



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

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July 15, 2008

Cyberdata
2555 Garden Road
Monterey, CA 93940

Dear Chris Elliott,

Enclosed is the EMC test report for compliance testing of the Cyberdata, LiteScape SPAR, Model 010835 (aka 010918 VoIP Card Reader), tested to the requirements of Title 47 of the CFR, Part 15.225, Subpart C for Certification as an Intentional Radiator.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Cyberdata\ EMCS80848-FCC225 Rev. 3)

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DOC-EMC705 2/26/2004



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**Electromagnetic Compatibility Criteria
Test Report**

For the

**Cyberdata
LiteScape SPAR, Model 010835 (aka 010918 VoIP Card Reader)**

Tested under
**The FCC Certification Rules Contained in Title 47 of the CFR, Part 15, Subpart C
For Certification as a Intentional Radiator**

MET Report: EMCS80848-FCC225 Rev. 3

July 15, 2008

Prepared For:

**Cyberdata
2555 Garden Road
Monterey, CA 93940**

**Prepared By:
MET Laboratories, Inc.
914 West Patapsco Avenue
Baltimore, MD 21230**



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MET Report: EMCS80848-FCC225 Rev. 3

Savitha Ramesh
Project Engineer, Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Title 47 of the CFR, Part 15, Subpart C for Certification as a Intentional Radiator and Part 15, Subpart B for a Class B Unintentional Radiator under normal use and maintenance.

Shawn McMillen,
Wireless Manager, Electromagnetic Compatibility Lab



Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	June 16, 2008	Initial Issue.
1	June 27, 2008	Added 15.207 Conducted Emissions Data; Revised sections 3.3, 3.6 & 3.7
2	July 15, 2008	Removed improper NVLAP accreditation listing.



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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
d	Measurement Distance
dB	Deci Bels
dBμV	Deci-Bels above one micro Volt
dBμV/m	Deci-Bels above one micro Volt per meter
DC	Direct Current
DCF	Distance Correction Factor
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
f	Frequency
FCC	Federal Communications Commission
H	Magnetic Field
GHz	Giga Hertz
Hz	Hertz
ICES	Interference-Causing Equipment Standard
kHz	kilohertz
kPa	kilopascal
kV	kilo Volt
LISN	Line Impedance Stabilization Network
MHz	MegaHertz
μH	micro Henry
μF	micro Farad
μs	micro seconds
RF	Radio Frequency
RMS	Root-Mean-Square



1. Testing Summary

Title 47 of the CFR, Part 15, Subpart C, Reference and Test Description	Results	Comments
15.215(c) 20 dB Bandwidth	Compliant	Emissions within band
15.225(a) Field Strength emissions within the band 13.553 – 13.567 MHz	Compliant	Emissions within applicable limits
15.225(b) Field Strength emissions within the band 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	Compliant	Emissions within applicable limits
15.225(c) Field Strength emissions within the band 13.110 – 13.410 MHz and 13.710 – 14.010 MHz	Compliant	Emissions within applicable limits
15.225(d) Outside-Band Field Strength emissions per 15.209 - 13.110 – 14.010 MHz	Compliant	Emissions within applicable limits
15.225(e) Frequency Tolerance of the Carrier	Compliant	Emissions within applicable limits

Table 1. Summary of Test Results



1. Equipment Configuration

2.1 Overview

MET Laboratories, Inc. was contracted by Cyberdata to perform testing on the LiteScape SPAR, Model 010835 (aka 010918 VoIP Card Reader), under Cyberdata's purchase order number 2007.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Cyberdata, LiteScape SPAR, Model 010835 (aka 010918 VoIP Card Reader).

The results obtained relate only to the item(s) tested.

Filing Status:	Original	
Model(s) Tested:	LiteScape SPAR, Model 010835 (aka 010918 VoIP Card Reader)	
Model(s) Covered:	010835 / 010918	
EUT Specifications:	Primary Power: 48VDC nominal IAW IEEE 802.3af	
	FCC ID: WBA-010835-010914	
	Equipment Code:	DXX
	EUT TX Frequency Ranges:	13.56MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Evaluated by:	Savitha Ramesh	
Report Date(s):	June 16, 2008	



2.2 References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025:2000	General Requirements for the Competence of Testing and Calibration Laboratories

2.3 Test Site

All testing was performed at MET Laboratories, Inc., 3162 Belick Street, Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a semi-anechoic chamber. In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

2.4 Description of Test Sample

The LiteScape SPAR, Model 010835 (aka 010918 VoIP Card Reader), Equipment Under Test (EUT), is a small human interface device designed for encrypting security related user inputs to a network device, such as a VoIP telephone, over an IEEE 802.3 LAN connection. It consists of a microprocessor controlled motherboard integrated with a network hub, a 3-track magnetic card reader, an RFID reader, and a biometric fingerprint reader. It is powered by IEEE 802.3af standard Power over Ethernet (PoE) Endpoint/Midspan Power Sourcing Equipment (PSE) {48Vdc nominal} and enumerates as a Class 0 Powered Device (PD). Optionally, it can be powered by a 48VDC external power brick with a 2.5 x 5.5mm DC barrel plug which is used for powering the device when connected to a standard non-PoE LAN. The 010835 and 010918 models are identical hardware with the exception of the LiteScape branded logo on the case of the 010835 model.

