FCC CFR47 PART 24 E CERTIFICATION

TEST REPORT

FOR

1900 MHz CDMA MULTI-CHANNEL AMPLIFIER

MODEL: NTGY81AC

FCC ID: E675JS0059

REPORT NUMBER: 02U1245-1

ISSUE DATE: APRIL 12, 2002

Prepared for
POWERWAVE TECHNOLOGIES, INC.
1801 E. ST. ANDREW PLACE
SANTA ANA, CA 92705
USA

Prepared by
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TABLE OF CONTENT

1. TEST RESULT CERTIFICATION

COMPANY NAME: **POWERWAVE**
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EUT DESCRIPTION: **1900 MHZ CDMA MULTI-CHANNEL AMPLIFIER**

MODEL NAME: **NTGY81AC**

DATE TESTED: **APRIL 9 - 11, 2002**

EQUIPMENT TYPE	1930-1990 MHz POWER AMPLIFIER
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 2, 15 and 24 Subpart E

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirement set forth in CFR 47, PART 24 Subpart E-Broadband PCS. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

Warning : This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Released For CCS By:

MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

KERWIN CORPUZ
ASSOCIATE EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

This product is design to provide power gain over the PCS cellular band transmit frequency range of 1930 MHz to 1990 MHz, with a maximum power output of 50 Watts.

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2))

6. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

7. APPLICABLE RULES AND BRIEF TEST RESULT

§24.232- POWER LIMIT

24.232(a); Maximum Peak output power for base station transmitters should not exceed 100 Watts EIRP (equivalent isotropically radiated power).

Spec limit: As specified above, 100W maximum.
Test result:Amplifier rated power is 50watts. All outputs were adjusted to 47.0 dBm (50Watts), during testing.

TYPE OF EMISSIONS

F9W (CDMA)

§24.235- FREQUENCY STABILITY

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Spec limit: As stated above.
Test result: Not Applicable, EUT is a power amplifier.

§24.238- EMISSION LIMITS

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.

Power Amplifier Mean Power = 50 Watts (47 dBm)
43 + 10 log (50 Watts) = 60 dB

Out-of-Band and Band-Edges emissions must be attenuated by the following amount:
47 dBm – 60 dB = -13dBm
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:

CDMA:
0.01 * 1.25 MHz = 12.5 kHz. A RES BW of 30 kHz was used for measuring at the block edges.

Spec limit: As specified as above.
Test result: no non-compliance noted.

§2.1057- SPECTRUM RANGE TO BE INVESTIGATED

Lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:

(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(2) If the equipment operates at or above 10 GHz and below 30 GHz:
to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

(3) If the equipment operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower.

(b) Particular attention should be paid to harmonics and sub-harmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency.
Radiation at the frequencies of multiplier stages should also be checked.

(c) The amplitude of spurious emissions, which are attenuated more than 20 dB below the permissible value, need not be reported.

(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

Spec limit: Frequency investigation range from 30MHz to tenth harmonic (i.e. 20 GHz.).

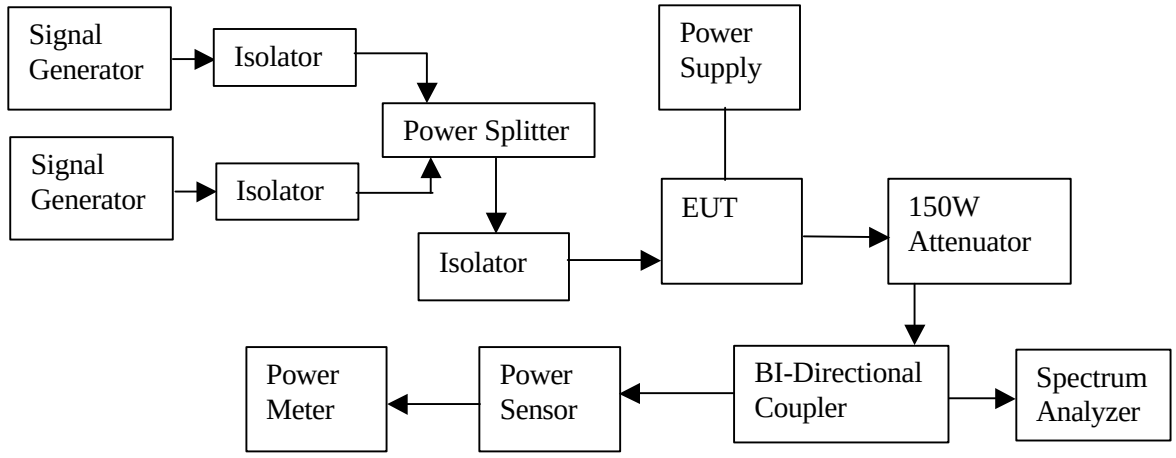
8. TEST SETUP, PROCEDURE AND RESULT

8.1. SECTION 2.1046: RF POWER OUTPUT

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Generator	AGILENT	E4432B	US40053529	2/28/03
Signal Generator	HP	E4431B	US39340357	10/27/02
Isolator	Raditek	RADI-CC-S3-10W	N/A	N/A
Isolator	Raditek	RADI-CC-S3-10W	N/A	N/A
Power Splitter	HP	11667A	18372	N/A
Isolator	ALCATEL	20A125-31	4595	N/A
150W Attenuator	NARDA	769.30	04983	N/A
BI-Direct. Coupler	NARDA	4226-20	02404	N/A
Power Sensor	HP	8481A	3318A99301	6/14/02
Power Meter	HP	438A	3048U53273	3/31/03
Power Supply	HP	6032A	3510A11093	10/31/02
Spectrum Analyzer	HP	8593EM	3710A00205	6/20/02

TEST SETUP



NOTE: All I/O cables used are N type to SMA with the length of 0.3 meter ~ 1.5 meter

TEST PROCEDURE

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

RESULT

Measured with power meter. All outputs were adjusted to 50 watts (47 dBm) during testing.

8.2. SECTION 2.1047: MODULATION CHARACTERISTICS

(NOT APPLICABLE, EUT IS A POWER AMPLIFIER)

8.3. SECTION 2.1049: OCCUPIED BANDWIDTH

SECTION 2.1049(i)

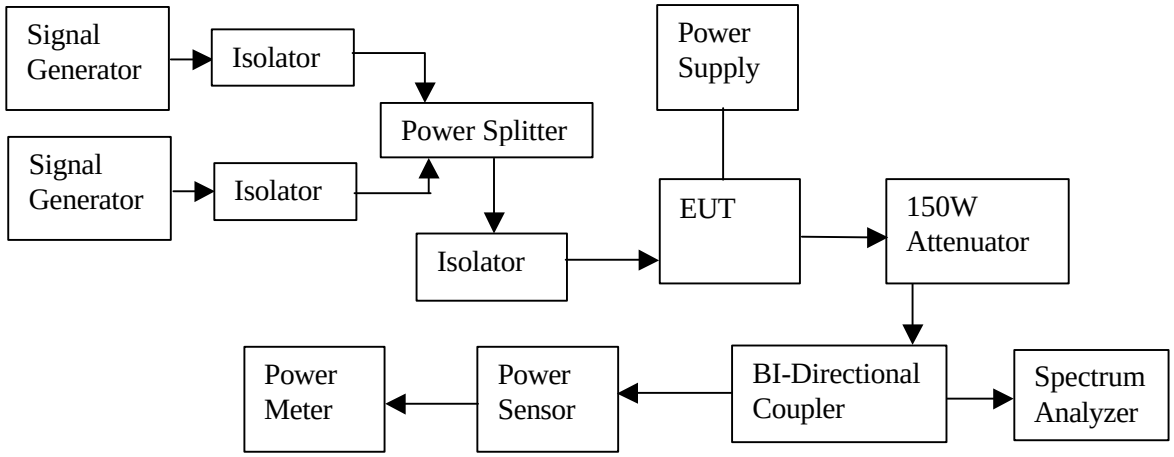
Transmitters designed for other types of modulation – when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used. A description of the input signal should be supplied.

INSTRUMENTS LIST

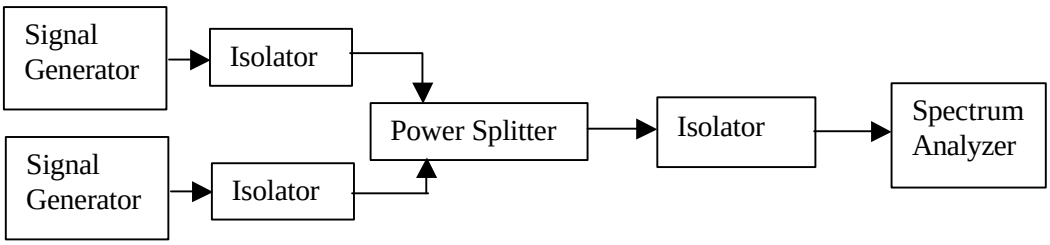
EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Generator	AGILENT	E4432B	US40053529	2/28/03
Signal Generator	HP	E4431B	US39340357	10/27/02
Isolator	Raditek	RADI-CC-S3-10W	N/A	N/A
Isolator	Raditek	RADI-CC-S3-10W	N/A	N/A
Power Splitter	HP	11667A	18372	N/A
Isolator	ALCATEL	20A125-31	4595	N/A
150W Attenuator	NARDA	769.30	04983	N/A
BI-Direct. Coupler	NARDA	4226-20	02404	N/A
Power Sensor	HP	8481A	3318A99301	6/14/02
Power Meter	HP	438A	3048U53273	3/31/03
Power Supply	HP	6032A	3510A11093	10/31/02
Spectrum Analyzer	HP	8593EM	3710A00205	6/20/02

TEST SETUP

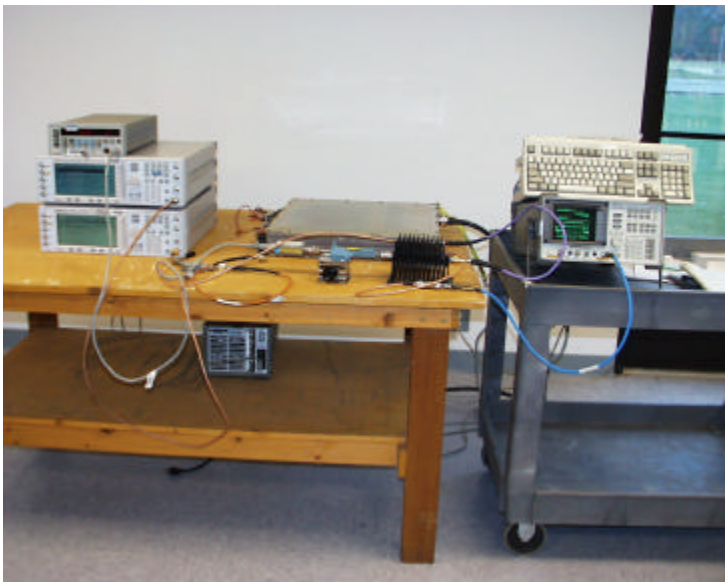
OUTPUT SETUP



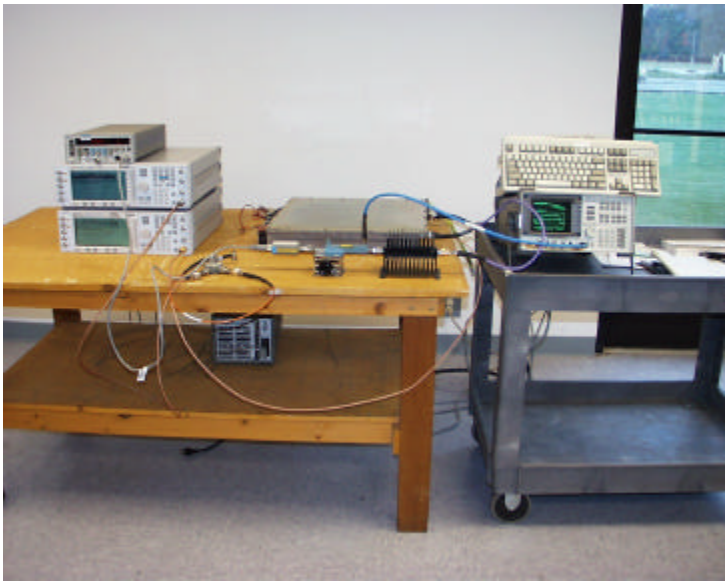
INPUT SETUP



NOTE: All I/O cables used are N type to SMA with the length of 0.3 meter ~ 1.5 meter



INPUT SETUP



OUTPUT SETUP

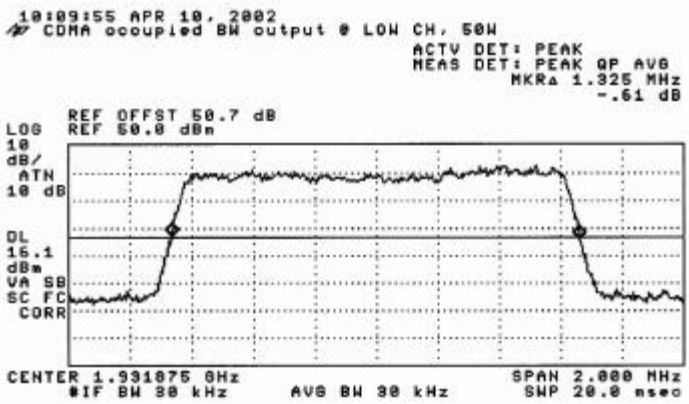
TEST PROCEDURE

The EUT's occupied bandwidth output plot is compared with the input source plot to check that the output bandwidth is representative of the input bandwidth. Identical bandwidths, spans and center frequencies are used for both plots. Reference levels and attenuation are adjusted.

