

MEASUREMENT/TECHNICAL REPORT

**Company - Model: Bose Corporation
Lifestyle 50 Personal Music Center and Multi-room
Interface
FCC ID: A94-M1
October 22, 1998**

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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Table of Contents

LETTER OF AGENCY	3
INTRODUCTION	5
EXHIBIT 1:.....	6
1.0 STATEMENT OF CONFORMITY	6
EXHIBIT 2.....	7
2.0 GENERAL DESCRIPTION.....	7
2.1 <i>Product Description</i>	7
2.2 <i>Related Submittal(s) Grants</i>	7
2.3 <i>Test Methodology</i>	7
2.4 <i>Test Facilities</i>	7
2.5 <i>Test Equipment Used</i>	8
EXHIBIT 3.....	10
3.0 MEASUREMENT RESULTS.....	10
3.1 <i>Operating Frequency</i>	10
3.2 <i>Electric Field Strength Radiation Measurements</i>	10
3.3 <i>Noise Floor Plots</i>	39
3.4 <i>Test Report from Integrity Design and Test Services, Inc.</i>	43
3.5 <i>Occupied Bandwidth Measurements</i>	70
3.6 <i>Intrusion into 2483.5-2500 MHz Restricted Band</i>	70
3.7 <i>Averaging factor derivation based on worst case 100mS period</i>	71
EXHIBIT 4.....	75
4.0 EQUIPMENT PHOTOGRAPHS	75
4.1 <i>Test configuration photographs:</i>	75
4.2 <i>Equipment detail photographs:</i>	77
EXHIBIT 5.....	102
5.0 PRODUCT LABELING	102
5.1 <i>Label Artwork</i>	102
5.2 <i>Label Location</i>	103
EXHIBIT 6.....	106
6.0 TECHNICAL SPECIFICATIONS.....	106
6.1 <i>Technical Description and Block Diagram</i>	106
6.2 <i>Schematics</i>	108
6.3 <i>Bill of Materials</i>	111
EXHIBIT 7.....	
7.0 INSTRUCTION MANUAL.....	

Letter of Agency



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:

A handwritten signature in cursive script, appearing to read "Thomas Froeschle", written over a horizontal line.

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 these devices 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. The Multi-room interface (base station) was tested on a non-conductive table and rotated around the axis perpendicular to its base.

The confidential information and descriptions included in this application are detailed descriptions of the products, block diagrams, component specifications, and schematic diagrams. We hereby respectfully request under the provision of section 0.457d of the code that the documents listed above and below be held confidential.

Exhibit 6: Technical Specifications

Bose Corporation is requesting that the technical specifications, including schematics, be kept confidential in the FCC application because of the proprietary design developed by Bose Corporation and which is unique to the industry.

EXHIBIT 1:**1.0 Statement of Conformity**

The Bose Corporation. Lifestyle 50 Personal Music Center (remote) and Multi-room Interface (base station) have 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. The Multi-room Interface complies with the conducted limits.
	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 Bilog 30 MHz-2 GHz	Chase	S/N:2435	Calibration Due:16-JUL-99
[]	GREEN-BLACK CBL6112B Bilog 30 MHz-2 GHz	Chase	S/N:2412	Calibration Due:30-MAR-99
[]	RED 3143 Biconilog 30 MHz-1.1 GHz	EMCO	S/N:1270	Calibration Due:28-MAY-99
[]	BLUE 3143 Biconilog 30 MHz-1.1 GHz	EMCO	S/N:1271	Calibration Due:28-MAY-99
[]	GREY 3141 Biconilog 26 MHz-2 GHz	EMCO	S/N:9703-1038	Calibration Due:19-MAR-99
[]	YELLOW-BLACK CBL6140A X-Wing Bilog 20 - 2000 MHz	Chase	S/N:1112	Calibration Due:19-MAR-99
[]	YELLOW 3115 Horn Antenna 1-18 GHz	EMCO	S/N:9608-4989	Calibration Due:3-MAR-99
[X]	BLACK 3115 Horn Antenna 1-18 GHz	EMCO	S/N:9703-5148	Calibration Due:16-MAR-99
[X]	WHITE 3160-09 Standard Gain Horn Antenna 18-26.5 GHz	EMCO	S/N:9610-09	Calibration Due:8-DEC-98
[]	LOOP PLA-130/A Passive Loop Antenna 9 KHz-30 MHz	ARA	S/N:1024	Calibration Due:13-AUG-98
[]	LOOP 6511 Passive Loop Antenna 20 Hz-5 MHz	EMCO	S/N:9704-1154	Calibration Due:11-AUG-99
[]	MONOPOLE 3301B Active Monopole antenna 30 Hz-30 MHz	EMCO	S/N:3824	Calibration Due:31-MAR-99
[]	DIPOLE 3121C Adjustable Dipole Antenna 30-1000 MHz	EMCO	S/N:1370	Calibration Due:01-APR-99
[]	DIPOLE 3121C Adjustable Dipole Antenna 30-1000 MHz	EMCO	S/N:1371	Calibration Due:01-APR-99

PREAMPLIFIER(S)

[X]	RED	ZFL-1000-LN	MiniCircuits		Calibration Due:16-APR-99
		RF Preamplifier 10 - 2000 MHz			
[]	BLUE	ZFL-1000-LN	MiniCircuits		Calibration Due:15-MAY-99
		RF Preamplifier 10 - 2000 MHz			
[]	GREEN	ZFL-1000-LN	MiniCircuits		Calibration Due:15-OCT-99
		RF Preamplifier 10 - 2000 MHz			
[]	GOLD	ZFL-1000-LN	MiniCircuits		Calibration Due:25-AUG-99
		RF Preamplifier 10 - 2000 MHz			
[X]	WHITE	SMC-12A	MITEQ	S/N:426643	Calibration Due:28-OCT-98
		RF Preamplifier 2000 - 18000 MHz			
[X]	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)

[]	SITE "F"	Calibration Due:9-OCT-98
[X]	SITE "T"	Calibration Due:28-MAY-99
[]	SITE "A"	Calibration Due:25-SEP-98
[]	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.

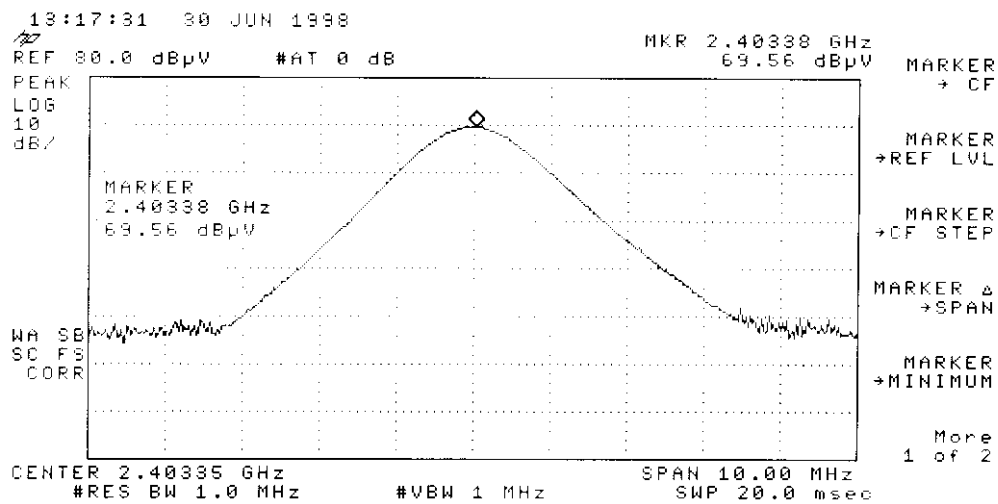
3.2 Electric Field Strength Radiation Measurements

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.

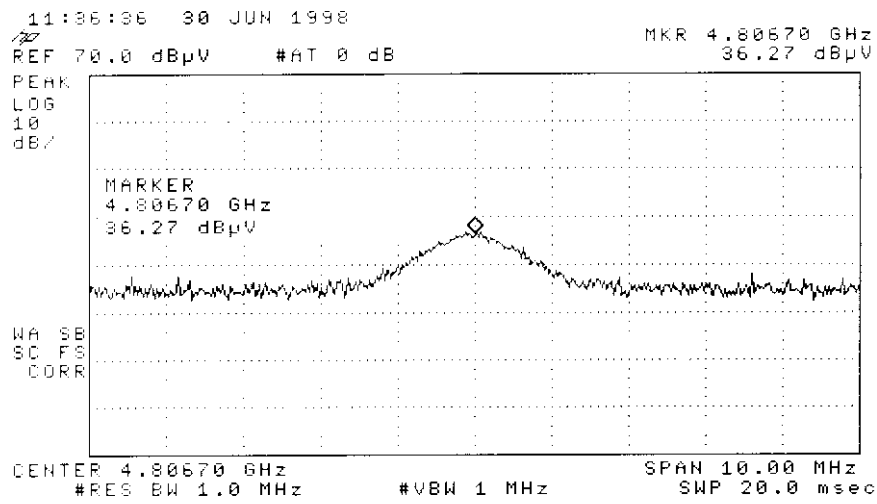
The required unintentional radiator digital device Radiated and Conducted Emissions testing was completed by Integrity Design & Test Services, Inc. The report for this testing can be found in section 3.4.

