



ADDENDUM TO POWERWAVE TECHNOLOGIES TEST REPORT FC04-043

FOR THE

RF AMPLIFIER, S18000 MCPA CABINET

FCC PART 24, CISPR 22 (1997) CLASS B AND RSS-133

COMPLIANCE

DATE OF ISSUE: SEPTEMBER 14, 2004

PREPARED FOR:

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

W.O. No.: 82251

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: May 25 – June 1, 2004

Report No.: FC04-043A

This report contains a total of 60 pages and may be reproduced in full only. Partial reproduction may only be done with the written consent of CKC Laboratories, Inc. The results in this report apply only to the items tested, as identified herein.

TABLE OF CONTENTS

Administrative Information.....	3
Summary of Results.....	4
Conditions for Compliance	4
Approvals	4
Equipment Under Test (EUT) Description.....	5
Equipment Under Test.....	5
Peripheral Devices.....	5
Temperature and Humidity During Testing.....	6
FCC 2.1033(c)(3) User's Manual.....	6
FCC 2.1033(c)(4) Type of Emissions	6
FCC 2.1033(c)(5) Frequency Range	6
FCC 2.1033(c)(6) Operating Power.....	6
FCC 2.1033(c)(7) Maximum Power Rating.....	6
FCC 2.1033(c)(8) DC Voltages	6
FCC 2.1033(c)(9) Tune-Up Procedure.....	6
FCC 2.1033(c)(10) Schematics and Circuitry Description.....	6
FCC 2.1033(c)(11) Label and Placement.....	6
FCC 2.1033(c)(12) Submittal Photos.....	6
FCC 2.1033(c)(13) Modulation Information.....	6
FCC 2.1033(c)(14)/2.1046/24.232(a) - RF Power Output.....	7
FCC 2.1033(c)(14)/2.1047(b) - Audio Frequency Response.....	9
FCC 2.1033(c)(14)/2.1047(b) - Modulation Limiting Response	9
FCC 2.1033(c)(14)/2.1049(i) - Occupied Bandwidth.....	9
FCC 2.1033(c)(14)/2.1051/24.238(a) - Spurious Emissions at Antenna Terminal.....	22
FCC 2.1033(c)(14)/2.1053/24.238(a) - Field Strength of Spurious Radiation.....	24
CISPR 22 – AC Conducted Emissions	31
CISPR 22 – Radiated Emissions	40
Bandedge	45
RSS-133 99% Bandwidth.....	53

ADMINISTRATIVE INFORMATION

DATE OF TEST: May 25 – June 1, 2004

DATE OF RECEIPT: May 25, 2004

PURPOSE OF TEST: To demonstrate the compliance of the RF Amplifier, S18000 MCPA Cabinet with the requirements for FCC Part 24, CISPR 22 Class B and RSS-133 devices.
Addendum A is to revise the bandedge and RSS-133 99% bandwidth plots.

TEST METHOD: ANSI C63.4 (2001), FCC Part 24 and RSS-133

FREQUENCY RANGE TESTED: 9 kHz-2 GHz

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

REPRESENTATIVE: Robert Biedka

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

SUMMARY OF RESULTS

As received, the Powerwave Technologies RF Amplifier, S18000 MCPA Cabinet was found to be fully compliant with the following standards and specifications:

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS-133	5.5	NA	NA	Types of modulation
RSS-133	6.2	47 CFR	24.232	Power Output
RSS-133	6.3	47 CFR	24.238	Emissions Limitations
RSS-133	8	47 CFR	1.1307	RF Exposure
IC 3172-D		100638		Site File No.

CONDITIONS FOR COMPLIANCE

Modification: 0.047 uF caps installed from +ve to return of each switching power supply module.

APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:



Joyce Walker, Quality Assurance Administrative Manager

TEST PERSONNEL:



Eddie Wong, EMC Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

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

EQUIPMENT UNDER TEST

RF Amplifier

Manuf: Powerwave Technologies
Model: S18000 MCPA Cabinet
Serial: NA
FCC ID: pending

PERIPHERAL DEVICES

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

Signal Generator

Manuf: Agilent
Model: E4433B
Serial: US40051853
FCC ID: NA

Signal Generator

Manuf: Agilent
Model: E4433B
Serial: US40051477
FCC ID: NA

Signal Generator

Manuf: Agilent
Model: E4432B
Serial: US40052250
FCC ID: NA

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

GXW (GSM/GMSK), G7W (EDGE)

FCC 2.1033 (c)(5) FREQUENCY RANGE

1930-1990 MHz.

FCC 2.1033 (c)(6) OPERATING POWER

Each carrier does not exceed the 100 Watt peak power limit. FCC limits 100 watts per carrier. When the EUT is operating within an assigned block, there are 24 carriers being transmitted with each sector transmitting 8 carriers. Since each sector is transmitting at 160 watts, each carrier is being transmitted at 20 watts, which is within the FCC's limit of 100 w per carrier.

FCC 2.1033 (c)(7) MAXIMUM POWER RATING

100 Watts

FCC 2.1033 (c)(8) DC VOLTAGES

The necessary information is contained in a separate document.

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

The necessary information is contained in a separate document.

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

The necessary information is contained in a separate document.

FCC 2.1033(c)(11) LABEL AND PLACEMENT

The necessary information is contained in a separate document.

FCC 2.1033(c)(12) SUBMITTAL PHOTOS

The necessary information is contained in a separate document.

FCC 2.1033 (c)(13) MODULATION INFORMATION

GSM (GMSK), EDGE

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

§24.232 Power and antenna height limits.

(a) Base stations are limited to 1640 watts peak equivalent isotropically radiated power (e.i.r.p.) with an antenna height up to 300 meters HAAT. See 24.53 for HAAT calculation method. Base station antenna heights may exceed 300 meters with a corresponding reduction in power; see Table 1 of this section. **In no case may the peak output power of a base station transmitter exceed 100 watts.** The service area boundary limit and microwave protection criteria specified in §§24.236 and 24.237 apply.

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

<i>HAAT in meters</i>	<i>Maximum E.I.R.P. (watts)</i>
ó300	1640
ó500	1070
ó1000	490
ó1500	270
ó2000	160

The EUT is a RF amplifier. The manufacturer does not provide an antenna for sale with the product, hence EIRP is not measured nor calculated.

The RF power of the EUT was measured at the antenna port. The EUT is placed on the turntable. All 3 RF Input ports are connected to support signal generators. The RF Outputs are connected to RF loads and a directional coupler. The RF power of the EUT is monitored at the output of the directional couplers and the RF input signal is adjusted to maintain the output power.

Total RF Power = 480W

Measurement is made at antenna port of each sector with an Average Power meter.

Modulation: EDGE and GSM

Block A

Section 1: 1932.5 MHz, 160 W (8 carriers)

Section 2: 1937.5 MHz, 160 W (8 carriers)

Section 3: 1942.5 MHz, 160 W (8 carriers)

Block B

Section 1: 1952.5 MHz, 160 W (8 carriers)

Section 2: 1957.5 MHz, 160 W (8 carriers)

Section 3: 1962.5 MHz, 160 W (8 carriers)

Block C

Section 1: 1977.5 MHz, 160 W (8 carriers)

Section 2: 1982.5 MHz, 160 W (8 carriers)

Section 3: 1987.5 MHz, 160 W (8 carriers)

Conclusion

As indicated above, each carrier does not exceed the 100 Watt peak power limit. FCC limits 100 watts per carrier. When the EUT is operating within an assigned block, there are 24 carriers being transmitted with each sector transmitting 8 carriers. Since each sector is transmitting at 160 watts, each carrier is being transmitted at 20 watt, which is within the FCC's limit of 100 W per carrier.

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
RF Power meter	02082	HP	435B	2445A11881	093002	093004
Power Sensor	02036	HP	8482A	1551A01004	052902	052904

PHOTOGRAPH SHOWING RF OUTPUT POWER



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

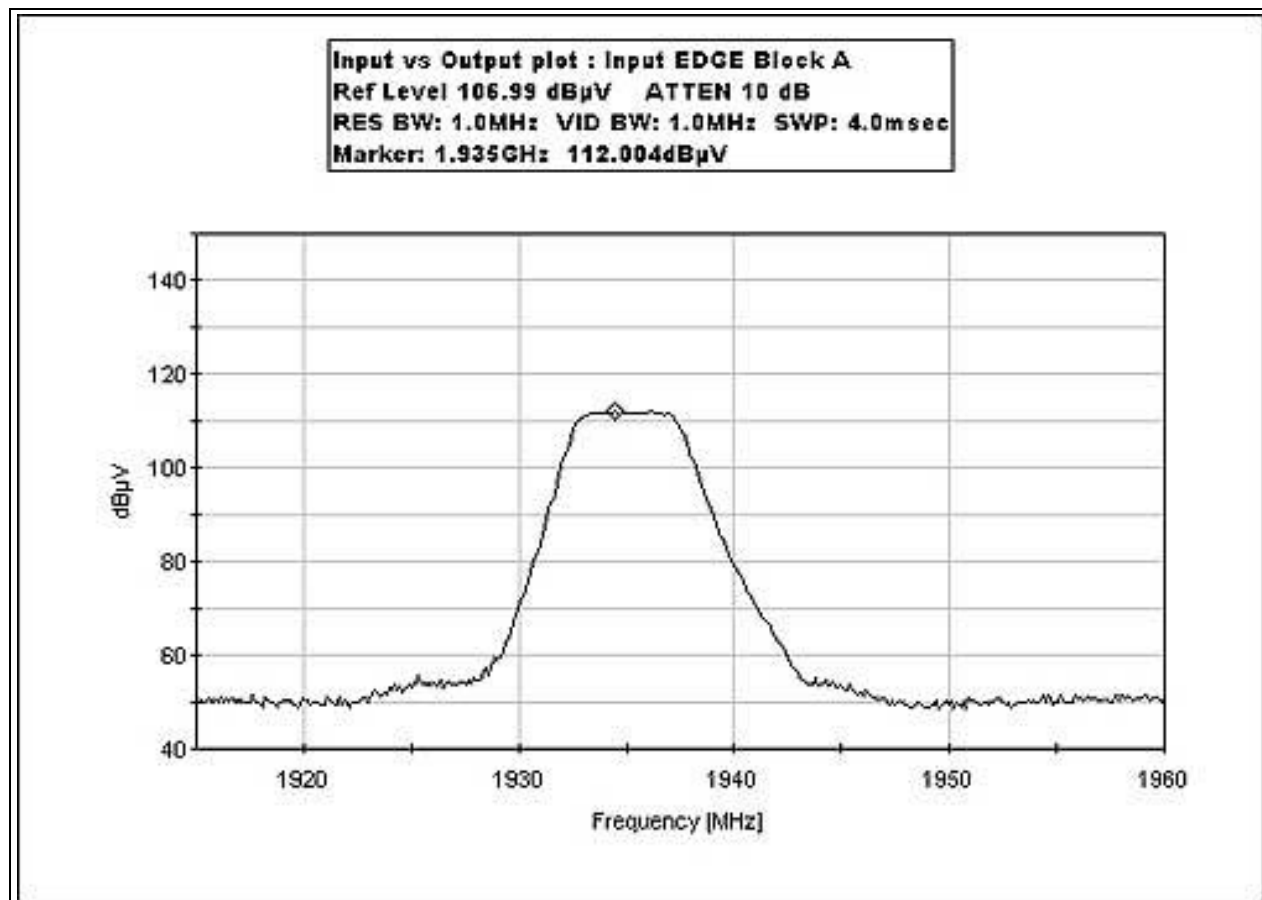
Not applicable to this unit.

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

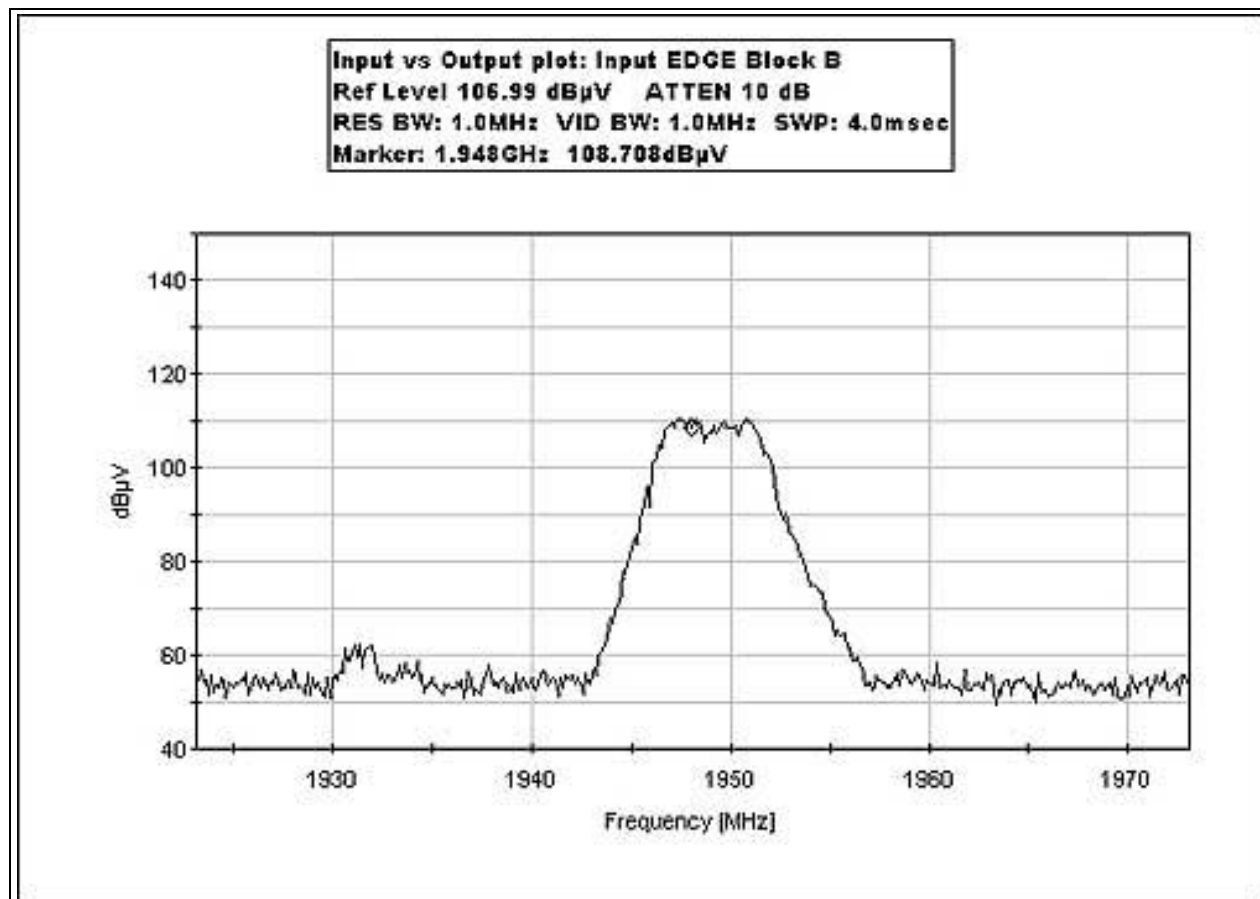
Not applicable to this unit.

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

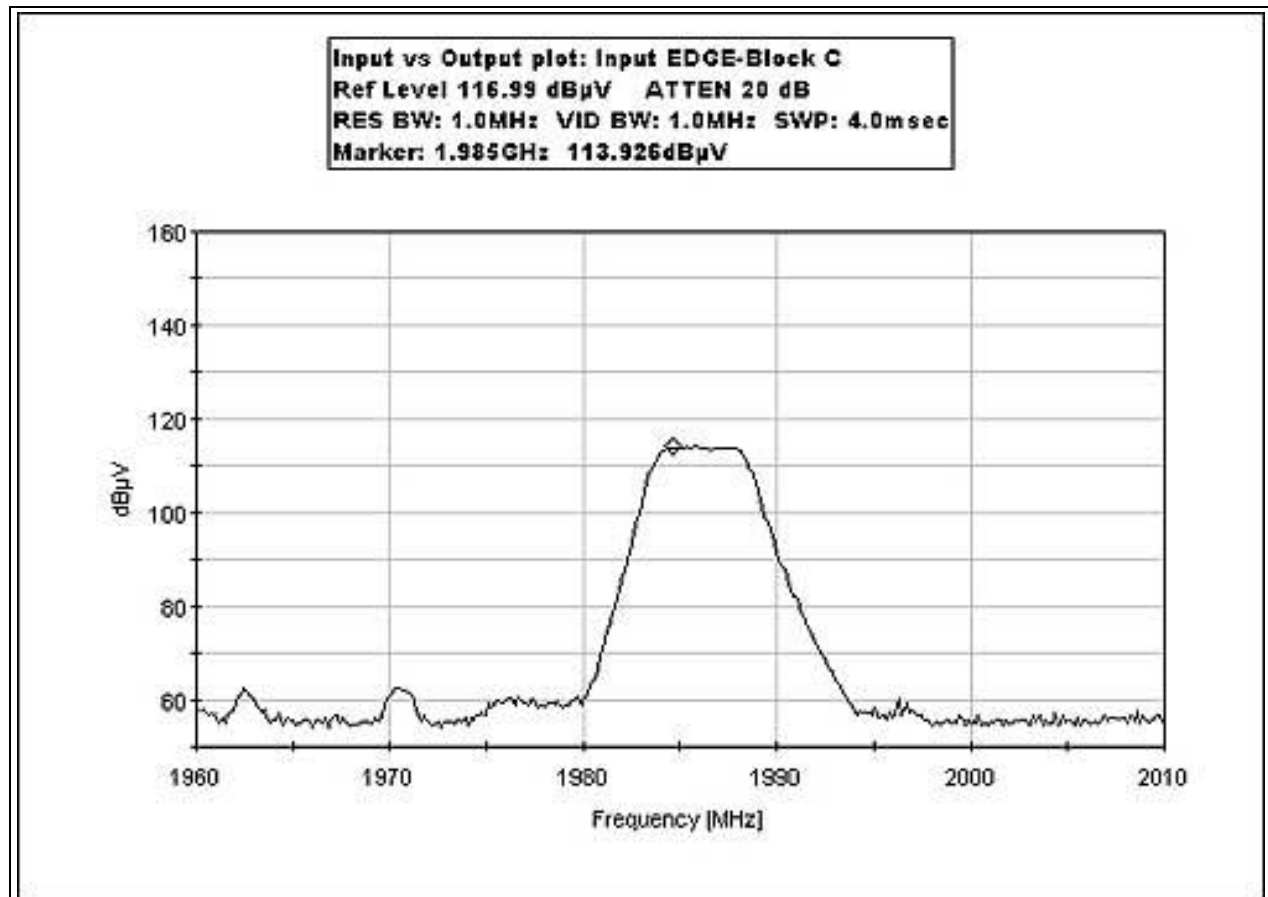
FCC 2.1049(i) Occupied Bandwidth Input EDGE Block A



