

# **EMISSIONS TEST REPORT FOR A LOW POWER TRANSMITTER**

## **I. GENERAL INFORMATION**

Requirement: Federal Communications Commissions

Test Requirements: 15.205, 15.207, 15.209, 15.247

Applicant: Root Inc.  
2F, KS Bldg., 1-17-8 Nishikata  
Bunkyo-ku, Tokyo 113-0024, JAPAN

FCC ID: NN4RGW2400-0D

## **II. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)**

The RGW2400-OD is a direct sequence spread spectrum transceiver, operating in the 2400 - 2483.5 MHz Part 15 ISM band.

Output power : 50 mW (17 dBm) nominal

Lowest channel: Channel 1 ( 2412 MHz )  
Highest channel: Channel 13 ( 2472 MHz )

The EUT meets IEEE 802.11 and 802.11b protocols. Four modulation rates are available:

1 Mbps: DBPSK  
2 Mbps: DQPSK  
5.5 and 11 Mbps: CCK

## **III. TEST LOCATION**

All emissions tests per 15.247 were performed at:

Compliance Certification Services  
571F Monterey Road  
Morgan Hill, CA 95037

Emissions from the digital portion of the EUT (30 - 1000 MHz) were performed by

Noise Laboratory Co., Ltd. (NOISEKEN)  
Test Lab Funabashi  
69, Kanehorich Funabashi -City  
Chiba Pref., 274-0054, Japan

T.N. Cokenias  
EMC Consultant/Agent for Alvarion

30 June 2002

## TEST PROCEDURES

### Radiated Emissions

**Test Requirement:** 15.109, 15.205, 15.209, 15.247

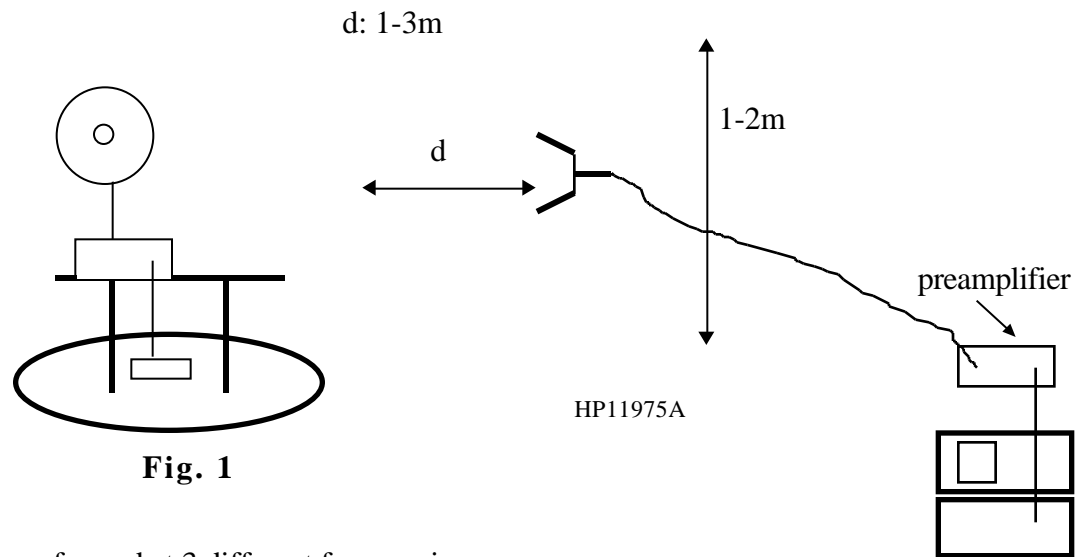
### Measurement Equipment Used:

Type of Equipment	Manufacture	Model
Spectrum Analyzer	HP	8566B
Spectrum Display	HP	85662A
Quasi-Peak Detector	HP	85650A
Pre-Amplifier (1-26.5GHz)	MITEQ	NSP2600-44
Bilog Antenna 30 - 1000 MHz	CHASE	CBL6112
Horn Antenna (1-18GHz)	EMCO	3115
Horn Antenna (18-26.5GHz)	ARA	MWH-1826/B

### Test Procedures, 1- 22 GHz:

1. The EUT was placed on a wooden table resting on a turntable on the open air test site. The search antenna was placed 3m from the EUT. The EUT antenna was mounted vertically as per normal installation.
2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.
3. Radiated emissions were investigated for a LOW channel, a MID channel, and HIGH channel. Emissions were investigated to the 10<sup>th</sup> harmonic.
4. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

## Radiated Test Set-up, 1-25 GHz



**Fig. 1**

Testing was performed at 3 different frequencies

Channel	Frequency, MHz
Low	2412
Mid	2442
High	2472

Radiated emissions were performed at each frequency 4 different transmitter antennas at maximum input power to antenna.

Antennas provided are listed below. Antennas tested are marked with asterix:

Antenna type	Gain (dBi)	Model ID	Operating Channels, US
Omni	6	MFB24006	5,6,7 (with 45 ft cable min.)
<b>Patch*</b>	8	MP24008XFPT	5,6,7 (with 45 ft cable min.)
<b>Omni*</b>	10	MFB24010	5,6,7 (with 45 ft cable min.)
<b>Sector*</b>	13	MSP24013MB	5,6,7,8,9 (with 45 ft cable min.)
<b>Directional*</b>	15	HG2415G	5, 6,7 (with 45 ft. cable min.)

**Test Results:** Worst case results are presented. Refer to separate Excel spread sheet file for harmonic and spurious radiated emissions. Bandedge emissions are attached.

NOTE: For radiated emissions that fall on restricted bands per 15.205, emissions limit is 54 dBuV/m at 3 m for emissions above 960 MHz.

Per 15.247(c) all other undesired emissions must be 20 dB below the highest in-band emission when measured in a 100 kHz bandwidth. Conducted measurements are presented for emissions up to 26.5 GHz.

06/03/02 **FCC Measurement**  
**Compliance Certification Services, Morgan Hill Open Field Site**

**Test Engr:** Frank Ibrahim  
**Project #:** 02U1329-1  
**Company:** Root Inc.  
**EUT Descrip.:** 2.4 GHz Direct Sequence Spread Spectrum - Omni Directional Antenna (10dBi)  
**EUT M/N:** LINK CX  
**Test Target:** 15.205 bandedge

**Equipment for 1-22 GHz:**

HP8563E Analyzer  
 HP 8449B Preamp  
 EMCO 3115 Antenna  
 Cable: 12.0 feet

**Equipment for 22 - 58 GHz:**

HP8566B Analyzer  
 HP 11975A Amplifier (LO)  
 HP 11970K External mixer/antenna  
 Cable: IF Only (321 MHz)

**Peak Measurements:**

1 MHz Resolution Bandwidth  
 1MHz Video Bandwidth

**Average Measurements:**

1MHz Resolution Bandwidth  
 10Hz Video Bandwidth

TX Out

	f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	TX CL	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
ch5	2.3900	10.0	35.7	24.2	27.8	3.1	0.0	0.1	-2.7	64.0	52.5	74.0	54.0	-10.0	-1.5	V
ch7	2.4835	10.0	35.7	24.3	28.0	3.1	0.0	0.1	-2.7	64.2	52.9	74.0	54.0	-9.8	-1.1	V
ch6	2.4835	10.0	32.2	22.0	28.0	3.1	0.0	0.1	-2.7	60.7	50.5	74.0	54.0	-13.3	-3.5	V
	f	Measurement Frequency		Amp	Preamp Gain		Avg Lim	Average Field Strength Limit				Pk Lim	Peak Field Strength Limit			
	Dist	Distance to Antenna		D Corr	Distance Correct to 3 meters		Pk Lim	Peak Field Strength Limit				Avg Mar	Margin vs. Average Limit			
	Read	Analyzer Reading		Avg	Average Field Strength @ 3 m		Avg Mar	Margin vs. Average Limit				Pk Mar	Margin vs. Peak Limit			
	AF	Antenna Factor		Peak	Calculated Peak Field Strength		Pk Mar	Margin vs. Peak Limit								
	CL	Cable Loss		HPF	High Pass Filter											

06/03/02 **FCC Measurement**  
**Compliance Certification Services, Morgan Hill Open Field Site**

**Test Engr:** Frank Ibrahim  
**Project #:** 02U1329-1  
**Company:** Root Inc.  
**EUT Descrip.:** 2.4 GHz Direct Sequence Spread Spectrum - Patch Panel Antenna  
**EUT M/N:** LINK CX  
**Test Target:** 15.205 bandedge

**Equipment for 1-22 GHz:**

HP8563E Analyzer  
 HP 8449B Preamp  
 EMCO 3115 Antenna  
 Cable: 12.0 feet

**Equipment for 22 - 58 GHz:**

HP8566B Analyzer  
 HP 11975A Amplifier (LO)  
 HP 11970K External mixer/antenna  
 Cable: IF Only (321 MHz)

**Peak Measurements:**

1 MHz Resolution Bandwidth  
 1MHz Video Bandwidth

**Average Measurements:**

1MHz Resolution Bandwidth  
 10Hz Video Bandwidth

TX Out

	f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	TX CL	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
ch5	2.3900	10.0	34.0	22.2	27.8	3.1	0.0	0.1	-2.7	62.3	50.5	74.0	54.0	-11.7	-3.5	V
ch7	2.4835	10.0	35.0	23.7	28.0	3.1	0.0	0.1	-2.7	63.5	52.2	74.0	54.0	-10.5	-1.8	V
ch6	2.4835	10.0	31.8	22.2	28.0	3.1	0.0	0.1	-2.7	60.4	50.7	74.0	54.0	-13.6	-3.3	V

