



**POWERWAVE TECHNOLOGIES TEST REPORT**

**FOR THE**

**POWER AMPLIFIER, G3L-1900-54 AND G3L-1900-54-A**

**FCC PART 24 AND PART 15 SUBPART B SECTIONS 15.107 AND 15.109 CLASS B**

**COMPLIANCE**

**DATE OF ISSUE: FEBRUARY 24, 2003**

**PREPARED FOR:**

Powerwave Technologies  
1801 E. St. Andrew Place  
Santa Ana, CA 92705

P.O. No.: 62475  
W.O. No.: 80118

**PREPARED BY:**

Mary Ellen Clayton  
CKC Laboratories, Inc.  
5473A Clouds Rest  
Mariposa, CA 95338

Date of test: February 5-11, 2003

**Report No.: FC03-016**

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## **ADMINISTRATIVE INFORMATION**

**DATE OF TEST:** February 5-11, 2003

**DATE OF RECEIPT:** February 5, 2003

**PURPOSE OF TEST:** To demonstrate the compliance of the Power Amplifier, G3L-1900-54 and G3L-1900-54-A with the requirements for FCC Part 24 and Part 15 Subpart B Sections 15.107 and 15.109 Class B devices.

**TEST METHOD:** ANSI C63.4 (1992) and FCC Part 24

**FREQUENCY RANGE TESTED:** 9 kHz - 20 GHz

**MANUFACTURER:** Powerwave Technologies  
1801 E. St. Andrew Place  
Santa Ana, CA 92705

**REPRESENTATIVE:** Greg Butler

**TEST LOCATION:** CKC Laboratories, Inc.  
110 Olinda Place  
Brea, CA 92621

## SUMMARY OF RESULTS

As received, the Powerwave Technologies Power Amplifier, G3L-1900-54 and G3L-1900-54-A was found to be fully compliant with the following standards and specifications:

### United States

- FCC Part 24
- FCC Part 15 Subpart B Sections 15.107 and 15.109 Class B using:
- ANSI C63.4 (1992) method

### Canada

RSS-133 using:

- RSS133 Sections 6.2, 6.3 & 8.0
- FCC Part 24
- FCC Part 15 Subpart B Sections 15.107 and 15.109 Class B using:
- ANSI C63.4 (1992) method

## CONDITIONS FOR COMPLIANCE

Steward PN 25S2022-000 ribbon ferrite installed.

## APPROVALS

### QUALITY ASSURANCE:



Steve Behm, Director of Engineering Services and Quality Assurance

### TEST PERSONNEL:



Eddie Wong, EMC Engineer



Joyce Walker, Quality Assurance Administrative Manager



Septimiu Apahidean, Lab Manager

## MEASUREMENT UNCERTAINTY

TEST	HIGHEST UNCERTAINTY
Radiated Emissions	+/- 2.94 dB
Conducted Emissions	+/- 1.56 dB

Note: Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Statements of compliance are based on the nominal values only.

## EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The Power Amplifier, G3L-1900-54 and G3L-1900-54A tested by CKC Laboratories were representative of production units.

The following models were tested by CKC Laboratories: **G3L-1900-54-A & G3L-1900-54-B**  
Since the time of testing the manufacturer has chosen to use the following model name in its place. Any differences between the names does not affect their EMC characteristics and therefore complies to the level of testing equivalent to the tested model name shown on the data sheets: **G3L-1900-54 & G3L-1900-54-A**

## EQUIPMENT UNDER TEST

### Power Amplifier

Manuf: Powerwave Technologies  
Model: G3L-1900-54  
Serial: PW030400272  
FCC ID: Pending

### Power Amplifier

Manuf: Powerwave Technologies  
Model: G3L-1900-54-A  
Serial: PW030400076  
FCC ID: Pending

## PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

### Power Meter

Manuf: HP  
Model: E4418B  
Serial: US39251692  
FCC ID: NA

### Spectrum Analyzer

Manuf: HP  
Model: 8563E  
Serial: 3350A01916  
FCC ID: NA

### Signal Amplifier

Manuf: Comtech  
Model: PST  
Serial: NA  
FCC ID: NA

### Signal Generator (3 each)

Manuf: Agilent  
Model: E4433B  
Serial: US40051329, US38440742,  
US40051303  
FCC ID: NA

### DC Power Supply

Manuf: Agilent  
Model: 6674A  
Serial: US36371786  
FCC ID: NA

## **TEMPERATURE AND HUMIDITY DURING TESTING**

The temperature during testing was within +15°C and + 35°C.  
The relative humidity was between 20% and 75%.

## **2.1033(c)(3) USER'S MANUAL**

The necessary information is contained in a separate document.

## **2.1033 (c)(4) TYPE OF EMISSIONS**

F9W

## **2.1033(c)(5) FREQUENCY RANGE**

1932.7 MHz – 1987.3 MHz

## **2.1033(c)(6) OPERATING POWER**

54 Watts

## **2.1033(c)(7) MAXIMUM POWER RATING**

100 Watts

## **2.1033(c)(8) DC VOLTAGES**

The necessary information is contained in a separate document.

## **2.1033(c)(9) TUNE-UP PROCEDURE**

The necessary information is contained in a separate document.

## **2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION**

The necessary information is contained in a separate document.

## **2.1033(c)(11) LABEL AND PLACEMENT**

The necessary information is contained in a separate document.

## **2.1033(c)(12) SUBMITTAL PHOTOS**

The necessary information is contained in a separate document.

## **2.1033(c)(13) MODULATION INFORMATION**

The necessary information is contained in a separate document.

## 2.1033(c)(14)/2.1046/24.232(a) - RF POWER OUTPUT

### FCC 24.232 (a) Effective Isotropic Radiated Power.

§24.232 Power and antenna height limits.

(a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (e.i.r.p.) with an antenna height up to 300 meters HAAT. See 24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power; see Table 1 of this section. **In no case may the peak output power of a base station transmitter exceed 100 watts.** The service area boundary limit and microwave protection criteria specified in §§24.236 and 24.237 apply.

Table 1: Reduced Power for Base Station Antenna Heights Over 300 Meters

HAAT in meters	Maximum E.I.R.P. (watts)
6300	1640
6500	1070
61000	490
61500	270
62000	160

The EUT is a RF amplifier. The manufacturer does not provide an antenna for sale with the product, hence EIRP is not measured nor calculated. The end user of this product is to exercise proper engineering judgement to select the appropriate antenna to comply with the EIRP limitation set forth by FCC24.23a (a).

The RF power of the EUT was measured at the antenna port. The measurement satisfies the above requirement by demonstrating the measured power is below 100 watts.

**Test setup :** The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the directional coupler.

Low\_Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz

Mid\_Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz

High\_Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz

RF Power = 54 Watts

Frequency range of measurement = Fundamental

RBW=1 MHz,VBW=1MHz.

16°C, 20% relative humidity.

43.3 dB of attenuation is compensated for.

Result :

Peak readings of the waveform (6dB bandwidth = 14 MHz) measured with spectrum analyzer with a RBW=VBW= 1 MHz

Freq	Power
Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz	= 153.1 dBuV = 40 Watts
Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz	= 153.8 dBuV = 49 Watts
Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz	= 153.7 dBuV = 48 Watts

Average power of the same waveform measured with broad band, Average Power meter.

Freq	Power
Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz	= 54 Watts
Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz	= 54 Watts
Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz	= 54 Watts



Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **FCC 24.238(a) Conducted Spurious Emission Block B**  
 Work Order #: **80118** Date: 02/06/2003  
 Test Type: **Conducted Emissions** Time: 15:15:03  
 Equipment: **Power Amplifier** Sequence#: 11  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A 208Vac 60 Hz  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the directional coupler. Low\_Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz. Mid\_Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz. High\_Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz. RF Power = 54 Watts. Frequency range of measurement = Fundamental. RBW=1 MHz, VBW=1MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

**Transducer Legend:**

T1=12' SMA Gore cable #1337 121603

<b>Measurement Data:</b>		Reading listed by margin.					Test Lead: Antenna Terminal				
#	Freq MHz	Rdng dBμV	T1 dB				Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1962.470M	152.0	+1.8				+0.0	153.8	157.0	-3.2	Anten
									G3L-1900-54-A, Mid		
2	1953.220M	152.0	+1.8				+0.0	153.8	157.0	-3.2	Anten
									G3L-1900-54-B, Mid		
3	1987.600M	151.9	+1.8				+0.0	153.7	157.0	-3.3	Anten
									G3L-1900-54-A, High		
4	1942.100M	151.3	+1.8				+0.0	153.1	157.0	-3.9	Anten
									G3L-1900-54-A, Low		



#### Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603
RF Power meter	02082	HP	435B	2445A11881	093002	093003

## RS133 6.2 - RF POWER OUTPUT

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **RSS 133 6.2 Output Power Test**  
 Work Order #: **80118**  
 Test Type: **Conducted Emissions**  
 Equipment: **Power Amplifier**  
 Manufacturer: Powerwave Technologies  
 Model: G3L-1900-54-A  
 S/N: PW030400272

Date: 02/06/2003  
 Time: 15:15:03  
 Sequence#: 11  
 Tested By: Eddie Wong  
 208Vac 60 Hz

### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

### Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

### Test Conditions / Notes:

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the directional coupler. Low\_Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz. Mid\_Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz, High\_Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz. RF power = 54 Watts. Frequency range of measurement = Fundamental. Spec limit = 100 Watts = 157 dBuV RBW=1 MHz, VBW=1 MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

### Transducer Legend:

T1=12' SMA Gore cable #1337 121603

### Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB				Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1962.470M	152.0	+1.8				+0.0	153.8	157.0	-3.2	Anten
									G3L-1900-54-A, Mid		
2	1953.220M	152.0	+1.8				+0.0	153.8	157.0	-3.2	Anten
									G3L-1900-54-B, Mid		
3	1987.600M	151.9	+1.8				+0.0	153.7	157.0	-3.3	Anten
									G3L-1900-54-A, High		
4	1942.100M	151.3	+1.8				+0.0	153.1	157.0	-3.9	Anten
									G3L-1900-54-A, Low		





#### Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603
RF Power meter	02082	HP	435B	2445A11881	093002	093003

## 2.1033(c)(14)/2.1047(a) - MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

Not applicable to this unit.

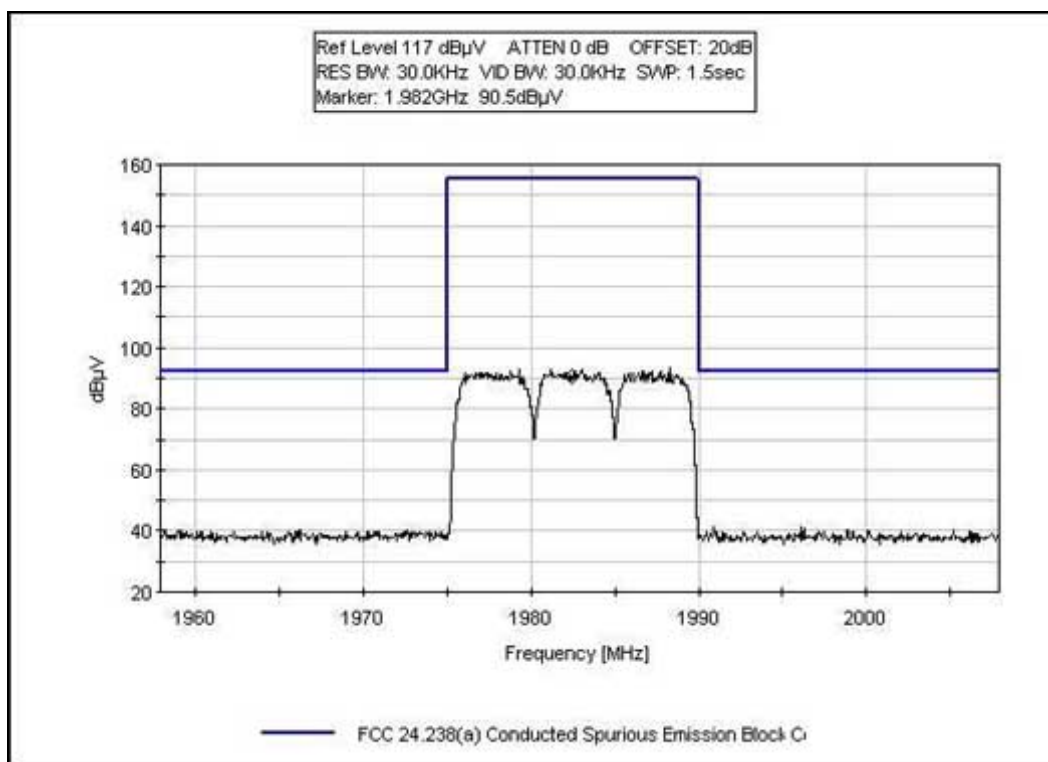
## 2.1033(C)(14)/2.1047(B) MODULATION CHARACTERISTICS – MODULATION LIMITING RESPONSE

Not applicable to this unit.

