

**Attachment 3: TEST REPORT**  
**FG05\_042EAL\_EMI\_B6110D\_ZEST (PART 1)**



Report No. : FG05-042EAL (1/9)

## EMI Test report

CATEGORY : EN55022(1994),+A1,+A2/ CISPR 22(1993)+A1,+A2 ; Class B  
AS/NZS CISPR22 (2002)  
FCC Part-15 (2004)  
VCCI (2004)

MANUFACTURER : FUJITSU LIMITED  
1405, Ohmaru, Inagi-shi, Tokyo 206-8503 JAPAN

PRODUCT TYPE : Personal computer B6110D  
AC Adapter SEC80N2-16.0  
Port Replicator FPCPR52 / FMV-NPR8  
Grouping model: B6110

TEST SITE : FUJITSU GENERAL EMC LABORATORY  
1116, Suenaga, Takatsu-ku, Kawasaki-shi, 213-8502 JAPAN

DATE TESTED : April 24, 2005 23°C 35%

TESTED BY : Hiroyuki Aikawa

Above EUT conforms mentioned regulations.

APPROVED BY : for K. Shimano DATE : May 4, 2005  
Hiroyuki Shimano, President

**FUJITSU GENERAL EMC LABORATORY LIMITED**  
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CLIENT : Engineering Dept.1 Mobile Computing Division, FUJITSU LIMITED  
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※ The description of the EUT and the system configuration in this report are provided by the client.



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## 1. Description of EUT

The EUT: B6110 series personal computer using Pentium-M 1.2 GHz or Celeron-M1.0GHz microprocessor has a system disk (40 GB). The EUT has the interface to extend for, RGB⑨, MIC IN②, Headphone①, LAN⑦, USB×4-③⑫⑬, Parallel⑮, Serial (232C) ⑩, PS2⑭ and has CF card slot, PC card slot, Bluetooth and wireless LAN.

The following type code are given according to a Centrino (Pentium-M CPU, Intel855 Chipset and Callexico2 WL-LAN).

| Type   | CPU, Chipset and WL-LAN |
|--------|-------------------------|
| B6110D | Non- Centrino           |
| B6110  | Centrino                |

Internal clock frequency : 4.000 MHz, 8.000 MHz, 14.318 MHz, 25.000 MHz, 33.300 MHz, 48.000 MHz, 66.000 MHz, 96.000 MHz, 100.000MHz

Input power : AC 100 - 230V, 50 / 60 Hz, Single-phase 2 wires

The EUT is intended to general use in the residential / domestic area or commercial and light industrial area; category class B.

### 1.1 Test system configuration

The measurement was performed using B6110D (Pentium-M 1.2 GHz microprocessor) with FMV-NPR8 as a maximum personal computer system with all related equipment shown in figure-1.

The EUT was selected from the pre-product line.

### 1.2 Operating condition

The following EUT and dependent devices were tested using "EMC.exe" and "SPBEST" program for continuously operating and to obtain maximize emission.

|                  |      |                                                                        |
|------------------|------|------------------------------------------------------------------------|
| ① PC-1           | LCD: | Display "H" character on screen (Maximum contrast / Luminescence)      |
|                  | LAN: | Continuous transmission and reception of the "H" character (1000 Mbps) |
|                  | TEL: | Continuous transmission of the test data (56 kbps)                     |
| ② PC card:       |      | Connecting only                                                        |
| ③ PS2            |      | Connecting only                                                        |
| ④ USB2.0 Memory: |      | Read/write the test data (480 Mbps)                                    |
| ⑤ Parallel       |      | Connecting only                                                        |
| ⑥ LCD:           |      | Display "H" character on screen (Maximum contrast / Luminescence)      |
| ⑦ Headset:       |      | Connecting only                                                        |
| ⑧ USB mouse:     |      | Connecting only                                                        |
| ⑨ PC-2:          |      | Read/write "H" character and receiving serial data.                    |
| ⑩ Serial         |      | Connecting only                                                        |

## 2. EMI test results summary

Applied standard: EN55022(1994), +A1(1995), +A2(1997)

Limit value: Class B

The test samples met the class B limit of EN55022(1994), +A1(1995), +A2(1997) / CISPR22(1993), +A1(1995), +A2(1996) and applicable following regulations as shown following highest 6 points of each emission profiles.

Australia, New Zealand: AS/NZS CISPR22(2002)

FCC Part-15(2004), Canada: CAN/CSA-CEI/TEC CISPR22-02

Japan: VCCI(2004), Taiwan: CSN 13438(1997)

The test result effective only for the EUT.

### 2.1 Radiated emission (30 MHz to 1,000 MHz) : Measured at 10 m distance

| Freq.<br>(MHz) | pol. | Noise level<br>(dB $\mu$ V/m) | Class B limit<br>(dB $\mu$ V/m) | Margin<br>(dB) |
|----------------|------|-------------------------------|---------------------------------|----------------|
| 30.72          | Vert | 23.7                          | 30.0                            | 6.3            |
| 33.34          | Vert | 24.8                          | 30.0                            | 5.2            |
| 250.00         | Vert | 33.6                          | 37.0                            | 3.4            |
| 600.00         | Vert | 33.0                          | 37.0                            | 4.0            |
| 657.94         | Horz | 31.8                          | 37.0                            | 5.2            |
| 943.61         | Vert | 33.6                          | 37.0                            | 3.4            |

• Limit value ; EN55022(1994) / CISPR 22(1993) and applied for FCC Part-15.

