Excellence in Compliance Testing

Certification Test Report

FCC ID: SO4YX230
IC: 5544A-YX230

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

ACS Report Number: 08-0003-LD

Applicant: Wireless Extenders Inc.
Model: YX230

Test Begin Date: January 4, 2008
Test End Date: January 22, 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
As a Smart Bi-Directional Amplifier (SBDA), the YX230 amplifies both the downlink (tower to phone) signals for both PCS (1930-1990 MHz) and Cellular (869 -894 MHz), and the uplink (phone to tower) signals for both PCS (1851-1910 MHz) and Cellular (824 - 849 MHz). The YX230 is designed for vehicle installation and usage.

The YX230 contains two separate transmit antennas. The Uplink antenna is an omni-directional mag mount dipole antenna with 2.15dBi gain. The Downlink antenna is dipole with 1dBi gain at both PCS and Cellular frequency bands.

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. The device also provides a cut-off feature for when the input power level exceeds the specified maximum drive levels.

For intentional radiated emissions the RF output port was configured with a 50 Ohm non-radiating load.

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:

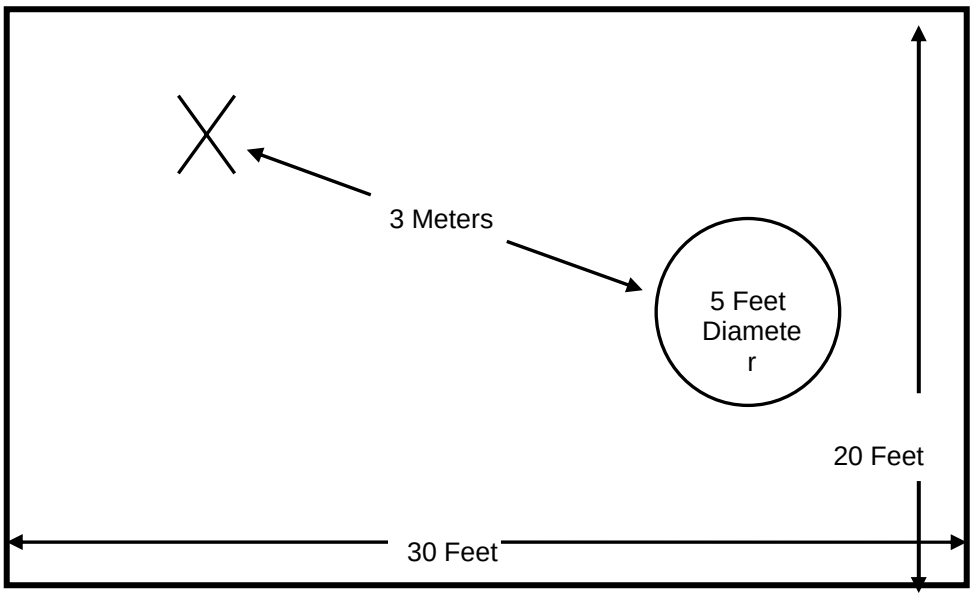

