

Certification Test Report

FCC ID: S04YX300-PCS-CEL
IC: 5544A-YX300PCSCEL

FCC Rule Part: CFR 47 Part 22 Subpart H, Part 24 Subpart E
IC Radio Standards Specification: RSS-131

ACS Report Number: 07-0256-LD

Applicant: Wireless Extenders Inc.
Model(s): YX300-PCS-CEL


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FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612


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This report contains **25** pages

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Additional Exhibits Included In Filing

Internal Photographs

Test Setup Photographs

RF Exposure – MPE Calculations

Theory of Operation

System Block Diagram

Schematics

External Photographs

Product Labeling

Installation/Users Guide

Parts List

Tune-up Procedure

1.0 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 24 Subpart E and Part 22 Subpart H of the FCC's Code of Federal Regulations and RSS-131 of Industry Canada's Radio Standards Specifications.

1.2 Product Description

1.2.1 General

The YX300 is a Smart Bi-Directional Amplifier (SBDA) system which captures the signal arriving outside a consumer's home and amplifies it inside the home, as well as capturing the signal from the user's phone and amplifying it to the outdoor network. Wireless Extenders designed the YX300 to meet BOTH the needs of the wireless carrier and the wireless consumer.

The YX300 handles all applicable air-interface protocols including AMPS, TDMA, GSM, and CDMA by amplifying the entire Cellular and PCS frequency bands. It includes multiple patent pending technologies to prevent interference to the network. The combination of low gain and low Noise Floor means that it will not raise the networks Base Transmit Station's (BTS) Noise Floor. The YX300 has a signal delay similar to multi-path signals making it transparent to the wireless network. Additionally, the YX300 is intelligent and continually monitors signal levels and adapts the automatic level control as the network changes so that it does not interfere with the BTS' uplink power control.

The YX300 contains two separate transmit antennas. The Uplink antenna is an Internal PCB Inverted F Type antenna with 5dBi gain at the PCS frequencies and 2dBi gain at Cellular. The Downlink antenna is an external Omni Dipole with 2dBi gain at both PCS and Cellular.

Manufacturer Information:

Wi-Ex
One Meca Way
Norcross, GA 30093

Detailed photographs of the EUT are filed separately with this filing.

1.3 Test Methodology and Considerations

The EUT was configured and tested utilizing the maximum input drive level resulting in maximum gain conditions for all tests. If the maximum input drive level is exceeded, internal attenuators are activated to produce a level RF output and eliminate the device from operating beyond the maximum RF output power that is below the saturated RF output power.

For intentional radiated emissions the RF output port was configured with a 50 Ohm non-radiating load. For unintentional radiated emissions and AC power line conducted emissions measurements the EUT was configured with the representative antennas attached.

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 89450

Industry Canada Lab Code: IC 4175

VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612-0

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

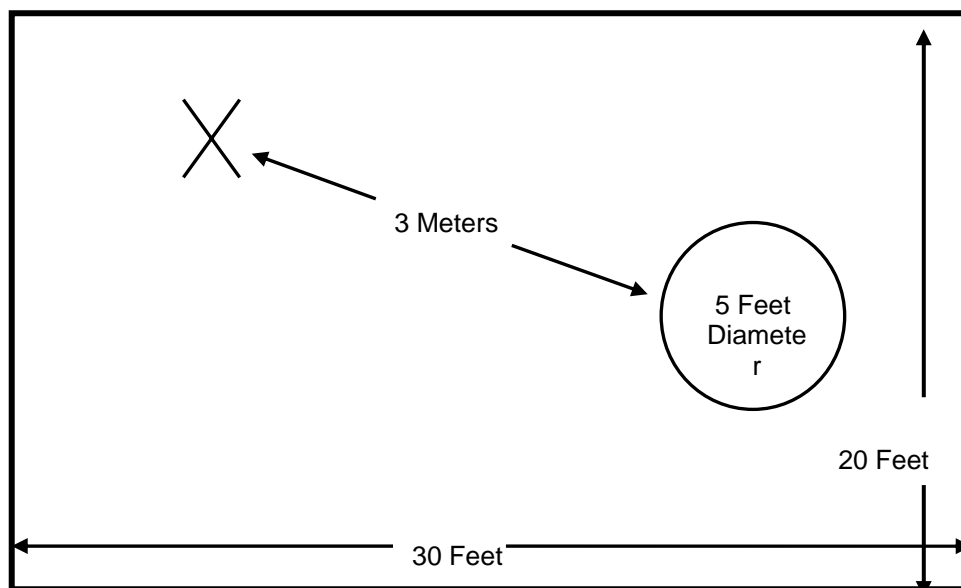


Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style reinforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

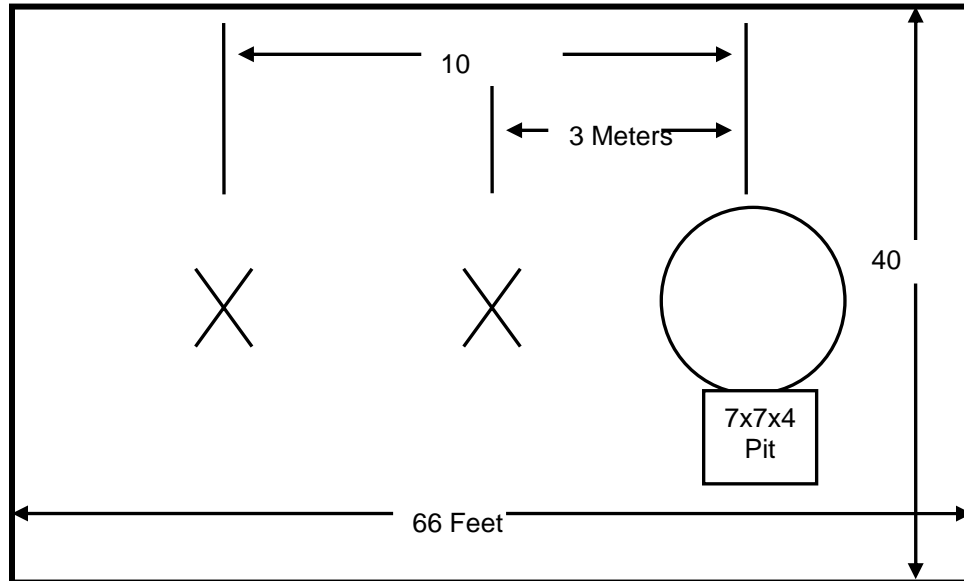


Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal ground reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