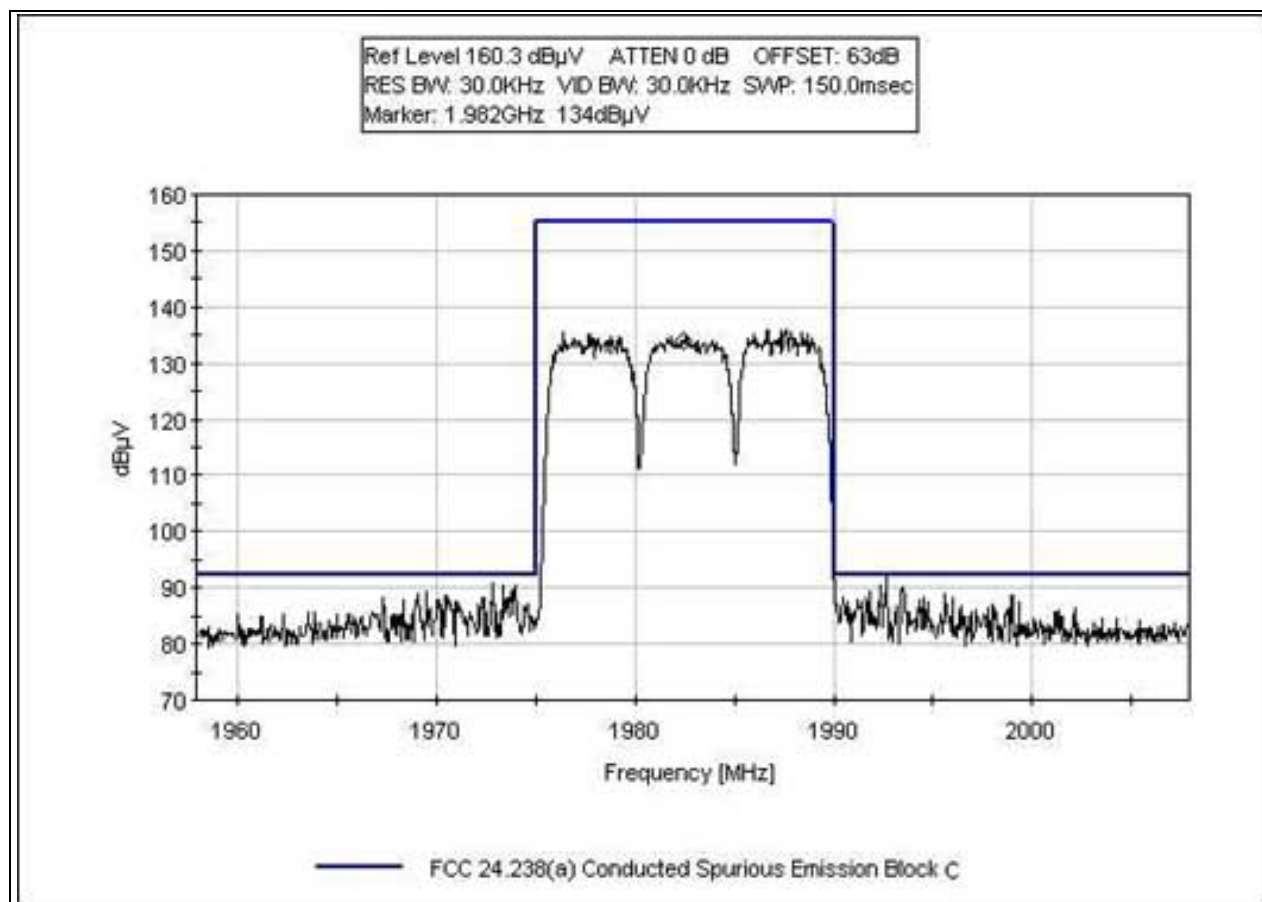
## 2.1033(c)(14)/2.1049(i)- OCCUPIED BANDWIDTH

**Test Conditions:** The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the directional coupler. Tx Freq = High\_ Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz. RF power = 54 Watt. Frequency range of measurement = 9 kHz-20 GHz. Required Attenuation =  $-43+10 \log P$  dB = 94 dBuV at antenna terminal. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz-20000 MHz, RBW=1 MHz, VBW=1 MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

