



**POWERWAVE TECHNOLOGIES, INC. TEST REPORT**

**FOR THE**

**REPEATER, RH304022/03A**

**FCC PARTS 22 & 24**

**TESTING**

**DATE OF ISSUE: APRIL 1, 2008**

**PREPARED FOR:**

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

P.O. No.: 118432  
W.O. No.: 87766

**PREPARED BY:**

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

Date of test: March 19-27, 2008

**Report No.: FC08-035**

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**ADMINISTRATIVE INFORMATION**

**DATE OF TEST:** March 19-27, 2008

**DATE OF RECEIPT:** March 19, 2008

**REPRESENTATIVE:** Sean Doan

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

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

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

**TEST METHOD:** FCC Parts 22 & 24

**PURPOSE OF TEST:** To perform the testing of the Repeater, RH304022/03A with the requirements for FCC Parts 22 & 24 devices.

**APPROVALS**

**QUALITY ASSURANCE:**

**TEST PERSONNEL:**

Steve Behm, Director of Engineering Services

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Stuart Yamamoto, EMC Engineer

**SUMMARY OF RESULTS**

<b>Test</b>	<b>Specification/Method</b>	<b>Results</b>
RF Power Output	FCC 2.1033(c)(14)/2.1046/22.913(a)	Pass
	FCC 2.1033(c)(14)/2.1046/24.232(a)	Pass
Input and Output Plots	FCC 2.1033(c)(14)/2.1049(i)/Part 22	Pass
	FCC 2.1033(c)(14)/2.1049(i)/Part 24	Pass
Spurious Emissions at Antenna Terminal	FCC 2.1033(c)(14)/2.1051/22.917(a)	Pass
	FCC 2.1033(c)(14)/2.1051/24.238(a)	Pass
Field Strength of Spurious Radiation	FCC 2.1033(c)(14)/2.1051/22.917(a)	Pass
	FCC 2.1033(c)(14)/2.1051/24.238(a)	Pass
Block Edge	FCC 22.917(a)	Pass
	FCC 24.238(a)	Pass

**CONDITIONS DURING TESTING**

No modifications to the EUT were necessary during testing.



## EQUIPMENT UNDER TEST (EUT) DESCRIPTION

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

The following device name was used during testing by CKC Laboratories: **Dual Band Transceiver**

Since the time of testing the manufacturer has chosen to use the following device name in its place. Any differences between the names does not affect their EMC characteristics and therefore meets the level of testing equivalent to the tested model name shown on the data sheets: **Repeater**

## EQUIPMENT UNDER TEST

### Repeater

Manuf: Powerwave Technologies, Inc.  
Model: RH304022/03A  
Serial: 2A.56150  
FCC ID: pending

## PERIPHERAL DEVICES

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

### Signal Generator

Manuf: Agilent  
Model: E4433B  
Serial: US40051840

### Laptop Computer

Manuf: HP  
Model: Compaq nc6000  
Serial: CNU502FCDM

**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**

F9W, G7W, GXW, DXW.

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

Part 22: 870-893 MHz, Part 24: 1930-1990 MHz.

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

Part 22: 20.7 Watts, Part 24: 22 Watts.

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

Part 22: 500 Watts, Part 24: 1640 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**

IS-95 CDMA, CDMA 2000, EDGE, GSM, TDMA, WCDMA

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

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Power Meter	02778	Agilent	E4418A	GB37170458	021508	021510
Power Sensor	02777	Agilent	E4412A	MY41499662	021508	021510

**Test Conditions**

The equipment under test (EUT) is stand alone on the table top. The EUT Donor 2 In port is connected to the signal generator. The EUT Service 2 port was connected through a high power attenuator and then to the measuring power meter. A laptop computer was connected to the EUT Local port (a service/maintenance port) and was only used to monitor the EUT's parameters. The frequency range tested was 870MHz to 893MHz. The operating range of this configured EUT was 869MHz to 894MHz. The actual operating frequencies of the EUT during this test were 870MHz, 881MHz, and 893MHz. The rated output of the EUT was 20 watts average. Data was taken with the equipment under test transmitting at its maximum rated output power.

**Test Setup Photos**



**Test Results**

The EUT RF Output power measured was 870MHz at 20 watts, 881MHz at 20.7 watts, and 893MHz at 20.2 watts.

**Test Limit**

In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts.

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

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Power Meter	02778	Agilent	E4418A	GB37170458	021508	021510
Power Sensor	02777	Agilent	E4412A	MY41499662	021508	021510

**Test Conditions**

The equipment under test (EUT) was stand alone on the table top. The EUT Donor In port was connected to the signal generator. The EUT Service port was connected through a high power attenuator and then to the measuring power meter. A laptop computer was connected to the EUT Local port (a service/maintenance port) and was only used to monitor the EUT's parameters. The frequency range tested was 1930MHz to 1990MHz. The operating range of this configured EUT was 1930MHz to 1990MHz. The actual operating frequencies of the EUT during this test were 1930MHz, 1960MHz, and 1990MHz. The rated output of the EUT was 20 watts average. Data was taken with the equipment under test transmitting at its maximum rated output power.

**Test Setup Photos**



**Test Results**

The EUT RF Output power measured was 1930MHz at 20 watts, 1960MHz at 22 watts, and 1990MHz at 20 watts.

**Test Limit**

Base stations are limited to 1640 watts peak equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT.



**FCC 2.1033(c)(14)/2.1049(i)/PART 22- INPUT AND OUTPUT PLOTS**

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
High Frequency Coaxial Cable	P02946	Astrolab	32022-2-2909K-36TC	(none)	091807	091809
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209

**Test Conditions**

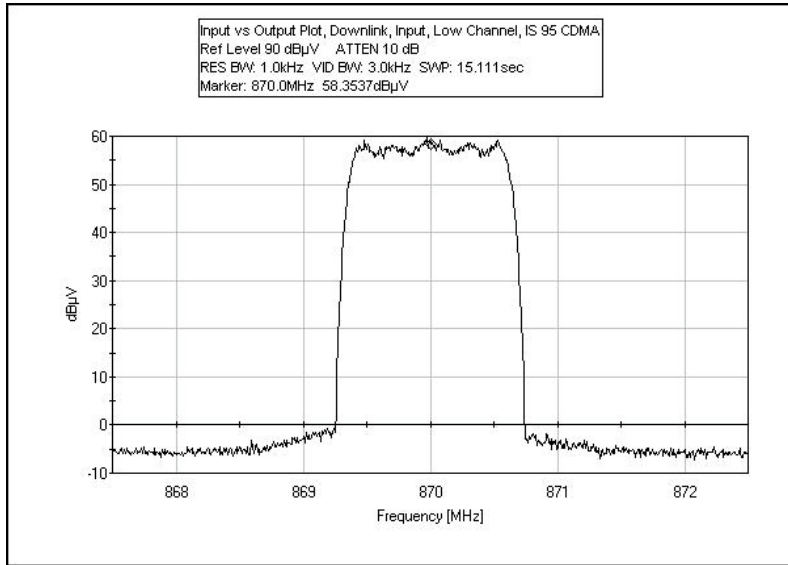
The equipment under test (EUT) was stand alone on the table top. There were two measurements and plots made for this test. One was the input waveform where the signal generator was connected directly to the measuring spectrum analyzer. The second measurement was taken from the EUT Service port. For this plot, the signal generator was connected to the Donor In port of the EUT and the Service port was connected to the measuring spectrum analyzer through a high power attenuator. A laptop computer was connected to the EUT Local port (a service/maintenance port) and was only used to monitor the EUT’s parameters. The frequency range tested was 870MHz to 893MHz and 1931MHz to 1989MHz. The operating range of this configured EUT was 869MHz to 894MHz and 1930MHz to 1990MHz. The actual operating frequencies of the EUT during this test was 870MHz, 872MHz, 881MHz, 891MHz, 893MHz, 1931MHz, 1933MHz, 1960MHz, 1987MHz, and 1989MHz. The rated output of the EUT was 20 watts average. Data was taken with the equipment under test transmitting at its maximum rated output power.

**Test Setup Photos**

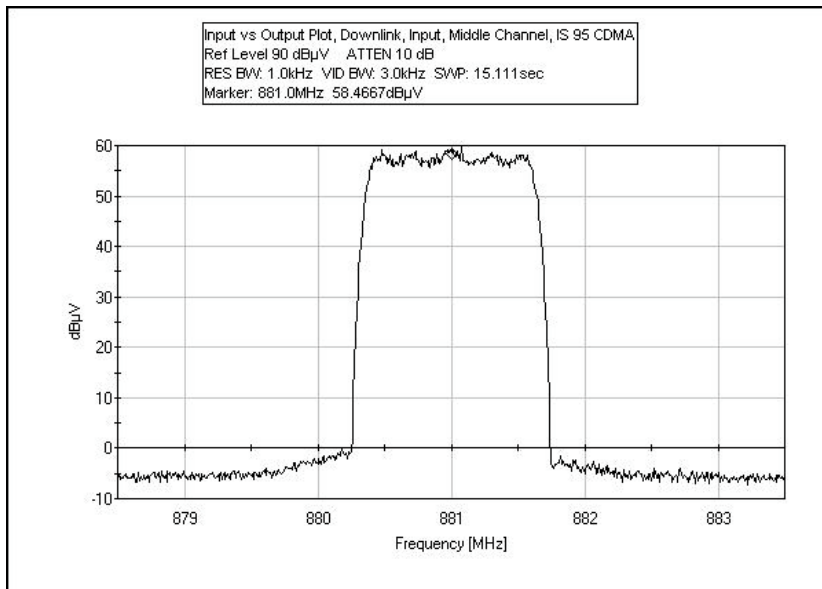


### Test Plots

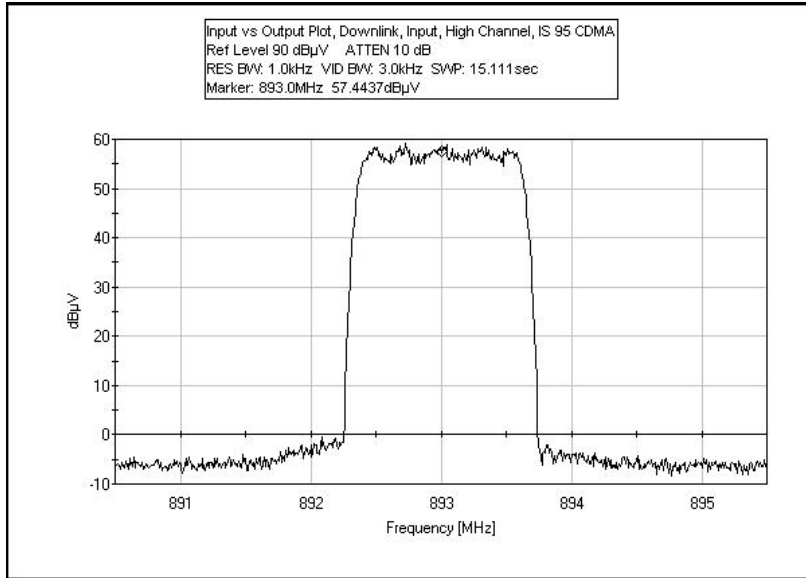
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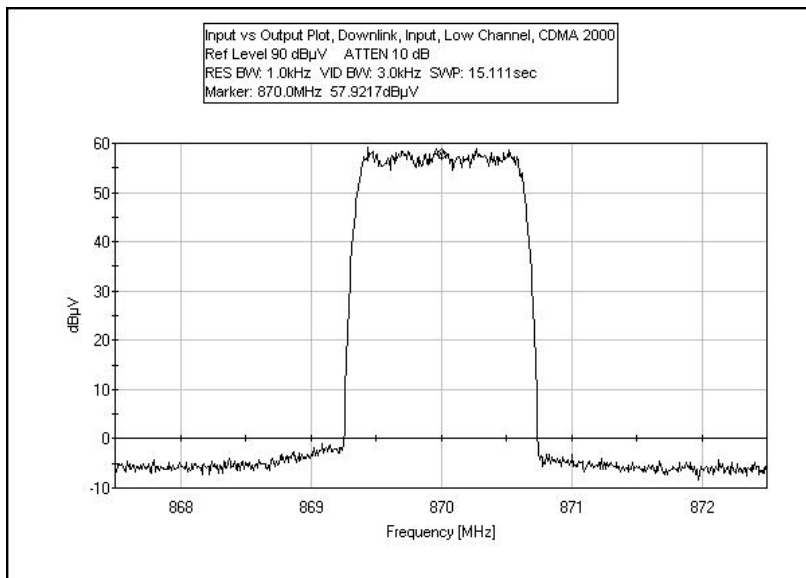
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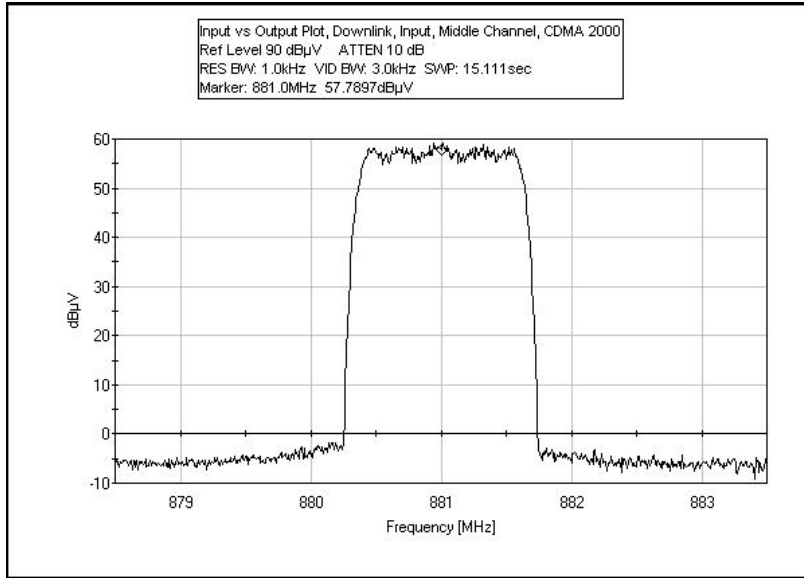
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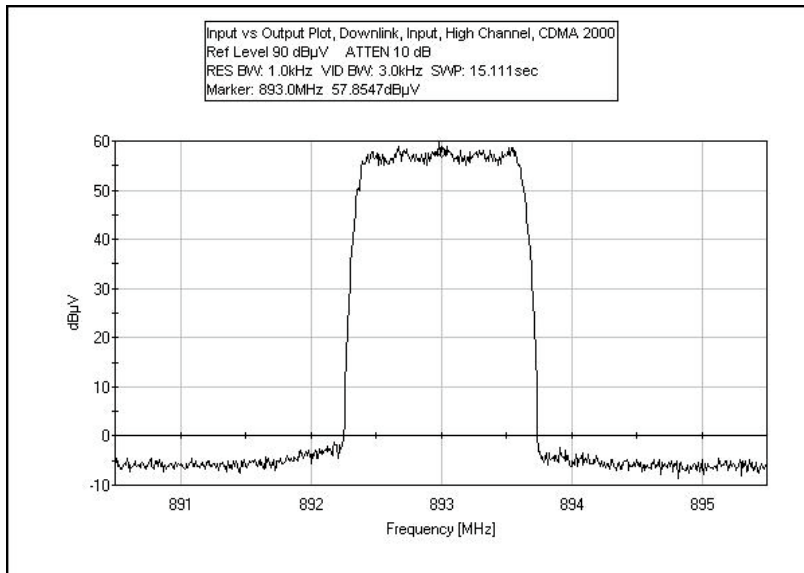
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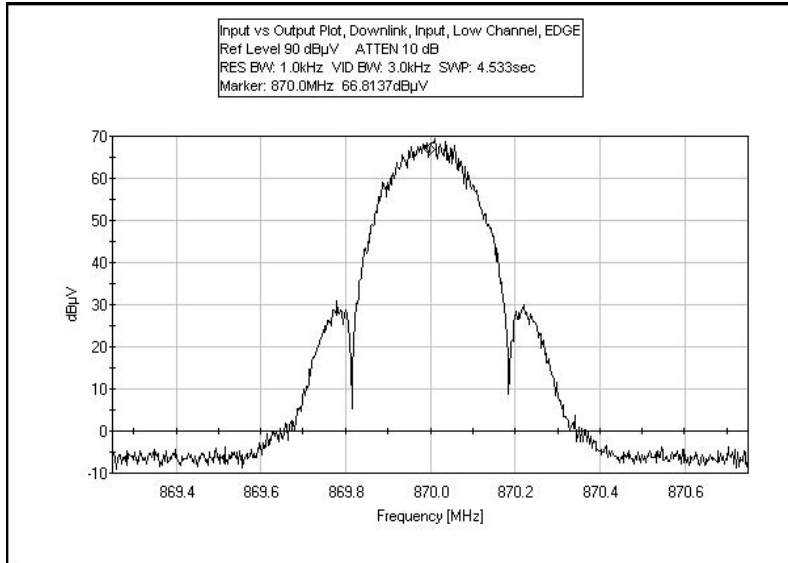
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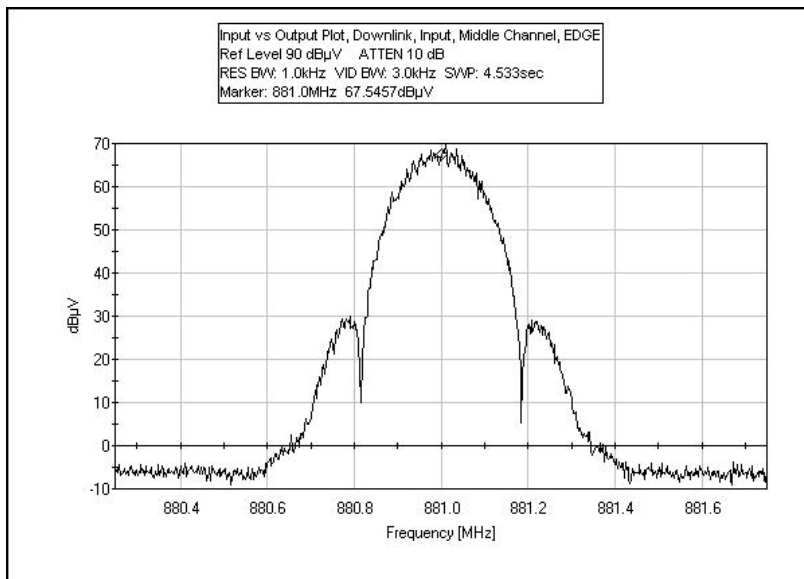
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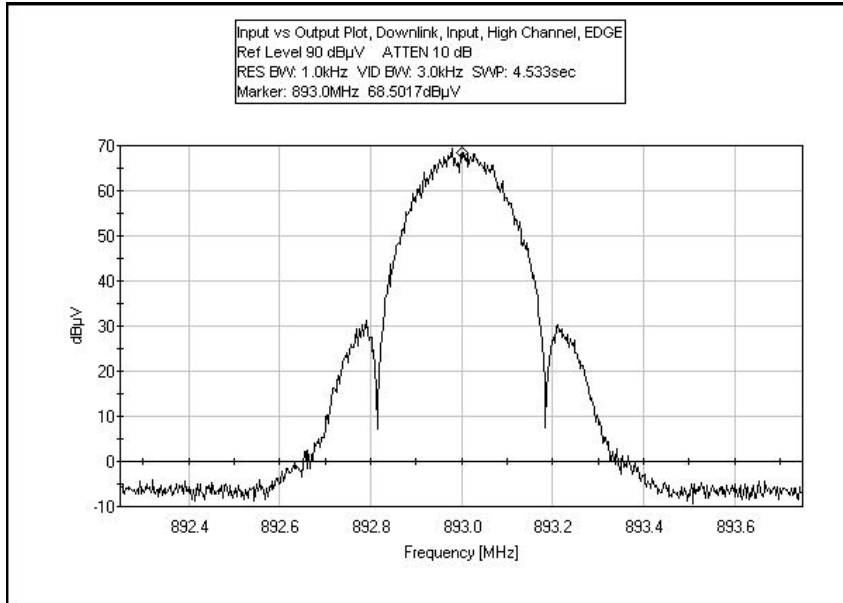
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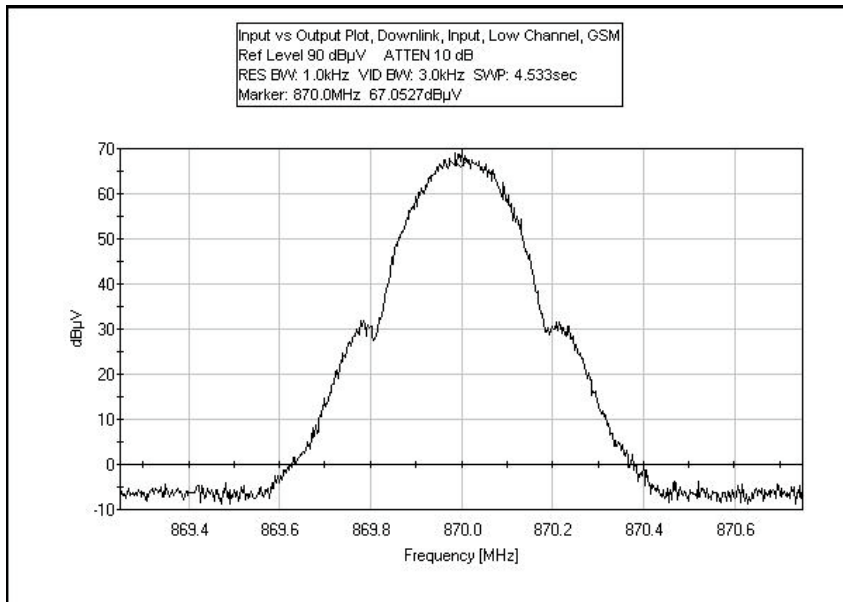
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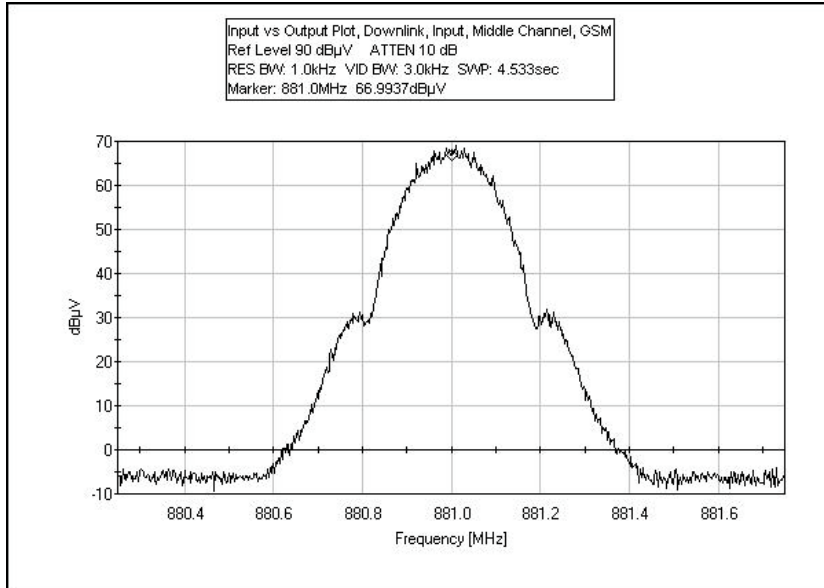
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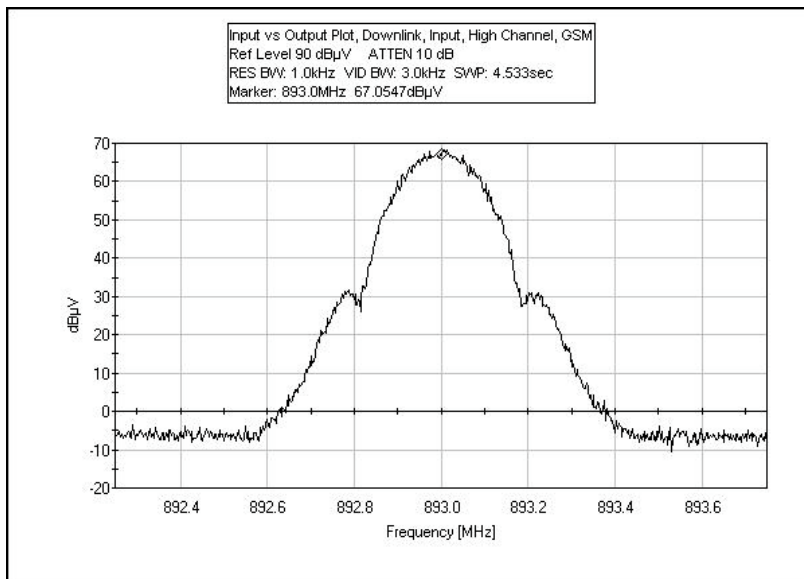
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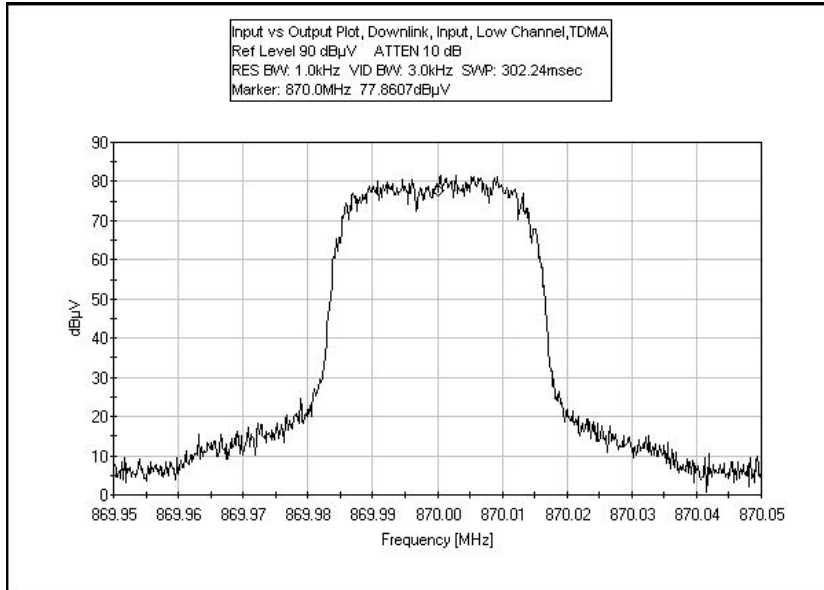
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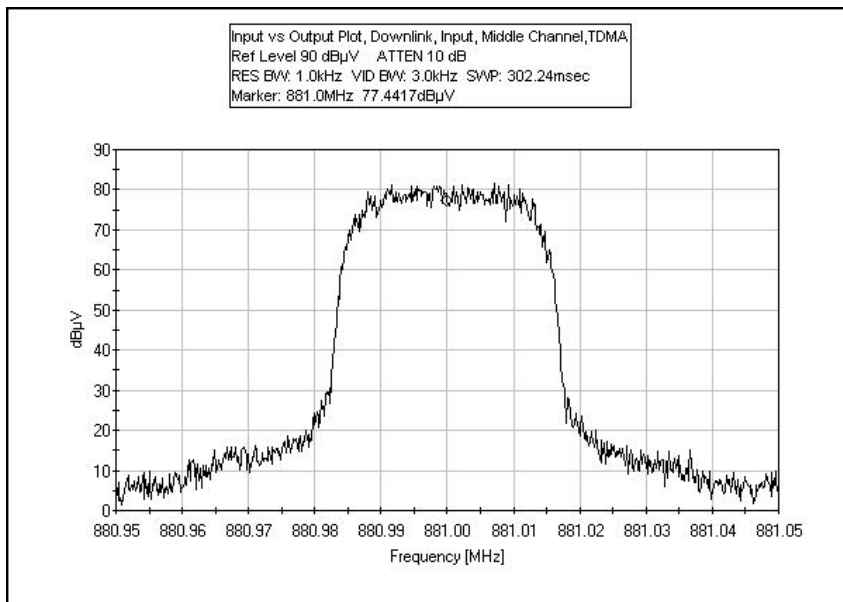
### FCC PART 22 INPUT PLOT DOWNLINK - HIGH CHANNEL GSM



