

# Certificate of Test

**WE HEREBY CERTIFY THAT:**

*Certificate No.: R07122709E*

*Yuan Hsun Electric Co., Ltd.*

*No. 57, Chung He Rd, Zuo-Ying Dist., Kaohsiung City 813, Taiwan R.O.C.*

*Quad photobeam detector*

*Quad-200CS*

*Quad-150CS, Quad-100CS, Quad-50CS*



**AND KEEPS ALL REQUIREMENTS ACCORDING THE FOLLOWING REGULATIONS**

*Test Standards:*

*EN 55022:2006*

*EN 50130-4:1995: +A1:1998 +A2: 2003*

*IEC 61000-4-2:2001 IEC 61000-4-3:2007*

**IS IN COMPLIANCE TO THE EUROPEAN COUNCIL DIRECTIVE 2004/108/EEC  
AS AMENDED BY DIRECTIVES 92/31/EEC AND 93/68/EEC WITHIN CE MARKING  
REQUIREMENT.**

***Name of Laboratory : Matrix Test Laboratory***

***Site Location : 2F, No 146, Jian Yi Rd, Chung-Ho City, Taipei Hsien, Taiwan, R.O.C.***

***Issue Date : Mar.07, 2008***

***Approved by :***

A handwritten signature in black ink that reads 'Peter Chin'. The signature is written in a cursive, flowing style.

***/ Managing Director***

***This certification shall not be reproduced without the written approval of the laboratory.  
The certification is valid only in accordance with the test report No. R07122709E . The confirmation is valid only if  
the product is manufactured in accordance with the test report.***



*Declaration of Conformity*

We declare under our sole responsibility that the product designated in this Declaration complies with the following specifications and bears CE mark in accordance with the provisions of the Electromagnetic Compatibility (EMC) Directive 2004/1086/EEC as amended by Directives 92/31/EEC and 93/68/EEC within CE marking requirement.

**Standards:**

EN55022:2006

EN50130-4:2003

IEC 61000-4-2: 2001 IEC 61000-4-3: 2007

**Product** : Quad photobeam detector  
**Model** : Quad-200CS  
**Serial** : Quad-150CS, Quad-100CS, Quad-50CS  
**Issue Date** : May. 07, 2008  
**Applicant** : Yuan Hsun Electric Co., Ltd.  
**Address** : No. 57, Chung He Rd, Zuo-Ying Dist., Kaohsiung City 813,  
Taiwan R.O.C.

**Representative's Name** : \_\_\_\_\_ **/ Title** : \_\_\_\_\_

**Signature and Stamp** : \_\_\_\_\_



## EMC Testing Report



<b>Equipment Under Test :</b>	Quad photobeam detector
<b>Model Number :</b>	Quad-200CS
<b>Serial No. :</b>	Quad-150CS, Quad-100CS, Quad-50CS
<b>Applicant :</b>	Yuan Hsun Electric Co., Ltd.
<b>Address of Applicant :</b>	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,  
Taipei Hsien, Taiwan, R.O.C.  
TEL. : +886 02 2228-6610  
FAX. : +886 02 2228-6580

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# Verification

**Applicant :** Yuan Hsun Electric Co., Ltd.  
**Manufacturer :** Yuan Hsun Electric Co., Ltd.  
 (Yu Heng Electric Co., Ltd.)  
**Equipment Under Test :** Quad photobeam detector  
**Model No. :** Quad-200CS  
**Serial No. :** Quad-150CS, Quad-100CS, Quad-50CS  
**Sample received date :** 2008-04-30


**Test Standards :**

Emission:	Immunity:
<input checked="" type="checkbox"/> EN 55022:2006 Class B	<input checked="" type="checkbox"/> EN 50130-4:1995 +A1:1998 A2: 2003 <input checked="" type="checkbox"/> IEC 61000-4-2 <input checked="" type="checkbox"/> 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 50130-4 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:**  **Date:** 2008-05-07  
 Kay Wang/ ADM. Dept Staff

**Test Engineer:**  **Date:** 2008-05-05  
 Darren Wang/ ENG. Dept. Staff

**Approved:**  **Date:** 2008-05-07  
 Peter Chin/ Head of Laboratory

# 1 General Description

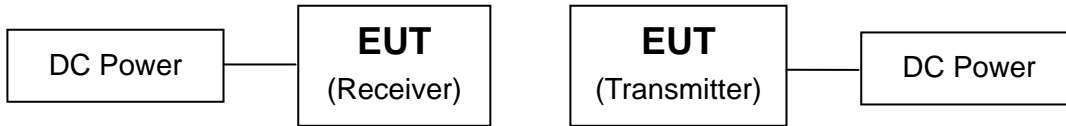
## 1.1 Description of EUT

<b>Equipment Under Test</b>	:	Quad photobeam detector
<b>Model Number</b>	:	Quad-200CS
<b>Serial Number</b>	:	Quad-150CS, Quad-100CS, Quad-50CS
<b>Applicant</b> <b>Address of Applicant</b>	:	Yuan Hsun Electric Co., Ltd. No. 57, Chung He Rd, Zuo-Ying Dist., Kaohsiung City 813, Taiwan R.O.C.
<b>Manufacturer</b> <b>Address of Manufacturer</b>	:	Yuan Hsun Electric Co., Ltd.(Yu Heng Electric Co., Ltd.) No. 57, Chung He Rd, Zuo-Ying Dist., Kaohsiung City 813, Taiwan R.O.C.
<b>Power Supply</b>	:	Input: 12~24Vac/dc
<b>Data Cable</b>	:	<input checked="" type="checkbox"/> N/A
<b>Description of EUT</b>	:	<p><b>Dimensions</b> : 387 mm X 113 mm X 110 mm (Receiver) 387 mm X 113 mm X 110 mm (Transmitter)</p> <p><b>Weight</b> : 1.3 kg/ 1.3 kg</p> <p><b>Intended function</b> : The EUT is a photobeam detector.</p> <p><b>Product Variant</b> : The manufacturer declares that the serial products share the identical circuit design. The difference between them is on the resistance of the resistor they applied respectively. Matrix only takes the responsibility to the test result of the main test sample.</p>

## 1.2 Test Supporting Units

Battery 12V \*2

## 1.3 Block Diagram



## 1.4 Description of Pre-Test Modes

1. Stand by mode. (Power on)
2. Operation mode. (Block the light beam to trigger the detection 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 Immunity Performance Criterion

There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the application of the discharges is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

The EUT shall also meet the acceptance criteria for the functional test, after the conditioning. And, the acceptance criteria for this functional test shall be that there is no change in the functioning of the equipment and no significant change in any measurement.

