



POWERWAVE TECHNOLOGIES, INC. TEST REPORT

FOR THE

900MHZ CELLULAR REPEATER, ALR 1200

FCC PART 90

COMPLIANCE

DATE OF ISSUE: OCTOBER 18, 2005

PREPARED FOR:

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

P.O. No.: 71687
W.O. No.: 83984

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Date of test: July 18 - October 5, 2005

Report No.: FC05-051

This report contains a total of 33 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc. The results in this report apply only to the items tested, as identified herein.



TABLE OF CONTENTS

Administrative Information	3
Conditions for Compliance	4
Approvals	4
Equipment Under Test (EUT) Description	5
Equipment Under Test	5
Peripheral Devices	5
Temperature and Humidity During Testing	6
FCC 2.1033(c)(3) User's Manual	6
FCC 2.1033(c)(4) Type of Emissions	6
FCC 2.1033(c)(5) Frequency Range	6
FCC 2.1033(c)(6) Operating Power	6
FCC 2.1033(c)(7) Maximum Power Rating	6
FCC 2.1033(c)(8) DC Voltages	6
FCC 2.1033(c)(9) Tune-Up Procedure	6
FCC 2.1033(c)(10) Schematics and Circuitry Description	6
FCC 2.1033(c)(11) Label and Placement	6
FCC 2.1033(c)(12) Submittal Photos	6
FCC 2.1033(c)(13) Modulation Information	6
FCC 2.1033(c)(14)/2.1046/90.635(b) - RF Power Output	7
FCC 2.1033(c)(14)/2.1047(b) - Audio Frequency Response	8
FCC 2.1033(c)(14)/2.1047(b) - Modulation Limiting Response	8
FCC 2.1033(c)(14)/2.1049(i) – Input Plots	9
FCC 2.1033(c)(14)/2.1049(i) – Output Plots	16
FCC 2.1033(c)(14)/2.1051/90.669(a) - Spurious Emissions at Antenna Terminal	23
FCC 2.1033(c)(14)/2.1053/90.669(a) - Field Strength of Spurious Radiation	24
Bandedge Plots	29



ADMINISTRATIVE INFORMATION

DATE OF TEST: July 18 - October 5, 2005

DATE OF RECEIPT: July 18, 2005

FREQUENCY RANGE TESTED: 9kHz-10GHz

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 92621

TEST METHOD: FCC Part 90, ANSI/TIA/EIA-603-B (2002)

PURPOSE OF TEST: To demonstrate the compliance of the 900MHz Cellular Repeater, ALR 1200 with the requirements for FCC Part 90 Class devices.

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:



Joyce Walker, Quality Assurance Administrative
Manager

TEST PERSONNEL:



Eddie Wong, EMC Engineer



EQUIPMENT UNDER TEST (EUT) DESCRIPTION

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

EQUIPMENT UNDER TEST

900MHz Cellular Repeater

Manuf: Powerwave Technologies
Model: ALR 1200
Serial: NA
FCC ID: pending

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.



TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°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

16K0F3E and iDEN

FCC 2.1033 (c)(5) FREQUENCY RANGE

935MHz – 940MHz

FCC 2.1033 (c)(6) OPERATING POWER

16K0F3E – 0.3162 Watts, iDEN – 0.0800 Watts

FCC 2.1033 (c)(7) MAXIMUM POWER RATING

500 Watts

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

AMP

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

Power and Antenna Height Limit:

(b) The effective radiated power and antenna height, for base stations used in suburban-conventional systems of communications shall be no greater than 500 watts (27 dBw) and 152 m. (500 ft.) above average terrain (AAT) respectively

The EUT is a RF repeater. The manufacturer does not provide an antenna for sale with the product, hence ERP 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 FCC90.635 (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 500watts.

Test setup : The EUT is placed on the wooden table. RF Input port is connected to a remote support Signal Amplifier and a 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.

Modulation	Frequency	Measured Power
iDEN	935.0MHz	0.0800W
iDEN	937.5MHz	0.0800W
iDEN	940.0MHz	0.0800W
16K0F3E	935.0MHz	0.3162W
16K0F3E	937.5MHz	0.3162W
16K0F3E	940.0MHz	0.3162W

Conclusion: As indicated above, the measured power does not exceed the 500 Watt power limit.

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
RF Power meter	02082	HP	435B	2445A11881	061704	061706
Power Sensor	02036	HP	8482A	1551A01004	061806	061806

RF Output Power



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

Not applicable to this unit.

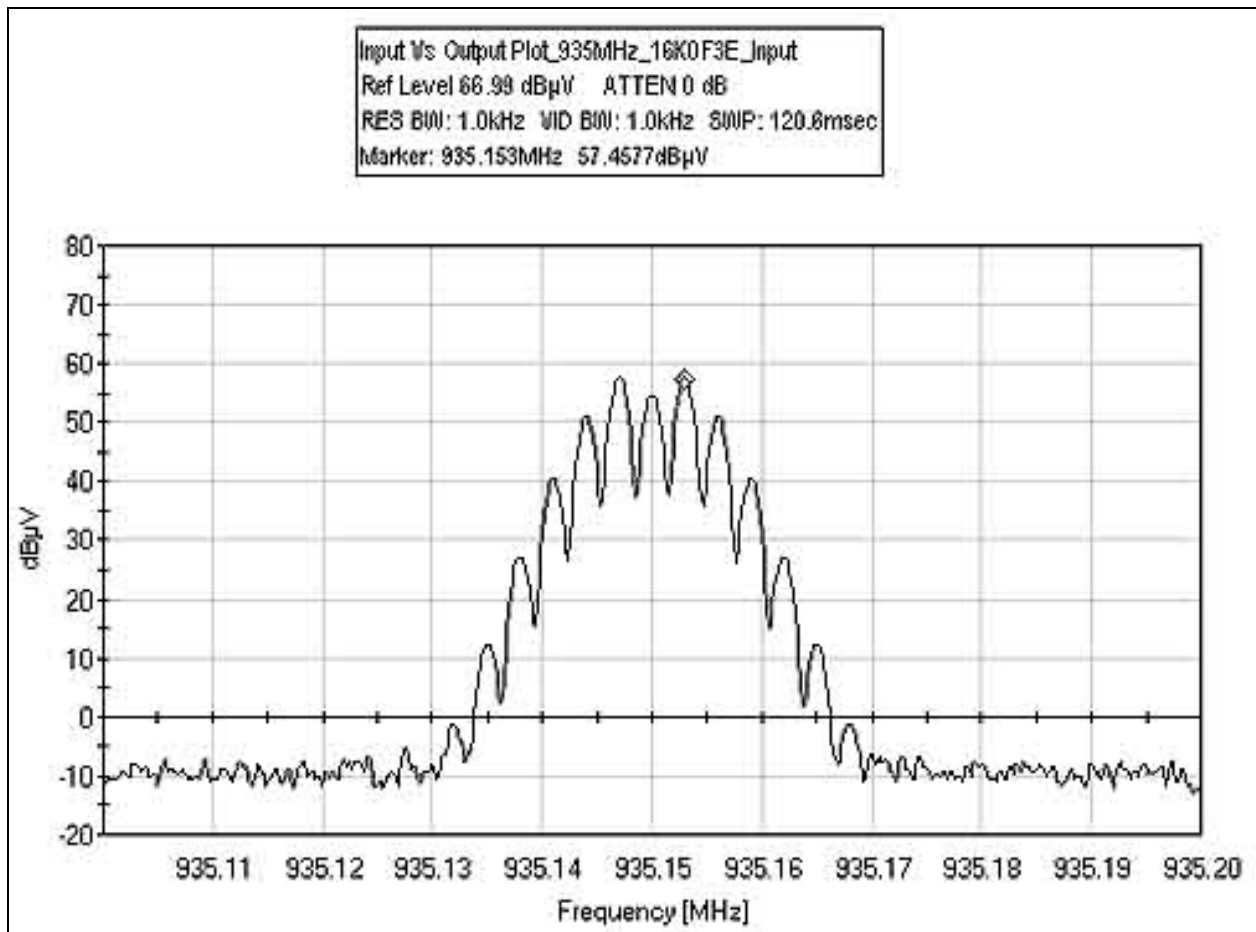
FCC 2.1033(c)(14)/2.1047(b) MODULATION CHARACTERISTICS- Modulation Limiting Response

Not applicable to this unit.

