

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 1 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

This drawing consists of pages issued or re-issued on dates shown in the following list. *Italic underlined words* indicate content changes or additions on revised pages.

PAGE

1 - 40

ISSUED

28 Sep 2004

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TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 2 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

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TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 3 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

TABLE OF CONTENTS

Page	Section	Description
1	0.0	Drawing; Client; Product; Standards
6	1.0	Engineering Considerations
	1.1	General Engineering Considerations
	1.1.1	23 April 2004 FCC Conformance Statement
7	1.2	Specific Engineering Considerations
	1.3	Product Description and Intended Use
9	1.4	Abbreviated List of Photographs
10	1.5	Equipment Used During Measurements
14	2.0	Mandatory Labeling, Manual Information, and Shipping Documents
	2.1	FCC Label
15		Label Illustration
16	2.2	Operators' Manual Information
17	2.3	FCC User Information
18	2.4	Industry Canada
19		Photographs
27		Oscillator Frequencies
28		EUT Orientation
29	3.0	Radiated Electromagnetic Interference - Test Configuration
32	4.0	Radiated EMI – Results
35	5.0	Conducted EMI -Test Configuration
35	6.0	Conducted EMI - Results
39		FCC Conducted Graphs
40		Last Page of Report
		Certificate of Conformance

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 4 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Pulver Laboratories Inc. (PLI) File Number: 5406

Pulver Laboratories Inc. (PLI) Project Number: C3334

Product Names: (1) Network Adapter (EUT)
(EUT = Equipment Under Test)

Model Numbers: (1) IPTV 7000

Serial Numbers: (1) None

Pulver Laboratories Sample ID: (1) 5406C3334-01

Applicant: Coaxsys, Inc.
718 University Avenue, Suite 202
Los Gatos, California 95032
Telephone: (408) 395-5556
Facsimile: (408) 395-2127
E-mail: info@coaxsys.com

Location Certified: Coaxsys, Inc.
718 University Avenue, Suite 202
Los Gatos, California 95032
Telephone: (408) 395-5556
Facsimile: (408) 395-2127
E-mail: info@coaxsys.com

Manufacturing Location: Coaxsys, Inc.
718 University Avenue, Suite 202
Los Gatos, California 95032
Telephone: (408) 395-5556
Facsimile: (408) 395-2127
E-mail: info@coaxsys.com

Pulver Laboratories Inc. (PLI) Control Number: 5406X

Equipment Category

- Information Technology Equipment including Electrical Business Equipment

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 5 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Evaluated to the Following Standards

PLI Certification.

Certified by Pulver Laboratories Inc. to comply with the following standards.

FCC Verification Certification.

Federal Communications Commission (FCC, USA)

Category Classification: Class B - Residential
FCC ID number - SIU5406X
Issued 05 October 2004

- American National Standards Institute C63.4-2001 entitled Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- Federal Communications Commission Rules and Regulations located in the Code of Federal Regulations, Title 47, Part 1.1307(b); Part 2.1091; Part 2 entitled Frequency Allocations and Radio Treaty Matters; General Rules and Regulations; Part 15 entitled Radio Frequency Devices, 23 April 2004 Edition; Part 18 entitled Industrial, Scientific, and Medical Equipment, 01 October 2001.

ICAN Verification.

Industry Canada (ICAN)

Category Classification: Class B - Residential

- Canadian Standards Association (CSA) C108.8-M1983 (R2000) entitled Electromagnetic Emissions for Data Processing Equipment and Electronic Office Machines.
- Canadian Standards Association (CSA) CAN3-C108.3.1-M84 (R2000) entitled Limits and Measurement Methods of Electromagnetic Noise from AC Power Systems.
- Industry Canada. Interference-Causing Equipment Standard: ICES-003, Issue 3, 22 Nov 97, entitled "Interference-Causing Equipment Standard for Digital Apparatus".
- Industry Canada (ICAN) Radio Interference Regulation amendment dated 15 September 1988 (Radio Act Registration SOR/88-475); 3862 01 Data Processing Equipment.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 6 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

1.0 Engineering Considerations

1.1 General Engineering Considerations

1.1.1 This report deals with conformance to the:

- Code of Federal Regulations, 47 CFR, Part 2 and Part 15, issued 23 April 2004;
- American National Standards Institute standard number C63.4-2001 entitled Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz;

1.1.2 To assist the Federal Communications Commission in the continuing education of applicants and grantees, Pulver Laboratories has advised Coaxsys, Inc. to review a copy of the Rules and Regulations located in the Code of Federal Regulations, Title 47, Part 2 entitled Frequency Allocations and Radio Treaty Matters; General Rules and Regulations; and Part 15 entitled Radio Frequency Devices, issued 23 April 2004.

1.1.3 The manufacturer has a contractual obligation to Pulver Laboratories to incorporate into production all modifications photographed and outlined in this report with associated documentation.

1.1.4 The Pulver Laboratories Certificate of Conformance issued with this report allows the manufacturer to ship and sell product using the Pulver Laboratories Product Certification Label. This label can only be used if the manufacturer allows Pulver Laboratories to conduct a Follow Up Service at the manufacturing facilities and conduct an Electromagnetic Interference test of the finished product every six months.

1.1.5 This report also deals with conformance to Radio Frequency Interference Suppression of High Frequency Equipment for Industrial, Scientific, and Medical (ISM) and similar purposes for Canada and the countries listed in the Pulver Laboratories Certificate of Conformance associated with this report.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 7 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

1.2 Specific Engineering Considerations

1.2.1 Climatic conditions:

Climatic Conditions	Limits	Readings
Ambient temperature	15°C to 35°C	21°C
Relative humidity	45% to 75%	52%
Atmospheric pressure	68 kPa (680 mbar) to 106 kPa (1060 mbar)	1008 mbar

1.2.2 Interconnecting low voltage cable lengths:

Cable Description	Length (feet)	Length (meters)	Shielded / Unshielded
EUT: power	6.00	1.83	Unshielded
EUT: CAT5	3.30	1.01	Shielded
EUT: Coaxial	50.00	15.24	Unshielded
Computer: power	6.00	1.83	Unshielded
Modem: serial data	3.30	1.01	Shielded
Modem: power	6.00	1.83	Unshielded
Modem: phone-in	12.00	3.66	Unshielded
Printer: parallel data	3.30	1.01	Shielded
Printer: power	6.00	1.83	Unshielded
Monitor: data	5.00	1.52	Shielded
Monitor: power	6.00	1.83	Unshielded
Keyboard: data	6.50	1.98	Unshielded
Mouse: data	6.50	1.98	Unshielded

