

**Attachment 3: TEST REPORT**

**FG05\_050EAL (PART 1)**



Report No. : FG05-050EAL (1/9)

## EMI Test report

CATEGORY : EN55022(1994), +A1, +A2 / CISPR 22(1993), +A1, +A2 ; Class B  
AS/NZS CISPR22 (2002)  
FCC Part-15 (2003)  
VCCI (2005)

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

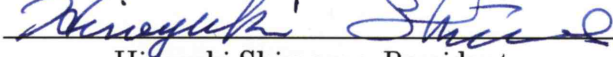
PRODUCT TYPE : Personal computer ST5031  
AC Adapter SEC80N2-16.0  
Docking Station FPCPR43  
Grouping model : ST5032 ST5030 ST5032D ST5031D ST5030D

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

DATE TESTED : May 19, 2005 23°C 45%

TESTED BY : Hikaru Shirasawa

Above EUT conforms mentioned regulations.

APPROVED BY :  DATE : May 20, 2005  
Hiroyuki Shimanoe, President

### FUJITSU GENERAL EMC LABORATORY 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: ST5031 series personal computer using Dothan ULV 1.2GHz microprocessor has a DVD/CD-RW drive, and a system disk (40 GB). The EUT has the interface to extend for, IEEE1394③②⑩, RGB⑧, MIC IN②, Phone out①, Line out②②, LAN⑨, TEL⑧, USB×5-⑭⑮⑯⑰, PC card slot, CF card slot, BT and wireless LAN.

The following typecode are given according to the Wireless-LAN, the LCD size and the use place.

Type	Wireless-LAN	LCD size	Use place
ST5031	Calexico2 11b/g or 11a+11b/g	10 inch	Outdoor
ST5032	Calexico2 11b/g or 11a+11b/g	12 inch	Outdoor
ST5030	Calexico2 11b/g or 11a+11b/g	12 inch	Indoor
ST5032D	Atheros New 11a+11b/g	12 inch	Outdoor
ST5031D	Atheros New 11a+11b/g	10 inch	Outdoor
ST5030D	Atheros New 11a+11b/g	12 inch	Indoor

Internal clock frequency : 4.000 MHz, 14.318 MHz, 24.576 MHz, 25.000 MHz, 33.300 MHz,  
48.000 MHz, 66.000 MHz, 96.000 MHz, 100.000 MHz

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 ST5031 with FPCPR43 as a maximum personal computer system with all related equipment shown in figure-1. The final measurement was performed using ST5031 that maximum generate emissions by the primary measurement.

The EUT was selected from the pre-product line.

### 1.2 Operating condition

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

- |                  |         |  |
|------------------|---------|--|
| ① PC-1           | LCD:    | Display "H" character on screen (Maximum contrast / Luminescence)      |
|                  | DISK:   | Play Test disk   |
|                  | LAN:    | Continuous transmission and reception of the "H" character (1000 Mbps) |
|                  | TEL:    | Continuous transmission of the test data (56 kbps)                     |
|                  | WL-LAN: | Continuous transmission of the 11g mode                                |
|                  | BT:     | Continuous transmission  |
| ② PC card:       |         | Connecting only  |
| ③ USB2.0 Memory: |         | Read/write the test data (480 Mbps)                                    |
| ④ LCD:           |         | Display "H" character on screen (Maximum contrast / Luminescence)      |
| ⑤ Headset:       |         | Connecting only  |
| ⑥ USB mouse:     |         | Connecting only  |
| ⑦ PC-2:          |         | Read/write "H" character and receiving serial data.                    |

## 2. EMI test results summary

Applied standard: EN55022(1994), +A1(1995), +A2(1997) / CISPR22(1993), +A1(1995), +A2(1996)

Limit value: Class B

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

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

FCC Part-15(2003), Canada: CAN/CSA-CEI/IEC CISPR22-02

Japan: VCCI(2005), 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 $\mu$ V/m)	Class B limit (dB $\mu$ V/m)	Margin (dB)
35.51	Vert	26.2	30.0	3.8
100.57	Vert	27.7	30.0	2.3
106.48	Vert	26.6	30.0	3.4
130.14	Vert	25.1	30.0	4.9
166.55	Vert	26.6	30.0	3.4
252.45	Horiz	32.4	37.0	4.6

