



FCC CFR47 PART 24 SUBPART E BROADBAND

EVALUATION REPORT

FOR

1900MHz MULTI-CARRIER POWER AMPLIFIER

MODEL: G3S-1900-80

FCC ID: E675JS0045

REPORT NUMBER: 00U0339

ISSUE DATE: SEPTEMBER 27, 2000

Prepared for
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LAB CODE:200065-0

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ATTACHMENT

1. EUT PHOTOGRAPHS
2. INSTALLATION & SERVICE MANUAL
3. ADDENUM 1 SCHEMATIC, PARTS LISTS & BLOCK DIAGRAM
4. PROPOSED FCC ID LABEL FORMAT
5. SPURIOUS EMISSIONS AT ANTENNA TERMINAL PLOTS

1. FCC CERTIFICATION INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part2, Subpart J, Sections 2.1033 – 2.1055.

2.1033(c)(1) Applicant: POWERWAVE TECHNOLOGIES, INC.
2026 MCGAW AVENUE
IRVINE, CA 92614

Contact person: CLINT LAWRENCE

Telephone number: (916) 941-3168

2.1033(c)(2) FCC ID: E675JS0045

2.1033(c)(3) Instructions/Installation Manual

Refer to **Attachment**: Installation and Service manual.

2.1033(c)(4) Type of emissions
5M00F9W (WCDMA)
1M25F9W (CDMA)
DXW (TDMA)
GXW (GSM)
F8W (FM AMPS)

2.1033(c)(5) Frequency Range

Transmit: **1930 MHz. to 1990 MHz.**

2.1033(c)(6) Range of Operation Power
80 to 100 WATTS

2.1033(c)(7) Maximum Power Rating

140 WATTS.

2.1033(c)(8) Applied voltage and currents into the final transistor elements

27VDC, 55Amps @ 80Watts

2.1033(c)(9) Tune-up/Optimizations Procedure

Refer to **Attachment**: Installation and Service manual.

2.1033(c)(10) Complete Circuit Diagrams and Functional Diagram

Refer to **Attachment**: Schematics, Parts list & Block Diagram. Confidentiality is requested for these items.

2.1033(c)(10a) Means for Frequency Stabilization

Not Applicable. Eut is a power amplifier

2.1033(c)(10b) Means for Suppressing of Spurious radiation.

Not Applicable. Eut is a power amplifier.

2.1033(c)(10c) Means for Limiting Modulation.

Not Applicable. Eut is a power amplifier.

2.1033(c)(10d) Means for Limiting Power.

RF Feedback control.

2.1033(c)(11) Equipment Identification

A drawing of the equipment identification nameplate appears under **Attachment**: PROPOSED FCC ID LABEL FORMAT.

2.1033(c)(12) Photographs

Photographs of the equipment, internal and external views, are found in the **Attachment**: Eut Photographs.

2.1033(c)(13) Description of Digital Modulation Techniques

Not Applicable. Eut is a power amplifier.

2.1033(c)(14) Standard Test Condition

The power amplifier was tested under the following conditions.

DC Supply Voltage: 27Vdc

The amplifier was aligned and tuned up according to manufacturer's alignment procedure, prior to testing. All data presented represents the worst case parameter being measured.

2.1033 Description of Various Base Station Configuration

Not Applicable.

TYPE OF EQUIPMENT:	1900MHz MULTI-CARRIER POWER AMPLIFIER
MEASUREMENT DISTANCE:	(X) 3 METER () 10 METER
FCC RULES:	PART 2, PART 15, PART 24 SUBPART E
EQUIPMENT AUTHORIZATION PROCEDURE	CERTIFICATION
MODIFICATIONS MADE ON EUT	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 2, PART 15 and PART 24. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Reviewed By

