

# EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

**Product : Notebook PC**

**Model No. : T10**

**FCC ID : A3LST10R**

1. This test reports shall not be reproduced except in full, without the written approval of SEC EMC Testing laboratory.
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 3, 2002 ~ June 4, 2002

**Issued Date :** June 8, 2002

**Tested by:**

I. K. Bae

Il Kweon, BAE / Test Engineer

**Reviewed by:**

Yang S. Kim

Yang Soo, KIM / Manager of EMC Lab.

**Authorised by:**

K. B. Chung

Kyu Baek, CHUNG / Chief of EMC Lab.

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 Code: 200447

## Table of Contents

### 1. General Information

- 1.1 Product Description
- 1.2 Configuration of EUT and peripherals
- 1.3 Used Cable Description
- 1.4 System Block Diagram of Test Configuration
- 1.5 Test Facility

### 2. System Test Configuration

- 2.1 Configuration of Radiated and Conducted Interference Measurement
- 2.2 Operation Environment
- 2.3 Test Procedure

### 3. Conducted Emission Test Data

### 4. Radiated Emission Test Data

### 5. Label Configuration and Location

### 6. Test Equipment Used

### Distribution

This test report has been made available as follows:

|                                             |            |
|---------------------------------------------|------------|
| <b>CS Management Center, EMC Laboratory</b> | 1 original |
| Computer Division                           | 1 copy     |

## 1. General Information

**Applicant** : Samsung Electronics Co., Ltd.  
CS Management Center EMC Test Laboratory  
Tel.: +81-(0)31-200-2135 Fax.: +81-(0)31-200-2189

**Full Address** : 416 Maetan 3 Dong, Paldal-Ku,  
Suwon City, Kyungki Do, Korea, 442-742

**Kind of Product** : **Notebook PC**

**FCC ID** : **A3LST10R**

**Project Name** : **Matrix III Plus**

**Model & Variant Names** : **Transport GX3** (Brand Name: Micronpc)  
**ST10** (Brand Name: Samsung)  
**Samsung T10** (Brand Name: Samsung)

**Test Report Produced by** : Il Kweon BAE / Test Engineer

## 1.1 Product Description

### 1) Justification

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

The system was pre-tested using the below additional components, and we found worst emission level for the components, were selected as the final components for the test.

| Component      | Brand and Model Name    | Remark     |
|----------------|-------------------------|------------|
| CD-ROM         | - Samsung, SN-124Q      |            |
| CD-ROM         | - Samsung, SN-124P      |            |
| CD-ROM         | - Teac, CD-233E         |            |
| CD-RW          | - Matsushita, UJDA-330A |            |
| DVD            | - Toshiba, SD-C2502     |            |
| DVD_CDRW_Combo | - Toshiba, SD-R2102     |            |
| DVD_CDRW_Combo | - Matsushita, UJDA-710  | Worst Case |
|                |                         |            |
|                |                         |            |

And then the system was tested with the configuration of (A), (B), (C), (D) below

(A) CPU Pentium IV 2.0GHz, LCD 15.0" without Docking Station(SMD-830E)

(B) CPU Pentium IV 2.0GHz, LCD 15.0" with Docking Station

(C) CPU Pentium IV 1.9GHz, LCD 14.1" without Docking Station

(D) CPU Pentium IV 1.9MHz, LCD 14.1" with Docking Station

In each test mode, Finally we found worst case emission that is above (A) configuration with the Worst case components(in the above table). So, the DATA of the maximum(worst case) EUT operation was reported.

Further details of cabling and configuration are shown in the test system configuration.