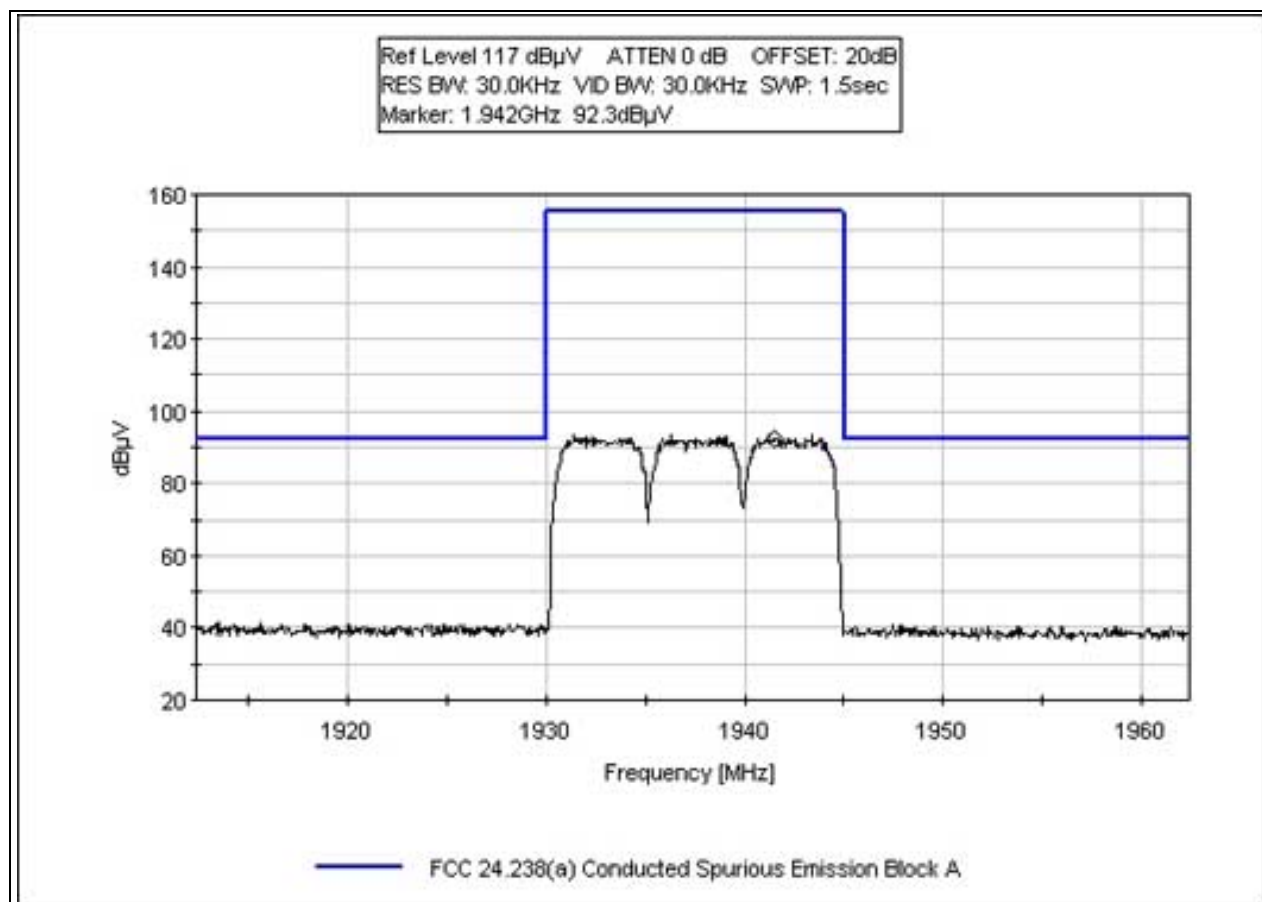
### INPUT VS OUTPUT PLOT - HIGH INPUT



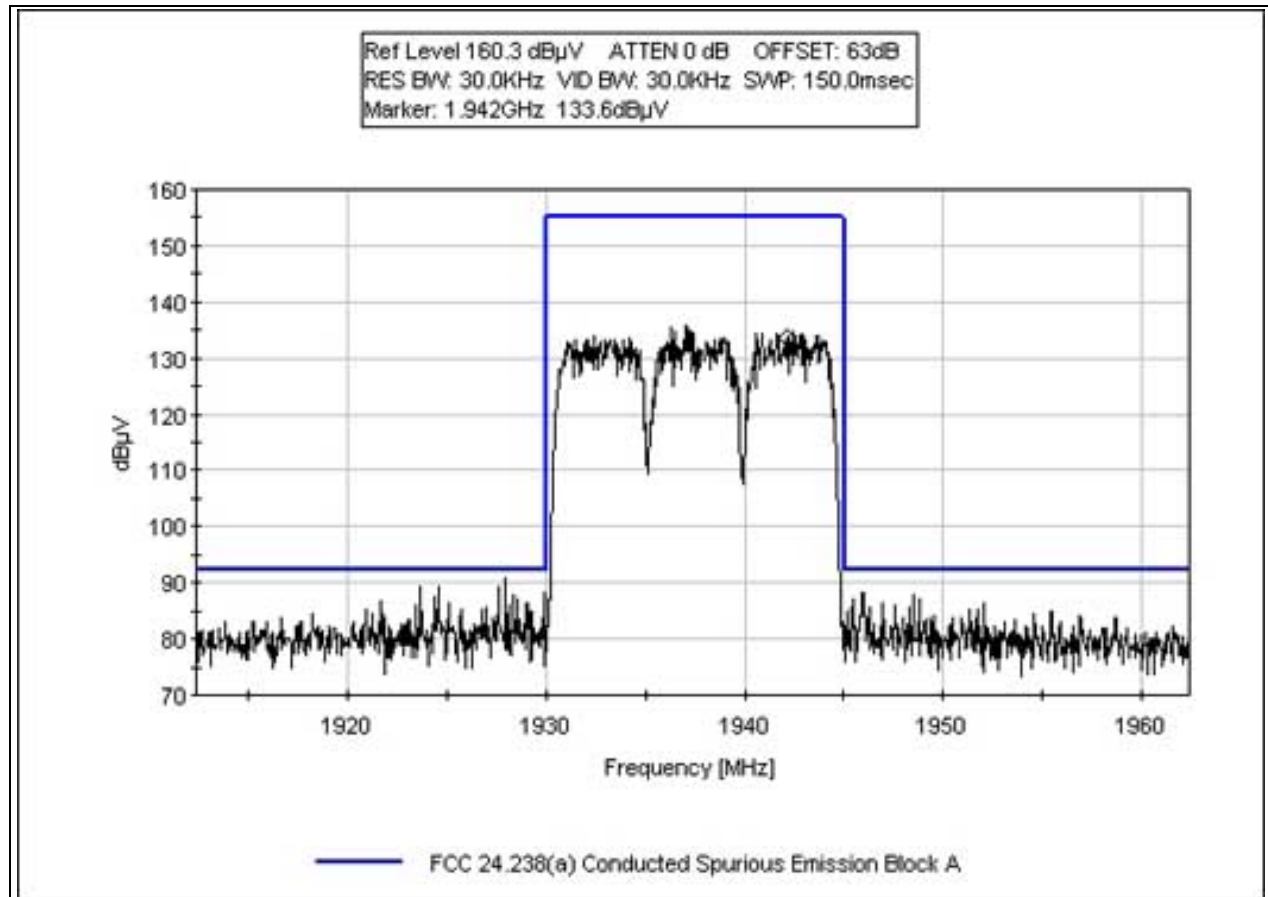
## INPUT VS OUTPUT PLOT - HIGH OUTPUT



## INPUT VS OUTPUT PLOT - LOW INPUT

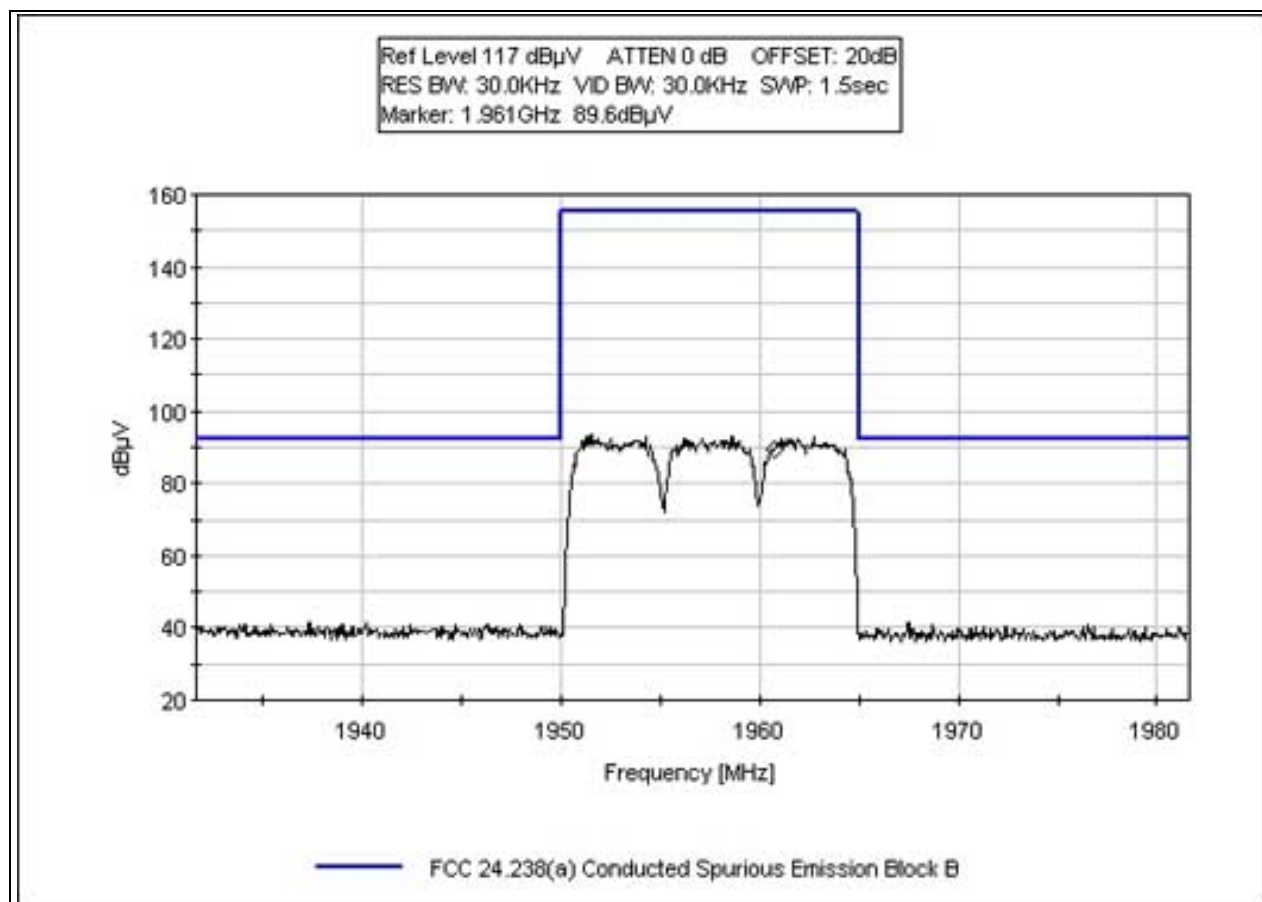


## INPUT VS OUTPUT PLOT - LOW OUTPUT

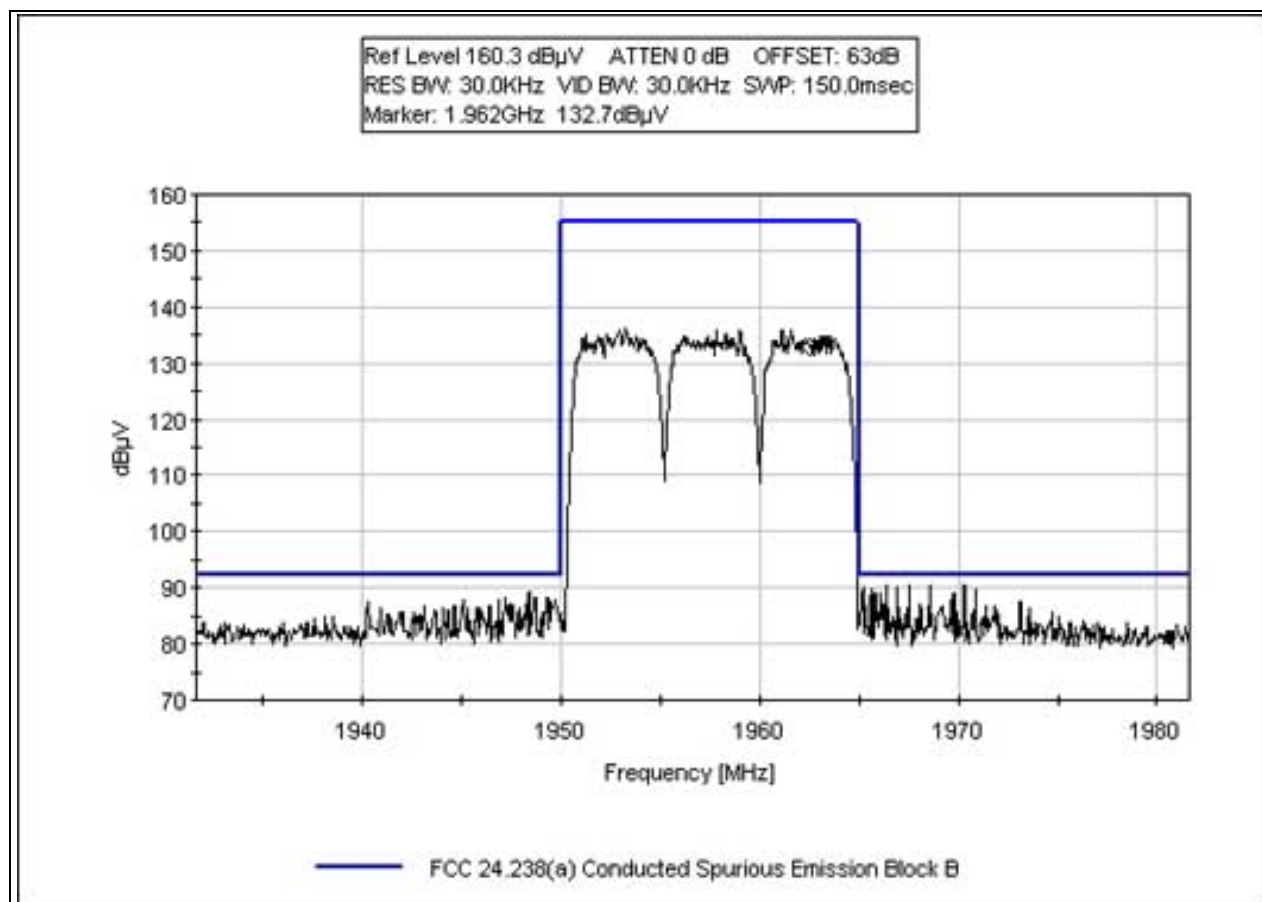




## INPUT VS OUTPUT PLOT - MID INPUT



## INPUT VS OUTPUT PLOT - MID OUTPUT



### Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603
RF Power meter	02082	HP	435B	2445A11881	093002	093003



## 2.1033(c)(14)/2.1051/24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

### Limit line for Spurious Conducted Emission

$$\text{Required Attenuation} = 43 + 10 \log P \text{ dB}$$

$$\begin{aligned} \text{Limit line (dBuV)} &= V_{\text{dBuV}} - \text{Attenuation} \\ V_{\text{dBuV}} &= 20 \log \frac{V}{1 \times 10^{-6}} \\ &= 20 (\log V - \log 1 \times 10^{-6}) \\ &= 20 \log V - 20 \log 1 \times 10^{-6} \\ &= 20 \log V - 20(-6) \\ &= 20 \log V + 120 \end{aligned}$$

$$\begin{aligned} \text{Attenuation} &= 43 + 10 \log P \\ &= 43 + 10 \log \frac{V^2}{R} \\ &= 43 + 10 (\log V^2 - \log R) \\ &= 43 + 10 (2 \log V - \log R) \\ &= 43 + 20 \log V - 10 \log R \end{aligned}$$

$$\begin{aligned} \text{Limit line} &= V_{\text{dBuV}} - \text{Attenuation} \\ &= 20 \log V + 120 - (43 + 20 \log V - 10 \log R) \\ &= 20 \log V + 120 - 43 - 20 \log V + 10 \log R \\ &= 20 \log V + 120 - 43 - 20 \log V + 10 \log R \\ &= 120 - 43 + 10 \log 50 \quad \text{Note : } R = 50 \Omega \\ &= 120 - 43 + 16.897 \\ &= 94 \text{ dBuV at any power level} \end{aligned}$$

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **FCC 24.238(a) Conducted Spurious Emission Block A**  
 Work Order #: **80118** Date: 02/06/2003  
 Test Type: **Conducted Emissions** Time: 16:02:52  
 Equipment: **Power Amplifier** Sequence#: 12  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A 208Vac 60 Hz  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the Directional coupler. Tx Freq = Low\_Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz. RF power = 54 Watts. Frequency range of measurement = 9 kHz - 20 GHz. Required Attenuation = -43+10 Log P dB = 94 dBuV at antenna terminal. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

**Transducer Legend:**

T1=12' SMA Gore cable #1337 121603
------------------------------------

**Measurement Data:** Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB				Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1087.200M	77.8	+1.5				+0.0	79.3	94.0	-14.7	Anten

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **FCC 24.238(a) Conducted Spurious Emission Block B**  
 Work Order #: **80118** Date: 02/06/2003  
 Test Type: **Conducted Emissions** Time: 16:09:34  
 Equipment: **Power Amplifier** Sequence#: 13  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A 208Vac 60 Hz  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the Directional coupler. Tx Freq = Mid\_Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz. RF power = 54 Watts. Frequency range of measurement = 9 kHz - 20 GHz. Required Attenuation = -43+10 Log P dB = 94 dBuV at antenna terminal. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

**Transducer Legend:**

--

**Measurement Data:** Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
---	-------------	--------------	----	----	----	----	---------------	--------------	--------------	--------------	--------------



Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **FCC 24.238(a) Conducted Spurious Emission Block B**  
 Work Order #: **80118** Date: 02/06/2003  
 Test Type: **Conducted Emissions** Time: 16:41:52  
 Equipment: **Power Amplifier** Sequence#: 14  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A 208Vac 60 Hz  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

