# EMI TEST REPORT

Test report no. : ERI-FCC-0120

Type of equipment : DIGITAL VIDEO CAMERA

Model no. : SCD180

Applicant. : SAMSUNG ELECTRONICS CO., LTD.

Test standards : FCC Part15 Subpart B (Class B)

Test Procedure and Items :

- AC Power line Conducted Emissions Measurement : ANSI C63.4-1992
- Radiated Emissions Measurement : ANSI C63.4-1992

Test result : Complied

This equipment has been tested to comply with the requirements of FCC Rules and Regulations Part 15 Subpart B Unintentional Radiators.
The results in this report apply only to the sample tested.
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Date of test: 2002. 5. 27 5 .28 Issued date: 2002. 6. 7

Tested by : GWEON, HUR approved by: SANG-KYU, LEE

This laboratory is registered by KOLAS, KOREA.

This test report have been performed in accordance with Its terms of registration.

66-6, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA
TEL: 82 31 336 1186 FAX : 82 31 336 1184 homepage : www.eri.re.kr
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6. Photographs

Conducted Emission test
Radiated Emission Test
EUT(Front, Rear, Inner)
Main Board(Front, Rear)
LCD Board(Front, Rear)

## 1. Client information

| | |
|---|---|
| **Applicant** | : SAMSUNG ELECTRONIC CO., LTD |
| **Address** | : 416, Maetan-3dong, Paldal-Gu, Suwon-City, Kyungki-Do, Korea |
| **Telephone Number** | : 81-31-200-5754 |
| **Facsimile Number** | : 81-31-200-3458 |
| **Contact person** | : Kang jae soon |

| | |
|---|---|
| **Manufacturer** | : SAMSUNG ELECTRONIC CO., LTD |
| **Address** | : 416, Maetan-3dong, Paldal-Gu, Suwon-City, Kyungki-Do, Korea |
| **Telephone Number** | : 81-31-200-5754 |
| **Facsimile Number** | : 81-31-200-3458 |

## 2. Laboratory information

Address

The open area test site and EMC facilities are used for these testing.
This facility was accredited by KOLAS, EK of Korea, MIC, FCC.
EMC RESEARCH INSTITUTE .
80, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA
Telephone Number : 82- 31- 336- 1186
Facsimile Number : 82- 31- 336 -1184
KOLAS No. : 111
EK : J
MIC : KR0030
FCC Filing No. : 302567


