Certification Test Report

FCC ID: SO4YX110
IC: 5544A-YX110

FCC Rule Part: CFR 47 Part 22 Subpart H, Part 24 Subpart E

IC Radio Standards Specification: RSS-131

ACS Report Number: 07-0255-LD

Applicant: Wireless Extenders Inc.
Model: YX110

Test Begin Date: February 8, 2008
Test End Date: February 19, 2008

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FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

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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 YX110 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.

Manufacturer Information:
Wi-Ex
One Meca Way
Norcross, GA 30093

Test Sample Condition:
The EUT was recieved in good working order with no visual defects.

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 the device will cutoff.

For unintentional radiated emissions measurements the EUT was configured with one port loaded with a 50 Ohm non-radiating load and the other port loaded with a representative antenna. Both ports could not be loaded with representative antennas within the test environment due to the isolation required between antennas and the fact the device would receive and transmit any received signals via the antennas. Both the uplink and downlink ports were evaluated with antennas attached and the worst case provided in this report.

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: 894540
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:

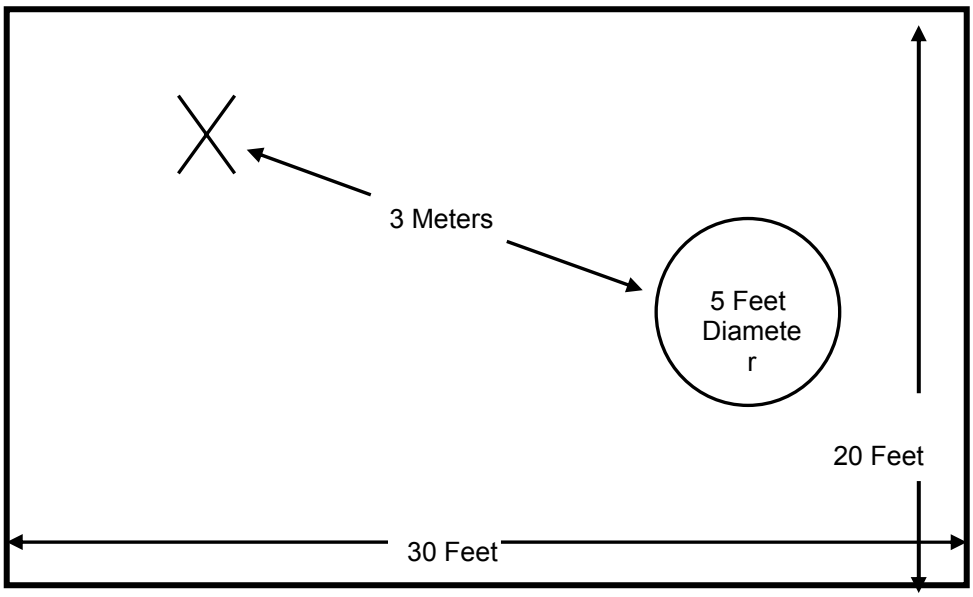

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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 re-enforced 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:

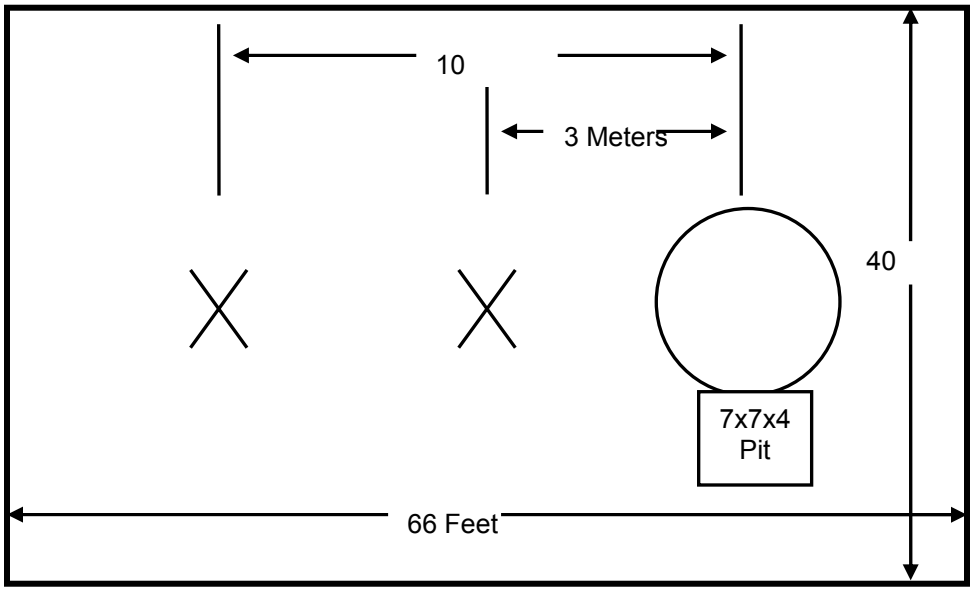

Figure 2.3-2: Open Area Test Site

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 group 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:

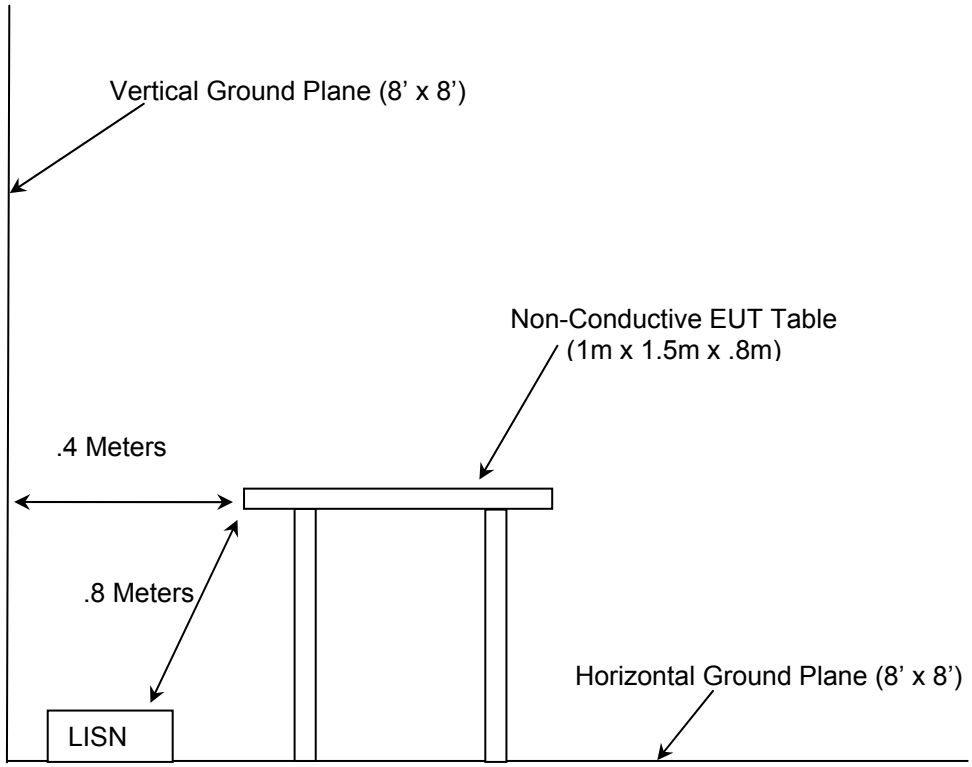

Figure 2.4-1: AC Mains Conducted EMI Site

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 - TIA-603-C: Land Mobile FM or PM - Communications Equipment - Measurement and Performance Standards – (2004)
3 - US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures (October 2007)
4 - US Code of Federal Regulations (CFR): Title 47, Part 24, Subpart E: Broadband PCS (October 2007)
5 - US Code of Federal Regulations (CFR): Title 47, Part 22, Subpart H: Cellular Radiotelephone Service (October 2007)
6 – 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**
NA	Agilent	Signal Generator	E4438C	MY41000179	04-09-2008
NA	Agilent	Signal Generator	E8257D	MY46130821	10-05-2008
1	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	833771/007	10-26-2008
2	Rohde & Schwarz	Spectrum Analyzers	ESMI-Receiver	839587/003	10-26-2008
22	Agilent	Amplifiers	8449B	3008A00526	04-10-2008
25	Chase	Antennas	CBL6111	1043	06-06-2008
30	Spectrum Technologies	Antennas	DRH-0118	970102	05-10-2008
70	Rohde & Schwarz	Spectrum Analyzers	ESH-3	879676/050	10-24-2008
144	Omega	Climate Monitoring Equipment	RH4111	H0103373	11-29-2008
152	EMCO	LISN	Feb-25	9111-1905	02-20-2008
153	EMCO	LISN	Feb-25	9411-2268	11-27-2008
