

Marstech Limited

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TEST REPORT

REPORT DATE: 8 February 1999

REPORT NO: 99021D

CONTENTS: See Table of Contents

SUBMITTOR: TOSHIBA TEC CORPORATION
Mishima Plant
6-78 Minami-Cho, Mishima-Shi
Shizuoka-Ken
411-8520 JAPAN

SUBJECT: Model Nos: 4227

FCC ID: BJIOH-96001

TEST SPECIFICATION: FCC CFR 47, Part 15, Subpart B
NOTE: Tests Conducted Are "Type" Tests.

DATE SAMPLE RECEIVED: N/A

DATE TESTED: 4 December 1998

RESULTS: Equipment tested complies with referenced specification.

ALTERATIONS: None

Tested By: Toshiba TEC Corporation

Approved by: *Robert G. Marshall*
R. G. MARSHALL Robert G. Marshall, P. Eng.

Date: Feb 10/99

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Authorized by:

Professional Engineer
Ontario



Engineering &
Administrative



Testing For FCC
Submissions/Verifications



Approved Test Facility



TECHNICAL REPORT - FCC 2.1033(b)

Applicant

Toshiba TEC Corporation
6-78 Minami-Cho, Mishima-Shi
Shizuoka-Ken, JAPAN

FCC Identifier

BJIOH-96001

Manufacturer

Toshiba TEC Corporation
Mishima-Shi, Shizuoka-Ken,
JAPAN

TABLE OF CONTENTS

<u>Exhibit</u>	<u>Description</u>	<u>FCC Ref.</u>	<u>Page</u>
C	Block and Schematic Diagrams Block Diagram Schematic Diagram	2.1033(b)(5)	Exhibit C Exhibit C(1) Exhibit C(2)-1 to -4
D	Test Report Report of Measurements/Test Facility/ Test Equipment List	2.1033(b)(6)	Exhibit D Exhibit D(1)-1 to -20
E	Photographs Label Equipment	2.1033(b)(7)	Exhibit E Exhibit E(1) Exhibit E(2)-1 to -4

January 18, 1999
UC-99011

REPORT MEASUREMENTS

**Dot Matrix Printer, Model 4227
with Serial and Parallel Interface
BJIOH-96001
Report of Measurements / Test Facility /
Test Equipment List
Exhibit D**

FCC ID: BJIOH-96001
Marstech Report No. 99021D
EXHIBIT D

December 17. 1998

REPORT OF MEASUREMENT ON DIGITAL DEVICE

TEC APPLICATION NO. : OF-98023

1. Applicant : TEC CORPORATION Mishima Plant
6-78 Minami-cho, Mishima-shi,
Shizuoka-ken, JAPAN.
2. Manufacturer : TEC CORPORATION Mishima Plant
6-78 Minami-cho, Mishima-shi,
Shizuoka-ken, JAPAN.
3. Description of Device : Dot Matrix Printer
 - b) FCC ID : BJIOH-96001
 - c) Trade Name : LEXMARK
 - d) Model No. : 4227-XXX
 - e) Serial No. : -----
 - f) Date of Manufacture : December 7, 1998
 - g) Power Supply : 120VAC 60Hz
4. Date of Measurement : December 7. 1998 (Completed)
5. Regulations Applied : FCC Part 15 Subpart B
6. Measurement Procedure : ANSI C63.4-1992
7. Place of Measurement : TEC CORPORATION Ohito Plant
8. Measurement Results : The results obtained from the measuring of
the above-mentioned device are as shown in
the attached sheets.

I HEREBY CERTIFY THAT : The data shown in this report were made in accordance with the procedures given in ANSI C63.4-1992 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

NOTE : These results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations.

TEC CORPORATION



S. Akimoto
Manager
Circuit Production Engineering Department

RADIATED RADIO NOISE MEASUREMENT

DESCRIPTION OF DEVICE : Dot Matrix Printer
 Model No. : 4227-Plus
 FCC ID :
 Classification of EUT : Class B
 Type of EUT : Desk-top

TEST CONDITION OF EQUIPMENT UNDER TEST (EUT) :

Configuration of EUT : Refer to the sheet No.6
 Operating Condition : Running with the program prepared by applicant.
 EUT Grounding : Grounded at the plug end of line cord.
 Power Rating : 120 VAC ; 60 Hz

MODE OF INTERFACE : Parallel

EUT Warm-up Time : 15 minutes
 Date : December 04, 1998
 Temp. : 14 C Humi. : 50 %

Frequency (MHz)	Antenna Factor (dB)	Meter Reading at 3 m (dB/uV)		Class B Limits (dB/uV/m)	Emission Level at 3 m (dB/uV/m)	
		Horizontal	Vertical		Horizontal	Vertical
31.8	19.3	3.5	13.0	40.0	22.8	32.3
59.1	11.5	16.5	16.0	40.0	28.0	27.5
73.9	10.3	18.0	19.5	40.0	28.3	29.8
147.8	20.7	10.5	6.5	43.5	31.2	27.2
167.5	21.9	8.0	10.0	43.5	29.9	31.9
182.3	22.8	10.5	8.0	43.5	33.3	30.8
192.2	23.2	13.0	6.0	43.5	36.2	29.2
202.0	24.0	11.5	6.0	43.5	35.5	30.0
251.3	25.1	7.5	4.5	46.0	32.6	29.6

NOTES : 1) The cable (53m) loss is included in the antenna factor.

