



ADDENDUM TO FC03-027
FOR THE
POWER AMPLIFIER, G3L-1929-120
FCC PART 24 AND PART 15 SUBPART B SECTION 15.109 CLASS A
COMPLIANCE

DATE OF ISSUE: SEPTEMBER 11, 2003

PREPARED FOR:

Powerwave Technologies
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Santa Ana, CA 92705

P.O. No.: 96165
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Date of test: June 3 - July 17, 2003

Report No.: FC03-027A

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TABLE OF CONTENTS

Administrative Information	3
Summary of Results	4
Conditions for Compliance	4
Approvals	4
Equipment Under Test (EUT) Description	5
Equipment Under Test	5
Peripheral Devices	5
Measurement Uncertainty	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)/2.1046/24.232(a) - RF Power Output.....	7
FCC 2.1033(c)(14)/2.1047(b) - Audio Frequency Response.....	11
FCC 2.1033(c)(14)/2.1047(b) - Modulation Limiting Response.....	11
FCC 2.1033(c)(14)/2.1049(i) - Occupied Bandwidth.....	11
FCC 2.1033(c)(14)/2.1051/24.238(a) - Spurious Emissions at Antenna Terminal	50
FCC 2.1033(c)(14)/2.1053/24.238(a) - Field Strength of Spurious Radiation	68
FCC 2.1033(c)(14)/2.1055(a) - Frequency Stability.....	74
FCC 2.1091 - MPE Calculations	75
FCC 15.109 – Radiated Emissions	76

ADMINISTRATIVE INFORMATION

DATE OF TEST: June 3 - July 17, 2003

DATE OF RECEIPT: June 3, 2003

PURPOSE OF TEST: To demonstrate the compliance of the Power Amplifier, G3L-1929-120 with the requirements for FCC Part 24 and Part 15 Subpart B Sections 15.109 Class A devices.
Addendum A is to revise the radiated spurious emissions data.

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

FREQUENCY RANGE TESTED: 9 kHz – 20 GHz

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

REPRESENTATIVE: Jeffrey Dale

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

SUMMARY OF RESULTS

As received, the Powerwave Technologies Power Amplifier, G3L-1929-120 was found to be fully compliant with the following standards and specifications:

United States

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

CONDITIONS FOR COMPLIANCE

Installed Steward 28A2029-0A0 on internal DC power cable.

APPROVALS

Steve Behm, Director of Engineering Services and Quality Assurance

QUALITY ASSURANCE:



Joyce Walker, Quality Assurance Administrative Manager



Septimiu Apahidean, Lab Manager

TEST PERSONNEL:



Eddie Wong, EMC Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

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

The following model was tested by CKC Laboratories on WO# 80493: **G3L-1929-75-"Harley"**

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-1929-120**

EQUIPMENT UNDER TEST

Power Amplifier

Manuf: Powerwave Technologies
Model: G3L-1929-120
Serial: 002
FCC ID: pending

PERIPHERAL DEVICES

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

Power Meter

Manuf: HP
Model: E4418B
Serial: US39251692

Signal Amplifier

Manuf: Comtech
Model: PST
Serial: NA

Signal Generator

Manuf: Agilent
Model: E4433B
Serial: US40051329, US40051207 &
US4005 1303

DC Power Supply

Manuf: HP
Model: 6269B
Serial: 2436A-11867

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.

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

WCDMA – 3M83F9W; CDMA – 1M35F9W; GSM – 280KGXW; TDMA – 35K0DXW;
EDGE – 282KG7W

FCC 2.1033(c)(5) FREQUENCY RANGE

1930 MHz – 1990 MHz.

FCC 2.1033(c)(6) OPERATING POWER

Power listed is 100 Watts per channel, not to exceed 125W total output power.

FCC 2.1033(c)(7) MAXIMUM POWER RATING

100 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

WCDMA, CDMA, GSM, TDMA and EDGE

FCC 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..

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

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

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 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.

RF Power (all 3 channels) is measured at the monitoring port of the Directional coupler with RF power meter and peak reading of single channel is measured with a spectrum analyzer.

Conclusion

As indicated below, each single channel does not exceed the 100 Watt peak power limit.

Result :

Modulation: WCDMA

Block	Single channel Power (watt)	3 channel total Power (watt)
A	32.36	110
B	18.67	110
C	17.42	110

See note below

Modulation: CDMA

Block	Single channel Power (watt)	3 channel total Power (watt)
A	26.98	110
B	25.18	110
C	20.94	110

See Note below

Modulation: TDMA

Block	Single channel Power (watt)	3 channel total Power (watt)
A	76.00	110
B	83.40	110
C	85.30	110

Modulation: EDGE

Block	Single channel Power (watt)	3 channel total Power (watt)
A	48.90	125
B	91.42	125
C	87.30	125

Modulation: GSM

Block	Single channel Power (watt)	3 channel total Power (watt)
A	46.20	125
B	48.97	125
C	45.70	125

Note: WCDMA has wider BW than CDMA.

GSM

Block A = 1930MHz, 1930.6 MHz, 1945 MHz.

Block B = 1950 MHz, 1950.6 MHz, 1965 MHz

Block C = 1975 MHz, 1975.6 MHz, 1990 MHz

CDMA

Block A = 1930 MHz, 1932.5 MHz, 1945 MHz.

Block B = 1950 MHz, 1952.5 MHz, 1965 MHz

Block C = 1975 MHz, 1977.5 MHz, 1990 MHz

EDGE

Block A = 1930 MHz, 1930.6 MHz, 1945 MHz

Block B = 1950 MHz, 1950.6 MHz, 1965 MHz

Block C = 1975 MHz, 1975.6 MHz, 1990 MHz

W-CDMA

Block A = 1930 MHz, 1937.5 MHz, 1945MHz

Block B = 1950 MHz, 1957.5 MHz, 1965MHz

Block C = 1975MHz, 1982.5 MHz, 1990 MHz

TDMA

Block A = 1930 MHz, 1930.06 MHz, 1945MHz

Block B = 1950 MHz, 1950.06 MHz, 1965 MHz

Block C = 1975 MHz, 1975.06 MHz, 1990 MHz

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	HP	7405E	US40240225	033103	033104
RF Power Meter	02082	HP	534B	2445A11881	093002	093003
Power Sensor	02036	HP	8482A	1551A01004	052903	052904

Test Setup Photos



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

Not applicable to this unit.

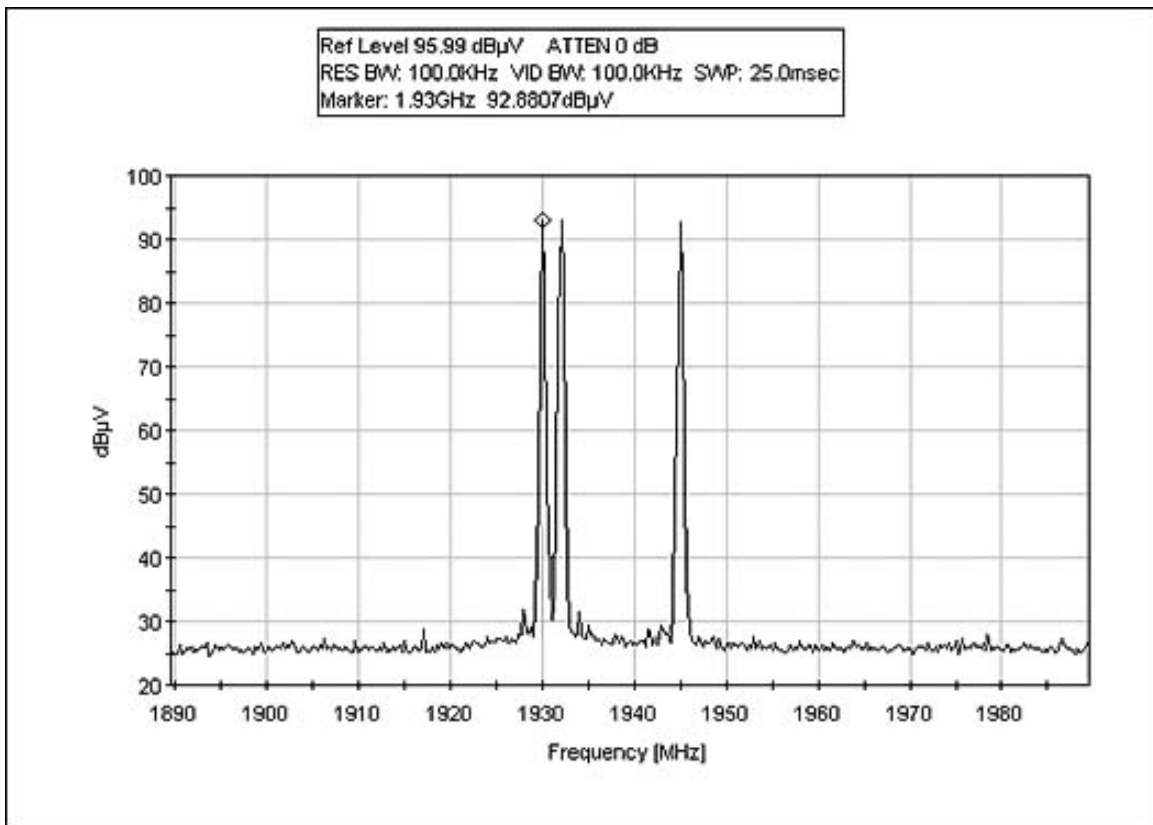
FCC 2.1033(c)(14)/2.1047(b) MODULATION CHARACTERISTICS – Modulation Limiting Response

Not applicable to this unit.

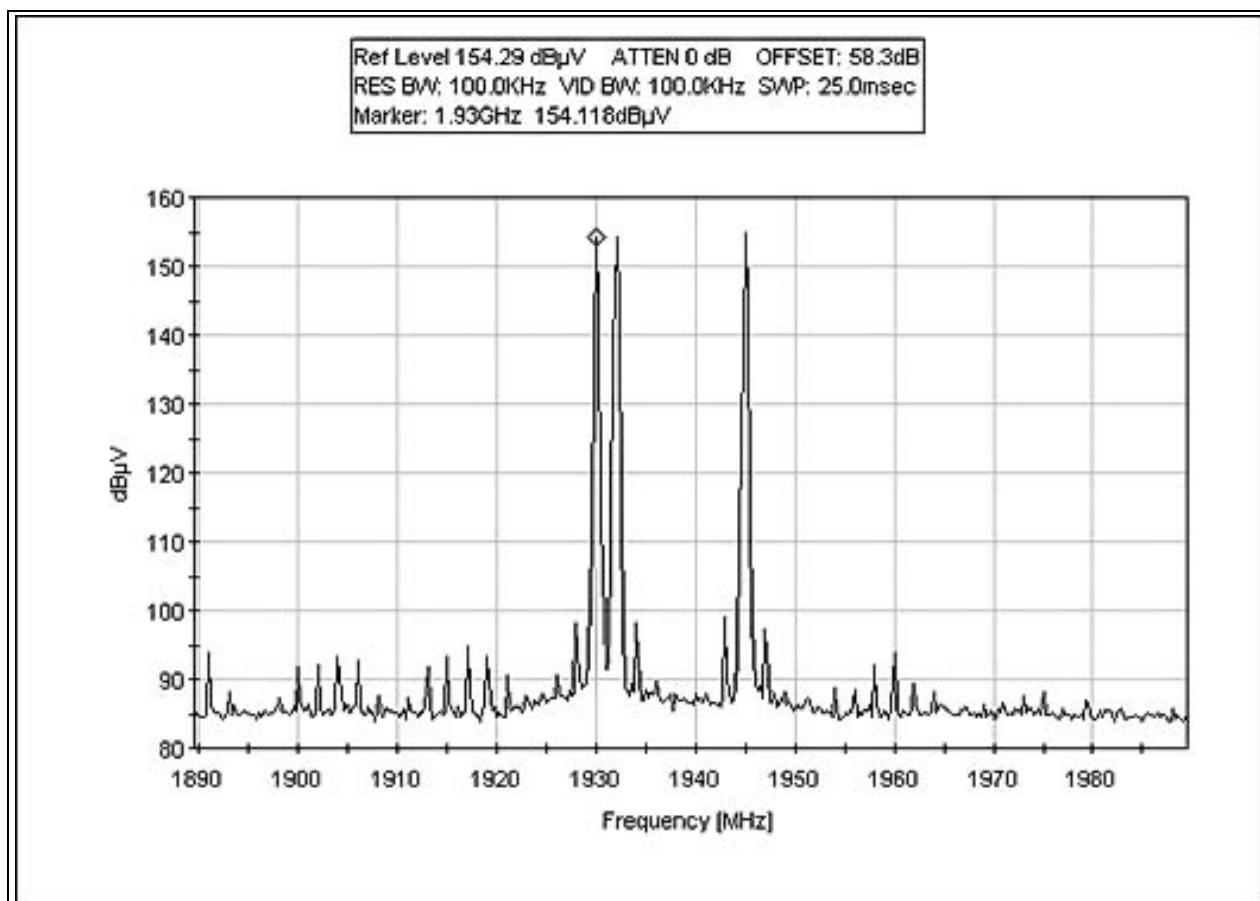
FCC 2.1033(c)(14)/2.1049(i)- OCCUPIED BANDWIDTH

Test Conditions: The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for.