167	ACS	Cables	Cable Set	167	01-04-2009
222	Andrew	Cables	F1-SMSM	473703-A0138A	08-27-2008
282	Microwave Circuits	Filters	H2G020G4	74541	03-09-2008
283	Rohde & Schwarz	Spectrum Analyzers	FSP40	1000033	11-09-2008
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	None	11-21-2008
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	None	11-21-2008
316	Rohde Schwarz	LISN	ESH3-Z5	861189-010	
321	Hewlett Packard	Amplifiers	HPC 8447D	1937A02809	07-17-2008
324	ACS	Cables	Belden	8214	07-10-2008
329	A.H.Systems	Antennas	SAS-571	721	08-13-2008
331	Microwave Circuits	Filters	H1G513G1	31417	03-24-2008
337	Microwave Circuits	Filters	H1G513G1	282706	08-28-2008
338	Hewlett Packard	Amplifiers	8449B	3008A01111	10-24-2008
339	Aeroflex/Weinschel	Attenuators	AS-18	7142	08-20-2008

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
3	Mini-Circuits	Amplifier	ZHL-5W-2G-S	267000716	N/A

.

6.0 EQUIPMENT UNDER TEST SETUP AND BLOCK DIAGRAM

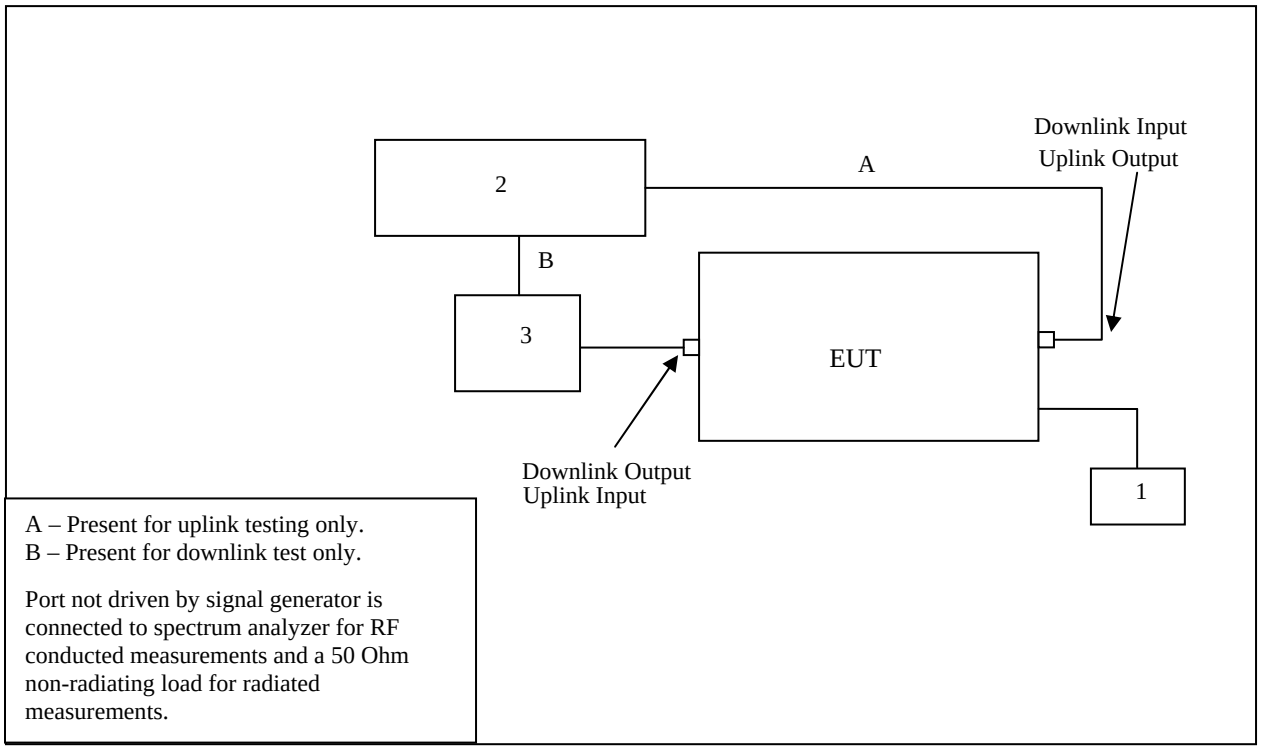

Figure 6-1: EUT Test Setup

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 07-0255-LD-24E (for PCS results) and 07-0255-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 Power Meter. 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 Peak Output Power

