Report No.	T5415608
FCC ID	OSCMSP345Classic
Specifications Test Method	FCC Part 15.109(g), CISPR 22, Class B ANSI C63.4 1992
Applicant Applicant address	TVS Electronics Limited 34, Developed plots, South Phase, Industrial Estate, Guindy, Chennai – 600 032.
Items tested Model No.	Printer MSP 345 Classic (Sample # T5415608)
Results Date	**Compliance** (As detailed within this report) 05/27/2003 (month / day / year)(Sample received) 08/05/2003 (month / day / year)(Tested)
Prepared by	Project Engineer
Authorized by	V. General Manager (Jacob Lin)
Issue date	October 13, 2003 (month / day / year)
Modifications	**Appendix C**
Tested by	Training Research Co., Ltd. **(Accredited by NVLAP)**
Office at	1F, No. 255, Nan Yang Street, Hsichih, Taipei Hsien 221, Taiwan
Open site at	No. 15, Lane 530, Pa-Lian RD., Sec. 1, Hsichih City, Taipei Hsien, Taiwan, R.O.C..

Conditions of issue :

- ***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.***
- ***The test data in this test report are following the procedures in accordance with the terms of accreditation.***
- ***This test report and measurements made by TRC are traceable to the NIST only Conducted and Radiated Method (TRC is accredited by NVLAP, code No.: 200174-0).***
- ***The device has been tested is fully complied with the requirements the Directive FCC Part 15.***

Contents

Chapter 1 Introduction

Description of EUT:

The EUT is a Dot Matrix Printer.

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.

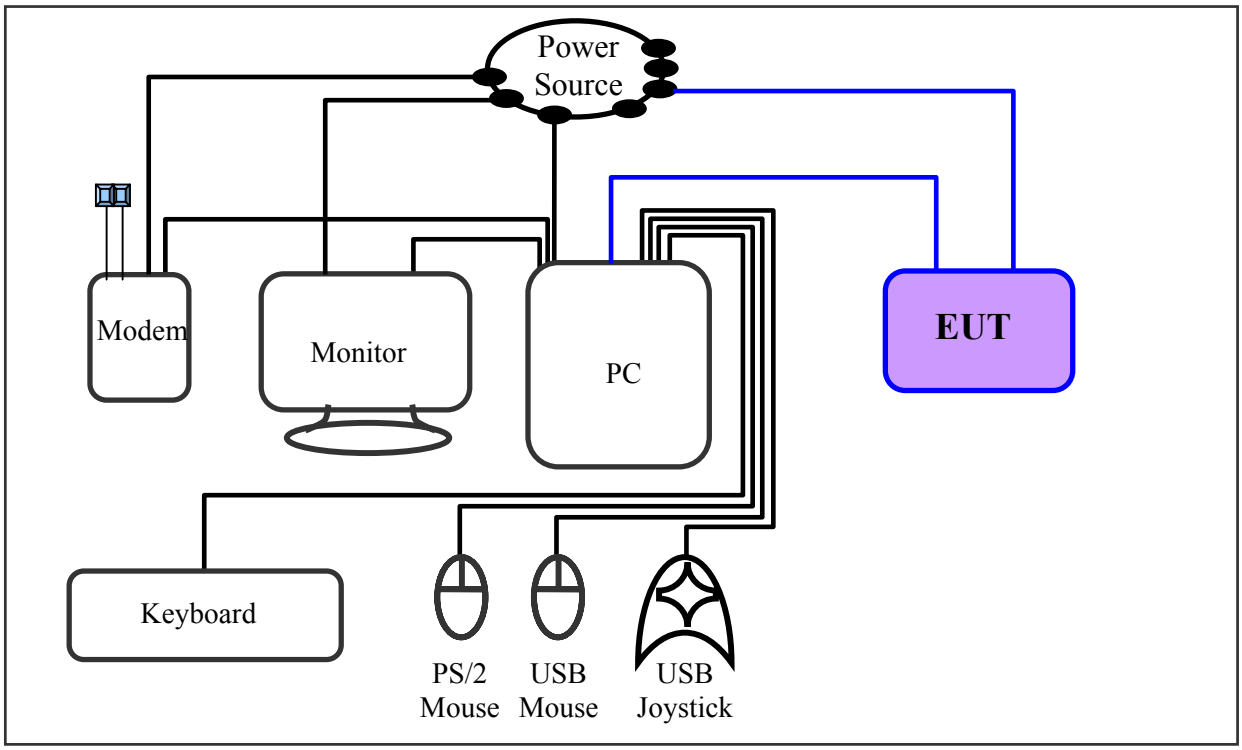
During the pretest, the EUT was at "operating" mode.

