Report No.	T5415475
Specifications Test Method	FCC Part 15.109(g), CISPR 22, Class B ANSI C63.4 1992
Applicant	TVS ELECTRONICS LTD.
Applicant address	Plot No.34, Developed Plots, South Phase Industrial Estate, Guindy, Chennai, Tamilnadu, India 600 032
Items tested Model No.	Printer MSP250 (Sample # T54474)
Results Date	**Compliance** (As detailed within this report) 06/19/2002 (month / day / year) (Sample received) 08/23/2002 (month / day / year) (Test)
Prepared by	Project Engineer
Authorized by	General Manager (Frank Tsai)
Issue date	*March 24, 2003* (month / day / year)
Modifications	**Appendix C**
Tested by	Training Research Co., Ltd.
Office at	1F, No. 255, Nan Yang Street, Hsichih, Taipei Hsien 221, Taiwan
Open site at	No. 5-3, Lane 21, Yen Chiu Yuan Rd., Sec. 4, Taipei, Taiwan

Conditions of issue :

(1) ***This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.***

(2) ***This report must not be used by the client to claim product endorsement by NVLAP or any agency of U.S. Government.***

★ ***NVLAP LAB CODE: 200174-0***

★ ***FCC ID:OSCMSP250***

Contents

Chapter 1 Introduction

Description of EUT

This device is printing data equipment. It is designed to connect with a compatible computer via parallel interface.

Connections of EUT

(1)The power port is connected with a power cable to AC power source.
(2)The parallel port is connected with the printer-port of personal computer.

Test method

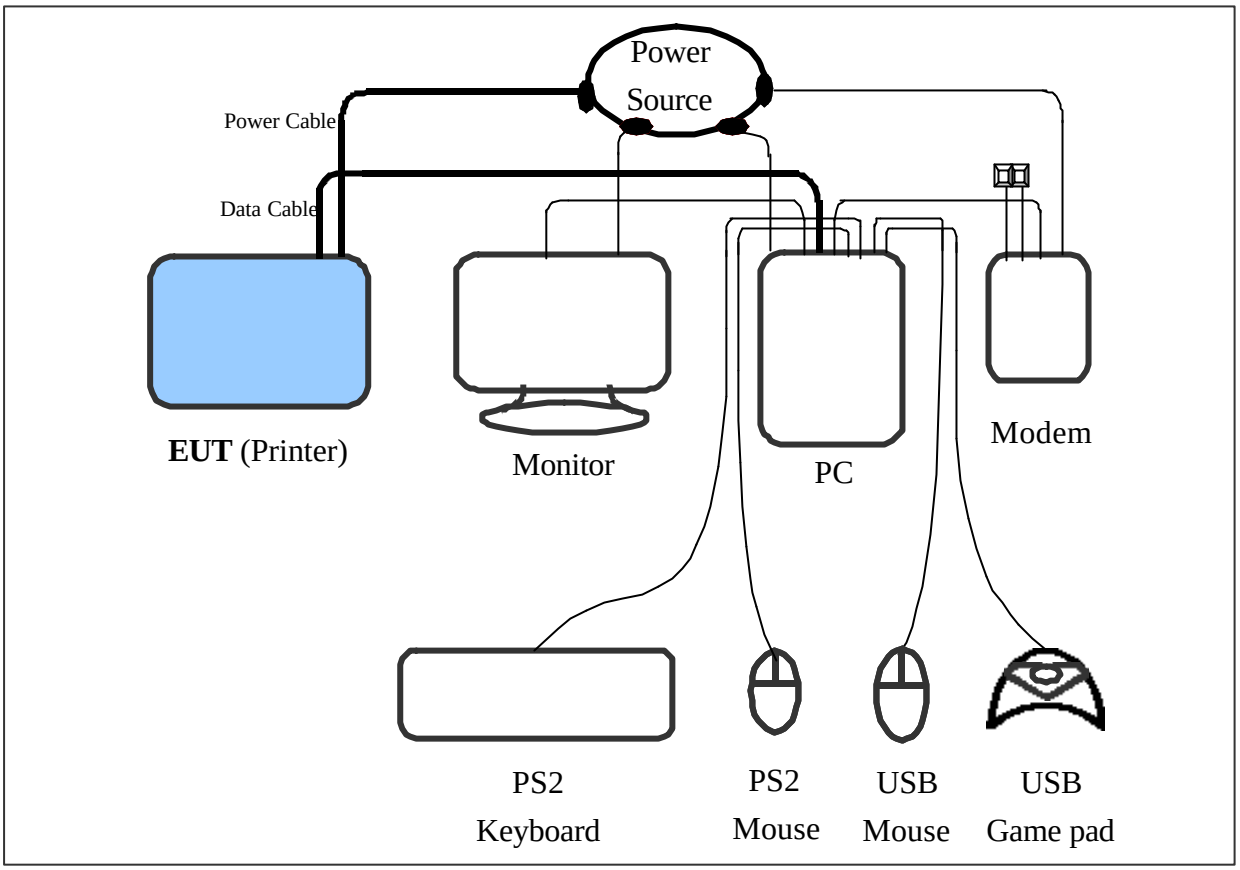
Pretest was found that the emission of operating mode is worse than standby mode. So, The final test is made at the operating mode.

