



**ADDENDUM TO POWERWAVE TECHNOLOGIES, INC. TEST REPORT FC06-032**

**FOR THE**

**MULTI-CARRIER RF POWER AMPLIFIER, G3L-850-160**

**FCC PART 22 AND RSS-131**

**COMPLIANCE**

**DATE OF ISSUE: JULY 25, 2006**

**PREPARED FOR:**

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

P.O. No.: 107080

W.O. No.: 85226

**PREPARED BY:**

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Mariposa, CA 95338

Date of test: May 18-July 24, 2006

**Report No.: FC06-032A**

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## ADMINISTRATIVE INFORMATION

**DATE OF TEST:** May 18-July 24, 2006

**DATE OF RECEIPT:** May 18, 2006

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

**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:** FCC Part 22 and RSS-131

**PURPOSE OF TEST:** To demonstrate the compliance of the Multi-Carrier RF Power Amplifier, G3L-850-160 with the requirements for FCC Part 22 and RSS-131 devices.  
**Addendum A** adds RF power for RSS-131 with new testing.

**FCC TO CANADA STANDARD CORRELATION MATRIX**

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS 131	5.4	N/A	N/A	External Controls
RSS 131	5.5	47 CFR	1.1307	RF Exposure
RSS 131	6.1	N/A	N/A	Passband Gain and Bandwidth
RSS 131	6.2	47 CFR	22.913	RF Power Output
RSS 131	6.3	TIA/EIA	603	Non-Linearity (Intermodulation Attenuation)
RSS 131	6.4	47 CFR	22.917	Spurious Emissions Limitations
RSS 131	6.5	N/A	N/A	Frequency Stability (Band Translators)
	3172-D		100638	Site File No.

**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



Stuart Yamamoto, 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

### Multi-Carrier RF Power Amplifier

Manuf: Powerwave Technologies  
Model: G3L-850-160  
Serial: PD00000ERN  
FCC ID: pending

## PERIPHERAL DEVICES

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

### Linear DC Power Supply

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

### Preamplifier

Manuf: Mini-Circuits  
Model: ZHL-4240  
Serial: NA

### Signal Generator

Manuf: Agilent  
Model: E4432B  
Serial: GB40051459

### Directional Coupler

Manuf: HP  
Model: 86205A  
Serial: NA

### Band Pass Filter

Manuf: Lorch Microwave  
Model: WF-11065  
Serial: AB 26

### Signal Generator (2 each)

Manuf: Agilent  
Model: E4433B  
Serial: US40051853 &  
US40051477

### 30dB Attenuator

Manuf: Aeroflex/Weinschel  
Model: 82-30-33  
Serial: NH108

### 20dB Attenuator

Manuf: Weinschel  
Model: 24-20-34  
Serial: BJ9847



**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**

F1D, F8W, DXW, F9W, GXW, G7W

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

869 MHz – 894 MHz.

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

185 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**

AMPS DATA, AMPS VOICE, CDMA, GSM, EDGE, TDMA, WCDMA

**FCC 2.1033(c)(14)/2.1046/22.913(a) - RF POWER OUTPUT**

**22.913 Effective radiated power limits**

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) *Maximum ERP.* The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

**Test Conditions:** The equipment under test (EUT) is a multi-carrier RF power amplifier for cellular phone base station use. The EUT is placed on the tabletop. Connected to the EUT are DC power cables, a RF input coaxial cable, and a RF output coaxial cable. Signal generators provide the modulated signal which is fed through a combiner, preamplifier, band pass filter and then to the EUT RF input port. The EUT RF output is fed through a high power attenuator, directional coupler, attenuator, power sensor and then to the power meter.

The RF power of the EUT was measured at the antenna port. Three input channels were chosen due to the Intermodulation Test setup and are used here for demonstrative purposes.

**Results**

<b>Modulation</b>	<b>Total Power in Watts</b>
AMPS DATA	185
AMPS VOICE	185
CDMA	185
GSM	185
EDGE	185
TDMA	185
WCDMA	185

Since all readings were less than the limit of 500 Watts, the EUT fulfills the requirements of this section.

**Test Equipment**

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

**PHOTOGRAPH SHOWING RF POWER**



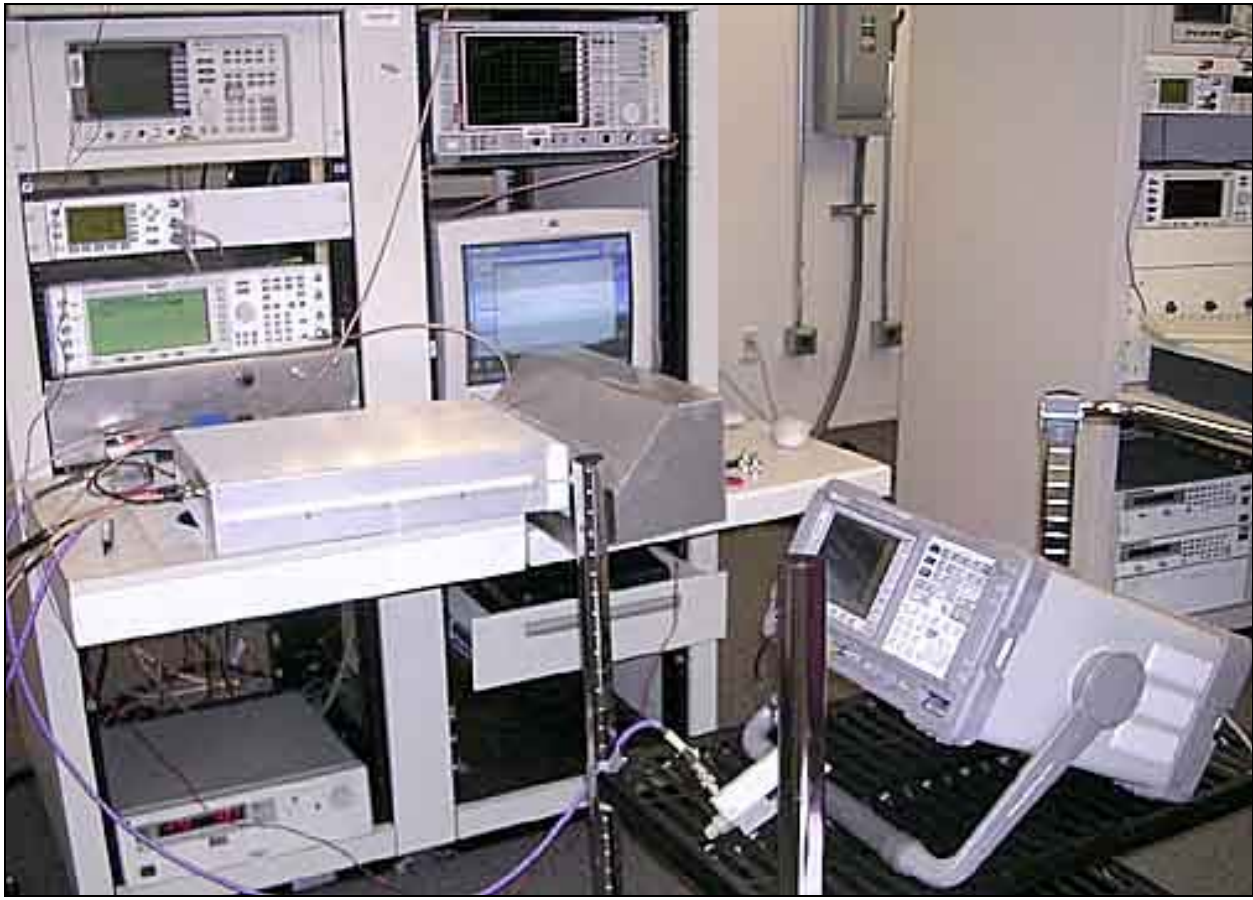


**RSS-131 - RF POWER OUTPUT**

**Test setup:** Two CW signals from two signal generators were combined and injected into the RF input port of the EUT. A spectrum analyzer was utilized for Output power measurement at the RF Output port. The Output power was then determined when third or fourth order modulation reached -43dB within the passband of the EUT. No inter-modulation product was generated. The built in protection measure shuts off the EUT.

10.2 dBm (16.6 Watts)

**PHOTOGRAPH SHOWING RF POWER OUTPUT**



**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032205	032207



**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)/2.1051/22.917(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 Part 22.917(a) Conducted Spurious Emision**  
 Work Order #: **85226** Date: 5/22/2006  
 Test Type: **Conducted Emissions** Time: 10:11:18  
 Equipment: **Multi-Carrier RF Power Amplifier** Sequence#: 1  
 Manufacturer: Powerwave Technologies Tested By: Stuart Yamamoto  
 Model: G3L-850-160 27Vdc  
 S/N: PD00000ERN

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

Function	Manufacturer	Model #	S/N
Multi-Carrier RF Power Amplifier*	Powerwave Technologies	G3L-850-160	PD00000ERN

***Support Devices:***

Function	Manufacturer	Model #	S/N
Band Pass Filter	Lorch Microwave	WF-11065	AB 26
Preamplifier	Mini-Circuits	ZHL-4240	
Signal Generator	Agilent	E4433B	US40051853
Linear DC Power Supply	HP	6269B	2436A-11867

***Test Conditions / Notes:***

The signal generator is providing the input signal to the EUT. From the signal generator the signal goes to the preamplifier and then the band pass filter before reaching the input of the EUT. The output of the EUT is connected to attenuators and a directional coupler. From the directional coupler the EUT fundamental output power is read. The spectrum analyzer is connected to the output of the directional coupler through another attenuator. The output of the EUT is putting out 185 watts. The data represented in this data sheet if for the EUT with the following modulations: AMPS VOICE, AMPS DATA, EDGE, GSM, TDMA, CDMA, and WCDMA. Frequency range scanned and maximized, 9kHz to 9GHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-9000 MHz RBW=1 MHz, VBW=1 MHz. Voltage to the EUT is 27VDC. Temperature: 18°C, Humidity: 60%, Pressure: 100kPa.

***Transducer Legend:***

T1=1-40 GHz Cable_011708	T2=HPF_AN02116_1.5GHz_062707
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***Measurement Data:***

Reading listed by margin.

Test Lead: None

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	Dist dB	Corr dB	Spec dBµV/m	Margin dB	Polar Ant
1	1787.003M	85.9	+0.5	+0.5	+0.0	86.9	94.0	-7.1	None
							EDGE modulation		
2	1783.017M	85.8	+0.5	+0.5	+0.0	86.8	94.0	-7.2	None
							WCDMA modulation		
3	1763.022M	85.5	+0.5	+0.5	+0.0	86.5	94.0	-7.5	None
							CDMA modulation		
4	1738.203M	85.4	+0.5	+0.6	+0.0	86.5	94.0	-7.5	None
							TDMA modulation		

5	1786.422M	85.4	+0.5	+0.5	+0.0	86.4	94.0	-7.6	None
							CDMA modulation		
6	1763.015M	85.3	+0.5	+0.5	+0.0	86.3	94.0	-7.7	None
							GSM modulation		
7	1787.708M	85.2	+0.5	+0.5	+0.0	86.2	94.0	-7.8	None
							AMPS DATA modulation		
8	1787.704M	85.2	+0.5	+0.5	+0.0	86.2	94.0	-7.8	None
							AMPS VOICE modulation		
9	1763.000M	85.1	+0.5	+0.5	+0.0	86.1	94.0	-7.9	None
							TDMA modulation		
10	1787.802M	85.0	+0.5	+0.5	+0.0	86.0	94.0	-8.0	None
							TDMA modulation		
11	1787.015M	85.0	+0.5	+0.5	+0.0	86.0	94.0	-8.0	None
							GSM modulation		
12	1763.004M	85.0	+0.5	+0.5	+0.0	86.0	94.0	-8.0	None
							AMPS VOICE modulation		
13	1763.007M	84.8	+0.5	+0.5	+0.0	85.8	94.0	-8.2	None
							AMPS DATA modulation		
14	1738.305M	84.5	+0.5	+0.6	+0.0	85.6	94.0	-8.4	None
							AMPS DATA modulation		
15	1743.022M	84.3	+0.5	+0.6	+0.0	85.4	94.0	-8.6	None
							WCDMA modulation		
16	1739.618M	84.3	+0.5	+0.6	+0.0	85.4	94.0	-8.6	None
							CDMA modulation		
17	1739.015M	84.3	+0.5	+0.6	+0.0	85.4	94.0	-8.6	None
							GSM modulation		
18	1738.307M	84.3	+0.5	+0.6	+0.0	85.4	94.0	-8.6	None
							AMPS VOICE modulation		
19	1763.007M	84.1	+0.5	+0.5	+0.0	85.1	94.0	-8.9	None
							EDGE modulation		
20	1763.017M	83.5	+0.5	+0.5	+0.0	84.5	94.0	-9.5	None
							WCDMA modulation		
21	1739.015M	83.4	+0.5	+0.6	+0.0	84.5	94.0	-9.5	None
							EDGE modulation		

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032505	032507
SMA Cable (White)	P05455	Pasteck	NA	1-40GHz_white	011706	011708
1.5 GHz HPF	02116	HP	84300-80037	3643A00027	062705	062707

**PHOTOGRAPH SHOWING DIRECT CONNECT TEST SETUP**





**FCC 2.1033(c)(14)/2.1053/22.917(a) - FIELD STRENGTH OF SPURIOUS RADIATION**

**Test Conditions:** The EUT is stand alone on the wooden table top RF out is connected to remote loadstring and power meter. RF in receives RF signal via remote ESGs and a premap. The RF level is adjusted to maintain the transmit power. Modulation :EDGE, Frequency = 869MHz, 881.5MHz and 894MHz, Power = 185 watts. Frequency range of measurement = 9 kHz - 9 GHz. Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz - 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz - 9,000 MHz RBW=1 MHz, VBW=1 MHz.

Operating Frequency: 869 MHz - 894 MHz  
 Channels: Low, Mid and High  
 Highest Measured Output Power: 52.67 ERP(dBm)= 185 ERP(Watts)  
 Distance: 3 meters  
 Limit:  $43+10\text{Log}(P)$  65.67 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
5,214.00	-23.4	Vert	76.07
4,344.98	-24.5	Horiz	77.17
4,345.12	-26.9	Vert	79.57
8,689.94	-29.1	Vert	81.77
5,214.00	-29.9	Horiz	82.57
5,214.00	-18.9	Horiz	71.57
8,689.95	-32.4	Horiz	85.07
1,738.05	-32.9	Vert	85.57
6,083.11	-34.4	Vert	87.07
7,821.06	-35.1	Vert	87.77
3,475.98	-35.6	Vert	88.27
3,476.02	-35.9	Horiz	88.57
6,083.15	-36.7	Horiz	89.37
1,738.00	-37.2	Horiz	89.87
7,821.08	-38.3	Horiz	90.97
6,952.11	-43.8	Vert	96.47
6,951.93	-43.9	Horiz	96.57
2,607.01	-45.5	Vert	98.17
2,607.03	-50.3	Horiz	102.97
959.02	-51.7	Vert	104.37
4,412.48	-22.8	Horiz	75.47
5,294.93	-23	Horiz	75.67
4,412.67	-27.4	Vert	80.07
1,764.90	-31.6	Vert	84.27
1,764.95	-36.2	Horiz	88.87
7,942.53	-36.5	Horiz	89.17
6,177.60	-36.6	Vert	89.27
7,942.46	-36.7	Vert	89.37
3,529.90	-36.9	Horiz	89.57
8,824.80	-37.3	Vert	89.97
5,295.10	-38	Vert	90.67
5,295.10	-20.7	Vert	73.37
2,647.67	-38.3	Vert	90.97
8,824.80	-38.4	Horiz	91.07
6,177.52	-38.7	Horiz	91.37
3,530.17	-39.7	Vert	92.37
7,059.97	-45	Horiz	97.67
7,060.05	-45.3	Vert	97.97
971.30	-49.6	Vert	102.27
2,647.45	-51.1	Horiz	103.77

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
5,364.05	-23.9	Vert	76.57
5,364.00	-26.1	Horiz	78.77
4,470.05	-27.2	Vert	79.87
4,470.00	-29.2	Horiz	81.87
4,470.01	-20	Horiz	72.67
3,576.05	-34.9	Horiz	87.57
3,575.90	-35	Vert	87.67
1,787.90	-35.8	Vert	88.47
8,940.05	-37.5	Vert	90.17
8,046.05	-38.2	Horiz	90.87
1,788.05	-38.7	Horiz	91.37
8,940.05	-39.5	Horiz	92.17
8,046.05	-41.9	Vert	94.57
2,681.90	-42.1	Vert	94.77
6,258.05	-42.7	Vert	95.37
7,152.05	-44.2	Horiz	96.87
7,152.05	-44.4	Vert	97.07
2,682.05	-48.2	Horiz	100.87
6,258.05	-48.2	Horiz	100.87



**Test Equipment**

<b>Equipment</b>	<b>Asset #</b>	<b>Manufacturer</b>	<b>Model #</b>	<b>Serial #</b>	<b>Cal Date</b>	<b>Cal Due</b>
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
<b>30MHz-1000MHz</b>						
Bilog Antenna	01995	Chase	CBL6111C	2451	020206	020208
Pre-amp	00309	HP	8447D	1937A02548	071404	071406
Antenna cable	P05198	Belden	8268 (RG-214)	Cable#15	010305	010307
Pre-amp to SA cable	P05050	Pasternack	RG223/U	Cable#10	051605	051607
<b>1GHz-9 GHz</b>						
Horn Antenna	00849	EMCO	3115	6246	072204	072206
Microwave Pre-amp	00786	HP	83017A	3123A00281	081204	081206
Helix Antenna cable	P04384	Andrew	LDF1-50	Cable#20	091604	091606
24" SMA Cable (White)	P05204	Pasterneck	35591-48	1-40GHz_white	020805	020807
1.5 GHz HPF	02116	HP	84300- 80037	3643A00027	062705	062707
<b>9kHz-30MHz</b>						
Loop Antenna	00314	EMCO	6502	2014	062804	062806

**PHOTOGRAPH SHOWING RADIATED EMISSIONS**



Radiated Emissions - Front View

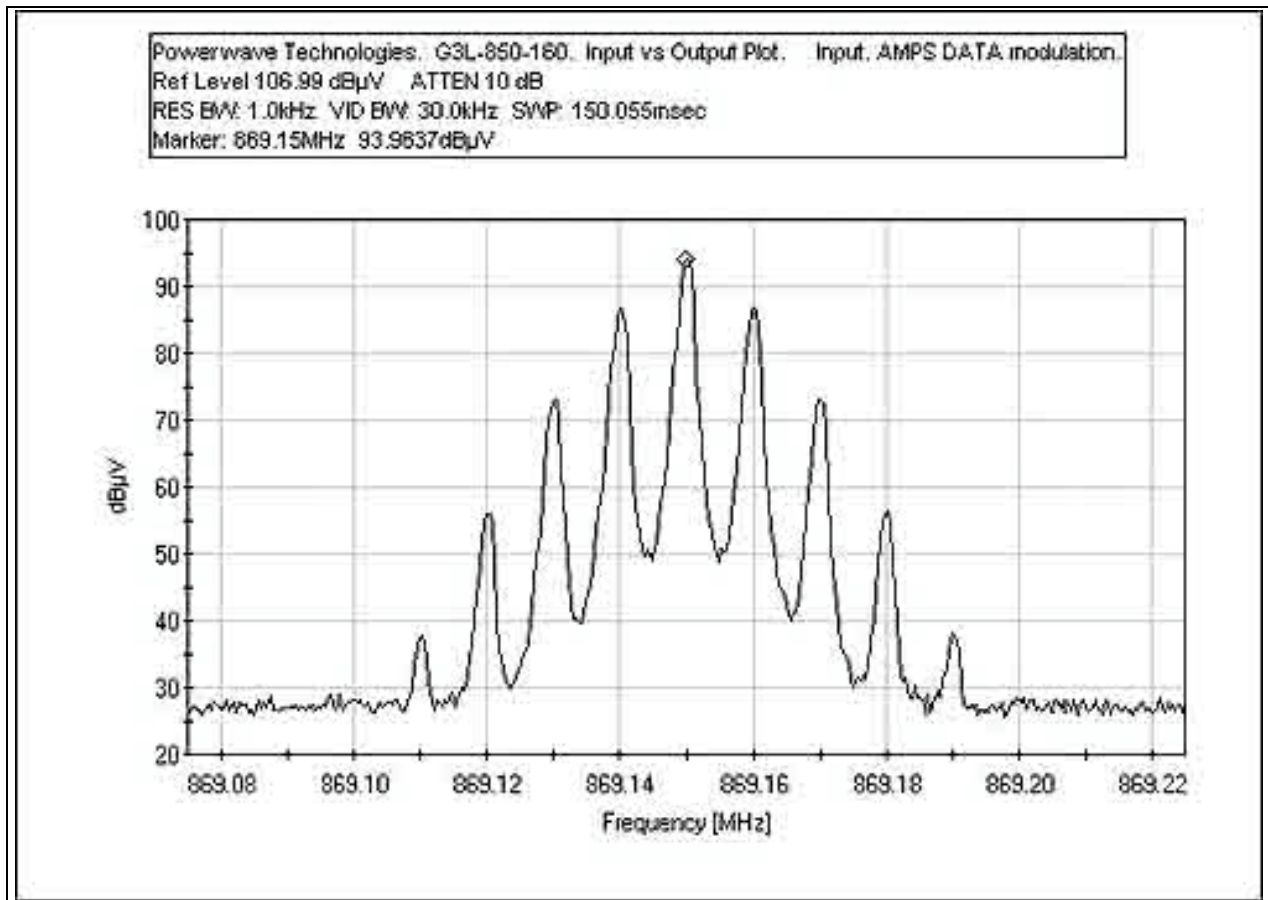
**PHOTOGRAPH SHOWING RADIATED EMISSIONS**



Radiated Emissions - Back View

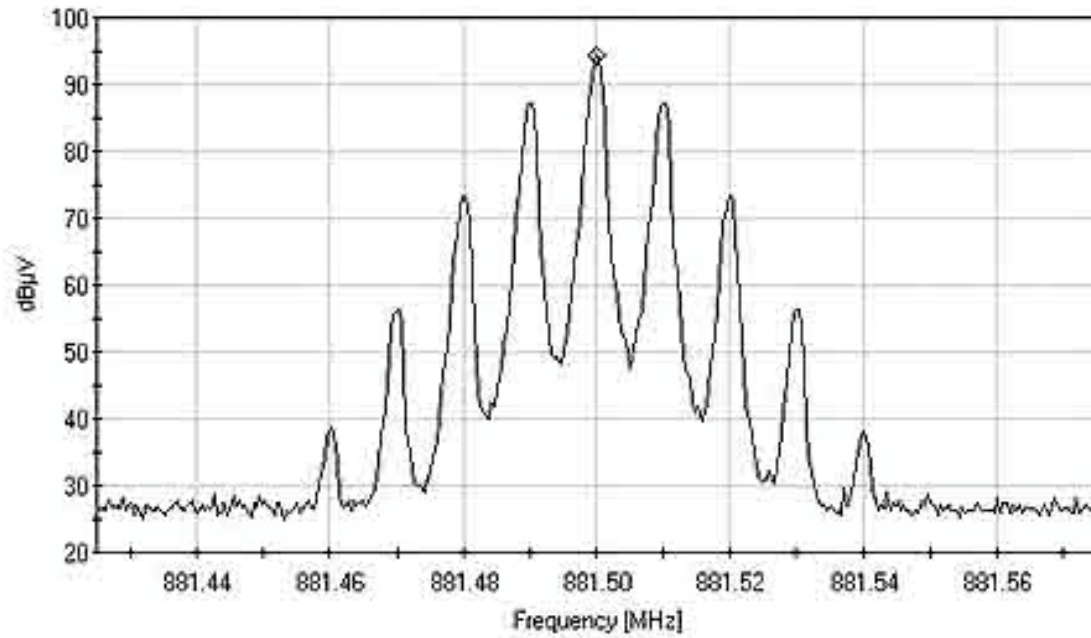
### INPUT PLOT - AMPS DATA - LOW

**Test Conditions:** The signal generator is providing the input signal to the EUT. From the signal generator the signal goes to the preamplifier and then the band pass filter before reaching the input of the EUT. The output of the EUT is connected to an attenuator and a directional coupler. From the directional coupler forward power port the EUT fundamental output power is read. The output reading was taken with the spectrum analyzer connected to the output of the directional coupler through another attenuator. The input reading was taken on the spectrum analyzer at the output of the band pass filter. The output of the EUT is putting out 185 watts. Data was taken for the EUT with the following modulations at low, middle and high channels: AMPS VOICE, AMPS DATA, EDGE, GSM, TDMA, CDMA, and WCDMA.



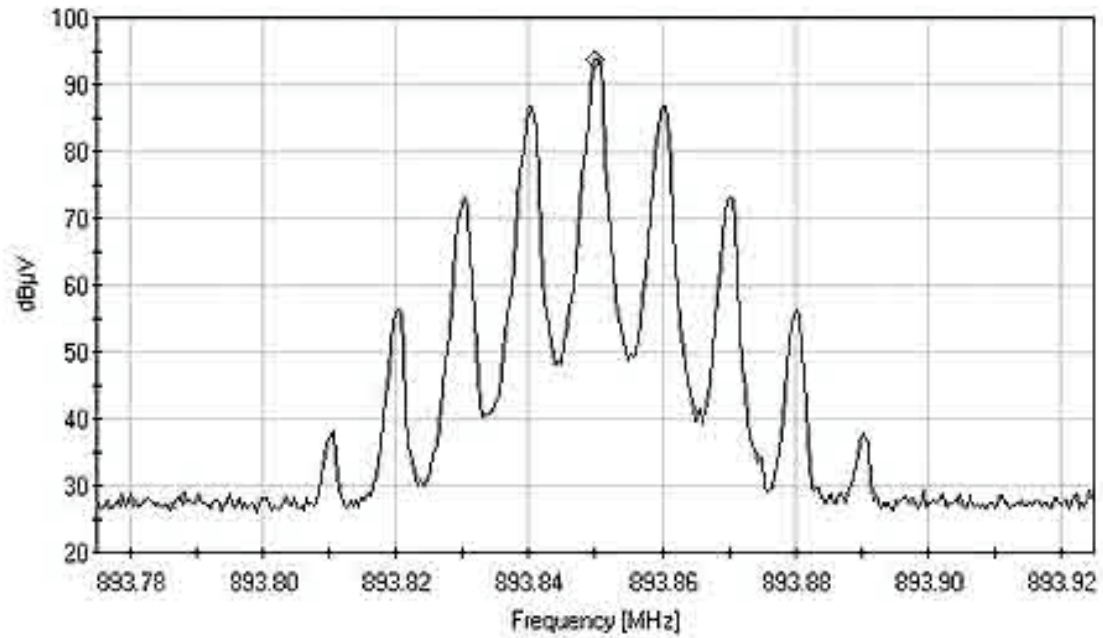
**INPUT PLOT - AMPS DATA - MID**

Powerwave Technologies, G3L-850-160, Input vs Output Plots, Middle Channel, Input, AMPS DATA modulation  
Ref Level 106.99 dB $\mu$ V ATTN 10 dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 150.055msec  
Marker: 881.5MHz 94.2877dB $\mu$ V

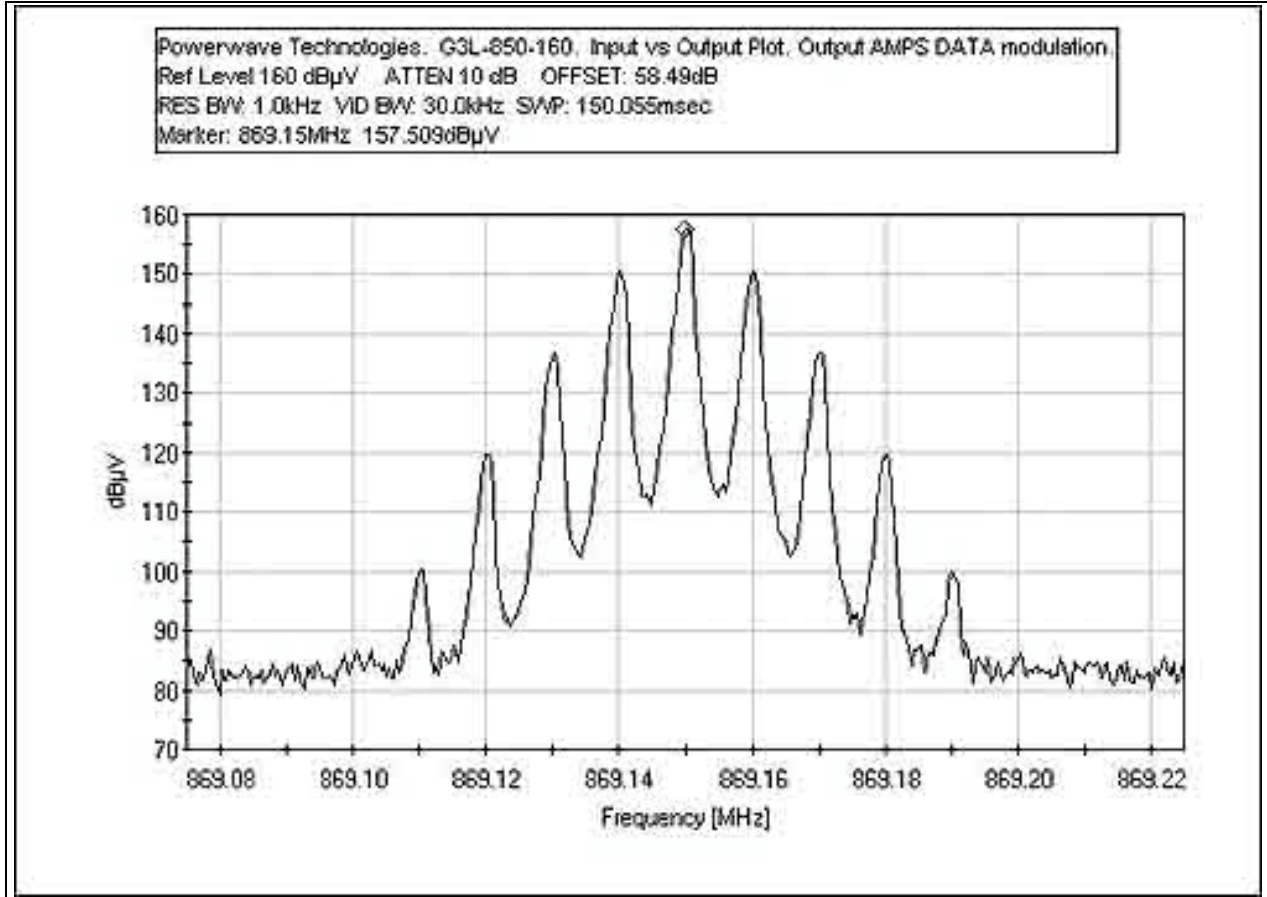


### INPUT PLOT - AMPS DATA - HIGH

Powerwave Technologies, G3L-850-160, Input vs Output Plots, Input, High, AMPS DATA modulation,  
Ref Level 106.99 dB $\mu$ V ATTEN 10 dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 150.055msec  
Marker: 893.85MHz 93.8397dB $\mu$ V

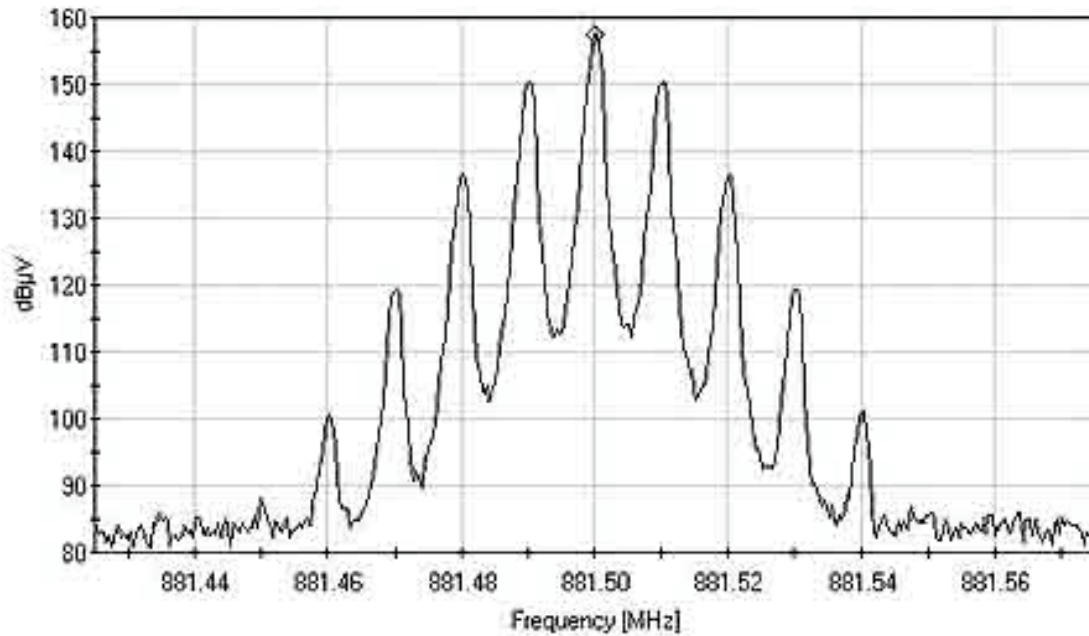


**OUTPUT PLOT - AMPS DATA - LOW**



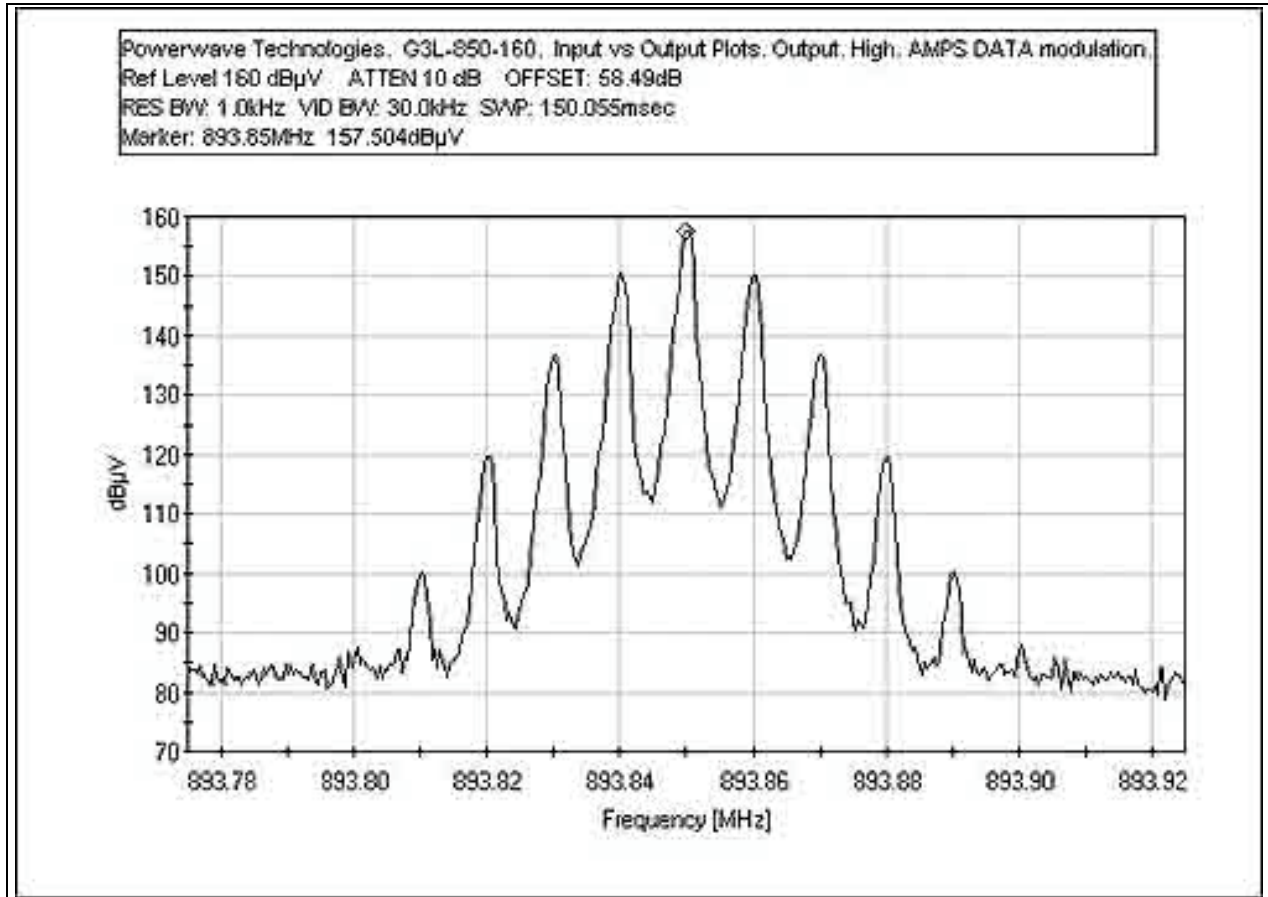
**OUTPUT PLOT - AMPS DATA - MID**

Powerwave Technologies: G3L-850-160, Input vs Output Plots, Middle Channel, Output, AMPS DATA modulation  
Ref Level 160 dB $\mu$ V ATTN 10 dB OFFSET: 58.59dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 150.055msec  
Marker: 881.5MHz 157.494dB $\mu$ V



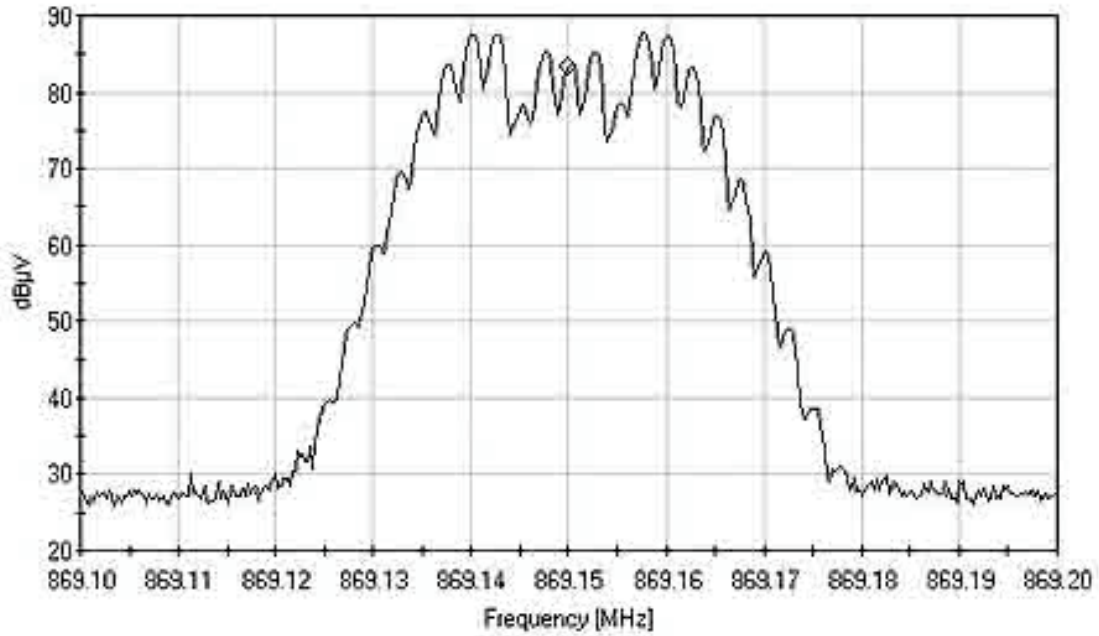


### OUTPUT PLOT - AMPS DATA - HIGH



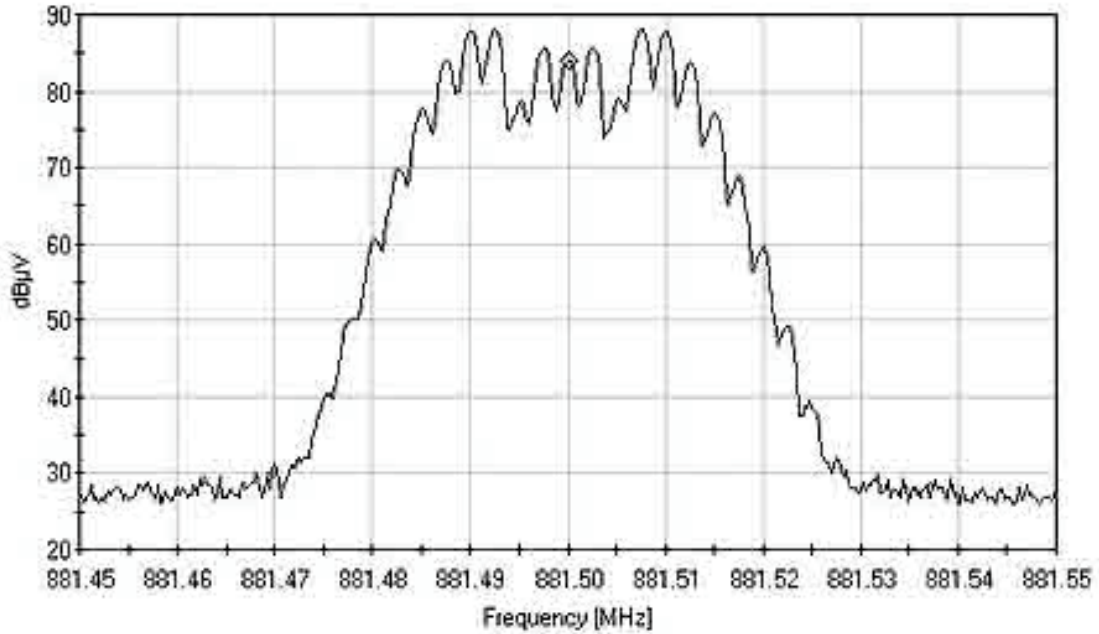
**INPUT PLOT - AMPS VOICE - LOW**

Powerwave Technologies: G3L-850-160, Input vs Output Plot, Input: AMPS VOICE modulation,  
Ref Level 106.99 dB $\mu$ V ATTEN 10 dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 100.037msec  
Marker: 869.15MHz 83.5287dB $\mu$ V



