SAMSUNG ELECTRONICS

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Notebook PC
Model No. : SOLO 5350

FCC ID : A3L5350015318R

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Date of test : December 18, 2001 - December 21, 2001

Issued Date : January 2 , 2002

Tested by: J. Y Park

Jay Yong, PARK / Test Engineer

Reviewed by: Yang S. Kim

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Kyu Baek, CHUNG / Chief of EMC Lab.

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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	**:**	**A3L5350015318R**
Project Name	**:**	**Drake II**
Model & Variant Names	**:**	**SOLO 5350** (Brand Name: Gateway)
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.

2) Operating Frequency :

1266MHz(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(VCH/ICH Clock)
10MHz(Micom Clock), 48MHz(USB Clock), 65MHz(LCD Clock), 66.6(Hub)

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
"H" Pattern display & Read / Write	LCD Screen
	CRT Monitor, TV Monitor
	Hard disk drive & DVD_CD-RW Combo 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(14.1")	1024 X 768	60Hz	32bits
Ext. Monitor	1024 X 768	85Hz	32bits
TV Monitor	800 X 600	60Hz	16bits

5) Assemble Parts

Item	Specification	Remark
CPU	Intel Pentium-III 1266MHz Tualatin	PSB 133 uFCPGA2, Cache 512KB
Main Memory (RAM)	SEC, PC133, 512MB (256MB x 2EA) Max. 1GB (512MB x 2EA)	M464S3254 x 2EA M464S6453 x 2EA
Video Controller	IGD(Internal Graphics Device) in GMCH-M 16MB, 400MHz DRDRAM Graphics Memory	Support Composite Video out
Video Display	SEC, LCD 14.1" TFT, LTN141XU-L02 Upto 1024x768 Pixels; 18-bit colors	
Swap Bay	Toshiba CD R/W / DVD COMBO Drive SC-C2002, 4x(CDR)/24x(CD), 6x (DVD)	
HDD	Toshiba 30GB , MK3017GAP	User-removable ; 2.5", 9.5mmH
LAN	10/100 Base-T Ethernet support	
Modem	SEC, SEM-2400iC, V.90 compliant / V92 ready , 56Kbps	AC-Link (Conexant SmartMCII)
Bluetooth	Bluetooth 2.402GHz~2.480GHz Spec. 1.1, USB interface	
Wireless LAN	Agere, MPCI3A-20, Mini-PCI Type IIIA	IEEE 802.11b(11MBPS), Mini PCI
Input Devices	Keyboard, 19mm pitch, 2.5mmH travel length Pointing Device, PS/2 Touchpad w/ 4 button	 Synaptics TM41P-351
AC Adapter	ASTEC, 80-Watts, AC 100~240V FREE-VOLTAGE	SA80T-3115
Battery	Toshiba, Removable 8-cell Li-Ion Smart, 58.46Wh	
Ports(MD-3)	2 USB, DIGITAL AUDIO OUT, DC IN, SVHS-in/out EXT MONITOR, MIDI Port, Serial Port, Parallel Port, TV-in/out, Audio Out R/L, MIC-IN, LINE-IN, HEADPHONE-OUT, SPDIF, Joy Stick, RCA, LINE-OUT, MIC, 2 PS/2, 2 Card bus slot. Etc	

