Test Report No.:	TWR080725 001		Page 1 of 20
Applicant:	HTM Instruments Sdn Bhd (687564-T)		
	No. 29 & 29A, Jalan SG 10/4, Taman Seri Gombak, 68100 Batu Caves,		
	Selangor Darul Ehsan, Malaysia		
Receipt No.:	Q050430R2	**Date of receipt:**	2008-07-02
Device under Test:	Trip Alarm Relay		
Model No.:	HTM TA2	**Serial No.:**	Engineering Sample
Place of Testing:	Refer to section: Test Facilities		
Test Specification:	*[Emission]*		
	EN 61326-1:2006		
	EN 55011:1998 +A1:1999 +A2:2002, *(group 1, class B)*		
	[Immunity]		
	EN 61326-1:2006		
	EN 61000-4-2:1995+A1:1998+A2:2001 (*contact: level 2 (±4kV), air: level 3 (±8kV)*)		
	EN 61000-4-3:2006	*(level 3 (10V/m)*	
	EN 61000-4-4:2004	(*AC/DC/Signal ports: level 3 (±2kV)*	
	EN 61000-4-5:2006	*(AC/DC ports: class 2)*	
	EN 61000-4-6:2007	*(AC/DC/Signal ports: level 2 (3V)*	
	EN 61000-4-11:2004		
Test Result:	The device under test passed the test specification(s)		
Test Laboratory:	TUV NORD Taiwan, Taichung Branch		
	4F., No. 8, Huasin St., North District, Taichung 404, Taiwan, R.O.C.		

Test Engineer:	**Reviewer:**
Christo Chi	Saul Lu
	
2009-03-05	2009-03-05
Date: Signature:	Date: Signature

Remark notes:

This test report relates to the a. m. test sample. The duplication of this test report or parts of it and its use for advertising purposes is only allowed with permission of the Test Laboratory. This test report does not entitle to carry any safety mark on this or similar products

TEST SUMMARY

5.1.1 HARMONICS ON AC MAINS

RESULT: N/A

5.1.2 VOLTAGE FLUCTUATIONS ON AC MAINS

RESULT: N/A

5.1.3 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

RESULT: PASS

5.2.1 RADIATED EMISSION

RESULT: PASS

6.1.1 RADIATED RADIO-FREQUENCY ELECTROMAGNETIC FIELDS (RS), AMPLITUDE MODULATION

RESULT: PASS

6.1.2 RADIO-FREQUENCY COMMON MODE / CONDUCTED SUSCEPTIBILITY (CS)

RESULT: PASS

6.2.1 ELECTRICAL FAST TRANSIENTS (EFT)

RESULT: PASS

6.2.2 SURGE

RESULT: PASS

6.2.3 ELECTROSTATIC DISCHARGES (ESD)

RESULT: PASS

6.3.1 VOLTAGE DIP

RESULT: PASS

6.3.2 VOLTAGE INTERRUPTION

RESULT: PASS

Contents

1. General Remarks

1.1 Complementary Materials

This applies to the following test report only

EM-E980030 of AUDIX Technology Co., Ltd.

2. Test Sites

2.1 Test Facilities

AUDIX Technology Co., Ltd.

EMC Department

No. 53-11, Tin-FuTsun, Lin-Kou Hsiang, Taipei Hsien, Taiwan

This test site is in accordance with CISPR 16 for measurement of radio interference.

2.2 List of Test and Measurement Instruments

Refer to the attached test report:

EM-E980030 of AUDIX Technology Co., Ltd.

3. General Product Information

3.1 Product Function and Intended Use

The DUT is a Trip Alarm Relay and used for electronic signal level detector. It is suitable for monitoring high and low conditions of measured signal.

3.2 Ratings and System Details

Rated Voltage:	AC 115/230V, DC 12, DC 24V
Frequency:	50/60Hz
Power:	3VA Max.
Protection Class:	II

3.3 Independent Operation Modes

The basic operation mode is:

A. Normal Operation: The DUT was set to input Hi-Lo signal then output Hi relay on and Lo relay on where connected to simple load.

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

3.4 Noise Generating and Noise Suppressing Parts

Linear DC to Dc converter circuit without high frequency oscillating devices, no significant noises are to be generated from the DUT. No noise suppressing parts are required.

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

3.5 Submitted Documents

Technical documents, User's Instruction, Wiring diagrams

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Emission: The device under test (DUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Immunity: The device under test (DUT) was configured to have its highest possible susceptibility against the tested phenomena. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Physical Configuration for Testing

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

4.3 Test Operation and Test Software

Refer to preceding section 3.3 for operation condition in detail.

4.4 Special Accessories and Auxiliary Equipment

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

4.5 Countermeasures to achieve EMC Compliance

No any additional measure was employed to achieve compliance.

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

5. Test Results EMISSION

5.1 Emission in the Frequency Range up to 30 MHz

5.1.1 Harmonics on AC Mains

RESULT: **N/A**

Reference standard: EN 61326-1:2006
Test procedure: EN 61000-3-2:2006

Note: The DUT can not be connected to AC mains directly during normal operation, this test item is not applicable.

5.1.2 Voltage Fluctuations on AC Mains

RESULT: **N/A**

Reference standard: EN 61326-1:2006
Test procedure: EN 61000-3-3:1995+A1:2001+A2:2005
Frequency range: (0 - 2)kHz

Note: The DUT can not be connected to AC mains directly during normal operation, this test item is not applicable.

5.1.3 Mains Terminal Continuous Disturbance Voltage

RESULT: **PASS**

Date of testing:	2008-11-21
Reference standard:	EN 61326-1:2006
Test procedure:	EN 55011:1998 +A1:1999 +A2:2002
Frequency range:	(0.15 - 30)MHz
Equipment classification:	group 1, class B
Kind of test site:	Shielded Room
Operation mode:	A
Supply Voltage:	AC 230V
Supply Frequency:	50Hz

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated Emission

RESULT: **PASS**

Date of testing:	2008-11-24
Reference standard:	EN 61326-1:2006
Test procedure:	EN 55011:1998 +A1:1999 +A2:2002
Frequency range:	(30 – 1000)MHz
Equipment classification:	group 1, class B
Kind of test site:	OATS
Operation mode:	A
Supply Voltage:	AC 230V and DC 24V
Supply Frequency:	50Hz

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

6. Test Results IMMUNITY

6.1 Continuous Disturbances

6.1.1 Radiated Radio-frequency Electromagnetic Fields (RS), Amplitude Modulation

RESULT: **PASS**

Date of testing:	2008-11-26
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-3:2006
Frequency ranges:	(80 - 1000)MHz
Test level 1:	3 (10V/m) (unmodulated, rms.)
Frequency range:	(1.4 – 2.0)GHz
Test level 2:	2 (3V/m) (unmodulated, rms.)
Frequency range:	(2.0 – 2.7)GHz
Test level 3:	1 (1V/m) (unmodulated, rms.)
Modulation:	80% AM, 1kHz
Sweep mode:	Automatic
Sweep rate:	1%, 3s dwell time
Operation mode:	A
Supply Voltage:	AC 230V
Supply Frequency:	50Hz
Performance criterion:	A

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

6.1.2 Radio-frequency Common Mode / Conducted Susceptibility (CS)

RESULT: **PASS**

Date of testing:	2008-12-05
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-6:2007
Severity level:	2 (3V) for AC/DC power and signal ports (unmodulated, rms.)
Source impedance:	150Ω
Frequency range:	150kHz - 80MHz
Modulation:	AM 80%, 1kHz sine-wave
Sweep mode:	Automatic
Sweep rate:	1%, 3s dwell time
Operation mode:	A
Supply Voltage:	AC 230V and DC 24V
Supply Frequency:	50Hz
Performance criterion:	A

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

6.2 Transient Disturbances

6.2.1 Electrical Fast Transients (EFT)

RESULT: **PASS**

Date of testing:	2009-02-03
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-4:2004
Severity level:	3 (±2kV) for AC/DC power ports
	3 (±1kV) for I/O signal ports
Operation mode:	A
Supply Voltage:	AC 230V and DC 24V
Supply Frequency:	50Hz
Performance criterion:	B

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

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6.2.2 Surge

RESULT: **PASS**

Date of testing:	2009-02-03
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-5:2006
Installation class:	2 for AC/DC power ports
Source impedance:	12Ω
Test voltages:	±0.5kV, ±1kV
Coupling phases:	0, π/2, π, 3π/2, 2π
Number of surges:	5 (for each parameter combination)
Operation mode:	A
Supply Voltage:	AC 230V and DC 24V
Supply Frequency:	50Hz
Performance criterion:	B

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

6.2.3 Electrostatic Discharges (ESD)

RESULT: **PASS**

Date of testing:	2009-02-03
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-2:1995+A1:1998+A2:2001
Severity level:	2 (±4kV) (contact discharge)
	3 (±8kV) (air discharge)
Number of discharges:	10
Operation mode:	A
Supply Voltage:	AC 230V
Supply Frequency:	50Hz
Performance criterion:	B

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

6.3 Power Supply Alterations

6.3.1 Voltage Dip

RESULT: **PASS**

Date of testing:	2009-02-03
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-11:2004
Test parameters:	-100%, 0.5 period, 10ms @ 50Hz, Per. B
	-100%, 1 period, 20ms @ 50Hz, Per. B
	-30%, 25 periods, 500ms @ 50Hz, Per. C
Operation mode:	A
Supply Voltage:	AC 230V
Supply Frequency:	50Hz

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

6.3.2 Voltage Interruption

RESULT: **PASS**

Date of testing:	2009-02-03
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-11:2004
Test parameters:	-100%, 250 periods, 5000ms @ 50Hz
Operation mode:	A
Supply Voltage:	AC 230V
Supply Frequency:	50Hz
Performance criterion:	C

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

7. Photographs of the Test Set-Up

Refer to the attached test report:
EM-E980030 of AUDIX Technology Co., Ltd.

8. Attachment: Test Report EM-E980030 of AUDIX Technology Co., Ltd.

54 pages including cover page following

EMC TEST REPORT

for

HTM Instruments Sdn Bhd (687564-T)

Trip Alarm Relay

Model No. : HTM TA2

Prepared for : HTM Instruments Sdn Bhd (687564-T)
No. 29 & 29A, Jalan SG 10/4, Taman
Seri Gombak, 68100 Batu Caves,
Selangor Darul Ehsan, Malaysia

Prepared by : AUDIX Technology Corporation
EMC Department
No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
Taipei Hsien, Taiwan

Tel : (02) 2609-9301, 2609-2133
Fax : (02) 2609-9303

File Number	:	EM971975
Report Number	:	EM-E980030
Date of Test	:	Nov. 21, 2008 ~ Feb. 03, 2009
Date of Report	:	Feb. 04, 2009

TABLE OF CONTENTS

TEST REPORT VERIFICATION

Applicant	:	HTM Instruments Sdn Bhd (687564-T)		
Manufacturer	:	HTM Instruments Sdn Bhd (687564-T)		
EUT Description	:	Trip Alarm Relay		
		(A) Model No.	:	HTM TA2
		(B) Serial No.	:	N/A
		(C) Power Supply	:	(1)AC 115/230V, 50/60Hz
				(2)DC 24V
		(D) Test Voltage	:	(1)AC 230V, 50Hz
				(2)DC 24V

Measurement Standard Used:

EN 61326-1/2006: Electromagnetic Compatibility
Emission: EN 55011/1998+A1/1999+A2/2002 (Group 1, Class B)
Immunity: EN 61000-4-2/1995+A1/1998+A2/2001, EN 61000-4-3/2006, EN 61000-4-4/2004, EN 61000-4-5/2006, EN 61000-4-6/2007, EN 61000-4-11/2004

The device described above was tested by AUDIX Technology Corporation to determine the maximum emission levels emanating from the device, its ensured severity levels, and performance criterion. This test report contains the measurement results, and AUDIX Technology Corporation assumes full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT is technically compliance with the requirements of EN 61326-1 standard.

Other emission tests in EN61000-3-2, -3 and relevant immunity tests in EN 61326-1 as specified in European Union EMC Directive are omitted and regarded as compliance due to EUT can not be connected to AC mains directly.

This report applies to above tested sample only and shall not be reproduced in part without written approval of AUDIX Technology Corporation.

Date of Test : Nov. 21, 2008 ~ Feb. 03, 2009 Date of Report : Feb. 04, 2009

Producer : Kitty Ni
(Kitty Ni/Administrator)

Review : Alex Deng
(Alex Deng/Deputy Manager)

Signatory : Ben Cheng
(Ben Cheng/Manager)

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance	EN 55011/1998+A1/1999 +A2/2002	Group I, Class B	PASS
Radiated disturbance	EN 55011/1998+A1/1999 +A2/2002	Group I, Class B	PASS
Harmonic distortion	EN 61000-3-2/2006	N/A	N/A
Voltage fluctuations and flicker	EN 61000-3-3/1995 +A1/2001 +A2/2005	N/A	N/A
IMMUNITY (EN 61326-1)			
Description of Test Item	**Basic Standard**	**Performance Criteria**	**Results**
Electrostatic discharge (ESD)	EN 61000-4-2/1995 +A1/1998+A2/2001	B	PASS
Radiated RF electromagnetic fields	EN 61000-4-3/2006	A	PASS
Electrical fast transients and bursts	EN 61000-4-4/2004	B	PASS
Surge	EN 61000-4-5/2006	B	PASS
Conducted disturbances, induced by RF fields	EN 61000-4-6/2007	A	PASS
Power frequency magnetic fields	EN 61000-4-8/2001	A	N/A, Note
Voltage dips, 0% reduction during 1 cycle	EN 61000-4-11/2004	B	PASS
Voltage dips, 40% reduction during 10/12 cycles		C	PASS
Voltage dips, 70% reduction during 25/30 cycles		C	PASS
Voltage interruptions, 0% reduction during 250/300 cycles		C	PASS

Note: No sensitive devices to magnetic filed are exist.

1. N/A is an abbreviation for Not Applicable.
2. According to Table 2 of standard, EUT supposed to be used in an industrial locations, heavy immunity levels are applied.

1.2. Description of Performance Criteria

The general principles (performance criteria) for the evaluation of the immunity test results are the following:

Performance criterion A : During testing, normal performance within the specification limits.

Example 1

If electronic equipment is required to work with high reliability, the EUT shall operate without any apparent degradation from the manufacturer's specification.

Performance criterion B : During testing, temporary degradation, or loss of function or performance which is self-recovering.

Example 1

A data transfer is controlled/checked by parity check or by other means. In the case of malfunctioning, such as caused by a lightning strike, the data transfer will be repeated automatically. The reduced data transfer rate at this time is acceptable.

Example 2

During testing, an analogue function value may deviate. After the test, the deviation vanishes.