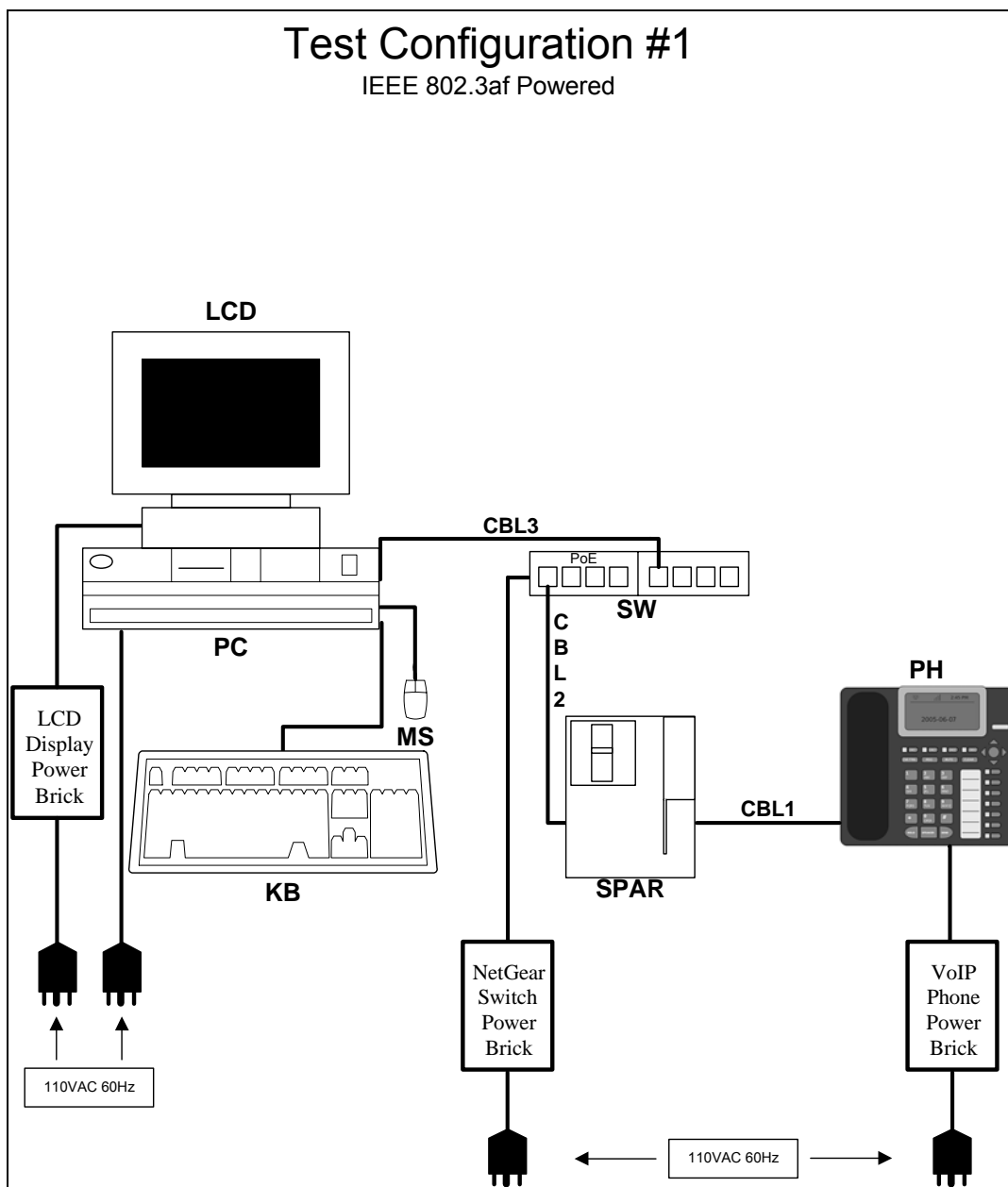


Figure 1. Block Diagram of Test Configuration 1

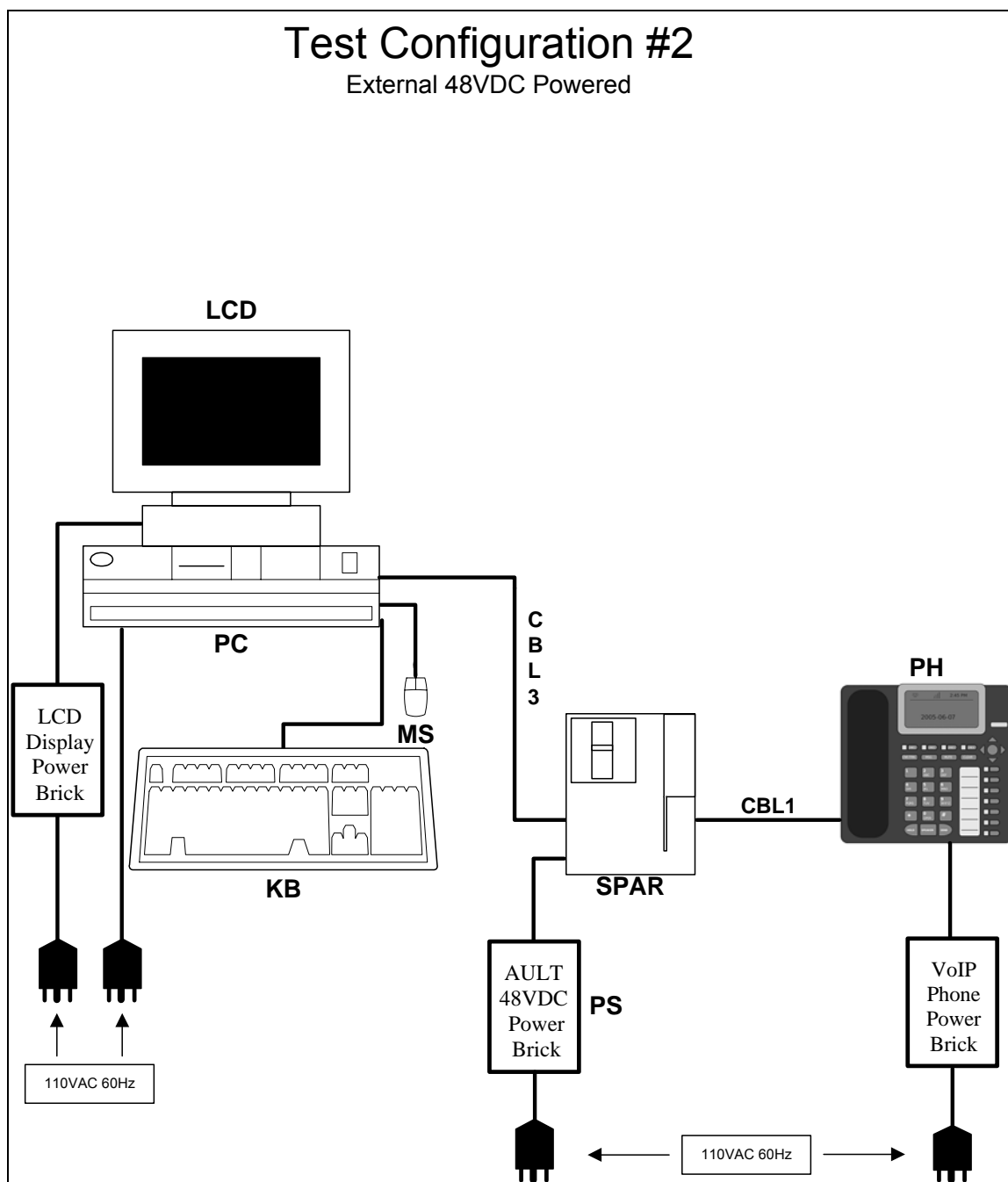


Figure 2. Block Diagram of Test Configuration 2



2.5 Equipment Configuration

The EUT is part of a system as shown in Figure 1 and Figure 2, Block Diagram of Test Setup. All cards, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Part Number	Serial Number	Revision
SPAR	LITESCAPE SPAR	010835	010835	835*TEST01	B

Table 2. Equipment Configuration

2.6 Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number
PC	STANDARD PC	EPSON	IM-210
LCD	LCD MONITOR	VIEWSONIC	VG150
KB	PS/2 KEYBOARD	BTC	5123S
MS	PS/2 MOUSE	MICROSOFT	INTELLIMOUSE 1.2A
PH	VOIP TELEPHONE	CISCO	7961
SW	8-PORT SWITCH WITH POE	NETGEAR	FS108P
PS	48VDC POWER BRICK	AULT	SC102TA4803F01

Table 3. Support Equipment

2.7 Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)	Termination Point
CBL1	"TO PHONE"	CAT 5	1	3	N	VOIP PHONE 10/100PC
CBL2	"HUB"	CAT 5	1	1	N	POE SWITCH
CBL3	"HUB"	CAT 5	1	1	N	PC LAN

Table 4. Ports and Cabling Information



2.8 Mode of Operation

The EUT will be receiving a constant data stream from the PC test application and responding to “module health” status requests for the duration of the test. It will be tested using both the default PoE power source and the optional 48VDC power brick.

