

MEASUREMENT/TECHNICAL REPORT

**Company - Model: Bose Corporation
Lifestyle 50 Personal Music Center
FCC ID: A94-P1
January 21, 1999**

Description: This is a report to support a request for an original grant of equipment authorization.

Equipment Type: Low Power Transceiver, RX Certified (DXC).

Report prepared by:

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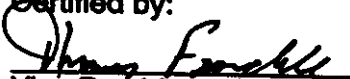
MEMO

TO: Federal Communications Commission
FROM: Tom Froeschle
SUBJECT: Product FCC Certification
DATE: September 15, 1998

I, Tom Froeschle, do hereby authorize Curtis-Straus, LLC to act on our behalf in front of the Federal Communications Commission with respect to all matters relating to certification of equipment under Part 15 of the FCC Rules until further notice.

I further certify that no party (as defined in #1,2002(b) of CFR 47, 1992) to this application, including myself, is subject to denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

Certified by:


Vice President of Research

Introduction

This report is an application for Certification of a Transmitter system operating pursuant to Part 15.24 of the FCC Rules, Code of Federal Regulations 47. The system consists of two transceivers used together to control an audio system. The base station is the Lifestyle 50 Multi-room Interface, while the remote is the Lifestyle 50 Personal Music Center. Each unit uses the same transceiver called an RDL (radio data link). An extended description is included in Exhibit 6 of this report.

This report is designed to demonstrate compliance of the Personal Music Center with the requirements outlined in Part 15 of CFR 47 using the methods outlined in Part 2 of CFR 47. The current revision date, October 1, 1997, of each Part has been used for technical requirements. The testing of the units for Part 15 Subpart B requirements (unintentional radiators) was performed by Integrity Design and Test Services, Inc. Their technical report has been included in Exhibit 3. The testing for Part 15 Subpart C (intentional radiators) was performed by Curtis-Straus LLC.

The Personal Music Center (remote) was tested mounted to a non-conductive box and rotated through three orthogonal axes to maximize emissions.

EXHIBIT 1:**1.0 Statement of Conformity**

The Bose Corporation. Lifestyle 50 Personal Music Center (remote) has been found to conform with the following parts of the 47 CFR as detailed below:

Part 2	Part 15	Comments
§2.925	15.19	The label is shown in the label exhibit.
	15.203	The antenna is attached to the printed circuit board through a special connector.
	15.205	The fundamental is not in a Restricted band and the spurious and harmonics in Restricted bands comply with the general emission limits of 15.209.
	15.207	The Personal Music Center is battery operated and the line conducted limits are therefore, not applicable.
	15.249	The unit complies with the field strength limits of the 15.209 table including the 20dB peak restriction of 15.35.

EXHIBIT 2

2.0 General Description

2.1 Product Description

The product is a self-contained remote control transceiver. It transmits an intermittent FSK signal at 2403.4 MHz - 2480.0 MHz.

2.2 Related Submittal(s) Grants

There are no other approvals required for this device.

2.3 Test Methodology

Radiated emission testing was performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance of 3 meters below 1 GHz, and at a distance of 3 or 1 meter(s) for signals above 1 GHz. The actual test distance used is noted in the test data sheets. The performances were investigated to 10 times the fundamental frequency.

For the remote unit, fresh batteries were used for all final measurements. Although the device does contain voltage regulating circuitry, the emissions in each configuration were maximized and a fresh battery was installed in the maximized configuration just prior to measurement. The Base Station also is regulated and the fundamental was confirmed to have no variation when the input voltage was varied from 85% to 115% of nominal AC line voltage

All other performance tests were made in accordance with the procedures outlined in Part 15 of CFR 47. The applicable sections provided under Part 15 are provided in the measurement section of this report, Exhibit 3.

2.4 Test Facilities

Curtis-Straus

The open area test site and conducted measurement facility used to collect the radiated data is located at 527 Great Road, Littleton, MA 01460. Site T was used. This test facility has been fully described in a report submitted to your office, and a letter verifying your acceptance was sent on August 8, 1997. Please reference your file # 31040/SIT should you have any questions regarding the test site construction.

Integrity Design & Test Services, Inc.

The test facility is located on the premises of Integrity Design & Test Services, Inc. at 37-7 Ayer Road, Littleton, MA 01460. Testing is performed in an Open Area Test Site conforming to the site attenuation characteristics defined by ANSI C63.4 1992. Test methods and facilities have been audited and accredited by the National Voluntary Lab Accreditation Program (NVLAP).

2.5 Test Equipment Used

SPECTRUM ANALYZER(S)

[]	RED 8591E 9 kHz-1.8GHz	HP	S/N:3441A03559	Calibration Due:13-MAR-99
[X]	WHITE 8593E 9 kHz-22 GHz	HP	S/N:3547U01252	Calibration Due:17-MAR-99
[]	BLUE 8591E 9 kHz-1.8 GHz	HP	S/N:3223A00227	Calibration Due:5-FEB-99
[]	YELLOW 8594E 9 kHz-2.9 GHz	HP	S/N:3523A01958	Calibration Due:18-MAR-99
[X]	GREEN 8593E 9 kHz-26.5 GHz	HP	S/N:3829A03618	Calibration Due:31-AUG-99
[]	BLACK 3585A 20 Hz-40.0 MHz	HP	S/N:A183438	Calibration Due:10-NOV-98
[]	8591EM 9 kHz-1.8 MHz	HP	S/N:3710A01179	Calibration Due:20-JAN-99

ANTENNA(S)

[]	GREEN CBL6112B Chase Bilog 30 MHz-2 GHz	S/N:2435	Calibration Due:16-JUL-99
[]	GREEN-BLACK CBL6112B Chase Bilog 30 MHz-2 GHz	S/N:2412	Calibration Due:30-MAR-99
[]	RED 3143 EMCO Biconilog 30 MHz-1.1 GHz	S/N:1270	Calibration Due:28-MAY-99
[]	BLUE 3143 EMCO Biconilog 30 MHz-1.1 GHz	S/N:1271	Calibration Due:28-MAY-99
[]	GREY 3141 EMCO Biconilog 26 MHz-2 GHz	S/N:9703-1038	Calibration Due:19-MAR-99
[]	YELLOW-BLACK CBL6140A Chase X-Wing Bilog 20 - 2000 MHz	S/N:1112	Calibration Due:19-MAR-99
[]	YELLOW 3115 EMCO Horn Antenna 1-18 GHz	S/N:9608-4989	Calibration Due:3-MAR-99
[X]	BLACK 3115 EMCO Horn Antenna 1-18 GHz	S/N:9703-5148	Calibration Due:16-MAR-99
[X]	WHITE 3160-09 EMCO Standard Gain Horn Antenna 18-26.5 GHz	S/N:9610-09	Calibration Due:8-DEC-98
[]	LOOP PLA-130/A ARA Passive Loop Antenna 9 KHz-30 MHz	S/N:1024	Calibration Due:13-AUG-98
[]	LOOP 6511 EMCO Passive Loop Antenna 20 Hz-5 MHz	S/N:9704-1154	Calibration Due:11-AUG-99
[]	MONOPOLE 3301B EMCO Active Monopole antenna 30 Hz-30 MHz	S/N:3824	Calibration Due:31-MAR-99
[]	DIPOLE 3121C EMCO Adjustable Dipole Antenna 30-1000 MHz	S/N:1370	Calibration Due:01-APR-99
[]	DIPOLE 3121C EMCO Adjustable Dipole Antenna 30-1000 MHz	S/N:1371	Calibration Due:01-APR-99

PREAMPLIFIER(S)

<input checked="" type="checkbox"/>	RED	ZFL-1000-LN	MiniCircuits		Calibration Due:16-APR-99
		RF Preamplifier 10 - 2000 MHz			
<input type="checkbox"/>	BLUE	ZFL-1000-LN	MiniCircuits		Calibration Due:15-MAY-99
		RF Preamplifier 10 - 2000 MHz			
<input type="checkbox"/>	GREEN	ZFL-1000-LN	MiniCircuits		Calibration Due:15-OCT-99
		RF Preamplifier 10 - 2000 MHz			
<input type="checkbox"/>	GOLD	ZFL-1000-LN	MiniCircuits		Calibration Due:25-AUG-99
		RF Preamplifier 10 - 2000 MHz			
<input checked="" type="checkbox"/>	WHITE	SMC-12A	MITEQ	S/N:426643	Calibration Due:28-OCT-98
		RF Preamplifier 2000 - 18000 MHz			
<input checked="" type="checkbox"/>	YELLOW	AFS4-18002650-60-8P-4	MITEQ	S/N:467559	Calibration Due:1-MAY-99
		RF Preamplifier 18 - 26.5 GHz			

OPEN AREA TEST SITE(S)

<input type="checkbox"/>	SITE "F"				Calibration Due:9-OCT-98
<input checked="" type="checkbox"/>	SITE "T"				Calibration Due:28-MAY-99
<input type="checkbox"/>	SITE "A"				Calibration Due:25-SEP-98
<input type="checkbox"/>	SITE "M"				Calibration Due:17-JUL-99

Unless otherwise noted the calibration interval is one year. All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

EXHIBIT 3

3.0 Measurement Results

3.1 Operating Frequency

The devices' operating frequencies are 2403.4 MHz - 2480.0 MHz.

3.2 Electric Field Strength Radiation Measurements

Data was obtained using the procedures outlined in ANSI C63.4 (1992). All signals from the transmitter within 20 dB of the emission limit are reported in the following data tables.

The required unintentional radiator digital device Radiated and Conducted Emissions testing was completed by Integrity Design & Test Services, Inc. The report for this testing can be found in section 3.4.

When the unit was originally tested, there was an emission at 4806.9 MHz that was at the limit. When the limit was converted from uV/m to dBuVm, it was rounded to the nearest 1/10 (i.e. 500uV/m was converted to 54.0 dBuV/m) The more precise value for the limit is 53.979 dBuV. To reduce that emission, two RDL notch filter capacitors were changed. C34 was changed from 0.6 pF to 0.5 pF, and C35 was changed from 0.7 pF to 1 pF. With these modifications, the RDL went from a Rev 0 to a Rev 1. Data from Rev 1 was taken and is recorded in the following table. Data from Rev 0 is included in tables 2 and 3.