• Measurement uncertainty :  $\pm 3.3$  dB (K=2, 95 %)

### 2.2 Above 1 GHz RF Radiated emission(1 GHz to 10 GHz) : Measured at 3 m distance

| Freq.<br>(GHz) | Pol  | Noise level<br>(dB $\mu$ V/m) | FCC Part-15<br>Class B limit<br>(dB $\mu$ V/m) |      | Margin<br>(dB to AV) |
|----------------|------|-------------------------------|------------------------------------------------|------|----------------------|
|                |      |                               | Peak                                           | A V  |                      |
| 1.0000         | Vert | 43.9                          | 74.0                                           | 54.0 | 10.2                 |
| 1.0650         | Vert | 39.7                          | 74.0                                           | 54.0 | 14.3                 |
| 1.5600         | Horz | 33.9                          | 74.0                                           | 54.0 | 20.1                 |
| 1.6900         | Vert | 34.3                          | 74.0                                           | 54.0 | 19.7                 |
| 1.8002         | Vert | 33.1                          | 74.0                                           | 54.0 | 20.9                 |
| 1.9530         | Vert | 33.1                          | 74.0                                           | 54.0 | 20.9                 |

### 2.3 AC power line conducted emission (150 kHz to 30 MHz)

< AC 100 V / 50 Hz single phase >

| Freq.<br>(MHz) | Line # | Noise level<br>(dB $\mu$ V) | Class B limit<br>(dB $\mu$ V) |      | Margin<br>(dB to AV) |
|----------------|--------|-----------------------------|-------------------------------|------|----------------------|
|                |        |                             | Q P                           | A V  |                      |
| 0.194          | # 1    | 45.7                        | 63.9                          | 53.9 | 8.2                  |
| 0.194          | # 2    | 47.6                        | 63.9                          | 53.9 | 6.3                  |
| 0.297          | # 2    | 39.3                        | 60.3                          | 50.3 | 11.0                 |
| 23.673         | # 1    | 37.9                        | 60.0                          | 50.0 | 12.1                 |
| 23.673         | # 2    | 37.4                        | 60.0                          | 50.0 | 12.6                 |
| 29.578         | # 1    | 37.5                        | 60.0                          | 50.0 | 12.5                 |

## &lt; AC 120 V / 60 Hz single phase &gt;

| Freq.<br>(MHz) | Line # | Noise level<br>(dB $\mu$ V) | Class B limit<br>(dB $\mu$ V) |      | Margin<br>(dB to AV) |
|----------------|--------|-----------------------------|-------------------------------|------|----------------------|
|                |        |                             | QP                            | AV   |                      |
| 0.189          | # 1    | 42.7                        | 64.1                          | 54.1 | 11.4                 |
| 0.189          | # 2    | 44.8                        | 64.1                          | 54.1 | 9.3                  |
| 0.277          | # 2    | 38.9                        | 60.9                          | 50.9 | 12.0                 |
| 0.730          | # 2    | 34.0                        | 56.0                          | 46.0 | 12.0                 |
| 23.673         | # 1    | 38.0                        | 60.0                          | 50.0 | 12.0                 |
| 29.578         | # 1    | 37.4                        | 60.0                          | 50.0 | 12.6                 |

## &lt; AC 230 V / 50 Hz single phase &gt;

| Freq.<br>(MHz) | Line # | Noise level<br>(dB $\mu$ V) | Class B limit<br>(dB $\mu$ V) |      | Margin<br>(dB to AV) |
|----------------|--------|-----------------------------|-------------------------------|------|----------------------|
|                |        |                             | QP                            | AV   |                      |
| 0.225          | # 2    | 40.5                        | 62.6                          | 52.6 | 12.1                 |
| 0.301          | # 2    | 36.5                        | 60.2                          | 50.2 | 13.7                 |
| 0.682          | # 2    | 32.9                        | 56.0                          | 46.0 | 13.1                 |
| 3.718          | # 2    | 32.5                        | 56.0                          | 46.0 | 13.5                 |
| 3.792          | # 2    | 32.8                        | 56.0                          | 46.0 | 13.2                 |
| 23.673         | # 2    | 37.9                        | 60.0                          | 50.0 | 12.1                 |

- Limit value ; EN55022(1994) / CISPR 22(1993) and applied for FCC Part-15.
- Measurement uncertainty :  $\pm 2.5$  dB (K=2, 95 %)

## 3. EUT modification under the test

None

## 4. Measurement procedure and test equipment

### 4.1 Radiated emission

#### 4.1.1 Radiated emission (30MHz~1,000MHz)

The EUT was set on the turntable in the 10 m RF semi-anechoic chamber.

The PC-2 and HUB were placed at outside of the chamber to make usual installation at the different place. The maximum noise level in the frequency range from 30 MHz to 1,000 MHz were measured by 10 m method with scanning the antenna height from 1 m to 4 m above the ground plane and rotates the EUT through 360 degrees for both horizontal and vertical polarization.