RESULT

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

*** CDMA OCCUPIED BANDWIDTH *** S/N: NNTM74PE080D with ACE filter		
Plot#	**Description**	**Bandwidth (MHz)**
1	Low Channel Output @ 1931.875 MHz	1.325
2	Mid Channel Output @ 1960 MHz	1.350
3	High Channel Output @ 1988.125 MHz	1.345
4	Low Channel Input @ 1931.875 MHz	1.330
5	Mid Channel Input @ 1960 MHz	1.350
6	High Channel Input @ 1988.125 MHz	1.345



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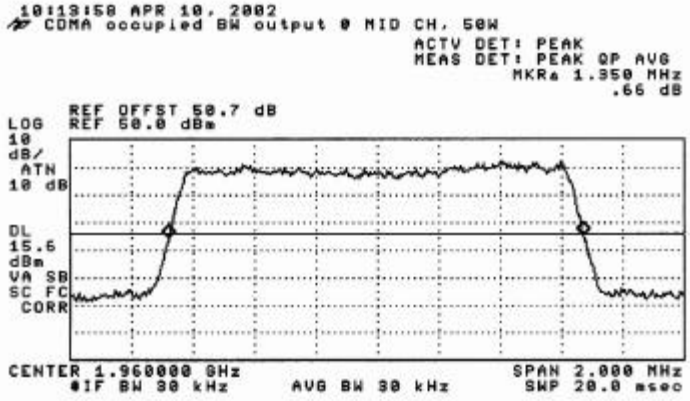

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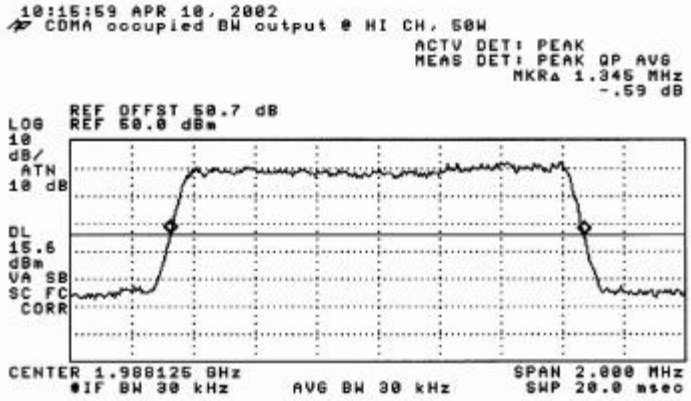

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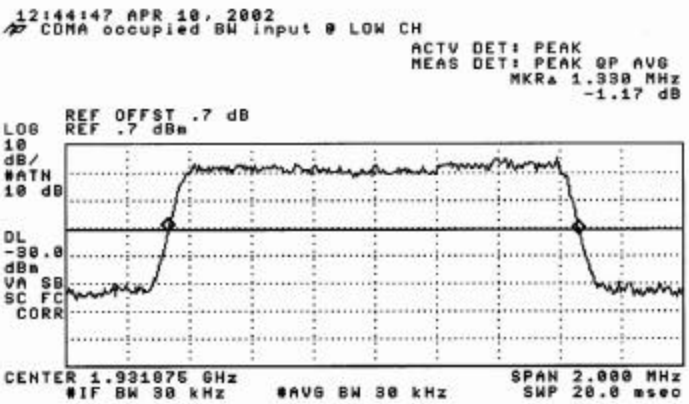

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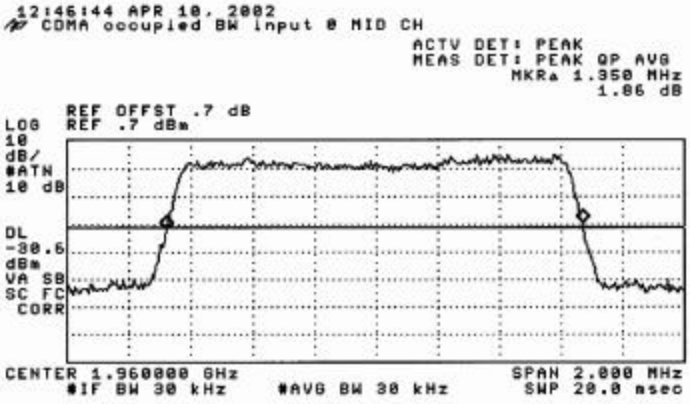

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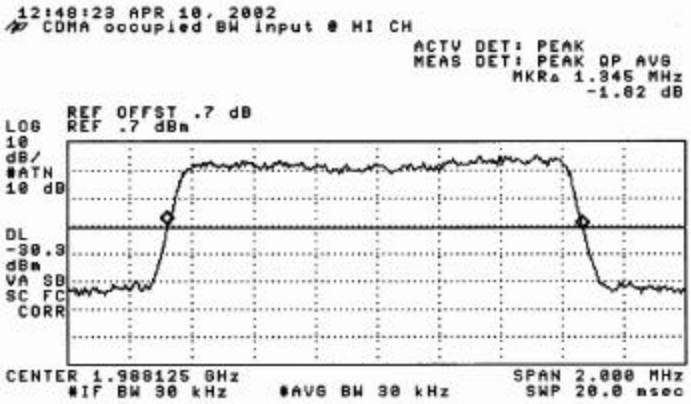

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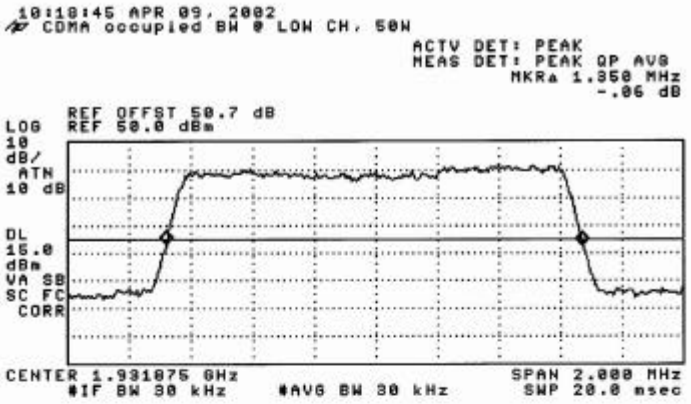
*** CDMA OCCUPIED BANDWIDTH *** S/N: NNTM74PE0805 with FILTRONICS filter		
Plot#	**Description**	**Bandwidth (MHz)**
7	Low Channel Output @ 1931.875 MHz	1.350
8	Mid Channel Output @ 1960 MHz	1.360
9	High Channel Output @ 1988.125 MHz	1.355
10	Low Channel Input @ 1931.875 MHz	1.345
11	Mid Channel Input @ 1960 MHz	1.360
12	High Channel Input @ 1988.125 MHz	1.360



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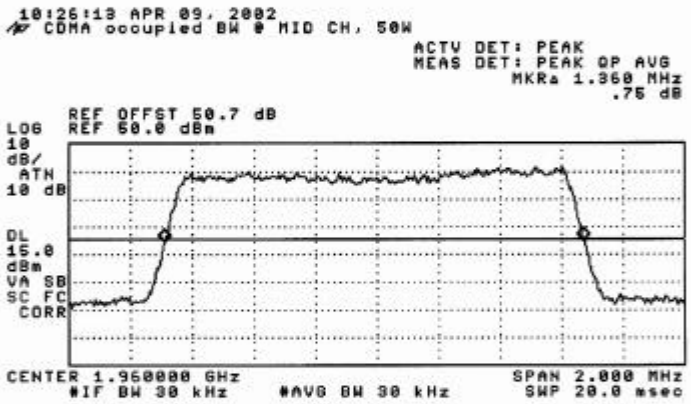

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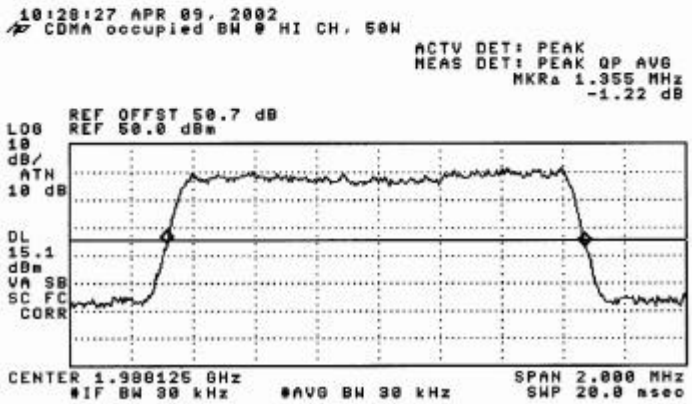

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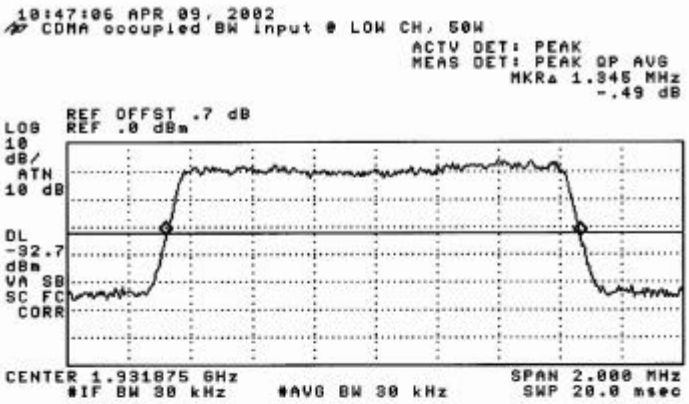

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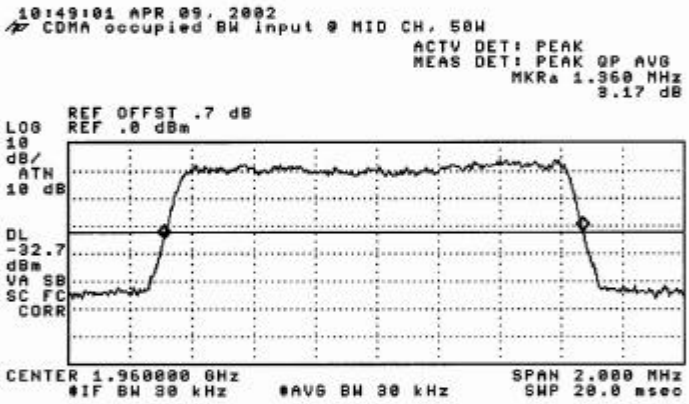

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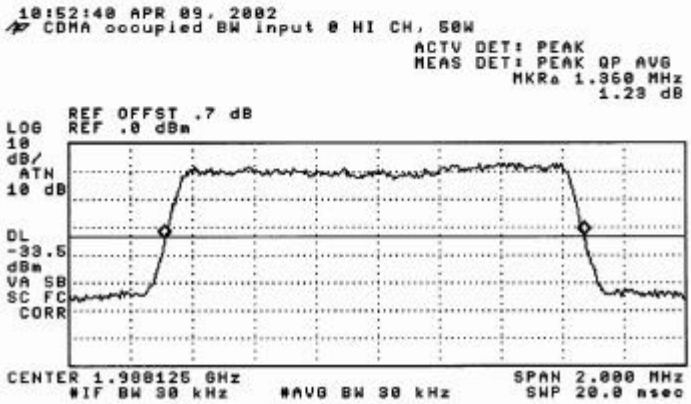

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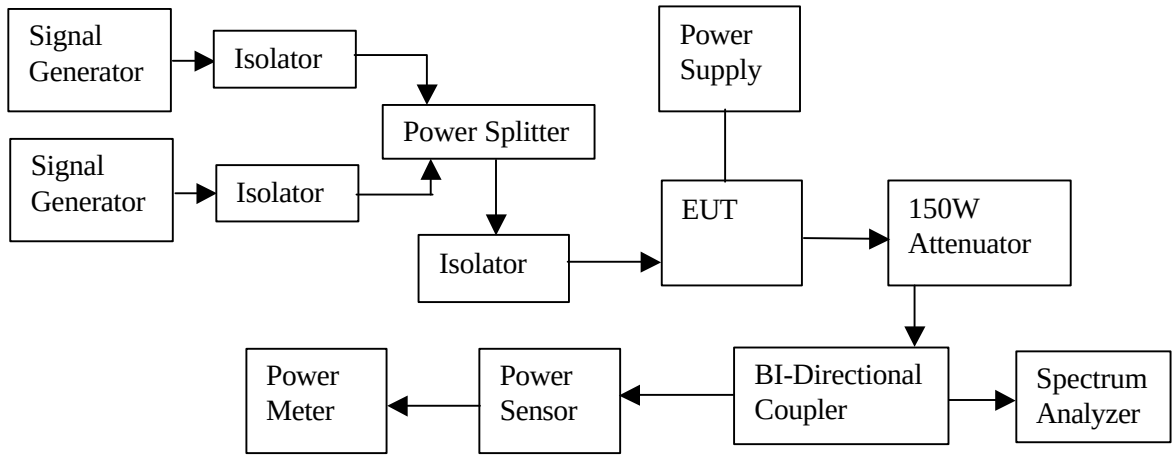
8.4. SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

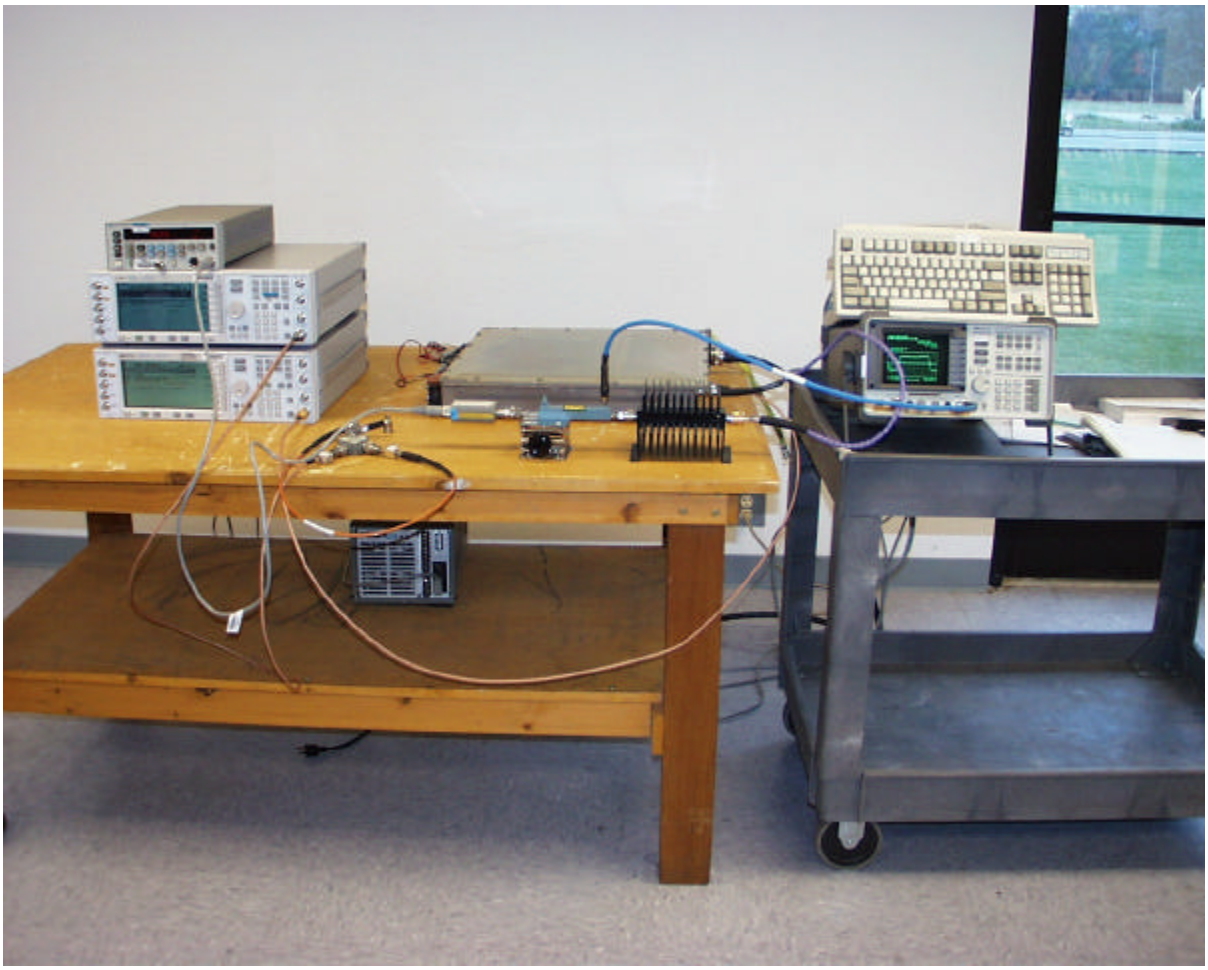
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Generator	AGILENT	E4432B	US40053529	2/28/03
Signal Generator	HP	E4431B	US39340357	10/27/02
Isolator	Raditek	RADI-CC-S3-10W	N/A	N/A
Isolator	Raditek	RADI-CC-S3-10W	N/A	N/A
Power Splitter	HP	11667A	18372	N/A
Isolator	ALCATEL	20A125-31	4595	N/A
150W Attenuator	NARDA	769.30	04983	N/A
BI-Direct. Coupler	NARDA	4226-20	02404	N/A
Power Sensor	HP	8481A	3318A99301	6/14/02
Power Meter	HP	438A	3048U53273	3/31/03
Power Supply	HP	6032A	3510A11093	10/31/02
Spectrum Analyzer	HP	8593EM	3710A00205	6/20/02

