



SPORTON LAB.



Certificate No: EC621418

CERTIFICATE

- **EQUIPMENT: Server**
MODEL NO. : SC5299-E
APPLICANT : Intel Corporation

5200 N.E. Elam Young Parkway,
Hillsboro, OR 97124-6497



I HEREBY

CERTIFY THAT:

THE MEASUREMENTS SHOWN IN THIS TEST REPORT WERE MADE IN ACCORDANCE WITH THE PROCEDURES GIVEN IN **EUROPEAN COUNCIL DIRECTIVE 89/336/EEC**. THE EQUIPMENT WAS **PASSED** THE TEST PERFORMED ACCORDING TO **EUROPEAN STANDARD EN 55022:1998/A1:2000/A2:2003 Class A, EN 61000-3-2:2000, EN 61000-3-3:1995/A1:2001, EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:1995/A2:2000, IEC 61000-4-3:1996, IEC 61000-4-4:1995/A2:2001, IEC 61000-4-5:1995/A1:2000, IEC 61000-4-6:1996/A1:2000, IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11:1994/A1:2000) and Australian Standard AS/NZS CISPR 22.** THE TEST WAS CARRIED OUT ON **Feb. 17, 2006 AT SPORTON INTERNATIONAL INC. LAB.**


Feb. 17, 2006

Alex Chen
Manager



EMC TEST REPORT

according to

**European Standard EN 55022:1998/A1:2000/A2:2003 Class A,
EN 61000-3-2:2000, EN 61000-3-3:1995/A1:2001,
EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:1995/A2:2000,
IEC 61000-4-3:1996, IEC 61000-4-4:1995/A2:2001,
IEC 61000-4-5:1995/A1:2000, IEC 61000-4-6:1996/A1:2000,
IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11:1994/A1:2000) and
Australian Standard AS/NZS CISPR 22**

Equipment : Server

Model No. : SC5299-E

Applicant : **Intel Corporation**
5200 N.E. Elam Young Parkway,
Hillsboro, OR 97124-6497

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- This test report is only applicable to European Community.

SPORTON International Inc.

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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History of this test report

Original Report Issue Date: Feb. 24, 2006

No additional attachment.

Additional attachment were issued as following record:

| Attachment No. | Issue Date | Description |
|----------------|------------|-------------|
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CERTIFICATE OF COMPLIANCE

according to

**European Standard EN 55022:1998/A1:2000/A2:2003 Class A,
EN 61000-3-2:2000, EN 61000-3-3:1995/A1:2001,
EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:1995/A2:2000,
IEC 61000-4-3:1996, IEC 61000-4-4:1995/A2:2001,
IEC 61000-4-5:1995/A1:2000, IEC 61000-4-6:1996/A1:2000,
IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11:1994/A1:2000)
and Australian Standard AS/NZS CISPR 22**

Equipment : Server

Model No. : SC5299-E

Applicant : **Intel Corporation**
5200 N.E. Elam Young Parkway,
Hillsboro, OR 97124-6497

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **EUROPEAN COUNCIL DIRECTIVE 89/336/EEC**. The equipment was *passed* the test performed according to **European Standard EN 55022:1998/A1:2000/A2:2003 Class A, EN 61000-3-2:2000, EN 61000-3-3:1995/A1:2001, EN 55024:1998/A1:2001/A2:2003 (IEC 61000-4-2:1995/A2:2000, IEC 61000-4-3:1996, IEC 61000-4-4:1995/A2:2001, IEC 61000-4-5:1995/A1:2000, IEC 61000-4-6:1996/A1:2000, IEC 61000-4-8:1993/A1:2000, IEC 61000-4-11:1994/A1:2000) and Australian Standard AS/NZS CISPR 22**. The test was carried out on Feb. 17, 2006 at **SPORTON International Inc. LAB**.

Alex Chen
Manager

SPORTON International Inc.

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1 Applicant

Intel Corporation
 5200 N.E. Elam Young Parkway,
 Hillsboro, OR 97124-6497

1.2 Manufacturer

Same as 1.1

1.3 Basic Description of Equipment under Test

Equipment : Server
 Model No. : SC5299-E
 Trade Name : Intel
 Data Cable Type : Please see section 2.2 of this test report for details
 RJ45 Cable *2 : Non-Shielded, 10m
 Power Supply Type : Switching
 AC Power Cord : Non-Shielded, 1.8m, 3 pin

1.4 Feature of Equipment under Test

| SKU | SC5299DP | SC5299BRP |
|-----------------|--|----------------------|
| Memory | SAMSUNG P/N: M395T6553CZ3-CD5, 512MB X 8 | |
| M/B | P/N: D44771-401 | |
| CD-ROM | MITSUMI No. CRMC-FY5200S | |
| SATA Card | Intel No. AAR-1420SA | |
| SATA HDD | Seagate No. ST380013AS 80G X 6 | |
| Power Supply | Delta No. DPS-550HB A | Hipro No. HP-R650FF3 |
| 6 Drive SATA BP | P/N: D22808-100 | |

| | |
|--|---|
| Intel® Entry Server Chassis SC5299-E Configuration | Intel® Server Boards Supported ¹ |
| DP (Dual-processor) | Intel® Server Boards S5000VSA and S5000PSL |
| WS (Workstation) | Intel® Server Board S5000XVN |
| BRP (Base Redundant Power) | Intel® Server Boards S5000VSA and S5000PSL |

Server Chassis Features

| Feature | Description |
|-------------------------------|---|
| Dimensions (pedestal) | <ul style="list-style-type: none"> • 17.8 in (45.2 cm) high with feet; 17.6 in (44.7 cm) without feet • 9.256 in (23.5 cm) wide • 19.2 in (48.7 cm) deep |
| Dimensions (rack) | <ul style="list-style-type: none"> • 9.256 in (23.5 cm) high without rack bezel; 10.3 in (26.2 cm) high with rack bezel • 17.6 in (44.7 cm) wide • 19.2 in (48.7 cm) deep |
| Hard drive cage | <ul style="list-style-type: none"> • One removable fixed hard drive cage that can accept up to 6 tool-less cabled 3.5-in x 1-in hard drives. <p>NOTE: An optional SCSI or SAS/SATA hot swap backplane hard drive cage (capable of handling up to 6 SCSI, SATA or SAS hot-swappable hard drives) can be purchased to replace the fixed hard drive cage.</p> |
| Peripherals | <ul style="list-style-type: none"> • Two tool-less 5.25-in device drive bays for CD-ROM, DVD-ROM drive, or tape drive • One tool-less 3.5-in device drive bay for a floppy drive |
| Front panel | <ul style="list-style-type: none"> • One for the DP/WS/BRP chassis configurations. |
| Front Panel LEDs and displays | <ul style="list-style-type: none"> • NIC1 Activity • NIC2 Activity • Power / Sleep • Hard Drive Activity • System Status • NMI <p>NOTE:</p> |
| Power Supply | <p>Wattage of power supply is dependent on configuration of server chassis purchased:</p> <ul style="list-style-type: none"> • DP - ships with a 550-W PFC tool-less fixed power supply • WS - ships with a 670-W PFC tool-less fixed power supply • BRP - ships with a 650-W PFC redundant power supply module in a 1+0 configuration. An additional module can be purchased as an accessory to create a 1+1 configuration. |
| Fans | <ul style="list-style-type: none"> • One 120-mm system fan • One power supply fan¹ • Processor fans for active thermal solution • Fan with optional hot swap drive kit upgrade • Memory cooling fan with WS chassis configuration |
| USB | <ul style="list-style-type: none"> • Two front panel USB ports |



- Baseboard Form Factor
- SSI EEB 3.5 Form factor (12 x 13")
- Dual Core Intel® Xeon® processors (533Mhz and 667Mhz FSB)
- Memory 8 FBDIMM (with DDR2 667) slots
 - 512Mb (stacked) Total of 16GB
 - 1Gb (stacked) Total of 32GB
 - 2Gb (stacked) Total of 64GB
- ECC support
- S5000P/S5000X Chipset
- Integrated I/O (4) SAS ports
- (2 - 6)SATA ports (3.0 Gb/s)
- IDE (Parallel ATA-100)
- (6) USB 2.0 port , 4 rear , 2 on a header , 1 vertical on board , 1 to IMM3
- Gb Ethernet ports (10/100/1000) (ESB-2)
- Basic 2D/3D on-board video solution (ATI RN50)
- SIO3
 - PS/2 keyboard/mouse
- -(2) serial ports (1 rear fixed; 1 int header that can be optionally front or rear with cabling option)
- SSI Front panel header
- IPMB headers
- Star Lake Table of Figures
- LCD header
- PCI (2) PCI-X 133 slots (from ESB2)
- PCI-Express (2) x8 PCI-Express slots (from BNB)
- x4 PCI-Express slots (from ESB2)
- Server management BMC integrated in ESB2
- Pop/depop Expanding Flash/memory support for ESB-2
- Add-in ASMI (Advanced Server Management Interface) card
- support for ESB-2
- Add-in 3rd party NIC card (via GCM3 conn) for 3rd NIC

2. Test Configuration of Equipment under Test

2.1 Test Manner

- a. During testing, the interface cables and equipment positions were varied according to European Standard EN 55022 and AS/NZS CISPR 22.
- b. The complete test system included remote workstation, SONY Monitor, COMPAQ PS/2 Keyboard, COMPAQ PS/2 Mouse, ACEEX Modem, 3C Headset, TERASYS USB 2.0 HDD and EUT for EMI test. The remote workstation included HP COMPAQ PC, COMPAQ Monitor, COMPAQ PS/2 Keyboard and COMPAQ PS/2 Mouse.
- c. The following test mode were pretested for EMI tests:
 - Mode 1. Power: 650W*2, VGA: 1280x1024 85Hz, LAN: 1Gbps/1Gbps, CPU: 2.8GHz*2, Fixed Drive Boot
 - Mode 2. Power: 650W*1, VGA: 1280x1024 85Hz, LAN: 1Gbps/1Gbps, CPU: 2.8GHz*2, Fixed Drive Boot
 - Mode 3. Power: 650W*2, VGA: 1280x1024 85Hz, LAN: 1Gbps/1Gbps, CPU: 2.8GHz*2, SATA Bp Boot
 - Mode 4. Power: 650W*2, VGA: 1280x1024 85Hz, LAN: 100Mbps/100Mbps, CPU: 2.8GHz*2, SATA Bp Boot
 - Mode 5. Power: 650W*2, VGA: 1280x1024 85Hz, LAN: 10Mbps/10Mbps, CPU: 2.8GHz*2, SATA Bp Boot
 - Mode 6. Power: 650W*2, VGA: 1280x1024 85Hz, LAN: 1Gbps/1Gbps, CPU: 3.0GHz*2, SATA Bp Boot
 - Mode 7. Power: 650W*2, VGA: 1280x1024 85Hz, LAN: 1Gbps/1Gbps, CPU: 3.2GHz*2, SATA Bp Boot
 - Mode 8. Power: 650W*2, VGA: 1280x1024 85Hz, LAN: 1Gbps/1Gbps, CPU: 3.46GHz*2, SATA Bp Boot
 - Mode 9. Power: 650W*2, VGA: 1024x768 85Hz, LAN: 1Gbps/1Gbps, CPU: 3.46GHz*2, SATA Bp Boot
 - Mode 10. Power: 650W*2, VGA: 800x600 85Hz, LAN: 1Gbps/1Gbps, CPU: 3.46GHz*2, SATA Bp Boot
 - Mode 11. Power: 550W, VGA: 1280x1024 85Hz, LAN: 1Gbps/1Gbps, CPU: 3.46GHz*2, SATA Bp Bootfor conduction test, cause "Mode 11" generated the worst test result, it was reported as final data.
for radiation test, cause "Mode 8" generated the worst test result, it was reported as final data.
- d. The following test modes were performed for disturbances at telecommunication ports test:
 - Mode 1. Power: 650W, LAN : 1Gbps/1Gbps (Current)
 - Mode 2. Power: 650W, LAN : 1Gbps/1Gbps (Voltage)
 - Mode 3. Power: 650W, LAN : 100Mbps/100Mbps
 - Mode 4. Power: 650W, LAN : 10Mbps/10Mbps
 - Mode 5. Power: 550W, LAN : 1Gbps/1Gbps (Current)
 - Mode 6. Power: 550W, LAN : 1Gbps/1Gbps (Voltage)
 - Mode 7. Power: 550W, LAN : 100Mbps/100Mbps
 - Mode 8. Power: 550W, LAN : 10Mbps/10Mbps
- e. The complete test system included remote DELL Notebook, VIEWSONIC LCD Monitor, DELL PS/2 Keyboard, DELL PS/2 Mouse, ACEEX Modem, KOKA Headset, TERASYS USB 2.0 HDD and EUT for EMS test.



- f. The following test mode were tested for Harmonics, Flickers and EMS tests:
 - Mode 1. Power: 650W Redundant
 - Mode 2. Power: 550W Single
- g. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 1000MHz.

2.2 Description of Test System**< EMI >**

Support Unit 1. -- Monitor (SONY) – for local workstation

| | |
|-------------------|---|
| FCC ID | : N/A |
| Model No. | : CPD-G520 |
| Power Supply Type | : Switching |
| Power Cord | : Non-Shielded |
| Serial No. | : SP0014 |
| Data Cable | : Shielded, 1.7m |
| Remark | : This support device was tested to comply with FCC standards and authorized under a declaration of conformity. |

Support Unit 2. -- PS/2 Keyboard (COMPAQ) – for local and remote workstation

| | |
|------------|---|
| FCC ID | : N/A |
| Model No. | : 6511-VA |
| Serial No. | : SP0021 |
| Data Cable | : Shielded, 360 degree via metal backshells, 1.6m |
| Remark | : This support device was tested to comply with FCC standards and authorized under a declaration of conformity. |

Support Unit 3. -- PS/2 Mouse (COMPAQ) – for local and remote workstation

| | |
|------------|---|
| FCC ID | : N/A |
| Model No. | : M-S69 |
| Serial No. | : SP0035 |
| Data Cable | : Shielded, 1.8m |
| Remark | : This support device was tested to comply with FCC standards and authorized under a declaration of conformity. |

Support Unit 4. -- Modem (ACEEX) – for local workstation

| | |
|-------------------|-------------------|
| FCC ID | : IFAXDM1414 |
| Model No. | : DM1414 |
| Power Supply Type | : Linear |
| Power Cord | : Non-Shielded |
| Serial No. | : SP0048 |
| Data Cable | : Shielded, 1.15m |



Support Unit 5. -- Headset (3C) – for local workstation

FCC ID : N/A
Model No. : MIC03
Serial No. : SP0059
Data Cable : Non-Shielded, 1.8m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 6. -- USB 2.0 HDD (TERASYS) – for local workstation

FCC ID : N/A
Model No. : F12-UF
Serial No. : SP0066
Data Cable : Shielded, 1.2m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 7. -- PC (HP COMPAQ) – for remote workstation

FCC ID : N/A
Model No. : d330 uT
Serial No. : SP0074
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 8. -- Monitor (COMPAQ) – for remote workstation

FCC ID : N/A
Model No. : S510
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0014
Data Cable : Shielded, 1.7m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

< EMS >

Support Unit 1. – LCD Monitor (VIEWSONIC) – for local workstation

FCC ID : N/A
Model No. : VX700
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0054
Data Cable : Shielded, 1.65m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- PS/2 Keyboard (DELL) – for local workstation

FCC ID : N/A
Model No. : SK-8100
Serial No. : SP0054
Data Cable : Shielded, 1.9m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. – PS/2 Mouse (DELL) – for local workstation

FCC ID : N/A
Model No. : M-SAW34
Serial No. : SP0001
Data Cable : Shielded, 1.8m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 4. -- Modem (ACEEX) – for local workstation

FCC ID : IFAXDM1414
Model No. : DM1414
Power Supply Type : Linear
Power Cord : Non-Shielded
Serial No. : SP0015
Data Cable : Shielded, 1.15 m



Support Unit 5. -- Headset (KOKA) – for local workstation

FCC ID : N/A
Model No. : HD-305
Serial No. : SP0123
Data Cable : Non-Shielded, 1.2m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 6. -- USB 2.0 HDD (TERASYS) – for local workstation

FCC ID : N/A
Model No. : F12-UF
Serial No. : SP0104
Data Cable : Shielded, 1.6m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 7. -- Notebook (DELL) – for remote workstation

FCC ID : N/A
Model No. : D400
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0049
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

3. Test Software

< EMI >

An executive program, " EMITEST.EXE " under Win 2003 Server, which generate a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows :

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- d. The PC sends " H " messages to the modem.
- e. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- f. Repeat the steps from c to e.

At the same time, were executed:

- Executed " Media Player " to play audio.
- Executed " Ping " to link with the remote workstation to receive and transmit data by RJ45 cables.
- Executed " Shortcut to EMCTEST.exe " to read and write data from external USB 2.0 HDD.

< EMS >

An executive program, " EMITEST.EXE " under Win 2003 Server, which generate a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows :

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- d. The PC sends " H " messages to the modem.
- e. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- f. Repeat the steps from c to e.

At the same time, the following programs were executed:

- Executed " Media Player " to play audio and video.
- Executed " Network Neighborhood " to link with the remote workstation to receive and transmit data by RJ45 cables.
- Executed "Shortcut to EMCTEST.exe" to read and write data from external USB 2.0 HDD.

4. General Information of Test

4.1 Test Facility

<EMI>

Test Site Location : No. 30-2, Lin 6, Diing-Fwu Tsuen, Lin-Kou-Hsiang,
Taipei Hsien, Taiwan, R.O.C.

