SAMSUNG ELECTRONICS

EMI TEST REPORT

FCC Part 15 Subpart B, Class B

Product : Laser Printer
Model No. : ML-1250

JOB NO. : KE-01-0312

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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 : June 14, 2001

Issued Date : June 19, 2001

Prepared by:
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1. General Information

APPLICANT	:	SAMSUNG ELECTRONICS CO., LTD.
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CONTACT PERSON	:	Jun Won, Kim TEL. +82-31-200-4325
CONTACT ADDRESS	:	416, Maetan-3Dong, Paldal-Gu Suwon-City, Kyungki-Do, Korea 442-742
REGULATION(S)	:	FCC Part 15 Subpart B, Class B
MODEL NUMBER	:	ML-1250
SERIAL NUMBER	:	-
KIND OF PRODUCT	:	Laser Printer
TESTED DATE	:	June 14, 2001
TEST SITE	:	3meter semi-anechoic chamber
TEST SITE ADDRESS	:	San 14, Nongseo-Ri, Kihung-Eup, Yongin-City, Kyungki-Do, Korea, 449-900

1.1 Product Description

The Samsung ML-1250 print at 1200dots per inch class,12 pages-per-minute.
Standard 150 sheet automatic input tray and a 1-sheet manual input tray support various sizes,types.
Main System Clock is 20MHz, Vedeo clock 44MHz, USB clock 48MHz and crystal clock 6.7149MHz.
Power rating is AC100~127V and 250W Power consumption during operation and less than 10W in sleep mode. See the attached ML-1250 User's Guide for more information.

1.2 Tested System Details

The FCC IDs for all equipment, plus descriptions of all products used in the tested system are:

	Device Type	Manufacturer	Model Number	Serial No.	FCC ID / DoC
(1)	Laser printer (EUT)	Samsung	ML-1250	N/A	A3LML1250
(2)	PC	SAMSUNG	TD260-DT	C92DK409981	FCC DoC
(3)	Monitor	Samsung	SyncMaster 17GLsi	H3MF400637	FCC DoC
(4)	Keyboard	Samsung	5900	K09141644	FCC DoC
(5)	Mouse	Logitech	M-SAS51	LZB00478743	JNZ211167
(6)	External Modem	US Robotics	SPORTSTER	33083962	CJE-0149-217

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in FCC/ANSI C63.4(1992).
Radiated testing was performed at a distance of 3 meters from the antenna to EUT.

1.4 Test Facility

All test described in this report were performed by :

☐ Open area test site : 781-14, Chung-Ri, Dongtan-Myun, Hwasung-Kun, Kyungki-Do, Korea
■ Conducted measurement facility and 3meter Semi-anechoic chamber :
San 14, Nongseo-Ri, Kihung-Eup,Yongin-City, Kyungki-Do, Korea, 449-900

2. System Test Configuration

2.1 Operation Environment

	Conduction	Radiation
Temperature [℃] :	25	25.5
Humidity [%] :	42	44
Power supply :	AC115V/60Hz	AC115V/60Hz

2.2 Justification

The system was configured in typical fashion(as a customer would normally use it) for testing.

2.3 EUT Exercise Soft ware

The EUT exercise program used during radiated and conducted testing is word editor(Hun2000).Type H character on decument 10 page and then execute print to EUT continuously.

2.4 Test Procedure

2.4.1 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.

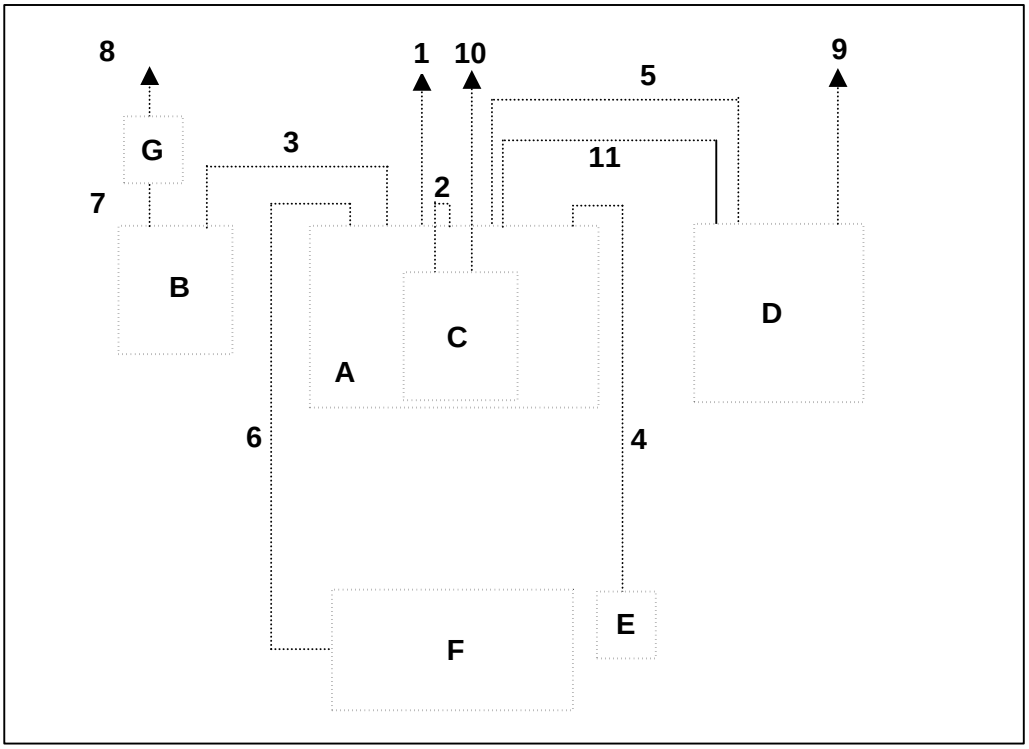
All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment.

2.4.2 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.
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 to obtain the maximum signal strength.