Configuration	Modulation	Channel	Frequency (MHz)	RF Power Output (dBm)
Uplink	CDMA	Low	1851.25	25.11
Uplink	CDMA	Middle	1880	25.9
Uplink	CDMA	High	1908.75	22.7
Uplink	TDMA	Low	1850.04	22.6
Uplink	TDMA	Middle	1879.98	21.21
Uplink	TDMA	High	1909.97	18.22
Uplink	GSM	Low	1850.2	20.32
Uplink	GSM	Middle	1880	19.98
Uplink	GSM	High	1909.8	18.04
Downlink	CDMA	Low	1931.25	3.83
Downlink	CDMA	Middle	1960	6.04
Downlink	CDMA	High	1988.75	8.05
Downlink	TDMA	Low	1930.04	3.54
Downlink	TDMA	Middle	1959.98	4.54
Downlink	TDMA	High	1989.97	4.86
Downlink	GSM	Low	1930.2	0.07
Downlink	GSM	Middle	1960	1.78
Downlink	GSM	High	1989.8	2.14

7.2.1.2 Cellular Results

Table 7.1-2: Cellular Peak Output Power

Configuration	Modulation	Channel	Frequency (MHz)	RF Power Output (dBm)
Uplink	CDMA	Low	824.7	21.54
Uplink	CDMA	Middle	836.52	23.90
Uplink	CDMA	High	848.31	22.25
Uplink	TDMA	Low	824.04	17.38
Uplink	TDMA	Middle	836.52	20.20
Uplink	TDMA	High	848.97	19.35
Uplink	GSM	Low	824.2	17.30
Uplink	GSM	Middle	836.6	19.29
Uplink	GSM	High	848.8	19.22
Downlink	CDMA	Low	869.7	8.55
Downlink	CDMA	Middle	881.52	7.85
Downlink	CDMA	High	893.31	8.01
Downlink	TDMA	Low	869.04	6.75
Downlink	TDMA	Middle	881.52	6.92
Downlink	TDMA	High	893.97	6.75
Downlink	GSM	Low	869.2	5.10
Downlink	GSM	Middle	881.6	5.80
Downlink	GSM	High	893.8	5.52

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 Tables 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 07-0255-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 07-0255-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 GSM signals. The spectrum analyzer resolution and video bandwidths were set to 1% the emission bandwidth. In the case of CDMA in-band measurements, a resolution bandwidth of 10kHz was used with an offset of 1dB applied for correction to 12.5kHz.

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 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 07-0255-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	GSM	Low	IM - In Band	Figure 35.
Uplink	GSM	Low	IM 30 - 2200	Figure 36.
Uplink	GSM	Low	IM 2200 - 20000	Figure 37.
Uplink	GSM	Middle	30 - 2200	Figure 38.
Uplink	GSM	Middle	2200 - 20000	Figure 39.
Uplink	GSM	High	IM - In Band	Figure 40.
Uplink	GSM	High	IM 30 - 2200	Figure 41.
Uplink	GSM	High	IM 2200 - 20000	Figure 42.

Table 7.3-2: PCS Spurious Emissions - Downlink

Configuration	Modulation	Channel	Frequency Range (MHz)	Plot Reference
Downlink	CDMA	Low	IM - In Band	Figure 43.
Downlink	CDMA	Low	IM - 30 - 2200	Figure 44.
Downlink	CDMA	Low	IM - 2200 - 20000	Figure 45.
Downlink	CDMA	Middle	30 - 2200	Figure 46.
Downlink	CDMA	Middle	2200 - 20000	Figure 47.
Downlink	CDMA	High	IM - In Band	Figure 48.
Downlink	CDMA	High	IM - 30 - 2200	Figure 49.
Downlink	CDMA	High	IM - 2200 - 20000	Figure 50.
Downlink	TDMA	Low	IM - In Band	Figure 51.
Downlink	TDMA	Low	IM - 30 - 2200	Figure 52.
Downlink	TDMA	Low	IM - 2200 - 20000	Figure 53.
Downlink	TDMA	Middle	30 - 2200	Figure 54.
Downlink	TDMA	Middle	2200 - 20000	Figure 55.
Downlink	TDMA	High	IM - In Band	Figure 56.
Downlink	TDMA	High	IM - 30 - 2200	Figure 57.
Downlink	TDMA	High	IM - 2200 - 20000	Figure 58.
Downlink	GSM	Low	IM - In Band	Figure 59.
Downlink	GSM	Low	IM 30 - 2200	Figure 60.
Downlink	GSM	Low	IM 2200 - 20000	Figure 61.
Downlink	GSM	Middle	30 - 2200	Figure 62.
Downlink	GSM	Middle	2200 - 20000	Figure 63.
Downlink	GSM	High	IM - In Band	Figure 64.
Downlink	GSM	High	IM 30 - 2200	Figure 65.
Downlink	GSM	High	IM 2200 - 20000	Figure 66.

