# FCC PART 15 CLASS B

# EMI MEASUREMENT AND TEST REPORT

For

## PePLink Ltd.

2302, Tai Tung Building 8 Fleming Road, Wanchai, Hong Kong

**FCC ID: SAN24PS**

March 9, 2006

| **This Report Concerns:** | **Equipment Type:** |
|---|---|
| ☒ Original Report | Internet Access Router |

| | |
|---|---|
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| **Report Number:** | RSZ06030202 |
| **Test Date:** | November 7-21, 2005 |
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# GENERAL INFORMATION

## Product Description for Equipment Under Test (EUT)

The *PePLink Ltd.* 's product, model *PePLink Surf* or the "EUT" as referred to in this report was a Internet Access Router which measures approximately 13.7 cm L x 16.5 cm W x 12.5 cm H, rated input voltage: DC 5 V.

Adapter: manufacture: Switching Power Supply, model: S024AU0500300, input: 100~240V 47-63Hz 700 mA, output: 5.0 V 3000 mA

** The test data gathered are from production sample, serial number: 0511038, provided by the manufacturer.*

## Objective

The following test report is prepared on behalf of *PePLink Ltd.* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine compliance with FCC Part 15 Class B.

## Related Submittal(s)/Grant(s)

No related submittal(s).

## Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Lab Corp. (ShenZhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Test Facility

The Test site used by Bay Area Compliance Lab Corp. (ShenZhen) to collect radiated and conducted emission measurement data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China.

Test site at Bay Area Compliance Lab Corp. (ShenZhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Lab Corp. (ShenZhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm

## Host System Configuration List and Details

| Manufacturer | Description | Model | Serial Number | FCC ID |
|---|---|---|---|---|
| DELL | Motherboard | OWC297 | CN-OWC297-70821-564-00NI | DoC |
| DELL | Power | NPS-250KB D | CN-0H2678-17972-56E-80BM | DoC |
| Seagate | Hard Disk | ST340014A | 5JXK3GXE | DoC |
| DELL | 3.5' Floppy | N/A | CN-0N8893-69802-54Q-02P0 | DoC |
| Lite-ON | CD-Rom | LTN-489S | N/A | DoC |
| Intel | Ethernet | PRO 10/100 VE | N/A | DoC |

## Local Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number | FCC ID |
|---|---|---|---|---|
| DELL | PC | DELL 170L | CN-0TC670-70821-560-F4Q6 | DoC |
| DELL | Keyboard | SK-8110 | CN07N244-71616-56A-1B1E | DoC |
| DELL | Mouse | M071KC | 520027907 | DoC |
| DELL | LCD Monitor | 1505FP | Y4287-7168-571-GBSH | DoC |
| ProMOS | Memory | V826632K24SATG-C0 | 0525-K1933700 | DoC |
| Intel | CPU | Celeron D-2533 | N/A | DoC |
| HP | Laser Jet5L | C3941A | JPTVOB2337 | DoC |
| SAST | Modem | AEM-2100 | 293 | DoC |

## External I/O Cable

| Cable Description | Length (M) | From/Port | To |
|---|---|---|---|
| Shielded Detachable Keyboard Cable | 1.50 | Keyboard Port / Host | Keyboard |
| Shielded Detachable Mouse Cable | 1.50 | PS/2 Port / Host | Mouse |
| Shielded Detachable Printer Cable | 1.20 | Parallel Port / Host | Printer |
| Shielded Detachable Serial Cable | 1.20 | Serial Port / Host | Modem |
| Shielded Detachable VGA Cable | 1.50 | VGA Port / Host | Monitor |
| Shielded Detachable USB Cable | 1.50 | EUT | host PC |
| Unshielded Undetachable DC Cable with a core | 1.90 | EUT | Adapter |

# SYSTEM TEST CONFIGURATION

## Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

## EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by Bay Area Compliance Lab Corp. (ShenZhen) can exercise the EUT as data transferring between the EUT and the host.

## Special Accessories

The special Accessories were supplied by Bay Area Compliance Lab Corp. (ShenZhen).