2.5 Test System configuration

2.5.1 System Block Diagram of Test Configuration



2.5.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	Remark
A	Desktop computer	TD260-DT	C92DK409981	Samsung	
B	External Modem	SPORTSTER	33083962	US ROBOTICS	
C	Monitor	SyncMaster 17GLsi	H3MF400637	Samsung	
D	Laser Printer	ML-1250	-	Samsung	EUT
E	PS/2 Mouse	M-SAS51	LZB00478743	Logitech	
F	Keyboard	5900	K09141644	Samsung	
G	AC/DC Adaptor	AW-1220A	-	US ROBOTICS	

2.5.3 Used Cable Description

No.	Item	Length[m]	Shielded(Y/N)	Remark
1	AC Power cable	1.7	N	
2	Video cable	1.5	Y	
3	Serial cable	1.5	Y	
4	Mouse cable	2.0	Y	
5	Printer cable	1.8	Y	
6	Keyboard Cable	1.7	Y	
7	DC Power cable	1.7	N	
8	AC Power cable	1.7	N	
9	AC Power cable	1.7	N	
10	AC Power cable	1.7	N	
11	USB	1.8	Y	

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3. Conducted and Radiated Measurement Photos

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

3.1 Conducted Measurement Photos

- ***Conduction(Front View)***

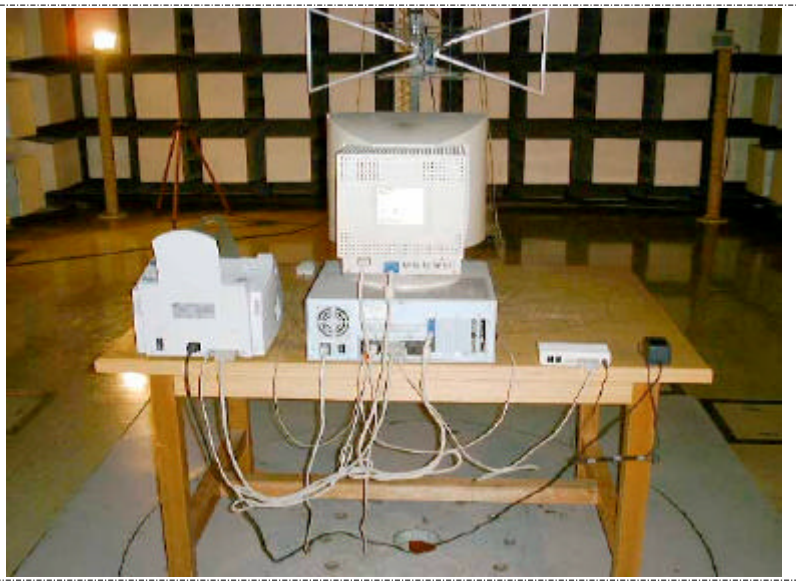
- ***Conduction(Rear View)***

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

3.2 Radiated Measurement Photos

- ***Radiation(Front View)***

- ***Radiation(Rear View)***



4. Measurement Uncertainty

All data in report are to be traceability to the national or international standards.

4.1 Conducted Emission Test

The measurement uncertainty(with a 95% confidence level)for this test was ±2.08dB.

☐ The data listed in this test report may exceed the test limit because it does not have enough margin(more than 2.0dB).

■ *The data listed in this test report has enough margin, more than 2.08dB.*

4.2 Radiated Emission Test

The measurement uncertainty(with a 95% confidence level)for this test was as follow

30MHz~200MHz : ±4.50 200MHz~1000MHz : ±5.23

☐ The data listed in this test report may exceed the test limit because it does not have enough margin(more than 2.0dB).

■ *The data listed in this test report has enough margin, more than 3.4dB.*

5. Conducted Emission Test Data

The initial step in collecting conducted data was to perform a quasi-peak scan over the measurement range using a spectrum analyzer.
All modes of operation(parallel and USB modes) were investigated and the worst case emission(printing on USB connection) was reported.
All other emission are non-significant.

The minimum margin to the limit is as follows :

Frequency	:	**20.157**	[MHz]
Meter Reading	:	**41.5**	[dBuV]
LISN Loss	:	**0.55**	[dB]
Cable loss	:	**0.8**	[dB]
Corrected Readings	:	**42.85**	[dBuV/m]
Margin	:	**-5.11**	[dB]

○ **Test Data Sheet**

Tested Frequency	Meter Reading [A]	LISN Pol.	Factor[B] LISN Loss	Factor[B] Cable Loss	Corrected Reading [A+B]	Limits	Margin
[MHz]	[dBuV]	[L1/L2]	[dB]		[dBuV/m]	[dBuV/m]	[dB]
0.765	**32.41**	**L2**	**0.14**	**0.40**	**32.95**	**47.96**	**-15.01**
1.645	**32.90**	**L1**	**0.18**	**0.40**	**33.48**	**47.96**	**-14.48**
11.458	**33.85**	**L2**	**0.35**	**0.70**	**34.90**	**47.96**	**-13.06**
11.610	**33.96**	**L2**	**0.39**	**0.70**	**35.05**	**47.96**	**-12.91**
20.141	**40.62**	**L1**	**0.55**	**0.80**	**41.97**	**47.96**	**-5.99**
20.157	**41.50**	**L1**	**0.55**	**0.80**	**42.85**	**47.96**	**-5.11**
24.173	**40.22**	**L2**	**0.63**	**0.80**	**41.65**	**47.96**	**-6.31**
24.184	**40.85**	**L1**	**0.63**	**0.80**	**42.28**	**48.96**	**-6.68**

* All readings are quasi-peak mode.
* Set resolution bandwidth to 9kHz minimum.
* Results = Meter Reading + LISN Insertion loss + Cable loss
* Margin = Corrected Reading - Limits
* L1 = Hot, L2 = Neutral

6. Radiated Emission Test Data

The initial step in collecting conducted data was to perform a quasi-peak scan over the measurement range using a spectrum analyzer.
All modes of operation(parallel and USB modes) were investigated and the worst case emission(printing on USB connection) was reported.
All other emission are non-significant.

The minimum margin to the limit is as follows :

Frequency	:	**460.00**	[MHz]
Meter Reading	:	**24.2**	[dBuV]
Antenna Factor	:	**14.70**	[dB]
Cable loss		**2.24**	[dB]
Corrected Reading	:	**41.1**	[dBuV/m]
Margin		**-4.86**	[dB]

