

EMC TEST REPORT  
for

SHANGHAI JENCO INSTRUMENTS CO., LTD

Field/Lab Dissolved Oxygen and Temperature Instrument

Model No.:	DO210	DO200A
Serial No.:	E1110335-01/01	--

Prepared For: SHANGHAI JENCO INSTRUMENTS CO., LTD  
18 Wangdongzhong Road, Sijing Town, Songjiang,  
Shanghai, China.

Prepared By: Audix Technology (Shanghai) Co., Ltd.  
3 F., 34 Bldg., 680 Guiping Rd.,  
Caohejing Hi-Tech Park,  
Shanghai 200233, China

Tel : +86-21-64955500  
Fax : +86-21-64955491

Report No. : ACI-E11163  
Date of Test : Oct 27 – Nov 03, 2011  
Date of Report: Nov 14, 2011

## TABLE OF CONTENTS

	Page
<b>1 SUMMARY OF STANDARDS AND RESULTS .....</b>	<b>5</b>
1.1 Description of Standards and Results .....	5
1.2 Description of Performance Criteria .....	6
<b>2 GENERAL INFORMATION .....</b>	<b>7</b>
2.1 Description of EUT .....	7
2.2 Description of Test Facility .....	7
2.3 Measurement Uncertainty .....	8
<b>3 TEST EQUIPMENT .....</b>	<b>9</b>
3.1 For Radiated Disturbance Test .....	9
3.2 For Electrostatic Discharge Immunity Test .....	9
3.3 For RF Electromagnetic Field Immunity Test .....	9
3.4 For Electrical Fast Transient/Burst Immunity Test .....	9
3.5 For Conducted Disturbances Immunity Test .....	10
<b>4 RADIATED DISTURBANCE TEST .....</b>	<b>11</b>
4.1 Block Diagram of Test Setup .....	11
4.2 Applicable Standard .....	11
4.3 Limits for Radiated Disturbance .....	12
4.4 EUT Configuration .....	12
4.5 Operating Condition of EUT .....	12
4.6 Test Procedure .....	12
4.7 Test Results .....	13
<b>5 ELECTROSTATIC DISCHARGE IMMUNITY TEST .....</b>	<b>16</b>
5.1 Block Diagram of Test Setup .....	16
5.2 Applicable Standard .....	16
5.3 Severity Levels and Performance Criterion .....	16
5.4 EUT Configuration .....	16
5.5 Operating Condition of EUT .....	17
5.6 Test Procedure .....	17
5.7 Test Results .....	17
<b>6 RF ELECTROMAGNETIC FIELD IMMUNITY TEST .....</b>	<b>19</b>
6.1 Block Diagram of Test Setup .....	19
6.2 Applicable Standard .....	19
6.3 Severity Levels and Performance Criterion .....	19
6.4 EUT Configuration .....	20
6.5 Operating Condition of EUT .....	20
6.6 Test Procedure .....	20
6.7 Test Results .....	20
<b>7 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST .....</b>	<b>24</b>
7.1 Block Diagram of Test Setup .....	24
7.2 Applicable Standard .....	24
7.3 Severity Levels and Performance Criterion .....	24
7.4 EUT Configuration .....	25
7.5 Operating Condition of EUT .....	25
7.6 Test Procedure .....	25
7.7 Test Results .....	25
<b>8 CONDUCTED DISTURBANCES IMMUNITY TEST .....</b>	<b>27</b>
8.1 Block Diagram of Test Setup .....	27
8.2 Applicable Standard .....	27
8.3 Severity Levels and Performance Criterion .....	27
8.4 EUT Configuration .....	27
8.5 Operating Condition of EUT .....	28
8.6 Test Procedure .....	28

8.7 Test Results.....28

**9 DEVIATION TO TEST SPECIFICATIONS.....30**

**10 PHOTOGRAPH.....31**

10.1 Radiated Disturbance Test.....31

10.2 Electrostatic Discharge Immunity Test.....32

10.3 RF Electromagnetic Field Immunity Test .....33

10.4 Electrical Fast Transient/Burst Immunity Test.....35

10.5 Conducted Disturbances Immunity Test .....35

**APPENDIX PHOTOGRAPHS OF EUT.....36**

## TEST REPORT

Applicant : SHANGHAI JENCO INSTRUMENTS CO., LTD

Telephone : +86-21-57619600

Manufacturer : SHANGHAI JENCO INSTRUMENTS CO., LTD

EUT Description : Field/Lab Dissolved Oxygen and Temperature Instrument

(A) Model No.	DO210	DO200A
(B) Serial No.	E1110335-01/01	--
(C) Power Supply	DC 9V (1604G Battery *1)	

**Test Standard Used:**

*EN 61326-1:2006 (IEC 61326-1:2005) (Basic immunity test requirements)  
(IEC 61000-4-2:2001, IEC 61000-4-3:2006, IEC 61000-4-4:2004+Corr.1:2006+Corr.2:2007,  
IEC 61000-4-6:2008, IEC 61000-4-8:2001)*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device and the severity levels of the device endured and its performance criterion. The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of all these testing. Also, this report shows that the EUT (Equipment Under Test) to be technically compliant with the EN 61326-1 requirement.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

Susceptibility tests and relevant emission tests as specified in European Union EMC Directive are omitted and regarded as compliance due to the nature of the product using our engineering judgment.

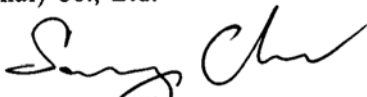
Date of Test : Oct 27 – Nov 03, 2011 Date of Report : Nov 14, 2011

Producer :   
KATHY WANG / Assistant

Review :   
DIO YANG / Assistant Manager



For and on behalf of  
Audix Technology (Shanghai) Co., Ltd.

Signatory :   
Authorized Signature EMC SAMMY CHEN / Deputy 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:

<b>EMISSION (EN 61326-1:2006) (IEC 61326-1:2005)</b>			
<b>Description of Test Item</b>	<b>Standard</b>	<b>Limits</b>	<b>Results</b>
Conducted Disturbance at Main Terminal	EN 61326-1:2006 (IEC 61326-1:2005)	N/A	N/A
Radiated Disturbance	EN 61326-1:2006 (IEC 61326-1:2005)	Class B	Pass
Harmonic Current Emission	IEC 61000-3-2:2005	N/A	N/A
Voltage Fluctuations and Flicker	IEC 61000-3-3: 2005	N/A	N/A
<b>IMMUNITY (EN 61326-1:2006) (IEC 61326-1:2005)</b>			
<b>Description of Test Item</b>	<b>Basic Standard</b>	<b>Performance Criteria</b>	<b>Results</b>
Electrostatic Discharge (ESD)	IEC 61000-4-2:2001	B	Pass
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2006	A	Pass
Electrical Fast Transient (EFT)	IEC 61000-4-4:2004 +Corr.1:2006+Corr.2:2007	A	Pass
Surge	IEC 61000-4-5:2005	N/A	N/A
Radio-Frequency, Continuous Conducted Disturbance	IEC 61000-4-6:2006	A	Pass
Power Frequency Magnetic Field	IEC 61000-4-8:2001	A	Pass
Voltage Dips, >95% reduction	IEC 61000-4-11:2004	N/A	N/A
Voltage Dips, 60% reduction		N/A	N/A
Voltage Dips, 30% reduction		N/A	N/A
Voltage Interruptions		N/A	N/A
N/A is an abbreviation for Not Applicable.			

