, 2006	Initial Issue.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent µ
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GR-1089-CORE	***(GR)*** **G**eneral **R**equirement(s) imposed by the NEBS standard, **(*CORE*) C**entral **O**ffice **R**ecovery **E**xpress (AT&T), ***(1089)*** specifies various parts of the General Requirements under Bellcore Technical Standard, Requirements for Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilovolt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**micro**henry
µ	**micro**farad
µs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the LGC Wireless FSN-8519-1 Remote Unit in conjunction with the FSN-1-MH-1 Main Hub and FSN-EH-1 Expansion Hub. 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 LGC Wireless FSN-8519-1 Remote Unit in conjunction with the FSN-1-MH-1 Main Hub and FSN-EH-1 Expansion Hub. LGC Wireless should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the EUT.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 22 Subpart H, Part 24 Subpart E and Part 15 Subpart B in accordance with LGC Wireless, purchase order number 717568.

Reference	Description	Compliance
Part 15 Subpart B §15.109(a)	Conducted Emissions	Compliant
Part 15 Subpart B §15.107(a)	Radiated Emissions	Compliant
§2.1046; §22.913, §24.232	RF Power Output	Compliant
§2.1047	Modulation Characteristics	Not Applicable
§2.1049	Occupied Bandwidth	Compliant
§2.1051; §22.917, §24.238	Spurious Emissions at Antenna Terminals	Compliant
§2.1053; §22.917, §24.238	Radiated Spurious Emissions	Compliant
§2.1055; §22.355, §24.135	Frequency Stability	Compliant
2-11-04/EAB/RF	Out of Band Rejection	Compliant

Table 1 Executive Summary of EMC ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by LGC Wireless to perform testing on the InterReach Fusion FSN-1-MH-1 Main Hub, FSN-EH-1 Expansion Hub, FSN-8519-1 Remote Unit, under LGC Wireless's purchase order number 717568.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the LGC Wireless, InterReach Fusion FSN-1-MH-1 Main Hub, FSN-EH-1 Expansion Hub, FSN-8519-1 Remote Unit.

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

Model(s) Tested:	InterReach Fusion FSN-1-MH-1 Main Hub, FSN-EH-1 Expansion Hub, FSN-8519-1 Remote Unit	
Model(s) Covered:	InterReach Fusion FSN-1-MH-1 Main Hub, FSN-EH-1 Expansion Hub, FSN-8519-1 Remote Unit	
EUT Specifications:	Primary Power: 100-240V/50-60Hz	
	FCC ID: NOOFSN-8519-1	
	Type of Modulations:	CDMA (F9W)
		TDMA (DXW)
		GSM (GXW)
		AMPS (F1D)
	Equipment Code:	TNB
	RF Output Power Cellular Band:	AMPS - 24.60 dBm
		CDMA - 23.39 dBm
		TDMA - 25.00 dBm
	RF Output Power PCS Band:	CDMA - 23.94 dBm
		TDMA - 25.10 dBm
		GSM - 23.81 dBm
	EUT Frequency Ranges Cellular Band:	Downlink: 869 – 894MHz
		Uplink: 824 – 849MHz
	EUT Frequency Ranges PCS Band:	Downlink: 1930 - 1990MHz
		Uplink: 1850 - 1910MHz
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:	Shawn McMillen	
Date(s):	September 5, 2006	

B. References

CFR 47, Part 22, Subpart H	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
CFR 47, Part 24, Subpart E	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 24: Rules and Regulations for Personal Communications Services
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025:2000	General Requirements for the Competence of Testing and Calibration Laboratories
EIA/TIA-603-A-2001	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards

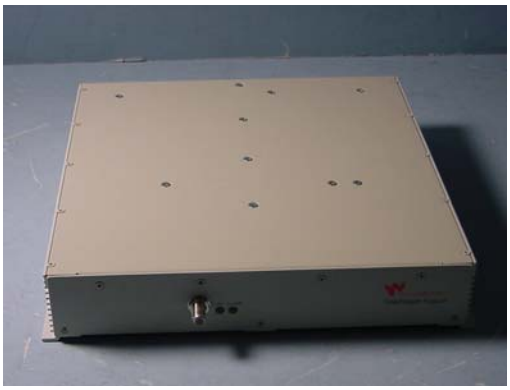
Test Site

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 the National Voluntary Laboratory Accreditation Program
(Lab Code: 100273-0).

C. Description of Test Sample

The LGC Wireless FSN-1-MH-1Main Hub, FSN-EH-1 Expansion Hub, and FSN-8519-1 RAU, is an RF amplification and distribution system. In the downlink direction, the Main Hub (MH) unit receives an RF signal, from a base station or repeater, which is then converted to IF signal. The IF signal is sent to the Expansion Hub (EH) via fiber link. The expansion hub distributes the IF signal to the remote access unit (RAU) via coax cable. The RAU then converts the IF to RF signal which is outputted to an antenna. In the Uplink direction the signal is received from the antenna by the RAU, which is processed back to the base station via the expansion and main hubs. The coax connection from expansion hub to remote unit also carries 54VDC power the remote unit.



Photograph 1. LGC Wireless, FSN-8519-1 Remote Unit

Photograph 2. LGC Wireless FSN-1-MH-1 Main Hub & FSN-EH-1 Expansion Hub

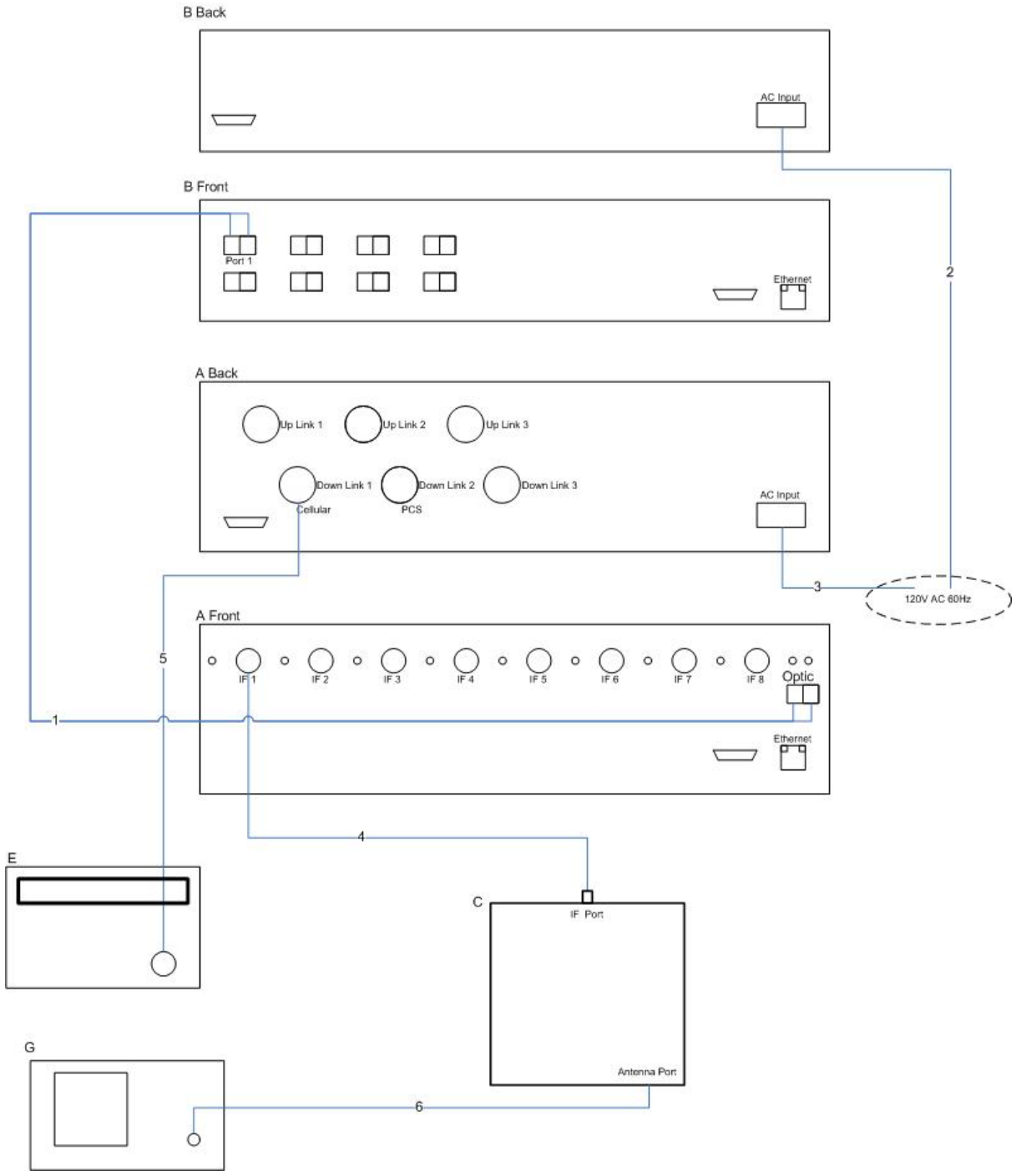


Figure 1. Block Diagram of Test Configuration (Downlink Cellular - Conducted Measurement & Frequency Stability)

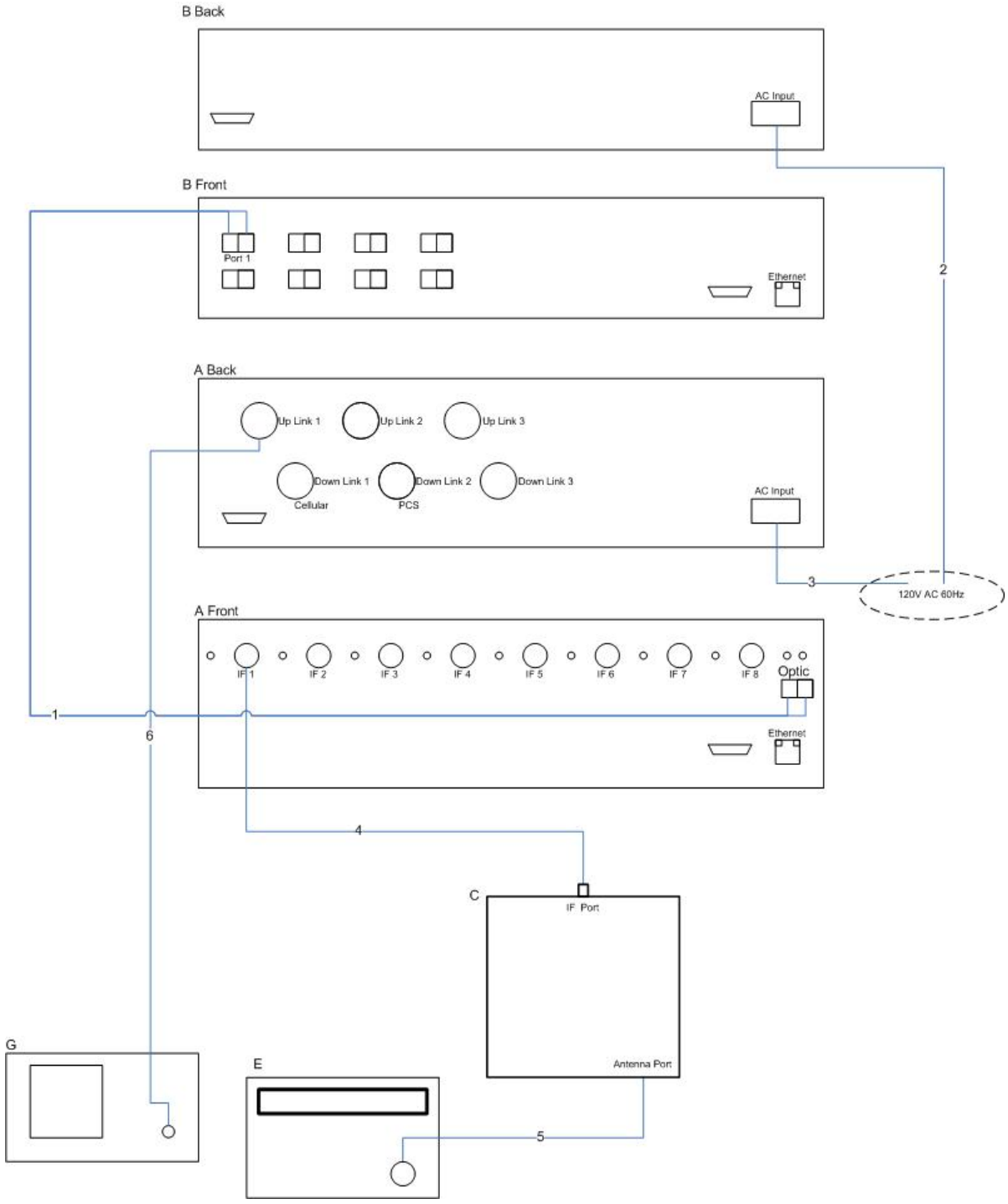


Figure 2. Block Diagram of Test Configuration (Uplink Cellular - Conducted Measurement & Frequency Stability)