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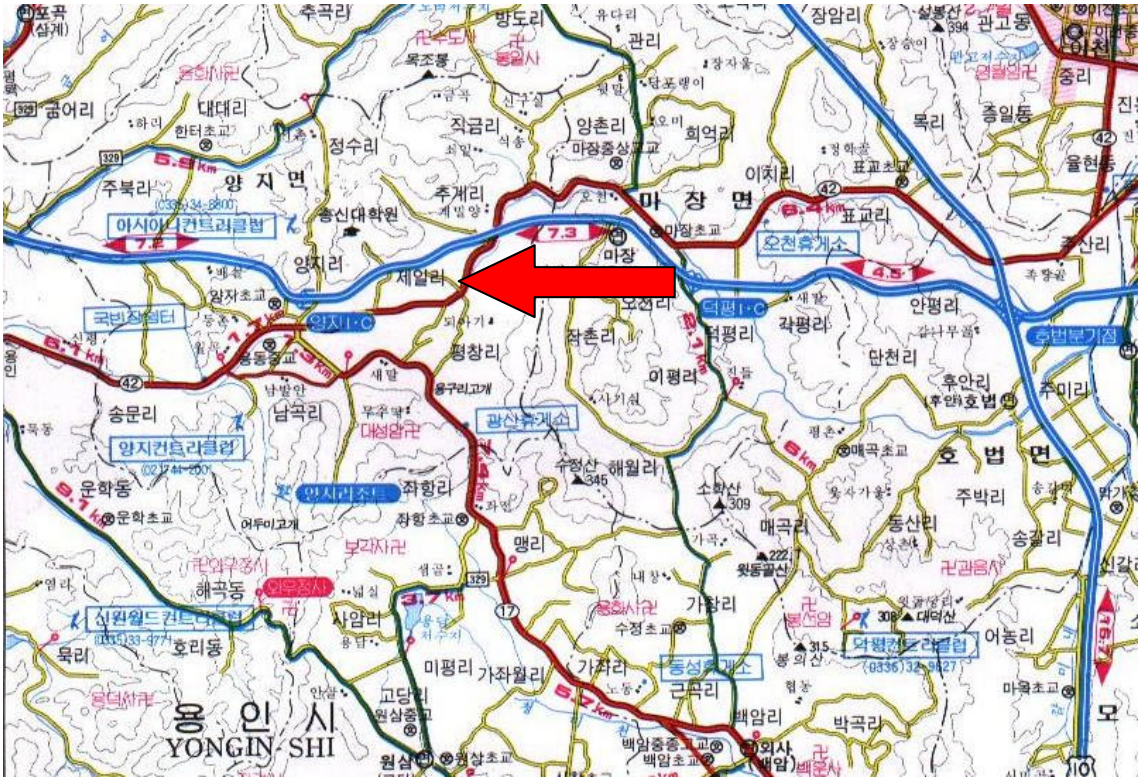
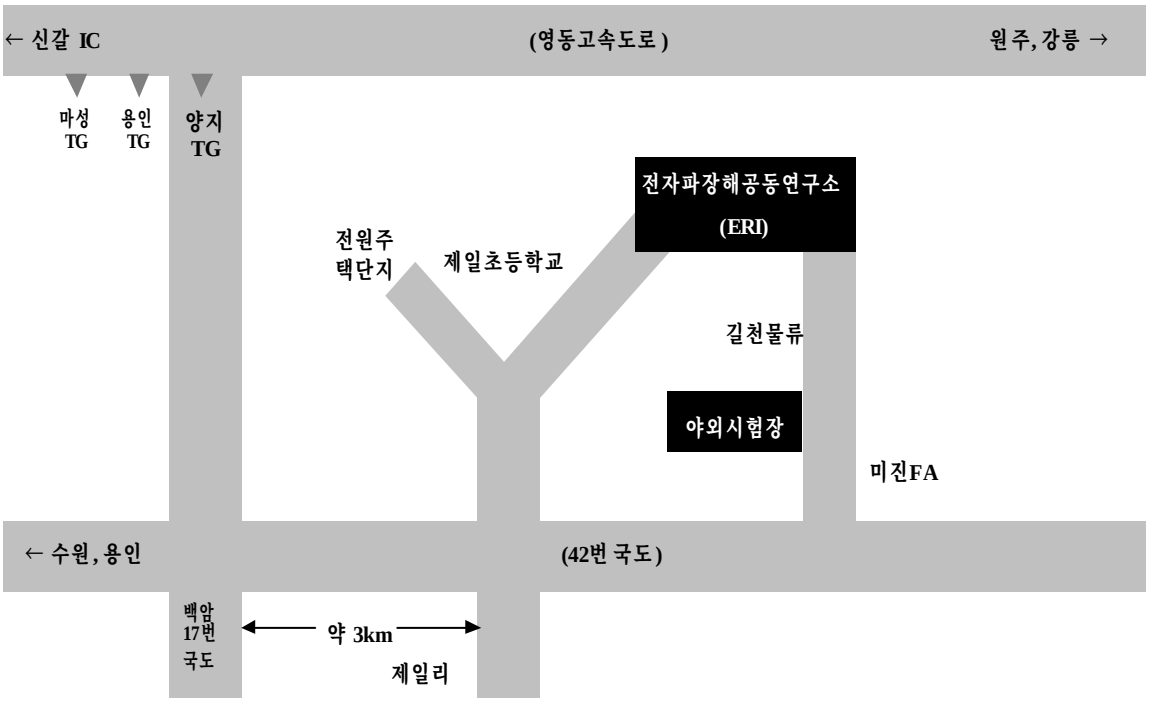
MAP





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# 3. TEST SYSTEM CONFIGURATION

## 3.1 Operation Environment

| | Temperature | Humidity | Pressure |
|---|---|---|---|
| 3m Chamber : | 18.0 ° C | 35 % | 999hPa |
| Shielded room : | 23.0 ° C | 38 % | 998hPa |

## 3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, specially in field of EMC.
The factors contributing to uncertainties are test receiver, Cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna Frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability.

Based on NIS 80,81, The measurement uncertainty level with a 95% confidence level were applied.

## 3.3 sample calculation

### Conducted emission

The field strength is calculated by adding the LISN factor, cable loss from the measured reading.
The sample calculation is as follows :

FS = MR + LF + CL
MR = Meter Reading
LF = LISN Factor
CL = Cable Loss

If MR is 30dB, LISN Factor 1dB, CL 1dB
The result (MR) is


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30 + 1 + 1 = 32dBuV

radiated emission

The field strength is calculated by adding the antenna Factor, cable loss and, Antenna pad subtracting the amplifier gain from the measured reading.
The sample calculation is as follows :

FS = MR + AF + CL + AT-AG

MR = Meter Reading
AF = Antenna Factor
CL = Cable Loss
AT = Antenna Pad
AG=Amplifier Gain

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB
The result (MR) is

30 + 12 + 5 + 10 –35 = 22dBuV/m

# 4. Description of E.U.T.

## 4.1 Product Description

| | |
|---|---|
| **Manufactured By:** | SAMSUNG ELECTRONICS CO., LTD |
| **Address:** | 416, Maetan-3dong, Paldal-Gu, Suwon City, Kyungki-Do, Korea |
| **Test Requested By:** | SAMSUNG ELECTRONICS CO., LTD |
| **Model:** | SCD180 |
| **Serial Number:** | N/A |
| **IMAGE SENSOR** | 200,000 fixel |
| **POWER CONSUMPTION** | 4.9W(LCD), 3.6W(CVF) |
| **Supply Voltage** | DC 8.4V , Lithium Lon Battery Pack 7.4V |
| **General Description:** | This EUT(Equipment Under Test) is DIGITAL VIDEO CAMERA. |


