

EMC TEST REPORT

Samsung Electronics Co., Ltd.

416 Maetan 3-Dong, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, 443-742 Korea
(Tel: 031 277 7752, Fax: 031 277 7753)

Project No. : LBE060719

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**1. Applicant**

- Name of organization : Samsung Electronics Co., Ltd.
- Address : 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si,
Gyeonggi-Do, 443-742 Korea
- Date of application : 2006. 03. 14

2. Purpose for the report : Approval for EMC**3. Kind of product : Laser Beam Printer(Model name : ML-3051ND)****4. Date of test : 2006.03. 14 ~ 2006.03.15****5. Applied standard : FCC Part 15:2003 Subpart B****6. Test result : PASS**

The equipment under test has found to be compliant with the applied standards.

(Refer to the attached test result for more detail.)

7. FCC ID : A3LML3051ND

Tested by

Name : Sang Kyu, Seo

Reviewed by

Name : No Cheon Park

This report is the test result about the sphere accredited by KOLAS which signed the Mutual Recognition Arrangement of International Laboratory Accreditation Cooperation.

2006. 03. 23

Samsung Electornics Co., Ltd.
Chief of CS Management Center

TEST RESULT

Test Report No. : LBE060719

Applicant / Address : Samsung Electronics Co., Ltd.
416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do
443-742 Korea

Manufacture / Address : 1) Samsung Electronics Co., Ltd.
259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do,
Korea 730-030
2) Shandong Samsung Telecommunications Co., Ltd.
264209, Samsung Road, Weihai Hi-Tech. IDZ,
Shandong Province, P.R.China

EUT : 1. Product name : Laser Beam Printer
2. Model name : ML-3051ND
3. Brand name : Samsung
4. Variant model : ML-3051N, ML-3050

Test Method : ANSI C 63.4:2003

Test Result : **PASS**
The equipment under test has found to be compliant
with the applied standards

Test Lab. : CS Management Center, Samsung Electronics Co., Ltd.



Tested by : Sang Kyu, Seo

Reviewed by : No Cheon Park

Date of Issue : 2006. 03. 23

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1. General information

1.1 Basic information related product

Applicant	Samsung Electronics Co., Ltd.
Model name	ML-3051ND
Applicant address	416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do 443-742 Korea
Contact person	Sangsu, ROH
Kind of product	Laser Beam Printer
Valiant model	ML-3051N, ML3050
Manufacturer	1) Samsung Electronics Co., Ltd. 259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do, Korea 730-030 2) Shandong Samsung Telecommunications Co., Ltd. 264209, Samsung Road, Weihai Hi-Tech. IDZ, Shandong Province, P.R.China
Rated power	AC 120 V, 60 Hz
New / Alternative / Permissive change information	Permissive change 1. Main PBA version : Rev 0.2 -> Rev 0.4 2. HVPS PBA version : Rev 0.4 -> Rev 1.0 3. SMPS PBA version : Rev 0.91 -> Rev 0.93 4. Core added at LSU SW harness 5. Core added at Exit Motor harness 6. Conductive tape added at Main Shield Bracket

1.2 Detail Information related product

1.2.1 Specification

Item	Specification and Description
Print Speed	Black and White : Up to 28 PPM in A4(30 PPM in Letter)
Resolution	Printer: Up to 1200 x 1200 dpi(effective output)
First print out time	From Standby Mode Less than 17 seconds From ColdBoot Less than 47 seconds
Warm-up time	Less than 40 seconds
Power Rating	110 ~ 127 VAC, 6.4A, 50/60 Hz
Power Consumption	Average : 520 W Power Save mode : Less than 11 W
Noise Level	Printing mode: Less than 54 dBA Standby mode : Less than 39 dBA Warm-up: Less than 50dBA
Consumable life	Black Toner Cartridge : Approx. 4,000 A4/Letter pages at 5% Coverage
Duty cycle (Max. Monthly Volume)	Print: 100,000 pages
Weight	12.7 kg (including consumables)
Package weight	3.1 kg
External dimensions (W x D x H)	400 x 435 x 284 mm(15.7 x 17.1 x 11.2 in)
Operating Environment	Temperature : 10 ~ 32 °C (50 ~ 90 °F) Humidity : 20 ~ 80 % RH
Printer Language	PCL6, PostScript3, IBM ProPrinter, EPSON, SPL
Memory	64MB (MAX320MB)
Interface	USB 2.0
OS compatibility	Windows 95/98/Me/NT 4.0/2000/XP/2003. Various Linux OS Mac OS 10.1 ~ 10.4

1.2.2 Operating frequencies

Main Source Clock	: 12 MHz
Video Clock	: 12 MHz
SDRAM Clock	: 100 MHz
USB Device Clock	: 12 MHz
NPC Clock	: 25MHz

1.3 Operating mode and condition

The system was configured for testing in typical fashion use. Cables 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.

- Standby mode
- **USB Printing mode (1 200 dpi, toner save on) : worst case emissions**
- Parallel Printing mode
- LAN Printing mode
- Test Voltage : 120 V, 60 Hz

1.4 Equipment modifications

No equipment modifications were required.

1.5 Test procedure

1.5.1 Conducted emission

EUT was placed on a platform nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of tabletop was located 40 cm 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 80 cm 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 bindle 30 cm to 40 cm long and were handed at a 40 cm 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 30	EMI Receiver	Quasi-Peak	9 kHz	-
		Average	9 kHz	-

1.5.2 Radiated emission

EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of EUT, including peripherals was aligned and flush with rear of tabletop.

The I/O cables that were connected to the peripherals were bundle in center.

They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged 40 cm 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 turn table azimuth was varied to obtain the maximum signal strength

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 1 000 MHz using biconiLog antenna.

Also, the EMI Receiver was scanned from 1 000 to 2 000 MHz using linearly polarization

Double ridge horn antennas were 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 1 000	EMI Receiver	Quasi-Peak	120 kHz	-
Above 1 000	EMI Receiver	Peak	1 MHz	1 MHz

1.6 Test configuration

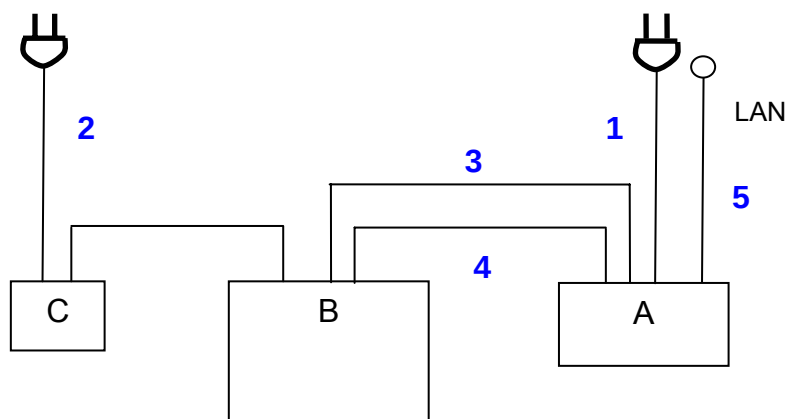
1.6.1 Used EUT and peripherals

Seq	Device	Model Name	Serial #	Maker	Note
A	Printer	ML-3051ND	–	Samsung	EUT
B	Notebook PC	Q20	I8619CWC00005	Samsung	–
C	AC Adaptor	AD-4212A	CNBA4400148ASE 383AK2463	Dong Guan SEM	–

1.6.2 Used cable description

No	Connect Cable	Length [m]	Shielded [Y/N]	Remark
1	Power	1.7	No	For printer
2	Power	1.7	No	For pc
3	Parallel	1.8	Yes	From printer to pc
4	USB	1.8	Yes	From printer to pc
5	RJ45C	2.0	No	For LAN

1.6.3 Block diagram



1.7 Applied Standards

Test standard	Test method
FCC Part 15:2003 Subpart B	ANSI C63.4:2003

1.8 Test Facility

1.8.1 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.

1.8.2 Accreditation and listing



1.8.3 Measurement uncertainty

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

Test item	Measurement uncertainty
Conducted emission	± 3.3 dB
Radiated emission Horizontal	± 4.0 dB
Vertical	± 4.4 dB

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	Test result
3.1	Conducted Emission	FCC Part 15:2003 Subpart B	Complied
3.2	Radiated Emission	FCC Part 15:2003 Subpart B	Complied

3. Description of individual tests

3.1 Conducted emission

3.1.1 Test information

Test engineer	Sang Kyu, Seo
Test date	March 15, 2006
Climate condition	Ambient temperature : 22.2 °C, Relative humidity : 33 % Atmospheric pressure 100.9 kPa
Test place	Shielded room # 1

3.1.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Next date	Interval (Month)
Test Software	EMC 32	R&S	None	N/A	N/A
Field strength meter	ESCI	R&S	100136	2006-04-17	12
L.I.S.N	ENV216	R&S	100116	2006-09-08	12
L.I.S.N	ENV216	R&S	100107	2006-08-18	12

EUT Test Setup

The EUT was set up as per normal use on a wooden table, 0.4 m from a vertical ground reference plane, At least 0.8 m from other conduction surfaces and 0.8 m from the LISN.

See photo.

Test Result

Measurement Results

Pass

The measured emissions of the EUT have found to be below the specified limits.

3.1.3 Test data and graph

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

Test Information

EUT Name: ML-3051ND
Serial Number:
Test Description: FCC Part 15
Operating Conditions: 110 VAC, 60 Hz
Operator Name: SSK
Comment:

Hardware Setup: Voltage with 2-Line-LISN - [EMI conducted]

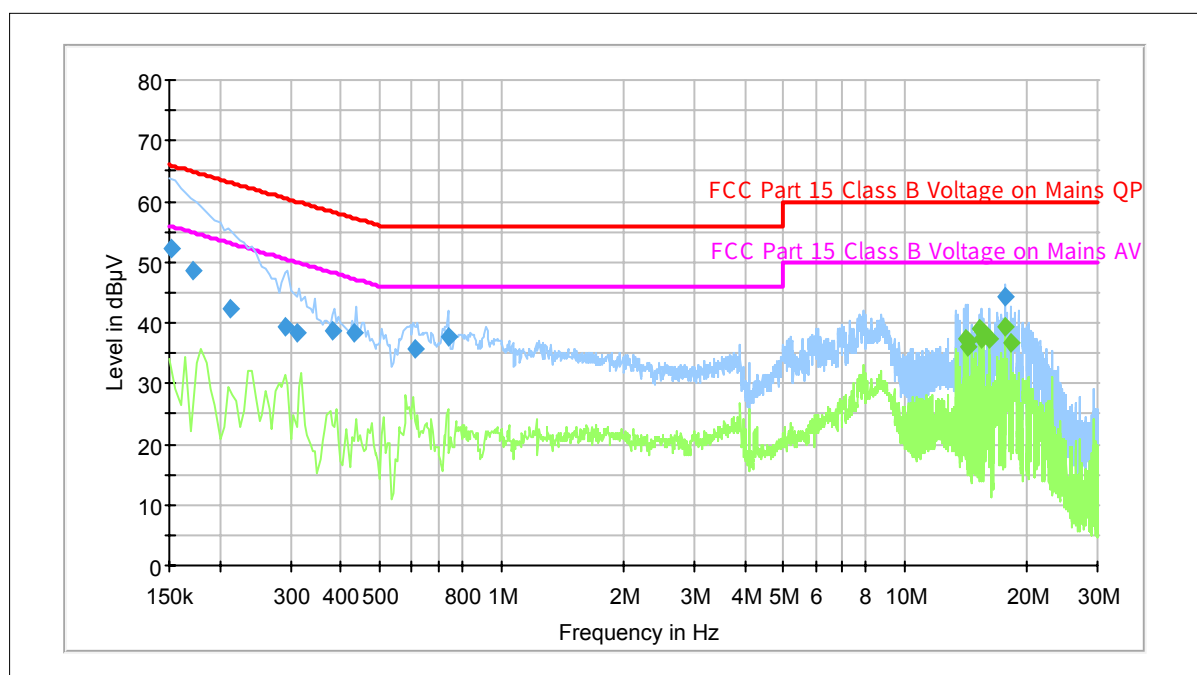
Subrange 1
Frequency Range: 150kHz - 30MHz
Receiver: ESCI 3
Transducer: ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: FCC Part 15 Class B_2-Line-LISN fin [EMI conducted]

Hardware Setup: Voltage with 2-Line-LISN
Level Unit: dB μ V

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
150kHz - 30MHz	QuasiPeak; Average	9kHz	5s	ESCI 3

FCC Part 15 Class _B with 2-Line-LISN



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dB μ V)	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Line
0.152000	52.3	9.6	13.6	65.9	N
0.172500	48.4	9.6	16.4	64.8	N
0.212500	42.4	9.6	20.7	63.1	N
0.292500	39.2	9.6	21.3	60.5	N
0.310500	38.2	9.6	21.8	60.0	N
0.380500	38.7	9.6	19.5	58.3	N
0.430500	38.4	9.6	18.9	57.2	N
0.610500	35.8	9.6	20.2	56.0	L1
0.736500	37.7	9.6	18.3	56.0	L1
17.694500	44.2	9.8	15.8	60.0	N

Final Measurement Detector 2

Frequency (MHz)	Average (dB μ V)	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Line
14.213500	37.3	9.8	12.7	50.0	N
14.274500	37.0	9.8	13.0	50.0	N
14.335500	36.2	9.8	13.8	50.0	N
15.250500	39.2	9.8	10.8	50.0	N
15.434500	38.7	9.8	11.3	50.0	N
15.556500	37.3	9.8	12.7	50.0	N
15.617500	38.5	9.8	11.5	50.0	N
16.228500	37.2	9.8	12.8	50.0	N
17.694500	39.4	9.8	10.6	50.0	N
18.243500	36.8	9.8	13.2	50.0	N

3.2 Radiated emission

3.2.1 Test information

Test engineer	Sang Kyu, Seo
Test date	March 14, 2006
Climate condition	Ambient temperature : 21.5 °C, Relative humidity : 34 % Atmospheric pressure 101.9 kPa
Test place	10 m Semi-anechoic Chamber

3.2.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Next date	Interval
Bi-con Antenna	CBL6141A	SCHAFFNER	4266	2006-05-24	12
Bi-con Antenna	CBL6141A	SCHAFFNER	4268	2006-05-24	12
EMI Receiver	ESI26	R&S	100287	2007-03-05	12
AMPLIFIER	310N	SONOMA	251677	2007-03-05	12
Ant Mast	MA4000	Inn-co	-	N/A	N/A
Ant Mast	MA4000	Inn-co	-	N/A	N/A
Mast Controller	CO2000	Inn-co	-	N/A	N/A

EUT Test Setup

EUT set up in semi-anechoic chamber. EUT positioned at 3 m from antenna in center of table.

All ports terminated into characteristic loads.

Test Result

Measurement Results	Pass The measured emissions of the EUT have found to be below the specified limits.
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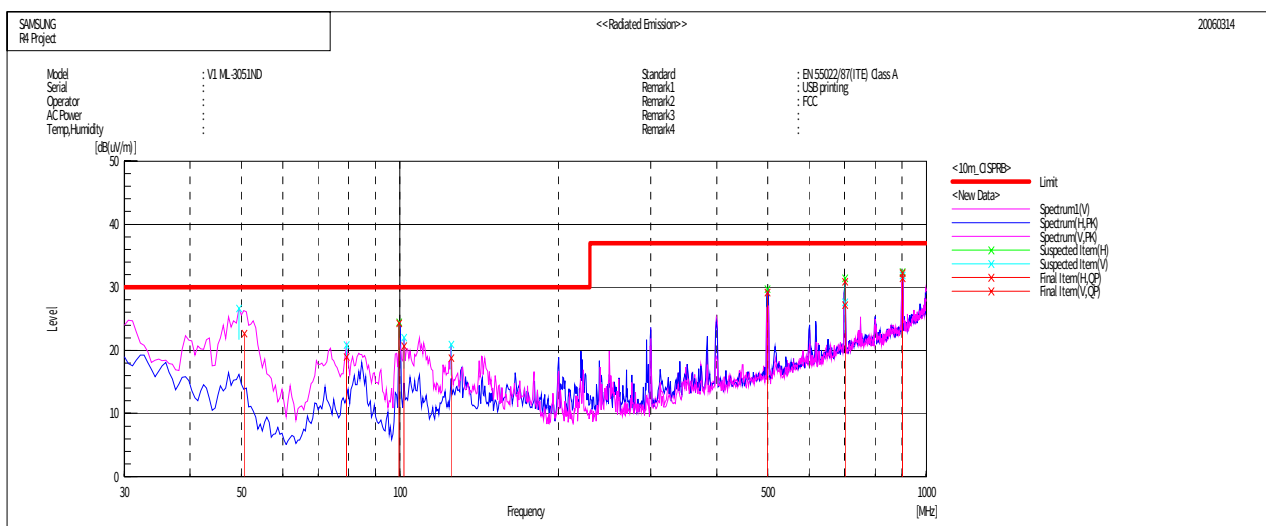
3.2.3 Test data and graph

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 emissions were reported.

All other emissions are non-significant

3.2.3.1 30 MHz ~ 1 000 MHz

■ Operating Mode: **H Printing, USB, 1 200 dpi, toner save on**



Final Result

No.	Frequency (P)	Reading	c.f	Result	Limit	Margin	Height	Angle	Remark
	[MHz]	[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[cm]	[deg]	
1	50.672	V 39.6	-16.9	22.7	30.0	7.3	130.0	140.1	
2	79.238	V 41.3	-22.3	19.0	30.0	11.0	100.0	9.5	
3	99.800	H 44.2	-19.9	24.3	30.0	5.7	400.0	338.0	
4	101.964	V 40.4	-19.7	20.7	30.0	9.3	100.0	145.4	
5	125.230	V 36.9	-18.1	18.8	30.0	11.2	100.0	124.0	
6	499.198	H 39.9	-10.7	29.2	37.0	7.8	200.0	109.4	
7	701.202	V 33.5	-6.3	27.2	37.0	9.8	200.0	305.6	
8	701.202	H 37.2	-6.3	30.9	37.0	6.1	100.0	232.3	
9	901.804	V 34.4	-2.9	31.5	37.0	5.5	200.0	327.9	
10	901.804	H 35.2	-2.9	32.3	37.0	4.7	400.0	358.1	

* Receiving antenna mode : Horizontal, Vertical

* Test distance : 3 m (Semi Anechoic Chamber)

* Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain)

* Margin = Limit – Reading

4. Appendix

4.1 Test photography



Picture 1. Conducted Emission (Front)



Picture 2. Conducted Emission (Rear)



Picture 3. Radiated emission (Front)



Picture 4. Radiated emission (Rear)

1.2 EUT photography



Picture 5. EUT (Front)



Picture 6. EUT (Rear)



Picture 7. EUT (Right Side)



Picture 8. EUT (Left Side)



Picture 9-1. Internal(1)



Picture 9-2. Internal(2)



Picture 9-3. Internal(3)

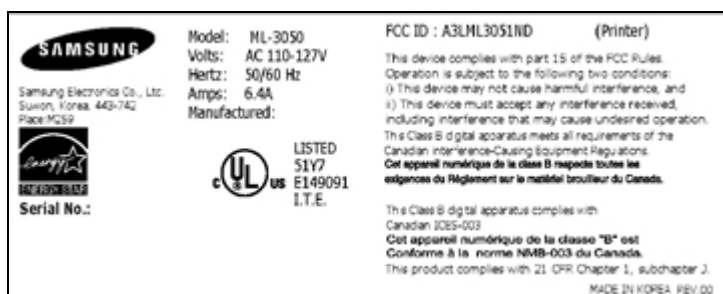
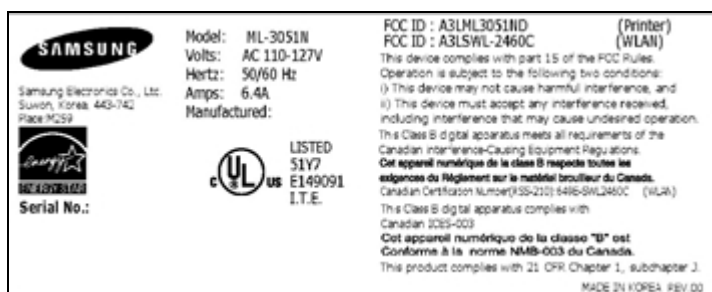
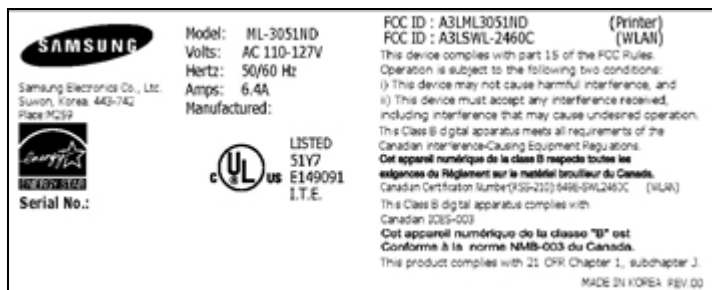


Picture 9-4. Internal(4)



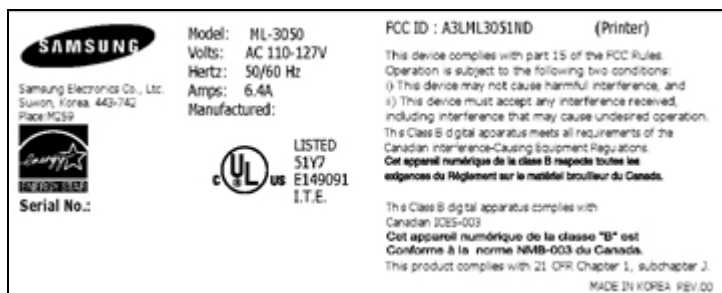
Picture 9-5. Internal(5)

4.3 Label and Label Location



- Samsung Electronics Co., Ltd. (Korea)

Picture 10-1. Label (ML-3051ND/ML-3051N/ML-3050)



- Shandong Samsung Telecommunications Co., Ltd.[China]

Picture 10-2. Label (ML-3051ND/ML-3051N/ML-3050)



Picture 11. Label location