EMC Testing Report

CE

Equipment Under Test：	Multi-Frequency (4 Channel Selectable) Twin Photobeam Detector
Model Number：	Dual-120CS
Serial No.：	Dual-90CS, Dual-60CS, Dual-30CS
Applicant：	Yuan Hsun Electric Co., Ltd.
Address of Applicant：	No.57 Chung He Rd. Zuo-Ying Dist., Kaohsiung City 813 Taiwan R.O.C.

Matrix Test Laboratory
2F, No.146, Jian Yi Rd, Chung-Ho City,
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Contents

Verification

Applicant：	Yuan Hsun Electric Co., Ltd.
Manufacturer：	Yuan Hsun Electric Co., Ltd.
Equipment Under Test：	Multi-Frequency (4 Channel Selectable) Twin Photobeam Detector
Model No.：	Dual-120CS
Serial No.：	Dual-90CS, Dual-60CS, Dual-30CS
Sample received date：	2008-05

Test Standards：

Emission:	**Immunity:**
☒ EN 55022:2006 Class B	☒ EN 55024:1998 A1:2001 A2:2003 ☒ IEC 61000-4-2 ☒ IEC 61000-4-3

Remark:

This report details the results of the testing carried out on one sample .The emission levels emanate from the device and the device endure and its performance criterion. This report shows the EUT is technically compliant with the EN 55022 and EN 55024 official requirements. This report applies to the above sample only and shall not be reproduced in part without written approval of Matrix Test Laboratory.

Documented: Jody Peng **Date:** 2008-08-11

Jody Peng/ ADM. Dept Staff

Test Engineer: Eros Gu **Date:** 2008-08-07

Eros Gu/ ENG. Dept. Staff

Approved: Peter Chin **Date:** 2008-08-11

Peter Chin/ Head of Laboratory

1 General Description

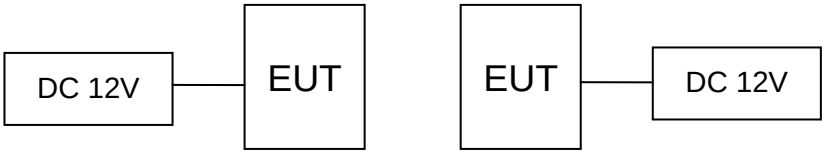
1.1 Description of EUT

Equipment Under Test	**:**	Multi-Frequency (4 Channel Selectable) Twin Photobeam Detector
Model Number	**:**	Dual-120CS
Serial Number	**:**	Dual-90CS, Dual-60CS, Dual-30CS
Applicant **Address of Applicant**	**:**	Yuan Hsun Electric Co., Ltd. No.57 Chung He Rd. Zuo-Ying Dist., Kaohsiung City 813 Taiwan R.O.C.
Manufacturer **Address of Manufacturer**	**:**	Yuan Hsun Electric Co., Ltd. No.57 Chung He Rd. Zuo-Ying Dist., Kaohsiung City 813 Taiwan R.O.C.
Power Supply	**:**	AC/DC 12-24V
Data Cable	**:**	☒N/A
Description of EUT	**:**	**Dimensions :** 173 X 74 X 72 (mm) **Weight :** 0.75 g **Intended function :** The EUT is a photobeam detector. **Product Variant :** The manufacturer declares that the serial products share the identical circuit design with the main test sample. The difference between them is on their detecting range. Matrix only takes the responsibility to the test result of the main test sample.

1.2 Test Supporting Units

N/A

1.3 Block Diagram



1.4 Description of Pre-Test Modes

1. Stand by mode
2. Operation mode

Note: After pre-test, we found that the Operation mode would bring out the worst result. The final test has been carried out on the worst case.

1.5 Decision of Final Test Mode

Operation mode

1.6 Test Power Supply

DC 12V

1.7 Immunity Performance Criterion

Criterion	Test description
A	The equipment shall continue to operate as intended without operator intervention, degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.
B	After the test, the equipment shall continue to operate as intended without operator intervention, degradation of performance or loss of function is allowed.
C	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of controls by the user in accordance with the manufacturer's instructions.

1.8 Test Facility

Site Description	**:**	All tests are completed by Matrix Test Laboratory. Radiated emission is performed at HongAn's open-site.
Name of Firm	**:**	Matrix Test Laboratory
Site Location	**:**	2F, No 146, Jian Yi Rd, Chung-Ho City, Taipei Hsien, Taiwan, R.O.C.

1.8.1 Methods and Procedures

Both conducted and Radiated Emission Test was performed according to the procedures in EN 55022. Radiated Emission Test was performed at 10 meters distance from antenna to EUT. All immunity tests were performed according to the procedures in EN 55024.

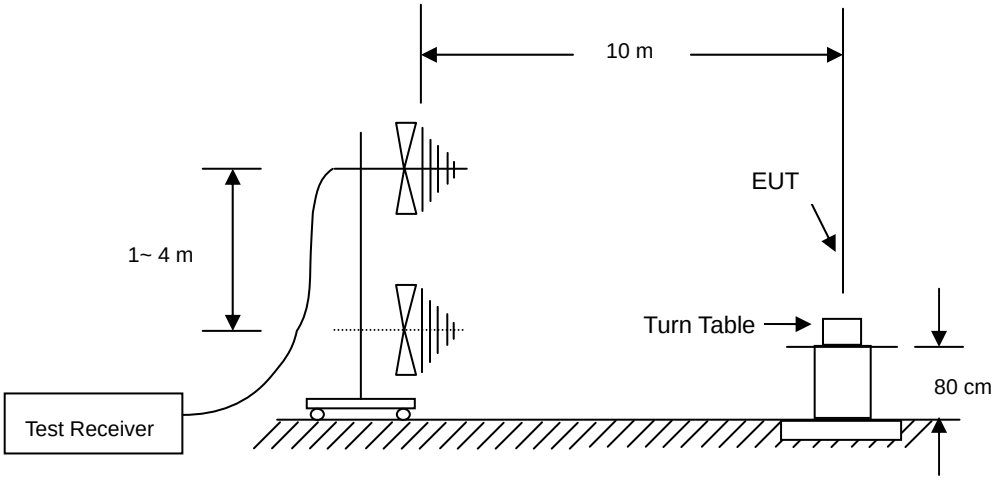
2 Radiated Emission Test

2.1 Test Instruments

Instrument	Manufacturer	Model	Serial No.	Date of Calibration
SPECTURM ANALZYER	HP	8595E	3829A03763	2008-07-19
Antenna	FRANKONIA	BTA-H	030001H	2008-08-03
Pre-Amplifier	Schaffner	CPA9231A	N/A	2008-08-03
RF Cable	MIYAZAKI	8D-F8	N/A	2008-08-03
EMI Test Receiver	R&S	ESCI	100615	2008-08-03

Note: All instrument upon which need to calibrated are with calibration period of 1 year.

