

Report No. : FG10-072EAL (1/11)

EMI Test report

CATEGORY : FCC Part-15 (2008); Class B
VCCI (2010)

PRODUCT : Personal computer

MODEL : T580
AC adapter PXW1931N ADP-60ZH_A
Wireless LAN 622ANHMW AR5BHB92 AR5B97
Bluetooth module BSMAN3

Grouping model : TH550


MANUFACTURER : FUJITSU LIMITED
4-1-1, Kamikodanaka, Nakahara-ku, Kawasaki 211-8588 JAPAN

TEST SITE : FUJITSU GENERAL EMC LABORATORY
1116, Suenaga, Takatsu-ku, Kawasaki 213-8502 JAPAN
2nd semi-anechoic chamber(R-1460)
1st shielded room(C-777/T-1687)

DATE TESTED : September 14, 2010 24°C 60%

TESTED BY : Hiroyuki Aikawa

EUT conforms to the above mentioning all regulations.

APPROVED BY :  DATE : September 17, 2010
for Hiroyuki Shimanoe, President

FUJITSU GENERAL EMC LABORATORY LIMITED
1116, Suenaga, Takatsu-ku, Kawasaki 213-8502 JAPAN
TEL: (044)861-7897 FAX: (044)861-9890

CLIENT : Global Business Division, FUJITSU LIMITED
4-1-1, Kamikodanaka, Nakahara-ku, Kawasaki 211-8588 JAPAN

※ The description of the EUT and the system configuration in this report are provided by the client.



Product Service



Accredited by NVLAP.
Authorized by TÜV SÜD PS.
Appointed by TÜV Rheinland Japan.
Registered on VCCI.

This accredited test report does not constitute an endorsement of NVLAP or the US government. Fujitsu General EMC Laboratory as a TÜV SÜD PRODUCT SERVICE (TÜV SÜD PS) recognized laboratory is entitled to print the logo on its test reports. Reports approved by a TÜV SÜD PS technical expert additionally must bear the TÜV SÜD PS stamp and authorized signature. It is not allowed to copy this report even partly without the allowance of the test laboratory in any form or by any means. ©Fujitsu General EMC Laboratory

1. Description of EUT

The EUT: T580 is personal computer using CPU; Core i7 620M 1.47 GHz microprocessor. The EUT has a 10.1 inch HD LCD and a system disk (160 GB×1). The EUT has the interface for HDMI⑥, RGB, Mic-in①, Phone-out①, LAN⑧, USB×2②③, Memory card slot, Bluetooth and wireless LAN module.

The following type code is given according to the market.

Type code	Market
T580	Commercial
TH550	Consumer

The EUT has anyone of the following wireless LAN module.

Type	Manufacturer	Category
622ANHMW	Intel	11a/b/g/n
AR5BHB92	Atheros	11a/b/g/n
AR5B97	Atheros	11b/g/n

Internal clock frequency : 32.000 kHz 12.000 MHz, 14.318 MHz, 25.000 MHz, 33.300 MHz
96.000 MHz, 100.000 MHz, 166.000 MHz

Input power : AC 100 V-240 V, 50 / 60 Hz, Single-phase 2 wires

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

1.1 Test system configuration

The radiated emission measurement was performed with the worst case configuration of the preliminary measurement, T580 with AC adapter; PXW1931N, internal wireless LAN module; 622ANHMW, Bluetooth module; BSMAN3, and all related equipments as shown in figure-1.

The conducted emission measurement was performed with each of AC adapter; PXW1931N and ADP-60HZ A, each of internal wireless LAN module; 622ANHMW, AR5BHB92 and AR5B97, Bluetooth module; BSMAN3, and all related equipments as shown in figure-1.

The EUT was selected from the pre-production line.

1.2 Operating condition

The following EUT and dependent devices were tested using "EMC32.exe", "CRTU" or "ART.exe" and "Blue test" program under continuous operating condition to obtain maximum emission.