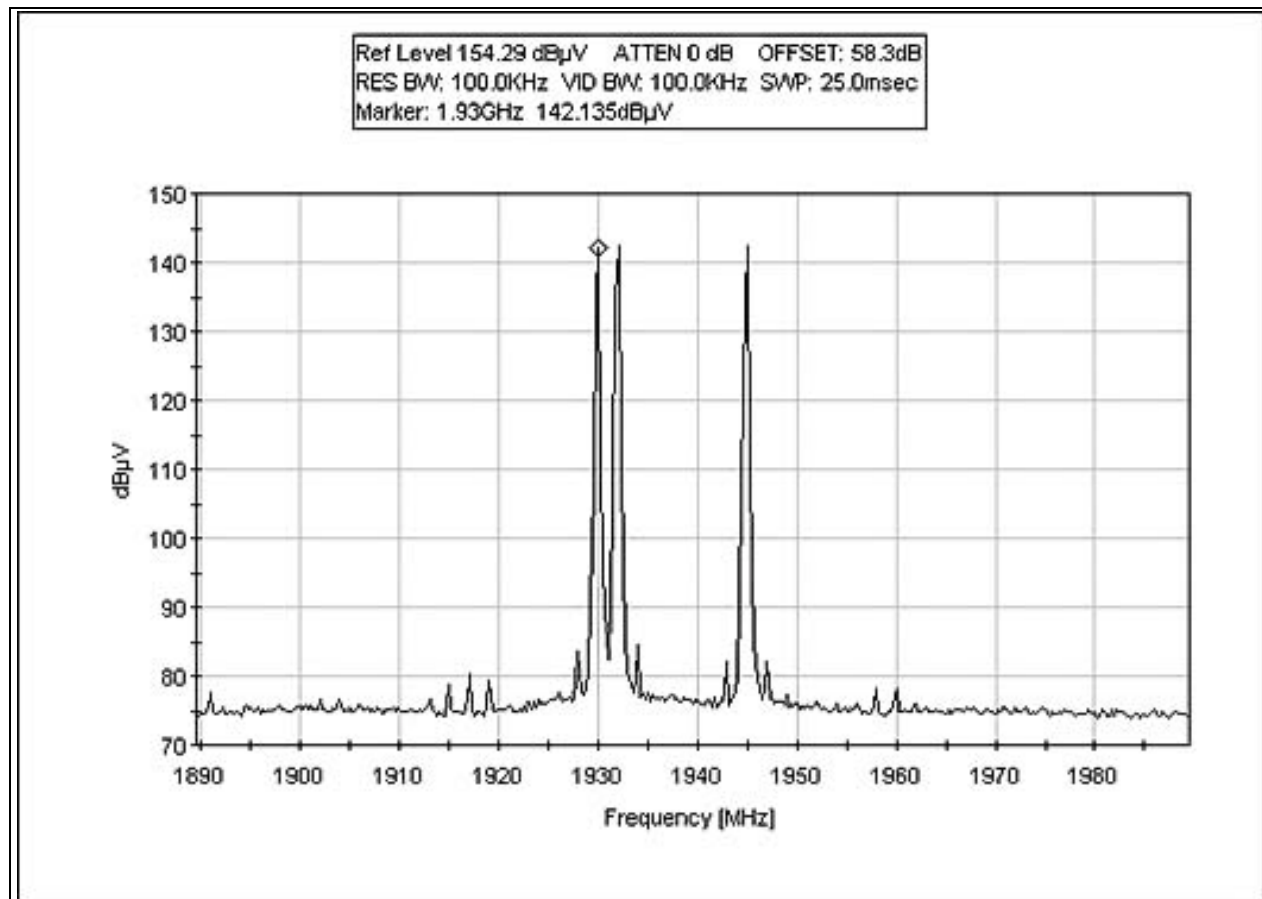
INPUT PLOT TDMA A



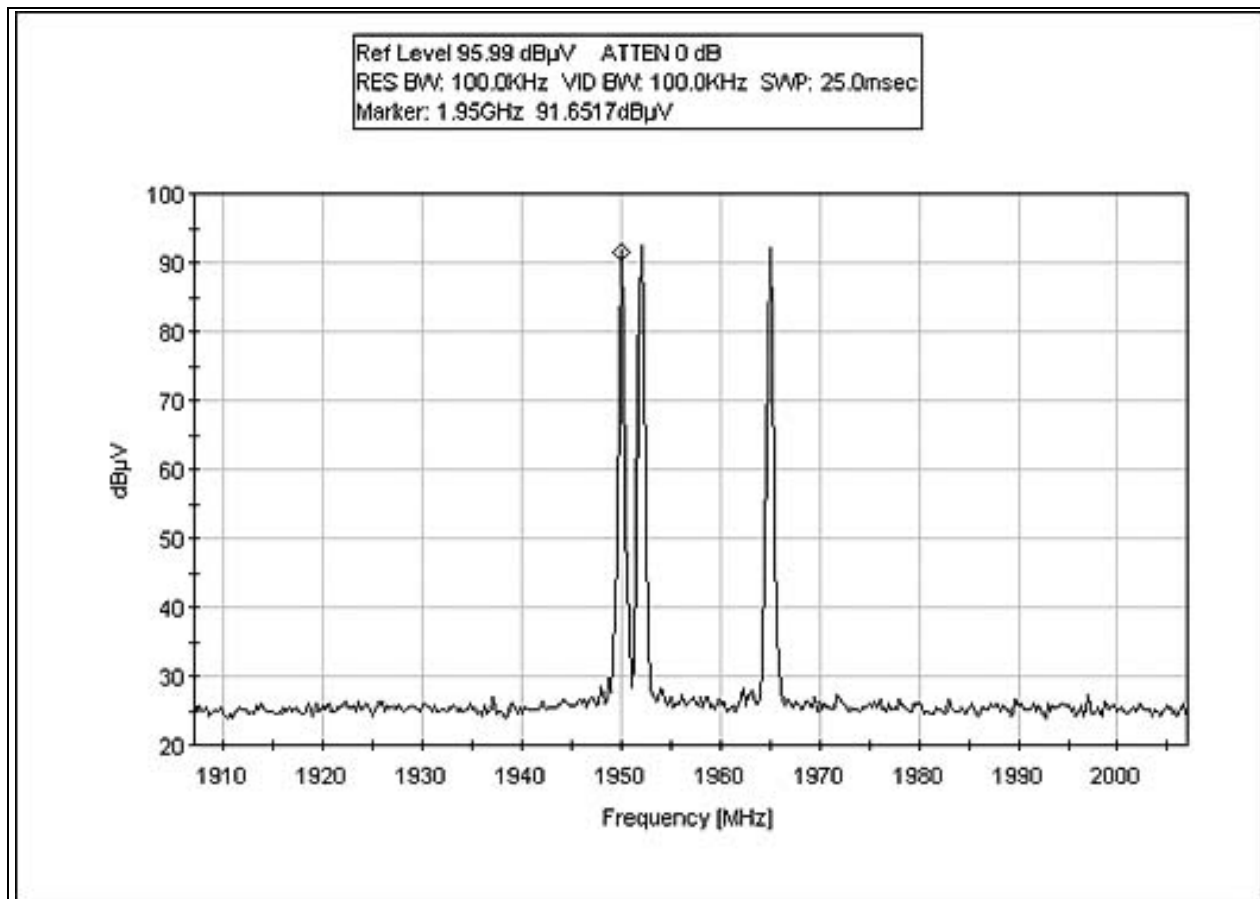
OUTPUT PLOT TDMA A



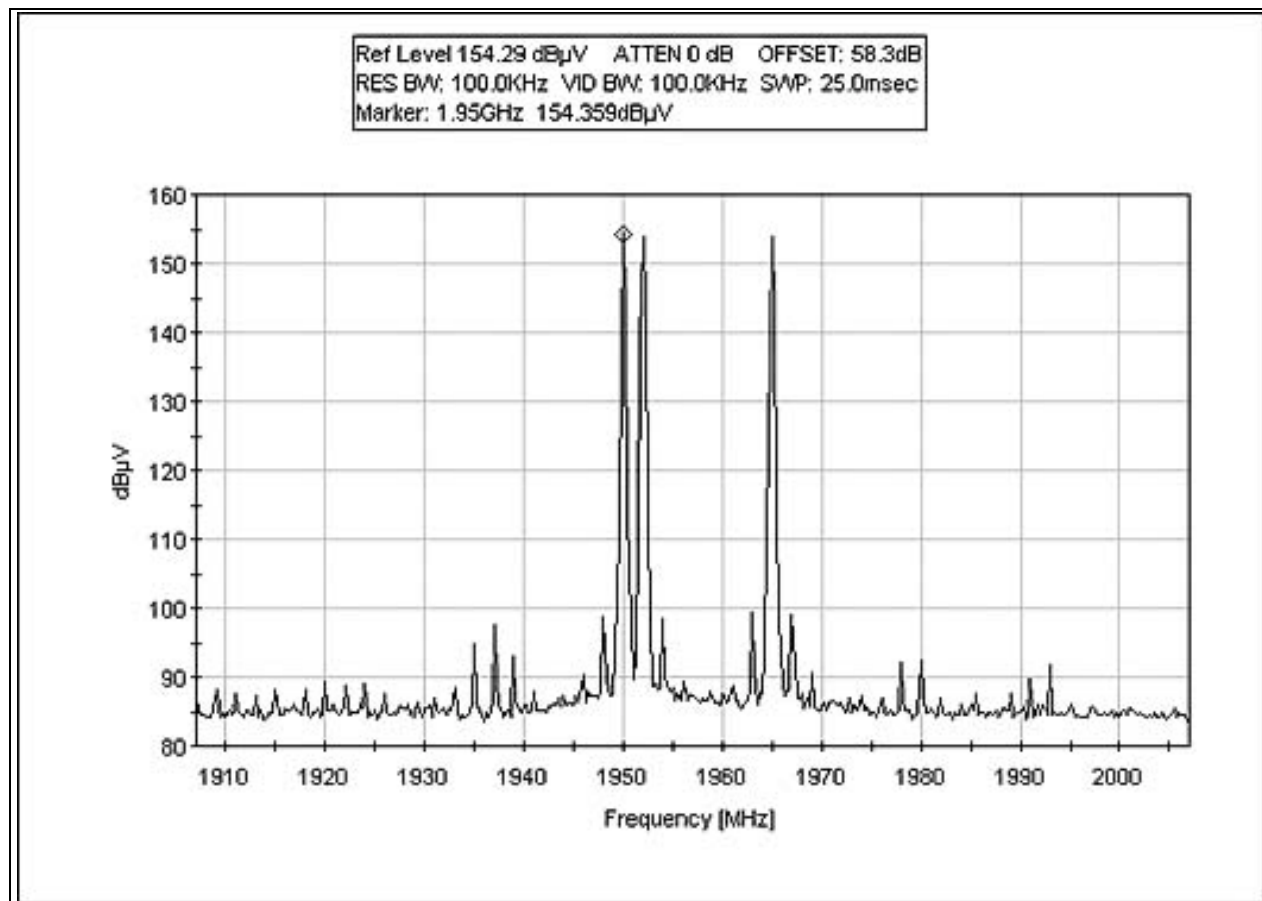
OUTPUT PLOT TDMA A AVERAGE



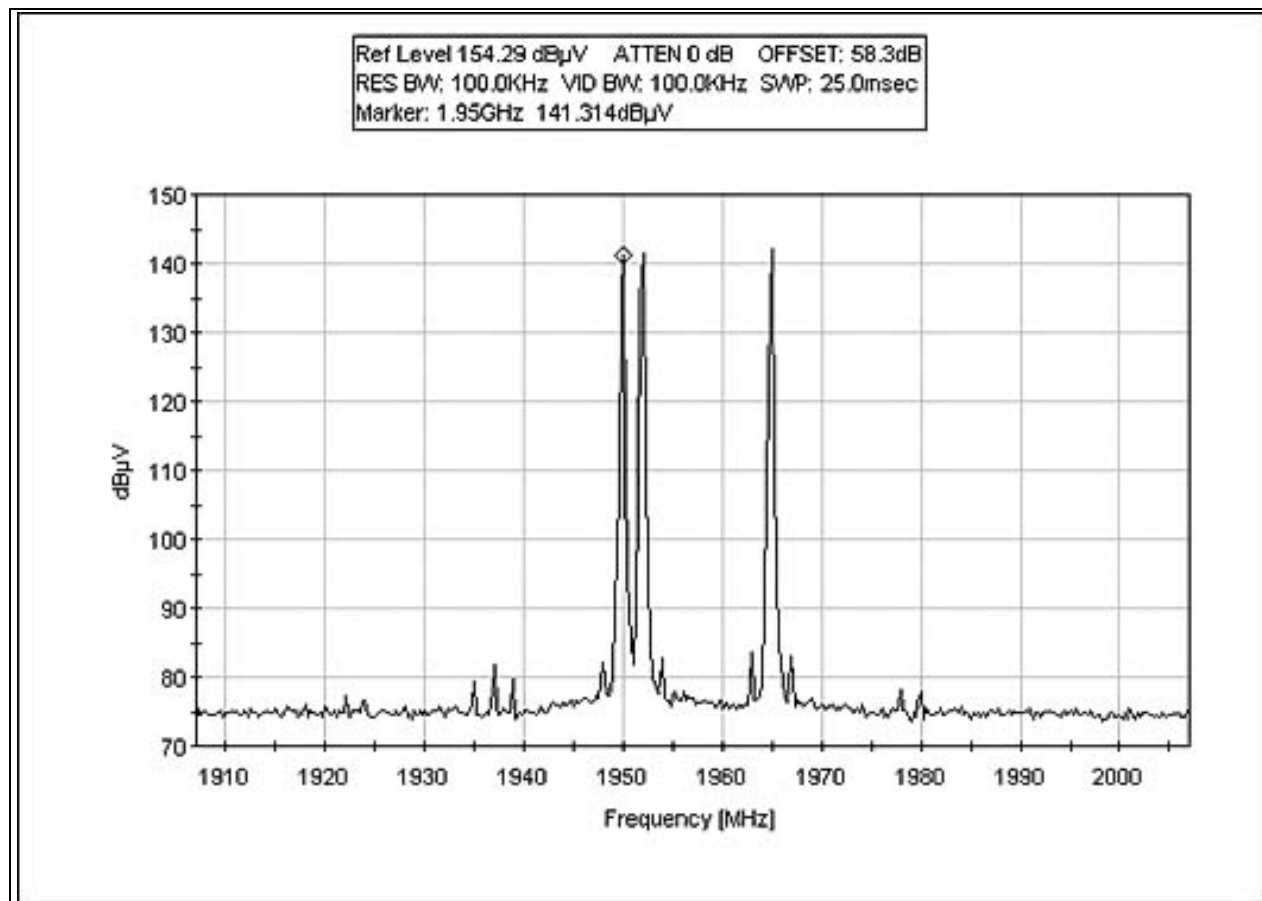
INPUT PLOT TDMA B



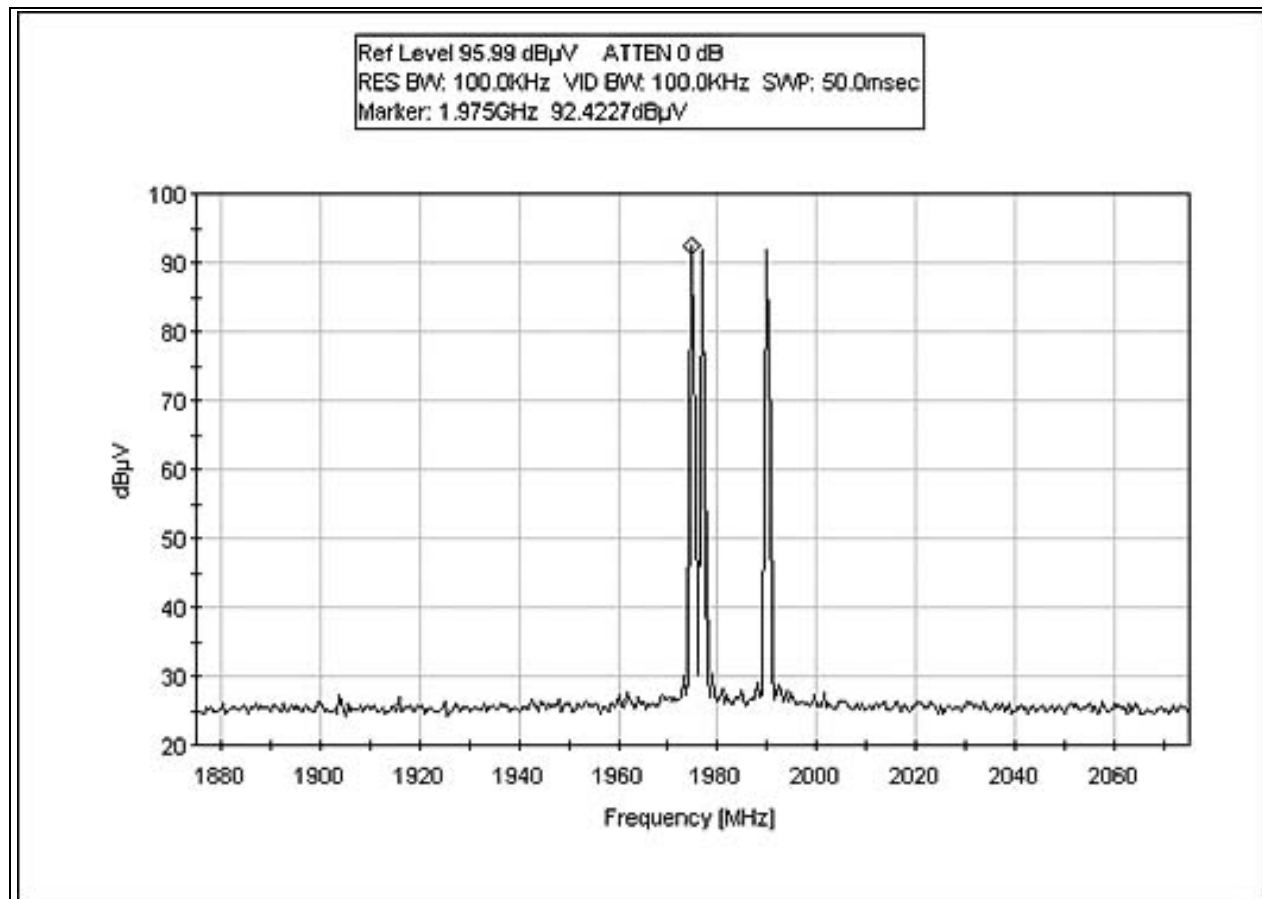
OUTPUT PLOT TDMA B



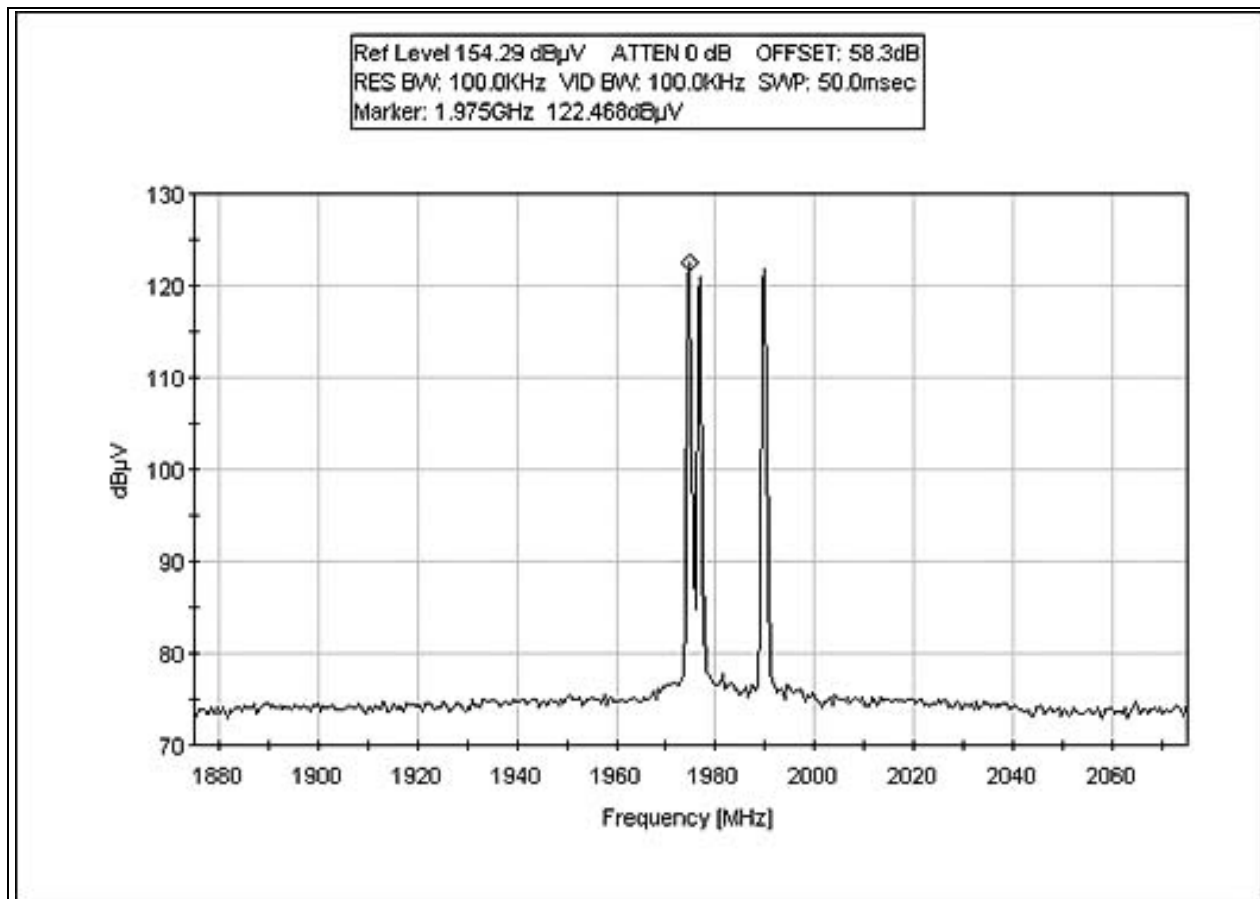
OUTPUT PLOT TDMA B AVERAGE



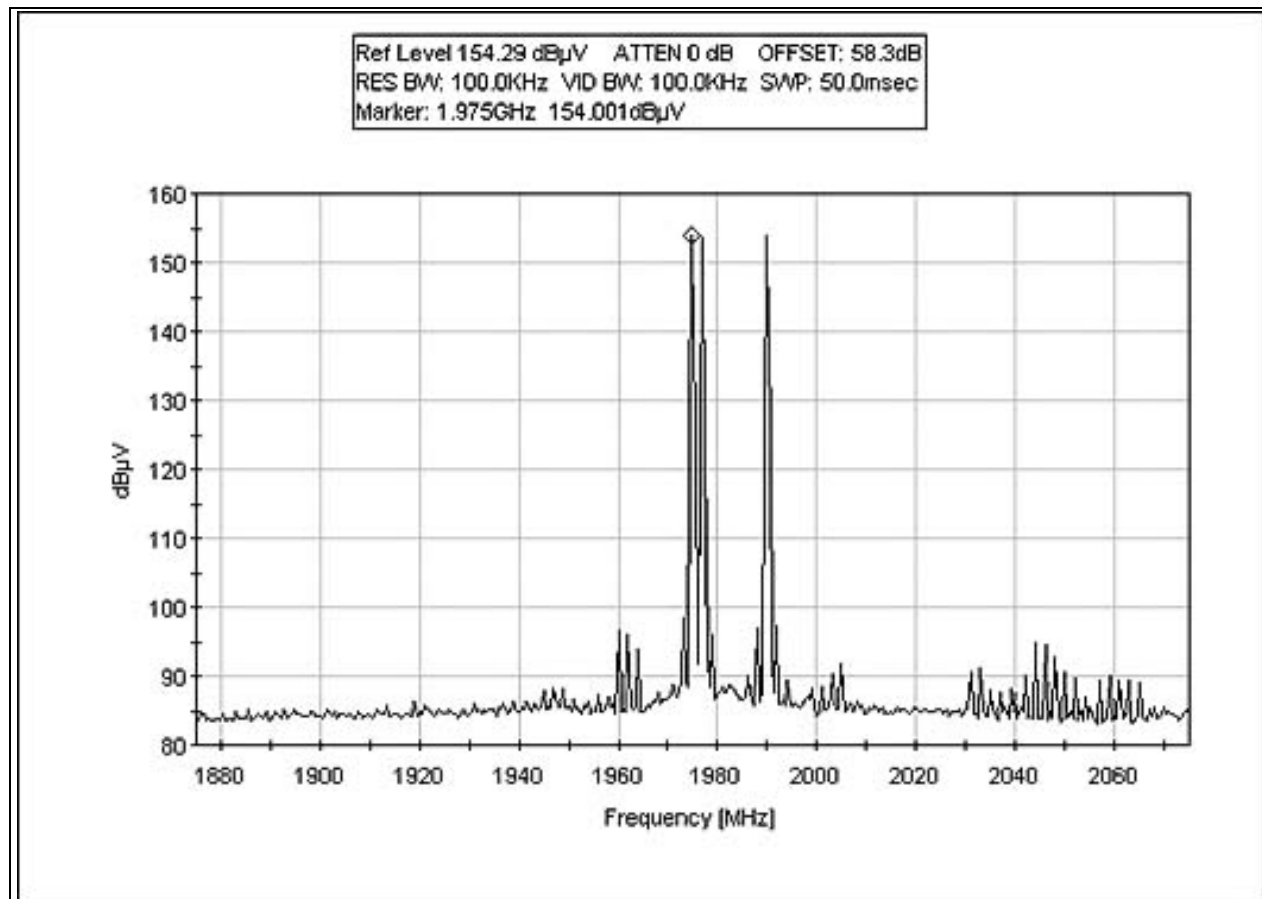
INPUT PLOT TDMA C



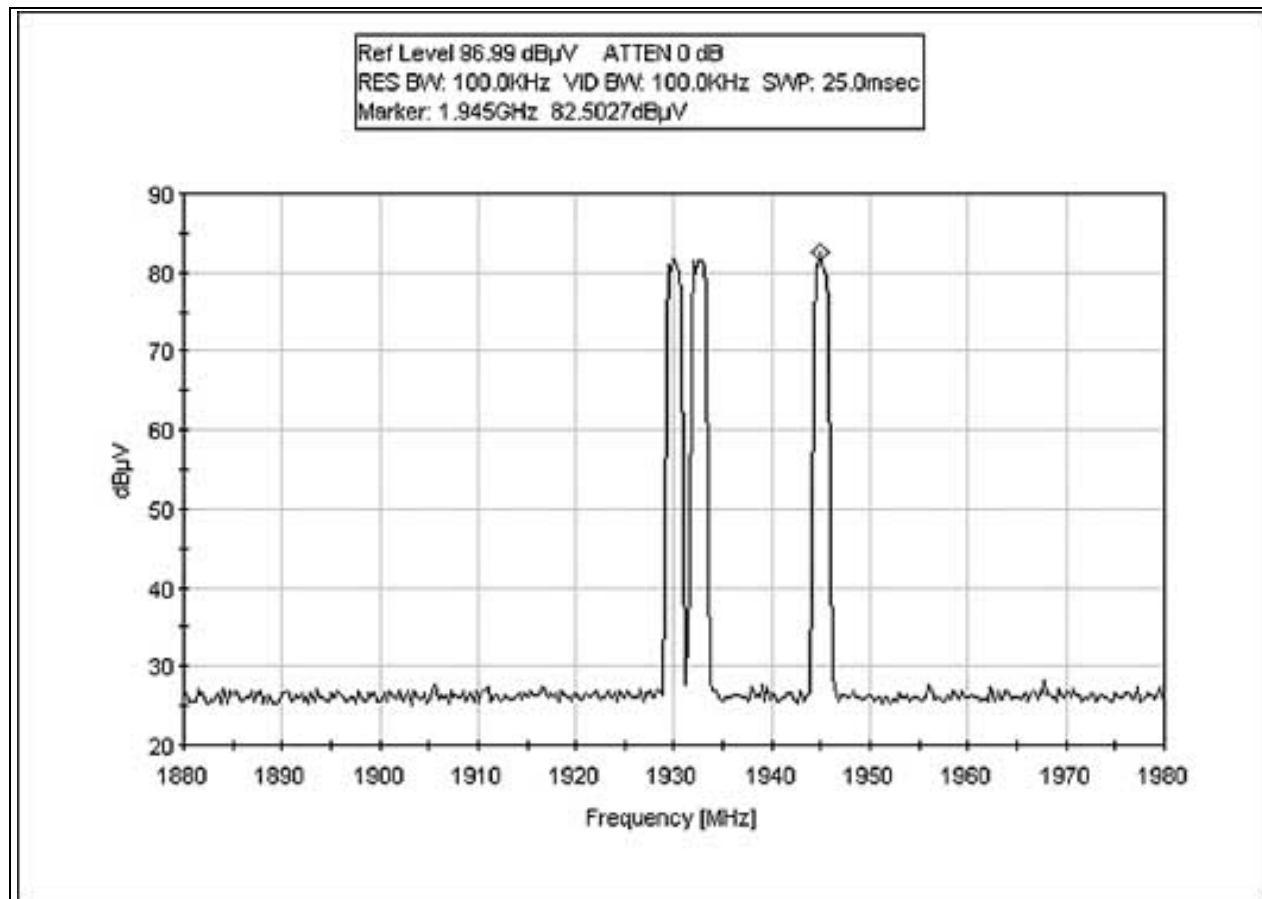
OUTPUT PLOT TDMA C AVERAGE



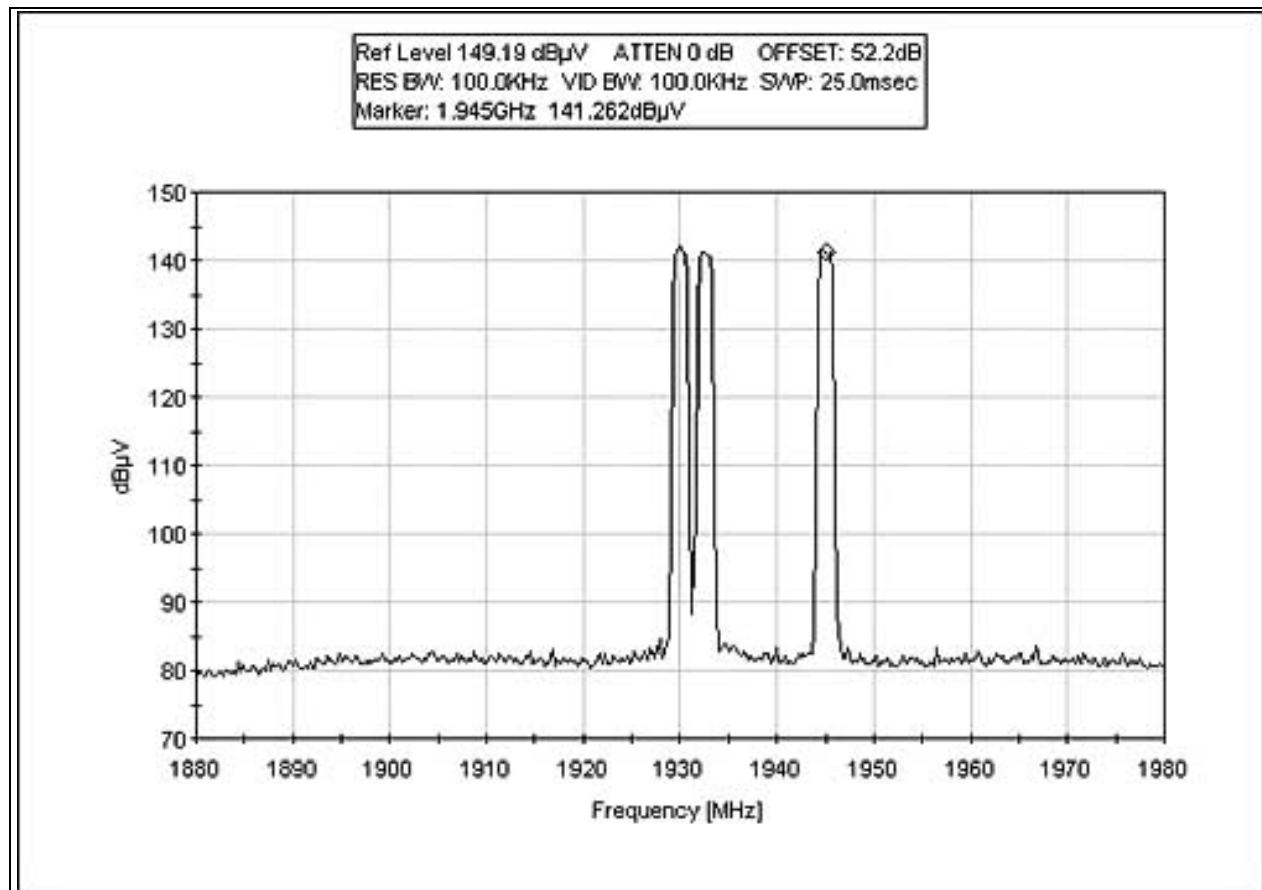
OUTPUT PLOT TDMA C



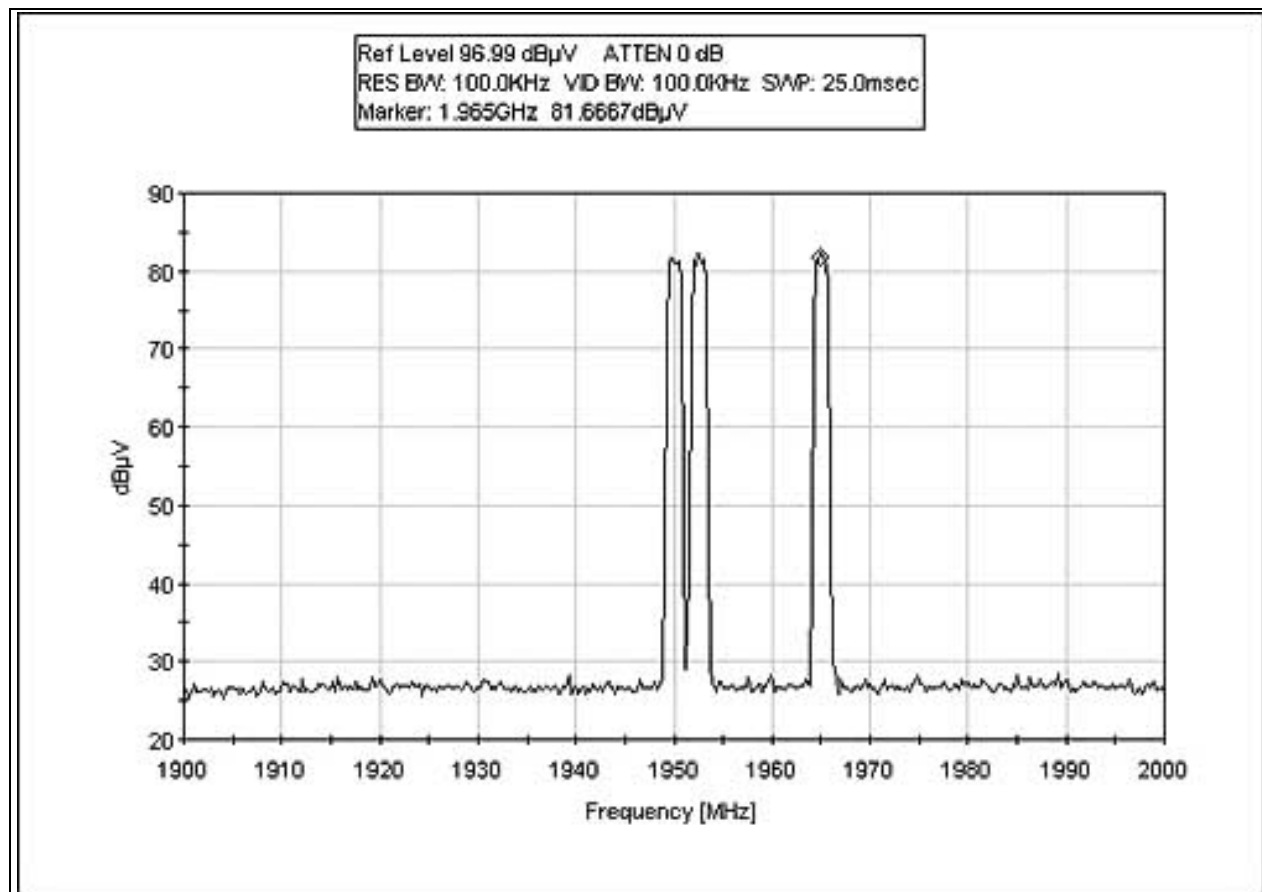
INPUT PLOT CDMA A 110



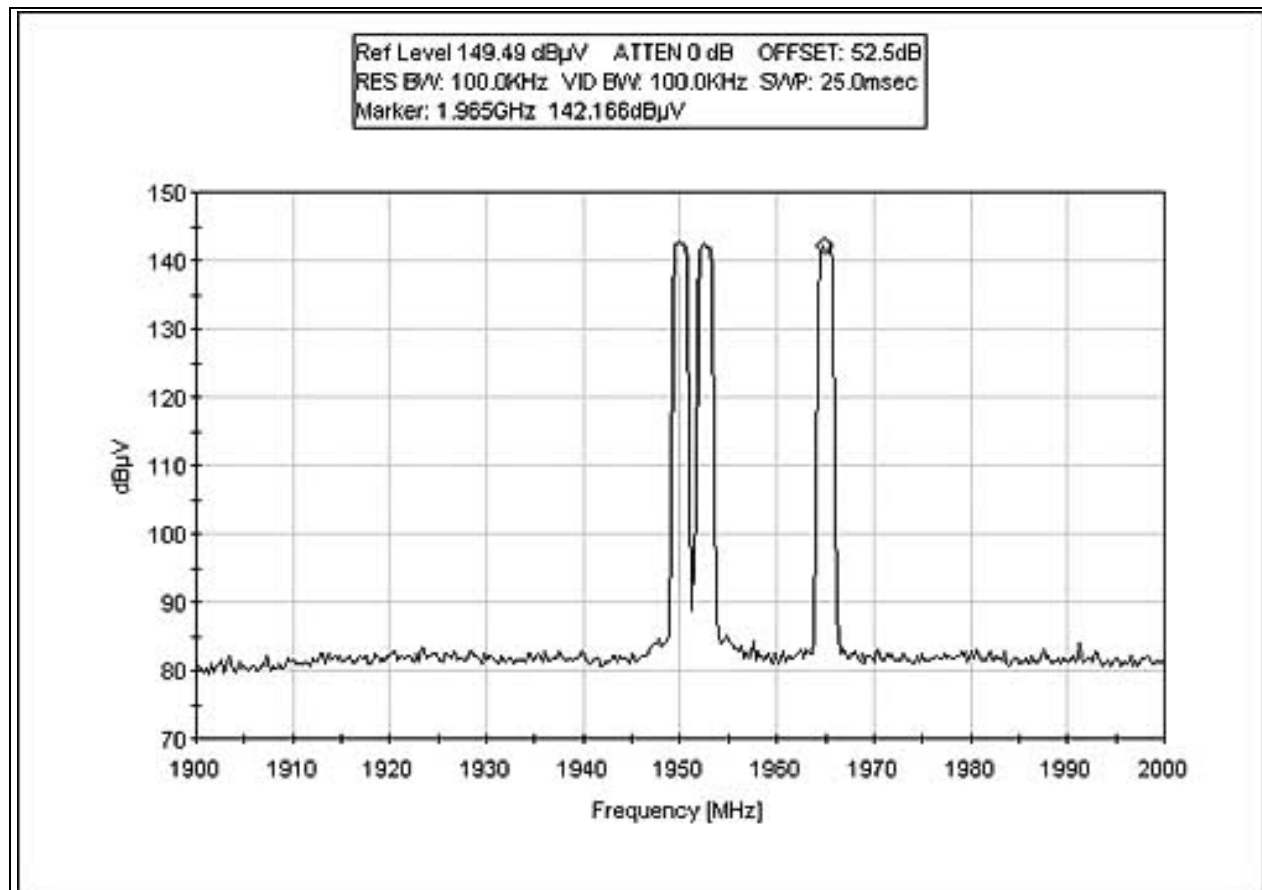
OUTPUT PLOT CDMA A 110



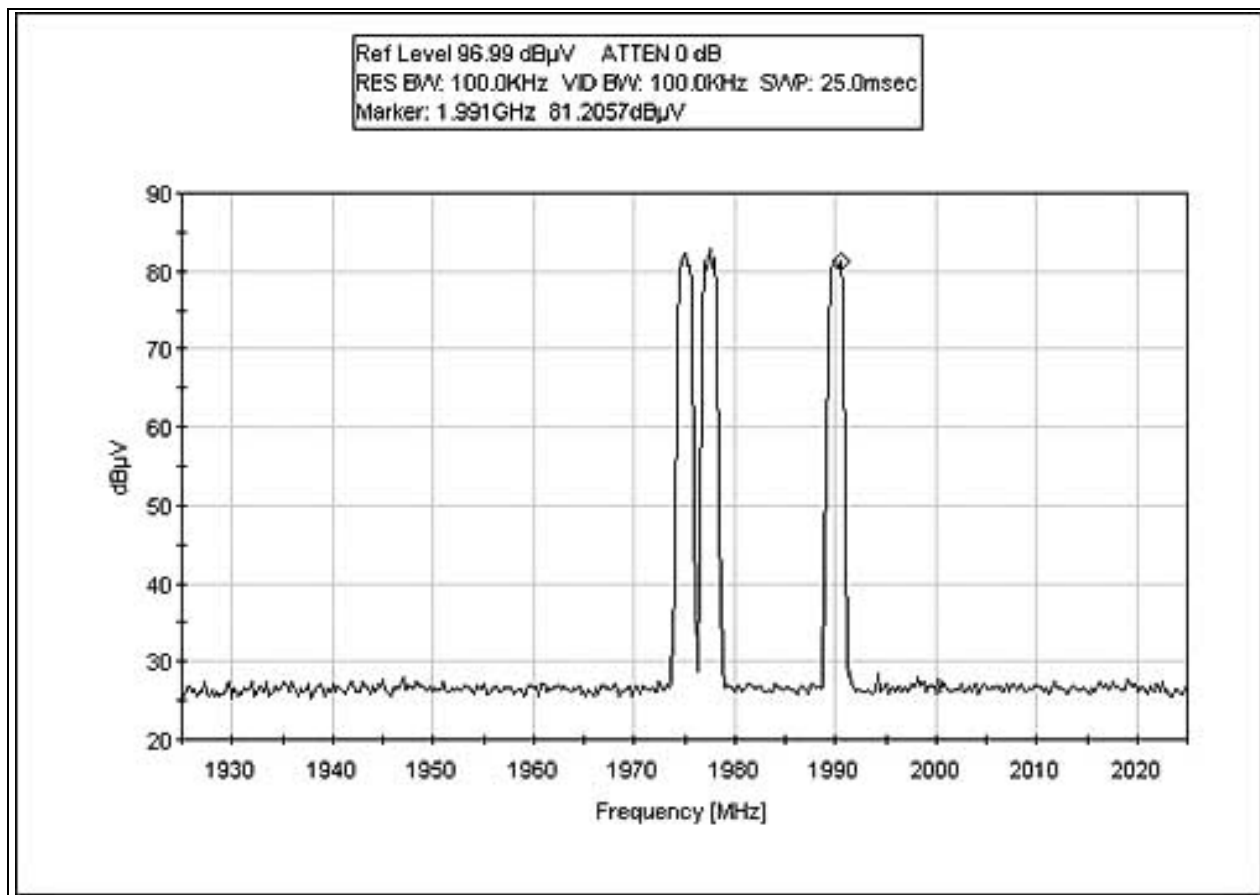
INPUT PLOT CDMA B 110



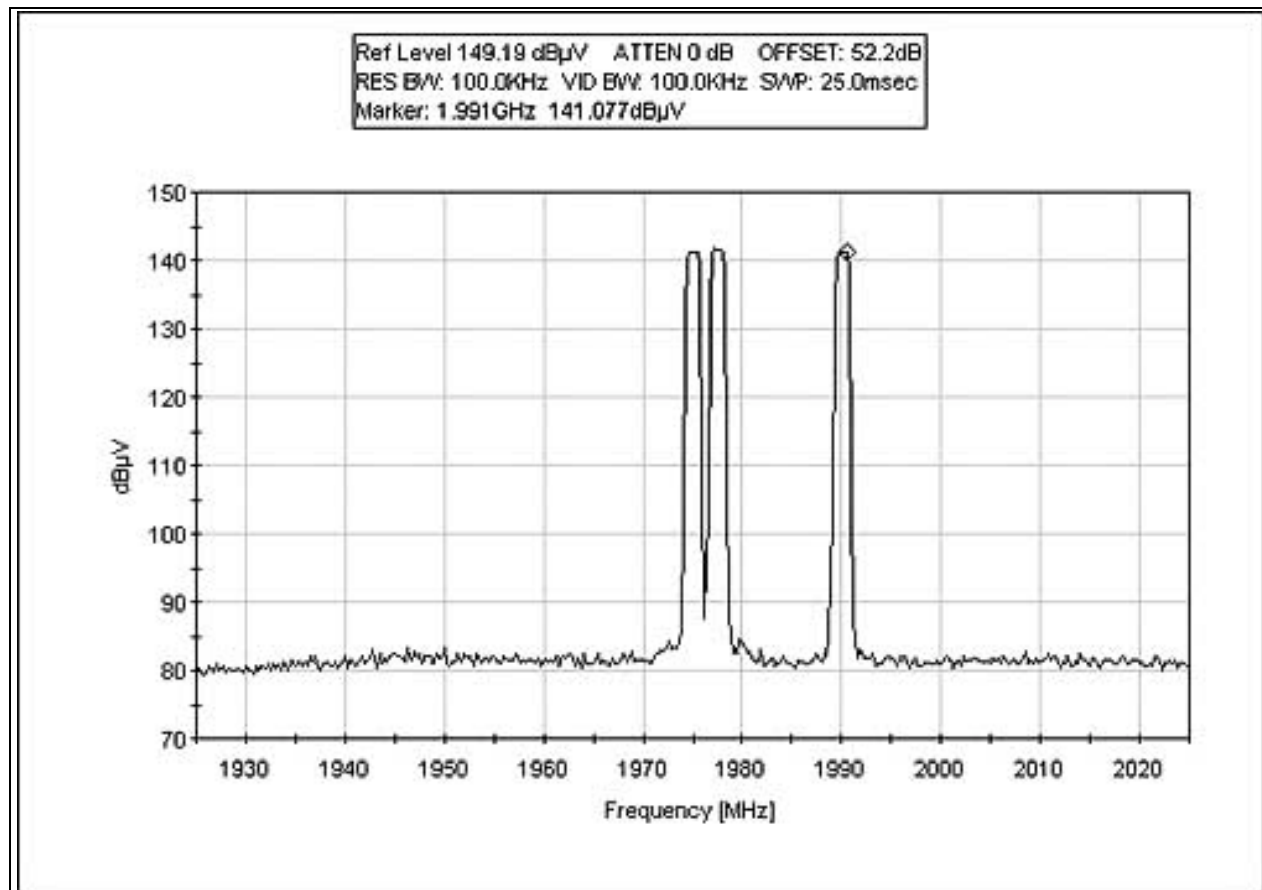
OUTPUT PLOT CDMA B 110



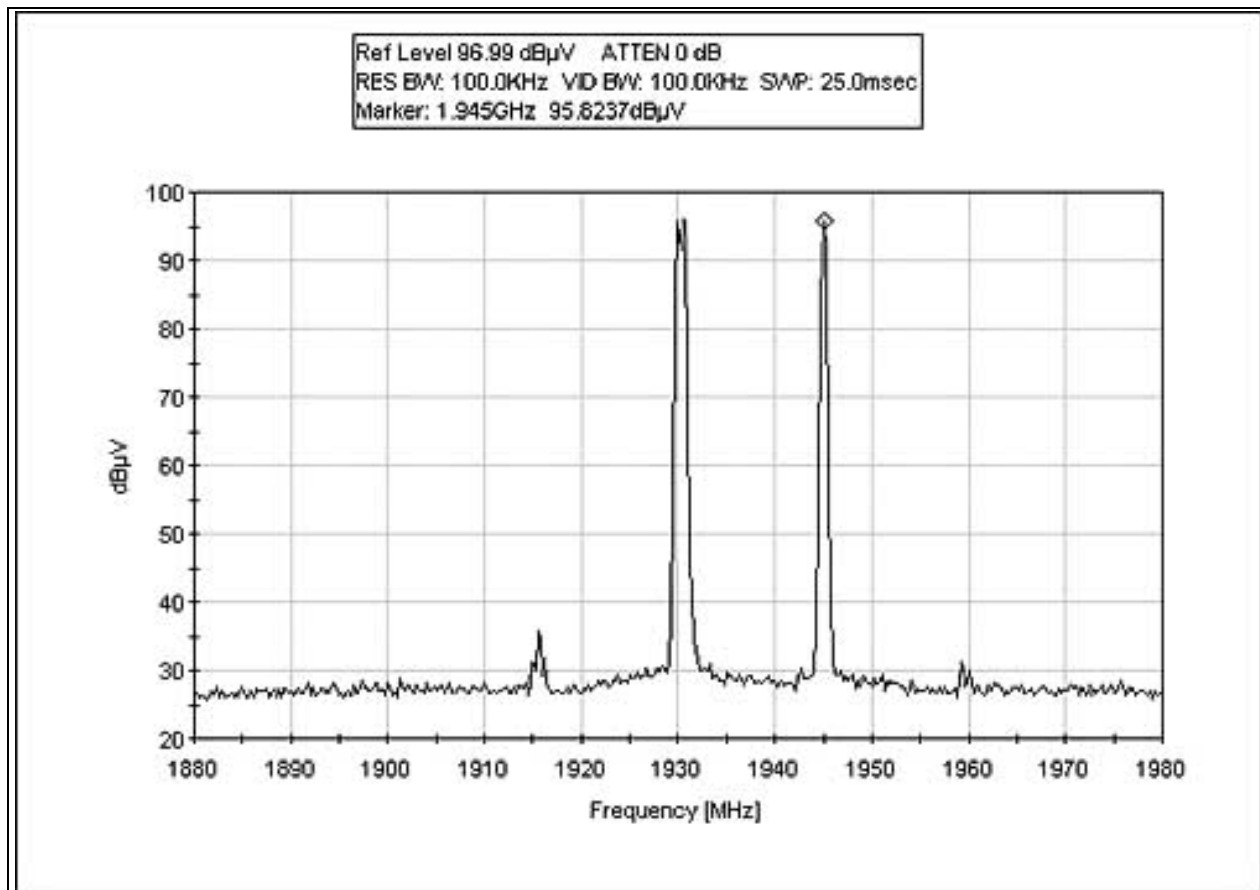
INPUT PLOT CDMA C 110



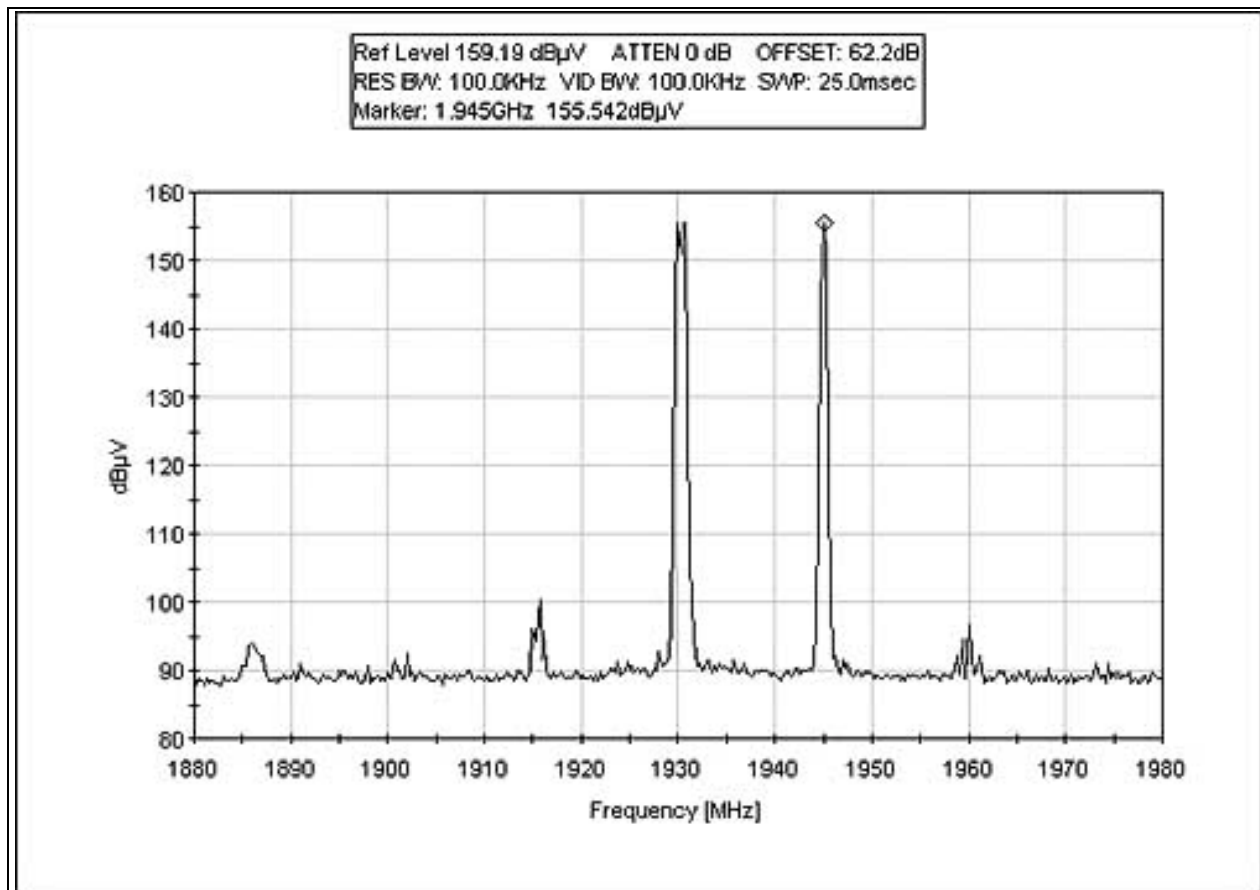
OUTPUT PLOT CDMA C 110



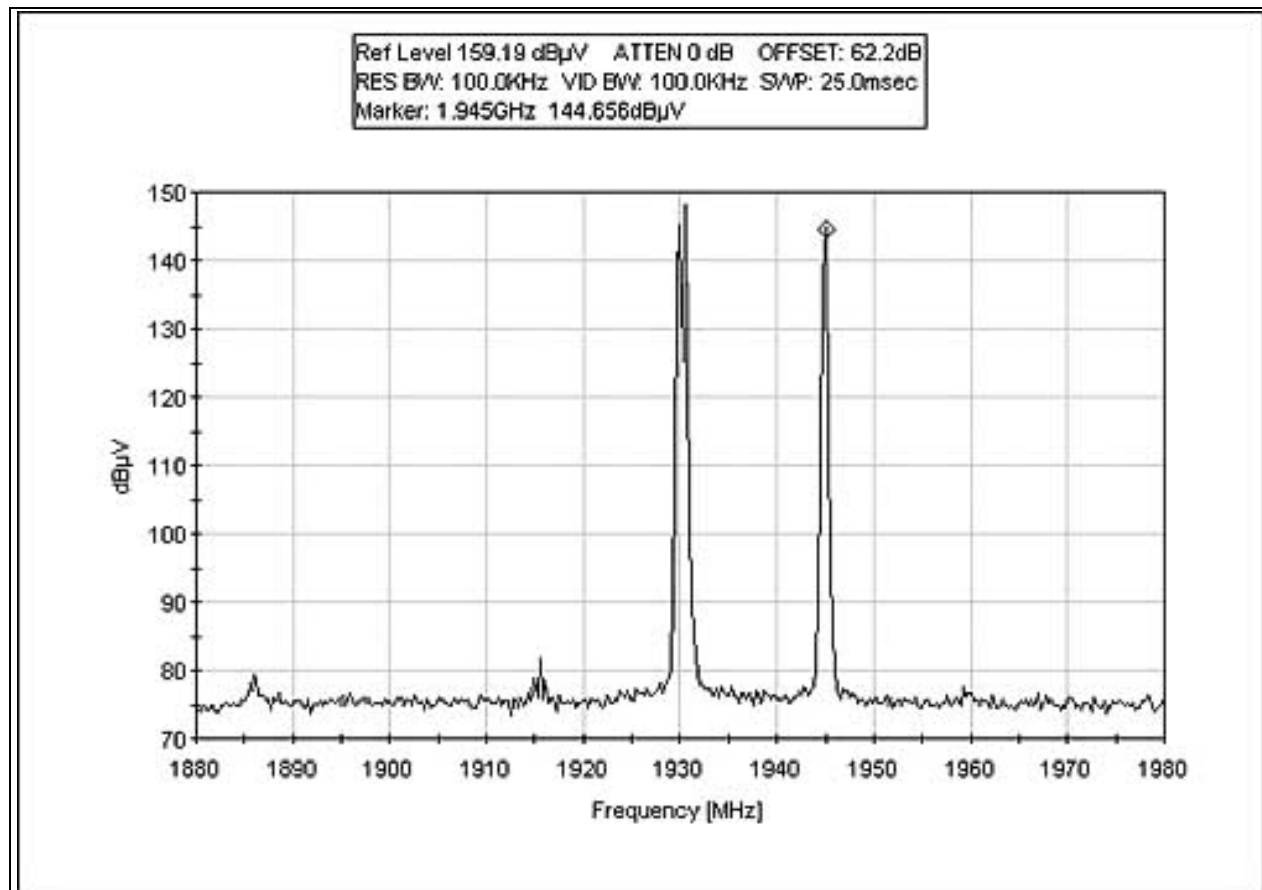
INPUT PLOT EDGE A 125



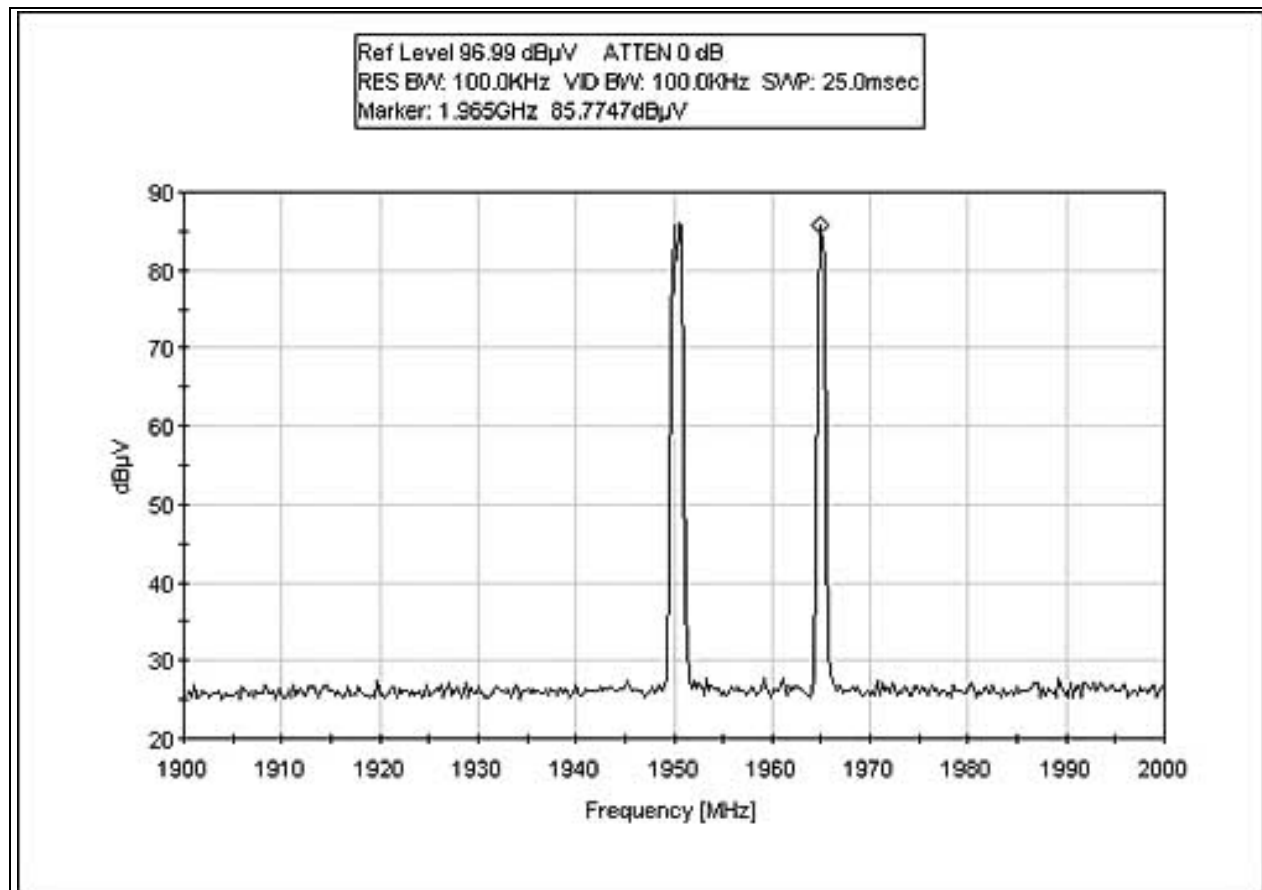
OUTPUT PLOT EDGE A 125



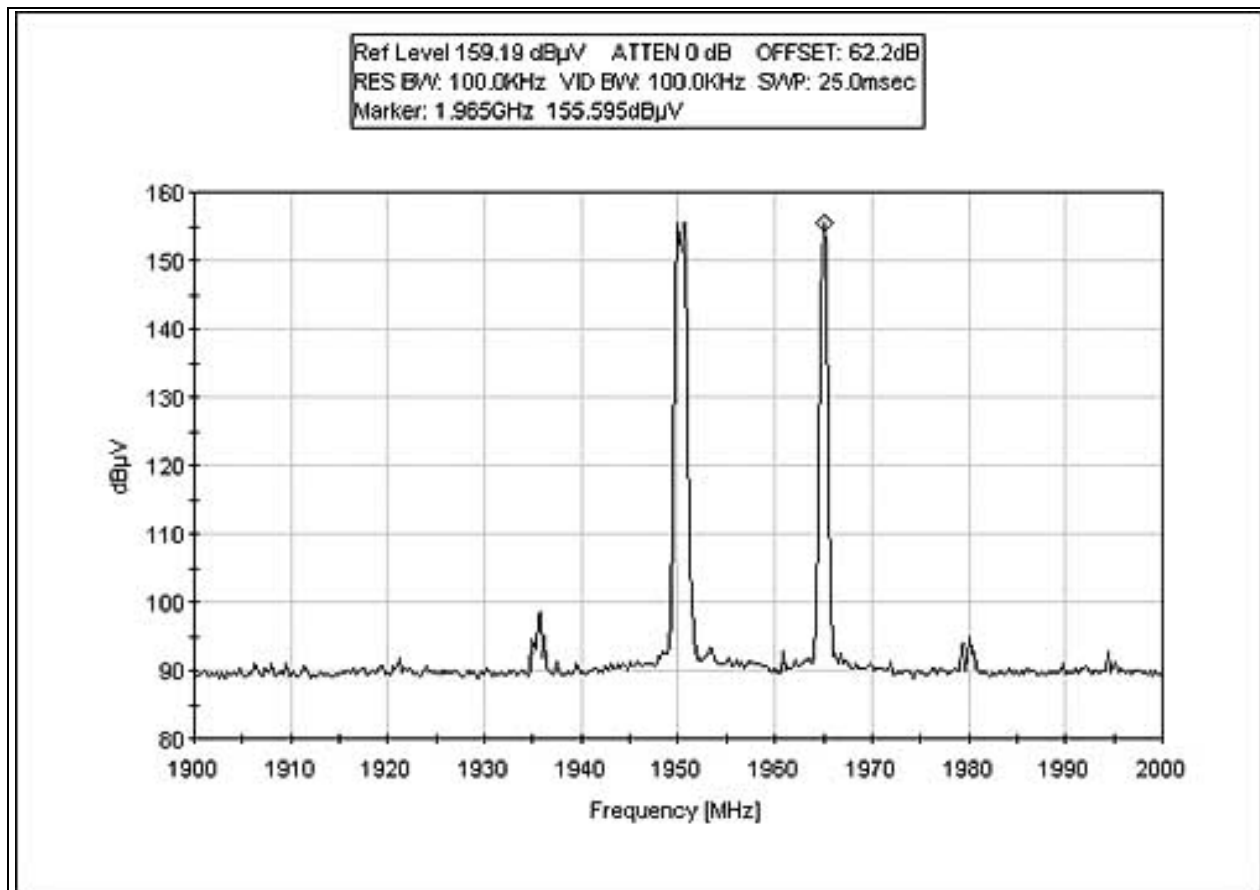
OUTPUT PLOT EDGE A 125 AVERAGE



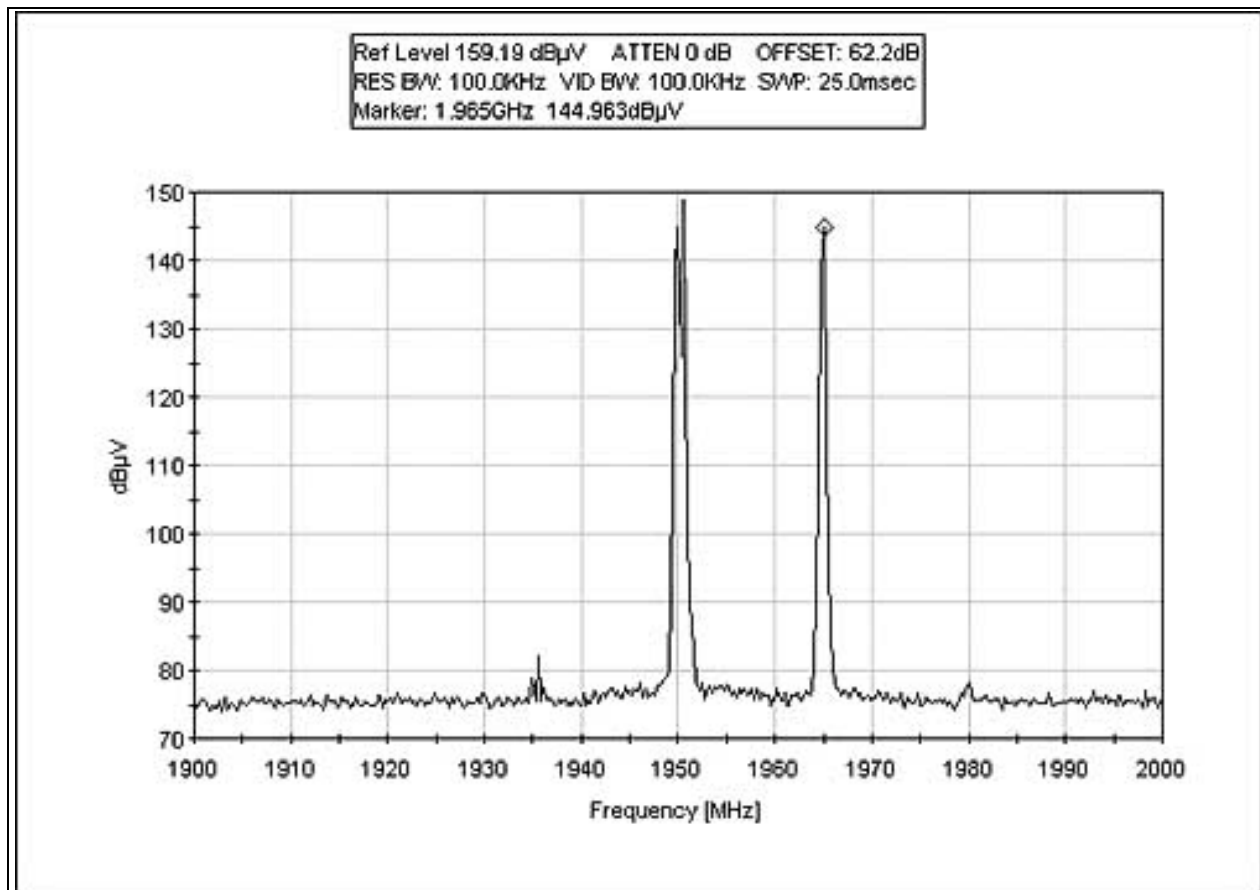
INPUT PLOT EDGE B 125



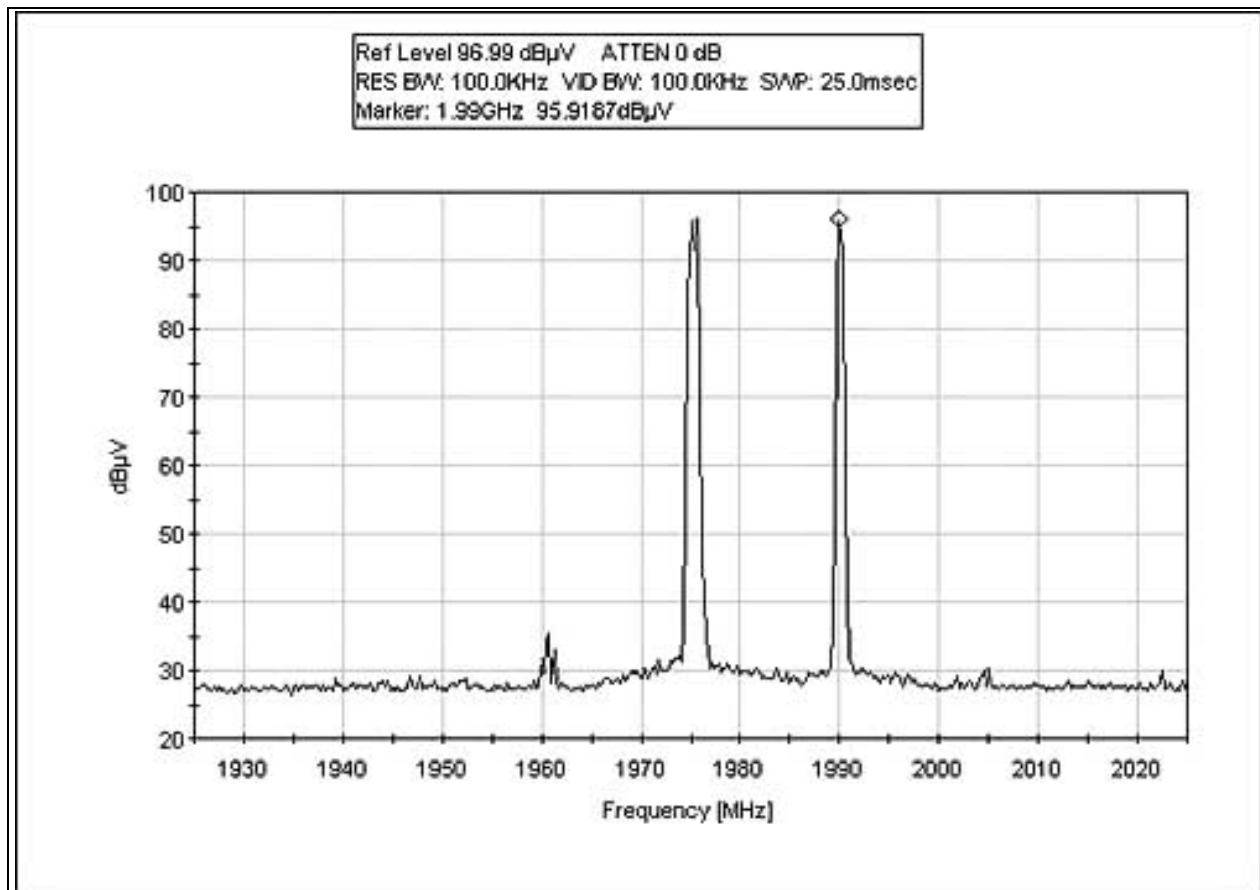
OUTPUT PLOT EDGE B 125



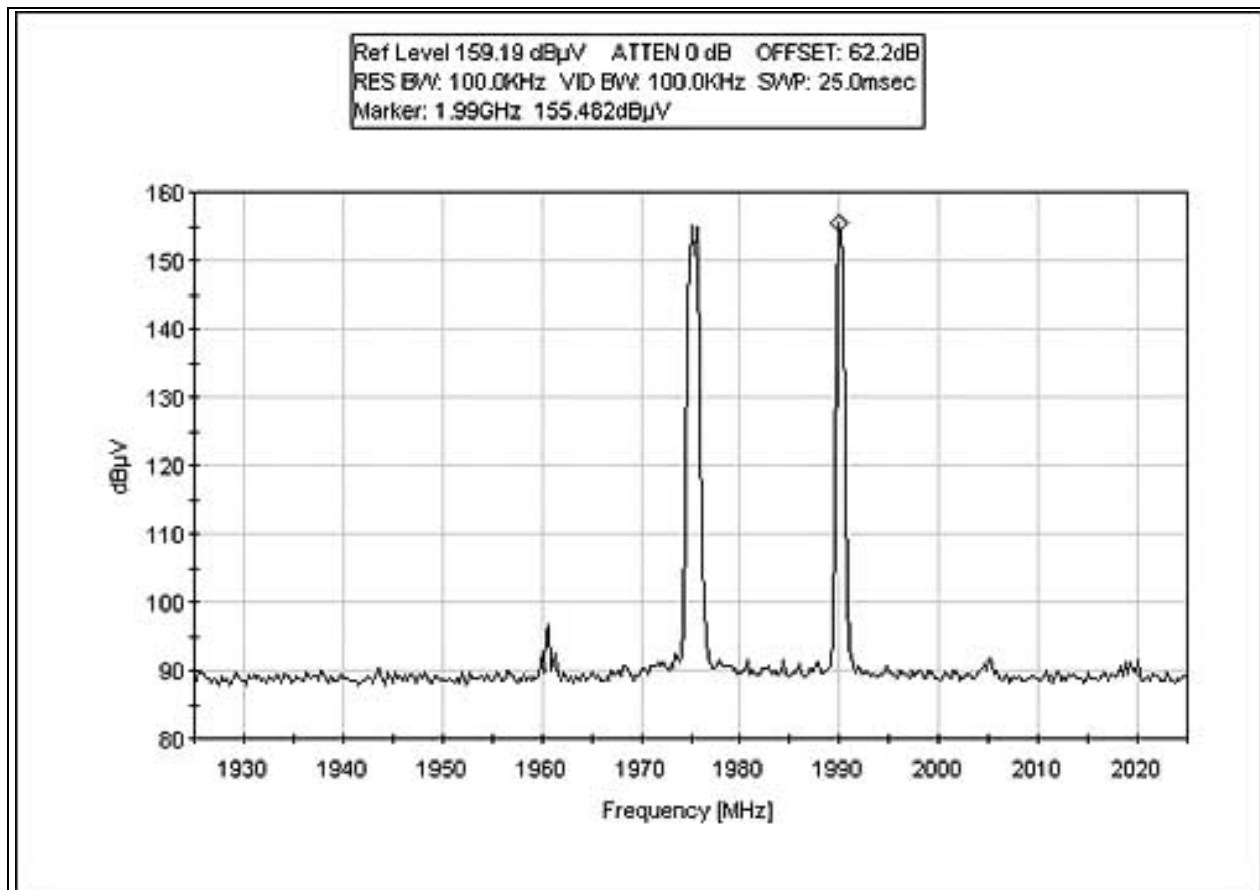
OUTPUT PLOT EDGE B 125 AVERAGE



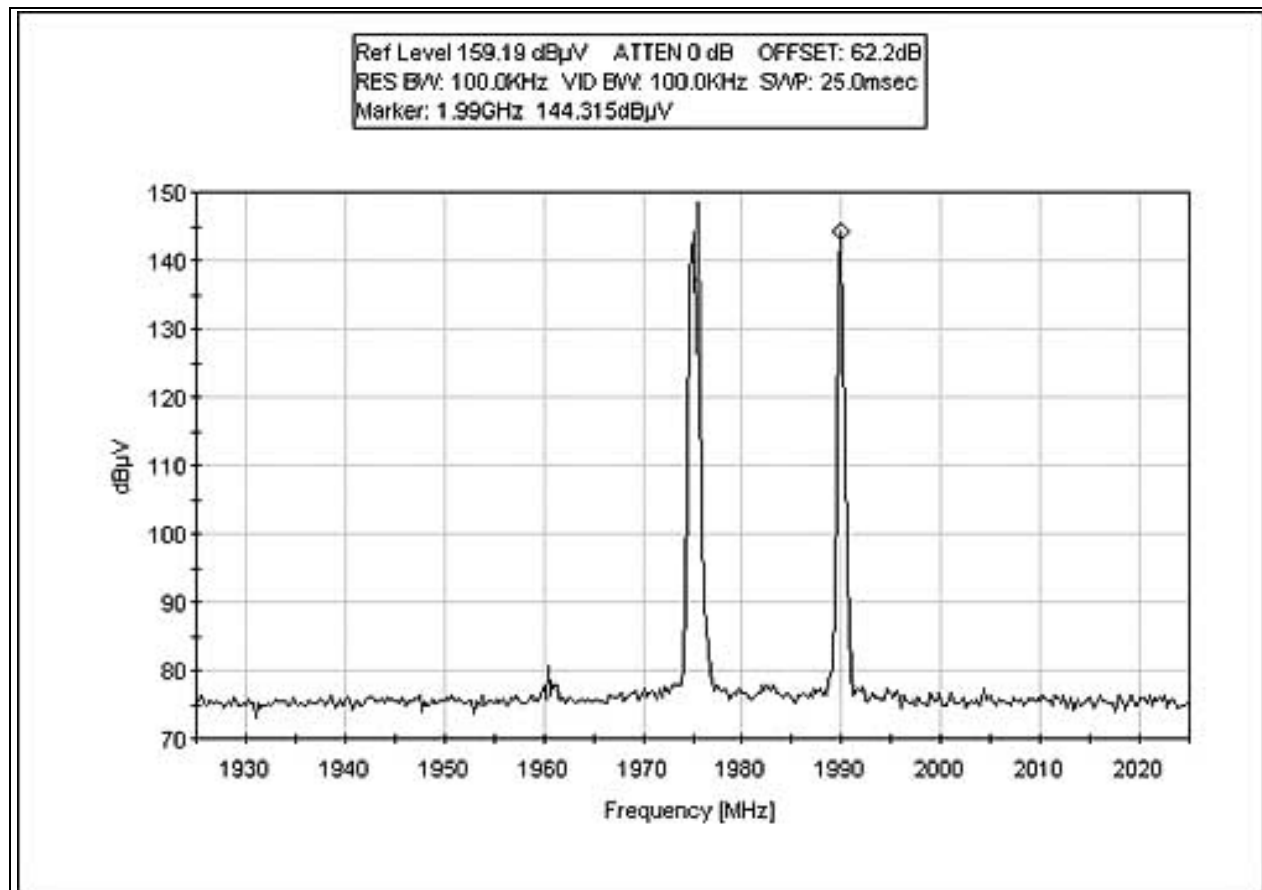
INPUT PLOT EDGE C 125



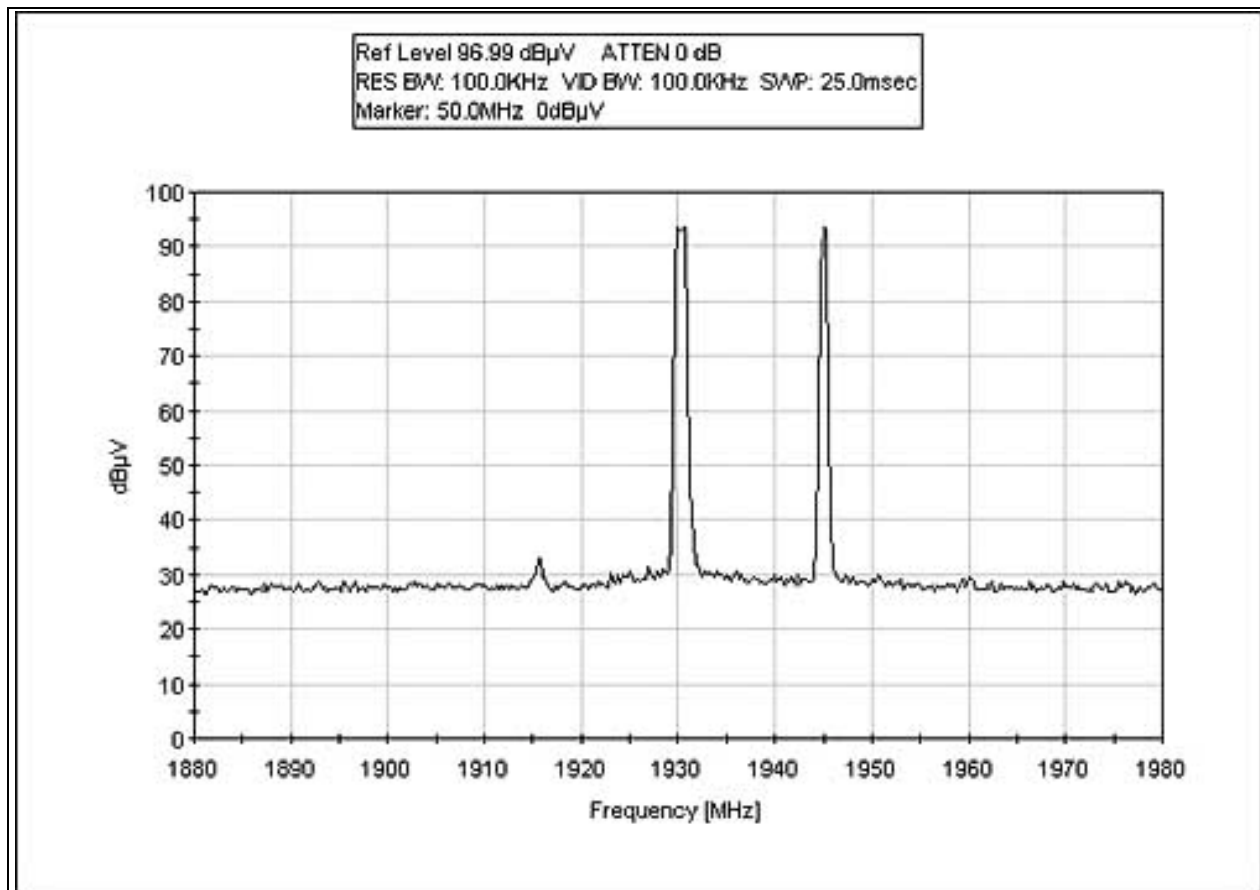
OUTPUT PLOT EDGE C 125



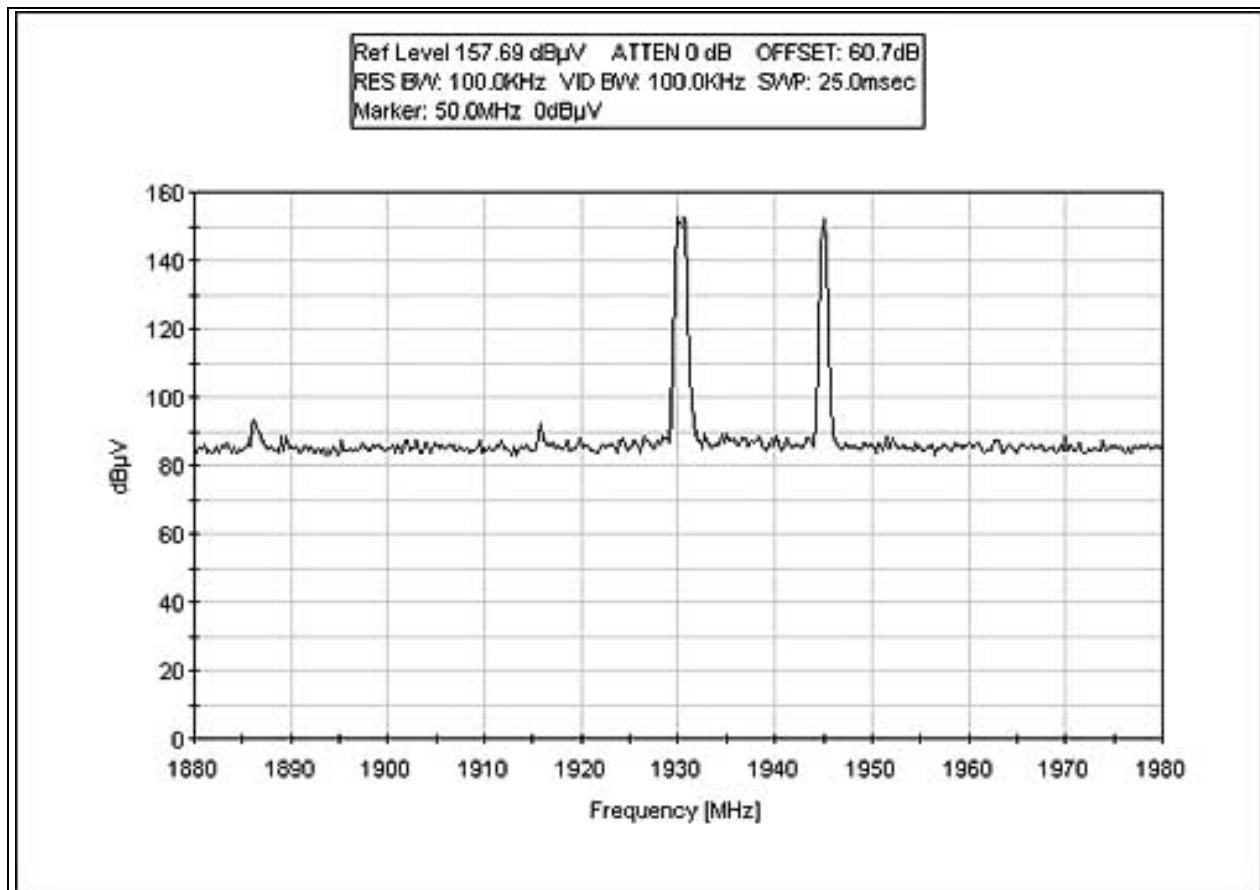
OUTPUT PLOT EDGE C 125 AVERAGE



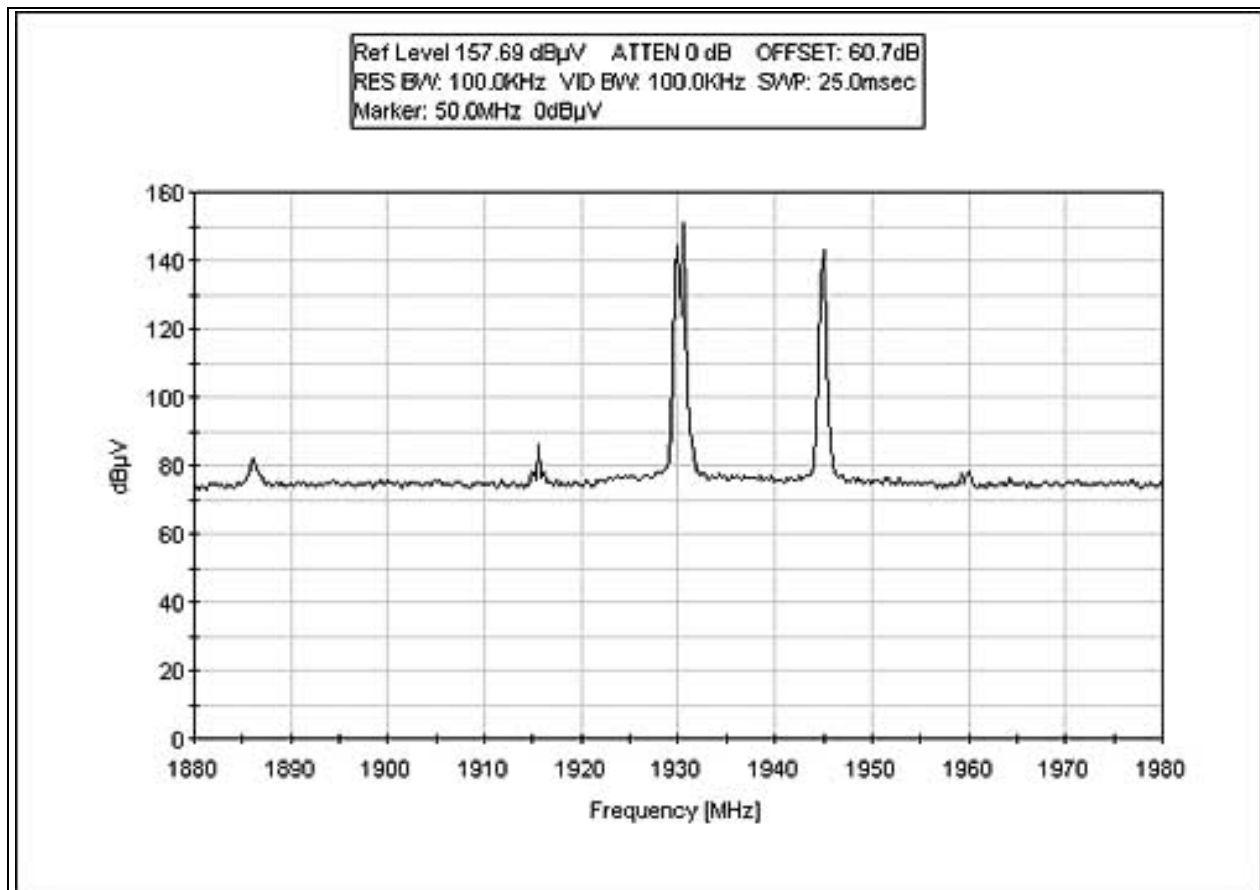
INPUT PLOT GSM A 125



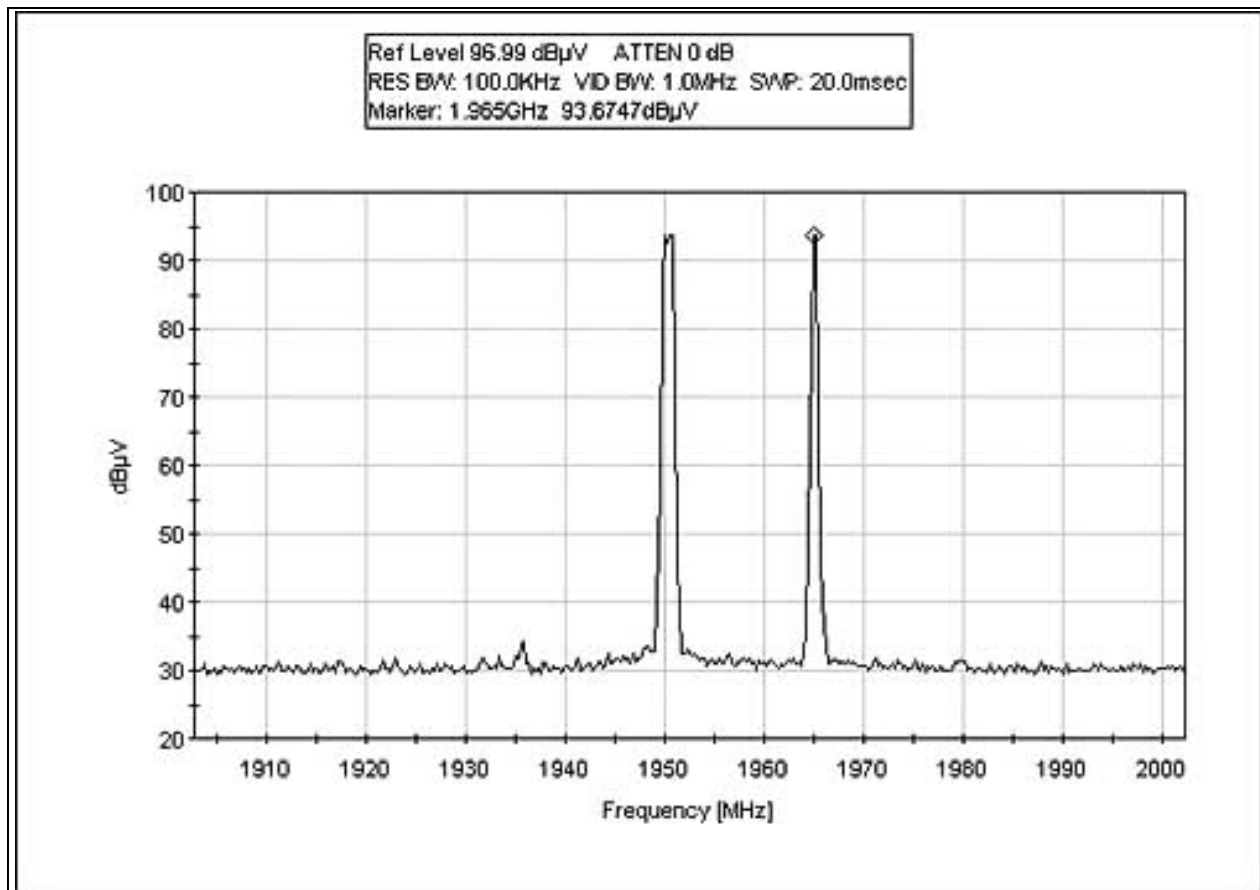
OUTPUT PLOT GSM A 125



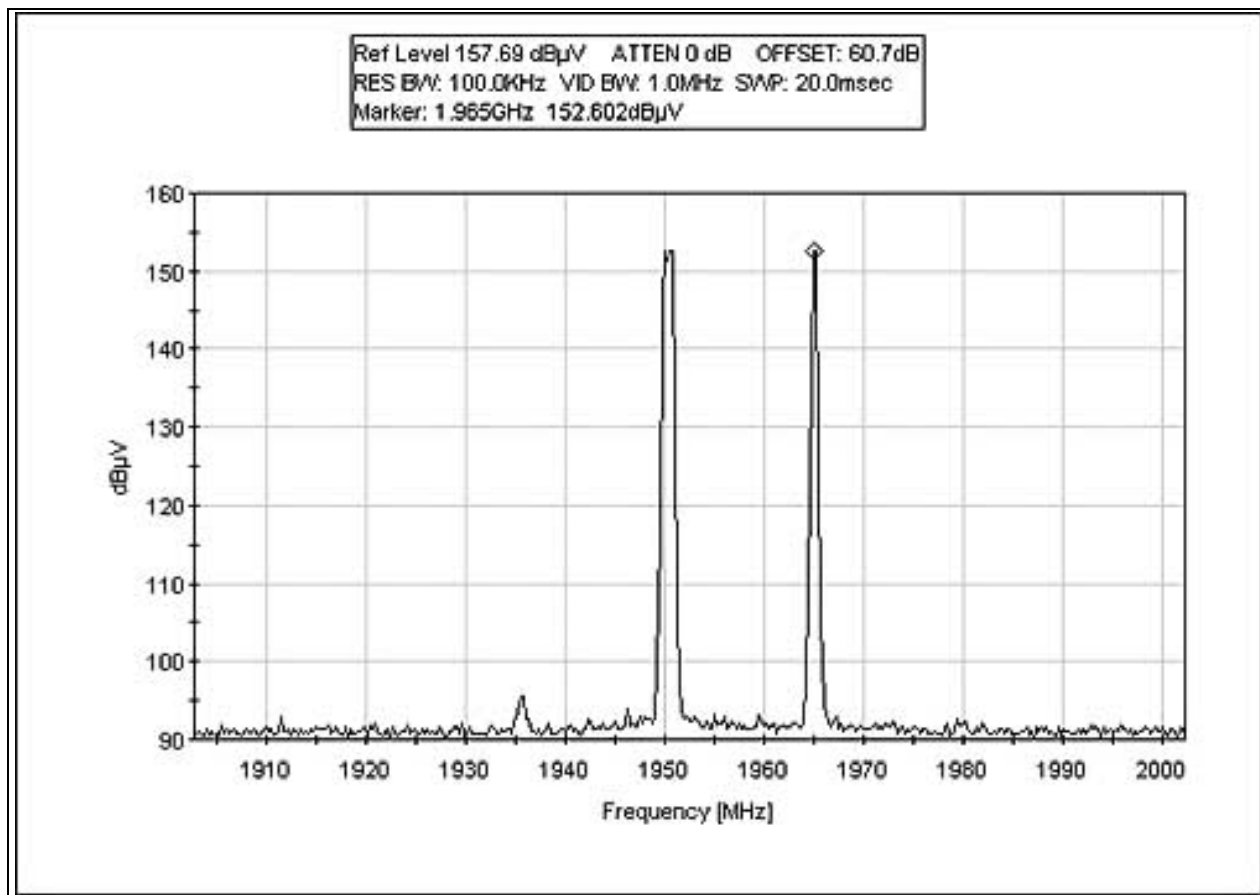
OUTPUT PLOT GSM A 125 AVERAGE



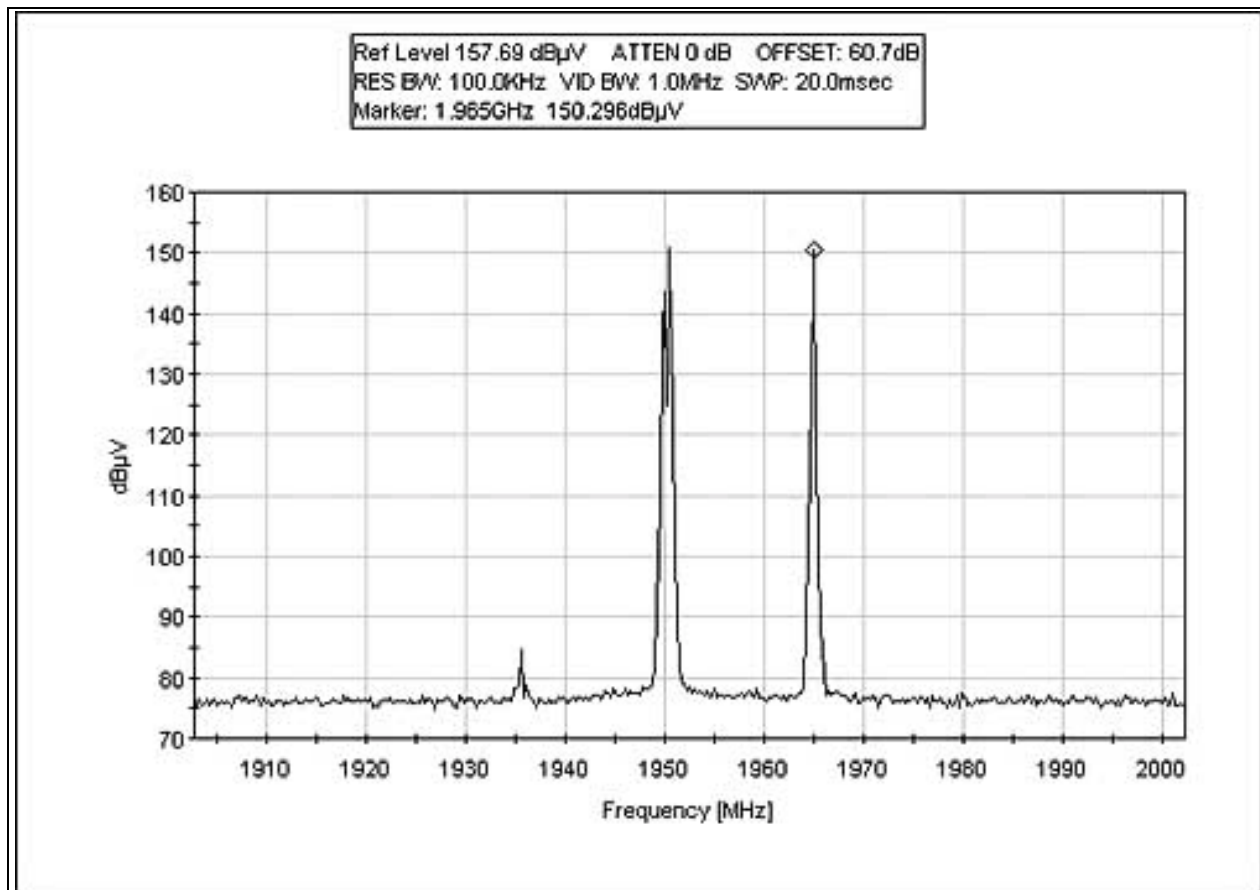
INPUT PLOT GSM B 125



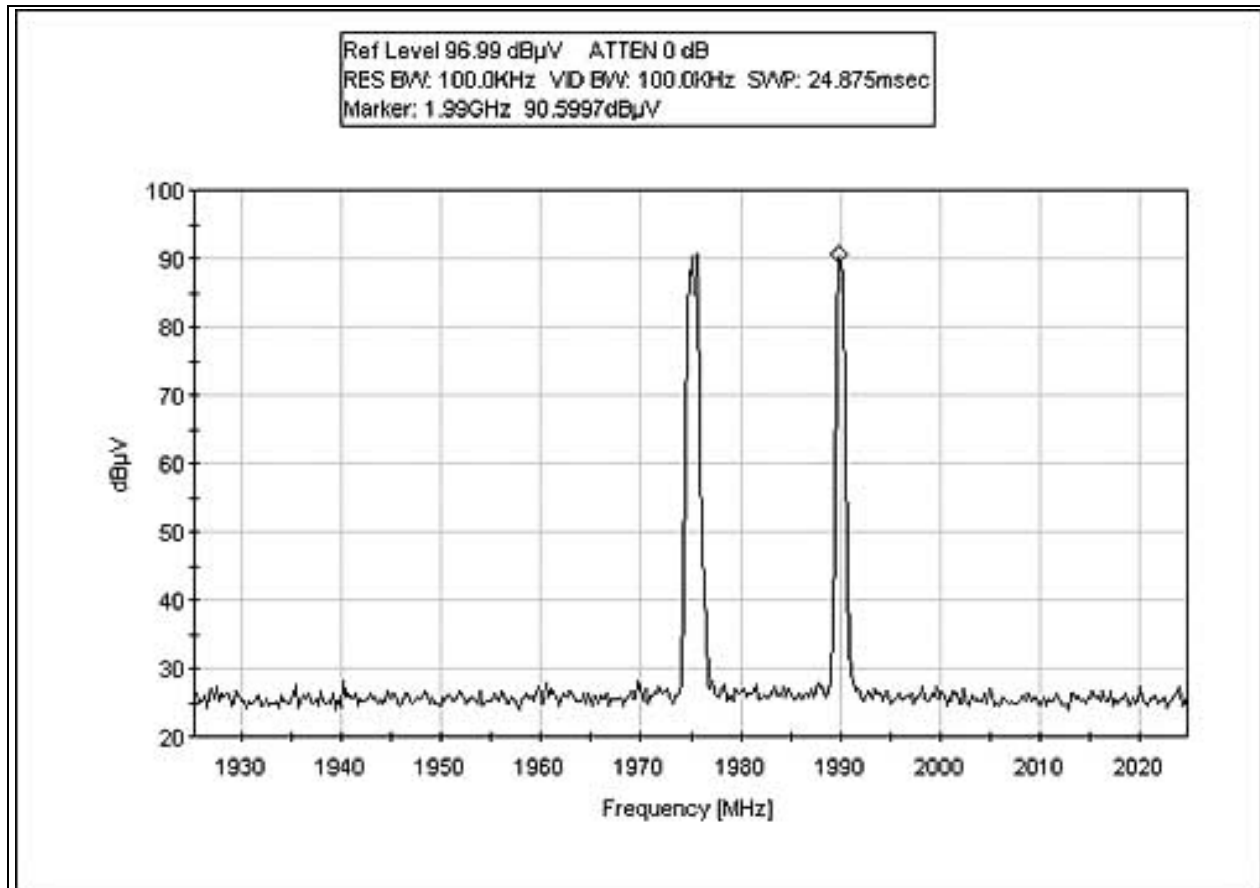
OUTPUT PLOT GSM B 125



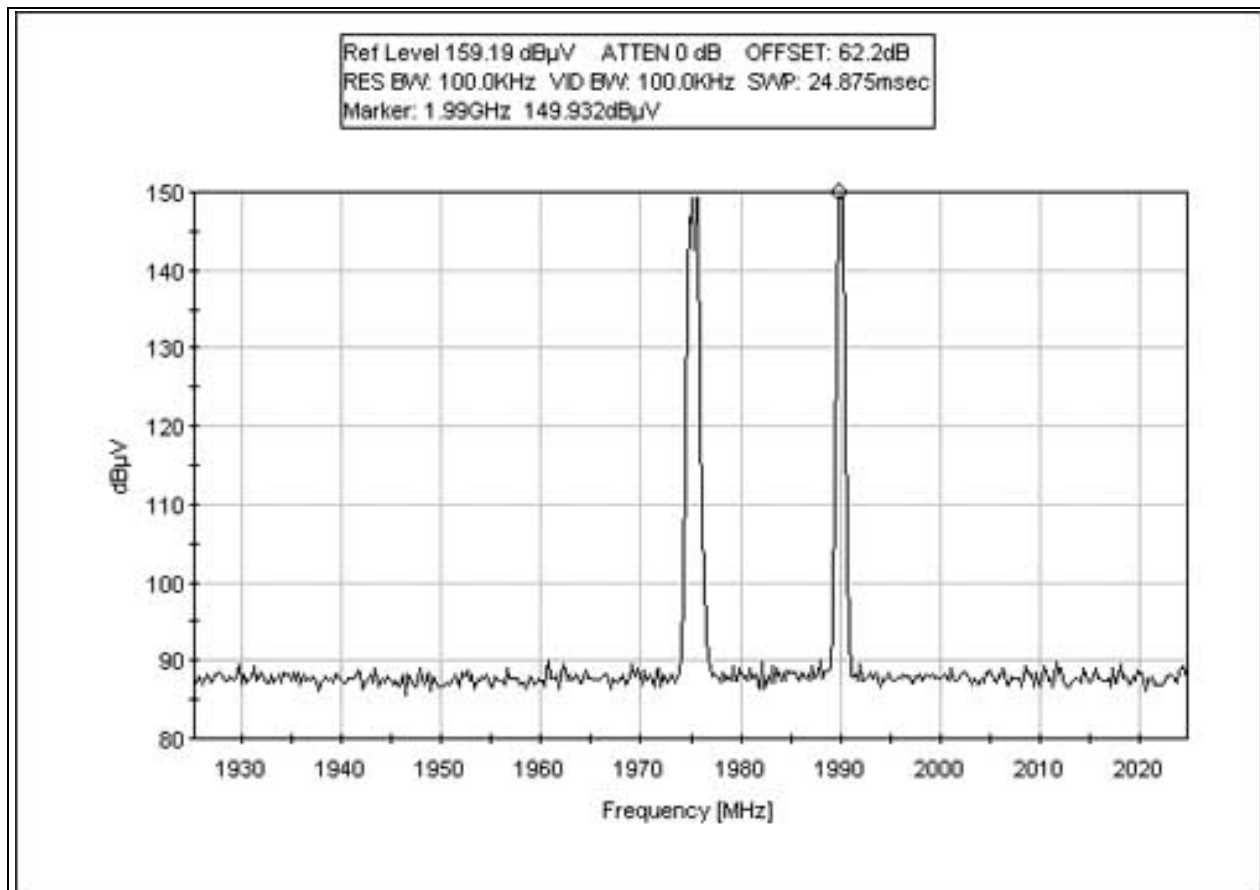
OUTPUT PLOT GSM B 125 AVERAGE