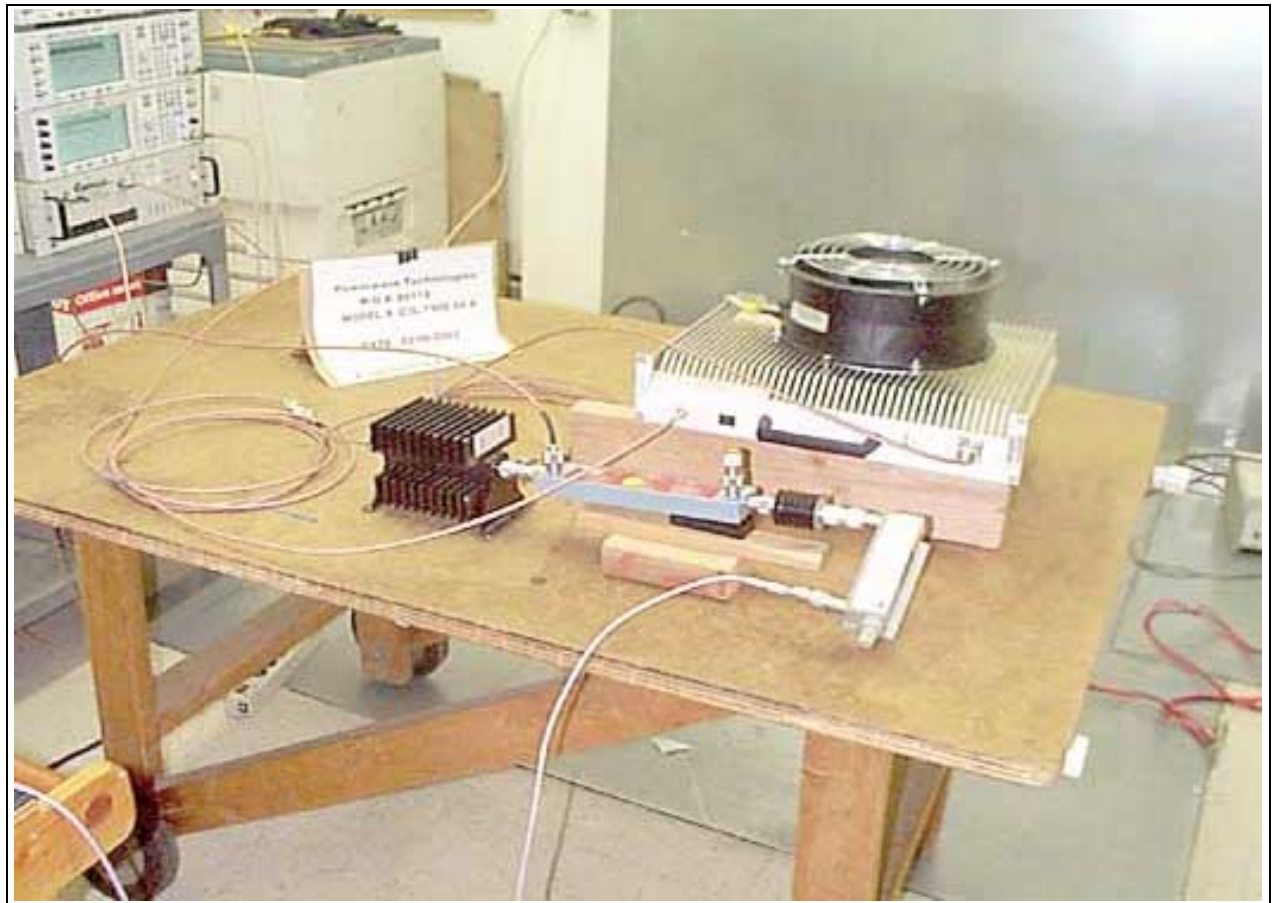
The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the directional coupler. Tx Freq = High\_ Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz. RF power = 54 Watt. Frequency range of measurement = 9 kHz-20 GHz. Required Attenuation = -43+10 Log P dB = 94 dBuV at antenna terminal. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz-20000 MHz, RBW=1 MHz, VBW=1 MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

**Transducer Legend:**

T1=12' SMA Gore cable #1337 121603
------------------------------------

**Measurement Data:** Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB				Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	922.600M	77.5	+1.4				+0.0	78.9	94.0	-15.1	Anten







#### Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603
RF Power meter	02082	HP	435B	2445A11881	093002	093003

## RSS133 6.3 - UNWANTED EMISSIONS

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **RSS133 6.3 Unwanted Radiated Emission Block A**  
 Work Order #: **80118** Date: 02/10/2003  
 Test Type: **Maximized emission** Time: 14:52:39  
 Equipment: **Power Amplifier** Sequence#: 15  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A  
 S/N: PW030400272

### *Equipment Under Test (\* = EUT):*

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

### *Support Devices:*

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

### *Test Conditions / Notes:*

The EUT is placed on the wooden table. RF input port is connected to a remote support signal amplifier, combiner and 3 signal generators. The RF output is connected to a remote RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. TX Power = 54 Watts, TX Freq = Low = Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz. Required attenuation = -43 +10 Log P = 82.3 dBuV/m at 3 meters. Frequency range of measurement = 9 kHz - 20 GHz. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 208VAC, 60 Hz, 17°C, 23% relative humidity. Steward PN 25S2022-000 ribbon ferrite installed.

### *Transducer Legend:*

T1=Log antenna, SN331 092303	T2=Bicon SN220 092303
T3=Cable #10 070803	T4=Cable 15 123002
T5=Preamp 8447D 082303	T6=Horn 6246_091003
T7=12' SMA Gore cable #1337 121603	T8=HP83017A Preamp 091103
T9=Cable#20 Helix 48ft	

### *Measurement Data:*

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V	dB $\mu$ V	dB	Ant
1	7761.200M	60.5	+0.0 +0.0 +10.5	+0.0 +36.4	+0.0 +4.3	+0.0 -36.4	+0.0	75.3	82.3	-7.0	Vert

2	9684.400M	43.5	+0.0 +0.0 +12.0	+0.0 +38.3	+0.0 +4.3	+0.0 -36.4	+0.0	61.7	82.3	-20.6	Horiz
3	7751.200M Ave	45.0	+0.0 +0.0 +10.5	+0.0 +36.4	+0.0 +4.3	+0.0 -36.4	+0.0	59.8	82.3	-22.5	Horiz
^	7751.200M	61.1	+0.0 +0.0 +10.5	+0.0 +36.4	+0.0 +4.3	+0.0 -36.4	+0.0	75.9	82.3	-6.4	Horiz
5	5811.200M Ave	48.0	+0.0 +0.0 +8.9	+0.0 +33.4	+0.0 +3.2	+0.0 -36.5	+0.0	57.0	82.3	-25.3	Vert
^	5811.200M	71.6	+0.0 +0.0 +8.9	+0.0 +33.4	+0.0 +3.2	+0.0 -36.5	+0.0	80.6	82.3	-1.7	Vert
7	5812.600M Ave	46.6	+0.0 +0.0 +8.9	+0.0 +33.4	+0.0 +3.2	+0.0 -36.5	+0.0	55.6	82.3	-26.7	Horiz
^	5812.600M	64.0	+0.0 +0.0 +8.9	+0.0 +33.4	+0.0 +3.2	+0.0 -36.5	+0.0	73.0	82.3	-9.3	Horiz
9	3874.600M	46.7	+0.0 +0.0 +7.0	+0.0 +33.2	+0.0 +3.2	+0.0 -39.3	+0.0	50.8	82.3	-31.5	Horiz
10	3881.500M	46.7	+0.0 +0.0 +7.0	+0.0 +33.2	+0.0 +3.2	+0.0 -39.3	+0.0	50.8	82.3	-31.5	Vert
11	1799.902M	46.0	+0.0 +0.0 +4.8	+0.0 +26.9	+0.0 +1.8	+0.0 -38.3	+0.0	41.2	82.3	-41.1	Vert
12	839.200M	24.9	+22.9 -27.6 +0.0	+0.0 +0.0	+0.5 +0.0	+5.6 +0.0	+0.0	26.3	82.3	-56.0	Vert
13	285.000M	28.9	+0.0 -28.2 +0.0	+21.7 +0.0	+0.3 +0.0	+3.0 +0.0	+0.0	25.7	82.3	-56.6	Horiz
14	1937.140M	76.4	+0.0 +0.0 +5.0	+0.0 +27.7	+0.0 +1.8	+0.0 -38.7	+0.0	72.2	157.0 Fundamental	-84.8	Vert
15	1936.820M	69.4	+0.0 +0.0 +5.0	+0.0 +27.7	+0.0 +1.8	+0.0 -38.7	+0.0	65.2	157.0 Fundamental	-91.8	Horiz

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **RSS133 6.3 Unwanted Radiated Emission Block B**  
 Work Order #: **80118** Date: 02/10/2003  
 Test Type: **Maximized emission** Time: 16:13:47  
 Equipment: **Power Amplifier** Sequence#: 16  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a remote support signal amplifier, combiner and 3 signal generators. The RF output is connected to a remote RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. TX Power = 54 Watts, TX Freq = Mid = Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz. Required attenuation = -43 +10 Log P = 82.3 dBuV/m at 3 meters. Frequency range of measurement = 9 kHz - 20 GHz. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 208VAC, 60 Hz, 17°C, 23% relative humidity. Steward PN 25S2022-000 ribbon ferrite installed.

**Transducer Legend:**

T1=Log antenna, SN331 092303	T2=Bicon SN220 092303
T3=Cable #10 070803	T4=Cable 15 123002
T5=Preamp 8447D 082303	T6=Horn 6246_091003
T7=12' SMA Gore cable #1337 121603	T8=HP83017A Preamp 091103
T9=Cable#20 Helix 48ft	T10=Brea Cable: 6' 1/4" Helix - Brea # 7.

**Measurement Data:** Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dBμV	T9	T10							
			dB	dB	dB	dB	Table	dBμV	dBμV	dB	Ant
1	7829.400M	54.6	+0.0	+0.0	+0.0	+0.0	+0.0	69.3	82.3	-13.0	Vert
			+0.0	+36.5	+4.2	-36.5					
			+10.5								
2	5874.100M	60.0	+0.0	+0.0	+0.0	+0.0	+0.0	68.9	82.3	-13.4	Horiz
			+0.0	+33.2	+3.2	-36.5					
			+9.0								

3	9790.601M	48.7	+0.0 +0.0 +12.2	+0.0 +38.7	+0.0 +4.4	+0.0 -36.5	+0.0	67.5	82.3	-14.8	Vert
4	7824.100M	52.6	+0.0 +0.0 +10.5	+0.0 +36.5	+0.0 +4.2	+0.0 -36.5	+0.0	67.3	82.3	-15.0	Horiz
5	9783.300M	41.6	+0.0 +0.0 +12.1	+0.0 +38.6	+0.0 +4.4	+0.0 -36.5	+0.0	60.2	82.3	-22.1	Horiz
6	3914.700M	53.1	+0.0 +0.0 +7.1	+0.0 +33.3	+0.0 +3.2	+0.0 -39.3	+0.0	57.4	82.3	-24.9	Vert
7	5872.060M Ave	46.4	+0.0 +0.0 +9.0	+0.0 +33.2	+0.0 +3.2	+0.0 -36.5	+0.0	55.3	82.3	-27.0	Vert
^	5872.060M	67.7	+0.0 +0.0 +9.0	+0.0 +33.2	+0.0 +3.2	+0.0 -36.5	+0.0	76.6	82.3	-5.7	Vert
9	3913.900M	48.2	+0.0 +0.0 +7.1	+0.0 +33.3	+0.0 +3.2	+0.0 -39.3	+0.0	52.5	82.3	-29.8	Horiz
10	914.200M	22.0	+24.1 -27.4 +0.0	+0.0 +0.0	+0.5 +0.0	+5.9 +0.0	+0.0	25.1	82.3	-57.2	Horiz
11	267.400M	24.7	+0.0 -28.2 +0.0	+20.2 +0.0	+0.3 +0.0	+2.9 +0.0	+0.0	19.9	82.3	-62.4	Vert
12	1958.080M	70.1	+0.0 +0.0 +5.0	+0.0 +27.8	+0.0 +1.8	+0.0 -38.8	+0.0	65.9	157.0 Fundamental	-91.1	Horiz
13	1957.260M	68.9	+0.0 +0.0 +5.0	+0.0 +27.8	+0.0 +1.8	+0.0 -38.8	+0.0	64.7	157.0 Fundamental	-92.3	Vert

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **RSS133 6.3 Unwanted Radiated Emission Block C**  
 Work Order #: **80118** Date: 02/11/2003  
 Test Type: **Maximized emission** Time: 09:45:22  
 Equipment: **Power Amplifier** Sequence#: 17  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a remote support signal amplifier, combiner and 3 signal generators. The RF output is connected to a remote RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. TX Power = 54 Watts. TX Freq = High = Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz. Required attenuation = -43 +10 Log P = 82.3 dBuV/m at 3 meters. Frequency range of measurement = 9 kHz – 20 GHz. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 208VAC, 60 Hz, 17°C, 23% relative humidity. Steward PN 25S2022-000 ribbon ferrite installed.