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 07-0255-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	GSM	Low	IM - In Band	Figure 35.
Uplink	GSM	Low	IM 30 – 1000	Figure 36.
Uplink	GSM	Low	IM 1000 - 10000	Figure 37.
Uplink	GSM	Middle	30 – 1000	Figure 38.
Uplink	GSM	Middle	1000 - 10000	Figure 39.
Uplink	GSM	High	IM - In Band	Figure 40.
Uplink	GSM	High	IM 30 – 1000	Figure 41.
Uplink	GSM	High	IM 1000 - 10000	Figure 42.

Table 7.3-4: Cellular Spurious Emissions - Downlink

Configuration	Modulation	Channel	Frequency Range (MHz)	Plot Reference
Downlink	CDMA	Low	IM - In Band	Figure 43.
Downlink	CDMA	Low	IM - 30 - 1000	Figure 44.
Downlink	CDMA	Low	IM - 1000 - 10000	Figure 45.
Downlink	CDMA	Middle	30 – 1000	Figure 46.
Downlink	CDMA	Middle	1000 - 10000	Figure 47.
Downlink	CDMA	High	IM - In Band	Figure 48.
Downlink	CDMA	High	IM - 30 - 1000	Figure 49.
Downlink	CDMA	High	IM - 1000 - 10000	Figure 50.
Downlink	TDMA	Low	IM - In Band	Figure 51.
Downlink	TDMA	Low	IM - 30 - 1000	Figure 52.
Downlink	TDMA	Low	IM - 1000 - 10000	Figure 53.
Downlink	TDMA	Middle	30 – 1000	Figure 54.
Downlink	TDMA	Middle	1000 - 10000	Figure 55.
Downlink	TDMA	High	IM - In Band	Figure 56.
Downlink	TDMA	High	IM - 30 - 1000	Figure 57.
Downlink	TDMA	High	IM - 1000 - 10000	Figure 58.
Downlink	GSM	Low	IM - In Band	Figure 59.
Downlink	GSM	Low	IM 30 – 1000	Figure 60.
Downlink	GSM	Low	IM 1000 - 10000	Figure 61.
Downlink	GSM	Middle	30 – 1000	Figure 62.
Downlink	GSM	Middle	1000 - 10000	Figure 63.
Downlink	GSM	High	IM - In Band	Figure 64.
Downlink	GSM	High	IM 30 – 1000	Figure 65.
Downlink	GSM	High	IM 1000 - 10000	Figure 66.

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. In the case of CDMA in-band measurements, a resolution bandwidth of 10kHz was used with an offset of 1dB applied for correction to 12.5kHz. 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 07-0255-LD-24E.

Table 7.4-1: PCS Band-edge

Configuration	Modulation	Channel	Frequency (MHz)	Plot Reference
Uplink	CDMA	Low	1851.25	Figure 67.
Uplink	CDMA	High	1908.75	Figure 68.
Uplink	TDMA	Low	1850.04	Figure 69.
Uplink	TDMA	High	1909.97	Figure 70.
Uplink	GSM	Low	1850.20	Figure 71.
Uplink	GSM	High	1909.80	Figure 72.
Downlink	CDMA	Low	1931.25	Figure 73.
Downlink	CDMA	High	1988.75	Figure 74.
Downlink	TDMA	Low	1930.04	Figure 75.
Downlink	TDMA	High	1989.97	Figure 76.
Downlink	GSM	Low	1930.20	Figure 77.
Downlink	GSM	High	1989.80	Figure 78.