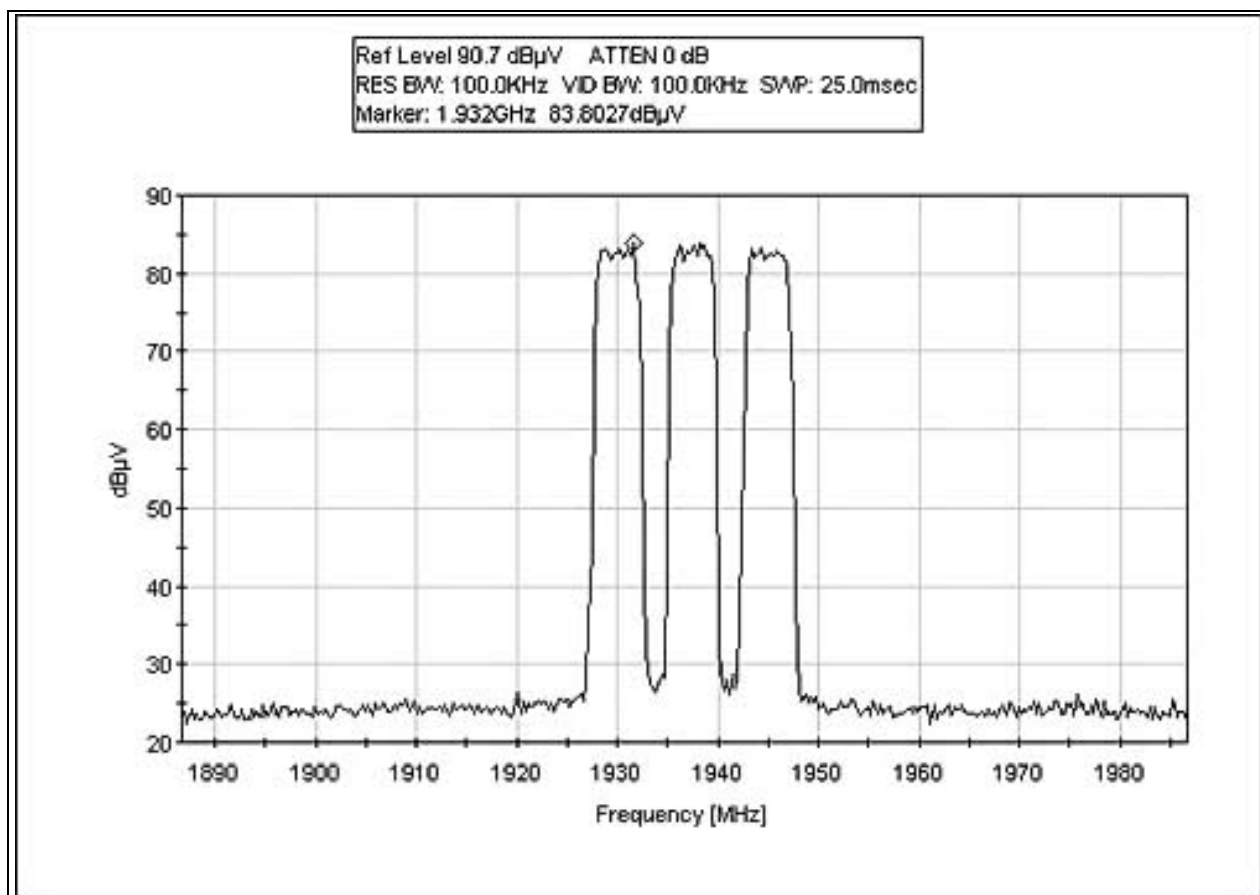
INPUT PLOT GSM C 125



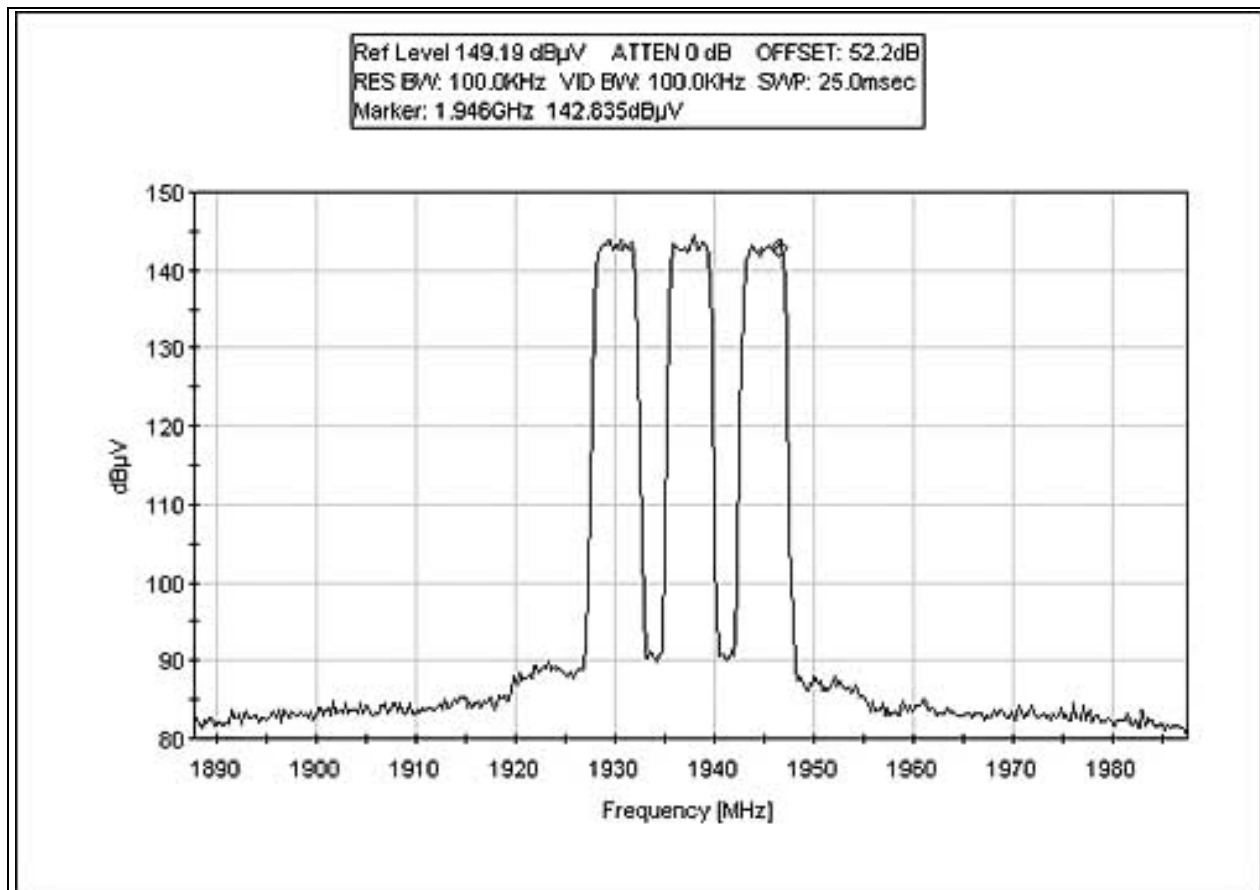
OUTPUT PLOT GSM C 125



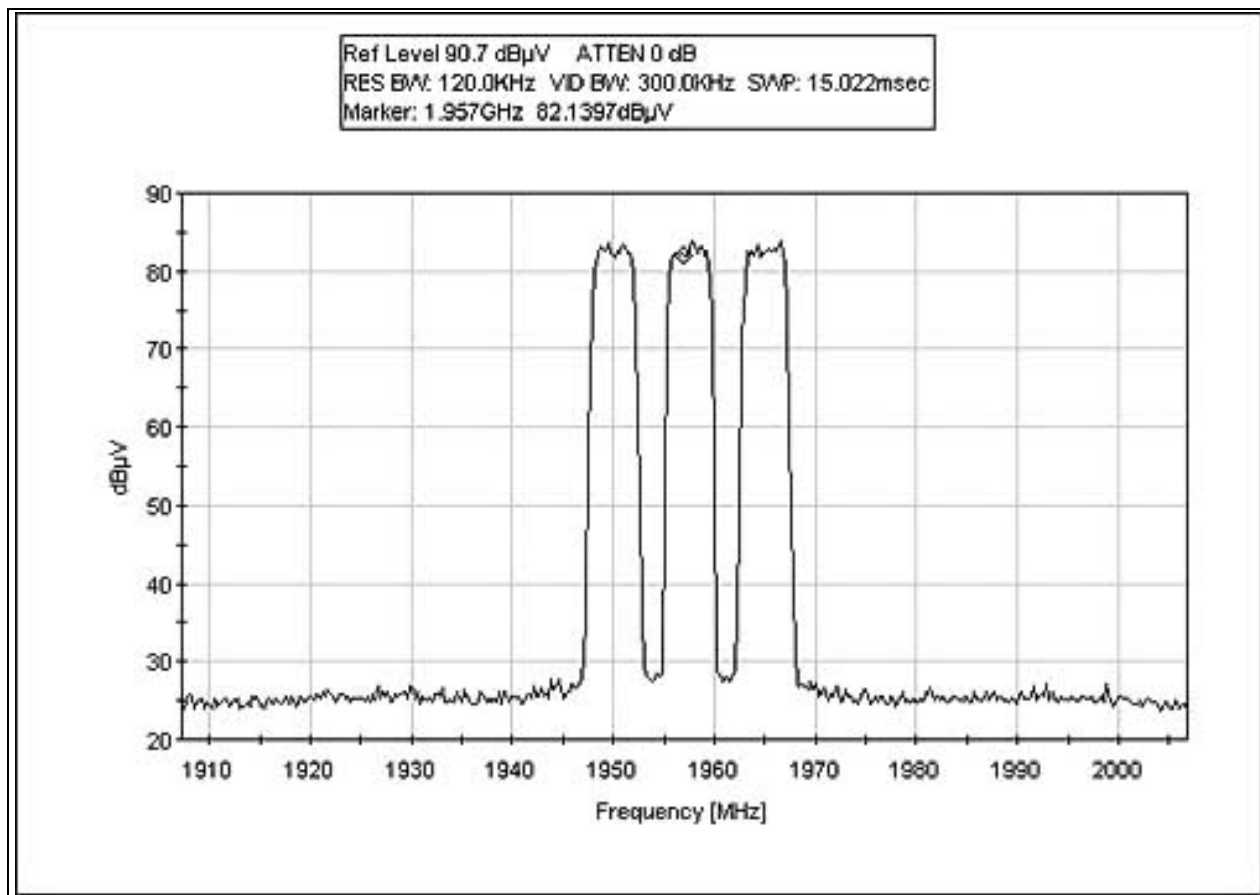
INPUT PLOT WCDMA A 110



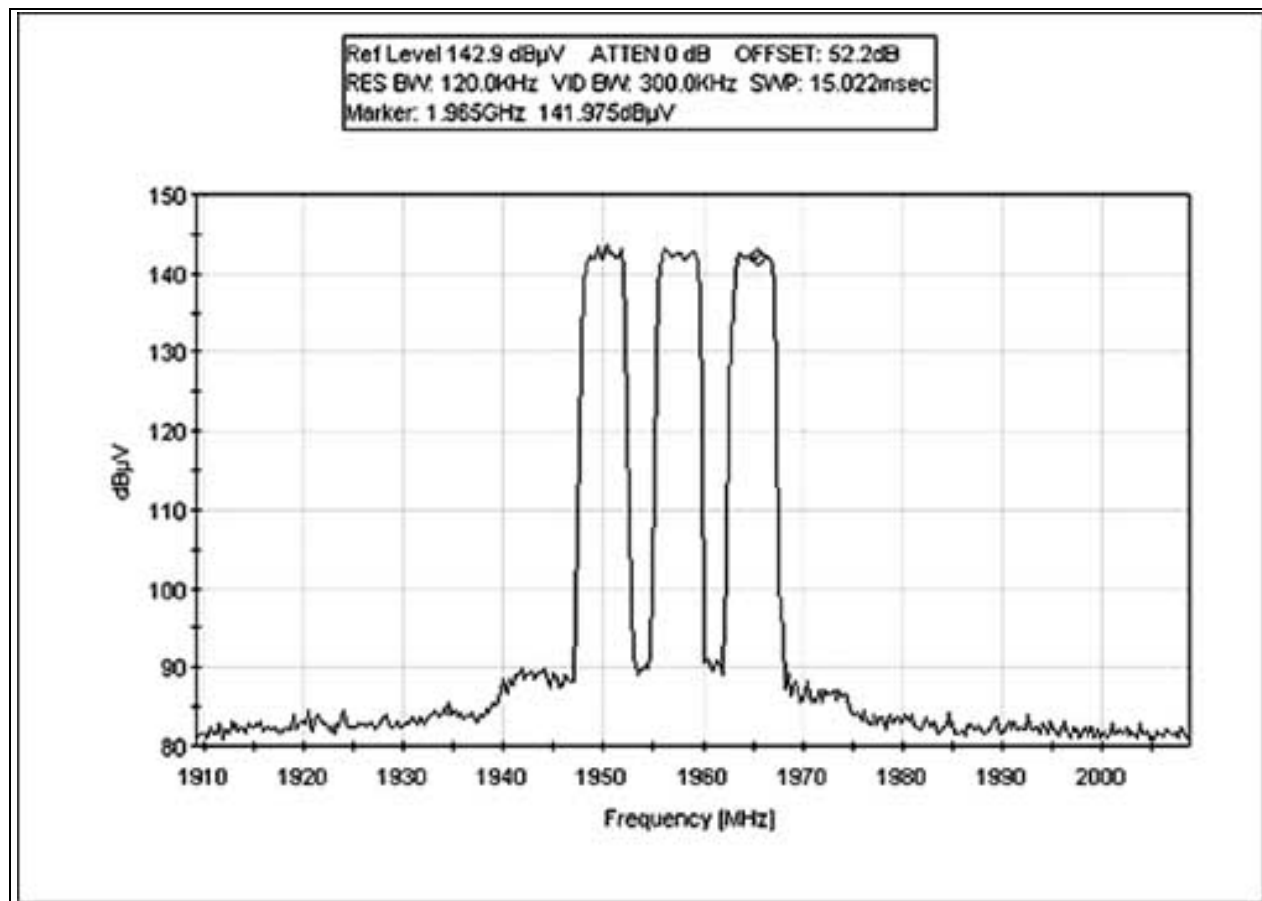
OUTPUT PLOT WCDMA A 110



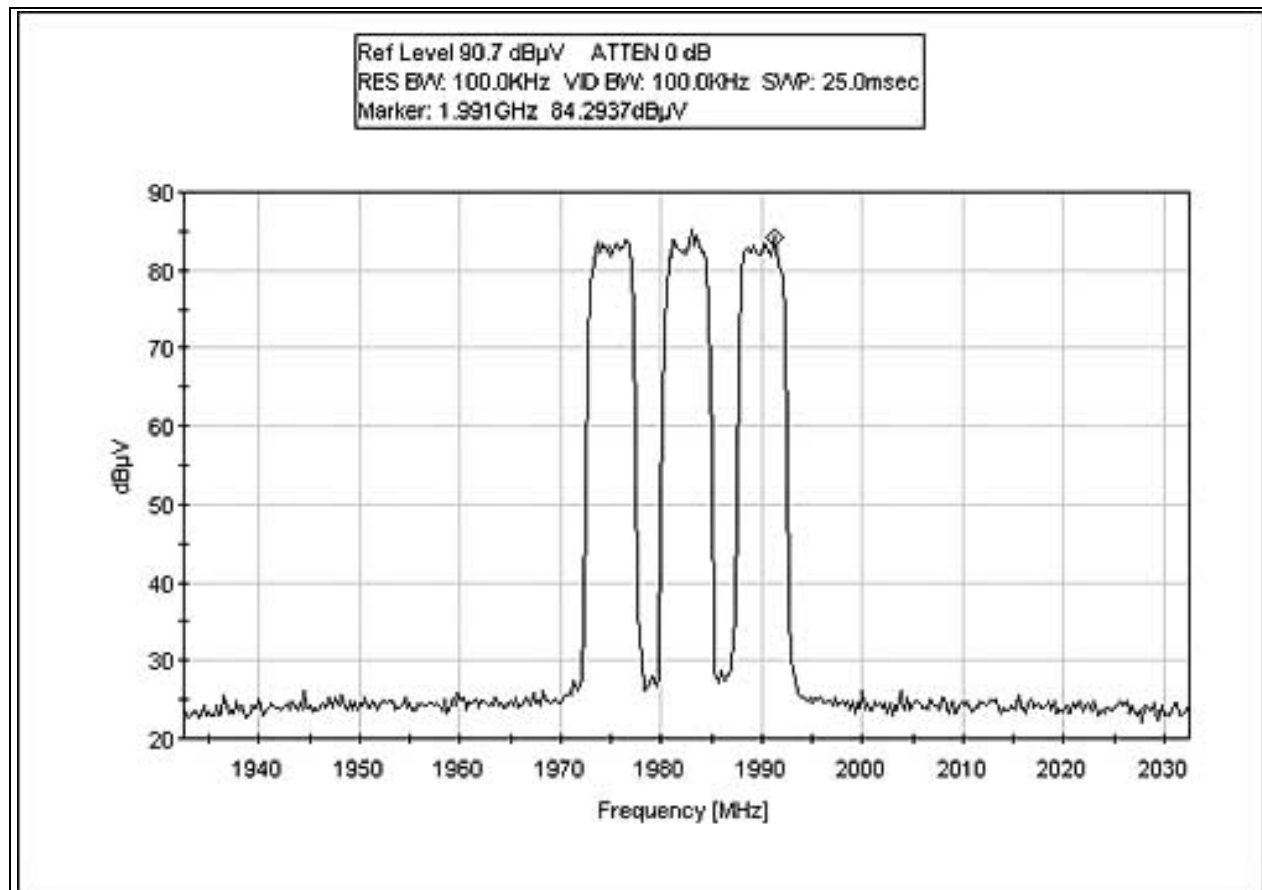
INPUT PLOT WCDMA B 110



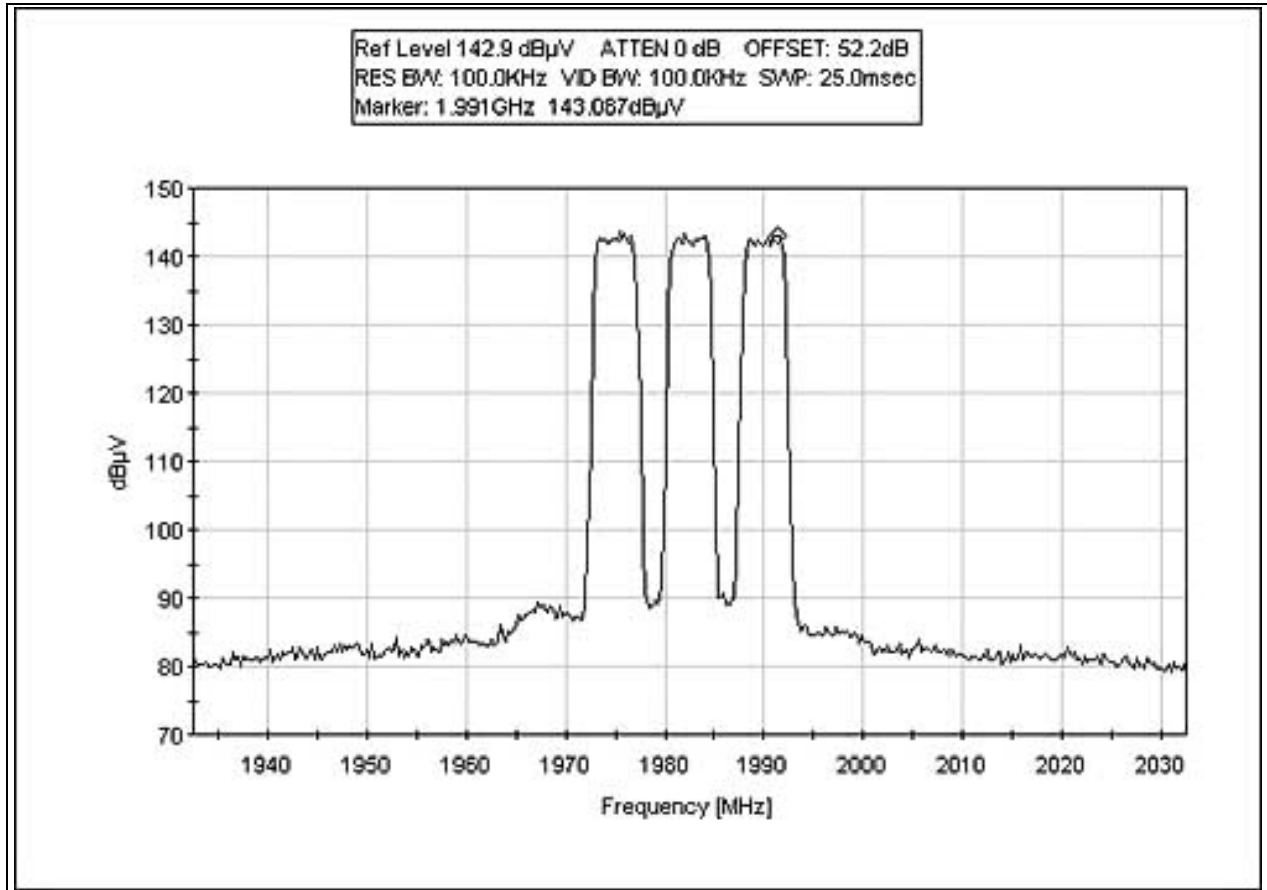
OUTPUT PLOT WCDMA B 110



INPUT PLOT WCDMA C 110



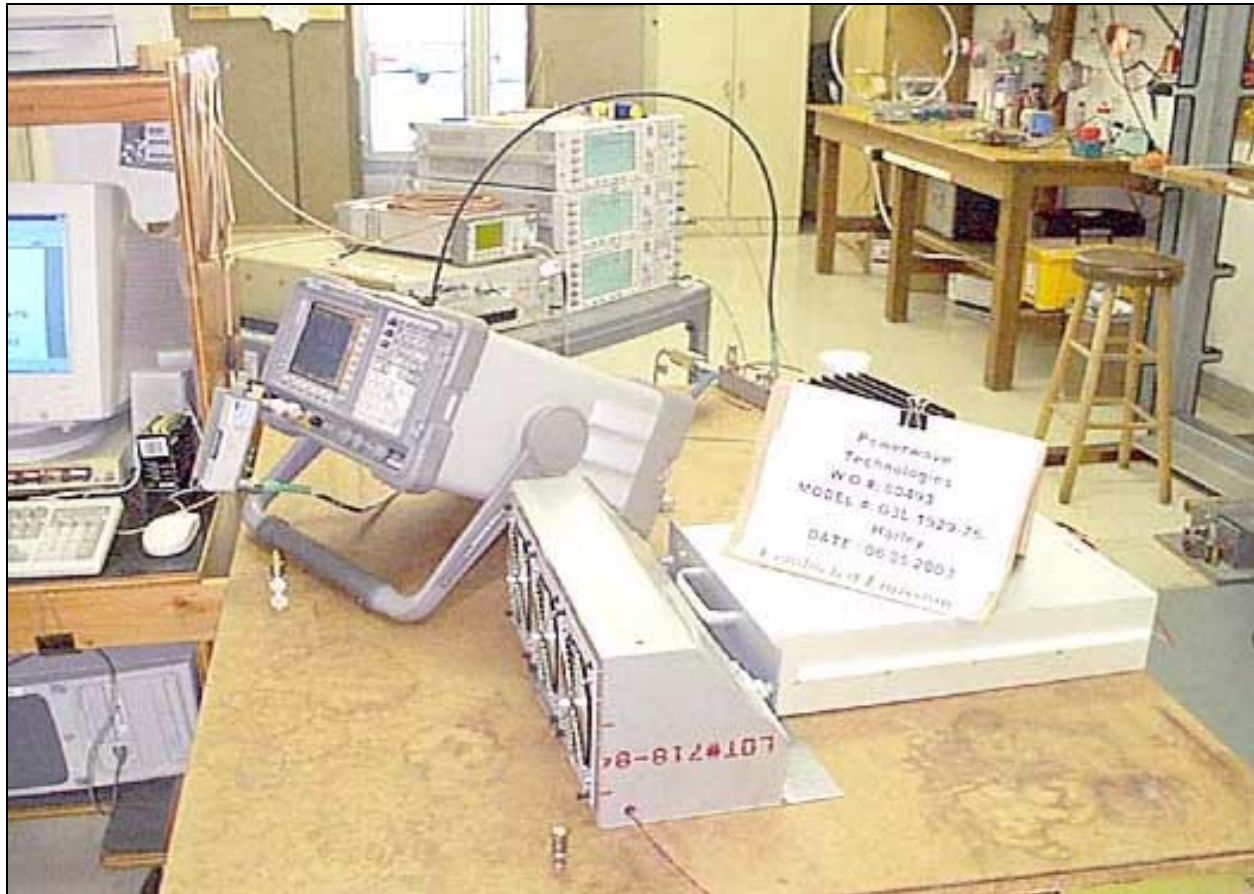
OUTPUT PLOT WCDMA C 110



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	HP	7405E	US40240225	033103	033104

Test Setup Photo



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

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 Emisison**
 Work Order #: **80493** Date: 06/06/2003
 Test Type: **Conducted Emissions** Time: 12:30:40
 Equipment: **Power Amplifier** Sequence#: 4
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 58.3 dB of attenuation is compensated for Mode: Transmit, Block A = 1930 MHz, 1930.06 MHz, 1945 MHz. Modulation: TDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz – 20 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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 68% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1930.000M	155.6	+0.7				+0.0	156.3	94.0	+62.3	Anten
Fundamental											
2	1884.870M	90.2	+0.7				+0.0	90.9	94.0	-3.1	Anten
	Ave										
^	1884.870M	108.8	+0.7				+0.0	109.5	94.0	+15.5	Anten
4	1960.500M	89.5	+0.6				+0.0	90.1	94.0	-3.9	Anten
	Ave										
^	1960.500M	100.2	+0.6				+0.0	100.8	94.0	+6.8	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 Emision**
 Work Order #: **80493** Date: 06/06/2003
 Test Type: **Conducted Emissions** Time: 12:39:13
 Equipment: **Power Amplifier** Sequence#: 3
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 58.3 dB of attenuation is compensated for Mode: Transmit, Block B = 1950 MHz, 1950.06 MHz, 1965 MHz. Modulation: TDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz – 20 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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 68% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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