Radiated Emissions Chart										Curtis-Straus LLC		
Date: 30-Oct-98			Company: Bose Corp.				Distance: 3 m					
Engineer: David Heald			EUT Desc: Lifestyle 50				Table No: 1					
Notes: Personal Music Center			Work Order: 980868									
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Averaging Factor (dB)	Filter Loss (dB)	Distance Factor (dB)	Adjusted Reading (dBµV)	FCC Class B		
										Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Tx Band 1	2403.5	69.9	0.0	29.6	1.4	20.0	0.0	0.0	80.9	94.0	-13.1	Pass
	4806.9	51.8	18.5	35.1	2.3	20.0	1.0	0.0	51.7	54.0	-2.3	Pass
	Above 2nd	Noise floor										
Tx Band 2	2845.0	69.1	0.0	30.8	1.6	20.0	0.0	0.0	81.5	94.0	-12.5	Pass
	4880.0	50.7	18.5	35.3	2.3	20.0	1.0	0.0	50.8	54.0	-3.2	Pass
	Above 2nd	Noise floor										
Tx Band 3	2480.0	68.3	0.0	29.8	1.4	20.0	0.0	0.0	79.5	94.0	-14.5	Pass
	4960.0	49.8	18.5	35.5	2.3	20.0	1.0	0.0	50.1	54.0	-3.9	Pass
	Above 2nd	Noise floor										
Rx Band 1	2443.2	45.6	0.0	29.7	1.4	20.0	0.0	0.0	56.7	94.0	-37.3	Pass
	4886.4	52.5	18.5	35.3	2.3	20.0	1.0	0.0	52.6	54.0	-1.4	Pass
	Above 2nd	Noise floor										
Rx Band 2	2479.8	44.9	0.0	29.8	1.4	20.0	0.0	0.0	56.1	94.0	-37.9	Pass
	4959.5	51.6	18.5	35.5	2.3	20.0	1.0	0.0	51.9	54.0	-2.1	Pass
	Above 2nd	Noise floor										
Rx Band 3	2440.1	44.5	0.0	29.7	1.4	20.0	0.0	0.0	55.6	94.0	-38.4	Pass
	4880.4	53.4	18.5	35.3	2.3	20.0	1.0	0.0	53.5	54.0	-0.5	Pass
	Above 2nd	Noise floor										

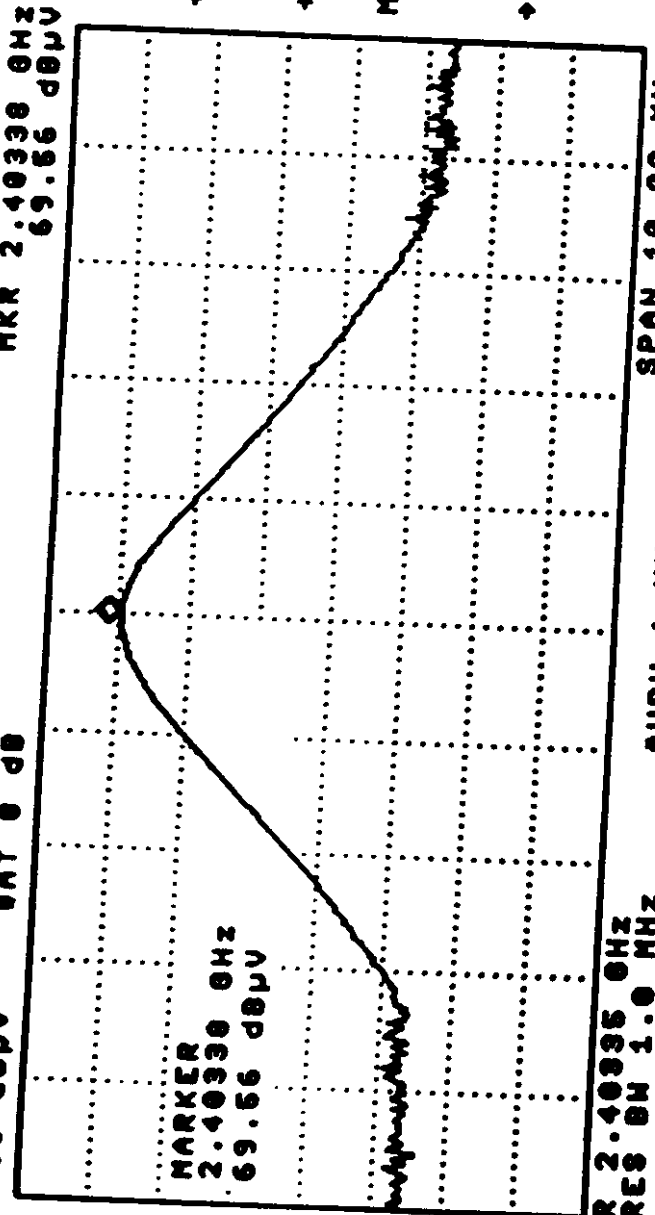
Pre-Amp: White OATS: "T" Cable: 12' RG8A/U Analyzer: Green Antenna: Yellow

Radiated Emissions Chart										Curtis-Straus LLC			
Date: 06/30/98			Company: Bose Corp.				Distance: 3 m						
Engineer: David Heald			EUT Desc: Lifestyle 50 Personal Music Center				Table No: 1						
Notes: C35=0.7 pF; C34=0.6pF			Transmitter section				Work Order: 980362						
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Averaging Factor (dB)	Filter Loss (dB)	Distance Factor (dB)	Adjusted Reading (dBµV/m)	FCC Class B			
										Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	
Band 1													
V	2403.5	69.7	0.0	29.9	1.4	20.0	0.0	0.0	81.0	94.0	-13.0	Pass	
V	4806.9	36.6	0.0	35.1	2.3	20.0	0.0	0.0	54.0	54.0	0.0	Pass	
Noise Floor	7210.5	32.5	17.9	37.8	2.0	20.0	1.0	0.0	35.4	54.0	-18.6	Pass	
Noise Floor	9614.0	32.9	17.2	40.1	2.4	20.0	1.0	0.0	39.2	54.0	-14.8	Pass	
Noise Floor	12017.5	36.1	16.9	40.1	2.8	20.0	1.0	0.0	43.1	54.0	-10.9	Pass	
Noise Floor	14421.0	38.0	17.1	42.2	3.2	20.0	0.0	0.0	46.3	54.0	-7.7	Pass	
Noise Floor	16824.5	41.3	17.3	42.0	3.5	20.0	0.0	0.0	49.5	54.0	-4.5	Pass	
Noise Floor	19228.0	41.1	21.4	40.2	0.0	20.0	0.0	10.0	29.9	54.0	-24.1	Pass	
Noise Floor	21631.5	44.2	21.8	40.3	0.0	20.0	0.0	10.0	32.7	54.0	-21.3	Pass	
Noise Floor	24035.0	45.7	21.8	40.4	0.0	20.0	0.0	10.0	34.3	54.0	-19.7	Pass	
Band 2													
V	2440.0	68.2	0.0	30.0	1.4	20.0	0.0	0.0	79.6	94.0	-14.4	Pass	
V	4880.0	35.4	0.0	35.3	2.3	20.0	0.0	0.0	53.0	54.0	-1.0	Pass	
Noise Floor	7320.0	32.7	17.8	38.0	2.0	20.0	1.0	0.0	35.9	54.0	-18.1	Pass	
Noise Floor	9760.0	33.6	17.1	40.2	2.4	20.0	1.0	0.0	40.1	54.0	-13.9	Pass	
Noise Floor	12200.0	35.3	16.9	40.3	2.8	20.0	1.0	0.0	42.5	54.0	-11.5	Pass	
Noise Floor	14640.0	39.2	17.1	42.3	3.2	20.0	0.0	0.0	47.6	54.0	-6.4	Pass	
Noise Floor	17080.0	39.5	17.3	43.1	3.6	20.0	0.0	0.0	48.9	54.0	-5.1	Pass	
Noise Floor	19520.0	42.8	21.4	40.3	0.0	20.0	0.0	10.0	31.7	54.0	-22.3	Pass	
Noise Floor	21960.0	44.9	21.9	40.3	0.0	20.0	0.0	10.0	33.3	54.0	-20.7	Pass	
Noise Floor	24400.0	43.8	22.4	40.4	0.0	20.0	0.0	10.0	31.8	54.0	-22.2	Pass	
Band 3													
V	2480.0	69.1	0.0	30.1	1.4	20.0	0.0	0.0	80.6	94.0	-13.4	Pass	
V	4960.0	34.2	0.0	35.5	2.3	20.0	0.0	0.0	52.0	54.0	-2.0	Pass	
Noise Floor	7440.0	32.3	17.8	38.3	2.0	20.0	1.0	0.0	35.8	54.0	-18.2	Pass	
Noise Floor	9920.0	34.1	17.1	40.3	2.5	20.0	1.0	0.0	40.8	54.0	-13.2	Pass	
Noise Floor	12400.0	35.6	16.9	40.6	2.9	20.0	1.0	0.0	43.2	54.0	-10.8	Pass	
Noise Floor	14880.0	39.2	17.1	42.0	3.3	20.0	0.0	0.0	47.4	54.0	-6.6	Pass	
Noise Floor	17360.0	37.9	17.3	44.2	3.6	20.0	0.0	0.0	48.4	54.0	-5.6	Pass	
Noise Floor	19840.0	43.4	21.4	40.3	0.0	20.0	0.0	10.0	32.3	54.0	-21.7	Pass	
Noise Floor	22320.0	45.5	21.9	40.3	0.0	20.0	0.0	10.0	33.9	54.0	-20.1	Pass	
Noise Floor	24800.0	44.9	22.8	40.4	0.0	20.0	0.0	10.0	32.5	54.0	-21.5	Pass	

Plots of emissions are on the next six pages.

