Test Report

File Nr. TA923_01.DOC

Inkjet printer
T3016

EUT:	Inkjet printer
Typ:	T3016
S/N:	2950002
Configuration:	Serial interface RS232 and parallel I/F Centronics.
Options:	None
Manufacturer:	Tally GmbH Glockeraustr. 4 89275 Elchingen Germany
Regulations:	FCC rules part 15, limit class B
Applicant:	Tally GmbH Glockeraustr. 4 89275 Elchingen Germany
Contact person:	Mr. Böhm -Tally GmbH
Test site:	Test facitlities of the EMCE GmbH Laupheimer-Str. 29 88483 Burgrieden Germany
Test date:	06/09/1999
Responsible Engineer:	Mr. Chr. Vogelmann EMCE GmbH Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung

Contents:

1 EMC Instrumentation

EMI:

x	Receiver	ESS 5Hz - 1000 MHz	Rohde & Schwarz
	Probe	ESH2-Z3	Rohde & Schwarz
x	LISN 1	ESH3-Z5	Rohde & Schwarz
x	LISN 2	ESH3-Z5	Rohde & Schwarz
	LISN 4	NNBM 8125	Schwarzbeck
	Absorbing Clamp	MDS 21	Schwarzbeck
	Antenna 9kHz - 30MHz	HFH2-Z2	Rohde & Schwarz
x	Antenna 30 - 300MHz	VHBA9123 / BBA9106	Schwarzbeck
x	Antenna 250 -1200MHz	UHALP 9108A	Schwarzbeck
	Antenna 9kHz - 30 MHz	Loop-Antenna 1,5m ∅	EMCE
x	Shielded Cabine	6,4m x 4m x 2,25m	Frankonia
x	Open Field Test Site	3m / 10m	EMCE GmbH / Burgrieden
x	AC Source 5kVA	5001i	California Instruments
	Netanalyser	PM3000A	Voltech
	LISN 3	NNB 4/32T	Rolf Heine HF-Technik

Miscellaneous:

x	PC SCENIC 5T/90 PCI	S26361-K345-V711	-	Siemens Nixdorf Informationssysteme AG
x	Monitor MCM 1702	S26361-K373-V318 S/N BU 908484	FCC-ID ARFKDM1788	Siemens Nixdorf Informationssysteme AG
x	Keyboard MF2 LC	S26381-K252-V120		Siemens Nixdorf Informationssysteme AG
x	Mouse Serial Mouse 2.0A	0222829	FCC-ID C3KSMP1	Microsoft Corp.
x	Additional Printer HP Deskjet 850C	S/N US545110NX	FCC-ID B94C2145X	Hewlett Packard

2.1.1.2 Test Procedure

Regulations:

FCC part 15 limit class B
0.45 - 30MHz

Test Operation:

During the tests, the system was exercised using a Microsoft Word for Windows document which provided for complete system operation. Data were displayed on the monitor and then transfered to the printers on the parallel port (HP Deskjet 850C) and the serial port (T3016), where it was printed. These tests represented a contious display-transfer-print programm operation which is a worst case mode and provided for a worst case emanated profile. The printed characters were shown in the appendix.

PC:	SCENIC 5T90/PCI
Monitor	MCM 1702
T3016	Ser.Nr. 2950002
Additional printer	HP Deskjet 850C
Parallel I/F cable:	Shielded cable
Serial I/F cable:	Shielded cable
Fanfoldpaper for the	T3016
Single sheet for the	HP Deskjet 850C
Supply voltage:	120VAC/60Hz

Test results:

Measurements are made with a CISPR receiver with the detector in peak mode. If the emanation is closer than 6dB to the limit or more, the receiver will stop and measure the exact value with quasipeak. The frequency, the maximum quasipeak value and the limit will be printed out.

Summary:

The limits were kept.

Conducted Emission

Protocolscope:

Conducted emission of the T3016 serial I/F on L1- and N-Phase
Conducted emission of the PC + Monitor on L1- and N-Phase (the monitor was supplied via the PC)
Conducted emission of the HP Deskjet 850C paralle I/F on L1- and N-Phase

EMCE GmbH Ing_buero fuer

09. Jun 99 10:47

Conducted emission

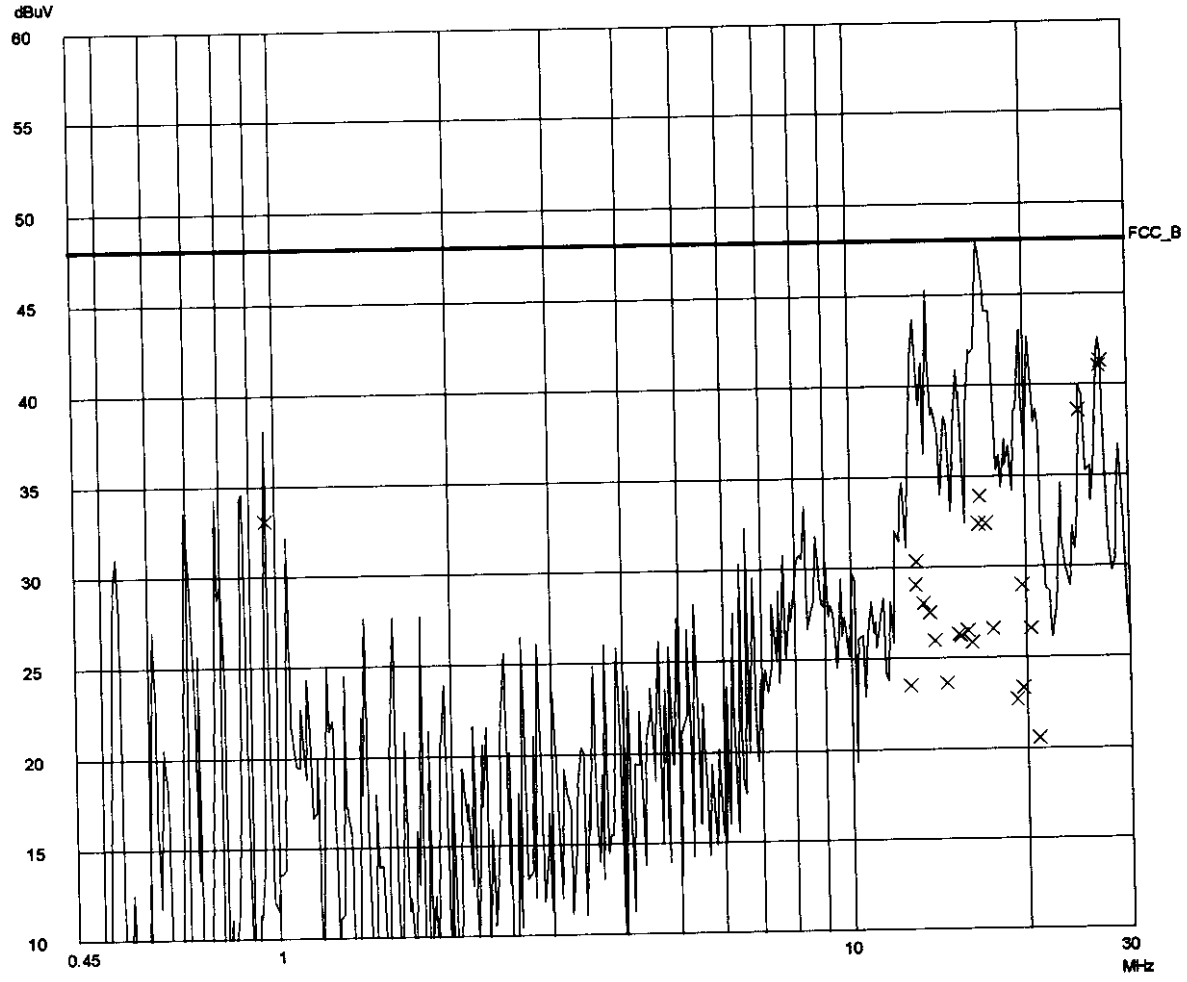
EUT:	Inkjet printer T3016, S/N 2950002
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpi, "HH...",120V/60Hz, RS232
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_01, Phase L - T3016

