EMC

TEST REPORT

REPORT NO. : CE87071009
MODEL NO. : PCM-5894A3.1, PCM-5892A3.1
DATE OF TEST : July 10 ~ July 23, 1998

PREPARED FOR: AAEON TECHNOLOGY INC.

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PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION
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1. CERTIFICATION

Issue date: July 27, 1998

Product	:	CPU BOARD	
Trade Name	:	AAEON	
Model No.	:	PCM-5894A3.1, PCM-5892A3.1	
Applicant	:	AAEON TECHNOLOGY INC.	
Standard	:	EN 55022:1994+A1:1995+A2:1997, Class A	**EN 50082-2:1995**
			EN 61000-4:2:1995
			EN 61000-4-3:1996
			EN 61000-4-4:1995
			EN 61000-4-6:1996
			EN 61000-4-8:1993
			ENV 50204:1995

We hereby certify that one sample of the designation has been tested in our facility from July 10 to July 23, 1998. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

CHECKED BY : Sharon Hsiung , DATE: 7/27/98

(Sharon Hsiung)

APPROVED BY : Mike Su, DATE: 7/27/98

(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	CPU BOARD
Model No.	:	PCM-5894A3.1, PCM-5892A3.1
Power Supply Type	:	DC (from PC)
Data Cable	:	N/A

Note: The EUT has two model names, which are identical to each other in all aspects except for the following:

- MODEL: PCM-5894A3.1, with LCD function
- MODEL: PCM-5892A3.1, without LCD function

From the above models, model: PCM-5894A3.1 was selected as the representative for the test as it has the highest emission levels, and therefore its data is recorded in this report.

During the test, the EUT was installed in a metal enclosure with a slot board to form an industrial PC. The Industrial PC includes the following:

* Chassis : AAEON, model: AIPC-110
* Switching power supply: SEASONIC, model: SSG-250G
* FDD : TEAC, model: FD-235HF
* HDD : MAXTOR, 72700AP
* CPU : INTEL Pentium 233MHZ
* DIO Card: AAEON, model: PCM-3724

The EUT was tested under the CPU: 233 MHz, frequency of clock generator is 66.6 MHz.

For more detailed features description, please refer to ATTACHMENT 1 - TECHNICAL DESCRIPTION OF EUT and User's Manual.

2.2 GENERAL DESCRIPTION OF APPLIED STANDARD

The EUT is a kind of Information Technology Equipment which could be used in industrial area and according to the manufacturer's specifications, it was tested according to the following standards:

EN 55022:1994+A1:1995+A2:1997, Class A

EN 50082-2:1995
EN 61000-4-2:1995
EN 61000-4-3:1996
EN 61000-4-4:1995
EN 61000-4-6:1996
EN 61000-4-8:1993
ENV 50204:1995

All tests are performed and recorded as per above standards.

2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories are used to form representative test configuration during the tests.

FOR EMISSION TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	COLOR MONITOR	ADI	PD-959	730020U00100265	Nonshielded Signal (1.5m) Shielded Power (1.8m)
2	PRINTER	HP	C2145A	SG5AH1511	Nonshielded Signal (1.9m) Shielded Power (2.1m)
3	MODEM	ACEEX	1414	980020569	Shielded signal (1.5m) Nonshielded Power (1.9m)
4	MODEM	ACEEX	1414	980020501	Shielded signal (1.2m) Nonshielded Power (1.9m)
5	MODEM	ACEEX	1414	980020569	Shielded signal (1.2m) Nonshielded Power (1.9m)
6	MODEM	ACEEX	1414	980020540	Shielded signal (1.2m) Nonshielded Power (1.9m)
7	KEYBOARD	FORWARD	FDA-102A	20613	Shielded Signal (2m)
8	MOUSE	HP	M-S34	LZA72033314	Shielded signal (1.8m)
9	PC	IBM	6560-Y-T7T	9983708	Nonshielded power (1.8m) Shielded Signal (2m)
10	MONITOR	ADI	937G	649015T00102093A	Shielded signal (1.5m) Nonshielded power (1.8m)
11	KEYBOARD	FORWARD	FDA-104GA	FDKB8001007	Nonshielded signal (1.2m)
12	MOUSE	DEXIN	A2P800A	80110014	Shielded signal (1.5m)
13	HUB	3 COM	TP800	7YNR014502	Nonshielded signal-- 10m to EUT; 2.0m to PC Shielded power (1.9m)

Note: Support unit 1~8 acted as SERVER PC and communicated with support unit 9-12 (which acted as HOST PC and systems of communication partner) via support unit 13 .

FOR IMMUNITY TEST

No.	Product	Brand	Model No.	Serial No.	I/O Cable
1	KEYBOARD	ACER	6311	K6357050927	Shielded signal (2.0m)
2	MONITOR	ACTION	0951	N/A	Shielded Signal (1.3m) Nonshielded Power (1.3m)
3	MOUSE	HP	M-S34	LZA72701223	Shielded Signal (1.8m)
4	MODEM	ACEEX	1414	980020527	Shielded signal (1.5m) Nonshielded power (1.8m)
5	MODEM	ACEEX	1414	980020528	Shielded signal (1.5m) Nonshielded power (1.8m)
6	MODEM	ACEEX	1414	980020517	Shielded signal (1.5m) Nonshielded power (1.8m)
7	MODEM	ACEEX	1414	980020514	Shielded signal (1.5m) Nonshielded power (1.8m)
8	PRINTER	HP	C2145A	SG5H1601K	Shielded signal (2m) Nonshielded power (1.8m)
9	PC	IBM	6560-Y-T7T	9983708	Nonshielded power (1.8m) Shielded Signal (2m)
10	MONITOR	ADI	937G	649015T00102093A	Shielded signal (1.5m) Nonshielded power (1.8m)
11	KEYBOARD	FORWARD	FDA-104GA	FDKB8001007	Nonshielded signal (1.2m)
12	MOUSE	DEXIN	A2P800A	80110014	Shielded signal (1.5m)
13	HUB	3 COM	TP800	7YNR014502	Nonshielded signal-- 10m to EUT; 2.0m to PC Shielded power (1.9m)

