

FCC CFR47 PART 24 SUBPART E BROADBAND



CERTIFICATION REPORT

FOR

1930MHz – 1990MHz SINGLE CHANNEL POWER AMPLIFIER

MODEL: NTQA50GA

FCC ID: E675JS0055

REPORT NUMBER: 01U0838

ISSUE DATE: 07/20/01

Prepared for
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1801 E. ST. ANDREW PLACE
SANTA ANA, CA 92705

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LAB CODE:200065-0

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1. FCC CERTIFICATION INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part2, Subpart J, Sections 2.1033 – 2.1055.

2.1033(c)(1): Applicant: POWERWAVE TECHNOLOGIES, INC.
1801 E. ST. ANDREW PLACE
SANTA ANA, CA 92705

Contact person: CLINT LAWRENCE

Telephone number: (916) 941-3167

2.1033(c)(2) FCC ID: E675JS0055

2.1033(c)(3) Instructions/Installation Manual

Refer to **Attachment**: Installation and Service manual.

2.1033(c)(4) Type of emissions

GXW (GSM)

G7W (EDGE)

2.1033(c)(5) Frequency Range

Transmit: **1930 MHz. to 1990 MHz.**

2.1033(c)(6) Range of Operation Power

0 - 33 WATTS

2.1033(c)(7) Maximum Power Rating

33 WATTS.

2.1033(c)(8) Applied voltage and currents into the final transistor elements

-48VDC @ 5 Amps maximum

2.1033(c)(9) Tune-up/Optimizations Procedure

Refer to **Attachment**: Installation and Service manual.

2.1033(c)(10) Complete Circuit Diagrams and Functional Diagram

Refer to **Attachment**: Schematics, Parts list & Block Diagram. Confidentiality is requested for these items.

2.1033(c)(10a) Means for Frequency Stabilization

Not Applicable. Eut is a power amplifier

2.1033(c)(10b) Means for Suppressing of Spurious radiation.

Not Applicable. Eut is a power amplifier.

2.1033(c)(10c) Means for Limiting Modulation.

Not Applicable. Eut is a power amplifier.

2.1033(c)(10d) Means for Limiting Power.

Gain control loop.

2.1033(c)(11)Equipment Identification

A drawing of the equipment identification nameplate appears under **Attachment:**
PROPOSED FCC ID LABEL FORMAT.

2.1033(c)(12)Photographs

Photographs of the equipment, internal and external views, are found in the
Attachment: Eut Photographs.

2.1033(c)(13)Description of Digital Modulation Techniques

Not Applicable. Eut is a power amplifier.

2.1033(c)(14) Standard Test Condition

The power amplifier was tested under the following conditions.

DC Supply Voltage: -48Vdc

The amplifier was aligned and tuned up according to manufacturer's alignment procedure, prior to testing. All data presented represents the worst case parameter being measured.

2.1033 Description of Various Base Station Configuration

Not Applicable.

TYPE OF EQUIPMENT:	1900MHz SINGLE CHANNEL POWER AMPLIFIER
MEASUREMENT DISTANCE:	(X) 3 METER () 10 METER
FCC RULES:	PART 2, PART 15, PART 24 SUBPART E
EQUIPMENT AUTHORIZATION PROCEDURE	CERTIFICATION
MODIFICATIONS MADE ON EUT	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 2, PART 15 and PART 24. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:

PETE KREBILL
EMC ASSOCIATE ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Approved & Released For CCS By:

STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

2. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
Signal Generator	HP	83732B	US3449059	3/21/01	3/21/02
Spectrum Analyzer	H.P.	8593EM	3710A00205	6/20/01	6/20/02
Pre-Amp	H.P.	8449B	3008A00369	5/30/01	5/30/02
Horn Antenna	EMCO	3115	2238	6/20/01	6/20/02
Horn Antenna	EMCO	3115	9001-3245	6/20/01	6/20/02
Horn Antenna	ARA	MWH-1826/B	1013	7/26/01	7/26/02

SUPPORT EQUIPMENT

Description	Manufacturer	Model	S/N	Cal Due
Signal Generator	Hewlett-Packard	E4431B	US39340358	11/22/02
Power Supply	Hewlett-Packard	6654A	US36391217	3/27/02
Power Meter	Hewlett-Packard	438A	3008A07236	1/29/02
Power Sensor	Hewlett-Packard	8482A	US37294292	8/07/01
Spectrum Analyzer	Hewlett-Packard	8563E	3416A02315	9/28/01

3. FCC 15 TEST RESULTS

The setup is the same as for FCC 24 testing.

Line conduction is not required, since the EUT is DC powered.

Test Result: Complies.

3.1 PRODUCT DESCRIPTION

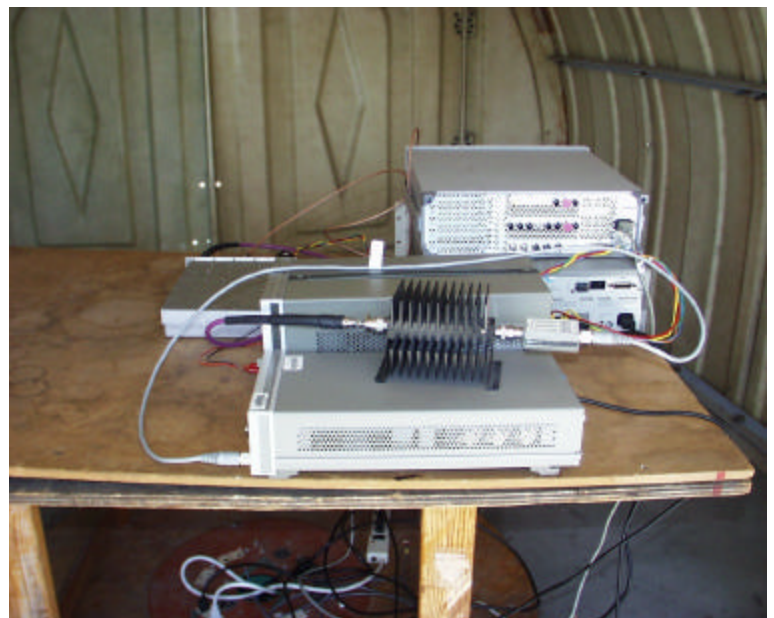
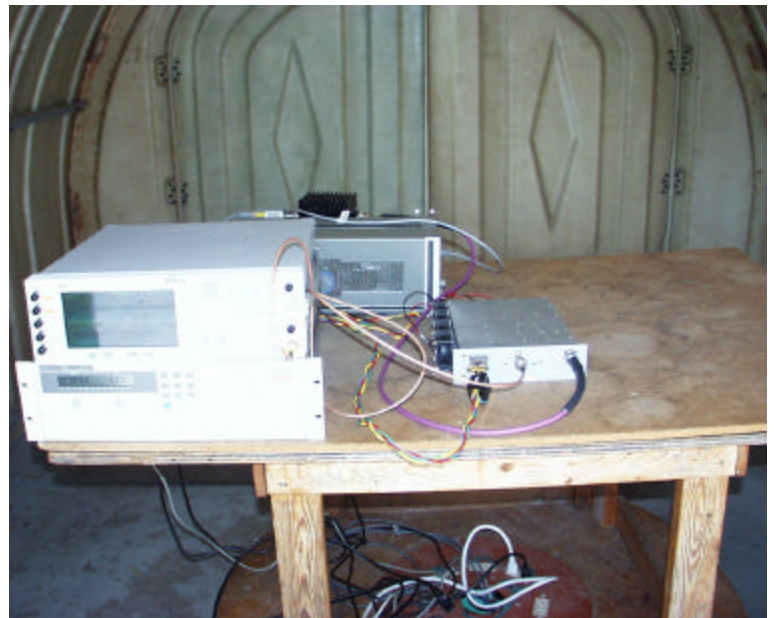
CHASSIS TYPE	METAL
LIST OF EACH OSC. OR XTAL. FREQ. (FREQ.>=1 MHz)	32KHz
POWER SUPPLY/NAME/MODEL/S.N.	BUILT-IN
POWER REQUIREMENTS	-48VDC
NO. OF EXTERNAL I/O CONNECTORS	3

3.2 TESTED SYSTEM DETAILS

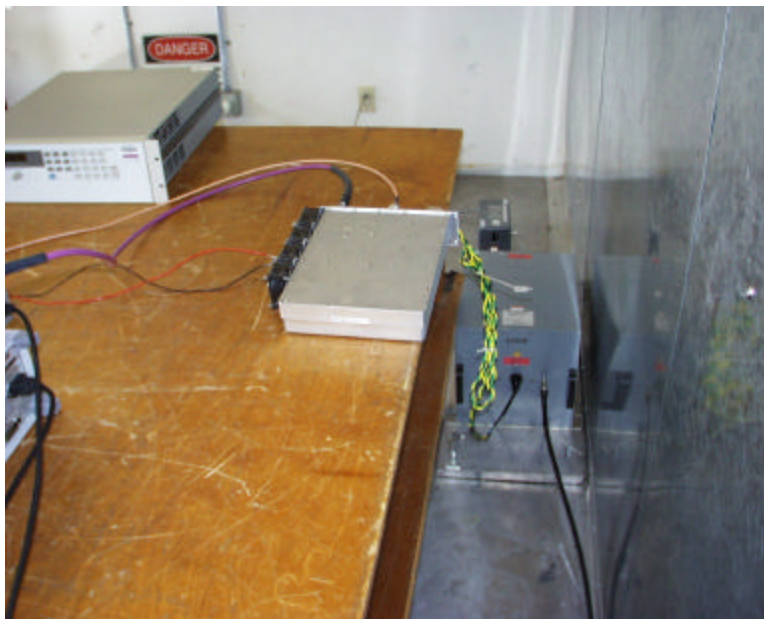
EUT				
Device Type	Manufacturer	Model Number	Serial Number	FCC ID/DoC
SINGLE CHANNEL POWER AMPLIFIER	POWERWAVE	NTQA50GA	NA/	N/A

TEST PERIPHERALS				
Device Type	Manufacturer	Model Number	Serial Number	FCC ID/Doc
Signal Generator	Hewlett-Packard	E4431B	US39340358	N/A
Power Supply	Hewlett-Packard	6654A	US36391217	N/A
Power Meter	Hewlett-Packard	438A	3008A07236	N/A
Power Sensor	Hewlett-Packard	8482A	US37294292	N/A
Spectrum Analyzer	Hewlett-Packard	8563E	3416A02315	N/A