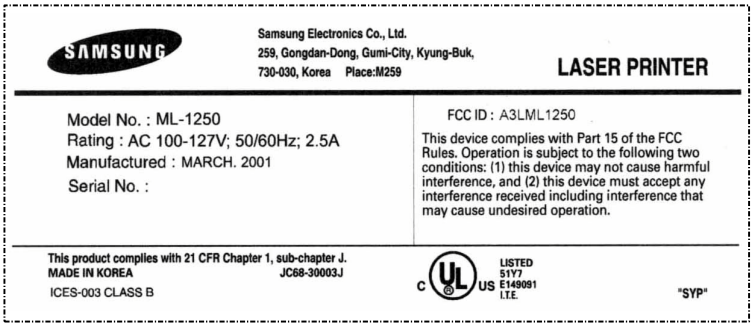
○ **Test Data Sheet**

Frequency Range [MHz]	Tested Frequency [MHz]	Ant. Pol.	Meter Reading [A] [dBuV]	Factor[B] [dB] Ant. Factor	Factor[B] [dB] Cable Loss	Antenna Height [Cm]	Turn table Degree [Deg]	Corrected Reading [A+B] [dBuV/m]	Margin [dB]	Limits [3m] [dBuV/m]
30 - 88	**34.4**	**V**	**14.50**	**17.10**	**0.10**	**130**	**80**	**31.70**	**-8.30**	**40**
	44.8	**V**	**19.20**	**11.30**	**0.10**	**140**	**110**	**30.60**	**-9.40**	
	52.2	**V**	**19.90**	**6.80**	**0.13**	**150**	**100**	**26.83**	**-13.17**	
	68.1	**V**	**18.80**	**6.60**	**0.30**	**130**	**150**	**25.70**	**-14.30**	
88 - 216	**119.9**	**V**	**17.60**	**9.80**	**0.80**	**150**	**100**	**28.20**	**-15.30**	**43.5**
	135.2	**V**	**20.20**	**8.40**	**0.75**	**130**	**90**	**29.35**	**-14.15**	
216 - 960	**240.0**	**H**	**28.40**	**9.00**	**1.46**	**160**	**90**	**38.86**	**-7.14**	**46**
	260.0	**H**	**28.60**	**9.80**	**1.50**	**130**	**100**	**39.90**	**-6.10**	
	400.0	**H**	**20.80**	**13.50**	**2.10**	**130**	**110**	**36.40**	**-9.60**	
	440.0	**V**	**24.30**	**14.30**	**2.20**	**110**	**150**	**40.80**	**-5.20**	
	460.0	**V**	**24.20**	**14.70**	**2.24**	**120**	**170**	**41.14**	**-4.86**	
	660.0	**V**	**18.40**	**18.20**	**2.72**	**150**	**80**	**39.32**	**-6.68**	
960 -										**54**

* "<" Means equal or less than * All readings are quasi-peak mode.
* The selected bandwidth in emission testing is 100kHz.
* Corrected Reading = Meter Reading + Antenna Factor + Cable loss
* Margin = Corrected Reading - Limits
* H = Horizontal Polarization/Antenna, V = Vertical Polarization/Antenna

7. Label and Label Location

7.1 Label



7.2 Label location

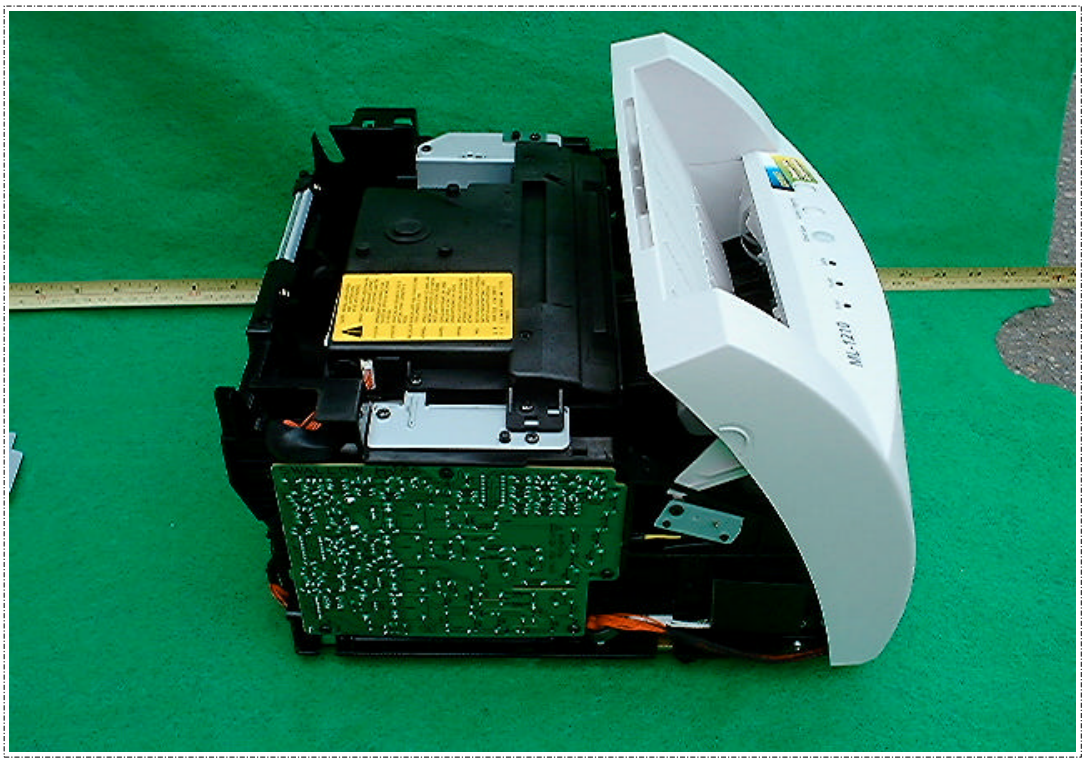
8. Test Equipment Used

Equipment	Model No.	Serial No.	Makers	Last calibration and Interval
Spectrum analyzer	8568B	2928A04826	H.P	00/06/28, 12Months
		Firmware versions : REV 7.4.87		
Quasi-peak adapter	85650A	2811A01342	H.P	00/06/28, 12Months
RF Preselector	85685A	2837A00835	H.P	00/06/28, 12Months
EMI Test Receiver	ESCS30	830986/004	R & S	01/01/06, 12Months
		F/W ver. : N/A		
L.I.S.N	ESH2-Z5	831886/006	R & S	00/11/30, 12Months
	3825/2	1408	EMCO	00/11/11, 12Months
Biconilog Antenna	HL 562	361324/003	R & S	01/01/22, 12Months
EMI Measurement Software	HP	Firmware versions : Rev. A.00.00		