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## 4.2 peripherals

| Description | Model / Part # | Serial Number | Manufacture |
|---|---|---|---|
| DIGITAL VIDEO CAMERA | SCD180 | N/A | SAMSUNG ELECTRONICS CO., LTD. |
| PRINTER | DeskJet 930C | CN13V1B1SZ | H/P |
| KEYBOARD | SDM4510UH | 4M015720 | SAMSUNG ELECTRONICS CO., LTD. |
| MOUSE | M-S34 | LZB92800974 | LOGITECH |
| NOTE PC | CM2080 | 5Y17JNZ9R892 | SAMSUNG ELECTRONICS CO., LTD. |
| AC/DC ADAPTOR | AA-E7 | N/A | SAMSUNG ELECTRONICS CO., LTD. |
| MIC, EARPHONE | N/A | N/A | N/A |
| AC/DC ADAPTOR | AD-60DB | MJD0124008757 | Delt ELECTRONICS CO., LTD. |

## 4.3 used cables

| EUT Port | Type | Shield (Y/N) | Length (meters) | Pin | Connected To |
|---|---|---|---|---|---|
| USB | USB | Y | 1.0 | 5 | NOTE PC |
| S-VIDEO | DIN | Y | 1.0 | 5 | OPEN |
| EARPHONE | P-JACK | N | 1.2 | 3 | EARPHONE |
| MIC | P-JACK | N | 1.5 | 3 | MIC |


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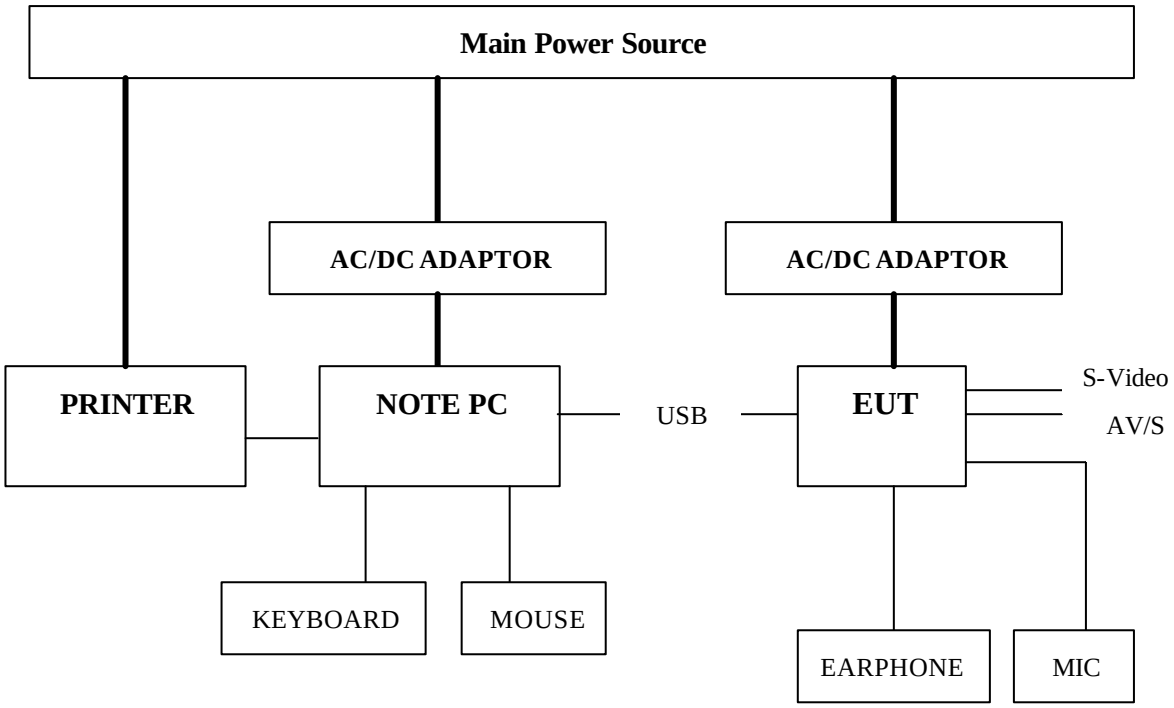
## 4.4 E.U.T Test Configuration




## 4.5 Operating conditions

Operating : USB Still camera mode, play mode, recording mode

- The system was configured in typical fashion (as a customer would normally use it) for testing.
- 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.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# 5. TEST RESULTS

## 5.1 Conducted emission

### 5.1.1 Measurement procedure

**Mains**

The measurements were performed in a shielded room.
EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.
The rear of tabletop was located 40Cm to the vertical conducted plane.
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 power lead, except ground (safety) lead, were individually connected through a LISN to input power source.
Both lines of power cord, hot and neutral, were measured.