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

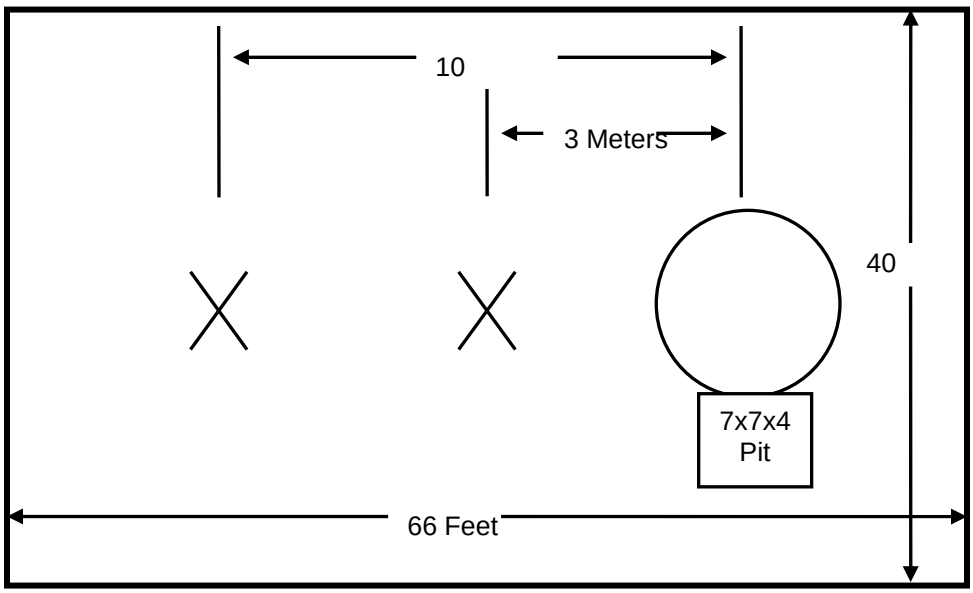

Figure 2.3-2: Open Area Test Site

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:

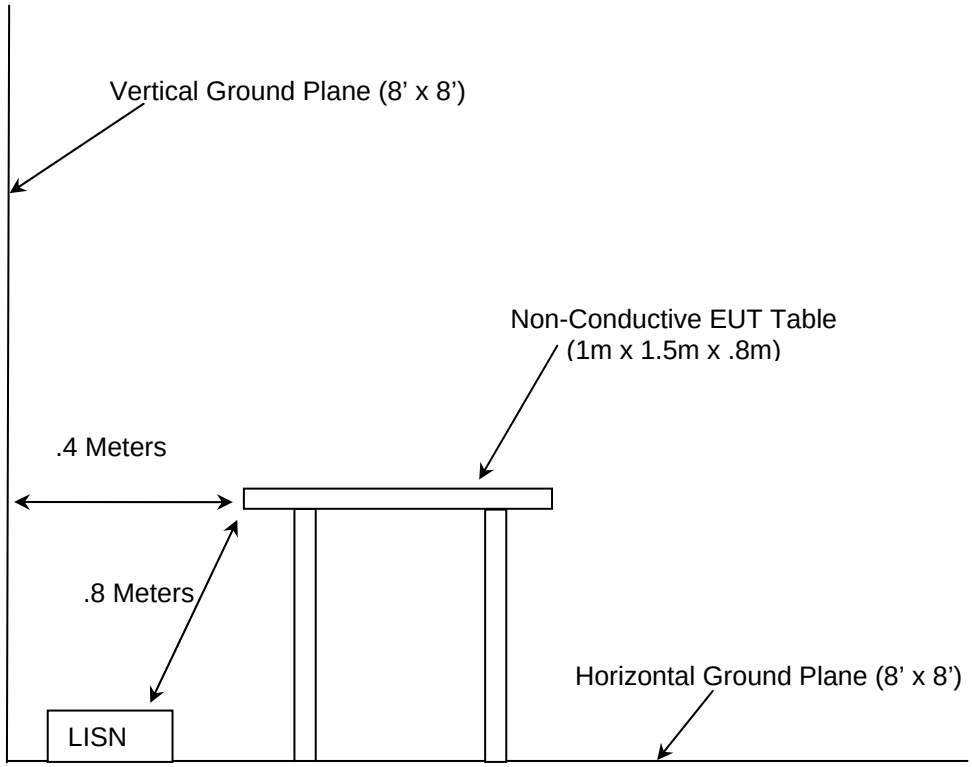

Figure 2.4-1: AC Mains Conducted EMI Site

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 - 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 2007)
4 - US Code of Federal Regulations (CFR): Title 47, Part 22, Subpart H: Cellular Radiotelephone Service (October 2007)
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**
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
30	Spectrum Technologies	Antennas	DRH-0118	970102	05-10-2008
144	Omega	Climate Monitoring Equipment	RH4111	H0103373	11-29-2008
168	Hewlett Packard	Attenuators	11947A	44829	03-13-2008
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
324	ACS	Cables	Belden	8214	07-10-2008
337	Microwave Circuits	Filters	H1G513G1	282706	08-28-2008
339	Aeroflex/Weinschel	Attenuators	AS-18	7142	08-20-2008
349	Aeroflex	Attenuators	47-30-43	BU7390	12-10-2008
NA	Agilent	Vector Signal Generator	E4438C	MY41000179	04-09-2008
NA	Agilent	Signal Generator	E8257D	MY46130821	10-05-2008
282	Microwave Circuits	Filters	H2G020G4	74541	03-09-2008

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

.