2.2 Configuration of Instrument Setup



2.3 Radiated Limit

☒ EN 55022:2006

Frequency (MHz)	☐ Class A	☒ Class B
	Quasi-Peak (dBuV/m)	Quasi-Peak (dBuV/m)
30 ~ 230	40.0	30.0
230 ~ 1000	47.0	37.0

2.4 Set of Instrument

2.4.1 The EMI test receiver frequency range set from 30 MHz to 1000 MHz.

2.4.2 The EMI test receiver bandwidth set at 120 kHz.

2.4.3 The EMI test receiver detector set as Quasi-Peak (Q.P.).

2.5 Test Configuration

2.5.1 The EUT was placed on a non-conductive table whose total height equaled 80cm. The turntable can rotate 360 degree to determine the position of the maximum emission level.

2.5.2 The EUT was set 10 meters away from the receiving antenna that was mounted on a non-conductive mast. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level.

2.5.3 The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

2.5.4 The identification of the frequency of highest emission with respect to the limit was found by investigating emissions at a number of significant frequencies. The probable frequency of maximum emission had been found and that the associated cable and EUT configuration and mode of operation had been identified.

2.6 Configuration of EUT

2.6.1 Setup the EUT and simulates as shown section 1.3.

2.6.2 Turn on the power of all equipment.

2.6.3 Activate the Operation mode

2.6.4 Measure the horizontal polarization and record the value.

2.6.5 Change into vertical polarization and record the value.

2.7 Test Result

PASS.

The final tests data as shown on following page.

Radiated Emission Test Data

Date of Tested	:	2008-08-06	Polarization	:	Horizontal
Temperature	:	25℃	Humidity	:	36%
Test Mode	:	Operation mode			

Frequency (MHz)	Factor (dB)	Meter Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV/m)	Margin (dB)
187.6	13.83	-3.83	10	30	-20
427.7	16.03	0.07	16.1	37	-20.9
672.6	19.66	2.64	22.3	37	-14.7
767.2	21.47	-0.37	21.1	37	-15.9
823	22.2	-0.5	21.7	37	-15.3
936.9	23.3	-1.8	21.5	37	-15.5

Remark：All readings are Quasi-Peak values.

Radiated Emission Test Data

Date of Tested	:	2008-08-06	Polarization	:	Vertical
Temperature	:	25℃	Humidity	:	36%
Test Mode	:	Operation mode			

Frequency (MHz)	Factor (dB)	Meter Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV/m)	Margin (dB)
66.4	11.53	1.47	13	30	-17
226.4	13.1	0.8	13.9	30	-16.1
471.4	16.59	-1.89	14.7	37	-22.3
595	18.45	0.35	18.8	37	-18.2
718.7	20.68	-1.68	19	37	-18
888.4	23.24	-1.74	21.5	37	-15.5

Remark：All readings are Quasi-Peak values.

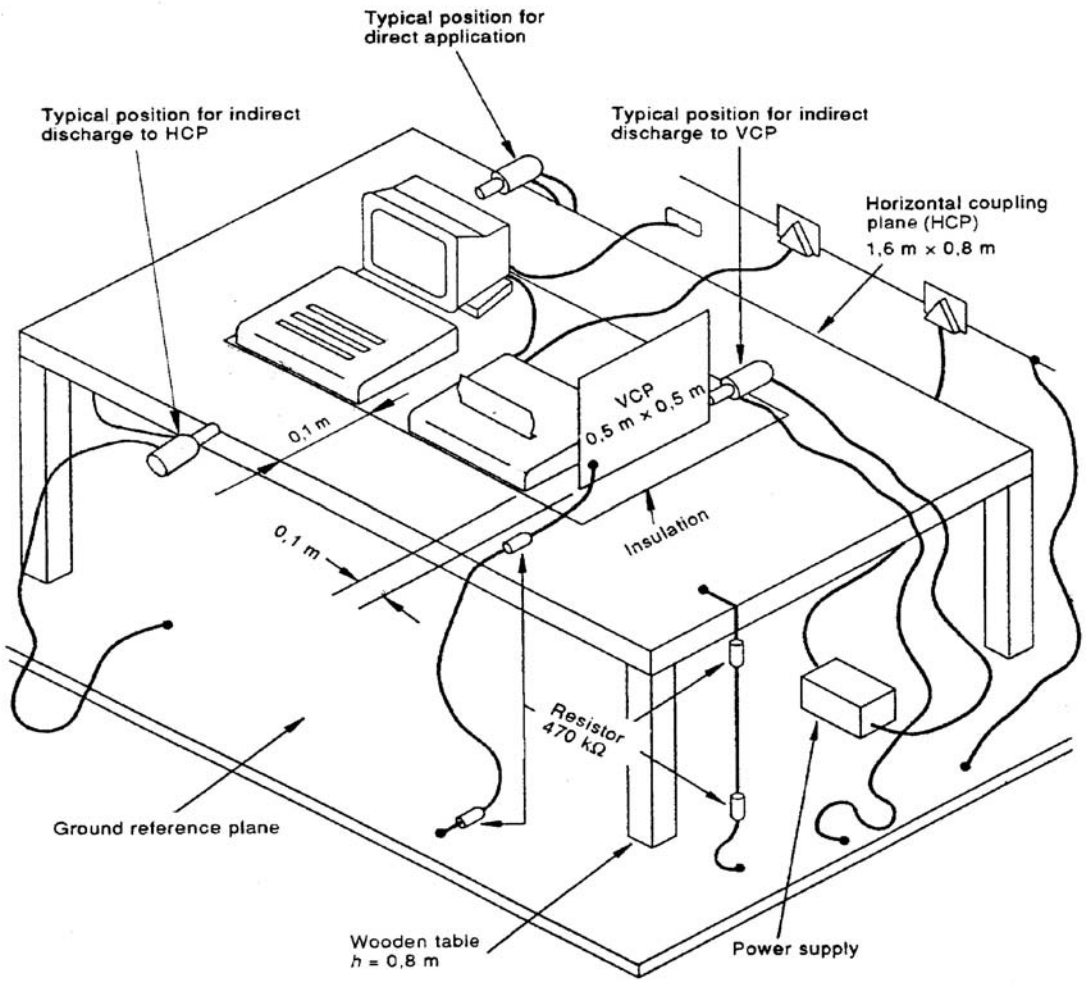
3 Electrostatic Discharge Immunity Test

3.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Date of Calibration
ESD Mouse Box	EMC PARTNER	ESD MOUSE	ESD101-301	2007-10-18
TRANSIENT 2000	EMC PARTNER	TRA-2000	449	2007-10-18

Note: All instrument upon which need to calibrated are with calibration period of 1 year.

