



**Measurement Report
On Behalf Of
Advantech Co., Ltd.
Data Acquisition Module**

Model # : PCM-3718, PCM-3724

**Prepared for:
Advantech Co., Ltd.
F1. 4, No. 108-3, Ming-Chuan Road, Shing-Tien City,
Taipei, Taiwan, R.O.C**

**Report By : Global EMC Standard Tech. Corp.
No.3 Pau-Tou-Tsuo Valley, Chia-Pau
Tsuen, Lin Kou Hsiang, Taipei County,
Taiwan, R.O.C.
Tel : (02) 2603-5321
Fax : (02) 2603-5325**

Test results given in this report only relate to the specimen(s) tested, calibrated or measured.
This report shall not be reproduced other than in full without the written consent of Gestek.

TABLE OF CONTENTS

	Description	Page
1.	Test Report Certification.....	4
2.	General Information	5
2.1	Production Description.....	5
2.2	Results:.....	5
2.3	Tested System Details.....	6
2.4	Test Methodology	8
2.5	Test Facility.....	8
3.	Conducted Emission Test	9
3.1	Test Equipments.....	9
3.2	Block Diagram of Test Setup	9
3.3	Conducted Emission.....	10
3.4	EUT Configuration on Measurement.....	10
3.5	EUT Exercise Software.....	11
3.6	Conducted Emission Data	11
4.	Radiation Emission Test.....	13
4.1	Test Equipment	13
4.2	Test Setup.....	14
4.2.1	Block Diagram of Connections between EUT and simulators	14
4.2.2	Open Test Site & Anechoic Chamber Setup Diagram.....	15
4.3	Radiated Emission Limit.....	15
4.4	EUT Configuration.....	16
4.5	Operating Condition of EUT.....	16
4.6	Radiated Emission Data	16
5.	Disturbance Measurement	19
5.1	Test Equipment	19
5.2	Test Setup of EUT.....	19
5.3	Limits of Harmonics Currents.....	20
5.4	EUT Operating Condition	20
5.5	Test Procedure.....	20
5.6	Test Method	20
5.7	Test Result.....	20
6.	ESD Measurement	21
6.1	Test Equipment	21
6.2	Test Setup.....	21
6.2.1	Block Diagram of Connections between EUT and simulators.....	21
6.3	Severity Levels.....	22
6.4	EUT Operating Condition	22
6.5	Test Procedure.....	22
6.6	Test Method	23
6.7	Test Result.....	23

7.	RF Field Strength Susceptibility Measurement	24
7.1	Test Equipment	24
7.2	Block Diagram of Test Setup	24
7.3	Severity Levels.....	25
7.4	EUT Operating Condition	25
7.5	Test Procedure.....	25
7.6	Test Method	25
7.7	Test Result.....	26
8.	Electrical Fast Transient/Burst Measurement	27
8.1	Test Equipment	27
8.2	Block Diagram of Test Setup	27
8.3	Severity Levels.....	27
8.4	EUT Operation Condition	28
8.5	Test Procedure.....	28
8.6	Test Method	28
8.7	Test Result.....	29
9.	Conducted Susceptibility Measurement	30
9.1	Test Equipment	30
9.2	Block Diagram of Test Setup	30
9.3	Severity Levels.....	30
9.4	EUT Operation Condition	30
9.5	Test Procedure.....	31
9.6	Test Method	31
9.7	Test Result.....	31
10.	Surge Measurement	32
10.1	Test Equipment	32
10.2	Block Diagram of Test Setup	32
10.3	Severity Levels.....	32
10.4	EUT Operation Condition	33
10.5	Test Procedure.....	33
10.6	Test Method	33
10.7	Test Result.....	33
11.	Voltage Dips and Interruption Measurement	34
11.1	Test Equipment	34
11.2	Block Diagram of Test Setup	34
11.3	Severity Levels.....	34
11.4	EUT Operation Condition	35
11.5	Test Procedure.....	35
11.6	Test Method	35
11.7	Test Result.....	35
12.	Photographs	36
13.	EMI/EMS Reduction Method During Compliance Testing.....	48

1. Test Report Certification

Applicant : Advantech Co., Ltd.
EUT Description : Data Acquisition Module
Model Number : PCM-3718, PCM-3724
Serial Number : ProtoType
Power Supply : 230V/50Hz

MEASUREMENT PROCEDURE USED :

EN50081-2/1993 RULES AND EN55022/1994+A1/1995 RULES AND EN61000-3-2,-3
EN50082-2/1995 RULES AND EN 61000-4 SERIES REGULATIONS

For EN50081-2/1993 and EN55022/1994+A1/1995:

The measurement shown in the attachment where made in accordance with the procedures indicated, and the maximum energy emitted by the equipment was found to be within the EN55022/1994+A1/1995 limits applicable.

For EN50082-2/1995 Rules and EN 61000-4 Series Regulations:

The device described above was evaluated by Global EMC Standard Tech. Corp. to determine the severity levels of the device, and the severity levels of the device can endure and its performance criterion. The measurement results are contained in this test report and show that the EUT to be technically compliant with EN50082-2/1995/EN 61000-4 Series regulations. Global EMC Standard Tech. Corp. recommends that the measurement results can pass performance criterion of above regulations.

GENERAL REMARK:

The tests were performed according to the technical requirement of EUT .

- ☒ Electron-magnetic Radiation Emission Interference (EN55022/55011)
- ☒ Electron-magnetic Conduction Emission Interference (EN55022/55011)
- ☒ Disturbance Measurement (EN60555-2 & 3/ EN61000-3-2,-3)
- ☒ ESD Measurement (IEC1000-4-2/ EN61000-4-2)
- ☒ RF Field strength Susceptibility Measurement(IEC1000-4-3/ EN 61000-4-3/ENV50140/ ENV50204)
- ☒ Electrical Fast Transient/Burst Measurement (IEC1000-4-4/ EN61000-4-4)
- ☒ Surge Measurement (IEC1000-4-5/ EN61000-4-5)
- ☐ Low Frequency Signals Immunity (IEC1000-2-2)
- ☐ Magnetic Field Measurement (EN61000-4-8)
- ☒ Voltage Dips/Interruption Measurement (EN61000-4-11)

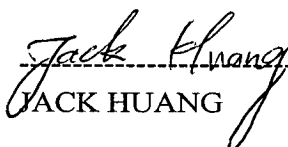
Sample Received Date : November. 11, 1998

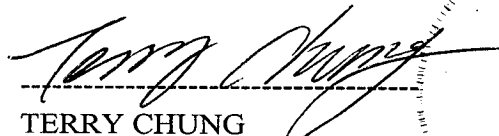
Final Test Date : December. 07, 1998

Documented by : JOAN CHEIN

Test Engineer :

Approve & Authorized Signer :


JACK HUANG


TERRY CHUNG

2. General Information

2.1 Production Description

Description : Data Acquisition Module
Model Number : PCM-3718, PCM-3724
Serial Number : ProtoType
Applicant : Advantech Co., Ltd.
Address : F1. 4, No. 108-3, Ming-Chuan Road, Shing-Tien City,
Taipei, Taiwan, R.O.C
Manufacturer : Advantech Co., Ltd.
Address : F1. 4, No. 108-3, Ming-Chuan Road, Shing-Tien City,
Taipei, Taiwan, R.O.C

2.2 Results:

The EUT(s) met the EN55022/CISPR 22 Class A requirements.

The Worst Emission data was found as following,

	Worst Emission Frequency (MHz)	Emission Level	Limit	Height of Antenna, Angel of Turntable
Conduction Mode 1	0.15376	46.0dBuV Line2 Q.P.	79dBuV	N/A
Radiation Mode 1	141.983	30.42[dB(uV/m)], Vertical	40.00 [dB(uV/m)],	1M, 188°

Note:

1. The EUT is a Data Acquisition Module which install inside PC system. Test setup was to simulated it's usual configuration and the data shown in this test report reflects the worst-case data for each operation mode.
2. PCM-3718 and PCM-3724 was both installed inside one PC system, PCM-3718 is for signal receiving, and PCM-3724 is for singnal transmitting.

2.3 Tested System Details

The FCC IDs/TYPES for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

☒ Host Personal Computer

Manufacture : HEWLETT PACKARD
System : D3496A
S/N : SG52902154
FCC ID : HCJVECTRAVE4
VGA Card : On Board
I/O Card : On Board
CPU Card : Intel Pentium 66MHz, Clock:66MHz
Power Cord : Non-Shielded , Detachable, 1.8m

☒ Monitor M01-010

Model Number : SyncMaster 700p
Serial Number : H3MH903296Y
Manufacturer :SAMSUNG
FCC ID :A3LCGH760
BCIQ ID :3872A230
Data Cable : Shielded, Undetachable, 1.8m
Power Cord : Shielded, Detachable, 1.8m

☒ Keyboard K01-030

Model Number : KB-5923
Serial Number : 7L10500809
FCC ID : E8HKB-5923
Manufacturer : TATUNG
BCIQ ID : 3862A177
Data Cable : Sheiled, Undetachable, 2.0 m

☒ Modem M03-003

Model Number : 1414
Serial Number : 960011400
FCC ID : IFAXDM1414
Manufacturer : ACEEX
Adaptor & Power Cord : Non-Shielded, Detachable, 1.5m
Data Cable : Shielded, Detachable, 1.2m

☒ Mouse(PS2) M02-028

Model Number : MUS3P
Serial Number : N/A
FCC ID : JKGMUS3P01
Manufacturer : Tremon Enterprises Co., Ltd.
Data Cable : Shielded, Undetachable, 1.5m

☒ Printer P01-001

Model Number : 2225C+
Serial Number : 3029S78093
FCC ID : DSI6XU2225
Manufacturer : HP
Adaptor & Power Cord : Non-Shielded, Detachable, 1.9m
Data Cable : Shielded, Detachable, 1.2m

2.4 Test Methodology

EMI Test:

Both conducted and radiated testing were performed according to the procedures in EN55022/1994+A1/1995. Radiated testing was performed at an antenna to EUT distance of 10 meters.

EMS Test:

Performed according to procedures in EN 61000-4(IEC 1000 Series Regulations)

2.5 Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	25-28
Humidity (%RH)	25-75 (45-75 for ESD, 1 st , ed.) (30-60 for ESD, 2 nd , Ed)	42-60 for ESD 50-70 for others
Barometric pressure (mbar)	860-1060	950-1000

Site Description : Oct. 17, 1995 File on NEMKO EMC Laboratory Authorization

Gaustadalleen 30, Postboks 73 Blindern, 0314 Oslo, Aut. No.: ELA 126

Aug. 15, 1996 Recognition on Det Norske Veritas AS

Statement No:510-96-1017

Sep. 30, 1996 Accreditation on NVLAP

NVLAP Lab Code: 200085-0

Dec. 13, 1995 Registration on VCCI

Registration No.: R-291 and C-305

Name of firm : Global EMC Standard Tech. Corp.

Site location : No. 3 Pau-Tou-Tsuo Valley, Chia-Pau Tsuen, Lin Kou
Hsiang, Taipei County, Taiwan, R.O.C.



3. Conducted Emission Test

3.1 Test Equipments

The following test equipments are used during the conducted power line tests:

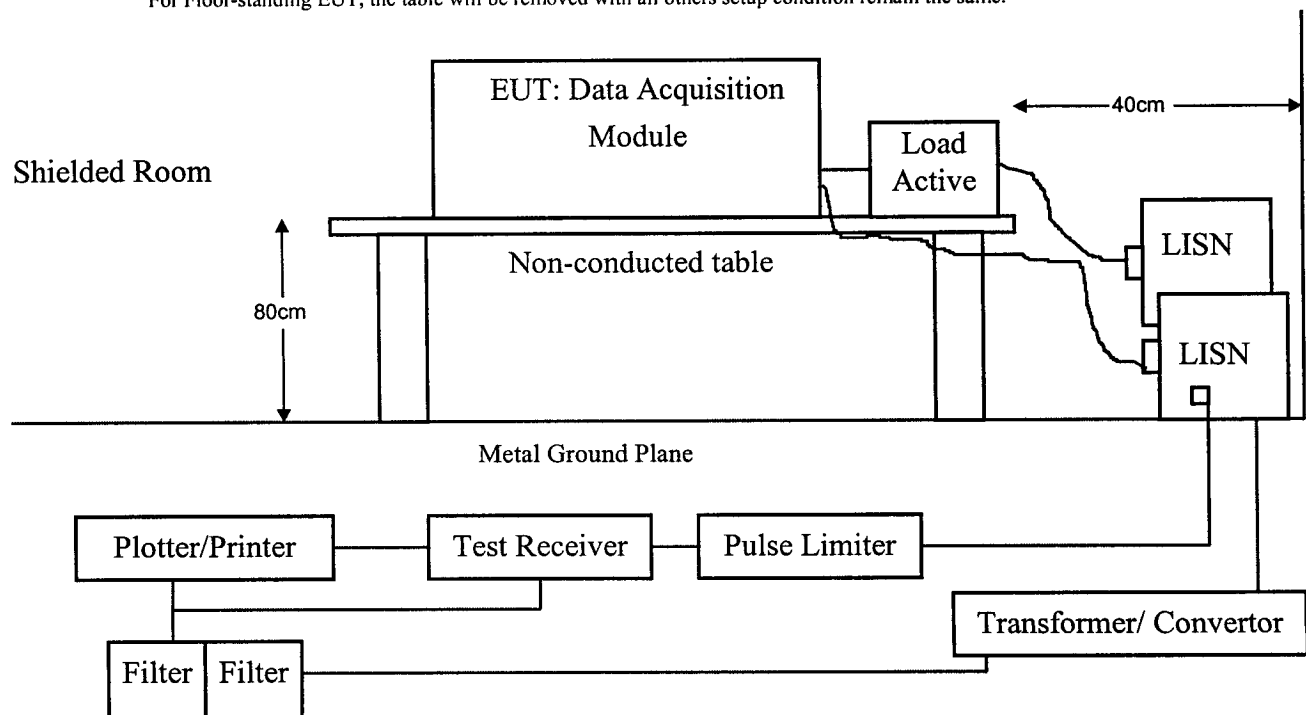
Instrument	Manufacturer	Type /Serial No.	Last Calibration	Location	C.E.
Test Receiver	Rohde & Schwarz	ESHS 30 / 828109/010	Dec. 24, 1997	Shield Room #1	✓
L.I.S.N.	Kyoritsu	KNW-407	Oct. 03, 1998	Shield Room #1	✓
L.I.S.N.	Solar	8012-50-R24 / 90038	Jun. 02, 1998	Shield Room #1	
L.I.S.N.	Rohde & Schwarz	ESH3-Z5 / 840567/002	Oct. 02, 1998	Shield Room #1	✓
L.I.S.N.	Schwarzbeck	NNLK 8121/8121358	Jun. 02, 1998	Shield Room #1	
Pulse Limiter	Rohde & Schwarz	ESH3-Z2/357.8810.52	Nov. 01, 1998	Shield Room #1	✓
Shielded Room	GesTek	GTK-RF-S04	Sep. 17, 1998	Shield Room #1	✓
RF CABLE	GesTek	GTK-RF-C07	Sep. 17, 1998	Shield Room #1	✓
50 Ohm Terminator	GesTek	GTK-RF-T01	Oct. 03, 1998	Shield Room #1	✓

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

3.2 Block Diagram of Test Setup

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



3.3 Conducted Emission

Frequency	Maximum RF Line Voltage dB(uV)			
	Class A		Class B	
MHz	QUASI-PEAK	AVERAGE	QUASI-PEAK	AVERAGE
0.15 - 0.50	79	66	66-56	56-46
0.50-5.0	73	60	56	46
5.0 - 30	73	60	60	50

Remarks : In the Above Table, the tighter limit applies at the band edges.

