Attachment 3

FCC PART 15B TEST REPORT

FUJITSU GENERAL EMC LABORATORY LIMITED
1116, SUENAGA, TAKATSU-KU, KAWASAKI 213-8502 JAPAN TEL:044-861-7897 FAX:044-861-9890

EMI Test report

CATEGORY : EN55022(2006) / CISPR 22(2005) ; Class B
AS/NZS CISPR22 (2006)
FCC Part-15 (2007)
VCCI (2008)
EN301 489-17 V1.2.1, EN301 489-1 V1.4.1

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

PRODUCT TYPE : Personal computer T2020
AC Adapter SED80N2-16.0
Port Replicator FPCPR87
Wireless LAN 533AN_HMW 512AN_HMW AR5BHB92
Bluetooth module EYTF3CS FS

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

DATE TESTED : August 19 , 2008 23℃ 65%

TESTED BY : Hiroyuki Aikawa

EUT conforms to the above mentioned all regulations.

APPROVED BY : for K. Dan DATE : August 20, 2008
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.

NVLAP LAB CODE 200373-0
TÜV SÜD Product Service
www.tuv.com TÜV ID 0000061034

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

1. Description of EUT

The EUT: T2020 is personal computer using CPU; Core2 Duo SU9400 1.4 GHz microprocessor. The EUT has a 12.1 inch WXGA LCD, a system disk (80 GB×1). The EUT has the interface for DVI⑧,RGB. Mic-in①, Phone-out①, LAN⑤, TEL④, IEEE1394③, USB×4②⑪⑫㉑㉒, Audio-out㉓, SD card slot, PC card slot, Bluetooth and wireless LAN.

Internal clock frequency : 32.768 kHz, 4.000 MHz, 12.000 MHz, 14.318 MHz, 24.576MHz, 25.000MHz, 30.000 MHz, 33.300 MHz, 48.000 MHz, 96.000 MHz, 100.000 MHz, 200.000 MHz

Input power : AC 100 - 230V, 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 T2020 with internal wireless LAN module and Bluetooth module, external Port Replicator; FPCPR87 and all related equipments as the maximum personal computer system 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" program under continuous operating condition to obtain maximum emission.

① PC-1

LCD-1:	Displaying "H" character on screen. (Maximum contrast/ Luminescence) (Display resolution 1280×800 / Refresh rate 60Hz)
HDD-1:	Reading/writing the test data.
LAN:	Continuous transmission and receiving of the ping command. (1000 M Max)
TEL:	Continuous transmission and receiving of the ping command. Down loading the test file.
Wireless LAN:	Continuous transmission of the RF signal.
Bluetooth	Continuous transmission of the RF signal.

② PC memory card: Read/write the test data.
③ SD memory card: Read/write the test data.
④ USB2.0 Memory: Read/write the test data. (480 M max)
⑤ IEEE1394: Read/write the test data. (400 M max)
⑥ LCD-2: Display "H" character on screen. (Maximum contrast / Luminescence)
⑦ Headset: Connecting only.
⑧ USB mouse: Connecting only.
⑨ PC-2: Receiving ping command and test data.

2. EMI test results summary

Applied standard: EN55022 (2006)
Limit value: Class B

The test samples met the class B limit of EN55022 (2006)/ CISPR22(2005) and applicable below regulations as shown the following highest 6 points of each emission profiles.

EN301 489-1 V1.4.1 for EN301 489-17
Australia, New Zealand: AS/NZS CISPR22 (2006)
U.S.A.: FCC Part-15(2007), Canada: CAN/CSA-CEI/IEC CISPR22-02
Japan: VCCI (2008), Taiwan: CSN 13438(2006)

The test result is effective in only for the EUT.

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

< AC 230 V / 50 Hz single phase >

Freq. (MHz)	pol.	Noise level (QP: dBμV/m)	Class B limit (QP: dBμV/m)	Margin (dB)
33.01	Vert	24.8	30.0	5.2
125.00	Vert	27.6	30.0	2.4
223.48	Horiz	27.9	30.0	2.1
340.03	Horiz	34.2	37.0	2.8
959.97	Horiz	32.8	37.0	4.2
959.97	Vert	35.6	37.0	1.4

< AC 120 V / 60 Hz single phase >

Freq. (MHz)	pol.	Noise level (QP: dBμV/m)	Class B limit (QP: dBμV/m)	Margin (dB)
33.01	Vert	23.7	30.0	6.3
125.00	Vert	27.2	30.0	2.8
223.48	Horiz	27.5	30.0	2.5
340.03	Horiz	34.4	37.0	2.6
959.97	Horiz	32.6	37.0	4.4
959.97	Vert	35.5	37.0	1.5

