



TEST REPORT

EUT Number: 50-145

Equipment Under Test: Computer Server

Trade Name: HP

Model: HP ProLiant ML350

Serial Number: CN7707025H

Customer: Hewlett-Packard (Thailand) Ltd.
2nd-3rd Floor, U Chu Liang Building,
968 Rama IV Road, Silom, Bangrak
Bangkok 10500

Manufactured by: Hewlett-Packard (Thailand) Ltd.

Receipt Date: 28 February 2007

Date of Test: 2-6 March 2007

Issued Date of Report: 16 March 2007

Approved by

A handwritten signature in blue ink that reads 'Mr. Pannarut'.

MR. Montri Pannarut
Operation Manager

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CONTENTS

1.	SUMMARY OF TESTING	3
2.	TEST PLAN AND DEVIATIONS FROM STANDARD	4
2.1	Test Plan	4
2.2	Deviations from standard	4
3	TEST CONDITIONS	5
3.1	Operation Mode	5
3.2	Uncertainty Application	5
3.3	Equipment Classifications	7
3.4	Protection Classifications	7
3.5	Performance Criteria of Test Specification	7
3.6	EUT Function Monitoring	7
4	TEST SYSTEM CONFIGURATION	7
4.1	EUT Exercise Software	7
4.2	EUT Modifications	7
5.	EUT DESCRIPTION	8
5.1	EUT Specification	8
5.2	EUT Configuration	9
5.3	Peripherals Description	9
5.4	Cables Description	9
6	TEST SETUP AND RESULT	10
6.1	Test Item : Conducted Emission	10
6.2	Test Item : Radiated Disturbance	13
7	APPENDIX	17

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1. SUMMARY OF TESTING

This product was tested and complied according to following specification standard:

FCC Part 15 Radio frequency devices

Test Item	Test Specification	Test Method	Result
Conducted Emission	FCC Part 15 Subpart B Section 15.107(a)	ANSI C63.4-2003	PASS
Radiated Disturbance	FCC Part 15 Subpart B Section 15.109(a)	ANSI C63.4-2003	PASS

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2. TEST PLAN AND DEVIATIONS FROM STANDARD

2.1 Test Plan

No.	Test Item	Input Voltage	Mode	Test Port	Test Specification
1	Conducted Emission	110 Vac 60 Hz	A	AC Main	FCC Part 15 Subpart B Section 15.107(a)
2	Radiated Disturbance	110 Vac 60 Hz	A	Enclosure	FCC Part 15 Subpart B Section 15.109(a)

2.2 Deviations from standard

-

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3 TEST CONDITIONS

3.1 Operation Mode

A: Run Burn in Software (PC. Performance Test).

3.2 Uncertainty Application

3.2.1 Uncertainty application according to CISPR 16-4-2:2003 for Conducted Emission , Radiated Disturbance and Disturbance Power Testing.

Compliance or Non-Compliance with a disturbance limit was determined in the following manner

If U_{lab} is less than or equal to U_{cispr} in table 1, then:

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.
- Non-Compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} in table 1, then:

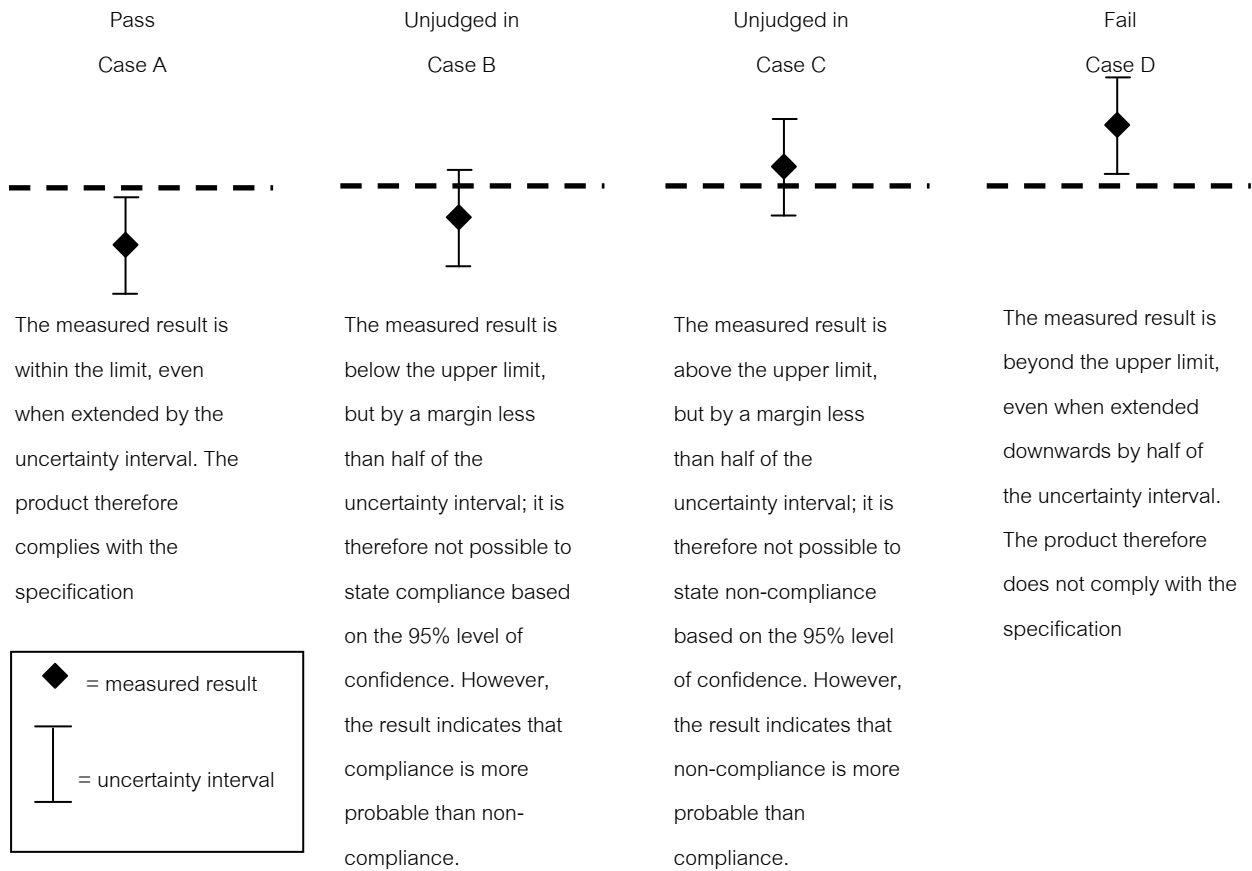
- Compliance is deemed to occur if no measured disturbance, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.
- Non-Compliance is deemed to occur if any measured disturbance, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

Table 1 – Values of U_{cispr}

Abbreviation	Testing system	Frequency range	U_{lab}	U_{cispr}	$U_{lab} - U_{cispr}$
CE	Conducted Emission	9 kHz - 150 kHz	3.02	4.00	-0.98
CE	Conducted Emission	150 kHz - 30 MHz	3.61	3.60	-0.01
RE	Radiated Disturbance	30 MHz – 1000 MHz	4.78	5.20	-0.42
PE	Disturbance Power	30 MHz – 300 MHz	2.50	4.50	-2.00

