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
FCC Part 24 Certification

AXESSTEL, Inc.
6480 Weathers Place
Suite 300
San Diego, CA 92121
Attn: Mr. David S. Kim
Product Manager

Dates of Tests: March 29, 2001
Test Report S/N: 24.210323179.PH7
Test Site: PCTEST Lab, Columbia MD U.S.A.

FCC ID	**PH7ACWP1900**
APPLICANT	**AXESSTEL, Inc.**

FCC Classification:	**Licensed Base Station for Part 24 (PCB)**
FCC Rule Part(s):	**§24(E), §2**
EUT Type:	**PCS CDMA WLL Phone**
Trade Name/Model(s):	***AXESSTEL ACW-P1900***
Tx Frequency Range:	**1850 ~ 1910 MHz**
Rx Frequency Range:	**1930 ~ 1990 MHz**
Max. RF Output Power:	**0.322 W EIRP (25.081 dBm)**
Frequency Tolerance:	**0.00025% (2.5 ppm)**
Emission Designator:	**1M25F9W**

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):

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

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LAB CODE 100431-0

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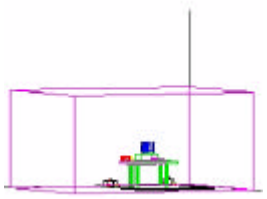
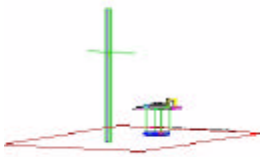


MEASUREMENT REPORT



1.1 Scope

Product Evaluation 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.

General Information

Applicant Name:	**AXESSTEL, Inc.**
Address:	**6480 Weathers Place, Suite 300**
	San Diego, CA 92121
Attention:	**David S. Kim, Product Manager**

- FCC ID: **PH7ACWP1900**
- Trade Name: ***AXESSTEL***
- Model(s): ***ACW-P1900***
- Quantity: Quantity production is planned
- Emission Designator: 1M25F9W
- Tx Freq. Range: 1850 – 1910 MHz
  Rx Freq. Range: *1930* – 1990 MHz
- Equipment Class: Licensed Base Station for Part 24 (PCB)
- Equipment Type: PCS CDMA WLL Phone
- Modulation: CDMA
- Frequency Tolerance: ± 0.00025% (2.5 ppm)
- Max. RF Output Power: 0.322 W EIRP (25.081 dBm)
- FCC Rule Part(s): §24(E), §2
- Dates of Tests: March 29, 2001
- Place of Tests: PCTEST Lab, Columbia, MD U.S.A.
- Test Report S/N: 24.210323179.PH7

2.1 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.

2.2 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).

