



DET NORSKE VERITAS

EMC TEST CERTIFICATE

CERTIFICATE NO. 397-96-0013

The certificate consists of 2 pages

This is to certify that the

CPU CARD

with type designation(s)

PCA-6155

Manufactured by

Advantech Co., Ltd.

FL 4, No. 108-3, Ming -Chuan Rd., Shing-Tien City, Taipei, Taiwan, R.O.C.

is found to comply with the following European Standard(s)

- EN 50081-2 (1993)
- prEN 50082-2 (1992)

The EMC tests were carried out at a local EMC laboratory in Taiwan, recognised by DNV after a Quality Audit and follow-ups, based on EN45001

The EMC test report for the product(s) has been assessed with respect to the standard(s) given above

Place and date

Taiwan, 31 December 1996
for Det Norske Veritas AS

Robin Shih
Industry Manager



Dennis Lin
EMC Engineer



Certificate No.: 397-96-0013

Product description

The CPU Card is a device for installing in industrial computer or workstation.

Referenced standards and Test results

EN 50081-2 (1993):

EN 55022: Product(s) found to comply with Class A

EN 60555-2: Product(s) found to comply with Class A

EN 60555-3

prEN 50082-2 (1992):

IEC 801-2: Product(s) found to comply with Performance Criterion A

IEC 801-3: Product(s) found to comply with Performance Criterion A

IEC 801-4: Product(s) found to comply with Performance Criterion A

Application/ Limitation

Industry Environment

This certificate is based on a single evaluation of one sample of the above mentioned product.

Documentation

EMC Test report no.: CEE-013-5

Laboratory

GesTek Laboratory

END OF CERTIFICATE

TEST REPORT

Electromagnetic Compatibility



Name & Address of the Testing Laboratory	GesTek Golbal EMC Standard Tech. Corp.	Tel: 886-2-6035321 Fax: 886-2-6035325
Name & Address of the applicant	<i>Advantech Co., Ltd.</i> <i>Fl.4, No. 108-3, Ming-Chuan Rd., Shing-Tien City</i> <i>Taipei, Taiwan, R.O.C.</i>	
Name & Address of the Manufacturer	<i>SAME AS APPLICANT</i>	
Name & Address of the Factory (production site)	<i>SAME AS APPLICANT</i>	
Product	<i>CPU CARD</i>	
Trademark	<i>ADVANTECH</i>	
Model/Type reference	<i>PCA-6155</i>	
Characteristics	<i>Pentium 133</i>	
Serial No.	<i>PROTOTYPE</i>	
Tested according to	<i>EN 50081-2 (1993)/EN 55022</i> <i>prEN50082-2 (1992)/IEC 801 SERIES</i>	
EMC Test Report No.....	<i>CEE-013-5</i>	CERTIFICATE NO. 397-96-0013
Work carried out by.....	<i>DENNIS LIN</i> <i>Dennis Lin</i>(Signature)	<i>30-Dec-1996</i>(Date)
Work verified by.....	<i>ROBIN SHIH</i> <i>Rob Shih</i>(Signature)	<i>30-Dec-96</i>(Date)
Date of issue.....	<i>31-DEC-1996</i>	



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OTHER INFORMATION

1. CUSTOMER REQUEST : -N/A-

2. EUT SERIAL APPROVAL : -N/A-

3. MODIFICATION : -N/A-

4. COMMENT: According to the EN 55022 mention, the following warning shall be included in the instructions for use: " This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

General Information:

Criteria A: Operate as intended during and after the test

Criteria B: Operate as intended after the test

Criteria C: Loss/Error of function



Clause	Requirement - test	Result	Verdict
1.	SCOPE OF WORK		PASS
	EN55022 (1994)	Comply with Class A	
	EN60555-2 (1987)		
	EN60555-3 (1987) + A1(1991)		
	IEC801-2 (1984)	Comply with Criteria A	
	IEC801-3 (1984)	Comply with Criteria A	
	IEC801-4 (1988)	Comply with Criteria A	
2.	TEST LABORATORY	GesTek EMC Standard Tech. Corp.	O. K.
	FACILITY (IEC 68-1)	Actual	
	TEMPERATURE : 15-35 degree C	20-28	
	HUMIDITY : 25 - 75% RH	40-50 for ESD, 60-81 for Others	
	BAROMETRIC : 860 -1060.mbar	950-1000	
	AC POWER SYSTEM	IT	
	EN45001 & ISO/IEC GUIDE 25	DNV: 510-96-1017	
3.	TEST PERIOD		
	SAMPLE RECEIVED TO FINAL TEST	10-SEPT.-1996 to 28-SEPT.-1996	



Clause	Requirement - test	Result	Verdict
4.	EQUIPMENT UNDER TEST		O.K.
	MODEL NO.	PCA-6155	
	CPU SPEED	Pentium 133	
	FDD #1	TEAC, Model: FD-235HF	
	Hard Disk	CONNER, Model: CFS425A	
	I/O Card	On Board	
	Switching Power Supply	Sea Sonic, Model: SSG-250G, SSH-250	
	Chassis	AWS-825P	
	Data Cable	Shielded, Undetectable, 1m	
	POWER CORD	Non-shielded Detachable, 1.5m	
5.	EVALUATE PERFORMANCE		PASS
	FUNCTION TEST	Carried out before/during/after the test	
	PERFORMANCE MONITORING	Verify correct performance during the test	
6.	SUMMARY		PASS
	CERTIFICATION	There was no observable degradation in performance. No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.	
7.	TEST REPORT	DNV : # CEE-013-5 Attached	PASS



DET NORSKE VERITAS AS

Order No :96-9444

TCF#: CEE-0013- 5

International Trade Bldg. Room 2102, 21F, 333 Keelung Rd., Sec. 1, Taipei, Taiwan, R.O.C. Tel: 886-2-757-6817 Fax: 886-2-757-6840



**Measurement Report
On Behalf Of
Advantech Co., Ltd.
CPU Card
Model # : PCA-6155**

**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) 603-5321
Fax : (02) 603-5325**

Test results given in this report only relate to the specimen(s) tested, calibrated or measured.
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1. Test Report Certification

Applicant : Advantech Co., Ltd.

EUT Description : CPU Card

Model Number : PCA-6155

Serial Number : Prototype

Power Supply : 230V/50Hz

MEASUREMENT PROCEDURE USED :

EN 50081-2/1992 RULES AND 55022/1987 RULES AND EN60555-2 & 3

prEN 50082-2/1992 RULES AND IEC 801 SERIES REGULATIONS

For EN50081-2/1992 and EN55022 :

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 limits applicable.

For prEN50082-2/1992 Rules and IEC 801 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 EN50082-1/IEC801 Series regulations. Global EMC Standard Tech. Corp. recommends that the measurement results can pass performance criterion of above regulations.

GENERAL REMARK:

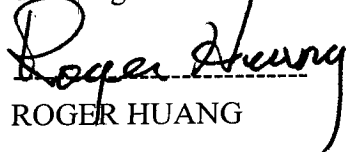
The tests were performed according to the technical requirement of EUT .

- ☒ Electron-magnetic Interference (EN55022)
- ☒ Disturbance Measurement (EN60555-2 & 3)
- ☒ ESD Measurement (IEC801-2)
- ☒ RF Field strength Susceptibility Measurement(IEC801-3)
- ☒ Electrical Fast Transient/Burst Measurement (IEC801-4)

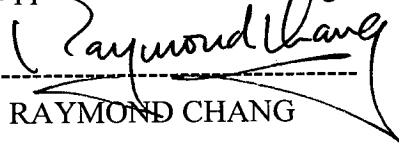
Sample Received Date : Sep. 10, 1996

Final Test Date : Sep. 28, 1996

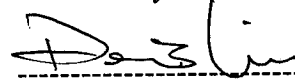
Test Engineer :


ROGER HUANG

Approve & Authorized Signer :


RAYMOND CHANG

Review by DNV:


DENNIS LIN



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2. General Information

2.1 Production Description

Description	: CPU Card
Model Number	: PCA-6155
Serial Number	: N/A
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
CPU Speed	: Pentium-133
FDD #1	: TEAC, Model: FD-235HF
Hard Disk	: CONNER, Model: CFS425A
I/O Card	: On board
Switching Power Supply	: Sea Sonic, Model: SSG-250G, SSH-250
Chassis	: AWS-825P
Data Cable	: Shielded, Undetectable, 1m
Power Cord	: Non-Shielded, Detachable, 1.5m



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2.2 Tested System Details

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

☒ Host Personal Computer

CPU Card	: Advantech, Model: PCA-6155
CRT	: Proton, Model: 1M-1560
FDD #1	: TEAC, Model: FD-235HF
Hard Disk	: Conner, Model: CFS425A
VGA Card	: Advantech, Model: PCA-6642A FCC ID: ILLTS4HV
PC BUS Back Plane	: Advantech, Model: PCA-6108B
I/O Card	: On board
Switching Power Supply	: Sea Sonic, Model: SSH-250
Data Cable	: Shielded, Undetectable, 1m
Power Cord	: Non-Shielded, Detachable, 1.5m

☒ Keyboard

Model Number	: 6311
Serial Number	: K6355092204
FCC ID	: JVP6311
Manufacturer	: ACER
Data Cable	: Sheiled, Undetachable, 1.2 m



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2.3 Test Methodology

EMI Test:

Both conducted and radiated testing were performed according to the procedures in EN 55022/1987. Radiated testing was performed at an antenna to EUT distance of 10 meters.

EMS Test:

Performed according to procedures in EN 61000(IEC 801)

2.4 Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-28
Humidity (%RH)	25-75 (45-75 for ESD, 1 st , ed.) (30-60 for ESD, 2 nd . Ed)	40-50 for ESD 60-81 for others
Barometric pressure (mbar)	860-1060	950-1000

Site Description : Hovik, 15 August, 1996 File on
DNV Laboratory Authorization
Det Norske Veritas AS
(Competent and Notified Body no. 575)

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.



