

TITLE: PLI Evaluation Report (RFI) **FCC ID: SAN5405X**
DRAWING: Q540502W.02.DWG.doc Issued: 17 Jul 2004
BY: Laura Bramschreiber and Clyde Pineda

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Re-Issued: 11 Aug 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	ISSUED
1 - 48	17 Jul 2004
PAGE	REISSUED
1 - 50	11 Aug 2004

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Pulver Laboratories Inc. (PLI) File Number: 5405

Pulver Laboratories Inc. (PLI) Project Number: C2734

Product Names: (1) Indoor Wireless Broadband
Internet Access Gateway (EUT)

(EUT = Equipment Under Test)

Model Numbers: (1) MANGA Point

Serial Numbers: (1) None

Pulver Laboratories Sample ID: (1) 5405C2734-01

Applicant: PePLink Ltd.
4606-10, 46/F., China Resources Building
26 Harbour Road, Wanchai
Hong Kong
Telephone: +852-2990-7657
Facsimile: +852-2304-2280
Contact: Michael Chan
E-mail: Michaelc@PePLink.com

Location Certified: PePLink Ltd.
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26 Harbour Road, Wanchai
Hong Kong
Telephone: +852-2990-7657
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Contact: Michael Chan
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Manufacturing Location: PePLink Ltd.
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E-mail: Michaelc@PePLink.com

Pulver Laboratories Inc. (PLI) Control Number: 5405X

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Equipment Category

- Information Technology Equipment including Electrical Business Equipment

Evaluated to the Following Standards

PLI Certification.

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

FCC Certification.

Federal Communications Commission (FCC, USA)

Category Classification: Class B - Residential
FCC ID number - SAN5405X (Pending)

- 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.

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".

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- Industry Canada (ICAN) Radio Interference Regulation amendment dated 15 September 1988 (Radio Act Registration SOR/88-475); 3862 01 Data Processing Equipment.

Referenced Test Standards

- EN55022 / CISPR 22 entitled Limits and methods of measurement of radio disturbance characteristics of information technology equipment, First Edition 1985.

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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 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.
- 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 MetroFi 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 08 December 2003.

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.

1.2 Specific Engineering Considerations

1.2.1 Climatic conditions:

Climatic Conditions	Limits	Readings
Ambient temperature	15°C to 35°C	24°C
Relative humidity	45% to 75%	51%
Atmospheric pressure	68 kPa (680 mbar) to 106 kPa (1060 mbar)	1014 mbar

1.2.2 Interconnecting low voltage cable lengths:

Cable Description	Length (feet)	Length (meters)	Shielded / Unshielded
EUT: Power	6.00	1.83	Unshielded
Printer: Parallel data	3.00	0.91	Shielded
Keyboard: Data	5.00	1.52	Unshielded
Monitor: Data	6.00	1.83	Shielded
Mouse: Data	5.00	1.52	Unshielded
Modem: Serial data	3.00	0.91	Unshielded
Computer: Power	6.00	1.83	Shielded
Monitor: Power	6.00	1.83	Shielded
Cat-5 Cable	3.00	0.91	Unshielded
Modem Power	6.25	1.91	Unshielded
Printer Power	12.00	3.66	Unshielded

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- 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.
- 1.2.4 Most severe cable orientation chosen when measuring unwanted radiated and conducted emissions.
- 1.2.5 Test Configuration with Monitor attached to input power mains radiated more electromagnetic interference than with the monitor connected to the CPU. Therefore, 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 The transceiver interconnect wire located inside the chassis from the antenna connector to the FCC Certified printed circuit board was mechanically retained in place.
- 1.2.7 There is one possible Equipment Under Test (MANGA Point Indoor Wireless Broadband Internet Access Gateway) 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:** The MANGA Point Indoor Wireless Broadband Internet Access Gateway connects to a Personal Computer System with peripherals, via an unshielded CAT5 cable.
- 1.2.9 This report does include measurement data to the 10th harmonic of the EUT crystal oscillators.

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1.2.10 Technical Specifications

- 1.2.10.1 IEEE 802.3 and 802.3U 10Base-T and 100Base-TX compliant.
- 1.2.10.2 IEEE 802.11g compliant.
- 1.2.10.3 IEEE 802.11x compliant.
- 1.2.10.4 Media Access Protocol: IEEE 802.11g and 802.11b.
- 1.2.10.5 MBPS Data Rate: 54/48/36/24/11/5.5/2/1.
- 1.2.10.6 Modulation Technique: OFDM/DSSS, BPQSK, QPSK/CCK.

1.2.11 Hardware Specification

- 1.2.11.1 Antenna: one 2dBi, omni directional, detachable, reverse polarity, SMA antenna.
- 1.2.11.2 Four port 10/100Base-T RJ-45 Ethernet switch.

1.3 Product Description and Intended Use

1.3.1 MANGA Point is a network device for one or more PCs on a LAN to simultaneously access secure wireless broadband Internet service. With integrated 4 Ethernet switching ports and user-friendly web-based network administration features, MANGA Point can connect 4 PCs to the Internet without installing any wireless LAN adapter or configuring tedious wireless network settings on the PCs. MANGA Point supports DHCP, NAT, DMZ and port forwarding functions. It can also be configured to filter incoming and outgoing traffic. So users could get online by just having to connect the PC and the MANGA Point with an Ethernet cable.