## 1.2 Description of Performance Criteria

The variety and the diversity of the apparatus within the scope of this standard make it difficult to define precise criteria for the evaluation of the immunity test results. If, as result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test. A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on the following criteria:

### 1.2.1 Performance criterion A

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

### 1.2.2 Performance criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

### 1.2.3 Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

## 2 GENERAL INFORMATION

### 2.1 Description of EUT

Description : Field/Lab Dissolved Oxygen and Temperature Instrument

Model No. : 

DO210	DO200A
-------	--------

Serial No. : 

E1110335-01/01	--
----------------	----

Note : The above two models are all the same expect for the model name and general appearance.  
The DO210 was tested and recorded in the report.

Specification :

Display	Range	Accuracy	Resolution
Dissolved oxygen(ppm)	0~20.00ppm	$\pm 2\%$ of the reading or $\pm 0.2$ ppm, whichever is greater	0.01ppm
Dissolved oxygen(%)	0~200.0%	$\pm 2\%$ of the reading or $\pm 2\%$ air saturation, whichever is greater	0.1%
Temperature	-6 to +46°C	$\pm 0.3^\circ\text{C} \pm 1$ digit	0.1°C

Applicant : SHANGHAI JENCO INSTRUMENTS CO., LTD  
18 Wangdongzhong Road, Sijing Town, Songjiang, Shanghai, China.

Manufacturer : SHANGHAI JENCO INSTRUMENTS CO., LTD  
18 Wangdongzhong Road, Sijing Town, Songjiang, Shanghai, China.

### 2.2 Description of Test Facility

Site Description : Audix Technology (Shanghai) Co., Ltd.

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F 34Bldg 680 Guiping Rd,  
Caohejing Hi-Tech Park,  
Shanghai 200233, China

## 2.3 Measurement Uncertainty

Radiated Emission Expanded Uncertainty (30-200MHz):

U = 4.58 dB (horizontal)

U = 4.70 dB (vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):

U = 4.84 dB (horizontal)

U = 4.70 dB (vertical)



### 3 TEST EQUIPMENT

#### 3.1 For Radiated Disturbance Test

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Preamplifier	HP	8447D	2944A10548	Sep 18, 2011	Mar 18, 2012
2.	Bi-log Antenna	TESEQ	CBL6112D	23192	Dec 01, 2011	Dec 01, 2012
3.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Mar 22, 2011	Mar 22, 2012
4.	Test Receiver	R&S	ESVS10	844594/001	Mar 22, 2011	Mar 22, 2012
5.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Sep 18, 2011	Mar 18, 2012
6.	Software	Audix	E3	SET00200 9912M295-2	-	-

#### 3.2 For Electrostatic Discharge Immunity Test

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	ESD Simulator	TESEQ	NSG 437	130	Nov 25, 2010	Nov 25, 2011

#### 3.3 For RF Electromagnetic Field Immunity Test

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Signal Generator	Agilent	E4421B	MY43350935	Mar 22, 2011	Mar 22, 2012
2.	Power Amplifier	AR	KAW2180	10088-2	Mar 22, 2011	Mar 22, 2012
3.	Power Amplifier	Milmega	AS0104-200-200	1016528	Apr 06, 2011	Apr 06, 2012
4.	Power Meter	HP	438A	2517A02731	Mar 22, 2011	Mar 22, 2012
5.	Power Sensor	HP	8481D	3318A13765	Apr 06, 2011	Apr 06, 2012
6.	Log-Periodic Antenna	AR	AT-1080	19300	Jan 30, 2011	Jan 30, 2012
7.	High Gain Horn Antenna	AR	AT4002A	309732	Jan 24, 2011	Jan 24, 2012
8.	Field Monitor	AR	FM2000	19221	NCR	NCR
9.	Field Probe	AR	FP2036	308920	May 19, 2011	May 19, 2012
10.	Dual Directional Coupler (DDC)	AR	DC6180	19326	Sep 18, 2011	Mar 18, 2012
11.	Dual Directional Coupler (DDC)	AR	DC7144A	310049	Sep 18, 2011	Mar 18, 2012

#### 3.4 For Electrical Fast Transient/Burst Immunity Test

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	EFT Generator	Prima	EFT61004A	PR11034301	Jul 08, 2011	Jul 08, 2012
2.	Capacitor Clamp	KeyTek	CE40CCL	9609470	Mar 06, 2011	Mar 06, 2012

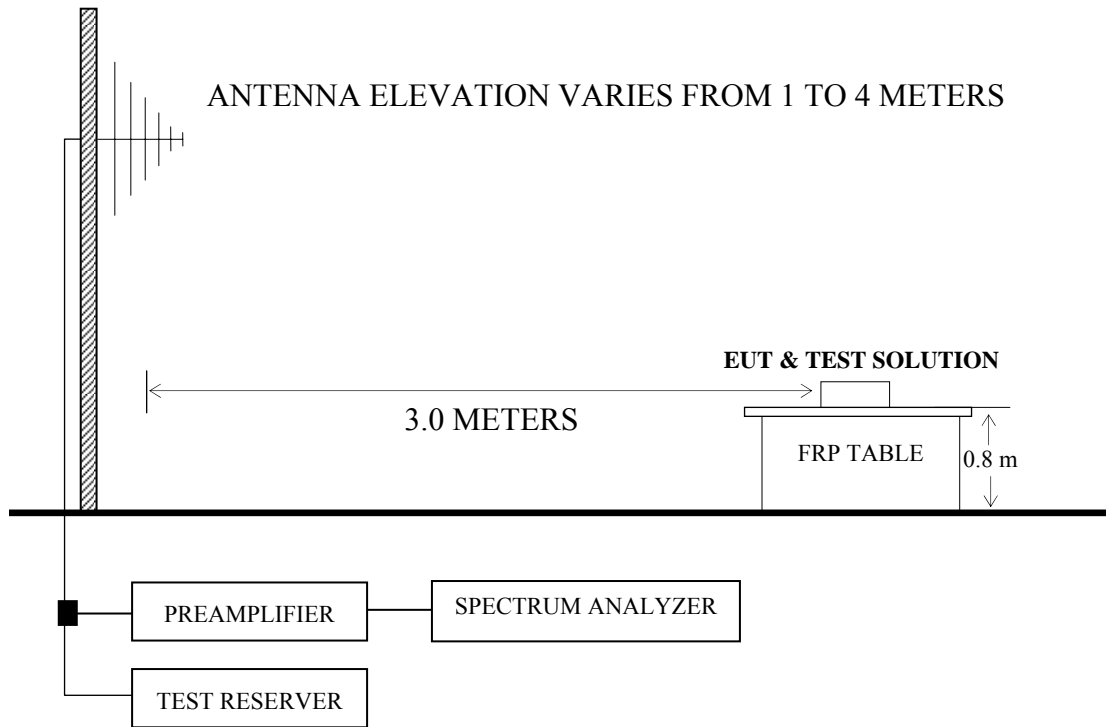
## 3.5 For Conducted Disturbances Immunity Test

