

TEST REPORT



Certification # 1367-01

Laboratory ID

Submitter ID

PRODUCT SAFETY ENGINEERING, INC.
12955 Bellamy Brothers Boulevard
Dade City, Florida 33525 USA
PH (352) 588-2209 FX (352) 588-2544

XM Radio
7777 Glades Road
Boca Raton, FL 33434

Report Issue Date: 08 MAR 06
Sample Radio ID# BRCV P6 87

Test Report Number: 05F440B
Model Designation: YX-M1

Sample Receipt Date: Dec 15, 2005

Product Description: Satellite Radio Receiver
and FM Transmitter

Sample Test Date: see data sheets

Marketing Approval _____

Description of non-standard test method or test practice: *None*

Estimated Measurement Uncertainty: *Not Applicable*

Special limitations of use: *None*

Traceability: *reference standards of measurement have been calibrated by a competent body using standards traceable to the NIST.*

According to testing performed at Product Safety Engineering, Inc., the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in regulations indicated on page (3) of the test report. The test results contained herein relate only to the model(s) identified above. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Project Engineer, I hereby declare that the equipment tested as specified above conforms to the requirements indicated on page (3) of the test report.

Signature David Foerstner Name David Foerstner
SA

Title Engineering Group Leader Date 08 MAR 06

Reviewed by: Steven Hoke
Approved Signatory John Hoke Date 08 MAR 06

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Test Report Number 05F440B

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Environmental conditions during testing:

	LAB	OATS
Temperature: *	_____	: _____
Relative Humidity: **	_____	: _____

* The ambient temperature during the testing was within the range of (50° - 104° F) unless indicted above.
 ** The humidity levels during the testing was within the range of (10% - 90%) relative humidity unless indicated above.

Power supply system : 110 Volts 60 Hz SINGLE phase

Sign Explanations:

- not applicable
- applicable

Product Description -

This product has (3) variations as follows:

- 1) Home dock - AC powered docking station
- 2) Mobile dock - 12 DC powered docking station
- 3) Portable - Internal battery powered operation

The three versions were tested separately and the worst case configuration's data is included within the test report. The only version that connects to the mains is the home dock version. The mobile dock receives power from the car (12) volts and the mobile version is powered by an internal battery.

All versions may have the output frequency set at any standard broadcast FM frequency between (88.1 - 107.9) MHz. The testing was completed while the output frequency was set to a low, medium and high operating frequency. While operating at each of these (3) frequencies, the spurious emissions were measured up to the (10 th) harmonic.

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Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE) measurements were performed at the following test location:

- Test not applicable

- Darby Test Site (Open Area Test Site)
- Darby Laboratory

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
<input checked="" type="checkbox"/>	8028-50	Solar	50 Ω LISN	829012, 829022
<input type="checkbox"/>	3825/2	Solar	50 Ω LISN	924840
<input checked="" type="checkbox"/>	EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/>	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/>	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/>	85662A	Hewlett Packard	Analyzer Display	2403A07352
<input type="checkbox"/>	8028-50	Solar	50 Ω LISN	903725, 903726
<input type="checkbox"/>	FCC-TLISN-T4	Fisher Custom Com.	Telecom ISN	20072

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The RADIATED EMISSIONS (MAGNETIC FIELD) measurements were performed at the following test location:

- Darby Test Site (Open Area Test Site)
-
-

at a test distance of :

- 3 meters
- 30 meters

- Test not applicable

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/>	96005	Eaton	Log Periodic Antenna	1099
<input type="checkbox"/>	BIA-25	Electro-Metrics	Biconical Antenna	4283
<input type="checkbox"/>	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/>	85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/>	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/>	ALR-30M	Electro-Metrics	Loop Antenna	824
<input type="checkbox"/>	8447D	Hewlett Packard	Preamplifier	2944A06832
<input type="checkbox"/>	EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/>	ALA-130/A	Antenna Research	Loop Antenna	106

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Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

- Test not applicable

- Darby Site (Open Area Test Site)
- Darby Lab
-

at a test distance of :