13117131 30 JUN 1998

REF 00.0 dBV 0AT 0 dB



MKR 2.40330 GHz
69.56 dBV

MARKER → CF

MARKER → REF LVL

MARKER → CF STEP

MARKER → SPAN

MARKER → MINIMUM

More 1 of 2

CENTER 2.40335 GHz
RES BW 1.0 MHz

VBW 1 MHz

SPAN 10.00 MHz
SHP 20.0 msec

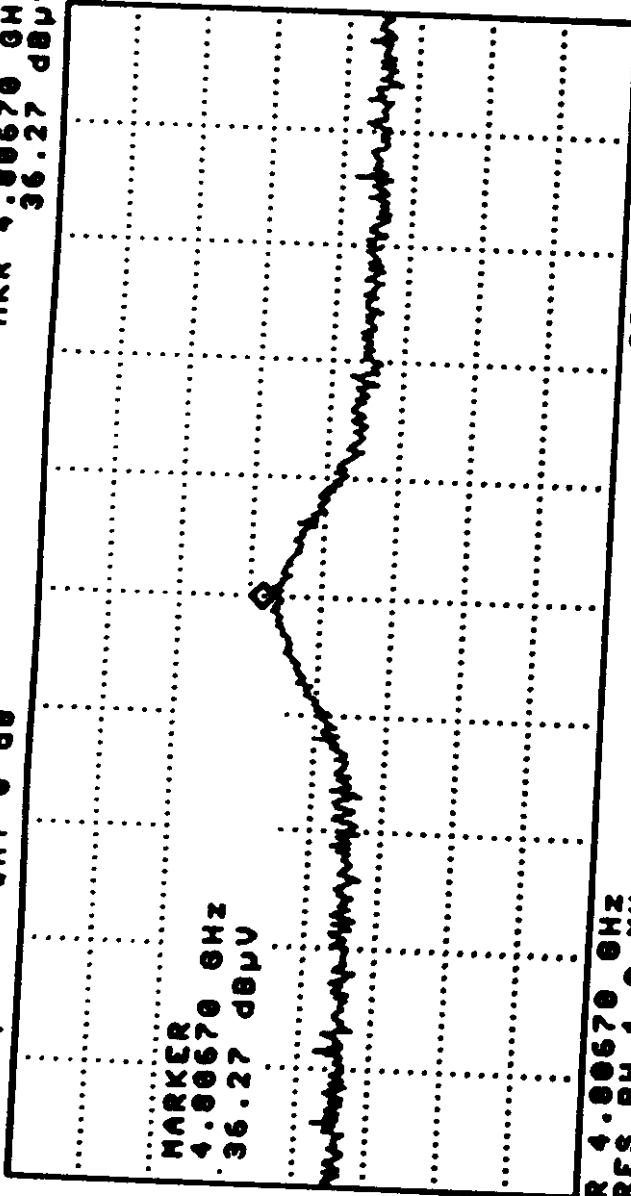
HA SB
SC FS
CORR

XMIT Remote Ch1 Fund

1136136 30 JUN 1990

REF 70.0 dBμV #AT 0 dB

MKR 4.00670 GHz
36.27 dBμV



MARKER
4.00670 GHz
36.27 dBμV

HA SB
SC FS
CORR

CENTER 4.00670 GHz
RES BW 1.0 MHz

VBW 1 MHz

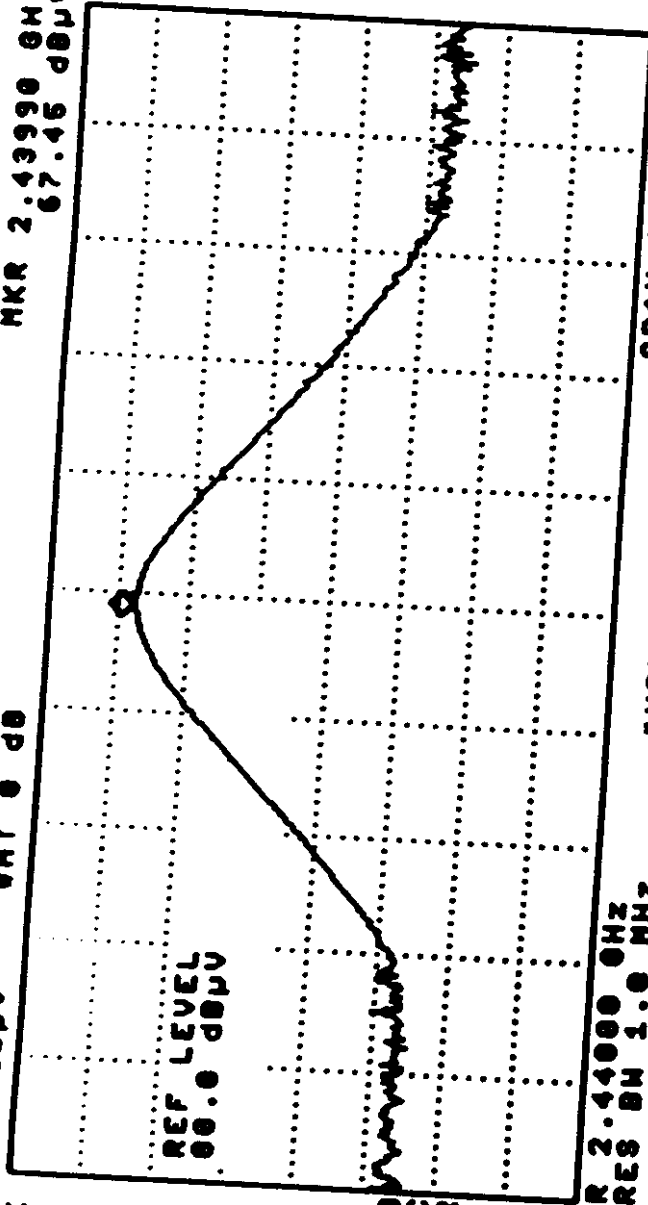
SPAN 10.00 MHz
SWP 20.0 msec

XMIT Remote Ch 1 2nd Harmonic

11157141 30 JUN 1998

REF 00.0 dBV 0AT 0 dB

MKR 2.43990 GHz
67.46 dBV



REF LEVEL
00.0 dBV

HA SB
SC FC
CORR

CENTER 2.44000 GHz
RES BW 1.0 MHz

VBW 1 MHz

SPAN 10.00 MHz
SFP 20.0 msec

ATTEN
AUTO MAN

SCALE
LOG LIN

PRESEL
PEAK

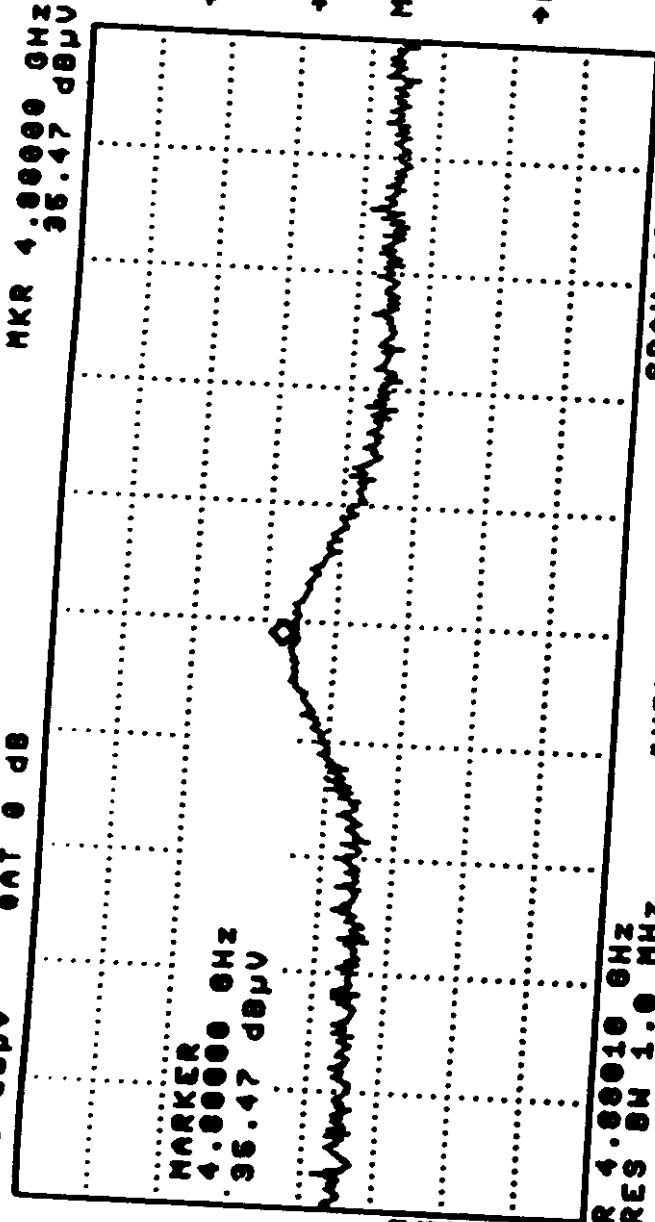
PRESEL
DEFAULT

More
1 of 2

XMIT Remote Ch2 Fundamentals

11:51:37 30 JUN 1998

REF 70.0 dBμV 0AT 0 dB



XMIT Remote CH2 2ND Harmonic

13:26:31 30 JUN 1990

REF 00.0 dBμV

0AT 0 dB

MKR 2.47983 GHz
60.96 dBμV



MARKER
→ CF

MARKER
▲

NEXT
PEAK

NEXT PK
RIGHT

NEXT PK
LEFT

More
1 of 2

HA SB
SC FS
CORR

CENTER 2.40000 GHz
RES BW 1.0 MHz

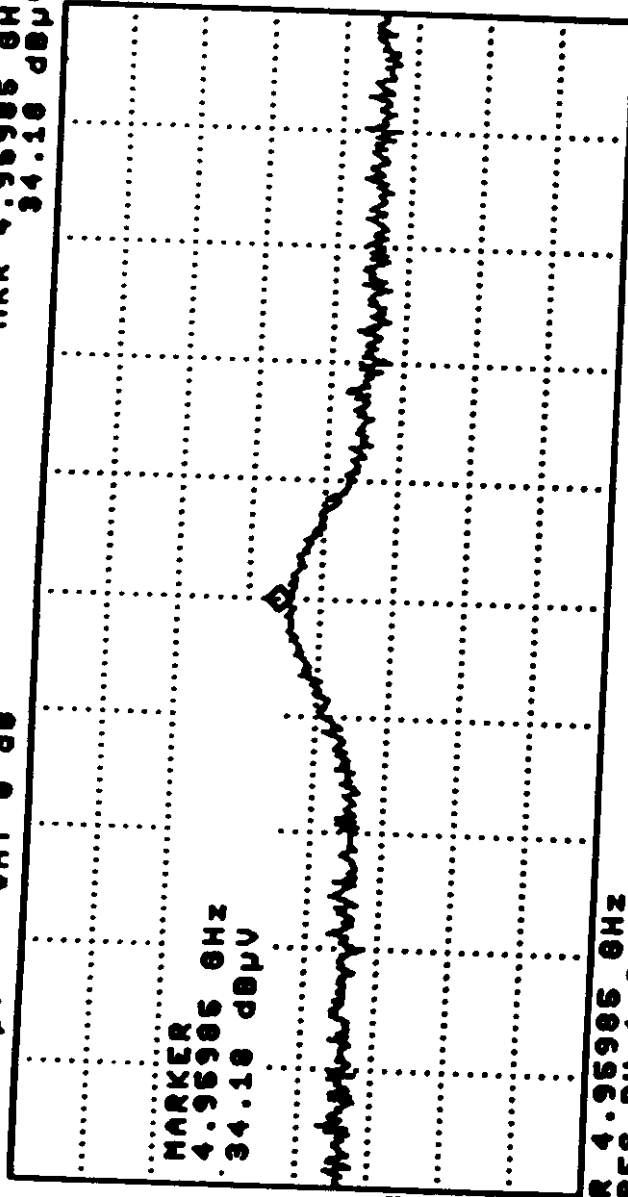
VBW 1 MHz

SPAN 10.00 MHz
SMP 20.0 msec

11142111 30 JUN 1998

REF 70.0 dBμV 0AT 0 dB

MKR 4.95985 GHz
34.10 dBμV



HA SB
SC FS
CORR

CENTER 4.95985 GHz
RES BW 1.0 MHz

VBW 1 MHz

SPAN 10.00 MHz
SMP 20.0 msec

XMIT Remote Ckt 3 2ND Harmon

Radiated Emissions Chart										Curtis-Straus LLC		
Date: 06/30/98			Company: Bose Corp.			Distance: 3 m						
Engineer: David Heald			EUT Desc: Lifestyle 50 Personal Music Center			Table No: 2						
Notes: Fundamental included in Xmit duty cycle.			Receiver section			Work Order: 980362						
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Averaging Factor (dB)	Filter Loss (dB)	Distance Factor (dB)	Adjusted Reading (dBµV/m)	FCC Class B		
										Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Band 1												
V	2443.2	45.4	0.0	30.0	1.4	20.0	0.0	0.0	56.8	94.0	-37.2	Pass
V	4886.4	49.9	18.5	35.3	2.3	20.0	1.0	0.0	50.0	54.0	-4.0	Pass
Noise Floor	7329.7	33.6	17.8	38.1	3.0	20.0	1.0	0.0	37.9	54.0	-16.1	Pass
Noise Floor	9772.8	34.5	17.1	40.2	2.4	20.0	1.0	0.0	41.0	54.0	-13.0	Pass
Noise Floor	12216.0	35.3	16.9	40.4	2.8	20.0	1.0	0.0	42.6	54.0	-11.4	Pass
Band 2												
V	2479.8	42.4	0.0	30.1	1.4	20.0	1.0	0.0	54.9	94.0	-39.1	Pass
V	4959.6	50.3	18.5	35.5	2.3	20.0	1.0	0.0	50.6	54.0	-3.4	Pass
Noise Floor	7439.5	32.3	17.8	38.3	3.0	20.0	1.0	0.0	36.8	54.0	-17.2	Pass
Noise Floor	9919.2	34.1	17.1	40.3	2.5	20.0	1.0	0.0	40.8	54.0	-13.2	Pass
Noise Floor	12399.0	35.6	16.9	40.6	2.9	20.0	1.0	0.0	43.2	54.0	-10.8	Pass
Band 3												
V	2440.2	45.8	0.0	30.0	1.4	20.0	0.0	0.0	57.2	94.0	-36.8	Pass
V	4880.4	50.1	18.5	35.3	2.3	20.0	1.0	0.0	50.2	54.0	-3.8	Pass
Noise Floor	7320.5	32.7	17.8	38.0	3.0	20.0	1.0	0.0	36.9	54.0	-17.1	Pass
Noise Floor	9760.8	33.6	17.1	40.2	2.4	20.0	1.0	0.0	40.1	54.0	-13.9	Pass
Noise Floor	12201.0	35.3	16.9	40.3	2.8	20.0	1.0	0.0	42.5	54.0	-11.5	Pass