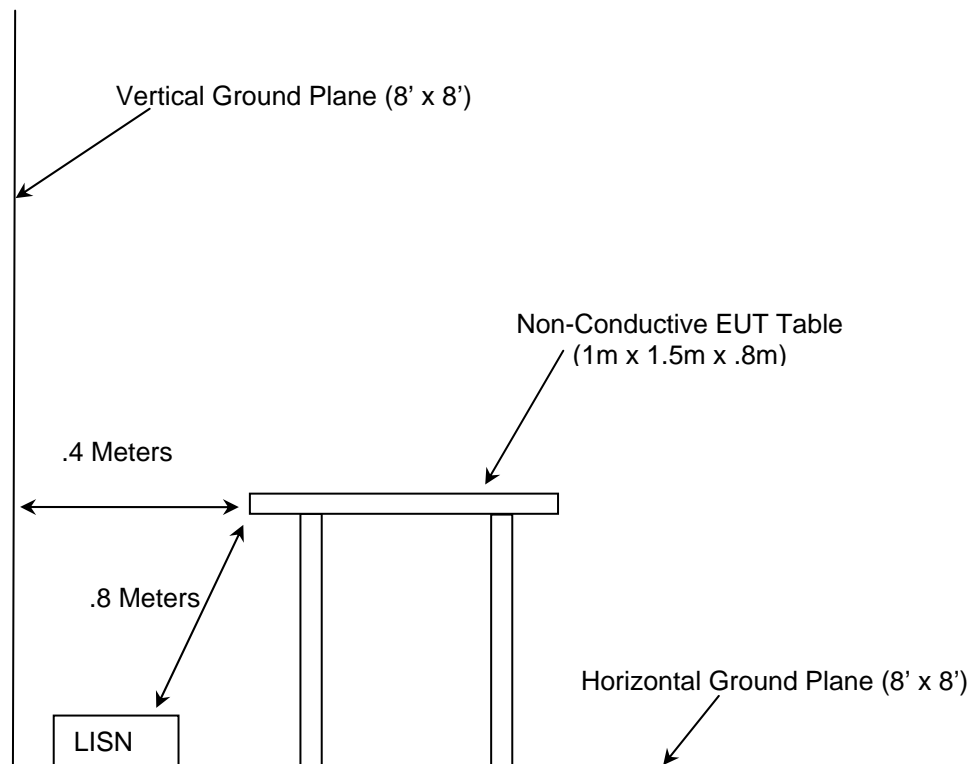


Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- 1 - ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- 2 - US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures (October 2006)
- 3 - US Code of Federal Regulations (CFR): Title 47, Part 24, Subpart E: Broadband PCS (October 2006)
- 4 - US Code of Federal Regulations (CFR): Title 47, Part 22, Subpart H: Cellular Radiotelephone Service (October 2006)
- 5 - Industry Canada Radio Standards Specification: RSS-131: Zone Enhancers for the Land Mobile Service (July 2003)

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4-1: Test Equipment

Equipment Calibration Information					
ACS#	Mfg.	Eq. type	Model	S/N	Cal. Due
<input checked="" type="checkbox"/> 152	EMCO	LISN	3825/2	9111-1905	2/16/08
<input checked="" type="checkbox"/> 168	Hewlett Packard	Pulse Limiter	11947A	3107A02268	3/13/08
<input checked="" type="checkbox"/> 167	ACS	Chamber EMI Cable Set	RG6	167	1/5/08
<input checked="" type="checkbox"/> 16	ACS	Conducted Emission Cable	Cable	16	5/21/08
<input checked="" type="checkbox"/> 25	Chase	Bi-Log Antenna	CBL6111	1043	6/6/08
<input checked="" type="checkbox"/> 041	ElectroMetrics	Bi-Con Antenna	BIA-25	2925	5/29/08
<input checked="" type="checkbox"/> 090	ElectroMetrics	LPA Antenna	LPA-25	1476	5/23/08
<input checked="" type="checkbox"/> 22	Agilent	Pre-Amplifier	8449B	3008A00526	4/10/08
<input checked="" type="checkbox"/> 73	Agilent	Pre-Amplifier	8447D	272A05624	5/9/08
<input checked="" type="checkbox"/> 30	Spectrum Technologies	Horn Antenna	DRH-0118	970102	5/10/08
<input checked="" type="checkbox"/> 329	A.H.Systems	Horn Antenna	SAS-571	721	8/24/2007
<input checked="" type="checkbox"/> 282	Microwave Circuits	High Pass Filter	H3G020G4	74541 DC0608	3/5/08
<input checked="" type="checkbox"/> 1	Rohde & Schwarz	Receiver Display	804.8932.52	833771/007	3/5/08
<input checked="" type="checkbox"/> 2	Rohde & Schwarz	ESMI Receiver	1032.5640.53	839587/003	3/5/08
<input checked="" type="checkbox"/> 3	Rohde & Schwarz	Receiver Display	804.8932.52	839379/011	10/24/07
<input checked="" type="checkbox"/> 4	Rohde & Schwarz	ESMI Receiver	1032.5640.53	833827/003	10/24/07
<input checked="" type="checkbox"/> 283	Rohde & Schwarz	Spectrum Analyzer	FSP-40	1000033	11/9/08
<input checked="" type="checkbox"/> 290	Florida RF Labs	HF RF Cable	SMSE-200-72.0-SMRE	NA	5/15/08
<input checked="" type="checkbox"/> 291	Florida RF Labs	HF RF Cable	SMRE-200W-12.0-SMRE	NA	5/15/08
<input checked="" type="checkbox"/> 292	Florida RF Labs	HF RF Cable	SMR-280AW-480.0-SMR	NA	5/24/08
<input checked="" type="checkbox"/> N/A	Gigatronics	Signal Generator	1018	315110	4/16/08
<input checked="" type="checkbox"/> 340	Aeroflex/Weinschel	10 dB Attenuator	AS-20	7136	8/29/07
<input checked="" type="checkbox"/> NA	Termaline	Coaxial Resistor 50W	8085	13328	N/A
<input checked="" type="checkbox"/> N/A	Termaline	Coaxial Resistor 100W	8164	7655	N/A
<input checked="" type="checkbox"/> N/A	Agilent	Signal Generator	E4437B	MY41000179	08/14/08