### 5.1.2 Used equipment

| Equipment | Model | Serial No. | Makers | Next Cal.Date | Used |
|---|---|---|---|---|---|
| Test receiver | ESS | 848588/006 | R&S | 02. 6. 08 | x |
| | ESCS30 | 100022 | R&S | 03. 3. 25 | |
| L.I.S.N. | ESH3-Z5 | 100028 | R&S | 02. 5. 21 | x |
| | ESH3-Z5 | 100029 | R&S | 01.5. 21 | x |

### 5.1.3 measurement uncertainty

Conducted Emission measurement : ± 2.4 (K=2)


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## 5.1.4 test data(R EC: the maximum mode)

| Frequency Range [MHz] | Tested Freq. [MHz] | LISN Pol. | Meter Reading[A] QP [dBuV] | Total Loss [B] [dB] | Results QP [A]+[B] [dBuV] | Margin [C]-[A+B] [dBuV] | Limits [C] [dBuV] |
|---|---|---|---|---|---|---|---|
| **0.45-30** | 0.150 | N | 33.70 | 0.16 | 33.86 | 14.14 | **48.00** |
| | 0.198 | N | 42.40 | 0.16 | 42.56 | 5.44 | **48.00** |
| | 0.261 | N | 40.00 | 0.16 | 40.16 | 7.84 | **48.00** |
| | 0.264 | H | 39.10 | 0.16 | 39.26 | 8.74 | **48.00** |
| | 0.330 | N | 39.00 | 0.17 | 39.17 | 8.83 | **48.00** |
| | 0.396 | N | 40.40 | 0.17 | 40.57 | 7.43 | **48.00** |
| | 0.525 | N | 42.30 | 0.18 | 42.48 | 5.52 | **48.00** |
| | 0.591 | H | 41.20 | 0.18 | 41.38 | 6.62 | **48.00** |
| | 0.855 | N | 41.30 | 0.18 | 41.48 | 6.52 | **48.00** |
| | 1.578 | N | 40.70 | 0.20 | 40.90 | 7.10 | **48.00** |
| | 2.634 | N | 41.20 | 0.24 | 41.44 | 6.56 | **48.00** |
| | 3.160 | N | 41.00 | 0.25 | 41.25 | 6.75 | **48.00** |
| | 5.530 | H | 39.80 | 0.45 | 40.25 | 7.75 | **48.00** |
| | 6.910 | N | 38.70 | 0.52 | 39.22 | 8.78 | **48.00** |
| | 7.110 | H | 38.50 | 0.54 | 39.04 | 8.96 | **48.00** |
| | 8.490 | N | 36.50 | 0.58 | 37.08 | 10.92 | **48.00** |
| | 10.400 | N | 32.70 | 0.66 | 33.36 | 14.64 | **48.00** |
| | 29.670 | N | 32.90 | 1.47 | 34.37 | 13.63 | **48.00** |

* Results = Meter Reading(QP) + Total Loss(LISN Insertion loss + Cable loss)
* Margin = Limits - Result
* IF Bandwidth = 9kHz
* Detecting Mode : Quasi-Peak
* Used receiver : ESS (Rohde & Schwarz)

## 5.1.7 Result

Complied


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## 5.2 Radiated Emission

### 5.2.1 Measurement procedure

A pretest was performed at 3m distance in an semi-anechoic chamber for searching correct frequency.
The final test was done at a 10m open area test site with a quasi-peak detector.
EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.
Cables connected to EUT were fixed to cause maximum emission.
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.

### 5.2.2 Used equipment

| Equipment | Model No. | Serial No. | Makers | Next Cal Date |
|---|---|---|---|---|
| Test receiver | ESMI | 826210/007 | R&S | 03. 3. 8 |
| | ESCS30 | 830986/015 | R&S | 03.3.18 |
| | ESS | 848588/006 | R&S | 02.6. 8 |
| Biconnical antenna | HK116 | 825177/013 | R&S | 02. 5. 30 |
| Log-Periodic antenna | HL223 | 825032/017 | R&S | 02. 5. 30 |
| Antenna Mast | EMAT2014 | N/A | EM | - |
| Turn Table | EMRT2015 | N/A | EM | - |
| Test site | 10m chamber | Test site | EM | - |
| | chamber(3m) | | EM | - |

### 5.2.3 measurement uncertainty

Radiated Emission measurement :

30-300MHz +3.96dB / -4.04dB
300-1000MHz +3.04dB / -3.00dB


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## 5.2.4 test data(REC: the maximum mode)

