

## FCC Part 22 Transmitter Certification

### Test Report

**FCC ID: DNY0A5EC2CELL**

**FCC Rule Part: CFR 47 Part 22 Subpart H**

**ACS Report Number: 06-0468-22H**

Manufacturer: EMS Wireless  
Equipment Type: Cellular Fiber Optic DAS  
Tradename: EkoCell® II  
Model: EC2CELL

Test Begin Date: December 21, 2006

Test End Date: January 24, 2007

Report Issue Date: January 31, 2007



FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

  
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This report contains **17** pages

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## **Additional Exhibits Included In Filing**

|                                |                          |
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| Internal Photographs           | External Photographs     |
| Schematics                     | Tune-up Procedure        |
| Test Setup Photographs         | Product Labeling         |
| System Block Diagram           | Theory of Operation      |
| RF Exposure – MPE Calculations | Installation/Users Guide |
| Parts List                     |                          |

## **1.0 GENERAL**

### **1.1 Purpose**

The purpose of this report is to demonstrate compliance with Part 2 Subpart J and Part 22 Subpart H of the FCC's Code of Federal Regulations.

### **1.2 Product Description**

#### **1.2.1 General**

The EkoCell II is a Fiber Optic Distributed Antenna System (DAS) which provides signal coverage of most all large buildings, multiple buildings, airports, convention centers etc. The system configuration consists of four components which include the AGC, Hub, Remote and PA/LNA. This report is for PA/LNA and Remote unit combination only. The additional components have been tested separately under other equipment authorization procedures.

The Remote does not have any provisions for operating without PA/LNA therefore the Remote and PA/LNA components were tested and shall be certified together. The combination of the Remote and PA/LNA components serve function of what is termed "remote unit" in the system described in the amp/booster equipment authorization guidelines.

Manufacturer Information:  
EMS Wireless  
2850 Colonnades Court, NW  
Norcross, GA 30071

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, an internal power protection circuit switches the PA\_ENABLE line off, thus stopping TX Power. The PA\_ENABLE will not switch back on until the input drive level falls back below the threshold set in the protection circuit.

### **1.4 EUT Modifications**

In order to comply with certain RF conducted tests, the maximum output power was reduced. The manufacturer is aware of the reduction in power and will comply with the new levels in their manufacturing process.