① PC-1	LCD-1:	Displaying "H" character on screen (Maximum contrast / Luminescence Display resolution 1366×768 / Refresh rate 60Hz)
	LAN:	Continuous transmission and receiving ping command (1000 M Max) Telecom line emission : DAT File 390MB, 1000 Mbps
	HDD-1:	Read/ writ the test data
	Wireless LAN:	Continuous transmission of the RF signal
	Bluetooth:	Continuous transmission of the RF signal
	CAMERA:	Monitoring the video picture of web camera
② SD memory card:		Read/ writ the test data
③ LCD-2:		Displaying "H" character on screen (Maximum contrast / Luminescence)
④ Headset:		Connecting only
⑤ USB memory(USB2.0):		Read/ writ the test data (480 M Max)
⑥ PC-2:		Continuous transmission and receiving of ping command (1000 M Max)

2. EMI test results summary

Applied standards: FCC (2009)

Limit value: Class B

The limit of radiated emission(30 MHz to 1,000 MHz) of FCC was applied limit of CISPR22(2005).

The test samples met the class B limit of VCCI (2010)/ CISPR22(2005) and applicable below regulations as shown the following highest 6 points of each emission profiles.

Over 1GHz radiated emission measurement for VCCI was not executed according to the customer's request.

Canada: ICES-003 Issue4.(2004)

The test result is effective in only the EUT.

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

2.1.1 Wireless module: 622ANHMW, AC adapter: PXW1931N

Freq. (MHz)	pol.	Noise level (QP; dB μ V/m)	Class B limit (QP; dB μ V/m)	Margin (dB)
30.00	Vert	22.7	30.0	7.3
105.50	Vert	26.8	30.0	3.2
229.41	Horiz	24.1	30.0	5.9
719.97	Horiz	30.1	37.0	6.9
961.47	Horiz	31.6	37.0	5.4
961.47	Vert	31.7	37.0	5.3

• Limit value ; CISPR22(2005)

• Measurement uncertainty : \pm 3.2 dB (K=2, 95 %)

2.1.2 Wireless module: AR5BHB92, AC adapter: PXW1931N

Freq. (MHz)	pol.	Noise level (QP; dB μ V/m)	Class B limit (QP; dB μ V/m)	Margin (dB)
30.00	Vert	22.5	30.0	7.5
105.50	Vert	26.7	30.0	3.3
229.41	Horiz	25.1	30.0	4.9
719.97	Horiz	31.0	37.0	6.0
961.47	Horiz	32.9	37.0	4.1
961.47	Vert	31.5	37.0	5.5

• Limit value ; CISPR22(2005)

• Measurement uncertainty : \pm 3.2 dB (K=2, 95 %)

2.1.3 Wireless module: AR5B97, AC adapter: PXW1931N

Freq. (MHz)	pol.	Noise level (QP; dB μ V/m)	Class B limit (QP; dB μ V/m)	Margin (dB)
30.00	Vert	22.5	30.0	7.5
105.50	Vert	26.8	30.0	3.2
229.41	Horiz	24.7	30.0	5.3
719.97	Horiz	31.0	37.0	6.0
961.47	Horiz	31.6	37.0	5.4
961.47	Vert	32.3	37.0	4.7

• Limit value ; CISPR22(2005)

• Measurement uncertainty : \pm 3.2 dB (K=2, 95 %)

2.2 Over 1 GHz Radiated emission : Measured at 3 m distance

2.2.1 Wireless module: 622ANHMW, AC adapter: PXW1931N

Freq. (GHz)	Pol.	Noise level (dB μ V/m)		Class B limit (dB μ V/m)		Margin (dB)	
		Peak	A V	Peak	A V	Peak	A V
1.0075	Vret	49.0	42.1	74.0	54.0	25.0	11.9
1.0519	Vret	46.3	48.9	74.0	54.0	27.7	5.1
1.9325	Horiz	53.8	44.8	74.0	54.0	20.2	9.2
1.9325	Vert	53.1	44.5	74.0	54.0	20.9	9.5
3.3300	Horiz	53.2	47.8	74.0	54.0	20.8	6.2
3.3300	Vert	53.5	48.8	74.0	54.0	20.5	5.2

- Limit value ; FCC Part-15 (2008)
- Measurement uncertainty : \pm 3.3 dB (K=2, 95 %)

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

2.3.1 Wireless module: 622ANHMW

2.3.1.1 AC Adapter: PXW1931N, AC120V 60Hz

Freq. (MHz)	Line #	Noise level (dB μ V)		Class B limit (dB μ V)		Margin (dB)	
		Q P	A V	Q P	A V	Q P	A V
6.128	# 1	44.7	41.8	60.0	50.0	15.3	8.2
6.128	# 2	45.0	42.2	60.0	50.0	15.0	7.8
14.604	# 1	50.1	46.0	60.0	50.0	9.9	4.0
14.604	# 2	49.9	46.3	60.0	50.0	10.1	3.7
15.258	# 1	49.5	45.1	60.0	50.0	10.5	4.9
15.258	# 2	49.8	45.0	60.0	50.0	10.2	5.0