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Signal Generator	HP	8648A	3636A02166	Sep 18, 2011	Mar 18, 2012
2.	Power Amplifier	AR	100A250	19367	Mar 22, 2011	Mar 22, 2012
3.	Coupling Decoupling Network (CDN)	FCC	F-203I-DCN -23MM	167	NCR	NCR
4.	EM Injection Clamp	FCC	F-203I-23M M	439	Mar 22, 2011	Mar 22, 2012
5.	Attenuator	Weinschel Corp.	40-6-34	LJ094	Sep 18, 2011	Mar 18, 2012
6.	Power Meter	HP	438A	2517A02731	Mar 22, 2011	Mar 22, 2012
7.	Power Sensor	HP	8482D	3318A06358	Mar 22, 2011	Mar 22, 2012

## 4 RADIATED DISTURBANCE TEST

### 4.1 Block Diagram of Test Setup

#### 4.1.1 Radiated emission test setup



■ : 50 ohm Coaxial Switch

### 4.2 Applicable Standard

EN 61326-1: 2006 (IEC 61326-1:2005) (Class B)

### 4.3 Limits for Radiated Disturbance

Frequency (MHz)	Distance (m)	Field Strength Limits dB( $\mu$ V/m)	Converted Field Strength Limits By 3 Meters Measuring Distance dB( $\mu$ V/m)
30 ~ 230	10	30	40
230 ~ 1000	10	37	47
<p>NOTE 1 - The tighter limit applies at the edge between two frequency bands.</p> <p>NOTE 2 – Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.</p> <p>NOTE 3 – Audix Technology (Shanghai) Co., Ltd. Only has a 3 meters Semi-anechoic Chamber to do the radiated test, therefore, Audix Shanghai used 3 meters measuring distance and converted limits to judge the EUT compliance with or not.</p>			

### 4.4 EUT Configuration

The EUT (listed in Sec. 2.1) was installed as shown as Sec. 4.1 to meet EN 61326-1 requirement and operating in a manner which tends to maximize its emission level in a normal application.

### 4.5 Operating Condition of EUT

- 4.5.1 Set up the EUT as shown on Sec. 4.1
- 4.5.2 Turn on the power of the EUT, and then test.
- 4.5.3 The test mode is measuring “Dissolved Oxygen and Temperature”.

### 4.6 Test Procedure

The EUT was placed upon a FRP turntable 0.8 m above the horizontal metal ground plane. The FRP turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) was used as receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all the interface cables were manipulated according to EN 61326-1(Class B) requirements during radiated test.

The bandwidth of R&S Test Receiver ESVS10 was set at 120 kHz.

The frequency range from 30 MHz to 1000 MHz was checked.

The test modes were done on radiated disturbance test and all the test results are listed in Sec. 4.7.

## 4.7 Test Results

<PASS>

All the following records are the disturbance levels and the frequencies of the highest disturbances, and if the disturbance not reported below are too low against the prescribed converted 3 meters limits.

Refer to the following pages.

Test Mode	Data Page
Measuring	P14 – P15

NOTE 1 – All reading are Quasi-Peak values.

NOTE 2 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 3 – All Quasi-Peak values are background value only.



Audix Technology (Shanghai) Co., Ltd.  
 3F #34Bldg, No.680 GuiPing Rd.,  
 CaoHeJing Hi-Tech Park,  
 Shanghai 200233, China  
 Tel:+86-21-64955500 Fax:+86-21-64955491  
 audixaci@audix.com

Data: 3 File: D:\test data\JJENCO2011.EM6 (4)



Site no :Audix ACI (3m Chamber)  
 Dis. / Ant. :3m /CBL 6112D-2010.12.01 Data no. :3  
 Limit :EN61326 CLASSB Ant. pol. :HORIZONTAL  
 Env. / Ins. :22'C 60%RH/ESVS 10 Engineer :Raven  
 EUT :Field/Lab Dissolved Oxygen and Temperature Instrument  
 M/N :D0210  
 S/N :E11101335-01/01  
 Power Rating:DC 9V  
 Test Mode :Measuring

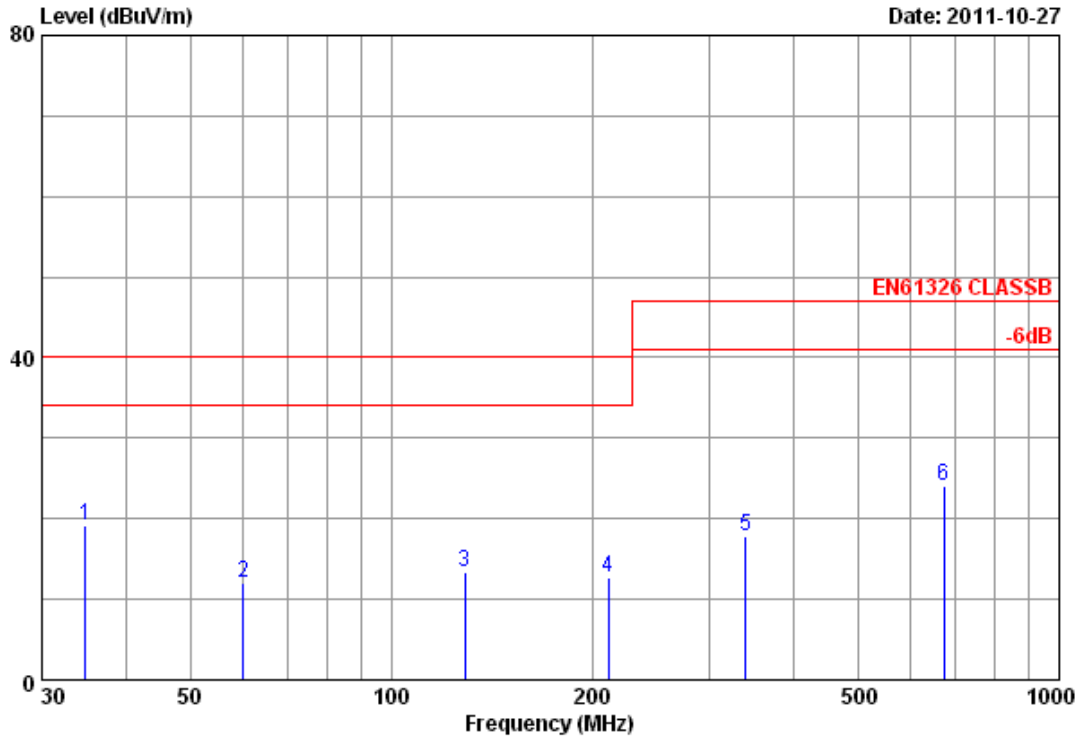
	Freq. (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	31.940	17.29	0.82	0.96	19.07	40.00	20.93
2	60.070	9.14	1.19	3.22	13.55	40.00	26.45
3	92.080	11.08	1.75	2.45	15.28	40.00	24.72
4	163.860	10.20	2.29	7.60	20.09	40.00	19.91
5	363.680	15.49	2.91	1.17	19.57	47.00	27.43
6	671.170	19.15	3.62	0.86	23.63	47.00	23.37