Note: Support unit 1~8 acted as SERVER PC and communicated with support unit 9-12 which acted as HOST PC and systems of communication partner via support unit 13 .

2.4 TEST SETUP

Please refer to the photos of test configuration in Item 6.

3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP Spectrum Analyzer	E4411A	US37360834	Sept. 28, 1998
CHASE Preamplifier	CPA9231A/4	3215	Oct. 31, 1998
HP Preamplifier	8347A	3307A01088	Sept. 4, 1998
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/002	Jan. 8, 1999
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 28, 1998
CHASE BiLOG Antenna	CBL6112	2074	Dec. 25, 1998
EMCO Double Ridged Guide Antenna	3115	9312-4192	April 3, 1999
CHANCE Turn Table & Tower Controller	ACS-I	N/A	N/A
Open Field Test Site	Site 6	ADT-R06	Dec. 23, 1998

Note: 1. The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	Aug. 4, 1998
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	892107/003	July 22, 1998
EMCO L.I.S.N.	3825/2	9504-2359	Aug. 1, 1998
Shielded Room	Site 3	ADT-C03	N/A

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

3.2 TEST INSTRUMENTS (IMMUNITY)

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
KeyTek, ESD Test System	2000	9105240/41	Aug. 10, 1998
KeyTek, ESD Simulator	MZ-15/EC	9507277	April 15, 1999
KeyTek, EFT Generator	CE-40	9508257	Sept. 9, 1998
KeyTek, Capacitive Clamp	CE-40-CCL	9508259	Sept. 9, 1998
ROHDE & SCHWARZ Signal Generator	SMY01	840490/009	Sept. 29, 1998
KALMUS Power Amplifier	LA1000V	091995-1	N/A
KALMUS Power Amplifier	757LC	091995-2	N/A
HOLADAY Field Probe	HI-4422	89915	Oct. 12, 1998
EMCO BiconiLog Antenna	3141	1001	N/A
COMTEST Compact Full Anechoic Chamber (7x3x3 m)	CFAC	ADT-S01	Aug. 4, 1998

Note: The calibration interval of the above test instruments is 12 months.
And the calibrations are traceable to NML/ROC and NIST/USA.

4. TEST RESULTS (EMISSION)

4.1 RADIO DISTURBANCE

Product Family Standard	:	EN 55 022+A1: 1995+A2: 1997, Class A
Frequency Range	:	0.15 - 30 MHz (Conducted Emission)
		30 - 1000 MHz (Radiated Emission)
Input Voltage	:	230 Vac, 50 Hz (to PC)
Temperature	:	30 ℃
Humidity	:	61 %
Atmospheric Pressure	:	997 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -21.9 dB at 3.915 MHz Minimum passing margin of radiated emission: -2.9 dB at 160.00 MHz

4.1.1 EUT OPERATION CONDITION

1. Turn on the power of all equipments.
2. Industrial PC reads a test program to enable all functions.
3. The Industrial PC reads and writes messages from HDD.
4. The Industrial PC sends "H" messages to monitor and monitor display "H" patterns on screen.
5. The Industrial PC sends "H" messages to modem.
6. The Industrial PC sends "H" messages to printer, and the printer prints them on paper.
7. Repeat steps 2-7.

4.1.2 TEST DATA OF CONDUCTED EMISSION

EUT: **CPU BOARD** MODEL: **PCM-5894A3.1**

6 dB Band Width: 10 kHz

TEST PERSONNEL: John Liao

Freq.	L Level		N Level		Limit		Margin [dB (μV)]			
[MHz]	[dB (μV)]		[dB (μV)]		[dB (μV)]		L		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.183	45.80	-	48.10	-	79.00	66.00	-33.2	-	-30.9	-
0.297	41.60	-	43.90	-	79.00	66.00	-37.4	-	-35.1	-
0.642	38.70	-	37.80	-	73.00	60.00	-34.3	-	-35.2	-
3.915	49.90	-	51.10	-	73.00	60.00	-23.1	-	-21.9	-
8.250	36.20	-	40.40	-	73.00	60.00	-36.8	-	-32.6	-
23.660	39.90	-	40.80	-	73.00	60.00	-33.1	-	-32.2	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
4. The emission levels of other frequencies were very low against the limit.
5. Margin value = Emission level - Limit value

