

**January 14, 1998**

**WYSE Technology EN 55022-B Test Record**

**for**

**Desk Top LCD Winterm**

**Model Number: WINTERM 2610SE**

**Tests performed by WYSE Technology**

**4399 Lick Mill Blvd. San Jose, CA**

**Test completed: January 14, 1998**

**Test Engineer: Richard Watkins**

**Approved by: Masood Abrishamcar**

## 1.0 INTRODUCTION

January 14, 1998

### 1.1 Scope

This record is intended to document conformance with the EMC Directive(89/336/EEC) and details the results of testing performed on January 14, 1998 on the WYSE WINTERM model: WINTERM 2610SE.

### 1.2 Purpose

Testing was performed to evaluate the emissions performance of the WINTERM 2610SE with respect to EN 55022 Class B.

### 1.3 Summary

The Desk Top Terminal WINTERM 2610 was found to be compliant to EN 55022 Class B Emission Requirements.

### 1.4 Testing Requirements

Testing was performed using procedures and criteria contained in EN 55022.

## 2.0 TEST ENVIRONMENT

### 2.1 Test Sample Description

WINTERM 2610SE is designed to communicate with a host system via Twisted Pair LAN interface on NT Windows Server.

#### Test Software

The software used during the test was a continuous loop batch file on Windows NT station. The program creates an entire page of "H"s and writes the entire page to the screen, and it also prints to the serial and parallel devices as used in the test setup. The cables were moved around to find the maximum emission from the EUT.

### 2.2 Test Facilities

#### 2.2.1 Emissions Test Site

Radiated emissions testing was performed on a weather protected Open Area Test Site. The description of OATS is filed at the WYSE Regulatory Engineering Department. The OATS is located at 4399 Lick Mill Blvd. San Jose, California, USA. Conducted emission testing was performed inside a shielded enclosure (Screen Room) in the WYSE RFI laboratory. The description of screen room is in filed at WYSE Regulatory Engineering Department. The Screen Room is located at 3471 N. First Street, San Jose, California, USA.

## 2.3 Test Equipment

January 14, 1998

The following are the list of equipment used during the radiation and conducted testing.

|                               |                    |
|-------------------------------|--------------------|
| HP 8447d Amplifier            | Serial #1937A02787 |
| HP 85650A Quasi-Peak Adapter  | Serial #2521A00635 |
| HP 8568A Spectrum Analyzer    | Serial #2134A02775 |
| HP 85685 RF Preselector       | Serial #2510A00103 |
| Schwarzbeck Biconical Antenna | Serial #3005       |
| Log Periodic Antenna          | Serial #1180       |

### SETUP:

In accordance with WYSE Technology test procedure.

### PROCEDURE:

30 MHz - 199 MHz biconical antenna was used. 200 MHz - 1 GHz the log periodic antenna was Used. The frequency range was checked for signals strength. The antenna was then raised and lowered for final maximization. The frequency range was checked with antennas in the horizontal and vertical polarization.

## 3.0 TEST RESULTS

### 3.1 Test Description

CISPR Publication 22:1985, limits and methods of measurements of radio interface of information technology equipment, was the guiding document for the test. The product's radiated emissions from 30 MHz to 1000 MHz and its power mains conducted emissions from 150 KHz to 30 MHz were measured.

### 3.2 Test Configuration

The EUT was configured with a typical mix of available peripherals which fully configured all types of communications ports of the EUT and exercised it in a typical manner.

### 3.3 Test Procedure

For radiated emissions testing the equipment is installed on a 0.8 meter high non-conductive turntable 10 meter from the receiving antenna mast. The EUT is fully exercised during the test to maximize emissions. The receiving antenna is scanned over the height range of 1 to 4 meters is both polarities and the turntable is rotated with emissions level observed at each frequency. During the process the equipment configuration is also modified by moving the interconnecting cables to find the typical configuration that maximizes emissions at each frequency. The frequency range from 30 MHz to 1000 MHz is explored. Measurement data is compared to Class B limit.

For conducted emissions testing the equipment is moved to a 0.4 meter high platform and the EUT and Configurations equipment are powered from a different LISNs. Both sides of the AC line are measured and the results compared to the Class B limit.

### 3.4 Test Results

January 14, 1998

A comparison of the measured data with the Class **B** limit of **CISPR** shows that Terminal **WINTERM 2610SE** was **2.34 dB** below the limits at the worst case frequency of **215.98 MHz** in a Vertical Polarization.