1.3.2 After accessing through computer internet web browser, successful "User name" and "Password" at the prompt allows access to the PePLink firmware programs that begins searching for a (1) wireless access point, which is then (2) registered and authenticated to Radius server, which then (3) allows system to obtain an IP address from the DHCP server, which then (4) allows the MANGA Point to connect to the internet.

1.4 List of Photographs Contained in this Report

FIGURE 1: PLI Photograph Number 5405C2734SJ-04 illustrates the front view of the EUT.

FIGURE 2: PLI Photograph Number 5405C2734SJ-05 illustrates the rear view of the EUT.

FIGURE 3: PLI Photograph Number 5405C2734SJ-01 illustrates the front view of the Equipment Under Test in Radiated Electromagnetic Interference Test Configuration #1.

FIGURE 4: PLI Photograph Number 5405C2734SJR-01 the rear view of the Equipment Under Test in Conducted Electromagnetic Interference Test Configuration #1.

FIGURE 5: PLI Photograph Number 5405C2734SJ-06 illustrates the top view of the EUT with the top cover removed.

FIGURE 6: PLI Photograph Number 5405C2734SJ-07 illustrates the top and bottom chassis with the main board removed.

FIGURE 7: PLI Photograph Number 5405C2734SJ-08 illustrates the component side of the motherboard printed circuit assembly, MANGA v2.0.

FIGURE 8: PLI Photograph Number 5405C2734LG-06 illustrates the information label removed from the transceiver printed circuit assembly installed on component side of the motherboard printed circuit assembly, MANGA v2.0.

FIGURE 9: PLI Photograph Number 5405C2734LG-07 illustrates the circuit side of the transceiver printed circuit assembly uninstalled from the motherboard printed circuit assembly, MANGA v2.0.

FIGURE 10: PLI Photograph Number 5405C2734SJ-08 illustrates the component side of the motherboard printed circuit assembly, MANGA v2.0 directly under the transceiver printed circuit assembly after removing the transceiver.

FIGURE 11: PLI Photograph Number 5405C2734LG-21 illustrates the top cover with label surface and 9.0 VDC output connector of the wall adapter power supply, which provides power for the EUT.

Product	:External Power Supply for EUT (100-240 VAC input; 9 VDC output)
Model Number	:NSA-0181S09US2
Serial Number	:PLI 5405C2734-03
FCC ID Number	:None
Manufacturer	:NAZ Technology, Co., Ltd.Emachines

FIGURE 12: PLI Photograph Number 5405C2734LG-23 illustrates the input power side of the wall adapter power supply, which provides power for the EUT.

FIGURE 13: PLI Photograph Number 5405C2734LG-25 shows the top cover removed, exposing the circuit side of the Printed Circuit Assembly for the Wall adapter power supply assembly.

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FIGURE 14: PLI Photograph Number 5405C2734LGLG-26 shows the EUT wall adapter with the enclosure removed from the printed circuit board. This view emphasizes the components on the Neutral side of the Printed Circuit Assembly. The Line and Neutral connections routed individually from the Printed Circuit Assembly to the contacts on the chassis.

FIGURE 15: PLI Photograph Number 5405C2734LGLG-28 shows the EUT wall adapter with the enclosure removed from the printed circuit board. This view emphasizes the components on the Line side of the Printed Circuit Assembly. The Line and Neutral connections routed individually from the Printed Circuit Assembly to the contacts on the chassis.

- 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.

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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



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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



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- 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 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.

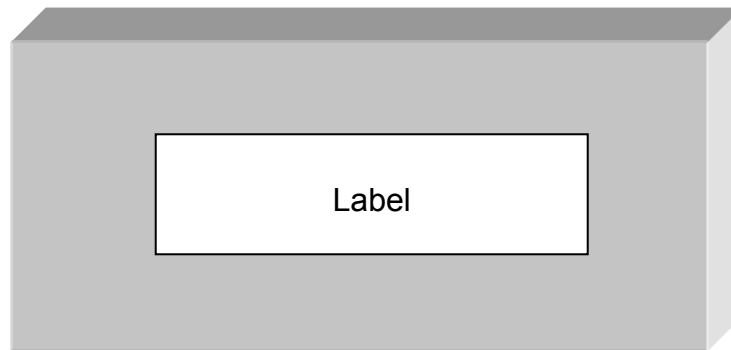
2.0 **Mandatory Labeling and Operators' Manual Information and Shipping Documents**

2.1 **Label**

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

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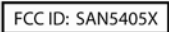
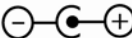
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Label Illustration
(RFI Controls Company part number S540501.01)

PePLink Ltd.

Indoor Wireless Broadband
Internet Access Gateway
Model: MANGA Point

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.
Contains an approved RF module FCC ID: Q72WJG

  9VDC 1.4A
Made in Hong Kong 


OR Alternative label


PePLink Ltd.
FCC ID: SAN5405X

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.

Contains an approved RF module FCC ID: Q72WLG

This Product Certified to meet the Standards in the
categories listed on this label by

 **Pulver Laboratories Inc.**
Control Number 5405X NRTL

 Information Technology Equipment
EMI: 47 CFR Parts 1, 2, and 15 for FCC Class B

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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) Connections between peripherals of this equipment may be made with low voltage non-shielded computer data cables.
- (2) Network connections may consist of non-shielded CAT 5 cable.

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.

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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

1. FCC RF Radiation Exposure Statement: This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.
2. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
3. 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.

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FIGURE 1: PLI Photograph Number 5405C2734SJ-04 illustrates the front view of the EUT.