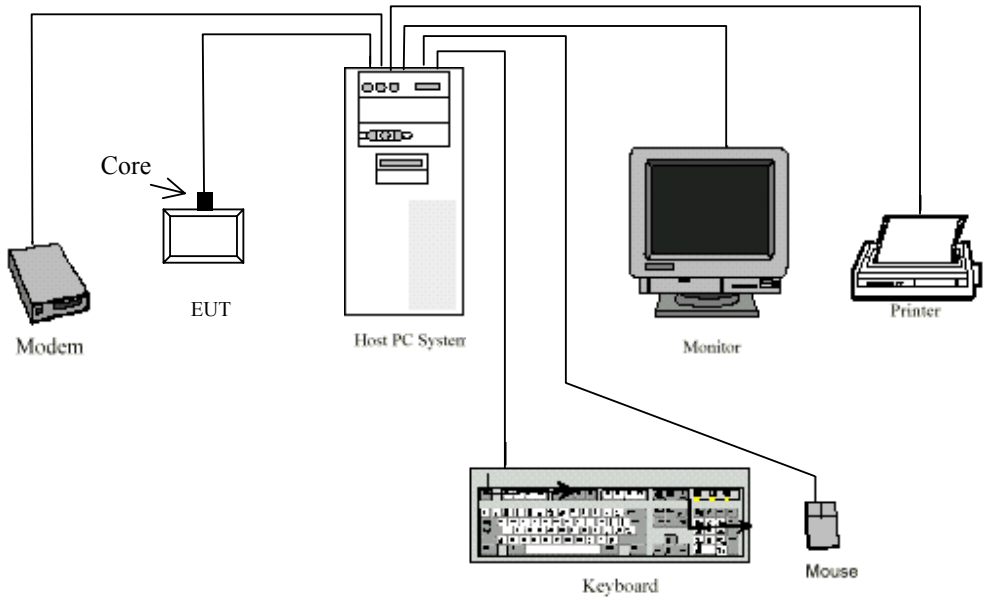
## Block Diagram/Schematics

Please refer to the Exhibit C.

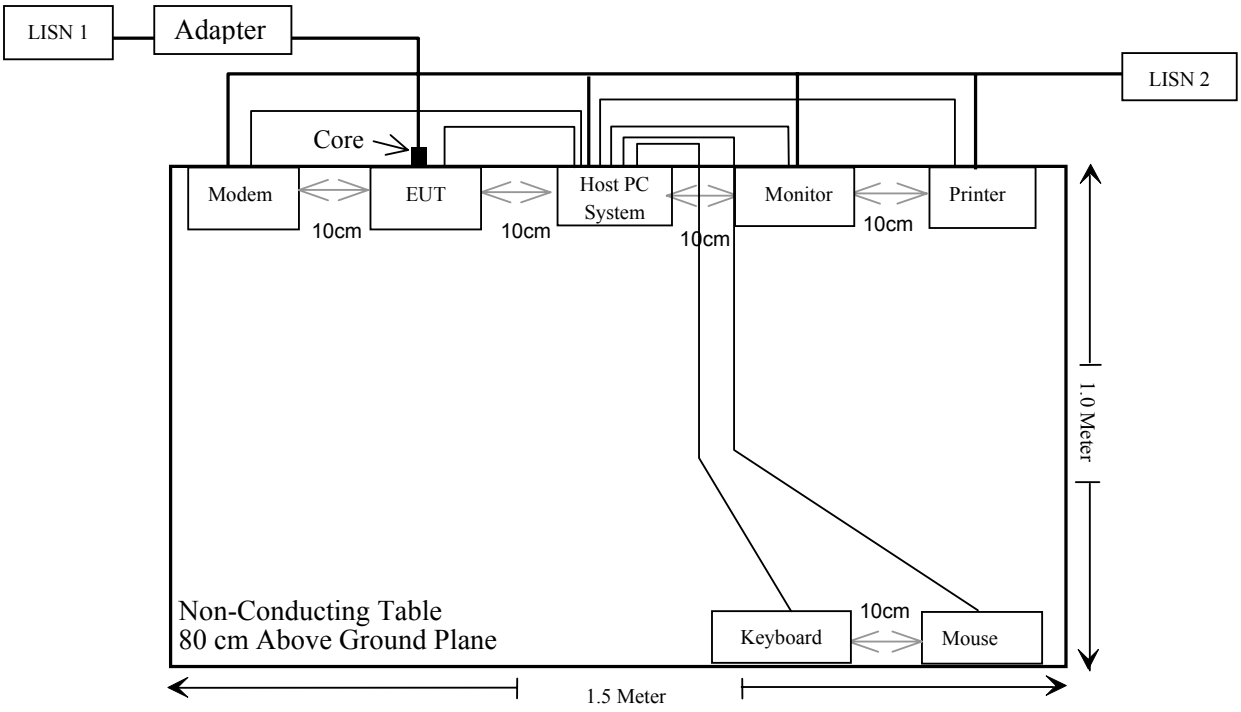
## Equipment Modifications

Bay Area Compliance Lab Corp. (ShenZhen) has not done any modification on the EUT.