### 3.5 Product Specification

Model: **WINTERM 2610SE (Video Board)**

#### Clock Circuit:

- 1) U75 = AV9173, P/N = 205556-50
- 2) R75 = 68 Ohm, P/N = 370461-21
- 3) C77 = 22 pF, P/N = 320310-21
- 4) L7, P/N = 400021-01
- 5) R831 = 75 Ohm, P/N = 370461-09
- 6) C830 = 22 pF, P/N = 320310-21
- 7) U450 = EPM7192SQC-15, P/N = 194075-51
- 8) R450, R451 = 0 Ohm, P/N = 370460-91
- 9) C450 = 30 pF, P/N = 320310-24
- 10) C451 = 22 pF, P/N = 320310-21

#### Video Chip:

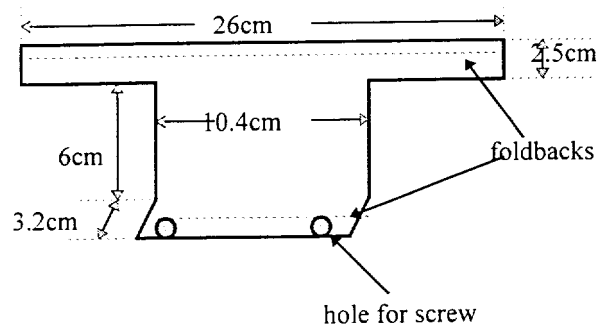
- 1) U501, U601, U701 = HI5714, P/N = 222011-50
- 2) U830, U831, U832, U833, U834 = 74F257, P/N = 171319-50
- 3) R835, R836, R837, R838, R839, R840 (Blue video lines); R841, R842, R843, R844, R845, R846 (Green video lines); R847, R848, R849, R850, R851, R852 (Red video lines) = 22 Ohm; P/N = 370461-09

#### LCD Harness / Video Cable:

Provided with ferrite core, type 47, Rated 3.6mH at 100Khz, P/N: 941324-01  
size: 6.4mm (ID) x 14.2mm (OD) x 28.5mm (Length)

#### Ground Strap:

Aluminum foil material with insulator backing, in the shape of a **T** with fold-backs on top and bottom edges for conductive contacts. Horizontal bar measuring 26cm (width) x 2.5cm (height), Vertical bar measuring 10.4cm (width) x 9.2 (height). The ground strap connects between the mounting bracket of LCD board secured by clips, and the mounting bracket above interconnect board secured by two screws. Refer to drawing below:



January 14, 1998

Model: WINTERM 2610SE (Logic Board)

**Clock Circuit:**

- 1) U1 = CPU, AMD, SC400-66, PC-AT, P/N=202036-50
- 2) Y5 = Crystal, 32.768 KHz, P/N=392013-01

PLL CLK filters-

- 3) C27 = 15uF, P/N=320310-17
- 4) C32 = 330uF, P/N=320310-49
- 5) C57 = 33pF, P/N=320310-25
- 6) C68, C28 = 470pF, P/N= 320310-53
- 7) C35 = 22pF, P/N=320310-21
- 8) C20 = 0.01uF, P/N=320333-01
- 9) C107 = 0.22uF, P/N=320316-49
- 10) R111, R101, R110, R102 = 4.7 Kohm, P/N=370461-65

CLK IO line-

- 11) Y7 = Crystal, 1.8432 MHz, P/N=390000-01
- 12) R74 = Zero ohm, P/N=370460-91
- 13) R41 = 2.2 Mohm, P/N=370462-33
- 14) C124 = 68uF, P/N=320310-33

**Video Circuit:**

- 1) U2 = Video chip, Cirrus Logic, CL-GD5440, P/N=205114-51
- 2) Y3 = OSC, 14.318 MHz, TTL, P/N=392007-01
- 3) C112 = 10pF, P/N=320310-13
- 4) R79 = 33 ohm, P/N=370456-13

VL\_LCLK line-

- 5) R171, R173 = 33ohm, P/N=370456-13
- 6) C110, C188 = 10pF, P/N=320310-13

M CLKVDD line-

- 7) R108 = 33ohm, P/N=370456-13
- 8) C14 = 10uF, P/N=313080-13
- 9) C121 = 0.1uF, P/N=320021-33