| Frequency Range [MHz] | Tested Frequency [MHz] | ANT Pol. | Meter Reading [A] [dBuV/m] | Total Loss [B] [dB] | Results [A+B] [dBuV/m] | Margine | Limits [dBuV/m] |
|---|---|---|---|---|---|---|---|
| ***30 - 88*** | 61.10 | V | 22.44 | 9.69 | 32.13 | 7.87 | **40.0** |
| | 65.80 | V | 24.33 | 8.09 | 32.42 | 7.58 | |
| | | | | | | | |
| | | | | | | | |
| ***88-216*** | 135.30 | H | 22.34 | 16.20 | 38.54 | 4.96 | **43.5** |
| | 162.30 | H | 15.63 | 18.00 | 33.63 | 9.87 | |
| | 165.70 | H | 16.75 | 18.10 | 34.85 | 8.65 | |
| | 189.30 | H | 20.94 | 19.07 | 40.01 | 3.49 | |
| | | | | | | | |
| | | | | | | | |
| ***216-960*** | 216.30 | H | 23.59 | 19.25 | 42.84 | 3.16 | **46.0** |
| | 297.30 | H | 19.82 | 22.90 | 42.72 | 3.28 | |
| | 310.5 | H | 22.90 | 17.35 | 40.25 | 5.75 | |
| | 352.50 | H | 24.30 | 18.20 | 42.50 | 3.50 | |
| | 522.50 | H | 18.25 | 21.90 | 40.15 | 5.85 | |
| | 774.30 | H | 16.57 | 26.10 | 42.67 | 3.33 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| ***960-above*** | | | | | | | **54.0** |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## 5.2.7 Result

Complied


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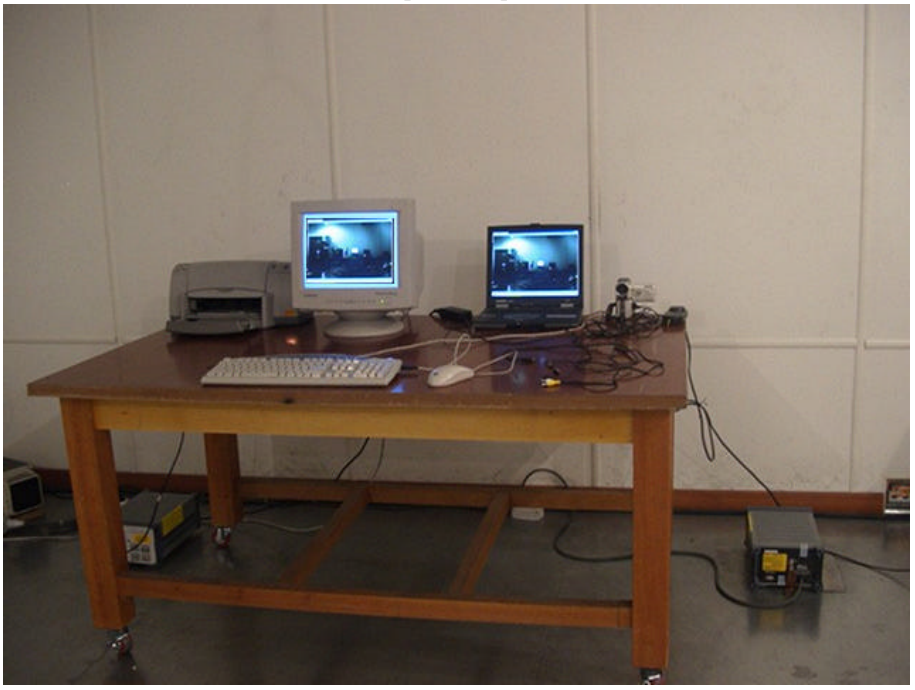
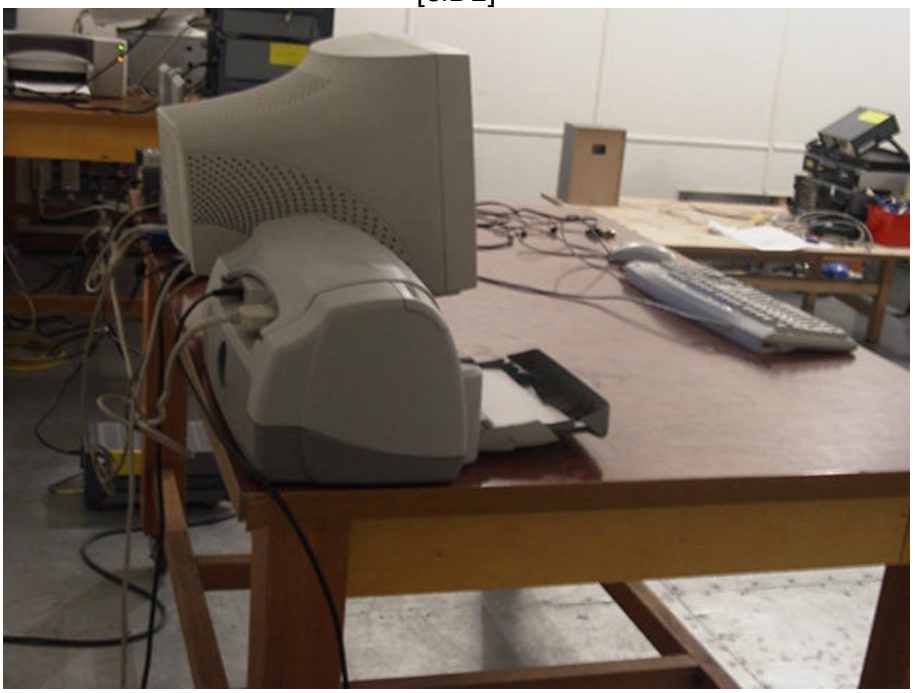
# 6. TEST PHOTOGRAPHS

## Conducted Emission

[FRONT]



[SIDE]

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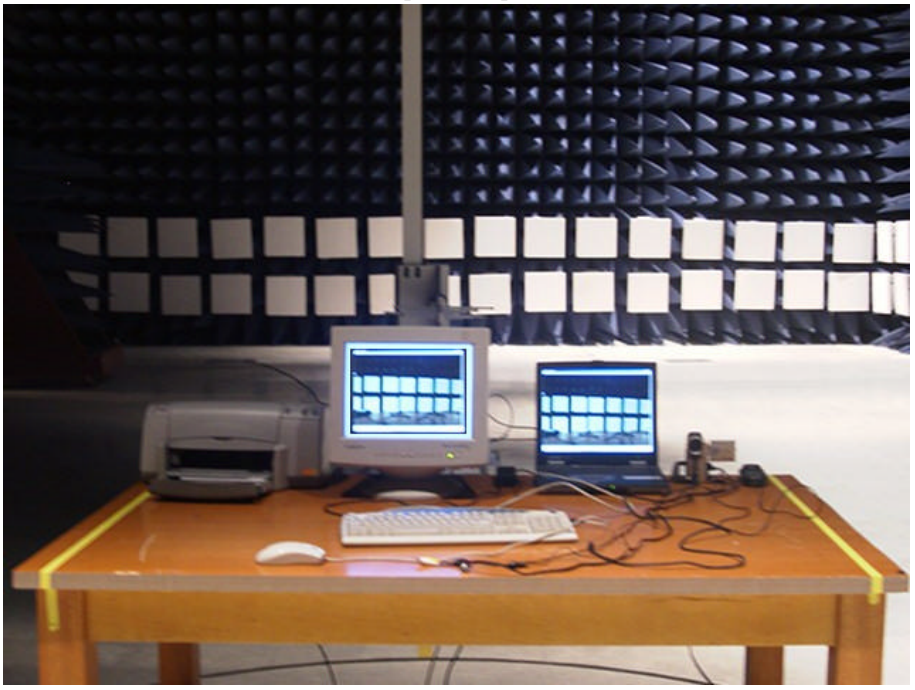
## Radiated Emission

[FRONT]



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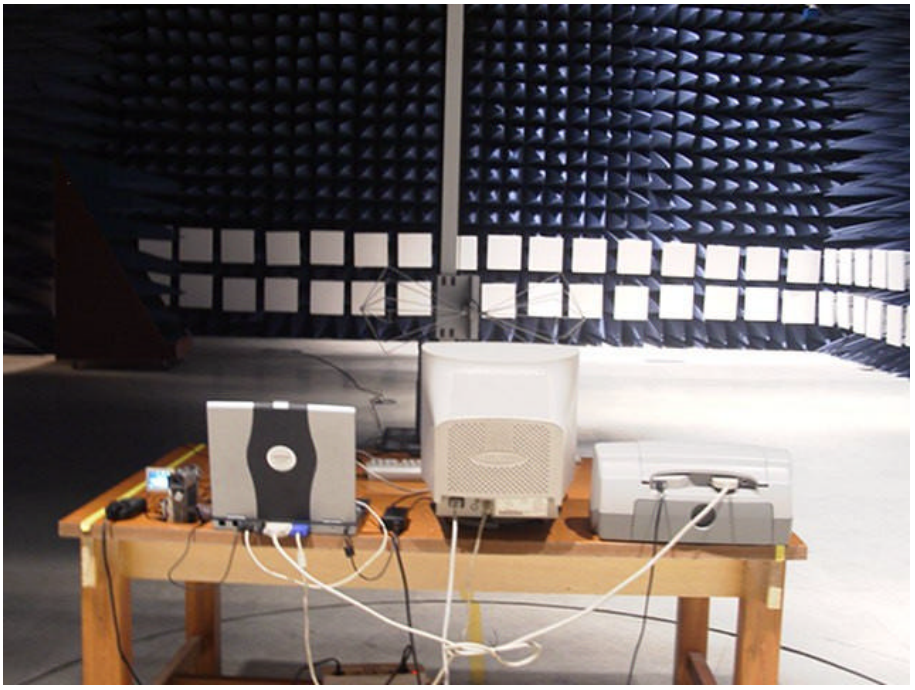


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[ EUT FRONT]

[ EUT REAR ]

