
# PCTEST Engineering Laboratory, Inc.

*6660-B Dobbin Road • Columbia, MD 21045 • U.S.A.*
*TEL (410) 290-6652 • FAX (410) 290-6654*
*http://www.pctestlab.com*


## CERTIFICATE OF COMPLIANCE (Type Acceptance)

**INNOVATIVE GLOBAL SOLUTION, INC.**
**4225 Executive Square**
**7th Floor, La Jolla, CA 92037**
**Attn: Sai Kwok, Staff Engineer**

**Dates of Tests: August 26-28, 1998**
**Test Report S/N: 24.980826588.N5W**
**Test Site: PCTEST Lab, Columbia MD U.S.A.**

| | |
|---|---|
| **FCC ID** | **N5WNP1PSBSM01** |
| **APPLICANT** | **INNOVATIVE GLOBAL SOLUTION, INC.** |

| | |
|---|---|
| **Classification:** | **Licensed Portable Transmitter Held to Ear (PCE)** |
| **FCC Rule Part(s):** | **§§§§24(E), 2.983, 2.987** |
| **EUT Type:** | **Single Band PCS CDMA Phone** |
| **Trade Name(s):** | ***Innovative Global Solution, Inc.*** |
| **Model(s):** | ***NeoPoint 1000*** |
| **Frequency Range:** | **Tx: 1851.25 – 1908.75MHz** |
| | **Rx: 1931.25 – 1988.75MHz** |
| **Max Output Power:** | **0.2 Watts** |
| **Frequency Tolerance:** | **0.00025% (2.5 ppm)** |

**This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947 with the following remarks (Note Codes):**

** (BC) The output power is continuously variable from the value listed in this entry to 5%-10% of the value listed.*

**I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.**

*PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a)*

Randy Ortanez
President & Chief Engineer

NVLAP LAB CODE 100431-0

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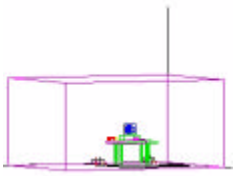

# MEASUREMENT REPORT

*Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.*

***§2983(a) General Information***

| | |
|---|---|
| **Applicant Name:** | **Innovative Global Solution, Inc.** |
| **Address:** | **4225 Executive Square** |
| | **7th Floor, La Jolla, CA 92037** |
| **Attention:** | **Mr. Sai Kwok, Staff Engineer** |

- §2983(b) FCC ID: **N5WNP1PSBSM01**
- §2983(c) Quantity: Quantity production is planned
- §2.983(d) Emission Designator: 1M25F9W
- §2.983(d) Maximum Power Rating: 0.2 W
- §2.983(d) D.C. Voltage into Final RF Amplifier: 5.4 VDC
- §2.983(d) D.C. Current into Final RF Amplifier: 350 mA
- Power Supply Battery: 7.2 VDC 1200mAh Li-Ion Battery Pack
- FCC Classification: Licensed Portable Tx Held to Ear (PCE)
- Equipment (EUT) Type: PCS CDMA Phone
- Modulation: CDMA
- Tx Frequency Range: 1851.25 – 1908.75 MHz
- Rx Frequency Range: 1931.25 – 1988.75 MHz
- Frequency Tolerance: ± 2.5 ppm
- FCC Rule Part(s): §§§ 24(E), 2.983, 2.987
- Dates of Tests: August 26-28, 1998
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.

**9 8 0 8 2 6 5 8 8 . N 5 W**

## 1.1 INTRODUCTION

These measurement tests were conducted at ***PCTEST Engineering Laboratory, Inc.*** facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

PCTEST Lab is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. The Scope of PCTEST Accreditation are for Electromagnetic Compatibility and Telecommunications and FCC.

## 1.2 PCTEST Location

The map at right shows the location of the PCTEST Lab, its proximity to the FCC Lab, the Columbia vicinity area, the Baltimore-Washington International (BWI) airport, and the city of Baltimore, and the Washington, D.C. area. (see Figure1).

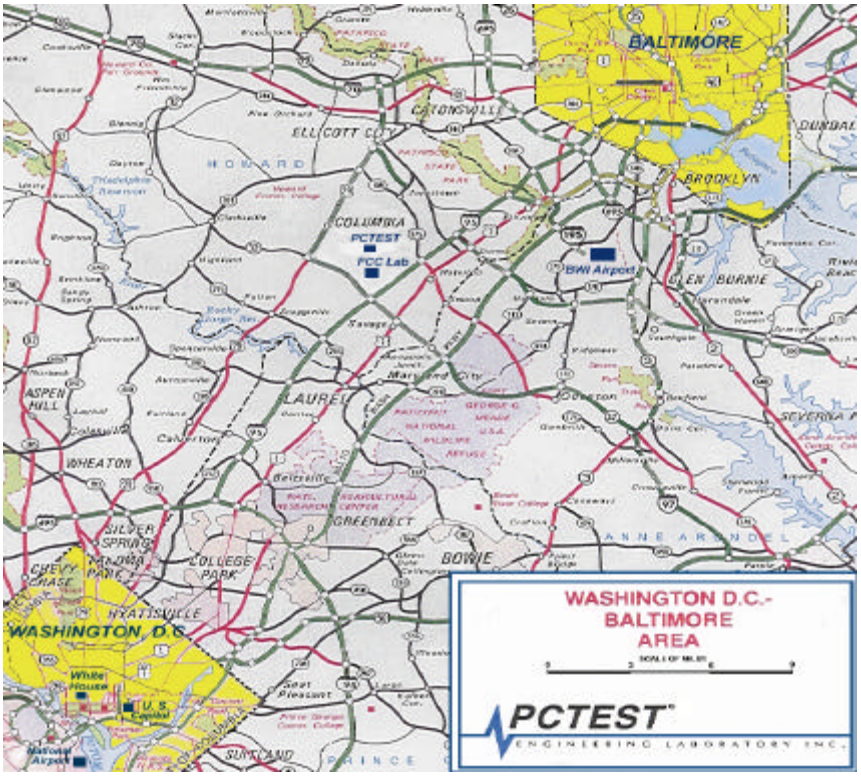


**Figure 1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.**

## 2.1 INSERTS PER §2.983(d)

### §2.983(d) Function of Active Devices

The Function of active devices are shown in Attachment L.

### §2.983(d) Circuit Diagrams & Description (Confidential)

The circuit diagrams & description are shown in Attachment J.

### §2.983(d) Block Diagrams (Confidential)

The block diagrams are shown in Attachment I.

### §2.983(d) Operating Instructions

The instruction manual is shown in Attachment M.

### §2.983(d) Tune-Up Procedure

The tune-up procedure is shown in Attachment L.

### §2.983(d) Parts List (Confidential)

The parts list is shown in Attachment L.

### §2.983(d) Description of Freq. Stabilization Circuit

The description of frequency stabilization circuit is shown in Attachment L.

### §2.983(d)( Description for Suppression of Spurious Radiation, for Limiting Modulation, and Harmonic Suppresion Circuits

The description of suppression stabilization circuits are shown in Attachment L.

# 3.1 DESCRIPTION OF TESTS

## 3.2 §24.238 Occupied Bandwidth Emission Limits

(a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

(b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

(d) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

## 3.3 §2.991 Spurious and Harmonic Emissions at Antenna Terminal

The level of the carrier and the various conducted spurious and harmonic frequencies are measured by means of a calibrated spectrum analyzer and microwave pre-amplifier. The spectrum is scanned from 10 MHz or the lowest frequency generated in the equipment up to 20 GHz. The transmitter is set to its maximum rated output power and modulated according to the manufacturer's supplied modulation characteristics.

| BLOCK | Freq. Range (MHz) Transmitter (Tx) | Freq. Range (MHz) Receiver (Rx) |
|---|---|---|
| A | 1850 - 1865 | 1930 - 1945 |
| B | 1870 - 1885 | 1950 - 1965 |
| C | 1895 - 1910 | 1975 - 1990 |
| D | 1865 - 1870 | 1945 - 1950 |
| E | 1885 - 1890 | 1965 - 1970 |
| F | 1890 - 1895 | 1970 - 1975 |

Table 1. Broadband PCS Service Frequency Blocks.

# 3.1 DESCRIPTION OF TESTS (CONTINUED)

## 3.4 §24.229 Frequencies

At the input terminals of the spectrum analyzer, an isolator (RF pad), and a high-pass filter are connected between the test transceiver (for conducted tests) or the receive antenna (for radiated tests), and the analyzer. The high-pass filter (signals below 2 GHz) is to limit the fundamental frequency from interfering with the measurement of low level spurious and harmonic emissions and to ensure that the preamplifier is not saturated.

## 3.5 §2.993 Radiation Spurious and Harmonic Emissions

Radiation and harmonic emissions above 1 GHz is measured at out 3-meter indoor site. The EUT is placed on the turntable connected to a dummy load in normal operation using the intended power source. A receiving antenna located 3 meters from the turntable receives any signal radiated from the transmitter and its operating accessories. The antenna is varied from 1 to 4 meters and the polarization is varied (horizontal and vertical) to determine the worst-case emission level. To obtain actual radiated signal strength, a signal generator is adjusted in output until a reading identical to that obtained with the actual transmitter is obtained at the receiver. Signal strength is read directly from the generator and recorded on the attached table.

## 3.6 §24.135 Frequency Stability/Temperature Variation

The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

*Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.0001 (±1 ppm) of the center frequency*.

**NOTE: The EUT is tested down to the battery endpoint.**

## 3.1 DESCRIPTION OF TESTS (Continued)

## 3.7 24.232(b) Equivalent Isotropically Radiated Power (E.I.R.P.)

The RF output power is measured via HP436A Power Meter and Sensor.

Supply Voltage: 7.2 VDC

Modulation: CDMA

| Channel No. | Nominal FREQ (MHz) | Measured Power Output (dBm) | Antenna Gain (dBi) | EIRP (dBm | EIRP (W) |
|---|---|---|---|---|---|
| 0025 | 1851.25 | 21.9 | 1.2 | 23.1 | .21 |
| 0600 | 1880.00 | 22.0 | 1.4 | 23.4 | .22 |
| 1175 | 1908.75 | 21.9 | 1.1 | 23.0 | .20 |

*Mobile / portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.*

# Test Data

## Radiated Measurements

### § 2.993 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 1851.25 MHz
CHANNEL: 0025 (Low)
MEASURED OUTPUT POWER: 23.00 dBm = 0.200 W
MODULATION SIGNAL: CDMA (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 log10 (W) = 36.01 dBc

| FREQ. (MHz) | LEVEL (dBm) | AFCL (dB) | POL (H/V) | F/S ($\mu$V/m) | EIRP (dBm) | (dBc) |
|---|---|---|---|---|---|---|
| 3702.50 | -86.8 | 44.4 | V | 1692.4 | -32.81 | 55.8 |
| 5553.75 | -118.3 | 49.7 | V | 83.2 | -58.98 | 82.0 |
| 7405.00 | -81.7 | 53.7 | V | 8912.5 | -18.38 | 41.4 |
| 9256.25 | -106.0 | 57.2 | V | 812.8 | -39.18 | 62.2 |
| 11107.50 | < -130 | | | | | |
| | | | | | | |
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| | | | | | | |

**NOTES:**

1. The bandwidth is set per §24.238.
2. The spectrum was checked from 25 MHz up to the 10th harmonic.
3. All emissions not listed were found to be more than 20dB below the limit.
4. < -130dBm is below the floor of the spectrum analyzer.
5. The EUT is manipulated through 3 orthogonal axis and the worst-case are reported.
6. The EUT is placed 3m. Away from the receiving antenna and the EIRP is calculated using the formula:

   EIRP (dBm) = 10Log10(((r(mV/m)/1 x 106)2/49.2/1x10-3

   EIRP (dBm) = 10Log10[(3 x FS/1 x 106)2 / (49.2) x 1000]

   EIRP (dBm) = [3 x FS)/1 x 106]2 / 49.2

# Test Data

## Radiated Measurements

### § 2.993 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 1880.00 MHz
CHANNEL: 0600 (Middle)
MEASURED OUTPUT POWER: 23.00 dBm = 0.200 W
MODULATION SIGNAL: CDMA (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 log10 (W) = 36.01 dBc

| FREQ. (MHz) | LEVEL (dBm) | AFCL (dB) | POL (H/V) | F/S ($\mu$V/m) | EIRP (dBm) | (dBc) |
|---|---|---|---|---|---|---|
| 3760.00 | -84.0 | 44.7 | V | 2426.6 | -29.68 | 52.7 |
| 5640.00 | -100.6 | 49.9 | V | 653.1 | -41.08 | 64.1 |
| 7520.00 | -82.1 | 54.0 | V | 8810.5 | -18.48 | 41.5 |
| 9400.00 | -101.5 | 57.4 | V | 1396.4 | -34.48 | 57.5 |
| 11280.00 | < -130 | | | | | |
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**NOTES:**

1. The bandwidth is set per §24.238.
2. The spectrum was checked from 25 MHz up to the 10th harmonic.
3. All emissions not listed were found to be more than 20dB below the limit.
4. < -130dBm is below the floor of the spectrum analyzer.
5. The EUT is manipulated through 3 orthogonal axis and the worst-case are reported.
6. The EUT is placed 3m. Away from the receiving antenna and the EIRP is calculated using the formula:
   EIRP (dBm) = $10Log_{10}(((r(mV/m)/1 \times 10^6)^2/49.2/1x10^{-3}$
   EIRP (dBm) = $10Log_{10}[(3 \times FS/1 \times 10^6)^2 / (49.2) \times 1000]$
   EIRP (dBm) = $[3 \times FS)/1 \times 10^6]^2 / 49.2$

# Test Data

## Radiated Measurements

### § 2.993 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 1908.75 MHz
CHANNEL: 1175 (High)
MEASURED OUTPUT POWER: 23.00 dBm = 0.200 W
MODULATION SIGNAL: CDMA (Internal)
DISTANCE: 3 meters
LIMIT: 43 + 10 log10 (W) = 36.01 dBc

| FREQ. (MHz) | LEVEL (dBm) | AFCL (dB) | POL (H/V) | F/S ($\mu$V/m) | EIRP (dBm) | (dBc) |
|---|---|---|---|---|---|---|
| 3817.50 | -84.5 | 45.0 | V | 2371.4 | -29.88 | 52.9 |
| 5726.25 | -104.9 | 50.1 | V | 407.4 | -45.18 | 68.2 |
| 7635.00 | -79.5 | 54.2 | V | 12161.9 | -15.68 | 38.7 |
| 9543.75 | -93.8 | 57.7 | V | 3507.5 | -26.48 | 49.5 |
| 11452.50 | < -130 | | | | | |
| | | | | | | |
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**NOTES:**

1. The bandwidth is set per §24.238.
2. The spectrum was checked from 25 MHz up to the 10th harmonic.
3. All emissions not listed were found to be more than 20dB below the limit.
4. < -130dBm is below the floor of the spectrum analyzer.
5. The EUT is manipulated through 3 orthogonal axis and the worst-case are reported.
6. The EUT is placed 3m. Away from the receiving antenna and the EIRP is calculated using the formula:
   EIRP (dBm) = $10Log_{10}(((r(mV/m)/1 \times 10^6)^2/49.2/1x10^{-3}$
   EIRP (dBm) = $10Log_{10}[(3 \times FS/1 \times 10^6)^2 / (49.2) \times 1000]$
   EIRP (dBm) = $[3 \times FS)/1 \times 10^6]^2 / 49.2$

# Test Data

## § 24.135 FREQUENCY STABILITY

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 600

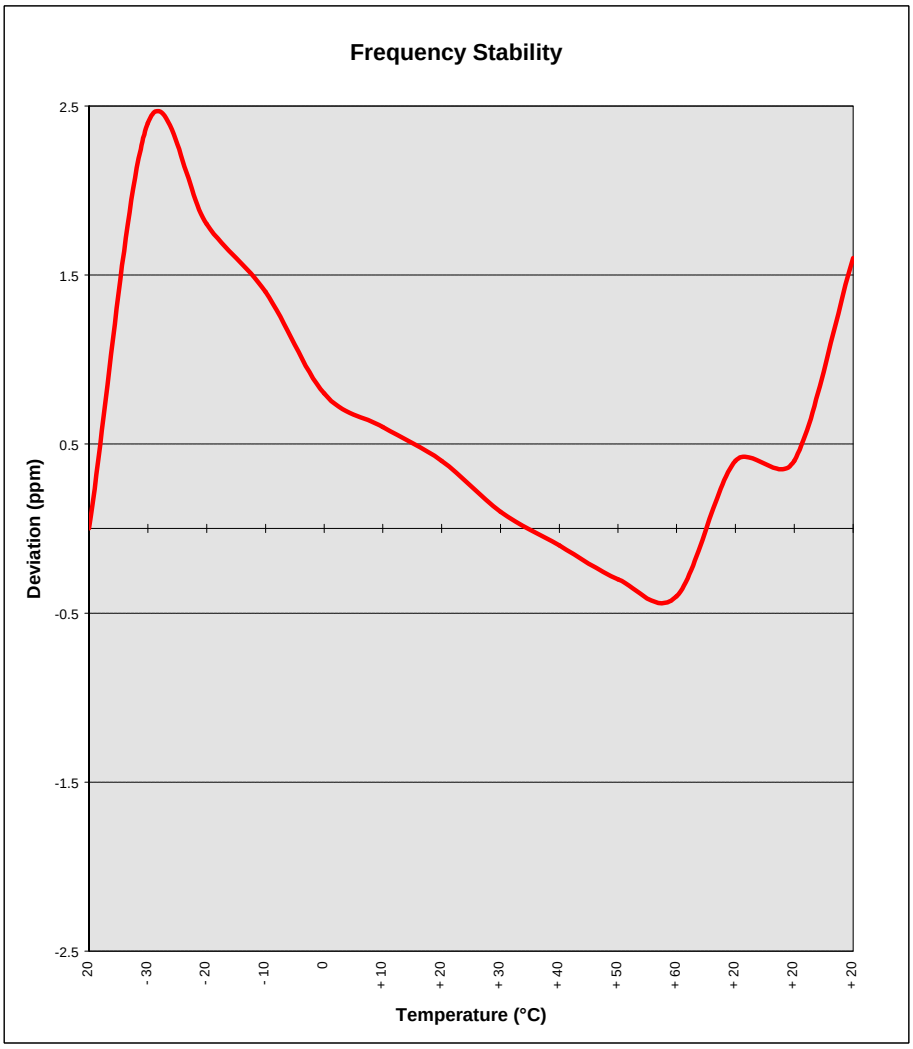
REFERENCE VOLTAGE: 7.2 VDC

DEVIATION LIMIT: 0.00025 % or 2.5 ppm

| VOLTAGE (%) | POWER (VDC) | TEMP (ºC) | FREQ. (Hz) | Deviation (%) |
|---|---|---|---|---|
| 100 % | 7.20 | + 20 (Ref) | 1,880,000,000 | 0.000000 |
| 100 % | | - 30 | 1,879,995,488 | 0.000240 |
| 100 % | | - 20 | 1,879,996,616 | 0.000180 |
| 100 % | | - 10 | 1,879,997,368 | 0.000140 |
| 100 % | | 0 | 1,879,998,496 | 0.000080 |
| 100 % | | + 10 | 1,879,998,872 | 0.000060 |
| 100 % | | + 20 | 1,879,999,248 | 0.000040 |
| 100 % | | + 30 | 1,879,999,812 | 0.000010 |
| 100 % | | + 40 | 1,880,000,188 | -0.000010 |
| 100 % | | + 50 | 1,880,000,564 | -0.000030 |
| 100 % | | + 60 | 1,880,000,752 | -0.000040 |
| 85 % | 6.12 | + 20 | 1,879,999,248 | 0.000040 |
| 115 % | 8.28 | + 20 | 1,879,999,248 | 0.000040 |
| BATT. ENDPOINT | 4.20 | + 20 | 1,879,996,992 | 0.000160 |

# Test Data

## § 24.135 FREQUENCY STABILITY



## 5.1 PLOT(S) OF EMISSIONS

(SEE ATTACHMENT D)

## 6.1 TEST EQUIPMENT

| 6.2 Type | Model | Cal. Due Date | S/N |
|---|---|---|---|
| Microwave Spectrum Analyzer | HP 8566B (100Hz-22GHz) | 08/15/99 | 3638A08713 |
| Microwave Spectrum Analyzer | HP 8566B (100Hz-22GHz) | 04/17/99 | 2542A11898 |
| Spectrum Analyzer/Tracking Gen. | HP 8591A (100Hz-1.8GHz) | 08/10/99 | 3144A02458 |
| Signal Generator* | HP 8640B (500Hz-1GHz) | 08/09/99 | 2232A19558 |
| Signal Generator* | HP 8640B (500Hz-1GHz) | 08/09/99 | 1851A09816 |
| Signal Generator* | Rohde & Schwarz (0.1-1000MHz) | 09/11/98 | 894215/012 |
| Ailtech/Eaton Receiver | NM 37/57A-SL (30-1000MHz) | 04/12/99 | 0792-03271 |
| Ailtech/Eaton Receiver | NM 37/57A (30-1000MHz) | 03/11/99 | 0805-03334 |
| Ailtech/Eaton Receiver | NM 17/27A (0.1-32MHz) | 09/17/98 | 0608-03241 |
| Quasi-Peak Adapter | HP 85650A | 08/15/99 | 2043A00301 |
| Ailtech/Eaton Adapter | CCA-7 CISPR/ANSI QP Adapter | 03/11/99 | 0194-04082 |
| RG58 Coax Test Cable | No. 167 | | n/a |
| Harmonic/Flicker Test System | HP 6841A (IEC 555-2/3) | | 3531A00115 |
| Broadband Amplifier (2) | HP 8447D | | 1145A00470, 1937A03348 |
| Broadband Amplifier | HP 8447F | | 2443A03784 |
| Transient Limiter | HP 11947A (9kHz-200MHz) | | 2820A00300 |
| Horn Antenna | EMCO Model 3115 (1-18GHz) | | 9704-5182 |
| Horn Antenna | EMCO Model 3115 (1-18GHz) | | 9205-3874 |
| Horn Antenna | EMCO Model 3116 (18-40GHz) | | 9203-2178 |
| Biconical Antenna (4) | Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance Design 1295, 1332, 0355 | | |
| Log-Spiral Antenna (3) | Ailtech/Eaton 93490-1 | | 0608, 1103, 1104 |
| Roberts Dipoles | Compliance Design (1 set) | | |
| Ailtech Dipoles | DM-105A (1 set) | | 33448-111 |
| EMCO LISN | 3816/2 | | 1079 |
| EMCO LISN | 3816/2 | | 1077 |
| EMCO LISN | 3725/2 | | 2009 |
| Microwave Preamplifier 40dB Gain | HP 83017A (0.5-26.5GHz) | | 3123A00181 |
| Microwave Cables | MicroCoax (1.0-26.5GHz) | | |
| Ailtech/Eaton Receiver | NM37/57A-SL | | 0792-03271 |
| Spectrum Analyzer | HP 8594A | | 3051A00187 |
| Spectrum Analyzer (2) | HP 8591A | | 3034A01395, 3108A02053 |
| Modulation Analyzer | HP 8901A | | 2432A03467 |
| NTSC Pattern Generator | Leader 408 | | 0377433 |
| Noise Figure Meter | HP 8970B | | 3106A02189 |
| Noise Figure Meter | Ailtech 7510 | | TE31700 |
| Noise Generator | Ailtech 7010 | | 1473 |
| Microwave Survey Meter | Holaday Model 1501 (2.450GHz) | | 80931 |
| Digital Thermometer | Extech Instruments 421305 | | 426966 |
| Attenuator | HP 8495A (0-70dB) DC-4GHz | | |
| Bi-Directional Coax Coupler | Narda 3020A (50-1000MHz) | | |
| Shielded Screen Room | RF Lindgren Model 26-2/2-0 | | 6710 (PCT270) |
| Shielded Semi-Anechoic Chamber | Ray Proof Model S81 | | R2437 (PCT278) |
| Enviromental Chamber | Associated Systems Model 1025 (Temperature/Humidity) | | PCT285 |

* Calibration traceable to the National Institute of Standards and Technology (NIST).

## 7.1 SAMPLE CALCULATIONS

Level μ/Vm @ 3 meters = $\text{Log } 10^{\frac{-1}{20}}$ (dBm + 107 + AFCL)

$$\text{Log } 10^{\frac{-1}{20}} (-14 + 107 + 31.7)$$

1717908.4 μ/Vm @ 3 meters

Sample Calculation (relative to a dipole)

EIRP (dBm) = $10 \text{ Log}_{10} (((r(\mu V/m)1x10^{6})^{2}/49.2/1x10^{-3})$

EIRP (dBm) = $10 \text{ Log}_{10}(((3(1717908.4)1x10^{6})^{2}/49.2/1x10^{-3})$

**EIRP (dBm) = 27.32**

## 8.1 RECOMMENDATION/CONCLUSION

The data collected shows that the **Innovative Global Solution, Inc. PCS CDMA Phone FCC ID: N5WNP1PSBSM01** complies with all the requirements of Parts 2 and 24 of the FCC rules.