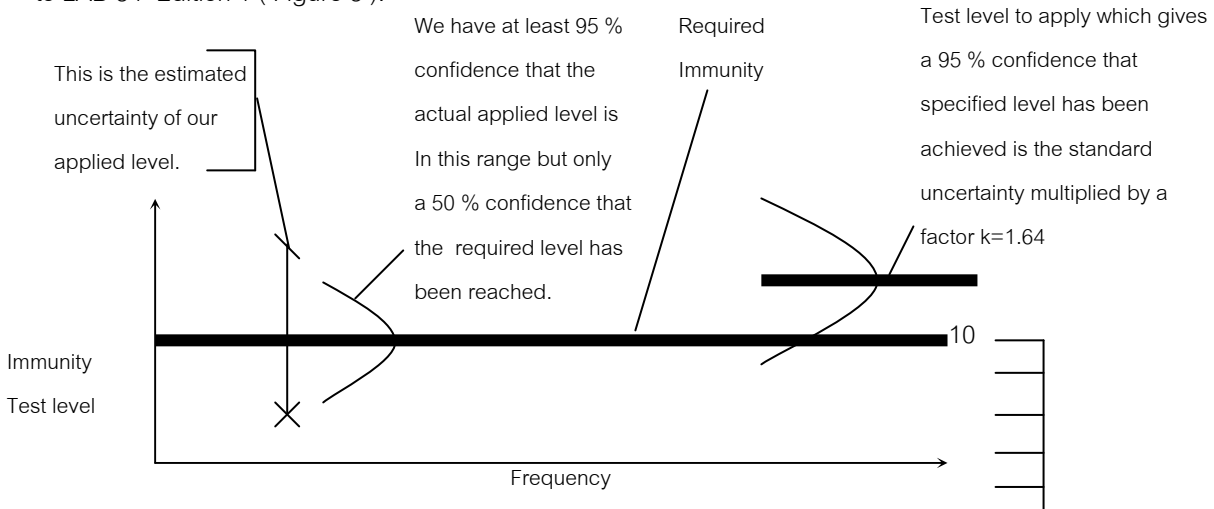
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3.2.2 Uncertainty Application according to LAB 34 Edition 1 (Figure 1) for other testing system.



3.2.3 Uncertainty Application for immunity testing.

Uncertainty of each test systems are applied for compliance with related standard according to LAB 34 Edition 1 (Figure 3).



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3.3 Equipment Classifications

Class B

3.4 Protection Classifications

-

3.5 Performance Criteria of Test Specification

-

3.6 EUT Function Monitoring

-

4 TEST SYSTEM CONFIGURATION

4.1 EUT Exercise Software

-

4.2 EUT Modifications

-

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5. EUT DESCRIPTION

5.1 EUT Specification

Input Voltage	110 Vac / 60 Hz
Input Current/Power	≤ 16 A
Clock/Oscillator	1.6 GHz

No.	Component Name	Specification
1	Processor	One Processor (Expandable to Two Processors) Intel Xeon 5110 (1.6Ghz, 80 Watts, 1066 MHz FSB) 4MB (1 x 4MB) Level 2 cache
2	Mainboard	Intel 5000Z Chipset
3	Memory	4GB (4 x 1GB) PC2-5300 Fully Buffered DIMMS (DDR2-667)
4	Hard Disk	2 Disks x HP 72GB SAS 10K SFF Hard Disks
5	Optical Drive	HP16X DVD-ROM drive
6	Raid Controller	Smart Array E200i/64 Controller (RAID 0/1/1+0)
7	Graphics	Integrated ATI ES 1000 Video Controller with 16MB SDRAM Video Memory
8	MONITOR	LCD 17" H782F Resolution:1280x1024@75Hz,Pixel Pitch (mm):0.264,Number of Colors:16.2M, Active Area (mm):338x275 HP L1706 17" TFT Flat Panel Monitor
9	KEYBOARD	Thai & English keyboard PS/2
10	MOUSE	Optical Mouse PS/2
11	CASE	Tower Form Factor
12	POWER SUPPLY	800 Watt-CE Mark Compliant Hot Plug Power Supply (1000 Watt high line)
13	LAN	Embedded NC373i Multifunction Gigabit Server Adapter
14	Expansion Slot	6 x Hot-Plug (SFF) 2.5" SAS/SATA Drive Bays, 6 expansion slots: One 64-bit/133-MHz PCI-X, Two 64-bit/100-MHz PCI-X, Three x4 PCI Express (with x8 connectors) and Six USB ports
15	I/O Port	Serial x 1, Mouse x 1, Graphics x 1, Keyboard x 1, Network RJ-45 x 2 (1 dedicated for iLO 2), USB 2.0 Ports x 6 (2 front, 2 rear, 2 internal)
16	OS Supported	Microsoft Windows Server 2003/R2 (Standard, Web, and Enterprise Editions) Microsoft Windows Small Business Server 2003 Microsoft Windows 2000 Server and Advanced Server

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5.2 EUT Configuration

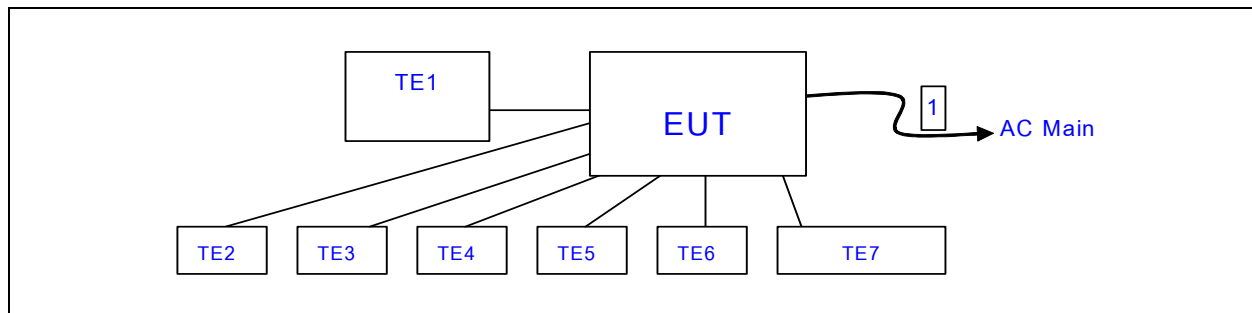


FIGURE 1 - EUT Configuration.

5.3 Peripherals Description

Diagram	Equipment name	Trade Name	Model	Serial Number
TE1	Printer	HP	L1706	-
TE2	Mouse	HP	M-UV69a	-
TE3-TE6	Mouse	Microsoft	Mouse Optical 1.1A	-
TE7	Keyboard	HP	KB-0316	B94290LVBTO0BI

5.4 Cables Description

Ref	Cable Type	Shield	Length (meters)	Ferrite	Connector	Connection Point 1	Connection Point 2
1	AC Power line	No	1.0	No	AC	EUT	AC Supply

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6 TEST SETUP AND RESULT

6.1 Test Item : Conducted Emission

6.1.1 Test Setup

- Test Specification

See 1 and 2.1

- Test Equipment

Equipment Name	Manufacture	Model	S/N	Traceability	Cal date
EMI Test Receiver (Display Unit)	Rohde & Schwarz	ESCI	1166.5950.03	DKD	06-03-2006
LISN1	R&S	ESH2-Z5	831886/009	DKD	16-02-2006
LISN2	PMM	L3-64	0000J90201	DKD	26-10-2006

- Customer's Equipment

Equipment Name	Manufacture	Model	S/N	Traceability	Cal date
-	-	-	-	-	-

- Test Uncertainty: ± 3.61 dB

- Test Location: TRM-001

- Test Environment

Temperature (°C)	23	Humidity (%)	47
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- Test Setup Description

The disturbance voltage at the main terminals and telecommunication ports testing measurements were performed with the EMI receiver to observe the emission characteristics and to identify the frequency of emission that had the highest amplitude related to the EUT configuration for the disturbance voltage testing.