1.2.3 Input / Output (I / O) Cables coiled and wrapped to maximum lengths of 30 to 40 cm, at least 40 cm from ground plane as recommended by ANSI 63.4-2001.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 8 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

- 1.2.4 Most severe cable orientation chosen when measuring unwanted radiated and conducted emissions.
- 1.2.5 The data in this report reflects the monitor connected directly to the AC mains.
- 1.2.6 To meet the agency criteria listed in this PLI Evaluation Report, the following modifications were made to the original design of the Equipment Under Test:
 - 1.2.6.1 A shielded CAT5 cable was substituted for a non-shielded cable between the EUT and the interconnected computer system.
 - 1.2.6.2 A 0.001uF capacitor was added to "C10" of the printed circuit assembly. Refer to PLI Photograph Number 5406C3334SJ-12.
 - 1.2.6.3 An RFI Controls Company *RFDisc*, part number 25425490 was added to "U3" of the printed circuit assembly. Refer to PLI Photograph Number 5406C3334SJ-13.
- 1.2.7 There is one possible Equipment Under Test (Network Adapter, IPTV 7000) input power configuration:
 - 1.2.7.1 One external wall adapter supplies the EUT with voltage.
- 1.2.8 There is one possible EUT test configuration:
 - 1.2.8.1 **Test Configuration #1:** Using a coaxial cable, the EUT is connected to an off site *Network Master* and hub with internet connection. Continuous video is streamed from the off-site hub and *Network Master* to the desktop computer through the EUT via a CAT5 cable connection.
- 1.2.9 This report includes measurement data to the 10th harmonic.

1.3 Product Description and Intended Use

1.3.1 Coaxsys Home Network Solution has everything you need to get your home connected. By delivering 100 Mbps Ethernet over your already existing coaxial cable you'll be distributing audio and video, playing online games with PCs and game consoles and much more without skipping a beat.

1.3.2 The electronics in the Network Master and Network Adapter are identical; only the designated function of the devices dictates whether the equipment will be used as a Network Master or Network Adapter.

1.4 List of Photographs Contained in this Report

FIGURE 1: PLI Photograph Number 5406C3334SJ-08 illustrates the front view of the Equipment Under Test with all peripherals attached during the "open field" Radio Frequency Interference / Electromagnetic Interference test program.

FIGURE 2: PLI Photograph Number 5406C3334SJ-09 illustrates the rear view of the Equipment Under Test with all peripherals attached during the "open field" Radio Frequency Interference / Electromagnetic Interference test program.

FIGURE 3: PLI Photograph Number 5406C3334SJ-10 illustrates the rear view of the Equipment Under Test with all peripherals attached during the Conducted Electromagnetic Interference test program.

FIGURE 4: PLI Photograph Number 5406C3334SJ-04 illustrates the top view of the EUT and associated power adapter.

FIGURE 5: PLI Photograph Number 5406C3334SJ-14 illustrates the top view of the EUT with the bottom cover removed showing the circuit side of the EUT printed circuit assembly, number PN-00057 Rev. 3. *[Short term confidentiality requested for this photo in FCC submission]*

FIGURE 6: PLI Photograph Number 5406C3334SJ-11 illustrates the component side of the EUT printed circuit assembly, number PN-00057 Rev. 3. *[Short term confidentiality requested for this photo in FCC submission]*

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 10 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

FIGURE 7: PLI Photograph Number 5406C3334SJ-12 illustrates a close up view of the added 0.001uF capacitor to C10. *[Short term confidentiality requested for this photo in FCC submission]*

FIGURE 8: PLI Photograph Number 5406C3334SJ-13 illustrates a close up view of the *RFDisc* placed on top of "U3". *[Short term confidentiality requested for this photo in FCC submission]*

- 1.5 Equipment used during measurements calibrated according to internationally acceptable laboratory procedures. Calibration data along with Certificates of conformance and traceability are on file at the testing facility. Each calibrated equipment item is individually labeled with date calibrated; due date for next calibration; initials of person who calibrated the equipment; and the name of the organization that performed the calibration service.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 11 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Laboratory Test Equipment					
Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Cycle
Spectrum Analyzer	Hewlett-Packard	8568A	2314A02738	11 May 2004	1 Year
Quasi-Peak Adapter	Hewlett-Packard	85650A	204300273	11 May 2004	1 Year
Amplifier	Hewlett-Packard	8447D Option 010	1937A03004	11 May 2004	1 Year
Spectrum Analyzer	Hewlett-Packard	8565A	PLI2200	11 May 2004	1 Year
Amplifier	Hewlett-Packard	8349A	PLI2201	11 May 2004	1 Year
Biconical Antenna	EMCO	3109	2089	22 Jun 2004	1 Year
Log Periodic Antenna	EMCO	3146	1118	22 Jun 2004	1 Year
Double Ridge Horn Antenna	EMCO	3115	4782	22 Jun 2004	1 Year
L.I.S.N	Solar Electronics	8012-50-R-24 BNC	PLI2202	14 Apr 2004	1 Year
L.I.S.N	Solar Electronics	8328-50-TS-50- N	PLI2203	14 Apr 2004	1 Year
High Pass Filter	Solar Electronics	7801-5.0	PLI2204	Not Applicable	
Tunable Band Pass Filter	K & L Microwave	5BT-48/95-5/B	NC583-1	Not Applicable	
Tunable Band Pass Filter	K & L Microwave	5BT-95/190-5/B	PLI2205	Not Applicable	
Magnetic Loop Antenna	Electro-Metrics	ALR-25M	M203680	Not Applicable	
Equipment Testing Turntable	EMCO	1061-06	PLI2206	Not Applicable	

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 12 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Laboratory Test Equipment					
Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Cycle
Antenna Positioning Tower	EMCO	1050	PLI2211	Not Applicable	
RF Attenuator	Narda	757C	35797	05 Jun 2004	1 Year
RF Attenuator	Narda	757C	36808	05 Jun 2004	1 Year
RF Attenuator	Narda	757C	40604	05 Jun 2004	1 Year
Close Field Antenna	Electro-Metrics	EFP-25	PLI2207	Not Applicable	
Oscilloscope	Tektronix	2445	PLI2208	Not Applicable	
Frequency Comb Generator	Hewlett-Packard	8406A	2246A02197	Not Applicable	
Absorbing Clamp	Schaffner EMC	MDS-21	831153	Not Applicable	
Line Probe	EMCO	3701	1007	Not Applicable	
Frequency Generator	Hewlett-Packard	TS-418B/U	PLI2209	Not Applicable	
Frequency Generator	Hewlett-Packard	TS-510A/U	PLI2210	Not Applicable	
Multimeter	Fluke	FLUKE 110 True RMS	78140239	12 Dec 2003	1 Year
Multimeter	Fluke	FLUKE 73 III	78850774	12 Dec 2003	1 Year
Digital Power Meter	Fluke	FLUKE 39	6836019	26 Feb 2004	1 Year
ELF Field Monitor	Walker Magnetic	ELF-50D	K71260-201	30 Dec 2003	1 Year

