Attachment 3

Q2010 LifeBook Test Report

Report number: FG06-041EAL

FUJITSU GENERAL EMC LABORATORY LIMITED
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EMI Test report

CATEGORY : EN55022(1998), +A2 / CISPR 22(1997) , +A2 ; Class B
AS/NZS CISPR22 (2002)
FCC Part-15 (2004)
VCCI (2005)
EN301 489-01 V1.4.1

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

PRODUCT TYPE : Personal computer Q2010
AC Adapter SEC80N2-16.0
Port Replicator FPCPR64
Bluetooth module EYTF3CS FT
Wireless LAN WM3945ABG AR5BXB6
Grouping model: Q2010D

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

DATE TESTED : March 30, 2006 25℃ 25%

TESTED BY : Akio Ogawa

Above EUT conforms mentioned all regulations.

APPROVED BY : DATE : March 31, 2006
Hiroyuki Shimanoe, President

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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.

NVLAP LAB CODE 200373-0

Client Laboratory Recognized By TÜV PRODUCT SERVICE

Accredited by NVLAP.
Authorized by TÜV P.S.
Appointed by TÜV Rheinland Japan
Registered on VCCI.

1. Description of EUT

The EUT: Q2010 series personal computer using Yonah-SC (ULV) 1.2 GHz microprocessor has a 12.1 inch WXGA , DVD-super multi drive and a system disk (60 GB×1). The EUT has the interface to extend for RGB⑫, Mic-in⑭, Phone-out⑭, LAN⑤, USB×5①②⑮⑯⑰⑱, and has SD card slot, Exptess card slot Bluetooth and wireless LAN.

Type	CPU, Chipset and Wireless LAN
Q2010	Centrino
Q2010D	Non-Centrino

Internal clock frequency : 4.000 MHz, 14.318 MHz, 25.000 MHz, 33.300 MHz, 48.000 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 measurement was performed using Q2010 (Yonah 1.2 GHz microprocessor) WXGA display and each wireless LAN module(WM3945ABG/ AR5BXB6) with FPCPR64 as a maximum personal computer system with all related equipment 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 "EMC.exe", "Blue test" and "CRTU" or "ART" program under continuous operating condition to obtain maximize emission.

① PC-1	LCD-1:	Display "H" character on screen (Maximum contrast / Luminescence/ (Display resolution 1280×768 / Refresh rate 60Hz)
	LAN:	Continuous transmission and receiving ping command. (1000 M Max)
	HDD-1:	Read/write the test data
	Bluetooth:	Continuous transmission of the RF signal
	Wireless LAN:	Continuous transmission of the RF signal
② POR	DVD:	Play the test disk
③ Express card:		Non-connection (Radiated emission)
		Read/write the test data (Conducted emission)
④ SD card:		Non-connection (Radiated emission)
		Read/write the test data (Conducted emission)
⑤ LCD-2:		Display "H" character on screen (Maximum contrast / Luminescence)
⑥ Headset:		Connecting only
⑦ USB mouse:		Connecting only
⑧ HDD-2:		Read/write the test data (480 M Max)
⑨ HDD-3:		Read/write the test data (480 M Max)
⑩ PC-2:		Continuous transmission and receiving ping command. (1000 M Max)

2. EMI test results summary

Applied standard: EN55022 (1998), +A2 (2003)
Limit value: Class B

The test samples met the class B limit of EN55022(1998), +A2 (2003)/ CISPR22(1997) , +A2 (2002) and applicable following regulations as shown following highest 6 points of each emission profiles.

Australia, New Zealand: AS/NZS CISPR22(2002)
U.S.A:FCC Part-15(2004), Canada: CAN/CSA-CEI/IEC CISPR22-02
Japan: VCCI(2005), Taiwan: CSN 13438(1997)

The test result is effective on only for the EUT.