## 1.7 Test Facility

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

### 1.7.1 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 50130-4



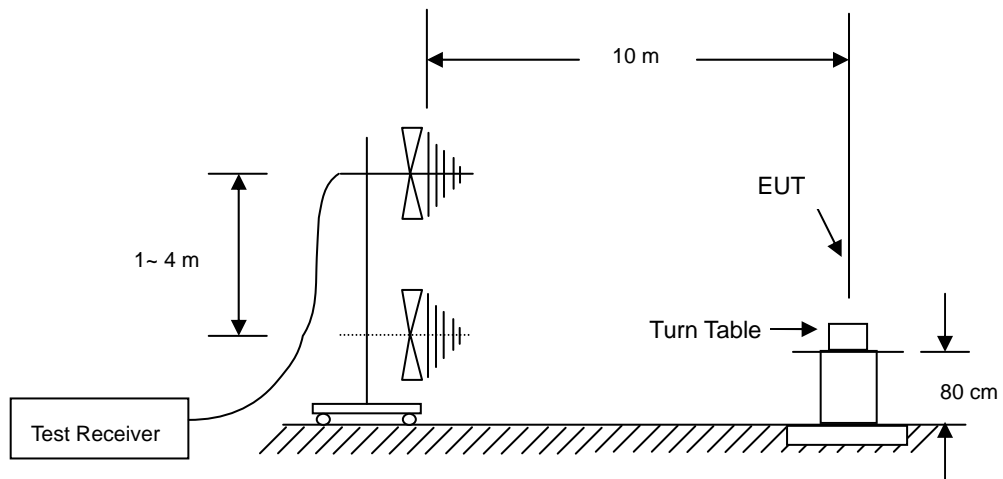
## 2 Radiated Emission Test

### 2.1 Test Instruments

Instrument	Manufacturer	Model	Serial No.	Date of Calibration
SPECTURM ANALZYER	HP	8595E	3829A03763	2007-07-19
Antenna	FRANKONIA	BTA-H	030001H	2007-03-25
Pre-Amplifier	Schaffner	CPA9231A	N/A	2007-04-24
RF Cable	MIYAZAKI	8D-F8	N/A	2007-04-30
EMI RECEIVER	AFJ	ER 55 CR/2.8	55309930144	2007-07-26

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)	<input type="checkbox"/> Class A	<input checked="" type="checkbox"/> 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 : 2008-05-02 Polarization : Horizontal  
 Temperature : 25°C Humidity : 50%  
 Test Mode : Operation mode

Frequency (MHz)	Factor (dB)	Meter Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV/m)	Margin (dB)
102.8	9.64	5.06	14.7	30	-15.3
129.4	9.45	6.15	15.6	30	-14.4
182.8	13.83	6.77	20.6	30	-9.4
301.6	13.29	6.21	19.5	37	-17.5
471.4	16.46	5.84	22.3	37	-14.7
684.8	20.68	0.12	20.8	37	-16.2

Remark : All readings are Quasi-Peak values.

### Radiated Emission Test Data

Date of Tested : 2008-05-02 Polarization : Vertical  
 Temperature : 25°C Humidity : 50%  
 Test Mode : Operation mode.

Frequency (MHz)	Factor (dB)	Meter Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV/m)	Margin (dB)
102.8	9.64	9.96	19.6	30	-10.4
182.39	13.83	12.17	26	30	-4
224	13.1	7.3	20.4	30	-9.6
301.6	3.29	16.31	19.6	37	-17.4
471.4	16.46	4.14	20.6	37	-16.4
886	23.24	-2.14	21.1	37	-15.9

Remark : All readings are Quasi-Peak values.

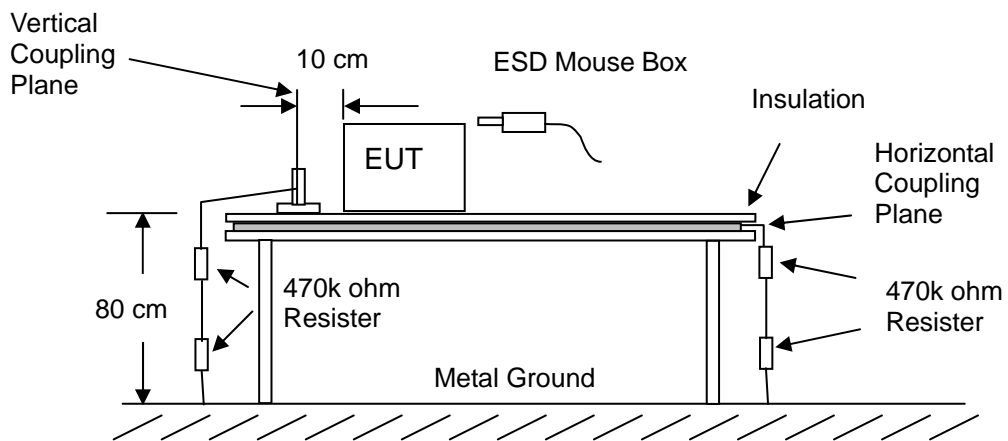
### 3 Electrostatic Discharge Immunity Test

#### 3.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Date of Calibration
ESD Mouse Box	EMC PARTNER	ESD MOUSE	ESD101-301	2007-08-01
TRANSIENT 2000	EMC PARTNER	TRA-2000	449	2007-08-01

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 & Criteria for compliance

##### 3.3.1 Test Levels

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

Note: The test voltages for the lower severity levels are included because all the lower severity levels must also be satisfied.

##### 3.3.2 Criteria for compliance

There shall be no damage, malfunction or change of status due to the conditioning. Flickering of an indicator during the application of the discharges is permissible, providing that there is no residual change in the EUT or any change in outputs, which could be interpreted by associated equipment as a change.