3.2 Configuration of Instrument Setup



3.3 Test Levels

Level	Contact discharge (kV)	Air discharge (kV)
1	±2	±2
2	±4	±4
3	±6	±8
4	±8	±15
X	Special	Special

3.4 Test Configuration

3.4.1 For Table-top equipment, the test set-up shall consist of a wooden table, 0.8 m high, standing on the ground reference plane.

3.4.2 Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points shall be subjected to at least 50 indirect discharges (contact) 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 (see IEC 61000-4-2: 2001 for use of the Vertical Conducting Plane (VCP)). Tests shall be performed at a maximum repetition rate of one discharge per second.

3.4.3 Air discharge at insulating surfaces:

There were minimum of 10 single air discharges to the selected test point.

3.4.4 The selected points, performed with electrostatic discharge were marked with red labels on the EUT. The ESD generator (gun) was held perpendicular to the surface to which the discharge was applied.

3.5 Configuration of EUT

3.5.1 Setup the EUT and simulates at section 1.3.

3.5.2 Turn on the power of all equipment.

3.5.3 Activate the operation mode.

3.5.4 Operating condition was shown on the monitor and observed by test engineer.

3.6 Test Requirement

3.6.1 Air discharge: ±8 kV

3.6.2 Contact discharge: ±4 kV

3.6.3 HCP discharge: ±4 kV

3.6.4 VCP discharge: ±4 kV

3.6.5 Performance criterion: B

3.7 Test Result

3.7.1 Environment Condition :

Temperature	Humidity	Atmospheric Pressure
24℃	34%RH	1004mbar

3.7.2 Observation of direct discharge

Test points: 1. Surface of case. 2. Junction of case. 3. Screw.

Type of Discharge	Test Specification				Performance required by EN55024	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of discharge			
Air Discharge	2,4,8 (KV)	±	1~3	10/ per point	B	A	Pass
Contact Discharge	2,4 (KV)	±	1,3	50/ per point	B	A	Pass
Remark:	1. No temporary degradation or less of function has been observed through out the entire time interval of air discharge. 2. No temporary degradation or less of function has been observed through out the entire time interval of contact discharge.						
Note:	The selected points were marked with red labels on the EUT.						

3.7.3 Observation of indirect discharge

Test points: 1. Front side. 2. Rear side. 3. Left side. 4. Right side.

Type of Discharge	Test Specification				Performance required by EN55024	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of discharge			
HCP application	2,4 (KV)	±	1~4	50/ per point	B	A	Pass
VCP application	2,4 (KV)	±	1~4	50/ per point	B	A	Pass
Remark:	1. No temporary degradation or less of function has been observed through out the entire time interval of HCP application. 2. No temporary degradation or less of function has been observed through out the entire time interval of VCP application.						
Note:	The selected points were marked with red labels on the EUT.						

PASS

The test result shows that the EUT compliant with the test requirement specified in EN 55024:1998/ A1:2001/ A2:2003.

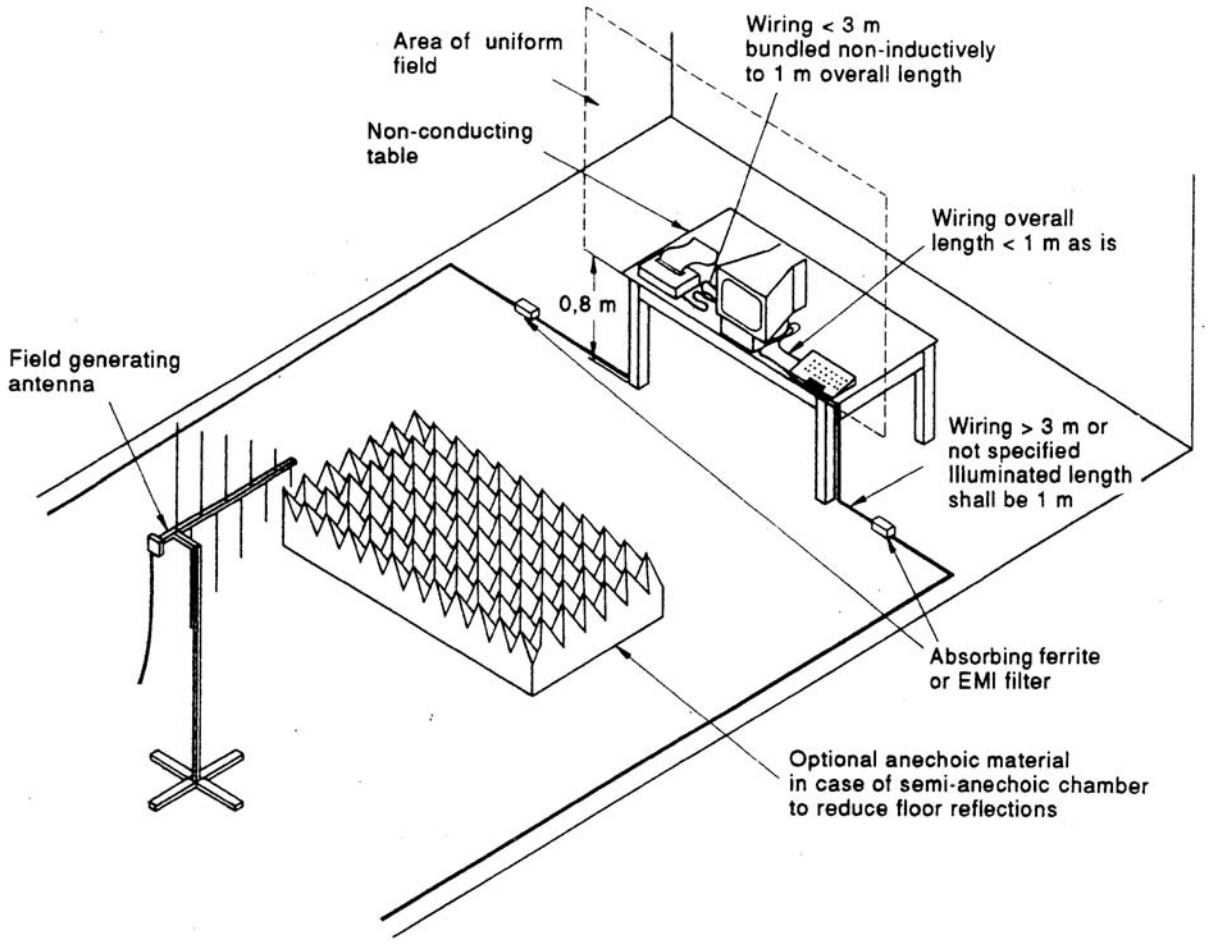
4 Radio-frequency, Electromagnetic field Immunity Test

4.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Date of Calibration
Signal Generator	R&S	SML03	103396	2008-07-26
Power Amplifier	IFI	CMX50	N/A	2007-10-15
Field Probe	EMCO	7201	N/A	2007-10-05
Antenna	FRANKONIA	BTA-H	030001H	2008-08-03

Note: All instrument upon which need to calibrated are with calibration period of 1 year.

