

Report No: EMC 0504081  
 File reference No: 2005-05-14

Applicant: Gembird Electronics Ltd.

Product: CPU and USB Manual Switch

Model No: CMSU-421

Trademark: Gembird

Test Standards: EN 55022:1998 EN 61000-3-2:2000  
 +A1:2000+A2:2003  
 EN 55024:1998 EN 61000-3-3:1995  
 +A1:2001+A2:2003 +A1:2001

Test result: The EMC testing has been performed on the submitted samples and found in compliance with council EMC Directive 89/336/EEC.

Approved By

Jack Chung

EMC Manager

Dated: March 14, 2005

**Results appearing herein relate only to the sample tested  
 The technical reports is issued errors and omissions exempt and is subject to  
 withdrawal at**

**HONG KONG TIMEWAY TECHNOLOGY DEVELOPMENT LIMITED**

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Test Report Conclusion  
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## 1.0 General Details

### 1.1 Test Lab Details

Name : Hong Kong Timeway Technology Development Limited  
Address: Rm.1805,18/F., Wu Sang House, Nathan Road, Mongkok, Kln. HONG KONG  
Telephone: (852) 2781 7498  
Fax: (852) 2381 2492

### 1.2 Applicant Details

Applicant: Gembird Electronics Ltd.  
Address: Room 1709, New Building, #2 Shennan Zhong Lu, Shenzhen  
Telephone: 86-755-82090225/82090379  
Fax: 86-755-82090540

### 1.3 Description of EUT

Product: CPU and USB Manual Switch  
Manufacturer: Gembird Electronics (Zhuhai) Co., Ltd.  
Brand Name: Gembird  
Model Number: CMSU-421  
Additional Model Number: -  
Additional Trade Name: -  
Rating: DC5V 350mA 1.75W  
The Difference between models: -

### 1.4 Submitted Sample

1 Sample

### 1.5 Test Duration

2005-04-28 to 2005-05-14

### 1.6 Test Uncertainty

Conducted Emissions Uncertainty =  $\pm 2.4$ dB

Radiated Emissions Uncertainty =  $\pm 4.2$ dB

### 1.7 Test or witness Engineer

The sample tested by \_\_\_\_\_  
Print Name: Ivy Zhu

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## 2.0 List of Measurement Equipment

### 2.1 Conducted Emission Test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EMI Test Receiver	ESCS30	830245/009	RS	2005.2.23	1 Year
Coaxial Switch	MP59B	M70585	ANRITSU	N/A	N/A
ISN	NTFM8132	8132137	SCHWARZBECK	2005.2.24	1 Year
ISN	NTFM8134	8134109	SCHWARZBECK	2005.2.24	1 Year
ISN	NTFM8136	8136102	SCHWARZBECK	2005.2.24	1 Year

### 2.2 Radiated Disturbance Test Equipment

Name	Model No	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EMI Test Receiver	ESCS30	830245/009	RS	2005.2.23	1 Year
Coaxial Switch	MP59B	M70585	ANRITSU	N/A	N/A
Spectrum Analyzer(with Tracking Generator)	MS2661C	MT72089	ANRITSU	2005.2.23	1 Year
Amplifier	MH648A	M20494	ANRITSU	2005.2.23	1 Year
Bilog Antenna	CBL6101C	2576	CHASE	2005.2.23	1 Year

### 2.3 Harmonic & Flicker Test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
Harmonics Flicker Test System	5001ix-CTS-400	X71730	CI	2005.2.24	1 Year

### 2.4 ESD Test Equipment

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
ESD Simulator	NSG435	2103	SCHNAFFNER	2005.2.23	1 Year

### 2.5 Radiated electromagnetic disturbance test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EMI Test Receiver	ESCS30	830245/009	RS	2005.2.23	1 Year
Coaxial Switch	MP59B	M70585	ANRITSU	N/A	N/A

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Spectrum Analyzer(with Tracking Generator)	MS2661C	MT72089	ANRITSU	2005.2.23	1Year
Amplifier	MH648A	M20494	ANRITSU	2005.2.24	1Year
Bilog Antenna	CBL6101C	2576	CHASE	2005.2.23	1Year

## 2.6 Electrical Fast Transient/Burst (EFT/B) immunity test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EFT Generator	NSG2025-1	2024	SCHNAFFNER	2005.2.23	1Year
Coupling Clamp	CDN126	418	SCHNAFFNER	N/A	N/A

## 2.7 Surge test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EMCPRO		9909302	KEYTEK	2005.2.23	1Year

## 2.8 Conducted Immunity test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
CW Generator	CW500	0399-10	EMTEST	2005.2.23	1Year
CDN	CDN-M2	9907105C	EMTEST	2005.2.23	1Year
CDN	CDN-M3	9905070C	EMTEST	2005.2.23	1Year
6dB Attenuator	ATT 6	9812105A	EMTEST	2005.2.23	1Year

## 2.9 Power Frequency magnetic field

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EMCPRO		9909302	KEYTEK	2005.2.23	1Year
Coil	F-1000-4-8/9/10-L-1M	9935	FCC	2005.2.23	1Year
Field Meter	ELF-66D	K71988-18	KEYTEK	2005.2.23	1Year

## 2.10 Voltage Dips/Interruptions immunity test

Name	Model No.	Serial No.	Manufacturer	Calibration Date	Calibration Cycle
EMCPRO		9909302	KEYTEK	2005.2.23	1Year

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### 3.0 Technical Details

#### 3.1 Investigations Requested

Perform Electromagnetic Interference [EMI] & Electromagnetic Susceptability[ EMS] tests for CE Marking

#### 3.2 Test Standards

Test Standards	
EN 55022:1998	Limits and methods of measurement of radio disturbance characteristics of information technology equipment Amendment A1:2000 to EN 55022:1998 Amendment A2:2003 to EN 55022:1998
EN 61000-3-2:2000	Electromagnetic compatibility(EMC)- Part 3-2:Limits-Limits for harmonic current emissions(equipment input current 16A per phase)
EN 61000-3-3:1995	Electromagnetic compatibility (EMC)- Part 3-3:Limits-Limitation of voltage changes, Voltage fluctuations and flicker in public low-voltage supply systems. For equipment with rated current t 16A per phase and not subject to conditional connection Amendment A1:2001 to EN 61000-3-3:1995
EN 55024:1998	Electromagnetic Compatibility Generic Immunity Standard, Part 1: Residential, Commercial and Light Industry. Amendment A1:2001 to EN 55024:1998 Amendment A2:2003 to EN 55024:1998
	EN 61000-4-2:1995 Electrostatic discharge
	EN 61000-4-3:1996 RF field strength susceptibility
	EN 61000-4-4:1995 Electrical Fast transients
	EN 61000-4-5:1995 Surge
	EN 61000-4-6:1996 Conducted susceptibility
	EN 61000-4-8:1994 Magnetic Field
	EN 61000-4-11:1994 Dips/Voltage Interruption Variation