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 13 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

- 1.6 List of Exhibits accompanying this report for FCC submission to help describe and clarify the Equipment Under Test.
 - 1.6.1 Schematics or detailed block diagrams.
 - 1.6.2 Equipment manual for operator or user showing enough detail to operate the equipment.
 - 1.6.3 Currently dated and originally signed FCC Application for Certification (Form 731) along with the FCC Certification fee (already submitted electronically).
 - 1.6.4 Current Agent Authorization letter.
 - 1.6.5 Proposed identification label representative of the production label to be placed on the equipment upon grant of the application. Positioned on equipment as shown in block rough in Section 2.1 of this report.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 14 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

2.0 **Mandatory Labeling and Operators' Manual Information and Shipping Documents**

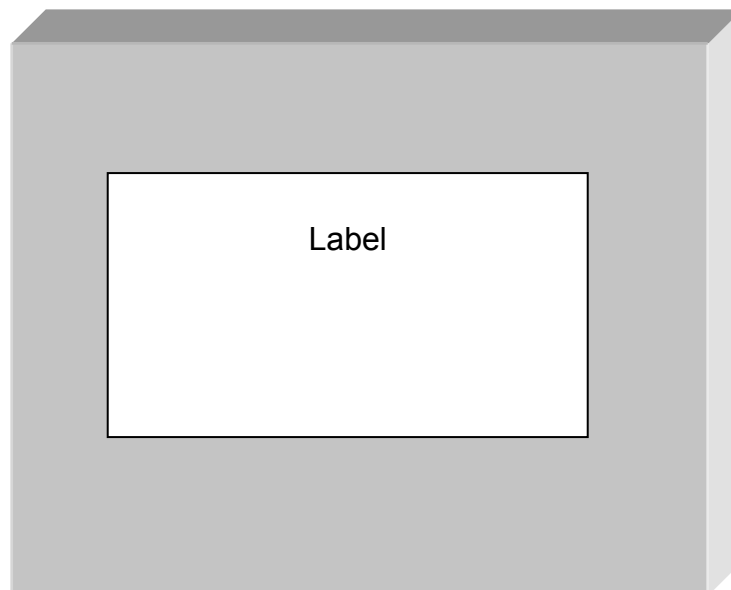
2.1 **Label**

The illustration on the next page shows the actual FCC label with the appropriate wording.

In future labels, note the letters "EMI" on the label, which abbreviate "Electromagnetic Interference". Organizations like the Federal Communications Commission and their respective limits are listed on the label.

Also notice the letters "NRTL", which abbreviate "Nationally Recognized Testing Laboratory" as recommended by OSHA and the National Electrical Code for the United States. For Pulver Laboratories product Certification labels used for safety Certification, the phrase "SAFETY" appears on the label. Safety Certifying organizations like Pulver Laboratories are listed on the label adjacent to the testing standards used during equipment evaluation.

A rough sketch of the label location is shown below.



Bottom Panel of EUT

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 15 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Label Illustration
{Enlarged FCC Label}

FCC ID: SIU5406X	This product is tested to comply with FCC standards. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) it must accept any interference received, including interference that may cause undesired operation.	This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.	#7090-0016
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TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 16 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

2.2 Operators' Manual Information

2.2.1 Insert the following information directly into the operators' manual to meet the requirements of product safety and Radio Frequency Interference (RFI) rules and regulations.

CAUTIONS

- (1) Use a shielded data cable connection between the parallel or serial data ports and peripherals of this equipment.
- (2) Other connections between peripherals of this equipment may be made with low voltage non-shielded computer data cables.
- (3) Network connections between the computer and the EUT consist of shielded CAT 5 cable.

WARNING

- (1) Use only the Coaxsys, Inc., specified wall adapter for this product. This Coaxsys, Inc. wall adapter enhances the system performance and increases the product safety features.

Note to Coaxsys, Inc.:

The following warning can be placed in the operators' manual to show Coaxsys, Inc. concern for public safety. This warning is optional, not mandatory. This warning can be used in conjunction with the alternative label shown after the warning phrases.

WARNING - The phrase "contains PULVER™ Shield" on the Product Certification Label means Coaxsys, Inc. has elected to install this state-of-the-art technology dedicated to significantly reducing Electromagnetic Radiation and Interference. The PULVER™ Shield protects this equipment and operators of this equipment from Electromagnetic Radiation beyond requirements of presently recognized product standards.

For continued protection against Electromagnetic Radiation, replace only with same model and version of PULVER™ Shield: 12 dB μ V/m maximum attenuation from 30 to 1000 MHz.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 17 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

- 2.3 **FCC User Information** - Place the following statements in the front of the operators' manual so that the user of the EUT is aware of its interference potential. If available, provide additional information to the user about corrective measures.

For a Class B Digital Device or Peripheral

FCC NOTICE INFORMATION FOR THE USER

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 instructions, 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:

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

The user may find the following publication prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems"
(Stock Number 004-000-00345-4).

Available exclusively from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (telephone 202-512-1800).

FCC WARNING

Changes or modifications not expressly approved by the party responsible for compliance to Part 15 of the FCC Rules could void the user's authority to operate the equipment.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 18 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

- 2.4 **Industry Canada** - Provide the ICAN statements that follow this paragraph along with the Pulver Laboratories Certificate of Conformance (in this report) in the first pages of the operators' manual and place with the shipping documents accompanying each product.

ICAN Class B Digital Equipment

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

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

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 19 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

FIGURE 1: PLI Photograph Number 5406C3334SJ-08 illustrates the front view of the Equipment Under Test with all peripherals attached during the "open field" Radio Frequency Interference / Electromagnetic Interference test program.



TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 20 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

FIGURE 2: PLI Photograph Number 5406C3334SJ-09 illustrates the rear view of the Equipment Under Test with all peripherals attached during the "open field" Radio Frequency Interference / Electromagnetic Interference test program.



TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 21 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

FIGURE 3: PLI Photograph Number 5406C3334SJ-10 illustrates the rear view of the Equipment Under Test with all peripherals attached during the Conducted Electromagnetic Interference test program.



TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 22 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

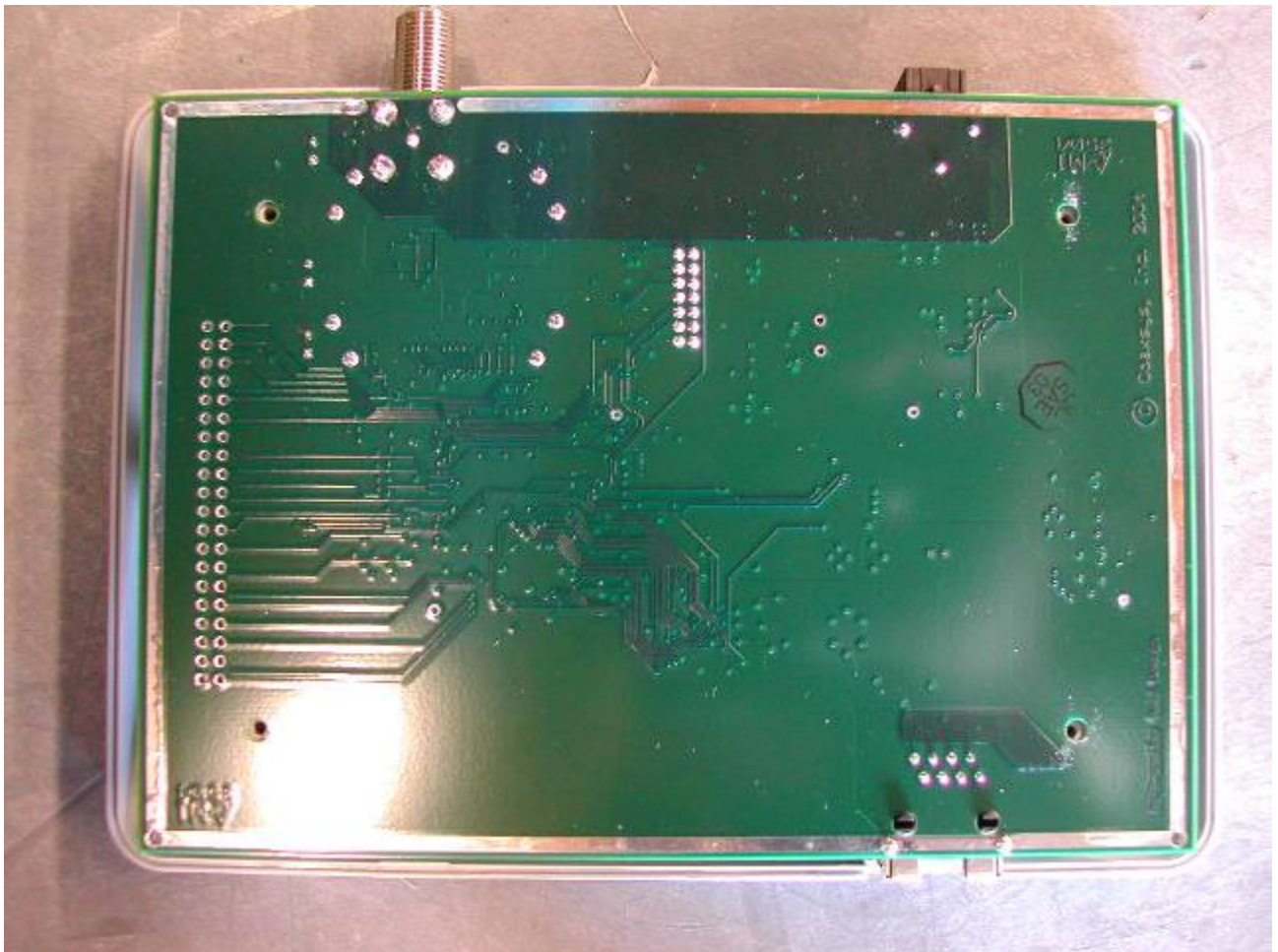
FIGURE 4: PLI Photograph Number 5406C3334SJ-04 illustrates the top view of the EUT and associated power adapter.



TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 23 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

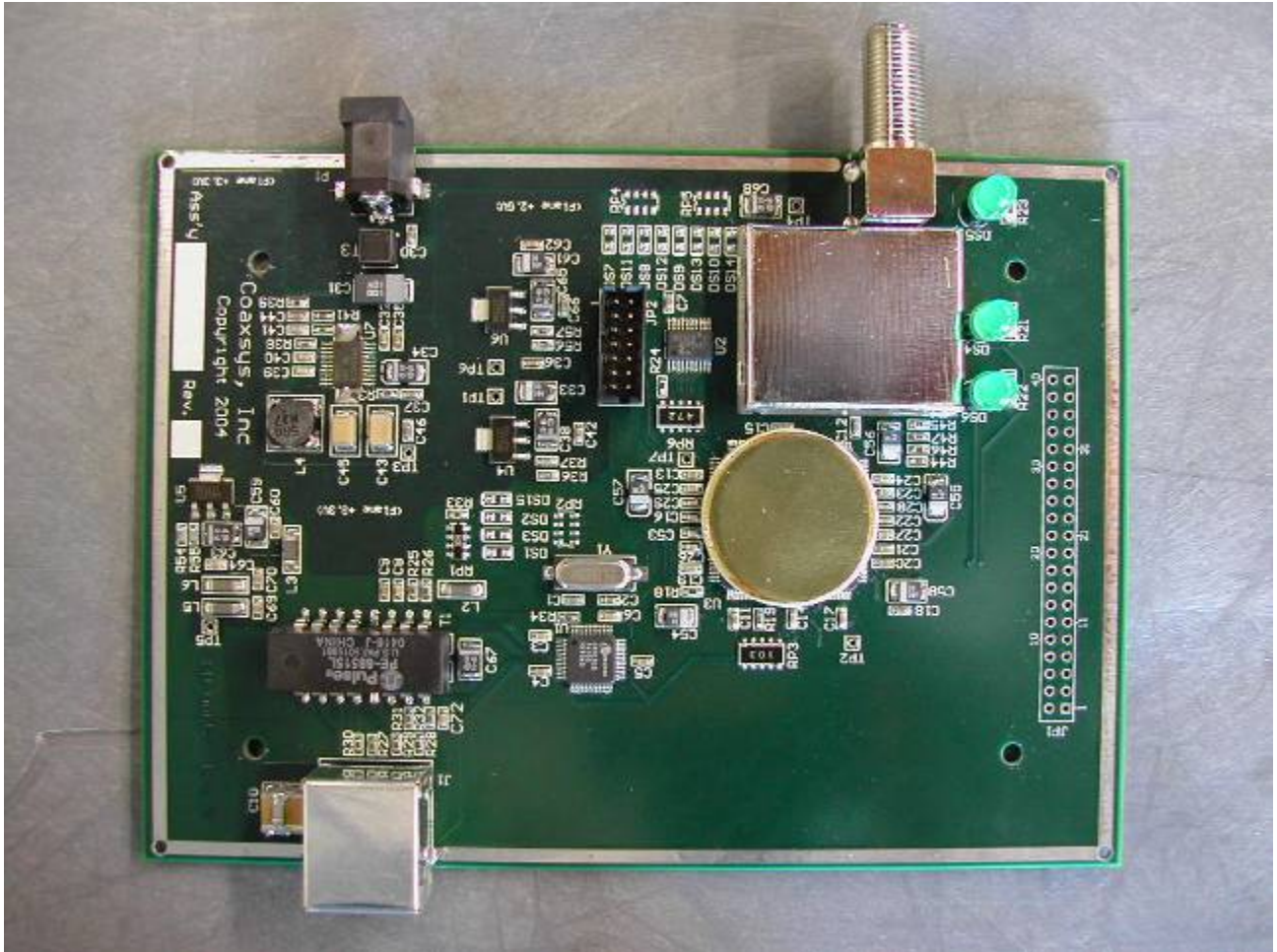
FIGURE 5: PLI Photograph Number 5406C3334SJ-14 illustrates the top view of the EUT with the bottom cover removed showing the circuit side of the EUT printed circuit assembly, number PN-00057 Rev. 3. *[Short term confidentiality requested for this photo in FCC submission]*



TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 24 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

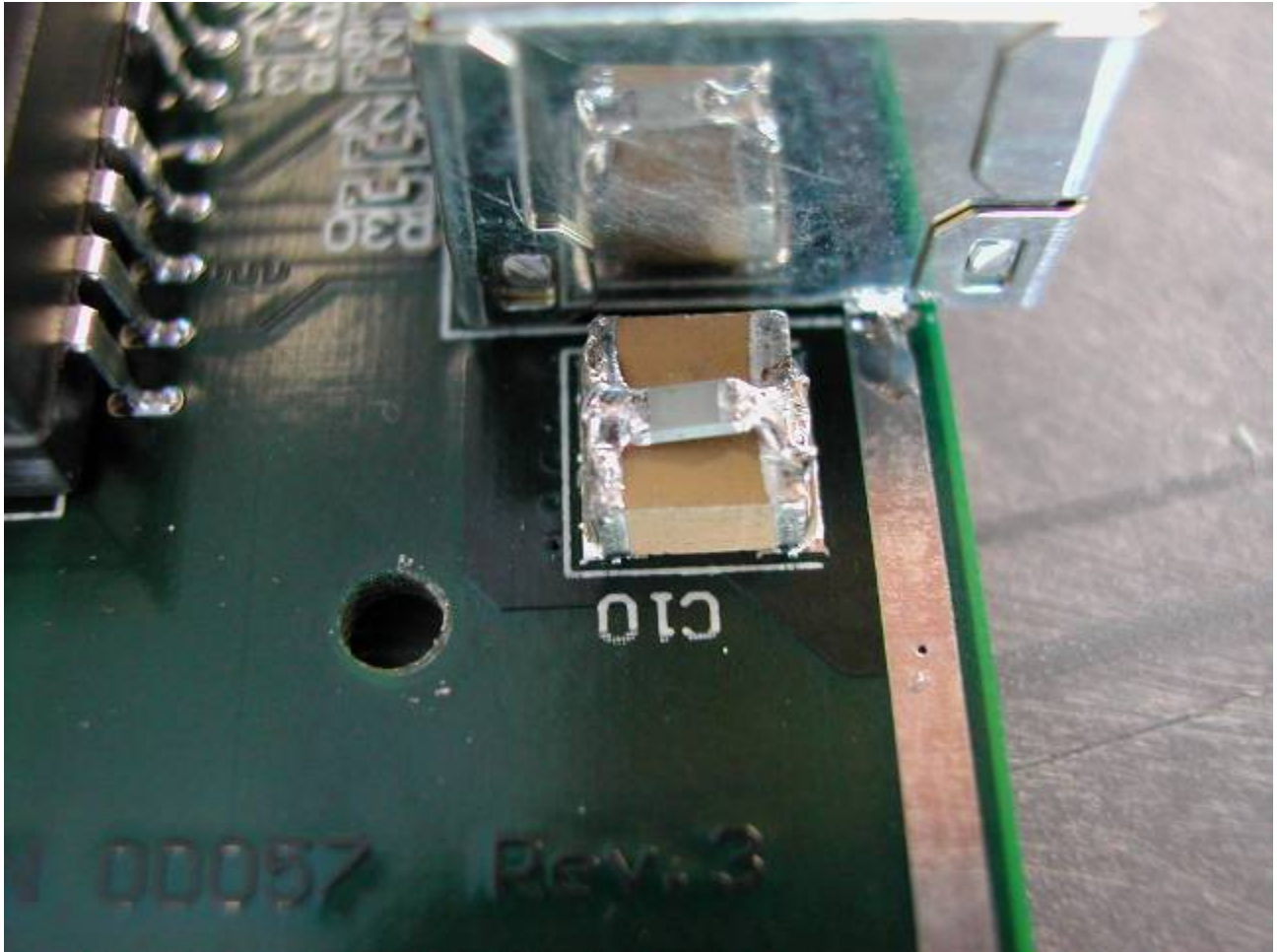
FIGURE 6: PLI Photograph Number 5406C3334SJ-11 illustrates the component side of the EUT printed circuit assembly, number PN-00057 Rev. 3. *[Short term confidentiality requested for this photo in FCC submission]*



TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 25 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

FIGURE 7: PLI Photograph Number 5406C3334SJ-12 illustrates a close up view of the added 0.001uF capacitor to C10. *[Short term confidentiality requested for this photo in FCC submission]*



Page 26 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 27 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Clock Oscillators and Frequencies of Operation		
Frequency	Component # / Location	Description of Use
25 MHz	Y1	Reference oscillator
Use this table to simplify locating the oscillators in the accompanying schematics.		

