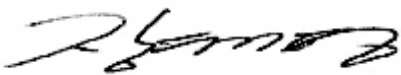
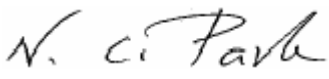
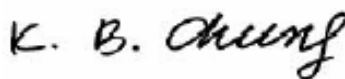


# EMC Test Report

## According to FCC Part 15 Subpart B

|                      |                                                                                                      |
|----------------------|------------------------------------------------------------------------------------------------------|
| Project No.          | LBE040752                                                                                            |
| Equipment under Test |                                                                                                      |
| Applicant            | Samsung Electronics Co. Ltd;<br>416 Maetan-3 Dong, Paldal-Ku, Suwon City, Kyungki-Do, Korea, 442-742 |
| FCC ID               | A3LHLP4663W                                                                                          |
| Product Name         | DLP PROJECTION TV                                                                                    |
| Model Name           | AT46L3                                                                                               |
| Manufacturer         | Samsung Electronics Co. Ltd                                                                          |
| Date of Test         | April 06 ~ 07, 2004                                                                                  |
| Issued Date          | April 09, 2004                                                                                       |

|               | Name/Position                         | Signature                                                                            |
|---------------|---------------------------------------|--------------------------------------------------------------------------------------|
| Tested by     | Jang Tae Young<br>Test Engineer       |  |
| Reviewed by   | No Cheon, Park<br>Manager of EMC Lab. |  |
| Authorized by | Kyu Baek, Chung<br>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 200447

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### **2. Summary of Test Results**

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- 4.2 EUT Photography

## 1. General Information

### 1.1 Basic Information related Product

|                   |                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------|
| Applicant         | Samsung Electronics Co. Ltd;                                                                               |
| Model name        | AT46L3                                                                                                     |
| Applicant Address | Samsung Electronics Co. Ltd; 416 Maetan3- Dong, Yeoung tong-Ku,<br>Suwon City, Gyeonggi-Do, Korea, 443-742 |
| Contact Person    | SEUNG CHEOL LEE                                                                                            |
| Kind of product   | DLP PROJECTION TV                                                                                          |
| Valiant list      |                                                                                                            |
| Manufacturer      | Samsung Electronics Co. Ltd;                                                                               |

### 1.2 Detail Information related Product

|               |
|---------------|
| Specification |
|---------------|

|                      |            |
|----------------------|------------|
| Resolution           | 1280 * 720 |
| Horizontal Frequency | 60kHz      |
| Vertical Frequency   | 75Hz       |

|                     |
|---------------------|
| Operating Frequency |
|---------------------|

### 1.3 Operating Mode and Condition

The system was configured for testing in typical fashion use.

The mode of operation utilized for testing was selected to best simulate typical EUT use.

- PC Video Input
- PC DVI Input

The EUT Exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

## **1.4 Equipment Modifications**

No equipment modifications were required.

## **1.5 Test Procedure**

### **1.5.1 Disturbance Voltage at Mains**

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 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.

### **1.5.2 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.

## 1.6 Test Configuration

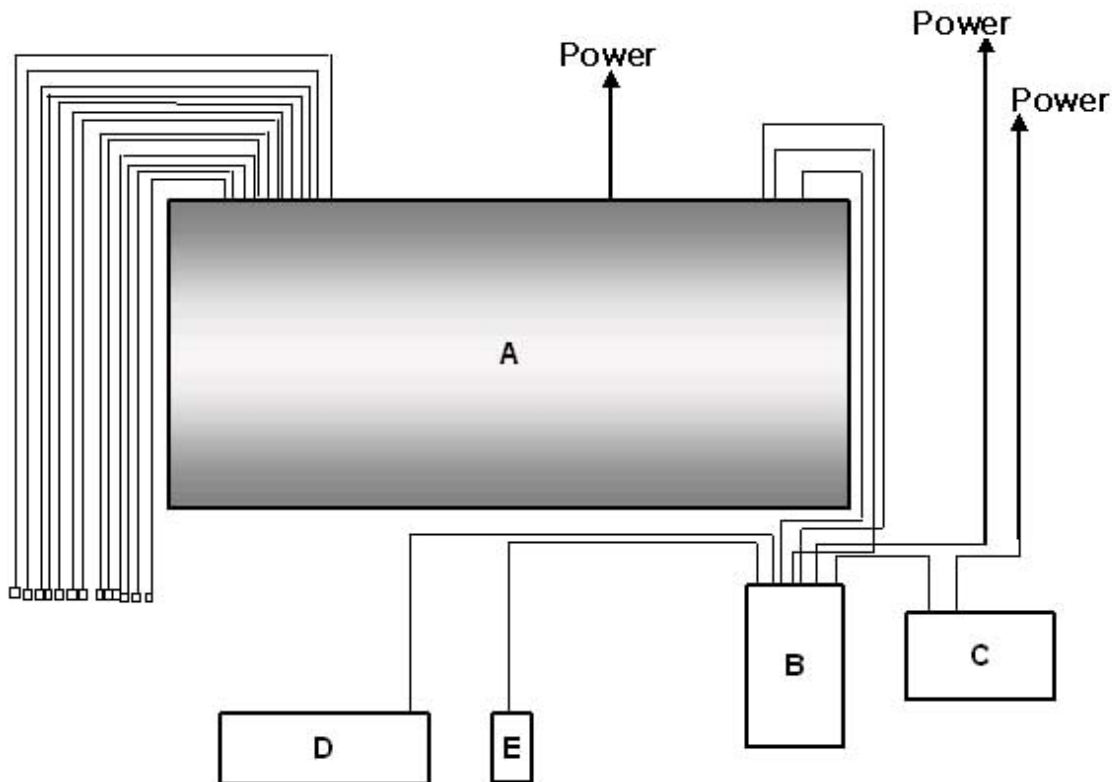
### Used EUT and Peripherals

| Seq | Device            | Model Name | Serial #       | Maker    | Note |
|-----|-------------------|------------|----------------|----------|------|
| A   | DLP Projection TV | AT46L3     | -              | SAMSUNG  |      |
| B   | PC                | M6320      | 625792GR301193 | SAMSUNG  |      |
| C   | Printer           | LQ-580H    | CG2Y016889     | EPSON    |      |
| D   | PS/2 Keyboard     | SEM-DT35   | 3T013127       | SAMSUNG  |      |
| E   | USB Mouse         | M-UR69     | LNA23802301    | Logitech |      |

### Used Cable Description

|    | Connect Cable       | Length [m] | Shielded [Y/N] | Remark |
|----|---------------------|------------|----------------|--------|
| 1  | Parallel (Printer)  | 1.7        | Yes            |        |
| 2  | Monitor             | 1.5        | Yes            |        |
| 3  | DVI                 | 1.5        | Yes            |        |
| 4  | USB                 | 1.5        | Yes            |        |
| 5  | PS/2                | 1.5        | Yes            |        |
| 6  | Component Video Out | 1.5        | No             |        |
| 7  | AV front IN         | 1.5        | No             |        |
| 8  | Audio Out           | 1.5        | No             |        |
| 9  | S -Video Out        | 1.5        | Yes            |        |
| 10 | Audio Out           | 1.5        | No             |        |

### Block Diagram



## 1.7 Applied Standards

### List

| Product or Generic Standards | Basic Standards   |
|------------------------------|-------------------|
| FCC Part15                   | ANSI C63.4 : 2000 |

### Performance Criteria

- A. normal performance within the specification limits
- B. temporary degradation or less of function or performance which is self-recoverable
- C. temporary degradation or less of function or performance which require operator intervention or system reset

## 1.6 Test Facility

### General Information

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 22, 16-1, 16-2, 11.