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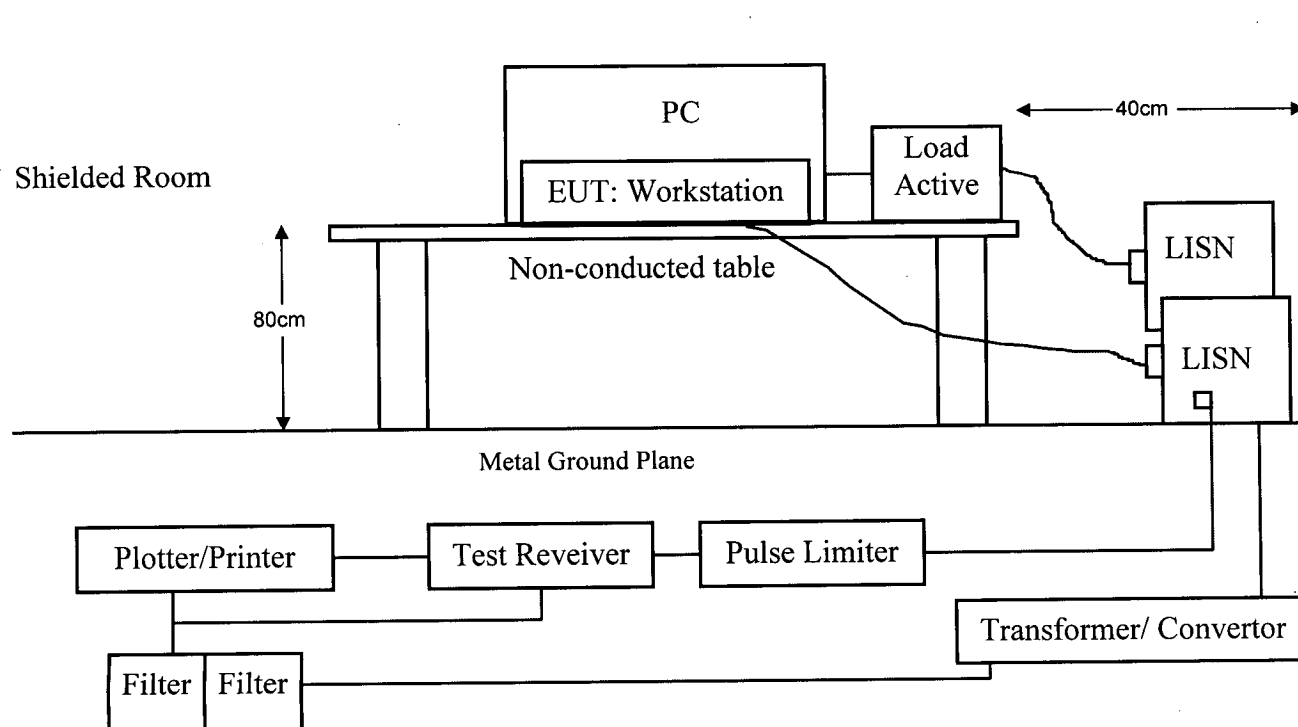
3. Conducted Power Line Test

3.1 Test Equipments

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

Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Test Receiver	Rohde & Schwarz	ESHS 30	JUL.1996
2	L.I.S.N.	Kyoritsu	KNW-407	JUL.1996
3	L.I.S.N.	EMCO	3825/2	JUL.1996
4	L.I.S.N.	Rohde & Schwarz	ESH3-Z5	JUL.1996
5	Computer	Enlight	486AT	N/A
6	Printer	NEC	6200	N/A
7	Plotter	HP	7440A	N/A
8	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A
9	Shielded Room 8.0m*4.0m*3m			N/A

3.2 Block Diagram of Test Setup





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3.3 Conducted Powerline Emission Limit

Frequency MHz	Maximum RF Line Voltage dB(uV)			
	Class A		Class B	
	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.

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:

- 3.1.5.1 Setup the EUT and simulators as shown on 4.2.1.
- 3.1.5.2 Turn on the power of all equipments.
- 3.1.5.3 Boot the PC from Floppy Disk.
- 3.1.5.4 PC sent "H" Pattern to Monitor.
- 3.1.5.5 PC sent "H" Pattern to Parallel port.
- 3.1.5.6 PC sent "H" Pattern to Serial port.
- 3.1.5.7 Repeat 3.5.4 to 3.5.6

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 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.



DET NORSKE VERITAS AS

Order No :96-9444

TCF#: CEE-0013- 5

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CONDUCTED EMISSION DATA

Date of Test : Sep. 28, 1996 Temperature : 22 °C
EUT : CPU Card Humidity : 56.4 %
Test Mode : AWS-825P Display Pattern : H Pattern

FREQUENCY	READING LEVEL dBuV				LIMITS	
	LINE1 QP	LINE1 AV	LINE2 QP	LINE2 AV	QP	AV
0.28517	45.1	*	45.4	*	60.669	50.669
0.44664	39.3	*	39.3	*	56.949	46.949
0.94028	35.1	*	35.5	*	56.000	46.000
2.03884	33.6	*	33.7	*	56.000	46.000
15.35850	34.9	*	33.4	*	60.000	50.000
19.71630	35.6	*	35.6	*	60.000	50.000

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

2. " * " means that the level is too low.

ROHDE & SCHWARZ ESHS 30

14. Nov 96 10:41

GesTek, PowerLine Conducted Emission

EUT: CPU CARD
Manuf: ADVANTECH
Operator: ROGER
Test Spec: EN55022 A
Comment: Line 1
M/N: PCA-6155

SV NOTIFICATION CLASSIFICATION AS

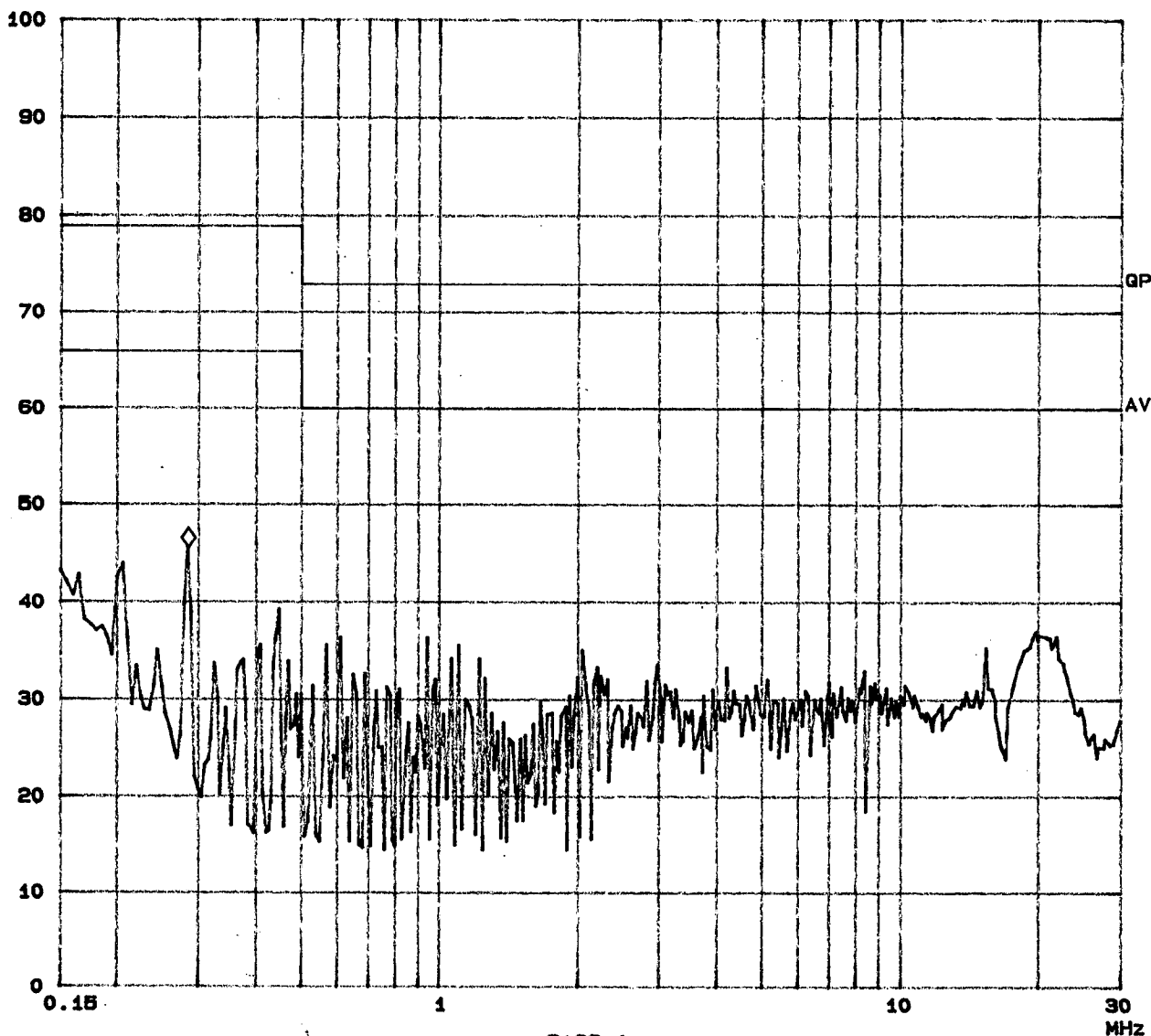
SIGN: *Dennis Lin*

DATE: 96-12-4

APPROVED



dBuV ◇ Mkr : 285.00 kHz 45.5 dBuV



ROHDE & SCHWARZ ESHS 30

14. Nov 96 10:52

GestTek, PowerLine Conducted Emission

EUT: CPU CARD
Manuf: ADVANTECH
Operator: ROGER
Test Spec: EN55022 A
Comment: Line 2
M/N: PCA-6155