#	Freq MHz	Rdng dBμV	T1 dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1950.000M	155.6	+0.6				+0.0	156.2	94.0	+62.2	Anten
									Fundamental		
2	1935.401M	89.9	+0.7				+0.0	90.6	94.0	-3.4	Anten
	Ave										
^	1935.401M	104.9	+0.7				+0.0	105.6	94.0	+11.6	Anten
4	1980.301M	88.9	+0.6				+0.0	89.5	94.0	-4.5	Anten
	Ave										
^	1980.301M	99.4	+0.6				+0.0	100.0	94.0	+6.0	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 Emision**
 Work Order #: **80493** Date: 06/06/2003
 Test Type: **Conducted Emissions** Time: 12:48:58
 Equipment: **Power Amplifier** Sequence#: 2
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 58.3 dB of attenuation is compensated for Mode: Transmit, Block C = 1975 MHz, 1975.06 MHz, 1990 MHz. Modulation: TDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz – 20 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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 68% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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

#	Freq MHz	Rdng dBμV	T1 dB	dB	dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1975.110M	155.2	+0.6				+0.0	155.8	94.0	+61.8	Anten
Fundamental											
2	1959.968M	91.6	+0.6				+0.0	92.2	94.0	-1.8	Anten
	Ave										
^	1959.968M	105.2	+0.6				+0.0	105.8	94.0	+11.8	Anten
4	2049.799M	87.8	+0.6				+0.0	88.4	94.0	-5.6	Anten
	Ave										
^	2049.799M	105.0	+0.6				+0.0	105.6	94.0	+11.6	Anten

6	2035.299M Ave	87.4	+0.6	+0.0	88.0	94.0	-6.0	Anten
^	2035.299M	101.5	+0.6	+0.0	102.1	94.0	+8.1	Anten
8	21.790M	82.9	+0.0	+0.0	82.9	94.0	-11.1	Anten
9	14.330M	82.3	+0.0	+0.0	82.3	94.0	-11.7	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 08:54:42
 Equipment: **Power Amplifier** Sequence#: 41