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

2.1.1 Wireless LAN module: WM3945ABG

< AC 230 V / 50 Hz single phase >

Freq. (MHz)	pol.	Noise level (dBμV/m)	Class B limit (dBμV/m)	Margin (dB)
36.01	Vert	24.1	30.0	5.9
125.00	Horiz	27.8	30.0	2.2
125.00	Vert	25.4	30.0	4.6
299.77	Horiz	33.6	37.0	3.4
299.77	Vert	33.7	37.0	3.3
745.69	Vert	31.2	37.0	5.8

< AC 120 V / 60 Hz single phase >

Freq. (MHz)	pol.	Noise level (dBμV/m)	Class B limit (dBμV/m)	Margin (dB)
125.00	Horiz	25.3	30.0	4.7
125.00	Vert	25.2	30.0	4.8
210.01	Horiz	24.0	30.0	6.0
299.77	Horiz	34.2	37.0	2.8
299.77	Vert	33.5	37.0	3.5
366.18	Horiz	32.1	37.0	4.9

2.1.2 Wireless LAN module: AR5BXB6

< AC 120 V / 60 Hz single phase >

Freq. (MHz)	pol.	Noise level (dBμV/m)	Class B limit (dBμV/m)	Margin (dB)
99.78	Vert	24.6	30.0	5.4
125.00	Horiz	26.9	30.0	3.1
125.00	Vert	25.6	30.0	4.4
166.08	Vert	24.3	30.0	5.7
299.77	Horiz	33.9	37.0	3.1
299.77	Vert	31.7	37.0	5.3

- Limit value ; CISPR22(1997
-)and applied for FCC Part15 (2004)
- Measurement uncertainty : ± 3.3 dB (K=2, 95 %)

2. 2 Above 1 GHz RF Radiated emission (1 GHz to 6 GHz) : Measured at 3 m distance

<Wireless LAN module: WM3945ABG>

Freq. (GHz)	Pol	Noise level (dBμV/m)	FCC Part-15 Class B limit (dBμV/m)		Margin (dB to AV)
		Peak	Peak	AV	
1.0509	Vert	37.6	74.0	54.0	16.4
1.0915	Vert	35.9	74.0	54.0	18.1
1.4402	Horiz	36.1	74.0	54.0	17.9
1.8016	Vert	35.9	74.0	54.0	18.1
1.9665	Vert	36.0	74.0	54.0	18.0
2.4021	Vert	36.1	74.0	54.0	17.9

2. 3 AC power line conducted emission (150 kHz to 30 MHz)

2.3.1 Wireless LAN module: WM3945ABG

< AC 230 V / 50 Hz single phase >

Freq. (MHz)	Line #	Noise level (dBμV)	Class A limit (dBμV)		Margin (dB to AV)
		QP	QP	AV	
0.171	# 1	48.7	64.9	54.9	6.2
0.171	# 2	49.3	64.9	54.9	5.6
0.324	# 1	41.1	59.6	49.6	8.5
3.694	# 1	38.5	56.0	46.0	7.5
3.694	# 2	39.9	56.0	46.0	6.1
7.549	# 2	41.1	60.0	50.0	8.6

< AC 120 V / 60 Hz single phase >

Freq. (MHz)	Line #	Noise level (dBμV)	Class A limit (dBμV)		Margin (dB to AV)
		QP	QP	AV	
0.189	# 1	48.3	64.1	54.1	5.8
0.189	# 2	48.6	64.1	54.1	5.5
3.698	# 1	39.8	56.0	46.0	6.2
3.698	# 2	40.7	56.0	46.0	5.3
7.546	# 1	40.0	60.0	50.0	10.0
7.546	# 2	41.5	60.0	50.0	8.5

< AC 100 V / 50 Hz single phase >

Freq. (MHz)	Line #	Noise level (dBμV)	Class A limit (dBμV)		Margin (dB to AV)
		QP	QP	AV	
0.206	# 1	47.2	63.4	53.4	6.2
0.206	# 2	47.5	63.4	53.4	5.9
3.600	# 1	37.0	56.0	46.0	9.0
3.600	# 2	39.5	56.0	46.0	6.5
6.849	# 1	40.4	60.0	50.0	9.6
6.849	# 2	39.3	60.0	50.0	10.7