3.4 EUT Configuration on Measurement

The equipments which is listed 3.2 are installed on Conducted Power Line Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application. The device under test, installed in a representative system as described in section 3.2, was placed on a non-conductive table whose total height equaled 80 CM. Powered from one LISN which signal output to receiver, and the other peripherals was powered from another LISN which signal output was terminated by 50Ω.

3.5 EUT Exercise Software

The EUT exercise program used during conducted testing was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

- 3.5.1 Setup the EUT and simulators as shown on 3.2
- 3.5.2 Turn on the power of all equipments and EUT.
- 3.5.3 Boot the PC from Floppy.
- 3.5.4 Run the EUT test program name:PCM.EXE
- 3.5.5 Start EMC test

3.6 Conducted Emission Data

The measurement range of conducted emission which is from **0.15 MHz to 30 MHz** was investigated. The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages. The final measurement equal to Receiver reading plus Correction factor if available. When LISN insertion loss bigger than 0.5dB then the receiver will add correction factor to reading level automatically.

The total uncertainty for this test is as follows:

- Uncertainty in the field strength measured: $< \pm 2.0$ dB

The uncertainty is calculated in accordance with NAMAS document NIS 81, and is given as 2 standard deviations.

CONDUCTED EMISSION DATA

Date of Test	: December. 05, 1998	Temperature	: 22.7 °C
EUT	: Data Acquisition Module	Humidity	: 71%
Test Mode	: Mode 1	Display Pattern	: N/A

FREQUENCY MHz	READING LEVEL dBuV				LIMIT	
	LINE1 QP	LINE1 AV	LINE2 QP	LINE2 AV	QP	AV
**0.15376	46.0	*	43.8	*	79	66
0.40166	44.5	*	44.4	*	79	66
1.38009	31.3	*	31.2	*	79	66
4.07539	26.2	*	26.1	*	73	60
9.02067	35.6	*	35.4	*	73	60
15.17169	35.6	*	35.2	*	73	60

Remarks : 1. All readings are Quasi-peak and average values.

2. " * " means that the quasi-peak reading level is lower then the average limits, it is not necessary to measure the average level.

3. " ** " means that this data is the worse case emission level.

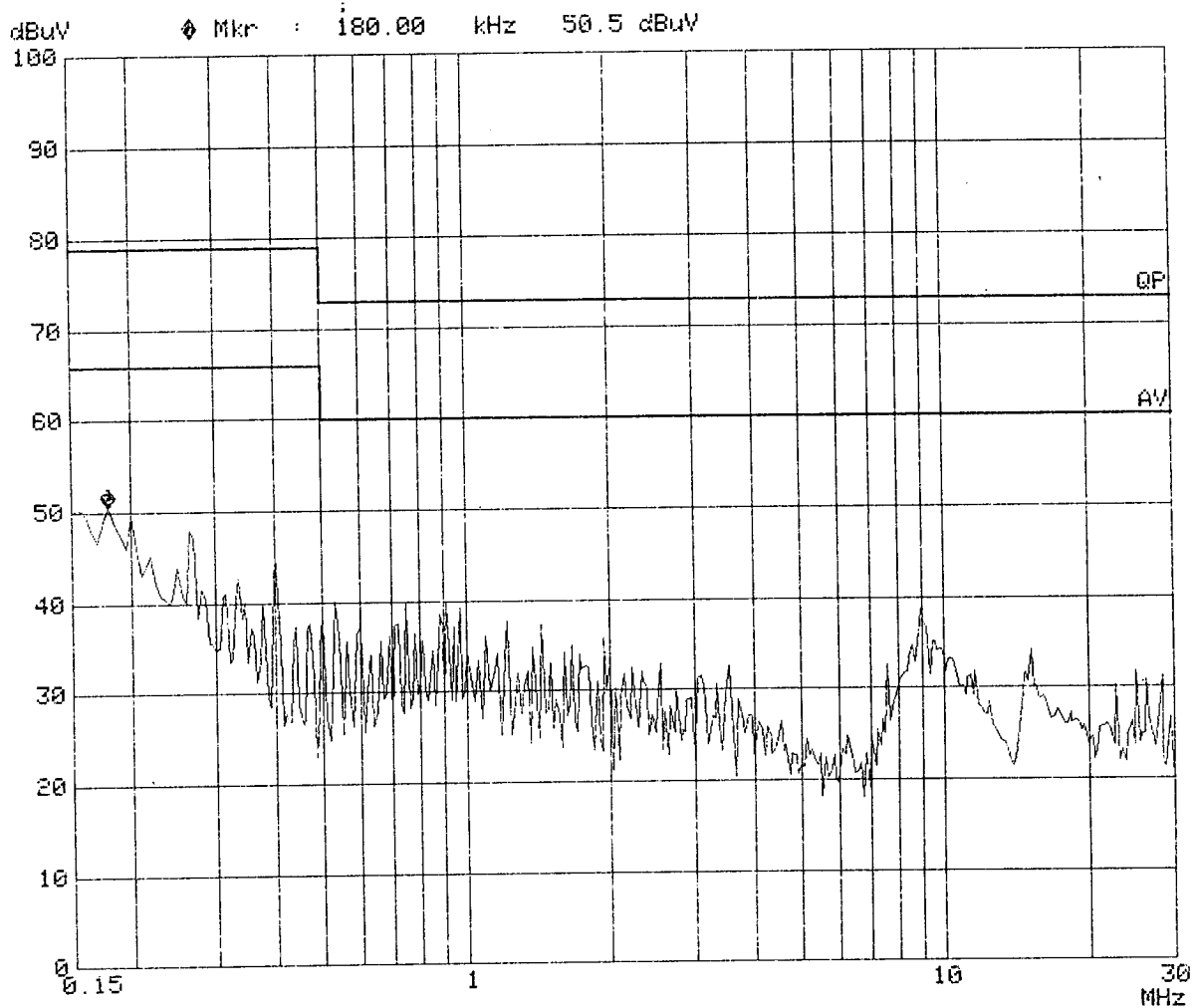
4. Final measurement = (Receiver reading) + (Correction factor if available)

Attached 2 individual pages of peak scan curve data sheets.

ROHDE & SCHWARZ ESHS 30

GestTek, PowerLine Conducted Emission

EUT: Data Acquisition Module
Manuf: Advantech
Operator: Jack Huang
Test Spec: EN55022 A
Comment: Line 1
PCM-3718, PCM-3724
Date: 05. Dec 98 13:56



ROHDE & SCHWARZ ESHS 30

GesTek, PowerLine Conducted Emission

EUT: Data Acquisition Module

Manuf: Advantech

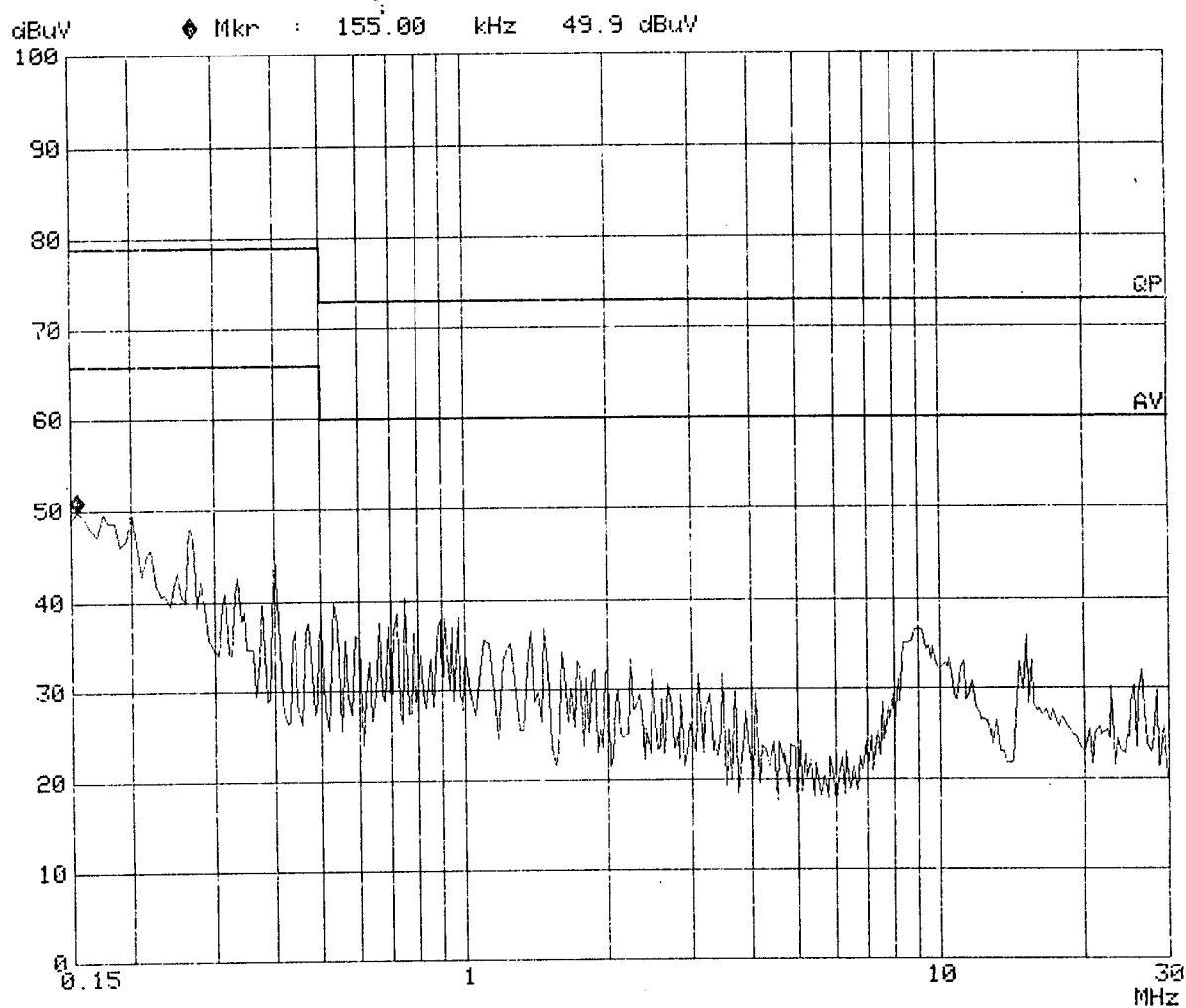
Operator: Jack Huang

Test Spec: EN55022 A

Comment: Line 2

PCM-3718, PCM-3724

Date: 05. Dec 98 13:44



4. Radiation Emission Test

4.1 Test Equipment

The following test equipments are used during the radiated emission tests:

Radiated test was performed on : ☒ Site #1 ☐ Site #2

Instrument	Manufacturer	Type /Serial No.	Last Cal.	Site #1	Site #2
Test Receiver	Rohde & Schwarz	ESVS 10/8421122/001	Dec. 26,1997	✓	
Spectrum Analyzer	HP	8594E / 3543A02689	N/A	✓	
Pre-Amplifier	HP	8447D / 2944A08272	N/A	✓	
Test Receiver	Rohde & Schwarz	ESCS 30/825022/003	Jul. 20,1998		✓
Spectrum Analyzer	HP	8591E/3543A05040	N/A		✓
Pre Amplifier	HP	8447D/2944A08273	N/A		✓
BILOG ANTENNA	Chase	CBL6112B/2417	May. 16,1998	✓	
BILOG ANTENNA	Chase	CBL6112B/2416	May. 16,1998		✓
Pre Amplifier	HP	8347A/3307A01401	N/A	✓	✓
Dipole Antenna	Schwarzbeck	VHAP/736,,737	May.19,1998	✓	✓
Dipole Antenna	Schwarzbeck	UHAP/719,,720	May.19,1998	✓	✓
Open Site	GesTek	GTK-RF-S01	May. 16,1998	✓	
Open Site	GesTek	GTK-RF-S02	May. 16,1998		✓
RF Cable	GesTek	GTK-RF-C01	May. 16,1998	✓	
RF Cable	GesTek	GTK-RF-C02	May. 16,1998	✓	
RF Cable	GesTek	GTK-RF-C03	May. 16,1998		✓
RF Cable	GesTek	GTK-RF-C04	May. 16,1998		✓
Test Program Software	GesTek	GTK-RF-P01	N/A	✓	
Test Program Software	GesTek	GTK-RF-P02	N/A		✓

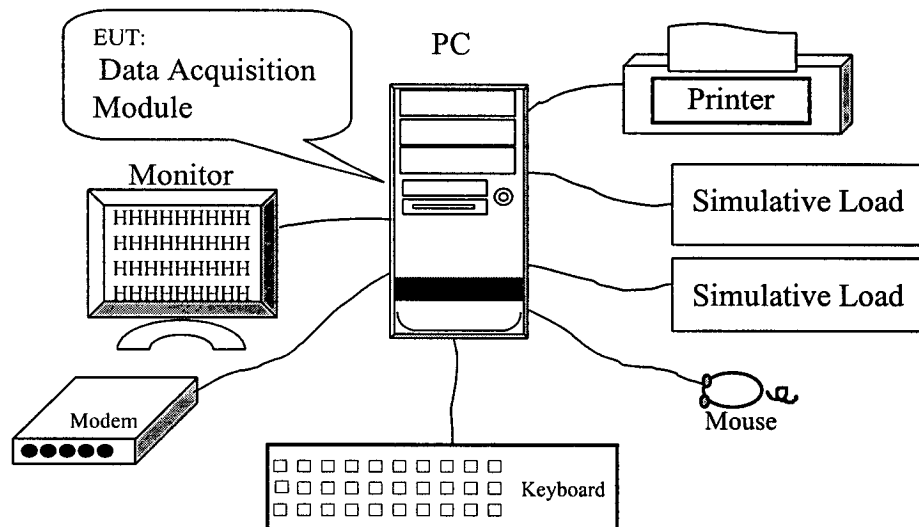
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

4.2 Test Setup

4.2.1 Block Diagram of Connections between EUT and simulators

Note: This is a representative setup diagram for Table-top EUT.