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	Frequency	Reading	Preamp	Antenna	Cable	Averaging	Filter	Distance	Adjusted	FCC Class B		
Polarization			Factor	Factor	Factor	Factor	Loss	Factor	Reading	Limit	Margin	Result
(H / V)	(MHz)	(dBµV)	(dB)	(dB/m)	(dB)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	(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
Pre-Amp: White OATS: "T" Cable: 12' RG8A/U Analyzer: White Antenna: Black												

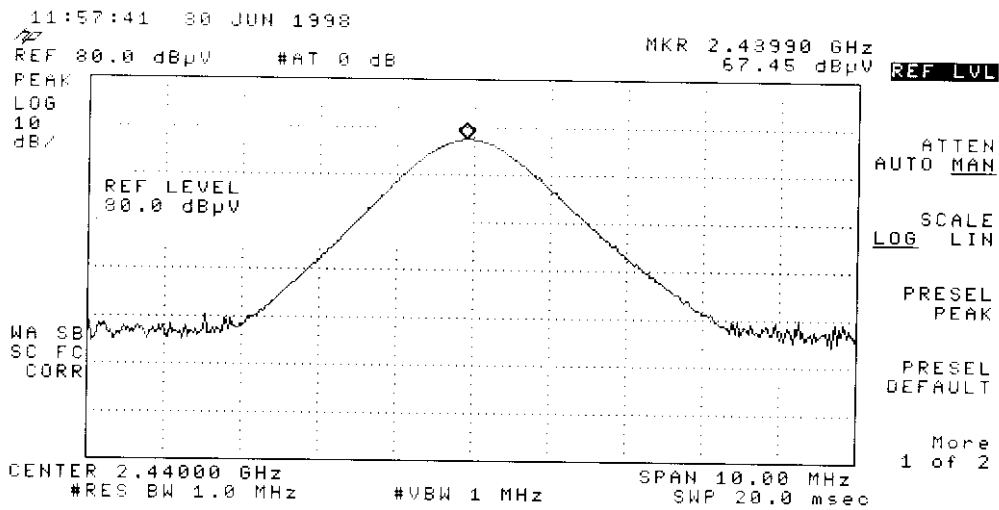
Plots of emissions are on the next six pages.



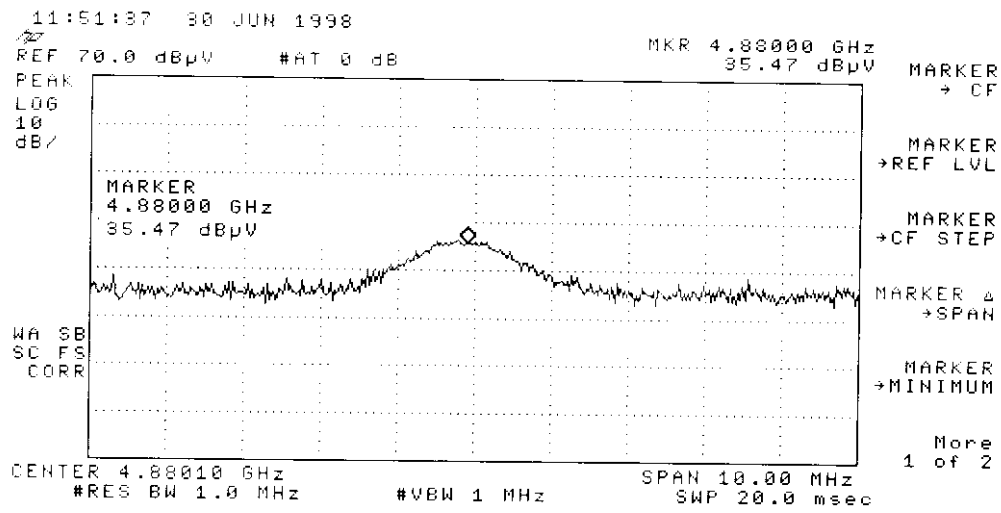
XMIT Remote CH1 FUND



XMIT Power Ch1 2nd Harmonic



XMIT Remote CH2 Fundamentals



XMIT Remote CH2 2ND Harmonic

13:25:31 30 JUN 1998

REF 80.0 dBμV #AT 0 dB

MR 2.47983 GHz
58.95 dBμV

MARKER
→ CF

PEAK
LOG
10
dB/

MARKER
Δ

NEXT
PEAK

NEXT PK
RIGHT

NEXT PK
LEFT

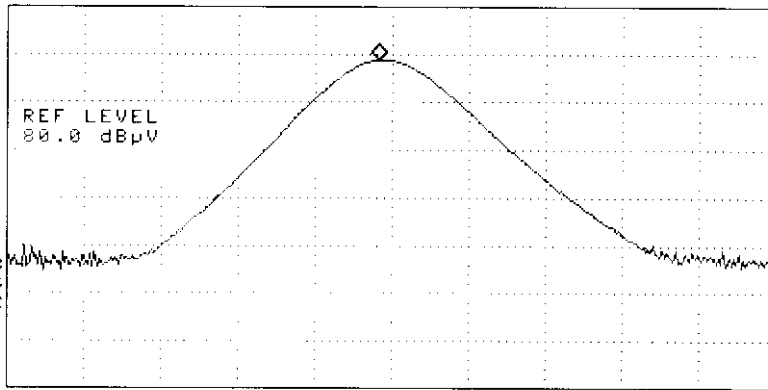
More
1 of 2

WA SB
SC FS
CORR

CENTER 2.48000 GHz
#RES BW 1.0 MHz

#VBW 1 MHz

SPAN 10.00 MHz
SWP 20.0 msec



11:42:11 30 JUN 1998

MR 4.95985 GHz

REF 70.0 dBμV

#AT 0 dB

34.18 dBμV

PEAK
LOG
10
dB/

MARKER
4.95985 GHz
34.18 dBμV

WA SB
SC FS
CORR

CENTER 4.95985 GHz

#RES BW 1.0 MHz

#VBW 1 MHz

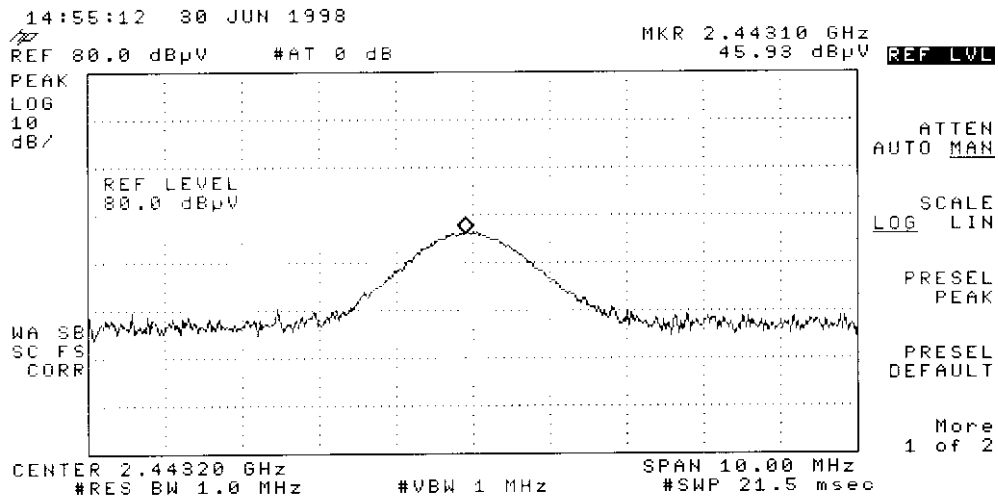
SPAN 10.00 MHz

SWP 20.0 msec

XMIT Remote Ch 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.



