Test Report No.:	TWR080724 001		Page 1 of 19
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:	Piezoresistive Level Sensor		
Model No.:	HTM PS420	**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 2 (3V/m)* EN 61000-4-4:2004 *(DC/Signal ports: level 3 (±2kV)* EN 61000-4-5:2006 *(DC/Signal ports: class 2)* EN 61000-4-6:2007 *(DC/Signal ports: level 2 (3V)*		
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	
Christo Chi			
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: N/A

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: N/A

6.3.2 VOLTAGE INTERRUPTION

RESULT: N/A

Contents

1. General Remarks

1.1 Complementary Materials

This applies to the following test report only

EM-E970378 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-E970378 of AUDIX Technology Co., Ltd.

3. General Product Information

3.1 Product Function and Intended Use

The DUT is a Piezoresistive Level Sensor suitable for measuring levels of water and any other non-corrosive liquids.

3.2 Ratings and System Details

Rated Voltage:	DC 12 – 36V
Outputs:	4-20mA, max. 60 Ohms @ DC 24V
Protection Class:	III

3.3 Independent Operation Modes

The basic operation mode is:

A. Normal Operation: The DUT was immersed into the tank with water filled in, by connecting to an indicator and suitable DC power source.

Refer to the attached test report:
EM-E970378 of AUDIX Technology Co., Ltd.

3.4 Noise Generating and Noise Suppressing Parts

Linear OP-IC circuits 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-E970378 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-E970378 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-E970378 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-E970378 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 61000-3-2:2000+A2:2005

Note: The DUT is supplied by DC power source, 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 is supplied by DC power source, this test item is not applicable.

5.1.3 Mains Terminal Continuous Disturbance Voltage

RESULT: **N/A**

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

Note: The DUT is supplied by DC power source, this test item is not applicable.

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:	DC 24V

Refer to the attached test report:
EM-E970378 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:	2008-12-08
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-3:2006
Frequency ranges:	(80 - 1000)MHz and (1.4 – 2.0)GHz
Test level 1:	2 (3V/m) (unmodulated, rms.)
Frequency range:	(2.0 – 2.7)GHz
Test level 2:	1 (1V/m) (unmodulated, rms.)
Modulation:	80% AM, 1kHz
Sweep mode:	Automatic
Sweep rate:	1%, 3s dwell time
Operation mode:	A
Supply Voltage:	DC 24V
Performance criterion:	A

Refer to the attached test report:
EM-E970378 of AUDIX Technology Co., Ltd.

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

RESULT: **PASS**

Date of testing:	2008-12-08
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-6:2007
Severity level:	2 (3V) for DC power / I/O 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:	DC 24V
Performance criterion:	A

Refer to the attached test report:
EM-E970378 of AUDIX Technology Co., Ltd.

6.2 Transient Disturbances

6.2.1 Electrical Fast Transients (EFT)

RESULT: **PASS**

Date of testing:	2008-12-09
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-4:2004
Severity level:	3 (±2kV) for DC / I/O signal ports
Operation mode:	A
Supply Voltage:	DC 24V
Performance criterion:	B

Refer to the attached test report:
EM-E970378 of AUDIX Technology Co., Ltd.

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6.2.2 Surge

RESULT: **PASS**

Date of testing:	2008-12-08
Reference standard:	EN 61326-1:2006
Test procedure:	EN 61000-4-5:2006
Installation class:	2 for DC power / I/O signal 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:	DC 24V
Performance criterion:	B

Refer to the attached test report:
EM-E970378 of AUDIX Technology Co., Ltd.

6.2.3 Electrostatic Discharges (ESD)

RESULT: **PASS**

Date of testing:	2008-12-09
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:	DC 24V
Performance criterion:	B

Refer to the attached test report:
EM-E970378 of AUDIX Technology Co., Ltd.

6.3 Power Supply Alterations

6.3.1 Voltage Dip

RESULT: **N/A**

Reference standard: EN 61326-1:2006

Test procedure: EN 61000-4-11:2004

Note: The DUT is supplied by DC power source, this test item is not applicable.

6.3.2 Voltage Interruption

RESULT: **N/A**

Reference standard: EN 61326-1:2006

Test procedure: EN 61000-4-11:2004

Note: The DUT is supplied by DC power source, this test item is not applicable.

7. Photographs of the Test Set-Up

Refer to the attached test report:
EM-E970378 of AUDIX Technology Co., Ltd.

8. Attachment: Test Report EM-E970378 of AUDIX Technology Co., Ltd.

36 pages including cover page following

EMC TEST REPORT

for

HTM Instruments Sdn Bhd (687564-T)

Piezoresistive Level Sensor

Model No. : HTM PS420

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	:	EM971974
Report Number	:	EM-E970378
Date of Test	:	Nov. 24 ~ Dec. 08, 2008
Date of Report	:	Dec. 09, 2008

TABLE OF CONTENTS

TEST REPORT VERIFICATION

Applicant	:	HTM Instruments Sdn Bhd (687564-T)
Manufacturer	:	HTM Instruments Sdn Bhd (687564-T)
EUT Description	:	Piezoresistive Level Sensor
	(A) Model No.	: HTM PS420
	(B) Serial No.	: N/A
	(C) Power Supply	: DC 12-36V
	(D) Test Voltage	: 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

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 uses DC power and the EUT cannot be connected to the mains while in use.

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. 24 ~ Dec. 08, 2008 Date of Report : Dec. 09, 2008

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	N/A
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	N/A
Voltage dips, 40% reduction during 10/12 cycles		C	N/A
Voltage dips, 70% reduction during 25/30 cycles		C	N/A
Voltage interruptions, 0% reduction during 250/300 cycles		C	N/A

Note: No sensitive devices to magnetic filed are exist.