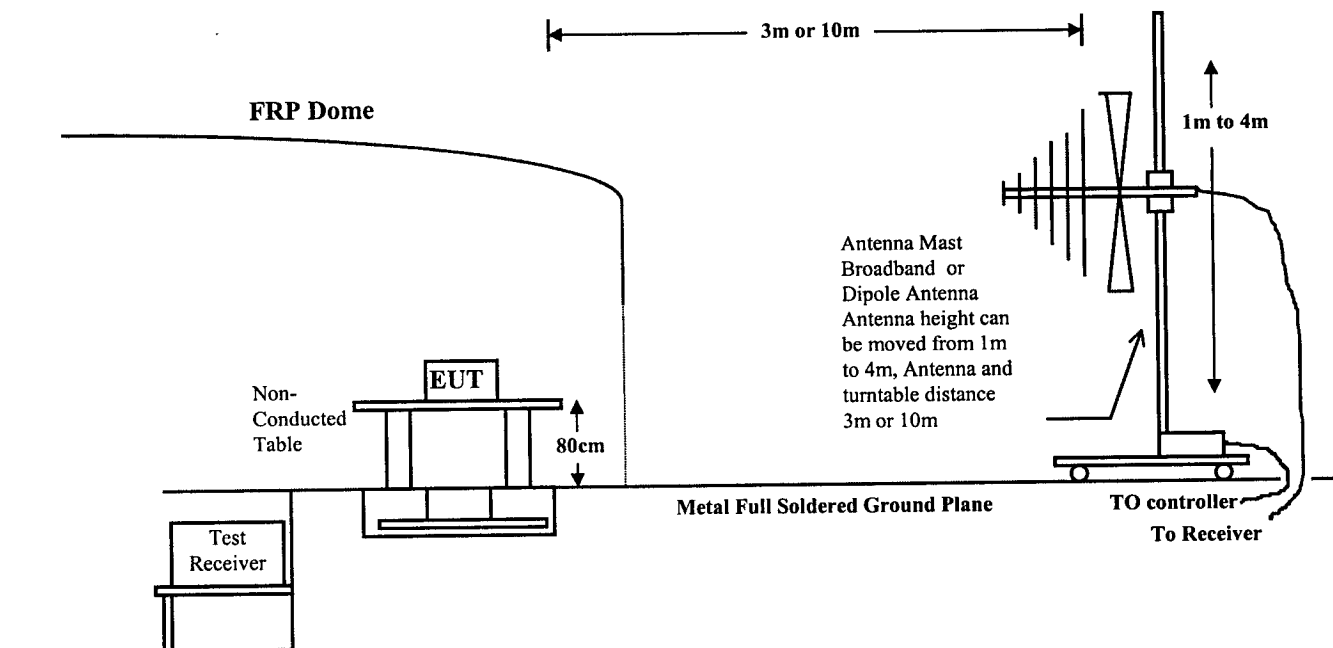
For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



4.2.2 Open Test Site & Anechoic Chamber Setup Diagram

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



4.3 Radiated Emission Limit

☐ Class B Limits

Frequency	Distance	Field Strength
MHz	Meter	dB(uV/M)
30 - 230	10	30
230 - 1000	10	37

☐ Class A Limits

Frequency	Distance	Field Strength
MHz	Meter	dB(uV/M)
30 - 230	10	40
230 - 1000	10	47

Remark: 1. The tighter limit shall apply at the edge between two frequency bands.

2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4 EUT Configuration

The equipments which is listed 3.2 are installed on Radiated Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 4.2.2, was placed on a non-conductive table whose total height equaled 80 CM. This table can be rotated 360 degree. The measurement antenna was mounted to a non-conductive mast capable of moving the antenna vertically. Antenna height was varied from 1 meter to 4 meters and the system under test was rotated from 0 degree through 360 degrees relative to the antenna position and polarization (Horizontal and Vertical). Also the I/O cable position was investigated to find the maximum emission condition.

4.5 Operating Condition of EUT

Same as Conducted Power Line Test which is listed in 3.5.

4.6 Radiated Emission Data

The measurement range of radiated emission which is from 30 MHz to 1 GHz was investigated. The initial step in collecting radiated data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages .

The total uncertainty for this test is as follows:

- Uncertainty in the field strength measured (3m antenna distance): $< \pm 4.0$ dB
- Uncertainty in the field strength measured (10m antenna distance): $< \pm 4.0$ dB

The uncertainty is calculated in accordance with NAMAS document NIS 81, and is given as 2 standard deviations.

Radiated Emission Data

Date of Test :11-29,1998 Sun
EUT :DATA ACQUISITION MODULE
Working Cond.:Mode 1

Temperature :31 deg/C
Humidity :65 %RH
Display Pattern:H Pattern

Frequency	Cable	Antenna	Reading Level	Emission Level	Limit
[MHz]	Loss	Factor	Horizontal	Horizontal	
	[dB]	[dB/m]	[dB(uV)]	[dB(uV/m)]	[dB(uV/m)]
72.650	1.24	6.42	7.52	15.18	40.00
141.985	1.83	11.16	13.91	26.90	40.00
200.440	2.20	10.20	13.00	25.40	40.00
249.998	2.50	12.47	10.53	25.49	47.00
267.260	2.63	12.85	7.31	22.79	47.00
300.670	2.91	13.60	11.70	28.21	47.00
367.485	3.33	15.39	12.97	31.69	47.00
*400.893	3.60	17.00	14.01	34.61	47.00

Remarks:

- 1.All Readings below 1GHz are Quasi-Peak, above are average value.
- 2.“ * ”, means this data is worse case emission level.
- 3.Emission Level = Reading Level + Antenna Factor + Cable loss
- 4.Deviations from the specifications: None.

Radiated Emission Data

Date of Test :11-29,1998 Sun
EUT :DATA ACQUISITION MODULE
Working Cond.:Mode 1

Temperature :31 deg/C
Humidity :65 %RH
Display Pattern:H Pattern

Frequency	Cable	Antenna	Reading Level	Emission Level	Limit
[MHz]	Loss	Factor	Vertical	Vertical	
	[dB]	[dB/m]	[dB(uV)]	[dB(uV/m)]	[dB(uV/m)]
36.010	0.82	16.40	8.58	25.80	40.00
66.812	1.20	6.08	18.56	25.84	40.00
*141.983	1.83	11.16	17.43	30.42	40.00
200.000	2.20	10.20	9.45	21.85	40.00
233.855	2.40	11.74	6.92	21.06	47.00
250.000	2.50	12.47	10.97	25.93	47.00
257.715	2.55	12.63	5.14	20.32	47.00
300.670	2.91	13.60	15.37	31.88	47.00
340.004	3.14	14.31	11.89	29.34	47.00
450.600	3.80	17.40	5.55	26.75	47.00

Remarks:

- 1.All Readings below 1GHz are Quasi-Peak, above are average value.
- 2.“ * ”, means this data is worse case emission level.
- 3.Emission Level = Reading Level + Antenna Factor + Cable loss
- 4.Deviations from the specifications: None.

5. Disturbance Measurement

5.1 Test Equipment

The following test equipments are used during the Disturbance tests:

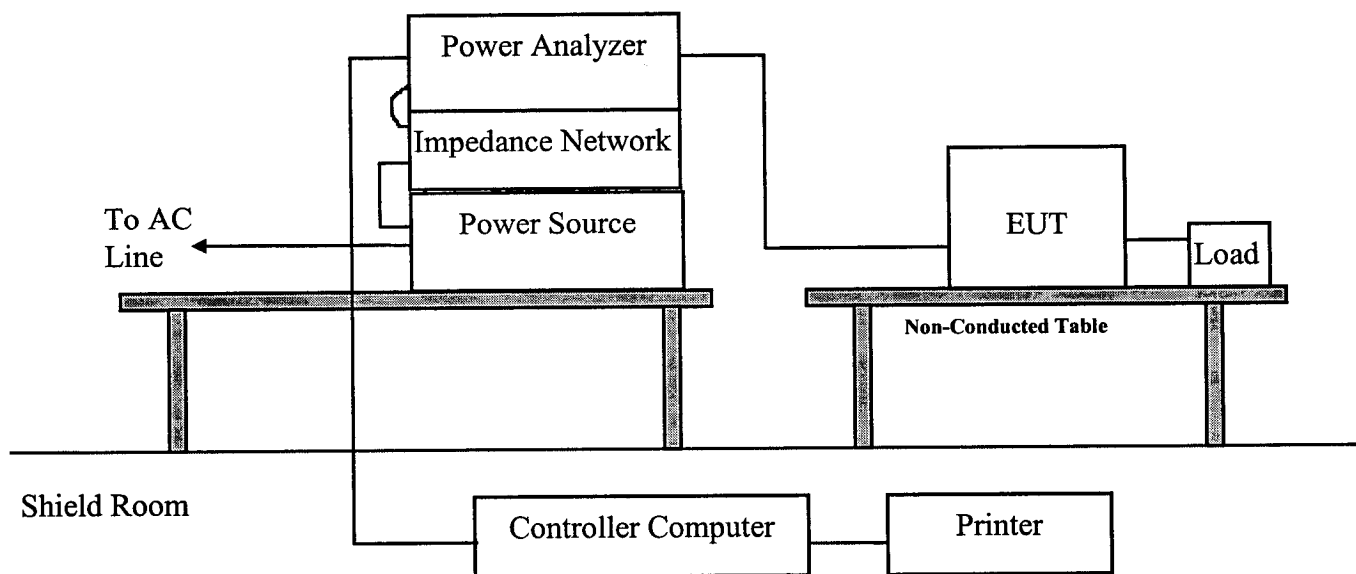
Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Power Analyzer	Voltech	PM 3000A	Aug. 20, 1998
2	Power Source	Pacific	345AMX/UPC32	Aug. 20, 1998
3	Impedance Network	Voltech	IB0718921	Aug. 20, 1998

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

5.2 Test Setup of EUT

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



5.3 Limits of Harmonics Currents

Harmonics Order	Maximum Permissible harmonic current (in amperes)	Harmonics Order	Maximum Permissible harmonic current (in amperes)
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	$8 \leq n \leq 40$	$0.23 * 8/n$
11	0.33		
13	0.21		
$15 \leq n \leq 39$	$0.15 * 15/n$		

5.4 EUT Operating Condition

1. Setup the EUT and Test Equipment as shown on 4.2.1
2. Power on.

5.5 Test Procedure

Power Harmonic:

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.94 times and 1.06 times shall be performed.

5.6 Test Method

According to EN61000-3-2,-3

5.7 Test Result

The measurement of the power harmonics which test at the extremes of EUT's supply range was investigated and test result were reported the following data pages.

The measurement limit were met, and the EUT **passed** the test.

Attached 2 individual pages of peak scan curve data sheets.