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 07-0255-LD-22H.

Table 7.4-2: Cellular Band-edge

Configuration	Modulation	Channel	Frequency (MHz)	Plot Reference
Uplink	CDMA	Low	824.7	Figure 67.
Uplink	CDMA	High	848.31	Figure 68.
Uplink	TDMA	Low	824.04	Figure 69.
Uplink	TDMA	High	848.97	Figure 70.
Uplink	GSM	Low	824.2	Figure 71.
Uplink	GSM	High	848.8	Figure 72.
Downlink	CDMA	Low	869.7	Figure 73.
Downlink	CDMA	High	893.31	Figure 74.
Downlink	TDMA	Low	869.04	Figure 75.
Downlink	TDMA	High	893.97	Figure 76.
Downlink	GSM	Low	869.2	Figure 77.
Downlink	GSM	High	893.8	Figure 78.

7.5 Field Strength of Spurious Emissions

7.5.1 Measurement Procedure

The equipment under test is placed in the Semi-Anechoic Chamber Test Site (described in section 2.3) 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 360º 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. 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 7.5-3.

7.5.2 Measurement Results

7.5.2.1 PCS 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	-58.70	-61.00	H	6.69	-54.31	-20.00	34.31
3700.08	-58.52	-60	V	6.65	-53.35	-20.00	33.35
5550.12	-58.22	-56	H	6.85	-49.15	-20.00	29.15
Mid Channel Uplink							
3759.96	-57.66	-57	H	6.61	-50.39	-20.00	30.39
3759.96	-58.01	-58	V	6.56	-51.44	-20.00	31.44
5639.94	-54.99	-47	H	6.83	-40.17	-20.00	20.17
5639.94	-57.4	-52	V	6.76	-45.24	-20.00	25.24
High Channel Uplink							
1791.82	-57.51	-53.00	H	6.89	-46.11	-20.00	26.11
1791.82	-57.2	-57	V	6.76	-50.24	-20.00	30.24
3641.86	-55.81	-47	H	6.82	-40.18	-20.00	20.18
3641.86	-57.65	-51	V	6.92	-44.08	-20.00	24.08
5491.9	-57.98	-51	H	5.28	-45.72	-20.00	25.72
5491.9	-59.53	-56	V	5.14	-50.86	-20.00	30.86
7341.94	-59.1	-53	H	6.21	-46.79	-20.00	26.79
7341.94	-59.86	-55	V	6.29	-48.71	-20.00	28.71

Note: Spurious emissions could only be detected from the Uplink path. All other emissions were below the noise floor of the measurement equipment.

7.5.2.2 Cellular Uplink Results

Table 7.5.-2: 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	-53.57	-53.00	H	5.41	-47.59	-20.00	27.59
1648.08	-55.58	-59	V	5.51	-53.49	-20.00	33.49
2472.12	-58.78	-64	H	5.22	-58.78	-20.00	38.78
2472.12	-58.04	-61	V	5.13	-55.87	-20.00	35.87
Mid Channel Uplink							
1673.04	-48.97	-51	H	5.36	-45.64	-20.00	25.64
1673.04	-51.44	-55	V	5.46	-49.54	-20.00	29.54
2509.56	-58.42	-64	H	5.26	-58.74	-20.00	38.74
2509.56	-57.07	-60	V	5.16	-54.84	-20.00	34.84
High Channel Uplink							
1697.94	-49.1	-51	H	5.31	-45.69	-20.00	25.69
1697.94	-52.86	-56	V	5.41	-50.59	-20.00	30.59
2546.91	-57.2	-60	H	5.31	-54.69	-20.00	34.69
2546.91	-55.83	-56	V	5.21	-50.79	-20.00	30.79

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

7.5.2.3 Cellular Downlink 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)
Mid Channel Uplink							
4407.6	-58.42	-59	V	6.86	-52.14	-20.00	32.14

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, the frequency was swept across the entire range of the EUT operation. The EUT was removed and the signal generator connected directly to the input of the spectrum analyzer. The signal generator was swept across the frequency range of operation to measure gain. 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

