

**KTL Test Report:** 8L0174EUS

**Applicant:** Airtech Wireless, Inc.  
1420 Valwood Pkwy., Suite 200  
Carrollton, TX. 75006

**Equipment Under Test:  
(E.U.T.)** PCS 1900 Booster, Single Feed - Single Antenna

**FCC ID:** OGAS21008

**In Accordance With:** **FCC Part 24, Subpart E**  
Broadband PCS Repeaters

**Tested By:** KTL Dallas, Inc.  
802 N. Kealy  
Lewisville, TX 75057-3136

**Authorized By:** \_\_\_\_\_  
T. Tidwell, Laboratory Manager

**Date:** 03/31/99

**Total Number of Pages:** 51

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*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
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**Annex A - Test Methodologies**

- RF Power Output
- Occupied Bandwidth (CDMA)
- Occupied Bandwidth (GSM)
- Occupied Bandwidth (NADC)
- Spurious Emission at Antenna Terminals
- Field Strength of Spurious
- Frequency Stability

**Annex B - Test Diagrams**

- R.F. Power Output
- Occupied Bandwidth
- Spurious Emissions at Antenna Terminals
- Field Strength of Spurious
- Frequency Stability

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Section 1. Summary of Test Results**

**General:**

Manufacturer: Airtech Wireless, Inc.

Model No.: PCS 1900 Booster, Single Feed - Single Antenna

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24, Subpart E.

New Submission

Production Unit

Class II Permissive Change

Pre-Production Unit

A	M	P
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Equipment Code

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE: **NONE.**



**NVLAP LAB CODE: 100351-0**

TESTED BY: Ron Gaytan DATE: 03/29/99  
Ron Gaytan, RF Senior Technician

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*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
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**Summary Of Test Data:**

<b>NAME OF TEST</b>	<b>PARA. NO.</b>	<b>SPEC.</b>	<b>MEAS.</b>	<b>RESULT</b>
RF Power Output	24.232	20W	19.9526	Complies
Occupied Bandwidth (CDMA)	24.238	Input/Output	See Plots	Complies
Occupied Bandwidth (GSM)	24.238	Input/Output	See Plots	Complies
Occupied Bandwidth (NADC)	24.238	Input/Output	See Plots	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	-14.1	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	58.6	Complies
Frequency Stability	24.235	N/A*	N/A*	N/A*

\*The E.U.T. is an amplifier; therefore, Frequency Stability is not applicable.

**Test Conditions:**

**Indoor:**      Temperature: 24°C  
                  Humidity:     42%

**Outdoor:**    Temperature: 22°C  
                  Humidity:     40%

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**Section 2. General Equipment Specification**

**Specifications:**

**Supply Voltage Input:** 12 V DC

**Frequency Range:** Downlink: 1930-1990 MHz

**Frequency Range:** Uplink: 1850-1910 (Connected to base station via coaxial cable.)

**Type of Modulation and Designator:**

<b>CDMA (F9W)</b>	<b>GSM (GXW)</b>	<b>NADC (DXW)</b>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**Output Impedance:** 50 Ohms

**Gain:** 2-12 dB

**Nominal Input Power from BTS:** +31 dBm

**RF Output (Rated):** Single: 20 Watts  
 Composite: N/A

**Frequency Translation:**

<b>F1-F1</b>	<b>F1-F2</b>	<b>N/A</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**Band Selection:**

<b>Software</b>	<b>Duplexer Change</b>	<b>Fullband Coverage</b>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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FCC PART 24, SUBPART E  
BROADBAND PCS REPEATERS  
REPORT NO.: 8L0174EUS

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*

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**Description of Modifications for Class II Permissive Change:**

**Not Applicable**

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FCC PART 24, SUBPART E  
BROADBAND PCS REPEATERS  
REPORT NO.: 8L0174EUS

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*FCC ID: OGAS21008*

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**Modifications Made During Testing:**

**Not Applicable**



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*

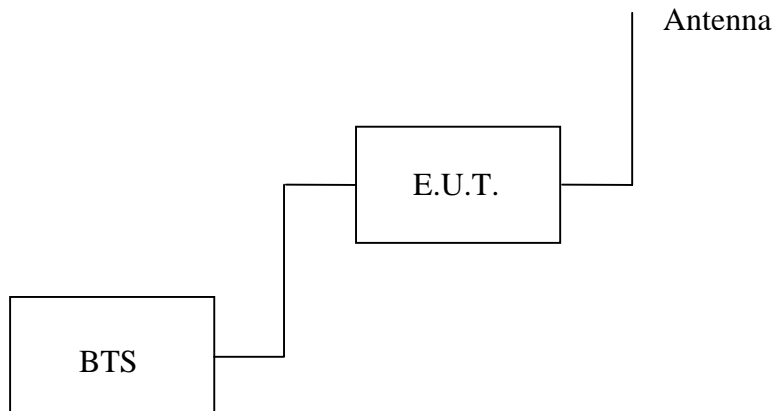
*FCC ID: OGAS21008*

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**Theory of Operation:**

The E.U.T. is a booster amplifier installed at the masthead of a PCS 1900 MHz GSM/TDMA system. The booster amplifier is fed with a signal level of +31 dBm and delivers 20 watts nominally to the transmit antenna.

**System Diagram:**



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Section 3. RF Power Output**

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: Ron Gaytan	DATE: 03/24/99, 03/29/99

**Test Results:** Complies.

**Test Data:** See attached tables.

	<b>Modulation Type</b>	<b>Per Channel Output Power (dBm)</b>	<b>Composite Output Power (dBm)</b>
Uplink	CDMA	N/A	N/A
Downlink	CDMA	N/A	N/A
Uplink	GSM	26.95	N/A
Downlink	GSM	43.07	N/A
Uplink	NADC	29.2	N/A
Downlink	NADC	43	N/A

See test data on the following page.

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
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**GSM Modulation Data Sheet:**

Freq. (GHz)	Meter Reading (dBm)	Attn. (dB)	Cable Loss (dB)	Correction Factor (dB)	Corrected Reading (dBm)	Corrected Reading (Watts)	Pol.	Comments:
1.93125	12.67	30	0.4		43.07	20.2768	N/A	
1.93125	-3.45	30	0.4		26.95	0.4955	N/A	Input Power Level

**NADC Modulation Data Sheet:**

Freq. (GHz)	Meter Reading (dBm)	Attn. (dB)	Cable Loss (dB)	Correction Factor (dB)	Corrected Reading (dBm)	Corrected Reading (Watts)	Pol.	Comments:
1.93125	12.6	30	0.4		43	19.9526	N/A	
1.93125	-1.2	30	0.4		29.2	0.8318	N/A	Input Power Level

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Section 4. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth (CDMA)	PARA. NO.: 2.1049
TESTED BY: N/A	DATE: N/A

**Not Applicable**

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BROADBAND PCS REPEATERS  
REPORT NO.: 8L0174EUS

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*FCC ID: OGAS21008*

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NAME OF TEST: Occupied Bandwidth (GSM)	PARA. NO.: 2.1049
TESTED BY: Ron Gaytan	DATE: 03/29/99

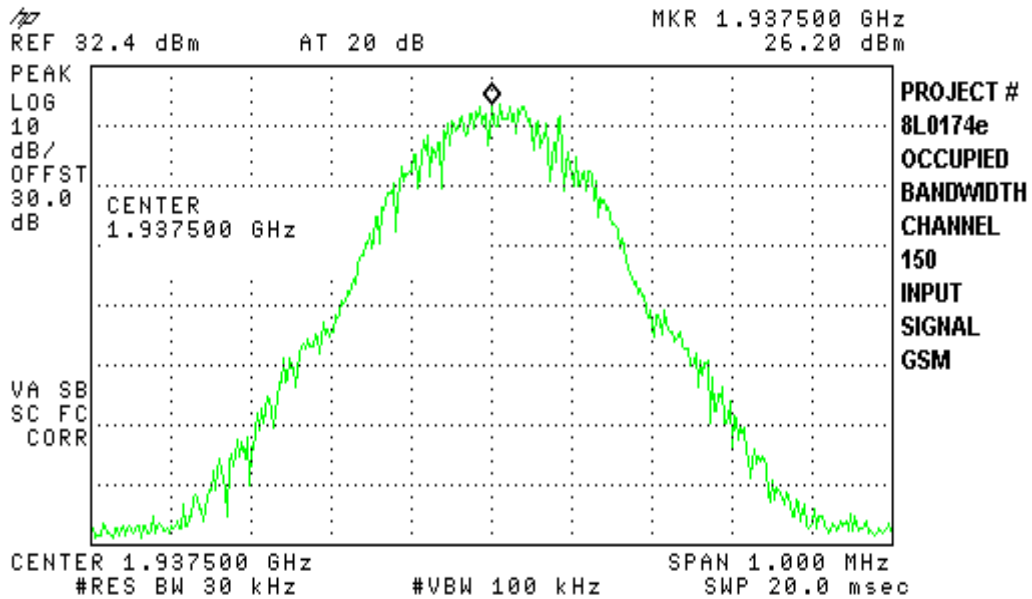
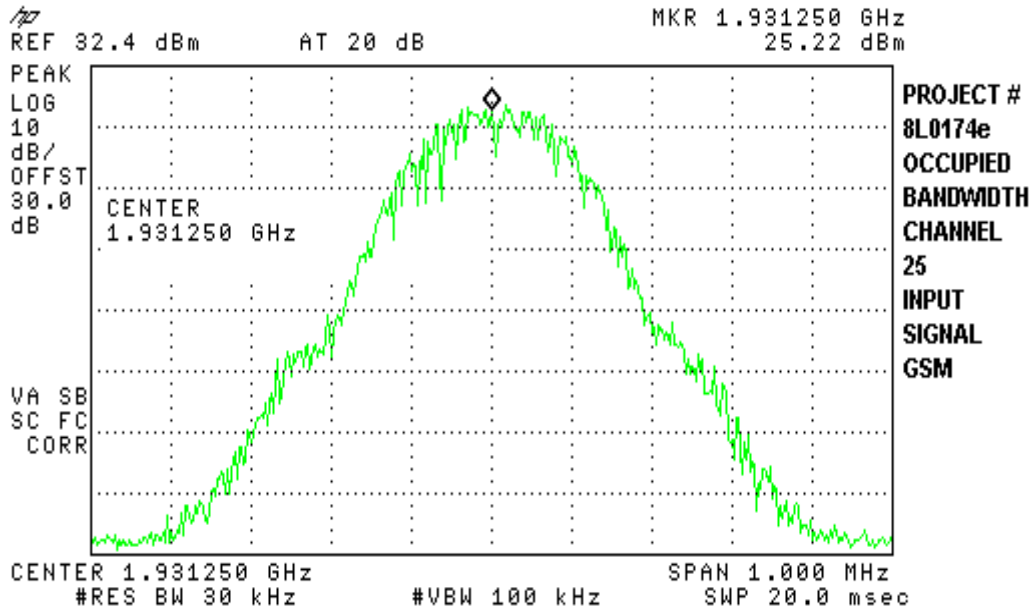
**Test Results:** Complies.