TEL : 886-2-2601-1640

FAX : 886-2-2601-1695

Test Site No. : CO01-LK, OS05-LK

<EMS>

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,
Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.

TEL : 886-3-327-3456

FAX : 886-3-318-0055

4.2 Test Voltage

230V / 50Hz

4.3 Standard for Methods of Measurement

EMI Test (conduction and radiation) : European Standard EN 55022 and AS/NZS CISPR 22 Class A

Harmonics Test : European Standard EN 61000-3-2.

Voltage Fluctuations Test : European Standard EN 61000-3-3.

EMS Test : European Standard EN 55024.

(ESD: IEC 61000-4-2, RS: IEC 61000-4-3, EFT: IEC 61000-4-4, SURGE: IEC 61000-4-5,

CS: IEC 61000-4-6, Power Frequency Magnetic Field: IEC 61000-4-8, DIPS: IEC 61000-4-11)

4.4 Test in Compliance with

EMI Test (conduction and radiation) : European Standard EN 55022 and AS/NZS CISPR 22 Class A

Harmonics Test : European Standard EN 61000-3-2.

Voltage Fluctuations Test : European Standard EN 61000-3-3.

EMS Test : European Standard EN 55024.

(ESD: IEC 61000-4-2, RS: IEC 61000-4-3, EFT: IEC 61000-4-4, SURGE: IEC 61000-4-5,

CS: IEC 61000-4-6, Power Frequency Magnetic Field: IEC 61000-4-8, DIPS: IEC 61000-4-11)

4.5 Frequency Range Investigated

- a. Conducted emission test: from 150 kHz to 30 MHz
- b. Radiated emission test: from 30 MHz to 1,000 MHz
- c. Radio frequency electromagnetic field immunity test : 80-1000 MHz.

4.6 Test Distance

- a. The test distance of radiated emission test from antenna to EUT is 10 M.
- b. The test distance of radio frequency electromagnetic field immunity test from antenna to EUT is 3 M.

5. Test of Conducted Powerline

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz and return leads of the EUT according to the methods defined in European Standard EN 55022 Clause 9 and AS/NZS CISPR 22. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

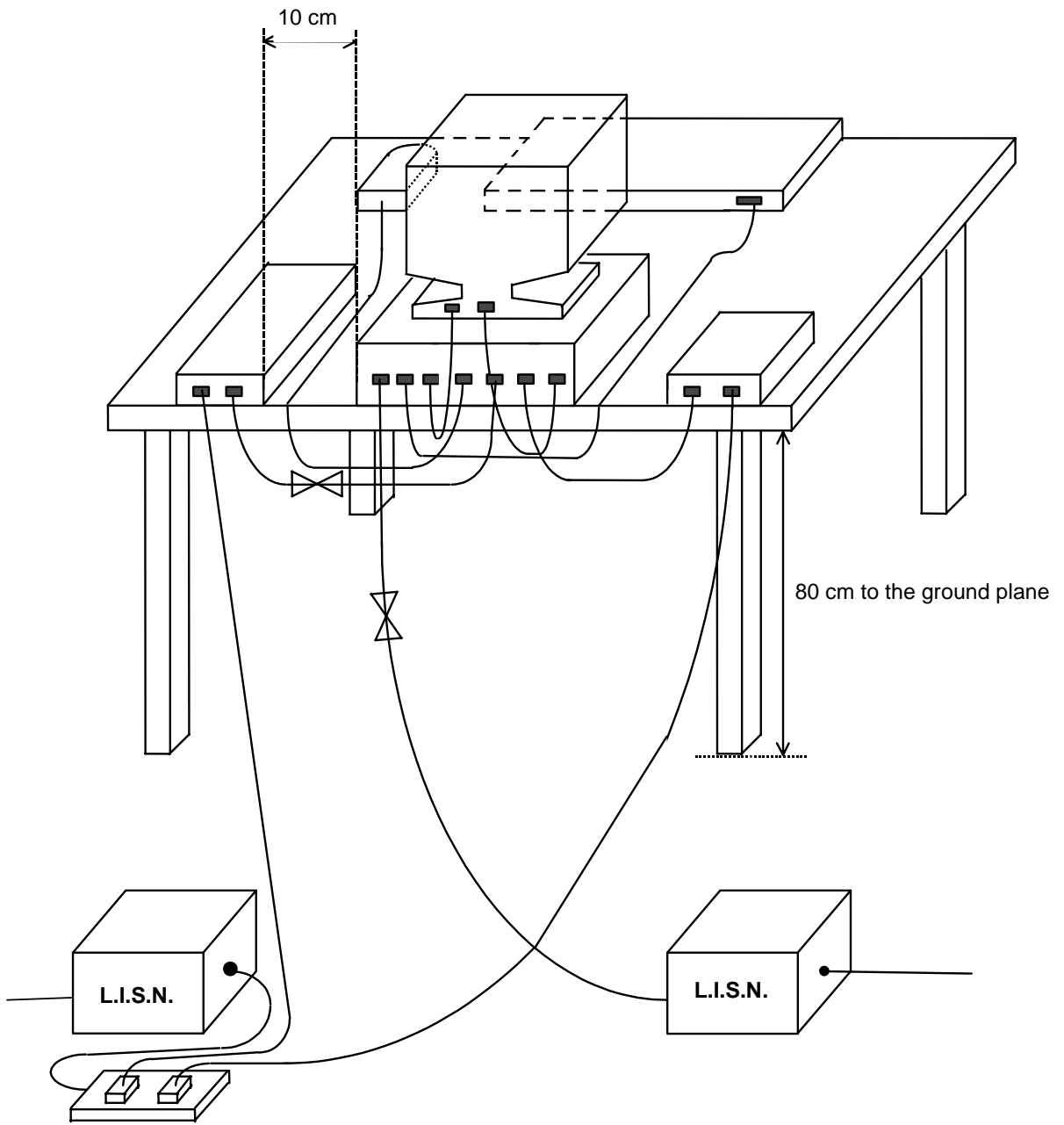
5.1 Description of Major Test Instruments

| | |
|-----------------|-----------------|
| ● Test Receiver | (R&S ESCS 30) |
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

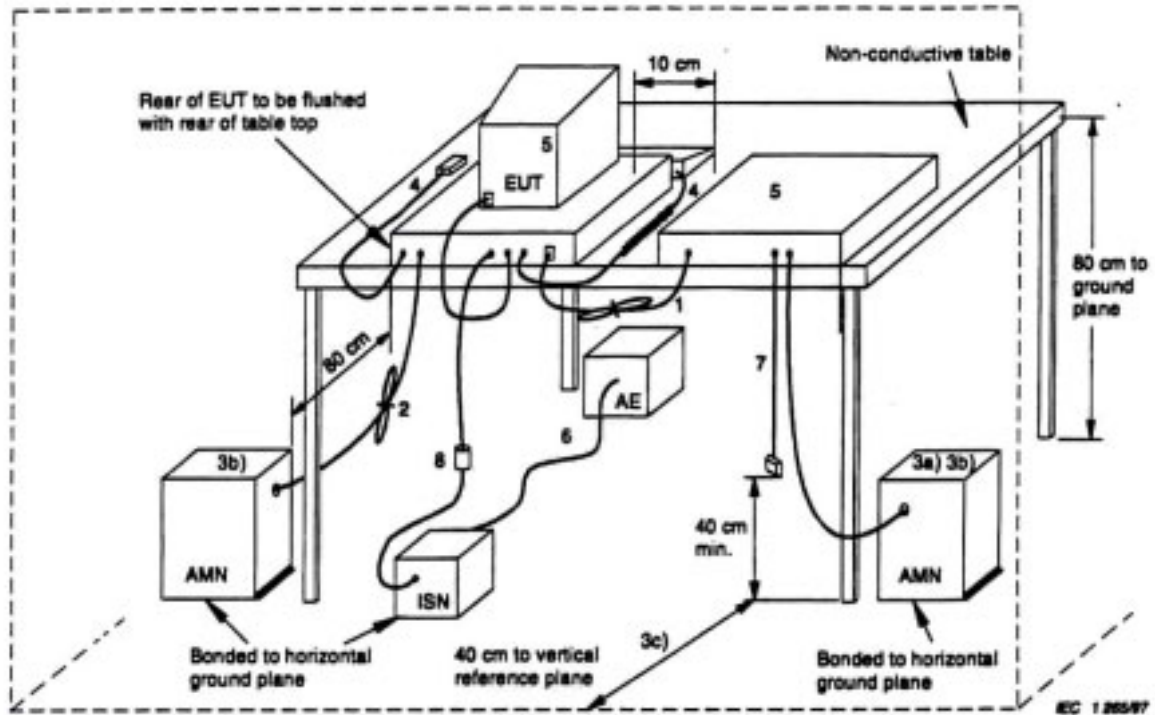
5.2 Test Procedures

- a. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. Connect Telecommunication port to ISN (Impedance Stabilization Network)
- d. All the support units are connect to the other LISN.
- e. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- f. The CISPR states that a 50 ohm , 50 microhenry LISN should be used.
- g. Both sides of AC line were checked for maximum conducted interference.
- h. The frequency range from 150 kHz to 30 MHz was searched.
- i. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.3 Typical Test Setup Layout of Conducted Powerline



5.4 Typical Test Setup Layout of Disturbances at Telecommunication Ports



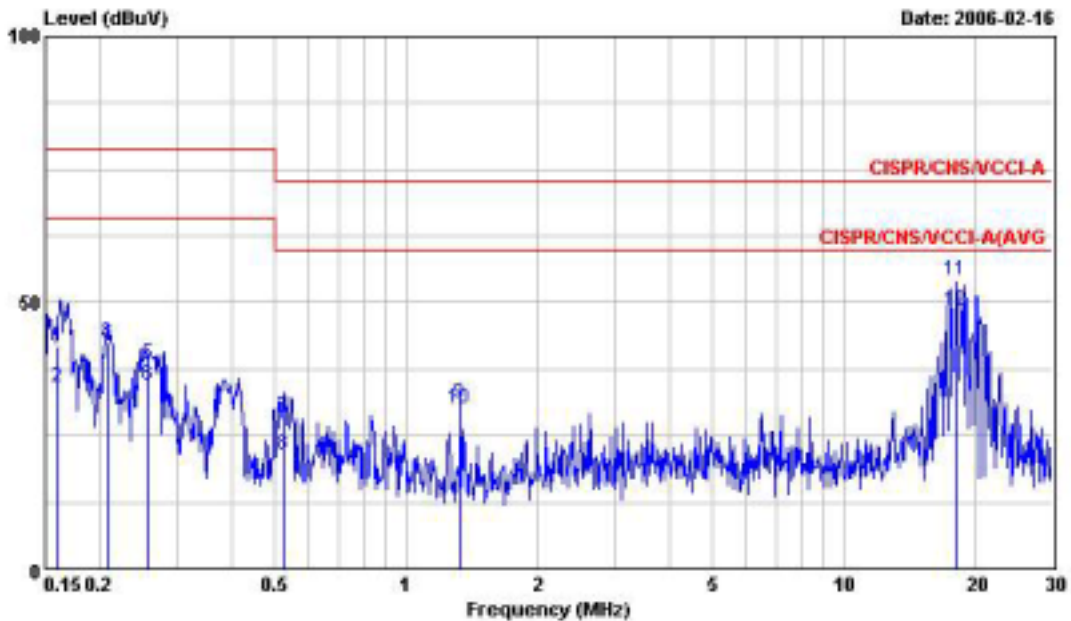
AMN = Artificial mains network
 AE = Associated equipment
 EUT = Equipment under test
 ISN = Impedance stabilization network

- 1) If cables, which hang closer than 40 cm to the horizontal metal groundplane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
- 2) Excess mains cord shall be bundled in the centre or shortened to appropriate length.
- 3) EUT is connected to one artificial mains network (AMN). All AMNs and ISNs may alternatively be connected to a vertical reference plane or metal wall (see figures 5 and 6).
 - a) All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
 - b) AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.
 - c) Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
- 4) Cables of hand operated devices, such as keyboards, mice, etc. shall be placed as for normal usage.
- 5) Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
- 6) I/O signal cable intended for external connection.
- 7) The end of the I/O signal cables which are not connected to an AE may be terminated, if required, using correct terminating impedance.
- 8) If used, the current probe shall be placed at 0,1 m from the ISN.

5.5 Test Result of AC Powerline Conducted Emission

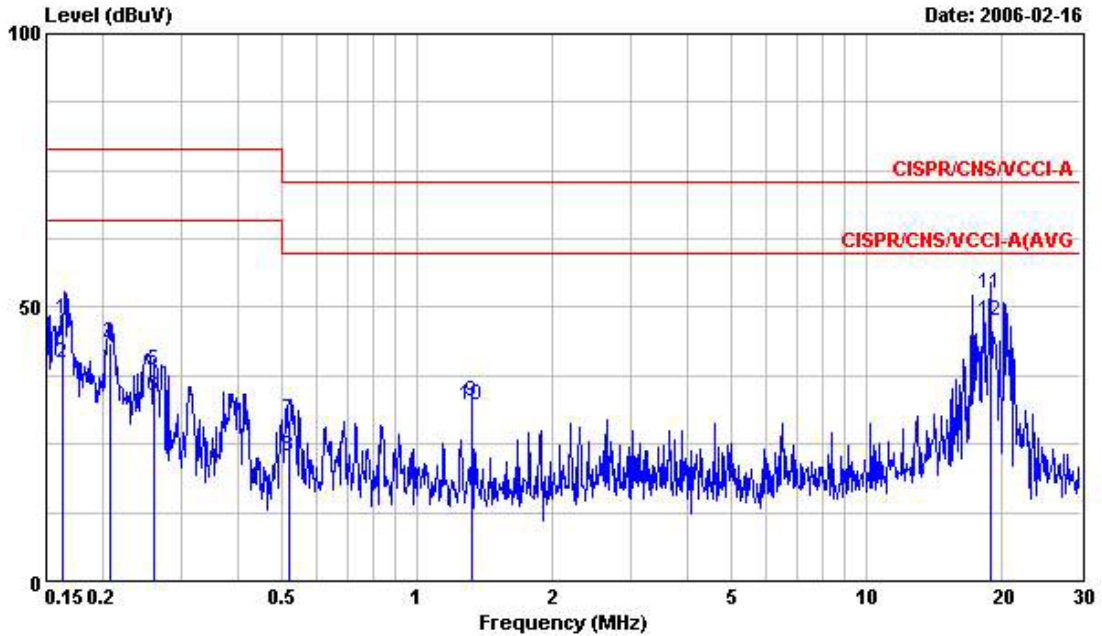
- Frequency Range of Test : from 0.15 MHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : C001-LK
 Condition : CISPR/CNS/VCCL-A LISN-2005-0912 LINE
 EUT : Server
 MODEL : SC5299-E(550W)
 POWER : 230V
 MEMO : 1280*1024 85Hz LAN:1G/1G
 : CPU:2.8G*2 FBDIMM:512M*8
 : PP4/SL SATA
 : Fixed Drive Boot

| | Freq | Level | Over | Limit | Read | LISN | Cable | Remark |
|------|--------|-------|--------|-------|-------|--------|-------|---------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.159 | 41.84 | -37.16 | 79.00 | 41.67 | 0.10 | 0.07 | QP |
| 2 @ | 0.159 | 34.15 | -31.85 | 66.00 | 33.98 | 0.10 | 0.07 | Average |
| 3 | 0.209 | 42.63 | -36.37 | 79.00 | 42.43 | 0.10 | 0.10 | QP |
| 4 @ | 0.209 | 42.06 | -23.94 | 66.00 | 41.86 | 0.10 | 0.10 | Average |
| 5 | 0.258 | 38.61 | -40.39 | 79.00 | 38.41 | 0.10 | 0.10 | QP |
| 6 @ | 0.258 | 34.29 | -31.71 | 66.00 | 34.09 | 0.10 | 0.10 | Average |
| 7 | 0.527 | 28.43 | -44.57 | 73.00 | 28.20 | 0.10 | 0.13 | QP |
| 8 | 0.527 | 21.35 | -38.65 | 60.00 | 21.12 | 0.10 | 0.13 | Average |
| 9 | 1.327 | 30.95 | -42.05 | 73.00 | 30.61 | 0.14 | 0.20 | QP |
| 10 @ | 1.327 | 30.22 | -29.78 | 60.00 | 29.88 | 0.14 | 0.20 | Average |
| 11 @ | 18.120 | 54.35 | -18.65 | 73.00 | 53.08 | 0.80 | 0.47 | QP |
| 12 @ | 18.120 | 48.59 | -11.41 | 60.00 | 47.32 | 0.80 | 0.47 | Average |