TOM N. COKENIAS, DIRECTOR OF ENGINEERING
COMPLIANCE CERTIFICATION SERVICES

2. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
Spectrum Analyzer	H.P.	8566B	2140A01296	12/15/99	12/15/00
Spectrum Analyzer	H.P.	8593EM	3710A00205	05/25/00	05/25/01
Pre-Amp	H.P.	8447D(P_1M)	2944A06833	10/25/99	10/25/00
Pre-Amp	MITEQ	NSP2600-44	646546	1/3/00	1/3/01
Bilog Antenna	CHASE	CBL6112	2049	11/23/99	11/23/00
Horn Antenna	EMCO	3115	9001-3245	1/05/00	1/05/01
Horn Antenna	ARA	MWH-1826/B	1013	7/28/00	7/28/01
Harmonic Mixer (26.5 – 40GHz)	H.P.	11970A	3003A04109	9/23/99	9/23/02
Mixer Amp	H.P.	HP11975	2517A01067	8/23/00	8/23/02

SUPPORT EQUIPMENT

Description	Manufacturer	Model No.	S/N	
Cal Due				
Signal Generator	Hewlett-Packard	E4432B	US40052843	
6/19/01				
Signal Generator	Hewlett-Packard	E4433B	US38440633	
3/4/01				
Signal Generator	Hewlett-Packard	E4432B	US40052707	
6/28/01				
Spectrum Analyzer	Hewlett-Packard	8563E	3728A07332	
6/15/01				
Power Supply	Hewlett-Packard	6673A	3239A00237	
9/30/00				
Power Meter	Hewlett-Packard	438A	3048U03364	
3/28/01				
Power Sensor	Hewlett-Packard	8481D	3643A21423	
3/24/01				
Power Sensor	Hewlett-Packard	8481A	1926A23343	
3/2/01				
Directional Bridge	Hewlett-Packard	778D	18553	N/A
Computer	Hewlett-Packard	Vectra 486/100	3503S00705	N/A
Monitor	Hewlett-Packard		JP40869630	N/A
Power Supply	Hewlett-Packard	6205C	2411A06681	N/A
Power Supply	Hewlett-Packard	6291A	3304A11043	N/A
Digital Multimeter	Hewlett-Packard	34401A	US36033838	
3/2/01				
Power Attenuator	Weinschel	82-30-34	LV409	
N/A				

Driver Amplifiers (3)
N/A
Misc. Cables, Combiners, Terminations
N/A

**3. TEST RESULT SUMMARY FOR PART 15.
FCC PART 15 Radiated Emission Test**

Test Result: See spreadsheet below.



FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

1366 BORDEAUX DRIVE, SUNNYVALE, CA 94089
PHONE: (408) 752-8166 FAX: (408) 752-8168

Project #: 00u0339
Report #: 000718a1
Date & Time: 07/18/00 3:33 PM
Test Engr: Juan Martinez

Company: Powerwave Technologies
EUT Description: 1900 MHz Multicarrier amplifier
Test Configuration: Eut/support equipment
Type of Test: FCC Class B
Mode of Operation: Transmitting