The test voltage is 230Vac/50Hz.

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:

PC:

*Serial Port --- via a 76cm shielded RS-232 cable to an external modem
*Monitor Port --- a monitor with 1.5m length data cable.
*Keyboard Port --- a keyboard with 1.7m length data cable.
*Mouse Port --- a mouse with 1.8m length of data cable.
*Printer port --- to EUT.
*USB Port A --- a joystick with 1.5m length shielded and no ferrite bead data cable
*USB Port B --- a mouse with 1.5m length shielded and no ferrite bead data cable
(Each port on PC is connected with suitable device)

EUT:

*Printer port --- via a 1.18m length braid shielded data cable to the printer port of PC.
*Power port --- via a 2.0m length power cable to the power source.

List of support equipment

Conducted (Radiated) test:

PC	**:**	**HP Brio 85xx 6/350**
Model No.	:	D6928A
Serial No.	:	SG91801443
FCC ID	:	Doc Approved
Power type	:	100 ~ 230VAC / 50 ~ 60Hz, 5A, Switching
Power cord	:	Non-shielded, 2.33m long, Plastic, No ferrite core

Keyboard	**:**	**Logitech SK-720C**
Model No.	:	Y-SA2
Serial No.	:	SCC04514357
FCC ID	:	GYUR49SK
Power type	:	By PC
Data cable	:	Shielded, 1.73m long, with ferrite core

Monitor	**:**	**HP 15' Color Monitor**
Model No.	:	D2827A
Serial No.	:	KR91161719
FCC ID	:	C5F7NFCMC1518X
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

Mouse	**:**	**HP**
Model No.	:	M-S34
Serial No.	:	LZB90714106 (LZB90714122)
FCC ID	:	DZL211029
Power type	:	By PC
Power cord	:	Non-shielded, 1.88m long, No ferrite core

USB Mouse	**:**	**Logitech Wheel Mouse**
Model No.	:	M-BJ-58
Serial No.	:	LN20901985
FCC ID	:	Doc Approved
Power type	:	By PC
Power cord	:	Non-shielded, 1.88m long, No ferrite core

Modem	**:**	**ACEEX**
Model No.	:	DM-1414V
FCC ID	:	IFAXDM1414
Power type	:	120VAC, 60Hz/ 9VAC, 1A
Power cord	:	Non-shielded, 1.9m long, no ferrite cord
Data cable	:	RS232, Shielded, 1.2m long, no ferrite core RJ11C x 2, 7' long non-shielded, no ferrite core

USB Joystick	**:**	**Rockfire**
Model No.	:	QF-337uv
Serial No.	:	10600545
FCC ID	:	CE Approval
Power type	:	Powered by PC
Power cable	:	Shielded, 1.8m long, No ferrite bead data cable

Chapter 2 Conducted emission test

Test condition and setup:

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

The EUT is assembled on a wooden table that is 80 cm high, is placed 40 cm from the back-wall that 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 for pretest.

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

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
Receiver	SCR3102	SCHAFFNER	012	04/22/03	04/21/04
LISN (EUT)	3825/2	EMCO	9411-2284	07/21/03	07/20/04
LISN (Support E.)	3825/2	EMCO	9210-2007	05/31/03	05/30/04
Preamplifier	EQ3-006	TRC	- - - - - - - - -	05/29/03	05/28/04
Line switch box	EQ3-007	TRC	- - - - - - - - -	05/29/03	05/29/04

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

Test Result: Pass (Appendix A)

Conducted Test Placement: (Photographs)

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 exactly emits form the EUT.