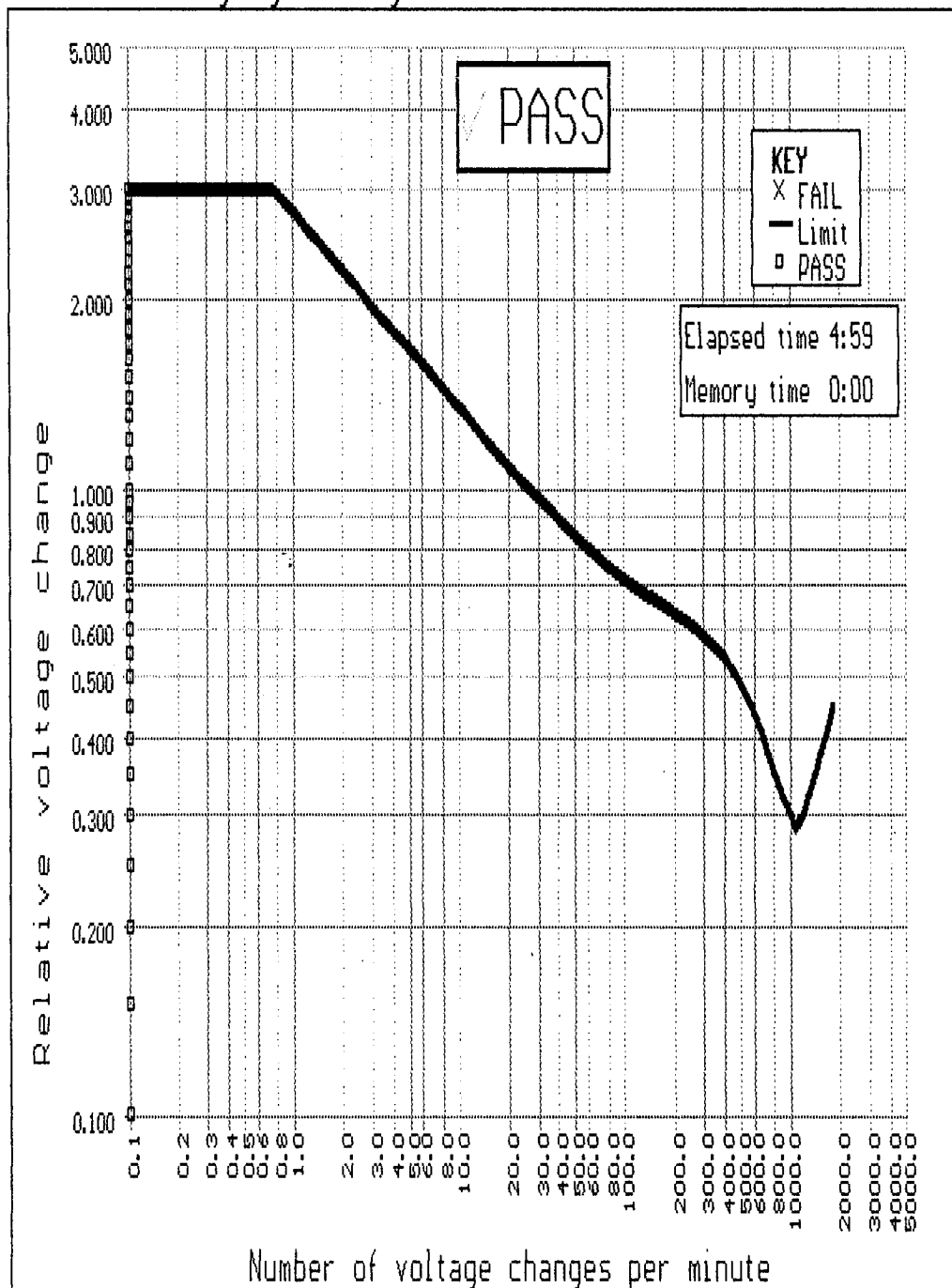
The total uncertainty for this test is as follows:

- Uncertainty in the current measured: $< \pm 10\%$

The uncertainty is calculated in accordance with NAMAS document NIS 81, and is given as 2 standard deviations.

Manufacture: Adcantech
EUT: Data Acquisition Module
M/N: PCM-3718, PCM-3724

CH1 Changing Voltage Wed Dec 09 09:09:04 1998



Manufacture:Adcantech
EUT:Data Acquisition Module
M/N:PCM-3718,PCM-3724

CH1 Steady State Harmonics Test. Wed Dec 09 09:02:36 1998

Volts 230.300003V
Amps 0.247900A
Watts 26.129999W
Power Factor 0.457600
Limits multiplied by 1.00

HNumber	IEC Limit (class A)	Magnitude	PASS FAIL
2	1.080A	0.001334A	PASS
3	2.300A	0.105360A	PASS
4	0.430A	0.003558A	PASS
5	1.140A	0.099230A	PASS
6	0.300A	0.002558A	PASS
7	0.770A	0.090970A	PASS
8	0.230A	0.002437A	PASS
9	0.400A	0.080650A	PASS
10	0.184A	0.001835A	PASS
11	0.330A	0.069030A	PASS
12	0.153A	0.001448A	PASS
13	0.210A	0.056740A	PASS
14	0.131A	0.000981A	PASS
15	0.150A	0.044740A	PASS
16	0.115A	0.000556A	PASS
17	0.132A	0.033380A	PASS
18	0.102A	0.000255A	PASS
19	0.118A	0.023420A	PASS
20	0.092A	0.000048A	PASS
21	0.107A	0.015139A	PASS
22	0.084A	0.000173A	PASS
23	0.098A	0.008992A	PASS
24	0.077A	0.000257A	PASS
25	0.090A	0.005547A	PASS
26	0.071A	0.000255A	PASS
27	0.083A	0.004692A	PASS
28	0.066A	0.000164A	PASS
29	0.078A	0.004811A	PASS
30	0.061A	0.000156A	PASS
31	0.073A	0.004635A	PASS
32	0.058A	0.000149A	PASS
33	0.068A	0.003915A	PASS
34	0.054A	0.000201A	PASS
35	0.064A	0.002961A	PASS
36	0.051A	0.000240A	PASS
37	0.061A	0.002165A	PASS
38	0.048A	0.000210A	PASS
39	0.058A	0.001951A	PASS
40	0.046A	0.000237A	PASS

Passed Steady State Harmonics test

6. ESD Measurement

6.1 Test Equipment

The following test equipments are used during the ESD tests:

Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Power Analyzer	Voltech	PM 3000A	Aug. 20, 1998
2	Power Source	Pacific	345AMX/UPC32	Aug. 20, 1998
3	Impedance Network	Voltech	IB0718921	Aug. 20, 1998

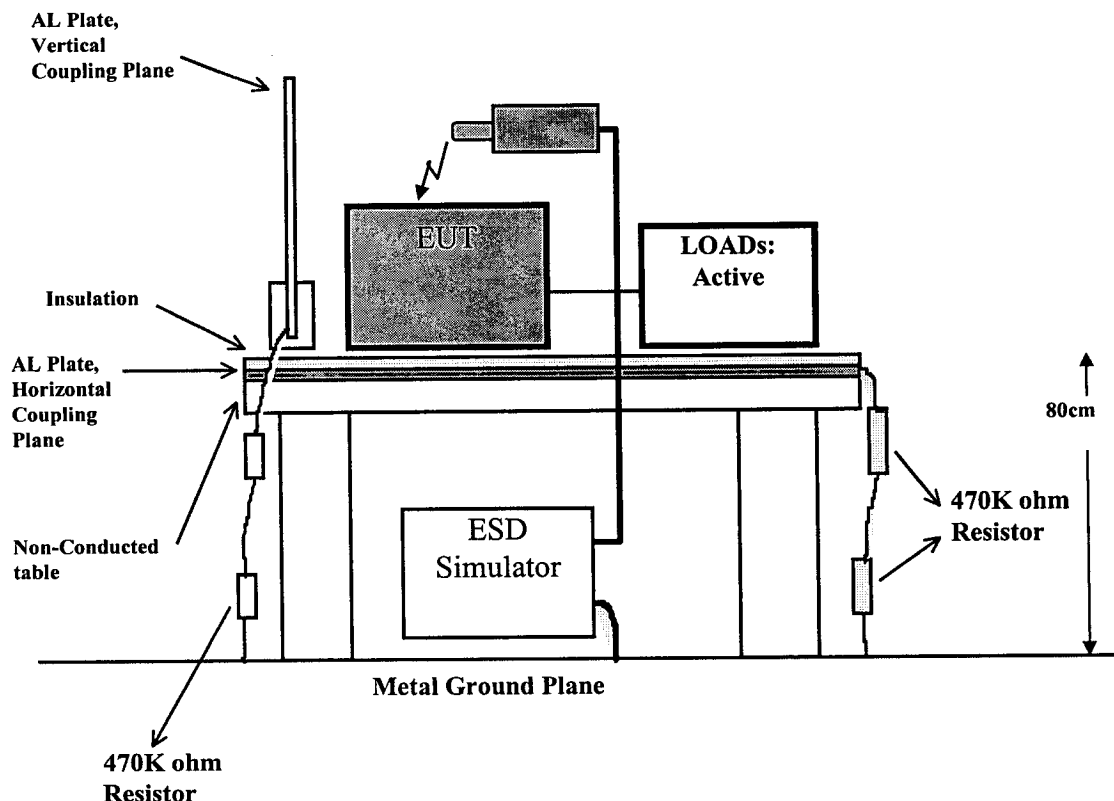
Note: All equipment upon which need to calibrated are with calibration period of 1 year.

6.2 Test Setup

6.2.1 Block Diagram of Connections between EUT and simulators

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



6.3 Severity Levels

LEVEL	TEST VOLTAGE CONTACT DISCHARGE	TEST VOLTAGE AIR DISCHARGE
1	2KV	2KV
2	4KV	4KV
3	6KV	8KV
4	8KV	15KV
X	SPECIAL	SPECIAL

Pursuant to EN50082-2:

Required Performance Criteria : B
Limit : $\pm 8\text{Kv}$ (Air Discharge)
 $\pm 4\text{Kv}$ (Contact Discharge)

6.4 EUT Operating Condition

Setup the EUT and Test Equipment as shown on 3.5

6.5 Test Procedure

Direct ESD :

Single discharge at > 1 second interval, 10 positive & 10 negative.

Air discharges to surfaces of the EUT.

Air Discharge:

This test was done above a non-conductive surfaces. The round discharge electrode about 30cm away will approach as fast as possible to touch test points of the EUT. Discharge happens before the contact. This procedure is repeated ten times on one selected location.

Indirect ESD : (Horizontal Coupling Plane under the EUT & Vertical Coupling Plane beside EUT)

Vertical Coupling Plane shall be positioned at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

Apply ESD to the earth reference plane on each accessible side of the EUT.

Single discharge at > 1 second interval, 10 positive & 10 negative

6.6 Test Method

According to EN 61000-4-2/1995. NEUTRAL LINE

6.7 Test Result

ITEM	AMOUNT OF DISCHARGE	VOLTAGE	REQUIRED CRITERIA	COMPLIED TO CRITERIA (A, B, C)	RESULTS
Direct Discharge Air	10	+8KV	B	A	PASS
	10	-8KV	B	A	PASS
Direct Discharge Contact	10	+4KV	B	A	PASS
	10	-4KV	B	A	PASS
Indirect Discharge VCP	10	+4KV	B	A	PASS
	10	-4KV	B	A	PASS
Indirect Discharge HCP	10	+4KV	B	A	PASS
	10	-4KV	B	A	PASS

NR: No Requirement

- ☒ Meet criteria A: Operate as intended during and after the test
- ☐ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss/Error of function
- ☐ Additional Information
- ☐ EUT stopped operation and could / could not be reset by operator at ____ KV of mode ____.
- ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

The total uncertainty for this test is as follows:

- Uncertainty in risetime (10%/90%) in first peak of the discharge pulse: < ±20%
- Uncertainty in first peak value of the discharge pulse: < ±8%
- Uncertainty in the discharge pulse value at 30ns: < ±30%
- Uncertainty in the discharge pulse value at 60ns: < ±30%

The uncertainty is calculated in accordance with NAMAS document NIS 81, and is given as 2 standard deviations.

7. RF Field Strength Susceptibility Measurement

7.1 Test Equipment

The following test equipments are used during the RS tests:

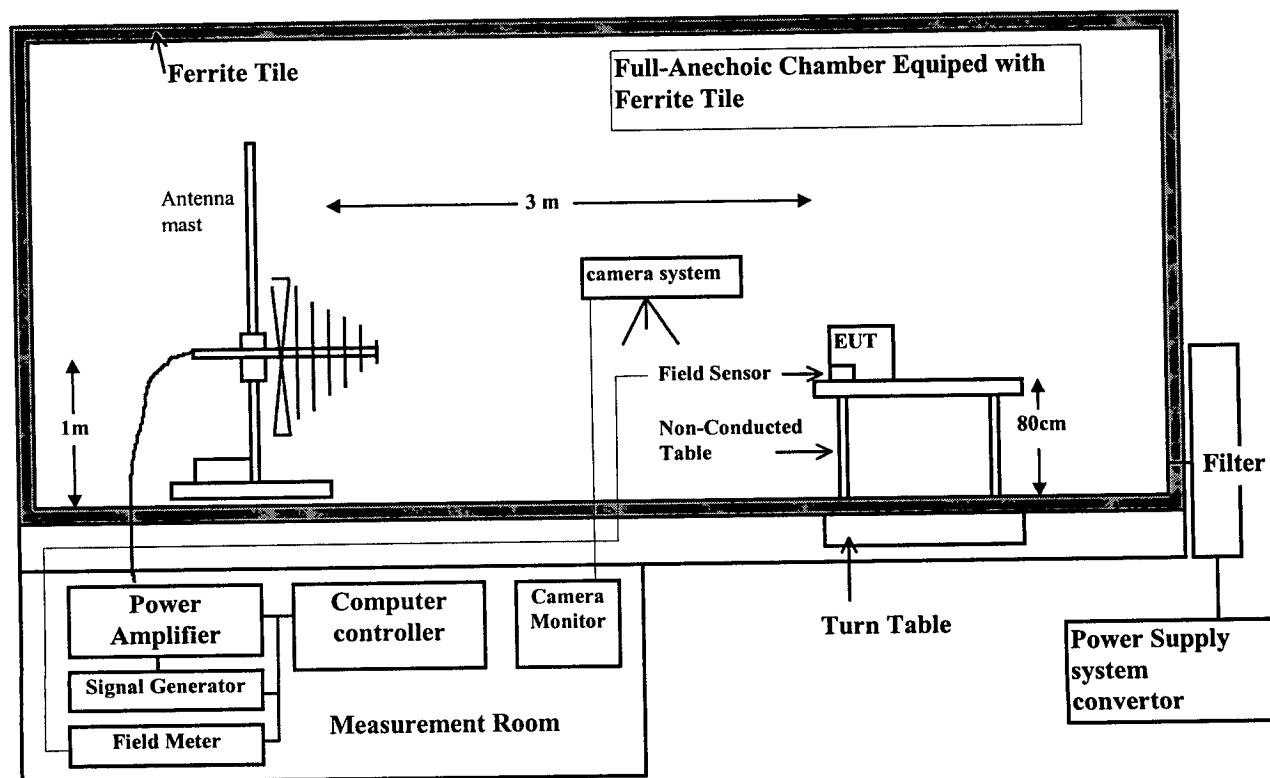
Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Signal Generator	HP	8657A	Jul. 20, 1998
2	Power Amplifier	A & R	100W1000M1	Aug. 18, 1998
3	Field Strength Meter	A & R	FM2000	Aug. 18, 1998
4	Field Strength Sensor	A & R	FP2000	Aug. 18, 1998
5	Power Antenna	Chase	CBL 6111A	Aug. 2, 1998
6	Power Amplifier	A & R	75A220	Aug. 18, 1998
7	Spectrum	HP	8591E	Jul. 20, 1998
8	Pre-Amplifier	HP	8447F	Jul. 20, 1998

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

7.2 Block Diagram of Test Setup

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



7.3 Severity Levels

LEVEL	FIELD STRENGTH V/M
1	1
2	3
3	10
X	SPECIAL

Pursuant to EN50082-2:

Required Performance Criteria : A
Limit : 10V/m

7.4 EUT Operating Condition

Same as section 3.5.

