

Tally GmbH
D-89275 Elchingen
Germany
FCC ID: EUENI3

Tally

June 23, 1998
W. Boehm, Dept. TQV

Application for FCC Class B Certification

Optional Ethernet Interface ENI/3 for Tally Printers

LIST OF EXHIBITS

EXHIBIT A: Test Report CS824_04.DOC for T2055 printer Conducted by EMCE GmbH, 88483 Burgrieden (Germany), Feb. 02, 1998
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EXHIBIT B: Test Report CS824_03.DOC for T2070 printer
Conducted by EMCE GmbH, 88483 Burgrieden (Germany), Feb. 02, 1998

EXHIBIT C: Technical Documentation of Interface ENI/3

- Printer block diagram
- Circuit diagram, component placement and parts list.
- Significant EMC design elements
- FCC Label

EXHIBIT D: Photographs

EXHIBIT A

Tally GmbH
D-89275 Elchingen
Germany
FCC ID: EUENI3

June 23, 1998
W. Boehm, Dept. TQV

Application for FCC Class B Certification

Optional Ethernet Interface ENI/3 for Tally Printers

Test Report CS824_04.DOC

Sheet:

1. Measurement of Radio-Noise Emissions according ANSI C63.4
Printer T2055 with Ethernet Printserver Interface ENI/3

1-33

EXHIBIT A

Tally GmbH
D-89275 Elchingen
Germany
FCC ID: EUENI3

June 23, 1998
W. Boehm, Dept. TQV

Application for FCC Class B Certification

Optional Ethernet Interface ENI/3 for Tally Printers

Test Report CS824_04.DOC

Sheet:

1. Measurement of Radio-Noise Emissions according ANSI C63.4
Printer T2055 with Ethernet Printserver Interface ENI/3

1-33

Test Report

File Nr. CS824_04.DOC

Ethernet-Interfacemodule

EUT: Ethernet-Interfacemodule for the matrix needleprinters
T2045/T2055 Tally GmbH

Typ: ENI/3-Tally

S/N: 0011

Configuration: Ethernet-Interfacemodule with 10Base2 and
10Base-T connectors

Options: -

Manufacturer: CSP Ingenieur Consult AG
Mozartstr. 1
76133 Karlsruhe
Germany

Regulations: FCC rules part 15, limit class B

Applicant: CSP Ingenieur Consult AG
Mozartstr. 1
76133 Karlsruhe
Germany

Contact person: Mr. Böhm - Tally GmbH
Mr. Zimmermann - CSP Software GmbH

Test site: Test facilities of the EMCE GmbH
Laupheimer-Str. 29
88483 Burgrieden
Germany

Test date: 06/02/1998 - 06/05/1998

Responsible Engineer: Mr. Chr. Vogelmann
EMCE GmbH
Ingenieurbüro für EMV-Prüfungen
und Schaltungsentwicklung

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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 Ø	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 ARFKDM178 8	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	Ethernet Plug and Play Card EN1660		FCC ID HEDEN1660	Accton Technology Corporation
x	Matrix needleprinter T2055	S/N 0764065	FCC-ID EUIT2055	Tally GmbH
x	Additional Printer HP Deskjet 850C	S/N US545110NX	FCC-ID B94C2145X	Hewlett Packard

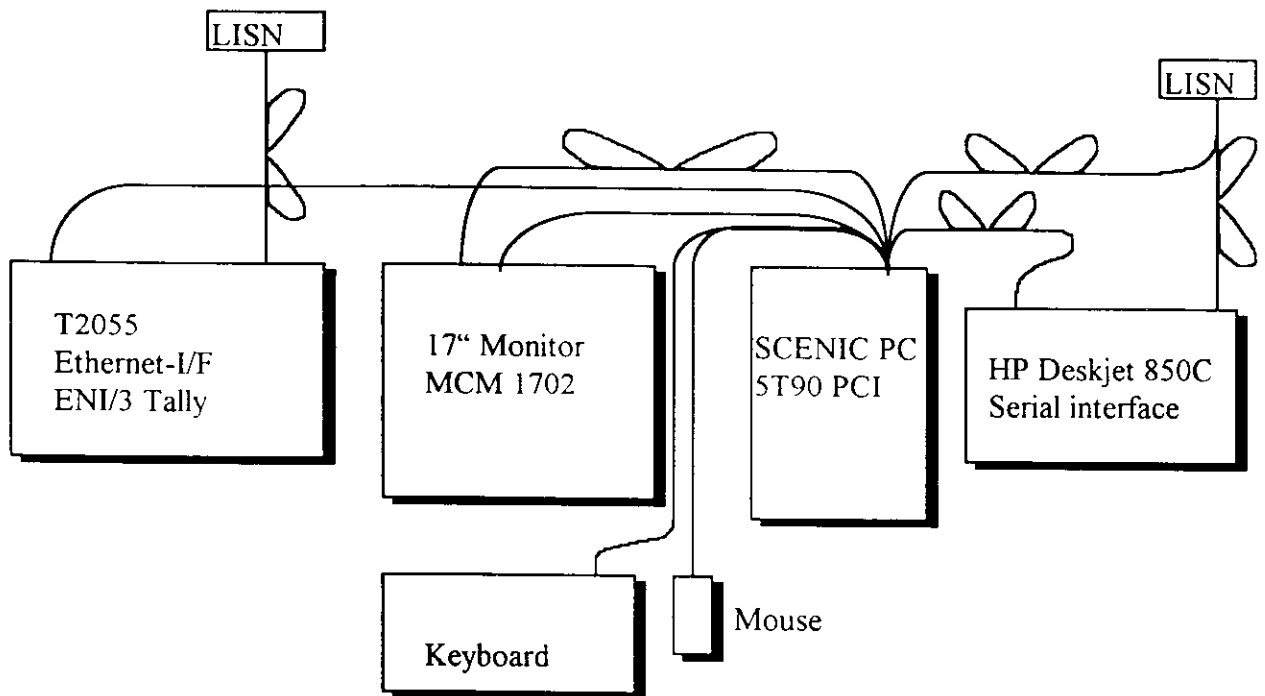
2 Report

2.1 EMI Report FCC part 15 limit class B

2.1.1 Conducted Emissions

2.1.1.1 Test Configuration

ANSI C63.4-1992
T2055 Ethernet I/F



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 transferred to the printers on the parallel port (HP Deskjet 850C) and the Ethernet port (T2055), where it was printed. These tests represented a continuous display-transfer-print program 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
T2055	Ser.Nr. 0764065
Additional printer	HP Deskjet 850C
Parallel I/F cable:	Shielded cable
Ethernet I/F cable:	Koaxcable
Fanfoldpaper for the	T2055
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:

First test run

Conducted emission of the T2055 Ethernet 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 parallel I/F on L1- and N-Phase

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Conducted emission

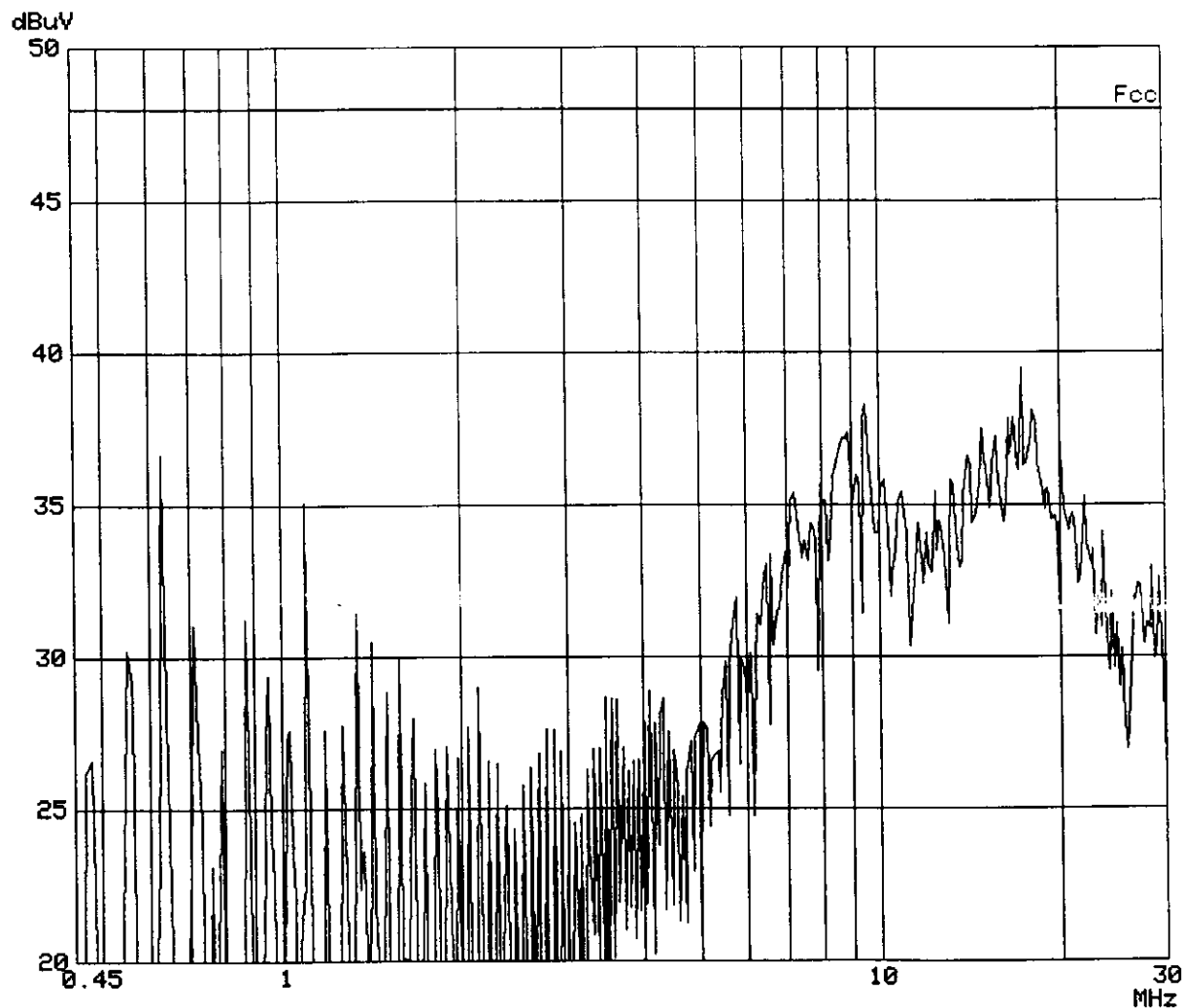
EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
CS823_01, T2055 / Phase L1
Date: 25. May 98 16:19

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB



EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
CS823_01, T2055 / Phase L1
Date: 25. May 98 16:19

Final Measurement Results:

no Results

EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

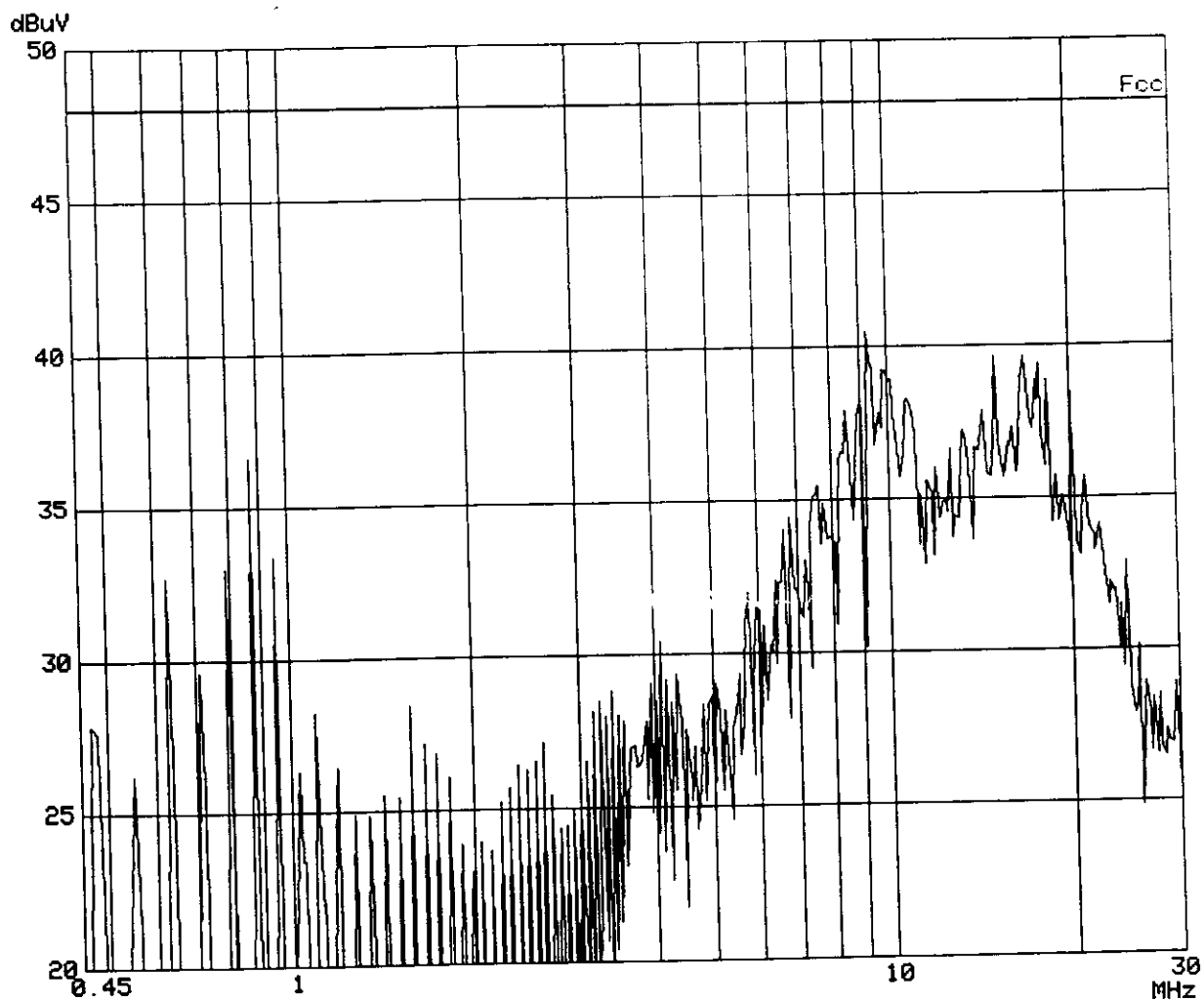
EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
CS823_02, T2055 / Phase N
Date: 25. May 98 16:23

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB



EMCE GmbH Ing büro für EMV-Prüfungen Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
 CS823_02, T2055 / Phase N
Date: 25. May 98 16:23

Final Measurement Results:

no Results

EMCE GmbH Ing büro für EMV_Prüfungen

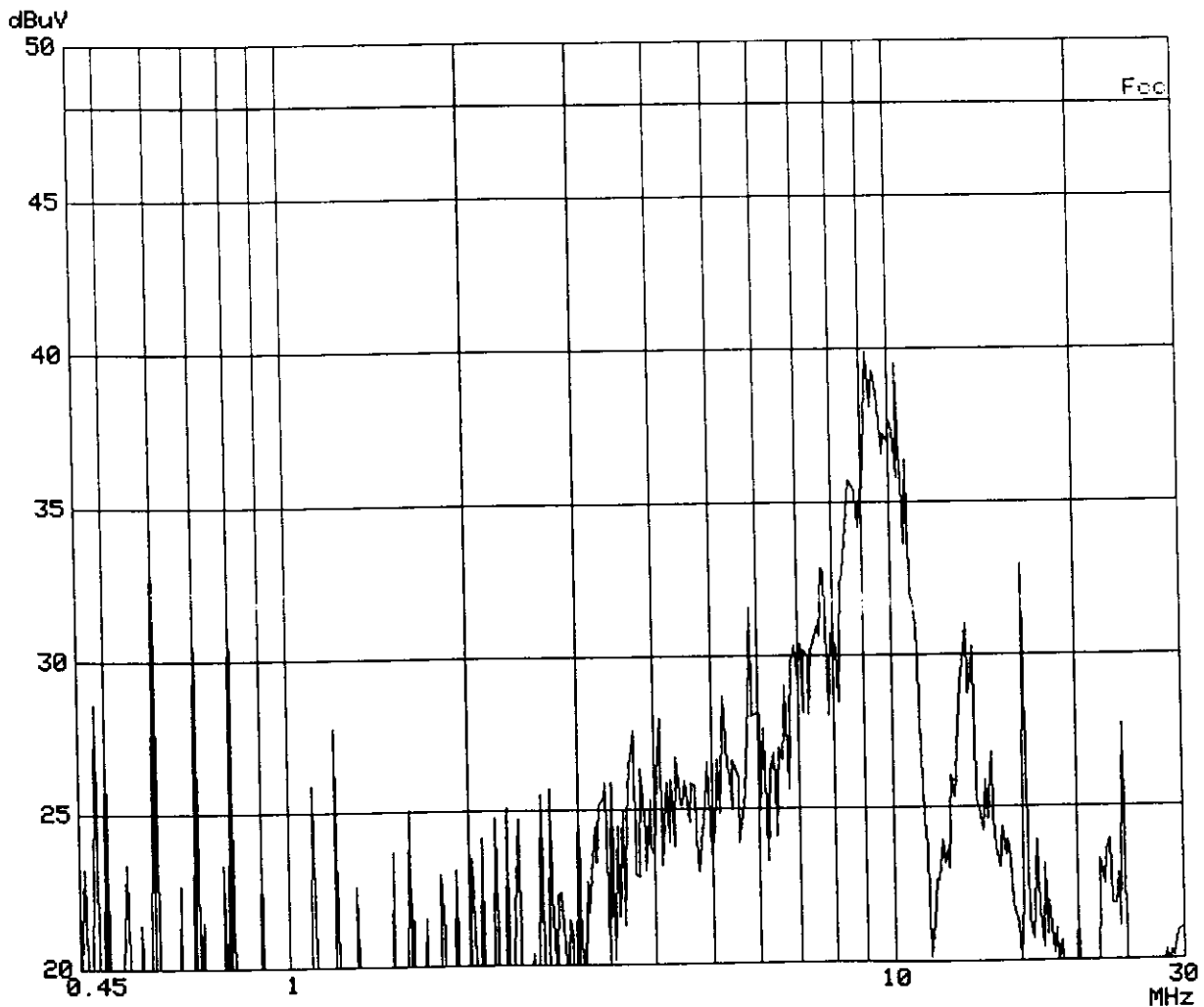
Conducted emission

EUT: Ethernet Interface ENI/3 Tally
 Manuf: Tally GmbH
 Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
 Operator: Vogelmann
 Test Spec: FCC Rule 15 Class B
 Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
 CS823_03, SCENIC_PC+Monitor, Phase L1
 Date: 25. May 98 16:27

Scan Settings (1 Range)

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

Final Measurement: x QP
 Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB



EMCE GmbH Ing büro für EMV-Prüfungen

Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
 CS823_03, SCENIC_PC+Monitor, Phase L1
Date: 25. May 98 16:27