The EUT was placed on the 80 cm height non-metallic table in the shielded room. The EUT was tested PC performance by Burn in software. The power line of the EUT was connected to the LISN, which was located in the shielded room. The EMI receiver in the control room measured the noise signals from the EUT. The testing method and the EUT setup were performed according to ANSI C63.4-2003. The EUT configuration for the disturbance voltage at the main terminals testing is shown in FIGURE 2 and 3, respectively.

● Test Picture

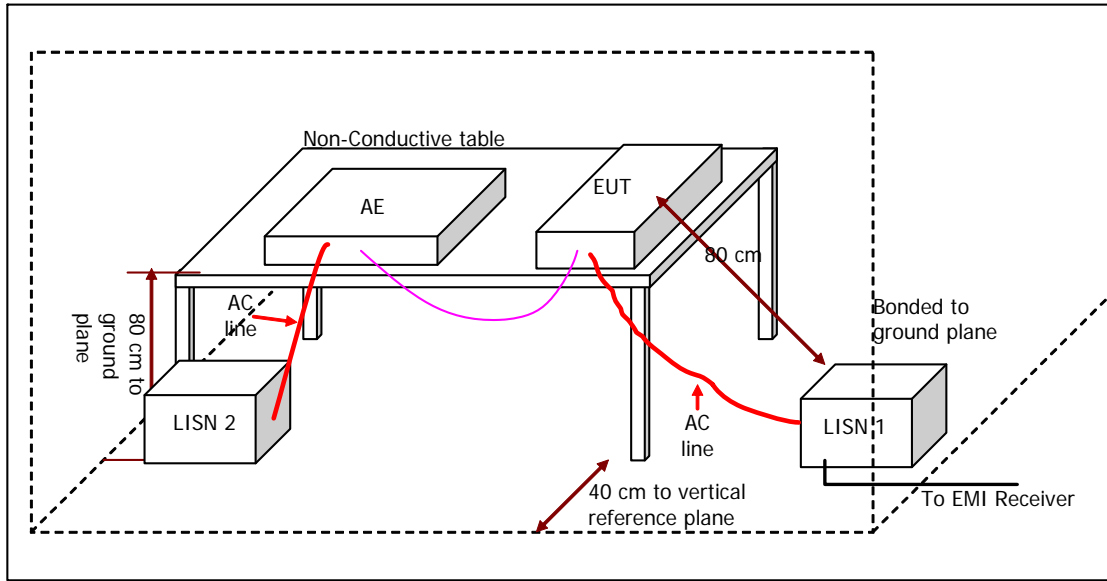


FIGURE 2 - The test setup diagram



FIGURE 3 - The test setup picture.

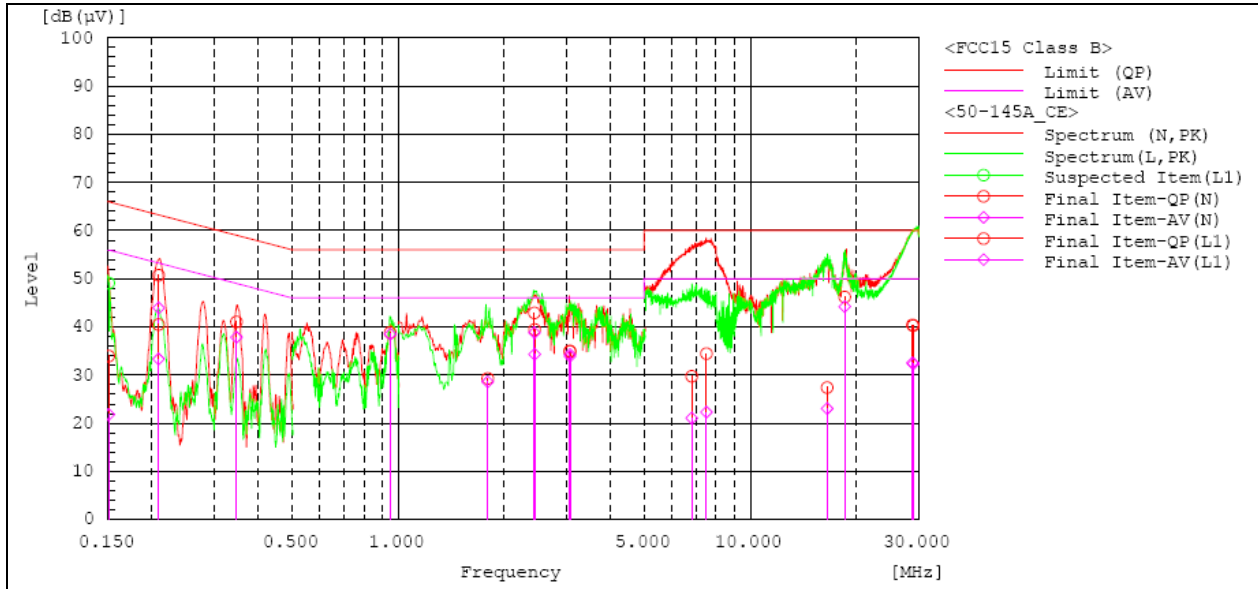
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6.1.2 Test Result

Measurement Port	AC Main	Operation Mode	A (See 3.1)
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Test Result for Neutron and Line1



Measurement Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB (µV)]	Reading AV [dB (µV)]	c.f [dB]	Result QP [dB (µV)]	Result AV [dB (µV)]	Limit QP [dB (µV)]	Limit AV [dB (µV)]	Margin QP [dB]	Margin AV [dB]
1	28.89977	39.6	31.7	0.8	40.4	32.5	60.0	50.0	19.6	17.5
2	7.51348	33.8	21.7	0.6	34.4	22.3	60.0	50.0	25.6	27.7
3	3.07541	34.6	33.9	0.4	35.0	34.3	56.0	46.0	21.0	11.7
4	2.44119	39.0	33.9	0.4	39.4	34.3	56.0	46.0	16.6	11.7
5	0.34758	40.8	37.7	0.2	41.0	37.9	59.0	49.0	18.0	11.1
6	0.20904	50.5	43.7	0.2	50.7	43.9	63.2	53.2	12.5	9.3

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB (µV)]	Reading AV [dB (µV)]	c.f [dB]	Result QP [dB (µV)]	Result AV [dB (µV)]	Limit QP [dB (µV)]	Limit AV [dB (µV)]	Margin QP [dB]	Margin AV [dB]
1	29.04125	39.0	31.1	1.3	40.3	32.4	60.0	50.0	19.7	17.6
2	18.5522	45.0	43.0	1.2	46.2	44.2	60.0	50.0	13.8	5.8
3	16.54072	26.3	21.9	1.1	27.4	23.0	60.0	50.0	32.6	27.0
4	6.82296	29.2	20.6	0.5	29.7	21.1	60.0	50.0	30.3	28.9
5	3.07691	34.5	33.5	0.4	34.9	33.9	56.0	46.0	21.1	12.1
6	2.43749	42.5	38.4	0.4	42.9	38.8	56.0	46.0	13.1	7.2
7	1.79723	29.0	28.3	0.3	29.3	28.6	56.0	46.0	26.7	17.4
8	0.94981	38.5	38.2	0.3	38.8	38.5	56.0	46.0	17.2	7.5
9	0.20883	40.3	33.1	0.2	40.5	33.3	63.3	53.3	22.8	20.0
10	0.15071	33.7	21.6	0.2	33.9	21.8	66.0	56.0	32.1	34.2

Tested by: MR. Marut HniHnae

Result: Pass

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6.2 Test Item : Radiated Disturbance

6.2.1 Test Setup

● Test Specification

See 1 and 2.1

● Test Equipment

Equipment Name	Manufacture	Model	S/N	Traceability	Cal date
EMI Test Receiver (Display Unit)	Rohde & Schwarz	ESMI	829179/008	UKAS	30-03-2006
EMI Test Receiver (Analyzer Unit)	Rohde & Schwarz	ESMI	829179/010	UKAS	30-03-2006
Bilog Antenna	Schaffner	CBL6141A	4146	UKAS	24-07-2006
Double Rigid Horn Antenna	EMCO	3115	96104996	NIST	23-02-2007

● Customer's Equipment

Equipment Name	Manufacture	Model	S/N	Traceability	Cal date
-	-	-	-	-	-

● Test Uncertainty: ± 4.78 dB

● Test Location: TRM-002

● Test Environment

Temperature (°C)	24	Humidity (%)	60
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● Test Setup Description

The radiated emission measurement was performed with EMI receiver to observe the emission characteristic and identify the frequency of emission that has the highest amplitude relative to limit by operating the EUT with a typical configuration. The EUT configuration, cable configurations of operation are determined for producing the maximum level of emissions.