2) The symbol of [*] means [With Dipole Antenna] and the rest means [With Broadband Antenna].

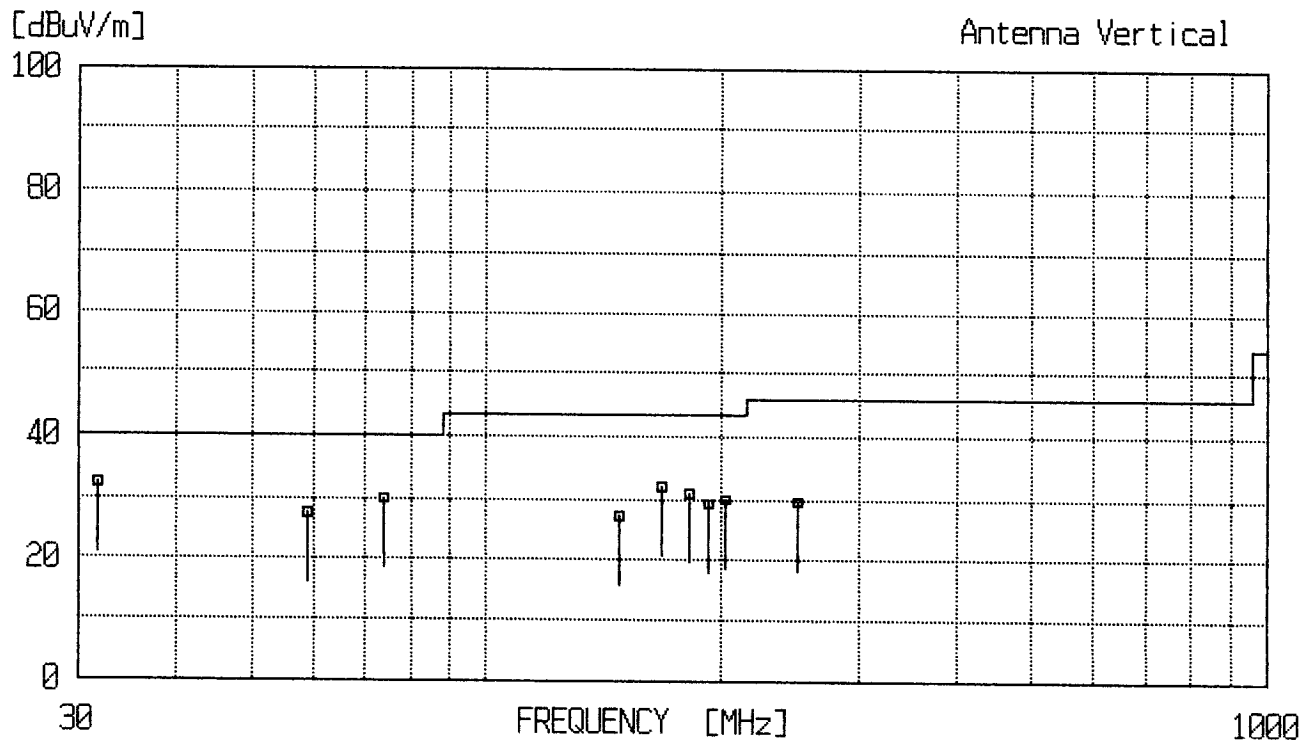
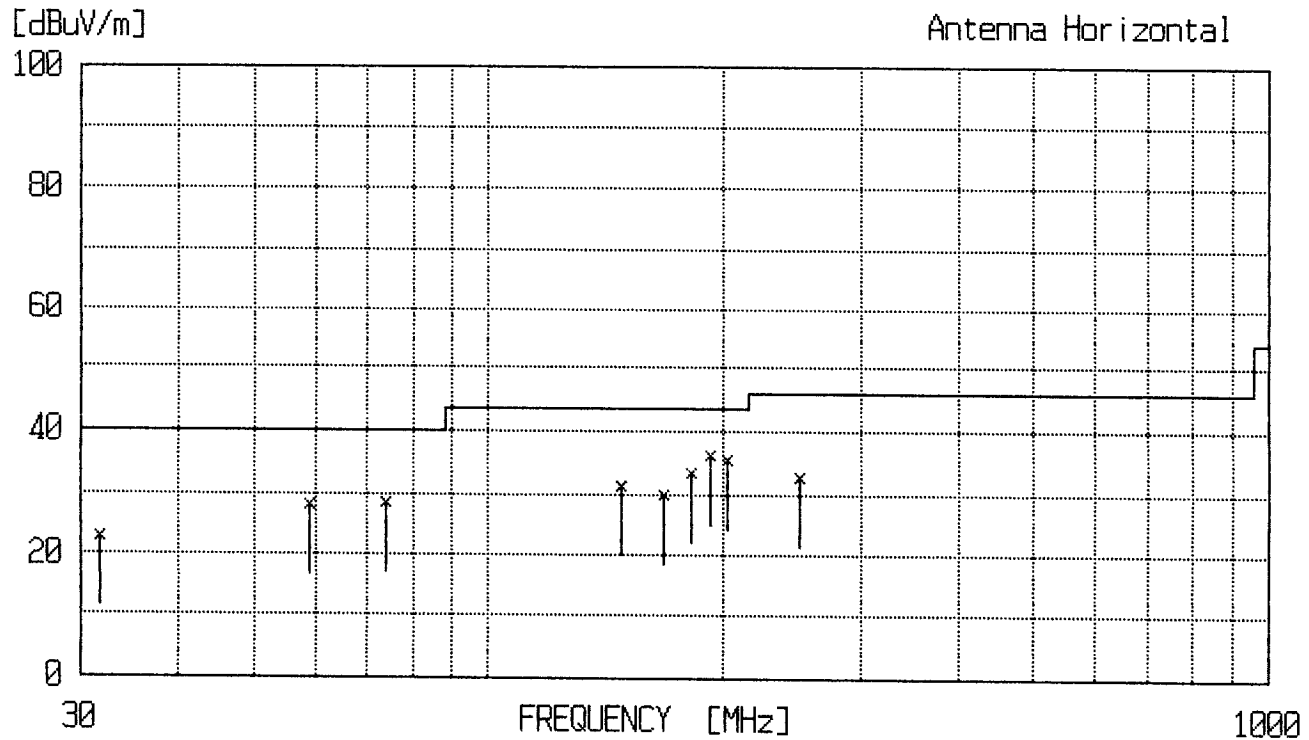
3) Meter Reading + Antenna Factor = Emission Level