## 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:

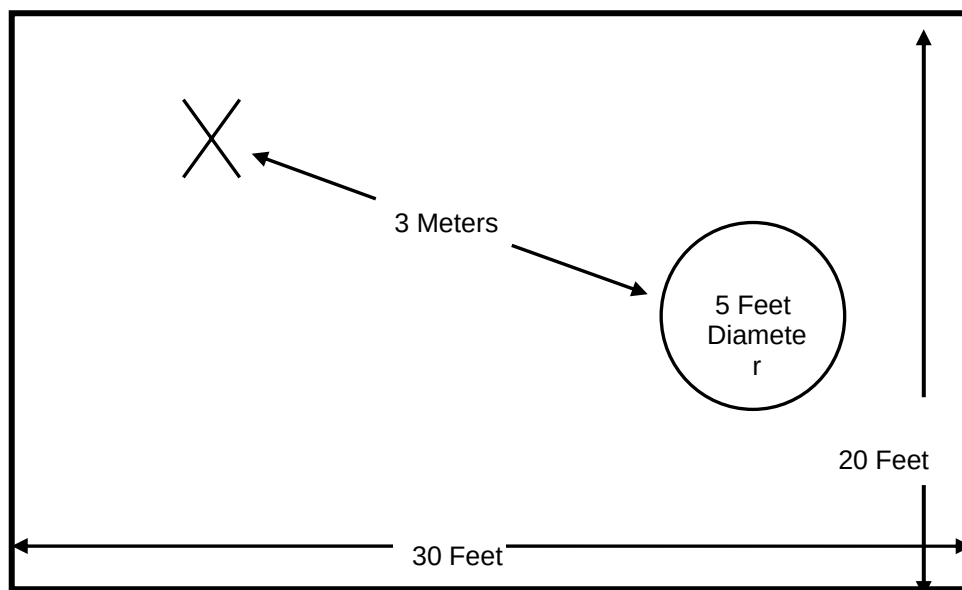


Figure 2.3-1: Semi-Anechoic Chamber Test Site

### 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:

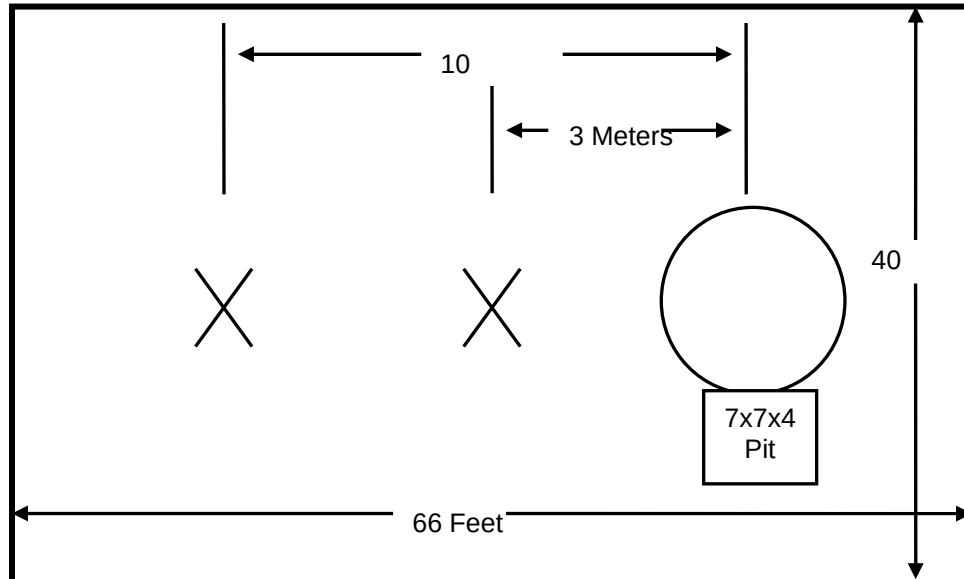


Figure 2.3-2: Open Area Test Site

## 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:

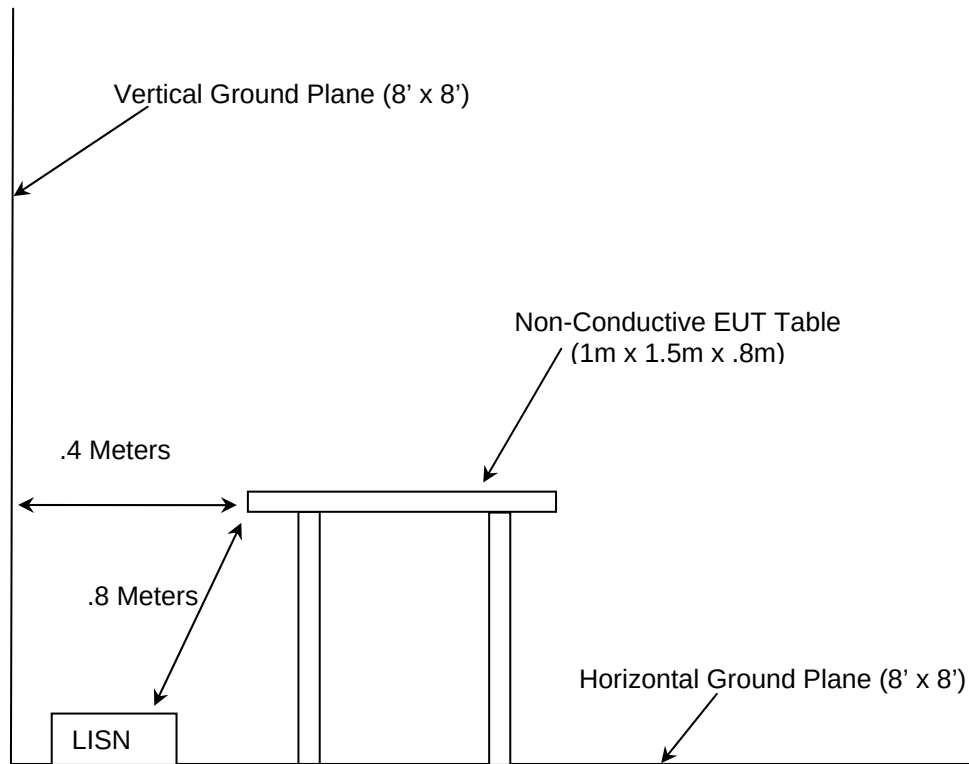


Figure 2.4-1: AC Mains Conducted EMI Site

## 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 2005)
- 3 - US Code of Federal Regulations (CFR): Title 47, Part 22, Subpart H: Cellular Radiotelephone Service (October 2005)