Rev Romero CH 1 FUNDAMENTAL

14:28:15 30 JUN 1998

REF 80.0 dBμV #AT 0 dB

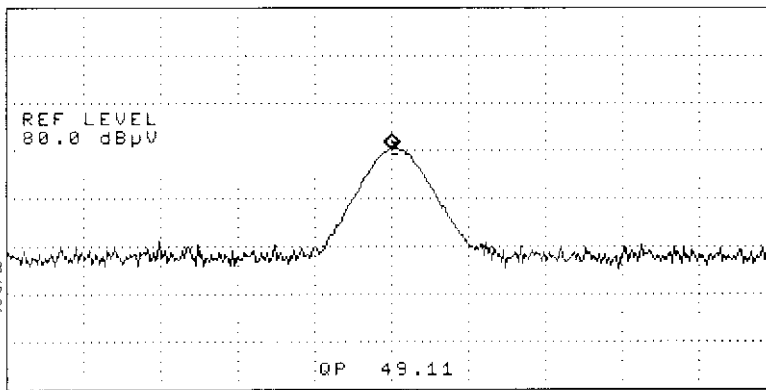
MKR 4.88640 GHz
50.13 dBμV

REF LVL

PEAK
LOG
10
dB/

REF LEVEL
80.0 dBμV

WA SB
SC FS
CORR



ATTEN
AUTO MAN

SCALE
LOG LIN

PRESEL
PEAK

PRESEL
DEFAULT

More
1 of 2

CENTER 4.88640 GHz
#RES BW 1.0 MHz

#VBW 1 MHz

SPAN 20.00 MHz
#SWP 21.5 msec

RCV Port 1 Ch 1 2ND HARM

14:48:06 30 JUN 1998

REF 80.0 dBμV #AT 0 dB

MKR 2.47980 GHz
42.15 dBμV

MARKER
→ CF

PEAK
LOG
10
dB/

MARKER
→ REF LVL

MARKER
→ CF STEP

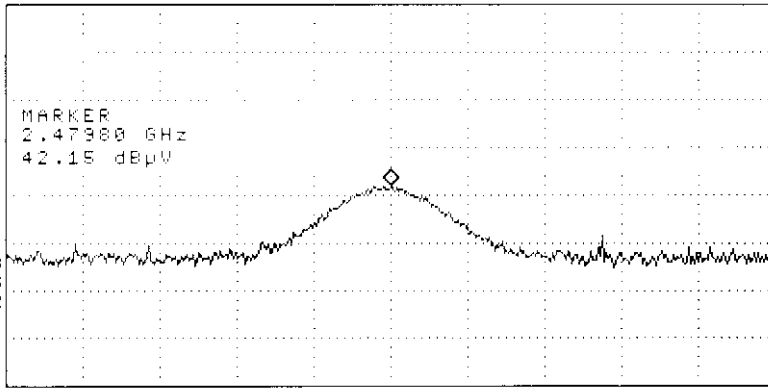
MARKER Δ
→ SPAN

MARKER
→ MINIMUM

More
1 of 2

WA SB
SC FS
CORR

CENTER 2.47980 GHz SPAN 10.00 MHz
#RES BW 1.0 MHz #VBW 1 MHz #SWP 21.5 msec



Rev Remote CH2 FUNDAMENTAL

14:08:43 30 JUN 1998

REF 80.0 dBμV #AT 0 dB

MKR 4.95960 GHz

50.47 dBμV REF LVL

PEAK
LOG
10
dB/

REF LEVEL
80.0 dBμV

ATTEN
AUTO MAN

SCALE
LOG LIN

PRESEL
PEAK

PRESEL
DEFAULT

More
1 of 2

WA SB
SC FS
CORR

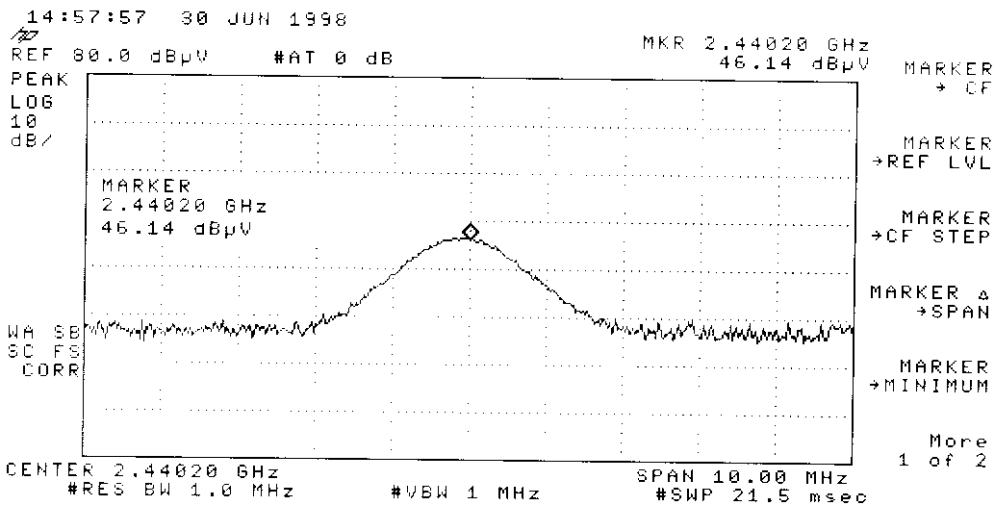
QP 51.95

CENTER 4.95960 GHz
#RES BW 1.0 MHz

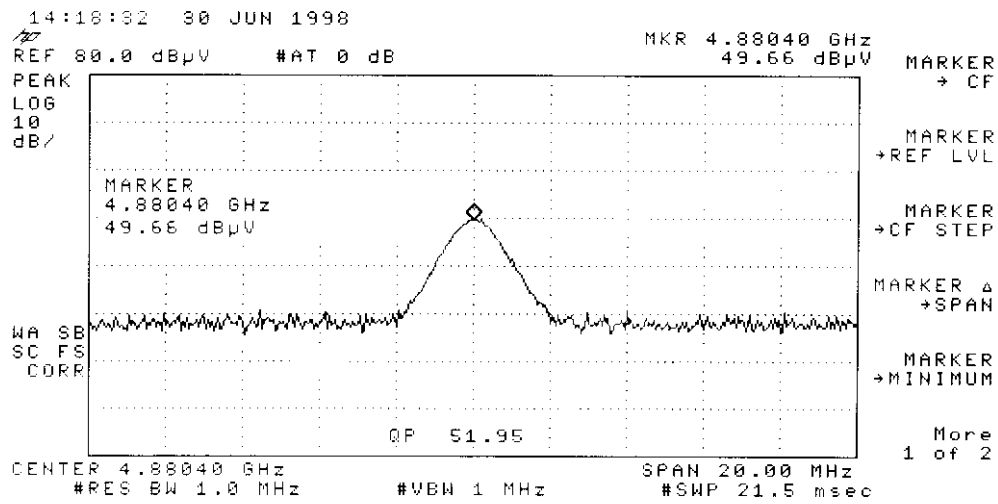
#VBW 1 MHz

SPAN 20.00 MHz
#SWP 21.5 msec

12cv Remote C1+2 2ND Harmonic



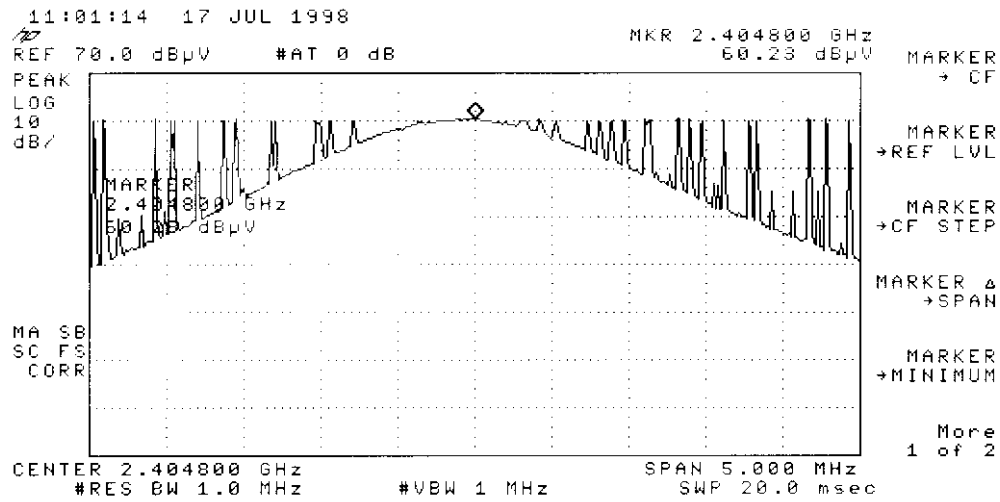
Rev Remote CH3 FUNDAMENTAL



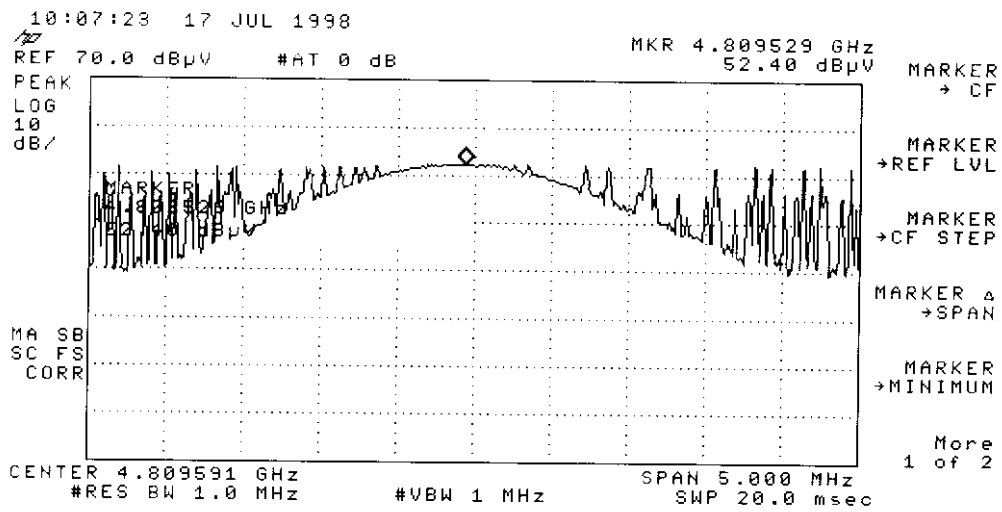
REV Remove CH3 2ND Harmonic

Radiated Emissions Chart										Curtis-Straus LLC		
Date: 07/17/98			Company: Bose					Distance: 3 m				
Engineer: David Heald			EUT Desc: Lifestyle 50 Multi-Room Interface					Table No: 3				
Notes:			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	2404.8	60.4	0.0	29.9	0.9	18.0	0.0	0.0	73.2	94.0	-20.8	Pass
V	4809.6	52.4	19.4	35.1	1.5	18.0	1.0	0.0	52.6	54.0	-1.4	Pass
Noise Floor	7214.4	34.5	17.8	37.8	2.0	18.0	1.0	0.0	39.5	54.0	-14.5	Pass
Noise Floor	9619.2	33.9	17.2	40.2	2.4	18.0	1.0	0.0	42.3	54.0	-11.7	Pass
Noise Floor	12024.0	35.9	16.9	40.1	2.8	18.0	1.0	0.0	44.9	54.0	-9.1	Pass
Noise Floor	14428.8	37.4	17.1	42.3	3.2	18.0	0.0	0.0	47.8	54.0	-6.2	Pass
Noise Floor	16833.6	39.4	17.3	42.1	3.5	18.0	0.0	0.0	49.7	54.0	-4.3	Pass
