



## **POWERWAVE TECHNOLOGIES, INC. TEST REPORT**

### FOR THE

### **RF REPEATER, AR 1200**

## FCC PART 15 SUBPART C SECTIONS 24 & 90 AND SUBPART B SECTIONS 15.107 & 15.109 CLASS B

### COMPLIANCE

### DATE OF ISSUE: APRIL 19, 2007

#### **PREPARED FOR:**

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

P.O. No.: 112436 W.O. No.: 86400 Mary Ellen Clayton CKC Laboratories, Inc. 5046 Sierra Pines Drive Mariposa, CA 95338

**PREPARED BY:** 

Date of test: March 30 - April 18, 2007

Report No.: FC07-031

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### **ADMINISTRATIVE INFORMATION**

DATE OF TEST: March 30 - April 18, 2007

**DATE OF RECEIPT:** March 30, 2007

**FREQUENCY RANGE** 9 kHz-10 GHz **TESTED:** 

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

**REPRESENTATIVE:** Jeffrey Dale

**TEST LOCATION:** CKC Laboratories, Inc. 110 Olinda Place Brea, CA 92823

**TEST METHOD:** ANSI C63.4 (2003)

**PURPOSE OF TEST:** To demonstrate the compliance of the RF Repeater, AR 1200 with the requirements for FCC Part 15 Subpart C Sections 24 & 90 and Subpart B Sections 15.107 & 15.109 Class B devices.

### **APPROVALS:**

Steve Behm, Director of Engineering Services

**QUALITY ASSURANCE:** 

Joyce Walker, Quality Assurance Administrative Manager

**TEST PERSONNEL:** 

ans

Eddie Wong, EMC Engineer



## CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

## EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The customer declares the EUT tested by CKC Laboratories was representative of a production unit.

## EQUIPMENT UNDER TEST

### <u>RF Repeater</u>

Manuf:Powerwave TechnologiesModel:AR 1200Serial:NAFCC ID:pending

### **PERIPHERAL DEVICES**

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

ESG		<b>Power Meter</b>		
Manuf:	Agilent	Manuf:	Agilent	
Model:	E4433B	Model:	E4419B	
Serial:	US40051207	Serial:	MY40510694	

## Spectrum Analyzer

Manuf:	HP
Model:	8563E
Serial:	NA



## TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within  $+15^{\circ}$ C and  $+35^{\circ}$ C. The relative humidity was between 20% and 75%.

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

The necessary information is contained in a separate document.

# **FCC 2.1033 (c)(4) TYPE OF EMISSIONS** F1D and D7W

**FCC 2.1033 (c)(5) FREQUENCY RANGE** 935-940.5 MHz

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

0.25 Watts for Part 24 and 4 watts for Part 90.

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

3500 watts ERP for Part 24 and 500 watts for Part 90.

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

The necessary information is contained in a separate document.

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

The necessary information is contained in a separate document.

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

The necessary information is contained in a separate document.

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

The necessary information is contained in a separate document.

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

The necessary information is contained in a separate document.

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

AMPS and iDEN



## FCC 2.1033(c)(14)/2.1046/24.132(c) - RF POWER OUTPUT

## **Test Equipment**

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
RF Power meter	02778	HP	EPM-441A	GB37170458	012706	012708
Power Sensor	02777	HP	E4412A	MY41499662	012706	012708

## **Test Setup Photos**





### **Test Data Sheets**

## 24.132(c) RF Output Power

(c) Base stations transmitting in the 930–931 MHz and 940–941 MHz bands are limited to 3500 watts e.r.p. per authorized channel and are unlimited in antenna height except as provided in paragraph (d) of this section.

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 FCC 24.132(c).

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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.

Modulation	Frequency	Power (dBm)	Power (Watts
AMPS-data	940.1 MHz	24	0.25



# FCC 2.1033(c)(14)/2.1051/24.133(a)(2)(ii) - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

## **Test Setup Photos**





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# Limit line for Spurious Conducted Emission

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<b>Required Attenuation</b>	=	43+10 Log P dB
Limit line (dBuV)	=	$V_{\ dBuv}$ - Attenuation
$V_{dBuV}$	=	$20 \text{ Log } \frac{\text{V}}{1 \times 10^{-6}}$
	=	$20(Log V - Log 1 \times 10^{-6})$
	=	$20 \text{ Log V} - 20 \text{ Log1 x } 10^{-6}$
	=	$20 \log V - 20 (-6)$
	=	20 Log V +120
Attenuation	=	43 + 10  Log P
	=	$43 + 10 \operatorname{Log} \frac{V^2}{P}$
	=	$43 + 10 (Log V^2 - Log R)$
	=	$43 + 10 (2 \log V - \log R)$
	=	43 + 20 Log V - 10 Log R
Limit line	=	V <sub>ADm.</sub> - 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
	=	$120 - 43 + 10 \text{ Log } 50$ Note : R = 50 $\Omega$
	=	120 - 43 + 16.897
	=	94 dBuV at any power level



### **Test Data Sheets**

Test Location:	CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112						
Customer: Specification:	Customer:Powerwave Technologies, Inc.upecification:24.133(a)(2)(ii) Conducted Spurious Emission						
Work Order #:	83894		Date:	4/17/2007			
Test Type:	Conducted Emissions		Time:	15:24:44			
Equipment:	RF Repeater		Sequence#:	11			
Manufacturer:	Powerwave Technologies		Tested By:	E. Wong			
Model:	AR 1200			110V 60Hz			
S/N:	NA						
Test Equipment:							
Function	S/N	Calibration D	Date Cal Due	Date	Asset #		
Spectrum Analyze	r US44300438	01/03/2007	01/03/20	009	02672		
24" SMA Cable	1-40GHz_white	02/16/2007	02/16/20	009	P05204		
1.5 GHz HPF	3643A00027	06/27/2005	06/27/20	007	02116		
Equipment Under	<i>r Test</i> (* = EUT):						
Function	Manufacturer	М	Iodel #	S/N			
RF Repeater*	Powerwave Tech	nnologies A	R 1200	NA			
Support Devices:							
Function	Manufacturer	М	Iodel #	S/N			
ESG	Agilent	E	4433B	US40	051207		
Power Meter	Agilent	E4	4419B	MY4	0510694		
Spectrum Analyze	r HP	85	563E	NA			

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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. Modulation: AMPS\_data, Power = 0.25 Watts. Frequency: 940.5 MHz. Frequency range of measurement = 9kHz - 10 GHz. 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 - 10000 MHz; RBW=1 MHz, VBW=1 MHz. 21°C, 27% relative humidity.