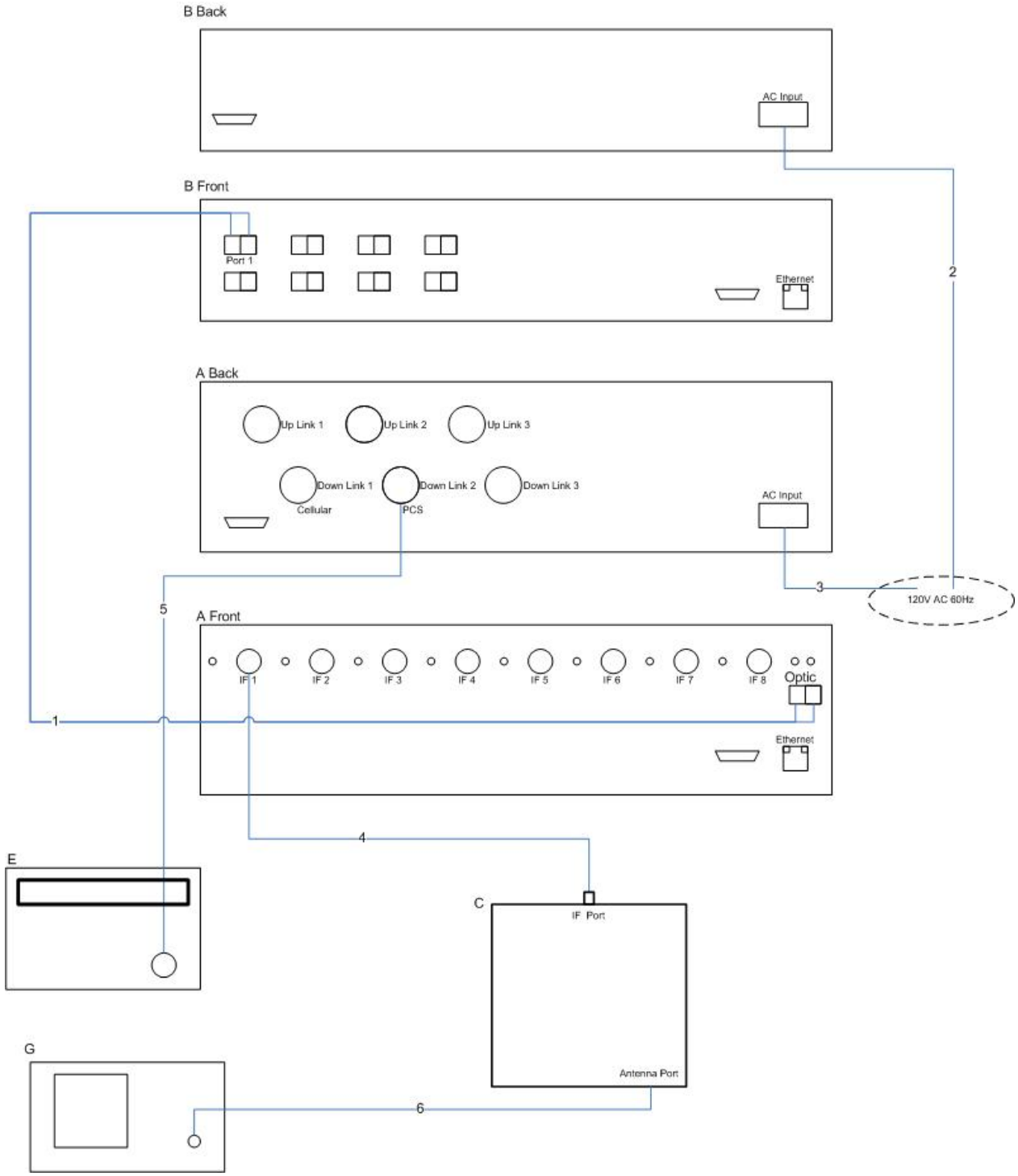


Figure 3. Block Diagram of Test Configuration (Downlink PCS - Conducted Measurement & Frequency Stability)

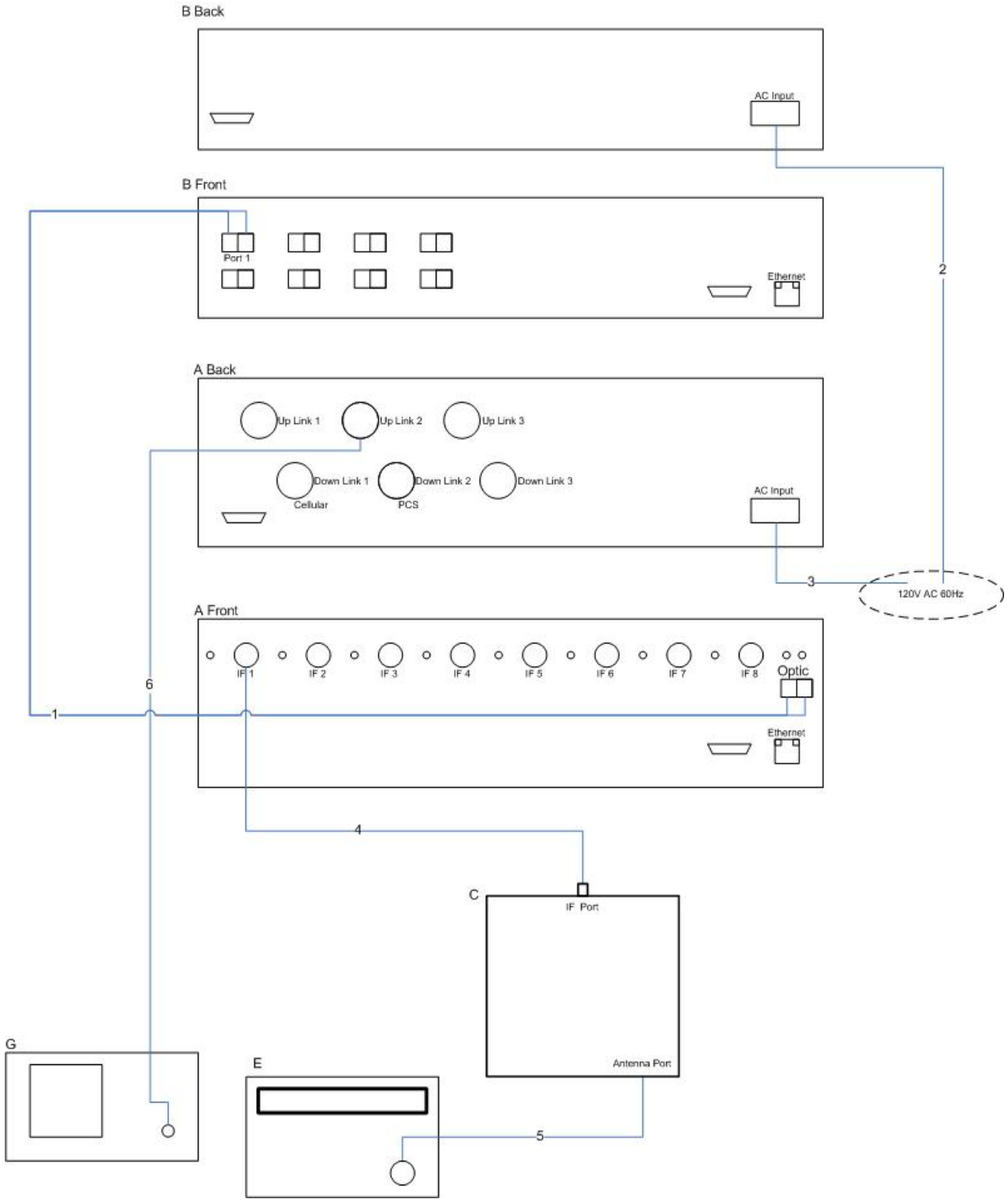


Figure 4. Block Diagram of Test Configuration (Uplink PCS - Conducted Measurement & Frequency Stability)

D. Equipment Configuration

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Serial Number
A	Expansion Hub	740630-1	FR1014RJ
B	Main Hub	740610-1	FR1014R1
C	RAU (Main board)	740650-0	F0100MYT

Table 2. Equipment Configuration

E. Support Equipment

LGC Wireless supplied support equipment necessary for the operation and testing of the InterReach Fusion FSN-1-MH-1 Main Hub, FSN-EH-1 Expansion Hub, FSN-8519-1 Remote Unit. All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name / Description	Manufacturer	Model Number	Serial Number
E	Signal Generator	HP	E4432B	US38080117
G	Spectrum Analyzer	HP	E4407B	MY45102898

Table 3. Support Equipment

F. 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
Frequency Stability & Conducted Measurement (Up-Link) Cellular						
1	A Front, Optic Tx Rx	Single Mode Optic	2	2	No	B, Port 1 Rx Tx
2	B Back, AC Input	AC PWR Cord	1	2	No	AC PWR Outlet
3	A Back, AC Input	AC PWR Cord	1	2	No	AC PWR Outlet
4	A Front, IF 1	Coax	1	30	Yes	C, IF Port
5	C, Antenna Port	Coax	1	5	Yes	E
6	A Back, Up-Link 1	Coax	1	1	Yes	G
Frequency Stability & Conducted Measurement (Down-Link) Cellular						
1	A Front, Optic Tx Rx	Single Mode Optic	2	2	No	B, Port 1 Rx Tx
2	B Back, AC Input	AC PWR Cord	1	2	No	AC PWR Outlet
3	A Back, AC Input	AC PWR Cord	1	2	No	AC PWR Outlet
4	A Front, IF 1	Coax	1	30	Yes	C, IF Port
5	A Back, Down-Link 1	Coax	1	5	Yes	E
6	C, Antenna Port	Coax	1	1	Yes	G
Frequency Stability & Conducted Measurement (Up-Link) PCS						
1	A Front, Optic Tx Rx	Single Mode Optic	2	2	No	B, Port 1 Rx Tx
2	B Back, AC Input	AC PWR Cord	1	2	No	AC PWR Outlet
3	A Back, AC Input	AC PWR Cord	1	2	No	AC PWR Outlet
4	A Front, IF 1	Coax	1	30	Yes	C, IF Port
5	C, Antenna Port	Coax	1	5	Yes	E
6	A Back, Up-Link 2	Coax	1	1	Yes	G
Frequency Stability & Conducted Measurement (Down-Link) PCS						
1	A Front, Optic Tx Rx	Single Mode Optic	2	2	No	B, Port 1 Rx Tx
2	B Back, AC Input	AC PWR Cord	1	2	No	AC PWR Outlet
3	A Back, AC Input	AC PWR Cord	1	2	No	AC PWR Outlet
4	A Front, IF 1	Coax	1	30	Yes	C, IF Port
5	A Back, Down-Link 2	Coax	1	5	Yes	E
6	C, Antenna Port	Coax	1	1	Yes	G

Table 4. Ports and Cabling Information

G. Mode of Operation

A modulated carrier was supplied to both the Up Link and Down Link port at an appropriate RF level. The EUT is not equipped with any method of controlling the RF output power.

H. Method of Monitoring EUT Operation

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

I. 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.

J. Disposition of EUT

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

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 (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.				