## Configuration of Test Setup




## Block Diagram of Test Setup



# SUMMARY OF TEST REPORT

| RULE | DESCRIPTION | RESULTS |
|---|---|---|
| §15.107 | Conducted Emission | Compliant |
| §15.109 | Radiated Emission | Compliant* |
| §15.33 | Frequency of Investigation | Compliant, Note 1 |
| §15.27 | Special Accessories | Compliant |

Note 1: The highest clocks of the EUT was 32 MHz.

* Within measurement uncertainty

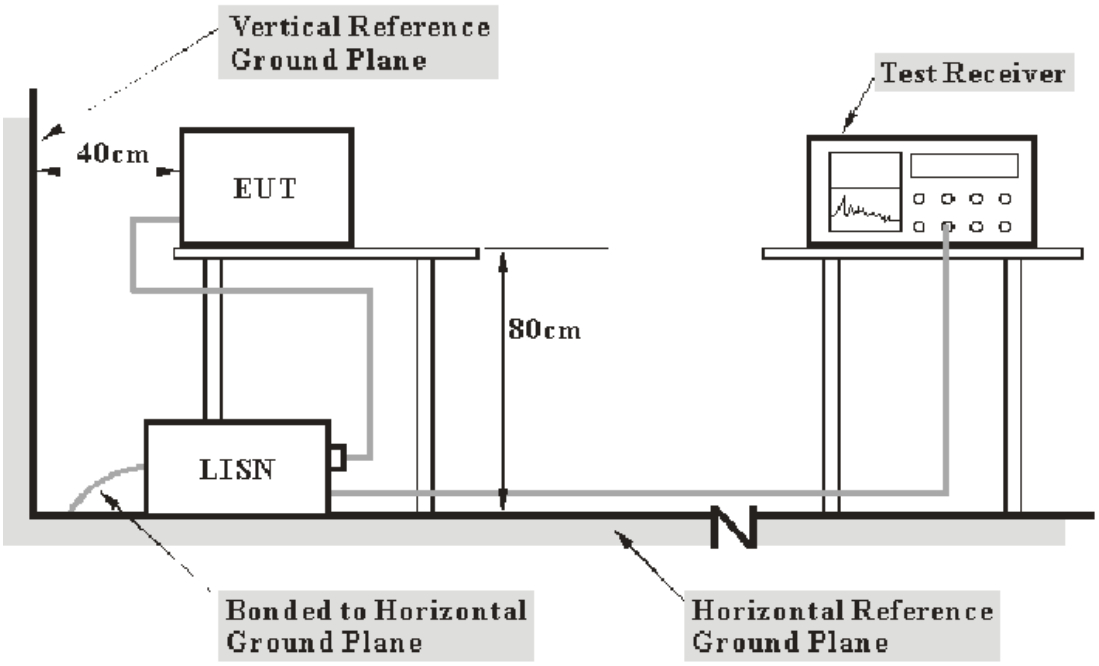
# §15.107 - CONDUCTED EMISSION

## Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Lab Corp. (ShenZhen) is ±2.4 dB.

## EUT Setup




Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

| ***Frequency Range*** | ***IFBW*** |
|---|---|
| 150 kHz – 30 MHz | 9 kHz |

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Com-Power | L.I.S.N. | LI-200 | 12005 | N/A | N/A |
| Com-Power | L.I.S.N. | LI-200 | 12008 | N/A | N/A |
| Rohde & Schwarz | EMI Test Receiver | ESCS30 | 830245/006 | 2005-1-26 | 2006-1-26 |
| Rohde & Schwarz | L.I.S.N. | ESH2-Z5 | 892107/021 | 2005-2-28 | 2006-2-28 |

***** Com-Power's LISN were used as the supporting equipment.
*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN, and all other support equipment power cords were connected to the outlet of the second LISN.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15 Class B, with the worst margin reading of:

**-8.7 dB** at **3.010 MHz** in the **Line** conductor mode.

## Test Data

### Environmental Conditions

| | |
|---|---|
| Temperature: | 25 ° C |
| Relative Humidity: | 55% |
| ATM Pressure: | 1000mbar |