4.2 Configuration of Instrument Setup



4.3 Test Level

Level	Test field strength (V/m)
1	1
2	3
3	10
X	Special

4.4 Test Configuration

4.4.1 Before testing, the intensity of the established field strength was checked by placing the field sensor at a calibration grid point, and with the field generating antenna and cables in the same positions as used for the calibration, the forward and reverse power were measured. The forward power needed to give the calibrated field was evaluated.

4.4.2 After the calibration had been verified, the test field was then generated using the values obtained from the calibration. The EUT and the auxiliary equipment were placed on a table with 0.8 meters height. The EUT was initially placed with one face coincidence with the calibration plane at a distance of 3 meters away from the illuminating antenna (the same as used for the field calibration). Both horizontal and vertical polarizations of the antenna and four sides of the EUT were set for the radiated field immunity test.

4.4.3 In order to survey the performance of the EUT, a CCD camera was used to monitor the EUT performance.

4.5 Configuration of EUT

4.5.1 Setup the EUT and simulates as shown section 1.3.

4.5.2 Turn on the power of all equipment.

4.5.3 Activate the operation mode.

4.5.4 Operating condition was shown on the monitor and observed by test engineer.

4.6 Test Result

4.6.1 Environment

Temperature	Humidity	Atmospheric Pressure
24℃	34％RH	1004mbar

4.6.2 Observation of test

Type of modulation	Test Specification			Performance required by EN55024	Observed Result	Verdict
	Field strength	Frequency range	Modulation			
Amplitude modulation	3V/m	80 to 1000MHz	80%, 1KHz, sinusoidal	A	A	Pass
Remark:	No temporary degradation or less of function has been observed through out the entire time interval of the test.					
Note:	N/A					

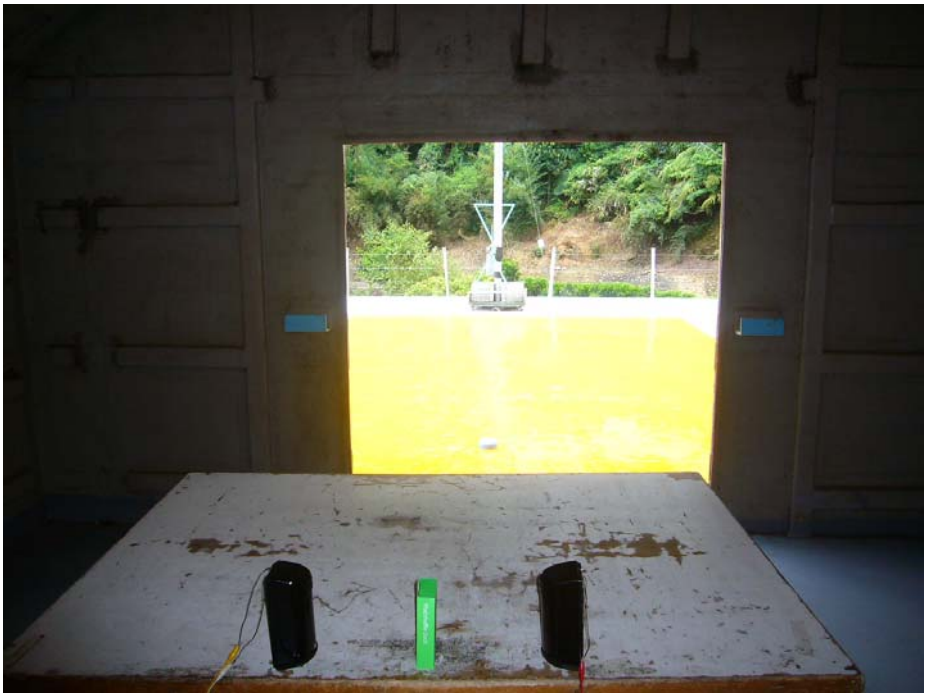
PASS

The test result shows that the EUT compliant with the test requirement specified in EN 55024:1998/ A1:2001/ A2:2003.