Final Measurement Results:

no Results

EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

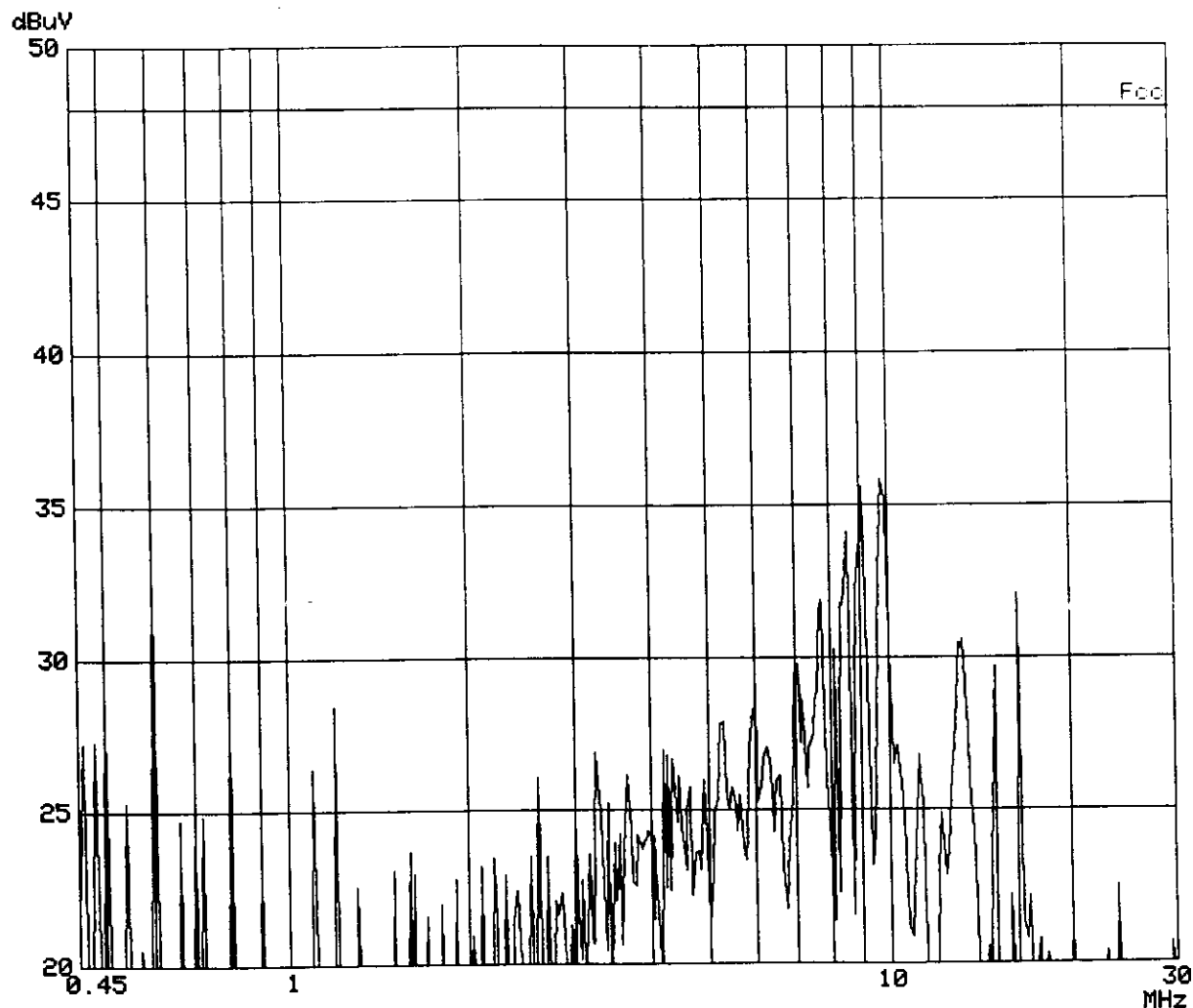
EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
CS823_04, SCENIC_PC+Monitor, Phase N
Date: 25. May 98 16:30

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB



EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
CS823_04, SCENIC_PC+Monitor, Phase N
Date: 25. May 98 16:30

Final Measurement Results:

no Results

EMCE GmbH Ing büro für EMV_Prüfungen

Conducted emission

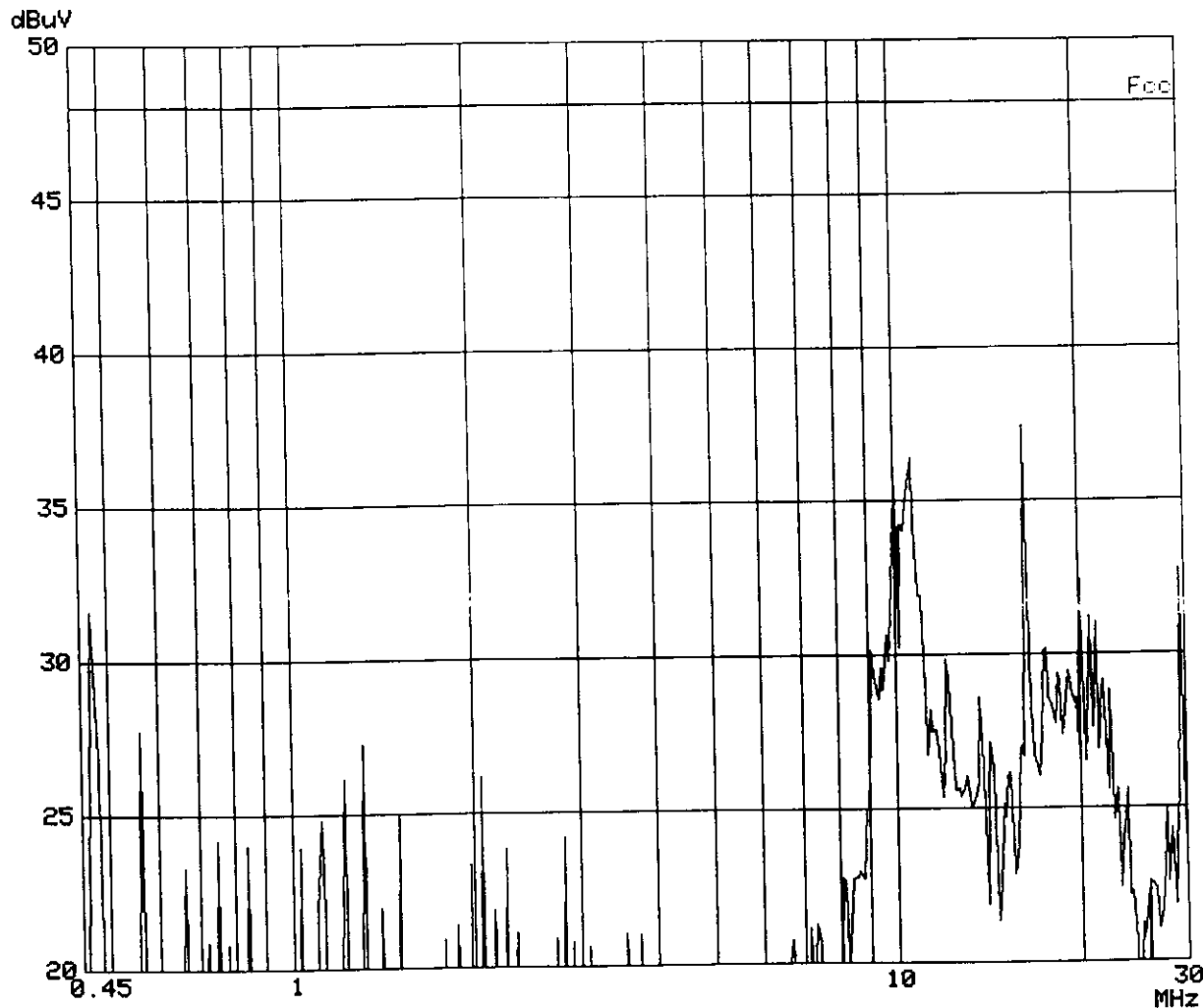
EUT: Ethernet Interface ENI/3 Tally
 Manuf: Tally GmbH
 Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
 Operator: Vogelmann
 Test Spec: FCC Rule 15 Class B
 Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
 CS823_05, HP Deskjet 850C, Phase L1
 Date: 25. May 98 16:36

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB



EMCE GmbH Ing büro für EMV_Prüfungen

Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
CS823_05, HP Deskjet 850C, Phase L1
Date: 25. May 98 16:36

Final Measurement Results:

no Results

EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

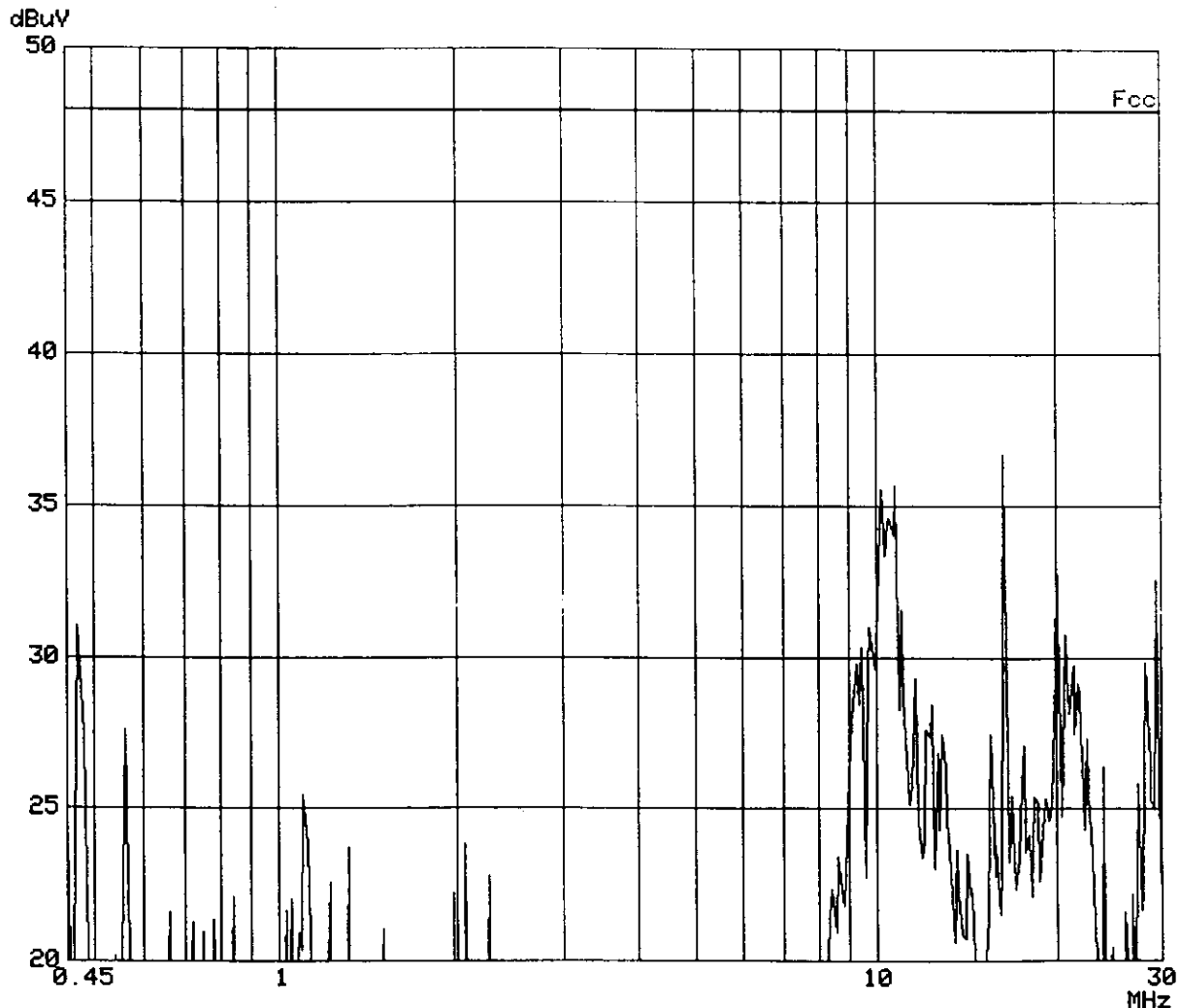
EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
CS823_06, HP Deskjet 850C, Phase N
Date: 25. May 98 16:39

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB



EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2055, S/N 0764065
 CS823_06, HP Deskjet 850C, Phase N
Date: 25. May 98 16:39

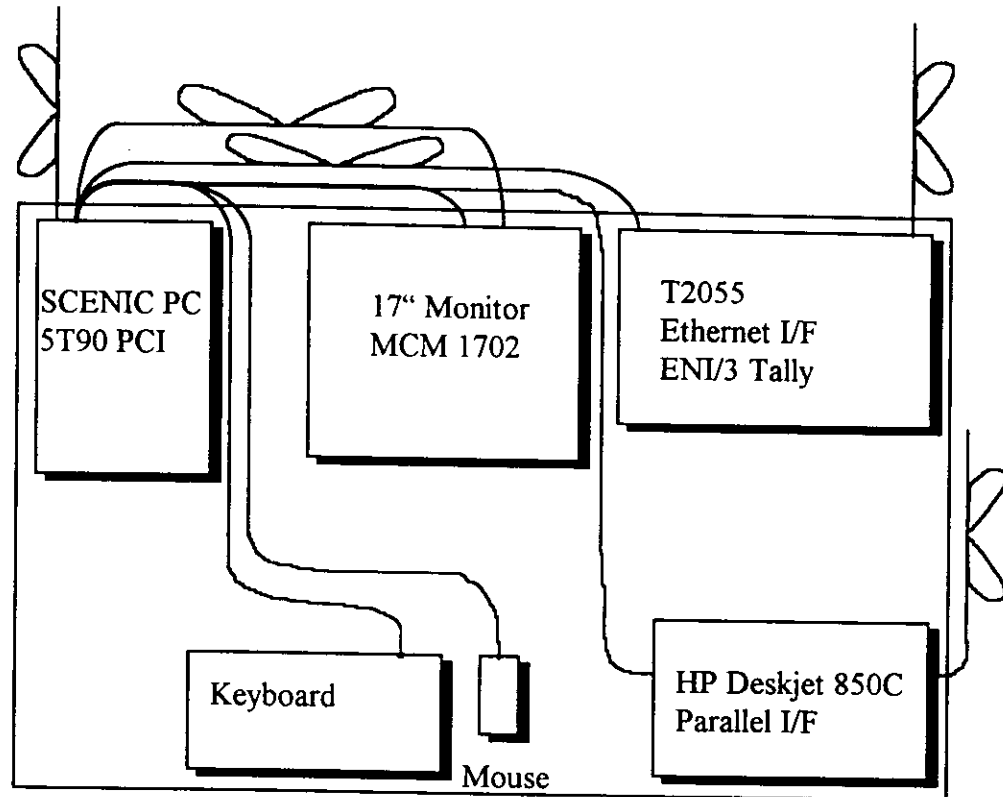
Final Measurement Results:

no Results

2.1.2 Radiated Emissions

2.1.2.1 Test Configuration

ANSI C63.4-1992
T2055 Ethernet 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 transferred to the printers on the parallel port (HP Deskjet 850C) and the Ethernet port (T2055), where it was printed. These tests represented a continuous display-transfer-print program 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
T2055	Ser.Nr. 0764065
Additional printer	HP Deskjet 850C
Parallel I/F cable:	Shielded cable
Ethernet I/F cable:	Koaxcable
Fanfoldpaper for the	T2055
Single sheet for the	HP Deskjet 850C
Supply voltage:	120VAC/60Hz

Test results:

Radiated Emission

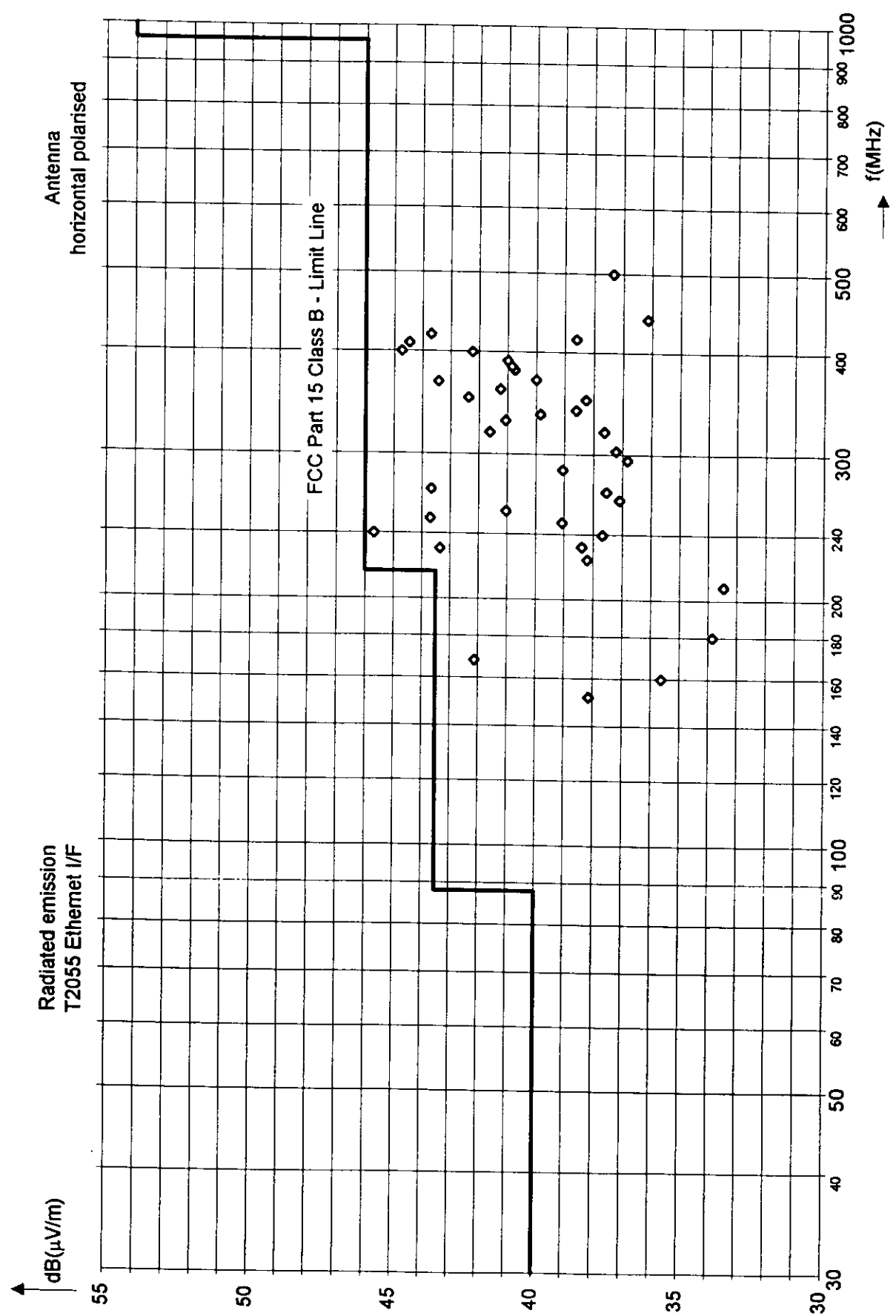
Polarisation of the antenna:
 Horizontal