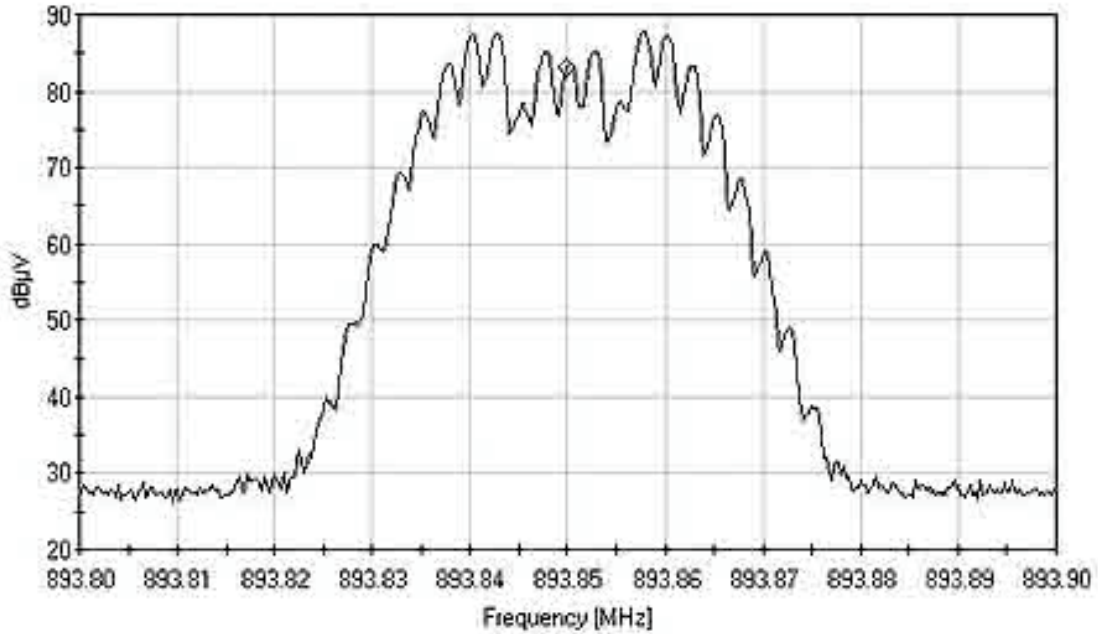
**INPUT PLOT - AMPS VOICE - MID**

Powerwave Technologies, G3L-850-160, Input vs Output Plots, Middle Channel, Input, AMPS VOICE modulation  
Ref Level 106.99 dB $\mu$ V ATTEN 10 dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 100.037msec  
Marker: 881.5MHz 83.9417dB $\mu$ V

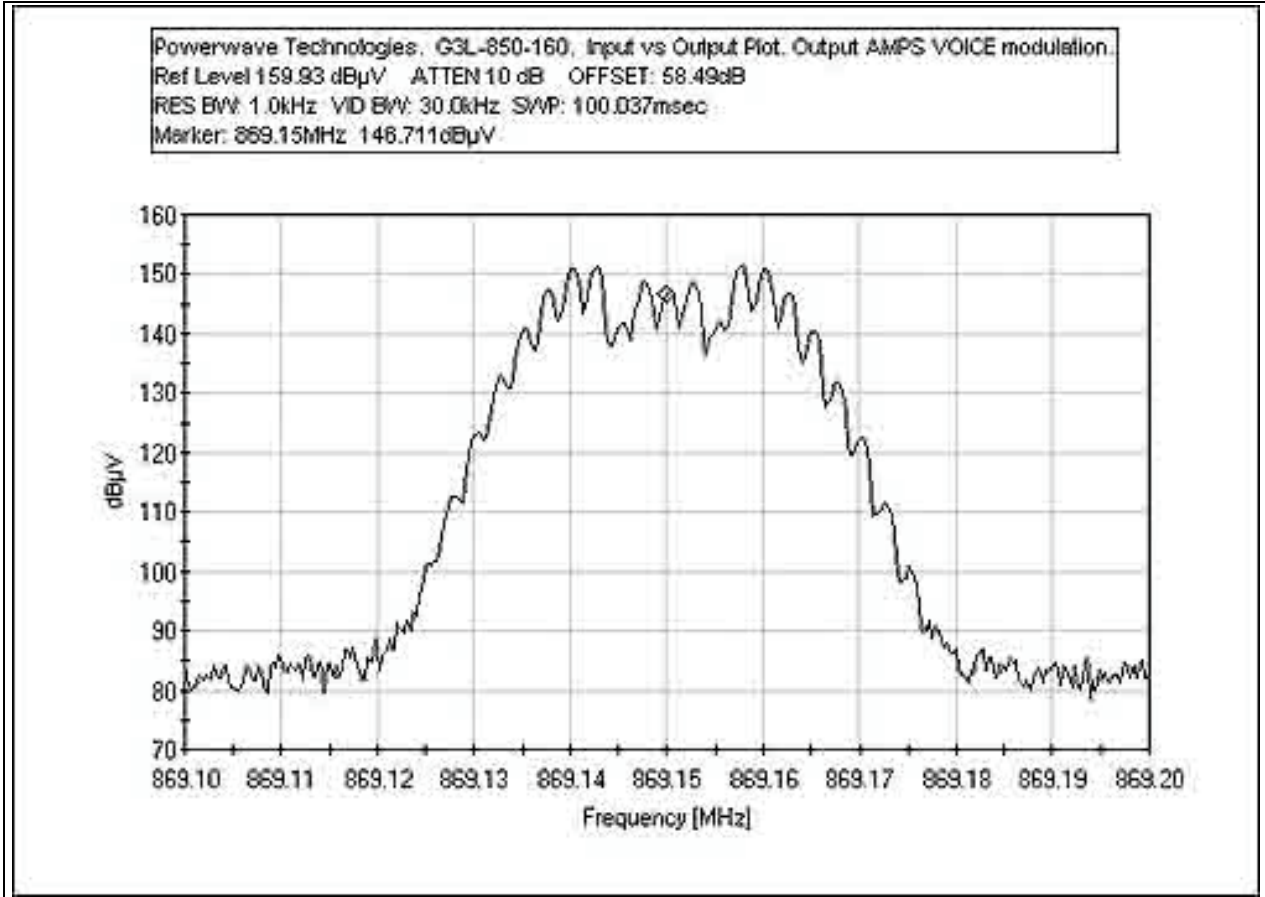


**INPUT PLOT - AMPS VOICE - HIGH**

Powerwave Technologies, G3L-850-160, Input vs Output Plots, Input, High, AMPS VOICE modulation,  
Ref Level 106.99 dB $\mu$ V ATTN 10 dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 100.037msec  
Marker: 893.85MHz 83.2707dB $\mu$ V

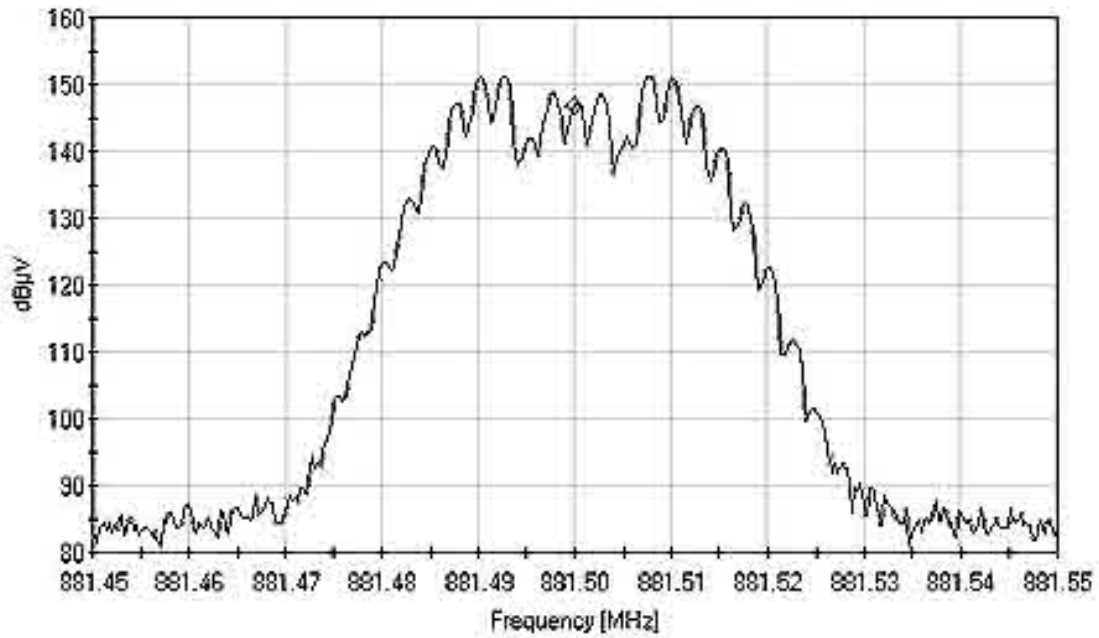


### OUTPUT PLOT - AMPS VOICE - LOW



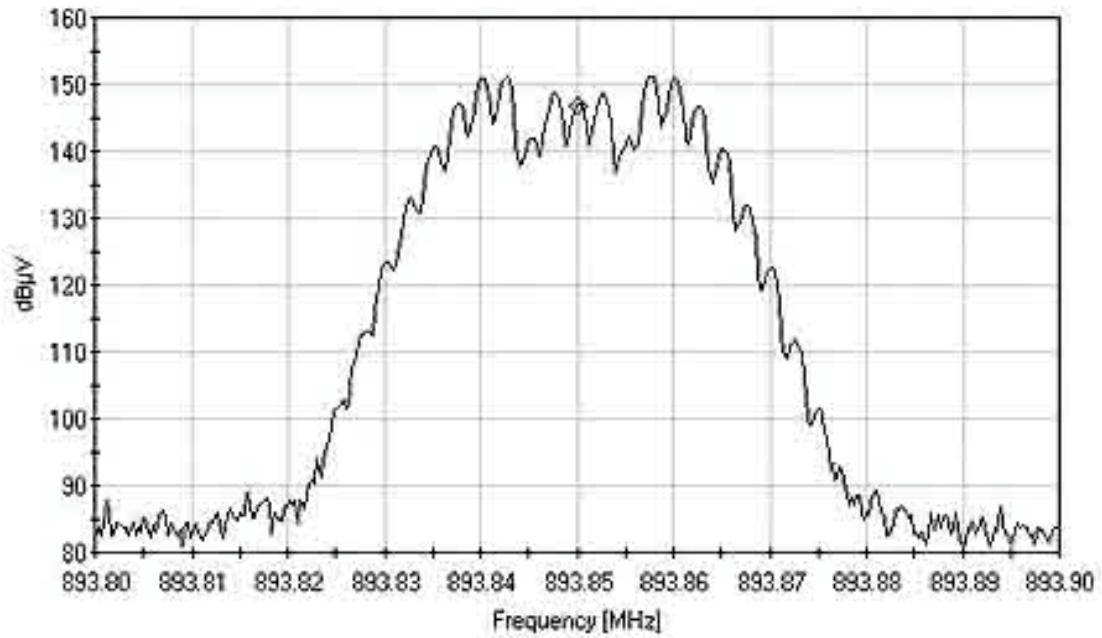
**OUTPUT PLOT - AMPS VOICE - MID**

Powerwave Technologies, G3L-850-160, Input vs Output Plots, Middle Channel, Output, AMPS VOICE modulation  
Ref Level 150 dB $\mu$ V ATTN 10 dB OFFSET: 58.59dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 100.037msec  
Marker: 881.5MHz 146.896dB $\mu$ V

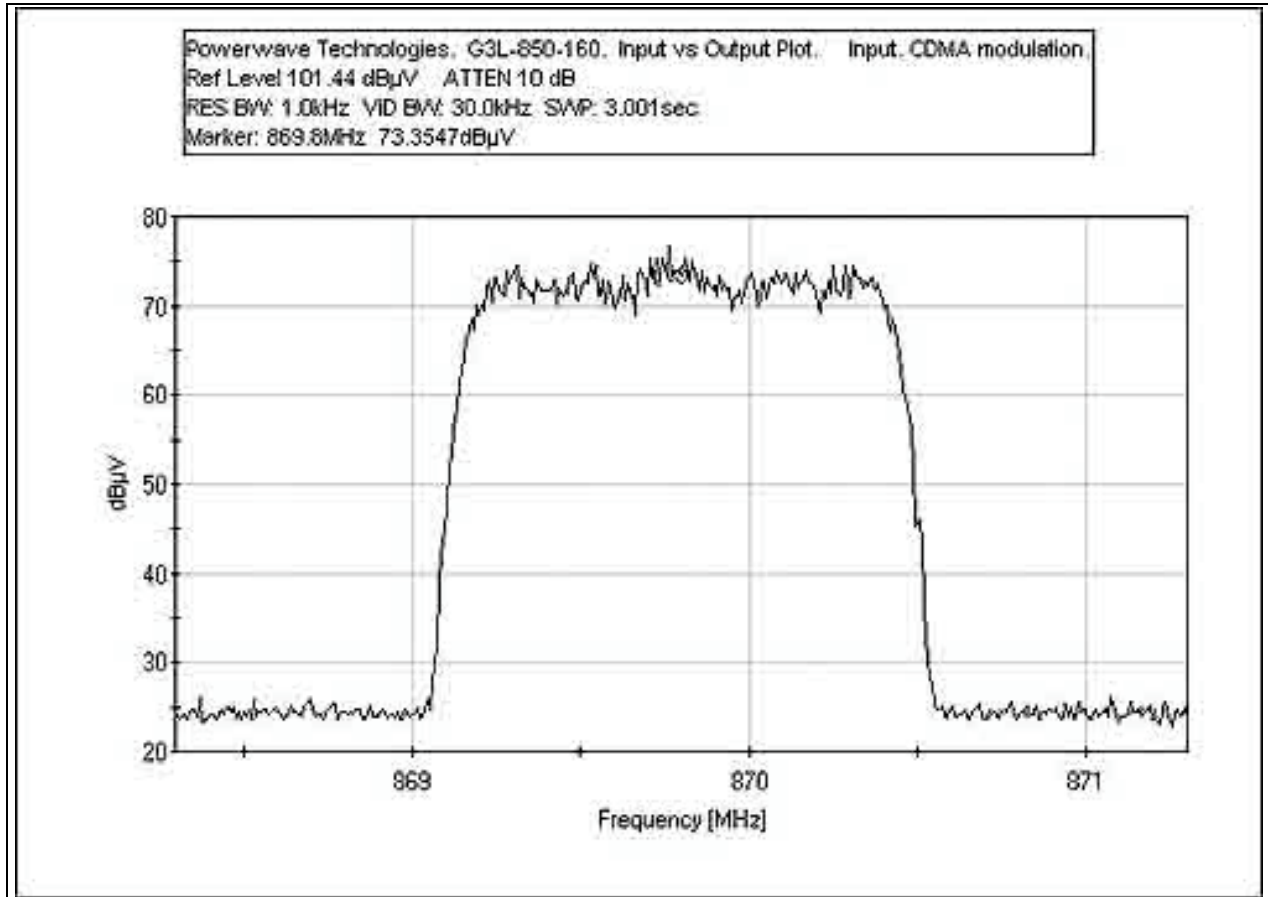


**OUTPUT PLOT - AMPS VOICE - HIGH**

Powerwave Technologies: G3L-850-160, Input vs Output Plots: Output: High, AMPS VOICE modulation,  
Ref Level 160 dB $\mu$ V ATTEN 10 dB OFFSET: 58.49dB  
RES BW: 1.0kHz VID BW: 30.0MHz SWP: 100.037msec  
Marker: 893.85MHz 146.913dB $\mu$ V