3.3 EUT SETUP PHOTOS



RADIATED EMISSION SETUP PHOTOS (WORST EMISSION POSITION)





CONDUCTED EMISSION SETUP PHOTOS (WORST EMISSION POSITION)

3.4 TEST EQUIPMENT LIST

TEST EQUIPMENTS LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Pre-Amplifier, 25 dB	HP0.1 - 1300MHz	8447D (P5)	2944A06550	9/19/01
Antenna, Bicon	Eaton30 - 200MHz	94455-1	1214	8/10/01
Antenna, LP	EMCO200 - 2000MHz	3146	9107-3163	8/10/01
Spectrum Analyzer	HP 0.1K - 1.5GHz	8568B	2732A03661	5/10/02
Spectrum Display	HP	85662A	2816A16696	5/4/02
Quasi Peak Adapter	HP9K - 1GHz	85650A	2811A01155	5/4/02
LISN	Fischer 9k - 100MHz	CC-LISN-50/250-25-	114	7/5/01
Line Filter	Lindgren 10k - 10GHz	LMF-3489	497	N.C.R.
EMI Test Receiver	Rohde & Schwarz	ESHS 20	827129/006	4/2/02

3.5 RADIATED EMISSION

 <p>FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP</p> <p>561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888</p>						Project #: 01U0838 Report #: 010705C2 Date & Time: 07/05/01 9:51 AM Test Engr: Pete Krebill					
Company: Powerwave EUT Description: PCS 1900MHz EDGE Modulation Single Channel Amp (NTQA50GA) Test Configuration: EUT/DCSupply/Signal Generator/DCSupply and Fan/Power Meter Type of Test: EN55022 B Mode of Operation: TX EDGE Modulation 45.2dBm @ 1960MHz											
											
Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit EN B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
SN: 222No emissions detected. Below noise floor readings.											
40.00	29.60	12.24	0.88	27.33	15.39	30.00	-14.61	10mV	0.00	1.00	P
50.00	28.80	10.76	0.98	27.26	13.28	30.00	-16.72	10mV	0.00	1.00	P
60.00	29.20	7.88	1.07	27.25	10.90	30.00	-19.10	10mV	0.00	1.00	P
70.00	31.60	5.94	1.15	27.25	11.44	30.00	-18.56	10mV	0.00	1.00	P
80.00	30.00	9.04	1.21	27.23	13.02	30.00	-16.98	10mV	0.00	1.00	P
120.00	32.20	10.57	1.55	27.09	17.23	30.00	-12.77	10mV	0.00	1.00	P
Total data #: 6 V.2c											

3.6 CONDUCTED EMISSION**CONDUCTED EMISSIONS DATA (-48VDC) EN55022 B LIMITS -6dB**

Mode: 0V (-48V_RET) linked to ground.

Freq. (MHz)	PK (dBuV)	Reading QP (dBuV)	AV (dBuV)	Cross (dB)	Limit QP	AV	Margin QP (dB)	AV (dB)	Remark LINE
0.15	39.47			0	60	50	-20.53		POSITIVE
0.299	33.5			0	54.2	44.2	-20.7		POSITIVE
0.358	34.63			0	53	43	-18.37		POSITIVE
0.15	48.1		47.06	0	60	50	-11.9	-2.94	NEGATIVE
2.49	36.22		35.24	0	54	44	-17.78	-8.76	NEGATIVE
2.87	39.99		38.13	0	54	44	-14.01	-5.87	NEGATIVE
6 Worst Data									

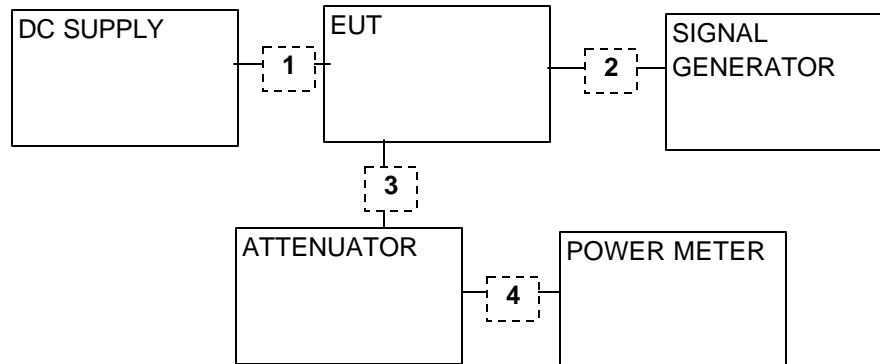
Mode: 0V (-48V_RET) floating.

Freq. (MHz)	PK (dBuV)	Reading QP (dBuV)	AV (dBuV)	Cross (dB)	Limit QP	AV	Margin QP (dB)	AV (dB)	Remark LINE
0.15	42.34			0	60	50	-17.66		POSITIVE
0.299	35.37			0	54.2	44.2	-18.83		POSITIVE
0.356	36.17			0	53	43	-16.83		POSITIVE
0.15	46.16		45.09	0	60	50	-13.84	-4.91	NEGATIVE
2.49	28.53		27.32	0	54	44	-25.47	-16.68	NEGATIVE
2.87	32.51		30.42	0	54	44	-21.49	-13.58	NEGATIVE
6 Worst Data									

3.7 EXTERNAL I/O CABLE CONSTRUCTION DESCRIPTION

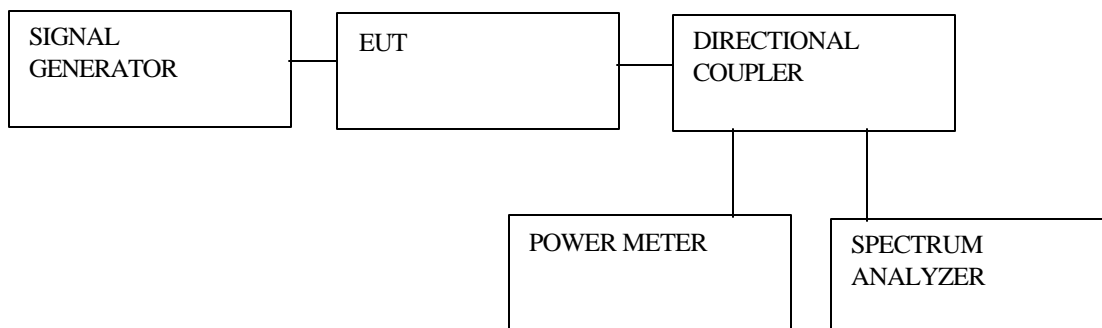
TEST I / O CABLES								
Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	DC	1	DC	UNSHIELDED	2.5	N	N	
2	RF INPUT	1	SMA	SHIELDED	1.5	Y	N	
3	RF OUTPUT	1	N-TYPE	SHIELDED	1.5	Y	N	
4	POWER SENSOR	1	N-TYPE	SHIELDED	1.5	Y	N	

3.8 CONFIGURATION BLOCK DIAGRAM



4. FCC PART 2 CERTIFICATION TEST RESULTS:

Test Set-up for the following tests:



SECTION 2.1046: RF POWER OUTPUT**Minimum Requirement:**

24.232(A); Maximum Peak output power for base station transmitters should not exceed 100 Watts.

24.232(B); Mobile/Portable stations are limited to 2 Watts EIRP peak power.

Test Procedure:

The EUT was set to maximum output power (maximum gain). RF output power was measured with Power Meter.

Test Result:

Measured with a power meter. All outputs were adjusted to 33 Watts, during testing.

SECTION 2.1047: MODULATION CHARACTERISTICS

(NOT APPLICABLE TO AMPLIFIERS)

SECTION 2.1049: OCCUPIED BANDWIDTH**Minimum requirement:**

Section 2.1049(i); transmitters designed for other types of modulation-when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

Test Procedure:

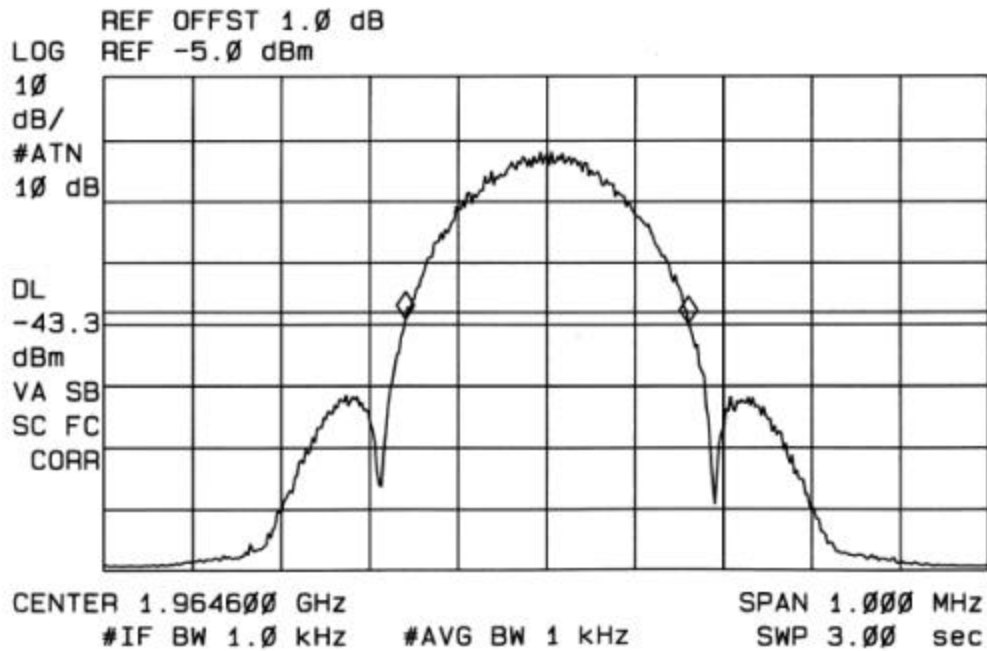
The EUT's occupied bandwidth output plot is compared with the input source plot to check that no distortion is created when the input signal is amplified by the EUT. Identical bandwidths, spans and center frequencies are used for both plots. Reference levels and attenuation are adjusted.

Test Result:

Plots of the input and output are included. Please refer to spectrum plots below.