Sample of calculation at 31.8 MHz : 3.5 + 19.3 = 22.8 dB/uV/m

RADIATED RADIO NOISE MEASUREMENT

DESCRIPTION OF DEVICE : Dot Matrix Printer
Model No. : 4227-Plus
FCC ID :

MODE OF INTERFACE : Parallel



LINE CONDUCTED RF VOLTAGE MEASUREMENT

DESCRIPTION OF DEVICE : Dot Matrix Printer
 Model No. : 4227-Plus
 FCC ID :
 Classification of EUT : Class B
 Type of EUT : Desk-top

TEST CONDITION OF EQUIPMENT UNDER TEST (EUT) :

Configuration of EUT : Refer to the sheet No.6
 Operating Condition : Running with the program prepared by applicant.
 EUT Grounding : Grounded at the plug end of line cord.
 Power Rating : 120 VAC ; 60 Hz

MODE OF INTERFACE : Parallel

EUT Warm-up Time : 15 minutes
 Date : December 07, 1998
 Temp. : 18 C Humi. : 45 %

Frequency (MHz)	LISN Factor (dB)	Meter Reading at QP (dB/uV)		QP/AVE -13dB	Class B Limits (dB/uV)	Emission Level (dB/uV)	
		One end & Grd'd	The other end & Grd'd			One end & Grd'd	The other end & Grd'd
0.510	--	26.1	24.5	--	48.0	26.1	24.5
0.815	--	21.0	22.7	--	48.0	21.0	22.7
1.832	--	18.7	20.6	--	48.0	18.7	20.6
2.547	--	22.5	23.8	--	48.0	22.5	23.8
6.621	--	30.2	31.4	--	48.0	30.2	31.4
7.335	--	31.5	28.9	--	48.0	31.5	28.9
14.770	--	29.0	18.0	--	48.0	29.0	18.0
23.562	--	27.5	30.3	--	48.0	27.5	30.3

NOTES : There is little or no LISN Factor and cable loss.