V CLKVDD line-

- 10) R109 = 33 ohm, P/N=370456-13
- 11) C15 = 10uF, P/N=313080-13
- 12) C119 = 0.1uF, 320021-33

V FILTER line-

- 13) R1 = 127 ohm, P/N=370466-11
- 14) C122 = 0.1uF, P/N=320021-33

V RED, V GRN, V BLU lines-

- 15) L1, L4, L5 = 1.6uH, 43MTL, SMD type, P/N=400021-01
- 16) C21, C22, C23, C24, C25, C26 = 33pF, P/N=320310-25
- 17) R81, R82, R83 = 75 ohm, P/N=370461-22

VSYN, HSYN lines-

- 18) C72, C73 = 220uF, P/N=320310-45
- 19) R67, R68 = 22 ohm, P/N=370461-09

January 14, 1998

**Network Circuit:**

- 1) U3 = Controller, CS8900, P/N=205110-01
- 2) Y4 = Crystal, 20 MHz, P/N=391002-39
- 3) T1 = Transformer, PE65745, 10Base isolation, P/N=429075-50

Filter-

- 4) C45, C47, C48, C49, C53, C54, C55, C56 = 33pF, P/N=320310-25
- 5) C113, C114, C115, C116 = 0.1uF, P/N=320021-33
- 6) R85 = 100 ohm, P/N=370466-01

RXD, TXD lines-

- 7) R7, R8 = 24.3 ohm, P/N=370465-38
- 8) C96 = 68uf, P/N=320310-33

**Flash Memory:** (Loaded to)

- 1) U25, U27 = IC, 4LC1M16ES-7, 1MX16, EDO, P/N=194077-01

Wyse Technology

San Jose

RADIATED EMISSIONS REPORT

Date: 1/14/98 7:13:30 a

RICH WATKINS

**E.U.T: WT-2610SE FLASH/MARS FILE 011498#1**

**SERIAL NUMBER: PHOM# 20608, LOGIC# 20609, P/S# 20407, KYBD# 20539, MOUSE# 20323**

SUPPORT DEVICES: HP BRIO SERVER IN TRAILER

ID NUMBER: CPU# 20601, MOUSE# 20599, KYBD# 20598, MONITOR# 20079

PRINTERS/CABLES: N/A

SOFTWARE: H PATTERN 800 X 600 256 BIT MODE

MODIFICATIONS: ADDED C830=22PF AND R831=75 OHMS

REQUESTOR: MASOOD ABRISHAMCAR / BOB HYMES

GOVERNMENT: CISPR 10 METERS - B

OBJECTIVE: To determine if the unit meets CISPR requirements for class B computing devices.

**CONCLUSIONS: This unit meets the requirments for class B computing devices**

WYSE Technology  
San Jose  
Radiated Emissions  
**10 METERS Open Area Test Site**  
Site Calibration Date: 30

**This data is not valid for ECNs or deviations.**

Date: 1/14/98 7:13:30 a  
E.U.T: WT-2610SE FLASH/MARS FILE 011498#1  
Serial Number: PHOM# 20608, LOGIC# 20609, P/S# 20407, KYBD# 20539, MOU  
SE# 20323  
Software: H PATTERN 800 X 600 256 BIT MODE  
Gov: CISPR 10 METERS - B

| TEST<br>FREQ | TEST<br>dBuV | ACTL<br>dBuV | VS<br>A | VS<br>B | ANT<br>TYPE | ANT<br>HGHT | TT<br>AZMT | SGNL |
|--------------|--------------|--------------|---------|---------|-------------|-------------|------------|------|
|--------------|--------------|--------------|---------|---------|-------------|-------------|------------|------|