1. N/A is an abbreviation for Not Applicable.
2. Above items not applicable in this report and regarded as compliance due to EUT uses DC power and the EUT cannot be connected to the mains while in use.
3. According to Table 2 of standard, EUT supposed to be used in 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	:	Piezoresistive Level Sensor
Model Number	:	HTM PS420
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
Power Supply	:	12 to 36Vdc
Outputs	:	4-20mA, max 600 Ohms@24Vdc
DC Power Cord(+Signal Cable)	:	Shielded, Undetachable, 15m
Date of Receipt of Sample	:	Nov. 17, 2008
Date of Test	:	Nov. 24 ~ Dec. 08, 2008

2.2.Tested Supporting System Details

【FOR RADIATED DISTURBANCE MEASUREMENT】

2.2.1. DC POWER SUPPLY

Model Number	:	3303A
Serial Number	:	721773
Manufacturer	:	TOP WARD
Power Cord	:	Non-Shielded, Detachable, 1.8m

2.2.2. MULTI-TESTER

Model Number	:	DM-3000
Serial Number	:	N/A
Manufacturer	:	HILA
DC Power Cord(-) (Link to EUT)	:	Non-Shielded, Detachable, 1.0m
DC Power Cord(+)	:	Non-Shielded, Detachable, 1.0m

【FOR EMS IMMUNITY TESTS】

2.2.3. DC POWER SUPPLY

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

2.2.4. MULTI-TESTER

Model Number	:	DH-370B
Serial Number	:	N/A
Manufacturer	:	DHA
DC Power Cord(-) (Link to EUT)	:	Non-Shielded, Detachable, 0.9m
DC Power Cord(+)	:	Non-Shielded, Detachable, 0.9m

2.3. Description of Test Facility

Name of Firm : **AUDIX Technology Corporation**
EMC Department
No. 53-11, Tin-Fu Tsun, Lin-Kou Hsiang,
Taipei Hsien, Taiwan.

Test Facility & Location : **No. 5 Open Area Test Site**
(R5) No. 67-4, Tin-Fu Tsun, Lin-Kou,
Taipei, Taiwan

Immunity Test Site
No. 53-11, Tin-Fu Tsun, Lin-Kou,
Taipei, Taiwan

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

The conducted disturbance voltage limits are not required for EUT which only employ DC power for operation.

4. RADIATED DISTURBANCE MEASUREMENT

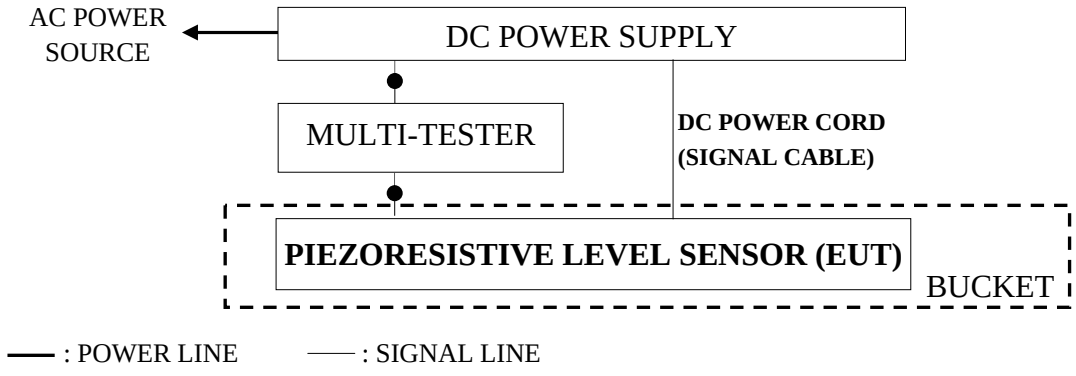
4.1. Test Equipment

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

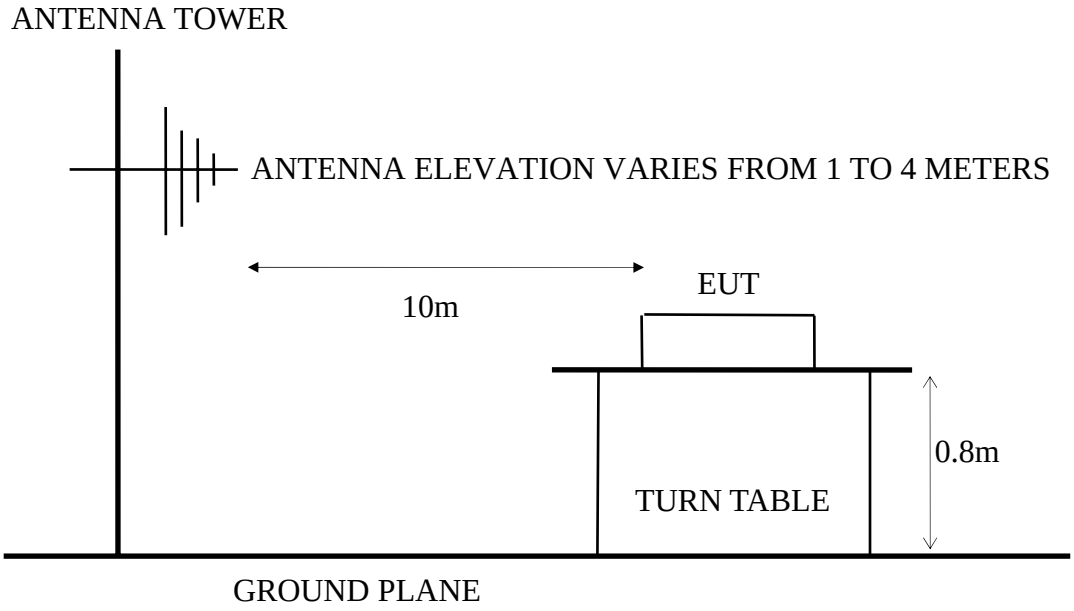
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E7405A	MY42000134	Jun. 23, 08’	Jun. 22, 09’
2.	Test Receiver	R & S	ESCI	100555	May. 20, 08’	May. 19, 09’
3.	Amplifier	HP	8447D	2944A07185	N/A	N/A
4.	Biconical Antenna	Chase	VBA6106A	1262	Apr. 10, 08’	Apr. 09,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



4.2.2. 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

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

4.4.2. To turn on the power of all equipment.

4.4.3. The EUT (Piezoresistive Level Sensor) was operated through the DC power supply and Multi-Tester during all testing. (The multi-tester was set on 20mA level to check the EUT function.)