Example 3

In the case of a monitor used only for man-machine monitoring, it is acceptable that some degradation takes place for a short time, such as flashes during the burst application.

Performance criterion C : During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs.

Example 1

In the case of an interruption in the mains longer than the specified buffer time, the power supply unit of the equipment is switched off. The switch-on may be automatic or carried out by the operator.

Example 2

After a program interruption caused by a disturbance, the processor functions of the equipment stops at a defined position and is not left in a "crashed state". The operator's decision prompts may be necessary.

Example 3

The test results in an opening of an over-current protection device that is replaced or reset by the operator.

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

Description	:	Trip Alarm Relay (Two representative samples, one is powered by AC 230V, one is powered by DC 24V)
Model Number	:	HTM TA2
Applicant	:	HTM Instruments Sdn Bhd (687564-T) No. 29 & 29A, Jalan SG 10/4, Taman Seri Gombak, 68100 Batu Caves, Selangor Darul Ehsan, Malaysia
Manufacturer	:	HTM Instruments Sdn Bhd (687564-T) No. 29 & 29A, Jalan SG 10/4, Taman Seri Gombak, 68100 Batu Caves, Selangor Darul Ehsan, Malaysia
Rated Voltage	:	(1)AC 115/230V, 50/60Hz (2)DC 24V
Power	:	3VA (Max.)
Date of Receipt of Sample	:	Nov. 17, 2008
Date of Test	:	Nov. 21, 2008 ~ Feb. 03, 2009

2.2.Tested Supporting System Details

【FOR CONDUCTED、RADIATED DISTURBANCE MEASUREMENT】

2.2.1. DC POWER SUPPLY #1

Model Number	:	3303D
Serial Number	:	684066
Manufacturer	:	TOP WARD
Data Cable*2	:	Non-Shielded, Detachable, 0.6m
AC Power Cord	:	Non-Shielded, Detachable, 1.8m

2.2.2. DC POWER SUPPLY #2

Model Number	:	3303D
Serial Number	:	N/A
Manufacturer	:	TOP WARD
Data Cable*2	:	Non-Shielded, Detachable, 0.6m
AC Power Cord	:	Non-Shielded, Detachable, 1.8m

2.2.3. AC POWER CORD

AC Power Cord	:	Non-Shielded, Detachable, 1.8m (2 Pin)

【FOR EMS IMMUNITY TESTS】

2.2.4. DC POWER SUPPLY #1

Model Number	:	3303A
Serial Number	:	721773
Manufacturer	:	TOP WARD
Data Cable*2	:	Non-Shielded, Detachable, 0.6m
AC Power Cord	:	Non-Shielded, Detachable, 1.8m

2.2.5. DC POWER SUPPLY #2

Model Number	:	3303D
Serial Number	:	684066
Manufacturer	:	TOP WARD
Data Cable*2	:	Non-Shielded, Detachable, 0.6m
AC Power Cord	:	Non-Shielded, Detachable, 1.8m

2.2.6. AC POWER CORD

AC Power Cord	:	Non-Shielded, Detachable, 1.8m (2 Pin)

2.3. Description of Test Facility

Name of Firm	:	**AUDIX Technology Corporation** **EMC Department** No. 53-11, Tin-Fu Tsun, Lin-Kou, Taipei, Taiwan.
Test Facility & Location (C4/R5)	:	**No. 4 Shielded Room &** **No. 5 Open Area Test Site** No. 67-4, Tin-Fu Tsun, Lin-Kou Hsiang, Taipei County 24443, Taiwan, R.O.C. **Immunity Test Area** No. 53-11, Tin-Fu Tsun, Lin-Kou, Taipei County, Taiwan, R.O.C.
NVLAP Lab. Code	:	200077-0

(NVLAP is a NATA accredited body under Mutual Recognition Agreement)

DAR-Registration No.	:	DAT-P-145/03-01

2.4. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB), (V/m)
Conduction Test	150kHz~30MHz	± 1.73dB
Radiation Test (Distance: 10m)	30MHz~300MHz	± 2.99dB
	300MHz~1000MHz	± 2.73dB
RF Field Strength Susceptibility Test	80MHz~1000MHz	±0.84V/m

Remark：Uncertainty = $ku_c(y)$

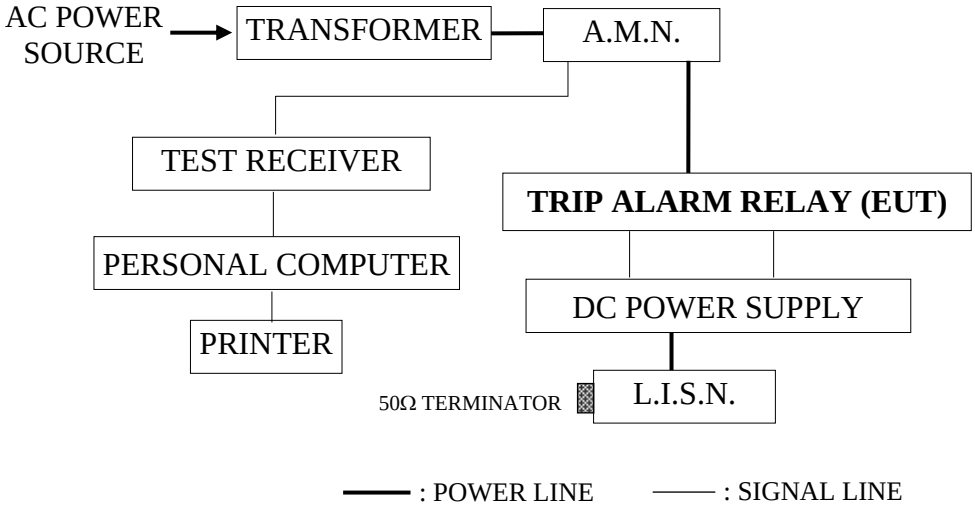
3. CONDUCTED DISTURBANCE MEASUREMENT

3.1. Test Equipment

The following test equipment were used during the conducted disturbance measurement：(No. 4 Shielded Room)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R & S	ESHS10	844591/015	Apr. 17, 08’	Apr. 16, 09’
2.	A.M.N.	R & S	ENV4200	825358/003	Jan. 05, 09’	Jan. 04, 10’
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1430-6	Sep. 24, 08’	Sep. 23, 09’

3.2. Block Diagram of Test Setup



3.3. Limits for Conducted Disturbance (EN55011 Group 1, Class B)

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dBμV	56 ~ 46 dBμV
500kHz ~ 5MHz	56 dBμV	46 dBμV
5MHz ~ 30MHz	60 dBμV	50 dBμV

Remark: 1. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.
2. The lower limit applies at the band edges.

3.4. Operating Condition of EUT

3.4.1. Set up the EUT and simulator as shown on 4.2.

3.4.2. To turn on the power of all equipment.

3.4.3. The EUT (Trip Alarm Relay) was tested in normal operation (the EUT was set to input Hi-Lo signal then output Hi relay on and Lo relay on) during all testing.

3.5. Test Procedure

The EUT was put on the table which was above the ground by 80cm and its power cord was connected to the AC mains through an Artificial Mains Network (A.M.N.). The peripheral devices power cord connected to the power mains through another line impedance stabilization network (L.I.S.N.). This provided a 50 ohm coupling impedance for the measuring equipment. (Please refer to the block diagram of the test setup and photographs.) Both sides of A.C. line were checked to find out the maximum conducted emission according to EN55011 Class B regulations during conducted disturbance measurement.

The bandwidth of the R&S Test Receiver ESHS10 was set at 10kHz.

The frequency range from 150kHz to 30MHz was pre-scanned with a peak detector.

All the readings of measurements were with the Quasi-Peak detector and Average detector. (Remark: If the Average limit is met when using a Quasi-Peak detector, the Average detector is unnecessary)

3.6. Conducted Disturbance Measurement Results

PASSED.
All emissions not reported below are too low against the prescribed limits.

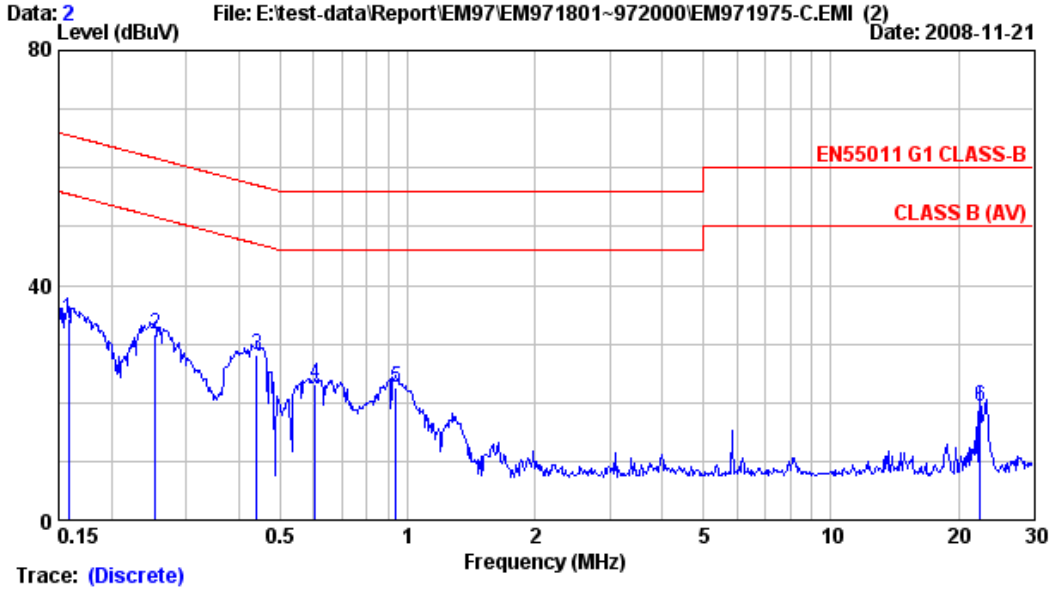
EUT (powered by AC 230V) was measured during this section testing and all test results are listed in next pages.

EUT：Trip Alarm Relay M/N：HTM TA2

Test Date：Nov. 21, 2008 Temperature：24℃ Humidity：52%

Reference Test Data No.：Neutral: # 2, Line: # 1

AUDIX TECHNOLOGY Corp. EMC Laboratory
No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei County, Taiwan R.O.C. Post Code:24443
Tel:+886-2-26092133 Fax:+886-2-26099303
Email:emc@audixtech.com



Site : NO.4 Shielded Room Data : 2
Condition : ENV-4200 Phase : NEUTRAL
Limit : EN55011 G1 CLASS-B
Env. / Ins. : 24*C /52 % ESHS 10 (015) Engineer: Gary-Lin
EUT : Trip Alarm Relay M/N:HTM TA2
Power Rating : 230 Vac / 50 Hz
Test Mode : Operating

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.158	10.30	0.20	23.74	34.24	65.56	31.32	QP
2	0.253	10.27	0.22	21.29	31.78	61.64	29.86	QP
3	0.440	10.19	0.26	17.62	28.07	57.07	29.00	QP
4	0.604	10.15	0.31	12.62	23.08	56.00	32.92	QP
5	0.938	10.11	0.39	12.15	22.65	56.00	33.35	QP
6	22.535	10.35	0.70	8.38	19.43	60.00	40.57	QP

Remarks: 1.Emission Level= LISN Factor + Cable Loss + Reading.
2.If the average limit is met when using a quasi-peak detector ,the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

AUDIX TECHNOLOGY Corp. EMC Laboratory
No.53-11, Tin-fu Tsun, Lin-kou Hsiang, Taipei
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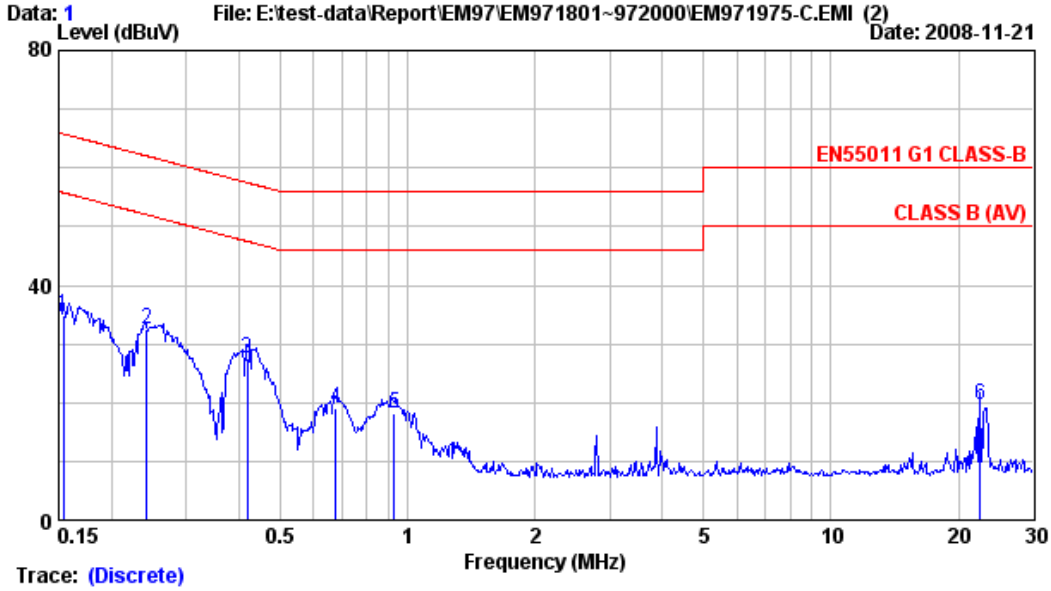
Email:emc@audixtech.com



Site : NO.4 Shielded Room Data : 1
Condition : ENV-4200 Phase : LINE
Limit : EN55011 G1 CLASS-B
Env. / Ins. : 24*C /52 % ESHS 10 (015) Engineer: Gary-Lin
EUT : Trip Alarm Relay M/N:HTM TA2
Power Rating : 230 Vac / 50 Hz
Test Mode : Operating

	Freq. (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Remark
1	0.154	10.30	0.20	24.31	34.81	65.78	30.97	QP
2	0.242	10.27	0.22	21.99	32.49	62.04	29.55	QP
3	0.419	10.19	0.26	17.11	27.57	57.46	29.89	QP
4	0.675	10.14	0.32	8.72	19.19	56.00	36.81	QP
5	0.928	10.11	0.39	7.66	18.15	56.00	37.85	QP
6	22.535	10.35	0.70	8.50	19.55	60.00	40.45	QP

Remarks: 1.Emission Level= LISN Factor + Cable Loss + Reading.
2.If the average limit is met when using a quasi-peak detector ,the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

