

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Notebook PC
Model No. : P30, T2200

FCC ID : A3LSP30

1. This test reports shall not be reproduced except in full, without the written approval of SEC EMC Testing laboratory.
2. This test reports does not constitute an endorsement by NIST/NVLAP or U.S Government.
3. This test report is to certify that the tested device properly complies with the requirements of FCC Rules and Regulations Part 15 Subpart B Unintentional Radiators.
All tests necessary to show compliance to the requirements were and these results met the specifications requirement.
4. That data in this report are traceable to National or International Standards.

Date of test : Oct 31, 2003

Issued Date : Nov 3, 2003

Tested by:

Kyeong Dong, KIM / Test Engineer

Reviewed by:

No Cheon, PARK / Manager of EMC Lab.

Authorized by:

Kyu Baek, CHUNG / Chief of EMC Lab.

This laboratory is registered by the NIST/NVLAP, U.S.A.
The test reported herein have been performed in accordance with its terms of registration.



NVLAP Code: 200623-

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
- 2.4 Measurement Uncertainty

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 : **A3LSP30**

Project Name : **Corona**

Model & Variant Names : **P30** (Brand Name: Samsung)
T2200 (Brand Name: Micronpc)

Manufacturer : Samsung Electronics Co., Ltd.

Test Report Produced by : Kyeong Dong, KIM / 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 tested using the below configurations of (A), (B), (C), (D), (E), and (F).

- (A) CPU 1600MHz, ODEM-333, ATI M9-CSP64, AUO LCD 15.0" SXGA+
- (B) CPU 1700MHz, ODEM-333, ATI M9-CSP64, AUO LCD 15.0" XGA
- (C) CPU 1400MHz, ODEM-266, ATI M9+32CL, AUO LCD 14.1" XGA
- (D) CPU 1500MHz, ODEM-266, ATI M9-CSP64, SEC LCD 15.0" XGA
- (E) CPU 1700MHz, ODEM-333, ATI M9-CSP64, SEC LCD 15.0" SXGA+**
- (F) CPU 1500MHz, ODEM-266, ATI M9+32CL, SEC LCD 14.1" XGA

This report is for above **(E)** configuration with the worst case component.

So the data of the maximum EUT operation was reported.

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

2) Operating Frequency :

1700MHz for CPU speed, 100MHz for CPU clock, 66MHz for the MCH, 33MHz for all PCI clocks, 27MHz for ATI Video, 66 MHz for ICH4-M, 32.768 kHz XTAL for ICH4-M real time clock, 14.318MHz for Clock Generator, 24.576MHz XTAL for SIGMATEL_9750TLC5 Audio Codec, 24.576MHz XTAL for R5C593 1394/PCMCIA/Memory stick Controller, 25MHz XTAL for LF8423 LAN Controller, 8MHz XTAL for MICOM

3) Description of Testing operating mode

The EUT exercise program used during radiated and conducted emissions testing was the Samsung Standardized Emission Test Program for Windows. During the certification test, the LCD panel was open and video signals were simultaneously active on the LCD panel, the S-video output port, and the VGA port simultaneously. All external peripherals were connected to the I/O ports on the advanced port replicator unless specified below. The system was configured for testing in a typical fashion that a customer would normally use, and was tested while in an automated non-attendant mode. The program repetitively sends a screen of H's to the display, reads and writes to the hard drive, and writes to all serial, parallel ports and modem.

Music is played from the CD player to the Line-In jack and ported out to the headphones.

As the keyboard, microphone, and mouse are strictly input devices, no data was transmitted to them during the performance of the emissions testing. They were however, continuously scanned for data input activity.

A hard drive from the remote PC was mapped to the EUT and a data file was read and written over the network connection to provide continuous activity. The EUT was connected to a remote Final testing was performed at 100 Mbps operation.

4) Tested Resolution :

This section provides details of the equipment under test (EUT) and the peripheral assemblies attached during radiated, conducted emissions and immunity testing.

For the 15.0" panel the SXGA+ resolution was set to its maximum value of 1400 x 1050. and VGA Monitor was set to the resolution of 1280 x 1024.