- 3 meters
- 10 meters
- 30 meters

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
<input checked="" type="checkbox"/>	LPA30	eElectro-Metrics	Log Periodic Antenna	2280
<input checked="" type="checkbox"/>	BIA-30	Electro-Metrics	Biconical Antenna	3852
<input checked="" type="checkbox"/>	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input checked="" type="checkbox"/>	85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input checked="" type="checkbox"/>	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input checked="" type="checkbox"/>	8447D	Hewlett-Packard	Preamplifier (26dB)	2944A06832
<input type="checkbox"/>	EMC-30	Electro-Metrics	EMI Receiver	191
<input type="checkbox"/>	8568B	Hewlett Packard	Spectrum Analyzer	2407A03213
<input type="checkbox"/>	85650A	Hewlett Packard	Quasi-Peak Adapter	2043A00358
<input type="checkbox"/>	85662A	Hewlett Packard	Analyzer Display	2340A05806
<input type="checkbox"/>	96005	Eaton	Log Periodic	1099
<input type="checkbox"/>	BIA 25	Electro-Metrics	Biconical Antenna	4283

Emissions Test Conditions): INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

- Test not applicable

- Darby Lab
-

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
<input type="checkbox"/>	MDS-21	Rhode&Schwarz	Absorbing Clamp	8608447020
<input type="checkbox"/>	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
<input type="checkbox"/>	85662A	Hewlett-Packard	Analyzer Display	2403A07352
<input type="checkbox"/>	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
<input type="checkbox"/>	8447D	Hewlett-Packard	Amplifier (26 dB)	2944A06832
<input type="checkbox"/>	EMC-30	Electro-Metrics	EMI Receiver	191

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The EQUIVALENT RADIATED EMISSIONS measurements in the frequency range 1 GHz - 1.1 GHz were performed in a horizontal and vertical polarization at the following test location :

- - Darby Test Site (Open Area Test Site)
- -
- -
- -

at a test distance of:

- - 1 meters
- - 3 meters
- - 10 meters

□ - Test not applicable

Test equipment used :

Model Number	Manufacturer	Description	Serial Number
■ - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
■ - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
■ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
■ - 8449B	Hewlett-Packard	Preamplifier	3008A00320
■ - 3115	Electro-Mechanics	Double Ridge Guide Horn	3810

The ANTENNA TERMINAL DISTURBANCE VOLTAGE in the frequency range 30 MHz - 1,000 MHz were performed.

- - Darby Test Site (Open Area Test Site)
- - Laboratory
- -
- -

■ - Test not applicable

Model Number	Manufacturer	Description	Serial Number
□ - 2F9-3C4-3C5	Wavecom	UHF PAL TV Modulator	185879
□ - 2F1-3C4-3C5	Wavecom	VHF PAL TV Modulator	157728
□ - A-8000	IFR	Spectrum Analyzer	1306
□ - 8648B	Hewlett-Packard	Signal Generator	3623A01433
□ - 8648B	Hewlett-Packard	Signal Generator	3623A01477
□ - LMV-182A	Leader	RMS Milli-Voltmeter	8010091
□ - 3202	Krhon-Hite	Active filter	5899
□ - FMT115	Leaming	FM Modulator	NONE
□ - 371	UDT	Optical power meter	06657
□ - TSG95	Tektronix	PAL video / Audio generator	B028883
□ -			

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Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

- Standby
- Test program (H - Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal Operating Mode
-

Configuration of the device under test:

- See System Under Test Information in Appendix B

Rationale for EUT setup / configuration:

ANSI C63.4

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Emission Test Results:

Conducted emissions 150 kHz - 30 MHz

The requirements are - MET - NOT MET
Minimum limit margin 6.4 dB at 0.23 MHz
Remarks: Against Average Limit

Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are - MET - NOT MET
Minimum limit margin dB at MHz
Remarks:

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are - MET - NOT MET
Minimum limit margin 0.8 dB at 107.5 MHz
Remarks: Measured in the mobile configuration

Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are - MET - NOT MET
Minimum limit margin dB at MHz
Remarks:

Radiated emissions 1 GHz - 1.08 GHz

The requirements are - MET - NOT MET
Minimum limit margin >10 dB at all GHz
Remarks:

Antenna Terminal Disturbance Voltage 30 MHz - 1,000 MHz

The requirements are - MET - NOT MET
Minimum limit margin dB at MHz
Remarks:

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GENERAL REMARKS:

The EUT's were tested in (3) orthogonal planes.