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FIGURE 2: PLI Photograph Number 5405C2734SJ-05 illustrates the rear view of the EUT.



FIGURE 3: PLI Photograph Number 5405C2734SJ-01 illustrates the front view of the Equipment Under Test in Radiated Electromagnetic Interference Test Configuration #1.



FIGURE 4: PLI Photograph Number 5405C2734SJR-01 the rear view of the Equipment Under Test in Conducted Electromagnetic Interference Test Configuration #1.



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FIGURE 5: PLI Photograph Number 5405C2734SJ-06 illustrates the top view of the EUT with the top cover removed.



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FIGURE 6: PLI Photograph Number 5405C2734SJ-07 illustrates the top and bottom chassis with the main board removed.

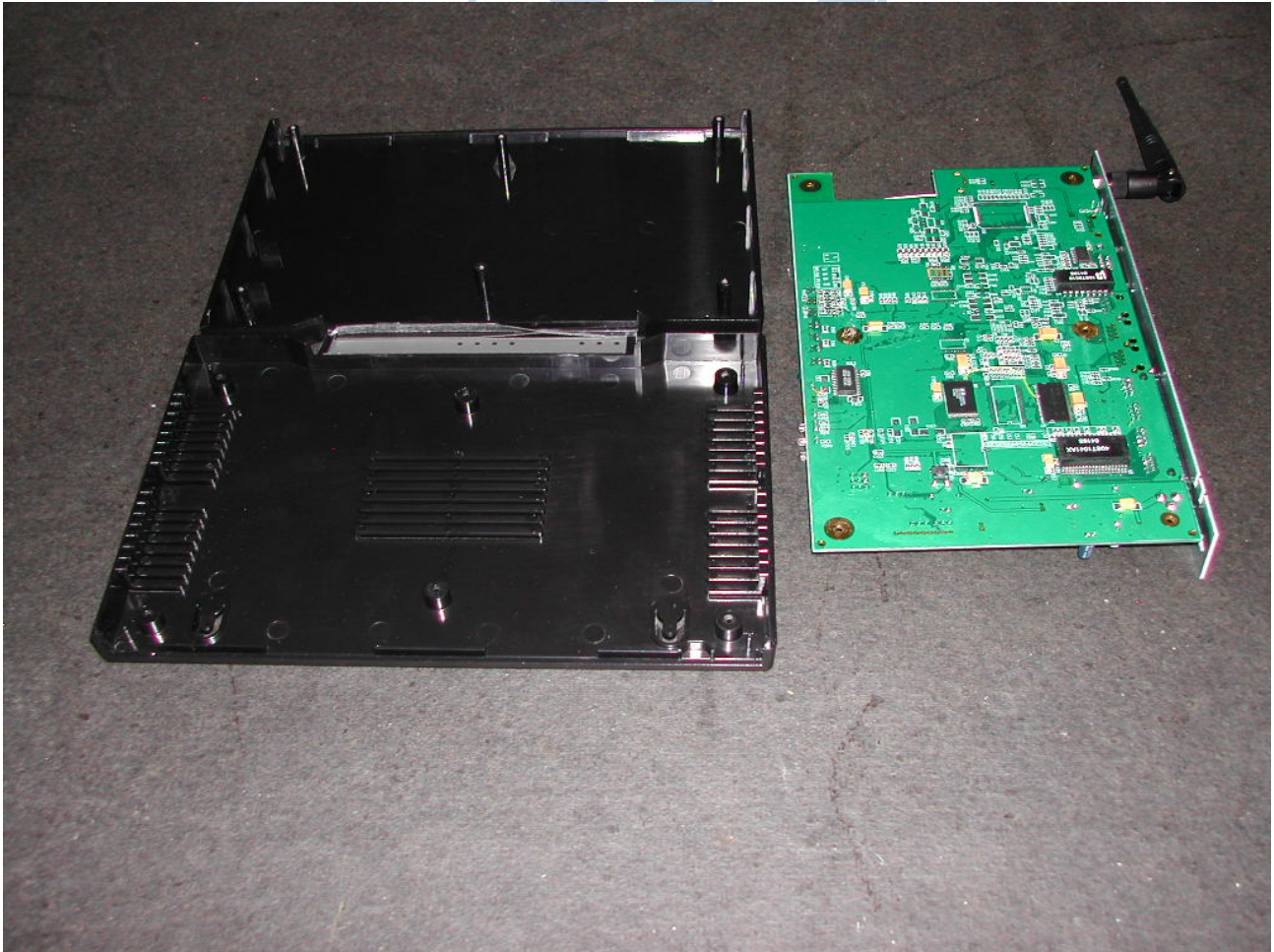


FIGURE 7: PLI Photograph Number 5405C2734SJ-08 illustrates the component side of the motherboard printed circuit assembly, MANGA v2.0.