**Test Data:** See attached graph(s).

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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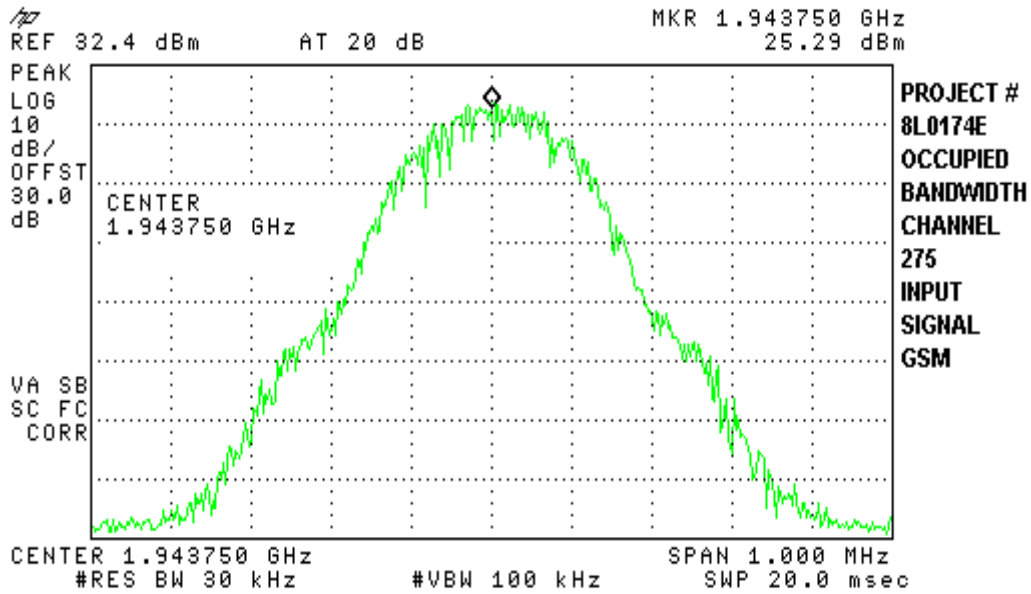
**Input Signal:**



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

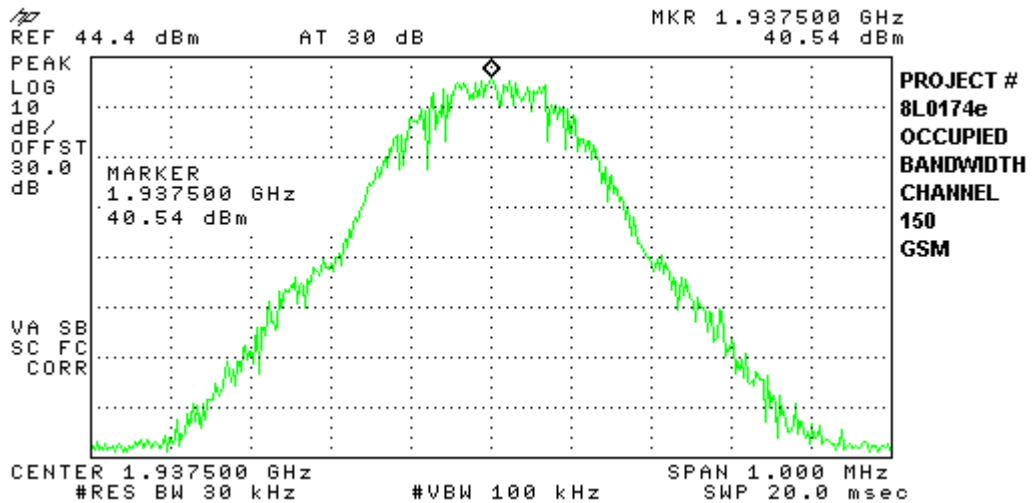
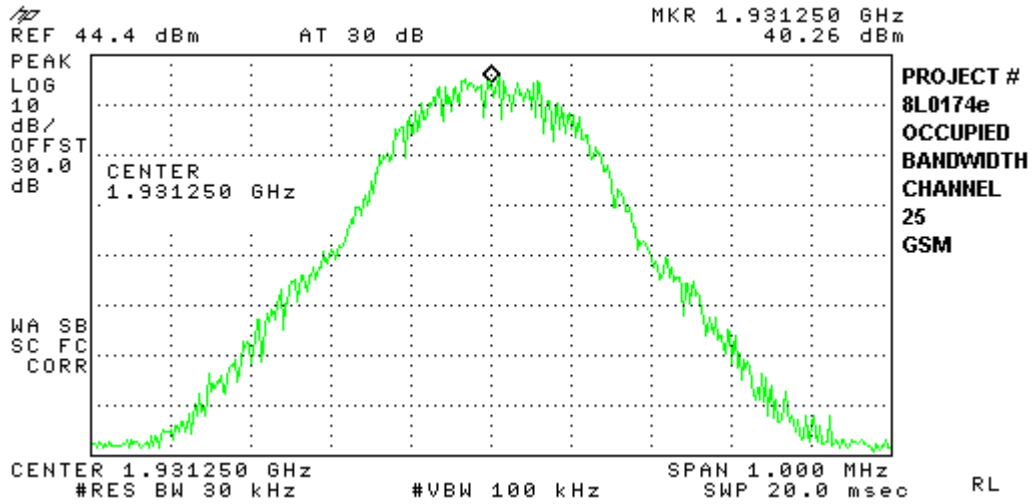
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**Input Signal (Continued):**



EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna  
FCC ID: OGAS21008

Max Power:

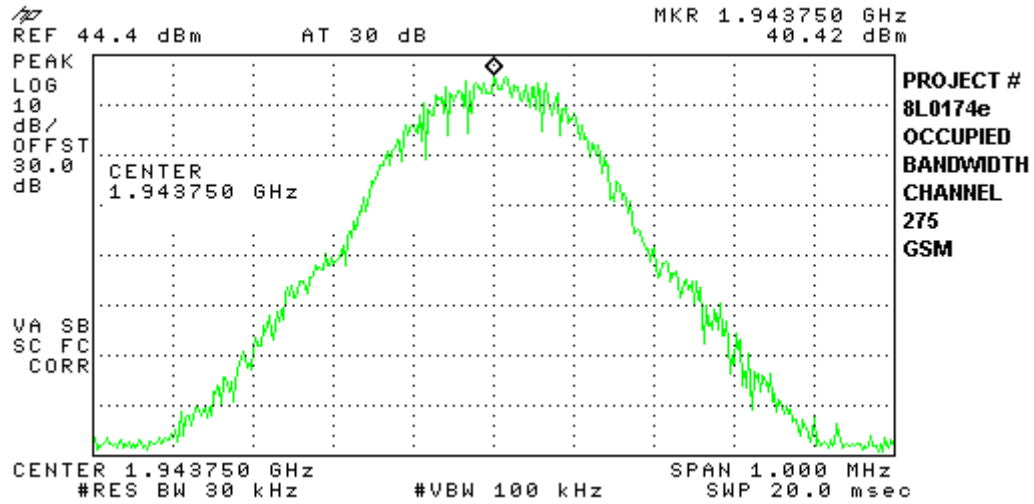




*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Max Power (Continued):**



**KTL Dallas, Inc.**

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BROADBAND PCS REPEATERS  
REPORT NO.: 8L0174EUS

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*

*FCC ID: OGAS21008*

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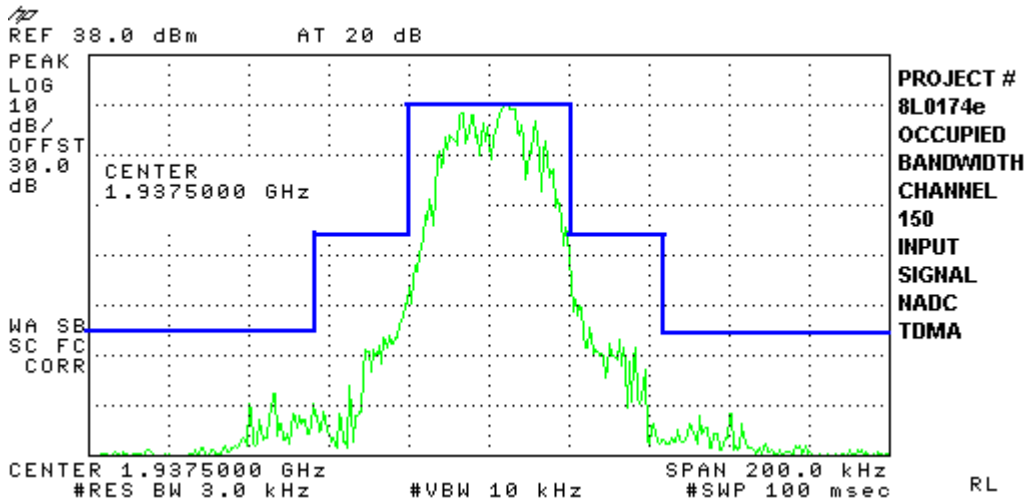
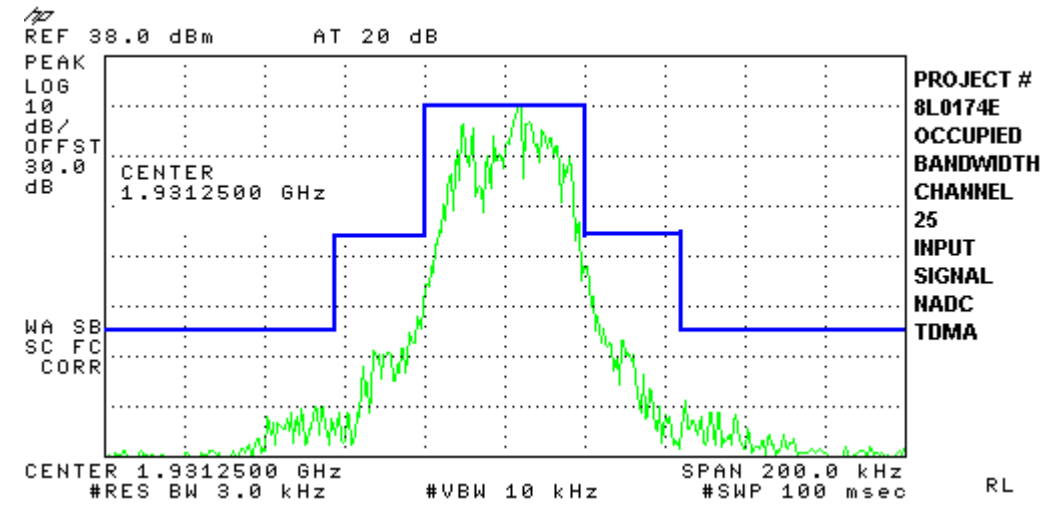
NAME OF TEST: Occupied Bandwidth (NADC)	PARA. NO.: 2.1049
TESTED BY: Ron Gaytan	DATE: 03/29/99