Final test: Final radiation measurement is made on a ***10*** **- meter,** open-field test site. The EUT is placed on a nonconductive table that is 0.8m height, the top surface is 1.0 x 1.5 meter. The placement is according to CISPR 22.

The M. E. whole range Antenna is used to measure frequency from 30 MHz to 1GHz. The final test is used the Receiver.

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 that is made by TRC is used for improving sensitivity and precaution is taken to avoid overloading. The spectrum analyzer's 6dB bandwidth is set to 120 KHz, and the EUT is measured at quasi-peak 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 shield room will be taken as the final data.

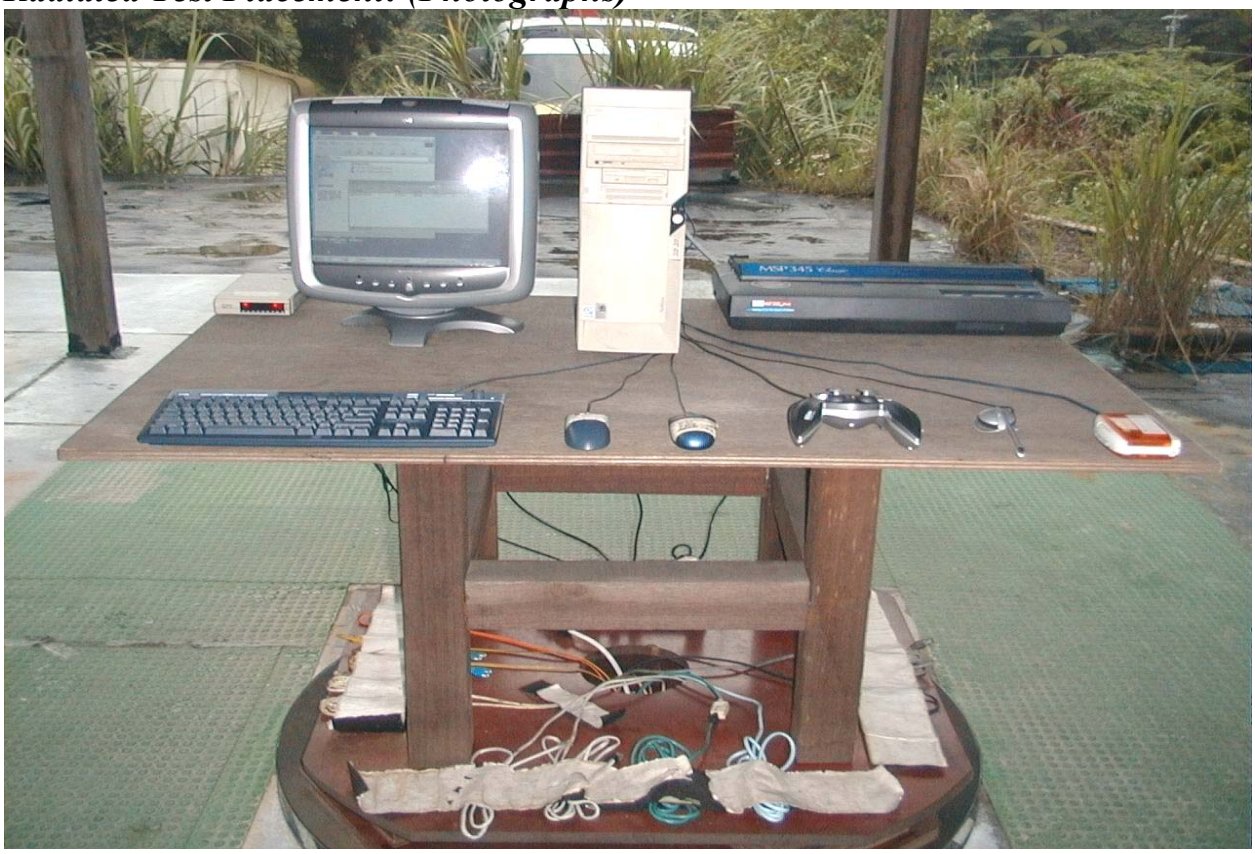
List of test Instrument :