*The testing was performed by Lisa Zhu on 2005-11-7.*

*Test Mode: Running*

| LINE CONDUCTED EMISSIONS | | | | FCC PART 15 CLASS B | |
|---|---|---|---|---|---|
| Frequency MHz | Amplitude dBμV | Detector QP/AV | Phase Line/Neutral | Limit dBμV | Margin dB |
| 3.010 | 47.30 | QP | Line | 56.00 | -8.70 |
| 2.880 | 42.10 | QP | Neutral | 56.00 | -13.90 |
| 0.845 | 41.60 | QP | Line | 56.00 | -14.40 |
| 0.945 | 31.60 | AV | Line | 46.00 | -14.40 |
| 1.740 | 40.60 | QP | Line | 56.00 | -15.40 |
| 1.245 | 40.50 | QP | Line | 56.00 | -15.50 |
| 1.420 | 40.40 | QP | Line | 56.00 | -15.60 |
| 0.945 | 40.30 | QP | Line | 56.00 | -15.70 |
| 2.880 | 29.50 | AV | Neutral | 46.00 | -16.50 |
| 1.420 | 29.30 | AV | Line | 46.00 | -16.70 |
| 2.195 | 38.70 | QP | Neutral | 56.00 | -17.30 |
| 0.795 | 28.60 | AV | Neutral | 46.00 | -17.40 |
| 1.120 | 37.80 | QP | Neutral | 56.00 | -18.20 |
| 1.740 | 27.40 | AV | Line | 46.00 | -18.60 |
| 0.160 | 27.30 | AV | Neutral | 46.00 | -18.70 |
| 0.795 | 37.20 | QP | Neutral | 56.00 | -18.80 |
| 0.335 | 40.30 | QP | Neutral | 59.33 | -19.03 |
| 0.160 | 46.10 | QP | Neutral | 65.46 | -19.36 |
| 3.010 | 26.50 | AV | Line | 46.00 | -19.50 |
| 1.245 | 26.50 | AV | Line | 46.00 | -19.50 |
| 0.335 | 27.40 | AV | Neutral | 49.33 | -21.93 |
| 1.120 | 22.60 | AV | Neutral | 46.00 | -23.40 |
| 0.845 | 22.00 | AV | Line | 46.00 | -24.00 |
| 2.195 | 19.90 | AV | Neutral | 46.00 | -26.10 |

## Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

# Conducted Emission Test
# FCC Part 15

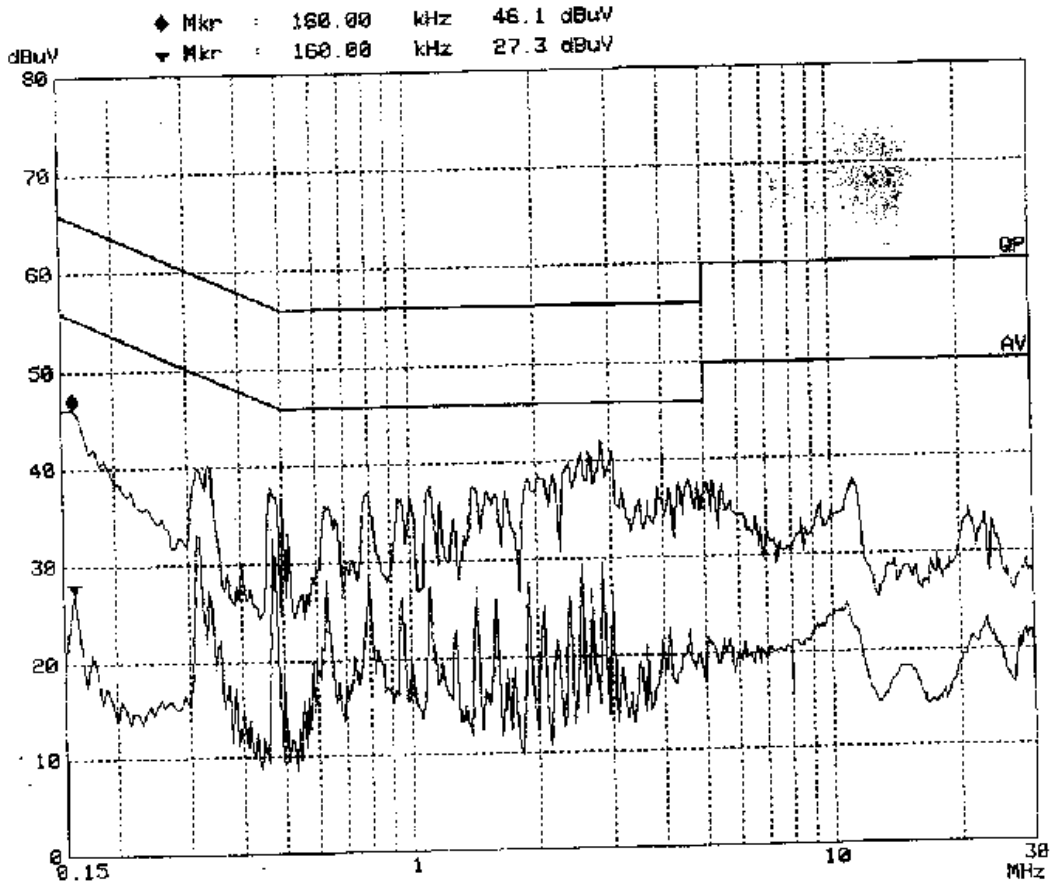
Manuf: PePLink
Op Cond: Running
Operator: Lisa
Test Spec: AC 120V/60Hz N
Comment: Temp:25
Humi:55%
Date: 07. Nov 05 14:08

