EMC

TEST REPORT

REPORT NO. : CE86092301
MODEL NO. : SBC-555
DATE OF TEST : Oct. 7 ~ Oct. 21, 1997

MULTIPLE LISTING FOR: AAEON TECHNOLOGY INC.
MODEL: SBC-554V

PREPARED FOR: AAEON TECHNOLOGY INC.

ADDRESS : 1F, NO. 6, ALLEY 6, LANE 45, PAO-HSIN RD.,
HSIN-TIEN CITY, TAIPEI, TAIWAN, R.O.C.

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION
12F, NO.1, SEC.4, NAN-KING EAST RD.,
TAIPEI, TAIWAN, R.O.C.

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1. CERTIFICATION

Issue date: Nov. 5, 1997

Product	:	CPU BOARD	
Trade Name	:	AAEON	
Model No.	:	SBC-555	
Applicant	:	AAEON TECHNOLOGY INC.	
Standard	:	EN 55022:1994, Class A	**EN50 082-2:1995**
			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
			ENV50204:1995

We hereby certify that one sample of the designation has been tested in our facility from Oct 7 to Oct. 21, 1997. 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.

PREPARED BY: Sharon Hsiung, DATE: 11/5/97
(Sharon Hsiung)

CHECKED BY: Paul Yang , DATE: 11/5/97
(Paul Yang)

APPROVED BY: , DATE: 11/5/97
(Harris W. Lai)

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	CPU BOARD
Model No.	:	SBC-555
Power Supply Type	:	Switching
Data Cable	:	N/A

Note: The EUT has two model names which are identical to each other in all aspects except for their interface bus:

* Model: SBC-555, BUS interface: ISA
* Model: SBC-554V, BUS interface: PISA (PCI+ISA)

From the above two models, model: SBC-555 was chosen as representative model and 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 other parts of industrial PC includes the following:

* Case: AAEON, model: AIPC-110
* Switching power supply: SEASONIC, model: SSG-250G
* VGA Card: AAEON, model: DPC-421

The EUT was tested under the CPU: MMX 200 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, Class A	**EN50 082-2:1995**
	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
	ENV50204:1995

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	KEYBOARD	TATUNG	FDA-102A	4001379	Shielded Signal (1.2m)
2	COLOR MONITOR	ADI	937G	649015T0010209 4A	Shielded Signal (1.5m) Nonshielded Power(1.8m)
3	PRINTER	HP	2225C+	3030S79138	Shielded Signal (1.2m) Nonshielded Power (1.9m)
4	MODEM	DATATRONICS	1200CK	07-503067	Shielded signal (1.2m) Nonshielded Power (1.9m)
5	USB KEYBOARD	BTC	7932	N/A	Shielded signal (1.7m)

Note: A USB cable (1.2m) was connected to the USB port of the EUT to form an open loop.

FOR IMMUNITY TEST

No.	Product	Brand	Model No.	Serial No.	I/O Cable
1	PERSONAL COMPUTER	IBM	6384-189	23KHC6G	Nonshielded Power (1.8m)
2	KEYBOARD	HP	C3758A	C3753-60223	Shielded signal (2.0m)
3	MONITOR	ACTION	VM-0951	N/A	Shielded Signal (1.3m) Nonshielded Power (1.3m)
4	VGA CARD	GAINWARD	S3 Trio 32/64	GEJ15166	N/A

Note: There is a ferrite core on the interface cable of support unit 2 & 3.
There is no ferrite core on the interface cable of other support units.

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	8590L	3544A01042	May 5, 1998
HP Preamplifier	8447D	2944A08313	March 24, 1998
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 5, 1998
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 29, 1997
CHASE BiLOG Antenna	CBL6111A	1647	Aug. 2, 1998
EMCO Turn Table	1016	1722	N/A
EMCO Tower	1051	1263	N/A
Open Field Test Site	Site 4	ADT-R04	Aug. 1, 1998

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESHS30	828765/002	July 31, 1998
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	828075/003	July 28, 1998
EMCO-L.I.S.N.	3825/2	90031627	July 28, 1998
Shielded Room	Site 5	ADT-C05	N/A