11: 11: 57 JUL 10, 2001
POWERWAVE NTQA50GA EDGE B/W IN

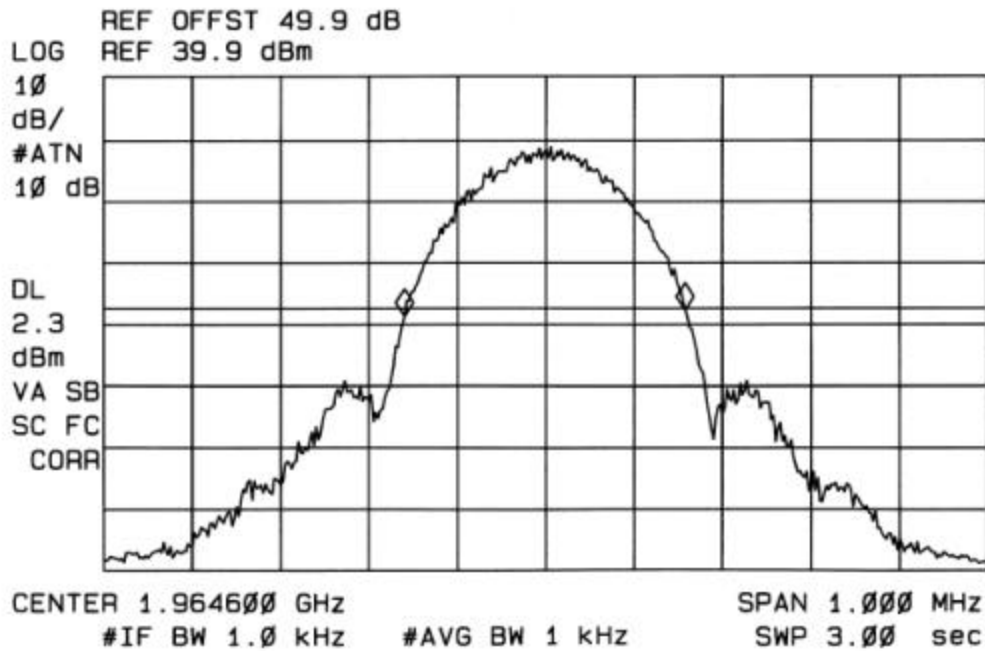
ACTV DET: PEAK
MEAS DET: PEAK GP AVG
MKR 320 kHz
-.74 dB



BANDWIDTH IN 1964.6MHz
(EDGE MODULATION)

10:57:45 JUL 10, 2001
POWERWAVE NTQA50GA EDGE B/W OUT

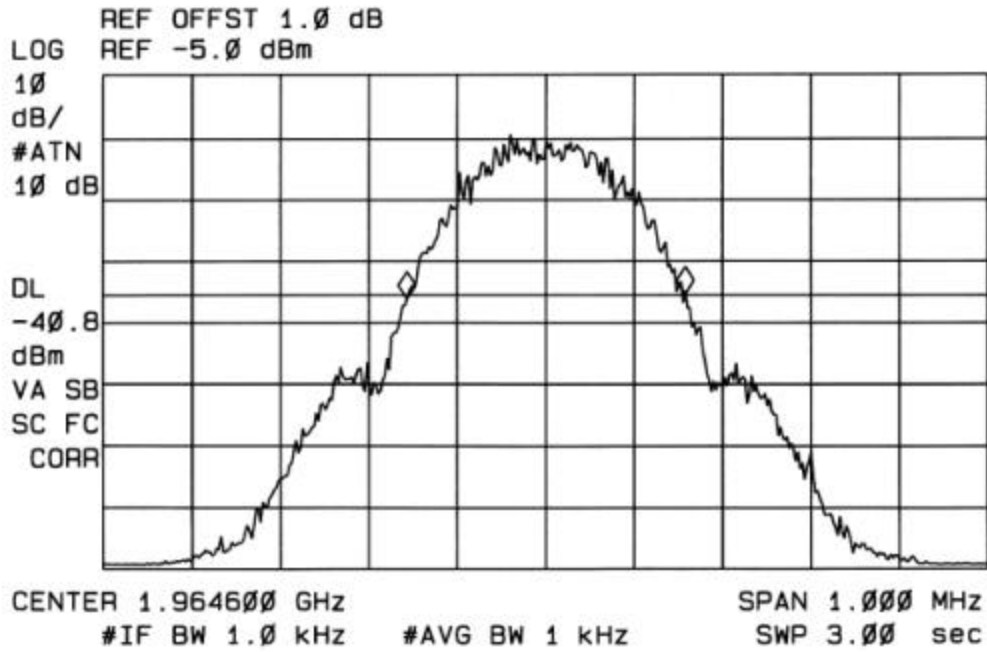
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 318 kHz
.97 dB



BANDWIDTH OUT 1964.6MHz
(EDGE MODULATION)

11:34:51 JUL 10, 2001
POWERWAVE NTQA50GA GSM B/W IN

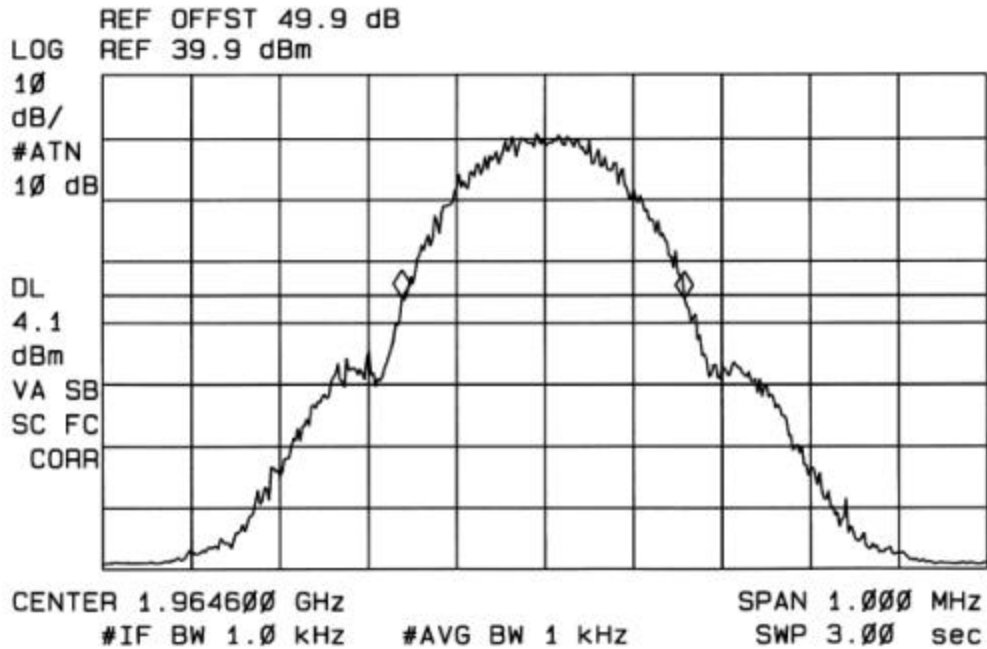
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 315 kHz
.80 dB



BANDWIDTH IN 1964.6MHz
(GSM MODULATION)

11:23:00 JUL 10, 2001
POWERWAVE NTQA50GA GSM B/W OUT

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 320 kHz
-.28 dB



BANDWIDTH OUT 1964.6MHz
(GSM MODULATION)

SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL**Minimum standard:**

24.238(a); The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not be less than $43 + 10 \log$ (mean output power in watts) dBc below the mean power output outside a licensee's frequency block.

Amplifier Mean Power = 33 Watts (45.19 dBm)

$43 + 10 \log (33 \text{ Watts}) = 58.19 \text{ dB}$

Out-of-Band and Band-edges emissions must be attenuated by the following amount:

$58.19 \text{ dBm} - 45.19 \text{ dB} = -13 \text{ dBm}$

24.238 (b) & (c):

- (1) Compliance with the out-of-band emissions requirement is based on test being performed with 1MHz analyzer RES BW.
- (2) At block edges, RES BW may be adjusted to a level at least as large as 1% of emission bandwidth. The emissions bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. For the EUT this is at least:

EDGE:

$.01 * 320\text{KHz} = 3.2 \text{ KHz}$. A RES BW of 10 KHz was used for measurement at the block edges.

GSM:

$.01 * 320\text{KHz} = 3.2 \text{ KHz}$. A RES BW of 10 KHz was used for measurement at the block edges.

Test Procedure:

An RF signal is input to the EUT set as close as possible to the bottom edge of block A (1930.4MHz). The RES BW is set to 1% of the emission bandwidth to show compliance with the -13 dBm limit, in the 1 MHz bands immediately outside and adjacent to the bottom edge of the frequency block.

For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 30 MHz to 20GHz. A display line was placed at -13 dBm to show compliance.

The measurements are then repeated with an input signal set as close as possible to the top edge of block C (1989.6MHz) and as close as possible to the top edge of block B (1964.6MHz).

Test Results:

Complies. The following table indicates the order of plots associated with the Bandwidth In, Bandwidth Out, Block Edge and Out of Band emission plots. All of the measurements are offset for external attenuation. All of the Out of Band Plots use video averaging with 100 sweeps. All of the other plots use a peak detector. See plots below.