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	TX CL	45ft transmit antenna cable loss		

05/24/02 **FCC Measurement**  
**Compliance Certification Services, Morgan Hill Open Field Site**

**Test Engr:** Frank Ibrahim  
**Project #:** 02U1329-1  
**Company:** Root Inc.  
**EUT Descrip.:** 2.4 GHz Direct Sequence Spread Spectrum - sector antenna  
**EUT M/N:** LINK CX  
**Test Target:** 15.205 bandedge

**Equipment for 1-22 GHz:**

HP8563E Analyzer  
 HP 8449B Preamp  
 EMCO 3115 Antenna  
 Cable: 12.0 feet

**Equipment for 22 - 58 GHz:**

HP8566B Analyzer  
 HP 11975A Amplifier (LO)  
 HP 11970K External mixer/antenna  
 Cable: IF Only (321 MHz)

**Peak Measurements:**

1 MHz Resolution Bandwidth  
 1MHz Video Bandwidth

**Average Measurements:**

1MHz Resolution Bandwidth  
 10Hz Video Bandwidth

TX Out

	f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	TX CL	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes	
ch5	2.390	9.8	34.7	23.8	27.8	3.1	0.0	0.0	-2.7	62.9	52.0	74.0	54.0	-11.1	-2.0	V	
ch6	2.390	9.8	34.8	22.0	27.8	3.1	0.0	0.0	-2.7	63.0	50.2	74.0	54.0	-11.0	-3.8	V	
ch9	2.483	9.8	33.3	22.0	28.0	3.1	0.0	0.0	-2.7	61.7	50.4	74.0	54.0	-12.3	-3.6	V	
	f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit			
	Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit			
	Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit			
	AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit			
	CL	Cable Loss					TX CL	45ft transmit antenna cable loss									

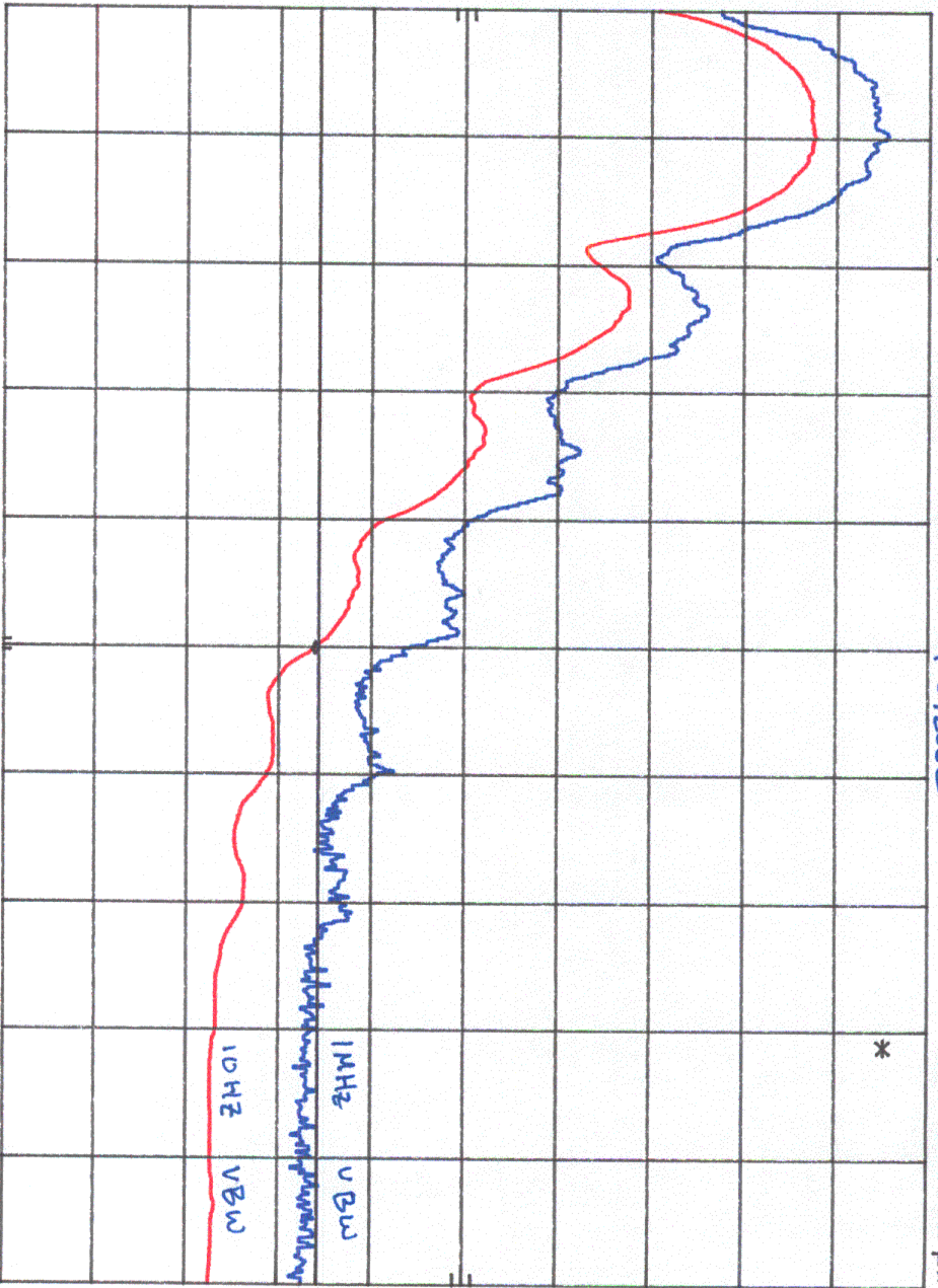


RGW2400/OD First Sample CH 7 (RADIATED) MKR 2.483 5 GHz  
HP REF 119.7 dBμV ATTEN 0 DB 6/20/2002 53.60 dBμV

10 dB/

OFFSET  
22.7  
DB

DL  
54.0  
dBμV



CENTER 2.483 GHz SPAN 100 MHz  
RES BW 1 MHz VBW 1 MHz SWP 20.0 msec



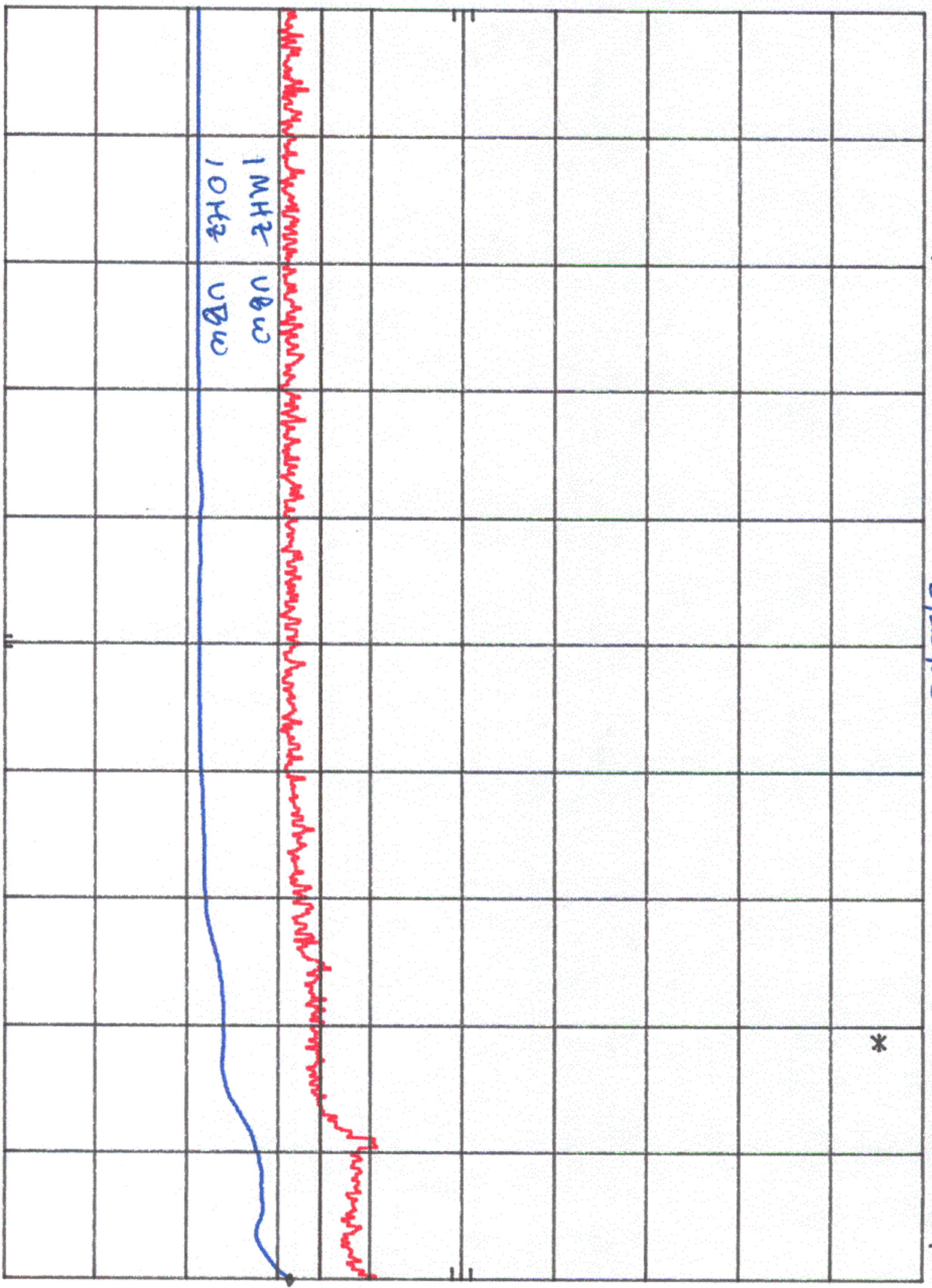


RGW2400/0D First Sample CH 25 (RADAR) MKR 2.390 00 GHz  
REF 119.4 dBμV ATTEN 0 DB 6/20/2002 50.70 dBμV