Note: 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	92022232	June 12, 1998
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, Class B
Frequency Range	:	0.15 - 30 MHz (Conducted Emission)
		30 - 1000 MHz (Radiated Emission)
Input Voltage	:	230 Vac, 50 Hz (to PC)
Temperature	:	26 ℃
Humidity	:	49 %
Atmospheric Pressure	:	1060 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -17.5 dB at 22.413 MHz Minimum passing margin of radiated emission: -8.6 dB at 465.00 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: **SBC-555**

6 dB Band Width: 10 kHz

TEST PERSONNEL: Lee Hong

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
0.158	53.50	-	52.00	-	79.00	66.00	-25.5	-	-27.0	-
0.219	46.20	-	45.40	-	79.00	66.00	-32.8	-	-33.6	-
0.776	29.70	-	31.70	-	73.00	60.00	-43.3	-	-41.3	-
6.022	37.00	-	36.90	-	73.00	60.00	-36.0	-	-36.1	-
20.332	44.20	-	44.80	-	73.00	60.00	-28.8	-	-28.2	-
22.413	55.50	-	55.50	-	73.00	60.00	-17.5	-	-17.5	-

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 level of other frequencies were very low against the limit.
5. Margin value = Emission level - Limit value

ADT CO. SITE 5
EN55022 CLASS A

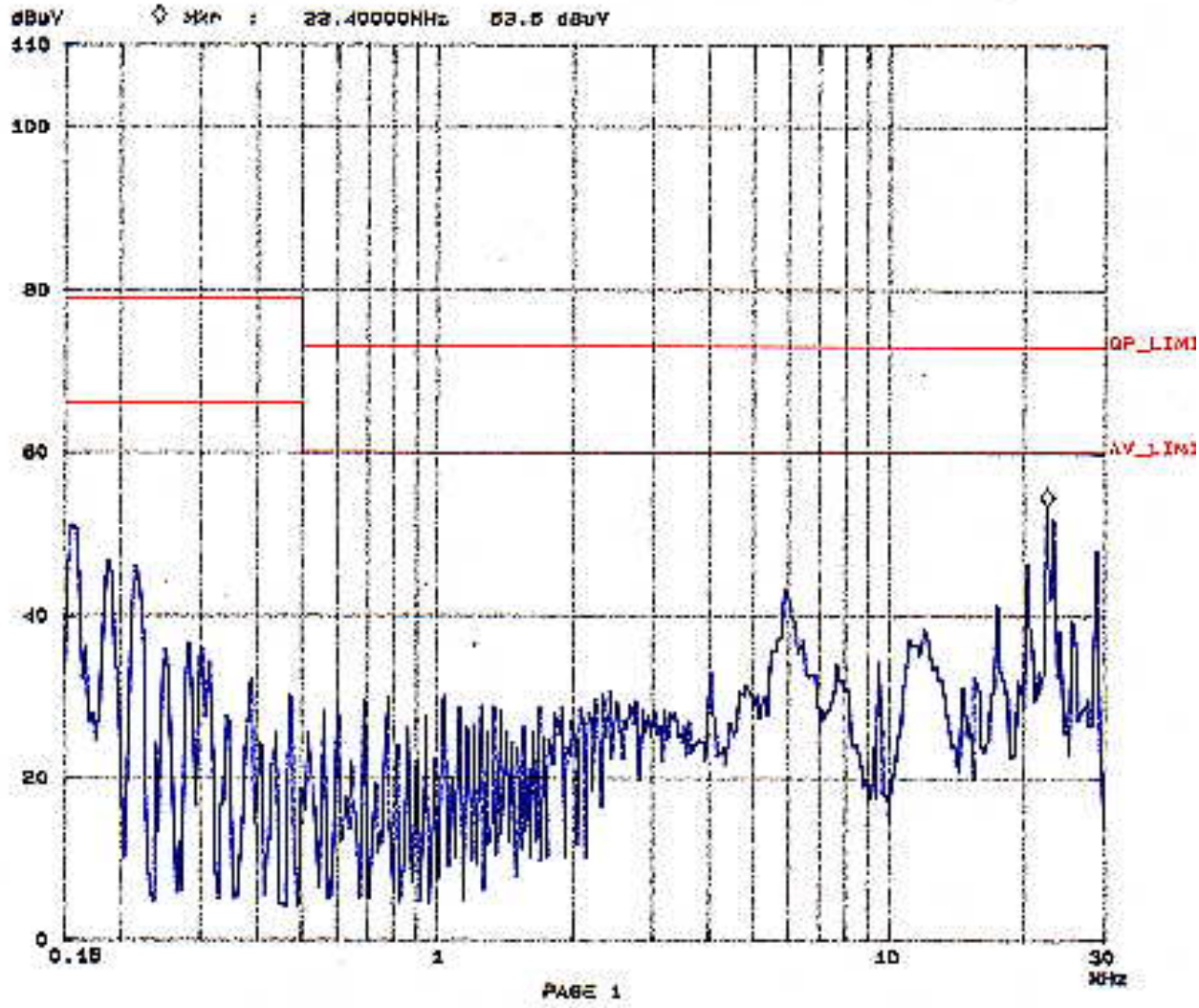
07. Oct 97 13:54

EUT: 88C-666
Operator: LEO
Test Spec: LISN : L
Comment: 230V AC/50Hz

File No. CE8609230 1
Page 9-1
Tested by Leo Hong

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	450k	9k	10k	PK	0.05ms	10dBLN	OFF	80dB
480k	5M	9k	10k	PK	0.05ms	10dBLN	OFF	80dB
5M	30M	9k	10k	PK	0.05ms	10dBLN	OFF	80dB



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ADT CO. SITE 5
EN55022 CLASS A