The EUT shall also meet the acceptance criteria for the functional test, after the conditioning. And, the acceptance criteria for this functional test shall be that there is no change in the functioning of the equipment and no significant change in any measurement.

### 3.4 Test Configuration

#### 3.4.1 Contact discharges to the conductive surfaces and coupling planes:

During the test, the time interval between successive single discharges should be longer than one second. One of the test points subjected to at least 10 indirect discharges to the center of the front edge of the Horizontal Coupling Plane (HCP). There were at least 10 single discharges with positive or negative polarities at the other same selected point.

There are also at least 10 indirect discharges to the Vertical Coupling Plane (VCP).

In case of contact discharge, the tip of the discharge electrode was touched the EUT before the discharge switch was operated.

The HCP was placed under the EUT. The discharge gun should be held perpendicular to the HCP and at a distance of 0.1 meter from the edge of EUT. The tip of the discharge electrode was touched the coupling plane before the discharge switch was operated.

The coupling plane of dimensions 0.5x0.5 meters was placed parallel to the EUT. The distance between the coupling plane and the surface of EUT was 0.1 meter. The discharge electrode was touched the coupling plane before the discharge switch was operated.

#### 3.4.2 Air discharge at insulating surfaces:

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

#### 3.4.3 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 as shown section 1.3.

3.5.2 Turn on the power of all equipment.

3.5.3 Activate the Operation mode, and make sure that the EUT is in its operating condition

3.5.4 Start the test. Monitor the EUT during the test period to detect any change in status.

### 3.6 Test Result

#### 3.6.1 Environment Condition :

Temperature	Humidity	Atmospheric Pressure
24°C	50%RH	1012mbar

#### 3.6.2 Observation of direct discharge

Test points: 1. Surface of case. 2. Junction of case. 3. Power Cable. 4. Screws.

Type of Discharge	Test Specification				Verdict
	Test Level	Polarity	Test Point	Number of discharge	
Air Discharge	2,4,8 (KV)	±	1-4	10/ per point	Pass
Contact Discharge	2,4,6 (KV)	±	4	10/ per point	Pass
Remark: 1. No Temporary degradation has been observed during the application of air discharge. 2. No Temporary degradation has been observed during the application of contact discharge.					

Note: The selected points were marked with red labels on the EUT.

#### 3.6.3 Observation of indirect discharge

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

Type of Discharge	Test Specification				Verdict
	Test Level	Polarity	Test Point	Number of discharge	
HCP application	2,4,6 (KV)	±	1~4	10/ per point	Pass
VCP application	2,4,6 (KV)	±	1~4	10/ per point	Pass
Remark: 1. No Temporary degradation has been observed during the application of HCP. 2. No Temporary degradation has been observed during the application of VCP.					

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 EN50130-4:1995/ A1:1998/ A2:2003.

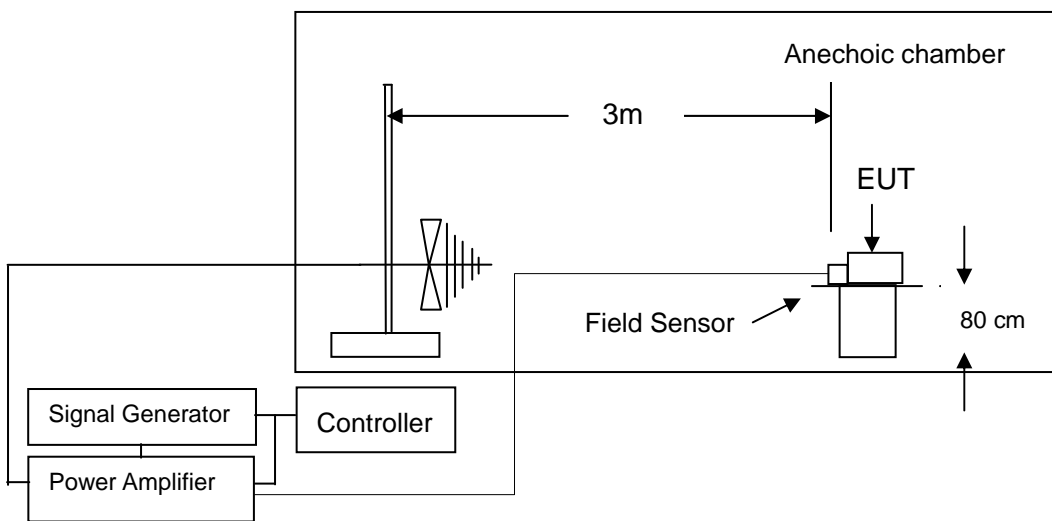
## 4 Radio-frequency, Electromagnetic field Immunity Test

### 4.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Date of Calibration
Signal Generator	HP	8648C	N/A	2007-11-22
Power Amplifier	IFI	CMX50	N/A	2007-10-15
Field Probe	EMCO	7201	N/A	2007-10-05
Power Antenna	EMCO	3142	N/A	2007-10-15

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

### 4.2 Configuration of Instrument Setup



### 4.3 Test Levels & Test Require

4.3.1 Test Level : 1, 3, 10 V/m

4.3.2 Criteria for compliance:

For components of CCTV systems, where the status is monitored by observing the TV picture, then deterioration of the picture is allowed at 10V/m, providing:

- there is no permanent damage or change to the EUT (e.g. no corruption of memory or changes to programmable settings etc.);
- at 3 V/m, any deterioration of the picture is so minor that the system could still be used; and
- there is no observable deterioration of the picture at 1 V/m.

## 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, and make sure that the EUT is in its operating condition
- 4.5.4 Start the test. Monitor the EUT during the test period to detect any change in status

## 4.6 Test Result

- 4.6.1 Environment:

Temperature	Humidity	Atmospheric Pressure
23°C	51%RH	1008mbar

- 4.6.2 Observation of test:

Type of modulation	Test Specification			Verdict
	Field strength	Frequency range	Modulation	
Amplitude modulation	10 V/m	80 to 2000 MHz	80%, 1KHz, sinusoidal	Pass
Pulse modulation:	10 V/m	80 to 2000 MHz	1Hz (0.5s ON/ 0.5s OFF)	Pass
Remark: No temporary degradation or less of function has been observed through out the entire time interval of the test.				