5) Assemble Parts

Item	Specification	Remark
CPU	Intel Banias CPU 1700MHz 479pin uFCBGA 400 MHz system bus On-die 1MB L2 cache	
Main Memory	512MB DDR type	
Chip set and Video	ODEM-333, ATI M9-CSP64, Integrated Graphic memory 64MB	
Flat Panel Display	SEC, LCD 15.0", LTN150P4-L02, SXGA+ 1400x1050	
HDD	Hitachi, 80G, IC25N080ATMR04, 2.5"	
PCMCIA	SanDisk, 128MB CompactFlash Flash Memory	
ODD Drive	SEC, CD-RW/DVD Drive, SN-324F/MMA CD 24X, DVD 8X, CDRW 4X Speed	
AC Adapter	Acbel, API1AD02, 19V DC, 60-Watts, 2 pin	100V-240V, AD-6019
MODEM	ActionTec, MD560LMI-2, 56KBPS, MDC type	56Kbps, MDC
LAN	Integrated 10/100Base T Ethernet	
Wireless LAN	Intel, Calexico 802.11b, WM3B2100, 11MBPS	
Input Devices	Keyboard, 19mm pitch, 2.4mmH travel length Pointing Device, PS/2 Touchpad w/2 button, Finger Print	
Memory Stick	Ricoh, R5C593	
Ports	2 USB, PS/2, RJ-11, RJ-45, DC IN,EXT. MONITOR, S-VHS TV-out,MIC-IN,HEADPHONE-OUT, Card bus slot. Port Replicator, 1394, IR, Etc	

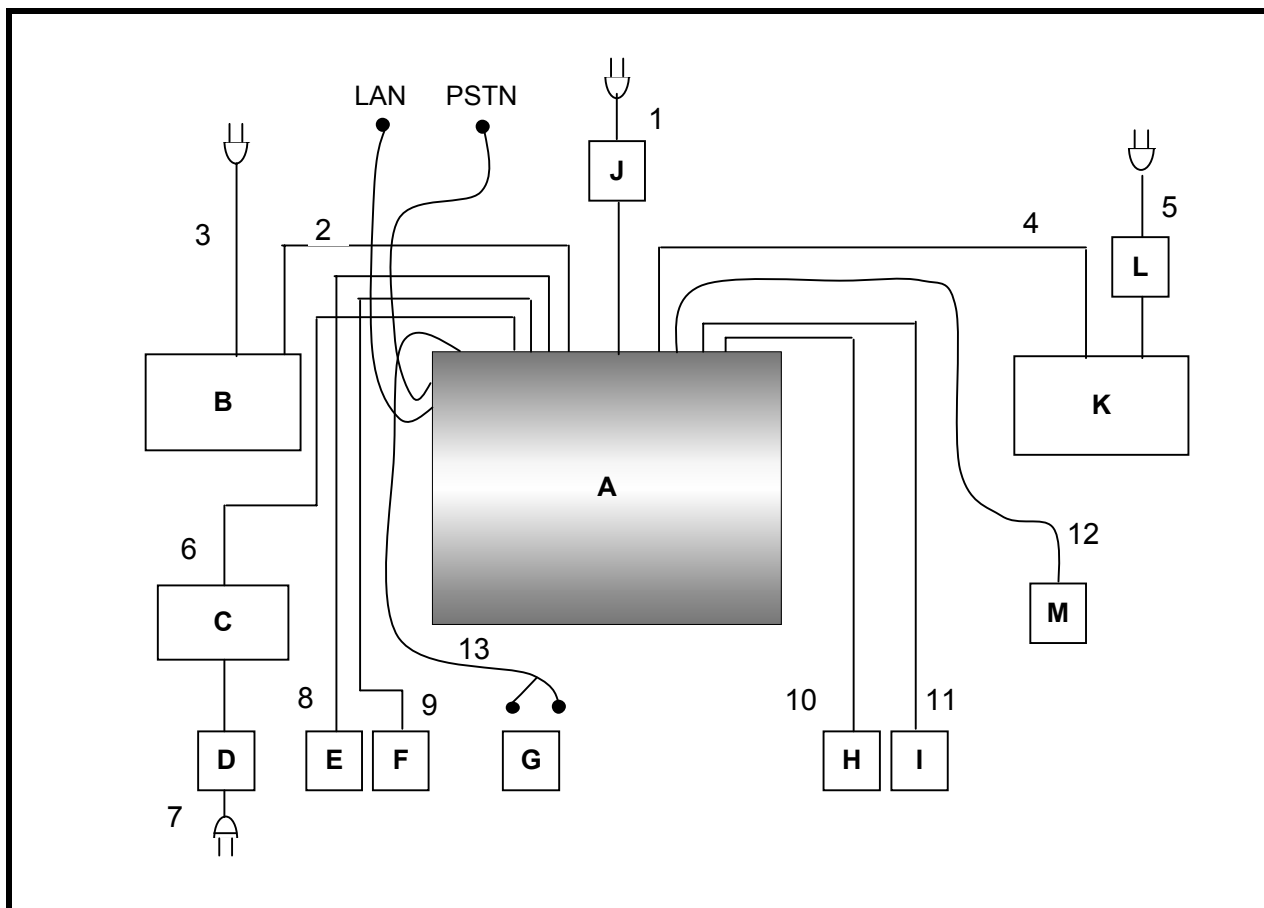
1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	P30	-	Samsung	A3LSP30
B	Printer	LQ-580H	CG2Y014505	EPSON	Support
C	TV	CCM-054TE	5411209 8613	Commax	Support
D	AC Adapter	YK-17130K	RF-18	Commax	For TV
E	Joy stick	X04-97602	3760200730535	Microsoft	Support
F	Joy stick	X04-97602	3760200730498	Microsoft	Support
G	Earphone	-	-	Samsung	Support
H	Serial mouse	M-M35	LZA71452614	Logitech	DZL210365
I	PS/2 Mouse	Scroll Mouse P801	02161489	Samsung	FSUGMZFT
J	AC Adapter	AP11AD02	100094	Acbel Electron	For E.U.T
K	TFT-LCD Monitor	Sync Master 192B	-	Samsung	DoC
L	AC Adapter	AP0414-UV	0304014410AA	Anam Instrument	For TFT-LCD Monitor
M	Camcorder	DCR-PC110	1091827	SONY	Support