- Limit value ; CISPR 22(2005) and applied for FCC Part15(2007)
- Measurement uncertainty : ± 3.3 dB (K=2, 95 %)

2.2 Over 1 GHz RF Radiated emission (1 GHz to 7 GHz) : Measured at 3 m distance

Freq. (GHz)	Pol	Noise level (dBμV/m)	Class B limit (dBμV/m)		Margin (dB to AV)
		Peak	Peak	AV	
1.6640	Vert	43.1	74.0	54.0	10.9
1.7476	Vert	39.3	74.0	54.0	14.7
3.0003	Horiz	42.6	74.0	54.0	11.4
3.0003	Vert	42.6	74.0	54.0	11.4
3.3289	Vert	49.3	74.0	54.0	4.7
3.4100	Vert	40.5	74.0	54.0	13.5

- Limit value ; FCC Part15(2007)

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

2.3.1 Wireless LAN: 533AN_ HMW

< AC 230 V / 50 Hz single phase >

Freq. (MHz)	Line #	Noise level (dBμV)		Class B limit (dBμV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.205	# 1	53.5	41.0	63.4	53.4	9.9	12.4
0.205	# 2	53.4	41.7	63.4	53.4	10.0	11.7
0.256	# 1	51.1	39.8	61.6	51.6	10.5	11.8
0.256	# 2	50.8	37.0	61.6	51.6	10.8	14.6
0.420	# 1	44.8	30.7	57.5	47.5	12.7	16.8
0.420	# 2	44.5	30.0	57.5	47.5	13.0	17.5

< AC 120 V / 60 Hz single phase >

Freq. (MHz)	Line #	Noise level (dBμV)		Class B limit (dBμV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.192	# 1	52.2	35.2	64.0	54.0	11.8	18.8
0.192	# 2	51.5	35.1	64.0	54.0	12.5	18.9
0.280	# 2	46.3	27.7	60.8	50.8	14.5	23.1
0.347	# 1	46.0	32.2	59.0	49.0	13.0	16.8
0.514	# 1	41.8	28.3	56.0	46.0	14.2	17.7
24.576	# 1	38.4	36.3	60.0	50.0	21.6	13.7

< AC 100 V / 50 Hz single phase >

Freq. (MHz)	Line #	Noise level (dBμV)	Class B limit (dBμV)		Margin (dB to AV)
		QP	QP	AV	
0.195	# 1	50.4	63.8	53.8	3.4
0.195	# 2	49.6	63.8	53.8	4.0
0.263	# 1	45.8	61.4	51.4	5.6
0.386	# 1	43.7	58.2	48.2	4.5
0.513	# 1	41.9	56.0	46.0	4.1
0.513	# 2	41.6	56.0	46.0	4.4

- Limit value ; CISPR 22(2005)
- Measurement uncertainty : ± 2.4 dB (K=2, 95 %)

2.3.2 Wireless LAN: AR5BHB92

< AC 120 V / 60 Hz single phase >

Freq. (MHz)	Line #	Noise level (dBμV)		Class B limit (dBμV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.192	# 1	52.0	36.2	64.0	54.0	12.0	17.8
0.192	# 2	52.1	36.1	64.0	54.0	11.9	17.9
0.280	# 2	46.8	29.0	60.8	50.8	14.0	21.8
0.347	# 1	46.1	32.3	59.0	49.0	12.9	16.7
0.514	# 1	41.1	27.6	56.0	46.0	14.9	18.4
24.576	# 1	37.6	36.1	60.0	50.0	22.4	13.9

- Limit value ; CISPR 22(2005)
- Measurement uncertainty : ± 2.4 dB (K=2, 95 %)

2.4 Telecommunication line conducted emission (150 kHz to 30 MHz)

< Telecom port >

Freq. (MHz)	Noise level (dBμV) QP	Class B limit (dBμV) QP	AV	Margin (dB to AV)
0.773	52.2	74.0	64.0	11.8
0.920	51.4	74.0	64.0	12.6
1.160	54.3	74.0	64.0	9.7
1.425	49.0	74.0	64.0	15.0
1.687	51.3	74.0	64.0	12.7
2.226	47.8	74.0	64.0	16.2

・ Limit value ; CISPR 22(2005)

< LAN port >

Freq. (MHz)	Noise level (dBμA) QP	Class B limit (dBμA) QP	AV	Margin (dB to AV)
0.392	11.1	32.0	22.0	10.9
0.528	11.6	30.0	20.0	8.4
0.576	8.9	30.0	20.0	11.1
1.170	8.8	30.0	20.0	11.2
24.000	10.5	30.0	20.0	9.5
24.577	13.4	30.0	20.0	6.6

・ Limit value ; CISPR 22(2005)

3. EUT modification under the test

None.