### FCC PART 22 INPUT PLOT DOWNLINK - LOW CHANNEL TDMA

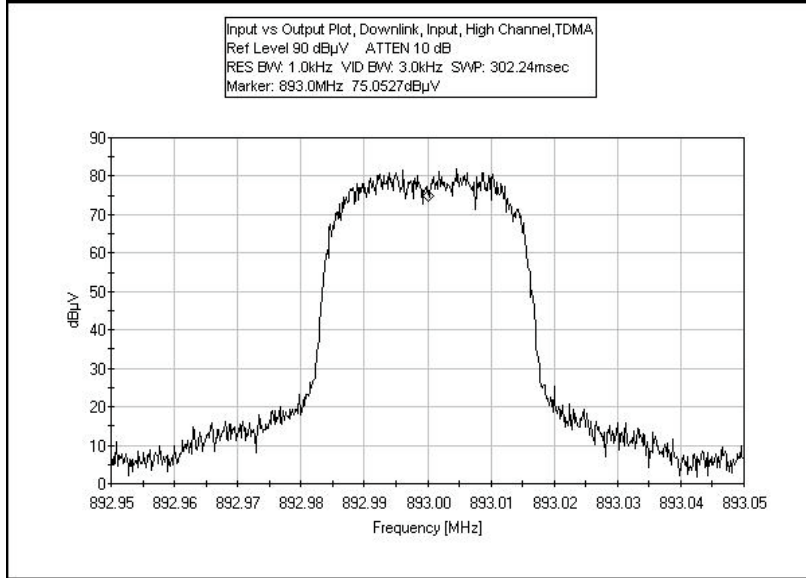


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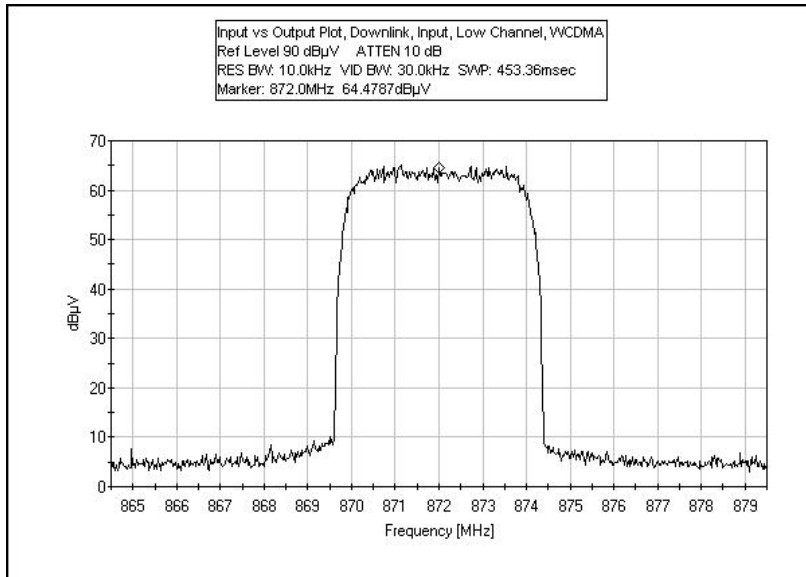




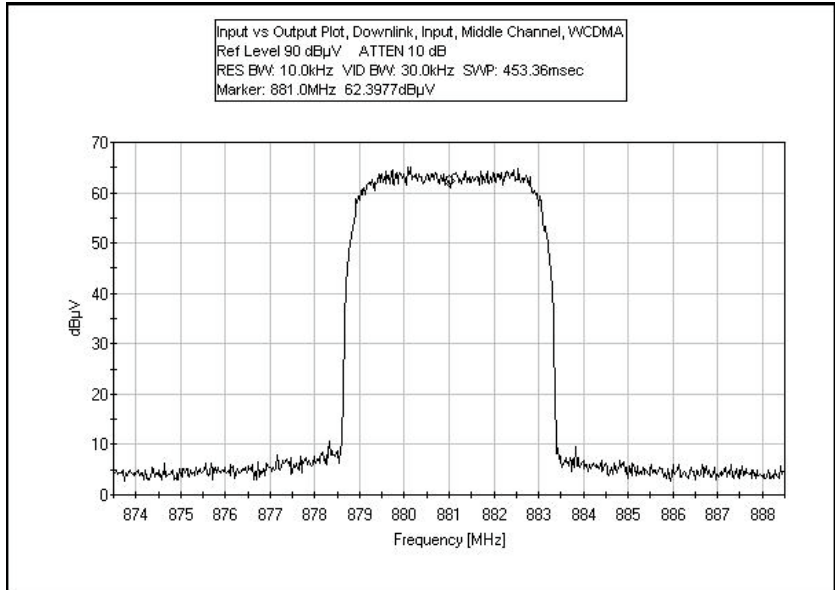
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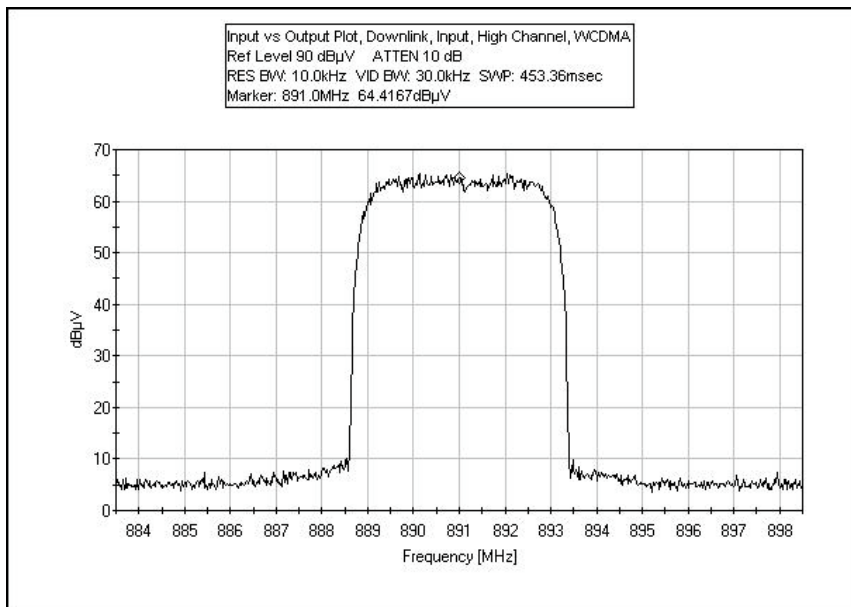
**FCC PART 22 INPUT PLOT DOWNLINK - LOW CHANNEL WCDMA**



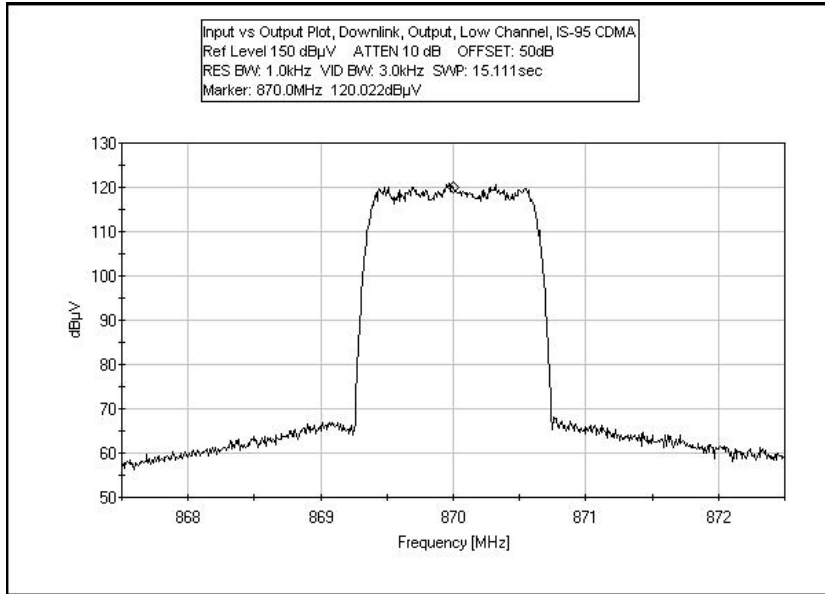
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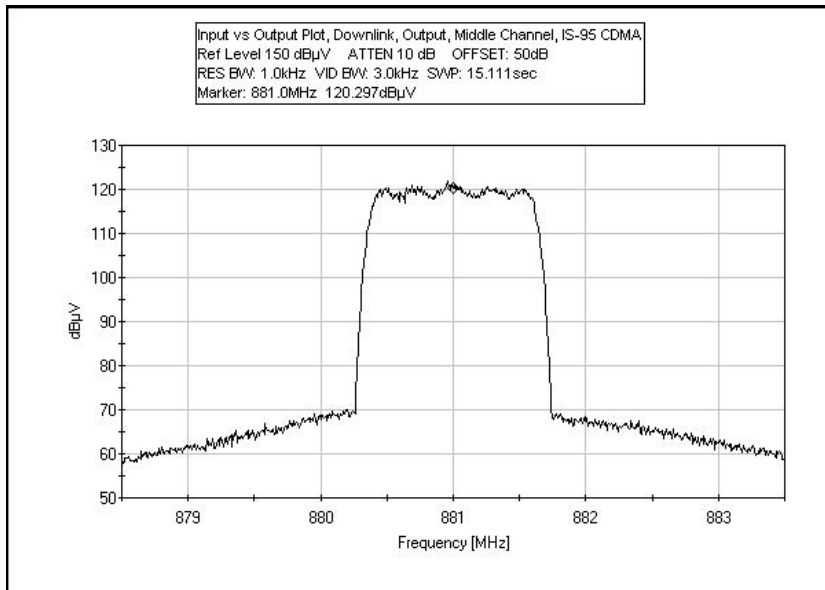
### FCC PART 22 INPUT PLOT DOWNLINK - HIGH CHANNEL WCDMA



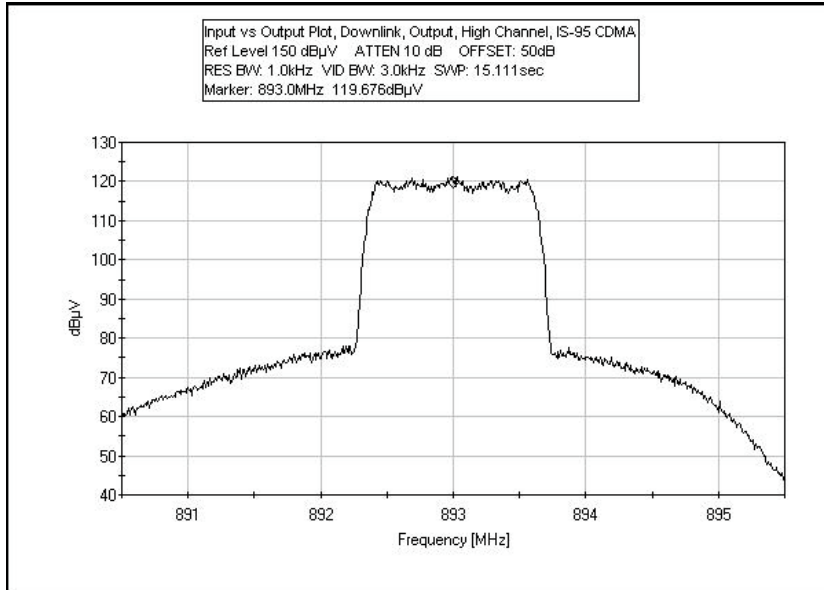
**FCC PART 22 OUTPUT PLOT DOWNLINK - LOW CHANNEL IS-95 CDMA**



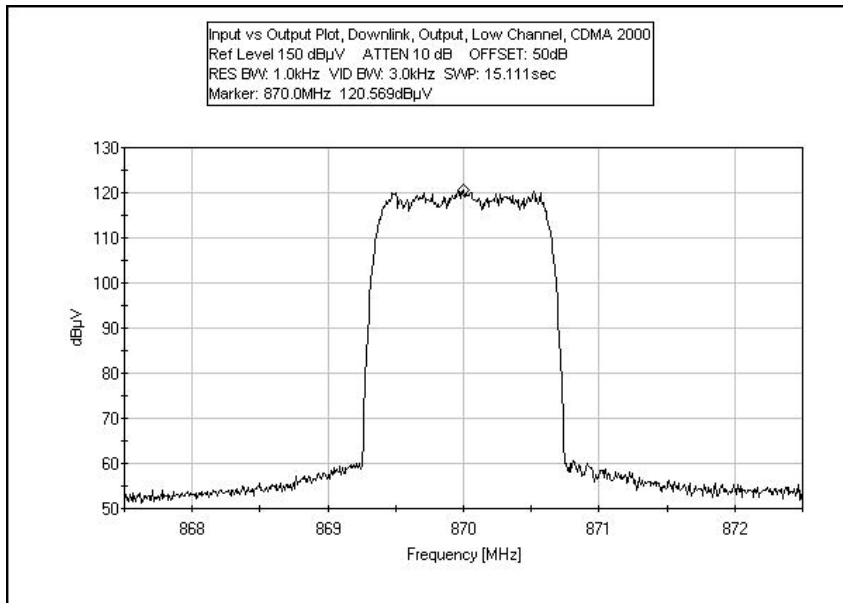
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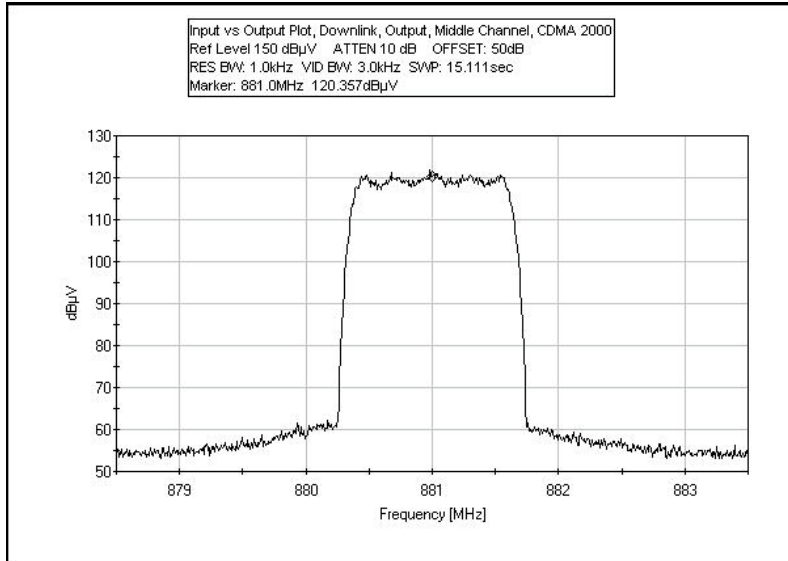
### FCC PART 22 OUTPUT PLOT DOWNLINK - HIGH CHANNEL IS-95 CDMA



