Attachment 3: TEST REPORT FG05_042EAL_EMI_B6110D_ZEST (PART 1)

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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 Adaputer 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℃ 35%

TESTED BY : Hiroyuki Aikawa

Above EUT conforms mentioned regulations.

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

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

NVLAP LAB CODE 200373-0

Client Laboratory Recognized By TÜV PRODUCT SERVICE

Accredited by NVLAP.
Authorized by TÜV P.S.
Registered on VCCI.

1. Description of EUT

The EUT: B6110 series personal computer using Pentium-M 1.2 GHz or Celelon-M1.0GHz microprocessor has a system disk (40 GB). The EUT has the interface to extend for, RGB⑲, MIC IN②, Headphone①, LAN⑦, USB×4-③⑫⑬,Parallel⑮, Serial (232C) ⑲,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 Calexico2 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/IEC 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. (MHz)	pol.	Noise level (dB μ V/m)	Class B limit (dB μ V/m)	Margin (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 : ± 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. (GHz)	Pol	Noise level (dB μ V/m)	FCC Part-15 Class B limit (dB μ V/m)		Margin (dB to AV)
		Peak	Peak	AV	
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. (MHz)	Line #	Noise level (dB μ V)	Class B limit (dB μ V)		Margin (dB to AV)
		QP	QP	AV	
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

< AC 120 V / 60 Hz single phase >

Freq. (MHz)	Line #	Noise level (dB μ V)	Class B limit (dB μ V)		Margin (dB to AV)
		QP	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

< AC 230 V / 50 Hz single phase >

Freq. (MHz)	Line #	Noise level (dB μ V)	Class B limit (dB μ V)		Margin (dB to AV)
		QP	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 : ± 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).

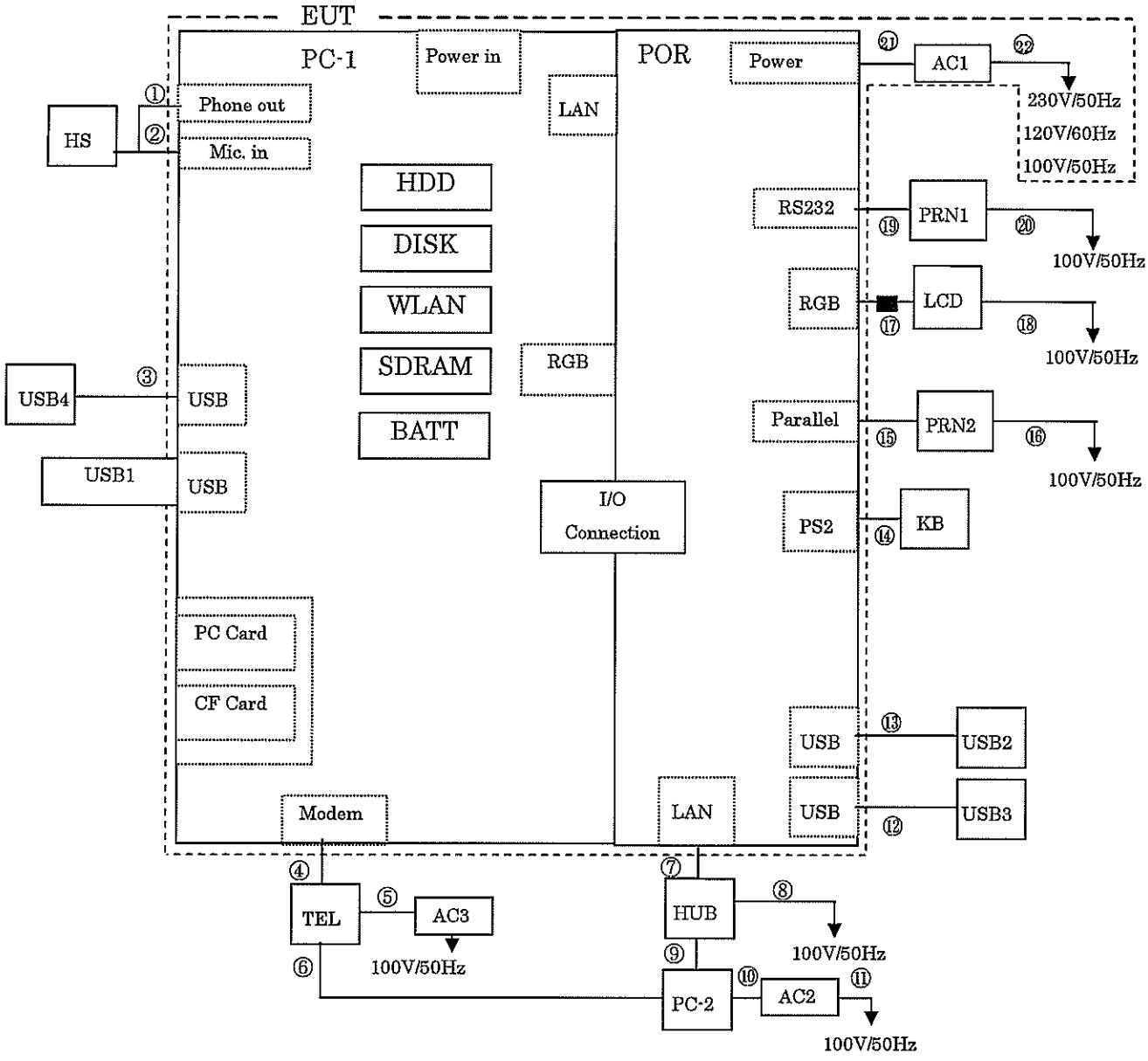
VCCI : 1st semi-anechoic chamber(R-753/C-776), Small shielded room(C-777)
Large shielded room(C-778)
2nd semi-anechoic chamber(R-1460/C-1547), 2nd shielded room(C-1548)
3rd shielded room(C-1549)

