

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Notebook PC
Model No. : P25

FCC ID : A3LSP10

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4. This test data in this report are traceable to National or International standards.

Date of test : April 3, 2003 ~ April 7, 2003

Issued Date : April 11, 2003

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NVLAP Code: 200447

Table of Contents

1. General Information

- 1.1 Product Description
- 1.2 Configuration of EUT and peripherals
- 1.3 Used Cable Description
- 1.4 System Block Diagram of Test Configuration
- 1.5 Test Facility

2. System Test Configuration

- 2.1 Configuration of Radiated and Conducted Interference Measurement
- 2.2 Operation Environment
- 2.3 Test Procedure

3. Conducted Emission Test Data

4. Radiated Emission Test Data

5. Label Configuration and Location

6. Test Equipment Used

Distribution

This test report has been made available as follows:

CS Management Center, EMC Laboratory	1 original
Computer Division	1 copy

1. General Information

Applicant : Samsung Electronics Co., Ltd.

Full Address : 416 Maetan 3 Dong, Paldal-Ku,
Suwon City, Kyungki Do, Korea, 442-742

Kind of Product : **Notebook PC**

FCC ID : **A3LSP10**

Project Name : **Taurus II**

Model & Variant Names : **P25** (Brand Name: Samsung)
P20 (Brand Name: Samsung)
Transport T2000 (Brand Name: Micron)

Test Report Produced by : Choon Kil, Kim / Test Engineer of EMC Lab.

1.1 Product Description

1) Justification

The system was configured for testing in typical fashion use. Cable were attached to each of the available I/O Ports. Where applicable, peripherals were attached to the I/O cables. The mode of operation utilized for testing was selected to best simulate typical EUT use.

The system was tested using the below configurations of (A), (B), (C), (D), and (E).

(A) LCD 15.0" XGA, CPU P4 2.4GHz, WLAN, and 2pin 90W Adapter without Port Replicator.

(B) LCD 15.0" XGA, CPU P4 2.2GHz, Bluetooth, and 2pin 90W Adapter without Port Replicator.

(C) LCD 15.0" SXGA, CPU P4 2.4GHz, WLAN, and 3pin 90W Adapter without Port Replicator.

(D) LCD 15.0" XGA, CPU P4 2.4GHz, WLAN, and 2pin 80W Adapter with Port Replicator.

(E) LCD 15.0" XGA(AUO), CPU P4 2.5GHz, WLAN, and 3pin 90W Adapter w/o PR.

This report is for above (E) configuration. So the data of the maximum EUT operation was reported.

Further details of cabling and configuration are shown in the test system configuration.

2) Operating Frequency :

2.5GHz(CPU Speed), 100MHz(Host Clock), 133MHz(SDRAM Clock),
33.3MHz(PCI Clock), 14.318MHz(Ref), 49.512MHz(Audio Clock), 25M(Network)
183MHz(Video Memory Clock), 12.288MHz(Audio Bit Clock), 24.576MHz(Audio C24)
10MHz(Micom Clock), 48MHz(USB Clock), 66.6(Hub), 65MHz(14.1" LCD Clock)

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
"H" Pattern display & Read / Write	LCD Screen
	External Monitor
	TV monitor
	Hard Disk Drive C:
	Swap Device drive D:
	LPT1 to printer
Data access	Telecommunications (LAN, Modem)

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors
LCD(15.0")	1024 X 768	60Hz	32bits
Ext. Monitor	1280 X 1024	85Hz	32bits
TV Monitor	640 X 480	60Hz	32bits

5) Manufacturer : SAMSUNG Electronics Co., Ltd.

6) Assemble Parts

Item	Specification	Remark
CPU	Intel Pentium IV Northwood 2.5GHz	512KB Cache, 400MHz PSB
Memory	Samsung, 512MB, 2 SODIMM, Max 1GB	
Video	AU Optronics, LCD 15" XGA TFT, B150XG01,	ATI Mobillity M7P
Display	Upto 1024 X 768 Pixels:32-bit colors(LCD)	
Modem	Samsung, SFM-3200LW, 56Kbps	V.90 compliant/V92 ready
Swap Device	SEC, SN-324, CD-RW/DVD Combo	
Wireless LAN	Agere, MPC13A-20/R, MiniPCI type, 11Mbps	Ruby
HDD	IBM, 20GB, IC25N020ATCS04-0, 2.5"	
LAN	10/100 Base-T Ethernet support, Intel Kinnereth	
Adapter	Astec, AD-9019M, AC 100~240V FREE-VOLTAGE	50/60Hz, 90W, 3pin
Input Device	Keyboard, 19mm pitch, 3mmH travel length, Pointing Device, PS/2 Touchpad w/2 button, Memory Stick	
Battery	65Wh, Removable 8-Cell Li-Ion Smart	
Port Replicator	DC-in, SVHS, SPDIF out, VGA, SIO, DVI, RJ-45, PS/2, 1394, USB, Headphone, Mic, Dock conn. Etc.	