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF	60dB

Final Measurement: x QP
Meas Time: 1 s
Subranges: 200
Acc Margin: 10dB

Transducer No.	Start	Stop	Name
2	1Hz	1000M	Kabel_6m



EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99 10:47

Conducted emission

EUT:	Inkjet printer T3016, S/N 2950002
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpi, "HH...",120V/60Hz, RS232
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_01, Phase L - T3016

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF	60dB

Transducer

No.	Start	Stop	Name
2	1Hz	1000M	Kabel_6m

Final Measurement: x QP
Meas Time: 1 s
Subranges: 200
Acc Margin: 10dB

Final Measurement Results:

Frequency MHz	QP Level dB	QP Limit dB
0.96000	33.0	48.0
12.64500	23.4	48.0
12.92500	29.0	48.0
13.02000	30.2	48.0
13.33500	28.0	48.0
13.65000	27.5	48.0
13.95000	25.9	48.0
14.55000	23.6	48.0
15.30500	26.2	48.0
15.49000	26.1	48.0
15.90000	26.5	48.0
16.12500	25.8	48.0
16.61500	32.3	48.0
16.71000	33.8	48.0
17.12000	32.3	48.0
17.50500	26.5	48.0
19.18000	22.6	48.0
19.68000	23.2	48.0
19.72500	29.0	48.0
20.36500	26.6	48.0
20.94000	20.5	48.0
24.83500	38.6	48.0
26.96000	41.0	48.0
27.02000	41.2	48.0

^V1S * limit exceeded^V0S

EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99

Conducted emission

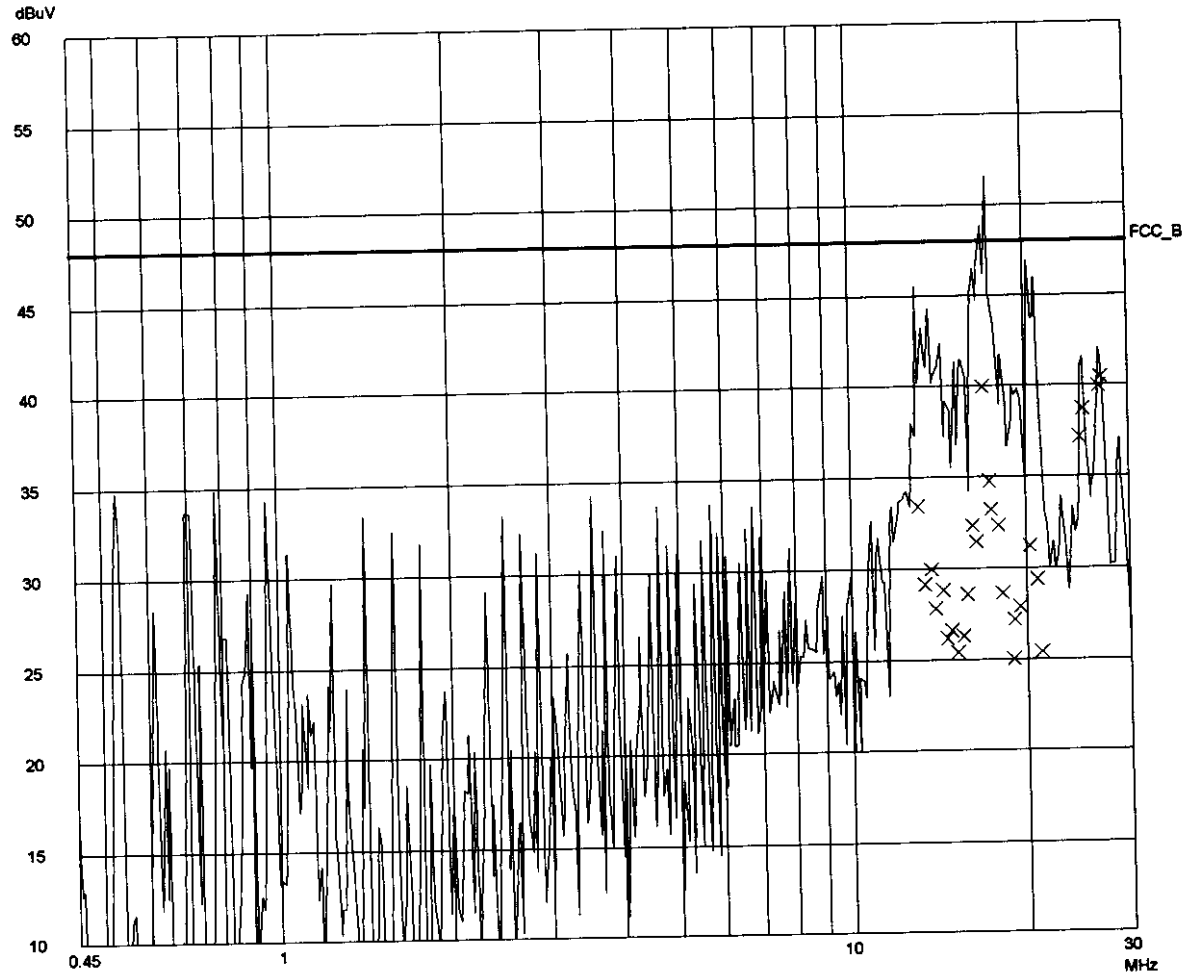
EUT:	Inkjet printer T3016, S/N
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpi, "HH...",120V/60Hz,
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_02, Phase N -