HP 10 dB/

OFFSET 22.4 DB

DL 54.0 DBμV



START 2.310 0 GHz RES BW 1 MHz VBW 1 MHz STOP 2.390 0 GHz SWP 20.0 msec

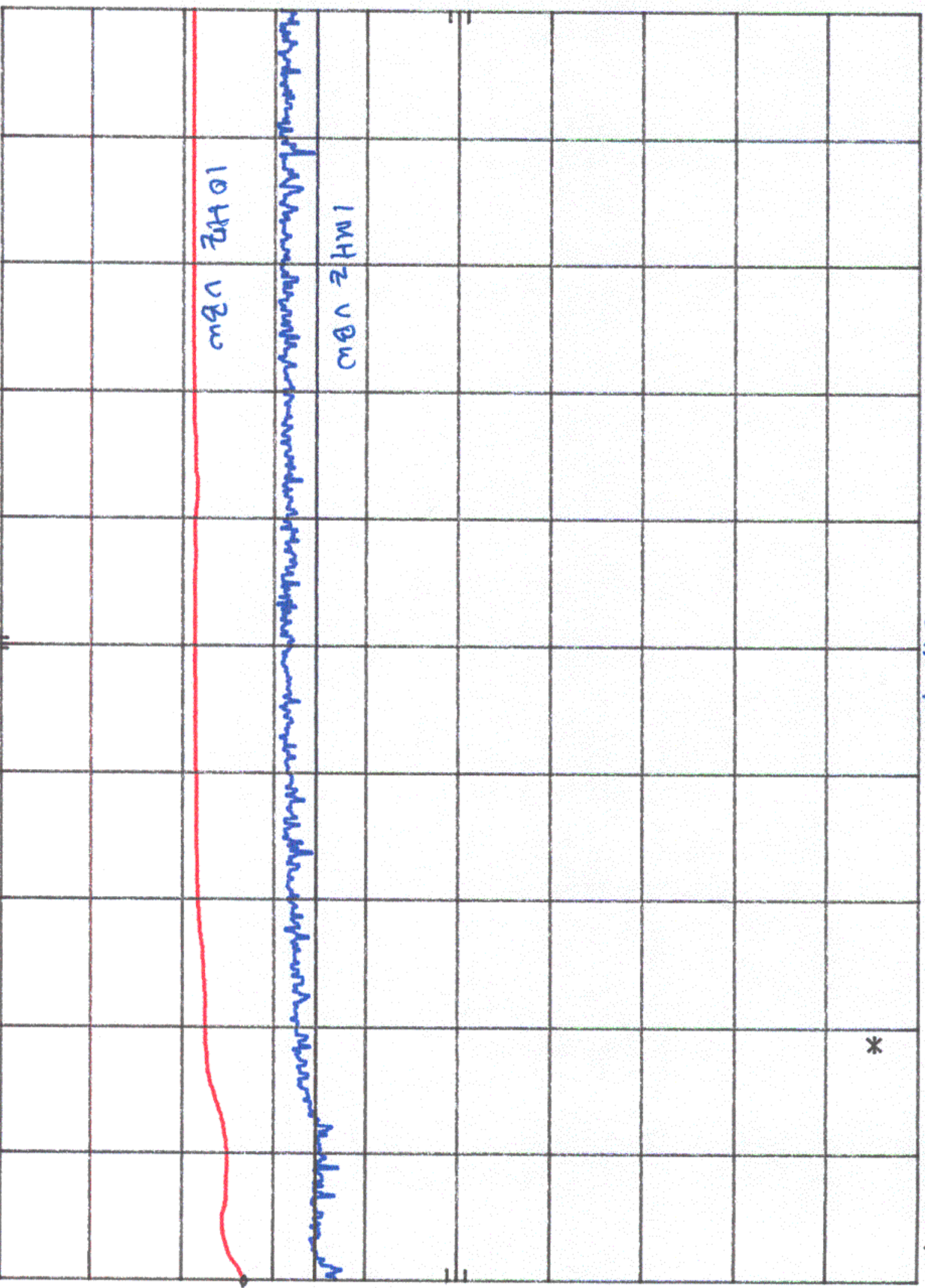


RGW2400/OD First Sample Ch 7 (RADATED) MKR 2.390 00 GHz  
REF 119.4 DB $\mu$ V ATTEN 0 DB 6/20/2002 46.20 DB $\mu$ V

HP  
10 DB/

OFFSET  
22.4  
DB

DL  
54.0  
DB $\mu$ V



START 2.310 0 GHz STOP 2.390 0 GHz  
RES BW 1 MHz VBW 1 MHz SWP 20.0 msec



**Test Results, 30 - 1000 MHz**

Refer to attached test report from Noiseken Laboratory of Japan.

## Summary

Type of test: RADIATED DISTURBANCE  
Regulation(s): FCC Rules, Part 15, Subpart C  
Test method(s): ANSI C63.4/1992  
**Test result:** **PASS**  
Test date: 09/17/2001  
Name of company: ROOT INC.  
Address: KS BLD.2F 1-17-8,NISHIKATA,BUNKYO-KU,  
TOKYO 113-0024,JAPAN  
Tel: +81 (0) 3-5840-7604 Fax: +81 (0) 3-5840-7608  
Name of company engineer: MR.K.SASAMURA  
Type of instrument: WIRELESS IP ROUTER  
Model No.: RGW2400-OD  
Serial No.: U2  
High frequency used: 25.0 MHz, 44.0 MHz, 83.5 MHz  
Power supply: AC 120V (60Hz)  
Phase: Single phase  
Measurement Uncertainty: +3.6dB/-3.3dB  
Test place: NOISE LABORATORY CO.,LTD. Test Lab Funabashi  
69,Kanehoricho,Funabashi-City,Chiba Pref,274-0054 Japan  
FCC Registration No.: In Reply refer to  
31040/SIT 1300F2  
(Open Site No.3)  
Noiseken engineer: S.Kurashima



**Test equipment**

( RADIATED DISTURBANCE )

TEST RECEIVER	ROHDE & SCHWARZ	Model No. ESVP Serial No. 882401/033 Last cal. 08/11/2001 Cal.int. 1 Year(s)
BICONICAL ANTENNA	Schwarzbeck	Model No. VHA 9103/BBA 9106 Serial No. 0003 Last cal. 10/23/2000 Cal.int. 1 Year(s)
LOG-PERIODIC ANTENNA	Schwarzbeck	Model No. UKLP9140 Serial No. 9140116 Last cal. 10/23/2000 Cal.int. 1 Year(s)
SIGNAL GENERATOR	Agilent technologies	Model No. 8657B Serial No. 3133U02079 Last cal. 08/11/2001 Cal.int. 1 Year(s)
HORN ANTENNA	Eaton Corporation	Model No. 96001 Serial No. 2604 Last cal. 08/24/2001 Cal.int. 1 Year(s)
SPECTRUM ANALYZER	Agilent technologies	Model No. 8566B Serial No. 2747A05834 Last cal. 08/11/2001 Cal.int. 1 Year(s)
SWEEP OSCILLATOR	Agilent technologies	Model No. 8350A Serial No. 2145J00130 Last cal. 02/26/2001 Cal.int. 1 Year(s)
RF PLUG-IN	Agilent technologies	Model No. 83592A Serial No. 2143A00296 Last cal. 02/26/2001 Cal.int. 1 Year(s)

MEASUREMENT OF RADIATED DISTURBANCE

WIRELESS IP ROUTER  
Model RGW2400-OD  
Serial No. U2

Date : Sep/17/01  
Weather : Fair  
Temp. : 29 °C  
Humidity: 50 %  
Site No.: 3

Frequency [MHz]	Limit [dB/m]	Maximum field strength [dB/m] (Quasi peak value)	
		Horizontal	Vertical
66.0	40.0	19.4	30.5
88.0	40.0	19.7	23.1
96.3	43.5	16.7	31.7
102.5	43.5	26.8	31.8
113.8	43.5	30.1	32.9
134.1	43.5	26.2	34.2
140.3	43.5	30.8	33.1
150.0	43.5	26.8	28.8
157.5	43.5	26.8	27.4
192.0	43.5	30.6	26.8
240.0	46.0	34.6	30.2
334.0	46.0	30.4	27.3
396.0	46.0	34.2	29.5
440.0	46.0	34.0	30.6
500.1	46.0	42.5	36.3
550.1	46.0	37.9	35.0
600.1	46.0	35.3	31.1

-- Continued --

Frequency [MHz]	Limit [dB/m]	Maximum field strength [dB/m] (Quasi peak value)	
		Horizontal	Vertical
799.1	46.0	35.2	34.1

Note: 0 dB = 1  $\mu$ V

Regulations: FCC Rules, Part 15, Subpart C

Measurement methods: ANSI C63.4-92

Measurement distance: 3 meter

Measurement conditions: CH.1 Communication mode.