TEST SETUP



NOTE: All I/O cables used are N type to SMA with the length of 0.3 meter ~ 1.5 meter



TEST PROCEDURE

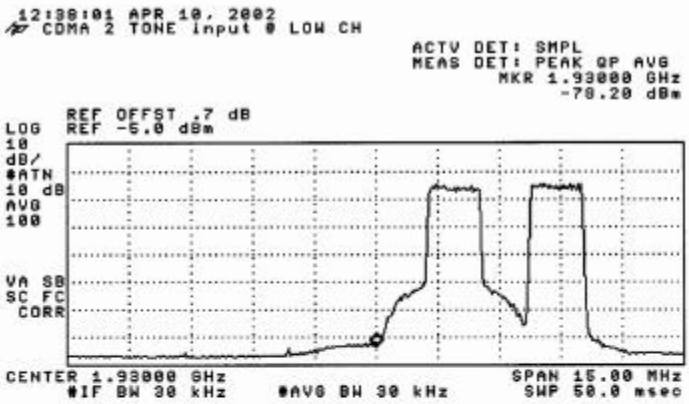
1) Two balanced signals were applied to the RF input. One set as close as possible to the bottom of the block edge and one set as close as possible to the top of the block edge and one set of each ends of the block edges. Set the RES BW to 1% of the emission bandwidth to show compliance with the –13dBm limit, in the 1 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

2) For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 30 MHz to 20 GHz of the fundamental carrier for all frequency block. A display line was placed at –13dBm to show compliance. The entire frequency band was split at the spectrum analyzer low band/high bands break.

RESULT

The following table indicates the plot number associated with the Block Edges, Intermodulation and Out-of-Band emission plots. All measurements are either peak or average detector mode as specified from plot.

*** CDMA *** S/N: NNTM74PE080D with ACE filter		
Plot#	**Description**	**Frequency Range (MHz)**
13	Signal Source 2 tones output @ Bottom Edge	1931.875 & 1934.375
14	Signal Source 2 tones output @ Top Edge	1985.625 & 1988.125
15	Bottom Block Edge	Channels @ 1931.875 & 1934.375 & marker @ 1930
16	Block **A** 2 tones Intermod bottom end	1931.875 & 1934.375 (25 MHz span)
17	Block **A** 2 tones Intermod bottom end	1931.875 & 1934.375 (100 MHz span)
18	Block **A** 2 tones Intermod out-of-band	15 to 2900
19	Block **A** 2 tones Intermod out-of-band	2900 to 20000
20	Block **A** 2 tones Intermod top end	1940.625 & 1943.125 (25 MHz span)
21	Block **A** 2 tones Intermod top end	1940.625 & 1943.125 (100 MHz span)
22	Block **A** 2 tones Intermod out-of-band	15 to 2900
23	Block **A** 2 tones Intermod out-of-band	2900 to 20000
24	Block **A** 2 tones Intermod both end	1931.875 & 1943.125 (25 MHz span)
25	Block **A** 2 tones Intermod both end	1931.875 & 1943.125 (100 MHz span)
26	Block **A** 2 tones Intermod out-of-band	15 to 2900
27	Block **A** 2 tones Intermod out-of-band	2900 to 20000
28	Top Block Edge	Channels @ 1985.625 & 1988.125 & marker @ 1990
29	Block **C** 2 tones Intermod top end	1985.625 & 1988.125 (25 MHz span)
30	Block **C** 2 tones Intermod top end	1982.625 & 1988.125 (100 MHz span)
31	Block **C** 2 tones Intermod out-of-band	15 to 2900
32	Block **C** 2 tones Intermod out-of-band	2900 to 20000
33	Block **C** 2 tones Intermod bottom end	1976.875 & 1979.375 (25 MHz span)
34	Block **C** 2 tones Intermod bottom end	1976.875 & 1979.375 (100 MHz span)
35	Block **C** 2 tones Intermod out-of-band	15 to 2900
36	Block **C** 2 tones Intermod out-of-band	2900 to 20000
37	Block **C** 2 tones Intermod both end	1976.875 & 1988.125 (25 MHz span)
38	Block **C** 2 tones Intermod both end	1976.875 & 1988.125 (100 MHz span)
39	Block **C** 2 tones Intermod out-of-band	15 to 2900
40	Block **C** 2 tones Intermod out-of-band	2900 to 20000



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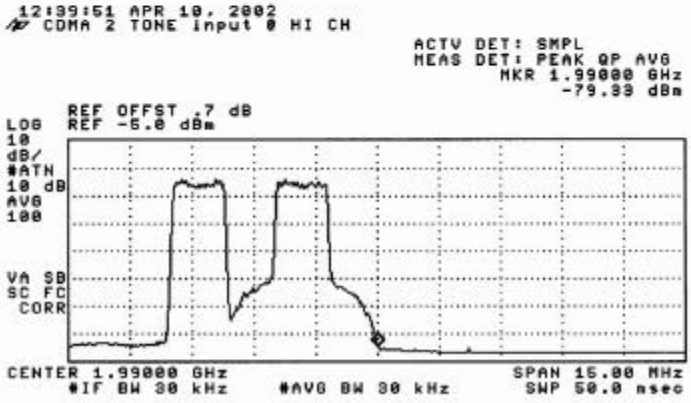

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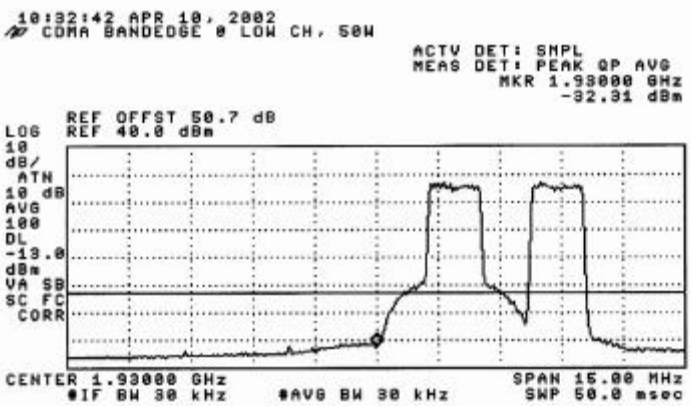

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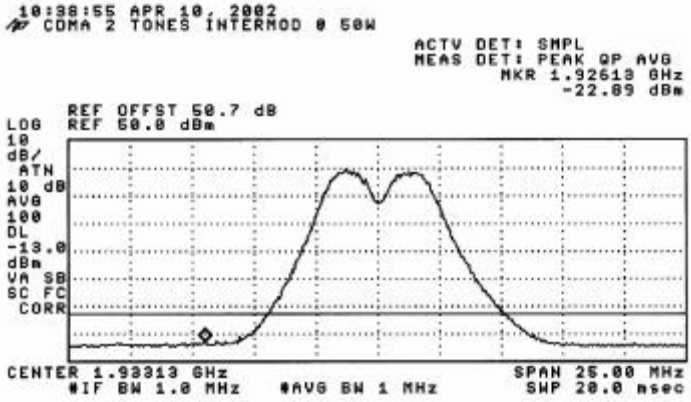

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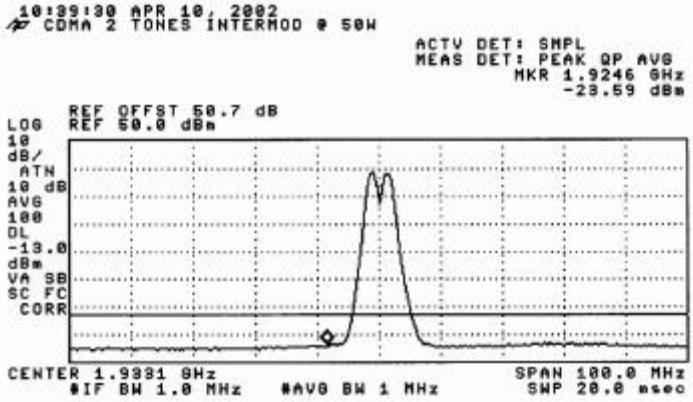

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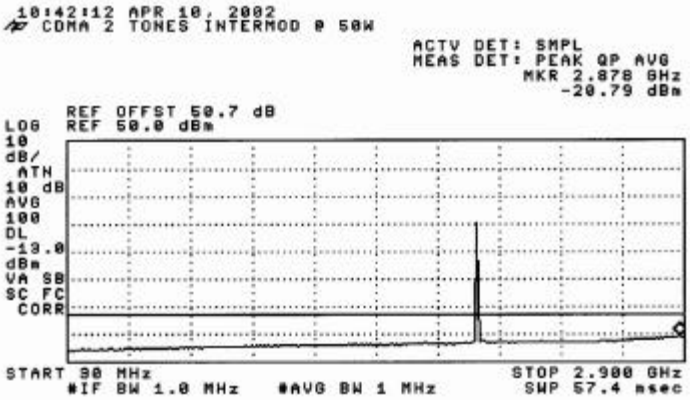

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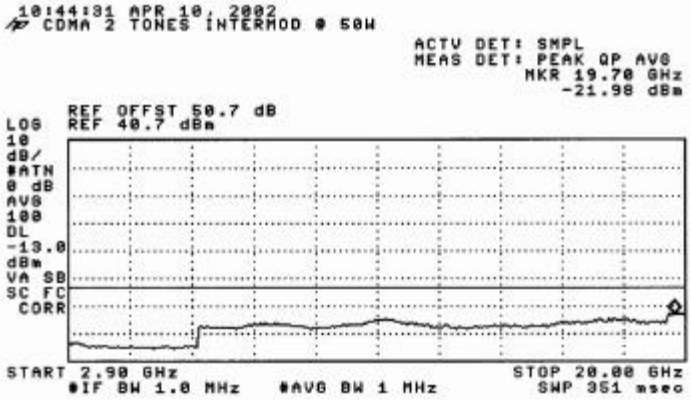

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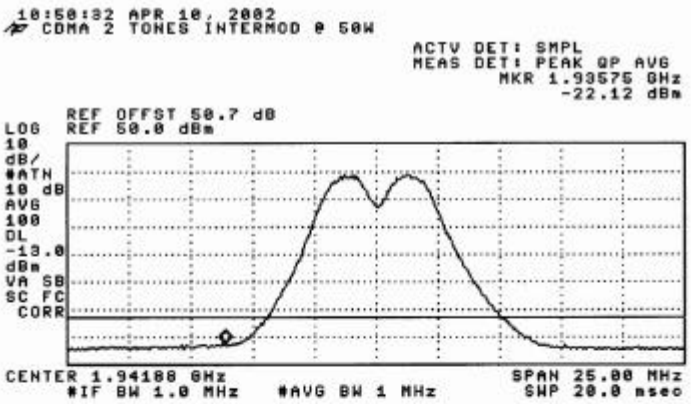

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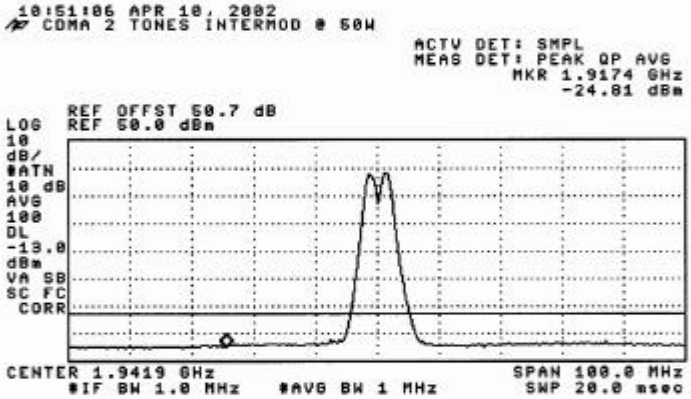

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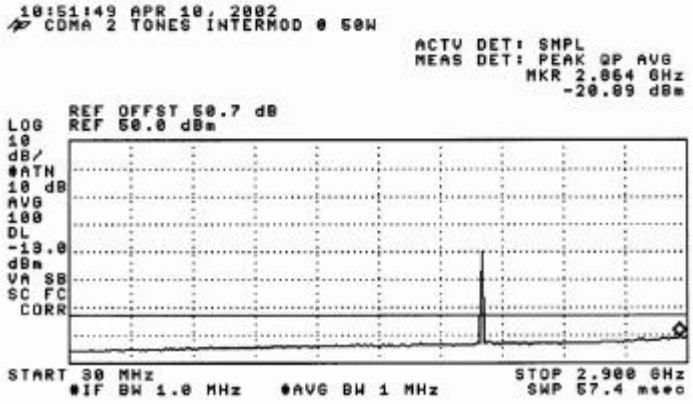