### PASS

The test result shows that the EUT compliant with the test requirement specified in EN50130-4:1995/ A1:1998/ A2:2003.



## 5 Photographs of Test

### 5.1 Radiated Emission Test

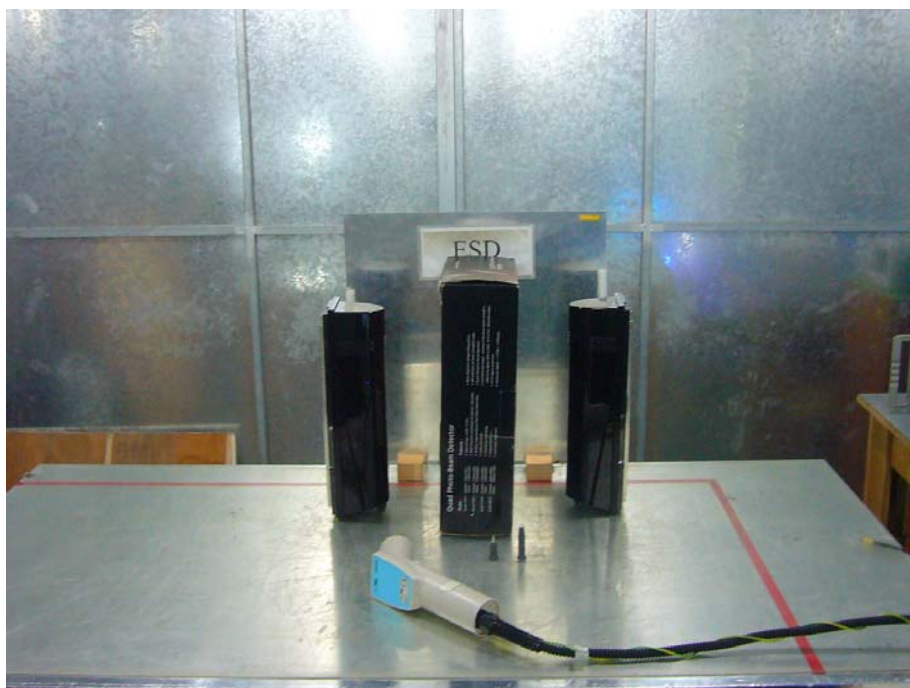


Front View



Rear View

## 5.2 Electrostatic Discharge Immunity Test



## 5.3 Radio-frequency, Electromagnetic field Immunity Test



## 6 Photographs of EUT



Front View of EUT (Receiver)



Rear view of EUT (Receiver)



Inside view of EUT (Receiver)