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 28 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Equipment Under Test Orientation and Configuration

Refer to PLI Photograph Number 5406C3334SJ-09

3.0 Radiated Electromagnetic Interference (EMI) - Test Configuration

- 3.1 PLI placed the Equipment Under Test (EUT) on an 80 centimeter high table located on a 12.70 millimeter (0.5 inch) thick, 1.83 meter (6.00 foot) diameter, remote controlled steel turntable positioned 3.00 meters away from a receiving antenna assembly. This steel gear driven turntable has a 2400 pound capacity. The grounded turntable top surface is flush with a grounded screen consisting of 6.35 millimeter (0.25 inch) squares forming a wire mesh. The automated 4.00 meter mast and antenna assembly connects to an RF amplifier attached to a spectrum analyzer with quasi-peak adapter.
- 3.2 The Equipment Under Test (EUT) was operated at its specified load condition for which it was designed. After 30 minutes of continuous operation the EUT reached normal operating temperature. PLI recorded EMI data in this report during the normal load and operating temperature of the EUT.
- 3.3 The EUT and system configuration follows:
 - 3.3.1 A desktop computer has a monitor, keyboard, mouse, modem, USB jump drive, and printer connected.
 - 3.3.2 The computer also connected to EUT output via a CAT5 cable.
 - 3.3.3 The EUT input connected via coaxial cable to an off-site *Network Master* and hub.
 - 3.3.4 The hub transfers an active high speed DSL internet connection by CAT5 cable to the *Master*.
 - 3.3.5 The EUT powered by external wall adapter with 4 to 5.5 VDC output.
 - 3.3.6 All systems connected to VAC power and powered ON.
 - 3.3.7 Once the computer operating system is loaded and Internet Explorer launched, select a continuous source of streaming video.
 - 3.3.8 Activate the streaming video which transmits through the EUT to the computer and associated display.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 30 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

3.4 The following equipment list defines the system configuration:

On-Site Equipment

EUT :Network Adapter
Model Number :IPTV 7000
Serial Number :none
PLI Sample ID :5406C3334-01
FCC ID Number :SIU5406X
Manufacturer :Coaxsys, Inc.

Product Name :Power Adapter for EUT
Model Number :AD1505C
Serial Number :None
PLI Sample ID :5406C3334-02
FCC ID Number :DOC Authorized
Manufacturer :Deer Computer Company

Product Name :Desktop Computer
Model Number :MTC2
Serial Number :9ZY0N51
FCC ID Number :DOC Authorized
PLI Sample ID :5406C3334-08
Manufacturer :Dell Computer

Product Name :Monitor
Model Number :E153FPB
Serial Number :CN-0D5421-46633-478-2F1U
FCC ID Number :DOC Authorized
PLI Sample ID :5406C3334-10
Manufacturer :Dell Computer

Product Name :Keyboard
Model Number :ZT7020
Serial Number :CN-04N454-37172-46M-O14P
FCC ID Number :DOC Authorized
PLI Sample ID :5406C3334-05
Manufacturer :Dell Computer

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 31 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Product Name :Mouse
Model Number :M071KC
Serial Number :423088493
FCC ID Number :DOC Authorized
PLI Sample ID :5406C3334-07
Manufacturer :Dell Computer

Product Name :USB Jump Drive
Model Number :Attache
Serial Number :None
PLI Sample ID :5406C3334-06
FCC ID Number :None
Manufacturer :PNY Technologies

Product Name :Modem
Model Number :5686
Serial Number :ZABLX42E5494
FCC ID Number :DOC Authorized
PLI Sample ID :5406C3334-13
Manufacturer :US Robotics

Product Name :Molded Power Adapter
Model Number :TEAC-41-Q91000U
Serial Number :1.015.1286
FCC ID Number :None
PLI Sample ID :5406C3334-14
Manufacturer :US Robotics

Off-Site Equipment

EUT :Network Master
Model Number :IPTV 7000
Serial Number :none
FCC ID Number :None
PLI Sample ID :5406C3334-03
Manufacturer :Coaxsys, Inc.

Product Name :Power Adapter for EUT
Model Number :AD1505C
Serial Number :None
PLI Sample ID :5406C3334-04
FCC ID Number :DOC Authorized
Manufacturer :Deer Computer Company

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 32 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

- 3.5 The Equipment Under Test was evaluated per the American National Standards Institute standard number C63.4-2001 entitled Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. To maximize Electromagnetic Interference signal strength, PLI rotated the System Under Test 360 degrees and then adjusted the receiving antenna height until the maximum signal appeared on the spectrum analyzer. The input/output interface cables between units of the system were always positioned to yield maximum field strength.

4.0 Radiated EMI – Results

- 4.1 The investigated frequency spectrum revealed radiated EMI signals. The highest interference in the horizontal polarization occurred when the front of the unit was facing 180 degrees clockwise with respect to the antenna. The highest interference in the vertical polarization occurred when the front of the unit was facing 180 degrees clockwise with respect to the antenna.
- 4.2 The "ACF" (Antenna Correction Factor) shown in the test data in this report includes compensation for the antenna factor; cable attenuation; the series RF attenuator; the RF amplifier; and pre-selector system losses. PLI shows the spectrum analyzer data as quasi-peak amplitudes.
- 4.3 The test facility is FCC registered; the procedures are CISPR registered, ICAN registered, VCCI registered, VDE approved, and RegTP approved.

Type of Test	Radiated Electromagnetic Interference
Specification	FCC, ICAN Class B
Date Data Collected	20-22 September 2004
Detection Technique	Spectrum Analyzer with Quasi-peak Adapter
Resolution Bandwidth (RB)	100 kHz 1 to 18 GHz: 1 MHz RB
Video Bandwidth (VB)	100 kHz 1 to 18 GHz: 10 MHz VB
Antennas	30 to 200 MHz High Field Biconical Antenna 200 to 1500 MHz Log-Periodic Antenna 1 to 18 GHz Double Ridge Guide Horn

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 33 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Test Configuration #1

Frequency MHz	EMI Data dBµV/M	ACF	Field Strength dBµV/M	FCC Limit dBµV/M	FCC Margin to Limit dBµV/M
------------------	-----------------------	-----	-----------------------------	------------------------	----------------------------------

30 - 1000 MHz

Horizontal

50.00	29.80	-10.12	19.68	40.00	-20.32
75.00	39.40	-13.09	26.31	40.00	-13.69
125.00	37.10	-9.53	27.57	43.50	-15.93
150.00	50.60	-9.35	41.25	43.50	-2.25
175.00	38.00	-8.56	29.44	43.50	-14.06
200.00	49.70	-11.30	38.40	43.50	-5.10
225.00	38.90	-9.70	29.20	46.00	-16.80
250.00	41.80	-8.08	33.72	46.00	-12.28
275.00	41.20	-6.19	35.01	46.00	-10.99
300.00	37.80	-5.59	32.21	46.00	-13.79
400.00	38.60	-3.09	35.51	46.00	-10.49
425.00	38.60	-2.45	36.15	46.00	-9.85
600.00	41.00	-0.58	40.42	46.00	-5.58
750.00	36.60	1.09	37.69	46.00	-8.31

Frequency MHz	EMI Data dBµV/M	ACF	Field Strength dBµV/M	FCC Limit dBµV/M	FCC Margin to Limit dBµV/M
------------------	-----------------------	-----	-----------------------------	------------------------	----------------------------------

30 - 1000 MHz

Vertical

50.00	40.70	-8.80	31.90	40.00	-8.10
75.00	41.10	-9.95	31.15	40.00	-8.85
125.00	34.50	-7.64	26.86	43.50	-16.64
150.00	45.70	-6.30	39.40	43.50	-4.10
175.00	34.00	-4.43	29.57	43.50	-13.93
225.00	43.00	-3.64	39.36	46.00	-6.64
275.00	40.80	-2.61	38.19	46.00	-7.81
300.00	36.20	-1.94	34.26	46.00	-11.74
325.00	37.50	-1.43	36.08	46.00	-9.92
375.00	40.30	-0.39	39.91	46.00	-6.09
600.00	37.50	4.05	41.55	46.00	-4.45
750.00	33.90	6.94	40.84	46.00	-5.16
950.00	29.50	10.97	40.47	46.00	-5.53

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 34 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

4.4 Calculations and Notes Concerning Data Presentation

4.4.1 "ACF" means the Antenna Correction Factor for either Horizontal or Vertical antenna orientation.

4.4.2 "H" designates the Horizontal antenna orientation.

4.4.3 "V" designates the Vertical antenna orientation.

4.4.4 "*" means the data shown in the "Margin to Limit" column exceeds the data in the "EN Limit" column, or exceeds the data in the "FCC Limit" column. "*" could also mean that the Margin to the Limit is greater than -2.00 dB μ V per meter.

4.4.5 "A" designates an ambient signal.

4.4.6 "(-.-)" means the signal level is lower than the adjacent data or within the background ambients.

4.4.7 "EMI DATA" plus "ACF" equals "Field Strength".

4.4.8 "Field Strength" minus "EN Limit" and/or minus "FCC Limit" equals "Margin to Limit".

4.4.9 "Margin to Limit" negative numbers show Equipment Under Test "Field Strength" below the "EN Limit" and/or below the "FCC Limit". "Margin to Limit" positive numbers show Equipment Under Test "Field Strength" above the "EN Limit" and/or above the "FCC Limit".

4.5 The field strengths in this section were measured at 3.0 meters. None of the Electromagnetic Interference quasi-peaks are in excess of the ICAN (Industry Canada), FCC (Federal Communications Commission), and EC (European Community) Class B maximums, even when the field strength readings in the above table are reduced by 20 dB μ V (to represent 30 meter test site measurements, since an antenna positioned at 30.0 meters receives one tenth of the field strength recorded at 3.0 meters).

4.6 **Conclusion** - The radiated Electromagnetic Interference of the Equipment Under Test meets the requirements for Industry Canada (ICAN) and Federal Communications Commission (FCC) Class B devices.

5.0 Conducted EMI - Test Configuration

- 5.1 Current input power leads of the Equipment Under Test were connected to a Line Impedance Stabilization Network (LISN), which isolate and couple the conducted interference from the power lines to a spectrum analyzer. The LISN and the Equipment Under Test were connected and positioned according to the Industry Canada and the Federal Communications Commission test recommendations. The Equipment Under Test was configured exactly as outlined in the Radiated Electromagnetic Interference Section of this report. The spectrum analyzer data is shown in the following table as quasi-peak amplitudes.
- 5.2 To increase data integrity and also meet the recommendations of the American National Standards Institute standard number C63.4-2001, all electrical devices comprising the system being tested with the Equipment Under Test were connected to the VAC mains using a second Line Impedance Stabilization Network.

6.0 Conducted EMI – Results

- 6.1 Investigation of the EUT revealed conducted interference levels as shown in the table below.

Type of Test	Conducted Electromagnetic Interference
Specification	FCC, ICAN Class B
Date Data Collected	20-22 September 2004
Detection Technique	Spectrum Analyzer with Quasi-peak Adapter
Frequency Range	0.150 to 30.0 MHz
Resolution Bandwidth	10 kHz
Video Bandwidth	10 kHz
Line Impedance Stabilization Network	50 micro Henry; 50 ohm

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 36 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Test Configuration #1

Frequency MHz	Line Data dBµV	Neutral Data dBµV	FCC Limit dBµV	FCC Margin to to Limit (Line) dBµV	FCC Margin to to Limit (Neutral) dBµV
0.16	45.90	-.	65.77	-19.87	-.
0.22	36.40	-.	64.32	-27.92	-.
0.27	60.00	-.	63.03	-5.94	-.
0.63	36.50	-.	56.00	-19.50	-.
0.80	42.30	-.	56.00	-13.70	-.
1.37	45.40	-.	56.00	-10.60	-.
1.51	20.30	-.	56.00	-35.70	-.
25.00	20.60	-.	60.00	-39.40	-.
0.16	-.	45.10	65.77	-.	-20.67
0.22	-.	39.50	64.32	-.	-24.82
0.27	-.	57.90	63.03	-.	-5.94
0.75	-.	44.20	56.00	-.	-11.80
0.81	-.	40.50	56.00	-.	-15.50
1.18	-.	34.60	56.00	-.	-21.40
1.38	-.	35.30	56.00	-.	-20.70
1.51	-.	21.80	56.00	-.	-34.20
21.65	-.	25.40	60.00	-.	-34.60
25.00	-.	20.60	60.00	-.	-39.40

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 37 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