#### Transducer Legend:

T1=SMA-cable\_W\_05204-021609-26GHz T2=HPF\_AN02116\_1.5GHz\_062707

Measu	urement Data:	Re	eading lis	ted by ma	argin.			Test Lead	l: Antenna	Terminal	
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	$dB\mu V/m$	dBµV/m	dB	Ant
1	6583.500M	46.0	+3.0	+1.0			+0.0	50.0	94.0	-44.0	Anten
	Ave										
^	6583.500M	56.8	+3.0	+1.0			+0.0	60.8	94.0	-33.2	Anten



# FCC 2.1033(c)(14)/2.1053/24.133(a)(2)(ii) - FIELD STRENGTH OF SPURIOUS RADIATION

**Test Setup Photos** 





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### **Test Data Sheets**

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

Customer:	Powerwave Technologies, Inc.		
Specification:	24.133(a)(2)(ii) Radiated Spurious Emi	ssion	
Work Order #:	83894	Date:	4/18/2007
Test Type:	Radiated Scan	Time:	09:37:29
Equipment:	RF Repeater	Sequence#:	7
Manufacturer:	Powerwave Technologies	Tested By:	E. Wong
Model:	AR 1200		
S/N:	NA		

#### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Loop Antenna	2014	06/14/2006	06/14/2008	00314
Bilog Antenna	2451	02/02/2006	02/02/2008	01995
Spectrum Analyzer	US44300438	01/03/2007	01/03/2009	02672
Pre amp to SA Cable	Cable #10	05/16/2005	05/16/2007	P05050
Cable	Cable15	01/05/2007	01/05/2009	P05198
Pre Amp	1937A02548	06/01/2006	06/01/2008	00309
Horn Antenna	6246	06/29/2006	06/29/2008	00849
24" SMA Cable	1-40GHz_white	02/16/2007	02/16/2009	P05204
Microwave Pre-amp	3123A00281	07/19/2006	07/19/2008	00786
Heliax Antenna Cable	P5565	09/18/2006	09/18/2008	P05565

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

Function	Manufacturer	Model #	S/N
			5/1
RF Repeater*	Powerwave Technologies	AR 1200	NA

Manufacturer	Model #	S/N
Agilent	E4433B	US40051207
Agilent	E4419B	MY40510694
HP	8563E	NA
	Manufacturer Agilent Agilent HP	ManufacturerModel #AgilentE4433BAgilentE4419BHP8563E

#### Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support Signal amplifier and a signal generator. 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. Modulation: AMPS-data, Power = 0.25 Watts. Frequency: 940.5 MHz. Frequency range of measurement = 9kHz -10 GHz. 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 - 10000 MHz; RBW=1 MHz, VBW=1 MHz. 21°C, 27% relative humidity.



### Operating Frequency: <u>940.1 MHz</u> Channels: <u>Single</u> Highest Measured Output Power: <u>23.98</u> ERP(dBm)= <u>0.25</u> ERP(Watts) Distance: <u>3</u> meters Limit: <u>43+10Log(P)</u> <u>36.98</u> dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
1,880.99	-52.9	Vert	76.88
1,880.97	-53.8	Horiz	77.78
2,821.47	-54.3	Vert	78.28



# FCC PART 24 INPUT PLOT - AMPS - 940.5 MHz

## **Test Equipment**

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	010307	010309
24" SMA Cable (White)	P05204	Pasterneck	35591-48	1-40GHz_white	011107	011109

# Test Setup Photo





**Test Conditions:** The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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. Evaluation performed at the antenna port.

### Plot





# FCC PART 24 OUTPUT PLOT - AMPS - 940.5 MHz

## **Test Equipment**

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	010307	010309
24" SMA Cable (White)	P05204	Pasterneck	35591-48	1-40GHz_white	011107	011109

# Test Setup Photo





**Test Conditions:** The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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. Evaluation performed at the antenna port.

### Plot





# FCC PART 24 BANDEDGE PLOT - AMPS - 940.5 MHz

## **Test Equipment**

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	010307	010309
24" SMA Cable (White)	P05204	Pasterneck	35591-48	1-40GHz_white	011107	011109

# Test Setup Photo





**Test Conditions:** The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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. Evaluation performed at the antenna port.

### Plot





# FCC 2.1033(c)(14)/2.1046/90.635(b) - RF POWER OUTPUT

## **Test Equipment**

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
RF Power meter	02778	HP	EPM-441A	GB37170458	012706	012708
Power Sensor	02777	HP	E4412A	MY41499662	012706	012708

## **Test Setup Photos**





### 90.635(b) RF Output Power

The effective radiated power and antenna height, for base stations used in suburban-conventional systems of communications shall be no greater than 500 watts.

The EUT is a RF amplifier. The manufacture 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 FCC 90.635(b).

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 3500W limit.

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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.

Modulation	Frequency	Power (dBm)	Power (Watts)
iDEN	935 MHz	36	4
iDEN	937 MHz	36	4
iDEN	940 MHz	36	4



# FCC 2.1033(c)(14)/2.1051/90.691(a)(2) - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

## **Test Setup Photos**





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# Limit line for Spurious Conducted Emission

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<b>Required Attenuation</b>	=	43+10 Log P dB
Limit line (dBuV)	=	$V_{\ dBuv}$ - Attenuation
$V_{dBuV}$	=	$20 \text{ Log } \frac{\text{V}}{1 \times 10^{-6}}$
	=	$20(Log V - Log 1 \times 10^{-6})$
	=	$20 \text{ Log V} - 20 \text{ Log1 x } 10^{-6}$
	=	$20 \log V - 20 (-6)$
	=	20 Log V +120
Attenuation	=	43 + 10  Log P
	=	$43 + 10 \operatorname{Log} \frac{V^2}{P}$
	=	$43 + 10 (Log V^2 - Log R)$
	=	$43 + 10 (2 \log V - \log R)$
	=	43 + 20 Log V - 10 Log R
Limit line	=	V <sub>ADm.</sub> - 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
	=	$120 - 43 + 10 \text{ Log } 50$ Note : R = 50 $\Omega$
	=	120 - 43 + 16.897
	=	94 dBuV at any power level