Frequency	Measured	+ AF	+ KF	Emission	Limit	Difference	Ant.-	Ant.-
MHz	value	dB/m	dB	dBµV/m	dBµV/m	dBµV	Height	Polar.
	dBµV	Antenna	Cable				meter	H/V
151,77	23,0	12,55	2,59	38,14	43,5	5,4	1,2	H
160,00	20,0	12,98	2,66	35,64	43,5	7,9	1,5	H
168,04	26,0	13,39	2,73	42,12	43,5	1,4	1,2	H
180,00	17,0	14,00	2,84	33,84	43,5	9,7	1,2	H
207,69	15,0	15,39	3,06	33,45	43,5	10,0	1,2	H
223,67	19,0	16,02	3,18	38,20	46,0	7,8	1,2	H
230,00	24,0	16,12	3,23	43,35	46,0	2,7	1,2	H
231,66	19,0	16,16	3,24	38,39	46,0	7,6	1,2	H
239,65	18,0	16,39	3,29	37,68	46,0	8,3	1,2	H
240,01	26,0	16,40	3,30	45,70	46,0	0,3	1,2	H
247,63	19,0	16,72	3,35	39,07	46,0	6,9	1,2	H
250,01	23,5	16,83	3,37	43,70	46,0	2,3	1,2	H
255,62	20,5	17,13	3,40	41,03	46,0	5,0	1,2	H
264,07	16,0	17,64	3,46	37,10	46,0	8,9	1,2	H
270,01	16,0	18,05	3,50	37,55	46,0	8,4	1,2	H
271,60	22,0	18,17	3,51	43,68	46,0	2,3	1,2	H
287,57	16,0	19,45	3,61	39,06	46,0	6,9	1,2	H
295,56	13,0	20,18	3,66	36,84	46,0	9,2	1,2	H
303,55	20,0	13,53	3,71	37,23	46,0	8,8	1,0	H
319,52	24,0	13,82	3,80	41,62	46,0	4,4	1,0	H
320,01	20,0	13,83	3,80	37,64	46,0	8,4	1,0	H
330,01	23,0	14,20	3,86	41,06	46,0	4,9	1,0	H
335,50	21,5	14,46	3,89	39,85	46,0	6,2	1,0	H
340,00	20,0	14,69	3,92	38,61	46,0	7,4	1,0	H
350,01	19,0	15,30	3,97	38,27	46,0	7,7	1,0	H
351,48	23,0	15,39	3,98	42,37	46,0	3,6	1,0	H
360,01	22,0	15,22	4,02	41,24	46,0	4,8	1,0	H
367,45	24,0	15,37	4,06	43,43	46,0	2,6	1,0	H
370,01	20,5	15,42	4,08	40,00	46,0	6,0	1,0	H
380,01	21,0	15,63	4,13	40,75	46,0	5,2	1,0	H

Frequency	Measured	+ AF	+ KF	Emission	Limit	Difference	Ant. -	Ant. -
MHz	value	dB/m	dB	dB μ V/m	dB μ V/m	dB μ V	Height	Polar.
	dB μ V	Antenna	Cable				meter	H/V
383,43	21,0	15,69	4,14	40,84	46,0	5,2	1,0	H
390,01	21,0	15,82	4,18	41,00	46,0	5,0	1,0	H
399,41	22,0	16,00	4,22	42,23	46,0	3,8	1,0	H
400,01	24,5	16,01	4,23	44,74	46,0	1,3	1,0	H
410,01	24,0	16,20	4,28	44,48	46,0	1,5	1,0	H
415,39	18,0	16,30	4,30	38,60	46,0	7,4	1,0	H
420,01	23,0	16,38	4,32	43,70	46,0	2,3	1,0	H
440,01	15,0	16,73	4,42	36,15	46,0	9,9	1,0	H
500,02	15,0	17,68	4,68	37,36	46,0	8,6	1,0	H

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

Summary: The limits were kept.



Polarisation of the antenna:
Vertical

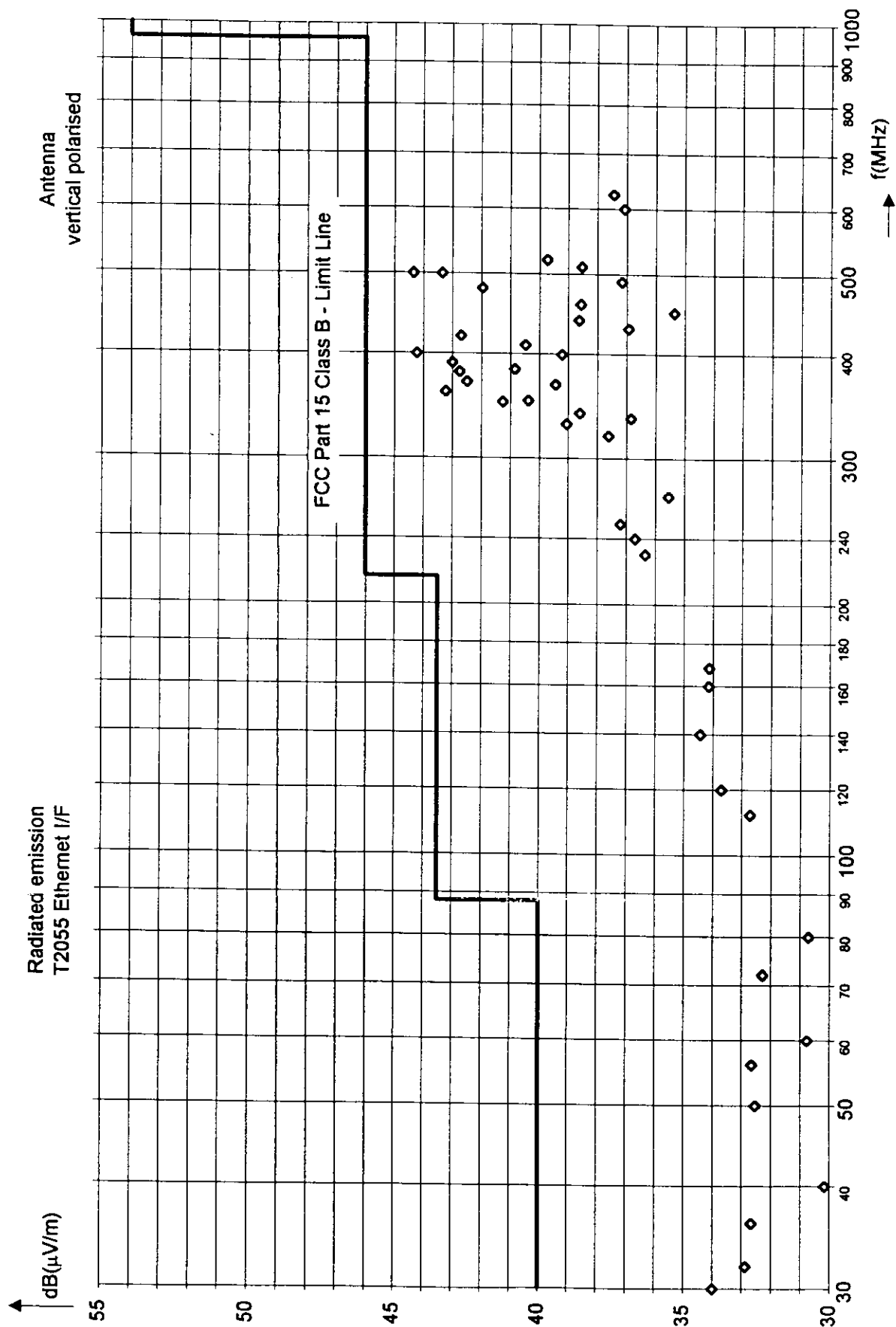
Frequency	Measured	+ AF	+ KF	Emission	Limit	Difference	Ant. -	Ant. -
MHz	value	dB/m	dB		dB μ V/m	dB μ V	Height	Polar.
	dB μ V	Antenna	Cable	dB μ V/m			meter	H/V
30,00	20,0	13,00	1,00	34,00	40,0	6,0	1,0	V
31,95	20,0	11,84	1,03	32,87	40,0	7,1	1,0	V
36,01	21,5	10,07	1,11	32,68	40,0	7,3	1,0	V
40,00	20,0	9,00	1,18	30,18	40,0	9,8	1,0	V
50,03	23,0	8,20	1,34	32,54	40,0	7,5	1,0	V
55,91	23,0	8,21	1,44	32,65	40,0	7,3	1,0	V
60,00	21,0	8,28	1,50	30,78	40,0	9,2	1,0	V
72,02	22,0	8,62	1,68	32,29	40,0	7,7	1,0	V
80,00	20,0	8,94	1,79	30,72	40,0	9,3	1,0	V
120,00	20,5	10,94	2,27	33,71	43,5	9,8	1,0	V
140,00	20,0	11,95	2,47	34,42	43,5	9,1	1,0	V
160,00	18,5	12,98	2,66	34,14	43,5	9,4	1,0	V
168,04	18,0	13,39	2,73	34,12	43,5	9,4	1,0	V
230,00	17,0	16,12	3,23	36,35	46,0	9,7	1,0	V
240,01	17,0	16,40	3,30	36,70	46,0	9,3	1,0	V
250,01	17,0	16,83	3,37	37,20	46,0	8,8	1,0	V
319,52	20,0	13,82	3,80	37,62	46,0	8,4	1,0	V
330,01	21,0	14,20	3,86	39,06	46,0	6,9	1,0	V
335,50	18,5	14,46	3,89	36,85	46,0	9,2	1,0	V
340,01	20,0	14,69	3,92	38,61	46,0	7,4	1,0	V
350,01	22,0	15,30	3,97	41,27	46,0	4,7	1,0	V
351,48	21,0	15,39	3,98	40,37	46,0	5,6	1,0	V
360,01	24,0	15,22	4,02	43,24	46,0	2,8	1,0	V
367,45	20,0	15,37	4,06	39,43	46,0	6,6	1,0	V
370,01	23,0	15,42	4,08	42,50	46,0	3,5	1,0	V
380,01	23,0	15,63	4,13	42,75	46,0	3,2	1,0	V
383,43	21,0	15,69	4,14	40,84	46,0	5,2	1,0	V
390,01	23,0	15,82	4,18	43,00	46,0	3,0	1,0	V
399,41	19,0	16,00	4,22	39,23	46,0	6,8	1,0	V
400,01	24,0	16,01	4,23	44,24	46,0	1,8	1,0	V
410,01	20,0	16,20	4,28	40,48	46,0	5,5	1,0	V

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
420,01	22,0	16,38	4,32	42,70	46,0	3,3	1,0	V
430,01	16,0	16,56	4,37	36,93	46,0	9,1	1,0	V
440,01	17,5	16,73	4,42	38,65	46,0	7,4	1,0	V
460,01	17,0	17,06	4,51	38,57	46,0	7,4	1,0	V
480,01	20,0	17,38	4,59	41,97	46,0	4,0	1,0	V
490,01	15,0	17,53	4,64	37,17	46,0	8,8	1,0	V
500,01	22,0	17,68	4,68	44,36	46,0	1,6	1,0	V
500,01	21,0	17,68	4,68	43,36	46,0	2,6	1,0	V
510,01	16,0	17,82	4,72	38,54	46,0	7,5	1,0	V
520,02	17,0	17,97	4,76	39,73	46,0	6,3	1,0	V
600,15	13,0	19,01	5,07	37,08	46,0	8,9	1,0	V
624,16	13,0	19,29	5,15	37,45	46,0	8,6	1,0	V

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

Summary:

The limits were kept.



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, 06/06/1998



EMCE GmbH
Ingenieurbüro für EMV-Prüfungen
und Schaltungsentwicklung
89233 Neu-Ulm · Wichernweg 1
EMV-Meßplatz
88483 Burgrieden · Laupheimer Str. 29
Telefon 073 92/911 370 · Fax 911 372

4 Appendix

Print Information

- T2055
- HP Deskjet 850C

Printer configuration

Ethernet configuration

Current settings

ID:47916 PRG
ID:47092E Gen

	Menu 1	Menu 2	Menu 3	Current
Font	DRAFT	DRAFT	DRAFT	DRAFT
CPI	10 CPI	10 CPI	10 CPI	10 CPI
LPI	6 LPI	6 LPI	6 LPI	6 LPI
Skip	0.0Inch	0.0Inch	0.0Inch	0.0Inch
Emulate	Epson LQ-2550	IBM Propr. XL24	Epson LQ-2550	Epson LQ-2550
Bidir	On	On	On	On
CG-Tab	Graphic	Graphic	Graphic	Graphic
CharSet	Extended	Extended	Extended	Extended
Country	E-US ASCII	TABLE 437	E-US ASCII	E-US ASCII
Sl.Zero	Off	Off	Off	Off
Auto-CR	On	On	On	On
Auto-LF	Off	Off	Off	Off
AutoTear	ViewTear=Off	ViewTear=Off	ViewTear=Off	ViewTear=Off
Width	13.6Inch	13.6Inch	13.6Inch	13.6Inch
Barcode	Off	Off	Off	Off
Bar--de	Unsecured	Unsecured	Unsecured	Unsecured
Tractor1				
E len	12.0Inch	12.0Inch	12.0Inch	12.0Inch
Heau	18	18	18	18
FormAdj	12/72"	12/72"	12/72"	12/72"
Single				
Formlen	12.0Inch	12.0Inch	12.0Inch	12.0Inch
Head	18	18	18	18
FormAdj	12/72"	12/72"	12/72"	12/72"
Interf.	Shared			
Buffer	128 KB			
CX-bid	On			
Menu	1			
ColorOpt	Not installed			
PapOpt	No			
Ph- 'j	12/72"			
Quic... .	Off			
AGA	On			
offset	0			
Pap.back	normal			
Sound	On			
FFmode	Off			
Wrap	On			
Rightzo	Off			
Leftzon	Off			
Head up	Off			
Pagewid	136/10"			
Physlm	0/10"			
Serial				
Baud	9600			
Format	8Bit No 1Stop			
Protocol	XON/XOFF			
DTR	DTR			

CSP ETHERpass T20xx-10
STATUS PRINTOUT

ETHERpass number : 1808-E0084
Print server name : CSP00054
MAC address : 00:20:B2:82:00:54
Software release : 2.29N/R4-2F.17.3.0 (Tue Feb 03 15:25:36 1998)
Loader version : 2.29/R4
Server config mode : nearest, preferred only

SERVER CONNECTIONS TYPE/STATUS

Default Port : LPT2
Cable type : 10Base2
Mode : TCP/IP
Memory left/largest block : 44664 bytes / 23712 bytes
Polling interval, ticks : 36
Job timeout, seconds : 15
IP config mode : AUTOIP
BOOTP : ON
IP address : 172.16.11.106
Subnet mask : 255.255.255.0
Default gateway : 0.0.0.0
BOOTP server : 0.0.0.0
TCP ports : 9100,9101,9102

PACKET STATISTICS

Packets transmitted : 3
Packets received : 0
Packets not read : 0
Transmit packet error : 81
Receive packet error : 0
Checksum error : 0
Frame alignment error : 0
Missed packet error : 0
Number of collisions : 0
Wait for send cycles : 5
Time since last reset : 0:05:27 (h:m:s)

(c) 1996,97 CSP AG, 68229 Mannheim, 0621 / 48463-0 (DUX,UZ,AW)

1234567891011121314151617181920212223242526272829303132333435363738394041424344454647484950515253545556575859606162636465666768697071727374757677787980818283848586878889909192939495969798991001011021031041051061071081091101111121131141151161171181191201211221231241251261271281291301311321331341351361371381391401411421431441451461471481491501511521531541551561571581591601611621631641651661671681691701711721731741751761771781791801811821831841851861871881891901911921931941951961971981992002012022032042052062072082092102112122132142152162172182192202212222232242252262272282292302312322332342352362372382392402412422432442452462472482492502512522532542552562572582592602612622632642652662672682692702712722732742752762772782792802812822832842852862872882892902912922932942952962972982993003013023033043053063073083093103113123133143153163173183193203213223233243253263273283293303313323333343353363373383393403413423433443453463473483493503513523533543553563573583593603613623633643653663673683693703713723733743753763773783793803813823833843853863873883893903913923933943953963973983994004014024034044054064074084094104114124134144154164174184194204214224234244254264274284294304314324334344354364374384394404414424434444454464474484494504514524534544554564574584594604614624634644654664674684694704714724734744754764774784794804814824834844854864874884894904914924934944954964974984995005015025035045055065075085095105115125135145155165175185195205215225235245255265275285295305315325335345355365375385395405415425435445455465475485495505515525535545555565575585595605615625635645655665675685695705715725735745755765775785795805815825835845855865875885895905915925935945955965975985996006016026036046056066076086096106116126136146156166176186196206216226236246256266276286296306316326336346356366376386396406416426436446456466476486496506516526536546556566576586596606616626636646656666676686696706716726736746756766776786796806816826836846856866876886896906916926936946956966976986997007017027037047057067077087097107117127137147157167177187197207217227237247257267277287297307317327337347357367377387397407417427437447457467477487497507517527537547557567577587597607617627637647657667677687697707717727737747757767777787797807817827837847857867877887897907917927937947957967977987998008018028038048058068078088098108118128138148158168178188198208218228238248258268278288298308318328338348358368378388398408418428438448458468478488498508518528538548558568578588598608618628638648658668678688698708718728738748758768778788798808818828838848858868878888898908918928938948958968978988999009019029039049059069079089099109119129139149159169179189199209219229239249259269279289299309319329339349359369379389399409419429439449459469479489499509519529539549559569579589599609619629639649659669679689699709719729739749759769779789799809819829839849859869879889899909919929939949959969979989991000

HP Duet and 1598

Application for FCC Class B Certification

Optional Ethernet Interface ENI/3 for Tally Printers

LIST OF EXHIBITS

EXHIBIT A: Test Report CS824_04.DOC for T2055 printer
Conducted by EMCE GmbH, 88483 Burgrieden (Germany), Feb. 02, 1998

EXHIBIT B: Test Report CS824_03.DOC for T2070 printer Conducted by EMCE GmbH, 88483 Burgrieden (Germany), Feb. 02, 1998
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EXHIBIT C: Technical Documentation of Interface ENI/3

- Printer block diagram
- Circuit diagram, component placement and parts list.
- Significant EMC design elements
- FCC Label

EXHIBIT D: Photographs

EXHIBIT B

Tally GmbH
D-89275 Elchingen
Germany
FCC ID: EU1ENI3

June 23, 1998
W. Boehm, Dept. TQV

Application for FCC Class B Certification

Optional Ethernet Interface ENI/3 for Tally Printers

Test Report CS824_03.DOC

Sheet:

1. Measurement of Radio-Noise Emissions according ANSI C63.4
Printer T2070 with Ethernet Printserver Interface ENI/3

1-33

EXHIBIT B

Tally GmbH
D-89275 Elchingen
Germany
FCC ID: EUIENI3

June 23, 1998
W. Boehm, Dept. TQV

Application for FCC Class B Certification

Optional Ethernet Interface ENI/3 for Tally Printers

Test Report CS824_03.DOC

Sheet:

1. Measurement of Radio-Noise Emissions according ANSI C63.4
Printer T2070 with Ethernet Printserver Interface ENI/3

1-33

Test Report

File Nr. CS824_03.DOC

Ethernet-Interfacemodule

EUT:	Ethernet-Interfacemodule for the matrix needleprinters T2060/T2070 Tally GmbH
Typ:	ENI/3-Tally
S/N:	0011
Configuration:	Ethernet-Interfacemodule with 10Base2 and 10Base-T connectors
Options:	-
Manufacturer:	CSP Ingenieur Consult AG Mozartstr. 1 76133 Karlsruhe Germany
Regulations:	FCC rules part 15, limit class B
Applicant:	CSP Ingenieur Consult AG Mozartstr. 1 76133 Karlsruhe Germany
Contact person:	Mr. Böhm -Tally GmbH Mr. Zimmermann - CSP Software GmbH
Test site:	Test facilities of the EMCE GmbH Laupheimer-Str. 29 88483 Burgrieden Germany
Test date:	06/02/1998 - 06/05/1998
Responsible Engineer:	Mr. Chr. Vogelmann EMCE GmbH Ingenieurbüro für EMV-Prüfungen und Schaltungsentwicklung

Contents:

1 EMC Instrumentation.....	3
2 Report.....	4
2.1 EMI Report FCC part 15 limit class B.....	4
2.1.1 Conducted Emissions.....	4
2.1.1.1 Test Configuration	4
2.1.1.2 Test Procedure.....	5
2.1.2 Radiated Emissions.....	7
2.1.2.1 Test Configuration	7
2.1.2.2 Test Procedure.....	9
3 Results	16
4 Appendix	17

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 Ø	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 ARFKDM178 8	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	Ethernet Plug and Play Card EN1660		FCC ID HEDEN1660	Accton Technology Corporation
x	Matrix needleprinter T2070	S/N 2860092	FCC-ID EUIT2060	Tally GmbH
x	Additional Printer HP Deskjet 850C	S/N US545110NX	FCC-ID B94C2145X	Hewlett Packard

2 Report

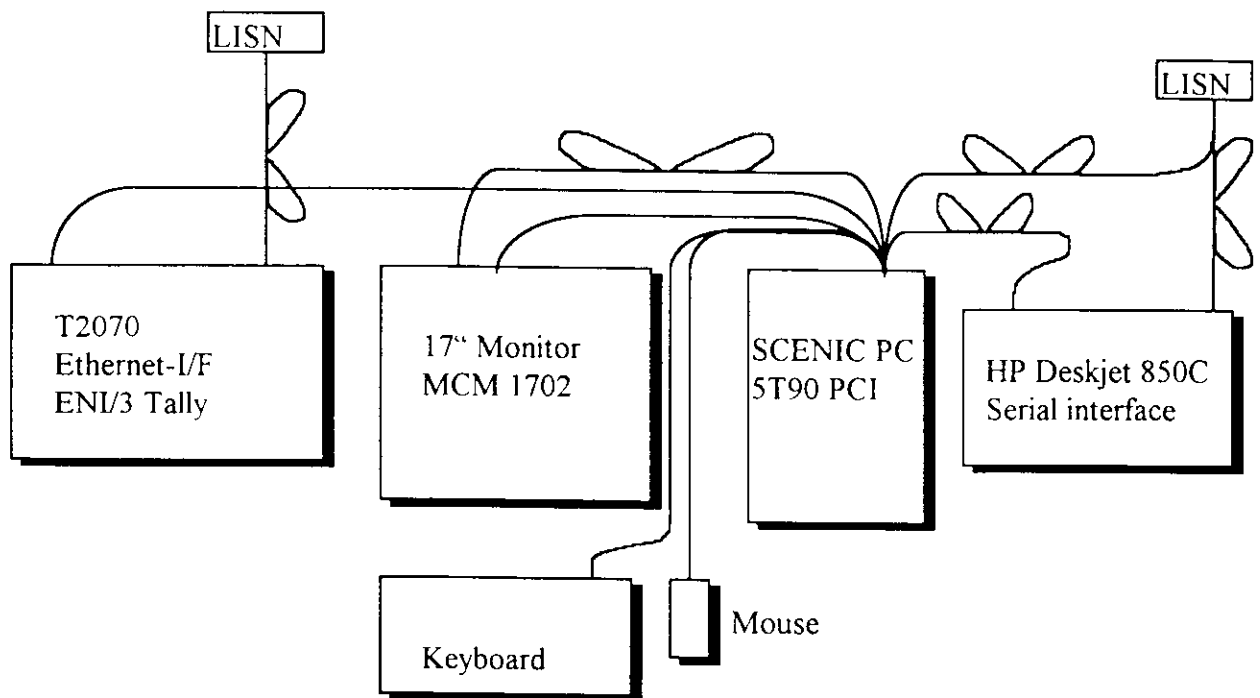
2.1 EMI Report FCC part 15 limit class B

2.1.1 Conducted Emissions

2.1.1.1 Test Configuration

ANSI C63.4-1992

T2070 Ethernet I/F



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 transferred to the printers on the parallel port (HP Deskjet 850C) and the Ethernet port (T2070), where it was printed. These tests represented a continuous display-transfer-print program 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
T2070	Ser.Nr. 2860092
Additional printer	HP Deskjet 850C
Parallel I/F cable:	Shielded cable
Ethernet I/F cable:	Koaxcable
Fanfoldpaper for the	T2070
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:

First test run

Conducted emission of the T2070 Ethernet 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 parallel I/F on L1- and N-Phase

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Conducted emission

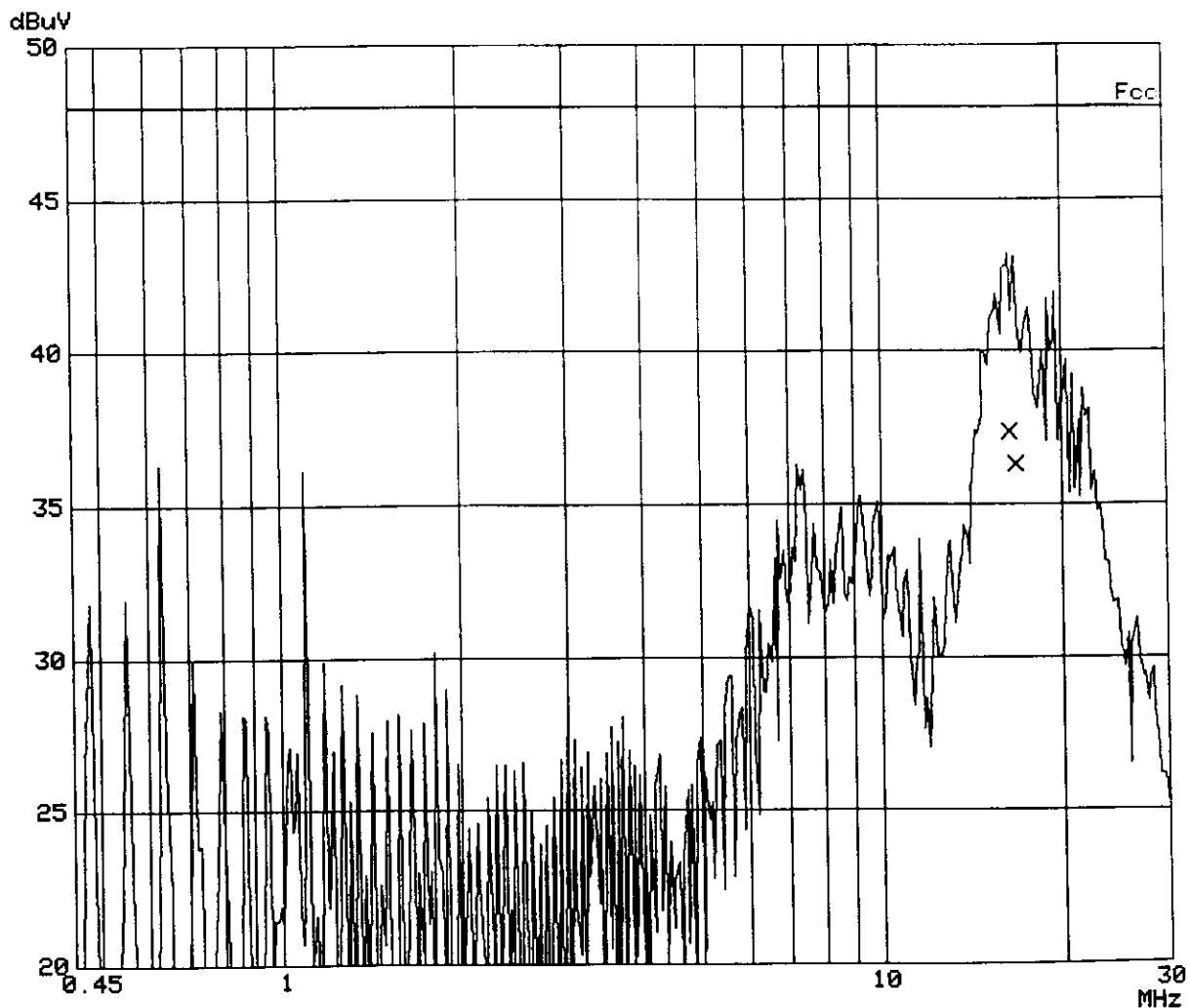
EUT: Ethernet Interface ENI/3 Tally
 Manuf: Tally GmbH
 Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
 Operator: Vogelmann
 Test Spec: FCC Rule 15 Class B
 Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
 CS823_07, T2070, Phase L1
 Date: 25. May 98 16:52

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB



EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
 CS823_07, T2070, Phase L1
Date: 25. May 98 16:52

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
16.38000	37.3	48.0
16.78000	36.3	48.0

* limit exceeded

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Conducted emission

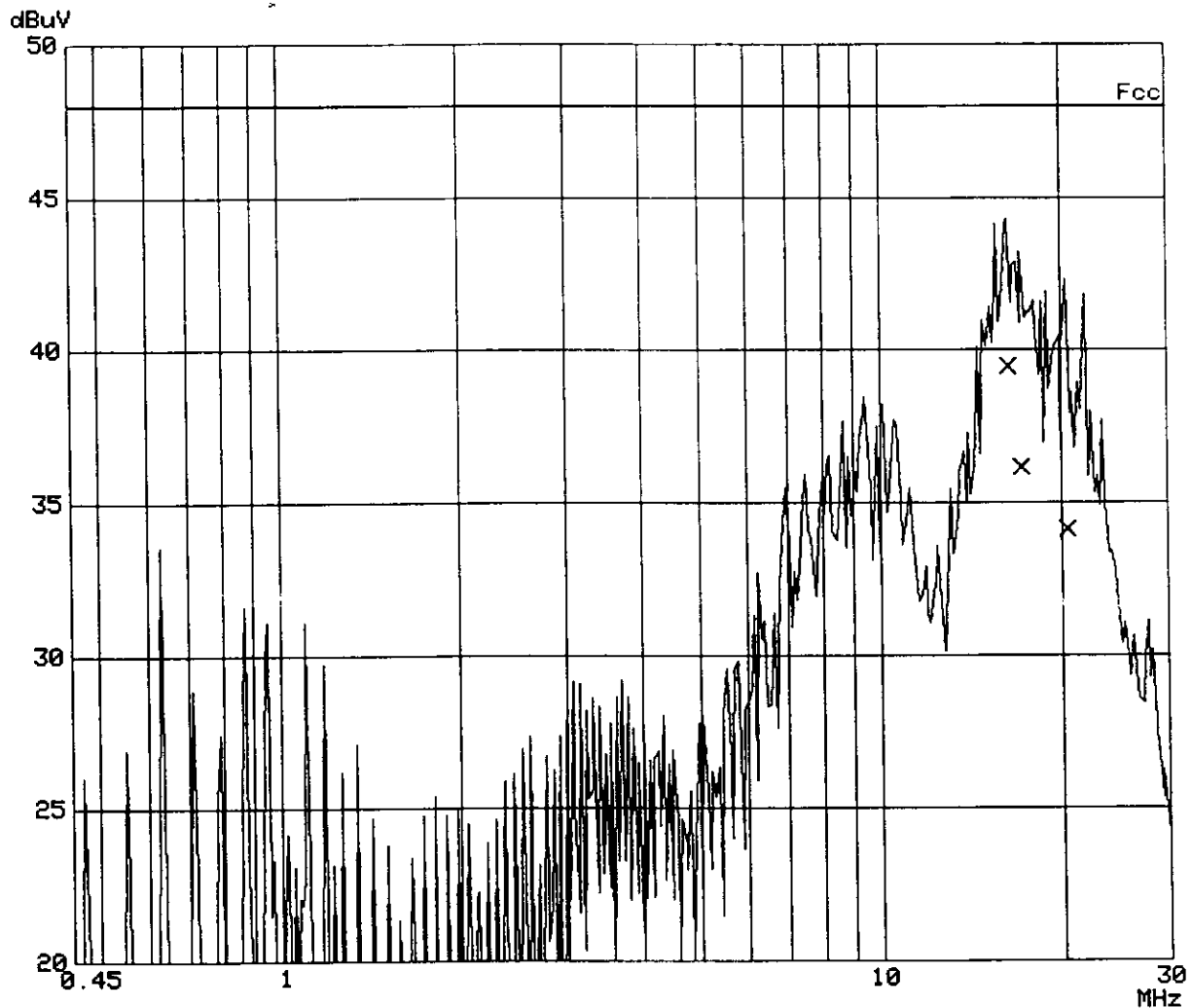
EUT: Ethernet Interface ENI/3 Tally
 Manuf: Tally GmbH
 Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
 Operator: Vogelmann
 Test Spec: FCC Rule 15 Class B
 Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
 CS823_08, T2070, Phase N
 Date: 25. May 98 16:55

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB



EMCE GmbH Ing büro für EMV-Prüfungen

Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
CS823_08, T2070, Phase N
Date: 25. May 98 16:55

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
16.38000	39.4	48.0
17.18000	36.1	48.0
20.47000	34.1	48.0

* limit exceeded

EMCE GmbH Ing büro für EMV_Prüfungen

Conducted emission

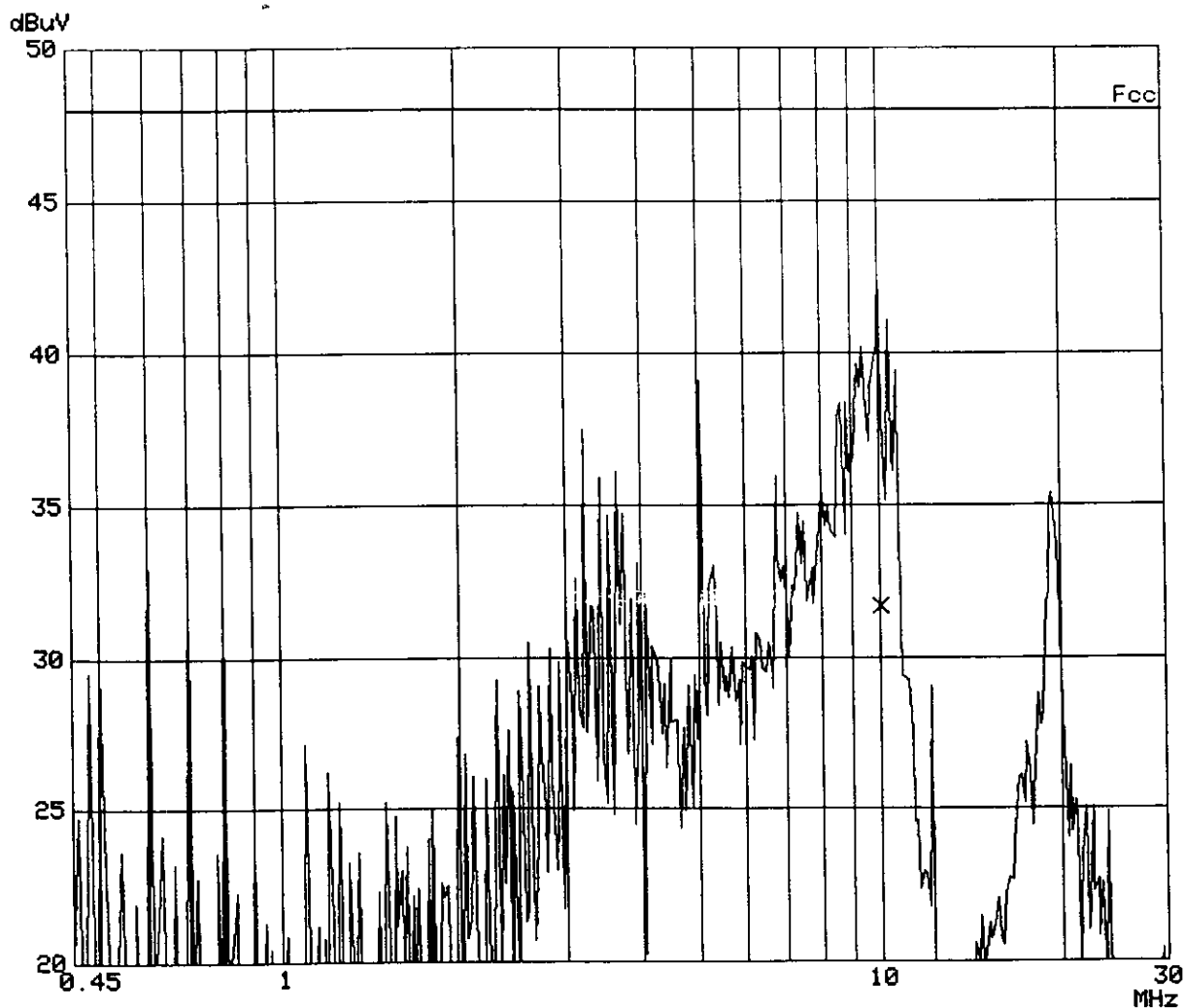
EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
CS823_09, SCENIC_PC+Monitor, Phase L1
Date: 25. May 98 16:59

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB



EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
 CS823_09, SCENIC_PC+Monitor, Phase L1
Date: 25. May 98 16:59

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
10.00000	31.7	48.0
	* limit exceeded	