6.0 EQUIPMENT UNDER TEST SETUP AND BLOCK DIAGRAM

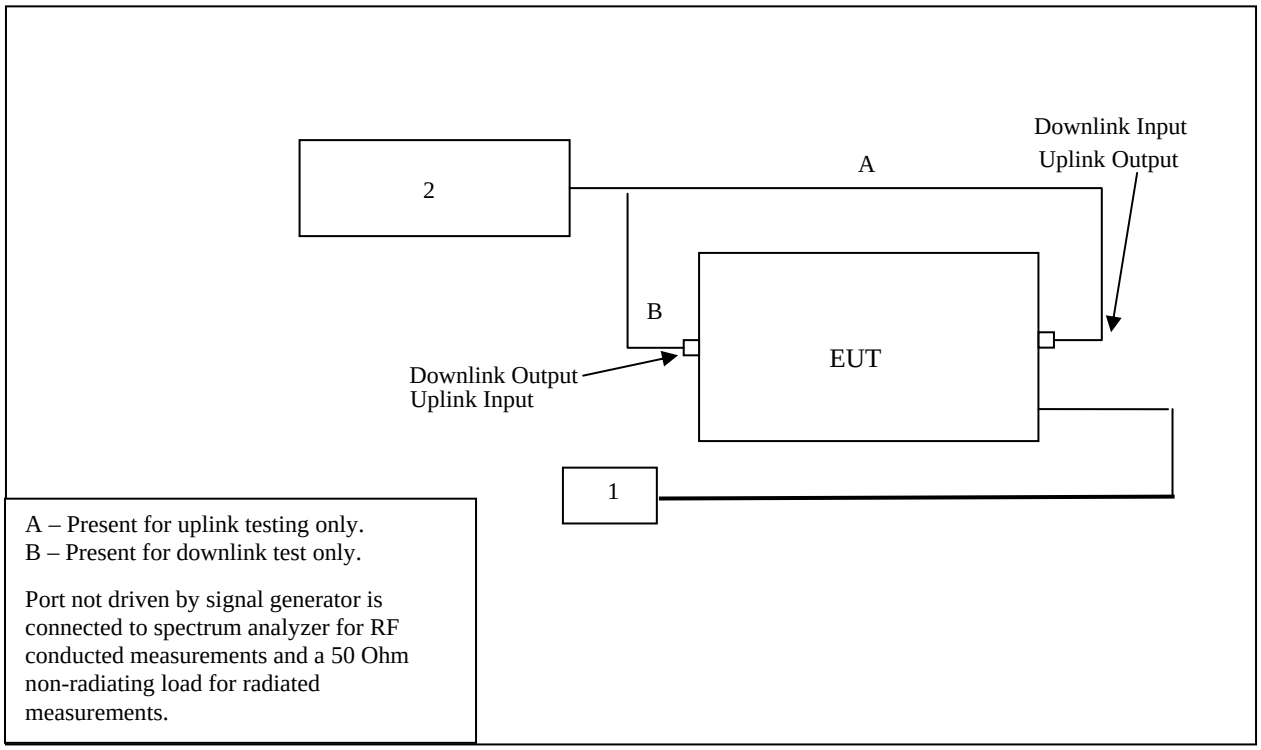

Figure 6-1: EUT Test Setup

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 08-0003-LD-24E (for PCS results) and 08-0003-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 a 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 Output Power