Note: (Next)Changed Antenna to Bi-Log

Note: (Next)ALL QP

|        |       |       |        |        |     |     |     |       |
|--------|-------|-------|--------|--------|-----|-----|-----|-------|
| 44.00  | 35.40 | 22.46 | -17.54 | -7.54  | B-V | 100 | 0   | VIDEO |
| 48.00  | 39.90 | 25.92 | -14.08 | -4.08  | B-V | 100 | 0   | VIDEO |
| 55.99  | 41.00 | 25.30 | -14.70 | -4.70  | B-V | 100 | 0   | MIXED |
| 63.99  | 40.20 | 23.46 | -16.54 | -6.54  | B-V | 100 | 0   | VIDEO |
| 79.98  | 35.10 | 18.30 | -21.70 | -11.70 | B-V | 100 | 359 | MIXED |
| 83.99  | 35.20 | 18.60 | -21.40 | -11.40 | B-V | 100 | 359 | VIDEO |
| 111.98 | 39.30 | 23.92 | -16.08 | -6.08  | B-V | 100 | 0   | VIDEO |
| 119.97 | 38.40 | 23.10 | -16.90 | -6.90  | B-V | 100 | 0   | MIXED |
| 123.97 | 38.20 | 23.10 | -16.90 | -6.90  | B-V | 100 | 0   | VIDEO |
| 127.97 | 41.00 | 26.10 | -13.90 | -3.90  | B-V | 100 | 0   | VIDEO |
| 135.98 | 33.80 | 19.48 | -20.52 | -10.52 | B-V | 100 | 0   | VIDEO |
| 143.98 | 35.50 | 21.78 | -18.22 | -8.22  | B-V | 100 | 0   | VIDEO |
| 151.98 | 31.20 | 18.06 | -21.94 | -11.94 | B-V | 100 | 0   | VIDEO |
| 159.98 | 32.90 | 20.40 | -19.60 | -9.60  | B-V | 100 | 0   | MIXED |
| 167.98 | 36.80 | 24.78 | -15.22 | -5.22  | B-V | 100 | 0   | VIDEO |
| 175.98 | 38.40 | 25.84 | -14.16 | -4.16  | B-V | 100 | 133 | MIXED |
| 179.98 | 36.20 | 23.20 | -16.80 | -6.80  | B-V | 100 | 95  | MIXED |
| 183.98 | 36.90 | 24.06 | -15.94 | -5.94  | B-V | 100 | 0   | VIDEO |
| 191.98 | 36.30 | 23.76 | -16.24 | -6.24  | B-V | 100 | 0   | VIDEO |
| 207.98 | 29.40 | 17.58 | -22.42 | -12.42 | B-V | 100 | 0   | VIDEO |
| 215.98 | 39.00 | 27.66 | -12.34 | -2.34  | B-V | 100 | 122 | VIDEO |
| 231.95 | 39.00 | 28.53 | -18.47 | -8.47  | B-V | 100 | 192 | VIDEO |
| 239.95 | 40.30 | 30.22 | -16.78 | -6.78  | B-V | 100 | 133 | MIXED |
| 247.95 | 38.70 | 29.00 | -18.00 | -8.00  | B-V | 100 | 204 | VIDEO |
| 251.95 | 29.30 | 19.73 | -27.27 | -17.27 | B-V | 100 | 182 | MIXED |
| 255.95 | 32.60 | 23.10 | -23.90 | -13.90 | B-V | 100 | 180 | VIDEO |
| 271.95 | 33.50 | 24.25 | -22.75 | -12.75 | B-V | 100 | 188 | VIDEO |
| 279.95 | 32.90 | 23.96 | -23.04 | -13.04 | B-V | 100 | 181 | MIXED |
| 287.95 | 31.10 | 22.57 | -24.43 | -14.43 | B-V | 100 | 40  | MIXED |
| 295.95 | 30.90 | 22.79 | -24.21 | -14.21 | B-V | 100 | 78  | VIDEO |

Note: (Next)Changed Antenna to Bi-Log

|        |       |       |        |        |     |     |     |       |
|--------|-------|-------|--------|--------|-----|-----|-----|-------|
| 311.94 | 32.80 | 25.23 | -21.77 | -11.77 | L-V | 100 | 104 | VIDEO |
| 319.94 | 29.60 | 22.26 | -24.74 | -14.74 | L-V | 100 | 147 | MIXED |
| 359.93 | 33.60 | 28.00 | -19.00 | -9.00  | L-V | 100 | 121 | MIXED |

Date: 1/14/98 7:13:30 a  
 E.U.T: WT-2610SE FLASH/MARS FILE 011498#1  
 Serial Number: PHOM# 20608, LOGIC# 20609, P/S# 20407, KYBD# 20539, MOU  
 SE# 20323  
 Software: H PATTERN 800 X 600 256 BIT MODE  
 Gov: CISPR 10 METERS - B

| TEST<br>FREQ | TEST<br>dBuV | ACTL<br>dBuV | VS<br>A | VS<br>B | ANT<br>TYPE | ANT<br>HGHT | TT<br>AZMT | SGNL  |
|--------------|--------------|--------------|---------|---------|-------------|-------------|------------|-------|
| 399.92       | 35.70        | 30.60        | -16.40  | -6.40   | L-V         | 100         | 275        | MIXED |
| 439.92       | 36.10        | 31.44        | -15.56  | -5.56   | L-V         | 100         | 157        | MIXED |
| 479.91       | 33.10        | 29.54        | -17.46  | -7.46   | L-V         | 100         | 144        | MIXED |