Measurements were made up to the tenth harmonic of the highest frequency transmitted.

There are (3) separate configurations that were tested.

- (1) Home installation, uses home style antenna and "home style" docking cradle
- (2) Mobile installation, uses vehicle style antenna and "vehicle style" docking cradle
- (3) Portable installation uses the short built in antenna attached to device and no docking station.

The EUT transmits at 200 KHz intervals starting at 88.1 MHz and ending at 107.9 MHz.

We tested all (3) configurations at 88.7, 98.5 & 107.5 MHz. Data is reported for the worst case configuration.

The line out port was never cabled during this "intentional radiator" testing because if cabled, it shuts off the transmitter.

SUMMARY:

The requirements according to the technical regulations are

- met
- **not** met.

The device under test does

- fulfill the general approval requirements mentioned on page 3.
- **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date Dec 15, 2005

Testing End Date: Dec 16, 2005

- PRODUCT SAFETY ENGINEERING INC -

Test Report Number 05F440B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Test-setup photo(s):
Conducted emission 150 kHz - 30 MHz



Test Report Number 05F440B

**Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544**

Test-setup photo(s):
Radiated emission 30 MHz - 1000 MHz



Test Report Number 05F440B

**Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544**

APPENDIX

A

Test Equipment Calibration Information & Test Data Sheets

TEST EQUIPMENT CALIBRATION INFORMATION

Manufacturer	Model	Description	Serial Number	Cal Due
Hewlett Packard	8566B	Spectrum Analyzer	2421A00526	07/18/06
Hewlett Packard	85662A	Display	2403A07352	07/18/06
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00209	07/18/06
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06832	12/08/06
Hewlett Packard	8568B	Spectrum Analyzer	2407A03213	08/03/06
Hewlett Packard	85662A	Display	2340A05806	08/03/06
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00358	08/03/06
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06901	08/03/06
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	1937A03247	08/03/06
Hewlett Packard	8449B	Preamp 1 - 26.5 GHz	3008A00320	12/08/06
Hewlett Packard	8648B	Signal Generator	3443U00312	05/26/06
Hewlett Packard	8672A	Signal Generator	2211A02426	12/13/05
Eaton	96005	Log Periodic Antenna	1099	01/26/06
Electro-Metrics	LPA 30	Log Periodic Antenna	2280	01/11/06
Electro-Metrics	BIA 30	Biconical Antenna	3852	01/11/06
Electro-Metrics	BIA 25	Biconical Antenna	4283	01/27/06
Electro-Mechanics	3115	Double Ridge Guide Ant.	3810	11/28/07
Electro-Metrics	ALR30M	Magnetic Loop Antenna	824	01/10/06
Solar	8012	LISN	924840	03/10/06
Solar	8028	LISN	829012/809022	12/12/06
Solar	8028	LISN	903725/903726	11/22/06
Schwartzbeck	MDS-21	Absorbing Clamp	02581	12/09/06
Leader	LFG1310	Function Generator	8060233	05/26/06
Electro-Metrics	EMC-30	EMI Receiver	191	05/26/06
Antenna Research	ALA-130/A	Loop Antenna	106	06/02/06
Radio Shack	63-867	Temp/Hygrometer	N/A	05/27/06
Radio Shack	63-867A	Temp/Hygrometer	N/A	05/27/06

