

December 8, 1999

WYSE Technology EN 55022-B Test Record

for

Window Based Terminal

Model Number: T1500

Tests performed by WYSE Technology

3471 N. First Street, San Jose, CA

Test completed: December 8, 1999

Test Engineer: Harinder Phul

Approved by: Masood Abrishamcar

December 8, 1999

1.0 INTRODUCTION

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 December 8, 1999 on the model T1500.

1.2 Purpose

Testing was performed to evaluate the emissions performance of the T1500 with respect to EN 55022 Class B.

1.3 Summary

The Windows Terminal T1500 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

T1500 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 3471 N. First Street, 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 filed at WYSE Regulatory Engineering Department. The Screen Room is located at 3471 N. First Street, San Jose, California, USA.

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2.3 Test Equipment

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

Radiated:

HP Receiver model 84560A (RES BW: 30 KHz-100KHz, VBW: 10KHz – 30KHz)

Conducted:

HP 85650A Quasi-Peak Adapter

HP 8566B Spectrum Analyzer (RES BW: 30KHz –100KHz, VBW: 10KHz – 30KHz)

SETUP:

In accordance with WYSE Technology test procedure.

PROCEDURE:

Biconilog antenna was used for frequency range 30MHz - 2 GHz. 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 in 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.

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For conducted emissions testing the equipment is moved to a 0.8 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

A comparison of the measured data with the Class **B** limit of **CISPR** shows that Windows Terminal **T1500** was **5.17 dB** below the limits at the worst case frequency of **30.99 MHz** in a Vertical Polarization.

3.5 Product Specification

Model: **T1500 (Logic Board P/N 991337-11 Rev. 1)**

Clock Circuit:

U21 = MK1492-03, P/N 205565-50

Filters:

33 MHZ CLK Line:

R85 = 100 Ohm, P/N 370508-97; Z61 = 15pF (not loaded)

R86 = 100 Ohm, P/N 370508-97; Z58 = 15pF (not loaded)

R87 = 100 Ohm, P/N 370508-97; Z64 = 15pF (not loaded)

R88 = 100 Ohm, P/N 370508-97; Z59 = 15pF (not loaded)

14.3 MHZ CLK Line:

R89 = 33 Ohm, P/N 370513-13; Z60 = 15pF (not loaded)

48 MHZ CLK Line:

R90 = 33 Ohm, P/N 370513-13; Z51 = 15pF (not loaded)

24.5 MHZ (Audio) CLK Line:

R91 = 33 Ohm, P/N 370513-13; Z52 = 22pF, P/N 320310-21

Y4 = 14 MHZ, P/N 392010-51

Filters:

R94 = 33 Ohm; Z56 = 15pF

L21 = 43MTL, P/N 400032-31; C432, C449 = 0.1uF

Y5 = 25 MHZ, P/N 392010-54

Filters:

R95 = 33 Ohm; Z57 = 37pF

L24 = 43MTL, P/N 400032-31; C311 = 0.1uF, P/N 320338-24;

C450 = 0.1uF

U2 = GXM233, P/N 200062-53

Power Filter

U1 = CX5530, P/N 205122-50

Filters:

R13 = 68 Ohm, P/N 370513-21; Z6 = 15pF (not loaded)

R12 = 68 Ohm, P/N 370513-21; Z5 = 15pF (not loaded)

L17, L18 = 43MTL, P/N 400032-31

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Video Circuit:

U1 = CX5530, P/N 205122-50

Filters:

L1 = 43MTL, P/N 400021-01; C4, C5 = 33pF, P/N 320313-25

L2 = 43MTL, P/N 400021-01; C3, C6 = 33pF, P/N 320313-25

L3 = 43MTL, P/N 400021-01; C2, C7 = 33pF, P/N 320313-25

Termination:

R4, R5, R6 = 75 Ohm, P/N 370508-85

Audio Circuit:

U15 = LM4546, P/N 205123-53

Filters:

L13, L22, L23 = 43MTL, P/N 400032-31

C19 = 100 pF, P/N 320313-37

Driving Transistor:

Q3, Q4 = MMBT3904, P/N 270010-50

Network:

U4 = MX98715, P/N 205125-50

Filters:

R70, R71 = 49.9 Ohm, P/N 370508-68

U17 = Transformer, P/N 429099-50

Filters:

C32, C33 = .1 uF, P/N 320338-24

C34 = .01 uF, P/N 320046-48

R72, R73, R74, R75 = 75 Ohm, P/N 370513-22

Zero Ohm Jumpers:

RJE = 0 Ohm; Z13, Z14 = 0 Ohm, P/N 370457-99

RJF = (not loaded)

U10 = P/N 206515-51

Z22 = P/N 205125-50

Radiated Emission Test

5m Chamber
WYSE Technology Inc.
3471 North 1st Street
San Jose Ca 95134

Test Description:

EUT: T1500 Compaq (Black)
Serial No. Engineering Sample
Part No. 901971-01
File No. 120899#1

Test Type:

EN55022 EN55022

FCC-A { }	FCC-B { }	CISPR-A { }	CISPR-B {X }
PASS: X	FAIL:	Debug:	
Frequency {MHz}	1. <u>30.99</u>	2. <u>588.53</u>	3. 4.
Margin {dBuv}	1. <u>-5.17</u>	2. <u>-5.19</u>	3. 4.

Configuration:

- 1) Fully configured
- 2) Video 1280 x 1024 @ 60Hz

Modifications:

- 1) *233MHz @ 2.9v @ 85c*.*
- 2) *Copper fingers were installed for the check out of the problems with the PCMCIA contact to Q-Gnd. The soldermask was removed and copper fingers were soldered into place so that they line up with the card's Gnd contact area.*

Test Procedure Definition:

HP Spectrum Analyzer/QP ad.	8566B/85650A (Oat)
Configuration	WYSE 5M Chamber and 10M OATS
Frequency Rang	30 - 2000 MHz
Operation to perform	Maximize & Measure
Initial Setting	Table angle: 0 degree to 360 degree
	Tower Height: 100 meter - 400 meter (Steps 100M)
	Antenna Polarity: Vertical and Horizontal

Comment:

- 1) H's Pattern on monitor screen.
- 2) No PCMCIA card

Test Engineer: Harinder S Phul

EUT:

Description	Part No.	Serial No.	FCC ID:
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T1500 Compaq (Black)

Supporting Devices:

Description	Model No.	Serial No.	FCC ID:
Server HP Brio Computer	81XX	US74852369	
3 Com Hub	TP400	7YPR021705	

Peripherals:

Description	Model No.	Serial No.	FCC ID:
Sony 21" Monitor	GDM-500PS	7028848	AK8GDM500PS
HP Serial Printer	2225D	3208S00972	DS16XU2225
HP Parallel Printer	C6411B	MX97G1W196	DOC
WYSE Key Board	7931M	B92600029	E5XKB10410U
HP Mouse	M-S34	LZC90710752	DZL211029
Gen. Microphone	Inland	None	
Gen. Speaker	AMX2000	None	