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | |
|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp |
| 150k | 30M | 5k | 9k | PK+AV | 20ms | AUTO | LN OFF |

| Transducer No. | Start | Stop | Name |
|---|---|---|---|
| 1 | 9k | 30M | FACTOR |

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



# Conducted Emission Test
# FCC Part 15

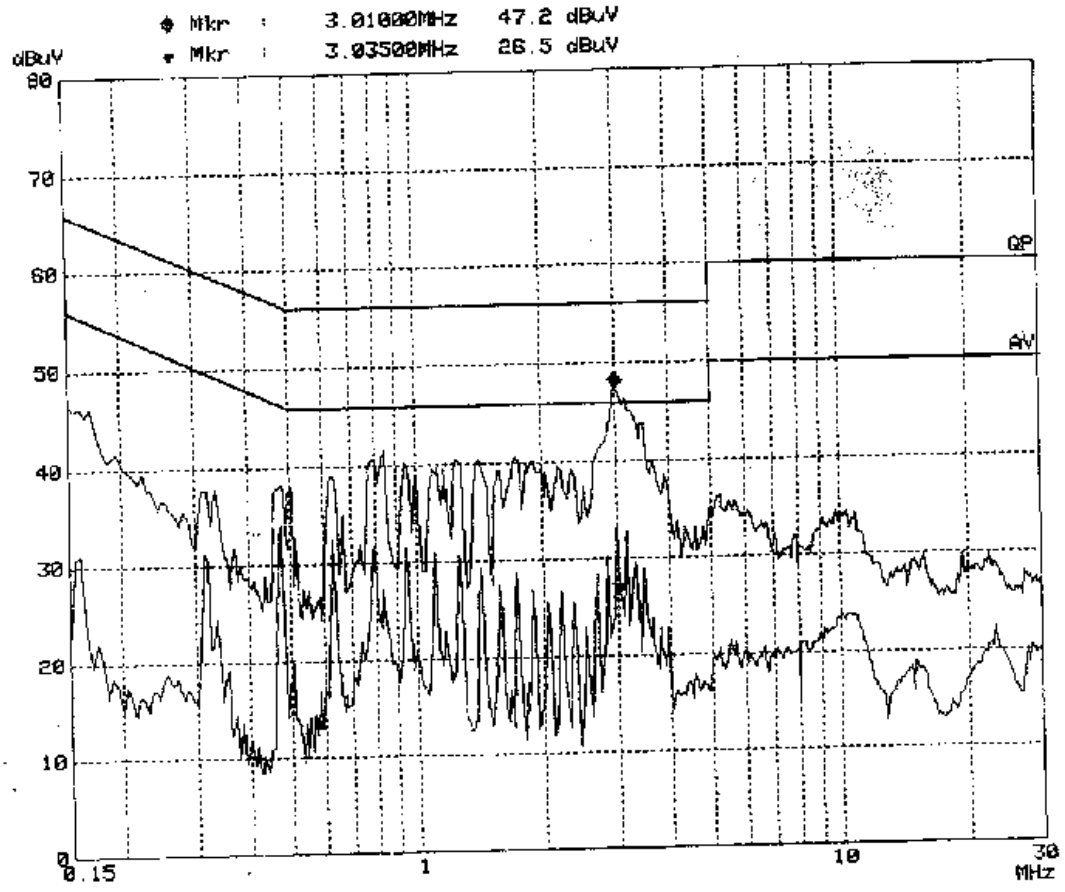
Manuf: PePLink
Op Cond: Running
Operator: Lisa
Test Spec: AC 120V/60Hz L
Comment: Temp:25
Humi:55%
Date: 07. Nov 05 14:27