### **Test Data Sheets**

Customer:Powerwave Technologies, Inc.Specification:FCC90.691 (a) Conducted Spurious emissionWork Order #: $83894$ Date: $4/17/2007$ Test Type:Conducted EmissionsEquipment:RF RepeaterSequence#:9Manufacturer:Powerwave TechnologiesPowerwave TechnologiesTested By:KR 1200NA110V 60HzS/N:NATest Equipment:FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/20090267224" SMA Cable1-40GHz_white02/16/200702/16/2009Po52041.5 GHz HPF3643A0002706/27/200506/27/200702116Equipment Under Test (* = EUT):FunctionManufacturerManufacturerModel #Symport Devices:FunctionManufacturerMagilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	Test Location:	CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112						
Specification:FCC90.691 (a) Conducted Spurious emissionWork Order #:83894Date: $4/17/2007$ Test Type:Conducted EmissionsTime: $14:26:59$ Equipment:RF RepeaterSequence#: 9Manufacturer:Powerwave TechnologiesTested By:Powerwave TechnologiesTested By:E. WongModel:AR 1200110V 60HzS/N:NA110V 60HzTest Equipment:FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/200924" SMA Cable1-40GHz white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NRF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:FunctionManufacturerModel #S/NStapport Devices:FunctionManufacturerModel #S/NFunctionManufacturerModel #S/NSeptort Devices:FunctionManufacturerModel #S/NFunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NFunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NFunctionManufacturerModel # </td <td>Customer:</td> <td>Powerwave Technologies</td> <td>, Inc.</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Customer:	Powerwave Technologies	, Inc.					
Work Order #:83894Date: $4/17/2007$ Test Type:Conducted EmissionsTime: $14:26:59$ Equipment:RF RepeaterSequence#:9Manufacturer:Powerwave TechnologiesTested By:E. WongModel:AR 1200110V 60HzS/N:NA110V 60Hz <b>Test Equipment:</b> FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/200924" SMA Cable1-40GHz_white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116 <b>Equipment Under Test (* = EUT):</b> FunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NFunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NFunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NFunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NFunctionManufacturerModel #S/NSectrum AnalyzerHP8563ENA	Specification:	FCC90.691 (a) Conducted	d Spurious o	emission				
Test Type:Conducted EmissionsTime: $14:26:59$ Equipment:RF RepeaterSequence#:9Manufacturer:Powerwave TechnologiesTested By:E. WongModel:AR 1200110V 60HzS/N:NA110V 60Hz <b>Test Equipment:</b> FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/20090267224" SMA Cable1-40GHz_white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116 <b>Equipment Under Test (* = EUT):</b> FunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	Work Order #:	83894			Date:	4/17/2007		
Equipment:RF RepeaterSequence#:9Manufacturer:Powerwave TechnologiesTested By:E. WongModel:AR 1200110V 60HzS/N:NA110V 60HzTest Equipment:FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/20090267224" SMA Cable1-40GHz_white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NRF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	Test Type:	Conducted Emissions			Time:	14:26:59		
Manufacturer:Powerwave TechnologiesTested By:E. WongModel:AR 1200110V 60HzS/N:NATest Equipment:FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/20090267224" SMA Cable1-40GHz_white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NRF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Snectrum AnalyzerHP8563ENA	Equipment:	RF Repeater		See	quence#:	9		
Model:AR 1200110V 60HzS/N:NA110V 60HzTest Equipment:FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/20090267224" SMA Cable1-40GHz_white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NRF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Snectrum AnalyzerHP8563ENA	Manufacturer:	Powerwave Technologies		Τe	ested By:	E. Wong		
S/N:NATest Equipment:FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/20090267224" SMA Cable1-40GHz_white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NRF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:FunctionManufacturerModel #S/NSGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP $8563E$ NA	Model:	AR 1200			-	110V 60H	Z	
Test Equipment:FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/20090267224" SMA Cable1-40GHz_white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NSign of the equipment Under Test (* = EUT):FunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	S/N:	NA						
FunctionS/NCalibration DateCal Due DateAsset #Spectrum AnalyzerUS4430043801/03/200701/03/20090267224" SMA Cable1-40GHz_white02/16/200702/16/2009P052041.5 GHz HPF3643A0002706/27/200506/27/200702116Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NSupport Devices:FunctionManufacturerModel #S/NSolutionSiglentE4433BUS40051207Power MeterAgilentE4419BMY40510694NA	Test Equipment:							
Spectrum Analyzer         US44300438         01/03/2007         01/03/2009         02672           24" SMA Cable         1-40GHz_white         02/16/2007         02/16/2009         P05204           1.5 GHz HPF         3643A00027         06/27/2005         06/27/2007         02116           Equipment Under Test (* = EUT):         Eurotion         Manufacturer         Model #         S/N           Function         Manufacturer         Model #         S/N           Support Devices:         Eurotion         Manufacturer         Model #         S/N           Function         Manufacturer         Model #         S/N         S/N           Support Devices:         Eurotion         Manufacturer         Model #         S/N           Function         Manufacturer         Model #         S/N         S/N           ESG         Agilent         E4433B         US40051207           Power Meter         Agilent         E4419B         MY40510694           Spectrum Analyzer         HP $8563E$ NA	Function	S/N	Calibration	Date	Cal Due	Date	Asset #	
24" SMA Cable       1-40GHz_white       02/16/2007       02/16/2009       P05204         1.5 GHz HPF       3643A00027       06/27/2005       06/27/2007       02116         Equipment Under Test (* = EUT):       Function       Manufacturer       Model #       S/N         Function       Manufacturer       Model #       S/N         RF Repeater*       Powerwave Technologies       AR 1200       NA         Support Devices:	Spectrum Analyze	r US44300438	01/03/2007		01/03/20	09	02672	
1.5 GHz HPF $3643A00027$ $06/27/2005$ $06/27/2007$ $02116$ Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NRF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:S/NFunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP $8563E$ NA	24" SMA Cable	1-40GHz white	02/16/2007		02/16/20	09	P05204	
Equipment Under Test (* = EUT):FunctionManufacturerModel #S/NRF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:S/NFunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	1.5 GHz HPF	3643A00027	06/27/2005		06/27/20	07	02116	
FunctionManufacturerModel #S/NRF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	Equipment Unde	<i>r Test</i> (* = EUT):						
RF Repeater*Powerwave TechnologiesAR 1200NASupport Devices:FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	Function	Manufacturer		Model #		S/1	N	
Support Devices:FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	RF Repeater*	Powerwave Tech	nnologies	AR 1200		NA	4	
FunctionManufacturerModel #S/NESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	Support Devices:							
ESGAgilentE4433BUS40051207Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	Function	Manufacturer		Model #		S/1	N	
Power MeterAgilentE4419BMY40510694Spectrum AnalyzerHP8563ENA	ESG	Agilent		E4433B		US	\$40051207	
Spectrum Analyzer HP 8563E NA	Power Meter	Agilent		E4419B		M	Y40510694	
	Spectrum Analyze	r HP		8563E		NA	4	

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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. Modulation: iDEN, Power = 4 Watts. Frequency: 937.5 MHz. Frequency range of measurement = 9kHz - 10 GHz. 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 - 10000 MHz; RBW=1 MHz, VBW=1 MHz. 21°C, 27% relative humidity.