5 Photographs of Test

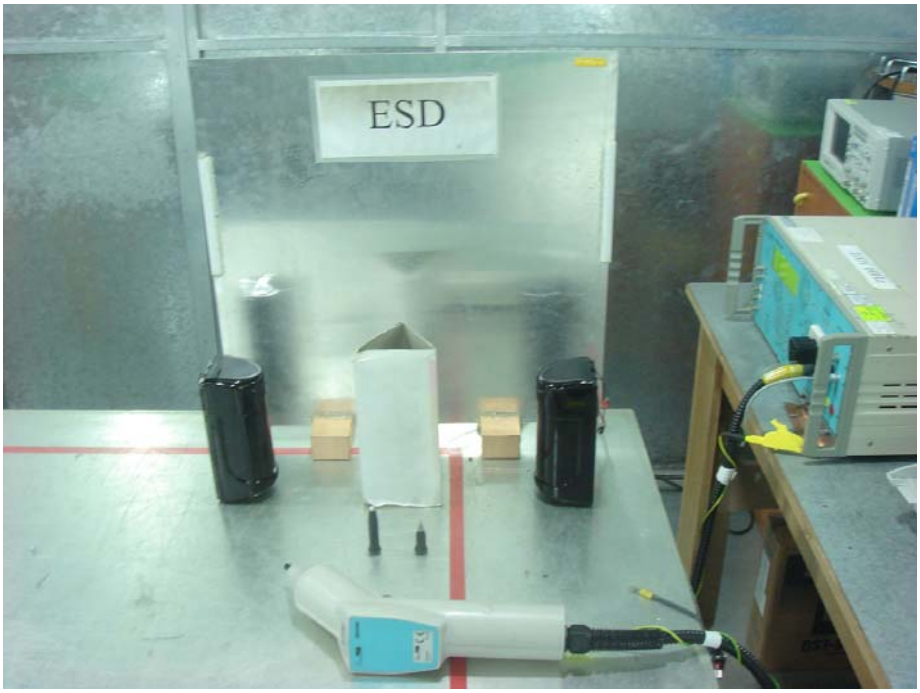
5.1 Radiated Emission Test

Front View

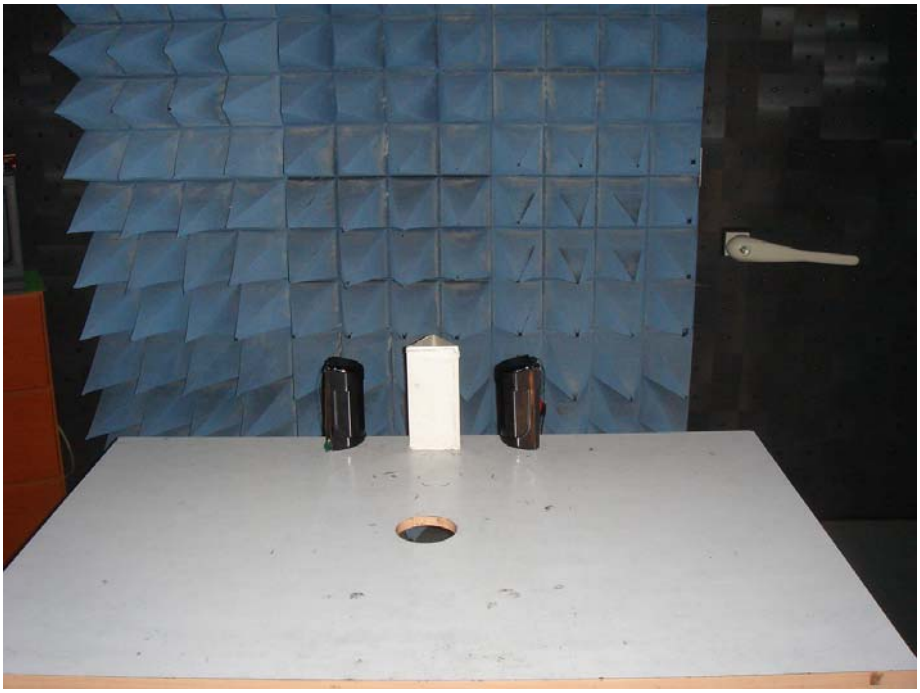


Rear View

5.2 Electrostatic Discharge Immunity Test



5.3 Radio-frequency, Electromagnetic field Immunity Test

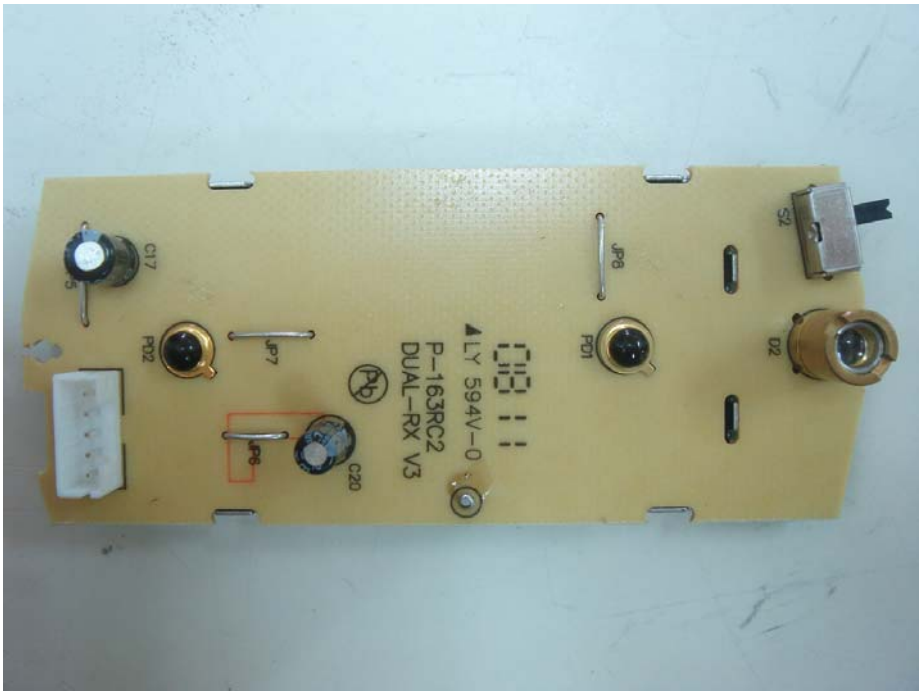


6 Photographs of EUT

Front View of EUT (RX)