Front view of EUT's PCB 1-1



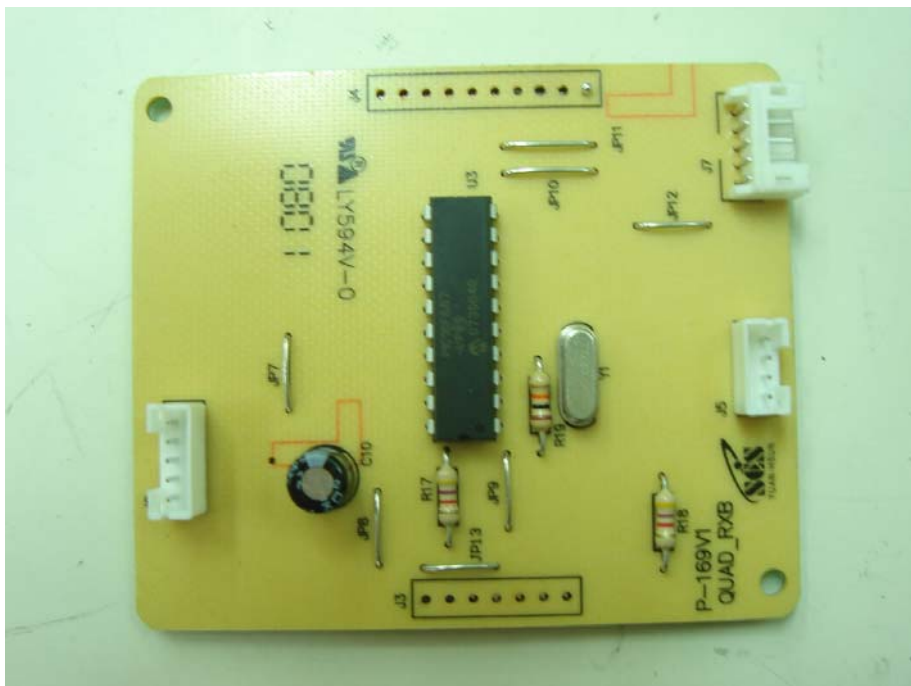
Rear view of EUT's PCB 1-2



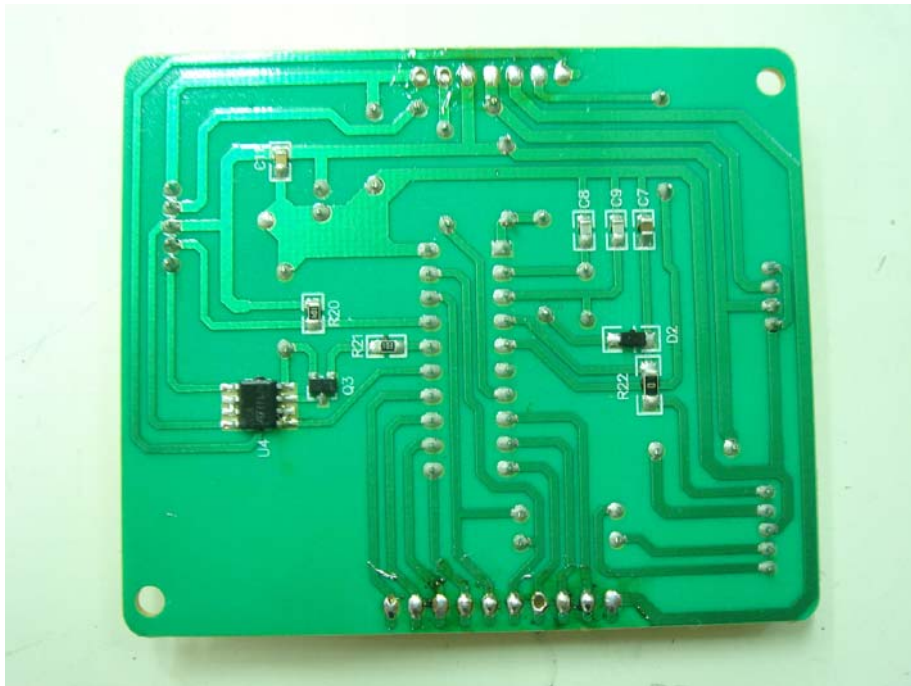
Front view of EUT's PCB 2-1



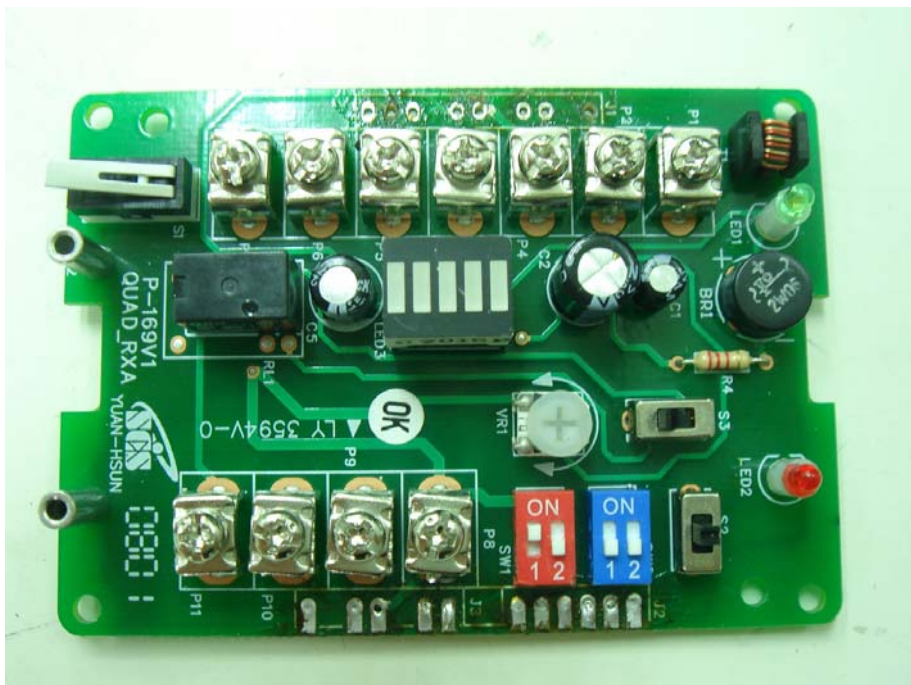
Rear view of EUT's PCB 2-2



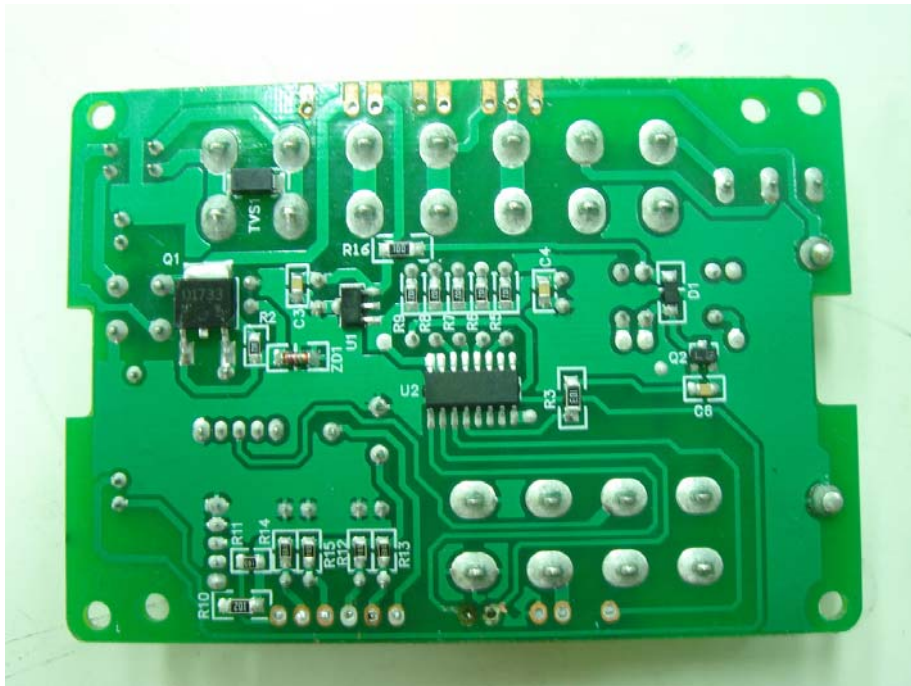