The EUT was placed on the 80 cm height non-metallic table on 1 m radius turntable. The EUT was set on a real operation-mode, read-write disk, hard disk, memory, display on the screen and simulate the communication signal. The Burn-in software was used for control the functions of the EUT.

Frequencies below 1000MHz

The Bi-Log antenna (30 MHz – 2GHz) was used for received the noise of EUT and put on the antenna mast, which they were in side the semi-anechoic chamber. The testing method and the EUT setup were performed according to ANSI C63.4-2003. The EUT configuration setup is shown in figures 4 and 5, respectively.

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Frequencies above 1000MHz

The Double Rigid Horn antenna (1GHz-18GHz) was used for received the noise at EUT and put on the antenna 1 m above ground plane (Cause of the antenna bandwidth is less than 30 degree, therefore the measurement above 1m don't necessary to test). They were in side the semi-anechoic chambers

● **Test Picture**

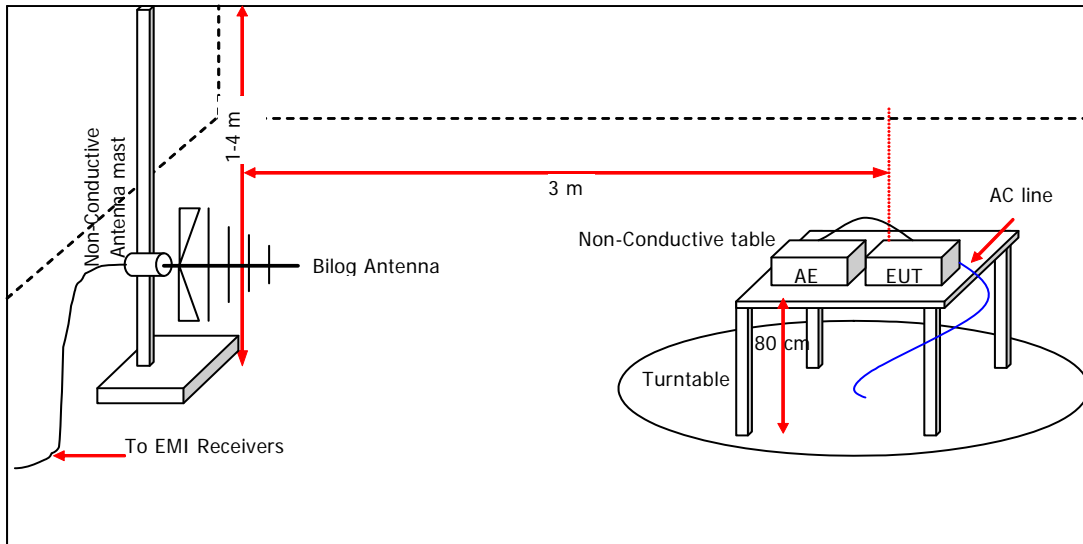


FIGURE 4 - The test setup diagram

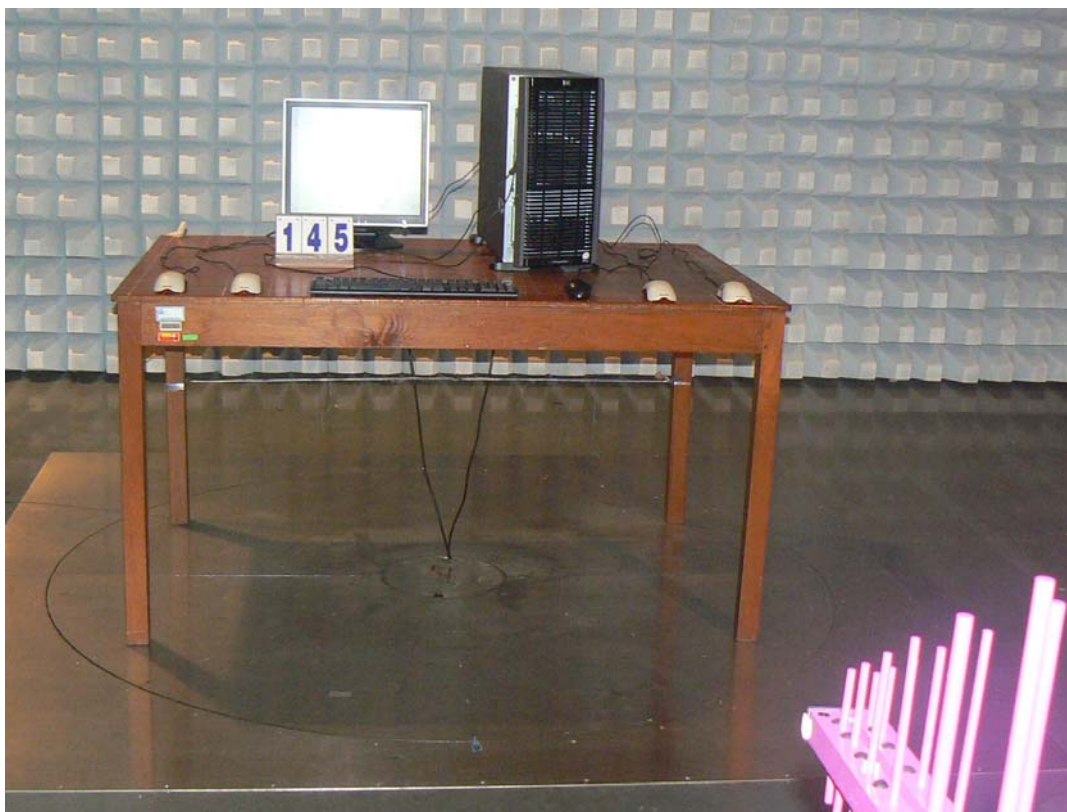


FIGURE 5 - The test setup picture.