Scan Settings (1 Range)

| Frequencies | | | Receiver Settings | | | | |
|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp |
| 150k | 30M | 5k | 9k | PK+AV | 20ms | AUTO | LN OFF |

| Transducer No. | Start | Stop | Name |
|---|---|---|---|
| 1 | 9k | 30M | FACTOR |

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



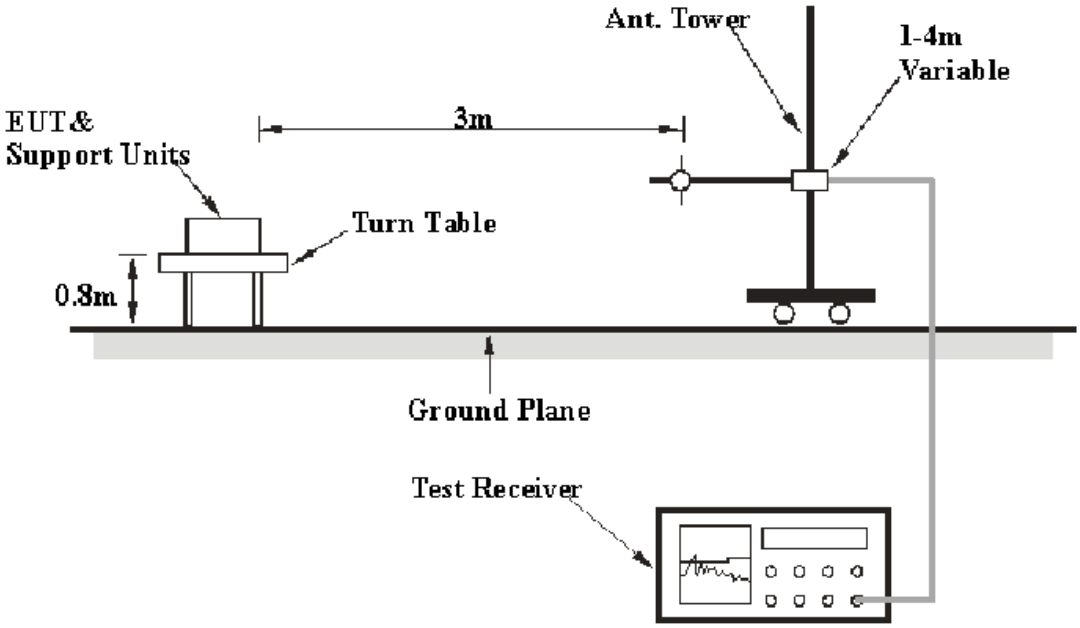
# §15.109 - RADIATED EMISSION

## Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Lab Corp. (ShenZhen) is ±4.0 dB.

## EUT Setup




The radiated emission tests were performed in the 3 meters chamber A test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

| ***Frequency Range*** | ***RBW*** | ***Video B/W*** | ***IF B/W*** |
|---|---|---|---|
| 30 – 1000 MHz | 100 kHz | 300 kHz | 120 kHz |
| Above 1GHz | 1MHz | 3MHz | 1MHz |

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30 | 849720/019 | 2005-12-21 | 2006-12-21 |
| HP | Amplifier | 8449B | 3008A00277 | 2005-8-17 | 2006-8-17 |
| Sunol Sciences | Horn Antenna | DRH-118 | A052604 | 2005-7-20 | 2006-7-20 |
| Rohde & Schwarz | EMI Test Receiver | ESCI | 100028 | 2005-8-17 | 2006-8-17 |
| HP | Amplifier | HP8447E | 1937A01046 | 2005-8-17 | 2006-8-17 |
| Sunol Sciences | Broadband Antenna | JB1 | A040904-2 | 2005-4-28 | 2006-4-28 |

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Procedure

For the radiated emissions test, the adapter was connected to the outlet of the first LISN and the host PC and all other support equipment power cords were connected to the outlet of the second LISN.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode.

