EMC

TEST REPORT

REPORT NO. : CE86123011
MODEL NO. : MB-562C
DATE OF TEST : Feb. 26 ~ April 17, 1998

PREPARED FOR: AAEON TECHNOLOGY INC.

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HSIN-TIEN CITY, TAIPEI, TAIWAN, R.O.C.

PREPARED BY:

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Accredited Laboratory

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: April 27, 1998

Product	:	CPU BOARD	
Trade Name	:	AAEON	
Model No.	:	MB-562C	
Applicant	:	AAEON TECHNOLOGY INC.	
Standard	:	EN 55022:1994, 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 Feb. 26 to April 17, 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: 4/27/98

(Sharon Hsiung)

APPROVED BY : Mike Su, DATE: 4/27/98

(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	CPU BOARD
Model No.	:	MB-562C
Power Supply Type	:	Switching
Data Cable	:	N/A

Note: 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:

* Chassis: AAEON, model: AIPX-250
* Switching power supply: SEASONIC, model: SSG-250G
* FDD: TEAC, modle: FD-235HF
* HDD: Seagate, ST3630A
* CPU: INTEL Pentium MMX 200MHz
* VGA Card: On-board

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 manufacturer's specification or 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	**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 (1.2m)
2	PRINTER	HP	2225C+	3030S79006	Nonshielded signal (1.9m) Shielded power (2.1m)
3	MODEM	DATATRONICS	1200C+	02-542193	Shielded signal (1.2m) Nonshielded power (1.9m)
4	MODEM	HAYES	231AA	A00331003365	Shielded signal (1.2m) Nonshielded power (1.9m)
5	MODEM	DATATRONICS	1200CK	07-503002	Shielded signal (1.2m) Nonshielded power (1.9m)
6	KEYBOARD	TATUNG	FDA-102A	4001379	Shielded signal (1.2m)
7	MOUSE	HP	M-S34	LZA72270336	Shielded signal (1.8m)
8	SPEAKER	J-S	J-003	S501006	Nonshielded signal (1.1m)
9	JOYSTICK	LOGITECH	#3001	LTD52000385	Nonshielded signal (2.2m)
10	MICROPHONE	CAROL	MUD-329	M501013	Nonshielded signal (3.0m)
11	RECORDER	PANASONIC	RQ-L309GT	C101013	Nonshielded signal (1.5m)
12	VIDEO CAMERA	KODAK	DVC300	748010017170474	Shielded signal (2.8m)
13	PC	ACER	PT75WB	TJ53521	Nonshielded power (1.8m)
14	MONITOR	OPTIQUEST	4500DC	3651700124	Shielded signal (1.5m) Nonshielded power (1.8m)
15	KEYBOARD	BTC	5139	853300109	Nonshielded signal (1.2m)
16	MOUSE	COMPAQ	M-S28-6MD	LCA53206237	Shielded signal (1.8m)
17	HUB	ACCTON	EN2040	144040-104	Nonshielded signal-- 10m to EUT; 2.0m to PC Shielded power (1.8m)

Note: A USB cable (2 m) was connected between support unit #1 and PC.

Support unit 1~12 acted as SERVER PC and communicated with support unit 13~17 which acted as HOST PC and systems of communication partner.

FOR IMMUNITY TEST

No.	Product	Brand	Model No.	Serial No.	I/O Cable
1	PERSONAL COMPUTER	ACER	PT-75WB	TJ53525	Nonshielded Power (1.8m)
2	KEYBOARD	HP	C3758A	C3753-60223	Shielded signal (2.0m)
3	MONITOR	ADI	PD-959	730020U00100373	Shielded Signal (1.3m) Nonshielded Power (1.3m)
4	MOUSE	HP	H-S34	LZA72556243	N/A
5	MODEM	GVC	F-1128V+/R6	50601531	Shielded signal (1.2m) Nonshielded power (1.8m)
6	MODEM	HAYES	5300AP	A1425300K045	Shielded signal (1.2m) Nonshielded power (1.7m)
7	MODEM	GVC	F-1114V/R6	853E100	Shielded signal (1.25m) Nonshielded power (1.3m)
8	SPEAKER	J-S	J-009	S501015	Nonshielded signal (1.1m)
9	JOYSTICK	QUICKSHOT	QS-123	J101003	Nonshielded signal (2.2m)
10	MICROPHONE	MICRO	ARG-220	M501003	Nonshielded signal (2.1m)
11	RECORDER	PANASONIC	RQ-L307GT	C101001	Nonshielded signal (1.2m)
12	VIDEO CAMERA	KODAK	DVC300	748010017170474	Shielded signal (2.8m)
13	PC	ACER	PT75WB	TJ53521	Nonshielded power (1.8m)
14	MONITOR	THREE SOMA	0012	N/A	Shielded signal (1.4m) Nonshielded power (1.8m\
15	KEYBOARD	HP	C3758A	C3253-60223	Nonshielded signal (1.2m)
16	MOUSE	COMPAQ	13H6690	23-D365100	Shielded signal (1.8m)
17	HUB	ACCTON	EN2040	144040-104	Nonshielded signal-- 10m to EUT; 2.0m to PC Shielded power (1.8m)

Note: A USB cable (2 m) was connected between support unit #1 and PC.

Support unit 1~12 acted as SERVER PC and communicated with support unit 13~17 which acted as HOST PC and systems of communication partner.

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	Sept. 18, 1998
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 5, 1998
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 28, 1998
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

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	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: 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	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	:	16 ℃
Humidity	:	84 %
Atmospheric Pressure	:	1060 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -21.5 dB at 5.865 MHz Minimum passing margin of radiated emission: -2.10 dB at 216.13 & 227 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: **MB-562C**

6 dB Band Width: 10 kHz

TEST PERSONNEL:

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
0.192	49.90	-	48.40	-	79.00	66.00	-29.1	-	-30.6	-
0.325	43.10	-	42.60	-	79.00	66.00	-35.9	-	-36.4	-
0.553	43.70	-	42.90	-	73.00	60.00	-29.3	-	-30.1	-
0.677	48.50	-	45.90	-	73.00	60.00	-24.5	-	-27.1	-
5.865	51.50	-	50.50	-	73.00	60.00	-21.5	-	-22.5	-
17.275	37.50	-	37.20	-	73.00	60.00	-35.5	-	-35.8	-

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

16. Mar 00 21:41

EUT: M8-0020
Test Spec: LISN : L
Comment: 230V AC/50Hz

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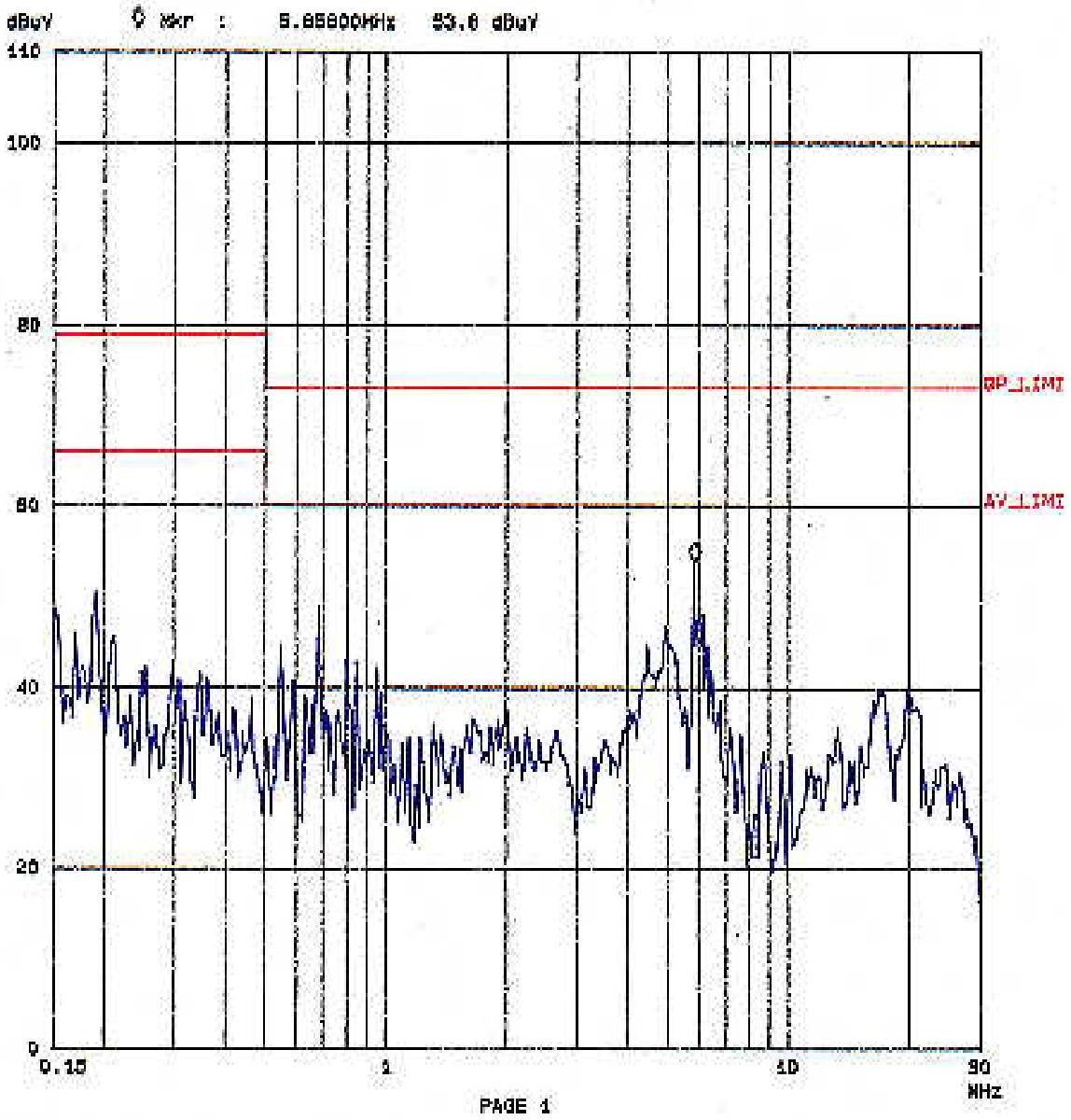
Tested by Leo Hong

Fast Scan Settings (2 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



ADT CO. SITE 5
EN55022 CLASS A

10. Mar 98 21:34

EUT: MS-583C
Test Spec: LISN : N
Comment: 230V AC/50Hz

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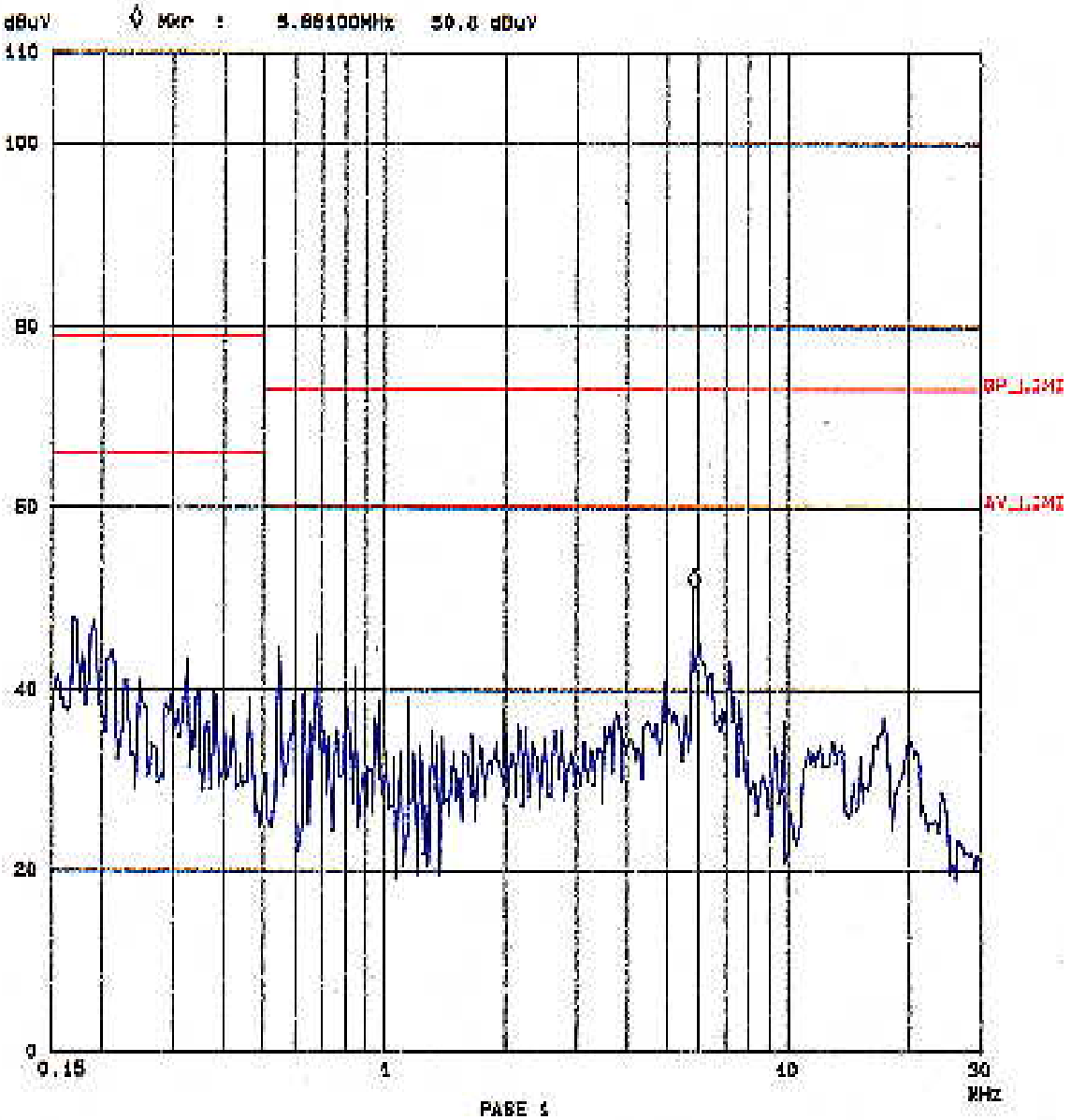
Tested by Lee Kong

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	DpRge
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: **MB-562C**

ANTENNA: CHASE BILOG CBL6111A POLARITY: Horizontal

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

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

TEST PERSONNEL:

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
183.72	11.2	20.7	31.9	40.0	-8.1
216.12	12.4	23.8	36.2	40.0	-3.8
226.95	13.0	23.3	36.3	40.0	-3.7
237.75	13.6	30.8	44.4	47.0	-2.6
248.59	14.2	27.3	41.5	47.0	-5.5
259.41	14.9	25.7	40.6	47.0	-6.4
270.18	14.8	27.8	42.6	47.0	-4.4
465.15	19.4	18.0	37.4	47.0	-9.6
561.42	21.3	14.3	35.6	47.0	-11.4
598.12	22.3	18.1	40.4	47.0	-6.6

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

TEST DATA OF RADIATED EMISSION

EUT: **CPU BOARD** MODEL: **MB-562C**

ANTENNA: CHASE BILOG CBL6111A 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)
129.69	12.0	21.4	33.4	40.0	-6.6
183.72	10.9	22.0	32.9	40.0	-7.1
216.13	12.6	25.3	37.9	40.0	-2.1
227.00	13.7	24.2	37.9	40.0	-2.1
237.79	14.7	28.9	43.6	47.0	-3.4
248.58	15.7	29.0	44.7	47.0	-2.3
259.41	16.2	25.5	41.7	47.0	-5.3
270.19	15.6	29.2	44.8	47.0	-2.2
465.30	20.5	18.3	38.8	47.0	-8.2
598.00	22.4	21.0	43.4	47.0	-3.6

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 50082-2	
Input Voltage	:	230 Vac, 50 Hz (to power of Industrial PC)	
Temperature	:	16 ℃	
Humidity	:	84 %	
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 : May Chen

Test Result		Remarks
Criterion A	**PASS**	Model: MB-562C

OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
4	+	2,3	Note 1	N/A
8	+	1 ~ 3	N/A	Note 1

Description of test point:

1. Junction of case
2. Metal of case
3. 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	:	May Chen

Test Result		Remarks
Criterion A	**PASS**	Model: MB-562C

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	:	May Chen

Test Result		Remarks
Criterion B	**PASS**	Model: MB-562C

OBSERVATION DESCRIPTION

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

Description of test result:

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

Note 2: There is beep noise during the test but self-recoverable after 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	:	May Chen

Test Result		Remarks
Criterion A	**PASS**	Model: MB-562C

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	:	May Chen

Test Result		Remarks
Criterion A	**PASS**	Model: MB-562C

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	:	May Chen

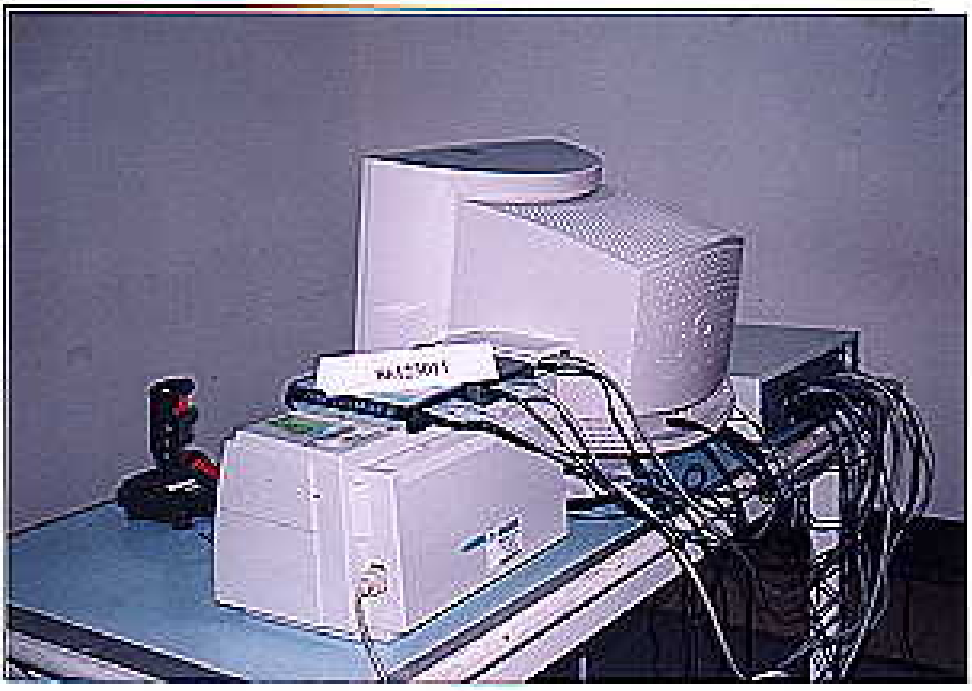
Test Result		Remarks
Criterion A	**PASS**	Model: MB-562C

Note: Four sides of EUT are verified separately.

OBSERVATION DESCRIPTION

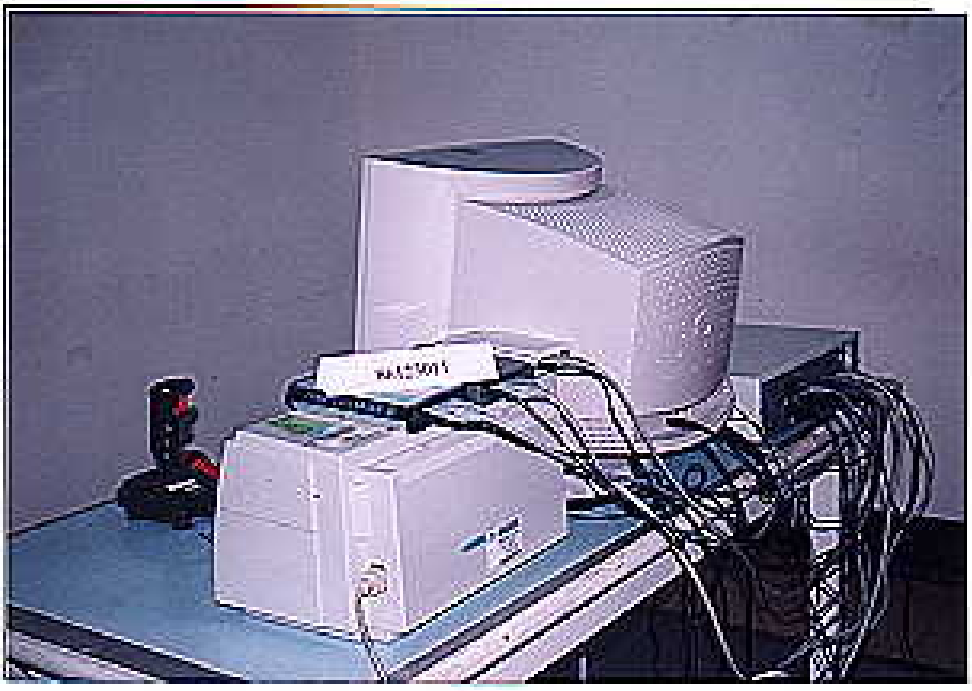
There is no change compared with initial operation during the test.

ESD TEST



CONDUCTED EMISSION TEST

ESD TEST



RS TEST (AM MODULATION AND PULSE MODULATION)

EFT TEST

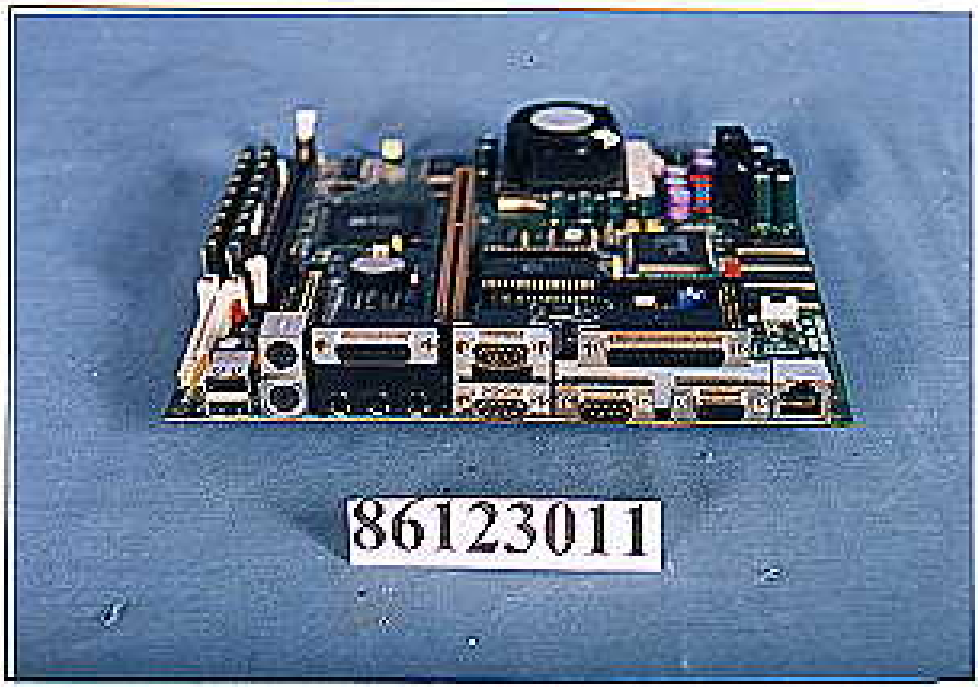
EFT CLAMP TEST

CONDUCTED SUSCEPTIBILITY TEST

CONDUCTED SUSCEPTIBILITY CLAMP TEST

MAGNETIC TEST

7. CONSTRUCTION PHOTOS OF EUT

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