Preliminary measurement using spectrum analyzer peak detection was performed to arrange the minimum margin spectrum. The settings of the interface cables and the mouse were adjusted to obtain maximum level at the minimum margin spectrum. The final measurement was performed using the RFI receiver (CISPR Quasi-peak, 120 kHz band width) and calibrated broadband antennas or dipole antennas about the main spectrums that is obtained by the preliminary measurement.

| Test equipment            | Manufacturer    | Type     | S/N         | Cal. Date  | Due. Date  |
|---------------------------|-----------------|----------|-------------|------------|------------|
| Bi Log antenna            | Schwarzbeck     | VULB9160 | 3118        | 2004.09.01 | 2005.09.01 |
| Dipole antenna            | Schwarzbeck     | VHA9103  | VHA91031573 | 2004.09.07 | 2005.09.07 |
| Dipole antenna            | Schwarzbeck     | UHA9105  | UHA91052119 | 2004.09.07 | 2005.09.07 |
| Field strength meter      | Rohde & Schwarz | ESCS30   | 849650/002  | 2005.02.05 | 2006.02.05 |
| Spectrum analyzer         | HP              | 85422E   | 3746A00242  | 2004.05.26 | 2005.05.26 |
| RF switch                 | Rohde & Schwarz | PSU      | 848290/003  | 2005.01.09 | 2006.01.09 |
| RF cable                  | ————            | C61      | ————        | 2005.01.09 | 2006.01.09 |
| 2nd semi-anechoic chamber | Riken eletech   | ————     | ————        | 2004.01.15 | 2006.01.15 |

#### 4.1.2 Radiated emission (1 GHz~10 GHz)

The EUT was set on the 80 cm height non-reflective desk on the turntable. The radiated emission measurement from 1 GHz to 10 GHz: Operating rate 1.2 GHz was performed using the spectrum analyzer (Peak detection, 1MHz band width) and the horn antenna that was positioned at 3 m from the EUT for class B. The measurement was performed with both horizontal and vertical polarization, rotate the EUT through 360 degrees and fixed the antenna height to the EUT center

| Test equipment    | Manufacturer | Type      | S/N        | Cal. Date  | Due. Date  |
|-------------------|--------------|-----------|------------|------------|------------|
| Horn antenna      | Schwarzbeck  | BBHA9120D | 136        | 2005.03.03 | 2007.03.04 |
| Spectrum analyzer | Advantest    | R3371A    | 75060396   | 2004.04.15 | 2005.04.15 |
| Pre amplifier     | HP           | 8449B     | 3008A01110 | 2004.11.25 | 2005.11.25 |

### 4.2 AC power line conducted emission

The conducted emission measurement was performed in the shielded room. The EUT was set on the 80 cm height wooden desk with using the 50Ω/50μH artificial mains network: AMN and operate the EUT by AC 100 V/ 50 Hz, AC 120 V/ 60 Hz and AC 230 V/ 50 Hz. Preliminary measurement using spectrum analyzer peak detection was performed in the frequency range from 150 kHz to 30 MHz to arrange the minimum margin spectrum. The setting of the cables was adjusted to obtain maximum level at the minimum margin spectrum. The final measurement was performed using the RFI receiver (CISPR Quasi-peak, 9 kHz band width) and recorded the maximum value in the monitored interval about the main spectrum that is obtained by the preliminary measurement.

| Test equipment       | Manufacturer    | Type     | S/N        | Cal. Date  | Due. Date  |
|----------------------|-----------------|----------|------------|------------|------------|
| AMN for EUT          | Kyoritsu        | KNW-407  | 8-823-18   | 2004.11.28 | 2005.11.28 |
| AMN for AE           | Kyoritsu        | KNW-242C | 8-1387-7   | 2004.06.20 | 2005.06.20 |
| Field strength meter | Rohde & Schwarz | ESCS30   | 849650/002 | 2005.02.05 | 2006.02.05 |
| Spectrum analyzer    | HP              | 85422E   | 3746A00242 | 2004.05.26 | 2005.05.26 |
| RF switch            | Rohde & Schwarz | PSU      | 848290/003 | 2005.01.09 | 2006.01.09 |
| Band pass filter     | Advantest       | TR14202  | 120200240  | 2005.01.09 | 2006.01.09 |
| 6 dB attenuator      | Kyoritsu        | CFA-03   | ————       | 2005.01.09 | 2006.01.09 |
| RF cable             | ————            | C63      | ————       | 2005.01.09 | 2006.01.09 |

