

Test Report

FCC Part 15 and IC RSS 210 Certification

ACS Report Number: 05-0234-15C

Manufacturer: Radiant Systems

Equipment Type: Point-of-Sale Terminal with 802.11b/g WLAN and 13.6
MHz RFID Reader

Model: P1220-XXXX POS Terminal with RFID Reader

Model Variants: Counter Top Configuration

Wall Mount Configuration

FCC ID: TFPOA00342

IC ID: 5955A-OA00342

Test Begin Date: June 15, 2005

Test End Date: June 30, 2005

Report Issue Date: July 5, 2005



FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

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This report contains 28 pages

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Additional Exhibits Included In Filing

Covering Letter	Request for Confidentiality
Internal Photographs	External Photographs
Test Setup Photographs	Product Labeling
BOM	Installation/Users Guide
Theory of Operation	System Block Diagram
Schematics	Data Plots

1.0 GENERAL

1.1 Introduction

The purpose of this report is to demonstrate compliance with Part 15.209 of the FCC's Code of Federal Regulations.

1.2 Product Description

The Radiant P1220-XXXX Point-of-Sale is the newest member in the Radiant Systems family of open retail platforms. This NEW 12" LCD form factor offers multiple mounting options included tilt stand, wall, and wedge mount. The terminal utilizes Intel's **Celeron M Ultra Low Voltage processor** and 852 chipset for low power and high performance.

Open Platform Highlights

- o Standard Intel Architecture
- o Industry standard storage (hard drive or CF Card), DDR memory, mini-PCI slot, and USB/RS232 connectivity
- o Multiple operating systems including Windows XP or XP-Embedded
- o OPOS drivers available

The new countertop enclosure provides many benefits, including a small footprint and multiple mounting options. The unique **CableStrap™ System** provides for ease of installation, controlled access to connectors, concealed cable routing, and cable restraint for better reliability. This all-in-one solution provides very tight integration of core point-of-sale hardware including a touch screen, magnetic stripe reader, and much more.

This package includes a 12" active matrix, color, 800x600 main display with a resistive or capacitive touch screen. The **high-bright, dual-bulb** active matrix screen provides the best possible display quality, with excellent contrast and brightness. Additionally, the P1220-XXXX provides the very best in retail multimedia, including full motion video.

The **resistive touch screen** provides a very durable, accurate, and fast touch interface even with a gloved hand or stylus. Alternatively, the **capacitive touch screen** offers a highly durable, accurate, and fast touch interface for applications that do not require gloved or stylus input.

The P1220-XXXX also has **more powered serial ports** than most alternative 12" POS terminals including four RS232, four USB, 1 DVI-I, 2 PS/2, and two dedicated cash drawer ports. This provides greater flexibility to support both legacy and next generation peripherals. Also, the powered serial ports eliminate the need for power bricks, thereby reducing another point of potential failure.

The **retail hardened design** offers a spill resistant, high impact enclosure that is built to withstand tough in-store conditions with continuous operation. Eliminating the active CPU fan increases reliability by preventing forced air through the unit, thereby reducing contaminants in the system. In addition, the P1220-XXXX can be configured as a silent, thin client, fanless, solid-state terminal for maximum reliability.

The P1220-XXXX supports **multiple operating systems** including Windows XP Professional and XP Embedded. The P1220-XXXX provides full support for TCP/IP networking on a 10BaseT or 100 BaseT Ethernet network and it has full support for a wireless network (optional). Upgradeability and serviceability are fundamental to the P1220-XXXX and it offers easy access to the hard drive, motherboard, RAM, and expansion slots.

The CC in the model designates either a 600MHz or a 1.6GHz processor. The XXXX's designate the options available.

1.3 Manufacturer Information

The EUT is manufactured by Radiant Systems

Radiant Systems
3925 Brookside Parkway
Alpharetta, GA 30022

Contact: Gary Benjamin
Phone: (770) 576-6377

2.0 LOCATION OF TEST FACILITY

All testing was performed by qualified ACS personnel located at the following address:

ACS, Inc.
5015 B.U. Bowman Drive
Buford, GA 30518
(770) 831-8048
www.acstestlab.com

2.1 DESCRIPTION OF TEST FACILITY

The Open Area Test Site (OATS), Semi-Anechoic Chamber and Conducted Emissions sites have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

In addition, ACS holds accreditation to ISO 17025 for the test method contained in this test report among others.

The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 89450
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Chamber Registration Number R-2019
- VCCI Conducted Emissions Site Registration Number: C-1608
- NVLAP Lab Code: 200612

2.1.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.1.1-1 below:

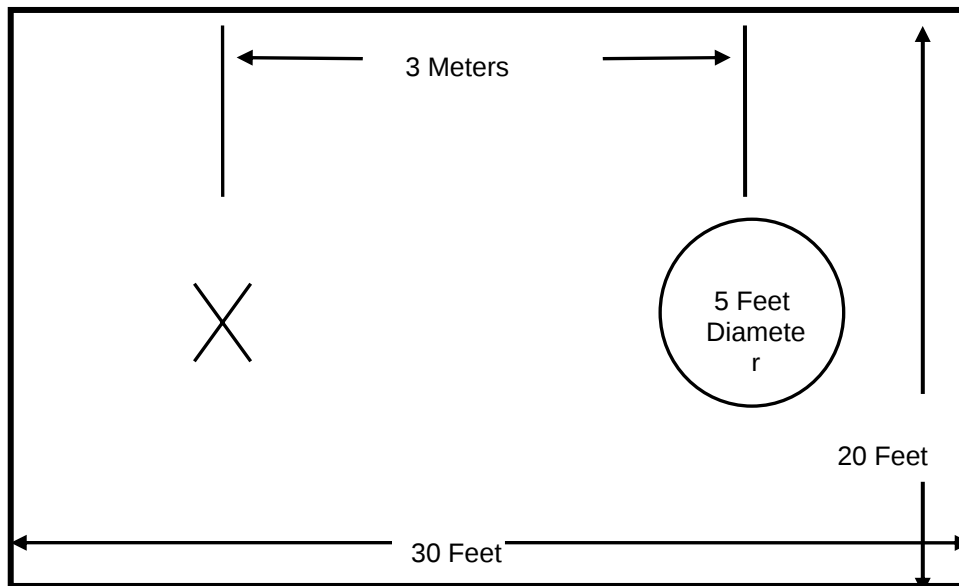


Figure 2.1.1-1: Semi-Anechoic Chamber Test Site

2.1.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.1.2-1 below:

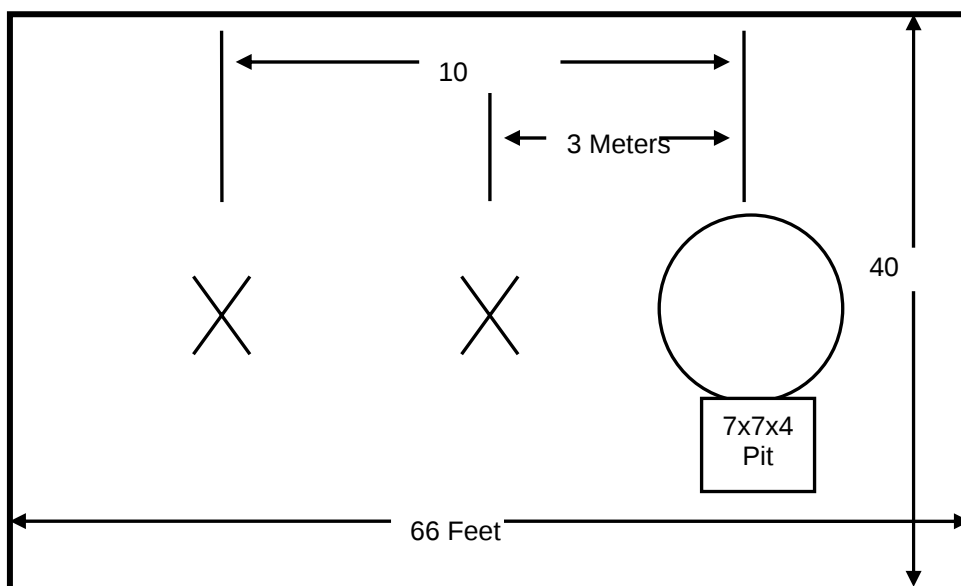


Figure 2.1.2-1: Open Area Test Site

2.1.3 Conducted Emissions Test Site Description

The AC mains conducted EMI site is a shielded room with the following dimensions:

- Height: 3.0 Meters
- Width: 3.6 Meters
- Length: 4.9 Meters

The room is manufactured by Rayproof Corporation and installed by Panashield, Inc. Earth ground is provided to the room via an 8' copper ground rod. Each panel of the room is connected electrically at intervals of 4".

Power to the room is filtered to prevent ambient noise from coupling to the EUT and measurement equipment. Filters are models 1B42-60P manufactured by Rayproof Corporation.

The room is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 2.1.3-1:

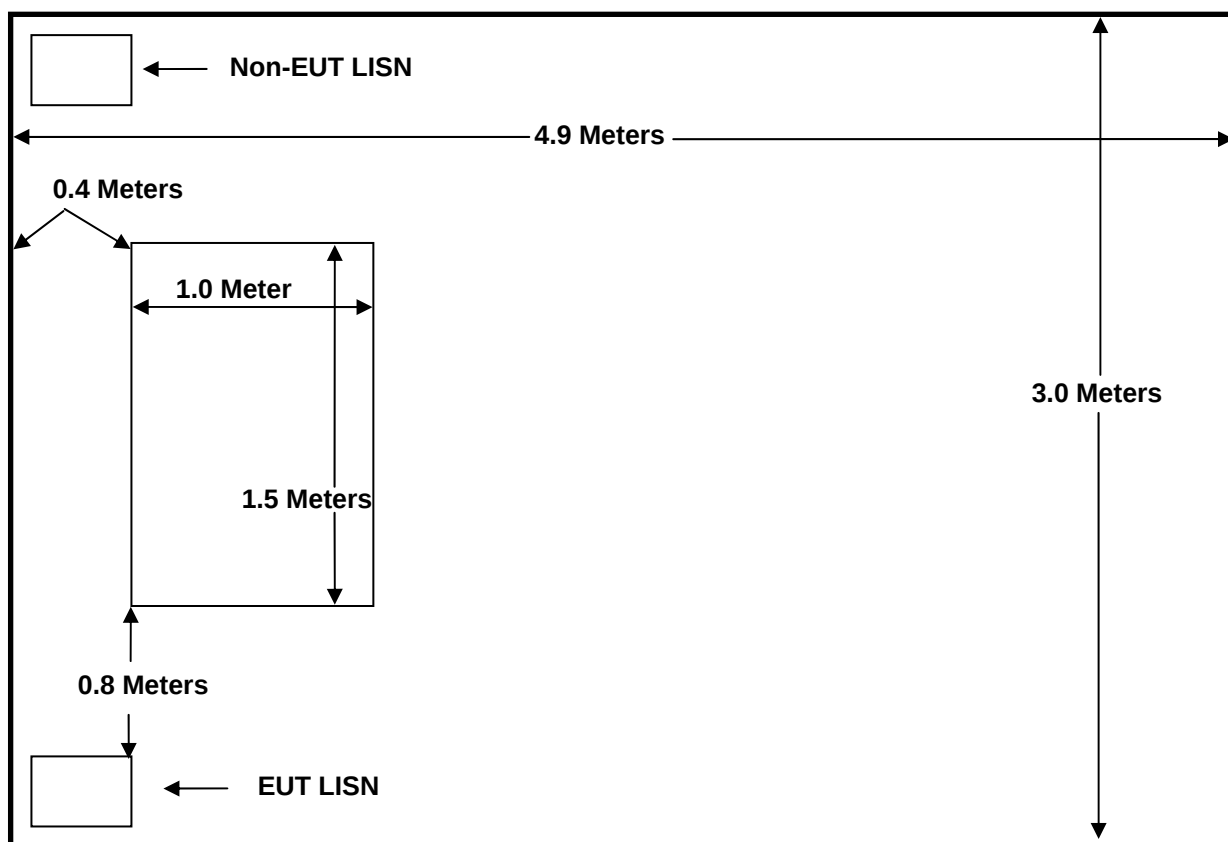


Figure 2.1.3-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARDS AND REFERENCE

1. ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the 9 KHz to 40GHz
2. US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart B: Radio Frequency Devices, Unintentional Radiators (October 2004)
3. US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators (October 2004)
4. FCC OET Bulletin 65 Appendix C - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4.0-1: Test Equipment

Equipment Calibration Information					
ACS#	Mfg.	Eq. type	Model	S/N	Cal. Due
☒ 26	Chase	Bi-Log Antenna	CBL6111	1044	10/15/05
☒ 78	EMCO	Loop Antenna	6502	9104-2608	1/12/2006
☒ 152	EMCO	LISN	3825/2	9111-1905	01/18/06
☒ 153	EMCO	LISN	3825/2	9411-2268	12/20/05
☒ 193	ACS	OATS Cable Set	RG8	193	01/07/06
☒ 165	ACS	Conducted EMI Cable Set	RG8	165	01/06/06
☒ 22	Agilent	Pre-Amplifier	8449B	3008A00526	05/06/06
☒ 73	Agilent	Pre-Amplifier	8447D	272A05624	05/18/06
☒ 30	Spectrum Technologies	Horn Antenna	DRH-0118	970102	05/09/06
☒ 1	Rohde & Schwarz	Receiver Display	804.8932.52	833771/007	03/07/06
☒ 2	Rohde & Schwarz	ESMI Receiver	1032.5640.53	839587/003	03/07/06
☒ 3	Rohde & Schwarz	Receiver Display	804.8932.52	839379/011	12/15/05
☒ 4	Rohde & Schwarz	ESMI Receiver	1032.5640.53	833827/003	12/15/05
☒ ---	Agilent	Spectrum Analyzer	E7402A	US41110277	11/10/05
☒ 213	Test Equipment Corp.	Pre-Amplifier	PA-102	44927	06/28/06
☒ 211	Eagle	Band Reject Filter	C7RFM3NFNM	n/a	01/06/06
☒ 168	Hewlett Packard	Pulse Limiter	11947A	3107A02268	01/06/06
☒ 93	Chase	EM Clamp	CIC 8101	65	01/06/06
☒ 6	Harbour Industries	HF RF Cable	LL-335	00006	03/16/06
☒ 7	Harbour Industries	HF RF Cable	LL-335	00007	03/16/06
☒ 208	Harbour Industries	HF RF Cable	LL142	00208	60/24/06
☒ 167	ACS	Chamber EMI Cable Set	RG6	167	12/29/05
☒ 204	ACS	Chamber EMI RF cable	RG8	204	01/07/06