EDGE MODULATION:

BLOCK EDGE (Block A)

BLOCK EDGE (Block B)

BLOCK EDGE (Block C)

OUT OF BAND #1 1930.4MHz

OUT OF BAND #2 1930.4MHz

OUT OF BAND #1 1964.6MHz

OUT OF BAND #2 1964.6MHz

OUT OF BAND #1 1989.6MHz

OUT OF BAND #2 1989.6MHz

GSM MODULATION:

BLOCK EDGE (Block A)

BLOCK EDGE (Block B)

BLOCK EDGE (Block C)

OUT OF BAND #1 1930.4MHz

OUT OF BAND #2 1930.4MHz

OUT OF BAND #1 1964.6MHz

OUT OF BAND #2 1964.6MHz

OUT OF BAND #1 1989.6MHz

OUT OF BAND #2 1989.6MHz

10:22:16 JUL 10, 2001

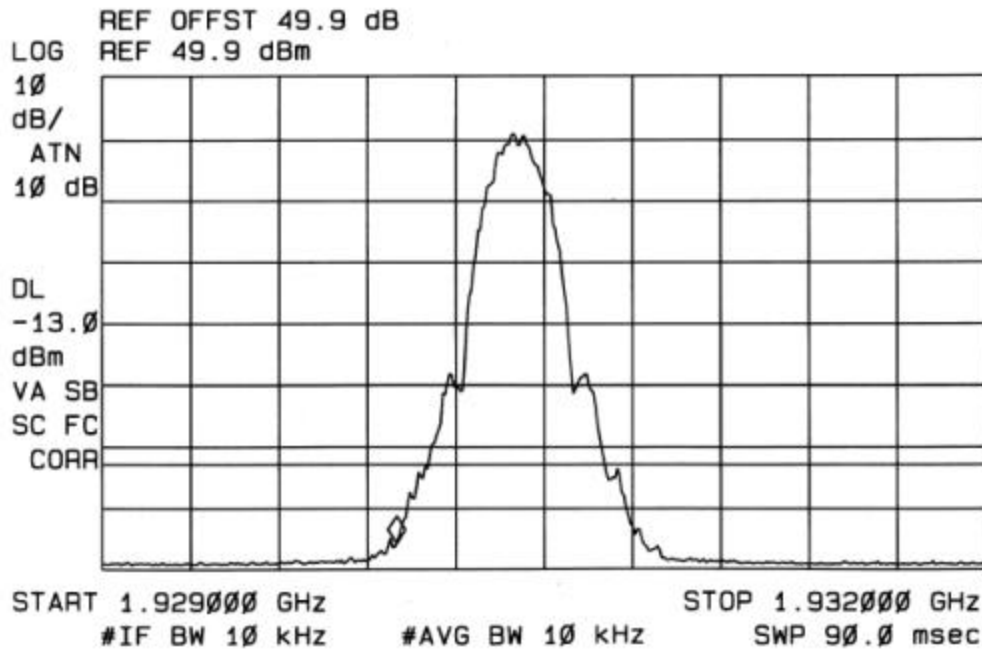
POWERWAVE NTQA50GA EDGE BLOCK EDGE Low

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 1.929998 GHz

-25.83 dBm



BLOCK EDGE (BLOCK A)
(EDGE MODULATION)

11:02:07 JUL 10, 2001

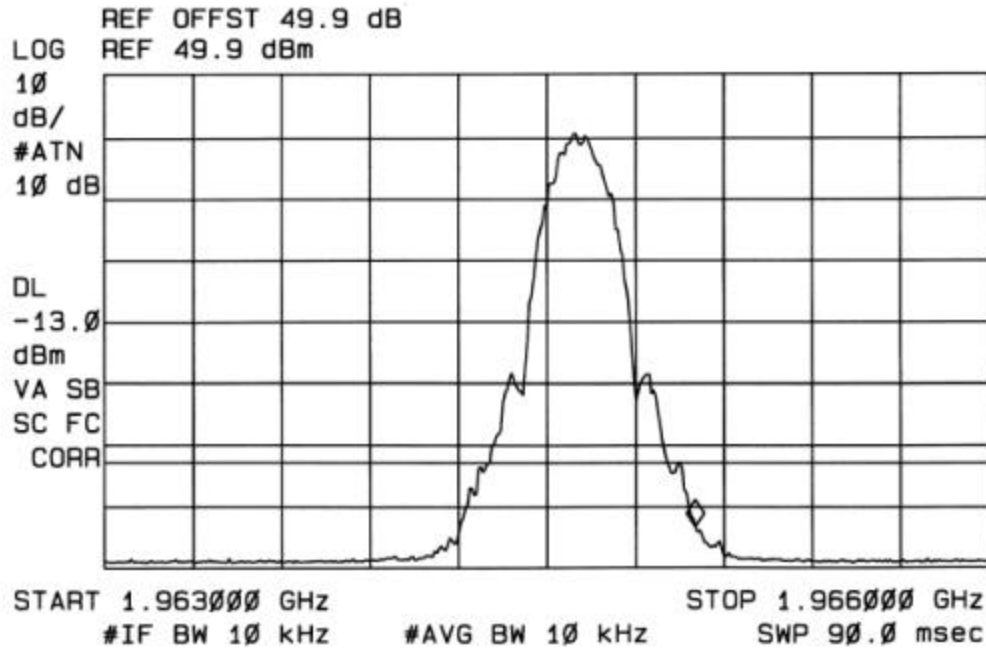
POWERWAVE NTQA50GA EDGE BLOCK EDGE MID

ACTV DET: PEAK

MEAS DET: PEAK GP AVG

MKR 1.965003 GHz

-23.41 dBm



BLOCK EDGE (BLOCK B)
(EDGE MODULATION)

10:39:42 JUL 10, 2001

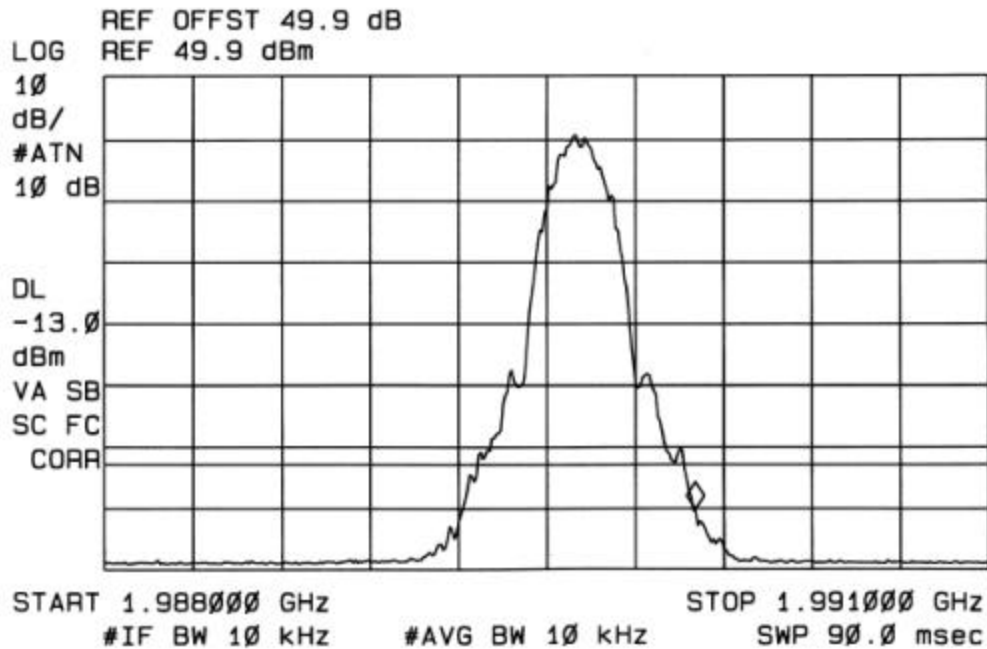
POWERWAVE NTGA50GA EDGE BLOCK EDGE HI

ACTV DET: PEAK

MEAS DET: PEAK GP AVG

MKR 1.990003 GHz

-20.32 dBm



BLOCK EDGE (BLOCK C)
(EDGE MODULATION)

10: 24: 21 JUL 10, 2001

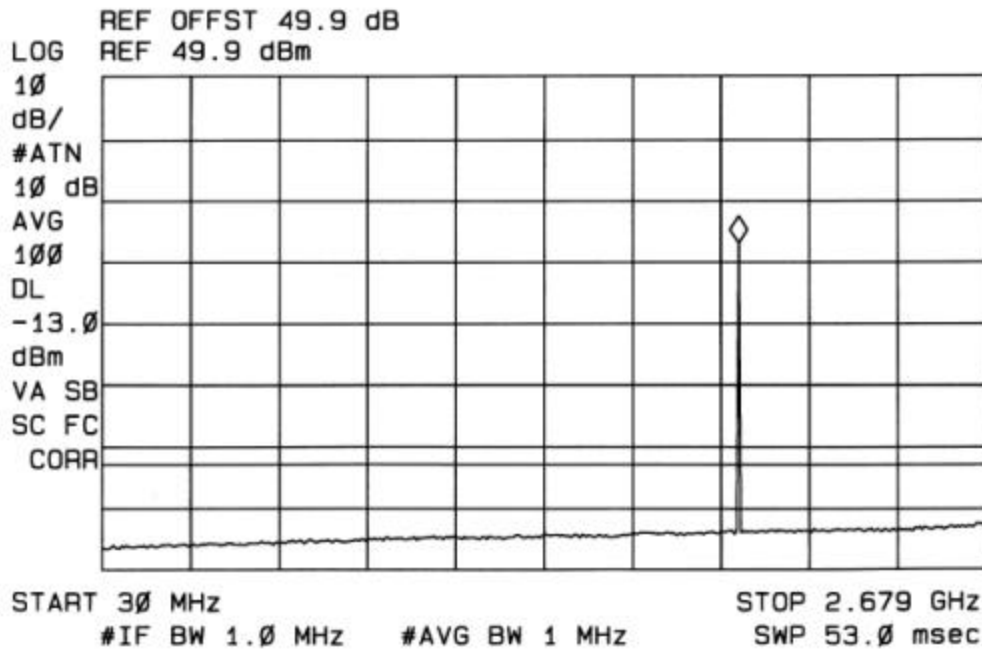
POWERWAVE NTQA50GA EDGE 1930.4MHz OUT/BAND 1

ACTV DET: SMPL

MEAS DET: PEAK GP AVG

MKR 1.937 GHz

22.66 dBm



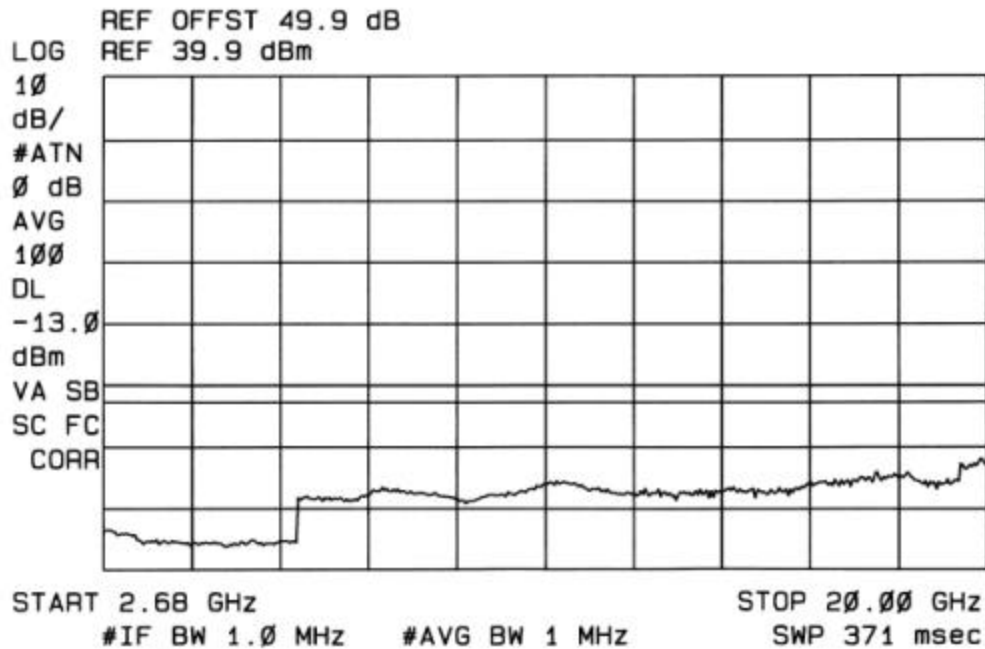
OUT OF BAND #1 1930.4MHz
(EDGE MODULATION)

