

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Notebook PC

Model No. : P10

FCC ID : A3LSP10

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All tests necessary to show compliance to the requirements were and these results met the specifications requirement.

Date of test : April 2, 2002 ~ April 10, 2002

Issued Date : April 12, 2002

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NVLAP Code: 200447

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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**

Model & Variant Names : **P10** (Brand Name: Samsung)

Test Report Produced by : Il Kweon, BAE / Test Engineer

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 pre-tested using the below additional components, and we found worst emission level for the components, were selected as the final components for the test.

Component	Brand and Model Name	Remark
CD-ROM	- Samsung, SN-124P	
CD-ROM	- Teac CD-224EC	
CD-RW	- Matsushita, UJDA-340A	
DVD	- Teac DV-28E-B	
DVD_CDRW_Combo	- Samsung, SN-308B	
DVD_CDRW_Combo	- Toshiba, SD-R2102	Worst Case 2
FDD	- Teac, FD-05HG	Worst Case 1
Bluetooth	- SEM, SWB-1000m	Worst Case 1
Wireless LAN	- Agere, MPCI3A-20/R	Worst Case 2
Finger Print	- SGS, ST92163	Worst Case 1
Memory Stick	- Samsung, SMB-2000W	Worst Case 2
Port Replicator	- Samsung, SPR-P10E	Worst Case 1, 2

And then the system was tested with the configuration of (A), (B), (C), (D) below

(A) CPU Pentium IV 1800MHz without Port Replicator, Worst-Case-1.

(B) CPU Pentium IV 1800MHz with Port Replicator, Worst-Case-1.

(C) CPU Pentium IV 1800MHz without Port Replicator, Worst-Case-2.

(D) CPU Pentium IV 1800MHz with Port Replicator, Worst-Case-2.

In each test mode, Finally we found worst case emission that is above (A) configuration with the Worst case components(in the above table). So, the DATA of the maximum(worst case 1) EUT operation was reported.

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

2) Operating Frequency :

1800MHz(CPU Speed), 100MHz(Host Clock), 133MHz(SDRAM Clock), 8M(Finger print)
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
	Floppy Disk Drive A:
	Hard Disk Drive C:
	Flash memory drive D: LPT1 to printer
Data access	Telecommunications (LAN, Modem)

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors
LCD(14.1")	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 1.8GHz	512KB Cache, 400MHz PSB
Memory	Samsung, 512MB, 2 SODIMM, Max 1GB	
Video	Samsung, LCD 14.1"XGA TFT	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	Teac, FD-05HG-7773, 3.5", 1.44MB	
Option	FingerPrint SGS, ST92163, TCS1A, TCT163T1E0011	
MiniPCI	SEM, Bluetooth(CSR), SWB-1000M	
HDD	TOSHIBA, 20GB, MK2017GAP, 2.5"	
LAN	10/100 Base-T Ethernet support, Intel Kinnereth	
Adapter	Astec, AD-8019, AC 100~240V FREE-VOLTAGE	
Input Device	Keyboard, 19mm pitch, 3mmH travel length, Pointing Device, PS/2 Touchpad w/2 button	
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.	