**Transducer Legend:**

T1=Log antenna, SN331 092303	T2=Bicon SN220 092303
T3=Cable #10 070803	T4=Cable 15 123002
T5=Preamp 8447D 082303	T6=Horn 6246_091003
T7=12' SMA Gore cable #1337 121603	T8=HP83017A Preamp 091103
T9=Cable#20 Helix 48ft	T10=Brea Cable: 6' 1/4" Helix - Brea # 7.

**Measurement Data:** Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dBμV	T9	T10							
			dB	dB	dB	dB	Table	dBμV	dBμV	dB	Ant
1	5945.900M	64.1	+0.0	+0.0	+0.0	+0.0	+0.0	73.0	82.3	-9.3	Vert
			+0.0	+33.1	+3.2	-36.4					
			+9.0								
2	5943.600M	61.1	+0.0	+0.0	+0.0	+0.0	+0.0	70.0	82.3	-12.3	Horiz
			+0.0	+33.1	+3.2	-36.4					
			+9.0								



3	7927.700M	52.2	+0.0 +0.0 +10.6	+0.0 +36.5 +4.1	+0.0 +4.1 -36.7	+0.0	+0.0	66.7	82.3	-15.6	Vert
4	7929.800M	51.2	+0.0 +0.0 +10.6	+0.0 +36.5 +4.1	+0.0 +4.1 -36.7	+0.0	+0.0	65.7	82.3	-16.6	Horiz
5	9914.399M	42.8	+0.0 +0.0 +12.3	+0.0 +39.1 +4.5	+0.0 +4.5 -36.5	+0.0	+0.0	62.2	82.3	-20.1	Vert
6	3966.100M	54.4	+0.0 +0.0 +7.2	+0.0 +33.4 +3.2	+0.0 +3.2 -39.2	+0.0	+0.0	59.0	82.3	-23.3	Vert
7	3964.600M	52.0	+0.0 +0.0 +7.2	+0.0 +33.4 +3.2	+0.0 +3.2 -39.2	+0.0	+0.0	56.6	82.3	-25.7	Horiz
8	989.200M	22.8	+24.6 -27.5 +0.0	+0.0 +0.0 +0.0	+0.5 +6.2 +0.0	+0.0	+0.0	26.6	82.3	-55.7	Vert
9	264.200M	27.8	+0.0 -28.2 +0.0	+20.0 +0.0 +0.0	+0.3 +2.9 +0.0	+0.0	+0.0	22.8	82.3	-59.5	Horiz
10	1987.480M	70.6	+0.0 +0.0 +5.1	+0.0 +27.9 +1.8	+0.0 +0.0 -38.9	+0.0	+0.0	66.5	157.0 Fundamental	-90.5	Vert
11	1986.800M	66.1	+0.0 +0.0 +5.1	+0.0 +27.9 +1.8	+0.0 +0.0 -38.9	+0.0	+0.0	62.0	157.0 Fundamental	-95.0	Horiz

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **RSS133 6.3 Unwanted Conducted Emission Block A**  
 Work Order #: **80118** Date: 02/06/2003  
 Test Type: **Conducted Emissions** Time: 16:02:52  
 Equipment: **Power Amplifier** Sequence#: 12  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A 208Vac 60 Hz  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the directional coupler. Tx Freq = Low\_Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz. RF power = 54 Watts. Frequency range of measurement = 9 kHz -20 GHz. Required Attenuation = -43+10 Log P dB = 94 dBuV at antenna terminal. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

**Transducer Legend:**

T1=12' SMA Gore cable #1337 121603
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**Measurement Data:** Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB				Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1087.200M	77.8	+1.5				+0.0	79.3	94.0	-14.7	Anten



Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **RSS133 Unwanted Conducted Emission Block B**  
 Work Order #: **80118** Date: 02/06/2003  
 Test Type: **Conducted Emissions** Time: 16:09:34  
 Equipment: **Power Amplifier** Sequence#: 13  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A 208Vac 60 Hz  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the directional coupler. Tx Freq = Mid\_Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz. RF power = 54 Watts. Frequency range of measurement = 9 kHz - 20 GHz. Required Attenuation = -43+10 Log P dB = 94 dBuV at antenna terminal. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

**Transducer Legend:**

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**Measurement Data:** Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV					Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
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Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **RSS133 6.3 Unwanted Conducted Emission Block A**  
 Work Order #: **80118** Date: 02/06/2003  
 Test Type: **Conducted Emissions** Time: 16:41:52  
 Equipment: **Power Amplifier** Sequence#: 14  
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong  
 Model: G3L-1900-54-A 208Vac 60 Hz  
 S/N: PW030400272

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier, combiner and 3 signal generators. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. RF power is measured at the monitoring port of the directional coupler. Tx Freq = High\_ Block C = 1977.7 MHz, 1982.5 MHz, 1987.3 MHz. RF Power = 54 Watts. Frequency range of measurement = 9 kHz - 20 GHz. Required Attenuation = -43+10 Log P dB = 94 dBuV at antenna terminal. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 16°C, 20% relative humidity. 43.3 dB of attenuation is compensated for.

**Transducer Legend:**

T1=12' SMA Gore cable #1337 121603
------------------------------------

**Measurement Data:** Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBμV	T1 dB				Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	922.600M	77.5	+1.4				+0.0	78.9	94.0	-15.1	Anten

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603
RF Power meter	02082	HP	435B	2445A11881	093002	093003

## **2.1033(c)(14)/2.1053/24.238(a)- FIELD STRENGTH OF SPURIOUS RADIATION**

**Test Conditions:** The EUT is placed on the wooden table. RF input port is connected to a remote support signal amplifier, combiner and 3 signal generators. The RF output is connected to a remote RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. TX Power = 54 Watts. TX Freq = Low = Block A = 1932.7 MHz, 1937.5 MHz, 1942.3 MHz. Block B = 1952.7 MHz, 1957.5 MHz, 1962.3 MHz. High = Block C = 1977.7 MHz, 82.5 MHz, 1987.3 MHz. Required attenuation =  $-43 + 10 \log P$  = 82.3 dBuV/m at 3 meters. Frequency range of measurement = 9 kHz – 20 GHz. Frequency 9 kHz - 150 kHz, RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz; 1000 MHz - 20000 MHz, RBW=1 MHz, VBW=1 MHz. 208VAC, 60 Hz, 17°C, 23% relative humidity. Steward PN 25S2022-000 ribbon ferrite installed.

Operating Frequency: 1932.7, 1936.5, 1942.3 MHz

Channels: Low

Highest Measured Output Power: 47.32 EIRP(dBm)= 54 EIRP(Watts)

Distance: 3 meters

Limit:  $43+10\log(P)$  60.32 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
7,761.20	-20	Vert	67.32
9,684.40	-33.60	Horiz	80.92
7,751.20	-35.50	Horiz	82.82
7,751.20	-19.40	Horiz	66.72
5,811.20	-38.30	Vert	85.62
5,811.20	-14.70	Vert	62.02
5,812.60	-39.70	Horiz	87.02
5,812.60	-22.30	Horiz	69.62
3,874.60	-44.50	Horiz	91.82
3,881.50	-44.50	Vert	91.82
1,799.90	-54.10	Vert	101.42
839.20	-69.00	Vert	116.32
285.00	-69.60	Horiz	116.92

Operating Frequency: 1952.7, 1957.5, 1962.3 MHz  
 Channels: Mid  
 Highest Measured Output Power: 47.32 EIRP(dBm)= 54 EIRP(Watts)  
 Distance: 3 meters  
 Limit:  $43+10\log(P)$  60.32 dBc

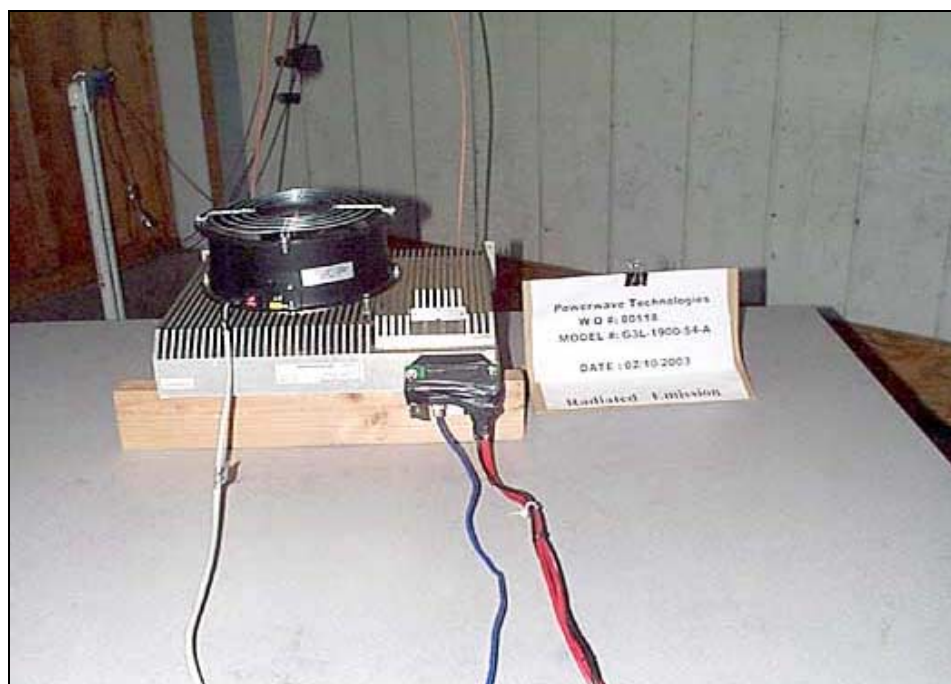
Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
7,829.40	-26	Vert	73.32
5,874.10	-26.40	Horiz	73.72
9,790.60	-27.80	Vert	75.12
7,824.10	-28.00	Horiz	75.32
9,783.30	-35.10	Horiz	82.42
3,914.70	-37.90	Vert	85.22
5,872.06	-40.00	Vert	87.32
5,872.06	-18.70	Vert	66.02
3,913.90	-42.80	Horiz	90.12
914.20	-70.20	Horiz	117.52
267.40	-75.40	Vert	122.72

Operating Frequency: 1977.7, 1982.5, 1987.3 MHz  
 Channels: High  
 Highest Measured Output Power: 47.32 EIRP(dBm)= 54 EIRP(Watts)  
 Distance: 3 meters  
 Limit:  $43+10\log(P)$  60.32 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
5,945.90	-22.3	Vert	69.62
5,943.60	-25.30	Horiz	72.62
7,927.70	-28.60	Vert	75.92
7,929.80	-29.60	Horiz	76.92
9,914.40	-33.10	Vert	80.42
3,966.10	-36.30	Vert	83.62
3,964.60	-38.70	Horiz	86.02
989.20	-68.70	Vert	116.02
264.20	-72.50	Horiz	119.82