Front view of EUT's PCB 3-1



Rear view of EUT's PCB 3-2



Front view of EUT's PCB 4-1

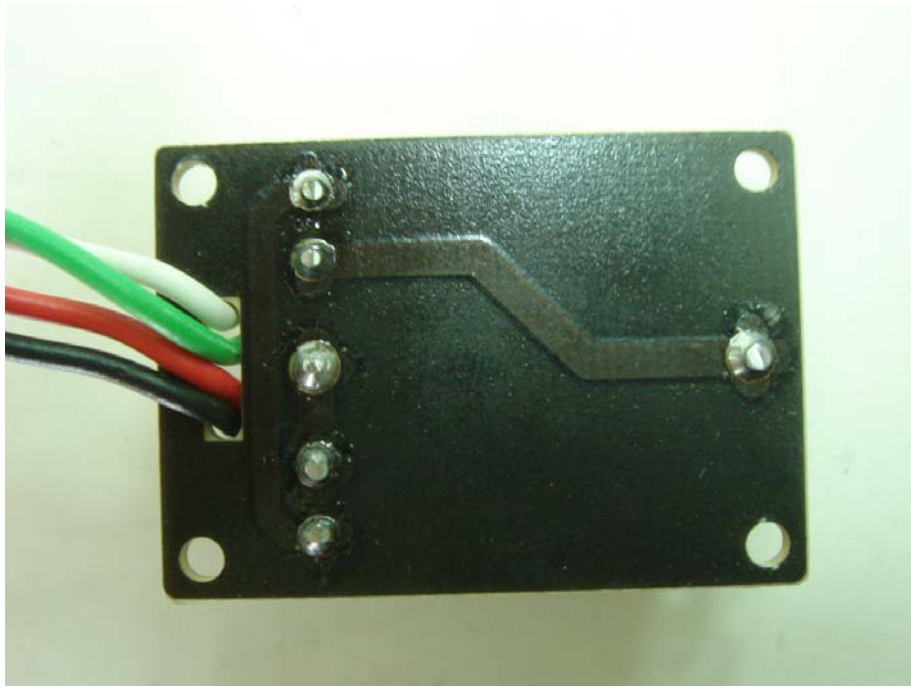


Rear view of EUT's PCB 4-2

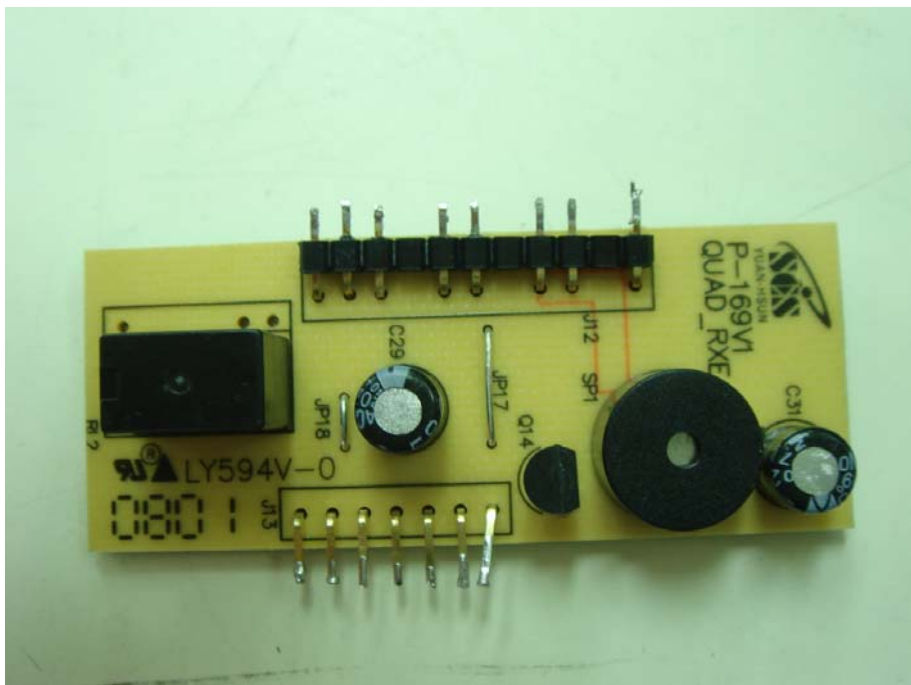


Front view of EUT's PCB 5-1

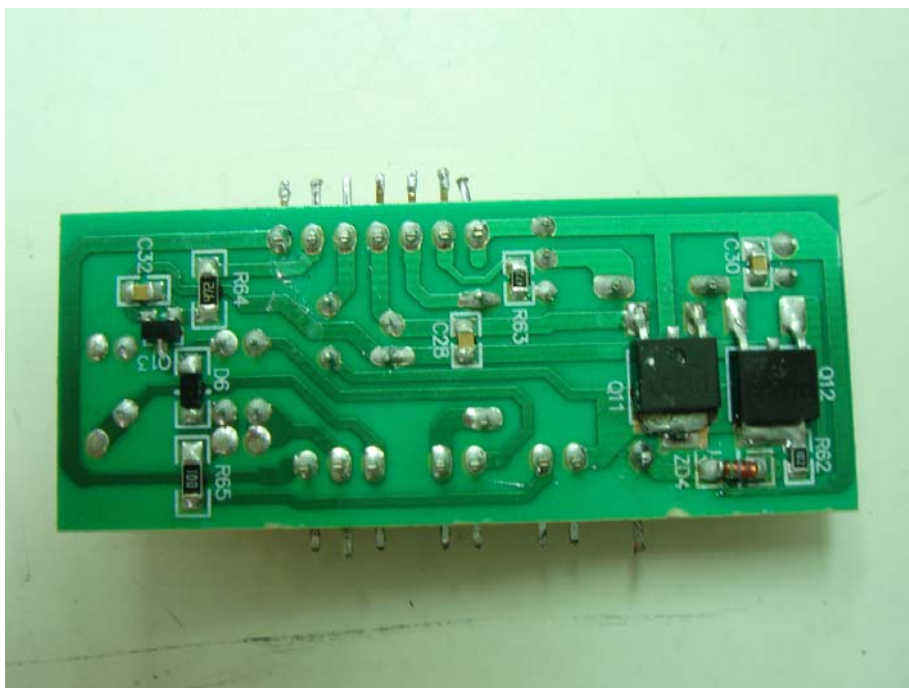