4. RADIATED DISTURBANCE MEASUREMENT

4.1. Test Equipment

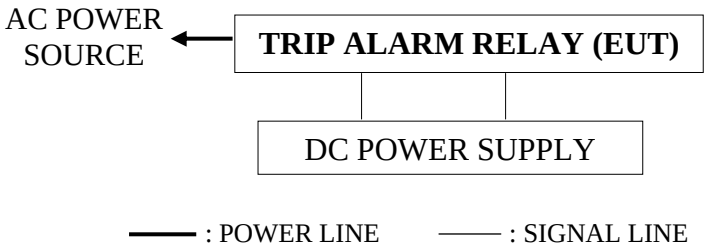
The following test equipments are used during the radiated disturbance measurement：(At No. 5 Open Area Test Site)

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E7405A	MY42000134	Jun. 23, 08’	Jun. 22, 09’
2.	Test Receiver	R & S	ESCI	100555	May 20, 08’	May 19, 09’
3.	Amplifier	HP	8447D	2944A07185	N/A	N/A
4.	Biconical Antenna	Chase	VBA6106A	1262	Apr. 10, 08’	Apr. 09, 09’
5.	Log Periodic Antenna	Chase	UPA6109	1061	Apr. 10, 08’	Apr. 09, 09’

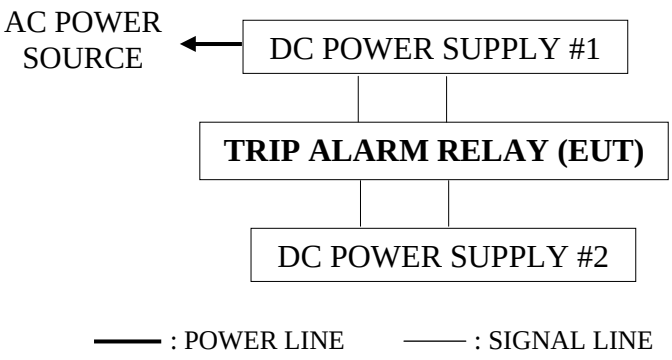
4.2. Block Diagram of Test Setup

4.2.1. Block Diagram of connection between EUT and simulators

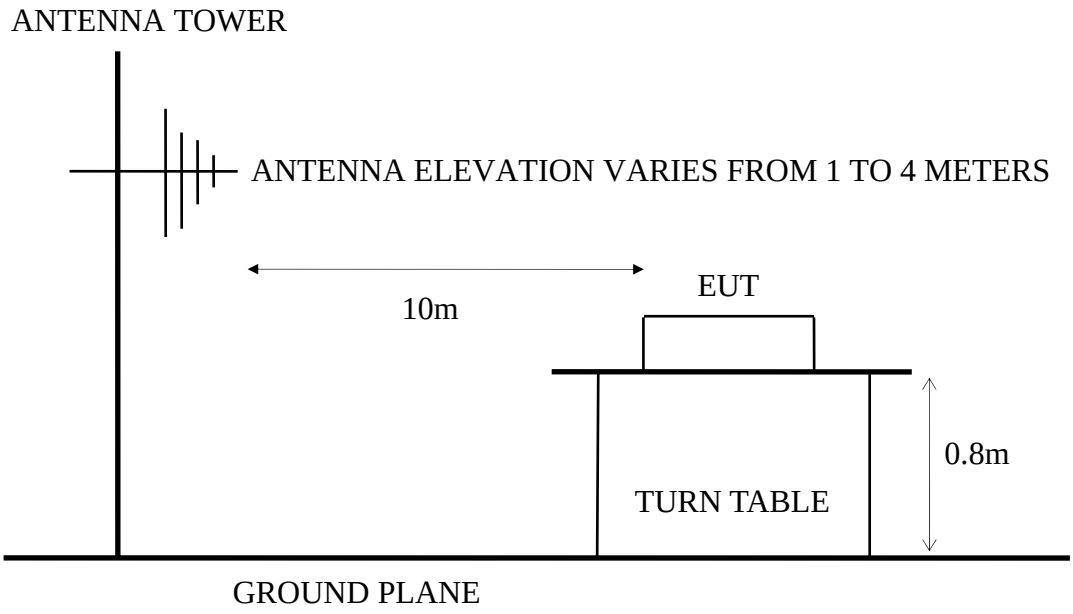
4.2.1.1. Sample Unit: powered by AC 230V



4.2.1.2. Sample Unit: powered by DC 24V



4.2.2. Open Area Test Site (10m) Setup Diagram



4.3. Limits for Radiated Disturbance (EN55011 Group 1, Class B)

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMITS (dBμV/m)
30 ~ 230	10	30
230 ~ 1000	10	37

Note： (1) The tighter limit applies at the edge between two frequency bands.
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the E.U.T.

4.4. Operating Condition of EUT

Same as conducted disturbance measurement which is listed in 3.4 except the test set up replaced by section 5.2.

4.5. Test Procedure

The EUT was placed on a turn table which was 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. EUT was set 10m away from the receiving antenna which was mounted on a antenna tower. The antenna could be moved up and down between 1 to 4 meters to find out the maximum emission level. Broadband antennas (calibrated biconical & log periodic antenna) were used as receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to EN55011 Class B requirement.

The bandwidth of the R&S Test Receiver ESCI was set at 120kHz.

The frequency range from 30MHz to 1000MHz was pre-scanned with a peak detector and all final readings of measurement from Test Receiver are Quasi-Peak values.

4.6. Radiated Disturbance Measurement Results

PASSED.
(All the emissions not reported below are too low against the prescribed limits.)

Two kinds of EUT were measured during this section testing and all test results are listed in next pages.

EUT：Trip Alarm Relay M/N：HTM TA2

Test Date：Nov. 24, 2008 Temperature：22℃ Humidity：61%

The details of test modes and reference test data are as follows：

No.	Sample Unit	Reference Test Data No.	
		Horizontal	Vertical
1.	powered by AC 230V	# 2	# 1
2.	powered by DC 24V	# 4	# 3

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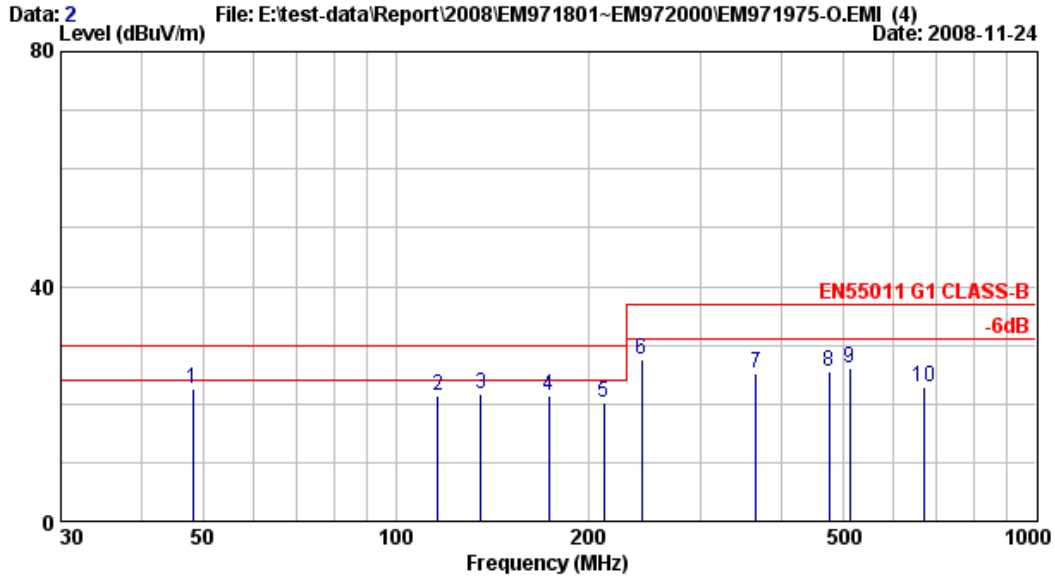

Site no. : NO.5 OPEN SITE Data no. : 2
Dis. / Ant. : 10m VBA6106A/UPA6109(08) Ant. pol. : HORIZONTAL
Limit : EN55011 G1 CLASS-B
Env. / Ins. : 22*C/61% ESCI(555) Engineer : TIM
EUT : Trip Alarm Relay M/N:HTM TA2
Power Rating : 230Vac / 50Hz
Test Mode : Operating

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	48.250	16.16	1.17	5.20	22.54	30.00	7.46	
2	116.580	18.50	1.55	1.37	21.42	30.00	8.58	
3	135.690	19.63	1.71	0.36	21.69	30.00	8.31	
4	173.250	20.94	1.96	-1.36	21.53	30.00	8.47	
5	211.250	21.72	2.21	-3.64	20.29	30.00	9.71	
6	242.360	22.11	2.48	2.95	27.54	37.00	9.46	
7	365.280	14.73	3.17	7.30	25.20	37.00	11.80	
8	475.025	17.18	3.61	4.60	25.39	37.00	11.61	
9	511.440	17.49	3.73	5.01	26.22	37.00	10.78	
10	669.360	20.42	4.05	-1.64	22.83	37.00	14.17	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

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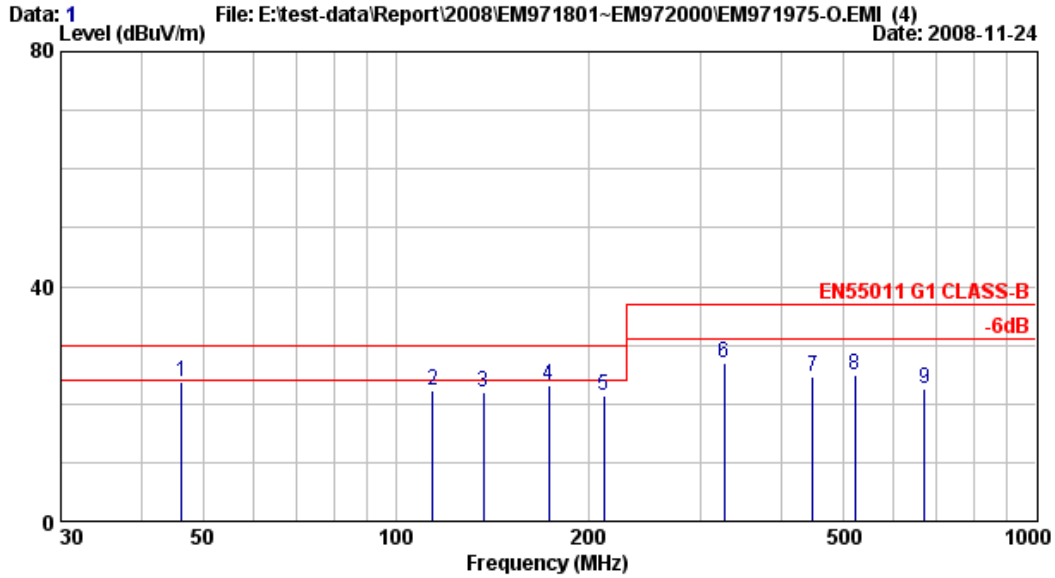

Site no. : NO.5 OPEN SITE Data no. : 1
Dis. / Ant. : 10m VBA6106A/UPA6109(08) Ant. pol. : VERTICAL
Limit : EN55011 G1 CLASS-B
Env. / Ins. : 22*C/61% ESCI(555) Engineer : TIM
EUT : Trip Alarm Relay M/N:HTM TA2
Power Rating : 230Vac / 50Hz
Test Mode : Operating

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	46.360	17.17	1.15	5.36	23.68	30.00	6.32	
2	114.250	18.40	1.53	2.20	22.14	30.00	7.86	
3	137.250	19.65	1.72	0.49	21.85	30.00	8.15	
4	173.250	20.94	1.96	0.25	23.15	30.00	6.85	
5	211.250	21.72	2.21	-2.60	21.33	30.00	8.67	
6	326.360	14.35	3.02	9.69	27.06	37.00	9.94	
7	447.580	16.29	3.50	4.90	24.69	37.00	12.31	
8	520.780	17.70	3.75	3.60	25.05	37.00	11.95	
9	669.250	20.42	4.05	-1.76	22.71	37.00	14.29	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

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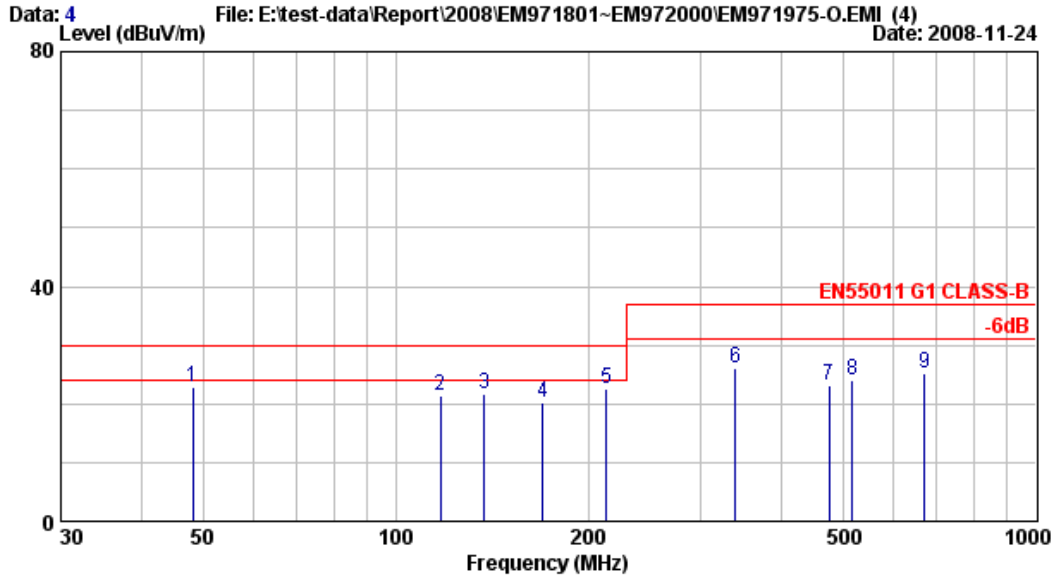

Site no. : NO.5 OPEN SITE Data no. : 4
Dis. / Ant. : 10m VBA6106A/UPA6109(08) Ant. pol. : HORIZONTAL
Limit : EN55011 G1 CLASS-B
Env. / Ins. : 22*C/61% ESCI(555) Engineer : TIM
EUT : Trip Alarm Relay M/N:HTM TA2
Power Rating : DC 24V
Test Mode : Operating

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	48.250	16.16	1.17	5.50	22.84	30.00	7.16	
2	117.550	18.53	1.56	1.25	21.34	30.00	8.66	
3	137.580	19.65	1.72	0.25	21.62	30.00	8.38	
4	169.660	20.81	1.93	-2.40	20.35	30.00	9.65	
5	213.250	21.81	2.23	-1.34	22.69	30.00	7.31	
6	339.360	14.77	3.07	8.30	26.15	37.00	10.85	
7	475.250	17.18	3.61	2.36	23.15	37.00	13.85	
8	516.258	17.64	3.74	2.69	24.07	37.00	12.93	
9	669.360	20.42	4.05	0.78	25.25	37.00	11.75	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