Noise Floor	19238.4	40.1	21.4	40.2	0.0	18.0	0.0	10.0	30.9	54.0	-23.1	Pass
Noise Floor	21643.2	44.9	21.9	40.3	0.0	18.0	0.0	10.0	35.3	54.0	-18.7	Pass
Noise Floor	24048.0	43.4	21.8	40.4	0.0	18.0	0.0	10.0	34.0	54.0	-20.0	Pass
Band 2												
V	2430.4	63.4	0.0	29.9	1.0	18.0	0.0	0.0	76.3	94.0	-17.7	Pass
V	4860.7	51.8	19.4	35.3	1.5	18.0	1.0	0.0	52.2	54.0	-1.8	Pass
Noise Floor	7291.2	32.9	17.8	38.0	2.0	18.0	1.0	0.0	38.1	54.0	-15.9	Pass
Noise Floor	9721.6	33.9	17.2	40.2	2.4	18.0	1.0	0.0	42.3	54.0	-11.7	Pass
Noise Floor	12152.0	35.0	16.9	40.3	2.8	18.0	1.0	0.0	44.2	54.0	-9.8	Pass
Noise Floor	14582.4	38.9	17.1	42.3	3.2	18.0	0.0	0.0	49.3	54.0	-4.7	Pass
Noise Floor	17012.8	40.6	17.3	42.8	3.6	18.0	0.0	0.0	51.7	54.0	-2.3	Pass
Noise Floor	19443.2	39.8	21.4	40.3	0.0	18.0	0.0	10.0	30.7	54.0	-23.3	Pass
Noise Floor	21873.6	45.0	21.9	40.3	0.0	18.0	0.0	10.0	35.4	54.0	-18.6	Pass
Noise Floor	24304.0	44.1	21.8	40.4	0.0	18.0	0.0	10.0	34.7	54.0	-19.3	Pass
Band 3												
V	2456.0	61.5	0.0	30.0	1.4	18.0	0.0	0.0	74.9	94.0	-19.1	Pass
V	4912.0	51.4	19.4	35.4	2.3	18.0	1.0	0.0	52.7	54.0	-1.3	Pass
Noise Floor	7368.0	34.2	17.8	38.1	2.0	18.0	1.0	0.0	39.5	54.0	-14.5	Pass
Noise Floor	9824.0	33.4	17.1	40.2	2.5	18.0	1.0	0.0	42.0	54.0	-12.0	Pass
Noise Floor	12280.0	34.5	16.9	40.4	2.9	18.0	1.0	0.0	43.9	54.0	-10.1	Pass
Noise Floor	14736.0	39.5	17.1	42.2	3.2	18.0	0.0	0.0	49.8	54.0	-4.2	Pass
Noise Floor	17192.0	38.6	17.3	43.5	3.6	18.0	0.0	0.0	50.4	54.0	-3.6	Pass
Noise Floor	19648.0	43.2	21.4	40.3	0.0	18.0	0.0	10.0	34.1	54.0	-19.9	Pass
Noise Floor	22104.0	44.9	21.9	40.3	0.0	18.0	0.0	10.0	35.3	54.0	-18.7	Pass
Noise Floor	24560.0	43.6	21.8	40.4	0.0	18.0	0.0	10.0	34.2	54.0	-19.8	Pass
Pre-Amp: White OATS: "T" Cable: 12' RG8A/U Analyzer: White Antenna: Black												

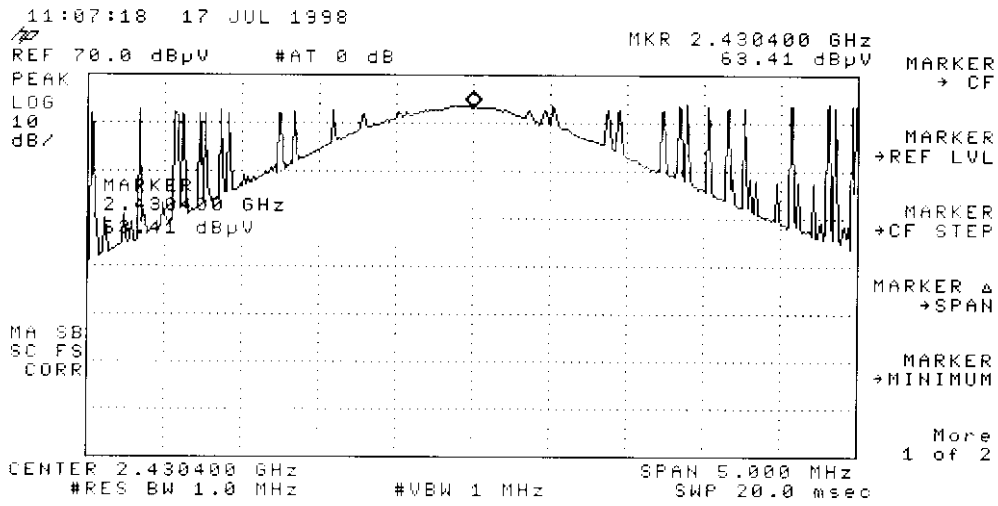
Plots of emissions are on the next six pages. Please note that to capture an informative plot of each emission, we used the maximum hold feature of the spectrum analyzer. The Multi-Room Interface polls various frequencies over time, and that is the source of the narrowband spurious emissions.