**Test Results:** Complies.

**Test Data:** See attached graph(s).

EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna  
FCC ID: OGAS21008

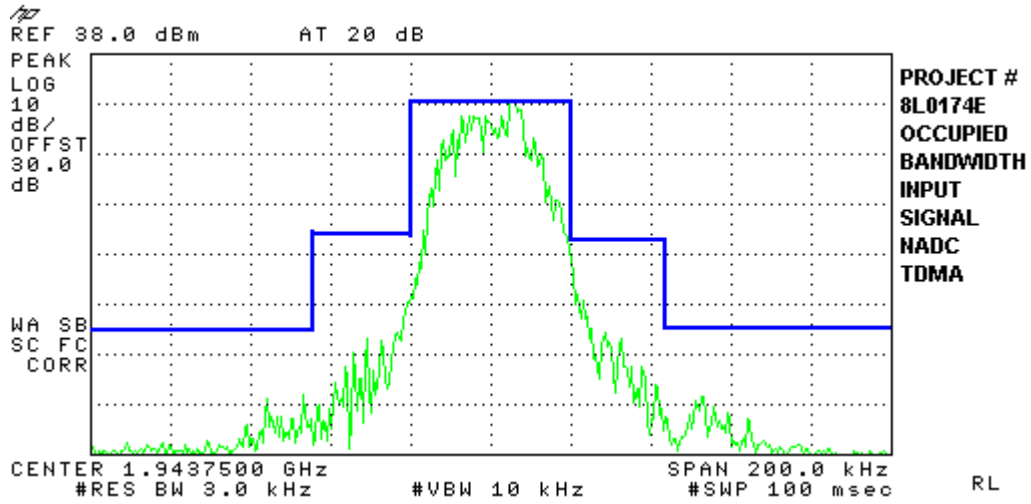
Input Signal:



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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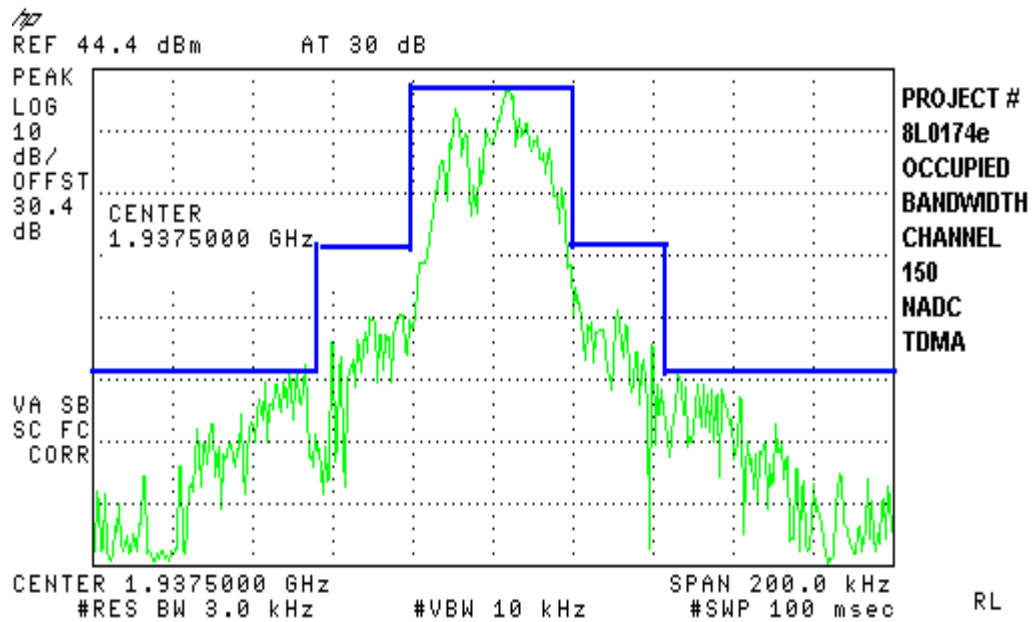
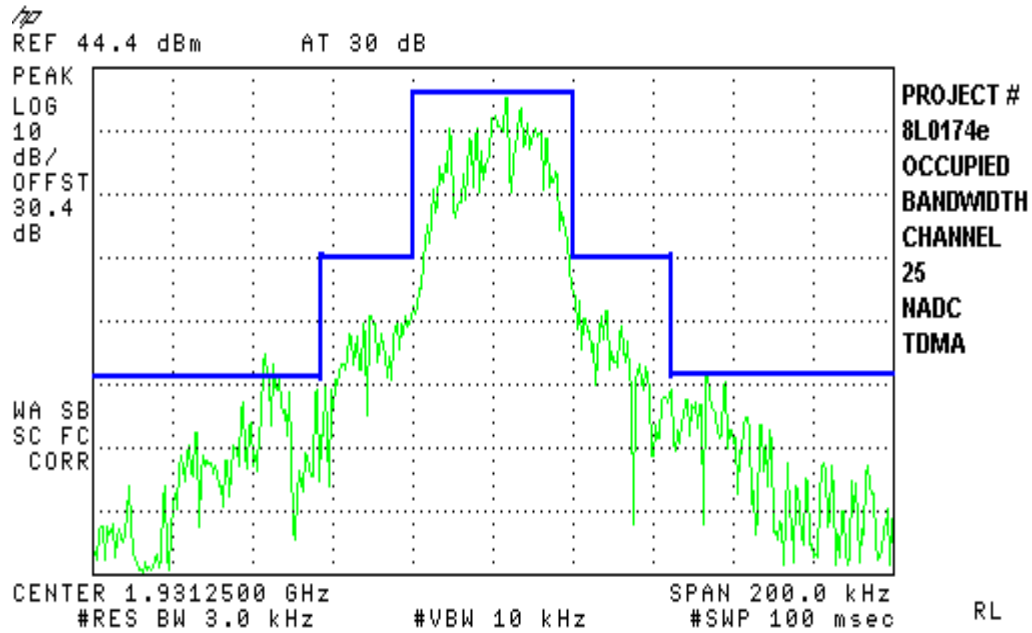
**Input Signal (Continued):**



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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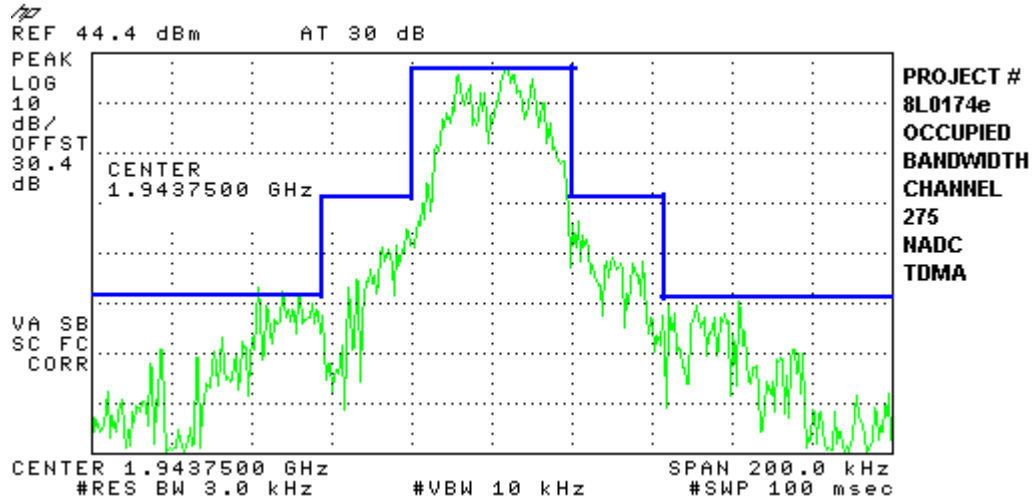
**Max Power:**



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

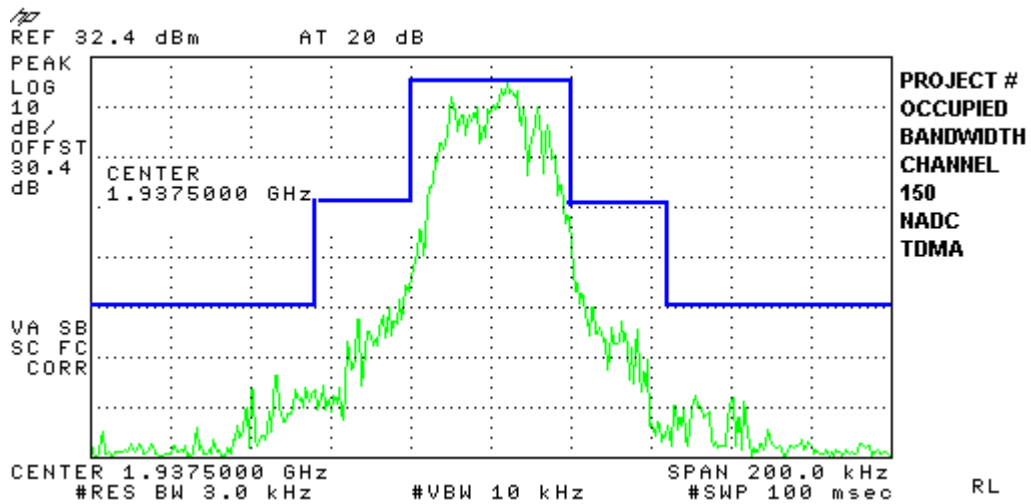
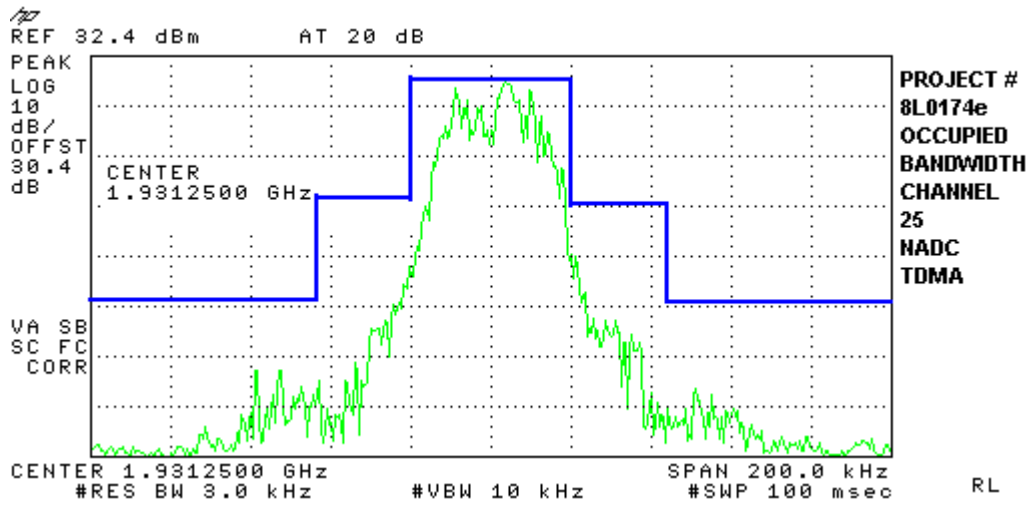
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**Max Power (Continued):**



EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna  
FCC ID: OGAS21008

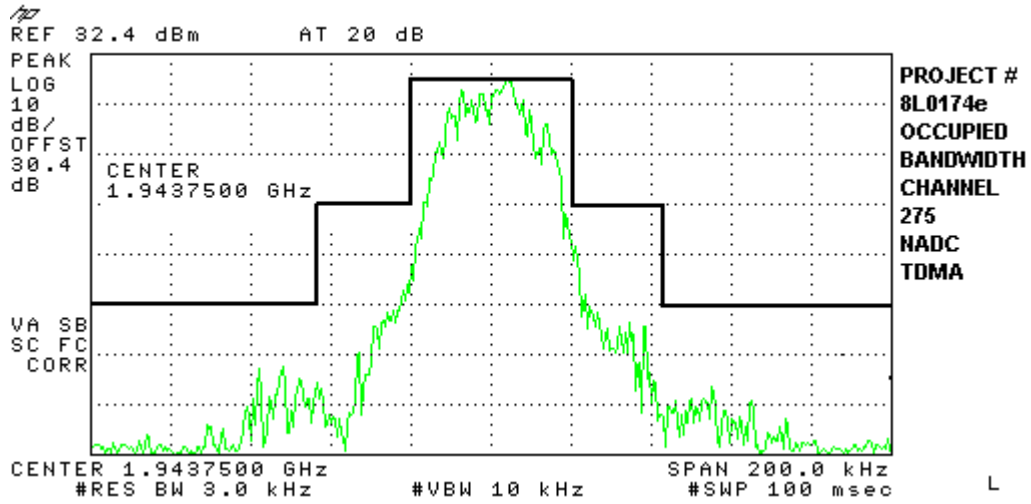
Low Power:



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Low Power (Continued):**





*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Section 5. Spurious Emissions at Antenna Terminals**

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.1051
TESTED BY: Ron Gaytan	DATE: 03/25/99

**Test Results:** Complies.

**Test Data:** See attached test data and graphs.

<b>NAME OF TEST</b>	<b>WORST-CASE SPURIOUS LEVEL(dBm)</b>
0 to 20 GHz spurious (Uplink)	N/A
0 to 20 GHz spurious (Downlink)	-15.4
3 – signal intermodulation (Uplink)	N/A
3 - signal intermodulation (Downlink)	N/A
Lower band edge spurious (Uplink)	N/A
Lower band edge spurious (Downlink)	N/A
Upper band edge spurious (Uplink)	N/A
Upper band edge spurious (Downlink)	N/A

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

**Test Data – Spurious Emissions at Antenna Terminal Test # SE-1:**

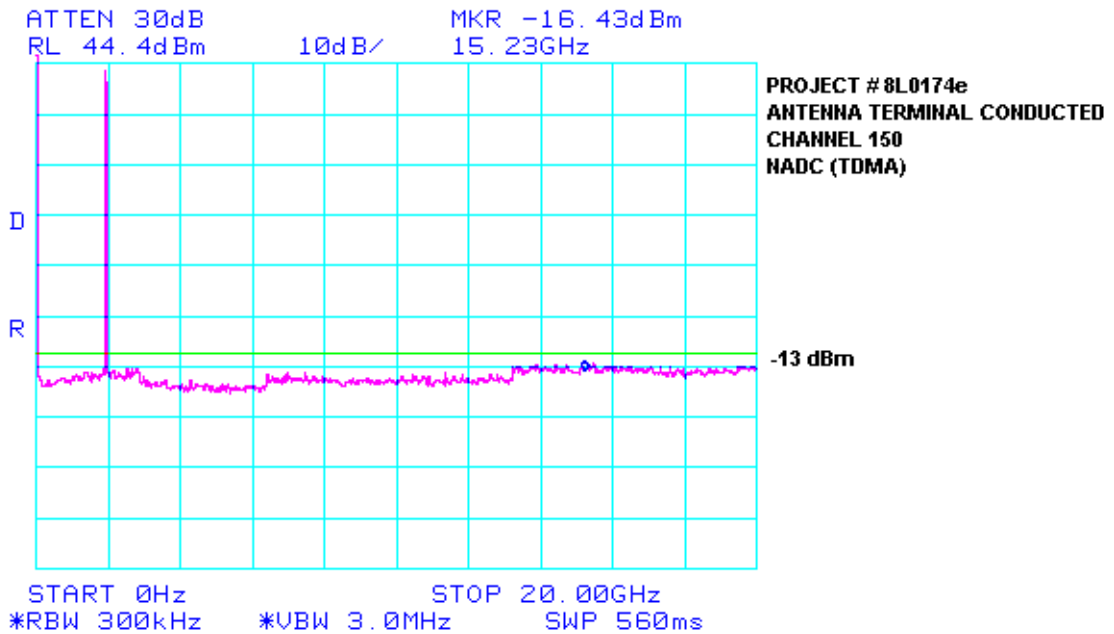
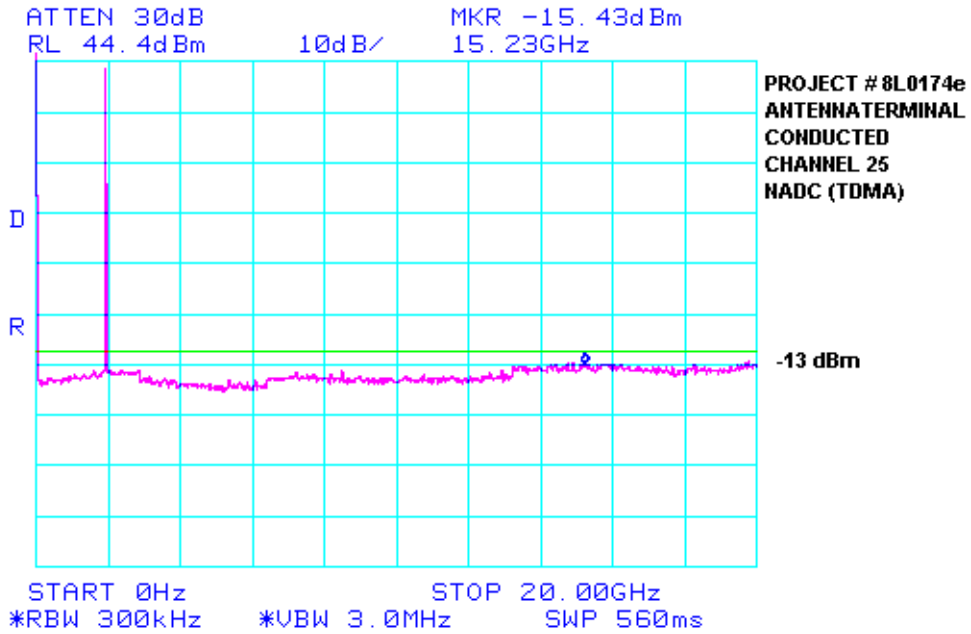
Freq. (MHz)	Meter Reading (dBuV)	Attn. (dB)	Cable Loss (dB)	Correction Factor (dB)	Corrected Reading (dBm)	Spec.limit (dBm)	Pol.	Comments:
500	3	30	0.2	-107	-73.8	-13	N/A	500MHz-1000MHz RBW= 100 kHz 1GHz-20GHz RBW= 1MHz
920	5	30	0.2	-107	-71.8	-13	N/A	
1.924	120	30	0.4	-107	43.4	N/A	N/A	Fundamental Frequency
1.947	54	30	0.4	-107	-22.6	-13	N/A	
3.862	59	30	0.8	-107	-17.2	-13	N/A	
<b>5.79</b>	<b>62</b>	<b>30</b>	<b>0.9</b>	<b>-107</b>	<b>-14.1</b>	<b>-13</b>	<b>N/A</b>	
7.726	36	30	2.1	-107	-38.9	-13	N/A	
9.679	40	30	2.2	-107	-34.8	-13	N/A	
11.57	19	30	3	-107	-55	-13	N/A	
13.529	29	30	3	-107	-45	-13	N/A	
15.404	18	30	3	-107	-56	-13	N/A	Noise Floor
17.392	19	30	3	-107	-55	-13	N/A	Noise Floor
								SCANNED FROM 1GHz-20GHz

**Test Data – Spurious Emissions at Antenna Terminal Test # SE-2:**

Freq. (MHz)	Meter Reading (dBuV)	Attn. (dB)	Cable Loss (dB)	Correction Factor (dB)	Corrected Reading (dBm)	Spec.limit (dBm)	Pol.	Comments:
500	3	30	0.2	-107	-73.8	-13	N/A	500MHz-1000MHz RBW= 100 kHz 1GHz-20GHz RBW= 1MHz
920	5	30	0.2	-107	-71.8	-13	N/A	
1.924	120	30	0.4	-107	43.4	N/A	N/A	Fundamental Frequency
1.932	60	30	0.4	-107	-16.6	-13	N/A	
3.859	60	30	0.8	-107	-16.2	-13	N/A	
<b>5.786</b>	<b>60</b>	<b>30</b>	<b>0.9</b>	<b>-107</b>	<b>-16.1</b>	<b>-13</b>	<b>N/A</b>	
7.72	32	30	2.1	-107	-42.9	-13	N/A	
9.676	34	30	2.2	-107	-40.8	-13	N/A	
11.57	18	30	3	-107	-56	-13	N/A	
13.515	26	30	3	-107	-48	-13	N/A	
15.404	18	30	3	-107	-56	-13	N/A	Noise Floor
17.392	19	30	3	-107	-55	-13	N/A	Noise Floor
								SCANNED FROM 1GHz-20GHz

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

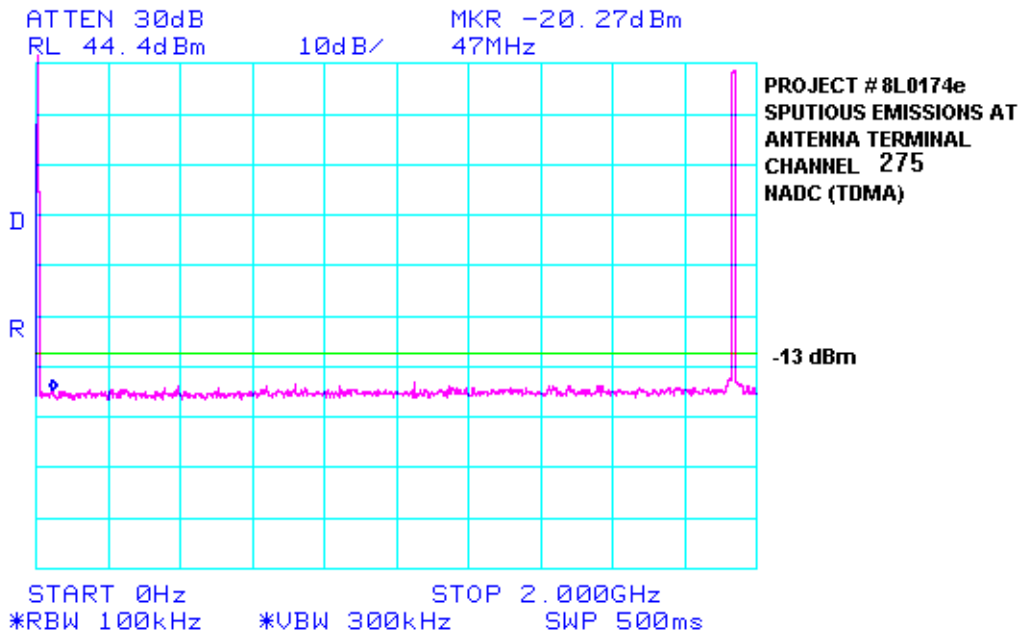
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*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
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**Section 6. Field Strength of Spurious Radiation**

NAME OF TEST: Field Strength of Spurious Radiation	PARA. NO.: 2.1053
TESTED BY: Ron Gaytan	DATE: 03/26/99

**Test Results:** Complies.  
The maximum field strength is 56.5 dB $\mu$ V/m @ 3m.

**Test Data:** See attached graph(s).

**KTL Dallas, Inc.**

FCC PART 24, SUBPART E  
BROADBAND PCS REPEATERS  
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**Test Data - Radiated Emissions – Uplink:**

**Not Applicable**

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Test Data - Radiated Emissions Test # MW-2 (1 GHz-20 GHz) – Downlink (GSM):**