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



Audix Technology (Shanghai) Co., Ltd.  
 3F #34Bldg, No.680 GuiPing Rd.,  
 CaoHeJing Hi-Tech Park,  
 Shanghai 200233, China  
 Tel:+86-21-64955500 Fax:+86-21-64955491  
 audixaci@audix.com

Data: 4 File: D:\test data\JJENCO2011.EM6 (4)



Site no :Audix ACI (3m Chamber)  
 Dis. / Ant. :3m /CBL 6112D-2010.12.01 Data no. :4  
 Limit :EN61326 CLASSB Ant. pol. :VERTICAL  
 Env. / Ins. :22'C 60%RH/ESVS 10 Engineer :Raven  
 EUT :Field/Lab Dissolved Oxygen and Temperature Instrument  
 M/N :D0210  
 S/N :E11101335-01/01  
 Power Rating:DC 9V  
 Test Mode :Measuring

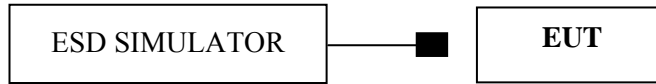
	Freq.	Antenna	Cable	Reading	Emission	Limits	Margin
	(MHz)	Factor	Loss	(dBuV)	Level	(dBuV/m)	(dB)
		(dB/m)	(dB)		(dBuV/m)		
1	34.850	15.70	0.84	2.55	19.09	40.00	20.91
2	60.070	9.14	1.19	1.78	12.11	40.00	27.89
3	128.940	10.84	2.10	0.53	13.47	40.00	26.53
4	211.390	10.26	2.47	0.00	12.73	40.00	27.27
5	339.430	14.83	2.85	0.09	17.77	47.00	29.23
6	671.170	19.15	3.62	1.35	24.12	47.00	22.88

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

## 5 ELECTROSTATIC DISCHARGE IMMUNITY TEST

### 5.1 Block Diagram of Test Setup

#### 5.1.1 Test setup



### 5.2 Applicable Standard

EN 61326-1: 2006 (IEC 61326-1:2005)  
 (IEC 61000-4-2:2001, Contact Discharge:  $\pm 2\text{kV}$ ,  $\pm 4\text{kV}$ ,  
 Air Discharge:  $\pm 2\text{kV}$ ,  $\pm 4\text{kV}$ )

### 5.3 Severity Levels and Performance Criterion

#### 5.3.1 Severity levels

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

#### 5.3.2 Performance criterion: **B**

### 5.4 EUT Configuration

The configuration of the EUT is same as Sec.4.4 except for the test setup replaced by Sec.5.1.



## 5.5 Operating Condition of EUT

- 5.5.1 Setup the EUT on a reference plane in a shielded room as Sec.5.1.
- 5.5.2 Single discharges are applied on the most sensitive points of the EUT, and the horizontal and vertical coupling plane at points on each side of the EUT.
- 5.5.3 Check the effects of this test.
- 5.5.4 The test modes refer to Sec.4.5.4.

## 5.6 Test Procedure

The test applied a non-conductive surface and a horizontal coupling plane on a wooden table, 0.8 m high, standing on the reference ground plane, which is a 2 m x 3 m metallic sheet with 1.5 mm thickness. This reference ground plane projected beyond the EUT by at least 0.5 m on all sides and the minimum distance between the EUT and all other conductive structure, except the ground plane beneath the EUT, was more than 1.0 m.

### 5.6.1 Contact Discharge

The tip of the discharge electrode should touch the EUT, before the discharge switch was operated.

### 5.6.2 Horizontal Coupling Plane (HCP)

More than 10 single discharges were applied at the front edge of each HCP opposite the center point of the EUT and 0.1mm from vertically the front of the EUT. Discharge to the HCP were made horizontal to the edge of the HCP.

### 5.6.3 Vertical Coupling Plane (VCP)

More than 10 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5 m x 0.5 m, was placed parallel to, and positioned at a distance of 0.1 m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that all sides of the EUT were completely illuminated.

### 5.6.4 Air Discharge

The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the ESD simulator (discharge electrode) was removed from the EUT. The simulator was then re-triggered for a new single discharge and applies more than 10 times on each reselected point. This procedure was repeated until the air discharge completed.

## 5.7 Test Results

<PASS>

Refer to the following pages.

# Electrostatic Discharge Immunity Test Result

Audix Technology (Shanghai) Co., Ltd.