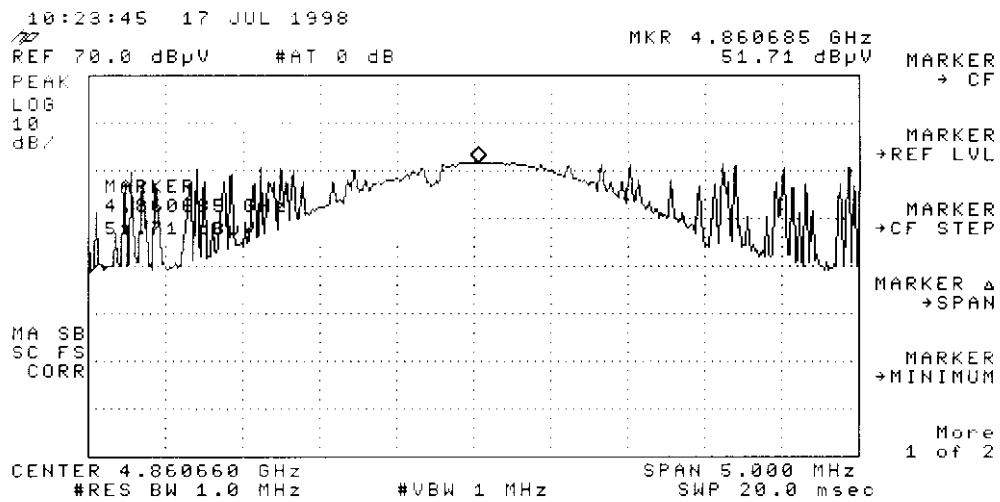
Base UNIT XMIT BAND 1 FUND



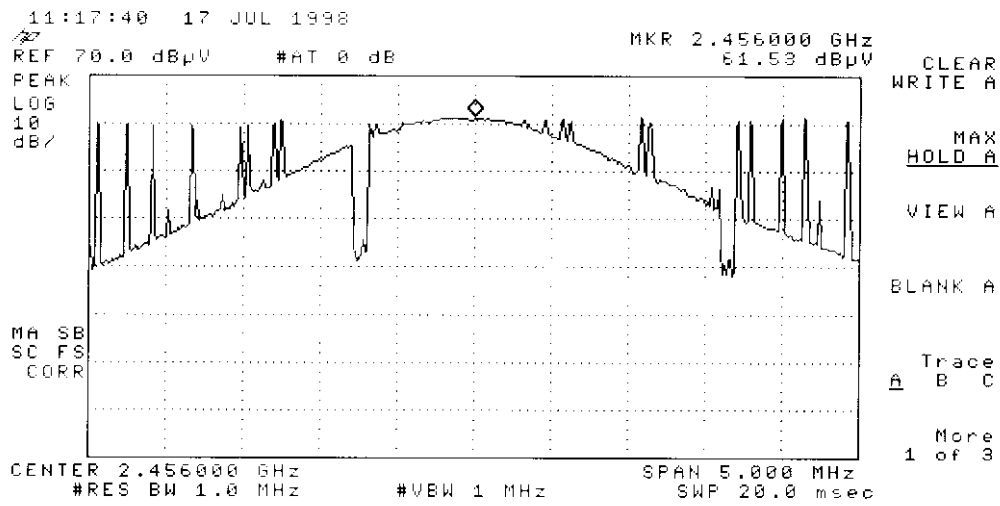
BASE STATION XMIT BAND 1 2ND HARM



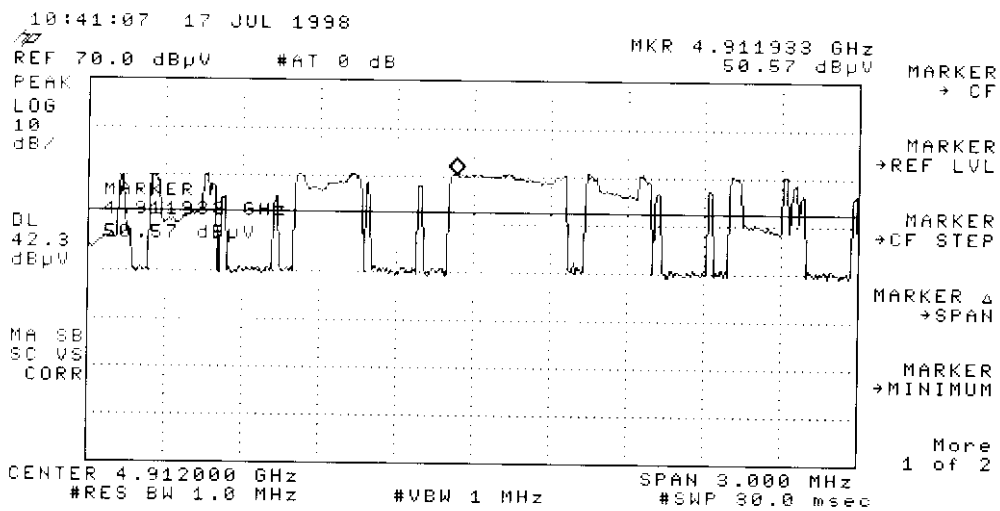
TRASE STATION XMIT BAND 2 FUND



TRAC STATION XMIT BAND 2 2ND HARM



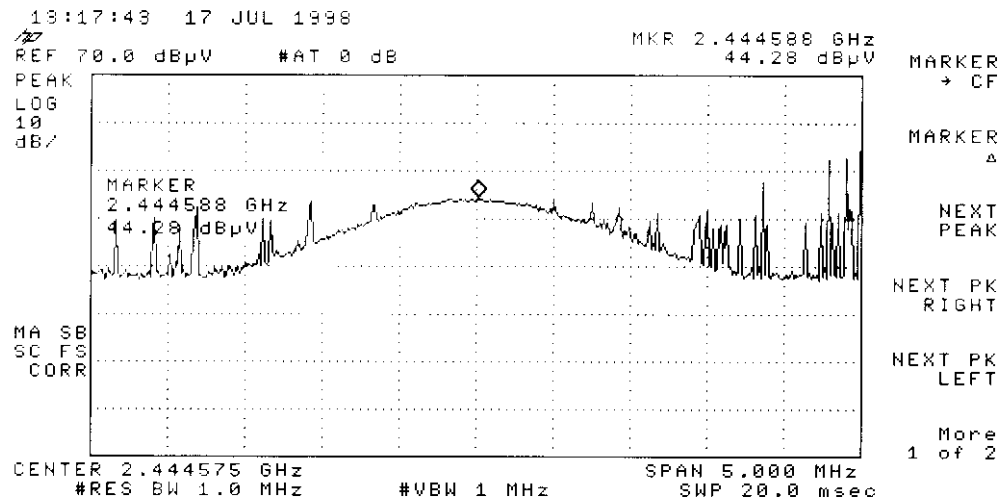
BASE UNIT XMIT BAND 3 TUND



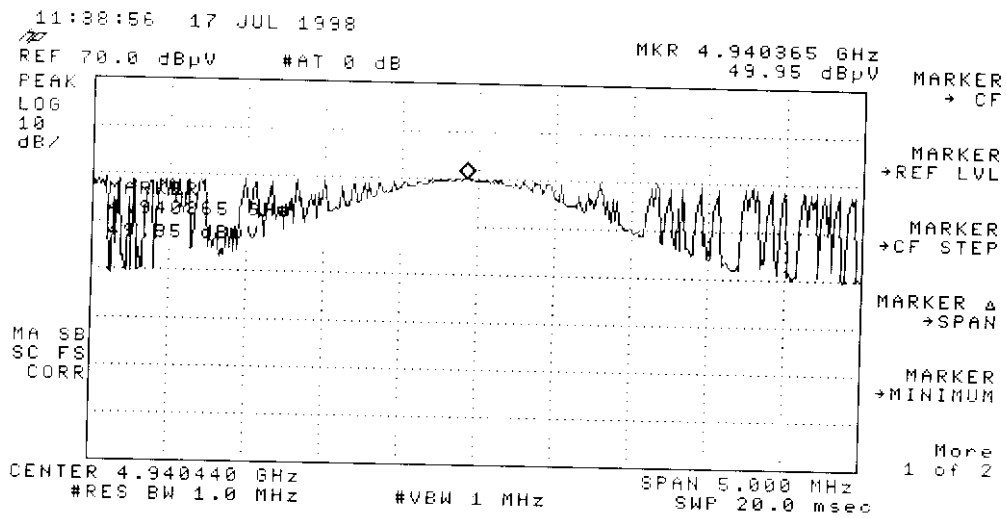
BASE UNIT XMIT BAND 3 2ND HARM

Radiated Emissions Chart										Curtis-Straus LLC			
Date: 07/17/98			Company: Bose							Distance: 3 m			
Engineer: David Heald			EUT Desc: Lifestyle 50 Multi-room Interface							Table No: 4			
Notes:			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	2444.6	44.3	0.0	30.0	1.0	18.0	0.0	0.0	57.3	94.0	-36.7	Pass	
V	4889.2	50.2	18.5	35.3	1.5	18.0	1.0	0.0	51.5	54.0	-2.5	Pass	
Noise Floor	7333.9	33.6	17.8	38.1	2.0	18.0	1.0	0.0	38.9	54.0	-15.1	Pass	
Noise Floor	9778.5	34.5	17.1	40.2	2.4	18.0	1.0	0.0	43.0	54.0	-11.0	Pass	
Noise Floor	12223.1	35.3	16.9	40.4	2.8	18.0	1.0	0.0	44.6	54.0	-9.4	Pass	
Band 2													
V	2470.2	46.5	0.0	30.0	1.0	18.0	1.0	0.0	60.5	94.0	-33.5	Pass	
V	4940.4	50.6	18.5	35.5	1.5	18.0	1.0	0.0	52.1	54.0	-1.9	Pass	
Noise Floor	7410.7	33.7	17.8	38.2	2.0	18.0	1.0	0.0	39.1	54.0	-14.9	Pass	
Noise Floor	9880.9	33.4	17.1	40.3	2.5	18.0	1.0	0.0	42.1	54.0	-11.9	Pass	
Noise Floor	12351.1	35.9	16.9	40.5	2.9	18.0	1.0	0.0	45.4	54.0	-8.6	Pass	
Band 3													
V	2416.8	46.2	0.0	29.9	0.9	18.0	0.0	0.0	59.0	94.0	-35.0	Pass	
V	4832.3	49.6	18.5	35.2	1.5	18.0	1.0	0.0	50.8	54.0	-3.2	Pass	
Noise Floor	7250.4	34.2	17.8	37.9	2.0	18.0	1.0	0.0	39.3	54.0	-14.7	Pass	
Noise Floor	9667.2	34.3	17.2	40.2	2.4	18.0	1.0	0.0	42.7	54.0	-11.3	Pass	
Noise Floor	12084.0	36.0	16.9	40.2	2.8	18.0	1.0	0.0	45.1	54.0	-8.9	Pass	
Pre-Amp: White OATS: "T" Cable: 12' RG8A/U Analyzer: White Antenna: Black													

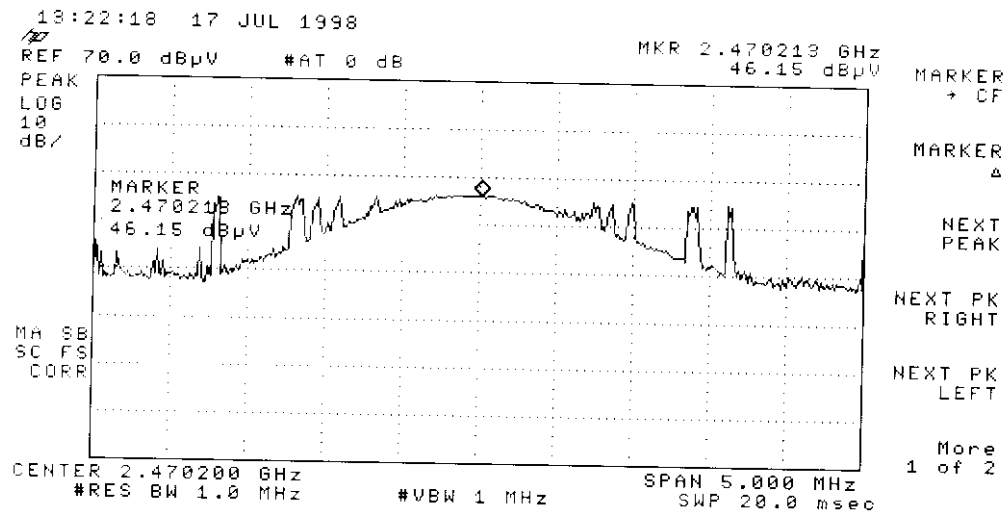
Plots of emissions are on the next six pages. Please note that to capture an informative plot of each emission, we used the maximum hold feature of the spectrum analyzer. The Multi-Room Interface polls various frequencies over time, and that is the source of the narrowband spurious emissions.



