R&TTE (EMC) TEST REPORT
for
SMART-GROUP (Dongguan Shima Electronics Co., Ltd.)

TRAIL CLICK
Model No.: SB-3R-TC, SB-2R-TC, SB-HVAC-TC, SB-1D1R1F-TC, SB-2D1R-TC, SB-1D2R-TC, SB-1D1R-TC

Prepared for	:	SMART-GROUP (Dongguan Shima Electronics Co., Ltd.)
Address	:	No. 135, Huancheng Road, Mawu Village, Qiaoli, Changping Town, Dongguan City, Guangdong Province, China

Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
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Report Number	:	201307727E
Date of Test	:	Jul. 12~ 18, 2013
Date of Report	:	Jul. 26, 2013

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TEST REPORT

Applicant	:	SMART-GROUP (Dongguan Shima Electronics Co., Ltd.)
Manufacturer	:	SMART-GROUP (Dongguan Shima Electronics Co., Ltd.)
EUT	:	TRAIL CLICK
Model No.	:	SB-3R-TC, SB-2R-TC, SB-HVAC-TC, SB-1D1R1F-TC, SB-2D1R-TC, SB-1D2R-TC, SB-1D1R-TC
Serial No.	:	N/A
Trade Mark	:	SMART-BUS SMART-BUS/ PREUSSEN/ S-MESH
Rating	:	DC 24V, 6-50mA

Measurement Procedure Used:

ETSI EN 301 489-1 V1.9.2 (2011-09)
ETSI EN 301 489-3 V1.4.1 (2002-08)

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 301 489-1 & EN 301 489-3 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Jul. 12~ 18, 2013

Prepared by : Rock Zeng
(Engineer / Rock Zeng)

Reviewer : Sally Zhang
(Project Manager / Sally Zhang)

Approved & Authorized Signer : Tom Chen
(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: TRAIL CLICK
Model Number	: SB-3R-TC, SB-2R-TC, SB-HVAC-TC, SB-1D1R1F-TC, SB-2D1R-TC, SB-1D2R-TC, SB-1D1R-TC (Note: The above samples are same except the model number & appearance, so we prepare "SB-2D1R-TC" for EMC test only.)
Test Power Supply	: DC 24V
Frequency	: 433.920MHz
Antenna Gain	: 0 dBi
Applicant	: SMART-GROUP (Dongguan Shima Electronics Co., Ltd.)
Address	: No. 135, Huancheng Road, Mawu Village, Qiaoli, Changping Town, Dongguan City, Guangdong Province, China
Manufacturer	: SMART-GROUP (Dongguan Shima Electronics Co., Ltd.)
Address	: No. 135, Huancheng Road, Mawu Village, Qiaoli, Changping Town, Dongguan City, Guangdong Province, China
Date of receiver	: Jul. 09, 2013
Date of Test	: Jul. 12~ 18, 2013

1.2. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS - LAB Code: L3503
Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021
Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, July 10, 2013.

IC-Registration No.: 8058A-1
Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, February 22, 2013.

Test Location
All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.3. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.3dB
Conduction Uncertainty	:	Uc = 3.4dB

1.4. Test Standards

ETSI EN 301 489-1 V1.9.2 (2011-09)
Electromagnetic compatibility and Radio spectrum Matters (ERM);
Electromagnetic Compatibility (EMC) standard for radio equipment and services;
Part 1: Common technical requirements
ETSI EN 301 489-3 V1.4.1 (2002-08)
Electromagnetic Compatibility and Radio Spectrum Matters (ERM);
ElectroMagnetic Compatibility (EMC) Standard for Radio Equipment and Services;
Part 3: Specific Conditions for Short-Range Devices (SRD) Operating on Frequencies between 9 KHz and 40 GHz V1.4.1

2. MEASURING DEVICE AND TEST EQUIPMENT

The following test equipments were used during test:

2.1. Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
7	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 23, 2013	1 Year
8	Trilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	1 Year
9	Pre-amplifier	Compliance Direction	PAP-0203	22008	Apr. 23, 2013	1 Year
10	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

Radiation Uncertainty : Ur = 4.3dB

2.2. Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	KIKUSUI	KES4021	LJ003477	Apr. 25, 2013	1 Year

2.3.R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 29, 2013	1 year
2.	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	May 29, 2013	1 year
3.	Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120 L3F	332	May 29, 2013	1 year
4.	Power Amplifier	PRANA	AP32MT215	N/A	May 29, 2013	1 year
5.	Power Amplifier	MILMEGA	AS0102-55	N/A	May 29, 2013	1 year
6.	Signal Generator	AEROFLEX	2023B	N/A	May 29, 2013	1 year
7.	Field Strength Meter	HOLADAY	HI-6005	N/A	May 29, 2013	1 year
8.	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 29, 2013	1 year
9.	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 29, 2013	1 year