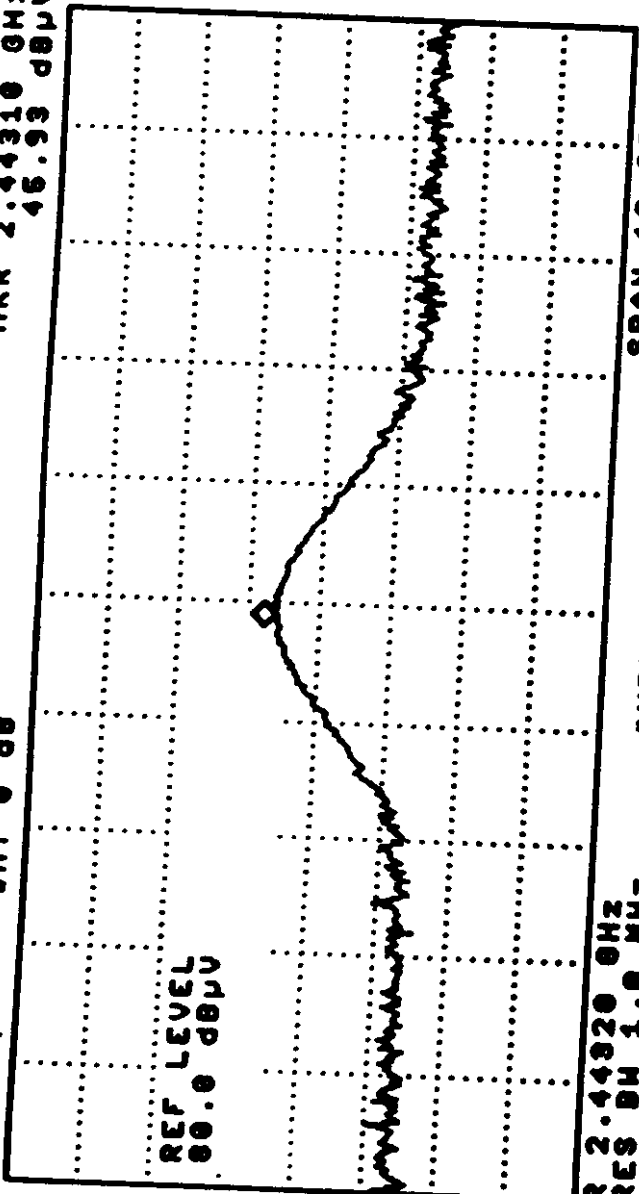
Pre-Amp: White OATS: "T" Cable: 12' RG8A/U Analyzer: White Antenna: Black

Plots of emissions are on the next six pages.