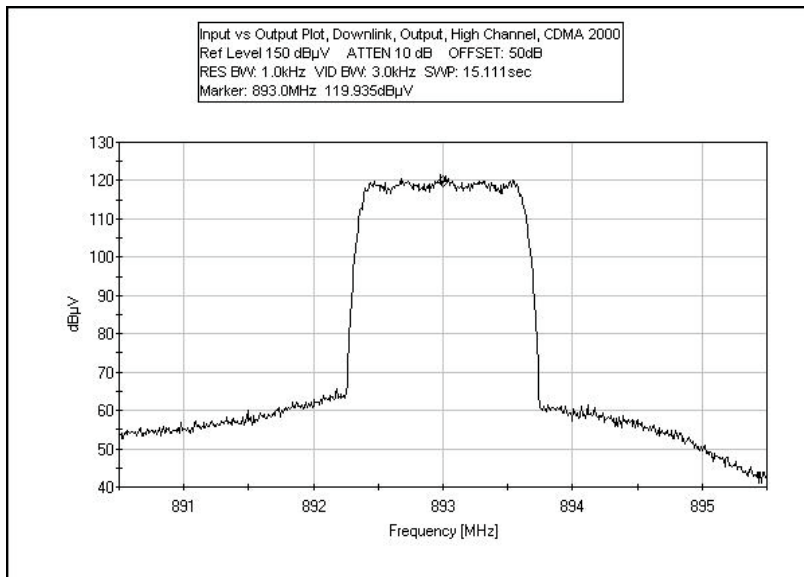
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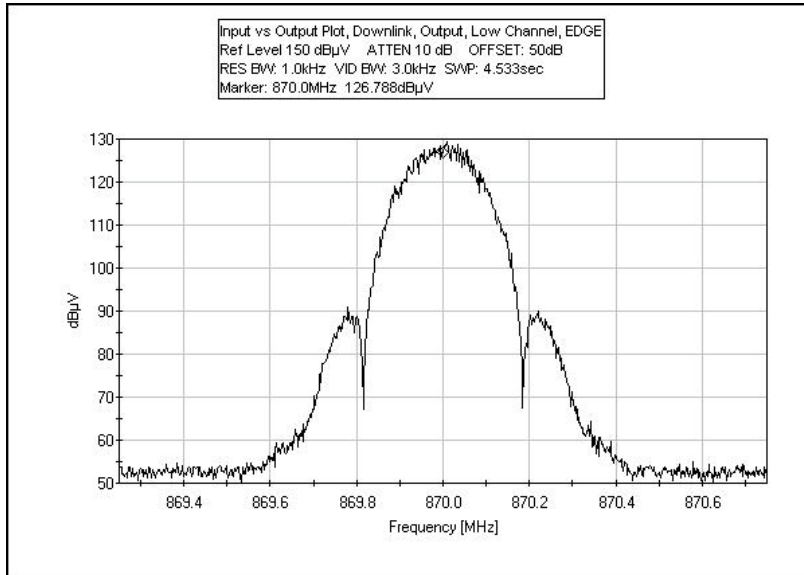
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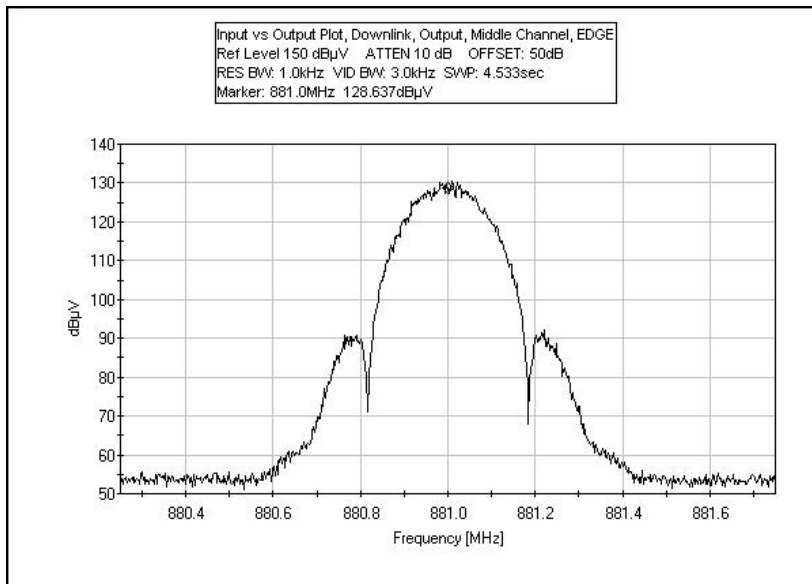
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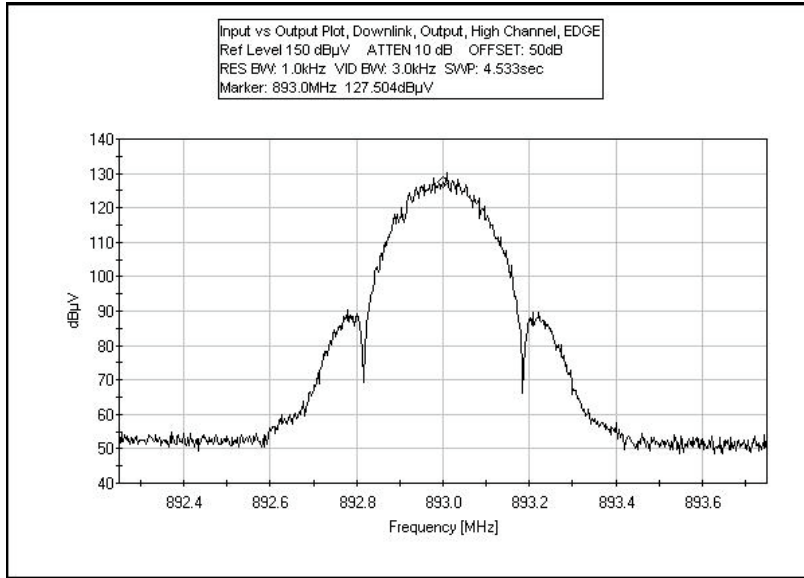
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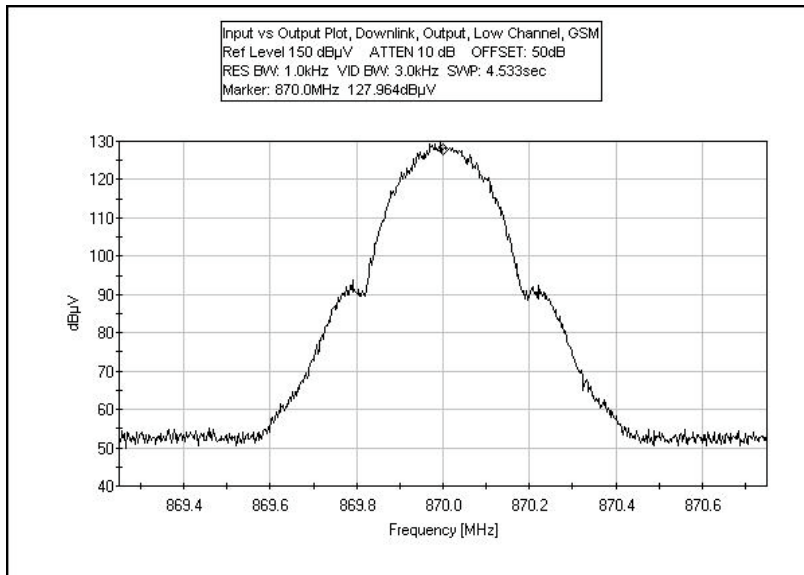
### FCC PART 22 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL EDGE



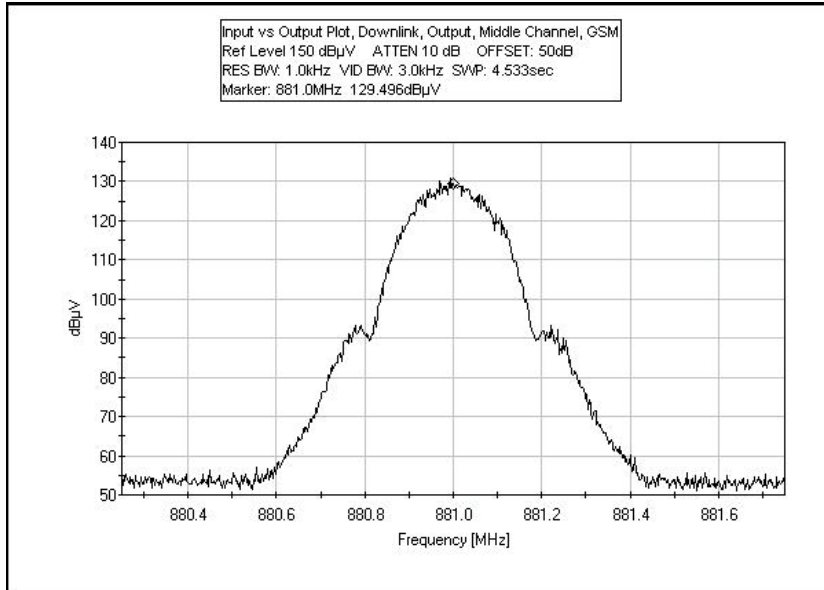
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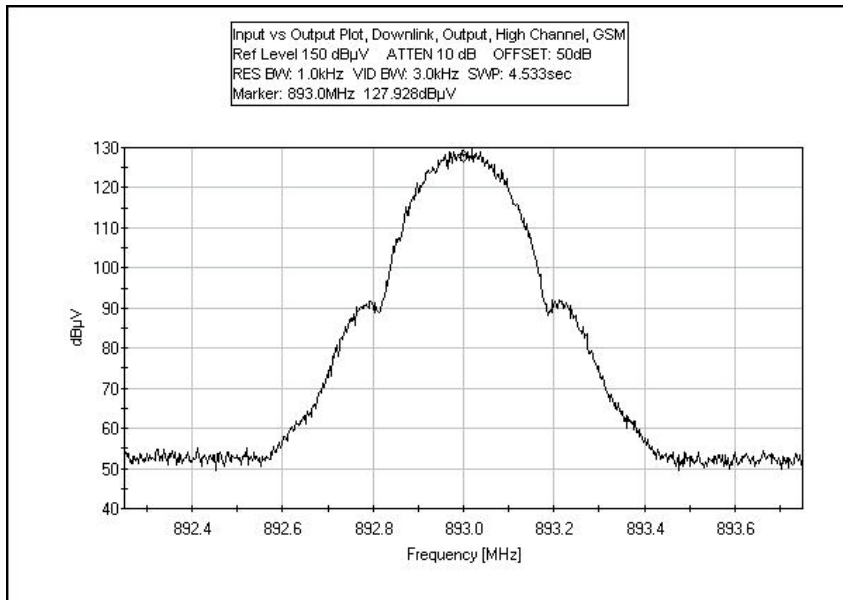
### FCC PART 22 OUTPUT PLOT DOWNLINK - LOW CHANNEL GSM



### FCC PART 22 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL GSM

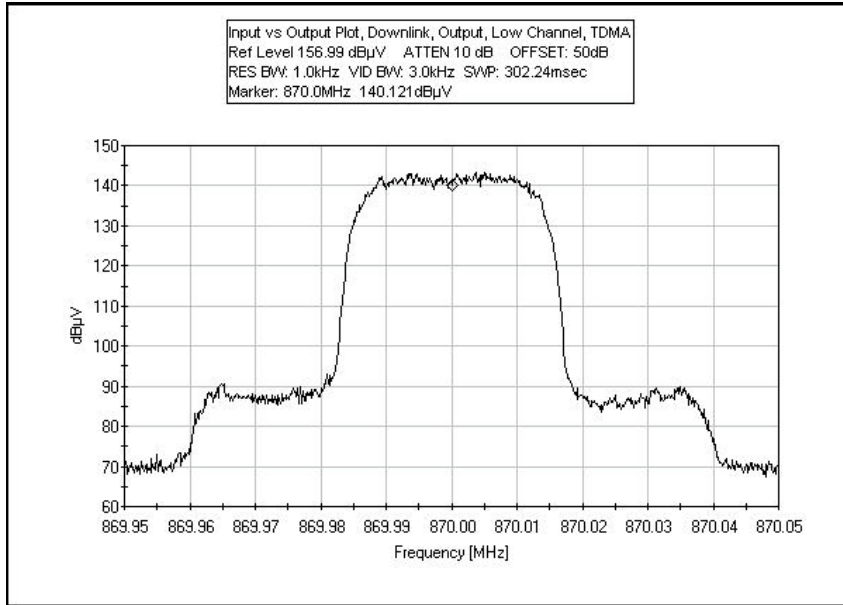


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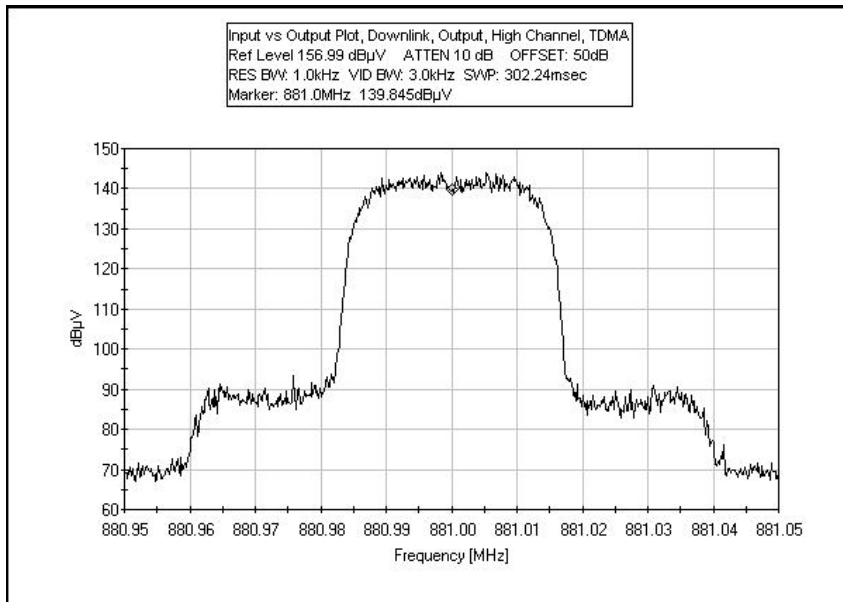




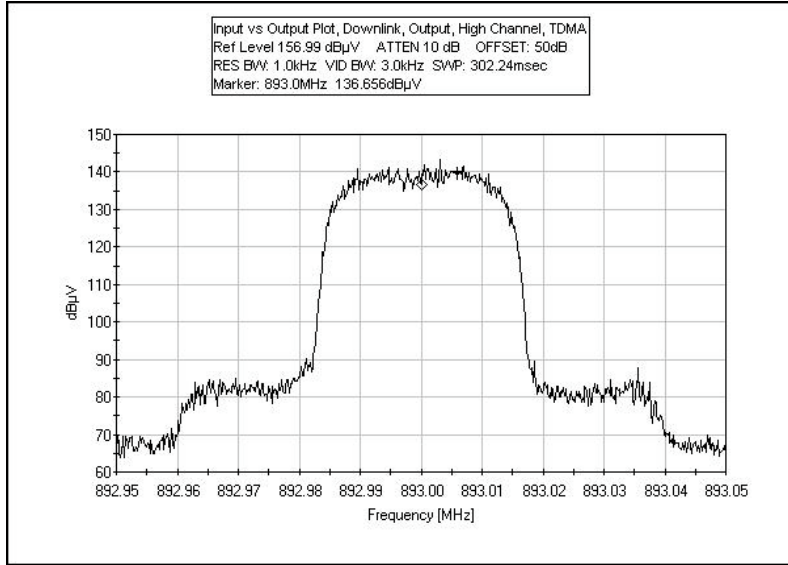
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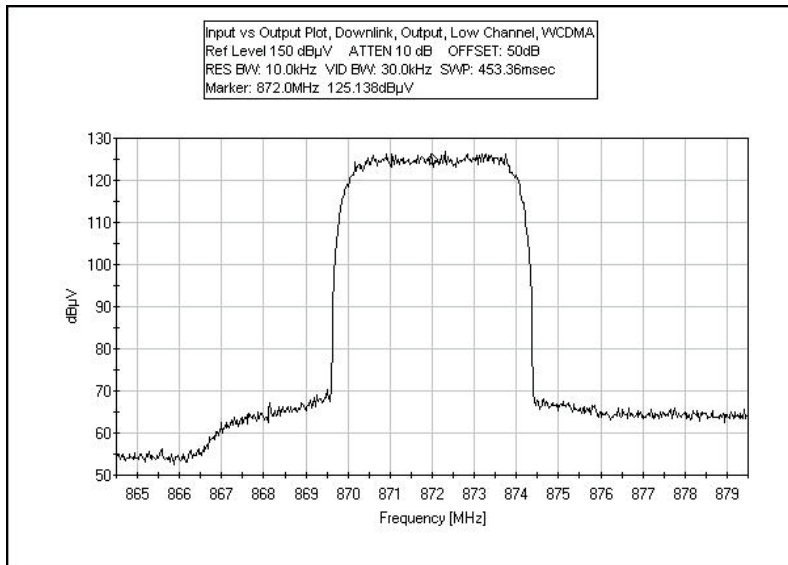
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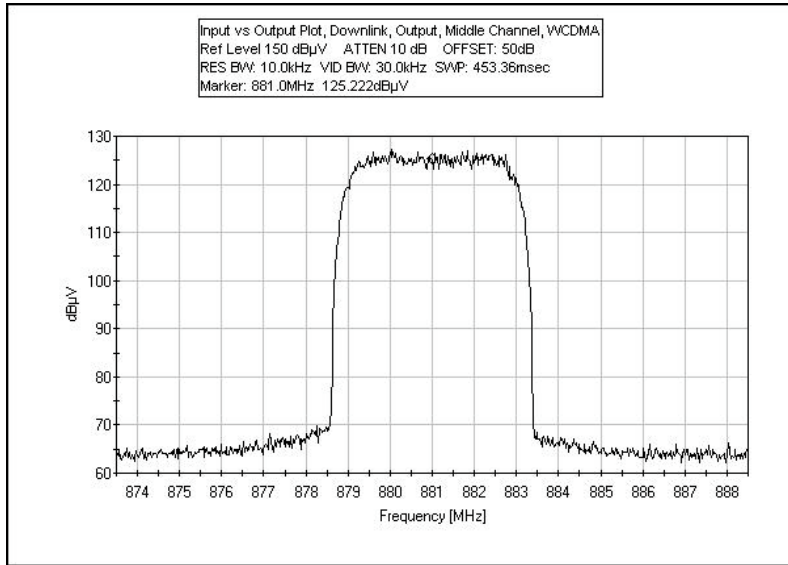
### FCC PART 22 OUTPUT PLOT DOWNLINK - HIGH CHANNEL TDMA



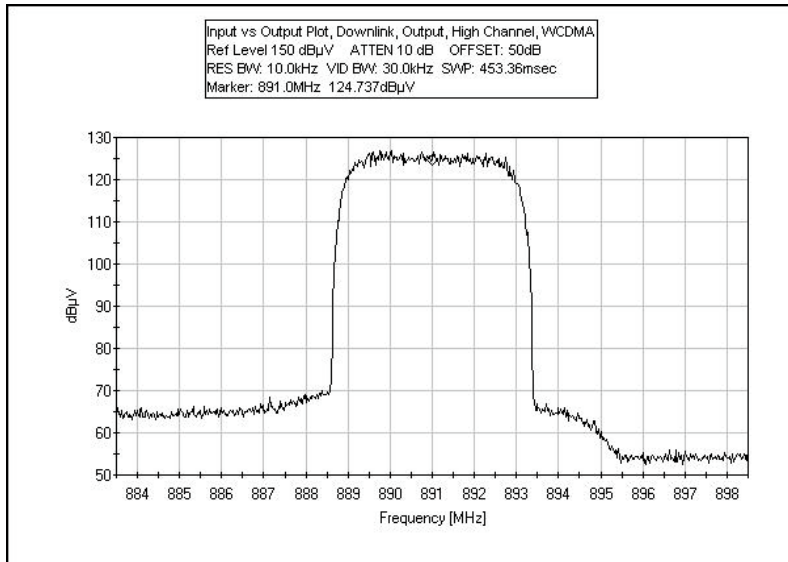
### FCC PART 22 OUTPUT PLOT DOWNLINK - LOW CHANNEL WCDMA



## FCC PART 22 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL WCDMA



## FCC PART 22 OUTPUT PLOT DOWNLINK - HIGH CHANNEL WCDMA



**FCC 2.1033(c)(14)/2.1049(i)/PART 24- INPUT AND OUTPUT PLOTS**

**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
High Frequency Coaxial Cable	P02946	Astrolab	32022-2-2909K-36TC	(none)	091807	091809
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209

**Test Conditions**

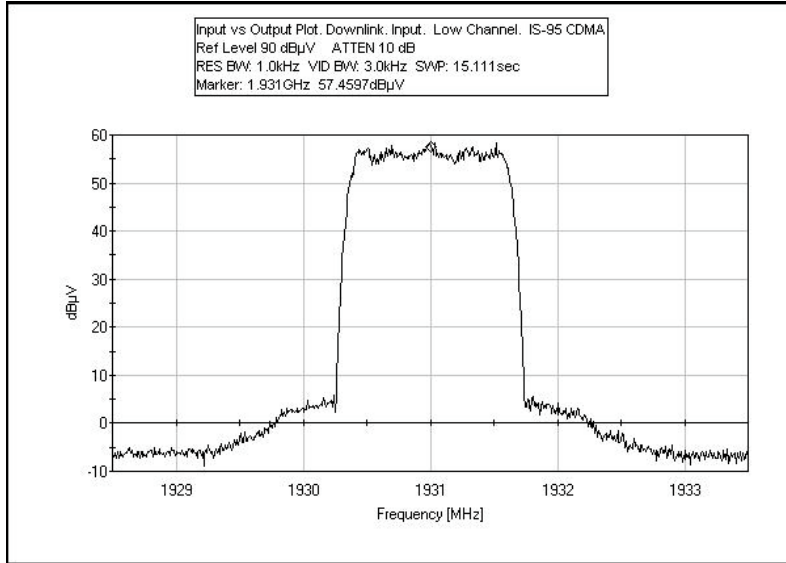
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**Test Setup Photos**

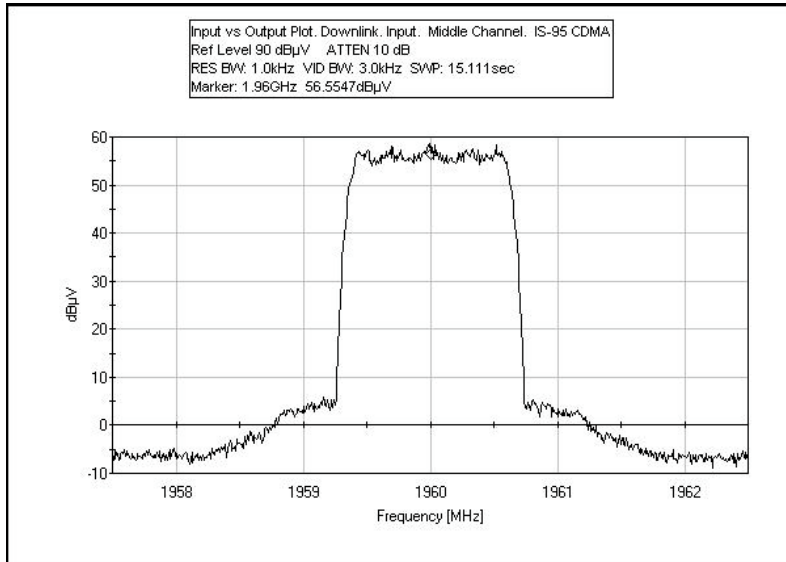


### Test Plots

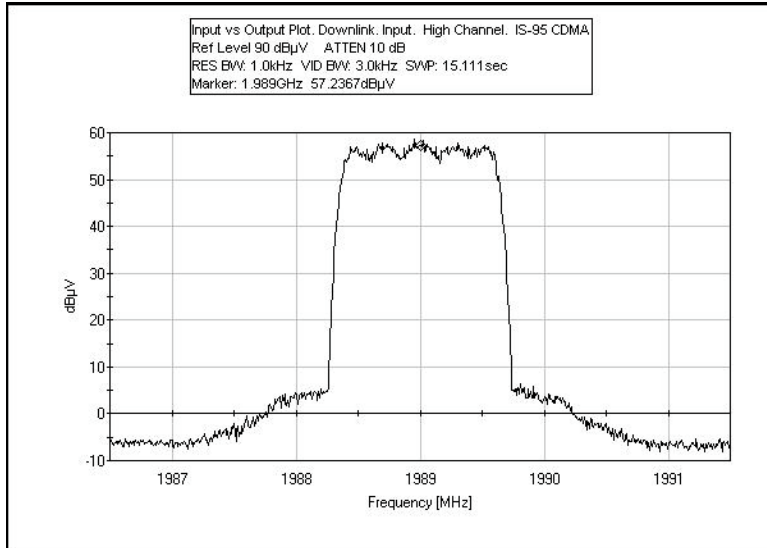
#### FCC PART 24 INPUT PLOT DOWNLINK - LOW CHANNEL IS-95 CDMA



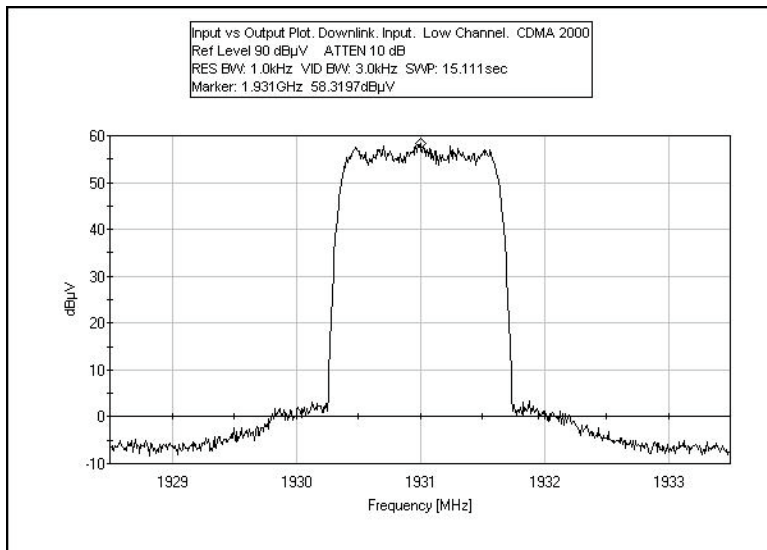
#### FCC PART 24 INPUT PLOT DOWNLINK - MIDDLE CHANNEL IS-95 CDMA