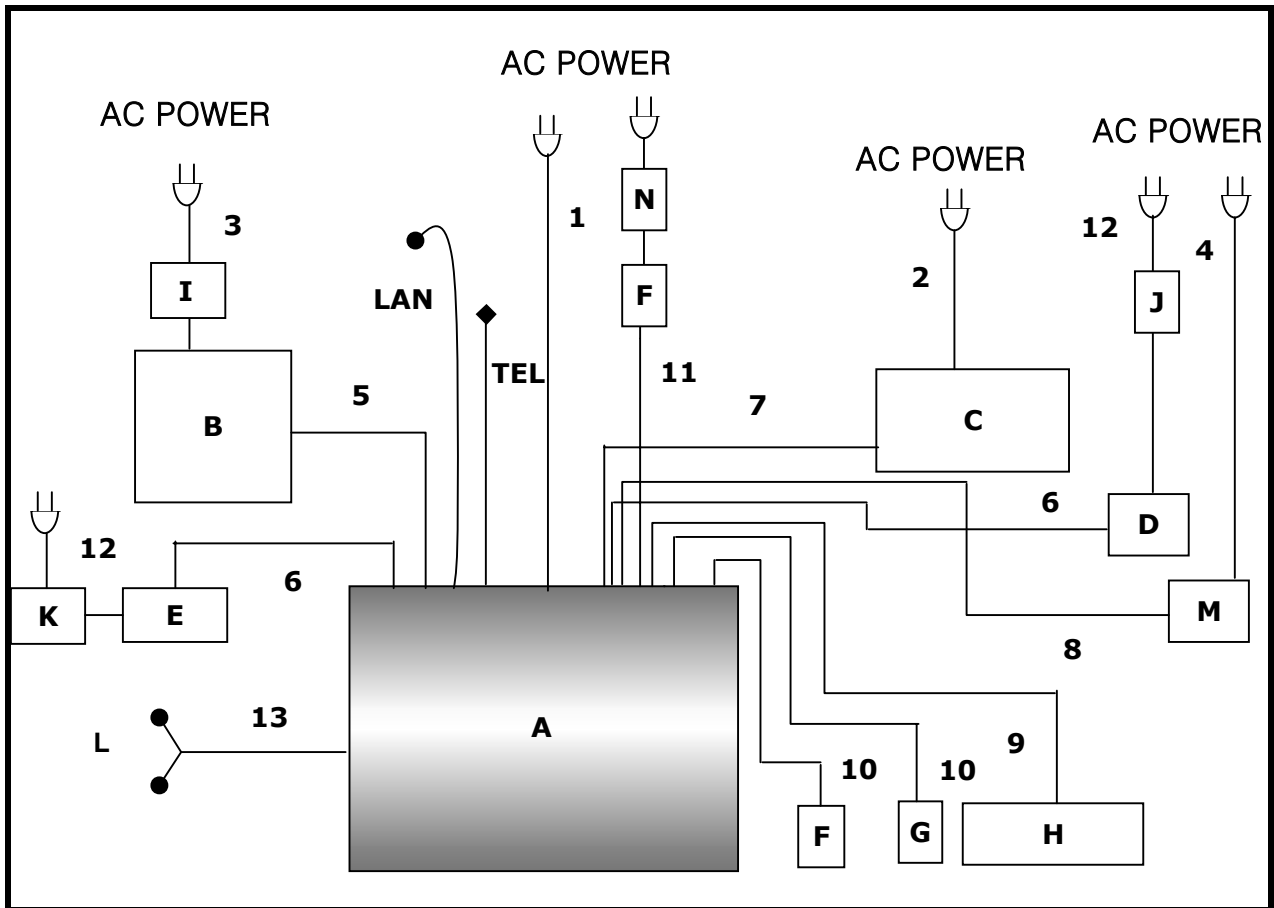
1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	P25	-	SAMSUNG	EUT
B	Monitor	M17D-AN	-	SAMSUNG	Doc
C	Printer	LQ-580H	CG2Y014010	EPSON	Doc
D	External HDD	SEV08UP	HV08J1AT600477	SAMSUNG	Doc
E	External HDD	SEV08UP	HV08J1AT600383	SAMSUNG	Doc
F	USB Mouse	M-U48a	LZE94654021	SAMSUNG	JNZ211360
G	Serial Mouse	M-M35	LZA71452614	LOGITECH	Doc
H	PS/2 Keyboard	7801	K1C100662	BTC	Doc
I	Adapter	AD-4214N	C011108527	SAMSUNG	For Monitor
J	Adapter	PSCV360104A	C020381928B	SAMSUNG	For HDD
K	Adapter	PSCV360104A	C020381562B	SAMSUNG	For HDD
L	Earphone	-	-	-	-
M	TV	SMP-150A	35ST104010	SAMSUNG	-
N	Adapter	AD9019M	CNBA4400130 ASE38120746	SAMSUNG	For EUT