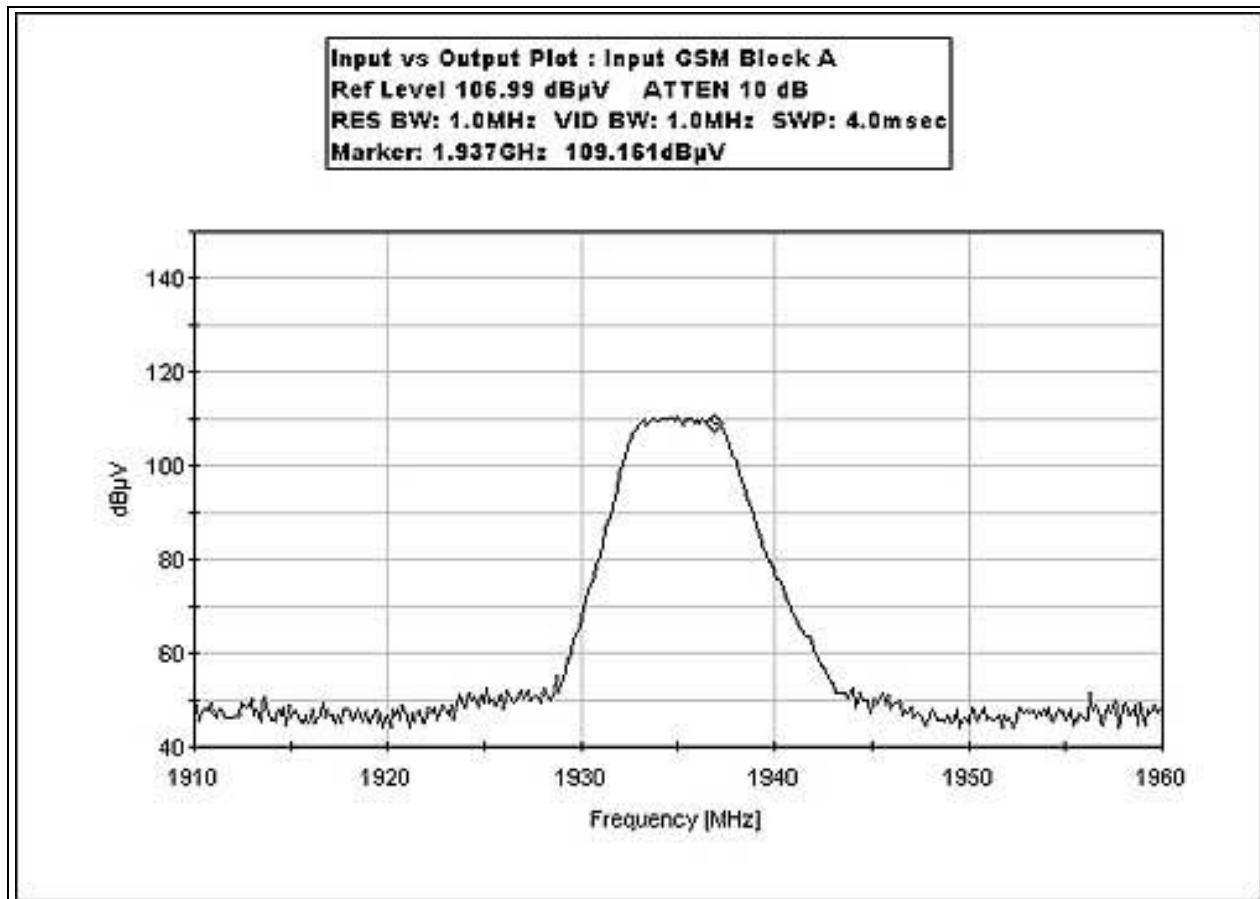
FCC 2.1049(i) Occupied Bandwidth Input EDGE Block B



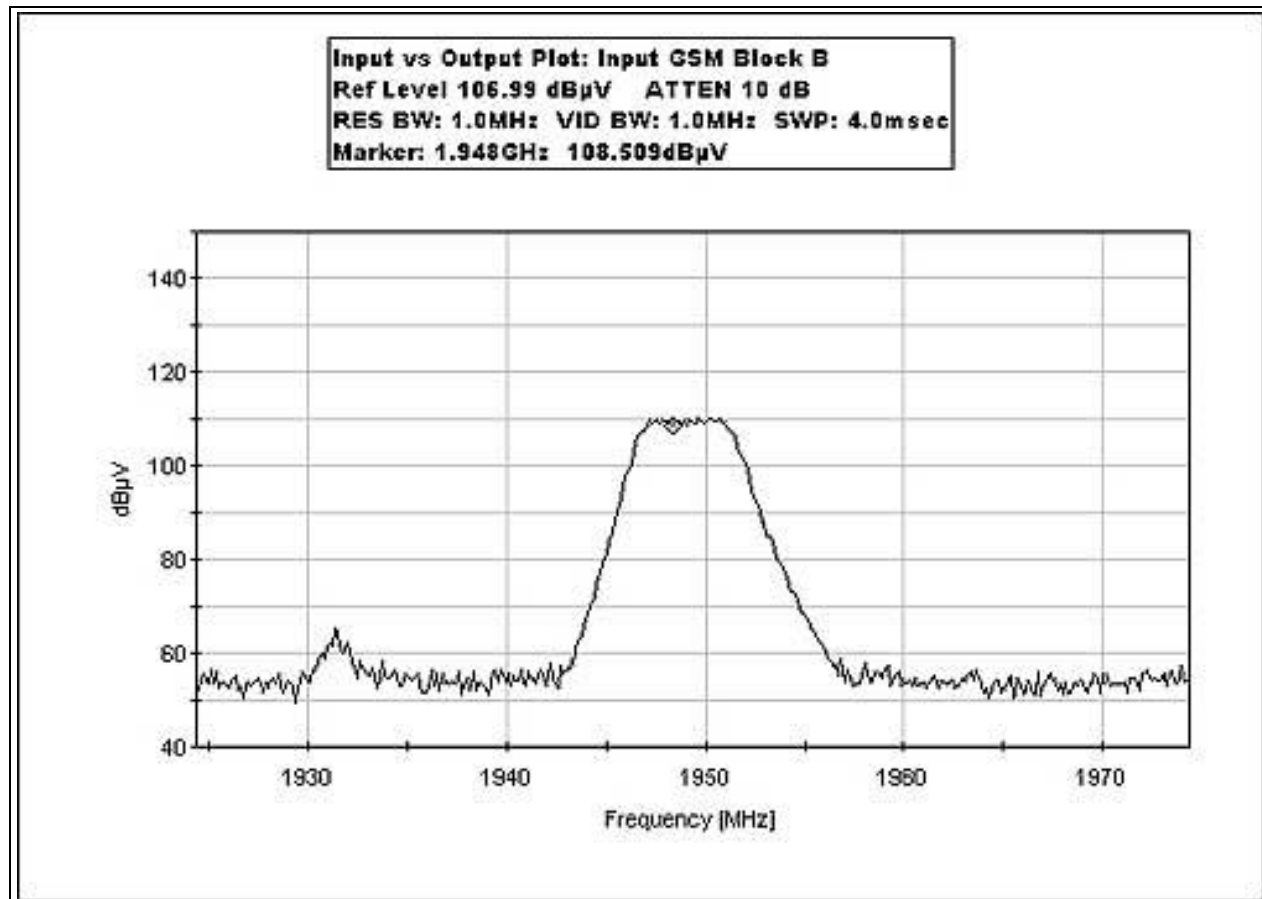
FCC 2.1049(i) Occupied Bandwidth Input EDGE Block C



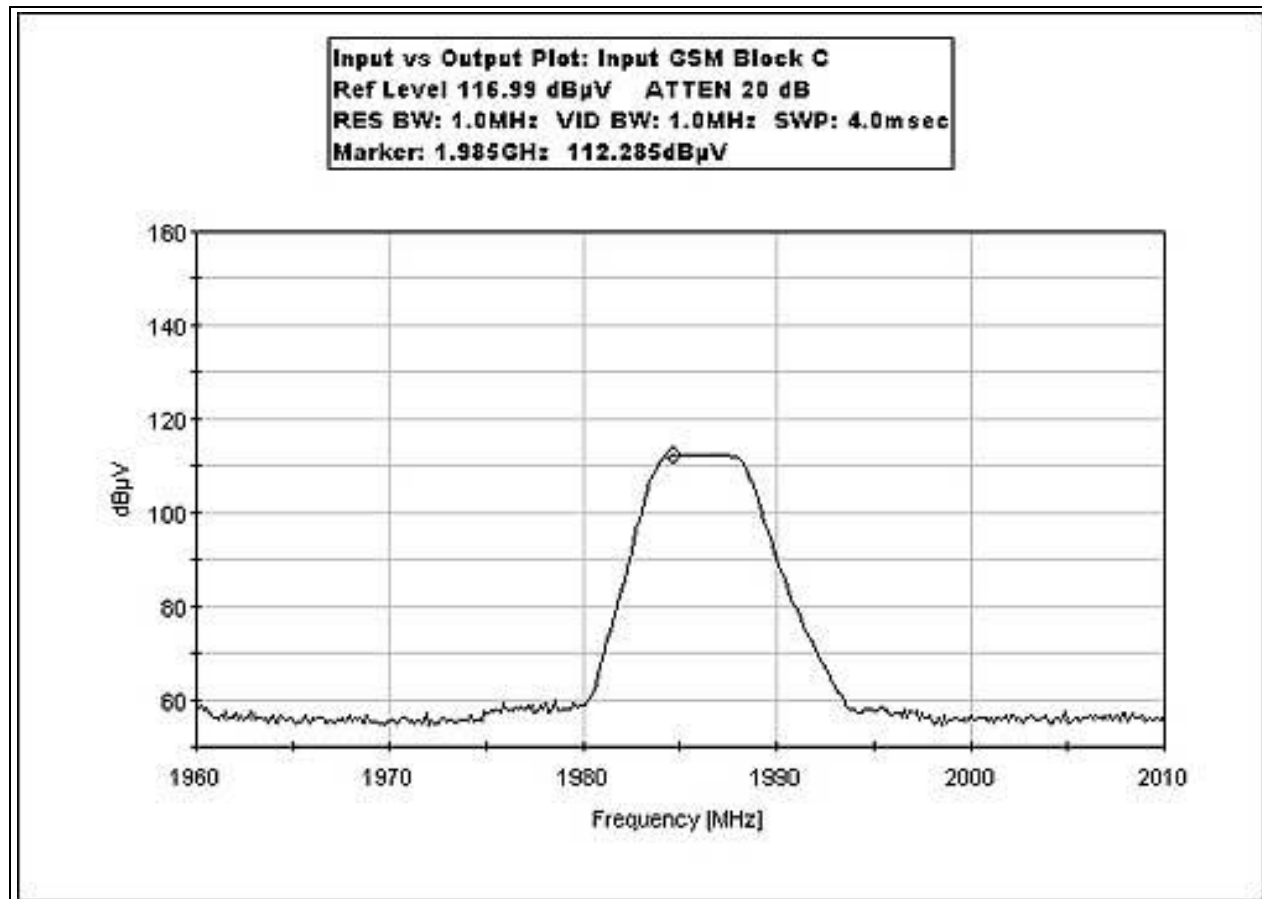
FCC 2.1409(i) Occupied Bandwidth Input GSM Block A



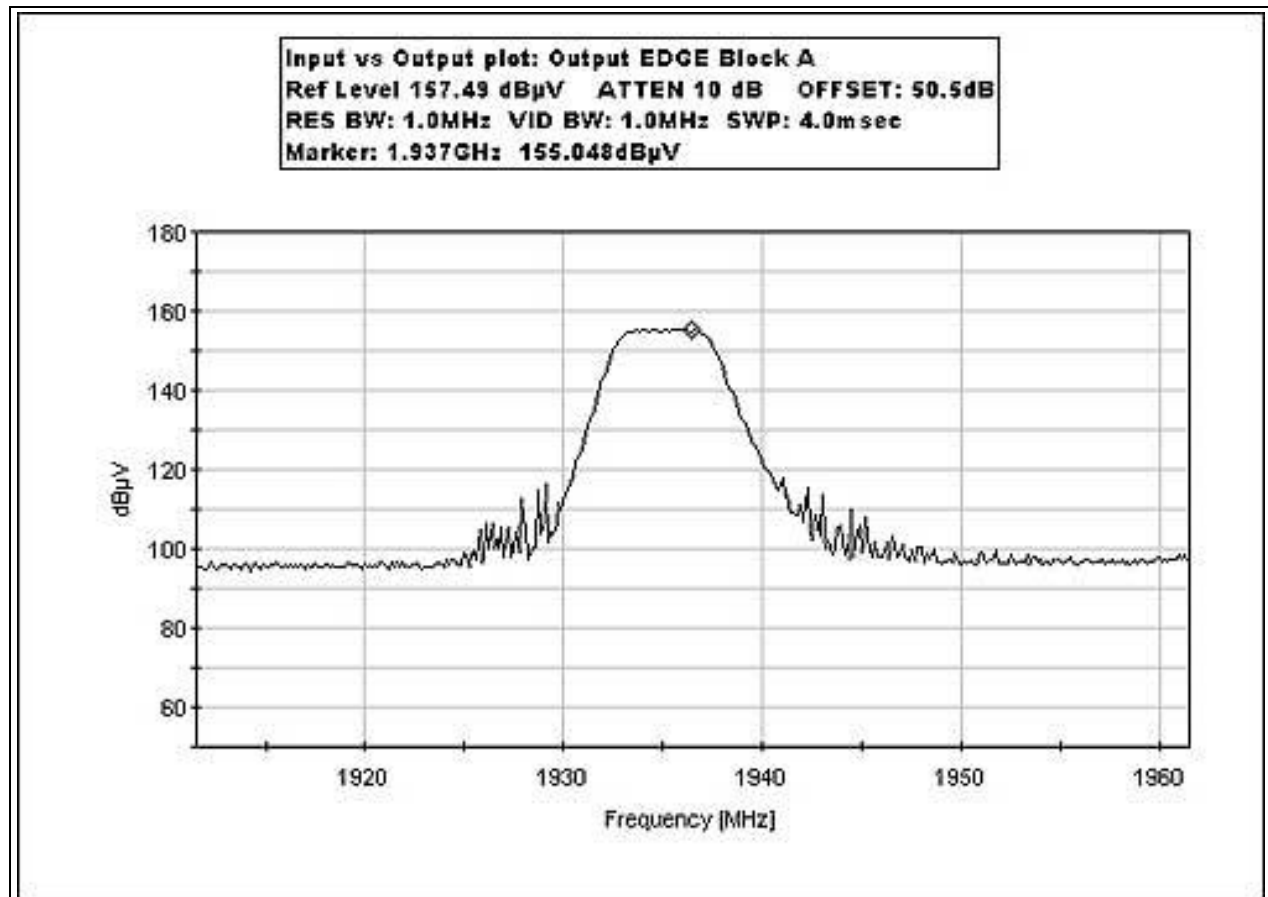
FCC 2.1409(i) Occupied Bandwidth Input GSM Block B



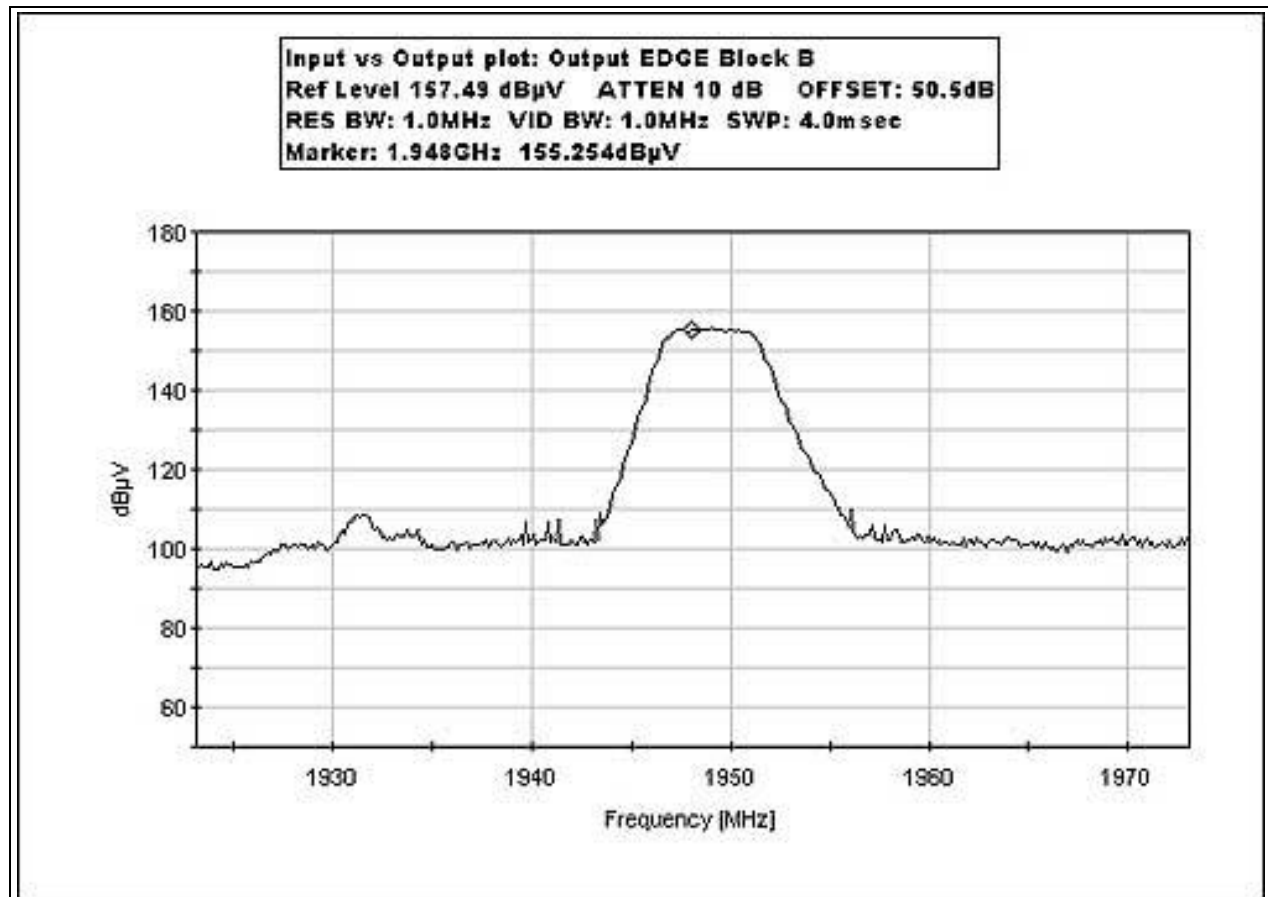
FCC 2.1409(i) Occupied Bandwidth Input GSM Block C