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 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 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): Elijah Garcia

Test Date(s): June 7, 2006

Conducted Emissions - Voltage, AC Power, Top Unit

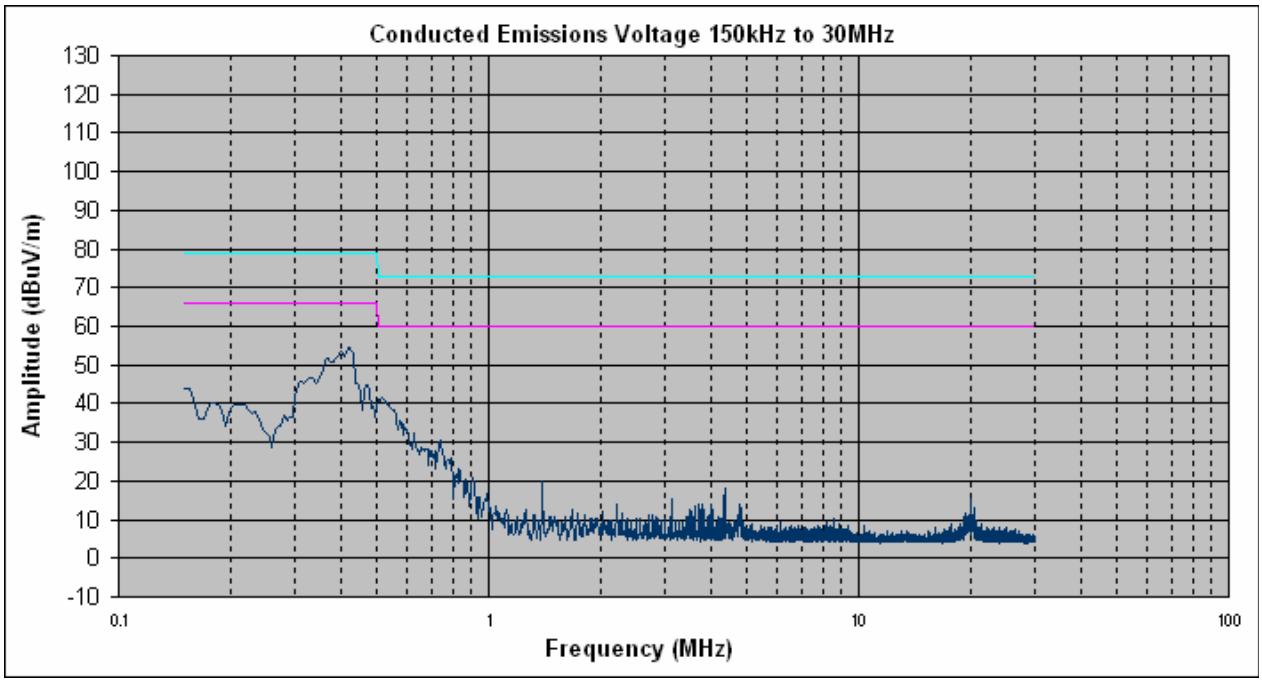
FREQ. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Results QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Results AVG	Margin (dB) AVG
0.209	31.83	79	PASS	-47.17	27.11	66	PASS	-38.89
0.412	51.83	79	PASS	-27.17	41.33	66	PASS	-24.67
0.745	26.11	73	PASS	-46.89	16.52	60	PASS	-43.48

Table 6. Conducted Emissions - Voltage, AC Power, Phase Line 120 VAC, Top Unit

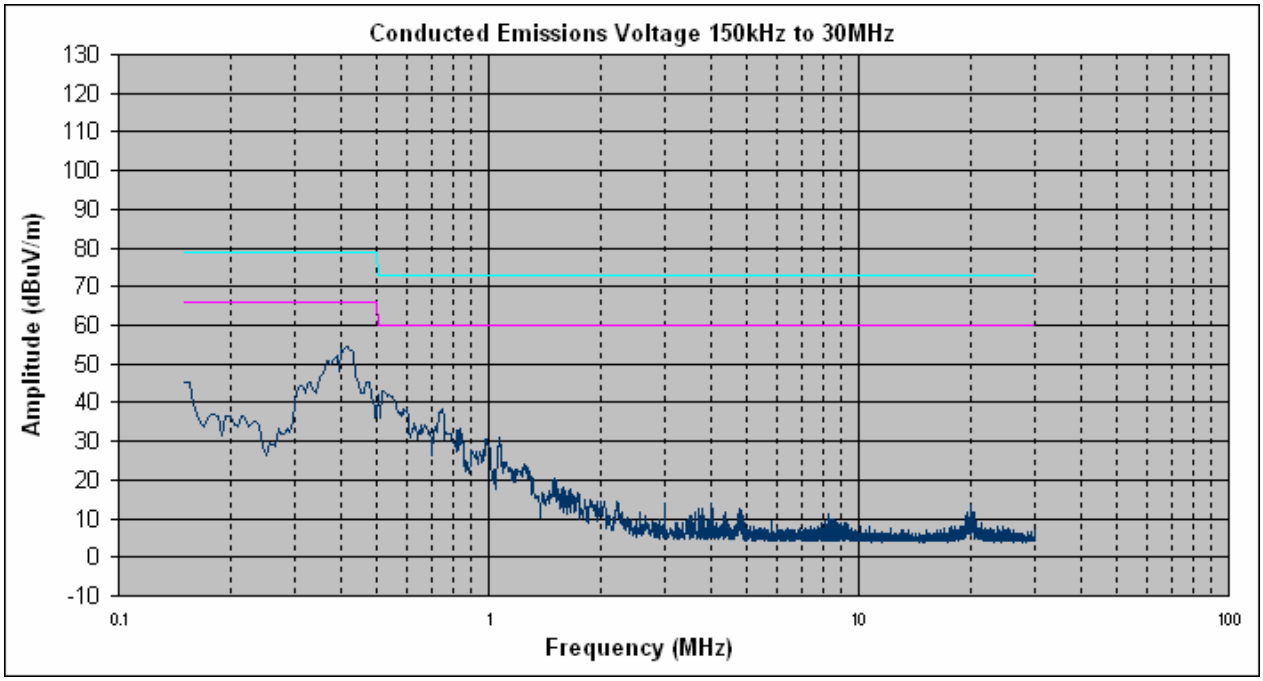
FREQ. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Results QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Results AVG	Margin (dB) AVG
0.165	29.58	79	PASS	-49.42	17.81	66	PASS	-48.19
0.208	28.82	79	PASS	-50.18	24.4	66	PASS	-41.6
0.414	51.15	79	PASS	-27.85	41.2	66	PASS	-24.8

Table 7. Conducted Emissions - Voltage, AC Power, Neutral Line 120 VAC, Top Unit

Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Top Unit



Conducted Emission, Phase Line Plots, Top Unit



Conducted Emission, Neutral Line Plots, Top Unit

Conducted Emissions - Voltage, AC Power, Expansion Hub

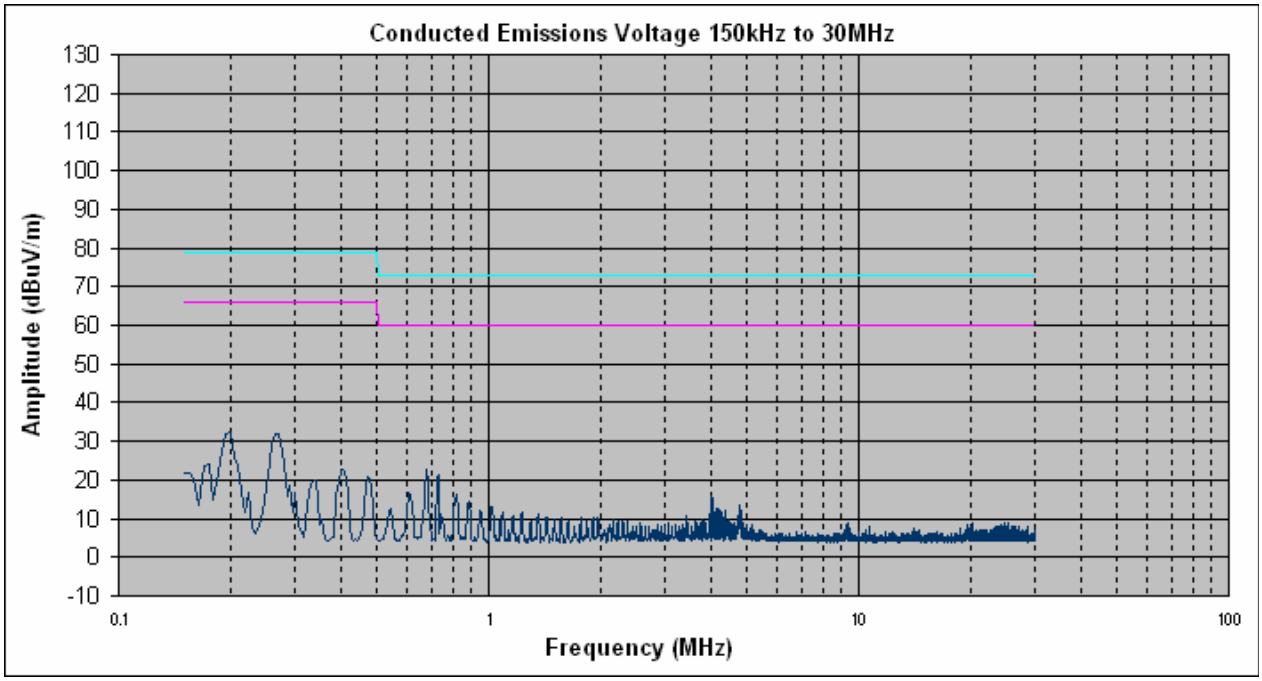
FREQ. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Results QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Results AVG	Margin (dB) AVG
0.2	31.71	79	PASS	-47.29	28.57	66	PASS	-37.43
0.271	31.48	79	PASS	-47.52	31.31	66	PASS	-34.69
0.677	17.17	73	PASS	-55.83	15.62	60	PASS	-44.38

Table 8. Conducted Emissions - Voltage, AC Power, Phase Line 120 VAC, Expansion Hub

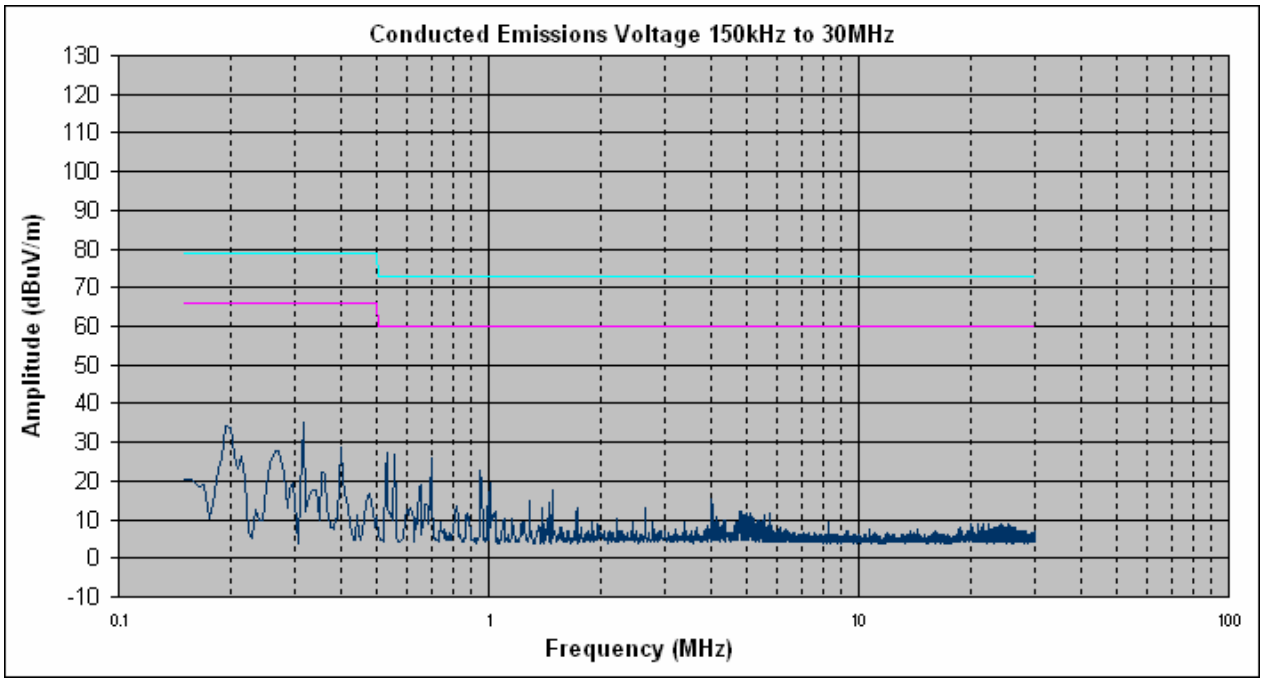
FREQ. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Results QP	Margin (dB) QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Results AVG	Margin (dB) AVG
0.202	29.77	79	PASS	-49.23	24.1	66	PASS	-41.9
0.271	26.99	79	PASS	-52.01	25.43	66	PASS	-40.57
0.407	16.51	79	PASS	-62.49	15.33	66	PASS	-50.67

Table 9. Conducted Emissions - Voltage, AC Power, Neutral Line 120 VAC, Expansion Hub