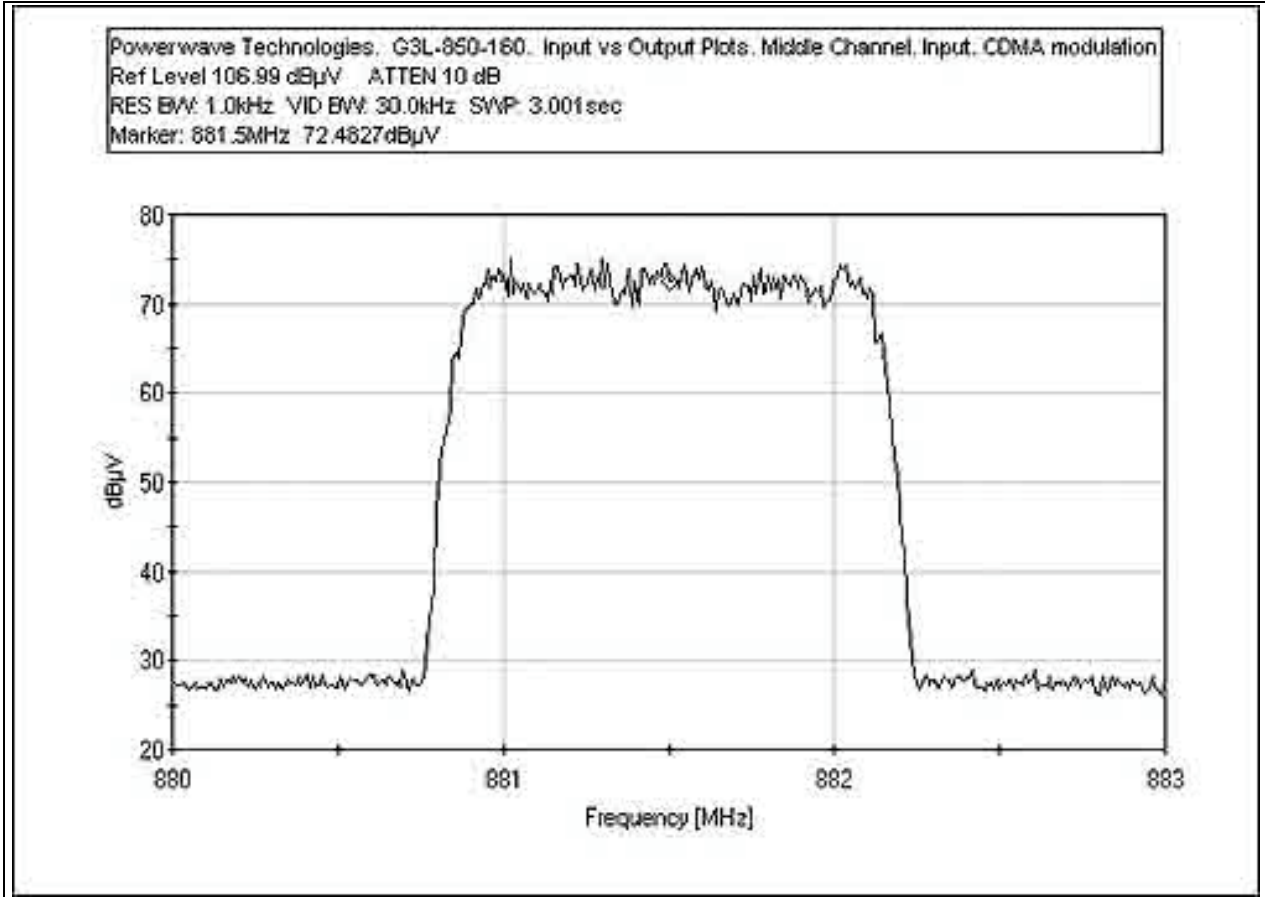


### INPUT PLOT - CDMA - LOW

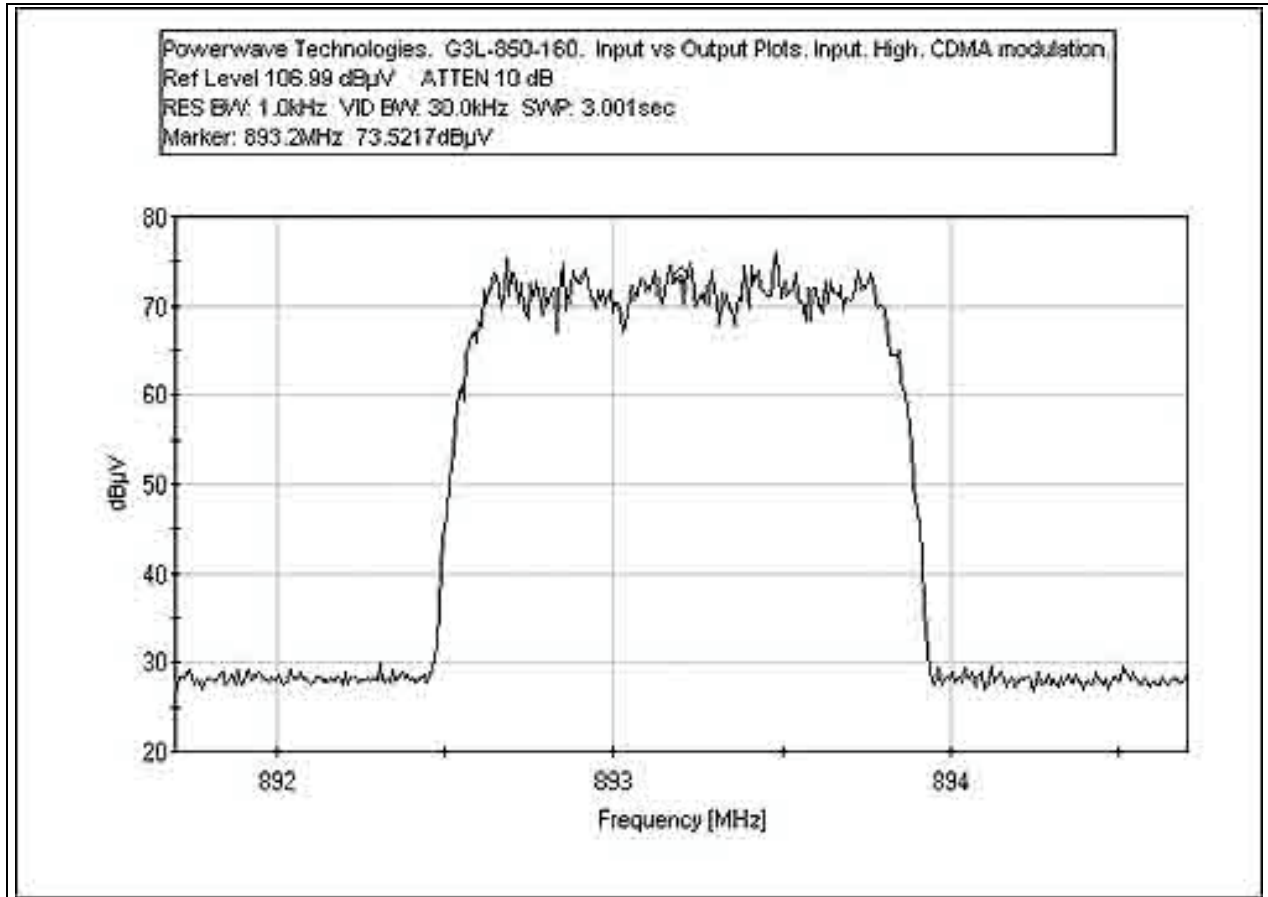




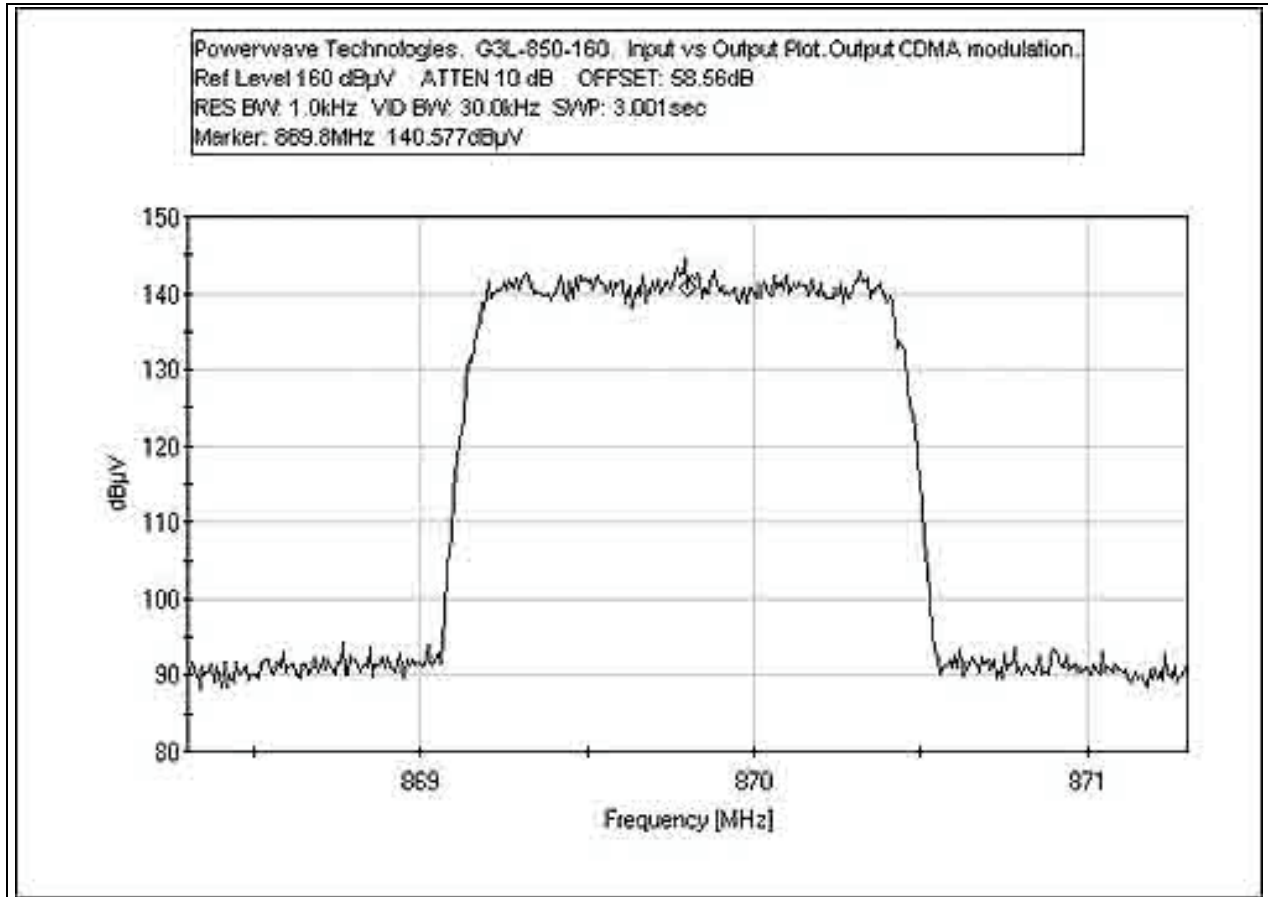
**INPUT PLOT - CDMA - MID**



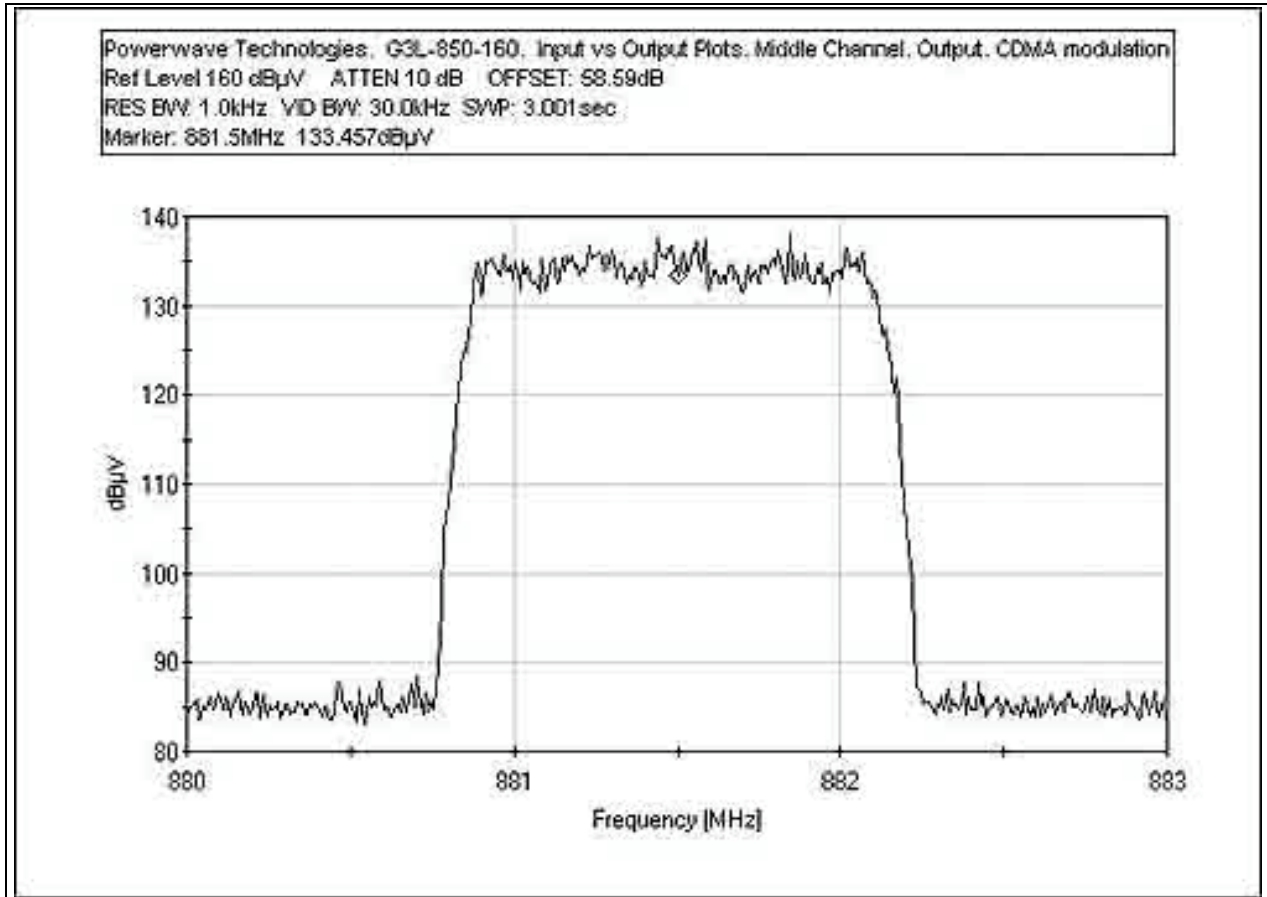
### INPUT PLOT - CDMA - HIGH



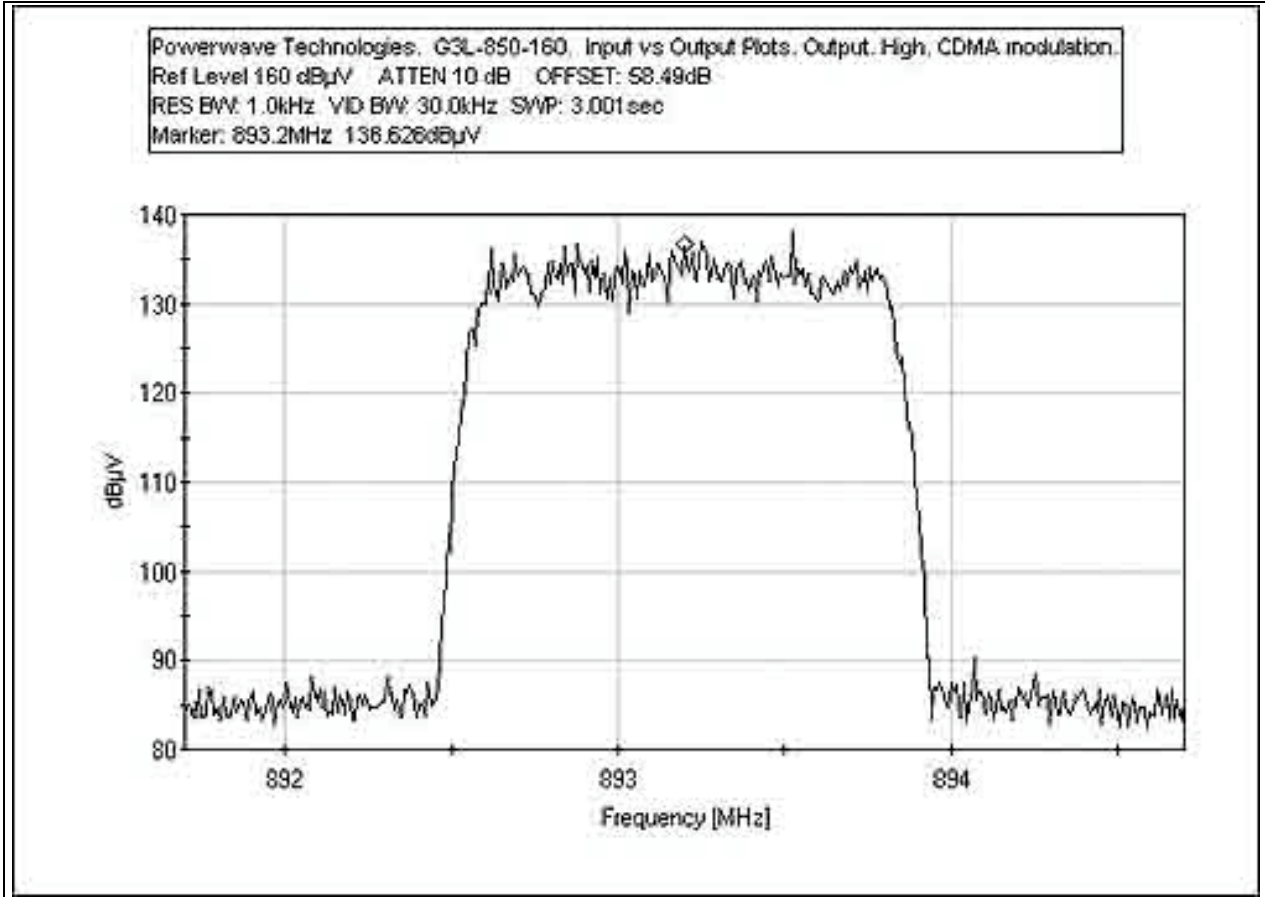
**OUTPUT PLOT - CDMA - LOW**



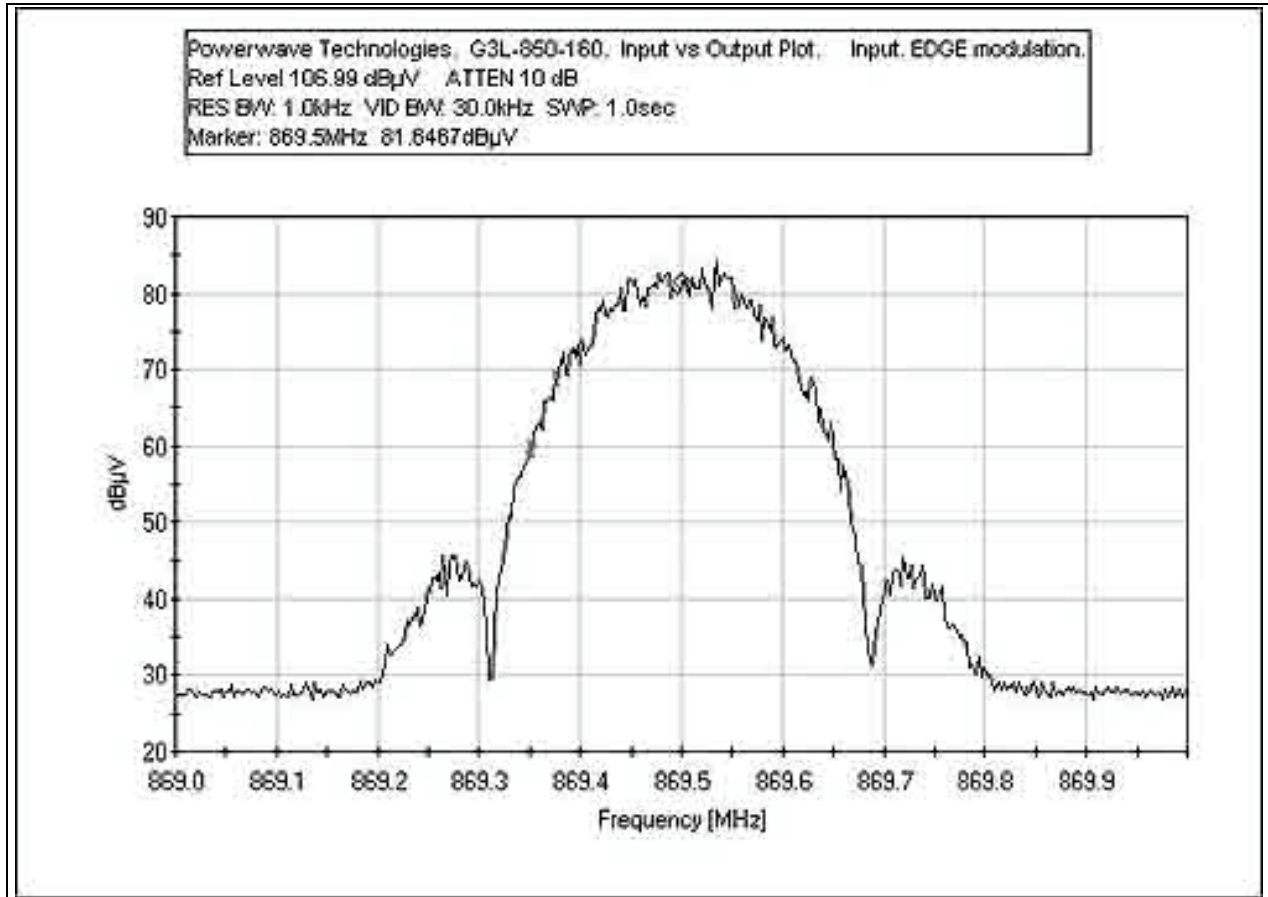
### OUTPUT PLOT - CDMA - MID



**OUTPUT PLOT - CDMA - HIGH**

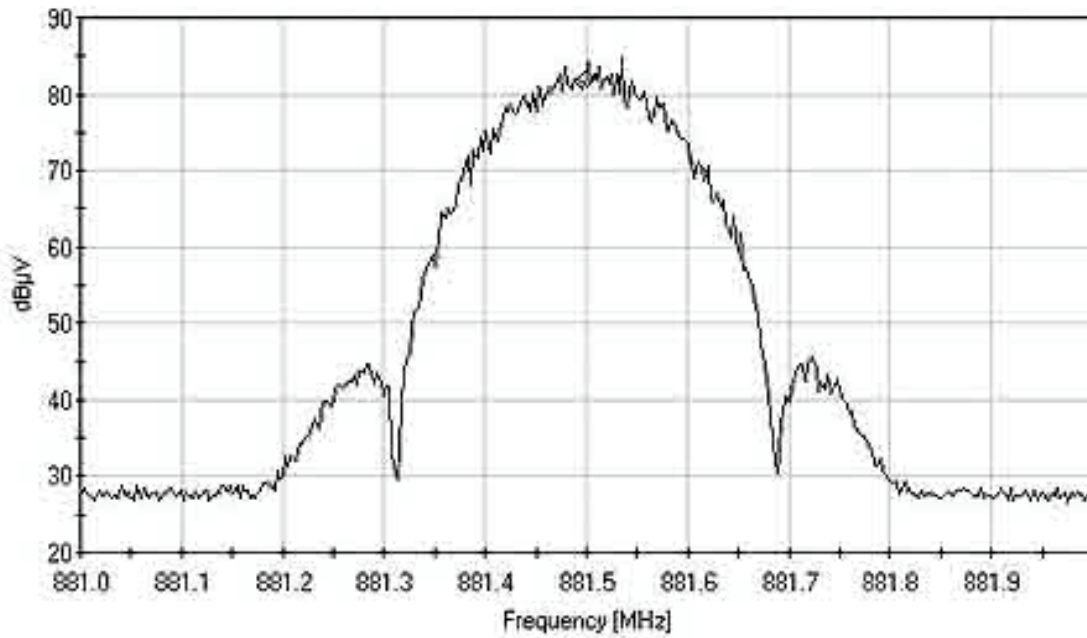


### INPUT PLOT - EDGE - LOW

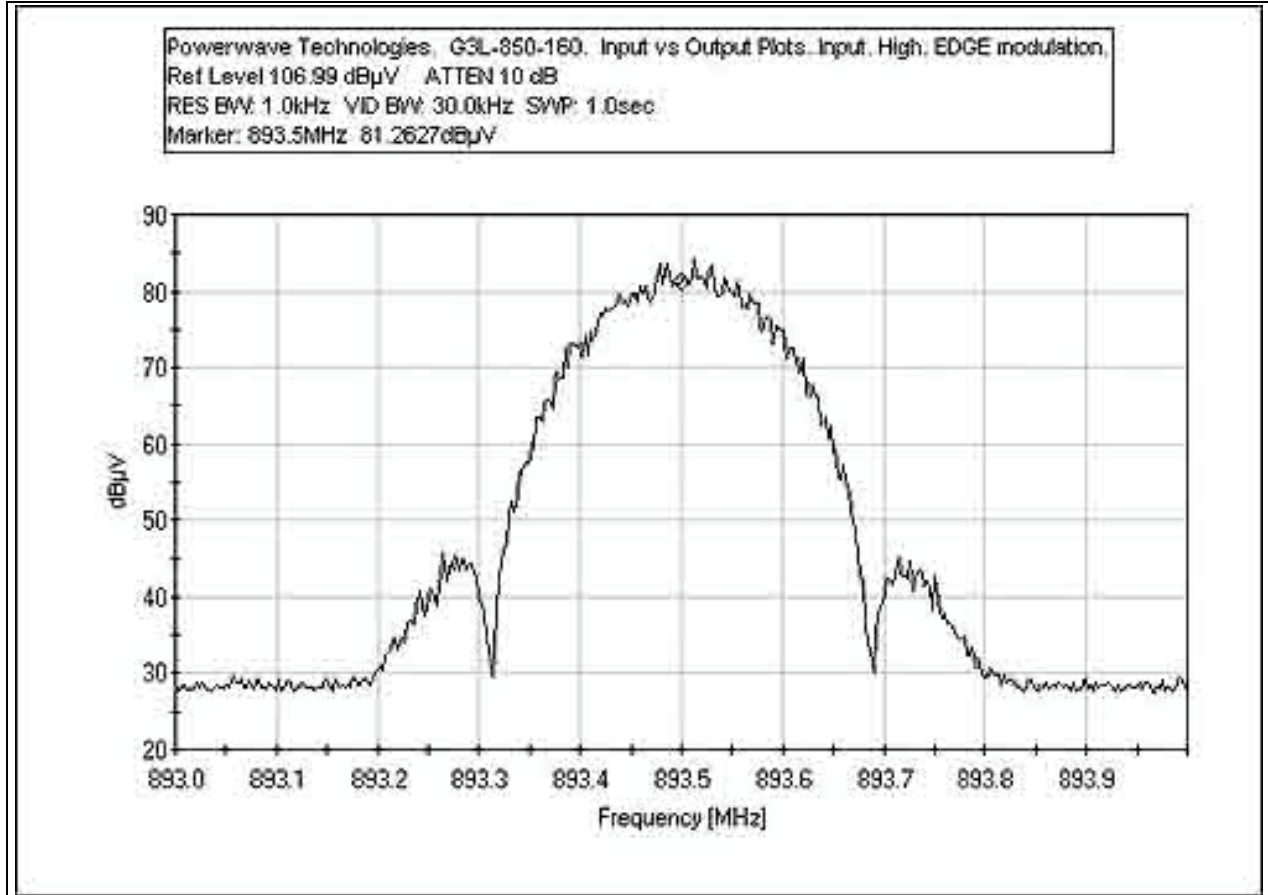


### INPUT PLOT - EDGE - MID

Powerwave Technologies: G3L-850-160. Input vs Output Plots. Middle Channel, Input. EDGE modulation  
Ref Level 106.99 dB $\mu$ V ATTEN 10 dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 1.0sec  
Marker: 881.5MHz 62.0577dB $\mu$ V

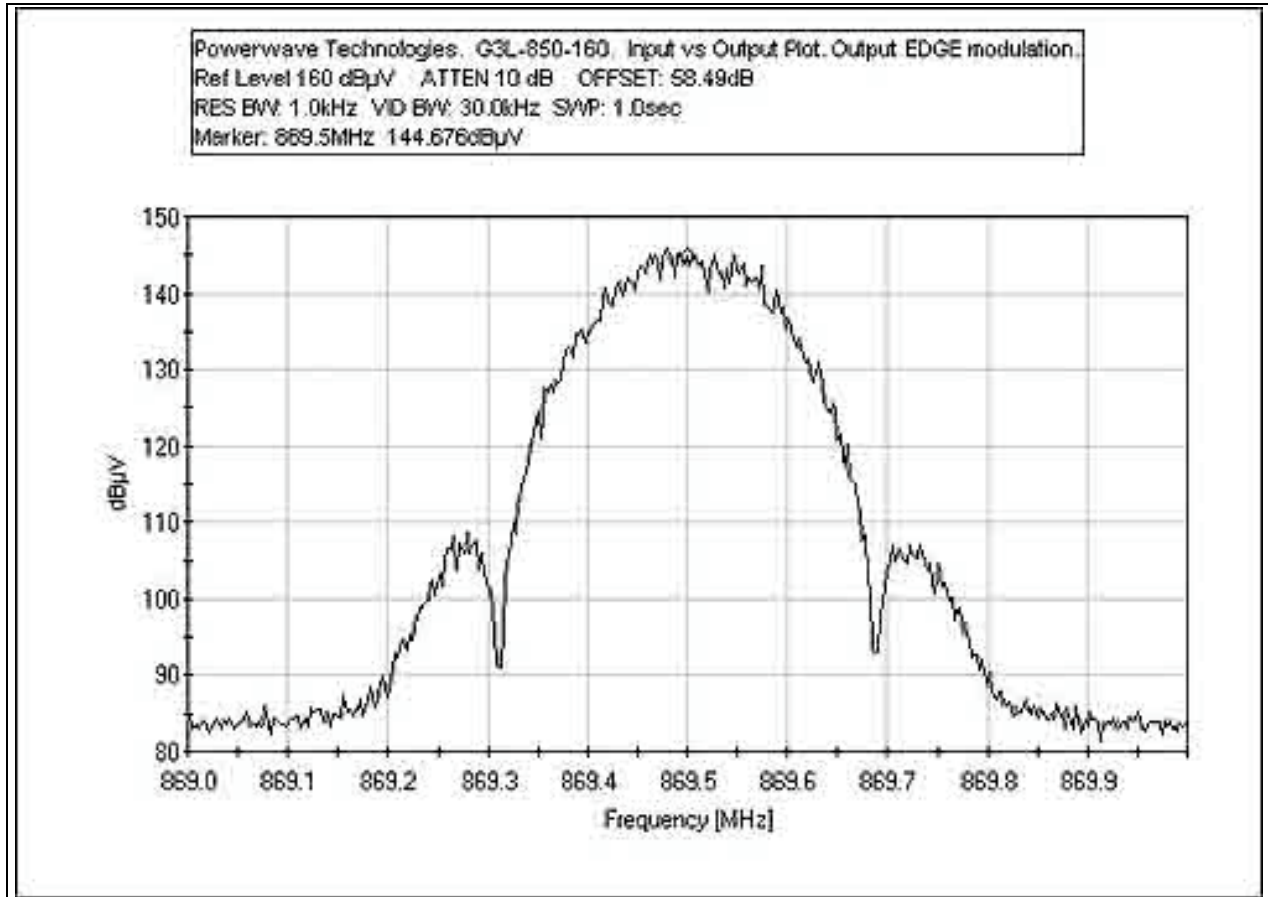


**INPUT PLOT - EDGE - HIGH**

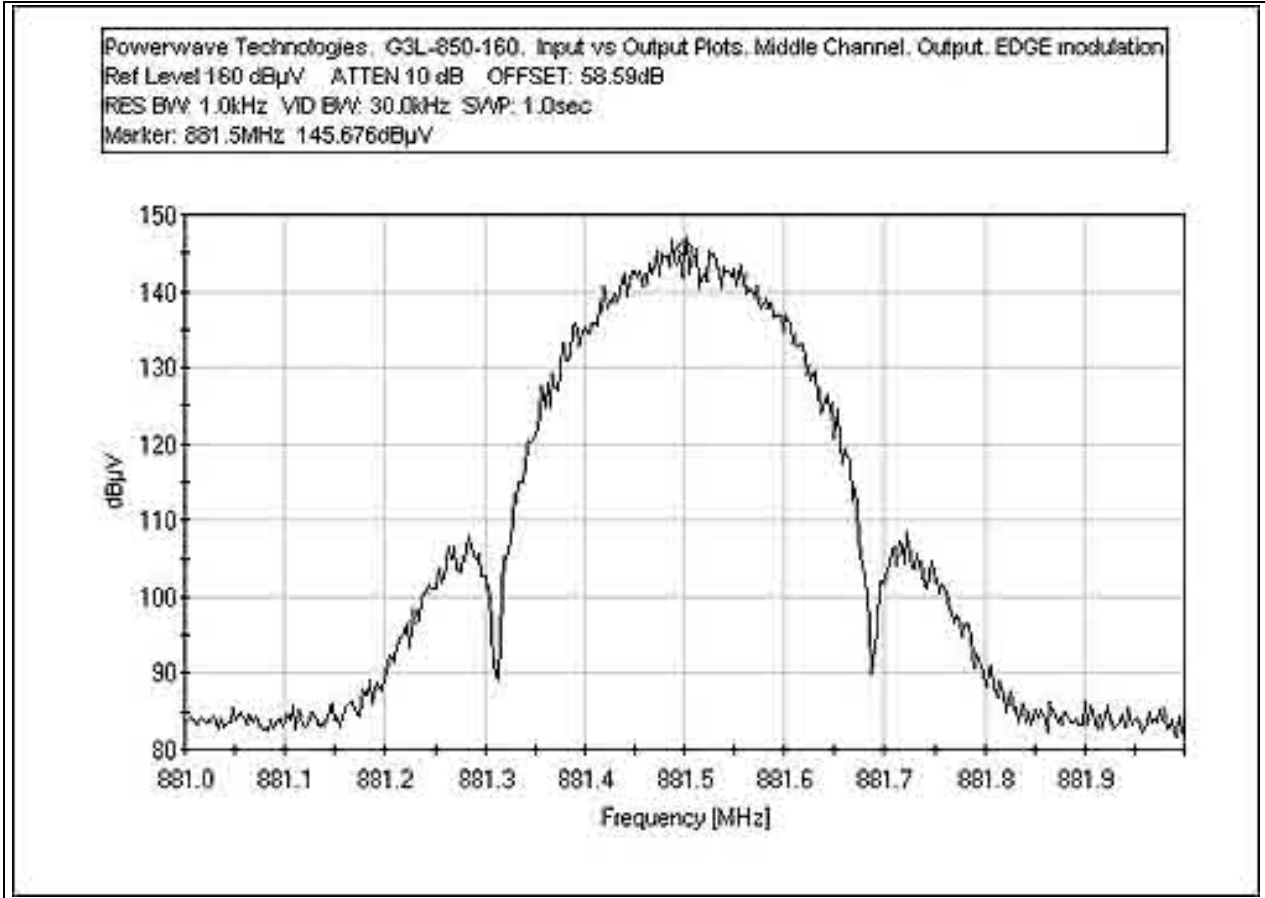




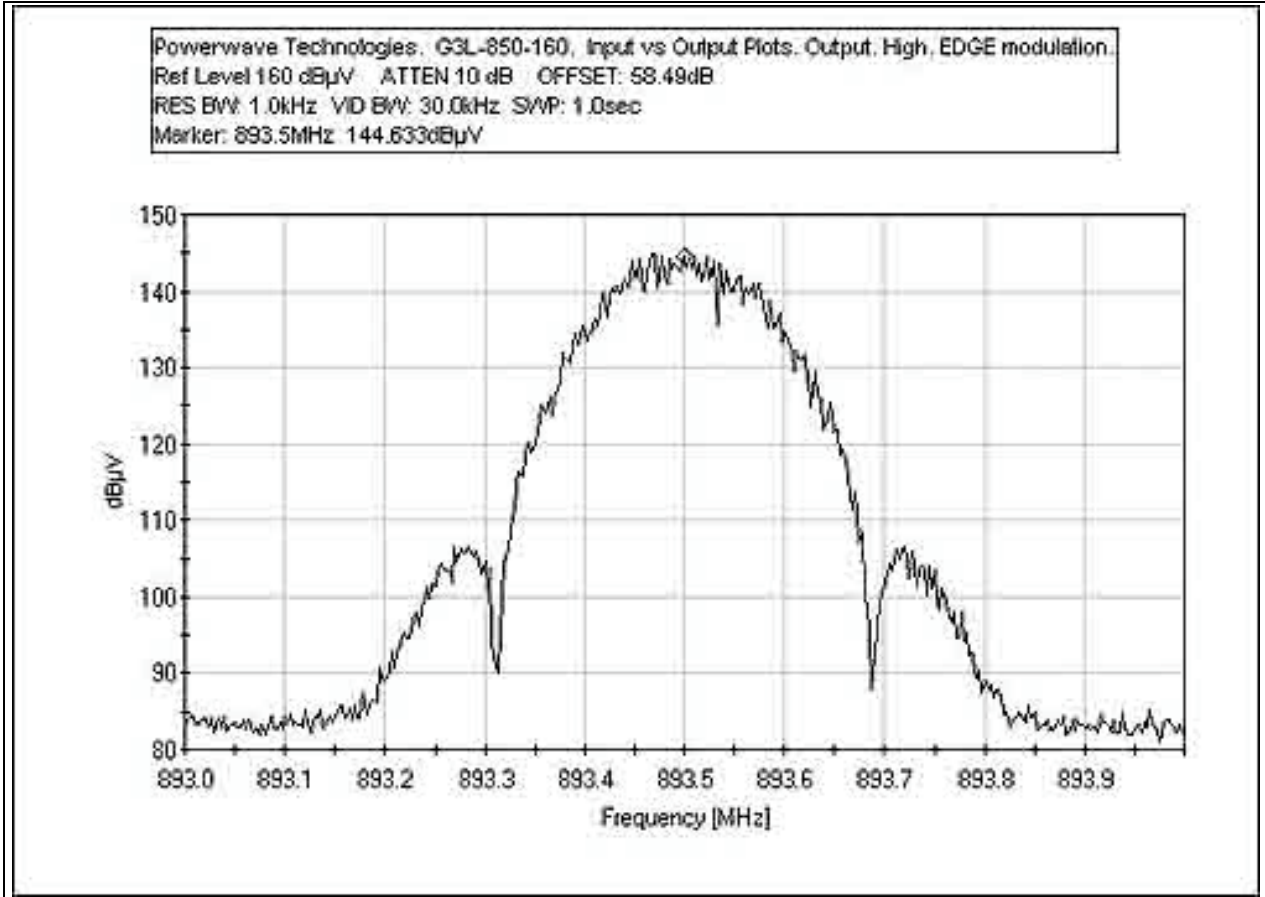
### OUTPUT PLOT - EDGE - LOW



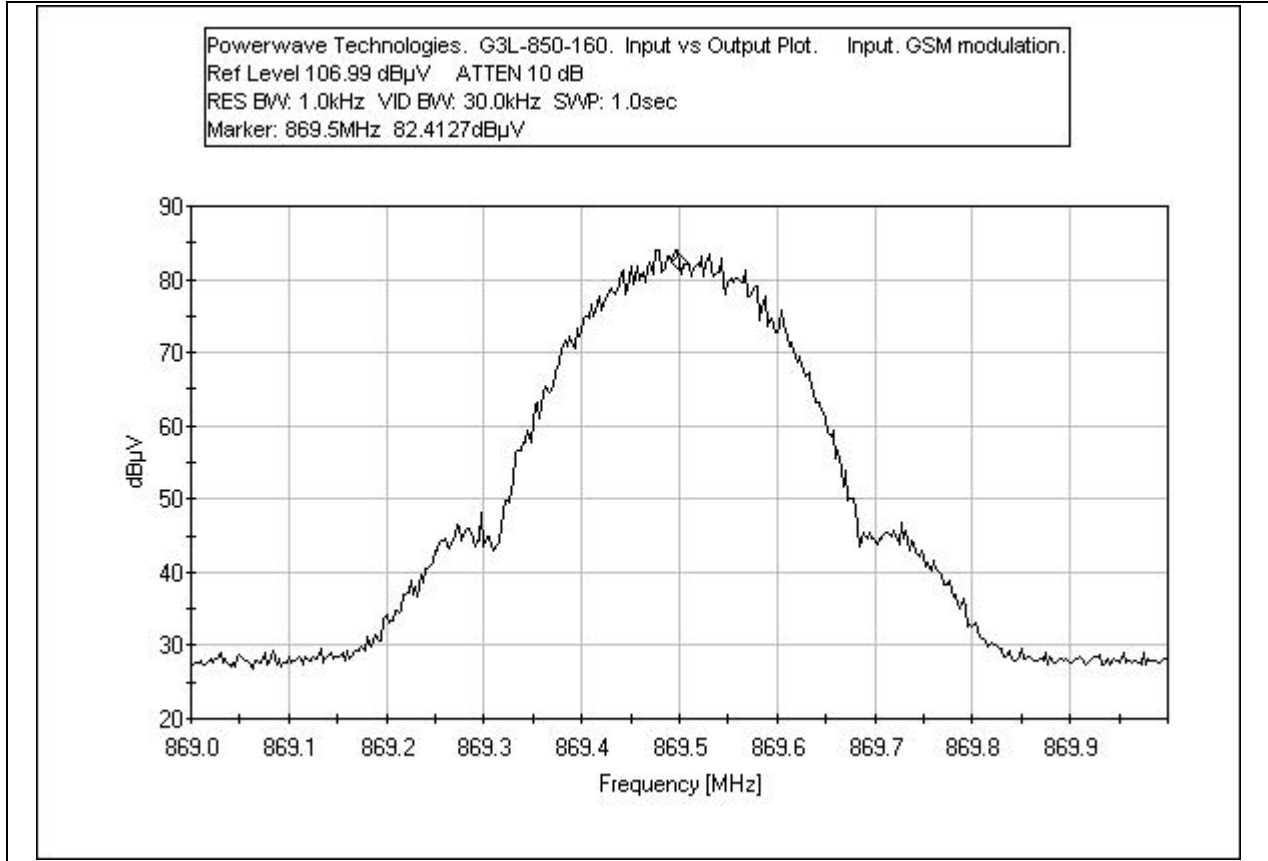
### OUTPUT PLOT - EDGE - MID



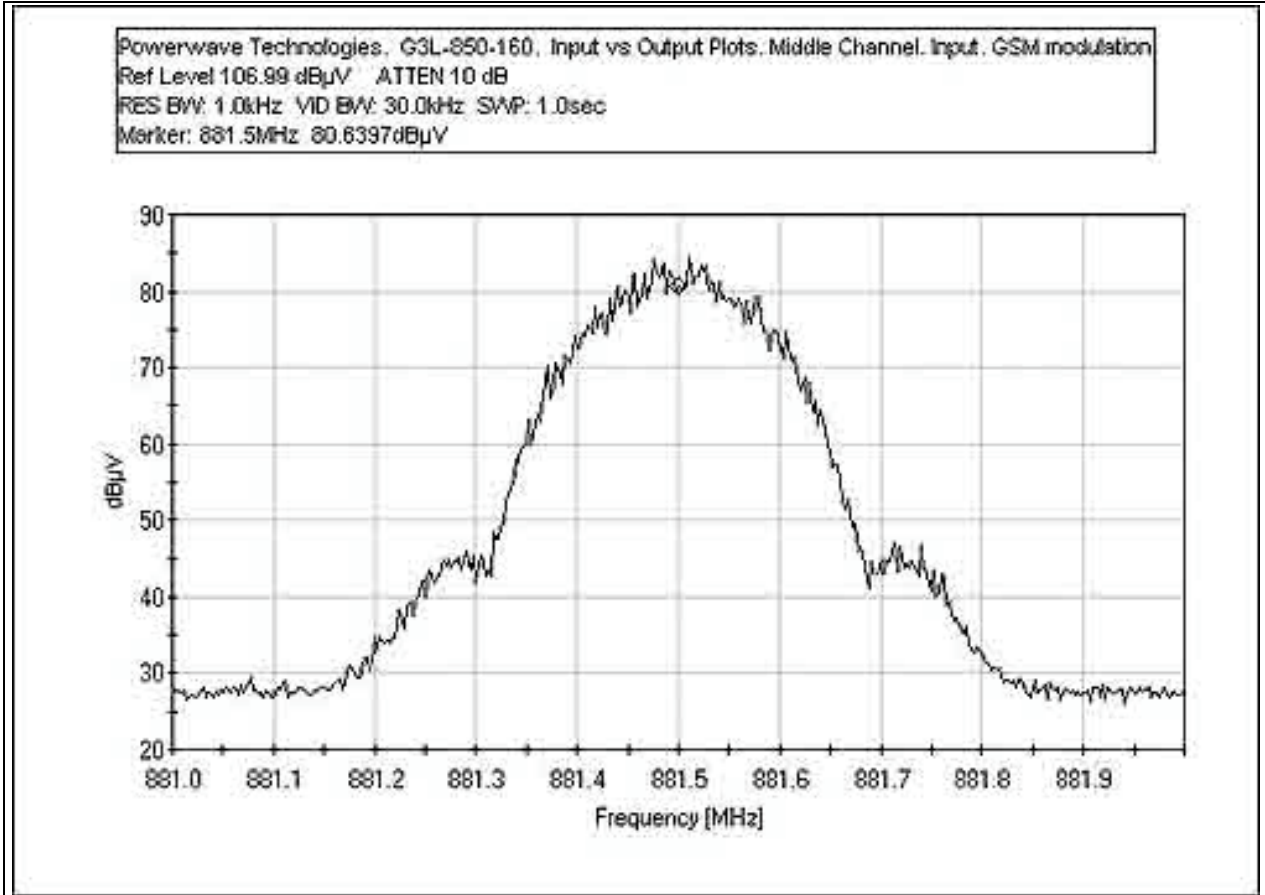
**OUTPUT PLOT - EDGE - HIGH**



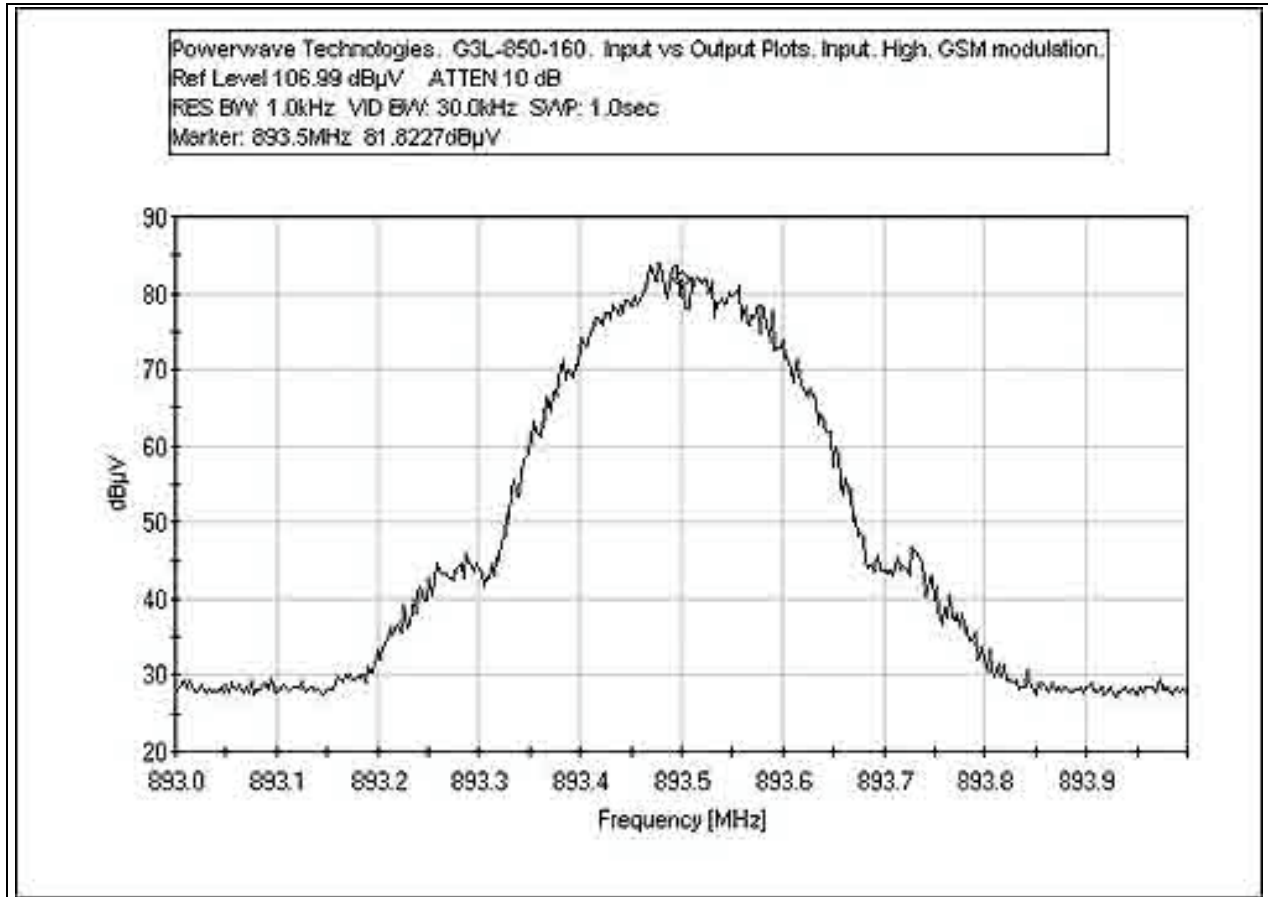
### INPUT PLOT - GSM - LOW



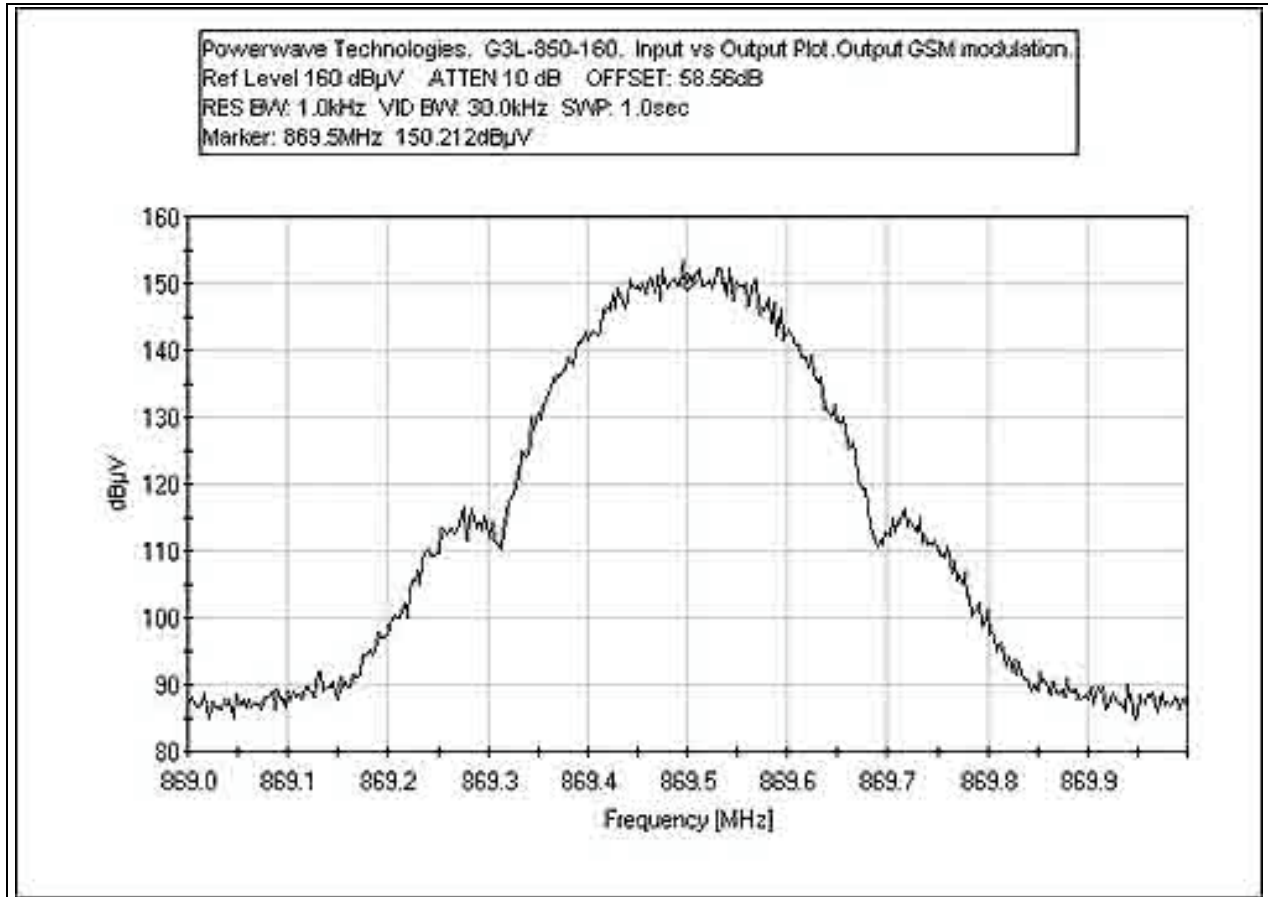
**INPUT PLOT - GSM - MID**



### INPUT PLOT - GSM - HIGH

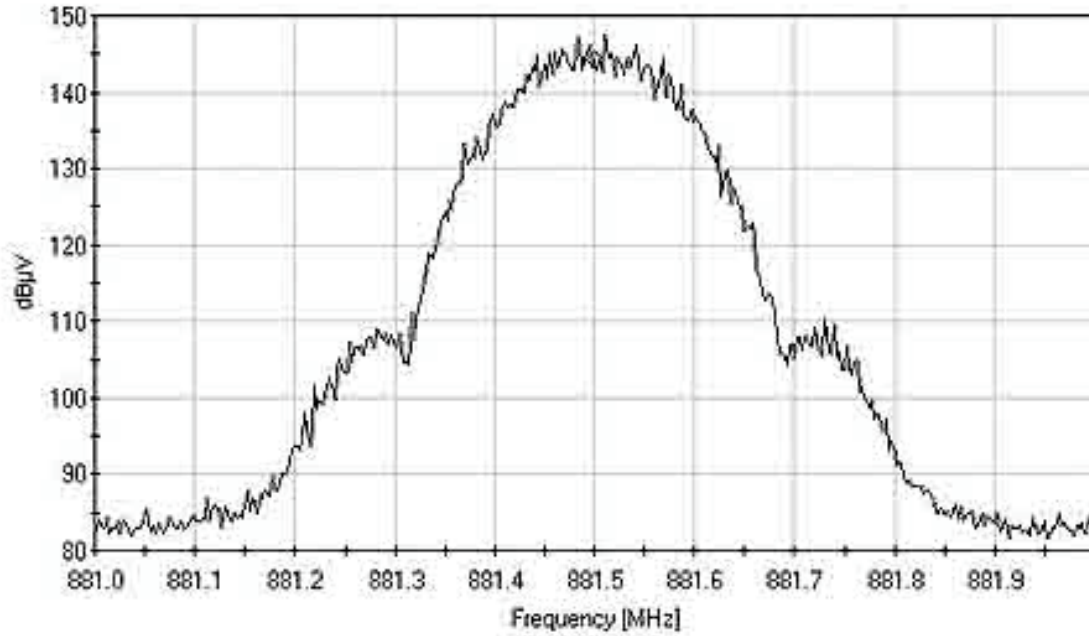


### OUTPUT PLOT - GSM - LOW



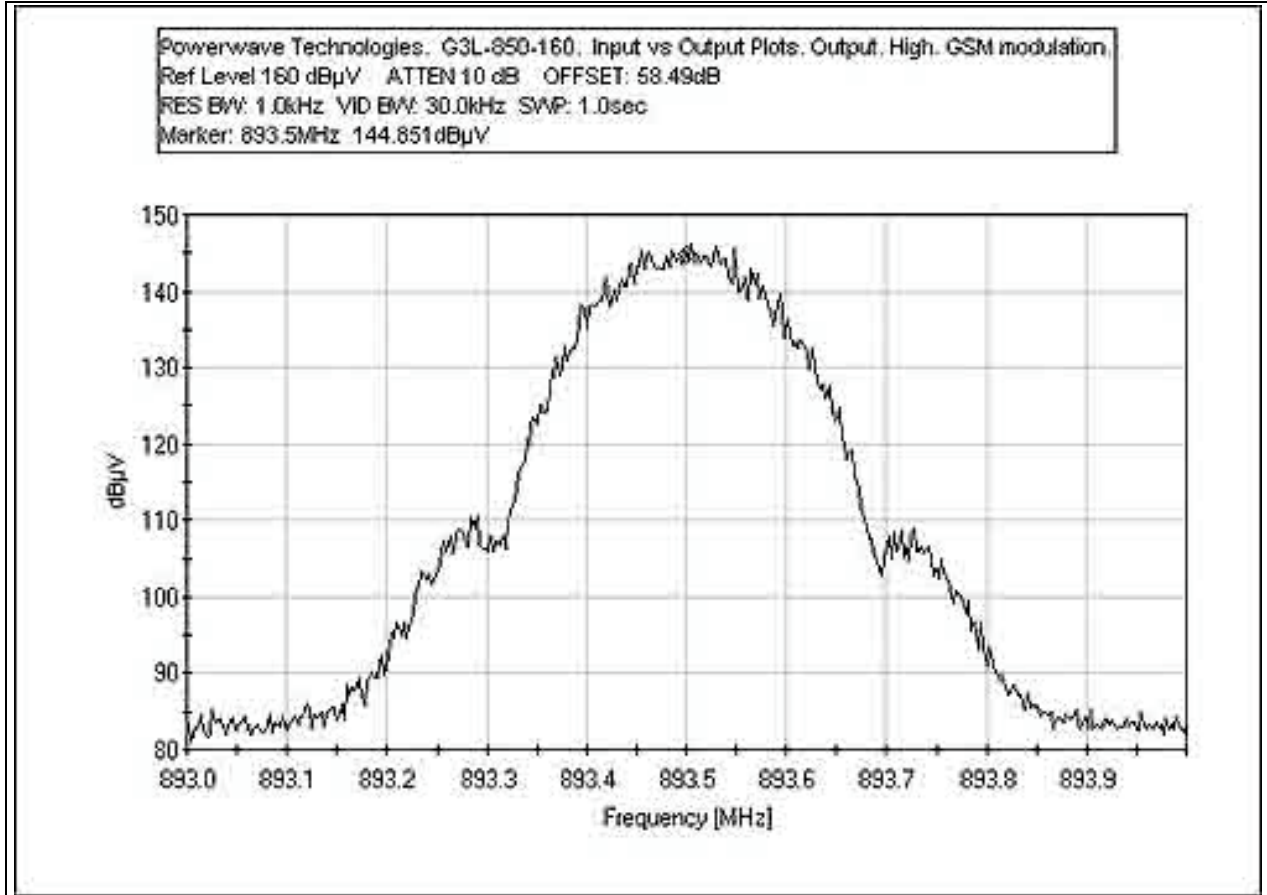
### OUTPUT PLOT - GSM - MID

Powerwave Technologies, G3L-850-160, Input vs Output Plots, Middle Channel, Output, GSM modulation  
Ref Level 160 dB $\mu$ V ATTEN 10 dB OFFSET: 58.59dB  
RES BW: 1.0kHz VID BW: 30.0kHz SVP: 1.0sec  
Marker: 881.5MHz 144.21dB $\mu$ V