## 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"/> 25  | Chase                 | Bi-Log Antenna        | CBL6111             | 1043         | 5/30/07   |
| <input checked="" type="checkbox"/> 041 | ElectroMetrics        | Bi-Con Antenna        | BIA-25              | 2925         | 5/25/07   |
| <input checked="" type="checkbox"/> 090 | ElectroMetrics        | LPA Antenna           | LPA-25              | 1476         | 5/25/07   |
| <input checked="" type="checkbox"/> 22  | Agilent               | Pre-Amplifier         | 8449B               | 3008A00526   | 5/06/07   |
| <input checked="" type="checkbox"/> 73  | Agilent               | Pre-Amplifier         | 8447D               | 272A05624    | 5/18/07   |
| <input checked="" type="checkbox"/> 30  | Spectrum Technologies | Horn Antenna          | DRH-0118            | 970102       | 5/12/07   |
| <input checked="" type="checkbox"/> 329 | A.H.Systems           | Horn Antenna          | SAS-571             | 721          | 8/24/2007 |
| <input checked="" type="checkbox"/> 331 | Microwave Circuits    | High Pass Filter      | H1G513G1            | 31417 DC0633 | 08/29/07  |
| <input checked="" type="checkbox"/> 1   | Rohde & Schwarz       | Receiver Display      | 804.8932.52         | 833771/007   | 3/01/07   |
| <input checked="" type="checkbox"/> 2   | Rohde & Schwarz       | ESMI Receiver         | 1032.5640.53        | 839587/003   | 3/01/07   |
| <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      | 3/24/07   |
| <input checked="" type="checkbox"/> 167 | ACS                   | Chamber EMI Cable Set | RG6                 | 167          | 1/7/07    |
| <input checked="" type="checkbox"/> 290 | Florida RF Labs       | HF RF Cable           | SMSE-200-72.0-SMRE  | NA           | 5/08/07   |
| <input checked="" type="checkbox"/> 291 | Florida RF Labs       | HF RF Cable           | SMRE-200W-12.0-SMRE | NA           | 5/08/07   |
| <input checked="" type="checkbox"/> 292 | Florida RF Labs       | HF RF Cable           | SMR-280AW-480.0-SMR | NA           | 5/24/07   |
| <input checked="" type="checkbox"/> 237 | Gigatronics           | Signal Generator      | 900                 | 282706       | 1/10/2007 |
| <input checked="" type="checkbox"/> 176 | Weinschel             | 30 dB Attenuator      | 46-30-34            | BN4922       | 1/11/2007 |
| <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  |
| <input checked="" type="checkbox"/> 215 | Sorensen              | DC Power Supply       | DCS60-50            | 0024B1130    | N/A       |

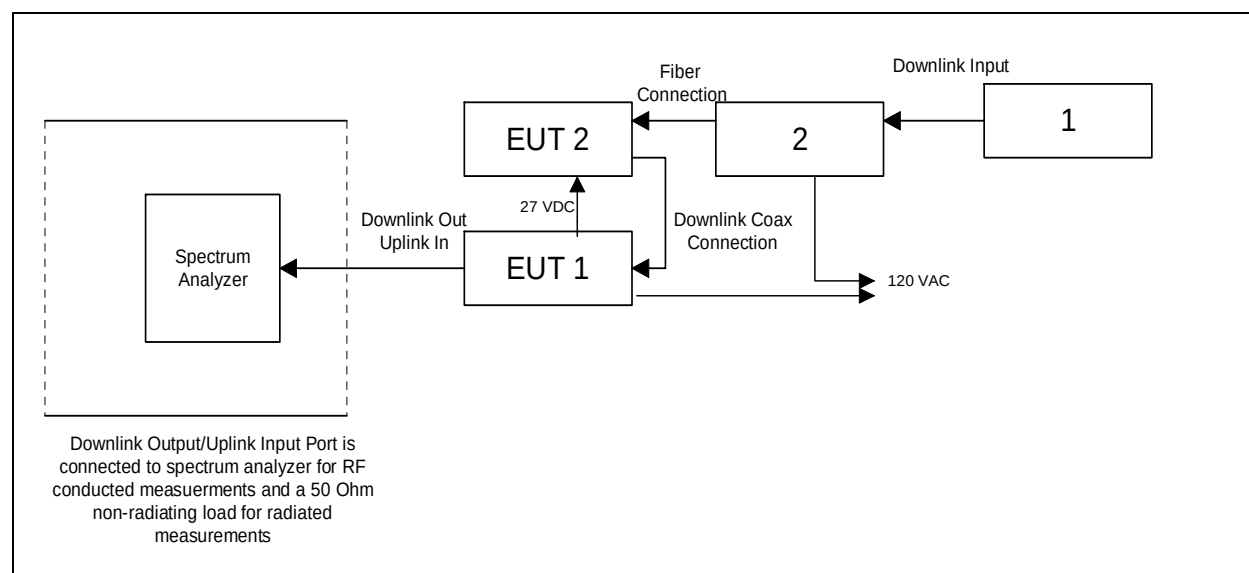


## 5.0 SUPPORT EQUIPMENT AND ACCESSORIES

**Table 5-1: Support Equipment and Accessories**

| Diagram # | Manufacturer | Equipment Type   | Model Number | Serial Number | FCC ID |
|-----------|--------------|------------------|--------------|---------------|--------|
| 1         | Agilent      | Signal Generator | E4437B       | MY41000179    | NA     |
| 2         | EMS          | EkoCell II Hub   | EKOCELLIIHUB | E02841000019  | NA     |

## 6.0 EQUIPMENT UNDER TEST SETUP AND BLOCK DIAGRAM



**Figure 6-1: EUT Test Setup**

Note: EUT 1 is the EkoCell II PA/LNA unit and EUT 2 is the EKOCell II Remote unit.

## 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 06-0468-22H-A.

### 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 the downlink configuration are shown below in Table 7.1-1.

#### 7.1.2 Measurement Results

**Table 7.1-1: Output Power**

| Configuration | Modulation | Channel | Frequency (MHz) | RF Power Output (dBm) |
|---------------|------------|---------|-----------------|-----------------------|
| Downlink      | CDMA       | Low     | 869.70          | 36.69                 |
| Downlink      | CDMA       | Middle  | 881.52          | 36.62                 |
| Downlink      | CDMA       | High    | 893.31          | 36.47                 |
| Downlink      | TDMA       | Low     | 869.04          | 37.10                 |
| Downlink      | TDMA       | Middle  | 881.52          | 37.08                 |
| Downlink      | TDMA       | High    | 893.97          | 36.91                 |
| Downlink      | GSM        | Low     | 869.20          | 37.06                 |
| Downlink      | GSM        | Middle  | 881.60          | 37.20                 |
| Downlink      | GSM        | High    | 893.80          | 36.73                 |

## 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% 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 the downlink configuration are shown below in Table 7.2-1.

### 7.2.2 Measurement Results

Occupied bandwidth plots are listed below and are supplied in the test report appendix 06-0468-22H-A.

**Table 7.2-1: Occupied Bandwidth**

| Configuration | Modulation | Channel | Frequency (MHz) | Plot Reference |
|---------------|------------|---------|-----------------|----------------|
| Downlink      | CDMA       | Low     | 869.70          | Figure 1.      |
| Downlink      | CDMA       | Middle  | 881.52          | Figure 2.      |
| Downlink      | CDMA       | High    | 893.31          | Figure 3.      |
| Downlink      | TDMA       | Low     | 869.04          | Figure 4.      |
| Downlink      | TDMA       | Middle  | 881.52          | Figure 5.      |
| Downlink      | TDMA       | High    | 893.97          | Figure 6.      |
| Downlink      | GSM        | Low     | 869.20          | Figure 7.      |
| Downlink      | GSM        | Middle  | 881.60          | Figure 8.      |
| Downlink      | GSM        | High    | 893.80          | Figure 9.      |

## 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 22.917 (b). The spectrum was investigated for the 30 MHz to 10 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

Emission plots are listed below in Table 7.3-1 and plots are supplied in the test report appendix 06-0468-22H-A.

**Table 7.3-1: Spurious Emissions - Downlink**

| Configuration | Modulation | Channel | Frequency Range (MHz) | Plot Reference |
|---------------|------------|---------|-----------------------|----------------|
| Downlink      | CDMA       | Low     | IM - In Band          | Figure 10.     |
| Downlink      | CDMA       | Low     | IM - 30 - 1000        | Figure 11.     |
| Downlink      | CDMA       | Low     | IM - 1000 - 10000     | Figure 12.     |
| Downlink      | CDMA       | Middle  | 30 - 1000             | Figure 13.     |
| Downlink      | CDMA       | Middle  | 1000 - 10000          | Figure 14.     |
| Downlink      | CDMA       | High    | IM - In Band          | Figure 15.     |
| Downlink      | CDMA       | High    | IM - 30 - 1000        | Figure 16.     |
| Downlink      | CDMA       | High    | IM - 1000 - 10000     | Figure 17.     |
| Downlink      | TDMA       | Low     | IM - In Band          | Figure 18.     |
| Downlink      | TDMA       | Low     | IM - 30 - 1000        | Figure 19.     |
| Downlink      | TDMA       | Low     | IM - 1000 - 10000     | Figure 20.     |
| Downlink      | TDMA       | Middle  | 30 - 1000             | Figure 21.     |
| Downlink      | TDMA       | Middle  | 1000 - 10000          | Figure 22.     |
| Downlink      | TDMA       | High    | IM - In Band          | Figure 23.     |
| Downlink      | TDMA       | High    | IM - 30 - 1000        | Figure 24.     |
| Downlink      | TDMA       | High    | IM - 1000 - 10000     | Figure 25.     |
| Downlink      | CW         | Low     | IM - In Band          | Figure 26.     |
| Downlink      | CW         | Low     | IM - 30 - 1000        | Figure 27.     |
| Downlink      | CW         | Low     | IM - 1000 - 10000     | Figure 28.     |
| Downlink      | CW         | High    | IM - In Band          | Figure 29.     |
| Downlink      | CW         | High    | IM - 30 - 1000        | Figure 30.     |
| Downlink      | CW         | High    | IM - 1000 - 10000     | Figure 31.     |
| Downlink      | GSM        | Low     | 30 - 1000             | Figure 32.     |
| Downlink      | GSM        | Low     | 1000 - 10000          | Figure 33.     |
| Downlink      | GSM        | Middle  | 30 - 1000             | Figure 34.     |
| Downlink      | GSM        | Middle  | 1000 - 10000          | Figure 35.     |
| Downlink      | GSM        | High    | 30 - 1000             | Figure 36.     |
| Downlink      | GSM        | High    | 1000 - 10000          | Figure 37.     |

## 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  $\geq 1\%$  the emission bandwidth. 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

Band-edge plots in are listed in Table 7.4-1 below and are supplied in the test report appendix 06-0468-22H-A.

**Table 7.4-1: Band-edge**

| Configuration | Modulation | Channel | Frequency (MHz) | Plot Reference |
|---------------|------------|---------|-----------------|----------------|
| Downlink      | CDMA       | Low     | 869.70          | Figure 38.     |
| Downlink      | CDMA       | High    | 893.31          | Figure 39.     |
| Downlink      | TDMA       | Low     | 869.04          | Figure 40.     |
| Downlink      | TDMA       | High    | 893.97          | Figure 41.     |
| Downlink      | GSM        | Low     | 869.20          | Figure 42.     |
| Downlink      | GSM        | High    | 893.80          | Figure 43.     |

## 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 for the downlink configuration. 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.

### 7.5.2 Measurement Results

**Table 7.5.-1: 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) |
|---------------------|-------------------------------|-----------------------|------------------------|-------------------------|-----------------------|-------------|-------------|
| <b>Downlink</b>     |                               |                       |                        |                         |                       |             |             |
| <b>Low Channel</b>  |                               |                       |                        |                         |                       |             |             |
| <b>1738.08</b>      | -52.48                        | -62.00                | H                      | 5.38                    | -56.62                | -13.00      | 43.62       |
| <b>1738.08</b>      | -54.15                        | -64                   | V                      | 5.22                    | -58.78                | -13.00      | 45.78       |
| <b>2607.12</b>      | -50.95                        | -56                   | H                      | 5.55                    | -50.45                | -13.00      | 37.45       |
| <b>2607.12</b>      | -54.13                        | -58                   | V                      | 5.80                    | -52.20                | -13.00      | 39.20       |
| <b>Mid Channel</b>  |                               |                       |                        |                         |                       |             |             |
| <b>1763.04</b>      | -53.37                        | -64.00                | H                      | 5.40                    | -58.60                | -13.00      | 45.60       |
| <b>1763.04</b>      | -52.73                        | -60                   | V                      | 5.26                    | -54.74                | -13.00      | 41.74       |
| <b>2644.56</b>      | -53.55                        | -59                   | H                      | 5.57                    | -53.43                | -13.00      | 40.43       |
| <b>2644.56</b>      | -53.32                        | -54                   | V                      | 5.82                    | -48.18                | -13.00      | 35.18       |
| <b>High Channel</b> |                               |                       |                        |                         |                       |             |             |
| <b>1787.94</b>      | -53.75                        | -60.00                | H                      | 5.42                    | -54.58                | -13.00      | 41.58       |
| <b>1787.94</b>      | -54.38                        | -63                   | V                      | 5.30                    | -57.70                | -13.00      | 44.70       |
| <b>2681.91</b>      | -51.64                        | -57                   | H                      | 5.60                    | -51.40                | -13.00      | 38.40       |
| <b>2681.91</b>      | -54.99                        | -59                   | V                      | 5.83                    | -53.17                | -13.00      | 40.17       |

## 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 spectrum analyzer resolution and video bandwidths were set to 3 MHz and 10 MHz respectively. The analyzer was set for Max Hold using a peak detector. Using a signal generator the downlink ports were driven with a CW signal. The frequency of the signal generator was swept across the entire range of operation. Results of the test are shown below in and Figure 7.6-1.

### 7.6.2 Measurement Results

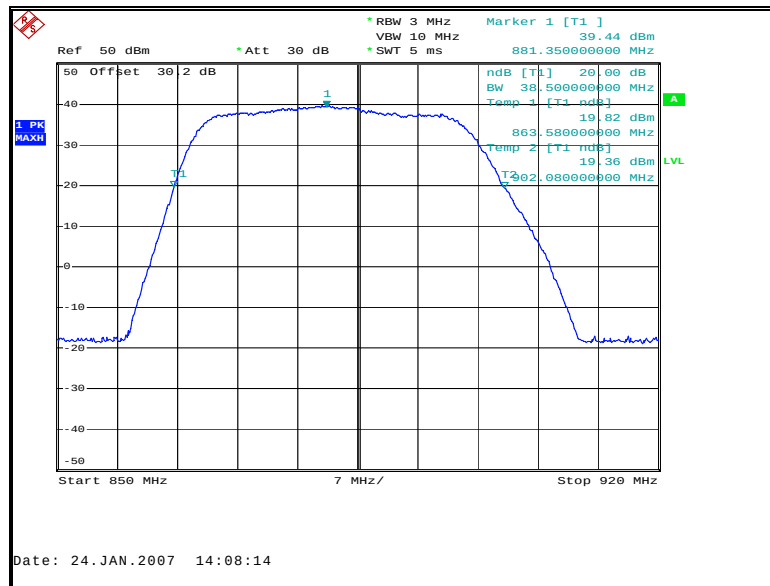


Figure 7.6-1: Frequency Response Downlink

## 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<br>(MHz) | Level<br>(dBuV) |         | Antenna<br>Polarity<br>(H/V) | Correction<br>Factors<br>(dB) | Corrected Level<br>(dBuV/m) |         | Limit<br>(dBuV/m) |         | Margin<br>(dB) |         |
|--------------------|-----------------|---------|------------------------------|-------------------------------|-----------------------------|---------|-------------------|---------|----------------|---------|
|                    | pk              | Qpk/Avg |                              |                               | pk                          | Qpk/Avg | pk                | Qpk/Avg | pk             | Qpk/Avg |
|                    |                 |         |                              |                               |                             |         |                   |         |                |         |
| Spurious Emissions |                 |         |                              |                               |                             |         |                   |         |                |         |
| 933.3376           |                 | 35.79   | H                            | 3.40                          | -----                       | 39.19   | -----             | 46.4    | -----          | 7.21    |
| 75.0072            |                 | 49.96   | H                            | -16.60                        | -----                       | 33.36   | -----             | 39.1    | -----          | 5.74    |
| 75.1044            |                 | 45.95   | V                            | -16.18                        | -----                       | 29.77   | -----             | 39.1    | -----          | 9.33    |
| 58.3422            |                 | 45.92   | V                            | -12.27                        | -----                       | 33.65   | -----             | 39.1    | -----          | 5.45    |
| 41.6589            |                 | 44.95   | V                            | -13.53                        | -----                       | 31.42   | -----             | 39.1    | -----          | 7.68    |
| 124.9935           |                 | 38.86   | V                            | -11.10                        | -----                       | 27.76   | -----             | 43.5    | -----          | 15.74   |
| 108.3464           |                 | 21.08   | V                            | 15.60                         | -----                       | 36.68   | -----             | 43.5    | -----          | 6.82    |



## 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<br>(MHz) | Uncorrected Reading<br>(dBuV) |         | Total<br>Correction<br>Factor<br>(dB) | Corrected Level    (dBuV) |         | Limit<br>(dBuV) |         | Margin<br>(dB) |         |
|--------------------|-------------------------------|---------|---------------------------------------|---------------------------|---------|-----------------|---------|----------------|---------|
|                    | Quasi-Peak                    | Average |                                       | Quasi-Peak                | Average | Quasi-Peak      | Average | Quasi-Peak     | Average |
| Line 1             |                               |         |                                       |                           |         |                 |         |                |         |
| 0.18               | 19.2                          | 18.3    | 9.80                                  | 29.00                     | 28.10   | 79.00           | 66.00   | 50.0           | 37.9    |
| 7.92               | 27.4                          | 17.7    | 9.80                                  | 37.20                     | 27.50   | 73.00           | 60.00   | 35.8           | 32.5    |
| 8.49               | 25.4                          | 18      | 9.92                                  | 35.32                     | 27.92   | 73.00           | 60.00   | 37.7           | 32.1    |
| 8.55               | 23.7                          | 16.7    | 9.91                                  | 33.61                     | 26.61   | 73.00           | 60.00   | 39.4           | 33.4    |
| 9.09               | 23.8                          | 16.4    | 9.91                                  | 33.71                     | 26.31   | 73.00           | 60.00   | 39.3           | 33.7    |
| 9.42               | 31.9                          | 21.8    | 9.90                                  | 41.80                     | 31.70   | 73.00           | 60.00   | 31.2           | 28.3    |
| Line 2             |                               |         |                                       |                           |         |                 |         |                |         |
| 0.18               | 15.1                          | 13.3    | 9.80                                  | 24.90                     | 23.10   | 79.00           | 66.00   | 54.1           | 42.9    |
| 0.2                | 3.8                           | 0       | 9.80                                  | 13.60                     | 9.80    | 79.00           | 66.00   | 65.4           | 56.2    |
| 5.49               | 6.4                           | -1.4    | 9.81                                  | 16.21                     | 8.41    | 73.00           | 60.00   | 56.8           | 51.6    |
| 8.08               | 29.5                          | 19.1    | 9.90                                  | 39.40                     | 29.00   | 73.00           | 60.00   | 33.6           | 31.0    |
| 8.67               | 27                            | 17.5    | 9.91                                  | 36.91                     | 27.41   | 73.00           | 60.00   | 36.1           | 32.6    |
| 9.4                | 21.4                          | 14.1    | 9.91                                  | 31.31                     | 24.01   | 73.00           | 60.00   | 41.7           | 36.0    |

**END REPORT**