2.3.2 Wireless LAN module: AR5BXB6

< AC 120 V / 60 Hz single phase >

Freq. (MHz)	Line #	Noise level (dBμV) QP	Class A limit (dBμV) QP	AV	Margin (dB to AV)
0.197	# 1	47.3	63.7	53.7	6.4
0.197	# 2	46.8	63.7	53.7	6.9
0.557	# 1	34.8	56.0	46.0	11.2
0.557	# 2	35.6	56.0	46.0	10.4
3.559	# 1	37.2	56.0	46.0	8.8
3.559	# 2	36.9	56.0	46.0	9.1

- Limit value ; FCC Part-15.
- Measurement uncertainty : ± 2.5 dB (K=2, 95 %)

2. 4 Telecommunication line conducted emission

< LAN port >

Freq. (MHz)	Noise level (dBμA) QP	Class B limit (dBμA) QP	AV	Margin (dB to AV)
0.251	19.7	35.7	25.7	6.0
0.385	16.6	32.2	22.2	5.6
0.517	15.3	30.0	20.0	4.7
1.503	10.2	30.0	20.0	9.8
2.851	12.7	30.0	20.0	7.3
7.948	5.3	30.0	20.0	14.7

3. EUT modification under the test

The shielded tape added to the IEEE1394 connector cover of the lower cover for the countermeasure of the radiated emission measurement.

4. Measurement procedure and test equipment

4.1 Radiated emission

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

The EUT was set on the 80 cm height desk placed 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 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 spectrums that is obtained by the preliminary measurement.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Bi Log antenna	Schwarzbeck	VULB9160	3123	2006.01.04	2007.01.04
Dipole antenna	Schwarzbeck	VHA9103	VHA91031573	2004.12.28	2006.12.28
Dipole antenna	Schwarzbeck	UHA9105	UHA91052119	2004.12.28	2006.12.28
Field strength meter	Rohde & Schwarz	ESCS30	849650/00 1	2005.04.25	2006.04.25
Spectrum analyzer	HP	85422E	3746A00241	2005.04.24	2006.04.24
RF switch	Rohde & Schwarz	PSU	846628/006	2005.04.26	2006.04.26
RF cable	———	CF005	———	2005.04.25	2006.04.25
1nd semi-anechoic chamber	Riken eletech	———	———	2004.04.03	2006.04.03
EMI test program	FGE	Version 1.3			

4.1.2 Radiated emission (1 GHz～6 GHz)

The EUT was set on the 80 cm height non-reflective desk on the turntable. The radiated emission measurement from 1 GHz to 6 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, rotating the EUT through 360 degrees and fixing the antenna height to the EUT center

The measurement was performed with off mode of the RF signal of the wireless LAN and Bluetooth

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Horn antenna	Schwarzbeck	BBHA9120D	414	2005.02.23	2007.02.23
Spectrum analyzer	Advantest	R3371A	75060396	2005.04.01	2006.04.01
Pre amplifier	HP	8449B	3008A01110	2005.03.24	2007.03.24

4. 2 AC power line conducted emission

The conducted emission measurement was performed in the shielded room. The EUT was set on 80 cm height wooden desk with using the 50 Ω /50 μ H artificial mains network: AMN ,and operated by AC230V/50Hz,AC 120 V/ 60 Hz and AC100V/50Hz. 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 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	2006.01.15	2007.01.15
AMN for AE	Kyoritsu	KNW-242C	8-1387-7	2006.01.15	2007.01.15
Field strength meter	Rohde & Schwarz	ESCS30	849650/001	2005.04.25	2006.04.25
Spectrum analyzer	HP	85422E	3746A00239	2005.04.24	2006.04.24
RF switch	Rohde & Schwarz	PSU	848290/003	2006.01.12	2007.01.12
Band pass filter	Advantest	TR14202	03560025	2006.01.12	2007.01.12
6 dB attenuator	Tamagawa	CFA-03	———	2006.01.12	2007.01.12
RF cable	———	C21	———	2006.01.12	2007.01.12
EMI test program	FGE	Version 1.3			