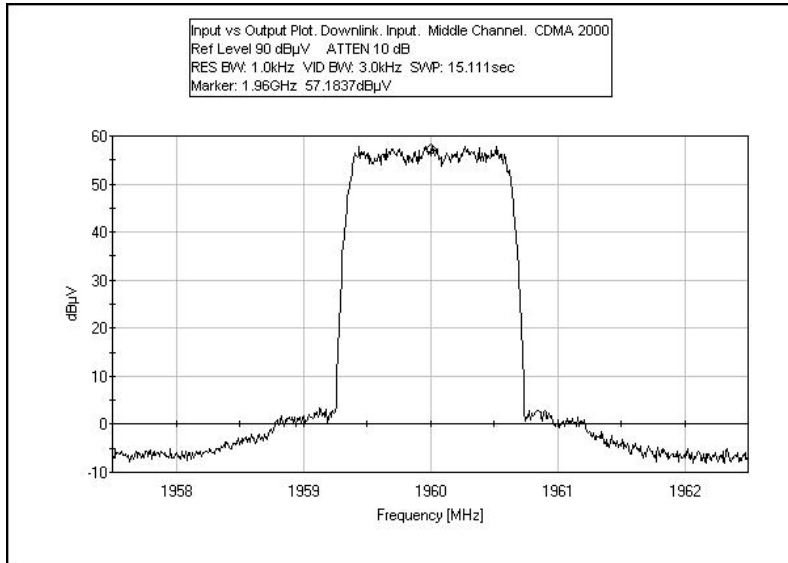
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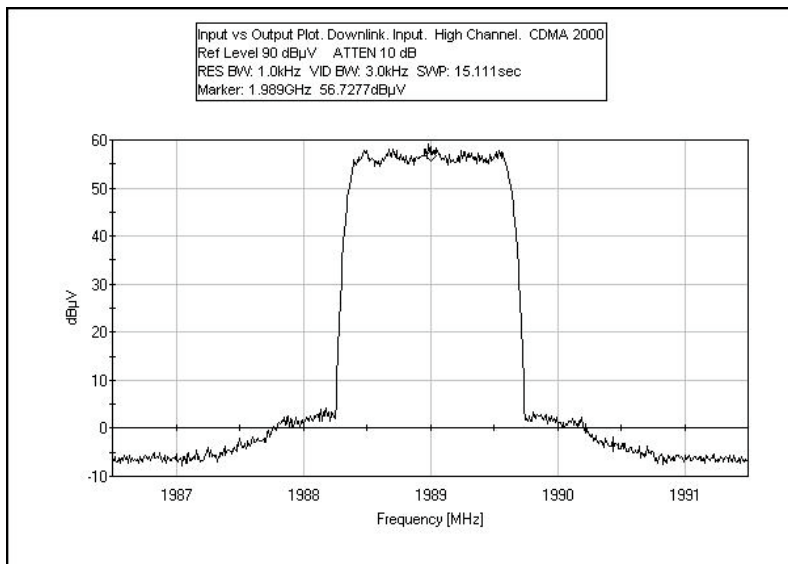
### FCC PART 24 INPUT PLOT DOWNLINK - LOW CHANNEL CDMA 2000



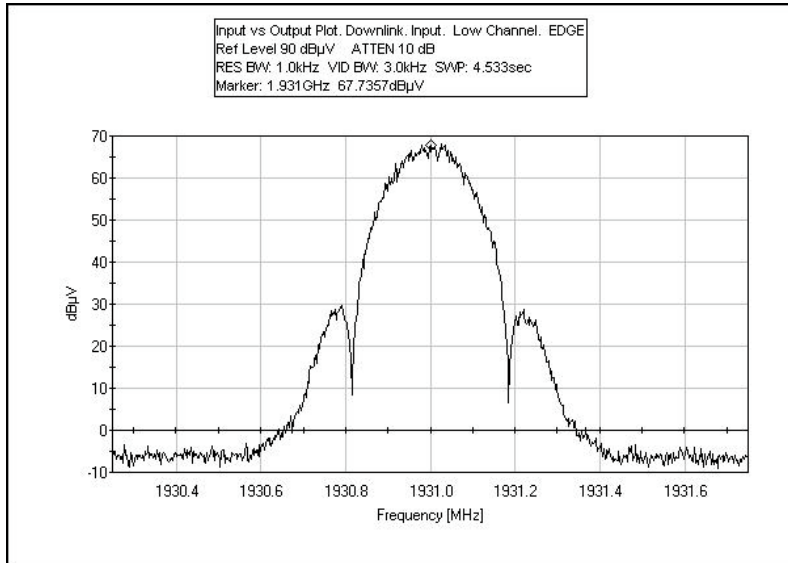
### FCC PART 24 INPUT PLOT DOWNLINK - MIDDLE CHANNEL CDMA 2000



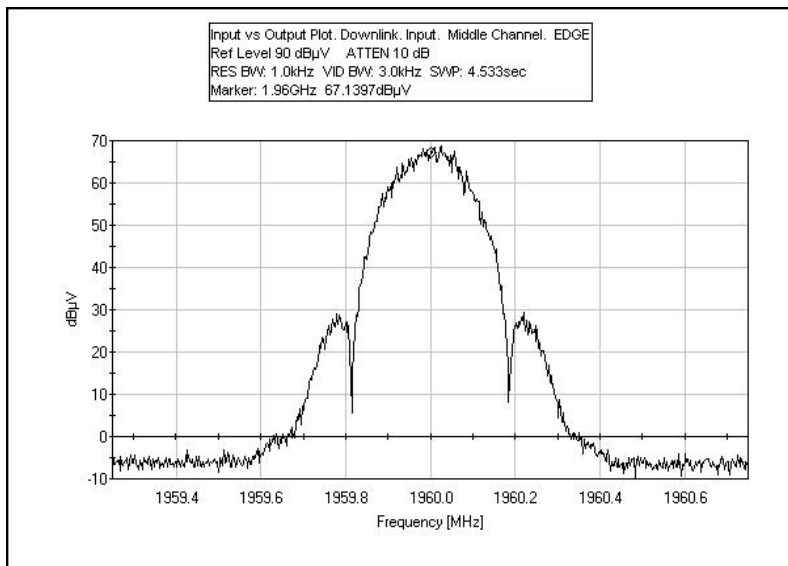
### FCC PART 24 INPUT PLOT DOWNLINK - HIGH CHANNEL CDMA 2000



### FCC PART 24 INPUT PLOT DOWNLINK - LOW CHANNEL EDGE

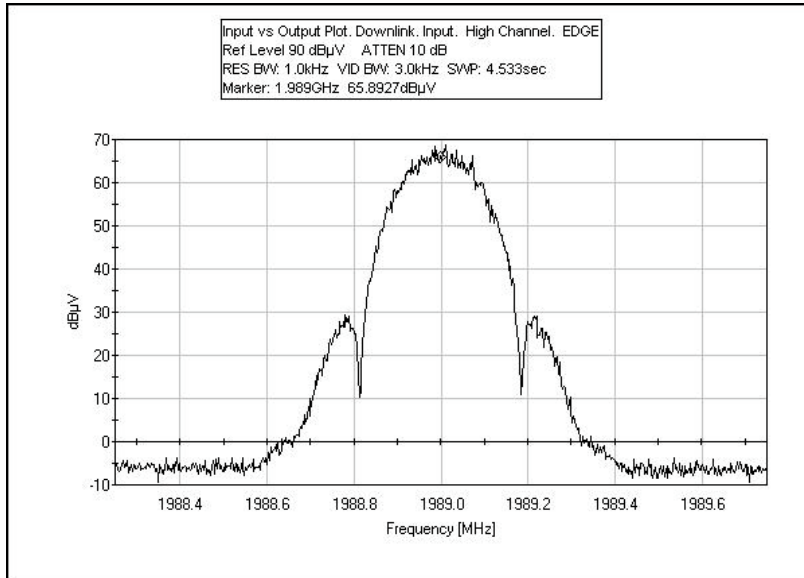


### FCC PART 24 INPUT PLOT DOWNLINK - MIDDLE CHANNEL EDGE

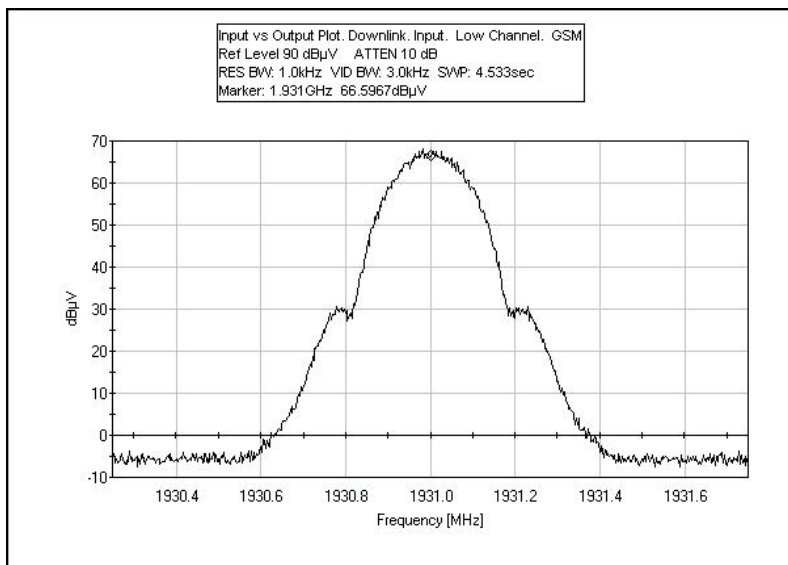




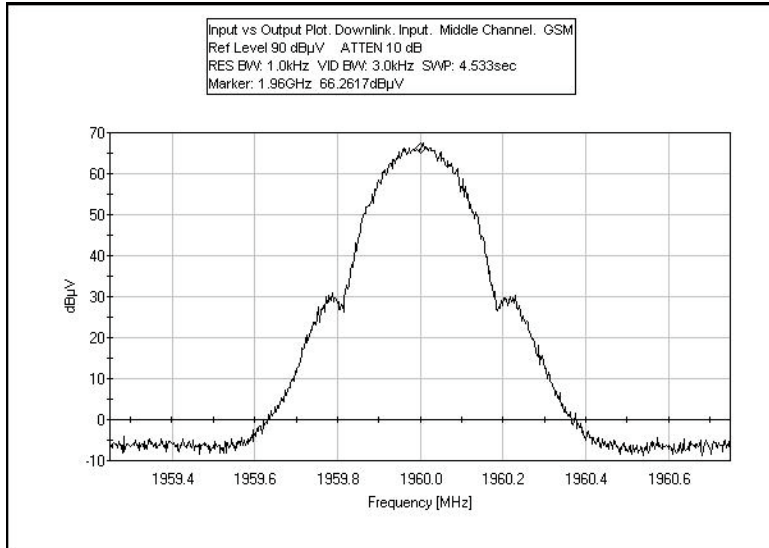
### FCC PART 24 INPUT PLOT DOWNLINK - HIGH CHANNEL EDGE



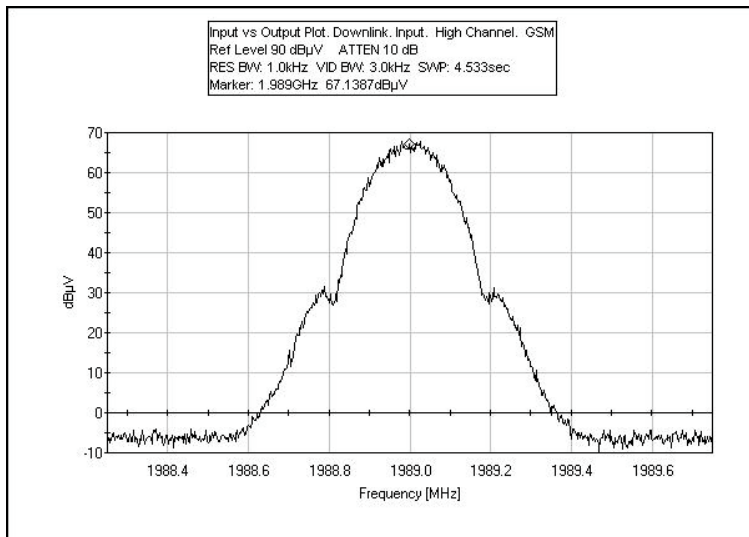
### FCC PART 24 INPUT PLOT DOWNLINK - LOW CHANNEL GSM



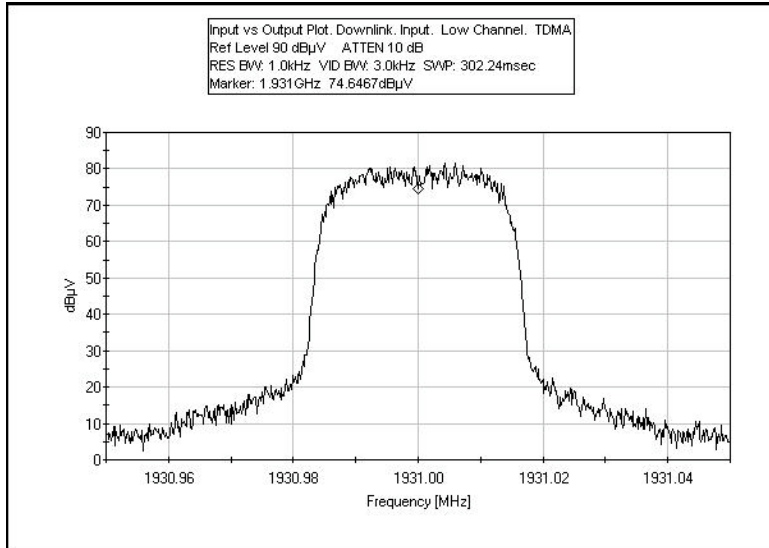
### FCC PART 24 INPUT PLOT DOWNLINK - MIDDLE CHANNEL GSM



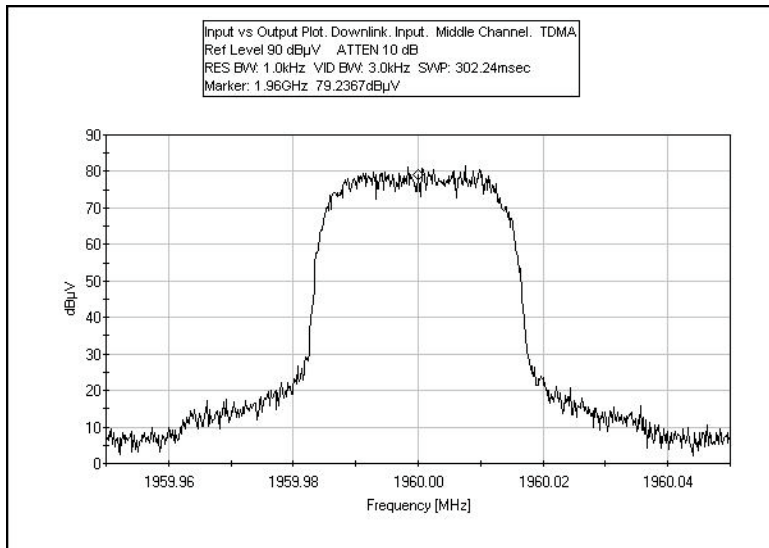
### FCC PART 24 INPUT PLOT DOWNLINK - HIGH CHANNEL GSM



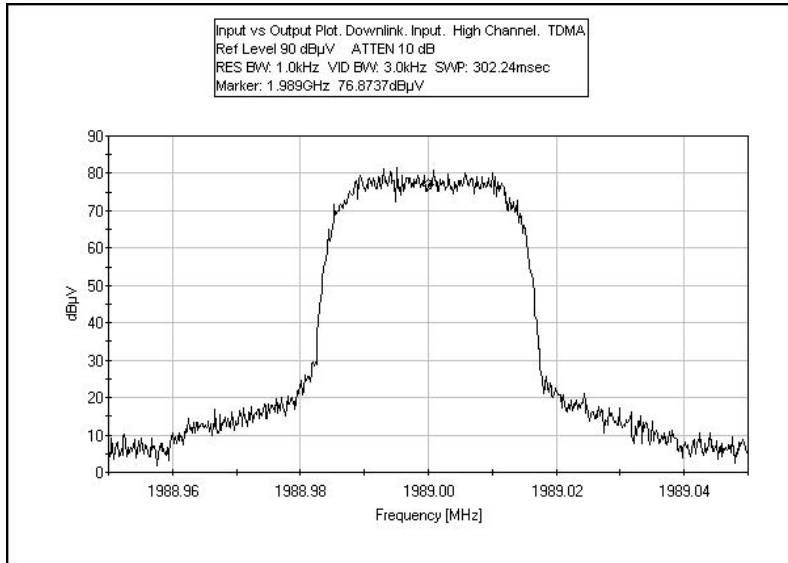
**FCC PART 24 INPUT PLOT DOWNLINK - LOW CHANNEL TDMA**



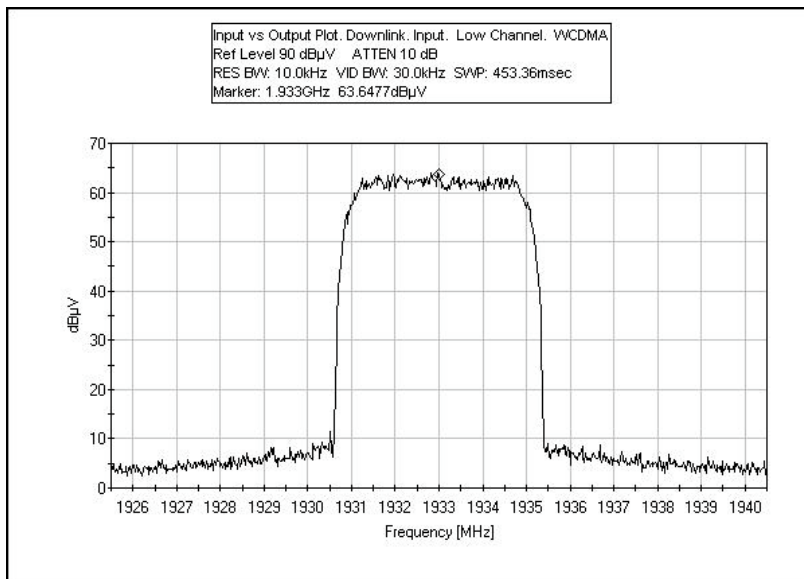
**FCC PART 24 INPUT PLOT DOWNLINK - MIDDLE CHANNEL TDMA**



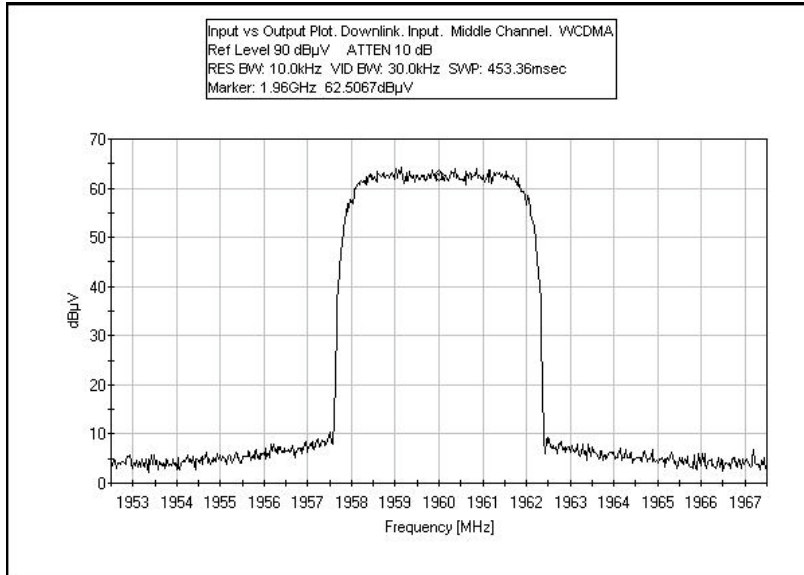
### FCC PART 24 INPUT PLOT DOWNLINK - HIGH CHANNEL TDMA



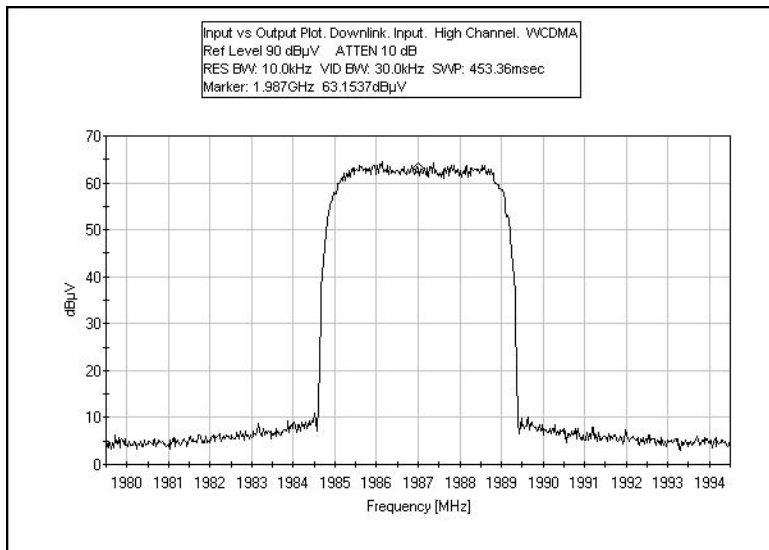
### FCC PART 24 INPUT PLOT DOWNLINK - LOW CHANNEL WCDMA



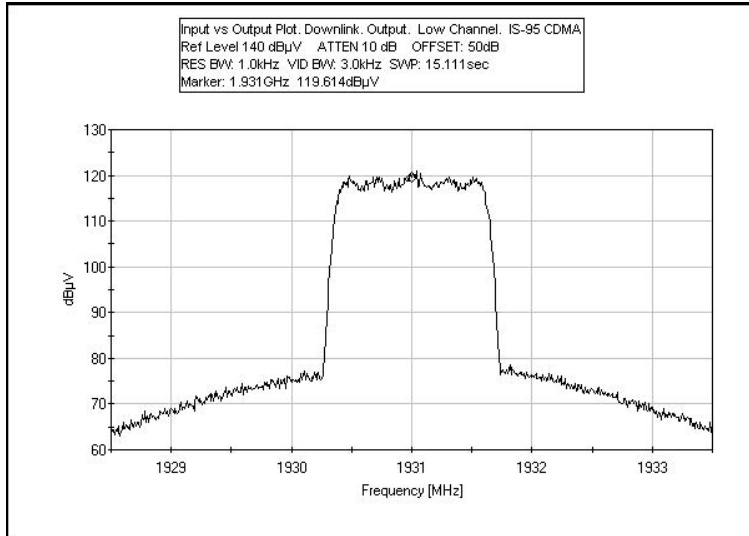
### FCC PART 24 INPUT PLOT DOWNLINK - MIDDLE CHANNEL WCDMA