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 56.9 dB of attenuation is compensated for Mode: Transmit, Block B = 1950 MHz, 1950.6 MHz, 1965 MHz. Modulation: GSM. Tx Power: 125 Watts. Frequency range of measurement = 9 kHz - 20 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 - 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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	1965.000M	152.7	+0.6				+0.0	153.3	94.0	+59.3	Anten
									Fundamental, channel 3		
2	552.300M	79.7	+0.0				+0.0	79.7	94.0	-14.3	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 08:53:33
 Equipment: **Power Amplifier** Sequence#: 40
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 56.9 dB of attenuation is compensated for Mode: Transmit, Block A = 1930 MHz, 1930.6 MHz, 1945 MHz. Modulation: GSM.Tx Power: 125 Watts. Frequency range of measurement = 9kHz-20GHz .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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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	1945.020M	153.2	+0.6				+0.0	153.8	94.0	+59.8	Anten
									Fundamental, channel 3		
2	830.500M	79.7	+0.0				+0.0	79.7	94.0	-14.3	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 09:06:01
 Equipment: **Power Amplifier** Sequence#: 42
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block C = 1975 MHz, 1975.6 MHz, 1990 MHz. Modulation: GSM.Tx Power: 125 Watts. Frequency range of measurement = 9 kHz - 20 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 - 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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	1990.000M	152.6	+0.6				+0.0	153.2	94.0	+59.2	Anten
									Fundamental, Channel 3		
2	333.000M	81.7	+0.0				+0.0	81.7	94.0	-12.3	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 09:42:39
 Equipment: **Power Amplifier** Sequence#: 43
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support Signal Amplifier and three 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 Measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block A = 1930 MHz, 1930.6 MHz, 1945 MHz. Modulation: EDGE. Tx Power: 125 Watts. Frequency range of measurement = 9 kHz – 20 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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Heliax - Brea # 7.