During testing, the EUT was operated at printing mode continuously.

The test placement as the photographs showed is the worst case emission placed. (If the emission is close to the ambient, the resolution BW and view resolution will be reduced and the data will be recorded by detection of maximum hold peak mode.)

The testing configuration of test setup is showing in the next page.

Configuration of Test Setup



Connections of Equipment

PC: *Serial Port --- an external modem
*Printer Port --- **EUT**
*Monitor Port --- a monitor
*Keyboard Port --- a PS2 keyboard
*Mouse Port --- a PS2 mouse
*USB A Port --- a USB mouse
*USB B Port --- a USB gamepad
(Each port on PC is connected with suitable device)

EUT: *Power cable x 1
--- 186cm long, plastic, non-shielded, no ferrite core
*Data cable x 1
--- 136cm long, shielded, no ferrite core

List of Support Equipment

Conducted (Radiated) test:

PC	**:**	**HP Brio 85xx 6/350**
Model No.	:	D6928A
Serial No.	:	SG91801552
FCC ID	:	N/A, DoC (Declaration of Confirmation) Approved
檢磁	:	3872H013
Power type	:	100 ~ 230VAC / 50 ~ 60Hz, 5A, Switching
Power cord	:	Non-shielded, 2.33m long, Plastic, No ferrite core
Monitor	**:**	**HP 15’ Color Monitor**
Model No.	:	D2827A
Serial No.	:	KR91379759
FCC ID	:	C5F7NFCMC1518X
檢磁	:	3872B039
Power type	:	110 ~ 240 VAC / 50 ~ 60 Hz, Switching
Power cord	:	Shielded, 1.83m long, No ferrite core
Data cable	:	Shielded, 1.46m long, with two ferrite cores
Keyboard	**:**	**HP**
Model No.	:	SK-2501K
Serial No.	:	MR81008879
FCC ID	:	GYUR38SK
檢磁	:	3862A621
Power type	:	By PC
Data cable	:	Shielded, 1.73m long, with ferrite core
Mouse	**:**	**HP**
Model No.	:	M-S34
Serial No.	:	LZB90910464
FCC ID	:	DZL211029
檢磁	:	4862A011
Power type	:	By PC
Power cord	:	Non-shielded, 1.88m long, No ferrite core

Fax/Modem	**:**	**Aceex**
Model No.	:	DM-1414
Serial No.	:	9010583
FCC ID	:	IFAXDM1414
Power type	:	Switching
Power Cord	:	Non-shielded, 1.90m long, Plastic hoods, and no ferrite bead
Data Cable	:	RS-232 → Shielded, 1.30m long, Metal hoods , No bead
		RJ-11Cx2 → Non-shielded, 7’ long, Plastic hoods, No bead

USB Mouse	**:**	**Logitech Inc**
Model No.	:	M-BJ58
Serial No.	:	LNA20901985
FCC ID	:	Doc Approved
檢磁	:	3902A701
Power type	:	By PC
Data Cable	:	Shielded, 1.80m long, Plastic, No ferrite core

Gamepad	**:**	**Rockfire**
Model No.	:	QF-337uv
Serial No.	:	10600545
FCC ID	:	Doc Approved
檢磁	:	3862A574
Power type	:	By PC
Data Cable	:	Shielded, 1.810m long, Plastic, with ferrite core

Chapter 2 Conducted Emission Test

Test condition and setup

All the equipment is placed and setup according to CISPR 22.