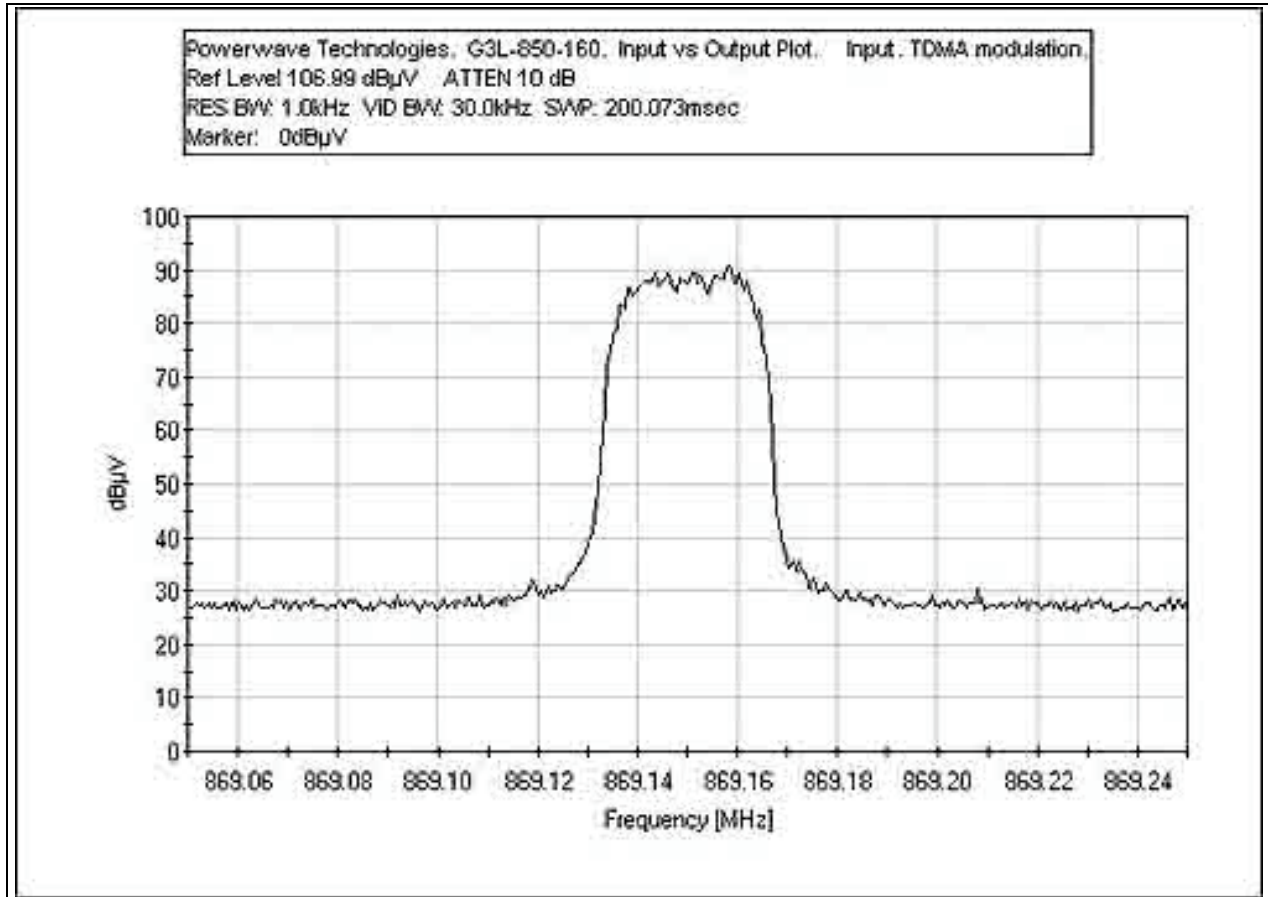




### OUTPUT PLOT - GSM - HIGH

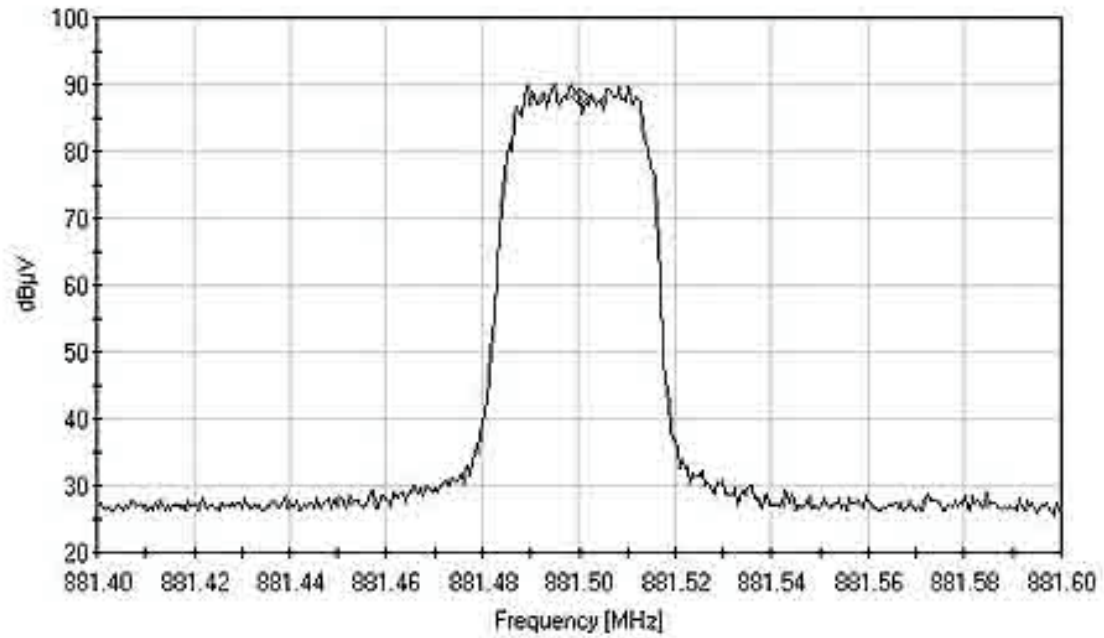


**INPUT PLOT - TDMA - LOW**

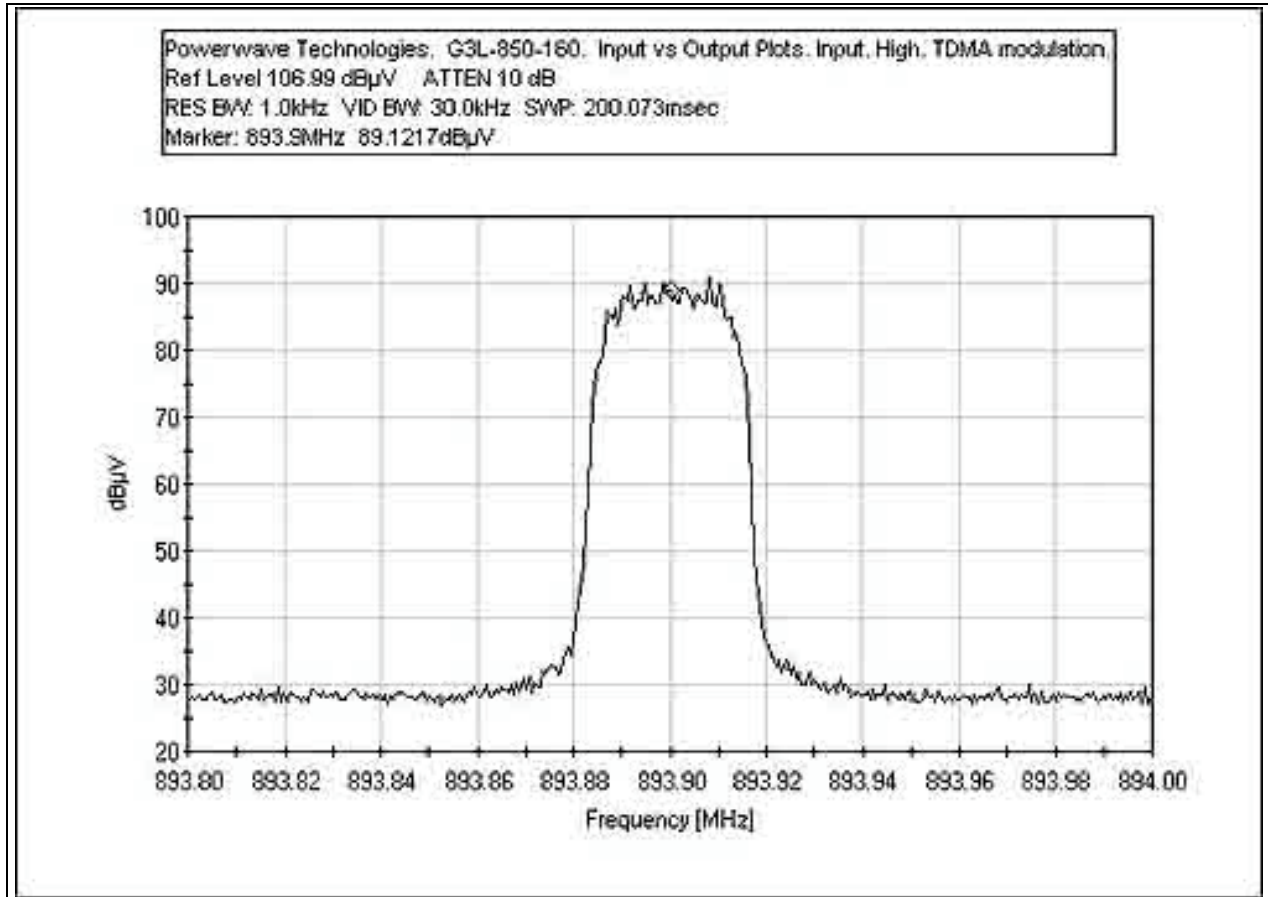


### INPUT PLOT - TDMA - MID

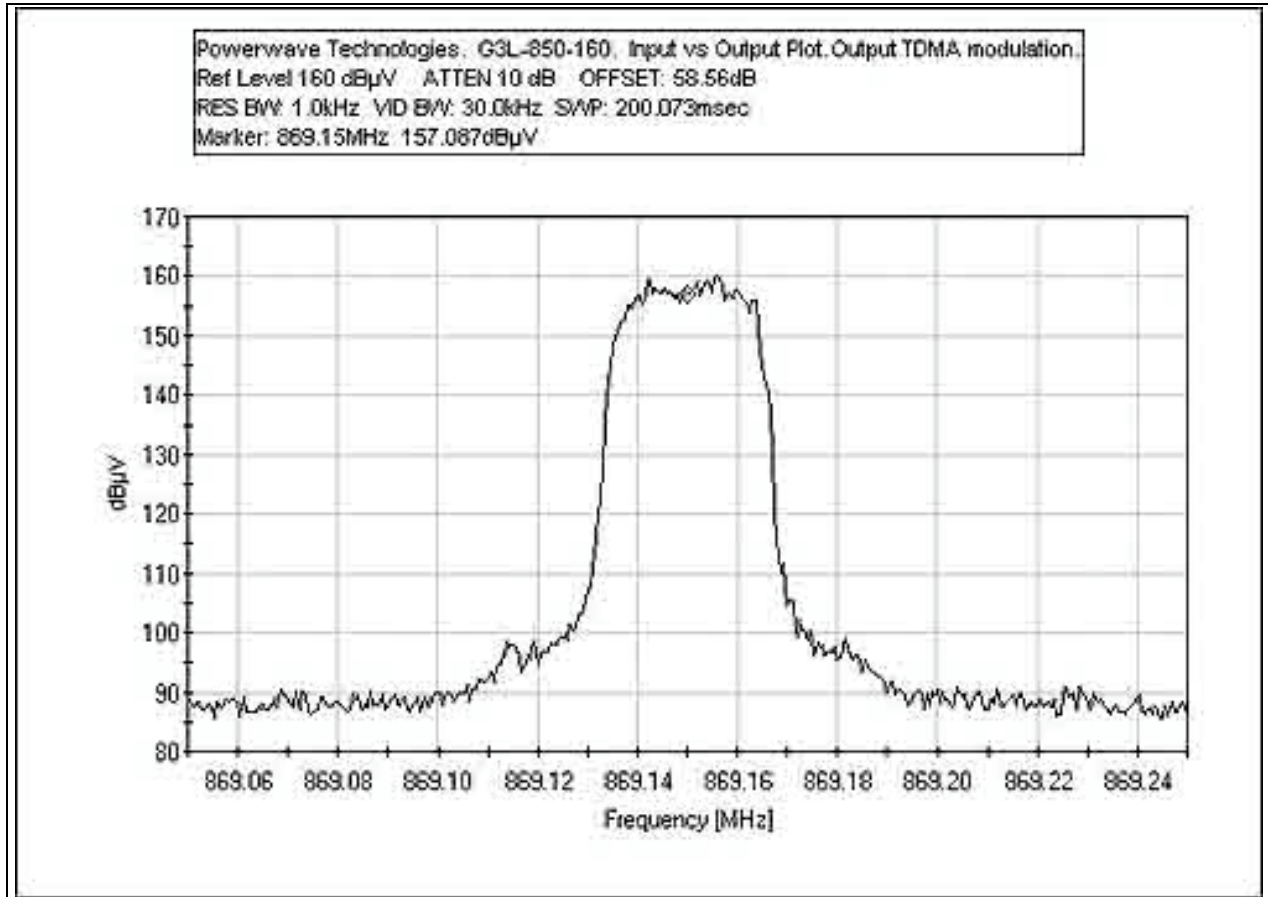
Powerwave Technologies: G3L-850-160, Input vs Output Plots, Middle Channel, Input, TDMA modulation  
Ref Level 106.99 dB $\mu$ V ATTEN 10 dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 200.073msec  
Marker: 881.5MHz 88.2607dB $\mu$ V



### INPUT PLOT - TDMA - HIGH

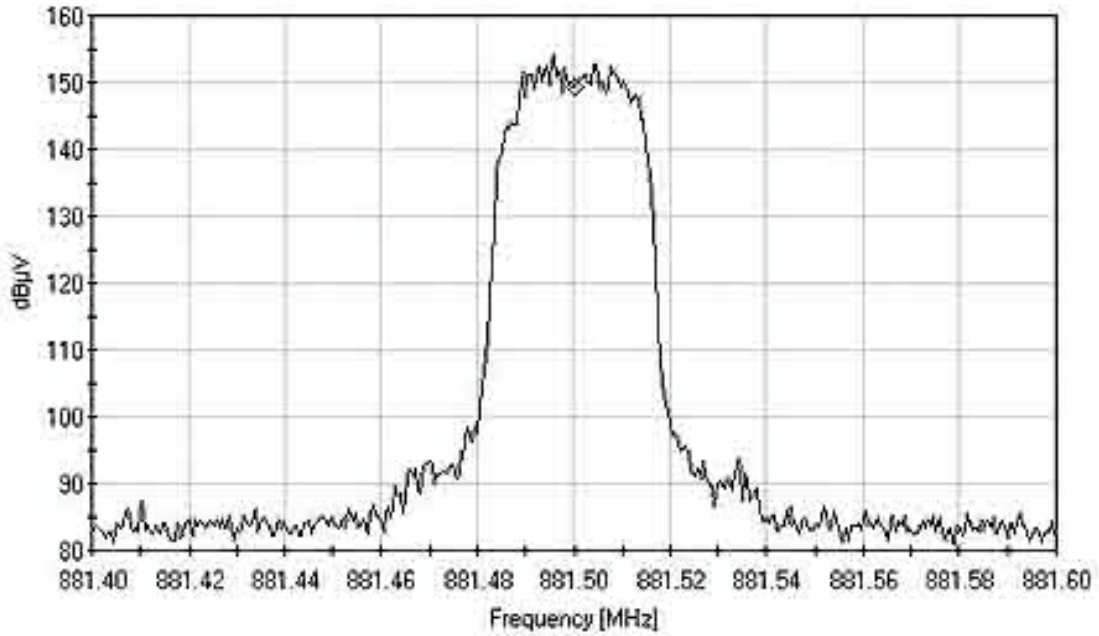


**OUTPUT PLOT - TDMA - LOW**

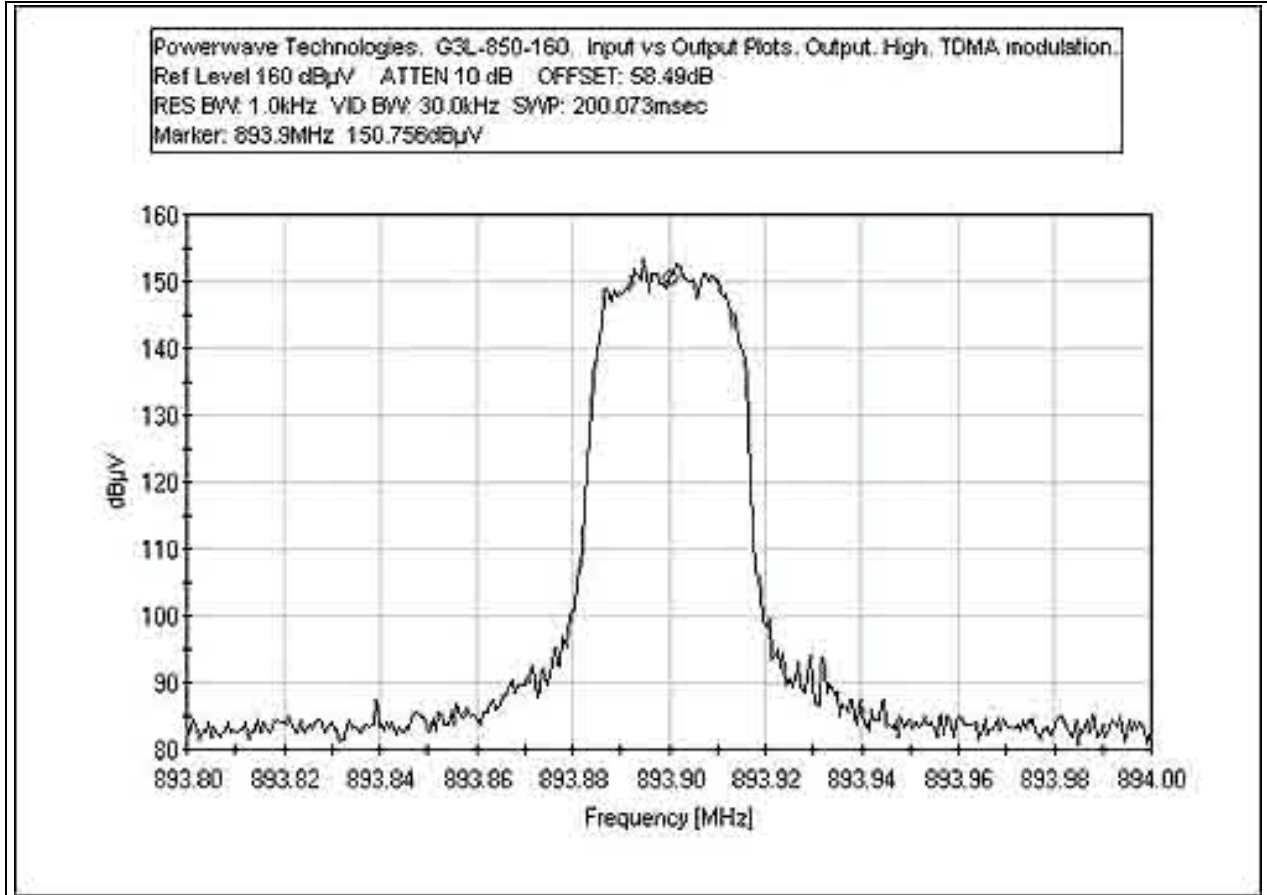


**OUTPUT PLOT - TDMA - MID**

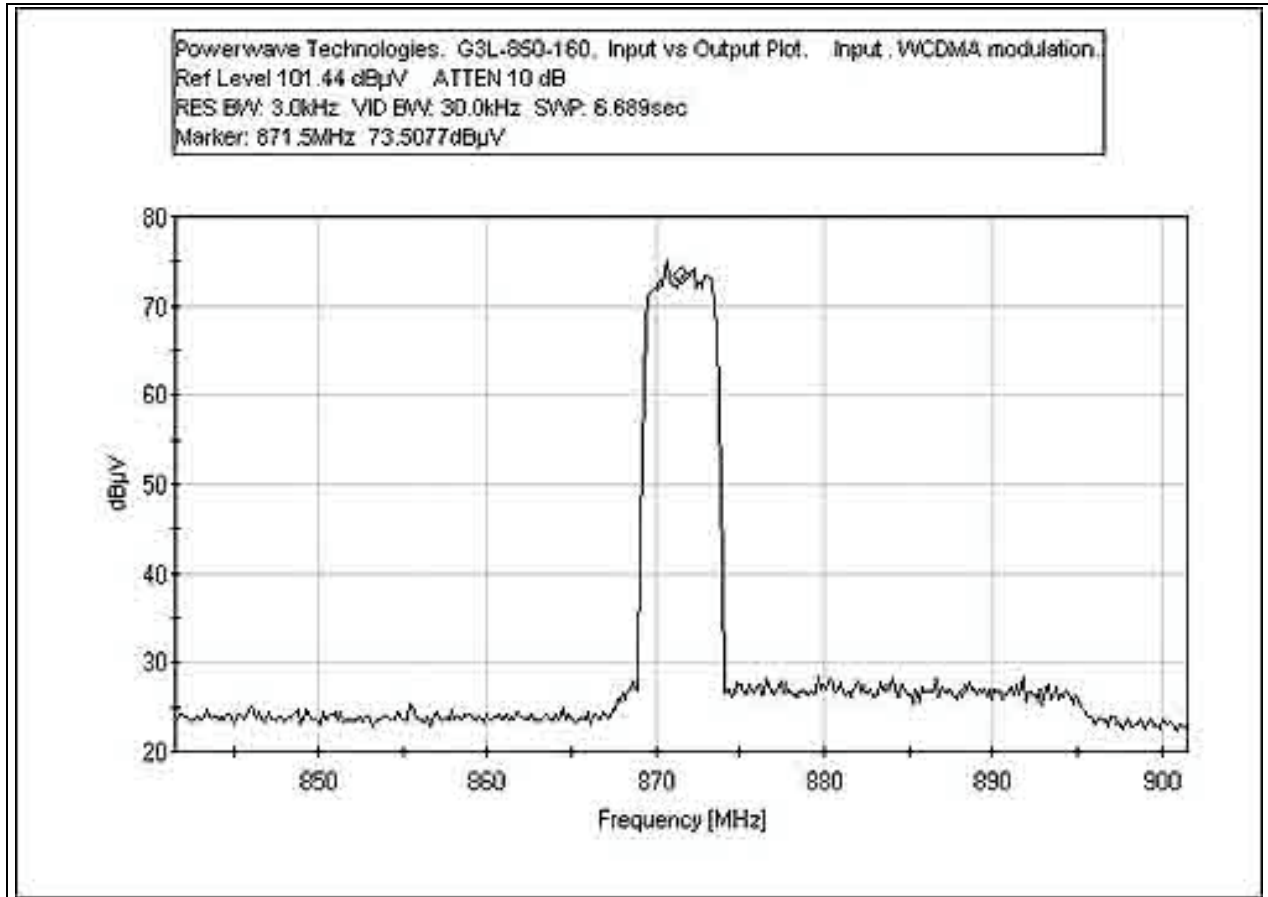
Powerwave Technologies, G3L-850-160, Input vs Output Plots, Middle Channel, Output, TDMA modulation,  
Ref Level 160 dBµV ATTN 10 dB OFFSET: 58.59dB  
RES BW: 1.0kHz VID BW: 30.0kHz SWP: 200.073msec  
Marker: 881.5MHz 149.263dBµV



### OUTPUT PLOT - TDMA - HIGH



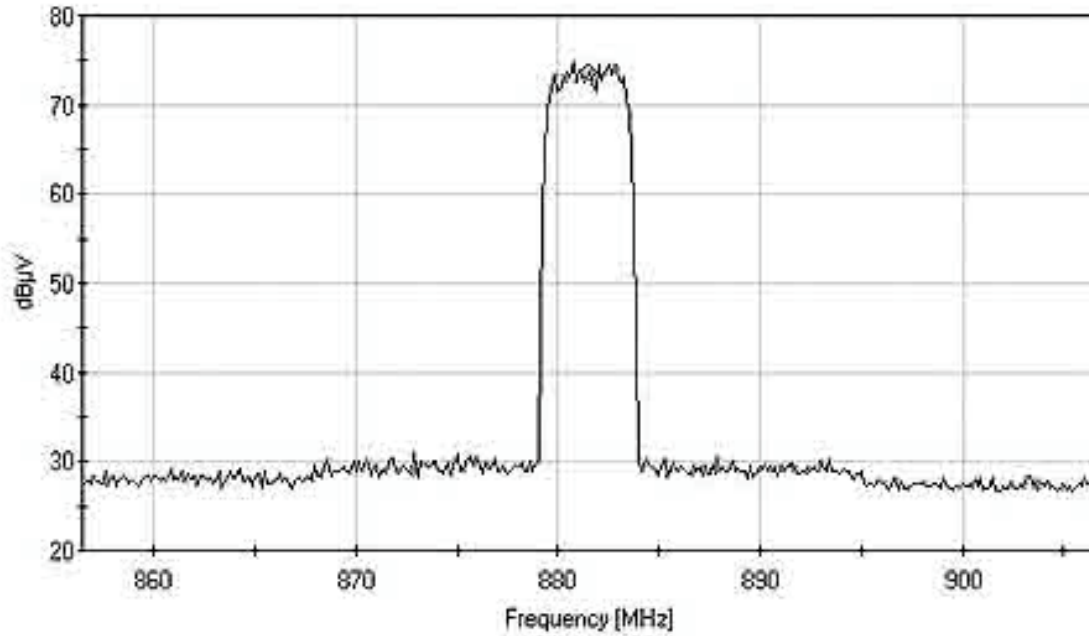
**INPUT PLOT - WCDMA - LOW**



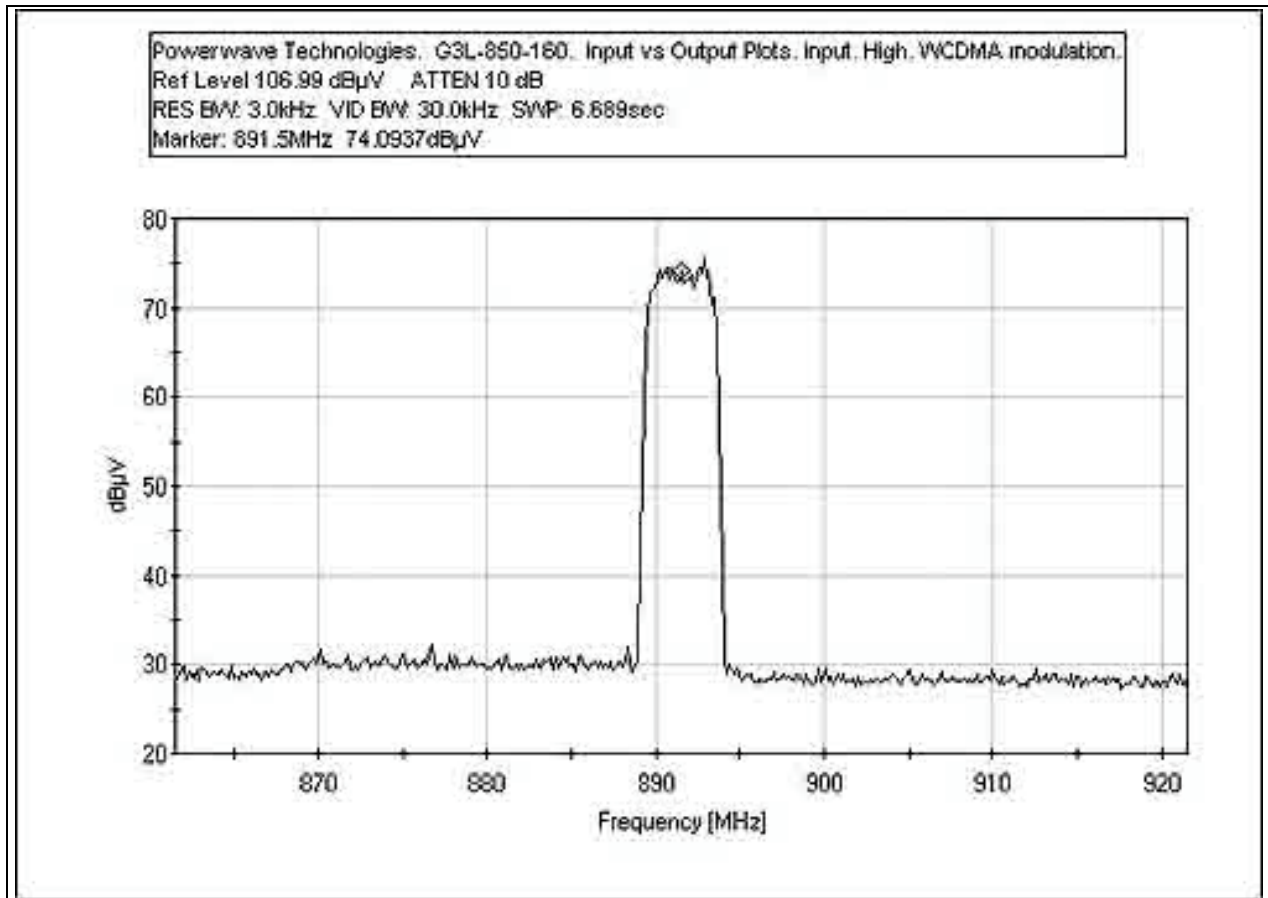


**INPUT PLOT - WCDMA - MID**

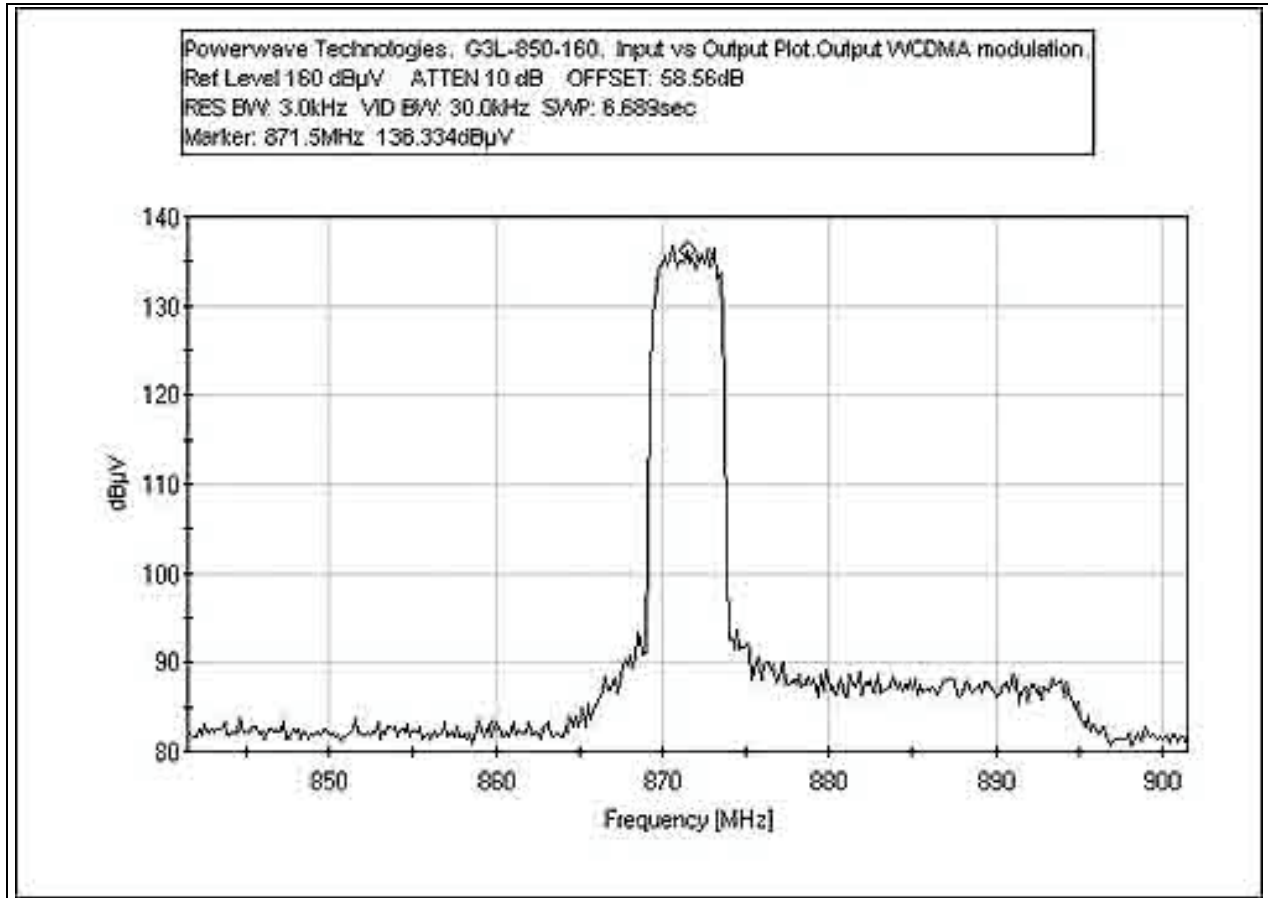
Powerwave Technologies, G3L-850-160, Input vs Output Plots, Middle Channel, Input, WCDMA modulation  
Ref Level 106.99 dB $\mu$ V ATTN 10 dB  
RES BW: 3.0kHz VID BW: 30.0kHz SWP: 5.574sec  
Marker: 861.5MHz 73.6237dB $\mu$ V



### INPUT PLOT - WCDMA - HIGH

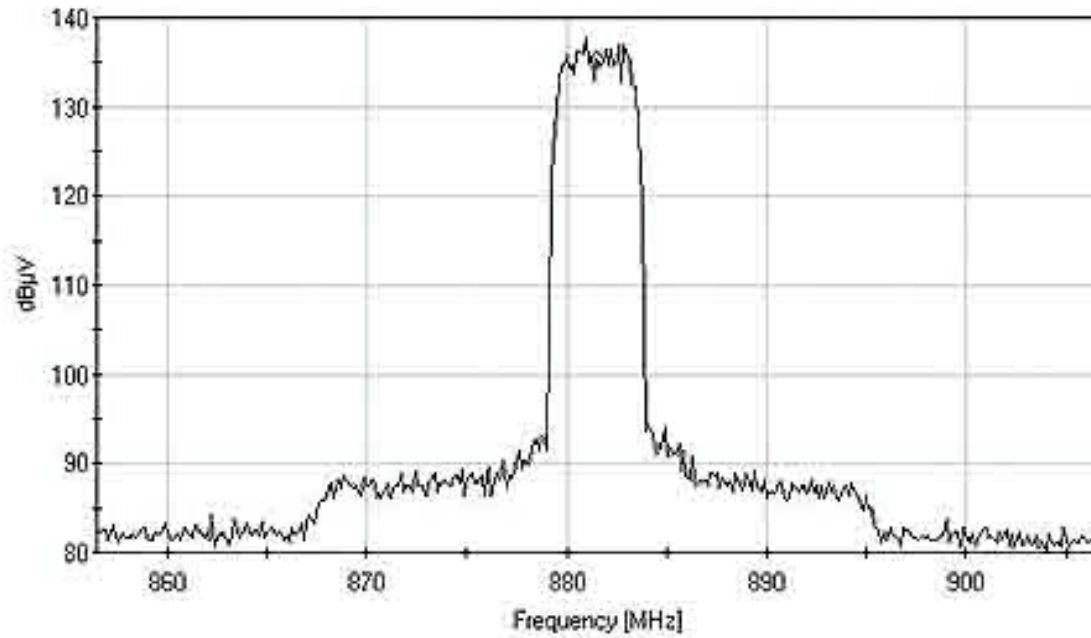


### OUTPUT PLOT - WCDMA - LOW



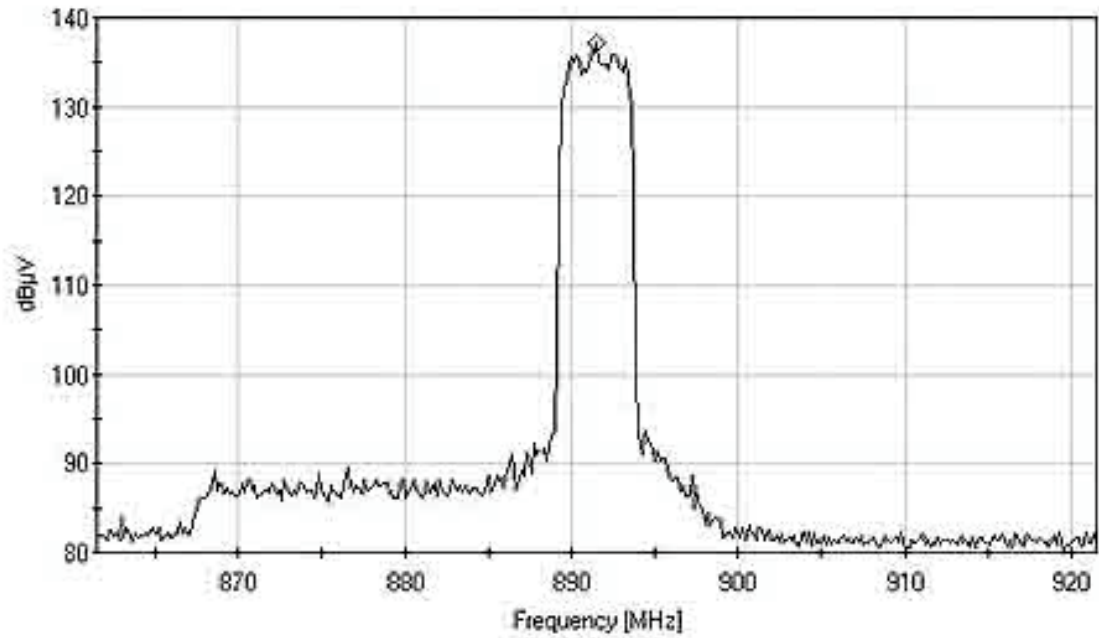
### OUTPUT PLOT - WCDMA - MID

Powerwave Technologies, G3L-850-160, Input vs Output Plots, Middle Channel, Output, WCDMA modulation  
Ref Level 160 dB $\mu$ V ATTEN 10 dB OFFSET: 58.59dB  
RES BW: 3.0kHz VID BW: 30.0kHz SAMP: 5.574sec  
Marker: 881.5MHz 135.344dB $\mu$ V



### OUTPUT PLOT - WCDMA - HIGH

Powerwave Technologies, G3L-850-160, Input vs Output Plots, Output, High, WCDMA modulation,  
Ref Level 160 dB $\mu$ V ATTN 10 dB OFFSET: 58.49dB  
RES BW: 3.0kHz VID BW: 30.0kHz SMP: 6.688sec  
Marker: 891.5MHz 137.177dB $\mu$ V



**Test Equipment**

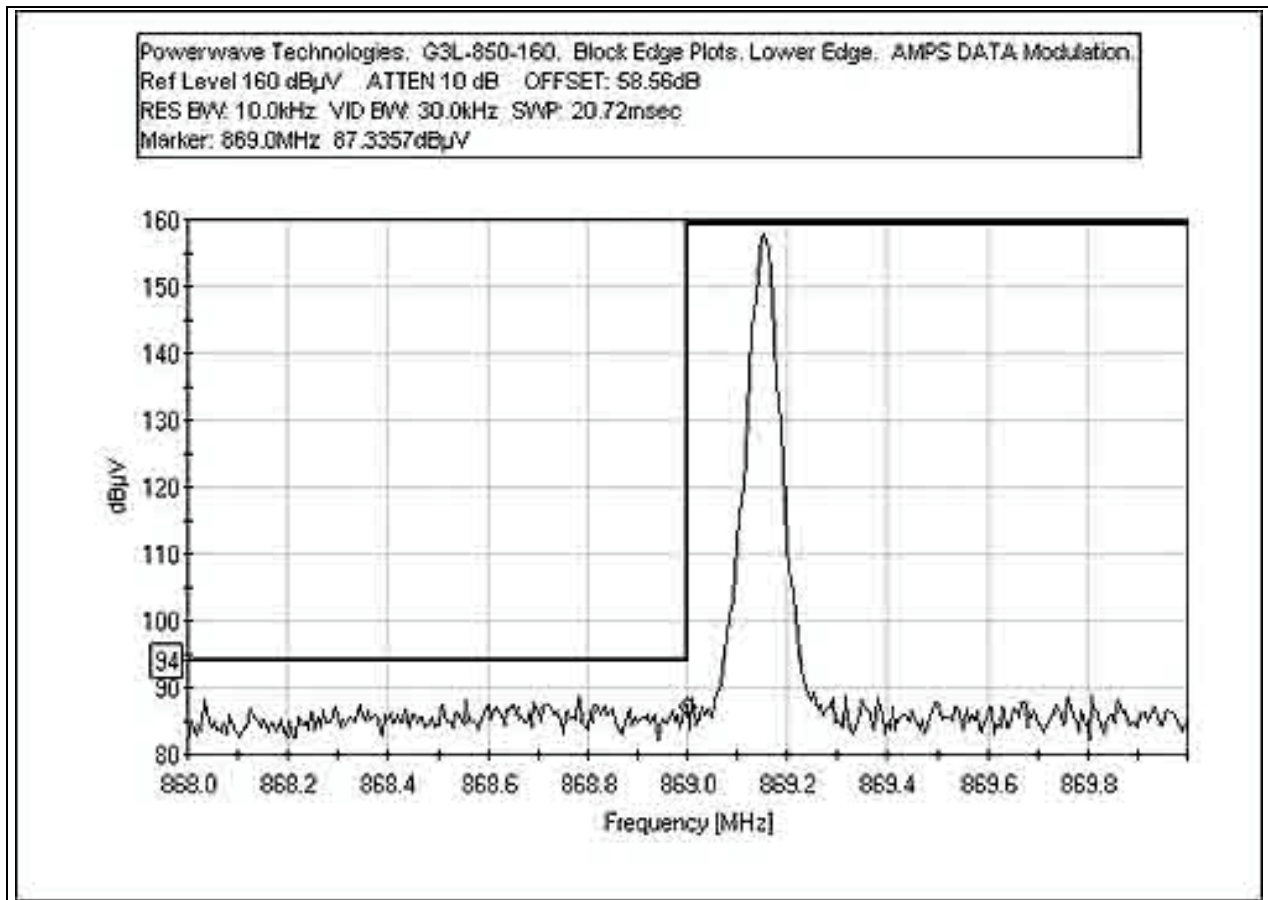
<b>Equipment</b>	<b>Asset #</b>	<b>Manufacturer</b>	<b>Model #</b>	<b>Serial #</b>	<b>Cal Date</b>	<b>Cal Due</b>
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032505	032507

**PHOTOGRAPH SHOWING INPUT AND OUTPUT PLOT SETUP**

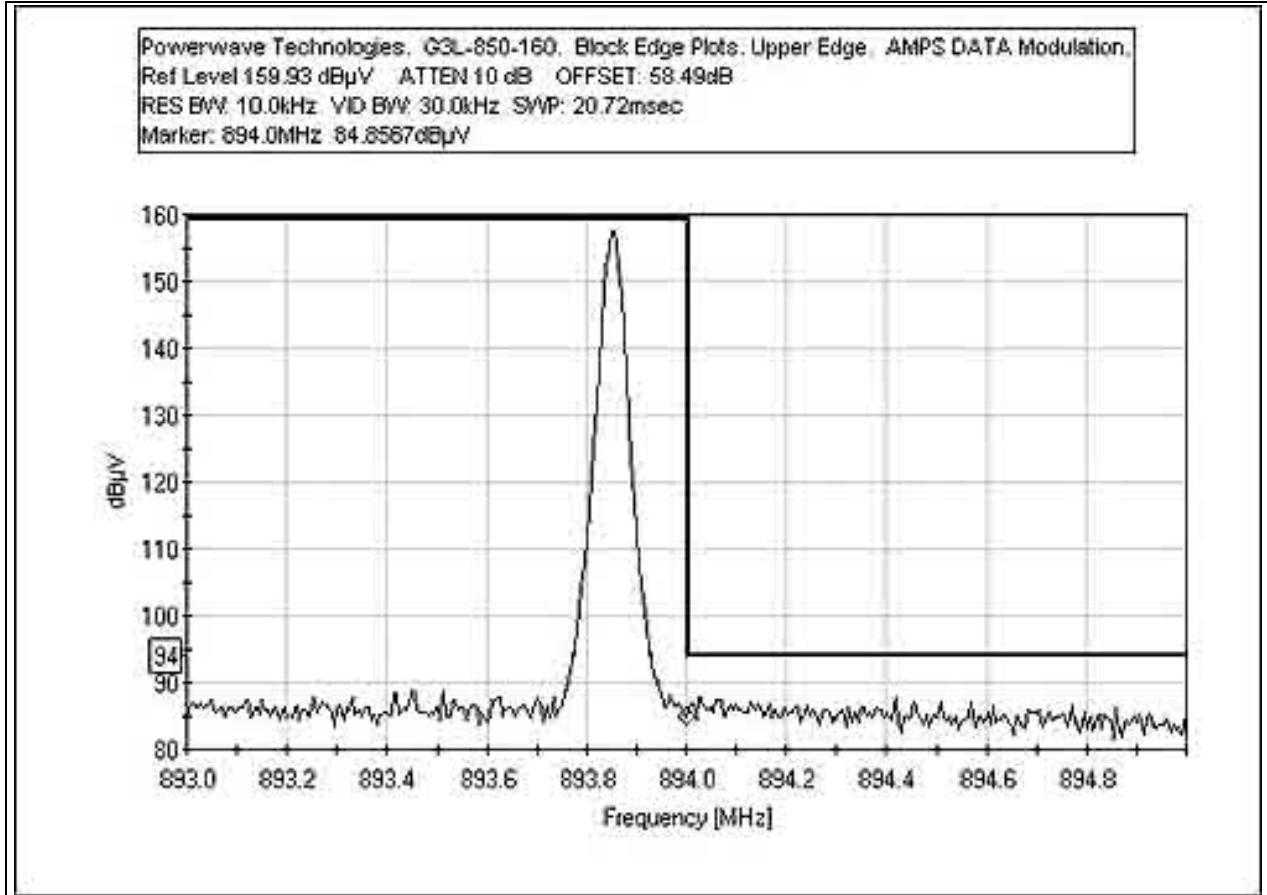


### BLOCKEDGE - AMPS DATA - LOW

**Test Conditions:** The signal generator is providing the input signal to the EUT. From the signal generator the signal goes to the preamplifier and then the band pass filter before reaching the input of the EUT. The output of the EUT is connected to an attenuator and a directional coupler. From the directional coupler forward power port the EUT fundamental output power is read. The block edge reading was taken with the spectrum analyzer connected to the output of the directional coupler through another attenuator. The output of the EUT is putting out 185 watts. Data was taken for the EUT with the following modulations at low, middle and high channels: AMPS VOICE, AMPS DATA, EDGE, GSM, TDMA, CDMA, and WCDMA.