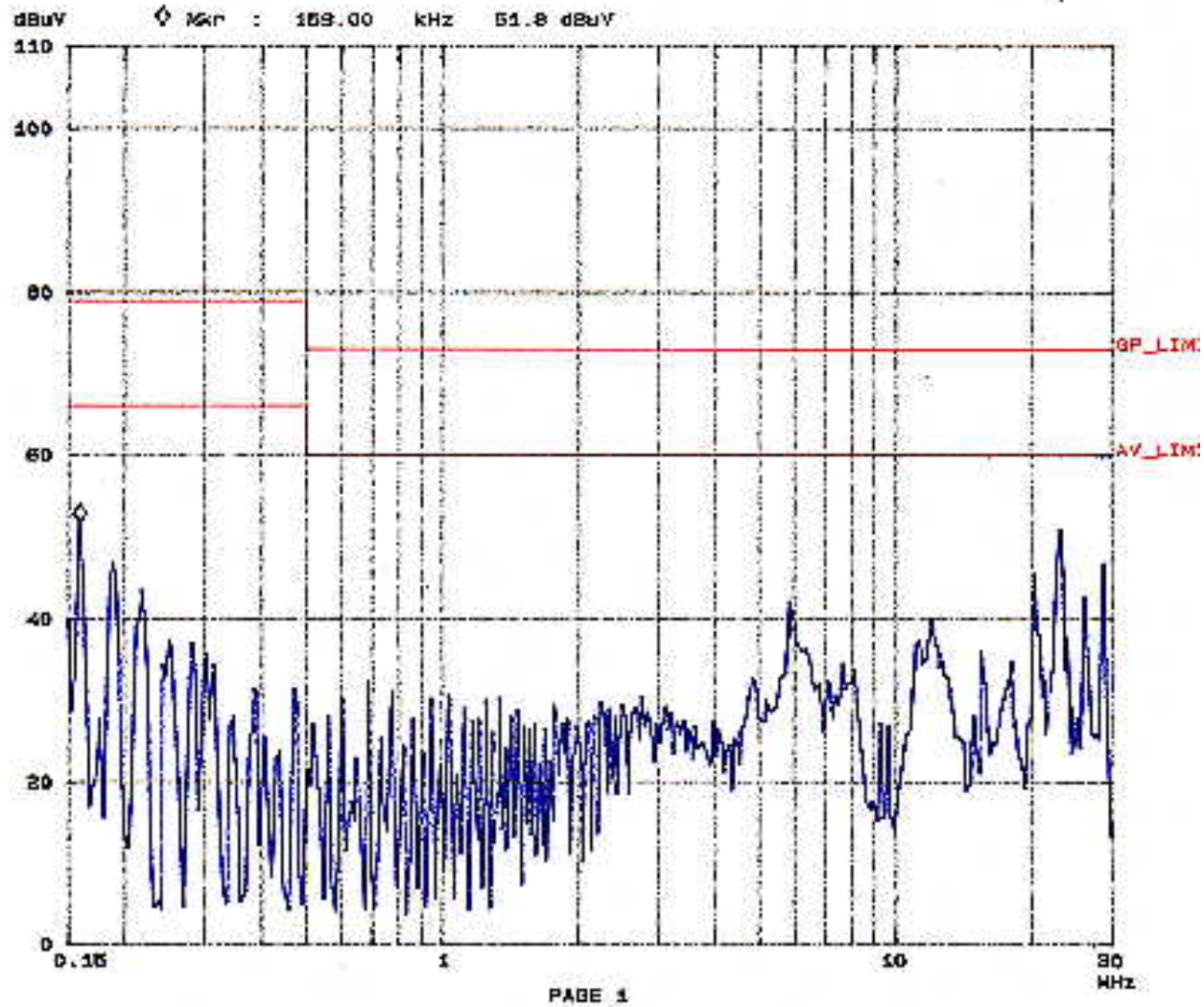
07. Oct 97 14:08

EUT: 880-655
Operator: LEO
Test Spec: LISN : N
Comment: 230V AC/60Hz

File No. CE860923-01
Page 9-2
Tested by Leo Hong

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: **SBC-555**

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: Leo Hong

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
34.75	17.8	5.4	23.2	40.0	-16.8
36.38	17.1	7.5	24.6	40.0	-15.4
37.31	16.8	7.0	23.8	40.0	-16.2
42.23	14.7	7.1	21.8	40.0	-18.2
47.22	12.1	13.5	25.6	40.0	-14.4
70.24	7.6	11.8	19.4	40.0	-20.6
144.05	13.5	8.7	22.2	40.0	-17.8
200.48	11.6	8.6	20.2	40.0	-19.8
240.02	13.7	13.3	27.0	47.0	-20.0
465.10	19.4	16.7	36.1	47.0	-10.9

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: **SBC-555**

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: Leo Hong

Frequency (MHz)	Correction Factor (dB/m)	Reading Data dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
34.89	18.9	10.2	29.1	40.0	-10.9
36.72	17.7	7.5	25.2	40.0	-14.8
37.28	17.4	9.4	26.8	40.0	-13.2
42.01	14.2	9.8	24.0	40.0	-16.0
46.59	11.5	14.7	26.2	40.0	-13.8
70.22	8.1	17.1	25.2	40.0	-14.8
144.03	12.5	10.0	22.5	40.0	-17.5
200.45	11.2	12.3	23.5	40.0	-16.5
240.01	14.9	11.3	26.2	47.0	-20.8
465.00	20.5	17.9	38.4	47.0	-8.6

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 50 082-2	
Input Voltage	:	230 Vac, 50 Hz (to power of Industrial PC)	
Temperature	:	25 ℃	
Humidity	:	55 %	
Atmospheric Pressure	:	1060 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	:	Dennis Chuang

Test Result		Remarks
Criterion A	**PASS**	Model: SBC-555

OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
4	+	1-3, 6	Note 1	N/A
8	+	1 ~ 6	N/A	Note 1

Description of test point:

1. All I/O ports
2. All LEDs
3. Case
4. Power-in connector
5. All openings
6. All screws

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	:	Dennis Chuang

Test Result		Remarks
Criterion A	**PASS**	Model: SBC-555

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	:	Dennis Chuang

Test Result		Remarks
Criterion A	**PASS**	Model: SBC-555

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:

Note1: There is no change compared with 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	:	Dennis Chuang

Test Result		Remarks
Criterion A	**PASS**	Model: SBC-555

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	:	Dennis Chuang

Test Result		Remarks
Criterion A	PASS	Model: SBC-555

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	:	ENV50204
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	:	Dennis Chuang

Test Result		Remarks
Criterion A	**PASS**	Model: SBC-555

Note: Four sides of EUT are verified separately.

OBSERVATION DESCRIPTION

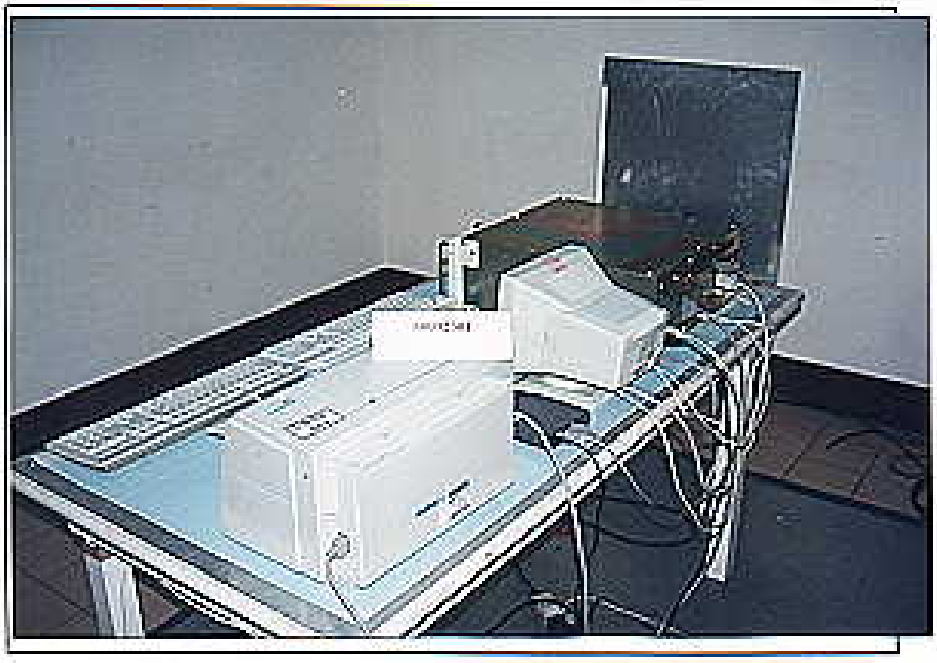
There is no change compared with initial operation during the test.

6. PHOTOGRAPHS OF THE TEST CONFIGURATION

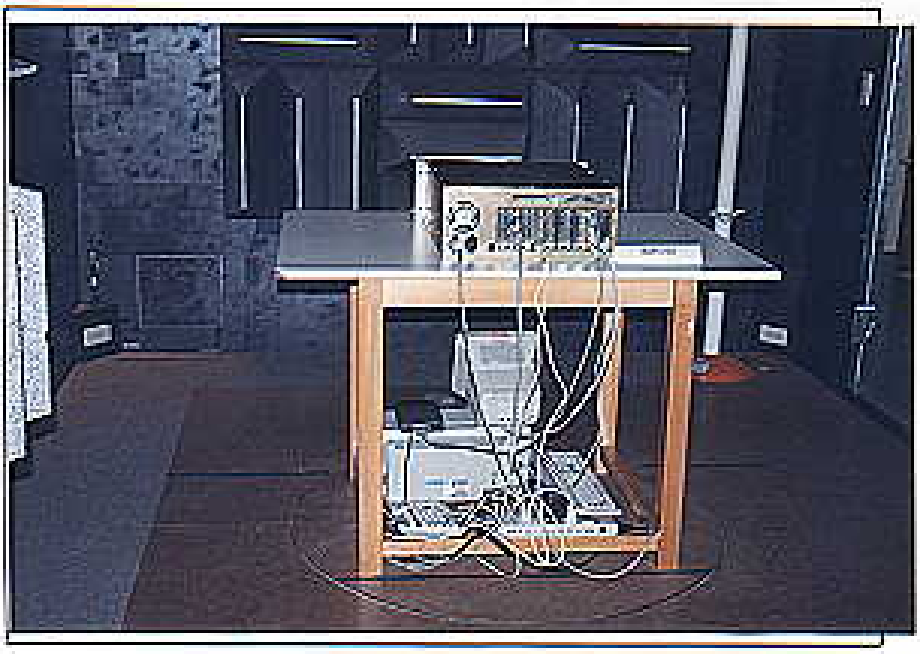
RADIATED EMISSION TEST

CONDUCTED EMISSION TEST

ESD TEST



RS TEST (AM MODULATION AND PULSE MODULATION)

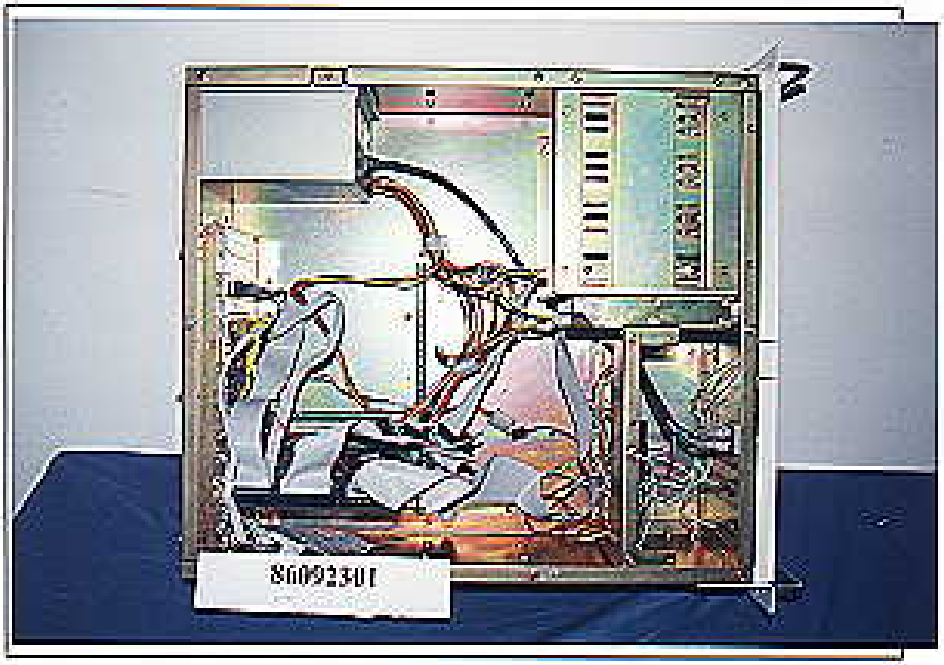


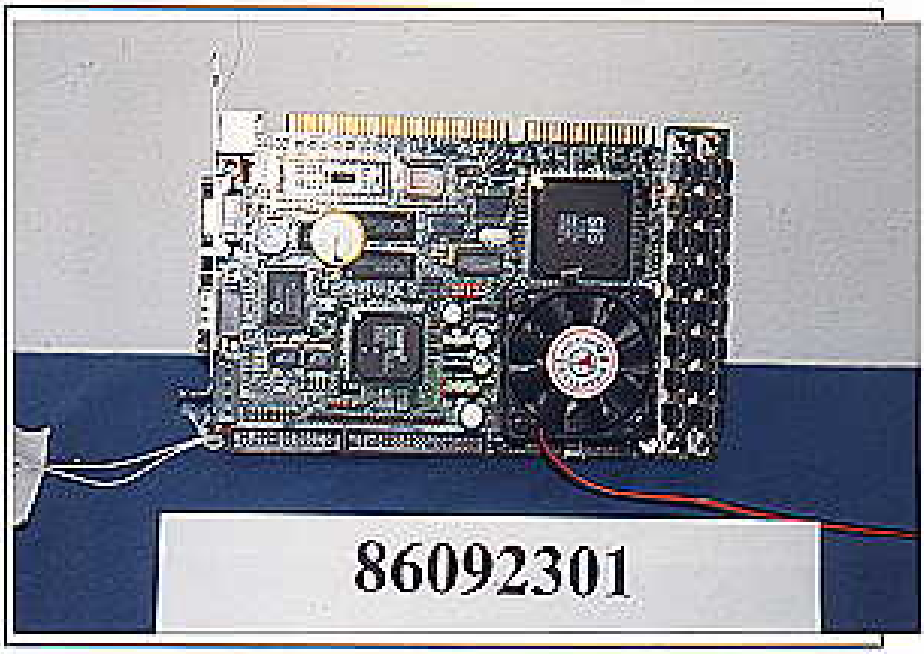
EFT TEST

CONDUCTED SUSCEPTIBILITY TEST

MAGNETIC TEST

7. CONSTRUCTION PHOTOS OF EUT

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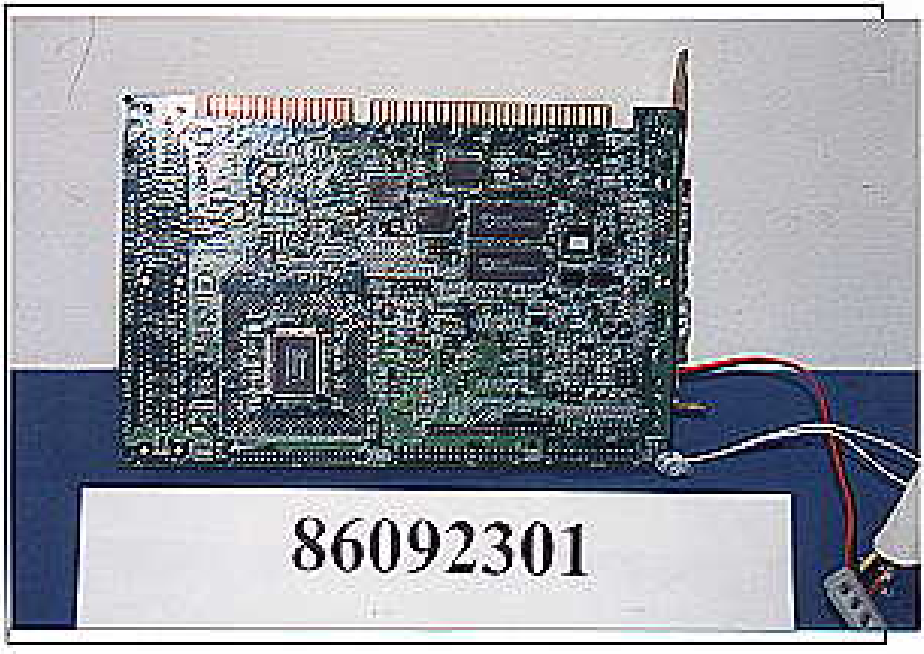
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8. ATTACHMENT I - TECHNICAL DESCRIPTION OF EUT

SPECIFICATIONS:

* CPU	Intel Pentium 75~200 MHz, P55C (MMX), Cyrix,/IBM/ SGS 6X86 PR100+~166+, M2, AMD K5 PR75~166, K6
* Bus Interface	ISA (for SBC-555), PISA (for SBC-554V)
* CPU Socket	PGA type
* BIOS	Award 256KB FLASH BIOS
* Chipset	SiS5582
* Super I/O Chipset	UMC8669C with Fully 16-bit I/O decoded
* 2nd Level Cache	On board 512KB pipeline burst 2nd level cache
* RAM memory	8MB to 128MB, Two 72-pin SIMM socket on board

* Enhanced IDE hard disk drive interface:
  Support up to two hard disk drives, BIOS auto-detect, Supports PIO mode 4 and Bus Master. Also supports Multi-word DMA and Ultra DMA/33

* Floppy disk drive interface:
  Supports up to two floppy disk drives, 5.25" (360KB and 1.2MB) and / or 3.5" (720KB, 1.44MB and 2.88MB)

* Multi-mode parallel port: Configured to LPT1, LPT2, LPT3 or disabled. Supports SPP, ECP and EPP

* Serial ports: One RS-232 and one RS-232/422/485 serial ports. Ports can be configured as COM1, COM2, COM3, COM4 or disabled individually. Two 16C550 serial UART's. IR connector reserved for future use.

* Keyboard/mouse connector:
  6 pin mini DIN connector supports standard PC/AT keyboard and PS/2 mouse

* USB connectors: Dual USB port on board

* Real Time Clock/Calendar:
  Dallas DS-12887 or equivalent with quartz oscillator, powered by lithium battery for data retention of up to 10 years.