Front view of EUT

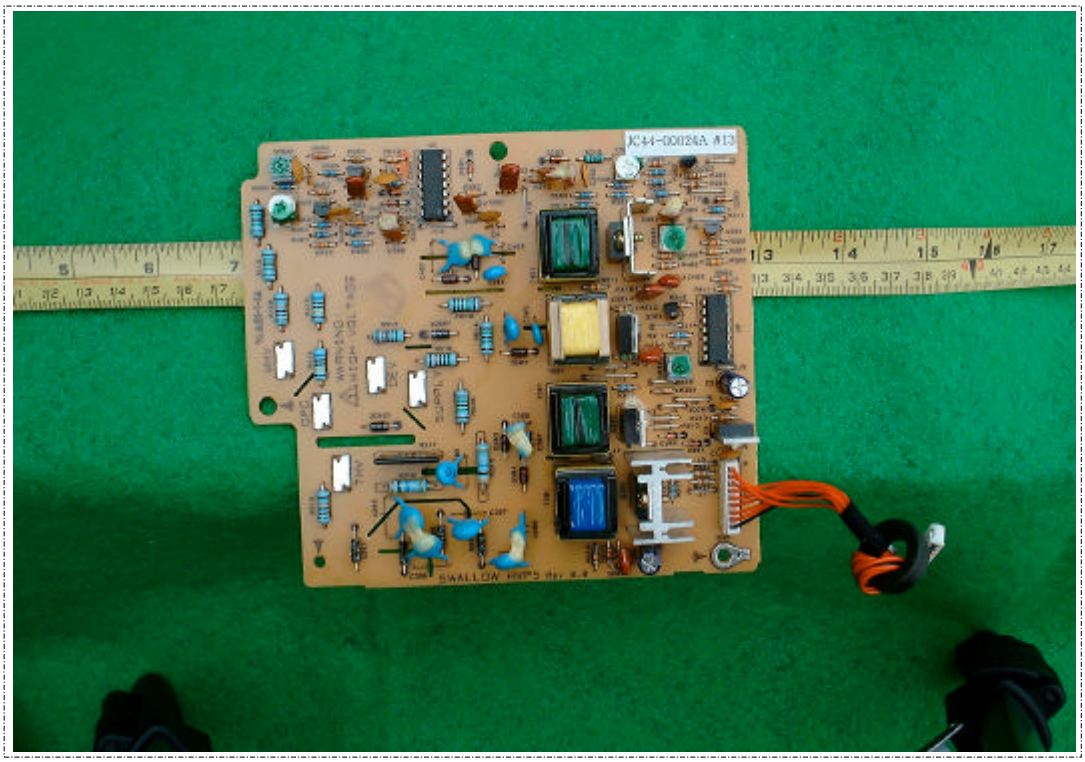
Rear view of EUT

Internal view of EUT

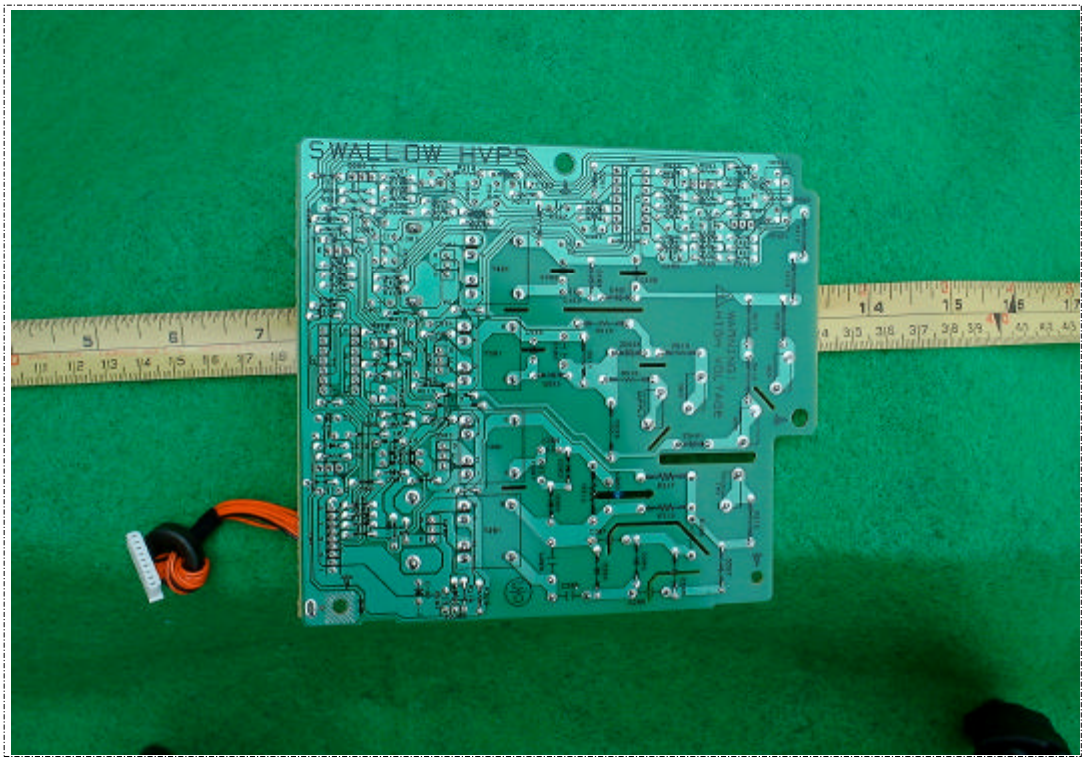


Side view of EUT

PCBs view of HVPS b'd

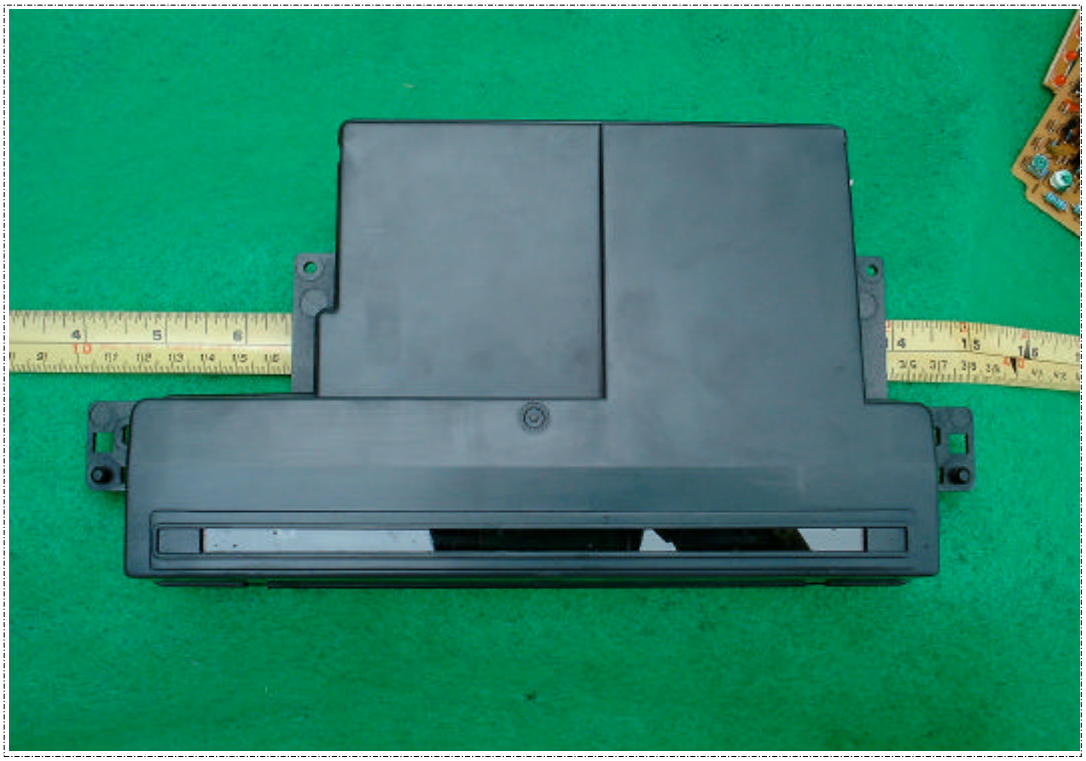