1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	AC Power Cable	1.5	N	PC
2	AC Power Cable	1.5	N	Printer
3	AC Power Cable	1.5	N	Monitor
4	AC Power Cable	1.5	N	TV
5	Monitor Cable	1.5	Y	
6	1394 Cable	1.5	Y	
7	Printer Cable	1.6	Y	
8	S-Video Cable	1.6	Y	
9	PS/2 Keyboard Cable	1.6	N	
10	Mouse Cable	1.7	N	
11	USB Cable	1.5	N	
12	AC Power Cable	1.5	N	HDD
13	Earphone Cable	1.0	N	

1.4 System Block Diagram of Test Configuration



1.5 Test Facility

All test described in this report were performed by :
 SAMSUNG ELECTRONICS CO., LTD.
 EMC TESTING LABORATORY
 416 Maetan 3 Dong, Paldal-Ku, Suwon City, Kyungki Do, Korea, 442-742
 Semi Anechoic Chamber #1(Registration Number:873282) and Shielded Room.

This test facility has been filed in FCC under the criteria in ANSI C63.4-1992.

2. System Test Configuration

2.1 Configuration of Radiated and Conducted Interference Measurement

* Cabling was taken into consideration and test data was taken under worse case conditions.

1)Conduction(Front View)



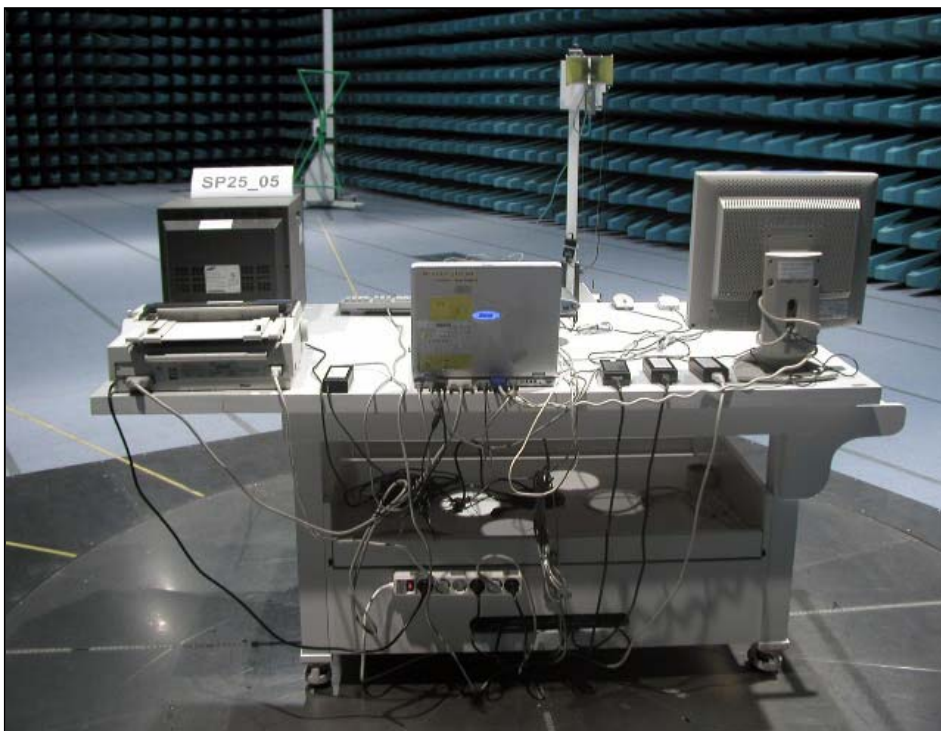
2)Conduction(Rear View)