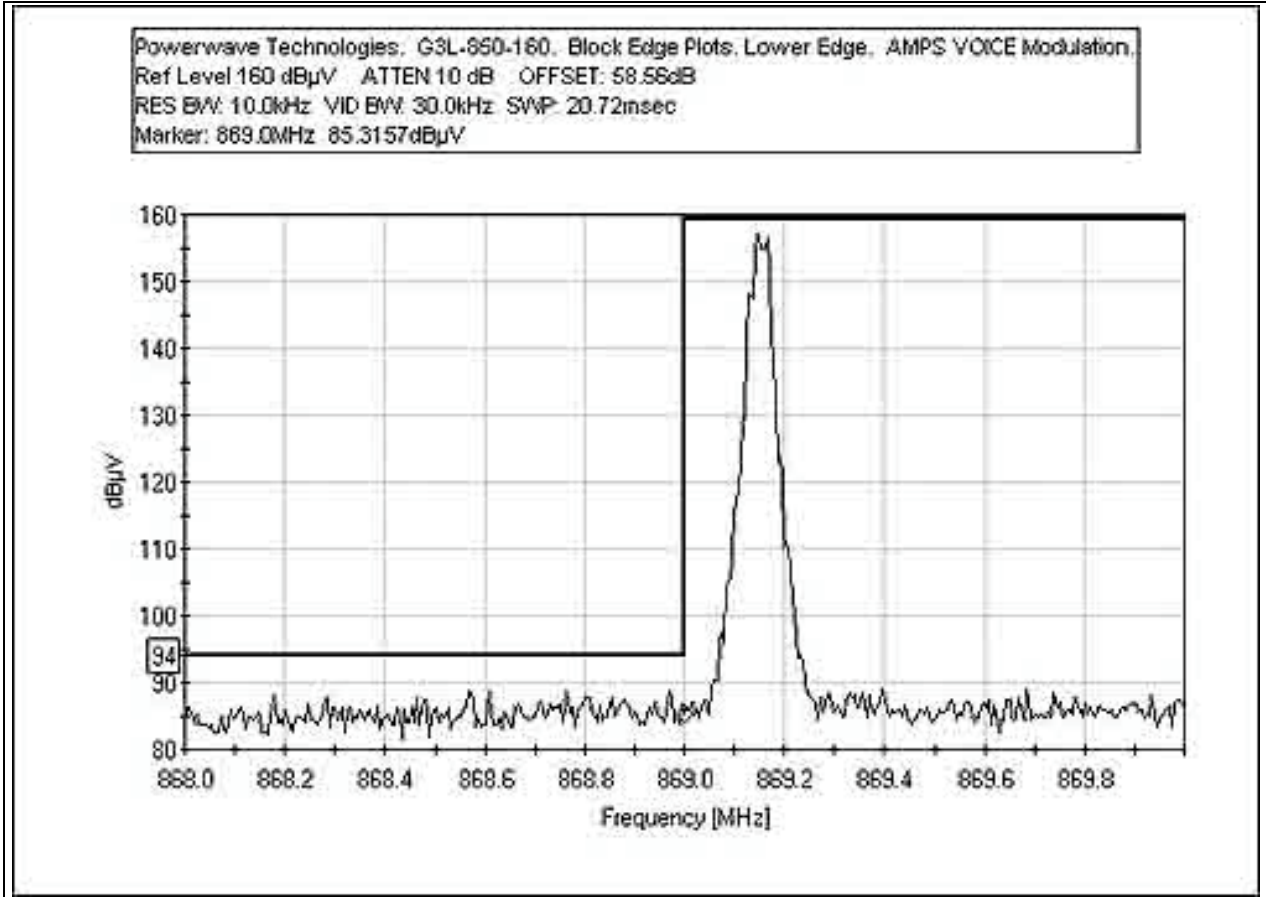


**BLOCKEDGE - AMPS DATA - HIGH**

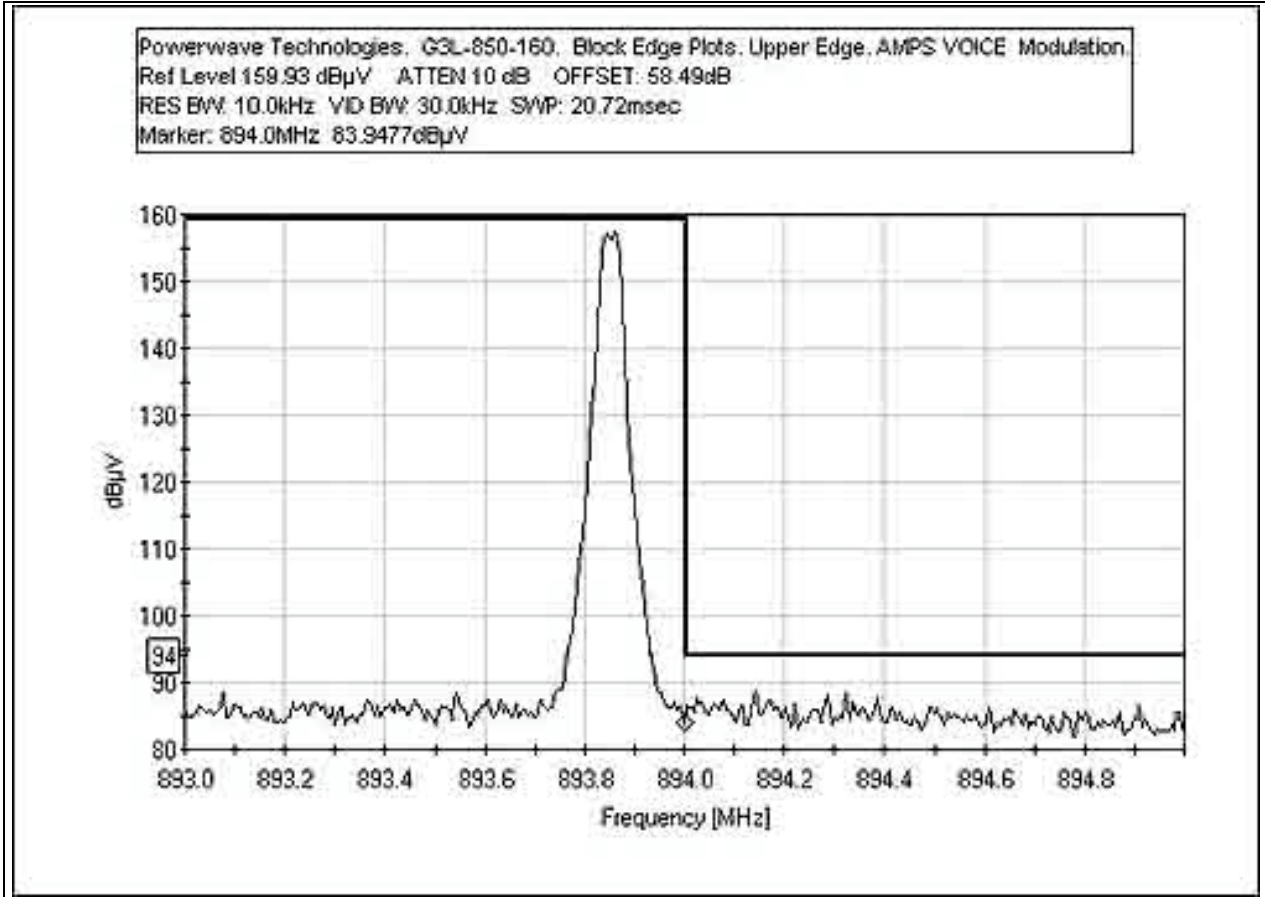




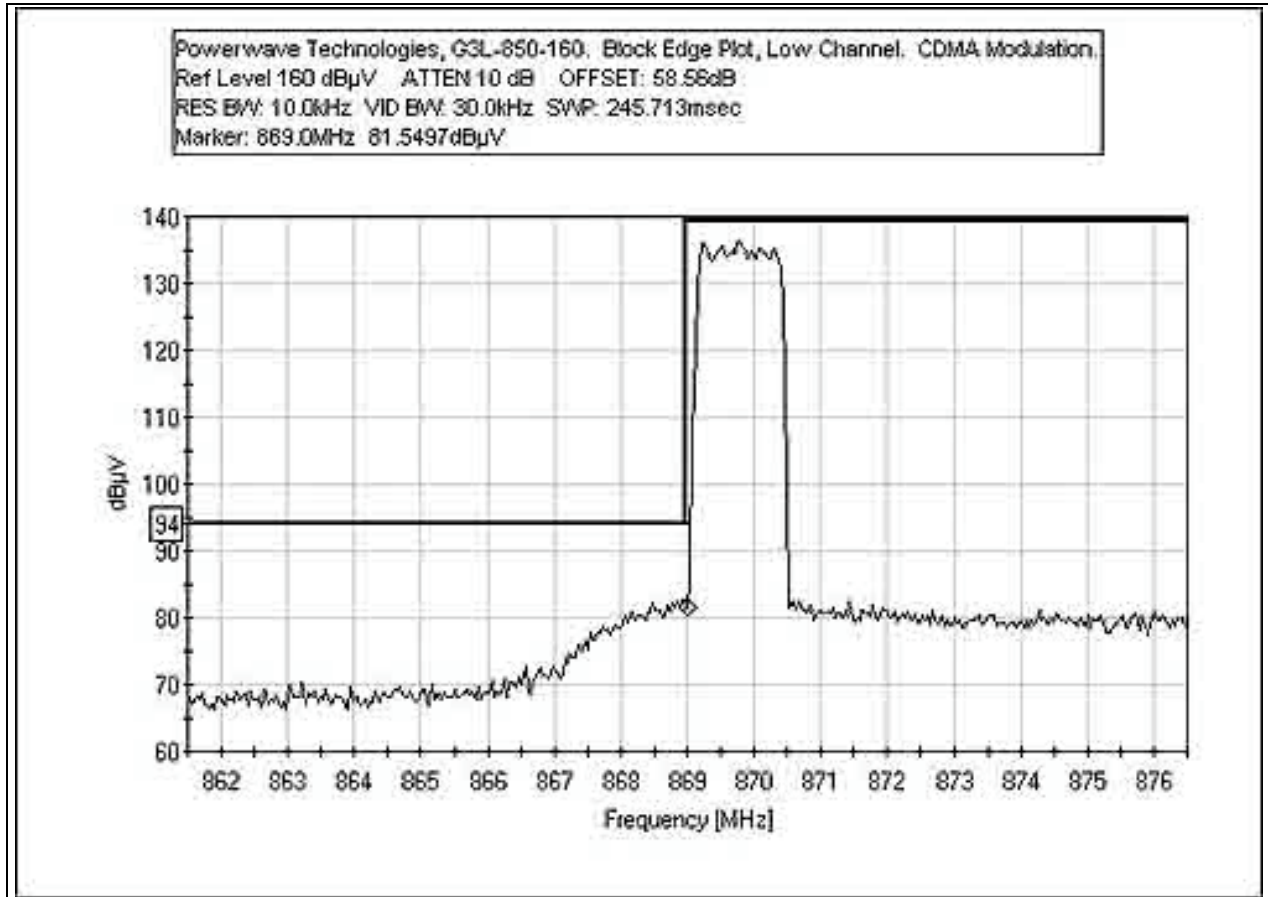
**BLOCKEDGE - AMPS VOICE - LOW**



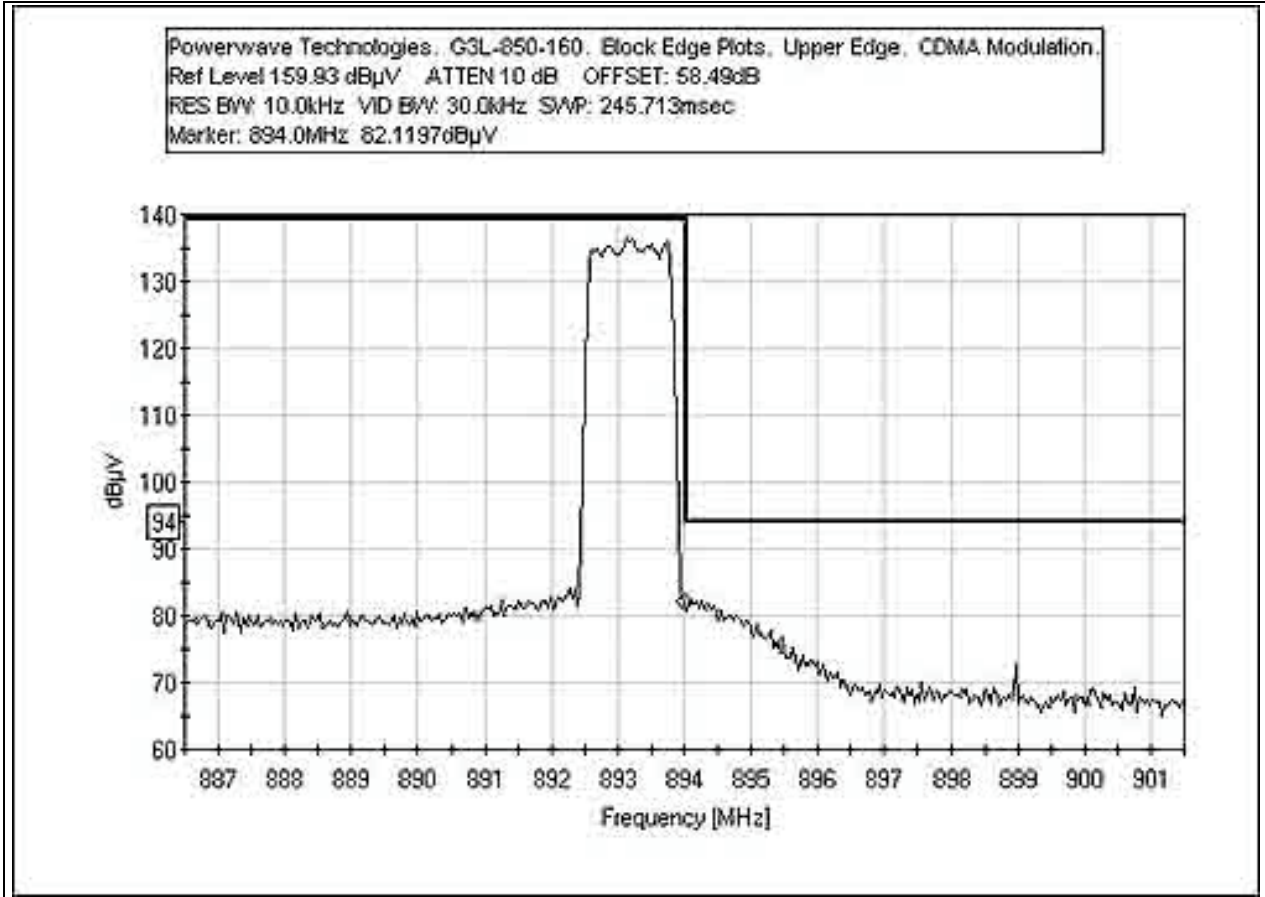
**BLOCKEDGE - AMPS VOICE - HIGH**



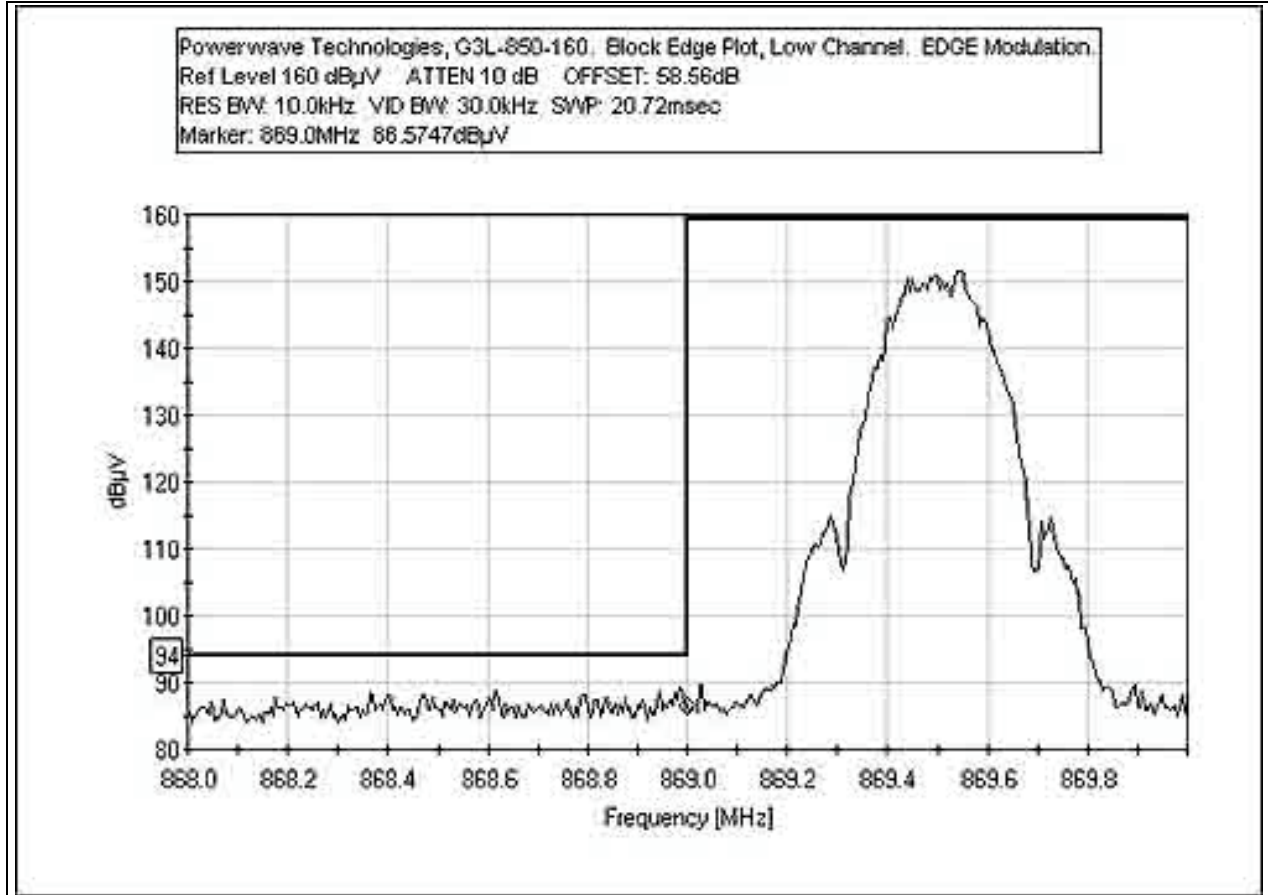
**BLOCKEDGE - CDMA - LOW BIGSPAN**



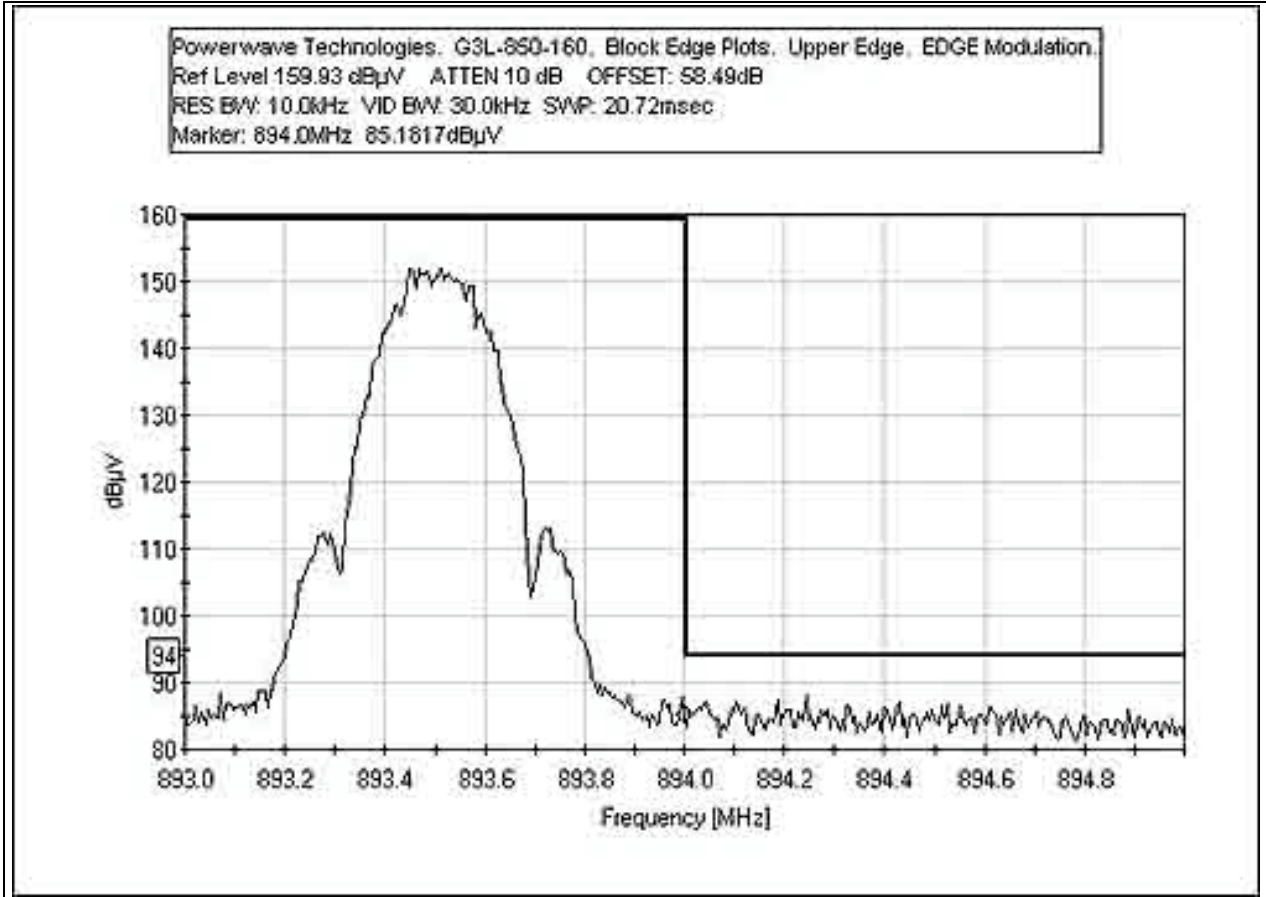
**BLOCKEDGE - CDMA - HIGH BIGSPAN**



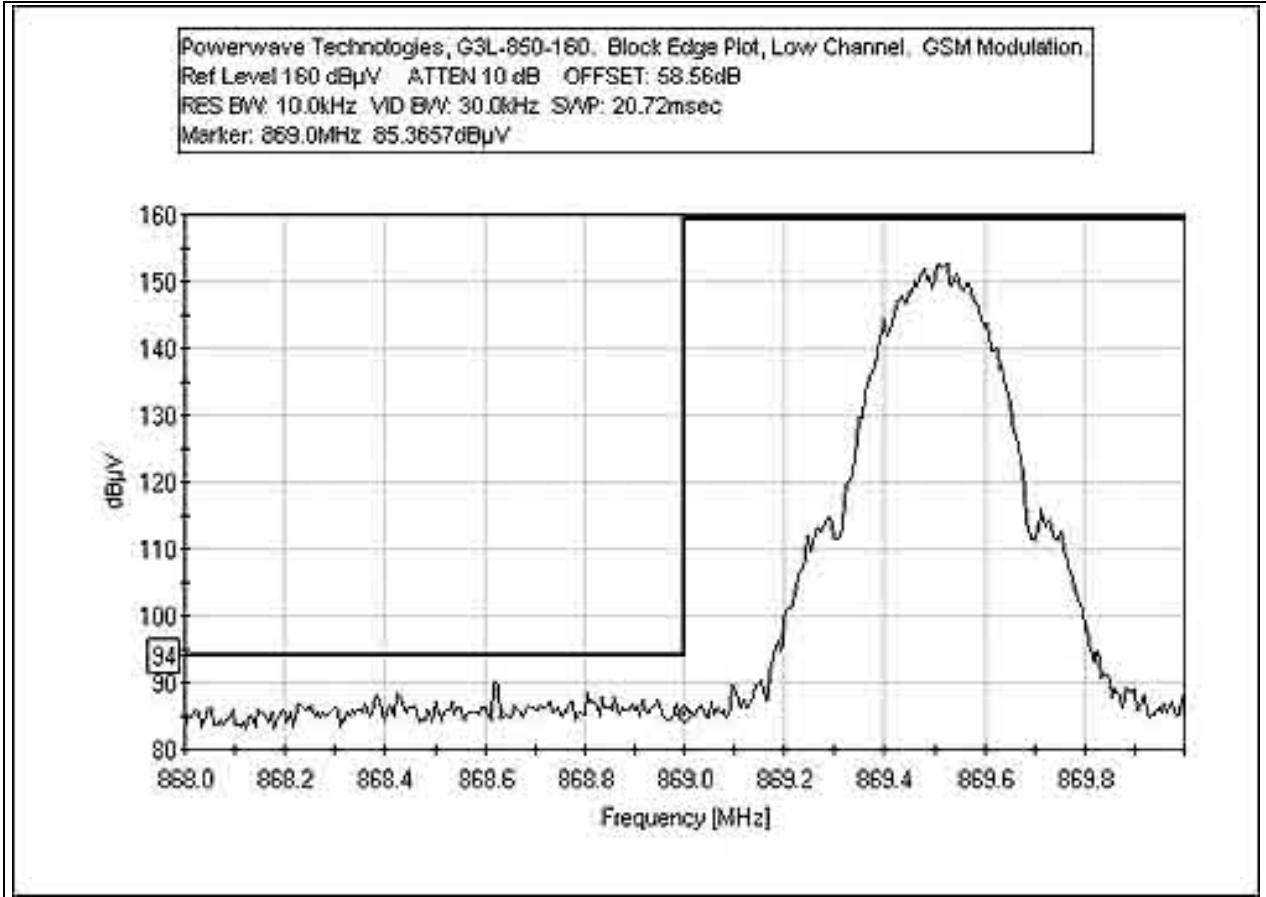
**BLOCKEDGE - EDGE - LOW**



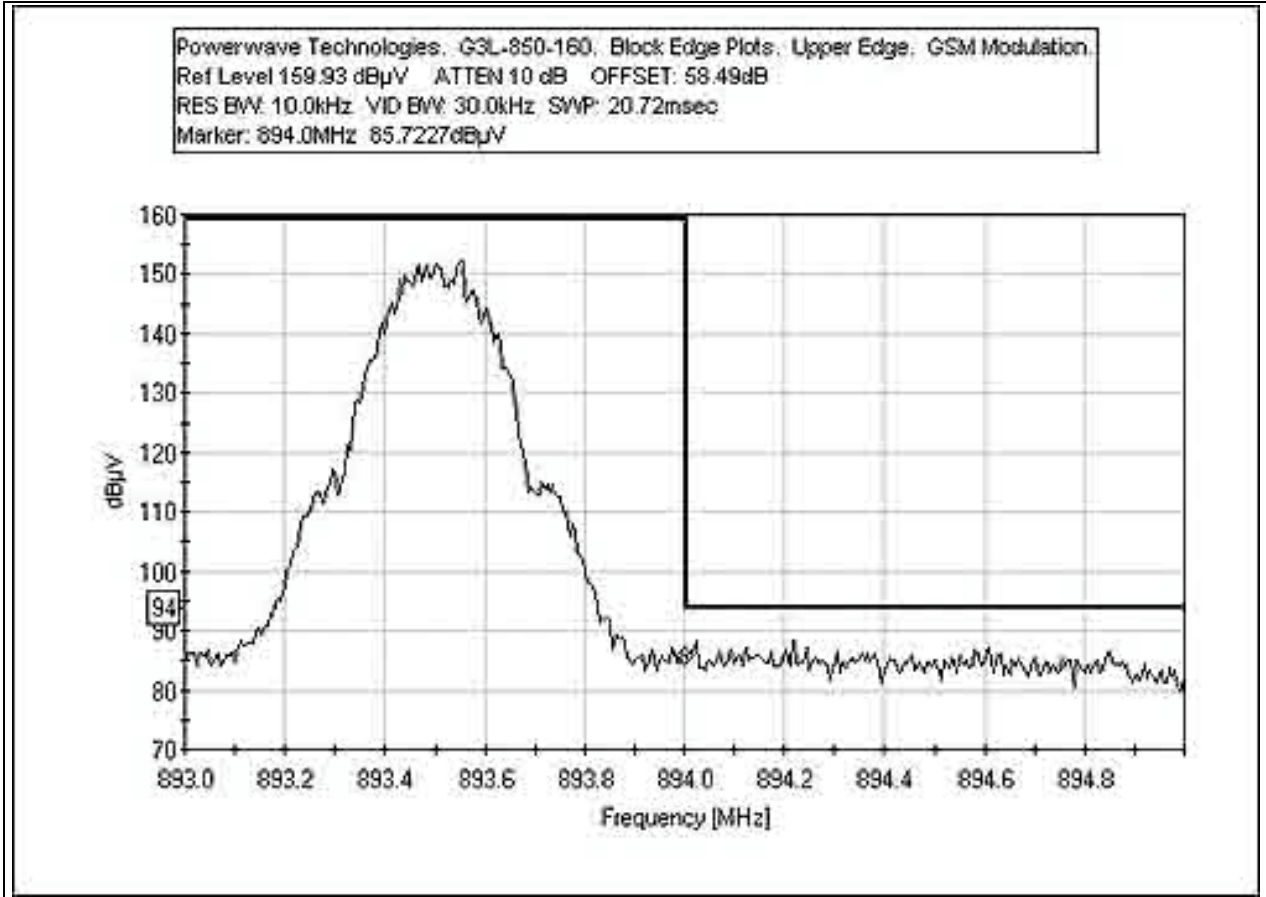
**BLOCKEDGE - EDGE- HIGH**



**BLOCKEDGE - GSM - LOW**

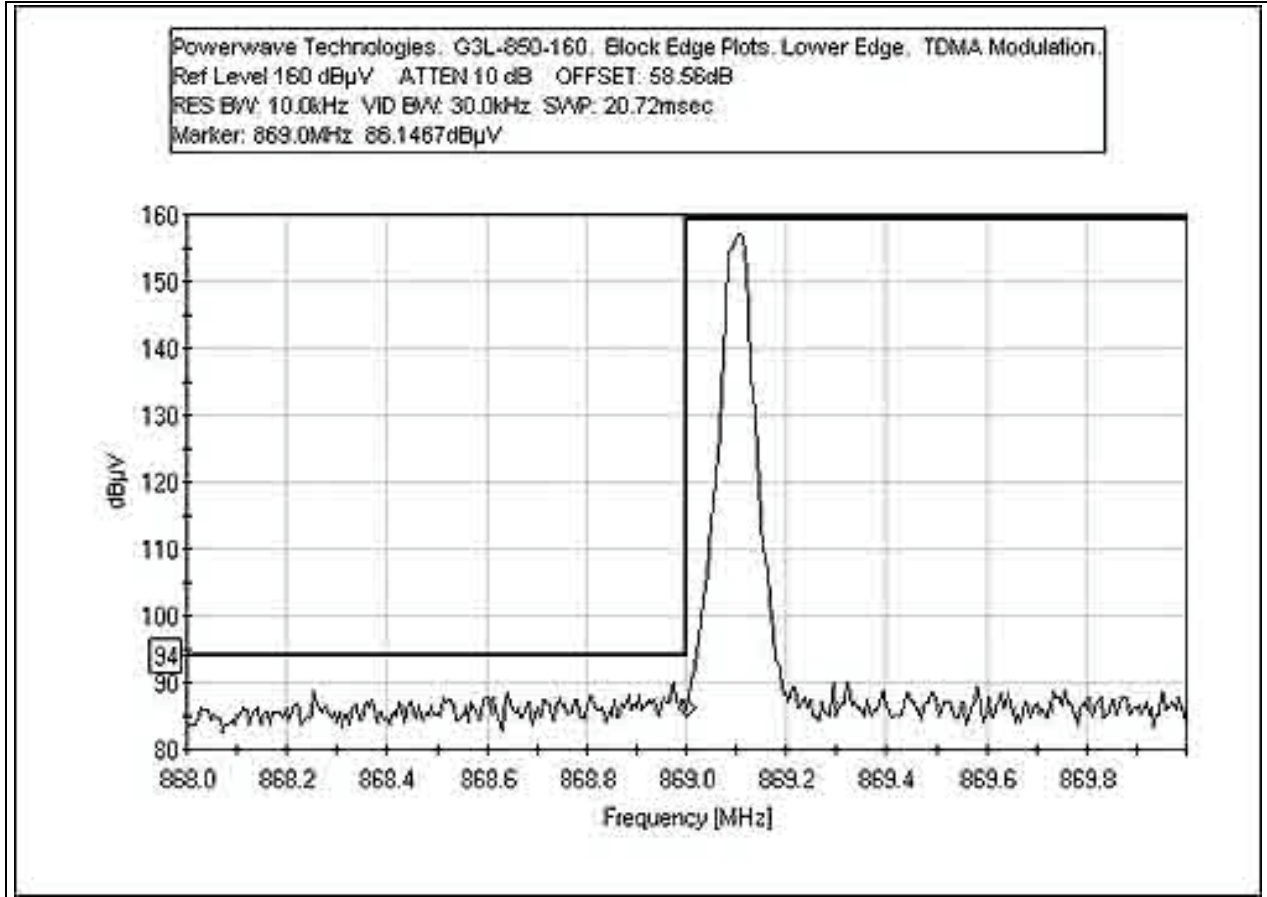


**BLOCKEDGE - GSM - HIGH**

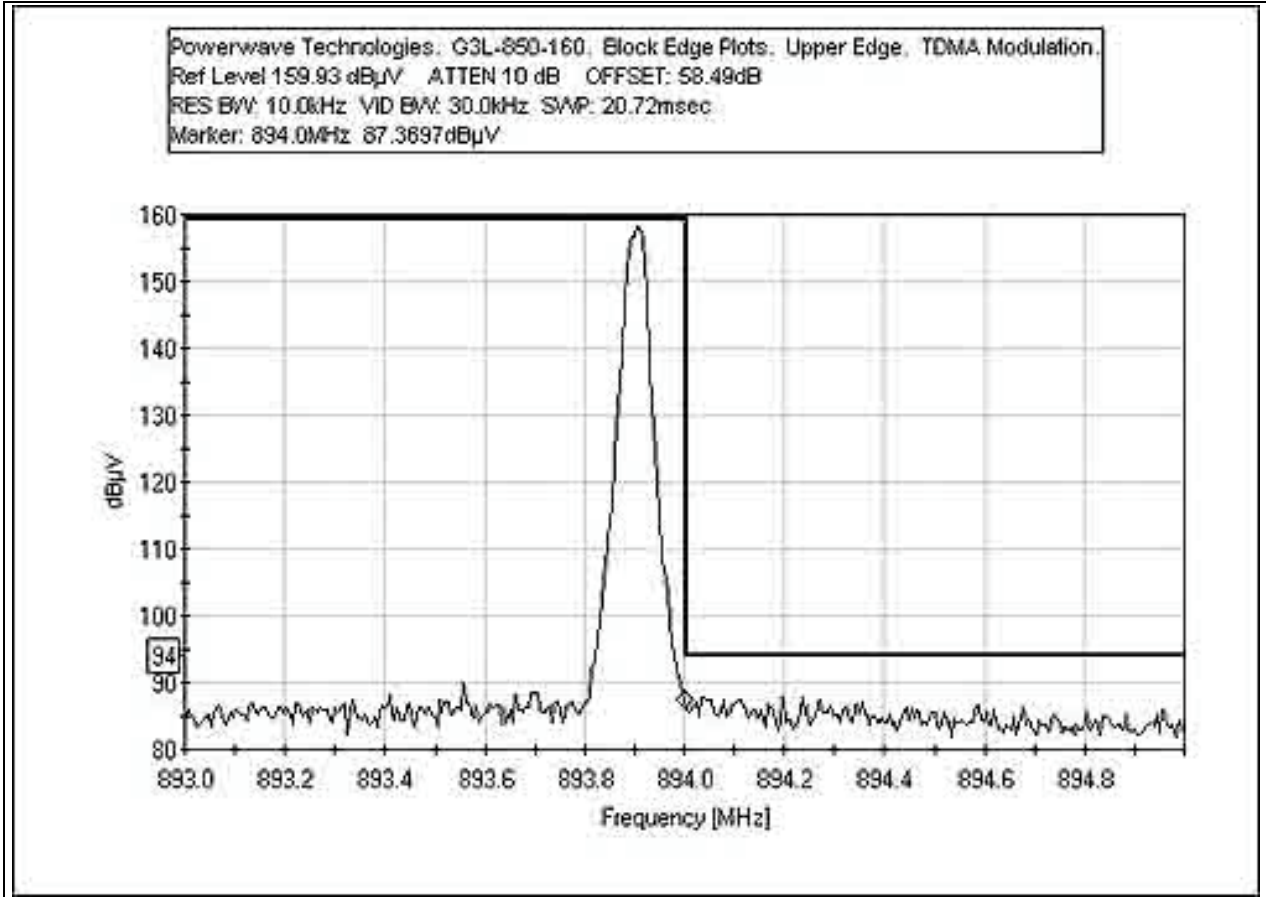




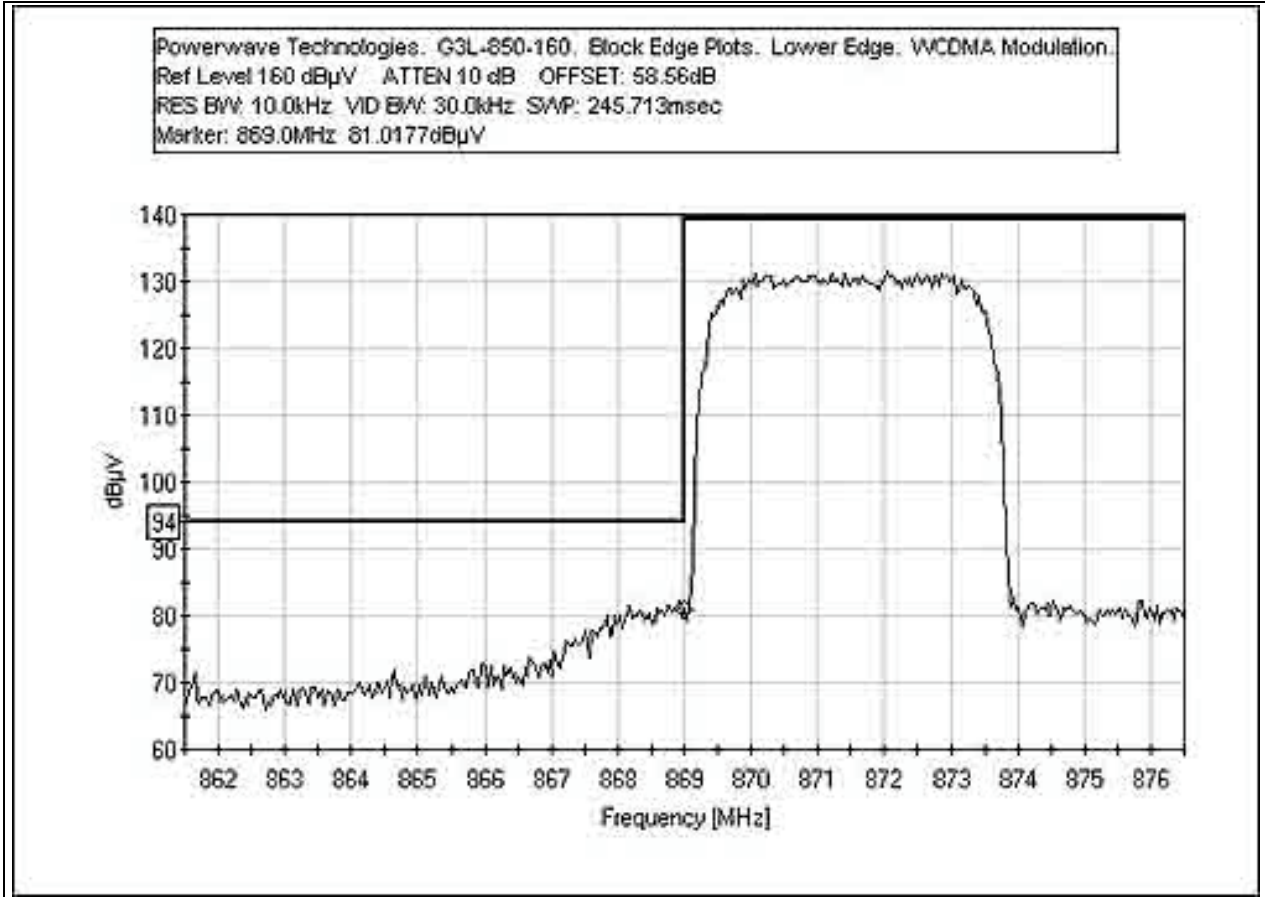
**BLOCKEDGE - TDMA - LOW**



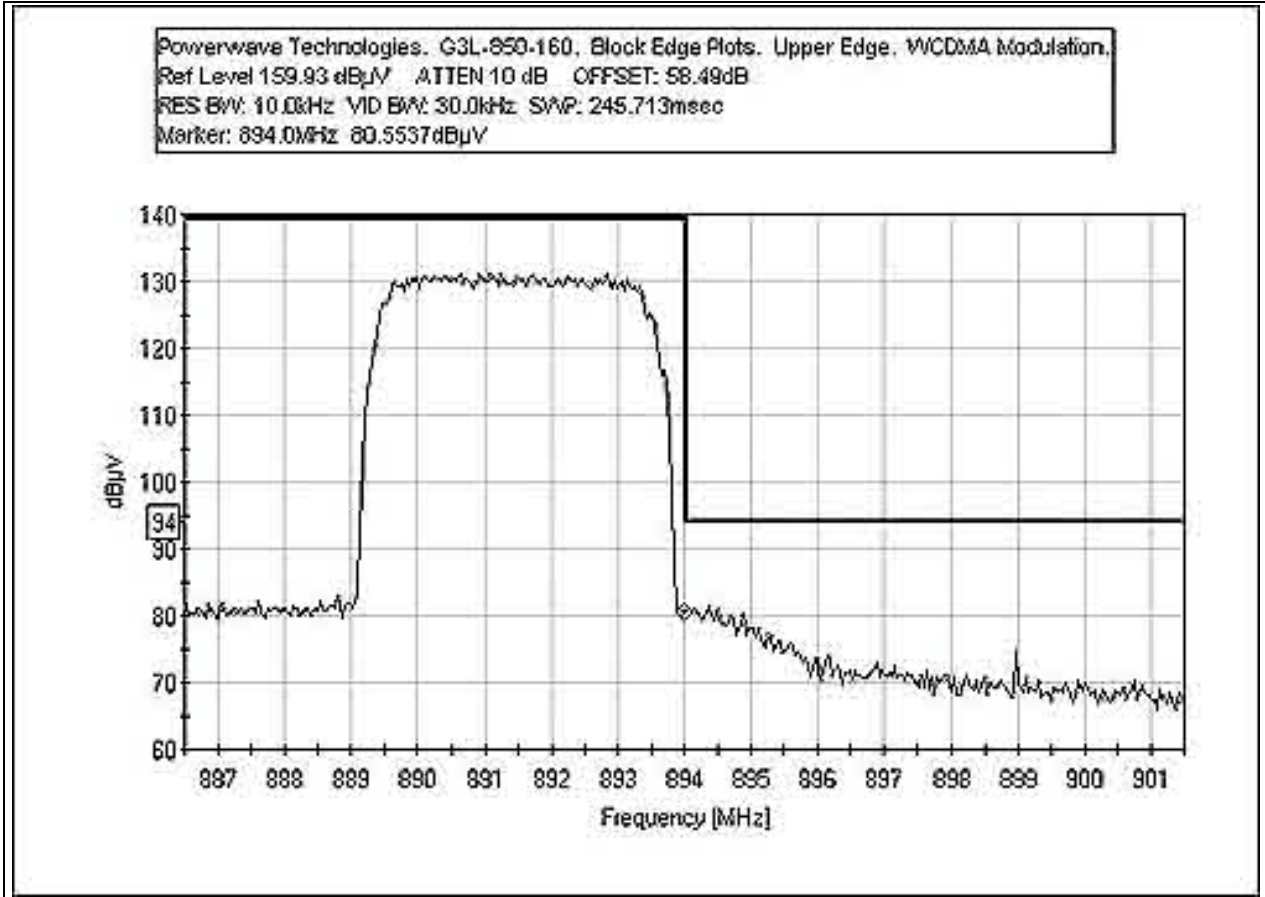
**BLOCKEDGE - TDMA - HIGH**



**BLOCKEDGE - WCDMA - LOW BIGSPAN**



**BLOCKEDGE - WCDMA - HIGH BIGSPAN**



**Test Equipment**

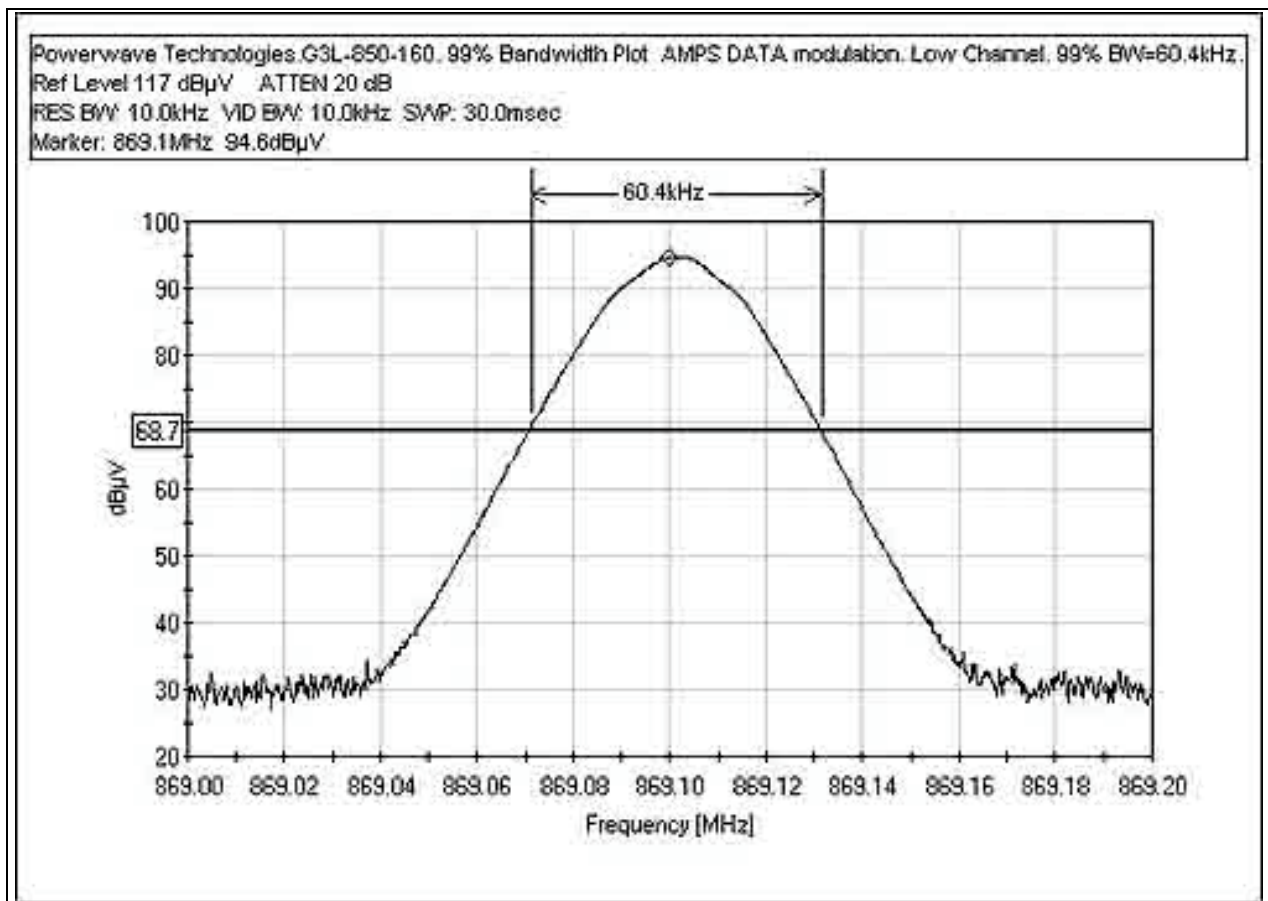
<b>Equipment</b>	<b>Asset #</b>	<b>Manufacturer</b>	<b>Model #</b>	<b>Serial #</b>	<b>Cal Date</b>	<b>Cal Due</b>
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032505	032507

**PHOTOGRAPH SHOWING BLOCKEDGE**



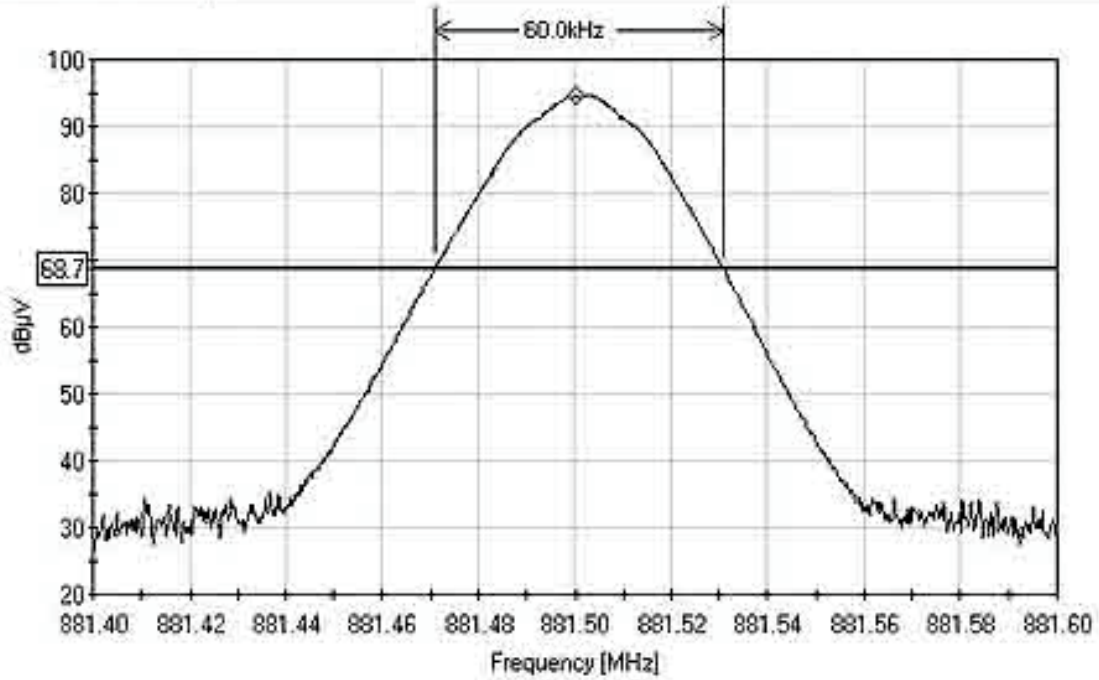
### 99% BANDWIDTH - AMPS DATA - LOW

**Test Conditions:** The signal generator is providing the input signal to the EUT. From the signal generator the signal goes to the preamplifier and then the band pass filter before reaching the input of the EUT. The output of the EUT is connected to an attenuator and a directional