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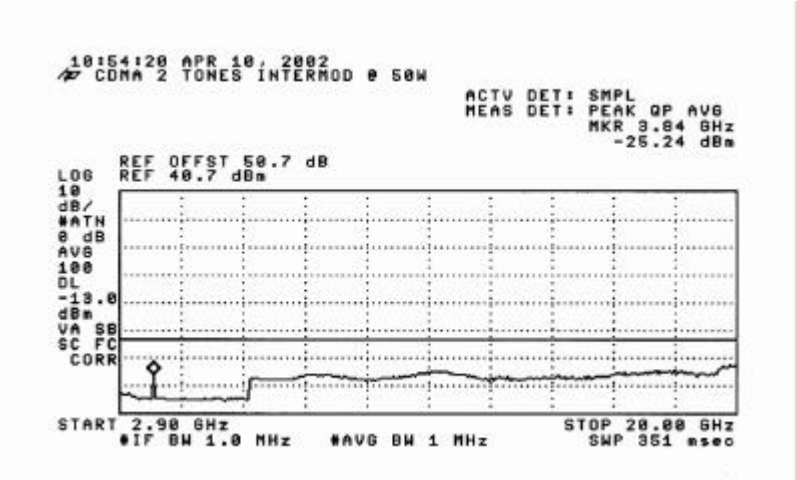

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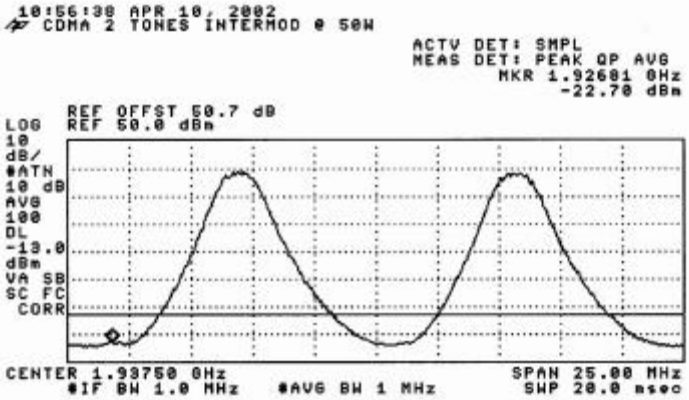

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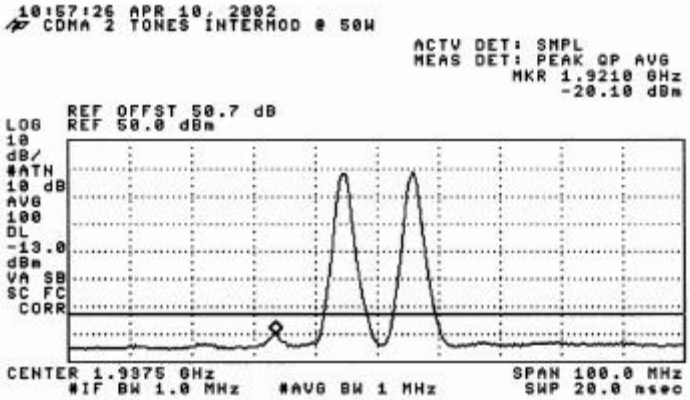

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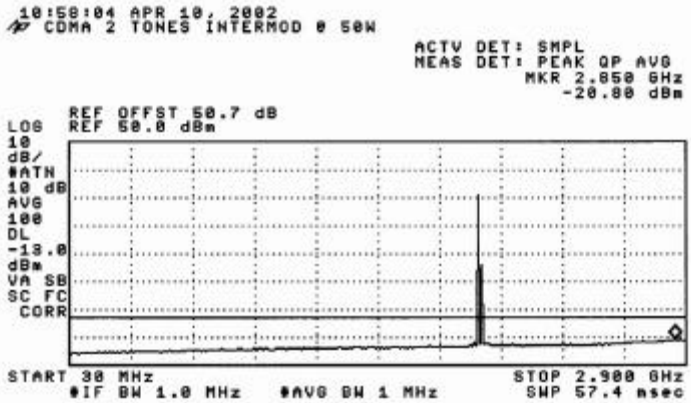

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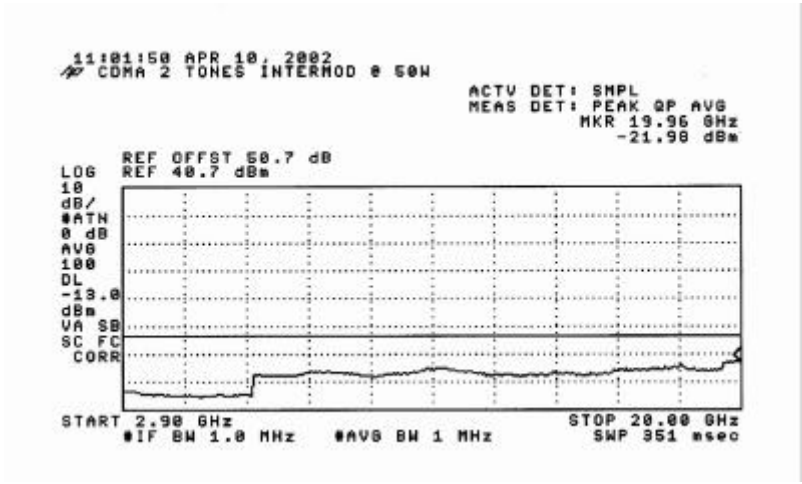

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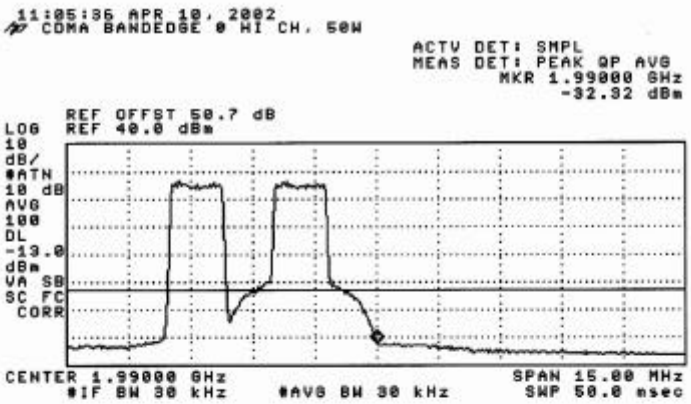

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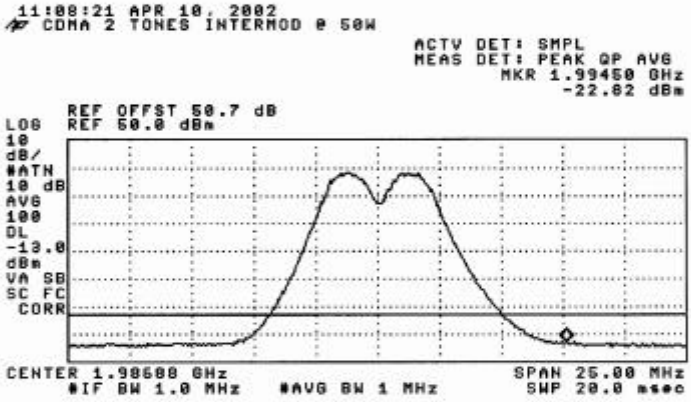

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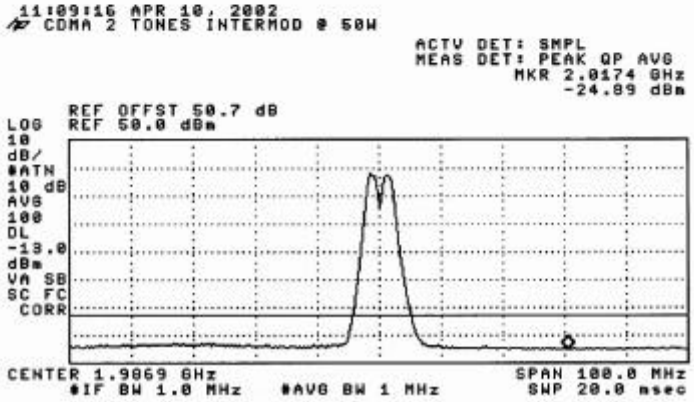

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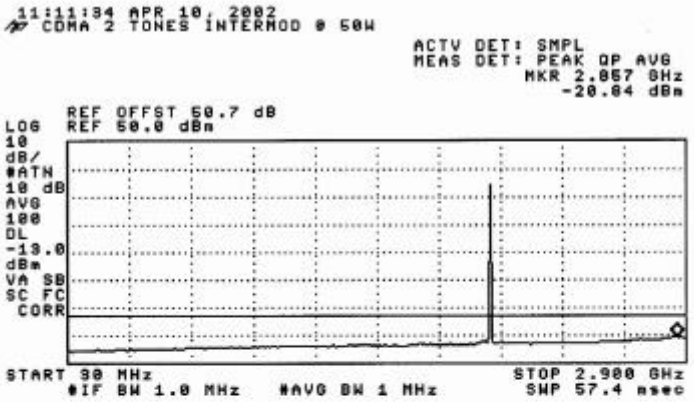

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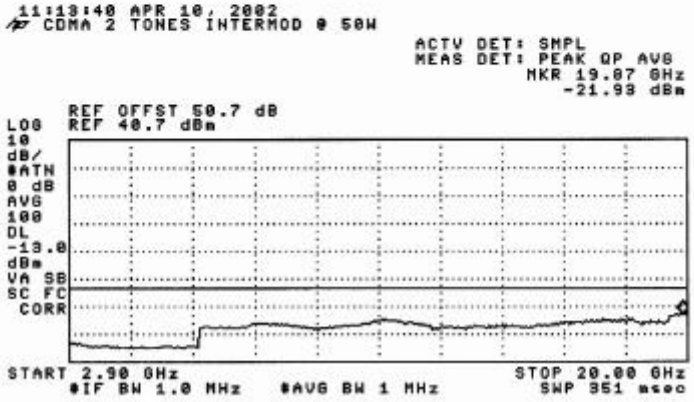

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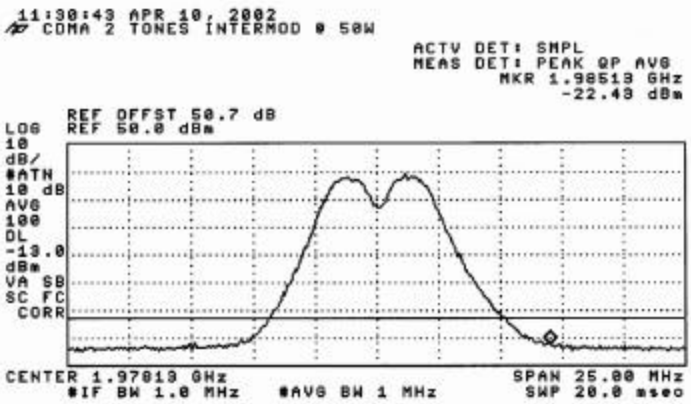

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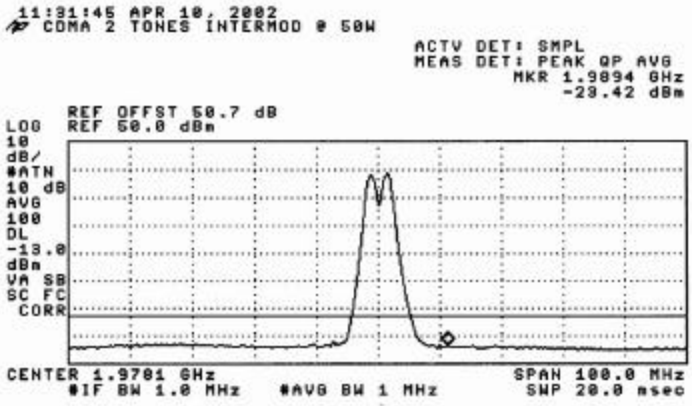

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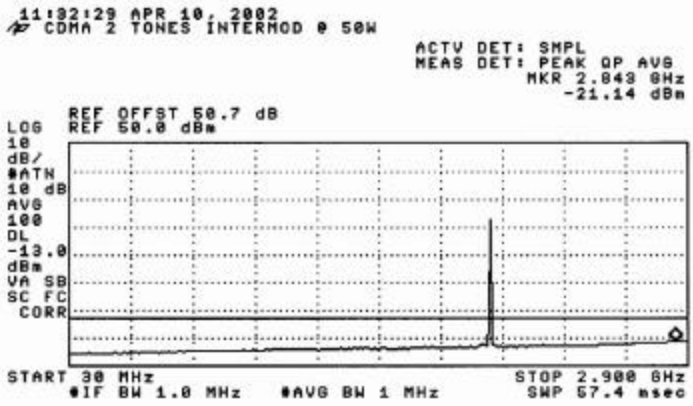

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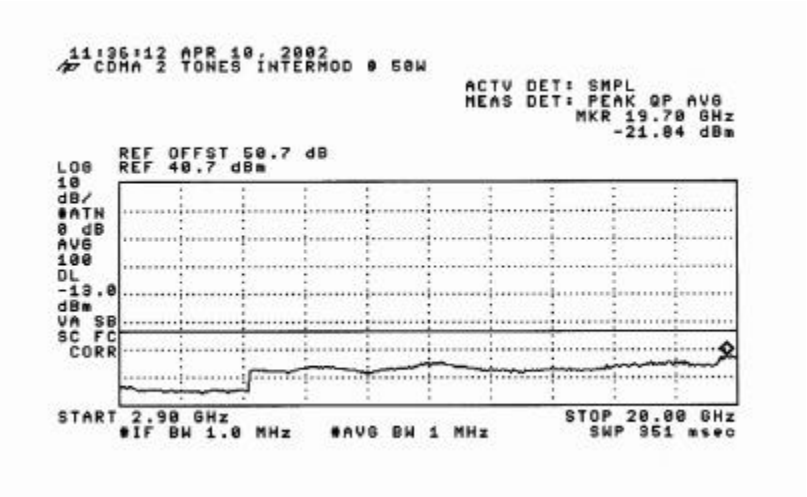

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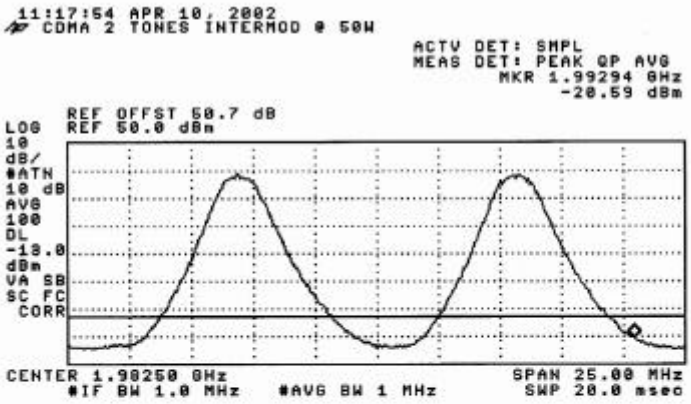