3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	24.5	20
Humidity [%]	39	43
Power supply	: AC120V/60Hz	AC120V/60Hz

2.3 Test Procedure

2.3.1 Conducted Emissions

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting ground plane.

The rear of EUT, including peripherals was aligned and flush with rear of tabletop. All other surfaces of tabletop was at least 80cm from any other grounded conducting surface. I/O cables and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.

Each EUT current-carrying power lead, except the ground(safety) lead, were individually connected through a LISN to the input power source.

All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment.

The EUT was switched on and allowed to warm up to its normal operating condition.

A quick scan, from 150kHz to 30MHz, was made on the L1 & L2 line by LISN.

High peaks, relative to the limit line, over the frequency range were then selected.

The EMI TEST RECEIVER was then tuned to the selected frequencies.

CISPR quasi-peak measurements with a receiver bandwidth setting of 10kHz, were taken.

2.3.2 Radiated Emissions

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.

The rear of EUT, including peripherals was aligned and flush with rear of tabletop. I/O cables that were connected to the peripherals were bundle in center.

They were folded back and forth forming a bundle 30cm to 40cm long and were hanged 40cm height to the ground plane.

The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000 MHz using biconiLog antenna. Also, the EMI TEST RECEIVER was scanned from 1000 to 18000MHz using linearly polarized double ridge horn antennas were used.

Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment; powering the monitor from the floor mounted outlet box and the computer aux AC outlet if applicable, and changing the polarity of the antenna; whichever determined the worst-case emission.

The explanation of measuring instrument setup when respective function is used in any frequency band is as following:

Frequency Band [MHz]	Instrument	Detector fuction	resolution Bandwidth	Video Bandwidth
30 to 1000	Spectrum analyzer	Peak	1MHz	1MHz
	EMI Test receiver	Quasi-Peak	120kHz	-
Above 1000	EMI Test receiver	Peak	1MHz	-

2.4 Measurement Uncertainty

Measurement Uncertainty according to NAMAS Publication NIS 80 is available for a customer's request.

3. Conducted Emission Test Data

O Test Data Sheet

Frequency [MHz]	Meter reading (a)		Total Loss (b) [dB]	Results (a) + (b)		Limits		Margin (Limits-Result)	
	QP	AV		QP	AV	QP	AV	QP	AV
	[dBuV]			[dBuV]		[dBuV]		[dB]	
0.498	48.4	19.4	0.6	49.0	20.0	56.0	46.0	7.0	26.0
0.517	48.2	21.9	0.6	48.8	22.5	56.0	46.0	7.2	23.5
0.896	39.9	21.1	0.5	40.4	21.6	56.0	46.0	15.6	24.4
1.009	39.9	22.2	0.6	40.5	22.8	56.0	46.0	15.5	23.2
3.380	31.6	25.4	0.6	32.2	26.0	56.0	46.0	23.8	20.0
4.920	34.8	30.6	0.8	35.6	31.4	56.0	46.0	20.4	14.6
17.584	33.3	24.7	1.4	34.7	26.1	60.0	50.0	25.3	23.9
25.494	35.1	25.7	1.7	36.8	27.4	60.0	50.0	23.2	22.6

* QP : Quasi-peak, AV: Average

* Results = Meter Reading(QP or AV) + Total Loss(LISN Insertion loss + Cable loss)