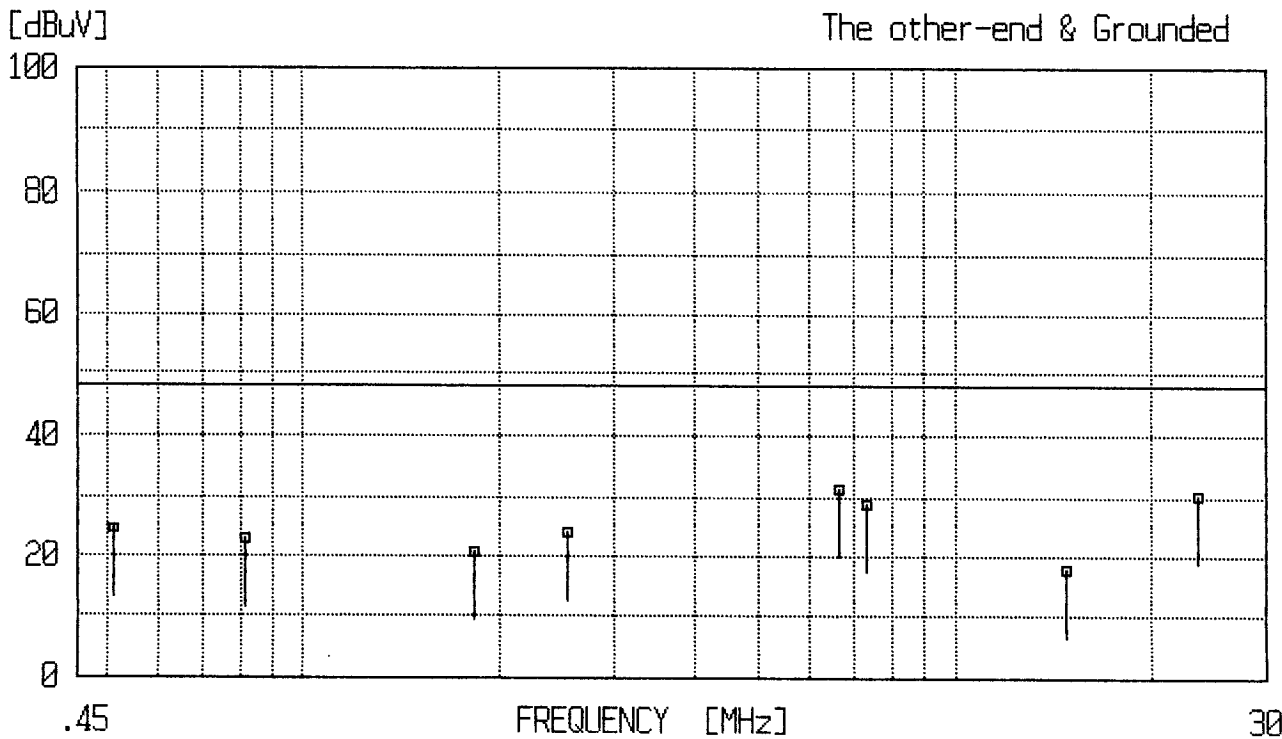
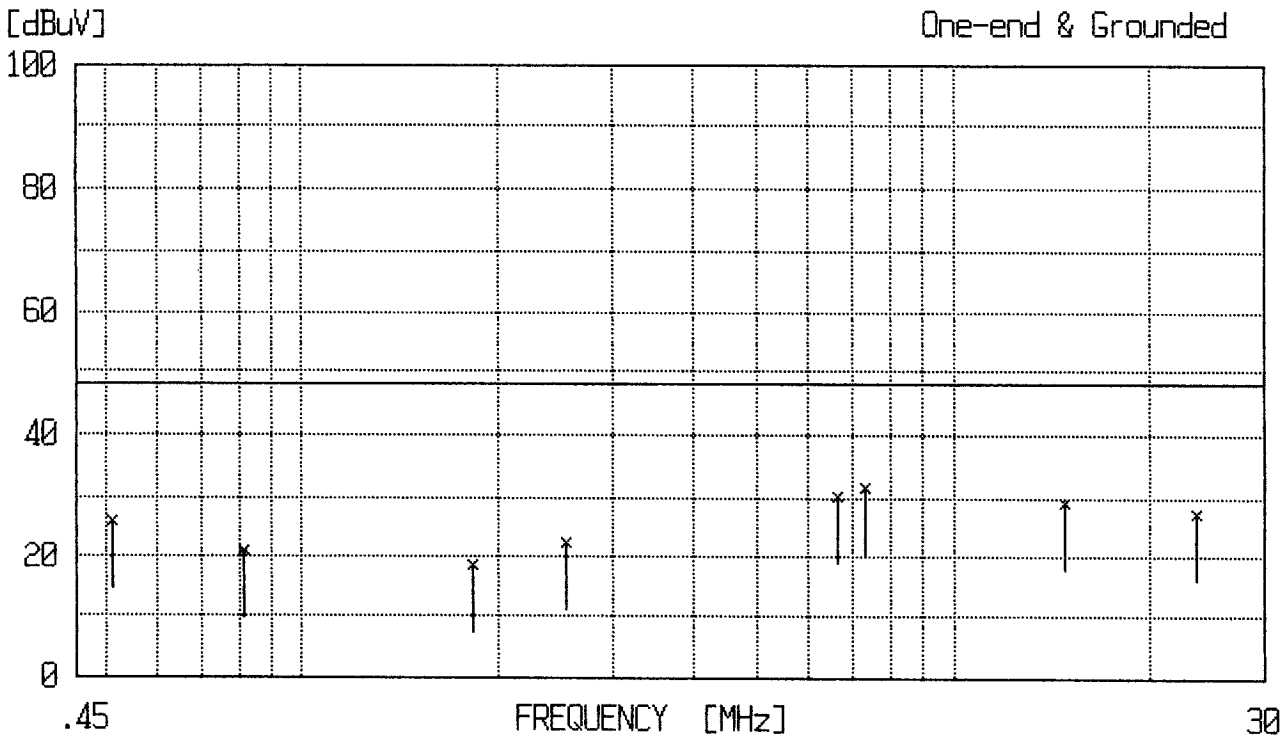
LINE CONDUCTED RF VOLTAGE MEASUREMENT

DESCRIPTION OF DEVICE : Dot Matrix Printer

Model No. : 4227-Plus

FCC ID :

MODE OF INTERFACE : Parallel



TEST CONDITIONS AND CONFIGURATION OF EUT

1. The equipment under test (EUT) consists of :

Description	Manufacturer	Model No.	FCC ID (if any)
Dot Matrix Printer	TEC CORPORATION	4227-XXX	BJIOH-96001
Option Tractor	TEC CORPORATION	11A6196	N/A

2. The measurement was carried out with the following equipment connected :

Description	Manufacturer	Model No.	FCC ID (if any)
Personal Computer	DEC Corporation	FR-751JY-11	A09-PC75X
CRT Display	DEC Corporation	PCXCV-GA	BEJCQ472
Keyboard Unit	DEC Corporation	PCXAJ-AA	N/A
Mouse Unit	DEC Corporation	PC7XS-AA	DZLMSF142
Dot Matrix Printer	TEC CORPORATION	9600	BJI9BUOH-87019