#### Transducer Legend:

T1=SMA-cable\_W\_05204-021609-26GHz T2=HPF\_AN02116\_1.5GHz\_062707

Meas	urement Data:	R	eading lis	ted by ma	argin.			Test Lea	d: Antenna	a Terminal	
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	6562.450M	44.8	+3.0	+1.0			+0.0	48.8	94.0	-45.2	Anten
	Ave										
/	6562.450M	69.7	+3.0	+1.0			+0.0	73.7	94.0	-20.3	Anten



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

Customer: Specification:	Powerwave Technologies, Inc. FCC90.691 (a) Conducted Spurio	us emission	
Work Order #:	83894	Date:	4/17/2007
Test Type:	Conducted Emissions	Time:	14:14:26
Equipment:	RF Repeater	Sequence#:	8
Manufacturer:	Powerwave Technologies	Tested By:	E. Wong
Model:	AR 1200		110V 60Hz
S/N:	NA		

#### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer	US44300438	01/03/2007	01/03/2009	02672
24" SMA Cable	1-40GHz_white	02/16/2007	02/16/2009	P05204
1.5 GHz HPF	3643A00027	06/27/2005	06/27/2007	02116

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

Function	Manufacturer	Model #	S/N
RF Repeater*	Powerwave Technologies	AR 1200	NA

#### Support Devices:

Support Deriversi			
Function	Manufacturer	Model #	S/N
ESG	Agilent	E4433B	US40051207
Power Meter	Agilent	E4419B	MY40510694
Spectrum Analyzer	HP	8563E	NA

#### Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support Signal amplifier and a signal generator. 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. Modulation: iDEN, Power = 4 Watts. Frequency: 935 MHz. Frequency range of measurement = 9kHz -10 GHz. 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 - 10000 MHz; RBW=1 MHz, VBW=1 MHz. 21°C, 27% relative humidity.

#### Transducer Legend:

T1=SMA-cable V	/ 05204-021609-26GHz

### T2=HPF\_AN02116\_1.5GHz\_062707

Measi	irement Data:	Re	eading lis	ted by ma	argin.			Test Lea	d: Antenna	a Terminal	
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	6548.484M	34.6	+3.0	+1.0			+0.0	38.6	94.0	-55.4	Anten
	Ave										
^	6548.484M	61.3	+3.0	+1.0			+0.0	65.3	94.0	-28.7	Anten



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

Customer: Specification:	Powerwave Technologies, Inc. FCC90.691 (a) Conducted Spurio	ous emission	
Work Order #:	83894	Date:	4/17/2007
Test Type:	Conducted Emissions	Time:	14:41:23
Equipment:	RF Repeater	Sequence#:	10
Manufacturer:	Powerwave Technologies	Tested By:	E. Wong
Model:	AR 1200		110V 60Hz
S/N:	NA		

#### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer	US44300438	01/03/2007	01/03/2009	02672
24" SMA Cable	1-40GHz_white	02/16/2007	02/16/2009	P05204
1.5 GHz HPF	3643A00027	06/27/2005	06/27/2007	02116

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

Function	Manufacturer	Model #	S/N
RF Repeater*	Powerwave Technologies	AR 1200	NA

#### Support Devices:

Support Deriversi			
Function	Manufacturer	Model #	S/N
ESG	Agilent	E4433B	US40051207
Power Meter	Agilent	E4419B	MY40510694
Spectrum Analyzer	HP	8563E	NA

#### Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support Signal amplifier and a signal generator. 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. Modulation: iDEN, Power = 4 Watts. Frequency: 940 MHz. Frequency range of measurement = 9kHz -10 GHz. 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 - 10000 MHz; RBW=1 MHz, VBW=1 MHz. 21°C, 27% relative humidity.

#### Transducer Legend:

T1=SMA-cable W	05204-021609-26GHz

### T2=HPF\_AN02116\_1.5GHz\_062707

Measi	irement Data:	Re	eading lis	ted by ma	argin.			Test Lea	d: Antenna	a Terminal	
#	Freq	Rdng	T1	T2			Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	6576.233M	44.6	+3.0	+1.0			+0.0	48.6	94.0	-45.4	Anten
	Ave										
^	6576.233M	59.3	+3.0	+1.0			+0.0	63.3	94.0	-30.7	Anten



# FCC 2.1033(c)(14)/2.1053/90.691(a)(2) - FIELD STRENGTH OF SPURIOUS RADIATION

## **Test Setup Photos**





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## **Test Data Sheets**

Test Location: C	KC Laboratories, Inc.	•110 N. Olinda Place •	Brea, CA 92823 • (714) 99	3-6112
Customer: P	owerwave Technologi	es, Inc.		
Specification: F	CC Part 90.691(a)(2)	Radiated Spurious I	Emission	
Work Order #: 8	3894	•	Date: 4/18/2007	
Test Type: <b>R</b>	adiated Scan		Time: 10:06:42	
Equipment: <b>R</b>	F Repeater		Sequence#: 4	
Manufacturer: P	owerwave Technologie	S	Tested By: E. Wong	
Model: A	R 1200			
S/N: N	A			
Test Equipment:				
Function	S/N	Calibration Date	Cal Due Date	Asset #
Loop Antenna	2014	06/14/2006	06/14/2008	00314
Bilog Antenna	2451	02/02/2006	02/02/2008	01995
Spectrum Analyzer	US44300438	01/03/2007	01/03/2009	02672
Pre amp to SA Cable	e Cable #10	05/16/2005	05/16/2007	P05050
Cable	Cable15	01/05/2007	01/05/2009	P05198
Pre Amp	1937A02548	06/01/2006	06/01/2008	00309
Horn Antenna	6246	06/29/2006	06/29/2008	00849
24" SMA Cable	1-40GHz_white	02/16/2007	02/16/2009	P05204
Microwave Pre-amp	3123A00281	07/19/2006	07/19/2008	00786
Heliax Antenna Cab	le P5565	09/18/2006	09/18/2008	P05565

Function	Manufacturer	Model #	S/N	
RF Repeater*	Powerwave Technologies	AR 1200	NA	
Same and Dania and				

Support Devices.				
Function	Manufacturer	Model #	S/N	
ESG	Agilent	E4433B	US40051207	
Power Meter	Agilent	E4419B	MY40510694	
Spectrum Analyzer	HP	8563E	NA	

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support Signal amplifier and a signal generator. 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. Modulation: iDEN, Power = 4 Watts. Frequency: 935 MHz, 937.5 MHz and 940 MHz. Frequency range of measurement = 9kHz -10 GHz. 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 - 10000 MHz; RBW=1 MHz, VBW=1 MHz. 21°C, 27% relative humidity.