## 2) Operating Frequency :

2.0GHz(CPU Speed), 100MHz(Host Clock), 133MHz(SDRAM Clock), 8M(Finger print)  
33.3MHz(PCI Clock), 14.318MHz(Ref), 49.512MHz(Audio Clock), 25M(Network)  
183MHz(Video Memory Clock), 12.288MHz(Audio Bit Clock), 24.576MHz(Audio C24)  
10MHz(Micom Clock), 48MHz(USB Clock), 54MHz(15.0"LCD Clock), 66.6(Hub)  
65MHz(14.1" LCD Clock)

## 3) Description of Testing operating mode

| Operating Mode                        | Operating section of EUT                                                                   |
|---------------------------------------|--------------------------------------------------------------------------------------------|
| "H" Pattern display &<br>Read / Write | LCD Screen                                                                                 |
|                                       | external Monitor                                                                           |
|                                       | television                                                                                 |
|                                       | floppy disk drive a:                                                                       |
|                                       | hard disk drive c:<br>flash memory drive e:<br>LPT1 to printer<br>COM4 to modem            |
| Audio Output                          | Digital Camcorder Input<br>DVD (drive d:) playing, audio to headphone and digital speakers |

## 4) Tested Resolution :

| Tested Video mode | Resolutions | Refresh rates | Colors |
|-------------------|-------------|---------------|--------|
| LCD(15.0")        | 1400 X 1050 | 60Hz          | 32bits |
| LCD(14.1")        | 1024 X 768  | 60Hz          | 32bits |
| Ext. Monitor      | 1280 X 1024 | 85Hz          | 32bits |
| TV Monitor        | 640 X 480   | 60Hz          | 32bits |
|                   |             |               |        |

## 5) Manufacturer : SAMSUNG Electronics Co., Ltd.

## 6) Assemble Parts

| Item                    | Specification                                                                                                                                       | Remark                               |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| CPU                     | Intel Pentium4, 2.0GHz<br>Intel NetBurst micro architecture<br>400 MHz system bus<br>512KB advanced transfer cache                                  |                                      |
| Main Memory             | Samsung, M470L3224BT0-CB0<br>direct DDR channel 64bit 256 MB memory * 2ea                                                                           |                                      |
| Graphic<br>Contoller    | ATI, Mobility M7-CSP32<br>intergrated LVDS,TMDS,TV encoder, DDR<br>static and dynamic power management                                              | SEC, K40263238A-GC45                 |
| Flat<br>Panel<br>Dispay | SEC, LCD 15" TFT, LTN150P3-L01<br>Upto 1400x1050 Pixels; 16-bit 64k colors                                                                          | Worst Case                           |
|                         | SEC, LCD 14.1" TFT, LTN141XF-L03<br>Upto 1024x768 Pixels                                                                                            | optional                             |
| FDD                     | Citizen, W1D<br>3.5", 1.44MB, 3 mode support                                                                                                        |                                      |
| HDD                     | Toshiba, MK4018GAP, 40GB, 4200RPM                                                                                                                   |                                      |
| PCMCIA                  | Samsung, SCF-48M, 48MB                                                                                                                              | SN : CEB201ASM9947                   |
| DVD-COMBO               | Matsushita, UJDA-710<br>CD 24X, DVD 8X, CDRW 4X Speed                                                                                               |                                      |
| AC Adapter              | ASTECH, AD-8019, 80-Watts, 2 pin                                                                                                                    |                                      |
| MODEM                   | SEC, SFM-3100LW, 56KBPS                                                                                                                             |                                      |
| LAN                     | 10/100 Base-T Ethernet support                                                                                                                      |                                      |
| Wireless LAN            | Agere, MPC13A-20/R, 11MBPS, 019492/B                                                                                                                | Ruby                                 |
| Input Devices           | Keyboard, 19mm pitch, 2.5mmH travel length<br>Pointing Device, PS/2 Touchpad w/ 2 button<br>Finger Print, ST Microelectronics, TCS1A                | Korean, US, UK, Japan German, French |
| Battery                 | Samsung, SSB-T10CLS, Removable 9-cell Li-Ion                                                                                                        |                                      |
| Ports                   | 2 USB, PIO, PS/2, RJ-11, RJ-45, DC IN,<br>EXT. MONITOR, Mini-Dock Connector, TV-out,<br>MIC-IN, LINE-IN,HEADPHONE-OUT, SPDIF, Card bus<br>slot. Etc |                                      |

