SAMSUNG ELECTRONICS

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Note Book Computer
Model No. : SENS Pro 760

FCC ID : A3LS760

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Date of test : October 13, 2000

Issued Date : October 31, 2000

Tested by: Choon Kil Kim
Choon Kil, KIM / Test Engineer

Reviewed by: S. K. Cha
Seung Kyu, CHA / Manager of EMC Lab

Authorised by: T. J. Shin
Taek Jeong, Shin / Chief of EMC Lab

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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
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Full Address : 416 Maetan 3 Dong, Paldal-Ku,
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Kind of Product : **Note Book Computer**

Model Name : **SENS Pro 760** (Brand Name: SAMSUNG)
NV5000 Series (Brand Name: SAMSUNG)

Customer Ref. : Computer Div.

Test Report Produced by : Choon Kil, Kim / Test Eng.

1.1 Product Description

1) Operating Frequency :

500MHz(CPU Speed), 100MHz(Host Clock), 100MHz(SDRAM Clock)
33.3MHz(PCI Clock), 14.318MHz(Ref. OSC), 49.512MHz(Audio Clock)
100MHz(Video Memory Clock), 12.288MHz(Audio Bit Clock), 24.576MHz(Audio C24)
16MHz(Micom Clock), 48MHz(USB Clock), 65MHz(LCD Clock)

2) 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.

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
"H" Pattern display & Read / Write	LCD Screen
	CRT Monitor
	FDD, Hard disk drive & CD-ROM drive
	LPT1 to Printer
Network	Media Player Playing through Video CD in Network Server
Audio Output	Audio out to Speaker

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors
LCD(12.1")	1024 X 768	60Hz	32bits
Ext. Monitor	1024 X 768	85Hz	32bits

5) Assemble Parts

Item	Specification	Remark
CPU	Intel Mobile Pentium-III 500MHz	BGA2 Package FSB 100MHz support L2 cache: 256KB(PentiumIII)
Main Memory (RAM)	SAMSUNG, 256MB	
Video Controller	2x Savage/IX-8(AGP) Support	AGP 2x Mode support Embedded 8BM SDRAM 3D Hardware Accelerator Support
Video Display	SEC, LCD 12.1": XGA TFT LCD	TFT XGA+(12.1")
FDD	Citizen,11 mm Height, 3.5", 1.44MB	2MB Mode support
HDD	None-Removable, UDMA(9.5mmH)	2.5", E-IDE I/F,PIO Mode-4,UDMA/33 mode
CD-ROM		3.5"/5.25", 12.7mm Height,680MB E-IDE I/F, PIO Mode-4 support, 24X
AC Adapter	SEC, 42-Watts, AC 90~240V FREE-VOLTAGE	AD-4212
MODEM/LAN	3COM, Mini-PCI MODEM/LAN Combo,	56KBPS V.90 DSP Modem and 10/100M Base T Ethernet support
Keyboard	80Keys UK-81Keys, Japanese-82Keys	Pitch 18.5mm
Docking	SEC, SSD-760E,K	
MP3 Player	32MB Flash Memory, MP3, WMA	
Ports	1 SERIAL (9 PIN) 1 PARALLEL (25 PIN) 1 EXT. MONITOR (15 PIN) 1 PS/2 (6 PIN) 1 TV-out (Composite) 1 100Pin Expention Connector 1 USB (4 PIN) 1 FIR 1 MIC-IN 1 LINE-IN 1 HEADPHONE-OUT 1 MODEM(RJ11) 1 LAN(RJ45) DC-IN	

1.2 Tested System Details

	Model	Description	Cable description	Remarks
(1)	Samsung Electronics M/N : SENS Pro 760	Personal Computer S/N : -	-	EUT
(2)	Samsung Electronics M/N : CKG7507L	External Monitor S/N : -	Unshielded AC Power Cable Shielded Video Cable	
(3)	LOGITECH M/N : M-M35	Serial Mouse S/N : LZA71452614	Shielded Mouse Cable	
(4)	LOGITECH M/N : M-U48a	USB Mouse S/N :LZE94457296	Shielded Mouse Cable	
(5)	H.P M/N : 2225C+	Inkjet Printer S/N : 2825S1773	Unshielded AC Power Cable Shielded Printer Cable	
(6)	LOGITECH M/N : M-U48a	USB Mouse S/N : LZE94457296	Shielded Mouse Cable	
(7)	GATEWAY M/N :MOSXUB	USB Mouse S/N : 3872F105	Shielded Mouse Cable	
(8)	Samsung Electronics M/N : SP-F18R	Telephone S/N :B22H334136	Unshielded Cable	
(9)	Samsung Electronics M/N : AD-4212	DC Power Supply S/N :-	Unshielded Cable	
(10)	Samsung Electronics M/N : SAMSUNG MP3	Earphone S/N :LTC93500036	Unshielded Cable	
(11)	EASTERN M/N : CERON	MIKE S/N : -	Shielded Mike Cable	
(12)	Samsung Electronics M/N : SEC-DC8LV	Keyboard S/N : PU005848	Unshielded Cable	

