

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Notebook PC
Model No. : SENS Pro 900

FCC ID : A3LS900

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

Date of test : August 27, 2001 ~ August 29, 2001

Issued Date : September 5, 2001

Tested by:

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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.
CS Management Center EMC Test Laboratory
Tel.: +81-(0)31-200-2135 Fax.: +81-(0)31-200-2189

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

Kind of Product : **Notebook PC**

FCC ID : **A3LS900**

Project Name : **Matrix II**

Model & Variant Names : **SENS Pro 900** (Brand Name: SAMSUNG)
TransPort XT2 (Brand Name: Micronpc)
GT9000 Series (Brand Name: SAMSUNG)
GT9000 Series (Brand Name: RM)

Test Report Produced by : Jay Yong, PARK / Test Eng.

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.

Comparing the test results with Docking Station & without Docking Station, the test results without Docking Station was found the worst case emissions. And so the final testing was performed without Docking Station. And the system was tested with

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

2) Operating Frequency :

1200MHz(CPU Speed), 133MHz(Host Clock), 133MHz(SDRAM Clock),
33.3MHz(PCI Clock), 14.318MHz(Ref. OSC), 49.152MHz(Audio Clock), 25M(Network)
12.288MHz(Audio Bit Clock), 24.576MHz(Audio C24), 66.6MHz(Hub Clock)
10MHz(Micom Clock), 48MHz(USB Clock), 65MHz(LCD Clock)

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
"H" Pattern display & Read / Write	LCD 14.1" + Ext. CRT Monitor See 3-1)
	LCD 14.1" + TV Monitor
	LPT1 to Printer
File Reading	Hard Disk Drive
	File reading form Flash Memory
	File reading form DVD Combo
Network	Media Player Playing through Video CD in
	Network Server
Audio Output	Audio out to Speaker,
	Audio out to Digital Speaker,
	Line input of Cassette Player

3-1) We found worst case display that the both of LCD and Ext CRT monitor.

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors
LCD(14.1")	1024 X 768	60Hz	32bits
Ext. Monitor	1024 X 768	85Hz	32bits
TV Monitor	640 X 480	60Hz	16bits

5) Assemble Parts

Item	Specification	Remark
CPU	Mobile Pentium III with SpeedStep Technology, Intel Tualatin 1.2 GHz (uFCPGA2) 133MHz PSB, Streaming SIMD support, 512KB L2 Cache	PIII 1.2 GHz
Main Memory (RAM)	256MB × 2 EA = 512MB SDRAM, Samsung support PC133 only, max of 1.0GB of system memory	PC133S-333-542-B1
Main Board	Matrix-II Main B'D, Samsung Rev : 1.0 PR	BA92-01302A SN : S240AYAR6E002
Graphics	Internal Graphics Device, 830M, Intel high Performance 3D setup and render engine optimized for HDTV/DVD/PC-VCR Direct support for a single Rambus direct channel 350 MHz Intergrated 24 bit RAMDAC DOV support	GMCH-M
Network	10/100 Base-T ,Kinnereth, Intel	Kinnereth
Modem	AC-97 Compliant Modem Controller, Samsung Software Modem	SFM-3100LW
LCD	14.1" XGA Color Active Matrix TFT LCD, Samsung up to 1024 X 768 Resolution	LTN141XF-L03 SN : 3A1000711E
HDD	Ultra DMA33 Support, IBM IBM 2.5",9.5/12.7mm, 30GB	DJSA-230 SN : 46M040728
Audio DJ	Support Volume up/down, LCD icon display, O2Micro UDMA , Maintains High Quality sound.	OZ165
Touch Pad	65 x 49 x 2.82, Additional pinouts for scroll up/down Synaptics	TM41PUA-351
DVD Combo Drive	Swappable, 3.5", 12.7mm Height, Toshiba CD 24X / DVD 8X / RW 4X Speed	SD-C2402 SN : 08GA115842
Battery	Smart Li-Ion 18650 8Cell, Samsung	SSB-900KLS
AC Adapter	AC100-240V Free Voltage, 60W, Samsung	AD-6019
IEEE 1394	Universal PCI interface, Texas Instrument	TSB43AB22
Mini-PCI	IEEE 802.11b, 11Mbps, Agere Mini PCI Type IIIA, Intergrated two antennas 400 Mbps, Serial ROM Interface	MPCI3A-20 SN : 38920993