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF

Final Measurement: x QP
Meas Time: 1
Subranges:
Acc Margin:

Transducer No.	Start	Stop
2	1Hz	1000M



EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99 11:02

Conducted emission

EUT:	Inkjet printer T3016, S/N 2950002
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpl, "HH...",120V/60Hz, RS232
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_02, Phase N - T3016

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF	60dB

Transducer No. Start Stop Name
2 1Hz 1000M Kabel_6m

Final Measurement: x QP
Meas Time: 1 s
Subranges: 200
Acc Margin: 10dB

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
13.03500	33.3	48.0
13.35000	29.0	48.0
13.71000	29.9	48.0
13.94000	27.7	48.0
14.34000	28.7	48.0
14.57000	26.1	48.0
14.84500	26.6	48.0
15.16000	25.3	48.0
15.56000	26.2	48.0
15.79000	28.5	48.0
16.19500	32.3	48.0
16.38000	31.4	48.0
16.94000	39.9	48.0
17.34000	34.7	48.0
17.43500	33.2	48.0
17.90500	32.3	48.0
18.12500	28.5	48.0
18.89000	25.0	48.0
18.99000	27.1	48.0
19.49000	27.8	48.0
20.24000	31.1	48.0
20.82500	29.3	48.0
21.15000	25.3	48.0
24.80500	37.1	48.0
25.12000	38.6	48.0
26.80000	39.9	48.0
27.02000	40.4	48.0

^v1S * limit exceeded^v0S

EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99

Conducted emission

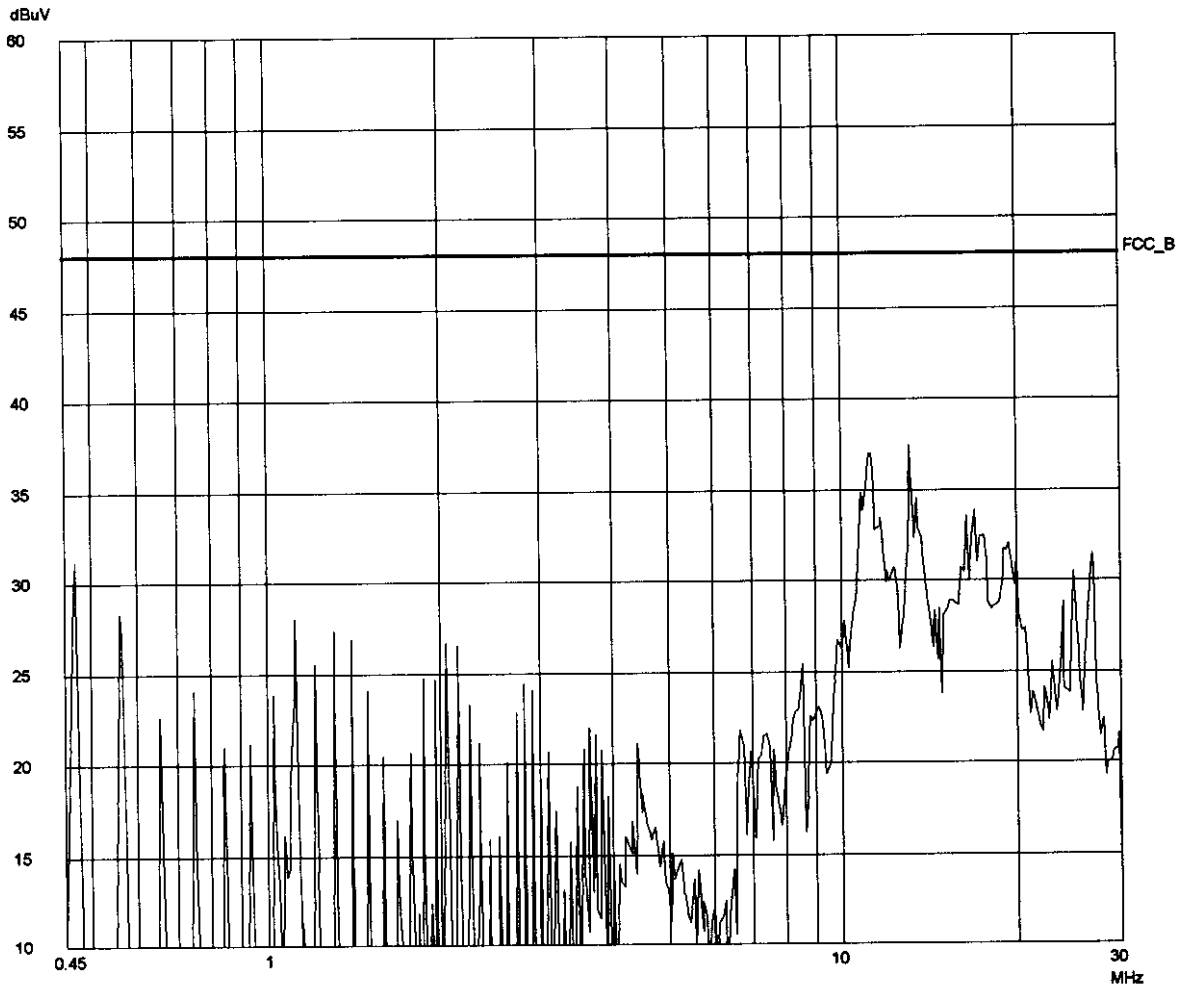
EUT: Inkjet printer T3016, S/N
Manuf: Tally GmbH Computerdrucker / Germany
Op Cond: LQ, 10cpi, "HH...",120V/60Hz,
Operator: Mr. Vogelmann
Test Spec: FCC Part 15 Class B
Comment: Test ID: PR923_14
TA923_03, Phase L - HP Deskjet