14155112 30 JUN 1990

REF 00.0 dBV 0AT 0 dB

MKR 2.44310 GHz
45.93 dBV



REF LEVEL
00.0 dBV

CENTER 2.44320 GHz
RES BW 1.0 MHz

VBW 1 MHz

SPAN 10.00 MHz
SMP 21.5 msec

HA SB
SC FS
CORR

ATTEN
AUTO MAN

SCALE
LOG LIN

PRESEL
PEAK

PRESEL
DEFAULT

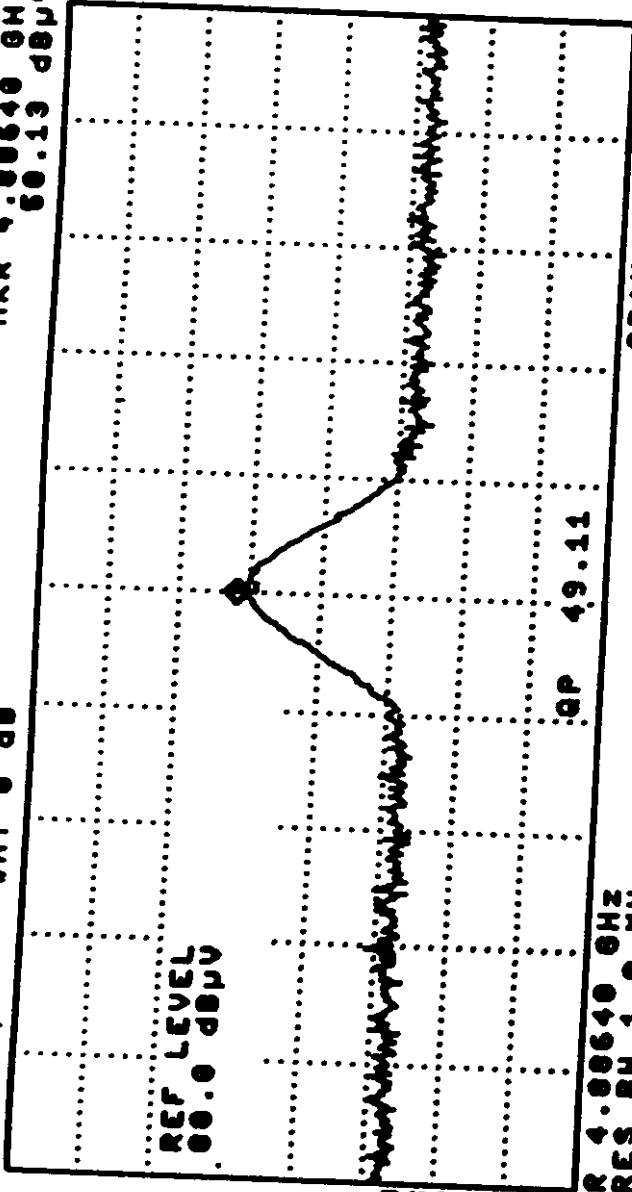
More
1 of 2

Rev Remote CA-1 FUNDAMENTAL

14:20:16 30 JUN 1990

REF 00.0 dBV 0AT 0 dB

MKR 4.00640 GHz
50.13 dBV



ATTEN
AUTO MAN

SCALE
LOG LIN

PRESEL
PEAK

PRESEL
DEFAULT

MORE
1 of 2

HA SB
SC FS
CORR

CENTER 4.00640 GHz
RES BW 1.0 MHz

QP 49.11

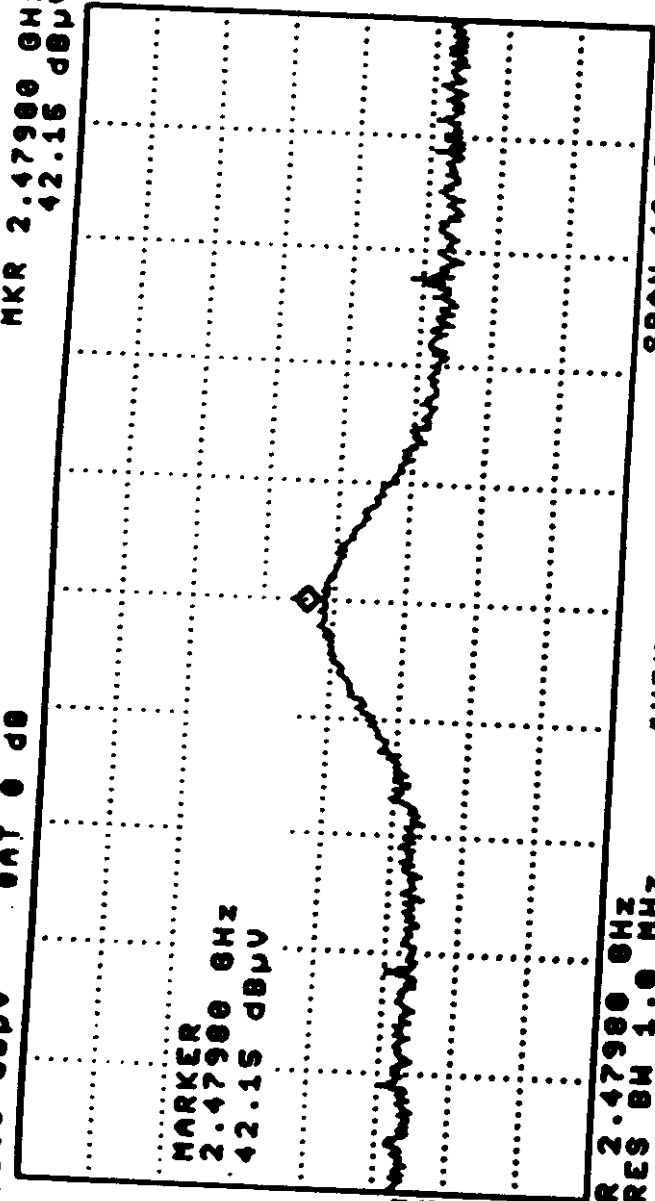
SPAN 20.00 MHz
OSMP 21.5 MS00

Rev Remotes Cat 1 2nd Harm

14140106 30 JUN 1990

REF 00.0 dBV 0AT 0 dB

MKR 2.47900 GHz
42.15 dBV



MARKER
2.47900 GHz
42.15 dBV

MARKER
→ CF

MARKER
→ REF LVL

MARKER
→ CF STEP

MARKER
→ SPAN

MARKER
→ MINIMUM

More
1 of 2

HA SB
SC FS
CORR

CENTER 2.47900 GHz
RES BW 1.0 MHz

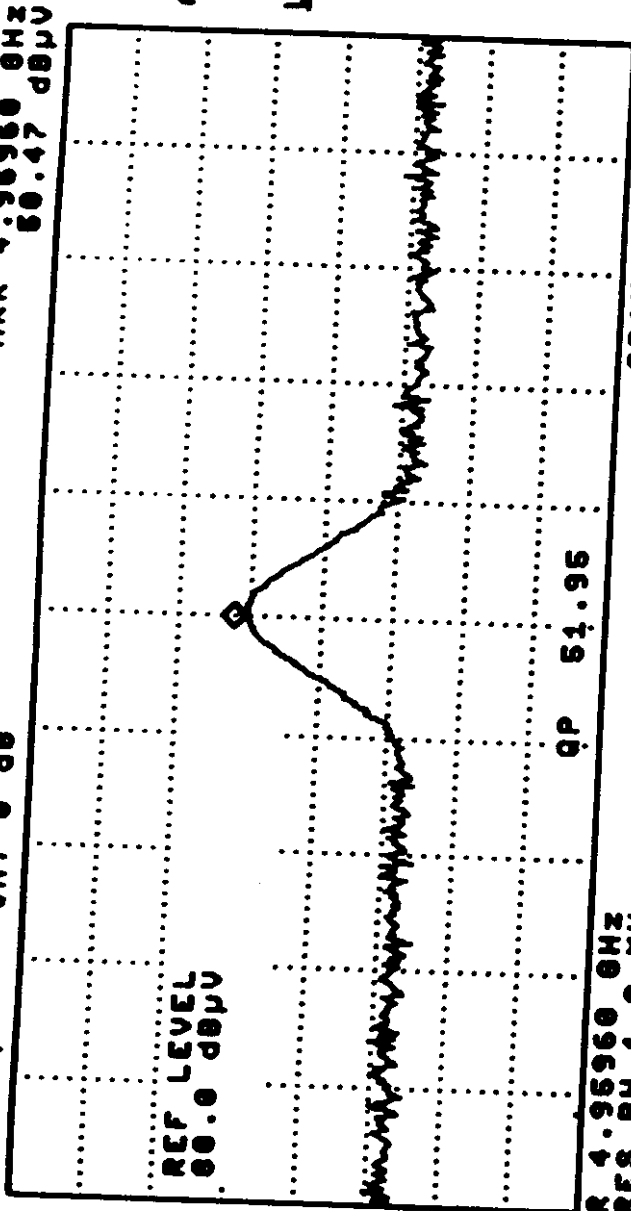
VBW 1 MHz

SPAN 10.00 MHz
#SMP 21.5 MS/s

Rev Remote CH2 FUNDAMENTAL

14100143 30 JUN 1998

REF 00.0 dBµV 0AT 0 dB



MKR 4.95960 MHz
50.47 dBµV

ATTEN
AUTO MAN

SCALE
LOG LIN

PRESEL
PEAK

PRESEL
DEFAULT

MORE
1 of 2

PEAK
LOO
10
dB/

WA 80
SC FS
CORR

CENTER 4.95960 MHz
RES BW 1.0 MHz

SPAN 20.00 MHz
#SMP 21.5 msec

QBW 1 MHz

Rev Remote Ch 2 2nd Harmonic

14157157 30 JUN 1990

REF 00.0 dBV

0AT 0 dB

MKR 2.44020 GHz
46.14 dBV

MARKER
→ CF

MARKER
2.44020 GHz
46.14 dBV

MARKER
→ REF LVL

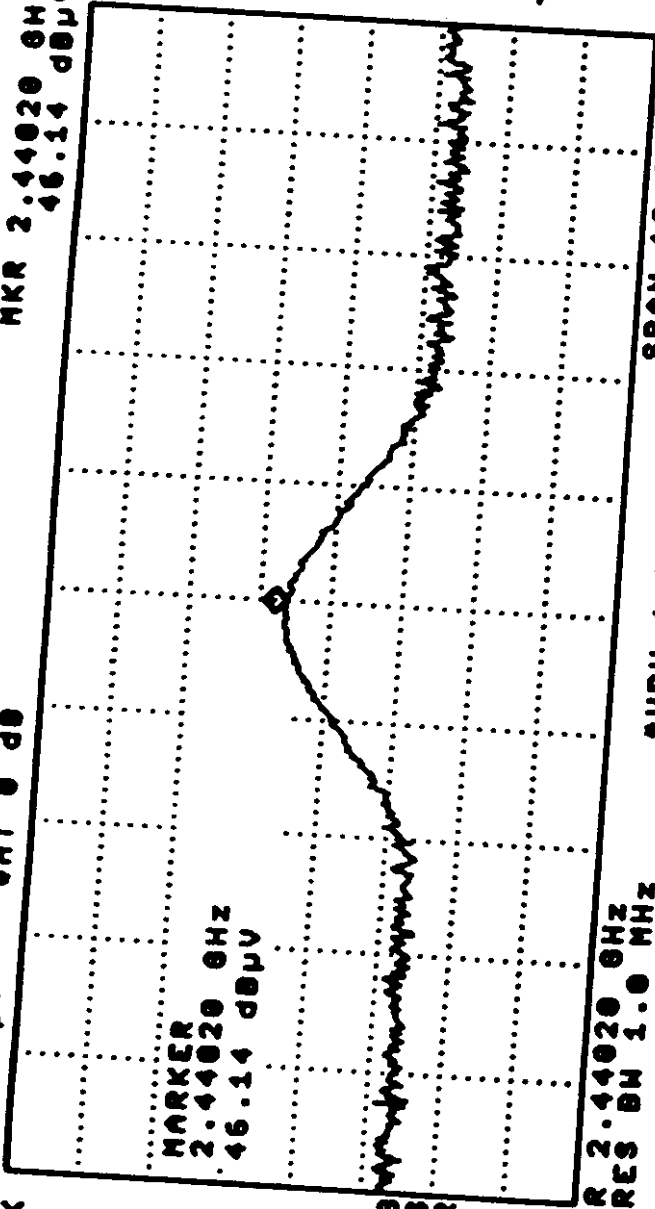
MARKER
→ CF STEP

HA SB
SC FS
CORR

MARKER 4
→ SPAN

MARKER
→ MINIMUM

MORE
1 OF 2



CENTER 2.44020 GHz
RES BW 1.0 MHz

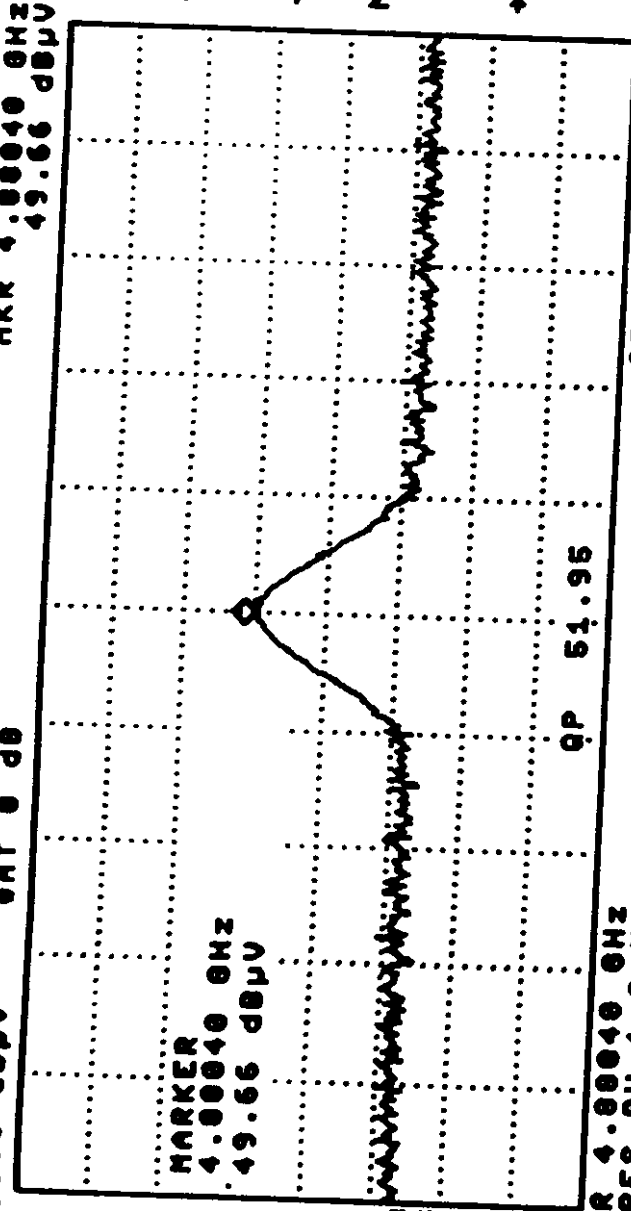
VBW 1 MHz

SPAN 10.00 MHz
SMP 21.5 MS00

Rev Remote Kit 3 FUNDAMENTAL

14110132 30 JUN 1998

REF 00.0 dBμV GAT 0 dB



Rev Remote Ckt 3 2nd Harmonic

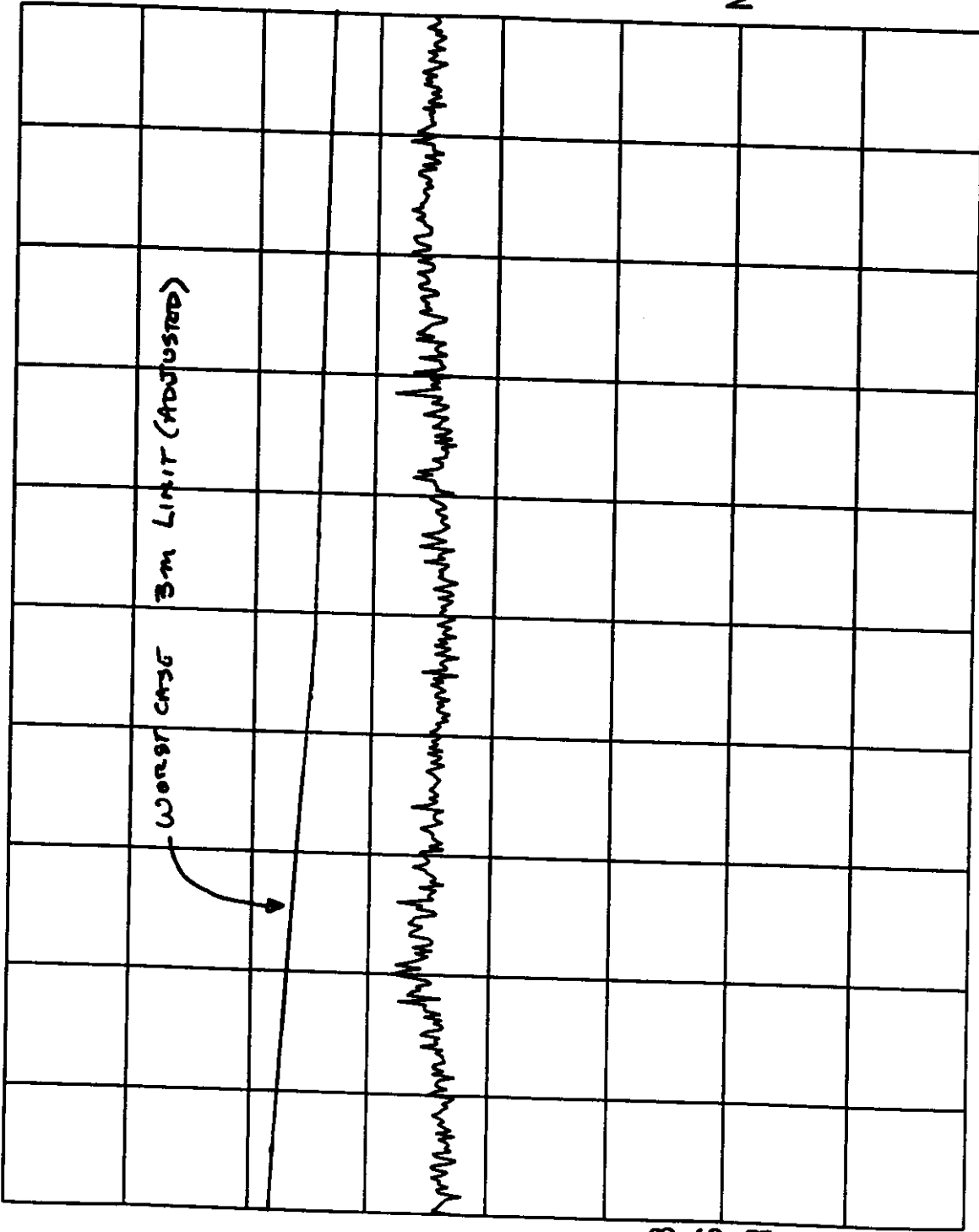
3.3 Noise Floor Plots

hp

Noise Floor Plot

REF 70.0 dBμV #AT 0 dB

PEAK
LOG
10
dB/



MARKER
NORMAL

MARKER
Δ

MARKER
AMPTD

SELECT
1 2 3 4

MARKER 1
ON OFF

More
1 of 2

WA SB
SC FS
CORR

START 7.000 GHz #RES BW 1.0 MHz