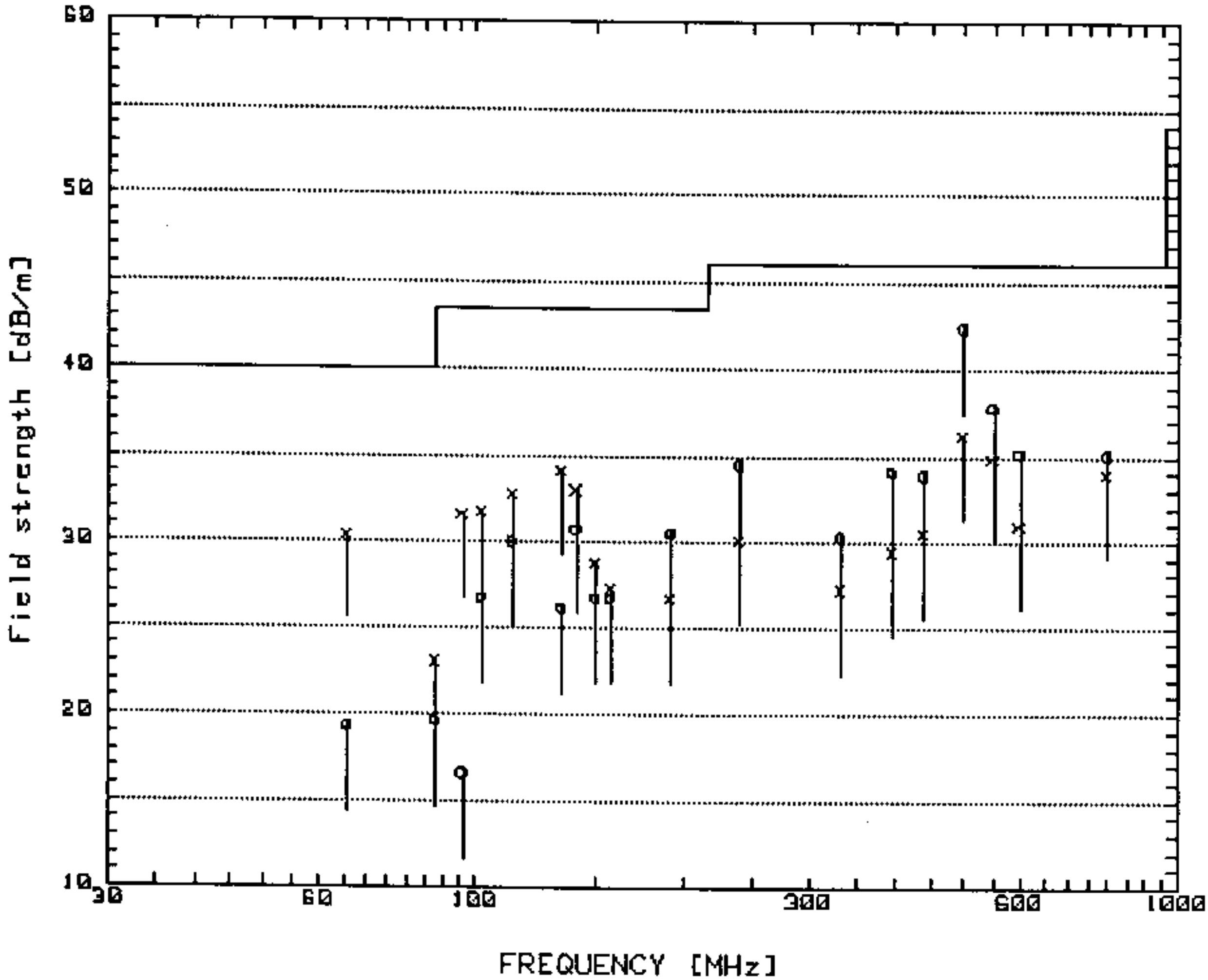


MEASUREMENT OF RADIATED DISTURBANCE

WIRELESS IP ROUTER

Date : Sep/17/01(Fair)  
Site No. : 3  
Model : RGW2400-OD  
Serial No.: U2

o: Horizontal  
x: Vertical  
——— Limit



Note: 0 dB = 1  $\mu$ V

Regulations: FCC Rules, Part 15, Subpart C

Measurement methods: ANSI C63.4-92

Measurement distance: 3 meter

Measurement conditions: CH.1 Communication mode.

MEASUREMENT OF RADIATED DISTURBANCE

WIRELESS IP ROUTER  
Model RGW2400-OD  
Serial No. U2

Date : Sep/17/01  
Weather : Fair  
Temp. : 29 °C  
Humidity: 50 %  
Site No.: 3

Frequency [MHz]	Limit [dB/m]	Maximum field strength [dB/m] (Peak value)	
		Horizontal	Vertical
1001.9	54.0	48.2	46.3
1168.9	54.0	41.4	42.6
1252.4	54.0	44.5	48.4
1335.9	54.0	41.6	40.6
2037.8	54.0	46.2	52.1
4075.5	54.0	51.3	52.0
4823.5	54.0	*<36.5	73.5
6113.4	54.0	*<43.2	*<43.2
8151.2	54.0	*<43.7	52.2
10189.0	54.0	*<43.7	*<43.7

Note: 0 dB = 1  $\mu$ V

\*: Very low reading

Regulations: FCC Rules, Part 15, Subpart C

Measurement methods: ANSI C63.4-92

Measurement distance: 3 meter

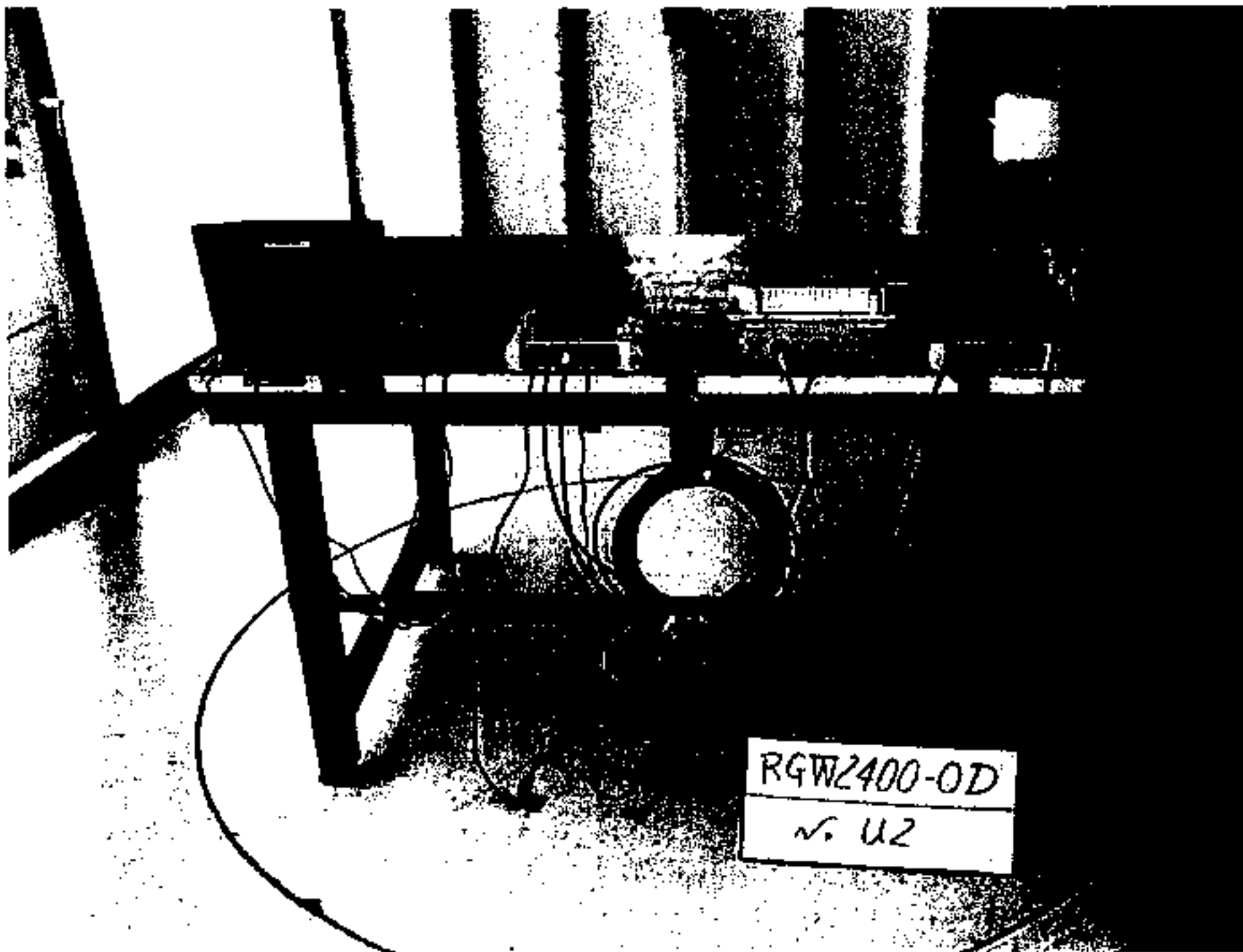
Measurement conditions: CH.1 Communication mode.

Setup photo(s)

( RADIATED DISTURBANCE )



Setup view



Setup view



This report is based on measurement made by

**MR.K.SASAMURA**

of your

company and the following NOISE LABORATORY engineers.



S.Kurashima

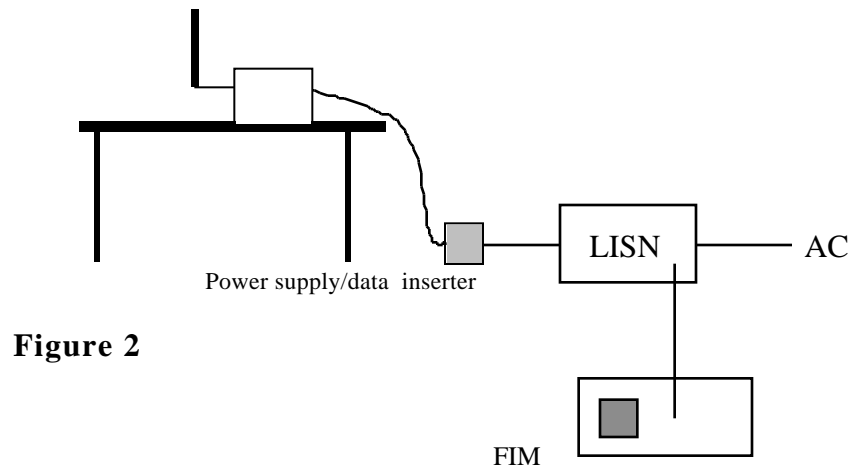
Engineer Test Lab Funabashi

**AC Line Conducted Emissions**  
**Test Requirement: 15.107, 15.207**

**Measurement Equipment Used:**

Rohde & Schwarz EMI Receiver ESHS-20  
Fischer Custom Communication LISN, FCC-LISN-50/250-25-2

**Test Set-up**



**Figure 2**

**Test Procedure**

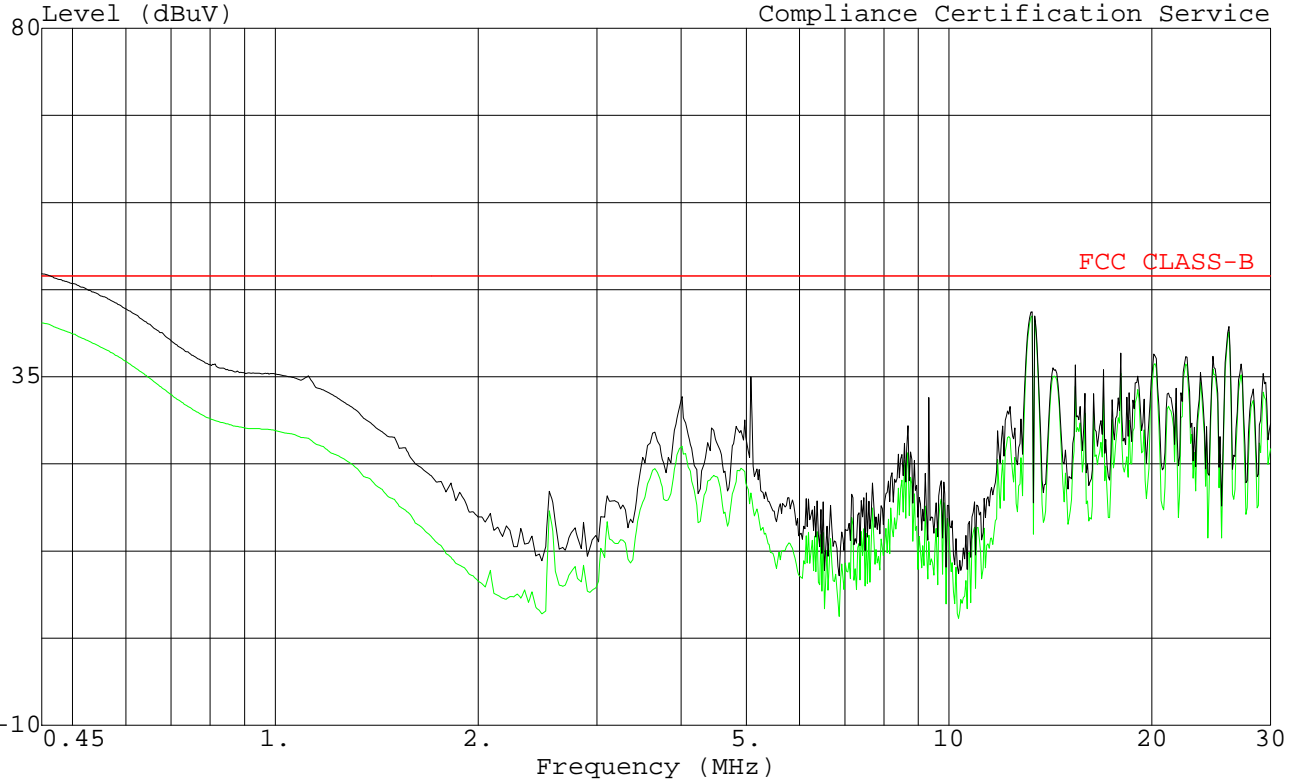
1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in normal mode.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

**Test Results**

Refer to attached graph and tabulated data sheets.

Data#: 10 File#: LC0524.EMI

Date: 05-24-2002 Time: 13:10:14



Trace: 8

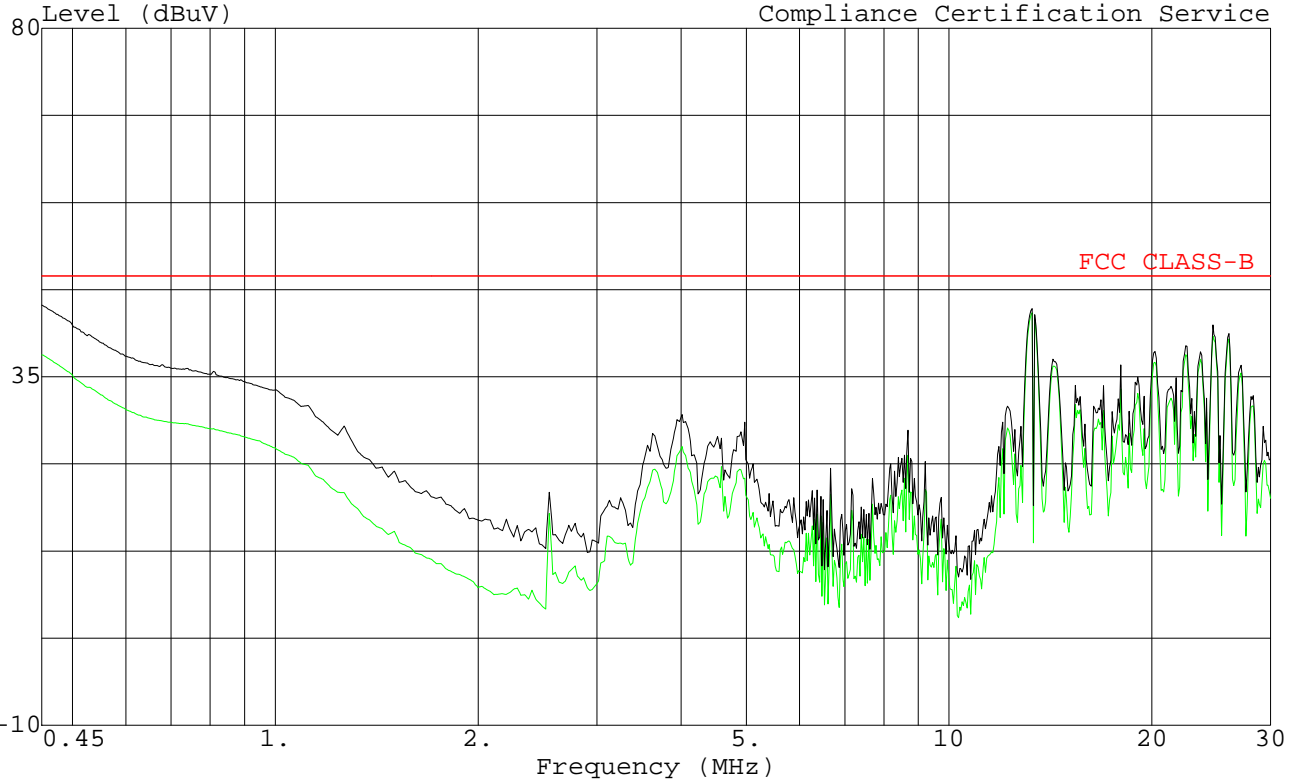
Ref Trace:

Project # : 02U1329-1  
 Test Engineer: Frank Ibrahim  
 Company : Root, Inc.  
 EUT : Residential Gateway System  
 : Model: RGW2400/OD  
 Test Config : EUT, Monitor, PC, Mouse, KB, Laptop, Hub  
 Type of Test : FCC CLASS B  
 Mode of Op. : L1: PK(GREEN), AV(BLACK)  
 : 115Vac, 60Hz



Data#: 17 File#: LC0524.EMI

Date: 05-24-2002 Time: 13:40:05



Trace: 15 Ref Trace:  
 Project # : 02U1329-1  
 Test Engineer: Frank Ibrahim  
 Company : Root, Inc.  
 EUT : Residential Gateway System  
 : Model: RGW2400/OD  
 Test Config : EUT, Monitor, PC, Mouse, KB, Laptop, Hub  
 Type of Test : FCC CLASS B  
 Mode of Op. : L2: PK(GREEN), AV(BLACK)  
 : 115Vac, 60Hz

28-May-02 FCC Measurement  
 Compliance Certification Services, Morgan Hill Open Field Site

Client : Root, Inc  
 Project # : 02U1329-1  
 EUT: RGW 2400/OD 2.4GHz Device  
 EUT's Antenna : Directional HG2415G

CONDUCTED EMISSIONS DATA (115VAC 60Hz)										
Freq. (MHz)	Reading			Class (dB)	Limit QP	FCC B		Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)			AV	QP (dB)	AV (dB)		
0.45	48.32	41.97	--	0.00	48.00	--	-6.03	--	L1	
13.23	43.34	42.85	--	0.00	48.00	--	-5.15	--	L1	
26.01	41.48	40.77	--	0.00	48.00	--	-7.23	--	L1	
0.45	44.26	37.83	--	0.00	48.00	--	-10.17	--	L2	
13.28	43.83	43.27	--	0.00	48.00	--	-4.73	--	L2	
24.63	41.71	40.25	--	0.00	48.00	--	-7.75	--	L2	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
6 Worst Data										

**Minimum 6 dB Bandwidth**  
**Test Requirement: 15.247(a)2**

**Measurement Equipment Used:**

HP 8593EM Spectrum Analyzer  
6' length low loss coaxial cable

**Test Procedures**

The EUT was configured on a test bench. The EUT was set for continuous operation. Frequency was set to 2412 MHz (LOW channel). While the transmitter broadcast a steady stream of digital data, the analyzer MAX HOLD function was used to capture the envelope of the transmission occupied bandwidth.

The test was repeated at MID channel and at HIGH channel.

**Test Results:** Refer to attached spectrum analyzer charts. Data taken with RES BW of 100 kHz shows minimum 6 dB BW of 11 MHz. Minimum requirement: 500 kHz

<b>Channel</b>	<b>Frequency, MHz</b>
1 LOW	2412
7 MID	2442
13 HIGH	2472

**NOTE:** 6 dB bandwidth was measured at each modulation, with essentially the same bandwidth resulting. Data is presented for the 11 Mbps modulation setting.

**15.247(a)2: Minimum 6 dB Bandwidth**



ATTEN 10dB  
RL 0dBm

10dB

$\Delta MKR - .67dB$   
 $-11.7MHz$

ROOT BW CH 1

\*

W

START 2.3637GHz

STOP 2.4637GHz

\*RBW 100kHz

VBW 100kHz

SWP 50.0ms

ATTEN 10dB

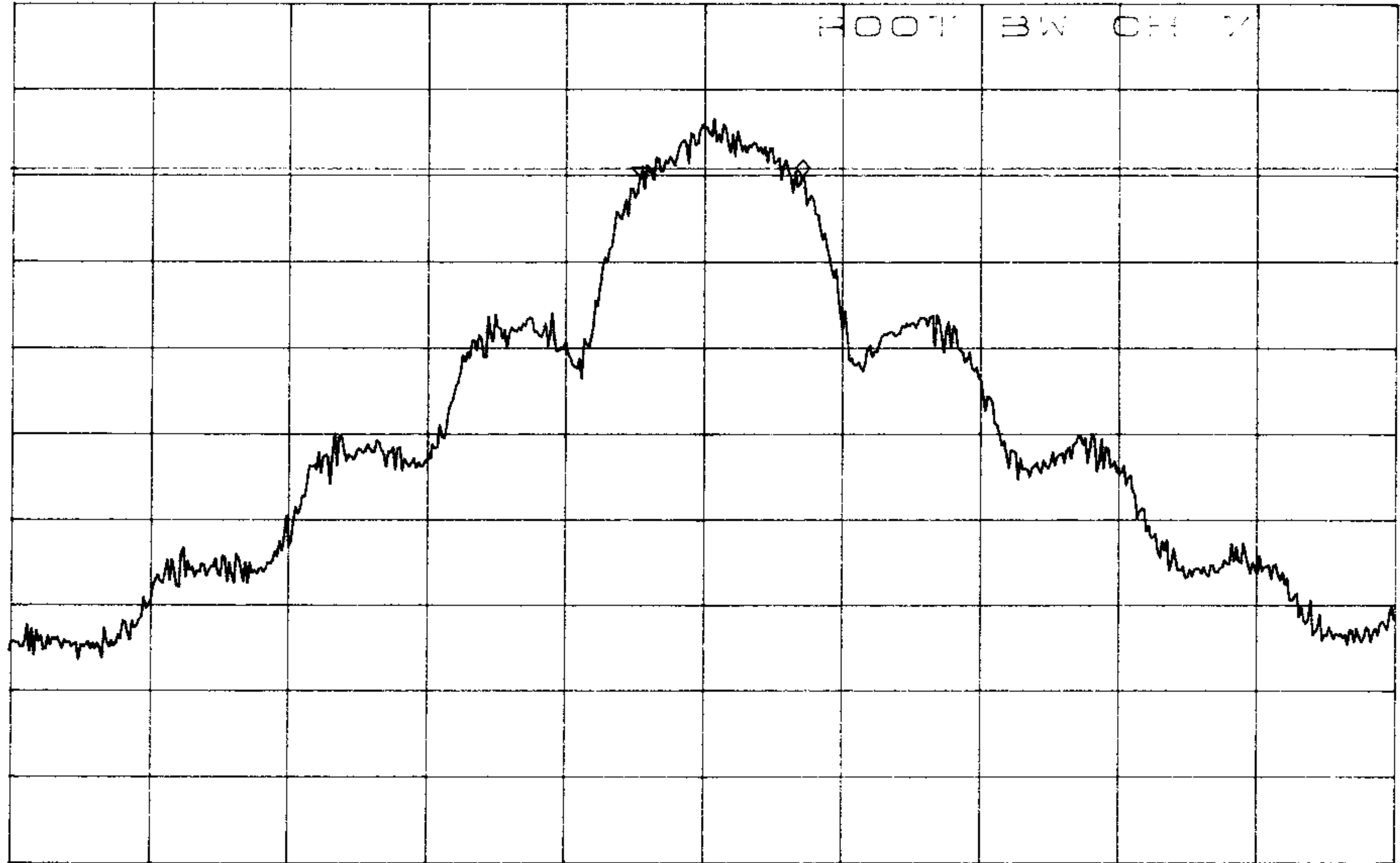
MARKER .17dB

RL 0dBm

10dB

11.7MHz

ROOT BW CH 1



W

START 2.3913GHz

STOP 2.4913GHz

\*RBW 100KHz

VBW 100KHz

SWP 50.0ms

ATTEN 20dB

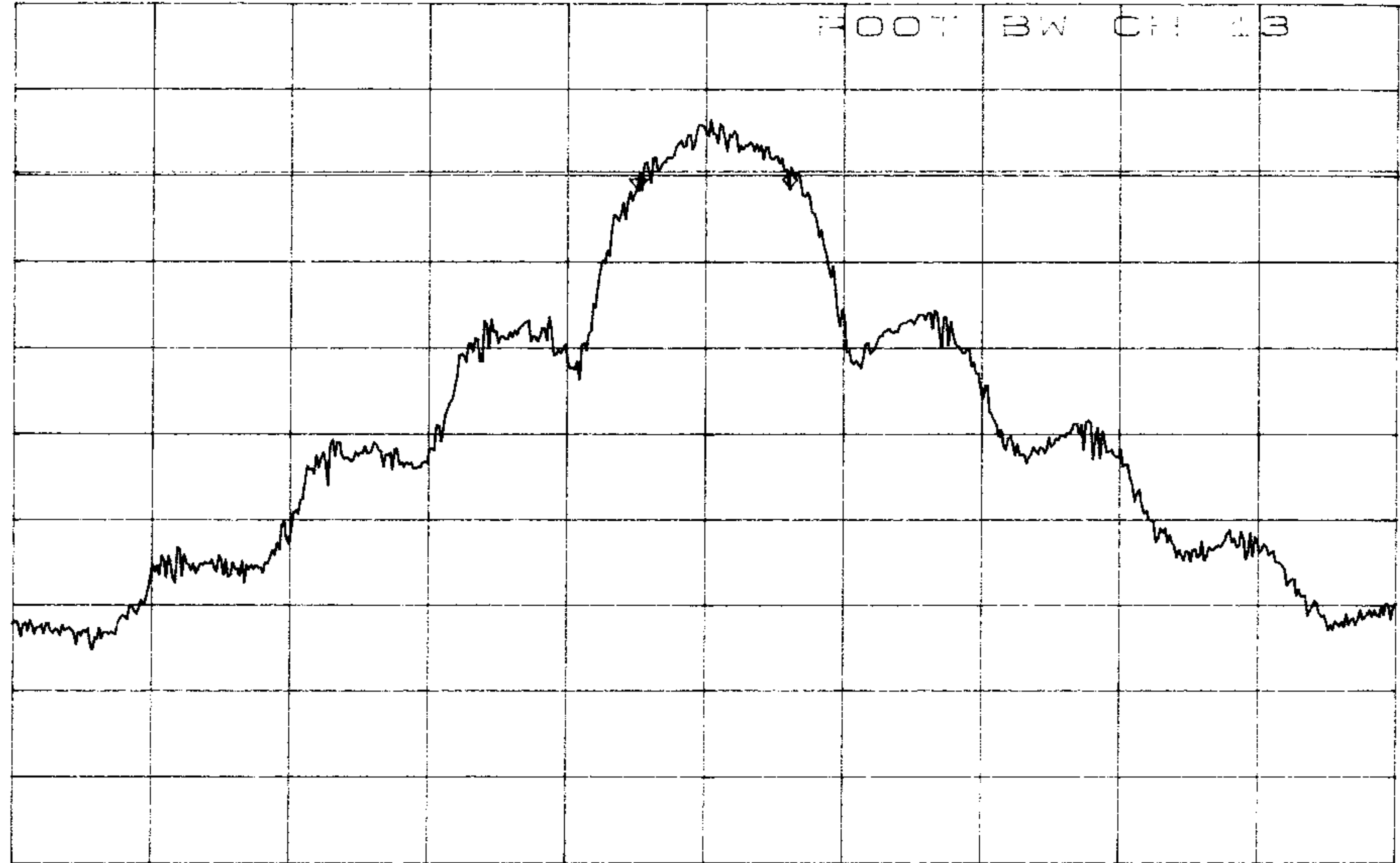
AMKR .17dB

RL 0dBm

10dB

11.0MHz

ROOT BW CH 13



START 2.4217GHz

STOP 2.5217GHz

\*RBW 100KHz

VBW 100KHz

SWP 50.0ms



**RF Power Output**  
**Test Requirement: 15.247(b)**

**Measurement Equipment Used:**

Agilent Peak Power Meter model E4416A  
Agilent Peak Power Sensor model E9323A

**Test Procedures**

1. The EUT was configured on a test bench. The power meter was zeroed and calibrated. The control software was activated and power was set to produce highest output level at LOW channel.
2. The process in (1) was repeated for MID channel and HIGH channel.