10:27:59 JUL 10, 2001

POWERWAVE NTQA50GA EDGE 1930.4MHz OUT/BAND 2

ACTV DET: SMPL

MEAS DET: PEAK QP AVG



OUT OF BAND #2 1930.4MHz
(EDGE MODULATION)

11:03:41 JUL 10, 2001

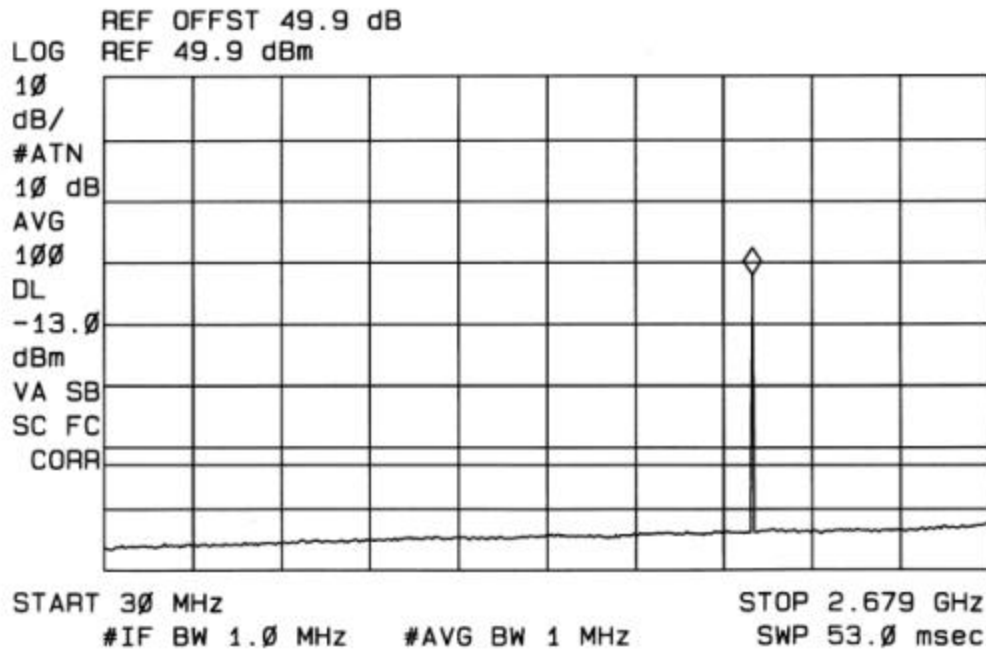
POWERWAVE NTQA50GA EDGE 1964.6MHz OUT/BAND 1

ACTV DET: SMPL

MEAS DET: PEAK GP AVG

MKR 1.970 GHz

17.59 dBm



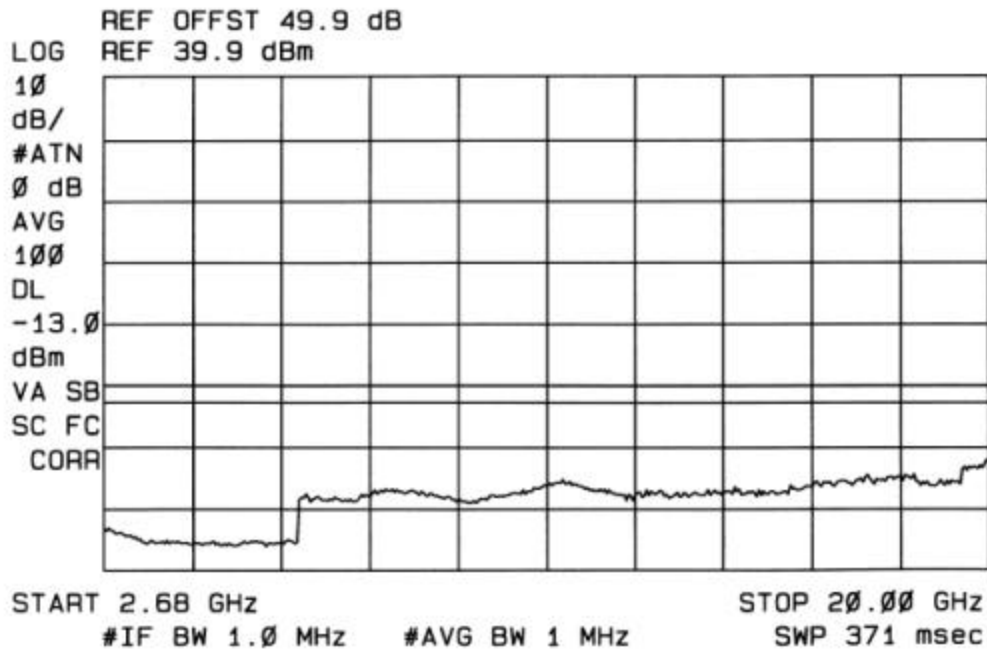
OUT OF BAND #1 1964.6MHz
(EDGE MODULATION)

11:06:18 JUL 10, 2001

POWERWAVE NTQA50GA EDGE 1964.6MHz OUT/BAND 2

ACTV DET: SMPL

MEAS DET: PEAK QP AVG



OUT OF BAND #2 1964.6MHz
(EDGE MODULATION)

10:40:58 JUL 10, 2001

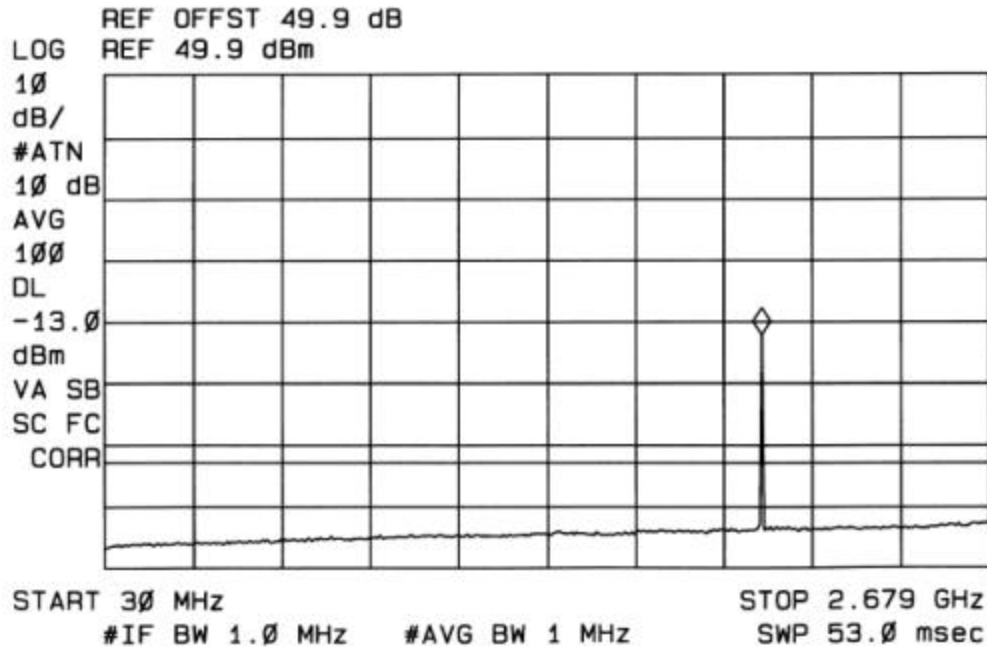
POWERWAVE NTQA50GA EDGE 1989.6MHz OUT/BAND 1

ACTV DET: SMPL

MEAS DET: PEAK GP AVG

MKR 1.997 GHz

7.50 dBm



OUT OF BAND #1 1989.6MHz
(EDGE MODULATION)

10:45:09 JUL 10, 2001

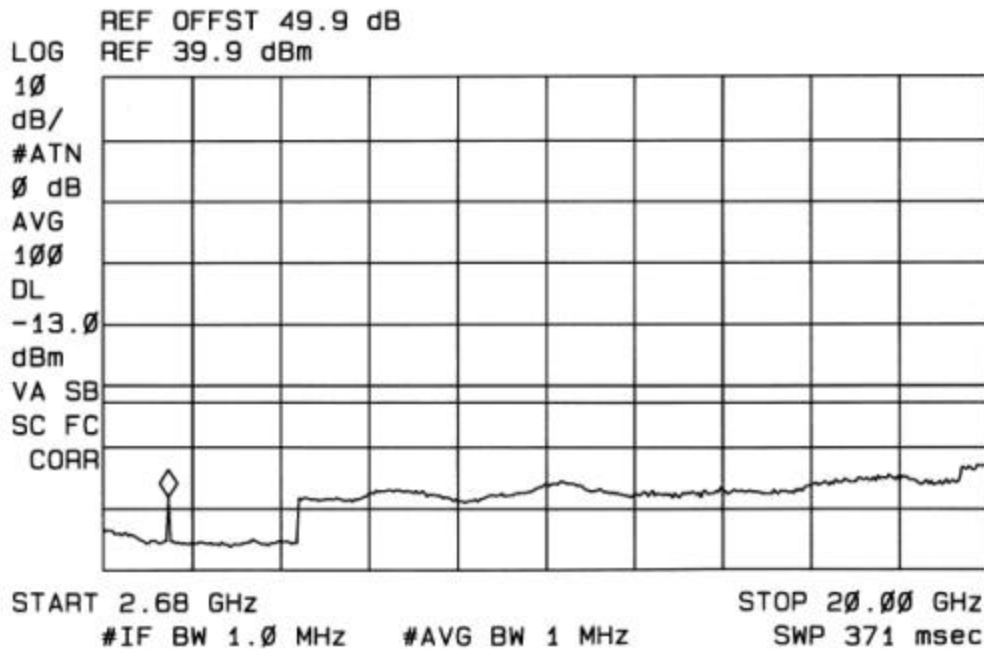
POWERWAVE NTQA50GA EDGE 1989.6MHz OUT/BAND 2