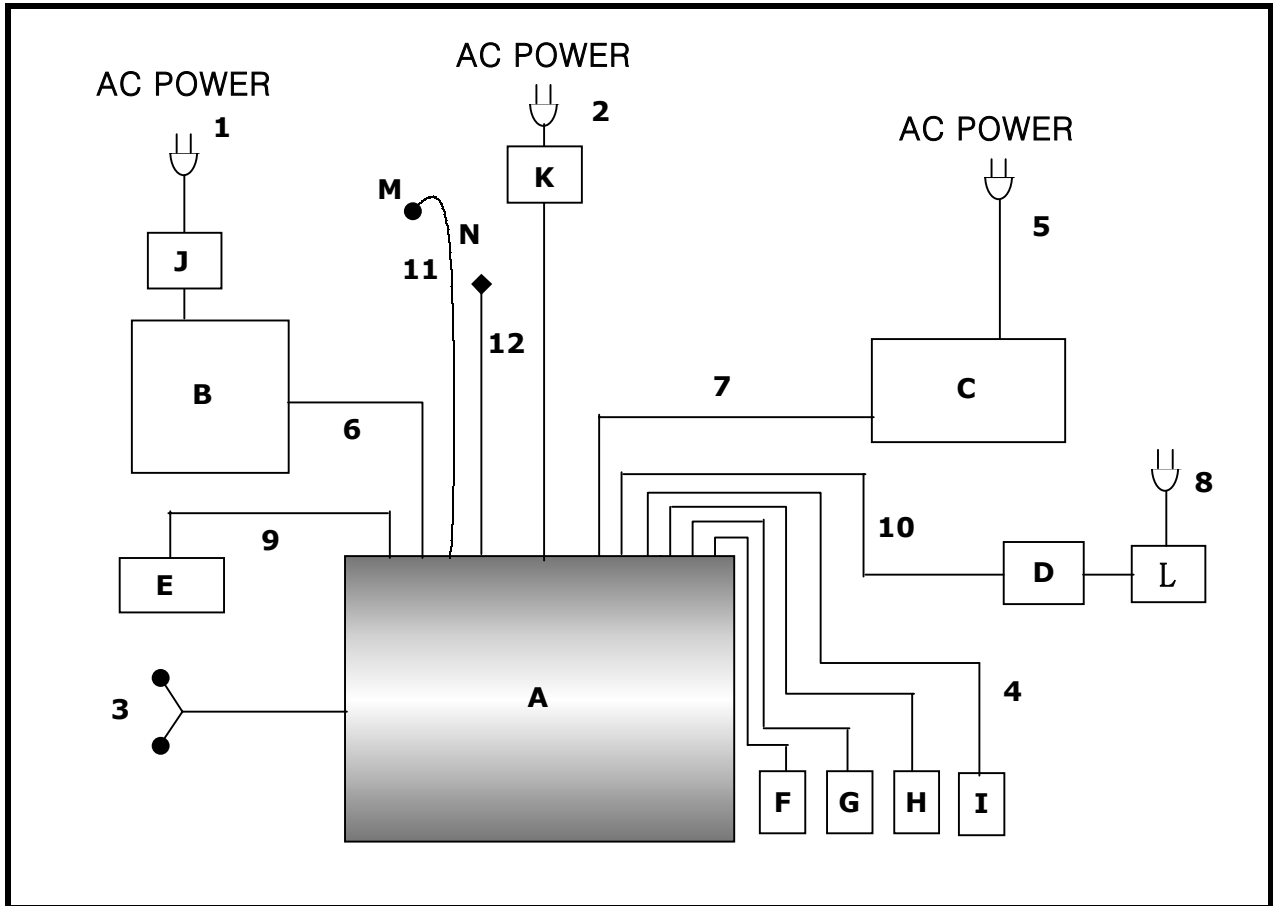
1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	P10	-	Samsung	A3LSP10
B	Monitor	M17D-AN	N106H4JT100838	Samsung	Doc
C	Printer	LQ-580H	CG2Y0014508	EPSON	Doc
D	TV	CCM052C	54059495	COMMAX	-
E	Digital Camcorder	DCR-PC110	1091827	SONY	-
F	USB Mouse	M-U48a	LZE01604737	LOGITECH	JNZ211360
G	USB Mouse	M-U48a	LZP12500058	LOGITECH	JNZ211360
H	Serial Mouse	M-M35	LZA71155447	LOGITECH	DZL210365
I	PS/2 Mouse	M-S34	LZA711505175	LOGITECH	DZL211029
J	Adapter	AD-4914N	C020280018	Samsung	-
K	Adapter	AD-8019	B3373D01N001B	ASTEC	-
L	Adapter	SA70-3105	6500175	GATEWAY	-
M	Lan Cable	-	-	-	-
N	Modem Cable	-	-	-	-
O	Ear Phone	-	-	-	-

1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	AC Power Cable	1.5	N	
2	AC Power Cable	1.5	N	
3	Earphone Cable	1.0	N	
4	Mouse Cable	1.5	N	
5	AC Power Cable	1.5	N	
6	Monitor Cable	1.6	Y	
7	Printer Cable	1.5	Y	
8	AC Power Cable	1.5	N	
9	Camcorder Cable	1.8	N	
10	TV Cable	1.2	N	
11	LAN Cable	5.0	N	
12	Modem Cable	1.7	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:98856) 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)



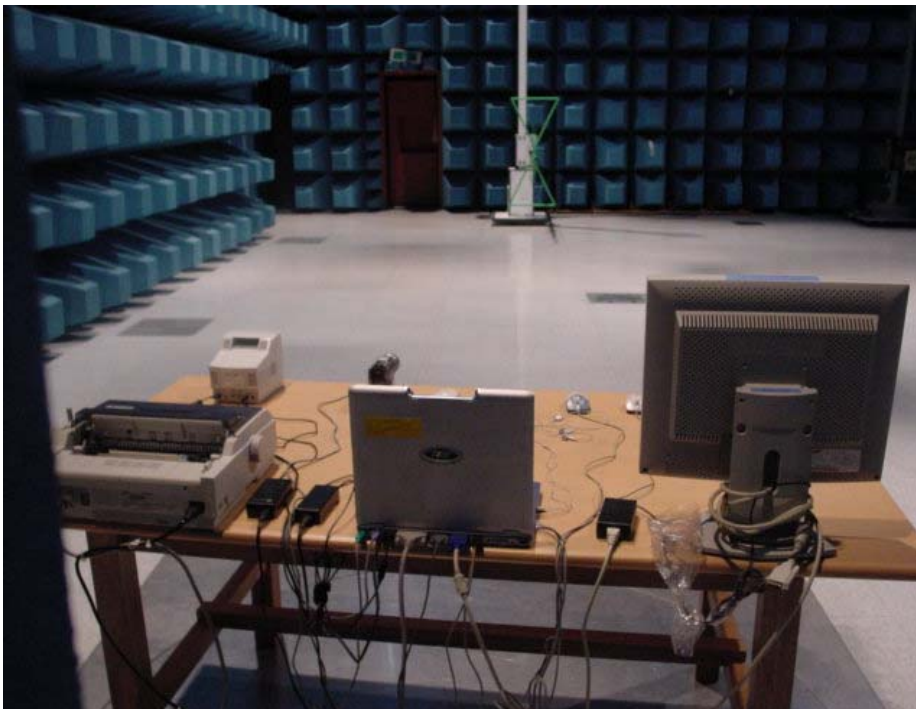
2)Conduction(Rear View)