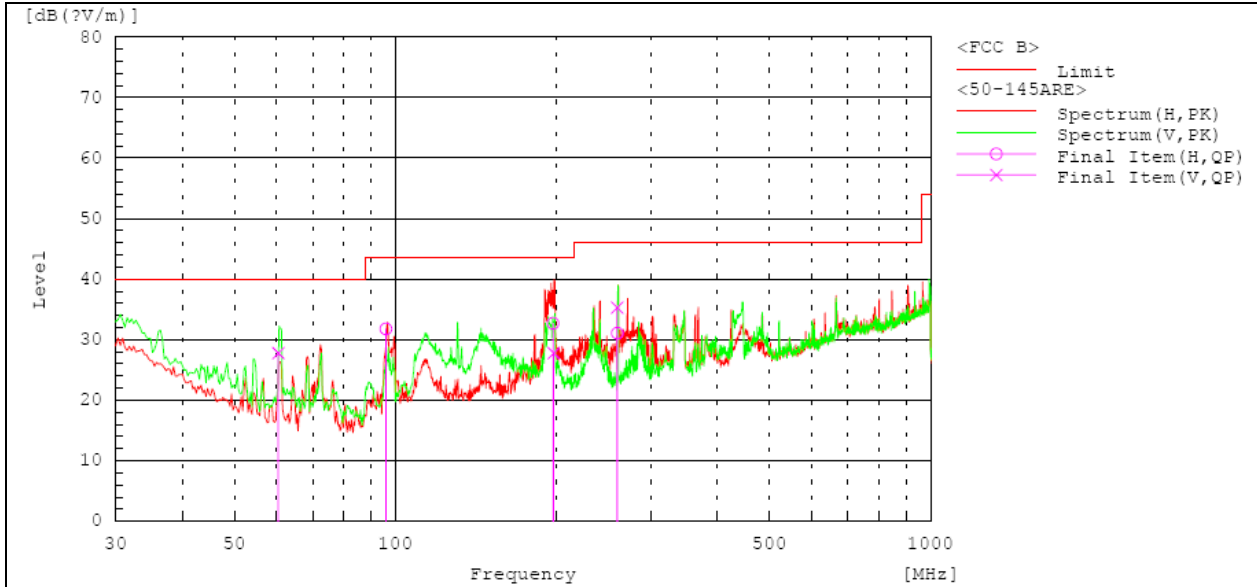
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6.2.2 Test Result

Measurement Port	Enclosure	Operation Mode	A (See 3.1)
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Test result for vertical polarization and Horizontal polarization



Measurement Result

No.	Frequency [MHz]	(P)	Reading QP [dB (?V)]	c.f [dB (1/m)]	Result QP [dB (?V/m)]	Limit [dB (?V/m)]	Margin QP [dB]	Height [cm]	Angle [?]
1	60.393	V	38.2	-10.4	27.8	40.0	12.2	100.0	322.0
2	197.544	V	35.2	-7.4	27.8	43.5	15.7	100.0	285.0
3	259.696	V	39.6	-4.3	35.3	46.0	10.7	159.0	159.0
4	95.964	H	41.8	-10.0	31.8	43.5	11.7	357.0	265.0
5	196.950	H	40.2	-7.5	32.7	43.5	10.8	153.0	142.0
6	259.701	H	35.4	-4.3	31.1	46.0	14.9	100.0	52.0

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Frequencies above 1GHz

MEASUREMENT RESULT OF PEAK DETECTOR (Horizontal)

Frequency (GHz)	Level (dBµV/m)	Limit (dBµV)	Margin (dB)
1.02	24.70	53.9	29.20
1.09	23.71	53.9	30.20
1.15	22.14	53.9	31.77
1.50	34.10	53.9	19.80
1.60	25.37	53.9	28.53
1.80	22.40	53.9	31.50
2.10	24.59	53.9	29.31
2.40	25.41	53.9	28.49
3.00	20.03	53.9	33.87

MEASUREMENT RESULT OF PEAK DETECTOR (Vertical)

Frequency (GHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1.20	27.32	53.9	26.58
1.33	27.88	53.9	26.02
1.42	25.07	53.9	28.83
1.58	29.26	53.9	24.64

Note

- The frequencies above 1 GHz up to fifth harmonic of the internal clock were measured.
- The level of frequencies above 3.0 GHz is very small compared to the noise floor level then the signal cannot display.

Result: Pass

Tested by: MR. Marut Hnihnae

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7 APPENDIX

FCC ID label location information

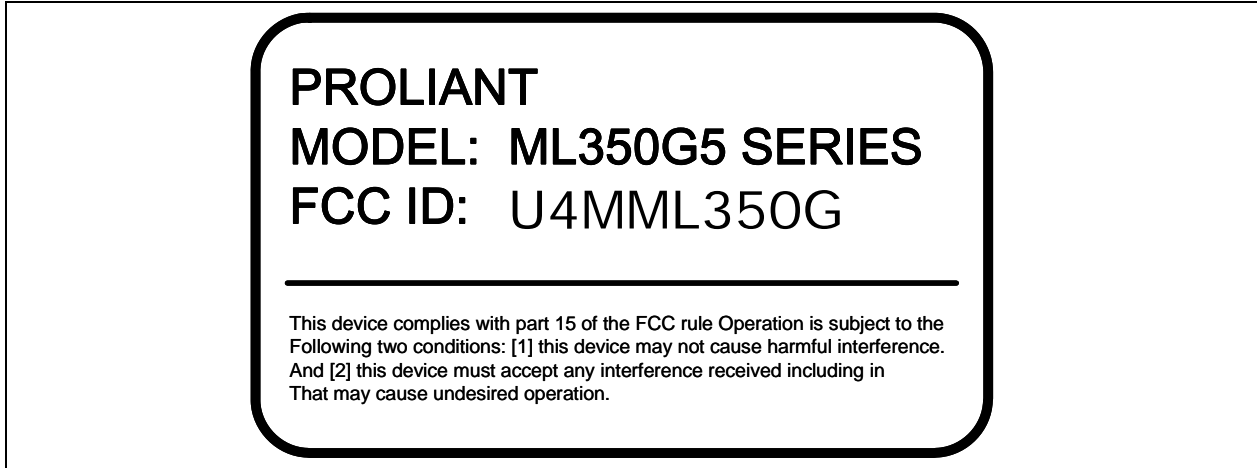


FIGURE 6 - FCC ID Label



FIGURE 7 - FCC ID Label Located

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FIGURE 8 – External Photographs (CPU Case)

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Front

Rear



Left

Right

FIGURE 9 – External Photographs (Monitor)

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FIGURE 10 - Mouse



FIGURE 11 – Key board

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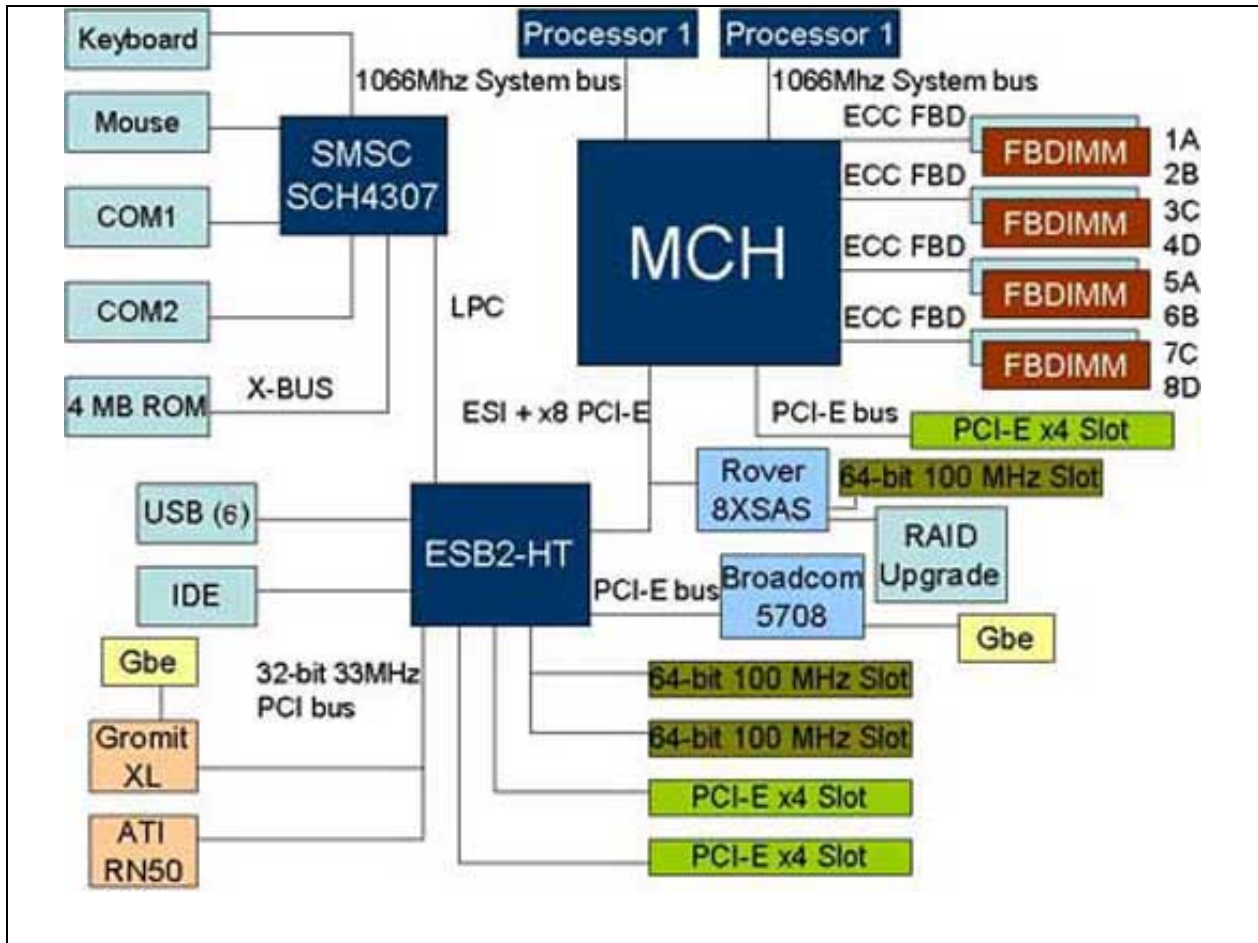