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 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.)

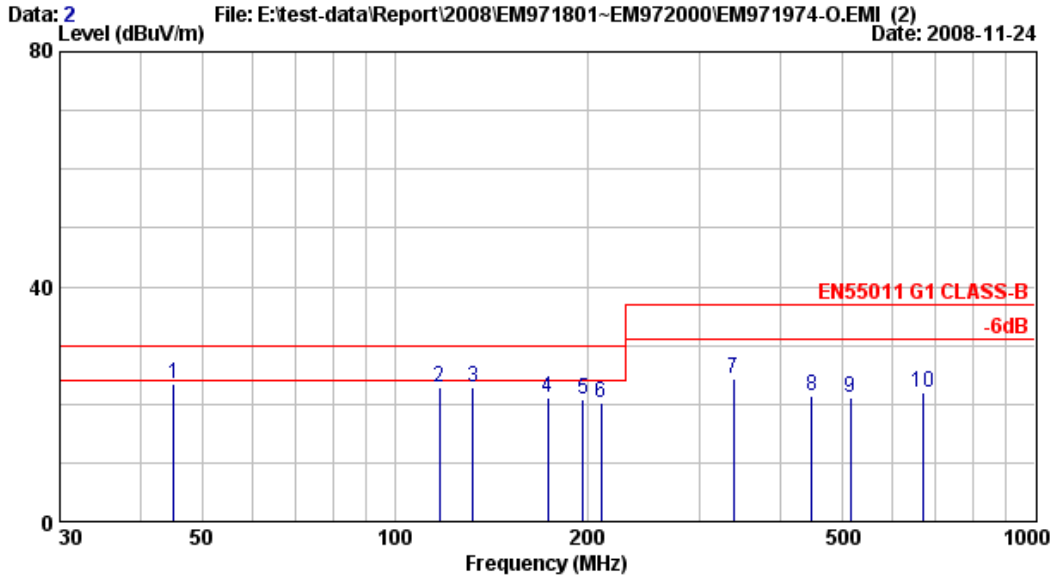
EUT was measured during the conducted disturbance testing and all the test results are listed in next pages.

EUT：Piezoresistive Level Sensor M/N：HTM PS420

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

Reference Test Data No.: Horizontal: # 2 ; Vertical: #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

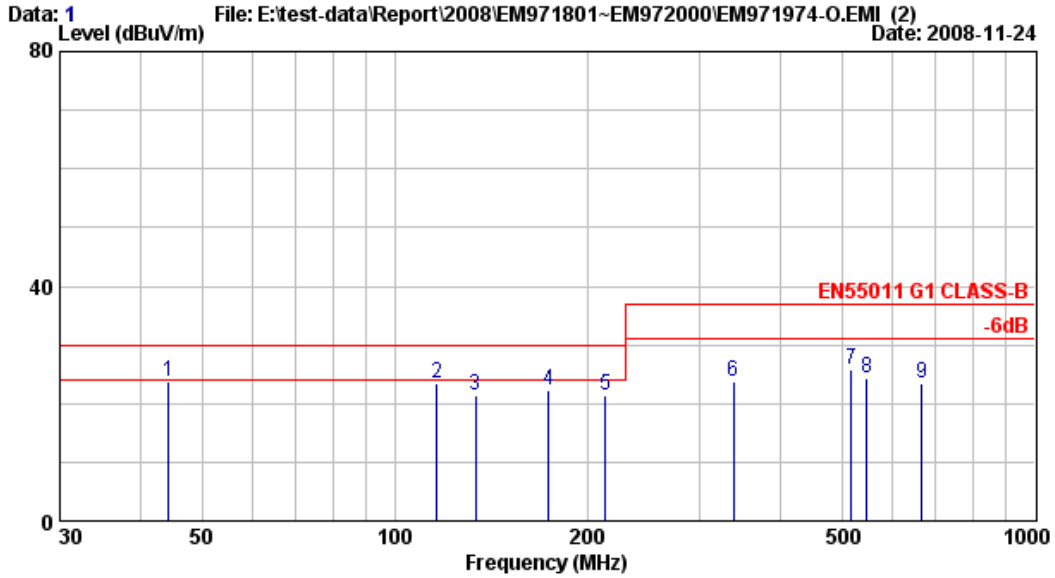


Site no. : NO.5 OPEN SITE Data no. : 2
Dis. / Ant. : 10m VBA6106A/UPA6109(08) Ant. pol. : HORIZONTAL
Limit : EN55011 G1 CLASS-B
Env. / Ins. : 22*C/61% ESCI(555) Engineer : TIM
EUT : Piezoresistive Level Sensor
Power Rating : DC 24V
Test Mode : Operating
M/N:HTM PS420

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	45.250	17.49	1.13	4.69	23.31	30.00	6.69	
2	117.550	18.53	1.56	2.90	22.99	30.00	7.01	
3	132.540	19.50	1.68	1.69	22.87	30.00	7.13	
4	173.440	20.94	1.96	-1.75	21.15	30.00	8.85	
5	196.890	21.46	2.08	-2.64	20.91	30.00	9.09	
6	210.250	21.73	2.20	-3.64	20.29	30.00	9.71	
7	338.360	14.74	3.07	6.66	24.47	37.00	12.53	
8	447.550	16.29	3.50	1.69	21.48	37.00	15.52	
9	515.850	17.64	3.74	-0.26	21.12	37.00	15.88	
10	669.330	20.42	4.05	-2.40	22.07	37.00	14.93	

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

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. : 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 : Piezoresistive Level Sensor
Power Rating : DC 24V
Test Mode : Operating
M/N:HTM PS420