### Operating Frequency: <u>935 MHz - 940 MHz</u> Channels: Low, Mid and High Highest Measured Output Power: <u>36.02</u> ERP(dBm)= <u>4</u> ERP(Watts) Distance: <u>3</u> meters Limit: <u>43+10Log(P)</u> <u>49.02</u> dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
1,871.00	-57.7	Horiz	93.72
2,806.50	-53.9	Horiz	89.92
1,871.00	-56.8	Vert	92.82
2,812.50	-53.8	Vert	89.82
2,812.50	-53.9	Horiz	89.92
1,875.00	-57.3	Vert	93.32
1,875.00	-58.1	Horiz	94.12
3,758.35	-52.3	Horiz	88.32
2,818.50	-55.8	Vert	91.82
1,879.00	-57.3	Vert	93.32
1,879.35	-58.1	Horiz	94.12



# FCC PART 90 INPUT PLOTS

## **Test Equipment**

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	010307	010309
24" SMA Cable (White)	P05204	Pasterneck	35591-48	1-40GHz_white	011107	011109

# Test Setup Photo





**Test Conditions:** The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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. Evaluation performed at the antenna port.

#### Input vs Output Plot\_Input\_935MHz\_iDEN Ref Level 66.99 dBµV ATTEN 0 dB RES BW: 1.0kHz VID BW: 1.0kHz SWP: 381.32msei Marker: 935.501MHz 51.6387dBµV 60 may approximate 50 40 30 **JB**UV 20 10 0 -10 -20 through the state of the Helphylonderedinteringerationerstransform 935 46 935 47 935 48 935 49 935 50 935 51 935 52 935 53 935 54 935 55 Frequency [MHz]

## FCC PART 90 INPUT PLOT - iDEN 935 MHz

# FCC PART 90 INPUT PLOT - iDEN 937 MHz





# FCC PART 90 INPUT PLOT - iDEN 940 MHz





# FCC PART 90 OUTPUT PLOTS

## **Test Equipment**

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	010307	010309
24" SMA Cable (White)	P05204	Pasterneck	35591-48	1-40GHz_white	011107	011109

# Test Setup Photo





**Test Conditions:** The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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. Evaluation performed at the antenna port.

## FCC PART 90 OUTPUT PLOT - iDEN 935 MHz



## FCC PART 90 OUTPUT PLOT - iDEN 937 MHz





# FCC PART 90 OUTPUT PLOT - iDEN 940 MHz





# FCC PART 90 BANDEDGE PLOTS

## **Test Equipment**

Equipment	Asset #	Manufacturer	Model	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	010307	010309
24" SMA Cable	P05204	Pasterneck	35591-48	1-40GHz_white	011107	011109
(White)						

# Test Setup Photo





**Test Conditions:** The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. 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. Evaluation performed at the antenna port.

## FCC PART 90 BANDEDGE PLOT - iDEN 935 MHz



FCC PART 90 BANDEDGE PLOT - iDEN 940 MHz





# FCC 15.107 – AC CONDUCTED EMISSIONS

## **Test Setup Photos**





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### **Test Data Sheets**

Test Location:	CKC Laboratories. Inc.	•110 N. Olinda Place •	Brea. CA 92823 •	(714) 993-6112
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Customer:	Powerwave Technologies, Inc.		
Specification:	FCC 15.107 Class B COND [AVE]		
Work Order #:	83894	Date:	3/30/2007
Test Type:	Conducted Emissions	Time:	13:15:31
Equipment:	RF Repeater	Sequence#:	2
Manufacturer:	Powerwave Technologies	Tested By:	E. Wong
Model:	AR 1200		110V 60Hz
S/N:	NA		

#### Test Equipment:

Function	S/N	Calibration	n Date	Cal Due Date		Asset #
LISN	1104	11/10/200	6	11/10/2008		00847
6dB Attenuator	None	11/21/200	6	11/21/2008		P05611
150kHz HPF	G7755	05/09/200	6	05/09/2007		02610
Conducted Emission	Cable #21	05/09/200	6	05/09/2008		P04358
Cable						
Spectrum Analyzer	US44300438	01/03/200	7	01/03/2009		02672
Equipment Under Te	est (* = EUT):					
Function	Manufacturer		Model #		S/N	
RF Repeater*	Powerwave Tech	nnologies	AR 1200		NA	
Support Devices:						
Function	Manufacturer		Model #		S/N	

#### Test Conditions / Notes:

The EUT is placed on the wooden table. RF in and RF out are connected to sections of shielded RF cable for termination purposes. Idle mode. 23°C, 62% relative humidity.

## Transducer Legend:

T1=150kHz HPF Asset 02610	T2=6dB Attenuator P05611
T3=Cable #21 Conducted Site A 050908	T4=(L1) Insertion Loss 00847 EMCO 3816/2NM

Measu	rement Data:	Re	eading lis	ted by ma	argin.			Test Lea	d: Black		
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	15.157M	38.5	+0.2	+6.1	+0.4	+0.8	+0.0	46.0	50.0	-4.0	Black
2	788.487k Ave	35.2	+0.1	+6.1	+0.1	+0.1	+0.0	41.6	46.0	-4.4	Black
	700 4071	40.1	.0.1	161	.0.1	10.1		16.5	16.0	.0.5	D1 1
	/88.48/k	40.1	+0.1	+6.1	+0.1	+0.1	+0.0	46.5	46.0	+0.5	Black
4	818.302k	35.0	+0.1	+6.1	+0.1	+0.1	+0.0	41.4	46.0	-4.6	Black
5	848.845k	35.0	+0.1	+6.1	+0.0	+0.1	+0.0	41.3	46.0	-4.7	Black
6	695.405k	33.8	+0.2	+6.1	+0.1	+0.1	+0.0	40.3	46.0	-5.7	Black



7	727.575k Ave	32.5	+0.1	+6.1	+0.1	+0.1	+0.0	38.9	46.0	-7.1	Black
^	727.575k	38.7	+0.1	+6.1	+0.1	+0.1	+0.0	45.1	46.0	-0.9	Black
9	661.226k	31.6	+0.2	+6.1	+0.1	+0.1	+0.0	38.1	46.0	-7.9	Black
10	151.618k Ave	38.5	+2.3	+6.2	+0.1	+0.1	+0.0	47.2	55.9	-8.7	Black
11	151.454k Ave	38.4	+2.3	+6.2	+0.1	+0.1	+0.0	47.1	55.9	-8.8	Black
^	151.454k	48.0	+2.3	+6.2	+0.1	+0.1	+0.0	56.7	55.9	+0.8	Black
^	151.618k	47.3	+2.3	+6.2	+0.1	+0.1	+0.0	56.0	55.9	+0.1	Black
^	151.454k	43.3	+2.3	+6.2	+0.1	+0.1	+0.0	52.0	55.9	-3.9	Black
15	12.860M	31.5	+0.2	+6.1	+0.4	+0.6	+0.0	38.8	50.0	-11.2	Black
16	12.977M	31.3	+0.2	+6.1	+0.4	+0.7	+0.0	38.7	50.0	-11.3	Black
17	13.094M	31.2	+0.2	+6.1	+0.4	+0.7	+0.0	38.6	50.0	-11.4	Black
18	12.734M	30.8	+0.2	+6.1	+0.4	+0.6	+0.0	38.1	50.0	-11.9	Black
19	12.364M	30.4	+0.2	+6.1	+0.4	+0.6	+0.0	37.7	50.0	-12.3	Black
20	13.220M	30.3	+0.2	+6.1	+0.4	+0.7	+0.0	37.7	50.0	-12.3	Black