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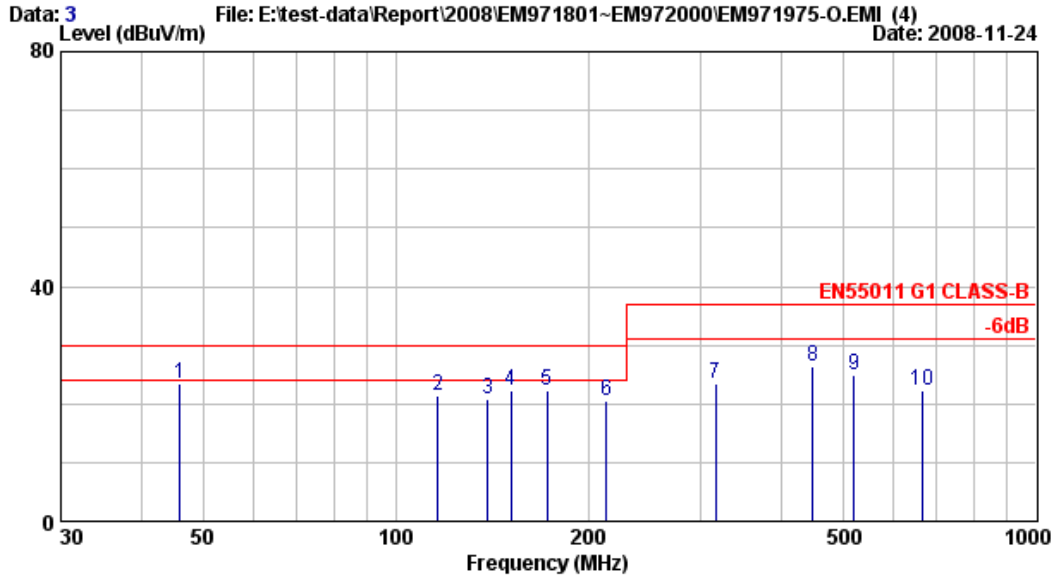



```
Site no.      : NO.5 OPEN SITE              Data no.   : 3
Dis. / Ant.   : 10m  VBA6106A/UPA6109(08)   Ant. pol.  : VERTICAL
Limit         : EN55011 G1 CLASS-B
Env. / Ins.   : 22*C/61%  ESCI(555)         Engineer   : TIM
EUT           : Trip Alarm Relay M/N:HTM TA2
Power Rating  : DC 24V
Test Mode     : Operating
```

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	45.980	17.49	1.14	4.90	23.53	30.00	6.47	
2	116.580	18.50	1.55	1.36	21.41	30.00	8.59	
3	139.360	19.70	1.74	-0.64	20.80	30.00	9.20	
4	151.250	20.13	1.82	0.25	22.20	30.00	7.80	
5	172.254	20.92	1.95	-0.60	22.27	30.00	7.73	
6	213.690	21.81	2.23	-3.64	20.39	30.00	9.61	
7	316.360	13.98	2.98	6.36	23.31	37.00	13.69	
8	447.580	16.29	3.50	6.60	26.39	37.00	10.61	
9	519.250	17.68	3.75	3.36	24.79	37.00	12.21	
10	664.270	20.38	4.04	-2.20	22.22	37.00	14.78	

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

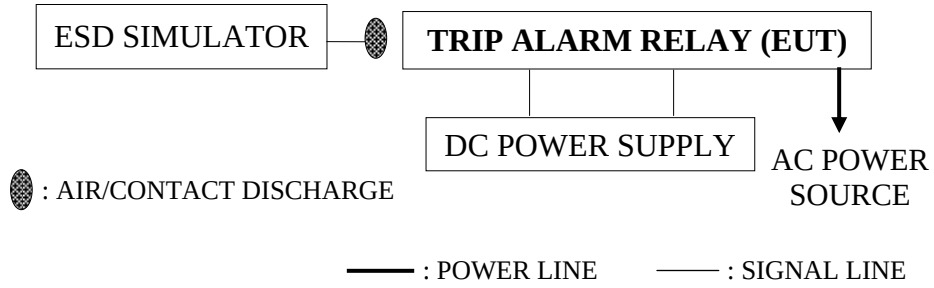
5. ELECTROSTATIC DISCHARGE IMMUNITY TEST

5.1. Test Equipment

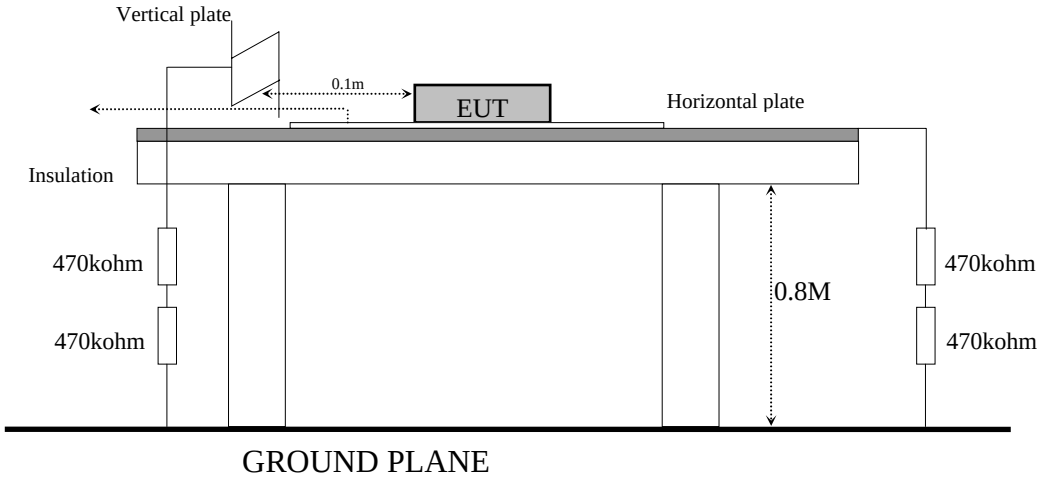
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	ESD Simulator	Keytek	MZ-15/EC	9907252	Aug. 28, 08'	Aug. 27, 09'

5.2. Block Diagram of Test Setup

5.2.1. Test Setup Diagram (1)



5.2.2. Test Setup Diagram (2)



5.3. Test Standard

EN 61326-1/2006
【EN 61000-4-2/1995+A1/1998+A2/2001, Test Levels **:** Contact: ±4kV, Air: ±8kV】

5.4. Test Levels and Performance Criterion

5.4.1. Test levels

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X	Special	Special

5.4.2. Performance criterion：B

5.5. Operating Condition of EUT

Same as conducted disturbance measurement which is listed in 3.4 except the test set up replaced by section 5.2.

5.6. Test Procedure

5.6.1. Air Discharge：

This test is done on a non-conductive surfaces. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the ESD generator discharge electrode shall be removed from the EUT. The generator is then retrigged for a new single discharge and repeated 10 discharges each at positive and negative polarity for each preselected test point. This procedure shall be repeated until all the air discharge completed.

5.6.2. Contact Discharge：

All the procedure shall be same as 5.6.1. except that the tip of the discharge electrode shall touch the EUT conductive surfaces & repeated 25 discharges each at positive and negative polarity for each test point before the discharge switch is operated.

5.6.3. Indirect discharge for horizontal coupling plane：

At least 10 discharges each at positive and negative polarity shall be applied to the horizontal coupling plane, at points on each side of the EUT. The ESD generator positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

5.6.4. Indirect discharge for vertical coupling plane：

At least 10 discharges each at positive and negative polarity shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

5.7. Test Results

PASSED. (Complied with Criterion A)

EUT (powered by AC 230V) was measured during this section testing and all the test results are attached in next page.

Electrostatic Discharge Immunity Test Results

AUDIX TECHNOLOGY CORPORATION

Date：02/04/2009

Applicant：HTM Instruments Sdn Bhd (687564-T)	Test Date：Feb. 03, 2009
EUT： Trip Alarm Relay, M/N HTM TA2	Temperature：20 ℃
	Humidity：50 %
Power Supply： AC 230V, 50Hz	Atmospheric pressure: 100 kPa
Working Condition： See Section 3.4.	Test Mode: Operating

Item	Amount of Discharge for per voltage	Voltage	Test Results & Performance Criterion
Contact Discharge	0	+2kV; +4kV	**Pass, A, Note**
		-2kV; -4kV	**Pass, A, Note**
Air Discharge	60	+2kV; +4kV; +8kV	**Pass, A**
		-2kV; -4kV; -8kV	**Pass, A**
Indirect Discharge (HCP)	20	+2kV; +4kV	**Pass, A**
		-2kV; -4kV	**Pass, A**
Indirect Discharge (VCP Front)	20	+2kV; +4kV	**Pass, A**
		-2kV; -4kV	**Pass, A**
Indirect Discharge (VCP Left)	20	+2kV; +4kV	**Pass, A**
		-2kV; -4kV	**Pass, A**
Indirect Discharge (VCP Back)	20	+2kV; +4kV	**Pass, A**
		-2kV; -4kV	**Pass, A**
Indirect Discharge (VCP Right)	20	+2kV; +4kV	**Pass, A**
		-2kV; -4kV	**Pass, A**

Measurement Points				
	1. LED	Air Discharge	2. LED	Air Discharge
	3. LED	Air Discharge		
	Please refer to the Photos of ESD Test Points Points 1 ~ 3 for Air Discharge.			

Note：Due to the EUT has no conductive surfaces, it's unnecessary to test contact discharge.

6. RF FIELD STRENGTH IMMUNITY TEST

6.1. Test Equipment

6.1.1. For 80MHz ~ 1000MHz

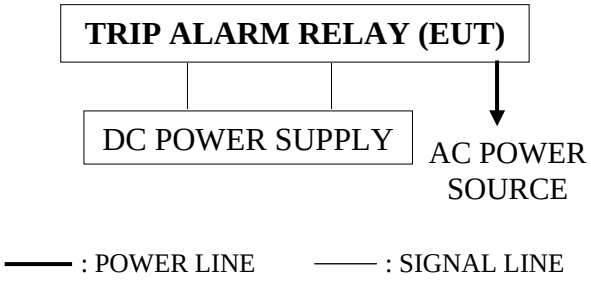
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Signal Generator	R & S	SML03	103251	Nov. 07, 08’	Nov. 06, 09’
2.	Power Amplifier	A & R	25W1000M7	13261	N/A	N/A
3.	Power Antenna	A & R	AT1080	13002	N/A	N/A
4.	Power Sensor	Agilent	E9327A	US40441766	Jan. 15, 09’	Jan. 14, 10’
5.	Power Monitor	Agilent	E4417A	GB41291797	Jan. 14, 09’	Jan. 13, 10’
6.	Direction Coupler	A & R	DC6180	19323	May 17, 08’	May 16, 09’

6.1.2. For 1.4GHz ~ 2.7GHz

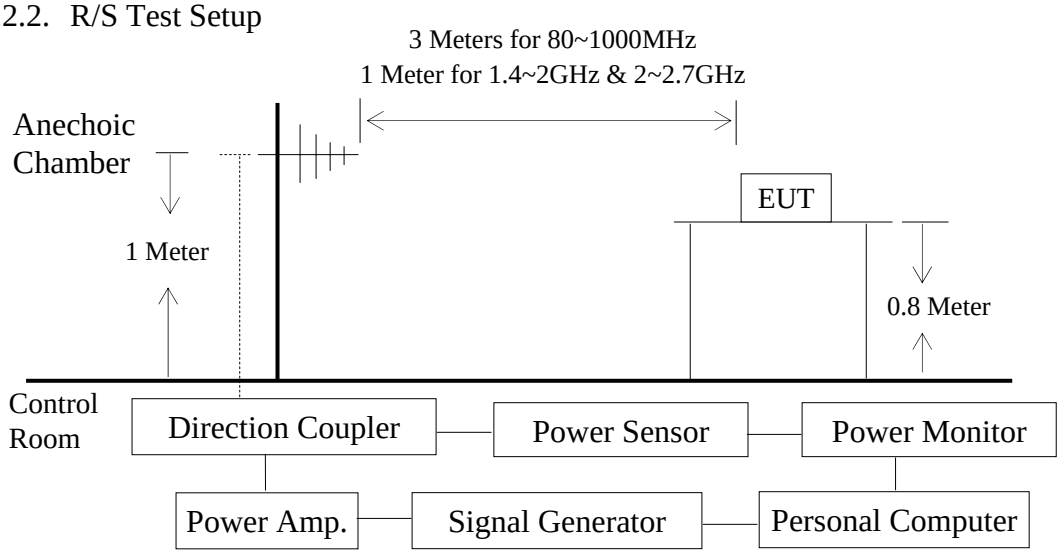
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Signal Generator	R & S	SML03	103251	Nov. 07, 08’	Nov. 06, 09’
2.	Power Amplifier	A & R	120S1G3	3039655	N/A	N/A
3.	Power Antenna	A & R	AT4002A	304290	N/A	N/A
4.	Power Sensor	Agilent	E9327A	US40441766	Jan. 15, 09’	Jan. 14, 10’
5.	Power Meter	Agilent	E4417A	GB41291797	Jan. 14, 09’	Jan. 13, 10’
6.	Direction Coupler	A & R	DC7144	304087	May 17, 08’	May 16, 09’

6.2. Block Diagram of Test Setup

6.2.1. Test Setup Diagram



6.2.2. R/S Test Setup



6.3. Test Standard

EN 61326-1/2006
【EN 61000-4-3/2006, Severity Level：80-1000MHz: 10V/m Field Strength, 1.4GHz-2.0GHz: 3V/m Field Strength, 2.0GHz-2.7GHz: 1V/m Field Strength; 80% AM (1kHz)】

6.4. Test Levels and Performance Criterion

6.4.1. Test levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

6.4.2. Performance criterion：A

6.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4 except the test set up replaced by section 6.2.

6.6. Test Procedure

The field sensor is placed on the EUT table (0.8 meter above the ground) which is 3 or 1 meters away from the transmitting antenna. Through the signal generator, power amplifier and transmitting antenna to produce a uniformity field strength (10V/m、3V/m and 1V/m measured by field sensor) around the EUT table from frequency range 80MHz to 1000MHz、1.4GHz-2.0GHz、2.0GHz-2.7GHz and records the signal generator's output level at the same time for whole measured frequency range. Then, put EUT and its simulators on the EUT turn table and keep them 1 meter away from the transmitting antenna which is mounted on an antenna tower and fixes at 1 meter height above the ground. Using the recorded signal generator's output level to measure the EUT from frequency range 80MHz to 1000MHz、1.4GHz-2.0GHz、2.0GHz-2.7GHz and both horizontal & vertical polarization of antenna must be set and measured. Each of the four sides of EUT must be faced this transmitting antenna and measures individually.
A CCD camera was put inside the chamber and through its display to monitor the EUT operational situation to judge the EUT Compliance criterion during measurement.