1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	AC power cable	1.5	N	Notebook PC
2	Printer Cable	1.8	Y	-
3	AC power cable	1.5	N	Printer
4	Monitor cable	1.7	Y	-
5	AC power cable	1.5	N	TFT-LCD Monitor
6	TV cable	1.5	N	-
7	AC power cable	1.5	N	TV
8	USB cable	1.7	N	-
9	USB cable	1.7	N	-
10	Serial mouse cable	1.8	N	-
11	PS/2 mouse cable	1.8	N	-
12	1394 cable	1.5	Y	-
13	Earphone cable	1.5	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)



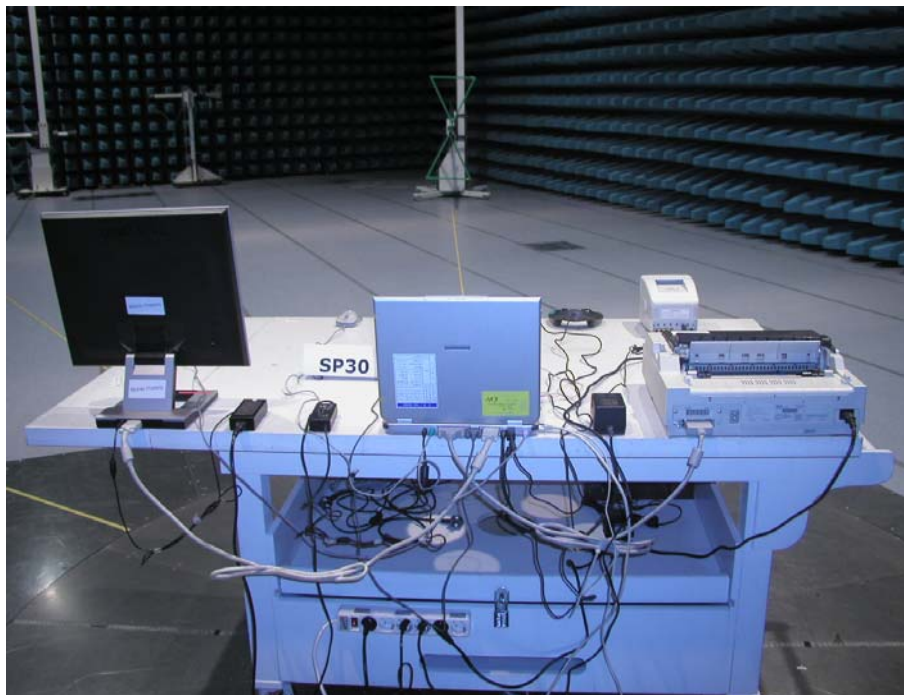
2)Conduction(Rear View)



3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	25.5	19
Humidity [%]	44	65
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. 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	Average	1MHz	-