Configuration	Modulation	Channel	Frequency (MHz)	RF Power Output (dBm)
Uplink	CDMA	Low	1851.25	17.61
Uplink	CDMA	Middle	1880	17.43
Uplink	CDMA	High	1908.75	15.70
Uplink	TDMA	Low	1850.04	19.26
Uplink	TDMA	Middle	1879.98	19.27
Uplink	TDMA	High	1909.97	16.68
Uplink	GSM	Low	1850.2	19.01
Uplink	GSM	Middle	1880	18.95
Uplink	GSM	High	1909.8	16.55
Downlink	CDMA	Low	1931.25	8.67
Downlink	CDMA	Middle	1960	10.74
Downlink	CDMA	High	1988.75	10.01
Downlink	TDMA	Low	1930.04	8.30
Downlink	TDMA	Middle	1959.98	10.49
Downlink	TDMA	High	1989.97	9.91
Downlink	GSM	Low	1930.2	8.40
Downlink	GSM	Middle	1960	10.59
Downlink	GSM	High	1989.8	9.93

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	17.11
Uplink	CDMA	Middle	836.52	17.57
Uplink	CDMA	High	848.31	18.36
Uplink	TDMA	Low	824.04	17.38
Uplink	TDMA	Middle	836.52	19.32
Uplink	TDMA	High	848.97	19.75
Uplink	GSM	Low	824.2	17.13
Uplink	GSM	Middle	836.6	17.44
Uplink	GSM	High	848.8	19.25
Downlink	CDMA	Low	869.7	11.81
Downlink	CDMA	Middle	881.52	14.10
Downlink	CDMA	High	893.31	12.69
Downlink	TDMA	Low	869.04	11.19
Downlink	TDMA	Middle	881.52	12.40
Downlink	TDMA	High	893.97	11.57
Downlink	GSM	Low	869.2	9.75
Downlink	GSM	Middle	881.6	9.53
Downlink	GSM	High	893.8	10.76

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 08-0003-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 08-0003-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

For out of band spurious emissions the spectrum analyzer resolution and video bandwidths were set to 1 MHz**.** The spectrum was investigated for the 30 MHz to 20 GHz for PCS and 30 MHz to 10 GHz for Cellular**.** 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 08-0003-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 - 2000	Figure 20.
Uplink	CDMA	Low	IM - 2000 - 20000	Figure 21.
Uplink	CDMA	Middle	30 – 2000	Figure 22.
Uplink	CDMA	Middle	2000 - 20000	Figure 23.
Uplink	CDMA	High	IM - In Band	Figure 24.
Uplink	CDMA	High	IM - 30 - 2000	Figure 25.
Uplink	CDMA	High	IM - 2000 - 20000	Figure 26.
Uplink	TDMA	Low	IM - In Band	Figure 27.
Uplink	TDMA	Low	IM - 30 - 2000	Figure 28.
Uplink	TDMA	Low	IM - 2000 - 20000	Figure 29.
Uplink	TDMA	Middle	30 - 2000	Figure 30.
Uplink	TDMA	Middle	2000 - 20000	Figure 31.
Uplink	TDMA	High	IM - In Band	Figure 32.
Uplink	TDMA	High	IM - 30 - 2000	Figure 33.
Uplink	TDMA	High	IM - 2000 - 20000	Figure 34.
Uplink	GSM	Low	IM - In Band	Figure 35.
Uplink	GSM	Low	IM 30 - 2000	Figure 36.
Uplink	GSM	Low	IM 2000 - 20000	Figure 37.
Uplink	GSM	Middle	30 - 2000	Figure 38.
Uplink	GSM	Middle	2000 - 20000	Figure 39.
Uplink	GSM	High	IM - In Band	Figure 40.
Uplink	GSM	High	IM 30 - 2000	Figure 41.
Uplink	GSM	High	IM 2000 - 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 08-0003-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. 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 08-0003-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 08-0003-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. 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	-59.23	-58.00	H	6.69	-51.31	-13.00	38.31
3700.08	-57	-53	V	6.65	-46.35	-13.00	33.35
5550.12	-60.05	-58	V	6.76	-51.24	-13.00	38.24
7400.16	-58.55	-48	V	6.02	-41.98	-13.00	28.98
Mid Channel Uplink							
3759.96	-59.33	-60	H	6.61	-53.39	-13.00	40.39
3759.96	-57.23	-51	V	6.56	-44.44	-13.00	31.44
5639.94	-56.97	-48	V	6.76	-41.24	-13.00	28.24
7519.92	-58.12	-47	H	5.97	-41.03	-13.00	28.03
7519.92	-57.4	-45	V	6.07	-38.93	-13.00	25.93
High Channel Uplink							
3819.94	-58.67	-56	H	6.53	-49.47	-13.00	36.47
3819.94	-57.23	-54	V	6.47	-47.53	-13.00	34.53
5729.91	-59.03	-55	H	6.81	-48.19	-13.00	35.19
5729.91	-58.85	-53	V	6.76	-46.24	-13.00	33.24
7639.88	-58.95	-49	H	6.04	-42.96	-13.00	29.96