STOP 12.500 GHz #VBW 1 MHz SWP 110 msec

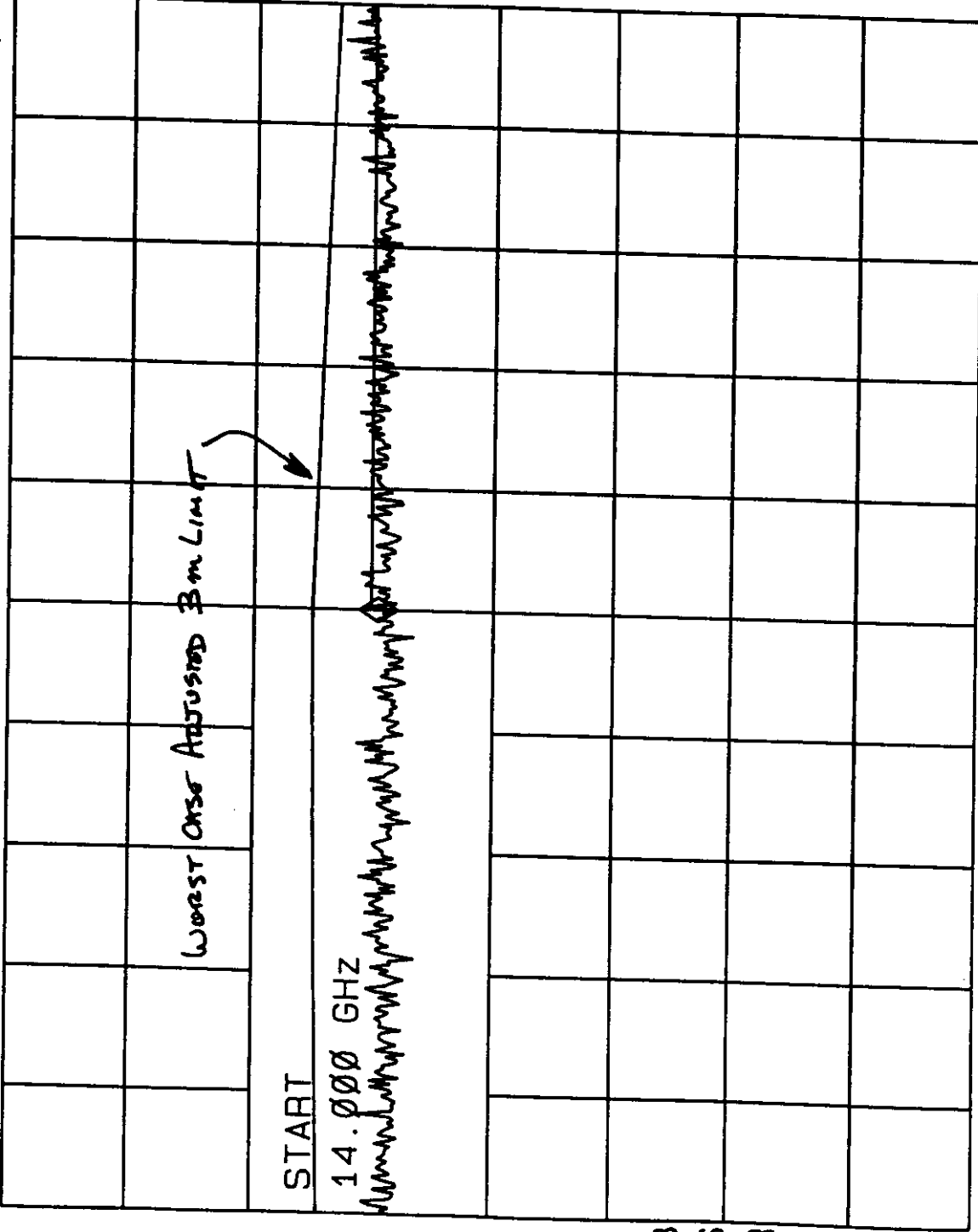
hp

Noise Floor Plot

MKR 16.000 GHZ
37.80 dBμV

REF 70.0 dBμV #AT 0 dB

PEAK
LOG
10
dB/



CENTER
FREQ

START
FREQ

STOP
FREQ

CF STEP
AUTO MAN

FREQ
OFFSET

Band
Lock

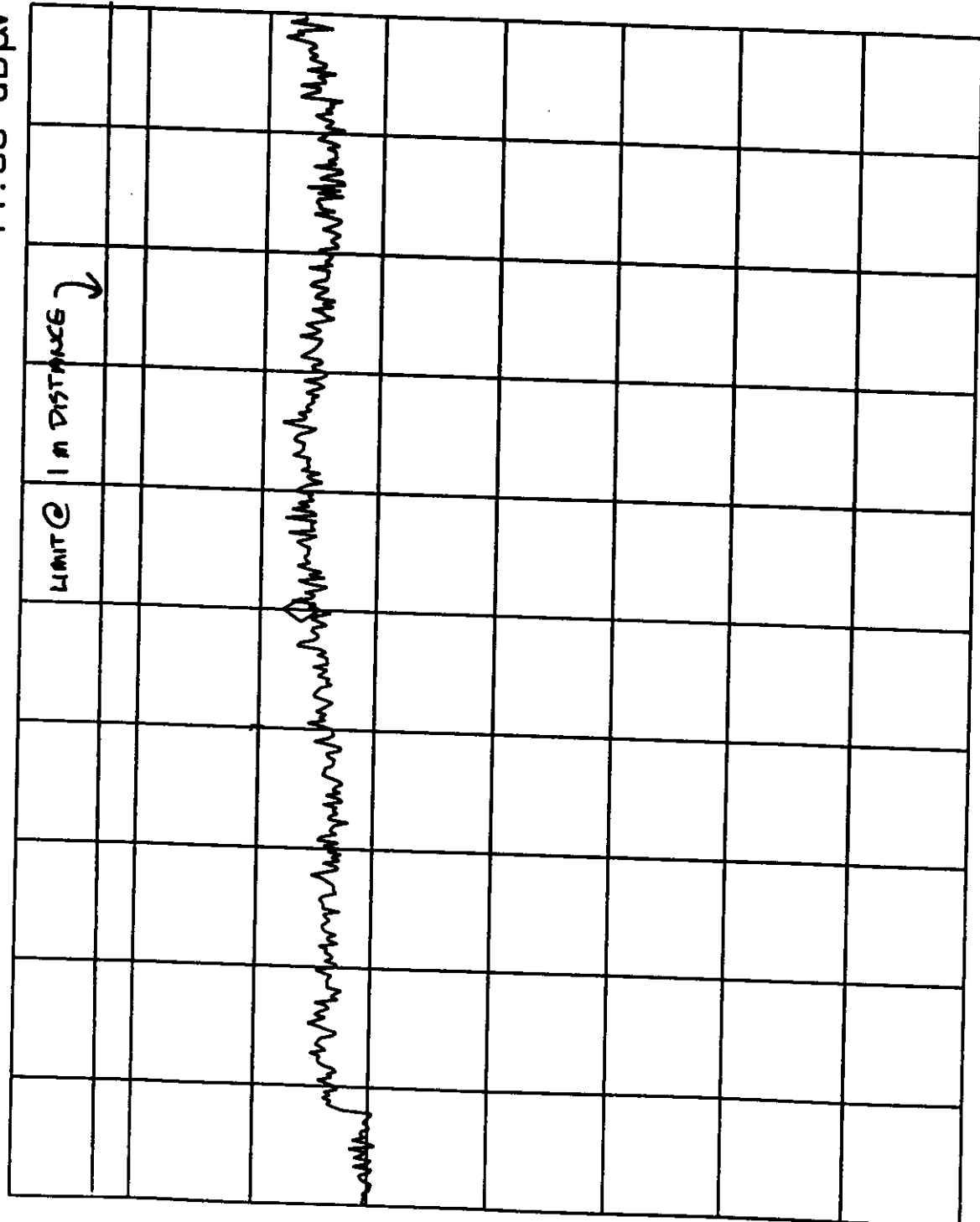
WA SB
SC FS
CORR

START 14.000 GHZ
#RES BW 1.0 MHz
STOP 18.000 GHZ
#VBW 1 MHz
SWP 80.0 msec

hp

Noise Floor Plot

REF 70.0 dBμV #AT 0 dB MKR 22.000 GHZ 44.85 dBμV



HOLD

DSP LINE
ON OFF

Change
Title

Limit
Lines

ANALOG+
ON OFF

More
1 of 2

PEAK
LOG
10
dB/

WA SB
SC FS
CORR

START 19.000 GHZ #RES BW 1.0 MHZ #VBW 1 MHZ STOP 25.000 GHZ SWP 130 msec

3.4 Test Report from Integrity Design and Test Services, Inc.

Integrity



**Design & Test
Services, Inc.**

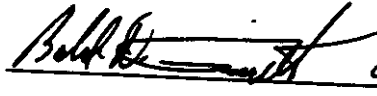
Standard(s): FCC Part 15, Class B

Model(s): Life Style 50 Home Theater System

Prepared for: Bose Corporation
The Mountain
Framingham, MA 01701-9168

Date(s) of Test: 4/14/98 & 4/16/98

Prepared by:  6/9/98
Mike Koffink, Compliance Engineer

Reviewed by:  6/12/98
Robert D. Goyette, EMI Section Manager

Report No. 62807.e1

Tel: (978) 486-0432

37-7 Ayer Road

Littleton, MA 01460

Fax: (978) 486-0592

Email: integrity@ids.com



Certificate of Compliance

The following product was found to comply with the requirement stated below when tested in accordance with the test procedures described in the accompanying test/measurement report. Reference report number 62807.e1

Manufacturer: Bose Corporation
The Mountain
Framingham, MA 01701-9168

Model Number: Life Style 50 Home Theater System

Requirement: FCC Part 15
Class B

Approved By:

Robert D. Goyette NVLAP Signatory	
Date	6/17/98

Remarks: *Testing is performed using calibrated equipment traceable to the National Institute of Standards and Technology (NIST).*

This certificate is valid for products tested as described in the accompanying test report. Specific modifications necessary to meet the above requirement, recommended by Integrity Design & Test Services, Inc. are described therein.