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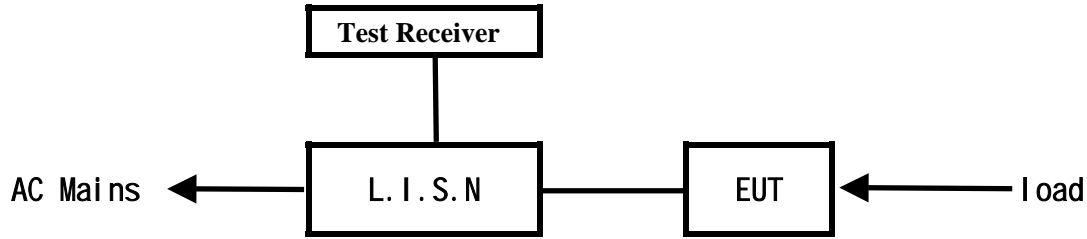
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**4. Power line Conducted Emission Test**

4.1 Schematics of the test

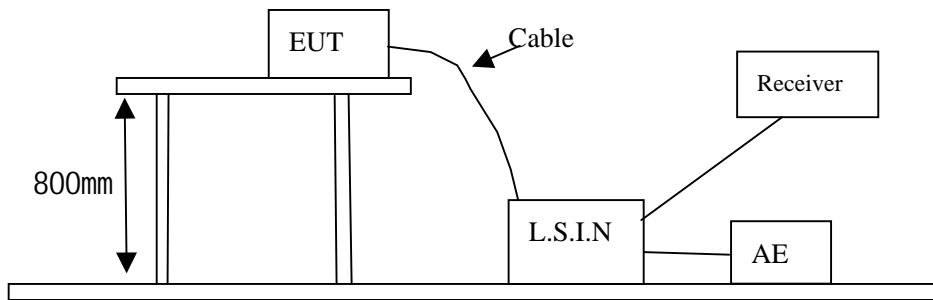


EUT: Equipment Under Test

4.2 Test Method:

The test was performed in accordance with EN 55022:1998

Block diagram of Test setup



4.3 Power line conducted Emission Limit

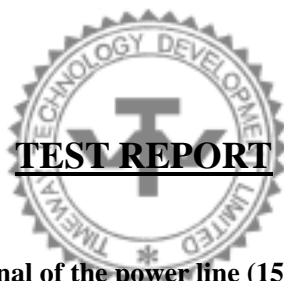
Frequency(MHz)	Limits dB( $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0*	56.0 ~ 46.0*
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

- Notes: 1. \*decreasing linearly with logarithm of frequency.  
 2. The lower limit shall apply at the transition frequencies

4.4 Test Results

Limits for Conducted Emission test, Please refer to limit line (Quasi-peak) in the following diagram labelled as (QP)

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**A Conducted Emission on Live Terminal of the power line (150kHz to 30MHz)**

EUT set Condition: -

**Results:** N/A

Please refer to following diagram for individual

Frequency (MHz)	Reading (dB $\mu$ V)				Limit	
	Live		Neutral		(dB $\mu$ V)	
	Quasi -peak	Average	Quasi -peak	Average	Quasi -peak	Average
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		
			-	-		

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**B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)**

EUT set Condition: -

**Results:** N/A

Please refer to following diagram for individual

Frequency (MHz)	Reading (dB $\mu$ V)				Limit	
	Live		Neutral		(dB $\mu$ V)	
	Quasi -peak	Average	Quasi -peak	Average	Quasi -peak	Average
	-	-				
	-	-				
	-	-				
	-	-				
	-	-				
	-	-				

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**5 Radiated Disturbance Test**