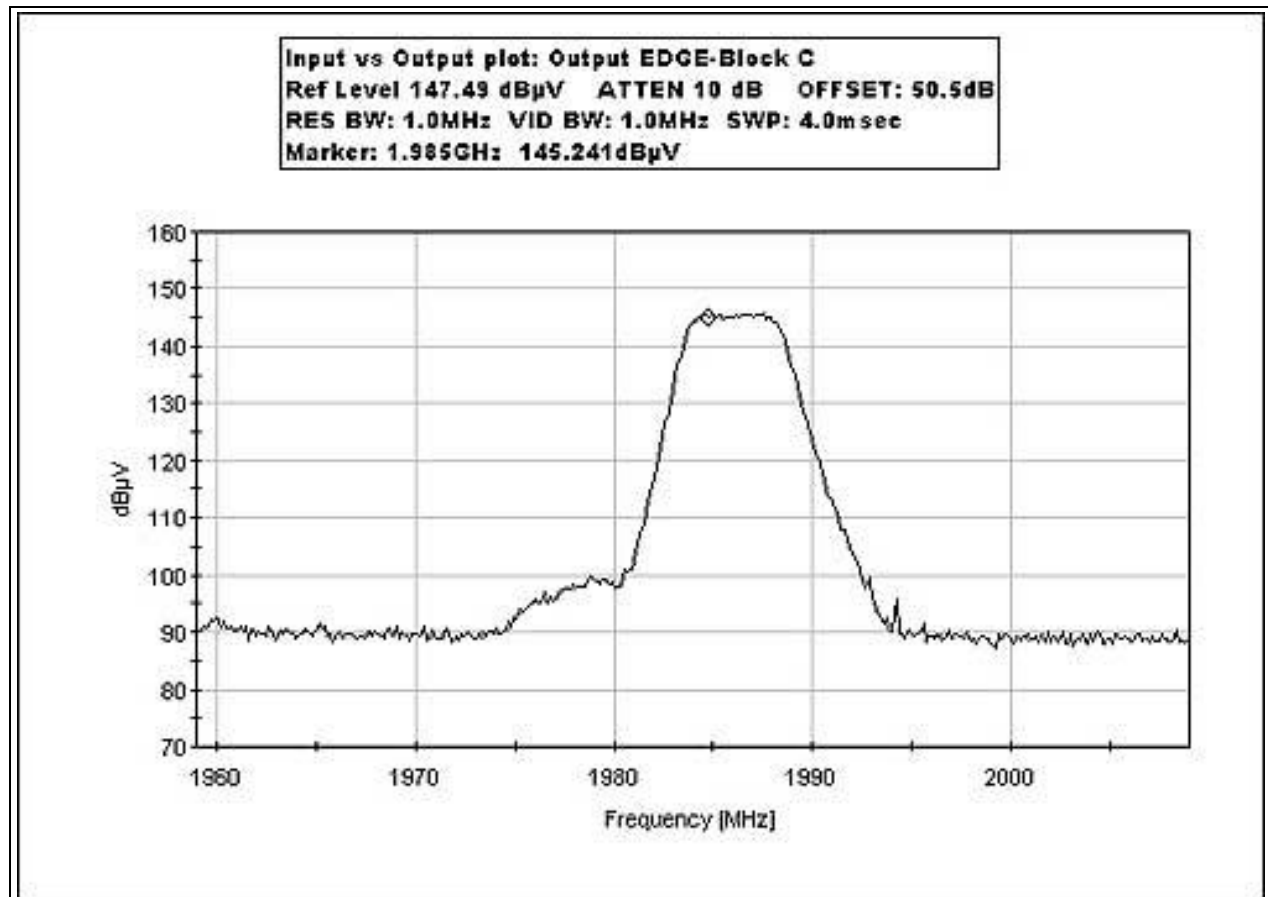
FCC 2.1409(i) Occupied Bandwidth Output EDGE Block A



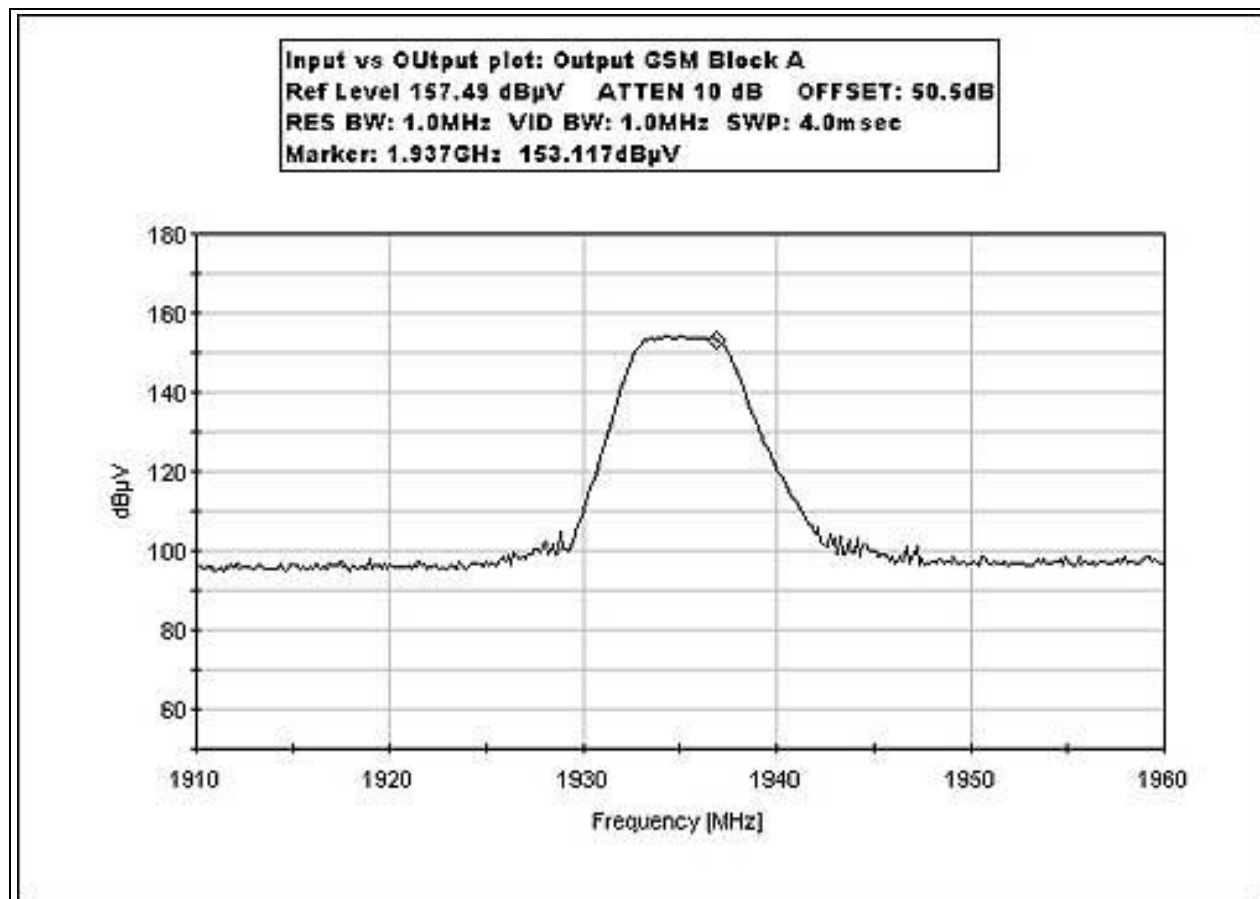
FCC 2.1409(i) Occupied Bandwidth Output EDGE Block B



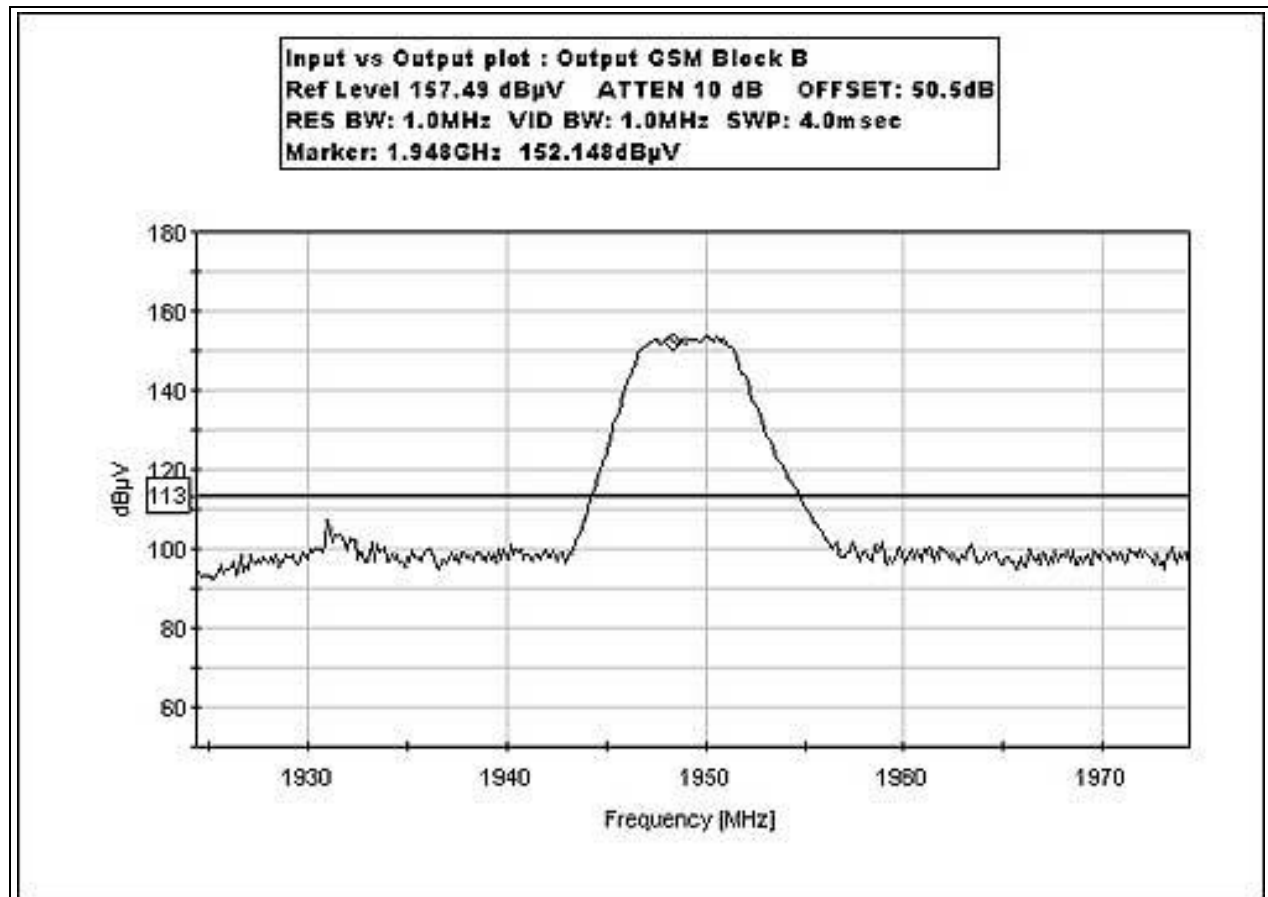
FCC 2.1409(i) Occupied Bandwidth Output EDGE Block C



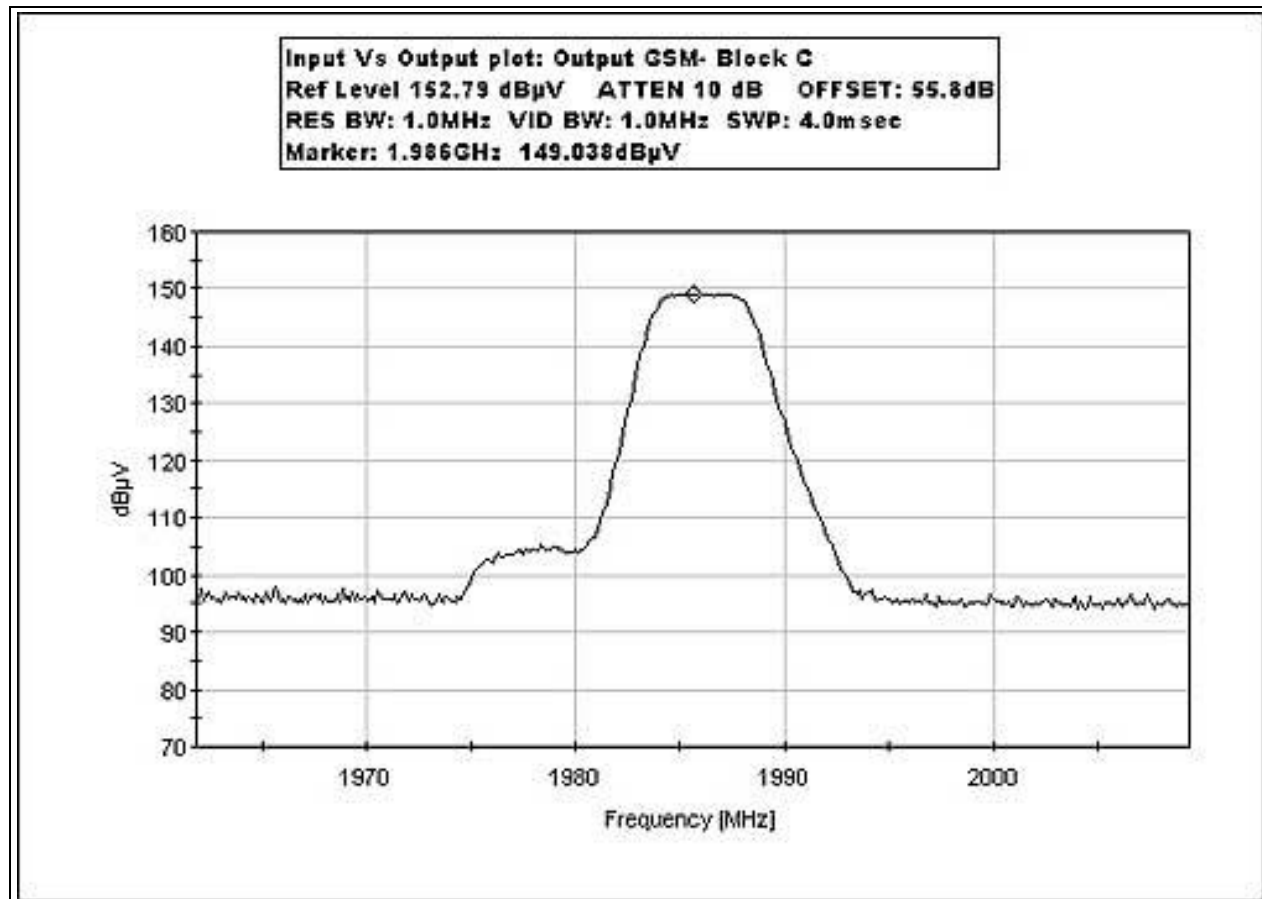
FCC 2.1409(i) Occupied Bandwidth Output GSM Block A



FCC 2.1409(i) Occupied Bandwidth Output GSM Block B



FCC 2.1409(i) Occupied Bandwidth Output GSM Block C



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Antenna cable (Heliac)	NA	Andrew	LDF1-50	Cable#19	101303	101304
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033105
2.4 GHz HPF	01440	K&L	91H31-3000	001	022003	022005

PHOTOGRAPH SHOWING DIRECT CONNECT EMISSIONS



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

No spurious emissions within 20 dB of the limit line detected.

Limit line for Spurious Conducted Emissions:

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

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

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

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

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

PHOTOGRAPH SHOWING DIRECT CONNECT EMISSIONS



Conducted Spurious Emissions

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

Test Location: CKC Laboratories Inc. • 180 N Olinda Place • Brea CA, 92823 • 714-993-6112

Customer: **Powerwave Technologies**
 Specification: **FCC 24.238 Radiated Spurious Emission**
 Work Order #: **82251** Date: 05/27/2004
 Test Type: **Maximized Emissions** Time: 15:18:43
 Equipment: **RF Amplifier** Sequence#: 2
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: S18000 MCPA Cabinet
 S/N: NA

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RF Amplifier*	Powerwave Technologies	S18000 MCPA Cabinet	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051853
Signal Generator	Agilent	E4433B	US40051477
Signal Generator	Agilent	E4432B	US40052250

Test Conditions / Notes:

The EUT is placed on the turntable. All 3 RF Input ports are connected to support preamps and signal generators. The RF outputs are connected to RF loads and a directional coupler. The RF power of the EUT is monitored at the output of the directional couplers and the RF input signal is adjusted to maintain the output power. Total RF Power = 480W. Modulation: EDGE. Block A Section 1: 1932.5 MHz, 160 W Section 2: 1937.5 MHz, 160 W Section 3: 1942.5 MHz, 160 W. Modulation: EDGE Block B Section 1: 1952.5 MHz, 160 W Section 2: 1957.5 MHz, 160 W Section 3: 1962.5 MHz, 160 W. Modulation: EDGE Block C Section 1: 1977.5 MHz, 160 W Section 2: 1982.5 MHz, 160 W Section 3: 1987.5 MHz, 160 W. Frequency range of measurement = 9kHz - 20,000MHz. 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 - 20000 MHz RBW=1 MHz, VBW=1 MHz. Required Attenuation = $43 + 10 \log P$ dB = 82.3 dBuV/m at 3 meter. 240VAC 60 Hz, 18°C, 50% relative humidity. Modification: 0.047 uF caps installed from +ve to return of each switching power supply module. Note: EUT has 3 sections. Each section is made up of 2 RF Amplifiers. Each section is designed to operate from 1930 - 1990 MHz. All 3 sections operate simultaneously, however at different frequencies of the assigned block.

