PMC 財團法人精密機械研究發展中心
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TEST REPORT NO.: N3E22-98R1415-007
ISSUE NO. : 1

CE EMC TEST REPORT

Applicant	:	SYN-TEK Technologies Inc. 4F, No.192, Jhonggong 2nd Rd., Taichung City 407, Taiwan
Manufacturer	:	SYN-TEK Technologies Inc. 4F, No.192, Jhonggong 2nd Rd., Taichung City 407, Taiwan
Product Name	:	DMCNET PCI Master Card with Motion Control
Model No.	:	PCI-DMC-A01
Series Model	:	N/A
Rate	:	1ϕ AC 230V, 50 Hz(PC)
Test Date	:	2009/10/05~2009/10/06
Standard	:	EN 55022 : 2006 EN 55024 : 1998 + A1: 2001 + A2: 2003
Test Result	:	**PASS**
Test Laboratory	:	PMC Electromagnetic Compatibility Testing Laboratory No.27, 37th Road, Taichung Industrial Park, Taichung, Taiwan, R.O.C. TEL: +886-4-2359-9009 FAX:+886-4-2359-8847

Testing by EMC Engineer — **Chun Ting Shen** — Chun Ting Shen (Signature) — Oct. 13, 2009 (Date)

Approved by EMC Manager — **Lee Hsin Chang** — Lee Hsin Chang (Signature) — Oct. 13. 2009. (Date)

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Note :
1. The test results only responds to the tested sample, and is invalid as separately used.
2. The test results are invalid without examination stamp and signature of this laboratory.
3. The test results are not reproduced except in full without the written approved of PMC Lab.

Table of Contents

Attachment : Photograph of EUT

1. General Description of EUT

1.1 Description of EUT

Production Name	:	SYN-TEK Technologies Inc.
Product Name	:	DMCNET PCI Master Card with Motion Control
Model No.	:	PCI-DMC-A01
Rate	:	1ϕ AC 230V, 50 Hz
Power cord	:	18AWG × 3C, Unshielded Power Cable

1.2 Difference of component

The product using two kind of countermeasure, including TVS-1 and TVS-2.As a result, we(PMC) have tested the 2 kind of modules, and the data is as the following pages. In order to distinguish the test results, the model name will be representative of the name-TVS-1 and TVS-2.

TVS	TVS-1	TVS-2
Manufactory	TI	SEMTECH
Model	TPD2E009	SM712

2. General Information of Test

2.1 Summary of Test Result

Standard	Data	Title	Comment
EN 55022	2006	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	PASS
EN 55024	1998 + A1: 2001 + A2: 2003	Information technology equipment - Immunity characteristics - Limits and methods of measurement	PASS

2.2 Performance Criteria of Immunity Test

Performance Criterion A：

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.

Performance Criterion 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

phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. During the test, degradation of performance is allowed. However, no change of actual operating state or stored data is allowed to persist after the test.

Performance Criterion C：

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 manufacturers instructions.

3. Conducted Emission Test

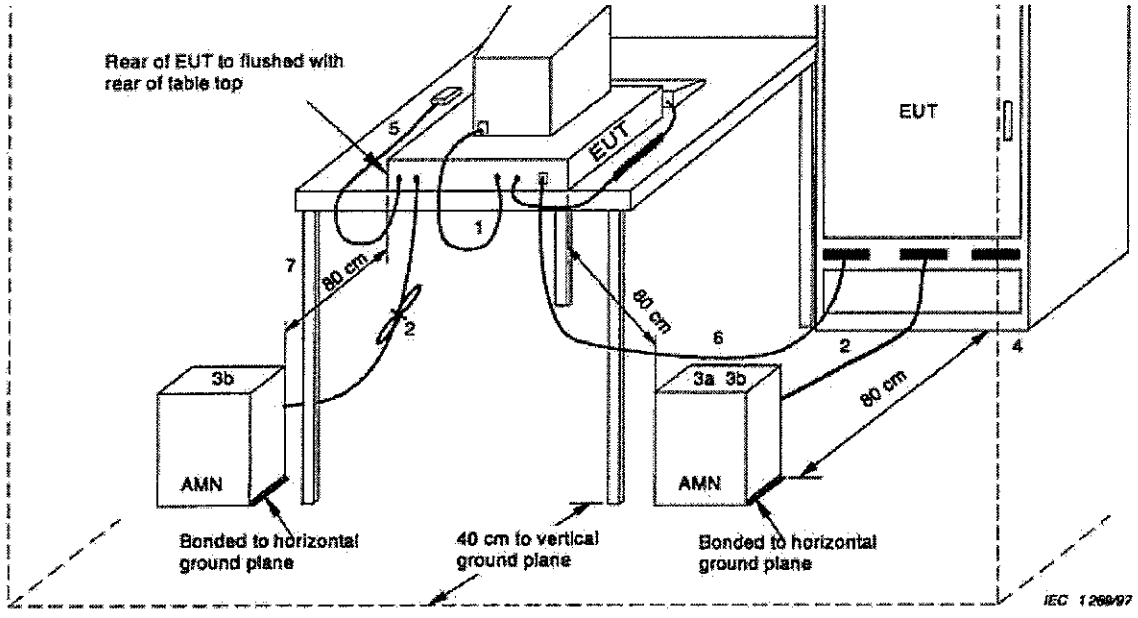
3.1 Reference standards

EN 55022：2006

3.2 Limits of terminal disturbance voltage

Standard	Frequency Range MHz	Limit Values dBuV	
		Quasi-Peak	Average
EN 55022 Class A	0.15 to 0.5	79	66
	0.5 to 5	73	60
	5 to 30	73	60
a. Decreasing linearly with logarithm of the frequency.			

3.3 Test setup



AMN = artificial mains network
EUT = equipment under test

3.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
EMI TEST RECEIVER	ROHDE & SCHWARZ ESCS 30	847793/004	May 31, 2010
L.I.S.N.	SCHWARZBECK MESS-ELEKTRONIK NNLK8129	8129129	Jul. 30, 2010

3.5 Environmental conditions

Test Data	Ambient Temperature	Relative Humidity	Atmospheric Pressure
Oct. 05, 2009	26 ℃	57 %	996 mbar

3.6 Description of the test

Positive-peak was done first to find the frequency ranges required then to do the quasi-peak value and average value measurement. Each phase of power lines was to be tested.

3.7 Test result

The following pages show the results of conducted emission test. Judging from these data, it is reasonable to assume that the EUT would pass the test to the limits.

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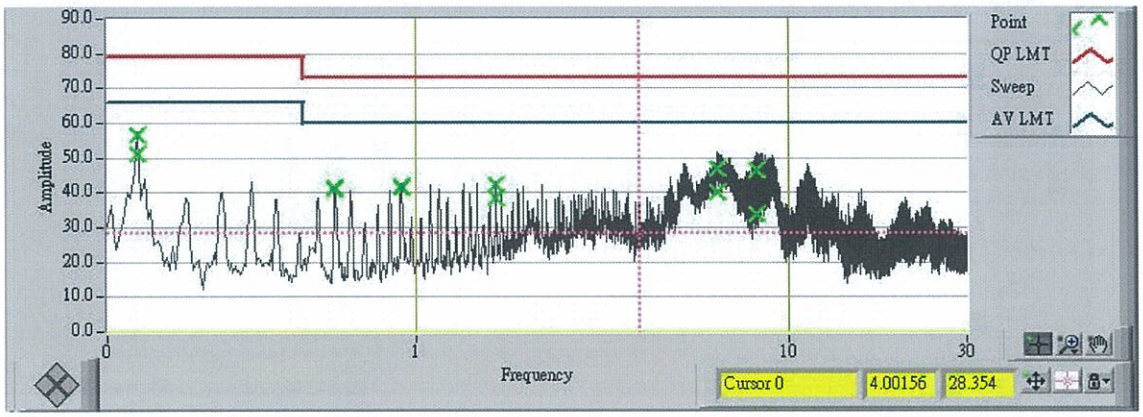
EMC Log Sheet of CE Test-L Phase
TVS-1



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.181	55.74	1.04	56.78	79.00	-22.22	QP
2	0.181	50.13	1.04	51.17	66.00	-14.83	AV
3	0.607	40.24	1.07	41.31	73.00	-31.69	QP
4	0.607	39.76	1.07	40.83	60.00	-19.17	AV
5	0.912	40.92	1.07	41.99	73.00	-31.01	QP
6	0.912	40.17	1.07	41.24	60.00	-18.76	AV
7	1.638	41.12	1.09	42.21	73.00	-30.79	QP
8	1.638	37.45	1.09	38.54	60.00	-21.46	AV
9	6.420	45.92	1.16	47.08	73.00	-25.92	QP
10	6.420	38.94	1.16	40.10	60.00	-19.90	AV
11	8.244	45.46	1.18	46.64	73.00	-26.36	QP
12	8.244	32.66	1.18	33.84	60.00	-26.16	AV

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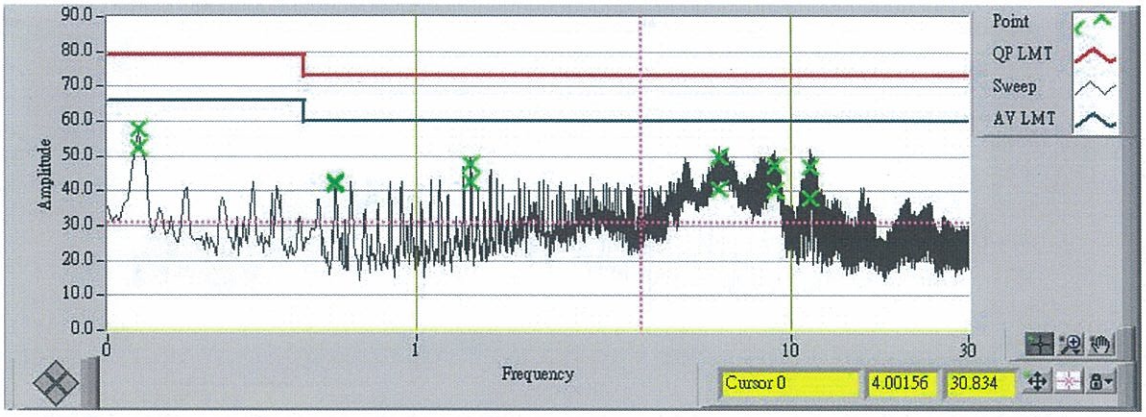
EMC Log Sheet of CE Test-N Phase