Site : CO01-LK
 Condition : CISPR/CNS/VCCI-A LISN-2005-0912 NEUTRAL
 EUT : Server
 MODEL : SC5299-E(550W)
 POWER : 230V
 MEMO : 1280*1024 85Hz LAN:1G/1G
 : CPU:2.8G*2 FBDIMM:512M*8
 : PP4/SL SATA
 : Fixed Drive Boot

| | Freq | Level | Over | Limit | Read | LISN | Cable | |
|----|--------|-------|--------|-------|-------|--------|-------|---------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | Remark |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.164 | 47.89 | -31.11 | 79.00 | 47.72 | 0.10 | 0.07 | QP |
| 2 | 0.164 | 39.79 | -26.21 | 66.00 | 39.62 | 0.10 | 0.07 | Average |
| 3 | 0.208 | 43.44 | -35.56 | 79.00 | 43.24 | 0.10 | 0.10 | QP |
| 4 | 0.208 | 42.97 | -23.03 | 66.00 | 42.77 | 0.10 | 0.10 | Average |
| 5 | 0.260 | 38.39 | -40.61 | 79.00 | 38.19 | 0.10 | 0.10 | QP |
| 6 | 0.260 | 33.93 | -32.07 | 66.00 | 33.73 | 0.10 | 0.10 | Average |
| 7 | 0.522 | 29.44 | -43.56 | 73.00 | 29.21 | 0.10 | 0.13 | QP |
| 8 | 0.522 | 22.74 | -37.26 | 60.00 | 22.51 | 0.10 | 0.13 | Average |
| 9 | 1.327 | 32.76 | -40.24 | 73.00 | 32.42 | 0.14 | 0.20 | QP |
| 10 | 1.327 | 31.98 | -28.02 | 60.00 | 31.64 | 0.14 | 0.20 | Average |
| 11 | 18.946 | 52.34 | -20.66 | 73.00 | 51.01 | 0.85 | 0.48 | QP |
| 12 | 18.946 | 47.39 | -12.61 | 60.00 | 46.06 | 0.85 | 0.48 | Average |

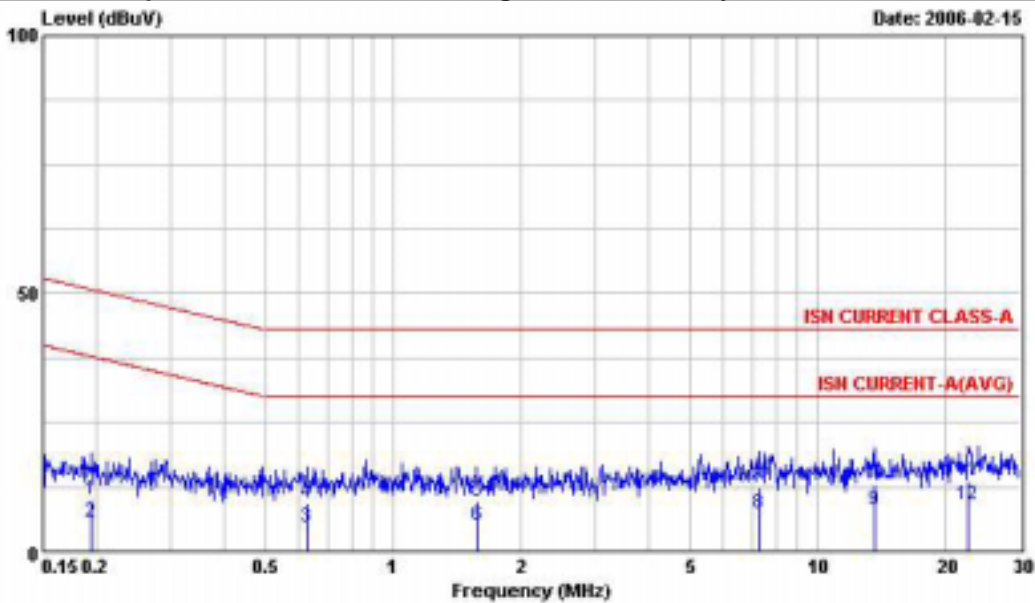
Test Engineer : Josh
 Josh Lin

5.6 Test Result of Disturbances at Telecommunication Ports

5.6.1 Test Mode: Mode 1

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : C001-LK
 Condition : ISN CURRENT CLASS-A CURREN2004.03.24
 EUT : Server
 MODEL : SC5299-E(650W)
 POWER : 230V(Power*2)
 MEMO : LAN:1G ISN A CURRENT

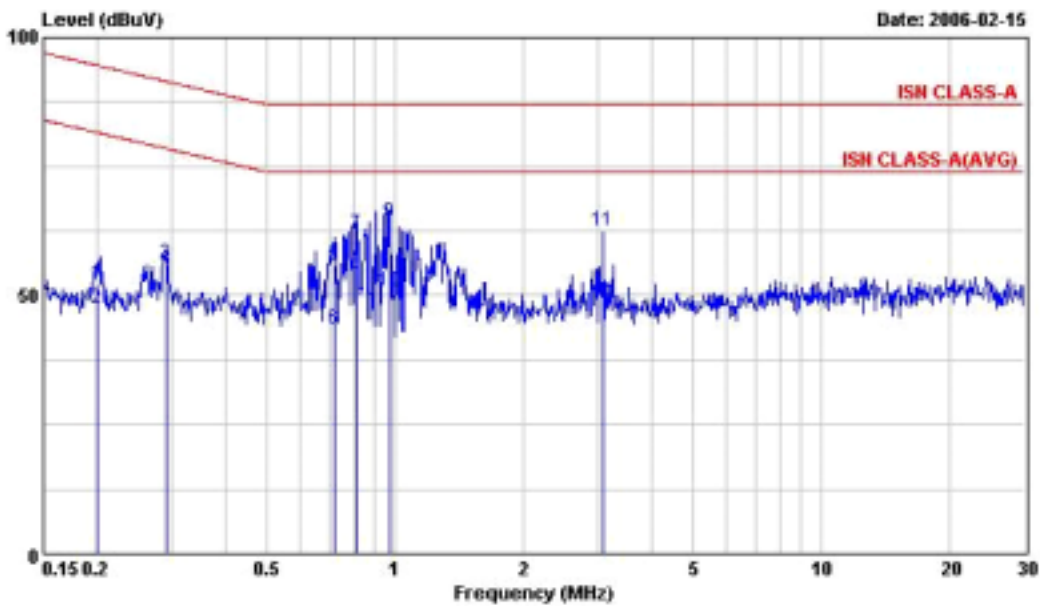
| | Freq | Level | Over | Limit | Read | LISN | Cable | |
|----|--------|-------|--------|-------|-------|--------|-------|---------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | Remark |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.195 | 10.04 | -40.78 | 50.82 | 9.54 | 0.40 | 0.10 | QP |
| 2 | 0.195 | 5.53 | -32.29 | 37.82 | 5.03 | 0.40 | 0.10 | Average |
| 3 | 0.627 | 4.79 | -25.21 | 30.00 | 4.51 | 0.13 | 0.15 | Average |
| 4 | 0.627 | 9.41 | -33.59 | 43.00 | 9.13 | 0.13 | 0.15 | QP |
| 5 | 1.580 | 9.54 | -33.46 | 43.00 | 9.13 | 0.23 | 0.20 | QP |
| 6 | 1.580 | 4.90 | -25.10 | 30.00 | 4.47 | 0.23 | 0.20 | Average |
| 7 | 7.290 | 12.36 | -30.64 | 43.00 | 11.77 | 0.29 | 0.30 | QP |
| 8 | 7.290 | 7.40 | -22.60 | 30.00 | 6.81 | 0.29 | 0.30 | Average |
| 9 | 13.700 | 7.91 | -22.09 | 30.00 | 7.20 | 0.33 | 0.38 | Average |
| 10 | 13.700 | 12.93 | -30.07 | 43.00 | 12.22 | 0.33 | 0.38 | QP |
| 11 | 22.660 | 13.86 | -29.14 | 43.00 | 12.99 | 0.31 | 0.56 | QP |
| 12 | 22.660 | 8.89 | -21.11 | 30.00 | 8.02 | 0.31 | 0.56 | Average |

Test Engineer : Josh
 Josh Lin

5.6.2 Test Mode: Mode 2

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : C001-LK
 Condition : ISN CLASS-A VOLATGE-A2
 EUT : Server
 MODEL : SC5299-E(650W)
 POWER : 230V(POWER*2)
 MEMO : LAN:1G ISN A VOLTAGE

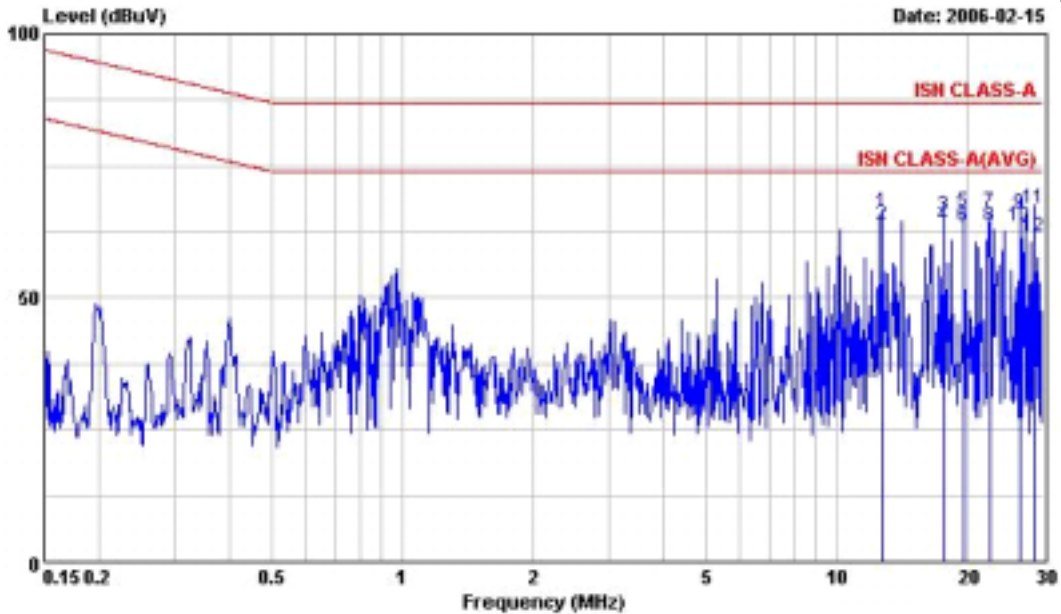
| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|----|-------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.201 | 52.15 | -42.40 | 94.55 | 18.72 | 33.33 | 0.10 | QP |
| 2 | 0.201 | 47.59 | -33.96 | 81.55 | 14.16 | 33.33 | 0.10 | Average |
| 3 | 0.292 | 56.15 | -35.32 | 91.47 | 22.74 | 33.31 | 0.10 | QP |
| 4 | 0.292 | 55.27 | -23.20 | 78.47 | 21.86 | 33.31 | 0.10 | Average |
| 5 | 0.720 | 55.76 | -31.24 | 87.00 | 22.33 | 33.27 | 0.16 | QP |
| 6 | 0.720 | 43.36 | -30.64 | 74.00 | 9.93 | 33.27 | 0.16 | Average |
| 7 | 0.817 | 61.86 | -25.14 | 87.00 | 28.42 | 33.26 | 0.18 | QP |
| 8 | 0.817 | 54.29 | -19.71 | 74.00 | 20.85 | 33.26 | 0.18 | Average |
| 9 | 0.979 | 64.23 | -22.77 | 87.00 | 30.78 | 33.25 | 0.20 | QP |
| 10 | 0.979 | 50.90 | -23.10 | 74.00 | 17.45 | 33.25 | 0.20 | Average |
| 11 | 3.090 | 62.50 | -24.42 | 87.00 | 29.11 | 33.21 | 0.26 | QP |
| 12 | 3.090 | 48.07 | -25.93 | 74.00 | 14.60 | 33.21 | 0.26 | Average |

Test Engineer : Josh
 Josh Lin

5.6.3 Test Mode: Mode 3

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : CO01-LK
 Condition : ISN CLASS-A ISN2004.05.24
 EUT : Server
 MODEL : SC5299-E(650W)
 POWER : 230V(Power*2)
 MEMO : LAN:100M ISN A(60/35dB)

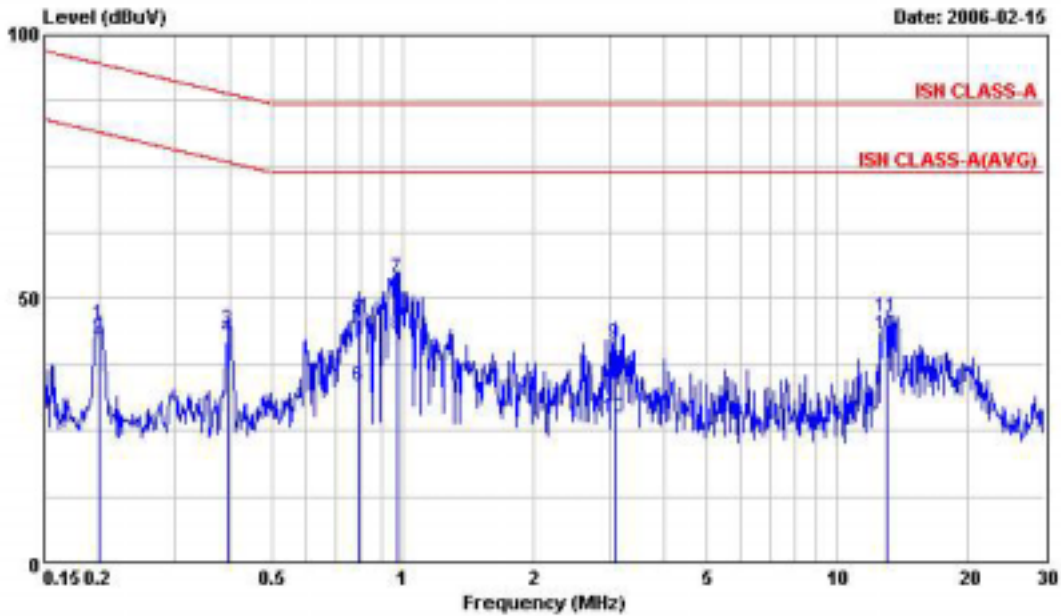
| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|------|--------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 @ | 12.808 | 66.28 | -20.72 | 87.00 | 56.34 | 9.58 | 0.36 | QP |
| 2 @ | 12.808 | 63.95 | -10.05 | 74.00 | 54.01 | 9.58 | 0.36 | Average |
| 3 @ | 17.694 | 65.64 | -21.36 | 87.00 | 55.73 | 9.45 | 0.46 | QP |
| 4 @ | 17.694 | 63.47 | -10.53 | 74.00 | 53.56 | 9.45 | 0.46 | Average |
| 5 @ | 19.709 | 66.22 | -20.78 | 87.00 | 56.31 | 9.41 | 0.50 | QP |
| 6 @ | 19.709 | 63.66 | -10.34 | 74.00 | 53.75 | 9.41 | 0.50 | Average |
| 7 @ | 22.579 | 66.14 | -20.86 | 87.00 | 56.22 | 9.36 | 0.56 | QP |
| 8 @ | 22.579 | 63.45 | -10.55 | 74.00 | 53.53 | 9.36 | 0.56 | Average |
| 9 @ | 26.609 | 65.86 | -21.14 | 87.00 | 55.93 | 9.30 | 0.63 | QP |
| 10 @ | 26.609 | 63.38 | -10.62 | 74.00 | 53.45 | 9.30 | 0.63 | Average |
| 11 @ | 28.685 | 66.95 | -20.05 | 87.00 | 57.01 | 9.27 | 0.67 | QP |
| 12 @ | 28.685 | 61.51 | -12.49 | 74.00 | 51.57 | 9.27 | 0.67 | Average |

Test Engineer : Josh
 Josh Lin

5.6.4 Test Mode: Mode 4

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : C001-LK
 Condition : ISN CLASS-A ISN2004.05.24
 EUT : Server
 MODEL : SC5299-E(650W)
 POWER : 230V(POWER*2)
 MEMO : LAN:10M ISN A(60/35dB)

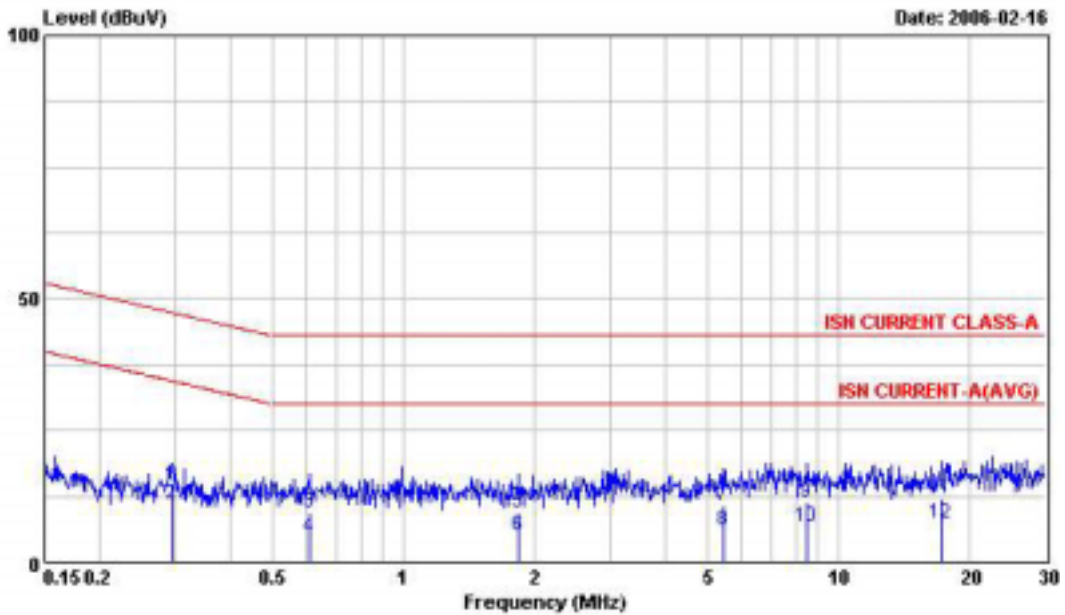
| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|------|--------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.200 | 45.23 | -49.38 | 94.61 | 35.24 | 9.89 | 0.10 | QP |
| 2 | 0.200 | 42.57 | -39.04 | 81.61 | 32.58 | 9.89 | 0.10 | Average |
| 3 | 0.398 | 44.02 | -44.87 | 88.89 | 34.03 | 9.89 | 0.10 | QP |
| 4 @ | 0.398 | 42.60 | -33.29 | 75.89 | 32.61 | 9.89 | 0.10 | Average |
| 5 | 0.796 | 46.10 | -40.90 | 87.00 | 36.03 | 9.89 | 0.18 | QP |
| 6 | 0.796 | 33.41 | -40.59 | 74.00 | 23.34 | 9.89 | 0.18 | Average |
| 7 @ | 0.979 | 53.96 | -33.04 | 87.00 | 43.87 | 9.89 | 0.20 | QP |
| 8 @ | 0.979 | 43.15 | -30.85 | 74.00 | 33.06 | 9.89 | 0.20 | Average |
| 9 | 3.090 | 41.33 | -45.67 | 87.00 | 31.29 | 9.78 | 0.26 | QP |
| 10 | 3.090 | 27.41 | -46.59 | 74.00 | 17.37 | 9.78 | 0.26 | Average |
| 11 | 13.072 | 46.61 | -40.39 | 87.00 | 36.67 | 9.57 | 0.37 | QP |
| 12 @ | 13.072 | 43.27 | -30.73 | 74.00 | 33.33 | 9.57 | 0.37 | Average |