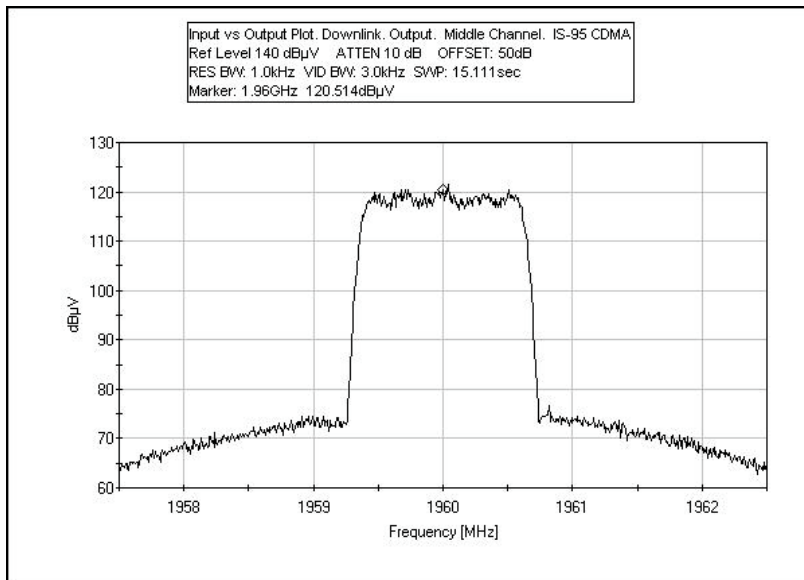
### FCC PART 24 INPUT PLOT DOWNLINK - HIGH CHANNEL WCDMA



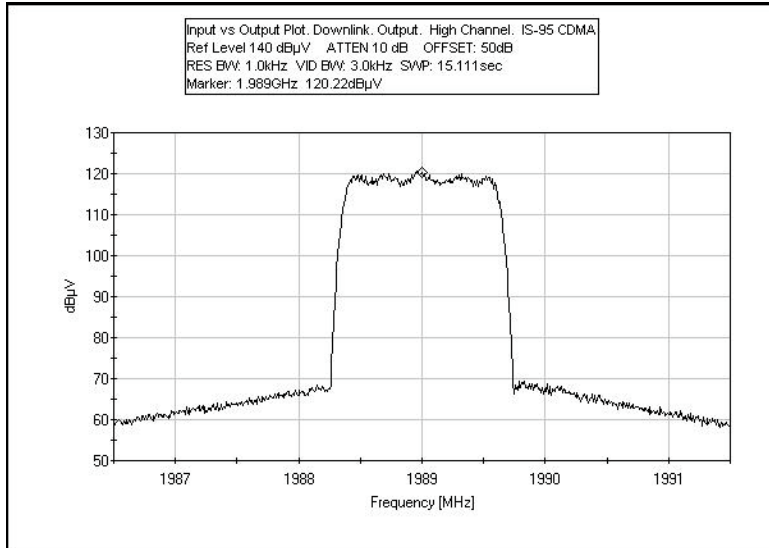
### FCC PART 24 OUTPUT PLOT DOWNLINK - LOW CHANNEL IS-95 CDMA



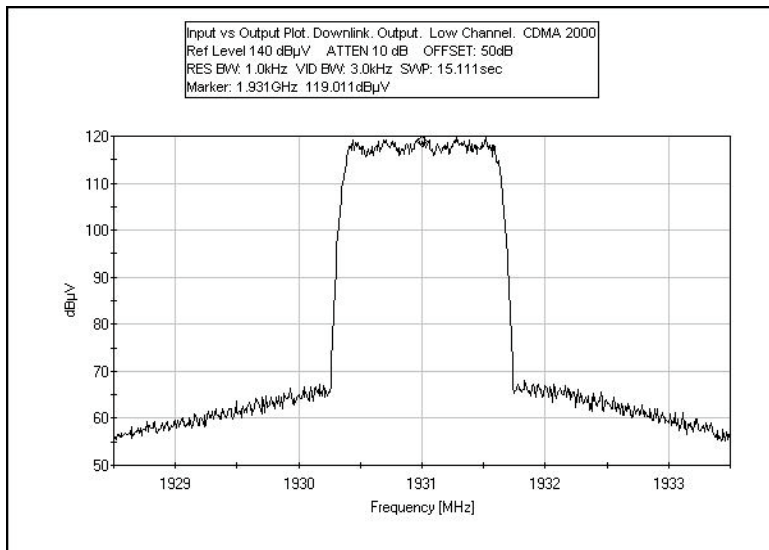
### FCC PART 24 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL IS-95 CDMA



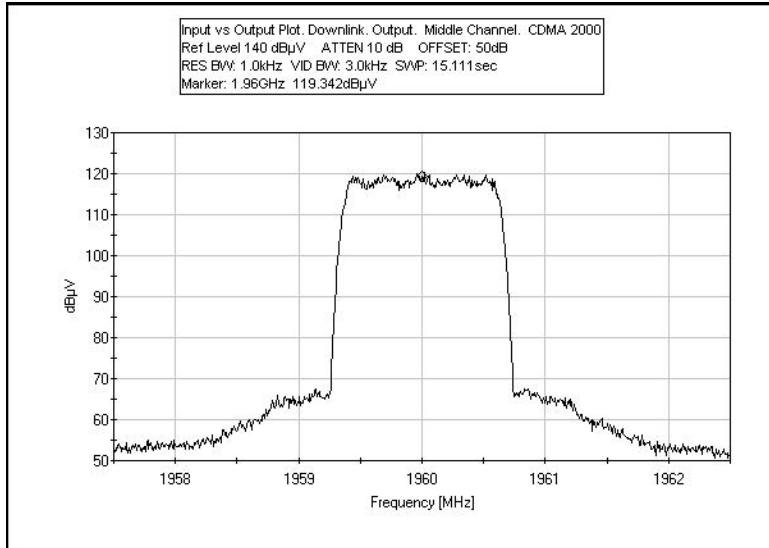
### FCC PART 24 OUTPUT PLOT DOWNLINK - HIGH CHANNEL IS-95 CDMA



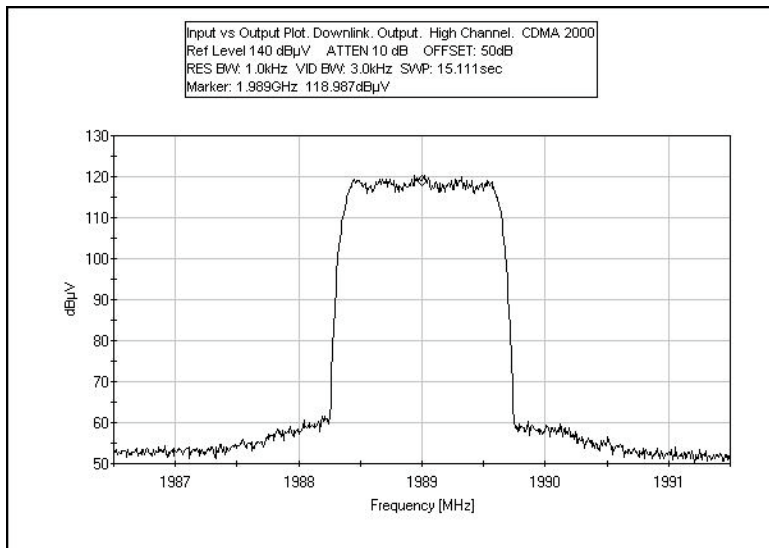
### FCC PART 24 OUTPUT PLOT DOWNLINK - LOW CHANNEL CDMA 2000



### FCC PART 24 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL CDMA 2000

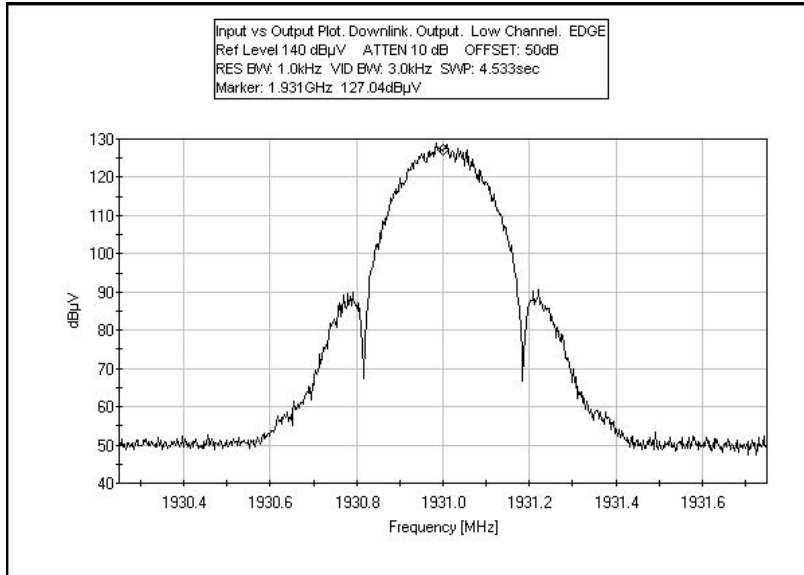


### FCC PART 24 OUTPUT PLOT DOWNLINK - HIGH CHANNEL CDMA 2000

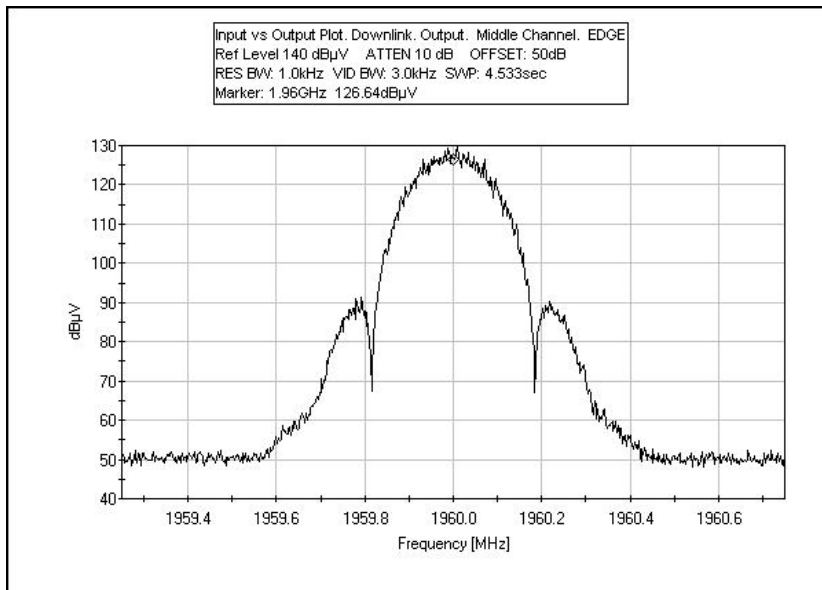




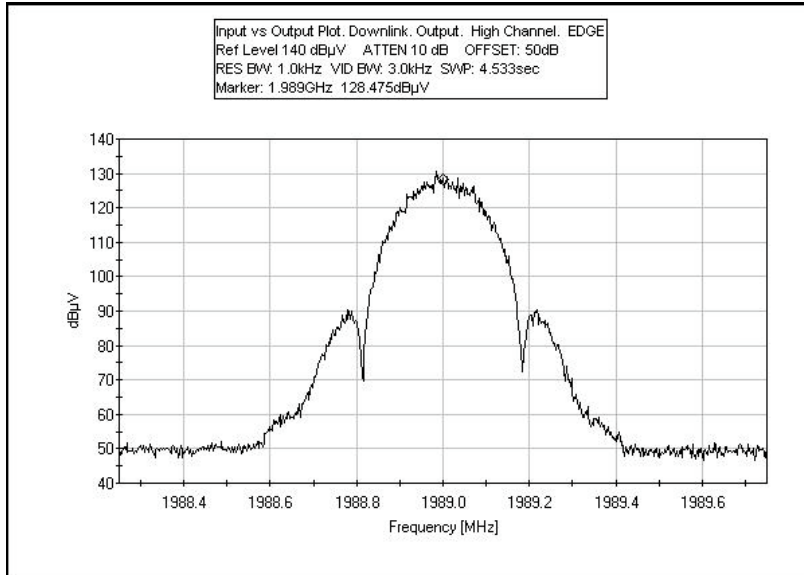
### FCC PART 24 OUTPUT PLOT DOWNLINK - LOW CHANNEL EDGE



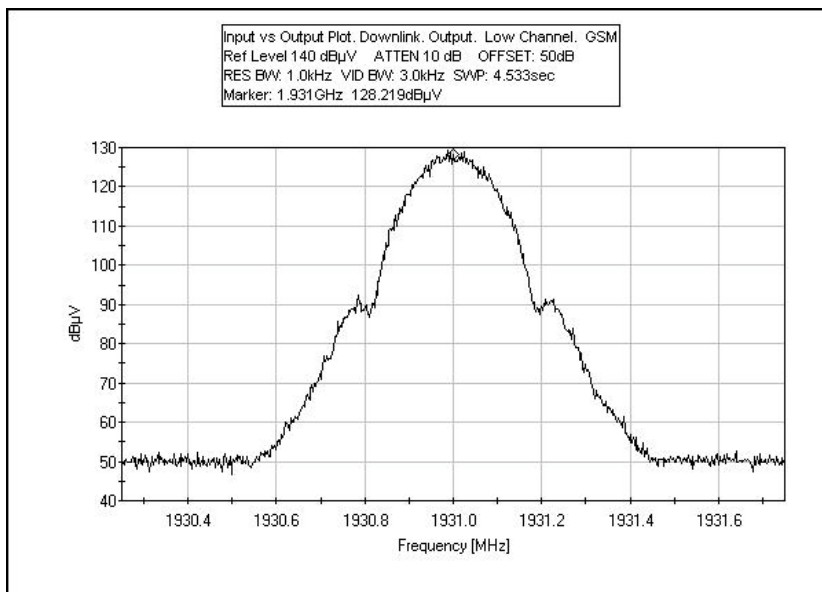
### FCC PART 24 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL EDGE



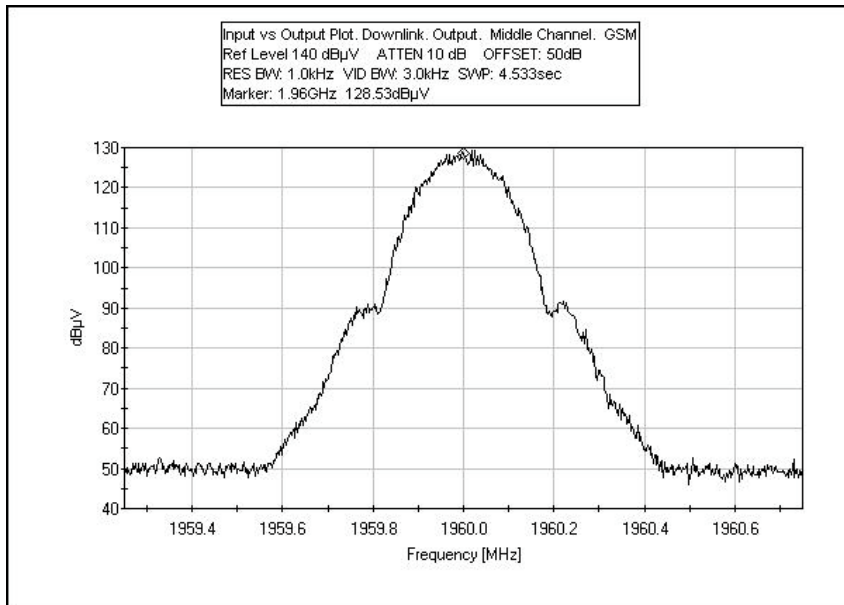
### FCC PART 24 OUTPUT PLOT DOWNLINK - HIGH CHANNEL EDGE



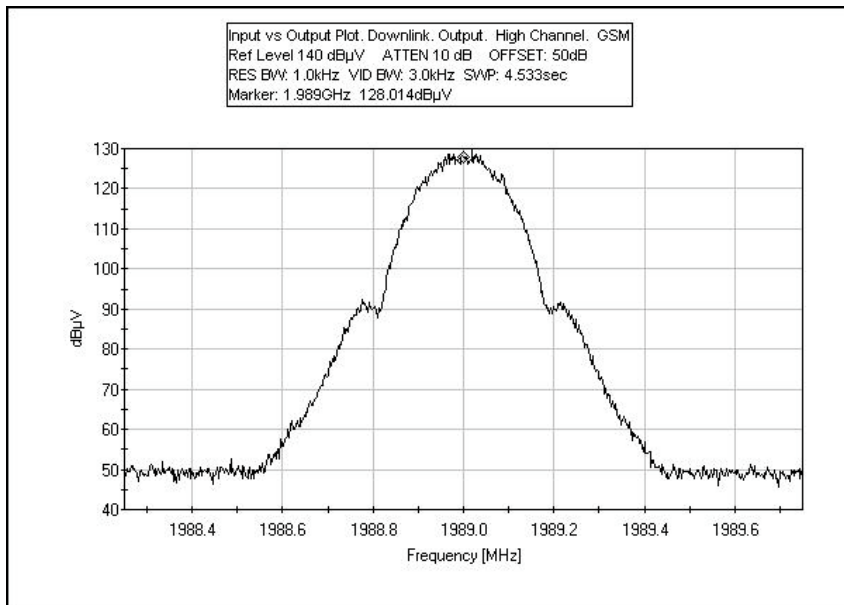
### FCC PART 24 OUTPUT PLOT DOWNLINK - LOW CHANNEL GSM



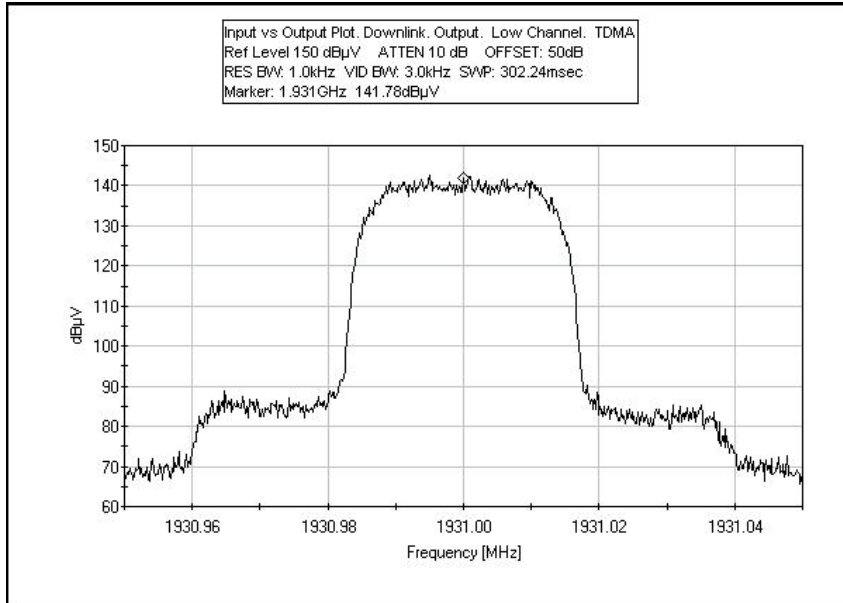
**FCC PART 24 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL GSM**



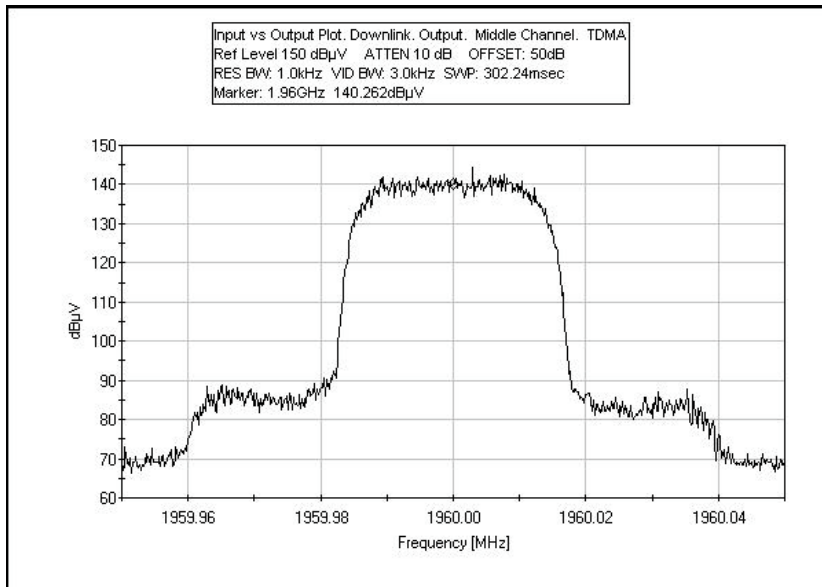
**FCC PART 24 OUTPUT PLOT DOWNLINK - HIGH CHANNEL GSM**



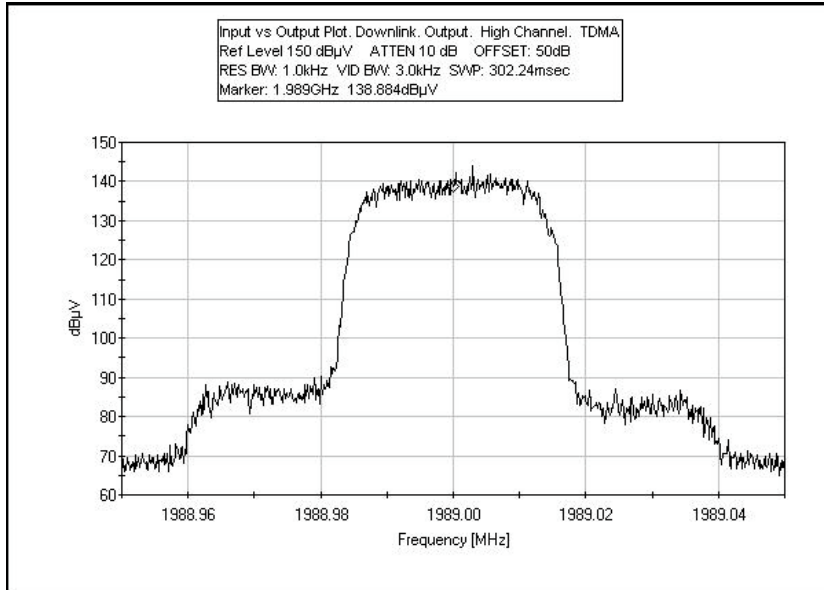
### FCC PART 24 OUTPUT PLOT DOWNLINK - LOW CHANNEL TDMA