4. Measurement procedure and test equipment

The measurement was performed without deviation from CISPR22 (2005).

4.1 Radiated emission

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

The EUT was set on the 80 cm height non-reflective desk (W: 150 cm×D: 100 cm) placed on the turntable in the 10 m RF semi-anechoic chamber.

The HUB, TEL, PC-2 and PC-3 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 of the main spectrums that was obtained by the preliminary measurement.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Bi Log antenna	Schwarzbeck	VULB9160	3118	2007.12.03	2008.12.03
Dipole antenna	Schwarzbeck	VHA9103	VHA91031573	2007.07.25	2009.07.25
Dipole antenna	Schwarzbeck	UHA9105	UHA91052119	2007.07.25	2009.07.25
Field strength meter	Rohde & Schwarz	ESCS30	849650/001	2008.06.04	2009.06.04
Spectrum analyzer	HP	85422E	3746A00242	2008.05.27	2009.05.27
RF switch	Anritsu	MP59B	M87079	2008.05.07	2009.05.07
RF cable	——	CF013	——	2008.05.07	2009.05.07
2nd semi-anechoic chamber		Riken eletech	——	2008.01.04	2010.01.04
EMI test program	FGE	Version 1.3			

4.1.2 Over 1 GHz radiated emission (1 GHz~7 GHz)

The EUT was set on the 80 cm height non-reflective desk (W: 150 cm×D: 100 cm) on the turntable. The radiated emission measurement from 1 GHz to 7 GHz: Operating rate 1.4 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 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 with RF signal "off" mode of the wireless LAN and Bluetooth.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
Horn antenna	Schwarzbeck	BBHA9120D	414	2007.02.23	2009.02.23
Spectrum analyzer	Advantest	R3371A	75060396	2008.05.27	2009.05.27
Pre amplifier	HP	8449B	3008A01110	2007.03.24	2009.03.24

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 operated by AC 230 V/ 50 Hz, 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	Kyoritsu	KNW-407	8-823-18	2007.09.07	2008.09.07
Field strength meter	Rohde & Schwarz	ESCS30	849650/003	2008.06.03	2009.06.03
Spectrum analyzer	HP	85422E	3746A00240	2008.05.27	2009.05.27
RF switch	Rohde & Schwarz	PSU	848290/005	2008.05.07	2009.05.07
Band pass filter	Advantest	TR14202	03560025	2008.05.07	2009.05.07
Pulse limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54	2008.05.07	2009.05.07
RF cable	———	CF009	———	2008.05.07	2009.05.07
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 impedance stabilization network: ISN(LCL:80 dB) for telecom port and the current probe for LAN port 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 was obtained by the preliminary measurement.

Test equipment	Manufacturer	Type	S/N	Cal. Date	Due. Date
ISN	Kyoritsu	KNW-2202	8S-2945-2	2007.09.03	2008.09.03
Current probe	Rohde & Schwarz	EZ-17	100007	2007.03.06	2009.03.06
Field strength meter	Rohde & Schwarz	ESCS30	849650/003	2008.06.03	2009.06.03
Spectrum analyzer	HP	85422E	3746A00240	2008.05.27	2009.05.27
RF switch	Rohde & Schwarz	PSU	848290/005	2008.05.07	2009.05.07
Band pass filter	Advantest	TR14202	03560025	2008.05.07	2009.05.07
Pulse limiter	Rohde & Schwarz	ESH3-Z2	0357.8810.54	2008.05.07	2009.05.07
RF cable	———	CF009	———	2008.05.07	2009.05.07
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/C-776), 1st 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)

