



**MEASUREMENT/TECHNICAL REPORT**

SAMSUNG ELECTRONICS CO., LTD.

Notebook Computer (SENS Pro 620)

FCC ID : A3LS620

DATE : JULY 10, 1998

이û SAMSUNG Reference NO. : 980626

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.

1. Applicant Name : SAMSUNG ELECTRONICS CO., LTD.  
(Company name & Address) 416 Maetan 3 Dong, Paldal - Ku,  
Suwon City, Kyungki Do, Korea,  
441 - 742

2. Identification of tested device

2.1 FCC ID : A3LS620  
2.2 Device Name : Notebook Computer  
2.3 Brand (Trade Name) : SAMSUNG  
2.4 Model Number : SENS Pro 620

3. Test Procedure and Items

3.1 AC Powerline Conducted Emissions Measurement : ANSI C63.4 - 1992  
3.2 Radiated Emissions Measurement : ANSI C63.4 - 1992

4. Date of Measurement : July 06, 1998

5. Issued Date : July 10, 1998

Tested by : MIN - SOEK CHUNG

Test Engineer

A handwritten signature in black ink, appearing to read "M. S. Chung", written over a horizontal line.

Approved by : SANG - KYU, LEE

Manager of EMC Testing Laboratory

A handwritten signature in black ink, appearing to read "S. K. Lee", written over a horizontal line.

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## **1. General Information**

### **1.1 Production Description**

The Samsung Electronics Co., Ltd. Notebook Computer Model SENS Pro 620(FCC ID :A3LS620)is based on the powerful pentium processor(CPU266MHz) and has internal clock speeds of 14.318, 33, 48, 56.448, and 66.6MHz. It can be operated from rechargeable battery pack or by 90 - 240V internal AC Adapter. See attached SENS Pro 620 User's Guide for more information.

### **1.2 Grants**

N/A

**1.3 Test System Details**

The FCC IDs for all equipment plus descriptions of all cables used with the tested system (including inserted cards which have grant) are:

| <b>FCC ID</b>  | <b>DESCRIPTION<br/>(Model Name)</b>         | <b>CABLE DESCRIPTION</b>                    |
|----------------|---------------------------------------------|---------------------------------------------|
| A3LS620        | <b>EUT<br/>(SENS Pro 620)</b>               | -                                           |
| FCC DOC        | <b>Monitor<br/>(6547 - 3BN)</b>             | Shielded Interface<br>Unshielded Power Cord |
| DSI16XU222     | <b>Inkjet Printer<br/>(2225C)</b>           | Shielded Interface                          |
| EW425 - 1040D  | <b>Serial Mouse<br/>(25 - 1040D)</b>        | Unshielded Interface                        |
| GJJSKR - 1032B | <b>Keyboard<br/>(SEM - K15Z)</b>            | Unshielded Interface                        |
| N/A            | <b>USB Termination Cable</b>                | Unshielded Interface                        |
| A3LSPR500E     | <b>Port Replicator<br/>(SPR - 500E)</b>     | Unshielded Interface                        |
| N/A            | <b>TelePhone<br/>(SSP - 2501)</b>           | Unshielded Interface                        |
| N/A            | <b>Speaker<br/>(BS - 211)</b>               | Unshielded Interface                        |
| N/A            | <b>Mike<br/>(YMC - 2511)</b>                | Unshielded Interface                        |
| N/A            | <b>PCMCIA(SLOTS - 2EA)<br/>FLASH MEMORY</b> | -                                           |

#### **1.4 Test Methodology**

**Both radiated and conducted tests were performed according to the procedure in ANSI C63.4. Radiated testing was performed at OATS.  
An antenna -to - EUT distance is three meters.**