ACTV DET: SMPL

MEAS DET: PEAK GP AVG

MKR 3.93 GHz

-28.24 dBm



OUT OF BAND #2 1989.6MHz
(EDGE MODULATION)

11:42:12 JUL 10, 2001

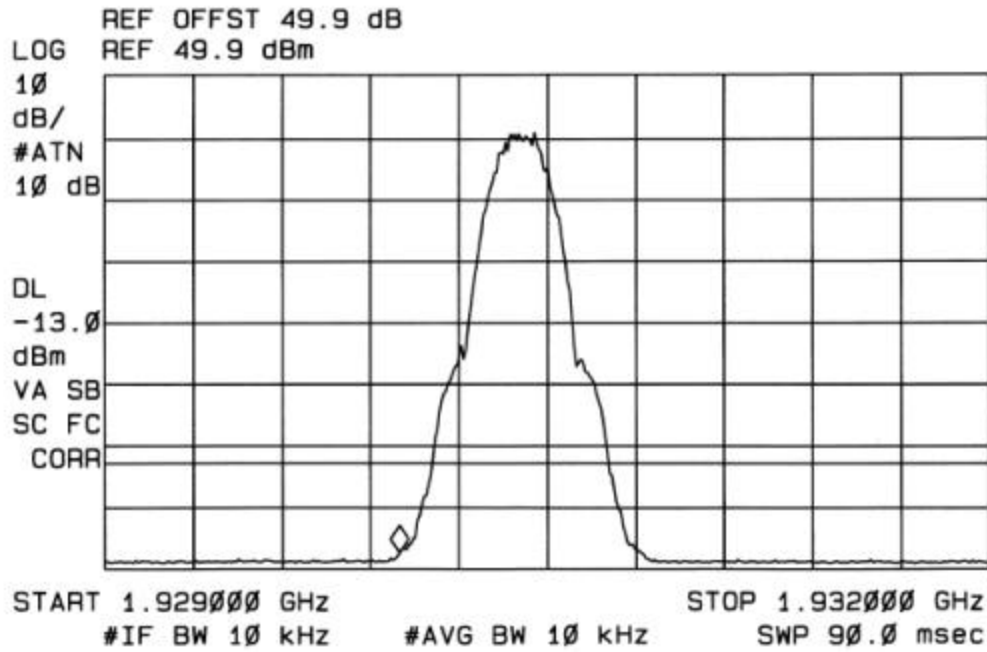
POWERWAVE NTQA50GA GSM BLOCK EDGE LOW

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 1.929998 GHz

-27.43 dBm



BLOCK EDGE (BLOCK A)
(GSM MODULATION)

11:24:53 JUL 10, 2001

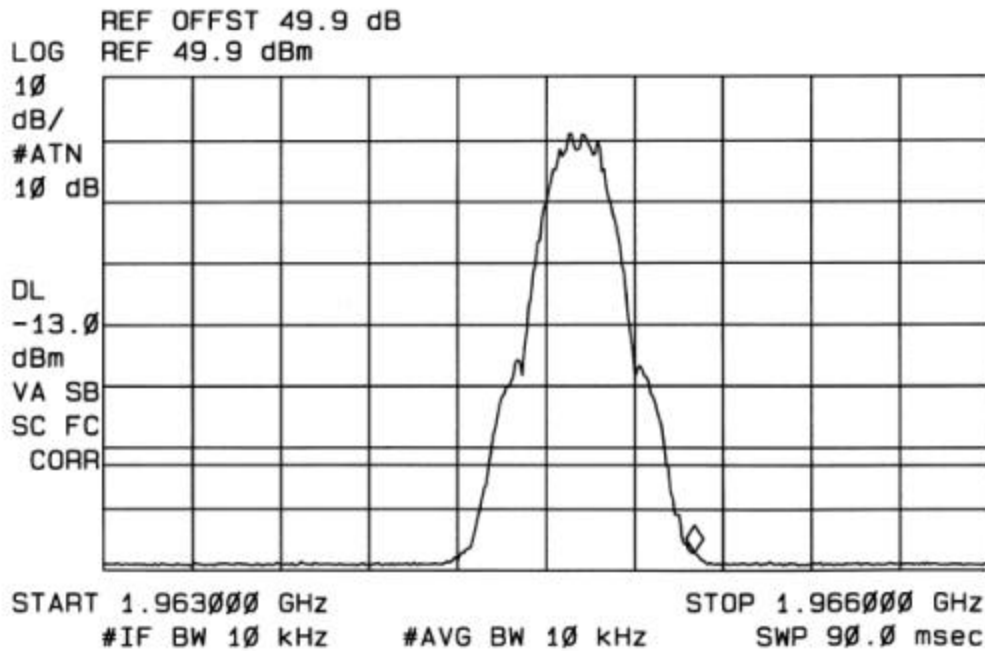
POWERWAVE NTQA50GA GSM BLOCK EDGE M10

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 1.965003 GHz

-27.12 dBm



BLOCK EDGE (BLOCK B)
(GSM MODULATION)

11:54:26 JUL 10, 2001

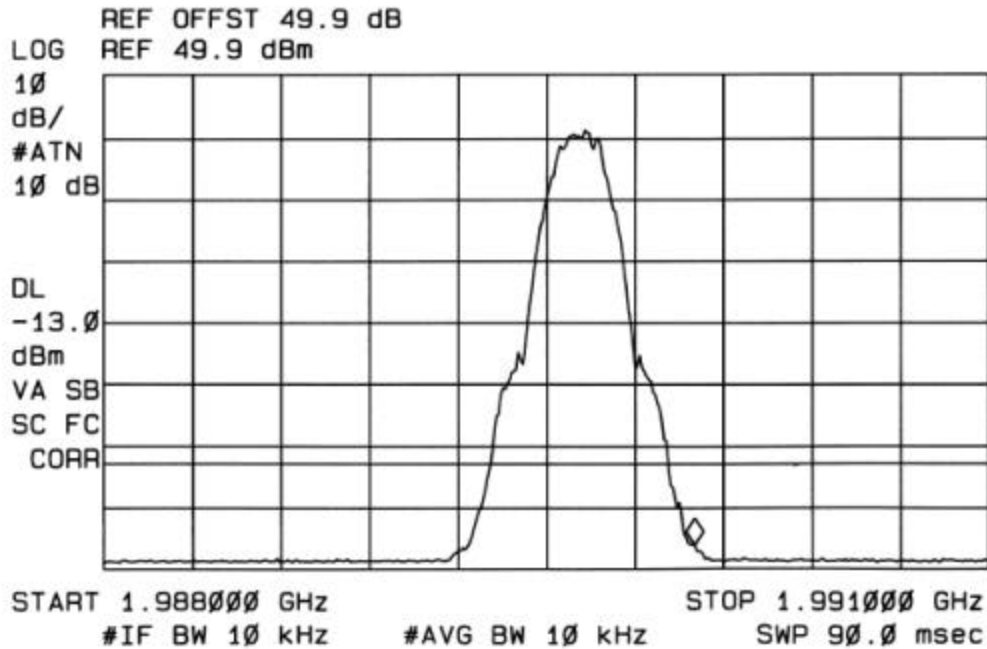
POWERWAVE NTQA50GA GSM BLOCK EDGE #1

ACTV DET: PEAK

MEAS DET: PEAK GP AVG

MKR 1.990003 GHz

-26.21 dBm



BLOCK EDGE (BLOCK C)
(GSM MODULATION)

11:44:48 JUL 10, 2001

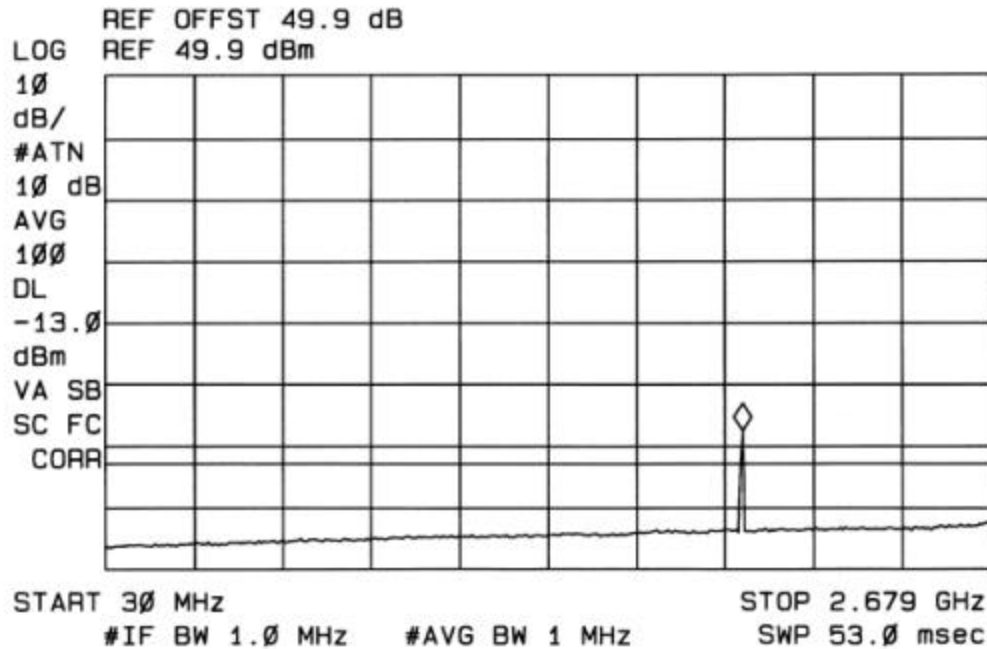
POWERWAVE NTQA50GA GSM 1930.4MHz OUT/BAND 1