- Limit value ; FCC Part-15 (2008)
- Measurement uncertainty : \pm 2.8 dB (K=2, 95 %)

2.3.1.2 AC Adapter: ADP-60ZH A, AC120V 60Hz

Freq. (MHz)	Line #	Noise level (dB μ V)		Class B limit (dB μ V)		Margin (dB)	
		Q P	A V	Q P	A V	Q P	A V
0.198	# 1	52.7	43.4	63.7	53.7	11.0	10.3
0.198	# 2	52.3	43.2	63.7	53.7	11.4	10.5
0.265	# 1	47.1	39.1	61.3	51.3	14.2	12.2
0.265	# 2	47.3	38.9	61.3	51.3	14.0	12.4
15.060	# 1	46.0	41.0	60.0	50.0	14.0	9.0
15.060	# 2	46.5	42.1	60.0	50.0	13.5	7.9

- Limit value ; FCC Part-15 (2008)
- Measurement uncertainty : \pm 2.8 dB (K=2, 95 %)

2.3.1.3 AC Adapter: PXW1931N, AC100V 50Hz

Freq. (MHz)	Line #	Noise level (dB μ V)		Class B limit (dB μ V)		Margin (dB)	
		Q P	A V	Q P	A V	Q P	A V
6.064	# 1	44.1	41.3	60.0	50.0	15.9	8.7
6.064	# 2	44.7	43.0	60.0	50.0	15.3	7.0
6.130	# 1	45.3	42.2	60.0	50.0	14.7	7.8
6.130	# 2	45.3	42.1	60.0	50.0	14.7	7.9
14.932	# 1	50.1	45.6	60.0	50.0	9.9	4.4
14.932	# 2	49.9	45.8	60.0	50.0	10.1	4.2

- Limit value ; VCCI (2010)
- Measurement uncertainty : \pm 2.8 dB (K=2, 95 %)

2.3.1.4 AC Adapter: ADP-60ZH A, AC100V 50Hz

Freq. (MHz)	Line #	Noise level (dB μ V)		Class B limit (dB μ V)		Margin (dB)	
		Q P	A V	Q P	A V	Q P	A V
		0.200	# 1	52.1	44.1	63.6	53.6
0.200	# 2	52.2	44.2	63.6	53.6	11.4	9.4
0.260	# 1	45.5	38.0	61.4	51.4	15.9	13.4
0.260	# 2	45.3	37.8	61.4	51.4	16.1	13.6
15.190	# 1	46.1	41.6	60.0	50.0	13.9	8.4
15.190	# 2	46.3	41.8	60.0	50.0	13.7	8.2

- Limit value ; VCCI (2010)
- Measurement uncertainty : ± 2.8 dB (K=2, 95 %)

2.3.2 Wireless module: AR5BHB92, AC adapter: PXW1931N, AC120V 60Hz

Freq. (MHz)	Line #	Noise level (dB μ V)		Class B limit (dB μ V)		Margin (dB)	
		Q P	A V	Q P	A V	Q P	A V
		6.065	# 1	44.4	40.6	60.0	50.0
6.065	# 2	44.5	42.5	60.0	50.0	14.5	7.5
14.800	# 1	51.1	46.3	60.0	50.0	8.9	3.7
14.800	# 2	51.0	46.7	60.0	50.0	9.0	3.3
15.190	# 1	50.6	46.1	60.0	50.0	9.4	3.9
15.190	# 2	50.6	45.9	60.0	50.0	9.4	4.1

- Limit value ; FCC Part-15 (2008)
- Measurement uncertainty : ± 2.8 dB (K=2, 95 %)

2.3.3 Wireless module: AR5B97, AC adapter: PXW1931N, AC120V 60Hz

Freq. (MHz)	Line #	Noise level (dB μ V)		Class B limit (dB μ V)		Margin (dB)	
		Q P	A V	Q P	A V	Q P	A V
		6.130	# 2	45.7	42.2	60.0	50.0
14.800	# 1	52.2	47.8	60.0	50.0	8.9	2.2
14.800	# 2	52.4	47.8	60.0	50.0	7.8	2.2
14.868	# 1	52.4	47.4	60.0	50.0	7.6	2.6
14.868	# 2	52.5	48.0	60.0	50.0	7.5	2.0
15.190	# 1	47.4	42.7	60.0	50.0	12.6	7.3