Operating Frequency: 1930 MHz - 1990 MHz
Channels: Block A, B & C
Highest Measured Output Power: 56.81 ERP(dBm)= 480 ERP(Watts)
Distance: 3 meters
Limit: 43+10Log(P) 69.81 dBc

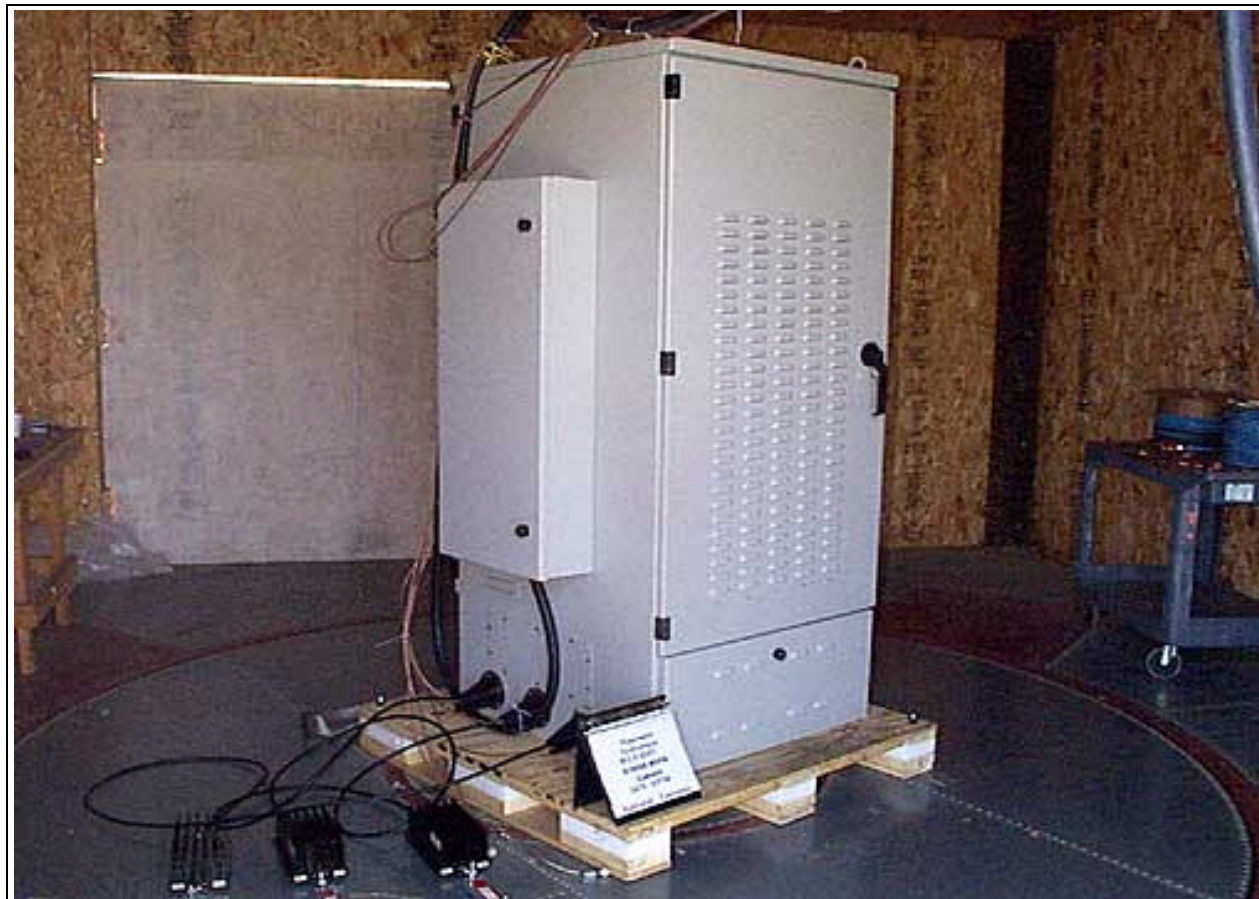
Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
3,886.00	-27	Vert	83.81
3,865.50	-29.1	Horiz	85.91
3,864.30	-29.6	Vert	86.41
3,886.00	-30.9	Horiz	87.71
5,799.00	-35.3	Vert	92.11
5,813.80	-35.4	Vert	92.21
5,828.30	-36.5	Vert	93.31
3,875.00	-37.2	Horiz	94.01
5,797.00	-42.1	Horiz	98.91
72.42	-48.1	Vert	104.91
72.98	-53.6	Horiz	110.41
3,903.00	-28	Vert	84.81
3,926.00	-28.4	Vert	85.21
5,860.00	-29.8	Vert	86.61
3,924.50	-33.4	Horiz	90.21
5,889.00	-34.7	Vert	91.51
3,904.80	-35.2	Horiz	92.01
5,858.80	-36	Horiz	92.81
5,888.50	-43.4	Horiz	100.21
5,873.00	-44.4	Vert	101.21
3,914.80	-45.8	Horiz	102.61
72.28	-46.2	Vert	103.01
73.53	-49.1	Horiz	105.91
3,955.00	-32.8	Vert	89.61
5,961.50	-34.2	Vert	91.01
5,931.50	-34.4	Vert	91.21
3,954.00	-34.8	Horiz	91.61
3,975.50	-35.3	Horiz	92.11
3,973.50	-36.5	Vert	93.31
3,964.80	-41.7	Horiz	98.51
3,965.00	-42	Vert	98.81
5,948.80	-42	Vert	98.81
49.28	-43.1	Vert	99.91
5,962.80	-45.2	Horiz	102.01
5,934.00	-45.3	Horiz	102.11
72.86	-52.9	Vert	109.71

PHOTOGRAPH SHOWING RADIATED EMISSIONS



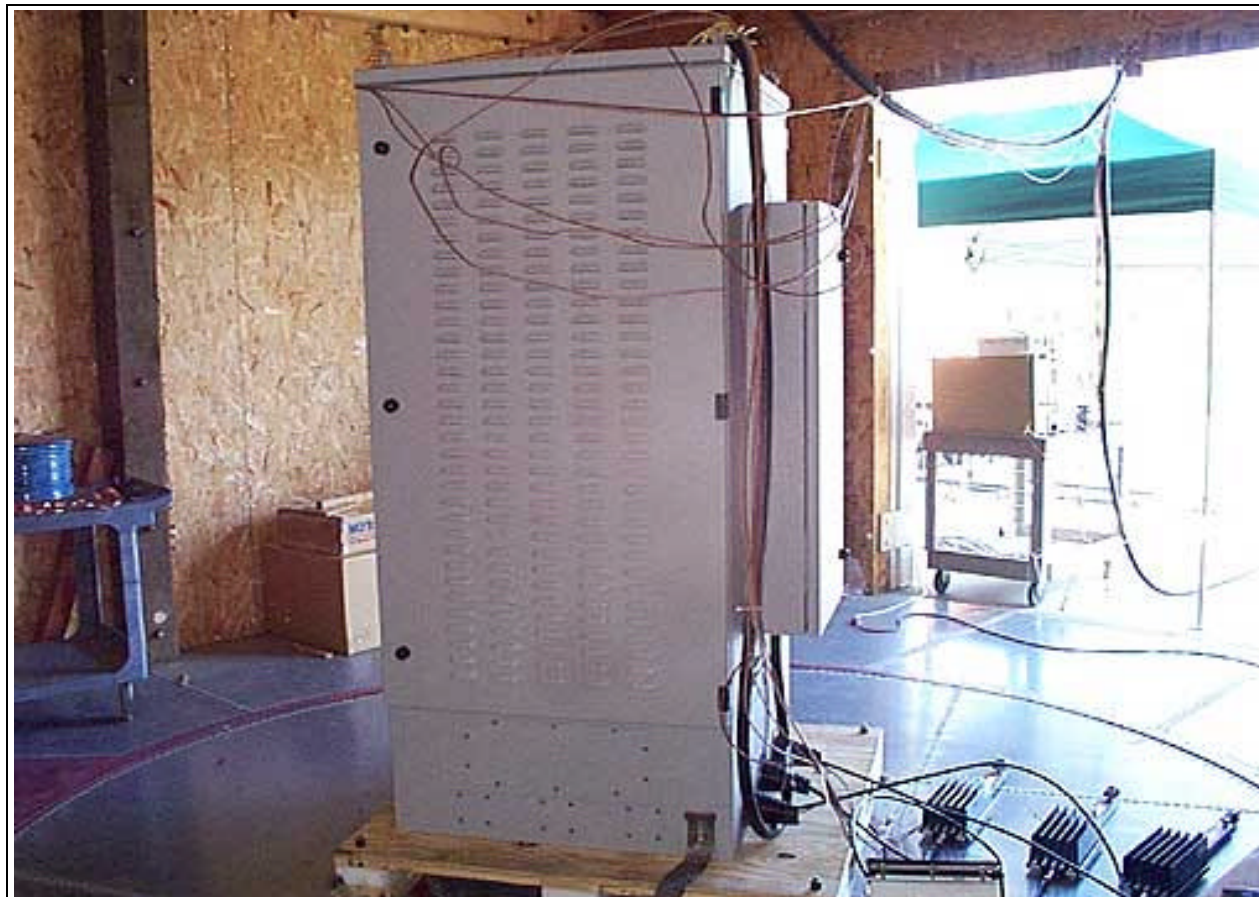
Radiated Emissions - Loop Antenna

PHOTOGRAPH SHOWING RADIATED EMISSIONS



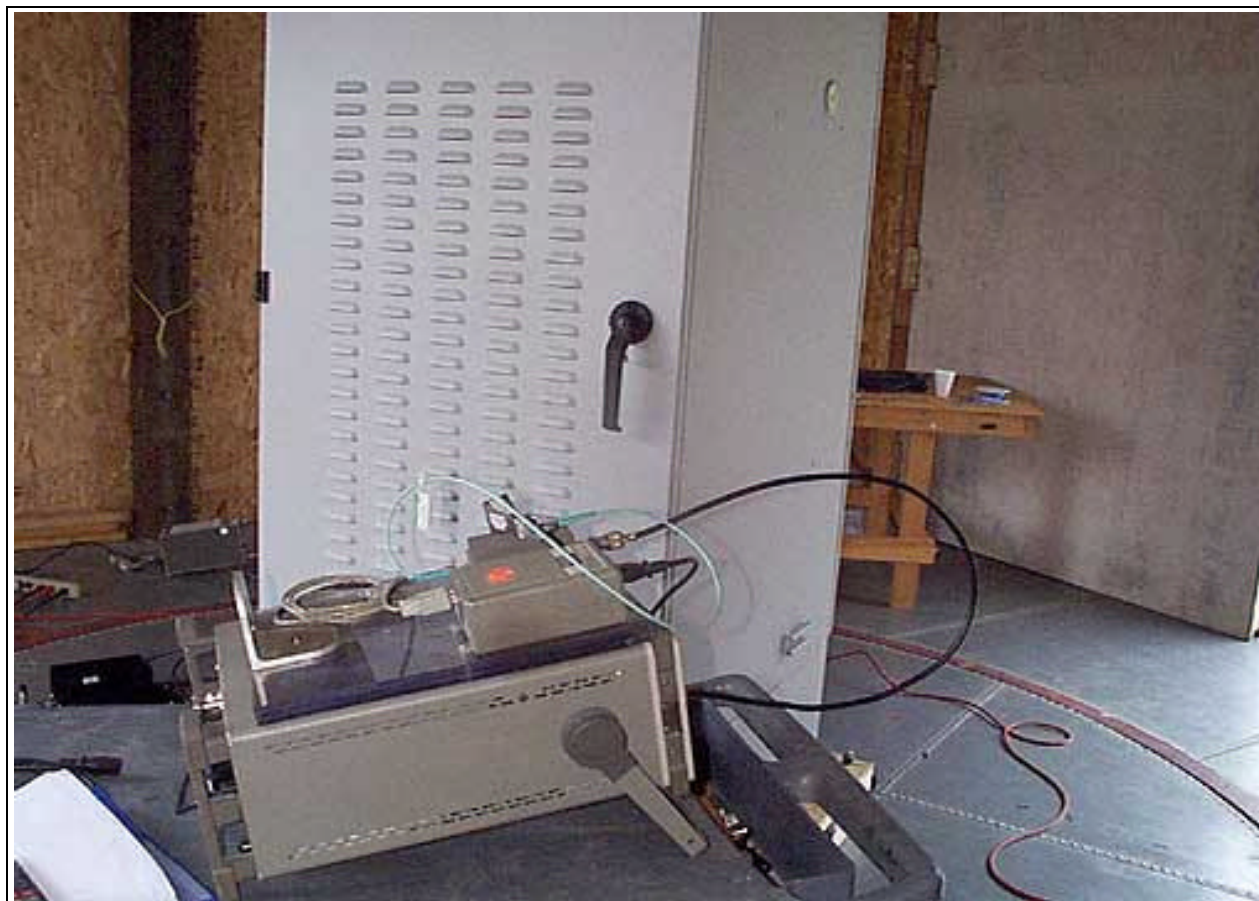
Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Horn Antenna

Radiated Emissions

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer RF Section	00312	HP	8568A	2049A01287	073102	073104
Spectrum Analyzer Display Section	00312	HP	85662A	2106A02109	073102	073104
Quasi Peak Adapter	02325	HP	85650A	2521A00932	073102	073104
Antenna cable (10 meter site D)	NA	Andrew	LDF1-50	Cable#17	100203	100204
Antenna cable from bulkhead to antenna	N/A	Pasternack	RG-214/U	Cable #33	032904	032905
Preamplifier to SA Cable (3 feet)	NA	Pasternack	E100316-I	Cable #22	100603	100604
Pre-amp	00010	HP	8447D	2727A05392	071602	071604
Antenna cable (Helix)	NA	Andrew	LDF1-50	Cable#19	101303	101304
Horn Antenna	01646	EMCO	3115	9603-4683	042503	042505
Microwave Pre-amp	00787	HP	83017A	3123A00282	042303	042305
24" SMA Cable	2604	Argosy	UFA147A	0-0360-200200	012304	012305
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033105
2.4 GHz HPF	01440	K&L	91H31-3000	001	022003	022005
Magnetic Loop Antenna	00314	Emco	6502	2014	072302	072304
Bicon Antenna	306	AH	SAS200/540	220	092302	092304
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092304
Horn Antenna	01646	EMCO	3115	9603-4683	042503	042505
18-26.5 GHz Horn Antenna	02112	HP	84125-8008	3643A00027	070103	070105
Spectrum Analyzer	02111	HP	8593EM	3624A000159	051203	051205

CISPR 22 – AC CONDUCTED EMISSIONS

Test Location: CKC Laboratories Inc. • 180 N Olinda Place • Brea CA, 92823 • 714-993-6112

Customer: **Powerwave Technologies**
 Specification: **CISPR22 B COND [AVE]**
 Work Order #: **82251**
 Test Type: **Conducted Emissions**
 Equipment: **RF Amplifier**
 Manufacturer: Powerwave Technologies
 Model: S18000 MCPA Cabinet
 S/N: NA

Date: 06/01/2004
 Time: 10:15:24 AM
 Sequence#: 10
 Tested By: Eddie Wong
 240V 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RF Amplifier*	Powerwave Technologies	S18000 MCPA Cabinet	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051853
Signal Generator	Agilent	E4433B	US40051477
Signal Generator	Agilent	E4432B	US40052250

Test Conditions / Notes:

The EUT is placed on the turntable. All 3 RF input ports are connected to support signal generators. The RF outputs are connected to RF loads and a directional coupler. Idle. Frequency range of measurement = 30 MHz- 1000MHz. Frequency 30 MHz - 1000 MHz, RBW=120 kHz, VBW=120 kHz. 240VAC 60 Hz, 18°C, 50% relative humidity. Modification: 0.047 uF caps installed from +ve to return of each switching power supply module.

Transducer Legend:

T1=Cable #8 072804	T2=150kHz HPF 041605
T3=Cable #9 41ft RG-214/U	

Measurement Data:

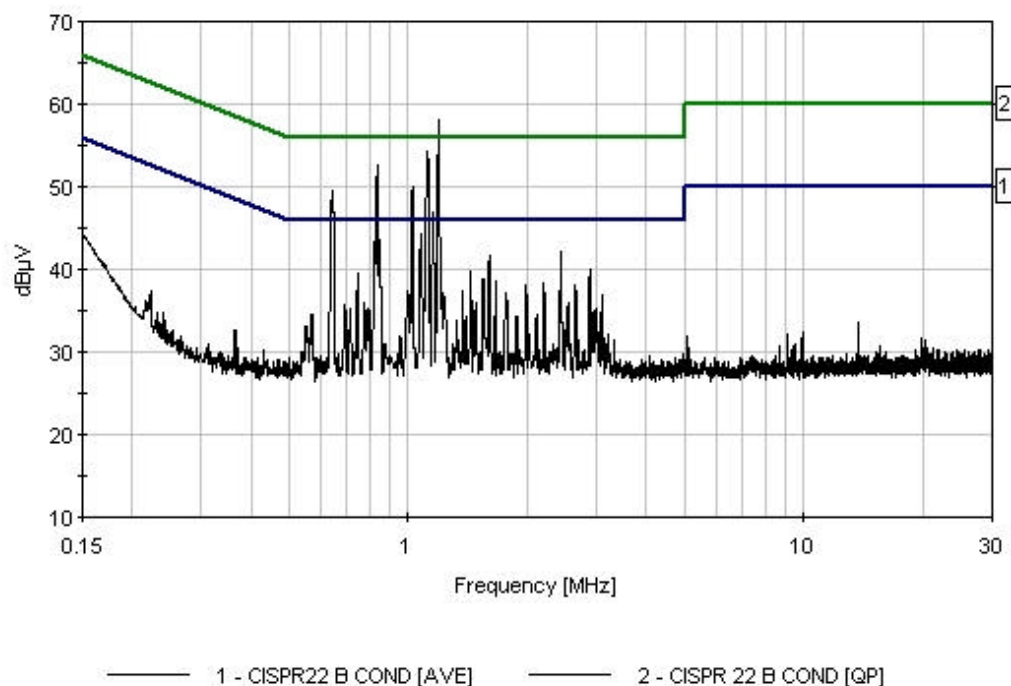
Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1.196M	57.7	+0.1	+0.2	+0.1		+0.0	58.1	46.0	+12.1	Black
	Ambient										
2	1.115M	54.0	+0.1	+0.2	+0.1		+0.0	54.4	46.0	+8.4	Black
	Ambient										
3	834.295k	52.3	+0.1	+0.2	+0.0		+0.0	52.6	46.0	+6.6	Black
	Ambient										
4	1.026M	49.7	+0.1	+0.2	+0.1		+0.0	50.1	46.0	+4.1	Black
	Ambient										
5	641.587k	49.4	+0.1	+0.1	+0.0		+0.0	49.6	46.0	+3.6	Black
	Ambient										
6	1.153M	46.5	+0.1	+0.2	+0.1		+0.0	46.9	46.0	+0.9	Black
	Ambient										
7	1.073M	44.0	+0.1	+0.2	+0.1		+0.0	44.4	46.0	-1.6	Black
	Ambient										
8	2.434M	41.7	+0.1	+0.1	+0.2		+0.0	42.1	46.0	-3.9	Black

9	1.604M	41.4	+0.1	+0.1	+0.1	+0.0	41.7	46.0	-4.3	Black
Ambient										
10	2.876M	39.6	+0.1	+0.1	+0.2	+0.0	40.0	46.0	-6.0	Black
11	1.438M	39.4	+0.1	+0.1	+0.1	+0.0	39.7	46.0	-6.3	Black
12	746.304k	39.2	+0.1	+0.2	+0.0	+0.0	39.5	46.0	-6.5	Black
13	1.545M	38.4	+0.1	+0.1	+0.1	+0.0	38.7	46.0	-7.3	Black
14	1.664M	38.2	+0.1	+0.1	+0.1	+0.0	38.5	46.0	-7.5	Black
15	2.204M	38.0	+0.1	+0.1	+0.1	+0.0	38.3	46.0	-7.7	Black

CKC Laboratories Inc. Date: 06/01/2004 Time: 10:15:24 AM Powerwave Technologies WVO#: 82251
CISPR22 B COND [AVE] Test Lead: Black 240V 60Hz Sequence#: 10



Test Location: CKC Laboratories Inc. •180 N Olinda Place • Brea CA, 92823 • 714-993-6112

Customer: **Powerwave Technologies**
 Specification: **CISPR22 B COND [AVE]**
 Work Order #: **82251**
 Test Type: **Conducted Emissions**
 Equipment: **RF Amplifier**
 Manufacturer: Powerwave Technologies
 Model: S18000 MCPA Cabinet
 S/N: NA

Date: 06/01/2004
 Time: 10:34:50
 Sequence#: 11
 Tested By: Eddie Wong
 240V 60Hz

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RF Amplifier*	Powerwave Technologies	S18000 MCPA Cabinet	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051853
Signal Generator	Agilent	E4433B	US40051477
Signal Generator	Agilent	E4432B	US40052250

Test Conditions / Notes:

The EUT is placed on the turntable. All 3 RF Input ports are connected to support signal generators. The RF Outputs are connected to RF loads and a directional coupler. Idle. Frequency range of measurement = 30 MHz – 1000 MHz. Frequency 30MHz - 1000 MHz, RBW =120 kHz, VBW=120 kHz. 240VAC 60 Hz, 18°C, 50% relative humidity. Modification: 0.047 uF caps installed from +ve to return of each switching power supply module.