3. Technical Test

3.1. Summary of Test Results

No Deviations from the technical specification(s) were ascertained in the course of the tests Performed	
Final Verdict: (only "Passed" if all single measurements are "Passed")	Passed

3.2. Test Report

Emission (EMI)

EMI Phenomenon	Port	Requirement		EUT Setup	Result	Applicability
		Standard	Basic Standard			
Conducted Interference Voltage	AC Mains	ETSI EN 301 489-1 Clause 8.4	EN 55022: 2010	Refer to Section 5	N/A	Not Applicable
Conducted Interference Voltage	DC Mains	ETSI EN 301 489-1 Clause 8.3	EN 55022: 2010	Refer to Section 4	N/A	Not Applicable
Radiated Interference Field Strength 30~1000MHz	Enclosure	ETSI EN 301 489-1 Clause 8.2	EN 55022: 2010	Refer to Section 4	Complies	Applicable
Harmonic Current Emissions	AC Mains Input Port	ETSI EN 301 489-1 Clause 8.5	EN 61000-3-2: 2008+A1:2009 +A2:2009	Refer to Section 5	N/A	Not Applicable
Flicker & Voltage Fluctuation	AC Mains Input Port	ETSI EN 301 489-1 Clause 8.6	EN 61000-3-3: 2008	Refer to Section 5	N/A	Not Applicable

Immunity (EMS)

EMS Phenomenon	Port	Requirement		EUT Setup	Result	Applicability
		Standard	Basic Standard			
Electronic Discharge (ESD)	Enclosure	ETSI EN 301 489-1 Clause 9.3	IEC 61000-4-2:2008	Refer to Section 5	Complies	Applicable
RF-Electro-Magnetic Field (80-1000MHz and 1400-2000 MHz)	Enclosure	ETSI EN 301 489-1 Clause 9.2	IEC 61000-4-3:2010	Refer to Section 5	Complies	Applicable
Fast Transients, Burst	Power Line	ETSI EN 301 489-1 Clause 9.4	IEC 61000-4-4:2012	Refer to Section 5	N/A	Not Applicable
Surge	Power Line (1 Phase)	ETSI EN 301 489-1 Clause 9.8	IEC 61000-4-5:2008	Refer to Section 5	N/A	Not Applicable

Transients & Surges Vehicular Environment	Power Line (Car Charge)	ETSI EN 301 489-1 Clause 9.6	ISO 7367-1: 2002+A1:2008 ISO 7367-2: 2004+A1:2008	N/A	N/A	Not Applicable
RF Common Mode (0.15-80MHz)	Power Line	ETSI EN 301 489-1 Clause 9.5	IEC 61000-4-6:2009	Refer to Section 5	N/A	Not Applicable
Vol. Dips, Interruptions & Fluctuations (AC Power)	Power Line	ETSI EN 301 489-1 Clause 9.7	IEC 61000-4-11:2004	Refer to Section 5	N/A	Not Applicable

N/A=Not Applicable

- Performance criteria A for immunity tests with phenomena of a continuous nature;
  Communication between the Tx and Rx in the front of pings should not drop during the test.
- Performance criteria B for immunity tests with phenomena of a transient nature;
  N/A
- Performance criteria C for immunity tests with power interruptions exceeding a certain time.
  N/A
  Note: For details see subclause 7 ETSI EN 301 489-3.

3.2.1. Emission Test – Radiated Emissions

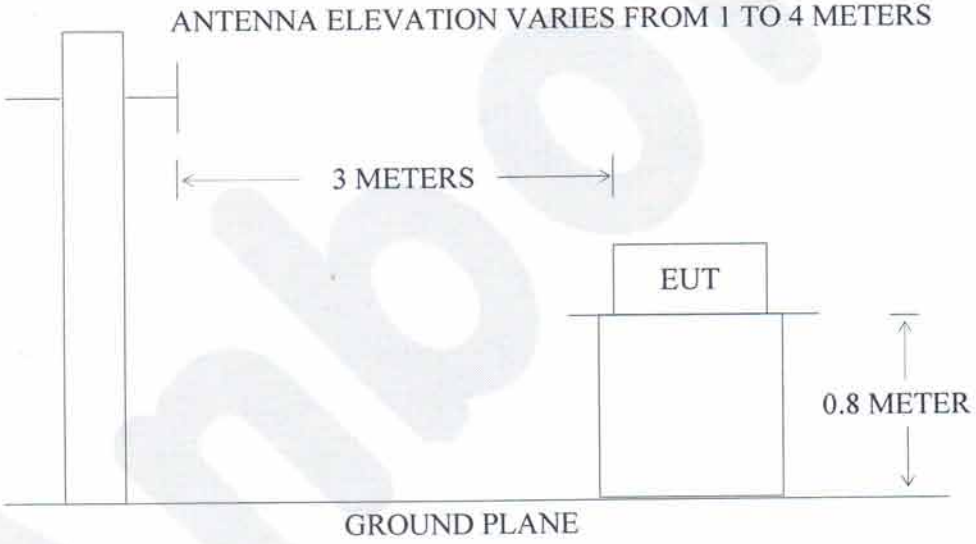
This test assesses that ability of ancillary equipment to limit their internal noise from being radiated from the enclosure.