2.9 Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

2.10 Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Cyberdata upon completion of testing.



3. Electromagnetic Compatibility Emission Criteria

3.1 §15.207 Conducted Emissions Limits

Test Requirement(s): § 15.207 (a): For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dB μ V)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 5. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a 0.8 m-high wooden table inside a semi-anechoic chamber. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω /50 μ H Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-1992 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω /50 μ H LISN as the input transducer to an EMC/field intensity meter. The tests were conducted in a RF-shielded enclosure.

Test Results: The EUT was found compliant with the requirement(s) of this section. Measured emissions were below applicable limits.

Test Engineer(s): Anderson Sounghpanya

Test Date(s): May 13, 2008



Conducted Emissions - Voltage, AC Power, Phase Line (110 VAC, 60 Hz)

FREQ. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Results QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG	Results AVG
.187	51.62	79	-27.38	Pass	39.35	66	-26.65	Pass
13.56	47.44	73	-25.56	Pass	46.86	60	-13.14	Pass
24.95	42.77	73	-30.23	Pass	26.45	60	-33.55	Pass

Table 6. Conducted Emissions - Voltage, AC Power, Phase Line (110 VAC, 60 Hz)

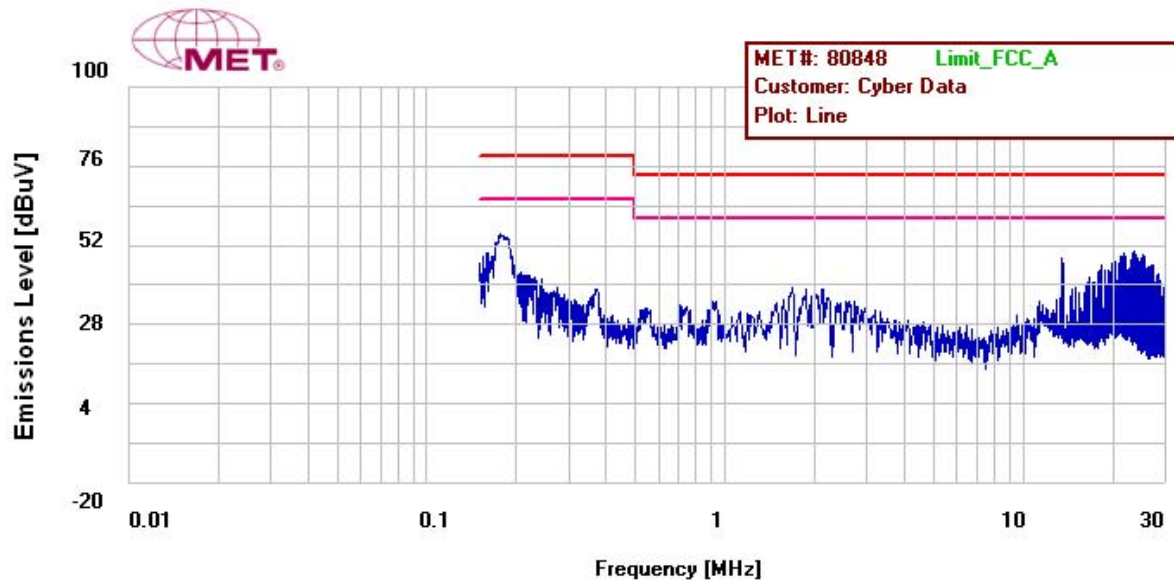
Conducted Emissions - Voltage, AC Power, Neutral Line (110 VAC, 60 Hz)

FREQ. (MHz)	Corrected Amplitude (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Results QP	Corrected Amplitude (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG	Results AVG
.182	50.64	79	-28.36	Pass	41.59	66	-24.41	Pass
13.56	46.46	73	-26.54	Pass	45.82	60	-14.18	Pass
23.54	48.8	73	-24.2	Pass	47.26	60	-12.74	Pass