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	Logitec
USB3	USB Mouse	M-UV96	HCA45001356	Logitec
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
Connector MC: Metal NMC: Non-metal PMC: Point contact metal

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)

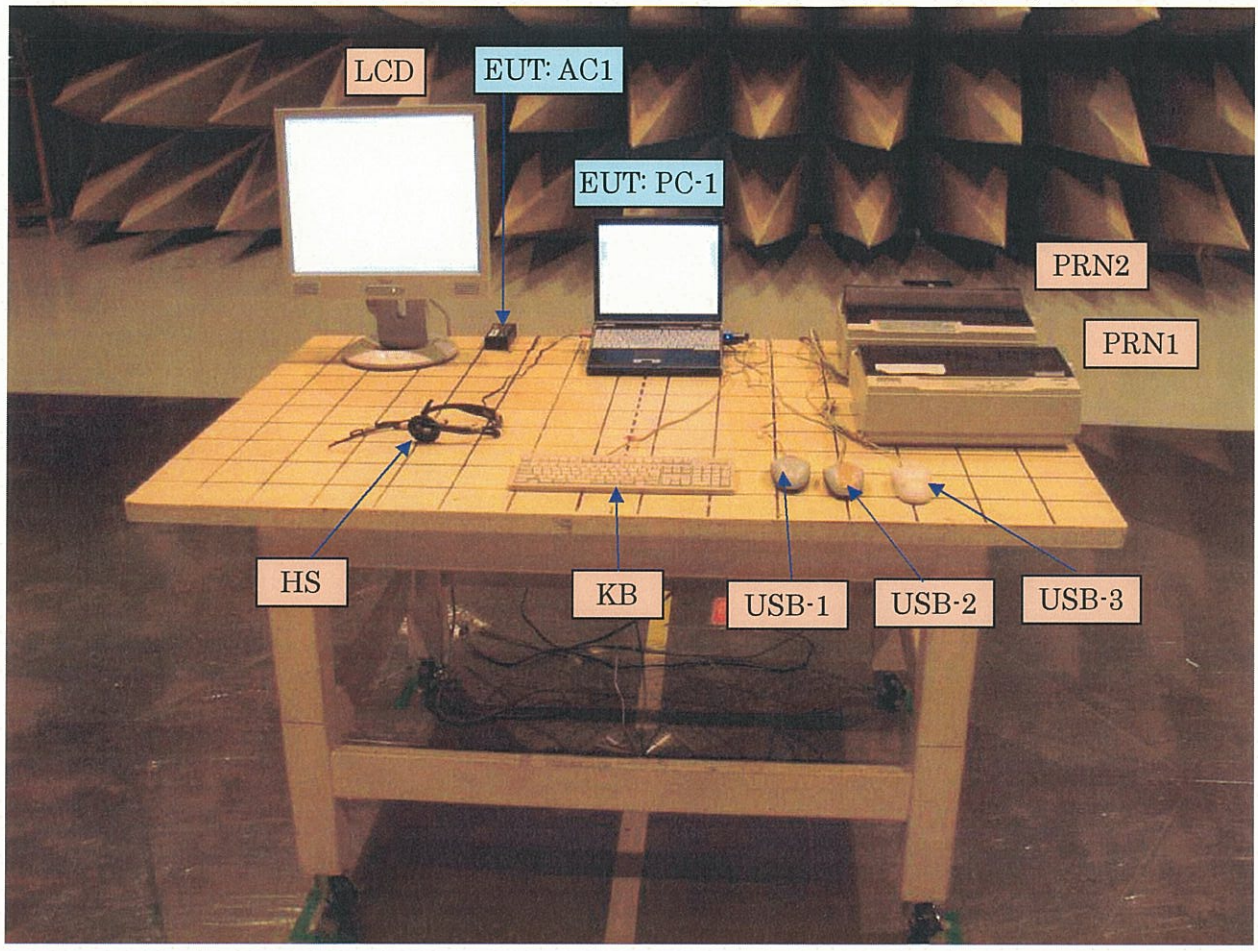
1. Photograph #05-042E (3 pages)