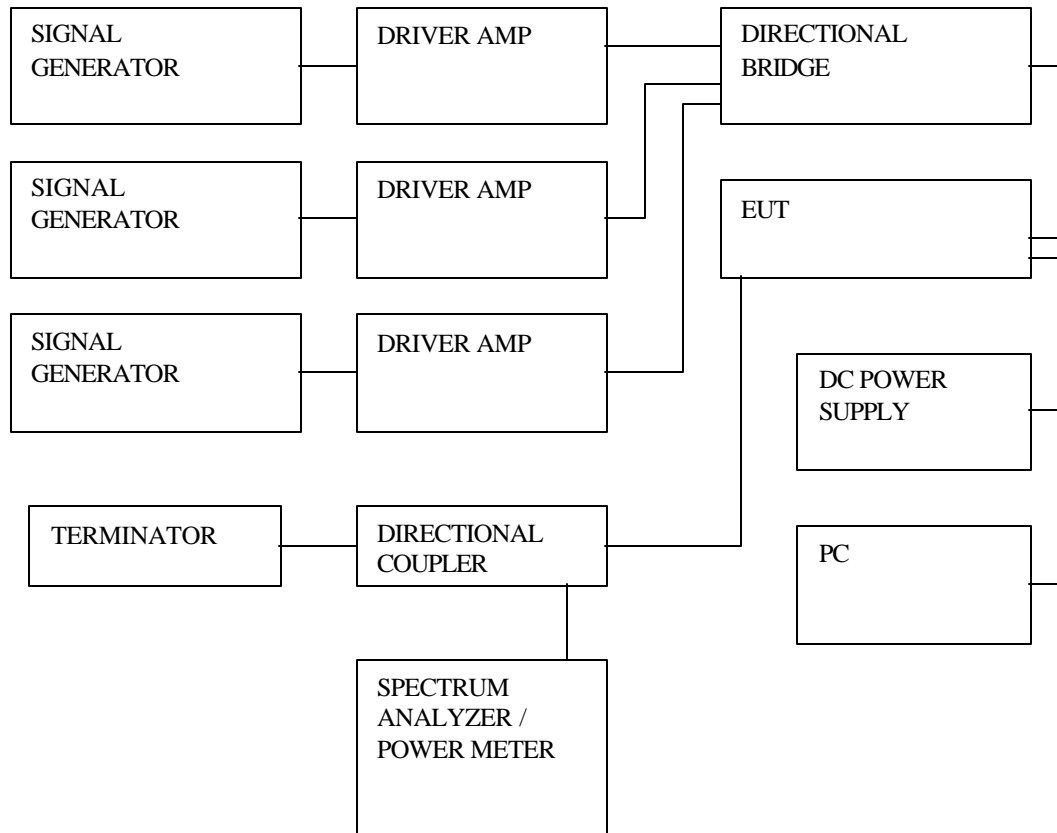
A-Site B-Site C-Site F-Site 6 Worst Data Descending

Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
75.00	15.90	6.97	1.13	0.00	24.00	40.00	-16.00	3mV	270.00	1.00	P
60.00	16.40	6.65	1.02	0.00	24.07	40.00	-15.93	3mV	225.00	1.00	P
120.00	19.70	14.33	1.49	0.00	35.52	43.50	-7.98	3mV	180.00	1.00	P
180.00	20.70	11.35	1.76	0.00	33.81	43.50	-9.69	3mV	90.00	1.00	P
360.00	14.60	15.34	2.66	0.00	32.59	46.00	-13.41	3mV	315.00	1.00	P
225.00	12.80	12.23	2.00	0.00	27.03	46.00	-18.97	3mV	45.00	1.00	P
105.00	10.40	12.44	1.35	0.00	24.19	43.50	-19.31	3mV	315.00	1.00	P
105.00	9.80	12.23	1.35	0.00	23.38	43.50	-20.12	3mH	270.00	1.80	P
225.00	12.20	11.71	2.00	0.00	25.91	46.00	-20.09	3mH	125.00	1.80	P
90.00	13.60	9.69	1.26	0.00	24.55	43.50	-18.95	3mH	45.00	1.80	P
180.00	14.60	10.79	1.76	0.00	27.15	43.50	-16.35	3mH	315.00	1.80	P
195.00	15.80	10.88	1.87	0.00	28.54	43.50	-14.96	3mH	225.00	1.80	P
210.00	14.90	11.09	1.94	0.00	27.93	43.50	-15.57	3mH	45.00	1.00	P
above measurements are for (S/N: 9) 19085.											
below is for (S/N: 12) MRF19090.											
225.00	14.30	11.71	2.00	0.00	28.01	46.00	-17.99	3mH	90.00	1.80	P
120.00	17.10	13.16	1.49	0.00	31.75	43.50	-11.75	3mH	90.00	1.80	P
105.00	6.50	12.23	1.35	0.00	20.08	43.50	-23.42	3mH	90.00	1.80	P
45.00	10.80	10.58	0.88	0.00	22.26	40.00	-17.74	3mH	90.00	1.80	P
330.00	14.70	15.12	2.53	0.00	32.35	46.00	-13.65	3mH	90.00	1.80	P
120.00	19.90	14.33	1.49	0.00	35.72	43.50	-7.78	3mV	225.00	1.00	P
105.00	7.10	12.44	1.35	0.00	20.89	43.50	-22.61	3mV	180.00	1.00	P
225.00	12.70	12.23	2.00	0.00	26.93	46.00	-19.07	3mV	225.00	1.00	P
300.00	15.60	13.86	2.40	0.00	31.86	46.00	-14.14	3mV	225.00	1.00	P
270.00	15.00	13.58	2.22	0.00	30.80	46.00	-15.20	3mV	270.00	1.00	P
180.00	20.60	11.35	1.76	0.00	33.66	43.50	-9.84	3mV	315.00	1.00	P