All the scanning conditions are as follows：

Condition of Test	Remarks
1. Field Strength	10V/m, 3V/m, 1V/m
2. Amplitude Modulated	1kHz, 80%AM
3. Scanning Frequency	80MHz – 1000MHz 1.4GHz – 2.0GHz 2.0GHz – 2.7GHz
4. Step Size	1% increments
5. The Rate of Sweep	0.0015 decade/s
6. Dwell Time	3 Sec.

6.7. Test Results

PASSED. (Complied with Criterion A)

EUT (powered by AC 230V) was measured during this section testing and all the test results are attached in next page.

RF Field Strength Immunity Test Results

AUDIX TECHNOLOGY CORPORATION

Date：02/04/2009

Applicant：HTM Instruments Sdn Bhd (687564-T)	Test Date： Nov. 26, 2008
EUT： Trip Alarm Relay, M/N HTM TA2	Temperature： 25 ℃
Power Supply： AC 230V, 50Hz	Humidity： 54 %
Working Condition： See Section 3.4.	Test Mode: Operating

Frequency Range (MHz)	Position (Angle)	Polarity (H or V)	Field Strength (V/M)	Test Results & Performance Criterion
80 ~ 1000	0°	H	10V/m+Modulated	**Pass, A**
80 ~ 1000	90°	H	10V/m+Modulated	**Pass, A**
80 ~ 1000	180°	H	10V/m+Modulated	**Pass, A**
80 ~ 1000	270°	H	10V/m+Modulated	**Pass, A**
80 ~ 1000	0°	V	10V/m+Modulated	**Pass, A**
80 ~ 1000	90°	V	10V/m+Modulated	**Pass, A**
80 ~ 1000	180°	V	10V/m+Modulated	**Pass, A**
80 ~ 1000	270°	V	10V/m+Modulated	**Pass, A**
1.4 ~ 2GHz	0°	H	3V/m+Modulated	**Pass, A**
1.4 ~ 2GHz	90°	H	3V/m+Modulated	**Pass, A**
1.4 ~ 2GHz	180°	H	3V/m+Modulated	**Pass, A**
1.4 ~ 2GHz	270°	H	3V/m+Modulated	**Pass, A**
1.4 ~ 2GHz	0°	V	3V/m+Modulated	**Pass, A**
1.4 ~ 2GHz	90°	V	3V/m+Modulated	**Pass, A**
1.4 ~ 2GHz	180°	V	3V/m+Modulated	**Pass, A**
1.4 ~ 2GHz	270°	V	3V/m+Modulated	**Pass, A**
2 ~ 2.7GHz	0°	H	1V/m+Modulated	**Pass, A**
2 ~ 2.7GHz	90°	H	1V/m+Modulated	**Pass, A**
2 ~ 2.7GHz	180°	H	1V/m+Modulated	**Pass, A**
2 ~ 2.7GHz	270°	H	1V/m+Modulated	**Pass, A**
2 ~ 2.7GHz	0°	V	1V/m+Modulated	**Pass, A**
2 ~ 2.7GHz	90°	V	1V/m+Modulated	**Pass, A**
2 ~ 2.7GHz	180°	V	1V/m+Modulated	**Pass, A**
2 ~ 2.7GHz	270°	V	1V/m+Modulated	**Pass, A**

Remark: No error occurred.

7. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

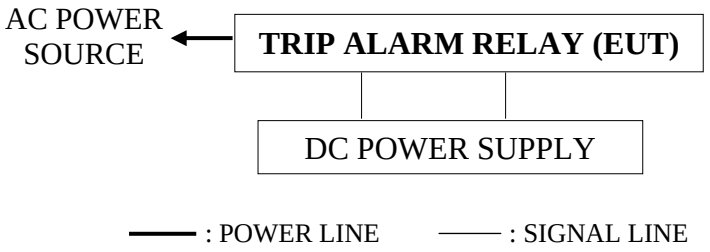
7.1. Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Control Center	Keytek	E103	9506267	N/A	N/A
2.	EFT Generator	Keytek	E411	9506182	Jun. 13, 08’	Jun. 12, 09’
3.	EFT Coupler / Decoupler	Keytek	E4551	9506216	Jun. 13, 08’	Jun. 12, 09’
4.	Capacitor Clamp	Keytek	CCL-4/S	9506190	Jun. 13, 08’	Jun. 12, 09’

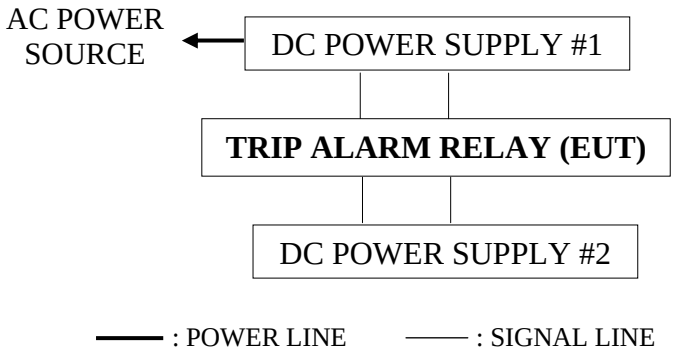
7.2. Block Diagram of Test Setup

7.2.1. Block Diagram of connection between EUT and simulators.

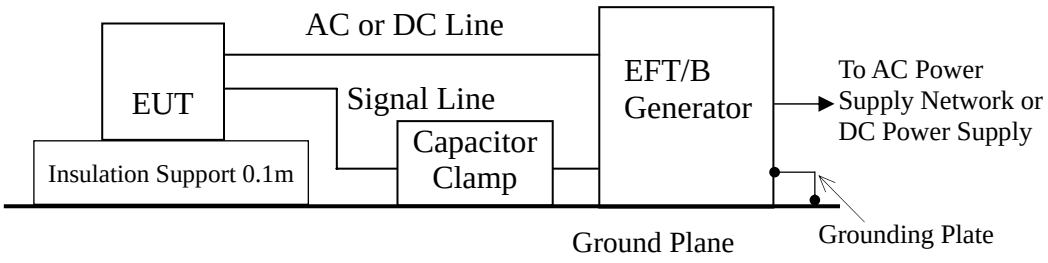
7.2.1.1. Sample Unit : powered by AC 230V



7.2.1.2. Sample Unit : powered by DC 24V



7.2.2. EFT Test Setup



Remark: Combination wave generator and decoupling networks are included in test.

7.3. Test Standard

EN 61326-1/2006
【EN 61000-4-4,
Test Level : AC & DC Power Port - ±2kV, 5/50ns,Repetition Rate: 5kHz;
I/O Signal Port - ±1kV, 5/50ns, Repetition Rate: 5kHz】

7.4. Test Levels and Performance Criterion

7.4.1. Test levels

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O (input/output) signal, data and control ports	
	Voltage peak kV	Repetition rate kHz	Voltage peak kV	Repetition rate kHz
1.	0.5	5 or 100	0.25	5 or 100
2.	1	5 or 100	0.5	5 or 100
3.	2	5 or 100	1	5 or 100
4.	4	5 or 100	2	5 or 100
X[a]	Special	Special	Special	Special
Note 1 : Use of 5kHz repetition rates is traditional; however, 100kHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types. Note 2 : With some products, there may be no clear distinction between power ports and I/O ports, in which case it is up to product committees to make this determination for test purposes.				
[a] "X" is an open level. The level has to be specified in the dedicated equipment specification.				

7.4.2. Performance criterion：**B**

7.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 7.2.

7.6. Test Procedure

The EUT was placed and insulated from ground plane which was a min. 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

7.6.1. For input and output AC power ports：

The EUT was connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines, and the length of the power line between the coupling device and the EUT shall be 1m or less. Both polarities of the test voltage should be applied during compliance test and the duration of the test can‘t less than 1min.

7.6.2. For signal lines and control lines ports：

The I/O interface cable of the EUT is connected to its simulator through a capacitive coupling clamp that is 1 meter long. The capacitive coupling clamp is impressed with burst noise for 1min and indirectly couples burst to I/O interface cable.

7.6.3. For DC input and DC output power ports：

The EUT is connected to the DC power source by using a coupling device which couples the EFT interference signal to DC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test can‘t less than 2min.

7.7. Test Results

PASSED. (Complied with Criterion A)

Two kinds of EUT {(1)powered by AC 230V (2)powered by DC 24V} were measured during this section testing and all the test results are attached in next page.

Electrical Fast Transient/Burst Immunity Test Results

AUDIX TECHNOLOGY CORPORATION

Date：02/04/2009

Applicant：HTM Instruments Sdn Bhd (687564-T)
EUT： Trip Alarm Relay, M/N HTM TA2
Power Supply： AC 230V, 50Hz
Working Condition： See Section 3.4.

Test Date： Feb. 03, 2009
Temperature： 20 ℃
Humidity： 50 %
Test Mode: Operating

Inject Place: Power Supply Line					Inject Place : I/O Cable				
Inject Line	Voltage kV	Inject Time(s)	Inject Method	Results & Performance Criterion	Inject Line	Voltage kV	Inject Time(s)	Inject Method	Results & Performance Criterion
L1	+0.5；1；2	60	Direct	**Pass, A**	I/O (Signal Cable)	+0.5；1	60	Clamp	**Pass, A**
L1	−0.5；1；2	60	Direct	**Pass, A**	I/O (Signal Cable)	−0.5；1	60	Clamp	**Pass, A**
L2	+0.5；1；2	60	Direct	**Pass, A**					
L2	−0.5；1；2	60	Direct	**Pass, A**					
L1, L2	+0.5；1；2	60	Direct	**Pass, A**					
L1, L2	−0.5；1；2	60	Direct	**Pass, A**					

Remark : No error occurred.

Applicant：HTM Instruments Sdn Bhd (687564-T)
EUT： Trip Alarm Relay, M/N HTM TA2
Power Supply： DC 24V
Working Condition： See Section 3.4.

Test Date： Feb. 03, 2009
Temperature： 20 ℃
Humidity： 50 %
Test Mode: Operating

Inject Place: Power Supply Line					Inject Place : I/O Cable				
Inject Line	Voltage kV	Inject Time(s)	Inject Method	Results & Performance Criterion	Inject Line	Voltage kV	Inject Time(s)	Inject Method	Results & Performance Criterion
L1	+0.5；1；2	60	Direct	**Pass, A**					
L1	−0.5；1；2	60	Direct	**Pass, A**					
L2	+0.5；1；2	60	Direct	**Pass, A**					
L2	−0.5；1；2	60	Direct	**Pass, A**					
L1, L2	+0.5；1；2	60	Direct	**Pass, A**					
L1, L2	−0.5；1；2	60	Direct	**Pass, A**					

Remark : No error occurred.

8. SURGE IMMUNITY TEST

8.1. Test Equipment

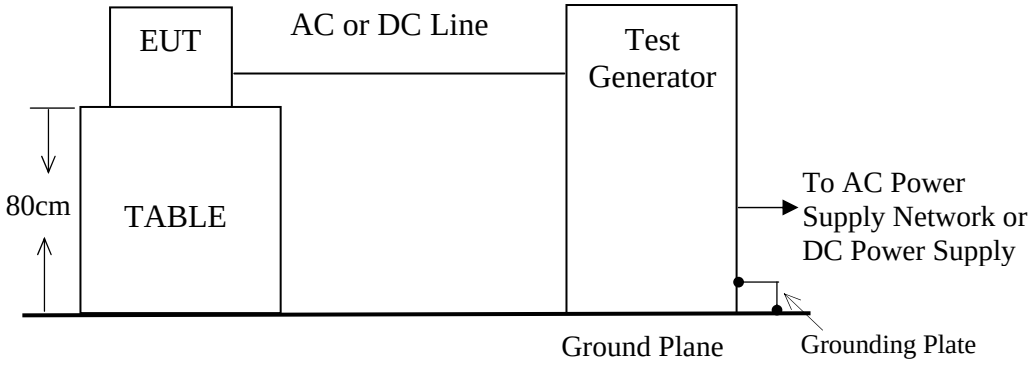
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Control Center	Keytek	E103	9907327	N/A	N/A
2.	Surge Combination Wave	Keytek	E501A	9506272	Jun. 13, 08’	Jun. 12, 09’
3.	Surge Coupler/ Decoupler	Keytek	E4551	9506216	Jun. 13, 08’	Jun. 12, 09’

8.2. Block Diagram of Test Setup

8.2.1. Block Diagram of connection between EUT and simulators.

Same as Section 7.2.1.

8.2.2. Test Setup



Remark: Test generator includes control center、surge combination and coupler.

8.3. Test Standard

EN 61326-1/2006

【IEC 61000-4-5/2006, Test Levels **:** line to line: ± 1.0kV, line to ground: ± 2.0kV, 1.2/50 (8/20) Tr/Th μ s.】

8.4. Test Levels and Performance Criterion

8.4.1. Test levels

Level	Open-circuit test Voltage +/- 10%, kV
1.	0.5
2.	1.0
3.	2.0
4.	4.0
X	Special

8.4.2. Performance criterion：B

8.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4 except the test set up replaced by section 8.2.

8.6. Test Procedure

8.6.1. Set up the EUT and test generator as shown on section 8.2.

8.6.2. For line to line coupling mode, provided a 0.5kV/1kV 1.2/50μs current surge (at open-circuit condition) and 8/20μs current surge to EUT selected points.

8.6.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate were conducted during test.

8.6.4. Different phase angles were done individually.

8.6.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

8.7. Test Results

PASSED. (Complied with Criterion A)

Two kinds of EUT {(1)powered by AC 230V (2)powered by DC 24V} were measured during this section testing and all the test results are attached in next page.

Surge Immunity Test Results

AUDIX TECHNOLOGY CORPORATION

Date：02/04/2009

Applicant：HTM Instruments Sdn Bhd (687564-T)	Test Date： Feb. 03, 2009
EUT： Trip Alarm Relay, M/N HTM TA2	Temperature： 20 ℃
Power Supply： AC 230V, 50Hz	Humidity： 50 %
Working Condition： See Section 3.4.	Test Mode: Operating

Input And Output AC Power Port

Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage (kV)	Results & Performance Criterion
L-N	+	0	5	0.5kV, 1kV	**Pass, A**
	+	90	5	0.5kV, 1kV	**Pass, A**
	+	180	5	0.5kV, 1kV	**Pass, A**
	+	270	5	0.5kV, 1kV	**Pass, A**
	-	0	5	0.5kV, 1kV	**Pass, A**
	-	90	5	0.5kV, 1kV	**Pass, A**
	-	180	5	0.5kV, 1kV	**Pass, A**
	-	270	5	0.5kV, 1kV	**Pass, A**

Remark : No error occurred.