Note: (Next)Changed Antenna to Bi-Log

|        |       |       |        |        |     |     |     |       |
|--------|-------|-------|--------|--------|-----|-----|-----|-------|
| 111.98 | 38.20 | 22.82 | -17.18 | -7.18  | B-H | 300 | 101 | VIDEO |
| 119.98 | 35.10 | 19.80 | -20.20 | -10.20 | B-H | 300 | 118 | MIXED |
| 127.98 | 32.00 | 17.10 | -22.90 | -12.90 | B-H | 300 | 118 | VIDEO |
| 135.98 | 33.70 | 19.38 | -20.62 | -10.62 | B-H | 300 | 326 | VIDEO |
| 143.98 | 33.70 | 19.98 | -20.02 | -10.02 | B-H | 300 | 326 | VIDEO |
| 151.98 | 32.60 | 19.46 | -20.54 | -10.54 | B-H | 300 | 326 | VIDEO |
| 159.98 | 33.50 | 21.00 | -19.00 | -9.00  | B-H | 300 | 359 | MIXED |
| 167.98 | 28.90 | 16.88 | -23.12 | -13.12 | B-H | 300 | 212 | VIDEO |
| 175.98 | 34.50 | 21.94 | -18.06 | -8.06  | B-H | 300 | 234 | VIDEO |
| 183.98 | 37.80 | 24.96 | -15.04 | -5.04  | B-H | 300 | 157 | VIDEO |
| 191.98 | 36.60 | 24.06 | -15.94 | -5.94  | B-H | 300 | 201 | VIDEO |
| 207.98 | 29.10 | 17.28 | -22.72 | -12.72 | B-H | 300 | 217 | VIDEO |
| 215.98 | 36.50 | 25.16 | -14.84 | -4.84  | B-H | 300 | 86  | VIDEO |
| 223.98 | 32.80 | 21.94 | -18.06 | -8.06  | B-H | 300 | 88  | VIDEO |
| 231.96 | 37.50 | 27.03 | -19.97 | -9.97  | B-H | 300 | 128 | VIDEO |
| 239.96 | 42.00 | 31.92 | -15.08 | -5.08  | B-H | 300 | 128 | MIXED |
| 247.96 | 37.50 | 27.80 | -19.20 | -9.20  | B-H | 300 | 148 | MIXED |
| 255.96 | 28.10 | 18.60 | -28.40 | -18.40 | B-H | 300 | 187 | VIDEO |
| 263.96 | 33.70 | 24.32 | -22.68 | -12.68 | B-H | 300 | 164 | MIXED |
| 271.93 | 28.90 | 19.65 | -27.35 | -17.35 | B-H | 300 | 143 | MIXED |
| 279.94 | 32.90 | 23.96 | -23.04 | -13.04 | B-H | 300 | 188 | VIDEO |
| 295.94 | 36.20 | 28.09 | -18.91 | -8.91  | B-H | 300 | 190 | MIXED |

Note: (Next)Changed Antenna to Bi-Log

|        |       |       |        |        |     |     |     |       |
|--------|-------|-------|--------|--------|-----|-----|-----|-------|
| 319.94 | 33.50 | 26.16 | -20.84 | -10.84 | L-H | 300 | 194 | MIXED |
| 359.93 | 32.40 | 26.80 | -20.20 | -10.20 | L-H | 300 | 207 | MIXED |
| 399.93 | 31.90 | 26.80 | -20.20 | -10.20 | L-H | 300 | 318 | MIXED |
| 439.91 | 32.10 | 27.44 | -19.56 | -9.56  | L-H | 300 | 77  | MIXED |

hp

100

EMI-TEST  
EMISSION

LEVEL [dBuV]