ACTV DET: SMPL

MEAS DET: PEAK QP AVG

MKR 1.937 GHz

-7.72 dBm



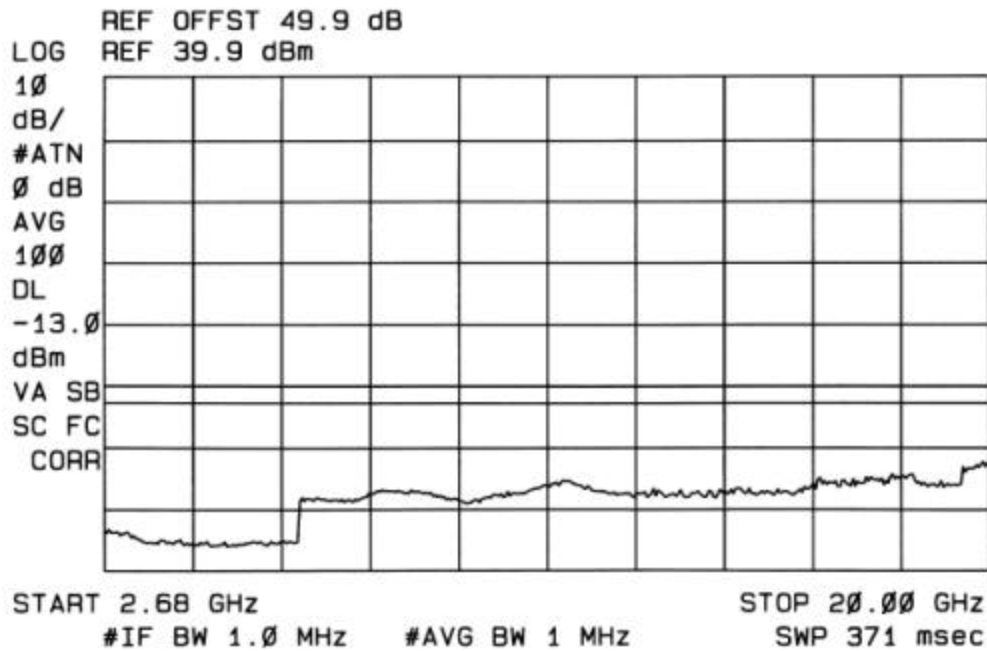
OUT OF BAND #1 1930.4MHz
(GSM MODULATION)

11: 47: 43 JUL 10, 2001

POWERWAVE NTQA50GA GSM 1930.4MHz OUT/BAND 2

ACTV DET: SMPL

MEAS DET: PEAK GP AVG



OUT OF BAND #2 1930.4MHz
(GSM MODULATION)

11: 25: 56 JUL 10, 2001

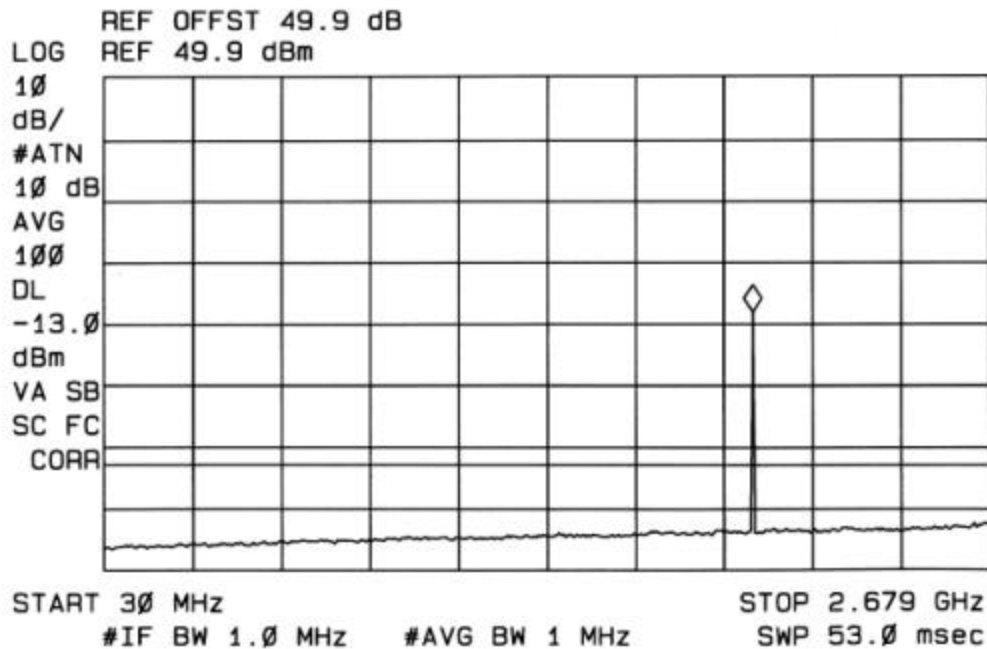
POWERWAVE NTQA50GA GSM 1964.6MHz OUT/BAND 1

ACTV DET: SMPL

MEAS DET: PEAK GP AVG

MKR 1.970 GHz

11.58 dBm



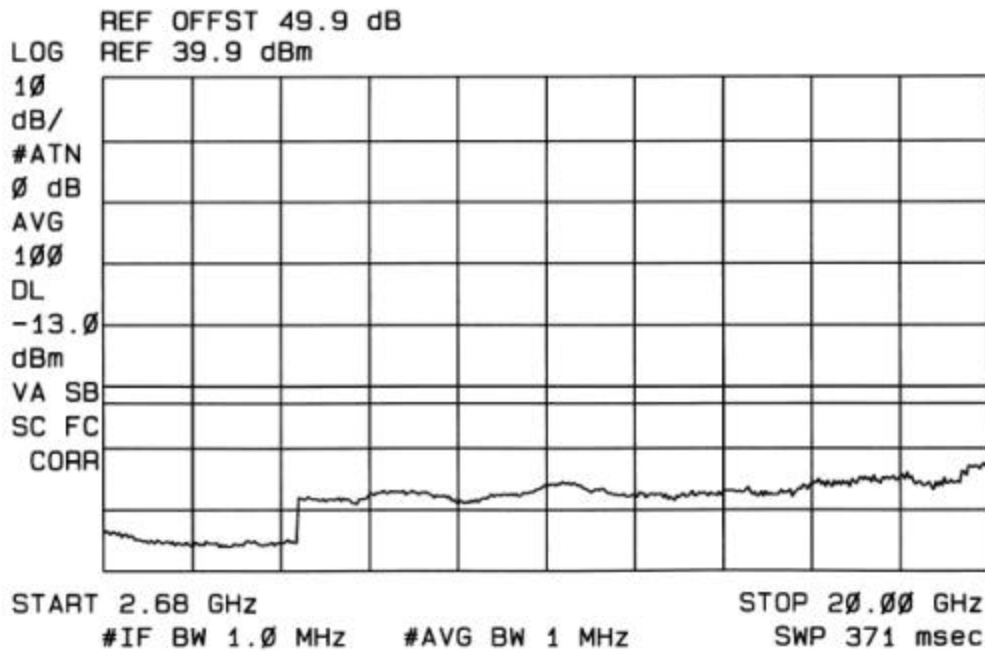
OUT OF BAND #1 1964.6MHz
(GSM MODULATION)

11:28:31 JUL 10, 2001

POWERWAVE NTQA50GA GSM 1964.6MHz OUT/BAND 2

ACTV DET: SMPL

MEAS DET: PEAK QP AVG



OUT OF BAND #2 1964.6MHz
(GSM MODULATION)

11:55:29 JUL 10, 2001

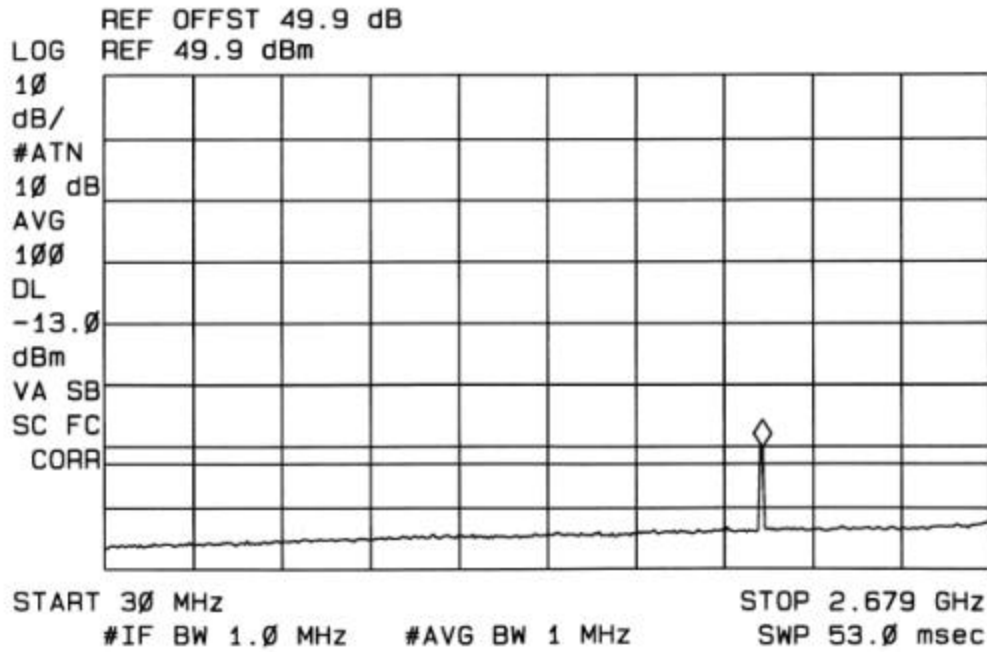
POWERWAVE NTQA50GA GSM 1989.6MHz OUT/BAND 1

ACTV DET: SMPL

MEAS DET: PEAK QP AVG

MKR 1.997 GHz

-10.36 dBm



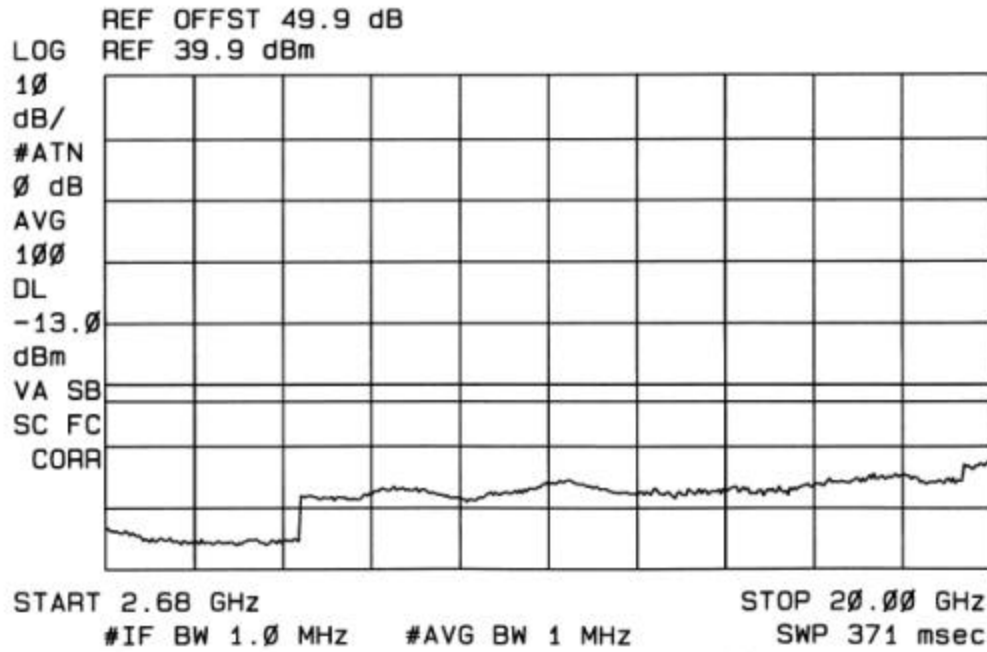
OUT OF BAND #1 1989.6MHz
(GSM MODULATION)