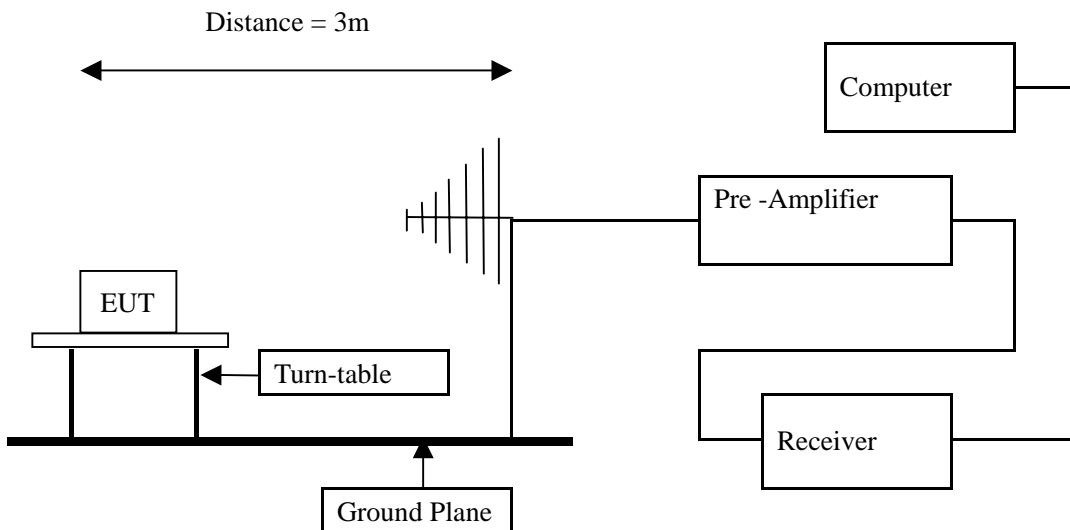
5.1 Schematics of the test



5.2 Test Method:

The test was performed in accordance with EN 55022:1998

**Block diagram of Test setup**



5.3 Power line conducted Emission Limit

Frequency Range(MHz)	Peak limits (dB $\mu$ V/m)
30-230	40.0
230-1000	47.0

Note: The lower limit shall apply at the transition frequencies

5.4 Test result

Please refer to following table

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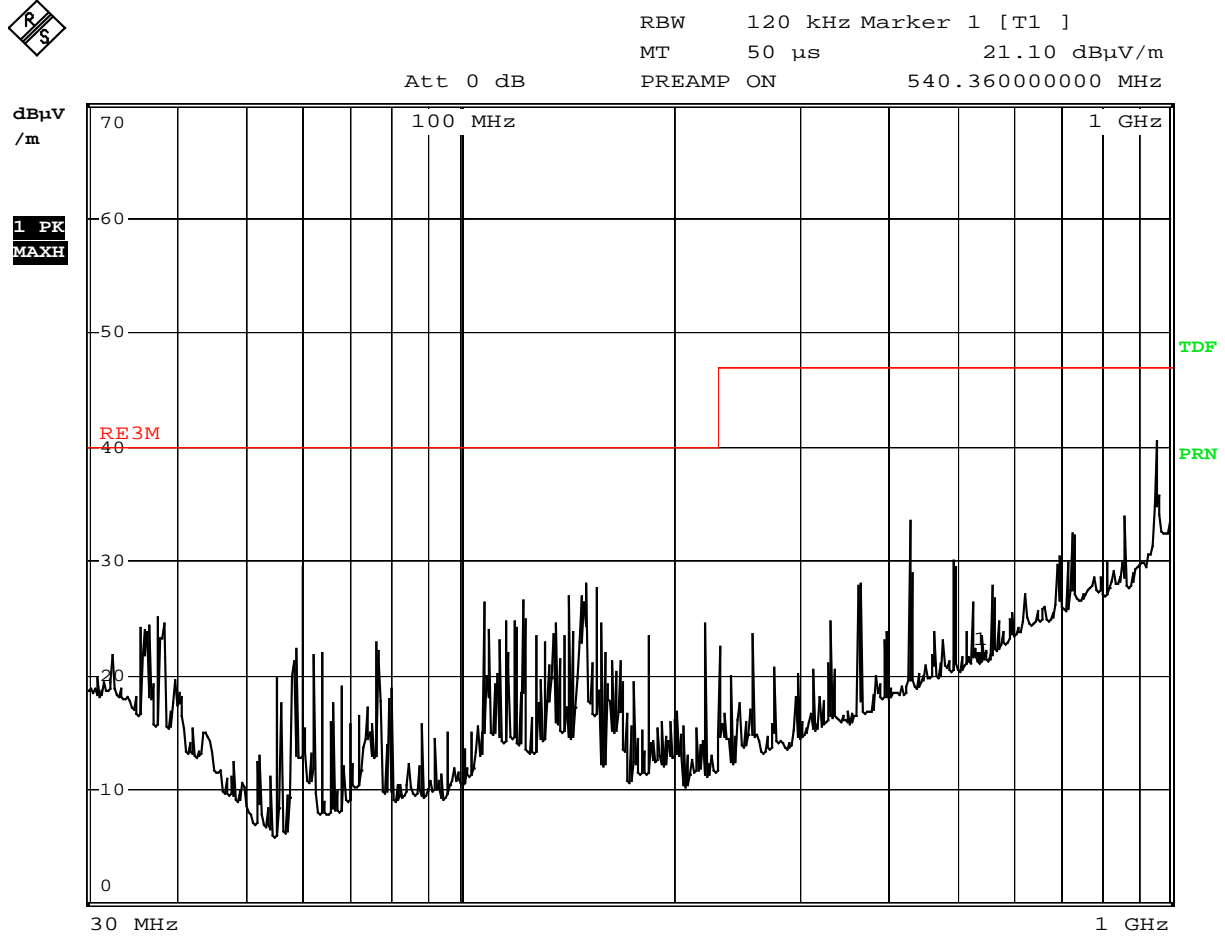


**Radiated Disturbance In Horizontal (30MHz---1000MHz)**

EUT set Condition: Normal Operation Mode

**Results: Pass**

Please refer to following diagram for individual



Date: 9.MAY.2005 17:29:27

Frequency (MHz)	Level@3m (dB µ V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
60.002	28.92	H	40
76.261	16.18	H	40
108.001	26.94	H	40
432.087	33.85	H	47
960.197	38.38	H	47

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**Radiated Disturbance In Vertical (30MHz----1000MHz)**

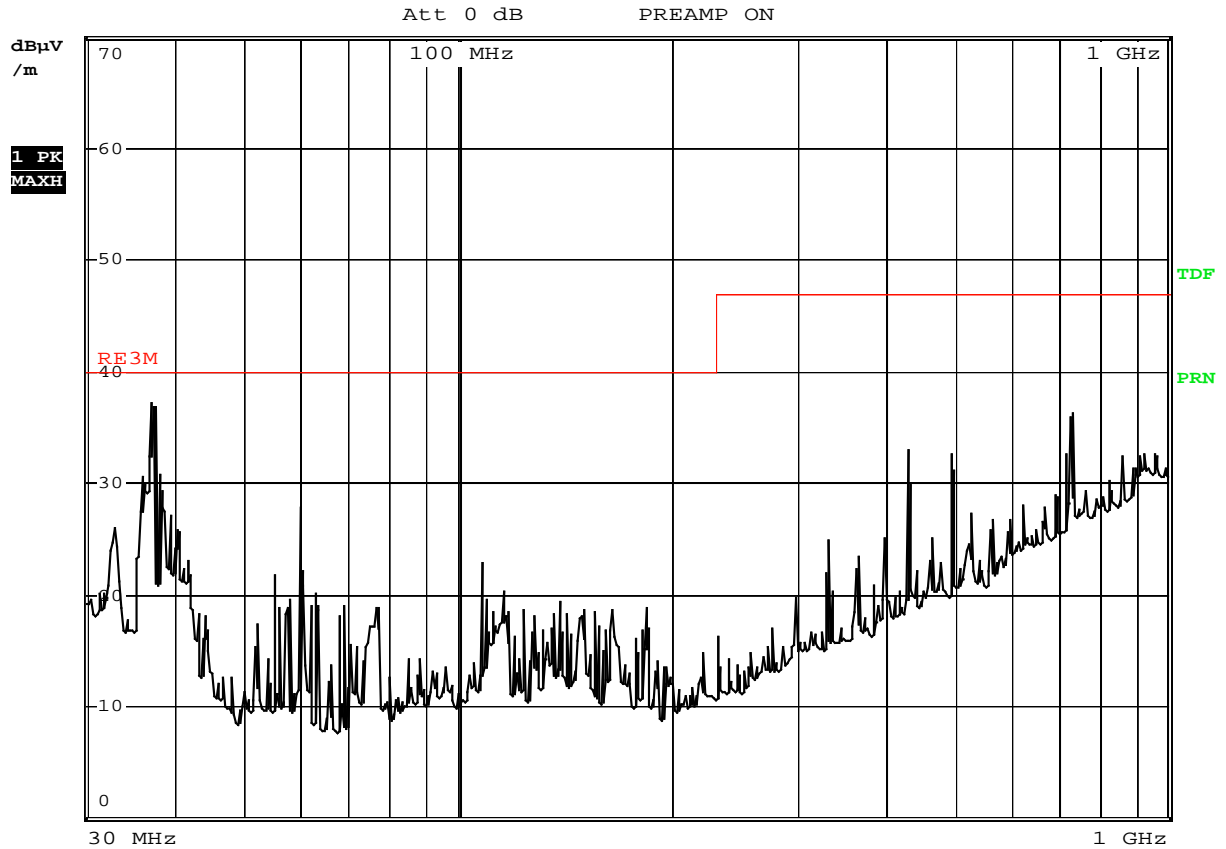
EUT set Condition: Normal Operation Mode