TVS-1



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.181	57.02	1.04	58.06	79.00	-20.94	QP
2	0.181	51.33	1.04	52.37	66.00	-13.63	AV
3	0.607	41.70	1.07	42.77	73.00	-30.23	QP
4	0.607	40.97	1.07	42.04	60.00	-17.96	AV
5	1.400	46.84	1.09	47.93	73.00	-25.07	QP
6	1.400	41.59	1.09	42.68	60.00	-17.32	AV
7	6.439	48.78	1.16	49.94	73.00	-23.06	QP
8	6.439	39.39	1.16	40.55	60.00	-19.45	AV
9	9.068	46.14	1.19	47.33	73.00	-25.67	QP
10	9.068	39.04	1.19	40.23	60.00	-19.77	AV
11	11.244	45.76	1.21	46.97	73.00	-26.03	QP
12	11.244	37.01	1.21	38.22	60.00	-21.78	AV

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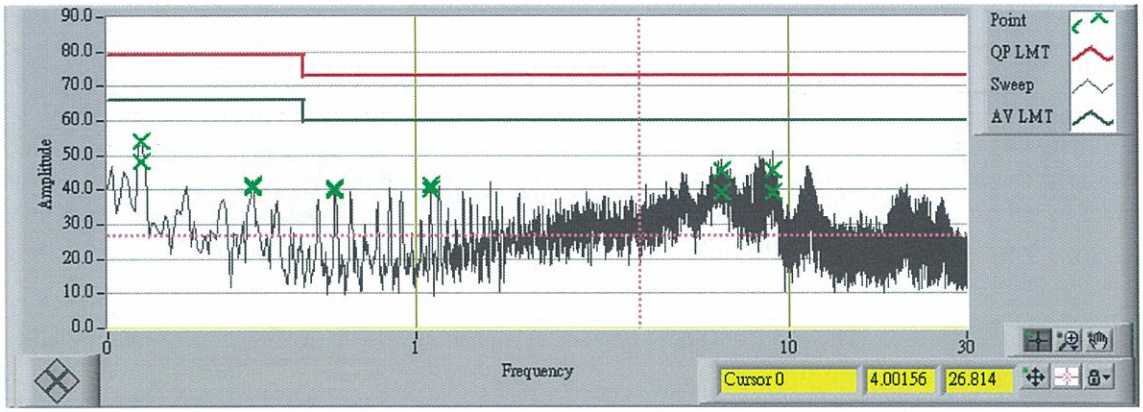
EMC Log Sheet of CE Test-L Phase
TVS-2



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.185	52.94	1.04	53.98	79.00	-25.02	QP
2	0.185	47.15	1.04	48.19	66.00	-17.81	AV
3	0.365	40.36	1.06	41.42	79.00	-37.58	QP
4	0.365	39.53	1.06	40.59	66.00	-25.41	AV
5	0.607	39.32	1.07	40.39	73.00	-32.61	QP
6	0.607	38.68	1.07	39.75	60.00	-20.25	AV
7	1.095	40.42	1.08	41.50	73.00	-31.50	QP
8	1.095	38.99	1.08	40.07	60.00	-19.93	AV
9	6.646	44.42	1.16	45.58	73.00	-27.42	QP
10	6.646	38.20	1.16	39.36	60.00	-20.64	AV
11	9.029	44.48	1.19	45.67	73.00	-27.33	QP
12	9.029	38.03	1.19	39.22	60.00	-20.78	AV

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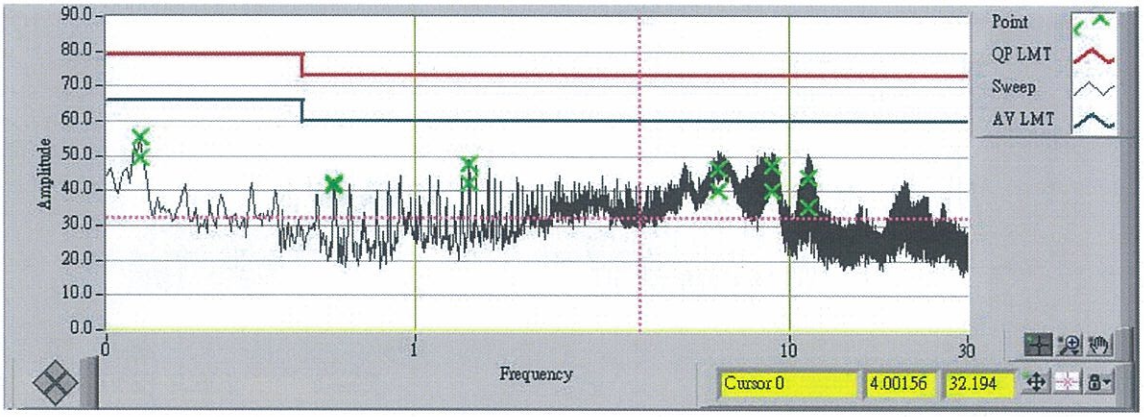
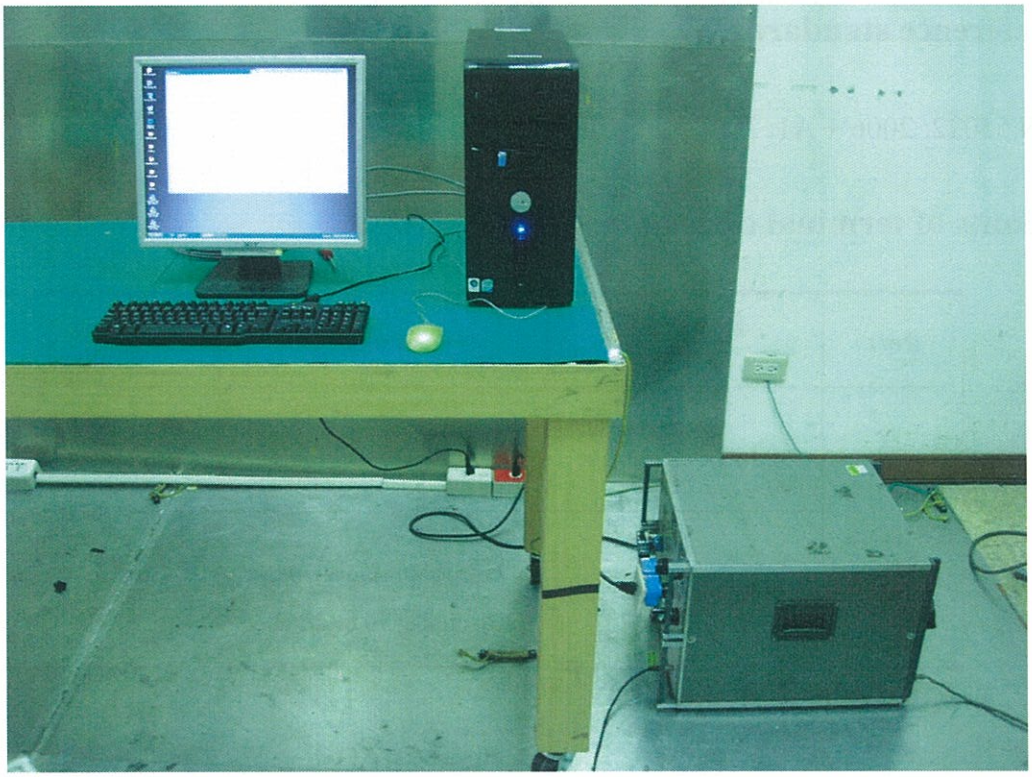
EMC Log Sheet of CE Test-N Phase
TVS-2



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.185	54.18	1.04	55.22	79.00	-23.78	QP
2	0.185	48.19	1.04	49.23	66.00	-16.77	AV
3	0.607	41.24	1.07	42.31	73.00	-30.69	QP
4	0.607	40.47	1.07	41.54	60.00	-18.46	AV
5	1.400	46.82	1.09	47.91	73.00	-25.09	QP
6	1.400	41.21	1.09	42.30	60.00	-17.70	AV
7	6.447	45.26	1.16	46.42	73.00	-26.58	QP
8	6.447	38.79	1.16	39.95	60.00	-20.05	AV
9	8.978	45.98	1.19	47.17	73.00	-25.83	QP
10	8.978	38.94	1.19	40.13	60.00	-19.87	AV
11	11.240	42.72	1.21	43.93	73.00	-29.07	QP
12	11.240	34.28	1.21	35.49	60.00	-24.51	AV

3.8 Photos during the test



4. Radiated Emission Test

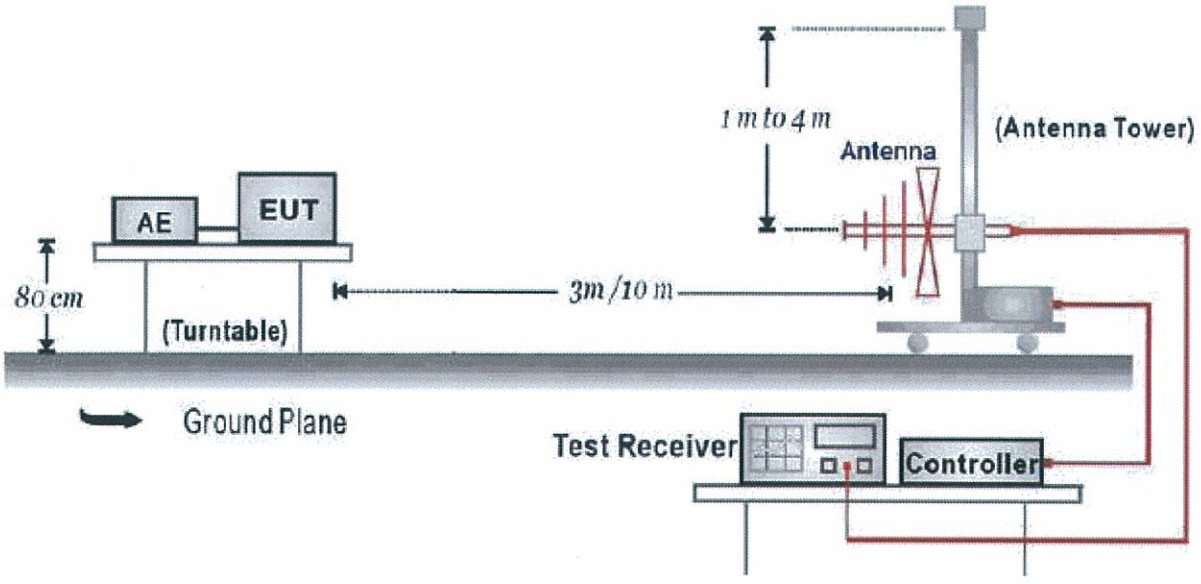
4.1 Reference standards

EN 55022: 2006 + A1: 2007

4.2 Limits of terminal disturbance voltage(10m)

Port	Frequency Range	Limits	Basic Standard
Enclosure	30 MHz - 230 MHz	40 dB (uV/m)quasi-peak, measured at 10m distance	EN 55022 (Class A)
	230 MHz - 1000 MHz	47 dB (uV/m) quasi-peak, measured at 10 m distance	EN 55022 (Class A)