5.0 SUPPORT EQUIPMENT AND ACCESSORIES

Table 5-1: Support Equipment and Accessories

Diagram #	Manufacturer	Equipment Type	Model Number	Serial Number	FCC ID
1	N/A	Power Supply	N/A	N/A	N/A
2	Agilent	Signal Generator	E4437B	MY41000179	N/A

6.0 EQUIPMENT UNDER TEST SETUP AND BLOCK DIAGRAM

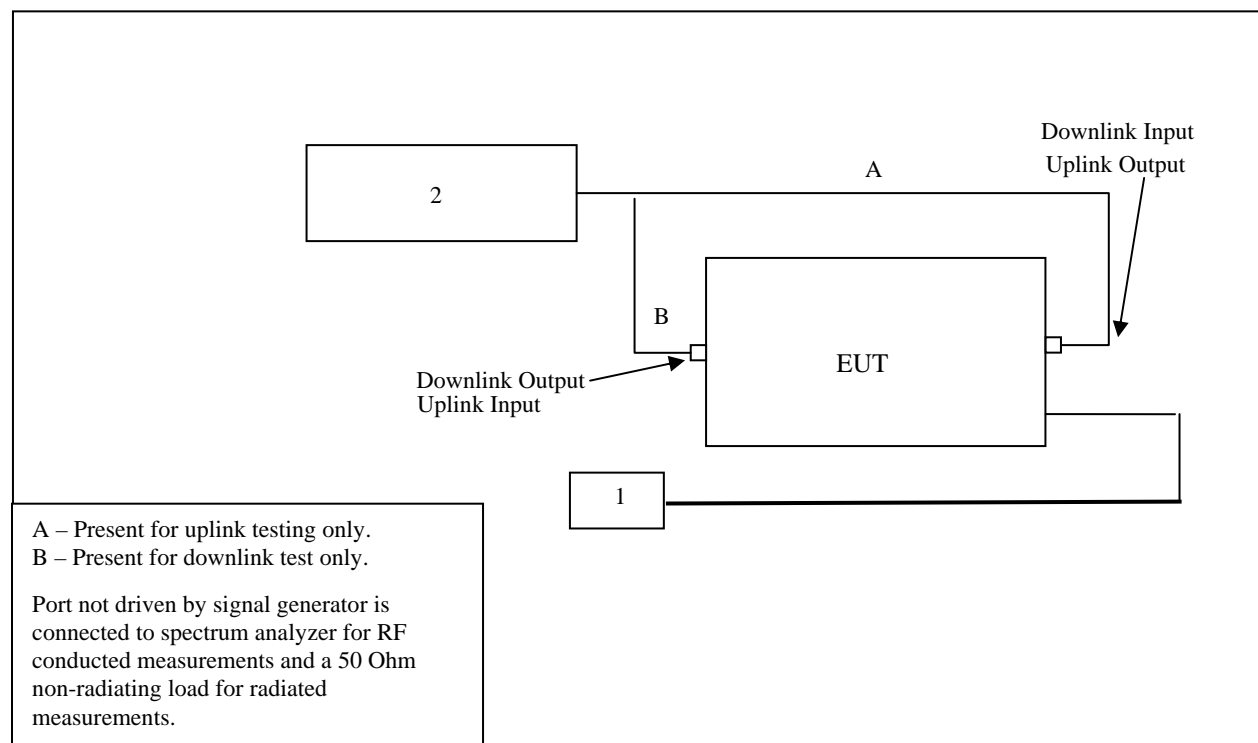


Figure 6-1: EUT Test Setup

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document. Data plots can be found in the test report appendix 07-0256-LD-24E (for PCS results) and 07-0256-LD-22H (for Cellular results).

7.1 RF Power Output

7.1.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The resolution and video bandwidths of the spectrum analyzer were set at sufficient levels, >> emission bandwidth, to produce accurate results. Results for PCS and Cellular uplink and downlink configurations are shown below in Table 7.1-1 and Table 7.1-2.

7.1.2 Measurement Results

7.1.2.1 PCS Results

Table 7.1-1: PCS Output Power

Configuration	Modulation	Channel	Frequency (MHz)	RF Power Output (dBm)
Uplink	CDMA	Low	1851.25	13.34
Uplink	CDMA	Middle	1880	13.49
Uplink	CDMA	High	1908.75	10.94
Uplink	TDMA	Low	1850.04	17.16
Uplink	TDMA	Middle	1879.98	16.65
Uplink	TDMA	High	1909.97	14.05
Uplink	GSM	Low	1850.2	20.44
Uplink	GSM	Middle	1880	20.25
Uplink	GSM	High	1909.8	17.39
Downlink	CDMA	Low	1931.25	8.34
Downlink	CDMA	Middle	1960	9.80
Downlink	CDMA	High	1988.75	10.42
Downlink	TDMA	Low	1930.04	8.62
Downlink	TDMA	Middle	1959.98	11.07
Downlink	TDMA	High	1989.97	11.37
Downlink	GSM	Low	1930.2	8.26
Downlink	GSM	Middle	1960	10.30
Downlink	GSM	High	1989.8	11.08

7.2.1.2 Cellular Results

Table 7.1-2: Cellular Output Power

Configuration	Modulation	Channel	Frequency (MHz)	RF Power Output (dBm)
Uplink	CDMA	Low	824.7	13.67
Uplink	CDMA	Middle	836.52	13.03
Uplink	CDMA	High	848.31	13.45
Uplink	TDMA	Low	824.04	17.20
Uplink	TDMA	Middle	836.52	16.43
Uplink	TDMA	High	848.97	17.53
Uplink	GSM	Low	824.2	20.34
Uplink	GSM	Middle	836.6	19.63
Uplink	GSM	High	848.8	20.67
Downlink	CDMA	Low	869.7	6.35
Downlink	CDMA	Middle	881.52	6.71
Downlink	CDMA	High	893.31	6.96
Downlink	TDMA	Low	869.04	6.57
Downlink	TDMA	Middle	881.52	6.46
Downlink	TDMA	High	893.97	6.38
Downlink	GSM	Low	869.2	6.93
Downlink	GSM	Middle	881.6	7.19
Downlink	GSM	High	893.8	7.41

7.2 Occupied Bandwidth (Emission Limits)

7.2.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The spectrum analyzer resolution and video bandwidths were set to 1% of the emission bandwidth. The analyzer was set for Max Hold using a peak detector. Both the input and output bandwidths were evaluated to show similar characteristics of the emissions. Results for PCS and Cellular uplink and downlink configurations are shown below in Table 7.2-1 and 7.2-2.