**Results: Pass**

Please refer to following diagram for individual



RBW 120 kHz  
 MT 50 μs  
 PREAMP ON



Date: 9.MAY.2005 17:42:36

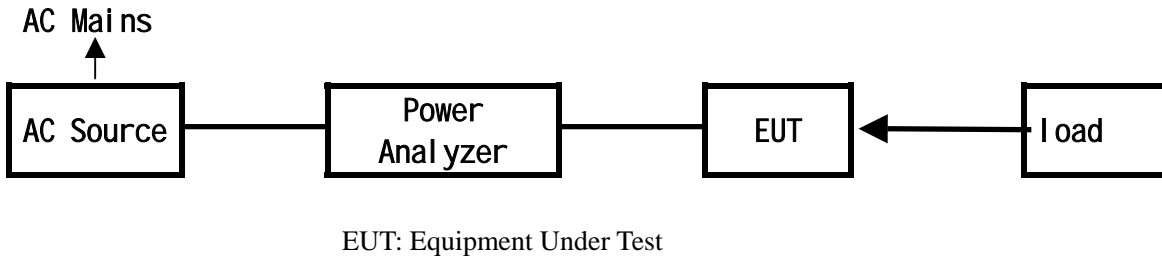
Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
36.867	36.31	V	40
37.823	27.61	V	40
60.001	29.40	V	40
108.229	17.10	V	40
432.088	35.42	V	47

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## 6. Voltage Fluctuations & Flicker Test

### 6.1 Schematic of the test



### 6.2 Test Method:

The test was performed in accordance with EN 61000-3-3:1995

### 6.3 Test Results

Result: N/A

\* N/A ---The test is not applicable for the product because the power less than 70W.

Please refer to the following pages

#### Maximum Occurring Levels:

Ut: 230.1 (EUT Test RMS Voltage)

Pst:	Limit=	1.0	(The Highest short Term Flicker Value)
Plt:	Limit=	0.65	(The Highest Long Term Flicker Value)
dt(%):	Limit=	4%	(The Highest instantaneous Voltage Change (10ms))
dc(%):	Limit=	3%	(The highest Relative steady state voltage change (1sec))
dmax:	Limit=	4%	(The highest Max Relative voltage change)
Tdt:	Limit=	200ms	( The Max Time(in milli-sec) that dt exceeds 3%)

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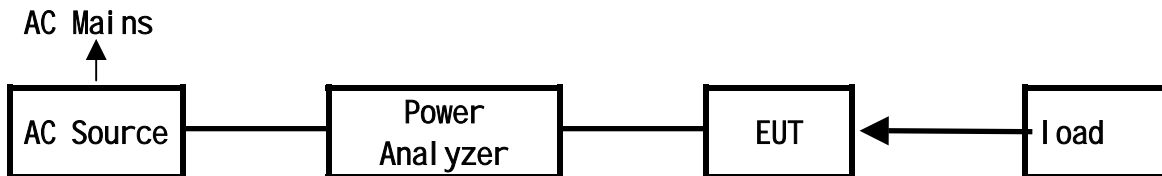
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## 7.0 Harmonic Current Emission Test

### 7.1 Schematic of the test



EUT: Equipment Under Test

### 7.2 Test Method

The test was performed in accordance with EN 61000-3-2: 2000

\*: The Level of the product is : CLASS A



7.3 Test Results

Result:N/A

\* N/A ---The test is not applicable for the product because the power less than 70W.

Please refer to the following pages

Rating:

Harmonic results as a% of the limits

No	(Test result/Limit)%	No	(Test result/Limit)%	No	(Test result/Limit)%	No	(Test result/Limit)%
1		10		21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		25		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

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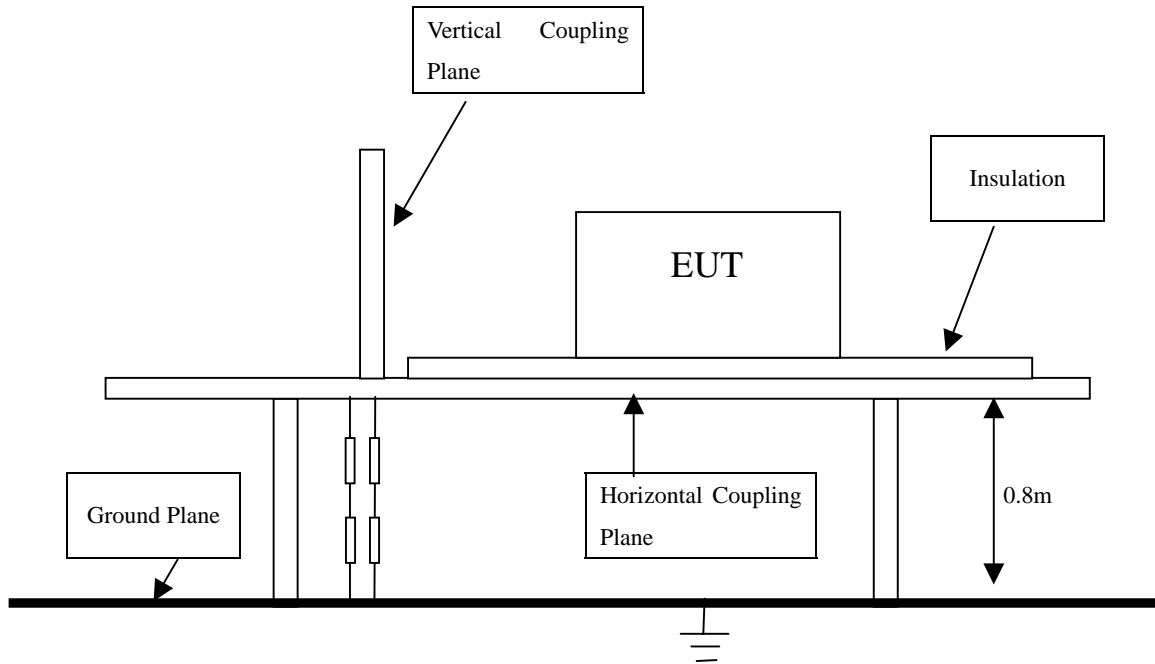
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**8.0 Electrostatic Discharge**

8.1 Schematic of the test



8.2 Test method

The test was performed in accordance with EN 61000-4-2:1995

8.3 Test severity

- ± 4kV for direct & in-direct Contact Discharge
- ± 8kV for air Discharge

Performance Criterion Require: B (Please see following table)

8.4 Susceptibility performance Criteria and Severity level

A	Normal performance within the specification limits
B	Temporary degradation or loss of function or performance which is self recoverable
C	Temporary degradation or loss of function or performance which requires operator intervention or system reset
D	Degradation or loss of function which is not recoverable due to damage of equipment(components) or software, or loss of data

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Severity Level

Level	Test Voltage Direct & in-direct contact Discharge (kV)	Test Voltage Air discharge(kV)
1	± 2kV	± 2kV
2	± 4kV	± 4kV
3	± 6kV	± 8kV
4	± 8kV	± 15kV

8.5 Test Result

Please refer to the following table for individual results.