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	1944.980M	153.2	+0.6				+0.0	153.8	94.0	+59.8	Anten
									Fundamental, Channel 3		
2	3860.656M Ave	82.2	+1.0				+0.0	83.2	94.0	-10.8	Anten
^	3860.656M	93.2	+1.0				+0.0	94.2	94.0	+0.2	Anten
4	670.000M	80.6	+0.0				+0.0	80.6	94.0	-13.4	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 10:02:16
 Equipment: **Power Amplifier** Sequence#: 44
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block B = 1950 MHz, 1950.6 MHz, 1965 MHz. Modulation: EDGE. Tx Power: 125 Watts. Frequency range of measurement = 9kHz – 20 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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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	1965.000M	156.0	+0.6				+0.0	156.6	94.0	+62.6	Anten
									Fundamental Channel 3		
2	3900.813M Ave	82.7	+1.0				+0.0	83.7	94.0	-10.3	Anten
^	3900.813M	93.1	+1.0				+0.0	94.1	94.0	+0.1	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 10:23:55
 Equipment: **Power Amplifier** Sequence#: 45
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block C = 1975 MHz, 1975.6 MHz, 1990 MHz. Modulation: EDGE. Tx Power: 125 Watts. Frequency range of measurement = 9 kHz – 20 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, V BW=120 kHz, 1000 MHz – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

Measurement Data:		Reading listed by margin.					Test Lead: Antenna Terminal				
#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1990.000M	155.8	+0.6				+0.0	156.4	94.0	+62.4	Anten
									Fundamental Channel 3		
2	3950.626M Ave	82.0	+1.0				+0.0	83.0	94.0	-11.0	Anten
^	3950.626M	93.4	+1.0				+0.0	94.4	94.0	+0.4	Anten
4	22.080M	82.0	+0.0				+0.0	82.0	94.0	-12.0	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 11:25:06
 Equipment: **Power Amplifier** Sequence#: 46