coupler. From the directional coupler forward power port the EUT fundamental output power is read. The emission bandwidth was taken with the spectrum analyzer connected to the output of the directional coupler through another attenuator. The output of the EUT is putting out 185 watts. Data was taken for the EUT with the following modulations at low, middle and high channels: AMPS VOICE, AMPS DATA, EDGE, GSM, TDMA, CDMA, and WCDMA.



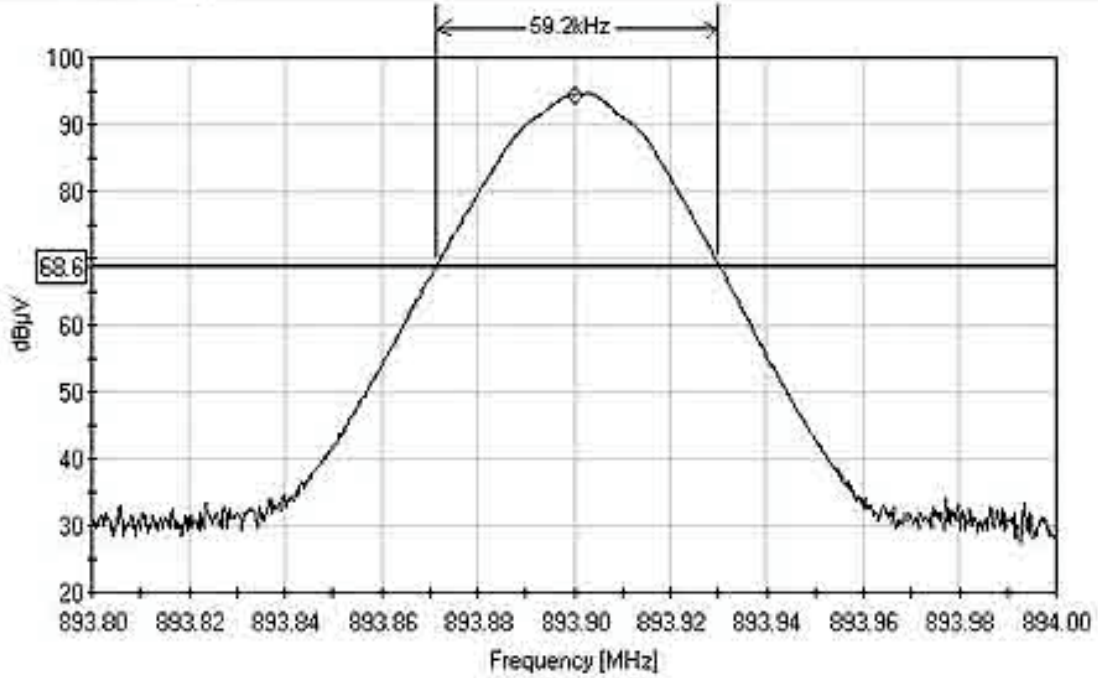
**99% BANDWIDTH - AMPS DATA - MID**

Powerwave Technologies, G3L-850-160, 99% Bandwidth Plot, AMPS DATA modulation, Mid Channel, 99% BW=60.0kHz,  
Ref Level 117 dB $\mu$ V, ATTN 20 dB  
RES BW: 10.0kHz, VID BW: 10.0kHz, SWP: 30.0nsec  
Marker: 881.5MHz, 94.6dB $\mu$ V



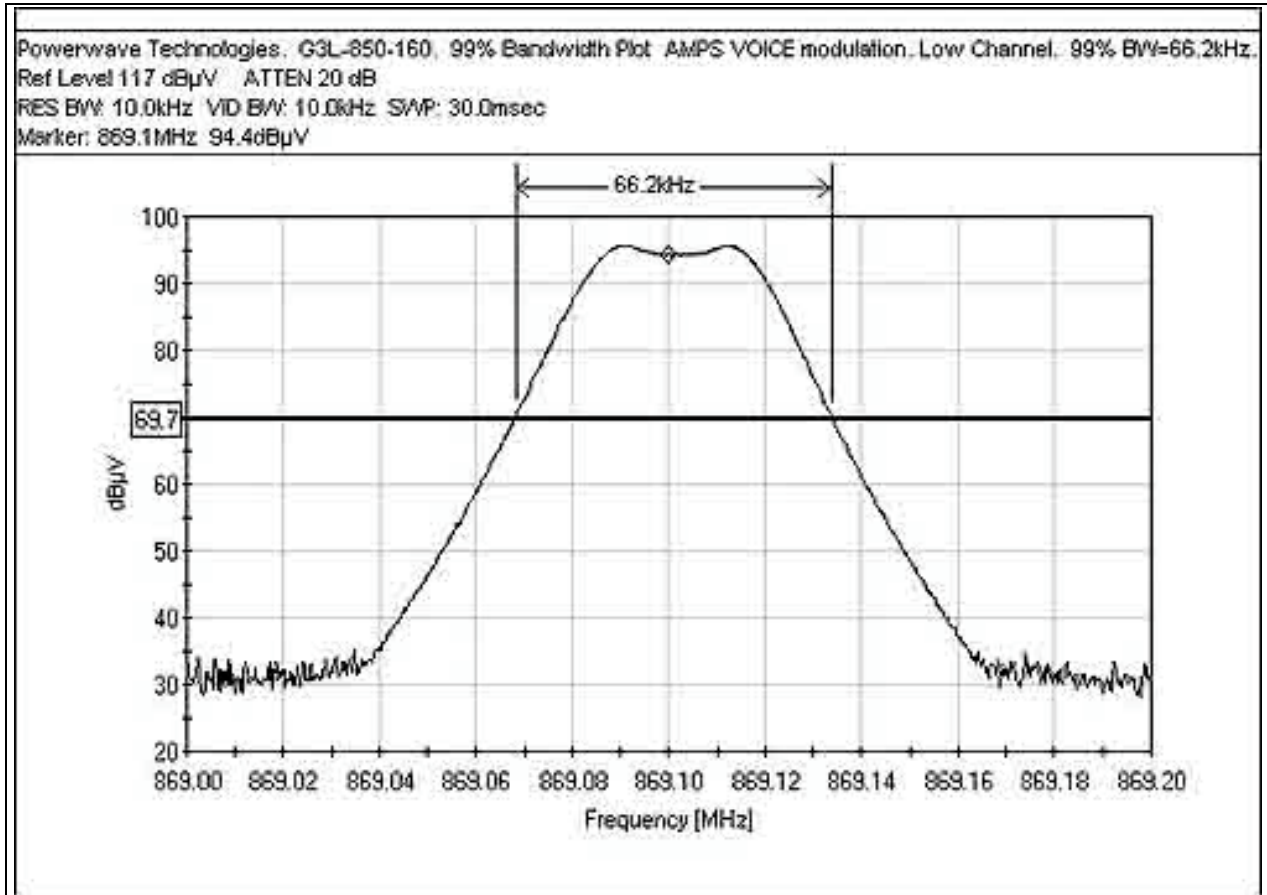
**99% BANDWIDTH - AMPS DATA - HIGH**

Powerwave Technologies.G3L-850-160. 99% Bandwidth Plot AMPS DATA modulation. High Channel. 99% BW=59.2kHz.  
Ref Level 117 dB $\mu$ V .ATTEN 20 dB  
RES BW: 10.0kHz VID BW: 10.0kHz SAMP: 30.0msec  
Marker: 893.9MHz 94.5dB $\mu$ V

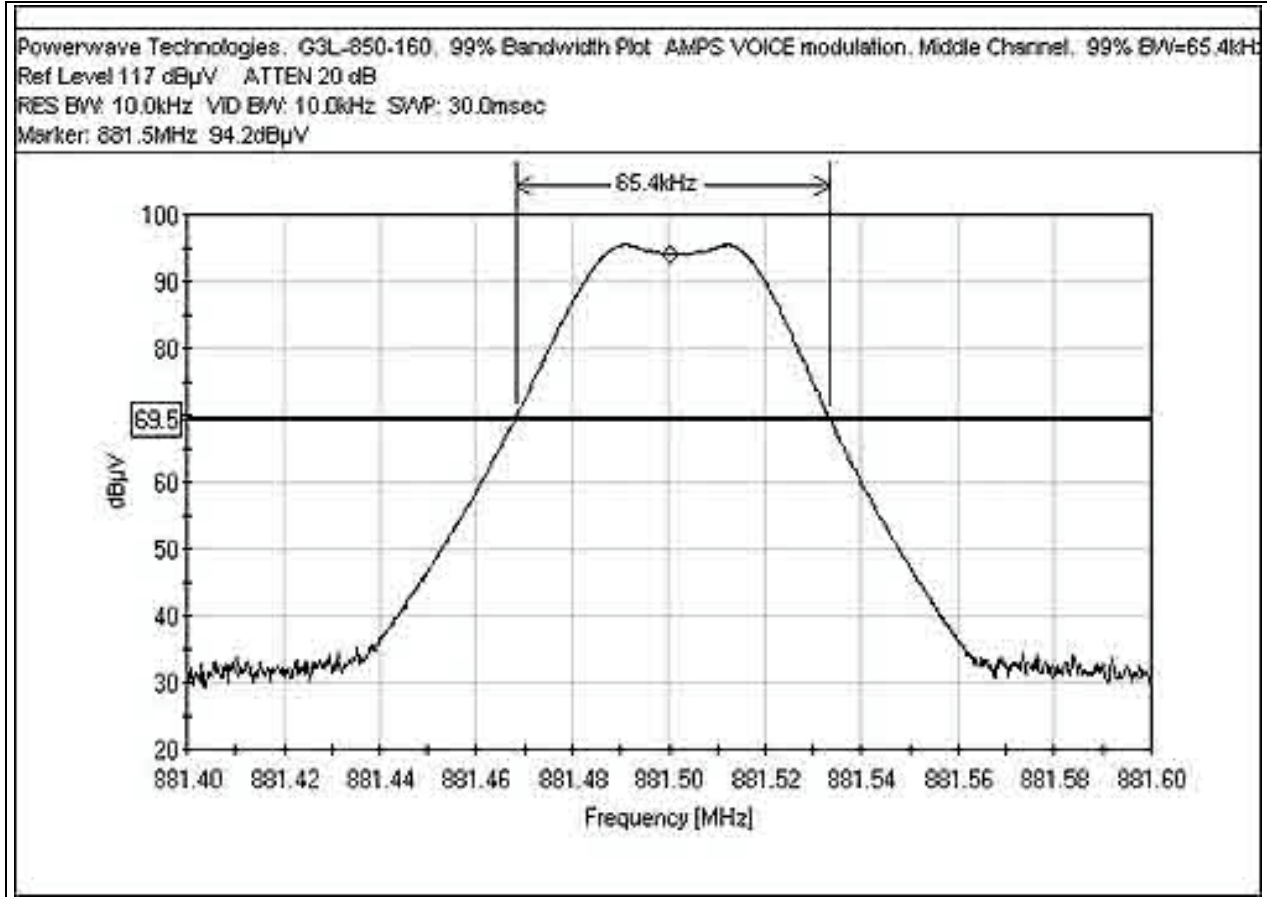




**99% BANDWIDTH - AMPS VOICE - LOW**

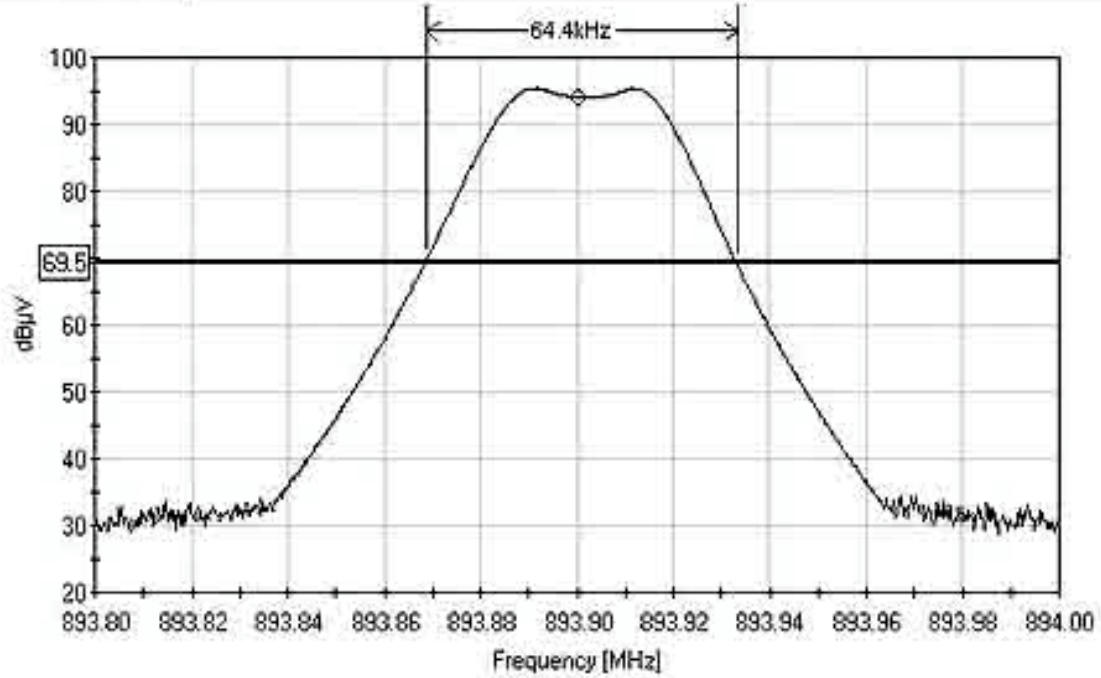


**99% BANDWIDTH - AMPS VOICE - MID**

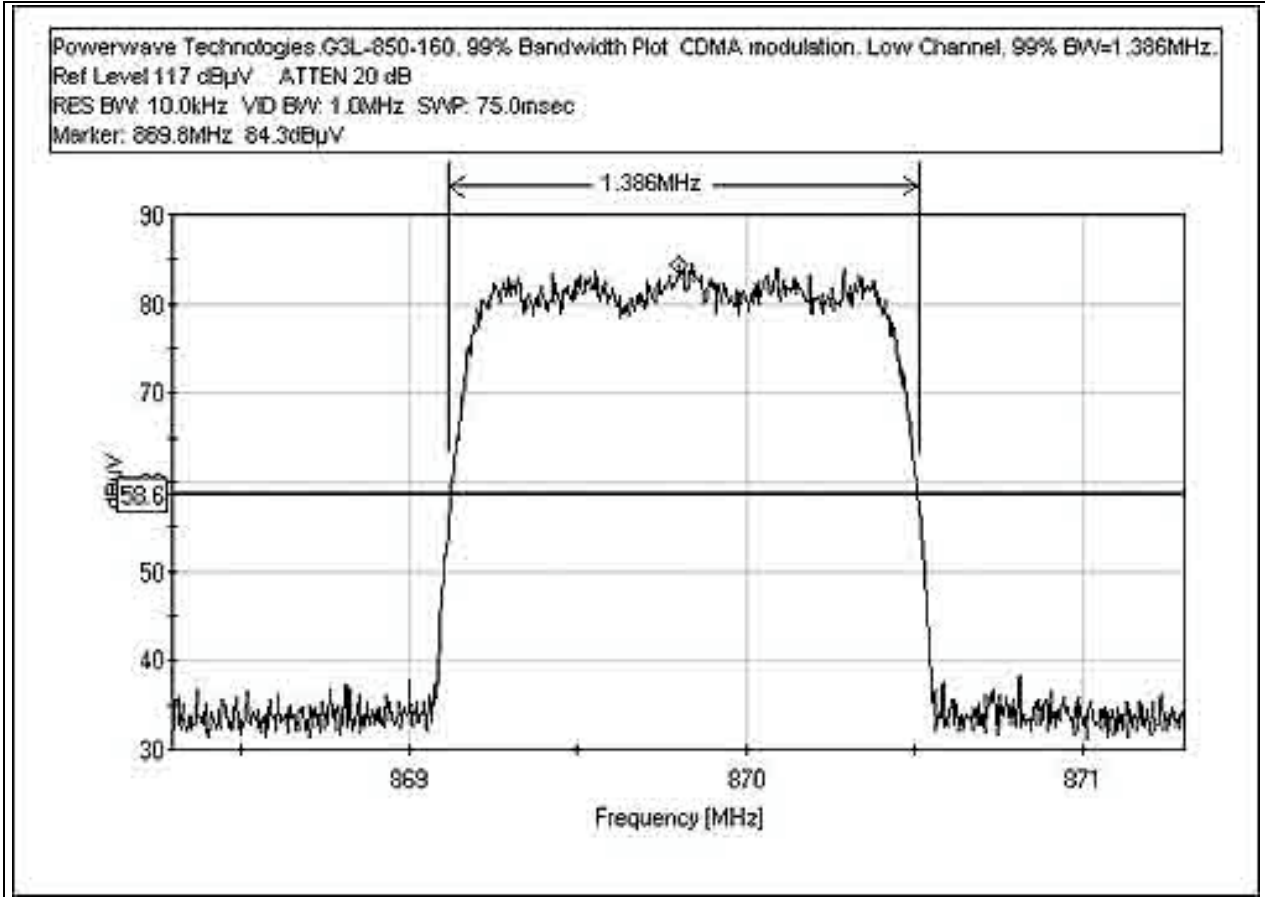


**99% BANDWIDTH - AMPS VOICE - HIGH**

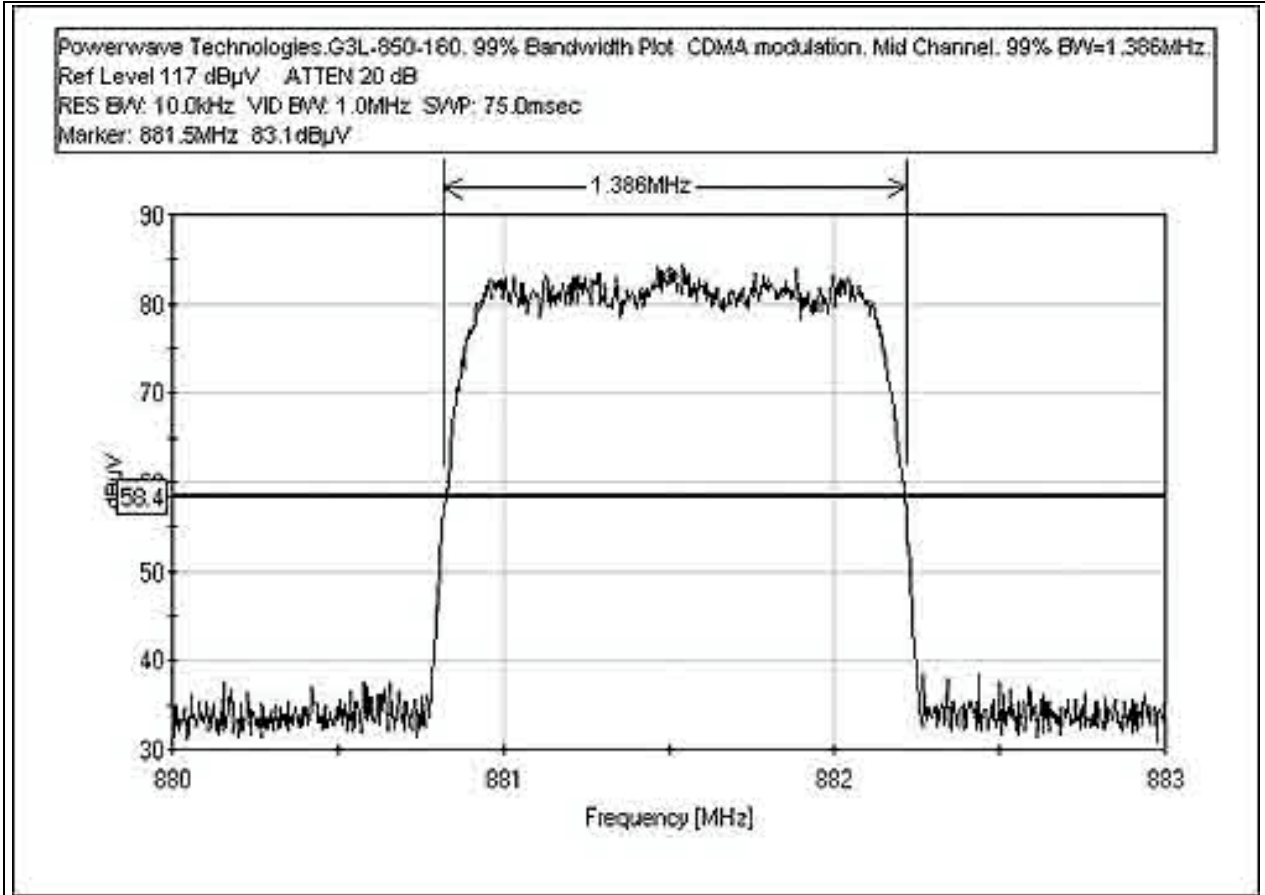
Powerwave Technologies, G3L-850-160, 99% Bandwidth Plot, AMPS VOICE modulation, High Channel, 99% BW=64.4kHz,  
Ref Level 117 dB $\mu$ V, ATTN 20 dB  
RES BW: 10.0kHz, VID BW: 10.0kHz, SWP: 30.0msec  
Marker: 893.9MHz, 94.1dB $\mu$ V