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 NAMAS Pub.NIS81)

| Test Item                                  | Expanded Uncertainty |
|--------------------------------------------|----------------------|
| Radiated Disturbance                       | 5.09                 |
| Disturbance voltage at the mains terminals | 1.64                 |

## 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 | FCC Part15       | Complied |
| 3.2                             | Radiated Emission  | FCC Part15       | Complied |

### 3. Description of Individual Tests

#### 3.1 Conducted Emission

| Test Information  |                                                                                     |
|-------------------|-------------------------------------------------------------------------------------|
| Test Engineer     | Jang Tae Young                                                                      |
| Test Date         | April 06, 2004                                                                      |
| Climate Condition | Ambient Temperature :24 °C Relative Humidity : 37%<br>Atmospheric Pressure 1013mbar |
| Test Place        | Shield Room                                                                         |

#### Test Equipments

| Equipment            | Modal Name  | Manufacturer | Serial No. | Calibration |          |
|----------------------|-------------|--------------|------------|-------------|----------|
|                      |             |              |            | Next Date   | Interval |
| Spectrum Analyzer    | E7405A      | Agilent      | US4110272  | 2004-06-14  | 12       |
| TV Signal Generator  | PM5418-TDSI | PHILIPS      | LO612437   | 2004-09-20  | 12       |
| L.I.S.N              | ESH3-Z5     | R&S          | 100261     | 2004-07-16  | 12       |
| Field strength meter | ESS         | R&S          | 844661     | 2004-05-31  | 12       |
| RF Relais Matrix     | PSU         | R&S          | 861206/024 | N/A         | 12       |
| L.I.S.N              | ESH3-Z5     | R&S          | 100260     | 2004-07-16  | 12       |
| Test Software        | EP5CE       | TOYO         | None       | N/A         | N/A      |

|                            |                                                                                                 |
|----------------------------|-------------------------------------------------------------------------------------------------|
| <b>Measurement Results</b> | <b>Passed</b><br>The Measured emissions of the EUT have found to be below the specified limits. |
|----------------------------|-------------------------------------------------------------------------------------------------|

### **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

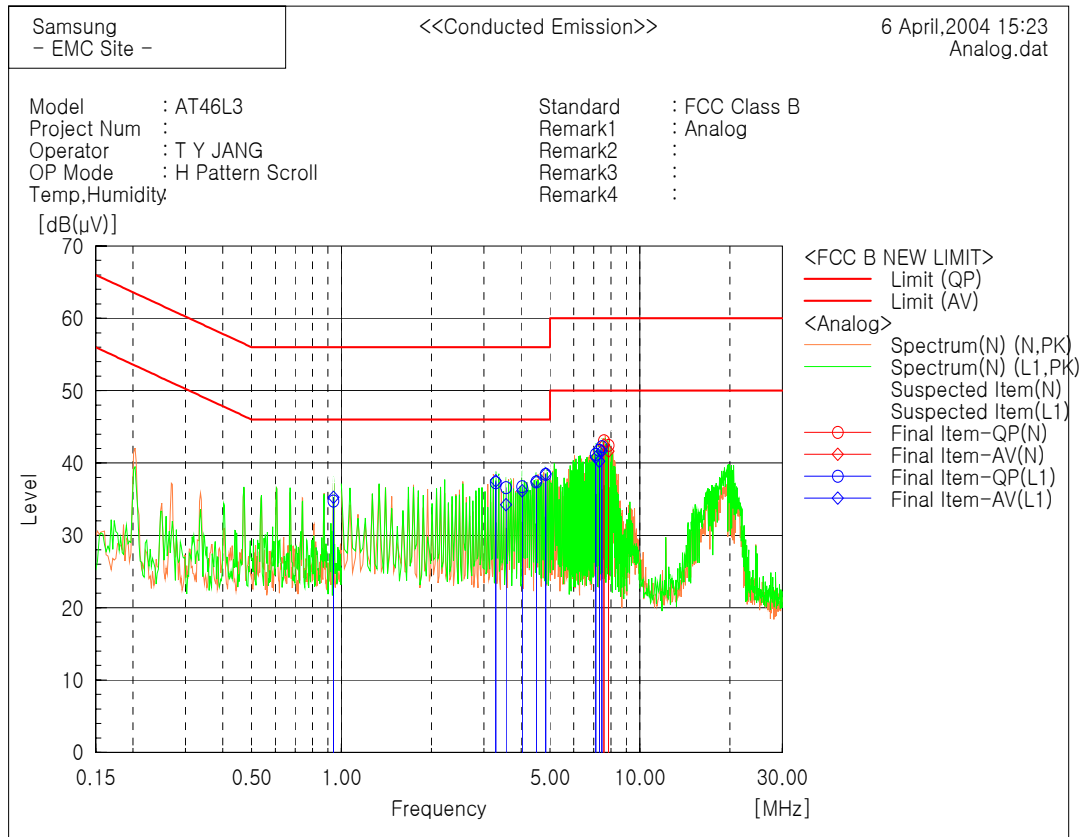
The find data represents worst-case emissions.

\* QP : Quasi-peak, AV: Average

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

\* Margin = Limit – Result

## 1. Analog - TEST DATA & GRAPH



### Final Result

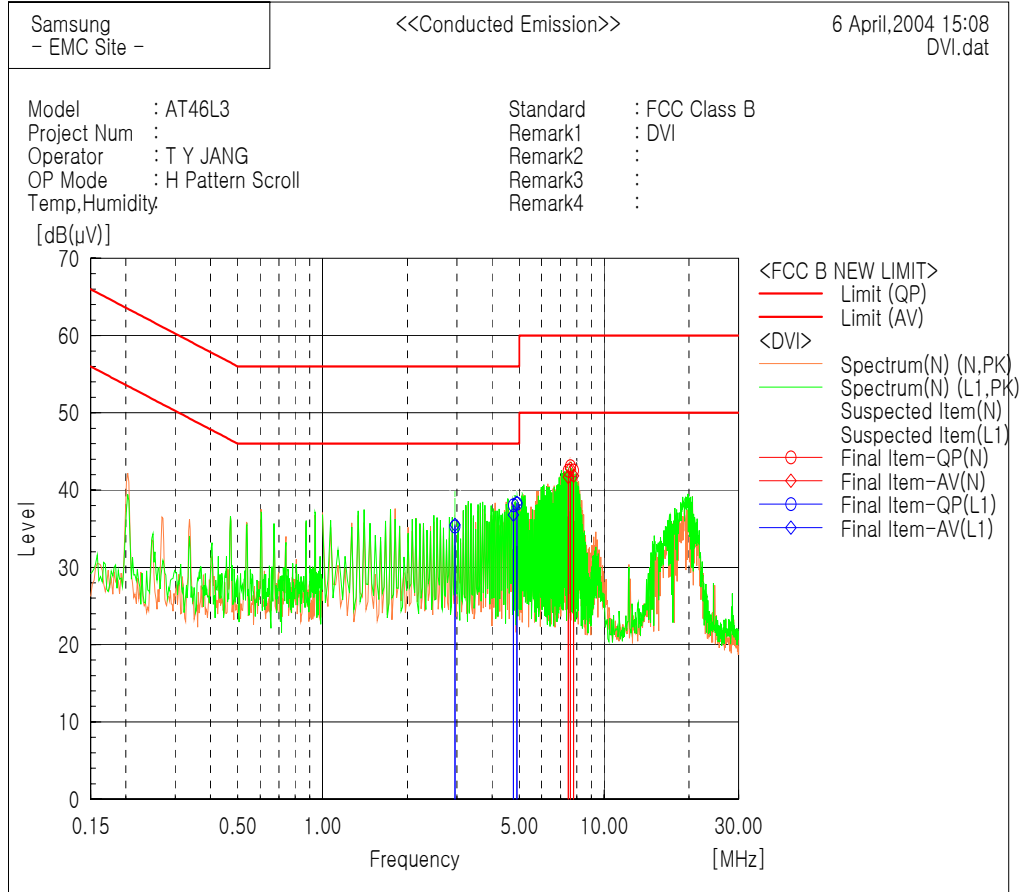
#### --- N Phase ---

| No. | Frequency | Reading<br>QP | Reading<br>AV | c.f  | Result<br>QP | Result<br>AV | Limit<br>QP | Limit<br>AV | Margin<br>QP | Margin<br>AV |
|-----|-----------|---------------|---------------|------|--------------|--------------|-------------|-------------|--------------|--------------|
|     | [MHz]     | [dB(μV)]      | [dB(μV)]      | [dB] | [dB(μV)]     | [dB(μV)]     | [dB(μV)]    | [dB(μV)]    | [dB]         | [dB]         |
| 1   | 7.5817    | 43.0          | 42.4          | 0.1  | 43.1         | 42.5         | 60.0        | 50.0        | 16.9         | 7.5          |
| 2   | 7.851     | 42.4          | 41.7          | 0.0  | 42.4         | 41.7         | 60.0        | 50.0        | 17.6         | 8.4          |