The EUT is assembled on a wooden table, which is 80 cm high, is placed 40 cm from the back-wall, which is a vertical conducting plane. One LISN is for EUT, the other LISN is for support equipment. They are all placed on the conductive ground. The EUT's LISN connect a line switch box for selecting L1 or L2, then connect to a preamplifier and spectrum.

The spectrum scans from 150KHz to 30MHz. Conducted emission levels are detected at maximum peak mode. But if the maximum peak mode failed or over average limit, it will be measured by average detection mode.

While testing, there is the worst-emission plot printed at peak detection mode, and there are more than 6 highest emissions relative to limit recorded. The plot is kept as the original data, not included in test report.

List of test Instrument

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum analyzer	8591EM	H P	3710A01203	05/29/02	05/29/03
Pre-selector (<30MHz)	AMP-01	TRC	REP-001	08/09/02	08/09/03
LISN (EUT)	TRC LISN01	TRC	LISN-01	08/21/02	08/21/03
LISN (Support E.)	LISN-01	TRC	9912-01, 02	12/13/01	12/13/02

The level of confidence of 95% , the uncertainty of measurement of radiated emission is ± 2.02dB .

Test Result: Pass (Appendix A)

Chapter 3 Radiated Emission Test

Test condition and setup

Pretest: Prior to the final test (OATS test), the EUT is placed in a shielded enclosure, and scan from 30MHz to 1GHz. This is done to ensure the radiation is exactly emitted from the EUT. ***Final test:*** Final radiation measurements are made on a **10 – meter,** open-field test site. The EUT is placed on a nonconductive table, which is 0.8m height, the top surface is 1.0 x 1.5 meter. The entire placement is according to CISPR 22.

The spectrum is examined from 30 MHz to 1GHz measured by HP spectrum. The whole range antenna is used to measure frequency from 30MHz to 1GHz. The final test is used the spectrum analyzer. Measure more than six top marked frequencies generated form pretest by computer step by step at each frequency. The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meters to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

Appropriated preamplifier which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading .The spectrum analyzer' s 6dB bandwidth is set to 120 kHz, and the EUT is measured at quasi-peak (below 1GHz) mode.

If the emission is close to the frequency band of ambient, the tester will recheck the data and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from shielded room will be taken as the final data.

List of test Instrument

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum analyzer	8591EM	H P	3710A01203	05/29/02	05/29/03
Pre-selector (>30MHz)	AMP-01	TRC	REP-001	10/02/01	10/02/02
Spectrum analyzer	8568B	H P	3004A18617	06/19/02	06/19/03
Quasi-peak Adapter	85650A	H P	2521A00984	06/20/02	06/20/03
RF Pre-selector	85685A	H P	2947A01011	06/20/02	06/20/03
RF Pre-selector	AMP-01	TRC	REP-002	10/02/01	10/02/02
Bi-log Antenna	VULB9160	M. E.	3064	07/09/02	07/09/03
Antenna (30M-2GHz)	3142	EMCO	9610-1094	10/02/01	10/02/02
Open test side (Antenna, Amplify, cable calibrated together)				05/20/02	05/20/03

The level of confidence of 95% , the uncertainty of measurement of radiated emission is ± 3.44dB .

Test Result: Pass (Appendix B)

Appendix A

Conducted Emission Test Result

Testing room : Temperature : 26 ° C Humidity : 69 % RH

Line 1

Frequency (kHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBmV)	*Quasi-Peak (dBmV)*	*Average (dBmV)*	*Quasi-Peak (dBmV)*	*Average (dBmV)*	
701.00	40.03	---	---	56.00	46.00	-5.97
783.00	38.53	---	---	56.00	46.00	-7.47
4840.00	38.28	---	---	56.00	46.00	-7.72
10360.00	46.21	---	---	60.00	50.00	-3.79
11040.00	42.87	---	---	60.00	50.00	-7.13
11260.00	43.18	---	---	60.00	50.00	-6.82
11780.00	42.12	---	---	60.00	50.00	-7.88
12190.00	42.45	---	---	60.00	50.00	-7.55
12450.00	41.78	---	---	60.00	50.00	-8.22
30000.00	24.66	---	---	60.00	50.00	-25.34