Conducted Emissions - Voltage, Worst Case Emissions, AC Power, Expansion Hub

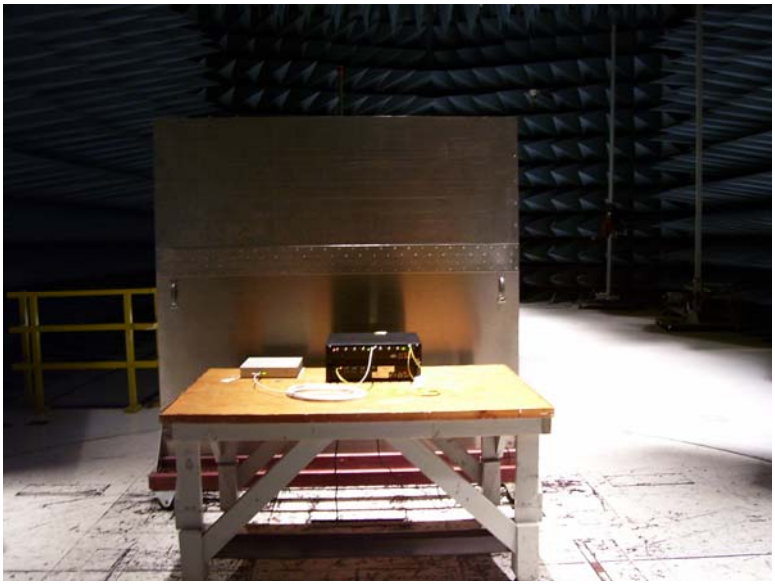


Conducted Emission, Phase Line Plots, Expansion Hub

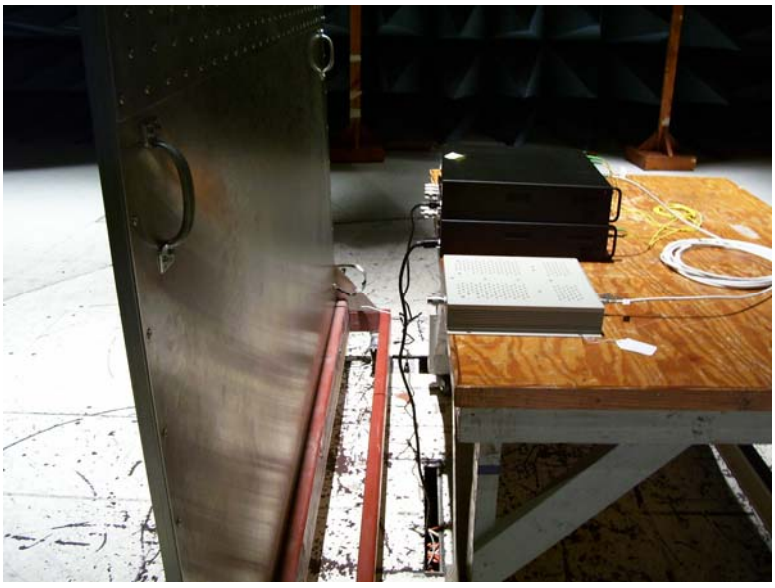


Conducted Emission, Neutral Line Plots, Expansion Hub

Conducted Emission Limits Test Setup



Photograph 3. Conducted Emissions Test Setup, Front View



Photograph 4. Conducted Emissions Test Setup, Back View

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 10.

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 10.

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 10. 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 3 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.

(Emissions measured at 3m were normalized using an inverse proportionality factor of 20dB per decade for comparison to the 10 m limit.)

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

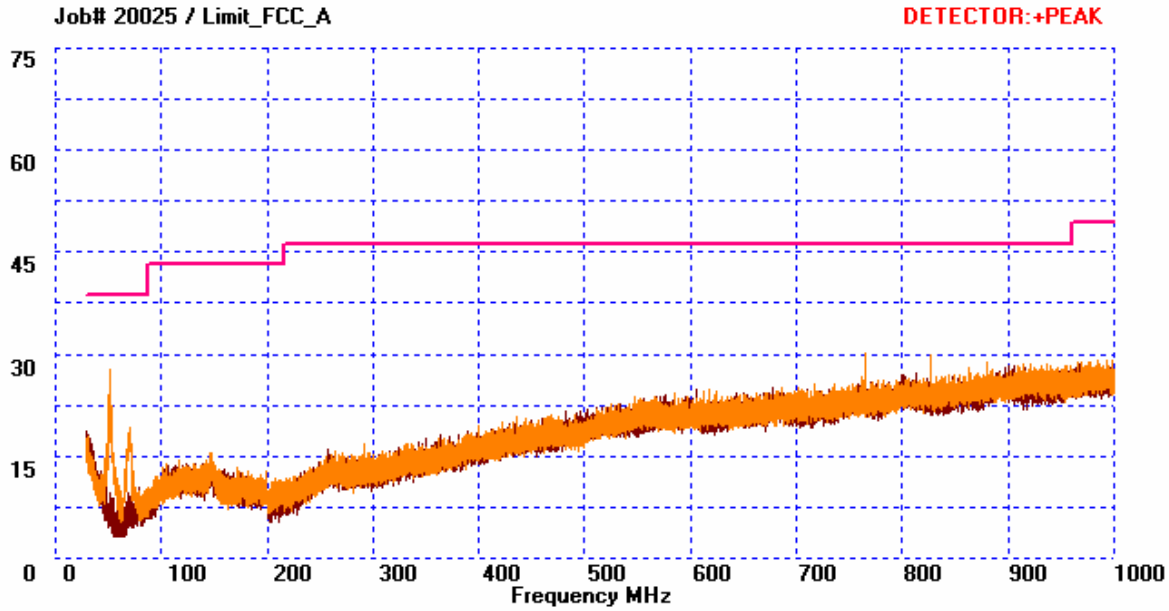
Test Engineer(s): Elijah Garcia

Test Date(s): June 7, 2006

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)
32.24	V	360	1	-4.82	15.90	0.94	12.03	39.00	-26.97
33.1	H	0	1.45	-3.20	16.65	0.95	14.40	39.00	-24.60
51.92	V	290	1.63	15.25	7.02	1.18	23.44	39.00	-15.56
69.88	V	211	1	11.62	5.48	1.38	18.48	39.00	-20.53
765.04	V	247	1.94	12.24	19.95	5.27	37.46	46.40	-8.94
826.04	V	219	1	7.63	19.72	5.58	32.92	46.40	-13.48

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



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

Radiated Emissions Limits Test Results, 1 GHz to 10 GHz, Class A

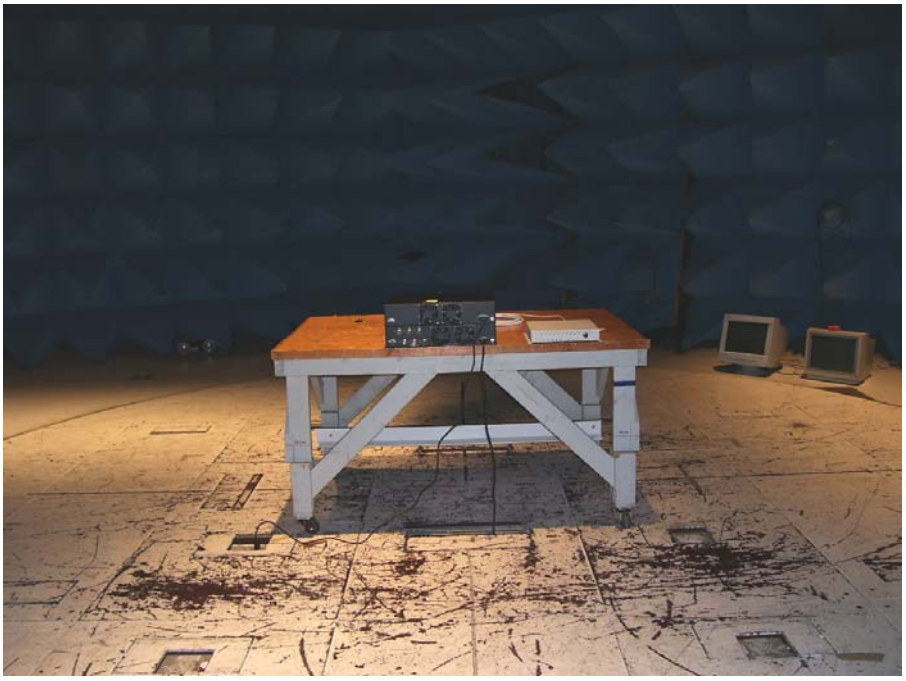
Frequency (GHz)	Azimuth (Degrees)	Antenna Polarity (H/V)	Height (m)	Raw Amp. @ 3m(Avg)	P.Amp (dB)	Ant.Cor. Factor (dB/m)	Cable Loss (dB)	Dist.Cor Factor (dB)	EUT Field Strength Final Amp. (dBuV/m)	Limit per FCC pt 15 @ 3m (dBuV/m)	Delta (dB)
1.65	201	H	1	53.82	35.21	25.90	2.75	10.46	36.80	49.5	-12.70
1.65	358	V	1.02	53.23	35.21	25.81	2.75	10.46	36.13	49.5	-13.37
1.72	180	V	2.7	50.02	35.23	26.14	2.85	10.46	33.32	49.5	-16.18
2	275	H	1.3	62.65	35.23	26.25	2.86	10.46	46.07	49.5	-3.43
3.177	357	H	1.05	56.04	35.52	30.61	4.17	10.46	44.84	49.5	-4.66
***3.177**	**2**	**V**	**1.02**	**59.62**	**35.52**	**30.42**	**4.17**	**10.46**	**48.23**	**49.5**	**-1.27**
3.45	300	H	1.42	55.04	35.33	31.18	4.36	10.46	44.78	49.5	-4.72
3.45	192	V	1.5	55.1	35.33	30.97	4.36	10.46	44.64	49.5	-4.86
3.825	200	V	1	43.04	35.15	32.13	4.61	10.46	34.17	49.5	-15.33

Table 12. Radiated Emissions Limits Test Results, 1 GHz to 10 GHz, Class A

Note: * - 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.

Radiated Emission Limits Test Setup, 30 MHz to 1 GHz

Photograph 5. Radiated Emission Limits Test Setup, 30 MHz to 1 GHz, Front View



Photograph 6. Radiated Emission Limits Test Setup, 30 MHz to 1 GHz, Back View

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.

§ 22.913 Power and antenna height limits.

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

§ 24.232 Power and antenna height limits.

§ 24.232 (b): Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

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.

Down Link			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
GSM	1930.0	10dBm	20.95
GSM	1962.5	10dBm	23.81
GSM	1990.0	10dBm	19.96

Down Link			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
CDMA	1930.0	10dBm	20.93
CDMA	1962.5	10dBm	23.94
CDMA	1990.0	10dBm	20.85

Down Link			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
TDMA	1930.0	10dBm	23.06
TDMA	1962.5	10dBm	25.10
TDMA	1990.0	10dBm	22.05

Uplink			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
GSM	1850.0	-40dBm	-29.47
GSM	1882.5	-40dBm	-26.12
GSM	1915.0	-40dBm	-34.17

Uplink			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
CDMA	1850.0	-40dBm	-29.99
CDMA	1882.5	-40dBm	-27.02
CDMA	1915.0	-40dBm	-34.16

Uplink			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
TDMA	1850.0	-40dBm	-30.00
TDMA	1882.5	-40dBm	-27.65
TDMA	1915.0	-40dBm	-33.65

Down Link			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Average Output Power (dBm)**
AMPS	869.0	10dBm	24.36
AMPS	881.5	10dBm	24.60
AMPS	894.0	10dBm	24.56

Down Link			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Average Output Power (dBm)**
CDMA	869.0	10dBm	23.20
CDMA	881.5	10dBm	23.39
CDMA	894.0	10dBm	23.17

Down Link			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Average Output Power (dBm)**
TDMA	869.0	10dBm	24.31
TDMA	881.5	10dBm	25.00
TDMA	894.0	10dBm	24.75

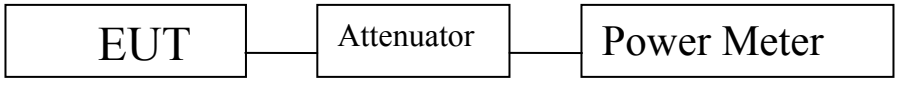
Uplink			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
AMPS	824.0	-40dBm	-27.20
AMPS	836.5	-40dBm	-25.98
AMPS	849.0	-40dBm	-27.50

Uplink			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
CDMA	824.0	-40dBm	-28.75
CDMA	836.5	-40dBm	-27.91
CDMA	849.0	-40dBm	-27.94

Uplink			
Modulation	**Frequency (MHz)**	**Input Power (dBm)**	**Modulated Output Power (dBm)**
TDMA	824.0	-40dBm	-27.60
TDMA	836.5	-40dBm	-26.70
TDMA	849.0	-40dBm	-28.03

Test Engineer(s): Shawn McMillen

Test Date(s): August 30, 2006



Block Diagram 1. RF Power Output Test Setup

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

§ 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.