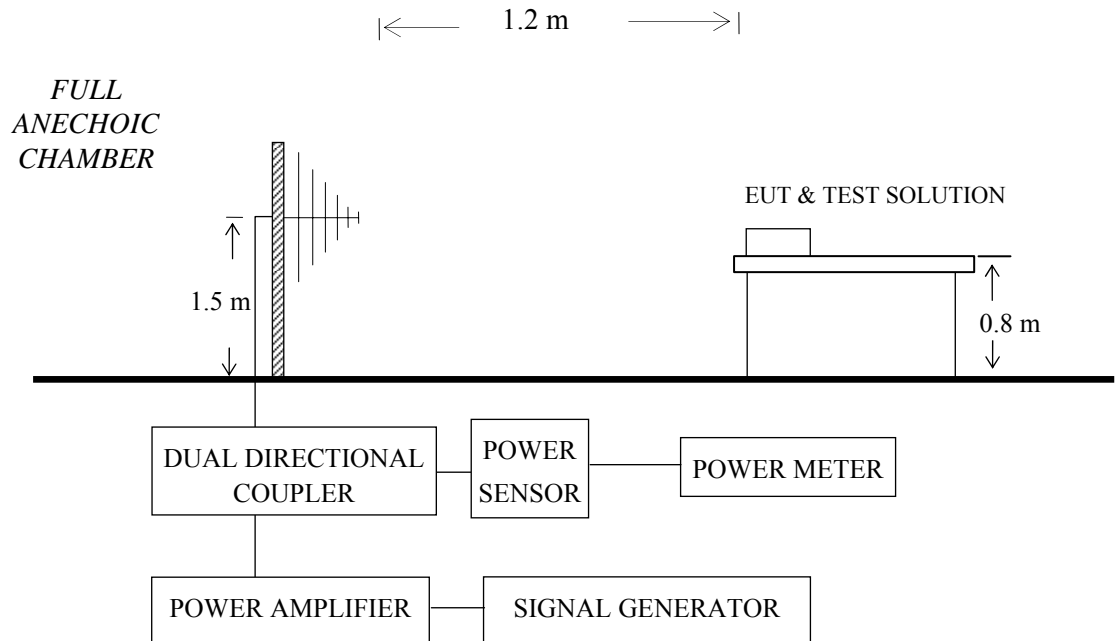
Applicant : SHANGHAI JENCO INSTRUMENTS CO., LTD	Test Date : Oct 25, 2011		
EUT : Field/Lab Dissolved Oxygen and Temperature Instrument	Temperature : 22°C		
M/N : DO210	Humidity : 55%		
S/N : E1110335-01/01	Atmospheric Pressure : 101.3kPa		
Power Supply : DC 9V	Test Mode : Measuring		
Air Discharge Voltage: $\pm 2\text{kV}$ , $\pm 4\text{kV}$ Contact Discharge Voltage: $\pm 2\text{kV}$ , $\pm 4\text{kV}$ Contact Discharge: For each point positive 10 times and negative 10 times discharge Air Discharge: For each point positive 10 times and negative 10 times discharge			
Location	Point(s)	Kind	Result
Around the EUT	4	C (HCP)	<b>PASS</b>
Around the EUT	4	C (VCP)	<b>PASS</b>
Metal Shell	1	C	<b>PASS</b>
Screws	2	C	<b>PASS</b>
NOTE 1 – A (Air Discharge), C (Contact Discharge) NOTE 2 – HCP (Horizontal Coupling Plane), VCP (Vertical Coupling Plane) NOTE 3 –B means during the $\pm 4\text{kV}$ contact discharge hit at the screws and the metal shell, the reading would change but recover by itself.			
Test Equipment: <input checked="" type="checkbox"/> ESD Simulator : TESEQ NSG 437			

TEST ENGINEER: JOE YE

## 6 RF ELECTROMAGNETIC FIELD IMMUNITY TEST

### 6.1 Block Diagram of Test Setup

#### 6.1.1 Test setup



### 6.2 Applicable Standard

EN 61326-1: 2006 (IEC 61326-1:2005)

(IEC 61000-4-3:2006,

Field Strength: 3 V/m, Test Value : 80-1000 MHz, Modulation: 80% AM 1 kHz;

Field Strength: 3 V/m, Test Value : 1400-2000 MHz, Modulation: 80% AM 1 kHz

Field Strength: 1 V/m, Test Value : 2000-2700 MHz, Modulation: 80% AM 1 kHz)

### 6.3 Severity Levels and Performance Criterion

#### 6.3.1 Severity levels

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

#### 6.3.2 Performance criterion: A

## 6.4 EUT Configuration

Same as Sec. 4.4

## 6.5 Operating Condition of EUT

- 6.5.1 Setup the EUT and sensor on the table in an anechoic chamber as Sec.6.1, and operated them as Sec.4.5.
- 6.5.2 The test was performed with the transmitting antenna facing each side of the EUT.
- 6.5.3 Check the effects of the test.

## 6.6 Test Procedure

The EUT and sensor were placed on a wooden table, 0.8 m high, standing on the ground reference plane.

The power meter was used to measure the forward power. The EUT was set 1.2 m from the transmitting antenna. Both horizontal and vertical polarization of the antenna was set on test. Each side of the EUT was faced to the transmitting antenna and measured individually.

A CCD camera was put inside the chamber and through its display to monitor the operational situation of the EUT to judge the EUT performance criterion during test.

The frequency range is swept from 80 MHz to 1000 MHz and 1400 MHz to 2700MHz.

All the scanning conditions are as follows:

Condition of Test	Remarks		
Fielded Strength	3 V/m (Severity Level 2)	3 V/m (Severity Level 2)	1 V/m (Severity Level 1)
Modulation	80% AM 1 kHz		
Scanning Frequency	80 – 1000 MHz	1400 – 2000 MHz	2000 – 2700 MHz
Dwell Time	3 sec.		

## 6.7 Test Results

<PASS>

Refer to the following pages.

# RF Field Strength Susceptibility Immunity Test Result

Audix Technology (Shanghai) Co., Ltd.

Applicant : <u>SHANGHAI JENCO INSTRUMENTS CO., LTD</u>	Test Date : <u>Nov 03, 2011</u>					
EUT : <u>Field/Lab Dissolved Oxygen and Temperature Instrument</u>	Temperature : <u>23°C</u>					
M/N : <u>DO210</u>	Humidity : <u>48%</u>					
S/N : <u>E1110335-01/01</u>	Atmospheric Pressure : <u>101.3kPa</u>					
Power Supply : <u>DC 9V</u>	Field Strength : <u>3 V/m</u>					
Test Mode : <u>Measuring</u>	Modulation : <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM					
<b>Frequency Range</b>	80 MHz to 1000 MHz	1400 MHz to 2000 MHz				
<b>Modulation</b>	80% AM 1 kHz	80% AM 1 kHz				
<b>Steps</b>	1 %	1 %				
<b>Antenna Polarization</b>	<b>Horizontal</b>	<b>Vertical</b>	<b>Horizontal</b>	<b>Vertical</b>		
<b>EUT Position</b>	Front	<b>PASS</b>	<b>PASS</b>	--	--	
	Rear	<b>PASS</b>	<b>PASS</b>	--	--	
	Right	<b>PASS</b>	<b>PASS</b>	--	--	
	Left	<b>PASS</b>	<b>PASS</b>	--	--	
	Floor	<b>PASS</b>	<b>PASS</b>	--	--	
	Top	<b>PASS</b>	<b>PASS</b>	--	--	
NOTE 1 – “--” means the item is no applicable. NOTE 2 – During the test, the temperature reading changed $\pm 0.3^{\circ}\text{C}$ , the other reading did not changed.						
Test equipment: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Signal Generator : Agilent E4421B  <input checked="" type="checkbox"/> Power Amplifier : AR KAW2180  <input checked="" type="checkbox"/> Power Meter : HP 438A  <input checked="" type="checkbox"/> Log-Periodic Antenna : AR AT1080         </td> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> DDC : AR DC6180  <input checked="" type="checkbox"/> Power Sensor : HP 8481D  <input checked="" type="checkbox"/> Field Probe : AR FP2036  <input checked="" type="checkbox"/> Field Monitor : AR FM2000         </td> </tr> </table>					<input checked="" type="checkbox"/> Signal Generator : Agilent E4421B <input checked="" type="checkbox"/> Power Amplifier : AR KAW2180 <input checked="" type="checkbox"/> Power Meter : HP 438A <input checked="" type="checkbox"/> Log-Periodic Antenna : AR AT1080	<input checked="" type="checkbox"/> DDC : AR DC6180 <input checked="" type="checkbox"/> Power Sensor : HP 8481D <input checked="" type="checkbox"/> Field Probe : AR FP2036 <input checked="" type="checkbox"/> Field Monitor : AR FM2000
<input checked="" type="checkbox"/> Signal Generator : Agilent E4421B <input checked="" type="checkbox"/> Power Amplifier : AR KAW2180 <input checked="" type="checkbox"/> Power Meter : HP 438A <input checked="" type="checkbox"/> Log-Periodic Antenna : AR AT1080	<input checked="" type="checkbox"/> DDC : AR DC6180 <input checked="" type="checkbox"/> Power Sensor : HP 8481D <input checked="" type="checkbox"/> Field Probe : AR FP2036 <input checked="" type="checkbox"/> Field Monitor : AR FM2000					