4.3 Test setup



4.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
EMI TEST RECEIVER	ROHDE & SCHWARZ ESCS 30	847793/004	May 31, 2010
BILOG ANTENNA	CHASE CBL 6111B	2085	Jun. 05, 2010

4.5 Environmental conditions

Test Data	Ambient Temperature	Relative Humidity	Atmospheric Pressure
Oct. 05, 2009	26 ℃	57 %	996 mbar

4.6 Description of the test

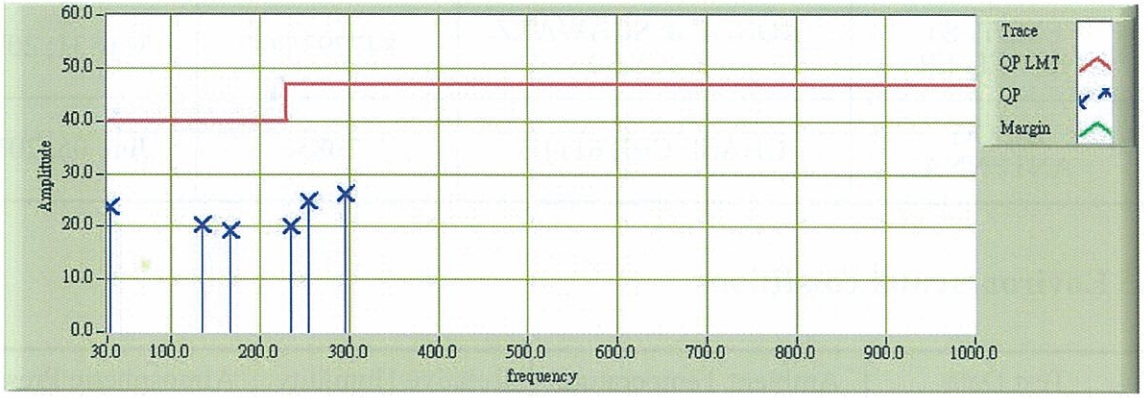
The receiving antenna was set 10 meters. The table is 80cm high, and wound rotate 360 angle. Measurement was made with the antenna having both horizontal and vertical polarities between 1m and 4m.

4.7 Test result

The following pages show the results with antenna having both horizontal and vertical polarities. And the following table shows quasi-peak values in some certain frequency ranges which are local maximums in the curves.

Judging from these data, it is reasonable to assume that the EUT would pass the test to the limits.

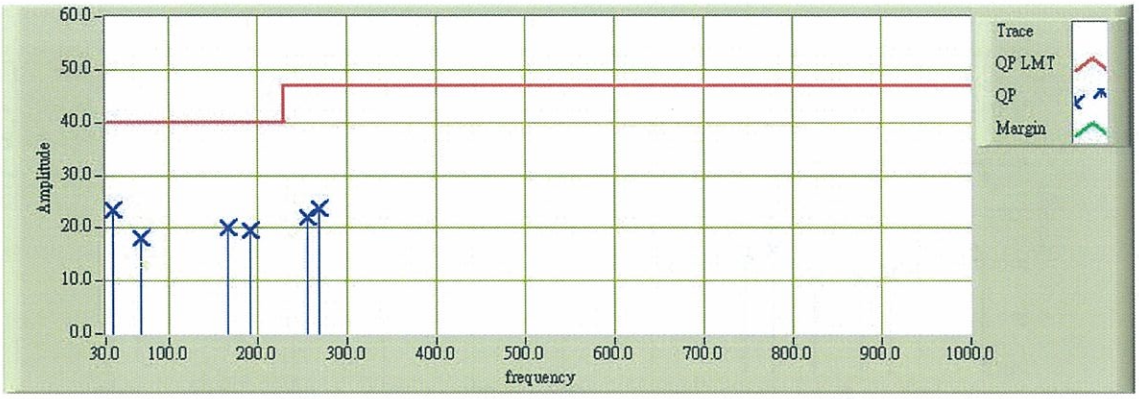
EMC Log Sheet of RE Test -Hor.(10m)
TVS-1



No.	Freq. (MHz)	Reading (dBuV/m)	Corr. (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Azimuth (°)	ANT Height(cm)
1	33.888	5.528	18.213	23.741	40.000	-16.259	250.700	400.000
2	134.970	6.222	14.168	20.390	40.000	-19.610	257.700	400.000
3	166.072	6.500	12.795	19.295	40.000	-20.705	49.800	400.000
4	234.108	6.056	14.071	20.127	47.000	-26.873	30.400	400.000
5	253.547	8.083	16.634	24.718	47.000	-22.282	8.600	400.000
6	294.369	9.056	17.254	26.309	47.000	-20.691	59.500	400.000

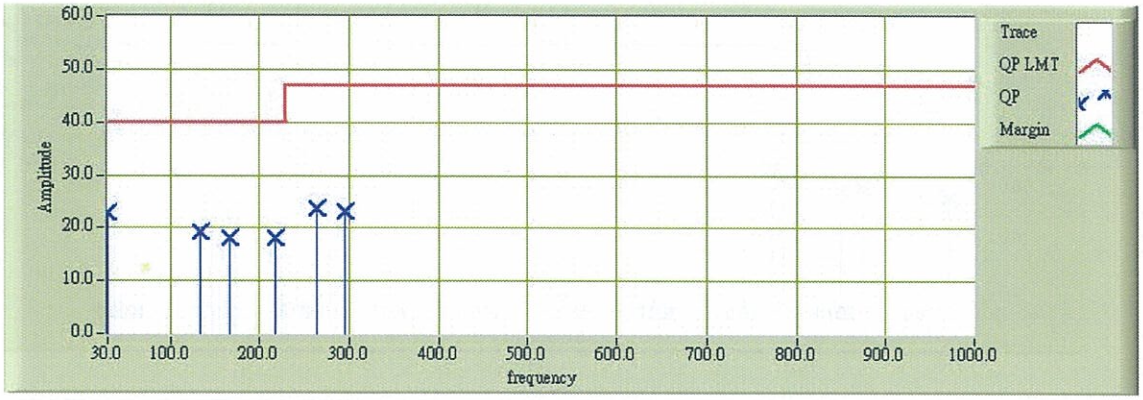
EMC Log Sheet of RE Test -Ver.(10m)

TVS-1



No.	Freq. (MHz)	Reading (dBuV)	Corr. (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Azimuth (°)	ANT Height(cm)
1	37.776	7.694	15.676	23.370	40.000	-16.630	103.400	100.000
2	68.878	10.000	8.053	18.053	40.000	-21.947	21.100	100.000
3	166.072	7.278	12.795	20.072	40.000	-19.928	169.100	100.000
4	191.343	7.667	11.775	19.442	40.000	-20.558	96.400	100.000
5	255.491	4.917	17.018	21.934	47.000	-25.066	52.600	100.000
6	269.098	6.778	16.853	23.631	47.000	-23.369	122.800	100.000

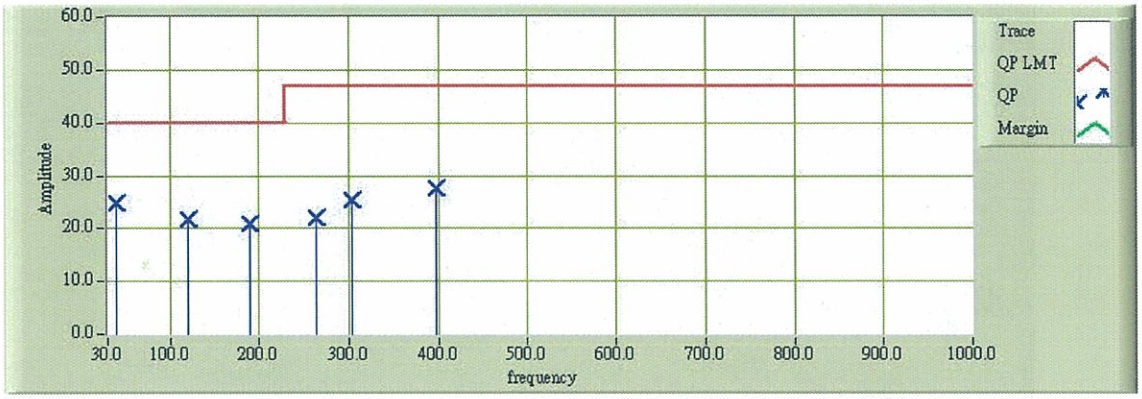
EMC Log Sheet of RE Test -Hor.(10m)
TVS-2



No.	Freq. (MHz)	Reading (dBuV/m)	Corr. (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Azimuth (°)	ANT Height(cm)
1	30.000	3.556	19.307	22.863	40.000	-17.137	0.000	400.000
2	133.026	5.000	14.304	19.304	40.000	-20.696	237.300	400.000
3	166.072	5.222	12.795	18.017	40.000	-21.983	0.900	400.000
4	218.557	5.472	12.637	18.110	40.000	-21.890	246.600	400.000
5	263.267	6.056	17.529	23.584	47.000	-23.416	41.100	400.000
6	294.369	5.944	17.254	23.198	47.000	-23.802	99.300	400.000

EMC Log Sheet of RE Test -Ver.(10m)

TVS-2



No.	Freq. (MHz)	Reading (dBuV)	Corr. (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Azimuth (°)	ANT Height(cm)
1	39.719	10.611	14.118	24.729	40.000	-15.271	115.600	100.000
2	121.363	7.472	14.181	21.653	40.000	-18.347	55.400	100.000
3	189.399	9.111	11.736	20.847	40.000	-19.153	110.900	100.000
4	263.267	4.528	17.529	22.057	47.000	-24.943	338.600	100.000
5	304.088	7.889	17.408	25.297	47.000	-21.703	178.600	100.000
6	397.395	7.333	20.359	27.693	47.000	-19.307	357.600	100.000