- Limit value ; FCC Part-15 (2008)
- Measurement uncertainty : ± 2.8 dB (K=2, 95 %)

2.4 Telecommunication line conducted emission (150 kHz to 30 MHz)**AC Adapter: ADP-80NB A, AC100V 50Hz**

< LAN port ®(CP) >

Freq. (MHz)	Noise level (dB μ A)		Class B limit (dB μ A)		Margin (dB to AV)
	Q P	A V	Q P	A V	
	3.233	5.3		30.0	
8.678	7.4		30.0	20.0	12.6
14.826	3.9		30.0	20.0	16.1
15.213	6.2		30.0	20.0	13.8
16.377	6.5		30.0	20.0	13.5
16.965	7.2		30.0	20.0	12.8

< LAN port ®(ISN) > (1000BAST-T CAT-6, LCL adapter: 75 dB)

Freq. (MHz)	Noise level (dB μ V)	Class B limit (dB μ V)		Margin (dB)
16.229	57.0	74.0	64.0	7.0
17.693	56.4	74.0	64.0	7.6
18.244	57.4	74.0	64.0	6.6
19.710	56.5	74.0	64.0	7.5
20.259	56.1	74.0	64.0	7.9
23.128	58.0	74.0	64.0	6.0

· Limit value ; VCCI (2009)

3. EUT modification under the test

None

4. Measurement procedure and test equipment

The measurement was performed without deviation from VCCI (2010) and ANSI C63.4 (2003).

4.1 Radiated emission

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

The measurement was performed in the 10 m RF semi-anechoic chamber. The EUT was set on the 80 cm height non-reflective desk (W: 150 cm×D: 100 cm) placed on the turntable. The HUB and PC-2 were placed at outside of the chamber to make usual install condition 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 rotating 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 for the main spectrum that was obtained by the preliminary measurement.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Dipole antenna	Schwarzbeck	VHA9103	VHA91031573	2010.04.13	2012.04.13
Dipole antenna	Schwarzbeck	UHA9105	UHA91052119	2010.04.13	2012.04.13
Bi Log antenna	Schwarzbeck	VULB9160	3118	2010.05.12	2011.05.12
Field strength meter	Rohde & Schwarz	ESCS30	849650/001	2010.07.08	2011.07.08
Spectrum analyzer	HP	85422E	3746A00242	2010.07.30	2011.07.30
RF switch	Anritsu	MP59B	M87079	2010.04.29	2011.04.29
RF cable	—	TF0207	—	2010.04.29	2011.04.29
2nd semianchoic camber	Riken eletech				
EMI test program	FGE	Version 1.3			

4.1.2 Over 1 GHz radiated emission

The measurement was performed in the 10 m RF semi-anechoic chamber. The EUT was set on the 80 cm height styrene foam desk (W: 150 cm×D: 100 cm) on the turntable. The radiated emission measurement from 1 GHz to 7.35 GHz; Operating rate 1.47 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 for both horizontal and vertical polarization. The measurement was performed with rotating the EUT through 360 degrees and fixing the antenna height to the 1 m for both horizontal and vertical polarization.

The measurement was performed using the RF signal “off” mode of the wireless LAN and Bluetooth.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Horn antenna	Schwarzbeck	BBHA9120D	316	2010.04.22	2011.04.22
Spectrum analyzer	Advantest	U3772	161200140	2010.05.24	2011.05.24
Pre amplifier	HP	8449B	3008A01010	2010.03.26	2011.03.26
2nd semianchoic camber	Riken eletech				

4.2 AC power line conducted emission

The measurement was performed in the shielded room. The EUT was set on the 80 cm height non-reflective desk and connected to the $50\Omega/50\mu\text{H}$ artificial mains network: AMN. The EUT was operated by AC 120 V/ 60 Hz and AC 100 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 of the main spectrum that was obtained by the preliminary measurement.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
AMN for EUT	Kyoritsu	KNW-242C	8-1387-7	2010.01.09	2011.01.09
AMN for AE	Kyoritsu	KNW-242C	8-1387-6	2010.01.09	2011.01.09
Field strength meter	Rohde & Schwarz	ESCS30	849650/003	2010.07.08	2011.07.08
Spectrum analyzer	HP	85422E	3746A00240	2010.07.30	2011.07.30
RF switch	Rohde & Schwarz	PSU	848290/005	2010.04.06	2011.04.06
Band pass filter	Advantest	TR14202	03560025	2010.04.06	2011.04.06
Pulse limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54	2010.04.06	2011.04.06
RF cable	----	TF0110	----	2010.04.06	2011.04.06
EMI test program	FGE	Version 1.3			
1st shielded room	Riken eletech				