7.5 Test Procedure

The EUT and load are placed on a table which is 0.8 meter above ground. The field sensor is also placed on the same table to monitor field strength from transmitting antenna. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna each time. The antenna is fixed 1 meter above ground. Both horizontal and vertical polarization of the antenna are set on measurement. In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

All the scanning conditions are as follows:

Condition of Test	Remarks
A 1. Field Strength	10 V/m Level 3
2. Radiated Signal	1K AM 80% Modulation
3. Scanning Frequency	80MHz-1000MHz
4. Frequency step size Δf :	$\Delta f = f_n - f_{(n-1)} = \frac{1}{Q} f_{(n-1)}$
where:	
Δf	= frequency step size
$f_{(n-1)}$	= previous test frequency
f_n	= next test frequency
Q	= ratio center frequency to bandwidth

B 1. Test Frequencies : 895 – 905 MHz

2. Rep. Frequency : 200 MHz

3. 50% Duty cycle

4. Pulse modulation : Signal 50% modulated by 200Hz pulses of equal mark/space ratio.

7.6 Test Method

According to EN61000-4-3/1995 Basic immunity standard;

Radiated radio-frequency electromagnetic field;

Immunity test.

7.7 Test Result

Freq. Range (MHz)	Position (Angle)	Polarity (H or V)	Field Strength (V/M)	Criteria	Results
80-1000	0	H	10	A	PASS
	0	H	10	A	PASS
80-1000	90	H	10	A	PASS
	90	H	10	A	PASS
80-1000	180	H	10	A	PASS
	180	H	10	A	PASS
80-1000	270	H	10	A	PASS
	270	H	10	A	PASS
80-1000	0	V	10	A	PASS
	0	V	10	A	PASS
80-1000	90	V	10	A	PASS
	90	V	10	A	PASS
80-1000	180	V	10	A	PASS
	180	V	10	A	PASS
80-1000	270	V	10	A	PASS
	270	V	10	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
☐ Meet criteria B: Operate as intended after the test
☐ Meet criteria C: Loss/Error of function
☒ Additional Information
☒ There was no observable degradation in performance.
☐ EUT stopped operation and could / could not be reset by operator at ____ V/m at frequency ____ MHz.
☐ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

The total uncertainty for this test is as follows:

- Uncertainty in applied field strength (3m antenna distance): -2.1/+2.9 dB

The uncertainty is calculated in accordance with NAMAS document NIS 81, and is given as 2 standard deviations.

8. Electrical Fast Transient/Burst Measurement

8.1 Test Equipment

The following test equipments are used during the EFT tests:

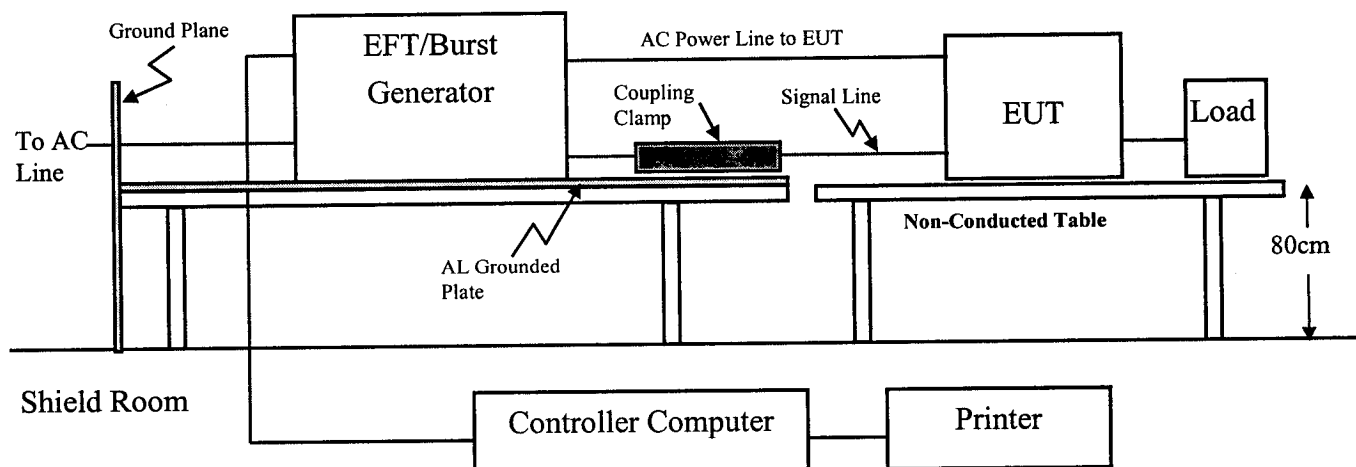
Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Fast Transient/Burst Generator	HAEFELY	EFT/Burst Tester PEFT-J	Jul. 16, 1998
2	Dips/Interruptions and Variations	HAEFELY	PLINE1610	Jul. 16, 1998

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

8.2 Block Diagram of Test Setup

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



8.3 Severity Levels

Open Circuit Output Test Voltage +/- 10%	
Level	On power supply lines
1	0.5KV
2	1KV
3	2KV
4	4KV
X	Special

Pursuant to EN50082-2:

Required Performance Criteria : A

Limit : $\pm 1KV$ for Signal Lines and Control Lines
 $\pm 2KV$ for Power Lines and protective earth terminal

8.4 EUT Operation Condition

Same as section 3.5.

8.5 Test Procedure

The EUT and its load are placed on a table which is 0.8 meter above a metal ground plane measured 1m*1m min. And 0.65mm thick min. And projected beyond the EUT by at least 0.1m on all sides. The EUT is away from the walls of the test AC power line test is as follows:

For AC Power line test:

The EUT is connected to the power mains through a coupling device that directly couples the EFT interference signal.

Each of the Line and Neutral conductor is impressed with burst noise for 1 min.

For Signal Lines and Control Lines test:

The EFT interference signal is through a coupling clamp device couples to the signal and control lines of the EUT.

8.6 Test Method

According to EN 61000-4-4/1995.

8.7 Test Result

Inject Line	Voltage KV	Inject time (second)	Inject Method	Required Criteria	Complied to Criteria	Result
L	± 2	60	DIRECT	B	A	PASS
N	± 2	60	DIRECT	B	A	PASS
PE	± 2	60	DIRECT	B	A	PASS
L+N	± 2	60	DIRECT	B	A	PASS
N+PE	± 2	60	DIRECT	B	A	PASS
L+PE	± 2	60	DIRECT	B	A	PASS
L+N+PE	± 2	60	DIRECT	B	A	PASS

NR: No Requirement

- ☒ Meet criteria A : Operate as intended during and after the test
- ☐ Meet criteria B : Operate as intended after the test
- ☐ Meet criteria C : Loss/Error of function
- ☐ Additional Information
 - ☐ EUT stopped operation and could / could not be reset by operator at ____ KV of Line _____.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

9. Conducted Susceptibility Measurement

9.1 Test Equipment

The following test equipments are used during the SURGE tests:

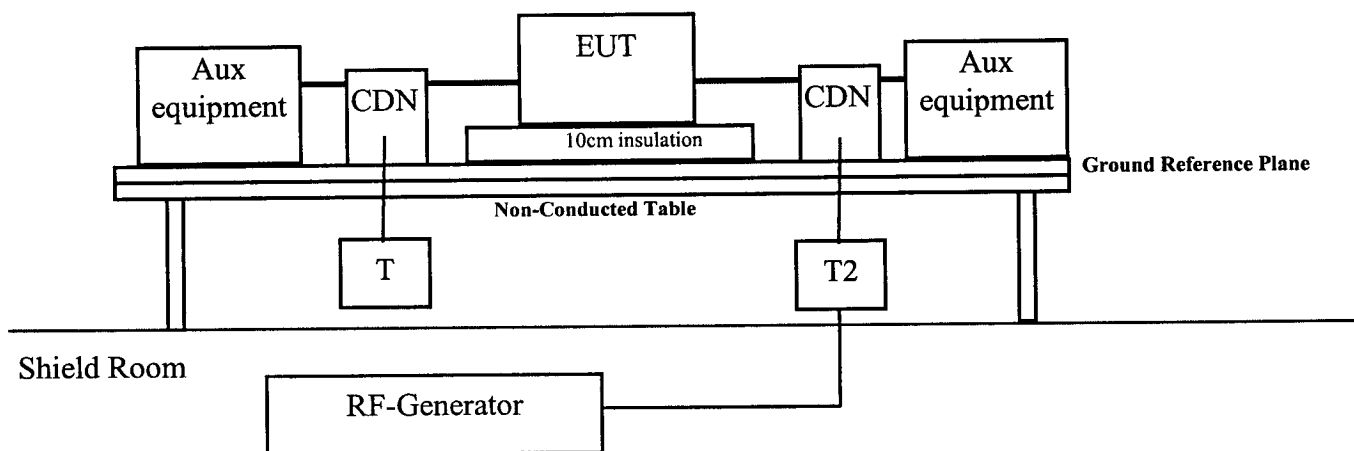
Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Surge Generator	HAEFELY	Psurge 4.1 S/N:083 070-16	Jul, 1998

Note: All equipment upon which need to be calibrated are with calibration period of 1 year.

9.2 Block Diagram of Test Setup

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



9.3 Severity Levels

Frequency Range 0.15kHz - 80MHz		
Level	Voltage Level (e.m.f)	
	U_o [dB μ V]	U_o [V]
1	120	1
2	130	3
3	140	10
X	Special	

Pursuant to EN50082-2

Required Performance Criteria : A

Limit : 10V, 80% AM Modulated

9.4 EUT Operation Condition

Same as section 3.5.

9.5 Test Procedure

The EUT are placed on a table which is 0.8 meter height, and a Ground reference plane on the table, EUT are placed upon table and use a 10cm insulation between.

For AC Power line test:

The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. And directly couples the disturbance signal into EUT.

Used CDN-M1 for single wire, CDN-M2 for two wires, or CDN-M3 for three wires.

For Signal Lines and Control Lines test:

The disturbance signal is through a coupling and decoupling networks(CDN) or EM-clamp device couples to the signal and control lines of the EUT.

9.6 Test Method

According to EN61000-4-6/1995

9.7 Test Result

Inject Line	Field Strength (V)	Inject Method	Required Criteria	Performance Criteria Complied To	Result
AC Line	10	CDN	A	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☐ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss/Error of function
- ☐ Additional Information
 - ☐ EUT stopped operation and could / could not be reset by operator at ____ KV of Line _____.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

10. Surge Measurement

10.1 Test Equipment

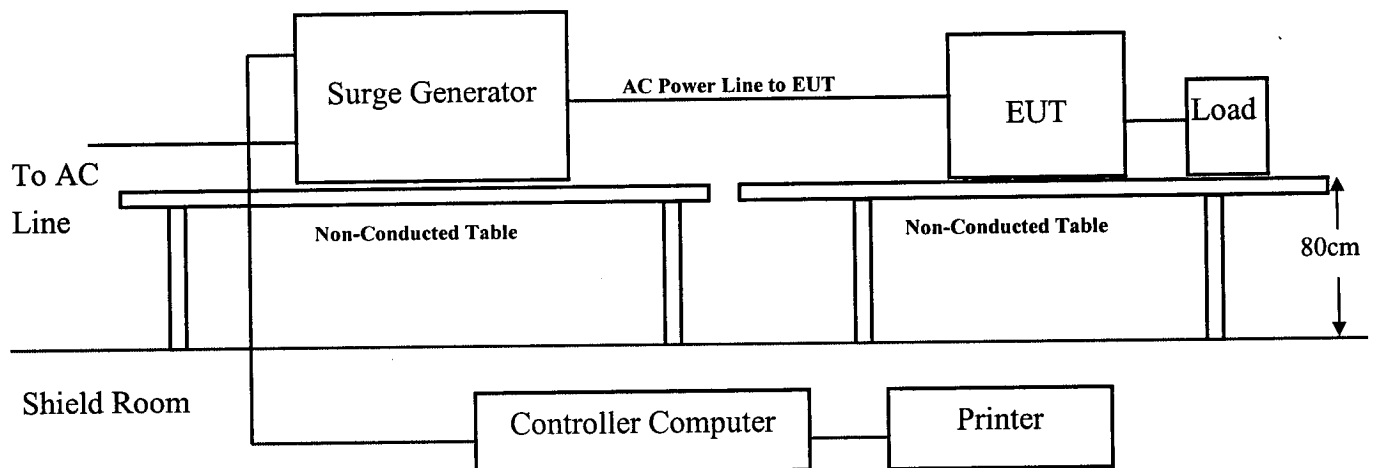
The following test equipments are used during the SURGE tests:

Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Surge Generator	HAEFELY	Psurge 4.1 S/N:083 070-16	Jul. 1998

10.2 Block Diagram of Test Setup

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



10.3 Severity Levels

Open Circuit Output Test Voltage +/- 10%	
Level	On power supply lines
1	0.5KV
2	1KV
3	2KV
4	4KV
X	Special

Pursuant to EN50082-2:1995

Required Performance Criteria : A

Limit : $\pm 2.0KV$ for Signal Lines and Control Lines
 $\pm 4.0KV$ for Power Lines and protective earth terminal

10.4 EUT Operation Condition

Same as section 3.5

10.5 Test Procedure

The EUT and its load are placed on a table which is 0.8 meter above a metal ground plane measured 1m*1m min. And 0.65mm thick min. And projected beyond the EUT by at least 0.1m on all sides. The EUT is away from the walls of the test AC power line test is as follows:

For AC Power line test:

The EUT is connected to the power mains through a coupling device that directly couples the EFT interference signal.

Each of the Line and Neutral conductor is impressed with burst noise for 1 min.

For Signal Lines and Control Lines test:

The EFT interference signal is through a coupling clamp device couples to the signal and control lines of the EUT.

10.6 Test Method

According to EN61000-4-5/1995.

10.7 Test Result

Inject Line	Voltage KV	Inject time (second)	Inject Method	Required Criteria	Complied to Criteria	Result
L-N	+2, -2	60	DIRECT	B	A	PASS
L-PE	+4, -4	60	DIRECT	B	A	PASS
N-PE	+4, -4	60	DIRECT	B	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test.
- ☐ Meet criteria B: Operate as intended after the test.
- ☐ Meet criteria C: Loss/Error of function.
- ☐ Additional Information.
 - ☐ EUT stopped operation and could / could not be reset by operator at ____ KV of Line _____.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

11. Voltage Dips and Interruption Measurement

11.1 Test Equipment

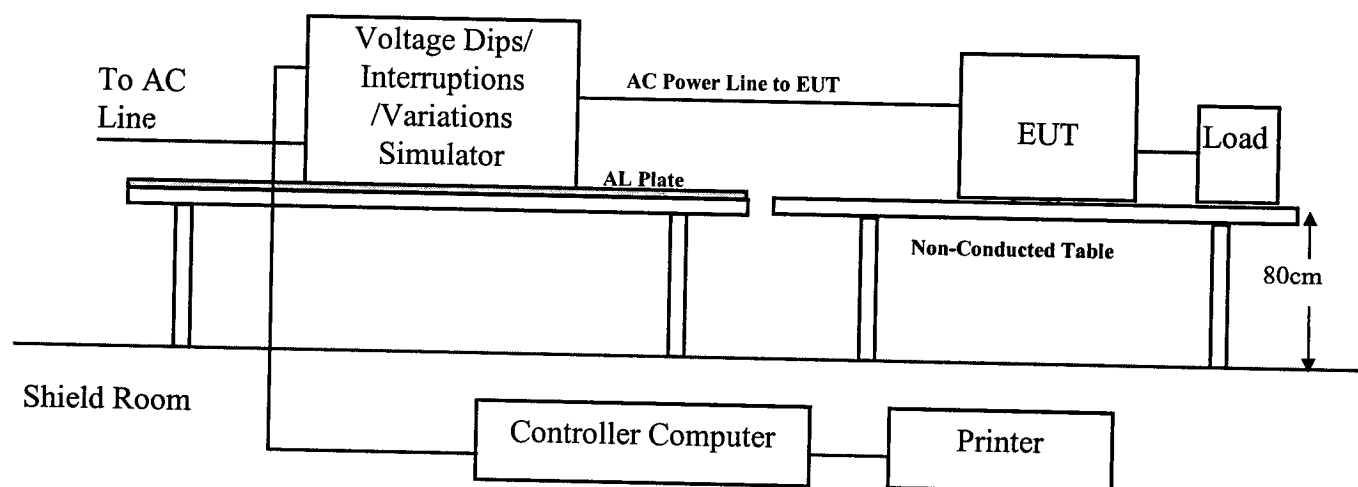
The following test equipments are used during the Dips/Interruptions tests:

Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Dips/Interruptions/ Variations Simulator	HAEFELY	PLINE 1610 S/N: 083 690-07	Oct, 1998

11.2 Block Diagram of Test Setup

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



11.3 Severity Levels

Voltage Dips and Interruption Reduction(%)	Required Performance Criteria	Test Duration (ms)
>30	B	10
>50	C	100
>95	C	500

Pursuant to EN50082-2 : 1995

11.4 EUT Operation Condition

Same as section 3.5.

11.5 Test Procedure

The EUT and its load are placed on a table which is 0.8 meter above a metal ground plane measured 1m*1m min. And 0.65mm thick min. And projected beyond the EUT by at least 0.1m on all sides. The EUT is away from the walls of the test AC power line test is as follows:

For AC Power line test:

The EUT is connected to the power mains through a coupling device that directly couples to the Voltage Dips and Interruption Generator.

Each of the Line and Neutral conductor is impressed with supplied voltage for interval of 10 Sec. By the sequence of 3 dips/interruption. Voltage phase shifting are base on 45 degrees increase.

11.6 Test Method

According to EN61000-4-11/1995

11.7 Test Result

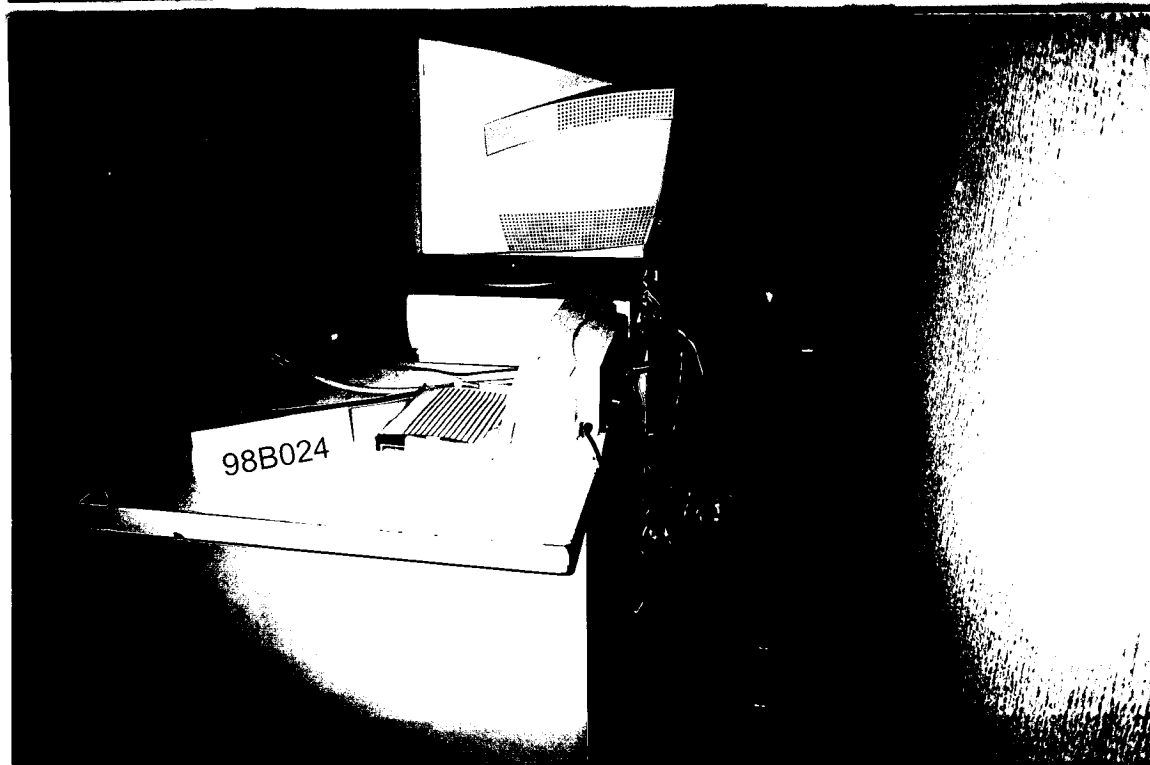
Voltage Dips and Interruption Reduction(%)	Test Duration (ms)	Required Performance Criteria	Performance Criteria Complied To	Test Result
30	10	B	A	PASS
50	100	C	C	PASS
>95	500	C	C	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☐ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss/Error of function
- ☐ Additional Information
 - ☐ EUT stopped operation and could / could not be reset by operator at ____ KV of Line _____.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

12. Photographs

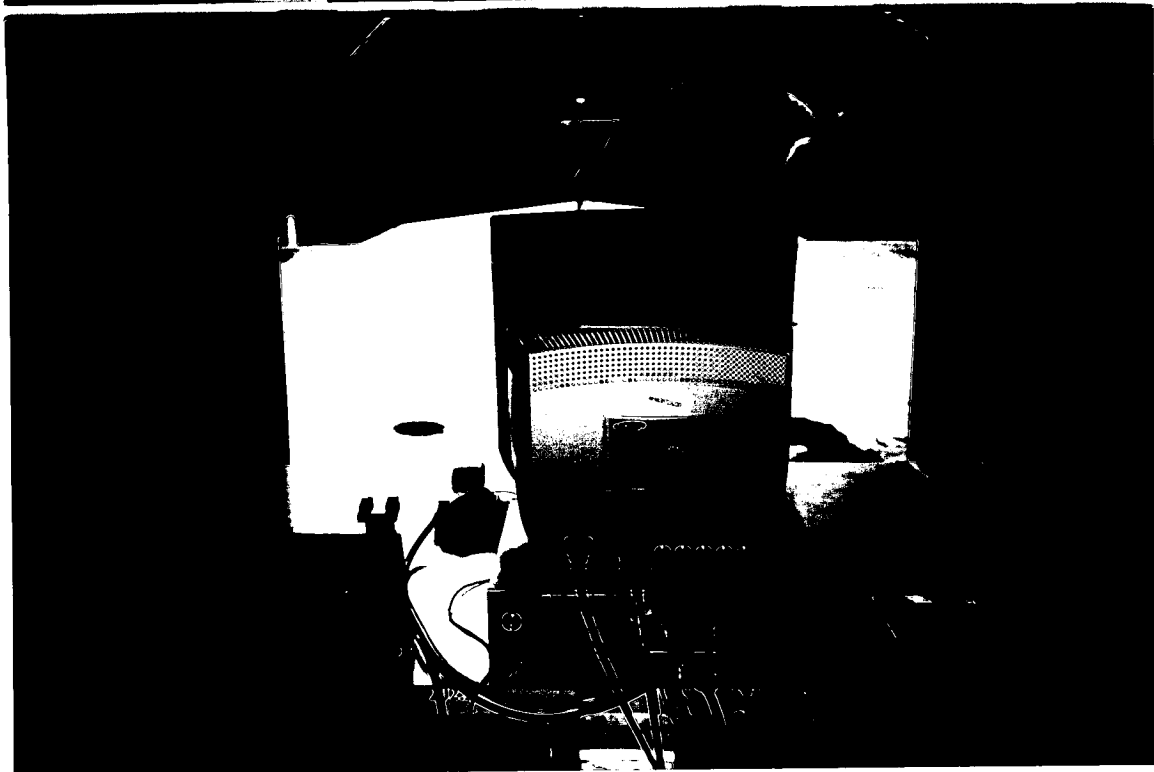
The following test photographs shown maximum emission configuration condition for each test mode.

