EMC Test Report

According to FCC Part 15 Subpart B

Project No.	LBE052075
Equipment under Test	
Applicant	Samsung Electronics Co., Ltd. 416 Maetan3- Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, Korea, 443-742
FCC ID	**A3LML-1610**
Product Name	Laser Beam Printer
Model Name	ML-1610
Manufacturer	Refer to page.3.
Date of Test	Sep 1, 2005
Issued Date	Sep 13, 2005

	Name/Position	Signature
Tested by	Kyeong Dong, Kim Test Engineer	
Reviewed by	No Cheon, Park Manager of EMC Lab.	
Authorized by	Seung Kyu, Cha Chief of EMC Lab.	

1. This test reports does not constitute an endorsement by NIST/NVLAP or U.S Government.
2. 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.

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 LAB CODE 200623-0

3. FCC filing Registration Number : 873282

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1. General Information

1.1 Basic Information related Product

Applicant	Samsung Electronics Co., Ltd.
Model name	ML-1610
Applicant Address	416 Maetan3- Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, Korea, 443-742
Contact Person	Kyeong Dong, Kim
Kind of product	Laser Beam Printer
Variant list	Phaser 3117, Dell Laser Printer 1100, Dell Laser Printer 1110
Manufacturer	1) Samsung Electronics Co., Ltd. 259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do, 730-030 Korea. 2) Shandong Samsung Telecommunications Co., Ltd. 264209, Samsugn (Sanxing) Road, Weihai Hi-Tech. IDZ, Shandong Province, P.R.China 3) Weihai Shin Heung Digital Electronics Co., Ltd. 98, Samsung Road, Weihai Hi-Tech, IDZ Shandong Province, P.R.CHINA 4) Samsung Electronics Slovakia s.r.o.Hviezdoslavova 807, 924 27 Galanta, SLOVAKIA
New / Alternative / Permissive change Information	- Alternative changed, SMPS - Permissive changed, (Variant added) Dell Laser Printer 1110 Brand : Dell (same as ML-1610)

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1.2 Detail Information related Product

Specification

Item	Specification	Remark
Print Speed	Up to 16PPM in A4(17ppm in Letter)	-
Printing Resolution	600 x 600 dpi	-
Power consumption	300W average during operation /Less than 10W in sleep mode	-
Toner Cartridge Life	2000 pages (for starter, 1000 pages) @ IDC 5% coverage	-
Interface	USB1.1 1Port	-
Power Rating	AC 100~127V(USA, Canada), 50/60Hz, 4.0A	-
Weight	5.7 Kg	
External Dimensions	358mm X 275mm X 215mm (W X D X H)	-
Warmup Time	30 seconds	

Operating Frequency

System Clock : 75MHz

Main Clock : 12MHz

V / USB Clock : 48MHz

VDO Frequency : 80MHz

1.3 Operating Mode and Condition

The system was configured for testing in typical fashion use. Cable were attached to each of the available I/O port. Where applicable, peripherals were attached to the I/O cables.

This EUT is supporting only the USB printing.

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, USB printing(600X600) was reported.

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1.4 Test System Details

Refer to 1.2

1.5 Equipment Modifications

No equipment modifications were required.

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1.6 Test Procedure

1.6.1 Conducted Emission

The EUT was placed on a platform 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 conducing 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 bindle 30cm to 40cm long and were handed 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.

Frequency Band [MHz]	Instrument	Detector	Resolution Bandwidth	Video Bandwidth
0.15 to 80	EMI Receiver	Quasi-Peak	9kHz	-
		Average	9kHz	-

1.6.2 Radiated Emission

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 and the run table azimuth was varied to obtain the maximum signal strength

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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 biconi-Log antenna.