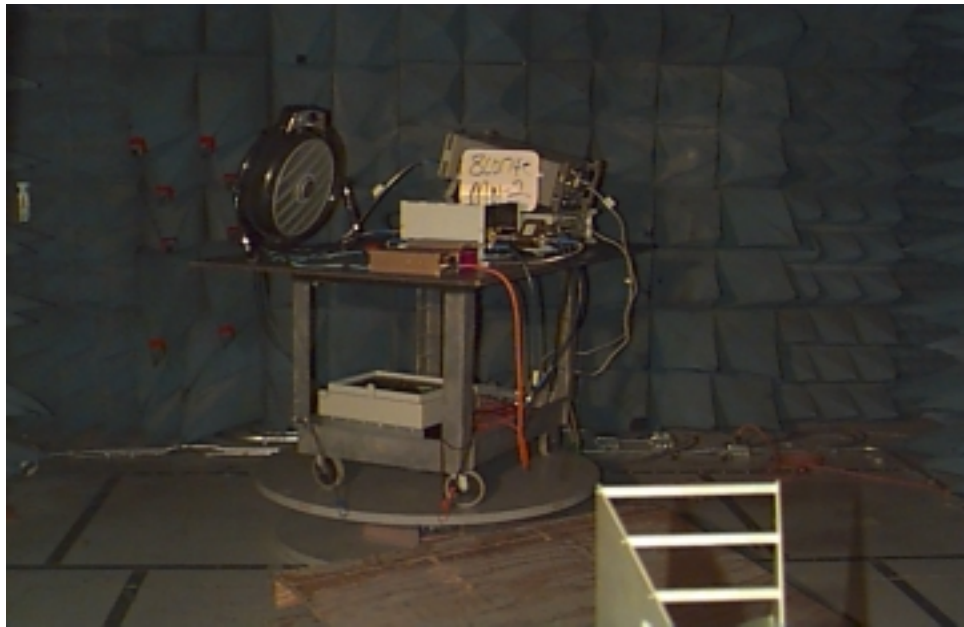
Freq. (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	Pol.	Comments:
1.923	35	28.1	2.8	0	65.9	N/A	H	FUNDAMENTAL FREQ.
3.862	30	31.6	4.0	0	65.6	82.2	H	
<b>5.79</b>	17	35	5.1	0	57.1	82.2	H	Noise Floor
7.726	18	37.2	6.0	0	61.2	82.2	H	Noise Floor
9.679	18	37.8	6.9	0	62.7	82.2	H	Noise Floor
11.57	18	39.7	7.5	0	65.2	82.2	H	Noise Floor
13.529	18	41.4	8.3	0	67.7	82.2	H	Noise Floor
15.404	18	40.8	8.7	0	67.5	82.2	H	Noise Floor
17.392	18	44.4	9.5	0	71.9	82.2	H	Noise Floor
1.923	35	28.1	2.8	0	65.9	N/A	V	FUNDAMENTAL FREQ.
3.862	29	31.6	4.0	0	64.6	82.2	V	
<b>5.79</b>	17	35	5.1	0	57.1	82.2	V	
7.726	18	37.2	6.0	0	61.2	82.2	V	Noise Floor
9.679	18	37.8	6.9	0	62.7	82.2	V	Noise Floor
11.57	18	39.7	7.5	0	65.2	82.2	V	Noise Floor
13.529	18	41.4	8.3	0	67.7	82.2	V	Noise Floor
15.404	18	40.8	8.7	0	67.5	82.2	V	Noise Floor
17.392	18	44.4	9.5	0	71.9	82.2	V	Noise Floor
								Scanned 1GHz-20GHz

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Radiated Emissions Photographs for Test # MW-2 (1 GHz-20 GHz) – Downlink (GSM):**

FRONT VIEW:



REAR VIEW:





EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna  
 FCC ID: OGAS21008

**Test Data - Radiated Emissions Test # RE-3 (30 MHz-1000 MHz) – Downlink (GSM):**

33.3	V	0.0	58.1	11.9	1.1	25.0	46.1	82.2	-36.11	Pass	BROADBAND NOISE
39.2	V	0.0	63.0	11.9	1.1	25.0	51.0	82.2	-31.21	Pass	BROADBAND NOISE
44.0	V	0.0	65.0	11.4	1.4	25.0	52.9	82.2	-29.34	Pass	BROADBAND NOISE
47.4	V	0.0	64.0	11.2	1.4	25.0	51.7	82.2	-30.54	Pass	BROADBAND NOISE
59.3	V	0.0	71.0	10.1	1.8	24.9	58.0	82.2	-24.21	Pass	BROADBAND NOISE
62.5	V	0.0	68.0	9.8	1.8	24.9	54.6	82.2	-27.59	Pass	BROADBAND NOISE
71.1	V	0.0	67.0	8.8	1.3	24.9	52.1	82.2	-30.06	Pass	BROADBAND NOISE
81.0	V	0.0	58.0	8.7	1.3	24.9	43.1	82.2	-39.11	Pass	BROADBAND NOISE
87.0	V	0.0	58.0	9.3	1.3	24.9	43.7	82.2	-38.51	Pass	BROADBAND NOISE
109.0	V	0.0	47.0	9.9	2.7	24.9	34.7	82.2	-47.47	Pass	BROADBAND NOISE
142.4	V	0.0	49.0	11.8	3.0	24.8	39.0	82.2	-43.19	Pass	BROADBAND NOISE
183.6	V	0.0	52.0	13.9	3.0	24.6	44.3	82.2	-37.86	Pass	BROADBAND NOISE
256.0	V	0.0	45.0	18.7	4.6	24.7	43.6	82.2	-38.6	Pass	BROADBAND NOISE
33.4	H	0.0	44.0	11.9	1.1	25.0	32.0	82.2	-50.21	Pass	BROADBAND NOISE
39.2	H	0.0	47.0	11.9	1.1	25.0	35.0	82.2	-47.21	Pass	BROADBAND NOISE
44.0	H	0.0	51.0	11.3	1.4	25.0	38.7	82.2	-43.5	Pass	BROADBAND NOISE
45.3	H	0.0	57.0	11.1	1.4	25.0	44.5	82.2	-37.66	Pass	BROADBAND NOISE
48.8	H	0.0	60.0	11.3	1.4	25.0	47.7	82.2	-34.48	Pass	BROADBAND NOISE
59.3	H	0.0	58.0	10.1	1.8	24.9	45.0	82.2	-37.21	Pass	BROADBAND NOISE
61.3	H	0.0	58.0	9.9	1.8	24.9	44.7	82.2	-37.47	Pass	BROADBAND NOISE
71.1	H	0.0	53.0	8.8	1.3	24.9	38.1	82.2	-44.06	Pass	BROADBAND NOISE
81.0	H	0.0	52.0	8.7	1.3	24.9	37.1	82.2	-45.11	Pass	BROADBAND NOISE
87.0	H	0.0	52.0	9.3	1.3	24.9	37.7	82.2	-44.51	Pass	BROADBAND NOISE
109.3	H	0.0	55.0	9.9	2.7	24.9	42.7	82.2	-39.47	Pass	BROADBAND NOISE
119.5	H	0.0	59.0	11.2	2.7	24.9	48.1	82.2	-34.12	Pass	BROADBAND NOISE
127.1	H	0.0	59.0	11.5	3.0	24.9	48.7	82.2	-33.52	Pass	BROADBAND NOISE
143.0	H	0.0	60.0	11.9	3.0	24.8	50.1	82.2	-32.12	Pass	BROADBAND NOISE
149.7	H	0.0	56.0	12.3	3.0	24.8	46.5	82.2	-35.7	Pass	BROADBAND NOISE
165.5	H	0.0	60.0	13.6	3.0	24.8	51.8	82.2	-30.42	Pass	BROADBAND NOISE
170.4	H	0.0	64.0	13.6	3.0	24.8	55.8	82.2	-26.37	Pass	BROADBAND NOISE
181.7	H	0.0	63.0	13.8	3.0	24.6	55.3	82.2	-26.95	Pass	BROADBAND NOISE
196.6	H	0.0	56.0	14.7	3.0	24.6	49.1	82.2	-33.07	Pass	BROADBAND NOISE
224.7	H	0.0	51.0	15.2	4.1	24.6	45.7	82.2	-36.53	Pass	BROADBAND NOISE
252.0	H	0.0	42.0	17.9	4.6	24.7	39.8	82.2	-42.42	Pass	BROADBAND NOISE
256.0	H	0.0	55.0	18.7	4.6	24.7	53.6	82.2	-28.6	Pass	BROADBAND NOISE
265.4	H	0.0	42.0	19.7	4.6	24.7	41.6	82.2	-40.58	Pass	BROADBAND NOISE
272.1	H	0.0	38.0	20.0	4.6	24.7	37.9	82.2	-44.3	Pass	BROADBAND NOISE
288.0	H	0.0	41.0	20.6	4.6	24.7	41.5	82.2	-40.7	Pass	BROADBAND NOISE
309.6	H	0.0	34.0	19.2	4.7	24.7	33.2	82.2	-48.96	Pass	BROADBAND NOISE
317.0	H	0.0	35.0	16.7	4.7	24.7	31.7	82.2	-50.46	Pass	BROADBAND NOISE
325.7	H	0.0	35.0	15.4	4.7	24.7	30.5	82.2	-51.71	Pass	BROADBAND NOISE
339.0	H	0.0	36.0	15.4	4.7	24.7	31.5	82.2	-50.71	Pass	BROADBAND NOISE
352.0	H	0.0	43.0	15.9	4.7	24.7	39.0	82.2	-43.21	Pass	BROADBAND NOISE
383.9	H	0.0	38.0	16.7	4.7	24.7	34.8	82.2	-47.41	Pass	BROADBAND NOISE
516.4	H	0.0	40.0	17.7	6.4	24.7	39.3	82.2	-42.91	Pass	BROADBAND NOISE
545.4	H	0.0	33.0	19.4	6.4	24.7	34.0	82.2	-48.23	Pass	BROADBAND NOISE
600.0	H	0.0	34.0	19.9	7.1	24.8	36.2	82.2	-45.99	Pass	BROADBAND NOISE
700.2	H	0.0	34.0	20.8	7.9	25.0	37.7	82.2	-44.48	Pass	BROADBAND NOISE
309.5	V	0.0	36.0	19.2	4.7	24.7	35.2	82.2	-46.96	Pass	BROADBAND NOISE
317.0	V	0.0	35.0	16.7	4.7	24.7	31.7	82.2	-50.46	Pass	BROADBAND NOISE
324.2	V	0.0	37.0	15.4	4.7	24.7	32.5	82.2	-49.71	Pass	BROADBAND NOISE
339.0	V	0.0	37.0	15.4	4.7	24.7	32.5	82.2	-49.71	Pass	BROADBAND NOISE
352.0	V	0.0	42.0	15.9	4.7	24.7	38.0	82.2	-44.21	Pass	BROADBAND NOISE
368.6	V	0.0	36.0	16.5	4.7	24.7	32.6	82.2	-49.64	Pass	BROADBAND NOISE
383.9	V	0.0	35.0	16.7	4.7	24.7	31.8	82.2	-50.41	Pass	BROADBAND NOISE
412.8	V	0.0	36.0	16.4	6.0	24.8	33.7	82.2	-48.49	Pass	BROADBAND NOISE
427.5	V	0.0	34.0	17.1	6.0	24.8	32.4	82.2	-49.83	Pass	BROADBAND NOISE
501.1	V	0.0	42.0	18.4	6.4	24.7	42.0	82.2	-40.19	Pass	BROADBAND NOISE
516.0	V	0.0	43.0	17.7	6.4	24.7	42.3	82.2	-39.91	Pass	BROADBAND NOISE
538.5	V	0.0	30.0	18.3	6.4	24.7	29.9	82.2	-52.31	Pass	BROADBAND NOISE
545.4	V	0.0	28.0	19.4	6.4	24.7	29.0	82.2	-53.23	Pass	BROADBAND NOISE
600.0	V	0.0	35.0	19.9	7.1	24.8	37.2	82.2	-44.99	Pass	BROADBAND NOISE
700.1	V	0.0	32.0	20.8	7.9	25.0	35.7	82.2	-46.48	Pass	BROADBAND NOISE
737.1	V	0.0	35.0	20.4	7.9	25.0	38.3	82.2	-43.86	Pass	BROADBAND NOISE
747.7	V	0.0	33.0	19.9	7.9	25.0	35.9	82.2	-46.34	Pass	BROADBAND NOISE
											Scanned from 30 MHz to 1 Ghz