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF

Final Measurement: x QP
Meas Time: 1
Subranges:
Acc Margin:

Transducer No.	Start	Stop
2	1Hz	1000M



EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99 11:32

Conducted emission

EUT:	Inkjet printer T3016, S/N 2950002
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpi, "HH...",120V/60Hz, RS232
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_03, Phase L - HP Deskjet 850C

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF	60dB

Transducer

No.	Start	Stop	Name
2	1Hz	1000M	Kabel_6m

Final Measurement: x QP
Meas Time: 1 s
Subranges: 200
Acc Margin: 10dB

Final Measurement Results:

no Results

EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99

Conducted emission

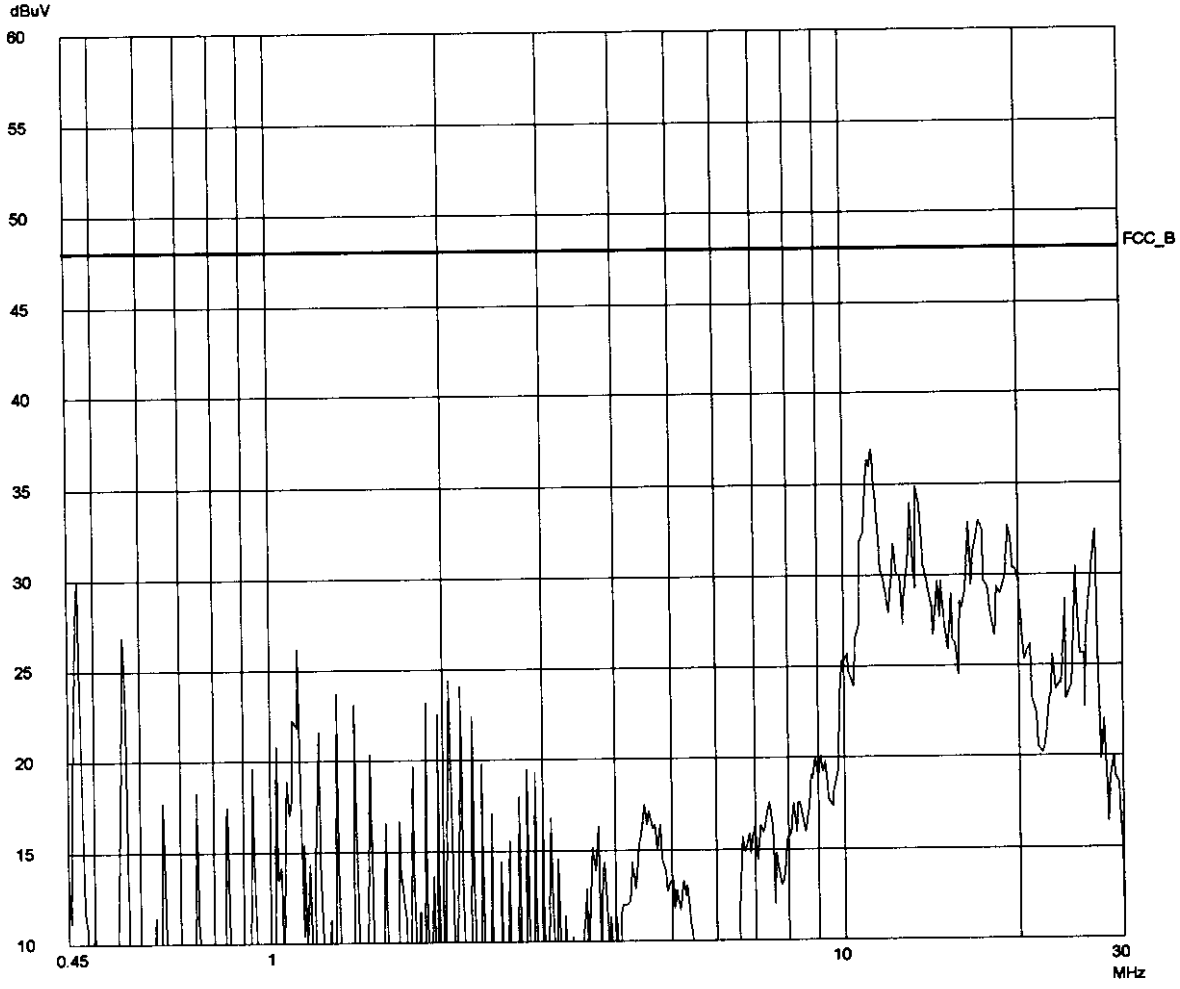
EUT:	Inkjet printer T3016, S/N
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpi, "HH...",120V/60Hz,
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_04, Phase N - HP Deskjet

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF

Final Measurement: x QP
Meas Time: 1
Subranges:
Acc Margin:

Transducer No.	Start	Stop
2	1Hz	1000M



EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99 11:51

Conducted emission

EUT:	Inkjet printer T3016, S/N 2950002
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpi, "HH...",120V/60Hz, RS232
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_04, Phase N - HP Deskjet 850C

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF

OpRge
60dB

Transducer No. Start Stop Name
2 1Hz 1000M Kabel_6m

Final Measurement: x QP
Meas Time: 1 s
Subranges: 200
Acc Margin: 10dB

Final Measurement Results:

no Results

EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99

Conducted emission

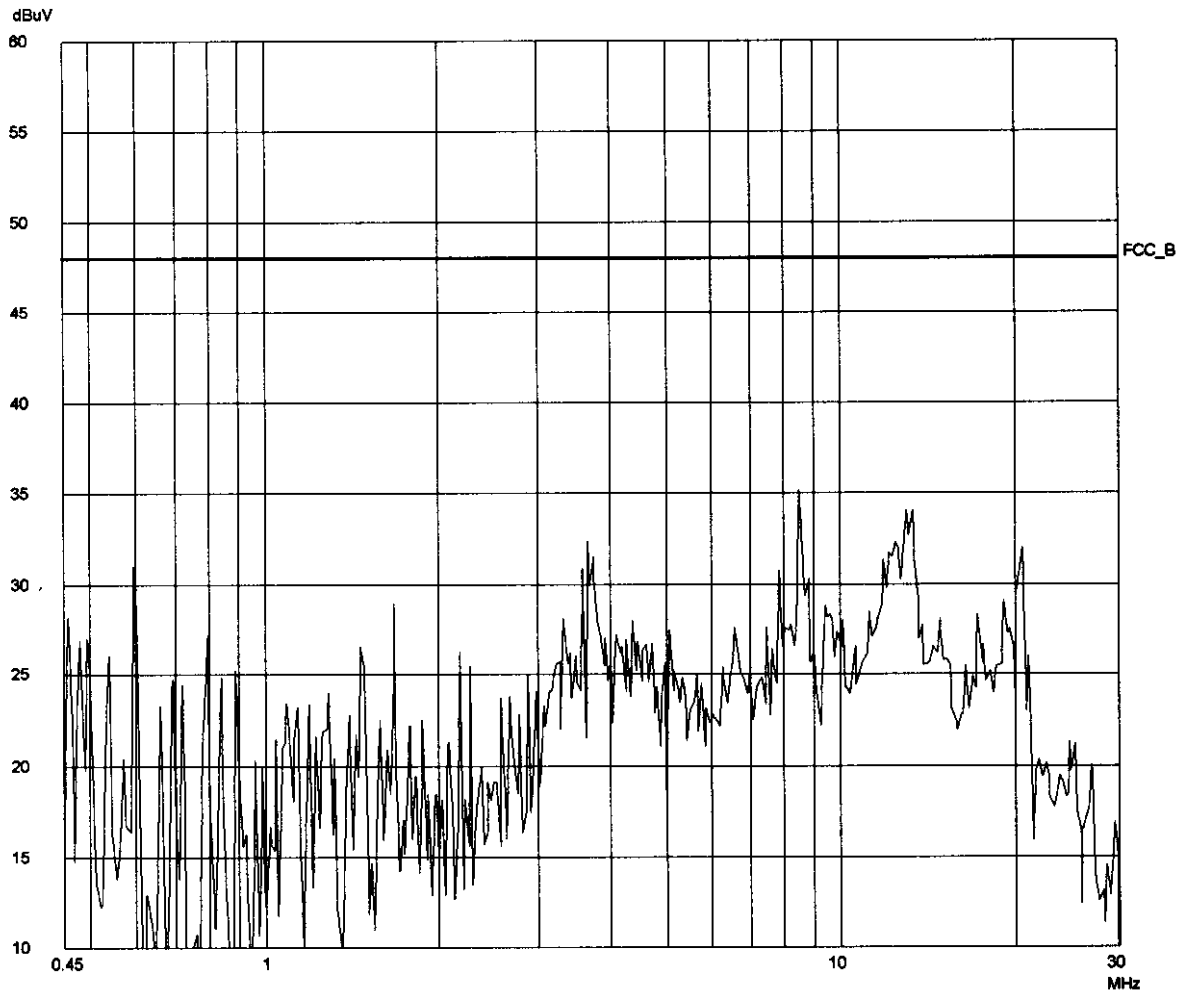
EUT: Inkjet printer T3016, S/N
Manuf: Tally GmbH Computerdrucker / Germany
Op Cond: LQ, 10cpi, "HH...",120V/60Hz,
Operator: Mr. Vogelmann
Test Spec: FCC Part 15 Class B
Comment: Test ID: PR923_14
TA923_05, Phase L -

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF

Final Measurement: x QP
Meas Time: 1
Subranges:
Acc Margin:

Transducer No. Start Stop
2 1Hz 1000M



EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99 11:58

Conducted emission

EUT:	Inkjet printer T3016, S/N 2950002
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpi, "HH...",120V/60Hz, RS232
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_05, Phase L - SCENIC_PC+Monitor

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF	60dB

Final Measurement: x QP
Meas Time: 1 s
Subranges: 200
Acc Margin: 10dB

Transducer No.	Start	Stop	Name
2	1Hz	1000M	Kabel_6m

Final Measurement Results:

no Results

EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99

Conducted emission

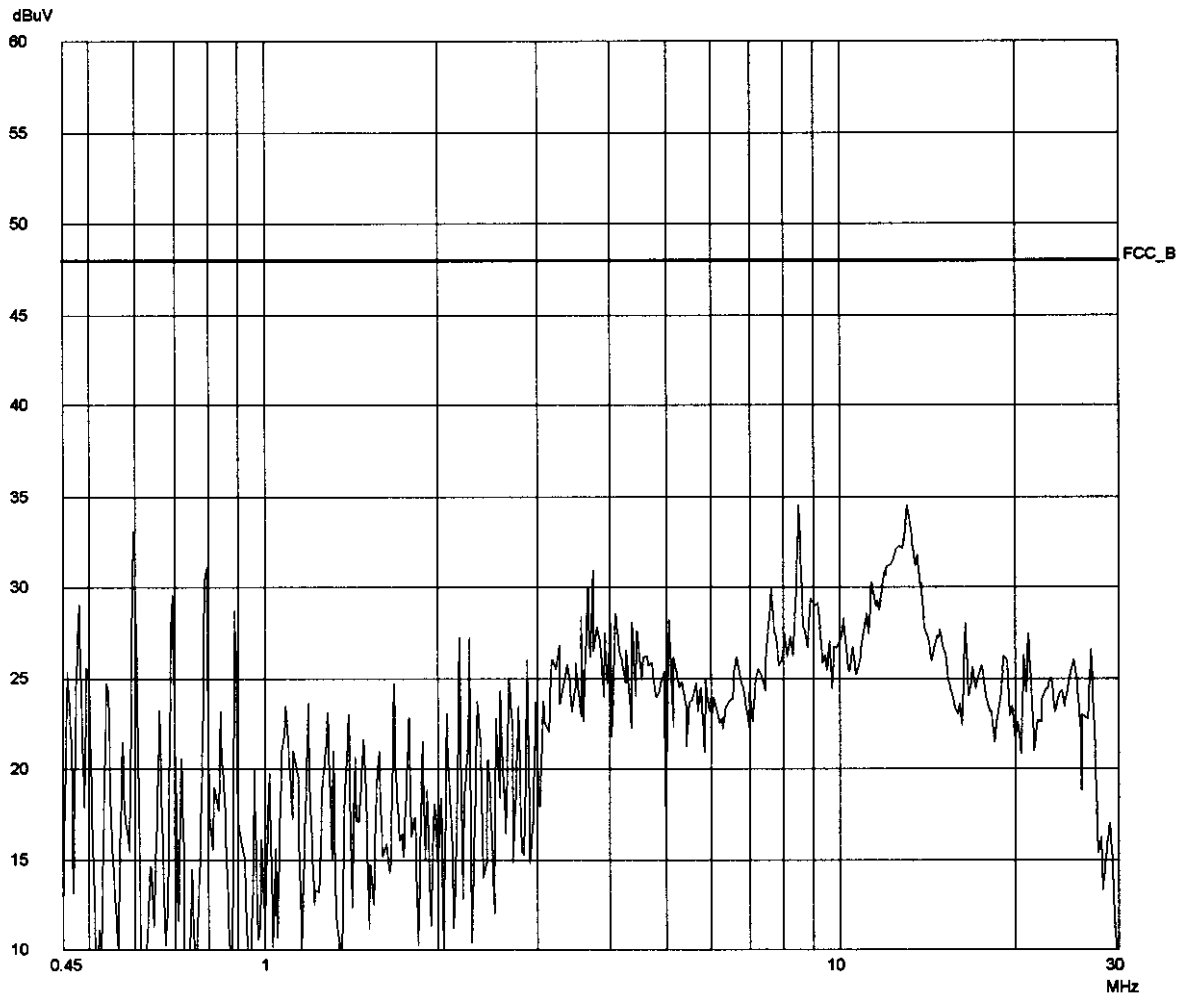
EUT: Inkjet printer T3016, S/N
Manuf: Tally GmbH Computerdrucker / Germany
Op Cond: LQ, 10cpi, "HH...",120V/60Hz,
Operator: Mr. Vogelmann
Test Spec: FCC Part 15 Class B
Comment: Test ID: PR923_14
TA923_06, Phase N -