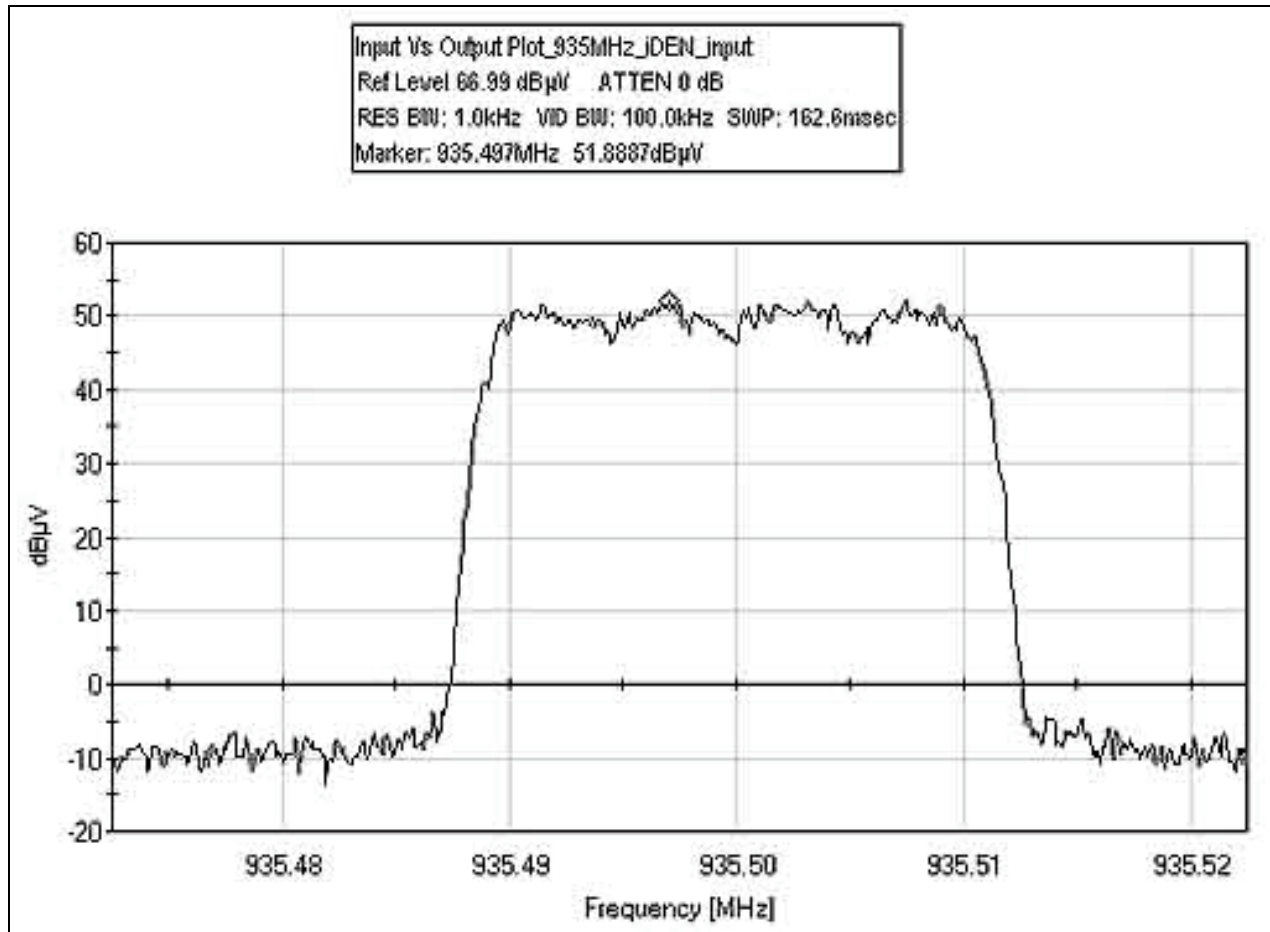
FCC 2.1033(c)(14)/2.1049(i)- INPUT PLOTS

INPUT PLOT 935MHz - 16K0F3E

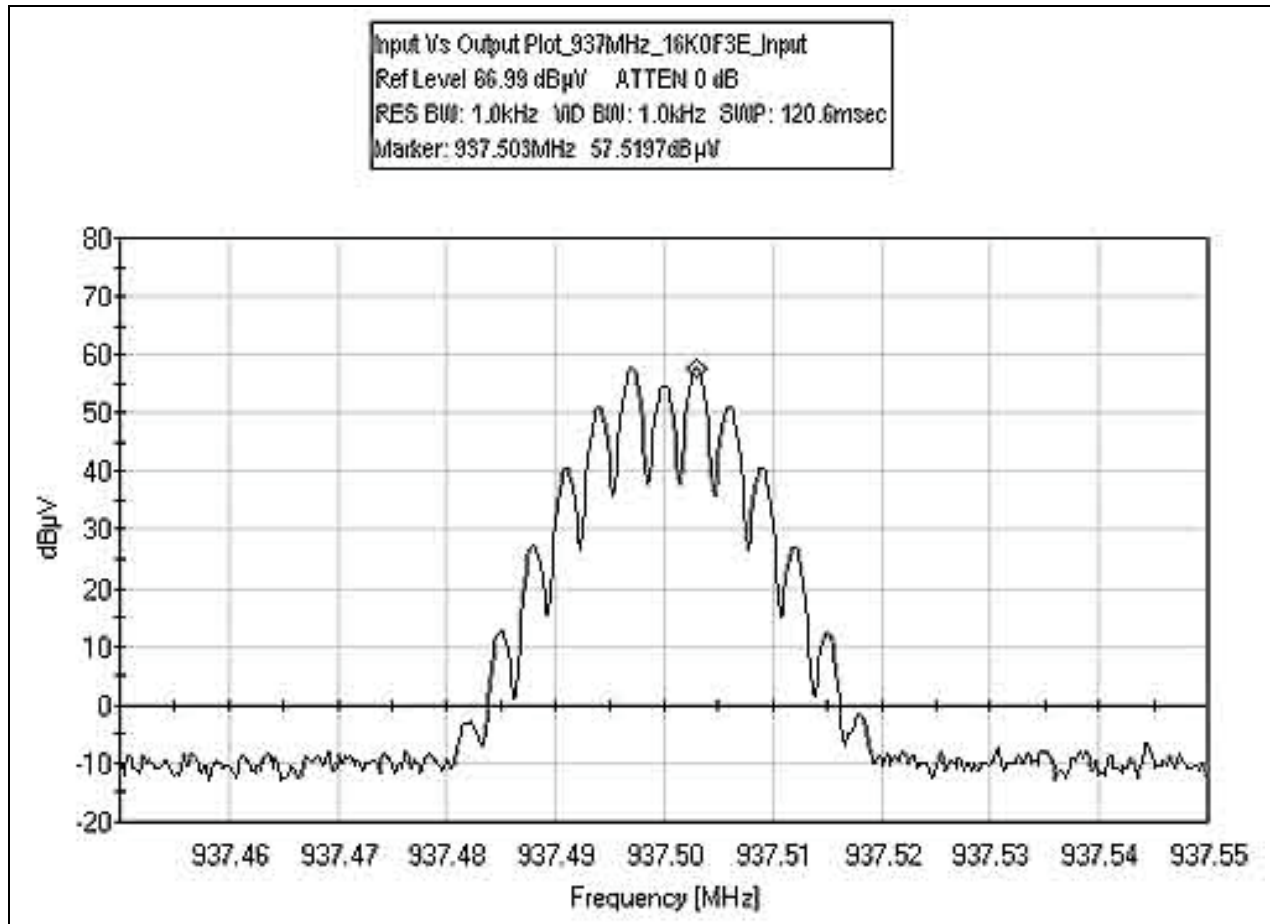
Test Conditions: The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. The RF Output is connected to a remote RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. Signal is measured at the antenna port. Modulation: AMP. Emission Designator: iDEN. Power = 19 dBm = 0.08 Watts. Emission Designator: 16K0F3E. Power = 25 dBm = 0.3162 Watts. Frequency: 935MHz, 937.5MHz and 940MHz. 24°C, 60% relative humidity.