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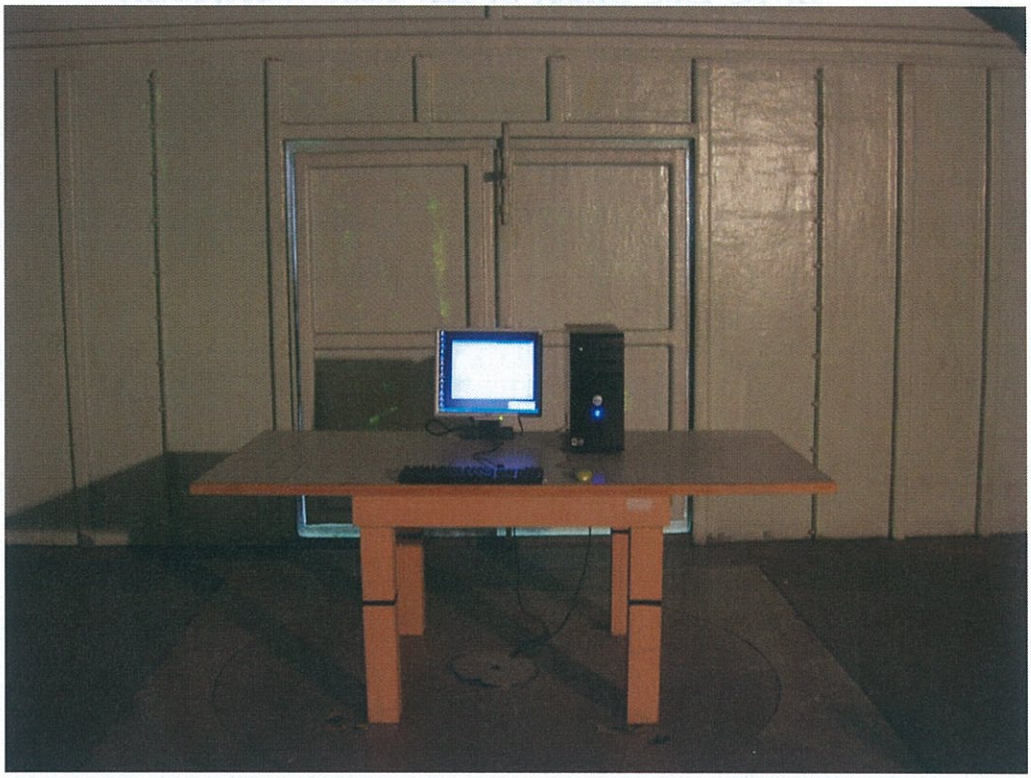
4.8 Photos during the test



5. Harmonics on AC Mains

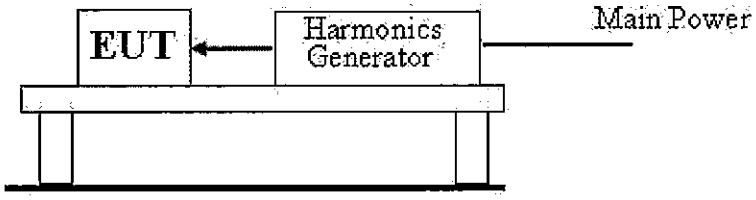
5.1 Reference standards :

EN 55022: 2006 + A1: 2007
EN 61000-3-2: 2006

5.2 Limits for harmonic current emission (Class A)

Harmonic order n	Maximum permissible harmonic current A
Odd harmonic	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15≦n≦39	0.15 × 15/n
Even harmonic	
2	1.08
4	0.43
6	0.30
8≦n≦40	0.23 × 8/n

5.3 Test setup



5.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
HARMONIC and FLICKER ANALYZER	EM TEST/ DPA 500	V0503100065	Nov. 24, 2009

5.5 Environmental conditions

Test Data	Ambient Temperature	Relative Humidity	Atmospheric Pressure
Oct. 06, 2009	26 ℃	54 %	992 mbar

5.6 Description of the test

1. The EUT was put on a desk and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
2. The test was repeated when the EUT was in running state.

5.7 Test result

The following pages show the results with the measurement data of the test. There no limits exceeded. And, according to the standard, the test was passed successfully.

TVS-1

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	351.950E-3	100.000		
2	19.564E-3	5.559	1.08	PASS
3	288.567E-3	81.991	2.30	PASS
4	10.971E-3	3.117	430.00E-3	PASS
5	173.233E-3	49.221	1.14	PASS
6	2.258E-3	0.641	300.00E-3	PASS
7	72.950E-3	20.727	770.00E-3	PASS
8	5.609E-3	1.594	230.00E-3	PASS
9	29.617E-3	8.415	400.00E-3	PASS
10	3.732E-3	1.060	184.00E-3	PASS
11	29.348E-3	8.339	330.00E-3	PASS
12	2.199E-3	0.625	153.33E-3	PASS
13	15.320E-3	4.353	210.00E-3	PASS
14	3.391E-3	0.964	131.43E-3	PASS
15	11.409E-3	3.242	150.00E-3	PASS
16	1.777E-3	0.505	115.00E-3	PASS
17	13.649E-3	3.878	132.35E-3	PASS
18	2.148E-3	0.610	102.22E-3	PASS
19	5.583E-3	1.586	118.42E-3	PASS
20	1.856E-3	0.527	92.00E-3	PASS
21	7.236E-3	2.056	160.71E-3	PASS
22	2.004E-3	0.569	83.64E-3	PASS
23	8.142E-3	2.314	146.74E-3	PASS
24	1.220E-3	0.347	76.66E-3	PASS
25	2.330E-3	0.662	135.00E-3	PASS
26	1.790E-3	0.508	70.77E-3	PASS
27	4.681E-3	1.330	124.99E-3	PASS
28	1.804E-3	0.513	65.71E-3	PASS
29	4.709E-3	1.338	116.39E-3	PASS
30	790.726E-6	0.225	61.33E-3	PASS

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
31	2.480E-3	0.705	108.87E-3	PASS
32	2.124E-3	0.604	57.50E-3	PASS
33	2.302E-3	0.654	102.27E-3	PASS
34	1.541E-3	0.438	54.12E-3	PASS
35	4.111E-3	1.168	96.44E-3	PASS
36	1.213E-3	0.345	51.11E-3	PASS
37	2.391E-3	0.679	91.21E-3	PASS
38	1.921E-3	0.546	48.42E-3	PASS
39	2.437E-3	0.692	86.53E-3	PASS
40	1.110E-3	0.315	46.00E-3	PASS

TVS-2

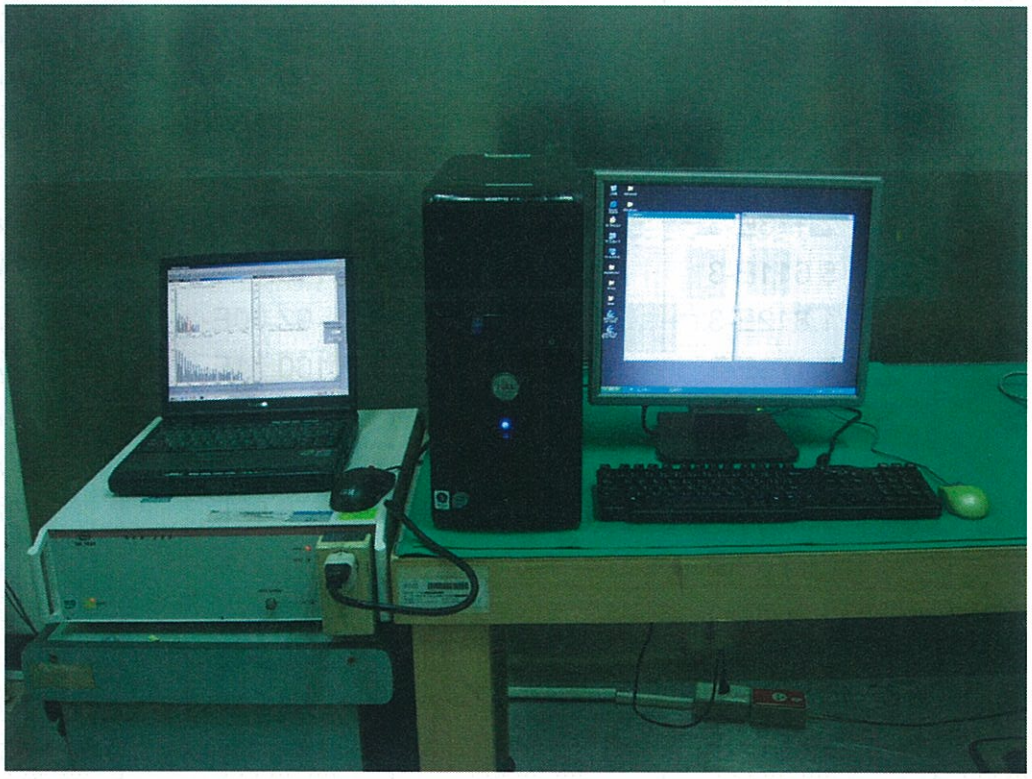
Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
1	351.659E-3	100.000		
2	19.538E-3	5.556	1.08	PASS
3	288.382E-3	82.006	2.30	PASS
4	10.989E-3	3.125	430.00E-3	PASS
5	173.094E-3	49.222	1.14	PASS
6	2.346E-3	0.667	300.00E-3	PASS
7	72.810E-3	20.705	770.00E-3	PASS
8	5.638E-3	1.603	230.00E-3	PASS
9	29.738E-3	8.456	400.00E-3	PASS
10	3.698E-3	1.052	184.00E-3	PASS
11	29.373E-3	8.353	330.00E-3	PASS
12	2.191E-3	0.623	153.33E-3	PASS
13	15.310E-3	4.354	210.00E-3	PASS
14	3.356E-3	0.954	131.43E-3	PASS
15	11.403E-3	3.243	150.00E-3	PASS
16	1.816E-3	0.516	115.00E-3	PASS
17	13.663E-3	3.885	132.35E-3	PASS
18	2.178E-3	0.619	102.22E-3	PASS
19	5.611E-3	1.596	118.42E-3	PASS
20	1.812E-3	0.515	92.00E-3	PASS
21	7.173E-3	2.040	160.71E-3	PASS
22	2.005E-3	0.570	83.64E-3	PASS
23	8.206E-3	2.334	146.74E-3	PASS
24	1.208E-3	0.343	76.66E-3	PASS
25	2.379E-3	0.677	135.00E-3	PASS
26	1.829E-3	0.520	70.77E-3	PASS
27	4.642E-3	1.320	124.99E-3	PASS
28	1.833E-3	0.521	65.71E-3	PASS
29	4.841E-3	1.377	116.39E-3	PASS
30	827.937E-6	0.235	61.33E-3	PASS

Average harmonic current results

Hn	Ieff [A]	Ieff [%]	Limit [A]	Result
31	2.433E-3	0.692	108.87E-3	PASS
32	2.119E-3	0.603	57.50E-3	PASS
33	2.356E-3	0.670	102.27E-3	PASS
34	1.565E-3	0.445	54.12E-3	PASS
35	4.135E-3	1.176	96.44E-3	PASS
36	1.185E-3	0.337	51.11E-3	PASS
37	2.404E-3	0.684	91.21E-3	PASS
38	1.942E-3	0.552	48.42E-3	PASS
39	2.426E-3	0.690	86.53E-3	PASS
40	1.132E-3	0.322	46.00E-3	PASS