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF

Final Measurement: x QP
Meas Time: 1
Subranges:
Acc Margin:

Transducer No. Start Stop
2 1Hz 1000M



EMCE GmbH Ing_buero fuer EMV_Pruefungen

09. Jun 99 12:08

Conducted emission

EUT:	Inkjet printer T3016, S/N 2950002
Manuf:	Tally GmbH Computerdrucker / Germany
Op Cond:	LQ, 10cpi, "HH...",120V/60Hz, RS232
Operator:	Mr. Vogelmann
Test Spec:	FCC Part 15 Class B
Comment:	Test ID: PR923_14
	TA923_06, Phase N - SCENIC_PC+Monitor

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
450k	30M	5k	10k	PK	20ms	AUTO	LD OFF

OpRge
60dB

Final Measurement: x QP
Meas Time: 1 s
Subranges: 200
Acc Margin: 10dB

Transducer No.	Start	Stop	Name
2	1Hz	1000M	Kabel_6m

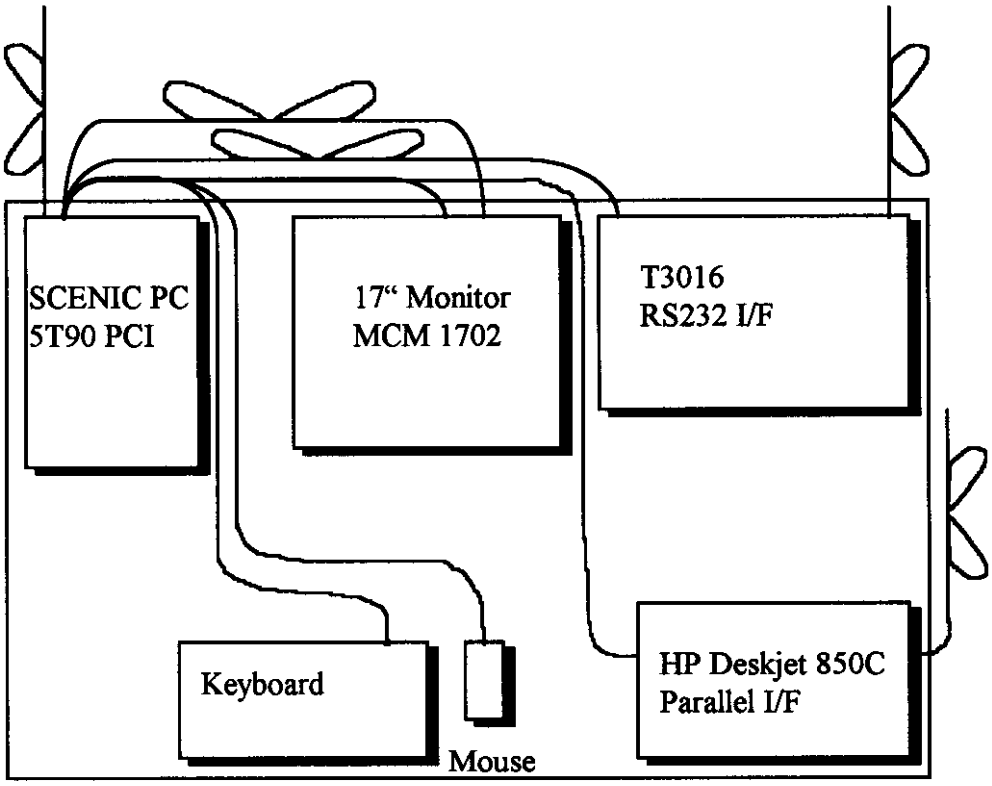
Final Measurement Results:

no Results

2.1.2 Radiated Emissions

2.1.2.1 Test Configuration

ANSI C63.4-1992
T3016 serial RS232 I/F



2.1.2.2 Test Procedure

Regulations:

FCC part 15 limit class B
30 - 1000MHz

Test Operation:

During the tests, the system was exercised using a Microsoft Word for Windows document which provided for complete system operation. Data were displayed on the monitor and then transfered to the printers on the parallel port (HP Deskjet 850C) and the serial port (T3016), where it was printed. These tests represented a contious display-transfer-print programm operation which is a worst case mode and provided for a worst case emanated profile. The printed characters were shown in the appendix.