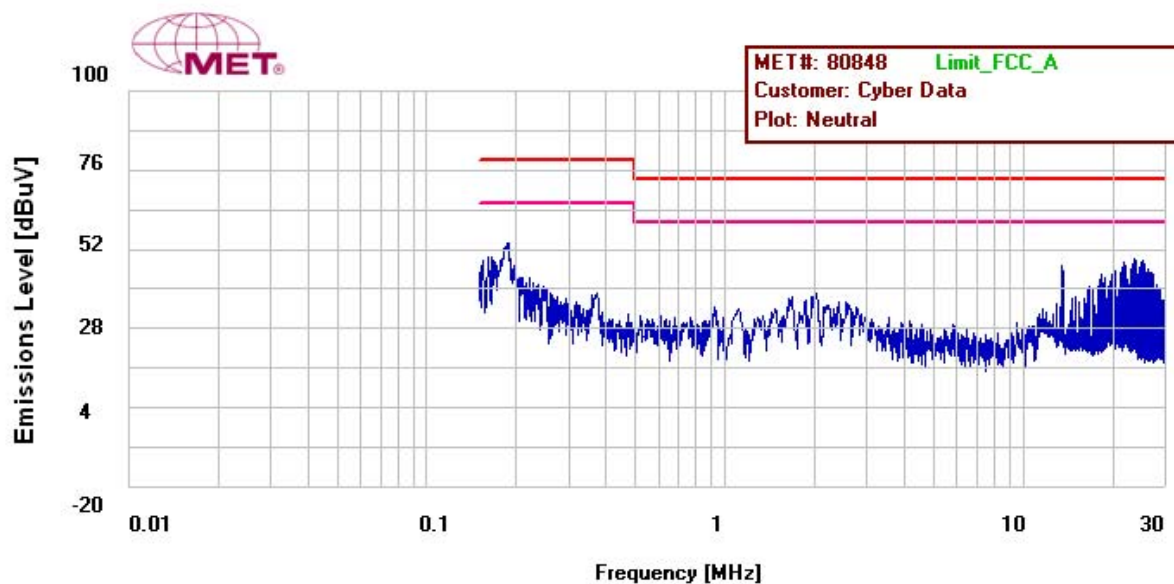
Table 7. Conducted Emissions - Voltage, AC Power, Neutral Line (110 VAC, 60 Hz)



Conducted Emissions - Voltage, Worst Case Emissions, AC Power, (110 VAC, 60 Hz)



Conducted Emission, Phase Line Plots



Conducted Emission, Neutral Line Plots

Conducted Emission Limits Test Setup



Photograph 1. Conducted Emissions Test Setup (AC Power Brick)



Photograph 2. Conducted Emissions Test Setup (POE)

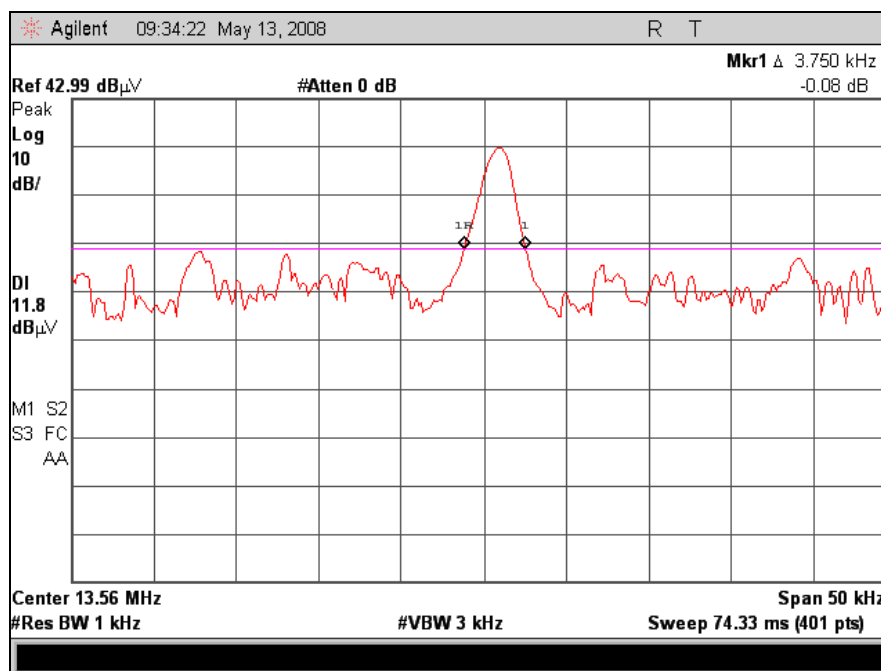


3.2 20 dB Bandwidth

Test Requirement(s): 15.215 (C) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through §15.257 and in Subpart E of this part, must be designed to ensure that the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Procedure: The SRD unit was made to transmit continuously on 13.56 MHz. A loop antenna placed 1m from the unit was connected to a spectrum analyzer and was used to measure the channel bandwidth.