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Remark
1	44.360	17.92	1.12	4.60	23.64	30.00	6.36	
2	116.360	18.50	1.55	3.36	23.41	30.00	6.59	
3	133.780	19.54	1.69	0.20	21.43	30.00	8.57	
4	174.250	20.93	1.96	-0.70	22.19	30.00	7.81	
5	213.250	21.81	2.23	-2.78	21.26	30.00	8.74	
6	338.250	14.74	3.07	5.90	23.71	37.00	13.29	
7	516.250	17.64	3.74	4.36	25.74	37.00	11.26	
8	546.250	19.05	3.81	1.36	24.21	37.00	12.79	
9	666.220	20.40	4.04	-1.00	23.44	37.00	13.56	

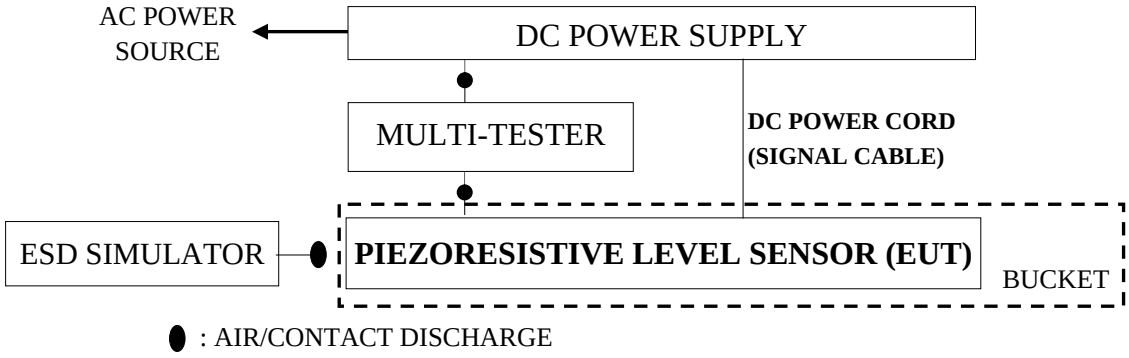
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

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



5.3. 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 radiated disturbance measurement which is listed in 4.4 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 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：12/09/2008

Applicant： HTM Instruments Sdn Bhd (687564-T)	Test Date： Dec. 08, 2008
EUT： Piezoresistive Level Sensor, M/N HTM PS420	Temperature： 25 ℃
	Humidity： 50 %
Power Supply： DC 24V	Atmospheric pressure: 100 kPa
Working Condition： See Section 4.4.	Test Mode: Operating

Item	Amount of Discharge for per voltage	Voltage	Results
Contact Discharge	40	+2kV; +4kV -2kV; -4kV	**Pass A** **Pass A**
Air Discharge	0	+2kV; +4kV; +8kV -2kV; -4kV; -8kV	**Pass A, Note** **Pass A, Note**
Indirect Discharge (HCP)	20	+2kV; +4kV -2kV; -4kV	**Pass A** **Pass A**
Indirect Discharge (VCP Front)	20	+2kV; +4kV -2kV; -4kV	**Pass A** **Pass A**
Indirect Discharge (VCP Left)	20	+2kV; +4kV -2kV; -4kV	**Pass A** **Pass A**
Indirect Discharge (VCP Back)	20	+2kV; +4kV -2kV; -4kV	**Pass A** **Pass A**
Indirect Discharge (VCP Right)	20	+2kV; +4kV -2kV; -4kV	**Pass A** **Pass A**
Measurement Points	1. Metal	Contact Discharge	2. Metal	Contact Discharge
	Please refer to the Photos of ESD Test Points *Points 1 ~ 2 for Contact Discharge.*			

Note: The EUT can't be discharged by testing ESD gun, it's no affection.

6. RF FIELD STRENGTH IMMUNITY TEST

6.1. Test Equipment

6.1.1. For 80MHz ~ 1000MHz

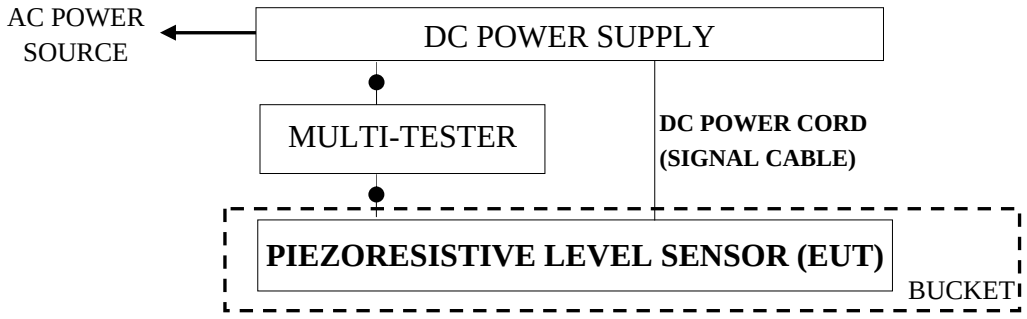
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Signal Generator	R & S	SML03	103251	Nov.07, 08’	Nov.06, 09’
2.	Power Amplifier	A & R	25W1000M7	13261	N/A	N/A
3.	Power Antenna	A & R	AT1080	13002	N/A	N/A
4.	Power Sensor	Agilent	E9327A	US40441766	Jan. 26, 08’	Jan. 25, 09’
5.	Power Monitor	Agilent	E4417A	GB41291797	Jan. 26, 08’	Jan. 25, 09’
6.	Direction Coupler	A & R	DC6180	19323	May 17, 08’	May 16, 09’