3. Type of Interface Cable(s)

	Shielded	Ferrite Core	Length
EUT / Personal Computer (LPT1 Port)	Yes	No	1.9 m
EUT / Option Tractor	Yes	No	1.1 m
Personal Computer / CRT Display	Yes	Yes (on Twin)	1.3 m
Personal Computer / Keyboard Uint	Yes	Yes (on One)	1.1 m
Personal Computer / Mouse Unit	Yes	No	1.8 m
Personal Computer / Dot Matrix Printer (COM1 Port)	Yes	No	2.1 m

TEST CONDITIONS AND CONFIGURATION OF EUT

4. Configuration of the Equipment Under Test

Refer to sheet No 8,9 and 10.

The system was configured to maximize emissions. The test reflects the worst case with the EUT actively Printing.

5. Arrangement of the Interface Cable(s)

Refer to sheet No 9 and 10.

These interface cables were positioned so as to produce the highest maximum at every frequency between 30 MHz and 1000MHz, being within the manner assumed to be a typical operating condition.

RADIATED RADIO NOISE MEASUREMENT

DESCRIPTION OF DEVICE : Dot Matrix Printer
 Model No. : 4227-Plus
 FCC ID :
 Classification of EUT : Class B
 Type of EUT : Desk-top

TEST CONDITION OF EQUIPMENT UNDER TEST (EUT) :

Configuration of EUT : Refer to the sheet No.15
 Operating Condition : Running with the program prepared by applicant.
 EUT Grounding : Grounded at the plug end of line cord.
 Power Rating : 120 VAC ; 60 Hz

MODE OF INTERFACE : Serial

EUT Warm-up Time : 15 minutes
 Date : December 04, 1998
 Temp. : 14 C Humi. : 50 %

Frequency (MHz)	Antenna Factor (dB)	Meter Reading at 3 m (dB/uV)		Class B Limits (dB/uV/m)	Emission Level at 3 m (dB/uV/m)	
		Horizontal	Vertical		Horizontal	Vertical
30.7	19.5	-3.5	7.5	40.0	16.0	27.0
49.3	15.4	3.0	10.5	40.0	18.4	25.9
69.0	10.2	19.0	25.5	40.0	29.2	35.7
78.8	10.9	12.5	15.0	40.0	23.4	25.9
162.5	21.5	14.5	18.0	43.5	36.0	39.5
182.2	22.8	10.5	13.0	43.5	33.3	35.8
192.1	23.2	8.5	9.0	43.5	31.7	32.2
251.2	25.1	9.0	4.0	46.0	34.1	29.1

NOTES : 1) The cable (53m) loss is included in the antenna factor.