Test Results: The SRD 20 dB bandwidth was found to be compliant with Part 15.215 (C). The following plots were taken that shows the 20 dB bandwidth.



Plot 1. 20 dB Bandwidth, Delta



3.3 Spurious Emission Limits, within the band 13.553 – 13.567 MHz

Test Requirement(s): 15.225 (a) The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Test Procedure: The EUT was set to transmit and placed on a 0.8m-high wooden stand inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4: 2003 were used. The loop antenna was located 1 m from the EUT. Measurements were conducted with the loop antenna at coaxial (parallel) and planar (perpendicular) orientations. The Spectrum analyzer RBW was set to 10 kHz and VBW was set to 30 kHz. A peak detector was used. The measurements were made at 1m and then extrapolated to 30m using the following correction factor.

$$40\log(1/30) = -59.1 \text{ dB}$$

Test Results: The EUT was found compliant with Part 15.225 (a) requirements of this section.

Freq.	Raw Amp. @ 1 m (Peak)	Ant. Cor. Factor	Cable Loss	Dist. Cor. Factor	EUT Field Strength Final Amp. @ 1 m	EUT Field Strength Final Amp. @ 30 m	Limit @ 30 m	Delta
MHz	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
13.56	37.37	35.00	0.75	-59.10	73.12	14.02	84	-69.98

Table 8. Spurious Emissions Limits, Test Results, 13.553 – 13.567 MHz

Test Engineer(s): Anderson Soungpanya

Test Date(s): 05/15/2008



3.4 Spurious Emission Limits, within the bands 13.410 – 13.553 MHz and 13.567 – 13.710 MHz

Test Requirement(s): 15.225 (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Test Procedures: The EUT was set to transmit and placed on a 0.8m-high wooden stand inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4: 2003 were used. The loop antenna was located 1 m from the EUT. Measurements were conducted with the loop antenna at coaxial (parallel) and planar (perpendicular) orientations. The Spectrum analyzer RBW was set to 10 kHz and VBW was set to 30 kHz. A peak detector was used. The measurements were made at 1m and then extrapolated to 30m using the following correction factor.

$$40\log(1/30) = -59.1 \text{ dB}$$

Test Results: The EUT was found compliant with Part 15.225 (a) requirements of this section.

Freq.	Raw Amp. @ 1 m (Peak)	Ant. Cor. Factor	Cable Loss	Dist. Cor. Factor	EUT Field Strength Final Amp. @ 1 m	EUT Field Strength Final Amp. @ 30 m	Limit @ 30 m	Delta
MHz	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
13.567	29.73	35.00	0.75	-59.10	65.48	6.38	50.5	-44.12
13.61	18.59	35.00	0.75	-59.10	54.34	-4.76	50.5	-55.26
13.44	13.44	35.00	0.75	-59.10	49.19	-9.91	50.5	-60.41
13.41	12.58	35.00	0.75	-59.10	48.33	-10.77	50.5	-61.27
13.553	27.47	35.00	0.75	-59.10	63.22	4.12	50.5	-46.38

Table 9. Spurious Emissions Limits, Test Results, 13.410 – 13.553 MHz and 13.567 – 13.710 MHz

Test Engineer(s): Anderson Soungpanya

Test Date(s): 05/15/2008



3.5 Spurious Emission Limits, within the bands 13.110 – 13.410 MHz and 13.710 – 14.010 MHz

Test Requirement(s): 15.225 (C) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Test Procedures: The EUT was set to transmit and placed on a 0.8m-high wooden stand inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4: 2003 were used. The loop antenna was located 1 m from the EUT. Measurements were conducted with the loop antenna at coaxial (parallel) and planar (perpendicular) orientations. The Spectrum analyzer RBW was set to 10 kHz and VBW was set to 30 kHz. A peak detector was used. The measurements were made at 1m and then extrapolated to 30m using the following correction factor.

$$40\log(1/30) = -59.1 \text{ dB}$$

Test Results: The EUT was found compliant with Part 15.225 (c) requirements of this section.