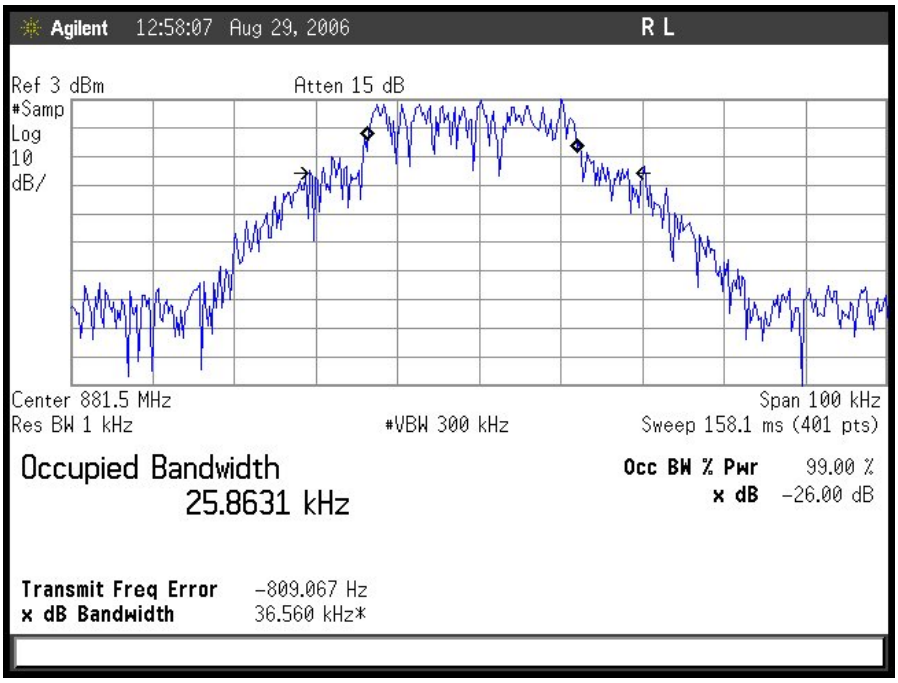
Test Procedures: As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made with a Spectrum Analyzer connected to the RF ports for both Uplink and Downlink

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.

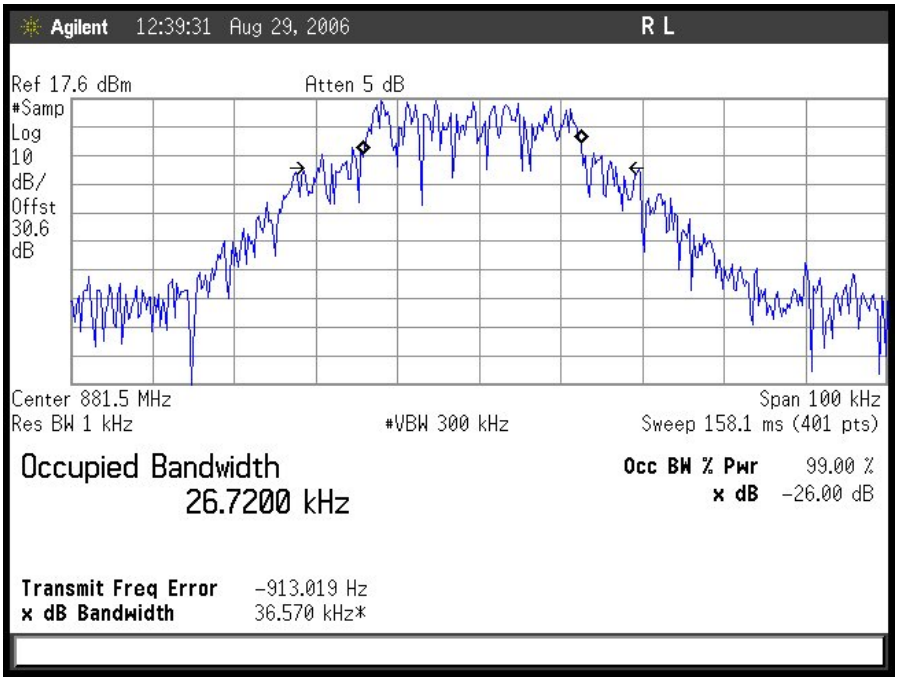
Test Results: The EUT complies with the requirements of this section.

Test Engineer(s): Shawn McMillen

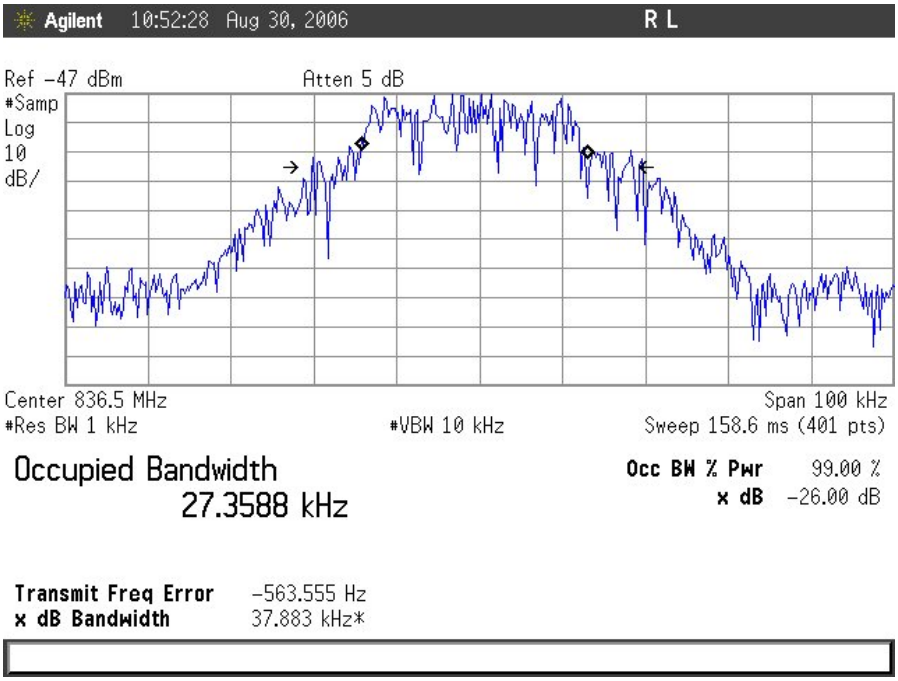
Test Date(s): August 30, 2006



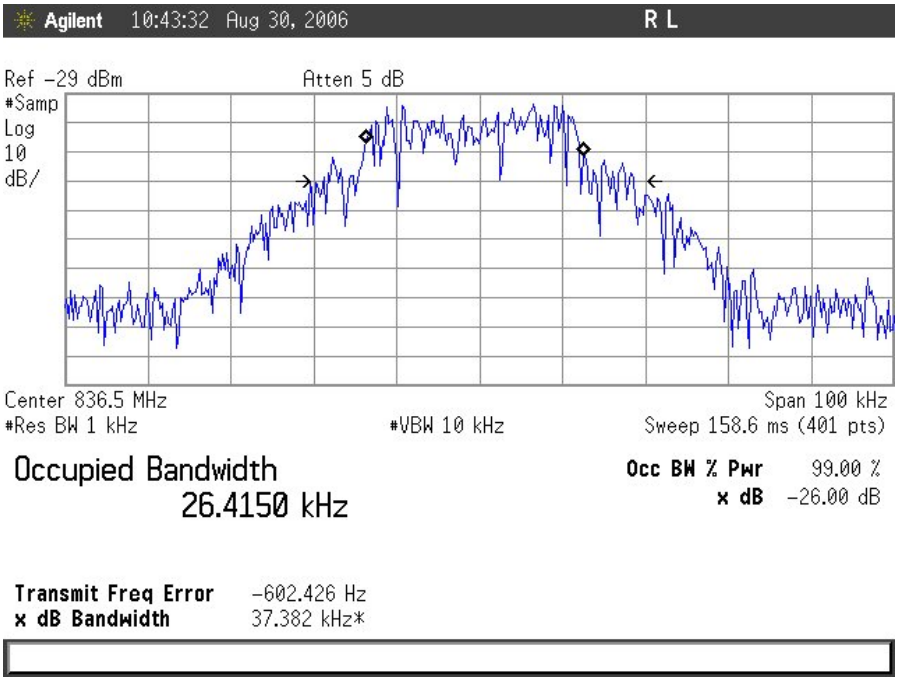
AMPS Downlink Input (Mid Channel - Cellular)



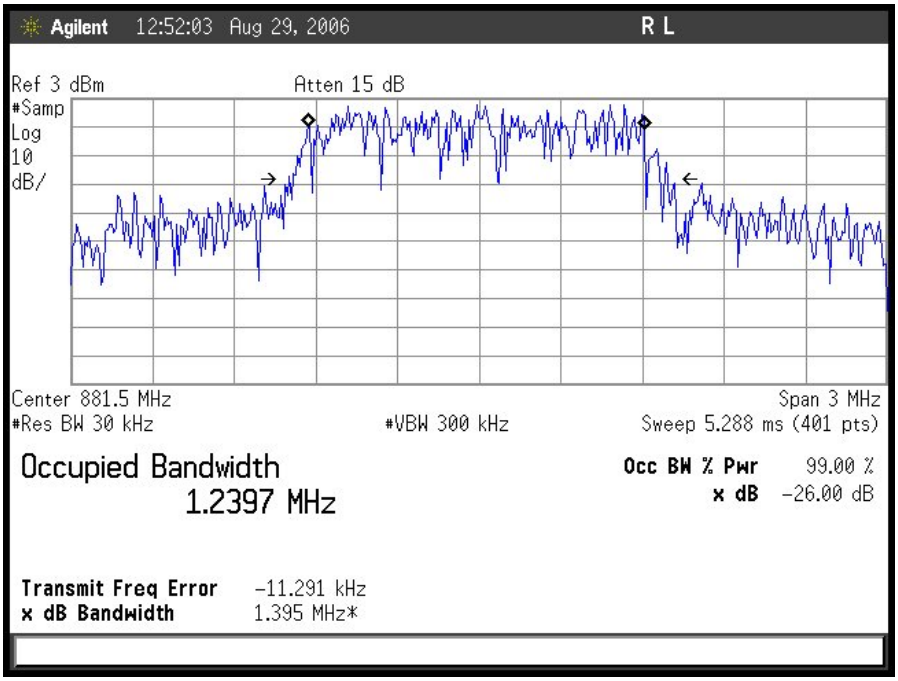
AMPS Downlink Output (Mid Channel - Cellular)



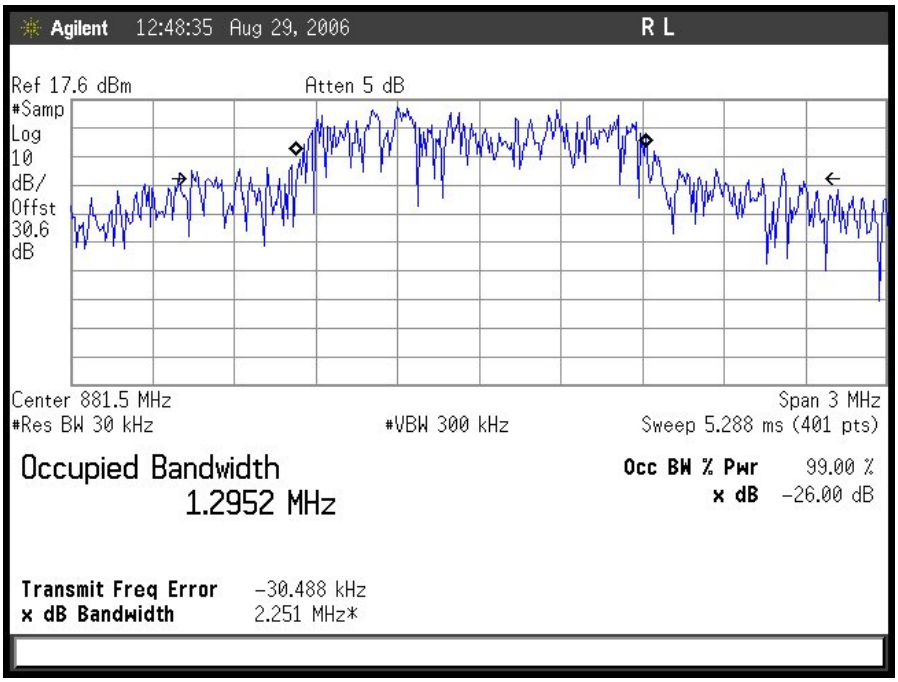
AMPS Uplink Input (Mid Channel - Cellular)