ADT CO. Shielded Room 3
EN55022 CLASS A

10. Jul 99 18:24

EUT: PCM-6894 (PCM-8784)
Manuf: CPU: INTEL233
Test Spec: LISN : L

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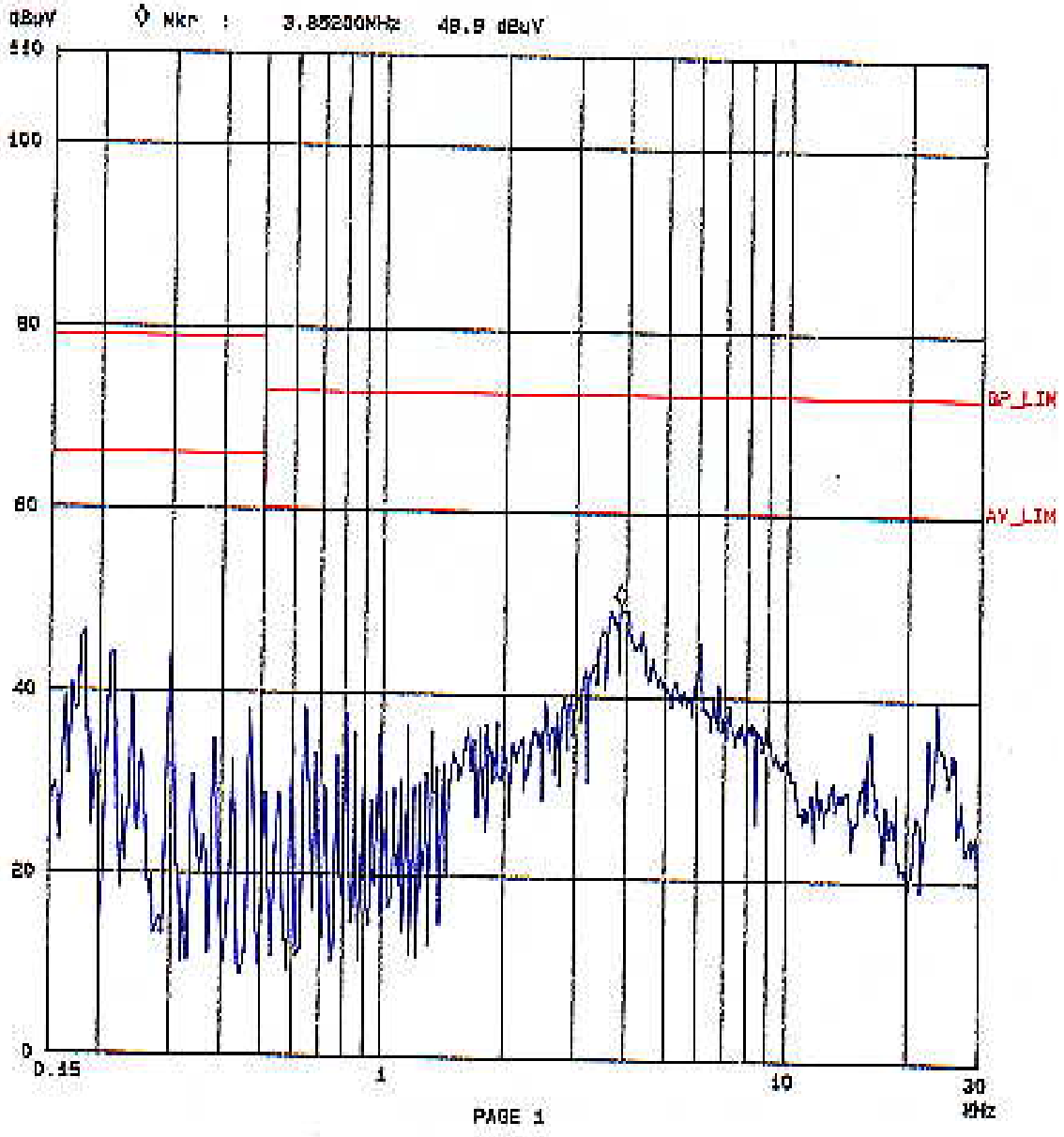
Tested by John Liao

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	CkRge
150k	450k	3k	10k	PK	0.05ms	10dBLN	OFF	60dB
450k	5M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB
5M	30M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB



ADT CO. Shielded Room 3
EN55022 CLASS A

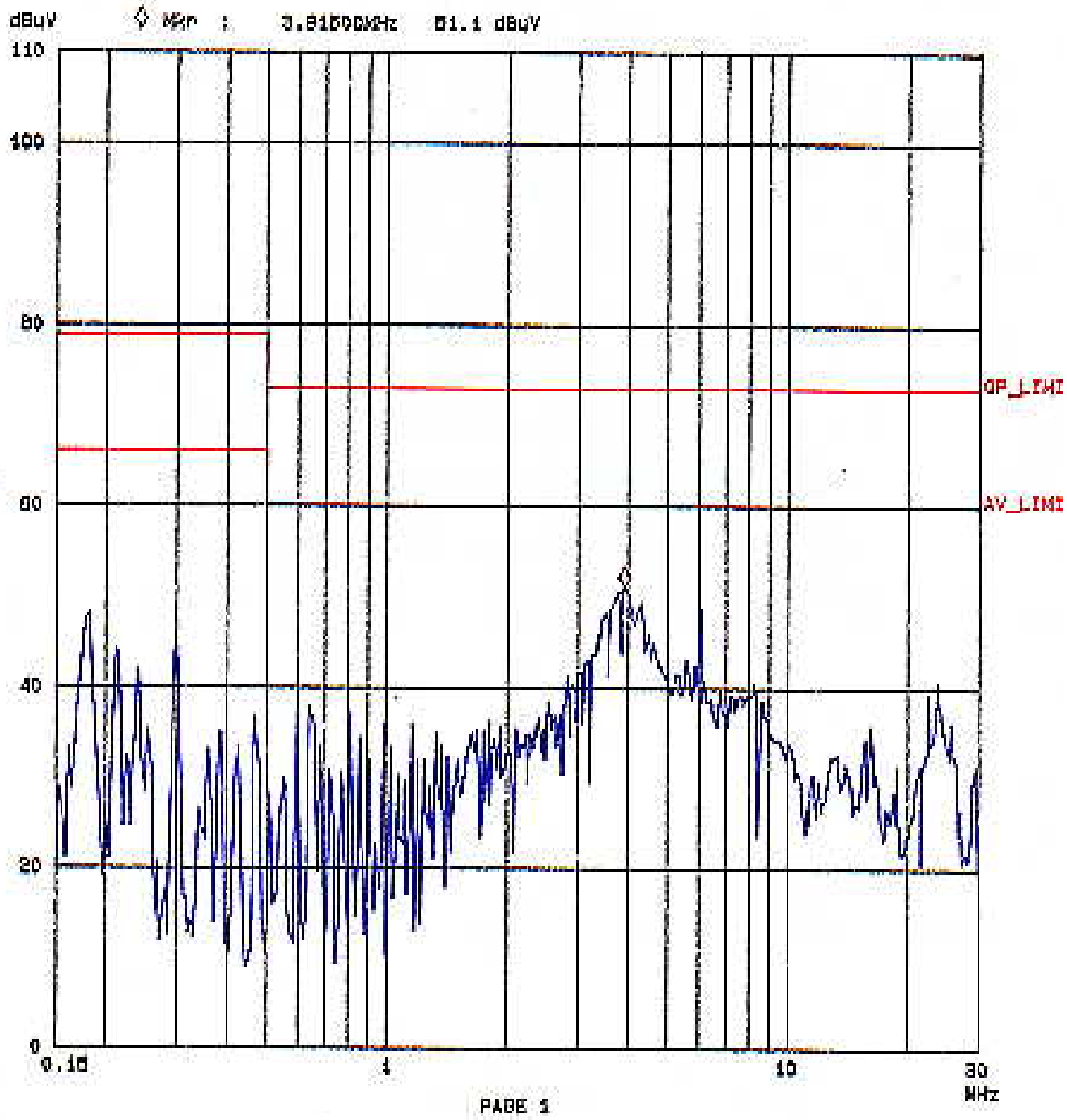
10. Jul 98 18:24

EUT: PGM-5804 (PGM-3724)
Manuf: GPUX INTEL299
Test Spec: LISN : N

Report No. CE8707100G
Page 10-2
Tested by John Liao

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	450k	3k	10k	PK	0.05ms	10dBLN	OFF	80dB
450k	5M	3k	10k	PK	0.05ms	10dBLN	OFF	80dB
5M	30M	3k	10k	PK	0.05ms	10dBLN	OFF	80dB



4.1.3 TEST DATA OF RADIATED EMISSION

EUT: **CPU BOARD** MODEL: **PCM-5894A3.1**

ANTENNA: CHASE BILOG CBL6112 POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: John Liao

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
118.69	15.5	9.6	25.1	40.0	-14.9
120.33	15.6	15.6	31.2	40.0	-8.8
150.00	12.1	20.4	32.5	40.0	-7.5
200.50	10.5	23.0	33.5	40.0	-6.5
201.70	10.6	13.4	24.0	40.0	-16.0
213.34	11.7	15.5	27.2	40.0	-12.8
240.61	14.2	24.2	38.4	47.0	-8.6
292.39	16.1	21.2	37.3	47.0	-9.7
750.00	23.8	13.4	37.2	47.0	-9.8

REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) +Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

TEST DATA OF RADIATED EMISSION

EUT: **CPU BOARD** MODEL: **PCM-5894A3.1**

ANTENNA: CHASE BILOG CBL6112 POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: John Liao

Frequency (MHz)	Correction Factor (dB/m)	Reading Data dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
66.28	7.5	27.3	34.8	40.0	-5.2
120.30	14.2	21.9	36.1	40.0	-3.9
121.95	14.2	17.3	31.5	40.0	-8.5
149.99	12.8	23.2	36.0	40.0	-4.0
160.00	12.3	24.8	37.1	40.0	-2.9
199.97	11.8	17.9	29.7	40.0	-10.3
200.51	11.9	21.4	33.3	40.0	-6.7
749.99	23.4	9.4	32.8	47.0	-14.2

REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) +Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

5. TEST RESULTS (IMMUNITY)

5.1 GENERAL DESCRIPTION

Basic Standard	:	EN61000-4-2	(Electrostatic Discharge Test, ESD)
		EN61000-4-3	(Radiated Radio-Frequency Disturbance Test, RS)
		EN61000-4-4	(Electrical Fast Transient/Burst Test, EFT)
		EN61000-4-6	(Conducted Radio Frequency Disturbances Test, CS)
		EN61000-4-8	(Power Frequency Magnetic Field Test)
		ENV50204	(Radio-Frequency Electromagnetic Field, Pulse modulated)
Generic Standard	:	EN 50082-2	
Input Voltage	:	230 Vac, 50 Hz (to power of Industrial PC)	
Temperature	:	28 ℃	
Humidity	:	58 %	
Atmospheric Pressure	:	998 mbar	

5.2 PERFORMANCE CRITERIA DESCRIPTION

Criterion A - The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion B - The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C - Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

5.3 EUT OPERATION CONDITION

Industrial PC runs a test program to access FDD/HDD/MODEM/PRINTER sequentially and show the result on monitor screen.