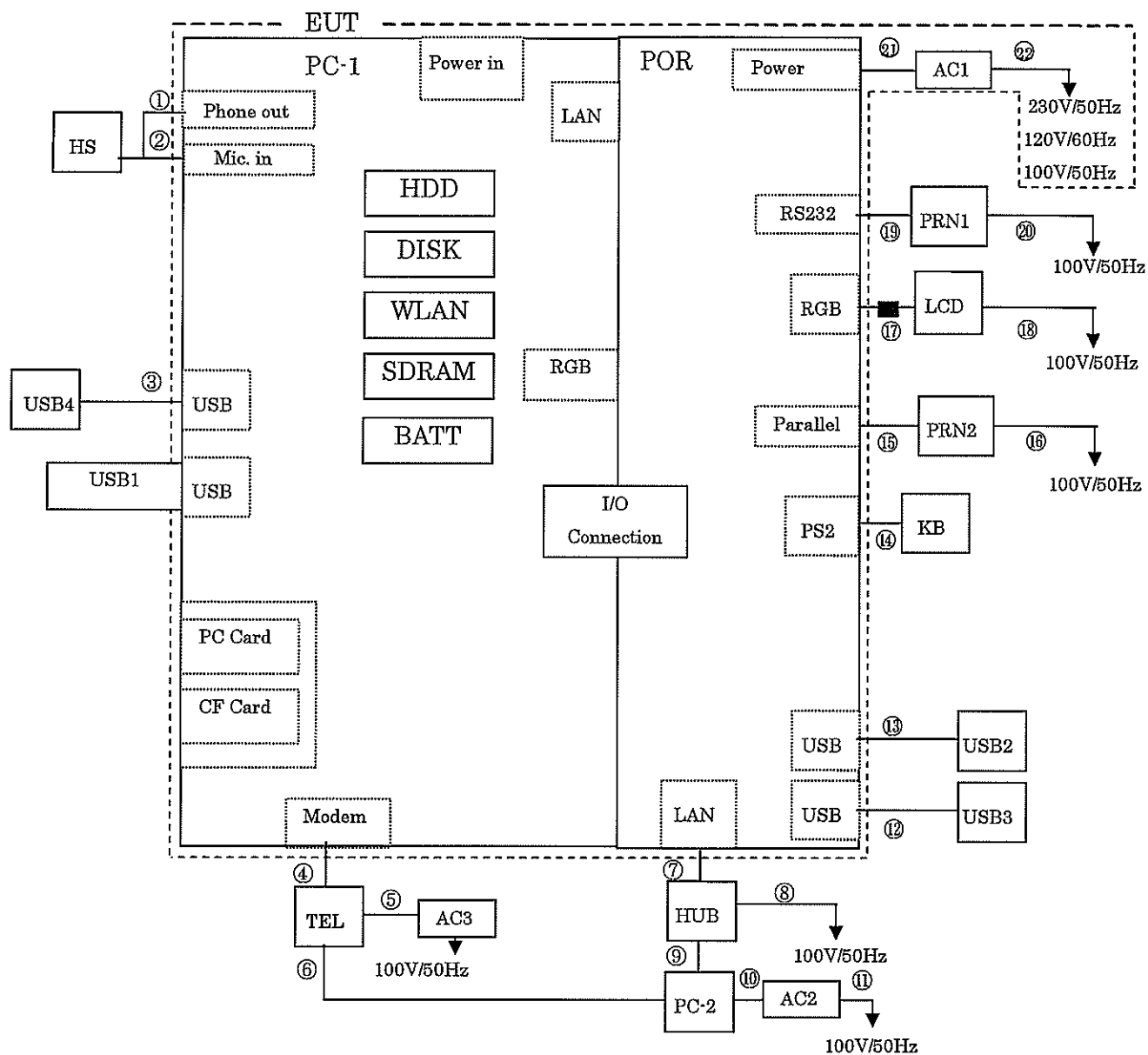
## 5 Test site and traceability

The FUJITSU GENERAL EMC LABORATORY performs the test for VCCI / EN / CISPR regulation and Fujitsu / Fujitsu General internal regulations. The test procedures and test facilities are comply with international standard. The laboratory is filed on VCCI (Japan), accredited from NVLAP (USA) and authorized from TÜV P. S. (Germany, CE-marking).

VCCI : 1st semi-anechoic chamber(R-753/C-776), Small shielded room(C-777)  
Large shielded room(C-778)  
2nd semi-anechoic chamber(R-1460/C-1547), 2nd shielded room(C-1548)  
3rd shielded room(C-1549)  
NVLAP : 1998.12.01 Accredited: Lab code 200373-0  
TÜV P.S. : 1999.01.29 Authorized

The measuring equipment used in the laboratory and test data are traceable to the national or international standard. Each equipment is maintain by periodical calibration and by daily check as a total measurement system to keep those accuracy.

Figure-1 System configuration and cables



■ : Ferrite core

#### Main EUT

| Code | Name              | Type   | S/N                   | Product |
|------|-------------------|--------|-----------------------|---------|
| PC-1 | Personal computer | B6110D | Pre-production sample | Fujitsu |

#### Related EUT

|     |                 |                    |       |         |
|-----|-----------------|--------------------|-------|---------|
| POR | Port Replicator | FPCPR52 / FMV-NPR8 | _____ | Fujitsu |
| AC1 | AC adapter      | SEC80N2-16.0       | _____ | Fujitsu |

#### Included device; PC-1

| Code  | Name         | Type                | S/N   | Product |
|-------|--------------|---------------------|-------|---------|
| HDD   | 40GB         | HDD2190             | _____ | _____   |
| WLAN  | Wireless LAN | WLL4070-D50         | _____ | ASKY    |
| BT    | Bluetooth    | UGXZ5-102A          | _____ | ALPS    |
| SDRAM | 256MB        | MT8HTF3264HDY-53EB3 | _____ | _____   |
| BATT  | 48000mA/h    | FPCBP111            | _____ | Fujitsu |