According to EMC basic standard (EN 55022)

Measurement according to EMC basic standard, The test results correspond to the 3m-OATS result. The EUT and it simulators are placed on a turntable which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to EN 55013 and EN 55022 on radiated measurement.
Radiated emissions were invested over the frequency range from 30MHz to 1GHz using a receiver bandwidth of 120kHz. Radiated was performed at an antenna to EUT distance of 3 meters.

Test Setup

EUT was setup on a 3m standard OATS



Limits

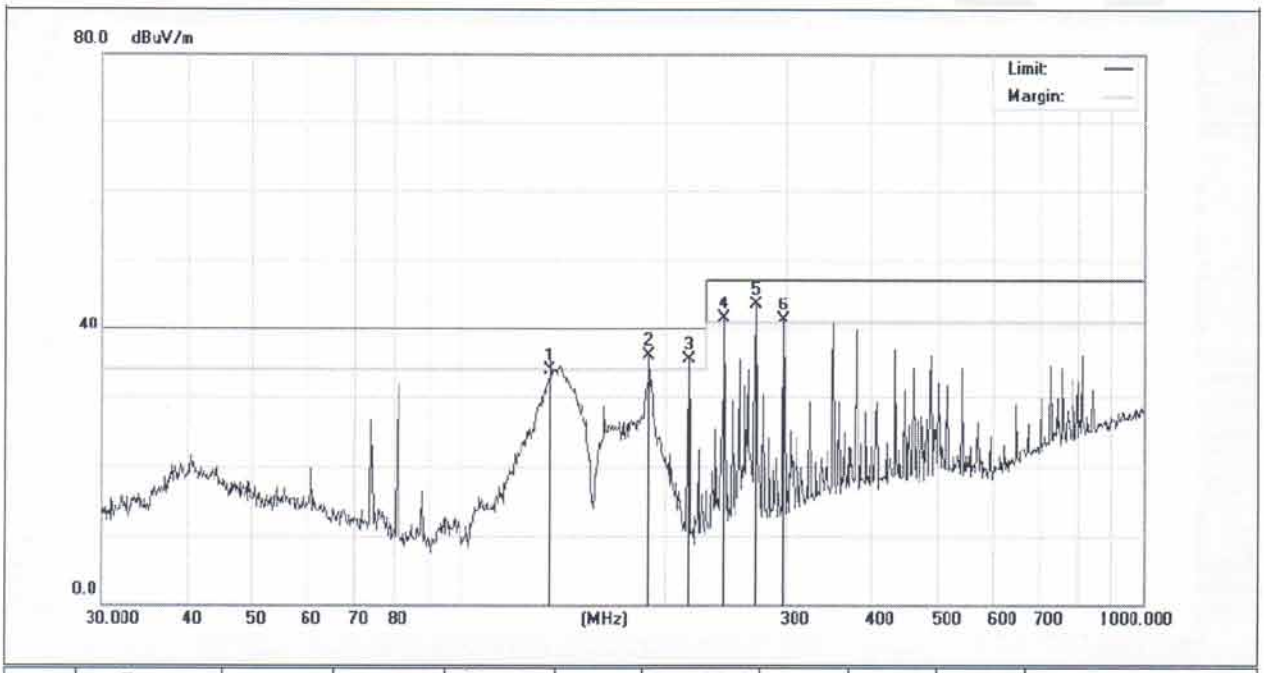
Freq. Range (MHz)	Distance (m)	Field Strength (dBμV/m)
30 – 230	3	40
230 – 1000	3	47

Results

Receiving Antenna Directed to	Angle of Turntable	Hori. / Vert.	Comment	Result (Passed / Failed)
--	0° - 360°	H/V	EUT Operating Normal	Passed