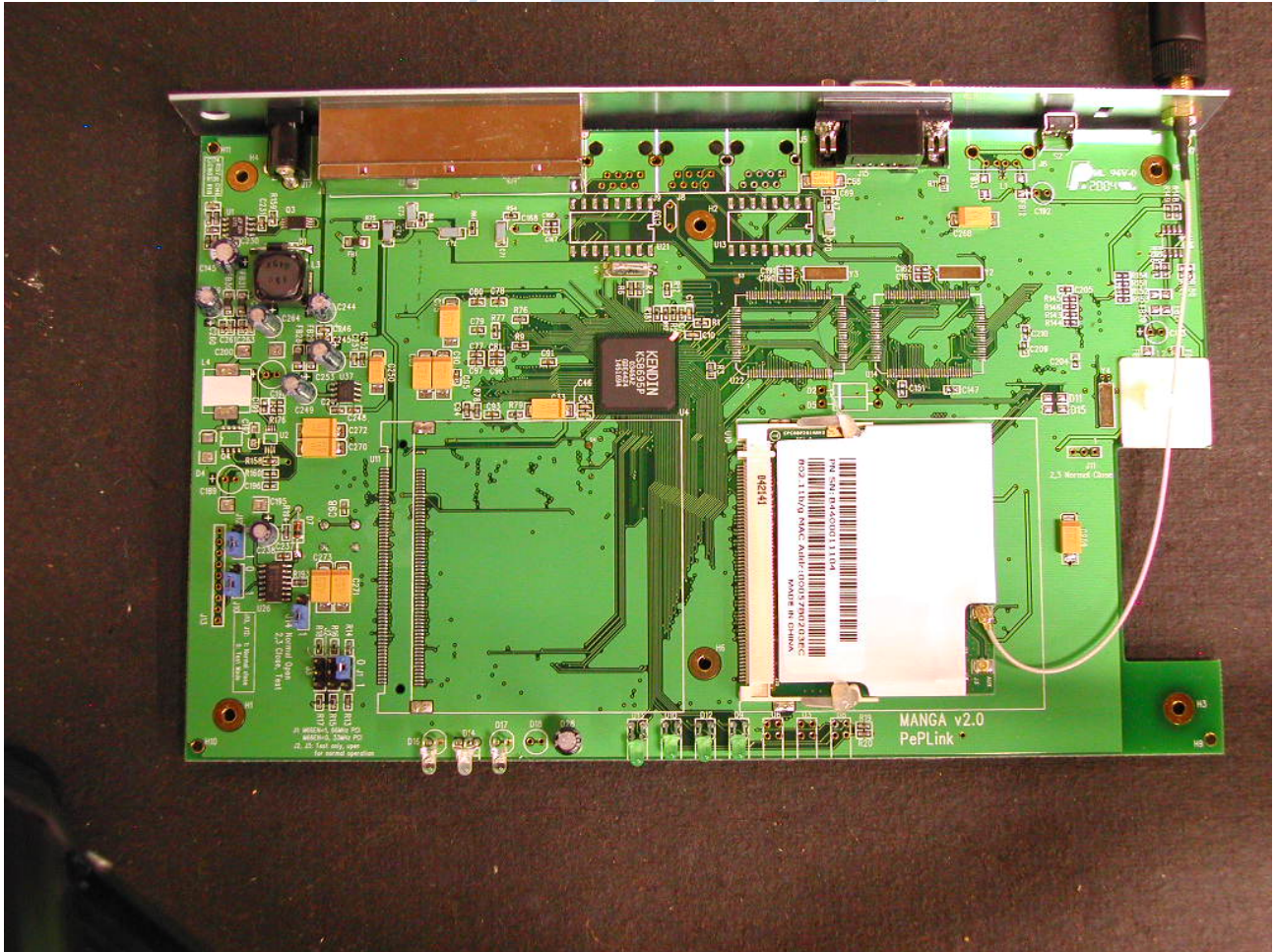


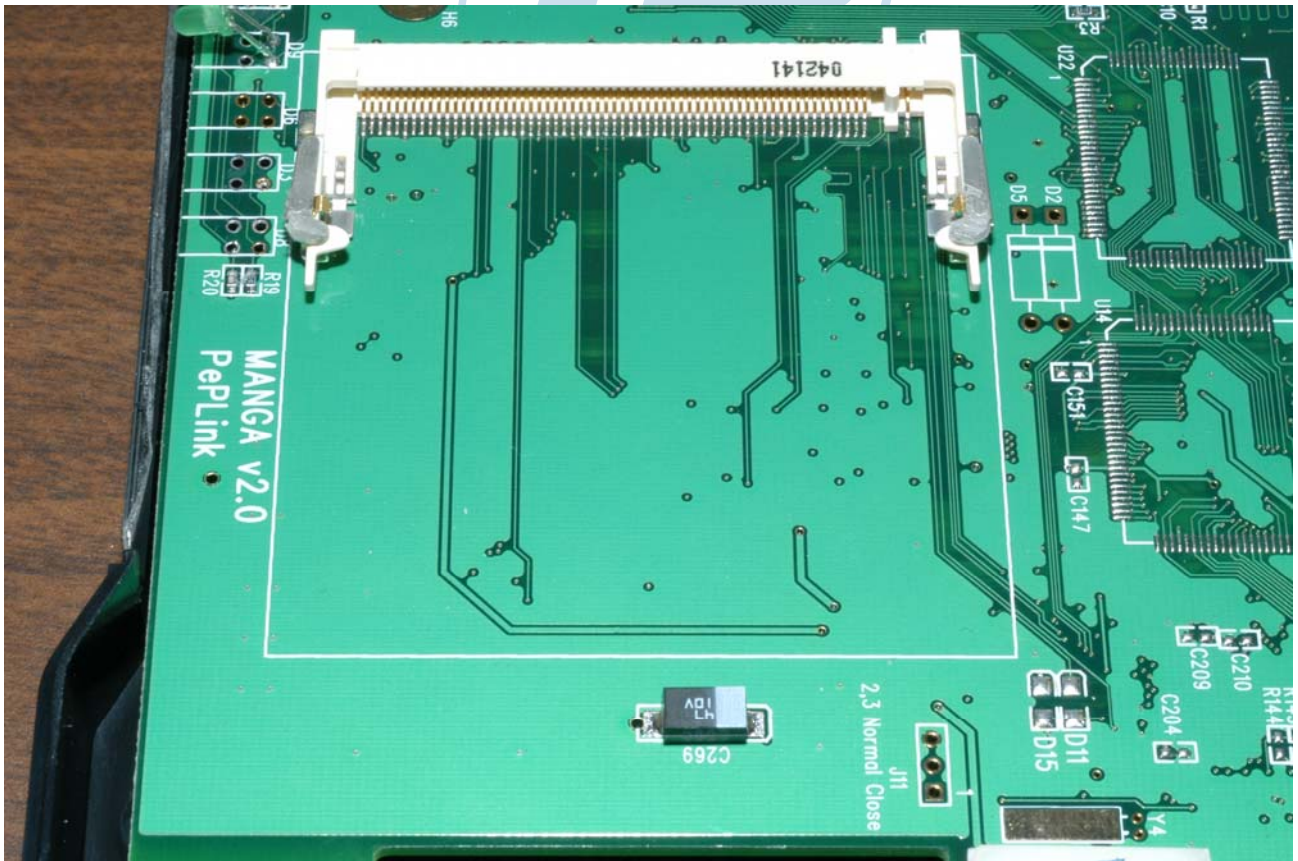
FIGURE 8: PLI Photograph Number 5405C2734LG-06 illustrates the information label removed from the transceiver printed circuit assembly installed on component side of the motherboard printed circuit assembly, MANGA v2.0.