**Test Results**

Power level readings converted to dBm are shown below. Refer also to spectrum analyzer graphs. Reference level offset corrects for external attenuation and cable loss.

<b>Channel</b>	<b>Frequency, MHz</b>	<b>Output Power, dBm</b>	<b>Limit, dBm</b>
1 LOW	2412	17.8	30.0
7 MID	2442	16.9	30.0
13 HIGH	2472	17.1	30.0

**NOTE:** Data is presented for the 11 Mbps modulation setting. Maximum power output is independent of modulation type



**Spurious Emissions, Conducted**  
**Test Requirement: 15.247(c)**

**Measurement Equipment Used:**

HP 8593EM Spectrum Analyzer  
2 ft length low loss A coaxial RF cable

**Test Procedure**

1. The EUT was configured on a test bench. The cable was connected between the EUT antenna port and the spectrum analyzer input port.

Spectrum analyzer RES BW was set to 100 kHz. The EUT's TDD function was stopped, transmission was continuous at the LOW channel. While the transmitter broadcast a steady stream of digital data, the analyzer MAX HOLD function was used to capture the envelope of the transmission.

Readings were taken out to 10fo.

2. The process in (1) was repeated for MID channel and HIGH channel.

**Test Results**

Refer to attached data sheets. Data shows out of band emissions are suppressed well below the -20 dBc minimum required by the Rules.

<b>Channel</b>	<b>Frequency, MHz</b>
1 LOW	2412
7 MID	2442
13 HIGH	2472

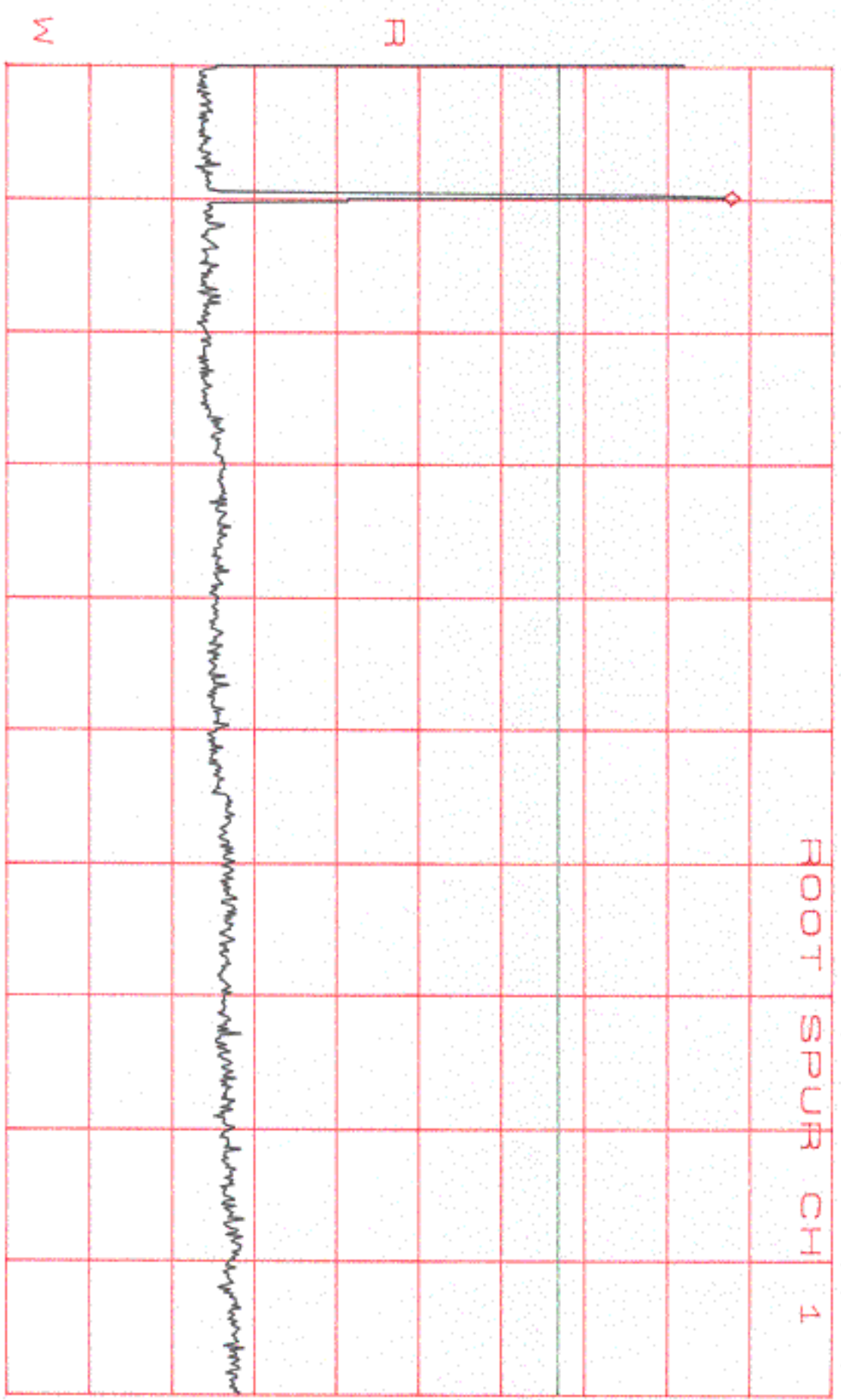
**NOTE:** Data is presented for the 11 Mbps modulation setting.

**15.247(c): Spurious Emissions, Conducted**

ATTEN 10DB  
RL 20.8dBm

MKR 7.63dBm  
10DB/  
2.406GHZ

ROOT SPUR CH 1



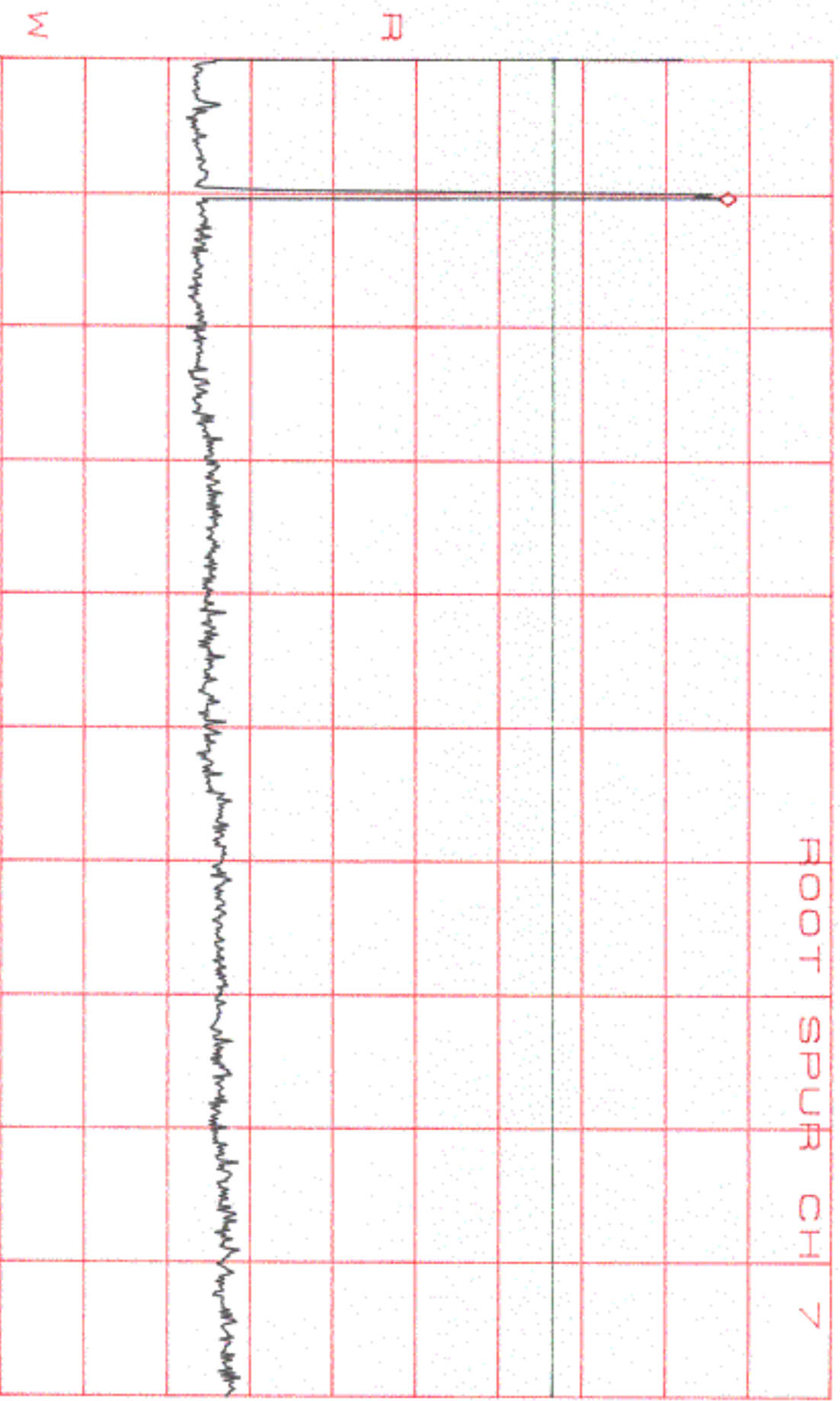
START OHZ  
\*RBW 100KHZ  
VBW 100KHZ  
STOP 24.00GHZ  
SWP 6.00sec