EMCE GmbH Ing büro für EMV-Prüfungen

Conducted emission

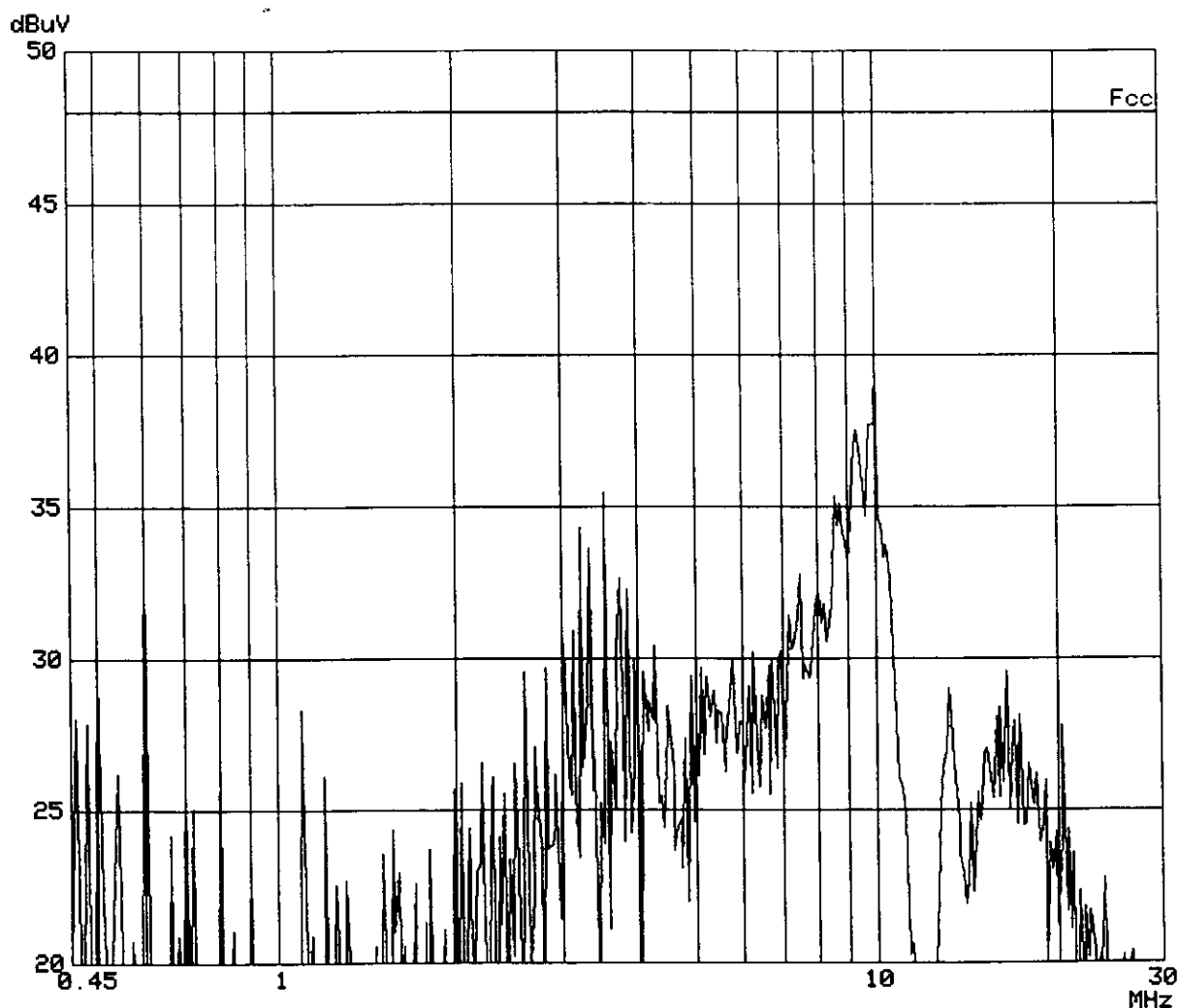
EUT: Ethernet Interface ENI/3 Tally
 Manuf: Tally GmbH
 Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
 Operator: Vogelmann
 Test Spec: FCC Rule 15 Class B
 Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
 CS823_10, SCENIC_PC+Monitor, Phase N
 Date: 25. May 98 17:02

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
 Subranges: 50
 Acc Margin: 6dB



EMCE GmbH Ing büro für EMV_Prüfungen

Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
CS823_10, SCENIC_PC+Monitor, Phase N
Date: 25. May 98 17:02

Final Measurement Results:

no Results

EMCE GmbH Ing büro für EMV_Prüfungen Conducted emission

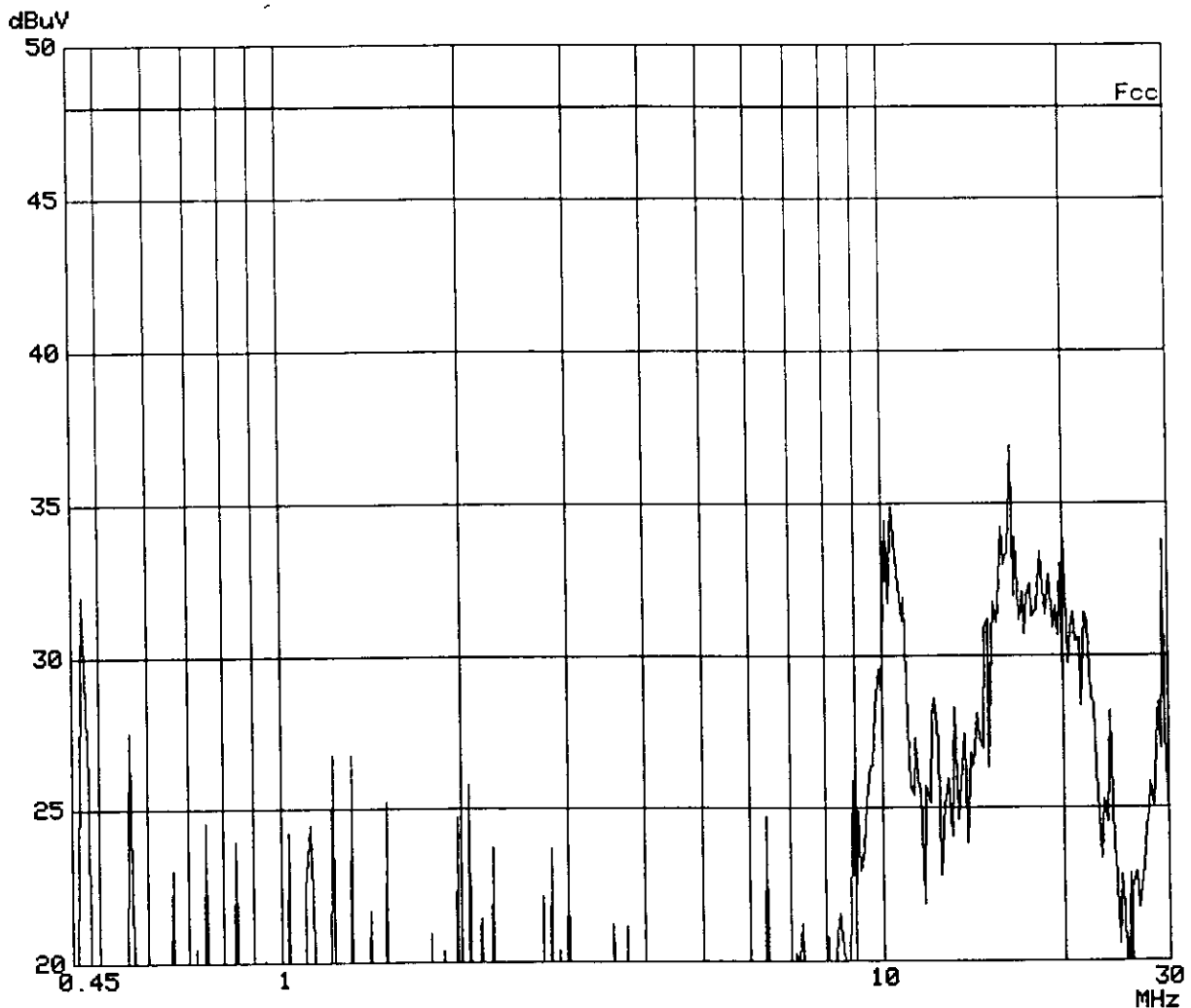
EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
CS823_11, HP Deskjet 850C, Phase L1
Date: 25. May 98 16:48

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB



EMCE GmbH Ing büro für EMV-Prüfungen

Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
CS823_11, HP Deskjet 850C, Phase L1
Date: 25. May 98 16:48

Final Measurement Results:

no Results

EMCE GmbH Ing büro für EMV_Prüfungen

Conducted emission

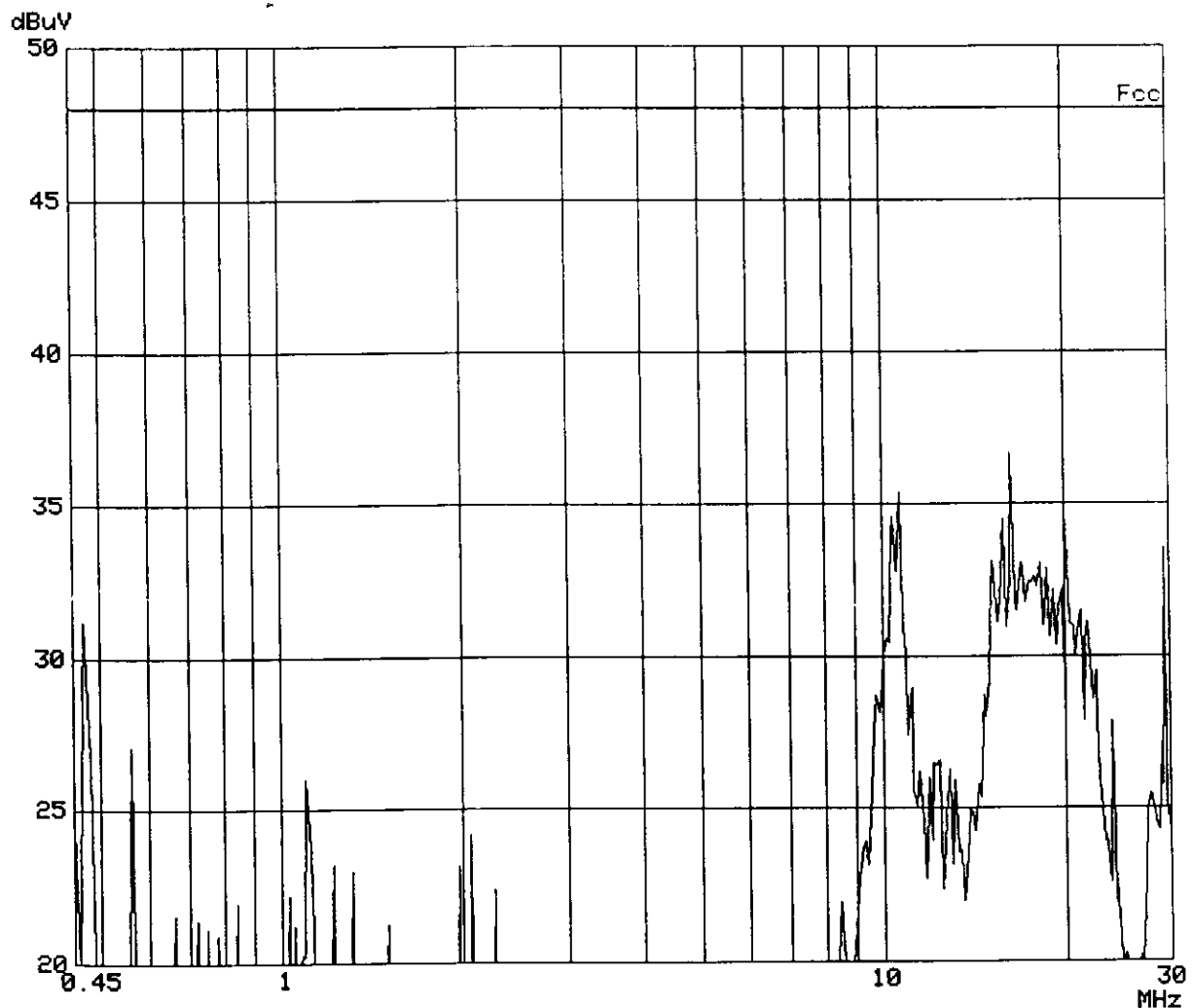
EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
CS823_12, HP Deskjet 850C, Phase N
Date: 25. May 98 16:44

Scan Settings (1 Range)

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

Final Measurement: x QP

Meas Time: 1 s
Subranges: 50
Acc Margin: 6dB



EMCE GmbH Ing büro für EMV-Prüfungen

Conducted emission

EUT: Ethernet Interface ENI/3 Tally
Manuf: Tally GmbH
Op Cond: 120V/60Hz, "H", 10cpi LQ, fanfold paper
Operator: Vogelmann
Test Spec: FCC Rule 15 Class B
Comment: PR821_08, Matrix Needleprinter T2070, S/N 2860092
 CS823_12, HP Deskjet 850C, Phase N
Date: 25. May 98 16:44

Final Measurement Results:

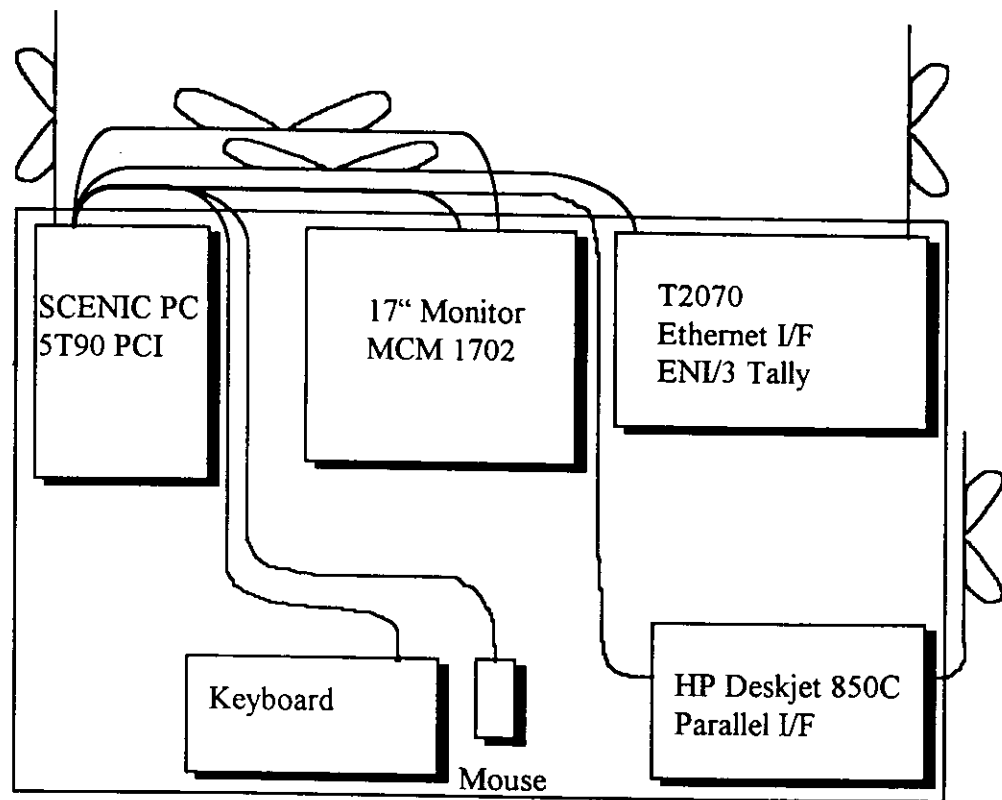
no Results

2.1.2 Radiated Emissions

2.1.2.1 Test Configuration

ANSI C63.4-1992

T2070 Ethernet 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 transferred to the printers on the parallel port (HP Deskjet 850C) and the Ethernet port (T2070), where it was printed. These tests represented a continuous display-transfer-print program 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
T2070	Ser.Nr. 2860092
Additional printer	HP Deskjet 850C
Parallel I/F cable:	Shielded cable
Ethernet I/F cable:	Koaxcable
Fanfoldpaper for the	T2070
Single sheet for the	HP Deskjet 850C
Supply voltage:	120VAC/60Hz

Test results:

Radiated Emission

Polarisation of the antenna:

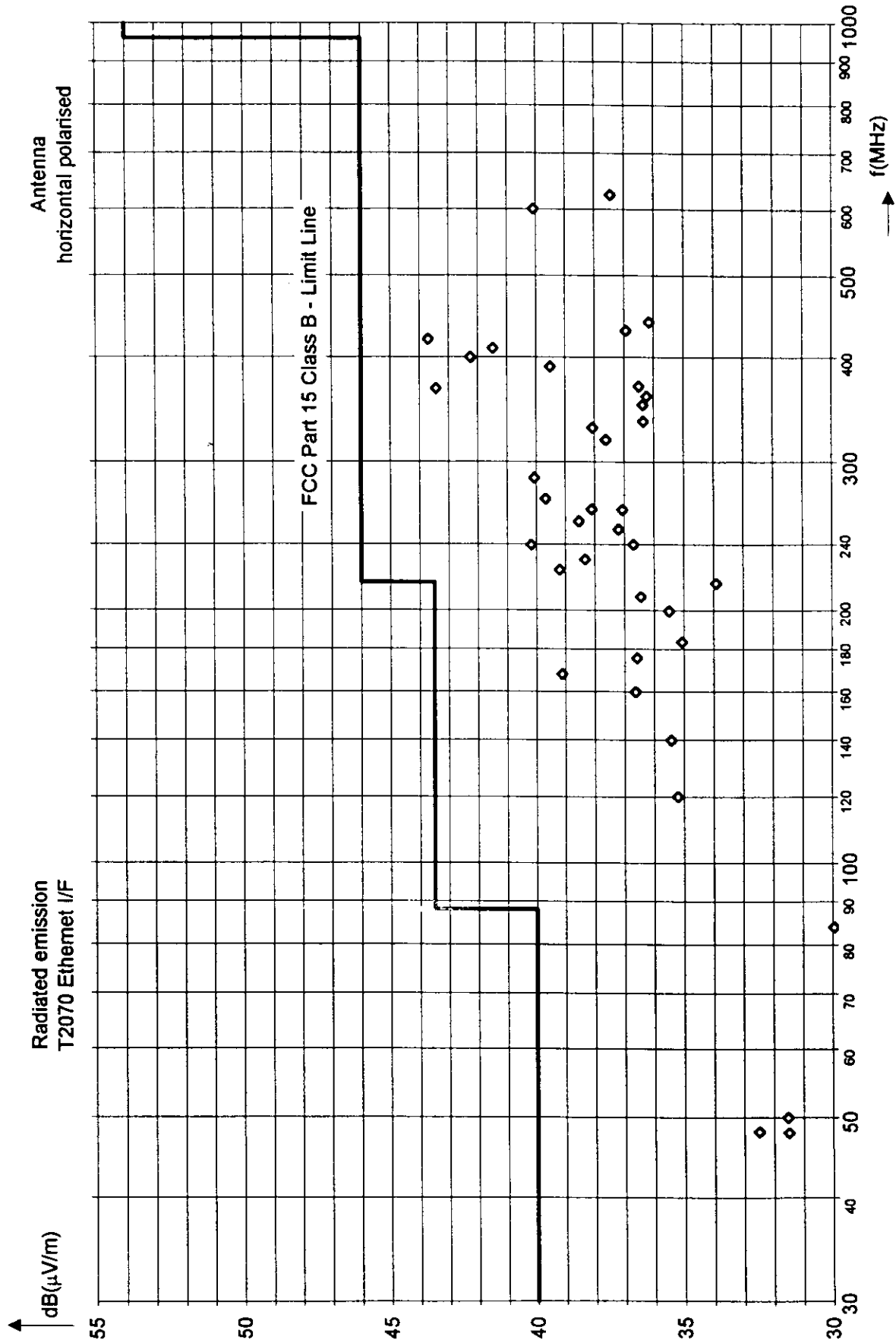
Horizontal

Frequency	Measured	+ AF	+ KF	Emission	Limit	Difference	Ant. -	Ant. -
MHz	value	dB/m	dB	dBµV/m	dBµV/m	dBµV	Height	Polar.
	dBµV	Antenna	Cable				meter	H/V
47,93	22,0	8,20	1,31	31,51	40,0	8,5	2,0	H
48,01	23,0	8,20	1,31	32,51	40,0	7,5	2,0	H
50,00	22,0	8,20	1,34	31,54	40,0	8,5	3,0	H
84,02	19,0	9,12	1,84	29,96	40,0	10,0	2,0	H
120,00	22,0	10,94	2,27	35,21	43,5	8,3	2,5	H
140,00	21,0	11,95	2,47	35,42	43,5	8,1	4,0	H
160,00	21,0	12,98	2,66	36,64	43,5	6,9	2,5	H
168,04	23,0	13,39	2,73	39,12	43,5	4,4	2,0	H
175,74	20,0	13,78	2,80	36,58	43,5	6,9	1,3	H
183,73	18,0	14,19	2,87	35,06	43,5	8,4	1,3	H
199,70	17,5	15,00	3,00	35,49	43,5	8,0	1,3	H
207,69	18,0	15,39	3,06	36,45	43,5	7,0	1,3	H
215,68	15,0	15,79	3,12	33,91	43,5	9,6	1,3	H
223,67	20,0	16,02	3,18	39,20	46,0	6,8	1,3	H
230,00	19,0	16,12	3,23	38,35	46,0	7,7	1,5	H
239,65	20,5	16,39	3,29	40,18	46,0	5,8	1,3	H
240,01	17,0	16,40	3,30	36,70	46,0	9,3	1,5	H
250,01	17,0	16,83	3,37	37,20	46,0	8,8	1,3	H
255,62	18,0	17,13	3,40	38,53	46,0	7,5	1,3	H
263,61	16,0	17,61	3,46	37,07	46,0	8,9	1,3	H
264,07	17,0	17,64	3,46	38,10	46,0	7,9	1,3	H
271,60	18,0	18,17	3,51	39,68	46,0	6,3	1,3	H
287,57	17,0	19,45	3,61	40,06	46,0	5,9	1,3	H
319,52	20,0	13,82	3,80	37,62	46,0	8,4	1,0	H
330,01	20,0	14,20	3,86	38,06	46,0	7,9	1,0	H
335,50	18,0	14,46	3,89	36,35	46,0	9,7	1,0	H
351,48	17,0	15,39	3,98	36,37	46,0	9,6	1,0	H
360,01	17,0	15,22	4,02	36,24	46,0	9,8	1,0	H
367,45	24,0	15,37	4,06	43,43	46,0	2,6	1,0	H
370,01	17,0	15,42	4,08	36,50	46,0	9,5	1,0	H

Frequency	Measured	+ AF	+ KF	Emission	Limit	Difference	Ant. -	Ant. -
MHz	value	dB/m	dB	dB μ V/m	dB μ V/m	dB μ V	Height	Polar.
	dB μ V	Antenna	Cable				meter	H/V
390,01	19,5	15,82	4,18	39,50	46,0	6,5	1,0	H
399,41	22,0	16,00	4,22	42,23	46,0	3,8	1,0	H
400,01	22,0	16,01	4,23	42,24	46,0	3,8	1,0	H
410,01	21,0	16,20	4,28	41,48	46,0	4,5	1,0	H
420,01	23,0	16,38	4,32	43,70	46,0	2,3	1,0	H
430,01	16,0	16,56	4,37	36,93	46,0	9,1	1,0	H
440,01	15,0	16,73	4,42	36,15	46,0	9,9	1,0	H
600,15	16,0	19,01	5,07	40,08	46,0	5,9	1,0	H
624,16	13,0	19,29	5,15	37,45	46,0	8,6	1,0	H

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

Summary: The limits were kept.



Polarisation of the antenna:

Vertical

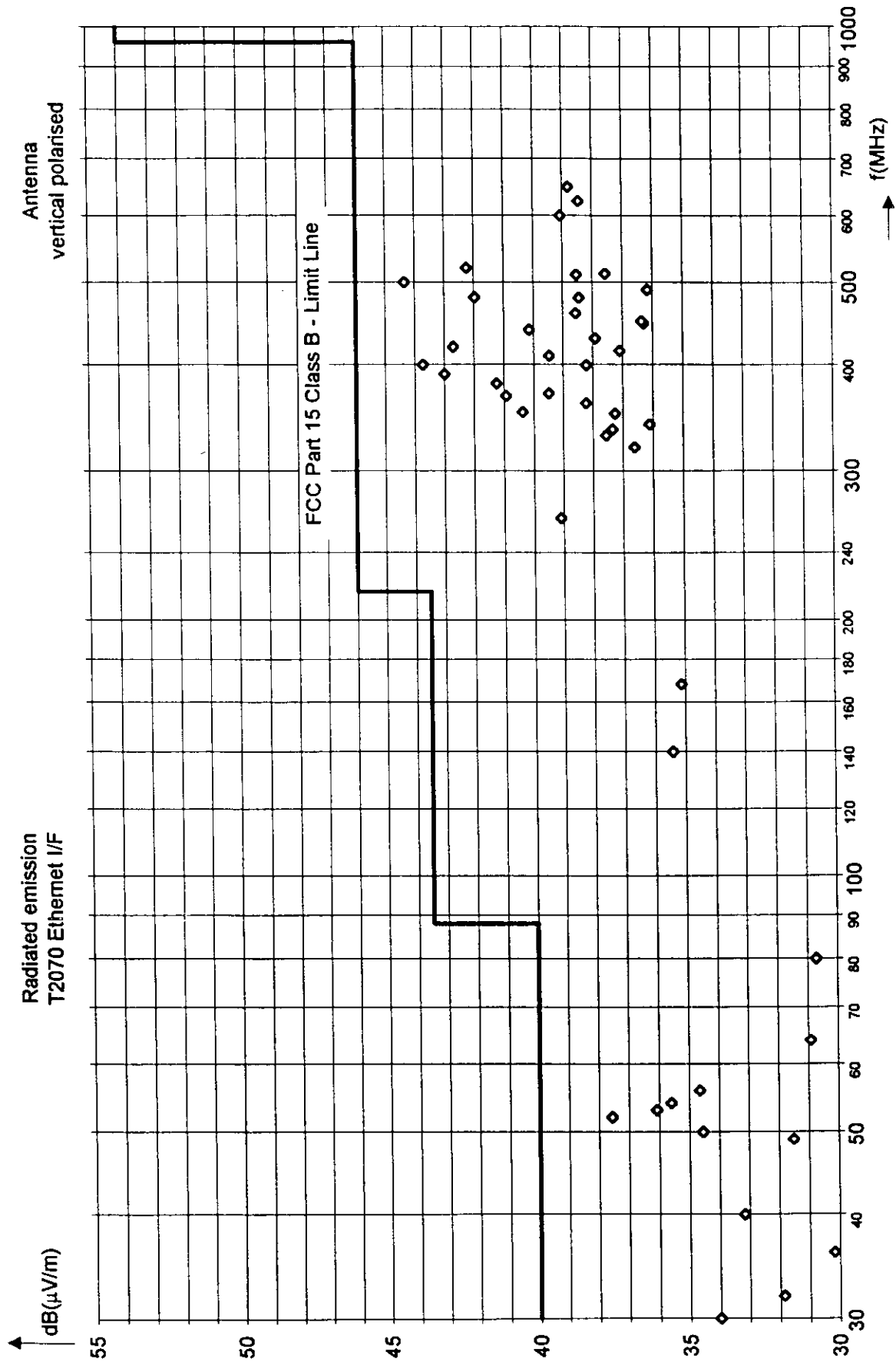
Frequency	Measured	+ AF	+ KF	Emission	Limit	Difference	Ant. -	Ant. -
MHz	value	dB/m	dB		dBµV/m	dBµV	Height	Polar.
	dBµV	Antenna	Cable	dBµV/m			meter	H/V
30,00	20,0	13,00	1,00	34,00	40,0	6,0	1,0	V
31,95	19,0	11,84	1,03	31,87	40,0	8,1	1,0	V
36,01	19,0	10,07	1,11	30,18	40,0	9,8	1,0	V
40,00	23,0	9,00	1,18	33,18	40,0	6,8	1,0	V
49,00	22,0	8,19	1,33	31,52	40,0	8,5	1,0	V
50,03	25,0	8,20	1,34	34,54	40,0	5,5	1,0	V
52,00	28,0	8,19	1,38	37,57	40,0	2,4	1,0	V
53,00	26,5	8,19	1,39	36,09	40,0	3,9	1,0	V
54,00	26,0	8,20	1,41	35,61	40,0	4,4	1,0	V
55,91	25,0	8,21	1,44	34,65	40,0	5,3	1,0	V
63,90	21,0	8,36	1,56	30,92	40,0	9,1	1,0	V
80,00	20,0	8,94	1,79	30,72	40,0	9,3	1,0	V
140,00	21,0	11,95	2,47	35,42	43,5	8,1	1,0	V
168,04	19,0	13,39	2,73	35,12	43,5	8,4	1,0	V
264,07	18,0	17,64	3,46	39,10	46,0	6,9	1,0	V
319,52	19,0	13,82	3,80	36,62	46,0	9,4	1,0	V
330,01	19,5	14,20	3,86	37,56	46,0	8,4	1,0	V
335,50	19,0	14,45	3,89	37,35	46,0	8,7	1,0	V
340,01	17,5	14,69	3,92	36,11	46,0	9,9	1,0	V
350,01	18,0	15,30	3,97	37,27	46,0	8,7	1,0	V
351,48	21,0	15,39	3,98	40,37	46,0	5,6	1,0	V
360,01	19,0	15,22	4,02	38,24	46,0	7,8	1,0	V
367,45	21,5	15,37	4,06	40,93	46,0	5,1	1,0	V
370,01	20,0	15,42	4,08	39,50	46,0	6,5	1,0	V
380,01	21,5	15,63	4,13	41,25	46,0	4,7	1,0	V
390,01	23,0	15,82	4,18	43,00	46,0	3,0	1,0	V
399,41	18,0	16,00	4,22	38,23	46,0	7,8	1,0	V
400,01	23,5	16,01	4,23	43,74	46,0	2,3	1,0	V
410,01	19,0	16,20	4,28	39,48	46,0	6,5	1,0	V
415,38	16,5	16,30	4,30	37,10	46,0	8,9	1,0	V
420,01	22,0	16,38	4,32	42,70	46,0	3,3	1,0	V

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
430,01	17,0	16,56	4,37	37,93	46,0	8,1	1,0	V
440,01	19,0	16,73	4,42	40,15	46,0	5,9	1,0	V
447,34	15,0	16,85	4,45	36,30	46,0	9,7	1,0	V
450,01	15,0	16,90	4,46	36,36	46,0	9,6	1,0	V
460,01	17,0	17,06	4,51	38,57	46,0	7,4	1,0	V
479,29	16,5	17,37	4,59	38,46	46,0	7,5	1,0	V
480,01	20,0	17,38	4,59	41,97	46,0	4,0	1,0	V
490,01	14,0	17,53	4,64	36,17	46,0	9,8	1,0	V
500,01	22,0	17,68	4,68	44,36	46,0	1,6	1,0	V
510,01	16,0	17,82	4,72	38,54	46,0	7,5	1,0	V
511,24	15,0	17,84	4,73	37,57	46,0	8,4	1,0	V
520,02	19,5	17,97	4,76	42,23	46,0	3,8	1,0	V
600,15	15,0	19,01	5,07	39,08	46,0	6,9	1,0	V
624,16	14,0	19,29	5,15	38,45	46,0	7,6	1,0	V
648,16	14,0	19,56	5,24	38,80	46,0	7,2	1,0	V

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

Summary:

The limits were kept.



[illegible]

Current settings

ID:47916 PRG
ID:47092E Gen

	Menu 1	Menu 2	Menu 3	Current
Font	DRAFT	DRAFT	DRAFT	DRAFT
CPI	10 CPI	10 CPI	10 CPI	10 CPI
LPI	6 LPI	6 LPI	6 LPI	6 LPI
Skip	0.0Inch	0.0Inch	0.0Inch	0.0Inch
Emulate	Epson LQ-2550	IBM Propr. XL24	Epson LQ-2550	Epson LQ-2550
Bidir	On	On	On	On
CG-Tab	Graphic	Graphic	Graphic	Graphic
CharSet	Extended	Extended	Extended	Extended
Country	E-US ASCII	TABLE 437	E-US ASCII	E-US ASCII
Sl.Zero	Off	Off	Off	Off
Auto-CR	On	On	On	On
Auto-LF	Off	Off	Off	Off
AutoTear	ViewTear=Off	ViewTear=Off	ViewTear=Off	ViewTear=Off
Width	13.6Inch	13.6Inch	13.6Inch	13.6Inch
Barcode	Off	Off	Off	Off
Barcode	Unsecured	Unsecured	Unsecured	Unsecured
Tr. r1				
Form	12.0Inch	12.0Inch	12.0Inch	12.0Inch
Head	18	18	18	18
FormAdj	12/72"	12/72"	12/72"	12/72"
Single				
Formlen	12.0Inch	12.0Inch	12.0Inch	12.0Inch
Head	18	18	18	18
FormAdj	12/72"	12/72"	12/72"	12/72"
Interf.	Shared			
Buffer	0 KB			
CX-bid	On			
Menu	1			
ColorOpt	Not installed			
PapOpt	No			
PhysAdj	12/72"			
Qui-+~.	Off			
AGn	On			
AGA(set	0			
Pap.back	normal			
Sound	On			
PFmode	Off			
Wrap	On			
Rightxo	Off			
Leftxon	Off			
Head up	Off			
Pagewid	136/10"			
Physla	0/10"			
Serial				
Baud	9600			
Format	8Bit No 1Stop			
Protocol	XON/XOFF			
DTR	DTR			

CSP ETHERpass T20xx-10
STATUS PRINTOUT

ETHERpass number : 1808-E0084
Print server name : CSP00054
MAC address : 00:20:B2:82:00:54
Software release : 2.29N/R4-2F.17.3.0 (Tue Feb 03 15:25:36 1998)
Loader version : 2.29/R4
Server config mode : nearest, preferred only

SERVER CONNECTIONS TYPE/STATUS

Default Port : LPT2
Cable type : 10Base2
Mode : TCP/IP
Memory left/largest block : 44664 bytes / 23712 bytes
Polling interval, ticks : 36
Job timeout, seconds : 15
IP config mode : AUTOIP
BOOTP : ON
IP address : 172.16.11.106
Subnet mask : 255.255.255.0
Default gateway : 0.0.0.0
BOOTP server : 0.0.0.0
TCP ports : 9100,9101,9102

PACKET STATISTICS

Packets transmitted : 3
Packets received : 0
Packets not read : 0
Transmit packet error : 23
Receive packet error : 0
Checksum error : 0
Frame alignment error : 0
Missed packet error : 0
Number of collisions : 0
Wait for send cycles : 5
Time since last reset : 0:01:33 (h:m:s)

© 1996,97 CSP AG, 68229 Mannheim, 0621 / 48463-0 (DUX,UZ,AW)

Tally GmbH
D-89275 Elchingen
Germany
FCC ID: EUENI3

Tally

June 23, 1998
W. Boehm, Dept. TQV

Application for FCC Class B Certification

Optional Ethernet Interface ENI/3 for Tally Printers

LIST OF EXHIBITS

EXHIBIT A: Test Report CS824_04.DOC for T2055 printer
Conducted by EMCE GmbH, 88483 Burgrieden (Germany), Feb. 02, 1998

EXHIBIT B: Test Report CS824_03.DOC for T2070 printer
Conducted by EMCE GmbH, 88483 Burgrieden (Germany), Feb. 02, 1998

EXHIBIT C: Technical Documentation of Interface ENI/3

- Printer block diagram
- Circuit diagram, component placement and parts list.
- Significant EMC design elements
- FCC Label

EXHIBIT D: Photographs

EXHIBIT C

Tally GmbH
D-89275 Elchingen
Germany
FCC ID: EUENI3

June 23, 1998
W. Boehm, Dept. TQV

Application for FCC Class B Certification

Optional Ethernet Interface ENI/3 for Tally Printers

Technical Documentation

Sheet:

- | | |
|--|------|
| 1. Block Diagram of Printer (Interface thick framed) | 1-1 |
| 2. Identical Product Confirmation | 1-1 |
| 3. Circuit Diagram, Components Placement on top and bottom side | 1-12 |
| 4. Parts List of boards, ENI/3-MT360 | 1-2 |
| 5. Significant EMC design elements:
Description of generated frequencies and
EMI suppression components with data sheets | 1-15 |
| 6. Sketch of FCC ID labeling | 1-1 |

Subject: ENI/3 Tally
Date: 12.06.1998

FCC Documentation



Description of generated frequencies and EMI suppression measures,
data sheets of EMI suppression components for ENI/3-Tally

1. Generated Frequencies:

Board 188_MT1 V1.0 or higher

Module	Kind	Part #	Frequency	Remark
Ethernet	Clock	T1	20/10 MHz	Clock for Network Controller/CPU

2. List of components used for EMI suppression:

Board 188_MT1 V1.0 or higher

Part	Reference	Value	CSP Ident #	Manufacturer
Resistor	R8	270 Ohm	46048	Phillips
Capacitor	C19,C25	3,3nF	45050	Phillips,AVX
Capacitor	C36	1nF	45012	Phillips,AVX
Ferrite	L7	2 * 3,5 coils (0,5mm) on Würth 742 70116	53001	CSP
PCB	4 Layers Multilayer		14550	

Resistance	whichever is smaller	10,000 M Ohms or 100 secs whichever is smaller	10,000 M Ohms or 100 secs whichever is smaller
Dielectric Strength	250% of rated volts (500V parts 120% of rated volts) for 5 seconds @ 50mAmps max.	250% of rated volts (500V parts 120% of rated volts) for 5 seconds @ 50mAmps max.	250% of rated volts for 5 seconds @ 50mAmps max.

AVX

KYOCERA

ELCO

AVX

General Specifications Microwave MLC's

These porcelain and ceramic dielectric multilayer capacitor chips are best suited for RF/Microwave applications typically ranging from 10MHz to 4.2 GHz. Characteristic is a fine grained, high density, high purity dielectric material impervious to moisture with heavy internal palladium electrodes.

These characteristics lead well to applications requiring:

- High current carrying capabilities
- High quality factors.
- Very low equivalent series resistance
- Very high series resonance
- Excellent stability under stress of changing voltage, frequency, time and temperature.

Electrical Specifications

Capacitance Range	0.1pF to 5.1nF
Capacitance Tolerance	$\pm 0.1pF$ to $\pm 20\%$
Temperature Coefficient	M (+90 $\pm$ 20ppm/ $^{\circ}$ C) A (0 $\pm$ 30ppm/ $^{\circ}$ C)
Operating Temperature	-55 $^{\circ}$ C +125 $^{\circ}$ C
Quality Factor	Per MIL-C-55681/4
Insulation Resistance	Per MIL-C-55681 1 Gohm to 470pF @ +25 $^{\circ}$ C 100,000 Mohm to 470pF @ +125 $^{\circ}$ C 100,000 Mohm above 470pF @ +25 $^{\circ}$ C 10,000 Mohm above 470pF @ +125 $^{\circ}$ C
Ageing and Piezoelectric effects	None
Dielectric Withstanding Voltage	2.5 x rated voltage (for 500v 1.5 x rated voltage)

C19, C25

AVX

KYOCERA



General Specifications MLC Capacitors

C0G Dielectric

C0G ceramics offer one of the most stable capacitor dielectrics available. Capacitance change with temperature is $0 \pm 30 \text{ ppm}/^\circ\text{C}$ which is less than $\pm 0.3\% \Delta C$ from -55°C to $+125^\circ\text{C}$. Capacitance drift for C0G ceramics is negligible at less than $\pm 0.05\%$. Typical capacitance change with life is less than $\pm 0.1\%$ for C0G's, one fifth that is shown by most other dielectrics. C0G formulations show no ageing characteristics. In these capacitors dielectric materials are used which have a very high specific resistance, very good Q and linear temperature dependence. C0G also exhibits negligible capacitance and dissipation factor change with voltage or frequency. Uses for this dielectric include Oscillators, RF Filters, Timing, Resonant and Tuning circuitry.

X7R Dielectric

X7R is a reasonably stable high-permittivity (Hi-K) dielectric, which allows capacitance values beyond $1\mu\text{F}$ to be achieved within a reasonable package size. X7R exhibits a non linear variation of capacitance with temperature which is within $\pm 15\%$ over the temperature range -55°C to $+125^\circ\text{C}$. Capacitance for X7R also varies under the influence of electrical operating conditions such as voltage and frequency. It also varies with time, approximately $1\% \Delta C$ per decade of time, representing about 5% change in 10 years. Uses for this dielectric include: Filters, (Input and Output), EMI filters, Snubber, Voltage multipliers, AC bypass, Reservoirs, Timing and Decoupling.

Y5V Dielectric

Y5V exhibits a high permittivity which allows high capacitance values to be achieved in a small package, $10\mu\text{F}$ in a 1210 case for example. Y5V exhibits a wide temperature characteristic of $+22\% -82\%$ capacitance change over the operating temperature range of -30°C to $+85^\circ\text{C}$. Y5V capacitors are mainly used in decoupling circuitry but can also be used for coupling.

Electrical Specifications

	C0G	X7R	Y5V
Capacitance Range	0.5pF to 33nF	100pF to 2.2 μF	2.2nF to 10 μF
Capacitance Measurement	(1.0 $\pm$ 0.2 Vrms, 1KHz) C $\leq$ 1nF, 1MHz, 1.0 $\pm$ 0.2 Vrms C > 1nF, 1KHz, 1.0 $\pm$ 0.2 Vrms	(1.0 $\pm$ 0.2 Vrms, 1KHz)	(1.0 $\pm$ 0.2 Vrms, 1KHz)
Capacitance Tolerance	For C < 10pF, preferred $\pm 0.25\text{pF}$, $\pm 0.5\text{pF}$ others available: $\pm 0.1\text{pF}$ For C $\geq$ 10pF, preferred $\pm 5\%$, $\pm 10\%$ others available $\pm 1\%$, $\pm 2\%$	Preferred $\pm 10\%$, $\pm 20\%$ others available: $\pm 5\%$	Preferred $+80\% -20\%$ others available: 0, $+100\%$
Temperature Characteristic	$0 \pm 30 \text{ ppm}/^\circ\text{C}$	$0 \pm 15\%$ (0 VDC)	$+22\%$ to -82%
Operating Temperature	-55°C to $+125^\circ\text{C}$	-55°C to $+125^\circ\text{C}$	-30°C to $+85^\circ\text{C}$
Voltage Ratings	25, 50, 100, 200 and 500 VDC	10, 16, 25, 50, 100, 200 and 500 VDC	10, 16, 25 and 50 VDC
Dissipation Factor	0.1% max for C > 50pF (150/C $\pm$ 7) $\times$ 0.0001 max for C $\leq$ 50pF	2.5% max. for 50, 100, 200, 500V 3.0% max. for 25V 3.5% max. for 10/16V	5.0% max. 25, 50V All styles 7.0% max. 16V All styles except 0805 2.2 μF 1206 4.7 μF 9.0% max. 16V

AVX

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Thin Film Capacitors

The use of very thin high dielectric materials (ferroelectric, titanate and strontium oxytitanate) in conjunction with highly conductive electrode films yields a capacitor with lower ESR and high Q. These high frequency characteristics change at a slower rate with increasing frequency than for ceramic microwave capacitors.

These capacitors are characterised by a number of beneficial properties.

- Internationally agreed sizes with excellent dimensional control
- Small chip size (0603)
- Tight capacitance tolerances
- Low ESR at VHF, UHF & microwave frequencies
- High stability with respect to time, temperature, frequency and voltage variation
- Nickel/solder coated terminations to provide excellent solderability and leach resistance
- Enhanced RF power handling capability (Accu-P™)

Typical Applications

- Cellular communications
- Cordless telephones/Personal communication networks
- Satellite & Cable television
- Global positioning systems
- Vehicle location systems
- Vehicle alarm systems
- Paging
- Military communications
- Radar systems
- Video switching
- Test & measurement
- Filters
- VCO's
- Matching networks
- RF Amplifiers (Accu-P™)

Electrical Specifications

Capacitance Range	0.1pF to 100pF
Capacitance Tolerance	$\pm 0.05\text{pF}$ to $\pm 5\%$
Capacitance Measurement	1 MHz, 1 Vrms
Operating & Storage Temperature Range	-55°C to +125°C
Temperature Coefficient	J ($0 \pm 30\text{ppm}/^\circ\text{C}$) K ($0 \pm 60\text{ppm}/^\circ\text{C}$)
Insulation Resistance	$\geq 10\text{Gohm}$
Proof Voltage	2.5 x rated voltage for 5 secs.
Ageing	None
Dielectric Absorption	0.01%



General Specifications Negative T.C. Capacitors

Introduction

Temperature compensating capacitors have defined temperature coefficients where the capacitance value changes with temperature in a predictable and sensibly linear way. The most common of these have a negative temperature coefficient (NTC) where the decrease in capacitance with increase in temperature is expressed in parts per million per degree C (ppm/°C) as shown below. These are used to balance positive going changes exhibited by other electronic components and ferrites.

Electrical Specifications

Capacitance Range	0.5pF to 1.0nF
Capacitance Tolerance	± 0.25pF to ± 20%
Capacitance Measurement	C ≤ 1000pF, 1Mhz, 0.5-5 Vrms C > 1000pF, 1Khz, 0.5-5 Vrms
Operating Temperature	-55°C to +125°C
Temperature Coefficient	See table below
Insulation Resistance	≥ 10Gohms or 500 MohmµF min, whichever is less
Quality Factor	C < 30pF: Q ≥ 400 + 20C C ≥ 30pF: Q ≥ 1000
Ageing	Zero
Dielectric Withstanding Voltage	2.5 x rated voltage

Temperature Coefficient

Capacitance (pF)	N150 ppm/°C	N220 ppm/°C	N330 ppm/°C	N470 ppm/°C	N750 ppm/°C	SL ppm/°C
0.5 - 2.9	± 250	± 250	± 250	± 250	± 250	+350, -1000
3.0 - 3.9	± 120	± 120	± 120	± 120	± 120	+350, -1000
4.0 - 9.9	± 60	± 60	± 60	± 60	± 120	+350, -1000
≥ 10	± 60	± 60	± 60	± 60	± 120	+350, -1000

RC01	± 5	711 81...	711 51...	712 81...	712 71...	-	-
	± 2	711 41...	711 71...	712 83...	712 23...	-	-
RC11	± 5	730 81...	730 71...	731 81...	731 71...	731 81...	-
	± 2	730 31...	730 41...	730 21...	731 41...	731 51...	-
RC21	± 5	702 80...	702 70...	-	-	-	702 80...
	± 2	702 65...	-	-	-	-	702 65...
Jumper 0 Ω							
RC01; note 1	-	711 91032	711 91005	712 91024	712 91004	-	-
RC11; note 1	-	730 91002	730 91003	731 91003	731 91002	731 91006	-
RC21; note 2	-	702 96001	702 97001	-	-	-	702 91002

Notes

1. The jumper has a maximum resistance $R_{max} = 50 \text{ m}\Omega$ and a rated current $I_R = 2 \text{ A}$.
2. The jumper has a maximum resistance $R_{max} = 50 \text{ m}\Omega$ and a rated current $I_R = 1 \text{ A}$.

Ordering code (12NC)

- The resistors have a 12-digit ordering code starting with 2322.
- The subsequent 5 digits indicate the resistor type and packaging; see Table 1.
- The remaining 3 digits indicate the resistance value:
 - The first 2 digits indicate the resistance value
 - The last digit indicates the resistance decade in accordance with Table 2.

Table 2 Last digit of 12NC

RESISTANCE DECADE	LAST DIGIT
1 to 9.76 Ω	8
10 to 97.6 Ω	9
100 to 976 Ω	1
1 to 9.76 k Ω	2
10 to 97.6 k Ω	3
100 to 976 k Ω	4
1 to 9.76 M Ω	5
10 M Ω	6

ORDERING EXAMPLE

The ordering code of a RC11 resistor, value 4700 Ω with $\pm 2\%$ tolerance, supplied on cardboard tape of 5000 units per reel is: 2322 730 31472.

Resistor R8

TYPE	TOL.	ORDERING CODE 1222 --				
		CARDBOARD TAPE ON REEL	EMBOSSED CARRIER TAPE ON REEL	BULK CASE	10000 units	25000 units

Table 1 Ordering code indicating resistor type and packaging

ORDERING INFORMATION

Standard chip resistors
sizes 1206, 0805 and 0603

RC01/11/21

Product specification

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201/11/21

Philips Components

Product specification

Standard chip resistors sizes 1206, 0805 and 0603

RC01/11/21

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E24 series for resistors with a tolerance of $\pm 5\%$ or $\pm 2\%$. The values of the E24 series are in accordance with IEC publication 63.

Limiting values

TYPE	LIMITING VOLTAGE ⁽¹⁾ (V)	LIMITING POWER (W)
RC01	200	0.25
RC11	180	0.125
RC21	50	0.063

Note

1. This is the maximum voltage that may be continuously applied to the resistor element, see IEC publication 115-8.

DERATING

The power that the resistor can dissipate depends on the operating temperature: see Fig. 1.

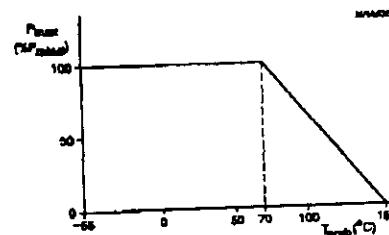
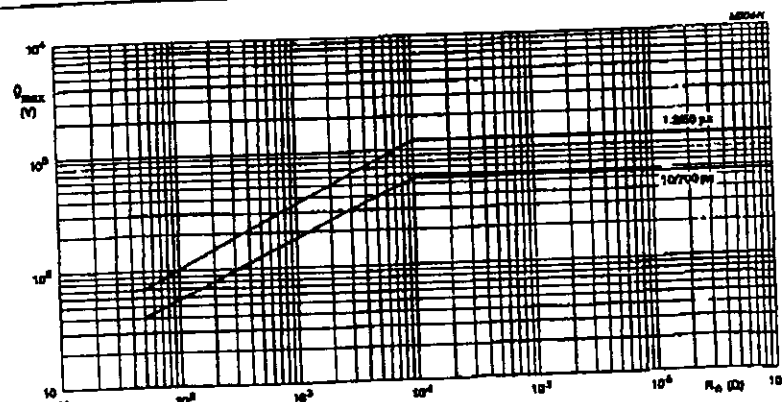


Fig. 1 Maximum dissipation (P_{max}) in percentage of rated power as a function of the ambient temperature (T_{amb}).

PULSE LOADING CAPABILITIES



These pulses may not be applied on a regular basis.

Fig. 2 Maximum permissible peak pulse voltage without failing to 'open circuit' in accordance with DIN IEC 40 (CO) 833 for type: RC01.

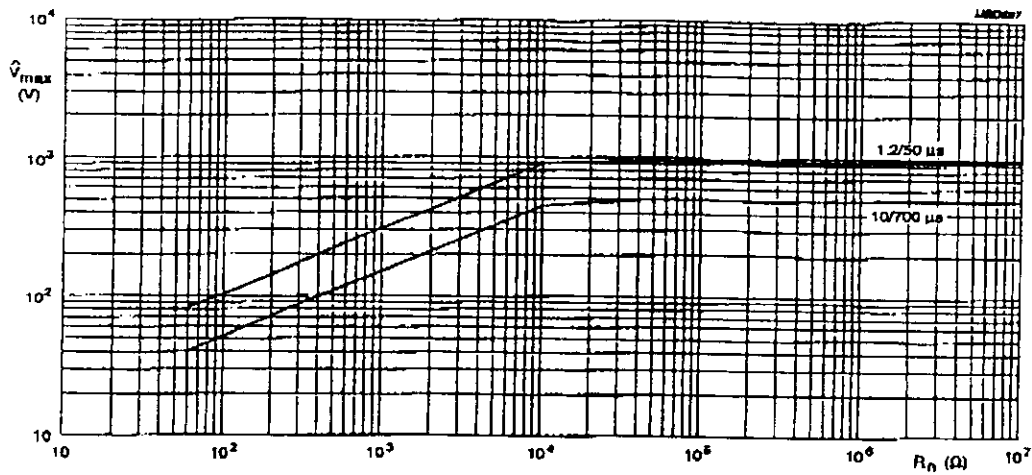


Fig.3 Maximum permissible peak pulse voltage without failing to 'open circuit' in accordance with DIN IEC 40 (CO) 533 for type: RC11.

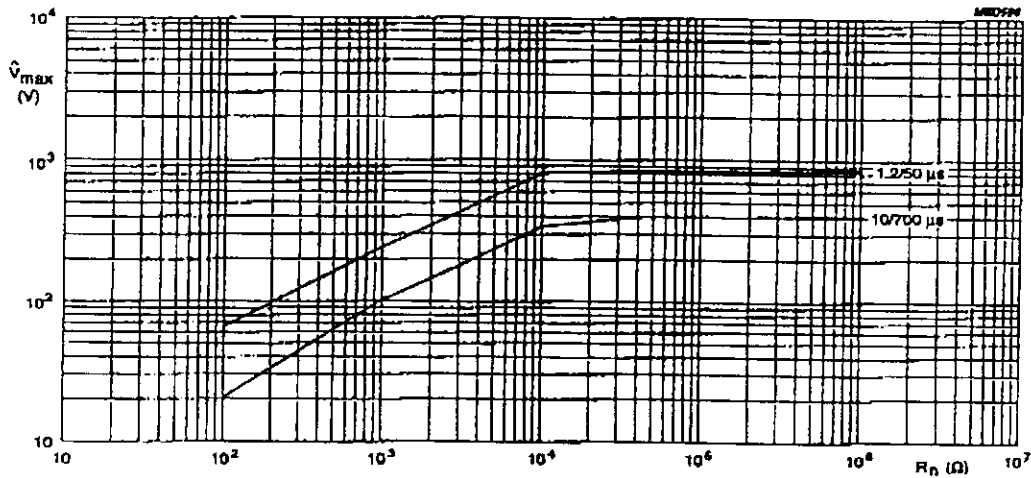


Fig.4 Maximum permissible peak pulse voltage without failing to 'open circuit' in accordance with DIN IEC 40 (CO) 533 for type: RC21.

Standard chip resistors
sizes 1206, 0805 and 0603

RC01/11/21

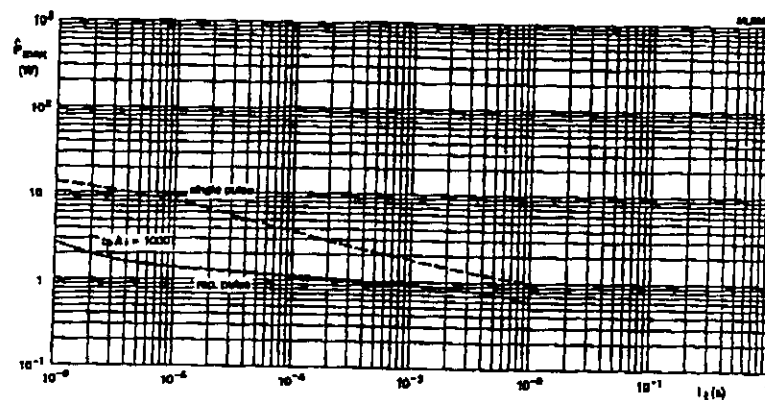


Fig.5 Pulse on a regular basis for type: RC01; maximum permissible peak pulse power (P_{max}) as a function of pulse duration for $R \leq 10 \text{ k}\Omega$, single pulse and repetitive pulse $t_1/T_1 = 1000$.

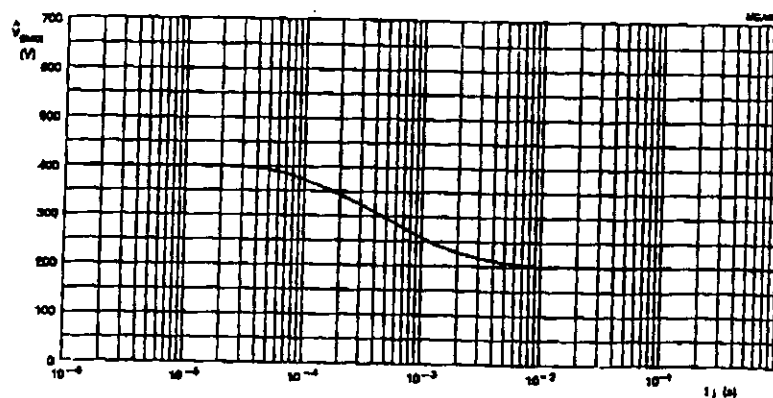


Fig.6 Pulse on a regular basis for type: RC01; maximum permissible peak pulse voltage (V_{max}) as a function of pulse duration.