・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)

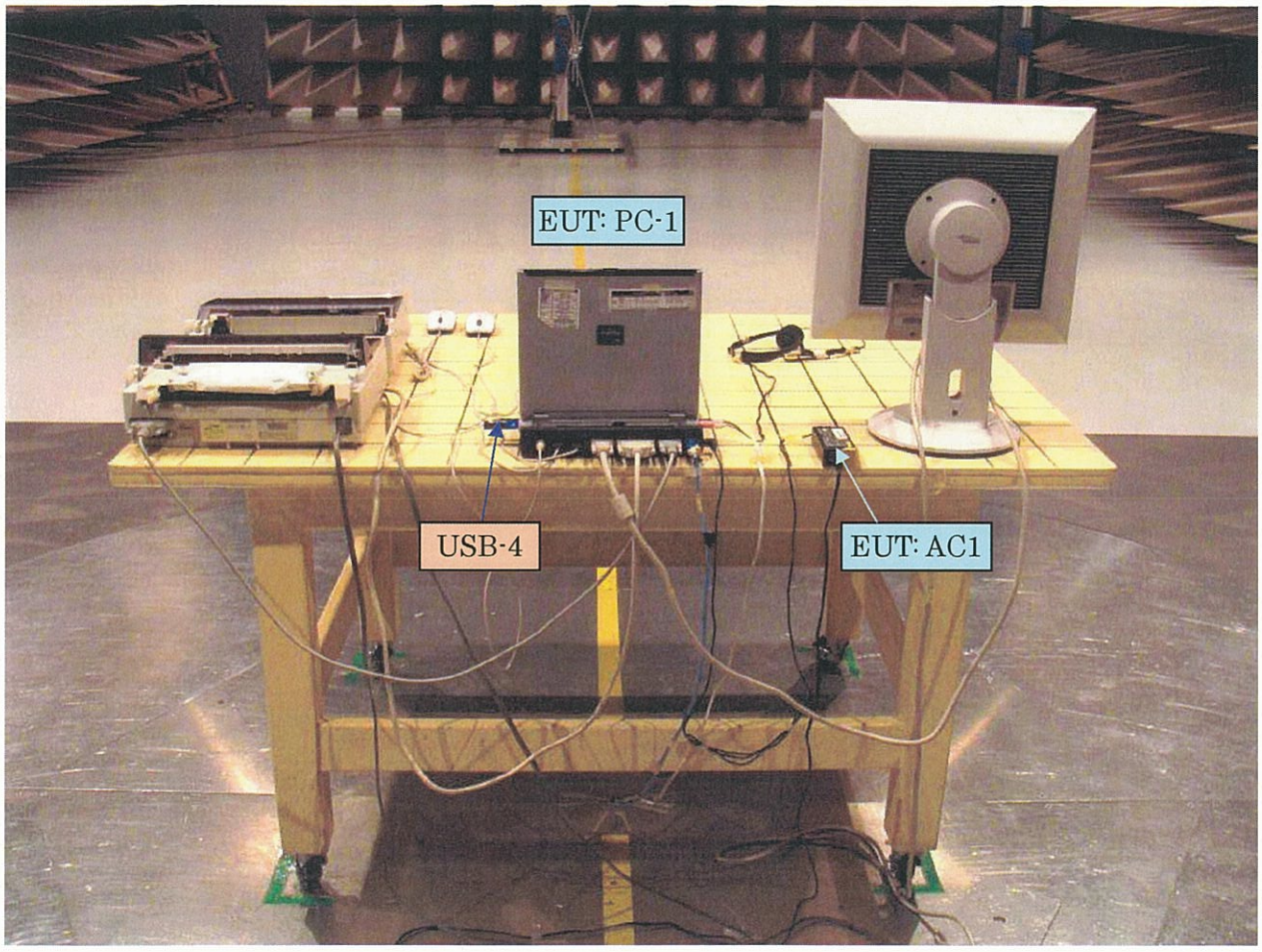


Photo-1.3 Radiated emission measurement; 1-11 GHz (Front)