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Radiated Emissions Photographs for Test # RE-3 (30 MHz-1000 MHz) – Downlink (GSM):**

FRONT VIEW:



REAR VIEW:



**NOTE:** Photographs for RE-3 are unavailable; however RE-2 set up is identical other than modulation type.

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Test Data - Radiated Emissions Test # MW-1 – Downlink (TDMA):**

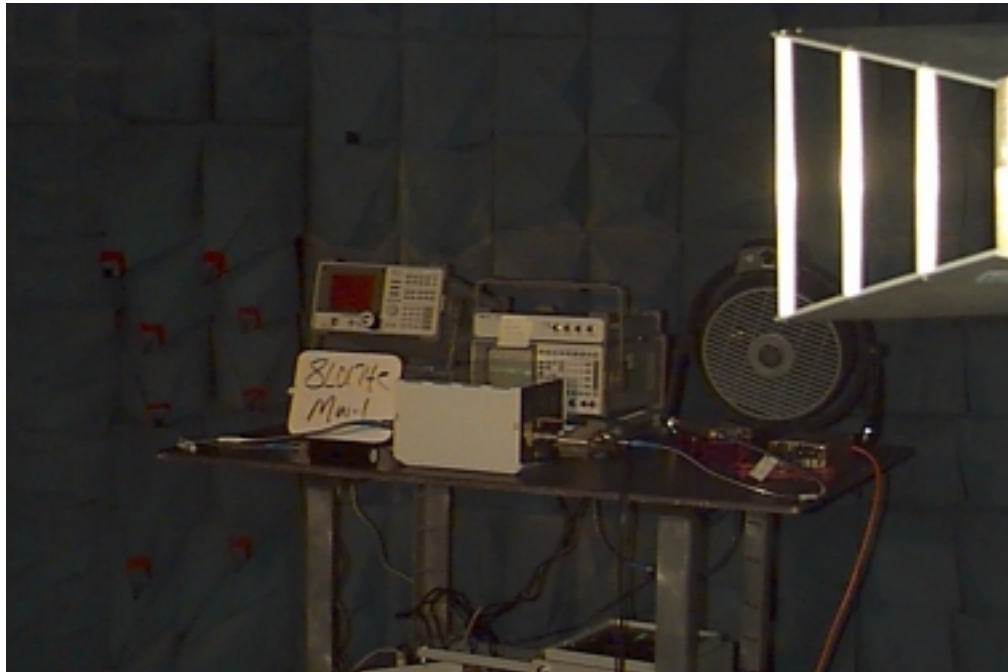
Freq. (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	Pol.	Comments:
1.923	35	28.1	2.8	0	65.9	N/A	H	FUNDAMENTAL FREQ.
3.862	30	31.6	4.0	0	65.6	82.2	H	
<b>5.79</b>	17	35	5.1	0	57.1	82.2	H	Noise Floor
7.726	18	37.2	6.0	0	61.2	82.2	H	Noise Floor
9.679	18	37.8	6.9	0	62.7	82.2	H	Noise Floor
11.57	18	39.7	7.5	0	65.2	82.2	H	Noise Floor
13.529	18	41.4	8.3	0	67.7	82.2	H	Noise Floor
15.404	18	40.8	8.7	0	67.5	82.2	H	Noise Floor
17.392	18	44.4	9.5	0	71.9	82.2	H	Noise Floor
1.923	35	28.1	2.8	0	65.9	N/A	V	FUNDAMENTAL FREQ.
3.862	29	31.6	4.0	0	64.6	82.2	V	
<b>5.79</b>	17	35	5.1	0	57.1	82.2	V	
7.726	18	37.2	6.0	0	61.2	82.2	V	Noise Floor
9.679	18	37.8	6.9	0	62.7	82.2	V	Noise Floor
11.57	18	39.7	7.5	0	65.2	82.2	V	Noise Floor
13.529	18	41.4	8.3	0	67.7	82.2	V	Noise Floor
15.404	18	40.8	8.7	0	67.5	82.2	V	Noise Floor
17.392	18	44.4	9.5	0	71.9	82.2	V	Noise Floor
								Scanned 1GHz-20GHz

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

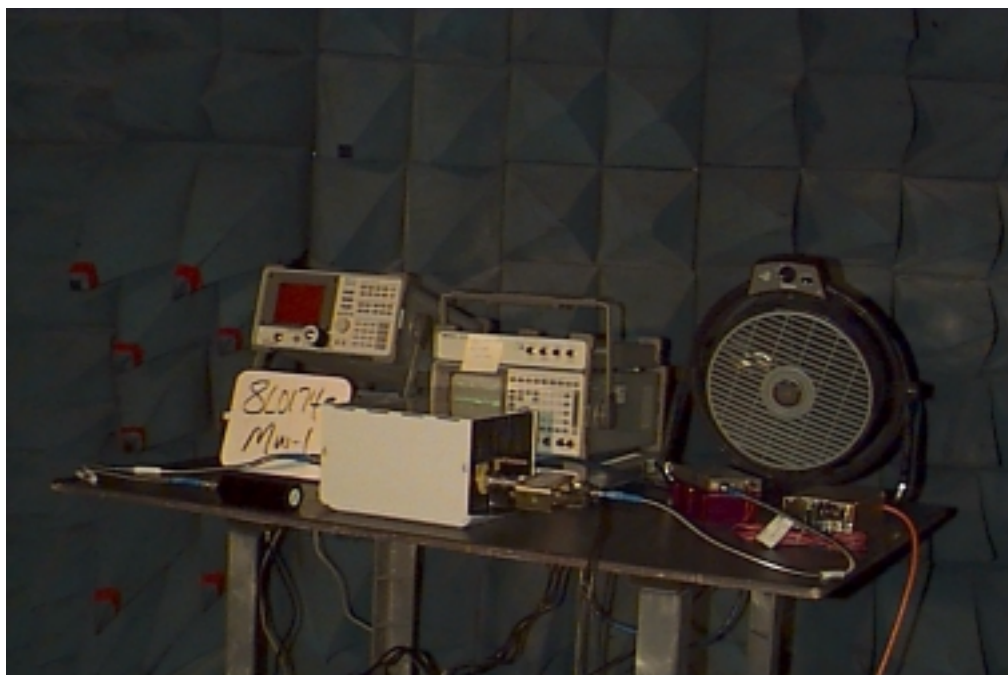
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**Radiated Emissions Photographs for Test # MW-1 – Downlink (TDMA):**

FRONT VIEW:



REAR VIEW:



EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna  
 FCC ID: OGAS21008

**Test Data - Radiated Emissions Test # RE-2 (30 MHz-1000 MHz) – Downlink (TDMA):**

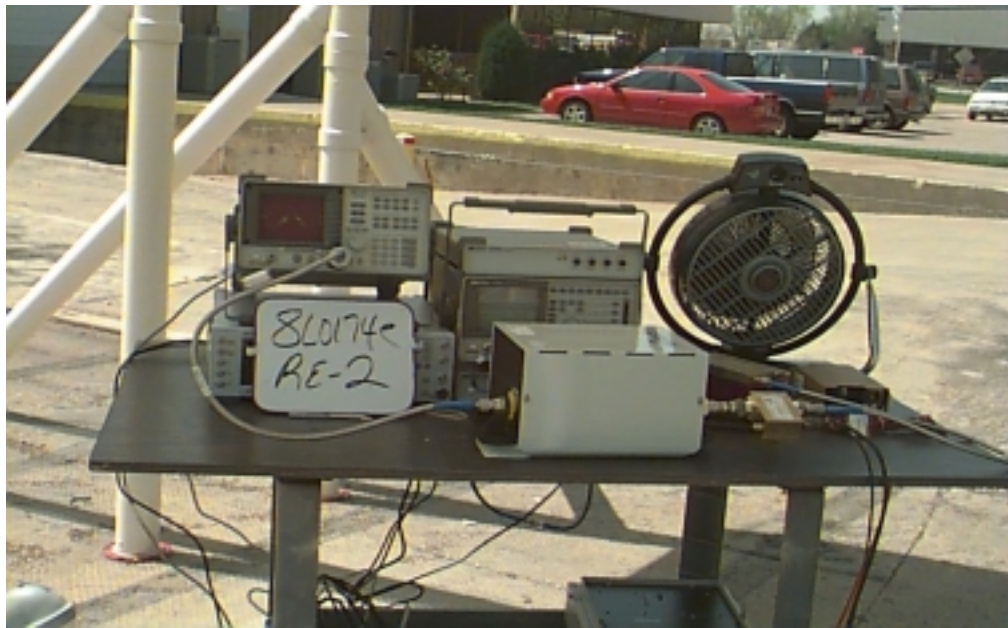
Emmission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	CR/SL Delta (dB)	Pass Fail Marginal	Notes
33.3	V	0.0	58.1	11.9	1.1	25.0	46.1	82.2	-36.11	Pass	BROADBAND NOISE
39.2	V	0.0	63.0	11.9	1.1	25.0	51.0	82.2	-31.21	Pass	BROADBAND NOISE
44.0	V	0.0	65.0	11.4	1.4	25.0	52.9	82.2	-29.34	Pass	BROADBAND NOISE
47.4	V	0.0	64.0	11.2	1.4	25.0	51.7	82.2	-30.54	Pass	BROADBAND NOISE
59.3	V	0.0	71.0	10.1	1.8	24.9	58.0	82.2	-24.21	Pass	BROADBAND NOISE
62.5	V	0.0	68.0	9.8	1.8	24.9	54.6	82.2	-27.59	Pass	BROADBAND NOISE
71.1	V	0.0	67.0	8.8	1.3	24.9	52.1	82.2	-30.06	Pass	BROADBAND NOISE
81.0	V	0.0	58.0	8.7	1.3	24.9	43.1	82.2	-39.11	Pass	BROADBAND NOISE
87.0	V	0.0	58.0	9.3	1.3	24.9	43.7	82.2	-38.51	Pass	BROADBAND NOISE
109.0	V	0.0	47.0	9.9	2.7	24.9	34.7	82.2	-47.47	Pass	BROADBAND NOISE
142.4	V	0.0	49.0	11.8	3.0	24.8	39.0	82.2	-43.19	Pass	BROADBAND NOISE
183.6	V	0.0	52.0	13.9	3.0	24.6	44.3	82.2	-37.86	Pass	BROADBAND NOISE
256.0	V	0.0	45.0	18.7	4.6	24.7	43.6	82.2	-38.6	Pass	BROADBAND NOISE
33.4	H	0.0	44.0	11.9	1.1	25.0	32.0	82.2	-50.21	Pass	BROADBAND NOISE
39.2	H	0.0	47.0	11.9	1.1	25.0	35.0	82.2	-47.21	Pass	BROADBAND NOISE
44.0	H	0.0	51.0	11.3	1.4	25.0	38.7	82.2	-43.5	Pass	BROADBAND NOISE
45.3	H	0.0	57.0	11.1	1.4	25.0	44.5	82.2	-37.66	Pass	BROADBAND NOISE
48.8	H	0.0	60.0	11.3	1.4	25.0	47.7	82.2	-34.48	Pass	BROADBAND NOISE
59.3	H	0.0	58.0	10.1	1.8	24.9	45.0	82.2	-37.21	Pass	BROADBAND NOISE
61.3	H	0.0	58.0	9.9	1.8	24.9	44.7	82.2	-37.47	Pass	BROADBAND NOISE
71.1	H	0.0	53.0	8.8	1.3	24.9	38.1	82.2	-44.06	Pass	BROADBAND NOISE
81.0	H	0.0	52.0	8.7	1.3	24.9	37.1	82.2	-45.11	Pass	BROADBAND NOISE
87.0	H	0.0	52.0	9.3	1.3	24.9	37.7	82.2	-44.51	Pass	BROADBAND NOISE
109.3	H	0.0	55.0	9.9	2.7	24.9	42.7	82.2	-39.47	Pass	BROADBAND NOISE
119.5	H	0.0	59.0	11.2	2.7	24.9	48.1	82.2	-34.12	Pass	BROADBAND NOISE
127.1	H	0.0	59.0	11.5	3.0	24.9	48.7	82.2	-33.52	Pass	BROADBAND NOISE
143.0	H	0.0	60.0	11.9	3.0	24.8	50.1	82.2	-32.12	Pass	BROADBAND NOISE
149.7	H	0.0	56.0	12.3	3.0	24.8	46.5	82.2	-35.7	Pass	BROADBAND NOISE
165.5	H	0.0	60.0	13.6	3.0	24.8	51.8	82.2	-30.42	Pass	BROADBAND NOISE
170.4	H	0.0	64.0	13.6	3.0	24.8	55.8	82.2	-26.37	Pass	BROADBAND NOISE
181.7	H	0.0	63.0	13.8	3.0	24.6	55.3	82.2	-26.95	Pass	BROADBAND NOISE
196.6	H	0.0	56.0	14.7	3.0	24.6	49.1	82.2	-33.07	Pass	BROADBAND NOISE
224.7	H	0.0	51.0	15.2	4.1	24.6	45.7	82.2	-36.53	Pass	BROADBAND NOISE
252.0	H	0.0	42.0	17.9	4.6	24.7	39.8	82.2	-42.42	Pass	BROADBAND NOISE
256.0	H	0.0	55.0	18.7	4.6	24.7	53.6	82.2	-28.6	Pass	BROADBAND NOISE
265.4	H	0.0	42.0	19.7	4.6	24.7	41.6	82.2	-40.58	Pass	BROADBAND NOISE
272.1	H	0.0	38.0	20.0	4.6	24.7	37.9	82.2	-44.3	Pass	BROADBAND NOISE
288.0	H	0.0	41.0	20.6	4.6	24.7	41.5	82.2	-40.7	Pass	BROADBAND NOISE
309.6	H	0.0	34.0	19.2	4.7	24.7	33.2	82.2	-48.96	Pass	BROADBAND NOISE
317.0	H	0.0	35.0	16.7	4.7	24.7	31.7	82.2	-50.46	Pass	BROADBAND NOISE
325.7	H	0.0	35.0	15.4	4.7	24.7	30.5	82.2	-51.71	Pass	BROADBAND NOISE
339.0	H	0.0	36.0	15.4	4.7	24.7	31.5	82.2	-50.71	Pass	BROADBAND NOISE
352.0	H	0.0	43.0	15.9	4.7	24.7	39.0	82.2	-43.21	Pass	BROADBAND NOISE
383.9	H	0.0	38.0	16.7	4.7	24.7	34.8	82.2	-47.41	Pass	BROADBAND NOISE
516.4	H	0.0	40.0	17.7	6.4	24.7	39.3	82.2	-42.91	Pass	BROADBAND NOISE
545.4	H	0.0	33.0	19.4	6.4	24.7	34.0	82.2	-48.23	Pass	BROADBAND NOISE
600.0	H	0.0	34.0	19.9	7.1	24.8	36.2	82.2	-45.99	Pass	BROADBAND NOISE
700.2	H	0.0	34.0	20.8	7.9	25.0	37.7	82.2	-44.48	Pass	BROADBAND NOISE
309.5	V	0.0	36.0	19.2	4.7	24.7	35.2	82.2	-46.96	Pass	BROADBAND NOISE
317.0	V	0.0	35.0	16.7	4.7	24.7	31.7	82.2	-50.46	Pass	BROADBAND NOISE
324.2	V	0.0	37.0	15.4	4.7	24.7	32.5	82.2	-49.71	Pass	BROADBAND NOISE
339.0	V	0.0	37.0	15.4	4.7	24.7	32.5	82.2	-49.71	Pass	BROADBAND NOISE
352.0	V	0.0	42.0	15.9	4.7	24.7	38.0	82.2	-44.21	Pass	BROADBAND NOISE
368.6	V	0.0	36.0	16.5	4.7	24.7	32.6	82.2	-49.64	Pass	BROADBAND NOISE
383.9	V	0.0	35.0	16.7	4.7	24.7	31.8	82.2	-50.41	Pass	BROADBAND NOISE
412.8	V	0.0	36.0	16.4	6.0	24.8	33.7	82.2	-48.49	Pass	BROADBAND NOISE
427.5	V	0.0	34.0	17.1	6.0	24.8	32.4	82.2	-49.83	Pass	BROADBAND NOISE
501.1	V	0.0	42.0	18.4	6.4	24.7	42.0	82.2	-40.19	Pass	BROADBAND NOISE
516.0	V	0.0	43.0	17.7	6.4	24.7	42.3	82.2	-39.91	Pass	BROADBAND NOISE
538.5	V	0.0	30.0	18.3	6.4	24.7	29.9	82.2	-52.31	Pass	BROADBAND NOISE
545.4	V	0.0	28.0	19.4	6.4	24.7	29.0	82.2	-53.23	Pass	BROADBAND NOISE
600.0	V	0.0	35.0	19.9	7.1	24.8	37.2	82.2	-44.99	Pass	BROADBAND NOISE
700.1	V	0.0	32.0	20.8	7.9	25.0	35.7	82.2	-46.48	Pass	BROADBAND NOISE
737.1	V	0.0	35.0	20.4	7.9	25.0	38.3	82.2	-43.86	Pass	BROADBAND NOISE
747.7	V	0.0	33.0	19.9	7.9	25.0	35.9	82.2	-46.34	Pass	BROADBAND NOISE
Scanned from 30 MHz to 1 Ghz											

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Radiated Emissions Photographs for Test # RE-2 (30 MHz-1000 MHz) – Downlink (TDMA):**

FRONT VIEW:



REAR VIEW:



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Section 7. Frequency Stability**

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY: N/A	DATE: N/A

**Not Applicable**

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Section 8. Test Equipment List**

The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items is typically 12 months from the calibration date shown.

<u>KTL ID</u>	<u>Nomenclature</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
C1A	A O.A.T.S. Cable Set			04/03/98
CF31	Storm Cable (7.6 meters)	Semi Flex		11/11/98
398	Preamplifier, 25dB (30 MHz - 1.5 GHz)	ICC LNA25	398	06/18/98
494	Horn Antenna	A.H. Systems SAS-200/571	162	04/29/98
606	Autotransformer	General Radio W20HMT3A	NSN	CNR
660(a)	Spectrum Analyzer	Hewlett Packard 8567A	2541A00109	08/05/98
660(b)	Display Unit	Hewlett Packard 85662A	2542A10537	08/05/98
660(c)	Quasi-Peak Adapter	Hewlett Packard 85650A	2551A00608	08/05/98
677	Receiver (1 - 18 GHz)	Electro Metrics EMC 50	185	07/24/97
G1017B	Attenuator	Narda 776B-20	N/A	08/14/98
G1018	Attenuator	Narda 776B-10	N/A	10/27/98
G2017	Antenna, Log Periodic	A.H. Systems SAS-200/510	556	01/25/99
G2031	Biconical Antenna	ICC BCON-30300	N/A	11/17/98
G2624	Spectrum Analyzer	Hewlett Packard 8563E	3551A04428	10/05/98
N/A	Coaxial Cable (Type N)	Huber & Suhner SUCOFLEX 104PB	16156/4PB	03/24/99



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Test Equipment List (Continued):**

<u>KTL ID</u>	<u>Nomenclature</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
		<b>ANECHOIC CHAMBER # 1</b>		
	Antenna Tripod	Polarad HFU-2		CNR
		<b>SITE A O.A.T.S. (OPEN AREA TEST SITE) 10 Meter Site</b>		
	Turntable, 4 foot	RF Consultants (Automated)		CNR
	Antenna Mast, 4 Meter	EMCO Part # 1050 (Automated)		CNR

**LEGEND:**

CNR CALIBRATION NOT REQUIRED  
N/A NOT APPLICABLE  
CBU CALIBRATED BEFORE USE

**KTL Dallas, Inc.**

FCC PART 24, SUBPART E  
BROADBAND PCS REPEATERS  
REPORT NO.: 8L00174EUS  
ANNEX A

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**ANNEX A**  
**TEST METHODOLOGIES**

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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<b>NAME OF TEST: RF Power Output</b>	<b>PARA. NO.: 2.1046</b>
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**Minimum Standard:** Para. No.24.232. Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 watts.

**Method Of Measurement:**

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation  $GP/4\pi R^2 = E^2/120\pi$  and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
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<b>NAME OF TEST: Occupied Bandwidth</b>	<b>PARA. NO.: 2.1049</b>
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**Minimum Standard:** Para. No. 24.238(b). 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.

**Method Of Measurement:**

CDMA

Spectrum analyzer settings:

RBW: 30 kHz

VBW:  $\geq$  RBW

Span: 5 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

GSM

RBW: 3 kHz

VBW:  $\geq$  RBW

Span: 2 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

NADC

RBW: 1 kHz

VBW:  $\geq$  RBW

Span: 1 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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<b>NAME OF TEST: Spurious Emission at Antenna Terminals</b>	<b>PARA. NO.: 2.1051</b>
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**Minimum Standard:** Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least  $43 + 10 \log (P)$  dB.