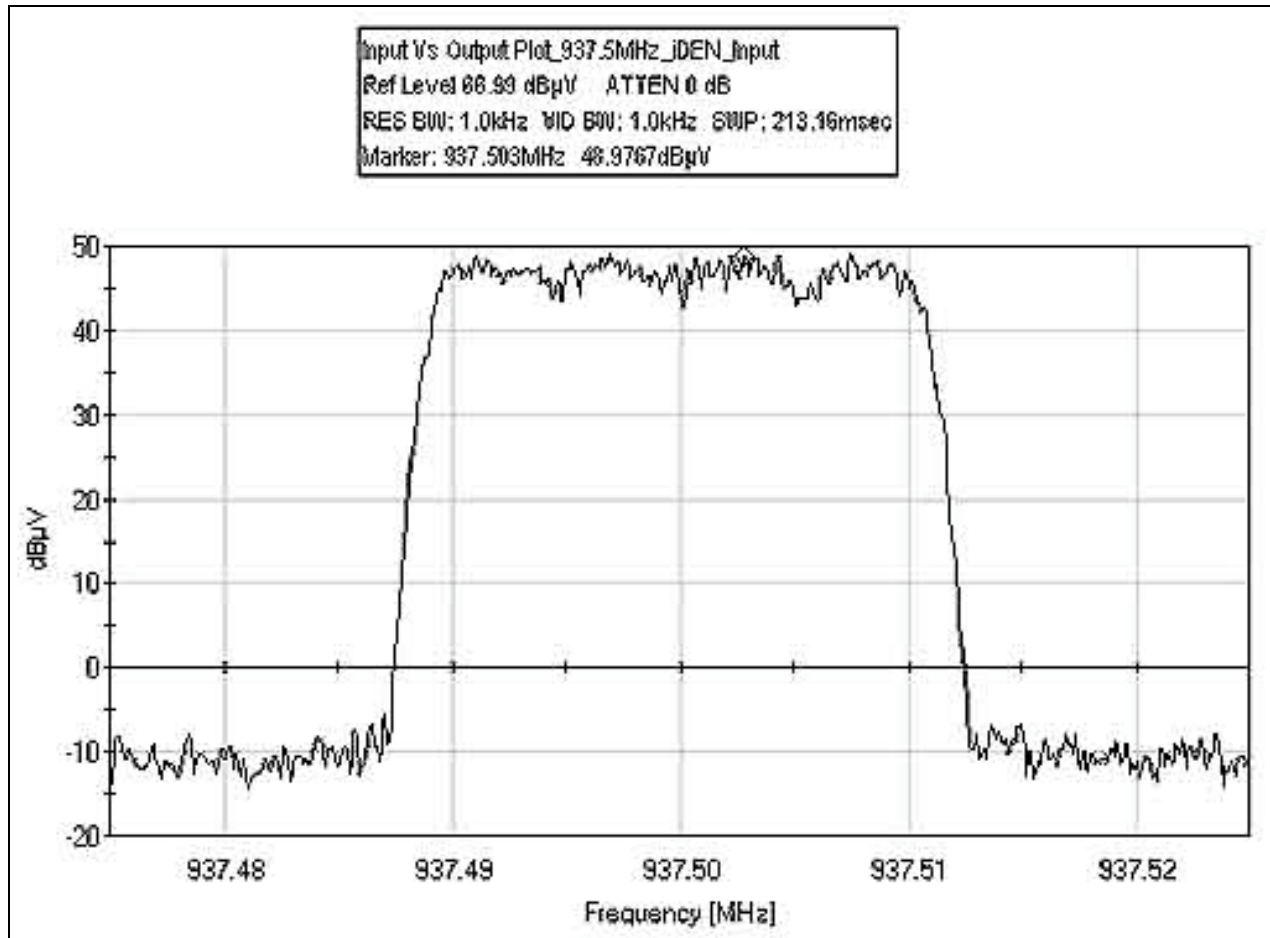
INPUT PLOT 935MHz - IDEN



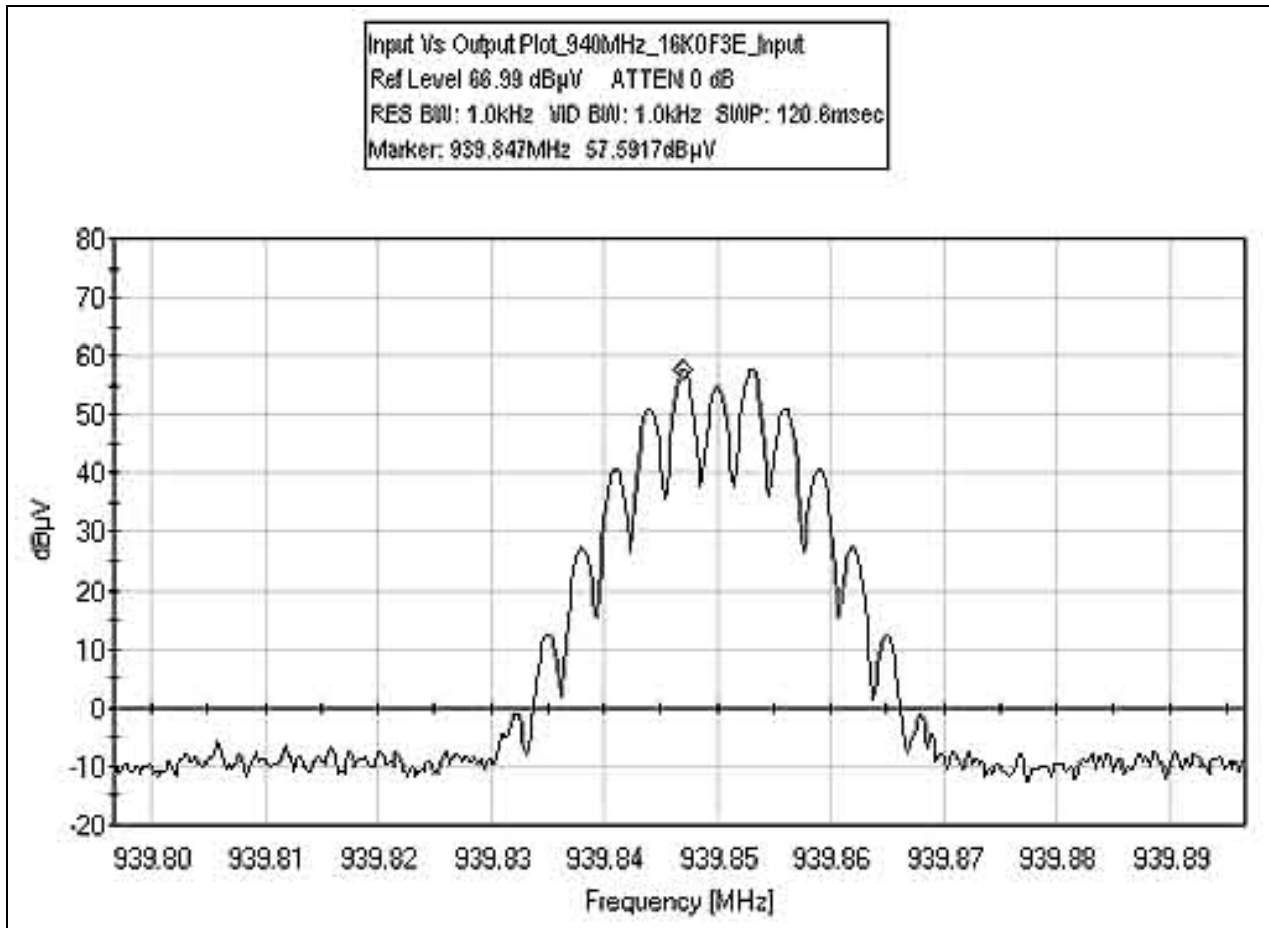
INPUT PLOT 937MHz - 16K0F3E



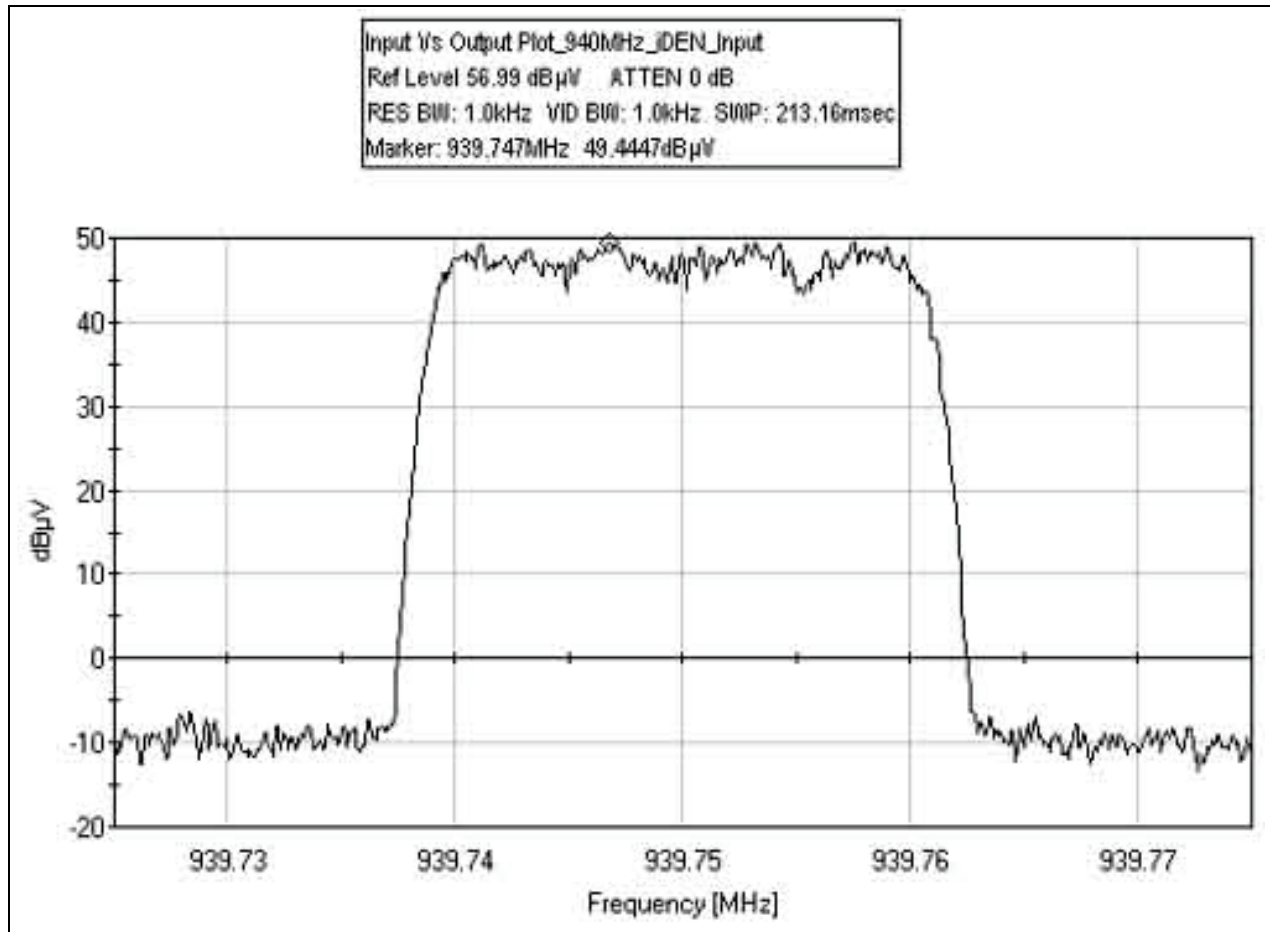
INPUT PLOT 937MHz - IDEN



INPUT PLOT 940MHz - 16K0F3E



INPUT PLOT 940MHz - IDEN