#### --- L1 Phase ---

| No. | Frequency | Reading<br>QP | Reading<br>AV | c.f  | Result<br>QP | Result<br>AV | Limit<br>QP | Limit<br>AV | Margin<br>QP | Margin<br>AV |
|-----|-----------|---------------|---------------|------|--------------|--------------|-------------|-------------|--------------|--------------|
|     | [MHz]     | [dB(μV)]      | [dB(μV)]      | [dB] | [dB(μV)]     | [dB(μV)]     | [dB(μV)]    | [dB(μV)]    | [dB]         | [dB]         |
| 1   | 0.93912   | 34.7          | 35.2          | 0.1  | 34.8         | 35.3         | 56.0        | 46.0        | 21.2         | 10.7         |
| 2   | 3.2883    | 37.2          | 37.4          | 0.1  | 37.3         | 37.5         | 56.0        | 46.0        | 18.7         | 8.5          |
| 3   | 3.5569    | 36.5          | 34.1          | 0.1  | 36.6         | 34.2         | 56.0        | 46.0        | 19.4         | 11.8         |
| 4   | 4.0269    | 36.6          | 36.1          | 0.1  | 36.7         | 36.2         | 56.0        | 46.0        | 19.3         | 9.8          |
| 5   | 4.4956    | 37.4          | 37.5          | 0.0  | 37.4         | 37.5         | 56.0        | 46.0        | 18.6         | 8.6          |
| 6   | 4.8315    | 38.4          | 38.5          | 0.0  | 38.4         | 38.5         | 56.0        | 46.0        | 17.6         | 7.5          |
| 7   | 7.1124    | 41.2          | 40.8          | 0.0  | 41.2         | 40.8         | 60.0        | 50.0        | 18.8         | 9.2          |
| 8   | 7.314     | 41.7          | 40.2          | 0.0  | 41.7         | 40.2         | 60.0        | 50.0        | 18.3         | 9.8          |
| 9   | 7.4483    | 42.3          | 41.7          | 0.0  | 42.3         | 41.7         | 60.0        | 50.0        | 17.7         | 8.3          |

## 2. DVI - TEST DATA & GRAPH



### Final Result

#### --- N Phase ---

| No. | Frequency | Reading<br>QP | Reading<br>AV | c.f  | Result<br>QP | Result<br>AV | Limit<br>QP | Limit<br>AV | Margin<br>QP | Margin<br>AV |
|-----|-----------|---------------|---------------|------|--------------|--------------|-------------|-------------|--------------|--------------|
|     | [MHz]     | [dB(μV)]      | [dB(μV)]      | [dB] | [dB(μV)]     | [dB(μV)]     | [dB(μV)]    | [dB(μV)]    | [dB]         | [dB]         |
| 1   | 7.4492    | 42.4          | 41.6          | 0.1  | 42.5         | 41.7         | 60.0        | 50.0        | 17.5         | 8.3          |
| 2   | 7.5824    | 43.0          | 42.7          | 0.1  | 43.1         | 42.8         | 60.0        | 50.0        | 16.9         | 7.3          |
| 3   | 7.7844    | 42.4          | 41.7          | 0.1  | 42.5         | 41.8         | 60.0        | 50.0        | 17.5         | 8.2          |

#### --- L1 Phase ---

| No. | Frequency | Reading<br>QP | Reading<br>AV | c.f  | Result<br>QP | Result<br>AV | Limit<br>QP | Limit<br>AV | Margin<br>QP | Margin<br>AV |
|-----|-----------|---------------|---------------|------|--------------|--------------|-------------|-------------|--------------|--------------|
|     | [MHz]     | [dB(μV)]      | [dB(μV)]      | [dB] | [dB(μV)]     | [dB(μV)]     | [dB(μV)]    | [dB(μV)]    | [dB]         | [dB]         |
| 1   | 2.9526    | 35.2          | 35.4          | 0.1  | 35.3         | 35.5         | 56.0        | 46.0        | 20.7         | 10.5         |
| 2   | 4.7645    | 38.0          | 36.8          | 0.0  | 38.0         | 36.8         | 56.0        | 46.0        | 18.0         | 9.2          |
| 3   | 4.8988    | 38.2          | 38.4          | 0.0  | 38.2         | 38.4         | 56.0        | 46.0        | 17.8         | 7.7          |

### 3.2 Radiated Emission

| Test Information  |                                                                                    |
|-------------------|------------------------------------------------------------------------------------|
| Test Engineer     | Jang Tae Young                                                                     |
| Test Date         | April 07, 2004                                                                     |
| Climate Condition | Ambient Temperature : 24℃ Relative Humidity : 37%<br>Atmospheric Pressure 1013mbar |
| Test Place        | 10m RF Semi Anechoic Chamber                                                       |

#### Test Equipments

| Equipment            | Modal Name | Manufacturer | Serial No.    | Calibration |           |
|----------------------|------------|--------------|---------------|-------------|-----------|
|                      |            |              |               | Next Date   | Next Date |
| Field strength meter | ESCS       | R&S          | 100104        | 2004-10-17  | 12        |
| RF Selector          | NS4900     | TOYO         | 0303-015      | N/A         | N/A       |
| Biconilog Antenna    | 6112B      | SCHAFFNER    | 2767          | 2004-06-03  | 12        |
| Mast Controller      | HD2000     | HD           | HD20000902027 | N/A         | N/A       |
| EMI Receiver         | ESI26      | R&S          | 100067        | 2005-01-09  | 12        |
| Test Software        | EP5RE      | TOYO         | None          | N/A         | 12        |
| Spectrum Analyzer    | E7405A     | Agilent      | MY42000109    | 2004-11-27  | 12        |

|                            |                                                                             |
|----------------------------|-----------------------------------------------------------------------------|
| <b>Measurement Results</b> | Pass<br>No Operation errors were detected during or after the applied test. |
|----------------------------|-----------------------------------------------------------------------------|

### **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.

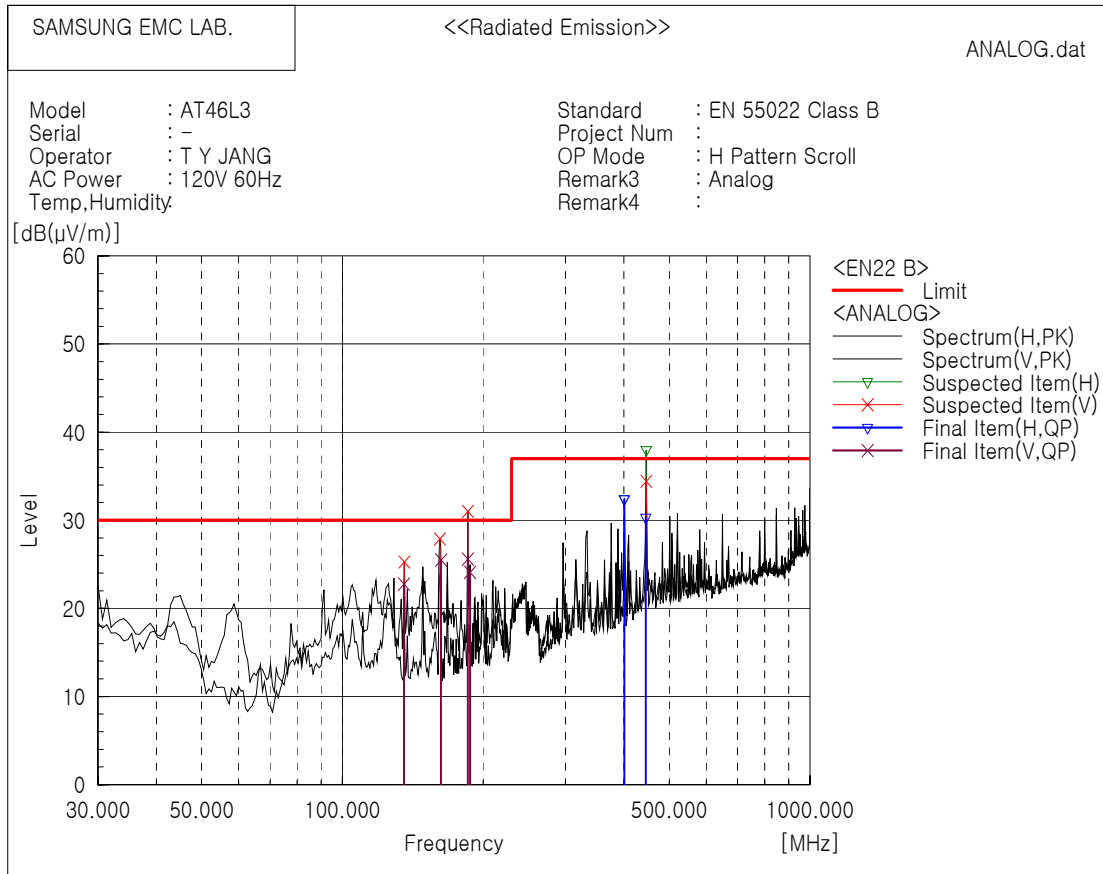
\* Receiving Antenna Mode : Horizontal, Vertical