FIGURE 9: PLI Photograph Number 5405C2734LG-07 illustrates the circuit side of the transceiver printed circuit assembly uninstalled from the motherboard printed circuit assembly, MANGA v2.0.



FIGURE 10: PLI Photograph Number 5405C2734SJ-08 illustrates the component side of the motherboard printed circuit assembly, MANGA v2.0 directly under the transceiver printed circuit assembly after removing the transceiver.



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FIGURE 11: PLI Photograph Number 5405C2734LG-21 illustrates the top cover with label surface and 9.0 VDC output connector of the wall adapter power supply, which provides power for the EUT.

Product :External Power Supply for EUT
(100-240 VAC input; 9 VDC output)
Model Number :NSA-0181S09US2
Serial Number :PLI 5405C2734-03
FCC ID Number :None
Manufacturer :NAZ Technology, Co., Ltd.Emachines



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FIGURE 12: PLI Photograph Number 5405C2734LG-23 illustrates the input power side of the wall adapter power supply, which provides power for the EUT.



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FIGURE 13: PLI Photograph Number 5405C2734LG-25 shows the top cover removed, exposing the circuit side of the Printed Circuit Assembly for the Wall adapter power supply assembly.

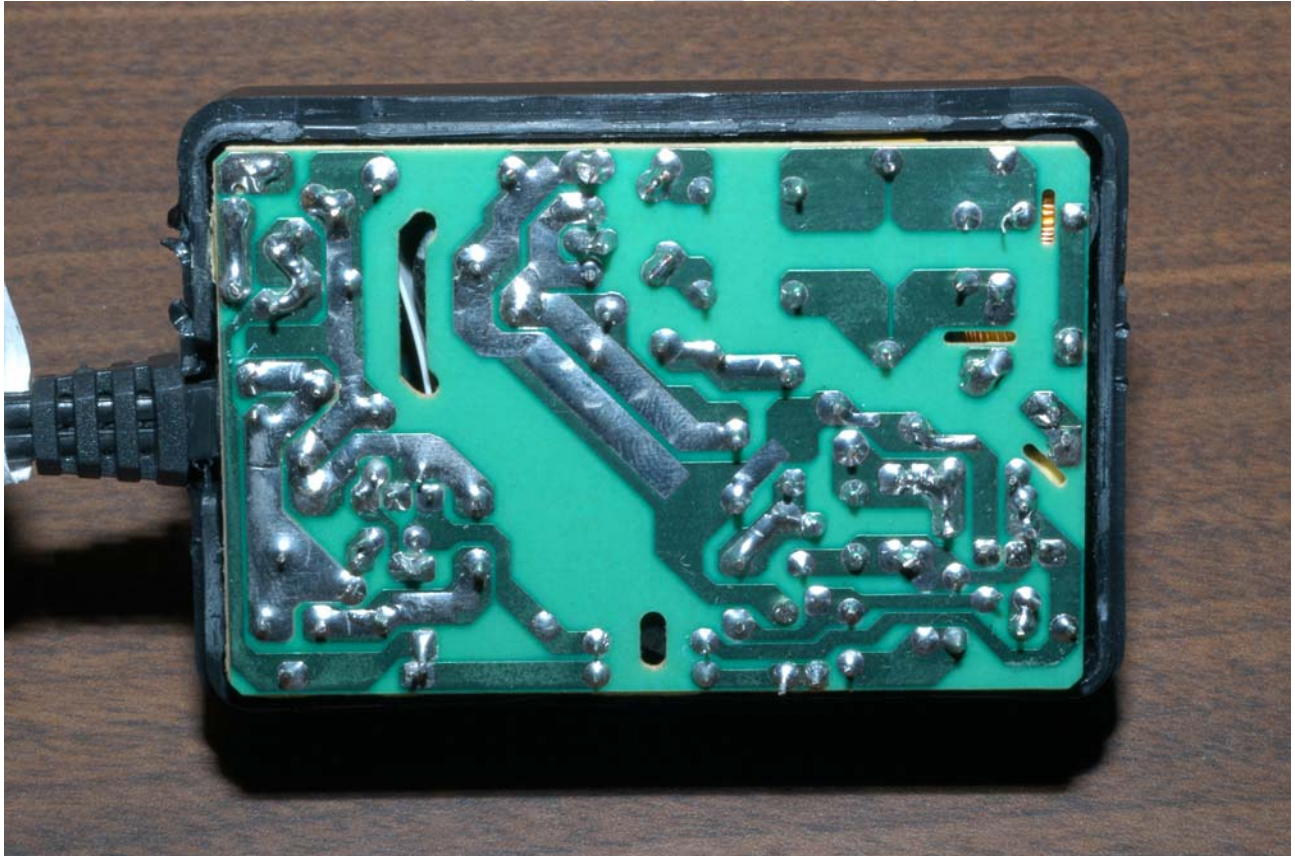


FIGURE 14: PLI Photograph Number 5405C2734LGLG-26 shows the EUT wall adapter with the enclosure removed from the printed circuit board. This view emphasizes the components on the Neutral side of the Printed Circuit Assembly. The Line and Neutral connections routed individually from the Printed Circuit Assembly to the contacts on the chassis.

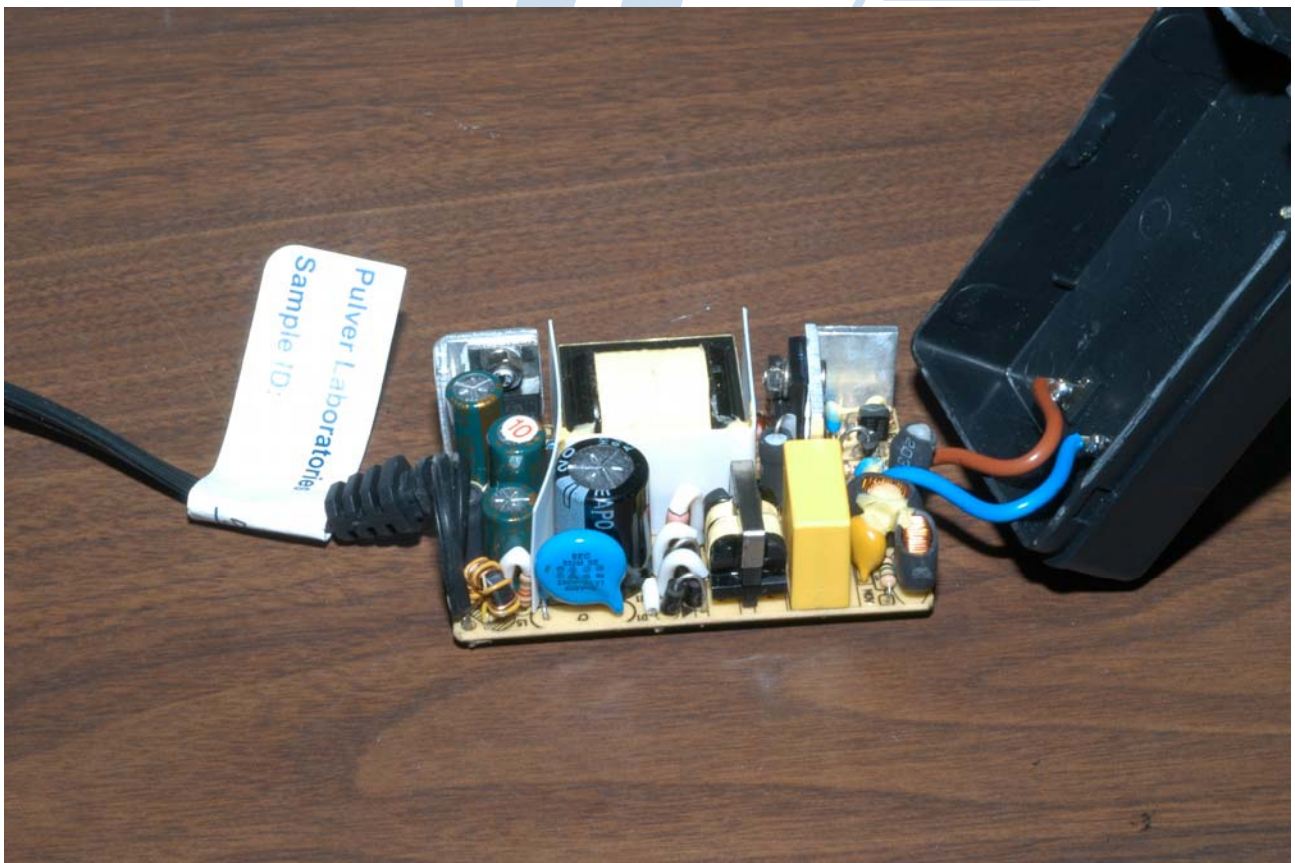


FIGURE 15: PLI Photograph Number 5405C2734LGLG-28 shows the EUT wall adapter with the enclosure removed from the printed circuit board. This view emphasizes the components on the Line side of the Printed Circuit Assembly. The Line and Neutral connections routed individually from the Printed Circuit Assembly to the contacts on the chassis.