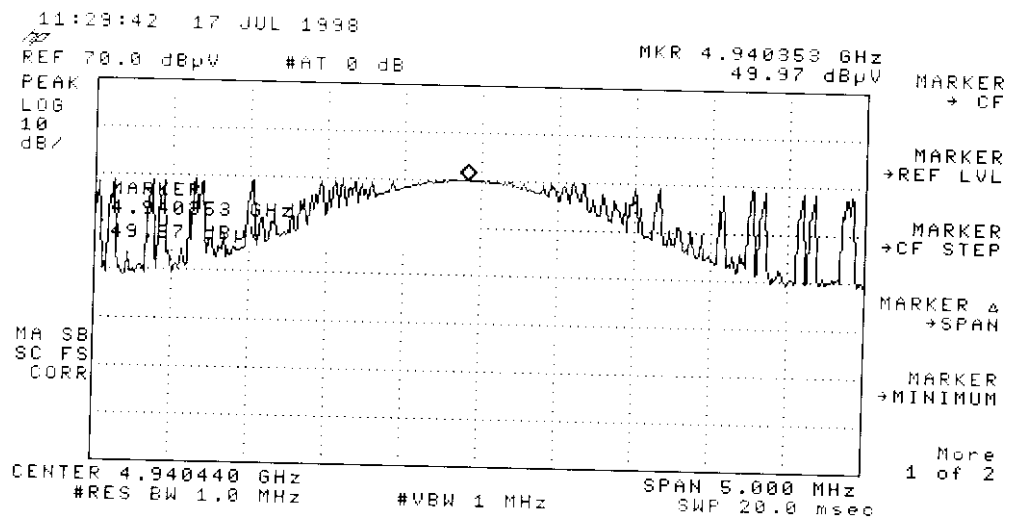
BASE UNIT REVR BAND 1 FWD.



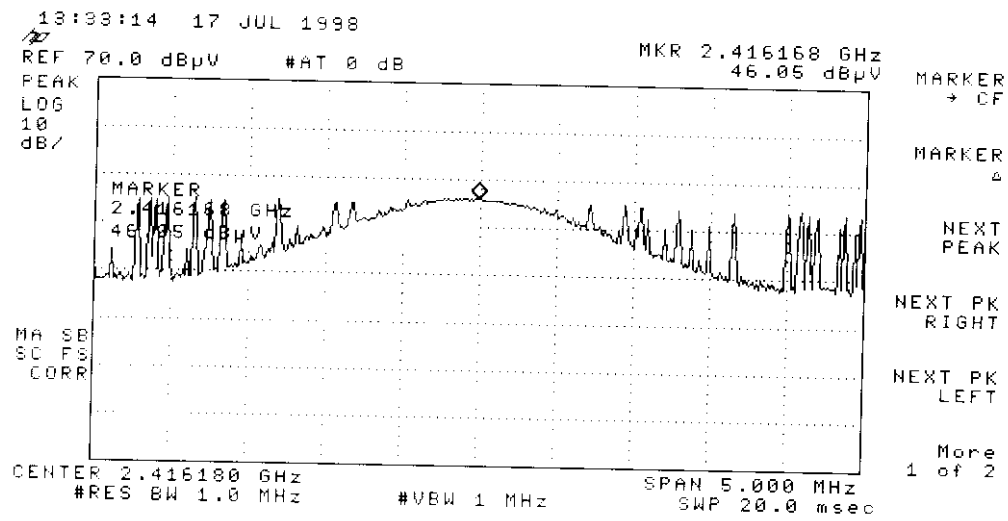
BASE UNIT RECVR BAND 1 2ND HARM



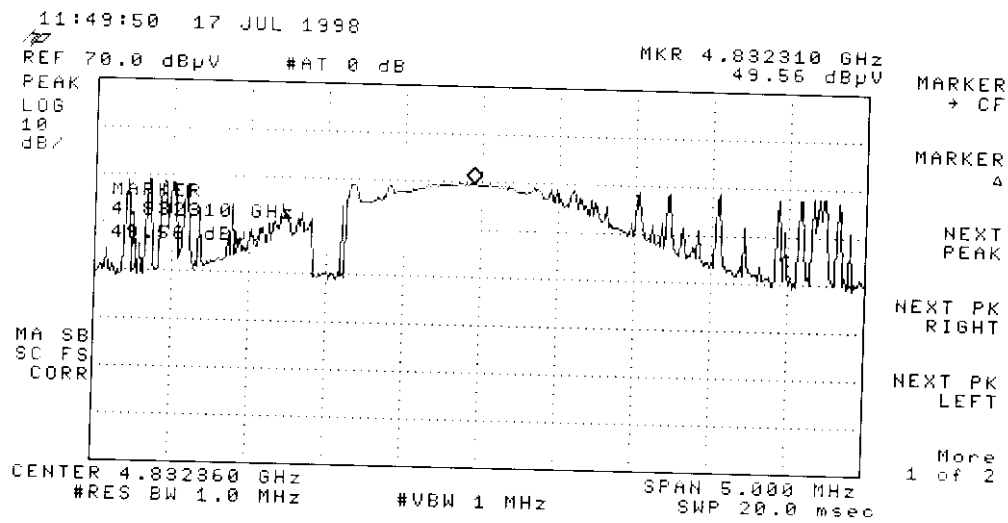
BASE UNIT REVR BAND 2 FUND



BASE UNIT RCVR BAND 2 2ND HARM



BASE UNIT RCVR BAND 3 FUND



BASE UNIT REVR BAND 3 2ND HARM

3.3 Noise Floor Plots

Noise Floor Plot

#AT Ø dB

PEAK
LOG
1Ø
dB/

MARKER	NORMAL
1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
27	28
29	30
31	32
33	34
35	36
37	38
39	40
41	42
43	44
45	46
47	48
49	50
51	52
53	54
55	56
57	58
59	60
61	62
63	64
65	66
67	68
69	70
71	72
73	74
75	76
77	78
79	80
81	82
83	84
85	86
87	88
89	90
91	92
93	94
95	96
97	98
99	100