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block A = 1930 MHz, 1932.5 MHz, 1945 MHz. Modulation: CDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz – 20 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 - 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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	1945.020M	150.7	+0.6				+0.0	151.3	94.0	+57.3	Anten
									Fundamental Channel 3		
2	532.000M	80.8	+0.0				+0.0	80.8	94.0	-13.2	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 11:48:11
 Equipment: **Power Amplifier** Sequence#: 47
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block B = 1950 MHz, 1952.5 MHz, 1965 MHz. Modulation: CDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz - 20 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 - 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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	1965.200M	150.4	+0.6				+0.0	151.0	94.0	+57.0	Anten
									Fundamental Channel 3		
2	413.000M	28.5	+0.0				+0.0	28.5	94.0	-65.5	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 13:21:47
 Equipment: **Power Amplifier** Sequence#: 48
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block C = 1975 MHz, 1977.5 MHz, 1990 MHz. Modulation: CDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz – 20 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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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	1989.900M	149.6	+0.6				+0.0	150.2	94.0	+56.2	Anten
									Fundamental Channel 3		
2	520.000M	81.7	+0.0				+0.0	81.7	94.0	-12.3	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 13:42:11
 Equipment: **Power Amplifier** Sequence#: 49
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block A = 1930 MHz, 1937.5 MHz, 1945MHz. Modulation: WCDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz – 20 GHz. 9 kHz - 150 kHz; RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz; RBW=9 kHz, V BW=9 kHz; 30 MHz – 1000 MHz; RBW=120 kHz, VBW=120 kHz, 1000 MHz – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Heliax - Brea # 7.