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407

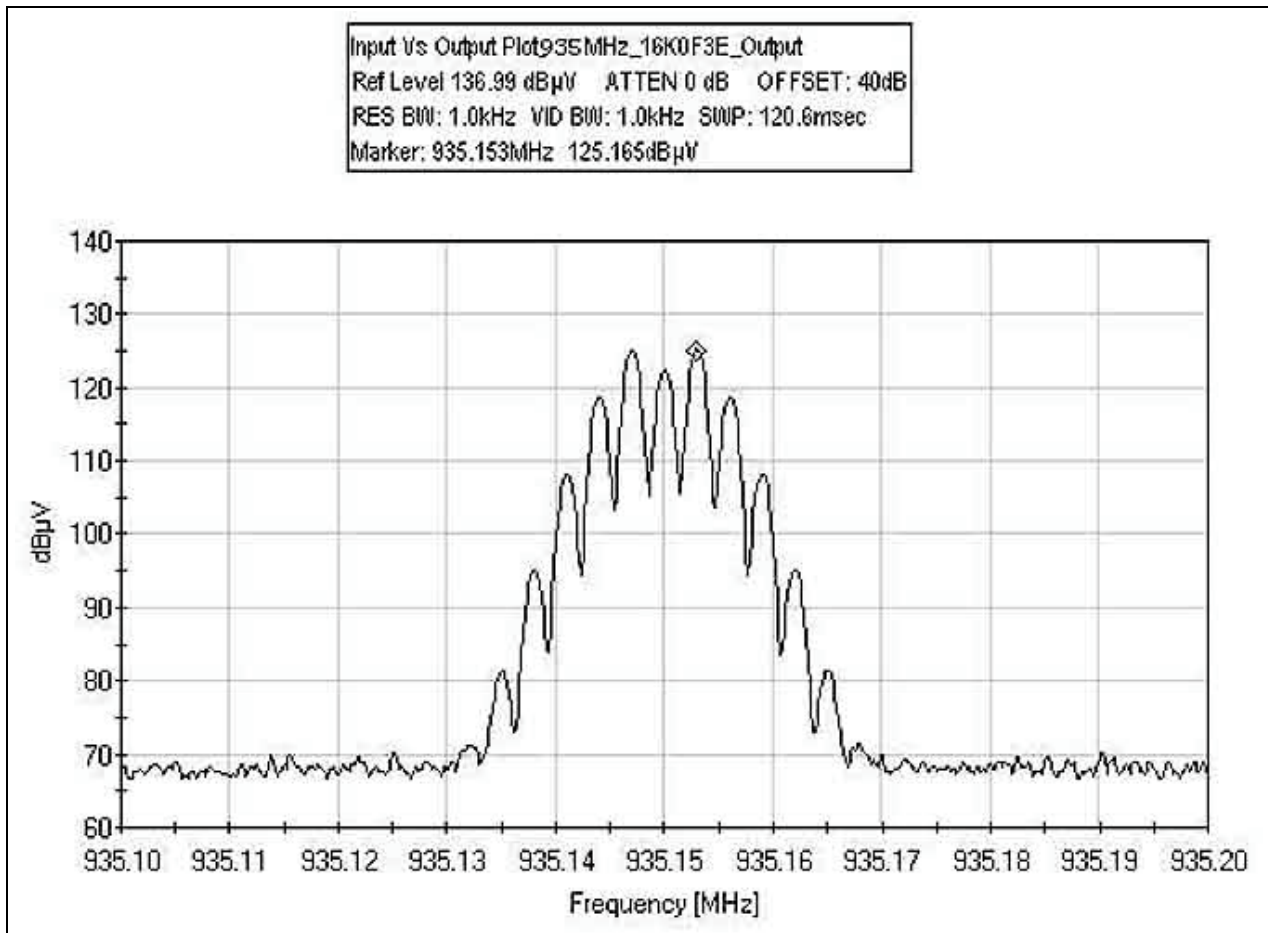
PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP



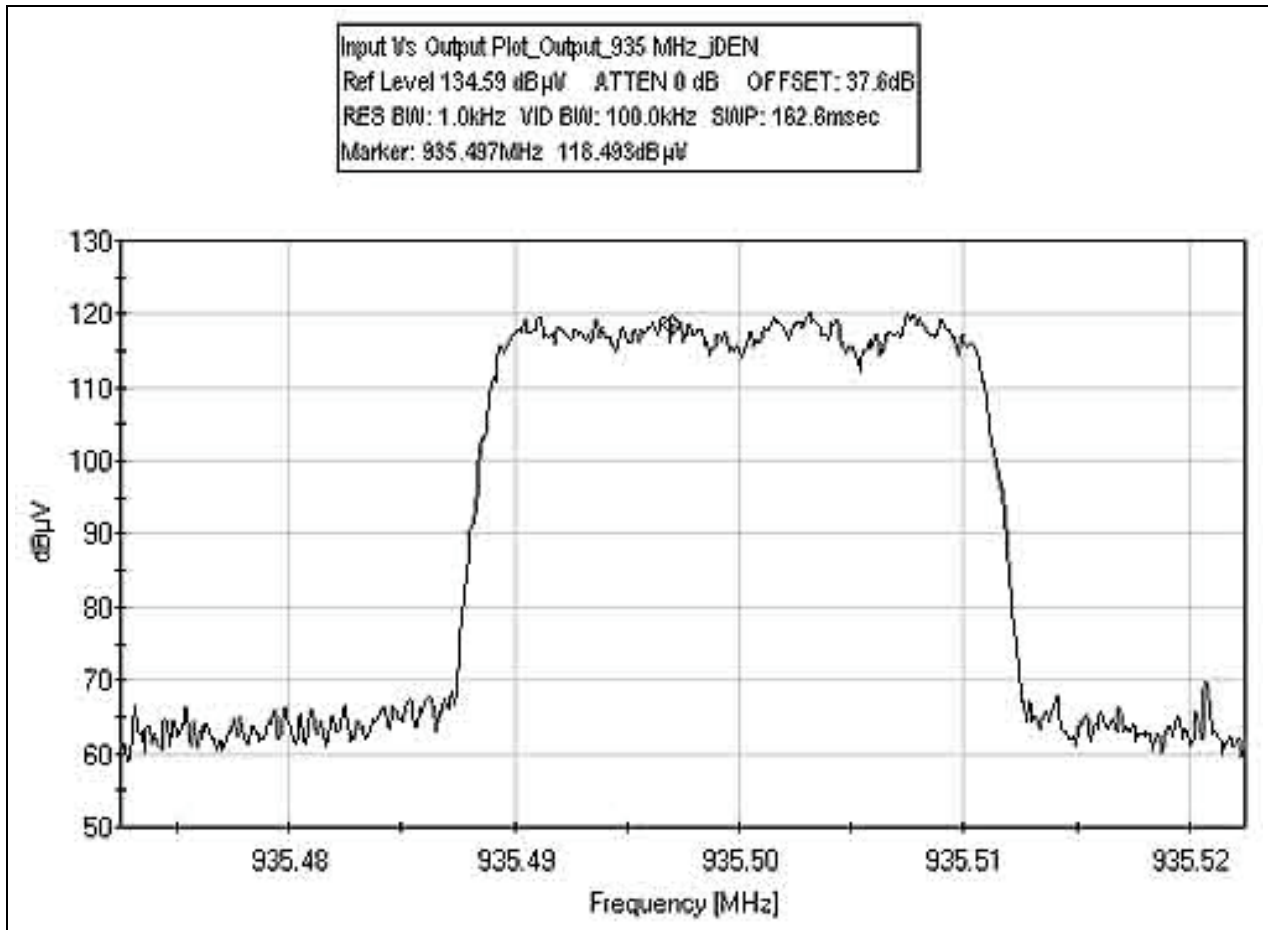
FCC 2.1033(c)(14)/2.1049(i)- OUTPUT PLOTS