Transducer Legend:

T1=Cable #8 072804	T2=150kHz HPF 041605
T3=Cable #9 41ft RG-214/U	

Measurement Data:

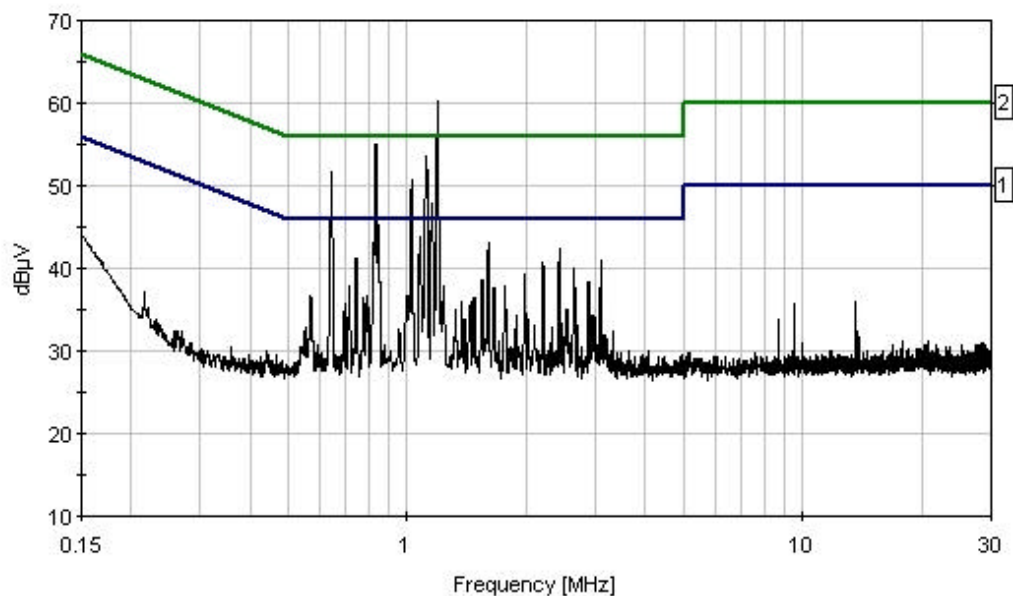
Reading listed by margin.

Test Lead: Red

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1.192M	59.8	+0.1	+0.2	+0.1		+0.0	60.2	46.0	+14.2	Red
	Ambient										
2	832.841k	54.8	+0.1	+0.2	+0.0		+0.0	55.1	46.0	+9.1	Red
	Ambient										
3	1.115M	53.1	+0.1	+0.2	+0.1		+0.0	53.5	46.0	+7.5	Red
	Ambient										
4	644.496k	51.5	+0.1	+0.1	+0.0		+0.0	51.7	46.0	+5.7	Red
	Ambient										
5	1.026M	50.2	+0.1	+0.2	+0.1		+0.0	50.6	46.0	+4.6	Red
	Ambient										
6	1.153M	47.5	+0.1	+0.2	+0.1		+0.0	47.9	46.0	+1.9	Red
	Ambient										
7	1.077M	43.3	+0.1	+0.2	+0.1		+0.0	43.7	46.0	-2.3	Red
	Ambient										
8	1.604M	42.9	+0.1	+0.1	+0.1		+0.0	43.2	46.0	-2.8	Red
	Ambient										
9	741.941k	41.0	+0.1	+0.2	+0.0		+0.0	41.3	46.0	-4.7	Red
	Ambient										

10	3.084M	40.5	+0.1	+0.1	+0.2	+0.0	40.9	46.0	-5.1	Red
11	2.204M	40.3	+0.1	+0.1	+0.1	+0.0	40.6	46.0	-5.4	Red
12	2.642M	39.5	+0.1	+0.1	+0.2	+0.0	39.9	46.0	-6.1	Red
13	1.987M	39.0	+0.1	+0.1	+0.1	+0.0	39.3	46.0	-6.7	Red
14	846.000k	31.1	+0.1	+0.2	+0.1	+0.0	31.5	46.0	-14.5	Red
Ave										
^	845.930k	44.8	+0.1	+0.2	+0.1	+0.0	45.2	46.0	-0.8	Red
16	2.429M	30.8	+0.1	+0.1	+0.1	+0.0	31.1	46.0	-14.9	Red
Ave										
^	2.429M	41.9	+0.1	+0.1	+0.2	+0.0	42.3	46.0	-3.7	Red

CKC Laboratories Inc. Date: 06/01/2004 Time: 10:34:50 Powerwave Technologies W/O#: 82251
CISPR22 B COND [AVE] Test Lead: Red 240V 60Hz Sequence#: 11



1 - CISPR22 B COND [AVE] 2 - CISPR 22 B COND [QP]

Test Location: CKC Laboratories Inc. •180 N Olinda Place • Brea CA, 92823 • 714-993-6112
 Customer: **Powerwave Technologies**
 Specification: **CISPR22 B COND [AVE]**
 Work Order #: **82251** Date: 06/01/2004
 Test Type: **Conducted Emissions** Time: 10:50:56
 Equipment: **RF Amplifier** Sequence#: 12
 Manufacturer: Powerwave Technologies Tested By: Eddie Wong
 Model: S18000 MCPA Cabinet 240V 60Hz
 S/N: NA

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RF Amplifier*	Powerwave Technologies	S18000 MCPA Cabinet	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051853
Signal Generator	Agilent	E4433B	US40051477
Signal Generator	Agilent	E4432B	US40052250

Test Conditions / Notes:

The EUT is placed on the turntable. All 3 RF input ports are connected to support signal generators. The RF outputs are connected to RF loads and a directional coupler. Idle. Frequency range of measurement = 30 MHz- 1000MHz. Frequency 30MHz- 1000 MHz, RBW =120 kHz, VBW=120 kHz. 240VAC 60 Hz, 18°C, 50% relative humidity. Modification: 0.047 uF caps installed from +ve to return of each switching power supply module.

Transducer Legend:

T1=Cable #8 072804	T2=150kHz HPF 041605
T3=Cable #9 41ft RG-214/U	

Measurement Data:

Reading listed by margin.

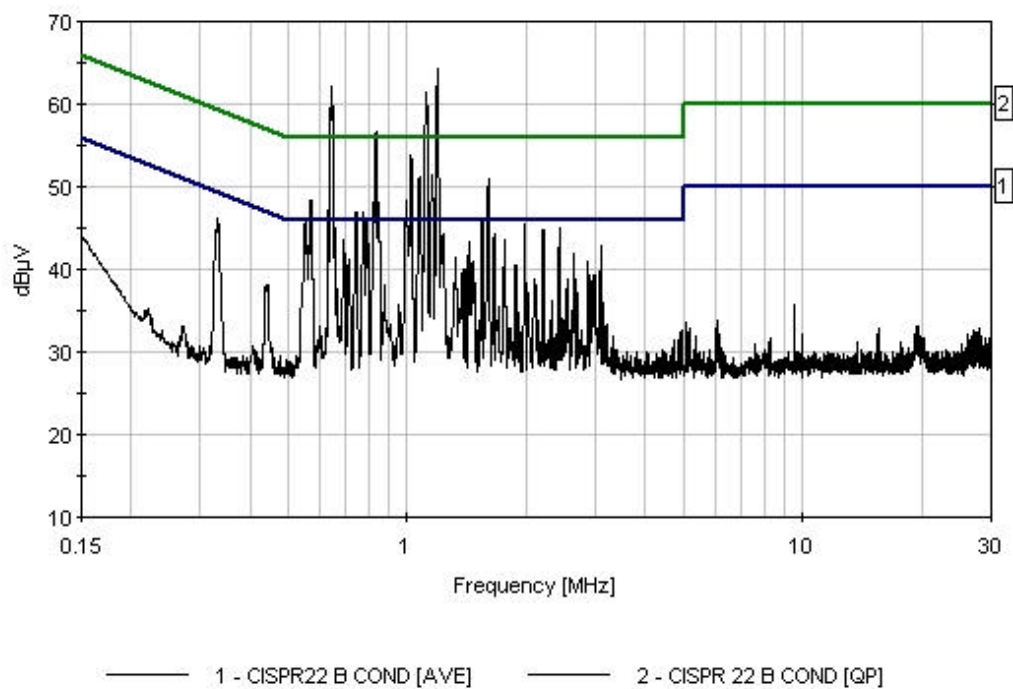
Test Lead: White

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1.196M Ambient	64.0	+0.1	+0.2	+0.1	+0.0	64.4	46.0	+18.4	White
2	642.314k Ambient	62.0	+0.1	+0.1	+0.0	+0.0	62.2	46.0	+16.2	White
3	1.115M Ambient	61.0	+0.1	+0.2	+0.1	+0.0	61.4	46.0	+15.4	White
4	836.477k Ambient	56.3	+0.1	+0.2	+0.0	+0.0	56.6	46.0	+10.6	White
5	1.022M Ambient	53.3	+0.1	+0.2	+0.1	+0.0	53.7	46.0	+7.7	White
6	1.153M Ambient	51.1	+0.1	+0.2	+0.1	+0.0	51.5	46.0	+5.5	White
7	1.073M Ambient	50.7	+0.1	+0.2	+0.1	+0.0	51.1	46.0	+5.1	White
8	1.604M Ambient	50.6	+0.1	+0.1	+0.1	+0.0	50.9	46.0	+4.9	White
9	570.322k Ambient	48.2	+0.1	+0.1	+0.0	+0.0	48.4	46.0	+2.4	White
10	996.084k Ambient	47.9	+0.1	+0.2	+0.1	+0.0	48.3	46.0	+2.3	White

11	629.952k Ambient	47.0	+0.1	+0.1	+0.0	+0.0	47.2	46.0	+1.2	White
12	742.668k Ambient	46.6	+0.1	+0.2	+0.0	+0.0	46.9	46.0	+0.9	White
13	653.950k Ambient	46.4	+0.1	+0.1	+0.0	+0.0	46.6	46.0	+0.6	White
14	1.545M Ambient	45.7	+0.1	+0.1	+0.1	+0.0	46.0	46.0	+0.0	White
15	792.118k Ambient	45.4	+0.1	+0.2	+0.0	+0.0	45.7	46.0	-0.3	White
16	690.310k	43.3	+0.1	+0.1	+0.0	+0.0	43.5	46.0	-2.5	White
17	1.766M	43.2	+0.1	+0.1	+0.1	+0.0	43.5	46.0	-2.5	White
18	1.434M	43.0	+0.1	+0.1	+0.1	+0.0	43.3	46.0	-2.7	White
19	3.084M	42.5	+0.1	+0.1	+0.2	+0.0	42.9	46.0	-3.1	White
20	331.073k	46.0	+0.1	+0.1	+0.0	+0.0	46.2	49.4	-3.2	White
21	2.642M	41.4	+0.1	+0.1	+0.2	+0.0	41.8	46.0	-4.2	White
22	1.324M	41.0	+0.1	+0.2	+0.1	+0.0	41.4	46.0	-4.6	White
23	554.000k Ave	37.9	+0.1	+0.1	+0.0	+0.0	38.1	46.0	-7.9	White
^	553.596k	45.8	+0.1	+0.1	+0.0	+0.0	46.0	46.0	+0.0	White
25	846.000k Ave	37.5	+0.1	+0.2	+0.1	+0.0	37.9	46.0	-8.1	White
^	845.930k	47.8	+0.1	+0.2	+0.1	+0.0	48.2	46.0	+2.2	White
27	2.421M Ave	37.1	+0.1	+0.1	+0.2	+0.0	37.5	46.0	-8.5	White
^	2.421M	44.7	+0.1	+0.1	+0.2	+0.0	45.1	46.0	-0.9	White
29	775.000k Ave	34.8	+0.1	+0.2	+0.0	+0.0	35.1	46.0	-10.9	White
^	774.665k	46.5	+0.1	+0.2	+0.0	+0.0	46.8	46.0	+0.8	White
31	2.208M Ave	28.0	+0.1	+0.1	+0.1	+0.0	28.3	46.0	-17.7	White
^	2.208M	44.5	+0.1	+0.1	+0.1	+0.0	44.8	46.0	-1.2	White

33	1.660M	27.4	+0.1	+0.1	+0.1	+0.0	27.7	46.0	-18.3	White
Ave										
^	1.660M	44.1	+0.1	+0.1	+0.1	+0.0	44.4	46.0	-1.6	White
35	1.239M	25.7	+0.1	+0.2	+0.1	+0.0	26.1	46.0	-19.9	White
Ave										
^	1.239M	44.0	+0.1	+0.2	+0.1	+0.0	44.4	46.0	-1.6	White

CKC Laboratories Inc. Date: 06/01/2004 Time: 10:50:56 Powerwave Technologies WVO#: 82251
CISPR22 B COND [AVE] Test Lead: White 240V 60Hz Sequence#: 12



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer RF Section	00312	HP	8568A	2049A01287	073102	073104
Spectrum Analyzer Display Section	00312	HP	85662A	2106A02109	073102	073104
Quasi Peak Adapter	02325	HP	85650A	2521A00932	073102	073104
Coaxial Cable		Harbour Industries	M17/60- RG142	Cable #8	072803	072804
41 ft Coax cable.	8368	Belden	RG214/u	Cable #9	050704	050705
150kHz HPF	02610	TTE	HB9615- 150k-50-720	07766	041604	041605
LISN	000938	Solar	8618-50-TS- 200N	913443	020303	020305
LISN	000939	Solar	8618-50-TS- 200N	913446	020303	020305
LISN	000936	Solar	8618-50-TS- 200N	913449	020303	020305

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions - Front View

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions - Back View

CISPR 22 – RADIATED EMISSIONS

Test Location: CKC Laboratories Inc. • 180 N Olinda Place • Brea CA, 92823 • 714-993-6112

Customer: **Powerwave Technologies**
 Specification: **CISPR 22 B RADIATED**
 Work Order #: **82251**
 Test Type: **Maximized Emissions**
 Equipment: **RF Amplifier**
 Manufacturer: Powerwave Technologies
 Model: S18000 MCPA Cabinet
 S/N: NA

Date: 05/26/2004
 Time: 13:32:16
 Sequence#: 1
 Tested By: Eddie Wong

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RF Amplifier*	Powerwave Technologies	S18000 MCPA Cabinet	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40051853
Signal Generator	Agilent	E4433B	US40051477
Signal Generator	Agilent	E4432B	US40052250

Test Conditions / Notes:

The EUT is placed on the turntable. All 3 RF input ports are connected to support signal generators. The RF outputs are connected to RF loads and a directional coupler. Idle. Frequency range of measurement = 30 MHz – 1000 MHz. Frequency 30MHz - 1000 MHz, RBW =120 kHz, VBW=120 kHz. 240VAC 60 Hz, 18°C, 50% relative humidity. Modification: 0.047 uF caps installed from +ve to return of each switching power supply module.