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	1946.000M	149.6	+0.6				+0.0	150.2	94.0	+56.2	Anten
									Fundamental Channel 3		
2	767.000M	81.3	+0.0				+0.0	81.3	94.0	-12.7	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 13:52:30
 Equipment: **Power Amplifier** Sequence#: 50
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block B = 1950 MHz, 1957.5 MHz, 1965MHz. Modulation: WCDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz – 20 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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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	1965.400M	149.1	+0.6				+0.0	149.7	94.0	+55.7	Anten
									Fundamental Channel 3		
2	498.000M	75.8	+0.0				+0.0	75.8	94.0	-18.2	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 Emision**
 Work Order #: **80493** Date: 07/01/2003
 Test Type: **Conducted Emissions** Time: 14:08:53
 Equipment: **Power Amplifier** Sequence#: 51
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" 220V 60Hz
 S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867
Signal Generator	Agilent	E4433B	US40051303
Signal Generator	Agilent	E4433B	US40051207

Test Conditions / Notes:

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for Mode: Transmit, Block C = 1975 MHz, 1982.5 MHz, 1990 MHz. Modulation: WCDMA. Tx Power: 110 Watts. Frequency range of measurement = 9 kHz – 20 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 – 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C, 63% relative humidity. Modification: Installed Steward 28A2029-0A0 on Internal DC power cable.

Transducer Legend:

T1=Brea Cable: 6' 1/4" Helix - Brea # 7.

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

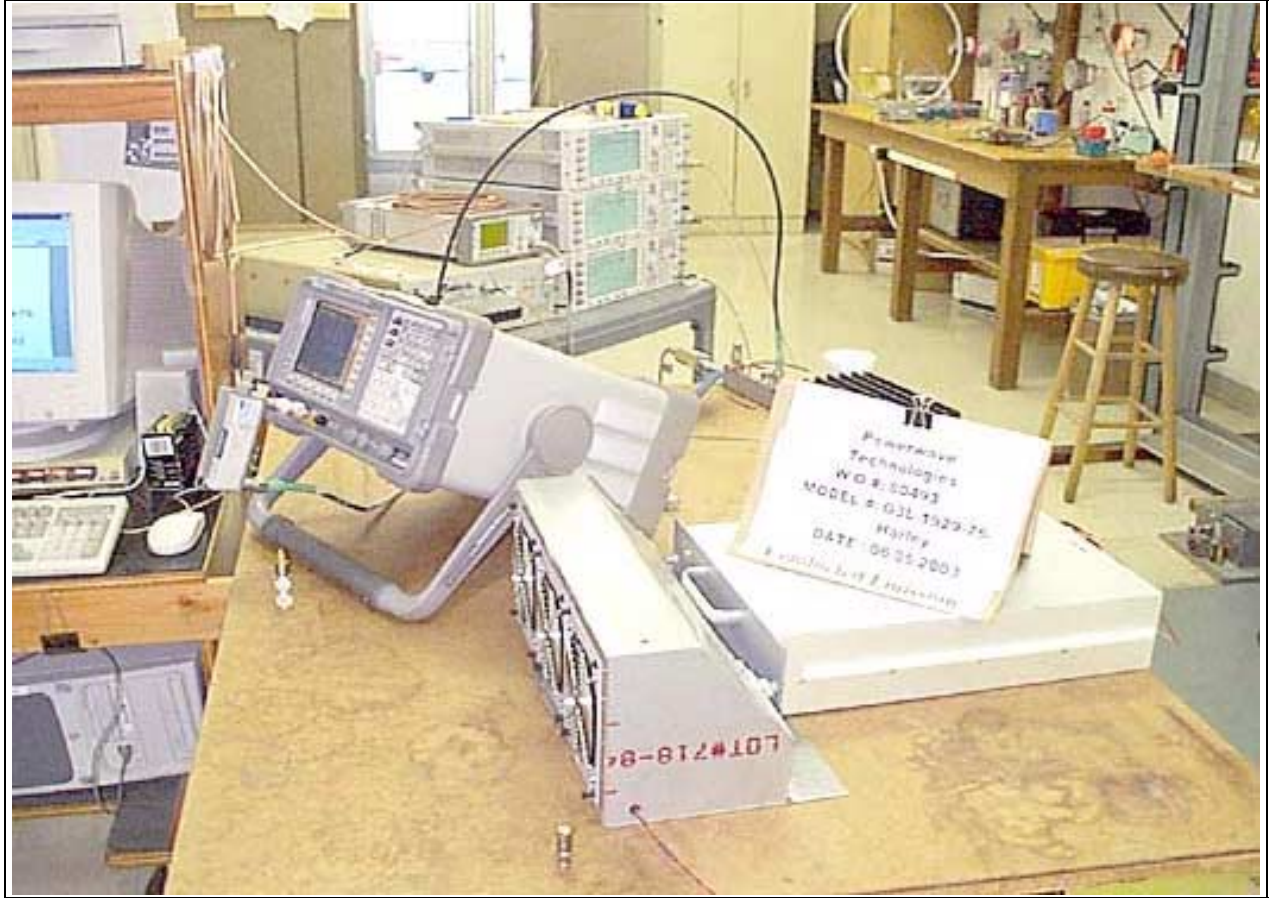
#	Freq MHz	Rdng dBµV	T1 dB				Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1989.400M	148.8	+0.6				+0.0	149.4	94.0	+55.4	Anten
									Fundamental Channel 3		
2	136.100M	75.5	+0.0				+0.0	75.5	94.0	-18.5	Anten

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	HP	7405E	US40240225	033103	033104
Spectrum Analyzer	02467	HP	7405E	US40240225	033103	033104
¼" Heliax Coaxial Cable	NA	Andrew	FSJ-50A-4	Cable#7 (6 ft)	071502	071503

Test Setup Photos





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

The EUT is placed on the wooden table. RF Input port is connected to a remote support signal amplifier and three 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 measurement is made at the antenna port via a directional coupler. 52.2 dB of attenuation is compensated for. Mode: Transmit. Modulation: GSM. Tx Power: 125 Watts. Frequency range of measurement = 9 kHz - 20 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 - 20 GHz; RBW=1 MHz, VBW=1 MHz. 27VDC (Support Power supply: 208VAC, 60 Hz), 21°C 63% relative humidity. Modification :Installed Steward 28A2029-0A0 on Internal DC power cable. Block A = 1930MHz, 1930.6 MHz, 1945 MHz. Block B = 1950 MHz, 1950.6 MHz, 1965 MHz. Block C = 1975 MHz, 1975.6 MHz, 1990 MHz.

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
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*
Spectrum Analyzer	02472	HP	8568B	3001A18430	031103	031104
QP Adapter	01437	HP	85650A	3303A01884	092702	092703
Horn Antenna 1-18 GHz	0849	EMCO	3115	6246	091002	091003
Horn Antenna 18-20 GHz	02112	HP	RA42-K-F-4B-C	961178-006	070103	070105
Microwave Pre-amp	00786	HP	83017A	3123A00281	091102	091103
HeliAx Antenna cable	NA	Andrew	LDF1-50	Cable#20	091102	091103
12' SMA Cable	01337	W.L.Gore	NA	244922	121602	121603
13" SMA Cable	P1510	GoreTex	3825510-10	244910	012103	012104
Spectrum Analyzer	02467	HP	7405E	US40240225	033103	033104
2.4GHz HPF	01440	K & L	91H31-3000	01440	101802	101803
Loop Antenna	00314	EMCO	6502	2014	072302	072303*

*This equipment was in calibration at the actual time of testing.

Operating Frequency: 1930 MHz - 1945 MHz
 Channels: 1930 MHz, 1930.6 MHz & 1945 MHz
 Highest Measured Output Power: 50.97 ERP(dBm)= 125 ERP(Watts)
 Distance: 3 meters
 Limit: $43+10\text{Log}(P)$ 63.97 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
5,805.64	-17.3	Horiz	68.27
3,875.30	-18.10	Vert	69.07
5,791.10	-19.80	Horiz	70.77
3,860.80	-20.00	Vert	70.97
3,875.40	-20.40	Horiz	71.37
7,735.90	-20.90	Horiz	71.87
7,750.80	-21.00	Horiz	71.97
5,820.40	-21.20	Horiz	72.17
3,860.90	-21.80	Horiz	72.77
5,805.60	-21.90	Vert	72.87
3,890.00	-25.40	Vert	76.37
5,790.60	-27.20	Vert	78.17
3,890.10	-27.60	Horiz	78.57
5,820.10	-27.80	Vert	78.77
5,834.90	-30.80	Horiz	81.77
5,776.40	-33.40	Horiz	84.37
104.35	-34.70	Vert	85.67
3,846.10	-35.80	Horiz	86.77
3,846.00	-36.80	Vert	87.77
136.12	-46.30	Horiz	97.27
131.49	-52.10	Vert	103.07
733.80	-66.20	Vert	117.17

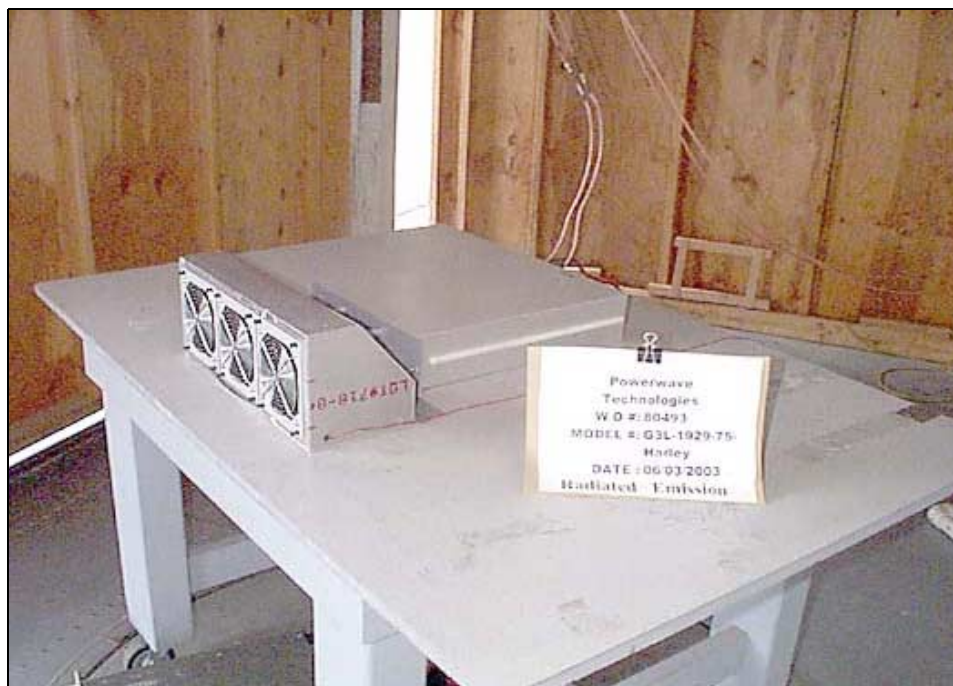
Operating Frequency: 1950 MHz - 1965 MHz
 Channels: 1950 MHz, 1950.6 MHz & 1965 MHz
 Highest Measured Output Power: 50.97 ERP(dBm)= 125 ERP(Watts)
 Distance: 3 meters
 Limit: $43+10\text{Log}(P)$ 63.97 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
3,915.14	-17.3	Vert	68.27
5,880.00	-19.30	Horiz	70.27
3,900.70	-19.70	Vert	70.67
7,816.00	-20.10	Horiz	71.07
5,880.20	-20.30	Vert	71.27
5,865.69	-20.90	Vert	71.87
5,865.69	-15.70	Vert	66.67
7,816.00	-21.30	Vert	72.27
3,900.80	-21.30	Horiz	72.27
5,865.55	-21.50	Horiz	72.47
5,865.55	-16.50	Horiz	67.47
3,915.30	-21.90	Horiz	72.87
5,851.00	-23.10	Horiz	74.07
5,850.90	-23.80	Vert	74.77
3,929.90	-24.80	Vert	75.77
5,895.00	-30.10	Horiz	81.07
3,930.30	-30.20	Horiz	81.17
3,885.80	-34.30	Horiz	85.27
3,886.20	-36.10	Vert	87.07
60.52	-37.80	Vert	88.77
41.12	-42.30	Vert	93.27
129.28	-46.00	Vert	96.97
125.76	-48.40	Horiz	99.37
585.28	-63.70	Horiz	114.67
319.61	-72.10	Vert	123.07

Operating Frequency: 1975 MHz - 1990 MHz
 Channels: 1975 MHz, 1975.6 MHz & 1990 MHz
 Highest Measured Output Power: 50.97 ERP(dBm)= 125 ERP(Watts)
 Distance: 3 meters
 Limit: $43+10\text{Log}(P)$ 63.97 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
5,940.55	-17.9	Horiz	68.87
7,916.10	-18.60	Horiz	69.57
3,965.50	-18.90	Vert	69.87
3,950.80	-19.40	Vert	70.37
5,926.10	-19.50	Horiz	70.47
5,940.55	-20.30	Vert	71.27
5,925.80	-20.60	Vert	71.57
3,965.30	-22.30	Horiz	73.27
5,955.30	-23.20	Vert	74.17
5,955.10	-23.30	Horiz	74.27
3,950.80	-24.50	Horiz	75.47
3,979.80	-25.00	Vert	75.97
7,915.60	-27.60	Vert	78.57
3,980.10	-28.20	Horiz	79.17
5,911.30	-30.40	Horiz	81.37
3,936.00	-31.80	Vert	82.77
5,911.30	-32.60	Vert	83.57
5,969.80	-33.60	Vert	84.57
5,970.30	-34.40	Horiz	85.37
3,935.80	-38.80	Horiz	89.77
93.84	-42.40	Vert	93.37
128.08	-44.70	Horiz	95.67
130.42	-45.70	Vert	96.67
124.64	-46.90	Horiz	97.87
45.78	-48.00	Vert	98.97
996.06	-62.10	Vert	113.07

Test Setup Photos



Radiated Emissions - Front View (30-1000 MHz)



Radiated Emissions - Back View (30-1000 MHz)



Radiated Emissions 18-20 GHz



Radiated Emissions 1-18 GHz



Radiated Emissions 9 kHz - 30 MHz

FCC 2.1033(c)(14)/2.1055(a) - FREQUENCY STABILITY

Not applicable to this unit.

FCC 2.1091 – MPE CALCULATIONS

Date of Report: July 07th 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-1929-75 “Harley”

FCC Identification: NA

Fundamental Operating Frequency: 1930-1990 MHz

Maximum Rated Output Power: 125 watt

Measured Output Power: 125 watt

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

MPE Limit for 1930-1990 MHz = 1 mW/cm² (10 W/m²)

Power Output (Watts)	Power Density Limit (mW/cm ²)	Minimum Distance (Meters)
125	1	0.99

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

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 0.9973 meter.

Calculation:

$$d = \sqrt{\frac{30 \times 125 \times 1}{10 \times 377}}$$

= 0.9973meter.

FCC 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 A**
 Work Order #: **80493** Date: 06/05/2003
 Test Type: **Maximized emission** Time: 13:11:58
 Equipment: **Power Amplifier** Sequence#: 1
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: G3L-1929-75-"Harley" S/N: 002

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Power Amplifier*	Powerwave Technologies	G3L-1929-75-"Harley"	002

Support Devices:

Function	Manufacturer	Model #	S/N
Power Meter	HP	E4418B	US39251692
Signal Amplifier	Comtech	PST	NA
Signal Generator	Agilent	E4433B	US40051329
DC Power Supply	HP	6269B	2436A-11867

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. Mode: Idle Frequency range of measurement = 30 MHz – 1000 MHz. Frequency 30 MHz - 1000 MHz; RBW=120 kHz, VBW=120 kHz, 27VDC (Support power supply: 208VAC, 60 Hz), 21°C, 68% relative humidity. Modification: Installed Steward 28A2029-0A0 on internal DC power cable.

Transducer Legend:

T1=Bicon SN220 092303	T2=Cable #10 070803
T3=Cable 15 123002	T4=Preamp 8447D 082303

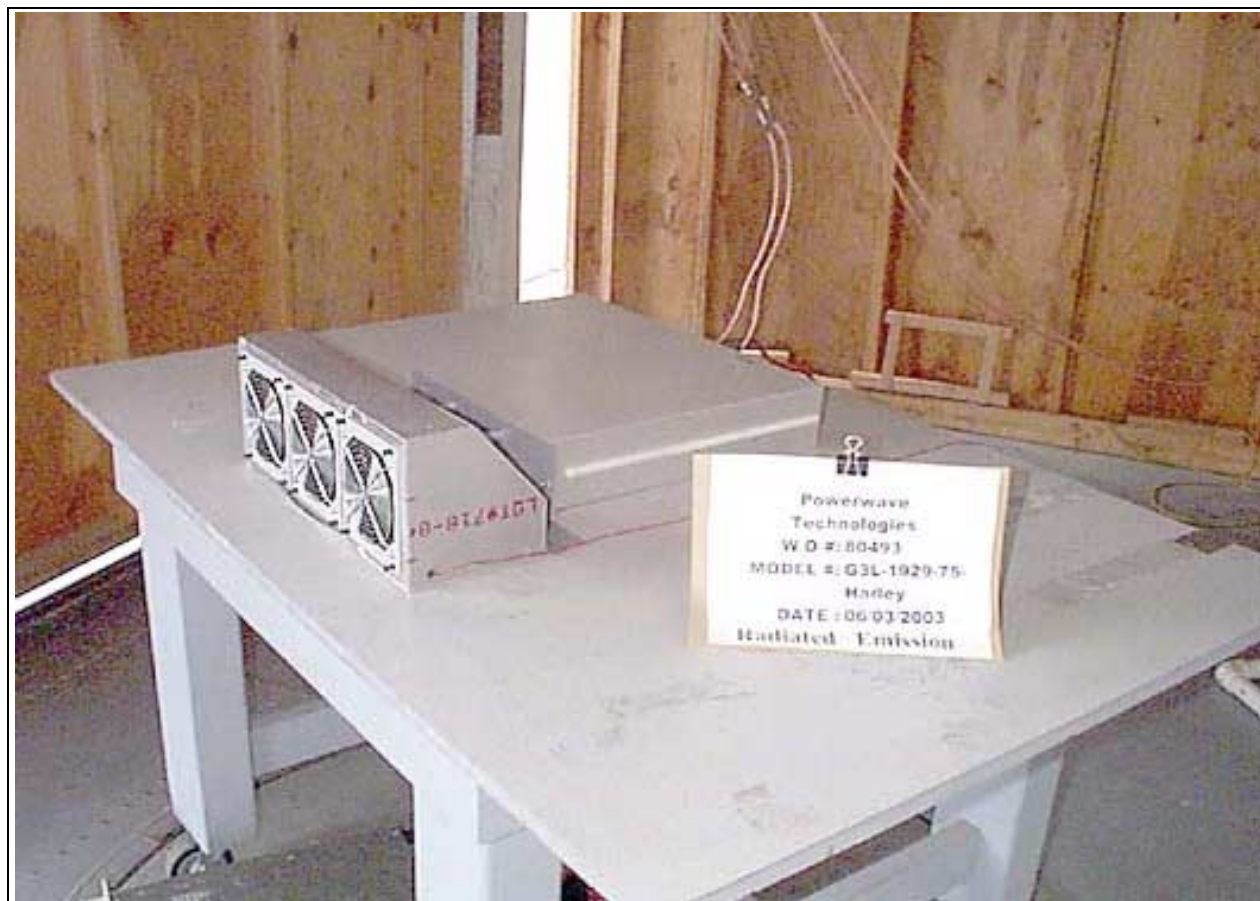
Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	35.900M	45.5	+16.8	+0.1	+1.1	-28.5	+0.0	35.0	39.1	-4.1	Vert
QP											
^	35.900M	48.3	+16.8	+0.1	+1.1	-28.5	+0.0	37.8	39.1	-1.3	Vert
3	114.740M	47.2	+14.9	+0.2	+1.9	-28.3	+0.0	35.9	43.5	-7.6	Vert
4	44.020M	43.7	+13.5	+0.1	+1.1	-28.5	+0.0	29.9	39.1	-9.2	Vert
5	41.465M	42.2	+14.7	+0.1	+1.1	-28.5	+0.0	29.6	39.1	-9.5	Vert
6	71.998M	47.9	+7.0	+0.1	+1.5	-28.5	+0.0	28.0	39.1	-11.1	Vert
7	68.740M	44.4	+7.1	+0.1	+1.5	-28.5	+0.0	24.6	39.1	-14.5	Vert
8	65.900M	42.5	+7.7	+0.1	+1.4	-28.5	+0.0	23.2	39.1	-15.9	Vert

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
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
Spectrum Analyzer	02472	HP	8568B	3001A18430	031103	031104
QP Adapter	01437	HP	85650A	3303A01884	092702	092703

Test Setup Photos



Radiated Emissions - Front View (30-1000 MHz)



Radiated Emissions - Back View (30-1000 MHz)