7.2.2 Measurement Results

7.2.2.1 PCS Results

Occupied bandwidth plots are listed below and are supplied in the test report appendix 07-0256-LD-24E.

Table 7.2-1: PCS Occupied Bandwidth

Configuration	Modulation	Channel	Frequency (MHz)	Plot Reference
Uplink	CDMA	Low	1851.25	Figure 1.
Uplink	CDMA	Middle	1880.00	Figure 2.
Uplink	CDMA	High	1908.75	Figure 3.
Uplink	TDMA	Low	1850.04	Figure 4.
Uplink	TDMA	Middle	1879.98	Figure 5.
Uplink	TDMA	High	1909.97	Figure 6.
Uplink	GSM	Low	1850.20	Figure 7.
Uplink	GSM	Middle	1880.00	Figure 8.
Uplink	GSM	High	1909.80	Figure 9.
Downlink	CDMA	Low	1931.25	Figure 10.
Downlink	CDMA	Middle	1960.00	Figure 11.
Downlink	CDMA	High	1988.75	Figure 12.
Downlink	TDMA	Low	1930.04	Figure 13.
Downlink	TDMA	Middle	1959.98	Figure 14.
Downlink	TDMA	High	1989.97	Figure 15.
Downlink	GSM	Low	1930.20	Figure 16.
Downlink	GSM	Middle	1960.00	Figure 17.
Downlink	GSM	High	1989.80	Figure 18.

7.2.2.2 Cellular Results

Occupied bandwidth plots are listed below and are supplied in the test report appendix 07-0256-LD-22H.

Table 7.2-2: Cellular Occupied Bandwidth

Configuration	Modulation	Channel	Frequency (MHz)	Plot Reference
Uplink	CDMA	Low	824.7	Figure 1.
Uplink	CDMA	Middle	836.52	Figure 2.
Uplink	CDMA	High	848.31	Figure 3.
Uplink	TDMA	Low	824.04	Figure 4.
Uplink	TDMA	Middle	836.52	Figure 5.
Uplink	TDMA	High	848.97	Figure 6.
Uplink	GSM	Low	824.2	Figure 7.
Uplink	GSM	Middle	836.6	Figure 8.
Uplink	GSM	High	848.8	Figure 9.
Downlink	CDMA	Low	869.7	Figure 10.
Downlink	CDMA	Middle	881.52	Figure 11.
Downlink	CDMA	High	893.31	Figure 12.
Downlink	TDMA	Low	869.04	Figure 13.
Downlink	TDMA	Middle	881.52	Figure 14.
Downlink	TDMA	High	893.97	Figure 15.
Downlink	GSM	Low	869.2	Figure 16.
Downlink	GSM	Middle	881.6	Figure 17.
Downlink	GSM	High	893.8	Figure 18.

7.3 Spurious Emissions at Antenna Terminals and Inter-modulation Products

7.3.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. For inter-modulation products the two tone two test method was used with the device operating at maximum drive levels. Two tones were placed at the lower band-edge and upper band-edge. Inter-modulation products were tested using TDMA, CDMA, and CW signals. CW covers FM (GSM and F1D) for inter-modulation products. The spectrum analyzer resolution and video bandwidths were set to 1% the emission bandwidth

For out of band spurious emissions the spectrum analyzer resolution and video bandwidths were set to 1 MHz according to Section 24.238 (b). The spectrum was investigated for the 30 MHz to 20 GHz in accordance to CFR 47 Part 2.1057. The analyzer was set for Max Hold using a peak detector. Spurious emissions were evaluated for all modulation modes.

7.3.2 Measurement Results

7.3.2.1 PCS Results

Emission plots are listed below in Table 7.3-1 and Table 7.3-2 and plots are supplied in the test report appendix 07-0256-LD-24E.

Table 7.3-1: PCS Spurious Emissions - Uplink

Configuration	Modulation	Channel	Frequency Range (MHz)	Plot Reference
Uplink	CDMA	Low	IM - In Band	Figure 19.
Uplink	CDMA	Low	IM - 30 - 2200	Figure 20.
Uplink	CDMA	Low	IM - 2200 - 20000	Figure 21.
Uplink	CDMA	Middle	30 - 2200	Figure 22.
Uplink	CDMA	Middle	2200 - 20000	Figure 23.
Uplink	CDMA	High	IM - In Band	Figure 24.
Uplink	CDMA	High	IM - 30 - 2200	Figure 25.
Uplink	CDMA	High	IM - 2200 - 20000	Figure 26.
Uplink	TDMA	Low	IM - In Band	Figure 27.
Uplink	TDMA	Low	IM - 30 - 2200	Figure 28.
Uplink	TDMA	Low	IM - 2200 - 20000	Figure 29.
Uplink	TDMA	Middle	30 - 2200	Figure 30.
Uplink	TDMA	Middle	2200 - 20000	Figure 31.
Uplink	TDMA	High	IM - In Band	Figure 32.
Uplink	TDMA	High	IM - 30 - 2200	Figure 33.
Uplink	TDMA	High	IM - 2200 - 20000	Figure 34.
Uplink	CW	Low	IM - In Band	Figure 35.
Uplink	CW	Low	IM - 30 - 2200	Figure 36.
Uplink	CW	Low	IM - 2200 - 20000	Figure 37.
Uplink	CW	High	IM - In Band	Figure 38.
Uplink	CW	High	IM - 30 - 2200	Figure 39.
Uplink	CW	High	IM - 2200 - 20000	Figure 40.
Uplink	GSM	Low	30 - 2200	Figure 41.
Uplink	GSM	Low	2200 - 20000	Figure 42.
Uplink	GSM	Middle	30 - 2200	Figure 43.
Uplink	GSM	Middle	2200 - 20000	Figure 44.
Uplink	GSM	High	30 - 2200	Figure 45.
Uplink	GSM	High	2200 - 20000	Figure 46.