Solder view of HVPS b'd

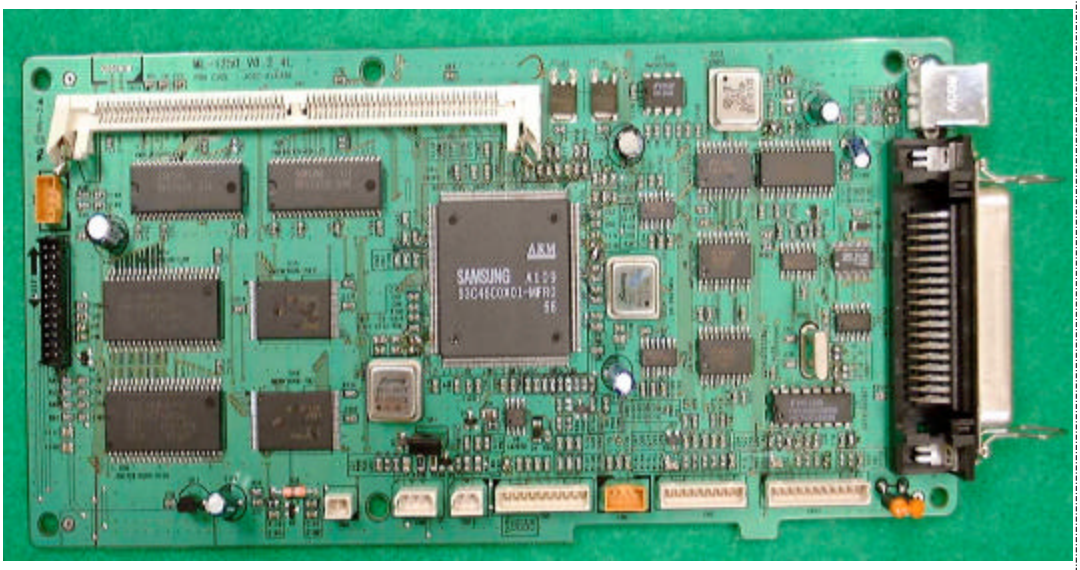


Front view of LSU

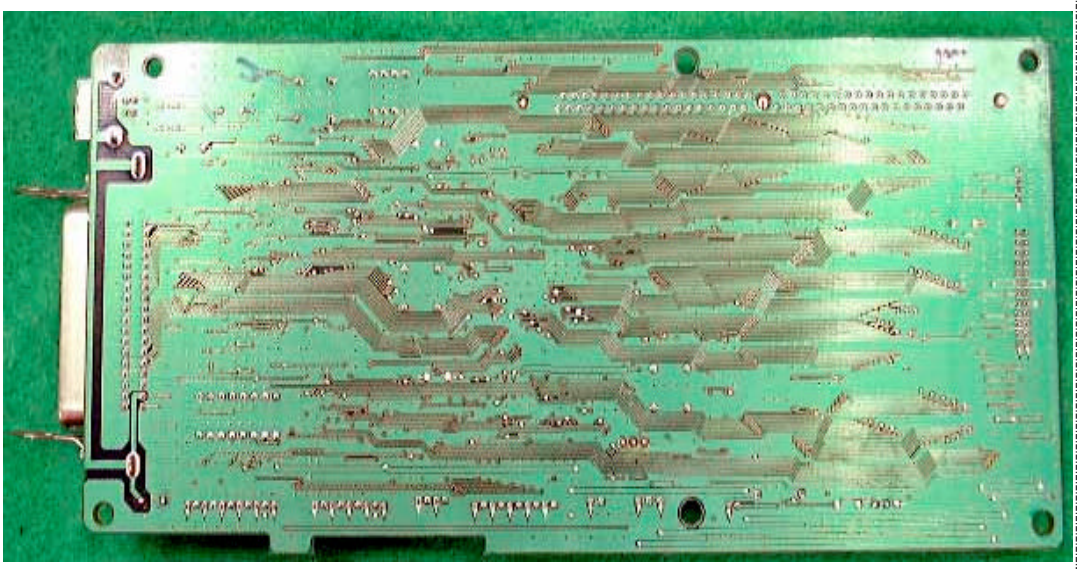
Rear view of LSU



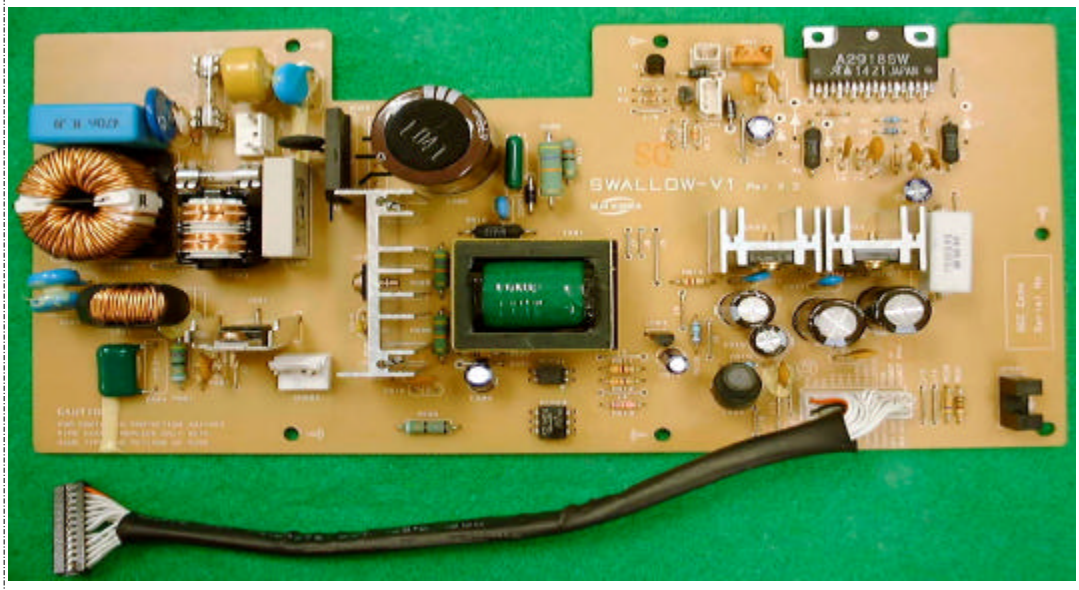
PCBs view of controller b'd