Total data #: 23
V.2a

4. FCC PART 2 CERTIFICATION TEST RESULTS:

Test Set-up for the following tests:



SECTION 2.1046: RF POWER OUTPUT

Minimum Requirement:

24.232(A); Maximum Peak output power for base station transmitters should not exceed 100 Watts EIRP.

24.232(B); Mobile/Portable stations are limited to 2 Watts EIRP peak power.

Test Procedure:

The EUT was set to maximum output power (maximum gain). RF output power was measured with Power Meter.

Test Result:

Measured with power meter. All outputs were adjusted to 100 Watts, during testing.

SECTION 2.1047: MODULATION CHARACTERISTICS

(NOT APPLICABLE TO AMPLIFIERS)

SECTION 2.1049: OCCUPIED BANDWIDTH

Minimum:

Section 2.1049(i); transmitters designed for other types of modulation-when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

Test Procedure:

The Eut's occupied bandwidth output plot is compared with the input source plot to check that no distortion is created when the input signal is amplified by the Eut. Identical bandwidths, spans and center frequencies are used for both plots. Reference levels and attenuation are adjusted.

Test Result:

Plots of the input and output are included. Please refer to spectrum plots under SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL.

SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL.

Minimum standard:

24.238(a); The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not be less than $43+10 \log$ (mean output power in watts) dBc below the mean power output outside a licensee's frequency block.

Amplifier Mean Power = 100 Watts (50 dBm)

$43 + 10 \log (100 \text{ Watts}) = 63 \text{ dB}$

Out-of-Band and Band-edges emissions must be attenuated by the following amount:

$50 \text{ dBm} - 63 \text{ dB} = -13 \text{ dBm}$

24.238 (b) & (c):

- (1) Compliance with the out-of-band emissions requirement is based on test being performed with 1MHz analyzer RES BW.
- (2) At block edges, RES BW may be adjusted to a level at least as large as 1% of emission bandwidth. The emissions bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. For the EUT this is at least:

CDMA:

$.01 * 1.25 \text{ MHz} = 12.5 \text{ kHz}$. A RES BW of 100 KHz was used for measurement at the block edges.

TDMA:

$.01 * 30 \text{ KHz} = 0.3 \text{ KHz}$. A RES BW of 30 KHz was used for measurement at the block edges.

GSM:

$.01 * 250 \text{ KHz} = 2.5 \text{ KHz}$. A RES BW of 30 KHz was used for measurement at the block edges.

Test Procedure:

- 1) Three balanced signals were applied to the RF input. One set as close as possible to the bottom of the block edge, one set as close as possible to the top of the block edge and one set near the middle of the block. Set the RES BW to 1% of the emission bandwidth to show compliance with the -13 dBm limit, in the 1 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.
- 2) For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 1483 MHz to $10f_0$ of the fundamental carrier for all frequency blocks. A display line was placed at -13 dBm to show compliance.