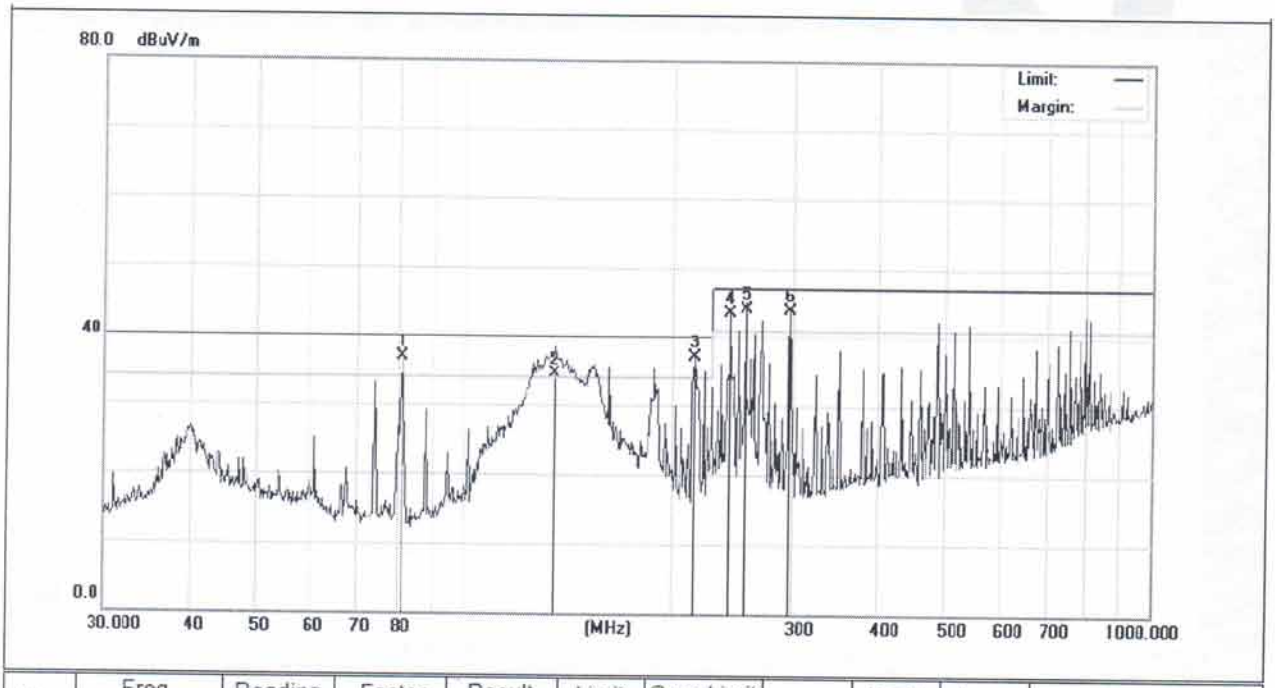
Please refer the following pages.

Job No.:	**AT1307667S**	**Polarization:**	**Horizontal**
Standard:	**(RE)EN 301 489_3m**	**Power Source:**	**DC 24V**
Test item:	**Radiation Test**	**Date:**	**2013/07/12**
Temp.(C)/Hum.(%RH):	**24.3(C)/55%RH**	**Time:**	**22/47/52**
EUT:	**TRAIL CLICK**	**Test By:**	**Rock Zeng**
Model:	**SB-2D1R-TC**	**Distance:**	**3m**
Note:	**ON**		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	135.0319	57.11	-23.15	33.96	40.00	-6.04	QP	300	0	
2	189.0742	57.21	-21.01	36.20	40.00	-3.80	QP	300	360	
3	216.0240	55.70	-20.27	35.43	40.00	-4.57	QP	300	0	
4	243.3771	59.84	-18.24	41.60	47.00	-5.40	QP	300	360	
5	270.3747	62.16	-18.59	43.57	47.00	-3.43	QP	300	0	
6	297.2241	59.09	-17.76	41.33	47.00	-5.67	QP	300	360	

Job No.:	**AT1307667S**	**Polarization:**	**Vertical**
Standard:	**(RE)EN 301 489_3m**	**Power Source:**	**DC 24V**
Test item:	**Radiation Test**	**Date:**	**2013/07/12**
Temp.(C)/Hum.(%RH):	**24.3(C)/55%RH**	**Time:**	**22/45/47**
EUT:	**TRAIL CLICK**	**Test By:**	**Rock Zeng**
Model:	**SB-2D1R-TC**	**Distance:**	**3m**
Note:	**ON**		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	80.9274	56.59	-19.68	36.91	40.00	-3.09	QP	100	360	
2	135.0319	52.58	-18.15	34.43	40.00	-5.57	QP	100	0	
3	216.0240	52.47	-15.27	37.20	40.00	-2.80	QP	100	360	
4	243.3771	57.59	-14.07	43.52	47.00	-3.48	QP	100	0	
5	256.5210	58.04	-14.01	44.03	47.00	-2.97	QP	100	360	
6	297.2241	58.58	-14.76	43.82	47.00	-3.18	QP	100	0	

3.2.2. Immunity Test – Electrostatic Discharge

According to EMC basic standard (IEC 61000-4-2)