OUTPUT PLOT 935MHz - 16K0F3E

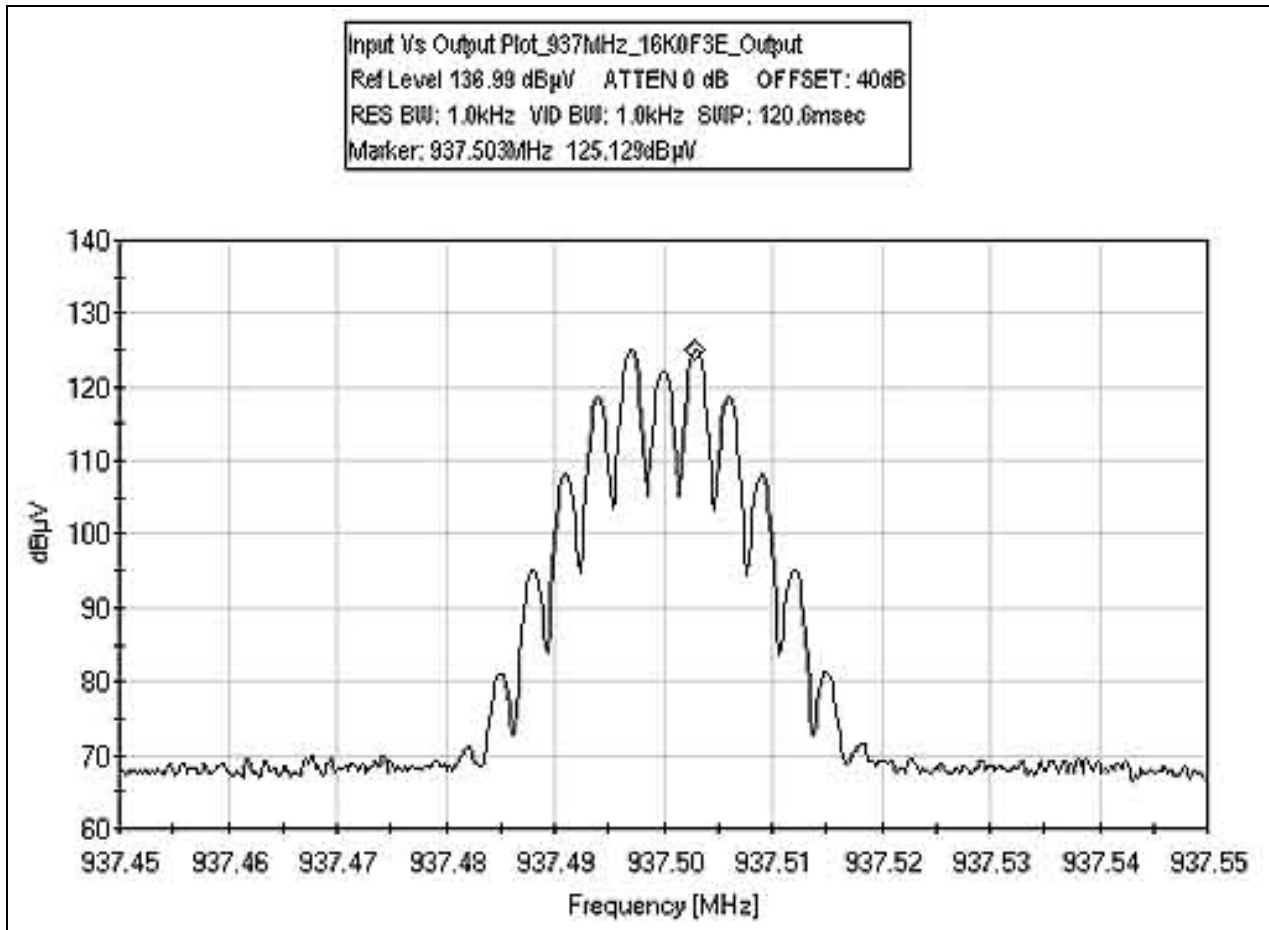
Test Conditions: The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. The RF Output is connected to a remote RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. Signal is measured at the antenna port. Modulation: AMP. Emission Designator: iDEN. Power = 19 dBm = 0.08 Watts. Emission Designator: 16K0F3E. Power = 25 dBm = 0.3162 Watts. Frequency: 935MHz, 937.5MHz and 940MHz. 24°C, 60% relative humidity.