Test Results:

The following table indicates the plot number associated with the Input Bandwidth, Output Bandwidth, Block Edge and Out of Band emission plots. All measurement are in average mode. (See attachment 5. *SPURIOUS EMISSIONS AT ANTENNA TERMINAL PLOTS.*)

FM AMPS SIGNALS		
Unit s/n 9, Block C, Input frequencies 1975.625MHz., 1980.625MHz. & 1989.375MHz.		
Plot #	Description	Frequency Range (MHz.)
1	Block Edges/Intermod	1957.5 to 2007.5
2	2 nd Harmonic Out of Band	3940 to 3990
3	3 rd Harmonic Out of Band	5922.5 to 5972.5
4	4 th Harmonic Out of Band	7905 to 7955
5	Out of Band	7000 to 20,000

CDMA SIGNALS		
Unit s/n 12, Block C, Input frequencies 1975.625MHz., 1980.625MHz. & 1989.375MHz.		
Plot #	Description	Frequency Range (MHz.)
6	Input Bandwidth	1986.875 to 1991.875
7	Output Bandwidth	1986.875 to 1991.875
8	Block Edge	1957.5 to 2007.5
9	Out of Band	1957.5 to 2007.5
10	Out of Band	1483 to 2483
11	Out of Band	2000 to 20,000
Unit s/n 12, Block A, Input frequencies 1930.625MHz., 1935.625MHz. & 1944.375MHz.		
Plot #	Description	Frequency Range (MHz.)
12	Block Edge	1912.5 to 1962.5
13	Out of Band	1912.5 to 1962.5
14	Out of Band	1438 to 2438
15	Out of Band	2000 to 20,000
Unit s/n 9, Block C, Input frequencies 1975.625MHz., 1980.625MHz. & 1989.375MHz.		
Plot #	Description	Frequency Range (MHz.)
16	Output Bandwidth	1986.875 to 1991.875
17	Out of Band	2000 to 20,000
18	Block Edge	1957.5 to 2007.5
19	Out of Band	1957.5 to 2007.5
20	Out of Band	1483 to 2483
Unit s/n 9, Block A, Input frequencies 1930.625MHz., 1935.625MHz. & 1944.375MHz.		
Plot #	Description	Frequency Range (MHz.)

21	Block Edge	1912.5 to 1962.5
22	Out of Band	1912.5 to 1962.5
23	Out of Band	1438 to 2438
24	Out of Band	2000 to 20,000
Unit s/n 9, Block B, Input frequencies 1950.625MHz., 1955.625MHz. & 1964.375MHz.		
Plot #	Description	Frequency Range (MHz.)
25	Block Edge	1932.5 to 1982.5
26	Out of Band	1932.5 to 1982.5
27	Out of Band	1458 to 2458
28	Out of Band	2000 to 20,000

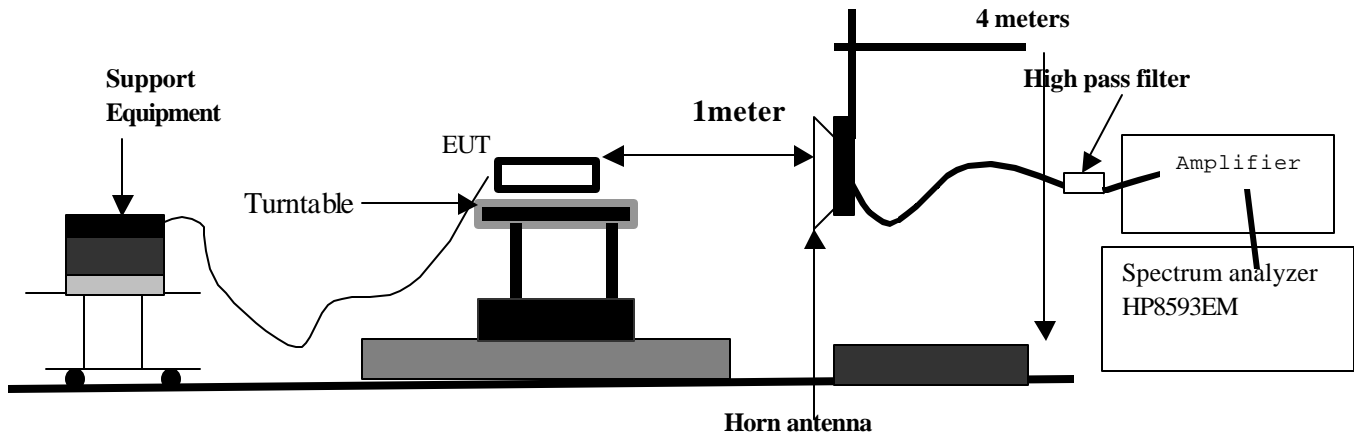
TDMA SIGNALS		
Unit s/n 12, Block C, Input frequencies 1975MHz., 1982.5MHz. & 1990MHz.		
Plot #	Description	Frequency Range (MHz.)
29	Input Bandwidth	1982 to 1983
30	Output Bandwidth	1982 to 1983
31	Block Edge	1972.5 to 1992.5
32	Out of Band	1957.5 to 2007.5
33	Out of Band	1483 to 2483
34	Out of Band	2000 to 20,000
Unit s/n 9, Block C, Input frequencies 1975MHz., 1982.5MHz. & 1990MHz.		
Plot #	Description	Frequency Range (MHz.)
35	Output Bandwidth	1982 to 1983
36	Block Edge	1972.5 to 1992.5
37	Out of Band	1957.5 to 2007.5
38	Out of Band	1483 to 2483
39	Out of Band	2000 to 20,000