## Assisted equipment

| Code    | Name                     | Type           | S/N          | Product     |
|---------|--------------------------|----------------|--------------|-------------|
| TEL     | Telephone line simulator | TLE-101        | _____        | ASCII Corp. |
| LCD     | LCD display              | P19-1          | YEGA217491   | FSC         |
| HS      | Head set                 | FMH-40acom     | _____        | Fujitsu     |
| PC-2    | Personal computer        | FMV LIFEBOOK   | _____        | Fujitsu     |
| PRN1    | Printer                  | LX300          | CDSY056316   | EPSON       |
| PRN2    | Printer                  | LX300+         | IYLY313391   | EPSON       |
| HUB     | Switching Hub            | ETG-SH8        | VD700010513N | I-O DATA    |
| AC2     | AC adapter               | FMV-AC314      | _____        | Fujitsu     |
| AC3     | AC adapter               | TLE-101        | _____        | LSI JAPAN   |
| USB1    | Memory Drive             | 256MB          | _____        | I-O DATA    |
| USB2    | USB Mouse                | M-UV96         | HCA44800081  | Logitech    |
| USB3    | USB Mouse                | M-UV96         | HCA45001356  | Logitech    |
| USB4    | USB Mouse                | FMV-MO202L     | LZE01001062  | Fujitsu     |
| KB      | Keyboard                 | N860-1474-T001 | K800022      | _____       |
| PC card | PC card                  | FMV-J502       | DM01010817   | Fujitsu     |
| CF card | CF card                  | HB286030C2     | _____        | Hitachi     |

## Cables SLD: Shielded NSLD: Non-shielded CAX: Coaxial

| No. | I/O Port  | Name            | Type  | Length | Cable type              |
|-----|-----------|-----------------|-------|--------|-------------------------|
| ①   | Phone-out | Headset cable   | _____ | 2.2m   | NSLD, MC                |
| ②   | Mic-in    | Headset cable   | _____ | 2.2m   | NSLD, MC                |
| ③   | USB4      | USB mouse cable | _____ | 2.5m   | SLD, MC                 |
| ④   | Modem     | Modem cable     | _____ | 20m    | NSLD, NMC               |
| ⑤   | _____     | DC cable        | _____ | 2.0m   | NSLD, NMC               |
| ⑥   | _____     | Modem cable     | _____ | 3.0m   | NSLD, NMC               |
| ⑦   | LAN       | LAN cable       | _____ | 20.0m  | SLD, MC                 |
| ⑧   | _____     | Power cable     | _____ | 2.0m   | NSLD, NMC               |
| ⑨   | _____     | LAN cable       | _____ | 1.0m   | SLD, MC                 |
| ⑩   | _____     | DC cable        | _____ | 1.6m   | NSLD, NMC               |
| ⑪   | _____     | AC cable        | _____ | 1.8m   | NSLD, NMC               |
| ⑫   | USB2      | USB mouse cable | _____ | 2.5m   | SLD, NMC                |
| ⑬   | USB3      | USB mouse cable | _____ | 2.5m   | SLD, NMC                |
| ⑭   | PS2       | PS2 KB cable    | _____ | 1.5m   | NSLD, MC                |
| ⑮   | Parallel  | Printer cable   | _____ | 2.0m   | SLD, MC                 |
| ⑯   | _____     | AC cable        | _____ | 2.0m   | NSLD, NMC               |
| ⑰   | RGB       | RGB cable       | _____ | 1.5m   | SLD, MC with fixed core |
| ⑱   | _____     | Power cable     | _____ | 2.0m   | SLD, NMC                |
| ⑲   | RS232     | Printer cable   | _____ | 2.0m   | SLD, MC                 |
| ⑳   | _____     | Power cable     | _____ | 2.0m   | NSLD, NMC               |
| ㉑   | Power     | DC cable        | _____ | 1.6m   | NSLD, NMC               |
| ㉒   | _____     | Power cable     | _____ | 1.8m   | NSLD, NMC               |