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

\* Result = Meter Reading + Total Loss(Antenna factor + Cable loss)

\* Margin = Limit – Result

## 1. Analog - TEST DATA & GRAPH



### Final Result

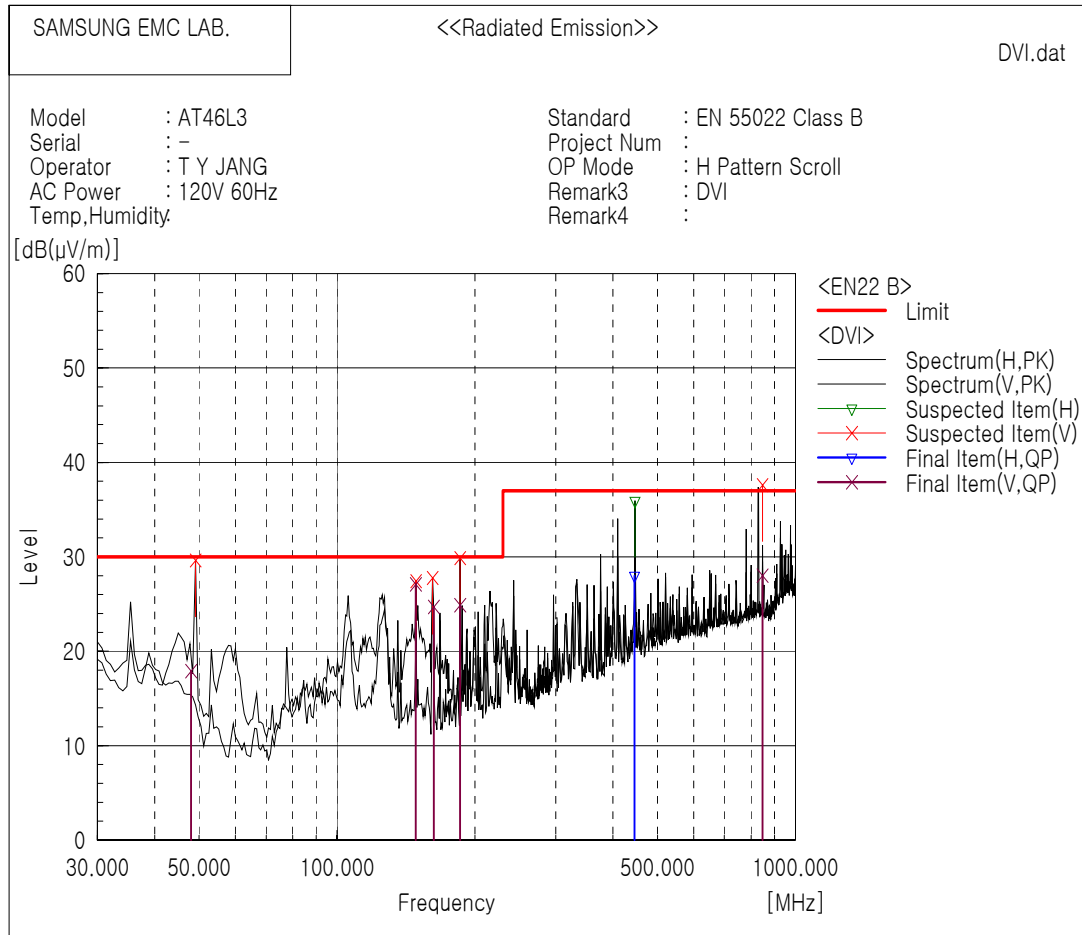
#### --- Horizontal Polarization (QP)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Remark |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|--------|
| 1   | 445.480         | 38.7             | -8.4          | 30.3              | 37.0             | 6.7         |        |
| 2   | 400.748         | 41.5             | -9.1          | 32.4              | 37.0             | 4.6         |        |

#### --- Vertical Polarization (QP)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Remark |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|--------|
| 1   | 135.469         | 38.5             | -15.7         | 22.8              | 30.0             | 7.2         |        |
| 2   | 162.496         | 42.5             | -17.0         | 25.5              | 30.0             | 4.5         |        |
| 3   | 185.466         | 42.7             | -17.1         | 25.6              | 30.0             | 4.4         |        |
| 4   | 187.496         | 41.1             | -17.0         | 24.1              | 30.0             | 5.9         |        |

## 2. DVI - TEST DATA & GRAPH



### Final Result

#### --- Horizontal Polarization (QP)---

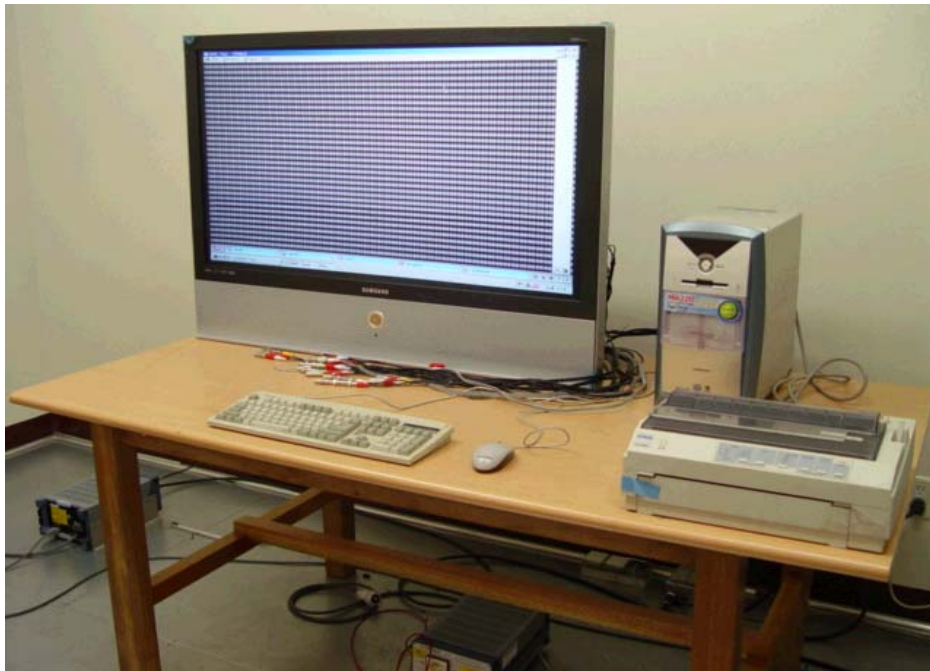
| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Remark |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|--------|
| 1   | 445.480         | 36.4             | -8.4          | 28.0              | 37.0             | 9.0         |        |

#### --- Vertical Polarization (QP)---

| No. | Frequency [MHz] | Reading [dB(μV)] | c.f [dB(1/m)] | Result [dB(μV/m)] | Limit [dB(μV/m)] | Margin [dB] | Remark |
|-----|-----------------|------------------|---------------|-------------------|------------------|-------------|--------|
| 1   | 47.996          | 36.5             | -18.6         | 17.9              | 30.0             | 12.1        |        |
| 2   | 148.375         | 43.4             | -16.3         | 27.1              | 30.0             | 2.9         |        |
| 3   | 162.496         | 41.7             | -17.0         | 24.7              | 30.0             | 5.3         |        |
| 4   | 185.466         | 42.0             | -17.1         | 24.9              | 30.0             | 5.1         |        |
| 5   | 847.020         | 31.1             | -3.1          | 28.0              | 37.0             | 9.0         |        |

## 4. Appendix

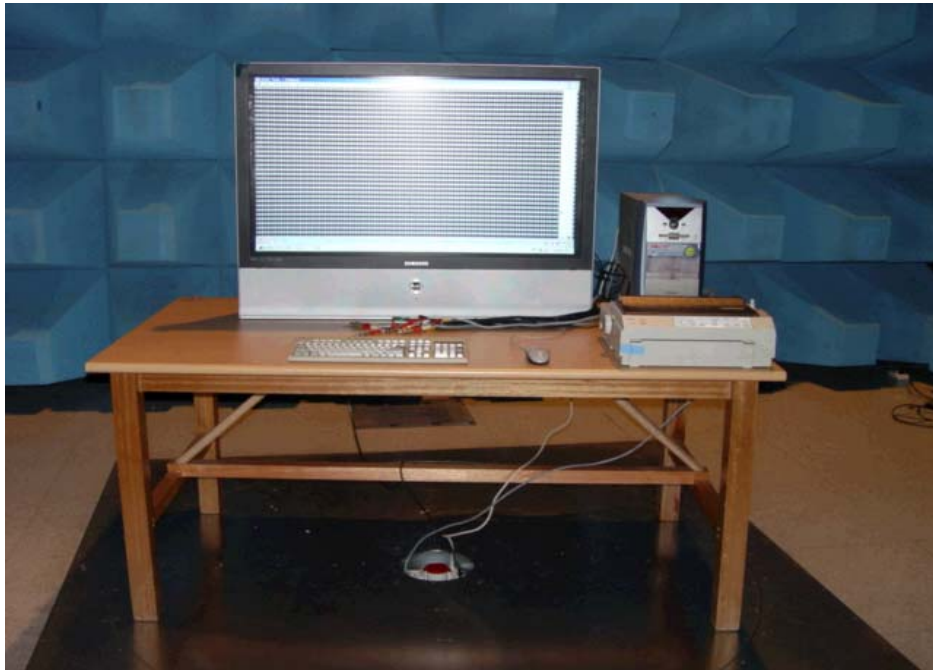
### 4.1 Test Photography



Pic. 1 Conducted Emission (Front)