- Type of Port: Enclosure
- Performance Criterion: CT/CR
  For the table top EUT the distance to the reference ground plane should be 80cm.
  Direct contact discharge on conducting surfaces of EUT
  Indirect air discharge on insulating surfaces of EUT
  ±2kV, ±4kV direct discharge & ±2kV, ±4kV, ±8kV air discharge
- Test Modes: ON

Test Results

Item	Contact Discharge to conducted surfaces and to coupling planes		Air Discharge at insulating surfaces
	Direct Contact Discharge	Indirect Contact Discharge	
Test Voltage	Reaction of EUT / Result	Reaction of EUT / Result	Reaction of EUT / Result
+2kV	n.r.r. Passed	n.r.r. Passed	n.r.r. Passed
-2kV	n.r.r. Passed	n.r.r. Passed	n.r.r. Passed
+4kV	n.r.r. Passed	n.r.r. Passed	n.r.r. Passed
-4kV	n.r.r. Passed	n.r.r. Passed	n.r.r. Passed
+6kV	-	-	-
-6kV	-	-	-
+8kV	-	-	n.r.r. Passed
-8kV	-	-	n.r.r. Passed

Remarks: n.r.r. = no reaction recognized
Performance Criteria A observed and No any function degraded during the tests.

3.2.3. Immunity Test – Radiated, RF Electromagnetic Fields

According to EMC basic standard (IEC 61000-4-3)

- Type of Port: Enclosure
- Performance Criterion: CT/CR
- The distance between the turn-table axis and TX&RX antenna is 3m.
- Field strength = 3V/m
- Start Frequency: 80MHz ~ 1000MHz, 1400MHz ~ 2700 MHz
- Frequency Step = lin 1MHz
- Modulation = AM, 400Hz, 1kHz, 80%
- Test Modes: ON

Results

Frequency (MHz)	Antenna Polarity	Radiation to	Reaction of the EUT During and after test	Result
80-1000, 1400-2700	Horizontal	Front	No reactions recognized	Passed
80-1000, 1400-2700	Vertical	Front	No reactions recognized	Passed
80-1000, 1400-2700	Horizontal	Rear	No reactions recognized	Passed
80-1000, 1400-2700	Vertical	Rear	No reactions recognized	Passed
80-1000, 1400-2700	Horizontal	Left	No reactions recognized	Passed
80-1000, 1400-2700	Vertical	Left	No reactions recognized	Passed
80-1000, 1400-2700	Horizontal	Right	No reactions recognized	Passed
80-1000, 1400-2700	Vertical	Right	No reactions recognized	Passed

Note: Performance criteria A observed.

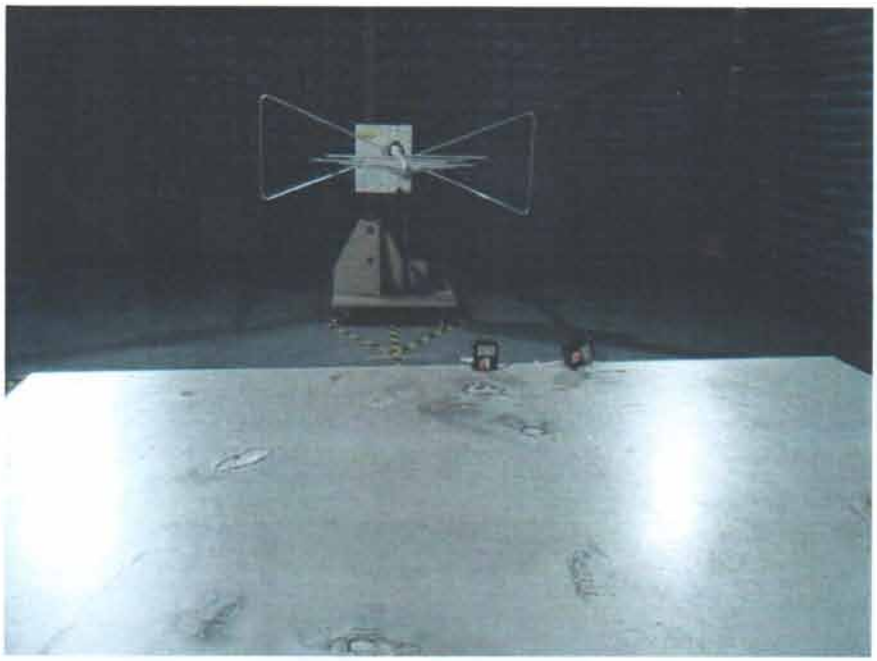
Test Procedure

The EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters. Both horizontal and vertical polarization of the antenna and four sides of the EUT are set on measurement.