5.8 Photos during the test



6. Voltage Fluctuation on AC Mains

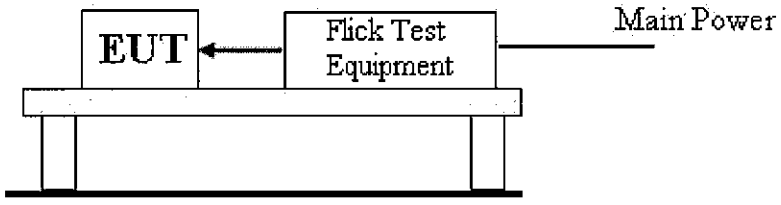
6.1 Reference standards :

EN 55022: 2006 + A1:2007
EN 61000-3-3: 1995+A1:2001+A2:2005

6.2 Limits

Test Item	Limit	Note
P_{ST}	1.0	P_{ST} means short-term flicker
P_{IT}	0.65	P_{IT} means long-term flicker
d(t)	500ms	*d(t)* means maximum time exceed 3.3%
d_C(%)	3.3%	d_C(%) means relative steady state voltage change
dmax (%)	4%	*dmax*(%) mean maximum relative voltage change

6.3 Test setup



6.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
HARMONIC and FLICKER ANALYZER	EM TEST/ DPA 500	V0503100065	Nov. 24, 2009

6.5 Environmental conditions

Test Data	Ambient Temperature	Relative Humidity	Atmospheric Pressure
Oct. 06, 2009	26 ℃	54 %	992 mbar

6.6 Description of the test

1. The EUT was put on a desk. The maximum voltage fluctuations were found during motor starting.
2. The test was repeated when the EUT was in normal operating condition. Switch ON/OFF the main power to determine the maximum voltage fluctuations during motor starting.

6.7 Test result

The following pages show the results with voltage fluctuations. Judging from these data, it is reasonable to assume that the EUT would pass the test to the limits.

Maximum Flicker Results

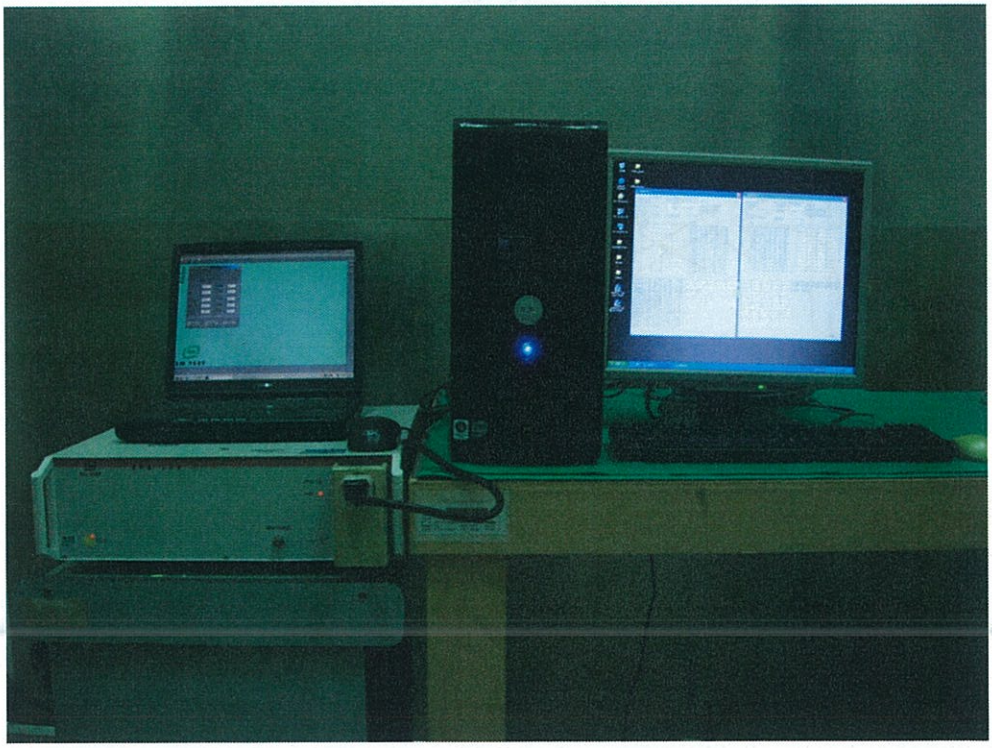
TVS-1

	EUT Values	Limit	Result
Pst	0.053	1.00	PASS
Plt	0.053	0.65	PASS
dc [%]	0.006	3.30	PASS
dmax [%]	0.330	4.00	PASS
dt [s]	0.000	0.50	PASS

TVS-2

	EUT Values	Limit	Result
Pst	0.040	1.00	PASS
Plt	0.040	0.65	PASS
dc [%]	0.009	3.30	PASS
dmax [%]	0.272	4.00	PASS
dt [s]	0.000	0.50	PASS

6.8 Photos during the test



7. Electrostatic Discharge Immunity Test

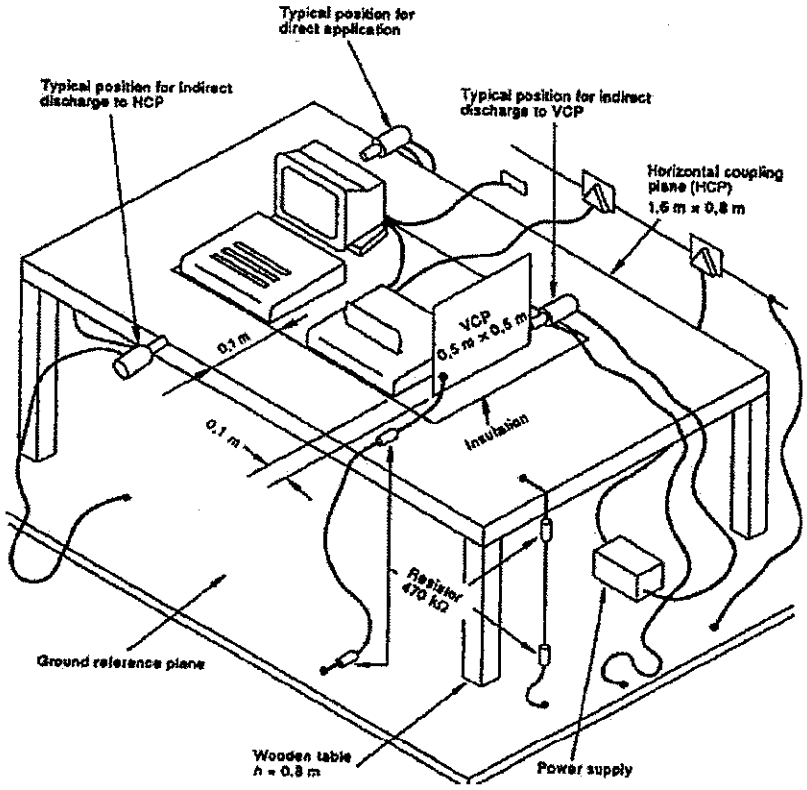
7.1 Reference standards

EN 55024: 1998 + A1: 2001 + A2: 2003
EN 61000-4-2:1995+A1:1998+A2:2001

7.2 Test specification and performance criteria

Test Port	Test Specification	Units	Basic Standard	Remarks	Performance Criteria
Enclosure	±4 Contact ±8Air Discharge	kV (Charge Voltage)	EN 61000-4-2	Note 1	B
Note 1： The 4kV contact discharge shall be applied to conductive accessible parts. Metallic contacts, suck as in battery compartments or in socket outlets are excluded from this requirement.					

7.3 Test setup



7.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
ESD TEST UNIT	EM TEST/ESD 30C	0297-22	May 31, 2010

7.5 Environmental conditions

Test Data	Ambient Temperature	Relative Humidity	Atmospheric Pressure
Oct. 06, 2009	26 ℃	54 %	992 mbar

7.6 Description of the test

1. Discharges were carried out both by conduct and through the air at vulnerable points likely to easily touched or approached point on the operator's panel and loading /unloading area of EUT. For each test, increasing severity until the required level was reached according to the standard did the discharge.
2. For each test point, ten discharges were done.
3. The performance was observed according to the intentional movement defined by the manufacturer and any discrepancies were noted.
4. The test was repeated when the EUT was in idle (standby) state.

7.7 Test result

The following pages show the process of testing in both auto mode and idle state. It can be seen that there were no unwanted movement on the EUT when contacting test. And, according to the standard, the test was passed successfully.

EMC Log Sheet of ESD Test

Item	Location of Test Point		
	Air	Contact	VCP
1	Case	Screw	Four Side of EUT

Severity Level	Requirement			TVS-1,TVS-2 Performance (Criteria)			Test Results
	Air	Contact	VCP	Air	Contact	VCP	
±2KV	B	B	A	A	A	A	PASS
±4KV	B	B	A	A	A	A	PASS
±8KV	B	N/R	N/R	A	N/R	N/R	PASS

Note : 1.N/R means no requirement

2.Tests points : • air discharge for non- conducted parts.

• contact discharge for conducted parts.

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7.8 Photos during the test

8. Immunity Test of Radiated Radio—Frequency Electromagnetic Field — Amplitude Modulated

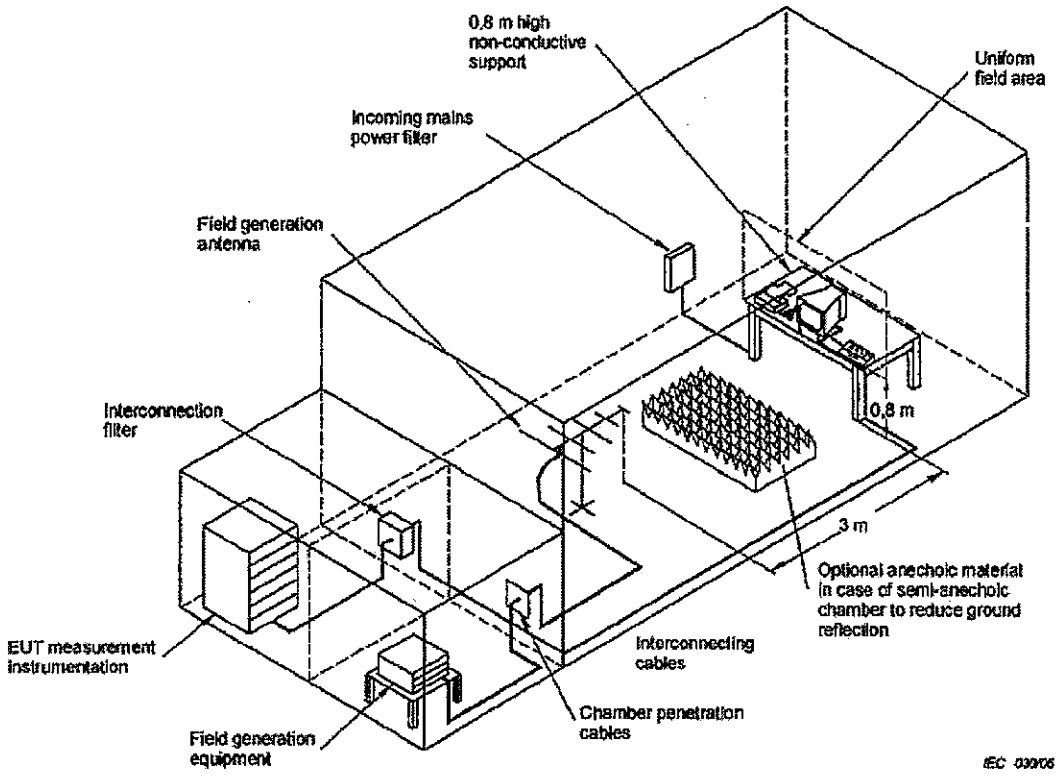
8.1 Reference standards

EN 55024: 1998 + A1: 2001 + A2: 2003
EN 61000-4-3:2006

8.2 Test specification and performance criteria

Phenomena	Test Specification	Units	Basic Standard	Test Setup	Performance Criteria
Radio-Frequency Electromagnetic Field. Amplitude Modulated.	80-1000 3 80	MHz V/M (Unmodulated,rms) % AM (1KHZ)	EN61000-4-3	See 8.3	A