## Appendix data (#05-042E: Total 13 pages)

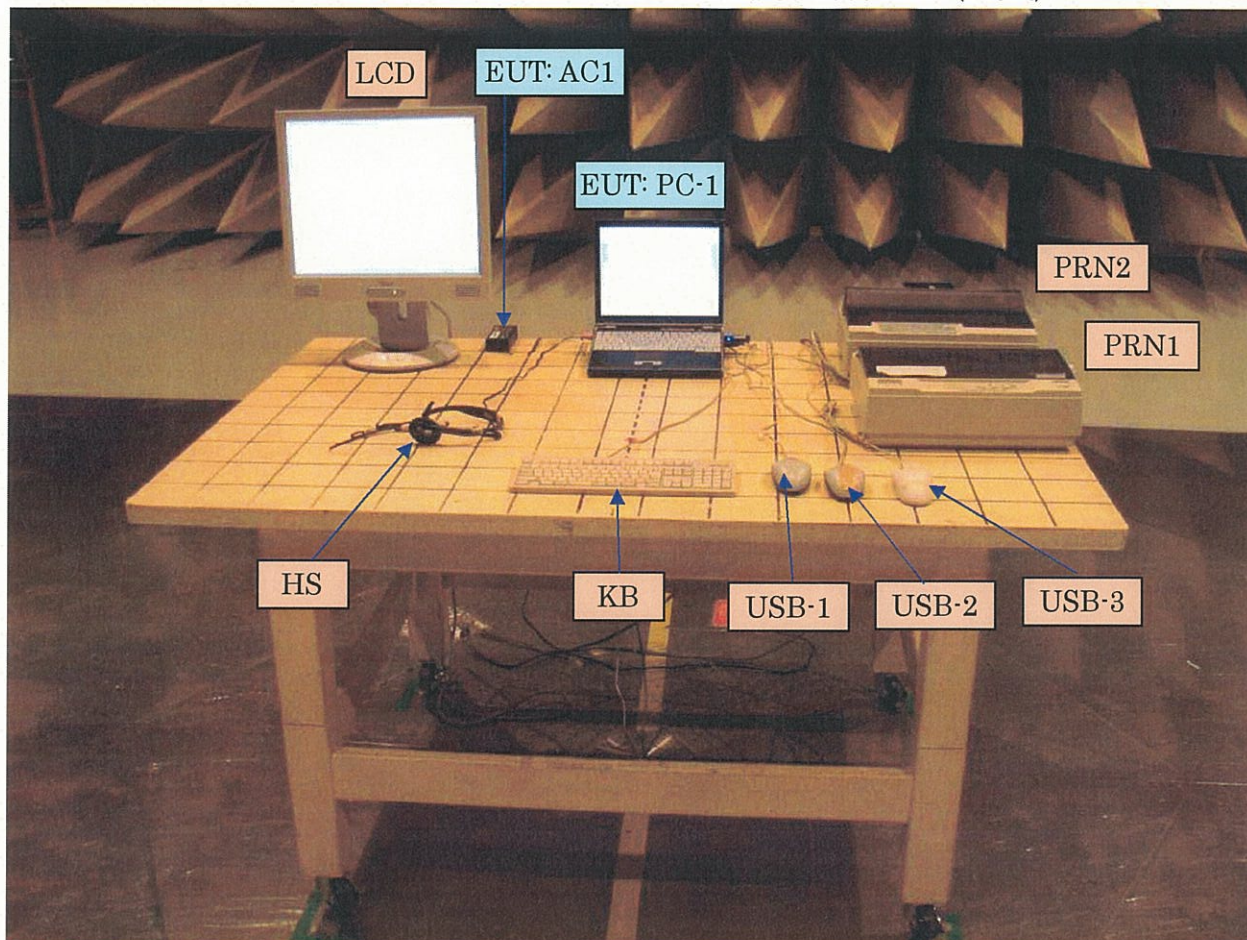
### 1. Photograph #05-042E (3 pages)

- Radiated emission measurement 30-1000 MHz(Front) : Photo-1.1
- 30-1000 MHz (Back) : Photo-1.2
- 1-10GHz (Front) : Photo-1.3
- Conducted emission measurement : Photo-2
- Label : Photo-3

### 2. Test data (10 pages)

- Radiated emission 30-1000 MHz : #05-042E-RE (2 pages)
- 1-10 GHz : #05-042E-GH (2 pages)
- Conducted emission AC 100 V / 50 Hz : #05-042E-CE1 (2 pages)
- AC 120 V / 60 Hz : #05-042E-CE2 (2 pages)
- AC 230 V / 50 Hz : #05-042E-CE3 (2 pages)

Photo-1.1 Radiated emission measurement; 30-1000 MHz (Front)



• PC-2 and HUB were set at outside of the chamber.

Photo-1.2 Radiated emission measurement; 30-1000 MHz (Back)