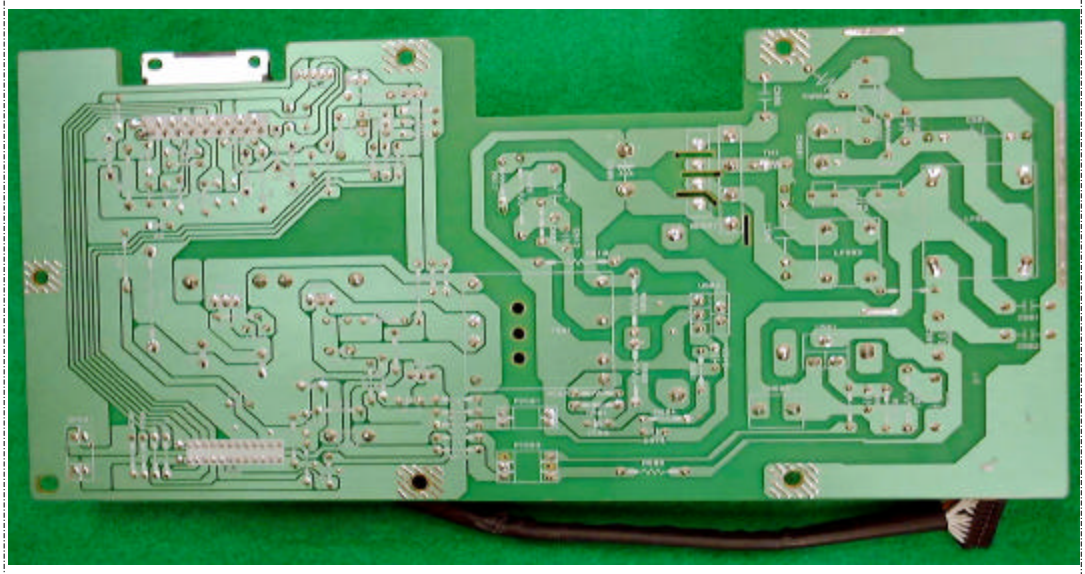
Solder view of controller b'd



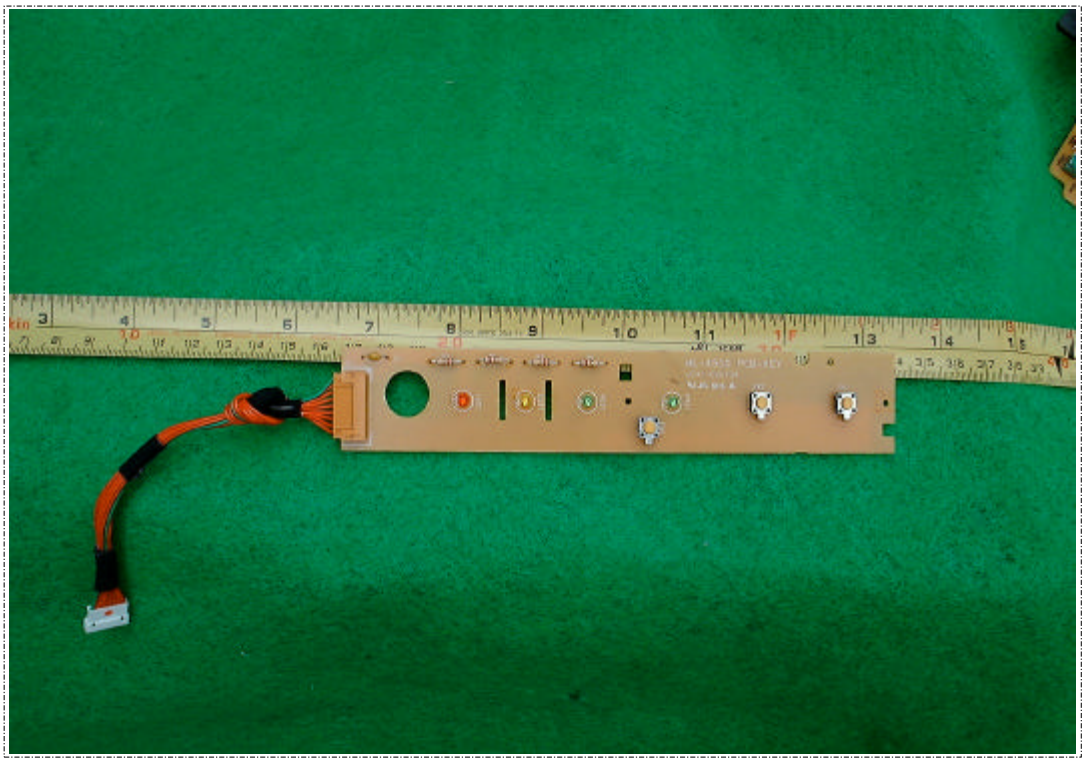
PCBs view of SMPS b'd



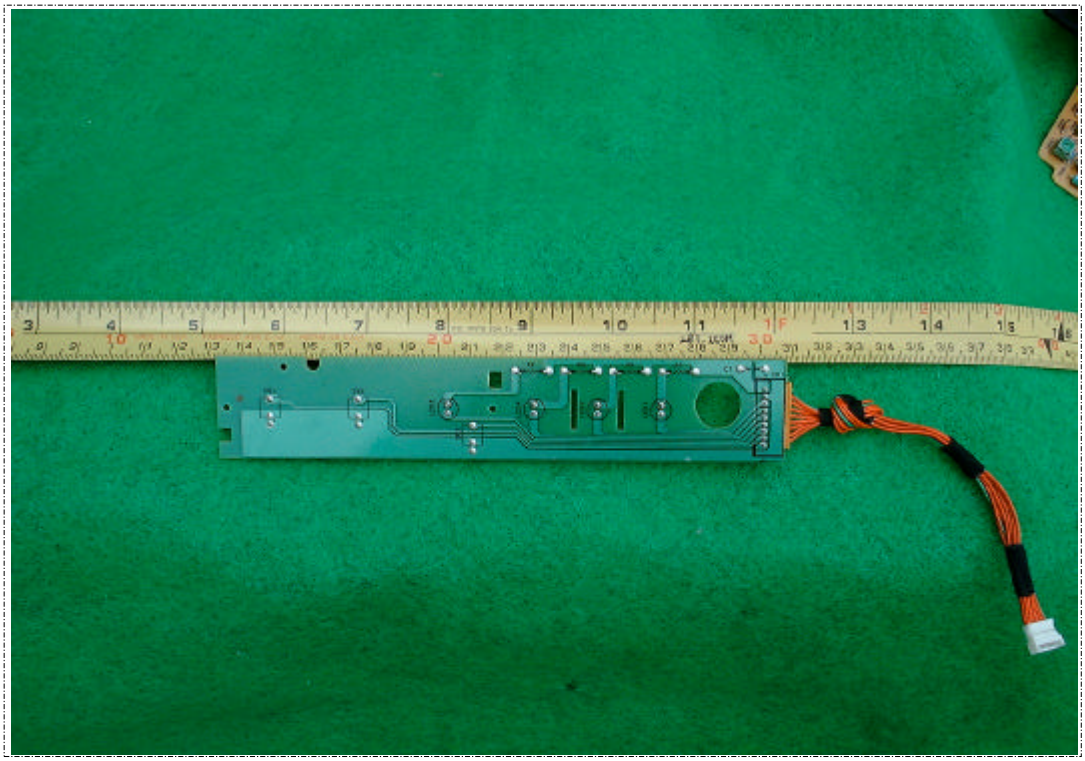
Solder view of SMPS b'd