TEST ENGINEER: TERRY HOU

# RF Field Strength Susceptibility Immunity Test Result

Audix Technology (Shanghai) Co., Ltd.

Applicant : SHANGHAI JENCO INSTRUMENTS CO., LTD	Test Date : Nov 03, 2011					
EUT : Field/Lab Dissolved Oxygen and Temperature Instrument	Temperature : 23°C					
M/N : DO210	Humidity : 48%					
S/N : E1110335-01/01	Atmospheric Pressure : 101.3kPa					
Power Supply : DC 9V	Field Strength : 3 V/m					
Test Mode : Measuring	Modulation : <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM					
<b>Frequency Range</b>	1400 MHz to 2000 MHz	900 MHz				
<b>Modulation</b>	80% AM 1 kHz	--				
<b>Steps</b>	1 %	--				
<b>Antenna Polarization</b>	<b>Horizontal</b>	<b>Vertical</b>	<b>Horizontal</b>	<b>Vertical</b>		
<b>EUT Position</b>	Front	<b>PASS</b>	<b>PASS</b>	--	--	
	Rear	<b>PASS</b>	<b>PASS</b>	--	--	
	Right	<b>PASS</b>	<b>PASS</b>	--	--	
	Left	<b>PASS</b>	<b>PASS</b>	--	--	
	Floor	<b>PASS</b>	<b>PASS</b>	--	--	
	Top	<b>PASS</b>	<b>PASS</b>	--	--	
NOTE 1 – “--” means the item is no applicable. NOTE 2 – During the test, the temperature reading changed $\pm 0.3^{\circ}\text{C}$ , the other reading did not changed.						
Test equipment: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Signal Generator : Agilent E4421B  <input checked="" type="checkbox"/> Power Meter : HP 438A  <input checked="" type="checkbox"/> Power Amplifier : Milmega AS0104-200-200  <input checked="" type="checkbox"/> High Gain Horn Antenna: AR AT-4002A         </td> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> DDC : AR DC7144A  <input checked="" type="checkbox"/> Power Sensor : HP 8481D  <input checked="" type="checkbox"/> Field Probe : AR FP2036  <input checked="" type="checkbox"/> Field Monitor : AR FM2000         </td> </tr> </table>					<input checked="" type="checkbox"/> Signal Generator : Agilent E4421B <input checked="" type="checkbox"/> Power Meter : HP 438A <input checked="" type="checkbox"/> Power Amplifier : Milmega AS0104-200-200 <input checked="" type="checkbox"/> High Gain Horn Antenna: AR AT-4002A	<input checked="" type="checkbox"/> DDC : AR DC7144A <input checked="" type="checkbox"/> Power Sensor : HP 8481D <input checked="" type="checkbox"/> Field Probe : AR FP2036 <input checked="" type="checkbox"/> Field Monitor : AR FM2000
<input checked="" type="checkbox"/> Signal Generator : Agilent E4421B <input checked="" type="checkbox"/> Power Meter : HP 438A <input checked="" type="checkbox"/> Power Amplifier : Milmega AS0104-200-200 <input checked="" type="checkbox"/> High Gain Horn Antenna: AR AT-4002A	<input checked="" type="checkbox"/> DDC : AR DC7144A <input checked="" type="checkbox"/> Power Sensor : HP 8481D <input checked="" type="checkbox"/> Field Probe : AR FP2036 <input checked="" type="checkbox"/> Field Monitor : AR FM2000					

TEST ENGINEER: TERRY HOU

# RF Field Strength Susceptibility Immunity Test Result

Audix Technology (Shanghai) Co., Ltd.