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Clock Oscillators and Frequencies of Operation

Frequency	Component # / Location	Description of Use
25 MHz	Y1 connected to U4A	Main oscillator for KS8695P on motherboard
25 MHz	Y2 connected to U14A	MiniPCI #3 for WAN1
25 MHz	Y3 connected to U22A	MiniPCI #4 for WAN2

**Use this table to simplify locating the oscillators
in the accompanying schematics.**

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Equipment Under Test Orientation and Configuration

Refer to Pulver Laboratories Photograph Numbers
5405C2734SJ-01 and 5405C2734SJ-03



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:

Hardware Connection

- 3.3.1 The EUT, personal computer system, and peripherals (including monitor, keyboard, mouse, printer and modem) were placed on the test table.
- 3.3.2 The EUT was connected to the computer system via a CAT5 cable. A serial cable was also connected to the EUT, as a termination, since this port only used to setup systems at the factory or point of distribution. The EUT was connected to 120VAC power using an external wall adapter. The computer system and peripherals were also connected to 120VAC power.

Software Sequence

- 3.3.3 The computer system and peripherals were powered on; the PC operating system loaded. Once initialized, Internet Explorer was launched from the PC desktop and the IP address was entered into the address bar. When prompted, the username and password were entered. This sequence allows access to the PePLink firmware programs that begins searching for a (1) wireless access point, which is then (2) registered and authenticated to Radius server,

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which then (3) allows system to obtain an IP address from the DHCP server, which then (4) allows the MANGA Point to connect to the internet.

3.4 The following equipment list defines the system configuration:

EUT :Indoor Wireless Broadband Internet Access Gateway
Model Number :MANGA Point
Serial Number :None
FCC ID Number :SAN5405X (Pending)
Manufacturer :PePLink, Ltd.

Product :Personal Computer System
Model Number :ETower 300
Serial Number :R300009405513
FCC ID Number :FCC DOC Authorized
Manufacturer :Emachines

Product :Monitor
Model Number :JC-1572VMA
Serial Number :ZX7383282
FCC ID Number :A3DJC-1572VMA
Manufacturer :NEC

Product Name :Keyboard
Model Number :PC98
Serial Number :K890306016
FCC ID Number :FCC DOC Authorized
Manufacturer :Emachines

Product Name :Mouse
Model Number :PS/2 Mouse
Serial Number :7M0163562
FCC ID Number :IOWCM-PS2C
Manufacturer :Emachines

Product Name :Printer
Model Number :Deskject 630C
Serial Number :MX11S1Z1VY
FCC ID Number :FCC DOC Authorized
Manufacturer :Hewlett Packard Co.

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Product Name :Modem
Model Number :56SPX-2
Serial Number :020052155
FCC ID Number :FCC DOC Authorized
Manufacturer :Best Data

(Internal device)
Product Name :Digital Transmission System
Model Number :CNE 802.11b/g mini-PCI Card
Serial Number :_440_11104
FCC ID Number :Q72WLG
Manufacturer :Chung Nam Electronics Co., Ltd.

Product :External Power Supply for EUT
(100-240 VAC input; 9 VDC output)
Model Number :NSA-0181S09US2
Serial Number :PLI 5405C2734-03
FCC ID Number :None
Manufacturer :NAZ Technology, Co., Ltd.Emachines

- 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 and ICAN Class B
Date Data Collected	14-15 July 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

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Test Configuration #1

Frequency MHz	EMI Data dB μ V/M	ACF	Field Strength dB μ V/M	FCC Limit dB μ V/M	FCC Margin to Limit dB μ V/M
30 - 1000 MHz					
Horizontal					
57.28	40.50	-10.60	29.90	40.00	-10.10
58.35	46.40	-10.67	35.73	40.00	-4.27
62.55	41.50	-11.14	30.36	40.00	-9.64
63.68	42.00	-11.30	30.70	40.00	-9.30
66.75	46.20	-11.74	34.46	40.00	-5.54
79.95	45.80	-13.97	31.83	40.00	-8.17
191.85	39.80	-9.53	30.27	43.50	-13.23
200.03	50.10	-11.30	38.80	43.50	-4.70
250.05	37.80	-8.08	29.72	46.00	-16.28
270.13	48.80	-6.56	42.24	46.00	-3.76
325.50	40.40	-5.95	34.45	46.00	-11.55
335.55	39.40	-6.09	33.31	46.00	-12.69
420.90	35.50	-2.55	32.95	46.00	-13.05
435.90	42.00	-2.17	39.83	46.00	-6.17
520.80	41.30	-1.13	40.17	46.00	-5.83
590.83	43.80	-0.66	43.14	46.00	-2.86
771.28	38.30	1.61	39.91	46.00	-6.09



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Test Configuration #1

Frequency MHz	EMI Data dB μ V/M	ACF	Field Strength dB μ V/M	FCC Limit dB μ V/M	FCC Margin to Limit dB μ V/M
30 - 1000 MHz					
Vertical					
48.63	45.20	-8.77	36.43	40.00	-3.57
49.65	44.20	-8.79	35.41	40.00	-4.59
50.68	44.50	-8.87	35.63	40.00	-4.37
54.68	44.40	-9.27	35.13	40.00	-4.87
61.95	46.90	-9.90	37.00	40.00	-3.00
62.83	47.20	-9.94	37.26	40.00	-2.74
178.28	39.80	-4.34	35.46	43.50	-8.04
181.30	40.70	-4.30	36.40	43.50	-7.10
250.00	36.20	-3.17	33.03	46.00	-12.97
300.00	42.10	-1.94	40.16	46.00	-5.84
375.08	39.50	-0.39	39.11	46.00	-6.89
435.25	40.00	0.86	40.86	46.00	-5.14
520.53	35.70	2.57	38.27	46.00	-7.73
617.75	33.40	4.38	37.78	46.00	-8.22
760.03	33.40	7.15	40.55	46.00	-5.45
794.28	32.20	7.86	40.06	46.00	-5.94
900.03	30.20	9.94	40.14	46.00	-5.86
951.03	31.50	10.99	42.49	46.00	-3.51