CKC Laboratories, Inc. Date: 3/30/2007 Time: 13:15:31 Powerwave Technologies, Inc. WO#: 83894 FCC 15:107 Class B COND [AVE] Test Lead: Black 110V 60Hz Sequence#: 2



![](_page_41_Picture_0.jpeg)

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

Customer: Specification:	Powerwave Technologies, Inc. FCC 15.107 Class B COND [AVE]		
Work Order #:	83894	Date:	3/30/2007
Test Type:	Conducted Emissions	Time:	13:22:59
Equipment:	RF Repeater	Sequence#:	3
Manufacturer:	Powerwave Technologies	Tested By:	E. Wong
Model:	AR 1200		110V 60Hz
S/N:	NA		

#### Test Equipment:

1 1				
Function	S/N	Calibration Date	Cal Due Date	Asset #
LISN	1104	11/10/2006	11/10/2008	00847
6dB Attenuator	None	11/21/2006	11/21/2008	P05611
150kHz HPF	G7755	05/09/2006	05/09/2007	02610
Conducted Emission	Cable #21	05/09/2006	05/09/2008	P04358
Cable				
Spectrum Analyzer	US44300438	01/03/2007	01/03/2009	02672
· · · · · · · · · · · · · · · · · · ·				

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

Function	Manufacturer	Model #	S/N
RF Repeater*	Powerwave Technologies	AR 1200	NA

#### Support Devices:

Function	Manufacturer
----------	--------------

#### Test Conditions / Notes:

The EUT is placed on the wooden table. RF in and RF out are connected to sections of shielded RF cable for termination purposes. Idle mode. 23°C, 62% relative humidity.

Model #

S/N

#### Transducer Legend:

T1=150kHz HPF Asset 02610	T2=6dB Attenuator P05611
T3=Cable #21 Conducted Site A 050908	T4=(L2) Insertion Loss 00847 EMCO 3816/2NM

Measurement Data: Reading listed by margin.					Test Lead: White						
#	Freq	Rdng	T1	T2	Т3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	166.726k	44.9	+0.5	+6.2	+0.1	+0.2	+0.0	51.9	55.1	-3.2	White
2	788.214k	35.2	+0.1	+6.1	+0.1	+0.1	+0.0	41.6	46.0	-4.4	White
	Ave										
^	788.214k	41.3	+0.1	+6.1	+0.1	+0.1	+0.0	47.7	46.0	+1.7	White
4	817.575k	35.2	+0.1	+6.1	+0.1	+0.1	+0.0	41.6	46.0	-4.4	White
5	848.118k	35.2	+0.1	+6.1	+0.0	+0.1	+0.0	41.5	46.0	-4.5	White
6	150.726k	42.3	+2.5	+6.2	+0.1	+0.2	+0.0	51.3	56.0	-4.7	White
	Ave										
7	248.173k	40.2	+0.2	+6.1	+0.1	+0.1	+0.0	46.7	51.8	-5.1	White

![](_page_42_Picture_0.jpeg)

8	152.090k	42.0	+2.2	+6.2	+0.1	+0.2	+0.0	50.7	55.9	-5.2	White
	Ave										
^	152.090k	50.1	+2.2	+6.2	+0.1	+0.2	+0.0	58.8	55.9	+2.9	White
^	150.726k	49.6	+2.5	+6.2	+0.1	+0.2	+0.0	58.6	56.0	+2.6	White
11	727.337k Ave	32.3	+0.1	+6.1	+0.1	+0.1	+0.0	38.7	46.0	-7.3	White
^	727.337k	39.5	+0.1	+6.1	+0.1	+0.1	+0.0	45.9	46.0	-0.1	White
13	15.157M	34.6	+0.2	+6.1	+0.4	+0.8	+0.0	42.1	50.0	-7.9	White
14	29.472M	33.6	+0.3	+6.2	+0.5	+1.4	+0.0	42.0	50.0	-8.0	White
15	667.771k	31.3	+0.2	+6.1	+0.1	+0.1	+0.0	37.8	46.0	-8.2	White
16	218.357k	36.0	+0.2	+6.1	+0.1	+0.2	+0.0	42.6	52.9	-10.3	White
17	641.591k	29.2	+0.2	+6.1	+0.1	+0.1	+0.0	35.7	46.0	-10.3	White
18	12.977M	31.7	+0.2	+6.1	+0.4	+0.7	+0.0	39.1	50.0	-10.9	White

CKC Laboratories, Inc. Date: 3/30/2007 Time: 13:22:59 Powerwave Technologies, Inc. WO#: 83894 FCC 15.107 Class B COND [AVE] Test Lead: White 110V 60Hz Sequence#: 3

![](_page_42_Figure_3.jpeg)

![](_page_43_Picture_0.jpeg)

## FCC 15.109 - RADIATED EMISSIONS

# **Test Setup Photos**

![](_page_43_Picture_3.jpeg)

![](_page_43_Picture_4.jpeg)

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![](_page_44_Picture_0.jpeg)