Applicant： HTM Instruments Sdn Bhd (687564-T)	Test Date： Feb. 03, 2009
EUT： Trip Alarm Relay, M/N HTM TA2	Temperature： 20 ℃
Power Supply： DC 24V	Humidity： 50 %
Working Condition： See Section 3.4.	Test Mode: Operating

Input And Output DC Power Port

Location	Polarity	No of Pulse	Pulse Voltage (kV)	Result & Performance Criterion
Differential Mode	+	5	0.5kV；1 kV	**Pass, A**
	-	5	0.5kV；1 kV	**Pass, A**

Remark : No error occurred.

9. CONDUCTED DISTURBANCE IMMUNITY TEST

9.1. Test Equipment

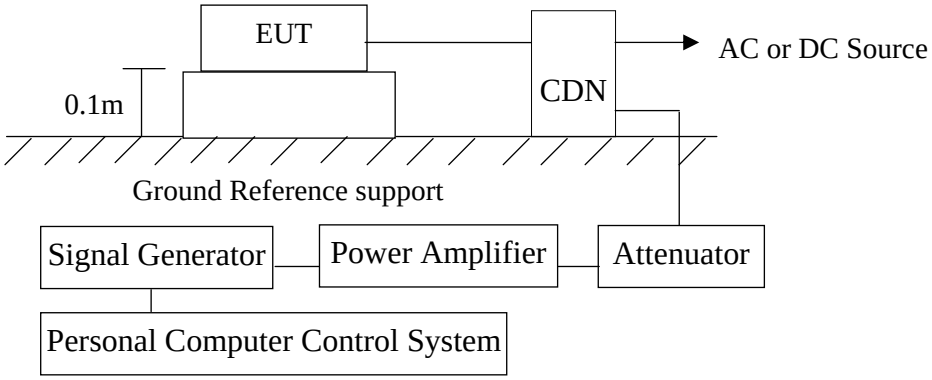
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Signal Generator	R & S	SML03	103251	Nov. 07, 08'	Nov. 06, 09'
2.	Power Amplifier	A & R	25A250A	18199	N/A	N/A
3.	Power Meter	HP	436A	2236A13620	Nov. 07, 08'	Nov. 06, 09'
4.	Power Sensor	HP	8482B	3318A05483	Nov. 07, 08'	Nov. 06, 09'
5.	Attenuator	Weinschel	40-6-34	NB538	May 17, 08'	May 16, 09'
6.	CDN-M2	Fischer	FCC-801-M2-25A	46	Jun. 24, 08'	Jun. 23, 09'
7.	Injection Clamp	Fisher	F-203I-23MM	332	May 23, 08'	May 24, 09'

9.2. Block Diagram of Test Setup

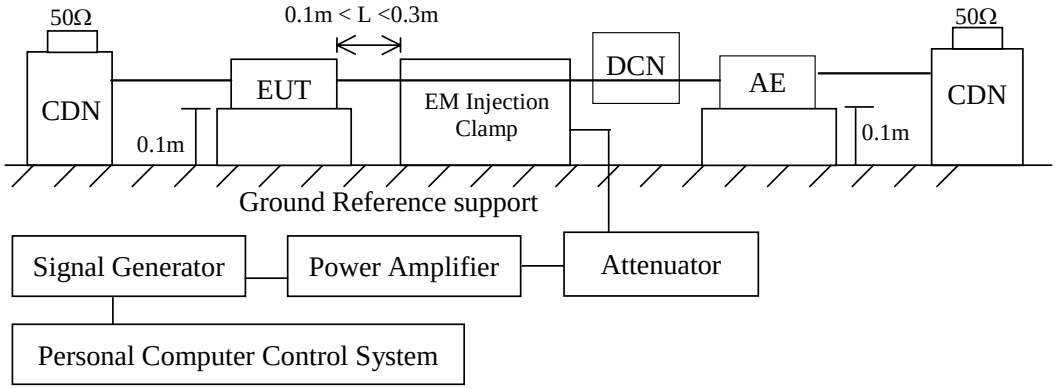
9.2.1. Block Diagram of connection between EUT and simulators.

Same as Section 7.2.1.

9.2.2. Common Mode Test Setup



9.2.3. EM Clamp Mode Test Setup



9.3. Test Standard

EN 61326-1/2006
【EN 61000-4-6/2007, Test Level：0.15-80MHz, 3V, 80%AM (1kHz)】

9.4. Test Levels and Performance Criterion

9.4.1. Test levels

Frequency range 0.15MHz - 80MHz		
Level	Voltage level (e.m.f.)	
	U_0 dB(μV)	U_0 V
1.	120	1
2.	130	3
3.	140	10
X[a]	Special	
[a] X is an open level.		

9.4.2. Performance criterion：A

9.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 9.2.

9.6. Test Procedure

** For AC & DC Power Line **

9.6.1. Set up the EUT, CDN and test generators as shown on section 9.2.1. & 9.2.2.

9.6.2. The EUT and supporting equipments were placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) was placed on the ground plane making contact with it about 0.1-0.3m from EUT. Cables between CDN and EUT were as short as possible.

9.6.3. The disturbance signal described below was injected to EUT through CDN.

9.6.4. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

9.6.5. The frequency range was swept from 150kHz to 100MHz using 10V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sinewave.

9.6.6. The rate of sweep shall not exceed 1.5*10^3decades/s. Where the frequency was swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

9.6.7. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

** For Signal Line **

9.6.8. Set up the EUT, EM Injection Clamp and test generators as shown on section 9.2.1. & 9.2.3.

9.6.9. The EUT and supporting equipment were placed on an insulating support 0.1m high above a ground reference plane. EM Injection Clamp (coupling and decoupling device) was placed on the ground plane making contact with it at about 0.1-0.3m from EUT. Cables between EM Injection Clamp and EUT were as short as possible.

9.6.10. The DCN was placed on between AE and EUT. The EUT and AE of power through CDN, CDN terminated with 50Ω at the RF disturbance input port.

9.6.11. The disturbance signal described below was injected to EUT through EM Injection Clamp.

9.6.12. Repeat above procedure from 9.6.4. to 9.6.7.

9.7. Test Results

PASSED. (Complied with Criterion A)

Two kinds of EUT {(1)powered by AC 230V (2)powered by DC 24V} were measured during this section testing and all the test results are attached in next page.

Conducted Disturbance Immunity Test Results

AUDIX TECHNOLOGY CORPORATION

Date：02/04/2009

Applicant： *HTM Instruments Sdn Bhd (687564-T)*	*Test Date：* *Nov. 26, 2008*
EUT： *Trip Alarm Relay, M/N HTM TA2*	*Temperature：* *25* *℃*
Power Supply： *AC 230V, 50Hz*	*Humidity：* *54* *%*
Working Condition： *See Section 3.4.*	*Test Mode:* *Operating*

Frequency Range (MHz)	*Injected Position*	*Strength*	*Results & Performance Criterion*
0.15MHz ~ 80MHz	*Main (AC Power Line)*	*3V(rms) Modulated*	***Pass, A***
0.15MHz ~ 80MHz	*I/O (Signal Cable)*	*3V(rms) Modulated*	***Pass, A***

Remark : 1. No error occurred.
2. Modulation Signal:1kHz 80% AM.

Applicant： *HTM Instruments Sdn Bhd (687564-T)*	*Test Date：* *Dec. 05, 2008*
EUT： *Trip Alarm Relay, M/N HTM TA2*	*Temperature：* *23* *℃*
Power Supply： *DC 24V*	*Humidity：* *54* *%*
Working Condition： *See Section 3.4.*	*Test Mode:* *Operating*

Frequency Range (MHz)	*Injected Position*	*Strength*	*Results & Performance Criterion*
0.15MHz ~ 80MHz	*Main (DC Power Line)*	*3V(rms) Modulated*	***Pass, A***

Remark : 1. No error occurred.
2. Modulation Signal:1kHz 80% AM.

10. VOLTAGE DIPS AND INTERRUPTIONS IMMUNITY TEST

10.1. Test Equipment

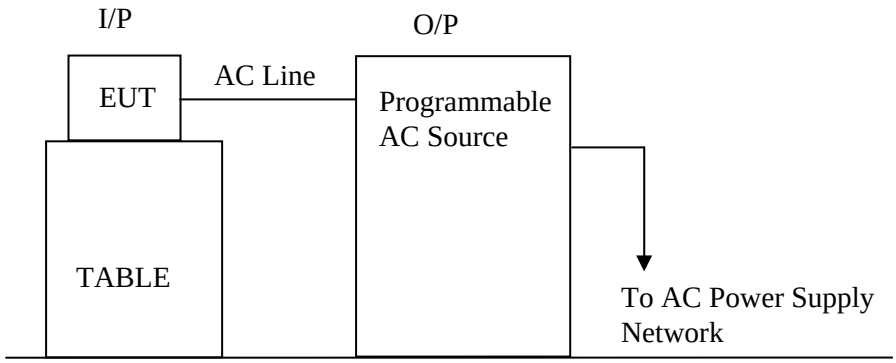
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Programmable Power Source	Chroma	6590	65900086	Jul. 25, 08’	Jul. 24, 09’

10.2. Block Diagram of Test Setup

10.2.1. Block Diagram of connection between EUT and simulators.

Same as Section 7.2.1.1

10.2.2. Test Setup



10.3. Test Standard

EN 61326-1/2006
【EN 61000-4-11/2004,
Test level : Voltage dips: 0% reduction, 1cycle
40% reduction, 10/12 cycle; 50/60Hz
70% reduction, 25/30 cycle; 50/60Hz
Voltage interruptions: 0% reduction, 250/300 cycle; 50/60Hz】

10.4. Test Levels and Performance Criterion

10.4.1. Preferred severity levels and durations for voltage dips

Class[a]	**Test level and durations for voltage dips (t_s) (50Hz/60Hz)**				
Class 1	Case-by-case according to the equipment requirements				
Class 2	0% during ½ cycle	0% during 1 cycle	70% during 25/30[c] cycles		
Class 3	0% during ½ cycle	0% during 1 cycle	40% during 10/12[c] cycles	70% during 25/30[c] cycles	80% during 250/300[c] cycles
Class X[b]	X	X	X	X	X

[a] Classes as per IEC 61000-2-4.
[b] To be defined by product committee. For equipment connected directly or indirectly to the public network, the levels must not be less severe than Class 2.
[c] "25/30 cycles" means "25 cycles for 50Hz test" and "30 cycles for 60Hz test".

10.4.2. Preferred severity levels and durations for short interruptions

Class[a]	**Test level and durations for short interruptions (t_s) (50Hz/60Hz)**
Class 1	Case-by-case according to the equipment requirements
Class 2	0% during 250/300[c] cycles
Class 3	80% during 250/300[c] cycles
Class X[b]	X

[a] Classes as per IEC 61000-2-4.
[b] To be defined by product committee. For equipment connected directly or indirectly to the public network, the levels must not be less severe than Class 2.
[c] "250/300 cycles" means "250 cycles for 50Hz test" and "300 cycles for 60Hz test".

10.4.3. Performance criterion：**B**

10.5. Operating Condition of EUT

Same as conducted measurement which is listed in 3.4. except the test set up replaced by section 10.2.

10.6. Test Procedure

10.6.1. Set up the EUT and test generator as shown on section 10.2.

10.6.2. The interruptions was introduced at selected phase angles with specified duration. There was a 10s minimum interval between each test event.

10.6.3. After each test a full functional check was performed before the next test.

10.6.4. Repeat procedures 10.6.2. & 10.6.3. for voltage dips, only the test level and duration was changed.

10.6.5. Record any degradation of Compliance.

10.7. Test Results

PASSED. (Complied with Criterion B)

EUT (powered by AC 230V) was measured during this section testing and all the test results are attached in next page.

Voltage Dips Immunity Test Results

AUDIX TECHNOLOGY CORPORATION

Date：02/04/2009

Applicant： HTM Instruments Sdn Bhd (687564-T)	Test Date： Feb. 03, 2009
EUT： Trip Alarm Relay, M/N HTM TA2	Temperature： 20 ℃
Power Supply： AC 230V, 50Hz/60Hz	Humidity： 50 %
Working Condition： See Section 3.4.	Test Mode: Operating

Single Test Voltage

Type of Test	Test Voltage	Phase Angle	% Reduction	Period (50Hz)	Period (60Hz)	Test Results & Performance Criterion
Voltage Dips	230	0	0 %	1	1	**Pass, B, Note**
		45	0 %	1	1	**Pass, B, Note**
		90	0 %	1	1	**Pass, B, Note**
		135	0 %	1	1	**Pass, B, Note**
		180	0 %	1	1	**Pass, B, Note**
		225	0 %	1	1	**Pass, B, Note**
		270	0 %	1	1	**Pass, B, Note**
		315	0 %	1	1	**Pass, B, Note**
Voltage Dips	230	0	40 %	10	12	**Pass, B, Note**
		45	40 %	10	12	**Pass, B, Note**
		90	40 %	10	12	**Pass, B, Note**
		135	40 %	10	12	**Pass, B, Note**
		180	40 %	10	12	**Pass, B, Note**
		225	40 %	10	12	**Pass, B, Note**
		270	40 %	10	12	**Pass, B, Note**
		315	40 %	10	12	**Pass, B, Note**
Voltage Dips	230	0	70 %	25	30	**Pass, B, Note**
		45	70 %	25	30	**Pass, B, Note**
		90	70 %	25	30	**Pass, B, Note**
		135	70 %	25	30	**Pass, B, Note**
		180	70 %	25	30	**Pass, B, Note**
		225	70 %	25	30	**Pass, B, Note**
		270	70 %	25	30	**Pass, B, Note**
		315	70 %	25	30	**Pass, B, Note**
Voltage interruptions	230	0	0 %	250	300	**Pass, B, Note**
		45	0 %	250	300	**Pass, B, Note**
		90	0 %	250	300	**Pass, B, Note**
		135	0 %	250	300	**Pass, B, Note**
		180	0 %	250	300	**Pass, B, Note**
		225	0 %	250	300	**Pass, B, Note**
		270	0 %	250	300	**Pass, B, Note**
		315	0 %	250	300	**Pass, B, Note**

Note: Criteria B, The EUT was stopped operating during the test, but it was self-recoverable after testing.