PRODUCT EMISSIONS

PRODUCT SAFETY ENGINEERING

Data File: BUNA S MOBILE FCC-B 12-16-05

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS			SITE			CORR FACTOR dB	COMMENTS
			ABS	dLIM dB	MODE	POL	HGT cm	AZM deg		
1	88.706	43.5	43.8	0.3	QP	H	300	1	-19.2	
2	98.286	43.5	46.5	3.0	QP	H	300	1	-16.2	
3	107.503	43.5	47.2	3.7	QP	V	100	1	-14.8	
4	177.400	43.5	26.3	-17.2	PK	V	100	1	-10.2	
5	196.601	43.5	24.0	-19.5	PK	V	100	1	-8.5	
6	215.000	43.5	17.5	-26.0	PK	H	200	1	-13.8	
7	266.099	46.0	17.0	-29.0	PK	H	200	1	-12.1	
8	294.900	46.0	19.1	-26.9	PK	H	200	1	-10.6	
9	322.501	46.0	22.0	-24.0	PK	H	200	1	-10.4	
10	354.804	46.0	22.4	-23.6	PK	H	200	1	-10.5	
11	392.703	46.0	19.4	-26.6	PK	H	200	1	-9.7	
12	430.000	46.0	20.9	-25.1	PK	H	200	1	-9.1	
13	443.500	46.0	21.2	-24.9	PK	H	200	1	-8.8	
14	491.500	46.0	22.5	-23.5	PK	H	200	1	-7.9	
15	532.200	46.0	17.6	-28.4	PK	H	200	1	-7.3	
16	537.499	46.0	22.5	-23.5	PK	H	200	1	-7.2	
17	589.800	46.0	23.5	-22.5	PK	H	200	1	-6.4	
18	620.900	46.0	25.5	-20.5	PK	H	200	1	-5.6	
19	645.000	46.0	23.8	-22.2	PK	H	200	1	-4.9	
20	688.100	46.0	15.2	-30.8	PK	H	200	1	-3.8	
21	709.600	46.0	25.9	-20.1	PK	H	200	1	-3.4	
22	752.500	46.0	26.0	-20.0	PK	H	200	1	-3.1	
23	786.400	46.0	26.4	-19.6	PK	H	200	1	-2.8	
24	798.300	46.0	26.9	-19.1	PK	H	200	1	-2.7	
25	860.000	46.0	29.0	-17.0	PK	H	200	1	-0.9	
26	884.700	46.0	28.5	-17.5	PK	H	200	1	-0.3	
27	887.000	46.0	17.7	-28.3	PK	H	200	1	-0.2	
28	968.599	54.0	30.0	-24.0	PK	H	200	1	1.	
29	983.000	54.0	29.4	-24.7	PK	H	200	1	1.3	
30	999.999	54.0	29.4	-24.6	PK	H	200	1	1.6	Mkr @ 1075 MHz