FIGURE 12 - EUT Block Diagram

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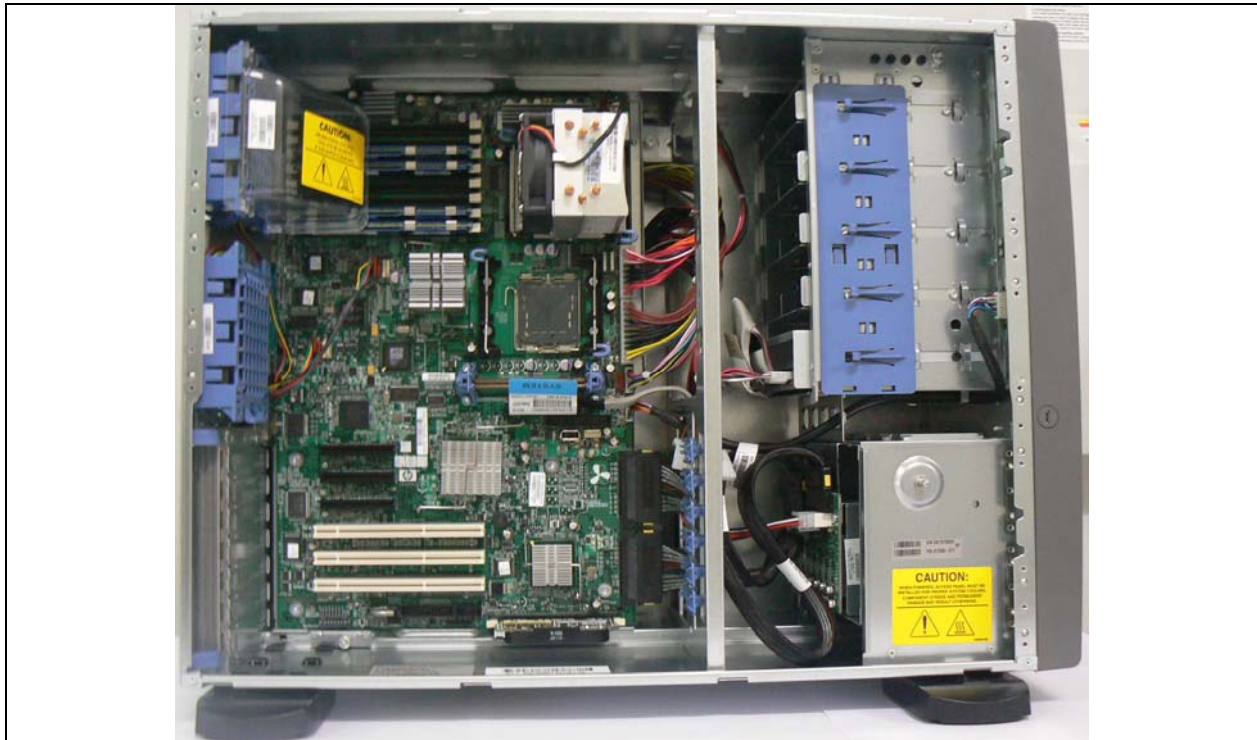
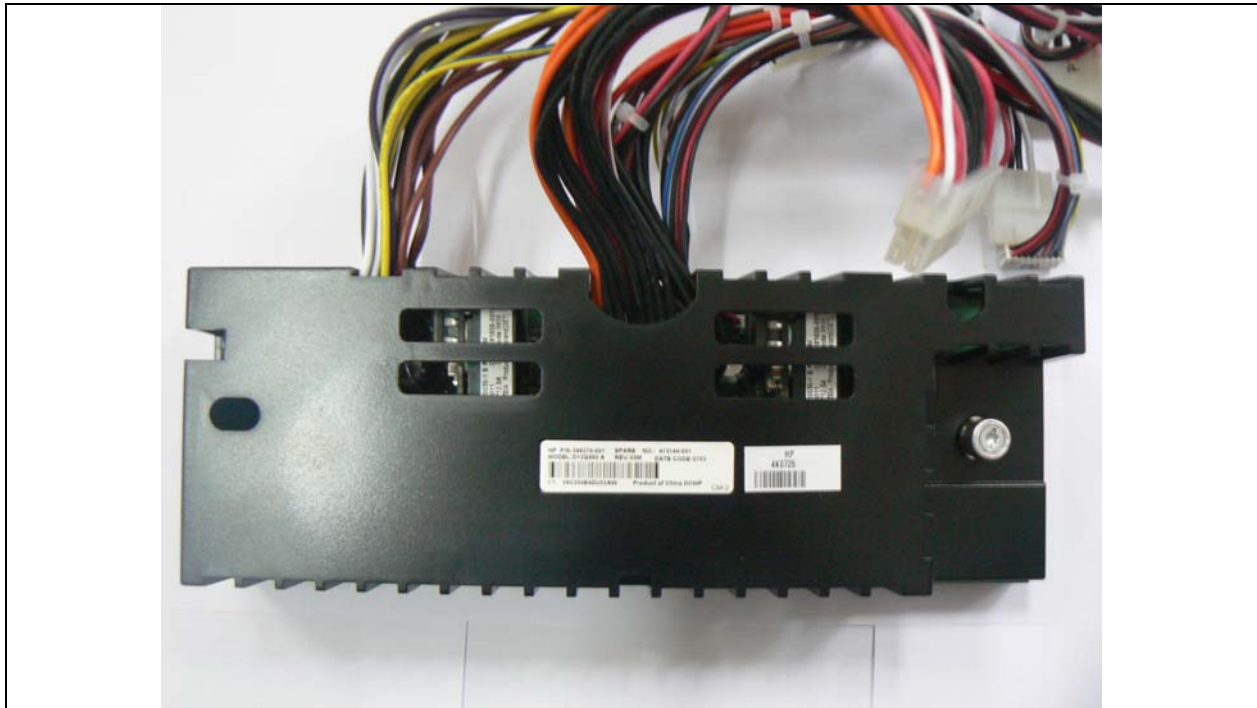


FIGURE 13 – Internal Photographs (CPU case).