ATTEN 10dB  
RL 20.8dBm

10dB/

MKR 7.30dBm  
2.486GHz

ROOT SPUR CH 7



START OHZ  
\*RBW 100KHZ

VBW 100KHZ

STOP 24.00GHZ  
SWP 6.00sec

ATTEN 10DB  
RL 20.8DBM

10DB/

MKR 5.47DBM  
2.48GHZ

ROOT SPUR CH 13



START OHZ  
\*RBW 100KHZ

VBW 100KHZ

STOP 24.00GHZ  
SWP 6.00sec

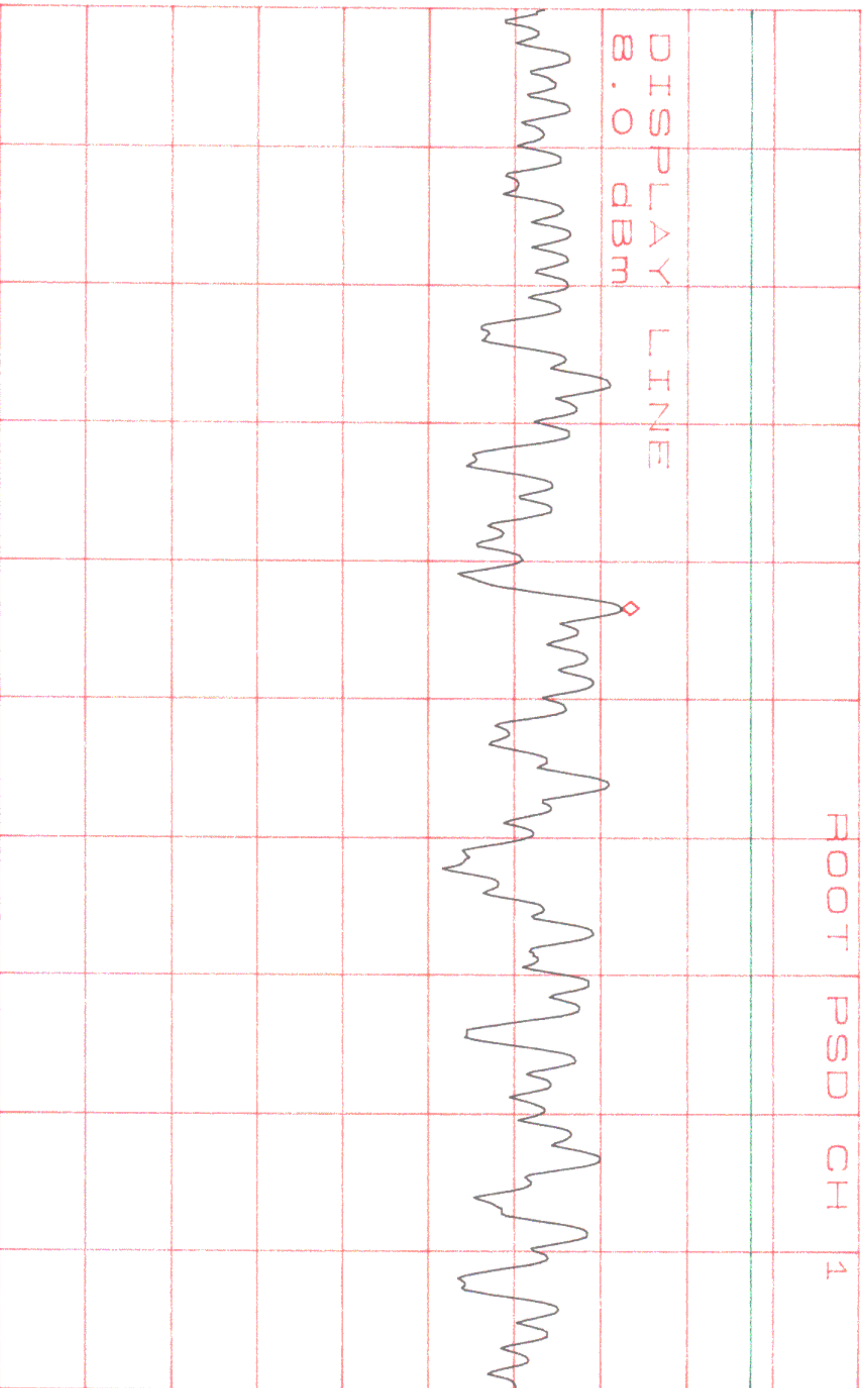
**15.247(d): Power Spectral Density**



ATTEN 10dB  
RL 20.8dBm

10dB/

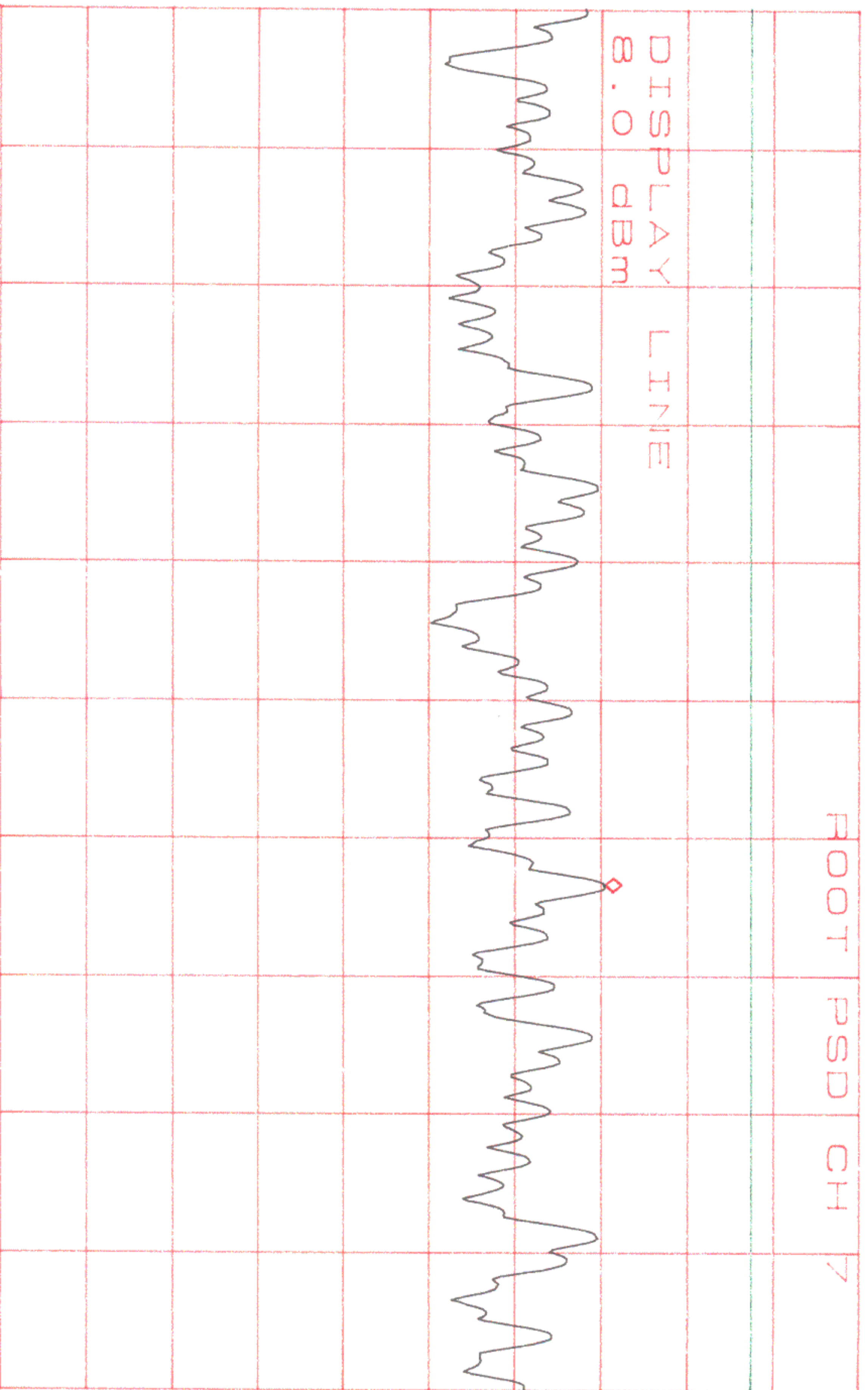
MKR -6.70dBm  
2.4124317GHz



CENTER 2.4124517GHz  
\*RBW 3.0kHz \*VBW 3.0kHz

SPAN 300.0kHz  
\*SWP 100sec

ATTEN 10dB MKR -8.70dBm  
RL 20.8dBm 10dB / 2.4431572GHz



CENTER 2.443167GHz SPAN 300.0kHz  
\*RBW 3.0kHz \*VBW 3.0kHz \*SWP 100sec