Freq.	Raw Amp. @ 1 m (Peak)	Ant. Cor. Factor	Cable Loss	Dist. Cor. Factor	EUT Field Strength Final Amp. @ 1 m	EUT Field Strength Final Amp. @ 30 m	Limit @ 30 m	Delta
MHz	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
13.36	15.15	35.00	0.75	-59.10	50.90	-8.20	40.5	-48.70
13.97	10.83	35.00	0.75	-59.10	46.58	-12.52	40.5	-53.02

Table 10. Spurious Emissions Limits, Test Results, 13.110 – 13.410 MHz and 13.710 – 14.010 MHz

Test Engineer(s): Anderson Soungpanya

Test Date(s): 05/15/2008



3.6 Spurious Emission Limits, outside the bands 13.110 – 14.010 MHz

Test Requirement(s): 15.225 (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Test Procedures: The EUT was set to transmit and placed on a 0.8m-high wooden stand inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4: 2003 were used. For measurements below 30 MHz a loop antenna placed 1m away from the unit was used. For measurements above 30 MHz a biconalog antenna placed 3m away from the unit was used. Measurements were conducted with the loop antenna at coaxial (parallel) and planar (perpendicular) orientations. The Spectrum analyzer RBW was set to 10 kHz and VBW was set to 30 kHz. A peak detector was used below 30 MHz and a Quasi-peak detector was used for measurements for above 30 MHz. The measurements made at 1m with the loop antenna were then extrapolated to 30m using the following correction factor.

$$40\log(1/30) = -59.1 \text{ dB}$$

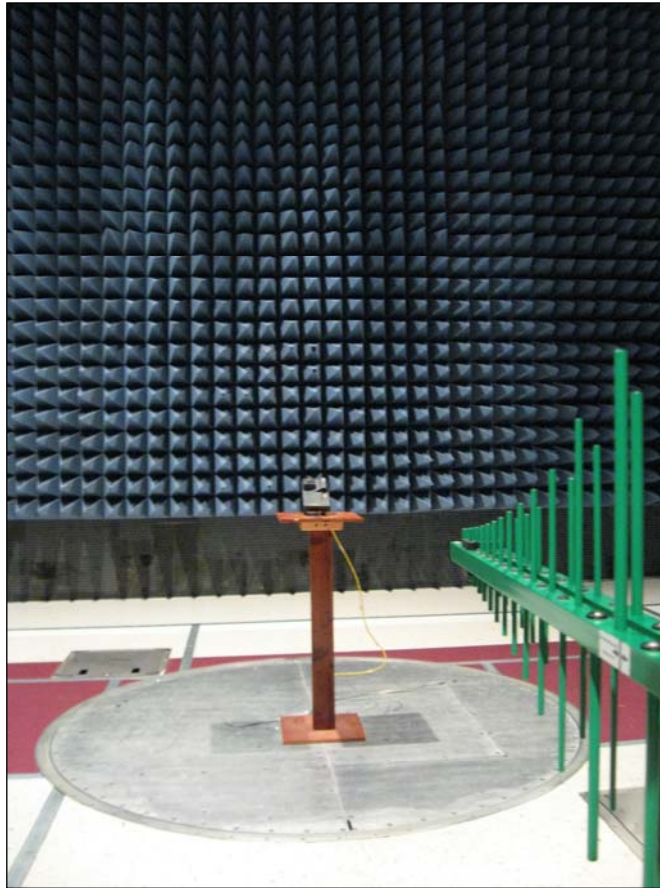
Test Results: The EUT was found compliant with Part 15.225 (d) requirements of this section.

Freq.	Raw Amp. @ 1 m (Peak)	Ant. Cor. Factor	Cable Loss	Dist. Cor. Factor	EUT Field Strength Final Amp. @ 1 m	EUT Field Strength Final Amp. @ 30 m	Limit @ 30 m	Delta
MHz	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
8.017	22.23	35.00	0.75	-59.10	57.98	-1.12	29.5	-30.62
1.23	21.87	35.00	0.75	-59.10	57.62	-1.48	29.5	-30.98
14.616	18.14	35.00	0.75	-59.10	53.89	-5.21	29.5	-34.71

Table 11. Spurious Emissions Limits, Test Results, 13.110 – 14.010 MHz, Loop < 30MHz

Freq.	Raw Amp. @ 3 m (QP)	Ant. Cor. Factor	Cable Loss	Dist. Cor. Factor	EUT Field Strength Final Amp. @ 3 m	Limit @ 3 m	Delta
MHz	(dBuV/m)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
53.55	27.85	7.10	0.91	-10.46	25.40	40	-14.6
66.48	26.12	5.85	0.98	-10.46	22.49	40	-17.51
41.63	25.72	11.22	0.86	-10.46	27.34	40	-12.66
104.77	25.44	13.07	1.38	-10.46	29.43	43.5	-14.07

Table 12. Spurious Emissions Limits, Test Results, 13.110 – 14.010 MHz, Bilog > 30 MHz



Photograph 3. Measurements above 30 MHz



Photograph 4. Measurements below 30 MHz



Photograph 5. Measurements below 30 MHz

Test Engineer(s): Anderson Soungpanya

Test Date(s): 05/15/2008



3.7 Frequency Stability

Test Requirement(s): 15.225(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure: Measurements are in accordance with Part 2.1055. The EUT was placed in the Environmental Chamber and allowed to reach desired temperature. A spectrum analyzer was used to measure the frequency drift. The EUT was set to transmit in the operating frequency range. Frequency drift was investigated for every 10°C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -20° to 50°C.