4.3 Telecommunication line conducted emission for First edition

The measurement was performed in the shielded room. The EUT was set on the 40 cm height wooden desk and connected to the impedance stabilization network: ISN (LCL; 75 dB) and the current probe for LAN port. The EUT was operated by AC 100 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 of the main spectrum that was obtained by the preliminary measurement.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Current probe	Rohde & Schwarz	EZ-17	100007	2009.06.01	2012.06.01
ISN	Kyoritsu	KNW-2208	8S-2972-5	2010.04.07	2012.04.07
Field strength meter	Rohde & Schwarz	ESCS30	849650/003	2010.07.08	2011.07.08
Spectrum analyzer	HP	85422E	3746A00240	2010.07.30	2011.07.30
RF switch	Rohde & Schwarz	PSU	848290/005	2010.04.06	2011.04.06
Band pass filter	Advantest	TR14202	03560025	2010.04.06	2011.04.06
Pulse limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54	2010.04.06	2011.04.06
RF cable	----	TF0110	----	2010.04.06	2011.04.06
1st shielded room					
EMI test program	FGE	Version 1.3			

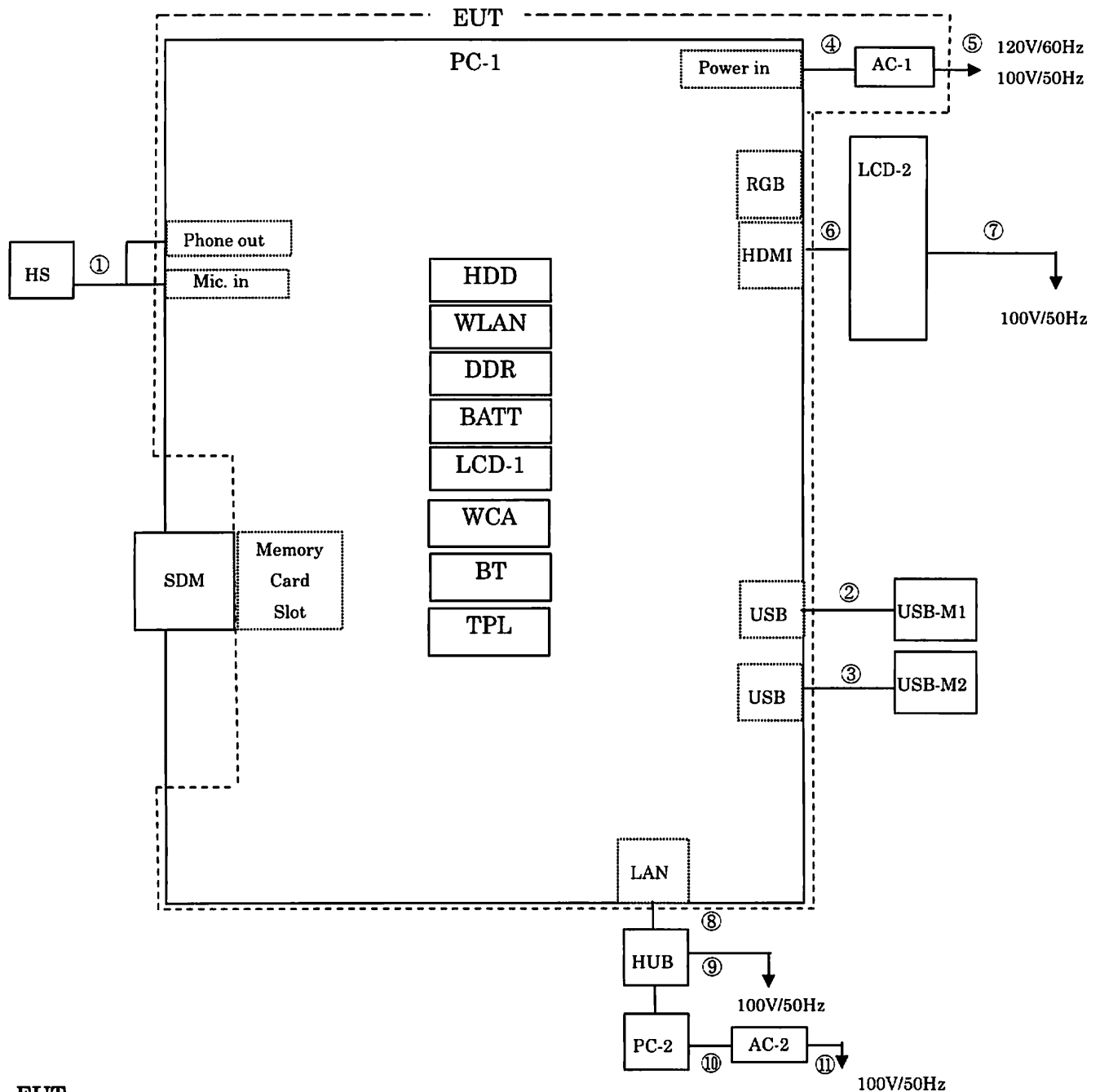
5. Test site and traceability

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 (U.S.A.), authorized from TÜV SÜD PS (Germany) and appointed from TÜV Rheinland (Germany).

VCCI : 1st semi-anechoic chamber(R-753/G-53/C-776/T-1686), 1st shielded room(C-777/T-1687)
Large shielded room(C-778)
2nd semi-anechoic chamber(R-1460/G-54/C-1547/T-1688), 2nd shielded room(C-1548/T-1689)
3rd shielded room(C-1549)
NVLAP : 1998.12.01 Accredited: Lab code 200373-0
TÜV SÜD PS : 1999.01.29 Authorized
TÜV Rheinland Japan : 2005.08.25 Appointed