Product Safety Engineering

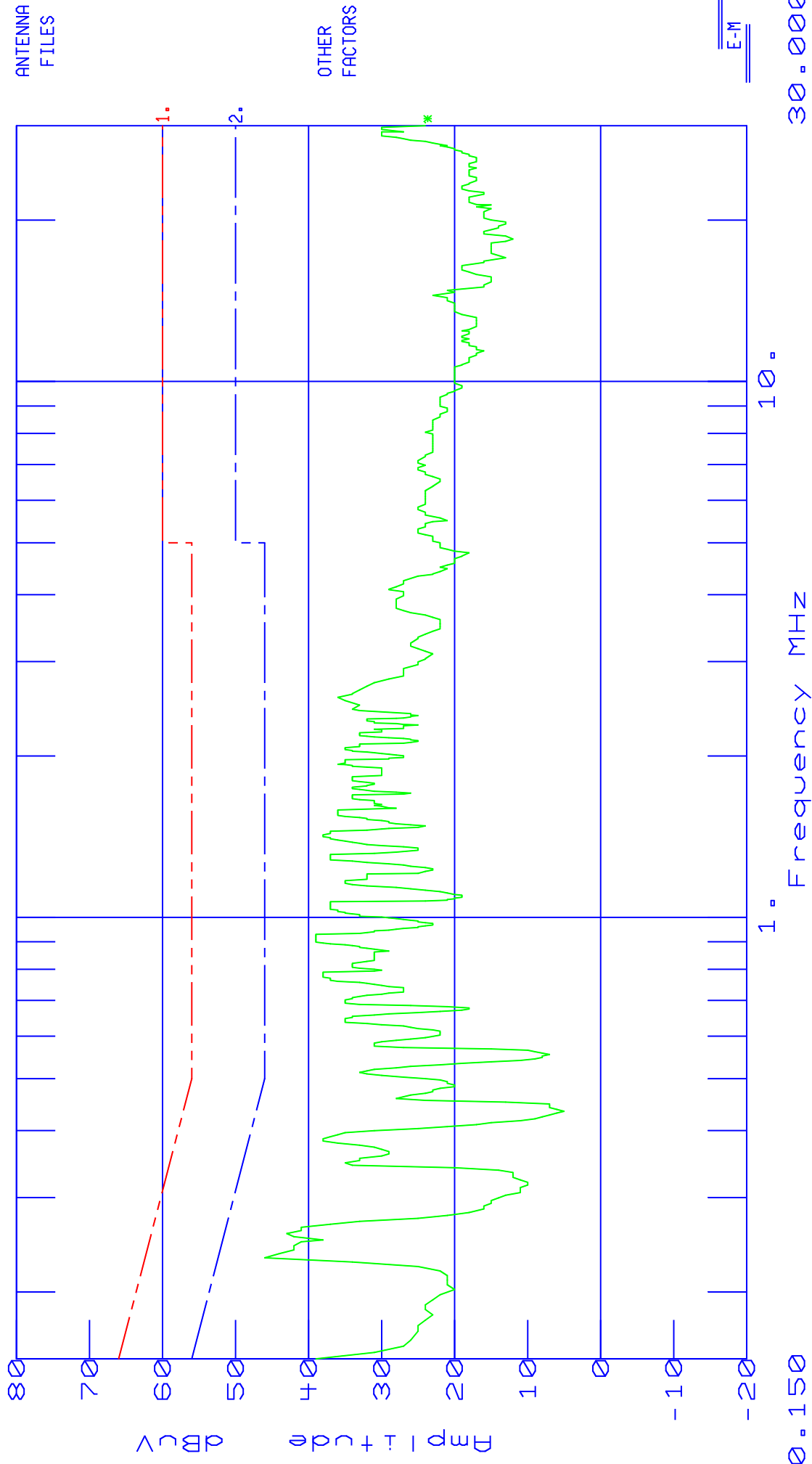
XM RADIO

Date : 01/06/06 Time : 16:07:55.63
 Technician : JACK GARNER Test Equip. : EMC-30
 Test Method : EN55022 CLASS B Test Number : 1
 Equipment : BUNA S Sensor Loc. : LINE
 Mode of Op. : NORMAL Sensor Pol. :
 Serial No. : Ext. Atten. : 0 dB

EMC-30 SETTINGS
 Detector QuasiPeak
 Bandwidth CISPR
 Dump/Dwell N/A
 RF Atten. 10 dB
 IF Atten. 10 dB

SPECS
 1) CISPR 22 Quasi Peak
 2) CISPR 22 AVG
 3)
 4)

Comment : 120 VAC / 60 HZ IN HOME DOCK



TEST TITLE:XM RADIO
DATA FILE :BUNA_L.D30
Amplitude Units : dBuV

Threshold -7 dB

PAGE 1
Freq.(MHz)
0.1500

Freq(MHz)	Amp	C22BQP.S30 vs Spec(dB)	C22BAVG.S30 vs Spec(dB)
0.2315	46.0		-6.396 *
0.8990	39.0		-7.000 *
0.9024	39.0		-7.000 *
0.9058	39.0		-7.000 *
0.9092	39.0		-7.000 *
0.9126	39.0		-7.000 *
0.9160	39.0		-7.000 *
0.9194	39.0		-7.000 *
0.9228	39.0		-7.000 *
0.9262	39.0		-7.000 *
0.9296	39.0		-7.000 *