6.1.2. For 1.4GHz ~ 2.7GHz

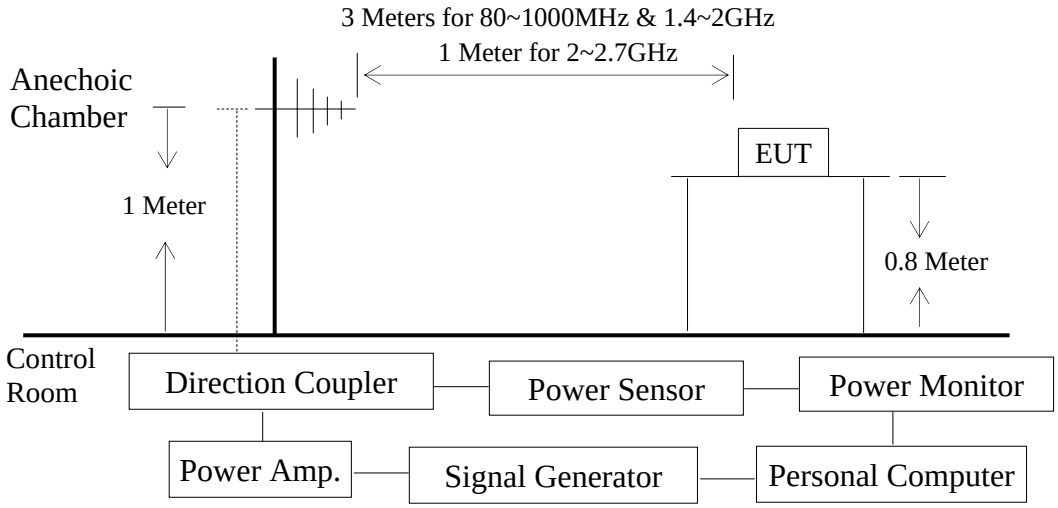
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Signal Generator	R & S	SML03	103251	Nov.07, 08’	Nov.06, 09’
2.	Power Amplifier	A & R	120S1G3	3039655	N/A	N/A
3.	Power Antenna	A & R	AT4002A	304290	N/A	N/A
4.	Power Sensor	Agilent	E9327A	US40441766	Jan. 26, 08’	Jan. 25, 09’
5.	Power Meter	Agilent	E4417A	GB41291797	Jan. 26, 08’	Jan. 25, 09’
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: 3V/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. Severity 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 4.4 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 (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	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 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：12/09/2008

Applicant：HTM Instruments Sdn Bhd (687564-T)	Test Date： Dec. 08, 2008
EUT： Piezoresistive Level Sensor, M/N HTM PS420	Temperature： 25 ℃
Power Supply： DC 24V	Humidity： 52 %
Working Condition： See Section 4.4.	Test Mode: Operating

Frequency Range (MHz)	Position (Angle)	Polarity (H or V)	Field Strength (V/M)	Test Results
80 ~1000	0 °	H	3V/m+Modulated	**Pass A**
80 ~ 1000	90 °	H	3V/m+Modulated	**Pass A**
80 ~ 1000	180 °	H	3V/m+Modulated	**Pass A**
80 ~ 1000	270 °	H	3V/m+Modulated	**Pass A**
80 ~1000	0 °	V	3V/m+Modulated	**Pass A**
80 ~ 1000	90 °	V	3V/m+Modulated	**Pass A**
80 ~ 1000	180 °	V	3V/m+Modulated	**Pass A**
80 ~ 1000	270 °	V	3V/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

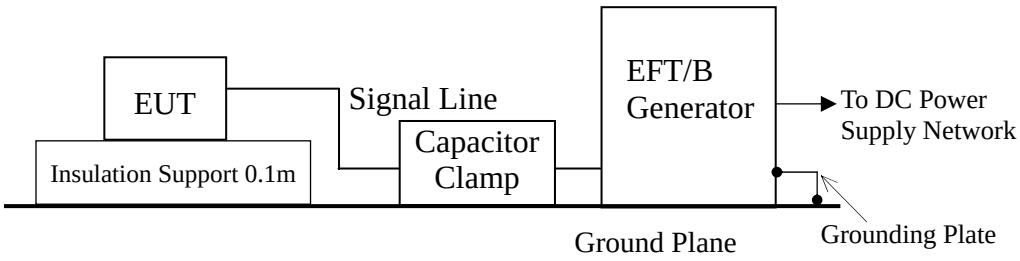
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Control Center	Keytek	E103	9506267	N/A	N/A
2.	EFT Generator	Keytek	E411	9506182	Jun. 13, 08’	Jun. 12, 09’
3.	EFT Coupler / Decoupler	Keytek	E4551	9506216	Jun. 13, 08’	Jun. 12, 09’

7.2. Block Diagram of Test Setup

7.2.1. Block Diagram of connection between EUT and simulators.

Same as Section 6.2.1.

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 : I/O signal - ±2kV, 5/50ns, 5kHz】

7.4. Test Levels and Performance Criterion

7.4.1. Severity 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 4.4. 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：

No AC ports. It‘s unnecessary to measure.

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：

No DC ports. It‘s unnecessary to measure.

7.7. Test Results

PASSED. (Complied with Criterion A)

EUT was 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：12/09/2008

Applicant：HTM Instruments Sdn Bhd (687564-T)	*Test Date：Dec. 08, 2008*
EUT：Piezoresistive Level Sensor, M/N HTM PS420	*Temperature：25 ℃*
Power Supply：DC 24V	*Humidity：50 %*
Working Condition：See Section 4.4.	*Test Mode: Operating*

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

Remark : No error occurred.

8. SURGE IMMUNITY TEST

8.1. Test Equipment

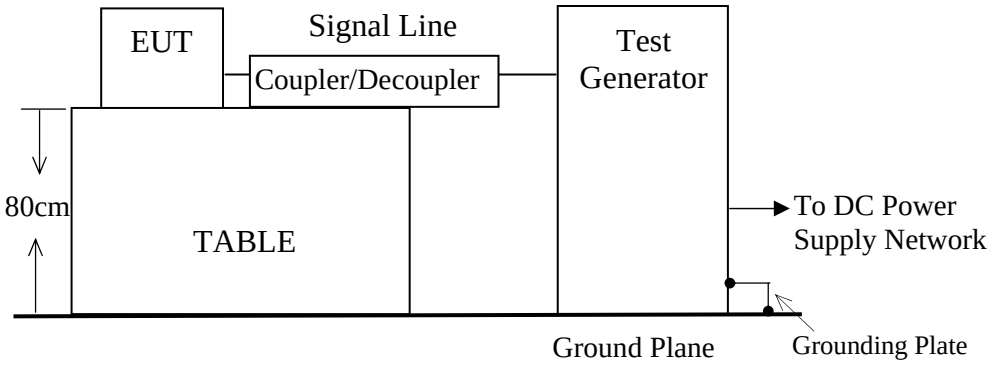
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Control Center	Keytek	E103	9907327	N/A	N/A
2.	Surge Combination Wave	Keytek	E501A	9506272	Jun. 13, 08’	Jun. 12, 09’
3.	Surge Coupler/ Decoupler	Keytek	E4551	9506216	Jun. 13, 08’	Jun. 12, 09’

8.2. Block Diagram of Test Setup

8.2.1. Block Diagram of connection between EUT and simulators.

Same as Section 6.2.1.