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
#VBW 1 MHZ
STOP 12.500 GHZ
SWP 110 msec
```

hp

Noise Floor Plot

REF 70.0 dBμV #AT 0 dB MKR 16.000 GHz 37.80 dBμV

PEAK
LOG
10
dB/

CENTER
FREQ

dB/

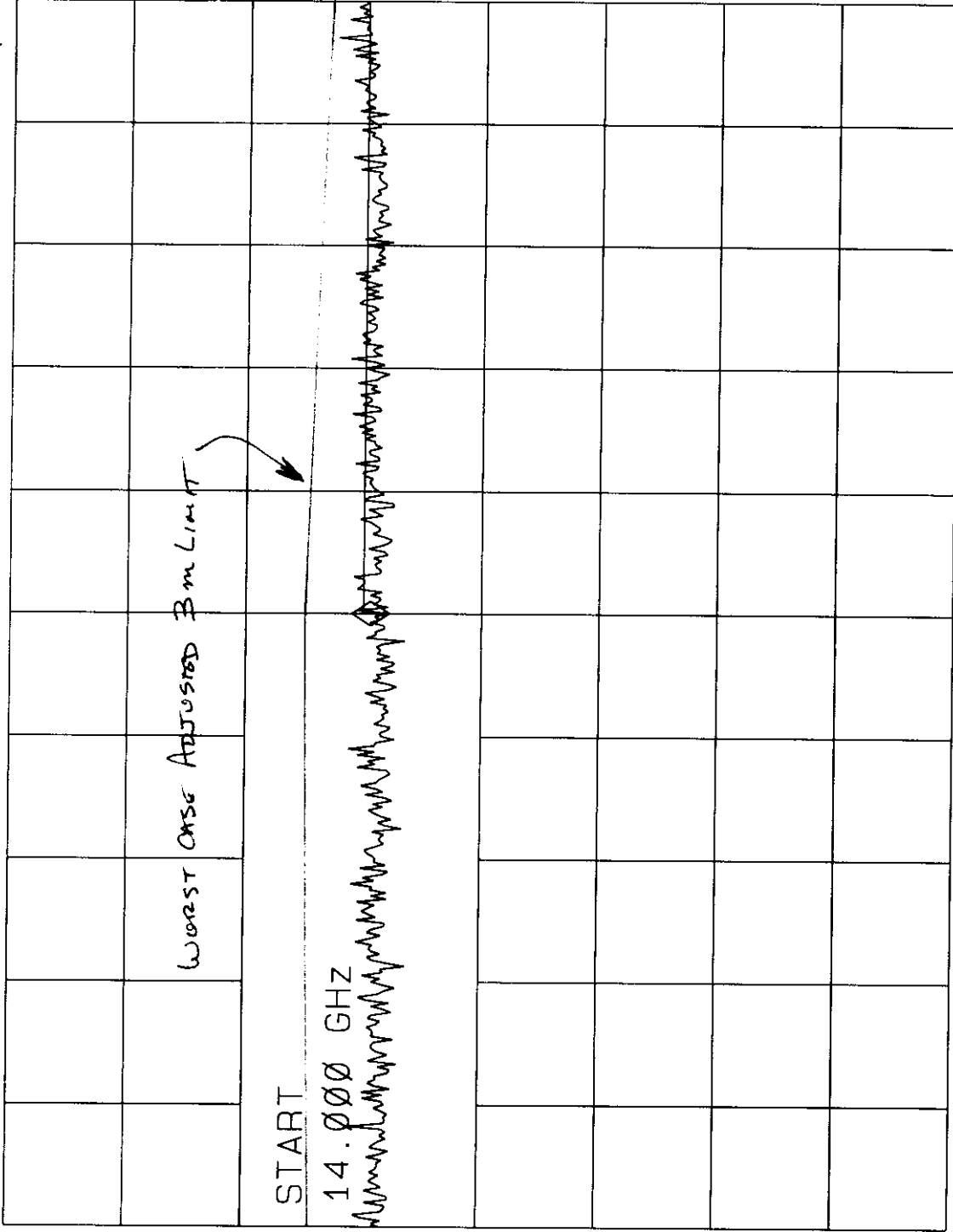
START
FREQ

STOP
FREQ

CF STEP
AUTO MAN

FREQ
OFFSET

Band
Lock



WA SB
SC FS
CORR

START 14.000 GHz

#RES BW 1.0 MHz

#VBW 1 MHz

STOP 18.000 GHz

SWP 80.0 msec

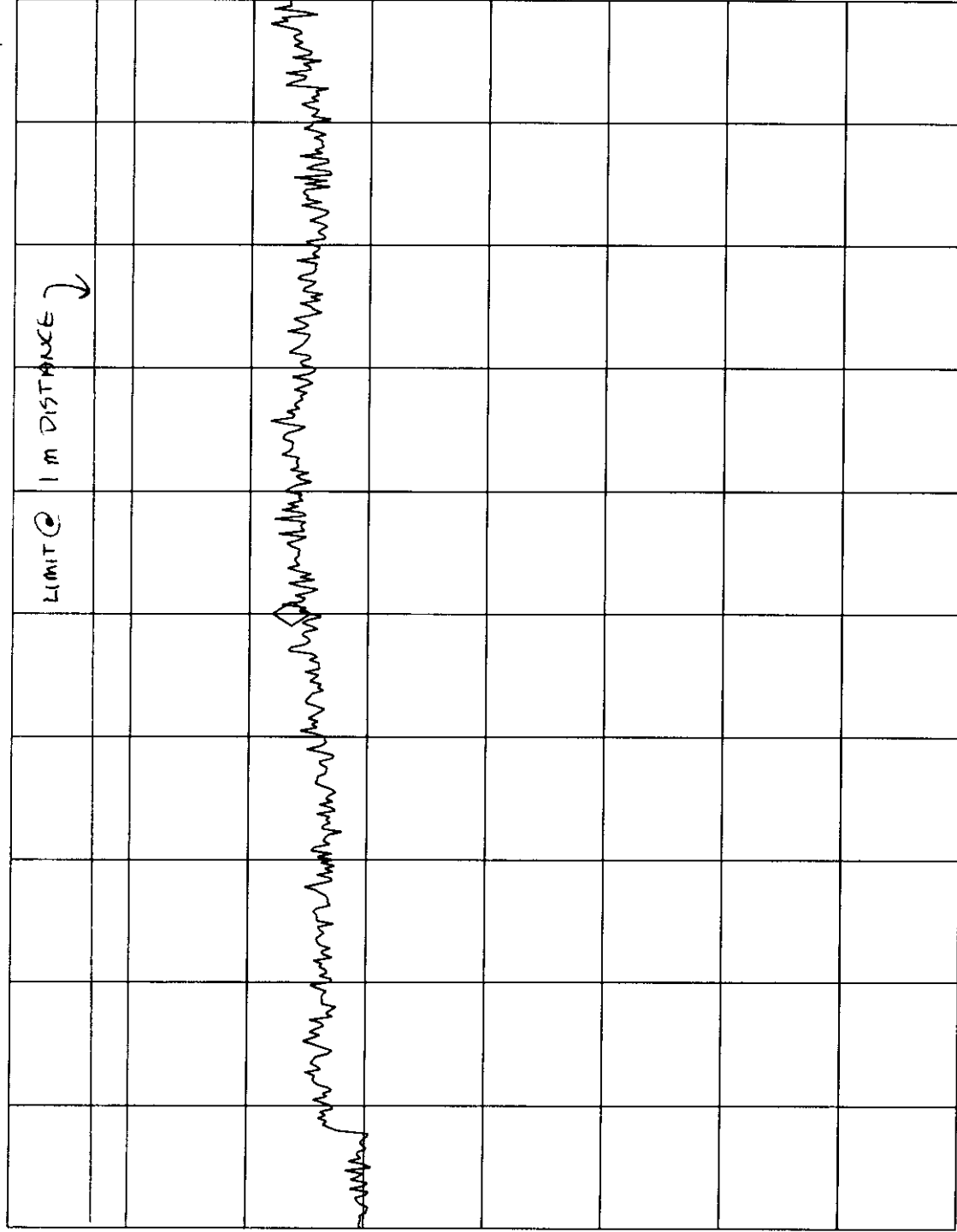
hp

Noise Floor Plot

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

PEAK
LOG
10
dB/

HOLD



DSP LINE
ON OFF

Change
Title

Limit
Lines

ANALOG+
ON OFF

More
1 of 2

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.



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

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

Report No. 62807.e1

Integrity

 Design & Test
Services, Inc.

Certificate of Compliance

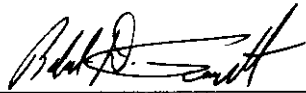
The following product was found to comply with the requirement stated below when tested in accordance with the test procedures described in the accompanying test/measurement report. Reference report number 62807.e1

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	6/12/98

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.

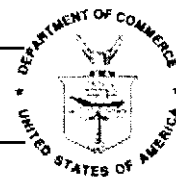
Integrity Design & Test Services, Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for Electromagnetic Emissions Testing.

United States Department of Commerce
National Institute of Standards and Technology



ISO/IEC GUIDE 25:1990
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

A handwritten signature in dark ink, appearing to read "J. L. G.", written over a horizontal line.

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.

Table of Contents

1. EXECUTIVE SUMMARY	1
1.1 SCOPE.....	1
1.2 CONTENT.....	1
1.3 CONCLUSIONS	1
2. TEST ENVIRONMENT	2
2.1 EUT DESCRIPTION.....	2
2.2 TEST FACILITY DESCRIPTION	4
2.3 TEST EQUIPMENT.....	4
2.4 PRODUCT DISPOSITION	4
3. TEST DESCRIPTION/RESULTS	6
3.1 RADIATED EMISSIONS.....	6
3.2 CONDUCTED EMISSIONS	9
3.3 LABELING REQUIREMENTS	13
APPENDIX A – TEST DATA	15
CONFIGURATION PHOTOGRAPHS	17

List of Tables

TABLE 2.3-1:	TEST EQUIPMENT.....	5
TABLE 3.1.1-1:	FCC CLASS B RADIATED EMISSIONS LIMIT	12
TABLE 3.2.1-1:	FCC CLASS B CONDUCTED EMISSIONS LIMIT	12
TABLE A1:	FCC CLASS B RADIATED EMISSIONS.	16

1. Executive Summary

1.1 Scope

This document describes electromagnetic emissions testing performed on the Life Style 50 Home Theater System on 4/14/98 & 4/16/98, pursuant to FCC CFR 47 Part 15 requirements. It may be used to demonstrate compliance with the FCC emissions requirements, as well as Canadian emissions requirements regulated by Industry Canada as defined in ICES-003 Issue 2, Revision 1.

1.2 Content

Contained herein are the technical descriptions of the equipment under test (EUT) as well as the test methods used to verify compliance with the FCC emissions requirements for Information Technology Equipment (ITE), other than personal computers or peripherals marketed to a residential environment, to the above named standards.

1.3 Conclusions

The Life Style 50 Home Theater System met the FCC Class B requirements when tested as received.

(Refer to Test Descriptions & Results in section 3 for a detailed description).

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

Cables

Quantity	Description
6	Stereo RCA cables (audio input/output)
4	DIN to DIN (to powered speakers)
1	DIN to DIN (to CD changer)
1	FM antenna
1	AM antenna
1	Power Cable (to wall pack AC adapter)

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.

Table 2.3-1: Test Equipment

Description	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer (9 KHz to 22 GHz)	HP8593E	3543A01976	12/30/97	12/30/98
Spectrum Analyzer (9 KHz to 1.8 GHz)	HP 8591E	3346A02258	4/22/98	4/22/99
Preamplifier (150 KHz to 1.3 GHz)	HP 447D	2944A07027	4/21/98	10/21/98
Preamplifier (150 KHz to 1.3 GHz)	HP 447D	2443A04077	4/21/98	10/21/98
Preamplifier (1 GHz to 26.5 GHz)	HP 8449B	3008A00232	11/16/97	5/16/98
BiLog Antenna (30 MHz to 2 GHz)	Chase CBL6112A	2284	3/10/98	3/10/99
BiLog Antenna (30 MHz to 2 GHz)	Chase CBL6112A	2173	1/13/98	1/13/99
Guided Ridged Horn (1 GHz to 18 GHz)	A.H. Systems SAS-200/571	163	10/4/97	10/4/98
LISN: 50 Ω /50 μ H	Solar 9252-50-R-24-BNC	941725	4/8/98	5/8/99
LISN: 50 Ω /50 μ H	Solar 9252-50-R-24-BNC	941724	5/12/97	5/12/98