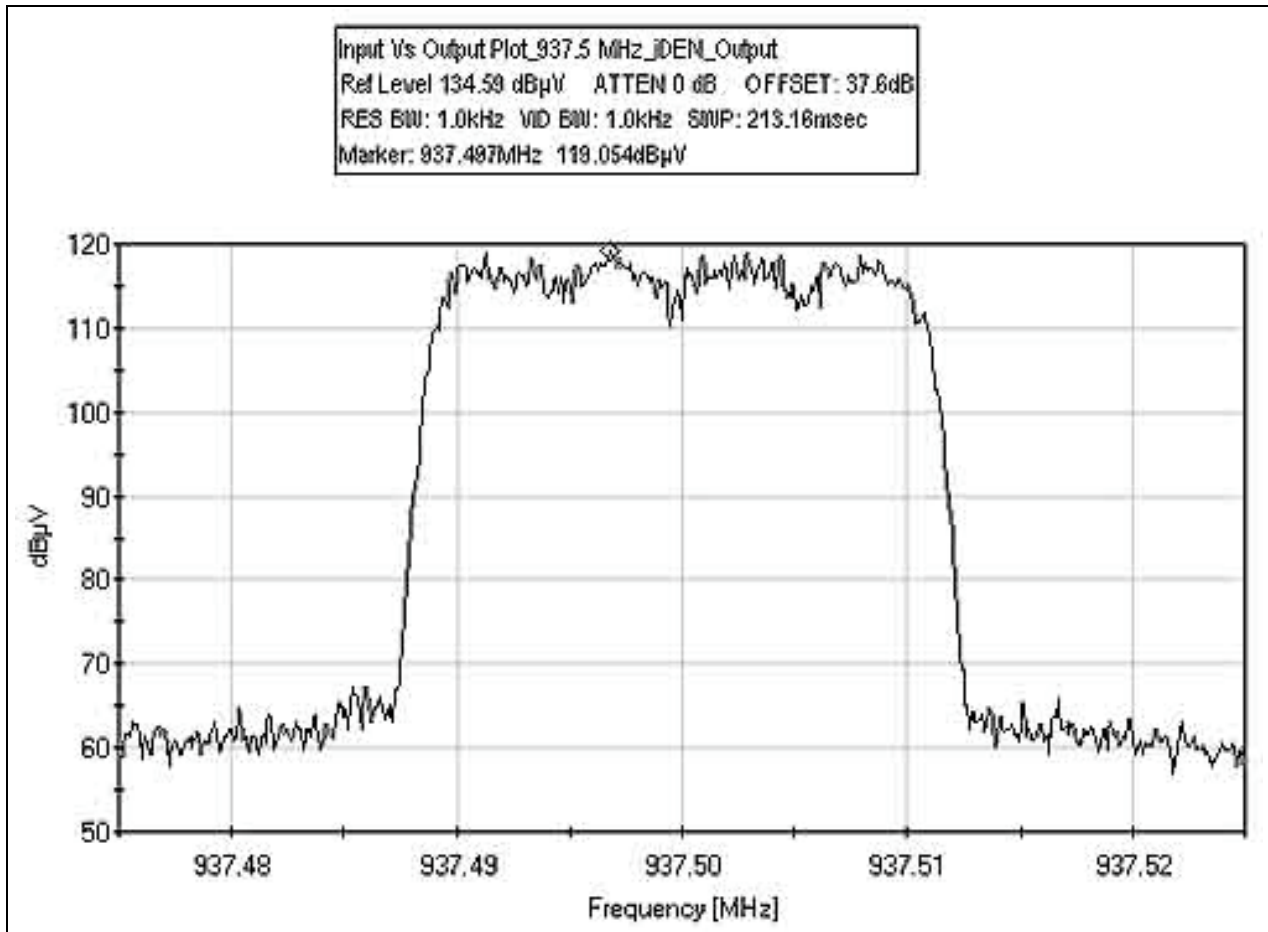
OUTPUT PLOT 935MHz - IDEN



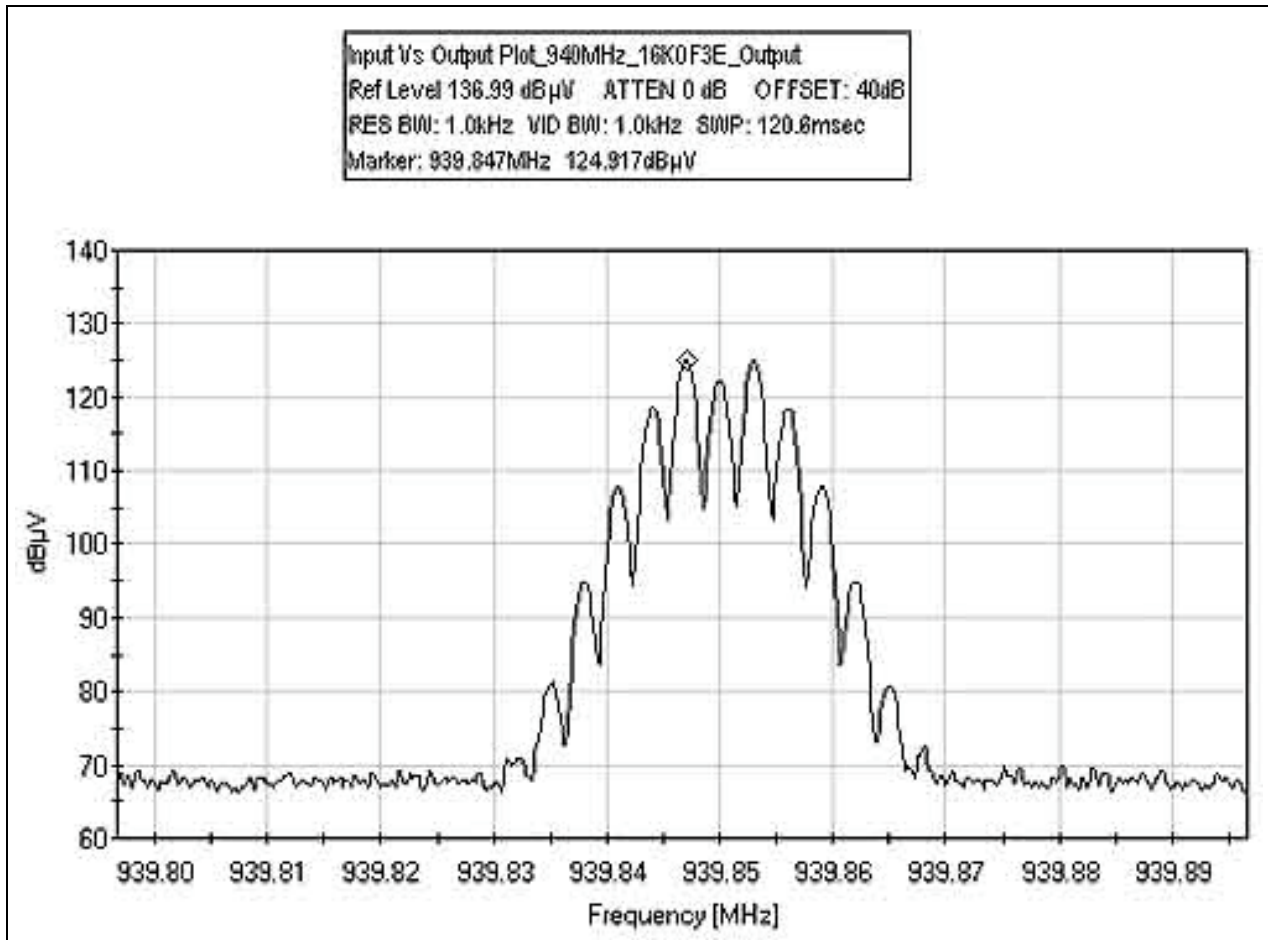
OUTPUT PLOT 937MHz - 16K0F3E



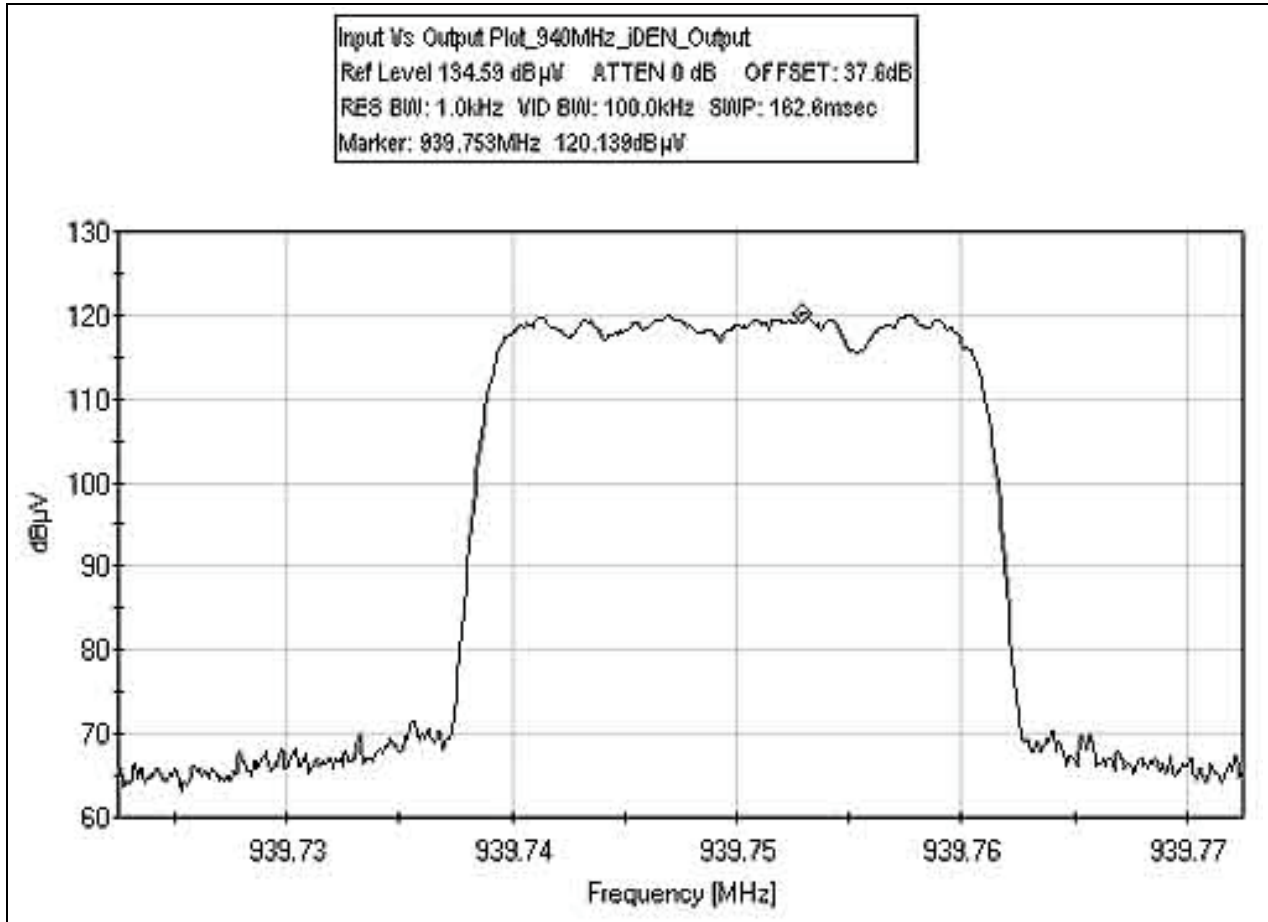
OUTPUT PLOT 937MHz - IDEN



OUTPUT PLOT 940MHz - 16K0F3E



OUTPUT PLOT 940MHz - IDEN



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407

PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP



FCC 2.1033(c)(14)/2.1051/90.669(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

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. Signal is measured at the antenna port. Modulation: AMP. Emission Designator: iDEN. Power = 19 dBm = 0.08 Watts. Emission Designator: 16K0F3E. Power = 25 dBm = 0.3162 Watts. Frequency: 935MHz, 937.5MHz and 940MHz. Frequency range of measurement = 9kHz-10GHz. 9kHz-150kHz; RBW=200Hz, VBW=200Hz; 150kHz-30MHz; RBW=9kHz, VBW=9kHz; 30MHz-1000MHz; RBW=120kHz,VBW=120kHz, 1000MHz-10000MHz; RBW=1MHz, VBW=1MHz. 24°C, 60% relative humidity. **No emissions detected.**

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407

PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP





FCC 2.1033(c)(14)/2.1053/90.669(a) - FIELD STRENGTH OF SPURIOUS RADIATION

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

Customer: **Powerwave Technologies, Inc.**
 Specification: **90.669(a) Radiated Spurious Emission**
 Work Order #: **83984** Date: 10/5/2005
 Test Type: **Radiated Scan** Time: 09:31:31
 Equipment: **Pager/ SMR Repeater** Sequence#: 21
 Manufacturer: Powerwave Technologies Tested By: E. Wong
 Model: ALR 1200
 S/N: NA

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Pager/ SMR Repeater*	Powerwave Technologies	ALR 1200	NA

Support Devices:

Function	Manufacturer	Model #	S/N
----------	--------------	---------	-----

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: AMP. Emission Designator: iDEN. Power = 19 dBm = 0.08 Watts. Emission Designator: 16K0F3E. Power = 25 dBm = 0.3162 Watts. Frequency: 935MHz, 937.5MHz and 940MHz. Frequency range of measurement = 9kHz-10GHz. 9kHz-150kHz; RBW=200Hz, VBW=200Hz; 150kHz-30MHz; RBW=9kHz, VBW=9kHz; 30MHz-1000MHz; RBW=120kHz, VBW=120kHz, 1000MHz-10000MHz; RBW=1MHz, VBW=1MHz. 20°C, 60% relative humidity.