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	-54.48	-51.00	H	6.48	-44.52	-13.00	31.52
3860.08	-52	-45	V	6.41	-38.59	-13.00	25.59
5790.12	-41.43	-30	H	6.80	-23.20	-13.00	10.20
5790.12	-43.36	-31	V	6.76	-24.24	-13.00	11.24
7720.16	-51.95	-36	H	6.08	-29.92	-13.00	16.92
7720.16	-52.83	-37	V	6.14	-30.86	-13.00	17.86
9650.2	-57.46	-43	H	6.43	-36.57	-13.00	23.57
9650.2	-57.81	-46	V	6.47	-39.53	-13.00	26.53
11580.24	-55.83	-45	H	6.89	-38.11	-13.00	25.11
11580.24	-59.94	-50	V	6.89	-43.11	-13.00	30.11
Mid Channel Downlink							
3919.96	-55.85	-53.00	H	6.40	-46.60	-13.00	33.60
3919.96	-50.56	-44	V	6.32	-37.68	-13.00	24.68
5879.94	-46.76	-34	H	6.79	-27.21	-13.00	14.21
5879.94	-44.09	-32	V	6.76	-25.24	-13.00	12.24
7839.92	-57.29	-45	H	6.15	-38.85	-13.00	25.85
7839.92	-55.95	-40	V	6.18	-33.82	-13.00	20.82
9799.9	-58.64	-46	H	6.77	-39.23	-13.00	26.23
9799.9	-60.39	-50	V	6.75	-43.25	-13.00	30.25
11759.88	-56.9	-46	H	6.74	-39.26	-13.00	26.26
11759.88	-60.48	-52	V	6.74	-45.26	-13.00	32.26
13719.86	-59.84	-46	H	6.80	-39.20	-13.00	26.20
High Channel Downlink							
3979.94	-55.36	-47.00	H	6.32	-40.68	-13.00	27.68
3979.94	-52.09	-46	V	6.23	-39.77	-13.00	26.77
5969.91	-44.45	-31	H	6.77	-24.23	-13.00	11.23
5969.91	-37.67	-24.15	V	6.76	-17.39	-13.00	4.39
7959.88	-50.02	-33	H	6.22	-26.78	-13.00	13.78
7959.88	-53.85	-38	V	6.22	-31.78	-13.00	18.78
9949.85	-56.72	-42	H	7.11	-34.89	-13.00	21.89
9949.85	-60	-49	V	7.03	-41.97	-13.00	28.97
11939.82	-60.17	-52	H	6.59	-45.41	-13.00	32.41
13929.79	-59.36	-45	H	6.38	-38.62	-13.00	25.62

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	-59.87	-66.00	H	5.41	-60.59	-13.00	47.59
2472.12	-57.94	-58	H	5.22	-52.78	-13.00	39.78
Mid Channel Uplink							
1673.04	-58.42	-64.00	H	5.36	-58.64	-13.00	45.64
1673.04	-58.04	-61	V	5.46	-55.54	-13.00	42.54
2509.56	-57.63	-58	H	5.26	-52.74	-13.00	39.74
4182.6	-58.65	-56	H	6.63	-49.37	-13.00	36.37
High Channel Uplink							
1697.94	-58.62	-66.00	H	5.31	-60.69	-13.00	47.69
2546.91	-58.29	-63	H	5.31	-57.69	-13.00	44.69
4244.85	-56.69	-51	H	6.74	-44.26	-13.00	31.26
5942.79	-59.56	-53	H	6.77	-46.23	-13.00	33.23