Transducer Legend:

T1=Bicon SN220 092304	T2=Cable #33 44ft. RG-214/U
T3=Cable Heliac #17 84ft(10 meter)	T4=Cable#22 BNC (preamp to SA)
T5=Pre Amp 8447D AN 0010_071604	T6=Log antenna, SN331 092304

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	84.302M	54.1	+8.3	+0.9	+1.0	+0.2	-10.0	27.6	30.0	-2.4	Vert
	QP		-26.9	+0.0							
^	84.302M	55.8	+8.3	+0.9	+1.0	+0.2	-10.0	29.3	30.0	-0.7	Vert
			-26.9	+0.0							
3	65.445M	53.8	+7.8	+0.8	+0.9	+0.2	-10.0	26.5	30.0	-3.5	Vert
	QP		-27.0	+0.0							
^	65.445M	58.4	+7.8	+0.8	+0.9	+0.2	-10.0	31.1	30.0	+1.1	Vert
			-27.0	+0.0							
5	52.125M	51.1	+10.7	+0.6	+0.8	+0.2	-10.0	26.4	30.0	-3.6	Vert
	QP		-27.0	+0.0							
^	52.125M	55.9	+10.7	+0.6	+0.8	+0.2	-10.0	31.2	30.0	+1.2	Vert
			-27.0	+0.0							

7	92.578M	49.9	+10.1	+0.9	+1.1	+0.2	-10.0	25.3	30.0	-4.7	Horiz
	QP		-26.9	+0.0							
^	92.578M	56.0	+10.1	+0.9	+1.1	+0.2	-10.0	31.4	30.0	+1.4	Horiz
			-26.9	+0.0							
9	90.250M	50.6	+9.4	+0.9	+1.1	+0.2	-10.0	25.3	30.0	-4.7	Horiz
	QP		-26.9	+0.0							
^	90.250M	52.9	+9.4	+0.9	+1.1	+0.2	-10.0	27.6	30.0	-2.4	Horiz
			-26.9	+0.0							
11	129.120M	42.4	+16.5	+1.2	+1.2	+0.2	-10.0	24.7	30.0	-5.3	Vert
	QP		-26.8	+0.0							
^	129.120M	49.8	+16.5	+1.2	+1.2	+0.2	-10.0	32.1	30.0	+2.1	Vert
			-26.8	+0.0							
13	123.120M	42.8	+16.0	+1.1	+1.2	+0.2	-10.0	24.5	30.0	-5.5	Vert
	QP		-26.8	+0.0							
^	123.120M	48.6	+16.0	+1.1	+1.2	+0.2	-10.0	30.3	30.0	+0.3	Vert
			-26.8	+0.0							
15	84.462M	50.5	+8.3	+0.9	+1.0	+0.2	-10.0	24.0	30.0	-6.0	Horiz
	QP		-26.9	+0.0							
^	84.462M	54.4	+8.3	+0.9	+1.0	+0.2	-10.0	27.9	30.0	-2.1	Horiz
			-26.9	+0.0							
17	72.795M	51.7	+7.1	+0.8	+1.0	+0.2	-10.0	23.8	30.0	-6.2	Vert
	QP		-27.0	+0.0							
^	72.795M	58.0	+7.1	+0.8	+1.0	+0.2	-10.0	30.1	30.0	+0.1	Vert
			-27.0	+0.0							
19	128.410M	41.5	+16.4	+1.2	+1.2	+0.2	-10.0	23.7	30.0	-6.3	Horiz
	QP		-26.8	+0.0							
^	128.410M	49.0	+16.4	+1.2	+1.2	+0.2	-10.0	31.2	30.0	+1.2	Horiz
			-26.8	+0.0							
21	71.515M	51.6	+7.0	+0.8	+1.0	+0.2	-10.0	23.6	30.0	-6.4	Horiz
			-27.0	+0.0							
22	118.782M	42.1	+15.6	+1.1	+1.2	+0.2	-10.0	23.4	30.0	-6.6	Horiz
			-26.8	+0.0							
23	78.380M	50.9	+7.4	+0.8	+1.0	+0.2	-10.0	23.4	30.0	-6.6	Horiz
			-26.9	+0.0							
24	65.523M	49.7	+7.8	+0.8	+0.9	+0.2	-10.0	22.4	30.0	-7.6	Horiz
			-27.0	+0.0							
25	112.314M	41.3	+14.5	+1.1	+1.2	+0.2	-10.0	21.5	30.0	-8.5	Horiz
			-26.8	+0.0							
26	184.792M	35.8	+18.3	+1.4	+1.4	+0.3	-10.0	20.6	30.0	-9.4	Horiz
			-26.6	+0.0							
27	109.620M	40.5	+14.0	+1.1	+1.1	+0.2	-10.0	20.1	30.0	-9.9	Vert
	QP		-26.8	+0.0							
^	109.620M	47.0	+14.0	+1.1	+1.1	+0.2	-10.0	26.6	30.0	-3.4	Vert
			-26.8	+0.0							
29	120.160M	38.3	+15.8	+1.1	+1.2	+0.2	-10.0	19.8	30.0	-10.2	Horiz
	QP		-26.8	+0.0							
^	120.160M	45.2	+15.8	+1.1	+1.2	+0.2	-10.0	26.7	30.0	-3.3	Horiz
			-26.8	+0.0							

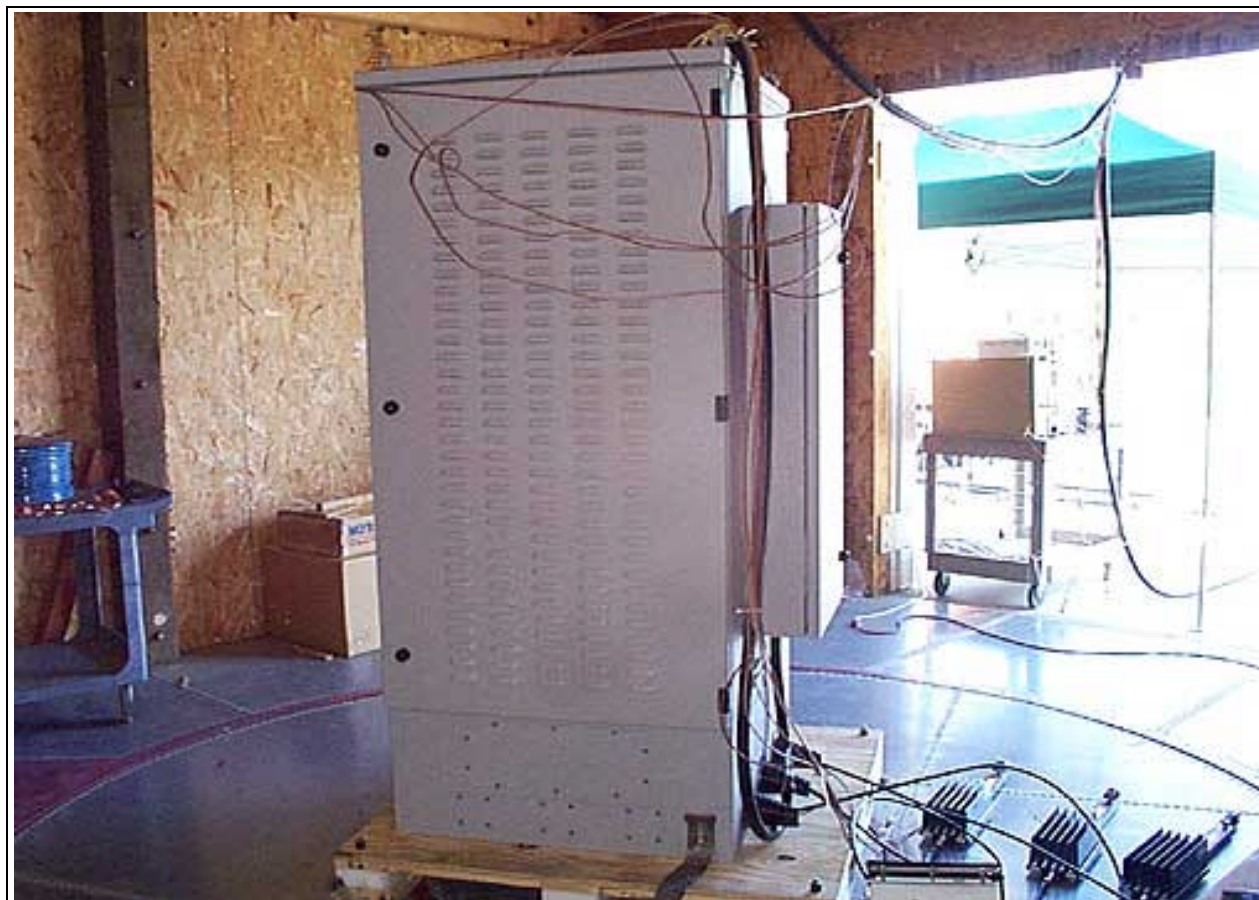
31	52.366M	42.4	+10.6 -27.0	+0.6 +0.0	+0.8	+0.2	-10.0	17.6	30.0	-12.4	Horiz
32	58.987M	43.2	+9.2 -27.0	+0.7 +0.0	+0.9	+0.2	-10.0	17.2	30.0	-12.8	Horiz
33	336.601M	28.9	+0.0 -26.5	+1.9 +20.4	+2.0	+0.4	-10.0	17.1	37.0	-19.9	Vert
34	420.006M	31.6	+0.0 -27.2	+2.3 +17.5	+2.2	+0.4	-10.0	16.8	37.0	-20.2	Vert

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

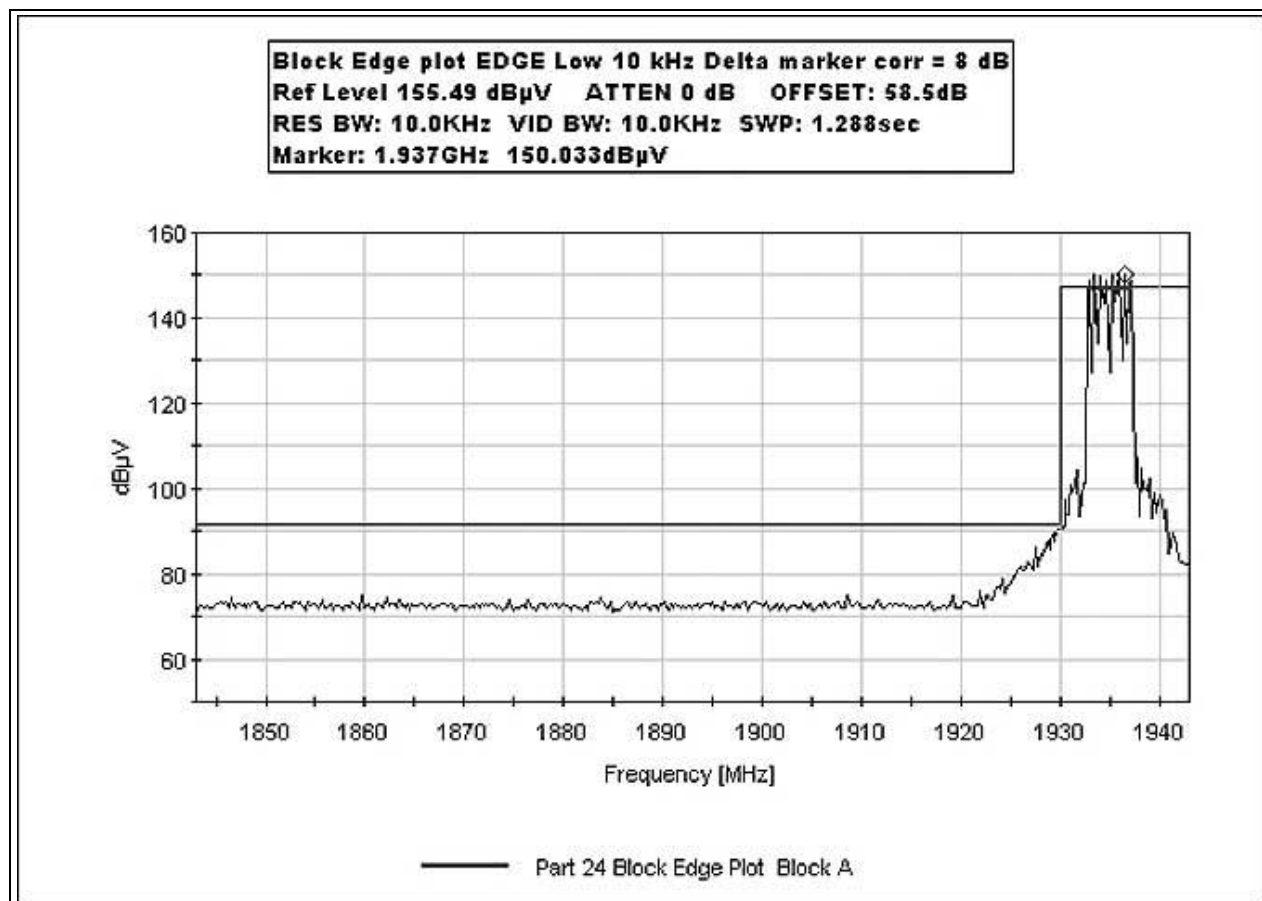


Radiated Emissions - Back View

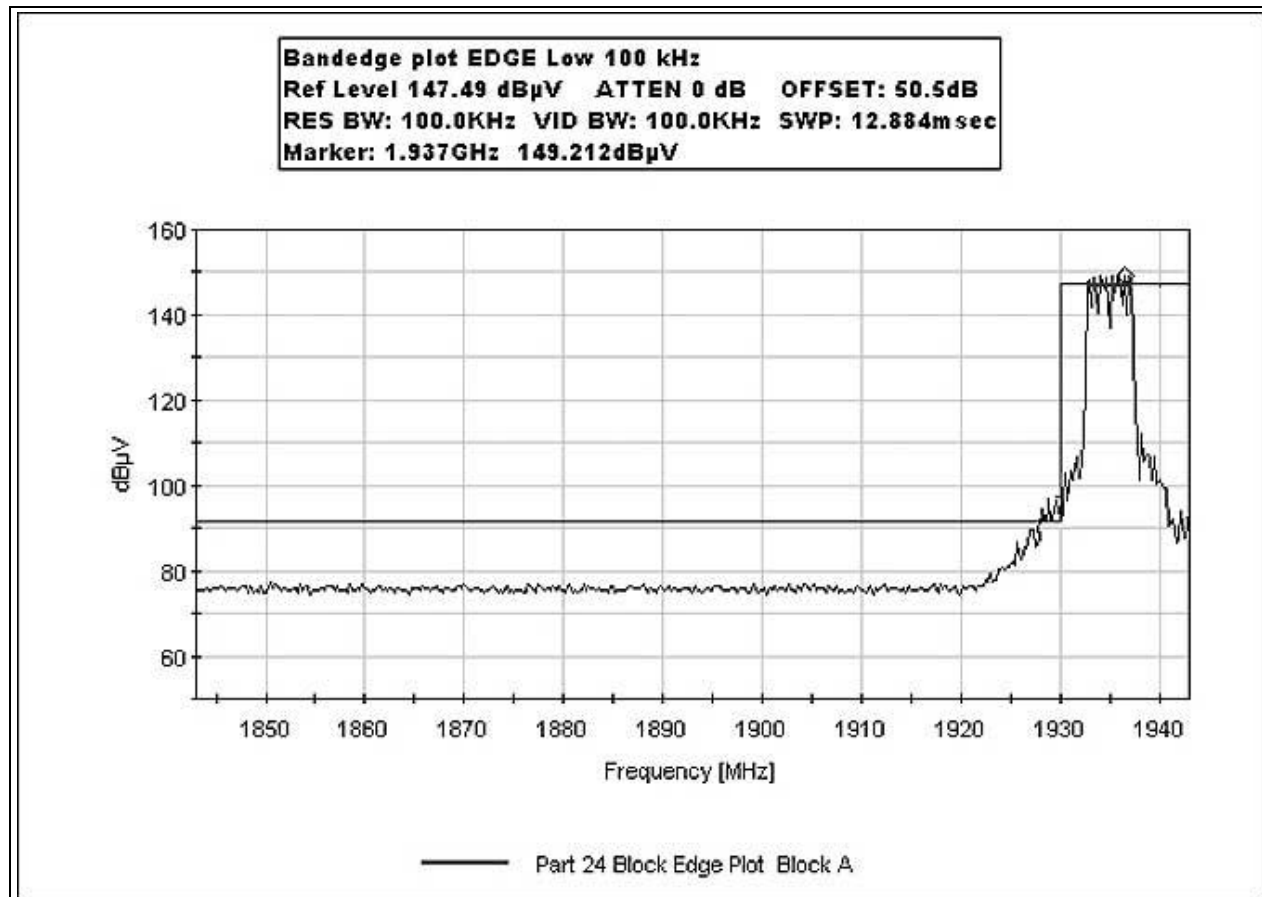
Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer RF Section	00312	HP	8568A	2049A01287	073102	073104
Spectrum Analyzer Display Section	00312	HP	85662A	2106A02109	073102	073104
Quasi Peak Adapter	02325	HP	85650A	2521A00932	073102	073104
Antenna cable (10 meter site D)	NA	Andrew	LDF1-50	Cable#17	100203	100204
Antenna cable from bulkhead to antenna	N/A	Pasternack	RG-214/U	Cable #33	032904	032905
Preamplifier to SA Cable (3 feet)	NA	Pasternack	E100316-I	Cable #22	100603	100604
Pre-amp	00010	HP	8447D	2727A05392	071602	071604
Bicon Antenna	306	AH	SAS200/540	220	092302	092304
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092304