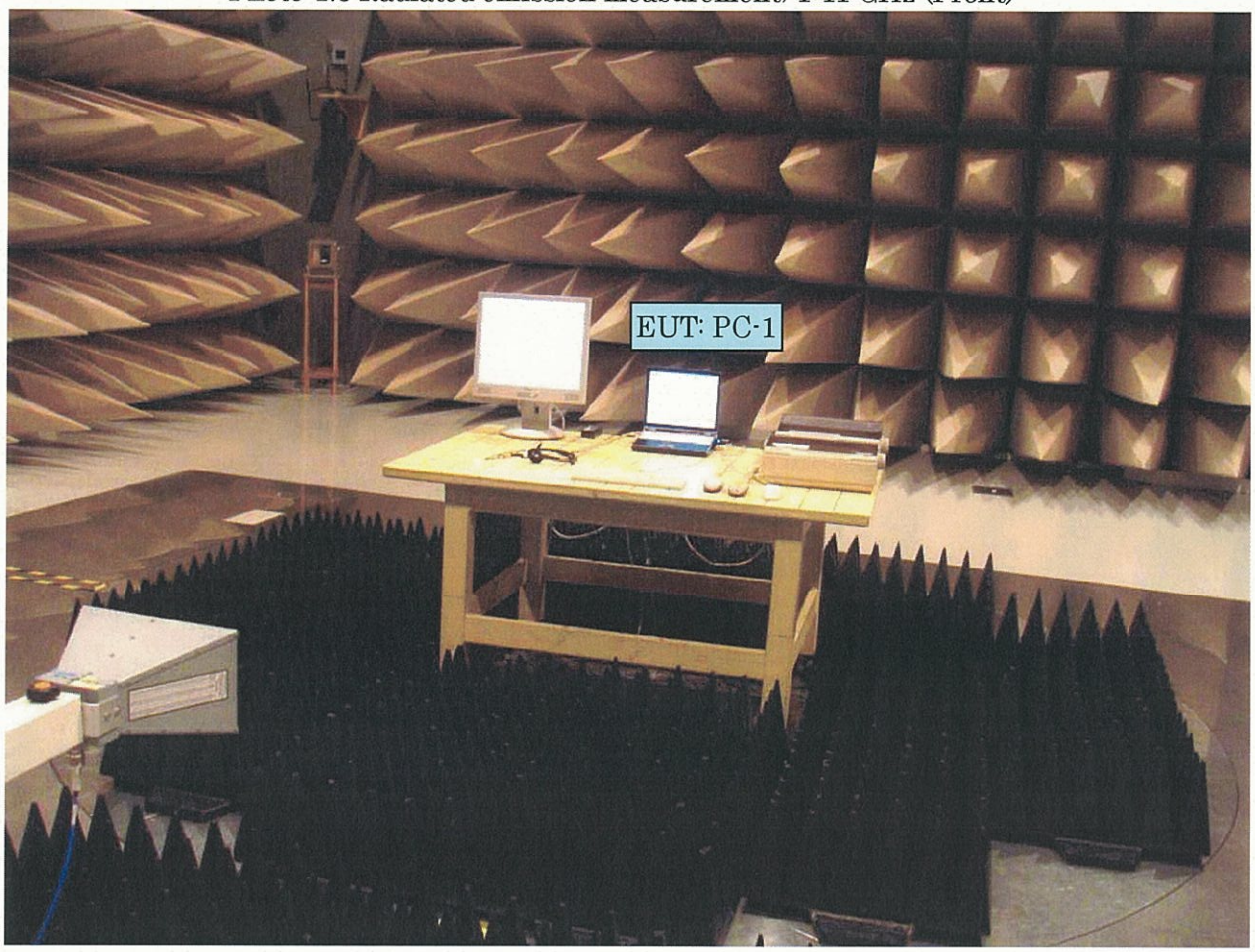


Photo-2 Conducted emission