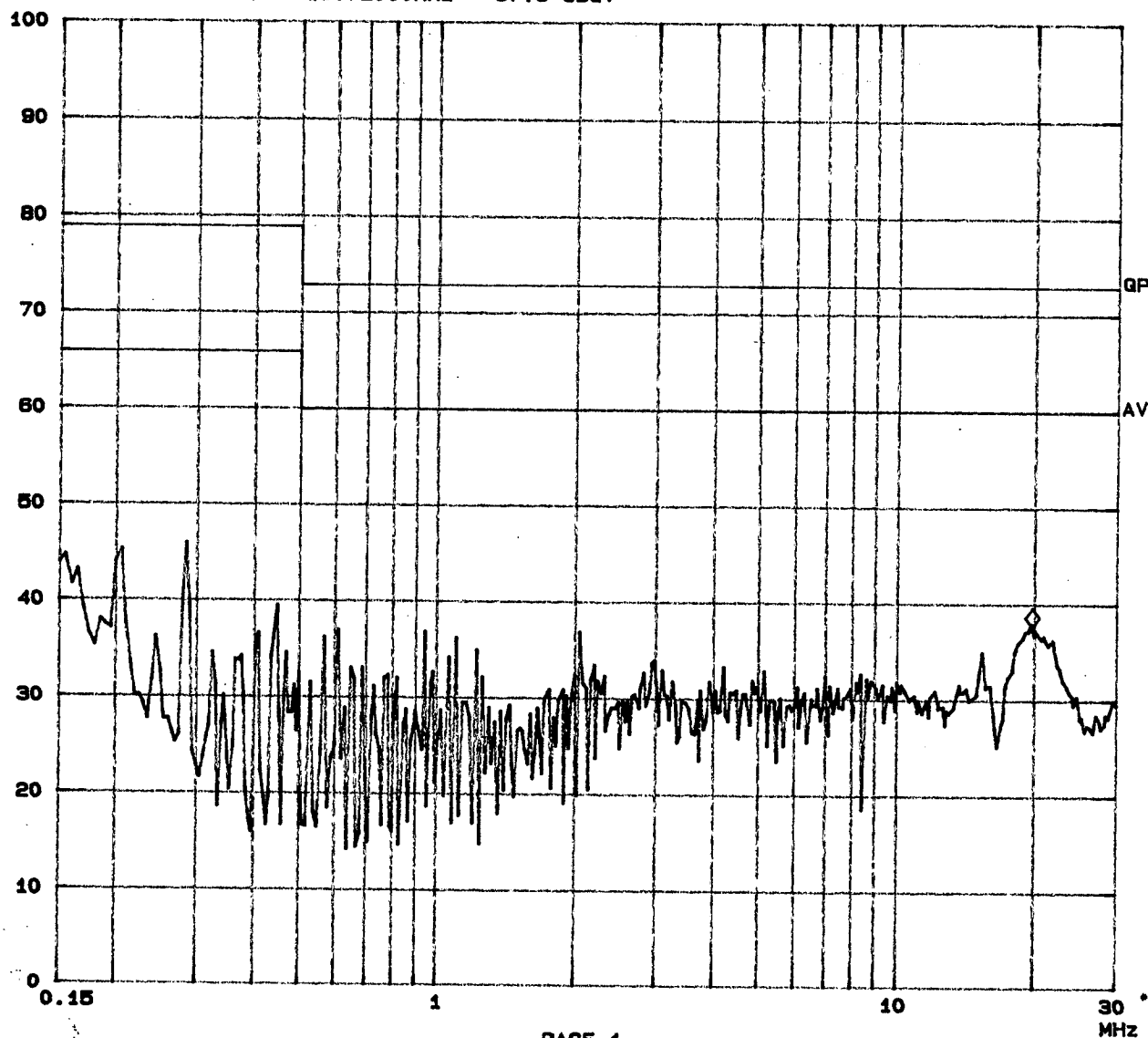


APPROVED

DATE: 96-12-31

SIGN: *Dennis Lin*DET NORSKE VERITAS CLASSIFICATION AS
TABLE

dBuV ◇ Mkr : 19.72000MHz 37.6 dBuV





DET NORSKE VERITAS AS

Order No :96-9444

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4. Radiation Emission Test

4.1 Test Equipment

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

Item	Instrument	Manufacturer	Type No.	Last Calibration
1	Spectrum Analyzer	Anristu	MA2601B	Jun. 1996
2	Test Receiver	Rohde & Schwarz	ESVS 30	Jun. 1996
3	Pre-Amplifier	HP	7447F	Jun.1996
4	Computer	DTK	486DX2/66	N/A
5	Printer	NEC	P6200	N/A
6	Antenna & Turn Table Controller	GesTek	AT7007	N/A
7	Spectrum Analyzer	HP	8568B	Aug. 1996
8	Test Receiver	Rohde & Schwarz	ESVS 10	Aug. 1996
9	Pre Amplifier	HP	8447D	Aug. 1996
10	Bilog Antenna	Chase	CBL6111	Jul. 1996
11	Broadband Antenna 30Mhz-2Ghz	Chase	CBL 6112	Feb. 1996
12	Bilog Antenna	Chase	CBL6111	Jun. 1996

4.2 Test Setup

4.2.1 Block Diagram of Connections between EUT and simulators





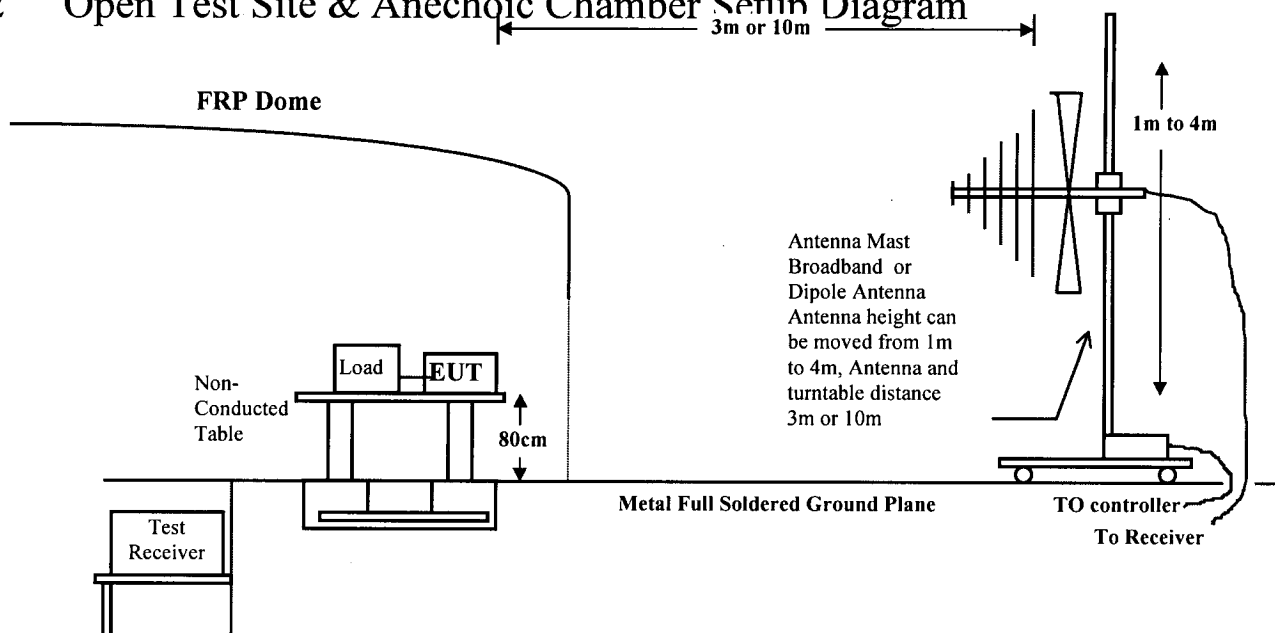
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4.2.2 Open Test Site & Anechoic Chamber Setup Diagram



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	30	30
230 - 1000	30	37

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.



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4.4 EUT Configuration

The equipments which is listed 3.2.2 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.

4.5 Operating Condition of EUT

Same as Conducted Power Line Test which is listed in 3.1.5.

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 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 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.



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Radiated Emission Data

Date of Test :09-18,1996 Temperature :22 deg/C
EUT :CPU CARD Humidity :56.5 %RH
Test Mode. :PCA-6155 Display Pattern:H Pattern

Frequency	Cable	Antenna	Reading Level	Emission Level	Limits
(MHz)	Loss	Factor	Horizontal	Horizontal	(dBuV/m)
	(dB)	(dB)	(dBuV/m)	(dBuV/m)	
66.683	0.91	6.30	17.27	24.48	40.00
136.320	1.33	12.45	0.65	14.43	40.00
157.500	1.46	11.59	10.86	23.91	40.00
197.492	1.69	10.50	9.38	21.57	40.00
208.507	1.75	10.25	8.36	20.37	40.00
266.892	2.09	13.67	13.50	29.26	47.00
300.158	2.29	14.50	8.68	25.47	47.00
366.764	2.68	15.69	4.44	22.82	47.00
400.130	2.88	17.50	4.77	25.15	47.00

Remarks: All Readings below 1GHz are Quasi-Peak, above are average value.



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TCF#: CEE-0013- 5

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Radiated Emission Data

Date of Test :09-18,1996 Temperature :22 deg/C
EUT :CPU CARD Humidity :56.5 %RH
Test Mode. :PCA-6155 Display Pattern:H Pattern

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB)	Reading Level Vertical (dBuV/m)	Emission Level Vertical (dBuV/m)	Limits (dBuV/m)
66.683	0.91	7.04	18.54	26.49	40.00
136.324	1.33	14.03	-3.01	12.35	40.00
157.502	1.46	10.99	8.39	20.84	40.00
197.492	1.69	10.96	18.87	31.51	40.00
208.507	1.75	10.44	10.96	23.15	40.00
266.894	2.09	13.27	17.15	32.51	47.00
366.766	2.68	15.66	3.75	22.10	47.00
400.134	2.88	18.40	1.27	22.55	47.00

Remarks:All Readings below 1GHz are Quasi-Peak, above are average value.



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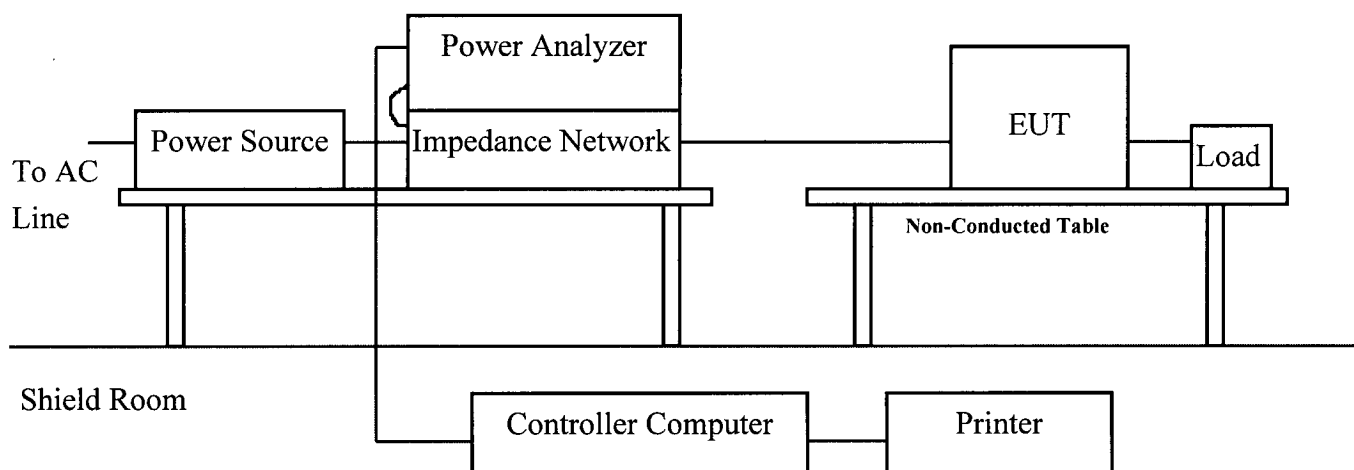
5. Disturbance Measurement

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	Oct. 1995
2	Power Source	Pacific	345AMX/UPC32	Oct. 1995
3	Impedance Network	Voltech	IB0718921	Oct. 1995

5.2 Test Setup of EUT





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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.
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 EN60555-2 & 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.