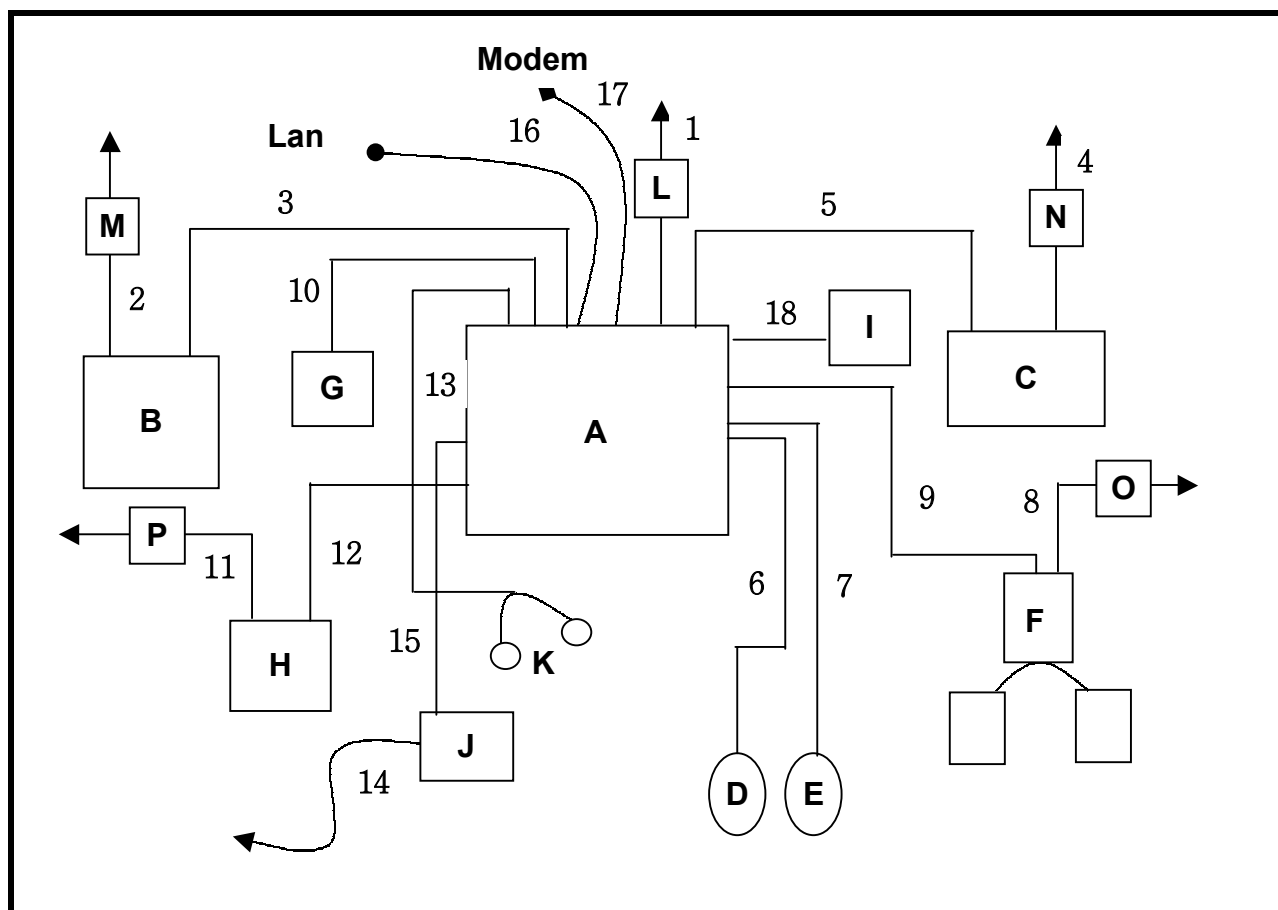
## 1.2 Configuration of EUT and peripherals

| Mark | Item                | Model No.    | Serial No.     | Manufacturer  | FCC ID    |
|------|---------------------|--------------|----------------|---------------|-----------|
| A    | Notebook PC         | T10          | -              | Samsung       | A3LST10R  |
| B    | External Monitor    | M17D-AN      | N106H4JT100839 | Samsung       | Doc       |
| C    | Printer             | LQ-580H      | CG2Y014508     | P.T INDONESIA | Doc       |
| D    | USB Mouse           | M-U48a       | LZC10703970    | LOGITECH      | JNZ211360 |
| E    | PS/2 Mouse          | M-S34-6MD    | LZA84951263    | LOGITECH      | JNZ211360 |
| F    | Digital speaker     | BA-790       | R0001479       | BOSTON        | Doc       |
| G    | Portable Cassette   | MY-250       | 160KB00620     | Samsung       | Doc       |
| H    | Digital camcord     | DCR-PC110    | 1091827        | SONY          | -         |
| I    | Memory stick reader | SMR-100Y     | 8V10R001       | -             | -         |
| J    | CCTV                | CCM-052C     | 54059495       | COMMAX        | -         |
| K    | Head Set            | -            | -              | -             | -         |
| L    | Adapter(EUT)        | AD-8019      | B3373800340BB  | ASTEC         | -         |
| M    | Adapter(Monitor)    | AD-4214N     | C011108523     | Samsung       | -         |
| N    | Adapter(Printer)    | -            | -              | -             | -         |
| O    | Adapter(Speaker)    | DK1201A5-2AN | -              | BOSTON        | -         |
| P    | Adapter(Camcord)    | AC-L10A      | 21121642       | SONY          | -         |
|      |                     |              |                |               |           |
|      |                     |              |                |               |           |

### 1.3 Used Cable Description

| No. | Item                      | Length[m] | Shielded (Y/N) | Remark   |
|-----|---------------------------|-----------|----------------|----------|
| 1   | Power Cable for EUT       | 3.52      | N              | AC Mains |
| 2   | Power Cable for Monitor   | 1.82      | N              |          |
| 3   | Monitor Cable             | 1.85      | Y              |          |
| 4   | Power Cable for Printer   | 1.85      | N              |          |
| 5   | Printer Cable             | 1.6       | Y              |          |
| 6   | USB Mouse Cable           | 1.8       | Y              |          |
| 7   | PS/2 Mouse Cable          | 1.8       | Y              |          |
| 8   | Power Cable for Speaker   | 1.5       | N              |          |
| 9   | Digital Speaker Cable     | 2.4       | N              |          |
| 10  | Audio Device Cable        | 1.9       | N              |          |
| 11  | Power Cable for Camcorder | 1.5       | N              |          |
| 12  | DVC Cable                 | 1.7       | N              |          |
| 13  | Head Set Cable            | 2.7       | N              |          |
| 14  | Power Cable for CCTV      | 0.5       | N              |          |
| 15  | CCTV Cable                | 1.5       | N              |          |
| 16  | LAN Cable                 | 5         | N              |          |
| 17  | Modem Cable               | 2         | N              |          |
| 18  | Mwmory stick reader cable | 0.5       | Y              |          |

## 1.4 System Block Diagram of Test Configuration



## 1.5 Test Facility

All test described in this report were performed by :  
SAMSUNG ELECTRONICS CO., LTD.  
EMC TESTING LABORATORY  
416 Maetan 3 Dong, Paldal-Ku, Suwon City, Kyungki Do, Korea, 442-742  
Semi Anechoic Chamber #1(Registration Number:98856) and Shielded Room.

This test facility has been filed in FCC under the criteria in ANSI C63.4-1992.

## 2. System Test Configuration

### 2.1 Configuration of Radiated and Conducted Interference Measurement

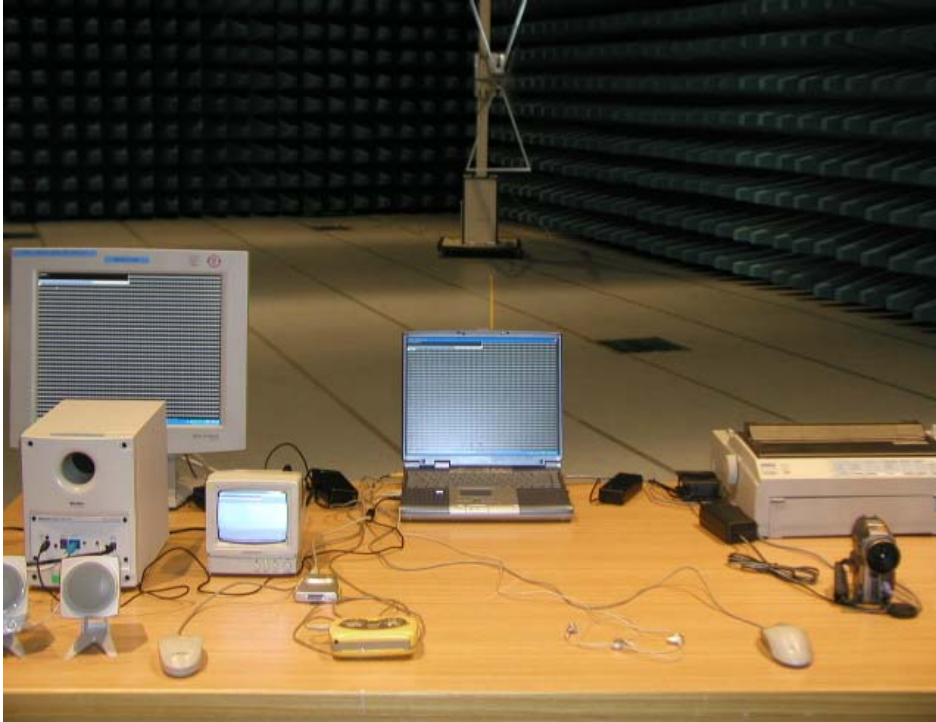
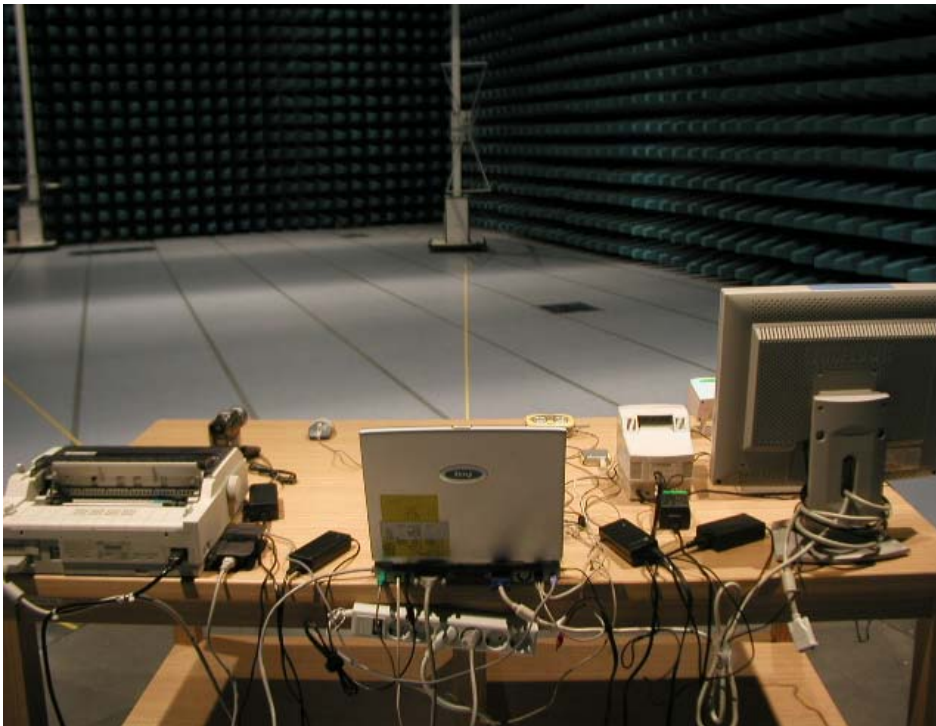
\* Cabling was taken into consideration and test data was taken under worse case conditions.

#### 1)Conduction(Front View)



#### 2)Conduction(Rear View)



**3) Radiation(Front View)****4) Radiation(Rear View)**

## 2.2 Operation Environment

|                     | Conduction    | Radiation   |
|---------------------|---------------|-------------|
| Temperature [ C ] : | 21.5          | 18.5        |
| Humidity [ % ]      | 51            | 57          |
| Power supply        | : AC120V/60Hz | AC120V/60Hz |

## 2.3 Test Procedure

### 2.3.1 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.

The EUT was switched on and allowed to warm up to its normal operating condition.

A quick scan, from 450kHz to 30MHz, was made on the L1 & L2 line by LISN.

High peaks, relative to the limit line, over the frequency range were then selected.

The EMI TEST RECEIVER was then tuned to the selected frequencies.

CISPR quasi-peak measurements with a receiver bandwidth setting of 10kHz, were taken.

### 2.3.2 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.

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 2000 MHz using biconiLog antenna.

Also, the EMI TEST RECEIVER was scanned from 1000 to 18000MHz using linearly polarized double ridge horn antennas were used.

Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment; powering the monitor from the floor mounted outlet box and the computer aux AC outlet if applicable, and changing the polarity of the antenna; whichever determined the worst-case emission.

The explanation of measuring instrument setup when respective function is used in any frequency band is as following:

| Frequency Band [MHz] | Instrument        | Detector function | resolution Bandwidth | Video Bandwidth |
|----------------------|-------------------|-------------------|----------------------|-----------------|
| 30 to 1000           | Spectrum analyzer | Peak              | 1MHz                 | 1MHz            |
|                      | EMI Test receiver | Quasi-Peak        | 120kHz               | -               |
| Above 1000           | EMI Test receiver | Peak              | 1MHz                 | -               |

### 3. Conducted Emission Test Data

**O Test Data Sheet**

| Frequency<br><br>[MHz] | Meter reading<br>(a) |      | Total<br>Loss<br>(b)<br>[dB] | Results<br>(a) + (b) |      | Limits      |             | Margin<br>(Limits-Result) |      |
|------------------------|----------------------|------|------------------------------|----------------------|------|-------------|-------------|---------------------------|------|
|                        | QP                   | AV   |                              | QP                   | AV   | QP          | AV          | QP                        | AV   |
|                        | [dBuV]               |      |                              | [dBuV]               |      | [dBuV]      |             | [dB]                      |      |
| 0.150                  | 51.3                 | 32.2 | 0.6                          | 51.9                 | 32.8 | <b>66.0</b> | <b>56.0</b> | 14.1                      | 23.2 |
| 0.238                  | 41.1                 | 27.9 | 0.6                          | 41.7                 | 28.5 | <b>62.2</b> | <b>52.2</b> | 20.4                      | 23.6 |
| 0.263                  | 41.7                 | 23.5 | 0.6                          | 42.3                 | 24.1 | <b>61.3</b> | <b>51.3</b> | 19.0                      | 27.2 |
| 0.337                  | 40.8                 | 32.3 | 0.5                          | 41.3                 | 32.8 | <b>59.3</b> | <b>49.3</b> | 18.0                      | 16.5 |
| 0.392                  | 39.6                 | 32.3 | 0.5                          | 40.1                 | 32.8 | <b>58.0</b> | <b>48.0</b> | 17.9                      | 15.2 |
| 0.403                  | 41.3                 | 30.3 | 0.5                          | 41.8                 | 30.8 | <b>57.8</b> | <b>47.8</b> | 16.0                      | 17.0 |
| 0.603                  | 41.7                 | 32.6 | 0.6                          | 42.3                 | 33.2 | <b>56.0</b> | <b>46.0</b> | 13.7                      | 12.8 |
| 0.607                  | 41.6                 | 32.5 | 0.6                          | 42.2                 | 33.1 | <b>56.0</b> | <b>46.0</b> | 13.8                      | 12.9 |
| 0.712                  | 41.0                 | 30.1 | 0.5                          | 41.5                 | 30.6 | <b>56.0</b> | <b>46.0</b> | 14.5                      | 15.4 |
| 0.864                  | 42.4                 | 32.4 | 0.6                          | 43.0                 | 33.0 | <b>56.0</b> | <b>46.0</b> | 13.1                      | 13.1 |
| 0.884                  | 42.1                 | 28.5 | 0.6                          | 42.7                 | 29.1 | <b>56.0</b> | <b>46.0</b> | 13.4                      | 17.0 |
| 2.048                  | 44.8                 | 44.4 | 0.6                          | 45.4                 | 45.0 | <b>56.0</b> | <b>46.0</b> | 10.6                      | 1.0  |
| 6.142                  | 34.3                 | 34.1 | 0.9                          | 35.2                 | 35.0 | <b>60.0</b> | <b>50.0</b> | 24.8                      | 15.0 |
| 10.239                 | 27.6                 | 26.0 | 0.9                          | 28.5                 | 26.9 | <b>60.0</b> | <b>50.0</b> | 31.5                      | 23.1 |
| 16.228                 | 29.5                 | 24.2 | 1.5                          | 31.0                 | 25.7 | <b>60.0</b> | <b>50.0</b> | 29.0                      | 24.3 |
| 17.692                 | 27.2                 | 23.2 | 1.7                          | 28.9                 | 24.9 | <b>60.0</b> | <b>50.0</b> | 31.1                      | 25.1 |
| 21.661                 | 28.2                 | 23.9 | 2.0                          | 30.2                 | 25.9 | <b>60.0</b> | <b>50.0</b> | 29.8                      | 24.1 |
| 27.157                 | 28.6                 | 26.0 | 2.1                          | 30.7                 | 28.1 | <b>60.0</b> | <b>50.0</b> | 29.3                      | 21.9 |

\* Results = Meter Reading(QP) + Total Loss(LISN Insertion loss + Cable loss)

\* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak

Bandwidth : 10kHz

#### 4. Radiated Emission Test Data

| Frequency Range<br>[MHz] | Tested Frequency<br>[MHz] | ANT Pol. | Meter Reading<br>[A]<br>[dBuV/m] | Total Loss<br>[B]<br>[dB] | Antenna Height<br>[Cm] | Turn table Degree<br>[Deg] | Results<br>[A+B]<br>[dBuV/m] | Limits<br>[dBuV/m] | Margin<br>(Limit-Result)<br>[dB] |
|--------------------------|---------------------------|----------|----------------------------------|---------------------------|------------------------|----------------------------|------------------------------|--------------------|----------------------------------|
| <b>30 - 230</b>          | 37.500                    | V        | 3.6                              | 16.7                      | 104                    | 88                         | 20.3                         | <b>30.0</b>        | 9.7                              |
|                          | 39.660                    | V        | 3.3                              | 15.4                      | 104                    | 73                         | 18.7                         | <b>30.0</b>        | 11.3                             |
|                          | 49.140                    | V        | 10.4                             | 9.6                       | 104                    | 48                         | 20.0                         | <b>30.0</b>        | 10.0                             |
|                          | 114.000                   | V        | 12.0                             | 11.2                      | 104                    | 285                        | 23.2                         | <b>30.0</b>        | 6.8                              |
|                          | 162.120                   | V        | 14.7                             | 9.5                       | 117                    | 315                        | 24.2                         | <b>30.0</b>        | 5.8                              |
|                          | 174.180                   | H        | 1.8                              | 9.5                       | 364                    | 67                         | 11.3                         | <b>30.0</b>        | 18.7                             |
| <b>230 - 1000</b>        | 264.180                   | H        | 16.6                             | 12.7                      | 347                    | 217                        | 29.3                         | <b>37.0</b>        | 7.7                              |
|                          | 276.480                   | V        | 14.4                             | 13.1                      | 118                    | 359                        | 27.5                         | <b>37.0</b>        | 9.5                              |
|                          | 300.600                   | H        | 10.4                             | 14.0                      | 379                    | 44                         | 24.4                         | <b>37.0</b>        | 12.6                             |
|                          | 337.920                   | H        | 17.4                             | 15.3                      | 245                    | 22                         | 32.7                         | <b>37.0</b>        | 4.3                              |
|                          | 378.360                   | V        | 6.5                              | 16.3                      | 104                    | 60                         | 22.8                         | <b>37.0</b>        | 14.2                             |
|                          | 816.540                   | V        | 3.9                              | 24.6                      | 400                    | 345                        | 28.5                         | <b>37.0</b>        | 8.5                              |
| <b>1000 - 10000</b>      | 1591(pk)                  | V        | 6.5                              | 30.0                      | 150                    | 0                          | 36.5                         | <b>74.0</b>        | 37.5                             |
|                          | 2274(pk)                  | V        | 0.2                              | 35.0                      | 100                    | 0                          | 35.2                         | <b>74.0</b>        | 38.8                             |

\* "<" Means equal or less then 5dB

\* Receiving Antenna Mode : **Horizontal, Vertical**

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

\* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak(Above 1000MHz: Peak)

Resolution Bandwidth : 120kHz(Above 1000MHz: 1MHz)

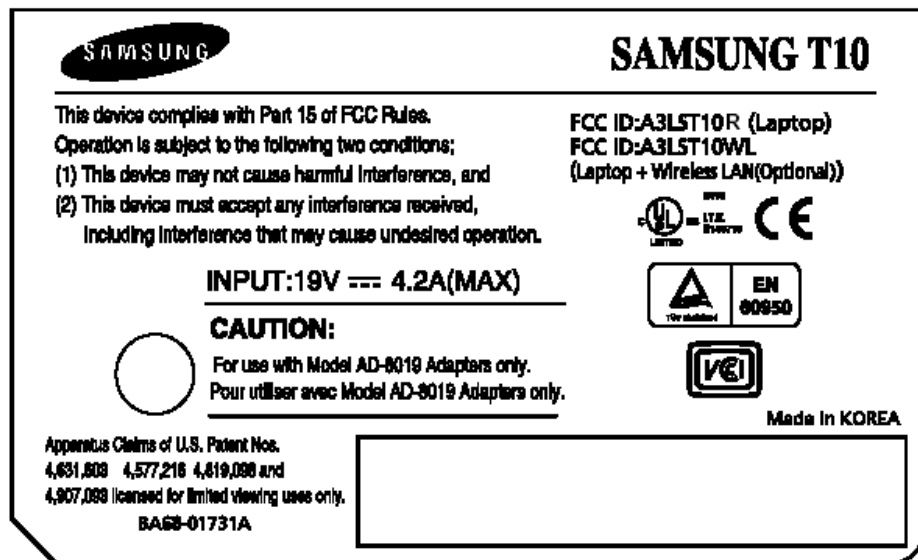
\* Test distance

- Below 1000MHz: 10m(Quasi-peak)

- Above 1000MHz: 3m(Peak)

## 5. FCC Label Configuration and Location

### 5.1 Label Configuration



### 5.2 Location of Label



## 6. Test Equipment Used

| Equipment                   | Model No.                                                  | Serial No.  | Makers | Next Calibration |
|-----------------------------|------------------------------------------------------------|-------------|--------|------------------|
| Field strength meter        | ESCS30                                                     | 830986/004  | R & S  | 2003-02-25       |
|                             | <b>Firmware versions : Main 2.22, OTP 02.01, GRA 02.36</b> |             |        |                  |
| Test Receiver               | ESI26                                                      | 100010      | R & S  | 2003-05-04       |
| L.I.S.N                     | ESH2-Z5                                                    | 831886/0006 | R & S  | 2002-11-20       |
| L.I.S.N                     | ESH3-Z5                                                    | 831887/0004 | R & S  | 2002-07-27       |
| Bi-Log Antenna              | HL562                                                      | 100005      | R & S  | 2002-08-02       |
| Double Ridged Guide Antenna | HF906                                                      | 100027      | R & S  | 2002-07-26       |