• Limit value ; EN55022(1994) / CISPR22 (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 6 GHz) : Measured at 3 m distance

Freq. (GHz)	Pol	Noise level (dB $\mu$ V/m)	FCC Part-15 Class B limit (dB $\mu$ V/m)		Margin (dB to AV)
			Peak	A V	
1.0240	Horz	35.7	74.0	54.0	18.3
1.5510	Horz	38.2	74.0	54.0	15.8
1.5890	Horz	35.4	74.0	54.0	18.6
1.6810	Horz	36.7	74.0	54.0	17.3
1.8540	Vert	34.8	74.0	54.0	19.2
2.0700	Horz	34.8	74.0	54.0	19.2

### 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 $\mu$ V)	Class B limit (dB $\mu$ V)		Margin (dB to AV)
		Q P	Q P	A V	
0.186	#1	49.2	64.2	54.2	5.0
0.186	#2	48.4	64.2	54.2	5.8
0.280	#2	40.7	60.4	50.4	9.7
0.295	#1	42.2	60.8	50.8	8.6
0.569	#2	35.2	56.0	46.0	10.8
0.649	#1	35.6	56.0	46.0	10.4

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

Freq. (MHz)	Line #	Noise level (dB $\mu$ V)	Class B limit (dB $\mu$ V)		Margin (dB to AV)
		QP	QP	AV	
0.197	#1	49.0	63.7	53.7	4.7
0.197	#2	49.1	63.7	53.7	4.6
0.269	#1	41.3	61.1	51.1	9.8
0.293	#2	41.1	60.4	50.4	9.3
0.500	#1	36.3	56.0	46.0	9.7
0.599	#2	36.5	56.0	46.0	9.5

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

Freq. (MHz)	Line #	Noise level (dB $\mu$ V)	Class B limit (dB $\mu$ V)		Margin (dB to AV)
		QP	QP	AV	
0.150	#1	51.1	66.0	56.0	4.9
0.150	#2	49.0	66.0	56.0	7.0
0.296	#1	41.6	60.4	50.4	8.8
0.369	#1	38.3	58.5	48.5	10.2
0.517	#2	35.6	56.0	46.0	10.4
0.738	#2	34.6	56.0	46.0	11.4

- Limit value ; EN55022(1994) / CISPR 22(1993)
- 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	2004.12.29	2005.12.29
Dipole antenna	Schwarzbeck	VHA9103	VHA91031573	2004.12.29	2005.12.29
Dipole antenna	Schwarzbeck	UHA9105	UHA91052119	2004.12.29	2005.12.29
Field strength meter	Rohde & Schwarz	ESCS30	849650/002	2005.04.25	2006.04.25
Spectrum analyzer	HP	85422E	3746A00242	2005.04.25	2006.04.25
RF switch	Rohde & Schwarz	PSU	848290/003	2005.04.25	2006.04.25
RF cable	———	C61	———	2005.04.25	2006.04.25
2nd semi-anechoic chamber	Riken eletech	———	———	2005.01.16	2007.01.16

#### 4.1.2 Radiated emission (1 GHz~11 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, 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	2005.03.04	2007.03.04
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 the 80 cm height wooden desk with using the 50 $\Omega$ /50 $\mu$  H 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	2005.01.14	2006.01.14
AMN for AE	Kyoritsu	KNW-242C	8-1387-7	2005.01.14	2006.01.14
Field strength meter	Rohde & Schwarz	ESCS30	849650/002	2005.04.25	2006.04.25
Spectrum analyzer	HP	85422E	3746A00242	2005.04.25	2006.04.25
RF switch	Rohde & Schwarz	PSU	848290/003	2005.04.25	2006.04.25
Band pass filter	Advantest	TR14202	120200240	2005.04.25	2006.04.25
6 dB attenuator	Kyoritsu	CFA-03	—	2005.04.25	2006.04.25
RF cable	—	C63	—	2005.04.25	2006.04.25

## 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.