Test Engineer : Josh Lin
 Josh Lin

5.6.5 Test Mode: Mode 5

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : CO01-LK
 Condition : ISN CURRENT CLASS-A CURREN2004.03.24
 EUT : Server
 MODEL : SC5299-E(550W)
 POWER : 230V
 MEMO : LAN:1G ISN A CURRENT

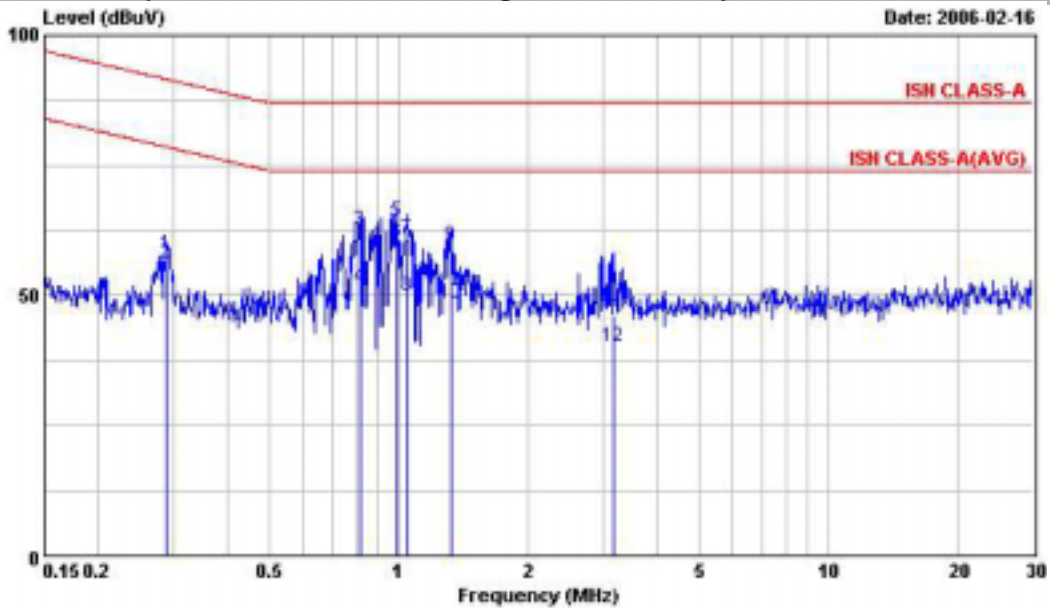
| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|------|--------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 @ | 0.293 | 14.71 | -32.72 | 47.43 | 14.37 | 0.24 | 0.10 | QP |
| 2 @ | 0.293 | 10.97 | -23.46 | 34.43 | 10.63 | 0.24 | 0.10 | Average |
| 3 @ | 0.611 | 9.32 | -33.68 | 43.00 | 9.05 | 0.12 | 0.15 | QP |
| 4 @ | 0.611 | 4.78 | -25.22 | 30.00 | 4.51 | 0.12 | 0.15 | Average |
| 5 @ | 1.850 | 9.45 | -33.55 | 43.00 | 9.01 | 0.24 | 0.20 | QP |
| 6 @ | 1.850 | 4.97 | -25.03 | 30.00 | 4.53 | 0.24 | 0.20 | Average |
| 7 @ | 5.450 | 10.85 | -32.15 | 43.00 | 10.28 | 0.27 | 0.30 | QP |
| 8 @ | 5.450 | 6.08 | -23.92 | 30.00 | 5.51 | 0.27 | 0.30 | Average |
| 9 @ | 8.500 | 11.47 | -31.53 | 43.00 | 10.87 | 0.30 | 0.30 | QP |
| 10 @ | 8.500 | 6.02 | -23.18 | 30.00 | 6.22 | 0.30 | 0.30 | Average |
| 11 @ | 17.200 | 12.14 | -30.86 | 43.00 | 11.36 | 0.33 | 0.45 | QP |
| 12 @ | 17.200 | 7.44 | -22.56 | 30.00 | 6.66 | 0.33 | 0.45 | Average |

Test Engineer : Josh
 Josh Lin

5.6.6 Test Mode: Mode 6

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : C001-LK
 Condition : ISN CLASS-A VOLATGE-A2
 EUT : Server
 MODEL : SC5299-E(550W)
 POWER : 230V
 MEMO : LAN:1G ISN A VOLTAGE

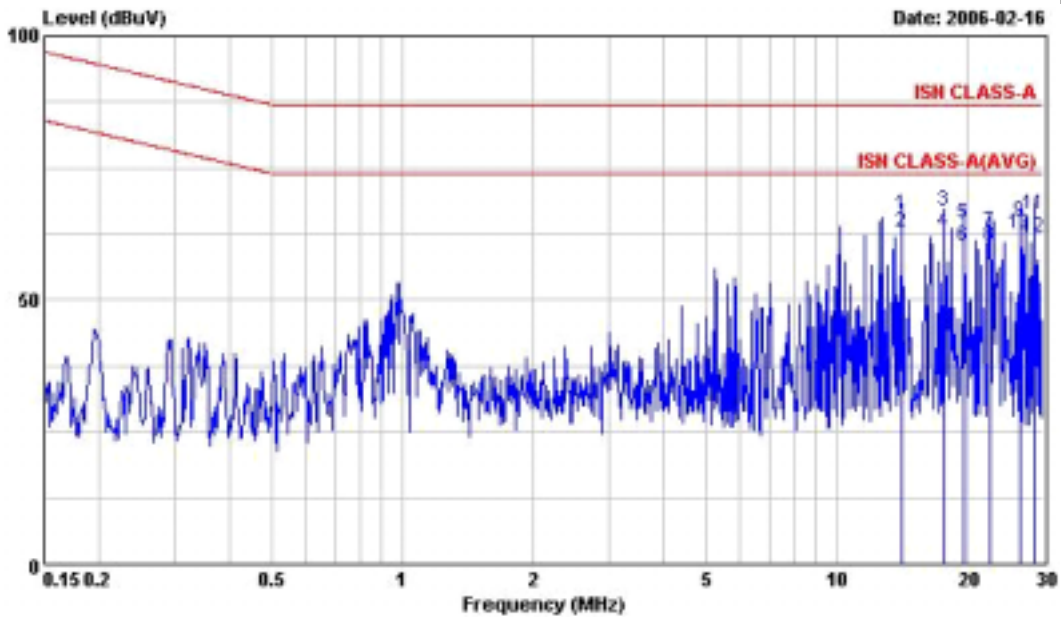
| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|----|-------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.289 | 57.76 | -33.79 | 91.55 | 24.34 | 33.32 | 0.10 | QP |
| 2 | 0.289 | 56.25 | -22.30 | 78.55 | 22.83 | 33.32 | 0.10 | Average |
| 3 | 0.813 | 62.70 | -24.30 | 87.00 | 29.26 | 33.26 | 0.18 | QP |
| 4 | 0.813 | 51.48 | -22.52 | 74.00 | 18.04 | 33.26 | 0.18 | Average |
| 5 | 0.994 | 64.09 | -22.91 | 87.00 | 30.64 | 33.25 | 0.20 | QP |
| 6 | 0.994 | 60.08 | -13.92 | 74.00 | 26.63 | 33.25 | 0.20 | Average |
| 7 | 1.050 | 61.02 | -25.98 | 87.00 | 27.57 | 33.25 | 0.20 | QP |
| 8 | 1.050 | 49.00 | -24.20 | 74.00 | 16.35 | 33.25 | 0.20 | Average |
| 9 | 1.330 | 59.69 | -27.31 | 87.00 | 26.25 | 33.24 | 0.20 | QP |
| 10 | 1.330 | 48.45 | -25.55 | 74.00 | 15.01 | 33.24 | 0.20 | Average |
| 11 | 3.170 | 46.31 | -40.69 | 87.00 | 12.83 | 33.21 | 0.27 | QP |
| 12 | 3.170 | 40.11 | -33.89 | 74.00 | 6.63 | 33.21 | 0.27 | Average |

Test Engineer : Josh
 Josh Lin

5.6.7 Test Mode: Mode 7

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : CO01-LK
 Condition : ISN CLASS-A ISN2004.05.24
 EUT : Server
 MODEL : SC5299-E(550W)
 POWER : 230V
 MEMO : LAN:100M ISN A(60/35dB)

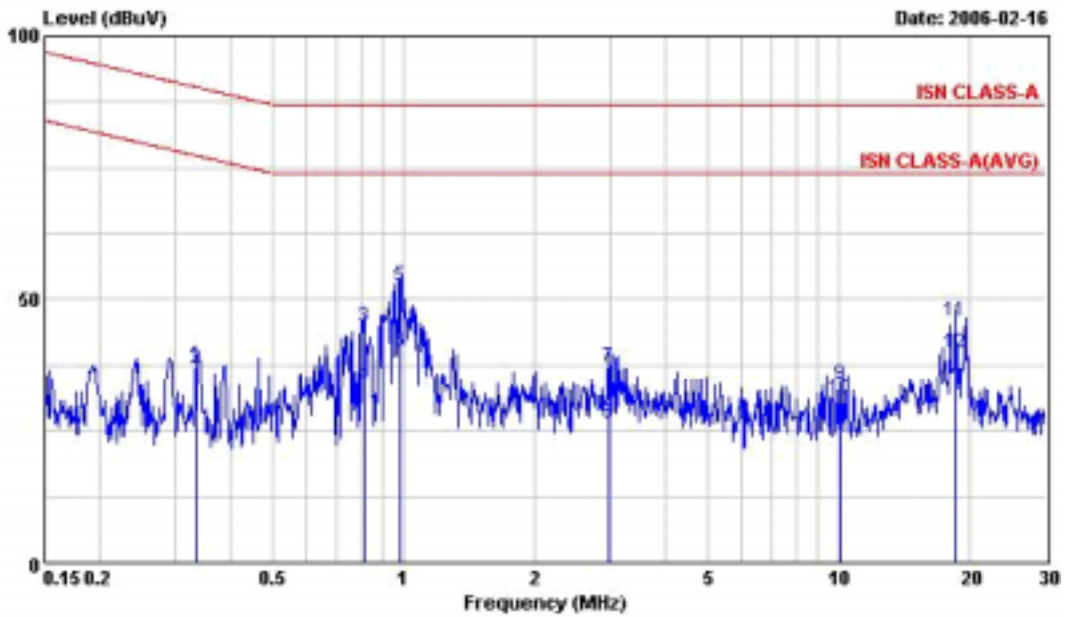
| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|------|--------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 @ | 14.211 | 66.11 | -20.89 | 87.00 | 56.18 | 9.54 | 0.39 | QP |
| 2 @ | 14.211 | 63.00 | -11.00 | 74.00 | 53.07 | 9.54 | 0.39 | Average |
| 3 @ | 17.695 | 66.93 | -20.07 | 87.00 | 57.02 | 9.45 | 0.46 | QP |
| 4 @ | 17.695 | 62.96 | -11.04 | 74.00 | 53.05 | 9.45 | 0.46 | Average |
| 5 @ | 19.709 | 64.54 | -22.46 | 87.00 | 54.63 | 9.41 | 0.50 | QP |
| 6 @ | 19.709 | 60.20 | -13.80 | 74.00 | 50.29 | 9.41 | 0.50 | Average |
| 7 @ | 22.578 | 62.72 | -24.28 | 87.00 | 52.80 | 9.36 | 0.56 | QP |
| 8 @ | 22.578 | 60.34 | -13.66 | 74.00 | 50.42 | 9.36 | 0.56 | Average |
| 9 @ | 26.610 | 65.04 | -21.96 | 87.00 | 55.11 | 9.30 | 0.63 | QP |
| 10 @ | 26.610 | 62.65 | -11.35 | 74.00 | 52.72 | 9.30 | 0.63 | Average |
| 11 @ | 28.685 | 66.32 | -20.68 | 87.00 | 56.38 | 9.27 | 0.67 | QP |
| 12 @ | 28.685 | 61.90 | -12.10 | 74.00 | 51.96 | 9.27 | 0.67 | Average |

Test Engineer : Josh
 Josh Lin

5.6.8 Test Mode: Mode 8

- Frequency Range of Test : from 150 kHz to 30 MHz
- Temperature: 20
- Relative Humidity: 51 %
- Corrected Reading (dBuV) = LISN Factor + Cable Loss + Read Level = Level
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table



Site : CO01-LK
 Condition : ISN CLASS-A ISN2004.05.24
 EUT : Server
 MODEL : SC5299-E(550W)
 POWER : 230V
 MEMO : LAN:10M ISN A(60/35dB)

| | Over | Limit | Read | LISN | Cable | | |
|------------|--------------|--------------|---------------|--------------|--------------|-------------|---------------------|
| Freq | Level | Limit | Line | Level | Factor | Loss | Remark |
| MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.337 | 37.56 | -52.72 | 90.28 | 27.57 | 9.89 | 0.10 QP |
| 2 | 0.337 | 36.80 | -40.48 | 77.28 | 26.81 | 9.89 | 0.10 Average |
| 3 | 0.817 | 44.69 | -42.31 | 87.00 | 34.62 | 9.89 | 0.18 QP |
| 4 | 0.817 | 33.29 | -40.71 | 74.00 | 23.22 | 9.89 | 0.18 Average |
| 5 | 0.989 | 52.53 | -34.47 | 87.00 | 42.44 | 9.89 | 0.20 QP |
| 6 @ | 0.989 | 40.29 | -33.71 | 74.00 | 30.20 | 9.89 | 0.20 Average |
| 7 | 2.960 | 37.05 | -49.95 | 87.00 | 27.00 | 9.79 | 0.26 QP |
| 8 | 2.960 | 26.50 | -47.50 | 74.00 | 16.45 | 9.79 | 0.26 Average |
| 9 | 10.152 | 33.62 | -53.38 | 87.00 | 23.65 | 9.67 | 0.30 QP |
| 10 | 10.152 | 31.25 | -42.75 | 74.00 | 21.28 | 9.67 | 0.30 Average |
| 11 | 18.643 | 45.82 | -41.18 | 87.00 | 35.91 | 9.43 | 0.48 QP |
| 12 | 18.643 | 39.82 | -34.18 | 74.00 | 29.91 | 9.43 | 0.48 Average |

Test Engineer : Josh
 Josh Lin

5.7 Photographs of Conducted Powerline Test Configuration

- The photographs show the configuration that generates the maximum emission.