2.3 Measurement Uncertainty

Measurement Uncertainty according to NAMAS Publication NIS81 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]	
0.162	53.8	-	0.6	54.4	-	65.4	55.4	11.0	-
0.170	52.7	-	0.6	53.3	-	65.0	55.0	11.7	-
0.185	50.9	-	0.6	51.5	-	64.3	54.3	12.7	-
0.216	48.3	-	0.6	48.9	-	63.0	53.0	14.0	-
0.240	45.5	-	0.6	46.1	-	62.1	52.1	16.0	-
0.287	42.1	-	0.5	42.6	-	60.6	50.6	18.0	-
0.505	34.3	-	0.6	34.9	-	56.0	46.0	21.2	-
0.720	30.7	-	0.5	31.1	-	56.0	46.0	24.9	-
1.084	32.2	-	0.6	32.8	-	56.0	46.0	23.2	-
1.373	32.5	-	0.6	33.1	-	56.0	46.0	22.9	-
2.455	24.8	-	0.5	25.3	-	56.0	46.0	30.7	-
3.107	22.4	-	0.5	22.9	-	56.0	46.0	33.1	-
5.119	6.5	-	0.8	7.3	-	60.0	50.0	52.8	-
8.939	26.4	-	1.1	27.5	-	60.0	50.0	32.5	-
16.162	35.3	-	1.5	36.8	-	60.0	50.0	23.2	-
19.709	38.7	-	1.5	40.2	-	60.0	50.0	19.8	-
21.666	37.6	-	1.6	39.2	-	60.0	50.0	20.8	-
23.127	39.9	-	1.6	41.6	-	60.0	50.0	18.5	-

* 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								30.0	
	33.17	V	9.4	17.4	100	95	26.8		3.2
	50.45	V	16.4	8.8	250	278	25.2		4.8
	66.31	V	15.9	6.3	221	330	22.2		7.8
	73.74	V	12.5	7.0	389	290	19.5		10.5
	106.72	H	8.5	12.8	274	89	21.3		8.7
	146.65	V	7.5	12.0	108	120	19.5		10.5
	184.33	V	14.6	10.4	100	90	25.0		5.0
230 - 1000	284.81	H	1.7	15.4	400	25	17.1	37.0	19.9
	418.57	V	10.5	19.9	210	280	30.4		6.6
	466.48	V	4.2	20.4	330	135	24.6		12.4
1000 - 8500	1387.0	V	20.1	16.9	100	50	37.0	54.0	17.0

* "<" Means equal or less than 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)

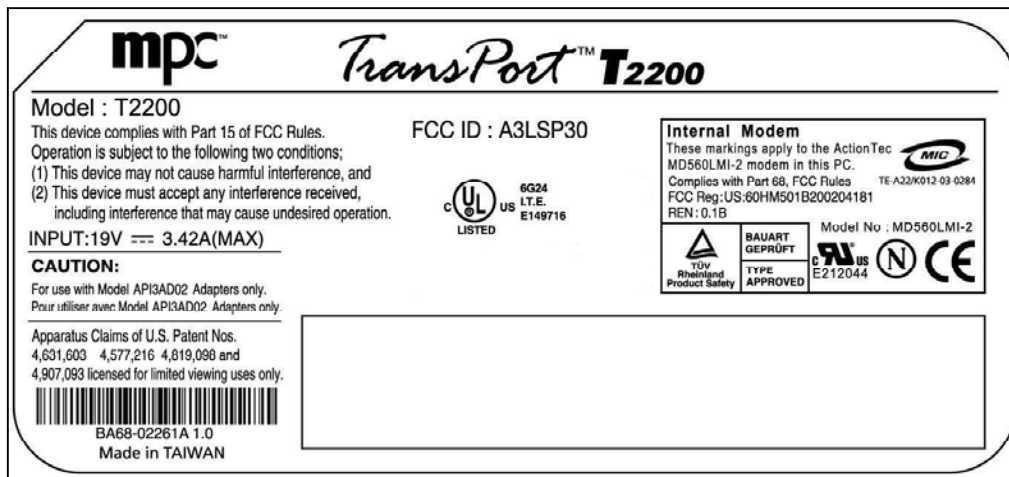
* Test distance

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

- Above 1000MHz: 3m(Average)

5. FCC Label Configuration and Location

5.1, 5.2 Label and Label Location



6. Test Equipment Used

Equipment	Model No.	Serial No	Makers.	Next Calibration date
Field strength meter	ESCS30	830986/004	R & S	2004-04-03
	Firmware versions : Main 2.22, OTP 02.01, GRA 02.36			
Test Receiver	ESI26	100010	R&S	2004-05-08
L.I.S.N	3810/2NM	2251	EMCO	2004-02-07
L.I.S.N	ESH3-Z5	831886/006	R&S	2004-02-07
Bi-Log Antenna	CBL6112B	2805	SCHAFFNER	2004-04-12
Horn Antenna	CBL6112B	2805	SCHAFFNER	2004-04-02