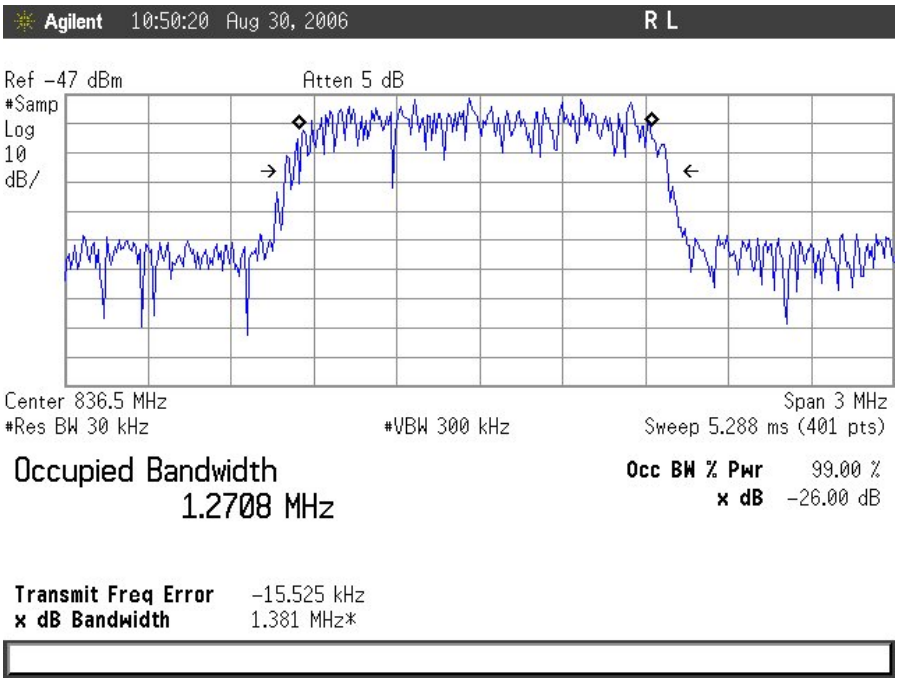
AMPS Uplink Output (Mid Channel - Cellular)



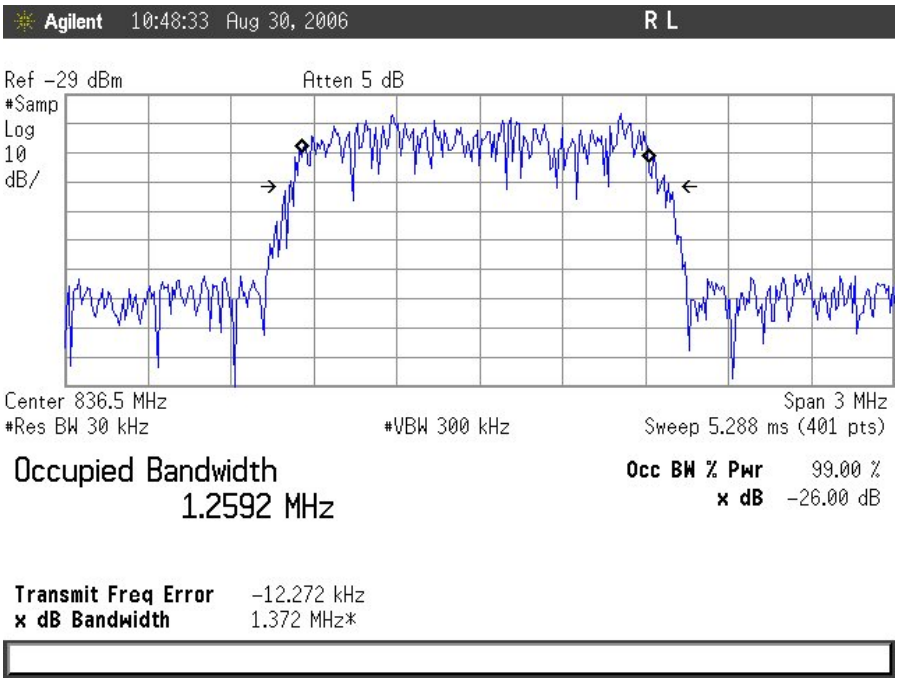
CDMA Downlink Input (Mid Channel - Cellular)



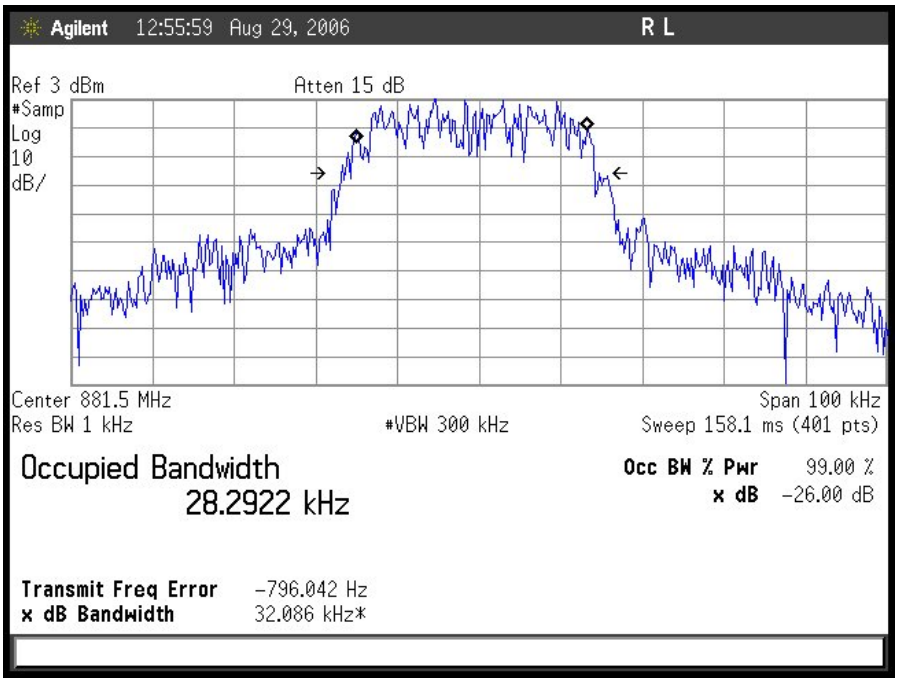
CDMA Downlink Output (Mid Channel - Cellular)



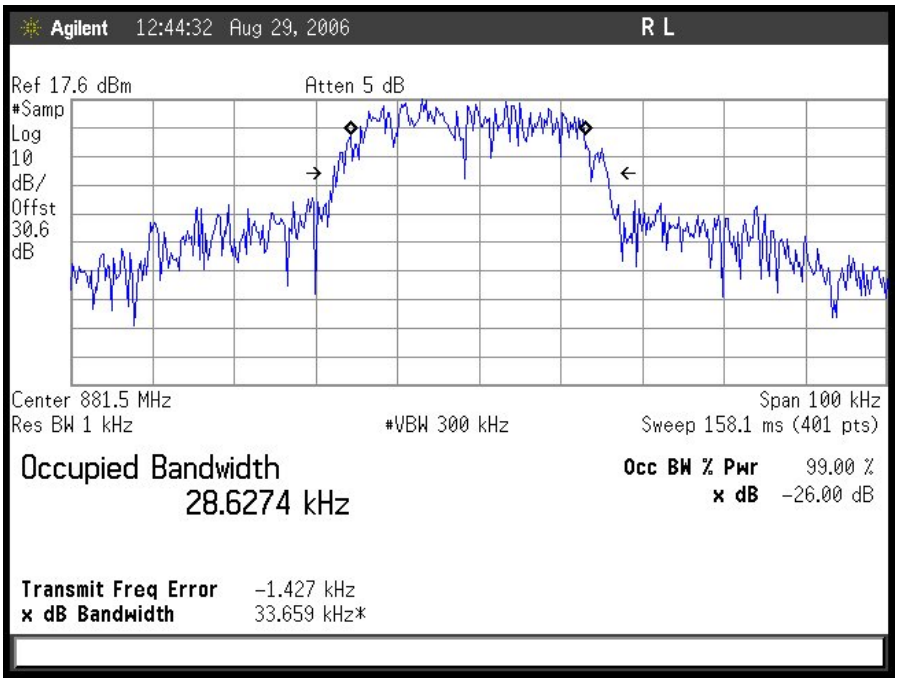
CDMA Uplink Input (Mid Channel - Cellular)



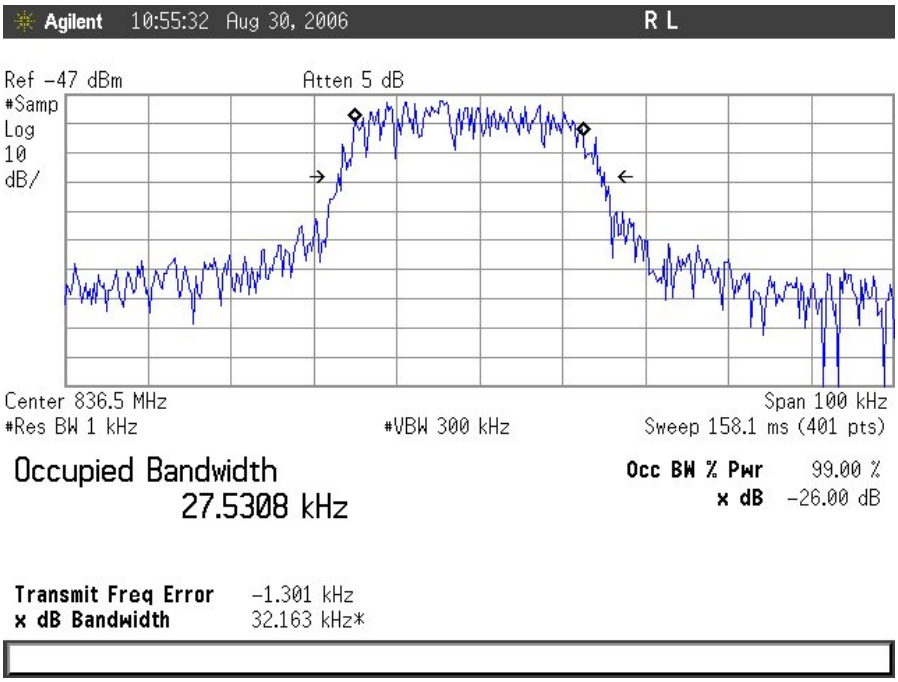
CDMA Uplink Output (Mid Channel - Cellular)



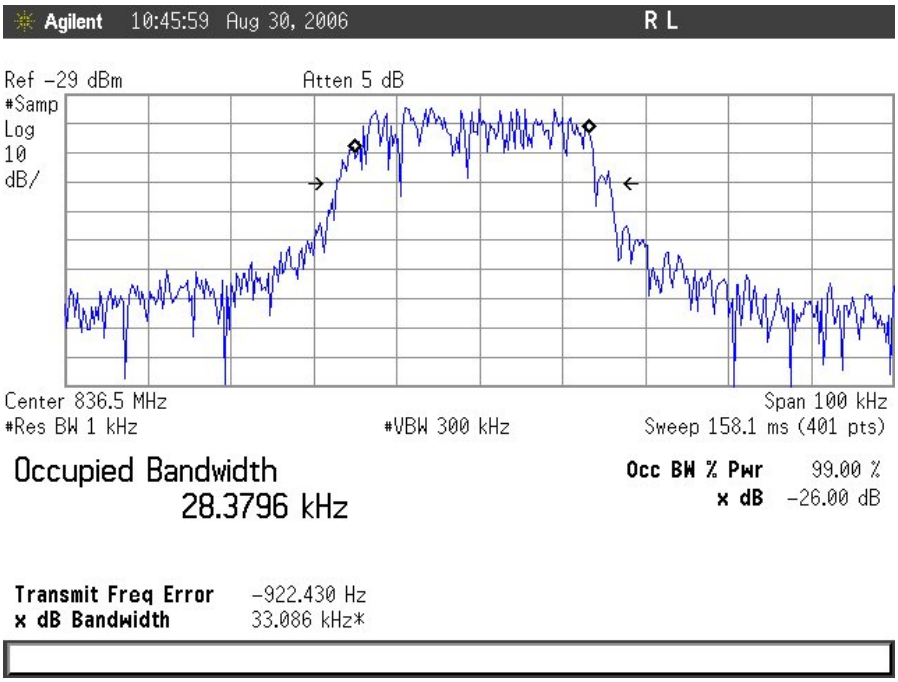
TDMA Downlink Input (Mid Channel - Cellular)