Operating Frequency: 935MHz - 940MHz
 Channels: Low, Mid and High - 16K0F3E
 Highest Measured Output Power: 25.00 ERP(dBm)= 0.3162 ERP(Watts)
 Distance: 3 meters
 Limit: 43+10Log(P) 38.00 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
2,805.00	-64.4	Horiz	89.40
1,870.00	-64.4	Horiz	89.40
2,805.00	-68	Horiz	93.00
2,812.50	-62.8	Horiz	87.80
1,875.00	-67.1	Horiz	92.10
2,820.00	-64.9	Horiz	89.90
1,880.00	-65.7	Horiz	90.70

Operating Frequency: 935MHz - 940MHz
 Channels: Low, Mid and High - iDEN
 Highest Measured Output Power: 19.03 ERP(dBm)= 0.08 ERP(Watts)
 Distance: 3 meters
 Limit: 43+10Log(P) 32.03 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
2,805.00	-65.4	Horiz	84.43
1,870.00	-67.6	Horiz	86.63
1,875.00	-56.4	Vert	75.43
2,812.50	-56.6	Vert	75.63
3,750.00	-59	Vert	78.03
1,880.00	-59	Horiz	78.03
2,820.00	-59.4	Horiz	78.43

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
9kHz-30MHz						
Loop Antenna	00314	EMCO	6502	2014	062804	062806
30-1000MHz						
Bicon Antenna	306	AH	SAS200/540	220	061305	061307
Log Periodic Antenna	300	AH	SAS 00/516	331	061305	061307
Pre-amp	00309	HP	8447D	1937A02548	071404	071406
Antenna cable	NA	NA	RG214	Cable#15	010305	010306
Pre-amp to SA cable	NA	Pasternack	RG223/U	Cable#10	051605	051606
1000-10000MHz						
Horn Antenna	0849	EMCO	3115	6246	072204	072206
Microwave Pre-amp	00786	HP	83017A	3123A00281	081204	081206
Heliac Antenna cable	NA	Andrew	LDF1-50	Cable#20	091604	091606
24" SMA Cable	2604	Argosy	UFA147A	0-0360-200200	012304	012306