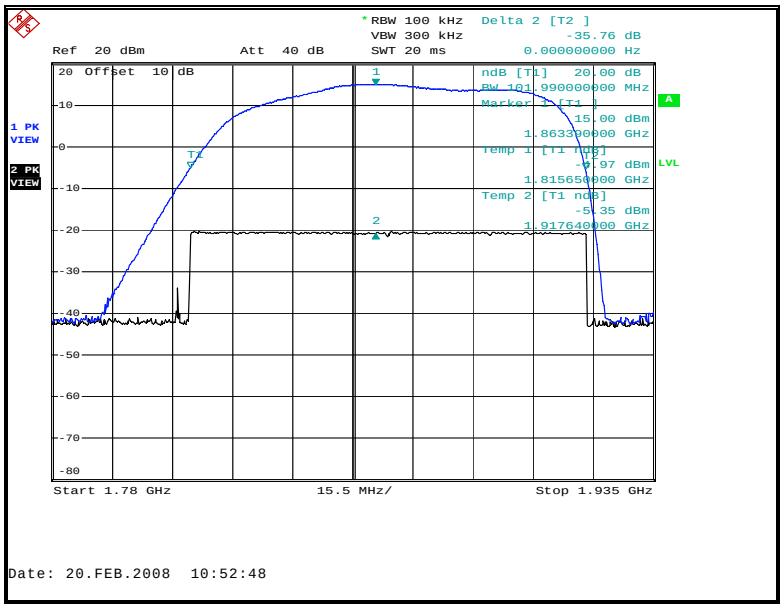

Figure 7.6-1: PCS Frequency Response Uplink

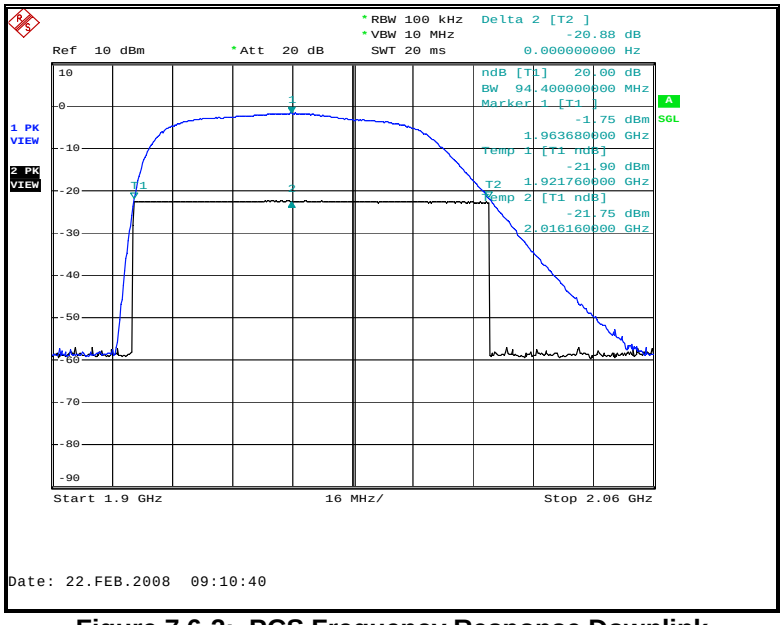

Figure 7.6-2: PCS Frequency Response Downlink

7.6.2.2 Cellular Results

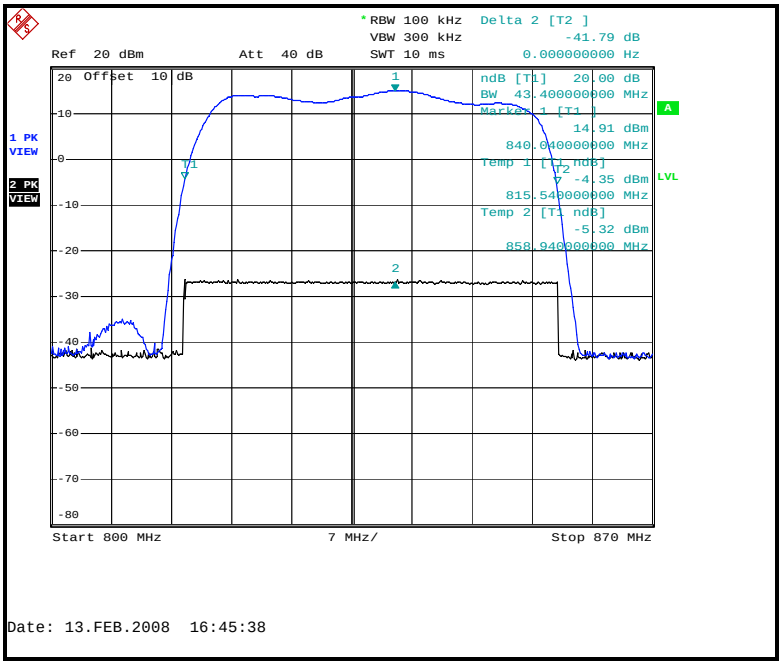

Figure 7.6-3: Cellular Frequency Response Uplink

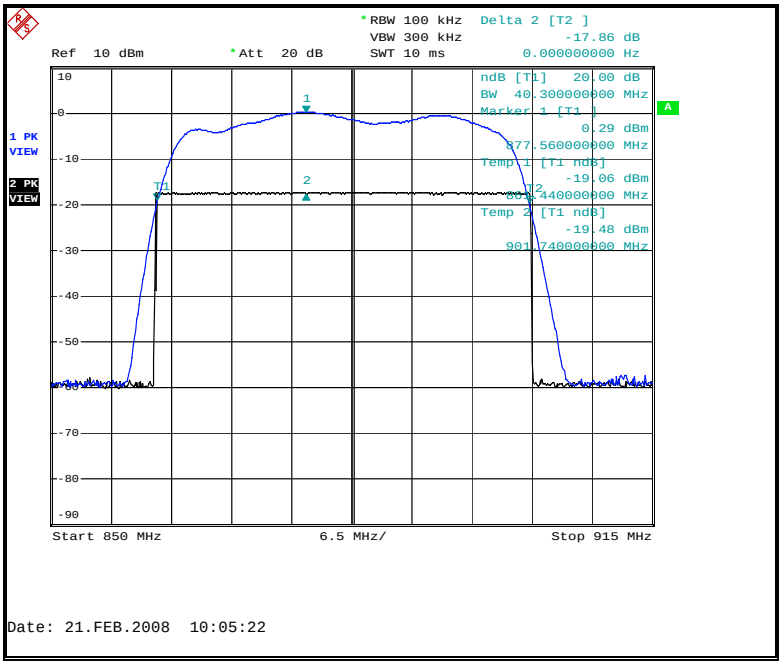

Figure 7.6-4: Cellular Frequency Response Downlink

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 360º 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	Antenna Height	Turntable Position	Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(cm)	(o)	pk	Qpk/Avg	pk	Qpk/Avg
33.46		38.81	V	100	168	--------	40.0	---------	1.19
60.17		25.90	V	100	69	--------	40.0	---------	14.10
60.749		26.79	V	100	78	--------	40.0	---------	13.21
99.807		28.28	V	133	132	--------	43.5	---------	15.22
145.286		25.72	V	100	258	--------	43.5	---------	17.78
160.111		28.30	V	100	164	--------	43.5	---------	15.20
957.966		24.81	V	100	315	--------	46.0	---------	21.19