Mode 1 ~ Mode 4

FRONT VIEW



REAR VIEW



Mode 5 ~ Mode 8

FRONT VIEW



REAR VIEW



6. Test of Radiated Emission

Radiated emissions from 30 MHz to 1000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in European Standard EN 55022, Clause 10 and AS/NZS CISPR 22. The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

6.1 Description of Major Test Instruments

- Amplifier (HP 8447D)
 - RF Gain 25 dB
 - Signal Input 0.1 MHz – 1.3 GHz

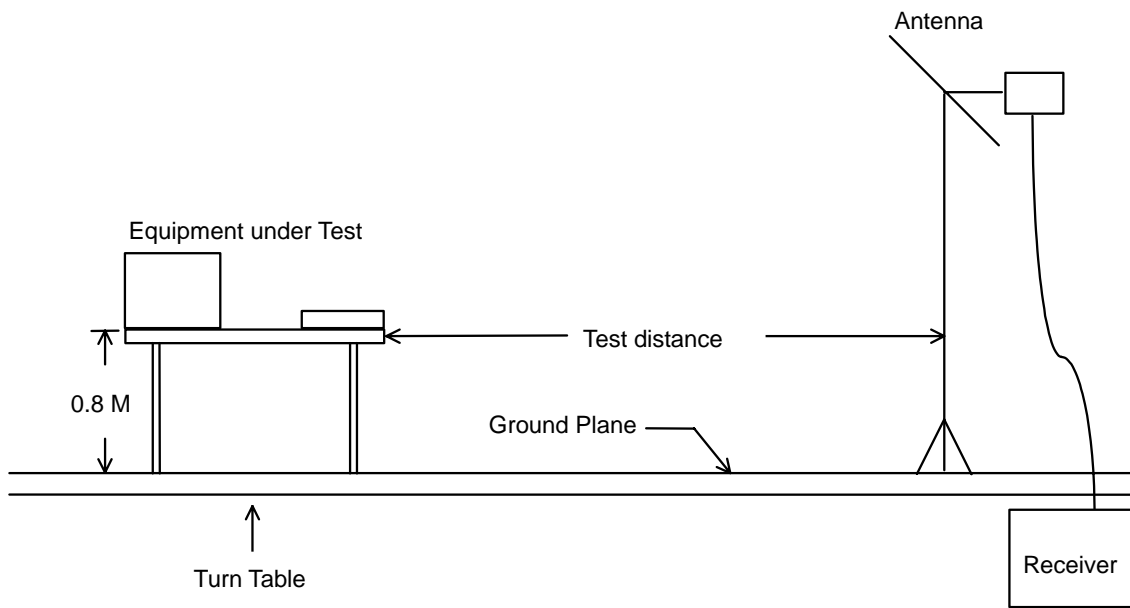
- Spectrum Analyzer (ADVANTEST R3261C)
 - Attenuation 10 dB
 - Start Frequency 30 MHz
 - Stop Frequency 1000 MHz
 - Resolution Bandwidth 120 kHz
 - Signal Input 9 kHz – 2.9 GHz

- Test Receiver (R&S ESCS 30)
 - Resolution Bandwidth 120 kHz
 - Frequency Band 9 kHz – 2.75 GHz
 - Quasi-Peak Detector ON for Quasi-Peak Mode
OFF for Peak Mode

6.2 Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 10 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

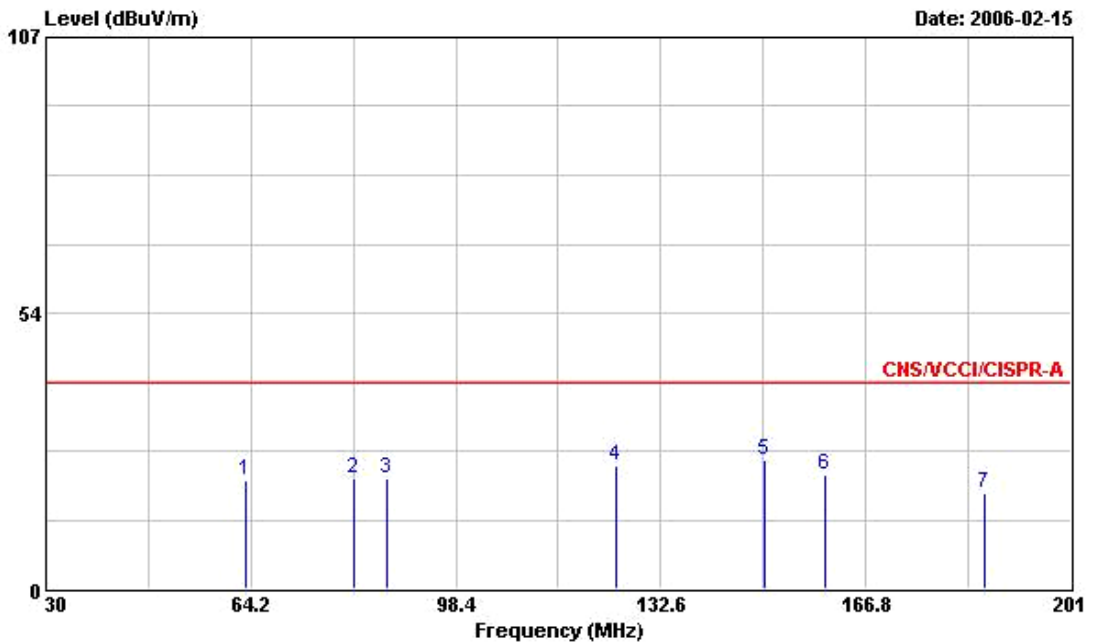
6.3 Typical Test Setup Layout of Radiated Emission



6.4 Test Result of Radiated Emission

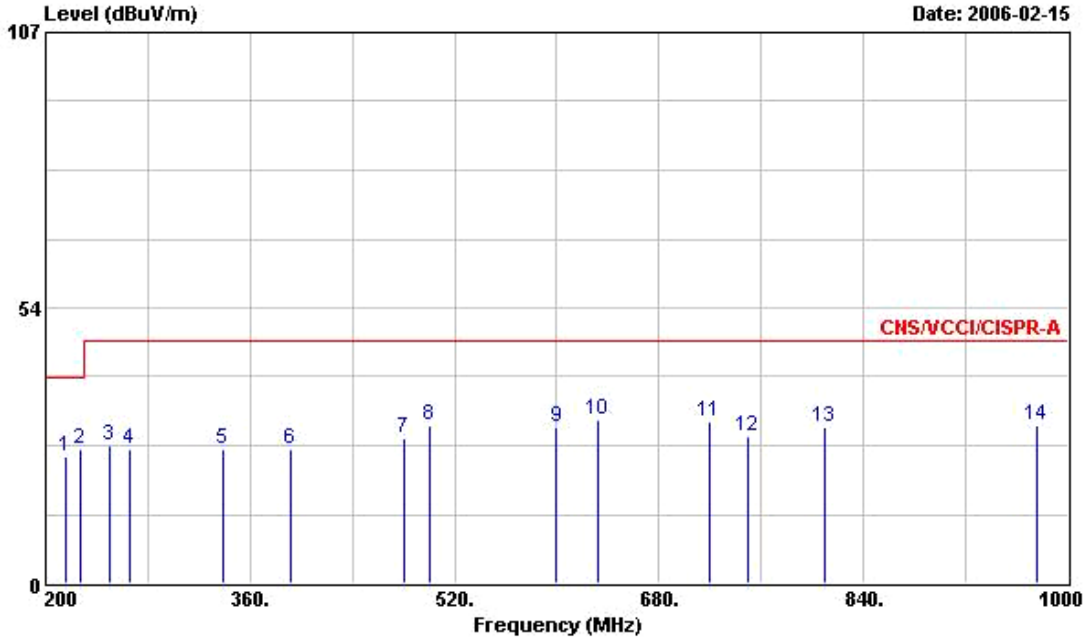
- Frequency Range of Test : from 30 MHz to 1000 MHz
- Temperature : 24
- Relative Humidity : 52 %
- Corrected Reading : Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

The test was passed at the minimum margin that marked by the frame in the following test record



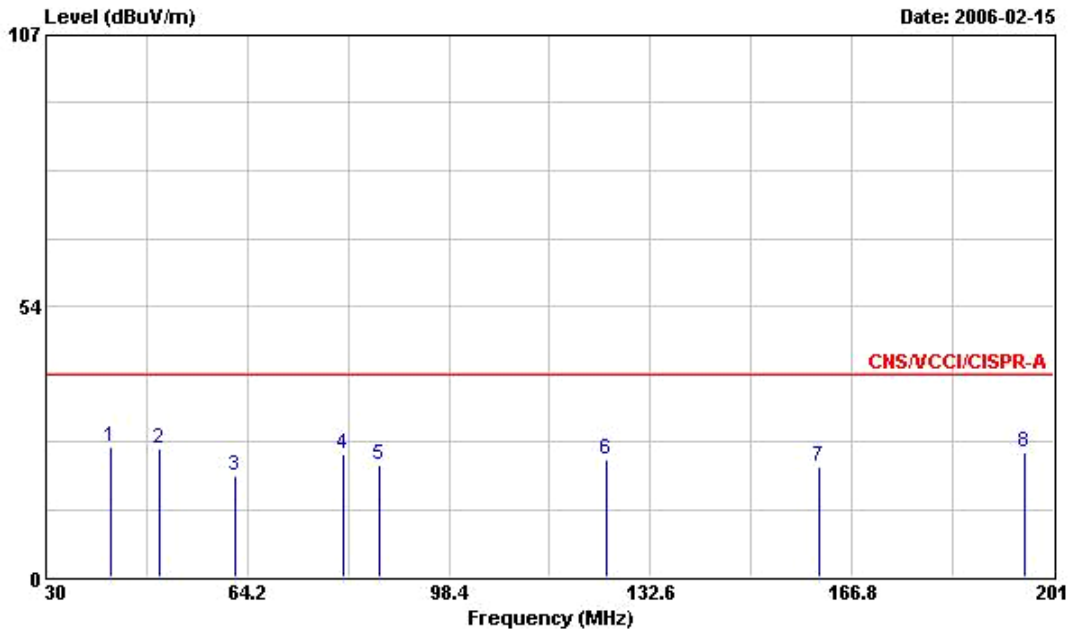
Site : OS05_LK
 Condition : CNS/VCCI/CISPR-A 10m SCHAFFNER2890APR0905 HORIZONTAL
 EUT : SERVER
 POWER : 230VAC (650W Redundant)POWER*2
 MODEL : SC5299-E
 MEMO : 1280*1024 85HZ LAN:1G/1G
 : CPU:3.46G*2 FBDIMM:512M*8
 : PP4 / SL SATA
 : SATA Bp Boot

| Freq | Level | Over | Limit | Read | Antenna | Cable | Preamp | Remark | Ant | Table |
|------|---------|-------|--------|-------|---------|-------|--------|------------|-----|-------|
| MHz | dBuV/m | Limit | Line | Level | Factor | Loss | Factor | | Pos | Pos |
| | | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 63.430 | 21.11 | -18.89 | 40.00 | 41.88 | 5.44 | 1.16 | 27.37 Peak | --- | --- |
| 2 | 81.520 | 21.30 | -18.70 | 40.00 | 40.89 | 6.54 | 1.21 | 27.34 Peak | --- | --- |
| 3 | 86.770 | 21.35 | -18.65 | 40.00 | 40.12 | 7.30 | 1.26 | 27.33 Peak | --- | --- |
| 4 | 125.000 | 23.97 | -16.03 | 40.00 | 38.26 | 11.38 | 1.50 | 27.17 Peak | --- | --- |
| 5 | 150.000 | 24.84 | -15.16 | 40.00 | 39.26 | 10.83 | 1.80 | 27.05 Peak | --- | --- |
| 6 | 160.140 | 22.08 | -17.92 | 40.00 | 36.85 | 10.50 | 1.72 | 26.99 Peak | --- | --- |
| 7 | 186.470 | 18.55 | -21.45 | 40.00 | 34.30 | 9.12 | 1.98 | 26.85 Peak | --- | --- |



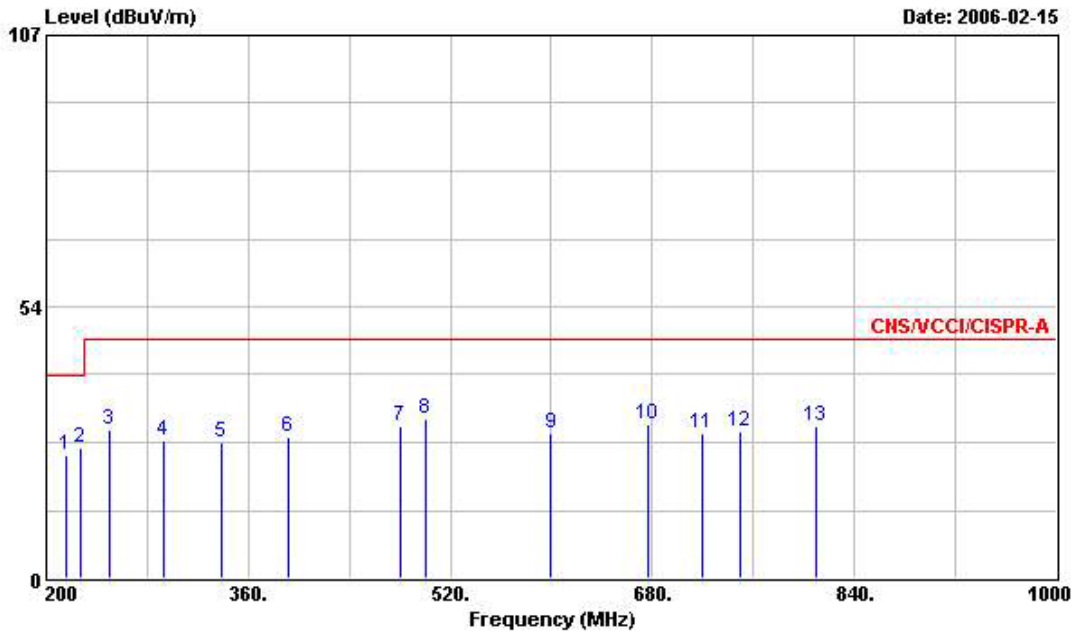
Site : OS05_LK
 Condition : CNS/VCCI/CISPR-A 10m SCHAFFNER2890APR0905 HORIZONTAL
 EUT : SERVER
 POWER : 230VAC (650W Redundant)POWER*2
 MODEL : SC5299-E
 MEMO : 1280*1024 85HZ LAN:1G/1G
 : CPU:3.46G*2 FBDIMM:512M*8
 : PP4 / SL SATA
 : SATA Bp Boot

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|----|---------|--------|------------|------------|------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 216.000 | 24.60 | -15.40 | 40.00 | 38.80 | 10.57 | 2.00 | 26.77 | Peak | --- | --- |
| 2 | 226.800 | 25.90 | -14.10 | 40.00 | 39.36 | 11.22 | 2.07 | 26.75 | Peak | 231 | 14 |
| 3 | 250.000 | 26.80 | -20.20 | 47.00 | 38.66 | 12.64 | 2.20 | 26.70 | Peak | --- | --- |
| 4 | 266.000 | 26.02 | -20.98 | 47.00 | 37.59 | 12.76 | 2.34 | 26.67 | Peak | --- | --- |
| 5 | 338.500 | 25.91 | -21.09 | 47.00 | 35.79 | 14.28 | 2.71 | 26.87 | Peak | --- | --- |
| 6 | 391.500 | 26.12 | -20.88 | 47.00 | 34.38 | 16.02 | 2.97 | 27.25 | Peak | --- | --- |
| 7 | 480.000 | 28.34 | -18.66 | 47.00 | 35.19 | 17.41 | 3.44 | 27.70 | Peak | --- | --- |
| 8 | 500.000 | 30.59 | -16.41 | 47.00 | 37.19 | 17.70 | 3.50 | 27.80 | Peak | --- | --- |
| 9 | 600.000 | 30.43 | -16.57 | 47.00 | 36.59 | 18.14 | 3.80 | 28.10 | Peak | --- | --- |
| 10 | 631.800 | 31.73 | -15.27 | 47.00 | 37.21 | 18.42 | 4.11 | 28.01 | Peak | --- | --- |
| 11 | 720.000 | 31.55 | -15.45 | 47.00 | 35.29 | 19.26 | 4.78 | 27.78 | Peak | --- | --- |
| 12 | 750.000 | 28.39 | -18.61 | 47.00 | 31.79 | 19.60 | 4.75 | 27.75 | Peak | --- | --- |
| 13 | 810.000 | 30.28 | -16.72 | 47.00 | 32.89 | 20.34 | 4.72 | 27.67 | Peak | --- | --- |
| 14 | 975.000 | 30.62 | -16.38 | 47.00 | 31.10 | 21.05 | 5.72 | 27.25 | Peak | --- | --- |



Site : OS05_LK
 Condition : CNS/VCCI/CISPR-A 10m SCHAFFNER2890APR0905 VERTICAL
 EUT : SERVER
 POWER : 230VAC (650W Redundant)POWER*2
 MODEL : SC5299-E
 MEMO : 1280*1024 85HZ LAN:1G/1G
 : CPU:3.46G*2 FBDIMM:512M*8
 : PP4 / SL SATA
 : SATA Bp Boot

| | Freq | Level | Over | Limit | Read | Antenna | Cable | Preamp | Remark | Ant | Table |
|---|---------|--------|--------|--------|-------|---------|-------|--------|--------|-----|-------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 41.010 | 25.67 | -14.33 | 40.00 | 37.47 | 14.73 | 0.87 | 27.40 | Peak | --- | --- |
| 2 | 49.290 | 25.26 | -14.74 | 40.00 | 42.32 | 9.35 | 0.99 | 27.40 | Peak | --- | --- |
| 3 | 62.230 | 19.94 | -20.06 | 40.00 | 40.78 | 5.38 | 1.15 | 27.37 | Peak | --- | --- |
| 4 | 80.580 | 24.42 | -15.58 | 40.00 | 44.17 | 6.39 | 1.20 | 27.34 | Peak | --- | --- |
| 5 | 86.440 | 22.02 | -17.98 | 40.00 | 40.79 | 7.30 | 1.26 | 27.33 | Peak | --- | --- |
| 6 | 125.000 | 23.15 | -16.85 | 40.00 | 37.44 | 11.38 | 1.50 | 27.17 | Peak | --- | --- |
| 7 | 161.160 | 21.83 | -18.17 | 40.00 | 36.60 | 10.50 | 1.72 | 26.99 | Peak | --- | --- |
| 8 | 196.040 | 24.44 | -15.56 | 40.00 | 39.85 | 9.41 | 2.00 | 26.82 | Peak | --- | --- |



Site : OS05_LK
 Condition : CNS/VCCI/CISPR-A 10m SCHAFFNER2890APR0905 VERTICAL
 EUT : SERVER
 POWER : 230VAC (650W Redundant)POWER*2
 MODEL : SC5299-E
 MEMO : 1280*1024 85HZ LAN:1G/1G
 CPU:3.46G*2 FBDIMM:512M*8
 : PP4 / SL SATA
 : SATA Bp Boot