Radiated Emissions - Front View



Radiated Emissions - Back View





Horn



Horn





Loop

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
<b>30MHz-1GHz</b>						
Bicon Antenna	306	AH	SAS200/540	220	092302	092303
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092303
Pre-amp	00309	HP	8447D	1937A02548	082302	082303
Antenna cable	NA	NA	RG214	Cable#15	123002	123003
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	070802	070803
<b>1 GHz- 18 GHz</b>						
Horn Antenna	0849	EMCO	3115	6246	091002	091003
<b>18-20 GHz</b>						
Horn Antenna	2112	HP	84125-80008	961178-006	062802	062803
Microwave Pre-amp	00786	HP	83017A	3123A00281	091102	091103
Heliac Antenna cable	NA	Andrew	LDF1-50	Cable#20	091102	091103
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603
<b>10KHz-30 MHz</b>						
Rod antenna	02159	Emco	3301B	9809-4058	071002	071003

**2.1033(c)(14)/2.1055 - FREQUENCY STABILITY**

**Not applicable to this unit.**

## 2.1091/1.1310(b)/RSS133 8.0 – MPE CALCULATIONS

### FCC 1.1310(b), Maximum Permissible Exposure Calculations RSS133 Sun clause 8 Exposure of Humans to RF Field

Date of Report: February 11<sup>th</sup>, 2003

Calculations prepared for:

*Powerwave Technologies*  
1801 E. St. Andrew Place  
Santa Ana, CA 92705

Calculations prepared by:

*Eddie Wong*  
110 N. Olinda Place  
Brea, CA 9283

Model Number: G3L-1900-54-A,  
G3L-1900-54-B

FCC Identification: NA

Fundamental Operating Frequency: 1930-1990 MHz

Maximum Rated Output Power: 54 Watts

Measured Output Power: 54 Watts

MPE Limit in accordance with 1.1310(b): Limits for general population/uncontrolled exposure

MPE Limit for 1930-1990 MHz = 1 mW/cm<sup>2</sup> (10 W/m<sup>2</sup>)

Power Output (Watts)	Power Density Limit (mW/cm <sup>2</sup> )	Minimum Distance (Meters)
<b>54</b>	<b>1</b>	<b>0.66</b>

$$\text{Power Density (W/m}^2\text{)} = \frac{30 \times P_t \times G}{d^2 \times Z_0}$$

$P_t$  = Power Delivered to the Antenna  
 $d$  = Distance in meters

$G$  = Antenna Gain  
 $Z_0$  = Impedance of Free Space

The typical antennas to be used with the EUT are structure mount antennas which under normal operation has an antenna height of at least 5 meters. As can be seen from the MPE result, this device passes the limit specified in 1.1310 at a distance of 0.66 meter.

Calculation:

$$d = \sqrt{\frac{30 \times 54 \times 1}{10 \times 377}}$$

= 0.66 meter.

## 15.107 - AC CONDUCTED EMISSIONS

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **FCC 15.107 Class B COND [AVE]**  
 Work Order #: **80118**  
 Test Type: **Conducted Emissions**  
 Equipment: **Power Amplifier**  
 Manufacturer: Powerwave Technologies  
 Model: G3L-1900-54-A  
 S/N: PW030400272

Date: 02/06/2003  
 Time: 9:41:11 AM  
 Sequence#: 2  
 Tested By: Eddie Wong  
 208Vac 60 Hz

### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

### Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329

### Test Conditions / Notes:

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier and signal generator. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. Freq = 1960 MHz. RF power = 54 Watts. Frequency range of measurement = 150 kHz – 30 MHz. Frequency 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz. 16°C, 20% relative humidity.

### Transducer Legend:

### Measurement Data:

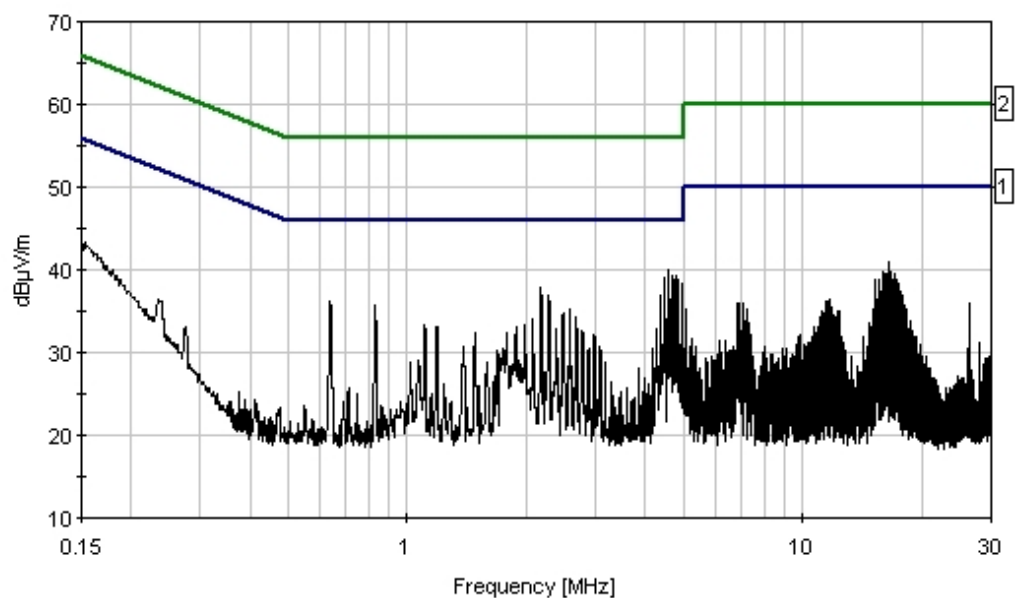
Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	4.564M	40.0					+0.0	40.0	46.0	-6.0	Black
2	4.764M	39.4					+0.0	39.4	46.0	-6.6	Black
3	4.662M	39.2					+0.0	39.2	46.0	-6.8	Black
4	4.462M	39.1					+0.0	39.1	46.0	-6.9	Black
5	4.862M	38.9					+0.0	38.9	46.0	-7.1	Black

6	4.956M	38.4	+0.0	38.4	46.0	-7.6	Black
7	2.178M	37.9	+0.0	37.9	46.0	-8.1	Black
8	4.364M	37.0	+0.0	37.0	46.0	-9.0	Black
9	2.276M	36.9	+0.0	36.9	46.0	-9.1	Black
10	16.570M	40.9	+0.0	40.9	50.0	-9.1	Black
11	637.951k	36.3	+0.0	36.3	46.0	-9.7	Black
12	828.478k	35.7	+0.0	35.7	46.0	-10.3	Black
13	16.021M	39.7	+0.0	39.7	50.0	-10.3	Black
14	16.715M	39.7	+0.0	39.7	50.0	-10.3	Black
15	17.129M	39.6	+0.0	39.6	50.0	-10.4	Black

CKC Laboratories, Inc. Date: 02/06/2003 Time: 9:41:11 AM Powerwave Technologies W/O#: 80118  
FCC 15.107 Class B COND [AVE] Test Lead: Black 208Vac 60 Hz Sequence#: 2



—— 1 - FCC 15.107 Class B COND [AVE]      —— 2 - FCC 15.107 Class B COND [QP]

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **FCC 15.107 Class B COND [AVE]**  
 Work Order #: **80118**  
 Test Type: **Conducted Emissions**  
 Equipment: **Power Amplifier**  
 Manufacturer: Powerwave Technologies  
 Model: G3L-1900-54-A  
 S/N: PW030400272

Date: 02/06/2003  
 Time: 09:49:55  
 Sequence#: 4  
 Tested By: Eddie Wong  
 208Vac 60 Hz

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier and signal Generator. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. Freq = 1960 MHz. RF power = 54 Watts. Frequency range of measurement = 150 kHz – 30 MHz. Frequency 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz. 16°C, 20% relative humidity.

**Transducer Legend:**

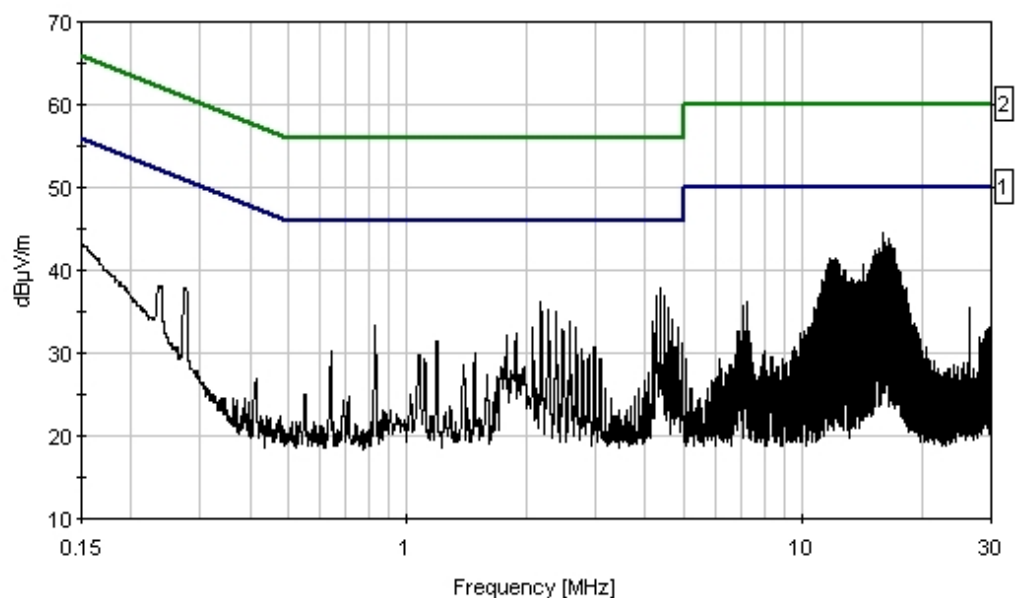
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**Measurement Data:** Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	16.021M	43.9					+0.0	43.9	50.0	-6.1	White
2	16.435M	43.8					+0.0	43.8	50.0	-6.2	White
3	16.579M	43.6					+0.0	43.6	50.0	-6.4	White
4	16.138M	43.3					+0.0	43.3	50.0	-6.7	White
5	16.715M	43.0					+0.0	43.0	50.0	-7.0	White
6	15.606M	42.7					+0.0	42.7	50.0	-7.3	White
7	16.985M	42.6					+0.0	42.6	50.0	-7.4	White
8	17.129M	42.6					+0.0	42.6	50.0	-7.4	White

9	16.291M	42.5	+0.0	42.5	50.0	-7.5	White
10	16.850M	42.5	+0.0	42.5	50.0	-7.5	White
11	15.327M	42.3	+0.0	42.3	50.0	-7.7	White
12	15.192M	42.1	+0.0	42.1	50.0	-7.9	White
13	15.742M	42.1	+0.0	42.1	50.0	-7.9	White
14	15.462M	42.0	+0.0	42.0	50.0	-8.0	White
15	15.877M	28.4	+0.0	28.4	50.0	-21.6	White
Ave							
^	15.877M	44.5	+0.0	44.5	50.0	-5.5	White

CKC Laboratories, Inc. Date: 02/06/2003 Time: 09:49:55 Powerwave Technologies WVO#: 80118  
FCC 15.107 Class B COND [AVE] Test Lead: White 208Vac 60 Hz Sequence#: 4



—— 1 - FCC 15.107 Class B COND [AVE]      —— 2 - FCC 15.107 Class B COND [QP]



Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **FCC 15.107 Class B COND [AVE]**  
 Work Order #: **80118**  
 Test Type: **Conducted Emissions**  
 Equipment: **Power Amplifier**  
 Manufacturer: Powerwave Technologies  
 Model: G3L-1900-54-B  
 S/N: PW030400076

Date: 02/06/2003  
 Time: 11:12:18  
 Sequence#: 12  
 Tested By: Eddie Wong  
 48Vdc

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-B	PW030400076

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	Agilent	6674A	US36371786

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier and signal generator. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The chassis of the EUT is grounded. Freq = 1960 MHz. RF power = 54 Watts. Frequency range of measurement = 150 kHz – 30 MHz. Frequency 150 kHz -30 MHz, RBW=9 kHz, VBW=9 kHz. 16°C, 20% relative humidity. Note: Measurement performed on the output of DC power supply.