4. 3 Telecommunication line conducted emission

The conducted emission measurement was performed in the shielded room. The EUT was set on the 40 cm height wooden desk with using the current probe and operated by 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 of the main spectrum that is obtained by the preliminary measurement.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Current probe	Rohde & Schwarz	EZ-17	100007	2005.12.21	2006.12.21
Field strength meter	Rohde & Schwarz	ESCS30	849650/001	2005.04.25	2006.04.25
Spectrum analyzer	HP	85422E	3746A00239	2005.04.24	2006.04.24
RF switch	Rohde & Schwarz	PSU	848290/003	2006.01.12	2007.01.12
Band pass filter	Advantest	TR14202	03560025	2006.01.12	2007.01.12
6 dB attenuator	Tamagawa	CFA-03	———	2006.01.12	2007.01.12
RF cable	———	C21	———	2006.01.12	2007.01.12

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)

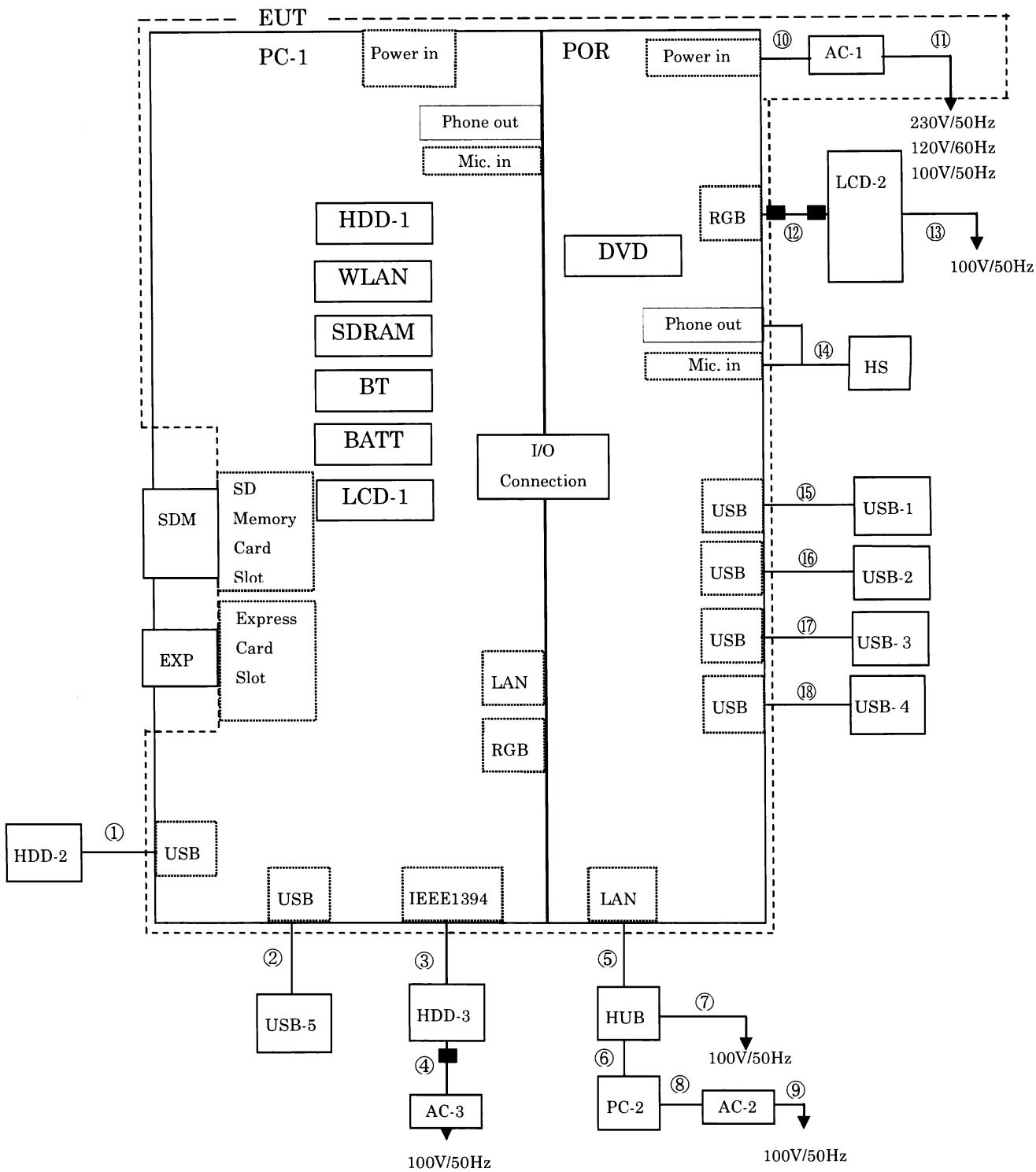
NVLAP : 1998.12.01 Accredited: Lab code 200373-0