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 **:** I/O signal : ± 1kV, 1.2/50 (8/20) Tr/Th μ s.】

8.4. Test Levels and Performance Criterion

8.4.1. Severity 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 4.4 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. Repeat procedures 8.6.2 to 8.6.4 except the open-circuit test voltage change from 0.5kV/1kV for line to earth coupling mode test.

8.6.6. 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)

EUT was measured during this section testing and all the test results are attached in next page.

Surge Immunity Test Results

AUDIX TECHNOLOGY CORPORATION

Date：12/09/2008

Applicant：HTM Instruments Sdn Bhd (687564-T)	*Test Date：* *Dec. 08, 2008*
EUT： *Piezoresistive Level Sensor, M/N HTM PS420*	*Temperature：* *25* *℃*
Power Supply： *DC 24V*	*Humidity：* *50* *%*
Working Condition： *See Section 4.4.*	*Test Mode:* *Operating*

I/O Signal Cable

Location	*Polarity*	*No of Pulse*	*Pulse Voltage (kV)*	*Result & Performance Criterion*
Common 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

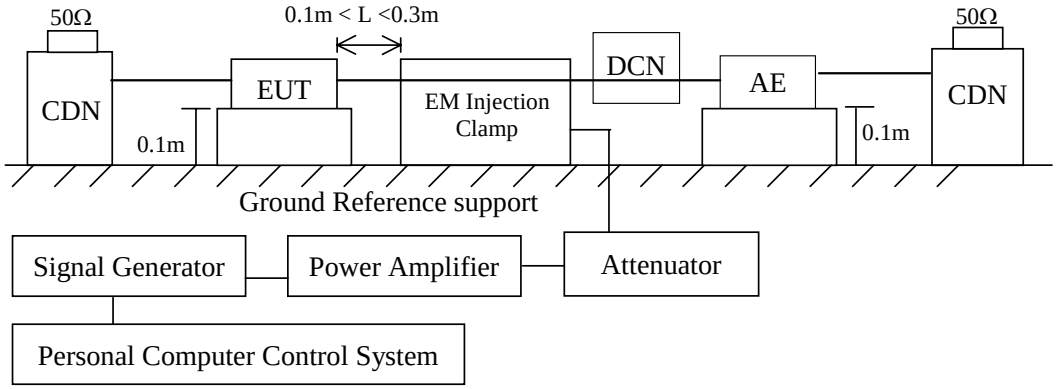
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Signal Generator	R & S	SML03	103251	Nov.07, 08’	Nov.06, 09’
2.	Power Amplifier	A & R	25A250A	18199	N/A	N/A
3.	Power Meter	HP	436A	2236A13620	Nov. 07, 08’	Nov. 06, 09’
4.	Power Sensor	HP	8482B	3318A05483	Nov. 07, 08’	Nov. 06, 09’
5.	Attenuator	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. 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. Severity 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 4.4. except the test set up replaced by section 9.2.

9.6. Test Procedure

9.6.1. Set up the EUT, EM Injection Clamp and test generators as shown on section 9.2.2.

9.6.2. 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.

9.6.3. 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.

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

9.6.5. Repeat above procedure from 9.6.4. to 9.6.7.

9.7. Test Results

PASSED. (Complied with Criterion A)

EUT was measured during this section testing and all the test results are attached in next page.

Conducted Disturbance Immunity Test Results

AUDIX TECHNOLOGY CORPORATION

Date：12/08/2008

Applicant：HTM Instruments Sdn Bhd (687564-T)	*Test Date：* *Dec. 08, 2008*
EUT： *Piezoresistive Level Sensor, M/N HTM PS420*	*Temperature：* *25* *℃*
Power Supply： *DC 24V*	*Humidity：* *52* *%*
Working Condition： *See Section 4.4.*	*Test Mode:* *Operating*