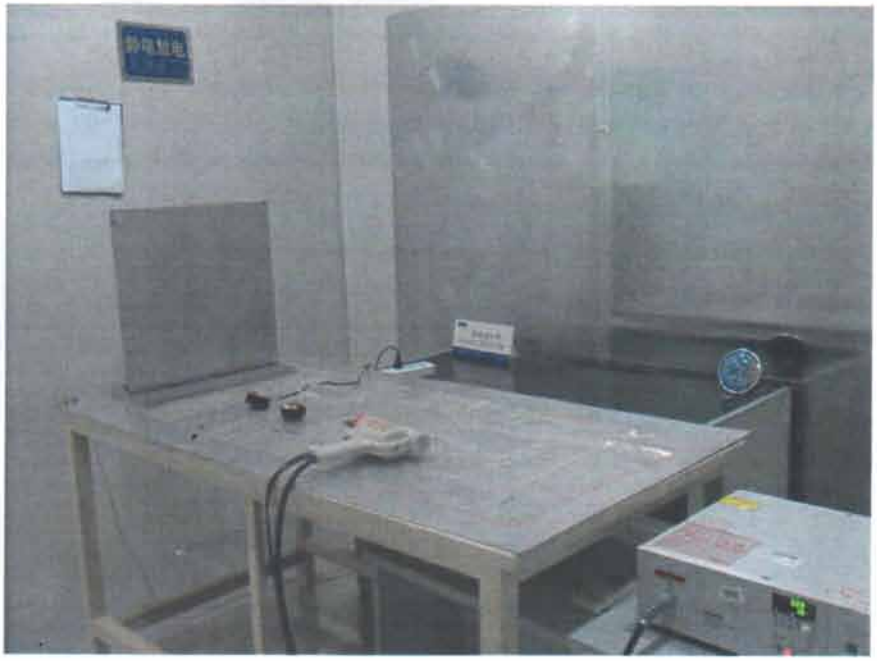
In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

APPENDIX I (TEST PHOTOGRAPHS)

1. Photo of Radiated Emission Test



2. Photo of Electrostatic Discharge Test



3. Photo of RF Field Strength susceptibility Test

APPENDIX II (EXTERNAL PHOTOS)

Figure 1
The EUT-Front View

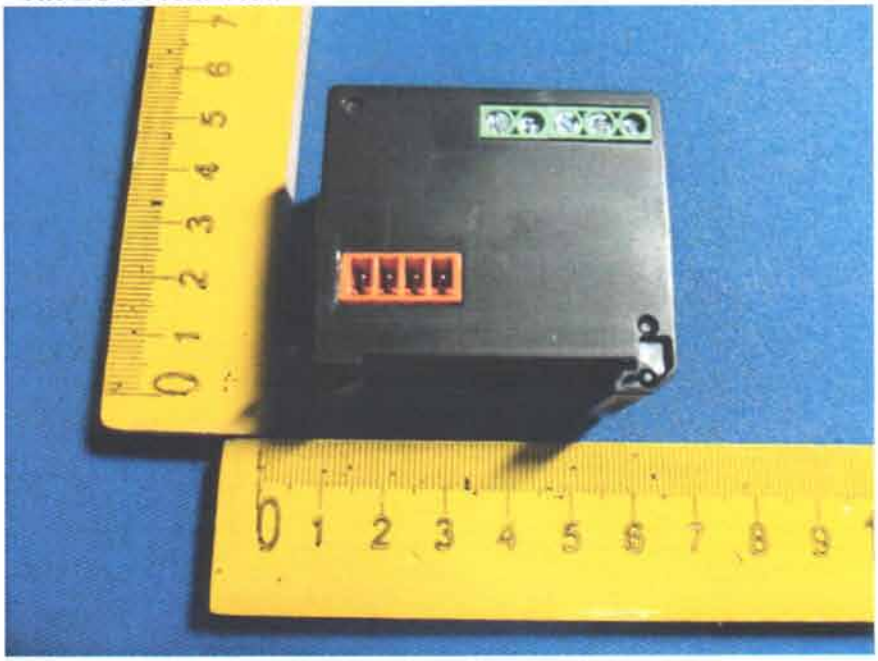
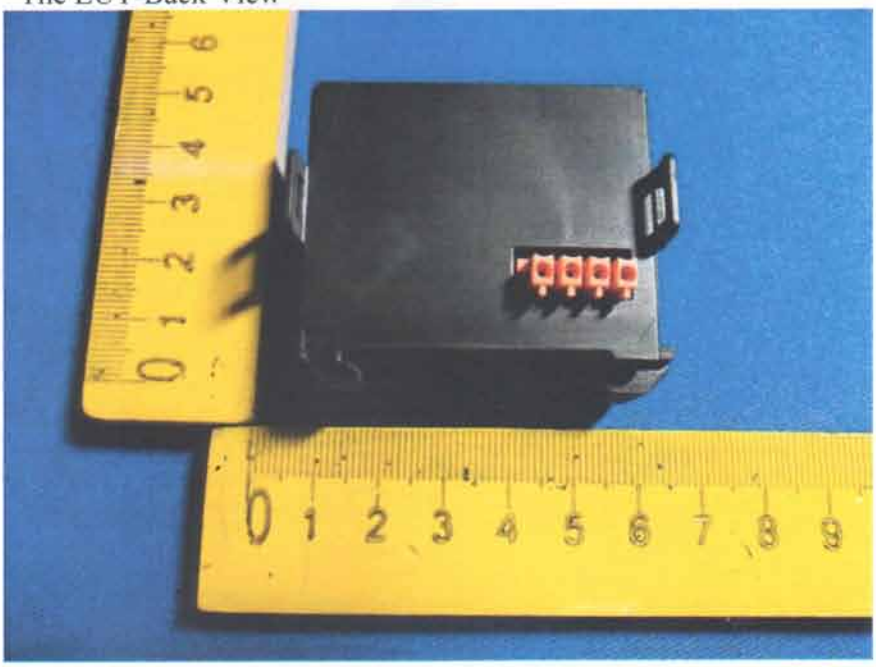