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							
1738.08	-58.65	-66.00	H	5.23	-60.77	-13.00	47.77
2607.12	-51.23	-45	H	5.39	-39.61	-13.00	26.61
2607.12	-57.22	-57	V	5.29	-51.71	-13.00	38.71
3476.16	-57.46	-56	H	6.90	-49.10	-13.00	36.10
3476.16	-56.31	-52	V	6.89	-45.11	-13.00	32.11
4345.2	-55.25	-49	H	6.93	-42.07	-13.00	29.07
4345.2	-49.99	-43	V	6.76	-36.24	-13.00	23.24
5214.24	-48.82	-37	H	6.50	-30.50	-13.00	17.50
5214.24	-52.25	-39	V	6.28	-32.72	-13.00	19.72
6083.28	-47.96	-33	H	6.67	-26.33	-13.00	13.33
6083.28	-47.91	-33	V	6.70	-26.30	-13.00	13.30
6952.32	-44.99	-27.36	H	5.78	-21.58	-13.00	8.58
6952.32	-52.22	-36	V	5.89	-30.11	-13.00	17.11
7821.36	-47.37	-28.22	H	6.14	-22.08	-13.00	9.08
7821.36	-56.01	-42	V	6.18	-35.82	-13.00	22.82
8690.4	-52.58	-35	H	6.35	-28.65	-13.00	15.65
8690.4	-57	-44	V	6.39	-37.61	-13.00	24.61
Mid Channel Downlink							
2644.56	57.15	-55	H	5.44	-49.56	-13.00	36.56
2644.56	-55.88	-53	V	5.34	-47.66	-13.00	34.66
3526.08	-56.39	-52	H	6.91	-45.09	-13.00	32.09
3526.08	-55.72	-53	V	6.91	-46.09	-13.00	33.09
4407.6	-55.22	-50	H	7.04	-42.96	-13.00	29.96
4407.6	-54.69	-49	V	6.86	-42.14	-13.00	29.14
5289.12	-48.62	-37	H	6.59	-30.41	-13.00	17.41
5289.12	-53.67	-42	V	6.41	-35.59	-13.00	22.59
6170.64	-50.83	-36	H	6.57	-29.43	-13.00	16.43
6170.64	-54.71	-42	V	6.64	-35.36	-13.00	22.36
7052.16	-56.16	-39	H	5.76	-33.24	-13.00	20.24
7052.16	-58.93	-45	V	5.86	-39.14	-13.00	26.14
7933.68	-51.49	-33	H	6.20	-26.80	-13.00	13.80
7933.68	-55.73	-40	V	6.22	-33.78	-13.00	20.78
8815.2	-55.68	-42	H	6.39	-35.61	-13.00	22.61
High Channel Downlink							
2681.91	-52.15	-49	H	5.49	-43.51	-13.00	30.51
2681.91	-58.37	-58	V	5.39	-52.61	-13.00	39.61
3575.88	-56.26	-53	H	6.85	-46.15	-13.00	33.15
3575.88	-57.46	-57	V	6.83	-50.17	-13.00	37.17
4469.85	-51.56	-44	H	7.15	-36.85	-13.00	23.85
4469.85	-53.6	-48	V	6.96	-41.04	-13.00	28.04
5363.82	-50.45	-38	H	6.69	-31.31	-13.00	18.31
5363.82	-53.04	-42	V	6.53	-35.47	-13.00	22.47
6257.79	-48.62	-34	H	6.47	-27.53	-13.00	14.53
6257.79	-54.05	-42	V	6.57	-35.43	-13.00	22.43
7151.76	-53.37	-35	H	5.81	-29.19	-13.00	16.19
7151.76	-57.96	-44	V	5.91	-38.09	-13.00	25.09
8045.73	-52.73	-35	H	6.24	-28.76	-13.00	15.76
8045.73	-57.56	-46	V	6.24	-39.76	-13.00	26.76
8939.7	-56.39	-41	H	6.43	-34.57	-13.00	21.57