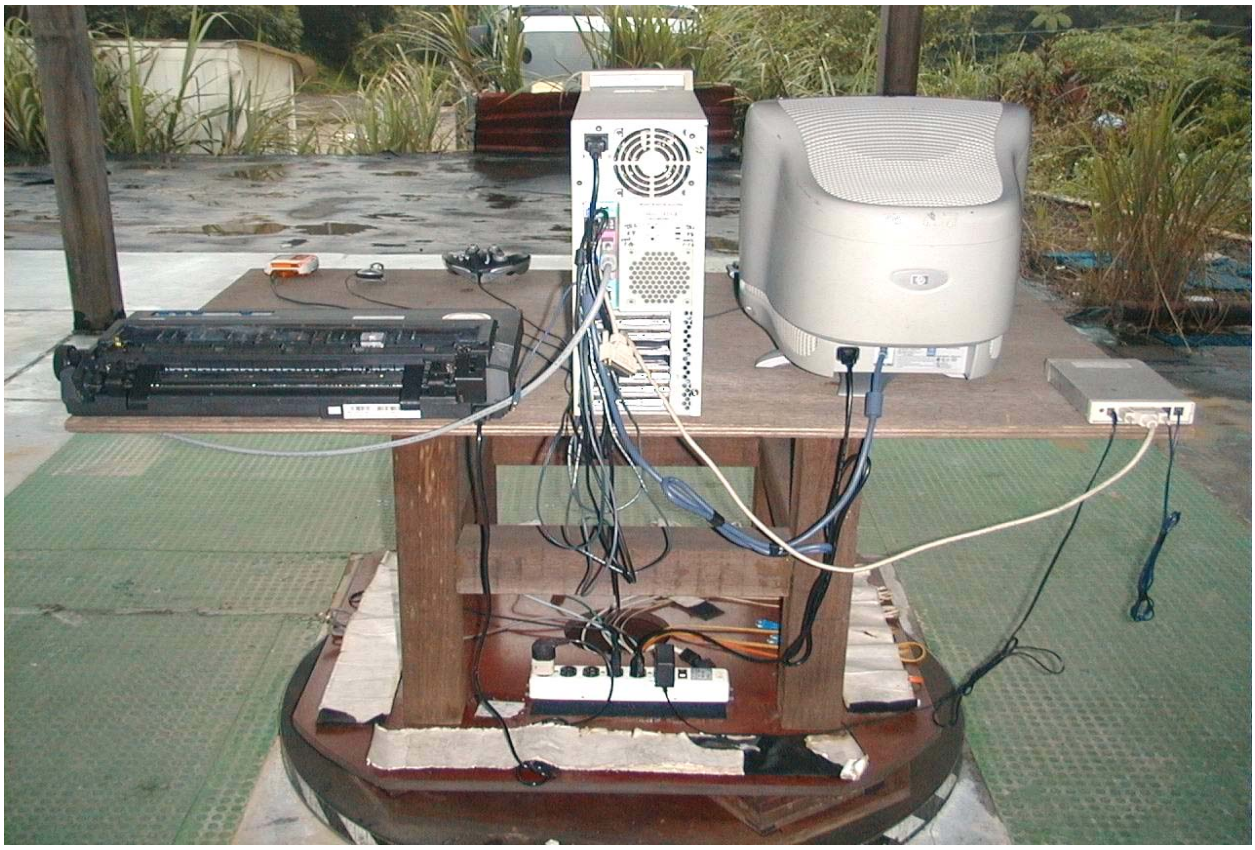
				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Receiver	SCR3102	SCHAFFNER	021	04/22/03	04/21/04
Control Box	TWR95-4	TRC	CB-002	N/A	N/A
Antenna	6502	EMCO	9206-2777	06/03/03	06/04/04
Open test side (Antenna, Amplify, cable calibrated together)				05/29/03	05/28/04

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

Test Result : Pass (Appendix B)

Radiated Test Placement: (Photographs)





Appendix A

Conducted Emission Test Result: (Test Mode: 230Vac/50Hz)

Testing room: Temperature : 20 ° C Humidity : 55 % RH

Line 1

Frequency (KHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBμV)	*Quasi-Peak (dBμV)*	*Average (dBμV)*	*Quasi-Peak (dBμV)*	*Average (dBμV)*	
3918.00	45.04	42.23	36.10	56.00	46.00	-9.90
3999.00	47.85	43.36	35.00	56.00	46.00	-11.00
4080.00	44.56	42.95	31.41	56.00	46.00	-13.05
4164.00	45.40	42.61	33.71	56.00	46.00	-12.29
4404.00	44.75	44.14	37.66	56.00	46.00	-8.34
4486.00	44.12	42.85	37.04	56.00	46.00	-8.96
6280.00	44.58	***.**	***.**	60.00	50.00	-5.42
16930.00	44.19	***.**	***.**	60.00	50.00	-5.81
23000.00	44.12	***.**	***.**	60.00	50.00	-5.88
29930.00	45.57	***.**	***.**	60.00	50.00	-4.43

Line 2

Frequency (KHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBμV)	*Quasi-Peak (dBμV)*	*Average (dBμV)*	*Quasi-Peak (dBμV)*	*Average (dBμV)*	
4184.00	45.88	44.40	39.20	56.00	46.00	-6.80
4425.00	46.60	46.69	40.69	56.00	46.00	-5.31
4504.00	45.87	45.44	40.31	56.00	46.00	-5.69
4662.00	47.68	43.40	35.65	56.00	46.00	-10.35
5520.00	46.37	***.**	***.**	60.00	50.00	-3.63
6068.00	47.19	38.27	33.55	60.00	50.00	-16.45
6460.00	45.34	***.**	***.**	60.00	50.00	-4.66
6920.00	46.12	***.**	***.**	60.00	50.00	-3.88
22950.00	44.80	***.**	***.**	60.00	50.00	-5.20
23000.00	45.53	***.**	***.**	60.00	50.00	-4.47

*The reading amplitudes are all under limit.

Appendix B

Radiated Emission Test Result: (Test Mode: 230Vac/50Hz)

Test Conditions:

Testing site : Temperature : 31 ° C Humidity : 60 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Class B Limit	Margin
MHz	dBμV/m	m	degree	dB	dBμV/m	dBμV/m	dB
Horizontal							
37.4525	27.37	2.49	97	0.99	28.36	30.00	-1.64
130.1570	30.23	3.99	194	-4.40	25.83	30.00	-4.17
200.2415	31.73	3.99	345	-3.90	27.83	30.00	-2.17
343.7458	32.40	2.49	326	1.30	33.70	37.00	-3.30
***							
Vertical							
37.4525	25.76	0.97	88	0.99	26.75	30.00	-3.25
74.4380	37.05	0.97	92	-10.22	26.83	30.00	-3.17
200.2390	28.81	0.97	244	-3.90	24.91	30.00	-5.09
340.4050	29.42	0.97	0	1.09	30.51	37.00	-6.49
343.7420	32.68	0.97	353	1.30	33.98	37.00	-3.02
347.0780	29.32	0.97	5	1.51	30.83	37.00	-6.17
363.7655	31.41	0.97	351	2.50	33.91	37.00	-3.09
***							

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)
   (For example : 30MHz correction factor = 15.5 + (-15.26) = 0.24 dB/m)

Appendix C

List of Modifications:

1. C50~C55 = 0.01 μ F.
2. C31and CD5 = 1000pF.
3. C47 = 470pF.
4. Connect the aluminum foil to:
   a. The screw hole nearby R23 with short wire.
   b. The metal plate beneath the roller nearby the right side (parallel port).
5. Interconnecting cable of CN1, CN2, CN8 placed to the left side of SPS.
6. Add a 30 x 5 mm conductive material near CN3's GND on soldering side or connect the area's GND directly to the metal ground plate.
7. Printer head part:
   a. Slide carriage changed to conductive one.
   b. Two additional metals beneath the carriage Guide.
8. Parallel cable changes to be shielded with foil and braid

Please refer to the photograph of EUT

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 Limited

By : _____ ***Mr. Babu*** ***Date: October 7, 2003***

Signature ***Printed*** ***Title: Manager***