5.0 SYSTEM BLOCK DIAGRAM

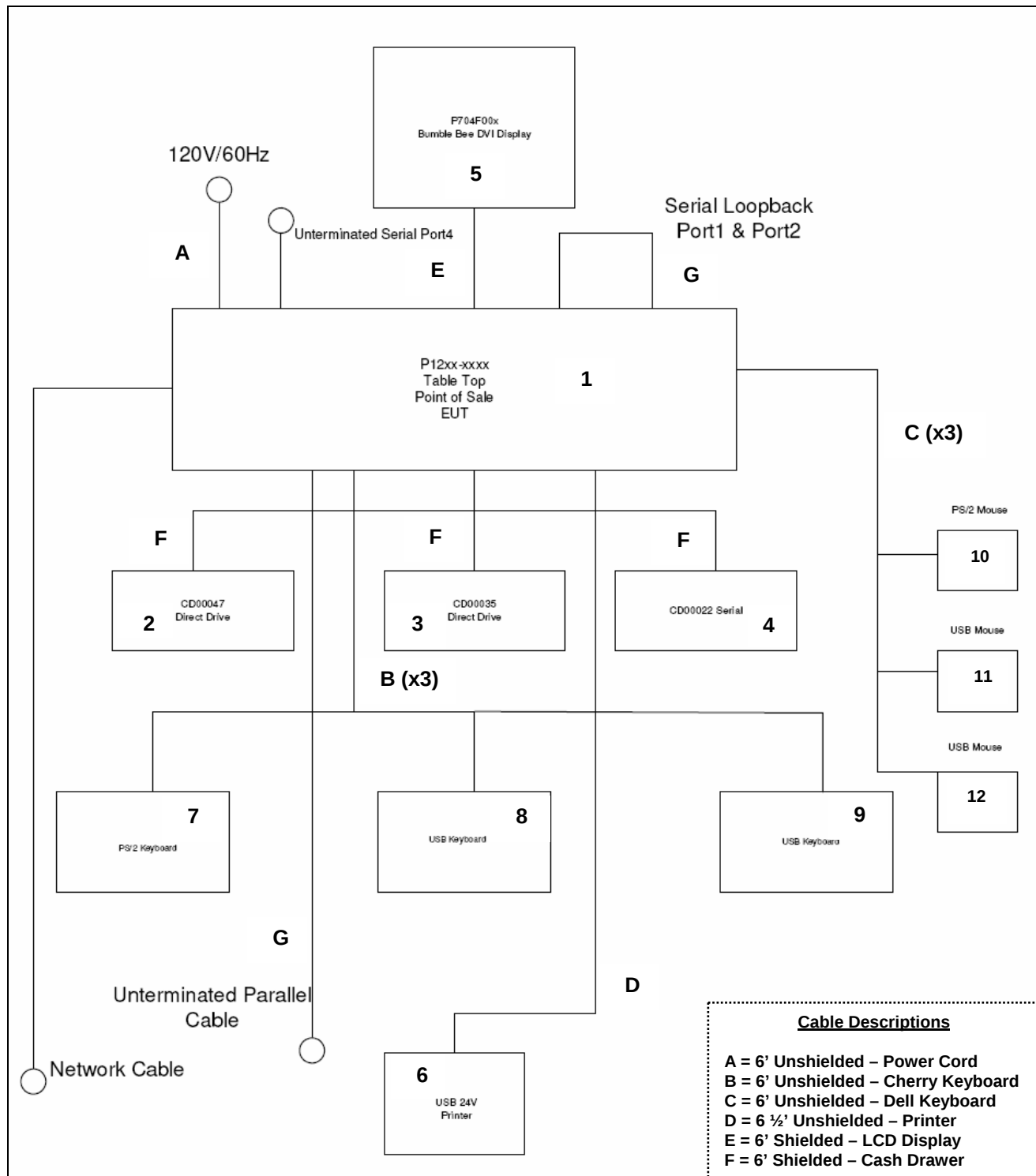


Figure 5.0-1: System Block Diagram

Table 5.0-1: Test Configuration Table

Diagram #	Description	Manufacturer	Model/Part #	Serial #
1	EUT Wall Mount or Counter Top	Radiant	P1220-XXXX	---
2	Cash Drawer	Radiant	CD0022	---
3	Cash Drawer	Radiant	CD0046	---
4	Cash Drawer	Radiant	CD0035	---
5	LCD	Radiant	---	---
6*	Receipt Printer	Epson	M129 C	D3V6138831
7	Keyboard	Dell	SK-1000REW	12710-7A6- 002762
8	Keyboard	Cherry	MY3000	00856
9	Keyboard	Cherry	MY3000	00600
10	Mouse	Belkin	F8E201-USB	301106390
11	Mouse	Logitech	M-S34	LZA80410332
12	Mouse	Logitech	M-UR69	LNB31025942

* ONLY AVAILABLE ON THE TABLE TOP VARIANT

6.0 TEST RESULTS

6.1 Test Requirement

6.1.1 Conducted Emissions (15.207)

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 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms 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 (MHz)	QP LIMITS (dBuV)	AV LIMITS (dBuV)
0.15 to 0.5	66.0 to 56.0*	56.0 to 46.0*
0.5 to 5.0	56.0	46.0
5.0 to 30.0	60.0	50.0

* Decreases Linearly with the Logarithm of the Frequency

6.1.2 Radiated Emissions – Intentional Radiators (15.225(d) & 15.209)

Emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

* At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

6.1.3 Radiated Emissions – Unintentional Radiators (15.109)

Corrected Reading = Analyzer Reading + Cable Loss + Antenna Factor – Preamp Gain
Margin (dB) = Applicable Limit – Corrected Reading

Class A equipment must meet the radiated and conducted limits as given in table 6.1.3-1 below:

Table 6.1.3-1 Emission Limits

Emission Type	Frequency Range (MHz)	Emission limits (dBuV/m)	
		Quasi-Peak	Average
Radiated Class A @ 10 meters	30.0 to 88.0	39.0	---
	88.0 to 216.0	43.5	---
	216.0 to 960.0	46.0	---
	Above 960.0	---	49.5

6.1.4 Frequency Stability (15.225(e))

The frequency tolerance of the carrier signal shall be maintained within +/- 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.

6.1.5 Emission Mask (15.225 (a), (b) and (c))

1. The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
2. 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.
3. 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.

6.2 Test Methodology

6.2.1 Conducted Emissions (15.207)

Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Corrected Reading – Applicable Limit

6.2.2 Radiated Emissions (15.225(a) & (b), 15.109 & 15.209)

Radiated emissions measurements were made over the frequency range of 9kHz to 8GHz. Quasi-Peak measurements are taken with the Spectrum Analyzer's Resolution Bandwidth set as follows:

Frequency (MHz)	RBW Setting	Measurement Detector
0.009 - 0.150	>100Hz	Quasi-Peak
0.150 – 30.0	9kHz	Quasi-Peak
30 – 960	120kHz	Quasi-Peak
>960	1MHz	Average

The EUT was caused to generate a continuous carrier at 13.5MHz for the intentional radiation measurements.

6.3 Test Justification

The EUT is offered with 2 CPU options, as well as other options. The EUT was configured to what is considered to be worst case in which every conceivable option was installed. Some options are only available on either the Wall Mount or the Table Top configuration. In those cases, radiated pre-scans were performed to determine which configuration was worst case. The radiated data given in section 6.4.3 is representative of both configurations and all options.

Tested units were:

Model: P1220-0010 with RFID Module Installed

Model: P1220-0005 with Biometric Reader and Parallel Cable Installed

See Appendix to this report for model matrix.

Different power supplies exist for each configuration, therefore it was necessary to perform conducted emissions on both configurations. Data for both is given in section 6.4.1.

The 802.11b/g radio is a pre-approved module using an antenna approved for use with it. The scope of this report does not include this module.