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|----|---------|--------|------------|------------|------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 216.000 | 24.26 | -15.74 | 40.00 | 38.46 | 10.57 | 2.00 | 26.77 | Peak | --- | --- |
| 2 | 226.800 | 25.56 | -14.44 | 40.00 | 39.02 | 11.22 | 2.07 | 26.75 | Peak | --- | --- |
| 3 | 250.000 | 29.36 | -17.64 | 47.00 | 41.22 | 12.64 | 2.20 | 26.70 | Peak | --- | --- |
| 4 | 293.300 | 27.10 | -19.90 | 47.00 | 38.24 | 12.97 | 2.50 | 26.61 | Peak | --- | --- |
| 5 | 338.500 | 26.77 | -20.23 | 47.00 | 36.65 | 14.28 | 2.71 | 26.87 | Peak | --- | --- |
| 6 | 391.500 | 27.78 | -19.22 | 47.00 | 36.04 | 16.02 | 2.97 | 27.25 | Peak | --- | --- |
| 7 | 480.000 | 29.80 | -17.20 | 47.00 | 36.65 | 17.41 | 3.44 | 27.70 | Peak | --- | --- |
| 8 | 500.000 | 31.35 | -15.65 | 47.00 | 37.95 | 17.70 | 3.50 | 27.80 | Peak | --- | --- |
| 9 | 600.000 | 28.69 | -18.31 | 47.00 | 34.85 | 18.14 | 3.80 | 28.10 | Peak | --- | --- |
| 10 | 677.000 | 30.17 | -16.83 | 47.00 | 34.65 | 18.82 | 4.57 | 27.87 | Peak | --- | --- |
| 11 | 720.000 | 28.51 | -18.49 | 47.00 | 32.25 | 19.26 | 4.78 | 27.78 | Peak | --- | --- |
| 12 | 750.000 | 29.05 | -17.95 | 47.00 | 32.45 | 19.60 | 4.75 | 27.75 | Peak | --- | --- |
| 13 | 810.000 | 30.04 | -16.96 | 47.00 | 32.65 | 20.34 | 4.72 | 27.67 | Peak | --- | --- |

Test Engineer : Neil
Neil Huang

6.5 Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW



7. Harmonics Test

7.1 Standard

- Standard : EN 61000-3-2: 2000

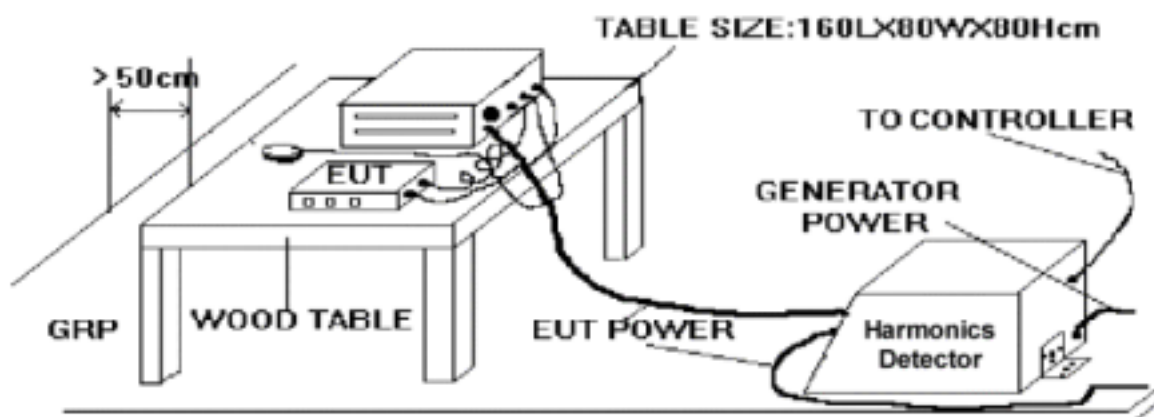
7.2 Test Procedure

The measured values of the harmonics components of the input current, including line current and neutral current, shall be compared with the limits given in Clause 7 of EN 61000-3-2.

7.3 Test Equipment Settings

- Line Voltage : 230 V
- Line Frequency : 50 Hz
- Device Class : D
- Current Measurement Range : High
- Measurement Delay : 10.0 seconds
- Test Duration : 2.00 minutes
- Class determination Pre-test Duration : 10.00 seconds

7.4 Test Setup



7.5 Current Harmonics Test

7.5.1 Test Data of Current Harmonics

- Final Test Result : PASS
- Temperature : 23 °C
- Relative Humidity : 54 %
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1

Urms = 228.7V Freq = 50.000 Range: 5 A
 Irms = 1.470A lpk = 2.412A cf = 1.641
 P = 321.7W Pap = 336.2VA pf = 0.957
 THDi = 13.6 % THDu = 0.10 % Class D

Test - Time :2min (100 %), Limit Reference: Pmax = 323.49W, Test completed, Result: PASSED

| Order | Iavg [A] | Iavg% [%] | Irms [A] | Irms% [%] | I _{max} [A] | I _{max} % [%] | Limit [A] | Status |
|-------|-------------|--------------|-------------|--------------|-------------------------|---------------------------|--------------|--------|
| 1 | 1.4755 | 100.39 | 1.4569 | 99.128 | 2.0831 | 141.74 | | |
| 2 | 0.0000 | 0.0000 | 0.0024 | 0.1661 | 0.0027 | 0.1869 | | |
| 3 | 0.1855 | 12.625 | 0.1871 | 12.728 | 0.1877 | 12.770 | 1.0999 | |
| 4 | 0.0000 | 0.0000 | 0.0006 | 0.0415 | 0.0009 | 0.0623 | | |
| 5 | 0.0409 | 2.7824 | 0.0412 | 2.8032 | 0.0412 | 2.8032 | 0.6146 | |
| 6 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0006 | 0.0415 | | |
| 7 | 0.0168 | 1.1420 | 0.0168 | 1.1420 | 0.0171 | 1.1628 | 0.3235 | |
| 8 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0003 | 0.0208 | | |
| 9 | 0.0098 | 0.6645 | 0.0095 | 0.6437 | 0.0101 | 0.6852 | 0.1617 | |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | |
| 11 | 0.0110 | 0.7475 | 0.0116 | 0.7890 | 0.0116 | 0.7890 | 0.1132 | |
| 12 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0003 | 0.0208 | | |
| 13 | 0.0153 | 1.0382 | 0.0153 | 1.0382 | 0.0156 | 1.0590 | 0.0958 | |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | |
| 15 | 0.0000 | 0.0000 | 0.0076 | 0.5191 | 0.0079 | 0.5399 | 0.0830 | |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | | |
| 17 | 0.0119 | 0.8098 | 0.0119 | 0.8098 | 0.0122 | 0.8306 | 0.0733 | |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | | |
| 19 | 0.0092 | 0.6229 | 0.0095 | 0.6437 | 0.0098 | 0.6645 | 0.0655 | |
| 20 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0003 | 0.0208 | | |
| 21 | 0.0266 | 1.8065 | 0.0272 | 1.8480 | 0.0272 | 1.8480 | 0.0593 | |
| 22 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0003 | 0.0208 | | |
| 23 | 0.0000 | 0.0000 | 0.0037 | 0.2492 | 0.0040 | 0.2699 | 0.0541 | |
| 24 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | | |
| 25 | 0.0247 | 1.6819 | 0.0250 | 1.7027 | 0.0253 | 1.7234 | 0.0498 | |
| 26 | 0.0000 | 0.0000 | 0.0006 | 0.0415 | 0.0009 | 0.0623 | | |
| 27 | 0.0128 | 0.8721 | 0.0125 | 0.8513 | 0.0131 | 0.8929 | 0.0461 | |
| 28 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | | |
| 29 | 0.0000 | 0.0000 | 0.0076 | 0.5191 | 0.0085 | 0.5814 | 0.0429 | |
| 30 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0003 | 0.0208 | | |
| 31 | 0.0183 | 1.2458 | 0.0186 | 1.2666 | 0.0189 | 1.2874 | 0.0402 | |
| 32 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0003 | 0.0208 | | |
| 33 | 0.0104 | 0.7060 | 0.0107 | 0.7267 | 0.0113 | 0.7683 | 0.0377 | |
| 34 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0006 | 0.0415 | | |
| 35 | 0.0000 | 0.0000 | 0.0052 | 0.3530 | 0.0058 | 0.3945 | 0.0356 | |
| 36 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0003 | 0.0208 | | |
| 37 | 0.0119 | 0.8098 | 0.0113 | 0.7683 | 0.0119 | 0.8098 | 0.0337 | |
| 38 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | 0.0003 | 0.0208 | | |
| 39 | 0.0000 | 0.0000 | 0.0064 | 0.4360 | 0.0067 | 0.4568 | 0.0319 | |
| 40 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0003 | 0.0208 | | |

Test Engineer : Kero
 Kero Kao

7.5.2 Test Data of Current Harmonics

- Final Test Result : PASS
- Temperature : 23 °C
- Relative Humidity : 54 %
- Test Date : Feb. 14, 2006
- Test Mode : Mode 2

Urms = 228.7V Freq = 49.987 Range: 5 A
 Irms = 1.431A Ipk = 2.957A cf = 2.067
 P = 296.2W Pap = 327.2VA pf = 0.905
 THDi = 39.9 % THDu = 0.10 % Class D

Test - Time :2min (100 %), Limit Reference: Pmax = 296.44W, Test completed, Result: PASSED

| Order | Iavg [A] | Iavg% [%] | Irms [A] | Irms% [%] | Imax [A] | Imax% [%] | Limit [A] |
|-------|-------------|--------------|-------------|--------------|-------------|--------------|--------------|
| 1 | 1.2982 | 90.742 | 1.3104 | 91.596 | 1.3116 | 91.681 | |
| 2 | 0.0000 | 0.0000 | 0.0027 | 0.1920 | 0.0073 | 0.5119 | |
| 3 | 0.5002 | 34.962 | 0.5029 | 35.154 | 0.5032 | 35.175 | 1.0079 |
| 4 | 0.0000 | 0.0000 | 0.0018 | 0.1280 | 0.0034 | 0.2346 | |
| 5 | 0.2057 | 14.377 | 0.2069 | 14.462 | 0.2084 | 14.569 | 0.5632 |
| 6 | 0.0000 | 0.0000 | 0.0012 | 0.0853 | 0.0027 | 0.1920 | |
| 7 | 0.0952 | 6.6553 | 0.0967 | 6.7619 | 0.0967 | 6.7619 | 0.2964 |
| 8 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0024 | 0.1706 | |
| 9 | 0.0876 | 6.1220 | 0.0885 | 6.1860 | 0.0897 | 6.2713 | 0.1482 |
| 10 | 0.0000 | 0.0000 | 0.0012 | 0.0853 | 0.0024 | 0.1706 | |
| 11 | 0.0467 | 3.2637 | 0.0473 | 3.3063 | 0.0485 | 3.3916 | 0.1038 |
| 12 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0021 | 0.1493 | |
| 13 | 0.0549 | 3.8396 | 0.0558 | 3.9036 | 0.0565 | 3.9462 | 0.0878 |
| 14 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0018 | 0.1280 | |
| 15 | 0.0256 | 1.7918 | 0.0256 | 1.7918 | 0.0296 | 2.0691 | 0.0761 |
| 16 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0018 | 0.1280 | |
| 17 | 0.0415 | 2.9010 | 0.0424 | 2.9650 | 0.0430 | 3.0077 | 0.0671 |
| 18 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0018 | 0.1280 | |
| 19 | 0.0195 | 1.3652 | 0.0195 | 1.3652 | 0.0235 | 1.6425 | 0.0601 |
| 20 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0018 | 0.1280 | |
| 21 | 0.0305 | 2.1331 | 0.0311 | 2.1758 | 0.0320 | 2.2398 | 0.0543 |
| 22 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0018 | 0.1280 | |
| 23 | 0.0195 | 1.3652 | 0.0195 | 1.3652 | 0.0226 | 1.5785 | 0.0496 |
| 24 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0018 | 0.1280 | |
| 25 | 0.0232 | 1.6212 | 0.0235 | 1.6425 | 0.0247 | 1.7278 | 0.0457 |
| 26 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0015 | 0.1067 | |
| 27 | 0.0174 | 1.2159 | 0.0174 | 1.2159 | 0.0204 | 1.4292 | 0.0423 |
| 28 | 0.0000 | 0.0000 | 0.0012 | 0.0853 | 0.0018 | 0.1280 | |
| 29 | 0.0208 | 1.4505 | 0.0208 | 1.4505 | 0.0226 | 1.5785 | 0.0394 |
| 30 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0015 | 0.1067 | |
| 31 | 0.0128 | 0.8959 | 0.0128 | 0.8959 | 0.0153 | 1.0666 | 0.0368 |
| 32 | 0.0000 | 0.0000 | 0.0012 | 0.0853 | 0.0015 | 0.1067 | |
| 33 | 0.0189 | 1.3225 | 0.0189 | 1.3225 | 0.0214 | 1.4932 | 0.0346 |
| 34 | 0.0000 | 0.0000 | 0.0012 | 0.0853 | 0.0015 | 0.1067 | |
| 35 | 0.0107 | 0.7466 | 0.0110 | 0.7679 | 0.0134 | 0.9386 | 0.0326 |
| 36 | 0.0000 | 0.0000 | 0.0012 | 0.0853 | 0.0015 | 0.1067 | |
| 37 | 0.0162 | 1.1305 | 0.0159 | 1.1092 | 0.0183 | 1.2799 | 0.0308 |
| 38 | 0.0000 | 0.0000 | 0.0009 | 0.0640 | 0.0015 | 0.1067 | |
| 39 | 0.0107 | 0.7466 | 0.0104 | 0.7253 | 0.0134 | 0.9386 | 0.0293 |
| 40 | 0.0000 | 0.0000 | 0.0012 | 0.0853 | 0.0015 | 0.1067 | |

Test Engineer : Kero
 Kero Kao

8. Voltage Fluctuations Test

8.1 Standard

- Standard : EN 61000-3-3:1995/A1:2001

8.2 Test Procedure

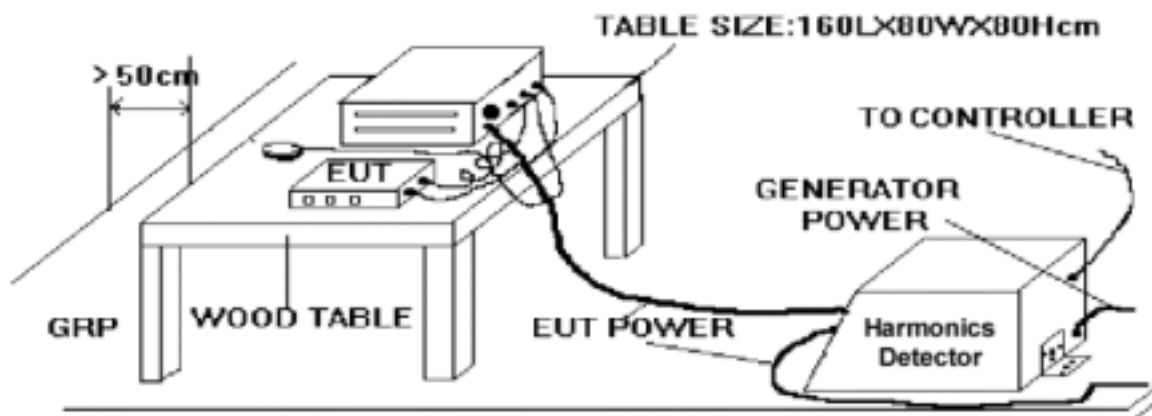
The equipment shall be tested under the conditions of **Clause 5**.

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of $\pm 8\%$ is achieved during the whole assessment procedure.

8.3 Test Equipment Settings

- Line Voltage : 230 V
- Line Frequency : 50 Hz
- Measurement Delay : 10.0 seconds
- Pst Integration Time : 10 minutes
- Pst Integration Periods : 1
- Test Duration : 00:10:00 minutes

8.4 Test Setup



8.5 Test Result of Voltage Fluctuation and Flicker Test

8.5.1 Test Data of Voltage Fluctuation and Flicker

- Final Test Result : **PASS**
- Temperature : 23 °C
- Relative Humidity : 54 %
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1

Urms = 228.7V Freq = 49.987 Range: 5 A
Irms = 1.484A Ipk = 2.444A cf = 1.646
P = 330.1W Pap = 339.5VA pf = 0.972

Test - Time : 1 x 10min = 10min (100 %)

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
 dmax : 4.00 % dc : 3.30 %
 dtLim : 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

Plt = 0.074

| | Pst | P50s | P10s | P3s | P1s | P0.1s | dmax [%] | dc [%] | dt>Lim [ms] |
|---|-------|-------|-------|-------|-------|-------|----------|--------|-------------|
| 1 | 0.074 | 0.010 | 0.010 | 0.010 | 0.011 | 0.021 | 0.000 | 0.060 | 0.000 |

Test Engineer :

Kero
Kero Kao

8.5.2 Test Data of Voltage Fluctuation and Flicker

- Final Test Result : **PASS**
- Temperature : 23 °C
- Relative Humidity : 54 %
- Test Date : Feb. 14, 2006
- Test Mode : Mode 2

Urms = 228.7V Freq = 50.000 Range: 5 A
Irms = 1.433A lpk = 2.966A cf = 2.070
P = 294.8W Pap = 327.8VA pf = 0.899

Test - Time : 1 x 10min = 10min (100 %)

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.30 %
dtLim : 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

Plt = 0.072

| | Pst | P50s | P10s | P3s | P1s | P0.1s | dmax [%] | dc [%] | dt>Lim [ms] |
|---|-------|-------|-------|-------|-------|-------|----------|--------|-------------|
| 1 | 0.072 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.000 | 0.070 | 0.000 |

Test Engineer : Kero
Kero Kao

8.6 Photographs of Harmonics Test, Voltage Fluctuation and Flicker Test

Mode 1

FRONT VIEW



REAR VIEW



Mode 2

FRONT VIEW



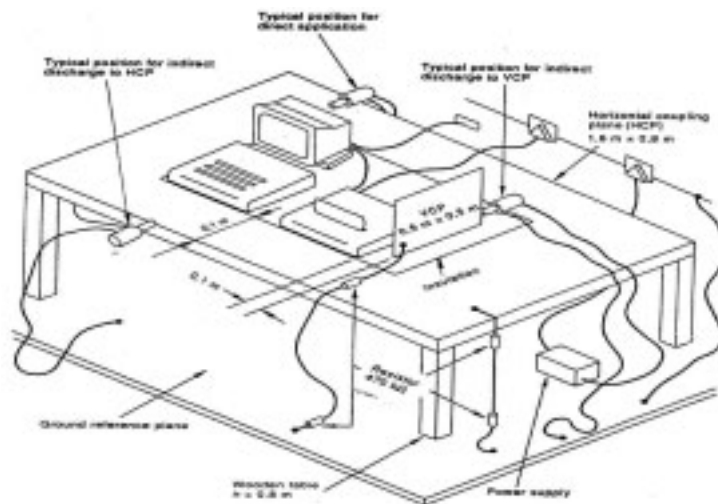
REAR VIEW



9. Electrostatic Discharge Immunity Test (ESD)

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-2:1995/A2:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 4 for air discharge
: 4 for contact discharge
- Test Voltage : $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV for air discharge
: $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV for contact discharge
- Temperature : 23
- Relative Humidity : 53 %
- Atmospheric Pressure : 98.5 kPa
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1 & Mode 2
- Observation : Normal

9.1 Test Setup



The test setup consists of the test generator, EUT and auxiliary instrumentation necessary to perform DIRECT and INDIRECT application of discharges to the EUT as applicable, in the follow manner :

- a. CONTACT DISCHARGE to the conductive surfaces and to coupling plane;
- b. AIR DISCHARGE at insulating surfaces.