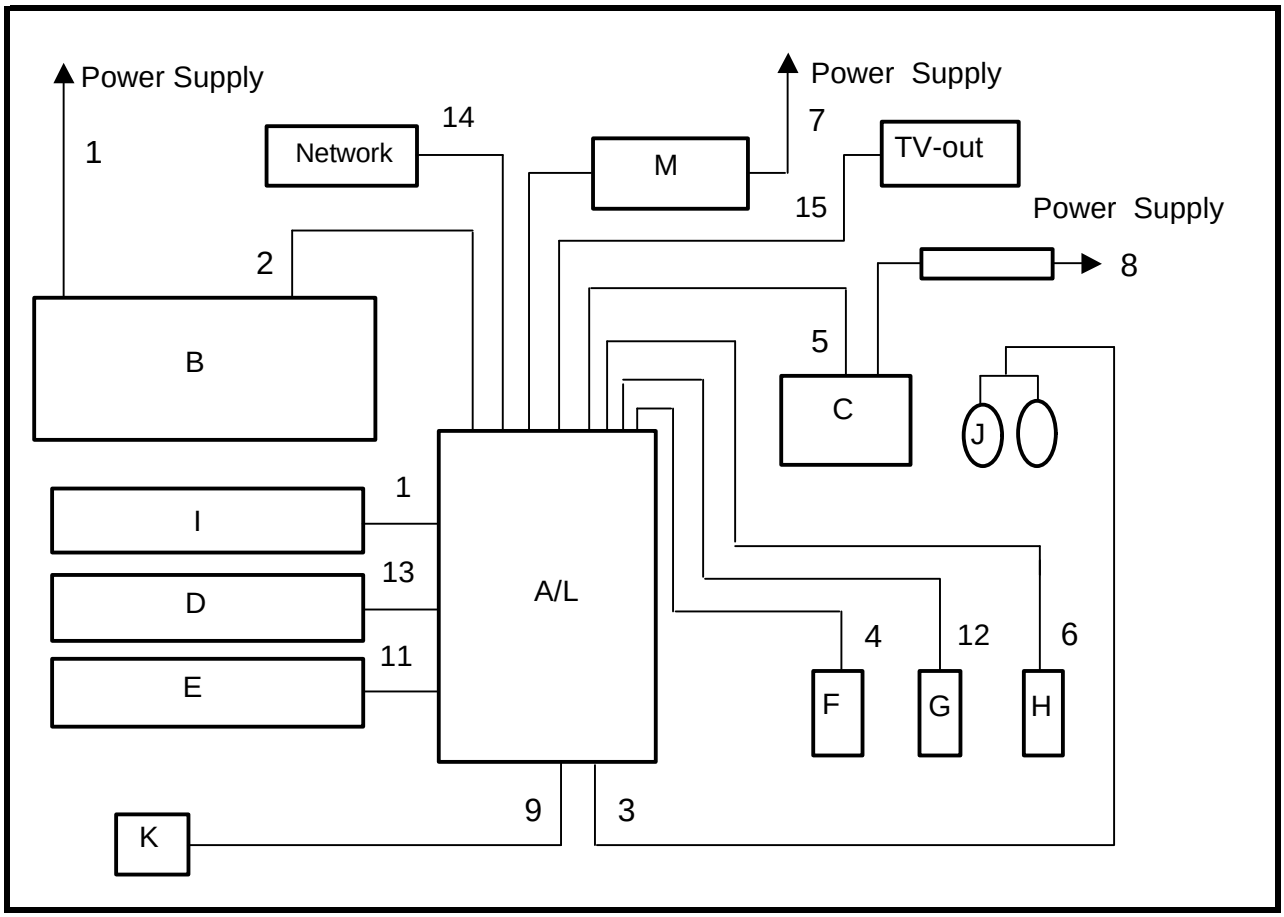
1.3 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	Remark
A	Personal computer	SENS Pro 760	-	Samsung	EUT
B	External Monitor	CKG7507L	-	Samsung	
C	Inkjet Printer	2225C+	2825S1773	Samsung	
D	Serial Mouse	M-M35	LZA71452614	Logitech	
E	USB Mouse	M-U48a	LZE94457296	Logitech	
F	USB Mouse	M-U48a	LZE94457296	Logitech	
G	USB Mouse	MOSXUB	3872F105	Gateway	
H	Keyboard	SEC-DC8LV	PU005848	Samsung	
I	Telephone	SP-F18R	B22H334136	Samsung	
J	Earphone	Samsung MP3	LTC93500036	Samsung	
K	Mike	CERON	-	Eastern	
L	Docking	SSD-760K	-	Samsung	
M	Adaptor	AD-4212	-	Samsung	