Table 7.3-2: PCS Spurious Emissions - Downlink

Configuration	Modulation	Channel	Frequency Range (MHz)	Plot Reference
Downlink	CDMA	Low	IM - In Band	Figure 47.
Downlink	CDMA	Low	IM - 30 - 2200	Figure 48.
Downlink	CDMA	Low	IM - 2200 - 20000	Figure 49.
Downlink	CDMA	Middle	30 - 2200	Figure 50.
Downlink	CDMA	Middle	2200 - 20000	Figure 51.
Downlink	CDMA	High	IM - In Band	Figure 52.
Downlink	CDMA	High	IM - 30 - 2200	Figure 53.
Downlink	CDMA	High	IM - 2200 - 20000	Figure 54.
Downlink	TDMA	Low	IM - In Band	Figure 55.
Downlink	TDMA	Low	IM - 30 - 2200	Figure 56.
Downlink	TDMA	Low	IM - 2200 - 20000	Figure 57.
Downlink	TDMA	Middle	30 - 2200	Figure 58.
Downlink	TDMA	Middle	2200 - 20000	Figure 59.
Downlink	TDMA	High	IM - In Band	Figure 60.
Downlink	TDMA	High	IM - 30 - 2200	Figure 61.
Downlink	TDMA	High	IM - 2200 - 20000	Figure 62.
Downlink	CW	Low	IM - In Band	Figure 63.
Downlink	CW	Low	IM - 30 - 2200	Figure 64.
Downlink	CW	Low	IM - 2200 - 20000	Figure 65.
Downlink	CW	High	IM - In Band	Figure 66.
Downlink	CW	High	IM - 30 - 2200	Figure 67.
Downlink	CW	High	IM - 2200 - 20000	Figure 68.
Downlink	GSM	Low	30 - 2200	Figure 69.
Downlink	GSM	Low	2200 - 20000	Figure 70.
Downlink	GSM	Middle	30 - 2200	Figure 71.
Downlink	GSM	Middle	2200 - 20000	Figure 72.
Downlink	GSM	High	30 - 2200	Figure 73.
Downlink	GSM	High	2200 - 20000	Figure 74.

7.3.2.2 Cellular Results

Emission plots are listed below in Table 7.3-3 and Table 7.3-4 and plots are supplied in the test report appendix 07-0256-LD-22H.

Table 7.3-3: Cellular Spurious Emissions - Uplink

Configuration	Modulation	Channel	Frequency Range (MHz)	Plot Reference
Uplink	CDMA	Low	IM - In Band	Figure 19.
Uplink	CDMA	Low	IM - 30 - 1000	Figure 20.
Uplink	CDMA	Low	IM - 1000 - 10000	Figure 21.
Uplink	CDMA	Middle	30 - 1000	Figure 22.
Uplink	CDMA	Middle	1000 - 10000	Figure 23.
Uplink	CDMA	High	IM - In Band	Figure 24.
Uplink	CDMA	High	IM - 30 - 1000	Figure 25.
Uplink	CDMA	High	IM - 1000 - 10000	Figure 26.
Uplink	TDMA	Low	IM - In Band	Figure 27.
Uplink	TDMA	Low	IM - 30 - 1000	Figure 28.
Uplink	TDMA	Low	IM - 1000 - 10000	Figure 29.
Uplink	TDMA	Middle	30 - 1000	Figure 30.
Uplink	TDMA	Middle	1000 - 10000	Figure 31.
Uplink	TDMA	High	IM - In Band	Figure 32.
Uplink	TDMA	High	IM - 30 - 1000	Figure 33.
Uplink	TDMA	High	IM - 1000 - 10000	Figure 34.
Uplink	CW	Low	IM - In Band	Figure 35.
Uplink	CW	Low	IM - 30 - 1000	Figure 36.
Uplink	CW	Low	IM - 1000 - 10000	Figure 37.
Uplink	CW	High	IM - In Band	Figure 38.
Uplink	CW	High	IM - 30 - 1000	Figure 39.
Uplink	CW	High	IM - 1000 - 10000	Figure 40.
Uplink	GSM	Low	30 - 1000	Figure 41.
Uplink	GSM	Low	1000 - 10000	Figure 42.
Uplink	GSM	Middle	30 - 1000	Figure 43.
Uplink	GSM	Middle	1000 - 10000	Figure 44.
Uplink	GSM	High	30 - 1000	Figure 45.
Uplink	GSM	High	1000 - 10000	Figure 46.

Table 7.3-4: Cellular Spurious Emissions - Downlink

Configuration	Modulation	Channel	Frequency Range (MHz)	Plot Reference
Downlink	CDMA	Low	IM - In Band	Figure 47.
Downlink	CDMA	Low	IM - 30 - 1000	Figure 48.
Downlink	CDMA	Low	IM - 1000 - 10000	Figure 49.
Downlink	CDMA	Middle	30 – 1000	Figure 50.
Downlink	CDMA	Middle	1000 - 10000	Figure 51.
Downlink	CDMA	High	IM - In Band	Figure 52.
Downlink	CDMA	High	IM - 30 - 1000	Figure 53.
Downlink	CDMA	High	IM - 1000 - 10000	Figure 54.
Downlink	TDMA	Low	IM - In Band	Figure 55.
Downlink	TDMA	Low	IM - 30 - 1000	Figure 56.
Downlink	TDMA	Low	IM - 1000 - 10000	Figure 57.
Downlink	TDMA	Middle	30 – 1000	Figure 58.
Downlink	TDMA	Middle	1000 - 10000	Figure 59.
Downlink	TDMA	High	IM - In Band	Figure 60.
Downlink	TDMA	High	IM - 30 - 1000	Figure 61.
Downlink	TDMA	High	IM - 1000 - 10000	Figure 62.
Downlink	CW	Low	IM - In Band	Figure 63.
Downlink	CW	Low	IM - 30 - 1000	Figure 64.
Downlink	CW	Low	IM - 1000 - 10000	Figure 65.
Downlink	CW	High	IM - In Band	Figure 66.
Downlink	CW	High	IM - 30 - 1000	Figure 67.
Downlink	CW	High	IM - 1000 - 10000	Figure 68.
Downlink	GSM	Low	30 – 1000	Figure 69.
Downlink	GSM	Low	1000 - 10000	Figure 70.
Downlink	GSM	Middle	30 – 1000	Figure 71.
Downlink	GSM	Middle	1000 - 10000	Figure 72.
Downlink	GSM	High	30 – 1000	Figure 73.
Downlink	GSM	High	1000 - 10000	Figure 74.

7.4 Band-edge Compliance

7.4.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The spectrum analyzer resolution and video bandwidths were set to 1% the emission bandwidth. The analyzer was set for Max Hold using a peak detector. The center frequency was set to both the upper and lower cellular frequency block edges. Band-edge compliance was evaluated for all modulation modes.

7.4.2 Measurement Results

7.4.2.1 PCS Results

Band-edge plots in are listed in Table 7.4-1 below and are supplied in the test report appendix 07-0256-LD-24E.