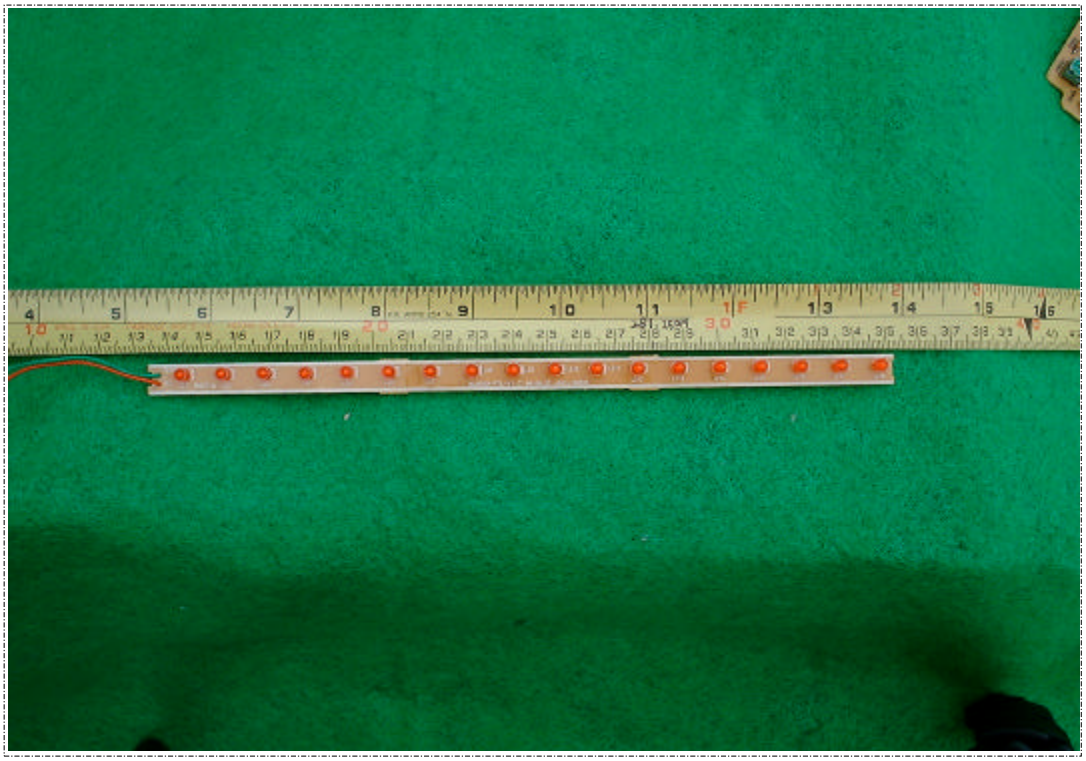
PCBs view of OP b'd



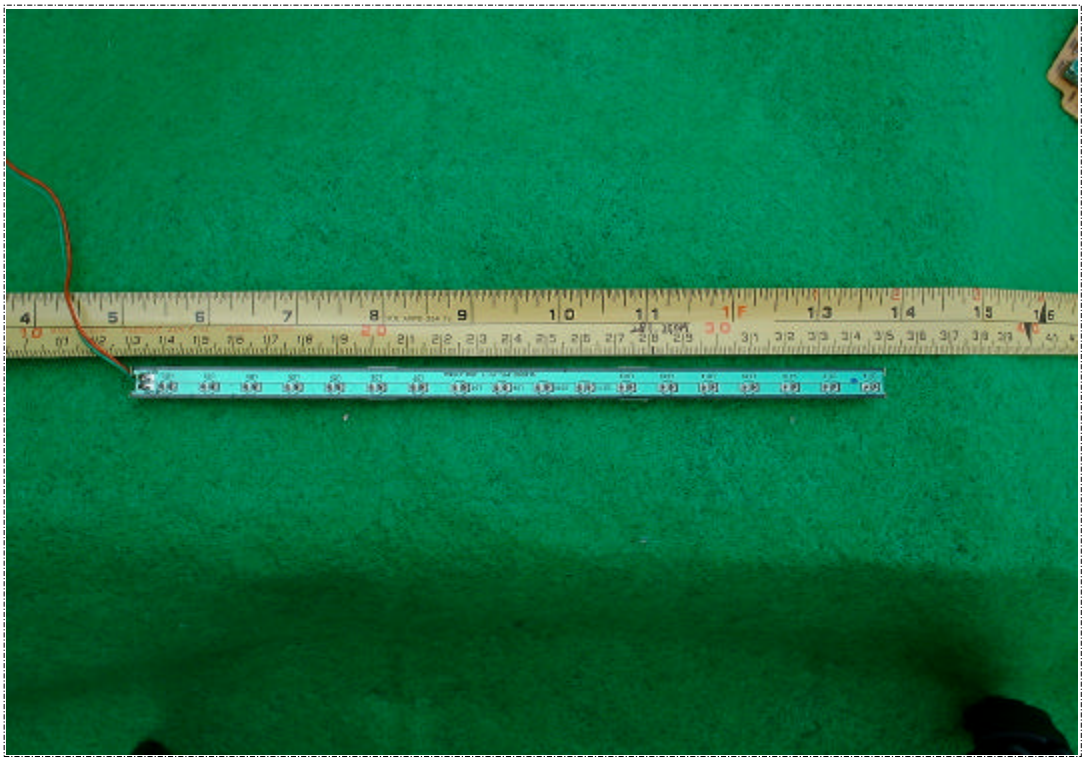
Solder view of OP b'd



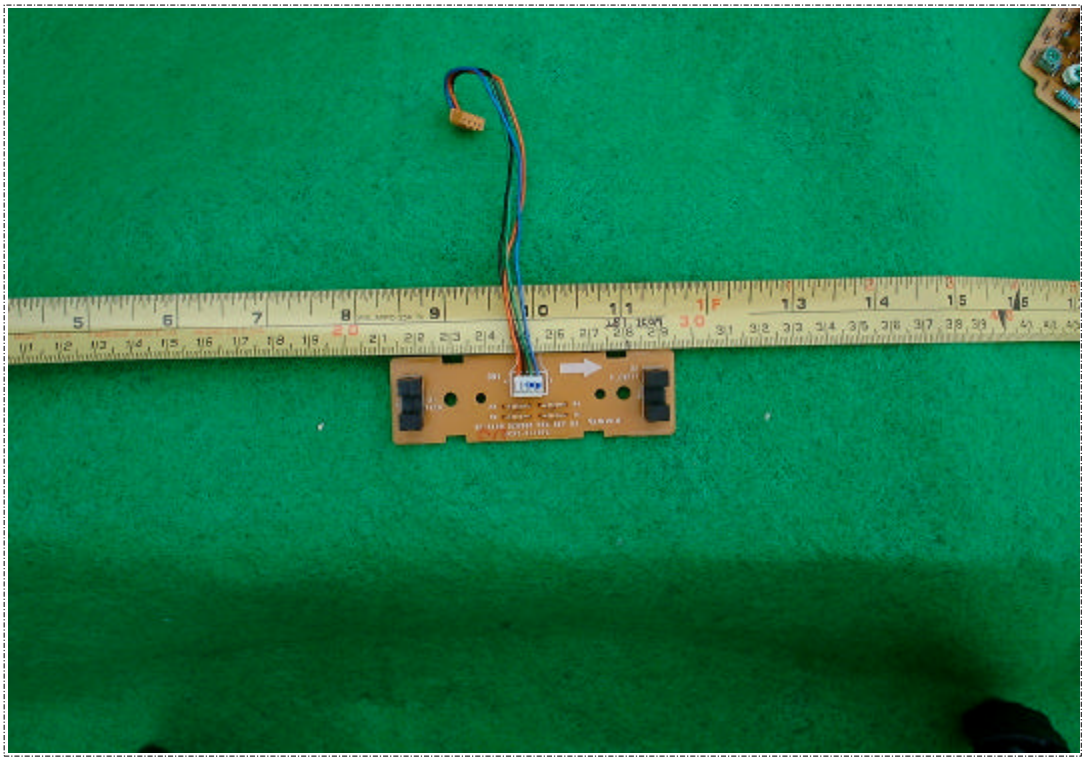
PCBs view of PTL b'd



Solder view of PTL b'd



PCBs view of Sensor b'd