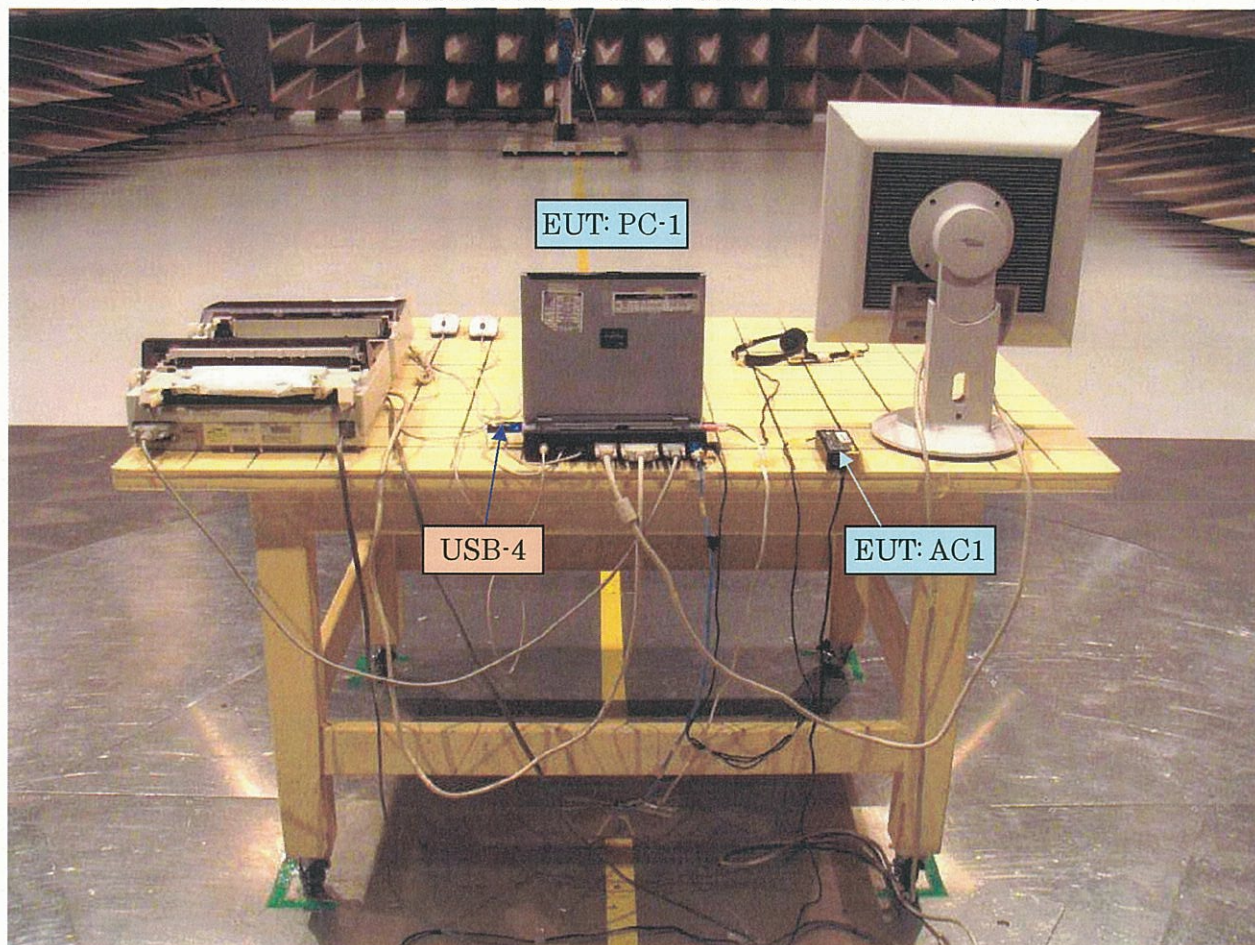


Photo-1.3 Radiated emission measurement; 1-11 GHz (Front)