Table 7.4-1: PCS Band-edge

Configuration	Modulation	Channel	Frequency (MHz)	Plot Reference
Uplink	CDMA	Low	1851.25	Figure 75.
Uplink	CDMA	High	1908.75	Figure 76.
Uplink	TDMA	Low	1850.04	Figure 77.
Uplink	TDMA	High	1909.97	Figure 78.
Uplink	GSM	Low	1850.20	Figure 79.
Uplink	GSM	High	1909.80	Figure 80.
Downlink	CDMA	Low	1931.25	Figure 81.
Downlink	CDMA	High	1988.75	Figure 82.
Downlink	TDMA	Low	1930.04	Figure 83.
Downlink	TDMA	High	1989.97	Figure 84.
Downlink	GSM	Low	1930.20	Figure 85.
Downlink	GSM	High	1989.80	Figure 86.

7.4.2.2 Cellular Results

Band-edge plots in are listed in Table 7.4-2 below and are supplied in the test report appendix 07-0256-LD-22H.

Table 7.4-2: Cellular Band-edge

Configuration	Modulation	Channel	Frequency (MHz)	Plot Reference
Uplink	CDMA	Low	824.7	Figure 75.
Uplink	CDMA	High	848.31	Figure 76.
Uplink	TDMA	Low	824.04	Figure 77.
Uplink	TDMA	High	848.97	Figure 78.
Uplink	GSM	Low	824.2	Figure 79.
Uplink	GSM	High	848.8	Figure 80.
Downlink	CDMA	Low	869.7	Figure 81.
Downlink	CDMA	High	893.31	Figure 82.
Downlink	TDMA	Low	869.04	Figure 83.
Downlink	TDMA	High	893.97	Figure 84.
Downlink	GSM	Low	869.2	Figure 85.
Downlink	GSM	High	893.8	Figure 86.

7.5 Field Strength of Spurious Emissions

7.5.1 Measurement Procedure

The equipment under test is placed on the Open Area Test Site (described in section 2.1) on a wooden table at the turntable center. For each spurious emission, the antenna mast is raised and lowered from one (1) to four (4) meters and the turntable is rotated 360° and the maximum reading on the spectrum analyzer is recorded. This repeated for both horizontal and vertical polarizations of the receive antenna.

The equipment under test is then replaced with a substitution antenna fed by a signal generator. The signal generator's frequency is set to that of the spurious emission recorded from the equipment under test. The antenna mast is raised and lowered from one (1) to four (4) meters to obtain a maximum reading on the spectrum analyzer. The output of the signal generator is then adjusted until the reading on the spectrum analyzer matches that obtained from the equipment under test. The signal generator level is recorded.

The power in dBm of each spurious emission is calculated by correcting the signal generator level for the cable loss and gain of the substitution antenna referenced to a dipole. The spectrum was investigated in accordance to CFR 47 Part 2.1057. A CW was used for both uplink and downlink for low, middle and high channels. The worst case emissions are reported of both uplink and downlink configurations. All emissions not reported were below the noise floor of the measurement equipment.

Results of the test are shown below in Table 7.5-1 to 7.5-4.

7.5.2 Measurement Results

7.5.2.1 PCS Uplink Results

Table 7.5-1: PCS Uplink Field Strength of Spurious Emissions

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
Low Channel Uplink							
3700.08	-58.17	-58.52	H	6.69	-51.83	-13.00	38.83
3700.08	-56.48	-58.28	V	6.65	-51.63	-13.00	38.63
5550.12	-54.12	-52.27	H	6.85	-45.42	-13.00	32.42
5550.12	-56.17	-53.52	V	6.76	-46.76	-13.00	33.76
7400.16	-51.54	-43.37	H	5.92	-37.45	-13.00	24.45
7400.16	-50.36	-43.12	V	6.02	-37.10	-13.00	24.10
Mid Channel Uplink							
3759.96	-56.14	-57.07	H	6.61	-50.46	-13.00	37.46
3759.96	-56.08	-58	V	6.56	-51.44	-13.00	38.44
5639.94	-57.15	-51.25	H	6.83	-44.42	-13.00	31.42
5639.94	-57.84	-53.53	V	6.76	-46.77	-13.00	33.77
7519.92	-54.97	-45.73	H	5.97	-39.76	-13.00	26.76
7519.92	-54.84	-46.94	V	6.07	-40.87	-13.00	27.87
High Channel Uplink							
3819.94	-56.57	-56.60	H	6.53	-50.07	-13.00	37.07
3819.94	-56.57	-58.79	V	6.47	-52.32	-13.00	39.32
5729.91	-56.13	-51	H	6.81	-44.19	-13.00	31.19
5729.91	-58.92	-55.47	V	6.76	-48.71	-13.00	35.71
7639.88	-55.83	-45.47	H	6.04	-39.43	-13.00	26.43
7639.88	-55.1	-46	V	6.11	-39.89	-13.00	26.89

Note: All other emissions were below the noise floor of the measurement equipment.

7.5.2.2 PCS Downlink Results

Table 7.5.-2: PCS Downlink Field Strength of Spurious Emissions

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
Low Channel Downlink							
3860.08	-59.60	-57.73	H	6.48	-51.25	-13.00	38.25
3860.08	-58.24	-59	V	6.41	-52.59	-13.00	39.59
Mid Channel Downlink							
3919.96	-54.93	-51.28	H	6.40	-44.88	-13.00	31.88
3919.96	-55.77	-54	V	6.32	-47.68	-13.00	34.68
High Channel Downlink							
3979.94	-56.71	-56.51	H	6.32	-50.19	-13.00	37.19
3979.94	-56.86	-54.71	V	6.23	-48.48	-13.00	35.48
5969.91	-55.76	-50.76	H	6.77	-43.99	-13.00	30.99
5969.91	-54.35	-49	V	6.76	-42.24	-13.00	29.24

Note: All other emissions were below the noise floor of the measurement equipment.

7.5.2.3 Cellular Uplink Results

Table 7.5.-3: Cellular Uplink Field Strength of Spurious Emissions

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
Low Channel Uplink							
1648.08	-57.69	-65	H	5.41	-59.59	-13.00	46.59
3296.16	-56.32	-57.31	H	6.52	-50.79	-13.00	37.79
Mid Channel Uplink							
1673.04	-55.96	-63.21	H	5.36	-57.85	-13.00	44.85
2509.56	-57.83	-62.43	H	5.26	-57.17	-13.00	44.17
5855.64	-57.77	-52.87	H	6.79	-46.08	-13.00	33.08
High Channel Uplink							
1697.94	-57.31	-63.93	H	5.31	-58.62	-13.00	45.62
2546.91	-56.11	-60.12	H	5.31	-54.81	-13.00	41.81
3395.88	-57.46	-58.85	H	6.73	-52.12	-13.00	39.12
5942.79	-57.37	-50.98	H	6.77	-44.21	-13.00	31.21

Note: All other emissions were below the noise floor of the measurement equipment.