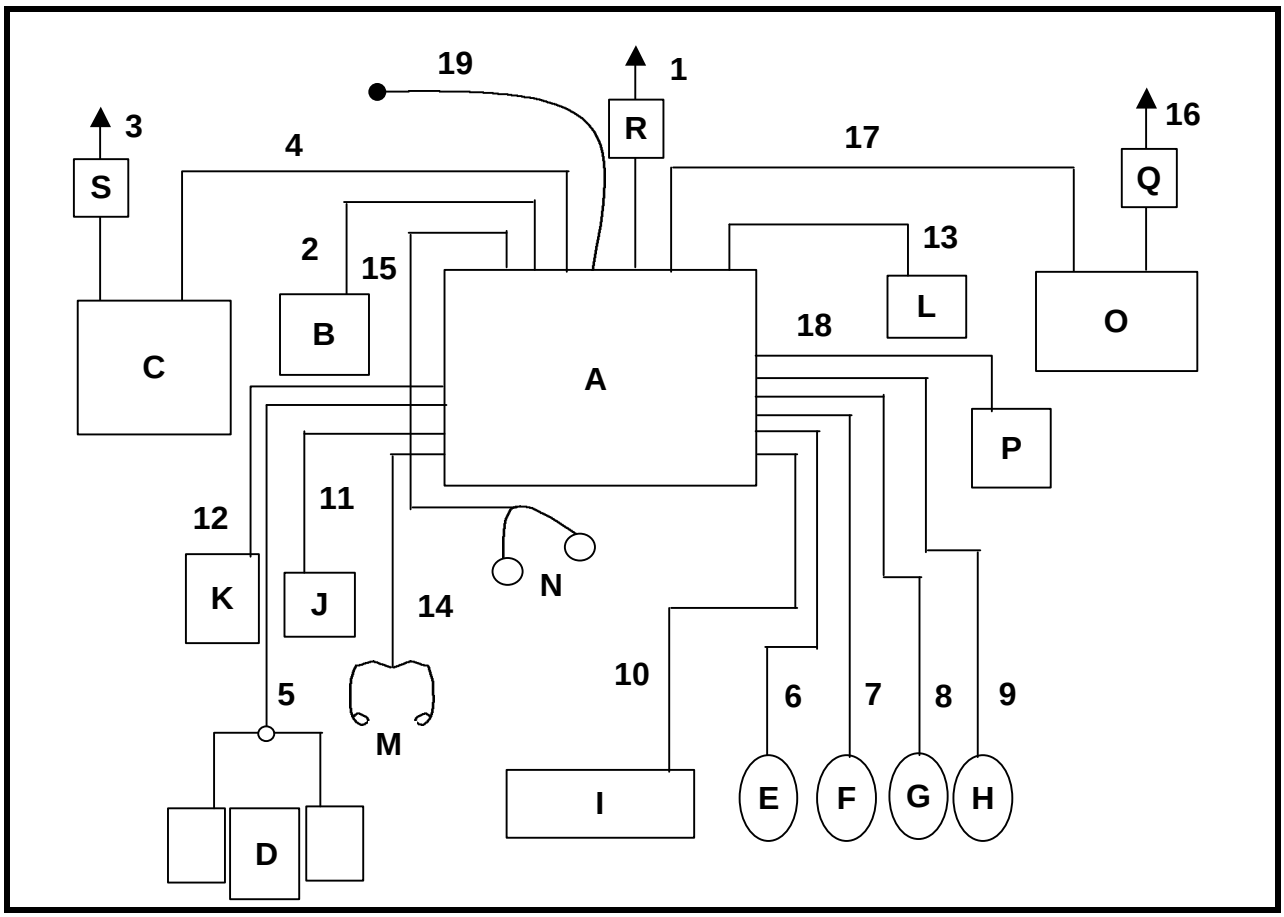
1.2 Tested System Details

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	SOLO 5350	-	Samsung	EUT
B	TV	CCM-052C	54059495	COMPAQ	-
C	External Monitor	TFT7010	147CK23DA272	COMPAQ	Doc
D	Digital Speaker	Digital BA735	7001332	BOSTON	-
E	USB Mouse	M-U48a	LZE01604737	Logitech	JNZ211360
F	USB Mouse	M-U48a	LZC10703957	Logitech	JNZ211360
G	PS/2 Mouse	NICE MOUSE	K9137324	KEYSYSTEMS	Doc
H	Serial Mouse	M-M35	LZA71155447	LOGITECH	Doc
I	Keyboard	SEM-A17K	-	Samsung	E2XSEM-A17K
J	Audio Device	MY-250	160KB0620	Samsung	-
K	Camcorder	DCR-PC110	1091827	SONY	-
L	Joystick	X03-57540	-	-	-
M	EarPhone	-	-	-	-
N	HeadPhone	-	-	-	-
O	Printer	K10158	CLG000800377	Cannon	Doc
P	Telephone	SSP-2300	042051841	Samsung	-
Q	Printer Adapter	SA70-3105	-	Gateway	-
R	EUT Adapter	ADP-80CBB	TPC0127000179	DELTA ELECTRONICS	-
S	Monitor Adapter	PSCV420102A	CO10603504	COMPAQ	-

1.3 Configuration of EUT and peripherals

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	Power Cable for EUT	3.52	N	AC Mains
2	TV RCA Cable	1.5	Y	
3	Power Cable for Monitor	1.82	N	
4	Monitor Cable	1.85	Y	
5	Digital Speaker Cable	2.4	N	
6	USB Mouse Cable	1.8	Y	
7	USB Mouse Cable	1.8	Y	
8	PS/2 Mouse Cable	1.8	Y	
9	Serial Mouse Cable	1.82	Y	
10	Keyboard Cable	1.8	Y	
11	Audio Device Cable	1.9	N	
12	Camcorder Cable	1.5	N	
13	Joystick Cable	1.9	N	
14	EarPhone Cable	2.7	N	
15	LINE IN	1.9	Y	
16	Power Cable for Printer	1.85	N	
17	Printer Cable	1.6	Y	
18	Telephone Cable	1.9	N	
19	LAN Cable	5	N	

1.5 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

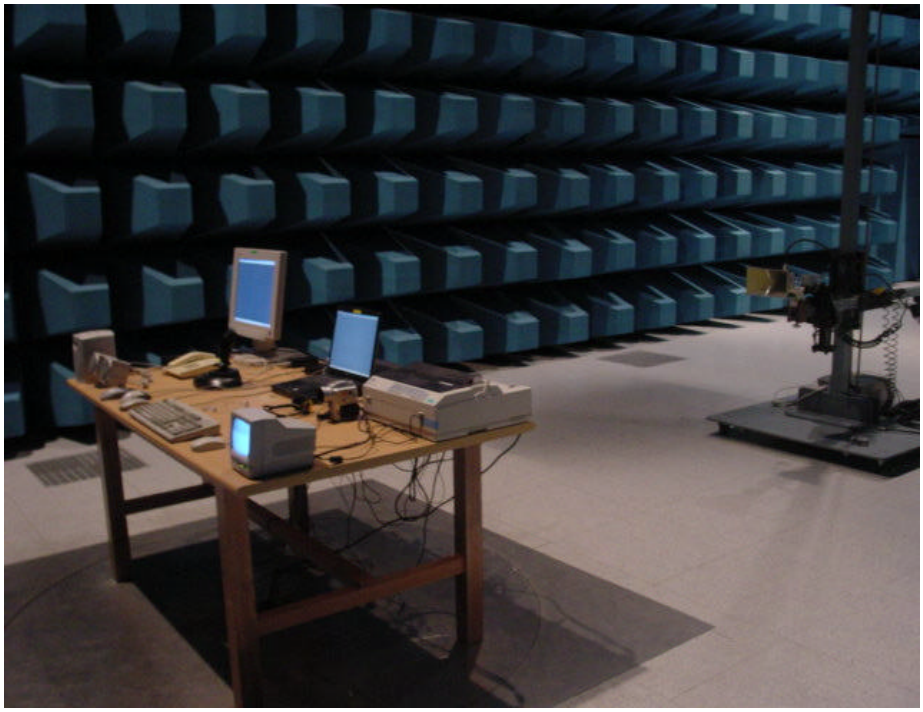
2.1 Configuration of Radiated and Conducted Interference Measurement

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

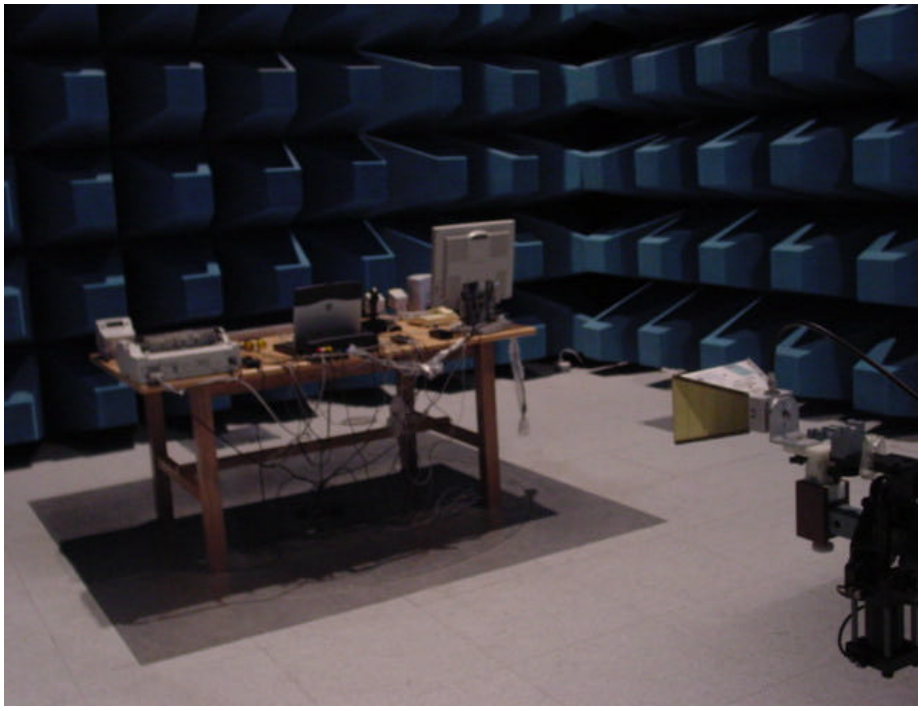
1)Conduction(Front View)

2)Conduction(Rear View)

3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	23	23
Humidity [%] :	63	63
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	-

+ Test Data Sheet

Frequency	Meter reading (a)		Total Loss	Results (a) + (b)		Limits		Margin (Limits-Result)	
	QP	AV	(b)	QP	AV	QP	AV	QP	AV
[MHz]	[dBuV]		[dB]	[dBuV]		[dBuV]		[dB]	
0.157	36.0	36.9	0.2	36.2	37.1	**65.6**	**55.6**	29.4	18.5
0.178	40.6	35.3	0.2	40.8	35.5	**64.6**	**54.6**	23.8	19.1
0.283	39.5	35.6	0.1	39.6	35.7	**60.7**	**50.7**	21.1	15.0
0.339	41.7	36.7	0.1	41.8	36.8	**59.2**	**49.2**	17.4	12.4
0.430	44.3	32.5	0.1	44.4	32.6	**57.3**	**47.3**	12.9	14.7
0.451	48.3	31.1	0.1	48.4	31.2	**56.9**	**46.9**	8.5	15.7
0.619	39.8	34.3	0.2	40.0	34.5	**56.0**	**46.0**	16.0	11.5
0.794	46.7	36.8	0.1	46.8	36.9	**56.0**	**46.0**	9.2	9.1
1.242	43.9	34.3	0.2	44.1	34.5	**56.0**	**46.0**	11.9	11.5
2.180	39.7	34.5	0.1	39.8	34.6	**56.0**	**46.0**	16.2	11.4
3.321	39.7	34.1	0.1	39.8	34.2	**56.0**	**46.0**	16.2	11.8
4.266	38.7	34.1	0.1	38.8	34.2	**56.0**	**46.0**	17.2	11.8
5.750	35.3	30.8	0	35.4	30.9	**60.0**	**50.0**	24.6	19.1
7.108	34.6	28.8	0	34.7	28.9	**60.0**	**50.0**	25.3	21.1
8.508	32.4	25.8	0.1	32.5	25.9	**60.0**	**50.0**	27.5	24.1
15.011	31.2	25.1	1.2	32.4	26.3	**60.0**	**50.0**	27.6	23.7
24.153	34.5	30.5	0.7	35.2	31.2	**60.0**	**50.0**	24.8	18.8
28.934	32.0	26.7	0.6	32.6	27.3	**60.0**	**50.0**	27.4	22.7

* 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	66.283	V	17.3	6.7	200	320	24.0	**30.0**	6.0
	72.340	V	12.0	7.3	220	290	19.3		10.7
	165.883	H	12.3	11.6	400	300	23.9		6.1
	165.892	V	10.4	11.6	100	62	22.0		8.0
	208.902	H	10.2	11.9	336	350	22.1		7.9
	228.162	V	12.8	12.9	100	65	25.7		4.3
230 - 1000	233.482	V	7.0	13.5	100	120	20.5	**37.0**	16.5
	398.708	H	12.3	20.0	170	280	32.3		4.7
	399.804	V	10.4	20.0	100	160	30.4		6.6
	430.631	V	7.0	20.9	100	10	27.9		9.1
	431.076	H	5.0	20.9	220	210	25.9		11.1
	498.539	V	5.2	22.1	100	10	27.3		9.7

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~ 7000	1002	V	15.00	28.60	100	20	43.60	**54.00**	10.40
	2649	V	6.88	31.30	100	25	38.18	**54.00**	15.82
	3699	V	11.87	30.10	100	30	41.97	**54.00**	12.03
	4957	V	7.17	41.21	100	25	48.38	**54.00**	5.62

** "<" 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 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	01/ 03/ 20, 12Months
	Firmware versions : Rev.29.9.86			
Quasi-peak adapter	85650A	2521A00687	H.P	01/ 10/ 10, 12Months
RF Preselector	85685A	2602A00224	H.P	01/ 10/ 10, 12Months
Field strength meter	ESCS30	839809/022	R & S	01/ 06/ 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
Bi-Log Antenna	CBL6112B	2767	SCHAFFNER	01/ 01/ 02, 12Months