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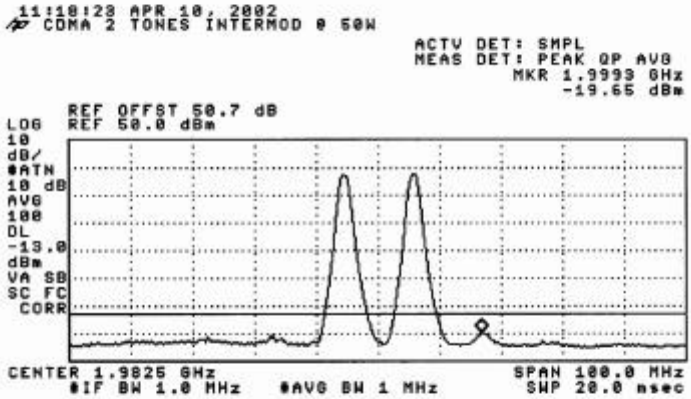

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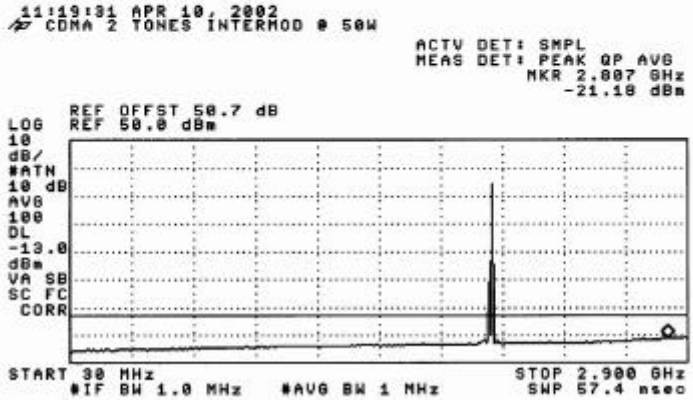

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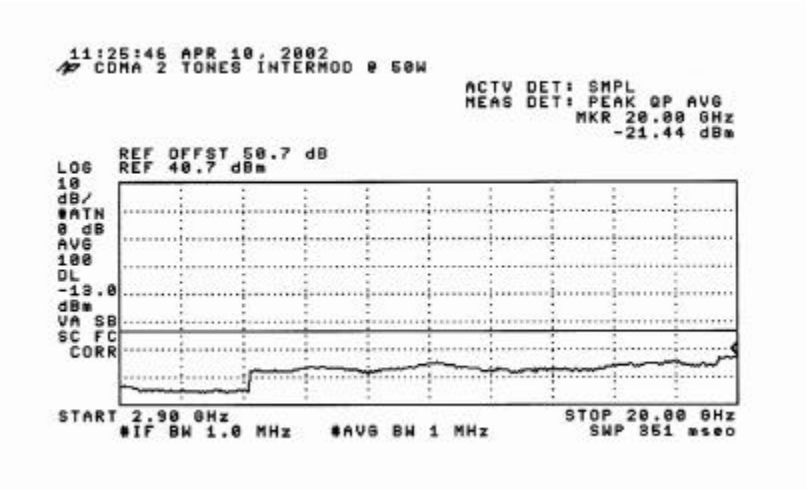

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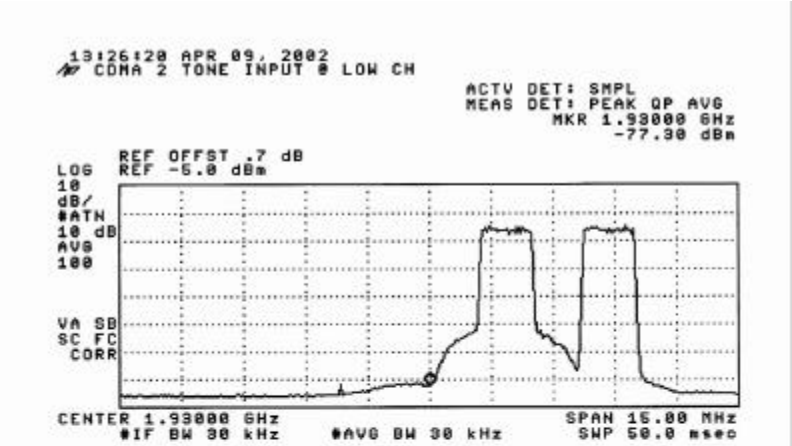
*** CDMA *** S/N: NNTM74PE0805 with FILTRONICS filter		
Plot#	**Description**	**Frequency Range (MHz)**
41	Signal Source 2 tones output @ Bottom Edge	1931.875 & 1934.375
42	Signal Source 2 tones output @ Top Edge	1985.625 & 1988.125
43	Bottom Block Edge	Channels @ 1931.875 & 1934.375 & marker @ 1930
44	Block **A** 2 tones Intermod bottom end	1931.875 & 1934.375 (25 MHz span)
45	Block **A** 2 tones Intermod bottom end	1931.875 & 1934.375 (100 MHz span)
46	Block **A** 2 tones Intermod out-of-band	15 to 2900
47	Block **A** 2 tones Intermod out-of-band	2900 to 20000
48	Block **A** 2 tones Intermod top end	1940.625 & 1943.125 (25 MHz span)
49	Block **A** 2 tones Intermod top end	1940.625 & 1943.125 (100 MHz span)
50	Block **A** 2 tones Intermod out-of-band	15 to 2900
51	Block **A** 2 tones Intermod out-of-band	2900 to 20000
52	Block **A** 2 tones Intermod both end	1931.875 & 1943.125 (25 MHz span)
53	Block **A** 2 tones Intermod both end	1931.875 & 1943.125 (100 MHz span)
54	Block **A** 2 tones Intermod out-of-band	15 to 2900
55	Block **A** 2 tones Intermod out-of-band	2900 to 20000
56	Top Block Edge	Channels @ 1985.625 & 1988.125 & marker @ 1990
57	Block **C** 2 tones Intermod top end	1985.625 & 1988.125 (25 MHz span)
58	Block **C** 2 tones Intermod top end	1982.625 & 1988.125 (100 MHz span)
59	Block **C** 2 tones Intermod out-of-band	15 to 2900
60	Block **C** 2 tones Intermod out-of-band	2900 to 20000
61	Block **C** 2 tones Intermod bottom end	1976.875 & 1979.375 (25 MHz span)
62	Block **C** 2 tones Intermod bottom end	1976.875 & 1979.375 (100 MHz span)
63	Block **C** 2 tones Intermod out-of-band	15 to 2900
64	Block **C** 2 tones Intermod out-of-band	2900 to 20000
65	Block **C** 2 tones Intermod both end	1976.875 & 1988.125 (25 MHz span)
66	Block **C** 2 tones Intermod both end	1976.875 & 1988.125 (100 MHz span)
67	Block **C** 2 tones Intermod out-of-band	15 to 2900
68	Block **C** 2 tones Intermod out-of-band	2900 to 20000



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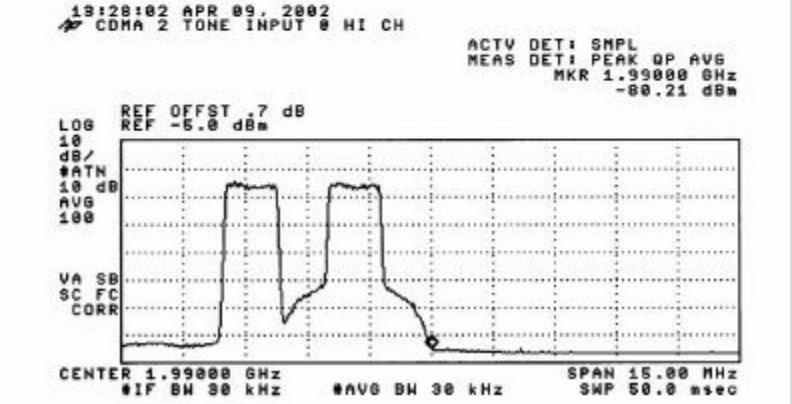

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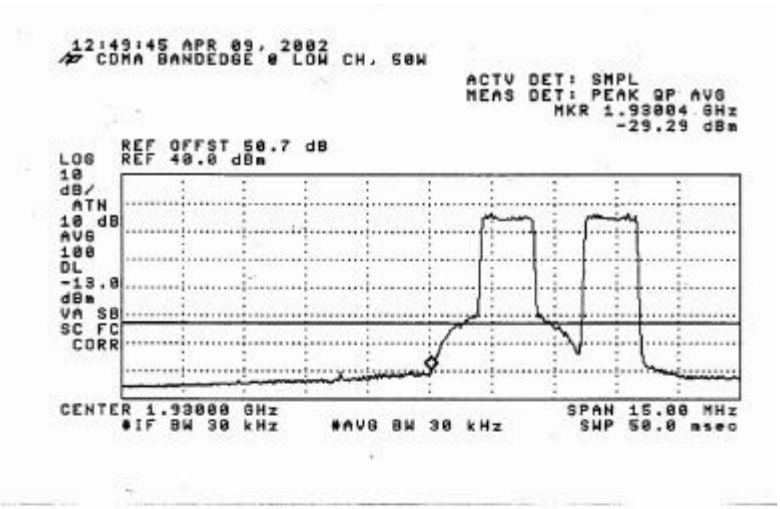

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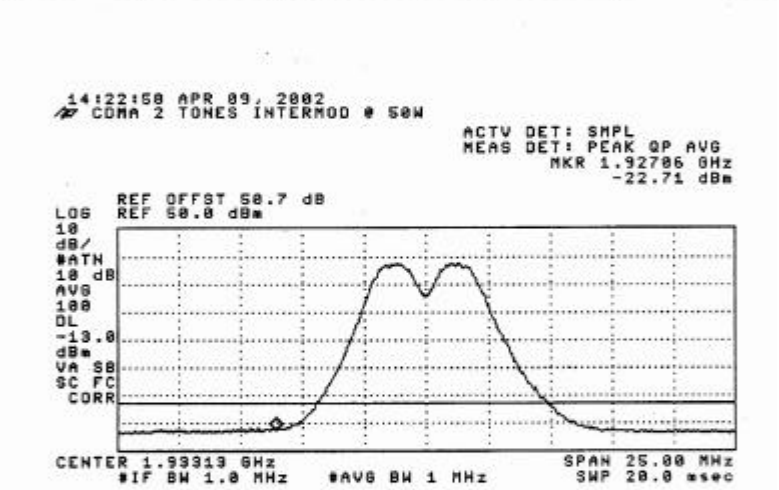

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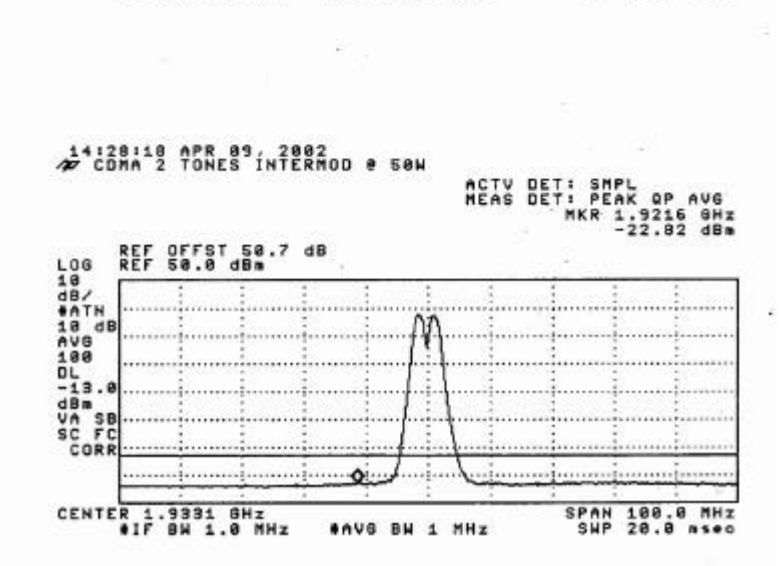

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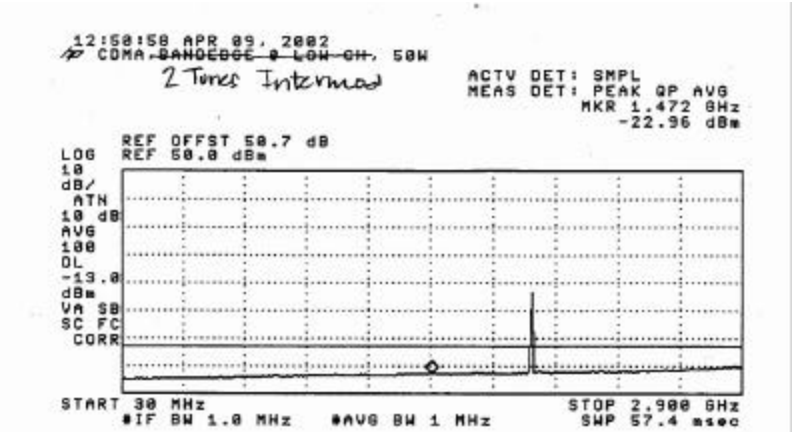

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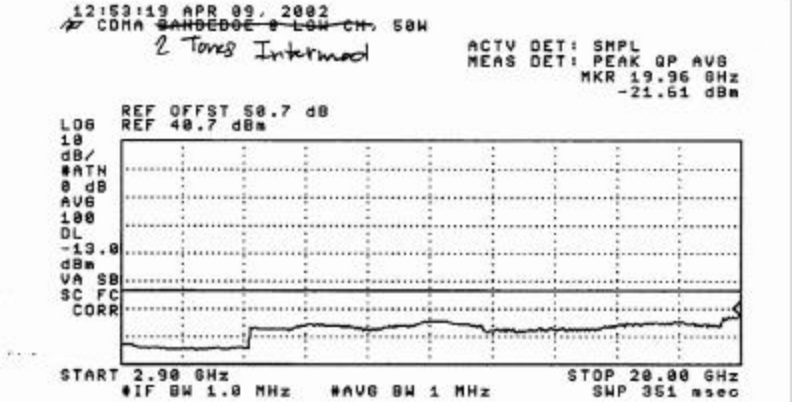

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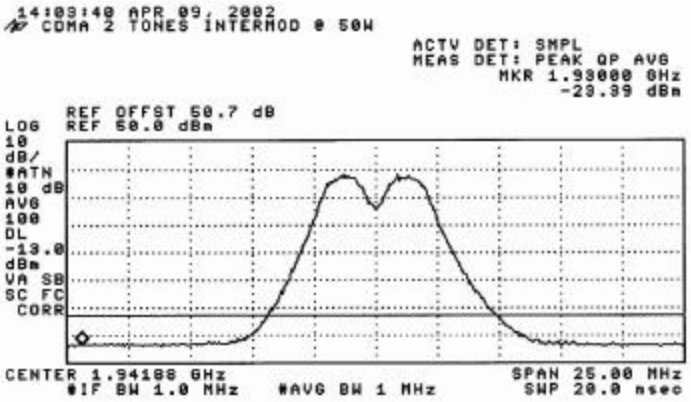