7.5.2.4 Cellular Downlink Results

Table 7.5.-4: Cellular Downlink Field Strength of Spurious Emissions

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
Low Channel Downlink							
3476.16	-55.02	-57.14	V	6.89	-50.25	-13.00	37.25
4345.2	-49.69	-49.69	H	6.93	-42.76	-13.00	29.76
4345.2	-47.54	-48.55	V	6.76	-41.79	-13.00	28.79
5214.24	-57.75	-43.8	V	6.28	-37.52	-13.00	24.52
6952.32	-53.06	-45.19	H	5.78	-39.41	-13.00	26.41
6952.32	-55.94	-48.8	V	5.89	-42.91	-13.00	29.91
7821.36	-53.24	-43.14	H	6.14	-37.00	-13.00	24.00
Mid Channel Downlink							
3526.08	-53.25	-56.63	H	6.91	-49.72	-13.00	36.72
3526.08	-54.6	-56.13	V	6.91	-49.22	-13.00	36.22
4407.6	-47.98	-47.81	H	7.04	-40.77	-13.00	27.77
4407.6	-46.23	-46.74	V	6.86	-39.88	-13.00	26.88
5289.12	-56.47	-51.29	H	6.59	-44.70	-13.00	31.70
5289.12	-55.54	-52.14	V	6.41	-45.73	-13.00	32.73
6170.64	-55.72	-48.76	H	6.57	-42.19	-13.00	29.19
6170.64	-56.9	-51	V	6.64	-44.36	-13.00	31.36
7052.16	-50.97	-43.59	H	5.76	-37.83	-13.00	24.83
7052.16	-55.38	-48.94	V	5.86	-43.08	-13.00	30.08
7933.68	-53.79	-44	H	6.20	-37.80	-13.00	24.80
High Channel Uplink							
3575.88	-53.91	-55.06	H	6.85	-48.21	-13.00	35.21
3575.88	-56.04	-57.12	V	6.83	-50.29	-13.00	37.29
4469.85	-49.24	-48.12	H	7.15	-40.97	-13.00	27.97
4469.85	-50.47	-49	V	6.96	-42.04	-13.00	29.04
7151.76	-54.55	-46.2	H	5.81	-40.39	-13.00	27.39

Note: All other emissions were below the noise floor of the measurement equipment.

7.6 Frequency Response

7.6.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer. The analyzer was set for Max Hold using a peak detector. Using a signal generator, both the uplink and downlink ports were driven with a CW signal. The frequency of the signal generator was sweep across the entire range of operation. Results of the test are shown below in and Figure 7.6-1 through 7.6-4.