measurement

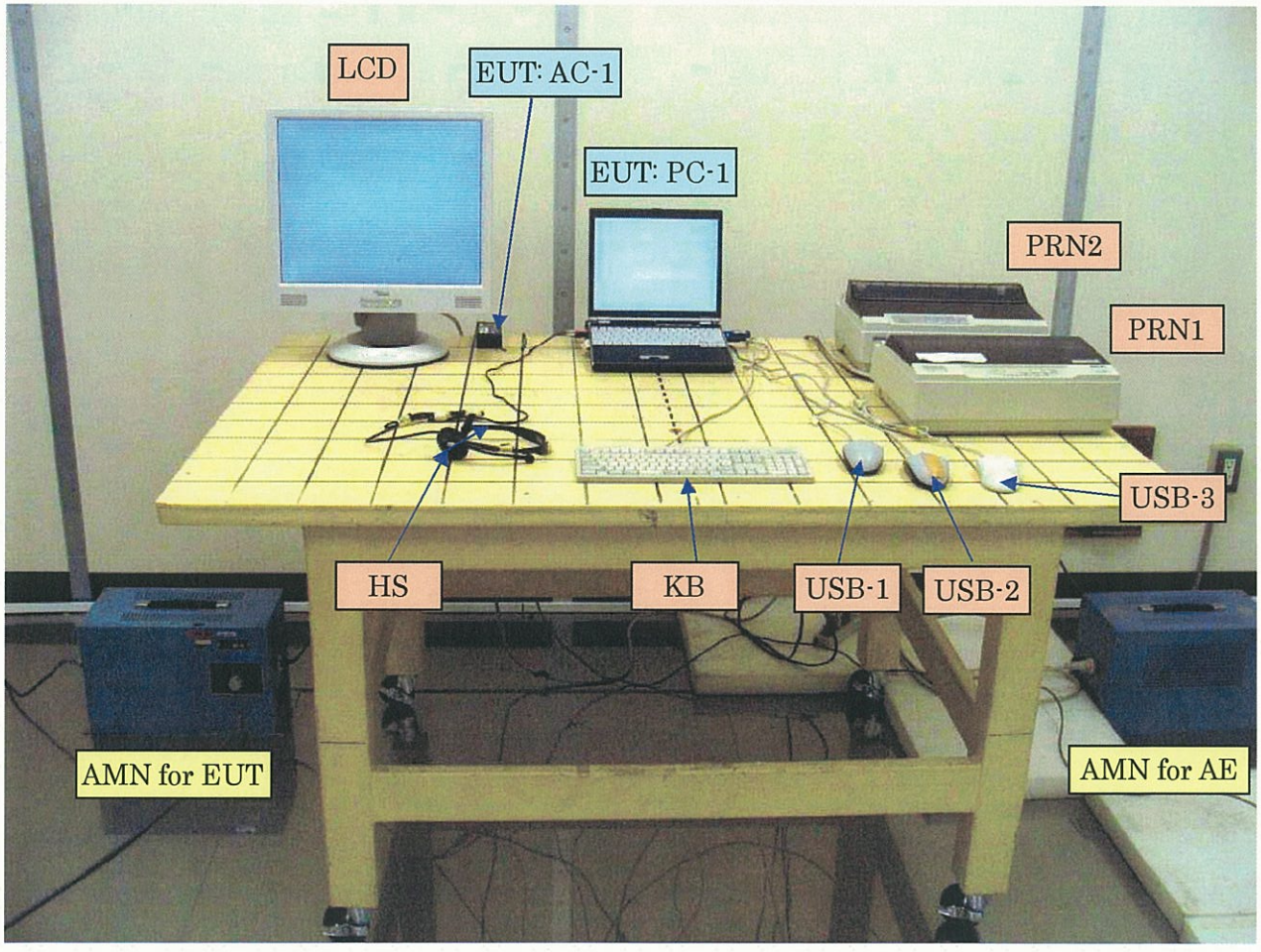


Photo-3 Label