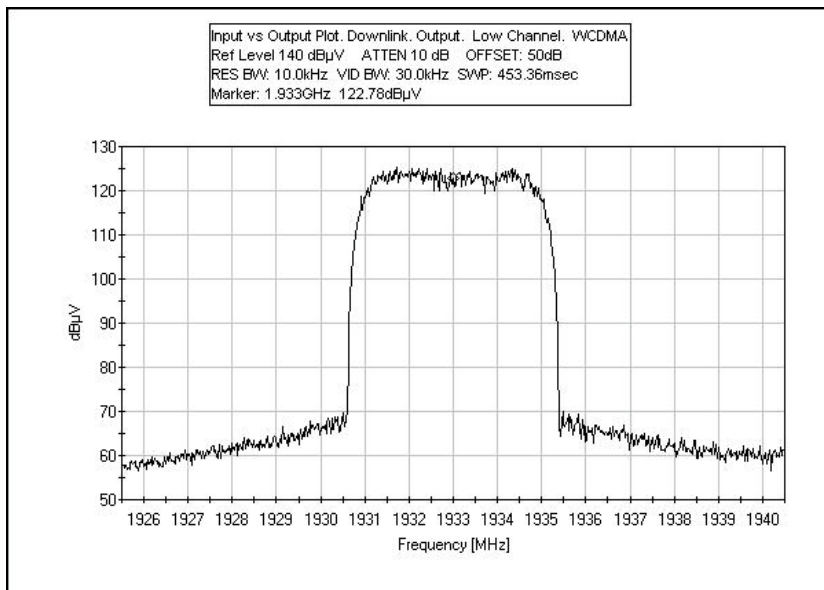
### FCC PART 24 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL TDMA



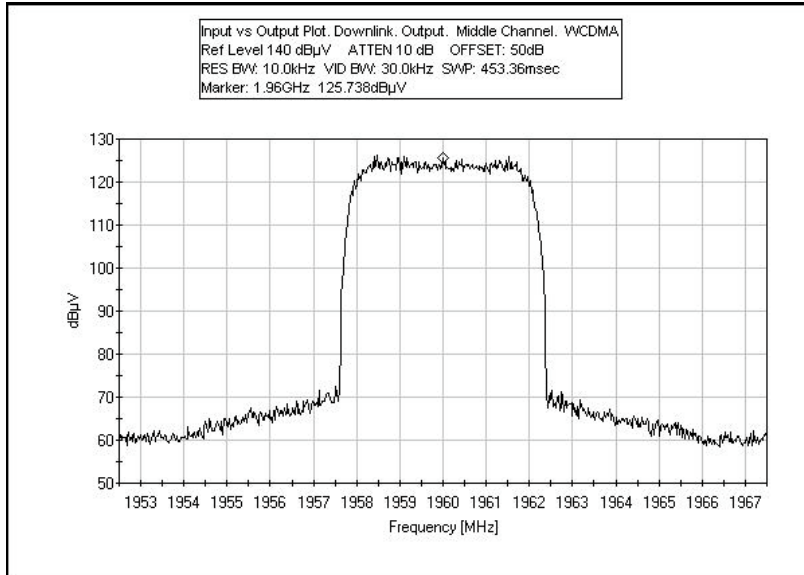
### FCC PART 24 OUTPUT PLOT DOWNLINK - HIGH CHANNEL TDMA



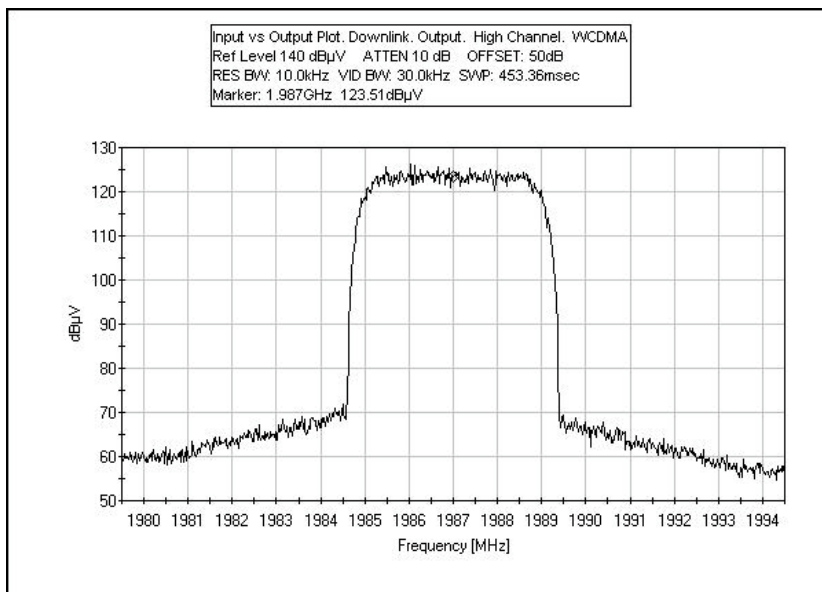
### FCC PART 24 OUTPUT PLOT DOWNLINK - LOW CHANNEL WCDMA



### FCC PART 24 OUTPUT PLOT DOWNLINK - MIDDLE CHANNEL WCDMA



### FCC PART 24 OUTPUT PLOT DOWNLINK - HIGH CHANNEL WCDMA



**FCC 2.1033(c)(14)/2.1051/22.917(a) - SPURIOUS EMISSIONS AT ANTENNA  
TERMINAL**

**Test Setup Photos**



**Test Data**

### Limit line for Spurious Conducted Emission

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

$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

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

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

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





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

Customer: **Powerwave Technologies, Inc.**  
 Specification: **FCC Part 22.917(a) Conducted Spurious Emission**  
 Work Order #: **87766** Date: 3/19/2008  
 Test Type: **Conducted Emissions** Time: 13:12:25  
 Equipment: **Dual Band Transceiver** Sequence#: 1  
 Manufacturer: Powerwave Technologies, Inc. Tested By: Stuart Yamamoto  
 Model: RH304022/03A 120V 60Hz  
 S/N: 2A.56150

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer	MY46186290	02/12/2007	02/12/2009	02869
40GHz cable		09/18/2007	09/18/2009	02946

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

Function	Manufacturer	Model #	S/N
Dual Band Transceiver*	Powerwave Technologies, Inc.	RH304022/03A	2A.56150

**Support Devices:**

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051840
Laptop Computer	HP	Compaq nc6000	CNU502FCDM

**Test Conditions / Notes:**

The equipment under test (EUT) is a dual band transceiver. The EUT and support laptop computer are located adjacent to each other on the table top. Connected to the EUT Donor In 2 port is a remotely located signal generator. Connected to the EUT Local 1 port is the local laptop computer. The laptop is used to monitor the performance of the EUT. Connected to the EUT Service 2 port are two high power attenuators then a coaxial cable to the measuring spectrum analyzer. Voltage to the EUT is 120Vac 60Hz. Temperature: 20°C, Humidity: 55%, Pressure: 100kPa. The EUT range of operation is 869MHz to 894MHz. This datasheet represents the EUT transmitting at 870MHz, 872MHz, 881MHz, 891MHz, and 893MHz at its maximum rated output power. Measurement Bandwidth is 100kHz. This data sheet is with the EUT's signal modulated with: TDMA, GSM, EDGE, IS-95/CDMA, CDMA 2000, WCDMA. Frequency range of test, 9kHz to 20GHz.

**Transducer Legend:**

T1=CAB-ANP02946091807

**Measurement Data:** Reading listed by margin. Test Lead: Service 2

#	Freq MHz	Rdng dBμV	T1 dB	dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	1761.977M	85.1	+0.5				+0.0	85.6	94.0	-8.4	Servi
									IS-95/CDMA		
2	1761.973M	84.0	+0.5				+0.0	84.5	94.0	-9.5	Servi
									EDGE		
3	1786.013M	83.9	+0.5				+0.0	84.4	94.0	-9.6	Servi
									IS-95/CDMA		
4	1762.019M	83.7	+0.5				+0.0	84.2	94.0	-9.8	Servi
									TDMA		
5	1762.007M	83.0	+0.5				+0.0	83.5	94.0	-10.5	Servi
									CDMA 2000		

6	1786.011M	83.0	+0.5	+0.0	83.5	94.0	-10.5	Servi
						TDMA		
7	1740.007M	83.0	+0.5	+0.0	83.5	94.0	-10.5	Servi
						TDMA		
8	1740.308M	82.8	+0.5	+0.0	83.3	94.0	-10.7	Servi
						IS-95/CDMA		
9	1786.027M	82.8	+0.5	+0.0	83.3	94.0	-10.7	Servi
						EDGE		
10	1740.012M	82.7	+0.5	+0.0	83.2	94.0	-10.8	Servi
						EDGE		
11	1786.023M	82.1	+0.5	+0.0	82.6	94.0	-11.4	Servi
						CDMA 2000		
12	1739.842M	80.8	+0.5	+0.0	81.3	94.0	-12.7	Servi
						CDMA 2000		
13	1780.310M	80.6	+0.5	+0.0	81.1	94.0	-12.9	Servi
						WCDMA		
14	1761.857M	80.0	+0.5	+0.0	80.5	94.0	-13.5	Servi
						GSM		
15	1739.863M	79.4	+0.5	+0.0	79.9	94.0	-14.1	Servi
						GSM		
16	1785.862M	79.0	+0.5	+0.0	79.5	94.0	-14.5	Servi
						GSM		
17	2673.140M	76.0	+0.6	+0.0	76.6	94.0	-17.4	Servi
						WCDMA		
18	1762.053M	74.2	+0.5	+0.0	74.7	94.0	-19.3	Servi
						WCDMA		
19	1745.950M	72.9	+0.5	+0.0	73.4	94.0	-20.6	Servi
						WCDMA		
20	2609.717M	70.3	+0.6	+0.0	70.9	94.0	-23.1	Servi
						IS-95/CDMA		
21	2643.010M	69.7	+0.6	+0.0	70.3	94.0	-23.7	Servi
						IS-95/CDMA		
22	2643.015M	68.7	+0.6	+0.0	69.3	94.0	-24.7	Servi
						CDMA 2000		
23	2678.985M	68.6	+0.6	+0.0	69.2	94.0	-24.8	Servi
						GSM		
24	2610.124M	68.6	+0.6	+0.0	69.2	94.0	-24.8	Servi
						GSM		
25	2679.005M	68.4	+0.6	+0.0	69.0	94.0	-25.0	Servi
						TDMA		
26	2643.005M	68.3	+0.6	+0.0	68.9	94.0	-25.1	Servi
						EDGE		
27	2616.380M	68.0	+0.6	+0.0	68.6	94.0	-25.4	Servi
						WCDMA		
28	2679.033M	68.0	+0.6	+0.0	68.6	94.0	-25.4	Servi
						IS-95/CDMA		
29	2643.003M	67.5	+0.6	+0.0	68.1	94.0	-25.9	Servi
						TDMA		

30	2643.033M	67.5	+0.6	+0.0	68.1	94.0	-25.9	Servi
						GSM		
31	2643.079M	67.4	+0.6	+0.0	68.0	94.0	-26.0	Servi
						WCDMA		
32	2679.000M	67.3	+0.6	+0.0	67.9	94.0	-26.1	Servi
						EDGE		
33	2610.208M	67.1	+0.6	+0.0	67.7	94.0	-26.3	Servi
						CDMA 2000		
34	2610.007M	66.7	+0.6	+0.0	67.3	94.0	-26.7	Servi
						TDMA		
35	2679.023M	66.0	+0.6	+0.0	66.6	94.0	-27.4	Servi
						CDMA 2000		
36	2610.012M	66.0	+0.6	+0.0	66.6	94.0	-27.4	Servi
						EDGE		

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

**Test Setup Photos**



**Test Data Sheets**

**Limit line for Spurious Conducted Emission**

**Required Attenuation** = **43+10 Log P dB**

Limit line (dBuV) =  $V_{dBuV} - \text{Attenuation}$

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

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

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



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

Customer: **Powerwave Technologies, Inc.**  
 Specification: **FCC Part 24.238(a) Conducted Spurious Emission**  
 Work Order #: **87766** Date: 3/19/2008  
 Test Type: **Conducted Emissions** Time: 15:36:06  
 Equipment: **Dual Band Transceiver** Sequence#: 2  
 Manufacturer: Powerwave Technologies, Inc. Tested By: Stuart Yamamoto  
 Model: RH304022/03A 120V 60Hz  
 S/N: 2A.56150

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
40GHz cable		09/18/2007	09/18/2009	02946
Spectrum Analyzer	MY46186290	02/12/2007	02/12/2009	02869

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

Function	Manufacturer	Model #	S/N
Dual Band Transceiver*	Powerwave Technologies, Inc.	RH304022/03A	2A.56150

**Support Devices:**

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051840
Laptop Computer	HP	Compaq nc6000	CNU502FCDM

**Test Conditions / Notes:**

The equipment under test (EUT) is a dual band transceiver. The EUT and support laptop computer are located adjacent to each other on the table top. Connected to the EUT Donor In 1 port is a remotely located signal generator. Connected to the EUT Local 1 port is the local laptop computer. The laptop is used to monitor the performance of the EUT. Connected to the EUT Service 1 port are two high power attenuators then a coaxial cable to the measuring spectrum analyzer. Voltage to the EUT is 120Vac 60Hz. Temperature: 20°C, Humidity: 46%, Pressure: 100kPa. The EUT range of operation is 1930MHz to 1990MHz. This datasheet represents the EUT transmitting at 1931MHz, 1933MHz, 1960MHz, 1987MHz and 1989MHz at its maximum rated output power. Measurement Bandwidth is 1MHz. This data sheet is with the EUT's signal modulated with: TDMA, GSM, EDGE, IS-95/CDMA, CDMA 2000, WCDMA. Frequency range of test, 9kHz to 20GHz.

**Transducer Legend:**

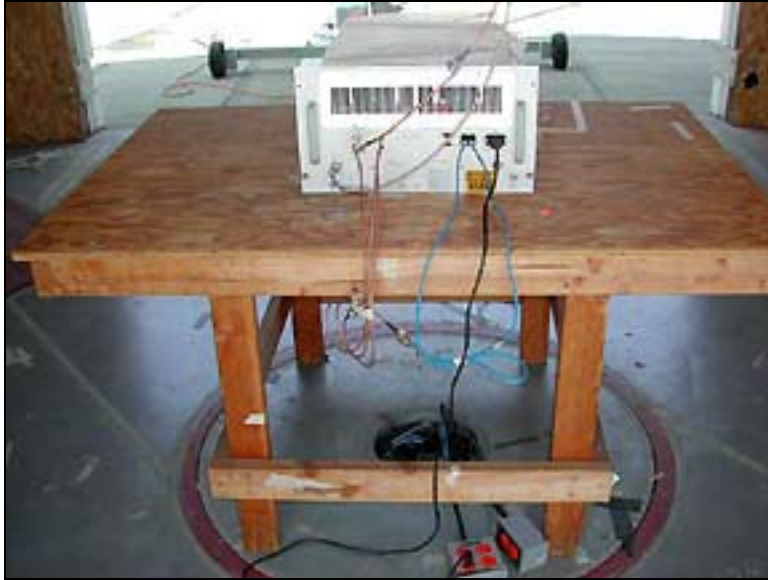
T1=CAB-ANP02946091807

#	Freq MHz	Reading listed by margin.					Test Lead: Service 1				
		Rdng dBμV	T1 dB	dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	1276.400M	86.7	+0.4				+0.0	87.1	94.0	-6.9	Servi
									IS-95/CDMA		
2	28.320M	86.4	+0.0				+0.0	86.4	94.0	-7.6	Servi
									IS-95/CDMA		
3	286.400M	82.3	+0.2				+0.0	82.5	94.0	-11.5	Servi
									IS-95/CDMA		
4	3978.050M	81.3	+0.7				+0.0	82.0	94.0	-12.0	Servi
									IS-95/CDMA		
5	28.193M	80.9	+0.0				+0.0	80.9	94.0	-13.1	Servi
									EDGE		

6	1261.700M	79.9	+0.4	+0.0	80.3	94.0	-13.7	Servi
						WCDMA		
7	28.260M	80.1	+0.0	+0.0	80.1	94.0	-13.9	Servi
						TDMA		
8	3920.550M	78.1	+0.7	+0.0	78.8	94.0	-15.2	Servi
						EDGE		
9	3889.933M	78.0	+0.7	+0.0	78.7	94.0	-15.3	Servi
						IS-95/CDMA		
10	3862.450M	77.6	+0.7	+0.0	78.3	94.0	-15.7	Servi
						TDMA		
11	3977.885M	77.6	+0.7	+0.0	78.3	94.0	-15.7	Servi
						GSM		
12	3977.048M	77.5	+0.7	+0.0	78.2	94.0	-15.8	Servi
						EDGE		
13	3862.630M	77.5	+0.7	+0.0	78.2	94.0	-15.8	Servi
						IS-95/CDMA		
14	3979.958M	77.2	+0.7	+0.0	77.9	94.0	-16.1	Servi
						TDMA		
15	3918.683M	77.2	+0.7	+0.0	77.9	94.0	-16.1	Servi
						CDMA 2000		
16	3922.350M	77.1	+0.7	+0.0	77.8	94.0	-16.2	Servi
						TDMA		
17	3862.015M	76.9	+0.7	+0.0	77.6	94.0	-16.4	Servi
						GSM		
18	3977.990M	76.9	+0.7	+0.0	77.6	94.0	-16.4	Servi
						CDMA 2000		
19	28.333M	77.2	+0.0	+0.0	77.2	94.0	-16.8	Servi
						GSM		
20	3861.000M	75.8	+0.7	+0.0	76.5	94.0	-17.5	Servi
						EDGE		
21	3862.003M	74.6	+0.7	+0.0	75.3	94.0	-18.7	Servi
						CDMA 2000		
22	3918.450M	73.9	+0.7	+0.0	74.6	94.0	-19.4	Servi
						GSM		
23	3974.070M	73.9	+0.7	+0.0	74.6	94.0	-19.4	Servi
						WCDMA		
24	3920.100M	73.9	+0.7	+0.0	74.6	94.0	-19.4	Servi
						WCDMA		
25	3866.270M	69.0	+0.7	+0.0	69.7	94.0	-24.3	Servi
						WCDMA		

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

**Test Setup Photos**







## Test Data Sheets

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

Customer: **Powerwave Technologies, Inc.**  
 Specification: **FCC Part 22.917(a) Radiated Spurious Emissions Limit**  
 Work Order #: **87766** Date: 3/26/2008  
 Test Type: **Maximized Emissions** Time: 11:38:14  
 Equipment: **Dual Band Transceiver** Sequence#: 2  
 Manufacturer: Powerwave Technologies, Inc. Tested By: Stuart Yamamoto  
 Model: RH304022/03A  
 S/N: 2A.56150

### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Antenna Cable	Cable #9	01/09/2008	01/09/2010	P01911
Bilog Antenna	2629	01/21/2008	01/21/2010	00851
Loop Antenna	2014	06/14/2006	06/14/2008	00314
Preamplifier	2727A05392	06/06/2006	06/06/2008	00010
Preamplifier Cable	Cable #22	08/10/2006	08/10/2008	P05555
10m Position Cable	Cable #17	09/19/2006	09/19/2008	P04382
40GHz cable		09/18/2007	09/18/2009	02946
Microwave Preamplifier	3123A00282	06/05/2007	06/05/2009	00787
Spectrum Analyzer	MY46186290	02/12/2007	02/12/2009	02869
Horn Antenna	9603-4683	06/29/2006	06/29/2008	01646
Antenna Cable	L1-PNMNM-48	09/18/2006	09/18/2008	P05563
1GHz High Pass Filter		01/11/2008	01/11/2010	02749

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

Function	Manufacturer	Model #	S/N
Dual Band Transceiver*	Powerwave Technologies, Inc.	RH304022/03A	2A.56150

### Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051840
Power Sensor	Agilent	E9301A	US39212029
Power Meter	Agilent	E4419B	GB40201912
Spectrum Analyzer	HP	8563E	007142

### Test Conditions / Notes:

The equipment under test (EUT) is a dual band transceiver. The EUT is stand alone on the test table top. Connected to the EUT's Donor 2 In port is a remotely located signal generator. The EUT's Service 2 port is connected to a remotely located monitoring spectrum analyzer and power meter. The test is performed with the EUT set to these low, middle, and high channels and using each of the six different modulations. Temperature: 20°C, Humidity: 35%, Pressure: 100kPa. Voltage to the EUT is 120Vac 60Hz. The EUT range of operation is 869MHz to 894MHz. This datasheet represent the EUT transmitting at 870MHz, 872MHz, 881MHz, 891MHz, and 893MHz at its maximum rated output power. Measurement Bandwidth is 100kHz. This data sheet is with the EUT's signal modulated with: TDMA, GSM, EDGE, IS-95/CDMA, CDMA 2000, WCDMA. Frequency range of test, 9kHz to 20GHz.

Operating Frequency: 870 MHz - 8930 MHz

Channels: Low, Mid and High

Highest Measured Output Power: 43.16 ERP(dBm)= 20.7 ERP(Watts)

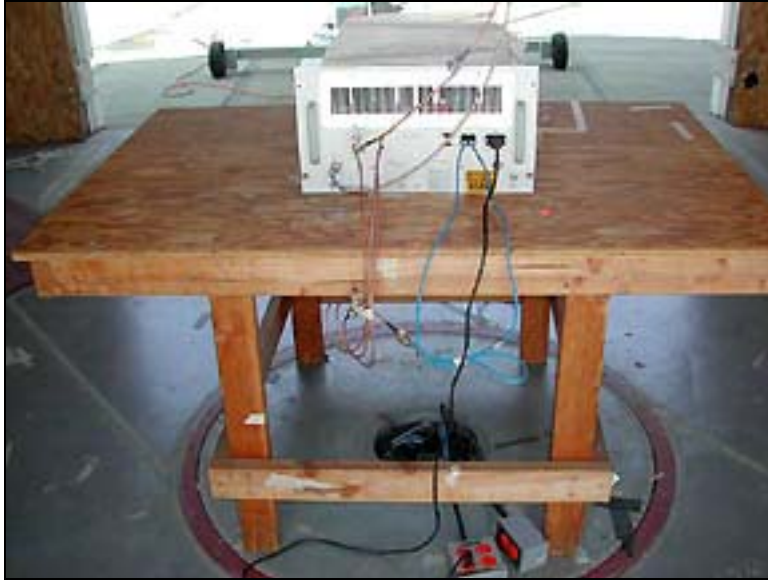
Distance: 3 meters

Limit:  $43+10\text{Log}(P)$  56.16 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
3,480.02	-45.1	Vert	88.26
3,479.90	-46.2	Horiz	89.36
3,524.06	-47.3	Horiz	90.46
3,524.03	-49.8	Vert	92.96
3,572.11	-50.2	Vert	93.36
3,572.32	-52.4	Vert	95.56

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

**Test Setup Photos**





**Test Data Sheets**

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

Customer: **Powerwave Technologies, Inc.**  
 Specification: **FCC Part 24.238(a) Radiated Spurious Emissions Limit**  
 Work Order #: **87766** Date: 3/26/2008  
 Test Type: **Maximized Emissions** Time: 13:08:42  
 Equipment: **Dual Band Transceiver** Sequence#: 1  
 Manufacturer: Powerwave Technologies, Inc. Tested By: Stuart Yamamoto  
 Model: RH304022/03A  
 S/N: 2A.56150

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Antenna Cable	Cable #9	01/09/2008	01/09/2010	P01911
Bilog Antenna	2629	01/21/2008	01/21/2010	00851
Loop Antenna	2014	06/14/2006	06/14/2008	00314
Preamplifier	2727A05392	06/06/2006	06/06/2008	00010
Preamplifier Cable	Cable #22	08/10/2006	08/10/2008	P05555
10m Position Cable	Cable #17	09/19/2006	09/19/2008	P04382
40GHz cable		09/18/2007	09/18/2009	02946
Microwave Preamplifier	3123A00282	06/05/2007	06/05/2009	00787
Spectrum Analyzer	MY46186290	02/12/2007	02/12/2009	02869
Horn Antenna	9603-4683	06/29/2006	06/29/2008	01646
Antenna Cable	L1-PNMNM-48	09/18/2006	09/18/2008	P05563

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

Function	Manufacturer	Model #	S/N
Dual Band Transceiver*	Powerwave Technologies, Inc.	RH304022/03A	2A.56150

**Support Devices:**

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051840
Power Sensor	Agilent	E9301A	US39212029
Power Meter	Agilent	E4419B	GB40201912
Spectrum Analyzer	HP	8563E	007142

**Test Conditions / Notes:**

The equipment under test (EUT) is a dual band transceiver. The EUT is stand alone on the test table top. Connected to the EUT's Donor 2 In port is a remotely located signal generator. The EUT's Service 2 port is connected to a remotely located monitoring spectrum analyzer and power meter. The test is performed with the EUT set to these low, middle, and high channels and using each of the six different modulations. The test is performed with the EUT set to these low, middle, and high channels and using each of the six different modulations. The frequency range of this test is 9kHz to 20GHz. Temperature: 20°C, Humidity: 35%, Pressure: 100kPa. The measurement bandwidth is 1MHz. Voltage to the EUT is 120Vac 60Hz. The EUT range of operation is 1930MHz to 1990MHz. This datasheet represent the EUT transmitting at 1931MHz, 1933MHz, 1960MHz, 1987MHz and 1989MHz at its maximum rated output power. This data sheet is with the EUT's signal modulated with: TDMA, GSM, EDGE, IS-95/CDMA, CDMA 2000, WCDMA.