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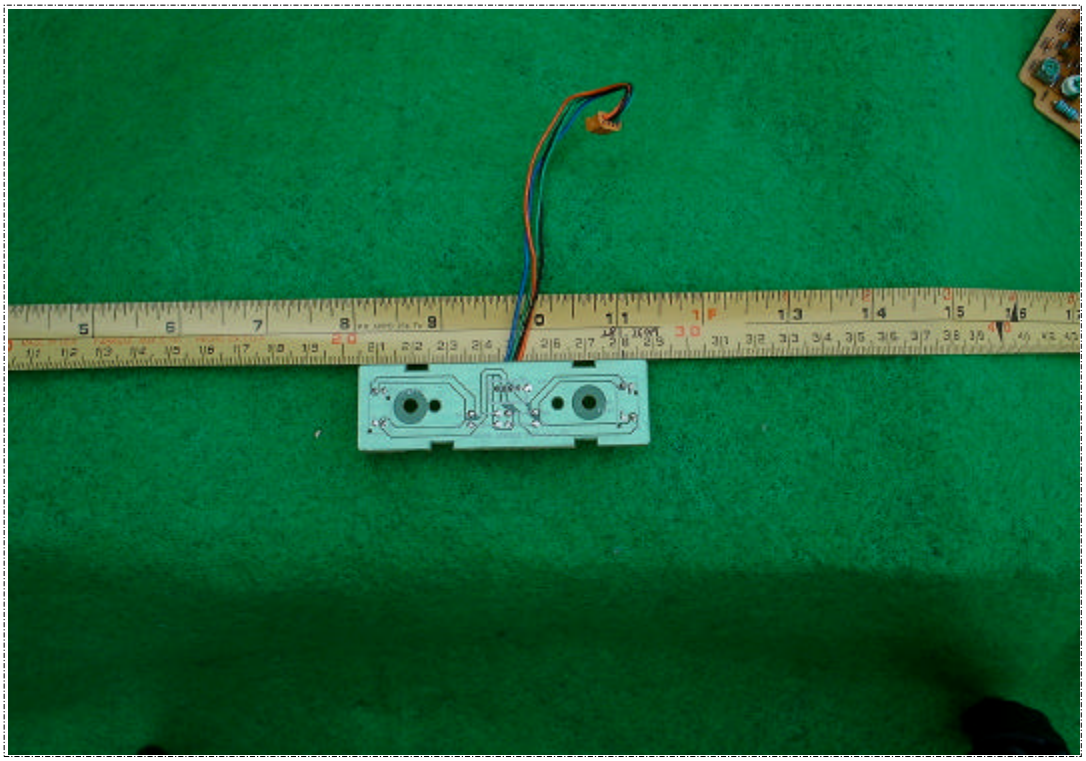
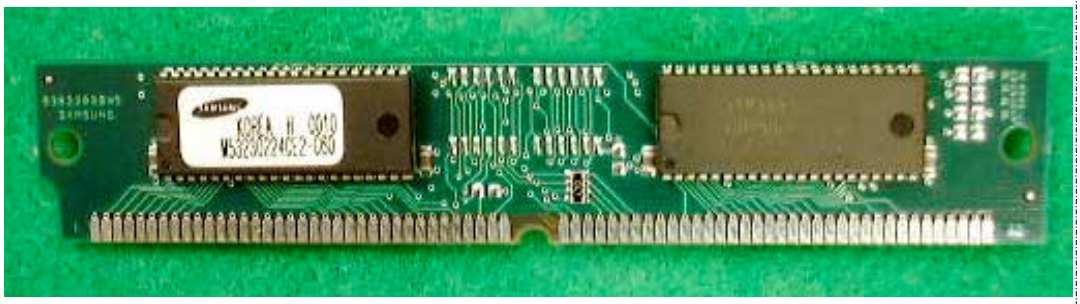
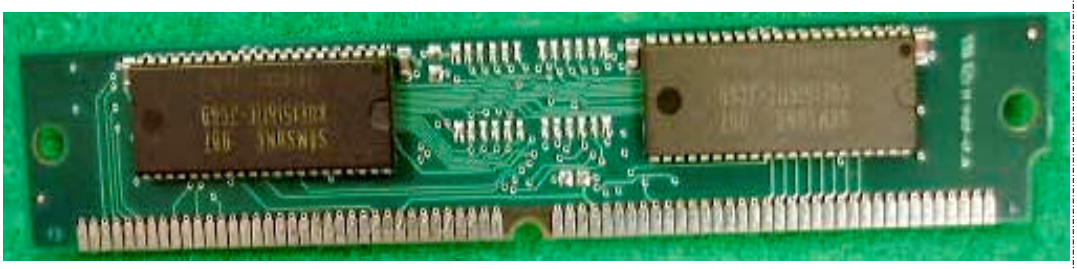


PCBs view of SIMM



Solder view of SIMM