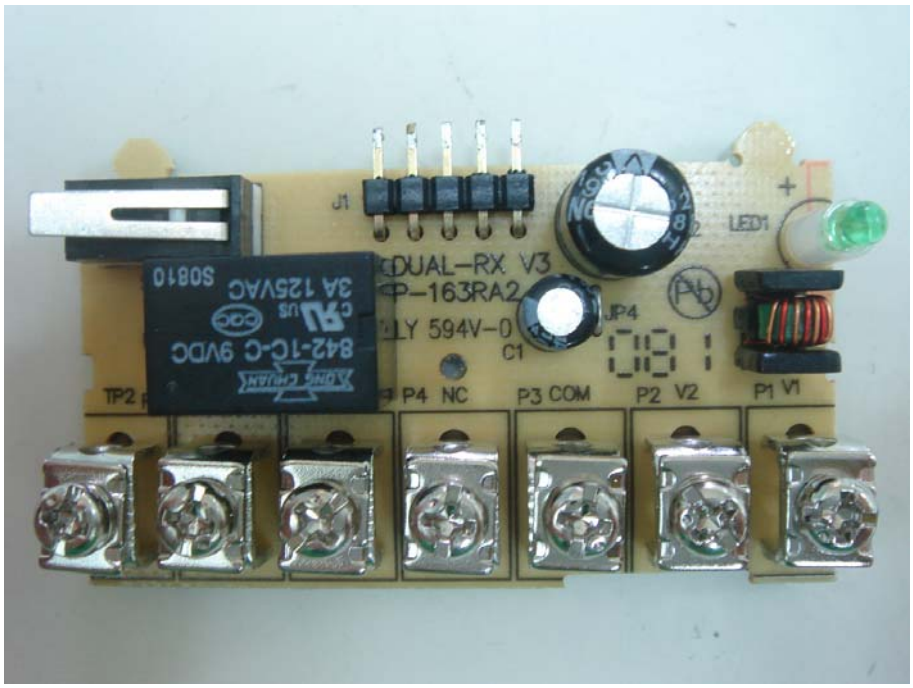
Rear View of EUT

Inside view of EUT

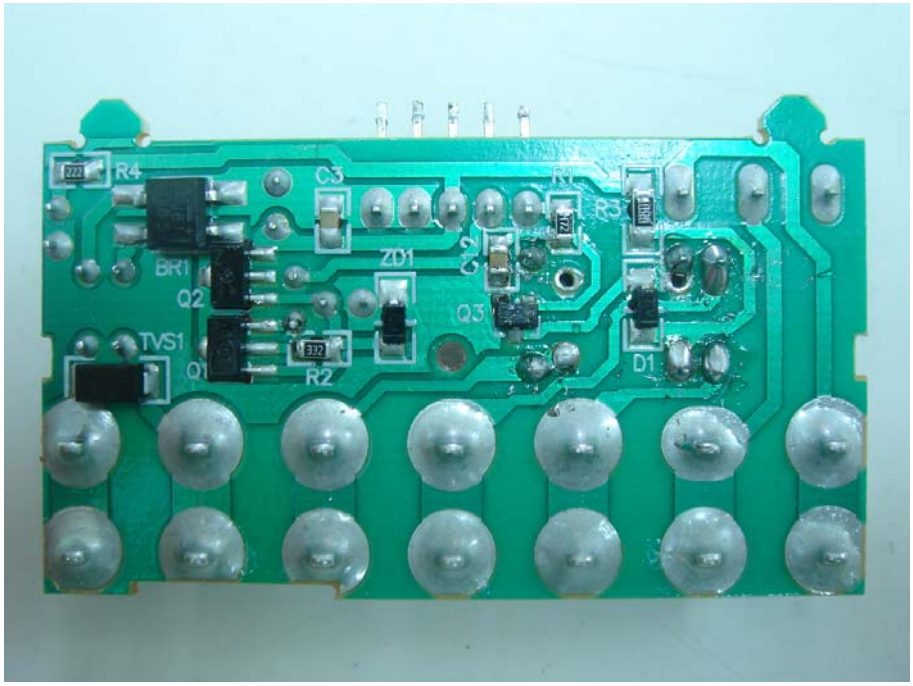


Front view of EUT's PCB 1-1

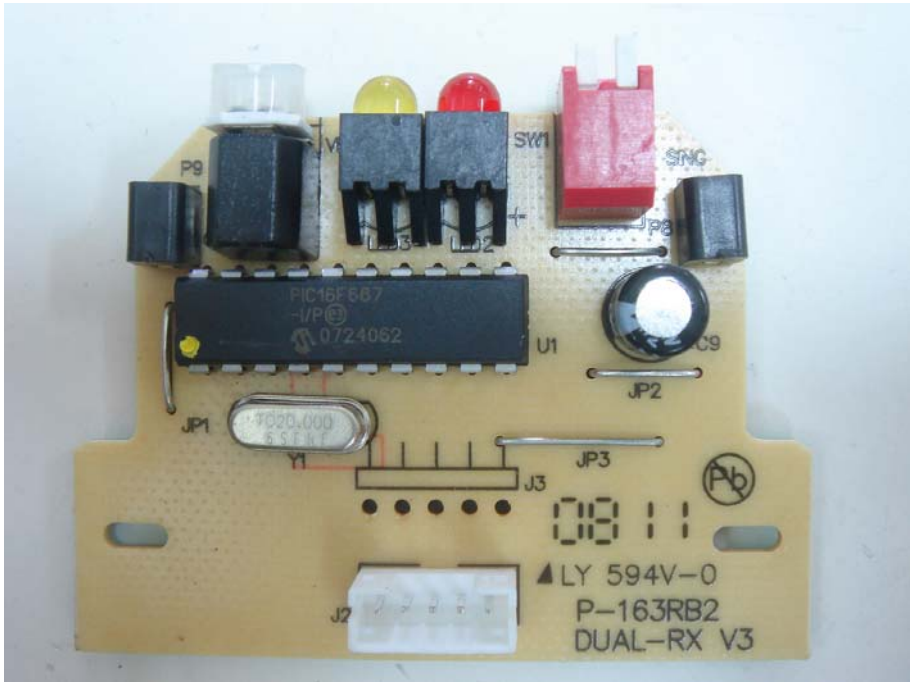
Rear view of EUT’s PCB 1-2



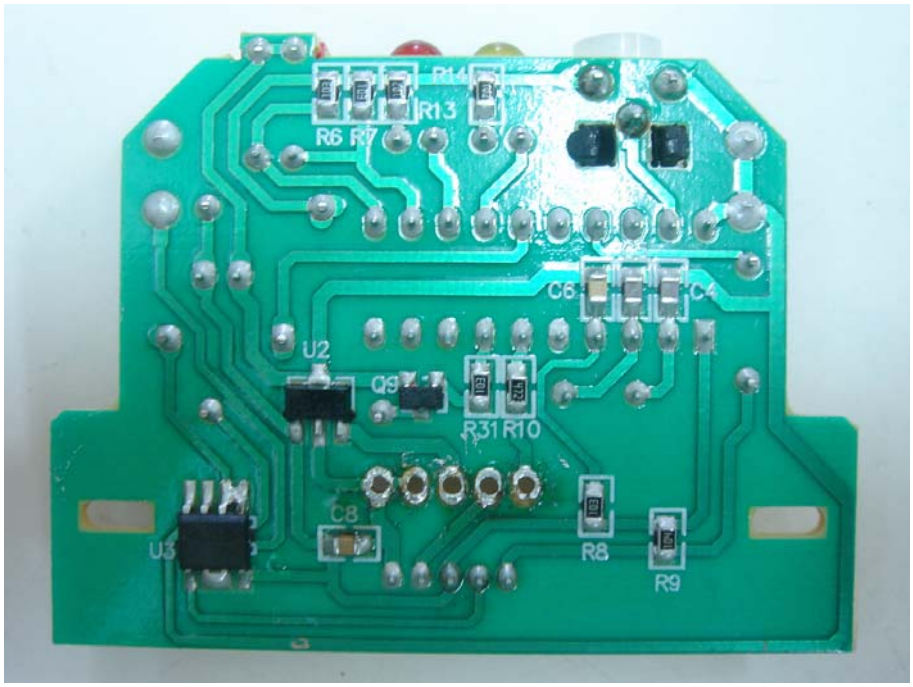
Front view of EUT’s PCB 2-1



Rear view of EUT's PCB 2-2



Front view of EUT's PCB 3-1



Rear view of EUT's PCB 3-2

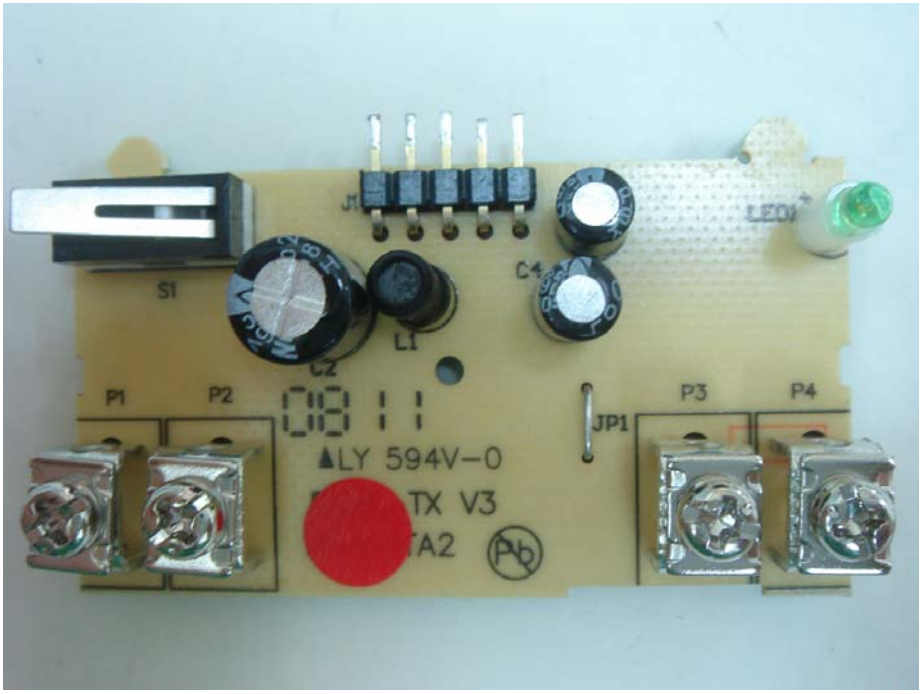
Front view of EUT (TX)