Standard chip resistors sizes 1206, 0805 and 0603

RC01/11/21

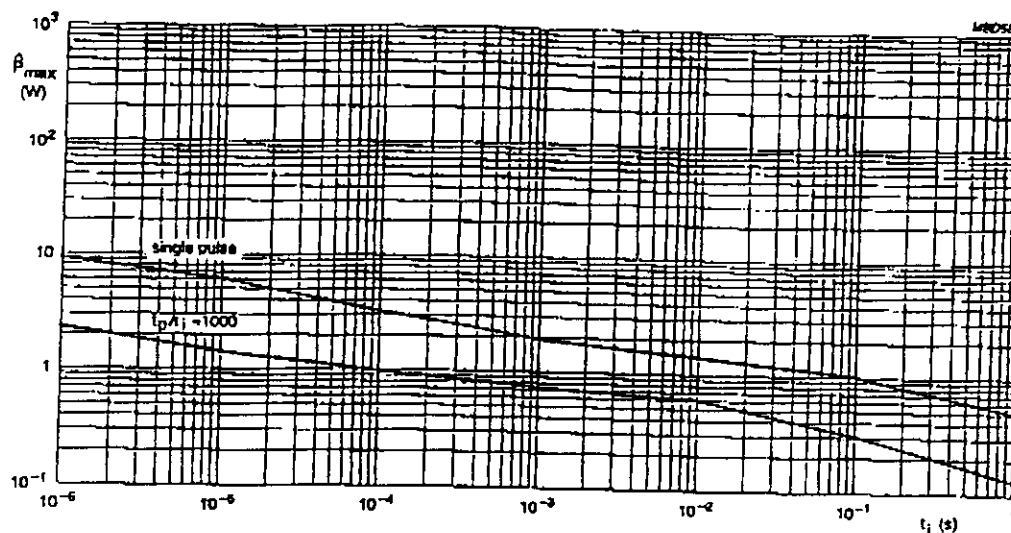


Fig.7 Pulse on a regular basis for type: RC11; maximum permissible peak pulse power ($\hat{P}_{max}$) as a function of pulse duration for $R \leq 10$ k Ω , single pulse and repetitive pulse $t_p/t_i = 1000$.

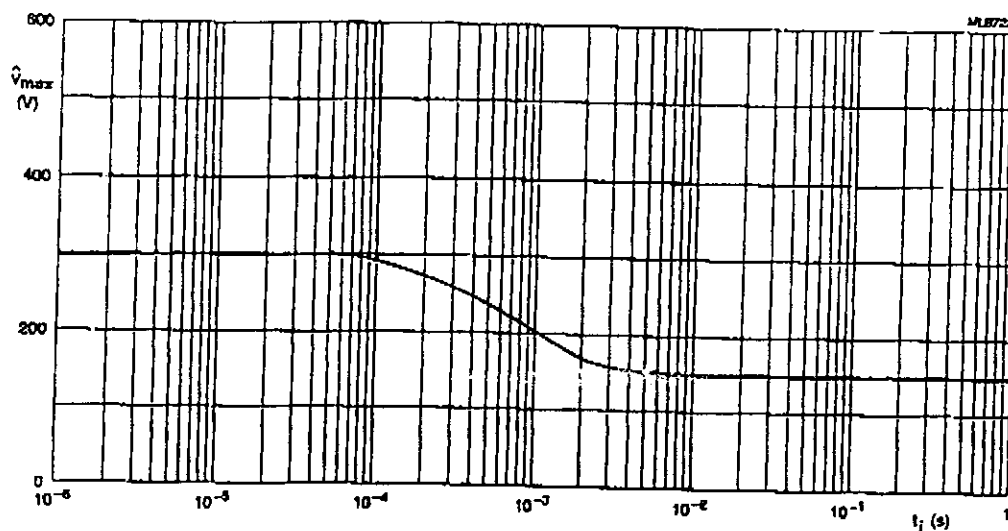


Fig.8 Pulse on a regular basis for type: RC11; maximum permissible peak pulse voltage ($\hat{V}_{max}$) as a function of pulse duration.

Standard chip resistors sizes 1206, 0805 and 0603

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RC11

RC21

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12R0

8202

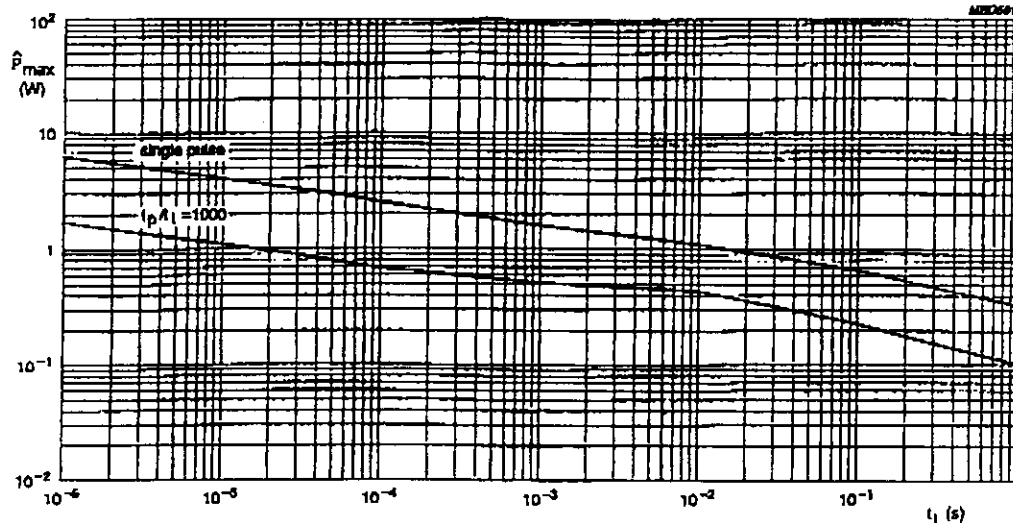
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TC valu
quantity
number

Fig.9 Pulse on a regular basis for type: RC21; maximum permissible peak pulse power ($\hat{P}_{max}$) as a function of pulse duration for $R \leq 10 \text{ k}\Omega$, single pulse and repetitive pulse $t_p/t_i = 1000$.

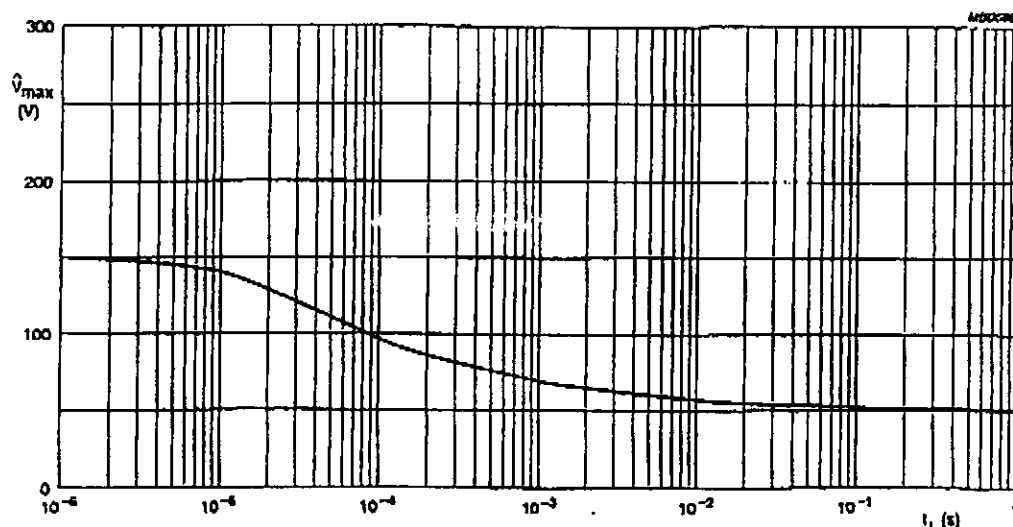


Fig.10 Pulse on a regular basis for type: RC21; maximum permissible peak pulse voltage ($\hat{V}_{max}$) as a function of pulse duration.

Standard chip resistors sizes 1206, 0805 and 0603

RC01/11/21

MECHANICAL DATA

Mass per 100 units

TYPE	MASS (g)
RC01	1.0
RC11	0.55
RC21	0.25

Marking

Each resistor is marked with a three digit code (occasionally four digit) on the protective coating to designate the nominal resistance value.

3-DIGIT MARKING

For values up to 91 Ω the R is used as a decimal point. For values of 100 Ω or greater the first 2 digits are significant, the third indicates the number of zeros to follow.

Example

MARKING	RESISTANCE
12R	12 Ω
823	82 k Ω

4-DIGIT MARKING

For values up to 976 Ω the R is used as a decimal point. For values of 1 k Ω or greater the first 3 digits are significant, the fourth indicates the number of zeros to follow.

Example

MARKING	RESISTANCE
12R0	12 Ω
8202	82 k Ω

The packaging is also marked and includes resistance value, tolerance, TC value, catalogue number, quantity, production period, batch number and source code.

Outlines

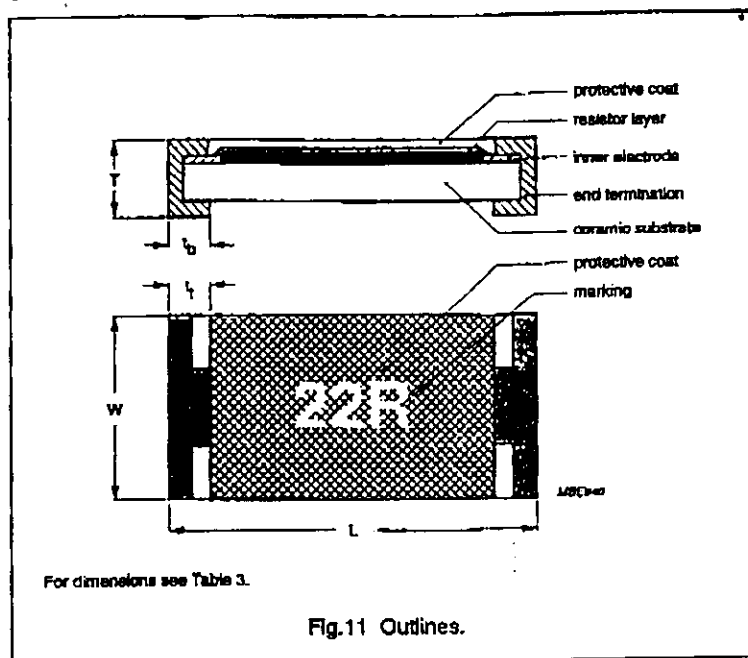


Table 3 Chip resistor types and relevant physical dimensions; see Fig.11

TYPE	L (mm)	W (mm)	T (mm)	t (mm)	t _b (mm)
RC01	3.20 +0.10/-0.20	1.60 ±0.15	0.55 ±0.10	0.45 ±0.25	0.50 ±0.25
RC11	2.00 ±0.15	1.25 ±0.15	0.55 ±0.10	0.40 ±0.20	0.40 ±0.20
RC21	1.60 ±0.10	0.80 +0.15/-0.05	0.45 ±0.10	0.30 ±0.20	0.30 ±0.20

Standard chip resistors sizes 1206, 0805 and 0603

RC01/11/21

Standard chip resistors sizes 1206, 0805 and 0603

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with the schedule of "IEC publication 115-8", category LCT/UCT/56 (rated temperature range: Lower Category Temperature, Upper Category Temperature; damp heat, long term, 56 days). The testing also covers the requirements specified by EIA and EIAJ.

The tests are carried out in accordance with IEC publication 68, "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmospheric conditions according to "IEC 68-1", subclause 5.3.

Unless otherwise specified the following values apply:

Temperature: 15 °C to 35 °C

Relative humidity: 45% to 75%

Air pressure: 86 kPa to 106 kPa (860 mbar to 1060 mbar).

In Table 4 the tests and requirements are listed with reference to the relevant clauses of "IEC publications 115-8 and 68"; a short description of the test procedure is also given. In some instances deviations from the IEC recommendations were necessary for our method of specifying.

All soldering tests are performed with mildly activated flux.

Table 4 Test procedures and requirements

IEC 115-8 CLAUSE	IEC 68-2 TEST METHOD	TEST	PROCEDURE	RESISTANCE RANGE	REQUIREMENTS		
					RC01	RC11	RC21
Tests in accordance with the schedule of IEC publication 115-8							
4.4.1		visual examination			no holes; clean surface; no damage		
4.4.2		dimensions (outline; see Fig.11)	gauge (mm)		$0.45 \leq T \leq 0.65$ $1.45 \leq W \leq 1.76$ $3.0 \leq L \leq 3.3$	$0.45 \leq T \leq 0.65$ $1.10 \leq W \leq 1.40$ $1.85 \leq L \leq 2.15$	$0.35 \leq T \leq 0.65$ $0.75 \leq W \leq 0.95$ $1.50 \leq L \leq 1.70$
4.5		resistance	applied voltage (+0/-10%): $R < 10 \Omega$: 0.1 V $10 \Omega \leq R < 100 \Omega$: 0.3 V $100 \Omega \leq R < 1 \text{ k}\Omega$: 1 V $1 \text{ k}\Omega \leq R < 10 \text{ k}\Omega$: 3 V $10 \text{ k}\Omega \leq R < 100 \text{ k}\Omega$: 10 V $100 \text{ k}\Omega \leq R < 1 \text{ M}\Omega$: 25 V $R \geq 1 \text{ M}\Omega$: 50 V		$R - R_{\text{nom}}$: max. $\pm 2\%$ or $R - R_{\text{nom}}$: max. $\pm 5\%$		
4.18	20 (Ta)	resistance to soldering heat	unmounted chips; 10 s; $260 \pm 5 \text{ }^{\circ}\text{C}$		no visual damage $\Delta R/R$ max.: $\pm 0.5\%$ $\pm 0.05 \Omega$;		
4.29	45 (Xa)	component solvent resistance	Isopropyl alcohol or H ₂ O followed by brushing in accordance with "MIL 202 F"		no visual damage		

IEC 115-8 CLAUSE	IEC 68-2 TEST METHOD	TEST	PROCEDURE	RESISTANCE RANGE	REQUIREMENTS		
					RC01	RC11	RC21
4.17	20 (Ta)	solderability	unmounted chips completely		good tinning (>95% covered); no visual damage		

1/11/21

Standard chip resistors sizes 1206, 0805 and 0603

RC01/11/21

no visual damage

brushing in accordance with
"MIL 202 F"solvent
resistance

IEC 115-8 CLAUSE	IEC 68-2 TEST METHOD	TEST	PROCEDURE	RESISTANCE RANGE	REQUIREMENTS		
					RC01	RC11	RC21
4.17	20 (Ta)	solderability	unmounted chips completely immersed for 2 ± 0.5 s in a solder bath at 235 ± 5 °C		good tinning (≥95% covered); no visual damage		
4.7		voltage proof on insulation	maximum voltage (RMS) during 1 minute metal block method		no breakdown or flashover		
4.13		short time overload	room temperature; $P = 6.25 \times P_n$ $5 s (V \leq 2 \times V_{max})$		$\Delta R/R$ max.: ±1% +0.05 Ω		
4.33		bending	resistors mounted on a 90 mm glass epoxy resin PCB (FR4); bending: 3 mm for RC01 and 5 mm for RC11 and RC21		no visual damage $\Delta R/R$ max.: ±1% +0.05 Ω		
4.19	14 (Na)	rapid change of temperature	30 minutes at LCT and 30 minutes at UCT; 5 cycles		no visual damage $\Delta R/R$ max.: ±0.5% +0.05 Ω		
4.23		climatic sequence:					
4.23.3	30 (D)	damp heat (accelerated) 1st cycle	6 days; 55 °C; 95 to 98% RH		R_{100} min.: 10 ⁴ MΩ $\Delta R/R$ max.: ±1.5% +0.1 Ω $\Delta R/R$ max.: ±3% +0.1 Ω		
4.23.6	30 (D)	damp heat (accelerated) remaining cycles		$R \leq 1$ MΩ $R > 1$ MΩ			
4.24.2	3 (Ca)	damp heat (steady state) (IEC)	56 days; 40 °C; 90 to 95% RH; loaded with 0.01 P_n (IEC steps: 4 to 100 V)	$R \leq 1$ MΩ $R > 1$ MΩ	$\Delta R/R$ max.: ±1.5% +0.1 Ω $\Delta R/R$ max.: ±3% +0.1 Ω		
4.25.1		endurance (at 70 °C)	1000 hours; loaded with P_n or V_{max} 1.5 hours on and 0.5 hours off	$R \leq 1$ MΩ $R > 1$ MΩ	$\Delta R/R$ max.: ±1.5% +0.1 Ω $\Delta R/R$ max.: ±3% +0.1 Ω		
4.23.2	27 (Ba)	endurance at upper category temperature	1000 hours; no load	$R \leq 1$ MΩ $R > 1$ MΩ	$\Delta R/R$ max.: ±1.5% +0.1 Ω $\Delta R/R$ max.: ±3% +0.1 Ω		
4.8.4.2		temperature coefficient	at 20/LCT/20 °C and 20/UCT/20 °C ($TC \times 10^{-6}/K$)	$R < 5 \Omega$ $R \leq 10$ MΩ	$\leq \pm 250$ $\leq \pm 200$		

Standard chip resistors
sizes 1206, 0805 and 0603

RC01/11/21

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IEC 115-8 CLAUSE	IEC 68-2 TEST METHOD	TEST	PROCEDURE	RESISTANCE RANGE	REQUIREMENTS		
					RC01	RC11	RC21
Other tests in accordance with IEC 115 clauses and IEC 68 test method							
4.17	20 (Tb)	solderability (after ageing)	8 hours steam or 16 hours 155 °C; unmounted chips completely immersed for 2 ±0.5 s in a solder bath at 235 ±5 °C		good tinning (≥85% covered); no damage		
4.6.1.1		insulation resistance	voltage (DC) after 1 minute, metal block method: 100 V for RC01 and RC11, 50 V for RC21		$R_{ins} \min.: 10^3 \text{ M}\Omega$		
4.12		noise	IEC publication 195 (measured with Quantech - equipment)	$R \leq 1 \text{ k}\Omega$ $R \leq 10 \text{ k}\Omega$ $R \leq 100 \text{ k}\Omega$ $R \leq 1 \text{ M}\Omega$	max. 1 $\mu\text{V/V}$ max. 3 $\mu\text{V/V}$ max. 6 $\mu\text{V/V}$ max. 10 $\mu\text{V/V}$		
Other applicable tests							
	(JIS)	humidity load (steady state)	1 000 hours; +40 °C; 90 to 85% RH; loaded with P_a or V_{max} 1.5 hours on and 0.5 hours off	$R \leq 1 \text{ M}\Omega$ $R > 1 \text{ M}\Omega$	$\Delta R/R \text{ max.: } \pm 3\% +0.1 \Omega$ $\Delta R/R \text{ max.: } \pm 5\% +0.1 \Omega$		
		leaching	unmounted chips; 60 s; 260 ±5 °C		good tinning; no leaching		
		trio damp heat test	1 000 hours; +85 °C; 85% RH; loaded with 0.1 P_a or V_{max}	$R \leq 1 \text{ M}\Omega$ $R > 1 \text{ M}\Omega$	$\Delta R/R \text{ max.: } \pm 3\% +0.1 \Omega$ $\Delta R/R \text{ max.: } \pm 5\% +0.1 \Omega$		