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

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

10. PHOTOGRAPHS

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

FRONT VIEW OF RADIATED MEASUREMENT

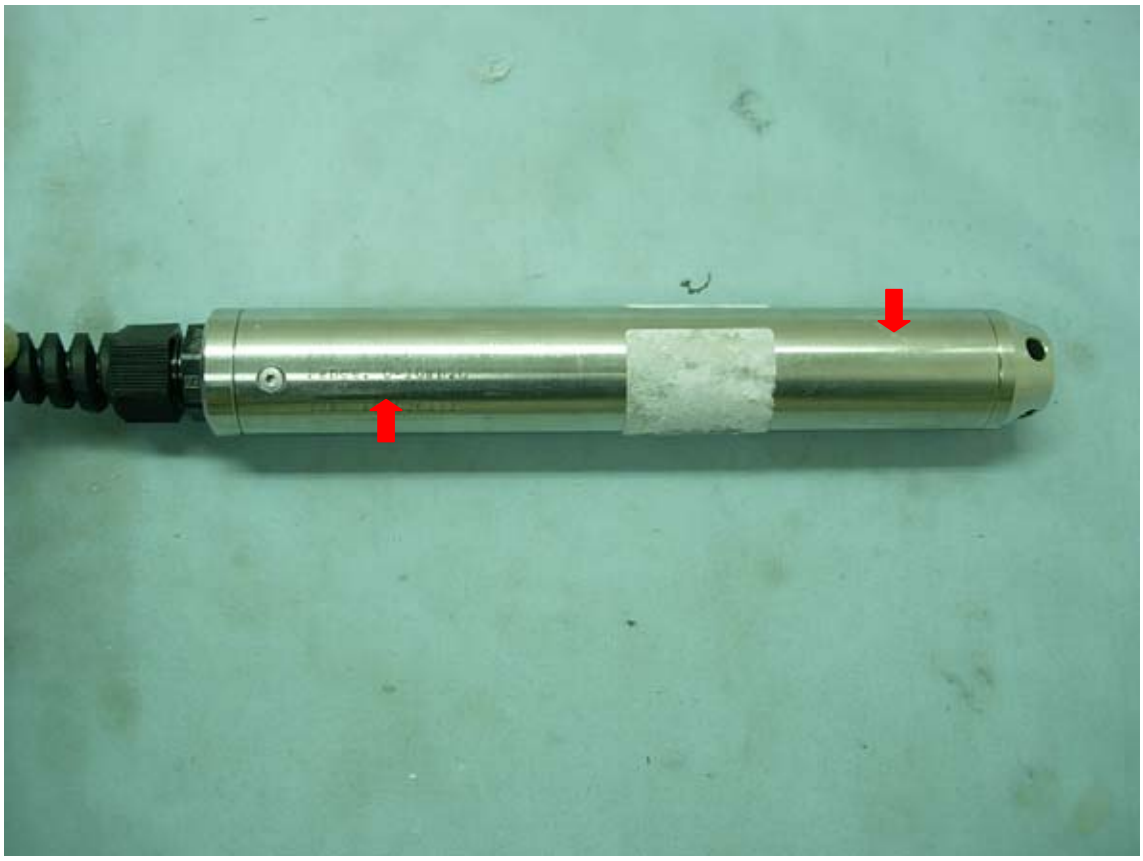
BACK VIEW OF RADIATED MEASUREMENT

10.2.Photos of Electrostatic Discharge Immunity Test

Contact Discharge Test

VCP & HCP Discharge

Photo of ESD Test Points

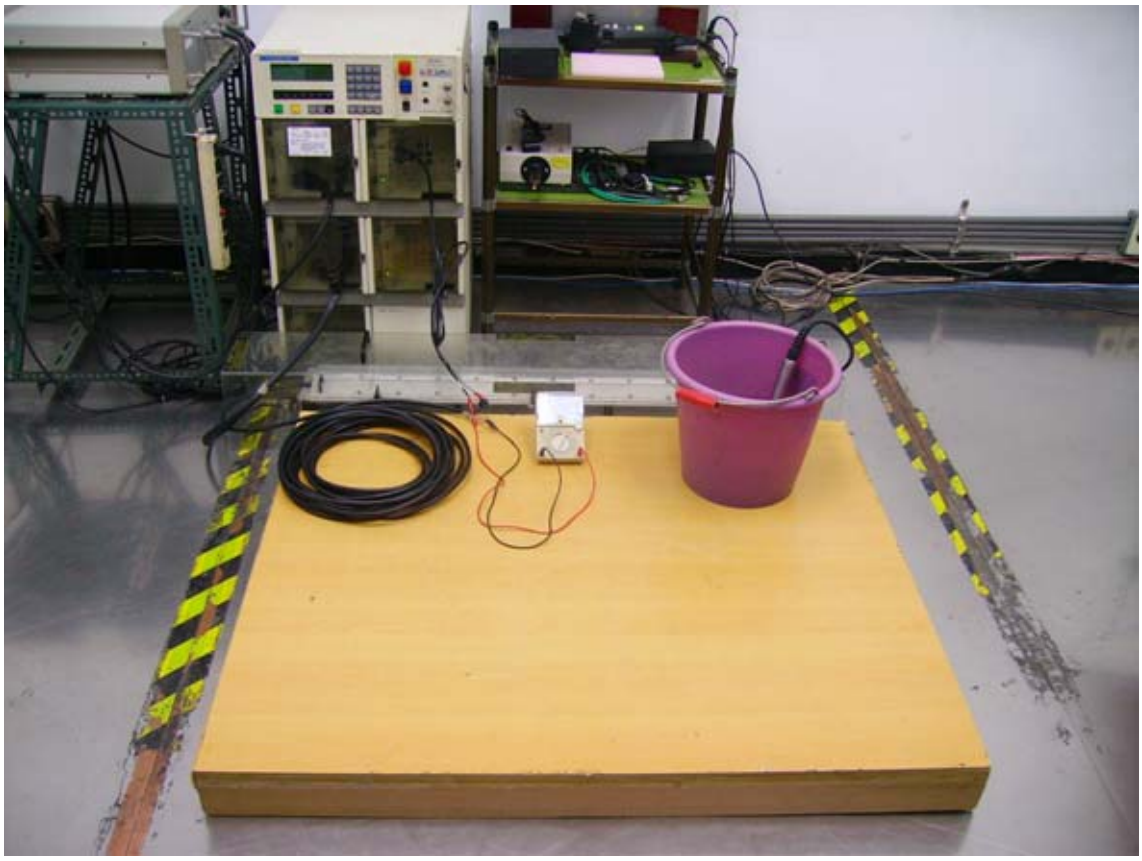


10.3.Photos of RF Field Strength Immunity Test

Frequency Range: 80-1000MHz

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

10.4.Photo of Electrical Fast Transient/Burst Immunity Test



10.5.Photo of Surge Immunity Test

10.6.Photo of Conducted Disturbance Immunity Test

APPENDIX I

(Photos of EUT)

Total Pages: 4 Pages

Figure 1
General Appearance

Figure 2
General Appearance

Figure 3
General Appearance

Figure 4
Internal View (Removed Main Board)

Figure 5
Internal View (Main Board/Front View)