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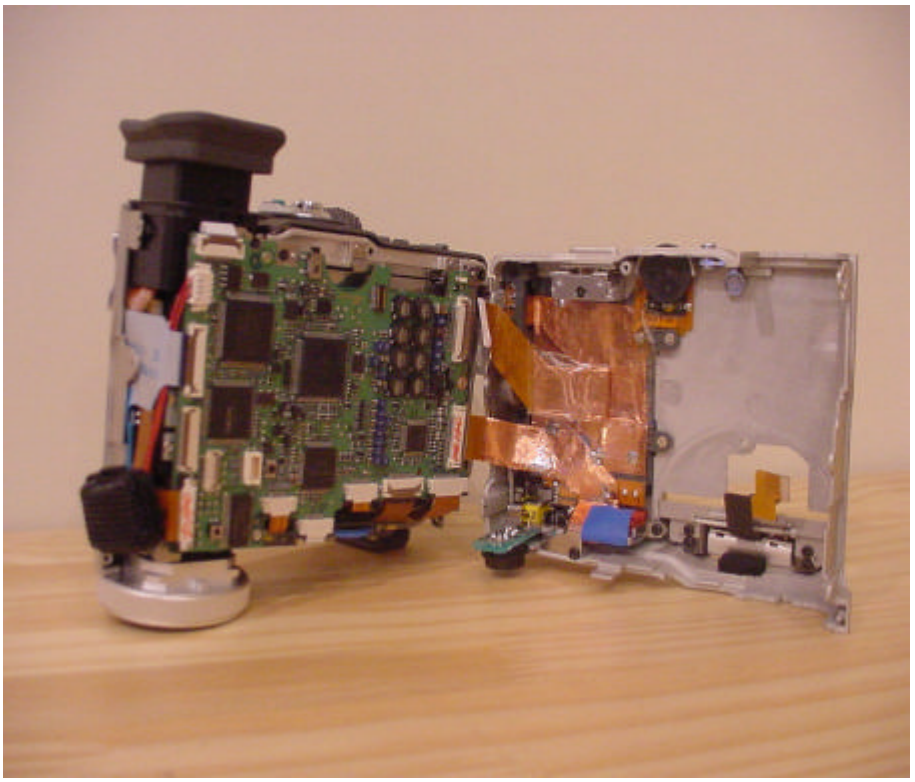
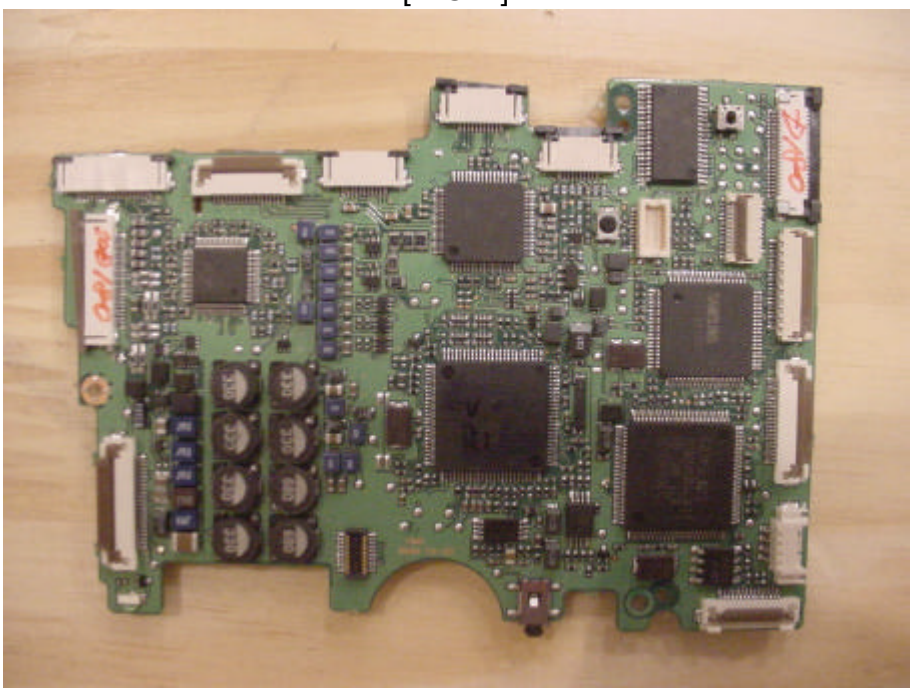
[ INSIDE ]



## Main Board

[FRONT]