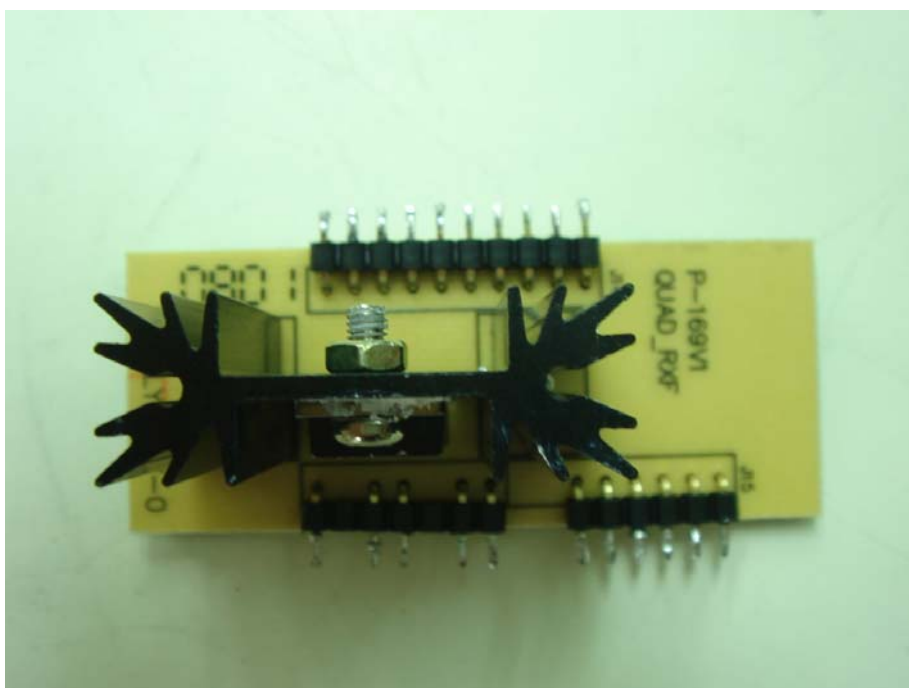
Rear view of EUT's PCB 5-2



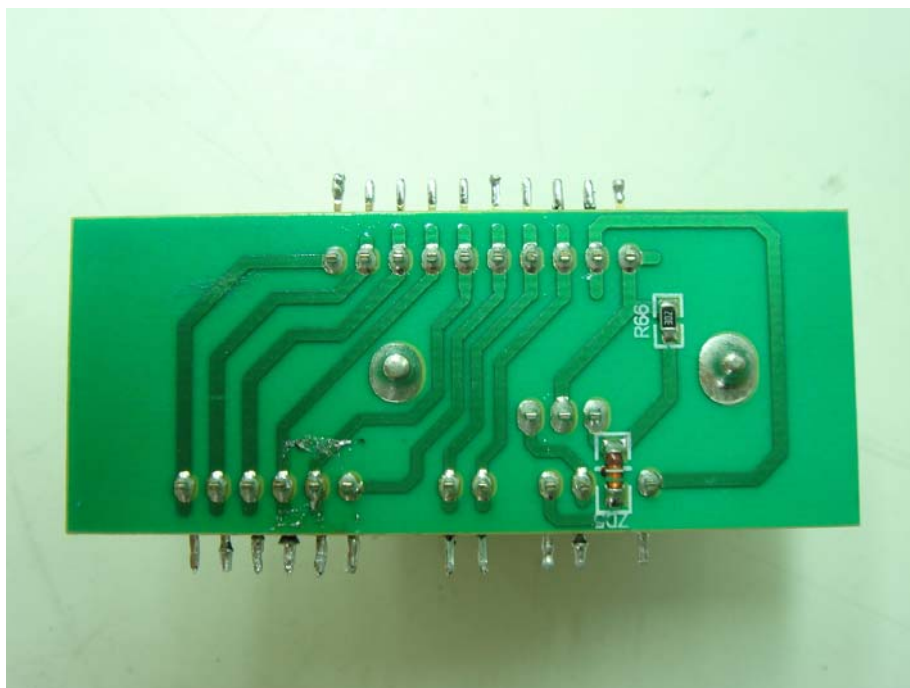
Front view of EUT's PCB 6-1



Rear view of EUT's PCB 6-2



Front view of EUT's PCB 7-1



Rear view of EUT's PCB 7-2



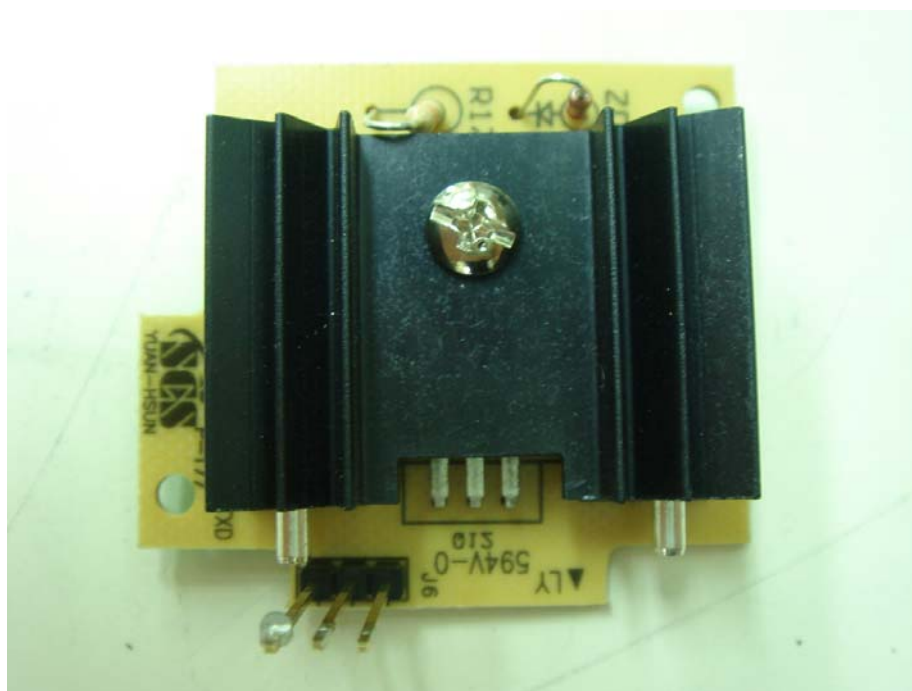
Front View of EUT (Transmitter)