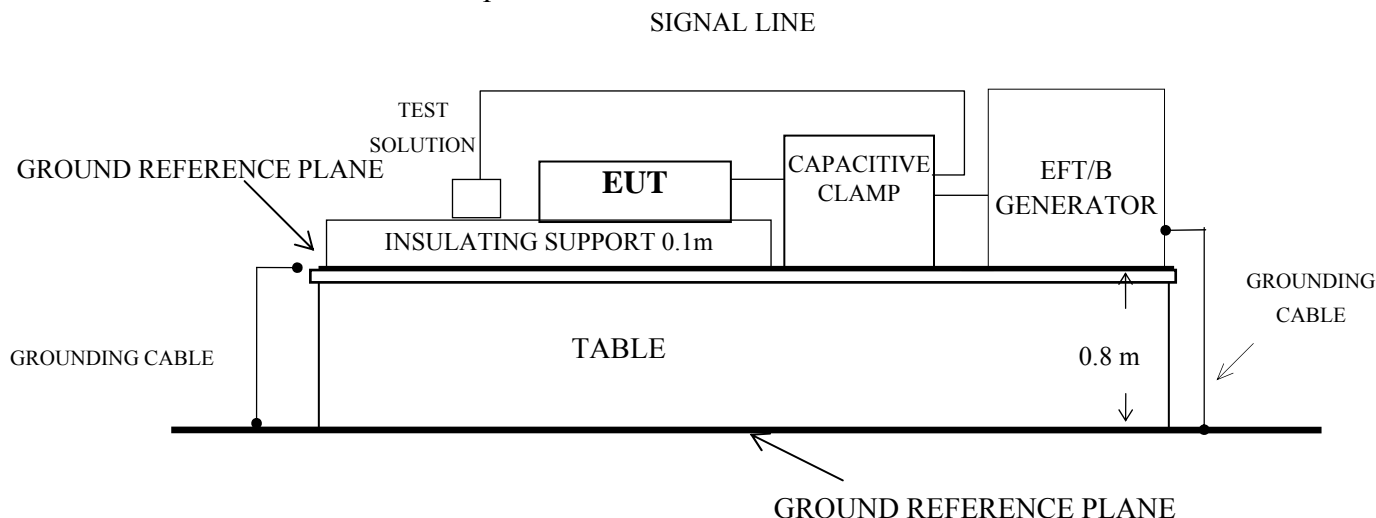
Applicant : <u>SHANGHAI JENCO INSTRUMENTS CO., LTD</u>	Test Date : <u>Nov 03, 2011</u>					
EUT : <u>Field/Lab Dissolved Oxygen and Temperature Instrument</u>	Temperature : <u>23°C</u>					
M/N : <u>DO210</u>	Humidity : <u>48%</u>					
S/N : <u>E1110335-01/01</u>	Atmospheric Pressure : <u>101.3kPa</u>					
Power Supply : <u>DC 9V</u>	Field Strength : <u>1 V/m</u>					
Test Mode : <u>Measuring</u>	Modulation : <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> AM					
<b>Frequency Range</b>	2000 MHz to 2700 MHz	900 MHz				
<b>Modulation</b>	80% AM 1 kHz	--				
<b>Steps</b>	1 %	--				
<b>Antenna Polarization</b>	<b>Horizontal</b>	<b>Vertical</b>	<b>Horizontal</b>	<b>Vertical</b>		
<b>EUT Position</b>	Front	<b>PASS</b>	<b>PASS</b>	--	--	
	Rear	<b>PASS</b>	<b>PASS</b>	--	--	
	Right	<b>PASS</b>	<b>PASS</b>	--	--	
	Left	<b>PASS</b>	<b>PASS</b>	--	--	
	Floor	<b>PASS</b>	<b>PASS</b>	--	--	
	Top	<b>PASS</b>	<b>PASS</b>	--	--	
NOTE 1 – “--” means the item is no applicable. NOTE 2 – During the test, the temperature reading changed $\pm 0.3^{\circ}\text{C}$ , the other reading did not changed.						
Test equipment: <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Signal Generator : Agilent E4421B  <input checked="" type="checkbox"/> Power Meter : HP 438A  <input checked="" type="checkbox"/> Power Amplifier : Milmega AS0104-200-200  <input checked="" type="checkbox"/> High Gain Horn Antenna: AR AT-4002A         </td> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> DDC : AR DC7144A  <input checked="" type="checkbox"/> Power Sensor : HP 8481D  <input checked="" type="checkbox"/> Field Probe : AR FP2036  <input checked="" type="checkbox"/> Field Monitor : AR FM2000         </td> </tr> </table>					<input checked="" type="checkbox"/> Signal Generator : Agilent E4421B <input checked="" type="checkbox"/> Power Meter : HP 438A <input checked="" type="checkbox"/> Power Amplifier : Milmega AS0104-200-200 <input checked="" type="checkbox"/> High Gain Horn Antenna: AR AT-4002A	<input checked="" type="checkbox"/> DDC : AR DC7144A <input checked="" type="checkbox"/> Power Sensor : HP 8481D <input checked="" type="checkbox"/> Field Probe : AR FP2036 <input checked="" type="checkbox"/> Field Monitor : AR FM2000
<input checked="" type="checkbox"/> Signal Generator : Agilent E4421B <input checked="" type="checkbox"/> Power Meter : HP 438A <input checked="" type="checkbox"/> Power Amplifier : Milmega AS0104-200-200 <input checked="" type="checkbox"/> High Gain Horn Antenna: AR AT-4002A	<input checked="" type="checkbox"/> DDC : AR DC7144A <input checked="" type="checkbox"/> Power Sensor : HP 8481D <input checked="" type="checkbox"/> Field Probe : AR FP2036 <input checked="" type="checkbox"/> Field Monitor : AR FM2000					

TEST ENGINEER: TERRY HOU

## 7 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

### 7.1 Block Diagram of Test Setup

#### 7.1.1 Test setup



### 7.2 Applicable Standard

EN 61326-1: 2006 (IEC 61326-1:2005)  
 (IEC 61000-4-4:2004+Corr.1:2006+Corr.2:2007,  
 Test Value : Signal Line:  $\pm 0.5\text{kV}$ , 5/50ns, 5kHz)

### 7.3 Severity Levels and Performance Criterion

#### 7.3.1 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 <sup>a</sup>	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.				
<sup>a</sup> "X" is an open level. The level has to be specified in the dedicated equipment specification.				



### 7.3.2 Performance criterion: **B**

## 7.4 EUT Configuration

The configuration of the EUT is same as Sec. 4.4 except for the test setup replaced by Sec.9.1.

## 7.5 Operating Condition of EUT

7.5.1 Setup the EUT on the table in a shielded room as Sec. 7.1.

7.5.2 The test voltage was coupled to signal line of the EUT.

7.5.3 Check the effects of the test.

## 7.6 Test Procedure

The EUT was placed upon a wooden table, 0.8 m high, standing on the ground reference plane, which is a 2 m x 3 m metallic sheet with 1.5 mm thickness. This ground reference plane projected beyond the EUT by at least 0.1 m on all sides and the minimum distance between the EUT and all other conductive structure, except the ground plane beneath the EUT, was more than 0.5 m.

7.6.1 For signal line ports

The EFT interference signal was coupled to the signal line of EUT through capacitive clamp. Applicable only to cables which according to the manufacturer's specification supports communication on cable lengths greater than 3m.

## 7.7 Test Results

<PASS>

Refer to the following pages.

# Electrical Fast Transient/Burst Immunity Test Result

Audix Technology (Shanghai) Co., Ltd.