11:57:53 JUL 10, 2001

POWERWAVE NTQA50GA GSM 1989.6MHz OUT/BAND 2

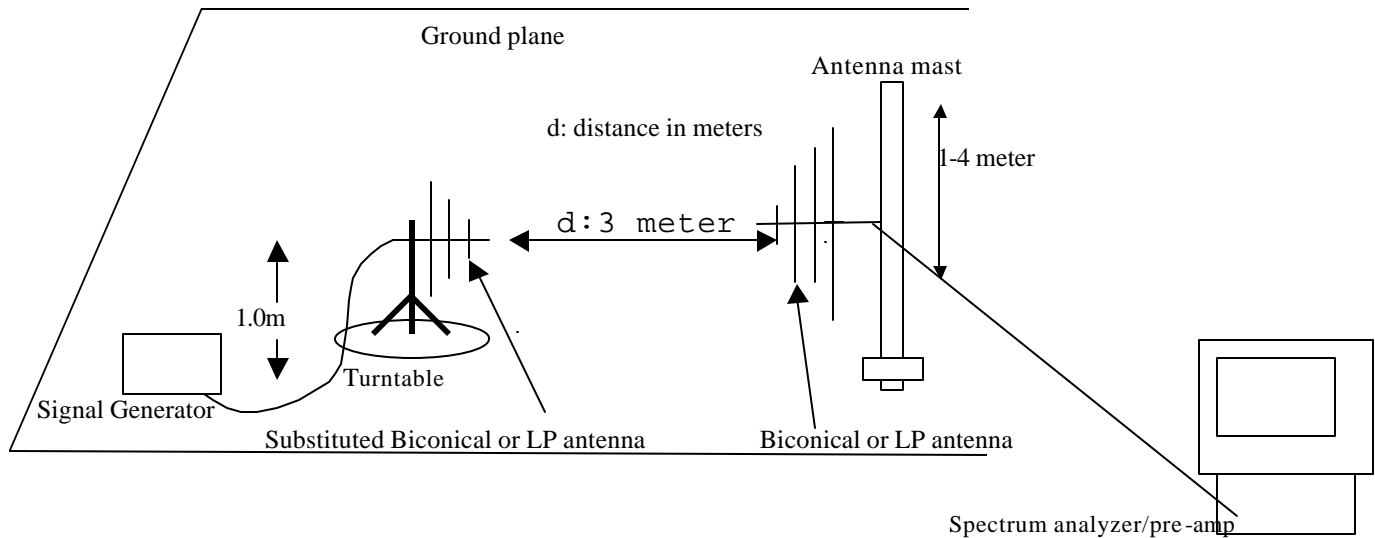
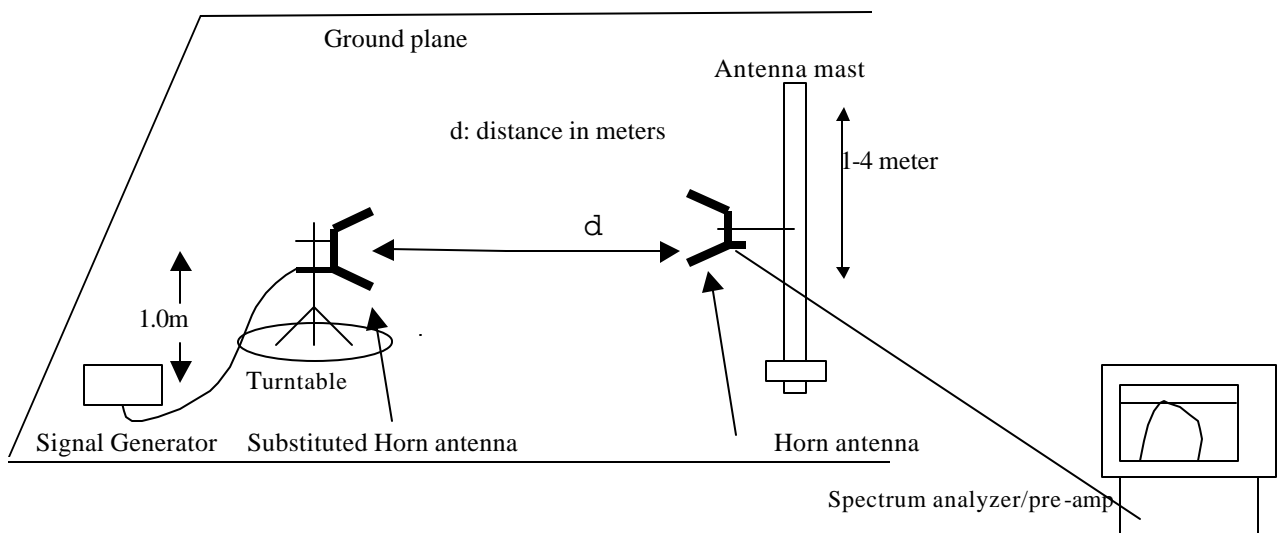
ACTV DET: SMPL

MEAS DET: PEAK QP AVG



OUT OF BAND #2 1989.6MHz

(GSM MODULATION)

SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION.**SUBSTITUTION METHOD: (Radiated Emissions)****Test Set-up:****Radiated BELOW 1GHz****Radiated ABOVE 1 GHz**

The actual signal generated by the measured equipment may be determined by means of a substitution measurement in which a known signal source replaces the device to be measured.

The substitution antenna will replace the EUT antenna in the same position and in vertical polarization. The frequency of the signal generator shall be set to the frequencies that were measured on the EUT. The test antenna shall be raised and lowered, if necessary, to ensure that the maximum signal is still being received. The signal generator, output level, shall be adjusted until an equal or a known related level to what was measured from the EUT is obtained in the spectrum analyzer.

The radiated power is equal to the power supplied by the signal generator

The formula, to calculate the true reading, is: True reading = dBm + GdBd - CL

dBm = signal generator output level

GdBd = the gain in dBd of the substitution antenna

CL = the cable loss

The calculated True reading is then compared to the limit and should not exceed the limit.

This method must be performed for every emission measured from the Eut. This shall also be repeated for horizontal polarization.

Minimum Requirement:

The magnitude of each spurious and harmonic emissions detected as being radiated from the EUT must be at a level no more than $43 + 10 \log$ (mean output power, watts) dB below the mean power output.

Test procedure:

EUT antenna output was terminated with a 50-ohm load. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 1 meter from the EUT. The transmitter was operated at full power. The radiated emissions substitution method shown above was performed.

Test Result:

Complies. The maximum readings so obtained are recorded in an attached spreadsheet below.

RADIATED SUBSTITUTION DATA

Powerwave
01U0838
NTQA 50GA

FCC 24.238
Substitution Measurements

7/6/01
Pete Krebill

Frequency MHz	SA reading dBuV	SA reading dBuV	Sig Gen dBm	Sig Gen dBm	CL dB	Gain dBi	Gain dBd	ERP dBm	ERP dBm	Limit dBm	Margin dB	Margin dB
	Horizontal	Vertical	Horizontal	Vertical				Horizontal	Vertical		Horizontal	Vertical
1960	56.8	66.6	-48.6	-35.5	2.7	9.9	7.7	-38.2	-25.1	-13	-25.2	-12.1
5880	46	46.4	-66.6	-66	5.1	10.2	8	-53.5	-52.9	-13	-40.5	-39.9
7840	<u>45.3</u>	<u>47.2</u>	<u>-62.6</u>	<u>-61.6</u>	5.85	11.1	8.9	-47.85	-46.85	-13	-34.85	-33.85
9800	<u>45.4</u>	<u>42.2</u>	<u>-61.6</u>	<u>-57.6</u>	6.6	11.8	9.6	-45.4	-41.4	-13	-32.4	-28.4
11760	45.1	45.2	-59.6	-55.6	7.2	12.6	10.4	-42	-38	-13	-29	-25
13720	<u>50.5</u>	<u>50.4</u>	<u>-48.6</u>	<u>-48.6</u>	8.1	11.4	9.2	-31.3	-31.3	-13	-18.3	-18.3
15680	49.8	49.8	-45.6	-42.6	9.3	14.5	12.3	-24	-21	-13	-11	-8
17640	<u>50.3</u>	<u>50.3</u>	<u>-44.6</u>	<u>-36.6</u>	10.05	9.1	6.9	-27.65	-19.65	-13	-14.65	-6.65
19600	<u>53.9</u>	<u>54.8</u>	<u>-49.6</u>	<u>-49.3</u>	10.95	23.9	21.7	-16.95	-16.65	-13	-3.95	-3.65
1931												
3862	49.8	56.6	-54.6	-45.6	2.7	9.9	7.7	-44.2	-35.2	-13	-31.2	-22.2
5793	45	50.3	-51.6	-51.6	5.1	10.2	8	-38.5	-38.5	-13	-25.5	-25.5
1989												
3978	58.9	70.7	-45.6	-31.6	2.7	9.9	7.7	-35.2	-21.2	-13	-22.2	-8.2
5967		48.8		-55.6	5.1	10.2	8		-42.5	-13		-29.5

All underlined readings are noise floor readings. Noise floor readings for 1931 MHz and 1989 MHz harmonics are nearly identical.

SECTION 2.1055: FREQUENCY STABILITY

(NOT APPLICABLE, EUT IS AN AMPLIFIER)