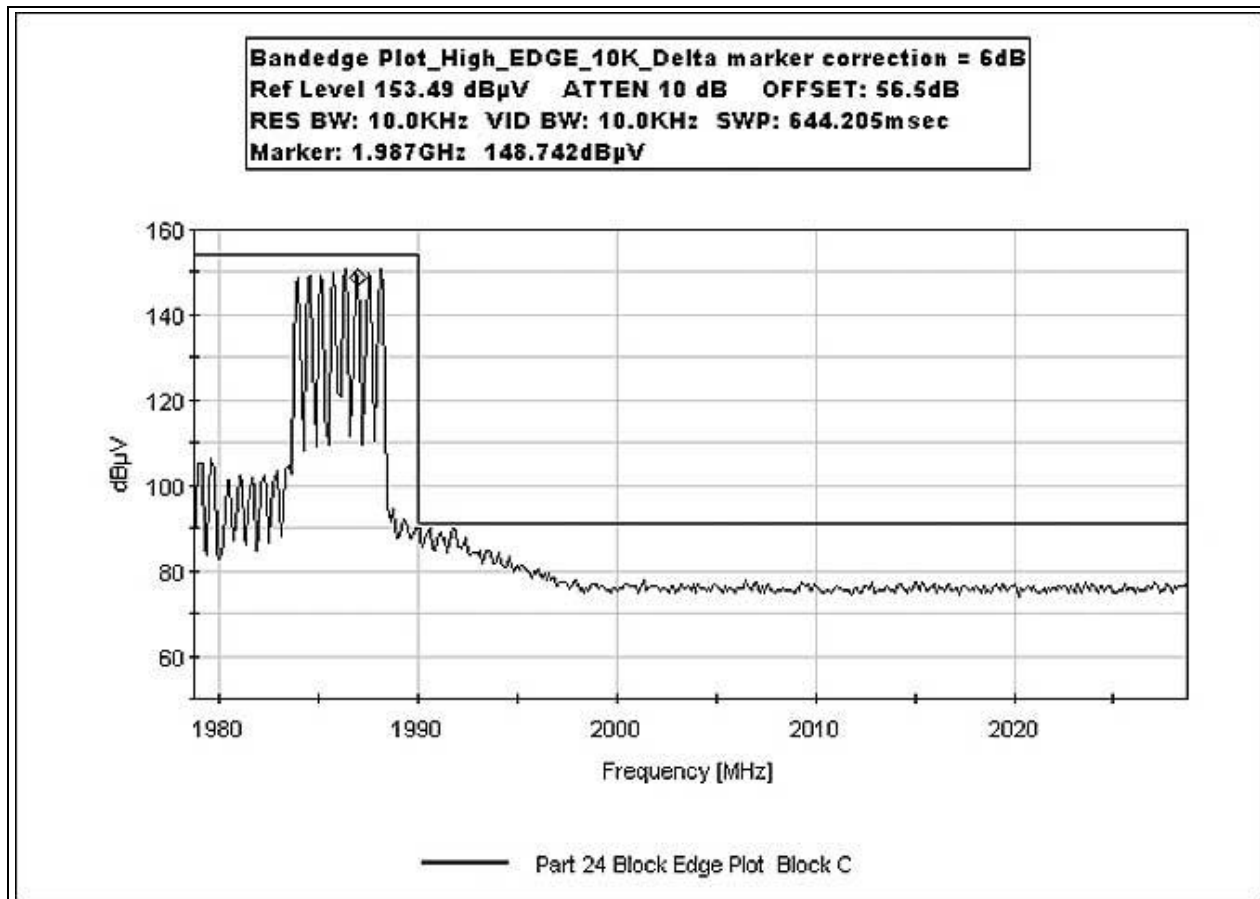
Bandedge EDGE Low 10 kHz



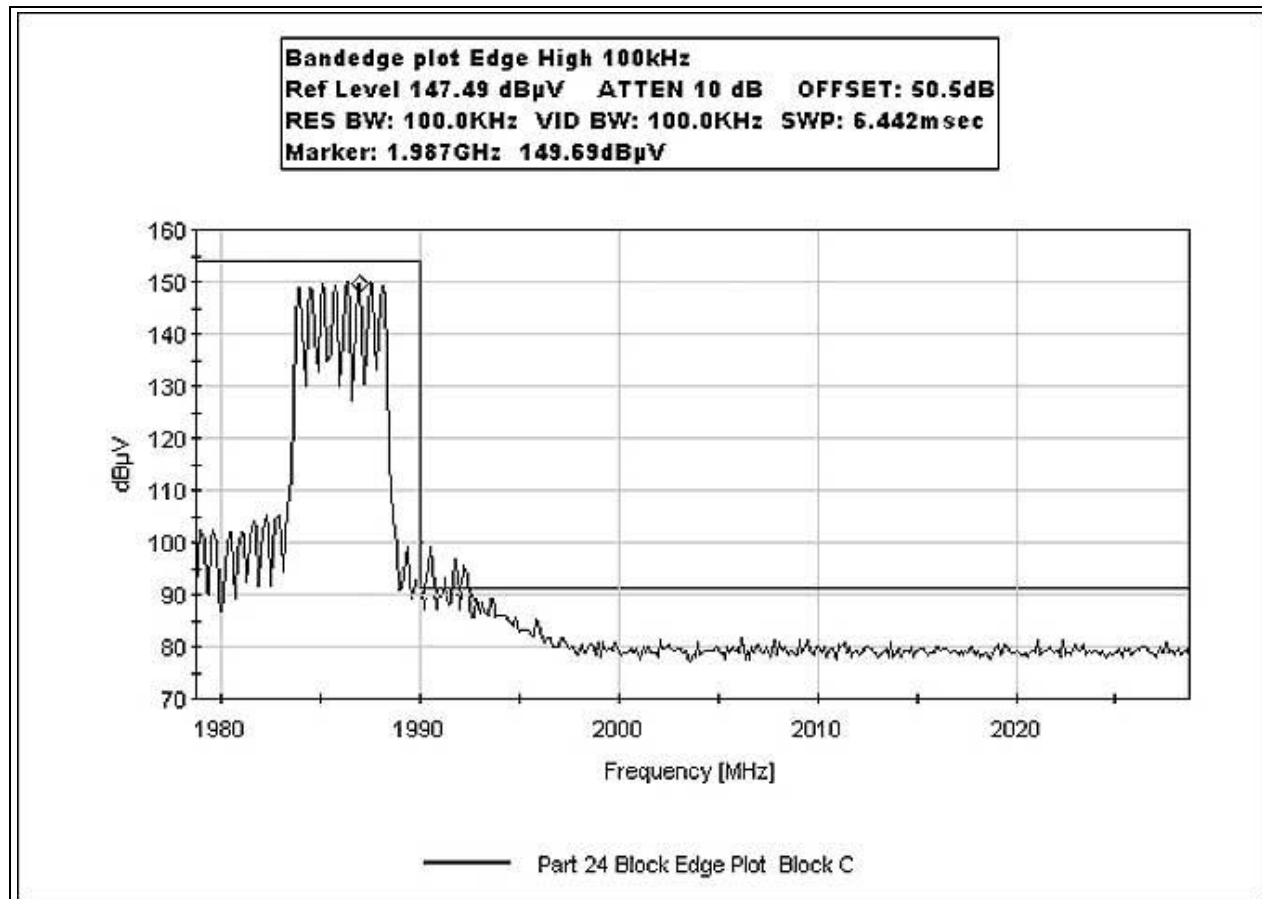
Bandedge EDGE Low 100 kHz



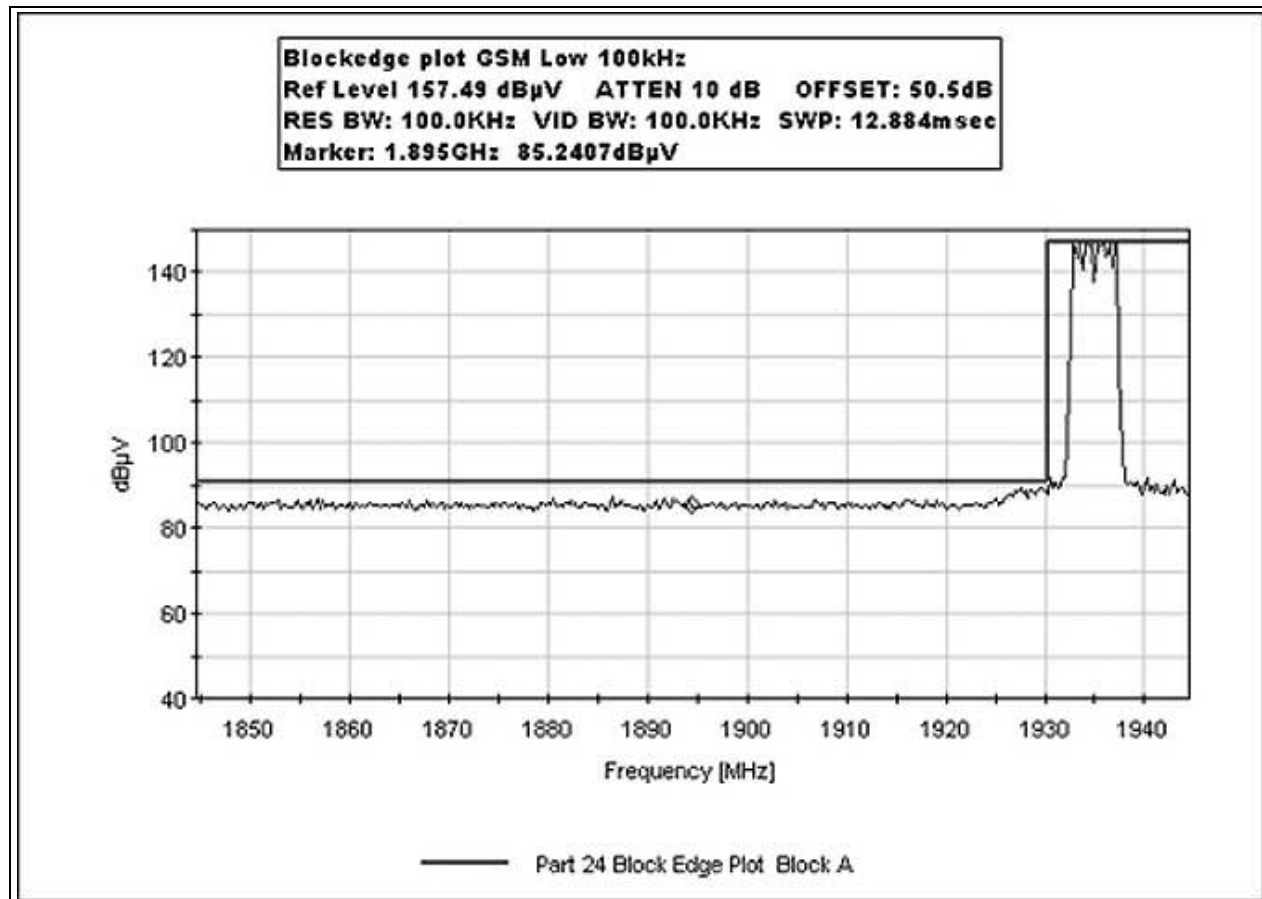
Bandedge EDGE High 10 kHz



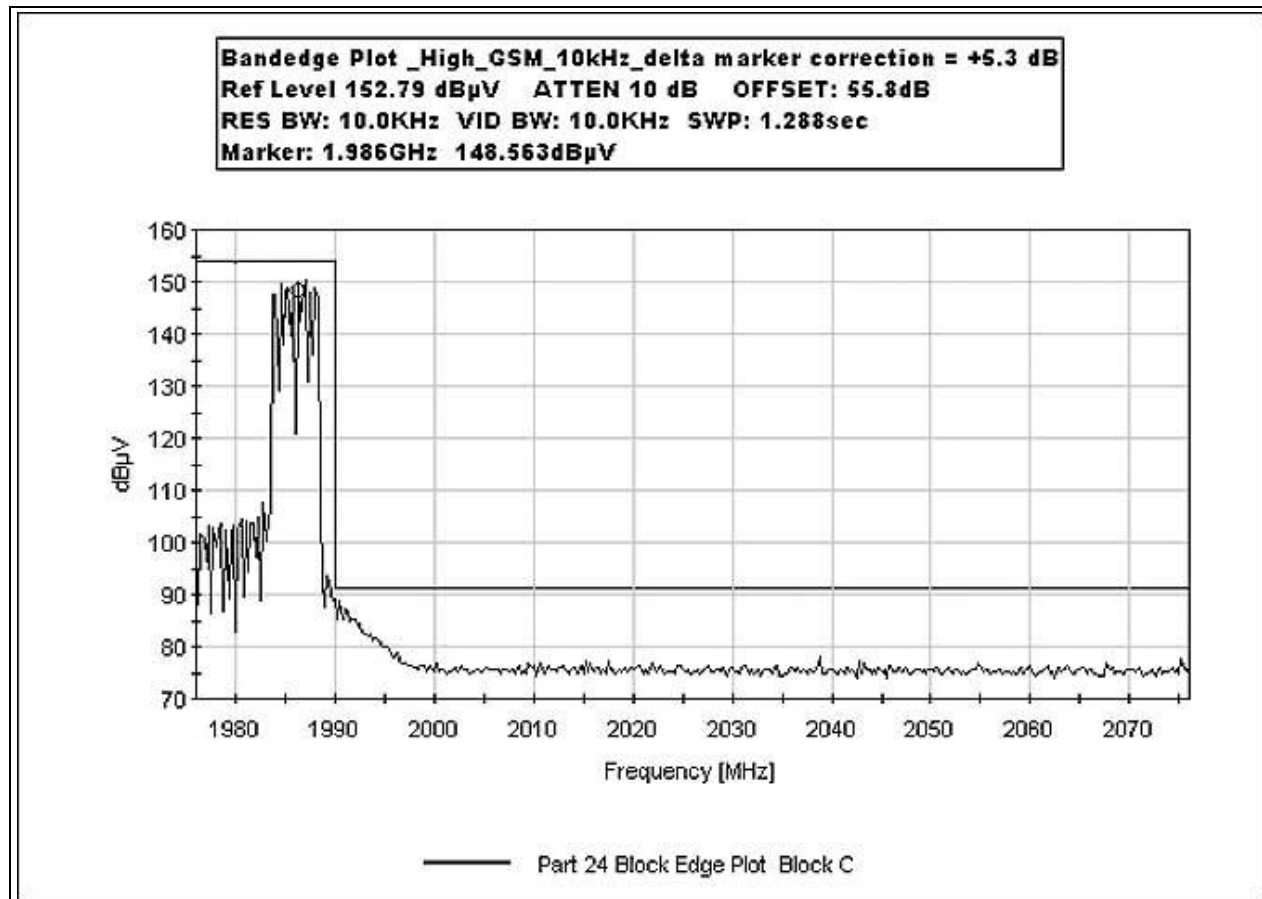
Bandedge EDGE High 100 kHz



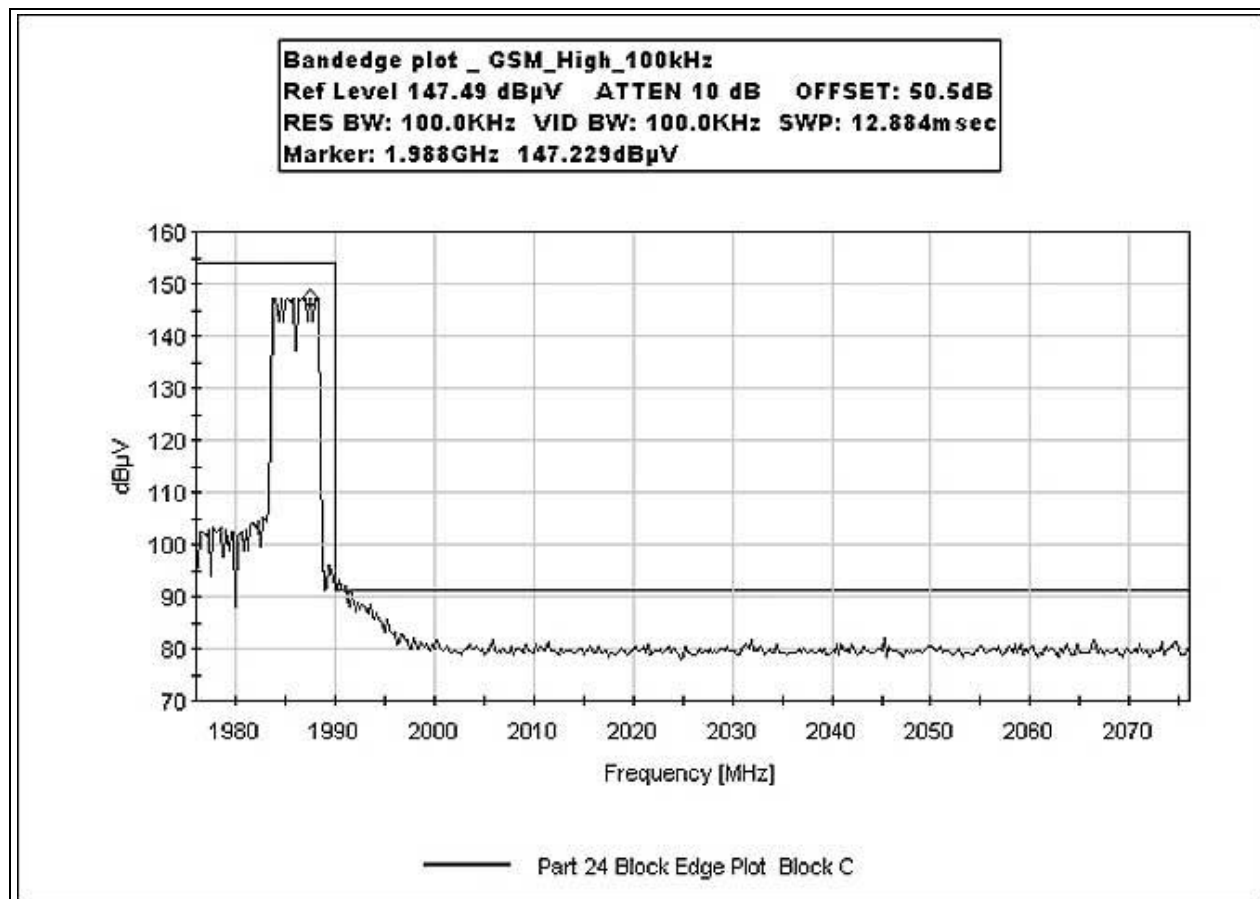
Bandedge GSM Low 100 kHz



Bandedge GSM High 10 kHz



Bandedge GSM High 100 kHz



Test Equipment

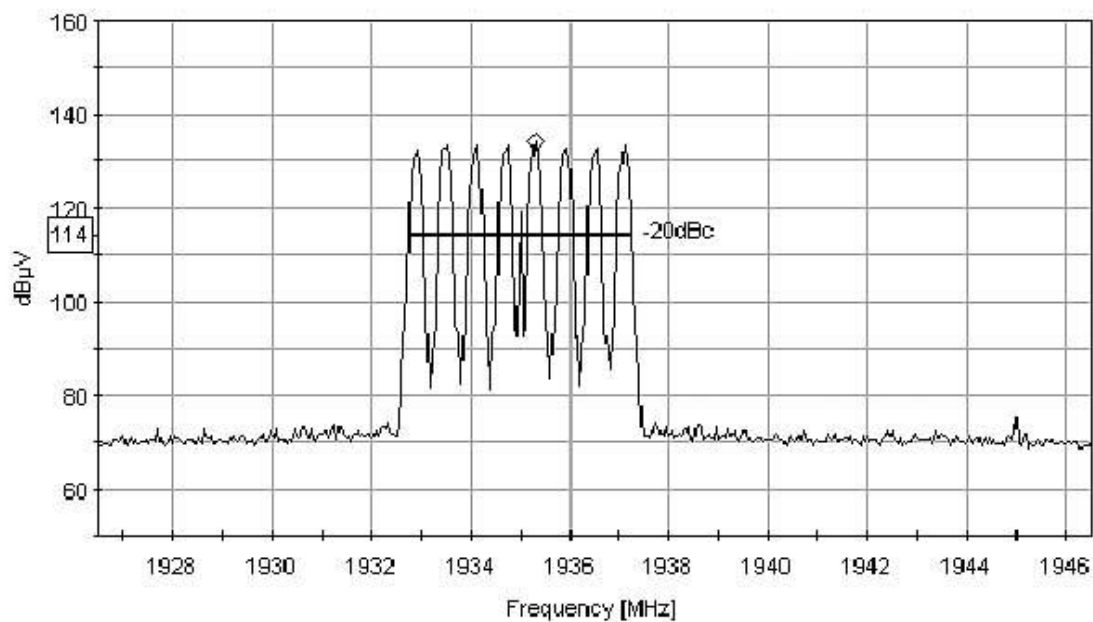
Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Antenna cable (Heliac)	NA	Andrew	LDF1-50	Cable#19	101303	101304
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033105
2.4 GHz HPF	01440	K&L	91H31-3000	001	022003	022005