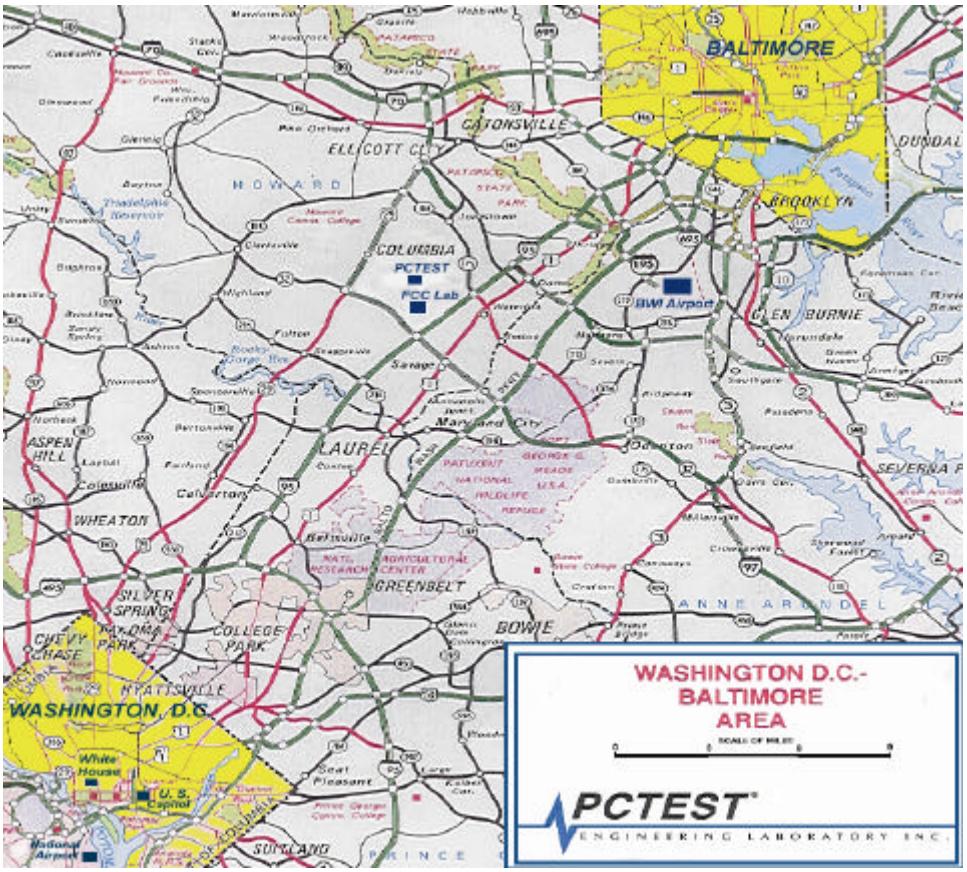


Figure 1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.

3.1 INSERTS

Function of Active Devices (Confidential)

The Function of active devices are shown in Attachment L.

Circuit Diagrams & Description (Confidential)

The circuit diagrams and description are shown in Attachment J.

Block Diagrams (Confidential)

The block diagrams are shown in Attachment I.

Operating Instructions

The instruction manual is shown in Attachment M.

Tune-Up Procedure (Confidential)

The tune-up procedure is shown in Attachment K.

Parts List (Confidential)

The parts list is shown in Attachment K.

Description of Freq. Stabilization Circuit (Confidential)

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

Description for Suppression of Spurious Radiation, for Limiting Modulation, and Harmonic Suppresion Circuits (Confidential)

The description of suppression stabilization circuits is shown in Attachment J.

4.1 DESCRIPTION OF TESTS

4.2 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.

4.3 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.

4.1 DESCRIPTION OF TESTS (CONTINUED)

4.4 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.

4.5 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.

4.6 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.

5.1 Test Data

Equivalent Isotropic Radiated Power (E.I.R.P.)

Radiated measurements at 3 meters

Supply Voltage: 9.6 VDC

Modulation: PCS CDMA

FREQ. (MHz)	LEVEL (dBm)	AFCL (dB)	POL (H/V)	Height (m)	Azimuth (o angle)	F/S (μV/m)	Margin (dBm)	EIRP (W)
1851.25	-22.000	35.31	H	1.3	60.0	1036334.6	25.081	0.322
1880.00	-22.500	35.48	H	1.3	60.0	997700.1	24.751	0.299
1908.75	-22.600	35.65	H	1.3	60.0	1005773.1	24.821	0.303

NOTES:

1. The bandwidth is set per §24.238 (RBW = 3MHz, VBW = 3MHz).
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) $= 10 \text{ Log}_{10} (((r(mV/m)/1 \times 10^{6})^2 / 30.0/1 \times 10^{-3})$

   EIRP (dBm) $= 10 \text{ Log}_{10} [(3 \times FS/1 \times 10^{6})^2 / (30.0) \times 1000]$

   EIRP (Watts) $= \{(3 \times FS)/1 \times 10^{6}\}^2 / 30.0$

6.1 Test Data

Radiated Measurements

6.2 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	1851.25	MHz	
CHANNEL:	0025 (Low)		
MEASURED OUTPUT POWER:	25.08 dBm =	0.322	W
MODULATION SIGNAL:	CDMA (Internal)		
DISTANCE:	3	meters	
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.08	dBc

FREQ. (MHz)	LEVEL (dBm)	AFCL (dB)	POL (H/V)	F/S (μV/m)	EIRP (dBm)	(dBc)
3702.50	-88.5	44.4	H	1391.6	-32.36	57.4
5553.75	-117.6	49.7	H	90.2	-56.13	81.2
7405.00	-120.5	53.7	H	102.9	-54.98	80.1
9256.25	-126.8	57.2	H	74.6	-57.78	82.9
11107.50	< -130					

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) = $10\text{Log}_{10}(((r(\text{mV/m})/1 \times 10^6)^2/30.0/1\text{x}10^{-3}$
   EIRP (dBm) = $10\text{Log}_{10}[(3 \times \text{FS}/1 \times 10^6)^2 / (30.0) \times 1000]$
   EIRP (Watts) = $[3 \times \text{FS})/1 \times 10^6]^2 / 30.0$

6.1 Test Data (Continued)

Radiated Measurements

6.3 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	1880.00	MHz	
CHANNEL:	0600 (Middle)		
MEASURED OUTPUT POWER:	25.08 dBm =	0.322	W
MODULATION SIGNAL:	CDMA (Internal)		
DISTANCE:	3	meters	
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.08	dBc