8.3 Test setup



8.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
SIGNAL GENERATOR	ROHDE & SCHWARZ/SMY01	844934/058	Aug. 02, 2010
POWER AMPLIFIER	KALMUS/747LC	8680-1	Jun. 19, 2010
BILOG ANTENNA	CHASE CBL 6111B	2085	Jun. 05, 2010

8.5 Environmental conditions

Test Data	Ambient Temperature	Relative Humidity	Atmospheric Pressure
Oct. 06, 2009	26 ℃	54 %	992 mbar

8.6 Description of the test

1. During the test, the frequency range was swept from 80 to 1000MHz incrementally with 1% step size of each frequency. The test signal was 80 % amplitude modulated with 1 kHz sine wave.
2. The performance was observed according to the intentional movement defined by the manufacturer and any discrepancies were noted.
3. The test was repeated when the EUT was in idle (standby) state.

8.7 Test result

The following pages show the process of testing in both auto mode and idle state. It can be seen that there were no unintentional movement on the EUT. And, according to the standard, the test was passed successfully.

EMS Log Sheet of RS Test

Requirement	TVS-1,TVS-2 Performance (Criteria)
A	A
Observation on EUT	
No unexpected movement was occurred.	

8.8 Photos during the test

9. Electrical Fast Transient/Burst Immunity Test

9.1 Reference standards

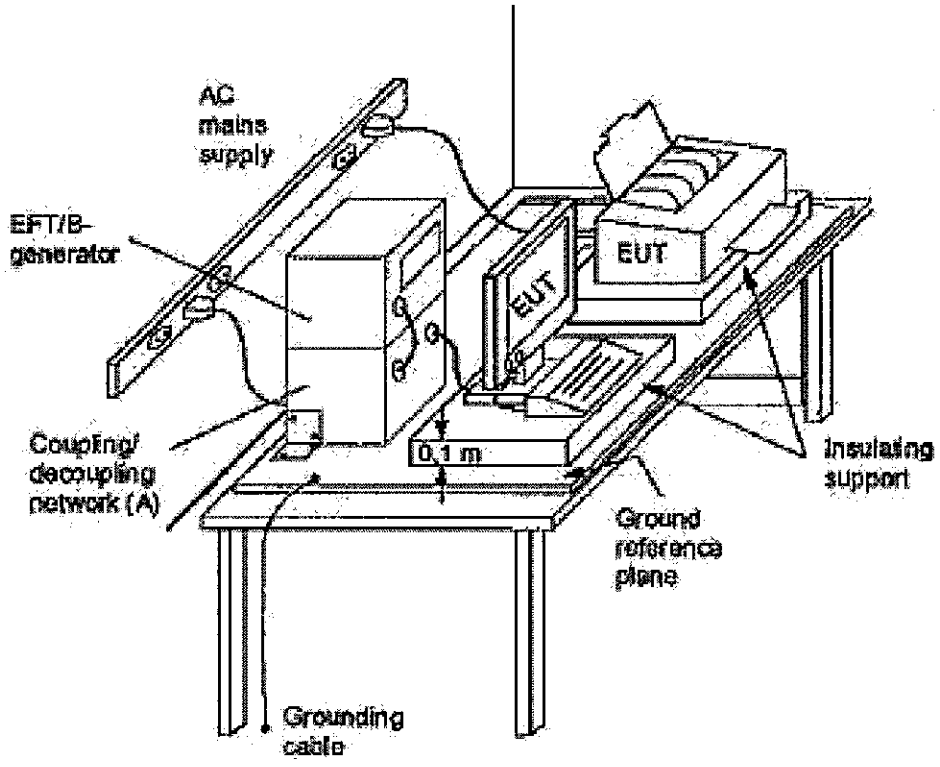
EN 55024: 1998 + A1: 2001 + A2: 2003
EN 61000-4-4:2004

9.2 Test specification and performance criteria

AC input and AC output power ports

Phenomena	Test Specification	Units	Basic Standard	Test Setup	Performance Criteria
Fast Transients	1 5/50 5	kV (Peak) Tr / Th ns Rep. Frequency kHz	EN61000-4-4	EN61000-4-4	B

9.3 Test setup



9.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
EFT TEST UNIT	EM TEST/EFT 500	0596-32	Jun. 01, 2010

9.5 Environmental conditions

Test Data	Ambient Temperature	Relative Humidity	Atmospheric Pressure
Oct. 06, 2009	26 ℃	54 %	992 mbar

9.6 Description of the test

1. The test was setup by coupling/decoupling network and a series of positive and negative polarity transients was direct injection on AC Input power cable. The performance was observed according to the intentional movement defined by the manufacturer and any discrepancies were noted.
2. The test was repeated when the EUT was in idle (standby) state.
3. The other cables are < 3m length. As a result, it is unnecessarily for this item of the test.

9.7 Test result

The following pages show the process of testing in both auto mode and idle state. It can be seen that there were no unintentional movements on the EUT. And, according to the standard, the test was passed successfully.

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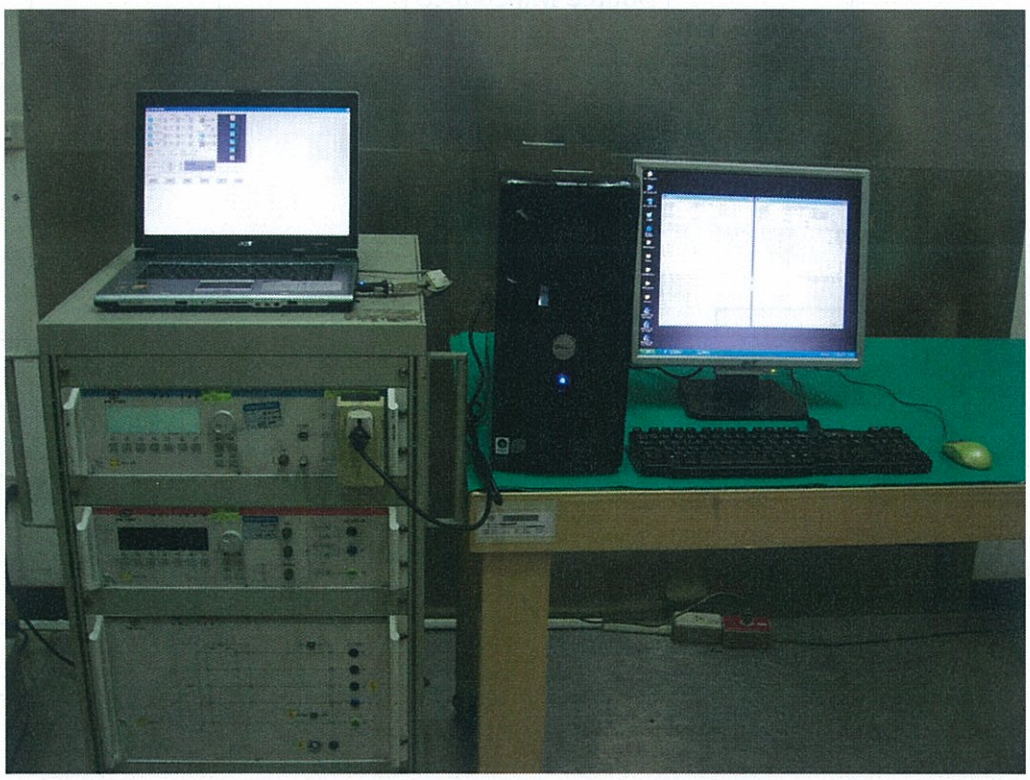
EMS Log Sheet of EFT Test

Coupling Mode / Severity Level	Requirement	TVS-1,TVS-2 Performance (Criteria)	Test Result
	AC Line	AC line	
±0.25KV	N/R	N/R	PASS
±0.5KV	B	A	PASS
±1.0KV	B	A	PASS
Note : 1. N/R means no requirement			

9.8 Photos during the test



10. Immunity Test of Conducted Disturbances Induced by Radio—Frequency Fields

10.1 Reference standards

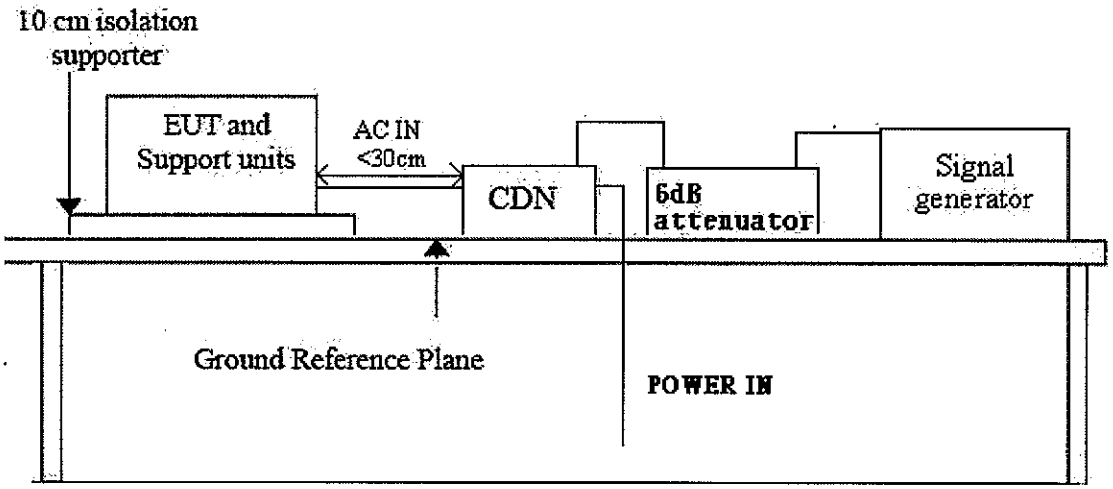
EN 55024: 1998 + A1: 2001 + A2: 2003
EN 61000-4-6:2007