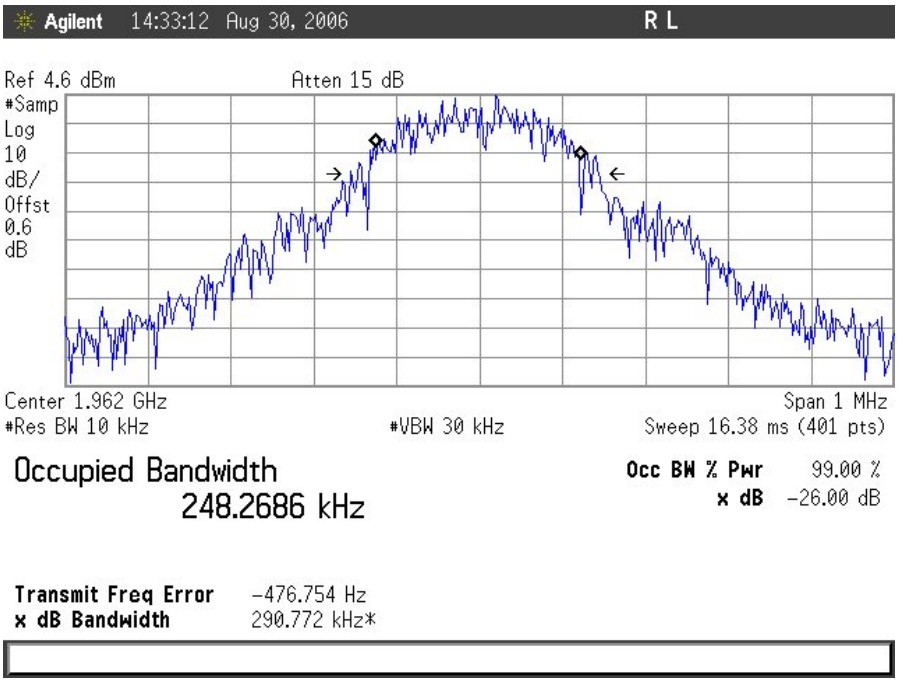
TDMA Downlink Output (Mid Channel - Cellular)



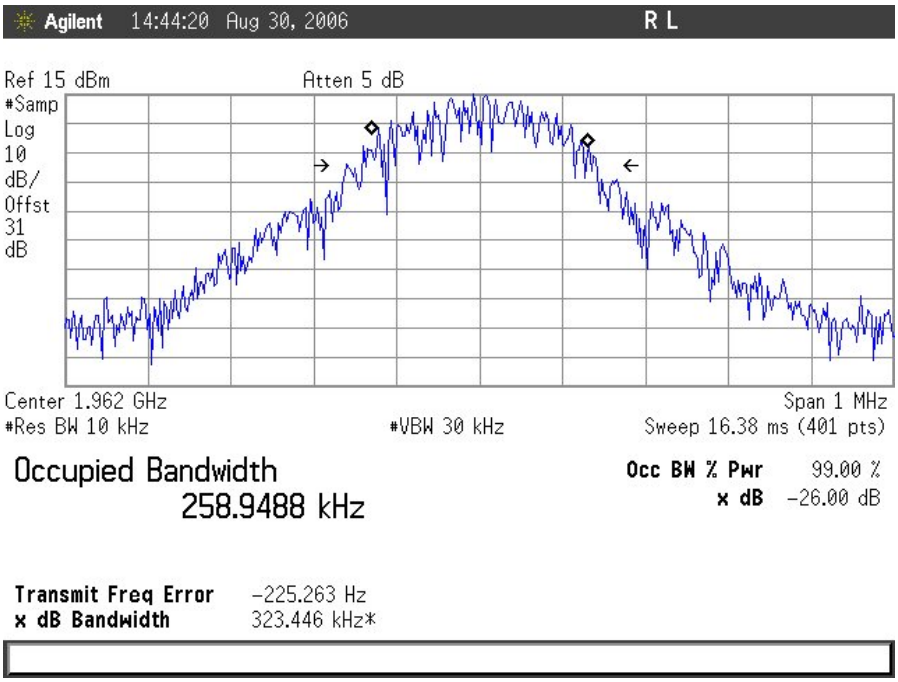
TDMA Uplink Input (Mid Channel - Cellular)



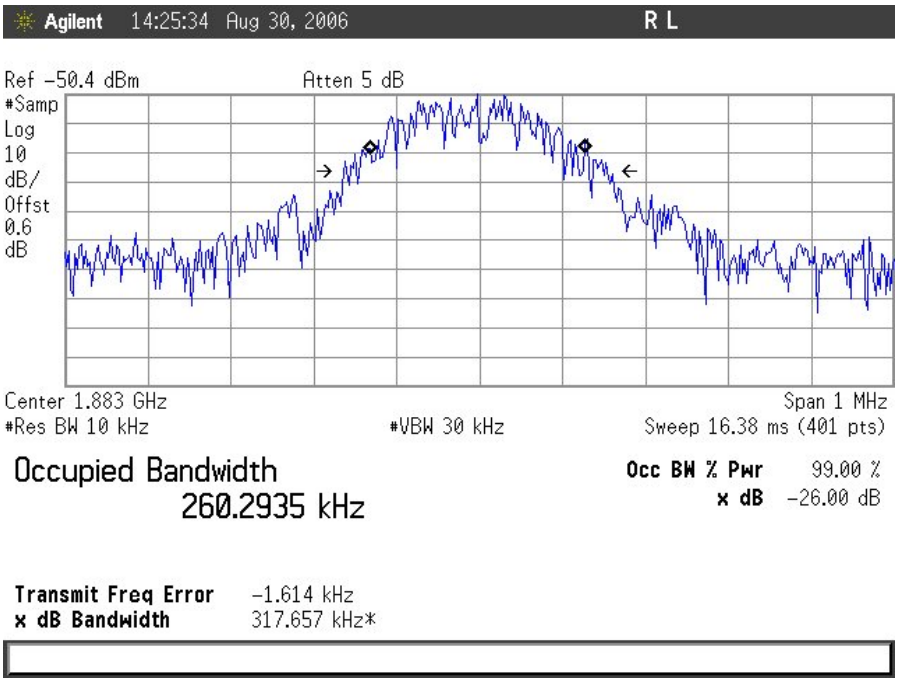
TDMA Uplink Output (Mid Channel - Cellular)



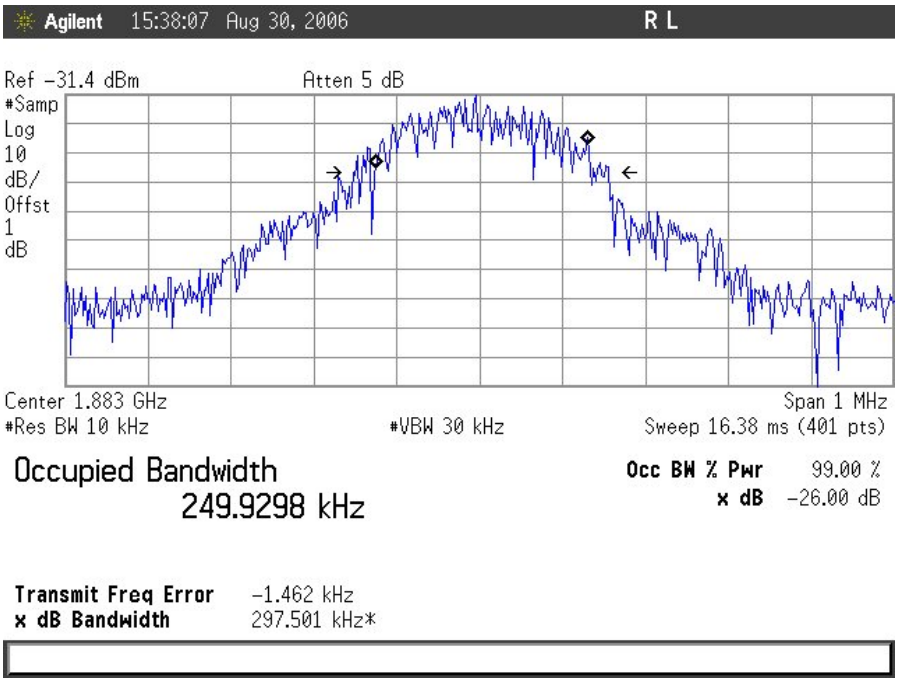
GSM Downlink Input (Mid Channel - PCS)



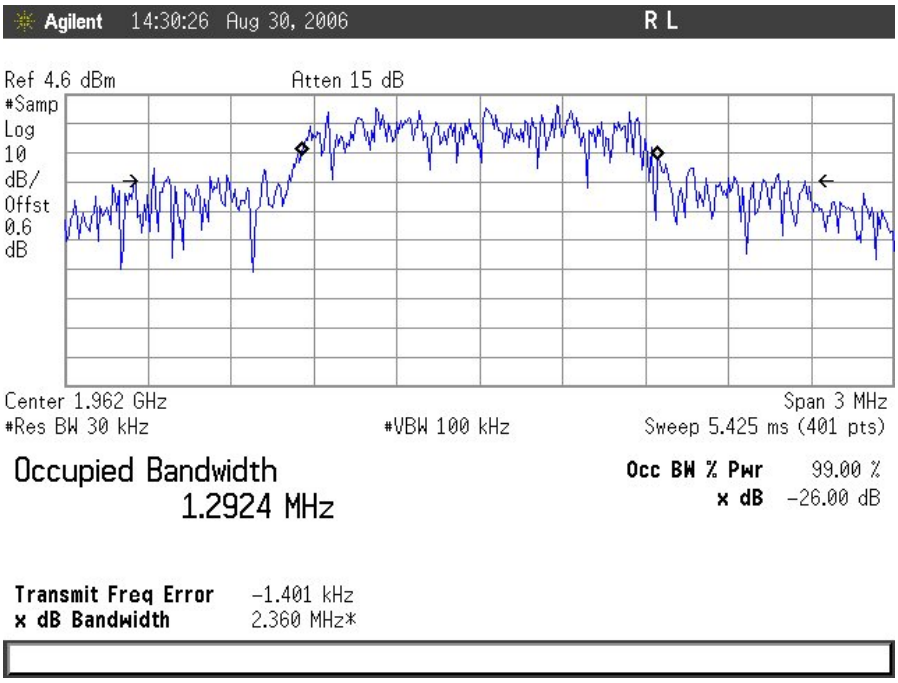
GSM Downlink Output (Mid Channel - PCS)



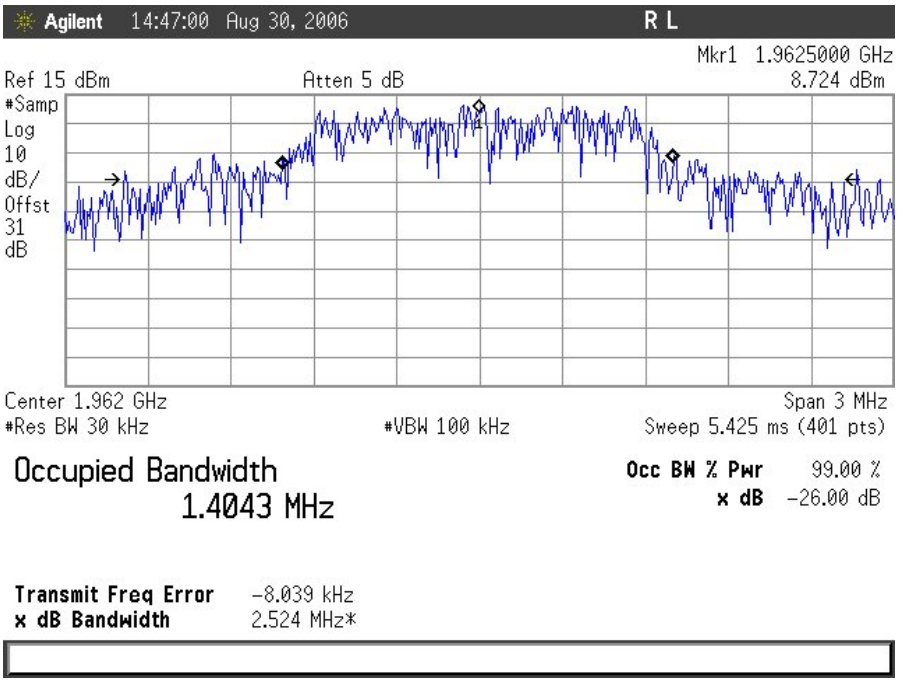
GSM Uplink Input (Mid Channel - PCS)