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) and FCC (Federal Communications Commission 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 and ICAN Class B
Date Data Collected	14-15 July; 09 Aug 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

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Test Configuration #1

Frequency MHz	Line Data dBµV	Neutral Data dBµV	FCC / EN Limit dBµV	FCC / EN Margin to Limit (Line) dBµV	FCC / EN Margin to Limit (Neutral) dBµV
0.27	60.30	--	68.84	-8.54	--
0.51	42.30	--	56.00	-13.70	--
1.84	47.40	--	56.00	-8.60	--
4.59	49.80	--	56.00	-6.20	--
5.29	49.10	--	60.00	-10.90	--
7.13	48.00	--	60.00	-12.00	--
11.13	40.60	--	60.00	-19.40	--
12.56	43.30	--	60.00	-16.70	--
13.79	41.80	--	60.00	-18.20	--
14.27	39.60	--	60.00	-20.40	--
16.49	36.90	--	60.00	-23.10	--
18.68	36.60	--	60.00	-23.40	--
0.51	--	45.00	56.00	--	-11.00
1.19	--	42.30	56.00	--	-13.70
1.65	--	47.30	56.00	--	-8.70
1.71	--	47.80	56.00	--	-8.20
4.80	--	48.80	56.00	--	-7.20
5.12	--	46.20	60.00	--	-13.80
5.87	--	47.30	60.00	--	-12.70
7.16	--	45.00	60.00	--	-15.00
11.66	--	41.00	60.00	--	-19.00
12.62	--	45.80	60.00	--	-14.20
13.91	--	40.90	60.00	--	-19.10
14.18	--	39.20	60.00	--	-20.80



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) and Federal Communications Commission (FCC) Class B devices.
- 6.4 Graphs of PEAK conducted Electromagnetic Interference for frequency ranges on Line and Neutral are shown on the following pages.

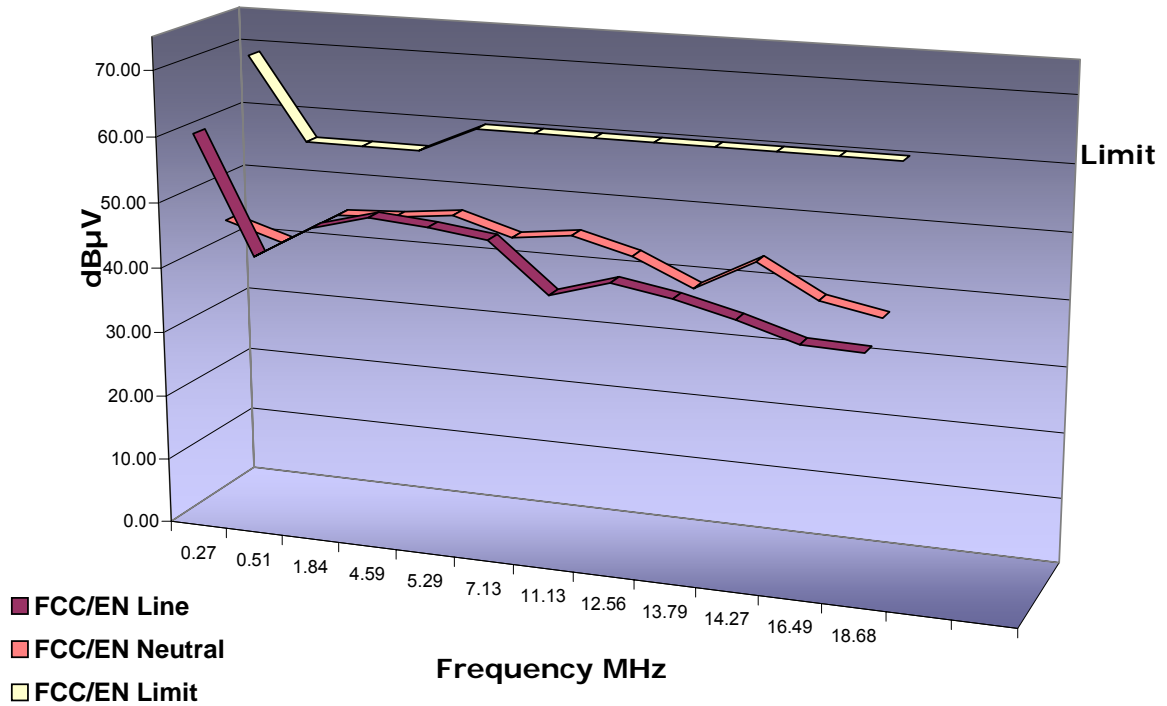
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- 6.5 The recorded conducted data utilized a quasi-peak measurement procedure. Hence, any differences between the graphs and the data are merely the differences between peak and quasi-peak measurements.
- 6.6 There are 33 AM and 56 FM radio stations 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.



Conducted EMI Data Graphic Configuration #1 (EN/FCC)



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Signature Page - Last Page of Report

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