Test Results: The EUT was found compliant with Part 15.225 (e) requirement(s) of this section.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 05/15/2008



Frequency Stability – Section 15.225 (e) Test Results

Temp	Measured Freq (MHz)	Diviation (MHz)	Limit (MHz)
50	13.560857	0.000036	0.01356
40	13.560872	0.000021	0.01356
30	13.560894	-0.000001	0.01356
20	13.560893	Reference	
10	13.560982	-0.000089	0.01356
0	13.560974	-0.000081	0.01356
-10	13.561038	-0.000145	0.01356
-20	13.561018	-0.000125	0.01356
Voltage			
102	13.560867	0.000026	0.01356
138	13.560869	0.000024	0.01356

Table 13. Frequency Stability Test Results



Frequency Stability Test Setup



Photograph 6. Frequency Stability Test Setup



4. Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

Test Name: 20 dB Bandwidth			Test Date(s): 05/15/2008		
MET Asset #	Nomenclature	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2460	SPECTRUM ANALYZER	AGILENT	E4407B	3/24/08	3/24/09
1S2482	5M CHAMBER	PANASHIELD	NA	11/18/07	11/18/08
1S2404	LOOP ANTENNA	EMCO	MODEL 6512	7/22/07	7/22/08
Test Name: Spurious Radiated Emissions			Test Date(s): 05/15/2008		
MET Asset #	Nomenclature	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2482	5M CHAMBER	PANASHIELD	NA	11/18/07	11/18/08
1S2404	LOOP ANTENNA	EMCO	MODEL 6512	7/22/07	7/22/08
1S2501	EMI RECIEVER	RHODE & SHWARZ	ESU40	4/8/08	4/8/09
1S2485	BICONILOG ANTENNA	TESEQ	CBL 6112D	1/21/08	1/21/09
Test Name: Frequency Stability			Test Date(s): 05/15/2008		
1S2229	TEMPERATURE CHAMBER	TENNY ENGINEERING	T630	1/31/08	1/31/09
1S2460	SPECTRUM ANALYZER	AGILENT	E4407B	3/24/08	3/24/09
1S2066	VARIABLE TRANSFORMER	STACO	3PN2210	SEE NOTE	

Note: Functionally verified test equipment is verified using calibrated instrumentation at the time of testing.



5.0. Compliance Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) *The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.*
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.



§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
 - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
 - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.



- (e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:
- (i) *Compliance testing;*
 - (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or
 - (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.
- (e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.
- (f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a provision that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.



The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.¹ *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.*
- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.948 Description of measurement facilities.

- (a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.
 - (1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.
 - (i) *If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*
 - (ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

¹ In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart C (of Part 15), which deals with unintentional radiators.



- (2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

§ 2.955 Retention of records.

- (a) For each equipment subject to verification, the responsible party, as shown in §2.909 shall maintain the records listed as follows:
 - (1) A record of the original design drawings and specifications and all changes that have been made that may affect compliance with the requirements of §2.953.
 - (2) A record of the procedures used for production inspection and testing (if tests were performed) to insure the conformance required by §2.953. (Statistical production line Emission testing is not required.)
- (b) The records listed in paragraph (a) of this section shall be retained for two years after the manufacture of said equipment item has been permanently discontinued, or until the conclusion of an investigation or a proceeding if the manufacturer or importer is officially notified that an investigation or any other administrative proceeding involving his equipment has been instituted.

§ 2.956 FCC inspection and submission of equipment for testing.

- (a) Each responsible party shall upon receipt of reasonable request:
 - (1) Submit to the Commission the records required by §2.955.
 - (2) Submit one or more sample units for measurements at the Commission's Laboratory.
 - (i) Shipping costs to the Commission's Laboratory and return shall be borne by the responsible party.
 - (ii) In the event the responsible party believes that shipment of the sample to the Commission's Laboratory is impractical because of the size or weight of the equipment, or the power requirement or for any other reason, the responsible party may submit a written explanation why such shipment is impractical and should not be required.



6.0. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) *In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

- (3) All other devices shall bear the following statement in a conspicuous location on the device:

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.

- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional radiator 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.



The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart C — Unintentional Radiators:

§ 15.105 Information to the user.

- (a) For a Class A digital device or peripheral, the instructions furnished 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 A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

- (b) For a Class B digital device or peripheral, the instructions furnished 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 power line and ground at the power terminal. The lower limit applies at the band edges.



End of Report