The preferred test method is that of type tests performed in laboratories and the only accepted method of demonstrating conformance with this standard. The EUT was arranged as closely as possible to arrangement in final installed conditions.

9.2 Test Setup for Tests Performed in Laboratory

A ground reference plane was provided on the floor of the test site. It was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. In the SPORTON EMC LAB., we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system.

The EUT was arranged and connected according to its functional requirements. A distance of 1m minimum was provided between the EUT and the wall of the lab. and any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2m to other conductive parts in the test setup.

Where the EUT is installed on a metal table, the table was connected to the reference plane via a cable with a 470k ohm resistor located at each end, to prevent a build-up of charge. The test setup was consist a wooden table, 0.8m high, standing on the ground reference plane. A HCP, 1.6 m x 0.8 m, was placed on the table. The EUT and cables was isolated from the HCP by an insulating support 0.5 mm thick. The VCP size, 0.5 m x 0.5 m.



9.3 ESD Test Procedure

- a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
 - ambient temperature: 15 to 35 ;
 - relative humidity : 30% to 60%;
 - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.
- c. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.
- d. The test shall be performed with both air discharge and contact discharge. On preselected points at least 10 single discharges (in the most sensitive polarity) shall be applied on air discharge. On preselected points at least 25 single discharges (in the most sensitive polarity) shall be applied on contact discharge.
- e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
- f. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
- g. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted :
 - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
 - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
 - The contact discharge test shall not be applied to such surfaces.
- h. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT . After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.



9.4 Test Severity Levels

9.4.1 Contact Discharge

| Level | Test Voltage (KV) of Contact discharge |
|-------|--|
| 1 | ±2 |
| 2 | ±4 |
| 3 | ±6 |
| 4 | ±8 |
| X | Specified |

Remark : "X" is an open level.

9.4.2 Air Discharge

| Level | Test Voltage (KV) of Air Discharge |
|-------|------------------------------------|
| 1 | ±2 |
| 2 | ±4 |
| 3 | ±8 |
| 4 | ±15 |
| X | Specified |

Remark : "X" is an open level.

9.5 Test Points

9.5.1 Test Result of Air Discharge

| Test Point | Voltage | Tested No. |
|----------------|-------------------------------------|------------|
| Case | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| LED | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| Power Switch | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| Reset Switch | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| VGA Port | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| PS/2 Port | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| Speaker Jack | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| AC Socket | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| USB Port | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| Control Button | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| LCD Panel | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |
| CD-ROM | $\pm 2 / \pm 4 / \pm 8 / \pm 15$ KV | BY 20 |

9.5.2 Test Result of Contact Discharge

| Test Point | Voltage | Tested No. |
|----------------|------------------------------------|------------|
| HCP (At Front) | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| HCP (At Left) | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| HCP (At Right) | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| HCP (At Rear) | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| VCP (At Front) | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| VCP (At Left) | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| VCP (At Right) | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| VCP (At Rear) | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| Case | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| Com Port | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |
| RJ45 Port | $\pm 2 / \pm 4 / \pm 6 / \pm 8$ KV | BY 25 |

Test Engineer : Kero
Kero Kao

9.6 Photographs of Electrostatic Discharge Immunity Test

Mode 1

FRONT VIEW



REAR VIEW



Mode 2

FRONT VIEW



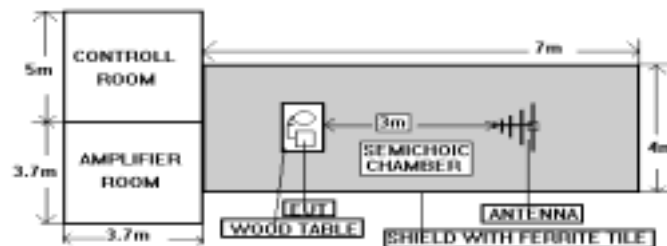
REAR VIEW



10. Radio Frequency Electromagnetic Field Immunity Test (RS)

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : A
- Basic Standard : IEC 61000-4-3:1996
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 2
- Frequency Range : 80-1000 MHz
- Field Strength : 3 V/m (Modulated 80% AM)
- Temperature : 23
- Relative Humidity : 53 %
- Atmospheric Pressure : 98.5 kPa
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1 & Mode 2
- Observation : Normal

10.1 Test Setup



NOTE : The SPORTON 7m x 4m x 4m semichoice chamber is compliance with the sixteen points uniform field requirement as stated in IEC 1000-4-3 Section 6.2.

The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semichoice chamber.

10.2 Test Procedure

- a. The equipment to be tested is placed in the center of the enclosure on a wooden table. The equipment is then connected to power and signal leads according to pertinent installation instructions.
- b. The bilog antenna which is enabling the complete frequency range of 80-1000 MHz is placed 3m away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the applicable antennae.
- c. The test is normally performed with the generating antenna facing each of four sides of the EUT. The polarization of the field generated by the broadband (bilog) antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.
- d. At each of the above conditions, the frequency range is swept 80-1000 MHz, pausing to adjust the R.F. signal level or to switch oscillators and antenna. The rate of sweep is in the order of $1.5 \cdot 10^{-3}$ decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

10.3 Test Severity Levels

Frequency Band : 80-1000 MHz

| Level | Test field strength (V/m) |
|-------|---------------------------|
| 1 | 1 |
| 2 | 3 |
| 3 | 10 |
| X | Specified |

Remark : "X" is an open class.

Test Engineer : Kero
Kero Kao

10.4 Photographs of Radio Frequency Electromagnetic Field Immunity Test

Mode 1

FRONT VIEW

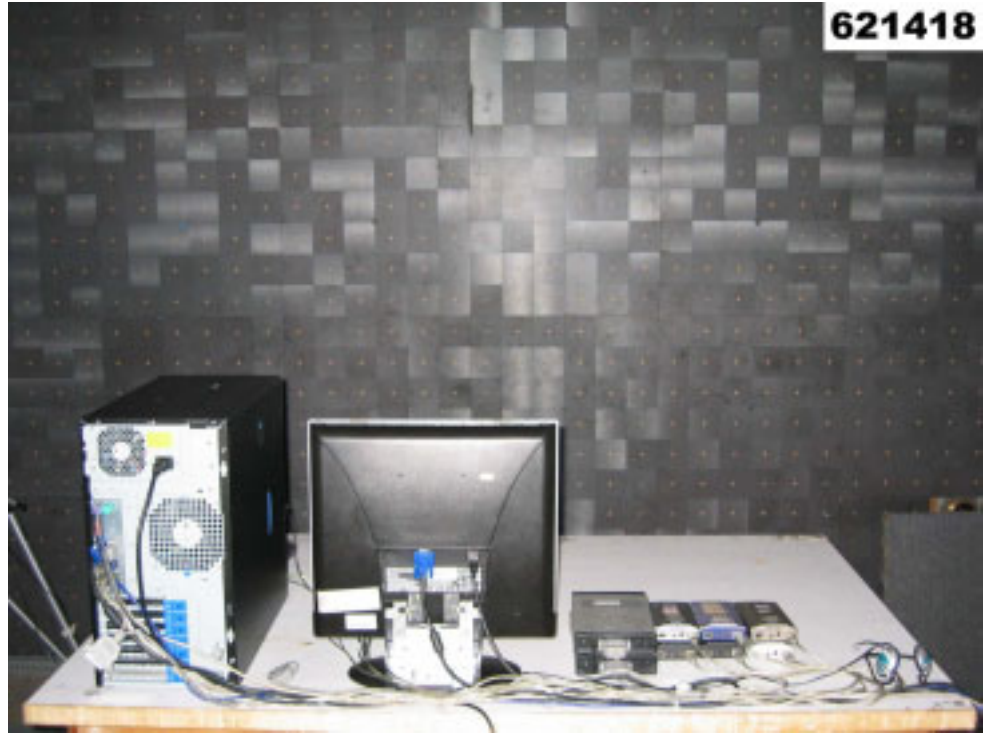


REAR VIEW

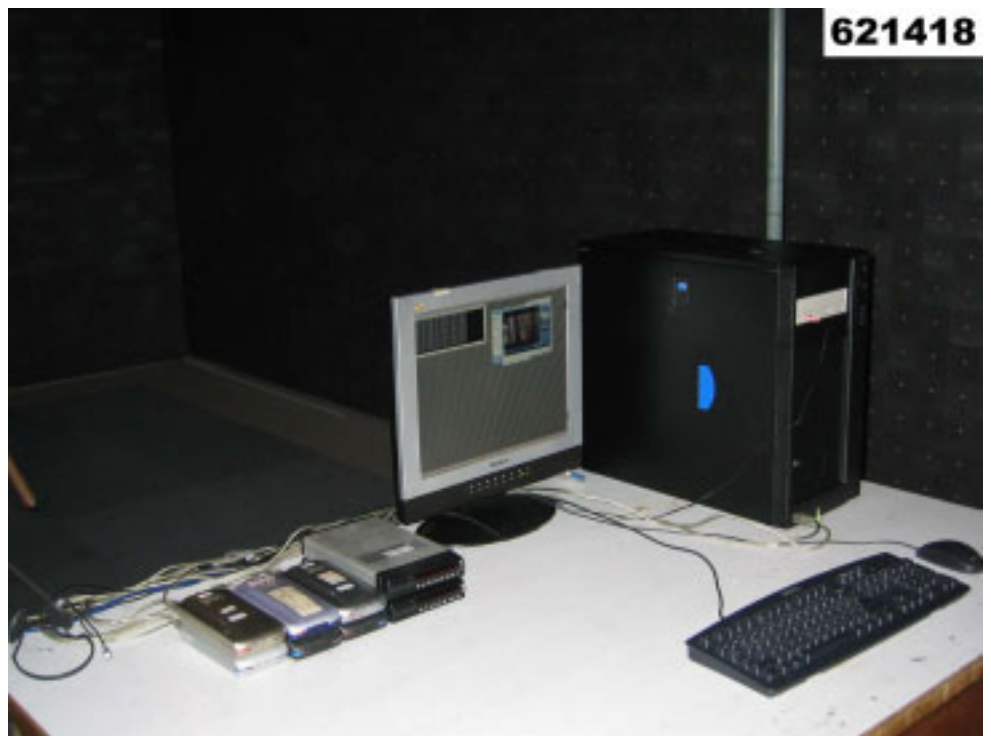


Mode 2

FRONT VIEW



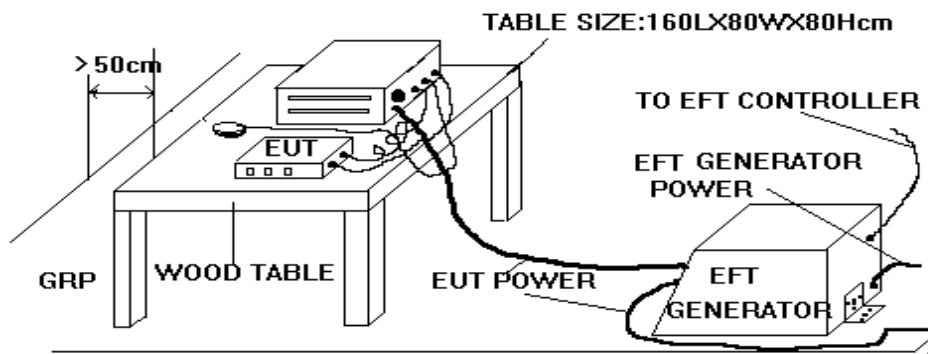
REAR VIEW



11. Electrical Fast Transient/Burst Immunity Test (EFT/BURST)

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-4:1995/A2:2001
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : on Power Supply -- 2
: on I/O signal, data and control line -- 2
- Test Voltage : on Power Supply -- $\pm 0.5 / \pm 1.0$ KV
: on I/O signal, data and control line -- $\pm 0.25 / \pm 0.5$ KV
- Temperature : 23
- Relative Humidity : 52 %
- Atmospheric Pressure : 98.5 kPa
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1 & Mode 2
- Observation : Normal

11.1 Test Setup



The EUT was placed on a ground reference plane and was insulated from it by an insulating support about 0.1m thick. If the EUT is table-top equipment, it was located approximately 0.8m above the GRP.. The GRP. was a metallic sheet (copper or aluminum) of 0.25 mm ,minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. It shall project beyond the EUT by at least 0.1m on all sides and connected to the protective earth. In the SPORTON EMC LAB. we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system. The EUT was arranged and connected according to its functional requirements. The minimum distance between the EUT and other conductive structures, except the GRP. beneath the EUT, was more than 0.5 m. Using the coupling clamp, the minimum distance between the coupling plates and all other conductive structures, except the GRP. beneath the EUT, was more than 0.5 m. The length of the signal and power lines between the coupling device and the EUT was 1m or less.

11.2 Test on Power Line

- a. The EFT/B-generator was located on the GRP.. The length from the EFT/B-generator to the EUT as not exceed 1 m.
- b. The EFT/B-generator provides the ability to apply the test voltage in a non-symmetrical condition to the power supply input terminals of the EUT.

11.3 Test on Communication Lines

- a. The coupling clamp is composed of a clamp unit for housing the cable (length more than 3 m), and was placed on the GRP..
- b. The coupling clamp provides the ability of coupling the fast transient/bursts to the cable under test.

11.4 Test Procedure

- a. In order to minimize the effect of environmental parameters on test results, the climatic conditions when test is carrying out shall comply with the following requirements:
 - ambient temperature: 15 to 35 ;
 - relative humidity : 45% to 75%;
 - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. In order to minimize the effect of environmental parameters on test results, the electromagnetic environment of the laboratory shall not influence the test results.
- c. The variety and diversity of equipment and systems to be tested make it difficult to establish general criteria for the evaluation of the effects of fast transients/bursts on equipment and systems.
- d. The test results may be classified on the basic of the operating conditions and the functional specification of the equipment under test, according to the following performance criteria :
 - Normal performance within the specification limits.
 - Temporary degradation or loss of function or performance which is self-recoverable.
 - Temporary degradation or loss of function or performance which requires operator intervention or system reset.
 - Degradation or loss of function which is not recoverable due to damage of equipment (components).



11.5 Test Severity Levels

The following test severity levels are recommended for the fast transient/burst test :

| Open circuit output test voltage $\pm 10\%$ | | |
|---|-----------------|--------------------------------------|
| Level | On Power Supply | On I/O signal, data and control line |
| 1 | 0.5 KV | 0.25 KV |
| 2 | 1.0 KV | 0.50 KV |
| 3 | 2.0 KV | 1.00 KV |
| 4 | 4.0 KV | 2.00 KV |
| X | Specified | Specified |

Remark : " X " is an open level. The level is subject to negotiation between the user and the manufacturer or is specified by the manufacturer.

Test Engineer :

Kero Kao

11.6 Photographs of Electrical Fast Transient/Burst Immunity Test

Mode 1

FRONT VIEW



REAR VIEW



Mode 2

FRONT VIEW



REAR VIEW



CLAMP



12. Surge Immunity Test

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-5:1995/A1:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Surge Wave Form (Tr/Th) : 1, 2/50 (8/20) μ s
- Level : 3
- Test Voltage : $\pm 0.5 / \pm 1.0 / \pm 2.0$ KV
- Temperature : 23
- Relative Humidity : 53 %
- Atmospheric Pressure : 98.5 kPa
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1 & Mode 2
- Observation : Normal
- Remark : The test on RJ45 port is not required due to the normal functioning cannot be achieved because of the impact of the CDN on the EUT.