Product Safety Engineering

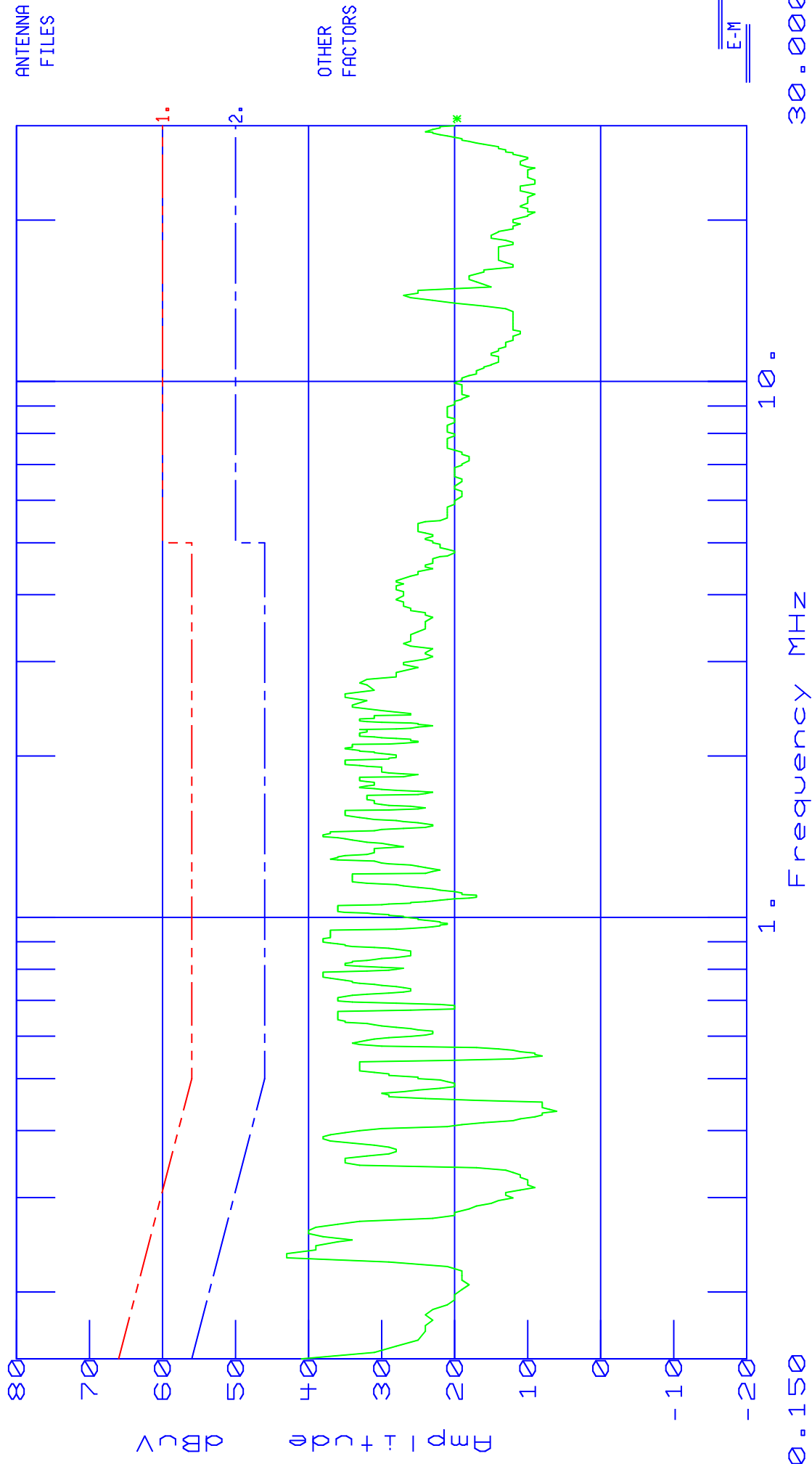
XM RADIO

Date : 01/06/06 Time : 15:52:34.86
 Technician : JACK GARNER Test Equip. : EMC-30
 Test Method : EN55022 CLASS B Test Number : 1
 Equipment : BUNA S Sensor Loc. : NEUTRAL
 Mode of Op. : NORMAL Sensor Pol. :
 Serial No. : Ext. Atten. : 0 dB

EMC-30 SETTINGS
 Detector QuasiPeak
 Bandwidth CISPR
 Dump/Dwell N/A
 RF Atten. 10 dB
 IF Atten. 10 dB

SPECS
 1) CISPR 22 Quasi Peak
 2) CISPR 22 AVG
 3)
 4)

Comment : 120 VAC / 60 HZ IN HOME DOCK



0.150

1. Frequency MHz

10.