Maximizing procedure was performed on the six (6) hightest emissions in the described configurations.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Meter Reading + Antenna Loss + Cable Loss- Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Class B Limit

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15 Class B, with the worst margin reading of:

**-2.3 dB** at **32.63 MHz** in the **Vertical** polarization.

## Test Data

### Environmental Conditions

| | |
|---|---|
| Temperature: | 18 °C |
| Relative Humidity: | 53 % |
| ATM Pressure: | 1015 mbar |

*The testing was performed by Hansen Hu on 2005-11-7.*

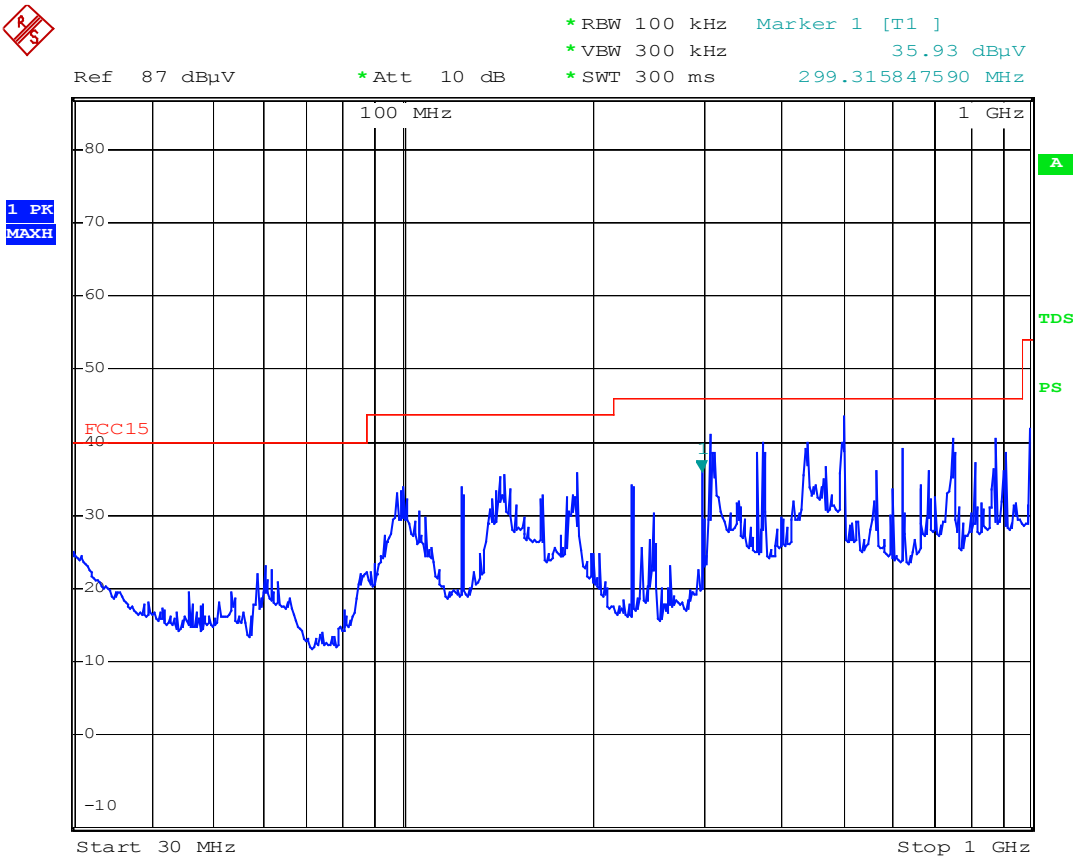
*Test mode: Running*

| INDICATED | | TABLE | ANTENNA | | CORRECTION FACTOR | | | CORRECTEI AMPLITUDI | FCC PART 15 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | Meter Reading | Angle | Height | Polar | Antenna Loss | Cable Loss | Amplifier Gain | Corr. Ampl. | Limit | Margin | Remark |
| MHz | dBμV/m | Degree | Meter | H/ V | dB | dB | dB | dBμV/m | dBμV/m | dB | |
| 32.63 | 41.8 | 45 | 1.2 | V | 24.1 | 0.6 | 28.8 | 37.7 | 40.0 | -2.3* | PK |