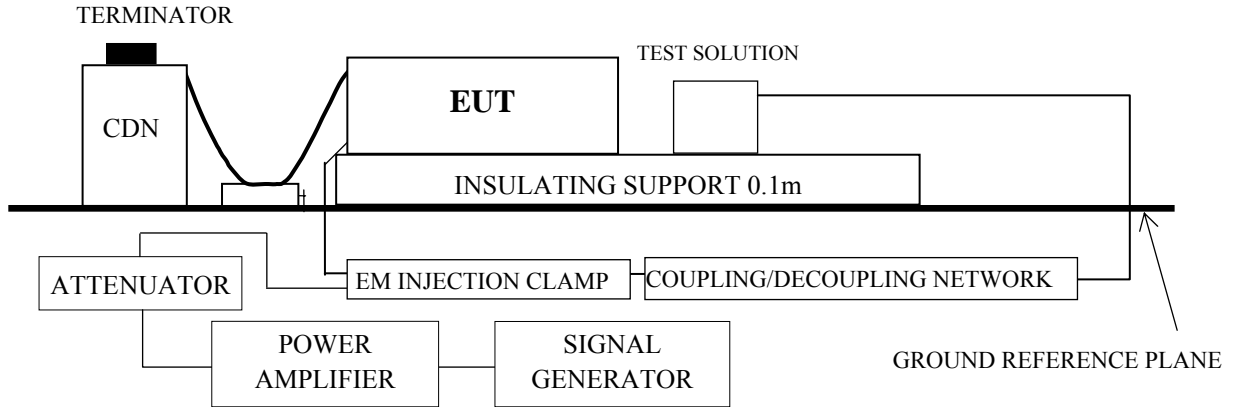
Applicant	: SHANGHAI JENCO INSTRUMENTS CO., LTD	Test Date	: Oct 25, 2011	
EUT	: Field/Lab Dissolved Oxygen and Temperature Instrument	Temperature	: 23°C	
M/N	: DO210	Humidity	: 50% RH	
S/N	: E1110335-01/01	Atmospheric Pressure	: 101.3kPa	
Power Supply	: DC 9V	Inject Place	: Signal Line	
Test Mode	: Measuring			
Inject Line	Voltage kV	Duration of Test (seconds)	Inject Method	Result
L	--	--	--	--
N	--	--	--	--
L、N	--	--	--	--
PE	--	--	--	--
L、PE	--	--	--	--
N、PE	--	--	--	--
L、N、PE	--	--	--	--
DC Supply	--	--	--	--
Signal Line	±0.5	120	Capacitive Clamp	<b>PASS</b>
NOTE 1 – "--" means the item is no applicable.				
NOTE 2 – During the test, the reading would change but recover by itself.				
Test equipment:				
<input checked="" type="checkbox"/>	EFT Generator	:	Prima EFT61004A	
<input checked="" type="checkbox"/>	Capacitor Clamp	:	KeyTek CE40CCL	

TEST ENGINEER: JOE YE

## 8 CONDUCTED DISTURBANCES IMMUNITY TEST

### 8.1 Block Diagram of Test Setup

#### 8.1.1 Test setup



### 8.2 Applicable Standard

EN 61326-1: 2006 (IEC 61326-1:2005)  
 (IEC 61000-4-6:2006, Test Value: 0.15-80MHz, 3V, 80%AM (1kHz))

### 8.3 Severity Levels and Performance Criterion

#### 8.3.1 Severity levels

Frequency Range 0.15 MHz – 80 MHz		
Level	Voltage Level (e.m.f.)	
	$U_0$ dB( $\mu$ V)	$U_0$ (V)
1.	120	1
2.	130	3
3.	140	10
X <sup>a</sup>	Special	
<sup>a</sup> X is an open level.		

#### 8.3.2 Performance criterion: A

### 8.4 EUT Configuration

Same as Sec.4.4

## 8.5 Operating Condition of EUT

8.5.1 Setup the EUT on the table as Sec. 8.1.

8.5.2 Inject the disturbance signal to signal line of EUT through the EM Injection Clamp.

8.5.3 Check the effects of the test.

## 8.6 Test Procedure

The EUT was placed on a wooden table 0.1m above a ground reference plane. Cables between CDN and the EUT are as short as possible, and their height above the ground reference plane is 0.03 m.

The disturbance signal was injected to the EUT through CDN & to the signal line of EUT through EM Injection Clamp..

The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.

All the scanning conditions are as follows:

Condition of Test	Remarks
-----	-----
Fielded Strength	3 V (Severity Level 2)
Modulation	80% AM 1 kHz
Scanning Frequency	0.15 - 80 MHz
Dwell Time	3 sec.

## 8.7 Test Results

<PASS>

Refer to the following pages.

# Conducted Disturbances Immunity Test Result

Audix Technology (Shanghai) Co., Ltd.

Applicant	: SHANGHAI JENCO INSTRUMENTS CO., LTD	Test Date	: Nov 03, 2011	
EUT	: Field/Lab Dissolved Oxygen and Temperature Instrument	Temperature	: 22°C	
M/N	: DO210	Humidity	: 50 % RH	
S/N	: E1110335-01/01	Atmospheric Pressure	: 101.3 kPa	
Power Supply	: DC 9V	Steps	: 1%	
Test Mode	: Measuring	Modulation	: <input type="checkbox"/> None <input type="checkbox"/> Pulse <input checked="" type="checkbox"/> 80% AM 1kHz	
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Criterion	Results
0.15 ~ 80	Signal Line	3V(r.m.s.)	A	<b>PASS</b>
NOTE – During the test, the temperature reading changed $\pm 0.3^{\circ}\text{C}$ , the other reading did not changed				
Test equipment:				
<input checked="" type="checkbox"/>	Signal Generator	:	HP 8648A	
<input checked="" type="checkbox"/>	CDN	:	F-203I-DCN-23MM	
<input checked="" type="checkbox"/>	EM Inject Clamp	:	F-203I-23MM	
<input checked="" type="checkbox"/>	Power Amplifier	:	AR 100A250	
<input checked="" type="checkbox"/>	Attenuator	:	WC 40-6-34	
<input checked="" type="checkbox"/>	Power Meter:	:	HP 438A	
<input checked="" type="checkbox"/>	Power Sensor	:	HP 8482B	

TEST ENGINEER: TERRY HOU

## **9 DEVIATION TO TEST SPECIFICATIONS**

None.

## 10 PHOTOGRAPH

### 10.1 Radiated Disturbance Test



*FRONT VIEW OF RADIATED EMISSION TEST*

## 10.2 Electrostatic Discharge Immunity Test



*DIRECT DISCHARGE*



*INDIRECT DISCHARGE*



### 10.3 RF Electromagnetic Field Immunity Test



*FRONT VIEW (80-1000MHZ)*



*FRONT VIEW (1400-2700MHZ)*



*BACK VIEW*



*VIEW IN MONITOR*

#### 10.4 Electrical Fast Transient/Burst Immunity Test



#### 10.5 Conducted Disturbances Immunity Test



# **APPENDIX**

## **PHOTOGRAPHS OF EUT**

*FIGURE 1  
FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO210)  
GENERAL APPEARANCE (FRONT VIEW)*



*FIGURE 2  
FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO210)  
GENERAL APPEARANCE (BACK VIEW)*



**FIGURE 3**  
**FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO210)**  
**BATTERY POSITION**



**FIGURE 4**  
**FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO210)**  
**INPUT PORT**



*FIGURE 5*  
*FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO210)*  
*COVER REMOVED*



**FIGURE 6**  
**FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO210)**  
**MAIN BOARD (COMPONENT SIDE)**



**FIGURE 7**  
**FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO210)**  
**MAIN BOARD (SOLDERED SIDE)**





FIGURE 8  
FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO210)  
CHIP ON MAIN BOARD



**FIGURE 9**  
**FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO200A)**  
**GENERAL APPEARANCE (FRONT VIEW)**



**FIGURE 10**  
**FIELD/LAB DISSOLVED OXYGEN AND TEMPERATURE INSTRUMENT (M/N: DO200A)**  
**GENERAL APPEARANCE (BACK VIEW)**