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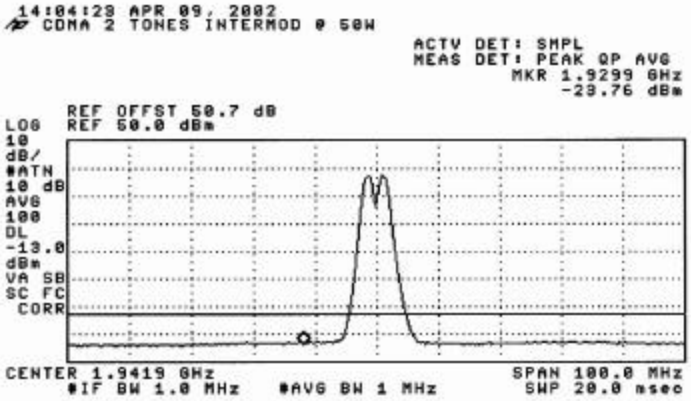

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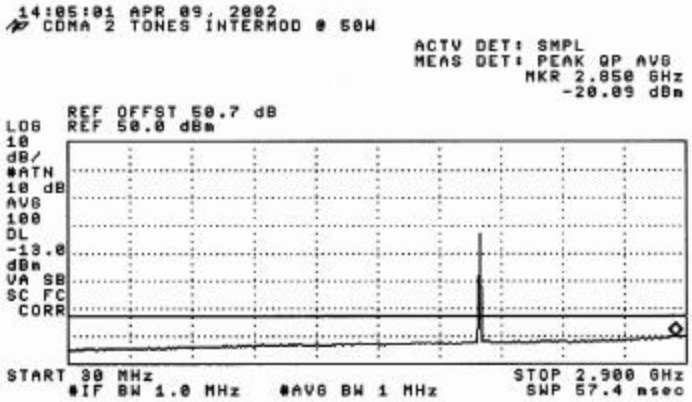

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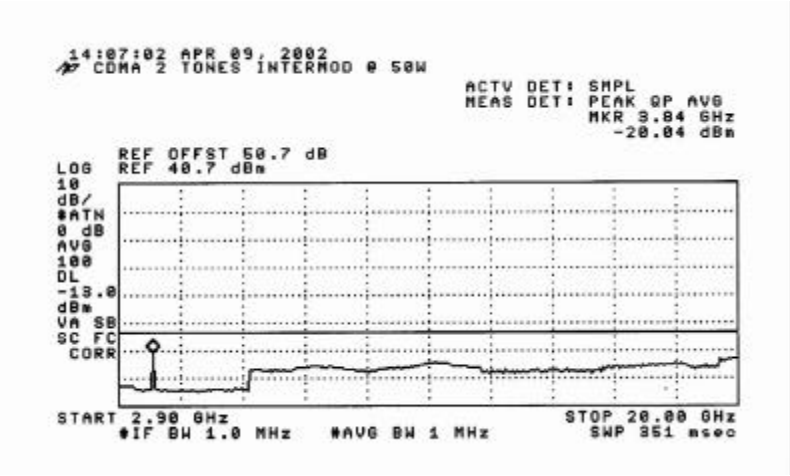

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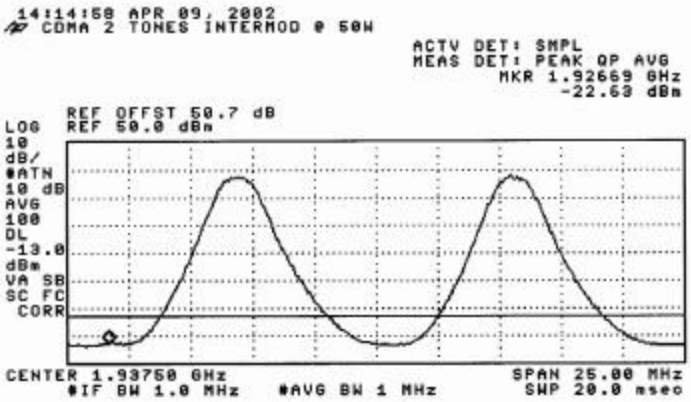

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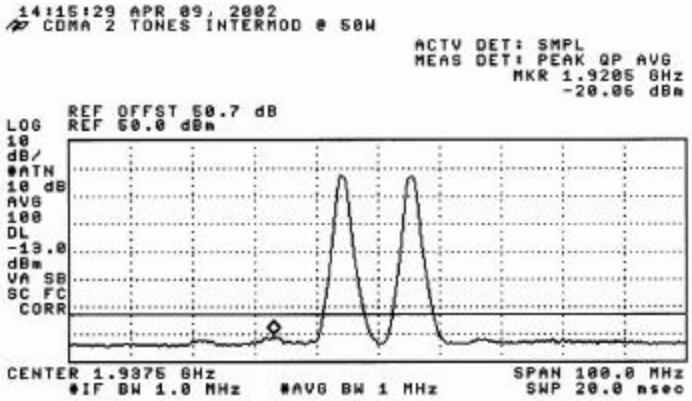

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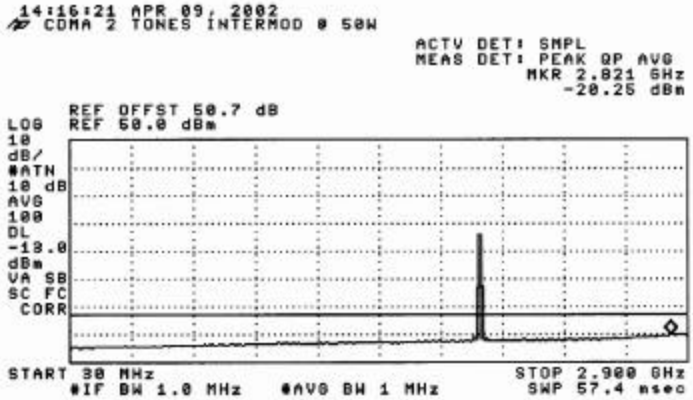

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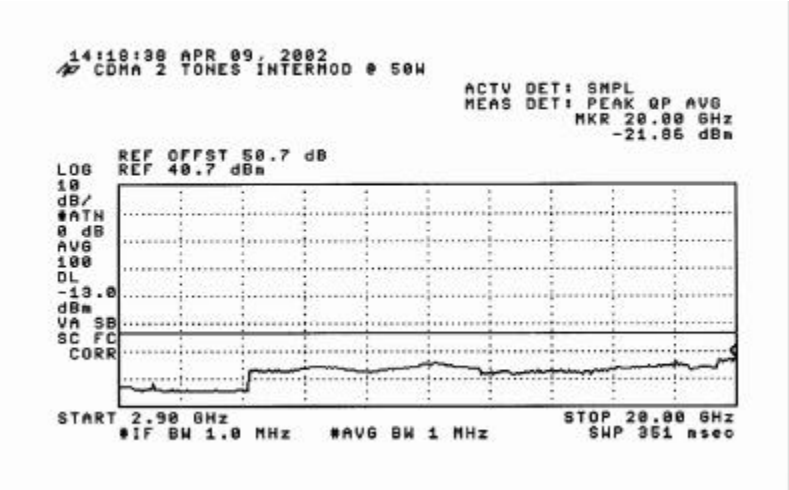

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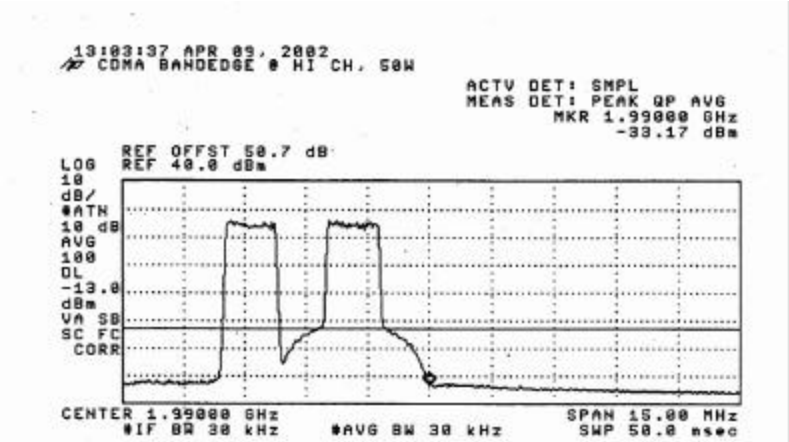

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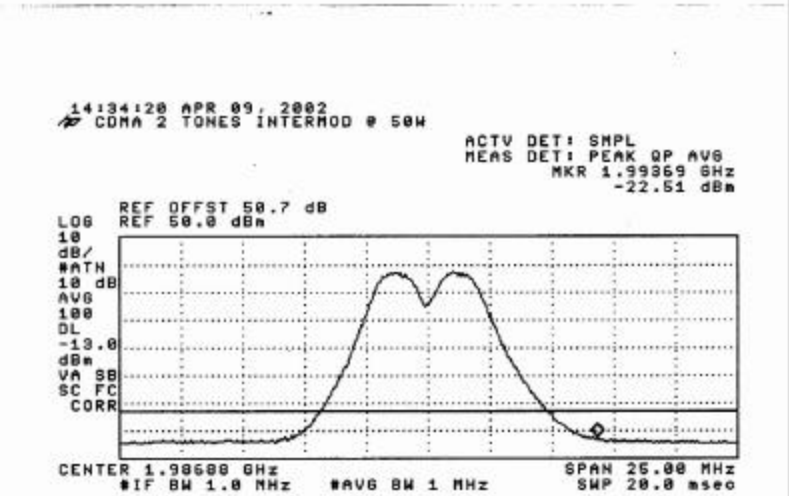

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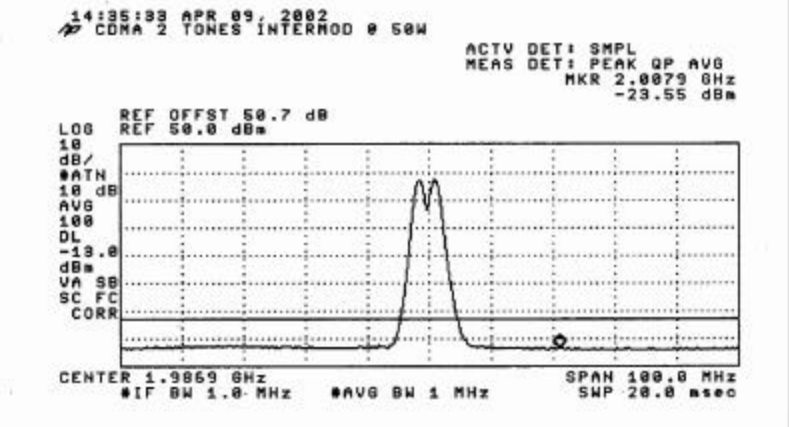

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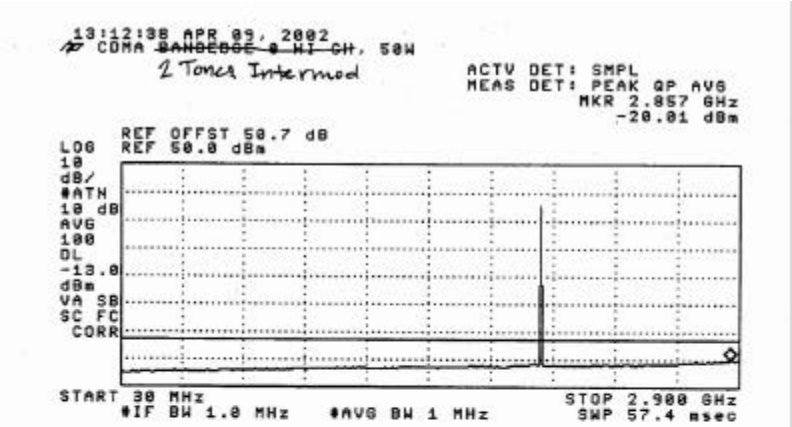

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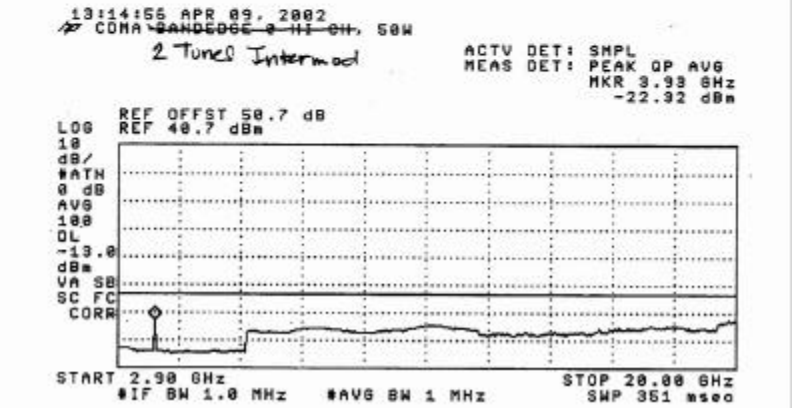

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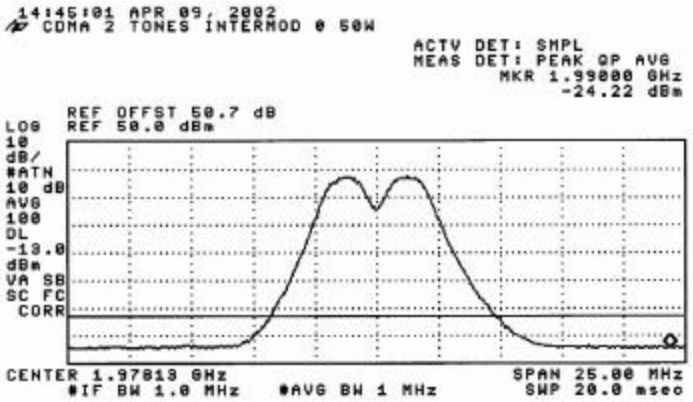

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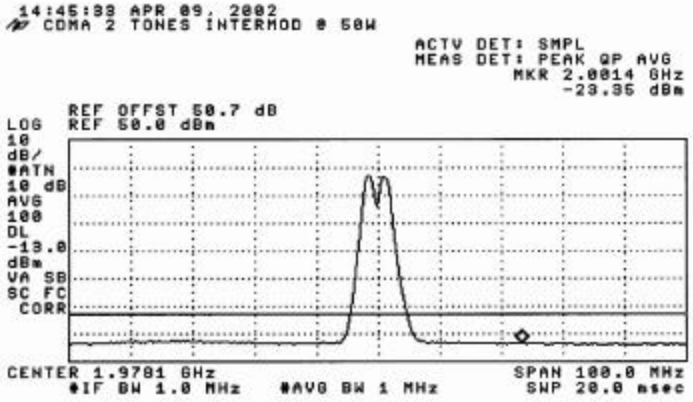