89.232		22.96	V	119	177	--------	43.5	---------	20.54
175.5		20.26	V	100	352	--------	43.5	---------	23.24
638.857		19.70	V	100	302	--------	46.0	---------	26.30

Note: All other emissions above 957.966 MHz were below the noise floor of the measurement equipment.

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									
0.1966	31.9	19	9.80	41.70	28.80	63.75	53.75	22.1	25.0
1.3875	24.7	9.7	9.80	34.50	19.50	56.00	46.00	21.5	26.5
1.9168	30	14.1	9.80	39.80	23.90	56.00	46.00	16.2	22.1
2.7562	25	7.5	9.80	34.80	17.30	56.00	46.00	21.2	28.7
4.4931	31.9	15.3	9.80	41.70	25.10	56.00	46.00	14.3	20.9
14.4371	27.5	12.7	10.01	37.51	22.71	60.00	50.00	22.5	27.3
Line 2									
0.5	26.3	9.3	9.80	36.10	19.10	56.00	46.00	19.9	26.9
0.8723	25.4	7	9.80	35.20	16.80	56.00	46.00	20.8	29.2
1.9177	20.5	5	9.80	30.30	14.80	56.00	46.00	25.7	31.2
4.2489	21.7	4.8	9.80	31.50	14.60	56.00	46.00	24.5	31.4
4.6776	26.1	9.3	9.80	35.90	19.10	56.00	46.00	20.1	26.9
24.2262	25.7	5.8	10.20	35.90	16.00	60.00	50.00	24.1	34.0

END Report