Operating Frequency: 1930 MHz - 1990 MHz

Channels: Low, Mid and High

Highest Measured Output Power: 43.42 ERP(dBm)= 22 ERP(Watts)

Distance: 3 meters

Limit:  $43+10\text{Log}(P)$  56.42 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
5,879.94	-27.4	Horiz	70.82
5,966.94	-28.5	Horiz	71.92
7,724.19	-30.3	Horiz	73.72
7,956.00	-30.4	Horiz	73.82
7,840.05	-30.5	Horiz	73.92
3,861.99	-35.8	Horiz	79.22
5,793.06	-35.9	Horiz	79.32
5,967.15	-36	Vert	79.42
7,724.01	-36.3	Vert	79.72
3,920.04	-36.7	Horiz	80.12
5,880.02	-37	Vert	80.42
7,839.93	-37.7	Vert	81.12
7,955.92	-39	Vert	82.42
5,792.75	-41.7	Vert	85.12
3,861.95	-42	Vert	85.42
3,977.95	-43.9	Horiz	87.32
3,480.02	-45.1	Vert	88.52
3,920.00	-45.3	Vert	88.72
3,479.90	-46.2	Horiz	89.62
3,524.06	-47.3	Horiz	90.72
3,572.11	-50.2	Vert	93.62
3,978.15	-52.9	Vert	96.32

**FCC 22.917(a) BLOCK EDGE**

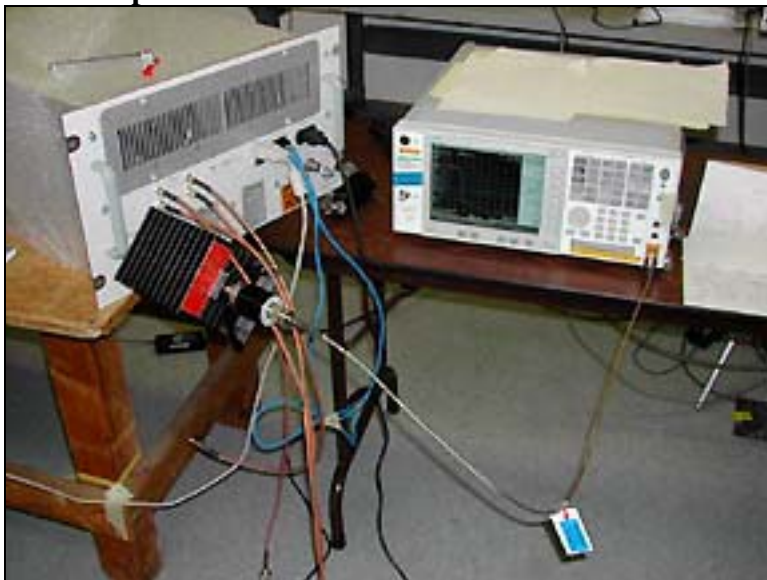
**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
High Frequency Coaxial Cable	P02946	Astrolab	32022-2-2909K-36TC	(none)	091807	091809
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209

**Test Conditions**

The equipment under test (EUT) was stand alone on the table top. The EUT Donor 2 In port was connected to the signal generator. The EUT Service 2 port was connected through a high power attenuators and then to the measuring spectrum analyzer via a fifty ohm coaxial cable. A laptop computer was connected to the EUT Local port (a service/maintenance port) and was only used to monitor the EUT’s parameters. Connected to the EUT Donor 1 In, Donor 1 Out, and Donor 2 Out were fifty ohm coaxial cables terminated into fifty ohm loads. The EUT WLI 1 and 2 ports were connected in loopback using a cat 5E UTP cable. The frequency range tested was 870MHz to 893MHz. The operating range of this configured EUT was 869MHz to 894MHz. The actual operating frequencies of the EUT during this test were 870MHz, 872MHz, 891MHz, and 893MHz. The test was performed with the EUT transmitting with six different modulations: TDMA, GSM, EDGE, IS-95/CDMA, CDMA 2000, WCDMA. Voltage to the EUT was 120Vac 60Hz. The rated output of the EUT was 20 watts average. Data was taken with the equipment under test transmitting at its maximum rated output power.

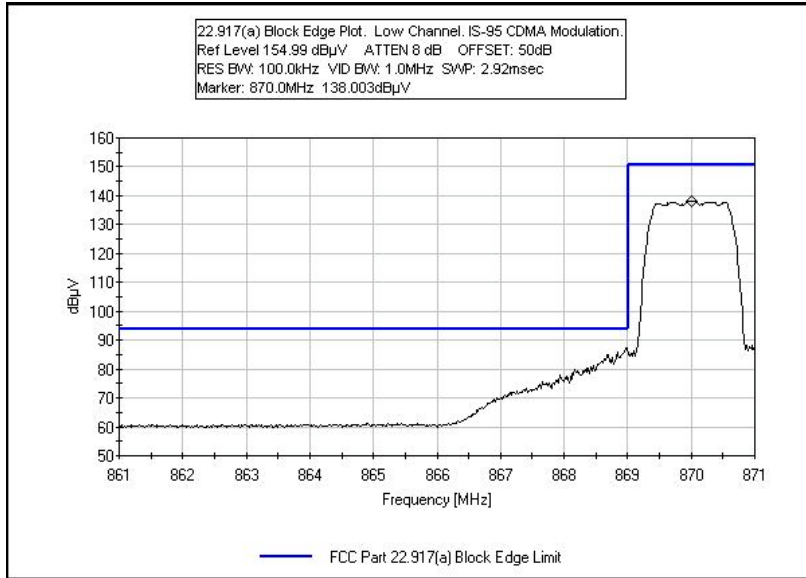
**Test Setup Photos**



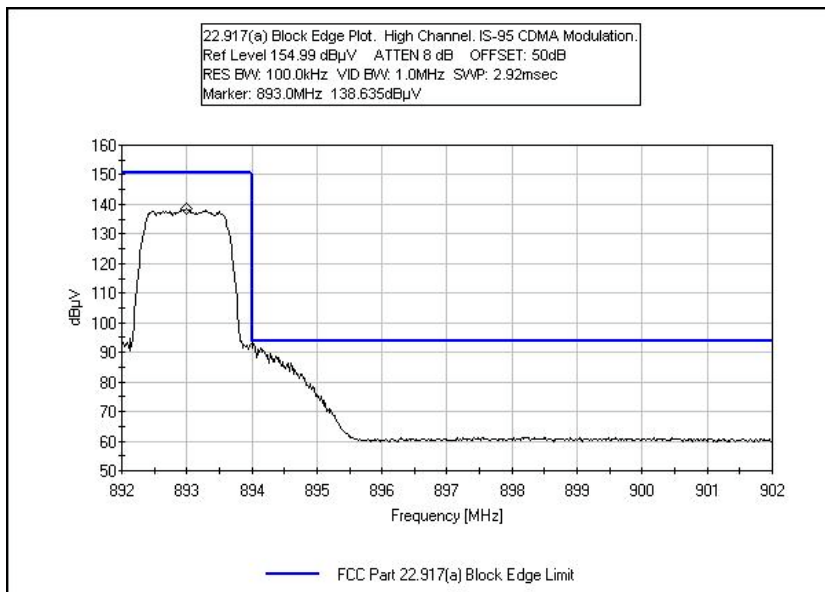


**Test Plots**

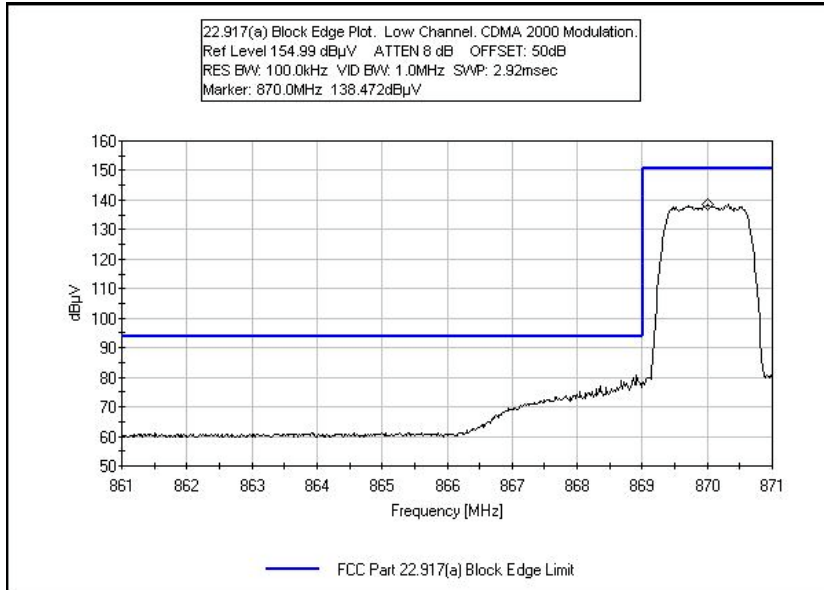
**FCC PART 22.917(a) BLOCK EDGE - LOW CHANNEL IS-95 CDMA**



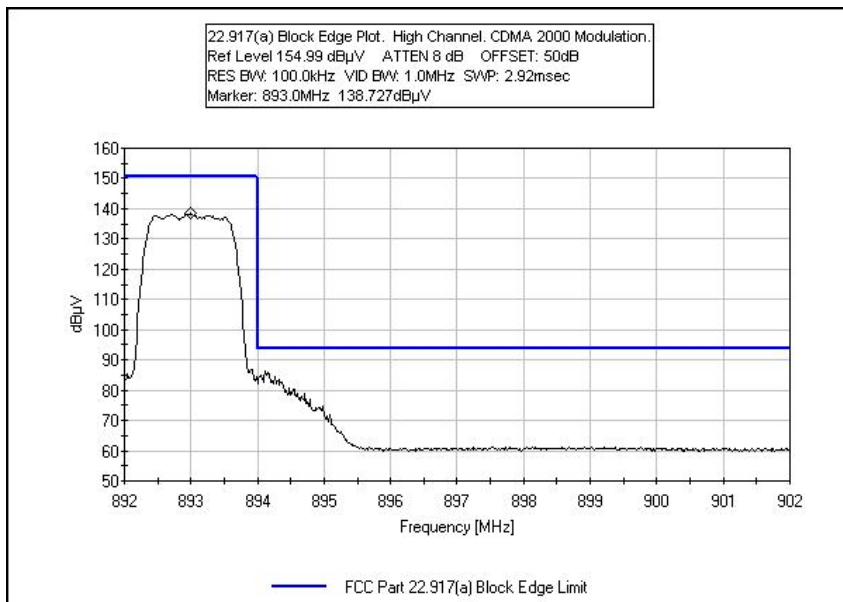
**FCC PART 22.917(a) BLOCK EDGE - HIGH CHANNEL IS-95 CDMA**



### FCC PART 22.917(a) BLOCK EDGE - LOW CHANNEL CDMA 2000

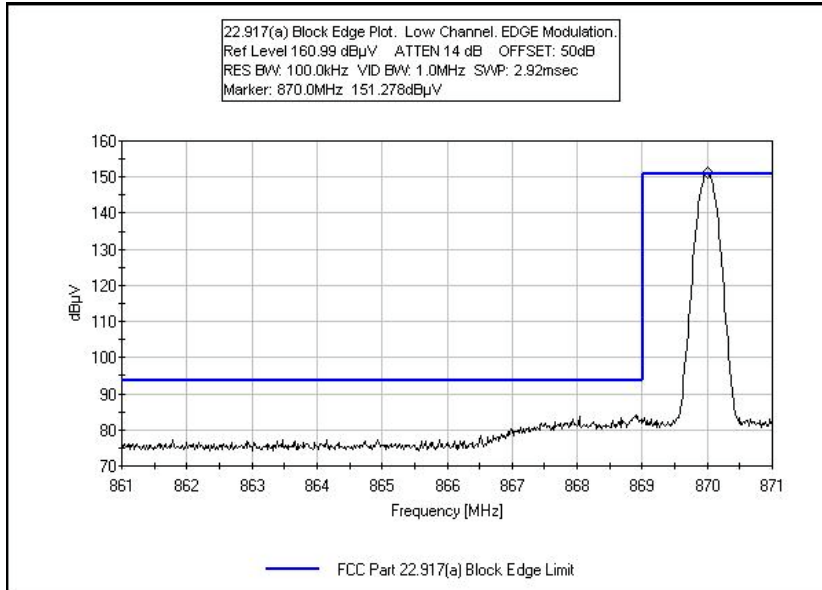


### FCC PART 22.917(a) BLOCK EDGE - HIGH CHANNEL CDMA 2000

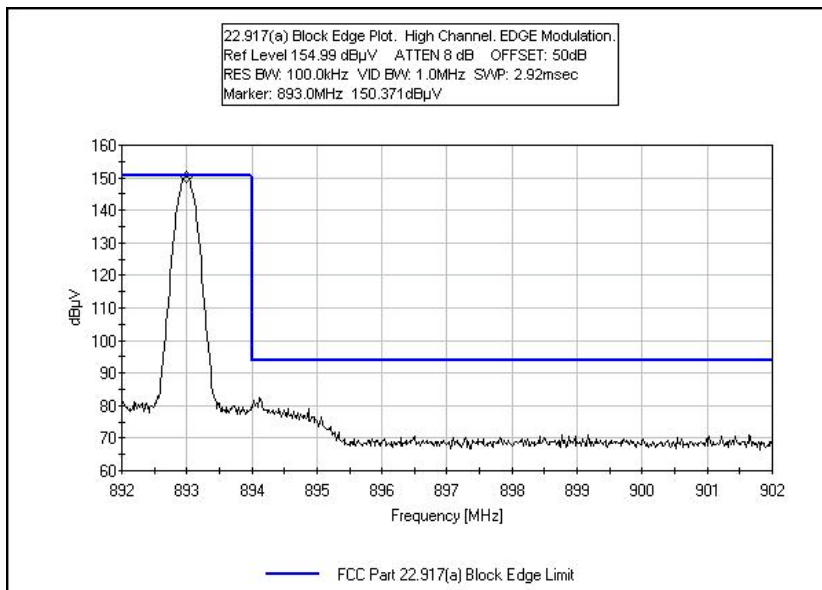




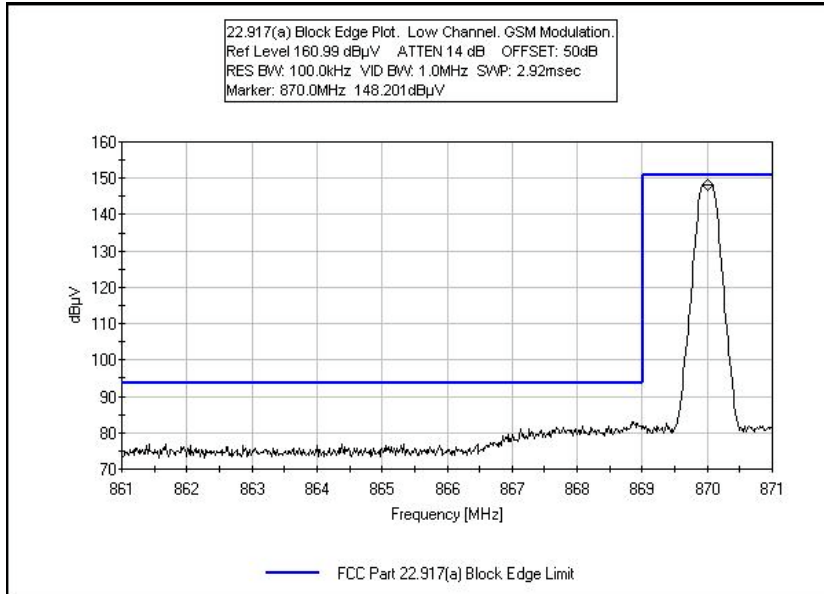
### FCC PART 22.917(a) BLOCK EDGE - LOW CHANNEL EDGE



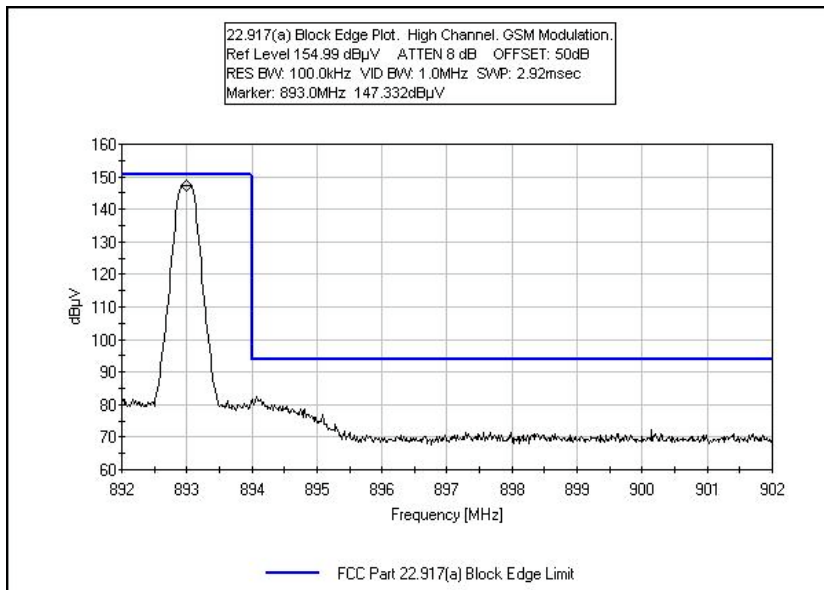
### FCC PART 22.917(a) BLOCK EDGE - HIGH CHANNEL EDGE



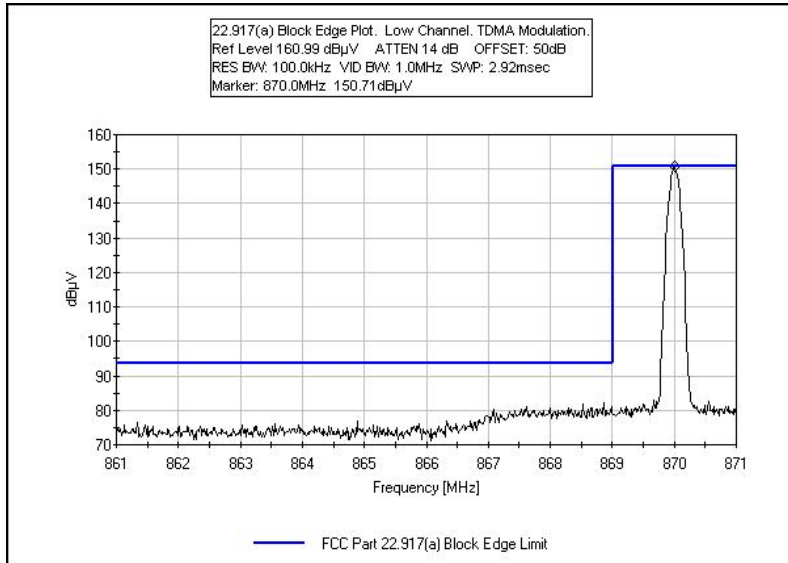
### FCC PART 22.917(a) BLOCK EDGE - LOW CHANNEL GSM



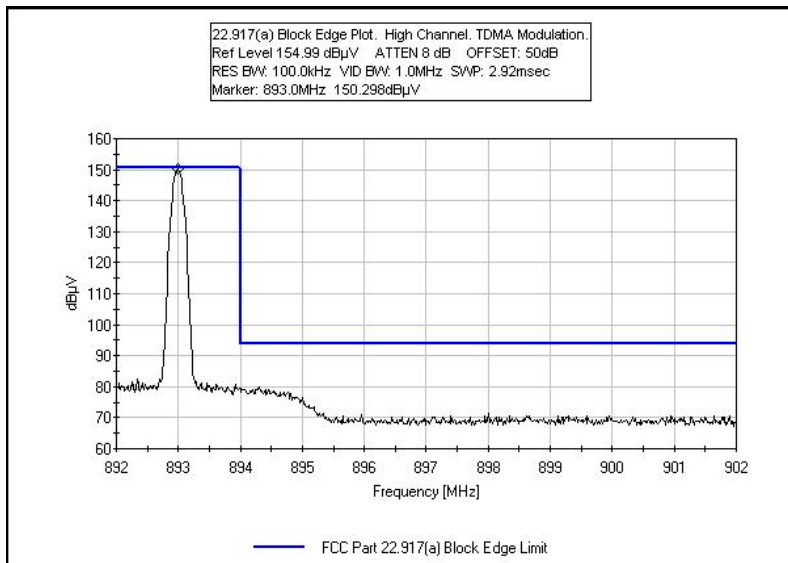
### FCC PART 22.917(a) BLOCK EDGE - HIGH CHANNEL GSM



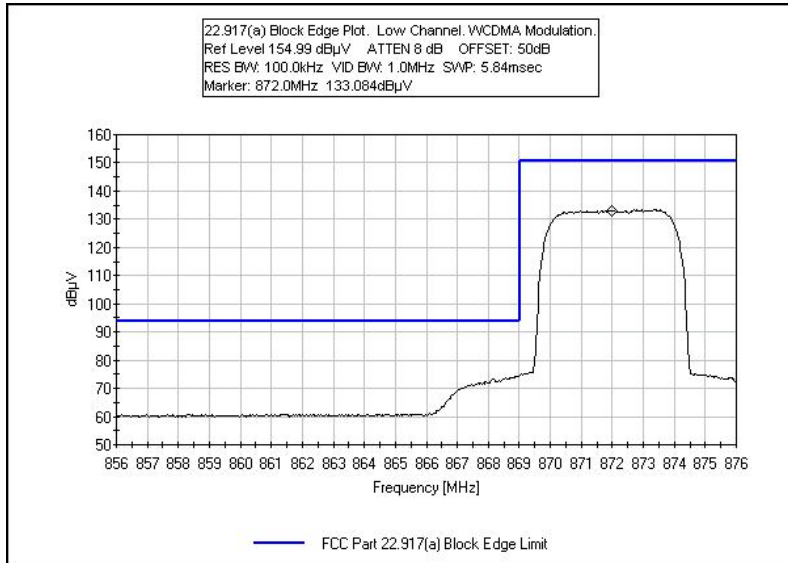
### FCC PART 22.917(a) BLOCK EDGE - LOW CHANNEL TDMA