Location	Discharge Method	Test Voltage	Results
HCP (Horizontal coupling plane)	Contact Discharge	± 4kV	PASS
VCP(Vertical Coupling plane)	Contact Discharge	± 4kV	PASS
Cover	Contact Discharge	± 4kV	PASS
PCI Signal Terminals	Contact Discharge	± 4kV	PASS
Mouse Terminals	Contact Discharge	± 4kV	PASS
Keyboard Terminals	Contact Discharge	± 4kV	PASS
USB	Contact Discharge	± 4kV	PASS
PC2 all the terminals	Contact Discharge	± 4kV	PASS
PC3 all the terminals	Contact Discharge	± 4kV	PASS
PC4 all the terminals	Contact Discharge	± 4kV	PASS
Console Mouse terminals	Contact Discharge	± 4kV	PASS
Keyboard terminals	Contact Discharge	± 4kV	PASS
Switch	Contact Discharge	± 4kV	PASS
Location	Discharge Method	Test Voltage	Results
HCP (Horizontal coupling plane)	Air Discharge	± 8kV	PASS
VCP(Vertical Coupling plane)	Air Discharge	± 8kV	PASS
Cover	Air Discharge	± 8kV	PASS
PCI Signal Terminals	Air Discharge	± 8kV	PASS
Mouse Terminals	Air Discharge	± 8kV	PASS
Keyboard Terminals	Air Discharge	± 8kV	PASS
USB	Air Discharge	± 8kV	PASS
PC2 all the terminals	Air Discharge	± 8kV	PASS
PC3 all the terminals	Air Discharge	± 8kV	PASS
PC4 all the terminals	Air Discharge	± 8kV	PASS
Console Mouse terminals	Air Discharge	± 8kV	PASS
Keyboard terminals	Air Discharge	± 8kV	PASS
Switch	Air Discharge	± 8kV	PASS

Remark: Calculated measurement uncertainty= ± 0.2kV

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**9.0 RF field strength susceptibility (80MHz----- 1000MHz)**

9.1 Schematics of the test

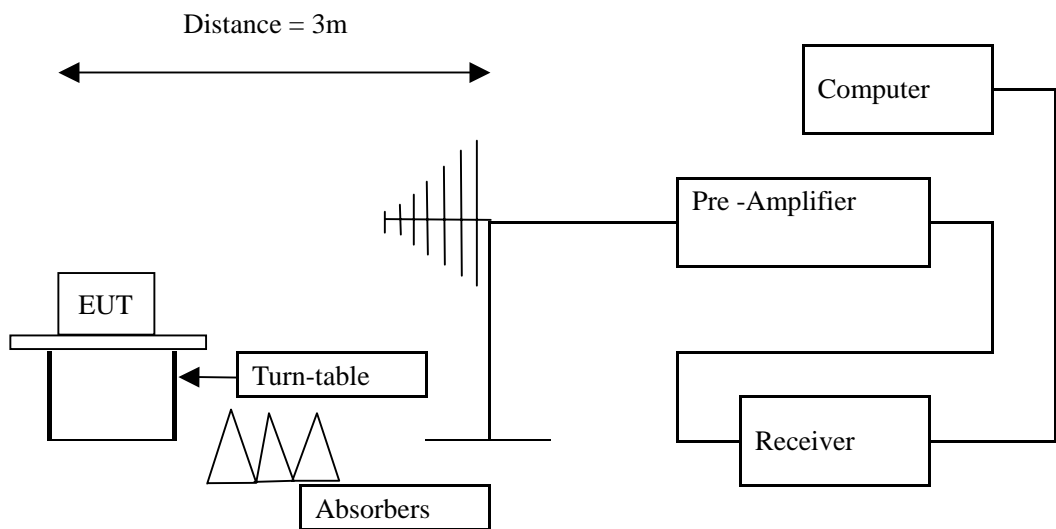


9.2 Test Method:

The test was performed in accordance with EN 61000-4-3:1996  
 Severity: Level 2 (3V/m)  
 Modulation: 80% AM

Performance Criterion Require: A (Please see following table)

**Block diagram of Test setup**



9.3 Susceptibility performance Criteria and severity Level

Susceptibility performance Criteria

A	Normal performance within the specification limits
B	Temporary degradation or loss of function or performance which is self recoverable
C	Temporary degradation or loss of function or performance which requires operator intervention or system reset
D	Degradation or loss of function which is not recoverable due to damage of equipment(components) or software, or loss of data

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## Severity Level

Level	Field Strength (V/m)
1	1
2	3
3	10

## 9.4 Test Result:

Please refer to the following table for individual results.

Frequency (MHz)	Face	Polarity	Level (V/m)	Dwell Time(s)	Sweep Rate (%)	Results
80-1000	0 °	Horizontal	3	1	1	PASS
80-1000	90 °	Horizontal	3	1	1	PASS
80-1000	180 °	Horizontal	3	1	1	PASS
80-1000	270 °	Horizontal	3	1	1	PASS
80-1000	0 °	Vertical	3	1	1	PASS
80-1000	90 °	Vertical	3	1	1	PASS
80-1000	180 °	Vertical	3	1	1	PASS
80-1000	270 °	Vertical	3	1	1	PASS

Remark: Calculated measurement uncertainty= 80MHz to 1000mHz (+3.7/ -1.3) V/m

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## 10.0 Electrical Fast Transient/Burst (EFT/B) immunity test

### 10.1 Schematics of the test



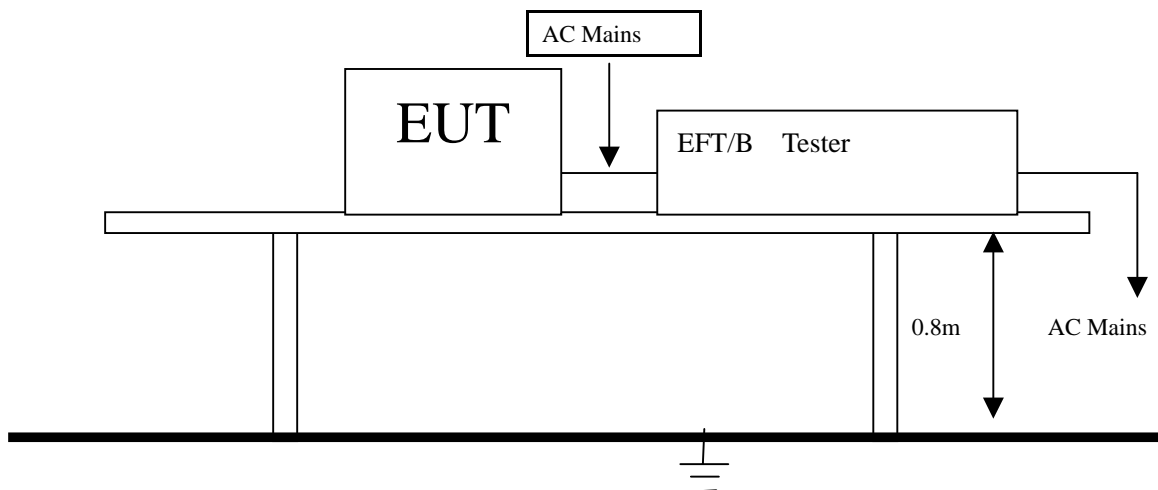
### 10.2 Test Method:

The test was performed in accordance with EN 61000-4-4:1995

Severity: Level 2 (1kV)

Performance Criterion Require: B (Please see following table)

#### Block diagram of Test setup



### 10.3 Susceptibility performance Criteria and Severity Level

#### Susceptibility performance Criteria

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**TEST REPORT**

A	Normal performance within the specification limits
B	Temporary degradation or loss of function or performance which is self recoverable
C	Temporary degradation or loss of function or performance which requires operator intervention or system reset
D	Degradation or loss of function which is not recoverable due to damage of equipment(components) or software, or loss of data

Severity Level

Open Circuit output Test Voltage ± 10%		
Level	On power Supply Lines	On I/O (Input/output) Signal data and control lines
1	0.5kV	0.5kV
2	1kV	1kV
3	2kV	2kV
4	4kV	4kV
X	Special	Special

10.4 Test Results

Please refer to following page.

Inject location:

Inject Line	Voltage kV	Inject Times (s)	Method	Results
L	± 1	120S	Direct	PASS
N	± 1	120S	Direct	PASS
L-N	± 1	120S	Direct	PASS

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**11.0 Surge test**

11.1 Schematics of the test

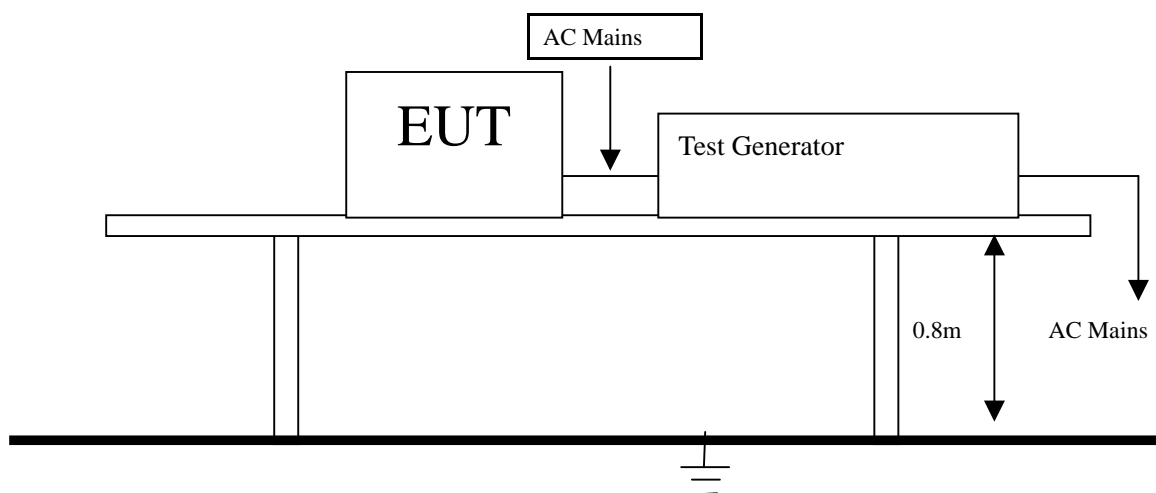


11.2 Test Method:

The test was performed in accordance with EN 61000-4-5:1995  
 Severity: Level 2 (Line to Neutral at 1kV)

Performance Criterion Require: C (Please see following table)

**Block diagram of Test setup**



11.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

A	Normal performance within the specification limits
B	Temporary degradation or loss of function or performance which is self recoverable
C	Temporary degradation or loss of function or performance which requires operator intervention or system reset
D	Degradation or loss of function which is not recoverable due to damage of equipment(components) or software, or loss of data

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Severity Level

Severity Level	Open-Circuit Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

11.4 Test Results

Please refer to following page.

Test location:

Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage(kV)	Results
L-N	+	0	5	1.0	PASS
	+	90	5	1.0	PASS
	+	180	5	1.0	PASS
	+	270	5	1.0	PASS
	-	0	5	1.0	PASS
	-	90	5	1.0	PASS
	-	180	5	1.0	PASS
	-	270	5	1.0	PASS

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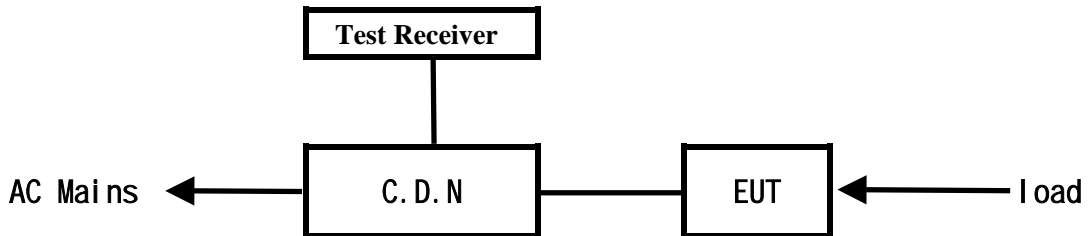
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**12.0 Conducted Immunity test**

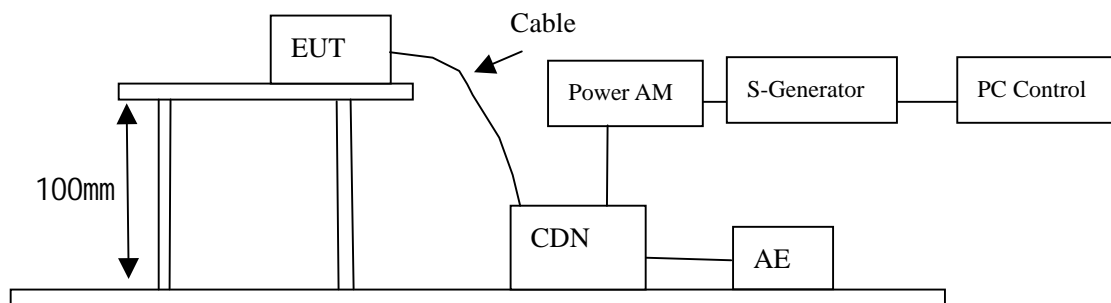
12.1 Schematics of the test



12.2 Test Method

The test was performed in accordance with EN 61000-4-6:1996  
 Severity: Level 2 (3 V rms), 0.15MHz—80MHz  
 Performance Criterion Require: A (Please see following table)