Pic. 2 Conducted Emission (Rear)



Pic. 3 Radiated Emission (Front)



Pic. 4 Radiated Emission (Rear)

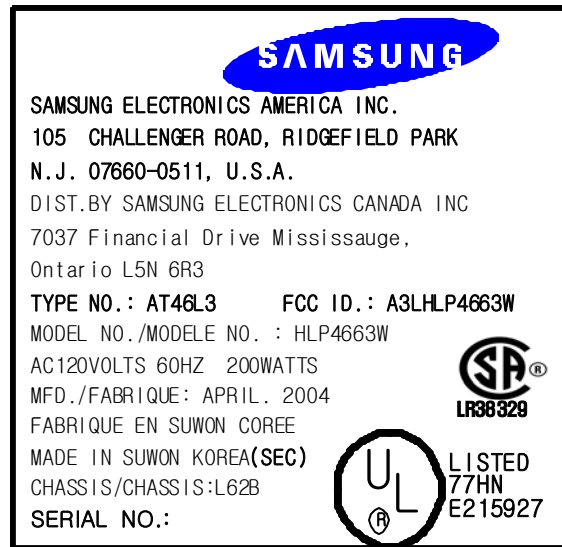
## 4.2 EUT Photography



Pic. 5 EUT (Front)



Pic. 6 EUT (Rear)



Pic. 7 EUT (Label)