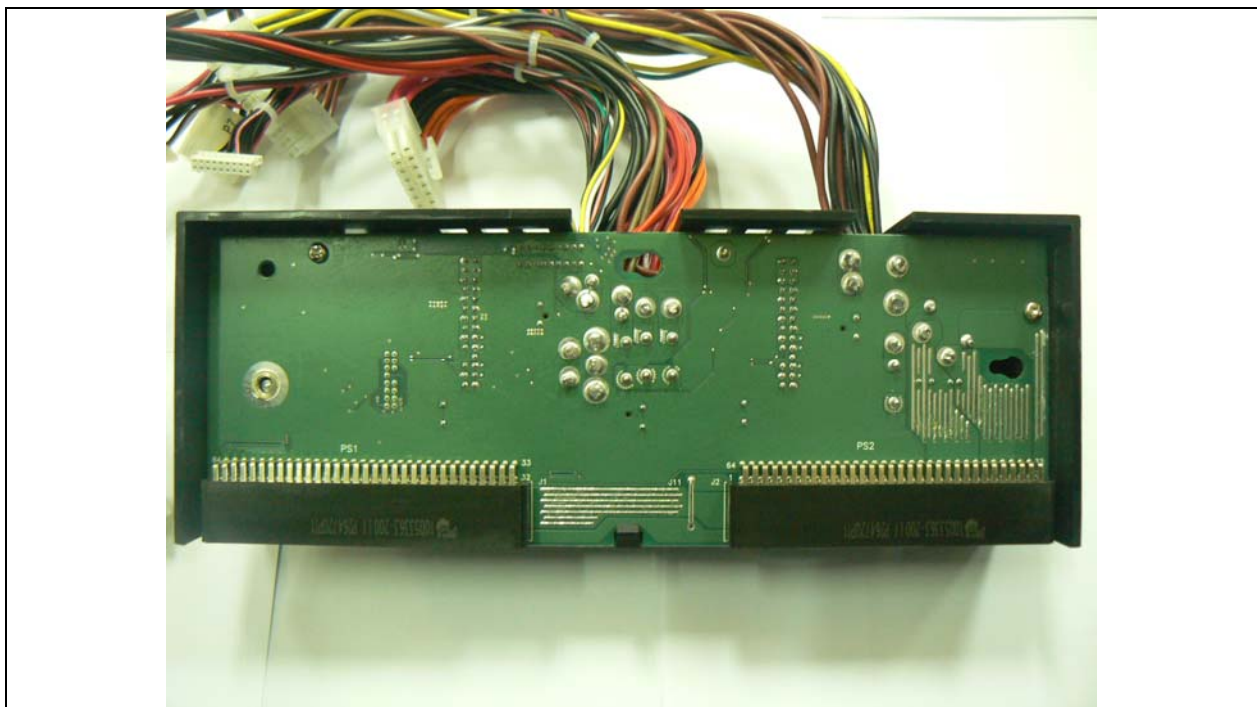


FIGURE 14 – Power Supply

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Front



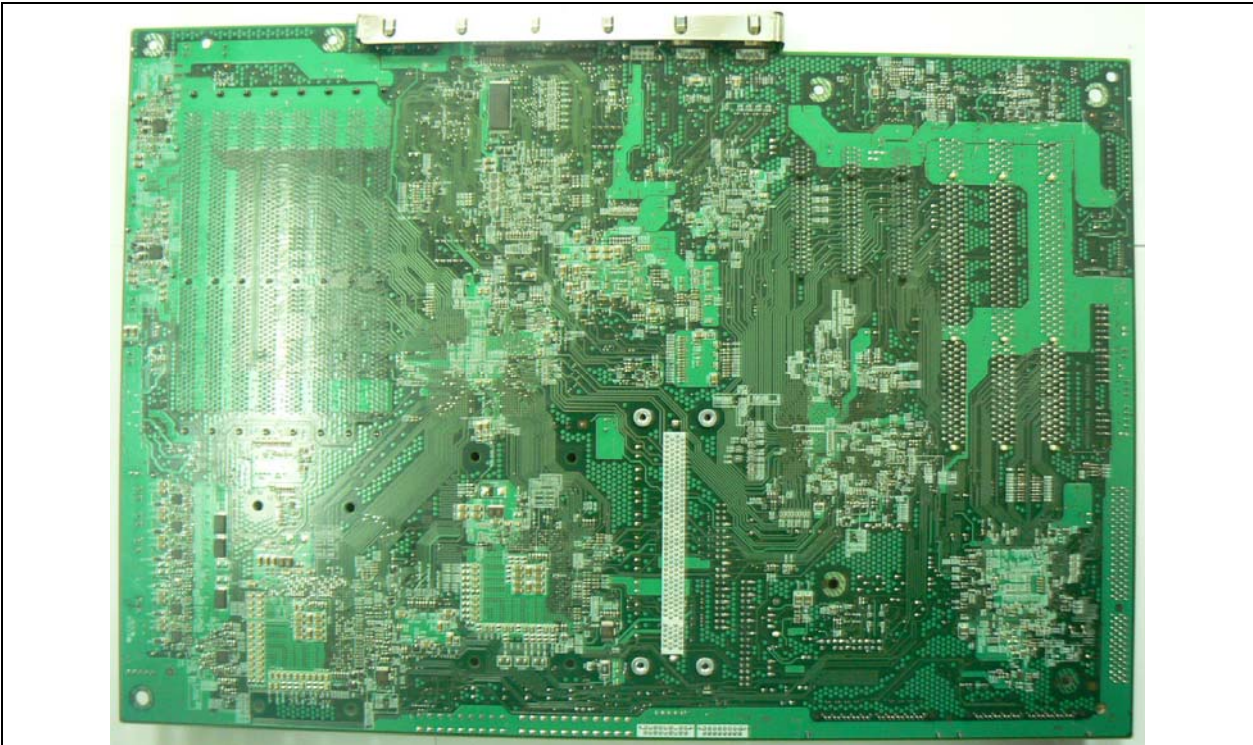
Rear

FIGURE 15 – Switching Power Supply Socket

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Front



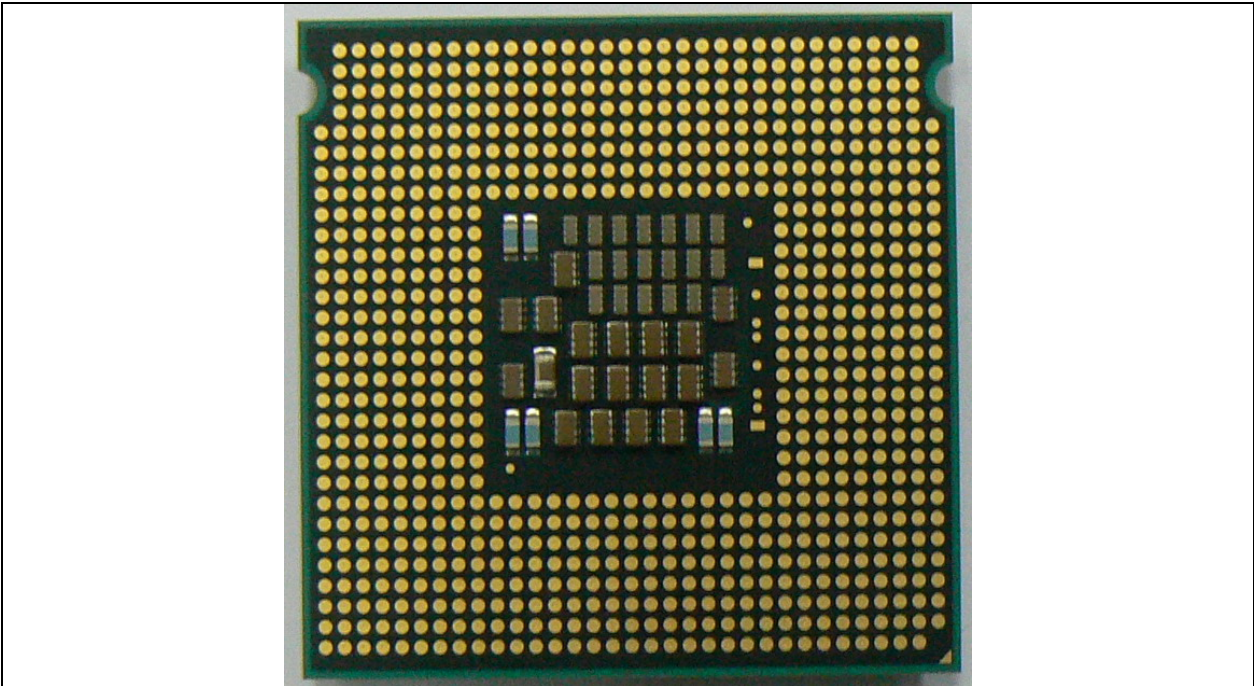
Rear

FIGURE 16 – Main Board

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Front



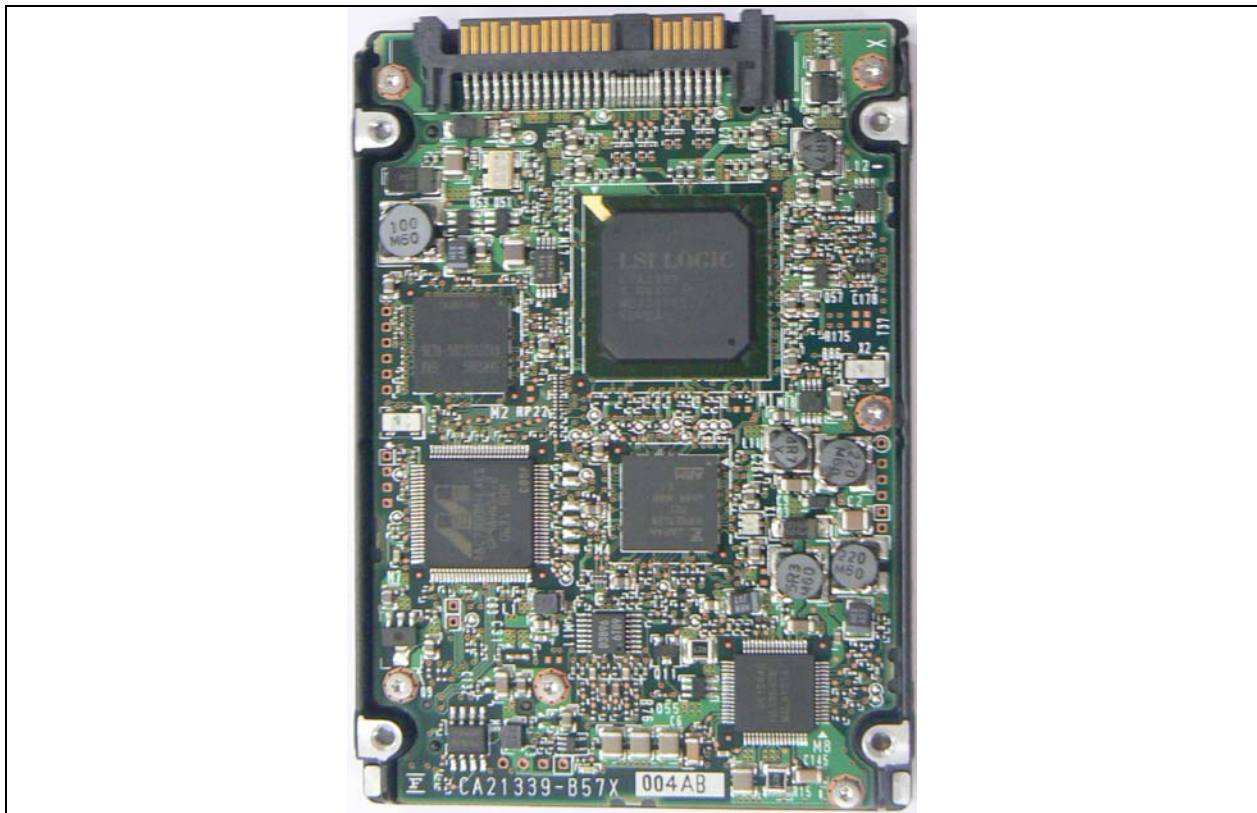
Rear

FIGURE 17 – CPU