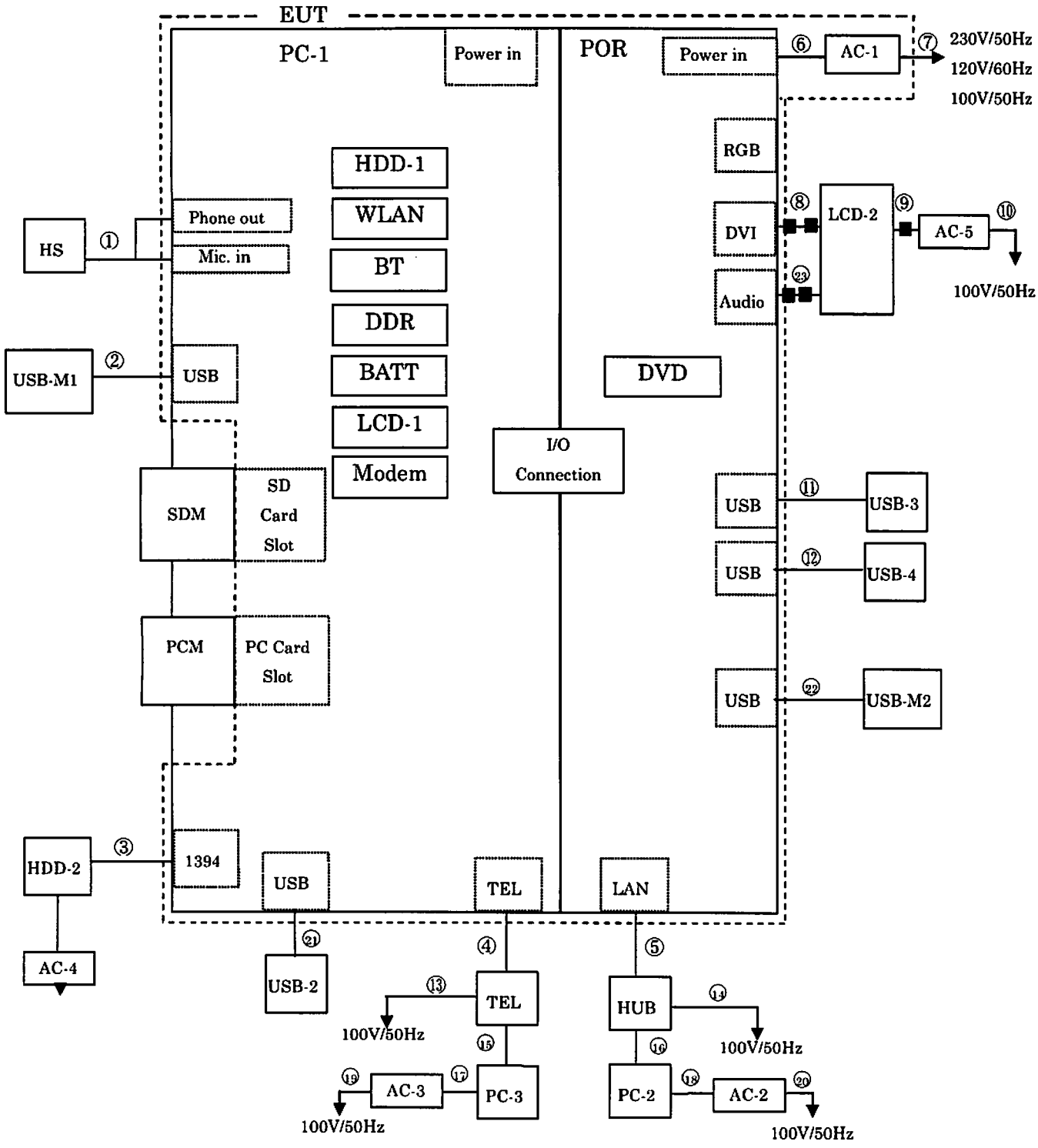
NVLAP : 1998.12.01 Accredited: Lab code 200373-0

TÜV 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



■ : Ferrite core

Main EUT

Code	Name	Type	S/N	Product
PC-1	Personal computer	T2020	Pre-production sample	Fujitsu

Related EUT

POR	Port Replicator	FPCPR87	———	Fujitsu
AC-1	AC adapter	SED80N2-16.0	———	Fujitsu

Included device; PC-1

Code	Name	Type	S/N	Product
HDD-1	80GB HDD	MHY2080BH	K41X84276C5	Fujitsu
WLAN	Wireless LAN	533AN_HWN	———	Intel
	Wireless LAN	512AN_HWN	———	Intel
	Wireless LAN	AR5BHB92	———	Ateros
BT	Bluetooth	EYTF3CS FS	———	TAIYO YUDEN
DDR	DDR Memory	2048 MB(1024 MB×2)	———	SAMSUNG
BATT	Battery	FPCBP186(10.8 V 5800mA/h)	———	Fujitsu
LCD-1	12.1"WXGA	HV121WX6-100	———	Hydis
Modem	Telephone modem	MDC1.5 model Model:D40	———	Agere