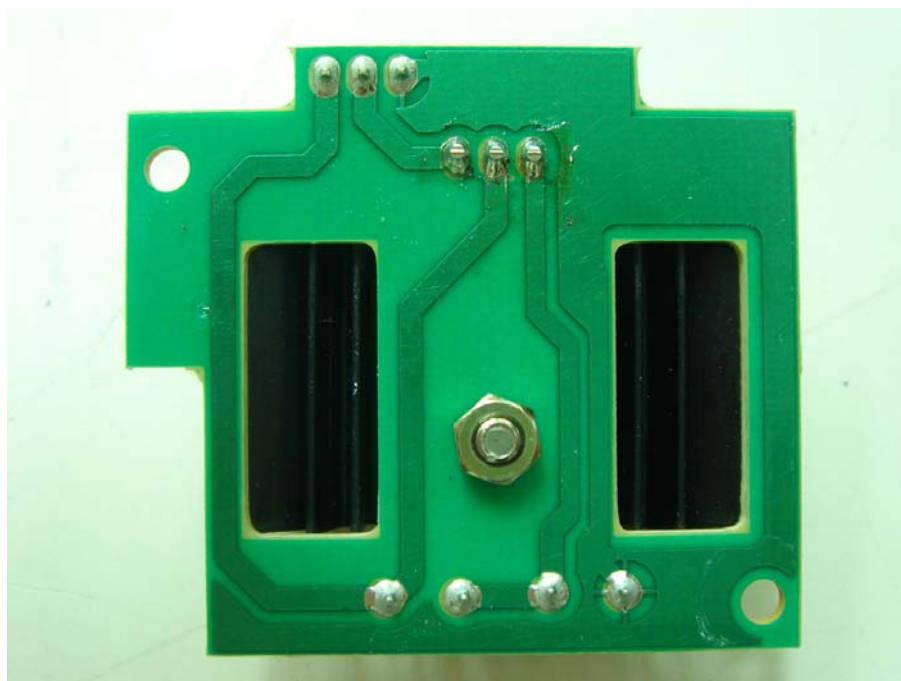
Rear view of EUT (Transmitter)



Inside view of EUT (Transmitter)



Front view of EUT's PCB 1-1

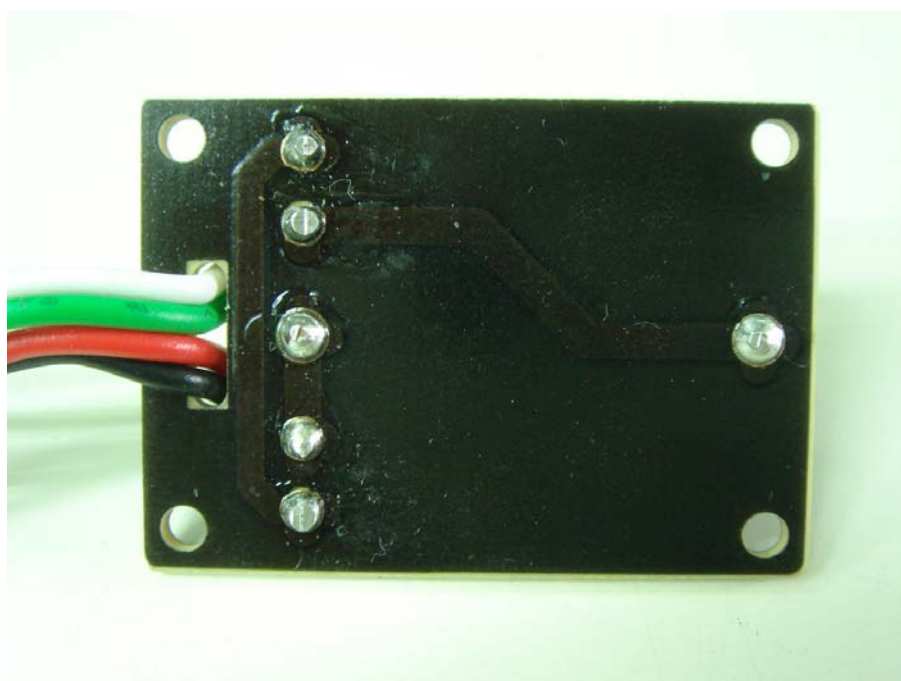


Rear view of EUT's PCB 1-2





Front view of EUT's PCB 3-1



Rear view of EUT's PCB 3-2

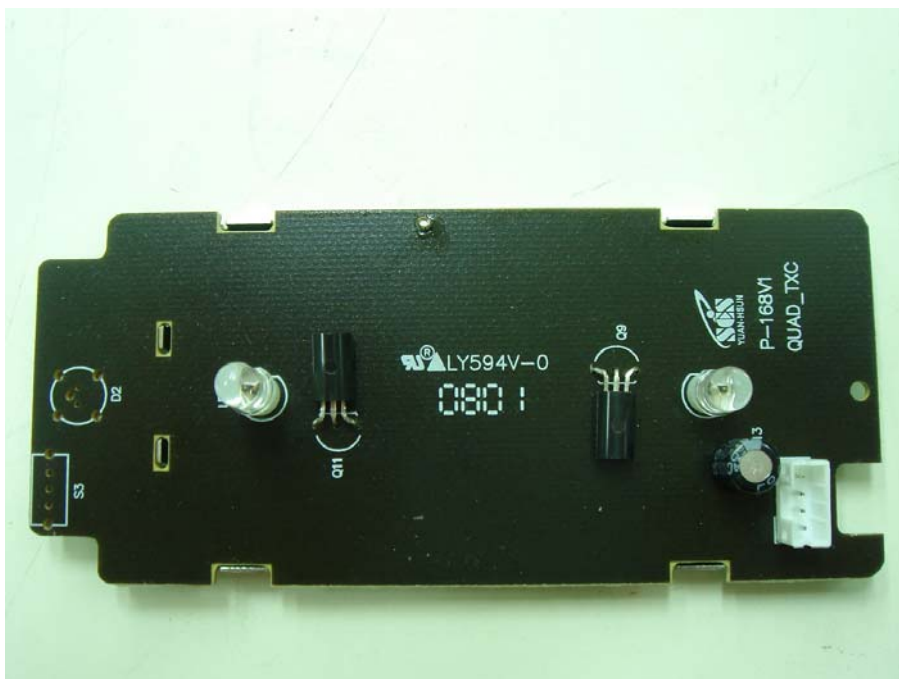


Front view of EUT's PCB 4-1



Rear view of EUT's PCB 4-2





Front view of EUT's PCB 5-1



Rear view of EUT's PCB 5-2

## 7 Photographs of Serial



View of Serial(RX)



View of Serial(TX)

## 8 Photographs of ESD Test Point



View of ESD test point



View of ESD test point



View of ESD test point

View of ESD test point