PHOTOGRAPH SHOWING DIRECT CONNECT EMISSIONS

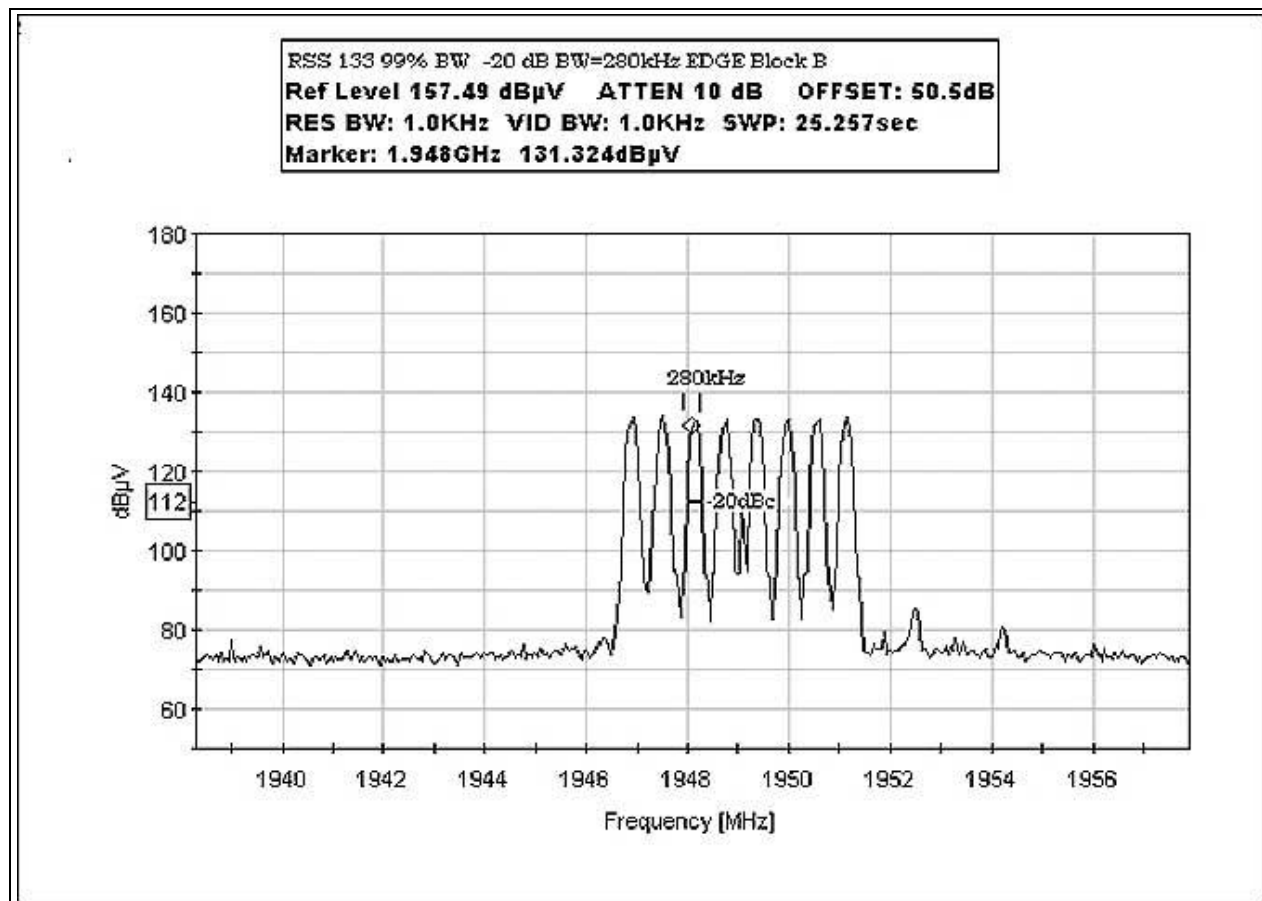


RSS-133 99% Bandwidth EDGE Block A

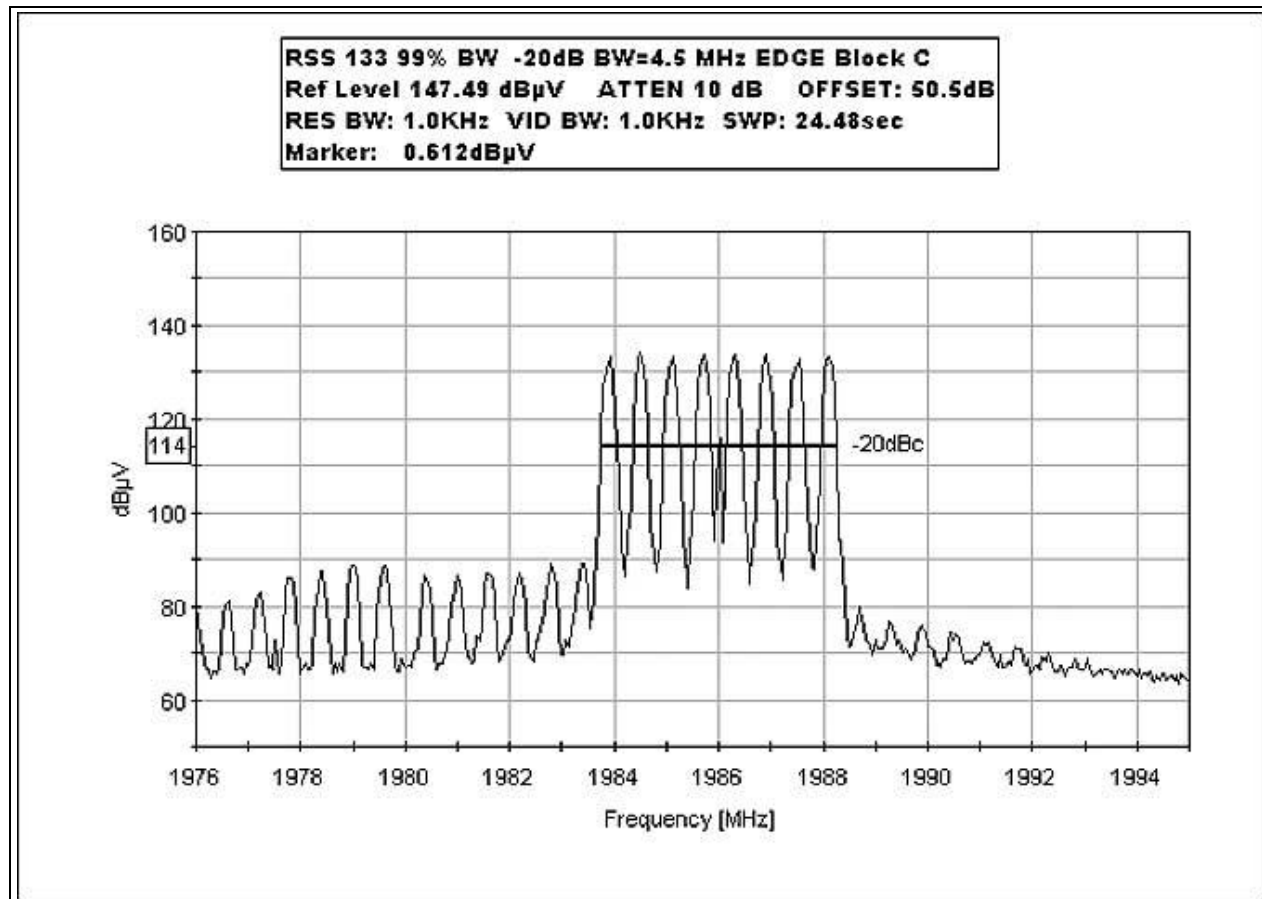
RSS 133 99% BW -20dB BW = 4.5 MHz EDGE Block A
Ref Level 157.49 dBμV ATTEN 10 dB OFFSET: 50.5dB
RES BW: 1.0KHz VID BW: 1.0KHz SWP: 25.768sec
Marker: 1.935GHz 134.019dBμV



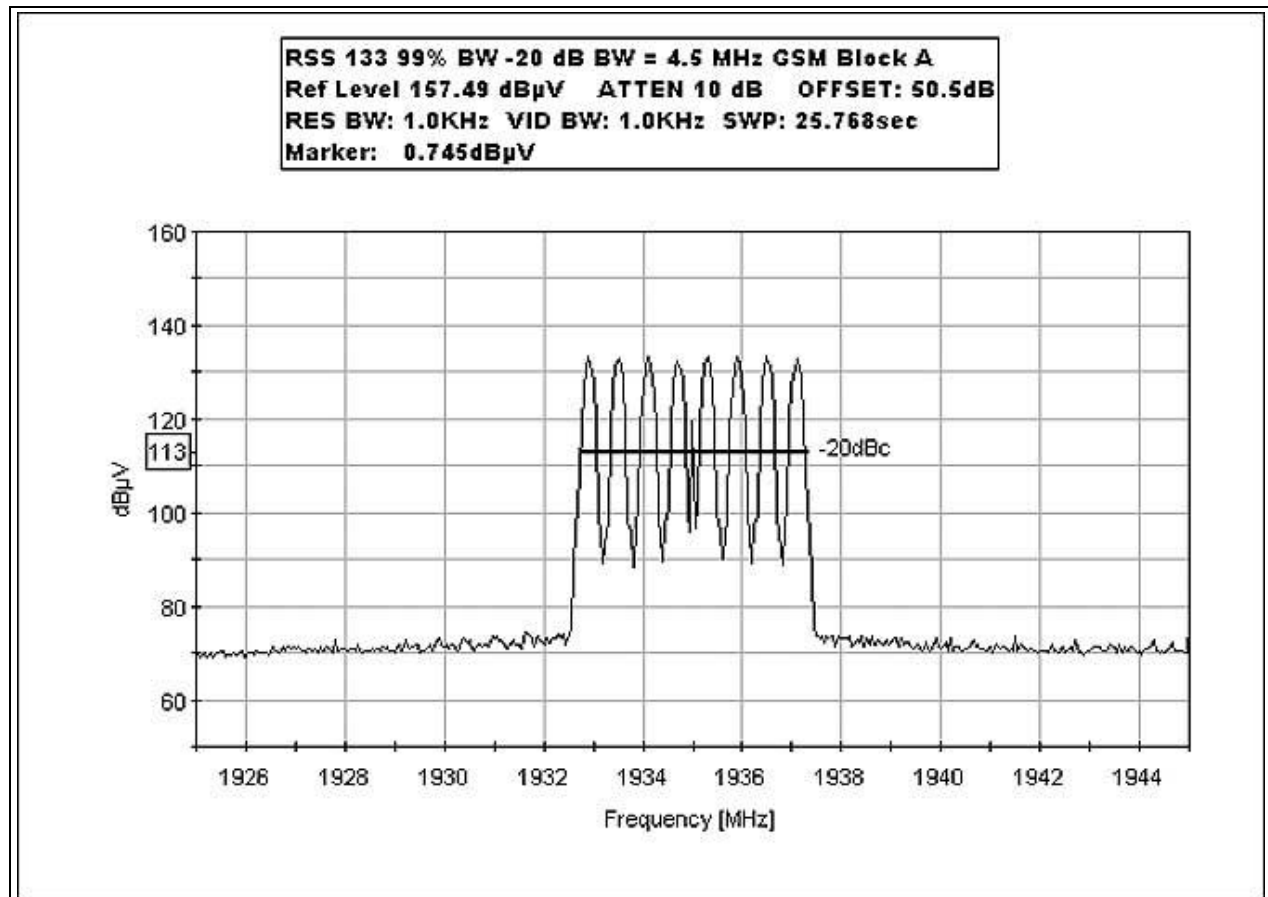
RSS-133 99% Bandwidth EDGE Block B



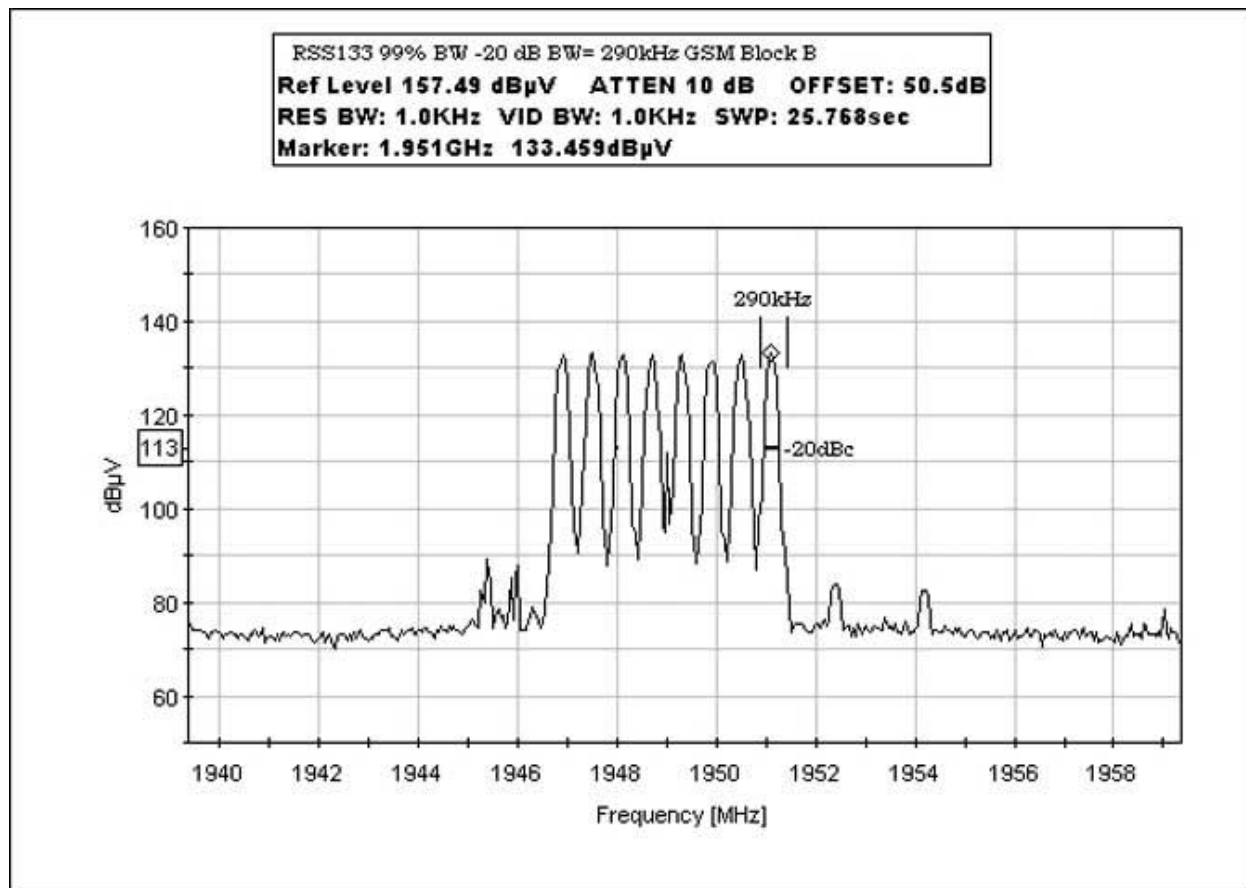
RSS-133 99% Bandwidth EDGE Block C



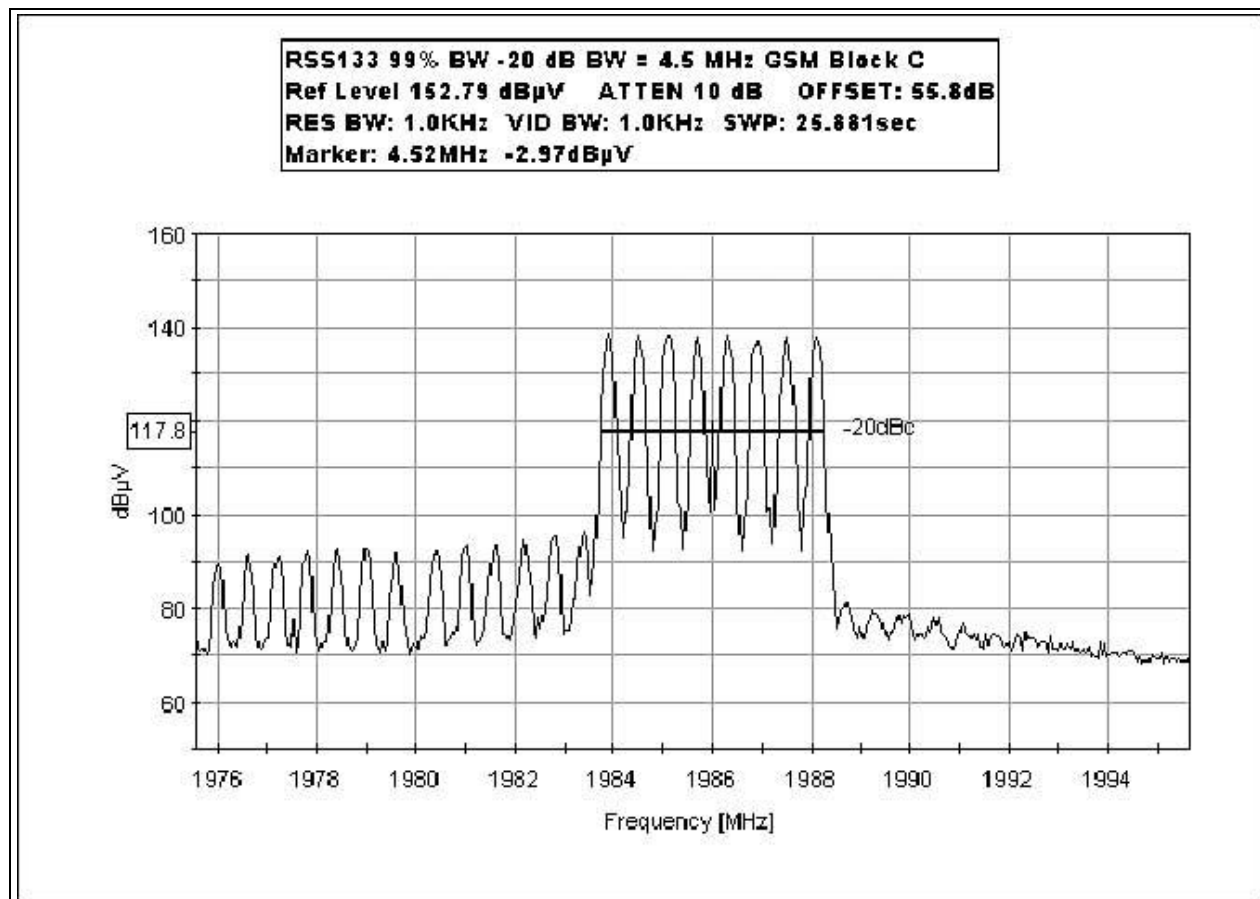
RSS-133 99% Bandwidth GSM Block A



RSS-133 99% Bandwidth GSM Block B



RSS-133 99% Bandwidth GSM Block C



Radiated Emissions

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer RF Section	00312	HP	8568A	2049A01287	073102	073104
Spectrum Analyzer Display Section	00312	HP	85662A	2106A02109	073102	073104
Quasi Peak Adapter	02325	HP	85650A	2521A00932	073102	073104
Antenna cable (10 meter site D)	NA	Andrew	LDF1-50	Cable#17	100203	100204
Antenna cable from bulkhead to antenna	N/A	Pasternack	RG-214/U	Cable #33	032904	032905
Preamp to SA Cable (3 feet)	NA	Pasternack	E100316-I	Cable #22	100603	100604
Pre-amp	00010	HP	8447D	2727A05392	071602	071604
Antenna cable (Helix)	NA	Andrew	LDF1-50	Cable#19	101303	101304
Horn Antenna	01646	EMCO	3115	9603-4683	042503	042505
Microwave Pre-amp	00787	HP	83017A	3123A00282	042303	042305
24" SMA Cable	2604	Argosy	UFA147A	0-0360-200200	012304	012305
Spectrum Analyzer	02467	Agilent	E7405A	US40240225	033103	033105
2.4 GHz HPF	01440	K&L	91H31-3000	001	022003	022005
Magnetic Loop Antenna	00314	Emco	6502	2014	072302	072304
Bicon Antenna	306	AH	SAS200/540	220	092302	092304
Log Periodic Antenna	300	AH	SAS 00/516	331	092302	092304
Horn Antenna	01646	EMCO	3115	9603-4683	042503	042505
18-26.5 GHz Horn Antenna	02112	HP	84125-8008	3643A00027	070103	070105
Spectrum Analyzer	02111	HP	8593EM	3624A000159	051203	051205

PHOTOGRAPH SHOWING DIRECT CONNECT EMISSIONS