Rear View of EUT

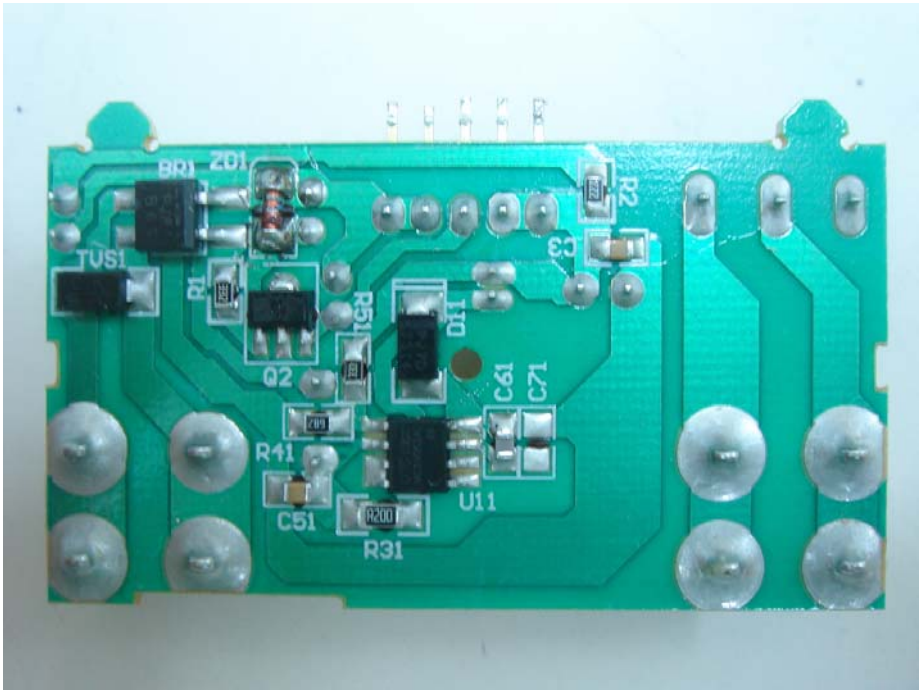
Inside View of EUT

Front view of EUT's PCB 1-1

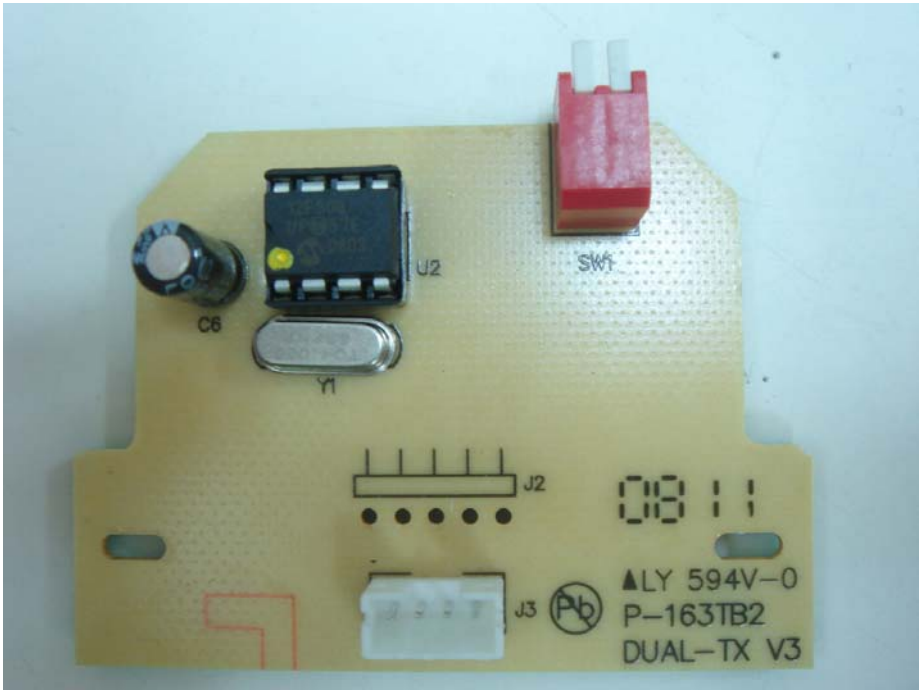
Rear view of EUT's PCB 1-2



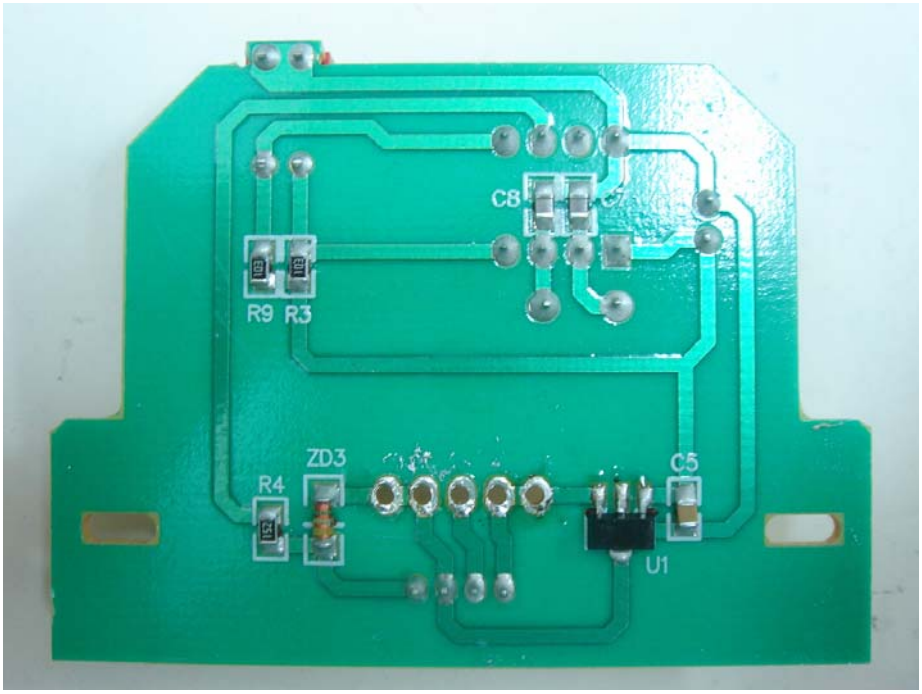
Front view of EUT's PCB 2-1



Rear view of EUT's PCB 2-2

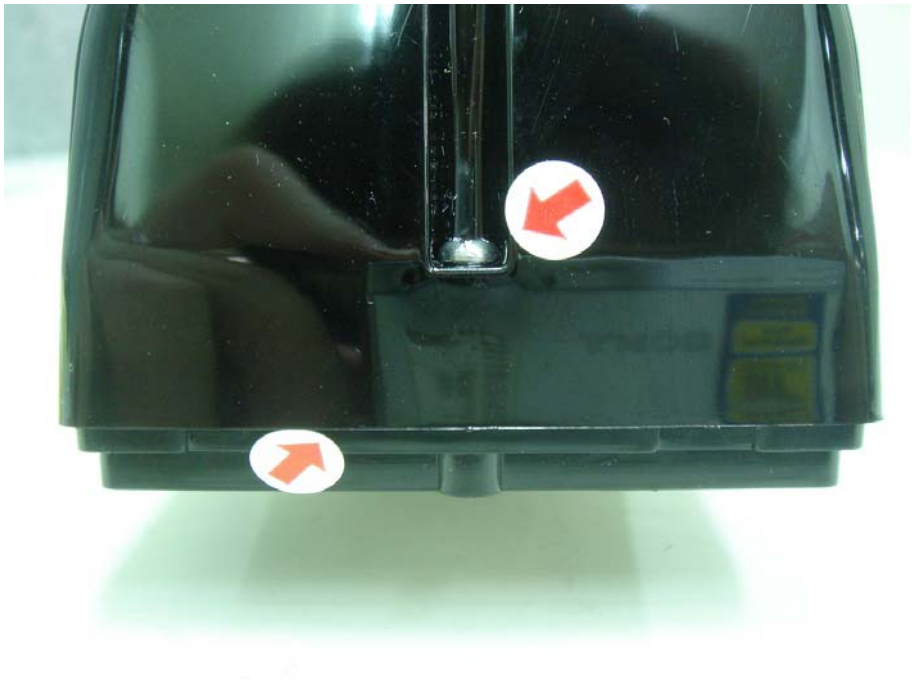