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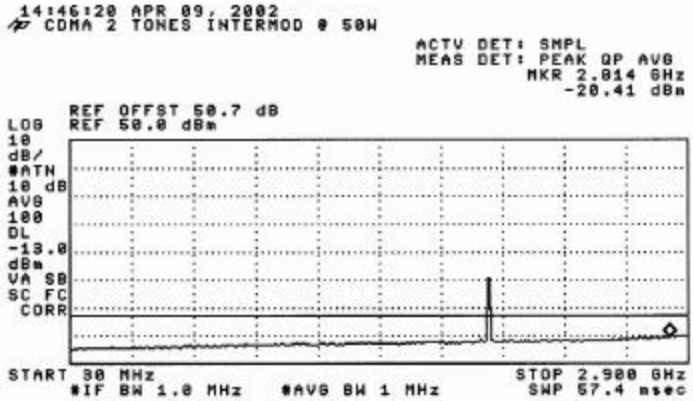

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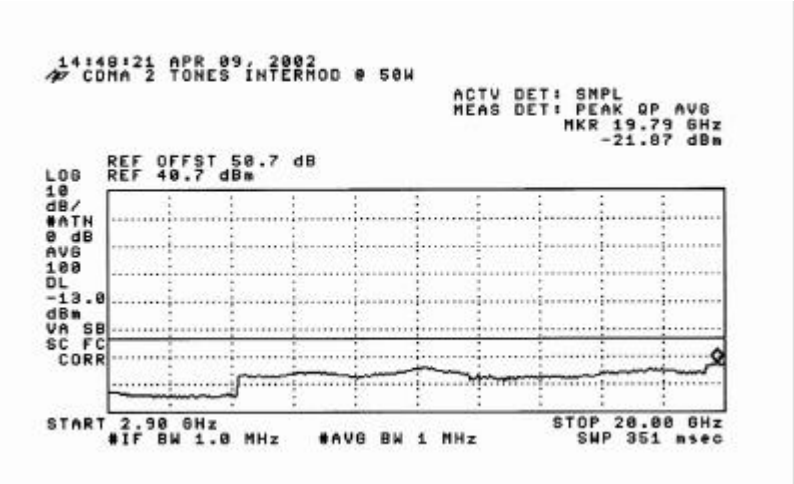

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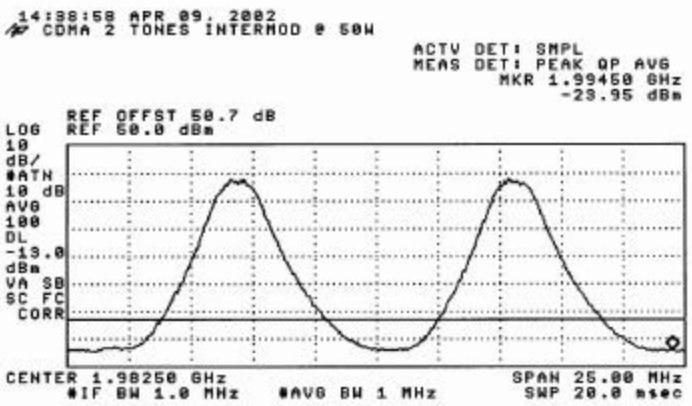

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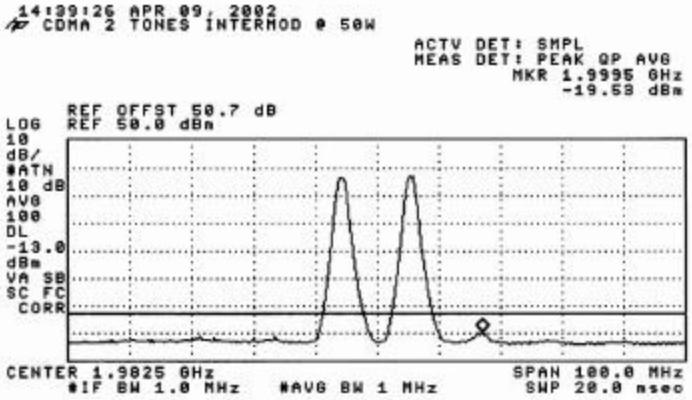

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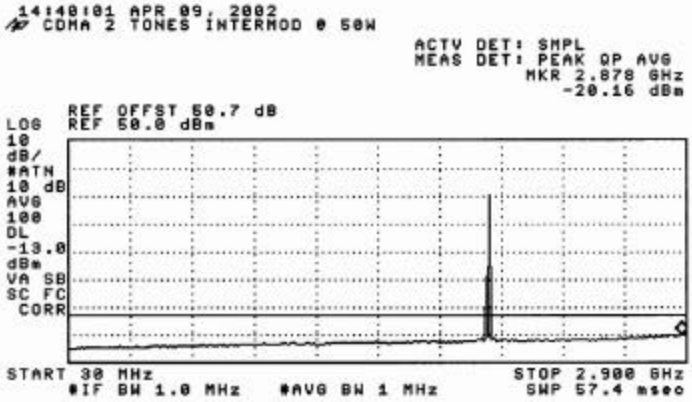

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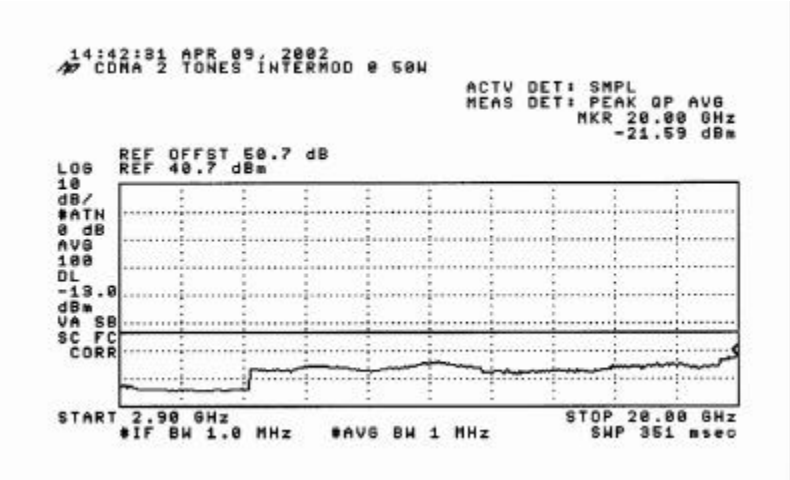

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8.5. SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION

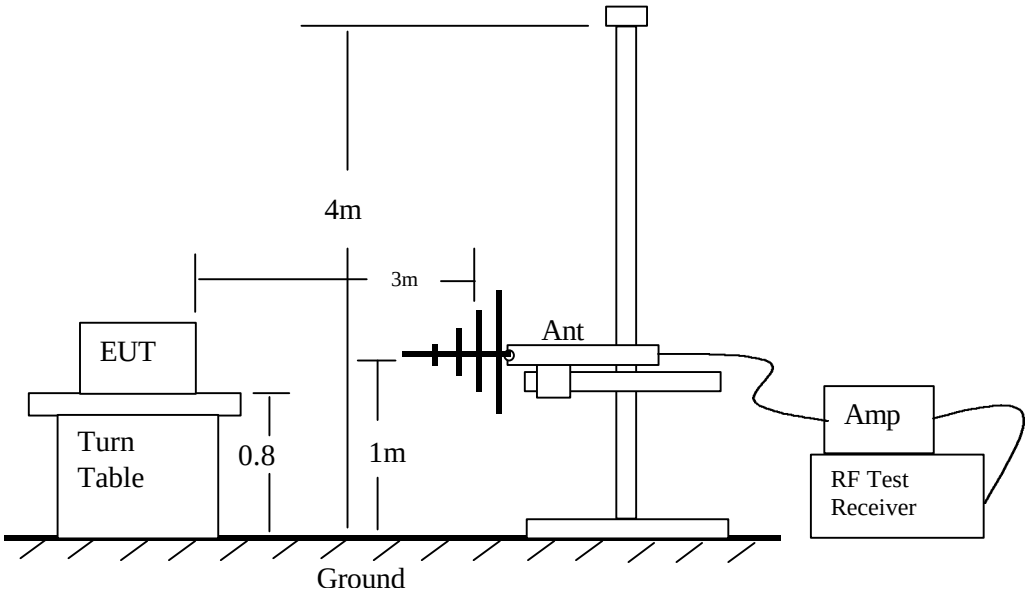
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Spectrum Analyzer	HP	8566B	2140A01296	5/4/02
RF Pre Selector	HP	85685A	2817A00756	5/4/02
Bilog Antenna	CHASE	CBL6112	2049	8/2/02
Amplifier	MITEQ	NSP2600-44	646456	4/12/02
Signal Generator	HP	83732B	US34490599	3/21/02
Rx Horn Antenna	EMCO	3115	6739	6/20/02
Rx Horn Antenna	ARA	MWH1826/B	1013	7/26/02
Tx Horn Antenna	EMCO	3115	6717	6/20/02
HPF	MICROLAB	FH-2400H	N/A	N/A
50 ohm terminator	NARDA	370BNM	N/A	N/A

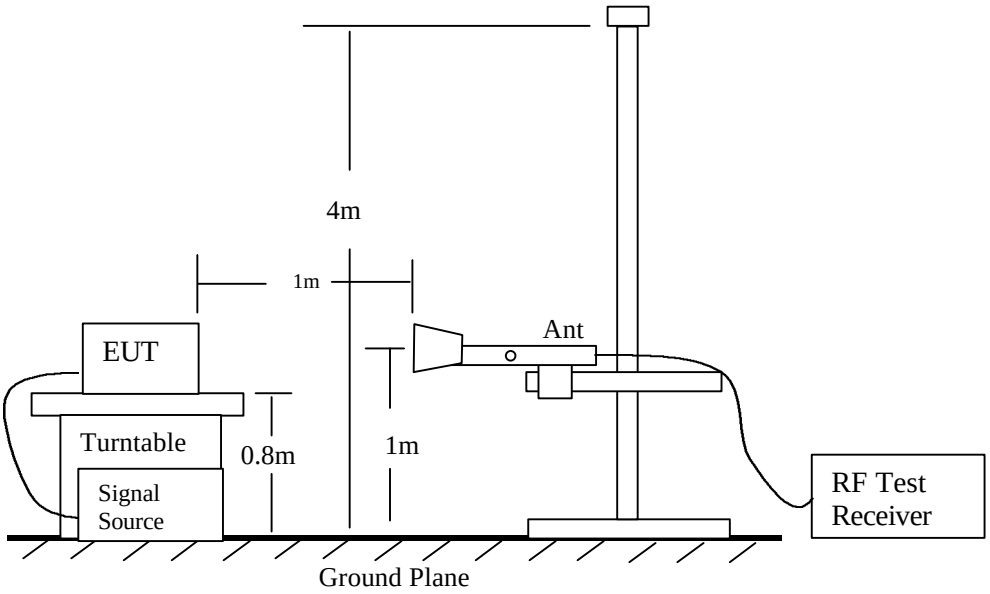
Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Below 1000	☒ Peak ☐ Quasi-Peak	☒ 100 kHz ☐ 1 MHz	☒ 100 kHz ☐ 1 MHz
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 10 Hz

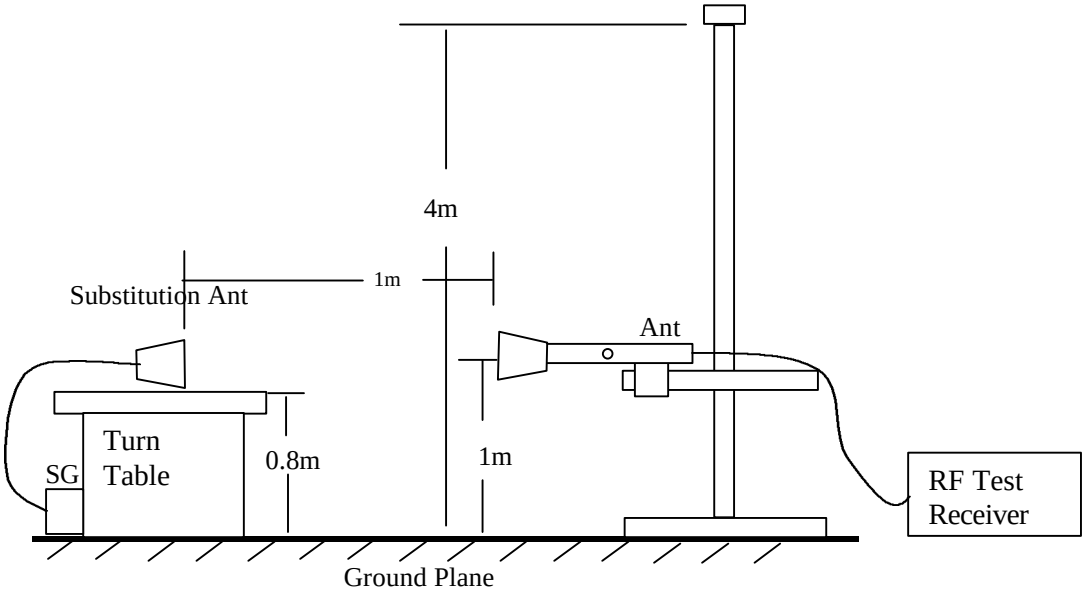
TEST SETUP



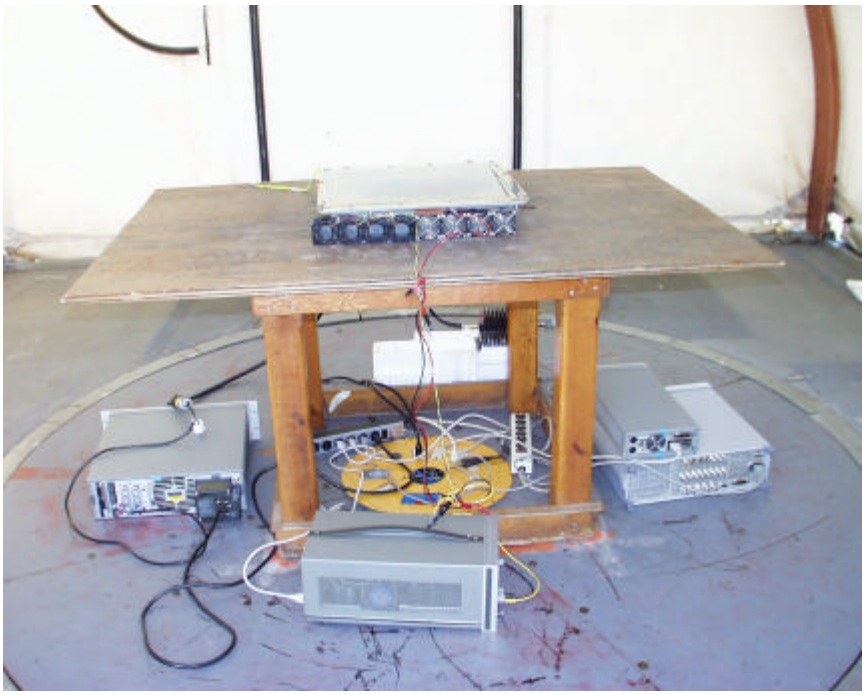
Radiated Emission Measurement below 1 GHz