GSM SIGNALS		
Unit s/n 12, Block C, Input frequencies 1975MHz., 1982.5MHz. & 1990MHz.		
Plot #	Description	Frequency Range (MHz.)
40	Input Bandwidth	1982 to 1983
41	Output Bandwidth	1982 to 1983
42	Block Edge	1972.5 to 1992.5
43	Out of Band	1957.5 to 2007.5
44	Out of Band	1483 to 2483
45	Out of Band	2000 to 20,000
Unit s/n 9, Block C, Input frequencies 1975MHz., 1982.5MHz. & 1990MHz.		
Plot #	Description	Frequency Range (MHz.)
46	Output Bandwidth	1982 to 1983
47	Block Edge	1972.5 to 1992.5
48	Out of Band	1957.5 to 2007.5
49	Out of Band	1483 to 2483

50	Out of Band	2000 to 20,000
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SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION.

TEST SETUP:



Minimum Requirement:

The magnitude of each spurious and harmonic emissions detected as being radiated from the EUT must be at a level no more than 43 + 10 log (mean output power, watts) dB below the mean power output.

Using the relationship between field strength and RF power into an isotropic transmit antenna. Since Section 24.232A refers power as EIRP, 1 will be used for antenna gain.

$$E (V/m) = \frac{\sqrt{30 \times P \times G}}{D}$$

P= Eut Maximum Power (Watts)
 G= Antenna in Numeric Gain (Assume 1)
 D= Distance (Meters)

$$E = \frac{\sqrt{30 \times 140W \times 1}}{1} = 64.81 \text{ V/m}$$

$$20 * \log (64.81 \text{ V/m} \times 1,000,000) = \mathbf{156.23 \text{ dBuV/m @ 1 meters}}$$

$$\text{Emission Mask: } 43 + 10 * \log (P) \text{ dB}$$

$$43 + 10 * \text{Log} (140 \text{ W}) = \mathbf{64.46dB}$$

$$156.23 - 64.46 = \mathbf{91.77 \text{ dBuV/m @ 1 meters}}$$

Resultant radiated field at 1 meters from -13 dBm source feeding isotropic antenna:
91.77 dBuV/m

Test procedure:

EUT antenna output was terminated with a 50-ohm load. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 1 meter from the EUT. With the transmitter operating at full power the turntable was slowly rotated to locate the direction of maximum emission once maximum direction was determined the search antenna was raised and lowered in both vertical and horizontal polarization.

Test Result:

The maximum readings so obtained are recorded in a spreadsheet attached. Maximum levels measured at 1 meter were extrapolated to specified distance of 3 meters.

COMPLIANCE ENGINEERING SERVICES, INC.

Harmonic Emissions
24.238(a)

7/18/00
Juan Maritnez
A site (1.0 Meter)

Powerwave Technologies, Inc.