1. FRONT VIEW OF CONDUCTED TEST
2. BACK VIEW OF CONDUCTED TEST



3. FRONT VIEW OF RADIATED TEST

4. BACK VIEW OF RADIATED TEST

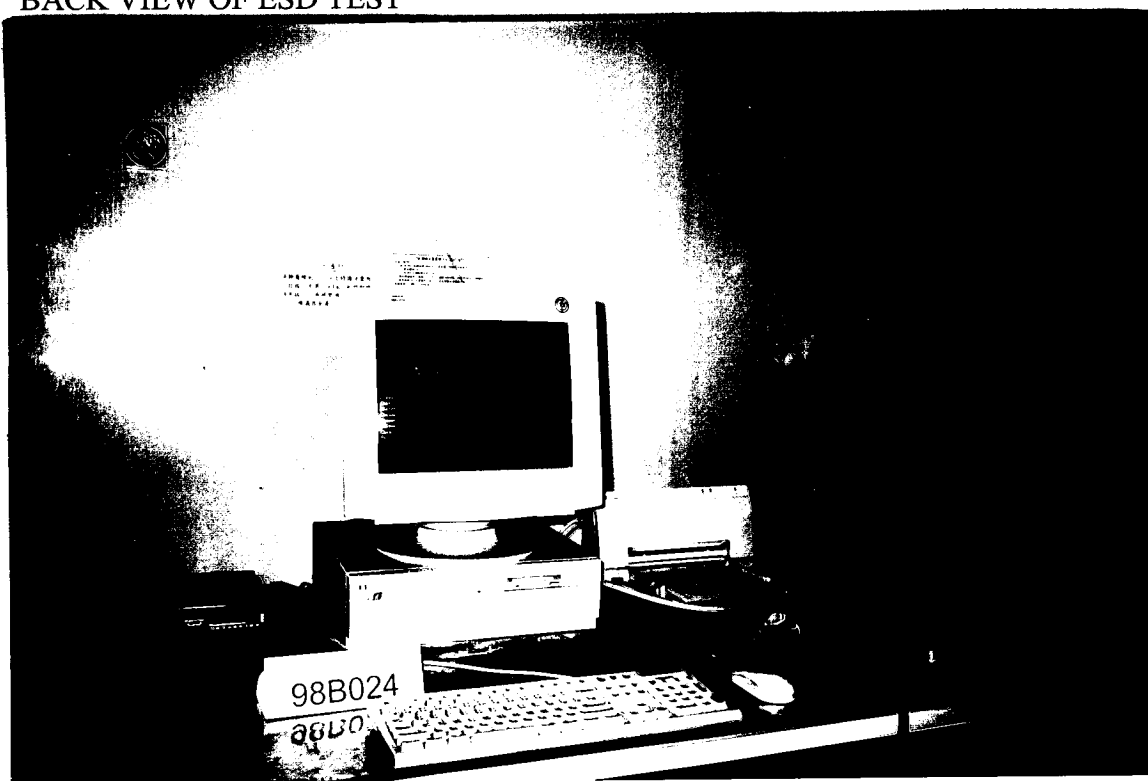


5. FRONT VIEW OF HARMONIC TEST

6. BACK VIEW OF HARMONIC TEST

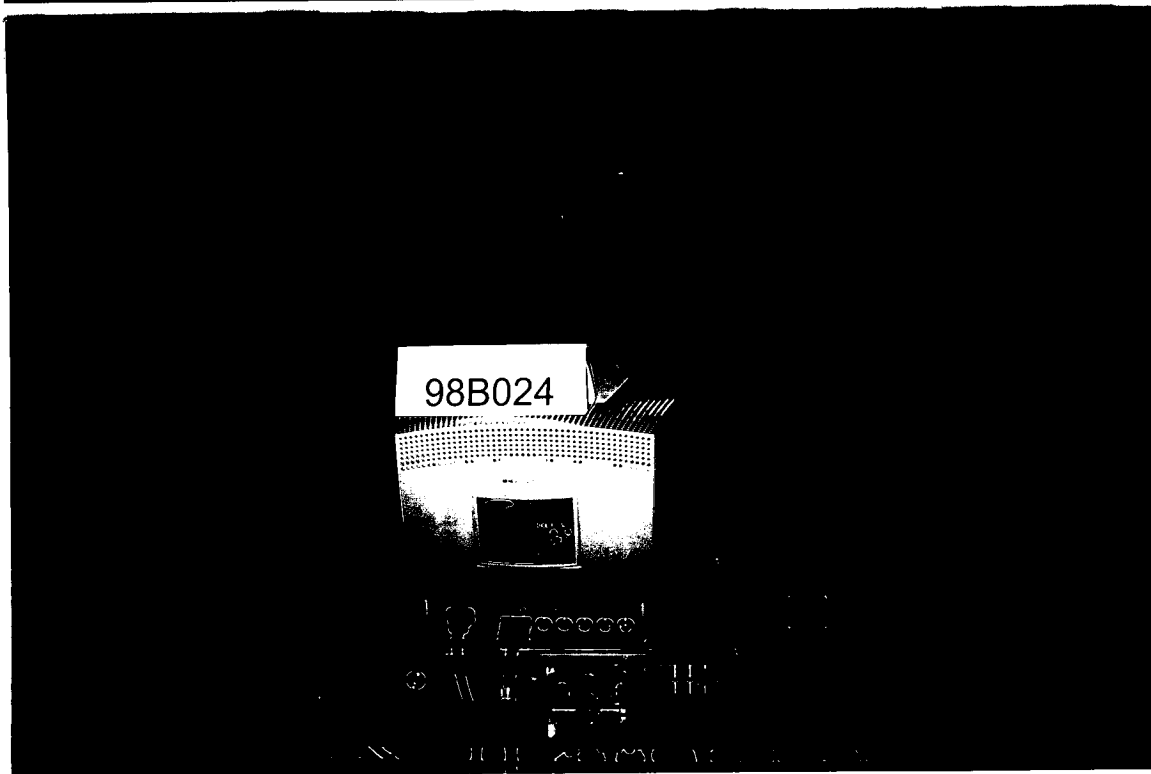
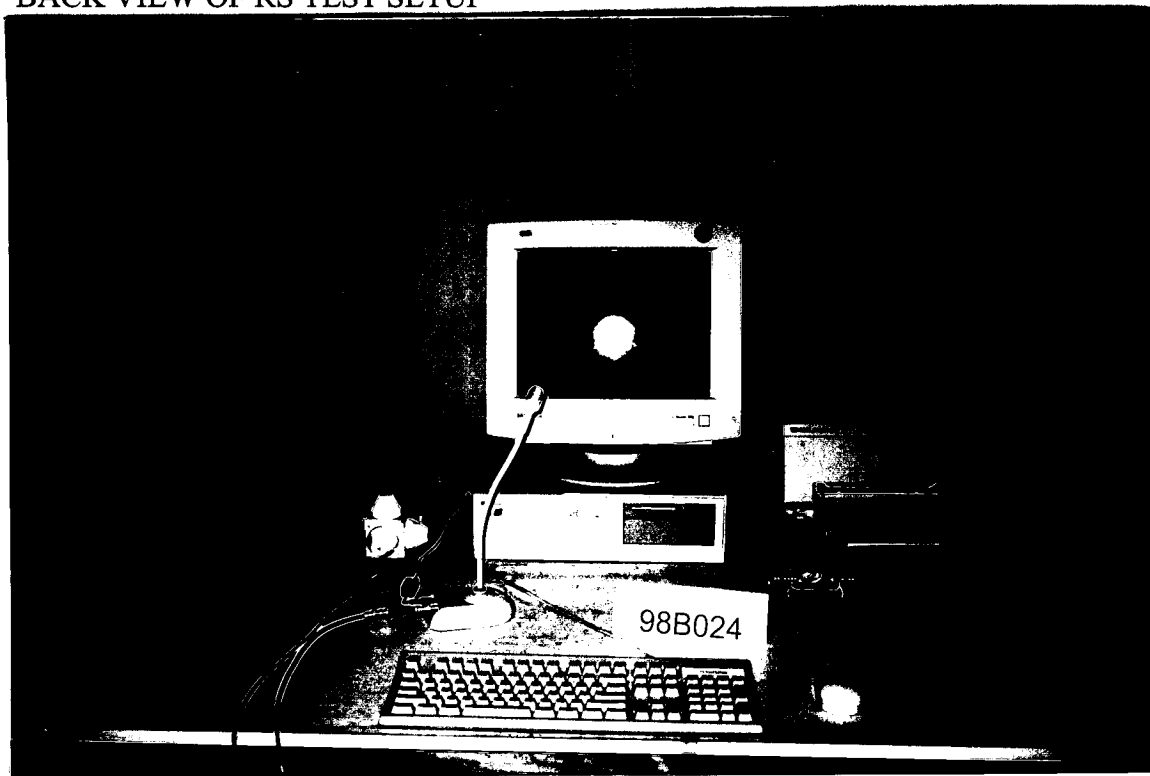


7. FRONT VIEW OF ESD TEST
8. BACK VIEW OF ESD TEST



9. FRONT VIEW OF RS TEST SETUP

10. BACK VIEW OF RS TEST SETUP



11. FRONT VIEW OF EFT TEST SETUP

12. BACK VIEW OF EFT TEST SETUP



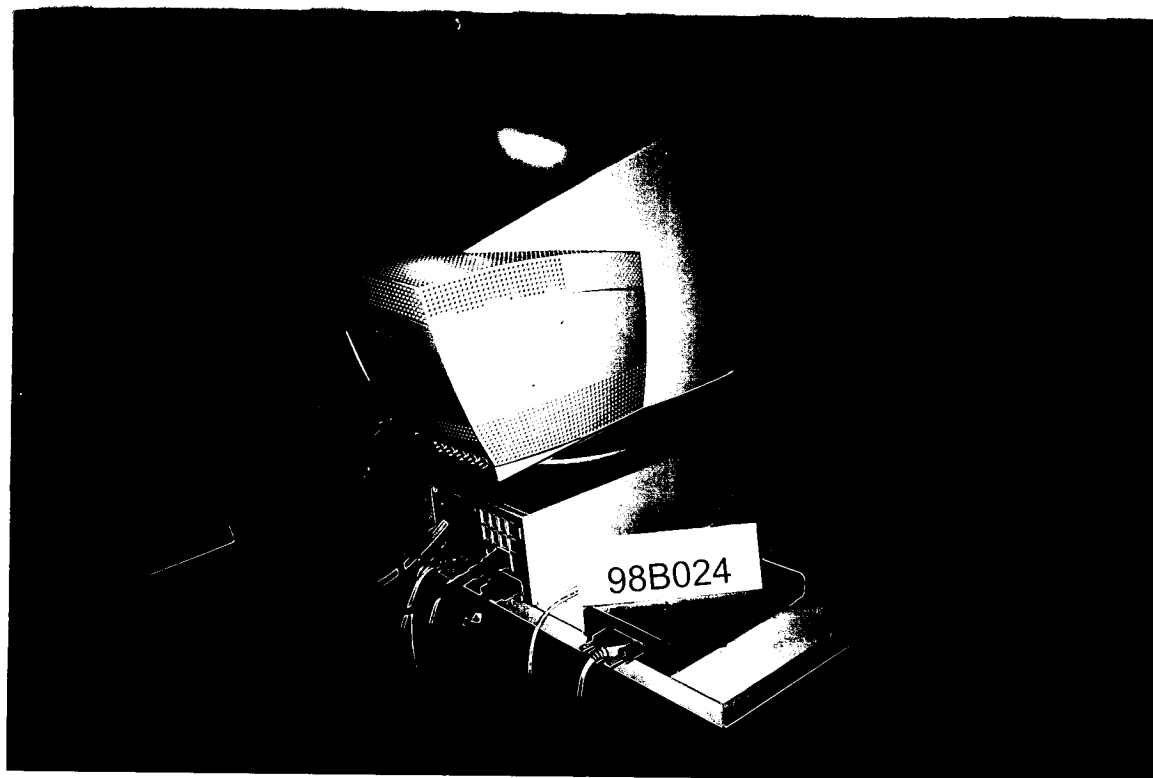
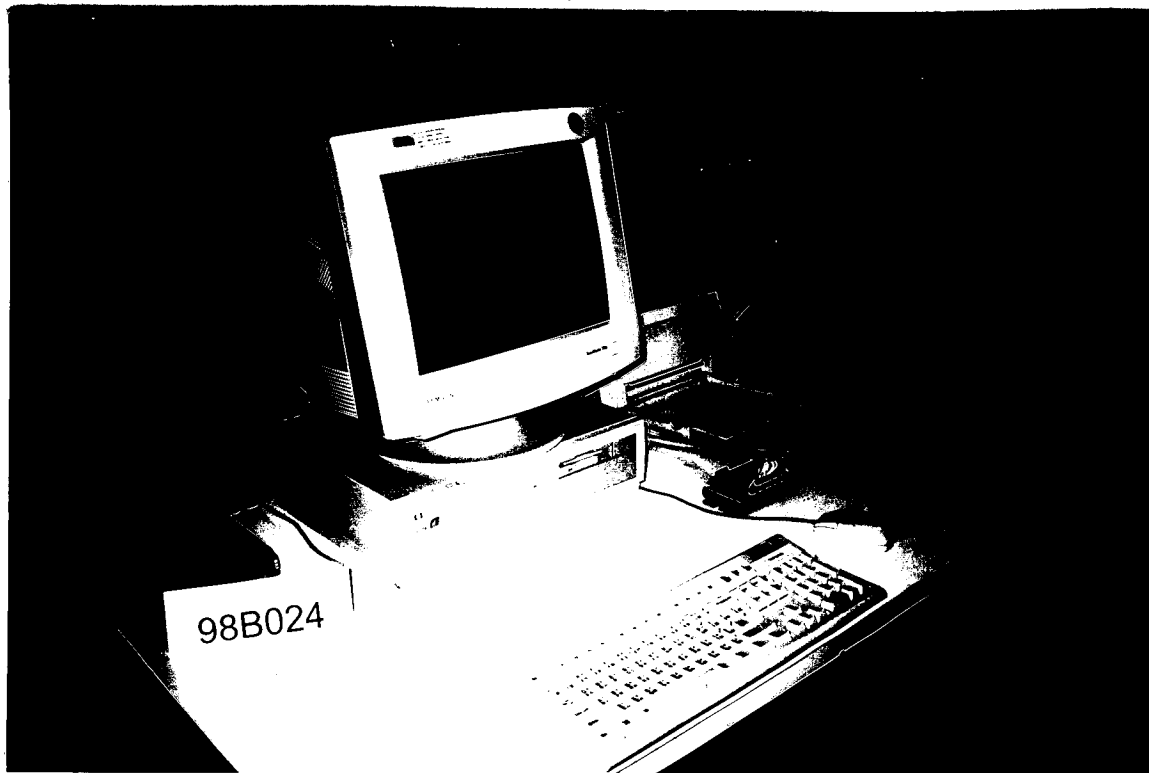
13. FRONT VIEW OF CS TEST SETUP

14. BACK VIEW OF CS TEST SETUP



15. FRONT VIEW OF SURGE TEST SETUP

16. BACK VIEW OF SURGE TEST SETUP



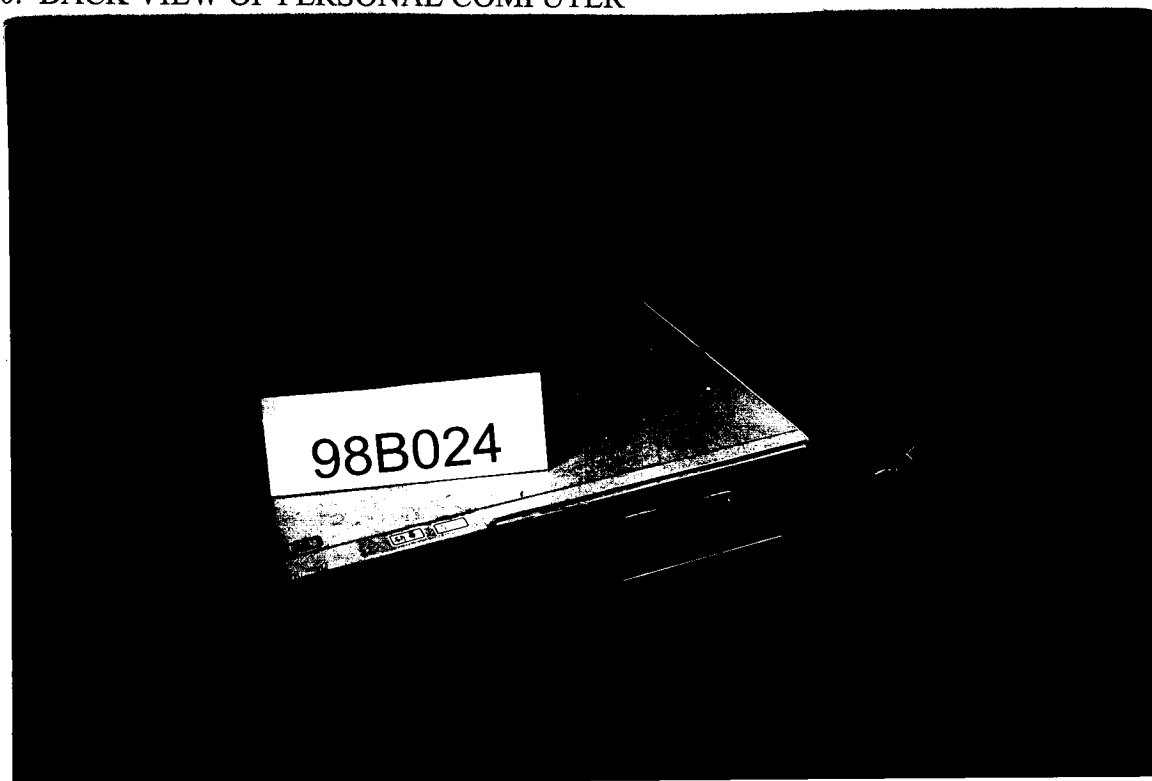
17. FRONT VIEW OF DIPS TEST SETUP

18. BACK VIEW OF DIPS TEST SETUP



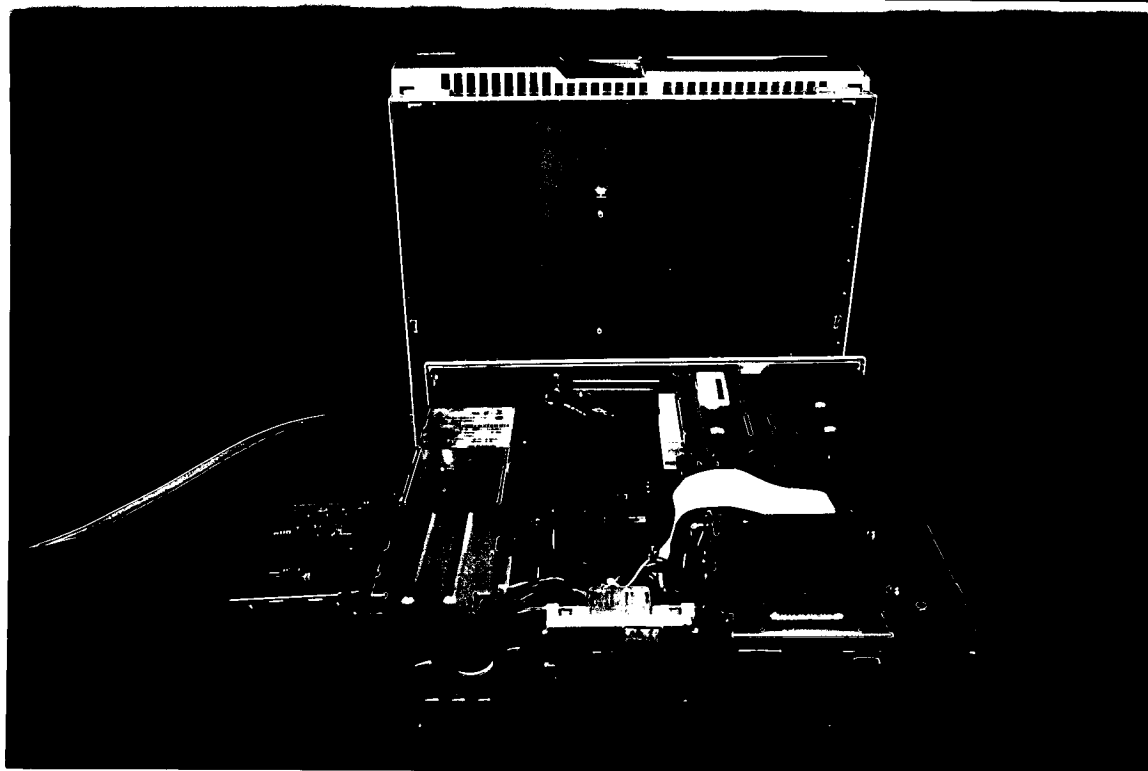
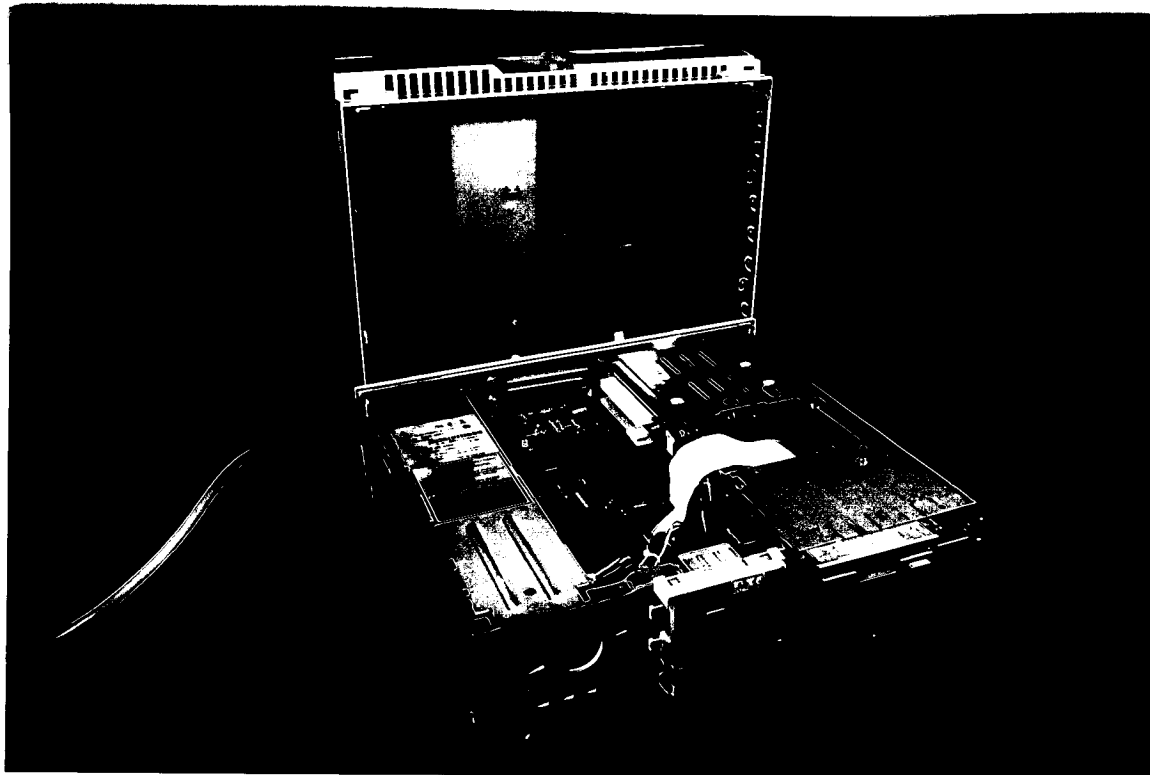
19. FRONT VIEW OF PERSONAL COMPUTER

20. BACK VIEW OF PERSONAL COMPUTER



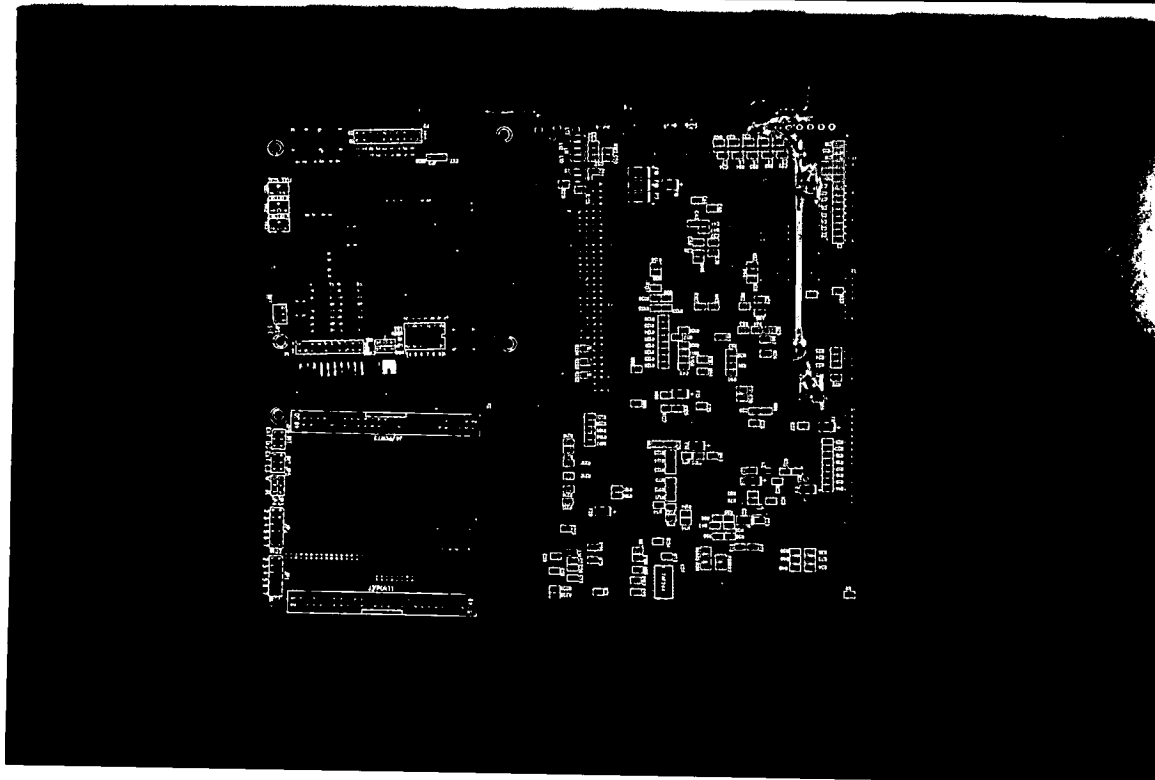
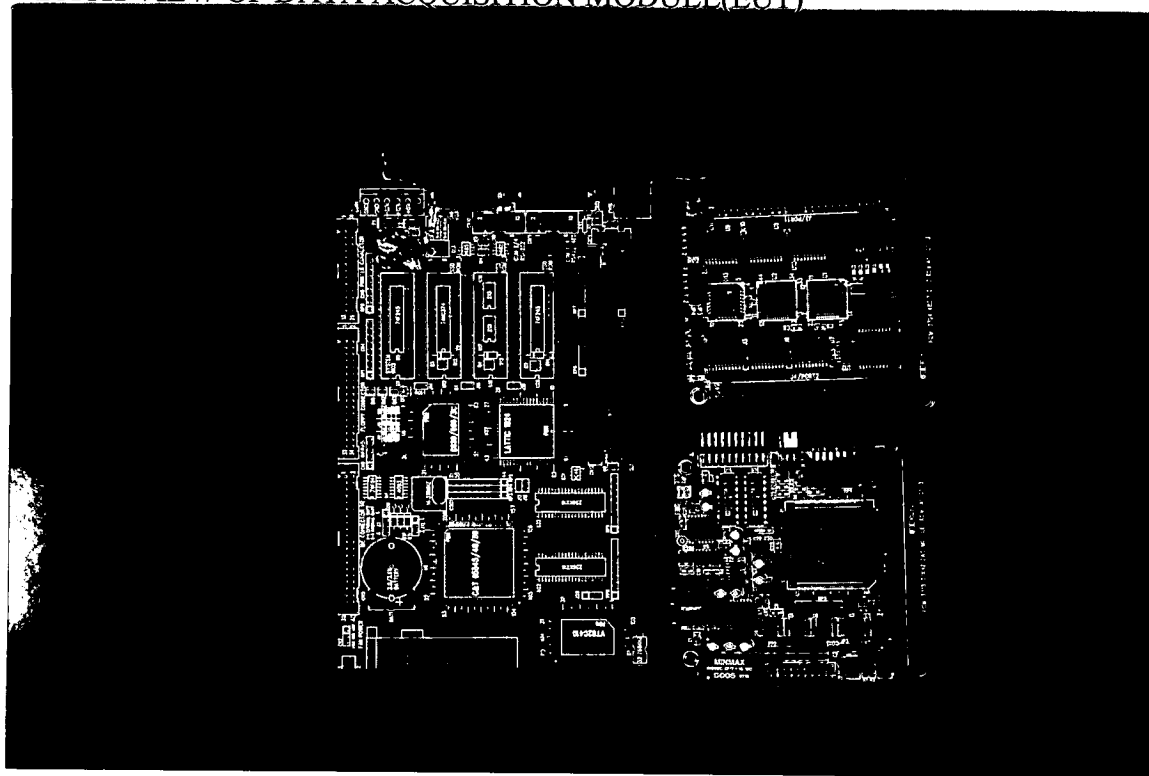
21. INNER VIEW OF PERSONAL COMPUTER

22. INNER VIEW OF PERSONAL COMPUTER



23. FRONT VIEW OF DATA ACQUISITION MODULE(EUT)

24. BACK VIEW OF DATA ACQUISITION MODULE(EUT)



13. EMI/EMS Reduction Method During Compliance Testing

No modification was made during testing.