PC:	SCENIC 5T90/PCI
Monitor	MCM 1702
T3016	Ser.Nr. 2950002
Additional printer	HP Deskjet 850C
Parallel I/F cable:	Shielded cable
Serial I/F cable:	Shielded cable
Fanfoldpaper for the	T3016
Single sheet for the	HP Deskjet 850C
Supply voltage:	120VAC/60Hz

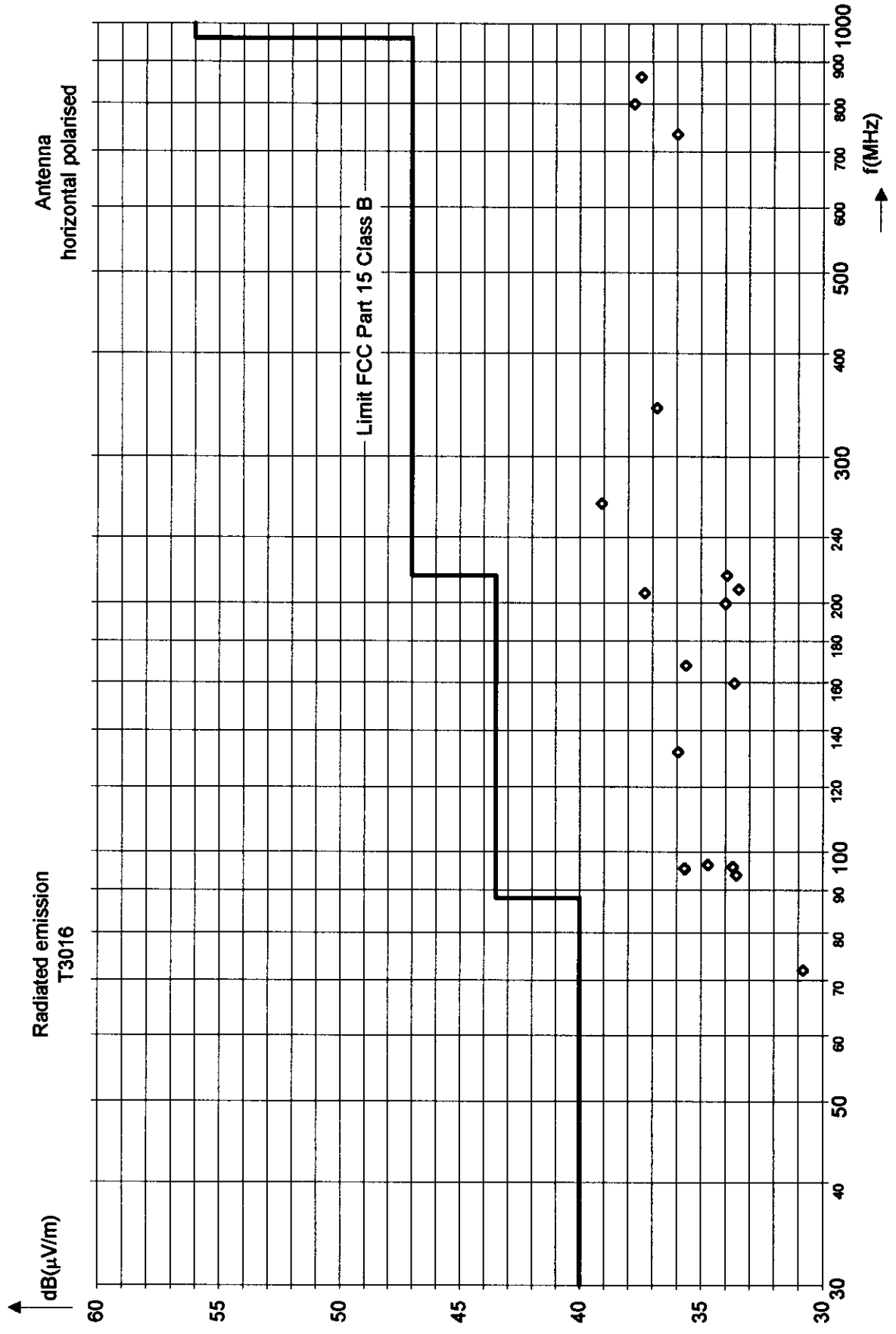
Test results:

Radiated Emission

Polarisation of the antenna:
Horizontal

Frequency	Measured	+ AF	+ KF	Emission	Limit	Difference	Ant.-	Ant.-
MHz	value	dB/m	dB		dBµV/m	dBµV	Height	Polar.
	dBµV	Antenna	Cable	dBµV/m			meter	H/V
72,000	20,5	8,6	1,7	30,8	40,0	9,2	4,0	H
93,800	22,0	9,6	2,0	33,6	43,5	9,9	2,1	H
95,280	24,0	9,7	2,0	35,6	43,5	7,9	4,0	H
95,640	24,0	9,7	2,0	35,7	43,5	7,8	2,1	H
96,000	22,0	9,7	2,0	33,7	43,5	9,8	4,0	H
96,480	23,0	9,7	2,0	34,7	43,5	8,8	2,1	H
132,010	22,0	11,5	2,4	35,9	43,5	7,6	2,0	H
159,773	18,0	13,0	2,7	33,6	43,5	9,9	1,8	H
168,010	19,5	13,4	2,7	35,6	43,5	7,9	2,0	H
199,714	16,0	15,0	3,0	34,0	43,5	9,5	1,5	H
205,416	19,0	15,3	3,0	37,3	43,5	6,2	1,5	H
207,703	15,0	15,4	3,1	33,5	43,5	10,0	1,5	H
216,000	15,0	15,8	3,1	33,9	43,5	9,6	1,4	H
264,050	18,0	17,6	3,5	39,1	46,0	6,9	1,4	H
343,502	18,0	14,9	3,9	36,8	46,0	9,2	3,5	H
734,938	10,0	20,5	5,5	36,0	46,0	10,0	3,5	H
798,846	11,0	21,0	5,7	37,8	46,0	8,2	2,8	H
862,754	10,0	21,6	5,9	37,5	46,0	8,5	2,8	H

All other measured emanations were 10 dB or more below the limits.
Summary: The limits were kept.