6.2 Calculations and Notes Concerning Data Presentation

- 6.2.1 "***" means the "Margin to Limit" Exceeds the "FCC Limit" and/or Exceeds the "EN Limit" or is within a -2 dB μ V margin.
- 6.2.2 "(-.-)" means the signal level is lower than the adjacent data or within the background ambients.
- 6.2.3 "Line Data" minus "FCC Limit" and/or minus "EN Limit" equals "Margin to Limit" for the Line side of the input power cord.
- 6.2.4 "Neutral Data" minus "FCC Limit" and/or minus "EN Limit" equals "Margin to Limit" for the Neutral side of the input power cord.
- 6.2.5 "Margin to Limit" negative numbers show Equipment Under Test "Field Strength" **below** the "FCC Limit" and/or **below** the "EN Limit". "Margin to Limit" positive numbers show Equipment Under Test "Field Strength" **above** the "FCC Limit" and/or **above** the "EN Limit".
- 6.2.6 "A" means an Ambient signal.
- 6.2.7 The symbol " Σ " adjacent to a line of conducted Electromagnetic Interference data means that the "Field Strength" was recorded directly as a quasi-peak measurement, and then reduced by 13 dB μ V. The data obtained in quasi-peak mode was 6 dB μ V or higher than the level of the same emission measured with the spectrum analyzer detector function set to the average mode. The emission was considered broadband, since the quasi-peak mode bandwidth setting was identical to the average mode bandwidth setting. 100 samples were recorded represented by the following equation:

$$\left(\frac{1}{n}\right)\sum_{i=1}^n X_i$$

- 6.3 **Conclusion** - The conducted Electromagnetic Interference of the Equipment Under Test meets the requirements for Industry Canada (ICAN), Federal Communications Commission (FCC), and the European Community (EC) Class B devices.
- 6.4 Graphs of PEAK conducted Electromagnetic Interference for frequency ranges on Line and Neutral are shown on the following pages.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

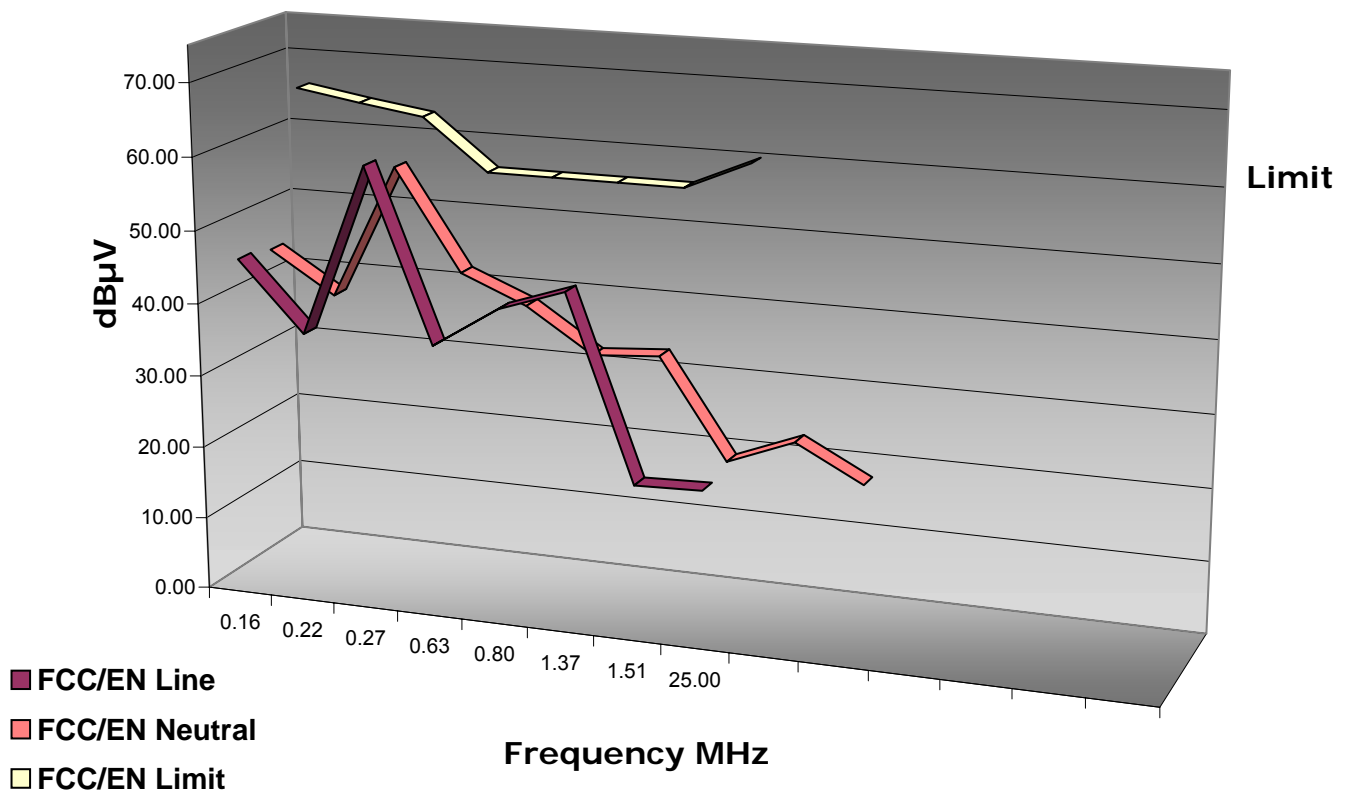
Page 38 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

- 6.5 The recorded conducted data utilized a quasi-peak measurement procedure. Hence, any differences between the graphs and the data are merely the differences between peak and quasi-peak measurements.
- 6.6 There are 33 AM and 56 FM radio stations in the immediate San Jose, California, area which create large ambient signals. Typical radio stations are:
- 0.810 MHz KGO
 - 1.170 MHz KLOK
 - 1.370 MHz KEEN
 - 1.500 MHz KHTT
 - 1.590 MHz KLIV
- 6.7 The conducted Electromagnetic Interference graphs in this report show some of the large ambient signals for several of these radio stations.
- 6.8 The final Electromagnetic Interference conducted test and measurement equipment configuration was evaluated to assure that Data Compression or Intermodulation Distortion did not occur due to these large ambient signals.

TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 39 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

Conducted EMI Data Graphic Configuration #1 (FCC)



TITLE: PLI Evaluation Report (RFI) FCC ID: SIU5406X
DRAWING: Q540601W.03.DWG.doc
BY: Laura Bramschreiber and Clyde Pineda

Page 40 of 40
Issued: 28 Sep 2004
Approved: Lee Pulver

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