

FCC CLASS B COMPLIANCE REPORT (DoC)

for

Electromagnetic Emissions

of

CPU Board

Trade Name : N/A
Model Number : SBC-800 (N)
Serial Number : N/A
Report Number : 010994-D
Date : November 2, 2001

Prepared for :

AAEON Technology Inc.

**5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien City,
Taipei, Taiwan, R.O.C.**

Prepared by :



C&C LABORATORY CO., LTD.

#B1, 1st Fl., Universal Center, No. 183, Sec. 1,

Tatung Rd., Hsi Chih,

Taipei Hsien, Taiwan, R.O.C.

TEL: (02) 86422071

FAX: (02) 86422256

**This report shall not be reproduced, except in full, without the written approval of
C&C Laboratory, Co., Ltd.**



TABLE OF CONTENTS

DESCRIPTION	PAGE
VERIFICATION OF COMPLIANCE	3
SYSTEM DESCRIPTION	4
PRODUCT INFORMATION	5
SUPPORT EQUIPMENT	6
MEASUREMENT PROCEDURE & LIMIT (LINE CONDUCTED EMISSION TEST)	7
MEASUREMENT PROCEDURE & LIMIT (RADIATED EMISSION TEST)	9
SUMMARY DATA	12
TEST FACILITY	17
TEST EQUIPMENT	18
BLOCK DIAGRAM OF TEST SETUP	19
APPENDIX 1 PHOTOGRAPHS (TEST SETUP OF LINE CONDUCTED EMISSION TEST)	20
APPENDIX 2 PHOTOGRAPHS (TEST SETUP OF RADIATED EMISSION TEST)	22
APPENDIX 3 PHOTOGRAPHS (EUT)	24



VERIFICATION OF COMPLIANCE

Equipment Under Test: CPU Board

Trade Name: N/A

Model Number: SBC-800 (N)

Serial Number: N/A

Applicant: **AAEON Technology Inc.**
5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien City,
Taipei, Taiwan, R.O.C.

Manufacturer: **AAEON Technology Inc.**
5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien City,
Taipei, Taiwan, R.O.C.

Type of Test: FCC Class B (DoC)

Measurement Procedure: ANSI C63.4: 1992

File Number: 010994-D

Date of test: Nov.1~ 2, 2001

Deviation: None

Condition of Test Sample: Normal

The above equipment was tested by C&C Laboratory, Co., Ltd. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart B and the measurement procedure according to ANSI C63.4. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Kuo Chen

Authorized Signatory

Responsible Party

Officer of the Responsible Party



SYSTEM DESCRIPTION

EUT Test Program:

1. EMI test program was loaded and executed under Windows environment.
2. The EMI test program sequentially exercised all I/O's of EUT.
3. A communicated software was loaded and executed to communicate between EUT and remote side.
4. The EUT sends to and receives message from remote side, and filling the screen of monitor with upper case of "H" patterns.
5. Repeat 2. to 4. Throughout the test.



PRODUCT INFORMATION

Housing Type: Metal case

EUT Power Rating: 115/230VAC, 60/50Hz, 8/5A

AC Power during Test 120VAC/60Hz

Power Supply Manufacturer: Seventeam

Power Supply Model Number: ST-300BLV

AC Power Cord Type: Unshielded, 1.8m (Detachable) to Power Supply

CPU Manufacture: Intel **Type:** P 4 2GHz

OSC/Clock Frequencies: 100MHz

Memory Capacity: **Install:** 64MB

HDD Manufacturer: Seagate **Model:** ST310210A 3.21

Chassis Manufacturer: AAEON Technology Inc. **Model:** ARC-6414

Backplane Manufacturer: AAEON Technology Inc. **Model:** BP-208SG-P3 Rev: A0.1

I/O Board Manufacturer: On Board

Sound Card Manufacturer: On Board

VGA Card Manufacturer: On Board

Note: The manufacture must list all items and the manipulation for compliance FCC requirement in the user' s manual.