Included device; POR

Code	Name	Type	S/N	Product
DVD	DVD-Multi drive	UJ-870A	———	Panasonic

Assisted equipment

Code	Name	Type	S/N	Product
LCD-2	LCD display	WBZA-H	YE1C017616	FSC
	LCD display	P19-1	YEGA217490	FSC
HS	Head set	AP-210Pro	———	FSC
HUB	Switching Hub	ETG-SH-8	VD7000010513N	I·O DATA
HDD-2	Herd disk drive	Stragebird 40 GB	3732650036	FSC
PC-2	Personal computer	FMV	———	Fujitsu
PC-3	Personal computer	FMV	———	Fujitsu
AC-2	AC adapter	FMV-AC317	———	Fujitsu
AC-3	AC adapter	FMV-AC322	———	Fujitsu
AC-4	AC adapter	ACTN-71T	———	Sunfone
AC-5	AC adapter	0218B1260	A30730002648	LI SHIN
USB-M1	USB Memory	256MB	———	I·O DATA
USB-M2	USB Memory	256MB	———	I·O DATA
USB-1	USB Mouse	M-UAE96	LZ6500J08ZE	FSC
USB-2	USB Mouse	M-BT69e	HCA52701556	FSC
USB-3	USB Mouse	M-BT69e	HCA52701562	FSC
USB-4	USB Mouse	M-BT69e	HCA52701578	FSC
PCM	PC memory card	20 MB	———	SunDisk
SDM	SD 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	Phone-out / Mic-in	Headset cable	———	2.2m	NSLD, MC
②	USB	USB cable	———	1.0m	SLD, NMC
③	1394	1394 cable	———	1.0m	SLD, MC
④	TEL	Modular cable	———	20.0m	NLD, NMC
⑤	LAN	LAN cable	———	20.0m	SLD, MC
⑥	Power in	AC adaptor cable	———	1.8m	NSLD, NMC
⑦	———	AC power cable	———	2.0m	2P-NSLD
⑧	RGB	RGB cable	———	2.0m	SLD, MC with fixed core
⑨	———	AC adaptor cable	———	1.8m	NSLD, NMC with fixed core
⑩	———	AC power cable	———	2.0m	3P-NSLD
⑪	USB	USB mouse cable	———	1.9m	SLD, MC
⑫	USB	USB cable	———	1.0m	SLD, NMC
⑬	———	AC power cable	———	2.0m	2P-NSLD
⑭	———	AC power cable	———	2.0m	3P-NSLD
⑮	———	Modular cable	———	1.0m	NSLD, NMC
⑯	———	LAN cable	———	1.0m	SLD, MC
⑰	———	AC adaptor cable	———	1.8m	NSLD, NMC
⑱	———	AC adaptor cable	———	1.8m	NSLD, NMC
⑲	———	AC power cable	———	2.0m	2P-NSLD
⑳	———	AC power cable	———	2.0m	2P-NSLD
㉑	USB	USB mouse cable	———	1.9m	SLD, MC
㉒	USB	USB mouse cable	———	1.9m	SLD, MC
㉓	Audio	Audio cable	———	2.0m	NLD, NMC

Appendix data (#08-099E: Total 28 pages)

1. **Photograph** #08-099E (4 pages)

• Radiated emission measurement	30-1000 MHz	(Front)	: Photo-1.1
		(Back)	: Photo-1.2
	1-7 GHz	(Front)	: Photo-1.3
• Conducted emission measurement			: Photo-2.1
• Telecom line emission measurement	Telecom port		: Photo-2.2
	LAN port		: Photo-2.3
• Label	Personal computer T2020		: Photo-3.1
	AC Adapter SED80N2-16.0		: Photo-3.2

2. **Test data** (24 pages)

• Radiated emission				
30-1000 MHz		AC 230 V / 50 Hz	: #08-099E-RE1	(2 pages)
		AC 120 V / 60 Hz	: #08-099E-RE2	(2 pages)
1-7 GHz			: #08-099E-GH	(2 pages)
• Conducted emission				
<Wireless LAN; 533AN_HMW>				
SED80N2-16.0	AC 230 V / 50 Hz	QP Mode	: #08-099E-CE1	(2 pages)
		AV Mode	: #08-099E-CE2	(2 pages)
	AC 120 V / 60 Hz	QP Mode	: #08-099E-CE3	(2 pages)
		AV Mode	: #08-099E-CE4	(2 pages)
	AC 100 V / 50 Hz		: #08-099E-CE5	(2 pages)
<Wireless LAN; AR5BHB92>				
	AC 120 V / 60 Hz	QP Mode	: #08-099E-CE6	(2 pages)
		AV Mode	: #08-099E-CE7	(2 pages)
• Telecommunication line emission		Telecom port	: #08-099E-TE1	(2 pages)
		LAN port	: #08-099E-TE2	(2 pages)