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

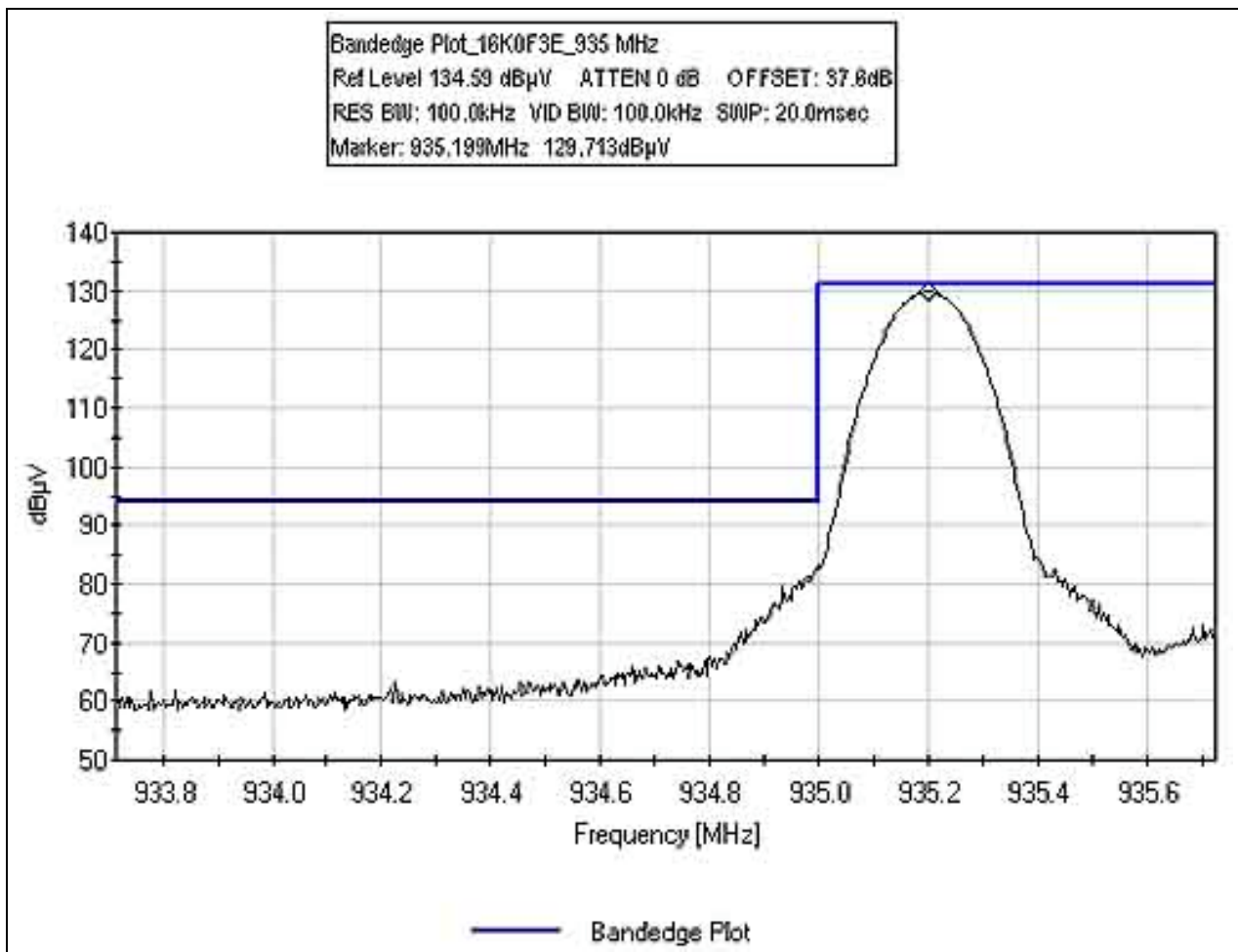
PHOTOGRAPH SHOWING RADIATED EMISSIONS



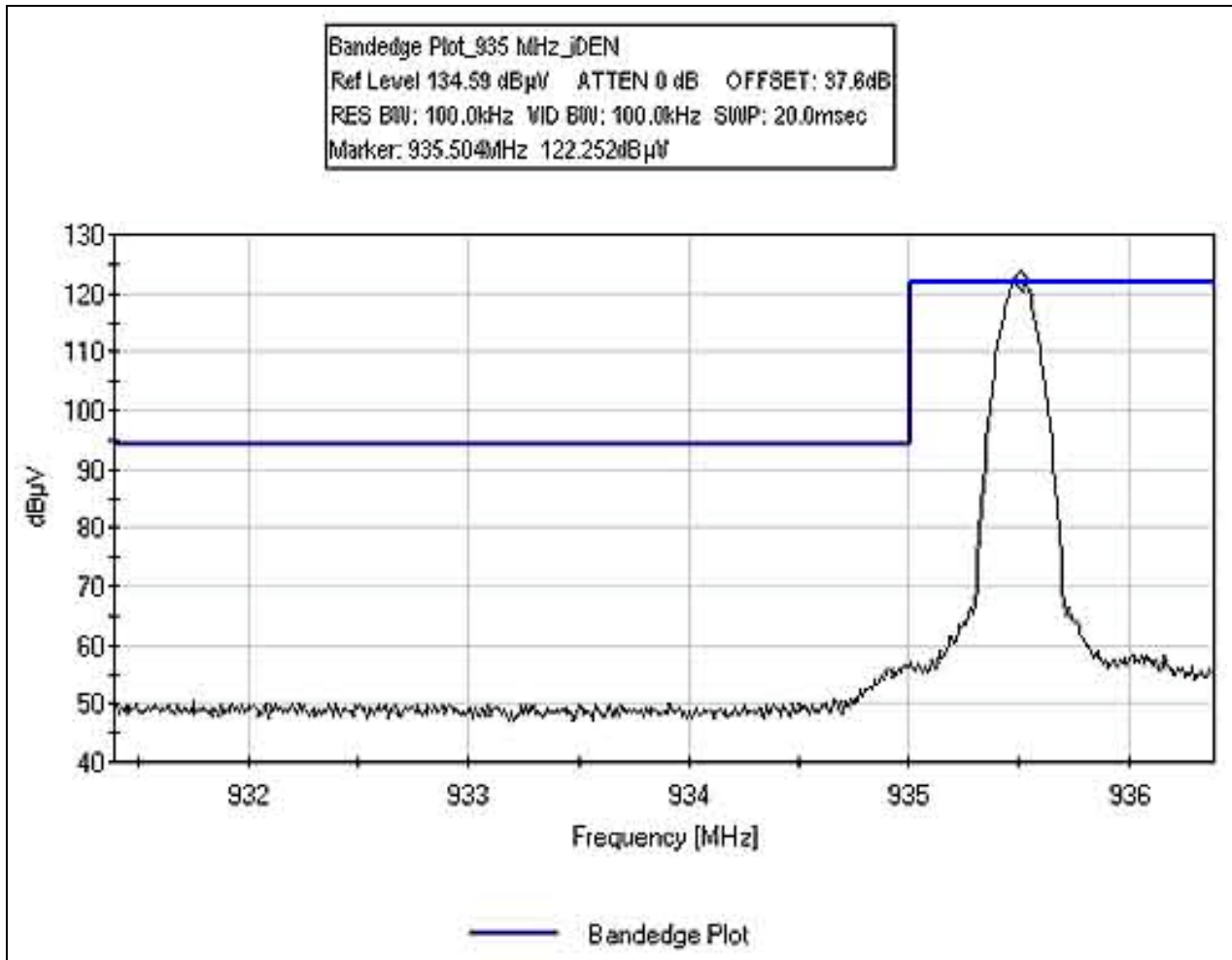
Radiated Emissions - Loop Antenna

BANDEDGE 935MHz - 16K0F3E

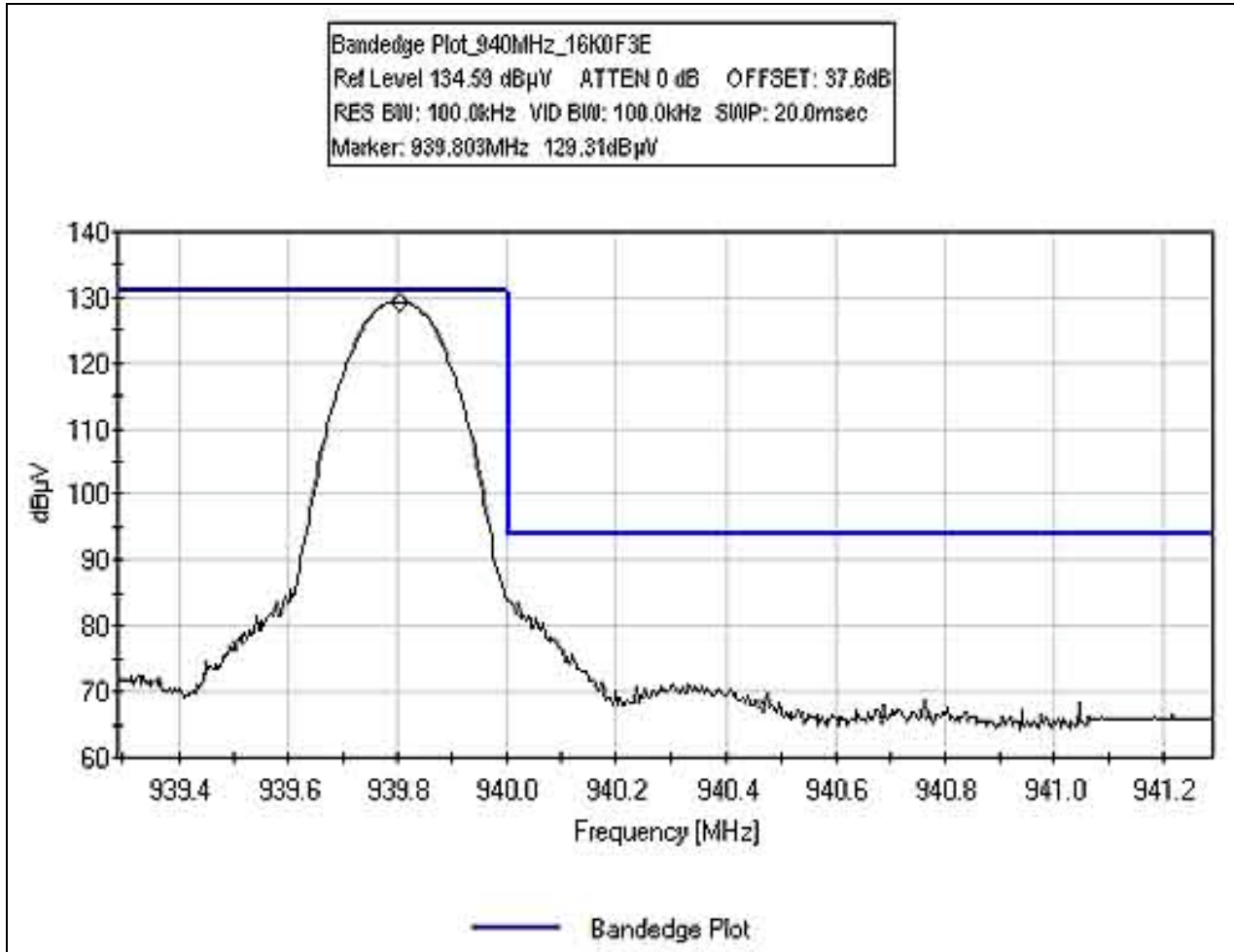
Test Conditions: The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and a signal generator. The RF Output is connected to a remote RF load and a directional coupler. The RF power of the EUT is monitored at the output of the directional coupler and the RF input signal is adjusted to maintain the output power. Signal is measured at the antenna port. Modulation: AMP. Emission Designator: iDEN. Power = 19 dBm = 0.08 Watts. Emission Designator: 16K0F3E. Power = 25 dBm = 0.3162 Watts. Frequency: 935MHz, 937.5MHz and 940MHz. 24°C, 60% relative humidity.



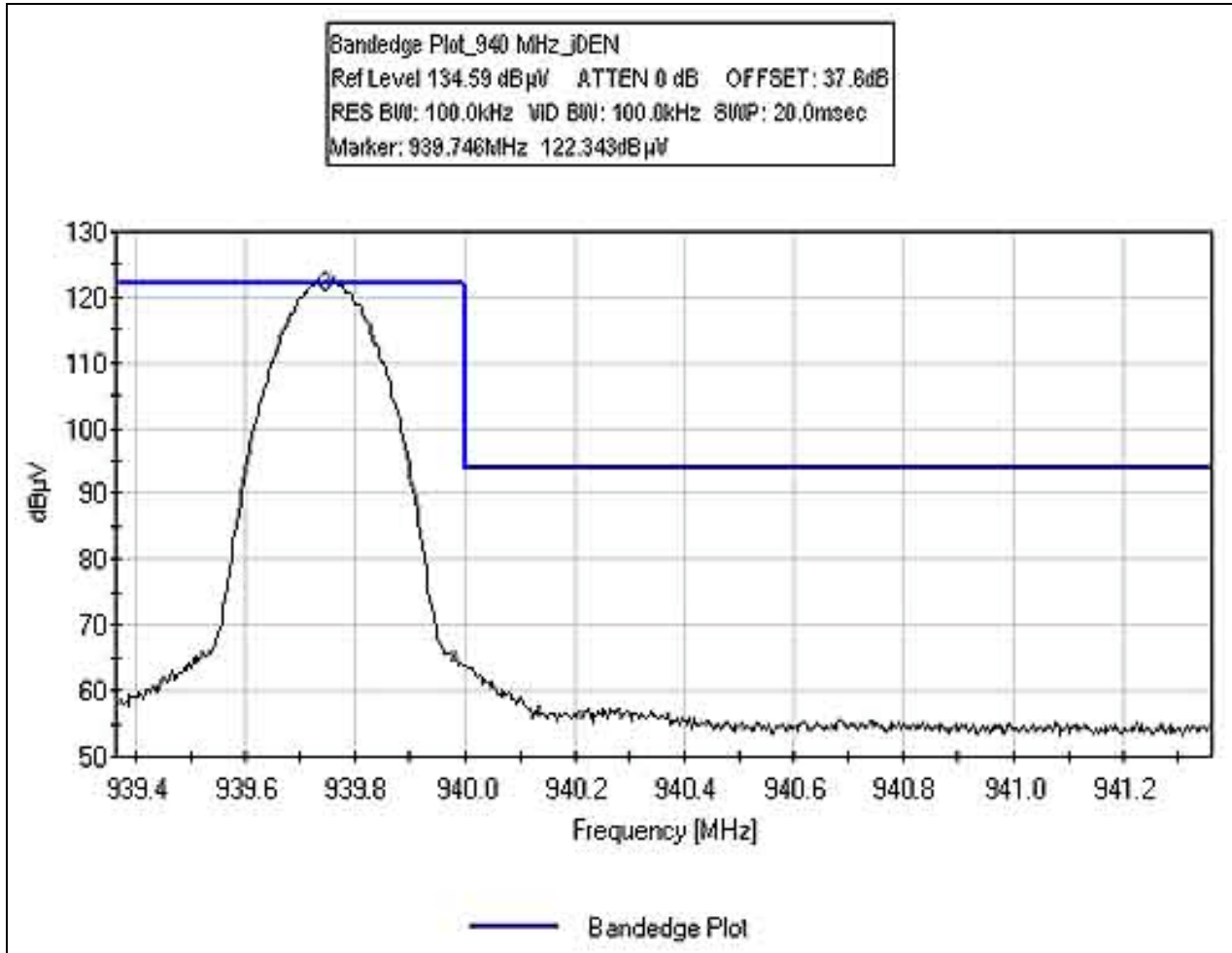
BANDEGE 935MHz - IDEN



BANDEDGE 940MHz - 16K0F3E



BANDEGE 940MHz - IDEN



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407

PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP