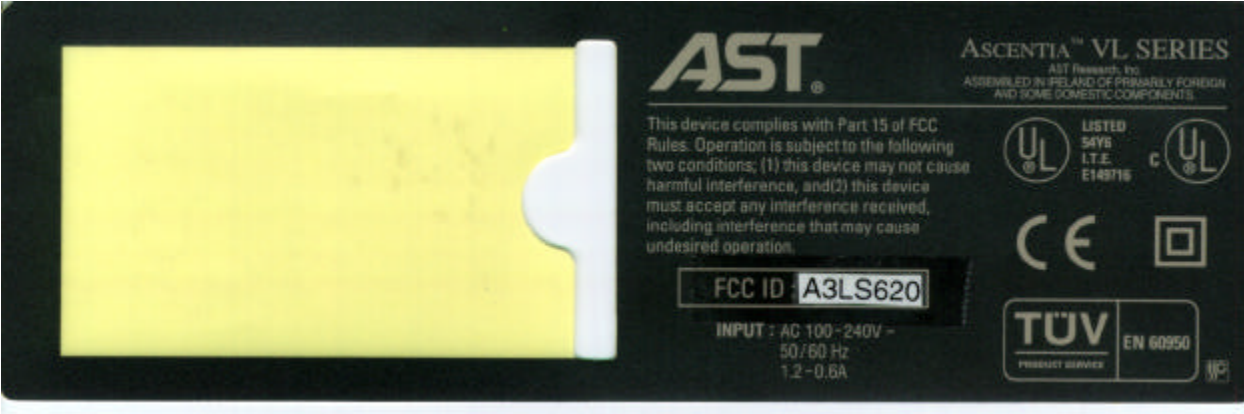
#### **1.5 Test Facility**

**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, 441 - 742  
Open field test site (3 meter) and Shielded Room.**

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

2. PRODUCT LABELING



### 3. SYSTEM TEST CONFIGURATION

#### 3.1 Justification

The system was configured for testing in typical fashion(as a customer would use it). The EUT has internal clock speeds of 14.318, 33, 48, 56.448, and 66.6MHz.

The EUT was investigated while operating at all speeds. The highest speed of 266MHz CPU was used for final testing as it was found to cause worst case emissions. And the EUT has LCD displays of 12.1" TFT.

The EUT's video circuitry is capable of operating at a maximum non-interlaced resolution of 1024\*768 pixels. The EUT was observed while scrolling a continuous stream for capital "H's" in the 1024\*768 mode(both LCD display and Ext. Monitor).

Comparing the test results without port replicator and with port replicator, The test result without port replicator was found the worst case emissions. And so the final testing was performed without port replicator.

#### 3.2 Video Mode Justification

The system was tested in 1024\*768 resolution mode and in the highest resolution mode of 1024\*768. since the 1024\*768 resolution mode(LCD & Ext. monitor both in use) was found to be worst case, this mode was used to collect the included data.

#### 3.3 EUT Exercise Software

The EUT exercise program used during testing was designed to exercise the system in a manner similar to a typical use. The software was contained on the EUT's hard disk and floppy disk. Once loaded, the program sequentially exercise each system component in turn.

The sequence used was : 1) serial "H's" scrolled to the LCD and monitor ; 2) copy series of "H"s characters to mass storage device. 3) print series of H characters to printer. Since the mouse and speaker are strictly input device, no data was transmitted to them during testing. They are, however, continuously scanned for data input activity.

#### **3.4 Equipment Modifications**

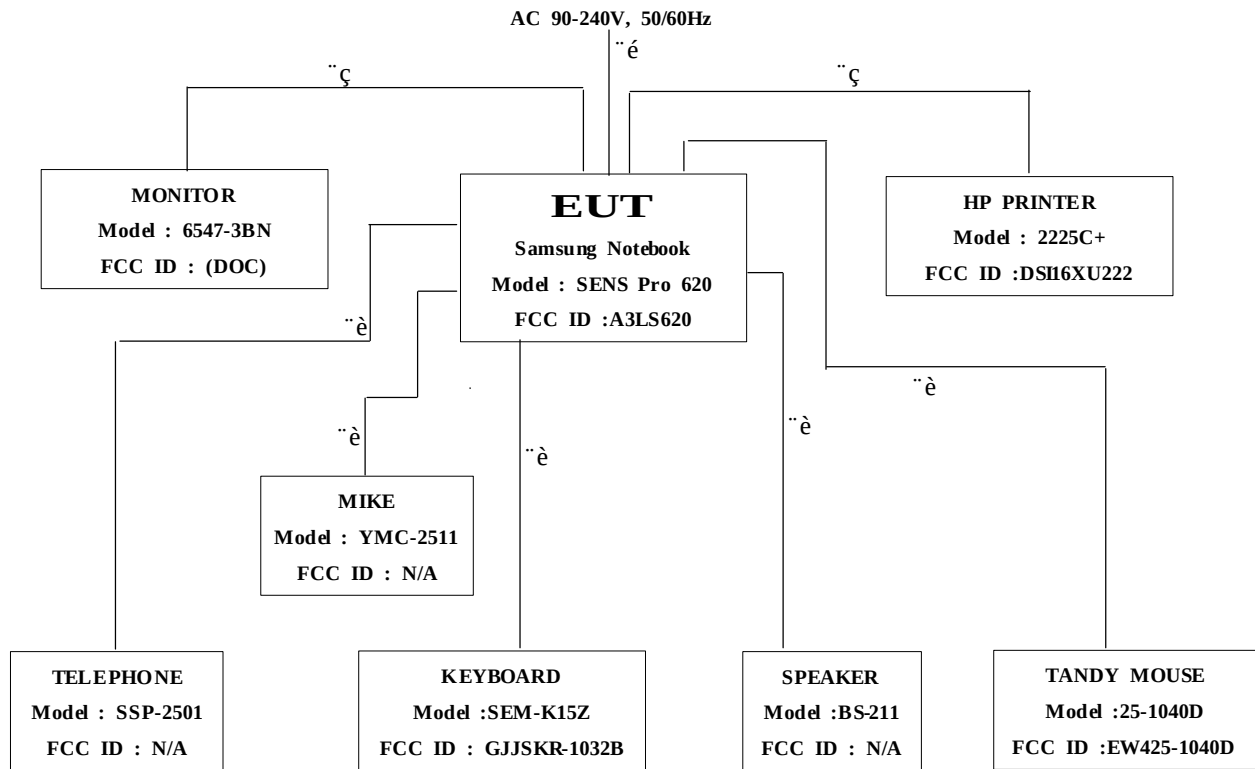
**No equipment modifications were performed during testing.**



### 3.5 Test System configuration

#### Samsung Notebook

#### Model : SENS Pro 620



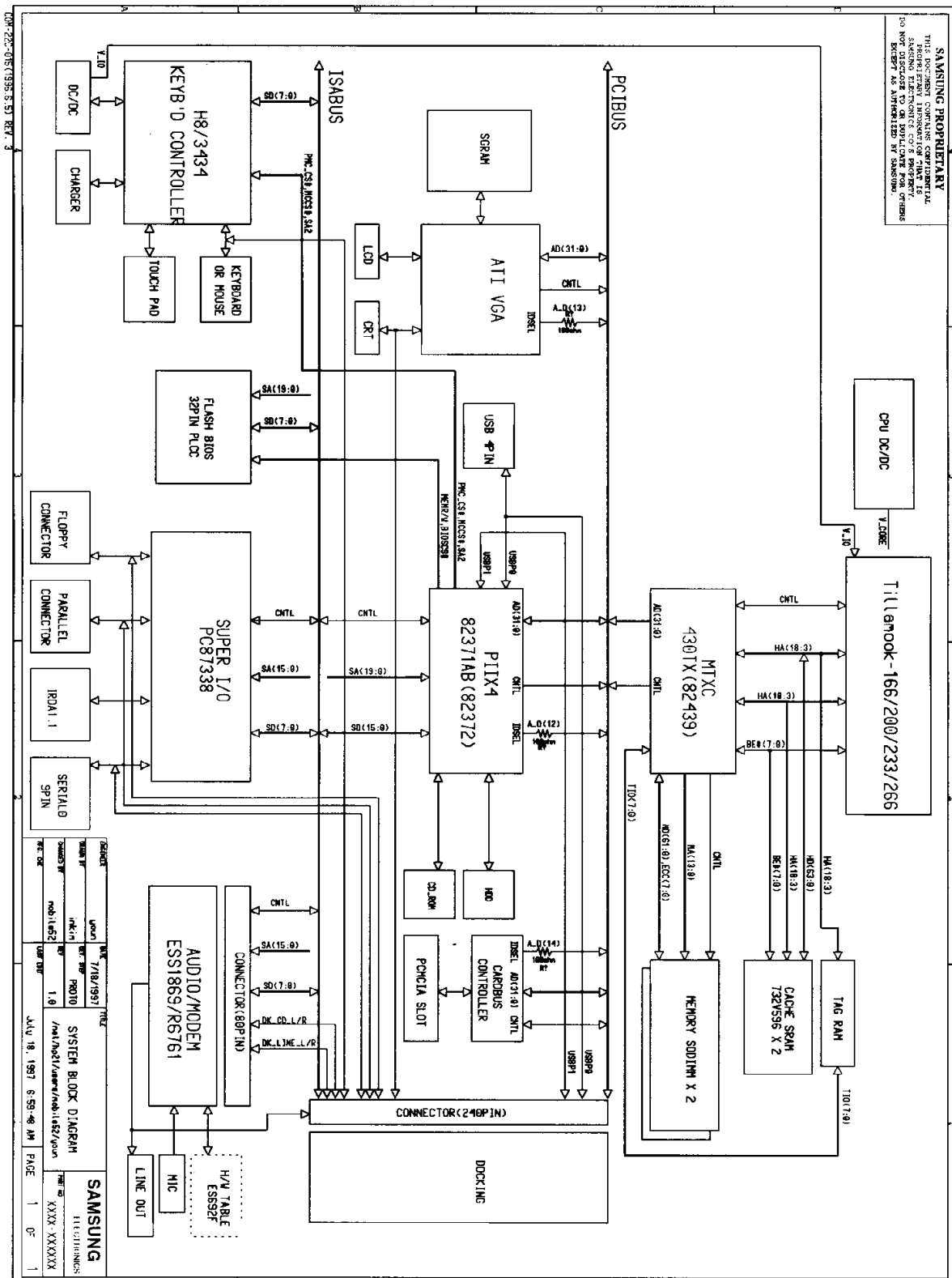
ç Shielded Cable  
è Unshielded Cable  
é Unshield Power Cord  
ê Ferrite Bead

#### **4. BLOCK DIAGRAM(S)**

**FIGURE 4.1 Block Diagram**

**Please see block diagram on the next page.**

Figure 4.1 Block Diagram



## 5. CONDUCTED AND RADIATED MEASUREMENT PHOTOS



Conducted Emission Test Front



Conducted Emission Test Rear



**Radiated Emission Test Front**



**Radiated Emission Test Rear**

## 6. CONDUCTED EMISSION DATA

The initial step in collecting conducted data was to perform a quasi-peak scan over the measurement range using a spectrum analyzer.

### - Sample Calculation

Frequency : 15.123 [MHz]  
 Meter Reading : 41.9 [dBuV] < - - Maximum Meter Reading  
 Factor of LISN : 0.2 [dB]

Then, Result is calculated as follows.

$$41.9 + 0.2 = 42.1 \text{ [dBuV]}$$

### - Summary of Test Result

Below data shows that the test device complies with FCC rules.

Minimum margin was 5.9dB at 15.123MHz.

### - Test Data Sheet

| Tested frequency<br>[MHz] | LISN | Meter Reading<br>[A]<br>[dBuV] | CABLE Loss<br>[B]<br>[dB] | Results<br>[A+B]<br>[dBuV] | Limits<br>[dBuV] |
|---------------------------|------|--------------------------------|---------------------------|----------------------------|------------------|
| 1.230                     | L    | 38.0                           | 0.1                       | 38.1                       | 48               |
| 1.374                     | L    | 38.5                           | 0.1                       | 38.6                       |                  |
| 1.518                     | L    | 38.2                           | 0.1                       | 38.3                       |                  |
| 2.169                     | L    | 36.3                           | 0.1                       | 36.4                       |                  |
| 15.123                    | N    | 41.9                           | 0.2                       | 42.1                       |                  |
| 28.065                    | L    | 38.5                           | 0.4                       | 38.9                       |                  |

N : Neutral L:Live

- Data graph

See the next pages.



0 SAMSUNG Reference NO. : 980727

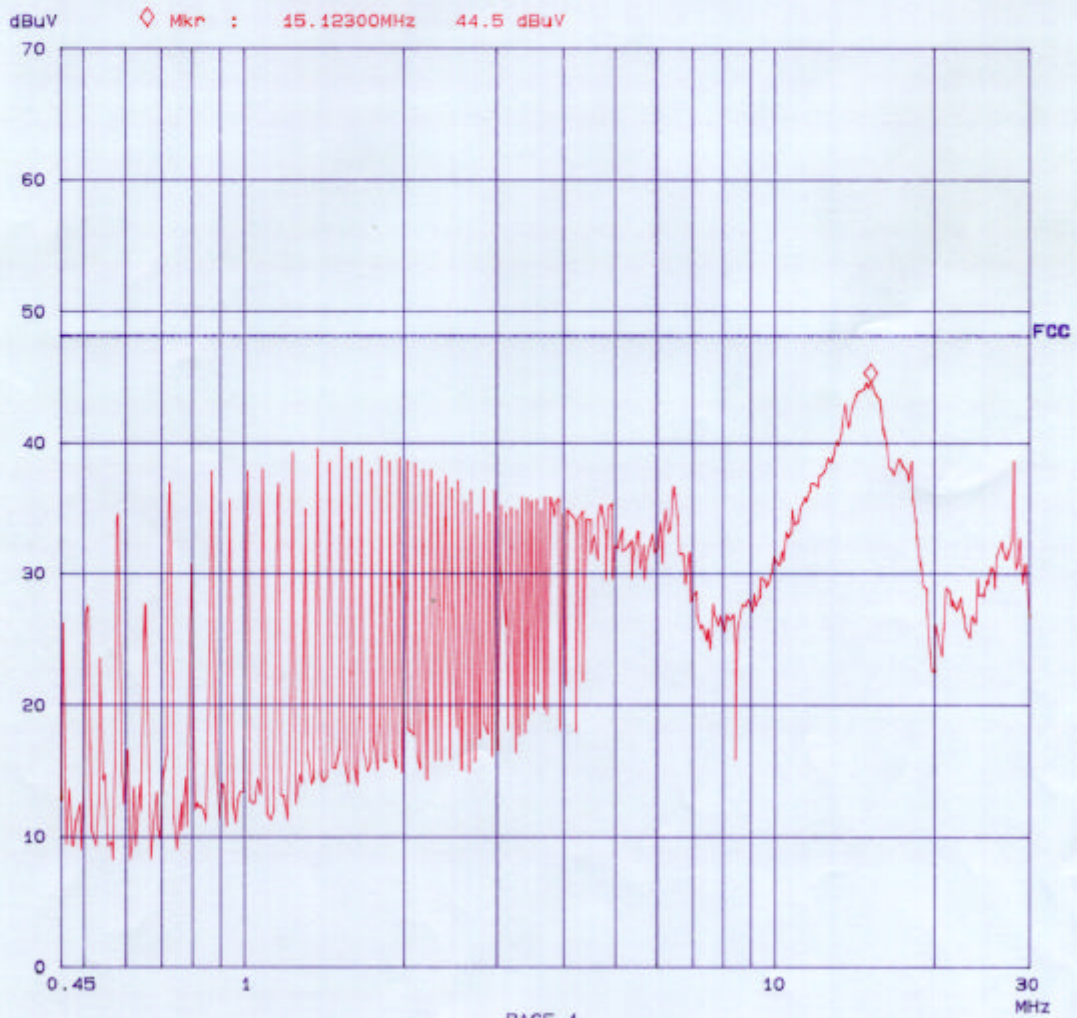
# Conducted Emission

24. Jun 99 13:46

EUT: SENS Pro 620  
Manuf: SAMSUNG  
Operator: M.S.CHUNG  
Comment: L1

## Fast Scan Settings (1 Range)

| Frequencies |      |      | Receiver Settings |          |        |       |         |       |
|-------------|------|------|-------------------|----------|--------|-------|---------|-------|
| Start       | Stop | Step | IF BW             | Detector | M-Time | Atten | Preamp  | OpRge |
| 450k        | 30M  | 3k   | 10k               | PK       | 0.10ms | 10dB  | BLN OFF | 60dB  |





# Conducted Emission

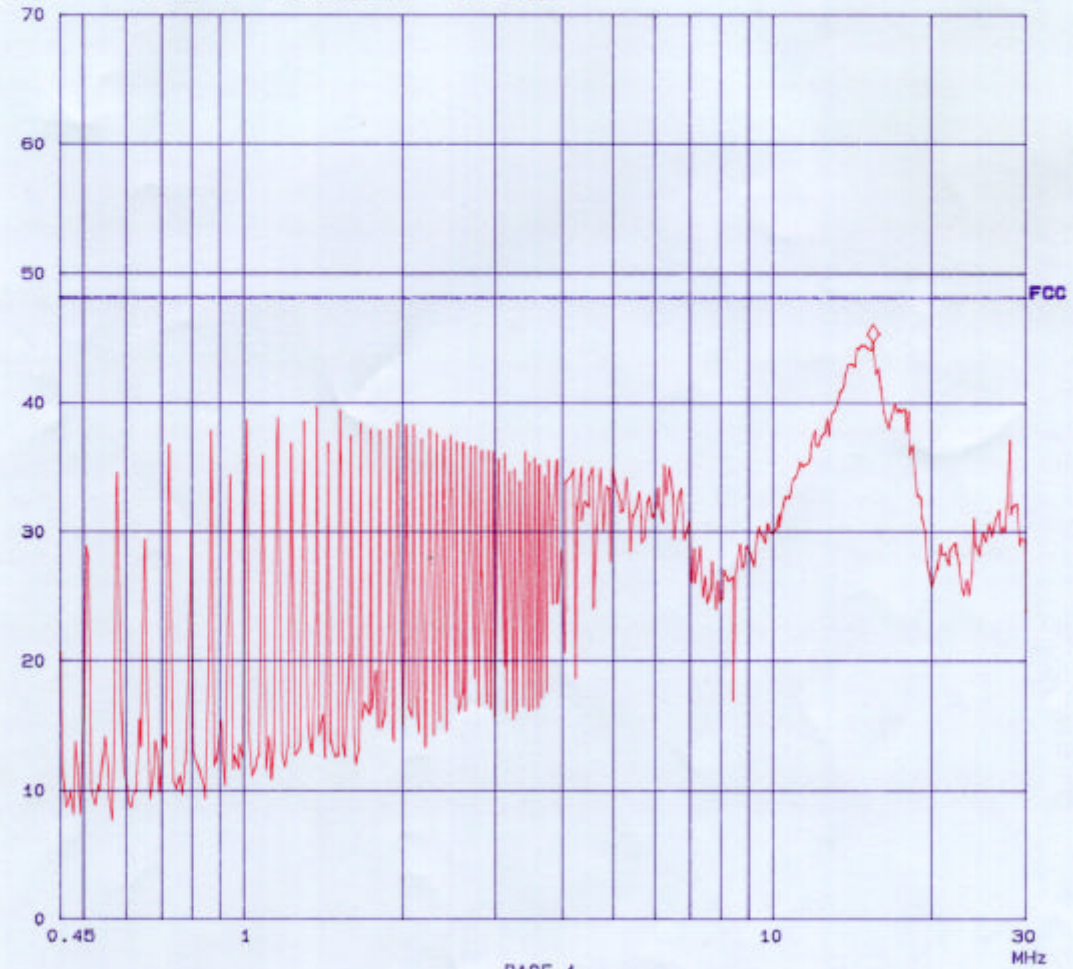
24. Jun 98 14:00

EUT: SENS Pro 620  
Manuf: SAMSUNG  
Operator: M.S. CHUNG  
Comment: N

## Fast Scan Settings (1 Range)

| Frequencies |      |      | Receiver Settings |          |        |       |        |       |
|-------------|------|------|-------------------|----------|--------|-------|--------|-------|
| Start       | Stop | Step | IF BW             | Detector | M-Time | Atten | Preamp | OpRge |
| 450K        | 30M  | 3k   | 10K               | PK       | 0.10ms | 10dB  | LN OFF | 60dB  |

dBuV ◇ Mkr : 15.49200MHz 44.5 dBuV



**7. RADIATED EMISSION DATA**

| Frequency Range<br>[MHz] | Tested Frequency<br>[MHz] | ANT Pol. | Meter Reading<br>[A]<br>[dBuV/m] | Total Loss<br>[B]<br>[dB] | Results<br>[A+B]<br>[dBuV/m] | Limits<br>[dBuV/m] |
|--------------------------|---------------------------|----------|----------------------------------|---------------------------|------------------------------|--------------------|
| <b>30 - 88</b>           | 40.80                     | V        | 15.0                             | 13.08                     | 28.1                         | <b>40.0</b>        |
|                          | 59.22                     | H        | 17.1                             | 10.20                     | 27.3                         |                    |
|                          | 65.10                     | H        | 13.5                             | 10.23                     | 23.7                         |                    |
|                          | 72.10                     | H        | 13.8                             | 10.26                     | 24.1                         |                    |
|                          | 77.30                     | H        | 13.6                             | 10.39                     | 24.0                         |                    |
|                          | 86.20                     | H        | 11.8                             | 11.08                     | 22.9                         |                    |
| <b>88 - 216</b>          | 113.20                    | V        | 19.3                             | 14.19                     | 33.5                         | <b>43.5</b>        |
|                          | 119.75                    | V        | 23.3                             | 14.50                     | 37.8                         |                    |
|                          | 160.10                    | H        | 15.6                             | 15.67                     | 31.3                         |                    |
|                          | 166.67                    | H        | 19.0                             | 15.81                     | 34.8                         |                    |
|                          | 177.70                    | H        | 16.7                             | 16.28                     | 33.0                         |                    |
|                          | 200.00                    | H        | 20.0                             | 18.29                     | 38.3                         |                    |
| <b>216 - 960</b>         | 330.80                    | H        | 17.8                             | 18.68                     | 36.5                         | <b>46.0</b>        |
|                          | 358.80                    | V        | 21.1                             | 19.17                     | 40.3                         |                    |
|                          | 466.67                    | V        | 17.5                             | 22.04                     | 39.5                         |                    |
|                          | 489.00                    | H        | 20.1                             | 22.61                     | 42.7                         |                    |
|                          | 600.00                    | H        | 18.5                             | 24.28                     | 42.8                         |                    |
|                          | 733.34                    | H        | 15.2                             | 27.64                     | 42.8                         |                    |
| <b>960 -</b>             | 1177                      | H        | 9.1                              | 31.70                     | 40.8                         | <b>54.0</b>        |
|                          | 1616                      | H        | 9.9                              | 34.80                     | 44.7                         |                    |
|                          | 1692                      | H        | 10.4                             | 35.20                     | 45.6                         |                    |
|                          | 1824                      | H        | 10.3                             | 36.40                     | 46.7                         |                    |
|                          |                           |          |                                  |                           |                              |                    |
|                          |                           |          |                                  |                           |                              |                    |

**NOTES:**

- 1.All modes of operation were investigated and the worst-case emission are reported.
- 2.All other emission are non - significant.
- 3.Measurements using CISPR quasi-peak mode.
- 4.H = Horizontal V = Vertical Polarization.

**8. LIST OF TEST INSTRUMENT.**

| <b>Equipment</b>                   | <b>Model No.</b> | <b>Serial No.</b> | <b>Maker</b> | <b>Calibration<br/>Last Calibration<br/>and Interval</b> |
|------------------------------------|------------------|-------------------|--------------|----------------------------------------------------------|
| <b>Spectrum Analyzer</b>           | 8566B            | 2607A2581         | H.P          | 97/09/12, 12 Months                                      |
| <b>Quasi - Peak Adapter</b>        | 85650A           | 2521A00687        | H.P          | 97/08/01, 12 Months                                      |
| <b>RF PreSelector</b>              | 85685A           | 2602A00224        | H.P          | 97/09/17, 12 Months                                      |
| <b>Spectrum Monitor</b>            | EZM              | 374.4019.03       | R & S        | 97/12/12, 12 Months                                      |
| <b>Field Strength<br/>Meter</b>    | ESVP             | 882401/009        | R & S        | 98/06/10, 12 Months                                      |
|                                    | ESH3             | 860905/010        | R & S        | 98/03/26, 12 Months                                      |
| <b>Pre - Amplifier</b>             | 8447D            | 2443A04331        | H.P          | 97/12/08, 12 Months                                      |
| <b>L.I.S.N</b>                     | 3825/2R          | 1151              | EMCO         | 97/07/23, 12 Months                                      |
|                                    | KNW - 404        | 8 - 507 - 5       | Kyoritsu     | 97/07/23, 12 Months                                      |
| <b>Bi - Conical Antenna</b>        | 3110B            | 2706              | EMCO         | 97/09/12, 12 Months                                      |
| <b>Log - Periodic<br/>Antenna</b>  | 3146A            | 1353              | EMCO         | 97/09/12, 12 Months                                      |
| <b>Double Ridged<br/>WaveGuide</b> | 3115             | 4028              | EMCO         | 97/10/05, 12 Months                                      |