PEAK

11 Mar 1998 14:50:56

EN 55022 CLASS B CONDUCTED

WT2610SE NUT side with SKYnet

Power Supply model SNP-PA54-WY

80

60

40

20

.15

CLASS B QP

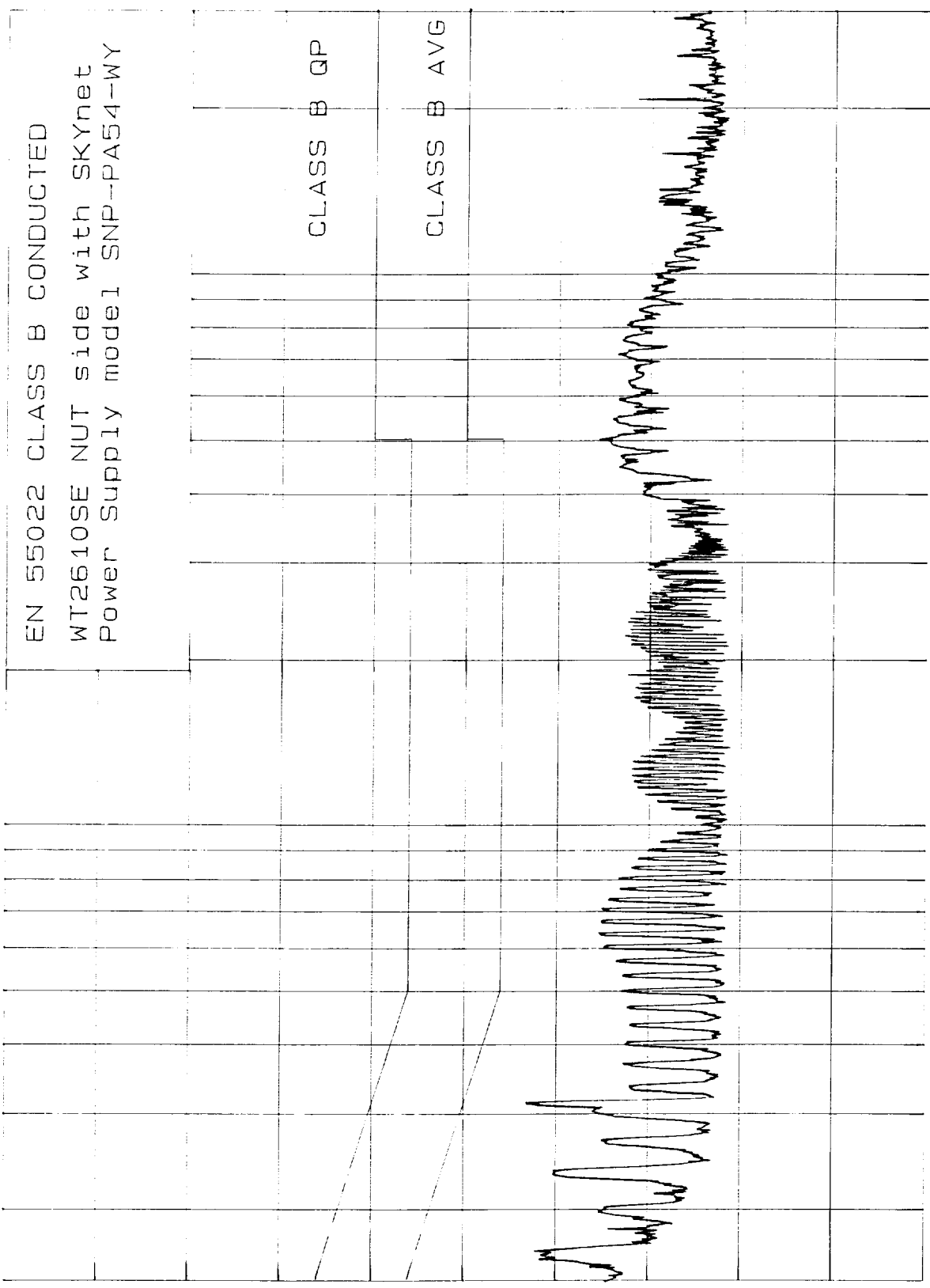
CLASS B AVG

30

10

1

FREQUENCY [MHz]



11 Mar 1998 15:00:10

EMI-TEST  
EMISSION LEVEL [dBuV] PEAK

EN 55022 CLASS B CONDUCTED  
WT2610SE Line Side with SKYNET  
Power Supply model SNP-PA54-WY

CLASS B QP

CLASS B AVG

FREQUENCY [MHz]

hp  
100

80

60

40

20

.15

1

10

30