**Transducer Legend:**

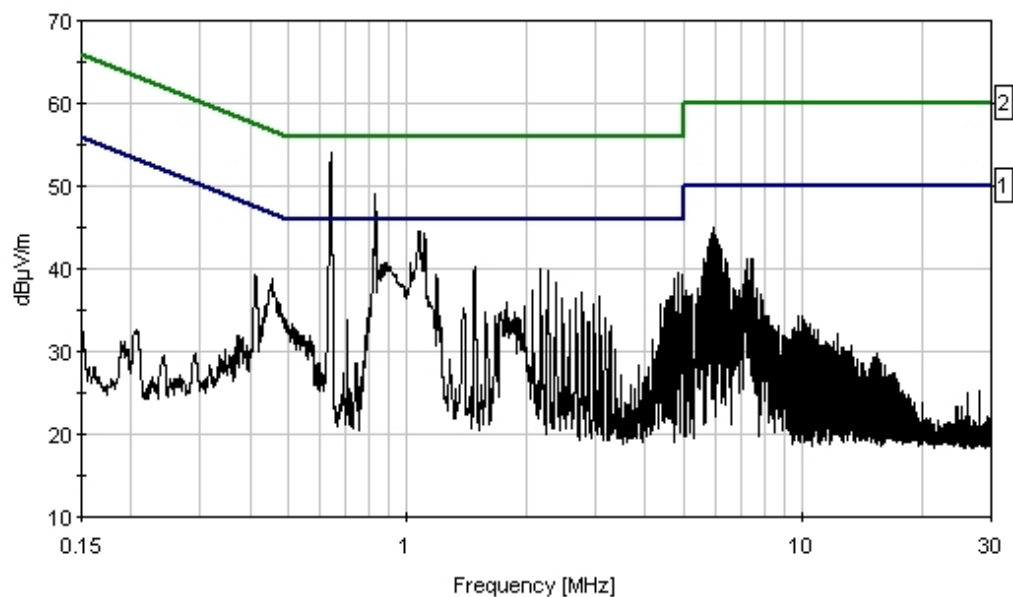
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**Measurement Data:** Reading listed by margin. Test Lead: Black

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	6.048M	44.0					+0.0	44.0	50.0	-6.0	Black
2	2.174M	39.9					+0.0	39.9	46.0	-6.1	Black
3	2.276M	39.8					+0.0	39.8	46.0	-6.2	Black
4	4.845M	39.6					+0.0	39.6	46.0	-6.4	Black
5	1.183M	39.4					+0.0	39.4	46.0	-6.6	Black
6	4.947M	39.2					+0.0	39.2	46.0	-6.8	Black
7	6.156M	42.8					+0.0	42.8	50.0	-7.2	Black

8	1.481M	33.9	+0.0	33.9	46.0	-12.1	Black
Ave							
^	1.481M	40.3	+0.0	40.3	46.0	-5.7	Black
10	5.859M	12.2	+0.0	12.2	50.0	-37.8	Black
Ave							
^	5.859M	44.3	+0.0	44.3	50.0	-5.7	Black
12	885.506k	4.9	+0.0	4.9	46.0	-41.1	Black
Ave							
^	885.506k	40.8	+0.0	40.8	46.0	-5.2	Black

CKC Laboratories, Inc. Date: 02/06/2003 Time: 11:12:18 Powerwave Technologies WVO#: 80118  
FCC 15.107 Class B COND [AVE] Test Lead: Black 48Vdc Sequence#: 12



1 - FCC 15.107 Class B COND [AVE] 2 - FCC 15.107 Class B COND [QP]

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**  
 Specification: **FCC 15.107 Class B COND [AVE]**  
 Work Order #: **80118**  
 Test Type: **Conducted Emissions**  
 Equipment: **Power Amplifier**  
 Manufacturer: Powerwave Technologies  
 Model: G3L-1900-54-B  
 S/N: PW030400076

Date: 02/06/2003  
 Time: 11:19:45  
 Sequence#: 13  
 Tested By: Eddie Wong  
 48Vdc

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-B	PW030400076

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	Agilent	6674A	US36371786

**Test Conditions / Notes:**

The EUT is placed on the wooden table. RF input port is connected to a support signal amplifier and signal generator. The RF output is connected to a RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. The Chassis of the EUT is grounded. Freq = 1960 MHz. RF Power = 54 Watts. Frequency range of measurement = 150 kHz – 30 MHz. Frequency 150 kHz - 30 MHz, RBW=9 kHz, VBW=9 kHz. 16°C, 20% relative humidity. Note: Measurement performed on the output of DC power supply.

**Transducer Legend:**

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**Measurement Data:**

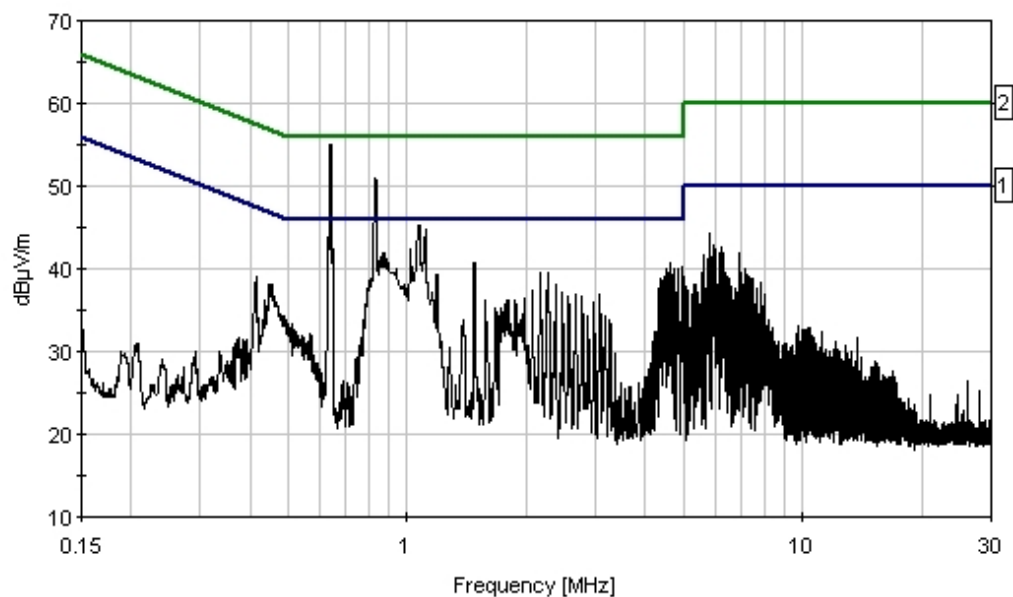
Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dBμV	dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	4.543M	39.9					+0.0	39.9	46.0	-6.1	White
2	4.743M	39.9					+0.0	39.9	46.0	-6.1	White
3	2.272M	39.6					+0.0	39.6	46.0	-6.4	White
4	1.477M	31.5					+0.0	31.5	46.0	-14.5	White
Ave											
^	1.477M	40.6					+0.0	40.6	46.0	-5.4	White
6	4.645M	29.5					+0.0	29.5	46.0	-16.5	White
Ave											
^	4.645M	40.6					+0.0	40.6	46.0	-5.4	White

8	4.943M	25.7	+0.0	25.7	46.0	-20.3	White
Ave							
^	4.943M	40.2	+0.0	40.2	46.0	-5.8	White
10	5.832M	28.1	+0.0	28.1	50.0	-21.9	White
Ave							
^	5.832M	44.2	+0.0	44.2	50.0	-5.8	White
12	881.253k	5.4	+0.0	5.4	46.0	-40.6	White
Ave							
^	881.253k	41.1	+0.0	41.1	46.0	-4.9	White

CKC Laboratories, Inc. Date: 02/06/2003 Time: 11:19:45 Powerwave Technologies WVO#: 80118  
FCC 15.107 Class B COND [AVE] Test Lead: White 48Vdc Sequence#: 13



1 - FCC 15.107 Class B COND [AVE] 2 - FCC 15.107 Class B COND [QP]



Mains Conducted Emissions - Front View



Mains Conducted Emissions - Side View

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
LISN	02128	EMCO	3816/2NM	9809-1090	032002	032003
LISN	00847	EMCO	3816/2NM	1104	010403	010404



## 15.109 - RADIATED EMISSIONS

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**

Specification: **FCC 15.109 Class B**

Work Order #: **80118**

Date: 02/07/2003

Test Type: **Maximized emission**

Time: 16:46:28

Equipment: **Power Amplifier**

Sequence#: 14

Manufacturer: Powerwave Technologies

Tested By: Eddie Wong

Model: G3L-1900-54-A

S/N: PW030400272

### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-A	PW030400272

### Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742

### Test Conditions / Notes:

The EUT is placed on the wooden table. RF input port is connected to a remote support signal amplifier, combiner and 3 signal generators. The RF output is connected to a remote RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. The ethernet port is connected to support laptop. Mode: Idle. Frequency range of measurement = 30 MHz - 1000 MHz. Frequency 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz. 208VAC, 60 Hz, 17°C, 23% relative humidity. Steward PN 25S2022-000 ribbon ferrite installed.

### Transducer Legend:

T1=Log antenna, SN331 092303	T2=Bicon SN220 092303
T3=Cable #10 070803	T4=Cable 15 123002
T5=Preamp 8447D 082303	

### Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	353.468M	42.9	+19.4 -28.3	+0.0	+0.3	+3.4	+0.0	37.7	46.0	-8.3	Horiz
2	359.981M	42.0	+19.0 -28.3	+0.0	+0.3	+3.4	+0.0	36.4	46.0	-9.6	Horiz
3	67.747M	47.6	+0.0 -28.5	+7.3	+0.1	+1.5	+0.0	28.0	40.0	-12.0	Vert
4	374.991M	39.4	+18.2 -28.2	+0.0	+0.3	+3.5	+0.0	33.2	46.0	-12.8	Horiz
5	935.670M	28.4	+24.3 -27.5	+0.0	+0.5	+6.0	+0.0	31.7	46.0	-14.3	Vert