11. PHOTOGRAPHS

11.1. Photos of Conducted Disturbance Measurement

FRONT VIEW OF CONDUCTED MEASUREMENT

BACK VIEW OF CONDUCTED MEASUREMENT

11.2. Photos of Radiated Disturbance Measurement at Open Area Test Site

Sample Unit : powered by AC 230V

FRONT VIEW OF RADIATED MEASUREMENT

BACK VIEW OF RADIATED MEASUREMENT

Sample Unit : powered by DC 24V

FRONT VIEW OF RADIATED MEASUREMENT

BACK VIEW OF RADIATED MEASUREMENT

11.3.Photos of Electrostatic Discharge Immunity Test

Air Discharge Test

VCP & HCP Discharge

Photo of ESD Test Points

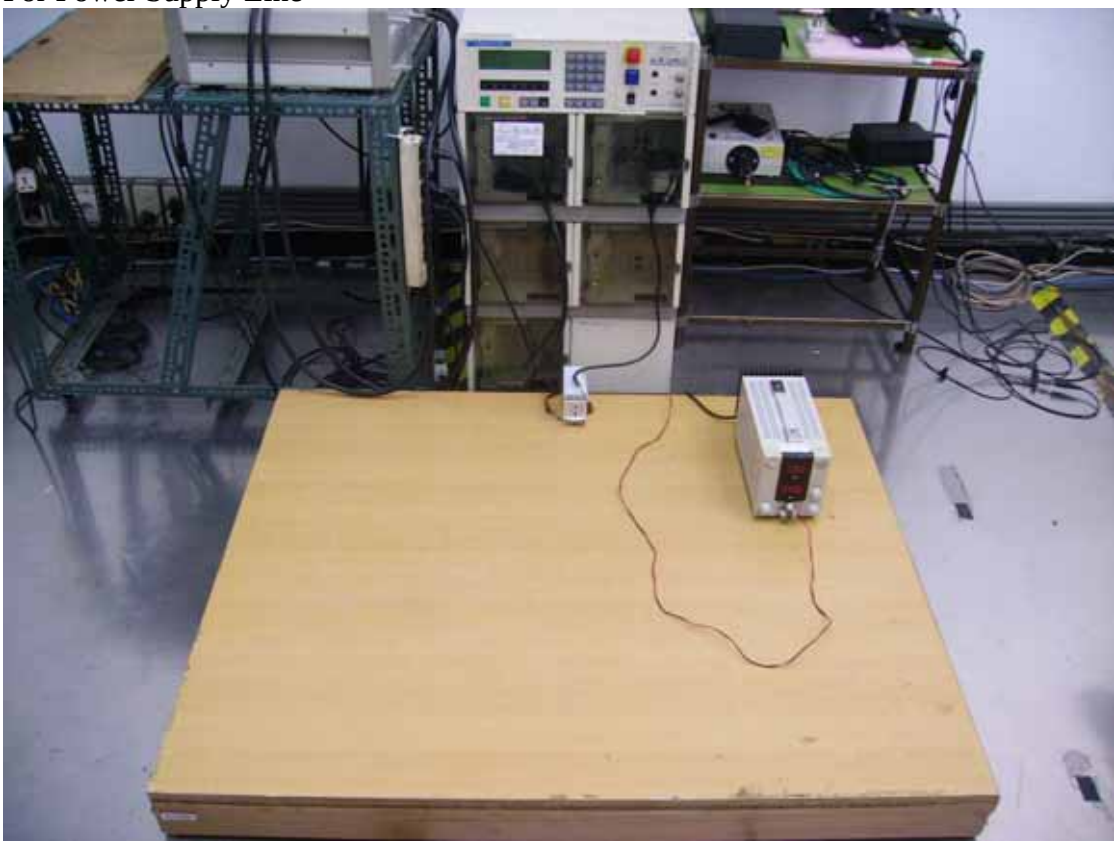
11.4.Photos of RF Field Strength Immunity Test

Frequency Range: 80-1000MHz

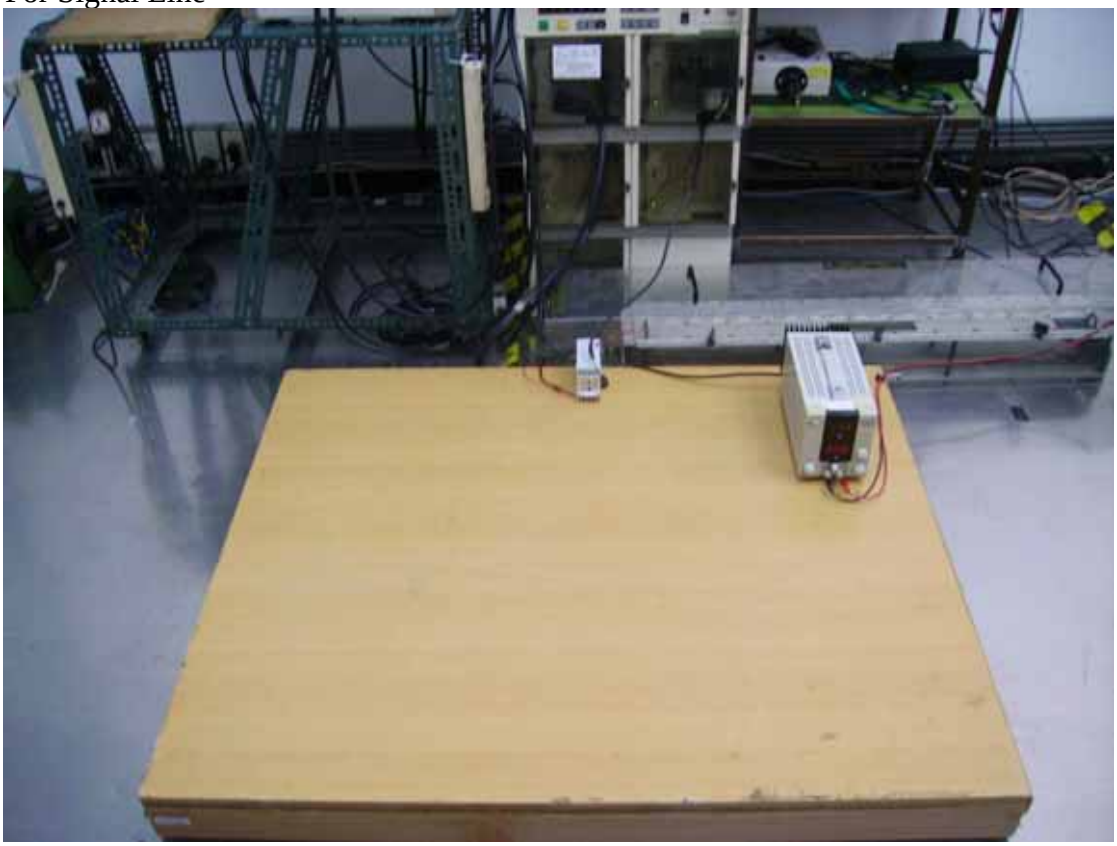
Frequency Range: 1.4 ~2GHz & 2 ~ 2.7GHz

11.5.Photos of Electrical Fast Transient/Burst Immunity Test

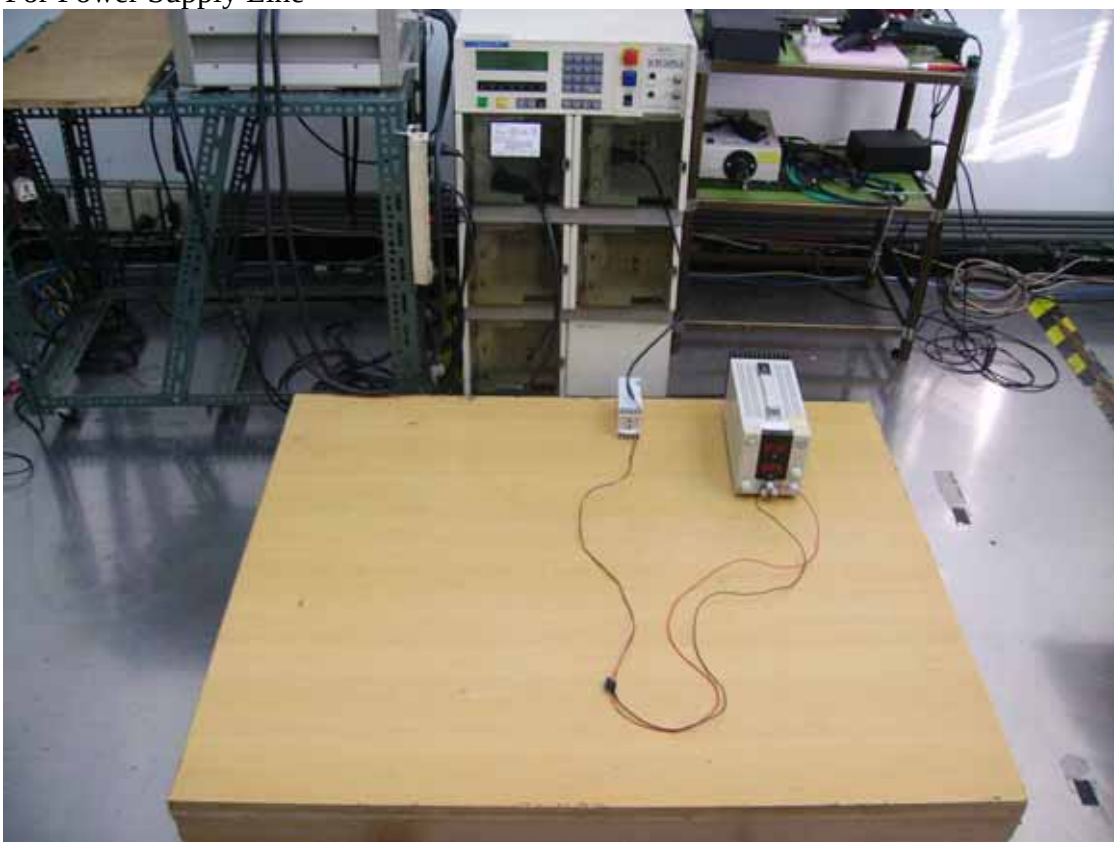
Sample Unit : powered by AC 230V
For Power Supply Line



For Signal Line



Sample Unit : powered by DC 24V
For Power Supply Line



11.6.Photos of Surge Immunity Test

Sample Unit : powered by AC 230V

Sample Unit : powered by DC 24V

11.7.Photos of Conducted Disturbance Immunity Test

Sample Unit : powered by AC 230V
Injection Position: Power Supply Line

Injection Position: Signal Line

Sample Unit : powered by DC 24V
Injection Position: Power Supply Line

11.8.Photo of Voltage Dips & Voltage Interruptions Immunity Test

APPENDIX I

(Photos of EUT)

Total Pages: 6 Pages

Figure 1
EUT powered by AC 230V
General Appearance (Front View)

Figure 2
EUT powered by AC 230V
General Appearance (Front & Bottom & Side View)

Figure 3
EUT powered by AC 230V
General Appearance (Back & Side View)

Figure 4
EUT powered by AC 230V
Internal View (Removed Main Board)

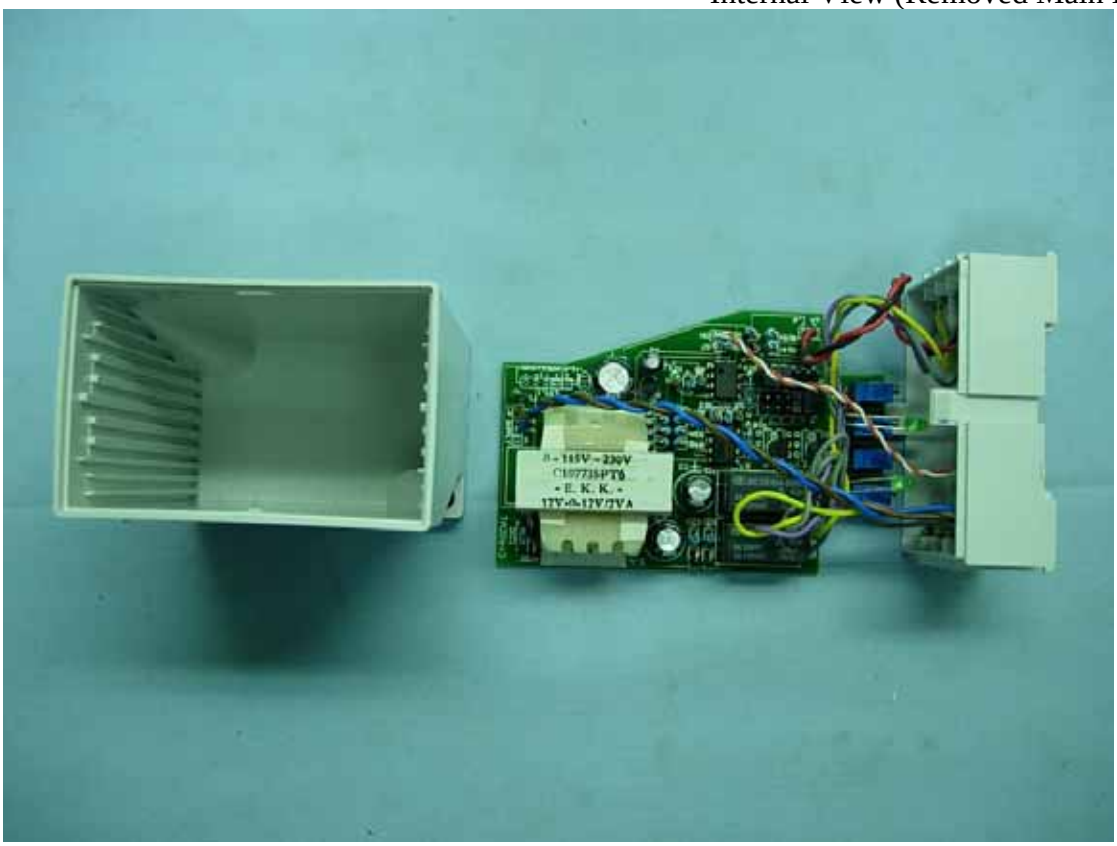


Figure 5
EUT powered by AC 230V
Internal View (Main Board/Front View)