10.2 Test specification and performance criteria

AC input and AC output power ports

Phenomena	Test Specification	Units	Basic Standard	Test Setup	Performance Criteria
Radio-Frequency	0.15-80	MHz	EN61000-4-6	EN61000-4-6	A
Common Mode	3	V(rms)			
Amplitude		(Unmodulated,rms)			
Modulated.	80	% AM (1kHz)			
		Source Impedance			
	150	Ω			

10.3 Test setup



10.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
SIGNAL GENERATOR	ROHDE & SCHWARZ/SMY01	844934/058	Aug. 02, 2010
POWER AMPLIFIER	AR/250A250	20686	Jun. 19, 2010
CDN	FCC/801-M4-100	9701	Jun. 02, 2010
6 dB ATTENUATOR	BNOS ELECTRONICS	522055	Jun. 19, 2010

10.5 Environmental conditions

Test Data	Ambient temperature	Relative humidity	Atmospheric pressure
Oct. 06, 2009	26 ℃	54 %	992 mbar

10.6 Description of the test

1. During the test, the frequency range was swept from 0.15 to 80 MHz incrementally with 1% step size of each frequency. The test signal was 80 % amplitude modulated with 1 kHz sine wave.
2. The performance was observed according to the intentional movement defined by the manufacturer and any discrepancies were noted.
3. The test was repeated when the EUT was in idle (standby) state.
4. The other cables are < 3m length. As a result, it is unnecessarily for this item of the test.

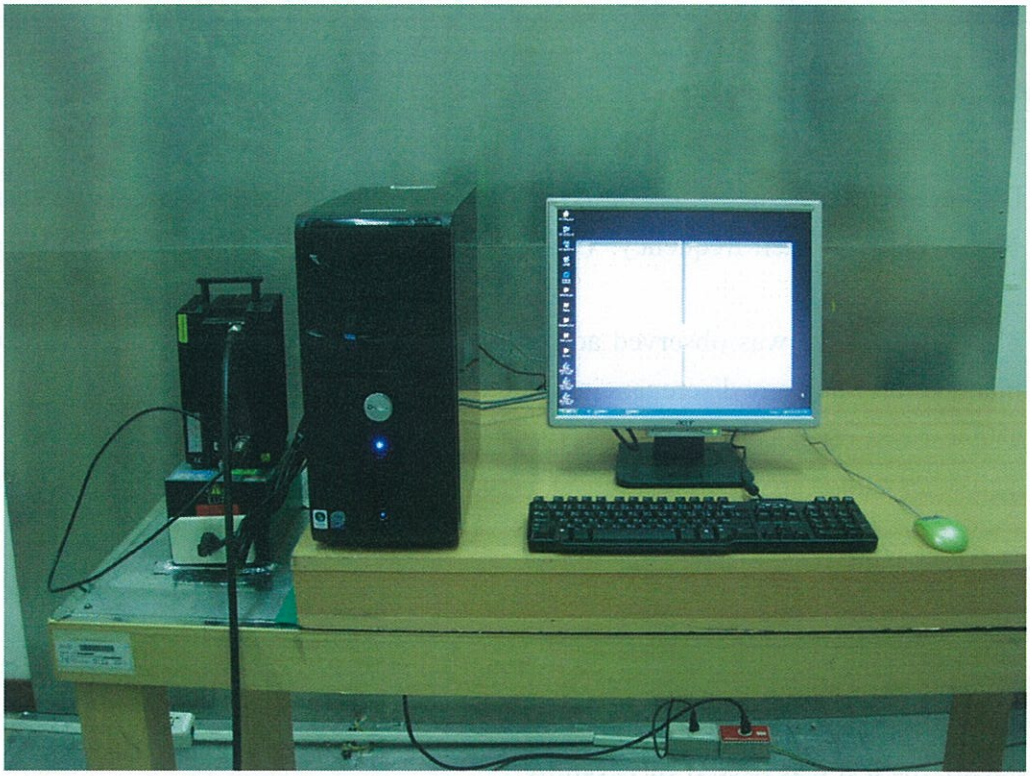
10.7 Test result

The following pages show the process of testing in both auto mode and idle state. It can be seen that there were no unintentional movement on the EUT. And, according to the standard, the test was passed successfully.

Results of CS Test

Description	Requirement	TVS-1,TVS-2 Performance (Criteria)	Test Result
AC Input Power Cable (L, N)	A	A	PASS
Note : 1. N/R means no requirement.			

10.8 Photos during the test



11. Surge Immunity Test

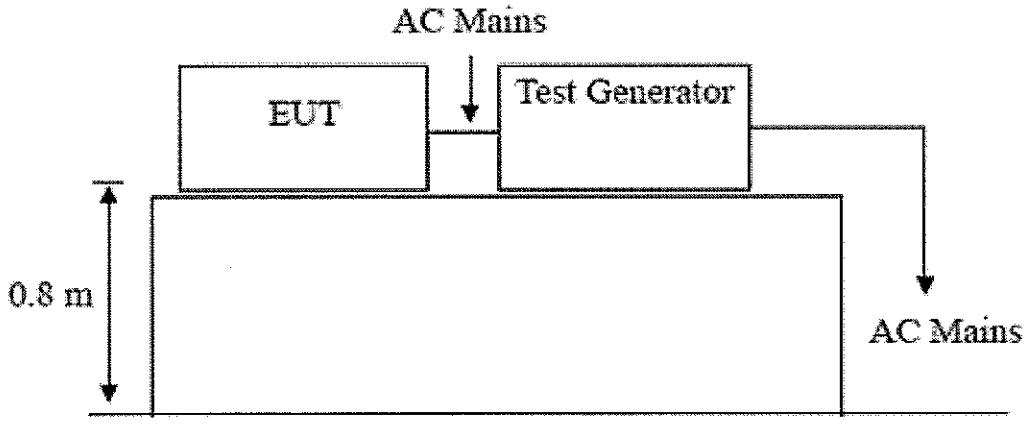
11.1 Reference standards

EN 55024: 1998 + A1: 2001 + A2: 2003
EN 61000-4-5:2006

11.2 Test specification and performance criteria

Test Port	Test Specification	Units	Basic Standard	Performance Criteria
Signal Ports Line to Ground	1.2/50(8/20) 1	Tr/Td μs kV	EN61000-4-5	B
a.c. Power Port	1.2/50(8/20) 2 1	Tr/Td μs kV kV	EN61000-4-5	B

11.3 Test setup



11.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
SURGE GENERATOR	EM TEST/VCS 500	0397-09	Jun. 01, 2010

11.5 Environmental conditions

Test Data	Ambient temperature	Relative humidity	Atmospheric pressure
Oct. 06, 2009	26 ℃	54 %	992 mbar

11.6 Description of the test

1. Overview 5 negative and 5 positive Impulses and Source impedance generator: line to line=2Ω, line /neutral to earth=12Ω. Phase shifting in between 0°~360° versus the A.C. line phase angle and steps is 90° .
2. The performance was observed according to the intentional movement defined by the manufacturer and any discrepancies were noted.
3. The test was repeated when the EUT was in idle (standby) state.
4. The other cables are < 3m length. As a result, it is unnecessarily for this kind of the test.

11.7 Test result

The following pages show the process of testing in both auto mode and idle state. It can be seen that there were no unintentional movement on the EUT, And, according to the standard, the test was passed successfully.

Results of Surge Test

Severity Level	Requirement		TVS-1,TVS-2 Performance (Criteria)		Test Result
Coupling Mode	AC Line - Line	AC Line - Ground	AC Line - Line	AC Line – Ground	
± 0.5kV	B	B	A	A	PASS
± 1.0kV	B	B	A	A	PASS
± 2.0kV	N/R	B	N/R	A	PASS
Note: 1. N/R means no requirement.					

11.8 Photos during the test

12. Voltage Dip and Voltage Variations Immunity Test

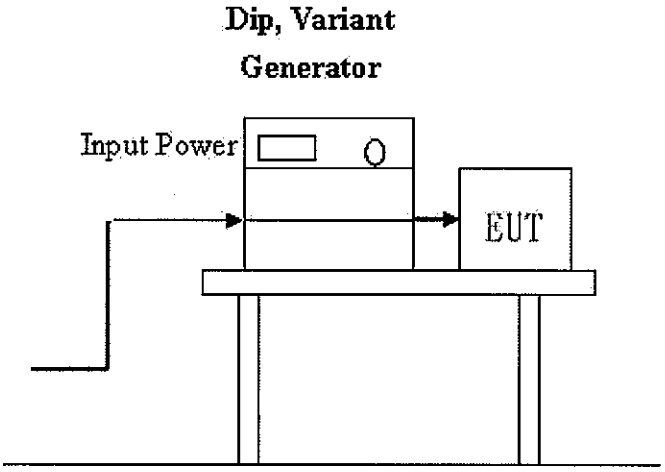
12.1 Reference standards :

EN 55024: 1998 + A1: 2001 + A2: 2003
EN 61000-4-11:2004

12.2 Test specification and performance criteria

Phenomena	Test Llevel IN % Rated Voltage	Duration (in periods of the Rated Frequency)	Performance Criteria
Voltage Dips	5	0.5	B
Voltage Interruptions	70	25	C
Voltage Interruptions	5	250	C

12.3 Test setup



12.4 Test equipment

Item	Brand / Model	Series No.	Calibration Due
POWER FAIL SIMULATOR	EM TEST/PFS 503	0897-03	Jan. 04, 2010

12.5 Environmental conditions

Test Data	Ambient temperature	Relative humidity	Atmospheric pressure
Oct. 06, 2009	26 ℃	54 %	992 mbar

12.6 Description of the test

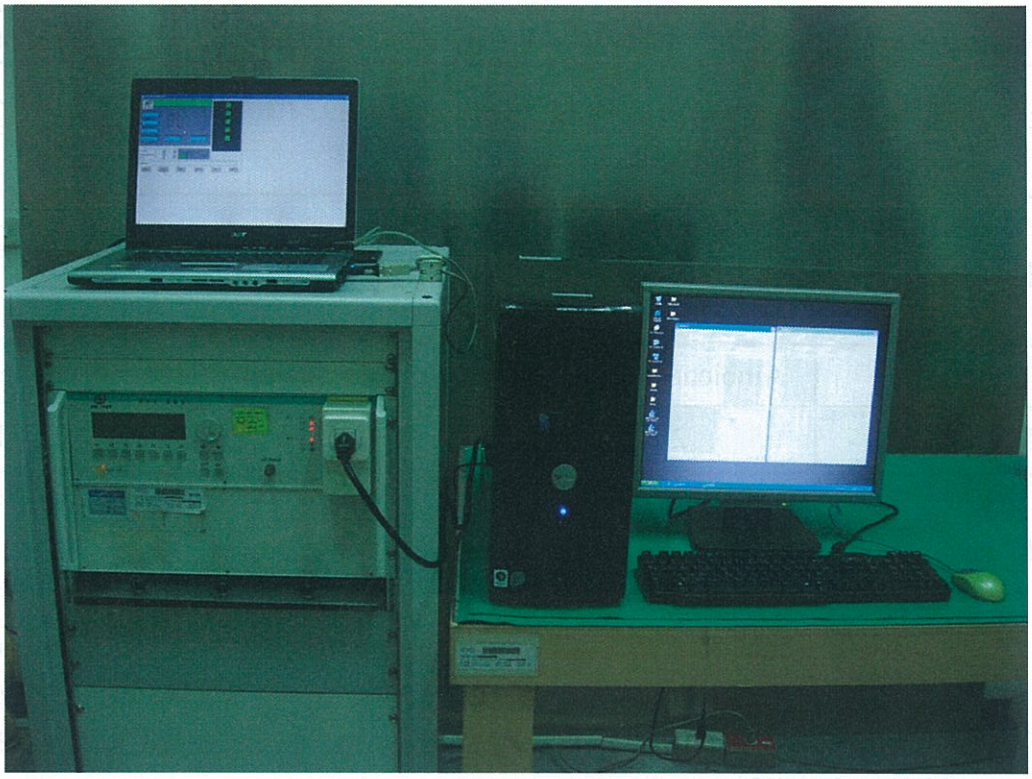
1. The EUT shall be tested for each selected combination of test level and duration with a sequence of three dip/interruptions with intervals of 10s minimum. Abrupt changes in supply voltage shall occur at zero crossings of the voltage, and additional angles selected form 0°~360°, step is 45°.
2. The performance was observed according to the intentional function defined by the manufacturer and any discrepancies were noted.
3. The test was repeated when the EUT was in running state.

12.7 Test result

The following show the process of testing in auto mode or running state. It can be observed that when the products were tested in 5% of rated voltage and test duration 5000ms, they(TVS-1,TVS-2) will shout down.

Test Level in % of rated voltage	**Test Duration (ms)**	**Numbers of applications**	**Observation criteria**	**Test Results**
5	10	3	A	PASS
70	500	3	A	PASS
5	5000	3	C	PASS

12.8 Photos during the test



ATTACHMENT

Photograph of EUT

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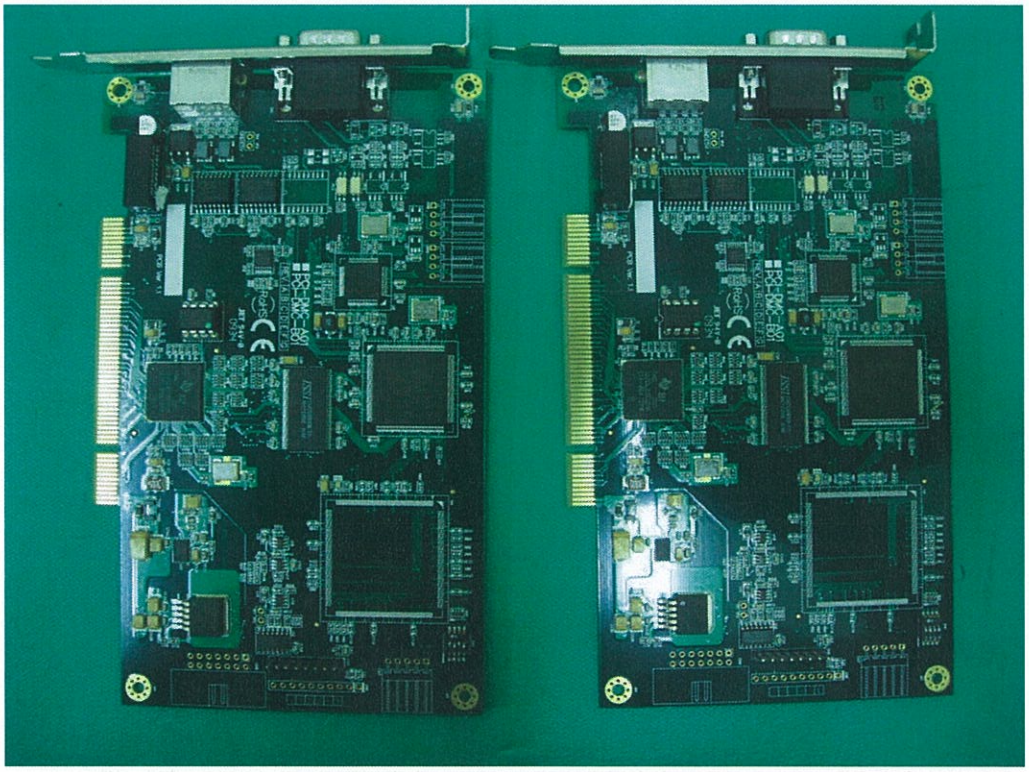
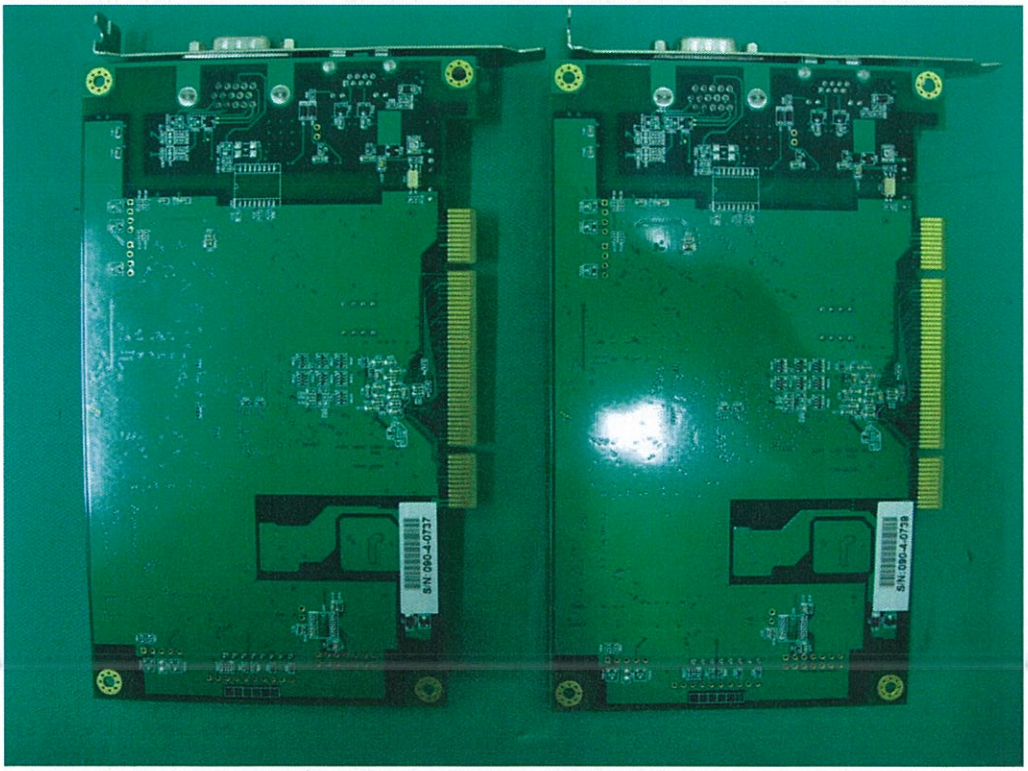
1. Overview of TVS-2



2. Overview of TVS-2



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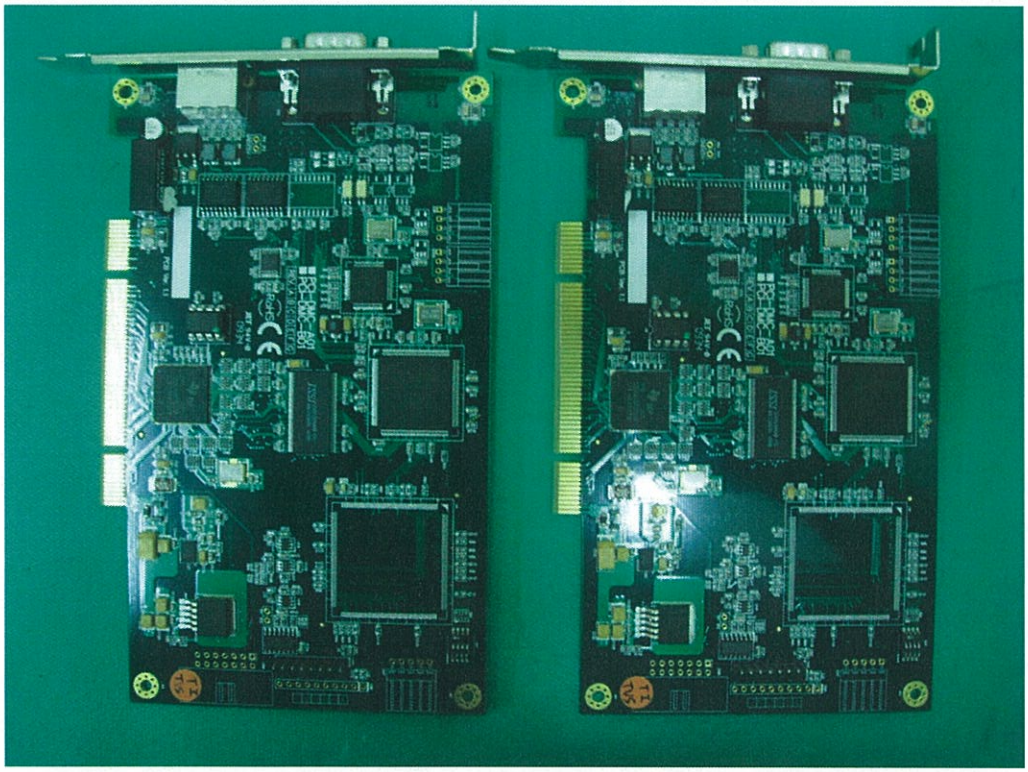
3. Overview of TVS-1



4. Overview of TVS-1