Intentional radiator measurements were made at a distance of 3 meters. The results were corrected using the square of an inverse linear distance extrapolation factor of 40 dB/decade per 15.31 (f)(2).

Lastly, the equipment operation voltage range is +/- 10%. The unit would not function above or below this threshold. Frequency stability at 20°C was performed at the equipment tolerances instead of the +/- 15% requirement as given in section 15.225(e).

6.4 Test Data

6.4.1 Conducted Emissions

DATE: June 20, 2005
MANUFACTURER: Radiant Systems
EUT: P1220-XXXX (Table-Top Configuration)
EUT VOLTAGE: 230VAC/50 Hz 120 VAC/60 Hz ✓ 12 VDC OTHER:
TYPE OF TEST: ✓ FCC CLASS A FCC CLASS B

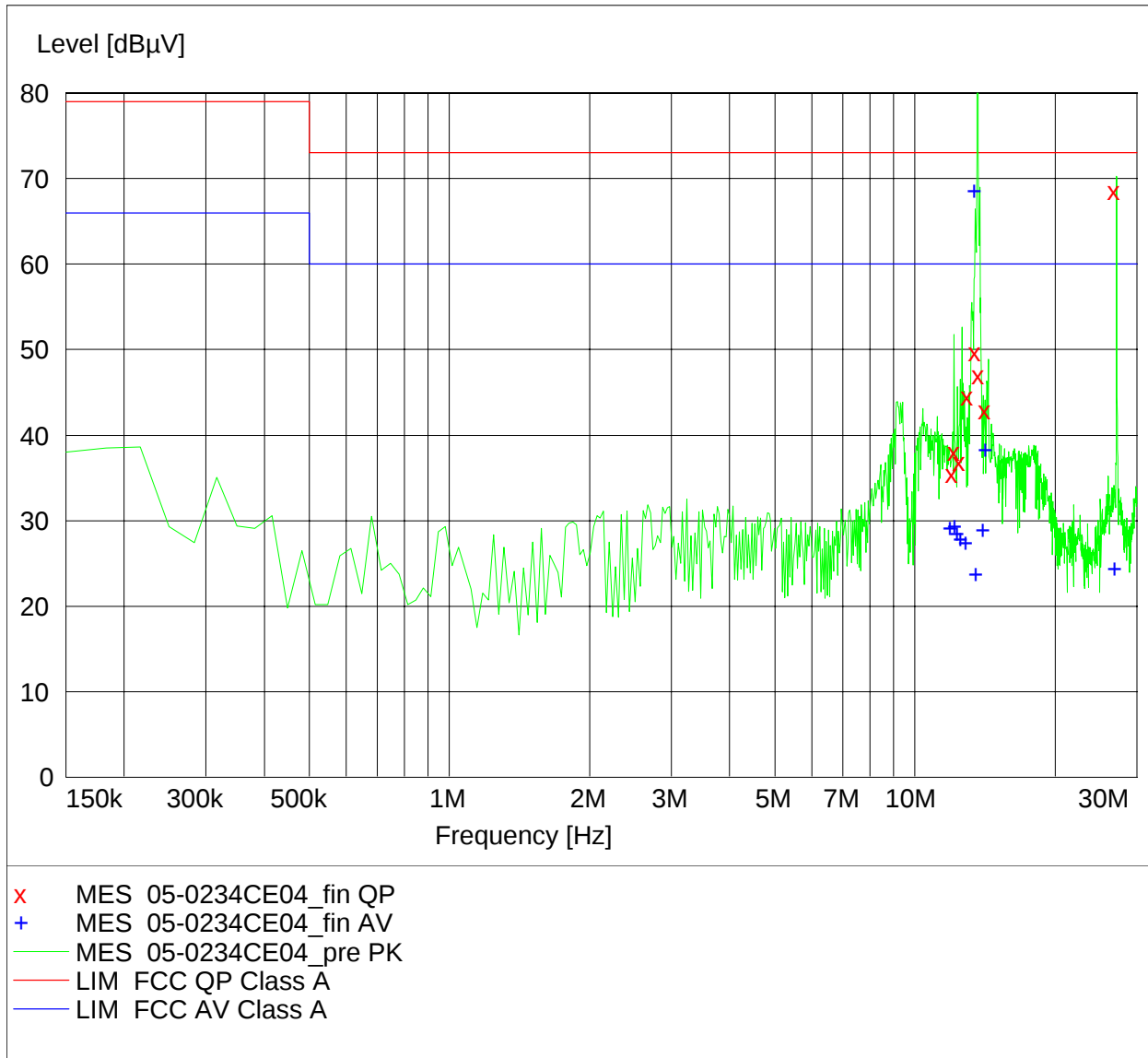


Figure Table 6.4.1-1: Conducted Emissions – Line 1

TABLE 6.4.1-1: CONDUCTED EMISSIONS LINE 1 –Quasi-Peak

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
12.174	35.5	10.2	73	37.4	L1	GND
12.312	38.1	10.2	73	34.8	L1	GND
12.63	36.9	10.2	73	36	L1	GND
13.152	44.5	10.2	73	28.4	L1	GND
13.56*	92.8	10.2	73	-19.8	L1	GND
13.65	49.7	10.2	73	23.2	L1	GND
13.884	47.1	10.2	73	25.8	L1	GND
14.322	43	10.2	73	29.9	L1	GND
27.12	68.6	10.3	73	4.3	L1	GND

* Transmitter fundamental

TABLE 6.4.1-2: CONDUCTED EMISSIONS LINE 1 –Average

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
12.042	29.2	10.2	60	30.7	L1	GND
12.312	29.3	10.2	60	30.6	L1	GND
12.45	28.5	10.2	60	31.4	L1	GND
12.654	27.9	10.2	60	32.1	L1	GND
12.996	27.4	10.2	60	32.5	L1	GND
13.56*	68.6	10.2	60	-8.6	L1	GND
13.692	23.8	10.2	60	36.1	L1	GND
14.148	28.9	10.2	60	31	L1	GND
14.322	38.3	10.2	60	21.6	L1	GND