Figure 2
The EUT-Back View



APPENDIX III (INTERNALPHOTOS)

Figure 3
The EUT-Inside View

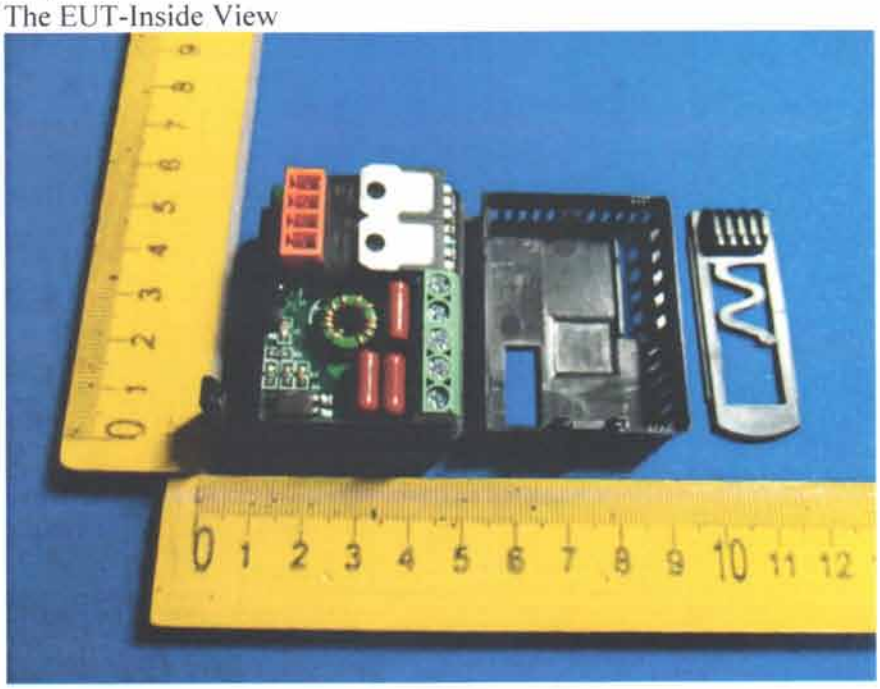


Figure 4
PCB of the EUT-Front View

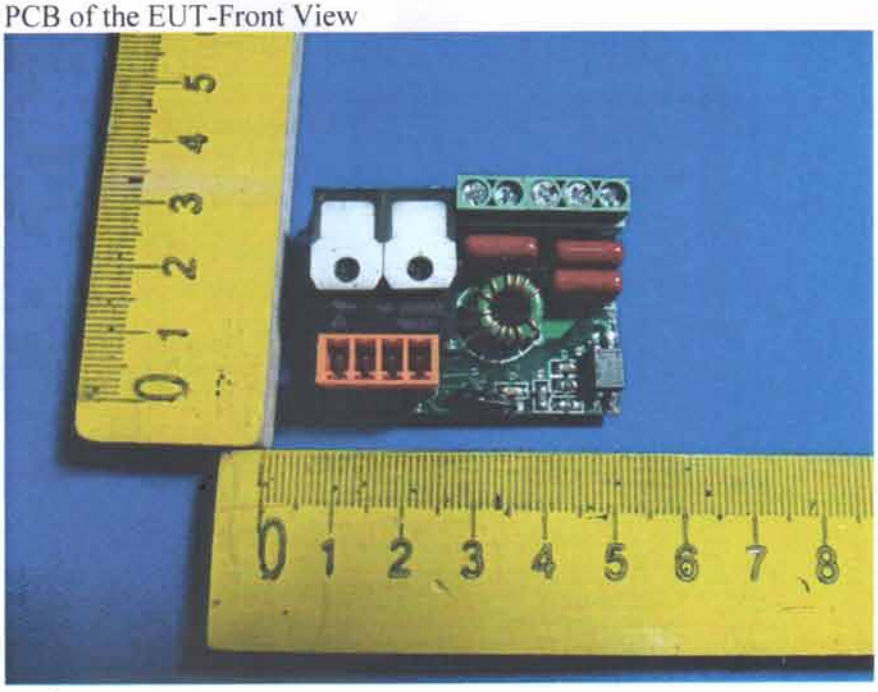