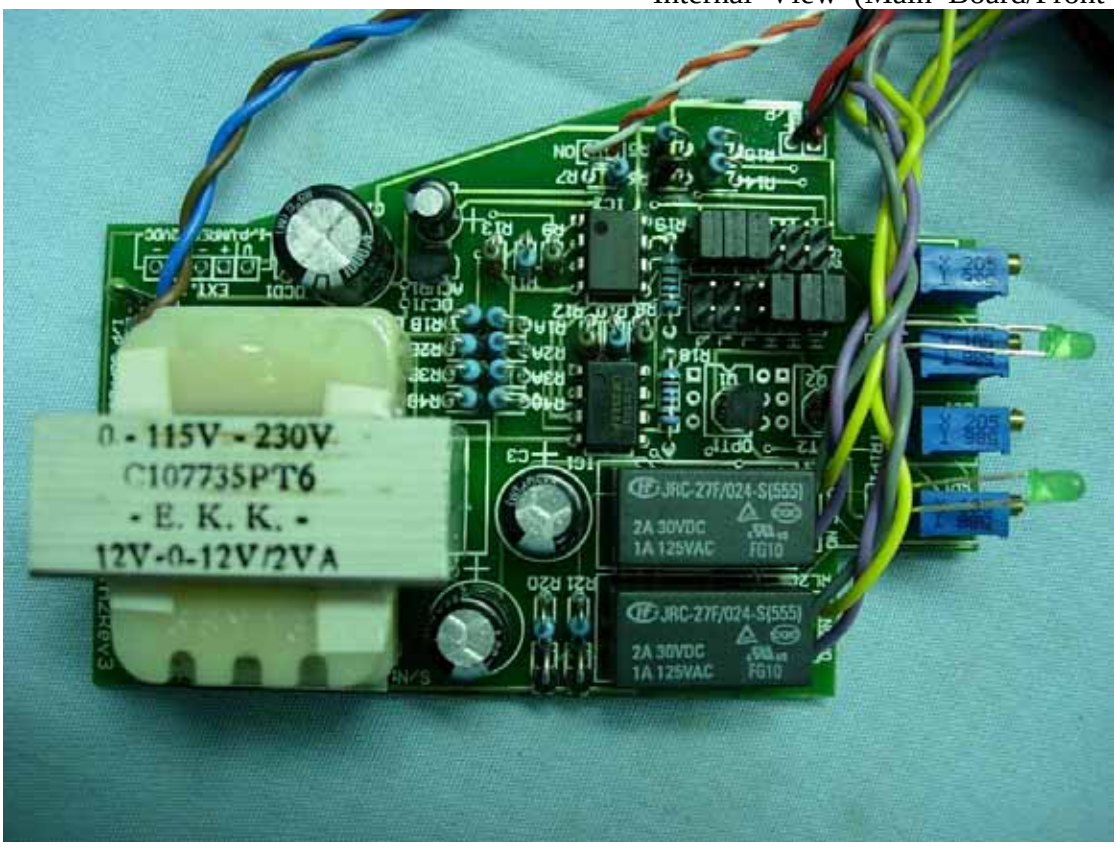


Figure 6
EUT powered by AC 230V
Internal View (Main Board/Rear View)

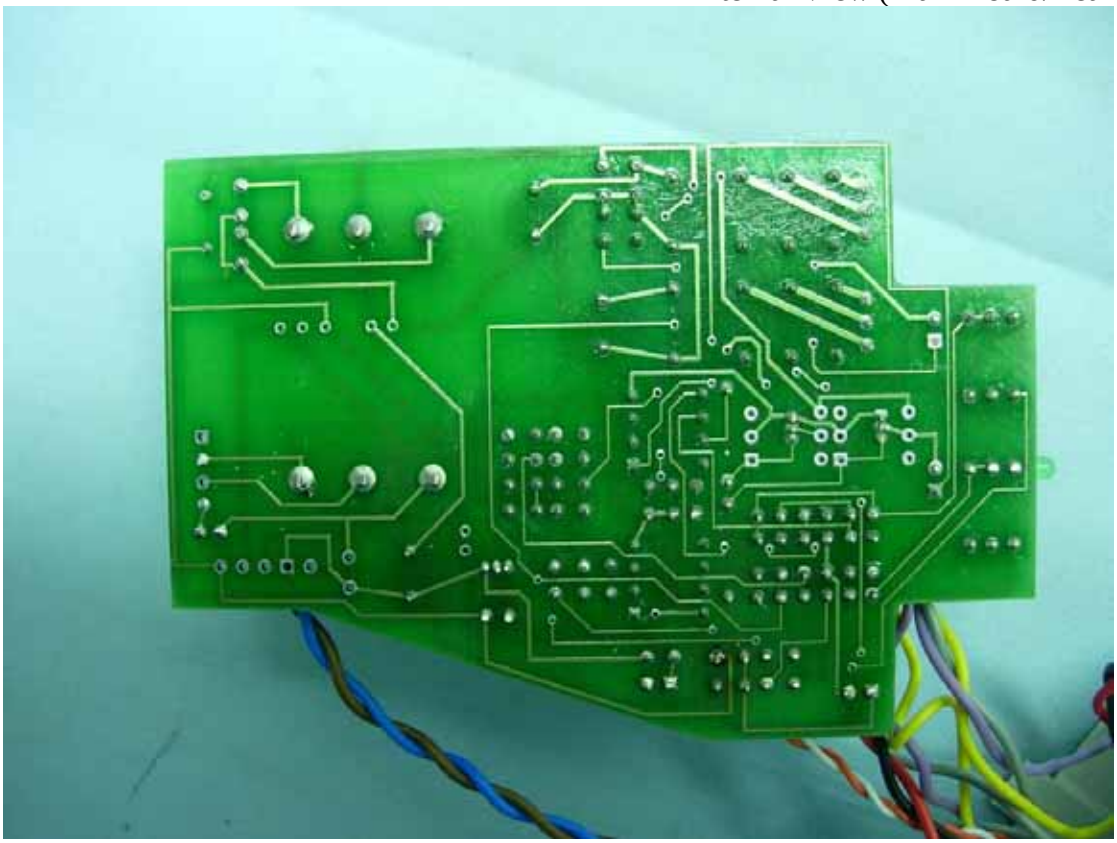


Figure 7
EUT powered by DC 24V
General Appearance (Front View)

Figure 8
EUT powered by DC 24V
General Appearance (Front & Bottom & Side View)

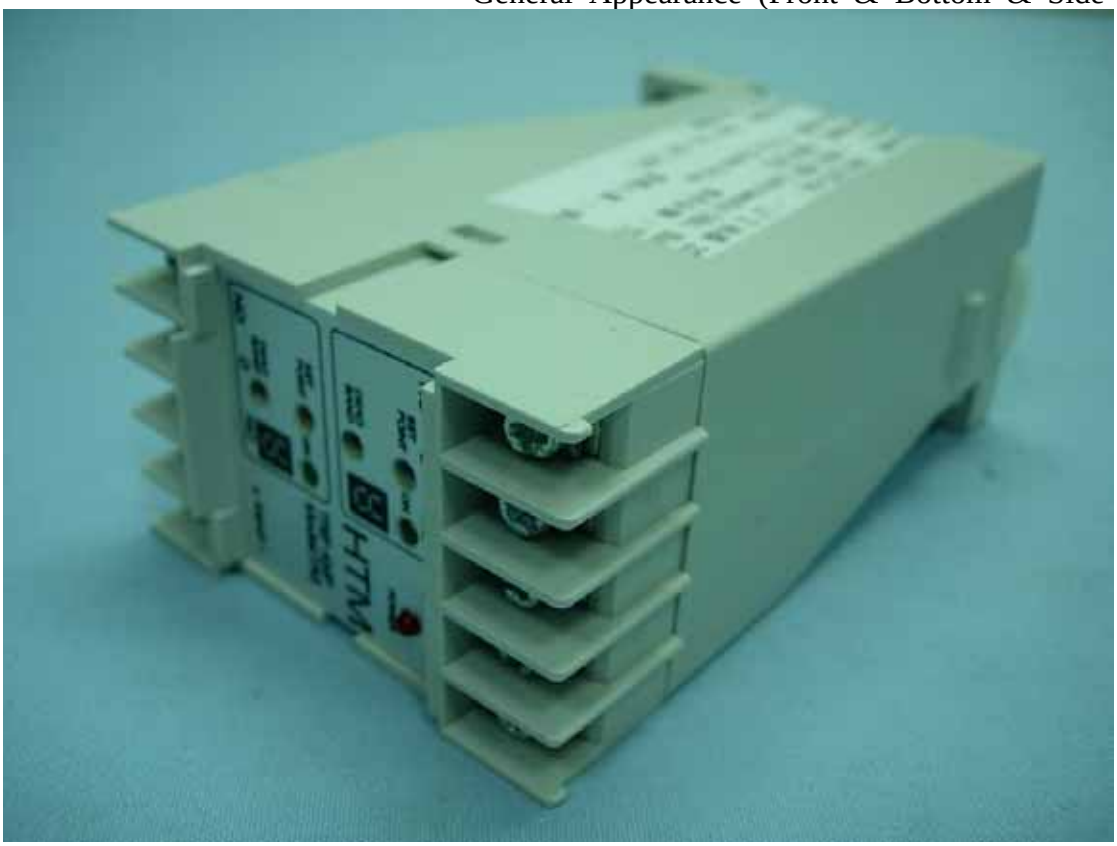


Figure 9
EUT powered by DC 24V
General Appearance (Back & Side View)

Figure 10
EUT powered by DC 24V
Internal View (Removed Main Board)

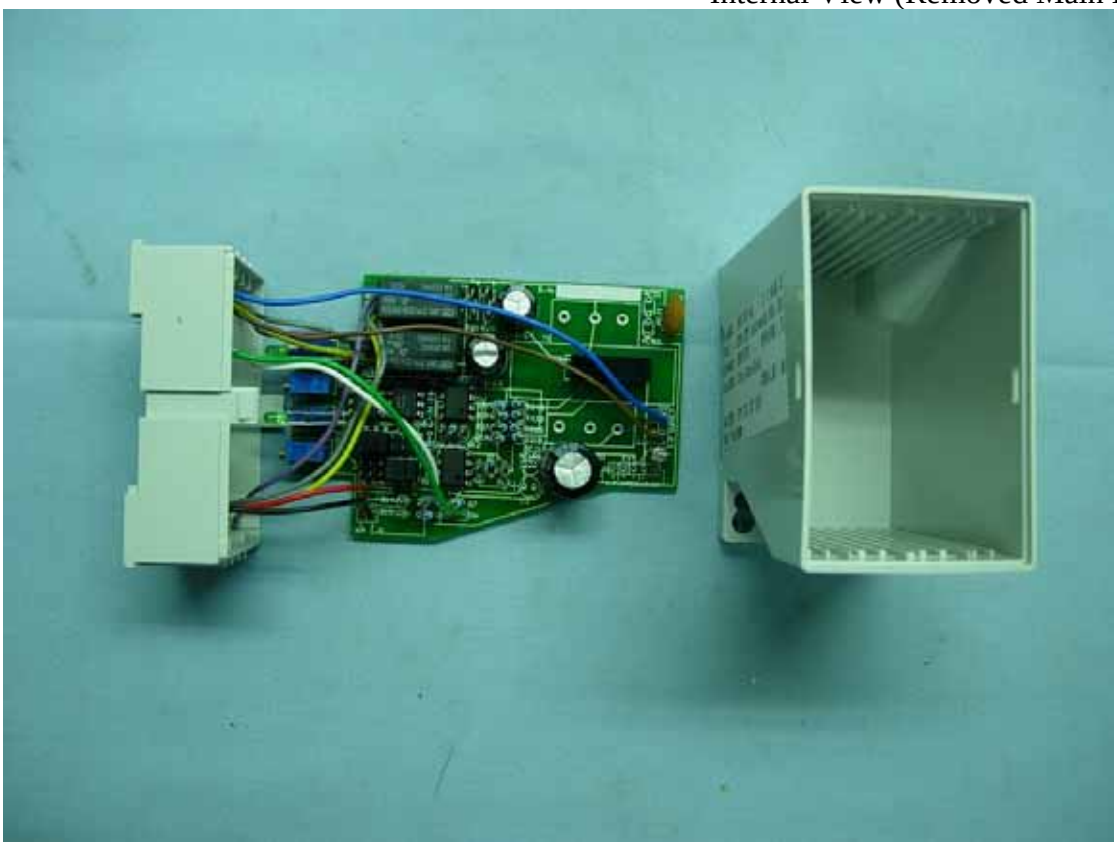


Figure 11
EUT powered by DC 24V
Internal View (Main Board/Front View)

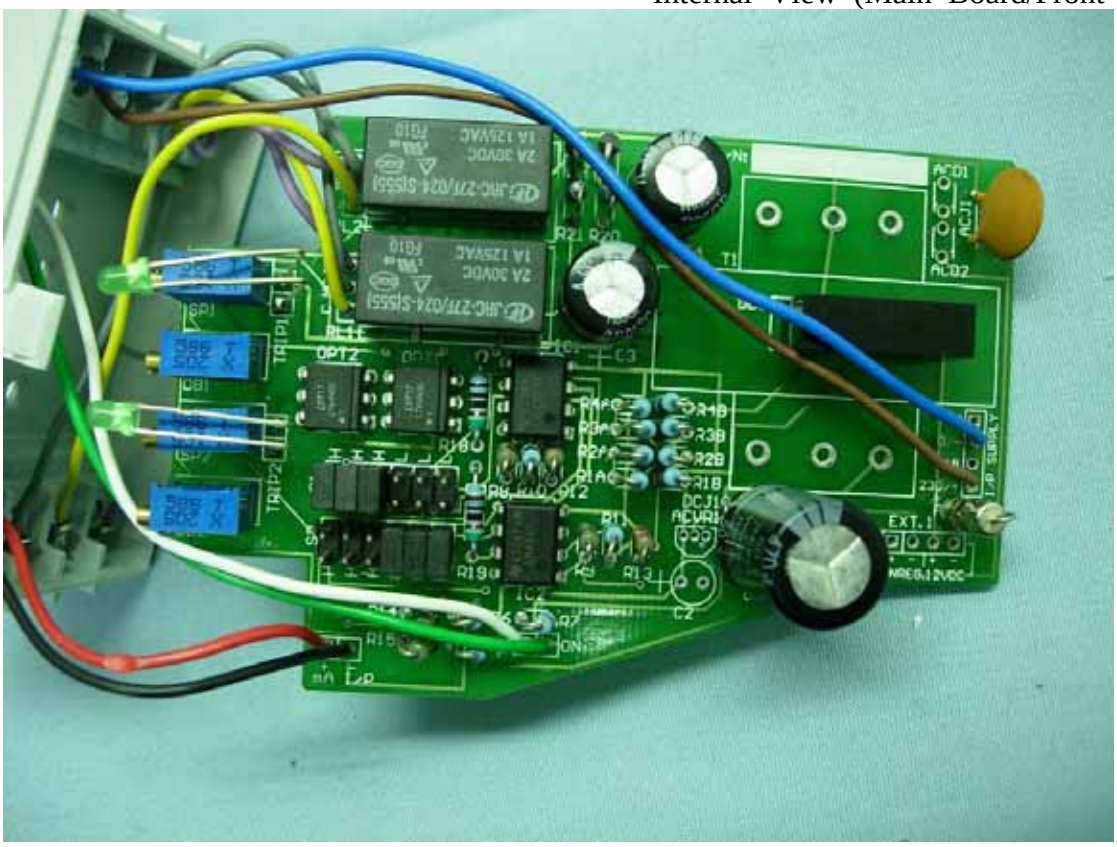


Figure 12
EUT powered by DC 24V
Internal View (Main Board/Rear View)