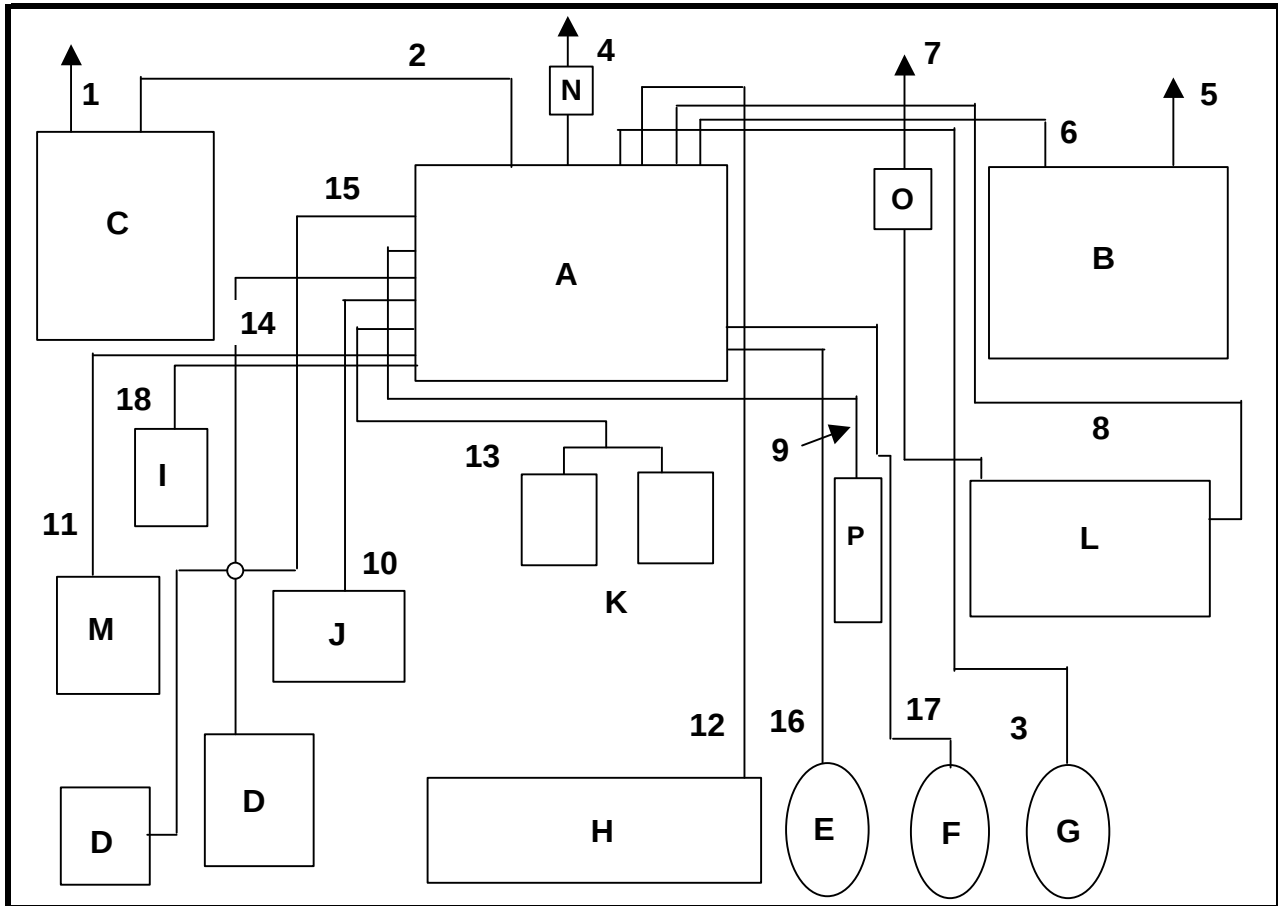
1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	S900	DR600032	Samsung	A3LS900
B	TV	SAM-14P	961206793	Samsung	-
C	External Monitor	109P	TY000009711202	PHILIPS	DOC
D	Digital Speaker	DigitalBA735	7001332	Boston	-
E	USB Mouse	M-U48a	LZE01604737	LOGITECH	JNZ211360
F	USB Mouse	M-U48a	LZC10703957	LOGITECH	JNZ211360
G	Serial Mouse	M-M35	LZA71155447	LOGITECH	-
H	Keyboard	SKR-1083	9030431301	Sejin	DOC
I	Digital Camcorder	DCR-PC110	1091827	Sony	-
J	Audio Device	MY-250	160KB00620	Samsung	-
K	Speaker	-	-	-	-
L	Printer	K10158	CLG000800377	Canon	DOC
M	Telephone	SSP-2300	042051841	Samsung	-
N	AC Adapter	AD-601P	BA44-00046A	Samsung	-
O	AC Adapter	K30088	CLG000800377	Canon	-
P	Microphone	YMC-2511	-	Samsung	-