**"-":The Quasi-peak reading value also meets average limit so it is not necessary to measure with Average detector

* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak

Bandwidth : 10kHz

4. Radiated Emission Test Data

Frequency Range [MHz]	Tested Frequency [MHz]	ANT Pol.	Meter Reading [A] [dBuV/m]	Total Loss [B] [dB]	Antenna Height [Cm]	Turn table Degree [Deg]	Results [A+B] [dBuV/m]	Limits [dBuV/m]	Margin (Limit-Result) [dB]
30 - 230	53.9	V	13.4	7.7	182	180	21.1	30.0	8.9
	58.7	V	17.2	6.8	195	180	24.0		6.0
	62.2	V	17.8	6.4	259	197	24.2		5.8
	77.2	V	18.2	7.6	149	113	25.8		4.2
	80.0	V	17.0	8.2	166	140	25.2		4.8
	81.2	V	14.7	8.5	110	149	23.2		6.8
	94.4	V	13.7	11.1	100	240	24.8		5.2
	98.4	V	14.0	11.6	150	240	25.6		4.4
	100.0	V	15.0	11.9	100	187	26.9		3.1
230 - 1000	435.4	V	6.9	19.8	320	180	26.7	37.0	10.3
	439.1	V	6.2	19.8	101	207	26.0		11.0
1000- 12500	1032.5	V	8.1	27.0	100	240	35.1	74.0	38.9
	2493.5	H	2.4	29.3	100	90	31.7		42.3
	9699.0	H	8.9	25.5	100	150	34.4		39.6

* "<" Means equal or less then 5dB

* Receiving Antenna Mode : **Horizontal, Vertical**

* Results = Meter Reading + Total Loss(Antenna factor + Cable loss)

* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak(Above 1000MHz: Peak)

Resolution Bandwidth : 120kHz(Above 1000MHz: 1MHz)

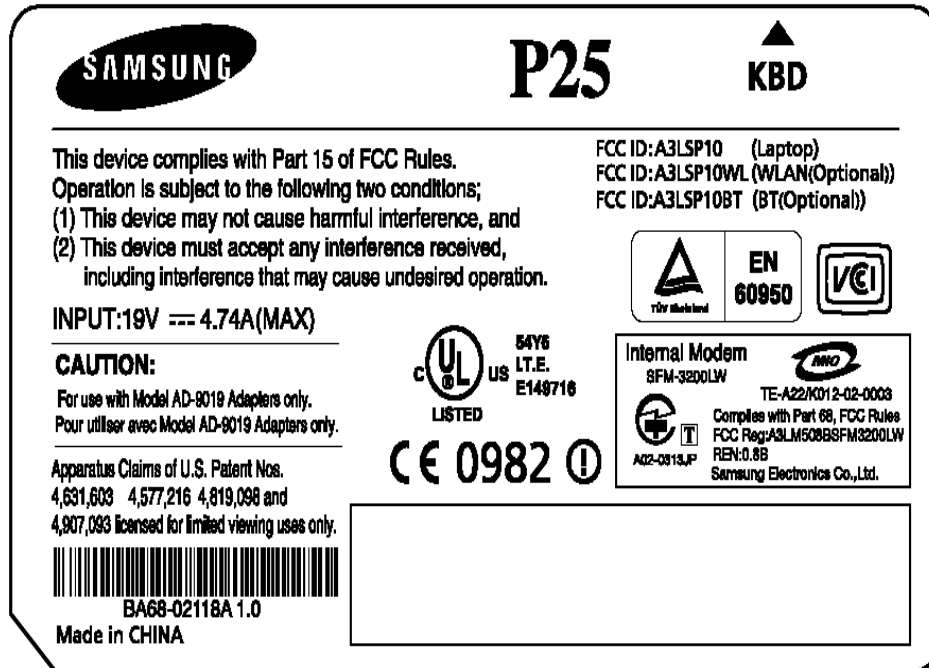
* Test distance

- Below 1000MHz: 10m(Quasi-peak)

- Above 1000MHz: 3m(Peak)

5. FCC Label Configuration and Location

5.1 Label Configuration



5.2 Location of Label



6. Test Equipment Used

Equipment	Model No.	Serial No	Makers.	Next Calibration date
Field strength meter	ESCS30	830876/004	R & S	2004-04-03
	Firmware versions : Main 2.22, OTP 02.01, GRA 02.36			
Test Receiver	ESI26	100010	R&S	2003-05-04
L.I.S.N	3810/2NM	2251	EMCO	2003-05-07
L.I.S.N	ESH3-Z5	831887/0004	R&S	2003-11-18
Bi-Log Antenna	CBL6112B	2804	SCHAFFNER	2003-04-23
Horn Antenna	HF906	100027	R & S	2003-08-19