**Block diagram of Test setup**



12.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

A	Normal performance within the specification limits
B	Temporary degradation or loss of function or performance which is self recoverable
C	Temporary degradation or loss of function or performance which requires operator intervention or system reset
D	Degradation or loss of function which is not recoverable due to damage of equipment(components) or software, or loss of data

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Severity Level

Severity Level	Field Strength V/m
1	1
2	3
3	10
*	Special

12.4 Test Results:

Please refer to the following page

Frequency Range (MHz)	Injected Position	Strength	Criterion	Result
0.15 - 20	AC Line	3V (rms) Unmodulated	A	PASS
20 - 80	AC Line	3V (rms) Unmodulated	A	PASS

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**13.0 Power Frequency magnetic field test**

13.1 Schematics of the test



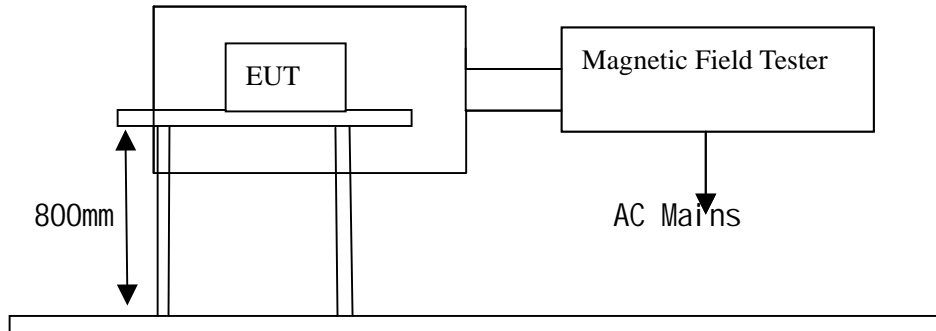
13.2 Test Method

The test was performed in accordance with EN 61000-4-8:1993

Severity: Level 2 (3A/m),

Performance Criterion Require: A (Please see following table)

**Block diagram of Test setup**



13.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

A	Normal performance within the specification limits
B	Temporary degradation or loss of function or performance which is self recoverable
C	Temporary degradation or loss of function or performance which requires operator intervention or system reset
D	Degradation or loss of function which is not recoverable due to damage of equipment(components) or software, or loss of data

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## Severity Level

Severity Level	Magnetic Field Strength A/m
1	1
2	3
3	10
4	30
5	100
*	Special

## 13.4 Test Results:

Please refer to the following page

Test Level	Testing Duration	Coil Orientation	Criterion	Result
3A/m	5 Mins	Horizontal	A	PASS
3A/m	5 Mins	Vertical	A	PASS

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**14.0 Voltage Dips/Interruptions immunity test**

14.1 Schematics of the test

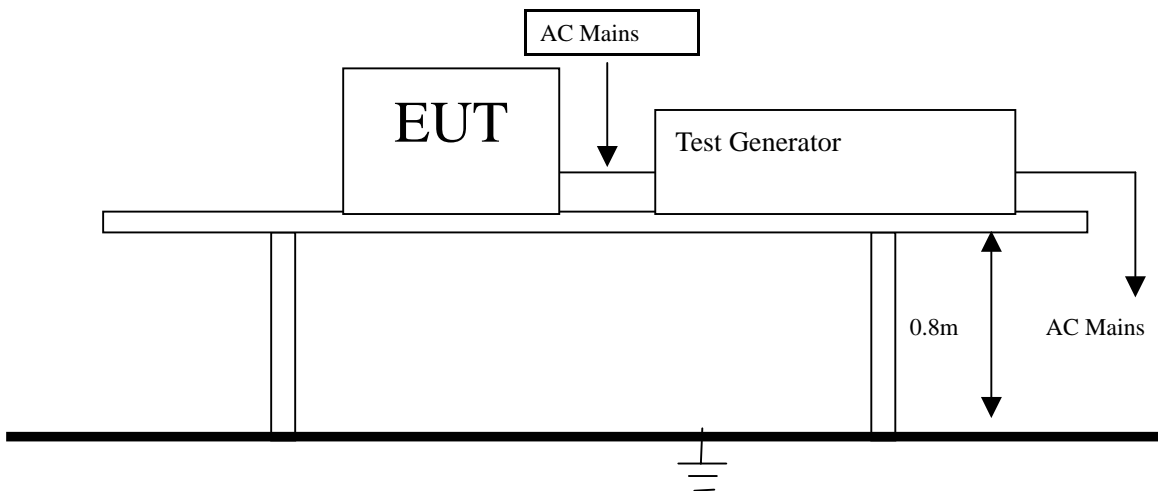


14.2 Test Method:

The test was performed in accordance with EN 61000-4-11:1994

Performance Criterion Require: C&B (Please see following table)

**Block diagram of Test setup**



14.3 Susceptibility performance Criteria and Severity Level

Susceptibility performance Criteria

A	Normal performance within the specification limits
B	Temporary degradation or loss of function or performance which is self recoverable
C	Temporary degradation or loss of function or performance which requires operator intervention or system reset
D	Degradation or loss of function which is not recoverable due to damage of equipment(components) or software, or loss of data

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Severity Level

Test Level % Ut	Voltage dip and short interruptions % Ut	Duration(in period)
0	100	0.5 1
40	60	5 10
70	30	25 50 *

14.4 Test Result:

Please refer to the following page

Test Level % Ut	Voltage dips & short interruptions % Ut	Duration(in period)	Phase Angle	Criterion	Result
0	100	250P	0 ° - 360 °	C	PASS
40	60	5P	0 ° - 360 °	C	PASS
70	30	0.5P	0 ° - 360 °	B	PASS

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## 15.0 Product Labeling

### 15.1 CE Mark label specification

Text of the mark is black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT or silk-screened onto the EUT.