FREQ. (MHz)	LEVEL (dBm)	AFCL (dB)	POL (H/V)	F/S (μV/m)	EIRP (dBm)	(dBc)
3760.00	-88.5	44.7	H	1445.4	-32.03	57.1
5640.00	-118.0	49.9	H	88.1	-56.33	81.4
7520.00	-119.7	54.0	H	116.5	-53.90	79.0
9400.00	-125.9	57.4	H	84.1	-56.73	81.8
11280.00	< -130					

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) = $10\text{Log}_{10}(((r(\text{mV/m})/1 \times 10^6)^2/30.0/1\text{x}10^{-3}$
   EIRP (dBm) = $10\text{Log}_{10}[(3 \times \text{FS}/1 \times 10^6)^2 / (30.0) \times 1000]$
   EIRP (Watts) = $[3 \times \text{FS})/1 \times 10^6]^2 / 30.0$

6.1 Test Data (Continued)

Radiated Measurements

6.4 Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	1908.75	MHz	
CHANNEL:	1175 (High)		
MEASURED OUTPUT POWER:	25.08 dBm =	0.322	W
MODULATION SIGNAL:	CDMA (Internal)		
DISTANCE:	3	meters	
LIMIT:	43 + 10 $\log_{10}$ (W) =	38.08	dBc

FREQ. (MHz)	LEVEL (dBm)	AFCL (dB)	POL (H/V)	F/S (μV/m)	EIRP (dBm)	(dBc)
3817.50	-88.1	45.0	H	1566.8	-31.33	56.4
5726.25	-118.3	50.1	H	87.1	-56.43	81.5
7635.00	-116.8	54.2	H	166.0	-50.83	75.9
9543.75	-126.2	57.7	H	84.1	-56.73	81.8
11452.50	< -130					

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) = $10\text{Log}_{10}(((r(\text{mV/m})/1 \times 10^6)^2/30.0/1\text{x}10^{-3}$
   EIRP (dBm) = $10\text{Log}_{10}[(3 \times \text{FS}/1 \times 10^6)^2 / (30.0) \times 1000]$
   EIRP (Watts) = $[3 \times \text{FS})/1 \times 10^6]^2 / 30.0$

7.1 Test Data

7.2 FREQUENCY STABILITY

OPERATING FREQUENCY: 1880000012 Hz

CHANNEL: 600

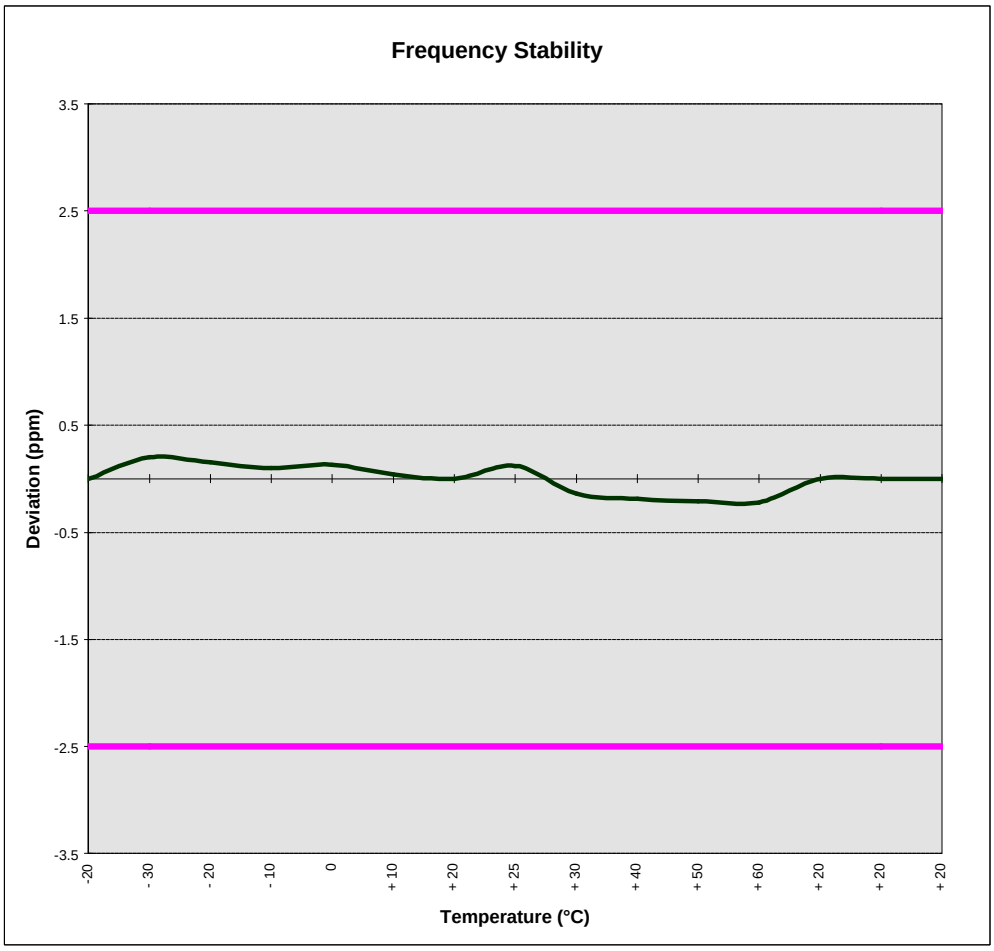
REFERENCE VOLTAGE: 4.8 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (ºC)	FREQ. (Hz)	Deviation (%)
100 %	4.80	+ 20 (Ref)	1880000012	0.000000
100 %		- 30	1,879,999,636	0.000020
100 %		- 20	1,879,999,730	0.000015
100 %		- 10	1,879,999,824	0.000010
100 %		0	1,879,999,768	0.000013
100 %		+ 10	1,879,999,937	0.000004
100 %		+ 20	1,880,000,012	0.000000
100 %		+ 25	1,879,999,786	0.000012
100 %		+ 30	1,880,000,275	-0.000014
100 %		+ 40	1,880,000,369	-0.000019
100 %		+ 50	1,880,000,407	-0.000021
100 %		+ 60	1,880,000,426	-0.000022
85 %	4.08	+ 20	1,880,000,012	0.000000
115 %	5.52	+ 20	1,880,000,012	0.000000
BATT. ENDPOINT	2.95	+ 20	1,880,000,012	0.000000