Integrity Design & Test Services, Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for Electromagnetic Emissions Testing.

United States Department of Commerce
National Institute of Standards and Technology

NVLAP[®]

ISO/IEC GUIDE 25:1988
ISO 9002:1987

Certificate of Accreditation



INTEGRITY DESIGN & TEST SERVICES, INC.
LITTLETON, MA

Is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:

**ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS
FCC**

September 30, 1998

Effective through

For the National Institute of Standards and Technology
NVLAP Lab Code: 200004-0

This report may not be reproduced in parts without the written consent of Integrity Design & Test Services, Inc. This report must not be used to claim product endorsement by NVLAP or any agency of the United States government.

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2. Test Environment

2.1 EUT Description

M/N: Life Style 50 Home Theater System S/N: Not Labeled

Description: Surround sound speaker system for home entertainment.

The EUT consisted of the following components:

Description	Manufacturer	Model Number	Serial Number	FCC ID
Personal Music Center	Bose	P1	N/A	N/A
Multi -Room Interface	Bose	M1	N/A	N/A
Compact Disc Changer	Bose	C1	N/A	N/A
Speaker System (w/ 5 Bose Jewel Cube speakers)	Bose	Powered Acoustimass 30	N/A	N/A

2.1.1 System Operation

The system was configured in a typical operation. During testing the EUT was fully operational. An audio track was being played from a CD at maximum volume. The FM tuner was set to 92.9 MHz.

2.1.2 Support Equipment:

Description	Manufacturer	Model Number	Serial Number	FCC ID
AC adapter	Bose	PS71	N/A	N/A

2.2 Test Facility Description

The test facility is located on the premises of Integrity Design & Test Services, Inc. at 37-7 Ayer Road, Littleton, MA 01460. All testing is performed in an Open Area Test Site conforming to the site attenuation characteristics defined by ANSI C63.4 1992. Test methods and facilities have been audited and accredited by the National Voluntary Lab Accreditation Program (NVLAP).

2.3 Test Equipment

All equipment used in the testing process have up to date calibrations traceable to the National Institute of Standards and Technology (NIST). Refer to Table 2.3-1 for a complete list of equipment used during the testing.

2.4 Product Disposition

All items received for testing undergo an inspection to ensure proper working condition upon reception and before return shipment. The unit under test passed the incoming inspection when received for testing on 4/14/98 & 4/16/98. The unit was returned to the client's facility at the completion of testing after passing the final inspection.

3. Test Description/Results

3.1 Radiated Emissions

3.1.1 Object

The purpose of this test is to measure the radiated electromagnetic emissions generated by the equipment under test (EUT), pursuant to FCC part 15 Class B requirements. (See Table 3.1.1-1 for the Class B radiated limits).

3.1.2 Procedure

Testing is performed in an Open Area Test Site. The EUT is placed on a wooden turntable 80 cm in height. The EUT is centered laterally on the turntable and flush with the rear of the table. Peripheral equipment are placed on either side of the EUT with a minimum of 10 cm spacing. (When testing a personal computer system, monitors shall be placed on top of the PC, and the keyboard and mouse shall be placed in front of the PC towards the front edge of the turntable.) Excess interface cables are draped over the back edge of the table no closer than 40 cm to the ground plane.

The EUT shall be set into operation such that all parts of the system are exercised. This may require the use of test software designed to exercise the various parts of the system. With the EUT set into operation, the turntable is rotated over 360 degrees and interface cables are manipulated to maximize the emissions. The peripherals are not moved during the test. The receiving antenna is placed at a test distance of 3 or 10 meters from the closest point on the EUT. The antenna height is varied from 1 to 4 meters, and the polarity of the antenna is switched between vertical and horizontal such that the received signal is maximized.

3.1.3 Deviations from Test Method

None

3.1.4 Measurement Uncertainty

A minimum of a 2 dB margin of compliance is required for radiated emissions data to verify passing results. This is required to compensate for the measurement uncertainties involved.

3.1.6 Radiated Emissions Terms and Calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading: This is the reading obtained on the spectrum analyzer in dB μ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.: This is the antenna factor for the receiving antenna. It is a conversion factor which converts electric fields strengths to voltages which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net: This is the net field strength measurement (as shown above).

Limit: This is the FCC Class B radiated emission limit (in units of dB μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 * \log(\mu\text{V/m})$$

Margin: This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example for an emission measuring 20.5 dB μ V on the spectrum analyzer at 592 MHz:
(Note: This shows a passing result (i.e. a negative margin))

Example only:

<u>Reading</u>	<u>A.F.</u>	<u>Net Reading</u>	<u>Net Reading</u>	<u>FCC limit</u>	<u>Margin</u>
20.5dB μ V	+ 25 dB	= 45.5 dB μ V/m	: 45.5 dB μ V/m	- 57 dB μ V/m	= -11.5 dB

3.2.5 Results

The Life Style 50 Home Theater System met the FCC Class B conducted emissions requirements when tested as described below. (See Appendix A for a complete listing of data points).

Modifications	FCC Class B Conducted Emissions
See Note (1)	No Emissions found above the level of the noise floor which is at least 6 dB below the class B limit.

Notes

- (1) Initial scan. No modifications installed.

The above results pertain only to the specific item submitted for testing, identified by the product's model and serial numbers.

Table 3.1.1-1: FCC Class B Radiated Emissions Limit

Frequency (MHz)	FCC Class B Quasi-Peak (dB μ V/m)	
	3m	10m
30 to 88	40	30
88 to 216	44	33
216 to 230	46	36
230 to 960	46	36
960 to 1000	54	44
Above 1000	*54	*50

* Average detector used.

Table 3.2.1-1: FCC Class B Conducted Emissions Limit

Frequency	Quasi-Peak Limit
.450 MHz to 30 MHz	48 dB μ V

(Note: For each table shown above, the stricter limit applies at the frequency transition points.)

3.3.2 Industry Canada Labeling (pursuant to ICES-003 Issue 2, Revision 1)

The following is the suggested text for the Canadian product label for ITE equipment. Although the wording may be combined with the FCC label, it must clearly state the equipment meets the Canadian Interference-Causing Equipment Regulations. (Ref. EMCAB-3 Issue 2)

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

OR

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Please note that Industry Canada requirements state that the label must be in French or English, (the two official languages of Canada).

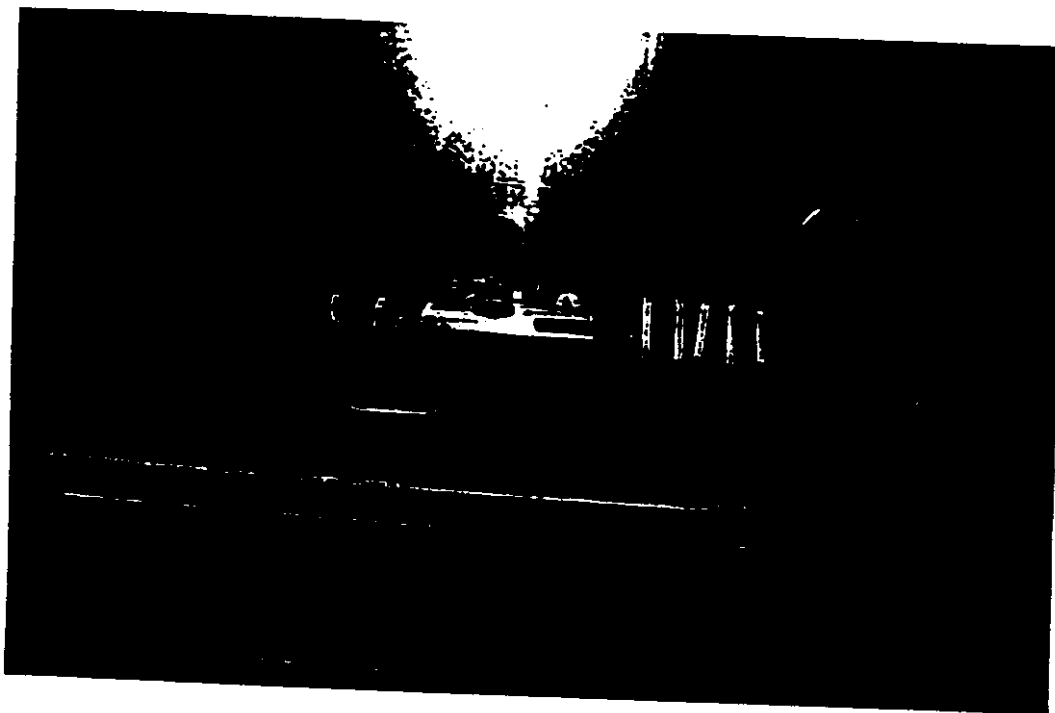
Table A1: FCC Class B Radiated Emissions.

Company: Bose Corporation
 Test Engineer: Rob Goyette
 M/N: Life Style 50 Home Theater System
 Test Date: 4/14/98
 OATS # 1

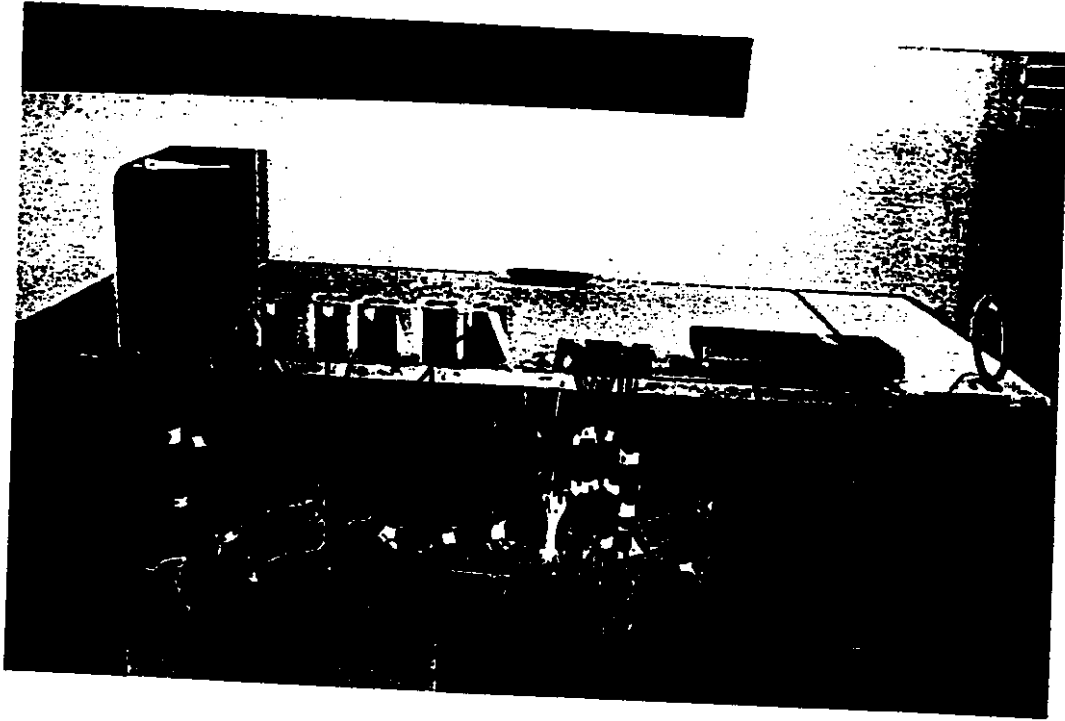
Test Configuration: Full Scan

Polarity (V or H)	Frequency (MHz)	Q.P. Reading (dBuV)	A.F. (dB)	Net (dBuV/m)	FCC Class B Limit @ 3m (dBuV/m)	FCC Margin (dB)
V	103.6	25.5	11.5	37	44	-7
V	207.2	22	10.5	32.5	44	-11.5
V	310.8	11	15.5	26.5	46	-19.5
V	33.9	16	17	33	40	-7
H	42.3	12	11	23	40	-17
V	135.4	16.5	12.5	29	44	-15
V	182	8	10.5	18.5	44	-25.5
V	220	8.5	10.5	19	46	-27
V	237.1	14.5	13	27.5	46	-18.5
H	321.8	17.5	15.5	33	46	-13
H	355.6	23.5	17	40.5	46	-5.5
H	423.5	13.5	18	31.5	46	-14.5