| 374.62 | 53.7 | 120 | 1.0 | V | 15.5 | 1.9 | 27.8 | 43.3 | 46.0 | -2.7* | PK |
| 502.93 | 51.4 | 45 | 1.2 | H | 18.0 | 2.4 | 28.6 | 43.2 | 46.0 | -2.8* | PK |
| 53.31 | 56.0 | 180 | 1.0 | V | 8.5 | 0.7 | 28.7 | 36.5 | 40.0 | -3.5* | PK |
| 502.93 | 50.0 | 60 | 1.0 | V | 18.0 | 2.4 | 28.6 | 41.8 | 46.0 | -4.2 | PK |
| 744.86 | 45.4 | 90 | 1.2 | V | 21.4 | 3.2 | 28.2 | 41.8 | 46.0 | -4.2 | PK |
| 309.99 | 53.0 | 270 | 1.0 | H | 13.9 | 1.6 | 27.7 | 40.8 | 46.0 | -5.2 | PK |
| 124.56 | 51.3 | 60 | 1.0 | V | 14.0 | 1.1 | 28.5 | 37.9 | 43.5 | -5.6 | PK |
| 750.10 | 43.6 | 360 | 1.2 | H | 21.6 | 3.2 | 28.1 | 40.3 | 46.0 | -5.7 | PK |
| 98.14 | 52.3 | 45 | 1.0 | H | 8.2 | 0.9 | 28.6 | 32.8 | 40.0 | -7.2 | PK |
| 145.35 | 49.4 | 270 | 1.2 | H | 13.4 | 1.1 | 28.5 | 35.4 | 43.5 | -8.1 | PK |
| 124.56 | 46.9 | 180 | 1.0 | H | 14.0 | 1.1 | 28.5 | 33.5 | 43.5 | -10.0 | PK |

* Within measurement uncertainty

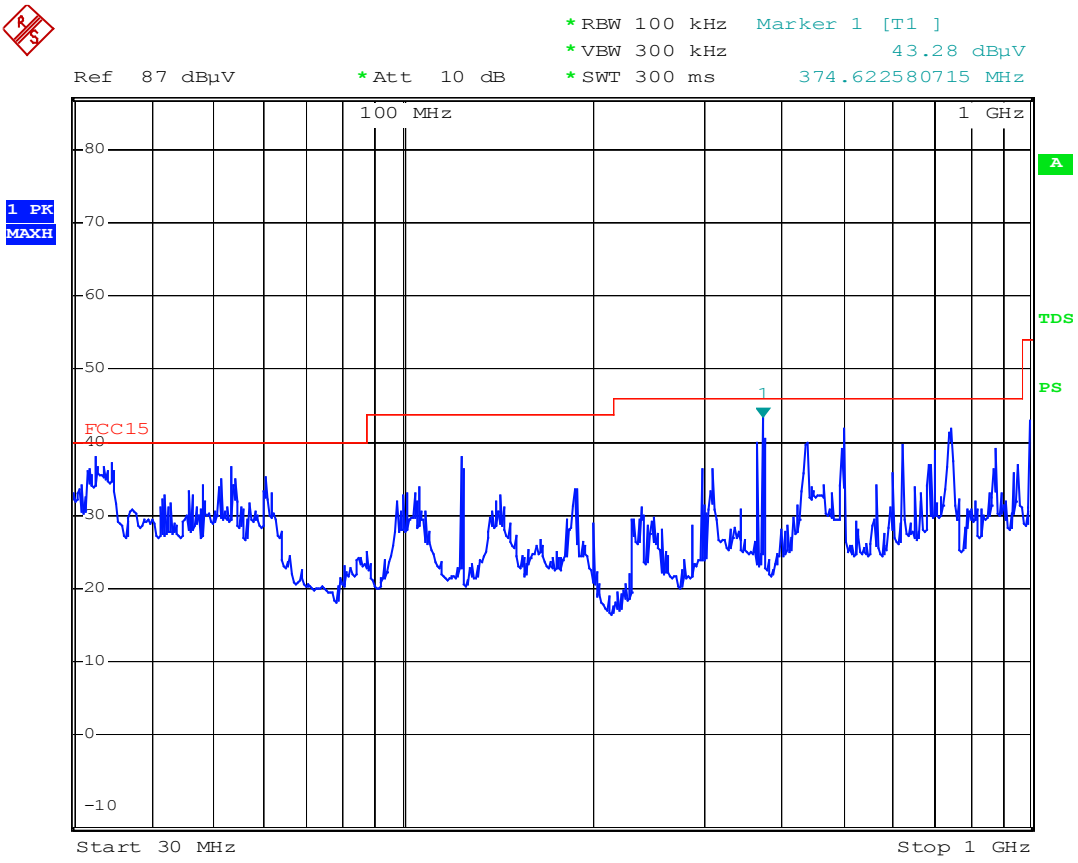
## Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.




Peplink winti winti2.4 horizontal

Date: 7.NOV.2005 09:30:30




Peplink vertical

Date: 7.NOV.2005 09:48:41