6	899.985M	28.5	+24.0 -27.4	+0.0	+0.5	+5.9	+0.0	31.5	46.0	-14.5	Horiz
7	346.909M	36.2	+19.8 -28.3	+0.0	+0.3	+3.4	+0.0	31.4	46.0	-14.6	Horiz
8	349.663M	35.9	+19.6 -28.3	+0.0	+0.3	+3.4	+0.0	30.9	46.0	-15.1	Horiz
9	365.233M	36.1	+18.7 -28.3	+0.0	+0.3	+3.5	+0.0	30.3	46.0	-15.7	Horiz
10	759.997M	30.1	+22.0 -27.5	+0.0	+0.4	+5.2	+0.0	30.2	46.0	-15.8	Vert
11	374.994M	36.2	+18.2 -28.2	+0.0	+0.3	+3.5	+0.0	30.0	46.0	-16.0	Vert
12	350.002M	35.0	+19.6 -28.3	+0.0	+0.3	+3.4	+0.0	30.0	46.0	-16.0	Vert
13	594.013M	32.3	+20.2 -27.7	+0.0	+0.4	+4.6	+0.0	29.8	46.0	-16.2	Vert
14	57.597M	40.9	+0.0 -28.4	+9.5	+0.1	+1.3	+0.0	23.4	40.0	-16.6	Vert
15	64.191M	42.0	+0.0 -28.4	+8.1	+0.1	+1.4	+0.0	23.2	40.0	-16.8	Vert
16	560.978M	31.8	+20.1 -27.9	+0.0	+0.4	+4.4	+0.0	28.8	46.0	-17.2	Vert
17	359.995M	34.1	+19.0 -28.3	+0.0	+0.3	+3.4	+0.0	28.5	46.0	-17.5	Vert
18	290.030M	31.3	+0.0 -28.3	+22.1	+0.3	+3.1	+0.0	28.5	46.0	-17.5	Vert
19	402.962M	35.1	+17.0 -28.2	+0.0	+0.3	+3.6	+0.0	27.8	46.0	-18.2	Vert
20	329.998M	31.1	+20.8 -28.3	+0.0	+0.3	+3.3	+0.0	27.2	46.0	-18.8	Vert
21	768.673M	26.7	+22.0 -27.5	+0.0	+0.4	+5.3	+0.0	26.9	46.0	-19.1	Vert
22	383.796M	33.6	+17.7 -28.2	+0.0	+0.3	+3.5	+0.0	26.9	46.0	-19.1	Vert
23	480.020M	30.8	+19.3 -28.2	+0.0	+0.4	+4.0	+0.0	26.3	46.0	-19.7	Vert
24	269.984M	30.6	+0.0 -28.2	+20.5	+0.3	+3.0	+0.0	26.2	46.0	-19.8	Vert
25	406.491M	33.2	+17.1 -28.2	+0.0	+0.3	+3.6	+0.0	26.0	46.0	-20.0	Horiz
26	359.091M	31.1	+19.1 -28.3	+0.0	+0.3	+3.4	+0.0	25.6	46.0	-20.4	Vert
27	419.986M	31.9	+17.5 -28.2	+0.0	+0.3	+3.7	+0.0	25.2	46.0	-20.8	Horiz
28	127.609M	32.2	+0.0 -28.3	+16.4	+0.2	+2.0	+0.0	22.5	43.5	-21.0	Horiz

29	420.007M	31.2	+17.5 -28.2	+0.0	+0.3	+3.7	+0.0	24.5	46.0	-21.5	Vert
30	403.491M	31.2	+17.0 -28.2	+0.0	+0.3	+3.6	+0.0	23.9	46.0	-22.1	Horiz
31	122.424M	27.1	+0.0 -28.3	+16.0	+0.2	+2.0	+0.0	17.0	43.5	-26.5	Horiz
32	999.174M	20.8	+24.7 -27.5	+0.0	+0.5	+6.2	+0.0	24.7	54.0	-29.3	Vert

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **Powerwave Technologies**

Specification: **FCC 15.109 Class B**

Work Order #: **80118**

Date: 02/07/2003

Test Type: **Maximized emission**

Time: 14:05:24

Equipment: **Power Amplifier**

Sequence#: 15

Manufacturer: Powerwave Technologies

Tested By: Eddie Wong

Model: G3L-1900-54-B

S/N: PW030400076

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1900-54-B	PW030400076

**Support Devices:**

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Spectrum Analyzer	HP	8563E	3350A01916
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US38440742
DC Power Supply	Agilent	6674A	US36371786

**Test Conditions / Notes:**

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**Transducer Legend:**

T1=Log antenna, SN331 092303	T2=Bicon SN220 092303
T3=Cable #10 070803	T4=Cable 15 123002
T5=Preamp 8447D 082303	

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

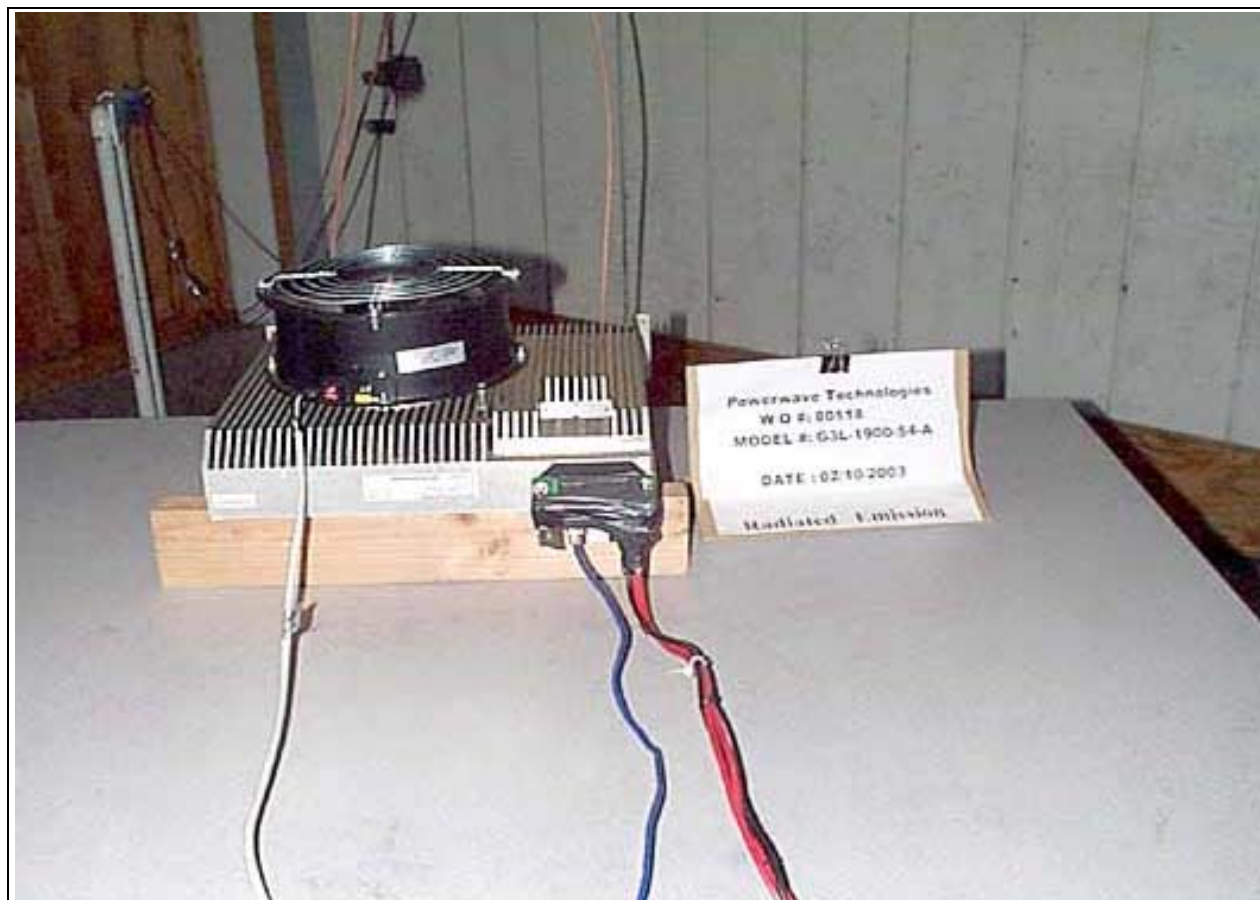
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	T5				Table	dBμV/m	dBμV/m	dB	Ant
1	38.049M	44.9	+0.0 -28.5	+16.1	+0.1	+1.1	+0.0	33.7	40.0	-6.3	Vert
2	39.555M	44.0	+0.0 -28.5	+15.6	+0.1	+1.1	+0.0	32.3	40.0	-7.7	Vert
3	195.141M	42.8	+0.0 -28.4	+17.9	+0.2	+2.5	+0.0	35.0	43.5	-8.5	Horiz
4	192.633M	42.1	+0.0 -28.4	+18.0	+0.2	+2.5	+0.0	34.4	43.5	-9.1	Horiz
5	593.998M	39.3	+20.2 -27.7	+0.0	+0.4	+4.6	+0.0	36.8	46.0	-9.2	Horiz

6	527.998M	40.1	+19.9 -28.0	+0.0	+0.4	+4.3	+0.0	36.7	46.0	-9.3	Vert
7	41.259M	42.3	+0.0 -28.5	+14.8	+0.1	+1.1	+0.0	29.8	40.0	-10.2	Vert
8	43.507M	43.2	+0.0 -28.5	+13.7	+0.1	+1.1	+0.0	29.6	40.0	-10.4	Vert
9	140.001M	40.2	+0.0 -28.4	+17.2	+0.2	+2.1	+0.0	31.3	43.5	-12.2	Horiz
10	272.706M	37.5	+0.0 -28.2	+20.7	+0.3	+3.0	+0.0	33.3	46.0	-12.7	Horiz
11	226.335M	40.3	+0.0 -28.3	+18.3	+0.2	+2.7	+0.0	33.2	46.0	-12.8	Horiz
12	139.544M	39.2	+0.0 -28.4	+17.2	+0.2	+2.1	+0.0	30.3	43.5	-13.2	Horiz
13	277.684M	35.0	+0.0 -28.2	+21.1	+0.3	+3.0	+0.0	31.2	46.0	-14.8	Horiz
14	131.748M	38.0	+0.0 -28.3	+16.6	+0.2	+2.1	+0.0	28.6	43.5	-14.9	Vert
15	221.697M	37.8	+0.0 -28.3	+18.2	+0.2	+2.7	+0.0	30.6	46.0	-15.4	Horiz
16	202.643M	35.8	+0.0 -28.4	+17.8	+0.2	+2.6	+0.0	28.0	43.5	-15.5	Horiz
17	560.998M	33.2	+20.1 -27.9	+0.0	+0.4	+4.4	+0.0	30.2	46.0	-15.8	Horiz
18	213.279M	34.6	+0.0 -28.3	+18.0	+0.2	+2.7	+0.0	27.2	43.5	-16.3	Horiz
19	170.973M	34.4	+0.0 -28.4	+18.5	+0.2	+2.3	+0.0	27.0	43.5	-16.5	Horiz
20	367.557M	34.9	+18.6 -28.3	+0.0	+0.3	+3.5	+0.0	29.0	46.0	-17.0	Horiz
21	237.584M	35.5	+0.0 -28.3	+18.5	+0.3	+2.8	+0.0	28.8	46.0	-17.2	Horiz
22	428.975M	34.6	+17.8 -28.3	+0.0	+0.4	+3.7	+0.0	28.2	46.0	-17.8	Horiz
23	429.028M	34.5	+17.8 -28.3	+0.0	+0.4	+3.7	+0.0	28.1	46.0	-17.9	Vert
24	231.769M	34.0	+0.0 -28.3	+18.4	+0.2	+2.7	+0.0	27.0	46.0	-19.0	Horiz
25	129.643M	33.8	+0.0 -28.3	+16.5	+0.2	+2.0	+0.0	24.2	43.5	-19.3	Vert
26	136.521M	32.8	+0.0 -28.3	+17.0	+0.2	+2.1	+0.0	23.8	43.5	-19.7	Horiz
27	525.002M	29.3	+19.9 -28.0	+0.0	+0.4	+4.3	+0.0	25.9	46.0	-20.1	Horiz
28	227.714M	32.9	+0.0 -28.3	+18.3	+0.2	+2.7	+0.0	25.8	46.0	-20.2	Vert
29	231.063M	31.6	+0.0 -28.3	+18.3	+0.2	+2.7	+0.0	24.5	46.0	-21.5	Vert



Radiated Emissions - Front View





Radiated Emissions - Back View

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	01865	HP	8566B	2532A02509	092702	092703
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
<b>30MHz-1GHz</b>						
Bicon Antenna	306	AH	SAS200/540	220	092302	092303
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092303
Pre-amp	00309	HP	8447D	1937A02548	082302	082303
Antenna cable	NA	NA	RG214	Cable#15	123002	123003
Pre-amp to SA cable	NA	Harbour	RG223/U	Cable#10	070802	070803