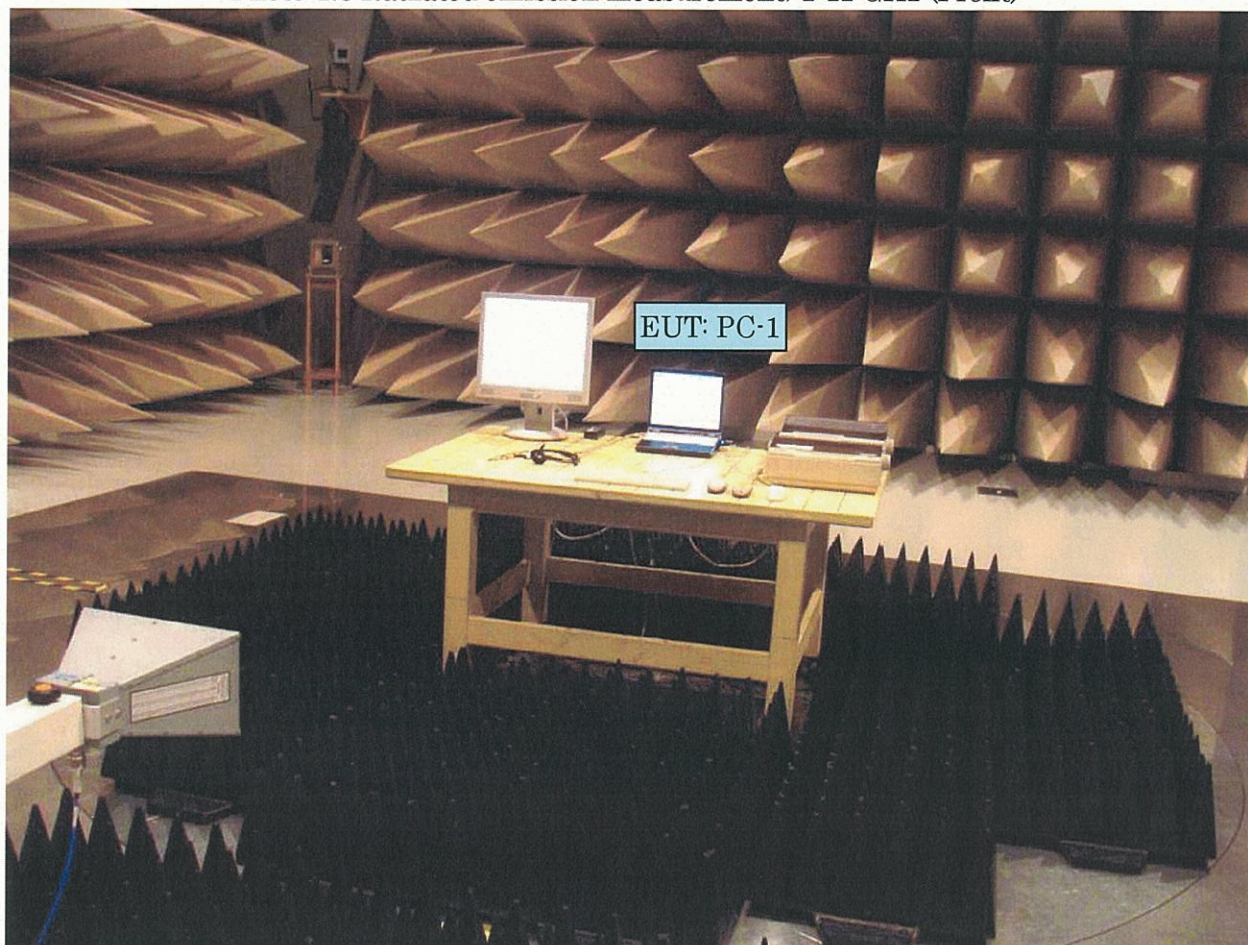


Photo-2 Conducted emission measurement

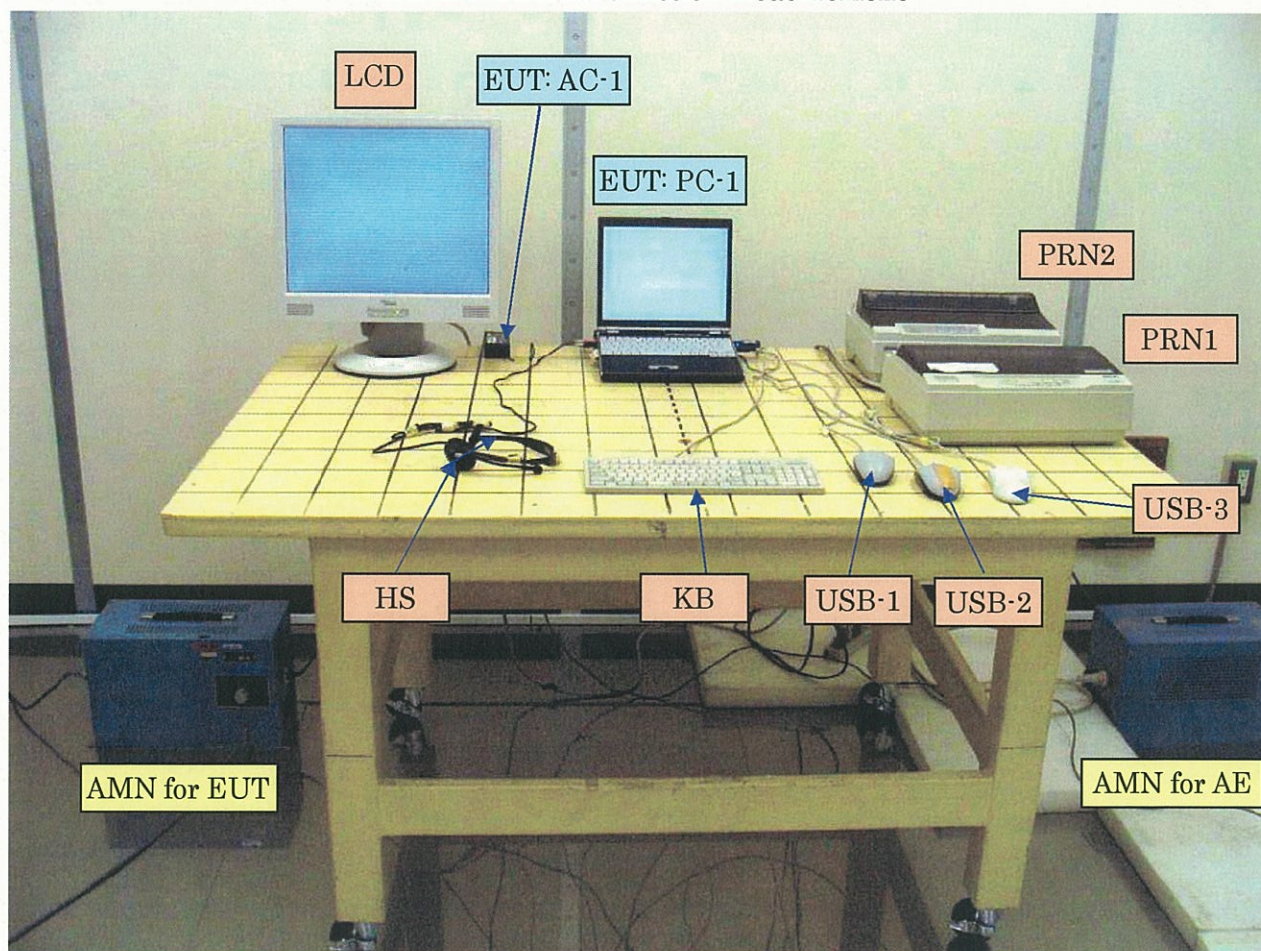


Photo-3 Label