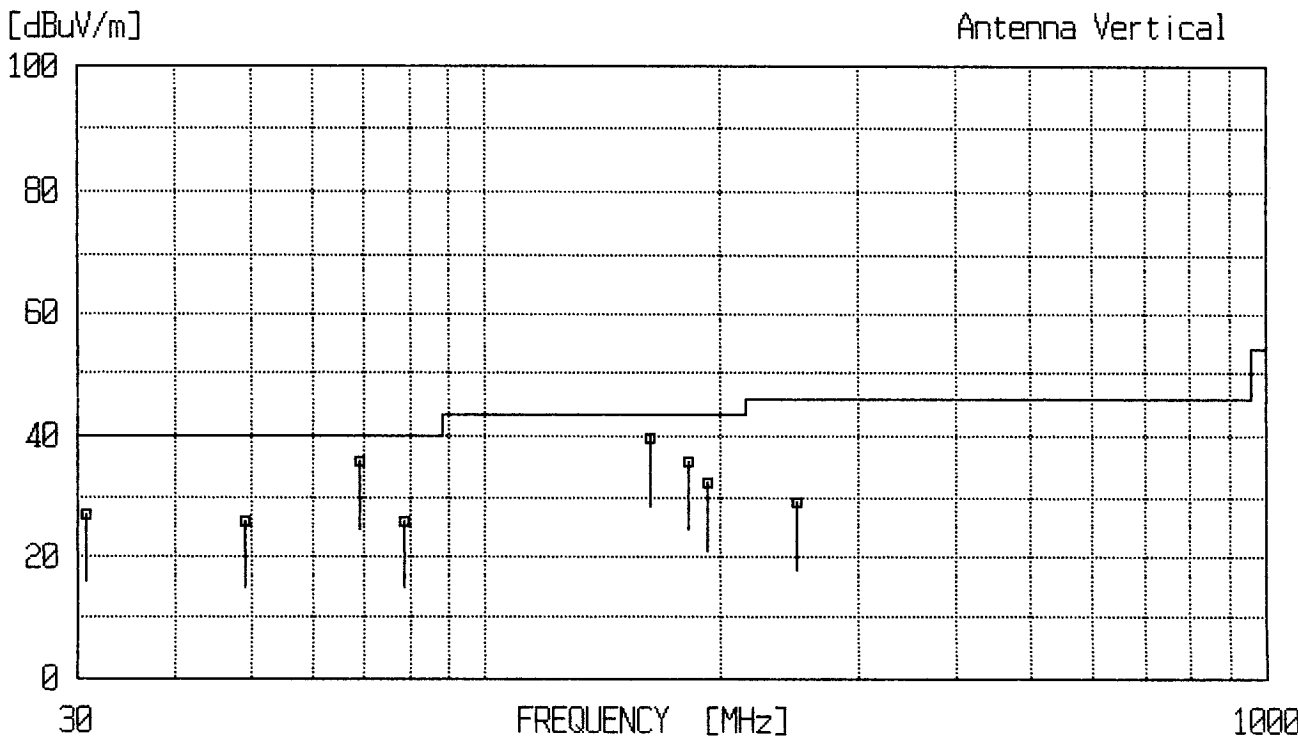
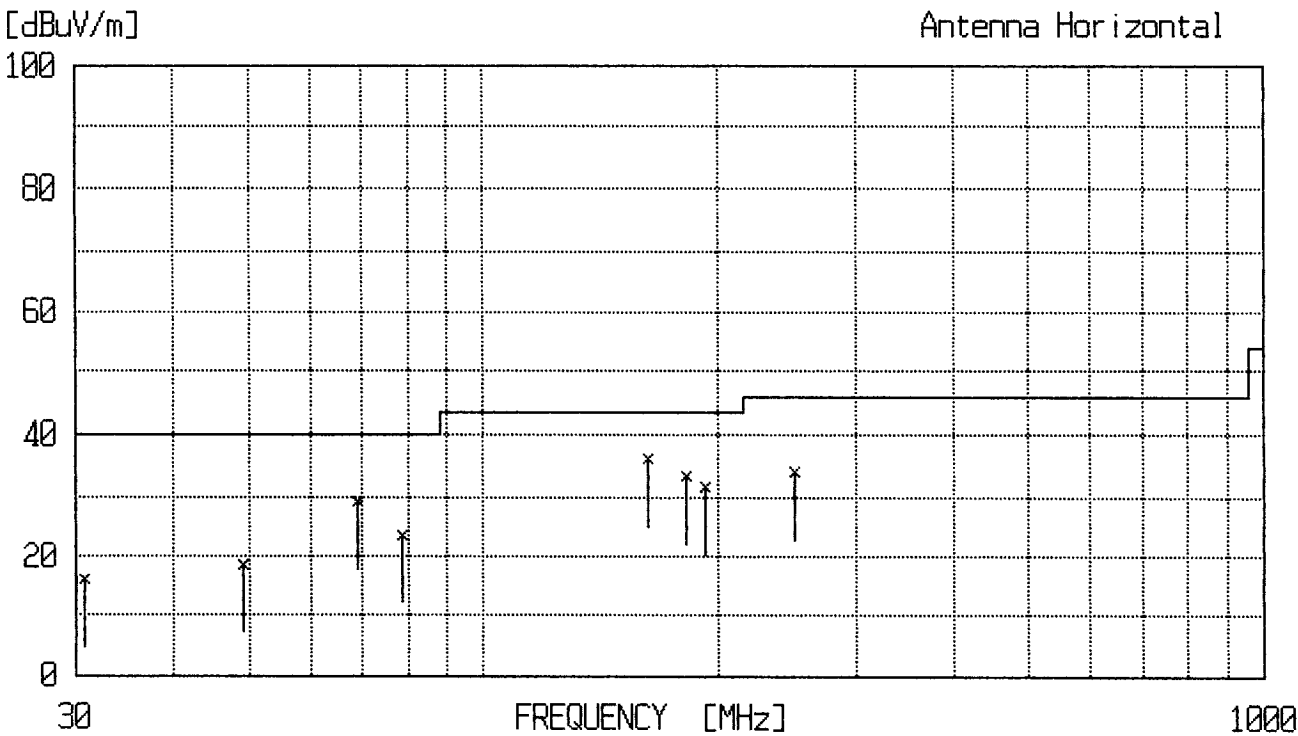
2) The symbol of [*] means [With Dipole Antenna] and the rest means [With Broadband Antenna].

3) Meter Reading + Antenna Factor = Emission Level

Sample of calculation at 30.7 MHz : $-3.5 + 19.5 = 16.0 \text{ dB/uV/m}$

RADIATED RADIO NOISE MEASUREMENT

DESCRIPTION OF DEVICE : Dot Matrix Printer
Model No. : 4227-Plus
FCC ID :
MODE OF INTERFACE : Serial



LINE CONDUCTED RF VOLTAGE MEASUREMENT

DESCRIPTION OF DEVICE : Dot Matrix Printer
 Model No. : 4227-Plus
 FCC ID :
 Classification of EUT : Class B
 Type of EUT : Desk-top

TEST CONDITION OF EQUIPMENT UNDER TEST (EUT) :
 Configuration of EUT : Refer to the sheet No.15
 Operating Condition : Running with the program prepared by applicant.
 EUT Grounding : Grounded at the plug end of line cord.
 Power Rating : 120 VAC ; 60 Hz

MODE OF INTERFACE : Serial

EUT Warm-up Time : 15 minutes
 Date : December 07, 1998
 Temp. : 18 C Humi. : 45 %

Frequency (MHz)	LISN Factor (dB)	Meter Reading at QP (dB/uV)		QP/AVE -13dB	Class B Limits (dB/uV)	Emission Level (dB/uV)	
		One end & Grd'd	The other end & Grd'd			One end & Grd'd	The other end & Grd'd
0.510	--	42.0	38.6	--	48.0	42.0	38.6
0.815	--	23.1	23.4	--	48.0	23.1	23.4
1.836	--	19.2	19.7	--	48.0	19.2	19.7
2.549	--	21.2	18.2	--	48.0	21.2	18.2
6.627	--	31.1	27.8	--	48.0	31.1	27.8
7.341	--	32.0	29.1	--	48.0	32.0	29.1
14.783	--	29.4	17.1	--	48.0	29.4	17.1
22.836	--	28.9	32.5	--	48.0	28.9	32.5

NOTES : There is little or no LISN Factor and cable loss.

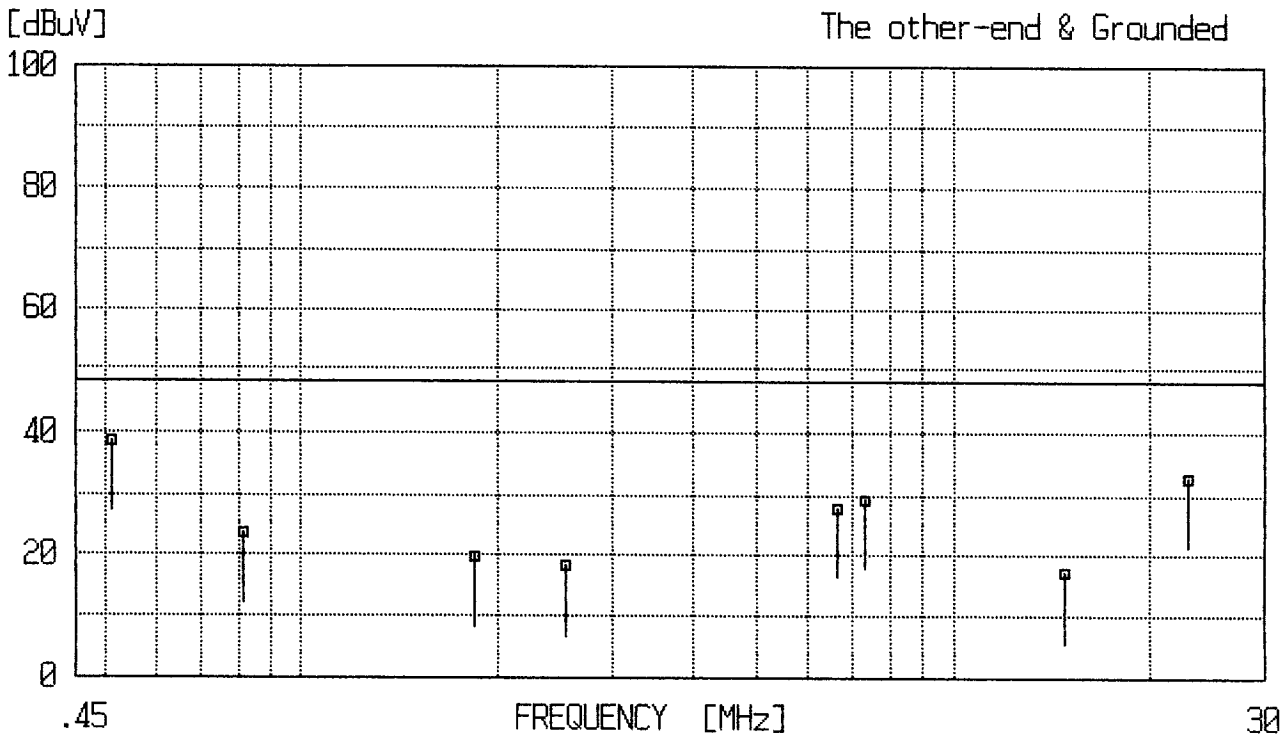
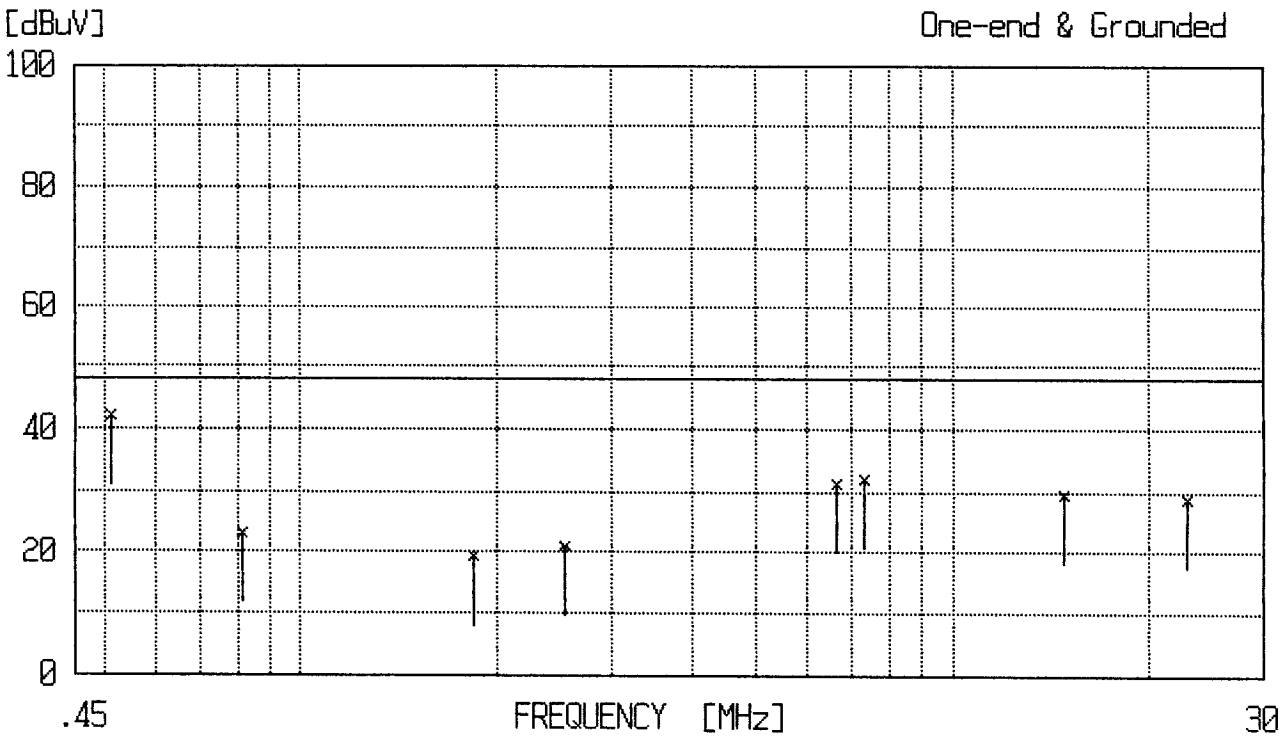
LINE CONDUCTED RF VOLTAGE MEASUREMENT

DESCRIPTION OF DEVICE : Dot Matrix Printer

Model No. : 4227-Plus

FCC ID :

MODE OF INTERFACE : Serial



TEST CONDITIONS AND CONFIGURATION OF EUT

1. The equipment under test (EUT) consists of :

Description	Manufacturer	Model No.	FCC ID (if any)
Dot Matrix Printer	TEC CORPORATION	4227-XXX	BJIOH-96001
Option Tractor	TEC CORPORATION	11A6196	N/A

2. The measurement was carried out with the following equipment connected :

Description	Manufacturer	Model No.	FCC ID (if any)
Personal Computer	DEC Corporation	FR-751JY-11	A09-PC75X
CRT Display	DEC Corporation	PCXCV-GA	BEJCQ472
Keyboard Unit	DEC Corporation	PCXAJ-AA	N/A
Mouse Unit	DEC Corporation	PC7XS-AA	DZLMSF142
Dot Matrix Printer	TEC CORPORATION	9600	BJI9BUOH-87019

3. Type of Interface Cable(s)

	Shielded	Ferrite Core	Length
EUT / Personal Computer(COM1 Port)	Yes	No	2.1 m
EUT / Option Tractor	Yes	No	1.1 m
Personal Computer / CRT Display	Yes	Yes (on Twin)	1.3 m
Personal Computer / Keyboard Uint	Yes	Yes (on One)	1.1 m
Personal Computer / Mouse Unit	Yes	No	1.8 m
Personal Computer / Dot Matrix Printer (LPT1 Port)	Yes	No	1.9 m

TEST CONDITIONS AND CONFIGURATION OF EUT

4. Configuration of the Equipment Under Test

Refer to sheet No 17,18 and 19.

The system was configured to maximize emissions. The test reflects the worst case with the EUT actively Printing.

5. Arrangement of the Interface Cable(s)

Refer to sheet No 18 and 19.

These interface cables were positioned so as to produce the highest maximum at every frequency between 30 MHz and 1000MHz, being within the manner assumed to be a typical operating condition.

Measuring Instrument Used :

Instrument	Manufacturer	Model No.
1. Field Strength Meter	Rohde & Schwarz	ESH3
Frequency Range : 9 kHz - 30 MHz		
Detector Function : CISPR Quasi Perk and Average		
IF Bandwidth : 200 Hz (9 - 150 kHz), 9 kHz (150 kHz - 30 MHz)		
2. Field Strength Meter	Rohde & Schwarz	ESU2
Frequency Range : 25 - 1000 MHz		
Detector Function : CISPR Quasi Perk		
IF Bandwidth : 120 kHz		
3. Field Strength Meter	Rohde & Schwarz	ESV
Frequency Range : 30 - 1000 MHz		
Detector Function : CISPR Quasi Perk		
IF Bandwidth : 120 kHz		
4. Spectrum Analyzer	Hewlett Packard	8568B
5. Spectrum Analyzer	Advantest	TR-4135
6. Line Impedance Stabilization Network (LISN)	Rohde & Schwarz	ESH2-Z5
7. Dipole Antenna	Schwarzbeck	
Tuning Range : 30 - 300 MHz		VHA9103
Tuning Range : 300 - 1000 MHz		UHA9105
8. Broadband Antenna	Schwarzbeck	
Range : 30 - 300 MHz		BBA9106
Range : 300 - 1000 MHz		UHALP9107