* Transmitter fundamental

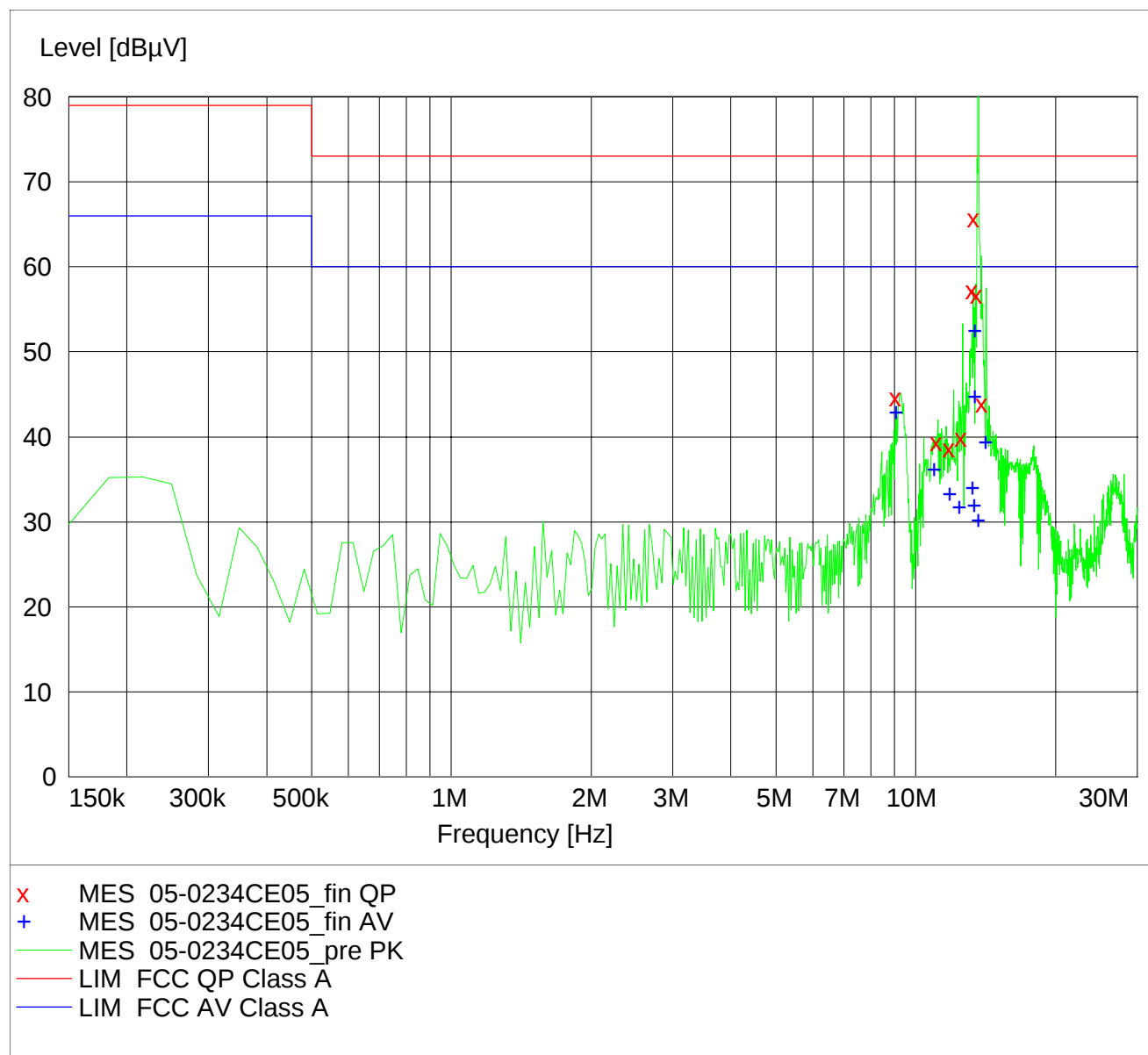


Figure Table 6.4.1-2: Conducted Emissions – Line 2

TABLE 6.4.1-3: CONDUCTED EMISSIONS LINE 2–Quasi-Peak

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
9.186	44.6	10.1	73	28.3	L2	GND
11.226	39.4	10.1	73	33.6	L2	GND
11.976	38.6	10.2	73	34.3	L2	GND
12.714	39.9	10.2	73	33	L2	GND
13.416	57.3	10.2	73	15.6	L2	GND
13.512	65.7	10.2	73	7.2	L2	GND
13.56*	93.5	10.2	73	-20.5	L2	GND
13.71	56.7	10.2	73	16.2	L2	GND
14.052	43.9	10.2	73	29	L2	GND
9.186	44.6	10.1	73	28.3	L2	GND

* Transmitter fundamental

TABLE 6.4.1-4: CONDUCTED EMISSIONS LINE 2 –Average

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
9.186	42.9	10.1	60	17.1	L2	GND
11.076	36.2	10.1	60	23.7	L2	GND
11.976	33.3	10.2	60	26.6	L2	GND
12.558	31.7	10.2	60	28.2	L2	GND
13.404	34	10.2	60	25.9	L2	GND
13.512	32	10.2	60	27.9	L2	GND
13.548	44.7	10.2	60	15.2	L2	GND
13.566*	52.5	10.2	60	7.4	L2	GND
13.776	30.2	10.2	60	29.7	L2	GND
14.316	39.4	10.2	60	20.5	L2	GND

* Transmitter fundamental

DATE: June 20, 2005
MANUFACTURER: Radiant Systems
EUT: P1220-XXXX (Wall-Mount Configuration)
EUT VOLTAGE: 230VAC/50 Hz 120 VAC/60 Hz ✓ 12 VDC OTHER:

TYPE OF TEST: ✓ FCC CLASS A FCC CLASS B

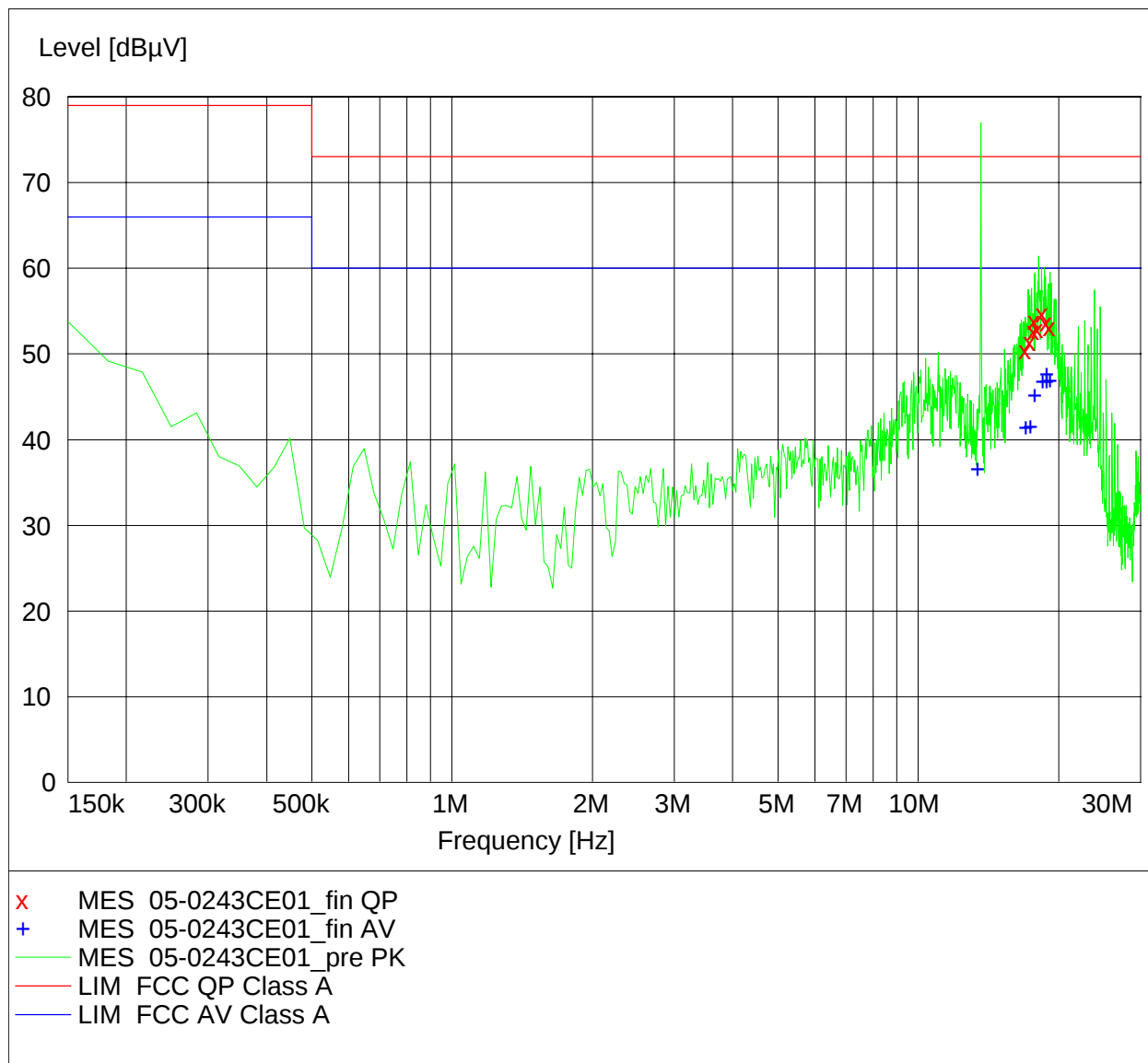


Figure Table 6.4.1-3: Conducted Emissions – Line 1

TABLE 6.4.1-5: CONDUCTED EMISSIONS LINE 1 –Quasi-Peak

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
13.56*	80.6	10.2	73	-7.6	L1	FLO
17.232	50.4	10.2	73	22.5	L1	FLO
17.598	51.4	10.2	73	21.5	L1	FLO
17.91	52.7	10.2	73	20.3	L1	FLO
17.964	53.9	10.2	73	19.1	L1	FLO
18.306	52.9	10.2	73	20	L1	FLO
18.696	54.7	10.2	73	18.2	L1	FLO
19.062	53.7	10.2	73	19.2	L1	FLO
19.434	53.2	10.2	73	19.7	L1	FLO

* Transmitter fundamental

TABLE 6.4.1-6: CONDUCTED EMISSIONS LINE 1 –Average

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
13.566*	36.6	10.2	60	23.3	L1	FLO
17.232	41.4	10.2	60	18.6	L1	FLO
17.598	41.5	10.2	60	18.4	L1	FLO
17.964	45.2	10.2	60	14.7	L1	FLO
18.696	46.8	10.2	60	13.1	L1	FLO
19.062	47.7	10.2	60	12.2	L1	FLO
19.068	46.8	10.2	60	13.1	L1	FLO
19.428	46.9	10.2	60	13	L1	FLO

* Transmitter fundamental

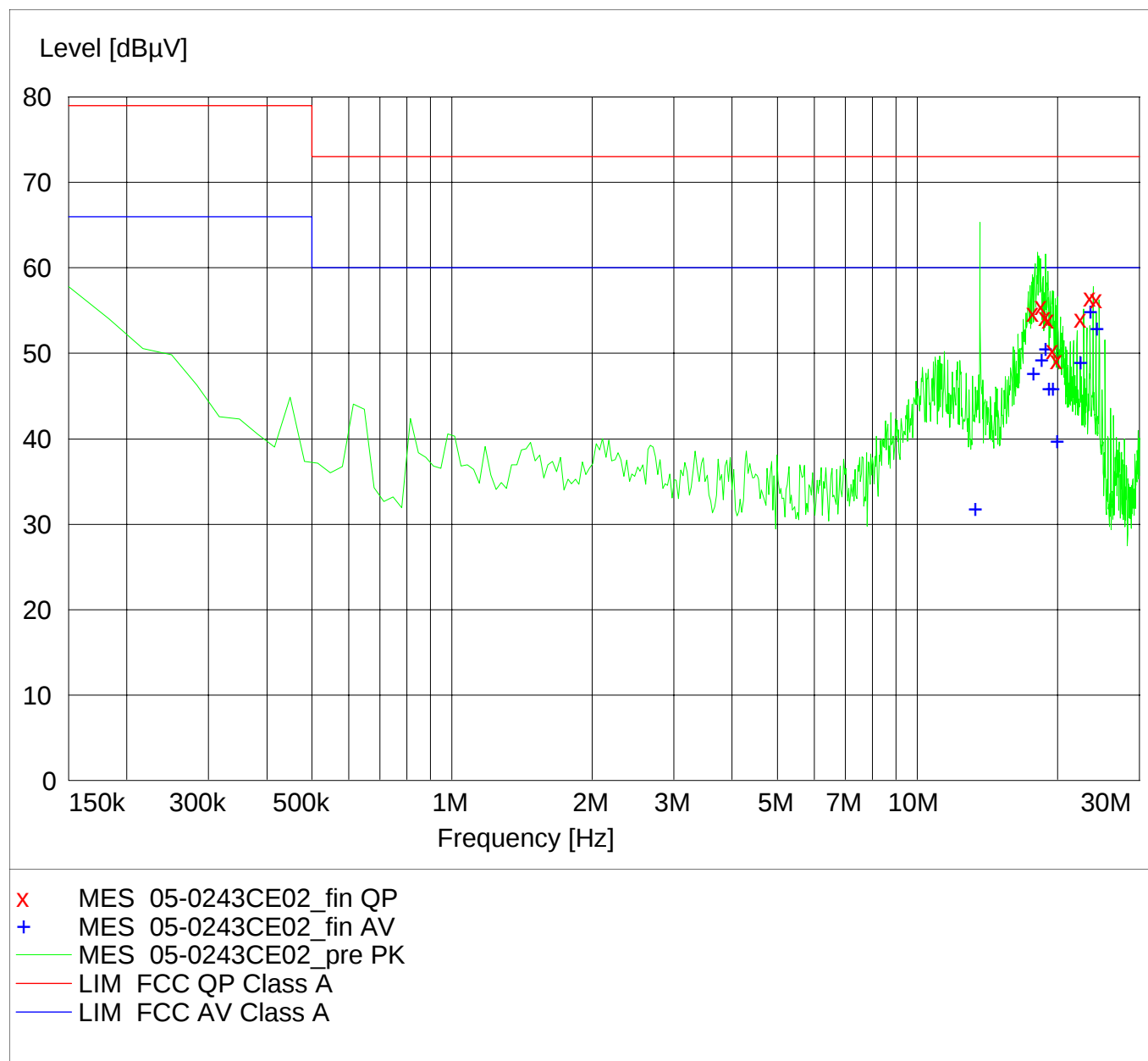


Figure Table 6.4.1-4: Conducted Emissions – Line 2

TABLE 6.4.1-7: CONDUCTED EMISSIONS LINE 2-Quasi-Peak

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
13.56*	80.8	10.2	73	-7.8	L2	FLO
17.97	54.8	10.2	73	18.1	L2	FLO
18.702	55.5	10.2	73	17.4	L2	FLO
19.068	54.3	10.2	73	18.6	L2	FLO
19.434	54	10.2	73	18.9	L2	FLO
19.8	50.4	10.2	73	22.5	L2	FLO
20.172	49.2	10.2	73	23.7	L2	FLO
22.734	54.1	10.2	73	18.8	L2	FLO
23.832	56.6	10.3	73	16.3	L2	FLO
24.57	56.4	10.4	73	16.5	L2	FLO

* Transmitter fundamental

TABLE 6.4.1-8: CONDUCTED EMISSIONS LINE 2 -Average

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
13.482	31.8	10.2	60	28.1	L2	FLO
17.964	47.6	10.2	60	12.3	L2	FLO
18.702	49.2	10.2	60	10.7	L2	FLO
19.068	50.5	10.2	60	9.4	L2	FLO
19.428	45.9	10.2	60	14	L2	FLO
19.8	45.9	10.2	60	14	L2	FLO
20.172	39.7	10.2	60	20.2	L2	FLO
22.728	48.9	10.2	60	11	L2	FLO
23.832	54.9	10.3	60	5	L2	FLO
24.564	52.9	10.4	60	7	L2	FLO

* Transmitter fundamental

6.4.2 Intentional Radiated Spurious Emissions (15.225 (b) & 15.209)

Frequency	Level (dBuV)	Antenna	Antenna	Turntable	Correctio n	Corrected Level	Limit	Margin
(MHz)	pk	Polarity (H/V)	Height (cm)	Position (o)	Factors (dB)	(dBuV/m) pk	(dBuV/m) Qpk	(dB) Qpk
						Fundamental Frequency		
13.56	102.99	-----	1	138	-56.70	46.29	84	37.71
13.56	-----	-----			-----	-----	-----	-----
						Spurious Emissions		
27.12	55.34	-----	1	36	-58.20	-2.86	29.5	32.36
27.12	-----	-----			-----	-----	-----	-----
40.68	33.59	H	259	162	-11.88	21.71	40	18.29
40.68	47.61	V	100	300	-14.24	33.37	40	6.63
54.24	41.91	H	345	141	-18.41	23.50	40	16.50
54.24	52.45	V	100	159	-18.89	33.56	40	6.44
67.8	41.76	H	250	110	-19.68	22.08	40	17.92
67.8	41.83	V	100	179	-20.15	21.68	40	18.32
81.36	41.86	H	198	213	-17.98	23.88	40	16.12
81.36	41.38	V	100	230	-19.06	22.32	40	17.68
94.92	41.71	H	251	159	-15.84	25.87	43.5	17.63
94.92	41.35	V	100	247	-14.95	26.40	43.5	17.10
108.48	46.46	H	174	0	-14.19	32.27	43.5	11.23
108.48	51.26	V	100	300	-13.83	37.43	43.5	6.07
122.04	48.82	H	155	10	-13.46	35.36	43.5	8.14
122.04	54.25	V	100	321	-12.71	41.54	43.5	1.96
135.6	49.48	H	198	44	-13.41	36.07	43.5	7.43
135.6	51.56	V	100	255	-12.28	39.28	43.5	4.22

6.4.3 Unintentional Radiated Emissions (15.109)

Table 6.4.3-1: Unintentional Radiated Emissions – Table Top Unit

Frequency (MHz)	Uncorrected Reading (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (°)	Total Correction Factor (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)
191.2	49.99	h	360	50	-12.66	37.33	40	2.7
250	53.98	h	390	270	-8.63	45.35	46.5	1.2
250	51.28	h	230	270	-8.63	42.65	46.5	3.9
311.2	45.8	h	190	143	-6.78	39.02	46.5	7.5
409	44.01	h	190	206	-3.44	40.57	46.5	5.9
431.2	46.14	h	160	166	-3.09	43.05	46.5	3.4
489	44.38	h	260	357	-1.84	42.54	46.5	4.0
210	36.53	v	100	0	-10.97	25.56	40	14.4
351.2	48.63	v	100	0	-5.44	43.19	46.5	3.3
369	48.12	v	400	26	-4.37	43.75	46.5	2.8
700.2	25.88	v	100	212	2.61	28.49	46.5	18.0

Table 6.4.3-2: Unintentional Radiated Emissions – Wall Mount Unit

Frequency (MHz)	Uncorrected Reading (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (°)	Total Correction Factor (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)
36.46	36.67	v	100	0	-6.96	29.71	39	9.3
100.05	28.54	v	100	0	11.81	40.35	43.5	3.2
136.7	34.05	v	100	0	-11.70	22.35	43.5	21.1
150.71	51.02	h	250	457	-10.84	40.18	43.5	3.3
350.1	47.4	h	200	0	-5.90	41.50	46.5	5.0
382.43	33.75	v	100	0	-5.03	28.72	46.5	17.8
393.21	36.76	v	250	0	-3.85	32.91	46.5	13.6
399.67	42.92	v	275	0	-3.34	39.58	46.5	6.9
840.48	38.49	v	150	238	4.76	43.25	46.5	3.2
249.86	46.83	h	250	480	-8.82	38.01	46.5	8.5
249.86	51.84	h	300	0	-8.82	43.02	46.5	3.5

6.4.4 Frequency Stability (15.225(c) & 2.1055)

Table 6.4.4-1: Frequency Stability

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-20 C	13.560800	58.997	100%	5.00
-10 C	13.560600	44.248	100%	5.00
0 C	13.560500	36.873	100%	5.00
10 C	13.560200	14.749	100%	5.00
20 C	13.560500	36.873	100%	5.00
30 C	13.560400	29.499	100%	5.00
40 C	13.560500	36.873	100%	5.00
50 C	13.560600	44.248	100%	5.00
20 C	13.561000	73.746	90%*	4.25
20 C	13.560000	0.000	110%*	5.75

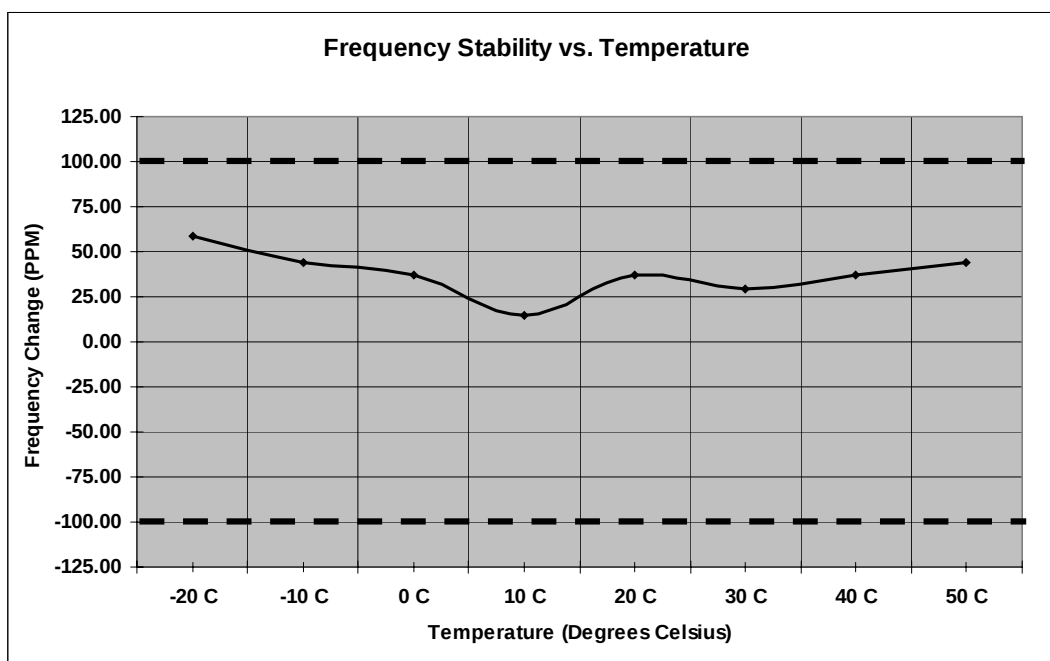
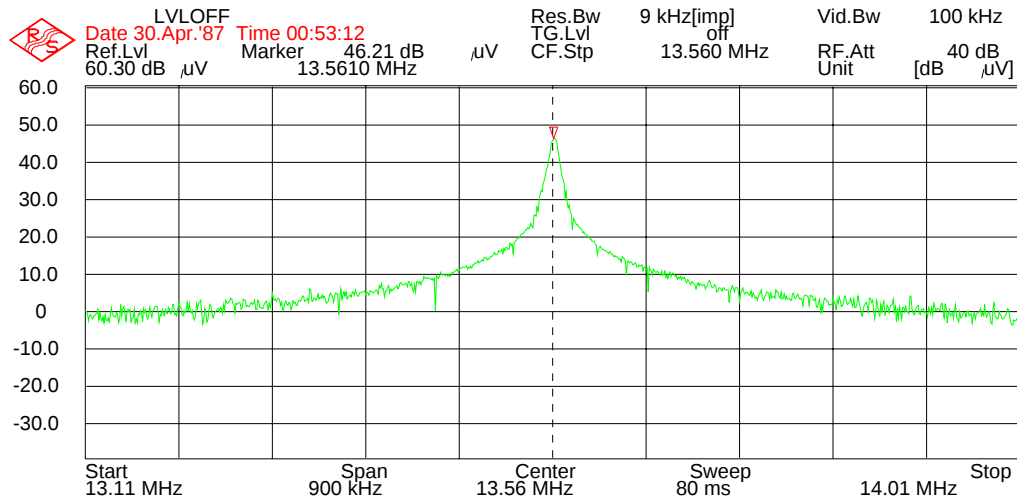


Figure 6.4.4-1: Frequency Stability Graph

* The equipment operation voltage range is +/- 10%. The unit would not function above or below this threshold. Frequency stability at 20°C was performed at the equipment tolerances instead of the +/- 15% requirement as given in section 15.225(e).

6.4.5 Emission Mask

The emission in the plot below has been corrected for all transducers in the system and includes the 40dB/decade range correction factor from 30 to 3 meters. The mask lines could not be placed on the plot since they are much higher than the reference level. Compliance with the emission mask requirement is clear.



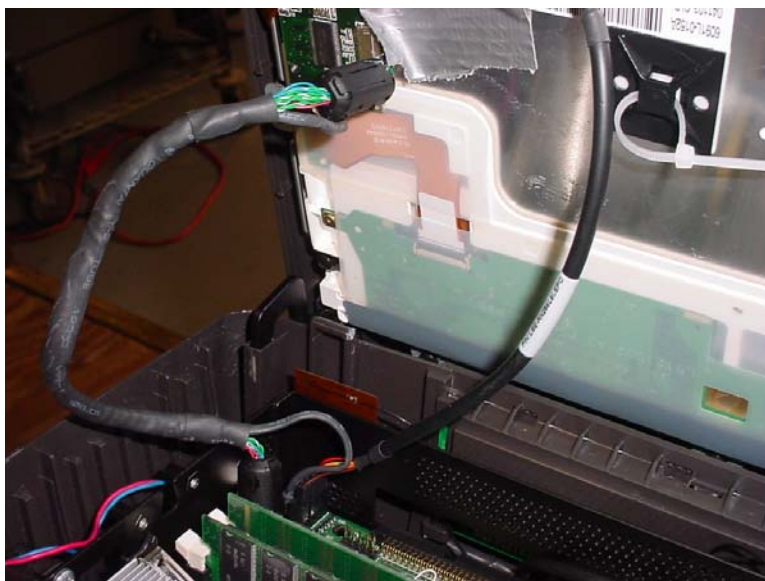
6.5 Modifications

1 - Ferrite clamped to DC Power cables on output of power supply as close as possible. Ferrite manufactured by Fair-Rite 0443164151



Figure 6.5-1: Modification #1

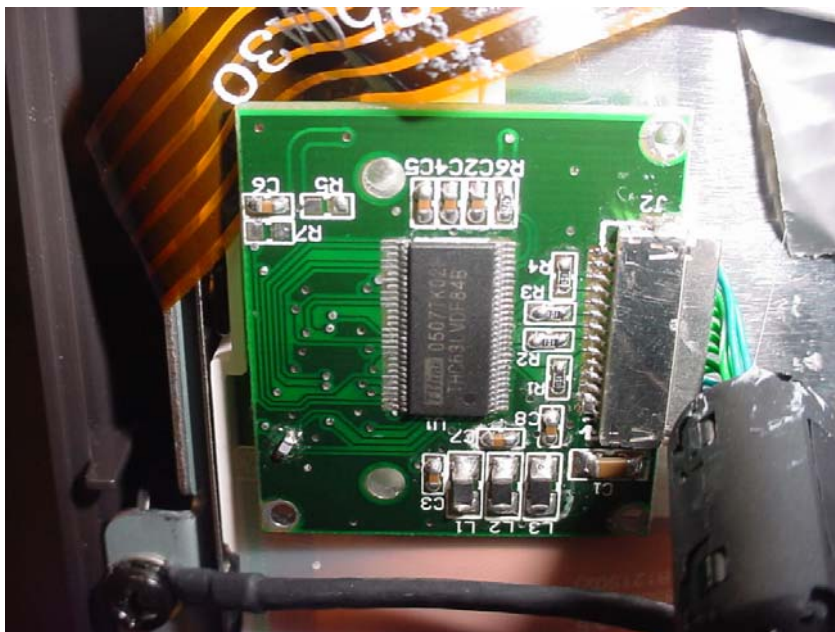
2 - Ferrite's attached to both ends of the LVDS (*low voltage differential signals) cable. This ferrite is a Steward 28A0350-0B2. When the EUT is assembled this cable will be forced to run outside the metal chassis, between the metal and plastic chassis parts.



3 - Data communication for Touch screen will be attached to the lid of the product (rear of LCD panel).



4 - A surface mount capacitor was added to the lower left corner, signal to ground decoupling 22pF.



7.0 CONCLUSION

In our opinion, the EUT as presented to ACS, defined in figure 5.0-1 in section 5.0 and as modified in section 6.5 of this report, meets the requirements of FCC CFR 47 Parts 15.109, 15.207 and 15.209 and Industry Canada's RSS 210.

Appendix: Model designation matrix

Model Number	Touch Type	Biometric Reader	Parallel Cable	MSR	VFD Display(Internal)	Powered USB (24V)	RFID Module/Antenna	Power Supply Type	RAM	DC to DC Converter	Wall Mount/Wedge or Table Top
P1220-0000	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0001	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0004	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Installed	Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0005	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Installed	Installed	12V Power Brick	256 MB	Installed	Wall Mount/Wedge
P1220-0006	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0007	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0008	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0009	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0010	Resistive	Installed	Installed	2-Track Installed	Installed	Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0012	Resistive	Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0013	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	12V Power Brick	256 MB	Installed	Wall Mount/Wedge
P1220-0014	Resistive	Not Installed	Installed	2-Track Installed	Installed	Not Installed	Not Installed	12V Power Brick	256 MB	Installed	Wall Mount/Wedge
P1220-0015	Resistive	Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	12V Power Brick	256 MB	Installed	Wall Mount/Wedge
P1220-0016	Resistive	Not Installed	Not Installed	2-Track Installed	Installed	Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top
P1220-0017	Resistive	Installed	Not Installed	2-Track Installed	Installed	Not Installed	Not Installed	ATX Supply	256 MB	Not Installed	Table Top

Ports	# of Ports
USB	4
Serial	4
DVI	1
Network	1
Direct Drive Port	2
PS/2	2
Powered USB	1
Parallel	1

All ports are used in one of the configurations listed above, as well as, future configurations.

Cashdrawer Model#	
CD00022	APG 18" US Radiant Serial
CD00026	APG 18" US Radiant USB
CD00023	APG 18" Int. Radiant Serial
CD00024	APG 16" US Radiant Serial
CD00027	APG 16" US Radiant USB
CD00035	APG 18" US Direct Drive
CD00036	APG 18" Int Direct Drive
CD00037	APG 16" US Direct Drive
CD00047	APG 16" 12V POS Direct Drive

CD000xx is representative of all the cashdrawers used during testing. The Cashdrawers have the same electronics, but the mechanicals are design to have either a US till or international till.

Tested units were:

P1220-0010 with RFID Module Installed

P1220-0005 with Biometric Reader and Parallel Cable Installed