EUT front view



EUT rear view



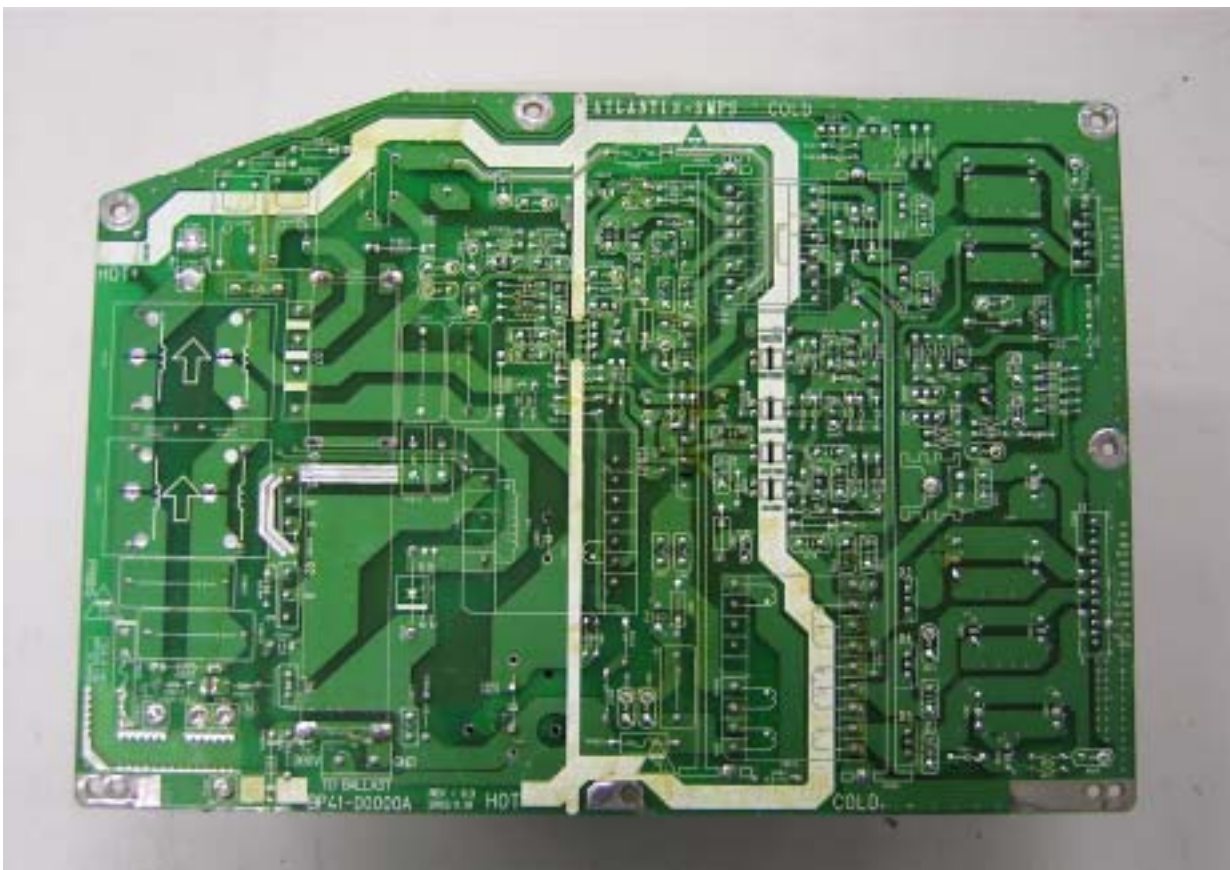
EUT internal view



Label view



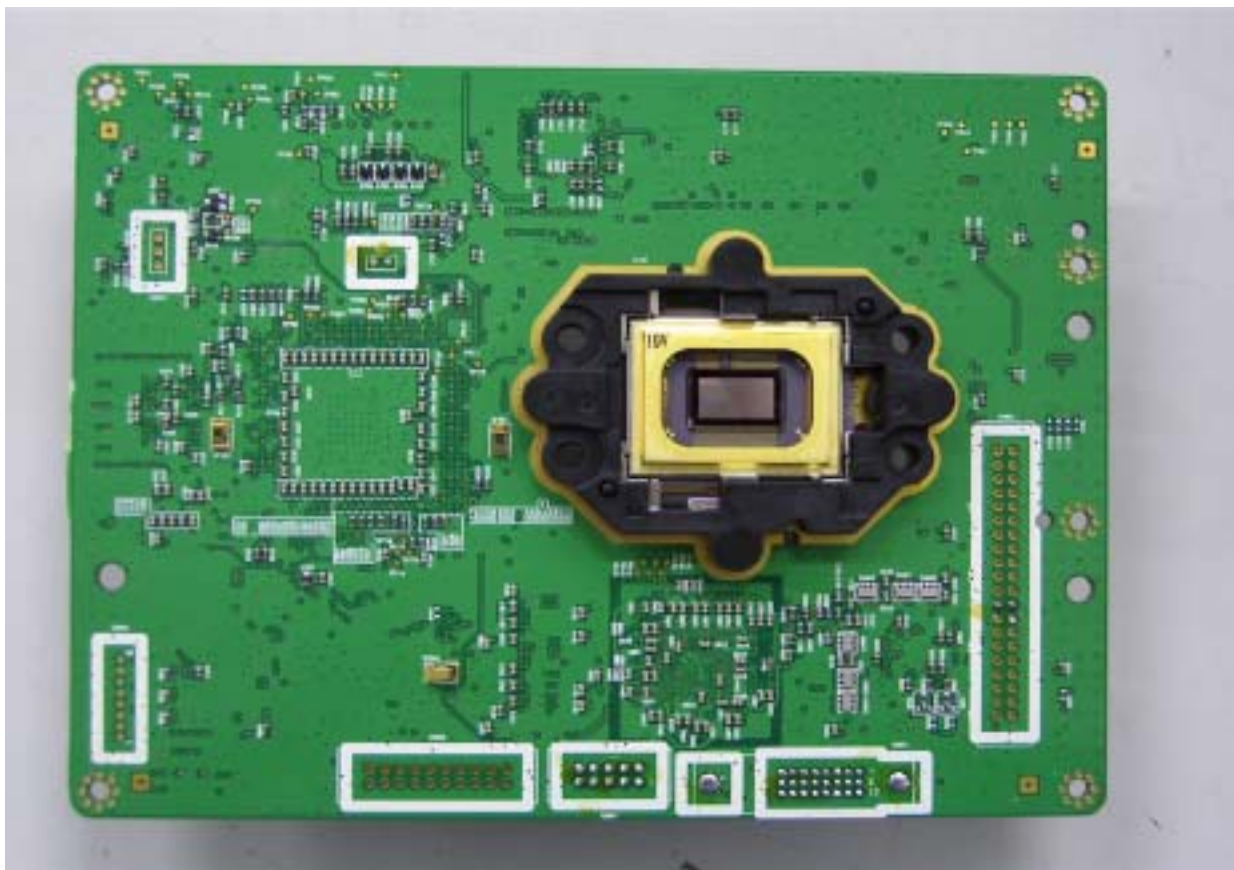
SMPS board top view



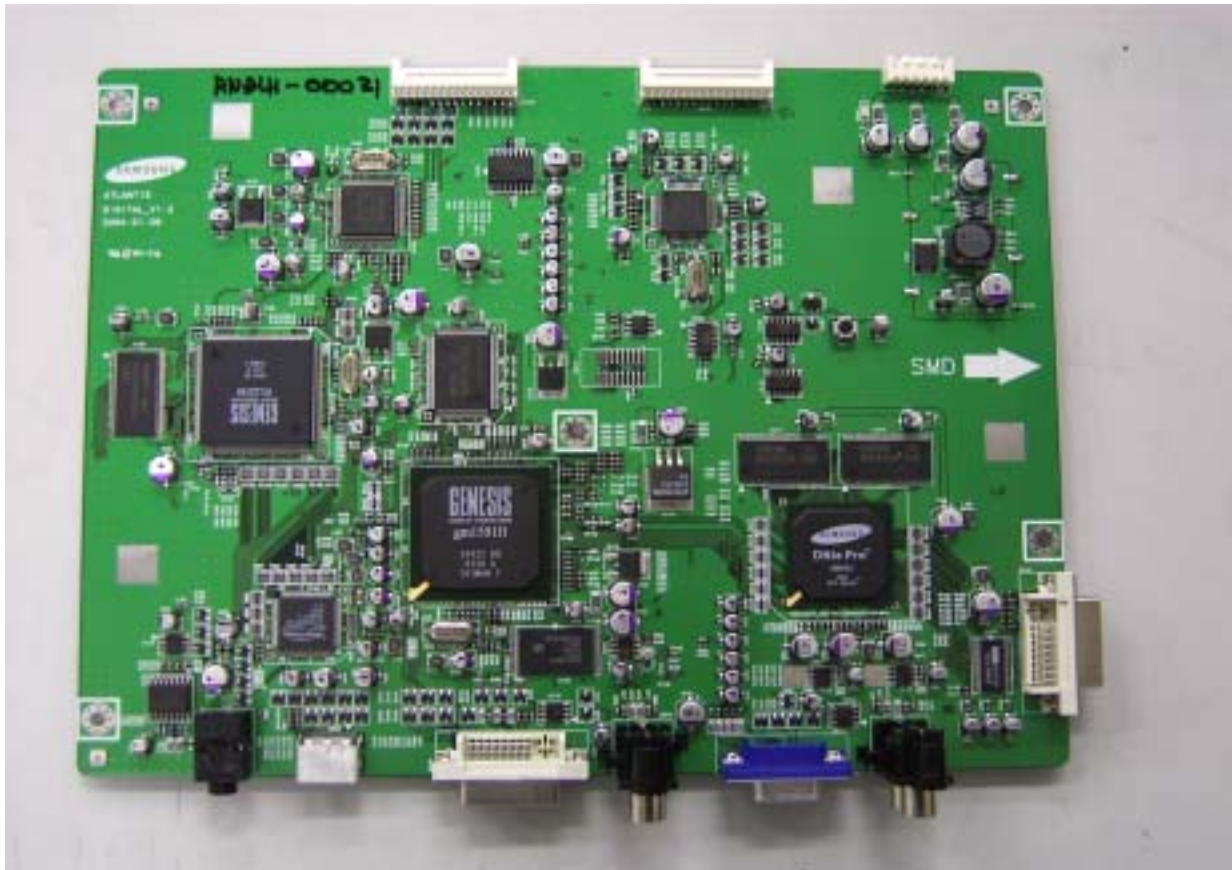
SMPS board bottom view