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Front



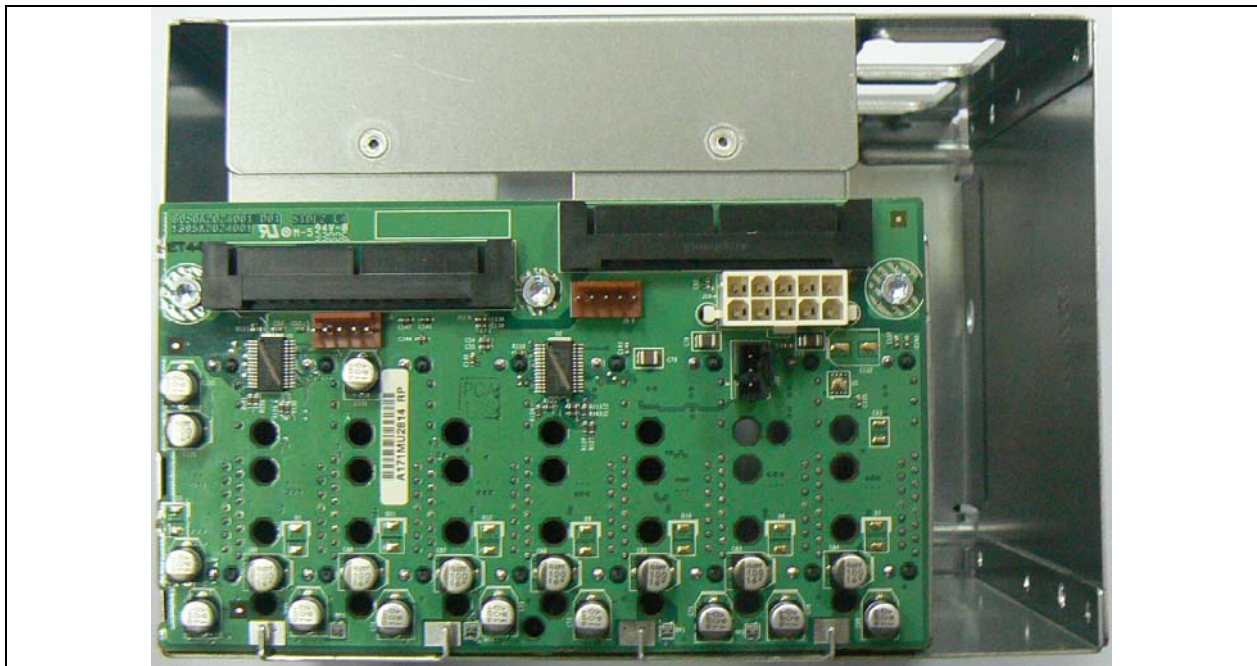
Rear

FIGURE 18 - Hard Disk

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Front



Rear

FIGURE 19 – External Hard disk Slot

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Front



Rear

FIGURE 20 – Memory (RAM)



FIGURE 21 – CD-Rom

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Front



Rear

FIGURE 22 – Rom

----- End of Report -----

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