1.4 Used Cable Description

No.	Item	Length[m]	Shielded(Y/N)	Remark
1	AC Power cable	1.7	N	Power supply for Monitor
2	Video Cable	1.5	Y	
3	Earphone Cable	2	N	
4	Mouse Cable	2	Y	
5	Printer Cable	1.5	Y	
6	Keyboard Cable	1.5	Y	
7	AC Power cable	1.7	N	Power supply for Personal computer
8	AC Power cable	1.7	N	Power supply for Printer
9	Mike Cable	2	Y	
10	Telephone Cable	2	N	
11	USB Mouse Cable	2	Y	
12	USB Mouse Cable	1.5	Y	
13	Serial Mouse Cable	2	Y	
14	Lan Cable	5	N	
15	TV connection Cable	1	N	

1.5 System Block Diagram of Test Configuration



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] :	25	24
Humidity [%] :	53	53
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.

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.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

3. Conducted Emission Test Data

The initial step in collecting conducted data was to perform a quasi-peak and average scan over the measurement range using a receiver.
The final data represents worst-case emissions.

+ Test Data Sheet

Frequency	Meter Reading [a]	LISN Pol.	Total Loss [b]	Results [a+b]	Limits	Margin (Result - Limits)
[MHz]	[dBuV]	[L,N]	[dB]	[dBuV]	[dBuV]	[dB]
0.45	30.8	L1	0.17	30.97		-17.03
1.42	36.4	L2	0.28	36.68		-11.32
1.81	38.6	L1	0.27	38.87		-9.13
2.26	41.7	L1	0.24	41.94		-6.06
2.84	43.2	L1	0.1	43.3		-4.7
3.55	42.6	L2	0.1	42.7	**48**	-5.3
4.45	40.1	L1	0.12	40.22		-7.78
5.1	37.5	L2	0.11	37.61		-10.39
5.94	36.4	L2	0.1	36.5		-11.5
7.04	35.9	L2	0.05	35.95		-12.05
8.46	33.3	L2	0.25	33.55		-14.45
10.59	41.9	L2	0.48	42.38		-5.62
25.02	36.4	L2	1.69	38.09		-9.91

* QP : Quasi-peak

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

4. Radiated Emission Test Data

The initial step in collecting radiated data was to perform a quasi-peak scan over the measurement range using a receiver.
All modes of operation were investigated and the worst-case emission are reported.
All other emission are non-significant.
The minimum margin to the limit is as follows :

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 (Result-Limit) [dB]
30 - 88	84.5	V	26.7	9.1	382	254	35.8	**40**	-4.2
88 - 216	100.5	V	25.3	9.5	386	265	34.80	**43.5**	-8.7
	130.6	V	26.4	9.4	368	266	35.80	**43.5**	-7.7
	200.1	H	22.9	12.1	346	198	35.00	**43.5**	-8.5
216 - 960	241	H	23.1	14.4	250	275	37.5	**46**	-8.5
	519.5	V	19.7	21.4	105	100	41.1	**46**	-4.9
	569	H	18.4	22.2	155	260	40.6	**46**	-5.4
	703.5	H	17.6	24.8	260	275	42.4	**46**	-3.6
	833.3	H	16.3	25.7	250	275	42.0	**46**	-4.0
	901.2	V	13.0	27.7	110	100	40.7	**46**	-5.3
	925.5	V	14.3	27.7	110	100	42.0	**46**	-4.0
960 - 5000	-	-	<	-	-	-	-	**54**	-

** "<" Means equal or less then 5dB*
** Receiving Antenna Mode :* ***Horizontal, Vertical***
** Test distance : 3m (OATS)*
** Results = Meter Reading + Total Loss(Antenna factor + Cable loss)*

5. FCC Label Configuration and Location

5.1 Label Configulation

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	00/03/15, 12Months
	Firmware versions : Rev.29.9.86			
Field strength meter	ESS	844861/005	R & S	00/ 6/23, 12Months
	Firmware versions : Main 1.08, OTP 02.01, GRA 02.03			
Field strength meter	ESVP	880726/042	R & S	99/12/29, 12Months
Quasi-peak adapter	85650A	3303A01784	H.P	99/12/30, 12Months
RF Preselector	85685A	3506A01500	H.P	99/12/30, 12Months
L.I.S.N	3825-2	9208-1981	EMCO	00/ 3/23, 12Months
Bi-conical Antenna	3110B	2012	EMCO	99/12/21, 12Months
Log-periodic Antenna	3146A	1320	EMCO	99/12/21, 12Months
Double ridged horn ant.	3115	9505-4441	EMCO	00/05/23, 12Months