I/O Port of EUT

I/O PORT TYPES	Q' TY	TESTED WITH
1) Parallel Port	1	1
2) Serial Port	2	2
3) Video Port	1	1
4) PS/2 Keyboard/ Mouse Port	1	1
5) AT Keyboard Port	1	1
6) Microphone Port	1	1
7) Line-IN	1	1
8) SPEAKER-OUT	1	1
9) LAN Port	2	2
10) USB Port	4	4



SUPPORT EQUIPMENT

No.	Equipment	Model #	Serial #	FCC ID	Trade Name	Data Cable	Power Cord
1.	Monitor	CPD-G200	N/A	FCC Doc	SONY	Shielded, 1.8m With one Core	Unshielded, 1.8m
2.	Printer	2225C	2909S40149	DSI6XU2225	HP	Shielded, 1.8m	Unshielded, 1.8m
3.	Modem	2400	94-364-176268	DK467GSM24	Computer Peripherals	Shielded, 1.8m	Unshielded, 1.8m
4.	PS/2 Keyboard	SK-2800C	B1C790BCPJCN6L	GYUR79SK	Compaq	Shielded, 1.8m	N/A
5.	PS/2 Mouse	M-CAA43	LZA11750827	DoC	Logitech	Shielded, 1.8m	N/A
6.	Mouse	M-CAA43	LZA11752603	DoC	Logitech	Shielded, 1.8m	N/A
7.	USB Mouse	M-BB48	LZE93050159	FCC DoC	Logitech	Shielded, 1.8m	N/A
8.	USB Mouse	M-BB48	LZE93050164	FCC DoC	Logitech	Shielded, 1.8m	N/A
9.	USB Mouse	M-BB48	LZE93050165	FCC DoC	Logitech	Shielded, 1.8m	N/A
10.	USB Mouse	M-BB48	LZE1450642	FCC DoC	Logitech	Shielded, 1.8m	N/A
11.	AT Keyboard	5121	N/A	E5XKBM104MUC	BTC	Shielded, 1.8m	N/A
12.	Speaker	DS-207	N/A	N/A	N/A	UnShielded, 2.2m	N/A
13.	Walkman	RQ-L10	GB003969	N/A	Panasonic	Shielded, 2.3m	N/A
14.	Microphone	DM-510	N/A	N/A	KOKA	Shielded, 2.4m	N/A
15.	Notebook PC (Remote)	A380	N/A	N/A	FIC	LAN Cable Unshielded, 15m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m With a core
16.	Notebook PC (Remote)	A360	N/A	N/A	FIC	LAN Cable Unshielded, 15m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m With a core

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.



MEASUREMENT PROCEDURE (PRELIMINARY LINE CONDUCTED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per ANSI C63.4.
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4) The EUT received AC power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipment received power from a second LISN supplying power of 110VAC/60Hz, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode were scanned during the preliminary test:

Mode(s):

- 1. 1024 x 768 Resolution + LAN 1+ LAN 2**
- 2. 800 x 600 Resolution + LAN 1+ LAN 2**
- 3. 640 x 480 Resolution + LAN 1+ LAN 2**

- 10) After the preliminary scan, we found the following test mode producing the highest emission level.

Mode: 1.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.



MEASUREMENT PROCEDURE (FINAL LINE CONDUCTED EMISSION TEST)

- 1) EUT and support equipment was set up on the test bench as per step 10 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Q.P. mode, then the emission signal was re-checked using an Average detector.
- 3) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. MHz	Q.P. Raw dBuV	Average Raw dBuV	Q.P. Limit dBuV	Average Limit dBuV	Q.P. Margin dB	Average Margin dB	Note
x.xx	43.95	---	56	46	-12.05	-2.05	L 1

- Freq. = Emission frequency in MHz
- Raw dBuV = Uncorrected Analyzer/Receiver reading
- Limit dBuV = Limit stated in standard
- Margin dB = Reading in reference to limit
- Note = Current carrying line of reading
- “---“ = The emission level complied with the Average limits, with at least 2 dB margin, so no further recheck.

LINE CONDUCTED EMISSION LIMIT

Frequency	Maximum RF Line Voltage	
	Q.P.	AVERAGE
150kHz-500kHz	66-56dBuV	56-46dBuV
500kHz-5MHz	56dBuV	46dBuV
5MHz-30MHz	60dBuV	50dBuV

Note: The lower limit shall apply at the transition frequency.



MEASUREMENT PROCEDURE (PRELIMINARY RADIATED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per ANSI C63.4.
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4) The EUT received AC power source from the outlet socket under the turntable. All support equipment received 110VAC/60Hz power from another socket under the turntable, if any.
- 5) The antenna was placed at 10 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Analyzer N/A a cable and at times a pre-amplifier would be used.
- 6) The Analyzer / Receiver quickly scanned from 30MHz to 5000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 7) The following test mode were scanned during the preliminary test:
Mode(s):
 - 1. 1024 x 768 Resolution + LAN 1+ LAN 2**
 - 2. 800 x 600 Resolution + LAN 1+ LAN 2**
 - 3. 640 x 480 Resolution + LAN 1+ LAN 2**
- 8) After the preliminary scan, we found the following test mode producing the highest emission level.

Mode: 1.

Then, the EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for reference of final testing.



MEASUREMENT PROCEDURE (FINAL RAIDATED EMISSION TEST)

- 1) EUT and support equipment were set up on the turntable as per step 8 of the preliminary test.
- 2) The Analyzer / Receiver scanned from 30MHz to 5000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 3) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
xx.xx	14.0	11.2	26.2	30	-3.8

Freq.	= Emission frequency in MHz
Raw Data (dBuV/m)	= Uncorrected Analyzer / Receiver reading
Corr. Factor (dB)	= Correction factors of antenna factor and cable loss
Emiss. Level	= Raw reading converted to dBuV and CF added
Limit dBuV/m	= Limit stated in standard
Margin dB	= Reading in reference to limit



RADIATED EMISSION LIMIT

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBuV/m)		
		Q.P.	AVERAGE	PEAK
30-230	10	30	/	/
230-1000	10	37	/	/
Above 1000	3	/	53.9	73.9

Note: The lower limit shall apply at the transition frequency.



SUMMARY DATA

(LINE CONDUCTED TEST)

Model Number: SBC-800 (N)

Location: Site # 4

Tested by: Lung Tsai

Test Mode: Mode 1

Test Results: Passed

Temperature: 25°C

Humidity: 69%RH

(The chart below shows the highest readings taken from the final data)

FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.183	39.10	---	64.35	54.35	-25.25	---	L1
1.051	31.40	---	56.00	46.00	-24.60	---	L1
5.066	34.70	---	60.00	50.00	-25.30	---	L1
9.997	33.90	---	60.00	50.00	-26.10	---	L1
11.141	38.40	---	60.00	50.00	-21.60	---	L1
11.684	36.30	---	60.00	50.00	-23.70	---	L1
0.183	40.30	---	64.35	54.35	-24.05	---	L2
3.336	30.40	---	56.00	46.00	-25.60	---	L2
4.938	35.60	---	56.00	46.00	-20.40	---	L2
9.947	32.90	---	60.00	50.00	-27.10	---	L2
11.043	38.70	---	60.00	50.00	-21.30	---	L2
12.088	36.70	---	60.00	50.00	-23.30	---	L2

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

****NOTE: “---” denotes the emission level was less -2 dB to the Average limit, so no re-check anymore.**



SUMMARY DATA (RADIATED EMISSION TEST)

Model Number: SBC-800 (N)

Location: Site # 4

Tested by: Allen Wang

Polar: Vertical--10m

Test Mode: Mode 1

Test Results: Passed

Detector Function: Quasi-Peak

Temperature: 23°C

Humidity: 65%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
33.24	9.0	17.8	26.8	30.0	-3.2
48.12	15.0	12.0	27.0	30.0	-3.0
80.80	18.8	8.2	27.0	30.0	-3.0
333.00	18.0	15.7	33.7	37.0	-3.3
500.27	13.3	20.7	34.0	37.0	-3.0
666.98	12.1	21.9	34.0	37.0	-3.0



SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: SBC-800 (N)

Location: Site # 4

Tested by: Allen Wang

Polar: Horizontal--10m

Test Mode: Mode 1

Test Results: Passed

Detector Function: Quasi-Peak

Temperature: 23°C

Humidity: 65%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (dBuV/m)	Limits	Margin (dB)
33.00	8.0	17.9	25.9	30.0	-4.1
80.59	18.5	8.2	26.7	30.0	-3.3
133.20	10.0	12.2	22.2	30.0	-7.8
500.12	10.9	20.7	31.6	37.0	-5.4
666.00	8.9	21.9	30.8	37.0	-6.2
666.59	12.0	21.9	33.9	37.0	-3.1



SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: SBC-800 (N)

Location: 3 meter chamber

Tested by: Jacky Wang

Polar: Vertical ---3 m

Test Mode: Mode 1.

Detector Function: Pk / A.V.

Test Results: Passed

Temperature: 25⁰C

Humidity: 66%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (Pk) (dBuV/m)	Limits (Pk)	Margin (dB)
1206.00	15.7	27.0	42.7	73.9	-31.2
2251.00	9.9	30.6	40.5	73.9	-33.4
3914.00	9.2	36.5	45.7	73.9	-28.2

Note: In case of peak reading complied with the limit at least 22dB margin, no measurement with A.V. detector required.



SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: SBC-800 (N)

Location: 3 meter chamber

Tested by: Jacky Wang

Polar: Horizontal ---3 m

Test Mode: Mode 1.

Detector Function: Pk / A.V.

Test Results: Passed

Temperature: 25⁰C

Humidity: 66%RH

(The chart below shows the highest readings taken from the final data)

Freq. (MHz)	Raw Data (dBuV/m)	Corr. Factor (dB)	Emiss. Level (Pk) (dBuV/m)	Limits (Pk) ()	Margin (dB)
1206.00	15.0	27.0	42.0	73.9	-31.9
3600.00	10.1	35.4	45.5	73.9	-28.4
4726.00	8.2	37.7	45.9	73.9	-28.0

Note: In case of peak reading complied with the limit at least 22dB margin, no measurement with A.V. detector required.



TEST FACILITY

- Location:** No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R. O. C.
- Description:** There are four 3/10m open area test sites and three line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements.
- Site Filing:** A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
- Registration also was made with Voluntary Control Council for Interference (VCCI).
- Site Accreditation:** Accredited by NEMKO (Authorization #: ELA 124) for EMC & A2LA (Certificate #: 824.01) for Emission
- Also accredited by BCIQ for the product category of Information Technology Equipment.
- Instrument Tolerance:** All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.
- Ground Plane:** Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

Site#3 & # 4Line Conducted Test Site: At Shielding Room



TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at C & C Laboratory, Co., Ltd. for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2-1988 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10kHz to 1.0 GHz or above.

Equipment used during the tests:

Open Area Test Site: # 4

Open Area Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	91700456	02/21/2001	02/20/2002
EMI Test Receiver	R&S	ESVS10	846285/016	04/16/2001	04/15/2002
Precision Dipole	SCHWAZBEC K	VHAP	998/999	05/17/2001	05/16/2002
Precision Dipole	SCHWAZBEC K	UHAP	981/982	05/17/2001	05/16/2002
Bilog Antenna	CHASE	CBL 6112B	2462	01/16/2001	01/15/2002
Turn Table	Chance most	N/A	N/A	N.C.R	N.C.R
Antenna Tower	Chance most	N/A	N/A	N.C.R	N.C.R
Controller	Chance most	N/A	N/A	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M51067	N.C.R	N.C.R
Site NSA	C&C Lab.	N/A	N/A	11/24/2000	11/23/2001

3 meter Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3271A	85060321	10/15/2001	10/14/2002
Pre-Amplifier	HP	8449B	3008A00965	10/11/2001	10/10/2002
Horn Antenna	EMCO	3115	9602-4659	04/17/2001	04/16/2002
Coaxial Cable	ANOREW	LDF-2-50	79027	09/22/2001	09/21/2002
Turn Table	HD	HD320	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA 240	N/A	N.C.R	N.C.R
Controller	HD	HD 100	N/A	N.C.R	N.C.R

Conducted Emission Test Site: # 4

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESHS10	843743/015	12/15/2000	12/14/2001
LISN	R&S	ENV 4200	8303261016	11/18/2000	11/17/2001
LISN	EMCO	3825/2	9003/1382	02/08/2001	02/07/2002

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

BLOCK DIAGRAM OF TEST SETUP

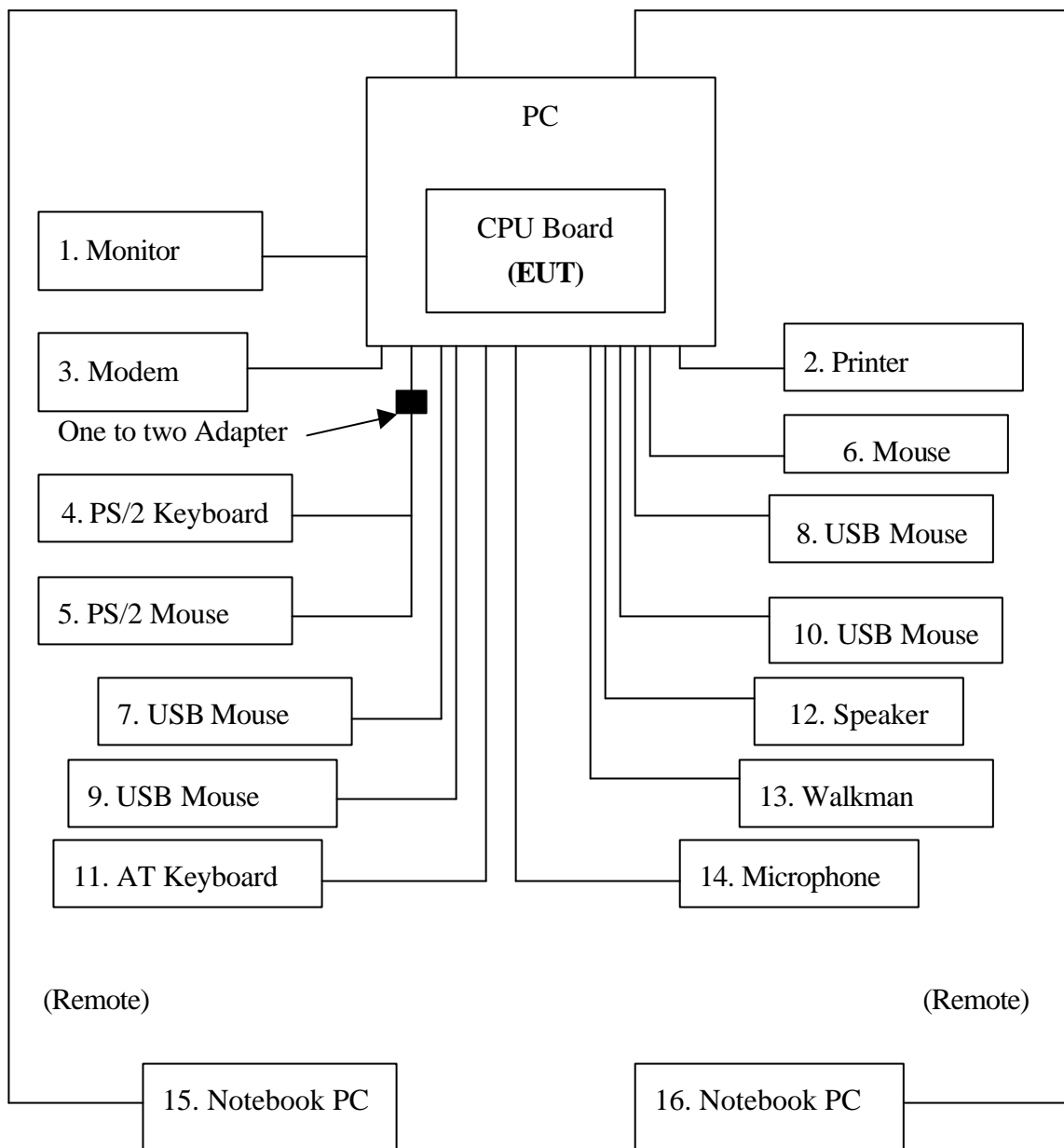
SYSTEM DIAGRAM OF CONNECTIONS BETWEEN EUT AND SIMULATORS

EUT: CPU Board

Trade Name: N/A

Model Number: SBC-800 (N)

Power Cord: Unshielded, 1.8m





APPENDIX 1

PHOTOGRAPHS (TEST SETUP OF LINE CONDUCTED EMISSION TEST)

LINE CONDUCTED EMISSION TEST

Front View



Back View

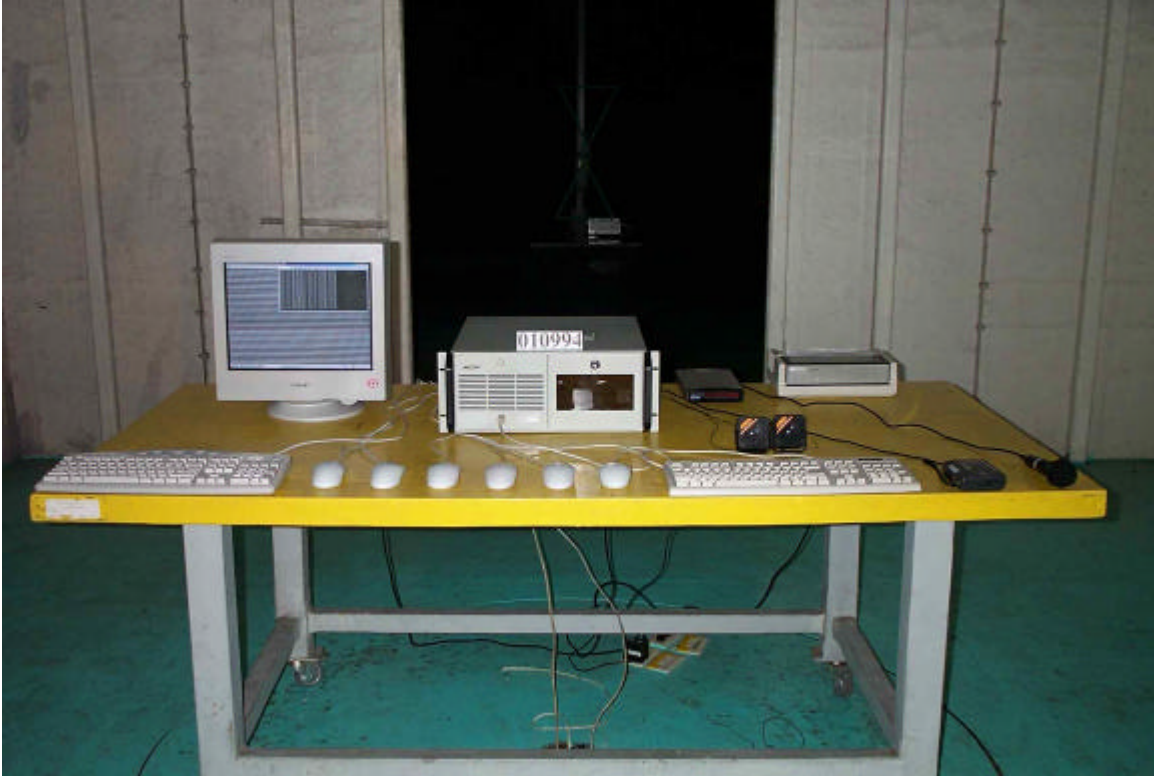




APPENDIX 2

PHOTOGRAPHS (TEST SETUP OF RADIATED EMISSION TEST)

RADIATED EMISSION TEST





APPENDIX 3

PHOTOGRAPHS (EUT)

Front view of EUT



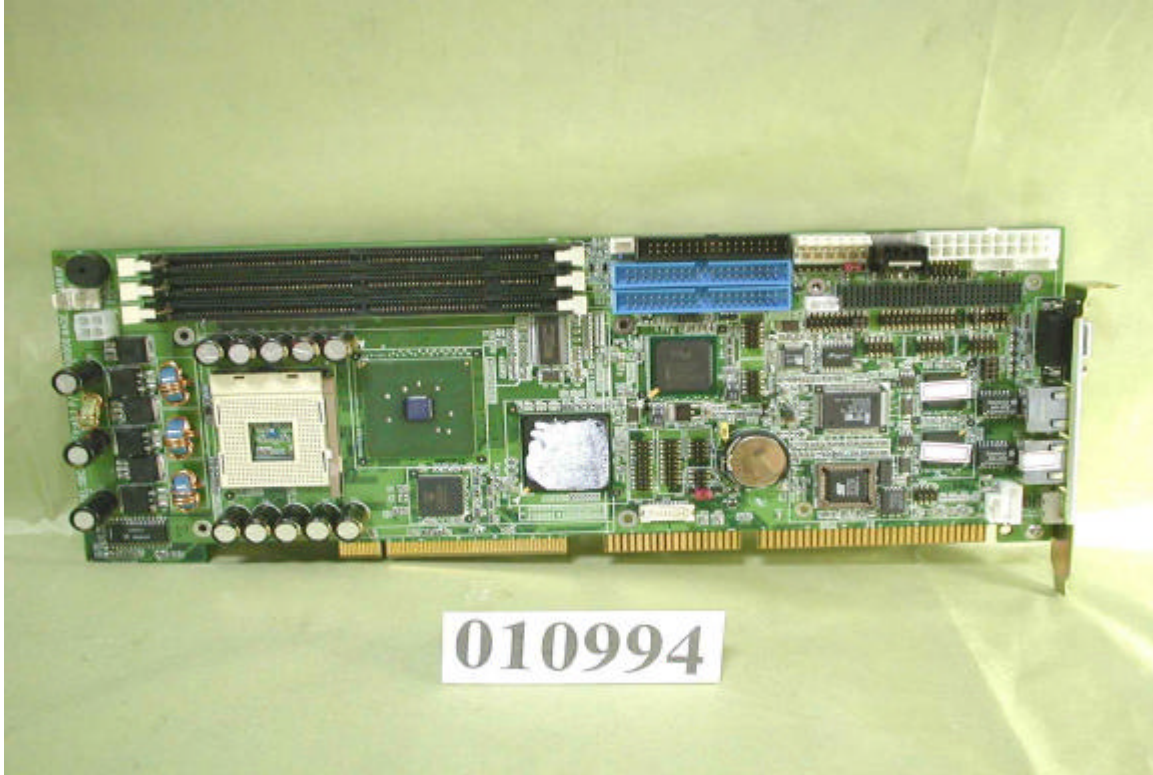
Back view of EUT



Open view of EUT



SBC-800 (N)
Front view of EUT



Back view of EUT



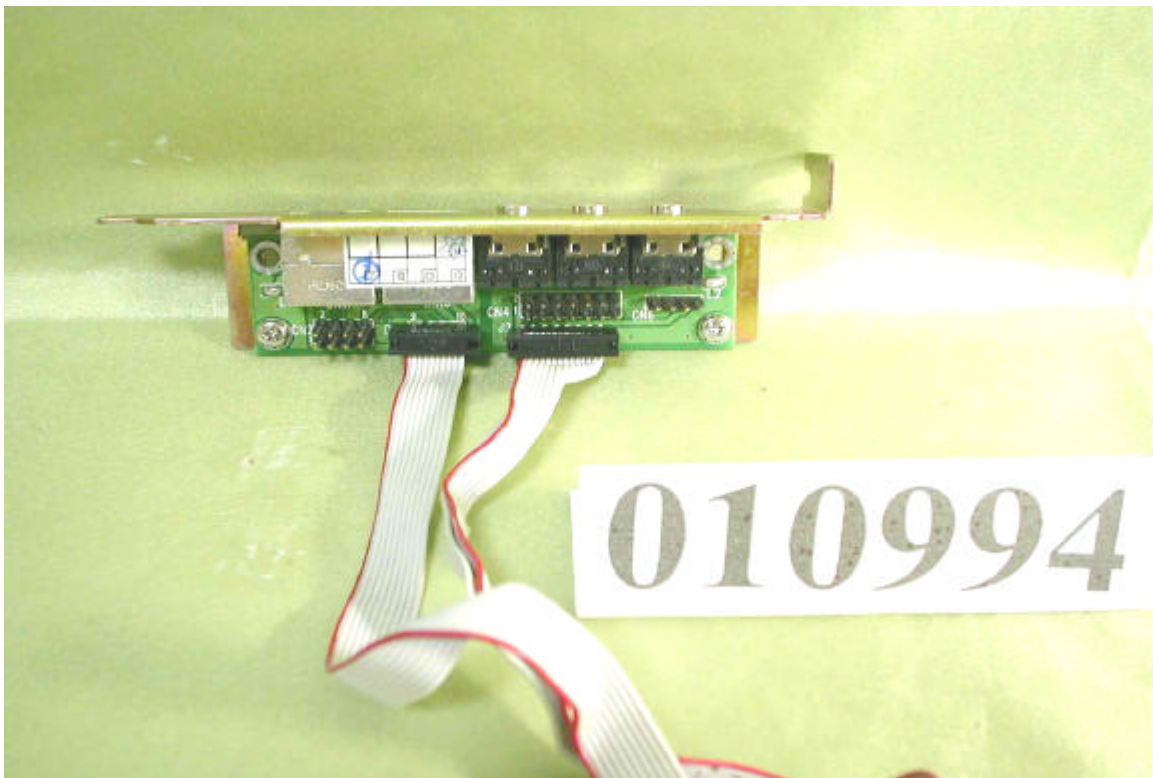
I/O Port of EUT



I/O Port of Sound Card



Front view of Sound Card



Back view of Sound Card