12.1 Test Record

| Voltage (KV) | Test Location | Polarity | Phase Angle | | | | Test Result |
|---------------------|---------------|----------|-------------|-----|------|------|--------------------|
| | | | 0° | 90° | 180° | 270° | |
| 0.5 ~ 1.0 KV | L - N | + | A | A | A | A | <u>PASS</u> |
| | | - | A | A | A | A | <u>PASS</u> |
| 2.0 KV | L - PE | + | A | A | A | A | <u>PASS</u> |
| | | - | A | A | A | A | <u>PASS</u> |
| | N - PE | + | A | A | A | A | <u>PASS</u> |
| | | - | A | A | A | A | <u>PASS</u> |

⊕ Remark : PE = Earth reference



12.2 Test Level

| Level | Open-circuit test voltage, $\pm 10\%$, KV |
|-------|--|
| 1 | 0.5 |
| 2 | 1.0 |
| 3 | 2.0 |
| 4 | 4.0 |
| x | Specified |

NOTE - x is an open class.
This level can be specified in the product specification.

12.3 Test Procedure

a. Climatic conditions

The climatic conditions shall comply with the following requirements :

- ambient temperature : 15 to 35
- relative humidity : 10 % to 75 %
- atmospheric pressure : 86 kPa to 106 kPa (860 mbar to 1060 mbar)

b. Electromagnetic conditions

The electromagnetic environment of the laboratory shall not influence the test results.

c. The test shall be performed according the test plan that shall specify the test set-up with

- generator and other equipment utilized;
- test level (voltage/current);
- generator source impedance;
- internal or external generator trigger;
- number of tests : at least five positive and five negative at the selected points;
- repetition rate : maximum 1/min.
- inputs and outputs to be tested;
- representative operating conditions of the EUT;
- sequence of application of the surge to the circuit;
- phase angle in the case of a.c. power supply;
- actual installation conditions, for example :
AC : neutral earthed,
DC : (+) or (-) earthed to simulated the actual earthing conditions.



- d. If not otherwise specified the surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the a.c. voltage wave (positive and negative).
- e. The surges have to be applied line to line and line(s) and earth. When testing line to earth, the test voltage has to be applied successively between each of the lines and earth, if there is no other specification.
- f. The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore the test voltage has to be increased by steps up to the test level specified in the product standard or test plan.
- g. All lower levels including the selected test level shall be satisfied. For testing the secondary protection, the output voltage of the generator shall be increased up to the worstcase voltage breakdown level (let-through level) of the primary protection.
- h. If the actual operating signal sources are not available, they may be simulated. Under no circumstances may the test level exceed the product specification. The test shall be carried out according to the test plan.
- i. To find all critical points of the duty cycle of the equipment, a sufficient number of positive and negative test pulses shall be applied. For acceptance test a previously unstressed equipment shall be used to the protection devices shall be replaced.

12.4 Operating Condition

Full system

Test Engineer : Kero
Kero Kao

12.5 Photographs of Surge Immunity Test

Mode 1

FRONT VIEW



REAR VIEW



Mode 2

FRONT VIEW



REAR VIEW



13. Conducted Disturbances Induced by Radio-Frequency Field Immunity Test (CS)

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : A
- Basic Standard : IEC 61000-4-6:1996/A1:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Level : 2
- Test Voltage : 3 V/rms (Modulated, 1KHz, 80%, AM)
- Frequency Range : 0.15 MHz to 80 MHz
- Test Port : on AC Power and Telecommunication Ports
- Dwell Time : 2.9 seconds
- Frequency Step Size : 1 %
- Coupling Mode : CDN-M16 SW M3 for AC power ports,
RJ45 for Telecommunication Ports
- Temperature : 23
- Relative Humidity : 53 %
- Atmospheric Pressure : 98.5 kPa
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1 & Mode 2
- Observation : Normal

13.1 Test Level

| Level | Voltage Level (EMF), |
|---|------------------------|
| 1 | 1 V |
| 2 | 3 V |
| 3 | 10 V |
| x | Specified |
| NOTE - x is an open class. This level can be specified in the product specification. | |

13.2 Operating Condition

Full system



13.3 Test Procedure

- a. The EUT shall be operated within its intended climatic conditions. The temperature and relative humidity should be recorded.
- b. This test method test can be performed without using a sell shielded enclosure. This is because the disturbance levels applied and the geometry of the setups are not likely to radiated a high amount of energy, especially at the lower frequencies. If under certain circumstances the radiated energy is too high, a shielded enclosure has to be used.
- c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF-input ports of the coupling devices are terminated by a 50 ohm load resistor.
- d. The frequency range is swept from 150 KHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1KHz sinewave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall no exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall no exceed 1% of the start and thereafter 1% of the preceding frequency value.
- e. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequency(ies) and harmonics or frequencies of dominant interest shall be analyzed separately.
- f. An alternative test procedure may be adopted, wherein the frequency range is swept incrementally, with a step size not exceeding 4% of the start ad thereafter 4% of the preceding frequency value. The test level should be at least twice the value of the specified test level.
- g. In cases of dispute, the test procedure using a step size not exceeding 1% of the start and thereafter 1% of preceding frequency value shall take precedence.
- h. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.
- i. The use of special exercising programs is recommended.
- j. Testing shall be performed according to a Test Plan, which shall be included in the test report.
- k. It may be necessary to carry out some investigatory testing in order to establish some aspects of the test plan.

Test Engineer :

Kero

Kero Kao

13.4 Photographs of CS Test

Mode 1

FRONT VIEW



REAR VIEW



Mode 2

FRONT VIEW



REAR VIEW



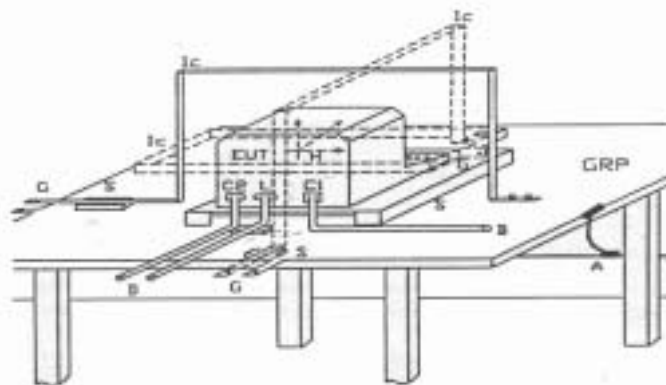
14. Power Frequency Magnetic Field Immunity Tests

- Final Test Result : **PASS**
- Pass Performance Criteria : A
- Required Performance Criteria : A
- Basic Standard : IEC 61000-4-8:1993/A1:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Temperature : 23
- Relative Humidity : 53 %
- Atmospheric Pressure : 98.5 kPa
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1 & Mode 2
- Observation : Normal

14.1 Test Record

| Power Frequency Magnetic Field | Testing duration | Coil Orientation | Results | Remark |
|--------------------------------|------------------|------------------|---------|--------|
| 50Hz, 1A/m | 1.0 Min | X-axis | Pass | Normal |
| 50Hz, 1A/m | 1.0 Min | Y-axis | Pass | Normal |
| 50Hz, 1A/m | 1.0 Min | Z-axis | Pass | Normal |

14.2 Test Setup



- | | |
|----------------------------|---------------------------------|
| GRP : Ground plane | C1 : Power supply circuit |
| A : Safety earth | C2 : Signal circuit |
| S : Insulating support | L : Communication line |
| EUT : Equipment under test | B : To power supply source |
| Lc : Induction coil | D : To signal source, simulator |
| E : Earth terminal | G : To the test generator |

Test Engineer : Kero
Kero Kao

14.3 Photographs of Power Frequency Magnetic Field Immunity Tests

Mode 1

FRONT VIEW



REAR VIEW



Mode 2

FRONT VIEW



REAR VIEW





15. Voltage Dips and Voltage Interruption Immunity Tests

- Final Test Result : **PASS**
- Pass Performance Criteria : C for voltage interruption, A for voltage dips
- Required Performance Criteria : C for voltage interruption, B/C for voltage dips
- Basic Standard : IEC 61000-4-11:1994/A1:2000
- Product Standard : EN 55024:1998/A1:2001/A2:2003
- Temperature : 23
- Relative Humidity : 53 %
- Atmospheric Pressure : 98.5 kPa
- Test Date : Feb. 17, 2006
- Test Mode : Mode 1 & Mode 2
- Observation : Normal

15.1 Test Record of Voltage Interruption

| Voltage (V) | Phase Angle | | % Reduction | Duration (periods) | Observation |
|------------------|-------------|-------|-------------|-----------------------|---|
| | 0 ° | 180 ° | | | |
| 230 | C | C | >95% | 250 | After the interruption, the power of EUT was off. The power of the EUT must be reset by the operator. |

15.2 Test Record of Voltage Dips

| Voltage (V) | Phase Angle | | % Reduction | Duration (periods) | Observation |
|------------------|-------------|-------|-------------|-----------------------|--------------------|
| | 0 ° | 180 ° | | | |
| 230 | A | A | 30 | 25 | Normal |
| 230 | A | A | >95 % | 0.5 | Normal |



15.3 Testing Requirement and Procedure

The test was based on IEC 61000-4-11:1994/A1:2000

15.4 Test Conditions

1. Source voltage and frequency : 230V / 50Hz, Single phase.
2. Test of interval : 10 sec.
3. Level and duration : Sequency of 3 dips/interrupts.
4. Voltage rise (and fall) time : 1 ~ 5 μ s.
5. Test severity :

| Voltage dip and Interrupt reduction (%) | Test Duration (ms) |
|---|--------------------|
| 30 | 500 |
| 60 | 100 |
| 100 | 10 |
| 100 | 80 |
| 100 | 5000 |

15.5 Operating Condition

Full system

Test Engineer : Kero
Kero Kao

15.6 Photographs of Voltage Dips and Voltage Interruption Immunity Tests

Mode 1

FRONT VIEW



REAR VIEW



Mode 2

FRONT VIEW



REAR VIEW



16. List of Measuring Equipment Used

< EMI >

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---------------------------------|--------------------|-----------|------------|---------------------------|------------------|--------------------------------------|
| Receiver | R&S | ESCS 30 | 8368581024 | 9 kHz - 2.75 GHz | Jul. 20, 2005 | Conduction (CO01-LK) |
| LISN | Rolf Hoine | NNB-2/16Z | 98087 | 9 kHz - 30 MHz | Sep. 12, 2005 | Conduction (CO01-LK) |
| LISN | Rolf Hoine | NNB-2/16Z | 98009 | 9 kHz - 30 MHz | Sep. 21, 2005 | Conduction (CO01-LK) |
| RF Cable-CON | Suhner Switzerland | RG223/U | CB017 | 9 kHz - 30 MHz | Dec. 15, 2005 | Conduction (CO01-LK) |
| Impedance Stabilization Network | SCHAFFNER | T400 | 16008 | 150 kHz - 230 MHz | May 30, 2005 | Conduction (Telecommunication port) |
| Capacitive Voltage Probe | SCHAFFNER | CVP2200 | 18250 | 150 kHz - 30 MHz | May 30, 2005 | Conduction (Telecommunication port) |
| CURRENT PROBE | SCHAFFNER | SMZ11 | 18029 | 9 kHz - 30 MHz | May 30, 2005 | Conduction (Telecommunication port) |
| Open Area Test Site | SPORTON | OATS-10 | OS05-LK | 30 MHz - 1 GHz 10m, 3m | Aug. 08, 2005 | Radiation (OS05-LK) |
| Amplifier | HP | 8447D | 2944A08242 | 0.1 MHz - 1.3 GHz | May. 03, 2005 | Radiation (OS05-LK) |
| Spectrum Analyzer | ADVANTEST | R3261C | 71720606 | 9 kHz - 2.6 GHz | Apr. 26, 2005 | Radiation (OS05-LK) |
| Receiver | R&S | ESCS 30 | 847793/003 | 9 kHz - 2.75 GHz | Aug. 11, 2005 | Radiation (OS05-LK) |
| Bilog Antenna | SCHAFFNER | CBL6112B | 2890 | 30 MHz - 2 GHz | Apr. 09, 2005 | Radiation (OS05-LK) |
| Antenna Mast | EMCO | 2075 | 9806-2160 | 1m - 4m | N/A | Radiation (OS05-LK) |
| Turn Table | EMCO | 2080 | 9806-2070 | 0° - 360° | N/A | Radiation (OS05-LK) |
| RF Cable-R10m | BELDEN | RG8/U | CB013 | 30 MHz - 1 GHz | Jul. 25, 2005 | Radiation (OS05-LK) |
| RF Cable-R03m | BELDEN | RG8/U | CB014 | 30 Hz - 1 GHz | Jul. 25, 2005 | Radiation (OS05-LK) |

Calibration Interval of instruments listed above is one year.

< EMS >

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|--|----------------|------------------------|----------------|--|------------------|--------------------|
| ESD Simulator | KEYTEK | MZ-15/EC | 9503213 | Air: 0 kV - 15 kV Contact: 0 kV - 8 kV | Jun. 14, 2005 | ESD |
| Antenna | FRANKONIA | BTA-L | 02002L | 26 MHz - 1 GHz | Nov. 01, 2005 | RS |
| Field Strength Monitoring Antennas (Probe) | AR | FP3000A | 16077 | 0.1 MHz - 1 GHz | Aug. 26, 2005 | RS |
| RS immunity Test system | HP | EMS test System | 2062 | 80 MHz - 1 GHz 3V/m, 10v/m | Nov. 23, 2005 | RS |
| Amplifier | AR | 100W 1000M3 | 16060 | 80 MHz - 1 GHz | Nov. 23, 2005 | RS |
| Power Meter | EMC Automation | 438A | 3513U04050 | 100 kHz - 4.2 GHz | Nov. 23, 2005 | RS |
| Signal Generator | HP | 8648A | 3426A00771 | 100 kHz - 1 GHz | Nov. 23, 2005 | RS |
| Power Sensor | HP | 8481D | 3318A13140 | 100 kHz - 1 GHz | Nov. 23, 2005 | RS |
| Power Sensor | HP | 8482A | 3318A26464 | 100 kHz - 1 GHz | Nov. 23, 2005 | RS |
| Attenuator | HP | 8491A | 53603 | 100 kHz - 1 GHz | Nov. 23, 2005 | RS |
| EFT Generator | EMC -PARTNER | TRANSIENT -2000 | TRA2000-376 | 0 kV - 4.4 kV | Jul. 04, 2005 | EFT |
| EFT/Clamp | EMC -PARTNER | CH4242 | CNEFT1000 -200 | 0 kV - 1 kV | N/A | EFT |
| SURGE Generator | EMC -PARTNER | TRANSIENT -2000 | TRA2000-376 | 0 kV - 6 kV/2 0 kV - 500 kV/12 | Jul. 04, 2005 | SURGE |
| Conducted Immunity Test System | FRANKONIA | CIT-10/75 | 1999010443 | 100 kHz - 266 MHz | Apr. 06, 2005 | CS |
| Conducted Immunity Test System Amplifier | A.R | 75A220 | 16980 | 15 - 230 MHz FM 1 kHz 80 % 75W | Apr. 26, 2005 | CS |
| Coupling and Decoupling Network | SCHAFFNER | CDN M016 | 16672 | 150 kHz - 230 MHz | Apr. 12, 2005 | CS |
| Coupling and Decoupling Network | FRANKONIA | CDN RJ45 | A3023001 | 150KHz ~ 230MHz | Apr. 15, 2005 | CS |
| Magnetic field Immunity Loop | FCC (KEYTEK) | F-1000-4-8/9/1 0-L-1AM | 03004 | 30A//CONTINUOUS 100A/2Hrs 230A/30SEC | Mar. 18, 2005 | PFMF |
| Magnetic Generator | FCC (KEYTEK) | F-1000-4-8/G-- 125A | 9830 | 30A//CONTINUOUS 100A/2Hrs 230A/30SEC | Mar. 18, 2005 | PFMF |
| DIP Generator | EMC -PARTNER | TRANSIENT -2000 | TRA2000-376 | 230VA/50Hz/60Hz 0%Open/5S 0%Short/5S 40%/0.10S 70%/0.01S | May. 03, 2005 | DIP |
| Harmonic/Flicker Test System | EMC PARTNER | Harmonics -1000 | HAR1000-41 | 4000VA 16A PEAK | Nov. 22, 2005 | Harmonics, Flicker |

Calibration Interval of instruments listed above is one year.

17. Notice for Class A Product

This Notice is for class A product only. If the Equipment under Test is a class B product, this notice should be disregarded.

Class A ITE is a category of all other ITE which satisfies the class A ITE limits but not the class B ITE limits. Such equipment should not be restricted in its sale but the following warning shall be included in the instructions for use:

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

18. Declaration of Conformity and the CE Mark

There are three possible procedures pertaining to the declaration of conformity :

18.1 Conformity Testing and Declaration of Conformity by the Manufacturer or His Authorized Representative Established within the Community or by an Importer.

- Article 10 (1) of the EMC Directive,
- § 3 (1) no. 2a of the EMC Act.

18.2 Declaration of Conformity Issued by the Manufacturer or His Authorized Representative Established within the Community or by an Importer Following Testing of the Product and Issued of an EC certificate of conformity by a competent body.

- Article 10 (2) of the EMC Directive,
- § 3 (1) no. 2b of the EMC Act.

18.3 Declaration of Conformity Issued by the Manufacturer or His Authorized Representative Established within the Community or by an Importer Following Testing and Certification of the Product by a Notified Body.

- Article 10 (5) of the EMC Directive,
- § 3 (1) no. 2b of the EMC Act (radio transmitting installations).

18.4 Specimen For The CE Marking Of Electrical / Electronical Equipment

The components of the CE marking shall have substantially the same vertical dimension, which may not be less than 5 mm.



APPENDIX A. Photographs of EUT