7.6.2 Measurement Results

7.6.2.1 PCS Results

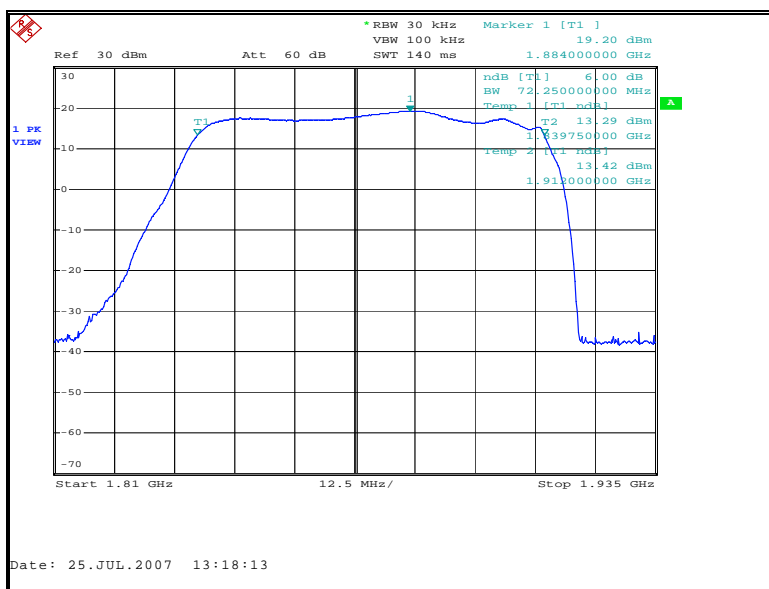


Figure 7.6-1: PCS Frequency Response Uplink

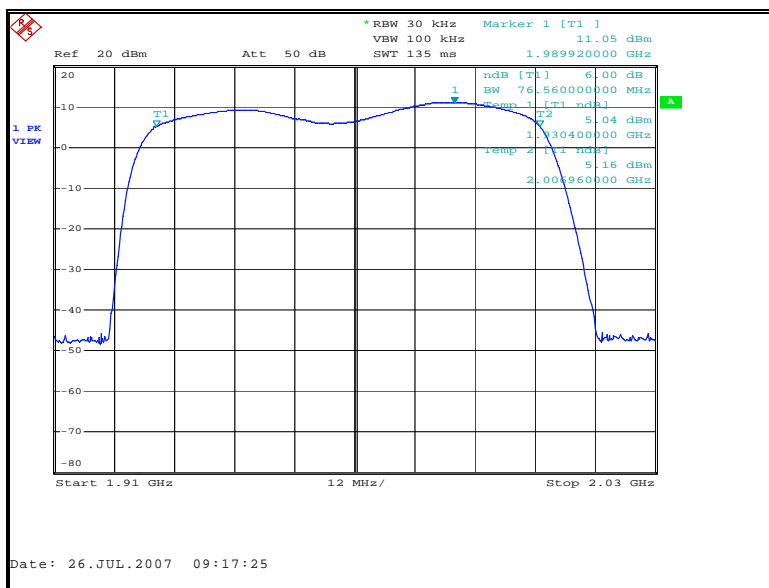


Figure 7.6-2: PCS Frequency Response Downlink

7.6.2.2 Cellular Results

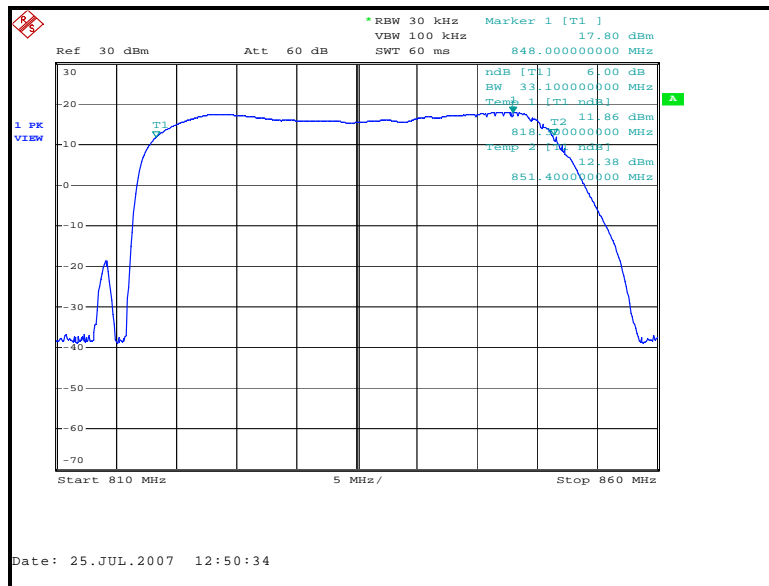


Figure 7.6-3: Cellular Frequency Response Uplink

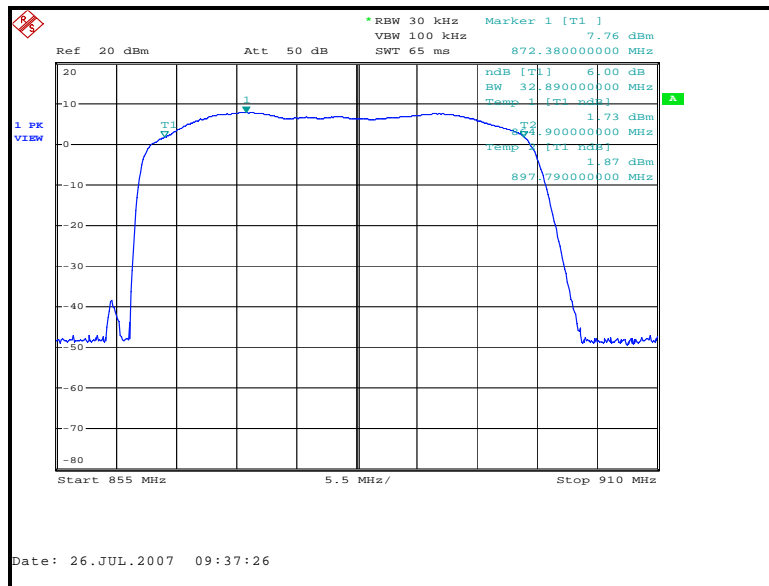


Figure 7.6-4: Cellular Frequency Response Downlink

7.7 Radiated Emissions (Unintentional Radiators) - FCC Section 15.109

7.7.1 Measurement Procedure

The equipment under test is placed on the Open Area Test Site (described in section 2.1) on a wooden table at the turntable center. For each radiated emission, the antenna mast is raised and lowered from one (1) to four (4) meters and the turntable is rotated 360° to obtain a maximum peak reading on the spectrum analyzer. The radiated emissions are then measured using an EMI receiver employing a CISPR quasi-peak detector for frequencies below 1000 MHz and an Average detector function for frequencies above 1000 MHz. This repeated for both horizontal and vertical polarizations of the receive antenna.

The field strength of each radiated emission is calculated by correcting the EMI receiver level for cable loss, amplifier gain, and antenna correction factors.

Field Strength (dBuV/m) = EMI Receiver Level (dBuV) + Cable Loss (dB) – Amplifier Gain (dB) + Antenna Correction Factor (1/m)

Results of the test are shown below in Table 7.7-1.

7.7.2 Measurement Results

Table 7.7-1: Radiated Emissions Tabulated Data

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Position (o)	Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg				pk	Qpk/Avg	pk	Qpk/Avg
58.48		27.20	V	104	316	-----	40.0	-----	12.80
93.36		24.20	V	106	81	-----	43.5	-----	19.30
133.68		25.30	V	106	169	-----	43.5	-----	18.20
135.84		27.10	V	106	169	-----	43.5	-----	16.40
144.96		28.40	V	104	169	-----	43.5	-----	15.10
149.6		27.50	V	104	169	-----	43.5	-----	16.00
150.32		27.20	V	110	169	-----	43.5	-----	16.30
159.36		29.70	V	100	0	-----	43.5	-----	13.80
1001	22.49	12.58	V			74.0	54.0	51.51	41.42
4980	37.37	25.68	V			74.0	54.0	36.63	28.32
8160	40.32	31.04	V			74.0	54.0	33.68	22.96
9590	40.95	31.69	V			74.0	54.0	33.05	22.31

7.8 Power Line Conducted Emissions - FCC Section 15.107

7.8.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss

Margin = Applicable Limit - Corrected Reading

7.8.2 Measurement Results

Results of the test are shown below in and Tables 7.8-1.

Table 7.8-1: Conducted EMI Results

Frequency (MHz)	Uncorrected Reading (dBuV)		Total Correction Factor (dB)	Corrected Level (dBuV)		Limit (dBuV)		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
Line 1									
0.2	31	17.2	9.80	40.80	27.00	63.61	53.61	22.8	26.6
0.3	27.5	16.8	9.80	37.30	26.60	60.24	50.24	22.9	23.6
0.57	23	11.8	9.80	32.80	21.60	56.00	46.00	23.2	24.4
3.45	26.7	11.7	9.80	36.50	21.50	56.00	46.00	19.5	24.5
4.84	28.6	13.2	9.80	38.40	23.00	56.00	46.00	17.6	23.0
7.52	22.8	9.8	9.91	32.71	19.71	60.00	50.00	27.3	30.3
Line 2									
0.29	27.6	11.2	9.80	37.40	21.00	60.52	50.52	23.1	29.5
0.48	25.7	9.3	9.80	35.50	19.10	56.34	46.34	20.8	27.2
0.9	24.4	5.2	9.80	34.20	15.00	56.00	46.00	21.8	31.0
2.74	25	5.7	9.80	34.80	15.50	56.00	46.00	21.2	30.5
4.48	27.6	9.2	9.80	37.40	19.00	56.00	46.00	18.6	27.0
16.61	21	5.3	10.01	31.01	15.31	60.00	50.00	29.0	34.7

END Report