### 15.2 Mark Location: Rear enclosure

\*

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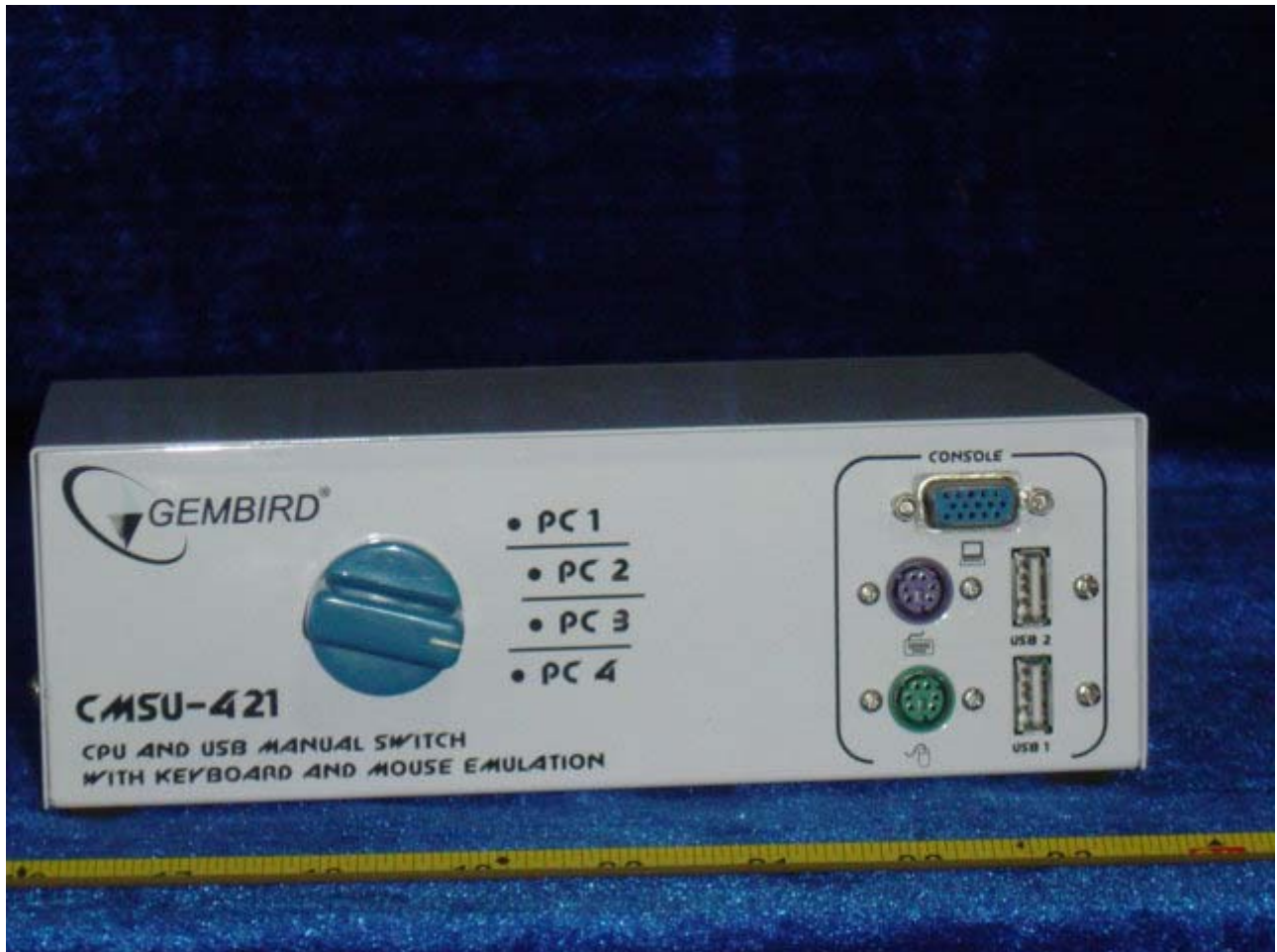
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Appendix:

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Photos of the Product



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Appendix:

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Photos of the Product



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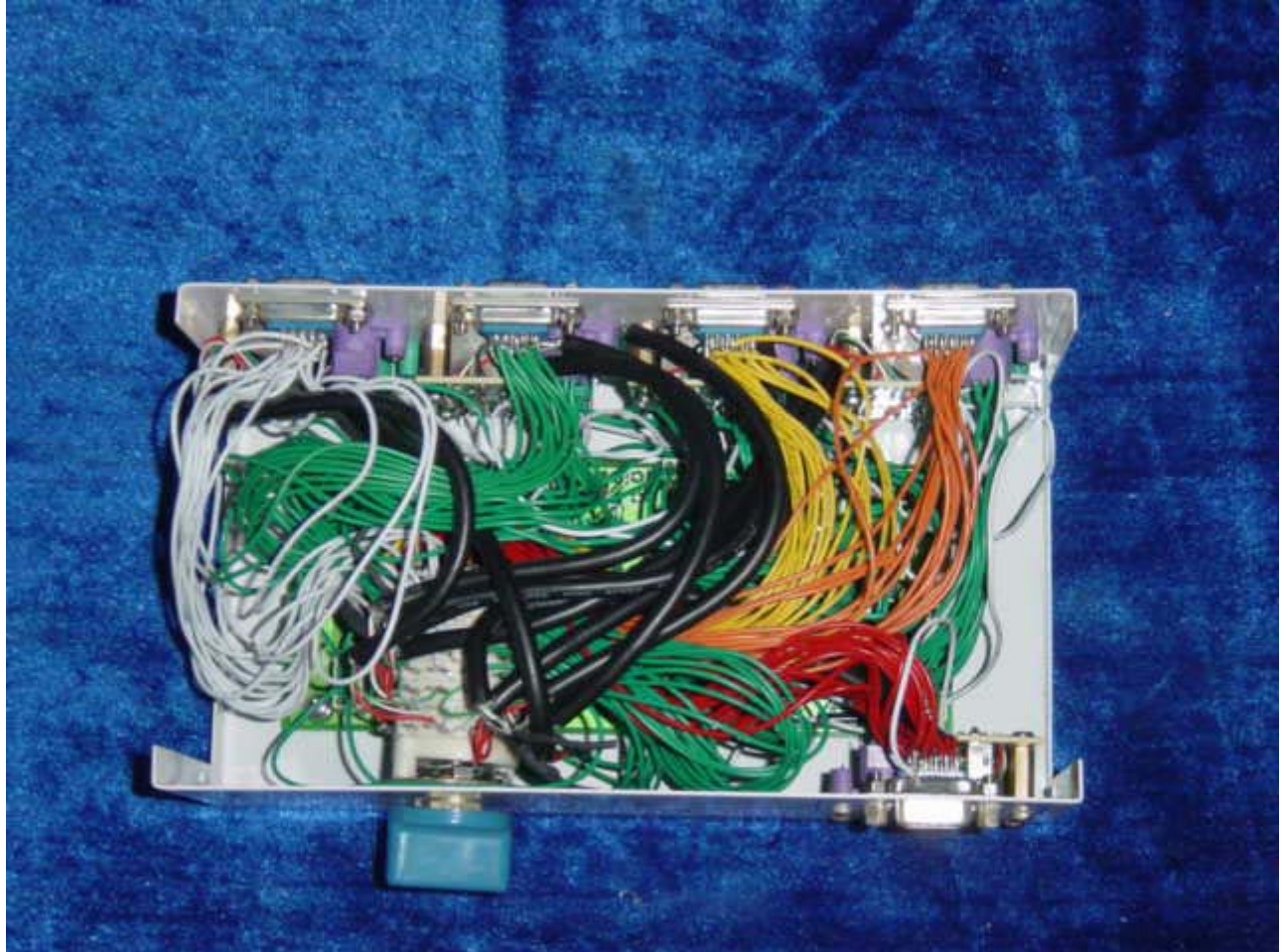




Appendix:

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Photos of the Product



End of the report

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