1900 MHz Multi-Carrier Power Amplifier (M/N: MPF19090) S/N: 12

f1= 1975 MHz f2= 1982.5 MHz f3= 1990 MHz High end

F(MHz)	READING		AF	CL	AMP	DIST	HPF TOTA L		LIMIT	MARGIN	
	(dBuV)						(dB)	(dB)		(dB)	(dB)
	Pk	Avg					Pk	Avg		Pk	Avg
Vertical											
3964	64.1		32.9	5.08	-31.25	0	0	70.83	82.2	-11.4	
5946	51.9		36.4	5.6	-31.25	0	0	62.65	82.2	-19.6	
7928	48.81		38.9	7	-31.25	0	0	63.46	82.2	-18.7	
9910	42.74		39.9	7.53	-31.25	0	0	58.92	82.2	-23.3	
11892	46.07		40	8.225	-31.25	0	0	63.05	82.2	-19.2	
13874	45.01		41.5	9.62	-31.25	0	0	64.88	82.2	-17.3	
15856	45.68		40.5	10.25	-31.25	0	0	65.18	82.2	-17	
17838	46.2		44.7	11.45	-31.25	0	0	71.1	82.2	-11.1	
19820	49.5		33	12.74	-31.25	0	0	63.99	82.2	-18.2	
Horizontal											
3964	67.08		32.9	5.08	-31.25	0	0	73.81	82.2	-8.39	
5946	51.16		36.4	5.6	-31.25	0	0	61.91	82.2	-20.3	
7928	49.07		38.9	7	-31.25	0	0	63.72	82.2	-18.5	
9910	45.35		39.9	7.53	-31.25	0	0	61.53	82.2	-20.7	
11892	46.14		40	8.225	-31.25	0	0	63.12	82.2	-19.1	
13874	46.05		41.5	9.62	-31.25	0	0	65.92	82.2	-16.3	
15856	46.89		40.5	10.25	-31.25	0	0	66.39	82.2	-15.8	
17838	47.58		44.7	11.45	-31.25	0	0	72.48	82.2	-9.72	

19820	49.3	33	12.74	-31.25	0	0	63.79	82.2	-18.4
f1=	1950 MHz	f2=	1957.5 MHz	f3=	1965 MHz		Low end		
Vertical									
3964	60.09	32.9	5.08	-31.25	0	0	66.82	82.2	-15.4
5946	52.48	36.4	5.6	-31.25	0	1	64.23	82.2	-18
7928	47.08	38.9	7	-31.25	0	1	62.73	82.2	-19.5
9910	44.81	39.9	7.53	-31.25	0	1	61.99	82.2	-20.2
11892	46.51	40	8.225	-31.25	0	1	64.49	82.2	-17.7
13874	45.01	41.5	9.62	-31.25	0	1	65.88	82.2	-16.3
15856	45.68	40.5	10.25	-31.25	0	1	66.18	82.2	-16
17838	46.2	44.7	11.45	-31.25	0	1	72.1	82.2	-10.1
19820	49.5	33	12.74	-31.25	0	1	64.99	82.2	-17.2
Horizontal									
3964	62.08	32.9	5.08	-31.25	0	0	68.81	82.2	-13.4
5946	51.86	36.4	5.6	-31.25	0	1	63.61	82.2	-18.6
7928	45.85	38.9	7	-31.25	0	1	61.5	82.2	-20.7
9910	48.56	39.9	7.53	-31.25	0	1	65.74	82.2	-16.5
11892	47.26	40	8.225	-31.25	0	1	65.24	82.2	-17
13874	45.21	41.5	9.62	-31.25	0	1	66.08	82.2	-16.1
15856	43.25	40.5	10.25	-31.25	0	1	63.75	82.2	-18.5
17838	46.2	44.7	11.45	-31.25	0	1	72.1	82.2	-10.1
19820	48.75	33	12.74	-31.25	0	1	64.24	82.2	-18

NOTE: ALL READINGS MEASURED AT 3 METER. LIMIT IS BASED ON 3 METER DISTANCE

DIST: Correction to extrapolate reading to 3m specification distance

AF: Antenna Factor

AMP: Pre-amp gain

CL: Cable loss

HPF: High pass filter insertion loss (4.5GHz)