1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	Power cable for Monitor	1.82	N	AC Mains
2	Monitor cable	1.85	Y	
3	Serial Mouse	1.82	N	
4	Power cable for EUT	3.52	N	
5	Power cable for TV	1.5	N	
6	TV RCA cable	1.5	Y	
7	Power cable for Printer	1.85	N	
8	Printer Cable	1.6	Y	
9	Microphone Cable	5	Y	
10	Audio Device Cable	1.9	N	
11	Telephone Cable	1.9	N	
12	PS/2 Keyboard Cable	1.8	N	
13	Speaker cable	2	N	
14	Digital Speaker cable 1	2	N	
15	Digital Speaker cable 2	2.35	N	
16	USB Mouse cable	1.8	N	
17	USB Mouse cable	1.8	N	
18	SPDIF Cable	1.8	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

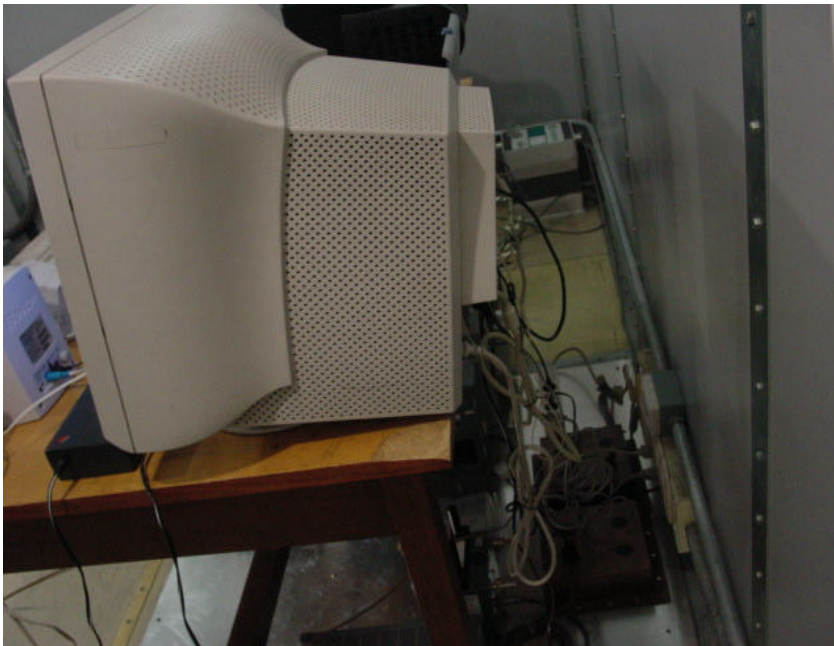
2.1 Configuration of Radiated and Conducted Interference Measurement

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

1)Conduction(Front View)



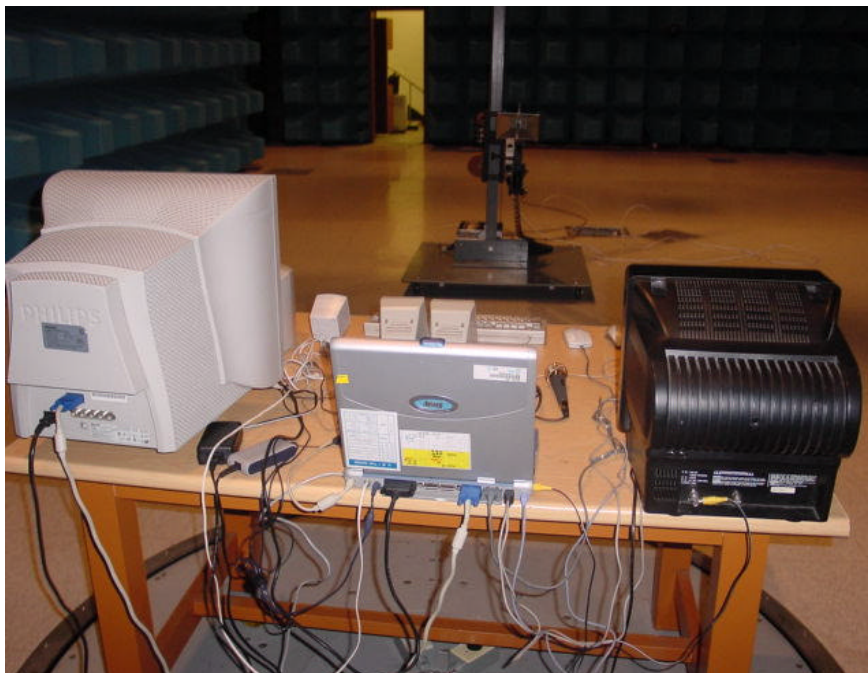
2)Conduction(Rear View)