Configuration Photograph

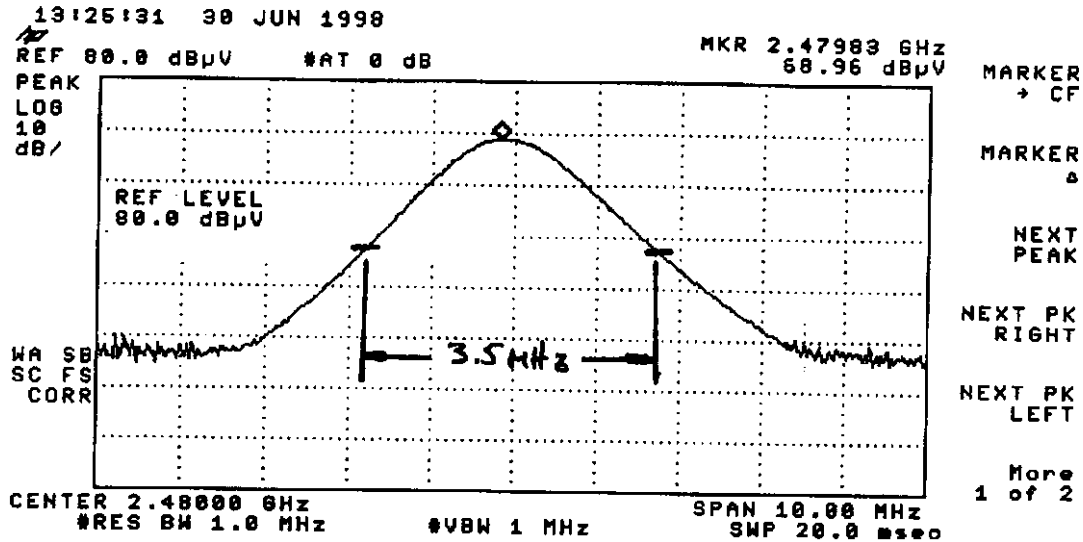


Configuration Photograph



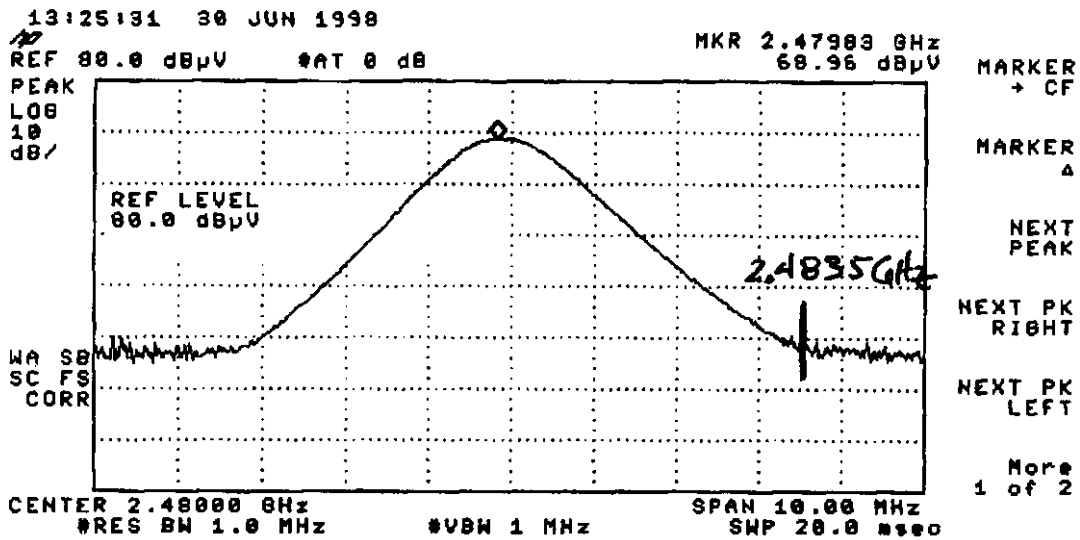
3.5 Occupied Bandwidth Measurements

The bandwidth was observed to be less than 3.6 MHz at the 20dB down points. Allowable bandwidth is 2400 MHz to 2483.5 MHz.



3.6 Intrusion into 2483.5-2500 MHz Restricted Band

The unit was checked for its intrusion into the 2483.5-2500 MHz restricted band. It met the 15.209 requirements.



3.7 Averaging factor derivation based on worst case 100mS period.

The following is a discussion of the pulse timing scheme employed by the FSK modulated device. As can be seen, the worst case 100mS second period results in an averaging factor of 20 dB for the Personal Music Center (remote) and 18 dB for the Multi-room Interface (base station).

Calculation of Duty Cycle for Bose RDL System

Base unit:

Condition 1) No controller awake (nominal condition):

Figure 1 shows duty cycle between transmit and receive, on any one frequency of three, when base unit is on and controllers are asleep:

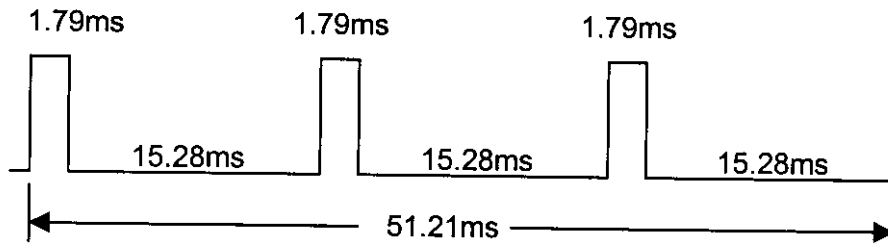


Fig. 1: Base unit on. No controller awake.

Poll Transmit Time: 1.79 msec.
 Receive Time: 15.28 msec.

$$\text{Duty Cycle} = \frac{3(1.79)}{51.21} = 10.49\% \Rightarrow \text{Averaging Correction Factor} = -19.6\text{dB}.$$

Condition 2) Sending data message along with wakeup poll to controller:

Figure 2 shows duty cycle between transmit and receive, on any one frequency of three, when base unit is on and sending data message to controller:

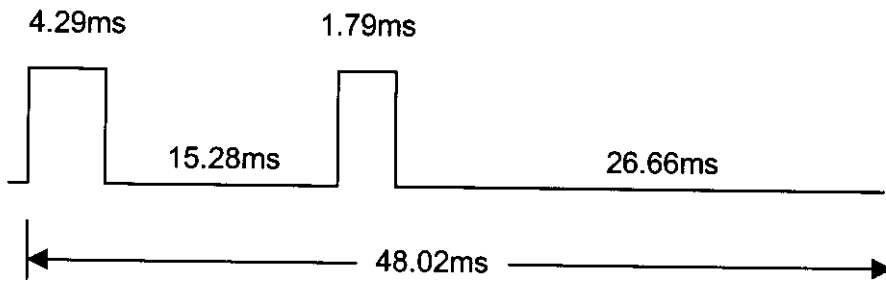


Fig. 2: Base unit on. Data message to controller.

Data Transmit Time: 4.29msec.
 Poll Transmit Time: 1.79msec.
 1st Receive Time: 15.28msec.
 2nd Receive Time: 26.66msec.

$$\text{Duty Cycle} = \frac{4.29+1.79}{48.02} = 12.66\% \Rightarrow \text{Averaging Correction Factor} = -18\text{dB}.$$

Therefore, a -18dB correction factor is used for the base unit.

Controller:

Condition 1) Controller awake, no data being sent:

Figure 3 shows duty cycle between transmit and receive, on any one frequency of three, when controller is on, but sending no data:

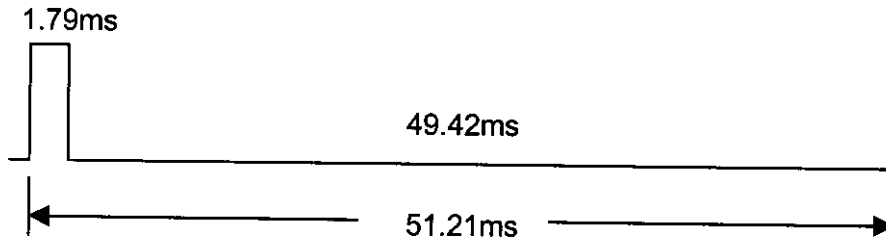


Fig. 3: Controller on. No data being sent.

Poll Transmit Time: 1.79msec.
Receive Time: 49.42msec.

$$\text{Duty Cycle} = \frac{1.79}{51.21} = 3.5\% \Rightarrow \text{Averaging Correction Factor} = -29.1\text{dB}^*$$

Condition 2) Controller awake, data being sent:

Figure 4 shows duty cycle between transmit and receive, on any one frequency of three, when controller is on, and sending data:

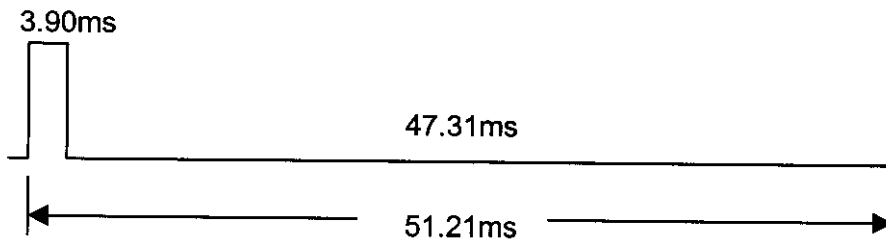


Fig. 4: Controller on. Data being sent.

Data Transmit Time: 3.90msec.
 Receive Time: 47.31msec.

$$\text{Duty Cycle} = \frac{3.9}{51.21} = 7.6\% \Rightarrow \text{Averaging Correction Factor} = -22.4\text{dB}^*$$

*Note: Maximum Averaging Correction factor allowed by FCC is -20dB.

Therefore, a -20dB correction factor is used for the Controller.

EXHIBIT 4

4.0 *Equipment Photographs*

4.1 Test configuration photographs: