EMC Test Report (Permissive II Change)

According to FCC Part 15 Subpart B

Project No.	LBE042282
Equipment under Test	
Applicant	Samsung Electronics Co. Ltd; 416 Maetan-3 Dong, Yeoung tong-Gu, Suwon City, Gyeonggi-Do, Korea, 442-742
FCC ID	**A3LML-2550**
Product Name	Laser Beam Printer
Model Name	ML-2552W
Manufacturer	Samsung Electronics Co. Ltd
Date of Test	December 10, 2004~ December 13, 2004
Issued Date	December 15, 2004

	Name/Position	Signature
Tested by	Kyeong Dong, Kim Test Engineer	
Reviewed by	No Cheon, Park Manager of EMC Lab.	N. C. Park
Authorized by	Kyu Baek, Chung Chief of EMC Lab.	K. B. Chung

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

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1. General Information

1.1 Basic Information related Product

Applicant Model name	Samsung Electronics Co. Ltd; ML-2552W
Applicant Address	416 Maetan3- Dong, Yeoung tong-Gu, Suwon City, Gyeonggi-Do, Korea, 443-742
Contact Person	Kyeong Dong, Kim
Kind of product	Laser Beam Printer
Valiant list	ML-2550 (Brand : Samsung) : Basic Model ML-2551N (Brand : Samsung) : with NIC Phaser 3450B (Brand : Xerox) : with Simplex Phaser 3450D (Brand : Xerox) : same as ML-2550 with Duplex Phaser 3450DN (Brand : Xerox) : with duplex, NIC Phaser 3450 (Brand : Xerox) : Multiple Model 9025 (Brand : Xerox) : same as ML-2550 except for Model No. 9025N (Brand : Xerox) : same as ML-2551N except for Model No.
Manufacturer	Samsung Electronics Co.Ltd;
New / Alternative / Permissive change Information	This report is permissive II change report - Original test report no. : LBE030992 Change Items - Main control board stack-up change ; 4 layer to 6 layer - NPC(Network printer care) change - PCB layout of shared NPC change - Embedded NPC added Refer to the critical component change item and picture of item, Annex I

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1.2 Detail Information related Product

Specification

Item	Specification	Remark
Speed	24PPM (A4)	-
Printing Resolution	1200 x 1200 dpi	-
Memory	Basic 32MB, Max. 160MB	-
CPU	Power PC 603e compatible interface controller	-
Interface	IEEE1284 1Port, USB2.0 1Port, Ethernet 10/100 Base TX, IEEE 802.11b Wireless LAN	-
Power Consumption	AC 220-240V, 50/60Hz	-
External Dimensions	386mm X 436mm X 326mm	-
Weight	13.5kg	-

Operating Frequency

Video : 5.97MHz,CPU:50MHz,LPEC clock:20MHz,Main Clock:12.5MHz

USB clock:30MHz,N/W clock:25MHz

Wireless LAN BW:2.4GHz

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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 have Wireless Printing server function so Host PC link to EUT and transfer print file formation "H" character document continuously.

ML-2552W is supporting the IEEE1284,USB,LAN,Wireless LAN printing mode.
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 was reported.

1.4 Test System Details

None

1.5 Equipment Modifications

No equipment modifications were required.

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1.6 Test Procedure

1.6.1 Disturbance Voltage at Mains

EUT was placed on a platform nominal size, 1m by 1.5m, raised 80cm above the conducti ng ground plane. The rear of tabletop was located 40cm to the vertical conducting groud 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.

1.6.2 Radiated disturbance

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

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.

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1.7 Test Configuration

Used EUT and Peripherals

Seq	Device	Model Name	Serial #	Maker	Note
A	LBP	ML-2552W	-	Samsung	E.U.T
B	Notebook PC	SQ20	KRBA9602113AB 2WF36U0192	Samsung	-
C	AC Adapter	AD-4212A	CNBA4400148AS E383AK	Dongguan SEM	-
D	MP3 Player	M8541	U22370Z2MJ2	Apple	-
E	Serial Mouse	OK-720	-	Mass Corp.	-

Used Cable Description

	Connect Cable	Length [m]	Shielded [Y/N]	Remark
1	Parallel (Printer)	1.8	Yes	-
2	USB	1.8	Yes	-
3	Wireless LAN	-	No	-
4	LAN (RJ45)	3.5	No	-
5	1394	1.2	Yes	-
6	Serial	1.5	No	-
7	Power	1.8	No	-
8	Power	1.8	No	-

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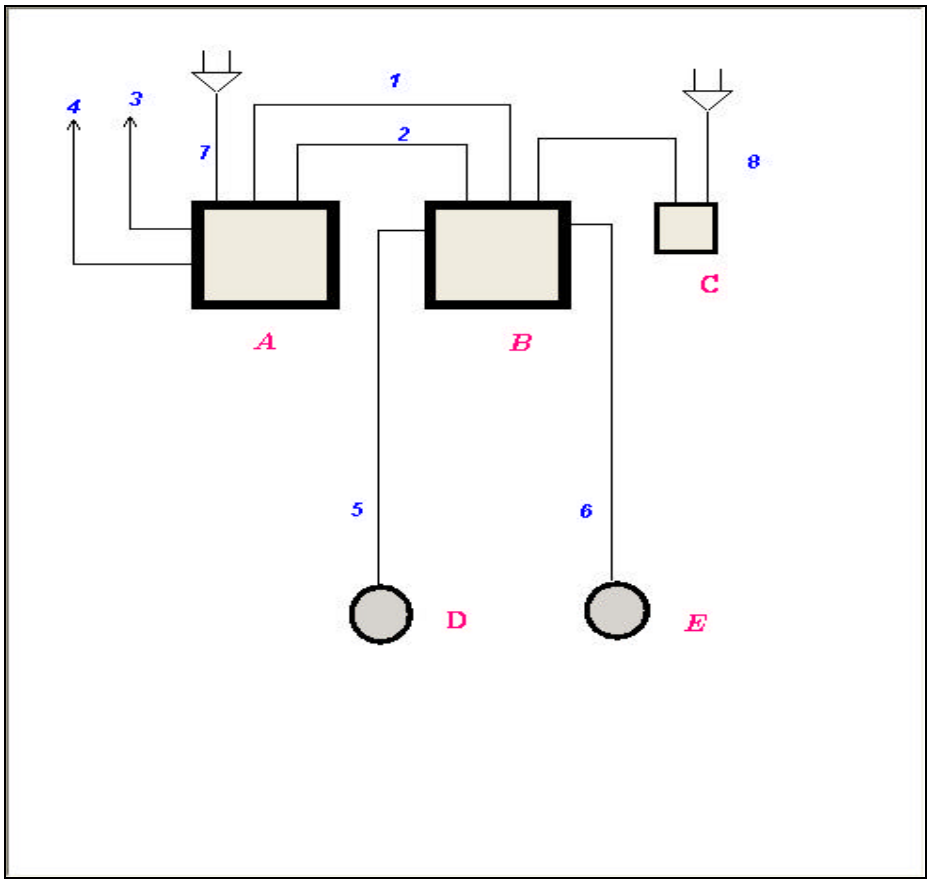
Block Diagram



1.8 Applied Standards

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List

Product or Generic Standards	Basic Standards
FCC Part15	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 Agreement (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 NAMAS Pub.NIS81)

Samsung IT EMC Test Lab.

Disturbance voltage at Mains : ±1.9dB

Radiated disturbance Bi-Log Antenna : ±5.1dB

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			
2.1	Conducted Emission	FCC Part15	Complied
2.2	Radiated Emission	FCC Part15	Complied

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3.1 Conducted Emission

Test Information	
Test Engineer	Kyeong Dong, Kim
Test Date	December 13, 2004
Climate Condition	Ambient Temperature :24 ? Relative Humidity : 37%
	Atmospheric Pressure 1028mbar
Test Place	Shielded Room

Test Equipments

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
EMI TEST RECEIVER	ESCS30	R&S	830986/004	2005-02-12	12
LISN	ESH3-Z5	R&S	100263	2005-05-25	12
LISN	3810/2NM	EMCO	2251	2005-02-07	12
Double 2-Wire ISN	ENY22	R&S	836727/016	2005-02-23	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. USB Printing - TEST DATA & GRAPH

1. Quasi Peak Table

Frequency	Meter Reading	Total Loss	Phase	Result	Limit	Margin
[MHz]	[dBuV]	[dB]		[dBuV]	[dBuV]	[dB]
0.150000	57.4	0.60	L1	58.0	66.0	8.0
0.155000	56.5	0.60	L1	57.1	65.7	8.6
0.175000	54.3	0.60	N	54.9	64.7	9.8
0.180000	53.7	0.60	N	54.3	64.5	10.2
0.210000	49.9	0.60	L1	50.5	63.2	12.7
14.055000	38.9	1.50	L1	40.4	60.0	19.6
14.125000	36.8	1.50	L1	38.3	60.0	21.7

2. Average Table

Frequency	Meter Reading	Total Loss	Phase	Result	Limit	Margin
[MHz]	[dBuV]	[dB]		[dBuV]	[dBuV]	[dB]
3.900000	28.9	0.80	N	29.7	46.0	16.3
13.585000	32.5	1.50	N	34.0	50.0	16.0
13.790000	29.4	1.50	L1	30.9	50.0	19.1
13.855000	33.3	1.50	L1	34.8	50.0	15.2
13.920000	33.3	1.50	N	34.8	50.0	15.2
14.190000	33.3	1.50	L1	34.8	50.0	15.2
14.275000	30.2	1.50	L1	31.7	50.0	18.3
14.390000	32.8	1.50	L1	34.3	50.0	15.7
14.525000	32.1	1.60	L1	33.7	50.0	16.3

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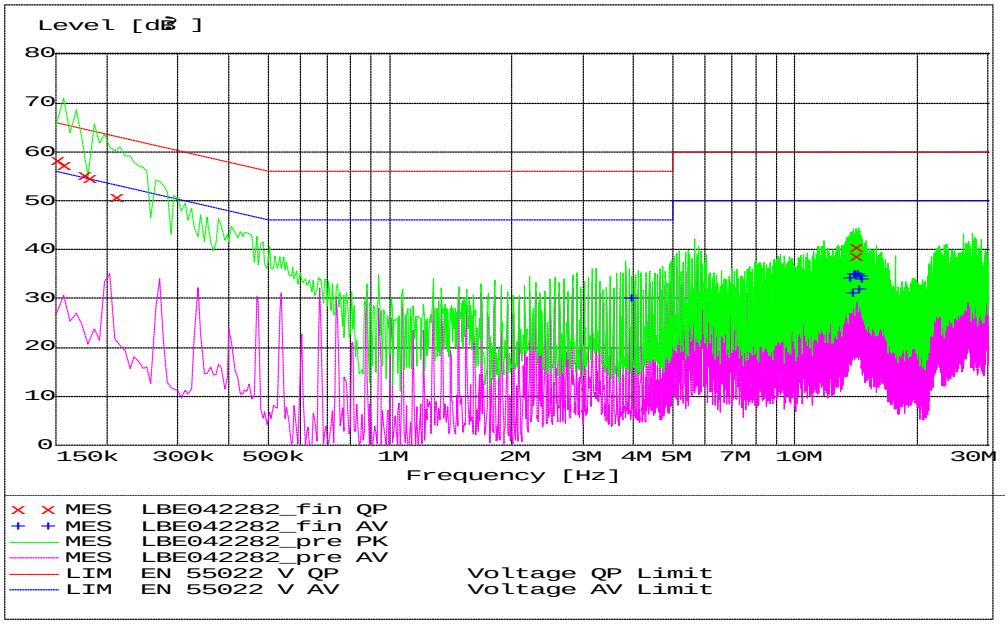
- Graph -



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3.2 Radiated Emission

Test Information	
Test Engineer	Kyeong Dong, Kim
Test Date	December 10, 2004
Climate Condition	Ambient Temperature : 24.5? Relative Humidity : 40% Atmospheric Pressure 1019mbar
Test Place	10m RF 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	2005-02-12	12
BILOG Antenna	CBL6112B	Schaffner	2805	2005-02-23	12
Test Receiver	ESI26	R&S	100010	2005-03-16	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 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

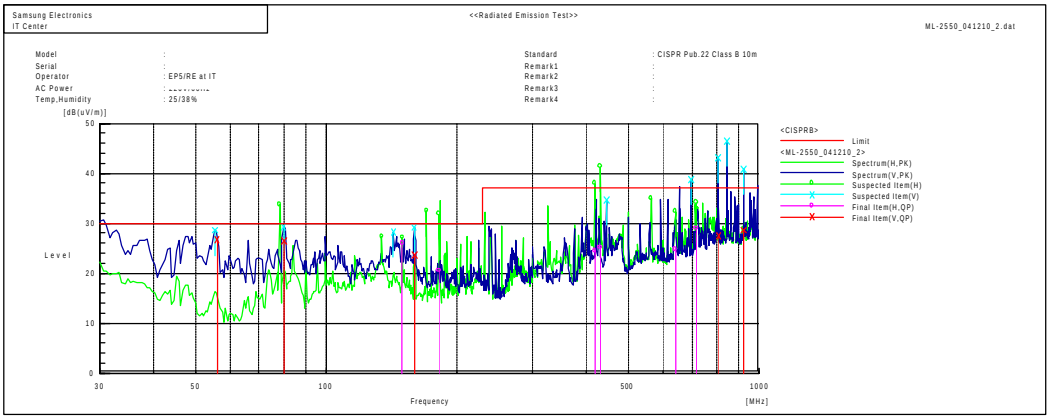
* Test distance : 10m (Semi-Anechoic Chamber)

* Result = Meter Reading + Total Loss(Antenna factor + Cable loss – Amplifier Gain)

* Margin = Limit – Result

1. USB Printing- Graph -

Samsung Electronics Co., Ltd
IT Center



Final Result

No.	Frequency [MHz]	(P)	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	56.018	V	40.8	-14.2	26.6	30.0	3.4	138.0	166.0	
2	80.069	V	39.5	-13.0	26.5	30.0	3.5	142.0	131.0	
3	150.031	H	34.4	-8.5	25.9	30.0	4.1	390.0	54.0	
4	160.182	V	32.9	-9.2	23.7	30.0	6.3	113.0	136.0	
5	182.585	H	30.7	-10.2	20.5	30.0	9.5	200.0	157.0	
6	417.836	H	26.0	-1.6	24.4	37.0	12.6	100.0	350.0	
7	430.461	H	26.3	-1.2	25.1	37.0	11.9	200.0	238.0	
8	640.159	H	21.7	3.1	24.8	37.0	12.2	319.0	256.0	
9	716.935	H	25.4	3.5	28.9	37.0	8.1	120.0	209.0	
10	806.055	V	22.6	4.8	27.4	37.0	9.6	171.0	287.0	
11	921.899	V	22.6	6.0	28.6	37.0	8.4	130.0	95.0	

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4. Appendix

4.1 Test Photography

Pic. 1 Conducted Emission (Front)

Pic. 2 Conducted Emission (Rear)

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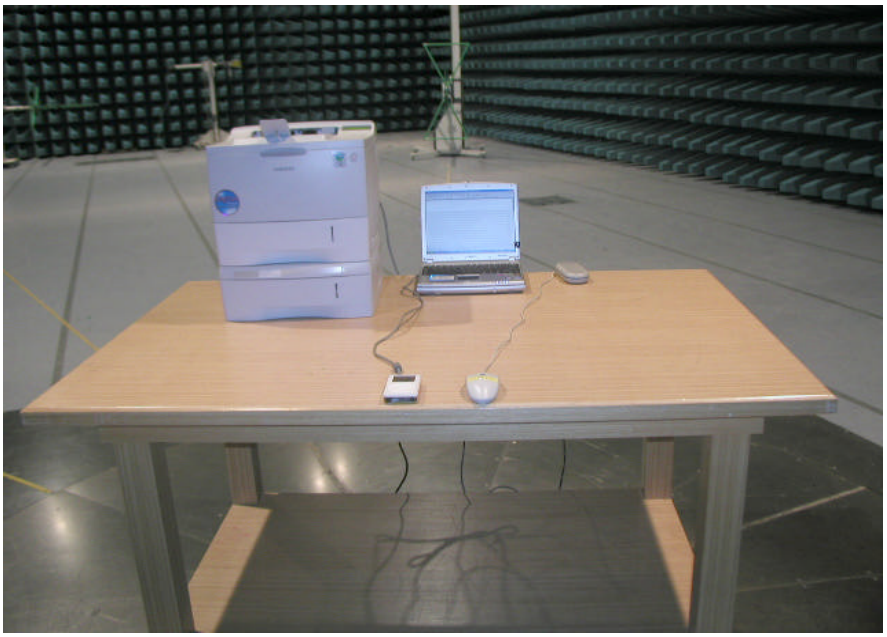
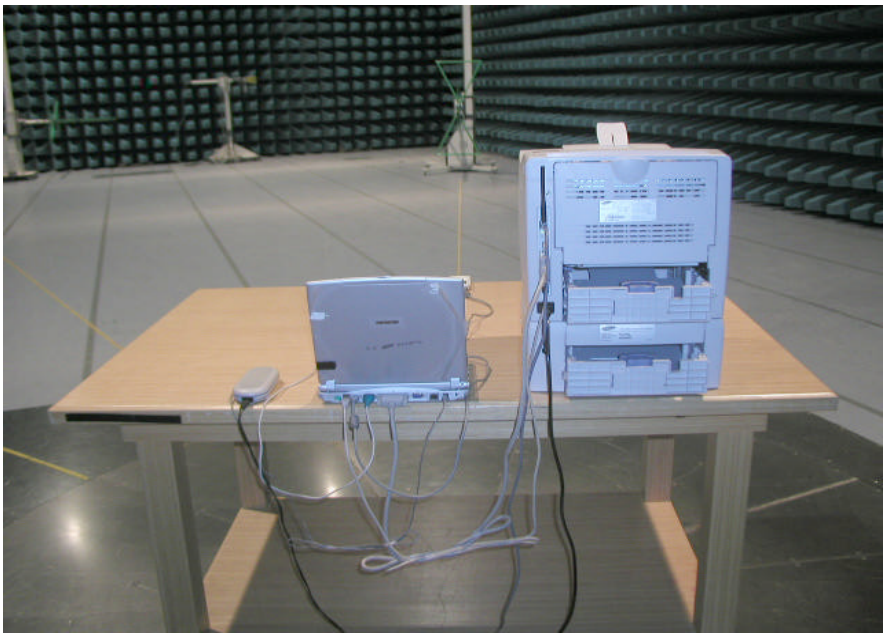


Pic. 3 Radiated Emission (Front)



Pic. 4 Radiated Emission (Rear)

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4.2 EUT Photography

Pic. 5 EUT (Front)

Pic. 6 EUT (Rear)

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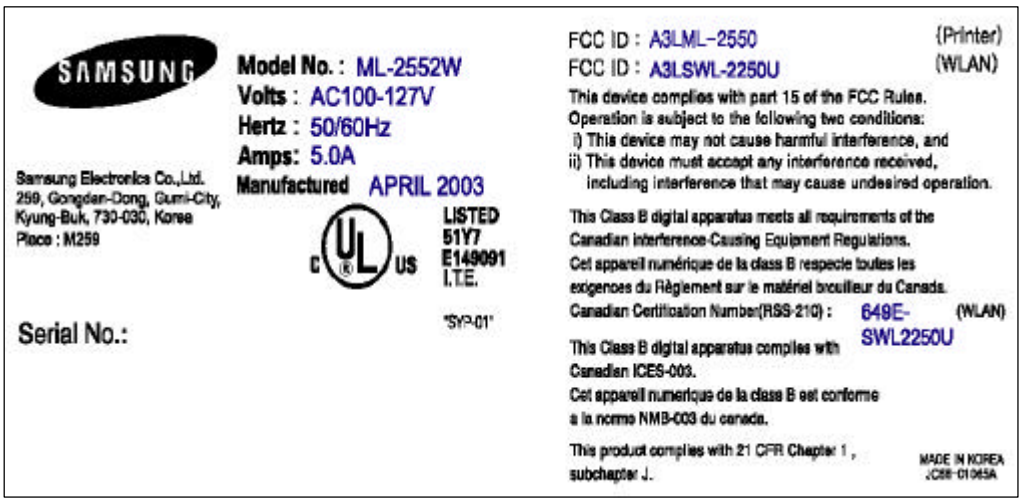
Pic. 7 EUT (Internal)



Pic. 8 Label Rating

Annex I

A.1 Critical component change information

- Before

Model Code	Type	Note
NET2270	16BIT,64P,30MHZ	IC-USC(U5)
FS781BZB	SOP,8P,150MIL,	IC-CLOCK GEN(U33)
CY25814SC Crystal Oscillator	SOIC,8P,150MIL 30MHz,50ppm,	IC-CLOCK GEN(U15,U16) CRYSTAL-UNIT(OSC1)
Crystal Oscillator	5.97MHz,50ppm,	CRYSTAL-UNIT(OSC2)
Crystal Oscillator	12.5MHZ,50ppm	CRYSTAL-UNIT(OSC3)
Crystal Oscillator	20MHZ,20PPM	CRYSTAL-UNIT(OSC4)

- After

Model Code	Type	Note
SPGPV3	ML-2550_VE,496PIN, ,PBGA	IC-ASIC(U10)
ISP1582BS A3977SLP	56P,12MHZ, TSSOP,28P,9.6X4.5X1.2MM,-	IC-USC(U13) IC-Motor Driver(U7)
CY25811	SOIC,8P,150MIL	IC Clock gen.(U8, U11)
Crystall Oscillator	12MHz, 50ppm	Crystal-Unit(OSC1)
Crystall Oscillator	12MHz, 50ppm	Crystal-Unit(OSC2)
Crystall Oscillator	12MHz, 50ppm	Crystal-Unit(OSC3)

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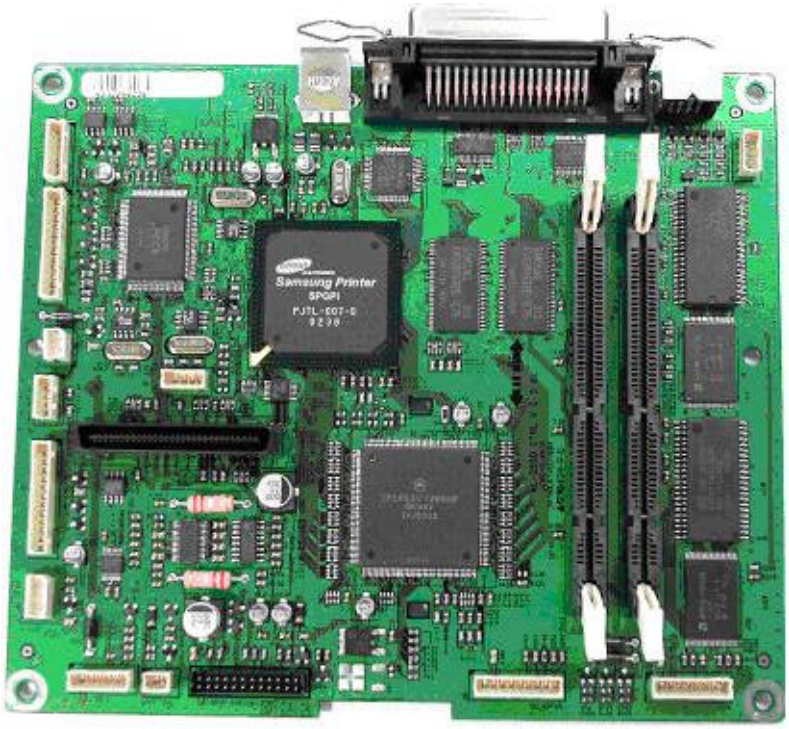
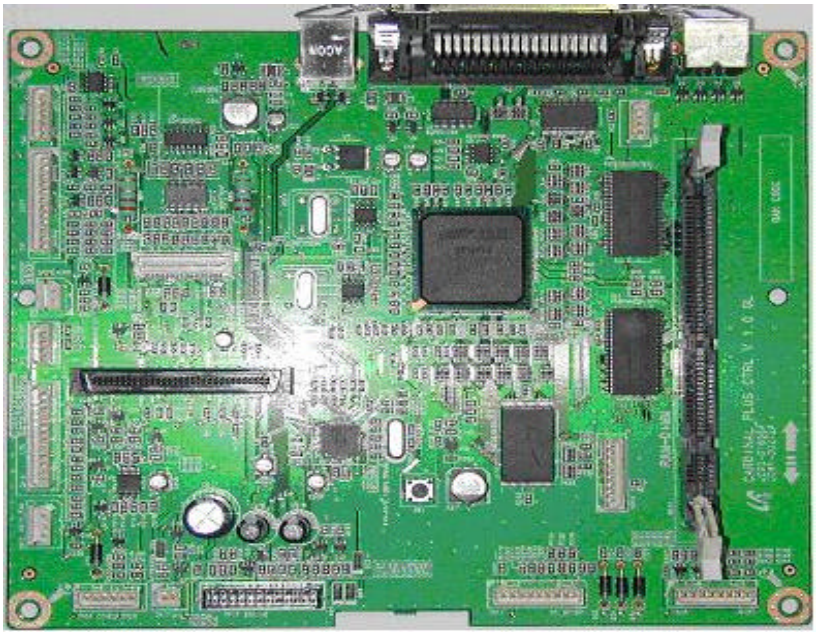
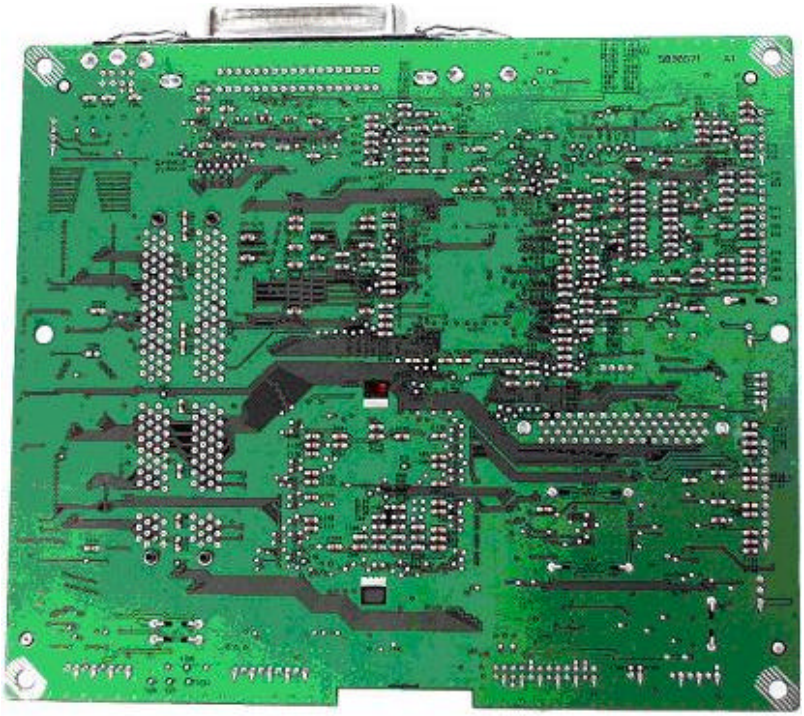
A.2 Picture Information



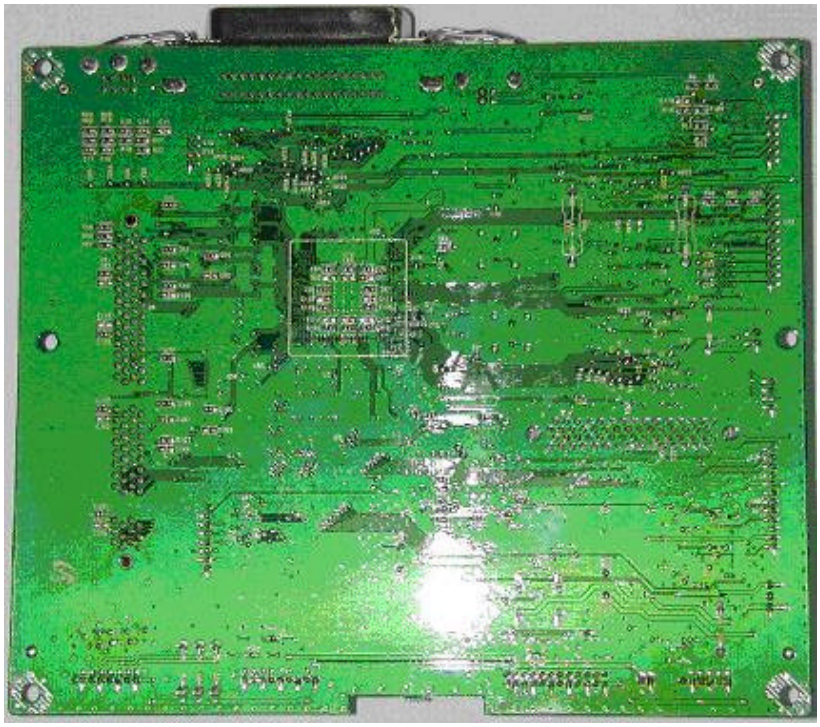
Mainboard Front (Before)



Mainboard Front (After)



Mainboard Rear (Before)



Mainboard Rear (After)

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Shared NPC Front (Before)

Shared NPC Front (After)

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Shared NPC Rear (Before)

Shared NPC Rear (After)

Additional embedded NPC Front

Additional embedded NPC Rear