SAMSUNG ELECTRONICS

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Laser Beam Printer
Model No. : ML-2150

FCC ID : A3LML-2150

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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.

Date of test : November 29, 2002 ~December 2, 2002

Issued Date : December 3, 2002

Tested by:
Jong Ho, Lee / Test Engineer

Reviewed by:
Yang Soo, KIM / Manager of EMC Lab.

Authorized by:
Kyu Baek, CHUNG / Chief of EMC Lab.

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The test reported herein have been performed in accordance with its terms of registration.

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Distribution

This test report has been made available as follows:

CS Management Center, EMC Laboratory	1 original
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1. General Information

Applicant	**:**	**Samsung Electronics Co., Ltd.**
Full Address	**:**	**416 Maetan 3 Dong, Paldal-Gu, Suwon City, Gyunggi Do, Korea, 442-742**
Kind of Product	**:**	**Laser Beam Printer**
FCC ID	**:**	**A3LML-2150**
Project Name	**:**	**-**
Model & Variant Names	**:**	**ML-2151N(Installed 10/100 Base Tx LAN) ML-2152W (Installed 10/100 Base Tx & 802.11b Wireless LAN)**
Test Report Produced by	**:**	**Jong Ho, Lee / Test Engineer**

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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
NIC	ML-00NB	10/100 Base Tx LAN
Wireless NIC	ML-00LB	802.11b Wireless LAN

And then the system was tested with the configuration as above

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

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

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2) Operating Frequency :

USB 30MHz CPU 120MHz

Main Clock 60MHz Video 19.61374MHz

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
USB2.0 Printing	Continuously H pattern printing by Computer
IEEE1284 Printing	Continuously H pattern printing by Computer
Wireless LAN	Continuously H pattern printing by Network
LAN	Continuously H pattern printing by Network

EUT was tested all operating mode as above.Finally EUT was tested USB2.0 Printing mode as maximum emission.

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors
LCD(14.1")	1024 X 768	60Hz	32bits

5) Manufacturer : SAMSUNG Electronics Co., Ltd.

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1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	LBP	ML-2150	-	Samsung	EUT
B	Computer	Type831115V	KAA6842	IBM	DoC
C	Keyboard	SDL3520	27011381	Samsung	DoC
D	Mouse	P801	2072747	Samsung	DoC
E	Monitor	CX151S	N209H4NT726970	Samsung	DoC

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1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	AC Power Cable	1.7	N	
2	Mouse Cable	1.2	N	
3	Keyboard Cable	1.2	N	
4	Monitor Cable	1.4	Y	
5	IEEE1284 Cable	1.5	Y	
6	USB Cable	1.4	Y	
7	LAN Cable	1.5	Y	EUT was connected to either Wireless LAN or LAN.

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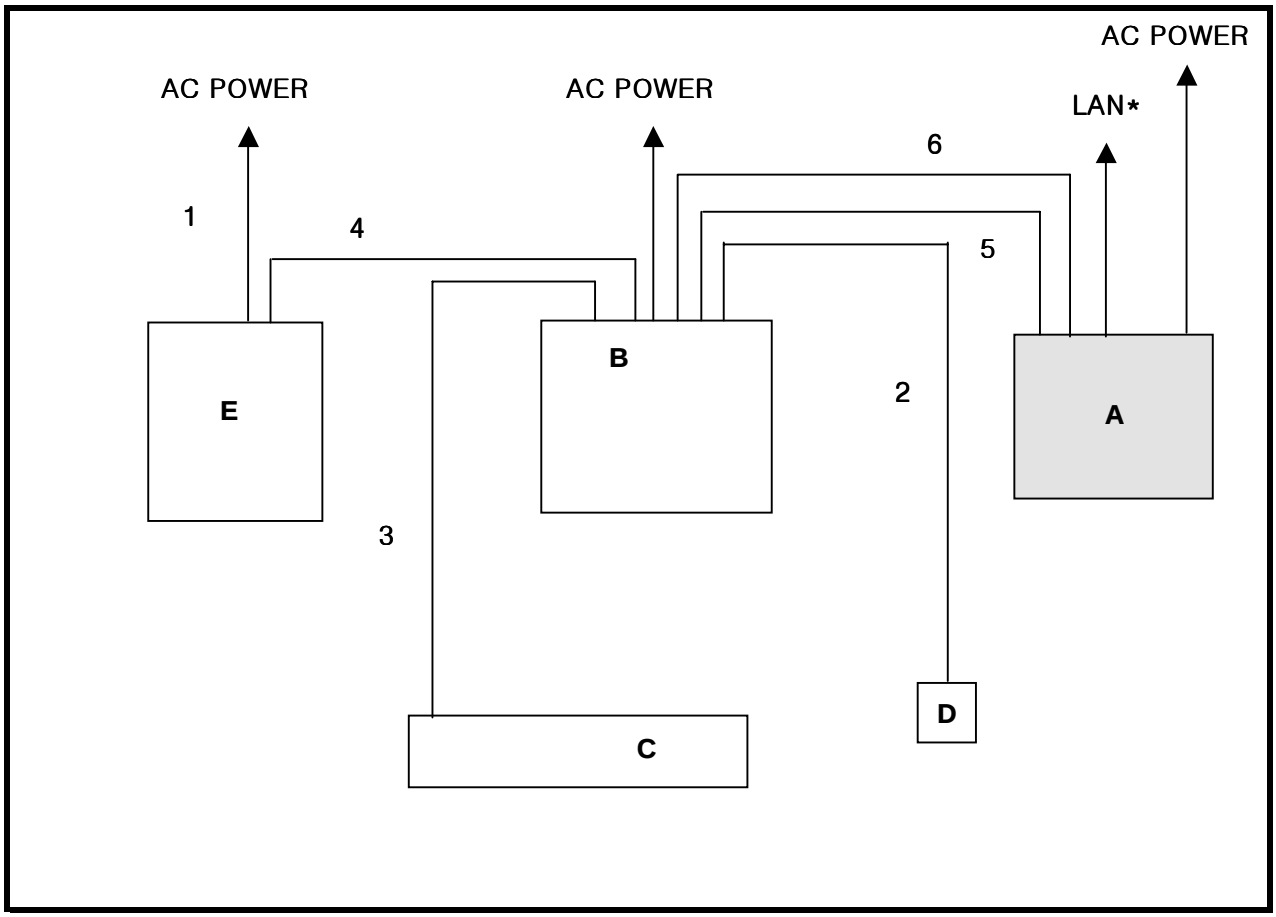
1.4 System Block Diagram of Test Configuration



LAN* : EUT was connected to either Wireless LAN or LAN.

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-Gu, Suwon City, Gyunggi 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.

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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)

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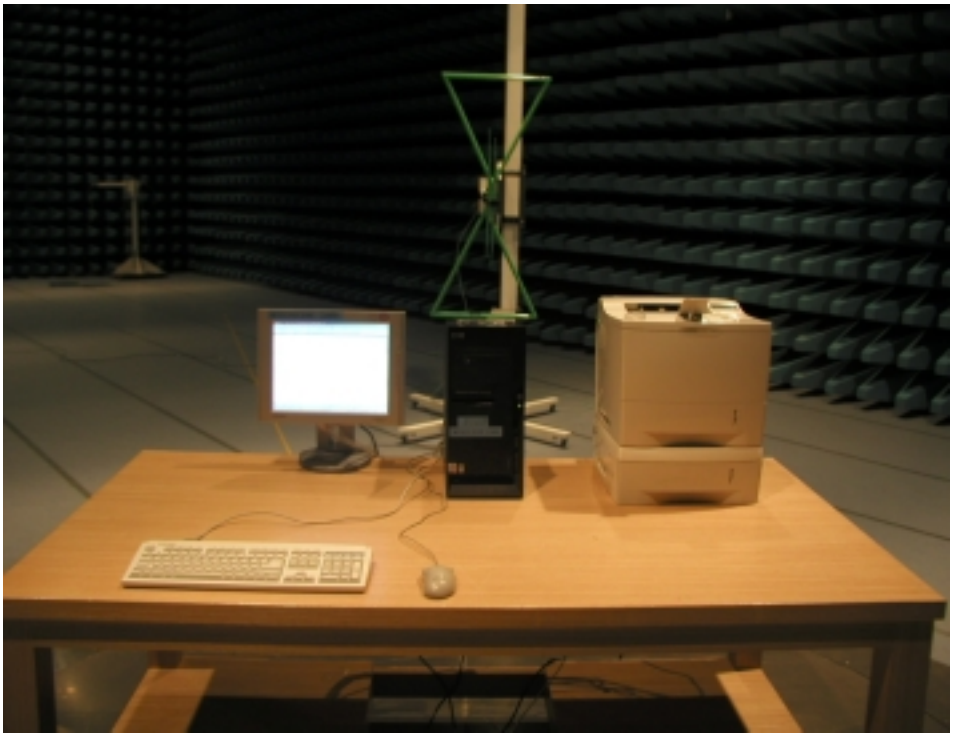
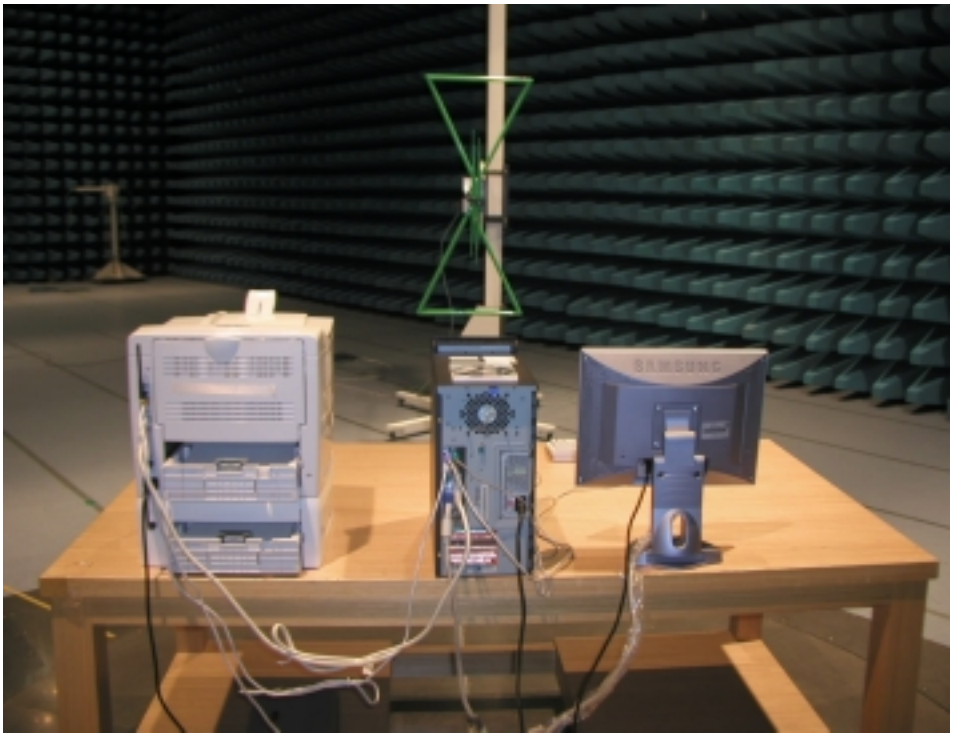
3) Radiation(Front View)



4) Radiation(Rear View)



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2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	22C	23C
Humidity [%]	45	45
Power supply :	AC110V/60Hz	AC110V/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.

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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.

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	-

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3. Conducted Emission Test Data

O Test Data Sheet

Frequency	Meter reading (a)		Total Loss (b)	Results (a) + (b)		Limits		Margin (Limits-Result)	
	QP	AV		QP	AV	QP	AV	QP	AV
[MHz]	[dBuV]		[dB]	[dBuV]		[dBuV]		[dB]	
0.150	56.60		0.61	27.09		**66.0**	**56.0**	38.91	
0.158	53.96		0.61	27.25		**65.6**	**55.6**	38.33	
0.216	51.93		0.61	28.36		**63.0**	**53.0**	34.60	
0.228	48.08		0.61	27.69		**62.5**	**52.5**	34.83	
22.94	43.83		1.76	45.59		**60.0**	**50.0**	14.41	
23.00	46.02		1.71	47.73		**60.0**	**50.0**	12.27	
23.40	42.28		1.71	43.99		**60.0**	**50.0**	16.01	
23.67	44.46		1.71	46.17		**60.0**	**50.0**	13.83	

* 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

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4. Radiated Emission Test Data

Frequency Range	Tested Frequency	ANT Pol.	Meter Reading [A]	Total Loss [B]	Antenna Height	Turn table Degree	Results [A+B]	Limits at 3m	Margin (Limit-Result)
[MHz]	[MHz]		[dBuV/m]	[dB]	[Cm]	[Deg]	[dBuV/m]	[dBuV/m]	[dB]
	30.000	V	13.1	17.8	105	68	30.9	**40.0**	9.1
30MHz	51.960	V	27.3	7.0	101	264	34.3	**40.0**	5.7
~	87.600	V	19.9	8.2	107	239	28.1	**40.0**	11.9
1000MHz	96.000	V	20.1	9.7	112	112	29.8	**43.5**	13.7
	392.160	V	11.1	15.4	100	215	26.5	**46.0**	19.5
	401.400	H	12.8	15.8	344	51	28.6	**46.0**	17.4
	549.180	H	17.0	18.9	100	167	35.9	**46.0**	10.1

** "<" 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: 3m(Quasi-peak)

- Above 1000MHz: 3m(Peak)

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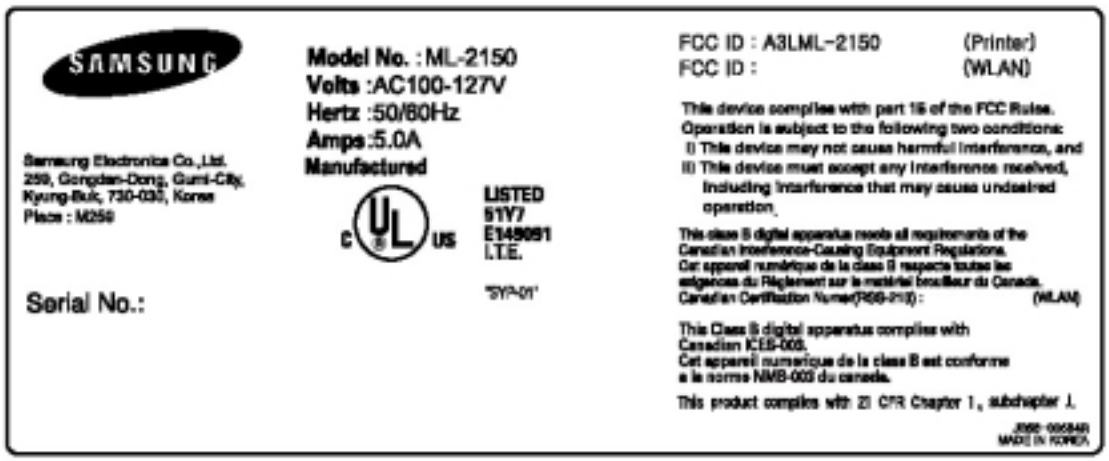
5. FCC Label Configuration and Location

5.1 Label Configuration



5.2 Location of Label

6. Test Equipment Used

Equipment	Model No.	Makers.	Serial No	Calibration Last calibration and Interval
Field strength meter	ESCS30	830986/004	R & S	2002-02-15
	Firmware versions : Main 2.22, OTP 02.01, GRA 02.36			
Test Receiver	ESI26	100010	R&S	2002-05-04
L.I.S.N	ESH3-Z5	831886/006	R & S	2002-08-06
Biconilog Antenna	CBL6112B	2806	SCHAFFNER	2002-04-23

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