3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Enviroment

	Conduction	Radiation
Temperature [C] :	23C	23C
Humidity [%] :	63C	63C
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 9kHz, 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 2000 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	-

3. Conducted Emission Test Data

+ 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]	
0.192	49.9	31.4	0.1	50.0	31.5	63.9	53.9	14.0	22.5
0.199	44.4	46.6	0.1	44.5	46.7	63.7	53.7	19.2	7.0
0.255	43.8	39.7	0.1	43.9	39.8	61.6	51.6	17.7	11.8
0.318	37.5	34.3	0.1	37.6	34.4	59.8	49.8	22.2	15.4
0.388	31.3	28.4	0.1	31.4	28.5	58.1	48.1	26.7	19.6
0.451	35.4	34.3	0.2	35.6	34.5	56.9	46.9	21.3	12.4
0.577	32.6	31.2	0.2	32.8	31.4	56.0	46.0	23.2	14.6
1.025	25.9	23.5	0.2	26.1	23.7	56.0	46.0	29.9	22.3
2.754	28.7	26.1	0.1	28.8	26.2	56.0	46.0	27.2	19.8
3.524	35.6	33.6	0.1	35.7	33.7	56.0	46.0	20.3	12.3
3.846	37.7	34.0	0.1	37.8	34.1	56.0	46.0	18.2	11.9
4.742	33.3	29.5	0.1	33.4	29.6	56.0	46.0	22.6	16.4
7.563	39.4	33.8	0.1	39.5	33.9	60.0	50.0	20.5	16.1
7.941	39.1	32.2	0.1	39.2	32.3	60.0	50.0	20.8	17.7
8.452	36.8	36.3	0.4	37.2	36.7	60.0	50.0	22.8	13.3
7.677	33.6	37.1	0.8	34.4	37.9	60.0	50.0	25.6	12.1
10.503	35.6	32.8	1.5	37.1	34.3	60.0	50.0	22.9	15.7
28.066	32.3	31.3	1.0	33.3	32.3	60.0	50.0	26.7	17.7

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

* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak

Bandwidth : 9kHz

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 at 10m [dBuV/m]	Margin (Limit-Result) [dB]
30 - 230	33.20	V	7.3	19.3	103	22	26.6	30.0	3.4
	37.70	V	7.1	16.3	101	91	23.4		6.6
	89.20	H	10.8	8.0	400	162	18.8		11.2
	132.80	V	10.5	8.7	112	347	19.2		10.8
	160.20	H	5.7	5.4	316	100	11.1		18.9
	197.90	V	7.1	11.6	104	100	18.7		11.3
230 - 1000	322.40	V	11.7	16.8	104	15	28.5	37.0	8.5
	337.40	V	11.0	17.0	107	20	28.0		9.0
	420.88	H	4.0	19.2	206	224	23.2		13.8
	456.30	H	8.1	20.0	200	187	28.1		8.9
	480.70	H	7.7	21.1	185	200	28.8		8.2
	516.00	H	8.4	22.2	150	190	30.6		6.4

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 at 3m [dBuV/m]	Margin (Limit-Result) [dB]
1000 ~ 6000	1319	H	3.87	29.61	150	70	33.48	54.00	20.52
	2199	H	2.80	32.30	110	60	35.10	54.00	18.90
	2779	H	2.21	38.85	120	65	41.06	54.00	12.94
	3622	H	1.16	41.20	117	57	42.36	54.00	11.64
	4439	H	1.00	43.40	115	55	44.40	54.00	9.60
	5450	H	1.20	47.11	113	54	48.31	54.00	5.69

* "<" 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: Average)

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

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	Calibration Last calibration and Interval
Spectrum analyzer	8566B	3340A21744	H.P	01/ 3/20, 12Months
	Firmware versions : Rev.29.9.86			
Quasi-peak adapter	85650A	2521A00687	H.P	00/10/10, 12Months
RF Preselector	85685A	2602A00224	H.P	00/10/10, 12Months
Field strength meter	ESCS30	839809/022	R & S	01/ 6/18, 12Months
	Firmware versions : Main 1.08, OTP 02.01, GRA 02.03			
Field strength meter	ESI 26	832692/002	R & S	01/06/18, 12Months
	Firmware versions : BIOS 3.3, Analyzer 2.09.2			
L.I.S.N	3825-2	9208-1981	EMCO	01/03/23, 12Months
Double Ridged Guide Antenna	3115	9505-4441	EMCO	01/06/03, 12Months
Biconilog Antenna	3142	1237	EMCO	01/ 0/02, 12Months