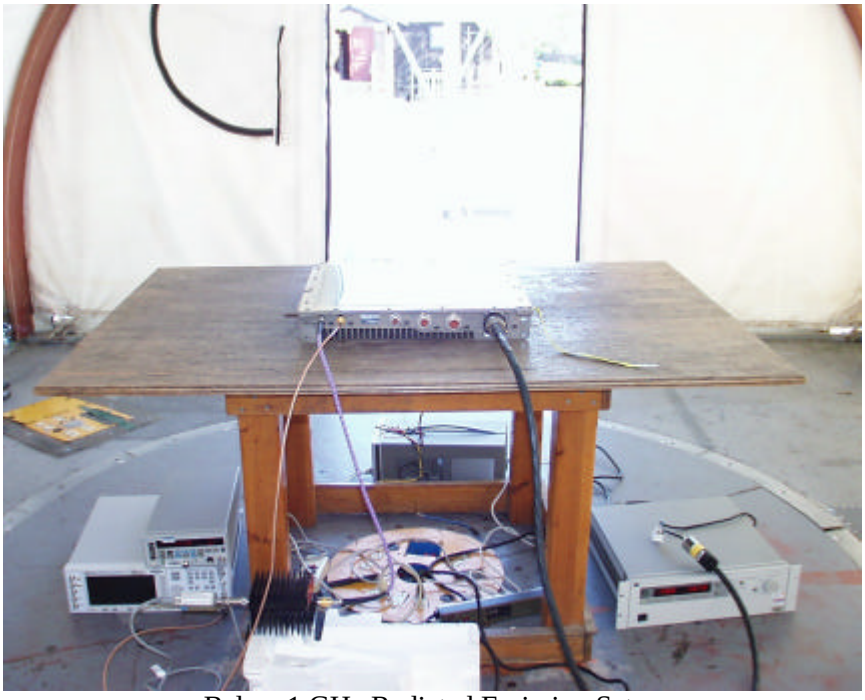
Radiated Emission Measurement above 1 GHz



Radiated Emission – Substitution Method set-up

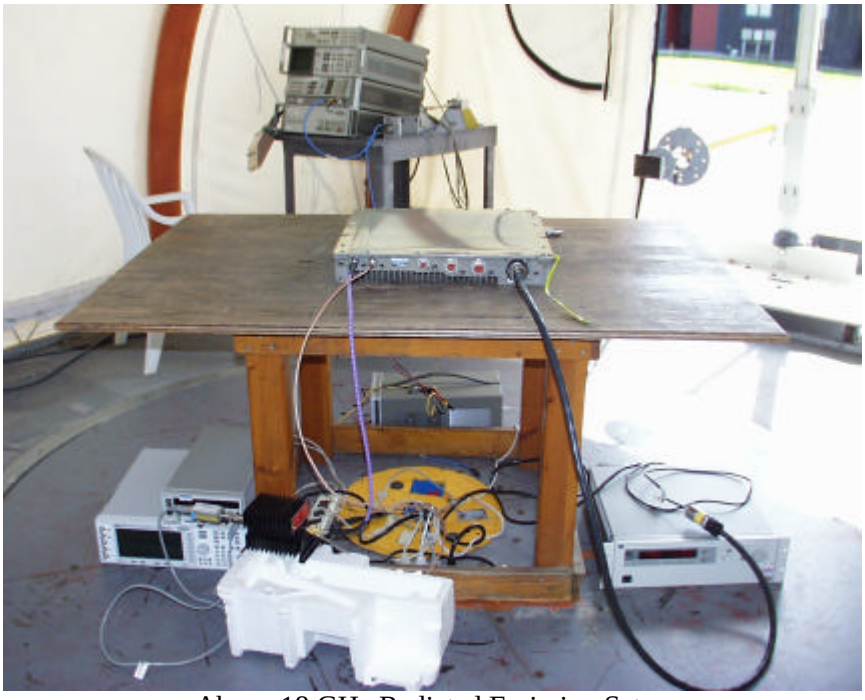


Radiated Emission Setup



Below 1 GHz Radiated Emission Setup

1 – 18 GHz Radiated Emission Setup



Above 18 GHz Radiated Emission Setup

1 - 18 GHz Substitution Method Setup

Above 18 GHz Substitution Method Setup

TEST PROCEDURE (PART 22)

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
2). The test antenna shall be oriented initially for vertical polarization located 1m from the EUT to correspond to the frequency of the transmitter.
3). The output of the test antenna shall be connected to the measuring receiver and either a peak or average detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4). The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6). The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8). The maximum signal level detected by the measuring receiver shall be noted.
9). The transmitter shall be replaced by a substitution antenna.
10). The substitution antenna shall be oriented for vertical polarization.
11). The substitution antenna shall be connected to a calibrated signal generator.
12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

RESULT

Complies, as shown below

Compliance Certification Services

Radiated Emissions 4/10/02
24.238(a) A-Site (1 meter)
Kerwin Corpuz

POWERWAVE
1900 MHz CDMA Multi-Channel Amplifier (M/N: NTGY81AC)
S/N: NNTM74PE080D (with ACE delay filter)

fo = 1931.25 MHz (LOW)

frequency (MHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
3862.5*	41.1	-79	1.6	9	6.85	-73.75	-13	-60.75
5793.75*	41.7	-73	2.1	9.9	7.75	-67.35	-13	-54.35
7725*	45.3	-71	2.4	10.2	8.05	-65.35	-13	-52.35
9656.25*	46.2	-67	2.7	10.3	8.15	-61.55	-13	-48.55
11587.5*	45.4	-63	3	11.7	9.55	-56.45	-13	-43.45
13518.75*	49.5	-60	3.3	12.1	9.95	-53.35	-13	-40.35
15450*	48.2	-60	3.7	15.3	13.15	-50.55	-13	-37.55
17381.25*	49.2	-55	4.1	8	5.85	-53.25	-13	-40.25
19312.5*	53.4	-55	4.4	7.5	5.35	-54.05	-13	-41.05

fo = 1960 MHz (MID)

frequency (MHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
3920*	41.4	-79	1.6	9	6.85	-73.75	-13	-60.75
5880*	44.5	-70	2.1	9.9	7.75	-64.35	-13	-51.35
7840*	46.7	-70	2.4	10.2	8.05	-64.35	-13	-51.35
9800*	46.1	-67	2.7	10.3	8.15	-61.55	-13	-48.55
11760*	45.3	-63	3	11.7	9.55	-56.45	-13	-43.45
13720*	49.1	-60	3.3	12.1	9.95	-53.35	-13	-40.35
15680*	49.2	-60	3.7	15.3	13.15	-50.55	-13	-37.55
17640*	49.8	-55	4.1	8	5.85	-53.25	-13	-40.25
19600*	53.5	-55	4.4	7.5	5.35	-54.05	-13	-41.05

fo = 1988.75 MHz (HIGH)

frequency (MHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
3977.5*	40.9	-79	1.6	9	6.85	-73.75	-13	-60.75
5966.25*	45	-70	2.1	9.9	7.75	-64.35	-13	-51.35
7955*	46.7	-70	2.4	10.2	8.05	-64.35	-13	-51.35
9943.75*	45.7	-67	2.7	10.3	8.15	-61.55	-13	-48.55
11932.5*	45.5	-63	3	11.7	9.55	-56.45	-13	-43.45
13921.25*	49	-60	3.3	12.1	9.95	-53.35	-13	-40.35
15910*	48.7	-60	3.7	15.3	13.15	-50.55	-13	-37.55
17898.75*	49.5	-55	4.1	8	5.85	-53.25	-13	-40.25
19887.5*	53.9	-55	4.4	7.5	5.35	-54.05	-13	-41.05

NOTE: * Measured noise floor (worse case vertical); H=horizontal and V=vertical
SA: Spectrum Analyzer
SG: Signal Generator
CL: SMA cable loss (5ft)

Gain (dBd) = TX Antenna - 2.15
ERP = SG reading - CL + Gain (dBd)
Margin = ERP - Limit

Compliance Certification Services

Radiated Emissions 4/10/02
24.238(a) A-Site (1 meter)
Kerwin Corpuz

POWERWAVE
1900 MHz CDMA Multi-Channel Amplifier (M/N: NTGY81AC)
S/N: NNTM74PE0805 (with FILTRONICS delay filter)

fo = 1931.25 MHz (LOW)

frequency (MHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
3862.5*	41.4	-79	1.6	9	6.85	-73.75	-13	-60.75
5793.75*	41.9	-73	2.1	9.9	7.75	-67.35	-13	-54.35
7725*	45.1	-71	2.4	10.2	8.05	-65.35	-13	-52.35
9656.25*	46.1	-67	2.7	10.3	8.15	-61.55	-13	-48.55
11587.5*	45.2	-63	3	11.7	9.55	-56.45	-13	-43.45
13518.75*	49.5	-60	3.3	12.1	9.95	-53.35	-13	-40.35
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17381.25*	49	-55	4.1	8	5.85	-53.25	-13	-40.25
19312.5*	53.4	-55	4.4	7.5	5.35	-54.05	-13	-41.05

fo = 1960 MHz (MID)

frequency (MHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
3920*	42	-79	1.6	9	6.85	-73.75	-13	-60.75
5880*	44.7	-70	2.1	9.9	7.75	-64.35	-13	-51.35
7840*	46.7	-70	2.4	10.2	8.05	-64.35	-13	-51.35
9800*	46.2	-67	2.7	10.3	8.15	-61.55	-13	-48.55
11760*	45.5	-63	3	11.7	9.55	-56.45	-13	-43.45
13720*	49.3	-60	3.3	12.1	9.95	-53.35	-13	-40.35
15680*	49.2	-60	3.7	15.3	13.15	-50.55	-13	-37.55
17640*	49.8	-55	4.1	8	5.85	-53.25	-13	-40.25
19600*	53.3	-55	4.4	7.5	5.35	-54.05	-13	-41.05

fo = 1988.75 MHz (HIGH)

frequency (MHz)	SA reading (dBuV)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
3977.5*	41.1	-79	1.6	9	6.85	-73.75	-13	-60.75
5966.25*	44.7	-70	2.1	9.9	7.75	-64.35	-13	-51.35
7955*	46.7	-70	2.4	10.2	8.05	-64.35	-13	-51.35
9943.75*	45.7	-67	2.7	10.3	8.15	-61.55	-13	-48.55
11932.5*	45.6	-63	3	11.7	9.55	-56.45	-13	-43.45
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15910*	48.7	-60	3.7	15.3	13.15	-50.55	-13	-37.55
17898.75*	49.1	-55	4.1	8	5.85	-53.25	-13	-40.25
19887.5*	53.6	-55	4.4	7.5	5.35	-54.05	-13	-41.05

NOTE: * Measured noise floor (worse case vertical); H=horizontal and V=vertical
SA: Spectrum Analyzer
SG: Signal Generator
CL: SMA cable loss (5ft)

Gain (dBd) = TX Antenna - 2.15
ERP = SG reading - CL + Gain (dBd)
Margin = ERP - Limit

TEST PROCEDURE (PART 15)

The EUT was placed on a wooden table 80 cm above the ground screen and all other support equipment were placed on the flush mounted turntable. Antenna to EUT distance was at 3 meter, measured E-Field with the range of 30M – 1GHz and a distance of 1 meter, measured 1GHz and above frequency. During the test, the table is rotated 360 degrees to maximize emissions and the antenna is positioned from 1 to 4 meters above the ground screen to further maximize emissions. The antenna is polarized in both vertical and horizontal positions.

EUT test configuration is according to Section 8 of ANSI C63.4/1992.

Monitor the frequency range of interest at a fixed antenna height and EUT azimuth. Frequency span should be small enough to easily differentiate between broadcast stations and intermittent ambient. Rotate EUT 360 degrees to maximize emissions received from EUT. If emission increases by more than 1 dB, or if another emission appears that is greater by 1 dB, return to azimuth where maximum occurred and perform additional cable manipulation to further maximize received emission.

Move antenna up and down to further maximize suspected highest amplitude signal. If emission increased by 1 dB or more, or if another emission appears that is greater by 1dB or more, return to antenna height where maximum signal was observed and manipulate cables to produce highest emissions, noting frequency and amplitude.

RESULT

Complies, as shown below

COMPLIANCE Certification Services
FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #:	02U1245-1
Report #:	020410A1
Date& Time:	04/10/02 2:55 PM
Test Engr:	KERWIN CORPUZ

Company:	POWERWAVE
EUT Description:	1900 MHz CDMA Multi-Channel Amplifier (M/N: NTGY81AC)
Test Configuration :	EUT with Support Equipments
Type of Test:	FCC CLASS B
Mode of Operation:	TX @ 1960 MHz

(•) A-Site ( ) B-Site ( ) C-Site ( ) F-Site [6 Worst Data] [Descending]

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
40.19	10.10	12.26	0.84	0.00	23.21	40.00	-16.79	3mV	0.00	1.00	P
137.09	9.70	11.26	1.59	0.00	22.55	43.50	-20.95	3mV	0.00	1.00	P
214.96	9.10	10.18	1.96	0.00	21.24	43.50	-22.26	3mV	0.00	1.00	P
312.71	9.40	14.23	2.45	0.00	26.09	46.00	-19.91	3mV	0.00	1.00	P
467.56	9.60	17.63	3.13	0.00	30.36	46.00	-15.64	3mV	0.00	1.00	P
558.79	9.90	18.80	3.42	0.00	32.12	46.00	-13.88	3mV	0.00	1.00	P

ABOVE DATA, MEASURED EMISSIONS ARE NOISE FLOOR.
COMPLETED SCAN 30 - 1000 MHz, VERTICAL AND HORIZONTAL POLARIZATION
Total data #: 6
V.2a

8.6. SECTION 2.1055: FREQUENCY STABILITY

(NOT APPLICABLE, EUT IS A POWER AMPLIFIER)

END OF REPORT