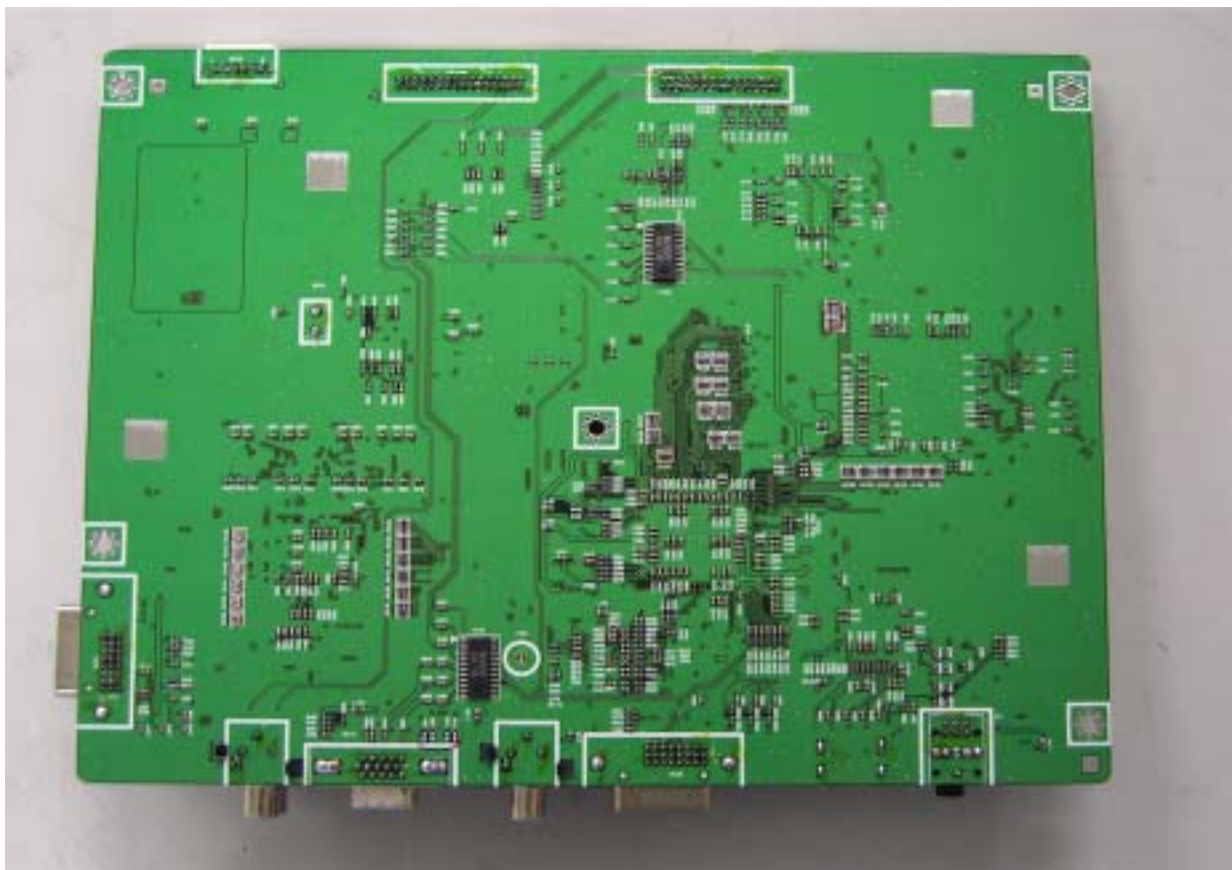
DMD board top view



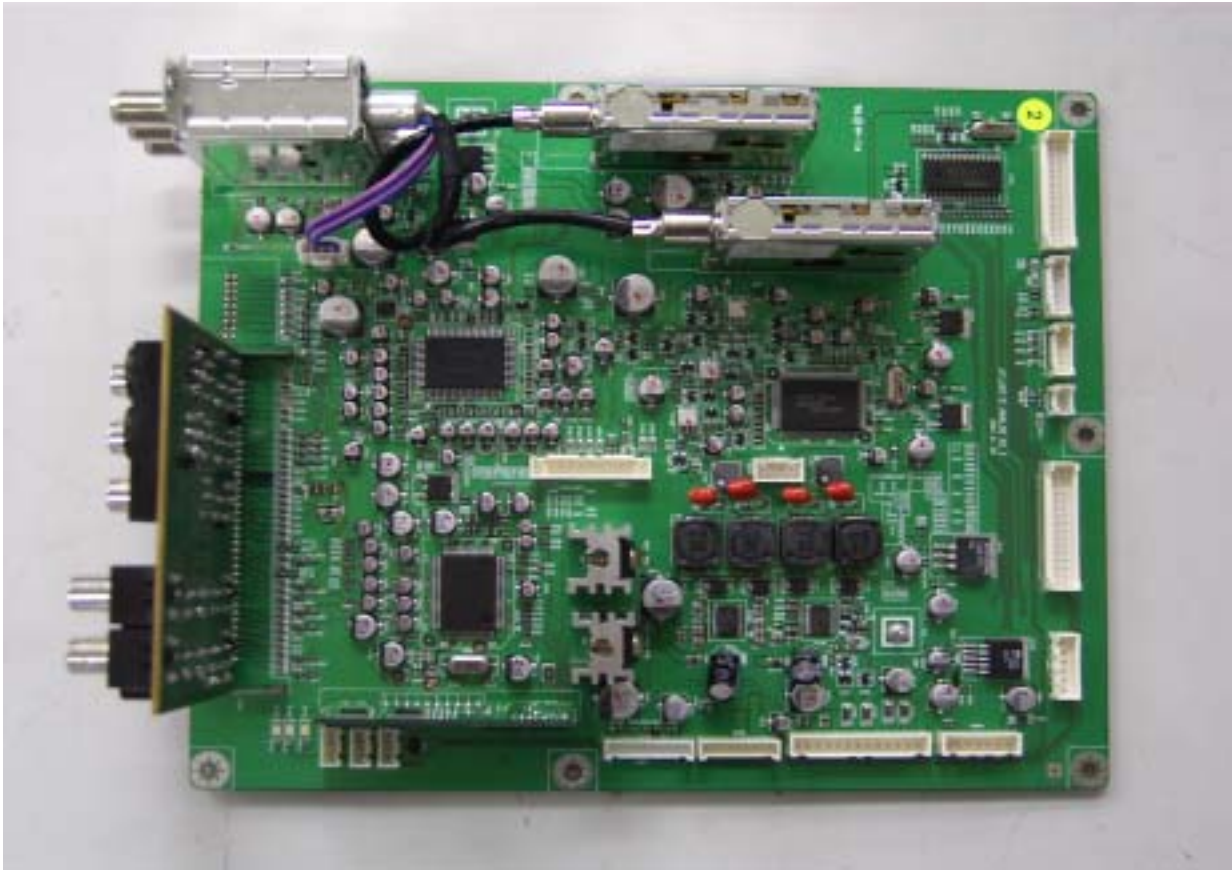
DMD board bottom view



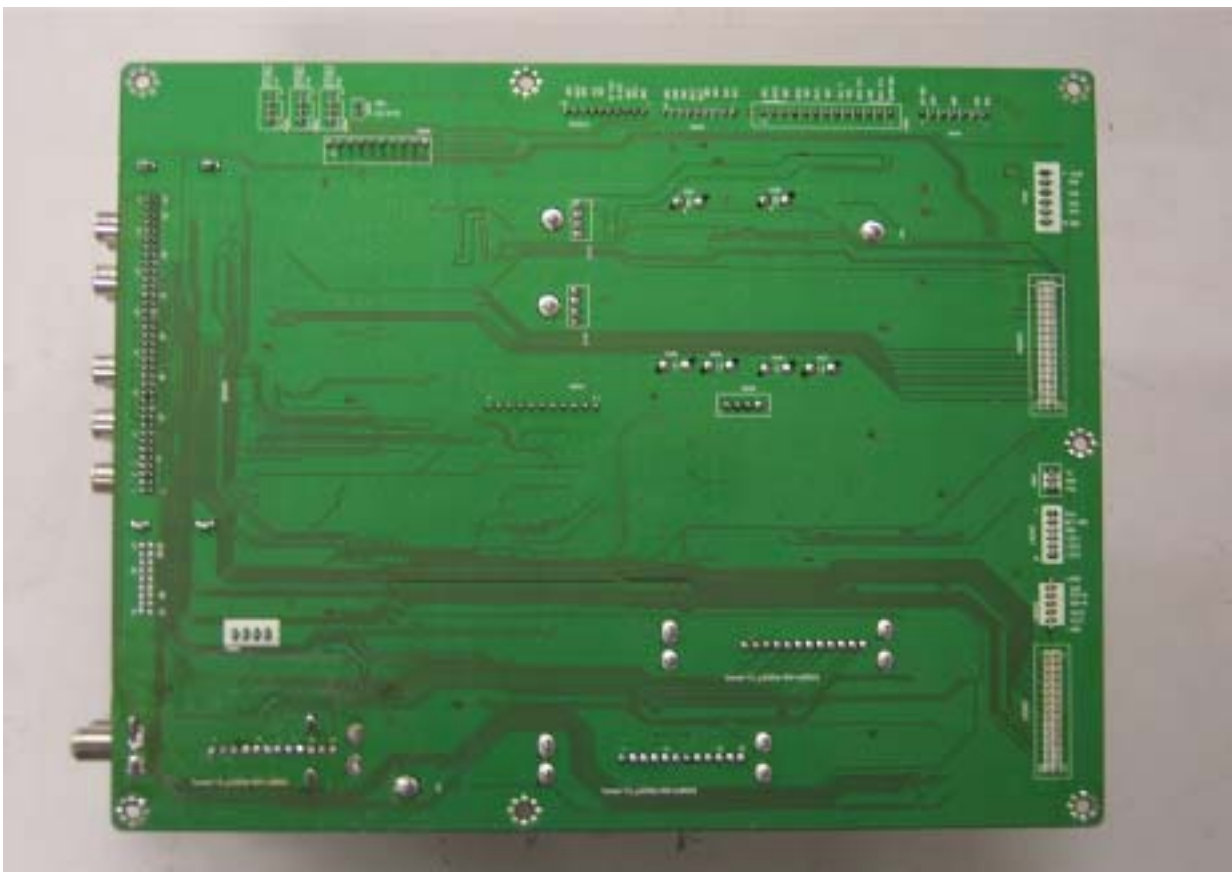
Digital board top view



Digital board bottom view



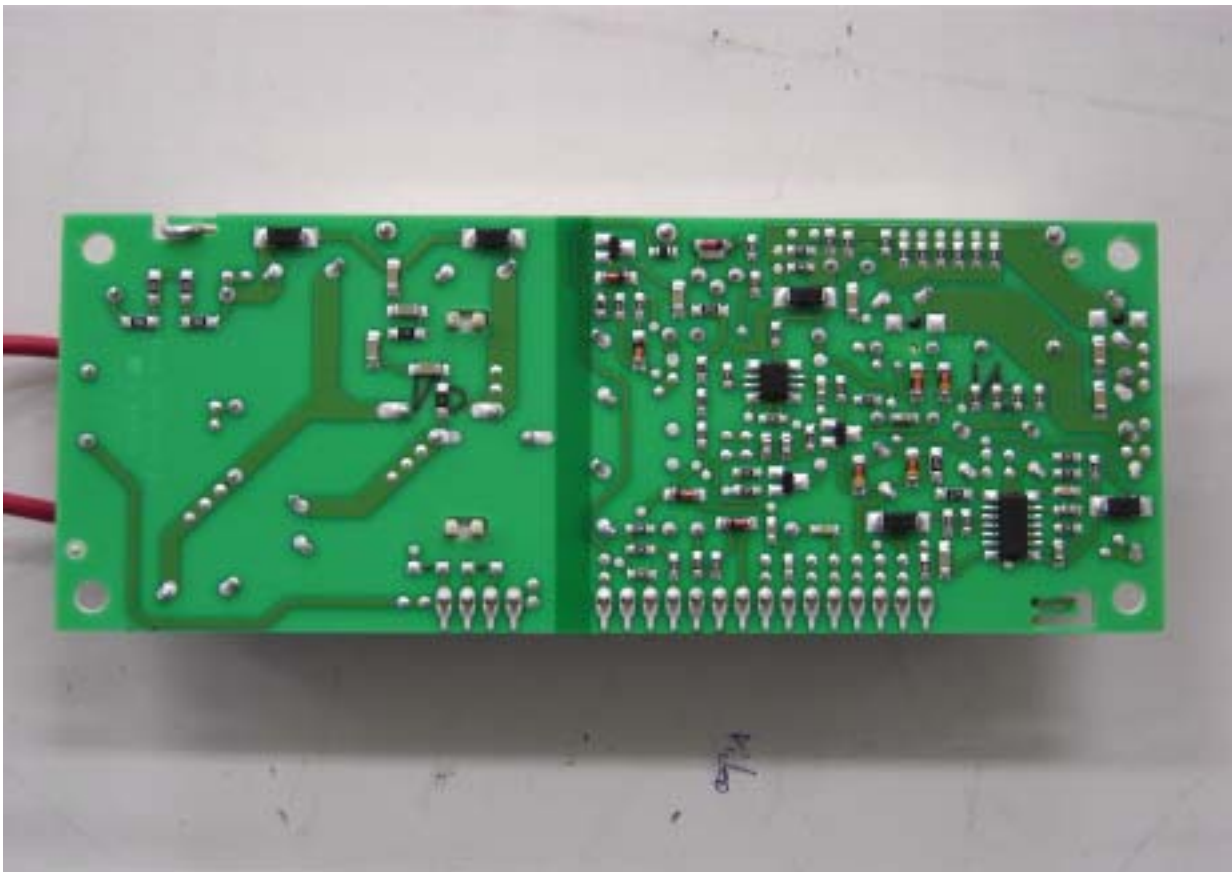