## **Test Data Sheets**

Test Lo	ocation:	ion: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112										
Custom Specific Work C Test Ty Equipm Manufa Model: S/N:	ner: cation: Drder #: /pe: nent: acturer:	Powerwave FCC 15.10 83894 Radiated S RF Repeat Powerwave AR 1200 NA	e Techno 9 Class F Scan er e Technol	logies, In 3 ogies	nc.	S	Da Tir Sequenc Tested I	nte: 3/30/2 ne: 10:53 e#: 1 By: E. Wo	2007 :09 ong			
Test E	<i>quipment</i> :	CDI				D	0.11		· · ·			
Functio	on .	S/N		C C	alibration	Date		Due Date	As	set #		
Billog A	Antenna um Analyzar	2451 US443	00/38	0.	2/02/2000 1/03/2007		02/0	2/2008	01	995 677		
Pre am	n to SA Cab	le Cable ±	438 #10	0.	5/16/2007		01/0	5/2009 6/2007	020 P0	5050		
Cable	p 10 571 Cuo	Cable1	5	0	1/05/2007		01/0	5/2009	P0	5198		
Pre Am	np	1937A	02548	0	6/01/2006		06/0	1/2008	00.	309		
Equip	ment Under	Test (* = $\mathbf{I}$	EUT):									
Functio	n	Ν	/lanufactu	irer		Model #			S/N			
RF Rep	beater*	Р	owerwav	e Techno	ologies	AR 1200	0		NA			
Suppo	ort Devices:	<u> </u>										
Functio	on	Ν	/Ianufactu	ırer		Model #			S/N			
Test Conditions / Notes:												
Test C	Conditions / 1	Notes:										
Test C The EU	<i>Conditions</i> / I UT is placed	Notes: I on the wo	ooden tab	ole. RF i	n and RF	out are	connect	ted to sect	ions of shi	elded RF	cable for	
Test C The EU termina	<i>Conditions / I</i> JT is placed ation purpose	Notes: I on the wo es. Idle mo	ooden tab de. 23°C	ole. RF i C, 62% re	n and RF elative hu	out are nidity.	connect	ted to sect	ions of shi	elded RF	cable for	
Test C The EU termina Transa	Conditions / I UT is placed ation purpose ducer Legen	Notes: l on the wo es. Idle mo od:	ooden tab de. 23°C	ole. RF i C, 62% re	n and RF elative hui	out are nidity.	connect	ted to sect	ions of shi	elded RF	cable for	
Test C The EU termina Transa T1=Pre	Conditions / I JT is placed ation purposed ducer Legen camp 8447D bla #10,051	Notes: I on the wo es. Idle mo d: 060108	ooden tab de. 23°C	ole. RF i C, 62% re	n and RF elative hui	out are nidity. T2=Bilo	connect	ted to sect	ions of shi	elded RF	cable for	
Test C The EU termina Transa T1=Pre T3=Cal	<i>Conditions / I</i> UT is placed ation purpose <i>ducer Legen</i> eamp 8447D ble #10 051	Notes: I on the wo es. Idle mo d: 060108 607	ooden tab de. 23°C	ble. RF i C, 62% re	n and RF elative hui	out are nidity. T2=Bilo T4=Cab	connect og AN0 le #15, S	ted to sect 1995 02020 Site A, 010	ions of shi 08 Chase 509	elded RF	cable for	
Test C The EU termina Transa T1=Pre T3=Cal Measur	Conditions / I JT is placed ation purpose ducer Legen eamp 8447D ble #10 051 rement Data	Notes:           I on the wo           es. Idle mo           od:           060108           607           ::         Re	ooden tab de. 23°(	ble. RF i C, 62% re ted by m	n and RF elative hun argin.	out are nidity. T2=Bilo T4=Cab	connect og AN0 le #15, S Te	ted to sect 1995 02020 Site A, 010 est Distance	ions of shi 08 Chase 509 e: 3 Meters	elded RF	cable for	
Test C The EU termina T1=Pre T3=Cal <i>Measur</i> #	<i>Conditions / 1</i> JT is placed ation purpose <i>ducer Legen</i> camp 8447D ble #10 051 rement Data Freq	Notes:           I on the wo           es. Idle mo           od:           060108           607           e:         Reg	ooden tab de. 23°C eading lis T1	ble. RF i C, 62% re ted by m T2	n and RF elative hun argin. T3	out are midity. T2=Bilo T4=Cab	connect og AN0 le #15, S Te Dist	ted to sect 1995 02020 Site A, 010 est Distance Corr	ions of shi 08 Chase 509 e: 3 Meters Spec	elded RF	cable for	
Test C The EU termina T1=Pre T3=Cal Measur #	<i>Conditions / I</i> JT is placed ation purpose <i>ducer Legen</i> camp 8447D ble #10 051 <i>rement Data</i> Freq MHz	Notes:           I on the work           I on the work           es. Idle model           060108           607           e:           Rdng           dBµV	eading lis T1 dB	ble. RF i C, 62% re ted by m T2 dB	n and RF elative hun argin. T3 dB	out are nidity. T2=Bilo T4=Cab T4 dB	connect og AN0 le #15, S Te Dist Table	ted to sect 1995 02020 Site A, 010 est Distance Corr dBµV/m	ions of shi 08 Chase 509 e: 3 Meters Spec dBµV/m	elded RF Margin dB	Polar Ant	
Test C The EU termina T1=Pre T3=Cal <i>Measur</i> #	<i>Conditions / 1</i> JT is placed ation purpose <i>ducer Legen</i> camp 8447D ble #10 051 <i>rement Data</i> Freq MHz 239.789M	Notes:           I on the work           I on the work           es. Idle model           060108           607           e:           Rdng           dBµV           51.6	eading lis T1 dB -27.7	ted by m T2 dB +11.8	n and RF elative hun argin. T3 dB +0.2	out are midity. T2=Bilo T4=Cab T4 dB +2.8	connect og AN0 le #15, S Te Dist Table +0.0	ted to sect 1995 02020 Site A, 010 est Distance Corr dBµV/m 38.7	ions of shi 08 Chase 509 e: 3 Meters Spec dBµV/m 46.0	elded RF Margin dB -7.3	Polar Ant Vert	
Test C The EU termina Transo T1=Pre T3=Cal Measur # 1 2	<i>Conditions / 1</i> JT is placed ation purpose <i>ducer Legen</i> camp 8447D ble #10 051 <i>rement Data</i> Freq MHz 239.789M 223.858M	Notes:           I on the work           I on the work           es. Idle mo           od:           060108           607           e:         Rd           Rdng           dBµV           51.6           50.6	eading lis T1 dB -27.7 -27.6	ted by m T2 dB +11.8 +10.7	n and RF elative hun argin. T3 dB +0.2 +0.2	out are midity. T2=Bilo T4=Cab T4 dB +2.8 +2.7	connect og AN0 le #15, S <u>Te</u> Dist Table +0.0 +0.0	ted to sect 1995 02020 Site A, 010 est Distance Corr dBµV/m 38.7 36.6	ions of shi 08 Chase 509 e: 3 Meters Spec dBµV/m 46.0 46.0	Margin dB -7.3 -9.4	Polar Ant Vert Horiz	
Test C The EU termina T1=Pre T3=Cal <i>Measur</i> # 1 2 3	<i>Conditions / 1</i> JT is placed ation purpose <i>ducer Legen</i> camp 8447D ble #10 051 <i>rement Data</i> Freq MHz 239.789M 223.858M 247.792M	Notes:           I on the work           l on the work           es. Idle model           060108           607           ::         Ref           Rdng           dBµV           51.6           50.6           47.7	eading lis T1 dB -27.7 -27.6 -27.7	ted by m T2 dB +11.8 +10.7 +12.4	n and RF elative hun argin. T3 dB +0.2 +0.2 +0.2	out are midity. T2=Bilo T4=Cab T4 dB +2.8 +2.7 +2.9	connect og AN0 le #15, S Dist Table +0.0 +0.0	ted to sect 1995 02020 Site A, 010 est Distance Corr dBμV/m 38.7 36.6 35.5	ions of shi 08 Chase 509 2: 3 Meters Spec dBµV/m 46.0 46.0 46.0	elded RF Margin dB -7.3 -9.4 -10.5	Polar Ant Vert Horiz Vert	
Test C The EU termina T1=Pre T3=Cal # 1 2 3 4	Conditions / 1 JT is placed ation purpose ducer Legen camp 8447D ble #10 051 rement Data Freq MHz 239.789M 223.858M 247.792M 225.725M	Notes:           I on the work           I on the work           es. Idle model           060108           607           ::         Rdng           dBµV           51.6           47.7           49.1	eading lis T1 dB -27.7 -27.6 -27.7 -27.6	ted by m T2 dB +11.8 +10.7 +12.4 +10.8	n and RF elative hun argin. T3 dB +0.2 +0.2 +0.2 +0.2	out are midity. T2=Bilo T4=Cab T4 dB +2.8 +2.7 +2.9 +2.7	connect og AN0 le #15, S Te Dist Table +0.0 +0.0 +0.0 +0.0	ted to sect 1995 02020 Site A, 010 est Distance Corr dBµV/m 38.7 36.6 35.5 35.2	ions of shi 08 Chase 509 e: 3 Meters Spec dBµV/m 46.0 46.0 46.0 46.0	elded RF Margin dB -7.3 -9.4 -10.5 -10.8	Polar Ant Vert Horiz Vert Vert Vert	
Test C The EU termina T1=Pre T3=Cal <i>Measur</i> # 1 2 3 4 5	<i>Conditions / 1</i> JT is placed ation purpose <i>ducer Legen</i> camp 8447D ble #10 051 <i>rement Data</i> Freq MHz 239.789M 223.858M 247.792M 225.725M 231.792M	Notes:           I on the work           I on the work           es. Idle mo           od:           060108           607           ::         Ref           Rdng           dBµV           51.6           50.6           47.7           49.1           48.1	eading lis T1 dB -27.7 -27.6 -27.6 -27.6 -27.6	ble. RF is      C, 62% reserved to the constraint of the c	n and RF elative hun argin. T3 dB +0.2 +0.2 +0.2 +0.2 +0.2 +0.2	out are midity. T2=Bilo T4=Cab T4 dB +2.8 +2.7 +2.9 +2.7 +2.8	connect og AN0 le #15, S Dist Table +0.0 +0.0 +0.0 +0.0 +0.0	ted to sect 1995 02020 Site A, 010 est Distance Corr dBμV/m 38.7 36.6 35.5 35.2 34.7	ions of shi 08 Chase 509 e: 3 Meters Spec dBµV/m 46.0 46.0 46.0 46.0 46.0 46.0	elded RF Margin dB -7.3 -9.4 -10.5 -10.8 -11.3	Polar Ant Vert Horiz Vert Vert Horiz	
Test C           The EU           termina           T1=Pre           T3=Cal           Measure           #           1           2           3           4           5           6	<i>Conditions / 1</i> JT is placed tion purpose <i>ducer Legen</i> camp 8447D ble #10 051 <i>rement Data</i> Freq MHz 239.789M 223.858M 247.792M 225.725M 231.792M 235.870M	Notes:           I on the work           l on the work           es. Idle mo           od:           060108           607           ::         Rd           Rdng           dBµV           51.6           50.6           47.7           49.1           48.1           47.8	eading lis T1 dB -27.7 -27.6 -27.6 -27.6 -27.6 -27.6	$\frac{\text{ted by m}}{\text{T2}}$ $\frac{\text{ted by m}}{\text{T2}}$ $\frac{1}{\text{dB}}$ $+11.8$ $+10.7$ $+12.4$ $+10.8$ $+11.2$ $+11.5$	n and RF elative hun argin. T3 dB +0.2 +0.2 +0.2 +0.2 +0.2 +0.2 +0.2	out are midity. T2=Bilo T4=Cab T4 dB +2.8 +2.7 +2.9 +2.7 +2.8 +2.8	connect og AN0 le #15, S Dist Table +0.0 +0.0 +0.0 +0.0 +0.0 +0.0	ted to sect 1995 02020 Site A, 010 est Distance Corr dBμV/m 38.7 36.6 35.5 35.2 34.7 34.7	ions of shi 08 Chase 509 e: 3 Meters Spec dBµV/m 46.0 46.0 46.0 46.0 46.0 46.0 46.0 46.0	elded RF Margin dB -7.3 -9.4 -10.5 -10.8 -11.3 -11.3	Polar Ant Vert Horiz Vert Vert Horiz Vert	