Front view of EUT's PCB 3-1



Rear view of EUT's PCB 3-2

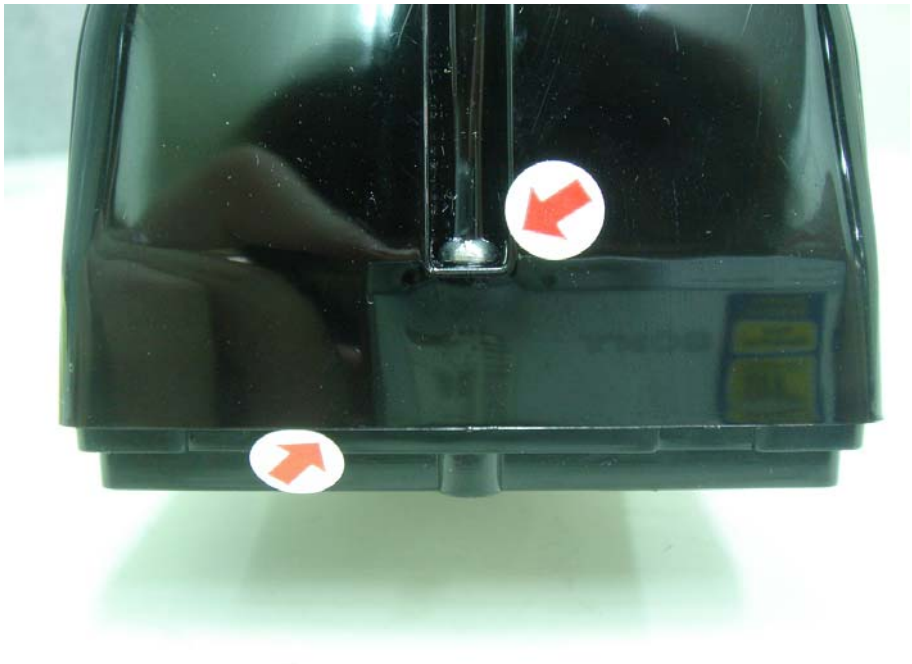
7 Photographs of ESD Test Point



View of ESD test point (RX)

View of ESD test point

View of ESD test point



View of ESD test point (TX)

View of ESD test point

View of ESD test point