The measuring equipments were 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



Main EUT

Code	Name	Type	S/N	Product
PC-1	Personal computer	T580	Pre-production sample	Fujitsu

Related EUT

AC-1	AC adapter	PXW1931N	---	Fujitsu
	AC adapter	ADP-60ZH A	---	Fujitsu

Included device; PC-1

Code	Name	Type	S/N	Product
HDD	160GB HDD	MJA2160BH	----	Fujitsu
WLAN	Wireless LAN	622ANHMW	----	Intel
	Wireless LAN	AR5BHB92	----	Atheros
	Wireless LAN	AR5B97	----	Atheros
BT	Bluetooth	BSMAN3	----	CSR
DDR	Memory 2 GB	HMT125S6BFR8C-G7	----	Hynix
BATT	Battery (6 cell)	FPBP219 10.8V 5800mAh	----	Fujitsu
LCD-1	10.1" HD	LTN101AT03	----	Samsung
TPL	Touch panel	FD01-101W100A0X	----	N-trig
WCA	Web-camera	CNF913621005130L	----	Chicony Electronics

Assisted equipment

Code	Name	Type	S/N	Product
LCD-2	LCD display	P22W-5 ECO	YE7G213217	FSC
	LCD display	P19-1	YEGA217498	FSC
HS	Head set	GN 501FSC	-----	FSC
HUB	Switching Hub	ETG-SH-8	VD7000010513N	I·O DATA
PC-2	Personal computer	FMV	-----	Fujitsu
AC-2	AC adapter	FMV-AC322	-----	Fujitsu
SDM	SD memory card	256 MB	-----	Panasonic
USB-M1	USB Memory	256 MB	-----	I·O DATA
USB-M2	USB Memory	256 MB	-----	I·O DATA

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 / Mic-in	Headset cable	-----	2.2m	NSLD, MC
②	USB	USB cable	-----	1.0m	SLD, MC
③	USB	USB cable	-----	1.0m	SLD, MC
④	Power in	AC adaptor cable	-----	1.8m	NSLD, NMC
⑤	-----	AC power cable	-----	1.8m	2P-NSLD
⑥	HDMI	HDMI cable	-----	2.0m	SLD, MC
⑦	-----	AC power cable	-----	2.0m	3P-NSLD
⑧	LAN	LAN cable	-----	20.0m	SLD, MC
⑨	-----	AC power cable	-----	2.0m	3P-NSLD
⑩	-----	AC adaptor cable	-----	1.8m	NSLD, NMC
⑪	-----	AC power cable	-----	2.0m	2P-NSLD