Analog board top view



Analog board bottom view



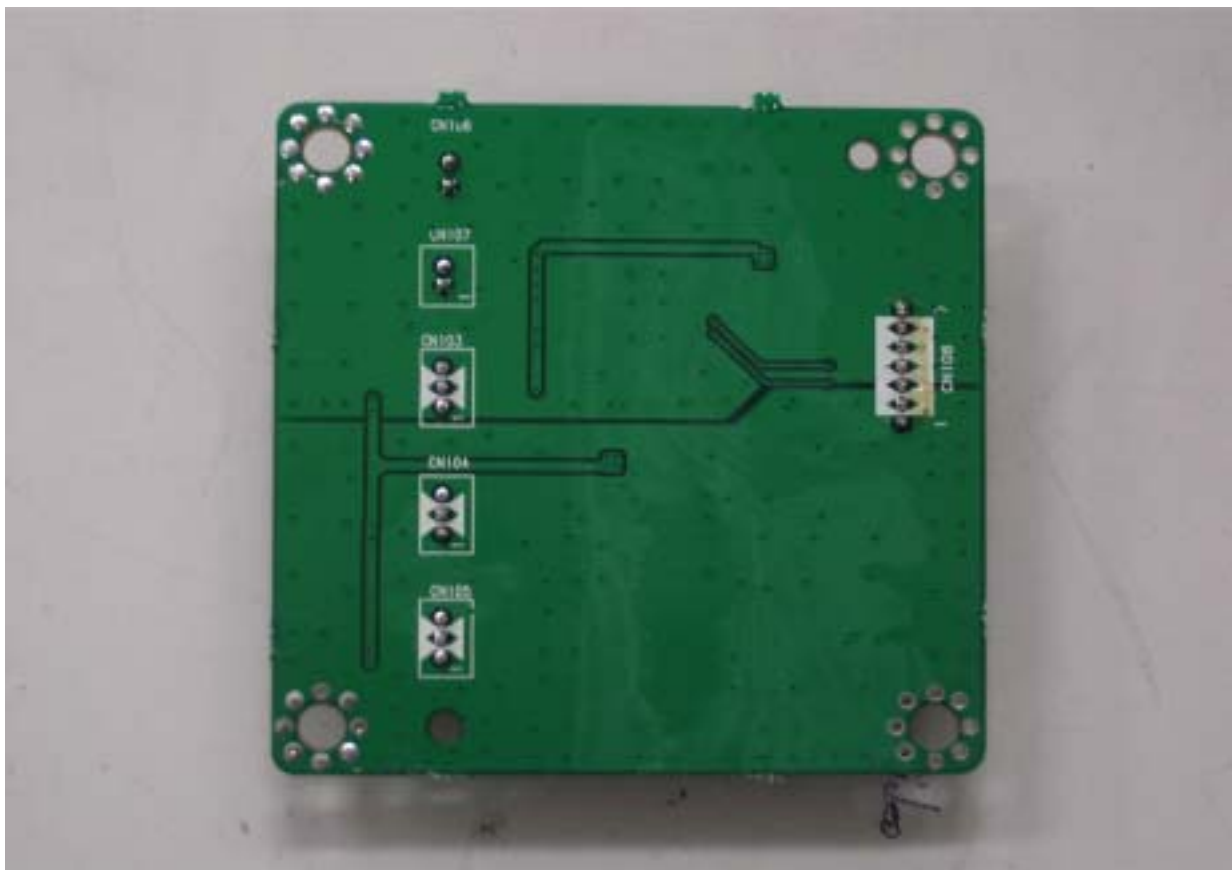
Ballast board top view



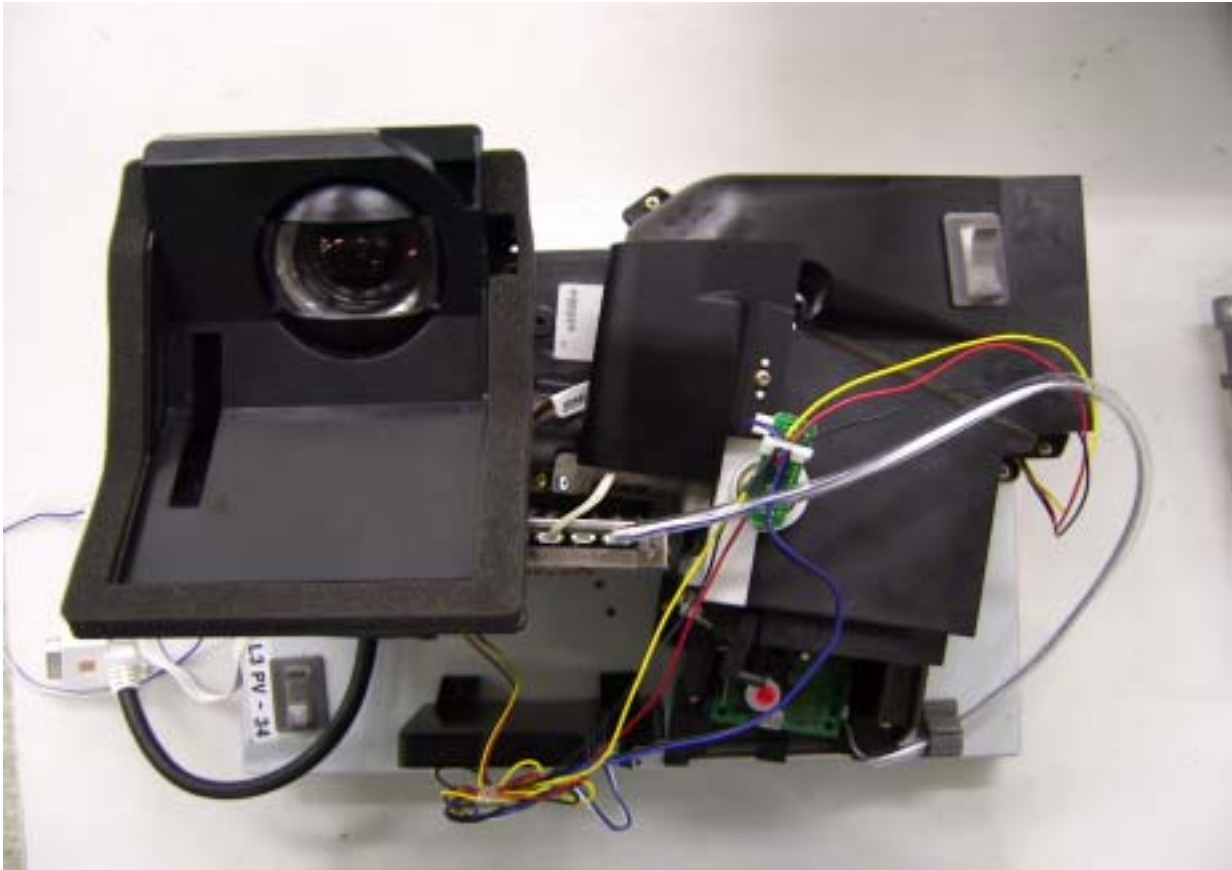
Ballast board bottom view



Sub detect board top view



Sub detect board bottom view



Engine view