ANALYZER SETTINGS

	Res B/W	Vid B/W
PEAK(Pk):	1MHz	1MHz
AVERAGE(Avg):	1MHz	10Hz

SECTION 2.1055: FREQUENCY STABILITY

(NOT APPLICABLE, EUT IS AN AMPLIFIER)

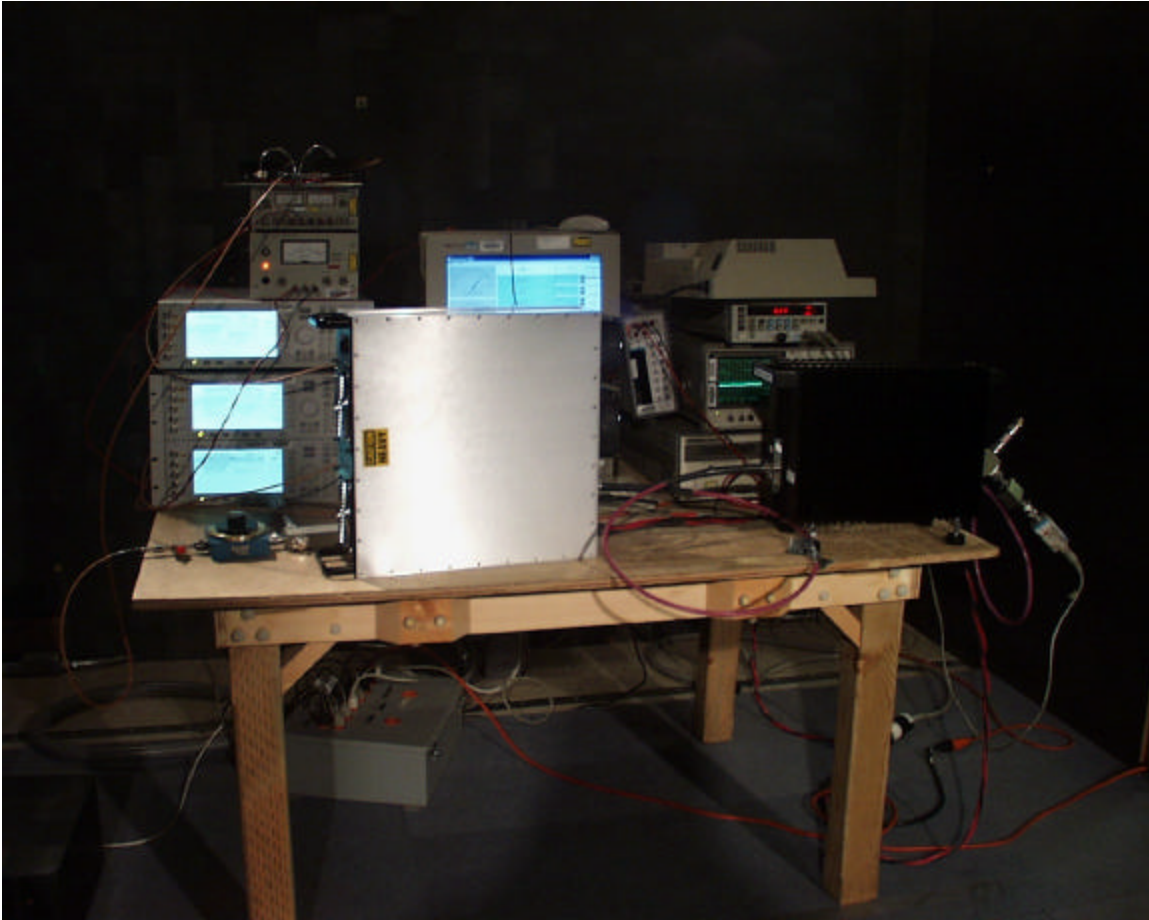
5. EUT SETUP PHOTOS

RADIATED PART 15 SETUP





ANTENNA CONDUCTED SETUP



1 METER RADIATED SETUP



ATTACHMENTS