Also, the EMI RECEIVER was scanned from 1000 to 1800MHz using linearly polarization Double ridge horn antenna was used. The explanation of measuring instrument setup when Respective function is used in any frequency band is as following;

Frequency Band [MHz]	Instrument	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1000	EMI Receiver	Quasi-Peak	120kHz	-
Above 1000	EMI Receiver	Peak	1MHz	1MHz

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1.7 Test Configuration

Used EUT and Peripherals

Seq	Device	Model Name	Serial #	Maker	Note
A	LBP	ML-1610	-	Samsung	EUT
B	Note PC	PP03L	04P102-70161-23K-J0V7	DELL	DoC
C	AC Adapter	ADP-90FB	TH-06G356-17974-23M-6VX6	DELTA Electronics	-
D	Ext. CD-ROM Drive	-	CN-00J105-70161-231-A077	DELL	DoC
E	USB FDD	MSFD-20U	20001405	SANYO MOTER	DoC
F	Serial Mouse	Serial Mouse	1022953	Microsoft	FCC ID : C3KMS1
G	PS/2 Mouse	M-S69	HCA14013966	Logitech	DoC

Used Cable Description

	Connect Cable	Length [m]	Shielded [Y/N]	Remark
1	Power	1.7	N	For EUT
2	Power	1.8	N	For Note PC
3	USB	1.8	Y	-
4	USB	0.7	Y	-
5	USB	1.0	Y	-
6	SERIAL	1.8	Y	-
7	PS/2	1.8	Y	-

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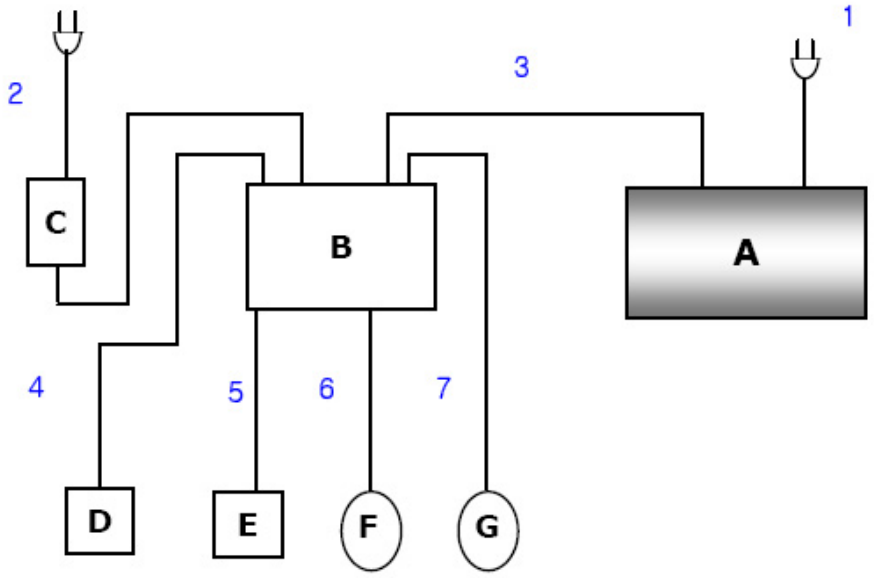
Block Diagram



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1.8 Applied Standards

List

Product or Generic Standards	Basic Standards
FCC Part15 B	ANSI C63.4 : 2003

1.9 Test Facility

General Information

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 22, 16-1, 16-2.

This EMC Testing Lab. is accredited by Korea Laboratory Accreditation Scheme(KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement(MRA) for the above test item(s) and test method(s).

This Lab. is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:1998.

Accreditation and Listing

Uncertainty (According to CISPR 16-4 and Lab. 34)

Samsung IT EMC Test Lab.

Conducted Emission		: ±3.1dB
Radiated Emission	Bi-Log Antenna	: ±7.3dB

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2. Summary of Test Results

Result : PASS

The equipment under test(EUT) has been found to comply with the applied standards.

Section of the Product Standard		Applied Standard	Result
Electromagnetic Emission Test			
3.1	Conducted Emission	ANSI C63.4 : 2003	Complied
3.2	Radiated Emission	ANSI C63.4 : 2003	Complied

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3.1 Conducted Emission

Test Information	
Test Engineer	Kyeong Dong, Kim
Test Date	Sep 1, 2005
Climate Condition	Ambient Temperature : 23.0 ℃ Relative Humidity : 60% Atmospheric Pressure : 1011mbar
Test Place	Shield Room #2

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
EMI TEST RECEIVER	ESCS30	R&S	830986/004	2006-02-17	12
LISN	3810/2NM	EMCO	2251	2006-02-01	12
LISN	ESH3-Z5	R&S	100263	2006-06-06	12

Measurement Results	**Passed** The Measured emissions of the EUT have found to be below the specified limits.

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Test Data & Graph

The Initial step in collecting conducted data was to perform a peak and average scan over the measurement range using a receiver

The find data represents worst-case emissions.

* QP : Quasi-peak, AV: Average

* Result = Meter Reading(QP or AV) + Total Loss(LISN Insertion loss + Cable loss)

* Margin = Limit – Result

1. TEST DATA & GRAPH

1.1 Quasi Peak

MEASUREMENT RESULT: "ML1610_FC_fin QP"

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.150000	54.10	0.2	66	11.9	L1	GND
0.200000	49.80	0.1	64	13.8	L1	GND
0.270000	46.30	0.1	61	14.8	L1	GND
4.560000	38.20	0.3	56	17.8	L1	GND
4.690000	43.00	0.3	56	13.0	N	GND
4.830000	39.30	0.3	56	16.7	L1	GND
4.890000	45.00	0.2	56	11.0	N	GND
4.960000	37.20	0.2	56	18.8	N	GND

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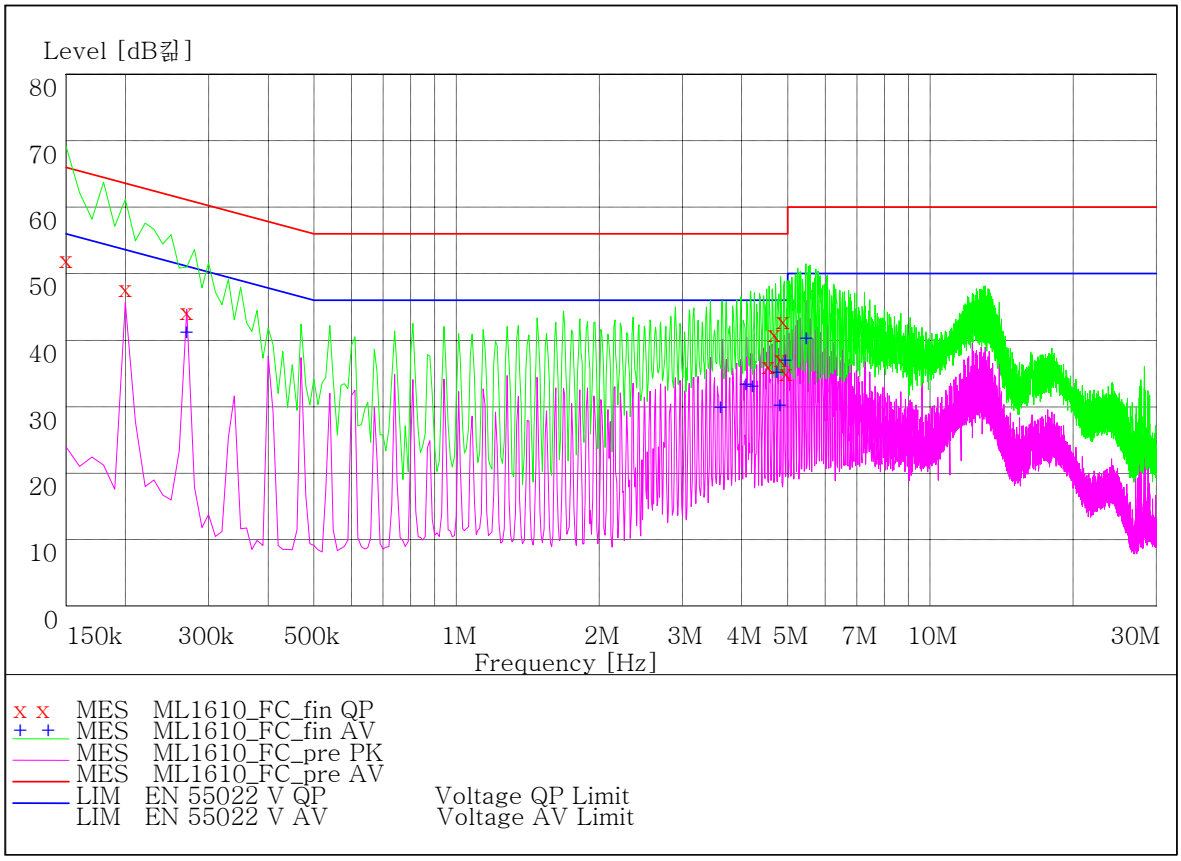
1.2 Average

MEASUREMENT RESULT: "ML1610_FC_fin AV"

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
0.270000	43.10	0.1	51	8.0	L1	GND
3.620000	31.90	0.2	46	14.1	N	GND
4.085000	35.40	0.3	46	10.6	L1	GND
4.220000	35.00	0.3	46	11.0	N	GND
4.755000	37.20	0.3	46	8.8	N	GND
4.825000	32.20	0.3	46	13.8	L1	GND
4.955000	38.90	0.2	46	7.1	N	GND
5.490000	42.30	0.3	50	7.7	N	GND

- Graph -



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3.2 Radiated Emission

Test Information	
Test Engineer	Kyeong Dong, Kim
Test Date	Sep 1, 2005
Climate Condition	Ambient Temperature : 19.0℃ Relative Humidity : 59% Atmospheric Pressure : 1004mbar
Test Place	10m Semi Anechoic Chamber

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Turn Table	DT430	HD	430/691/01	N/A	N/A
Antenna Mast	MA240	HD	240/678 BJ:01	N/A	N/A
Controller	HD100	HD	100/723	N/A	N/A
Preamplifier	CPA9232	Schaffner	1054	2006-02-07	12
BILOG Antenna	CBL6112B	Schaffner	2804	2005-11-09	12
Test Receiver	ESI26	R&S	100147	2005-10-04	12

Measurement Results	**Passed** No Operation errors were detected during or after the applied test.

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Test Data & Graph

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

All other emission are non-significant.

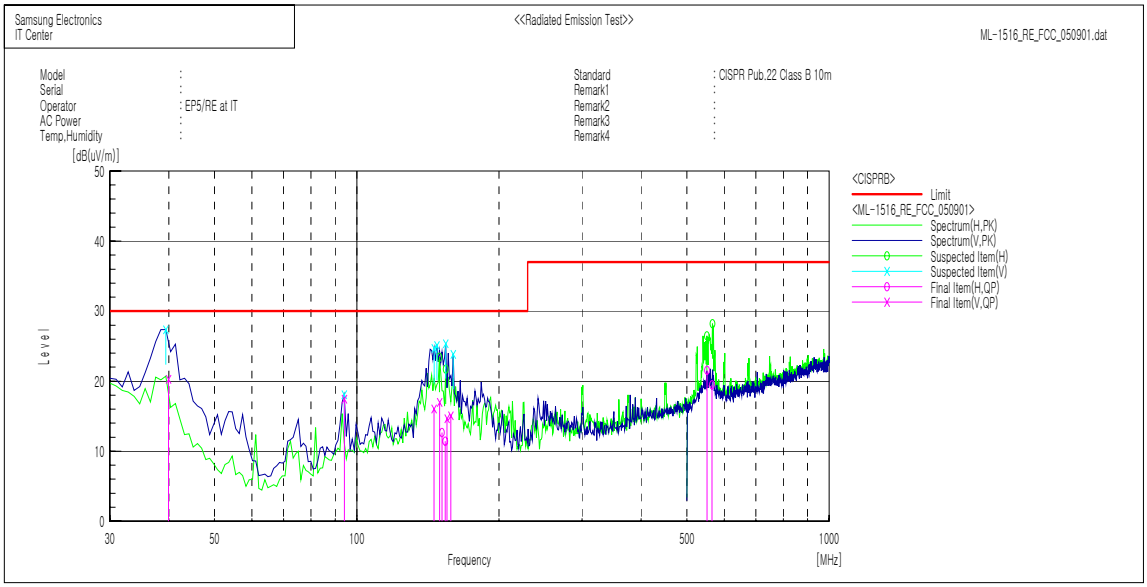
* Receiving Antenna Mode : Horizontal, Vertical

* Test distance : 10m (Semi-Anechoic Chamber)

* Result = Meter Reading + Total Loss(Antenna factor + Cable loss-Amp. Gain)

* Margin = Limit – Result

Samsung Electronics Co., Ltd
IT Center



Final Result

No.	Frequency [MHz]	(P)	S.C	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	Remark
1	39.942	V	S	27.2	-6.9	20.3	30.0	9.7	100.0	19.0	
2	155.257	V	S	23.8	-9.1	14.7	30.0	15.3	100.0	169.0	
3	145.687	V	S	24.6	-8.6	16.0	30.0	14.0	101.0	60.0	
4	158.129	V	S	24.4	-9.3	15.1	30.0	14.9	100.0	178.0	
5	149.690	V	S	25.8	-8.8	17.0	30.0	13.0	114.0	141.0	
6	94.119	V	S	27.7	-10.3	17.4	30.0	12.6	132.0	288.0	
7	151.451	H	S	21.6	-8.9	12.7	30.0	17.3	395.0	145.0	
8	564.865	H	S	16.5	3.0	19.5	37.0	17.5	132.0	198.0	
9	153.938	H	S	20.5	-9.1	11.4	30.0	18.6	399.0	160.0	
10	551.468	H	S	18.2	3.3	21.5	37.0	15.5	123.0	92.0	

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4. Appendix

4.1 Test Photography

Picture 1. Conducted Emission (Front)

Picture 2. Conducted Emission (Rear)

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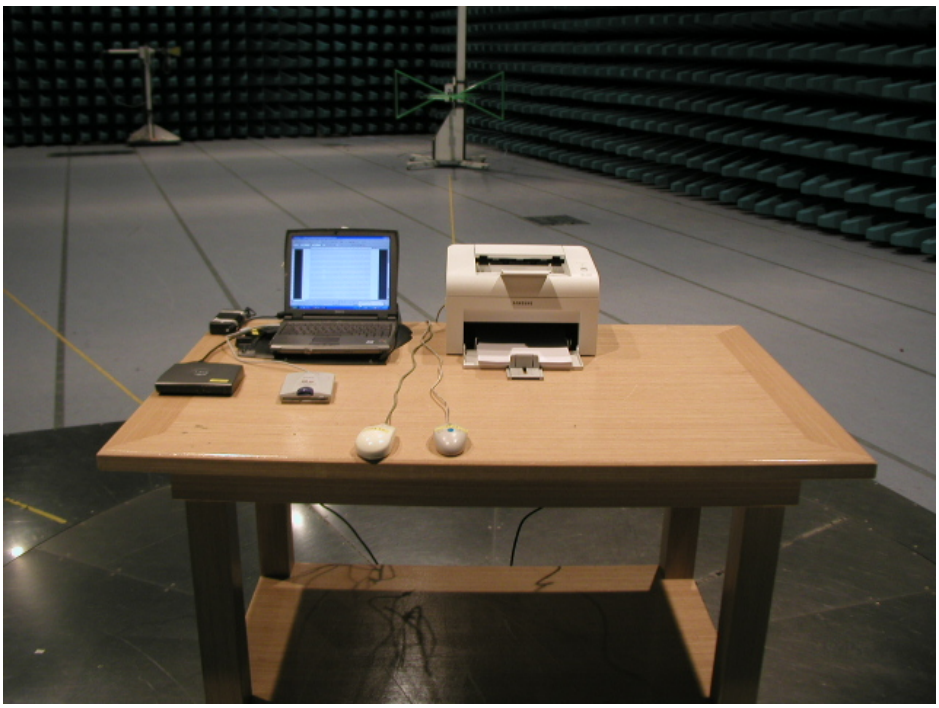
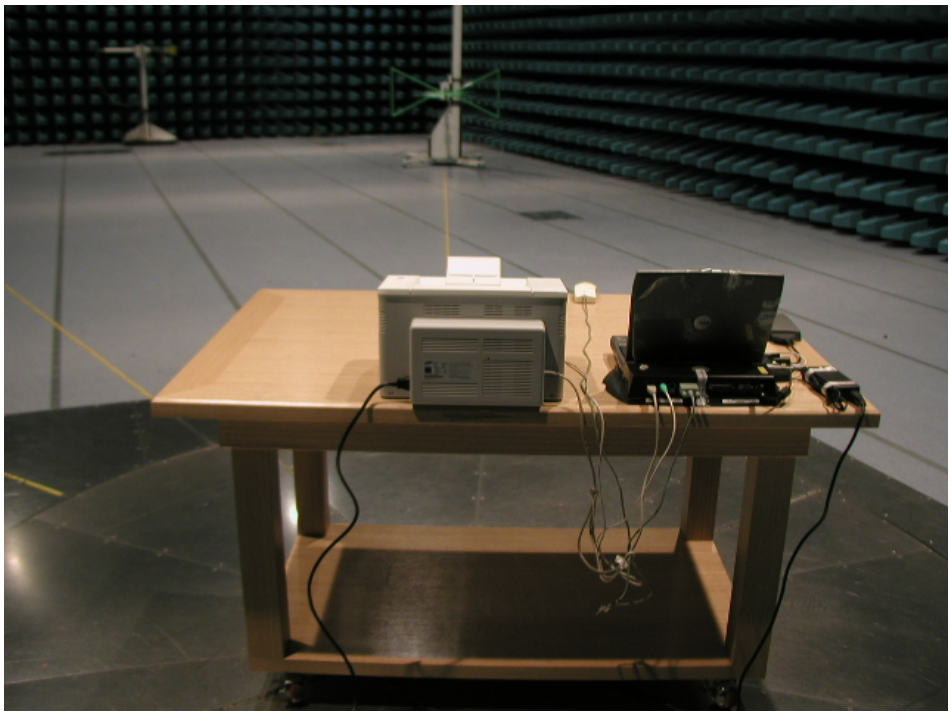


Picture 3. Radiated Emission (Front)



Picture 4. Radiated Emission (Rear)

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4.2 EUT Photography

Picture 5. EUT (Front)

Picture 6. EUT (Rear) & Label Location

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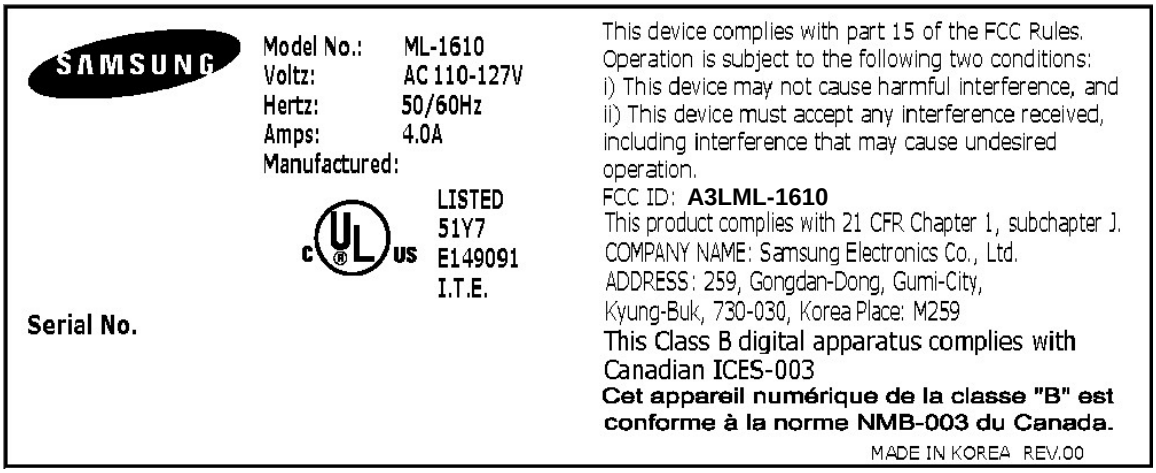
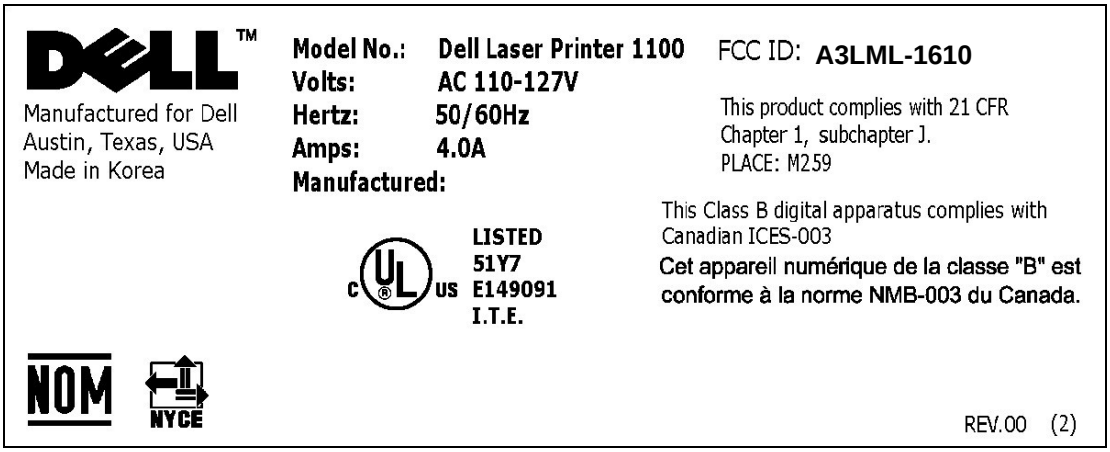


#1. Model Name : ML-1610 (Brand : Samsung)

- Factory #1 : Samsung Electronics Co., Ltd (Korea)
- Factory #2 : Shandong Samsung Telecommunications Co., Ltd (China)
- Factory #3 : Weihai Shin Heung Digital Electronics Co., Ltd. (China)
- Factory #4 : Samsung Electronics Slovakia s.r.o (Slovakia)

Picture 7. Label of Samsung ML-1610 (Korea/China/Slovakia)



#2. Model Name : Dell Laser Printer 1100 (Brand : DELL)

- Factory #1 : Shandong Samsung Telecommunications Co., Ltd (China)
- Factory #2 : Weihai Shin Heung Digital Electronics Co., Ltd. (China)

Picture 8. Label of Dell Laser Printer 1100 (China)

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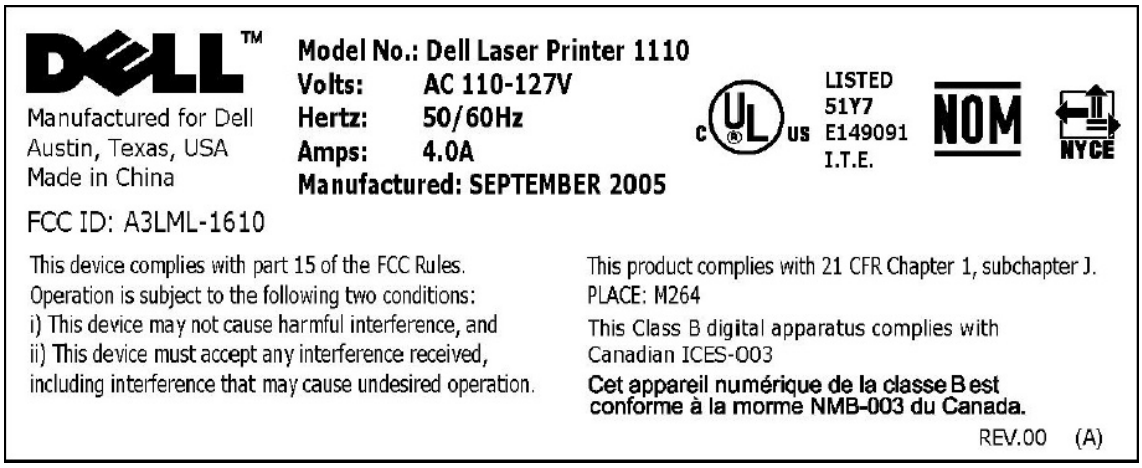
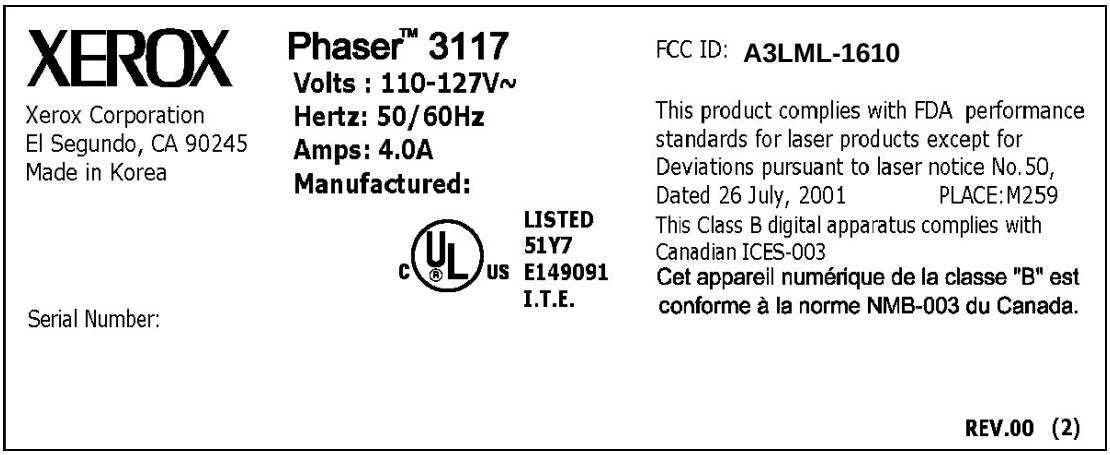


#3. Model Name : Dell Laser Printer 1110 (Brand : DELL)

- Factory #1 : Shandong Samsung Telecommunications Co., Ltd (China)
- Factory #2 : Weihai Shin Heung Digital Electronics Co., Ltd. (China)

Picture 9. Label of Dell Laser Printer 1110 (China)



#4. Model Name : Phaser 3117 (Brand : XEROX)

- Factory #1 : Shandong Samsung Telecommunications Co., Ltd (China)
- Factory #2 : Weihai Shin Heung Digital Electronics Co., Ltd. (China)

Picture 10. Label of Xerox Phaser 3117 (China)

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