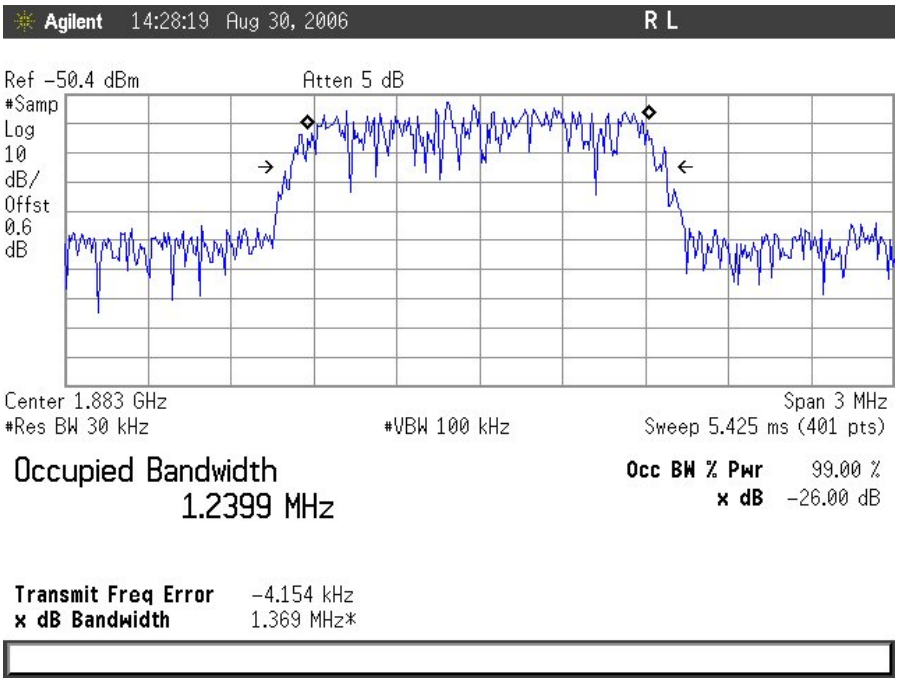
GSM Uplink Output (Mid Channel - PCS)



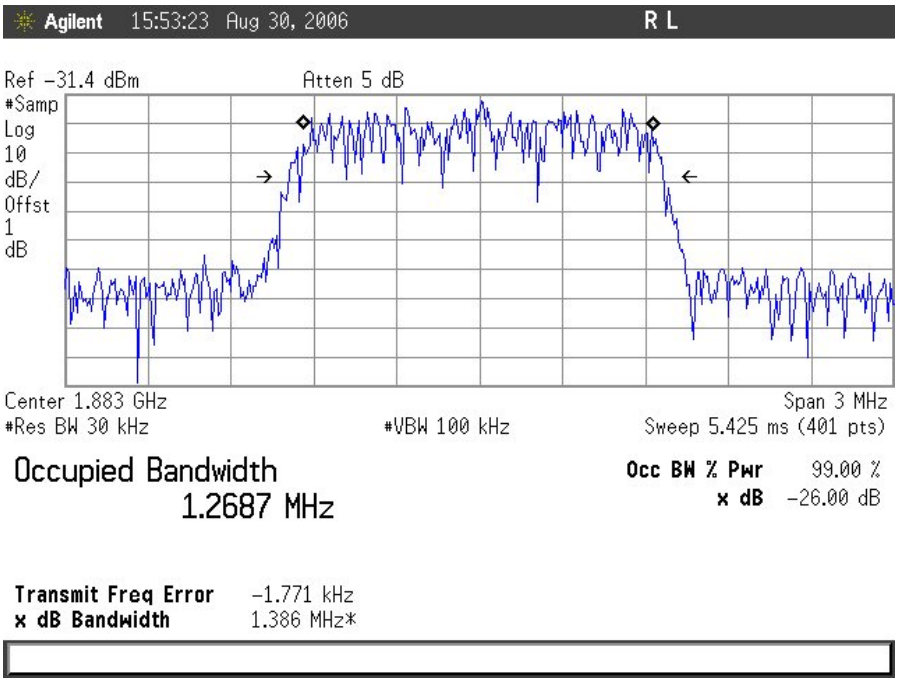
CDMA Downlink Input (Mid Channel - PCS)



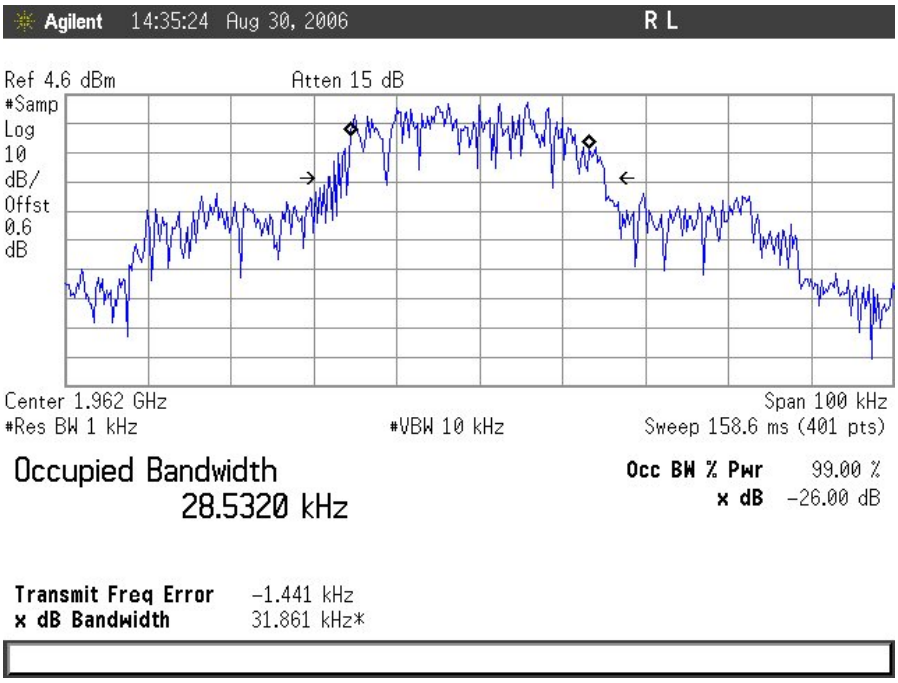
CDMA Downlink Output (Mid Channel - PCS)



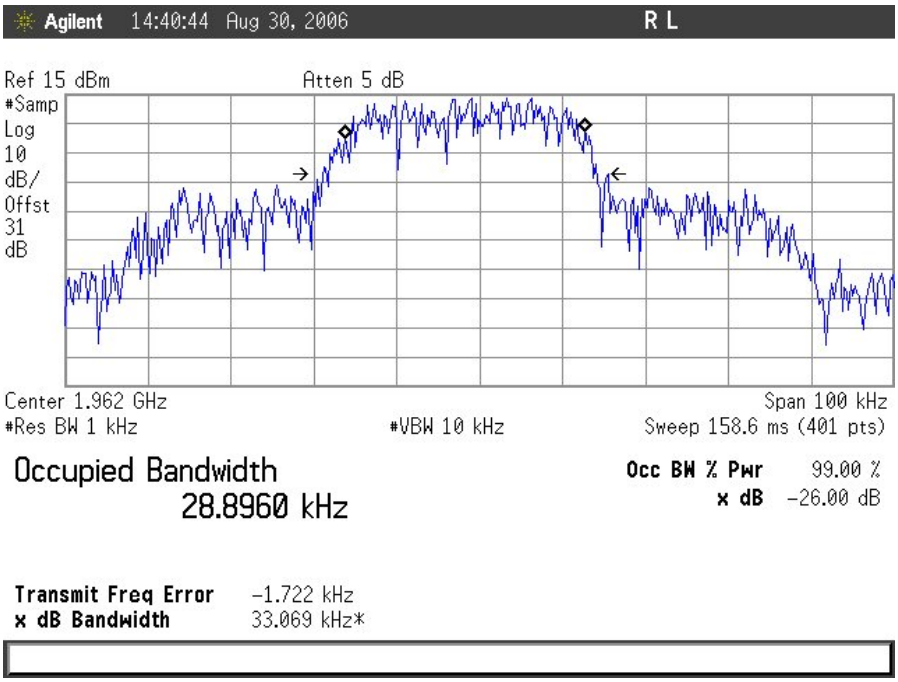
CDMA Uplink Input (Mid Channel - PCS)



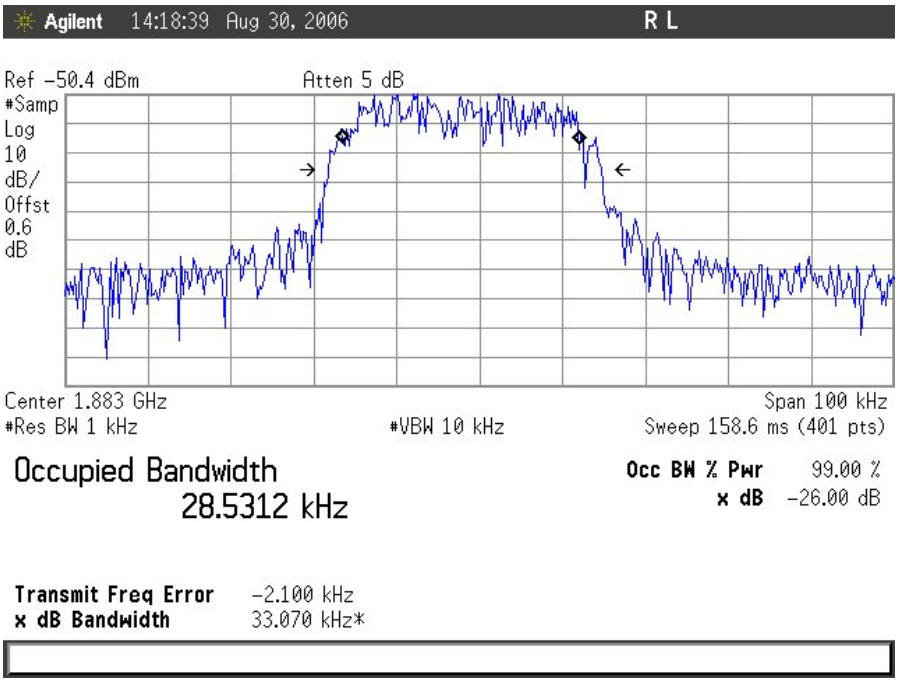
CDMA Uplink Output (Mid Channel - PCS)



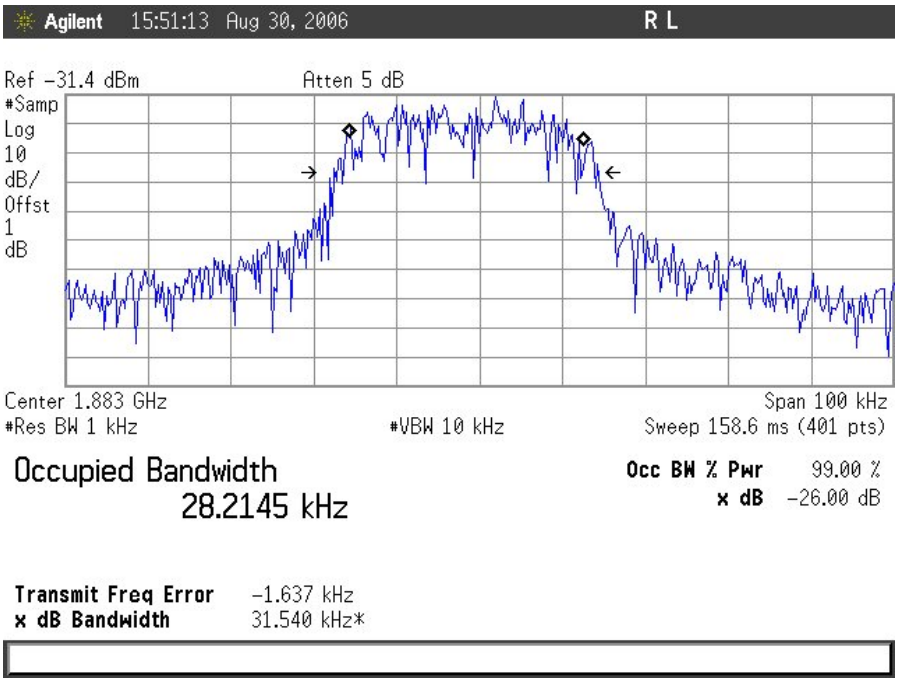
TDMA Downlink Input (Mid Channel - PCS)



TDMA Downlink Output (Mid Channel - PCS)



TDMA Uplink Input (Mid Channel - PCS)



TDMA Uplink Output (Mid Channel - PCS)

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.

§ 22.917 Emission limitations Cellular equipment: The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

§ 22.917 (a) Out of band emissions. 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).

§ 24.238 Emission limitations for Broadband PCS equipment: The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

§ 24.238 (a) Out of band emissions. 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).