![](_page_45_Picture_0.jpeg)

8	227.808M	47.5	-27.6	+11.0	+0.2	+2.7	+0.0	33.8	46.0	-12.2	Horiz
9	237.683M	46.3	-27.7	+11.7	+0.2	+2.8	+0.0	33.3	46.0	-12.7	Vert
10	367.700M	41.8	-27.7	+15.0	+0.3	+3.6	+0.0	33.0	46.0	-13.0	Horiz
11	255.792M	44.7	-27.7	+12.6	+0.2	+2.9	+0.0	32.7	46.0	-13.3	Vert
12	363.700M	39.7	-27.7	+14.9	+0.3	+3.6	+0.0	30.8	46.0	-15.2	Vert
13	374.958M	39.0	-27.7	+15.2	+0.3	+3.6	+0.0	30.4	46.0	-15.6	Horiz
14	201.000M	43.1	-27.6	+8.9	+0.2	+2.6	+0.0	27.2	43.5	-16.3	Horiz
15	236.500M	42.3	-27.6	+11.6	+0.2	+2.8	+0.0	29.3	46.0	-16.7	Horiz
16	220.617M	43.6	-27.6	+10.4	+0.2	+2.7	+0.0	29.3	46.0	-16.7	Vert
17	367.708M	38.0	-27.7	+15.0	+0.3	+3.6	+0.0	29.2	46.0	-16.8	Vert
18	400.025M	36.4	-27.8	+15.8	+0.3	+3.7	+0.0	28.4	46.0	-17.6	Vert
19	207.317M	41.1	-27.6	+9.4	+0.2	+2.6	+0.0	25.7	43.5	-17.8	Vert
20	299.992M	36.6	-27.6	+13.2	+0.3	+3.2	+0.0	25.7	46.0	-20.3	Vert
21	375.000M	34.1	-27.7	+15.2	+0.3	+3.6	+0.0	25.5	46.0	-20.5	Vert
22	335.975M	35.1	-27.6	+14.2	+0.3	+3.4	+0.0	25.4	46.0	-20.6	Vert
23	379.683M	33.8	-27.7	+15.3	+0.3	+3.6	+0.0	25.3	46.0	-20.7	Vert
24	274.983M	34.2	-27.7	+12.9	+0.3	+3.0	+0.0	22.7	46.0	-23.3	Vert
25	351.683M	31.9	-27.6	+14.5	+0.3	+3.5	+0.0	22.6	46.0	-23.4	Vert
26	316.700M	32.9	-27.6	+13.7	+0.3	+3.3	+0.0	22.6	46.0	-23.4	Vert