3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	22C	23C
Humidity [%]	38	38
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	-

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]	
0.372	43.2	-	0.2	43.4	-	58.5	48.5	15.0	-
0.384	44.0	-	0.2	44.2	-	58.2	48.2	14.0	-
0.392	44.2	-	0.1	44.3	-	58.0	48.0	13.8	-
0.400	43.7	-	0.1	43.8	-	57.9	47.9	14.0	-
0.446	43.4	-	0.1	43.5	-	56.9	46.9	13.4	-
0.454	43.4	-	0.1	43.5	-	56.8	46.8	13.3	-
0.509	34.9	-	0.2	35.1	-	56.0	46.0	20.9	-
0.525	33.1	-	0.2	33.3	-	56.0	46.0	22.7	-
0.763	34.2	-	0.2	34.4	-	56.0	46.0	21.7	-
0.821	33.9	-	0.1	34.0	-	56.0	46.0	22.0	-
2.048	43.5	-	0.1	43.6	-	56.0	46.0	12.4	-
2.970	24.2	-	0.1	24.3	-	56.0	46.0	31.7	-
5.450	28.8	-	-0.1	28.7	-	60.0	50.0	31.3	-
6.140	29.4	-	0.1	29.5	-	60.0	50.0	30.5	-
7.910	30.9	-	0.6	31.5	-	60.0	50.0	28.5	-
10.230	30.7	-	1.2	31.9	-	60.0	50.0	28.1	-
14.330	27.4	-	1.4	28.8	-	60.0	50.0	31.2	-
22.120	26.9	-	0.8	27.7	-	60.0	50.0	32.3	-

* 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	30.6	V	7.1	19.0	121	267	26.1	30.0	3.9
	35.0	V	10.2	16.8	117	245	27.0	30.0	3.0
	53.5	V	15.1	8.4	102	235	23.5	30.0	6.5
	66.7	V	16.9	6.7	131	200	23.6	30.0	6.4
	135.9	V	13.0	13.2	172	275	26.2	30.0	3.8
	180.9	V	14.0	11.5	125	217	25.5	30.0	4.5
230 - 1000	278.6	V	14.4	15.8	137	197	30.2	37.0	6.8
	364.5	V	13.8	18.8	101	0	32.6	37.0	4.4
	433.3	V	9.4	20.9	324	333	30.3	37.0	6.7
	479.5	V	9.0	21.9	325	341	30.9	37.0	6.1
	757.2	H	7.0	25.8	339	320	32.8	37.0	4.2
	999.8	V	5.4	28.0	100	315	33.4	37.0	3.6
1000 - 9000	1838.0	H	17.2(pk)	32.3	100	0	49.5	74.0	24.5
	3605.0	H	16.4(pk)	42.0	100	0	58.4	74.0	15.6

* "<" 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.	Makers.	Serial No	Calibration Last calibration and Interval
Spectrum analyzer	8566B	H.P	2611A02672	01/07/06, 12Months
	Firmware versions : Rev.29.9.86			
Quasi-peak adapter	85650A	H.P	2521A00687	01/10/09, 12Months
RF Preselector	85685A	H.P	3506A01500	01/10/10, 12Months
Field strength meter	ESVP	R & S	860688/015	02/02/28, 12Months
Field strength meter	ESI 26	R & S	832692/002	01/12/22, 12Months
	Firmware versions : BIOS 3.3, Analyzer 2.09.2			
Bi-Log Antenna	CBL6112B	SCHAFFNER	2767	01/05/23, 12Months
Double Ridged Guide Antenna	3115	EMCO	9505-4441	01/11/13, 12Months
Turn Table	BS412	HD	-	N/A
Antenna Mast	MA240	HD	40/602	N/A
Plotter	7550B	HP	3050A19010	N/A
Field strength meter	ESCS30	R & S	839809/002	01/ 06/18, 12Months
	Firmware versions : Main 1.08, OTP 02.01, GRA 02.03			
LISN	ESH3-Z5	R & S	847265/028	01/08/24, 12Months