All equipment used for testing has been calibrated according to methods and procedures defined by the National Institute of Standards and Technology (NIST).

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.

3.1.5 Results

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

Modifications	FCC Class B Radiated Emissions
See Note (1)	Passed: - 5.5 dB at 355.6 MHz

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.

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 Conducted Emissions

3.2.1 Object

The purpose of this test is to measure the conducted electromagnetic emissions on the AC power lines, pursuant to FCC part 15 Class B requirements. (See Table 3.2.1-1 for the Class B conducted limits).

3.2.2 Procedure

Testing is performed in an Open Area Test Site. Equipment is arranged on the turntable as described in section 3.1.2. Each individual current-carrying power lead shall be individually connected through a 50 Ω /50 μ H Line Impedance Stabilization Network(LISN). A 2 meter x 2 meter vertical coupling plane is placed 40 cm to the rear of the EUT. The EUT is set into operation such that all parts of the system are exercised, while the RF voltages across the 50 Ω measuring port of the LISN are recorded. The test is repeated for each current-carrying power line of the EUT.

3.2.3 Deviations from Test Method

None

3.2.4 Measurement Uncertainty

A minimum of a 1 dB margin of compliance is required for conducted emissions data to verify passing results. This is required to compensate for the measurement uncertainties involved.

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.

3.2.6 Conducted Emissions Terms and Calculation

The following is a description of terms and a sample calculation, as appears in the conducted 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 dBμV. Any external attenuators used are taken into account through internal analyzer settings.

Limit: This is the FCC Class B conducted emission limit (in units of dBμV). The FCC limits are given in units of μVolts. The following formula is used to convert the units of μVolts to dBμVolts:

$$Limit (dB\mu V) = 20 * \log(\mu V)$$

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 55 dBμV on the spectrum analyzer at 5.4 MHz.
(Note: This shows a passing result (i.e. a negative margin))

Example only:

<u>Reading</u>		<u>FCC limit</u>		<u>Margin</u>
55 dBμV	-	60 dBμV	=	-5 dB

Table 3.1.1-1: FCC Class B Radiated Emissions Limit

Frequency	FCC Class B Quasi-Peak (dB μ V/m)	
(MHz)	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 Labeling Requirements

3.3.1 FCC Labeling (taken from FCC CFR 47 section 15.19)

A compliance label similar to the following must be affixed to the product pursuant to FCC part 15 Class B requirements:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Information to user (taken from FCC CFR 47 section 15.105)

For a Class B digital device or peripheral, the instructions furnished to the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

In addition to the above statement, the users manual shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. (taken from FCC CFR 47 section 15.21).

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).

Appendix A – Test Data

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

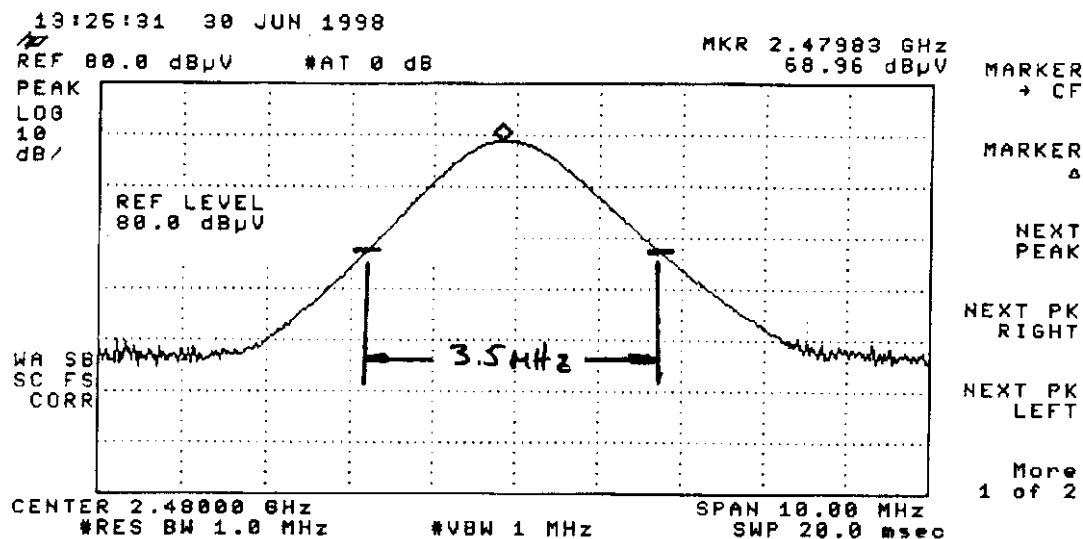
Test Configuration: Full Scan

Polarity (V or H)	Frequency (MHz)	Q.P. Reading (dB μ V)	A.F. (dB)	Net (dB μ V/m)	FCC Class B Limit @ 3m (dB μ V/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 Photographs

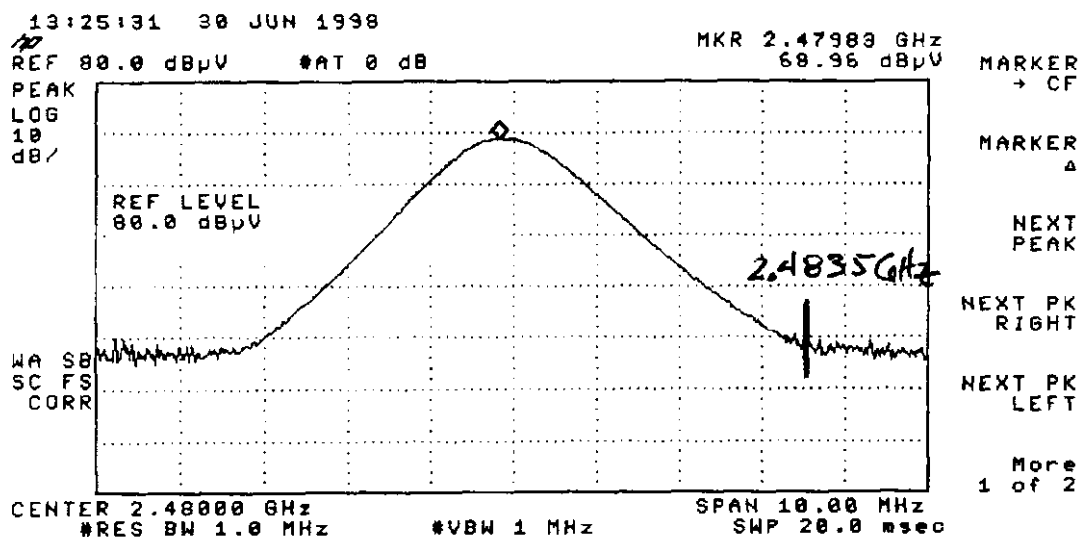
3.5 Occupied Bandwidth Measurements

The bandwidth 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

Each unit was checked for its intrusion into the 2483.5-2500 MHz restricted band. They all 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:

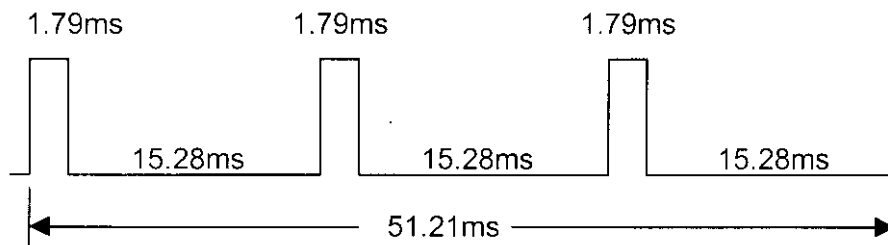


Fig. 1: Base unit on. No controller awake.

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:

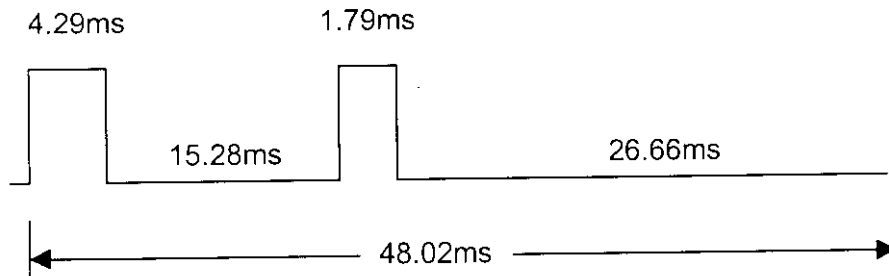


Fig. 2: Base unit on. Data message to controller.

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:

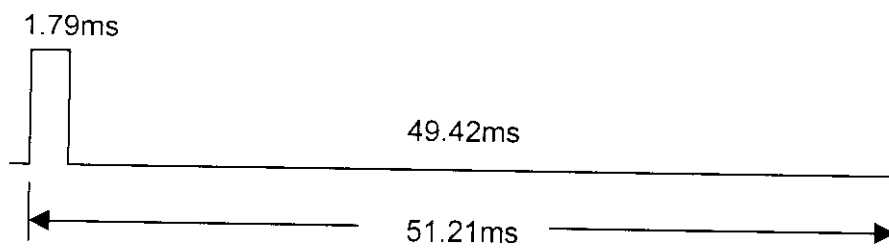


Fig. 3: Controller on. No data being sent.

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:

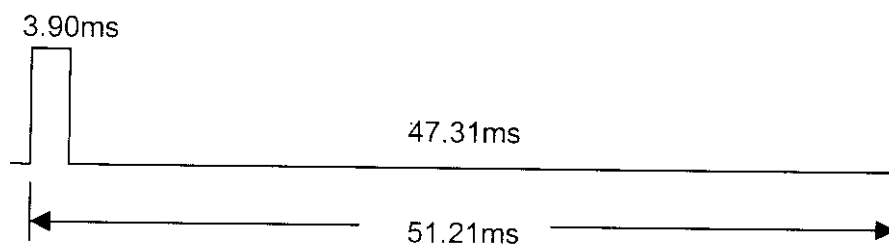


Fig. 4: Controller on. Data being sent.

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: