

# CE EMC TEST REPORT

**REPORT NO.:** CE930930L09

**MODEL NO.:** PCA-5640

**RECEIVED:** Oct. 01, 2004

**TESTED:** Nov. 01 ~ Nov. 04, 2004

**APPLICANT:** ADVANTECH CO., LTD

**ADDRESS:** No. 1, Alley 20, Lane 26, Rueiguang Road,  
Neihu District, Taipei, Taiwan 114, R.O.C.

**ISSUED BY:** Advance Data Technology Corporation

**LAB ADDRESS:** No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou  
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**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan,  
R.O.C.

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## 1 CERTIFICATION

**PRODUCT:** VGA CARD  
**BRAND NAME:** Advantech  
**MODEL NO:** PCA-5640  
**APPLICANT:** ADVANTECH CO., LTD  
**TESTED:** Nov. 01 ~ Nov. 04, 2004  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**STANDARDS:** EN 61000-6-4:2001      **EN 61000-6-2:2001**  
CISPR 11:1999      **EN 55024: 1998+A1: 2001+A2: 2003**  
EN 55022:1998+A1:      IEC 61000-4-2:2001  
2000+A2:2003, Class A      IEC 61000-4-3:2002+A1:2002

The above equipment have been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

**PREPARED BY :** Windy Chou , **DATE:** Nov. 05, 2004  
(Windy Chou)

**TECHNICAL**  
**ACCEPTANCE :** Mart Su , **DATE:** Nov. 05, 2004  
Responsible for EMI (Mart Su)

**TECHNICAL**  
**ACCEPTANCE :** Clark Lin , **DATE:** Nov. 05, 2004  
Responsible for EMS (Clark Lin)

**APPROVED BY :** Ken Lu , **DATE:** Nov. 05, 2004  
(Ken Lu / Manager)

## 2 SUMMARY OF TEST RESULTS

After estimating all the combination of every test mode, the result shown as below is the worst case.

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
EN 61000-6-4:2001 CISPR 11:1999	Conducted Test	PASS	Meets Limit Minimum passing margin is -40.21dB at 5.438MHz.
EN 55022:1998+A1: 2000+A2:2003, Class A	Radiated Test	PASS	Meets Limit Minimum passing margin is -6.69B at 810.28 MHz

IMMUNITY (EN 61000-6-2; EN 55024)			
Standard	Test Type	Result	Remarks
IEC 61000-4-2:2001	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3:2002 +A1:2002	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	VGA CARD
<b>MODEL NO.</b>	PCA-5640
<b>POWER SUPPLY</b>	230 Vac, 50Hz

**NOTE:**

1. There were a IPC with non R/C Power (model: IPC-7220) CPU Board (model: AIMB-744) and Power (AC 300W SPS, Model: HG2-6400P) provided to the EUT for testing.

2. There are two test modes provided to this EUT in this report. The details please refer to the table as below:

<b>TEST MODE</b>	<b>REMARK</b>
A	D-SUB (2048 x 1536 @75Hz)
B	DVI (1280 x 1024 @75Hz)

3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

#### 3.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is according to the specifications of the manufacturers, must comply with the requirements of the following standards:

**EN 61000-6-4:2001**

CISPR 11:1999

**EN 55022:1998+A1:**

**2000+A2:2003, Class A**

**EN 61000-6-2:2001**

**EN 55024: 1998+A1: 2001+A2: 2003**

IEC 61000-4-2:2001

IEC 61000-4-3:2002+A1:2002

All tests have been performed and recorded as per the above standards.

### 3.3 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 were used to form a representative test configuration during the tests.

#### For Emission Test

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	TV MONITOR	HACE	CT14A	35111411001756	VERIFICATION
2	LCD MONITOR	ACER	AL1721	ET.L0408.0104040 0206PK00	FCC DoC Approved
3	PRINTER	EPSON	LQ-300+	DCGY054105	FCC DoC Approved
4	MODEM	ACEEX	1414V/3	0401008276	IFAXDM1414
5	KEYBOARD	HP	SK-1688	C0306114690	GYUR84SK
6	MOUSE	HP	M-S69	M4-010571	INZ211443
7	MONITOR	ADI	CM100	240058T00100064	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8 m shielded cable
2	1.8 m shielded cable
3	1.8 m shielded cable
4	1.8 m shielded cable
5	1.6 m shielded cable
6	1.8 m shielded cable
7	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o cor

**NOTE:** 1. All power cords of the above support units are non-shielded (1.8m).

#### For Harmonics / Flicker / Immunity Test

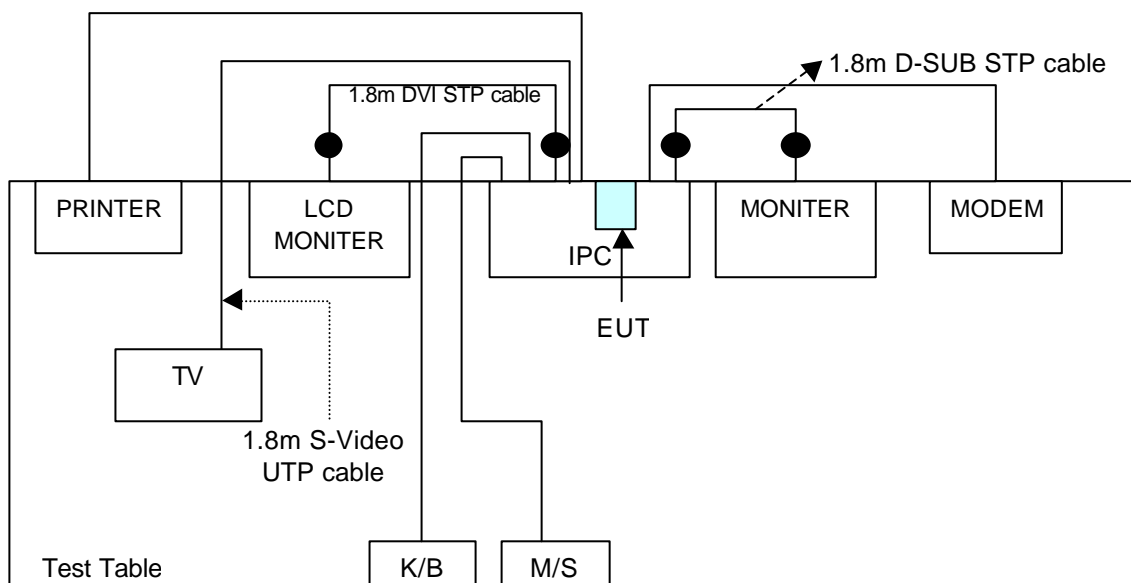
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	MONITOR	SONY	CPD-G520	2402885	FCC DoC Approved
2	LCD MONITOR	ACER	AL1721	ET.L0408.0104040 01D6PK00	FCC DoC Approved
3	TV MONITOR	HACE	CT14A	35111411001747	VERIFICATION
4	PS/2 MOUSE	BTC	M851	G00347024173	E5XMSM860
5	PS/2 KEYBOARD	BTC	5200T	F24800410	E5XKB5122WTH 0110

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core
2	1.8 m shielded cable
3	1.8 m shielded cable
4	1.5 m shielded cable
5	1.6 m shielded cable

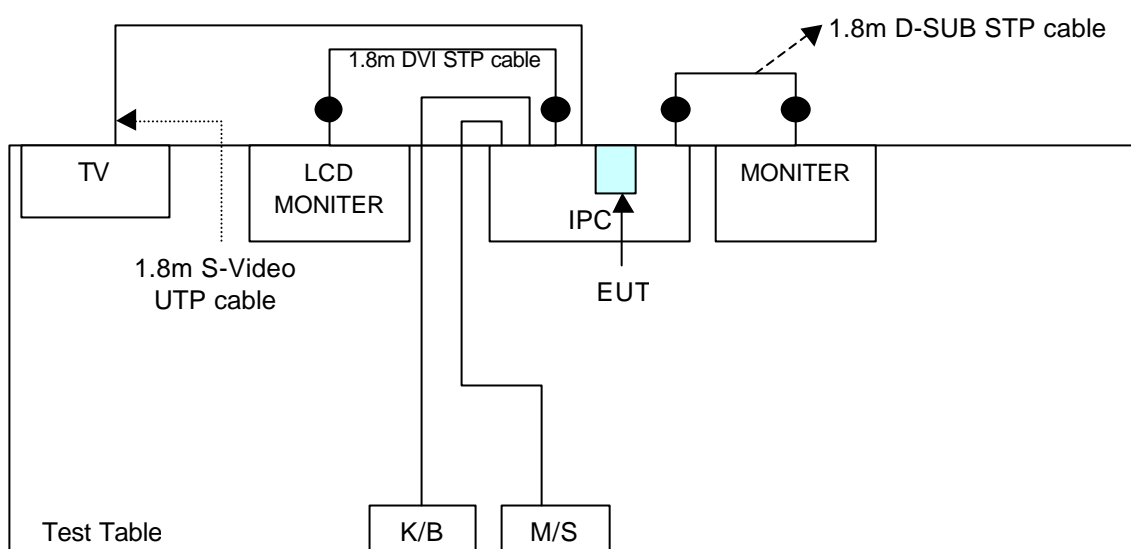
**NOTE:** 1. All power cords of the above support units are non-shielded (1.8m).

### 3.4 CONFIGURATION OF SYSTEM UNDER TEST

#### For Emission Test



#### For Harmonics / Flicker / Immunity Test





## 4 EMISSION TEST

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15 - 0.5	79	66
0.50 - 5.0	73	60
5.0 - 30.0	73	60

- NOTE:**
- (1) The lower limit shall apply at the transition frequencies.
  - (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Dec. 12, 2004
RF signal cable Woken	5D-FB	Cable-HYC01-01	Mar. 02, 2005
LISN ROHDE & SCHWARZ	ESH3-Z5	100312	Mar. 03, 2005
LISN ROHDE & SCHWARZ	ESH2-Z5	100104	Mar. 02, 2005
Software ADT	ADT_Cond_V3	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Shielded Room 1.
  3. The VCCI Site Registration No. is C-2040.

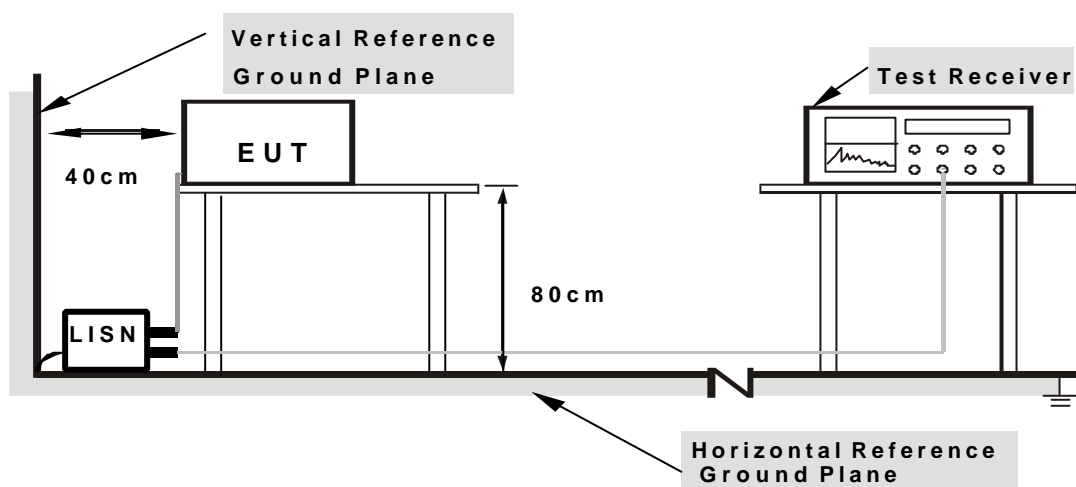
### 4.1.3 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20dB) were not recorded.

### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.1.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### **4.1.6 EUT OPERATING CONDITIONS**

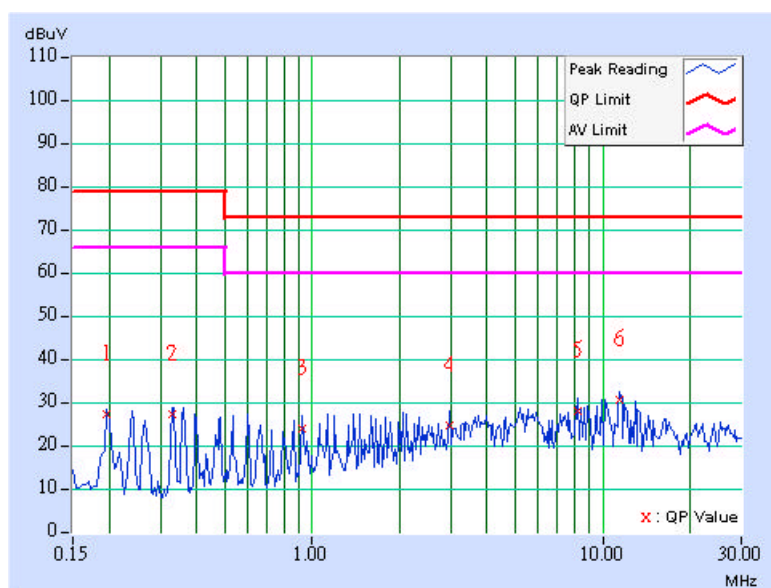
- a. Turned on the power of all equipment.
- b. EUT and communication PC ran a test program to enable all functions.
- c. EUT transmitted/and received messages from the communication PC via STP cable, which connected EUT and communication PC.
- d. EUT sent "H" messages to monitor and monitor displayed "H" patterns on screen.
- e. EUT sent "H" messages to printer, then printer printed them on paper.
- f. EUT sent "H" messages to modem.
- g. Repeated steps c-f.

## 4.1.7 TEST RESULTS

EUT	VGA CARD	MODEL NO.	PCA-5640
INPUT POWER	230 Vac, 50 Hz	TEST MODE	1
6dB BANDWIDTH	9 kHz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	20 deg. C, 65% RH, 991 hPa	TESTED BY	Kent Chan

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.197	0.12	26.90	-	27.02	-	79.00	66.00	-51.98	-
2	0.330	0.12	26.98	-	27.10	-	79.00	66.00	-51.90	-
3	0.927	0.15	23.54	-	23.69	-	73.00	60.00	-49.31	-
4	2.984	0.18	24.28	-	24.46	-	73.00	60.00	-48.54	-
5	8.236	0.30	27.78	-	28.08	-	73.00	60.00	-44.92	-
6	11.487	0.44	30.40	-	30.84	-	73.00	60.00	-42.16	-

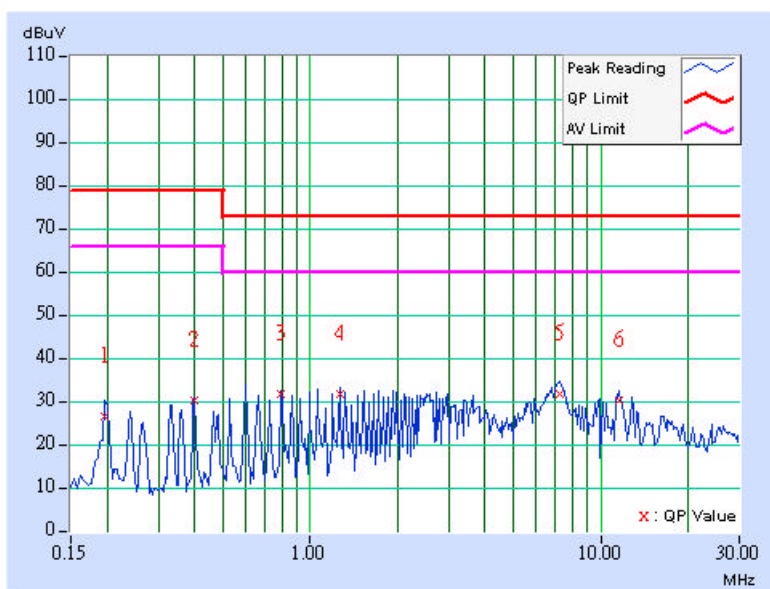
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



<b>EUT</b>	VGA CARD	<b>MODEL NO.</b>	PCA-5640
<b>INPUT POWER</b>	230 Vac, 50 Hz	<b>TEST MODE</b>	1
<b>6dB BANDWIDTH</b>	9 kHz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	20 deg. C, 65% RH, 991 hPa	<b>TESTED BY</b>	Kent Chan

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.197	0.11	26.38	-	26.49	-	79.00	66.00	-52.51	-
2	0.397	0.12	29.88	-	30.00	-	79.00	66.00	-49.00	-
3	0.795	0.13	31.35	-	31.48	-	73.00	60.00	-41.52	-
4	1.262	0.15	31.51	-	31.66	-	73.00	60.00	-41.34	-
5	7.227	0.28	31.40	-	31.68	-	73.00	60.00	-41.32	-
6	11.496	0.39	30.07	-	30.46	-	73.00	60.00	-42.54	-

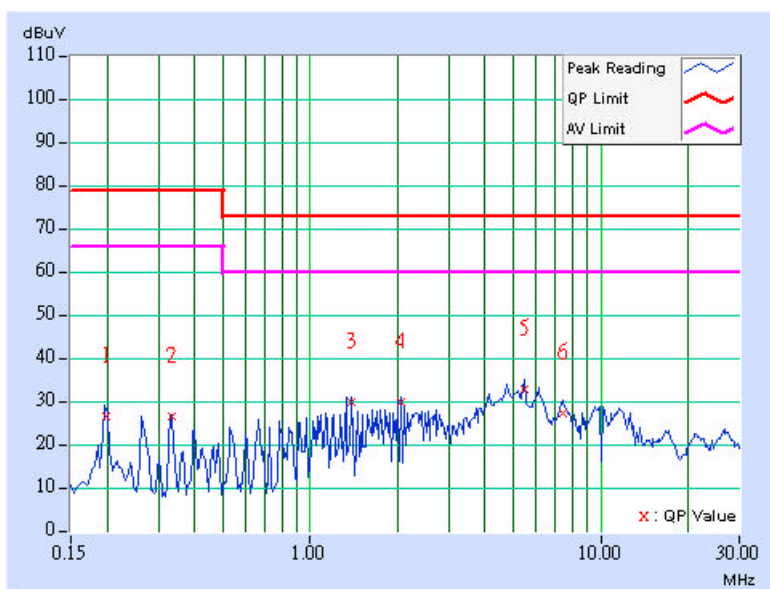
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



<b>EUT</b>	VGA CARD	<b>MODEL NO.</b>	PCA-5640
<b>INPUT POWER</b>	230 Vac, 50 Hz	<b>TEST MODE</b>	2
<b>6dB BANDWIDTH</b>	9 kHz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	20 deg. C, 65% RH, 991 hPa	<b>TESTED BY</b>	Kent Chan

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.199	0.12	26.54	-	26.66	-	79.00	66.00	-52.34	-
2	0.334	0.12	26.24	-	26.36	-	79.00	66.00	-52.64	-
3	1.391	0.15	29.65	-	29.80	-	73.00	60.00	-43.20	-
4	2.055	0.16	29.62	-	29.78	-	73.00	60.00	-43.22	-
<b>5</b>	<b>5.438</b>	<b>0.25</b>	<b>32.54</b>	-	<b>32.79</b>	-	<b>73.00</b>	<b>60.00</b>	<b>-40.21</b>	-
6	7.426	0.30	27.03	-	27.33	-	73.00	60.00	-45.67	-

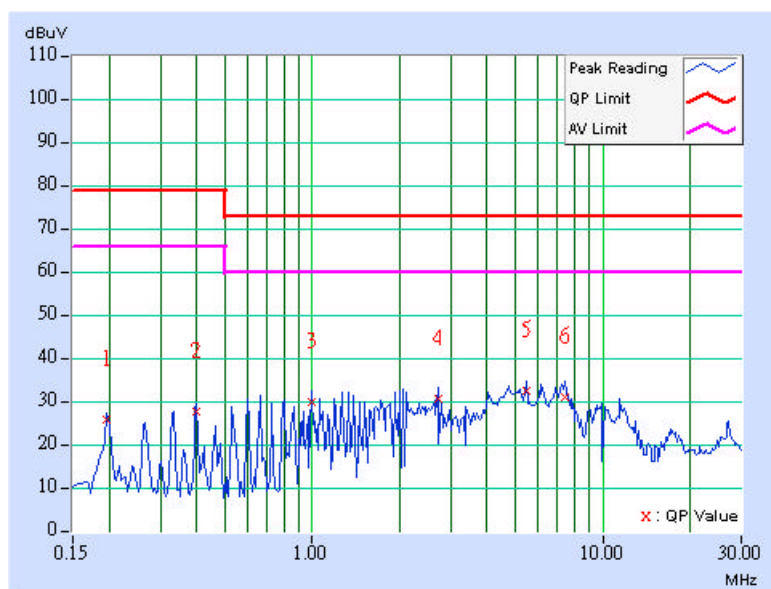
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



<b>EUT</b>	VGA CARD	<b>MODEL NO.</b>	PCA-5640
<b>INPUT POWER</b>	230 Vac, 50 Hz	<b>TEST MODE</b>	2
<b>6dB BANDWIDTH</b>	9 kHz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	20 deg. C, 65% RH, 991 hPa	<b>TESTED BY</b>	Kent Chan

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.197	0.11	25.53	-	25.64	-	79.00	66.00	-53.36	-
2	0.400	0.12	27.58	-	27.70	-	79.00	66.00	-51.30	-
3	0.994	0.15	29.79	-	29.94	-	73.00	60.00	-43.06	-
4	2.719	0.17	30.62	-	30.79	-	73.00	60.00	-42.21	-
5	5.438	0.23	32.32	-	32.55	-	73.00	60.00	-40.45	-
6	7.430	0.28	30.71	-	30.99	-	73.00	60.00	-42.01	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	dBuV/m (At 10m)
30 – 230	40
230 – 1000	47

- NOTE:**
- (1) The lower limit shall apply at the transition frequencies.
  - (2) Emission level (dBuV/m) = 20 log Emission level (uV/m).



## 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESIB7	100186	Jan. 09, 2005
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Jan. 09, 2005
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Feb. 03, 2005
BILOG Antenna SCHWARZBECK	VULB9168	9168-149	Feb. 03, 2005
Preamplifier Agilent	8447D	2944A10636	Jan. 15, 2005
Preamplifier Agilent	8447D	2944A10637	Jan. 15, 2005
RF signal cable Woken	8D-FB	Cable-Hych1-01	Feb. 16, 2005
RF signal cable Woken	8D-FB	Cable-Hych1-02	Feb. 16, 2005
Software ADT	ADT_Radiated_V7	NA	NA
Antenna Tower HD Deisel GmbH	MA240	11030	NA
Antenna Tower HD Deisel GmbH	MA240	12030	NA
Turn Table HD Deisel GmbH	DS430	50303	NA
Controller HD Deisel GmbH	HD2000	18303	NA
Ferrite clamp	FC18	910047	NA
Ferrite clamp	FC18	910068	NA
Ferrite clamp	FC18	910039	NA
Ferrite clamp	FC18	910046	NA
Ferrite clamp	FC18	910070	NA

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The test was performed in HwaYa Chamber 1.  
3. The VCCI Site Registration No. is R-1893.  
4. The IC Site Registration No. is IC4924-1.

### 4.2.3 TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

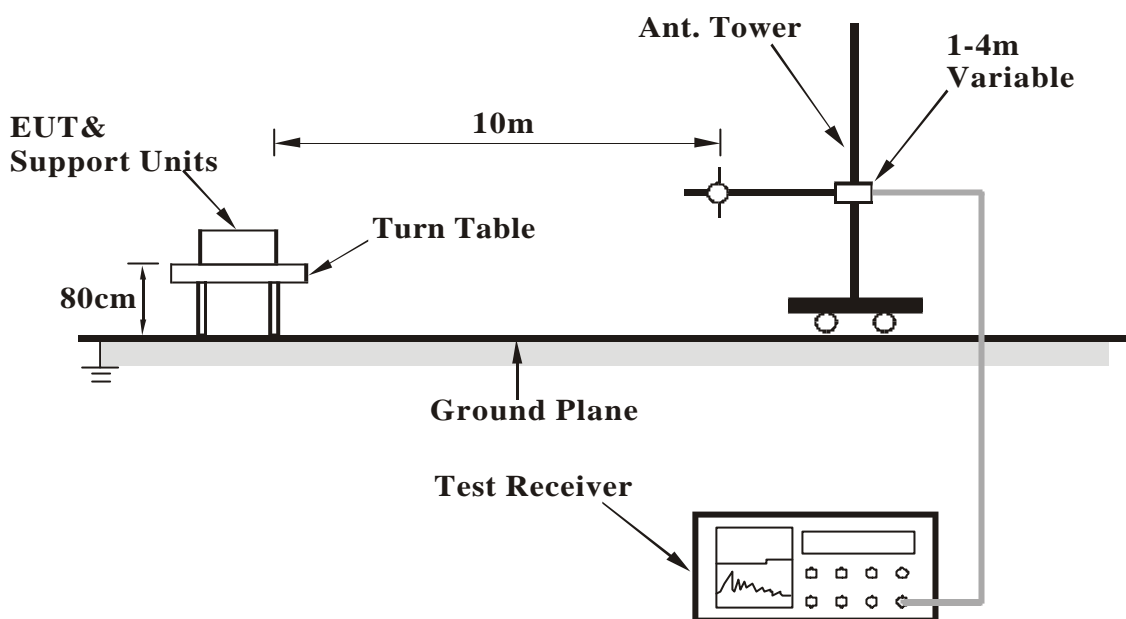
**NOTE:**

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

## 4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 4.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

## 4.2.7 TEST RESULTS

EUT	VGA CARD	MODEL NO.	PCA-5640
FREQUENCY RANGE	30 ~ 1000 MHz	TEST MODE	1
INPUT POWER	230 Vac, 50 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	24 deg. C, 60% RH, 991 hPa	TESTED BY	Scott Yang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	66.88	24.79 QP	40.00	-15.21	3.00 H	124	12.95	11.84
2	101.91	27.48 QP	40.00	-12.52	4.00 H	166	17.26	10.22
3	166.13	24.20 QP	40.00	-15.80	4.00 H	358	10.81	13.38
4	306.25	27.94 QP	47.00	-19.06	3.00 H	15	13.19	14.74
5	339.33	29.21 QP	47.00	-17.79	2.50 H	76	13.55	15.66
6	442.47	37.65 QP	47.00	-9.35	1.50 H	81	19.32	18.33
7	475.56	31.95 QP	47.00	-15.05	1.50 H	233	12.94	19.01
8	734.39	30.37 QP	47.00	-16.63	1.00 H	274	6.03	24.34
9	954.29	30.66 QP	47.00	-16.34	4.00 H	150	3.75	26.91

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	37.68	29.65 QP	40.00	-10.35	2.50 V	129	15.88	13.77
2	66.88	32.95 QP	40.00	-7.05	1.00 V	325	21.10	11.85
3	101.91	26.84 QP	40.00	-13.16	2.00 V	342	16.77	10.07
4	166.13	25.48 QP	40.00	-14.52	1.00 V	42	12.24	13.24
5	238.13	27.69 QP	47.00	-19.31	1.00 V	2	15.28	12.41
6	442.47	35.46 QP	47.00	-11.54	2.50 V	134	17.30	18.15
7	475.56	32.93 QP	47.00	-14.07	2.50 V	113	14.18	18.75
8	578.70	31.12 QP	47.00	-15.88	2.00 V	117	10.17	20.96
9	954.29	33.10 QP	47.00	-13.90	3.50 V	152	6.62	26.48

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

<b>EUT</b>	VGA CARD	<b>MODEL NO.</b>	PCA-5640
<b>FREQUENCY RANGE</b>	30 ~ 1000 MHz	<b>TEST MODE</b>	2
<b>INPUT POWER</b>	230 Vac, 50 Hz	<b>DETECTOR FUNCTION</b>	Quasi-Peak
<b>ENVIRONMENTAL CONDITIONS</b>	23 deg. C, 76% RH, 991 hPa	<b>TESTED BY</b>	Scott Yang

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 10 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	37.68	23.19 QP	40.00	-16.81	4.00 H	275	9.43	13.76
2	84.39	22.58 QP	40.00	-17.42	3.50 H	258	13.54	9.04
3	166.13	27.63 QP	40.00	-12.37	4.00 H	86	14.24	13.38
4	240.08	25.72 QP	47.00	-21.28	3.00 H	266	13.02	12.70
5	331.54	24.87 QP	47.00	-22.13	2.50 H	27	9.38	15.50
6	463.88	33.72 QP	47.00	-13.28	1.50 H	257	14.94	18.78
7	496.96	30.17 QP	47.00	-16.83	1.50 H	154	10.78	19.40
8	539.78	33.71 QP	47.00	-13.29	1.50 H	232	13.38	20.33
9	676.00	28.91 QP	47.00	-18.09	3.00 H	195	5.82	23.10
10	810.28	40.31 QP	47.00	-6.69	1.00 H	258	15.28	25.03
11	946.51	38.61 QP	47.00	-8.39	2.50 H	201	11.75	26.86

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 10 M</b>								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	35.74	29.06 QP	40.00	-10.94	1.00 V	278	15.60	13.47
2	166.13	25.65 QP	40.00	-14.35	1.00 V	276	12.40	13.24
3	240.08	24.25 QP	47.00	-22.75	1.00 V	0	11.72	12.53
4	434.69	26.91 QP	47.00	-20.09	1.50 V	224	8.97	17.95
5	500.85	28.73 QP	47.00	-18.27	3.00 V	342	9.61	19.12
6	539.78	30.80 QP	47.00	-16.20	3.00 V	342	10.87	19.93
7	676.00	29.95 QP	47.00	-17.05	2.00 V	269	7.33	22.62
8	810.28	37.15 QP	47.00	-9.85	1.50 V	182	12.53	24.61
9	909.53	38.21 QP	47.00	-8.79	1.50 V	210	12.20	26.01

**REMARKS:**

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

## 5 IMMUNITY TEST

### 5.1 GENERAL DESCRIPTION

<b>Generic Standard:</b>	<b>EN 61000-6-2:2001</b>	
<b>Basic Standard, specification requirement, and Performance Criteria:</b>	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 10V/m, 80% AM (1kHz), Performance Criterion A

<b>Product Standard:</b>	<b>EN55024:1998+A1:2001+A2:2003</b>	
<b>Basic Standard, specification requirement, and Performance Criteria:</b>	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A

## 5.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION

<b>CRITERION A</b>	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
<b>CRITERION B</b>	After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state if stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
<b>CRITERION C</b>	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

## 5.3 EUT OPERATING CONDITION

- a. Turned on the power of all equipment.
- b. EUT and communication PC ran a test program to enable all functions.
- c. EUT transmitted/and received messages from the communication PC via STP cable, which connected EUT and communication PC.
- d. EUT sent "H" messages to monitor and monitor displayed "H" patterns on screen.
- e. Repeated steps c-d.

## 5.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

### 5.4.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-2
<b>Discharge Impedance:</b>	330 ohm / 150 pF
<b>Discharge Voltage:</b>	Contact Discharge: 2 ; 4 kV (Direct/Indirect)
<b>Polarity:</b>	Positive & Negative
<b>Number of Discharge:</b>	Air Discharge: min. 20 times at each test point Contact Discharge: min. 50 times at each test point
<b>Discharge Mode:</b>	Single Discharge
<b>Discharge Period:</b>	1 second minimum

### 5.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Thermo ESD Simulator	MZ-15/EC	0310225	Oct. 12, 2004

**NOTE:** 1. The test was performed in Hwa Ya ESD Room No. 2.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.



### 5.4.3 TEST PROCEDURE

The discharges shall be applied in two ways:

- a. Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

- b. Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

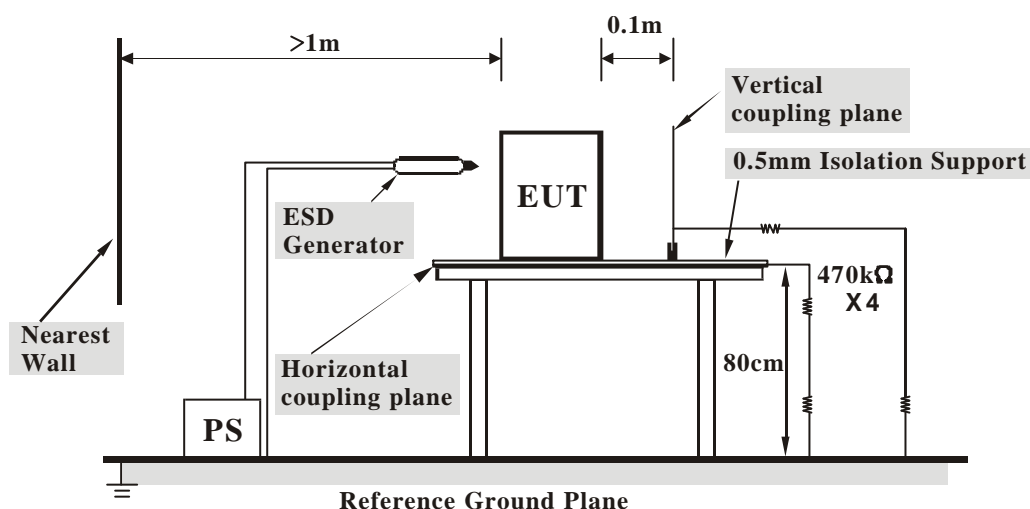
The basic test procedure was in accordance with IEC 61000-4-2:

- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- g. At least ten single discharges (in the most sensitive polarity) were applied to the **Horizontal Coupling Plane** at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP**.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

## 5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

## 5.4.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### NOTE:

#### TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

#### FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

## 5.4.6 TEST RESULTS

<b>EUT</b>	VGA CARD	<b>MODEL</b>	PCA-5640
<b>ENVIRONMENTAL CONDITIONS</b>	24 deg. C, 51% RH, 986 hPa	<b>INPUT POWER</b>	230 Vac, 50 Hz
<b>TESTED BY</b>	Kalvin Hsieh		

TEST RESULTS OF DIRECT APPLICATION					
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge	Test Result
2; 4	+/-	1~5	NOTE	NA	PASS

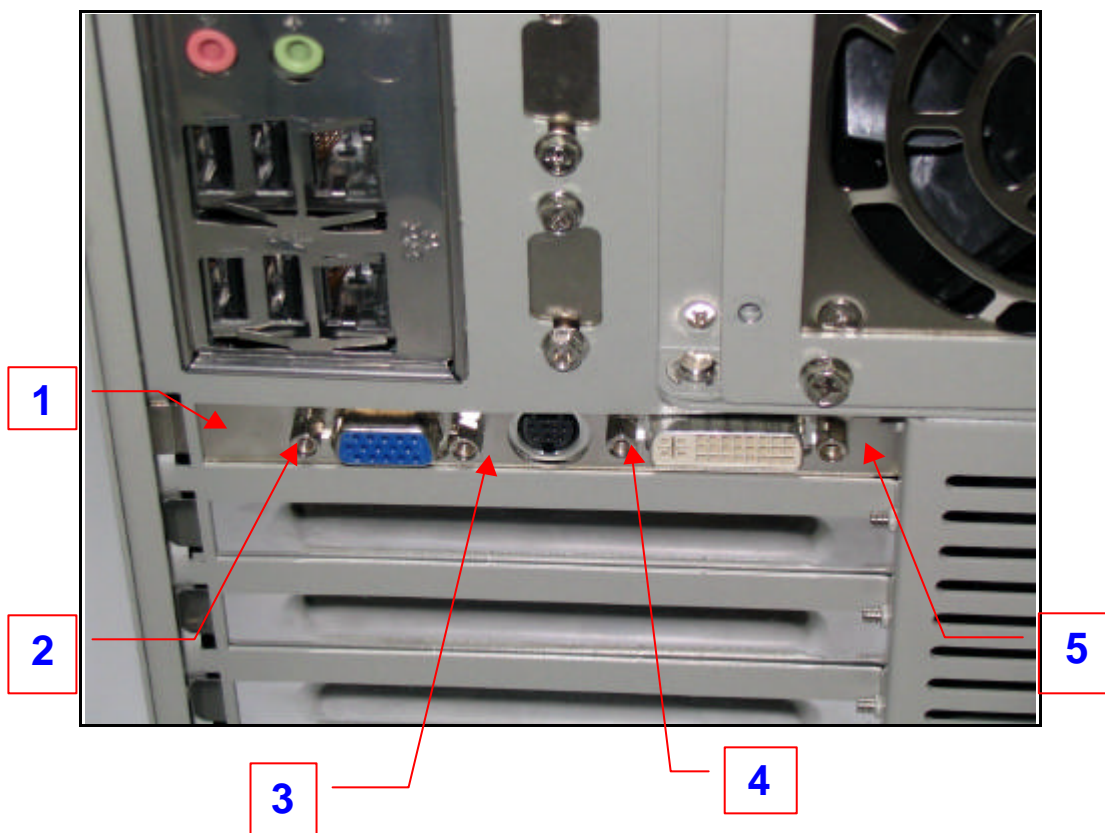
**Description of test point:** Please refer to following page.

TEST RESULTS OF INDIRECT APPLICATION					
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Test Result
2; 4	+/-	4 sides	NOTE	NOTE	PASS

**Description of test point:**

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

**NOTE:** There was no change compared with initial operation during and after the test.



## 5.5 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

### 5.5.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-3
<b>Frequency Range:</b>	80 MHz - 1000 MHz
<b>Field Strength:</b>	3 V/m
<b>Modulation:</b>	1 kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of preceding frequency value
<b>Polarity of Antenna:</b>	Horizontal and Vertical
<b>Test Distance:</b>	3 m
<b>Antenna Height:</b>	1.5m
<b>Dwell Time:</b>	at least 3 seconds

### 5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Boonton RF Power Meter	4232A-01-02	107402	Feb. 10, 2005
R&S Signal Generator	SML03	101499	Nov. 30, 2004
AR Amplifier	60S1G3M1	308049	Jan. 14, 2005
AR Amplifier RF TEST SYS CTRLR	SC1000M1	308057	Jan. 18, 2005
AR Amplifier	150W1000M1	308045	Jan. 14, 2005
AR ELECTRIC FIELD SENSOR	FP 6001	307198	Jan. 18, 2005
Software	ADT_RS_V450	NA	NA

**NOTE:** 1. The test was performed in Hwa Ya RS Room.  
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### **5.5.3 TEST PROCEDURE**

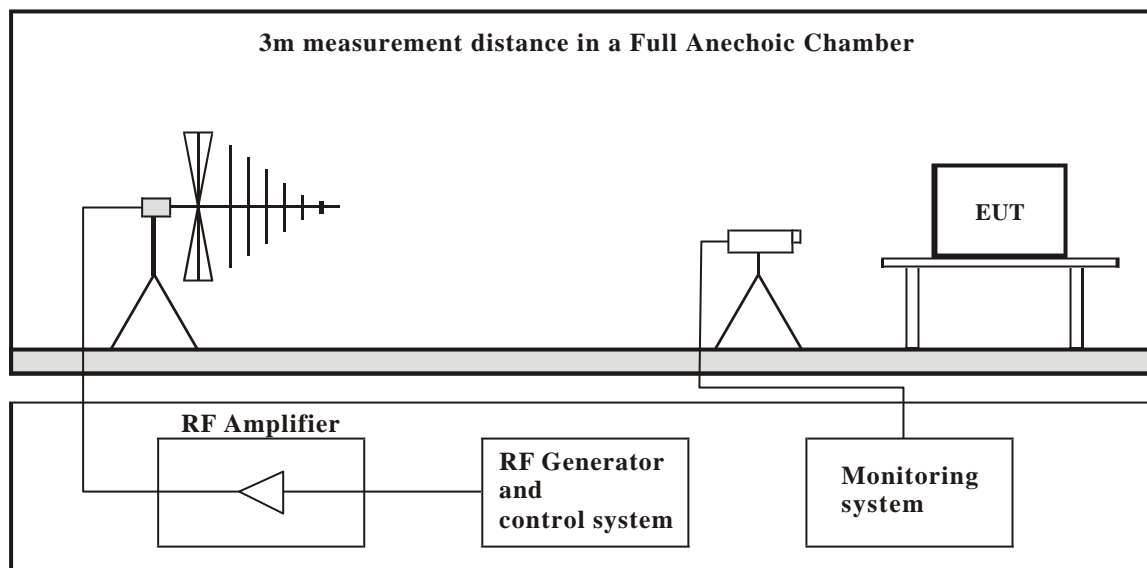
The test procedure was in accordance with IEC 61000-4-3

- a. The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- b. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sinewave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value.
- c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- d. The field strength level was 3V/m.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### **5.5.4 DEVIATION FROM TEST STANDARD**

No deviation.

## 5.5.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### NOTE:

#### TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

#### FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

## 5.5.6 TEST RESULTS

<b>EUT</b>	VGA CARD	<b>MODEL</b>	PCA-5640
<b>ENVIRONMENTAL CONDITIONS</b>	24 deg. C, 60% RH, 986 hPa	<b>INPUT POWER</b>	230 Vac, 50 Hz
<b>TESTED BY</b>	Kalvin Hsieh		

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Observation	Test Result
80 ~ 1000 MHz	V&H	0	3	NOTE	PASS
80 ~ 1000 MHz	V&H	90	3		
80 ~ 1000 MHz	V&H	180	3		
80 ~ 1000 MHz	V&H	270	3		

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

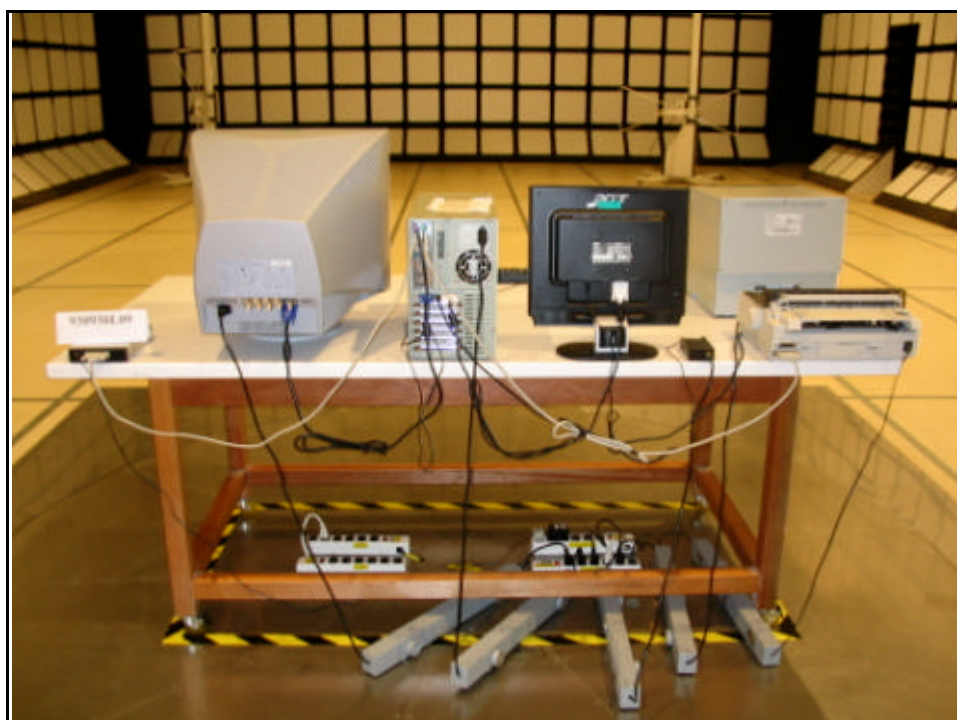


## 6 PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST



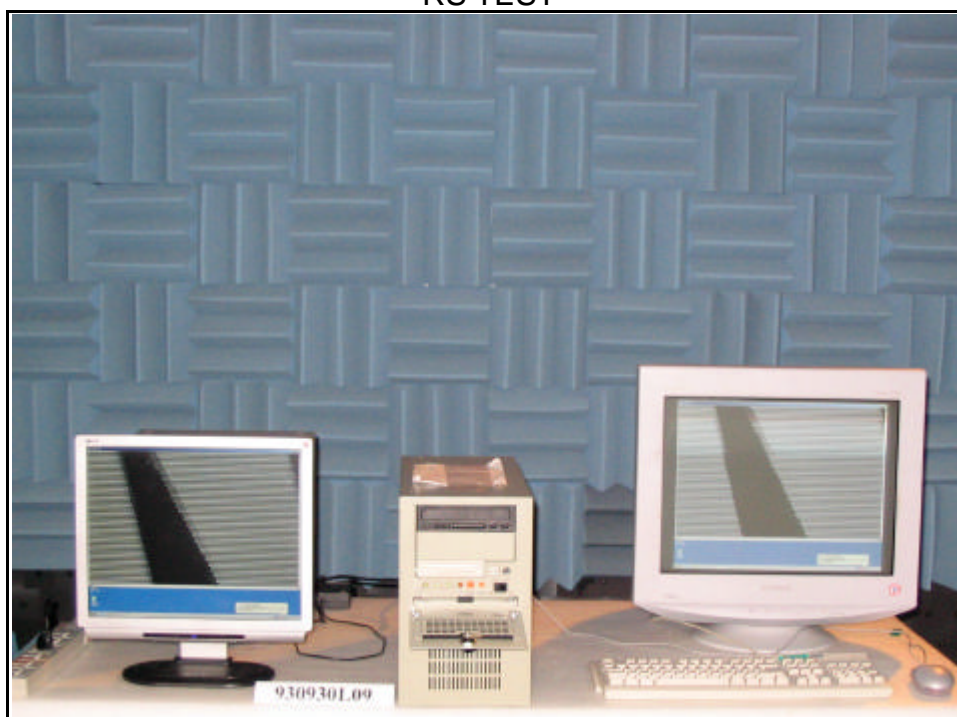
## RADIATED EMISSION TEST



## ESD TEST



## RS TEST



## 7 APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

<b>USA</b>	FCC, NVLAP, UL, A2LA
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA , CSA
<b>R.O.C.</b>	CNLA, BSMI, DGT
<b>Netherlands</b>	Telefication
<b>Singapore</b>	PSB , GOST-ASIA(MOU)
<b>Russia</b>	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml).

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The address and road map of all our labs can be found in our web site also.