Figure 5
PCB of the EUT-Back View

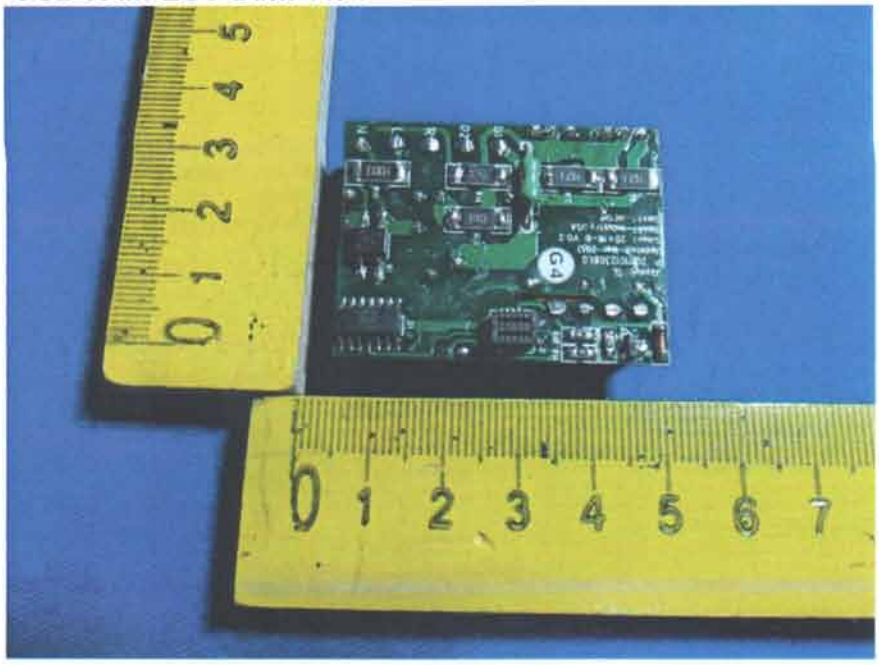


Figure 6
PCB of the EUT-Front View

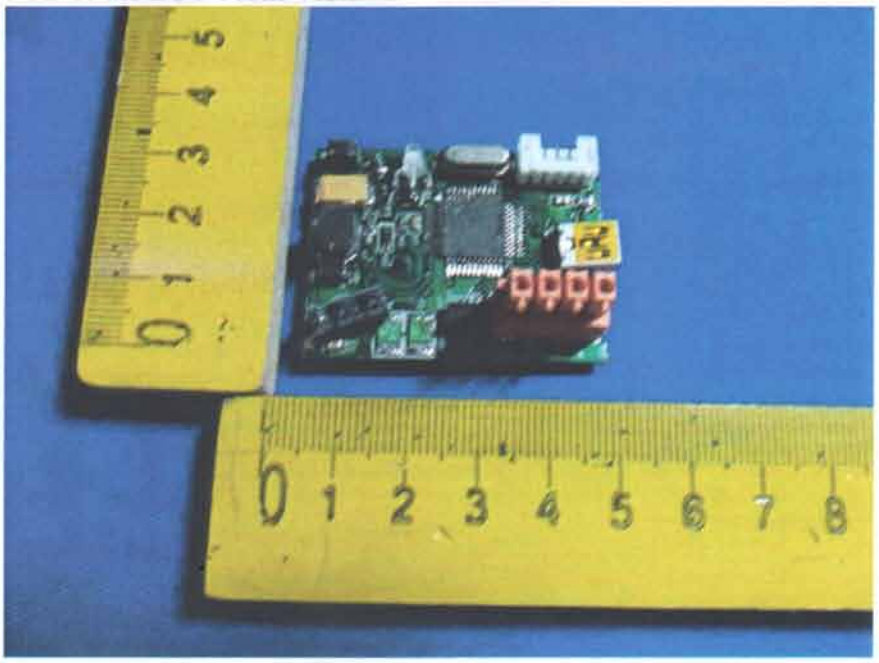


Figure 7
PCB of the EUT-Back View