Radiated emission
T3016
Antenna
horizontal polarised
Limit FCC Part 15 Class B
dB(µV/m)
f(MHz)
60
55
50
45
40
35
30
30
40
50
60
70
80
90
100
120
140
160
180
200
240
300
400
500
600
700
800
900
1000

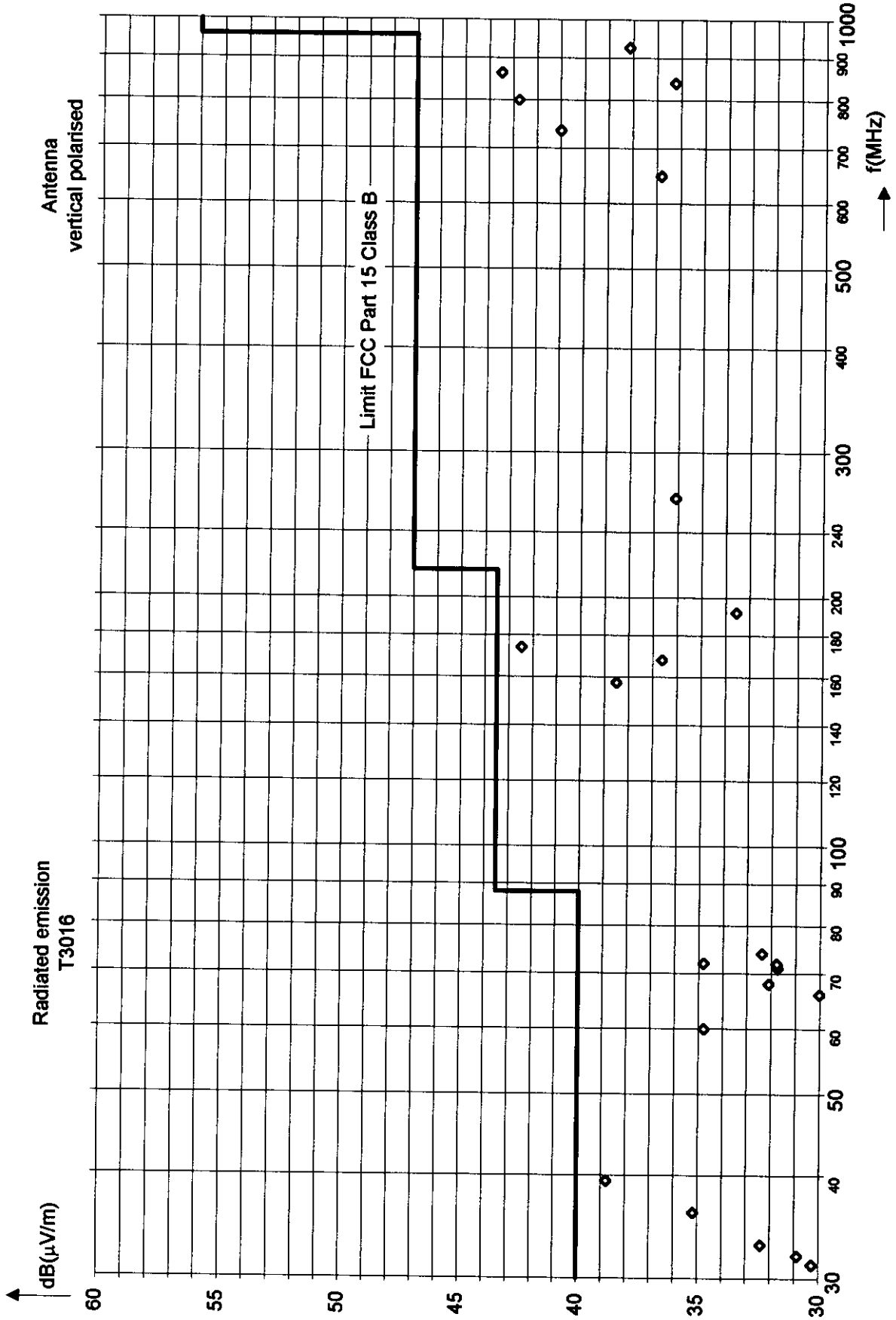
Polarisation of the antenna:
Vertical

Frequency	Measured	+ AF	+ KF	Emission	Limit	Difference	Ant.-	Ant.-
MHz	value	dB/m	dB		dBµV/m	dBµV	Height	Polar.
	dBµV	Antenna	Cable	dBµV/m			meter	H/V
31,200	17,0	12,3	1,0	30,3	40,0	9,7	1,0	V
31,941	18,0	11,8	1,0	30,9	40,0	9,1	1,0	V
32,918	20,0	11,3	1,1	32,4	40,0	7,6	1,0	V
36,018	24,0	10,1	1,1	35,2	40,0	4,8	1,0	V
39,409	28,5	9,1	1,2	38,8	40,0	1,2	1,0	V
60,018	25,0	8,3	1,5	34,8	40,0	5,2	1,0	V
66,000	20,0	8,4	1,6	30,0	40,0	10,0	1,0	V
68,000	22,0	8,5	1,6	32,1	40,0	7,9	1,0	V
71,000	21,5	8,6	1,7	31,7	40,0	8,3	1,0	V
71,900	21,5	8,6	1,7	31,8	40,0	8,2	1,0	V
72,018	24,5	8,6	1,7	34,8	40,0	5,2	1,0	V
74,000	22,0	8,7	1,7	32,4	40,0	7,6	1,0	V
157,600	23,0	12,9	2,6	38,5	43,5	5,0	1,0	V
168,043	20,5	13,4	2,7	36,6	43,5	6,9	1,0	V
173,958	26,0	13,7	2,8	42,5	43,5	1,0	1,0	V
192,026	16,0	14,6	2,9	33,5	43,5	10,0	1,0	V
264,055	15,0	17,6	3,5	36,1	46,0	9,9	1,0	V
648,164	12,0	19,6	5,2	36,8	46,0	9,2	1,0	V
734,936	15,0	20,5	5,5	41,0	46,0	5,0	1,0	V
798,846	16,0	21,0	5,7	42,8	46,0	3,2	1,0	V
839,928	9,0	21,4	5,8	36,2	46,0	9,8	1,0	V
862,752	16,0	21,6	5,9	43,5	46,0	2,5	1,0	V
926,660	10,0	22,1	6,1	38,1	46,0	7,9	1,0	V

All other measured emanations were 10 dB or more below the limits.

Summary:

The limits were kept.


Radiated emission
T3016
Antenna
vertical polarised
Limit FCC Part 15 Class B
dB(µV/m)
f(MHz)
60
55
50
45
40
35
30
30
40
50
60
70
80
90
100
120
140
160
180
200
240
300
400
500
600
700
800
900
1000

3 Results

EMI:

Regulation	Class	Result	Remarks
FCC part 15 limit class B			
Conducted Emission 0.45 - 30MHz	B	Limits kept.	
Radiated Emission 30 -1000MHz	B	Limits kept.	

Burgrieden, 06/11/1999

Dipl.Ing.(FH) Christian Vogelmann

4 Appendix

Print Information
- T3016
- HP Deskjet 850C