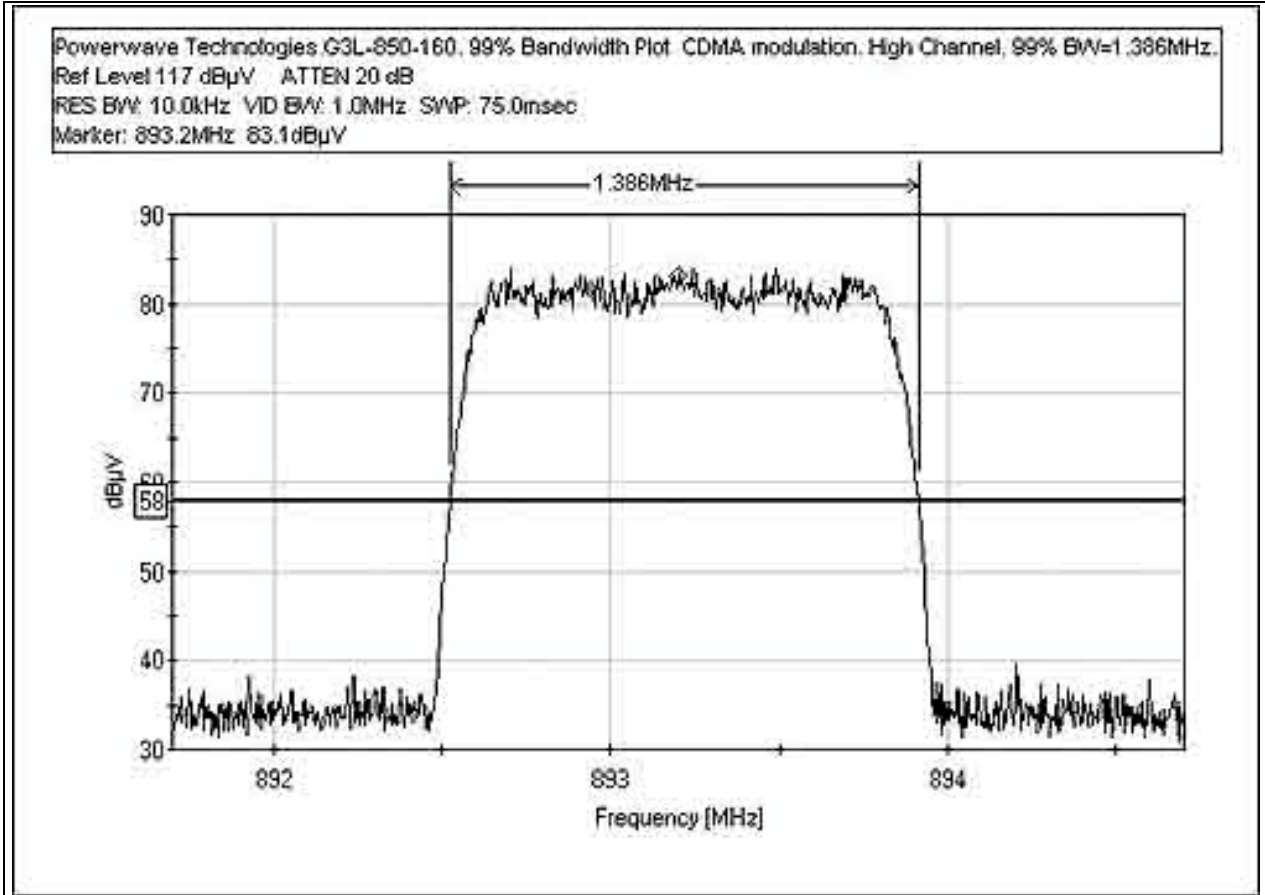
**99% BANDWIDTH - CDMA - LOW**



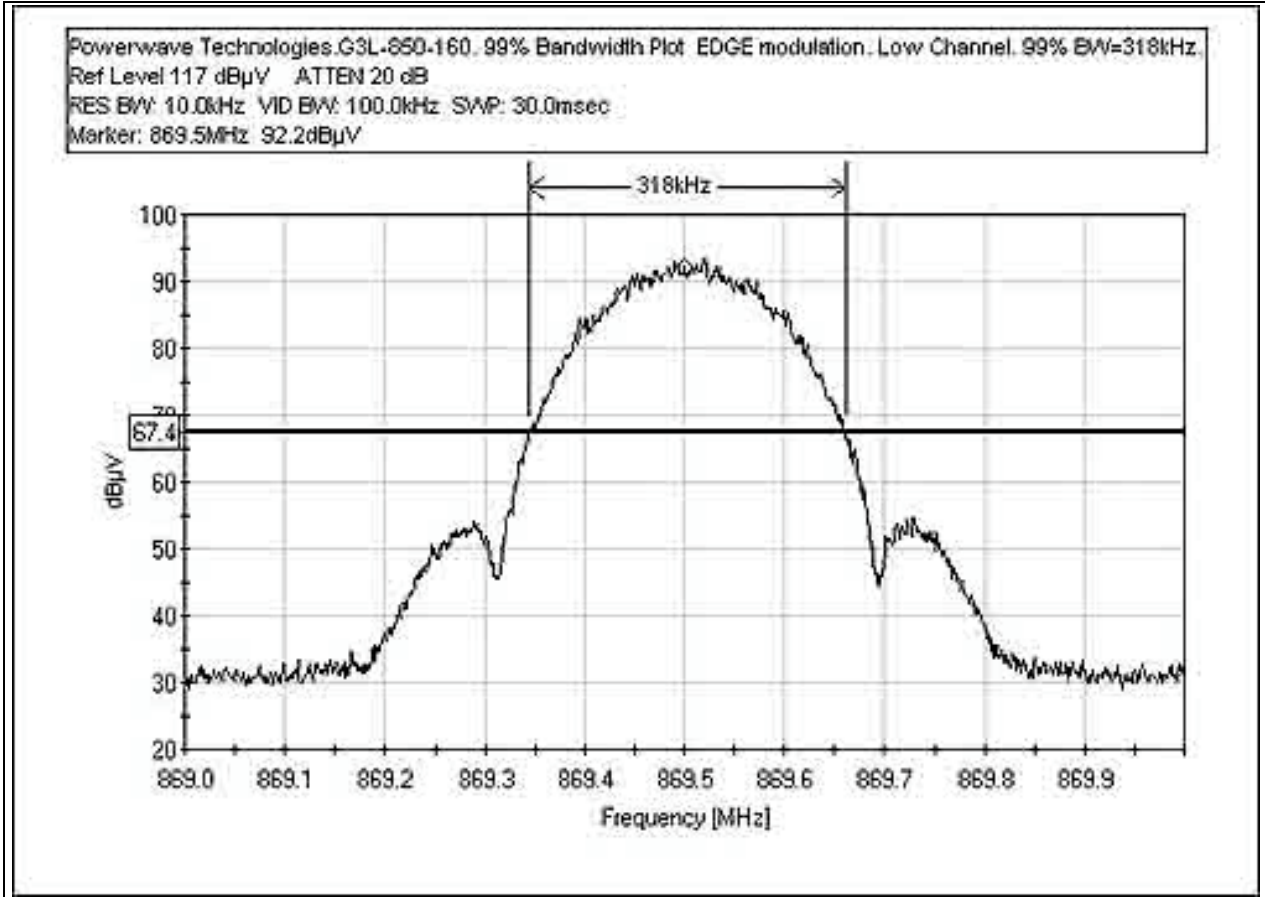
**99% BANDWIDTH - CDMA - MID**



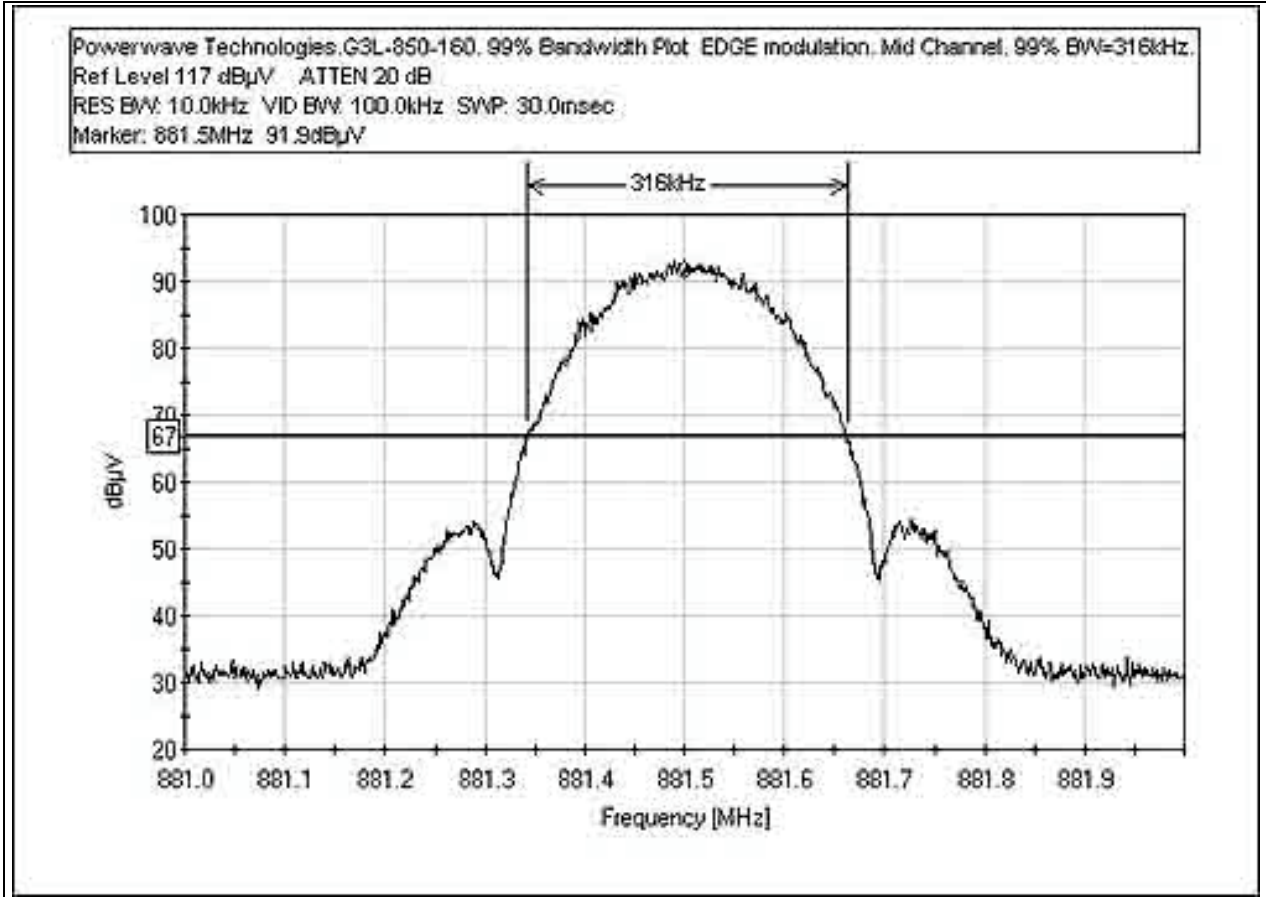
**99% BANDWIDTH - CDMA - HIGH**



**99% BANDWIDTH - EDGE - LOW**

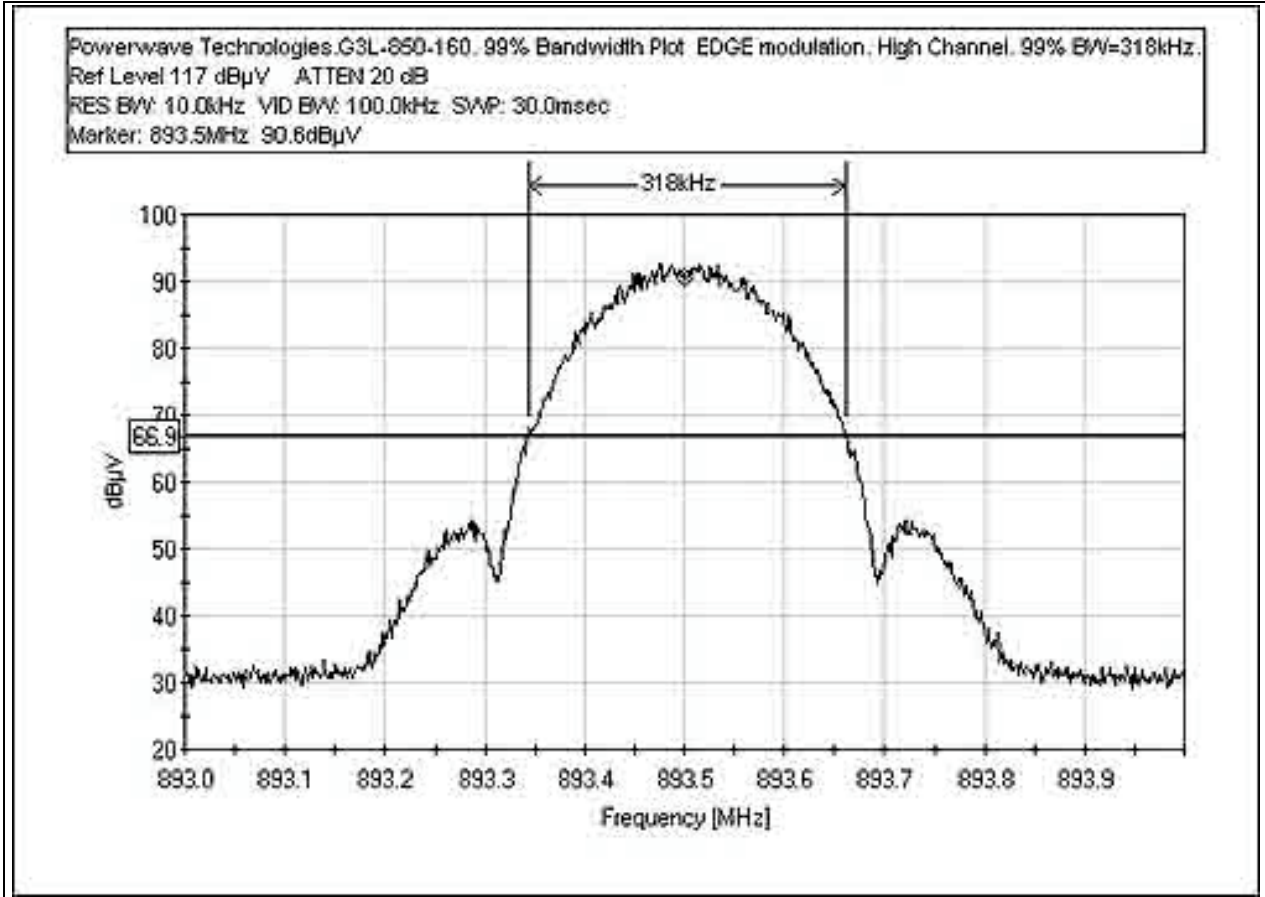


**99% BANDWIDTH - EDGE - MID**

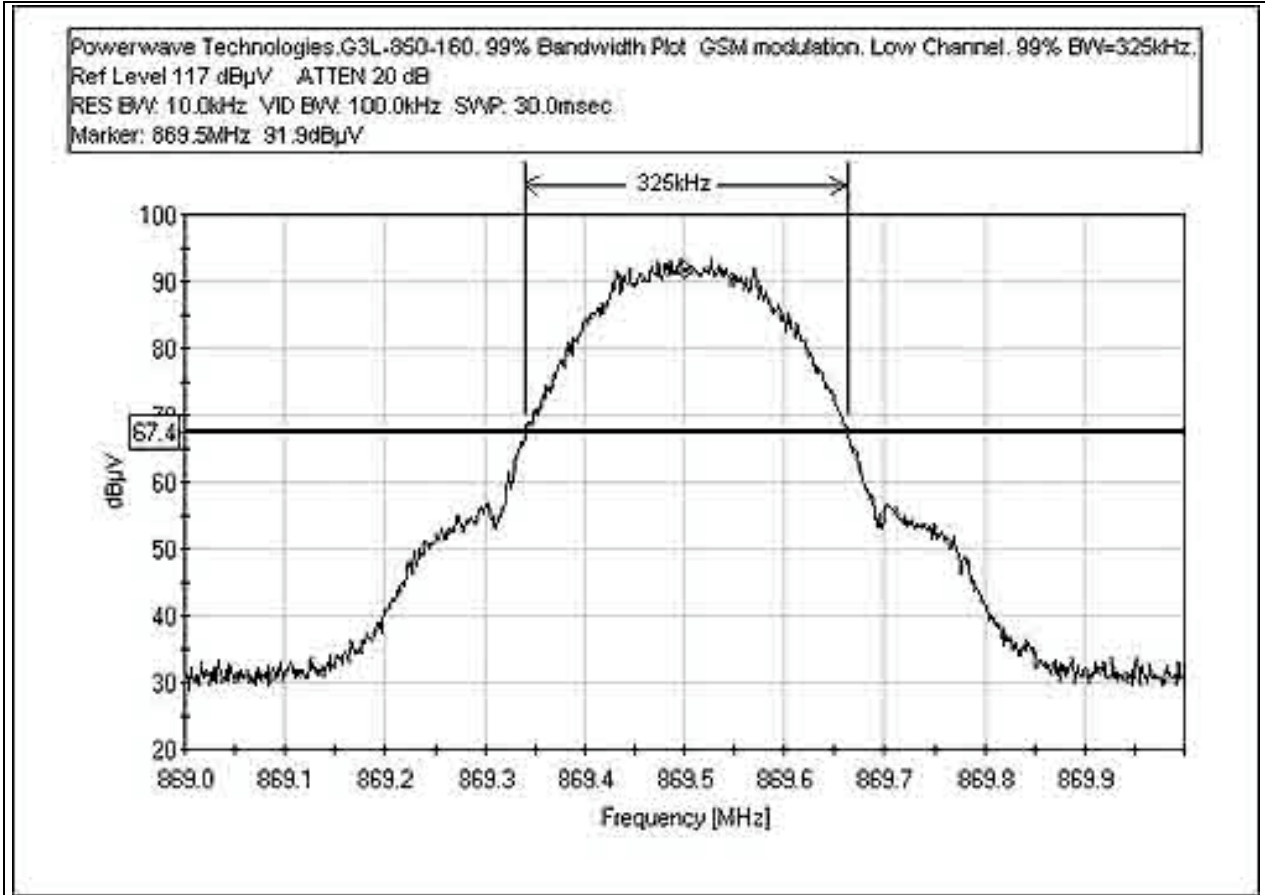




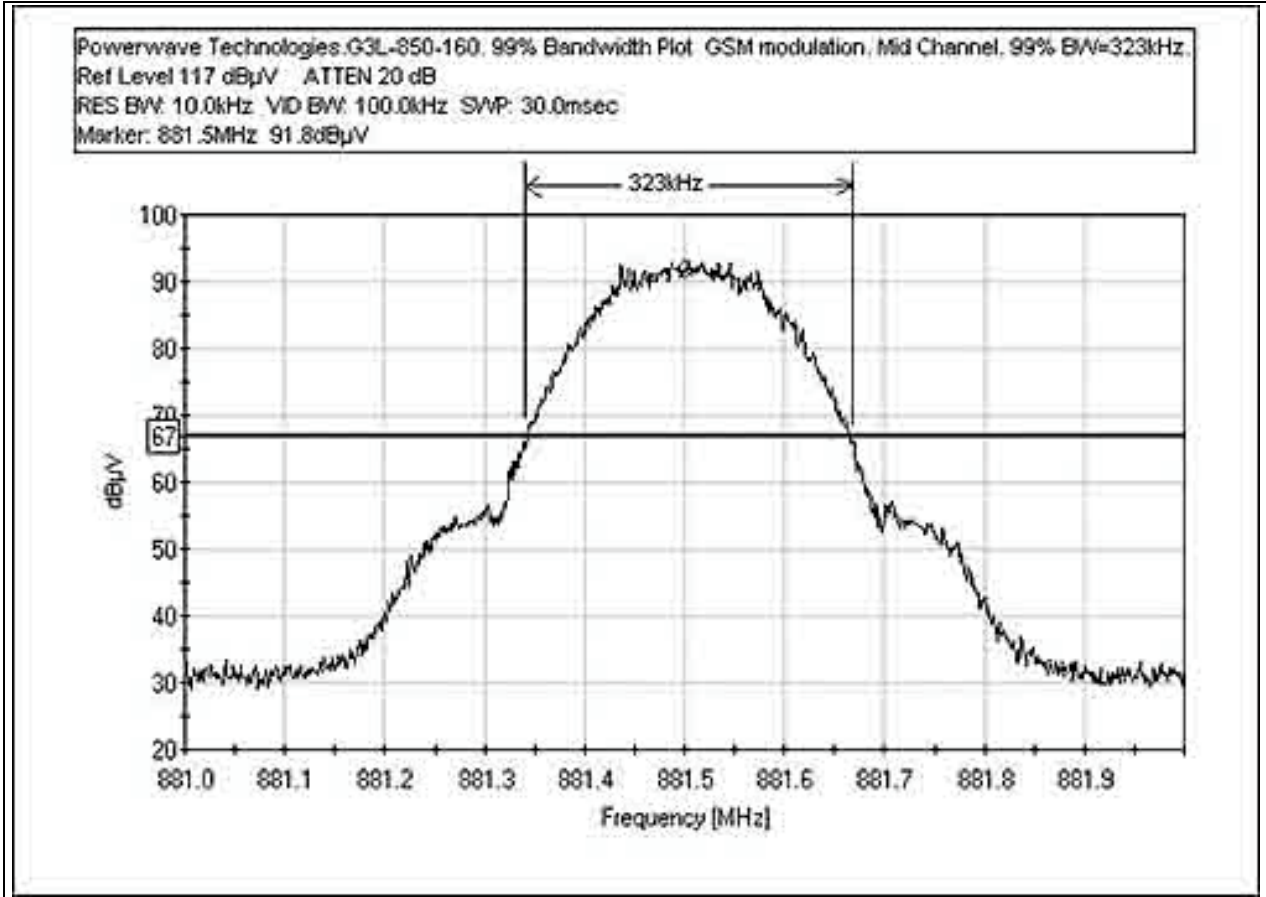
**99% BANDWIDTH - EDGE - HIGH**



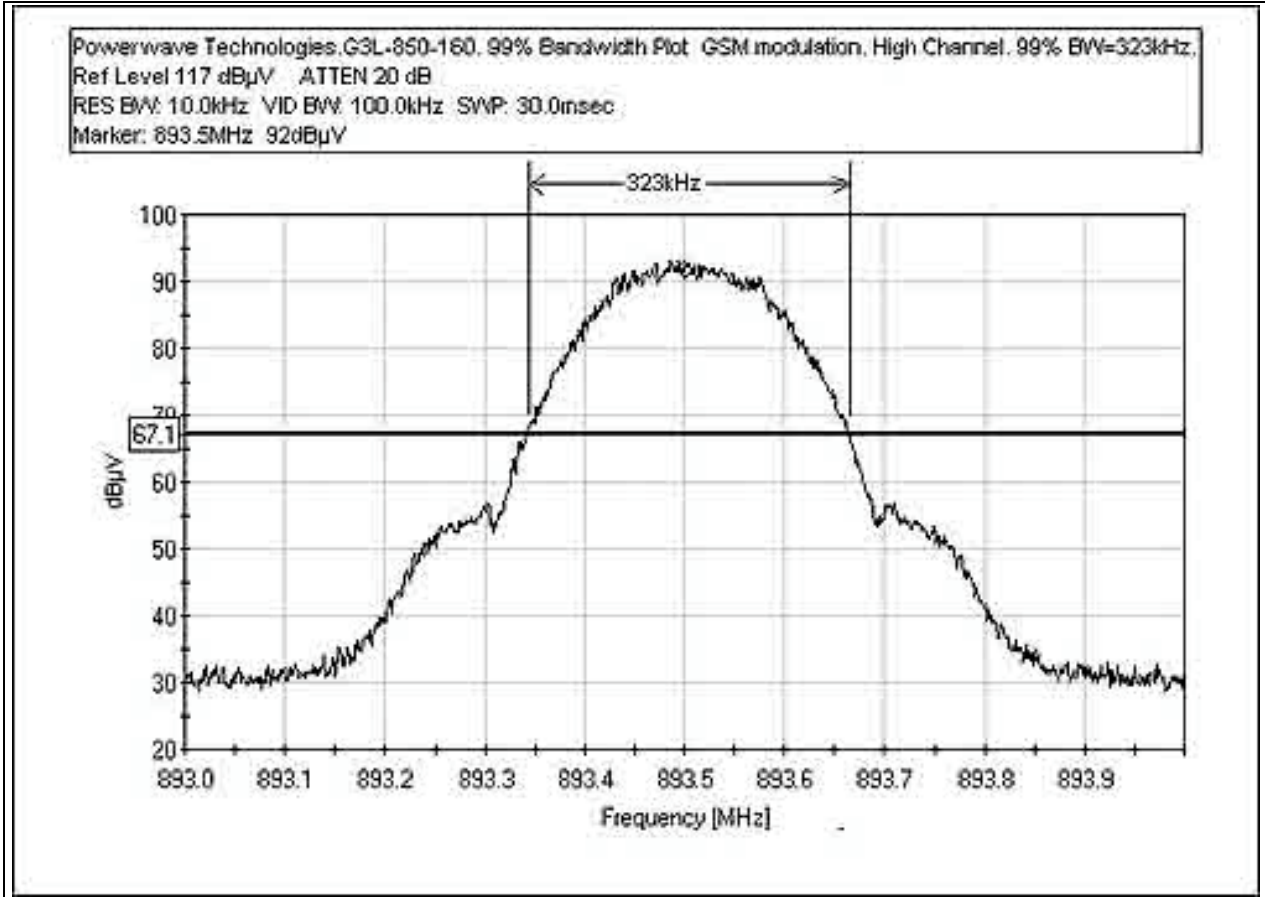
### 99% BANDWIDTH - GSM - LOW



**99% BANDWIDTH - GSM - MID**

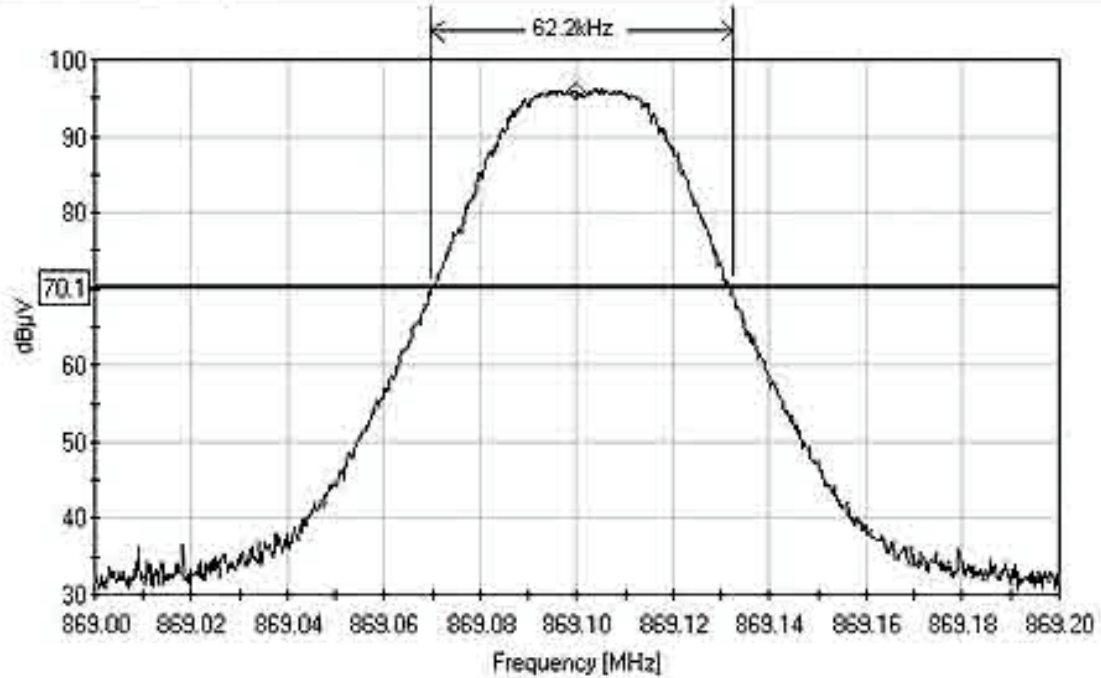


### 99% BANDWIDTH - GSM - HIGH



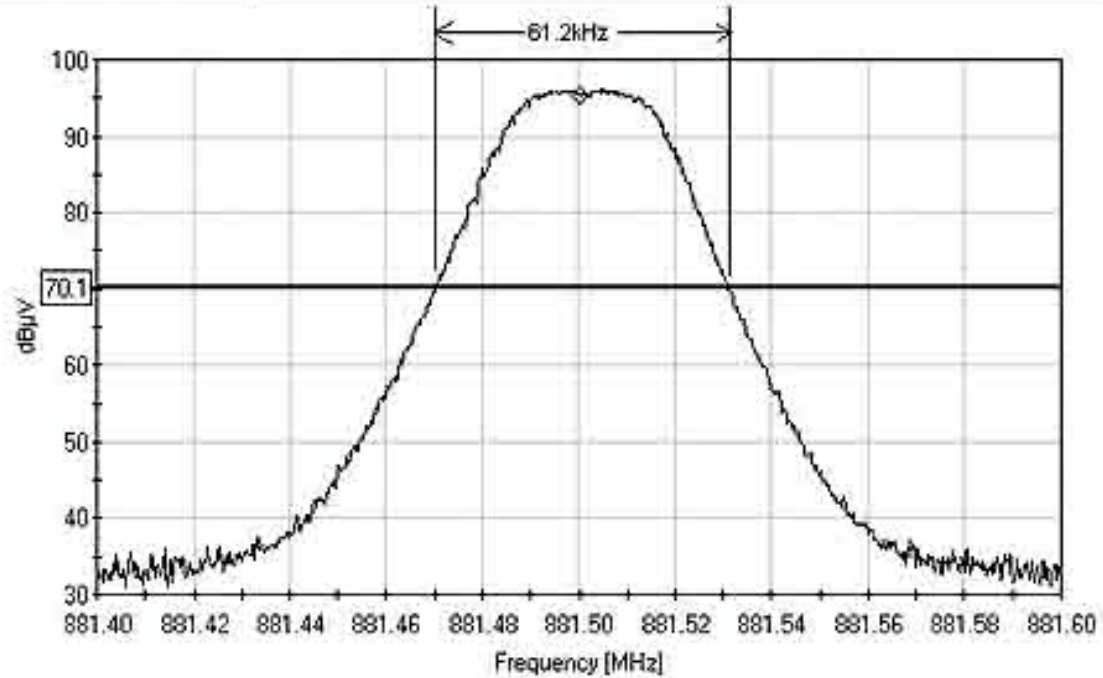
### 99% BANDWIDTH - TDMA - LOW

Powerwave Technologies G3L-850-160, 99% Bandwidth Plot TDMA modulation, Low Channel, 99% BW=62.2kHz  
Ref Level 117 dB $\mu$ V ATTN 20 dB  
RES BW: 10.0kHz VID BW: 100.0kHz SWP: 30.0msec  
Marker: 869.1MHz 95.8dB $\mu$ V



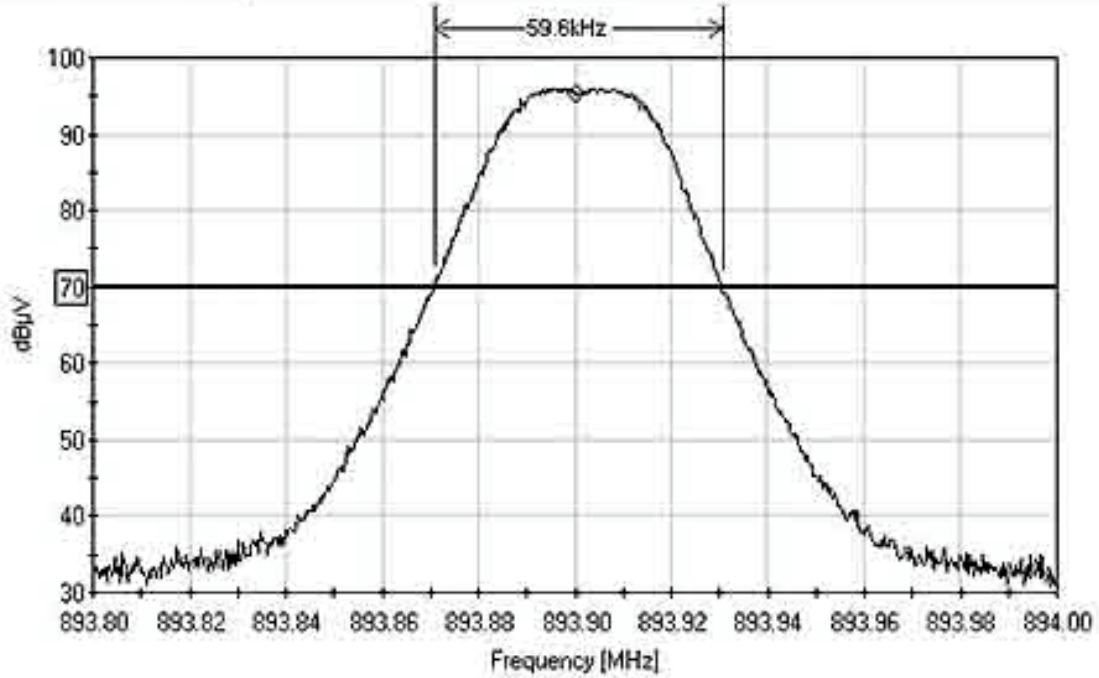
**99% BANDWIDTH - TDMA - MID**

Powerwave Technologies.G3L-850-160. 99% Bandwidth Plot TDMA modulation, Mid Channel, 99% BW=61.2kHz,  
Ref Level 117 dB $\mu$ V ATTEN 20 dB  
RES BW: 10.0kHz VID BW: 100.0kHz SWP: 30.0msec  
Marker: 881.5MHz 95.4dB $\mu$ V



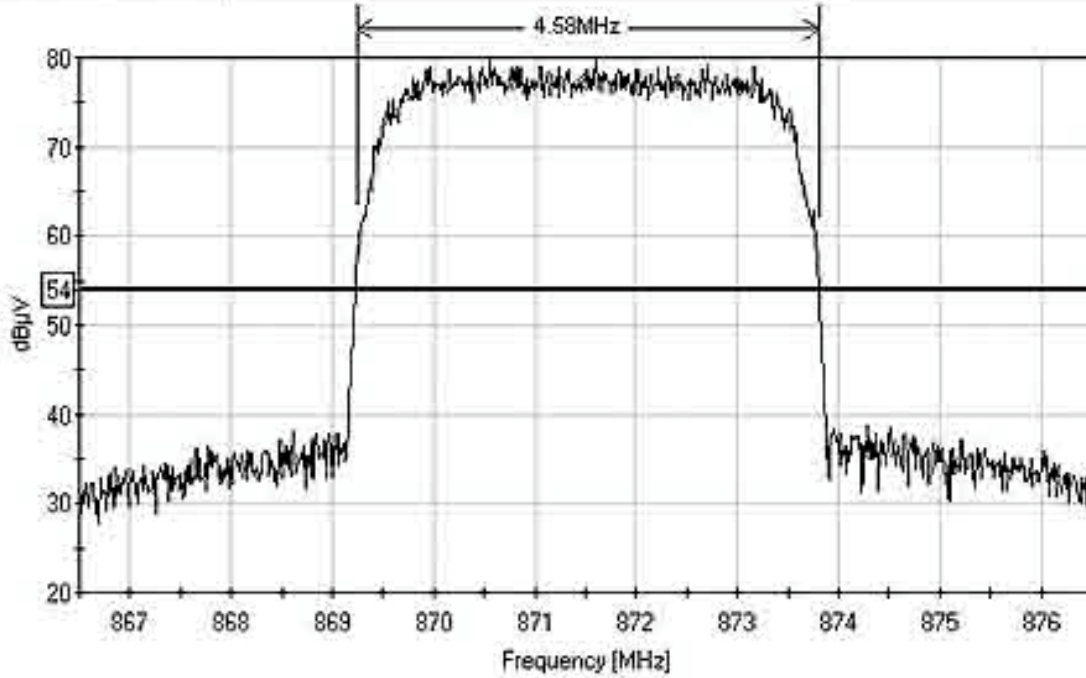
### 99% BANDWIDTH - TDMA - HIGH

Powerwave Technologies G3L-850-160. 99% Bandwidth Plot TDMA modulation. High Channel. 99% BW=59.6kHz  
Ref Level 117 dB $\mu$ V ATTN 20 dB  
RES BW: 10.0kHz VID BW: 100.0kHz SWP: 30.0msec  
Marker: 893.9MHz 95.3dB $\mu$ V



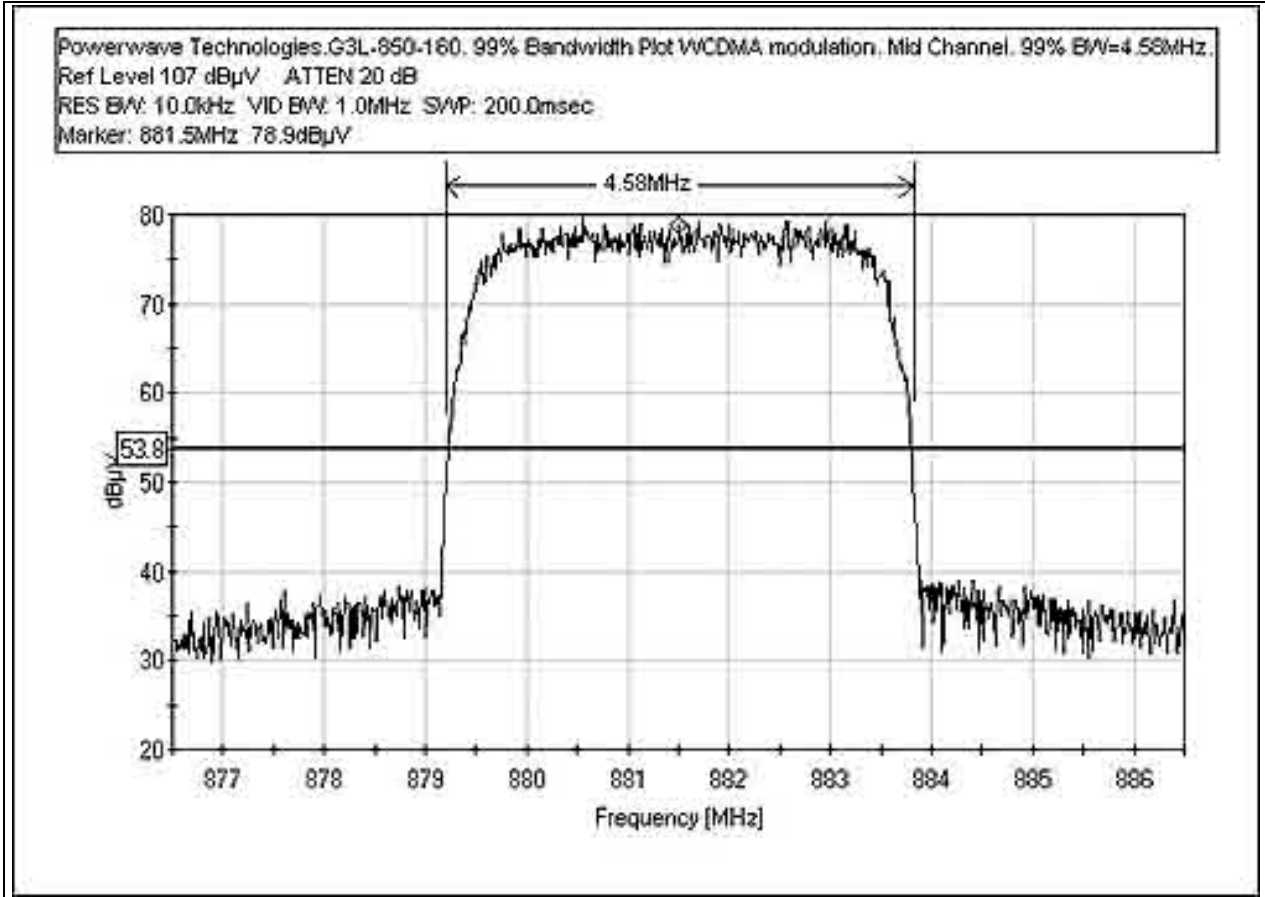
**99% BANDWIDTH - WCDMA - LOW**

Powerwave Technologies G3L-850-160, 99% Bandwidth Plot WCDMA modulation, Low Channel, 99% BW=4.58MHz,  
Ref Level 107 dB $\mu$ V ATTEN 20 dB  
RES BW: 10.0kHz VID BW: 1.0MHz SWP: 200.0msec  
Marker: 871.5MHz 77.4dB $\mu$ V