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.

GESTEK

MODEL: PCA-6155

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Report #: 969022E1

GestTek Lab. Voltech PM3000A-002 Universal Power Analyzer

MANUFACTURER: ADVANTECH

EUT: CPU CARD

M/N: PCA-6155

DEF NORSKE VERITET CLASSIFICATION AS
TAIPEI

CH1 Steady State Harmonics Test. Thu Nov 14 14:01:34 1996

Volts 230.300003V

Amps 0.972000A

Watts 107.220001W

Power Factor 0.490400

Limits multiplied by 1.00

HNumber	IEC Limit (class A)	Magnitude	PASS FAIL
2	1.080A	0.005454A	PASS
3	2.300A	0.449600A	PASS
4	0.430A	0.004877A	PASS
5	1.140A	0.411100A	PASS
6	0.300A	0.004378A	PASS
7	0.770A	0.361900A	PASS
8	0.230A	0.003617A	PASS
9	0.400A	0.304000A	PASS
10	0.184A	0.003008A	PASS
11	0.330A	0.242100A	PASS
12	0.153A	0.002467A	PASS
13	0.210A	0.180710A	PASS
14	0.131A	0.002018A	PASS
15	0.150A	0.124720A	PASS
16	0.115A	0.001583A	PASS
17	0.132A	0.077280A	PASS
18	0.102A	0.001533A	PASS
19	0.118A	0.041470A	PASS
20	0.092A	0.001229A	PASS
21	0.107A	0.020590A	PASS
22	0.084A	0.001130A	PASS
23	0.098A	0.018495A	PASS
24	0.077A	0.000848A	PASS
25	0.090A	0.021950A	PASS
26	0.071A	0.000647A	PASS
27	0.083A	0.022170A	PASS
28	0.066A	0.000463A	PASS
29	0.078A	0.019026A	PASS
30	0.061A	0.000204A	PASS
31	0.073A	0.014199A	PASS
32	0.058A	0.000170A	PASS
33	0.068A	0.009280A	PASS
34	0.054A	0.000195A	PASS
35	0.064A	0.005339A	PASS
36	0.051A	0.000200A	PASS
37	0.061A	0.003152A	PASS
38	0.048A	0.000057A	PASS
39	0.058A	0.002682A	PASS
40	0.046A	0.000086A	PASS

Passed Steady State Harmonics test

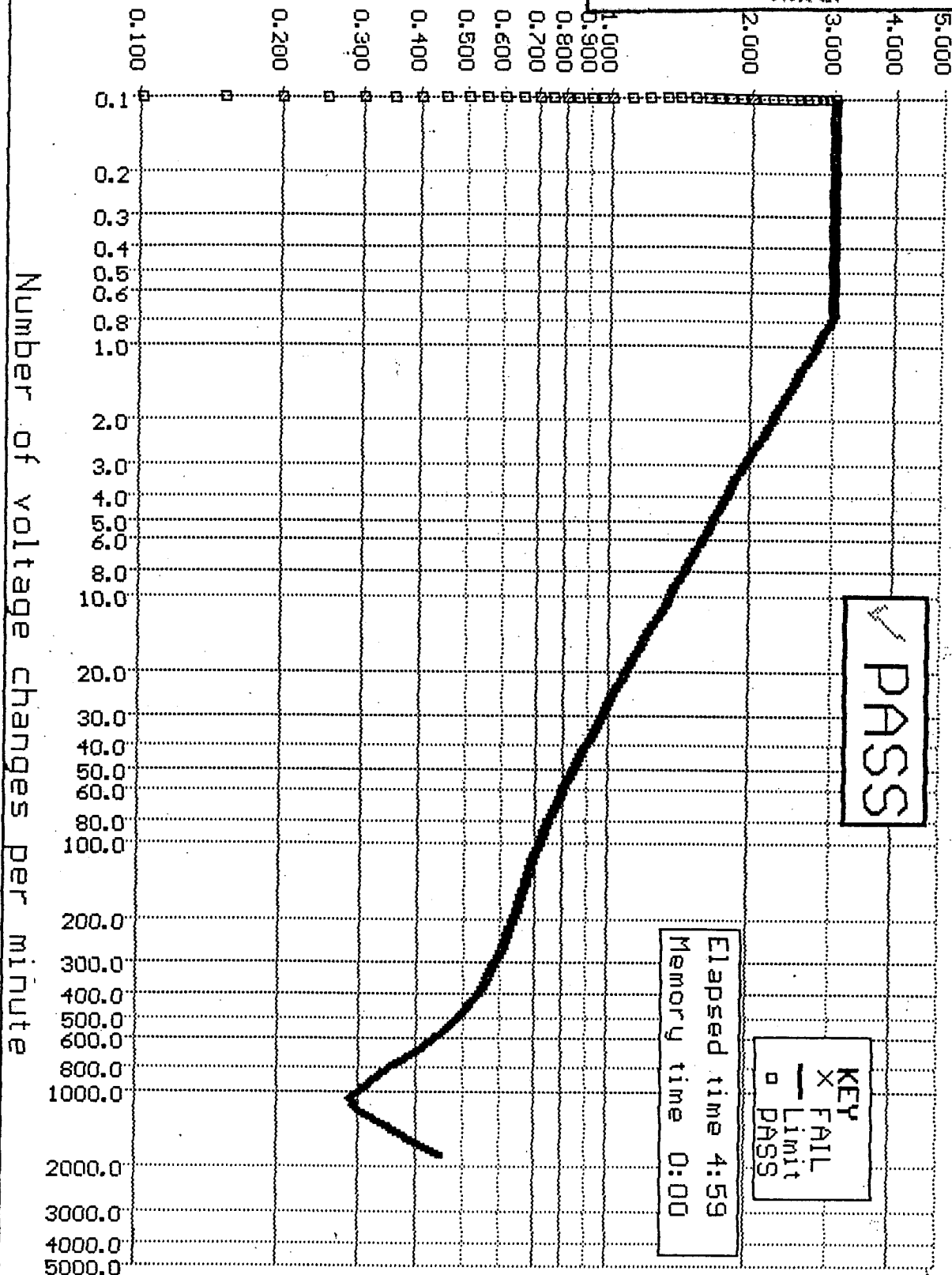
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Rev: 1



Relative voltage change

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TAIPEI



✓ PASS

KEY
X FAIL
— Limit
□ PASS

Elapsed time 4:59
Memory time 0:00

Unchanging voltage FRI NOV 08 10:24:32 1996



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Order No :96-9444

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6. ESD Measurement

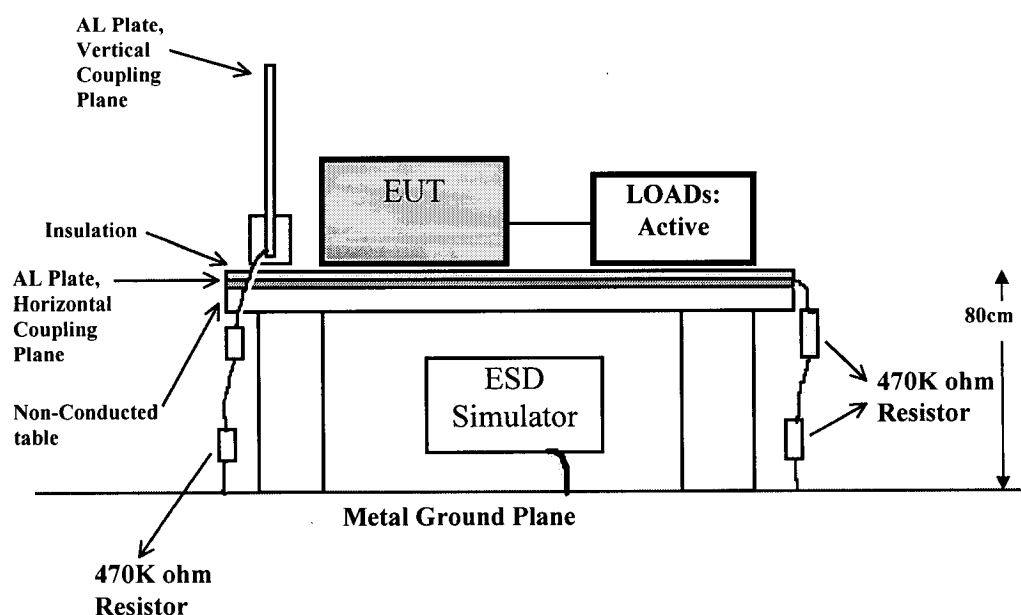
6.1 Test Equipment

The following test equipments are used during the ESD tests:

Item	Instrument	Manufacturer	Type No.	Last Calibration
1	ESD Simulator System	HAEFELY	ESD Tester	Apr. 1996
2	Shielded Room	GesTek	GTK 02	N/A

6.2 Test Setup

6.2.1 Block Diagram of Connections between EUT and simulators





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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 EN50082-1:

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

6.4 EUT Operating Condition

1. Setup the EUT and Test Equipment as shown on 3.2.2
2. Power on.

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



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6.6 Test Method

According to IEC 801-2/1991.

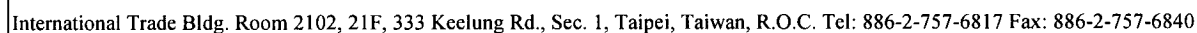
6.7 Test Result

ITEM	AMOUNT OF DISCHARGE	VOLTAGE	CRITERIA (A, B, C)	RESULTS
Direct	30	+2/4/8KV	A	PASS
Discharge	30	-2/4/8KV	A	PASS
Air				
Direct	30	+2/4/6KV	A	PASS
Discharge	30	-2/4/6KV	A	PASS
Contact				
Indirect	30	+2/4/8KV	A	PASS
Discharge	30	-2/4/8KV	A	PASS
VCP				
Indirect	30	+2/4/8KV	A	PASS
Discharge	30	-2/4/8KV	A	PASS
HCP				

☒ 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: $< \pm 20\%$
- Uncertainty in first peak value of the discharge pulse: $< \pm 8\%$
- Uncertainty in the discharge pulse value at 30ns: $< \pm 30\%$
- Uncertainty in the discharge pulse value at 60ns: $< \pm 30\%$





7.3 Severity Levels

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

Pursuant to EN50082-1:

Required Performance Criteria	:	A
Limit	:	3.0V/m

EUT Operating Condition
Same as section 3.2.4.

7.4 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
1. Field Strength	10 V/m Level 2
2. Radiated Signal	Un-modulated
3. Scanning Frequency	27MHz-500MHz
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



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7.5 Test Method

According to IEC 801-3/1984.