Line 2

Frequency (kHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBmV)	*Quasi-Peak (dBmV)*	*Average (dBmV)*	*Quasi-Peak (dBmV)*	*Average (dBmV)*	
4880.00	36.90	---	---	56.00	46.00	-9.10
5360.00	40.12	---	---	60.00	50.00	-9.88
5740.00	40.23	---	---	60.00	50.00	-9.77
10210.00	44.27	---	---	60.00	50.00	-5.73
11190.00	42.06	---	---	60.00	50.00	-7.94
12190.00	41.95	---	---	60.00	50.00	-8.05
12450.00	43.98	---	---	60.00	50.00	-6.02
13080.00	42.27	---	---	60.00	50.00	-7.73
13830.00	40.89	---	---	60.00	50.00	-9.11
30000.00	24.17	---	---	60.00	50.00	-25.83

****The reading amplitudes are all under limit.***

Appendix B

Radiated Emission Test Result (Polarity-horizontal)

Test Conditions:

Testing room : Temperature : 28 ° C Humidity : 60 % RH

Testing site : Temperature : 30 ° C Humidity : 87 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Class B Limit	Margin
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
108.342	42.10	4.00	194	-13.42	28.68	30.00	-1.32
240.000	46.80	4.00	293	-12.10	34.70	37.00	-2.30
336.000	39.70	4.00	46	-8.10	31.60	37.00	-5.40
384.000	40.30	2.55	101	-6.12	34.18	37.00	-2.82
415.697	41.84	2.55	213	-5.35	36.49	37.00	-0.51
432.000	41.10	2.55	113	-4.69	36.41	37.00	-0.59
480.000	36.60	2.55	211	-3.40	33.20	37.00	-3.80

Note:

1. Margin = Amplitude - limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude + Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)

Radiated Emission Test Result (Polarity-vertical)

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Class B Limit	Margin
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
37.500	44.60	1.00	114	-15.30	29.30	30.00	-0.70
75.000	38.90	2.55	95	-15.95	22.95	30.00	-7.05
87.500	45.80	4.00	10	-16.42	29.38	30.00	-0.62
125.000	40.10	1.00	153	-12.10	28.00	30.00	-2.00
162.502	37.70	1.00	220	-10.88	26.82	30.00	-3.18
200.002	43.10	1.00	146	-13.70	29.40	30.00	-0.60
212.503	38.50	1.00	186	-14.52	23.98	30.00	-6.02
216.670	38.90	4.00	16	-14.40	24.50	30.00	-5.50
225.003	36.10	1.00	120	-13.55	22.55	30.00	-7.45
229.178	37.20	1.00	178	-12.92	24.28	30.00	-5.72
254.170	37.40	1.00	4	-11.38	26.02	37.00	-10.98
336.000	39.40	1.00	282	-8.10	31.30	37.00	-5.70

Appendix C

Modification List

PCB Part No.2B150130/B:

1. The ping 3 of CN1 connected 33pF capacitor to GND.
2. The ping 1 of J2 connected 1000pF capacitor to GND.
3. The ping 4 ~ 6 of J7 (each ping) connected 1000pF capacitor to GND.
4. Adding GND trace by wire, See attached photo-1.
5. Connected a 1000pF capacitor to GND (Net power to GND). Which located on rear of drawing MH2.
6. The GND of J5 connected a 1000pF capacitor to GND (Net power to GND). Which is nearly drawing RN6.

Other:

7. The J1 ~ J4 is bound in nearly metal construction, See attached photo-2.
8. The three copper pieces fix on bottom (metal base), See attached photo-3.
9. The Cable of printer head connected a Flat Cable Suppression core. (Mfg.: Crown Ferrite Enterprise Co., Type: RP 49.6*6.5*12)

Statement of Applicant:

I acknowledge that the modifications made to the EUT for compliance during testing will be incorporated into mass production units.

Mfg.: TVS ELECTRONICS LTD.

By : _____

Signature

V. SUGHOSH

GENERAL MANAGER – R&D

TVS ELECTRONICS LTD

Date: January 20, 2003