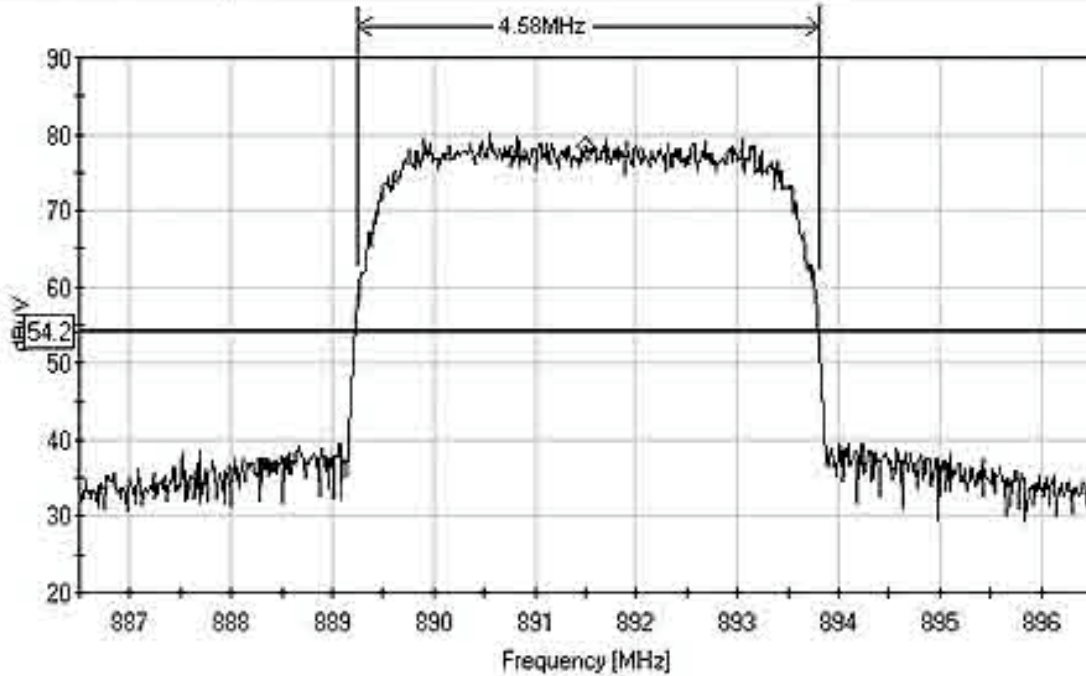


**99% BANDWIDTH - WCDMA - MID**



**99% BANDWIDTH - WCDMA - HIGH**

Powerwave Technologies.G3L-850-160. 99% Bandwidth Plot. CDMA modulation. High Channel. 99% BW=4.58MHz.  
Ref Level 107 dB $\mu$ V ATTN 20 dB  
RES BW: 10.0kHz VID BW: 1.0MHz SWP: 200.0msec  
Marker: 891.5MHz 78.5dB $\mu$ V



**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer RF Section	02462	HP	8568B	2928A04874	100804	100806
Spectrum Analyzer Display Section	02472	HP	85662A	3001A18430	100804	100806
QP Adapter	01437	HP	85650A	3303A01884	100804	100806

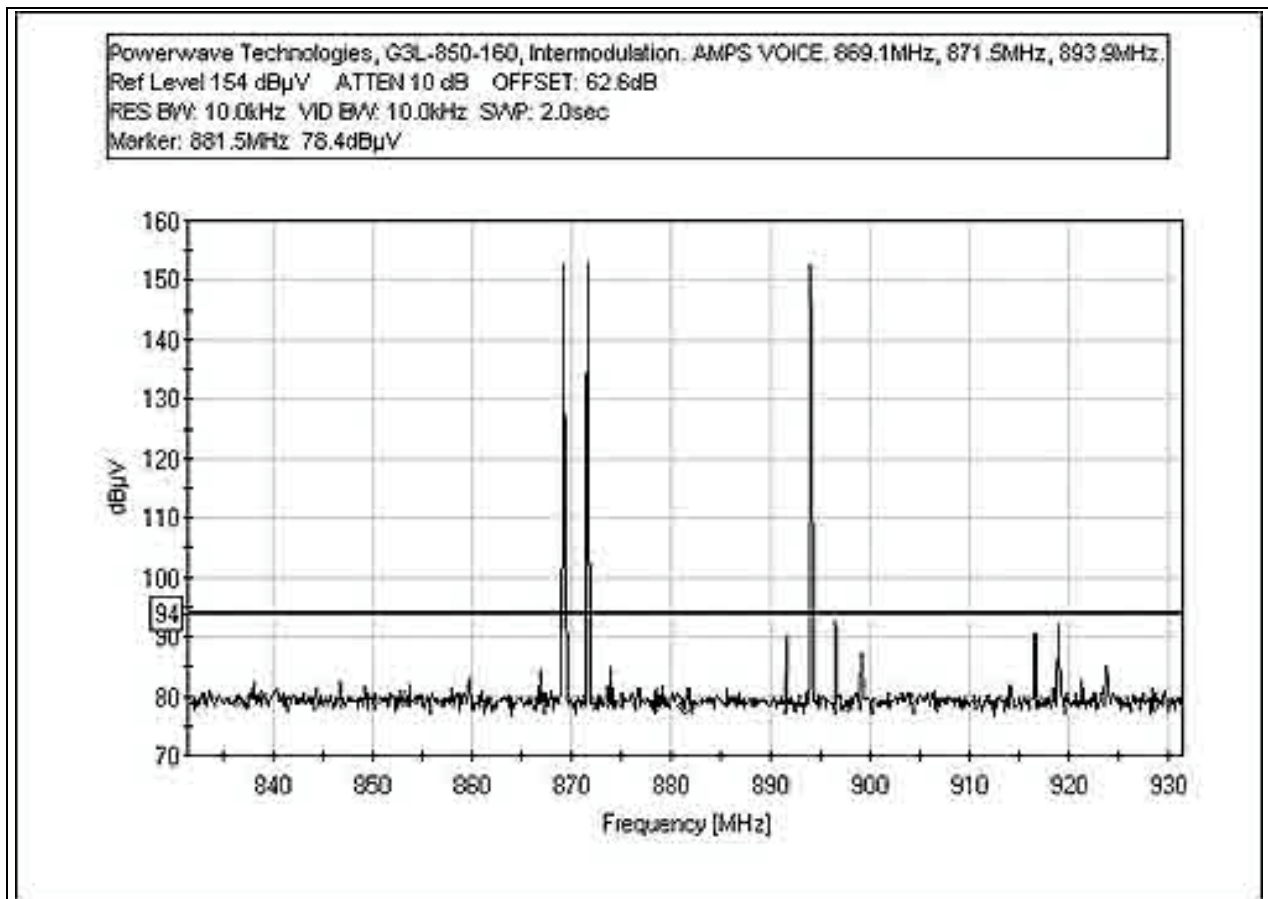
**PHOTOGRAPH SHOWING 99% BANDWIDTH**



### INTERMODULATION - AMPS VOICE1

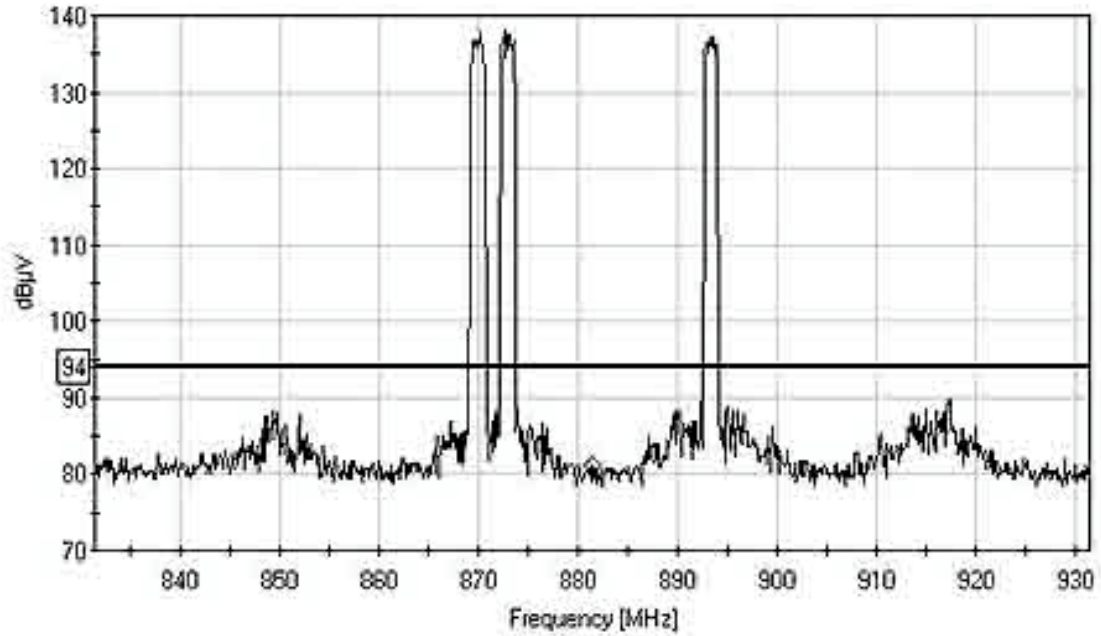
**Test Conditions:** Three signal generator are providing the input signal to the EUT. From the signal generators the signals go to the combiner, preamplifier and then the band pass filter before reaching the input of the EUT. The output of the EUT is connected to an attenuator and a directional coupler. From the directional coupler forward power port the EUT fundamental output power is read. The intermodulation plot was taken with the spectrum analyzer connected to the output of the directional coupler through another attenuator. The output of the EUT is putting out 160 watts for AMPS VOICE, AMPS DATA, EDGE, GSM, and TDMA modulations. The output of the EUT is putting out 135 watts for CDMA and WCDMA modulations.

### INTERMODULATION - AMPS VOICE1

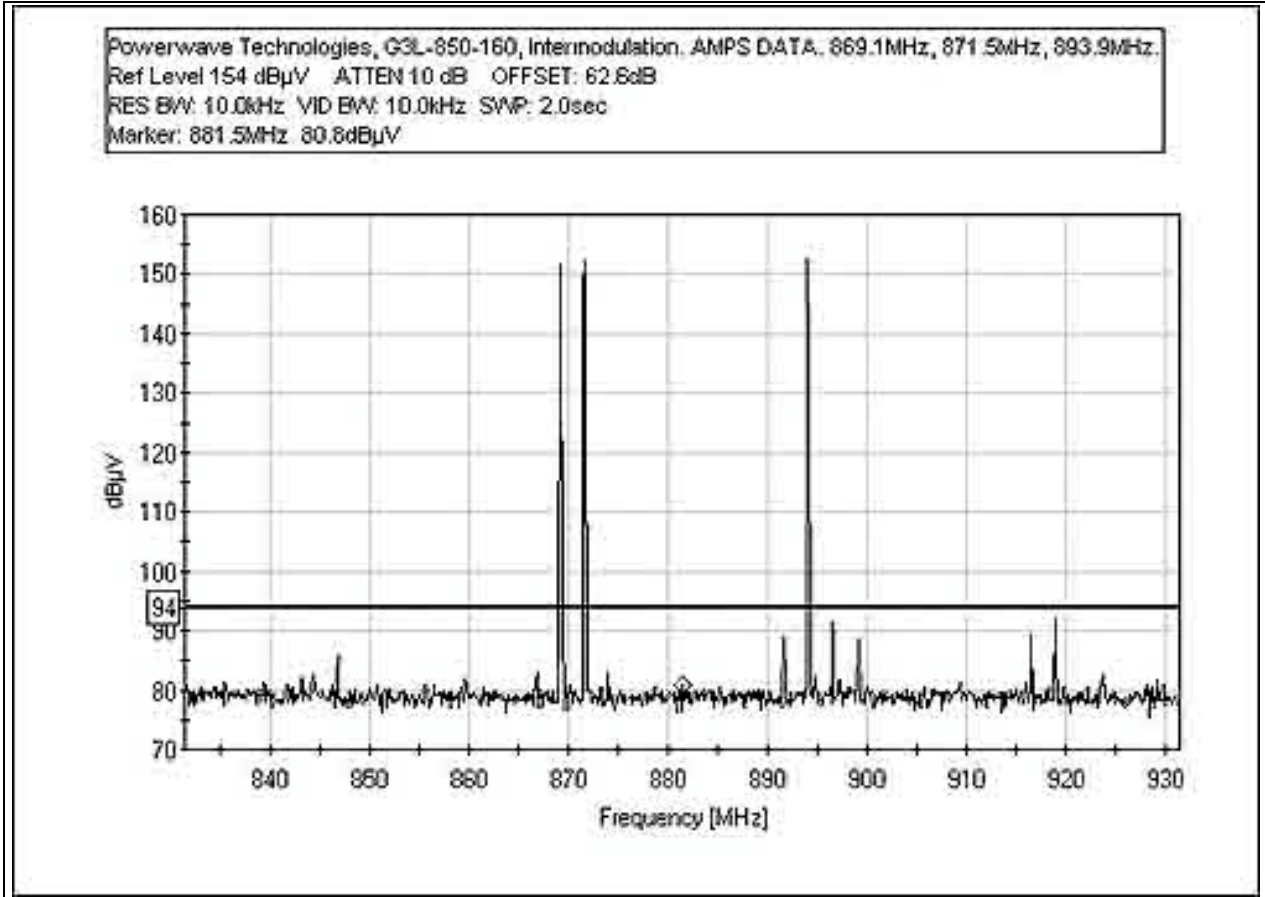


### INTERMODULATION - CDMA1

Powerwave Technologies, G3L-850-160, Intermodulation, CDMA, 869.8MHz, 872.8MHz, 893.2MHz.  
Ref Level 150 dB $\mu$ V ATTEN 10 dB OFFSET: 65.6dB  
RES BW: 10.0kHz VID BW: 10.0kHz SWP: 2.0sec  
Marker: 881.5MHz 81.3dB $\mu$ V

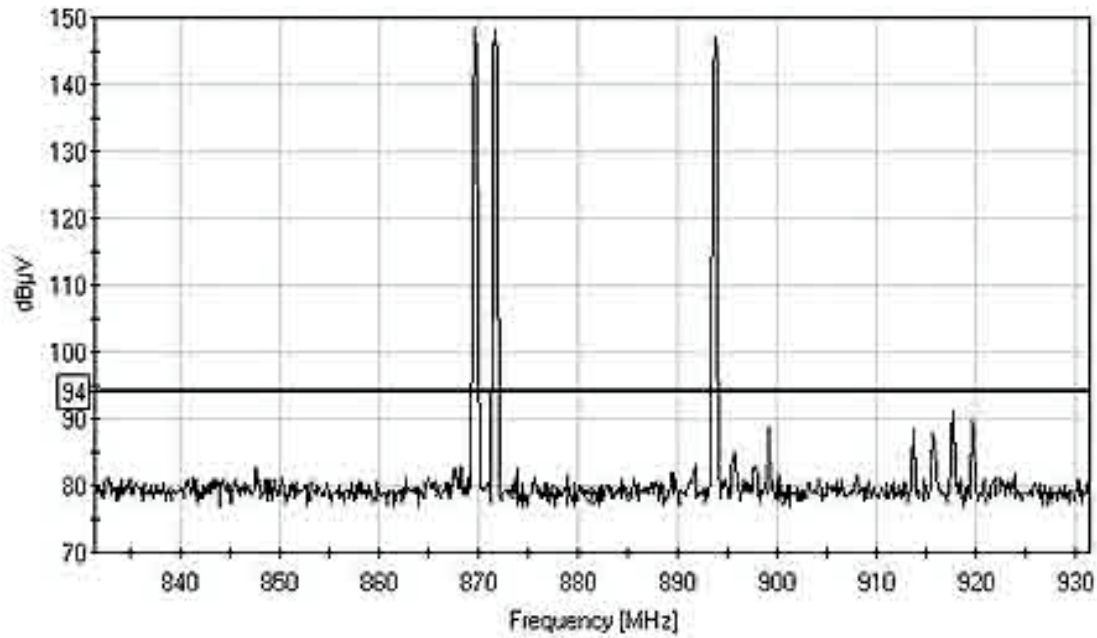


### INTERMODULATION - AMPS DATA1

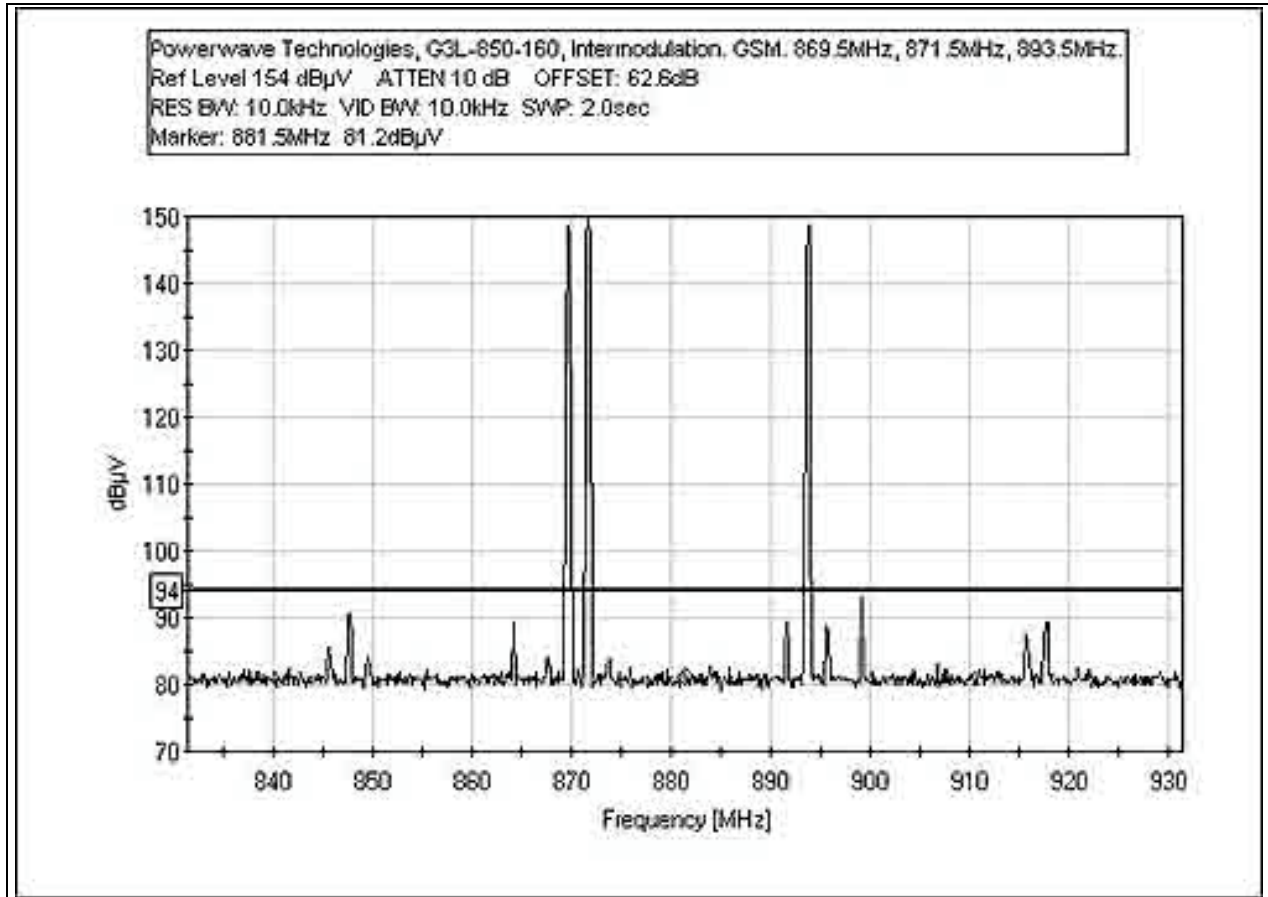


### INTERMODULATION - EDGE1

Powerwave Technologies, G3L-850-160, Intermodulation, EDGE. 869.5MHz, 871.5MHz, 893.5MHz,  
Ref Level 154 dB $\mu$ V ATTEN 10 dB OFFSET: 62.6dB  
RES BW: 10.0kHz VID BW: 10.0kHz SAMP: 2.0sec  
Marker: 881.5MHz 78.5dB $\mu$ V

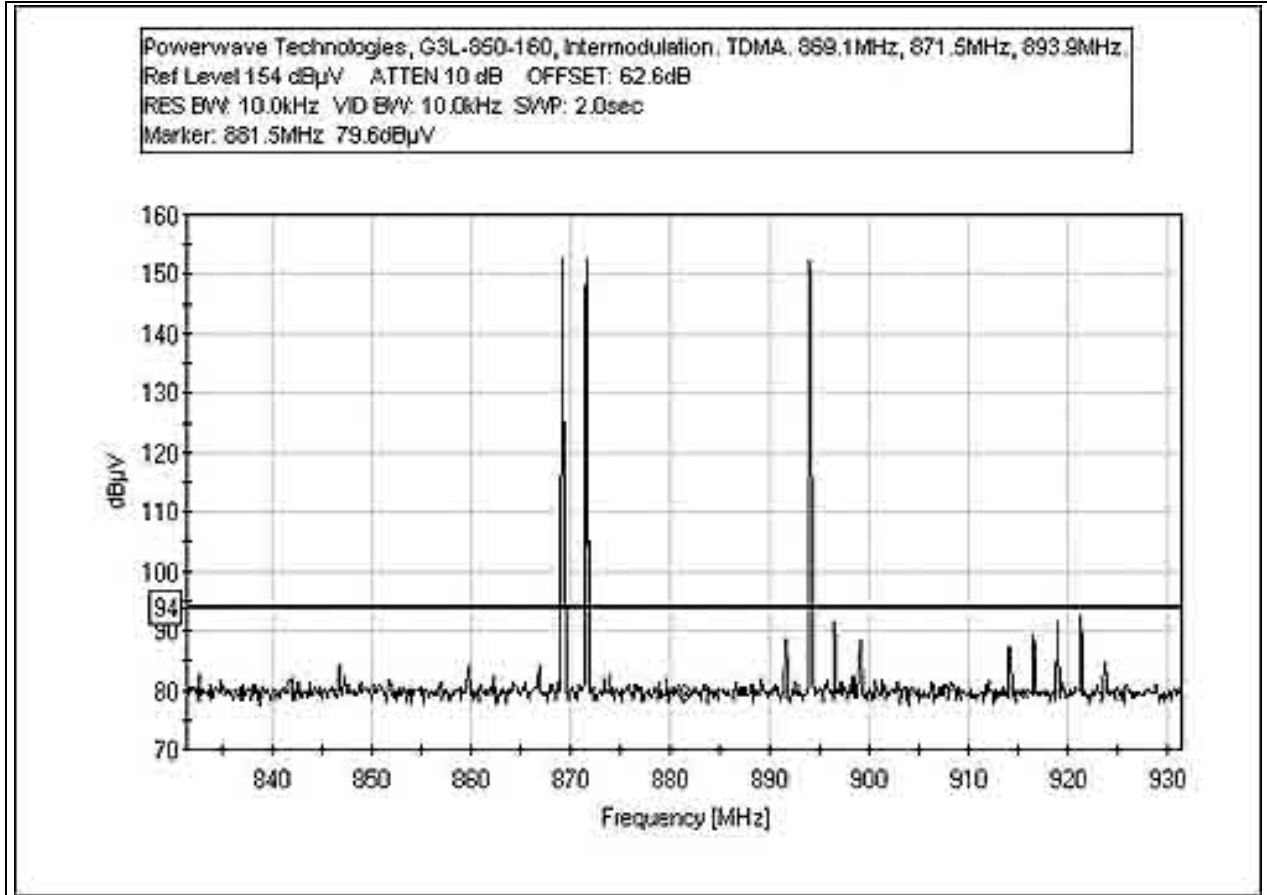


### INTERMODULATION - GSM1



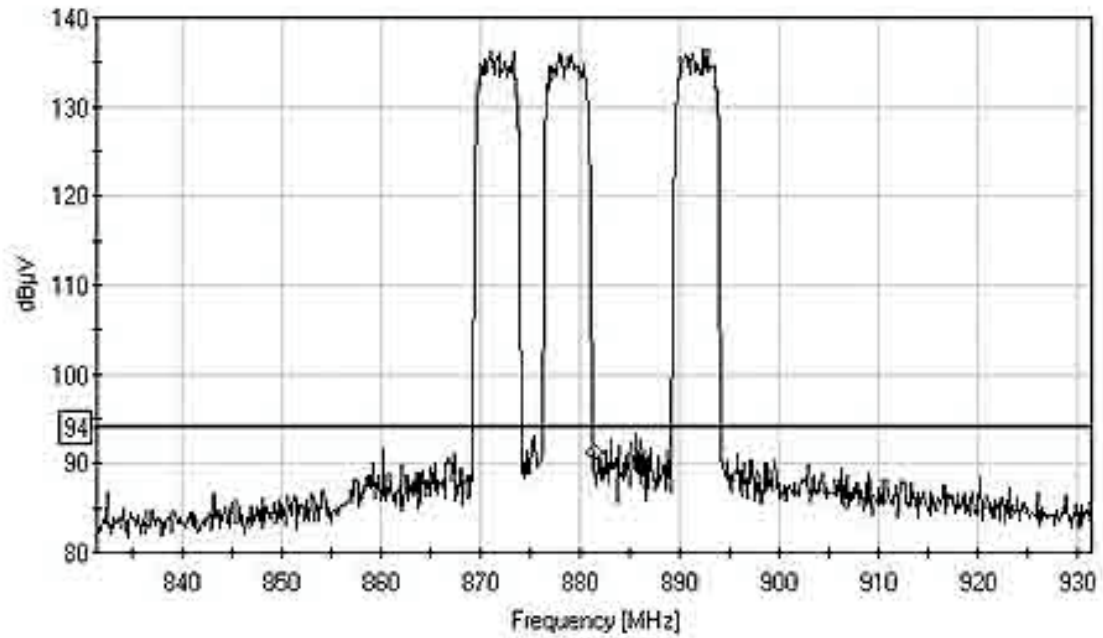


### INTERMODULATION - TDMA1



### INTERMODULATION - WCDMA3

Powerwave Technologies, G3L-850-160, Intermodulation, WCDMA, 871.5MHz, 878.5MHz, 891.5MHz,  
Ref Level 150 dB $\mu$ V ATTEN 10 dB OFFSET: 65.6dB  
RES BW: 10.0kHz VID BW: 10.0kHz SWP: 2.0sec  
Marker: 881.5MHz 91.3dB $\mu$ V



**Test Equipment**

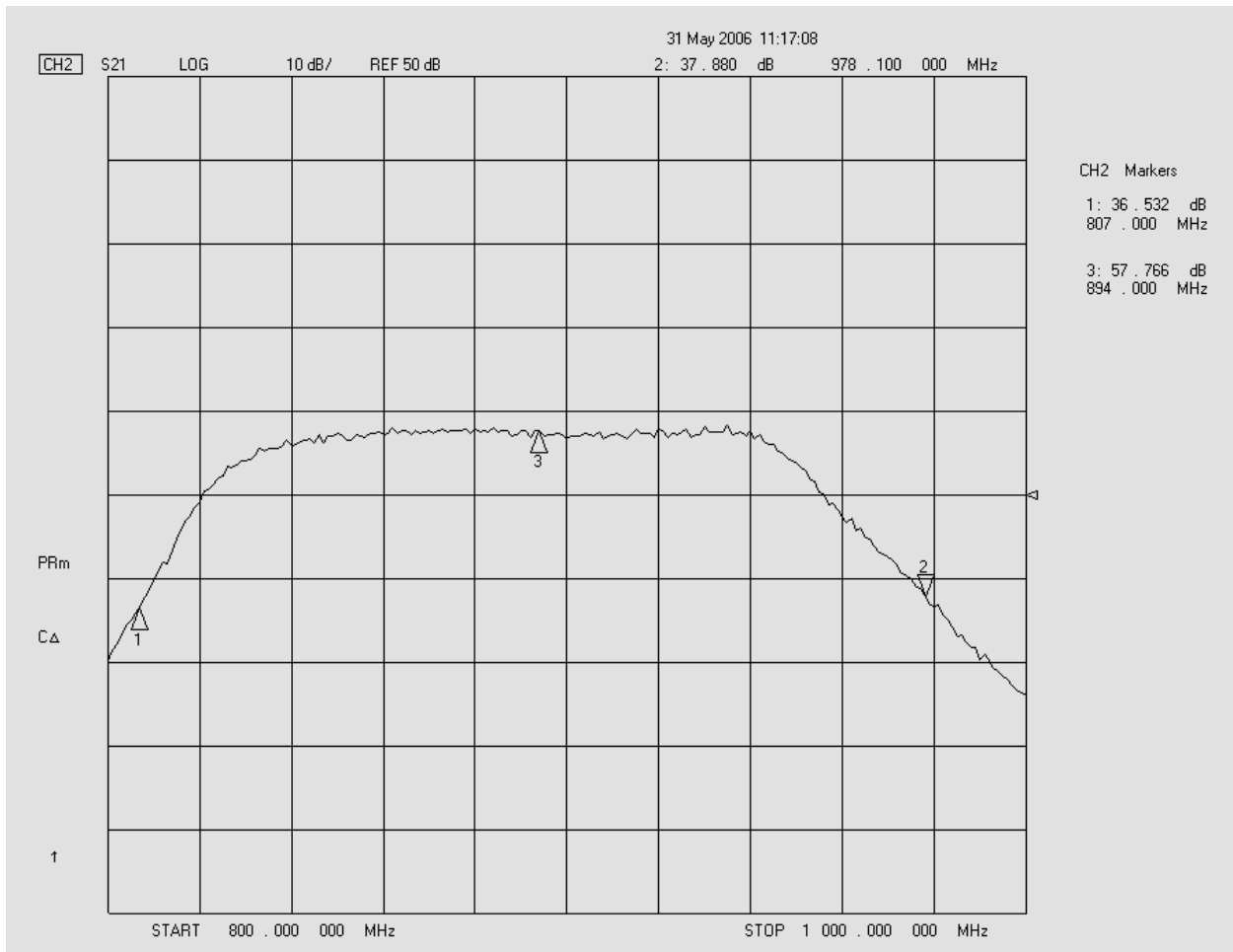
<b>Equipment</b>	<b>Asset #</b>	<b>Manufacturer</b>	<b>Model #</b>	<b>Serial #</b>	<b>Cal Date</b>	<b>Cal Due</b>
Spectrum Analyzer RF Section	02462	HP	8568B	2928A04874	100804	100806
Spectrum Analyzer Display Section	02472	HP	85662A	3001A18430	100804	100806
QP Adapter	01437	HP	85650A	3303A01884	100804	100806
Bilog Antenna	00851	Schaffner- Chase EMC	CBL6111C	2629	020206	020208
Antenna cable (10 meter site D)	NA	Andrew	LDF1-50	Cable#17	100204	100206
Antenna cable from bulkhead to antenna	N/A	Pasternack	RG-214/U	Cable #33	040105	040107
Preamp to SA Cable (3 feet)	NA	Pasternack	E100316-I	Cable #22	080904	080906
Pre-amp	00010	HP	8447D	2727A05392	070204	070206
Antenna cable (Heliac)	NA	Andrew	LDF1-50	P05348 (Cable#19)	092805	092807
SMA Cable (White)	P05455	Pasterneck	NA	1-40GHz_white	011706	011708
Horn Antenna	01646	EMCO	3115	9603-4683	072204	072206
Microwave Pre-amp	00787	HP	83017A	3123A00282	052705	052707
Magnetic Loop Antenna	00314	Emco	6502	2014	072804	072806
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	032505	032507
1.0 GHz HPF	02749	K&L	9SH10-1000	1	030706	030708

**PHOTOGRAPH SHOWING INTERMODULATION**

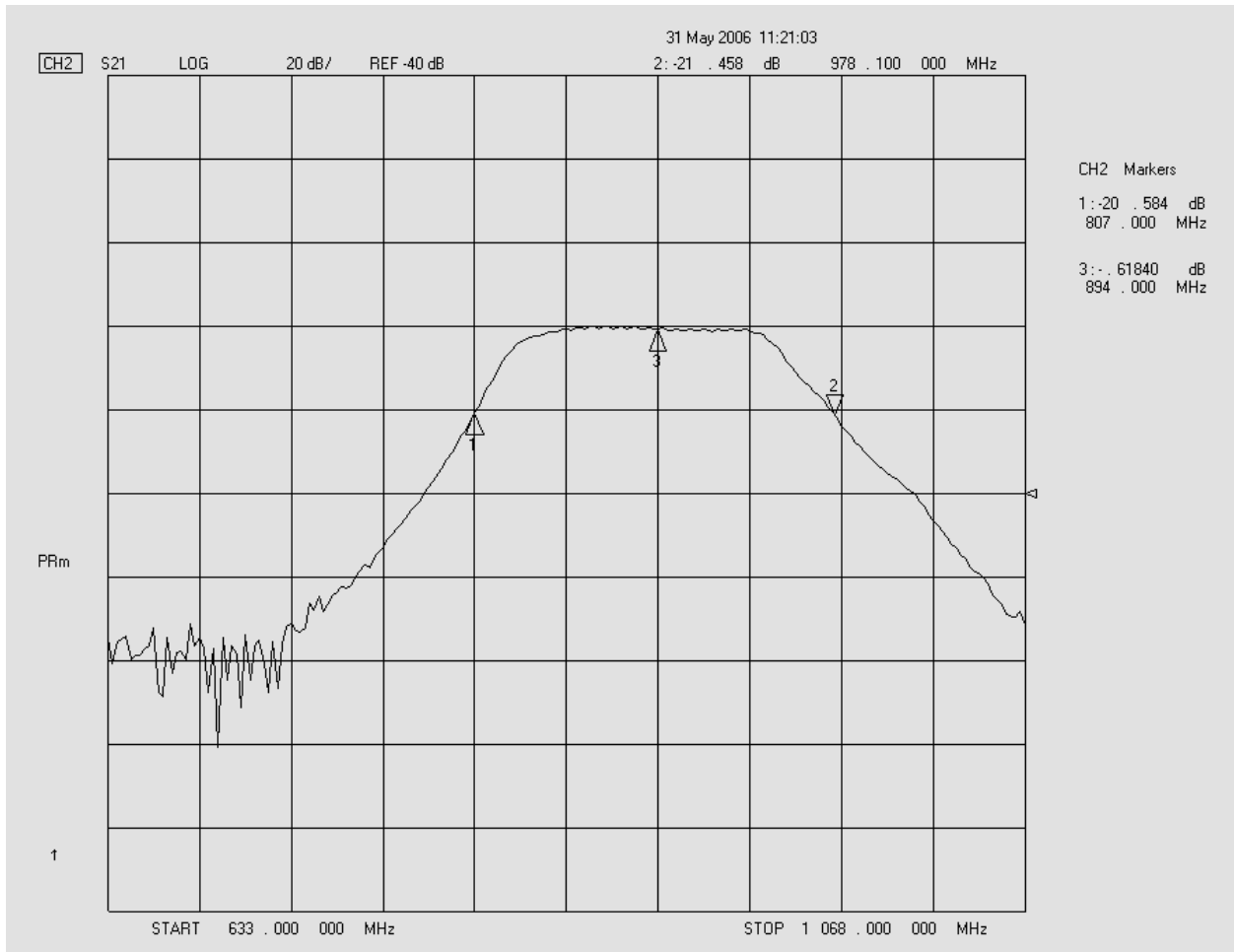


## RSS-131 GAIN LINEARITY

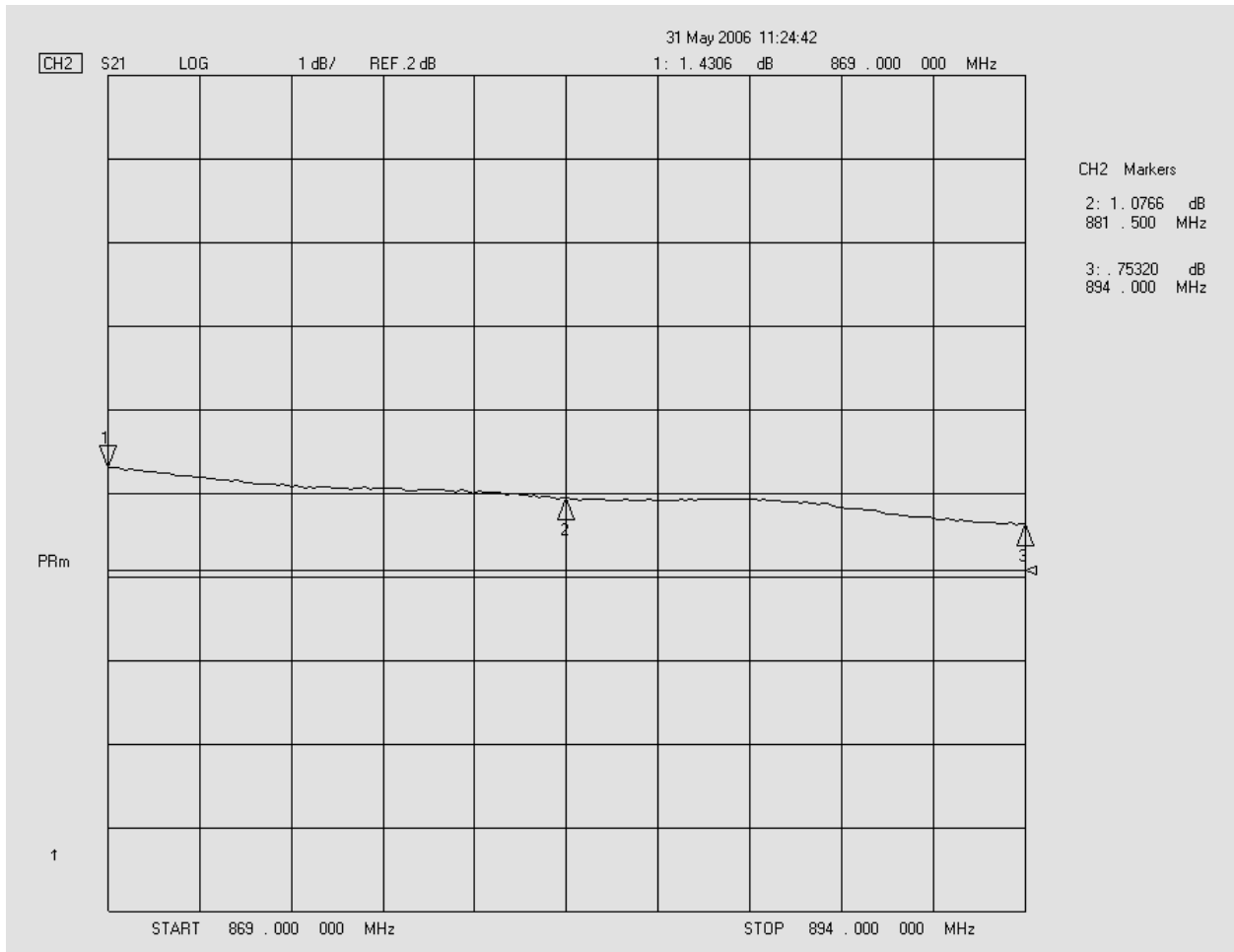
**Test Conditions:** The signal generator is providing the input signal to the EUT. From the signal generator the signal goes to the preamplifier and then the band pass filter before reaching the input of the EUT. The output of the EUT is connected to an attenuator and a directional coupler. From the directional coupler forward power port the EUT fundamental output power is read. The amplifier gain and bandwidth readings were taken with the network analyzer connected to the output of the directional coupler through another attenuator. The output of the EUT is putting out 185 watts. Data was taken for the EUT with the following modulations at low, middle and high channels: AMPS VOICE, AMPS DATA, EDGE, GSM, TDMA, CDMA, and WCDMA.



20dB gain BW



Gain linearity from 250% of 20dB BW.



Gain linearity:  $\pm 1$  dB from manufacturer's declaration.

**Test Equipment**

Equipment	Powerwave Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Network Analyzer	009646	HP	8753E	US38432770	072204	072206

**PHOTOGRAPH SHOWING RSS-131 GAIN LINEARITY**