30.000

TEST TITLE:XM RADIO
DATA FILE :BUNA_N.D30
Amplitude Units : dBuV

Threshold -9 dB

PAGE 1
Freq.(MHz)
0.1500

Freq(MHz)	Amp	C22BQP.S30 vs Spec(dB)	C22BAVG.S30 vs Spec(dB)
0.7697	37.0		-9.000 *
0.7731	38.0		-8.000 *
0.7765	38.0		-8.000 *
0.7799	38.0		-8.000 *
0.7833	38.0		-8.000 *
0.7867	38.0		-8.000 *
0.7901	38.0		-8.000 *
0.8956	37.0		-9.000 *
0.8990	38.0		-8.000 *
0.9024	38.0		-8.000 *
0.9058	38.0		-8.000 *
0.9092	38.0		-8.000 *
0.9126	38.0		-8.000 *
0.9160	37.0		-9.000 *
0.9194	37.0		-9.000 *
0.9228	37.0		-9.000 *
0.9262	37.0		-9.000 *
0.9296	37.0		-9.000 *
0.9330	37.0		-9.000 *
0.9365	37.0		-9.000 *
0.9399	37.0		-9.000 *
0.9433	37.0		-9.000 *
0.9467	37.0		-9.000 *
1.2831	37.0		-9.000 *
1.4145	38.0		-8.000 *
1.4212	38.0		-8.000 *
1.4246	38.0		-8.000 *
1.4341	37.0		-9.000 *
1.4409	37.0		-9.000 *
1.4443	37.0		-9.000 *

APPENDIX

B

System Under Test Description

SYSTEM COMPONENTS

DEVICE TYPE: EUT, XM RADIO MODEL# YX-M1
SATELLITE RECEIVER/ FM TRANSMITTER

DEVICE TYPE: EUT, XM RADIO MOBILE DOCK
(YA-CP100)

DEVICE TYPE: EUT, XM RADIO HOME DOCK
(YA-CD100)

DEVICE TYPE: EUT, XM RADIO AC POWER SUPPLY, MODEL# SMPS5V2A-XMR

DEVICE TYPE: EUT, XM RADIO SATELLITE RADIO ANTENNA (MOBILE USE)

DEVICE TYPE: EUT, XM RADIO SATELLITE RADIO ANTENNA (HOME USE)

INTERFACE CABLES

DEVICE TYPE: HOME ANTENNA

SHIELD: COAX

LENGTH: 7 METERS

CONNECTOR TYPE: DEDICATED TO COAXIAL PLUG

PORT: ANTENNA IN ON HOME DOCKING STATION

DEVICE TYPE: MOBILE ANTENNA

SHIELD: COAX

LENGTH: 7 METERS

CONNECTOR TYPE: DEDICATED TO COAXIAL PLUG

PORT: ANTENNA IN ON MOBILE DOCKING STATION

AC LINE CORDS

DEVICE TYPE: POWER SUPPLY (AC SIDE)

SHIELD: NO

LENGTH: N/A

CONNECTOR TYPE: 2 PIN POLARIZED WALL PLUG

DEVICE TYPE: POWER SUPPLY (DC SIDE)

SHIELD: NO

LENGTH: 8 FEET

CONNECTOR TYPE: DEDICATED TO MINI COAXIAL PLUG TO EITHER DOCK

APPENDIX

C

Measurement Protocol

The test methodology followed during the collection of the data included within this technical report was ANSI C63.4:1992.

The EUT was powered with (120) VAC / (60) Hz during the collection of data included within.

The data is compared to the FCC Part 15 Class B limits.

The "EMI" instrumentation is capable of calculating the final emission level based on the following formula:

Level at the receiver (dB μ V) + Antenna Correction Factor (dB/M) + Cable Loss (dB) - Preamp Gain (dB) = Actual Level in dB μ V/M.

The sample calculation below is based on the actual test data collected:

Observed Level		63.1	dB μ V	
ACF	+	8.7	dB/M	
Cable Loss	+	1.4	dB	
Preamp Gain	-	<u>26.0</u>	dB	
Actual Level		47.2	dB μ V/M	@ MHz

Please have a company official review this report and sign.