7.1 Test Data (Continued)

7.3 FREQUENCY STABILITY



8.1 PLOT(S) OF EMISSIONS

(SEE ATTACHMENT D)

9.1 TEST EQUIPMENT

9.2 Type	Model	Cal. Due Date	S/N
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	08/15/02	3638A08713
Microwave Spectrum Analyzer	HP 8566B (100Hz-22GHz)	04/17/02	2542A11898
Spectrum Analyzer/Tracking Gen.	HP 8591A (100Hz-1.8GHz)	08/10/02	3144A02458
Signal Generator*	HP 8640B (500Hz-1GHz)	06/03/02	2232A19558
Signal Generator*	HP 8640B (500Hz-1GHz)	06/03/02	1851A09816
Signal Generator*	Rohde & Schwarz (0.1-1000MHz)	09/11/02	894215/012
Ailtech/Eaton Receiver	NM 37/57A-SL (30-1000MHz)	04/12/02	0792-03271
Ailtech/Eaton Receiver	NM 37/57A (30-1000MHz)	03/11/02	0805-03334
Ailtech/Eaton Receiver	NM 17/27A (0.1-32MHz)	09/17/02	0608-03241
Quasi-Peak Adapter	HP 85650A	08/15/02	2043A00301
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	03/11/02	194-04082
Gigatronics Universal Power Meter	8657A		1835256
Gigatronics Power Sensor	80701A (0.05-18GHz)		1833460
Signal Generator	HP 8648D (9kHz-4GHz)		3613A00315
Amplifier Research	5S1G4 (5W, 800MHz-4.2GHz)		22322
Network Analyzer	HP 8753E (30kHz-3GHz)		JP38020182
Audio Analyzer	HP 8903B		3011A09025
Modulation Analyzer	HP 8901A		2432A03467
Power Meter	HP 437B		3125U24437
Power Sensor	HP 8482H (30µW-3W)		2237A02084
Harmonic/Flicker Test System	HP 6841A (IEC 555-2/3)		3531A00115
Broadband Amplifier (2)	HP 8447D		1145A00470, 1937A03348
Broadband Amplifier	HP 8447F		2443A03784
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 (6)	3816/2		1079
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
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).

10.1 SAMPLE CALCULATIONS

A. EIRP Calculation

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

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

1717908.4 µ/Vm @ 3 meters

Sample Calculation (relative to a dipole)

EIRP (dBm) = $10\ \text{Log}_{10}(((r(\mu V/m)1x10^{6})^{2}/30.0/1x10^{-3})$

EIRP (dBm) = $10\ \text{Log}_{10}(((3(1717908.4)1x10^{6})^{2}/30.0/1x10^{-3})$

EIRP (dBm) = 29.46

B. Emission Designator

CDMA Sample

2M + 2DK

CDMA BW = 1.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

Emission Designator = 1M25F9W

11.1 CONCLUSION

The data collected shows that the **AXESSTEL, Inc., PCS CDMA WLL Phone FCC ID: PH7ACWP1900** complies with all the requirements of Parts 2 and 24 of the FCC rules.