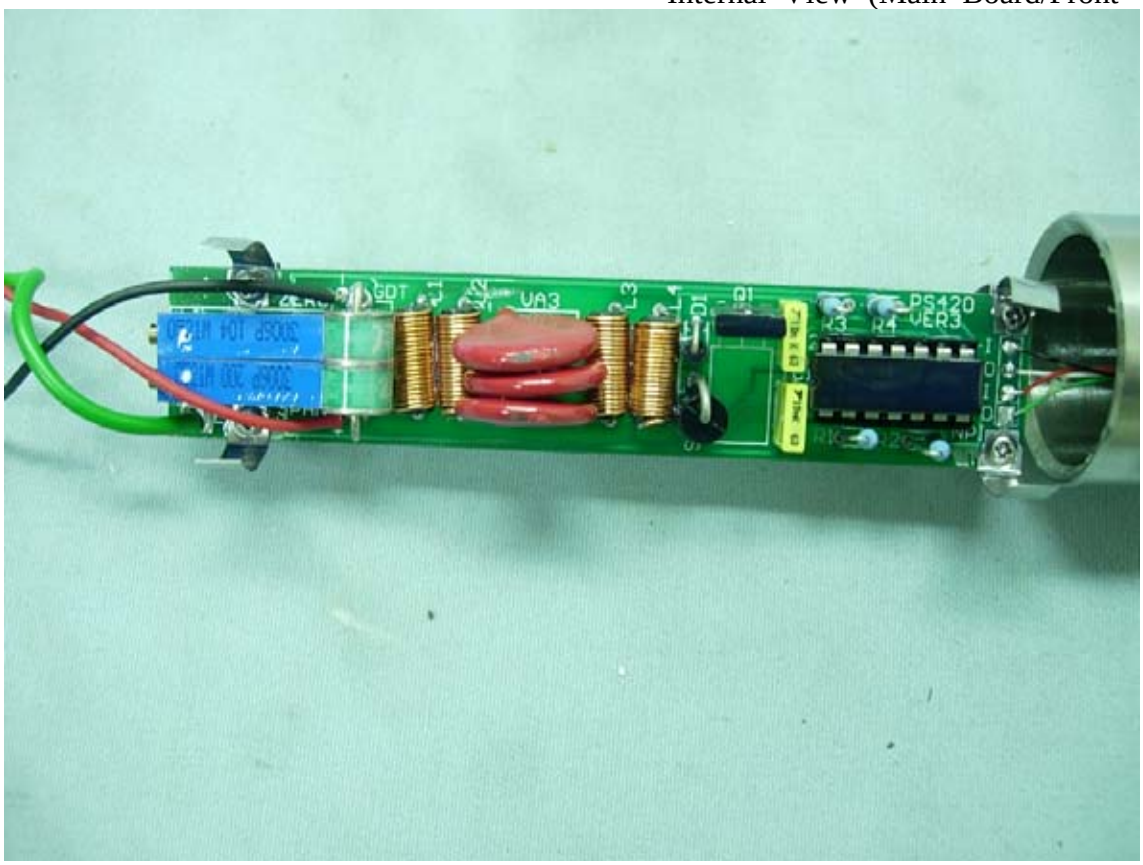


Figure 6
Internal View (Main Board/Rear View)

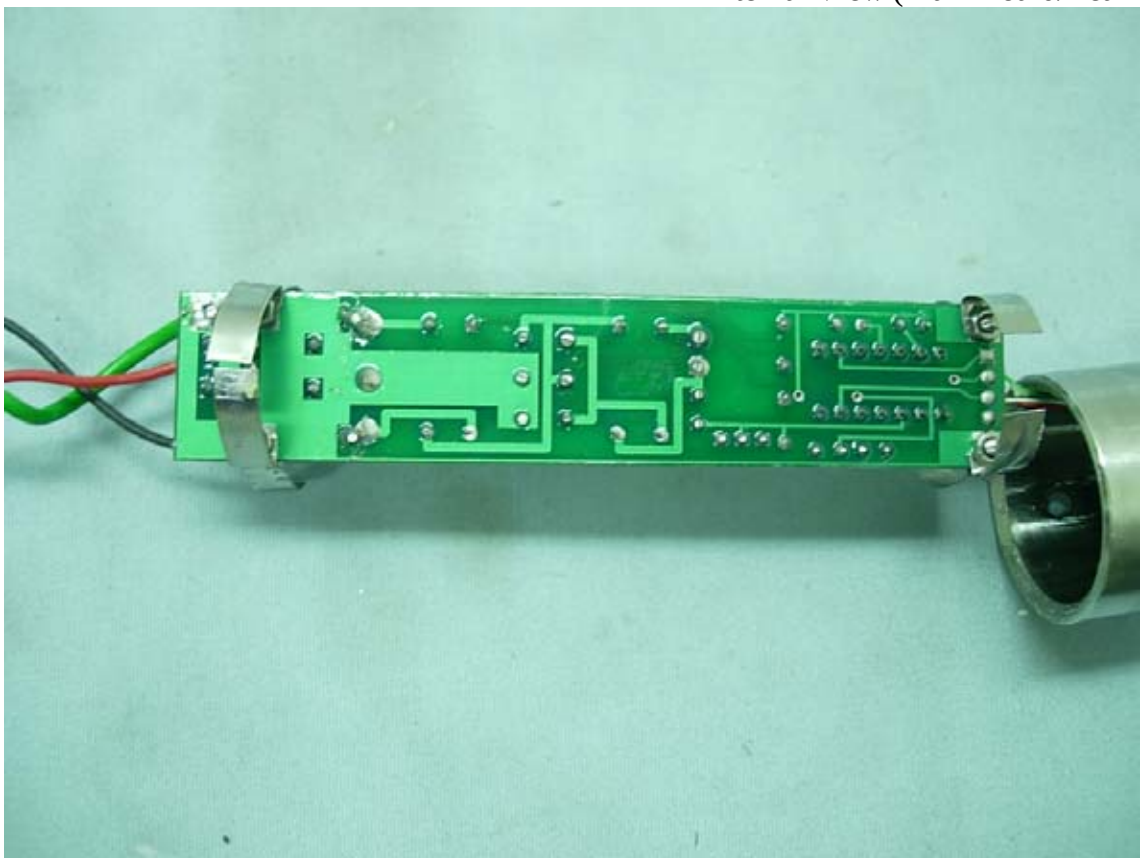


Figure 7
Internal View