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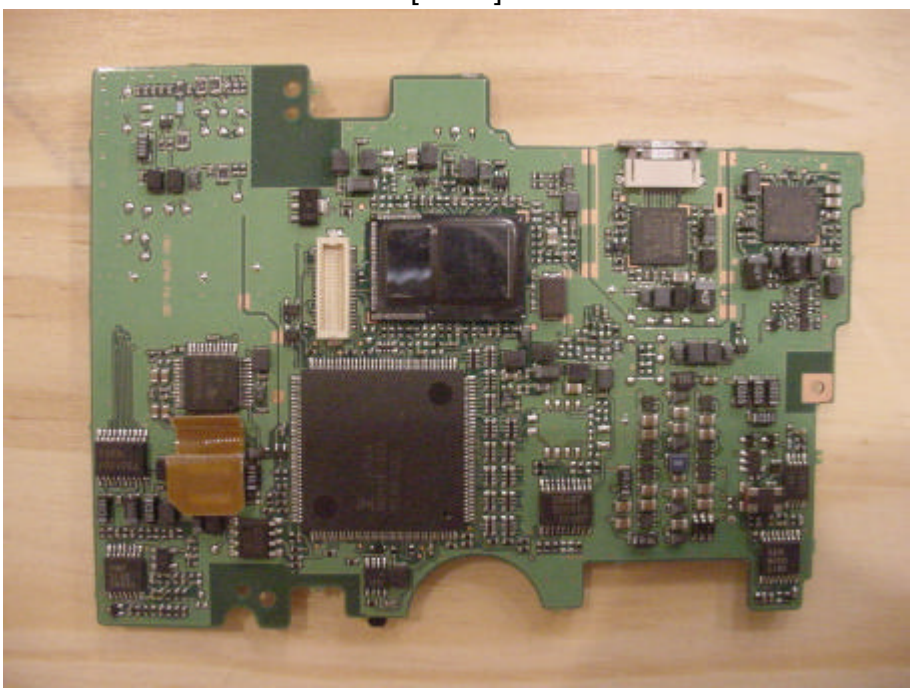
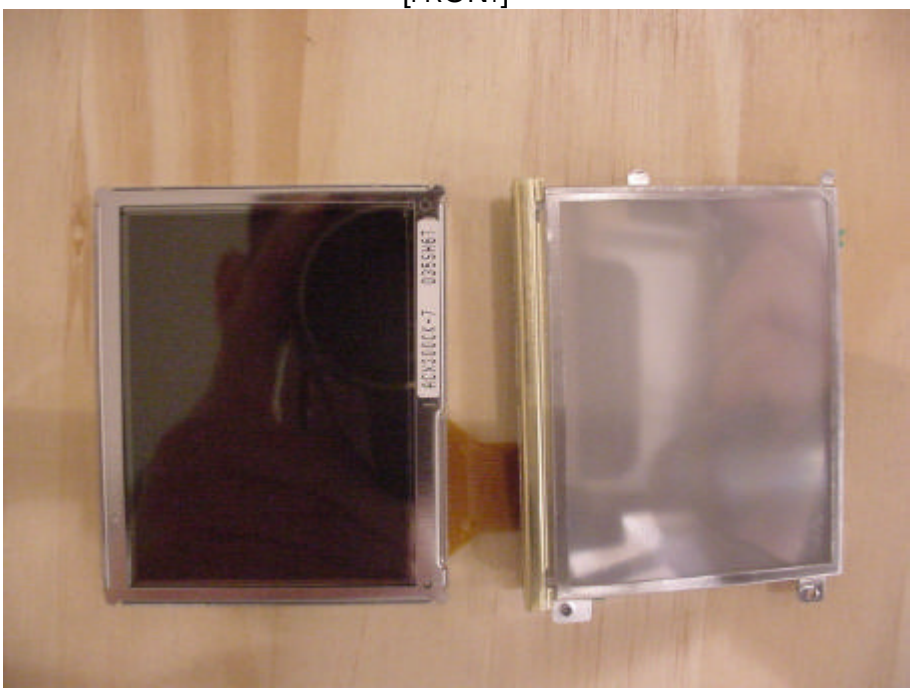
[REAR]



## LCD Board

[FRONT]

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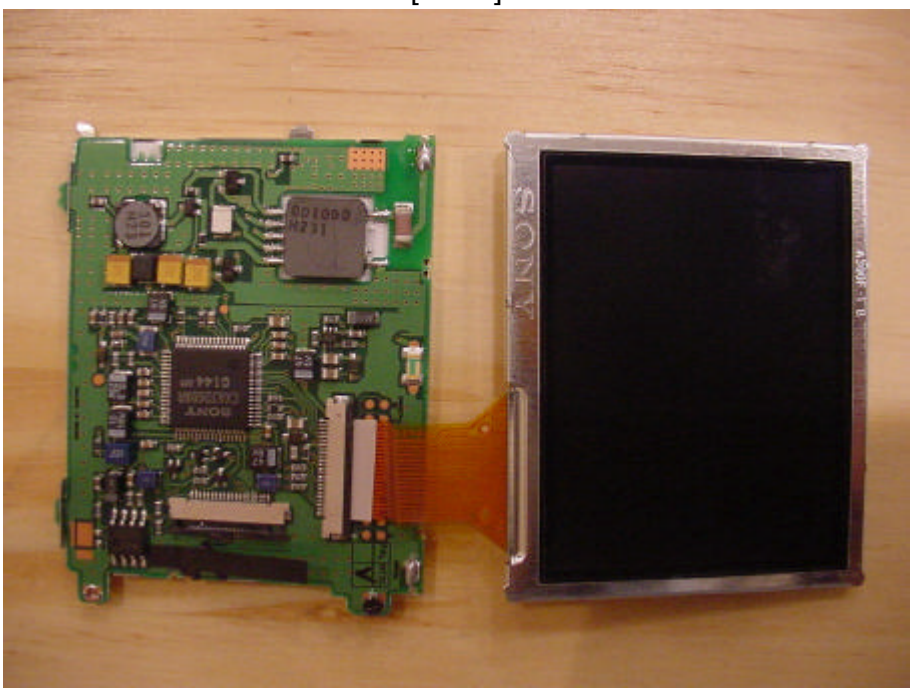
[REAR]

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