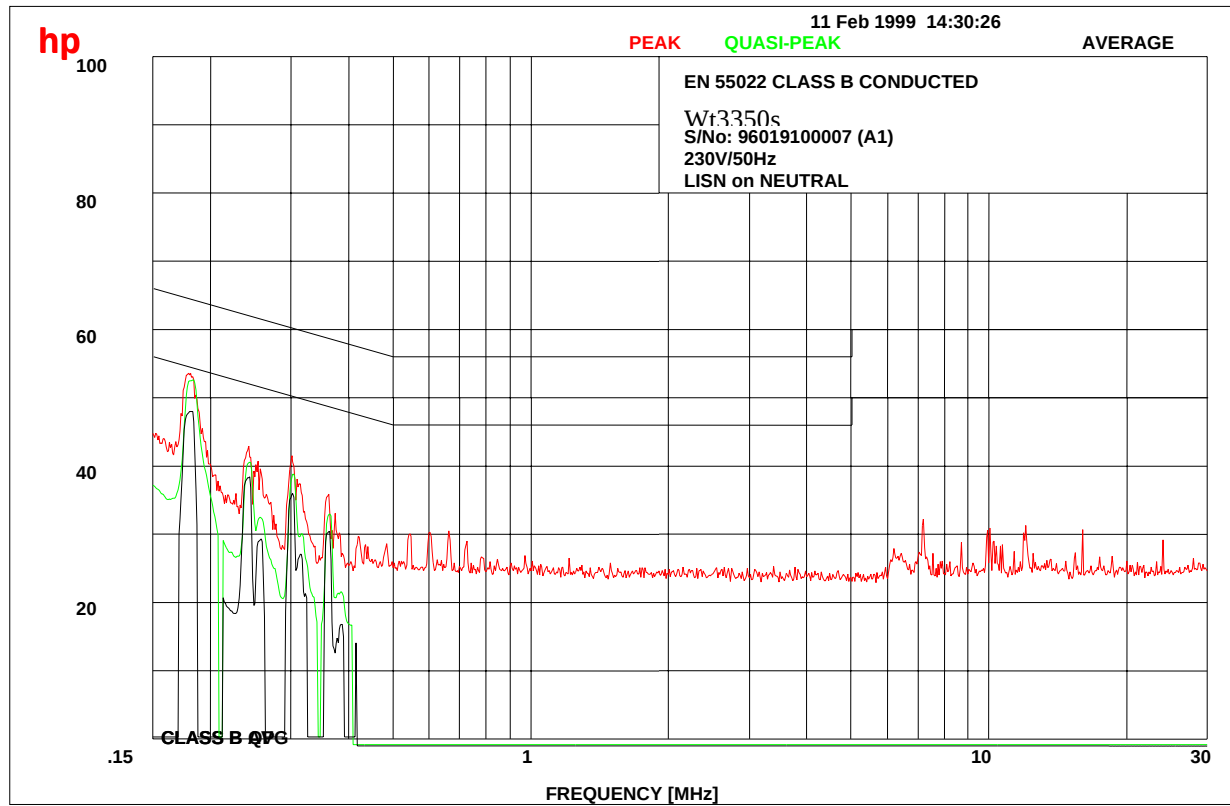
Final vertical [8/849]

Frequency MHz	Peak dBuV/m	DelLim-Pk dB	QP dBuV/m	DelLim-QP dB	Angle deg	Hgt cm	Pol
30.983572	24.83	-5.17	--.--	--.--	0	122	Vert
76.039637	12.43	-17.57	--.--	--.--	177	101	Vert
433.653088	34.24	-2.76	30.27	-6.73	262	398	Vert
542.025364	28.63	-8.37	--.--	--.--	270	101	Vert
588.533047	36.30	-0.70	31.81	-5.19	234	398	Vert
619.508904	26.48	-10.52	--.--	--.--	287	101	Vert
789.811564	25.44	-11.56	--.--	--.--	312	399	Vert
944.763812	28.05	-8.95	--.--	--.--	358	302	Vert

Final Horizontal [8/849]

Frequency MHz	Peak dBuV/m	DelLim-Pk dB	QP dBuV/m	DelLim-QP dB	Angle deg	Hgt cm	Pol
31.000100	22.34	-7.66	--.---	--.---	100	399	Horz
76.042646	6.37	-23.63	--.---	--.---	0	356	Horz
433.672406	23.43	-13.57	--.---	--.---	264	399	Horz
542.025364	26.34	-10.66	--.---	--.---	175	101	Horz
588.524520	21.03	-15.97	--.---	--.---	170	399	Horz
619.508904	25.07	-11.93	--.---	--.---	126	101	Horz
789.811564	24.93	-12.07	--.---	--.---	295	101	Horz
944.760712	25.35	-11.65	--.---	--.---	0	295	Horz

Product: T1500/T1000
Title : EN55022B
Line side at 230V input



Product: T1500/T1500
Title : EN55022B
Neutral side at 230V input