TÜV P.S. : 1999.01.29 Authorized

TÜV Rheinland Japan : 2005.08.25 Appointed

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	Q2010	Pre-production sample	Fujitsu

Related EUT

POR	Port Replicator	FPCPR64	———	Fujitsu
AC-1	AC adapter	SEC80N2-16.0	———	Fujitsu

Included device; PC-1

Code	Name	Type	S/N	Product
HDD-1	60GB HDD	M6006206GAH	NROCT4C25469	Toshiba
WLAN	Wireless LAN	WM3945ABG	———	Intel
		AR5BXB6	———	Atheros
SDRAM	1000 MB	MT47HH64M16BT-37E	———	Micron
BT	Bluetooth	EYTF3CSFT	———	TAOYO YUDEN
BATT	5200mA/h	FPCBP149	CP283030-01	Fujitsu
LCD-1	12.1"WXGA	LTD121EX5F	———	Toshiba

Included device; POR

Code	Name	Type	S/N	Product
DVD	DVD super multi	UJ-842B	———	MATSHITA

Assisted equipment

Code	Name	Type	S/N	Product
LCD-2	LCD display	P19-1	YEGA217491	FSC
HDD-2	Hard disk drive	YSRU009043	805000501	FSC
HS	Head set	AP-210Pro	———	FSC
PC-2	Personal computer	FMV	———	Fujitsu
HUB	Switching Hub	ETG-SH-8	VD7000010513N	I·O DATA
AC-2	AC adapter	FMV-AC312	03Y15899C	Fujitsu
USB-1	USB Mouse	M-BJ69	HCA50402874	FSC
USB-2	USB Mouse	M-BJ69	HCA50407420	FSC
USB-3	USB Mouse	M-BJ69	HCA50407247	FSC
USB-4	USB Mouse	M-BJ69	HCA50407481	FSC
USB-5	USB Mouse	M-BJ69	HCA50407248	FSC
EXP	Express card	512MB	———	Lexar
SDM	SD memory card	128MB	———	Panasonic

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	USB	USB cable	———	1.8m	SLD,MC
②	USB	USB mouse cable	———	1.0m	SLD,MC
③	IEEE1394	IEEE1394 cable	———	1.0m	SLD, MC
④	———	AC power cable	———	1.5m	2P-NSLD with core *1
⑤	LAN	LAN cable	———	15.0m	SLD, MC
⑥	———	LAN cable	———	1.0m	NSLD, NMC
⑦	———	AC power cable	———	2.0m	3P-NSLD
⑧	———	AC adaptor cable	———	1.8m	NSLD,NMC
⑨	———	AC power cable	———	1.8m	2P-NSLD
⑩	———	AC adaptor cable	———	1.8m	NSLD,NMC
⑪	———	AC power cable	———	2.0m	2P-NSLD
⑫	RGB	RGB cable	———	1.8m	SLD, MC fixed core
⑬	———	AC power cable	———	2.0m	3P-NSLD
⑭	Phone-out/Mic-in	Headset cable	———	2.2m	NSLD,NMC
⑮	USB	USB mouse cable	———	1.9m	SLD,MC
⑯	USB	USB mouse cable	———	1.9m	SLD,MC
⑰	USB	USB mouse cable	———	1.9m	SLD,MC
⑱	USB	USB mouse cable	———	1.9m	SLD,MC

* 1: KITAGAWA industry Co.,Ltd; TFC-23-11-14