5.4 TEST RESULT OF ELECTROSTATIC DISCHARGE (ESD)

Basic Standard	:	EN61000-4-2
Generic Standard	:	EN 50082-2
Discharge Impedance	:	330 ohm / 150 pF
Discharge Voltage (Direct/Indirect)	:	Air Discharge - 8 kV (Direct/Indirect) Contact Discharge - 4 kV
Polarity	:	Positive/Negative
Number of Discharge	:	Minimum 10 times at each test point
Discharge Mode	:	Single Discharge
Discharge Period	:	1-second minimum
Test Personnel	:	

Test Result		Remarks
Criterion A	**PASS**	Model: PCM-5894A3.1

OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+/-	1 ~ 4	N/A	Note 1
4	+/-	1,3,4	Note 1	N/A

Description of test point:

1. Metal of case
2. Power switch
3. VGA port
4. I/O ports

Indirect Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
4	+/-	1 ~ 4	Note 1	Note 1

Description of test point:

1. Front side
2. Right side
3. Left side
4. Rear side

Description of test result:

Note 1: There was no change compared with initial operation during the test.

5.5 TEST RESULT OF RADIATED RADIO FREQUENCY DISTURBANCES (RS)

Basic Standard	:	EN 61000-4-3
Generic Standard	:	EN 50082-2
Frequency range	:	80 MHz - 1000 MHz
Field strength	:	10 V/m
Modulation	:	1kHz Sine Wave, 80%, AM Modulation
Frequency step	:	1 % of fundamental
Polarity of Antenna	:	Horizontal and Vertical
Test distance	:	3 m
Test Personnel	:	

Test Result		Remarks
Criterion A	**PASS**	Model: PCM-5894A3.1

Note: Four sides of EUT are verified separately.

OBSERVATION DESCRIPTION

There is no change compared with initial operation during the test.

5.6 TEST RESULT OF ELECTRICAL FAST TRANSIENT/BURST (EFT/BURST)

Basic Standard	:	EN61000-4-4
Generic Standard	:	EN 50082-2
Test Voltage	:	Power Line - 2 kV (to power of Industrial PC) Signal/Control Line - N/A
Polarity	:	Positive/Negative
Impulse Frequency	:	5 kHz
Tr / Tn	:	5/50 ns
Burst Duration	:	15 ms
Burst Period	:	300 ms
Test Duration	:	Not less than 1 min.
Test Personnel	:	

Test Result		Remarks
Criterion A	**PASS**	Model: PCM-5894A3.1

OBSERVATION DESCRIPTION

Test Point	Polarity	Test Level (kV)	Result
L1	+/−	2	Note 1
L2	+/−	2	Note 1
GND	+/−	2	Note 1

Description of test result:

Note 1: There was no change compared to initial operation during the test.

5.7 TEST RESULT OF CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

Basic Standard	:	EN 61000-4-6
Generic Standard	:	EN 50082-2
Frequency range	:	0.15 MHz - 80 MHz
Field strength	:	10 V/m
Modulation	:	1kHz Sine Wave, 80%, AM Modulation
Frequency step	:	1 % of fundamental
Coupled cable	:	Power Mains, Unshielded
Coupling device	:	CDN-M3 (3 wires)
Test Personnel	:	

Test Result		Remarks
Criterion A	**PASS**	Model: PCM-5894A3.1

OBSERVATION DESCRIPTION

There is no change compared with initial operation during the test.

5.8 TEST RESULT OF POWER FREQUENCY MAGNETIC FIELD

Basic Standard	:	EN61000-4-8
Generic Standard	:	EN50 082-2
Frequency range	:	50Hz
Field strength	:	30 A/m
Observation Time	:	1 minute
Inductance coil	:	Rectangular type, 1mx1m
Test Personnel	:	

Test Result		Remarks
Criterion A	**PASS**	Model: PCM-5894A3.1

OBSERVATION DESCRIPTION

There was no change compared with initial operation during the test.

5.9 TEST RESULT OF RADIO-FREQUENCY ELECTROMAGNETIC FIELD, PULSE MODULATED

Basic Standard	:	ENV 50204
Generic Standard	:	EN 50082-2
Frequency range	:	900 +/- 5 MHz
Field strength	:	10 V/m
Modulation	:	200Hz, Square Wave, 50% Duty Cycle
Dewell Time	:	30 second
Polarity of Antenna	:	Horizontal and Vertical
Test distance	:	3 m
Test Personnel	:	

Test Result		Remarks
Criterion A	PASS	Model: PCM-5894A3.1

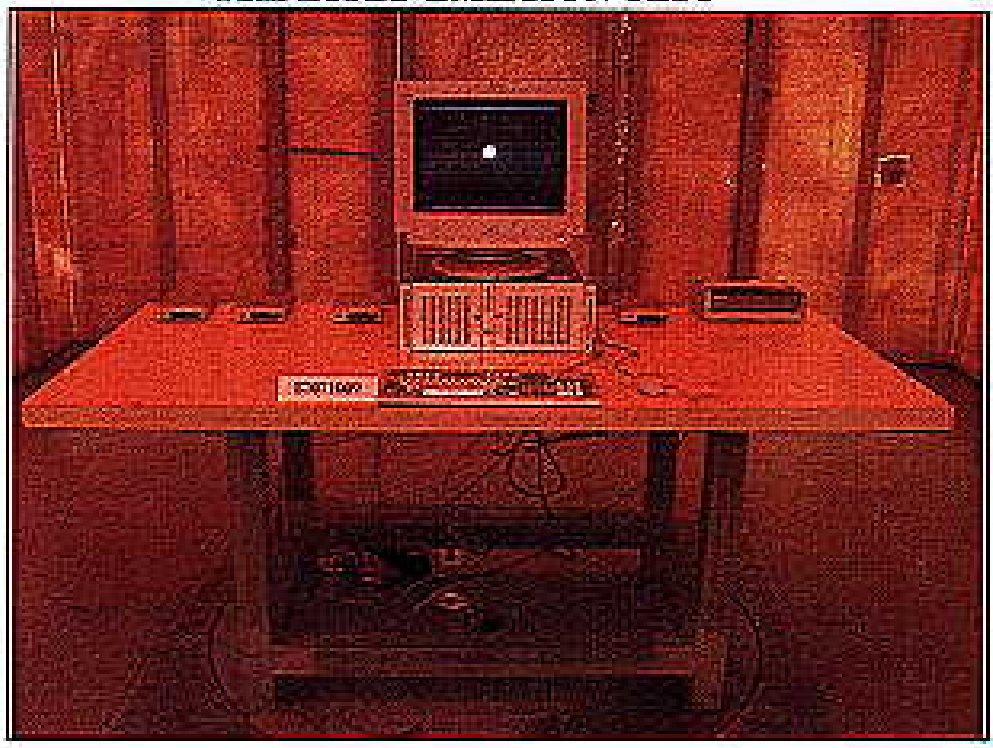
Note: Four sides of EUT are verified separately.

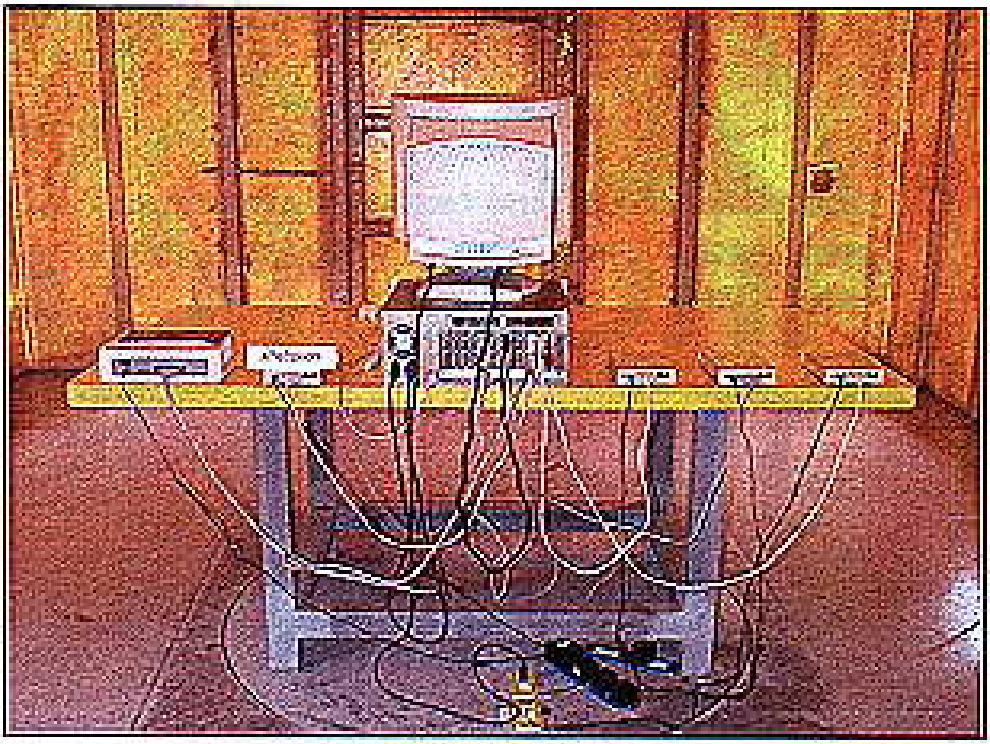
OBSERVATION DESCRIPTION

There is no change compared with initial operation during the test.

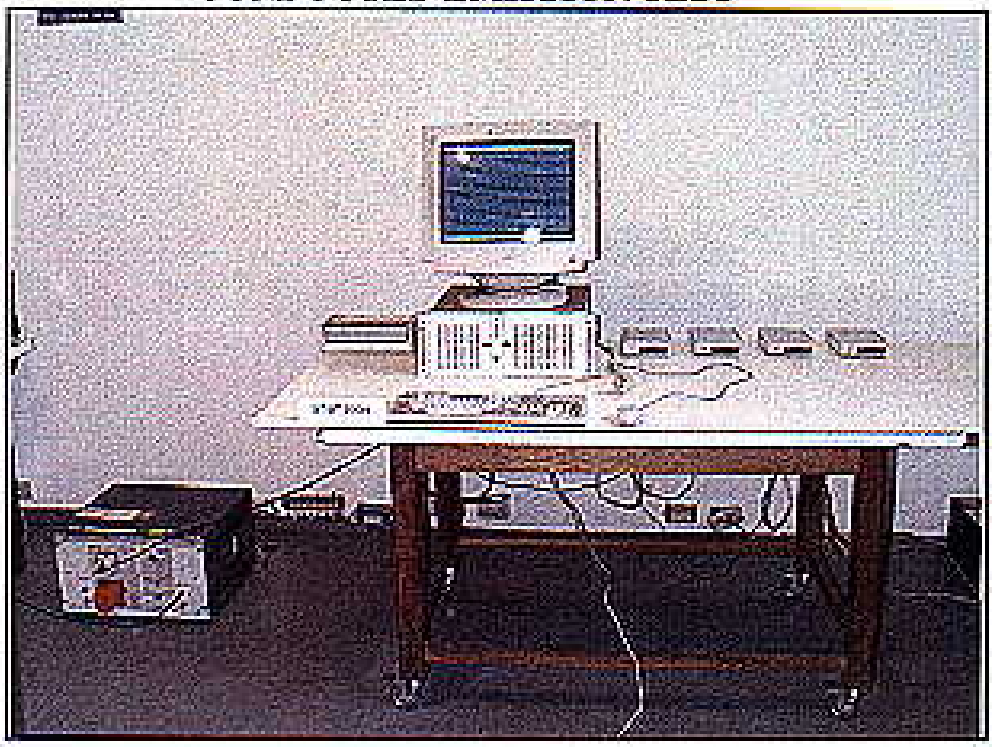
6. PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST

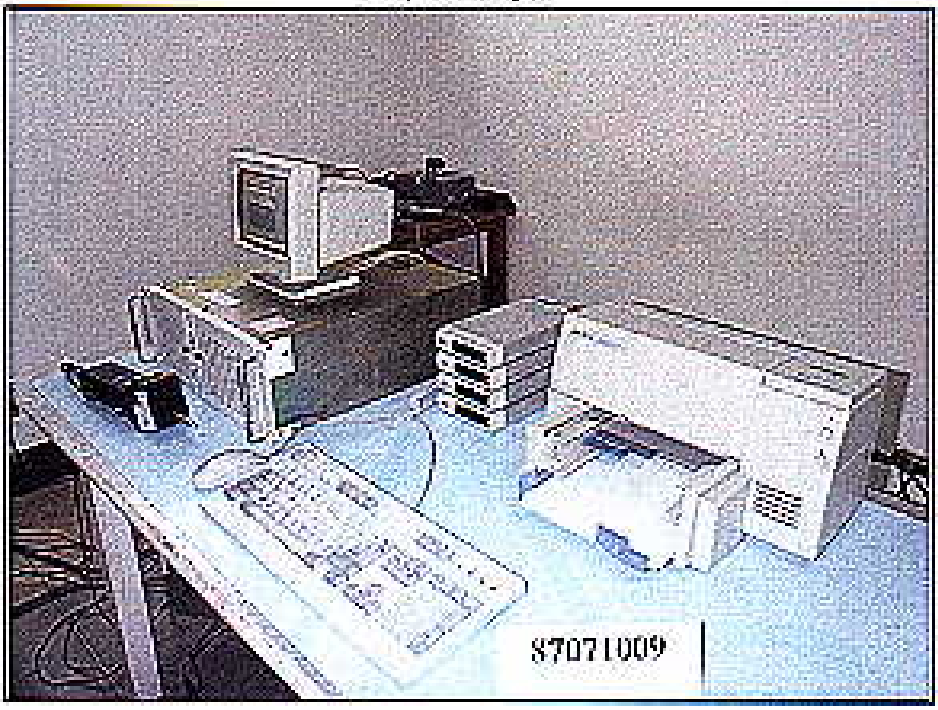


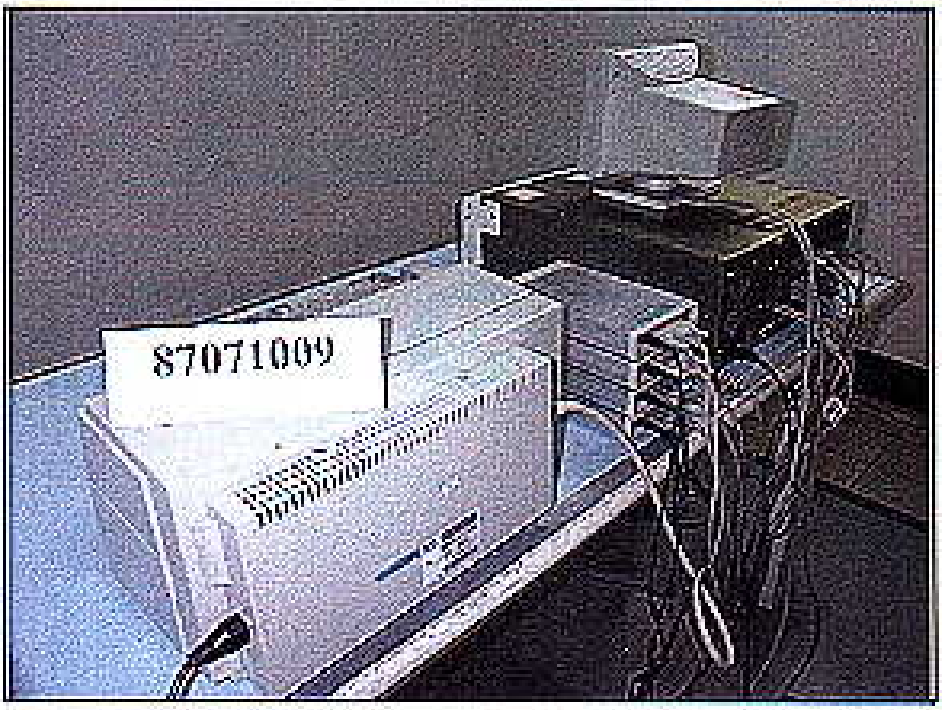


CONDUCTED EMISSION TEST

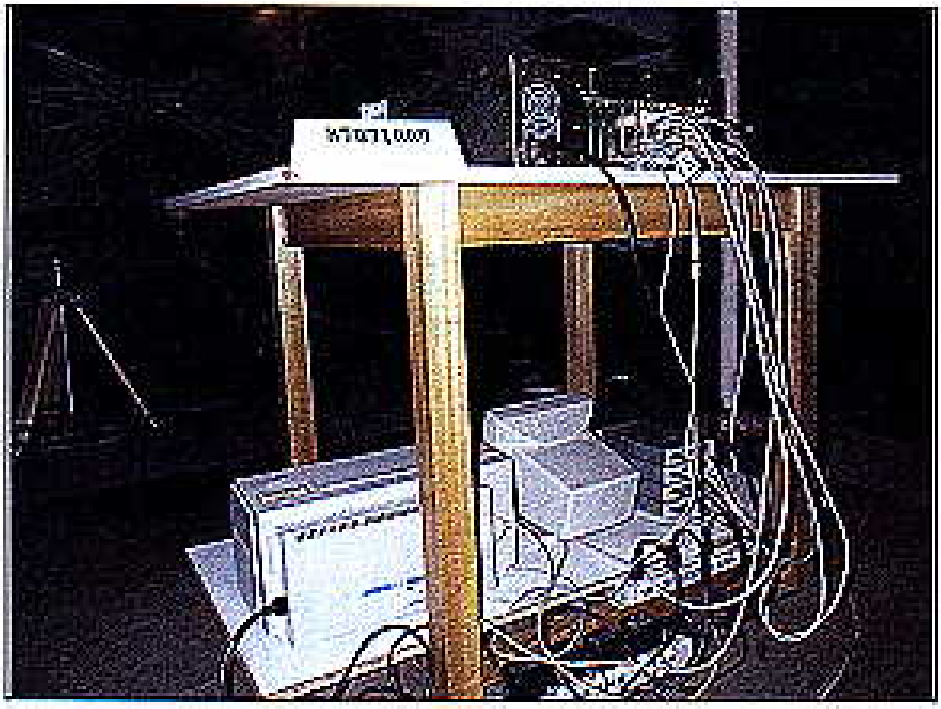


ESD TEST





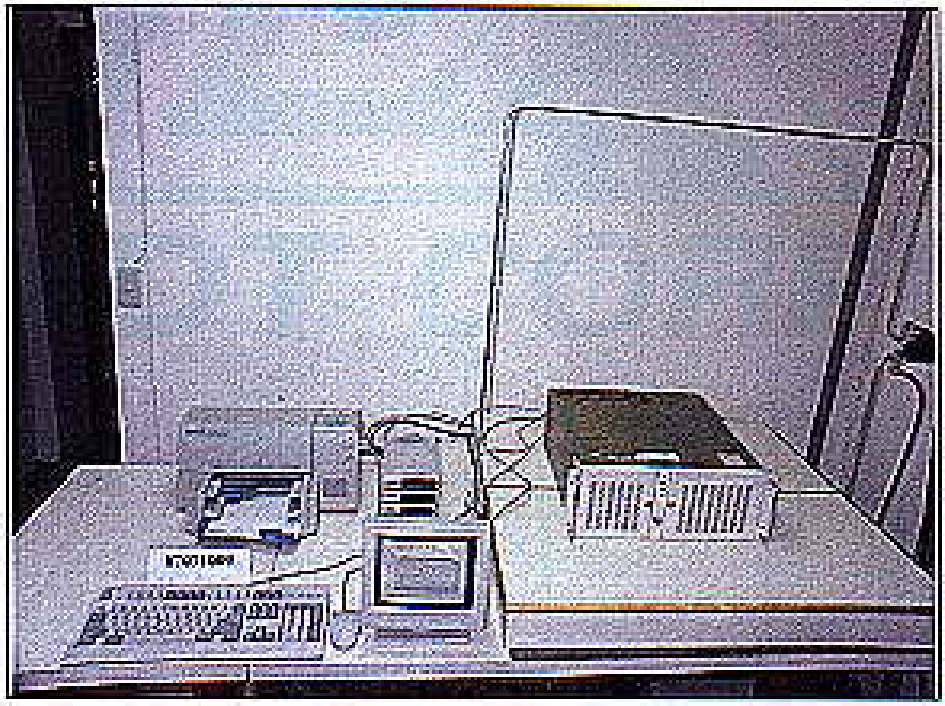
RS TEST
(AM MODULATION AND PULSE MODULATION)



EFT TEST

CONDUCTED SUSCEPTIBILITY TEST

MAGNETIC TEST



CONSTRUCTION PHOTOS OF EUT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