7.6 Test Result

Freq. Range (MHz)	Position (Angle)	Polarity (H or V)	Field Strength (V/M)	Criteria	Results
27-500	0	H	10	A	PASS
27-500	90	H	10	A	PASS
27-500	180	H	10	A	PASS
27-500	270	H	10	A	PASS
27-500	0	V	10	A	PASS
27-500	90	V	10	A	PASS
27-500	180	V	10	A	PASS
27-500	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.



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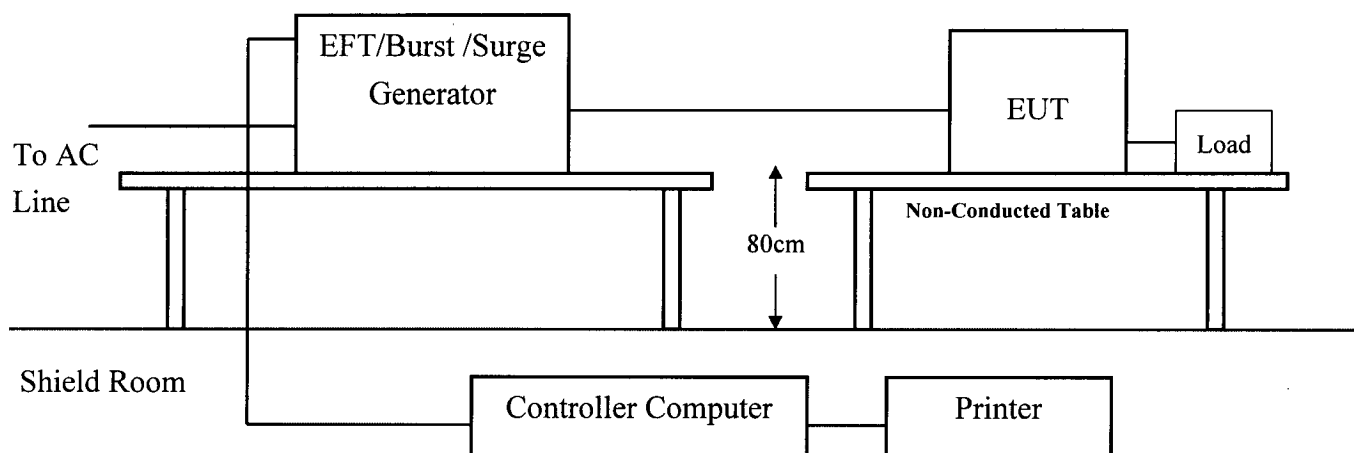
8. Electrical Fast Transient/Burst Measurement

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. 1995

8.2 Block Diagram of Test Setup



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 EN50082-1:

Required Performance Criteria : B

Limit : $\pm 0.5KV$ for Signal Lines and Control Lines
 $\pm 2.0KV$ for Power Lines and protective earth terminal



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8.4 EUT Operation Condition

Same as section 3.2.4.

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 IEC 801-4/1988.



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8.7 Test Result

Inject Line	Voltage KV	Inject time (second)	Inject Method	Result
L1-PE	+1/+2	90	DIRECT	PASS
L1-PE	-1/-2	90	DIRECT	PASS
L2-PE	+1/+2	90	DIRECT	PASS
L2-PE	-1/-2	90	DIRECT	PASS
L1-L2	+1/+2	90	DIRECT	PASS
L1-L2	-1/-2	90	DIRECT	PASS
Signal	+0.5	90	CLAMP	N/A
Signal	-0.5	90	CLAMP	N/A

- ☒ 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.

The total uncertainty for this test is as follows:

- Uncertainty in risetime (10%/90%) in of the pulse: $< \pm 30\%$
- Uncertainty in half width (50%/50%) in of the pulse: $< \pm 30\%$
- Uncertainty in pulse repetition: $< \pm 20\%$
- Uncertainty in the amplitude of the pulse: $< \pm 10.8\%$

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

GESTEK

MODEL: PCA-6155



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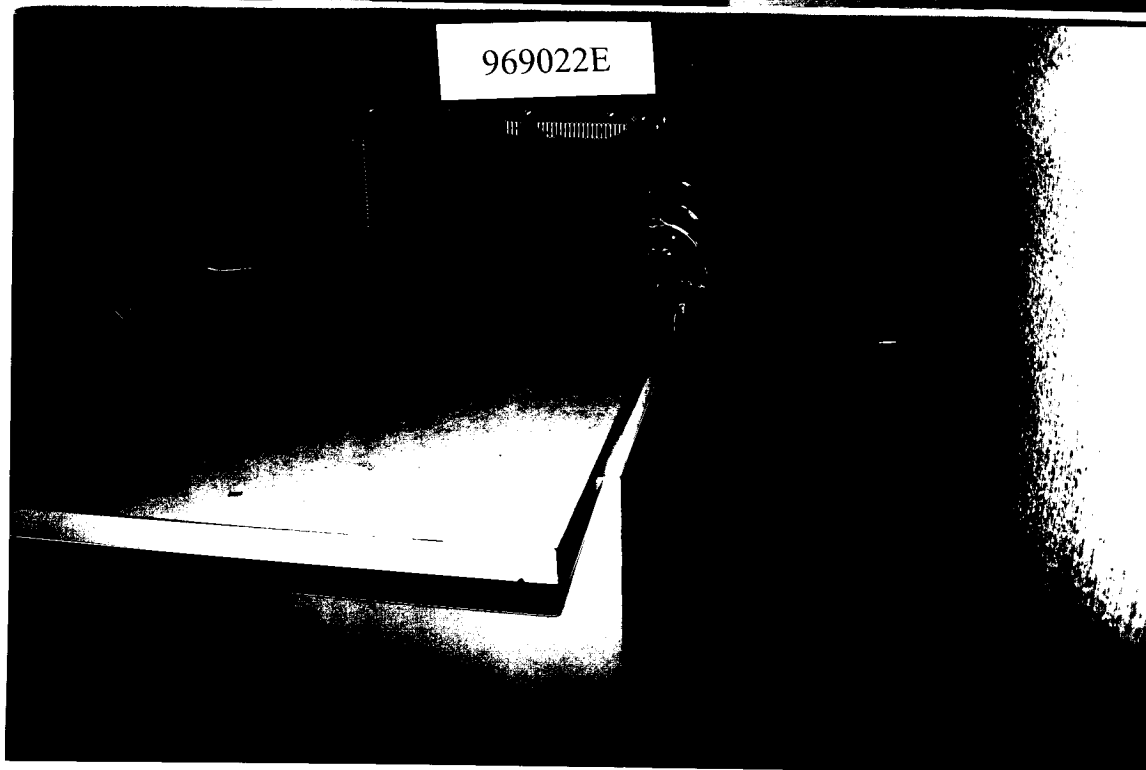
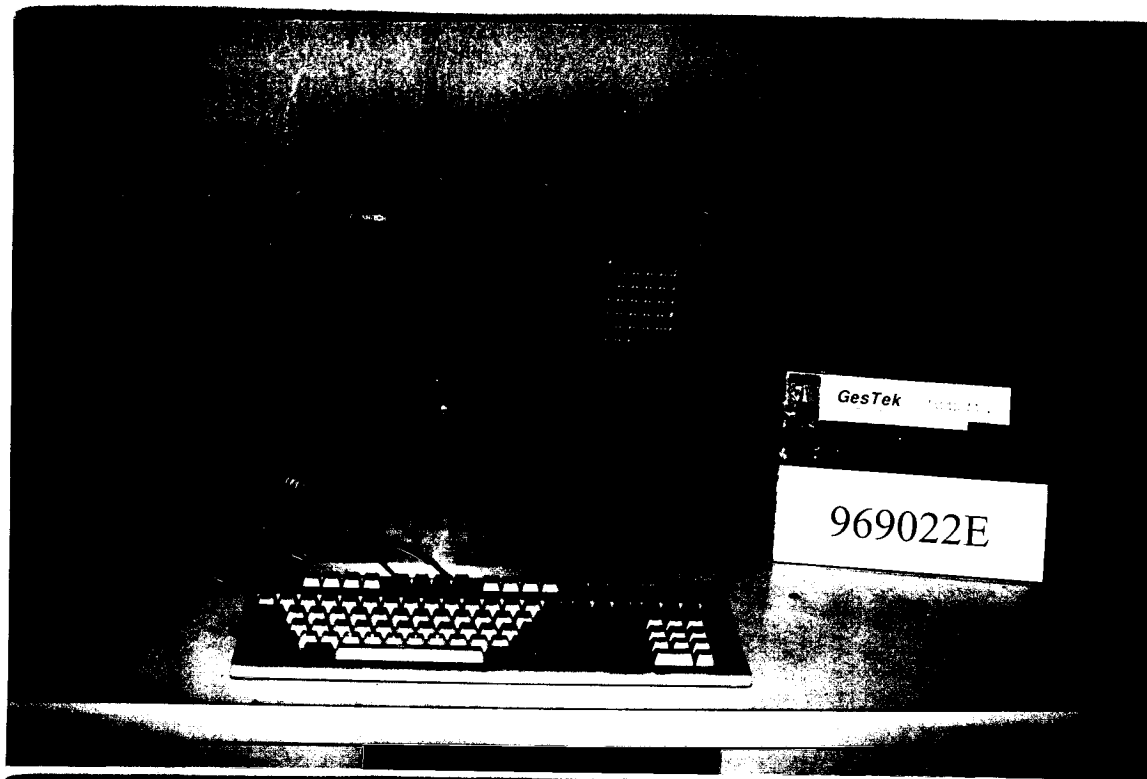
DATE: 96-12-31

SIGN: Dennis Lin

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9. Photographs

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



GESTEK

MODEL: PCA-6155



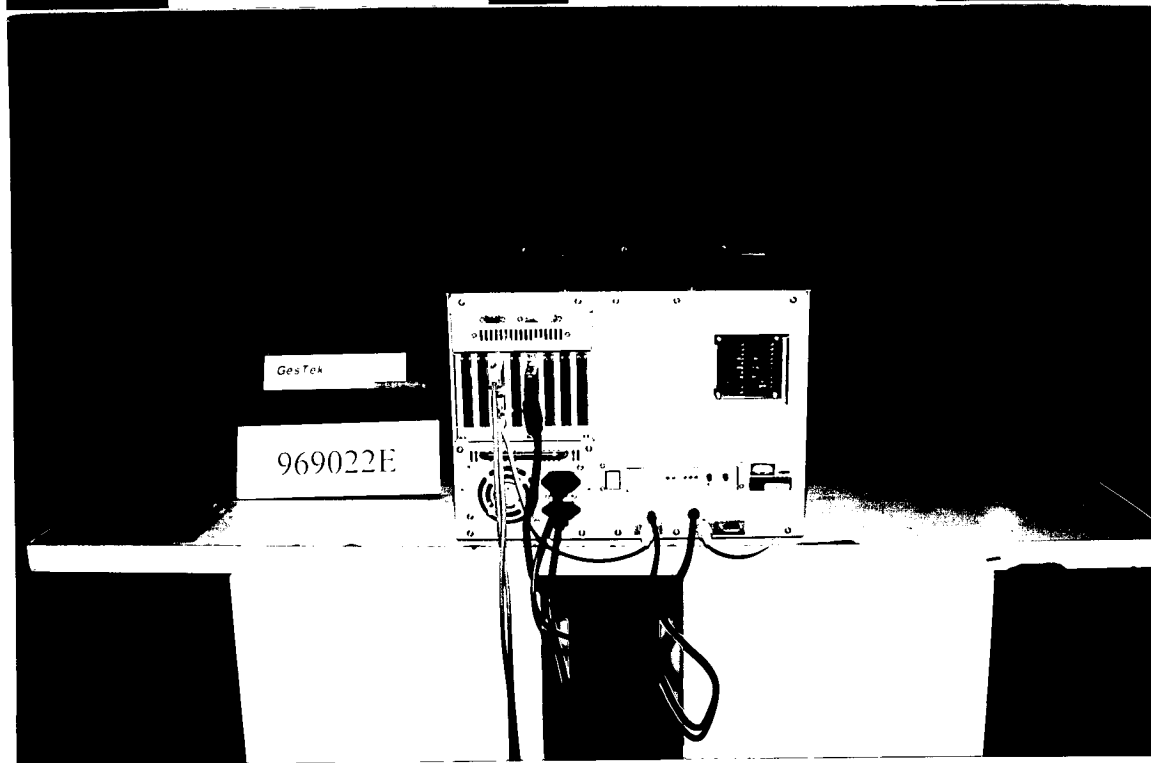
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3. FRONT VIEW OF RADIATED TEST
4. BACK VIEW OF RADIATED TEST



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5. FRONT VIEW OF HARMONIC TEST SETUP
6. BACK VIEW OF HARMONIC TEST SETUP



GESTEK

MODEL: PCA-6155



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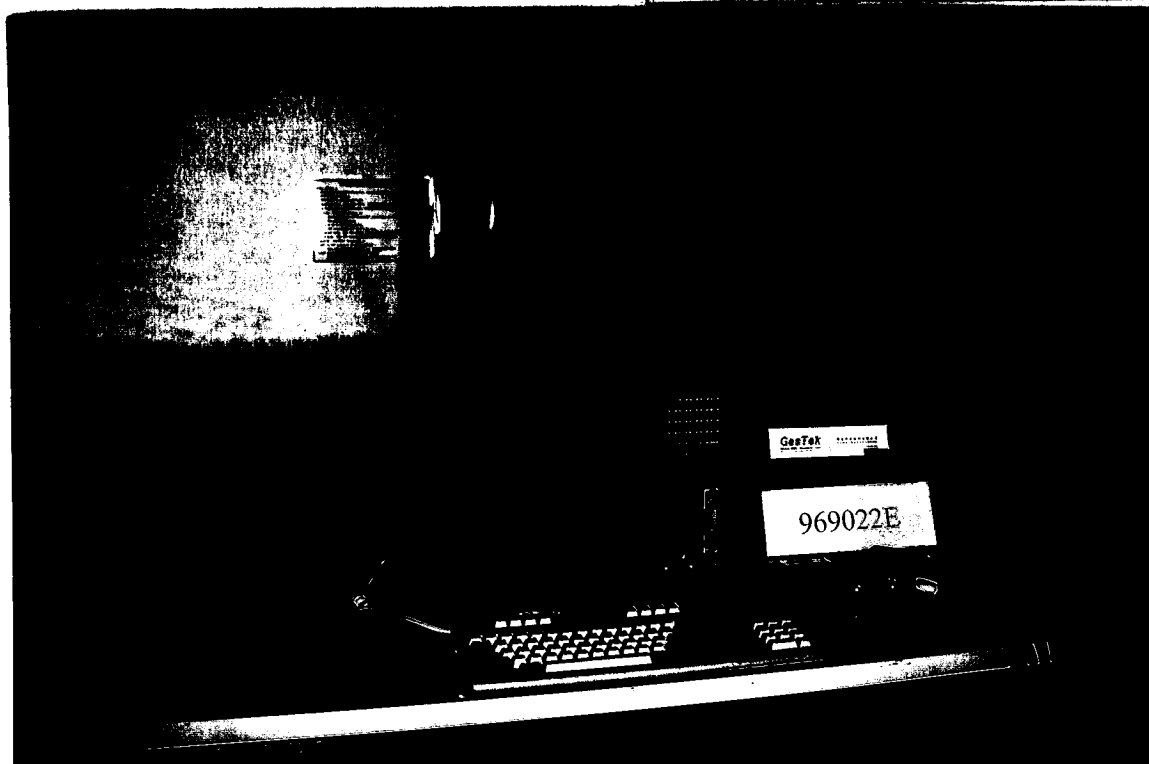
Report #: 969022E1

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



GESTEK

MODEL: PCA-6155



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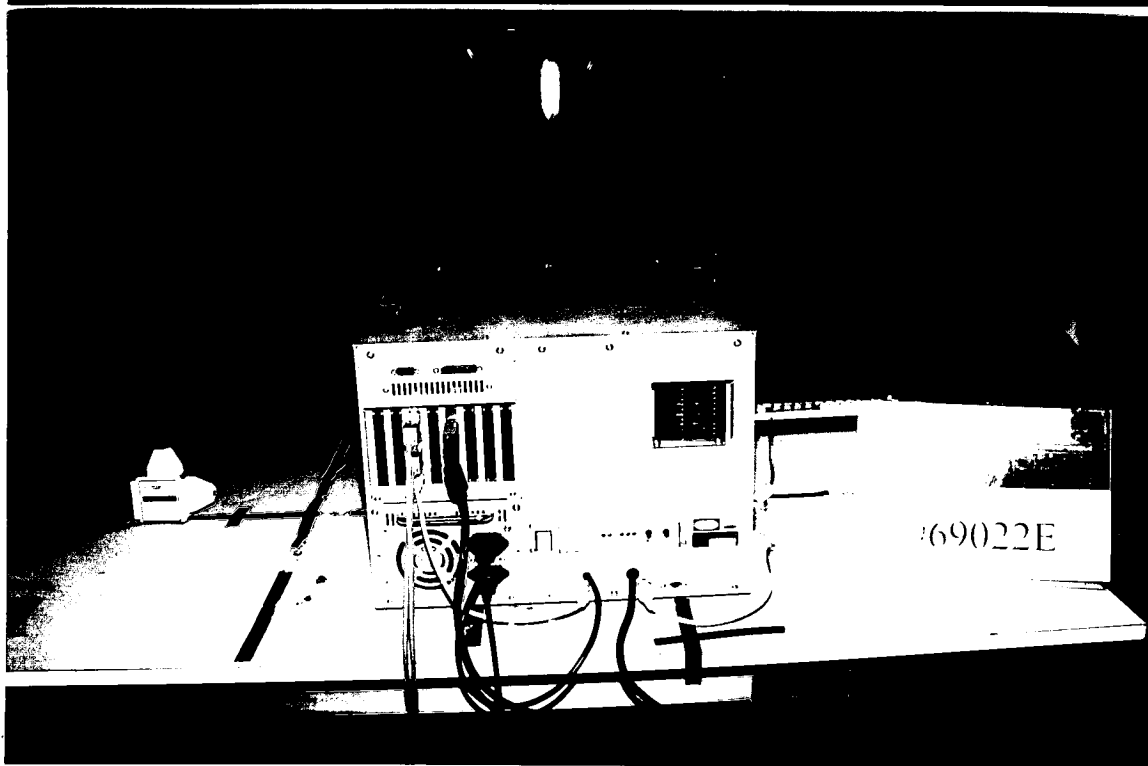
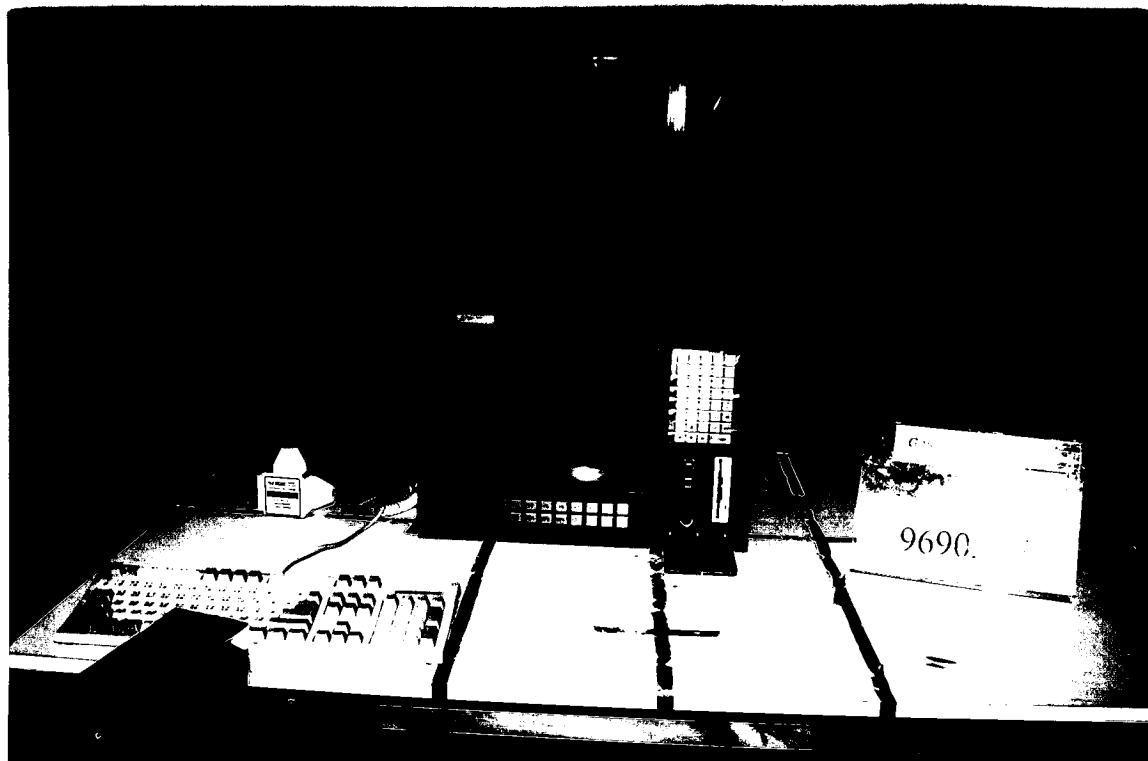
96-231
Report #: 969022E1

DATE:

SIGN: Dennis Lin

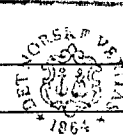
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- 9. FRONT VIEW OF RS TEST SETUP
- 10. BACK VIEW OF RS TEST SETUP



GESTEK

MODEL: PCA-6155



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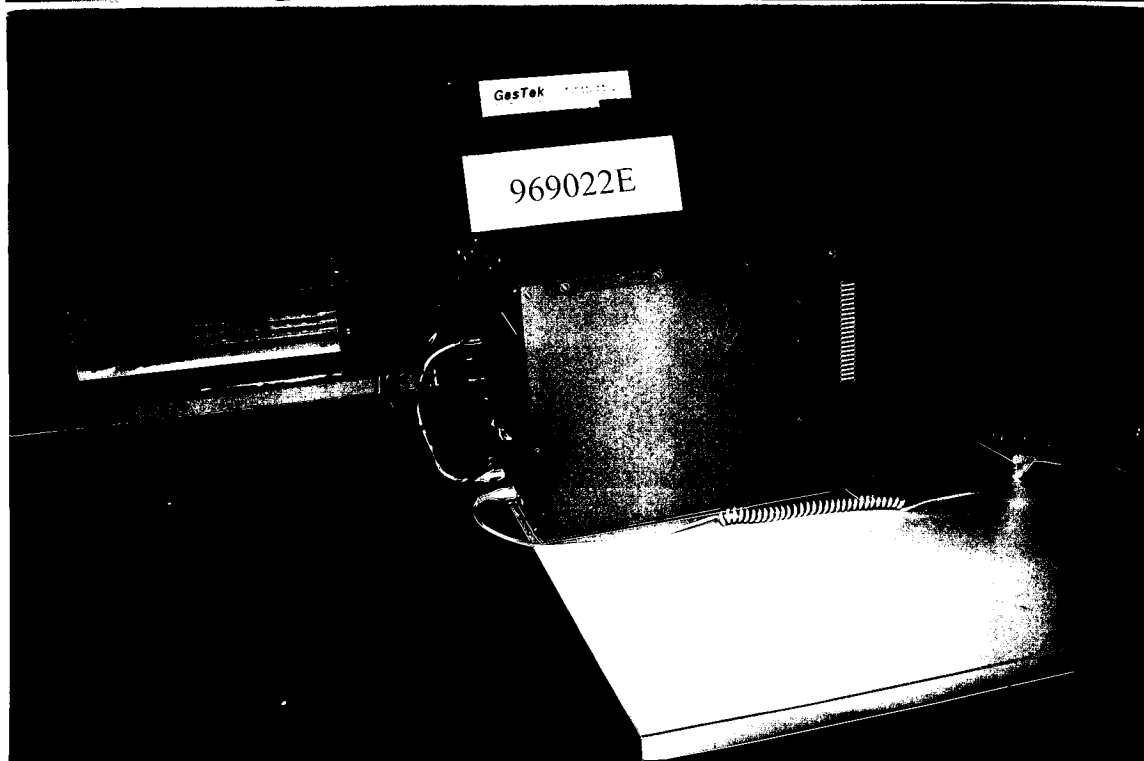
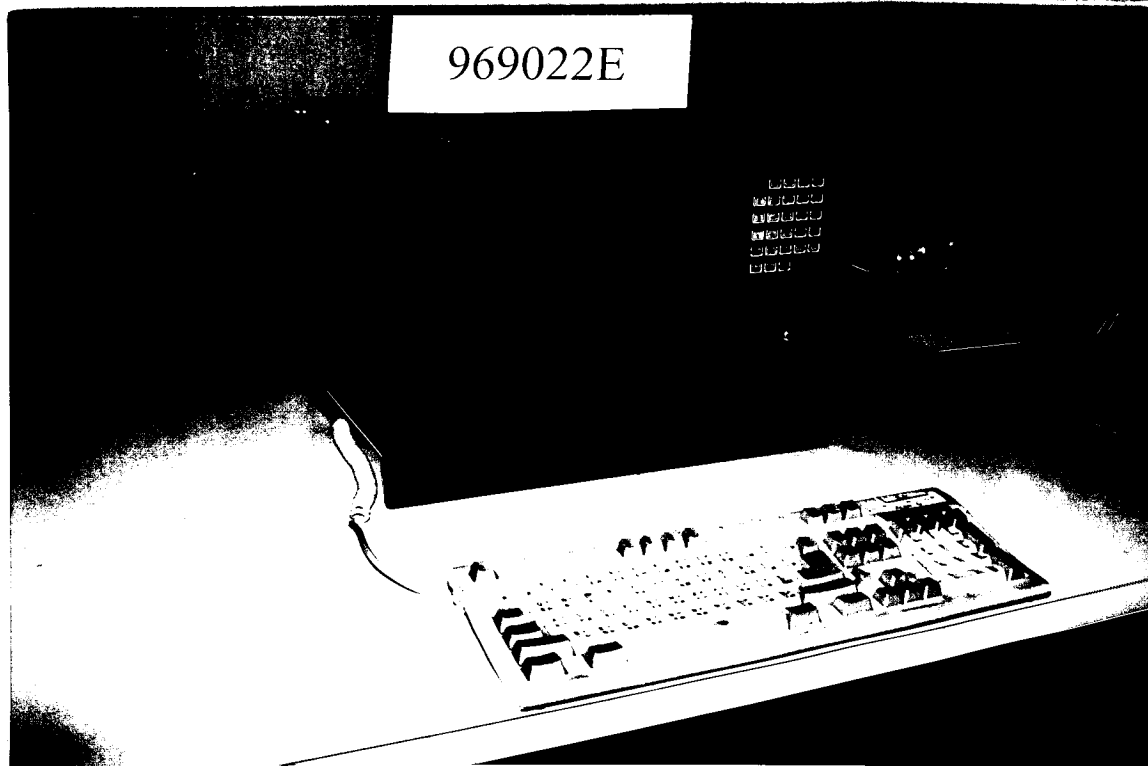
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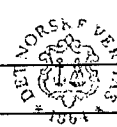
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11. FRONT VIEW OF EFT TEST SETUP
12. BACK VIEW OF EFT TEST SETUP



GESTEK

MODEL: PCA-6155



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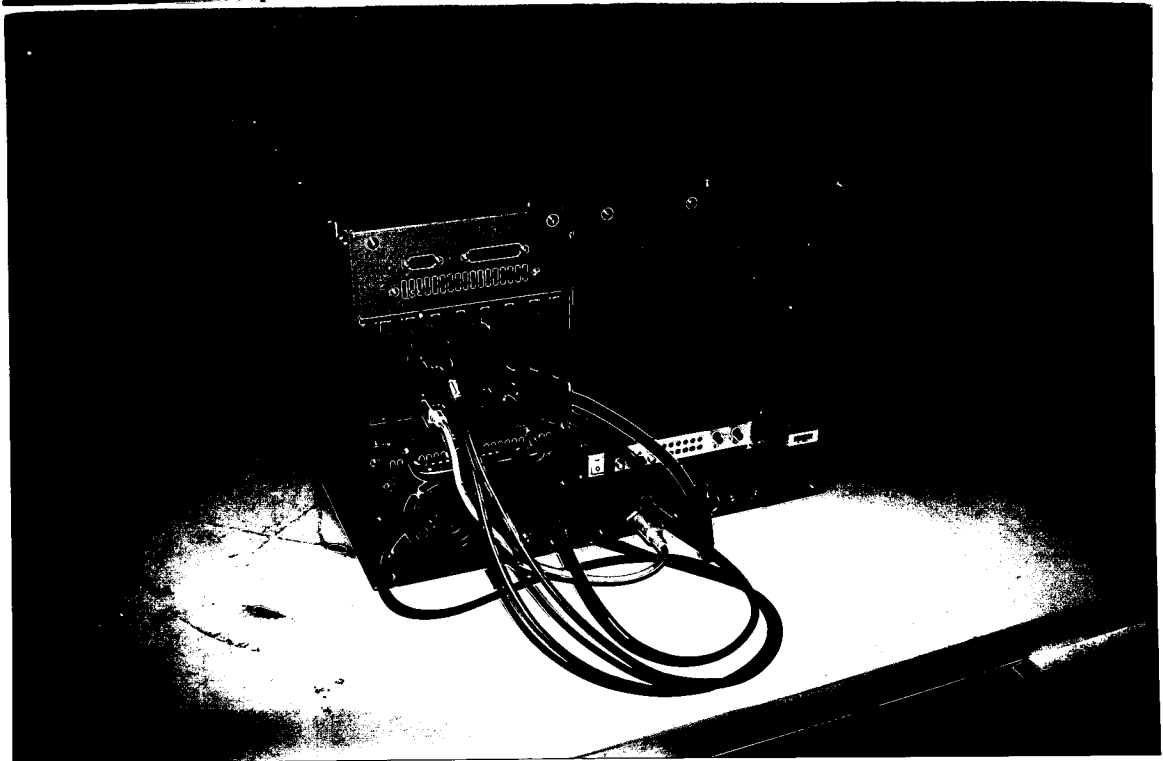
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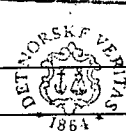
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- 13. FRONT VIEW OF INDUSTRY WORKSTATION
- 14. BACK VIEW OF INDUSTRY WORKSTATION



GESTEK

MODEL: PCA-6155



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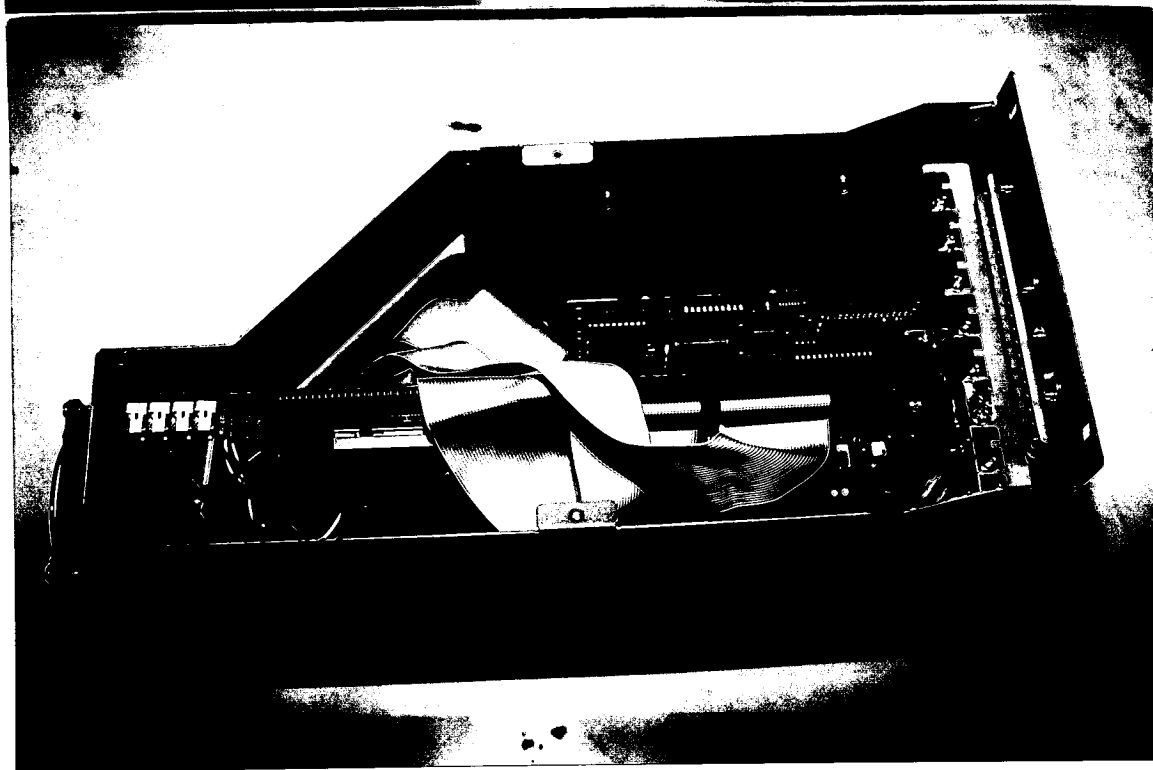
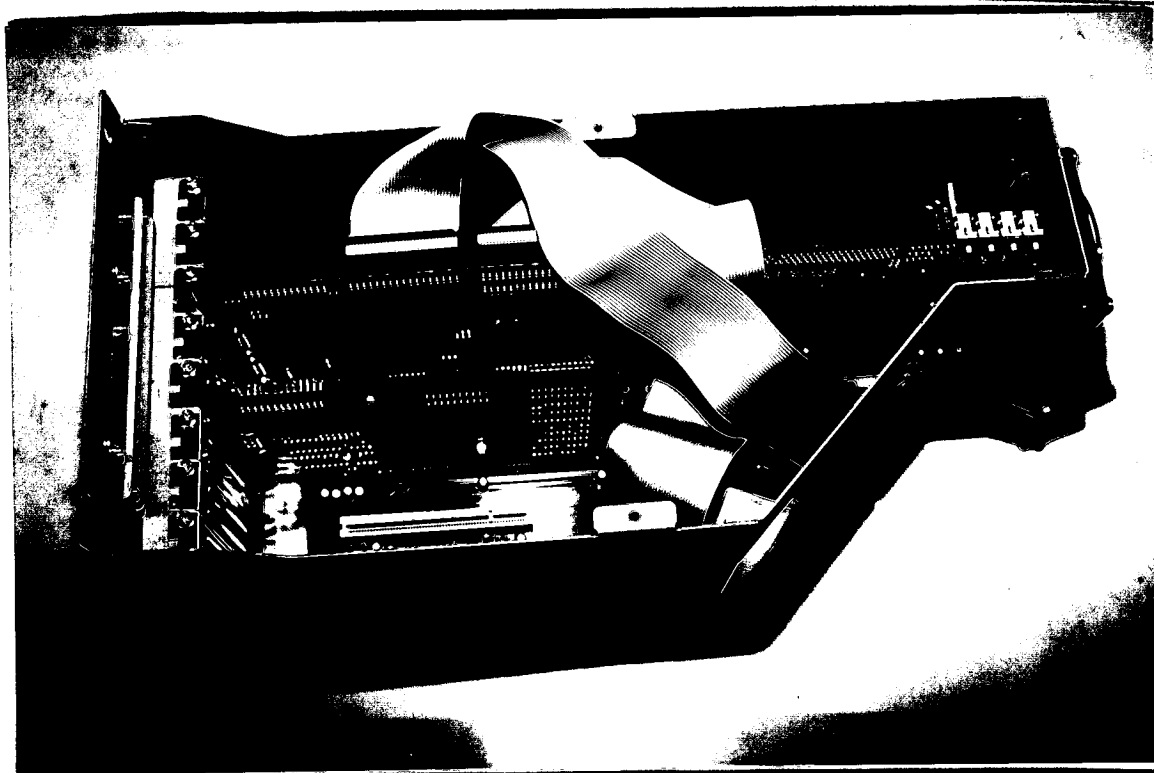
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15. INNER VIEW

16. INNER VIEW



GESTEK

MODEL: PCA-6155



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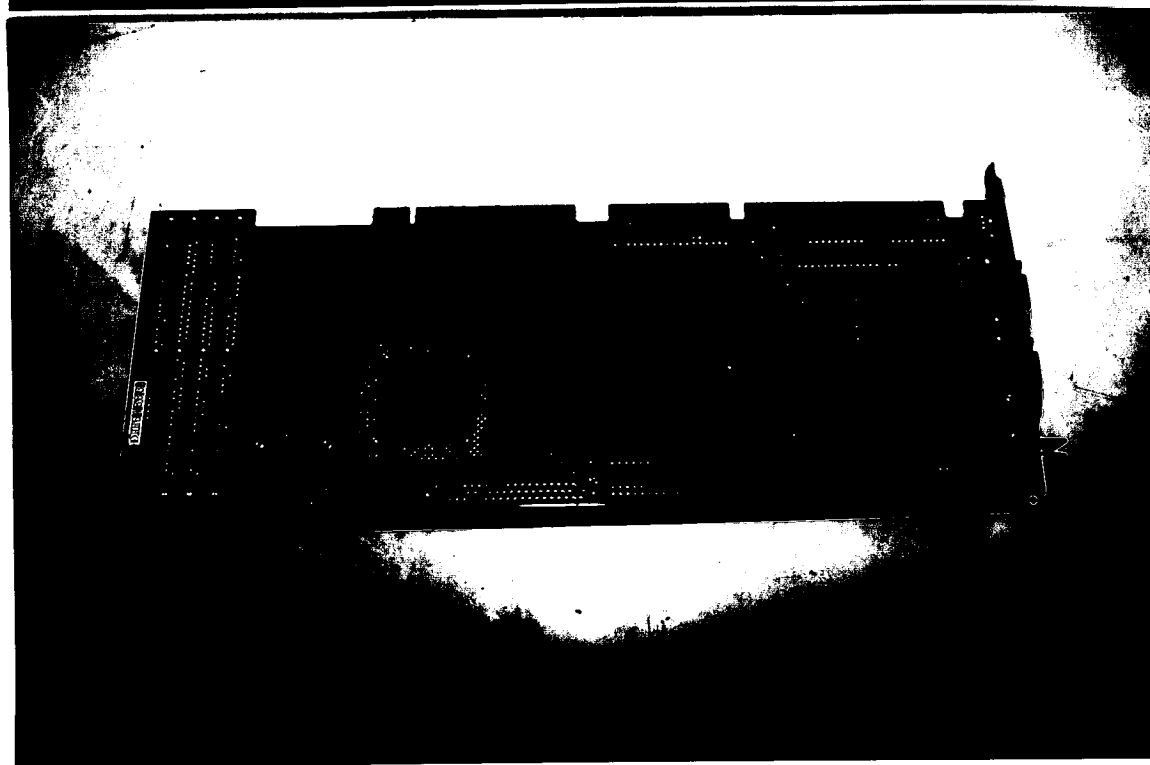
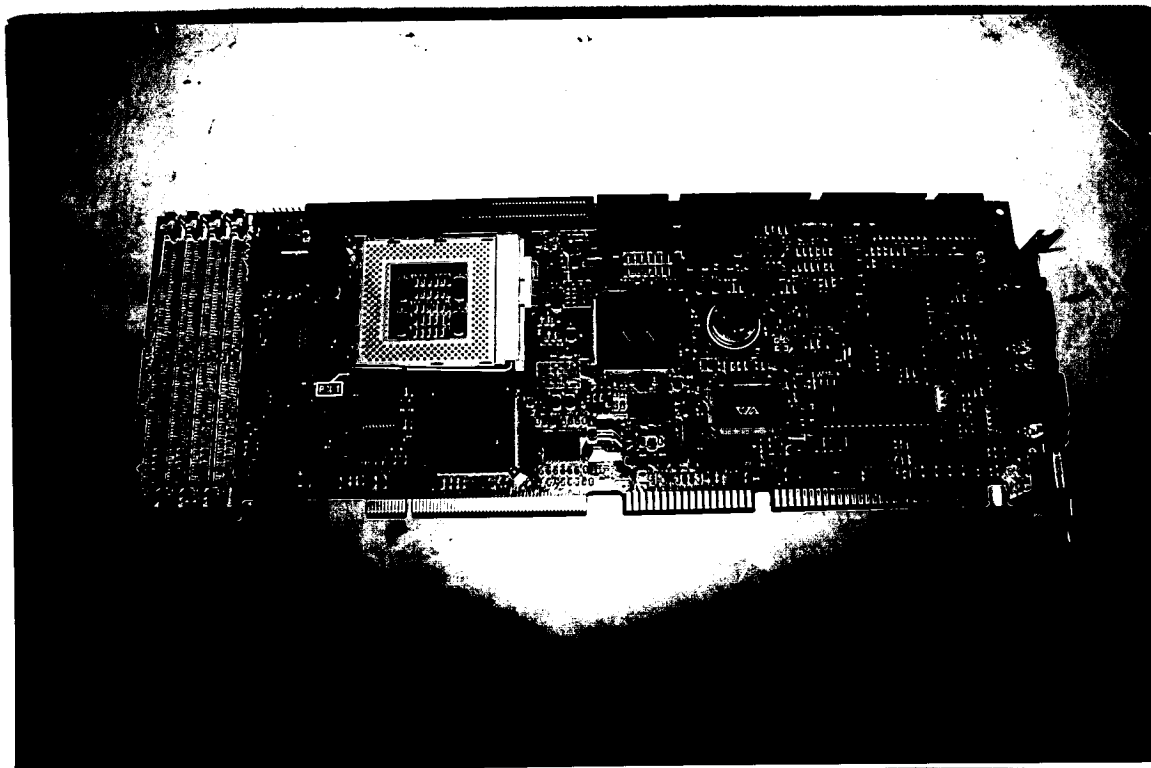
96-12-71
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17. COMPONENT SIDE OF CPU CARD

18. SOLDER SIDE OF CPU CARD





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10. EMI/EMS Reduction Method During Compliance Testing

No modification was made during testing.