**Method Of Measurement:**

Spectrum analyzer settings:

CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 30 kHz (< 1MHz from Band Edge)  
VBW:  $\geq$  RBW  
Sweep: Auto  
Video Avg: 6 Sweeps

GSM

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 3 kHz (< 1 MHz from Band Edge)  
VBW:  $\geq$  RBW  
Sweep: Auto  
Video Avg: Disabled

NADC

RBW: 1 MHz (> 1 MHz from Band Edge)  
RBW: 3 kHz (< 1 MHz from Band Edge)  
VBW:  $\geq$  RBW  
Sweep: Auto  
Video Avg: Disabled

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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<b>NAME OF TEST: Field Strength of Spurious Radiation</b>	<b>PARA. NO.: 2.1053</b>
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**Minimum Standard:** Para. No.24.238(a). On any frequency outside a licensee’s frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

**Calculation Of Field Strength Limit:**

An example of attenuation requirement of 43 + 10 Log P is equivalent to -13 dBm (5 x 10<sup>-5</sup> Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions ≤ 1 GHz:

- G = 1.64 (Dipole Gain)
- P = 10<sup>-5</sup> Watts (Maximum spurious output power)
- R = 3m (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R}$$

$$E = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V / m} = 84.4 \text{ dB}\mu\text{V / m}$$

For emissions > 1 GHz:

- G = 1 (Isotropic Gain)
- P = 1 x 10<sup>-5</sup> Watts (Maximum spurious output power)
- R = 3m (Measurement Distance)

$$E = 84.4 - 20 \text{Log} \sqrt{1.64} = 82.3 \text{ dB}\mu\text{V / m} @ 3 \text{m}$$

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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<b>NAME OF TEST: Frequency Stability</b>	<b>PARA. NO.: 2.1055</b>
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**Minimum Standard:** Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

**Method Of Measurement:**

Frequency Stability With Voltage Variation:

The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:

The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

**KTL Dallas, Inc.**

FCC PART 24, SUBPART E  
BROADBAND PCS REPEATERS  
REPORT NO.: 8L0174EUS  
ANNEX B

*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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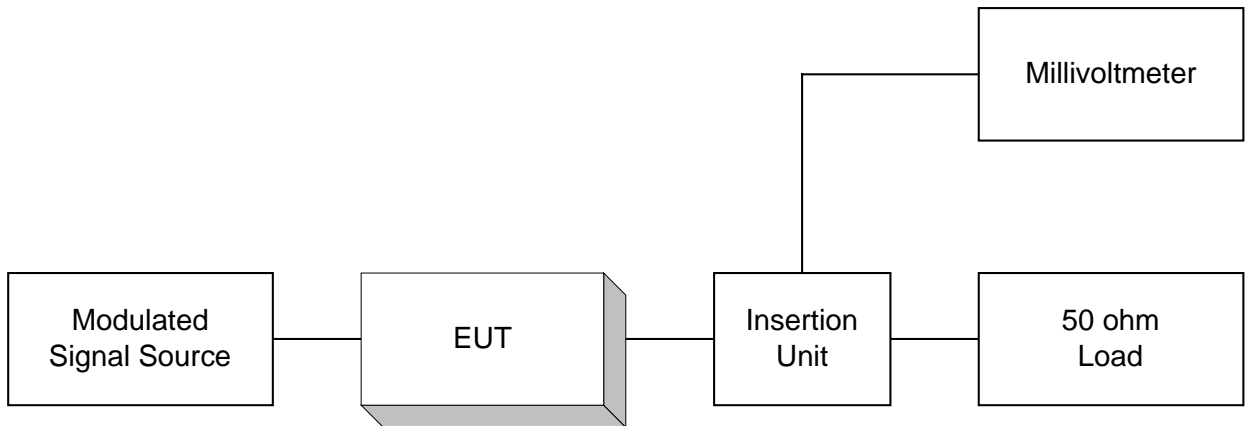
**ANNEX B**  
**TEST DIAGRAMS**



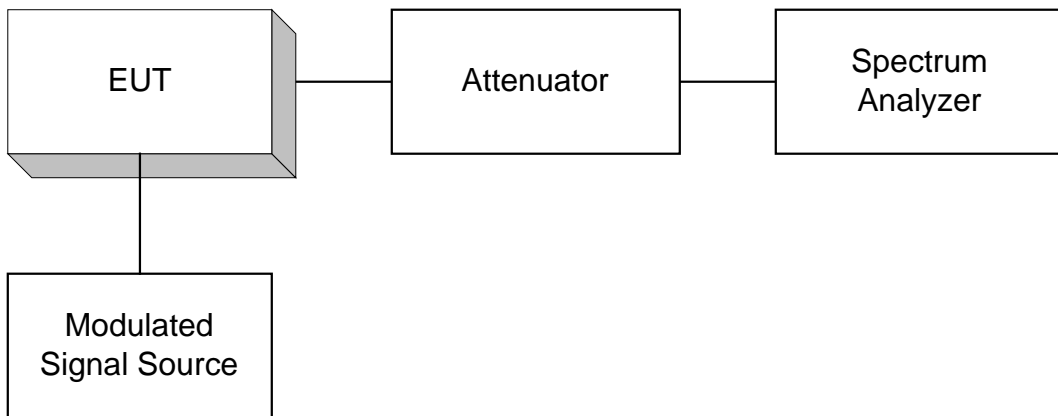
*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Para. No. 2.985 - R.F. Power Output:**



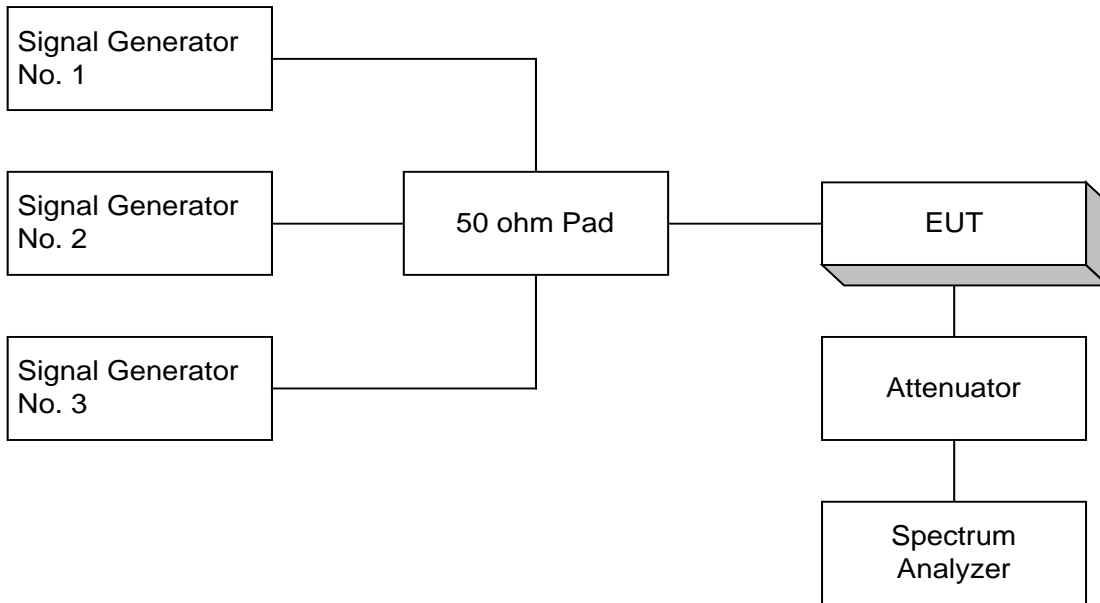
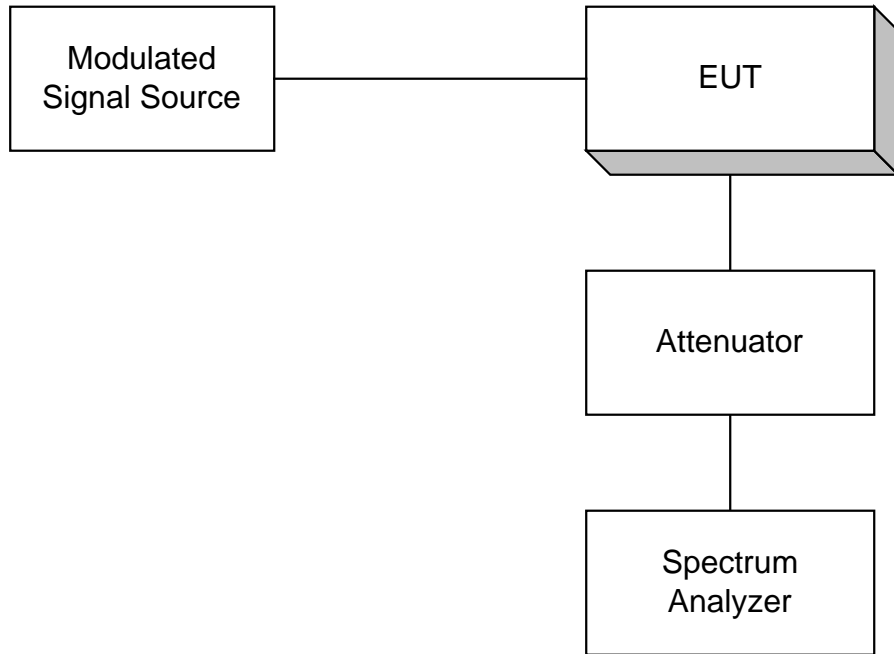
**Para. No. 2.989 - Occupied Bandwidth:**



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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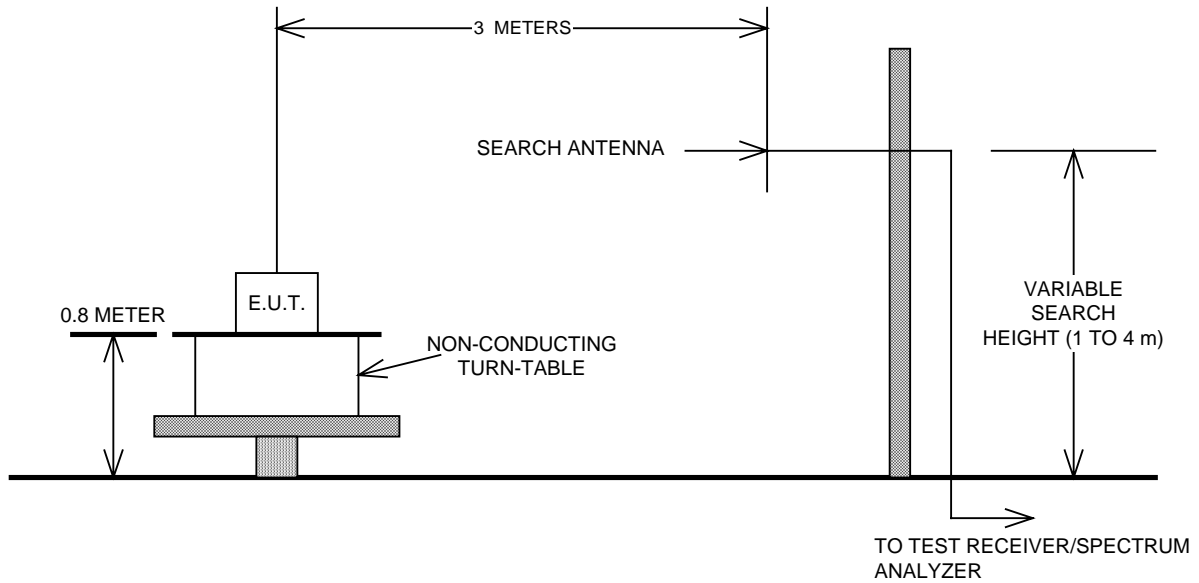
**Para. No. 2.991 Spurious Emissions at Antenna Terminals:**



*EQUIPMENT: PCS 1900 Booster, Single Feed - Single Antenna*  
*FCC ID: OGAS21008*

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**Para. No. 2.993 - Field Strength of Spurious Radiation:**



**Para. No. 2.995 - Frequency Stability:**