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

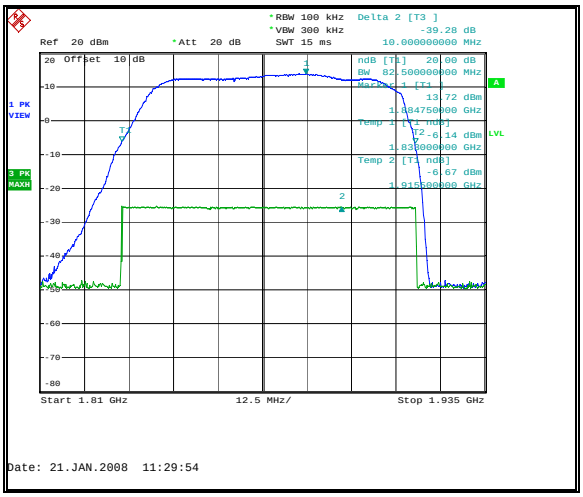

Figure 7.6-1: PCS Frequency Response Uplink

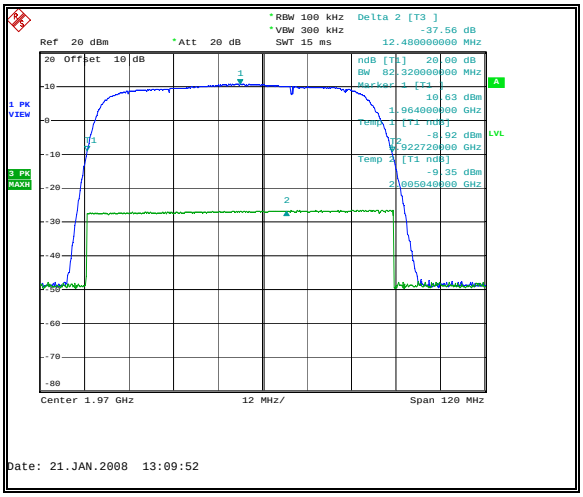

Figure 7.6-2: PCS Frequency Response Downlink

7.6.2.2 Cellular Results

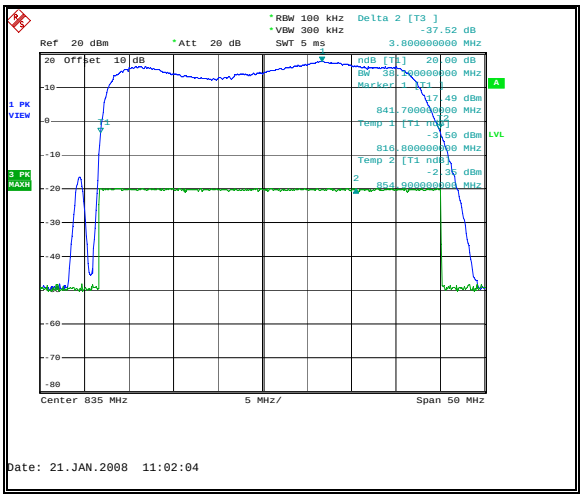

Figure 7.6-3: Cellular Frequency Response Uplink

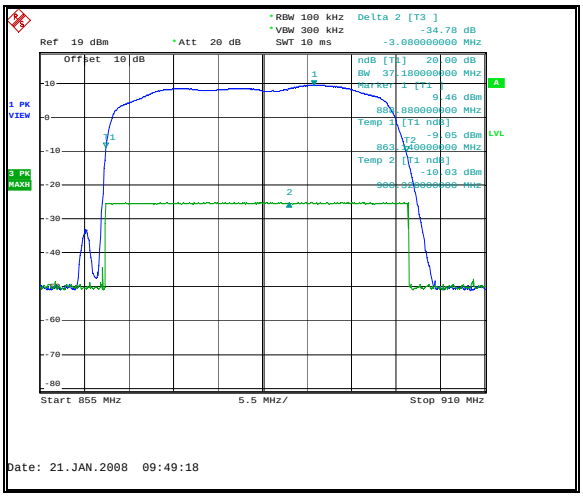

Figure 7.6-4: Cellular Frequency Response Downlink

END Report