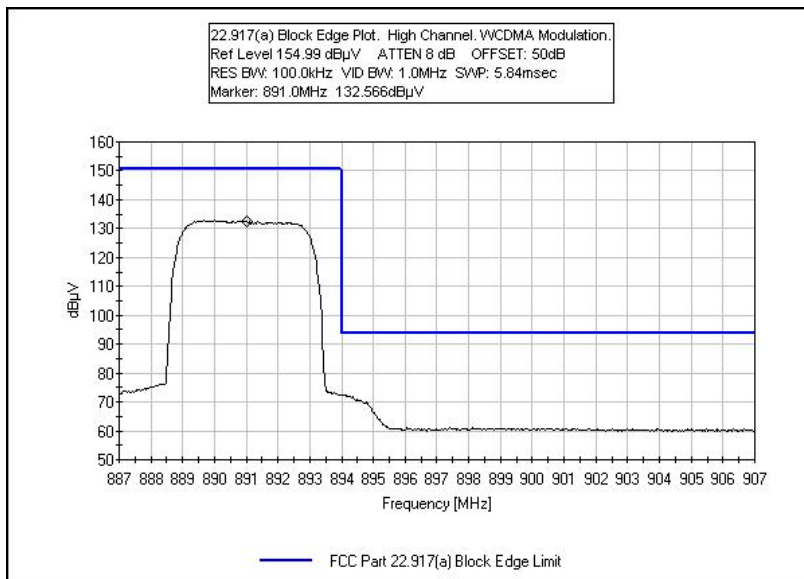
### FCC PART 22.917(a) BLOCK EDGE - HIGH CHANNEL TDMA



### FCC PART 22.917(a) BLOCK EDGE - LOW CHANNEL WCDMA



### FCC PART 22.917(a) BLOCK EDGE - HIGH CHANNEL WCDMA



**FCC 24.238(a) BLOCK EDGE**

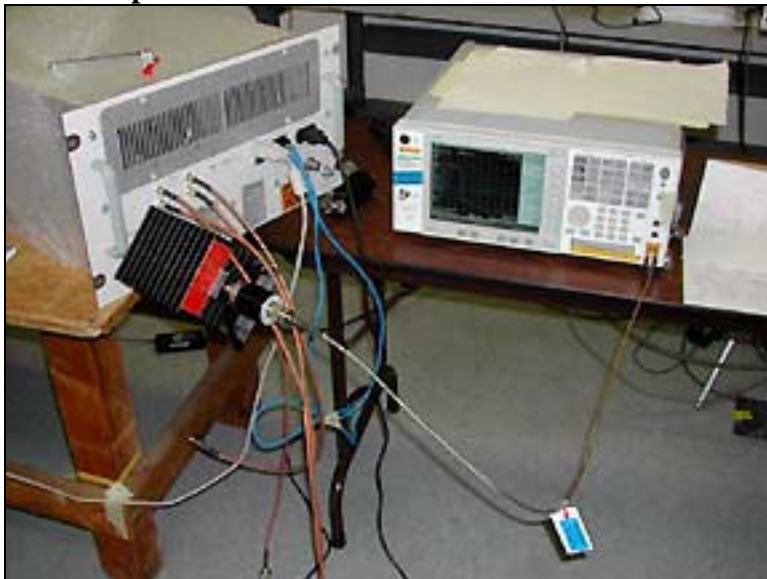
**Test Equipment**

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
High Frequency Coaxial Cable	P02946	Astrolab	32022-2-2909K-36TC	(none)	091807	091809
Spectrum Analyzer	02869	Agilent	E4440A	MY46186290	021207	021209

**Test Conditions**

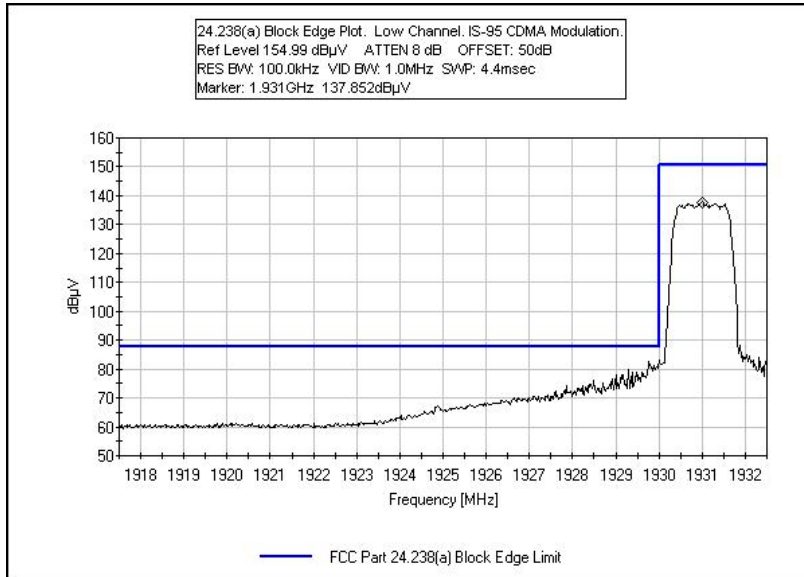
The equipment under test (EUT) was stand alone on the table top. The EUT Donor 2 In port was connected to the signal generator. The EUT Service 2 port was connected through a high power attenuators and then to the measuring spectrum analyzer via a fifty ohm coaxial cable. A laptop computer was connected to the EUT Local port (a service/maintenance port) and was only used to monitor the EUT's parameters. Connected to the EUT Donor 1 In, Donor 1 Out, and Donor 2 Out were fifty ohm coaxial cables terminated into fifty ohm loads. The EUT WLI 1 and 2 ports were connected in loopback using a cat 5E UTP cable. The frequency range tested was 1931MHz to 1989MHz. The operating range of this configured EUT is 1930MHz to 1990MHz. The actual operating frequencies of the EUT during this test were 1931MHz, 1933MHz, 1987MHz, and 1989MHz. The test was performed with the EUT transmitting with six different modulations: TDMA, GSM, EDGE, IS-95/CDMA, CDMA 2000, WCDMA. Voltage to the EUT was 120Vac 60Hz. The rated output of the EUT was 20 watts average. Data was taken with the equipment under test transmitting at its maximum rated output power.

**Test Setup Photos**

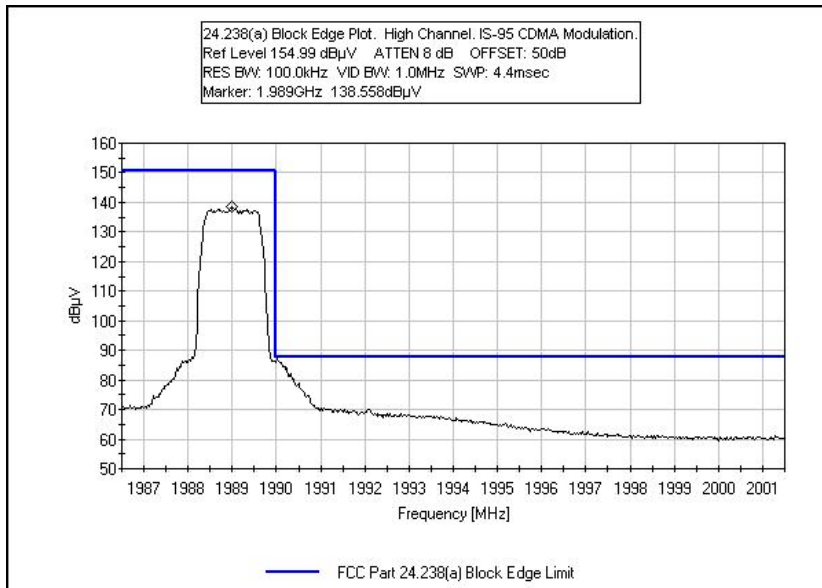


## Test Plots

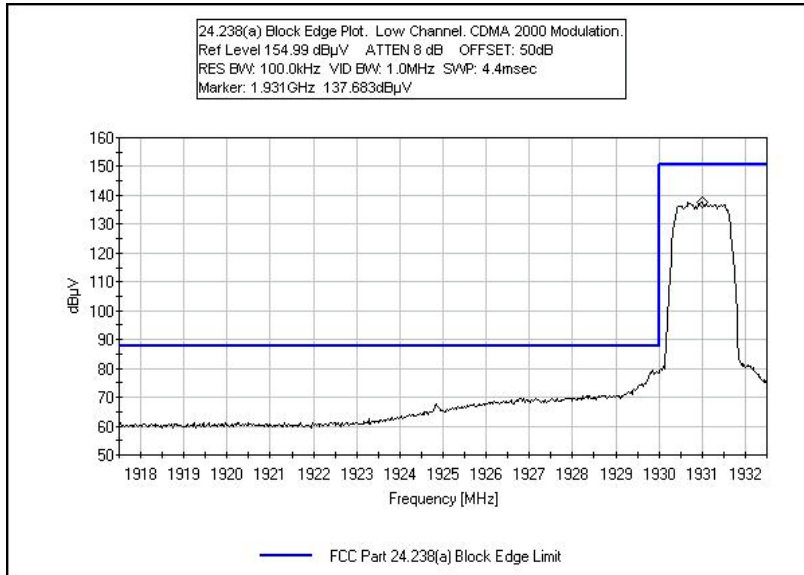
### FCC PART 24.238(a) BLOCK EDGE - LOW CHANNEL IS-95 CDMA



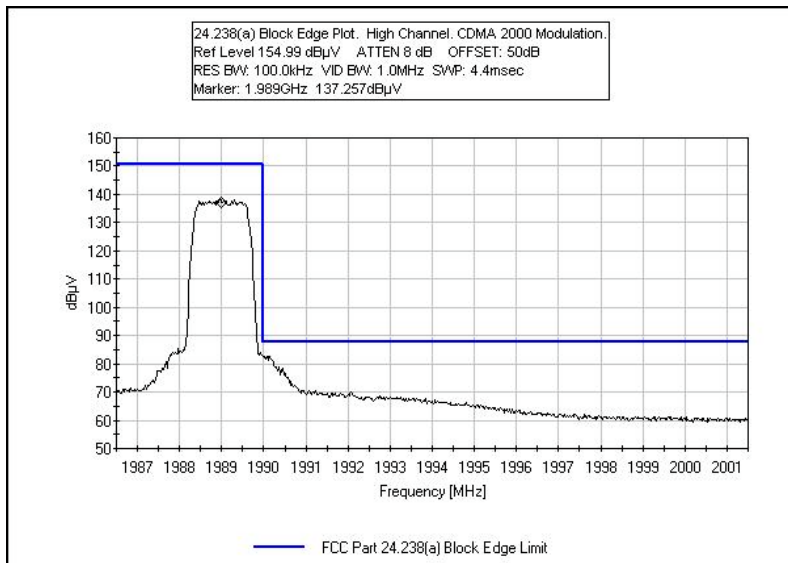
### FCC PART 24.238(a) BLOCK EDGE - HIGH CHANNEL IS-95 CDMA



### FCC PART 24.238(a) BLOCK EDGE - LOW CHANNEL CDMA 2000

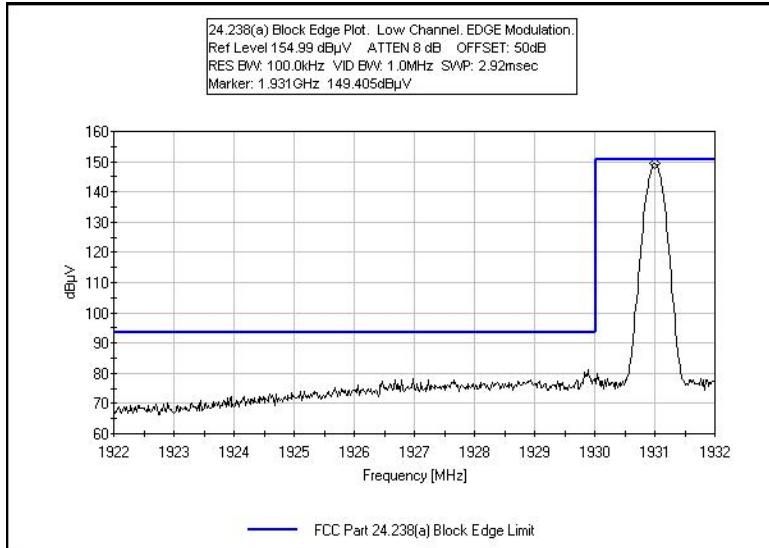


### FCC PART 24.238(a) BLOCK EDGE - HIGH CHANNEL CDMA 2000

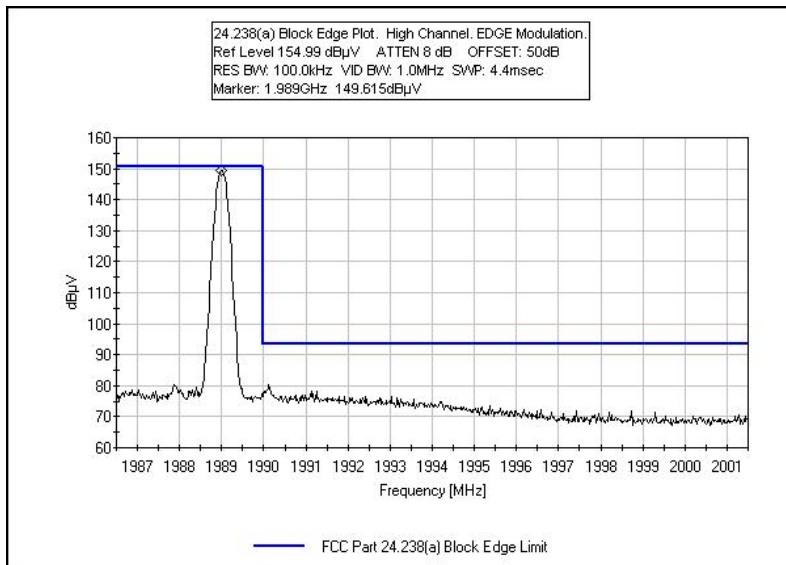




### FCC PART 24.238(a) BLOCK EDGE - LOW CHANNEL EDGE

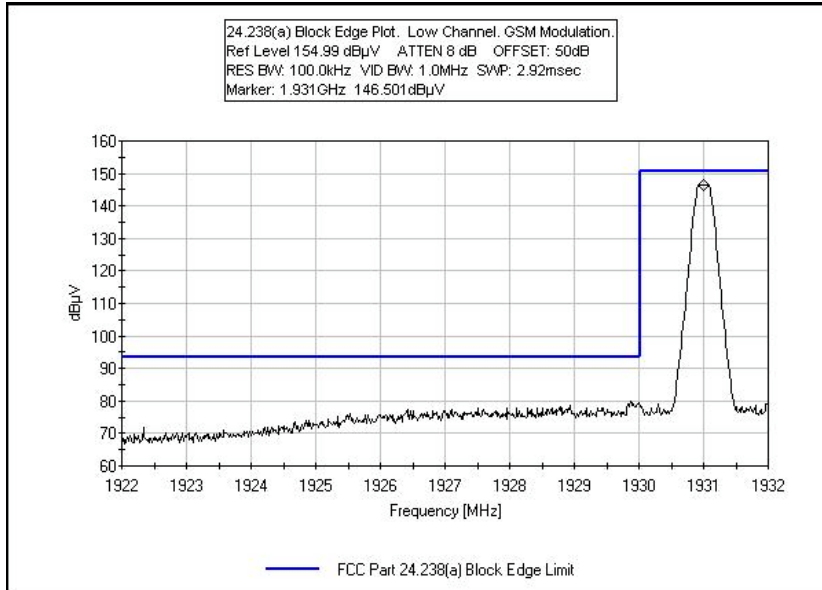


### FCC PART 24.238(a) BLOCK EDGE - HIGH CHANNEL EDGE

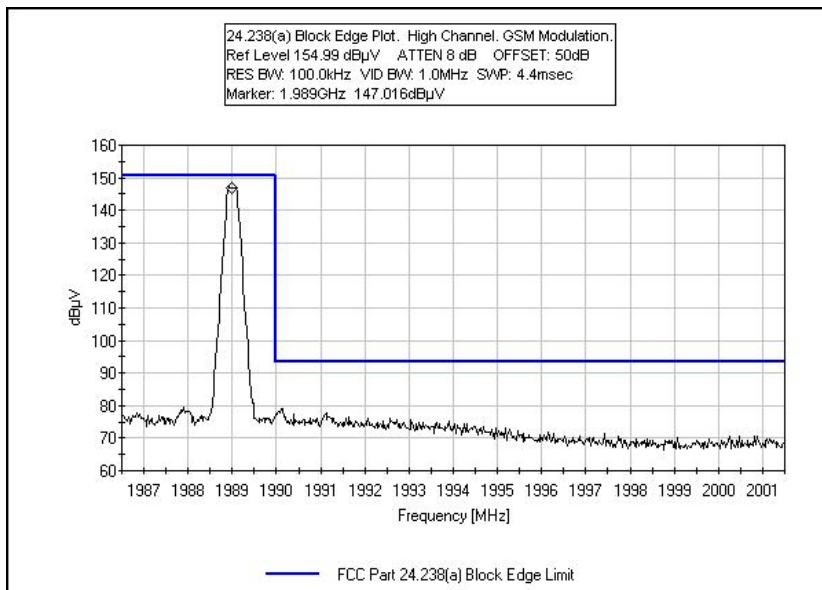




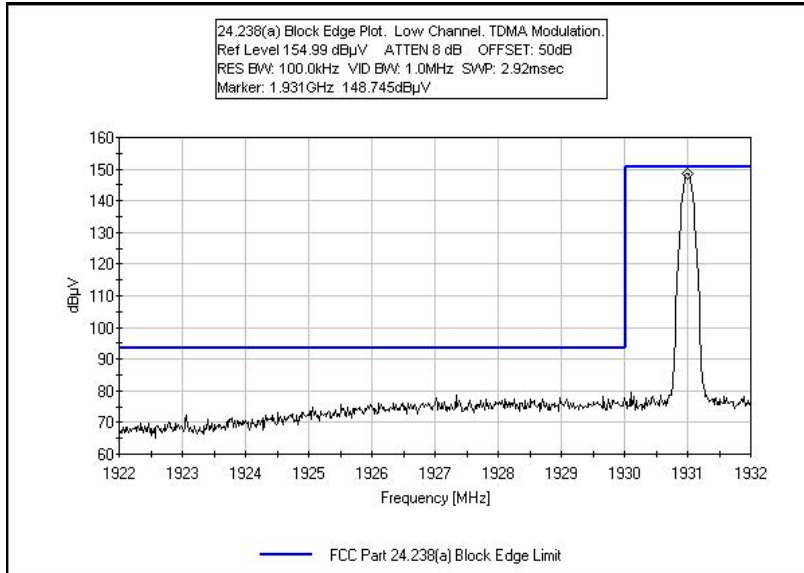
### FCC PART 24.238(a) BLOCK EDGE - LOW CHANNEL GSM



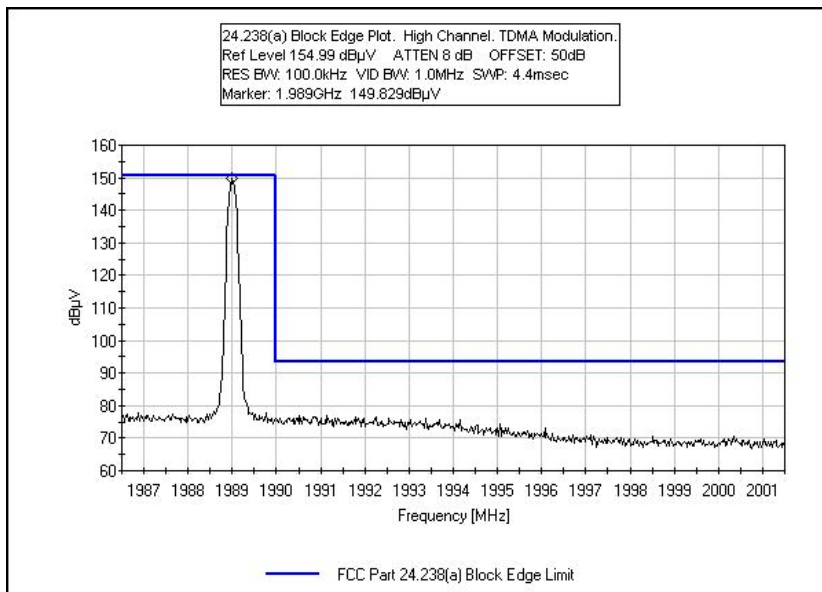
### FCC PART 24.238(a) BLOCK EDGE - HIGH CHANNEL GSM



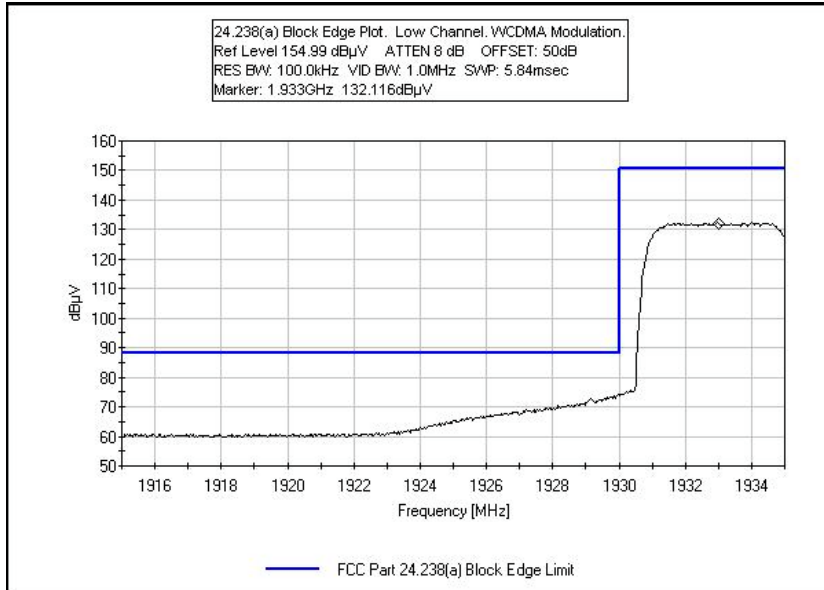
### FCC PART 24.238(a) BLOCK EDGE - LOW CHANNEL TDMA



### FCC PART 24.238(a) BLOCK EDGE - HIGH CHANNEL TDMA



### FCC PART 24.238(a) BLOCK EDGE - LOW CHANNEL WCDMA



### FCC PART 24.238(a) BLOCK EDGE - HIGH CHANNEL IS-95 WCDMA

