EMC COMPLIANCE TEST REPORT

Technical Statement of Conformity

in accordance with the council directive 2004/108/EC

The product

Equipment Under Test	:	RF Three-Axis Field Strength Meter
Model Number	:	TM-196
Product Series	:	N/A
Report Number	:	HA120056-CE
Issue Date	:	08-FEB-2012
Test Result	:	Compliance

is produced by

TENMARS ELECTRONICS CO., LTD.

6F, 586, RUI GUANG ROAD, NEIHU, TAIPEI TAIWAN

HongAn TECHNOLOGY CO., LTD.

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BSMI Registration No.：SL2-IN-E-0023, SL2-A1-E-0023, SL2-IS-E-0023, SL2-R1-E-0023, SL2-R2-E-0023, SL2-L1-E-0023

FCC Designation No.：TW1001

Nemko Authorization No.：ELA184

TAF Accreditation No.：1163

VCCI Registration No.：R-2156, C-2329, T-219

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Verification

Applicant	:	TENMARS ELECTRONICS CO., LTD.
Address of Applicant	:	6F, 586, RUI GUANG ROAD, NEIHU, TAIPEI TAIWAN
Manufacturer	:	TENMARS ELECTRONICS CO., LTD.
Address of Manufacturer	:	6F, 586, RUI GUANG ROAD, NEIHU, TAIPEI TAIWAN
Equipment Under Test	:	RF Three-Axis Field Strength Meter
Model Number	:	TM-196
Product Series	:	N/A
Sample Received Date	:	31-JAN-2012
Test Standard	:	

Emission：	**Immunity**：
☒ EN 61326-1:2006 Class B ☒ EN 55011:2009/A1:2010 Group 1 Class B	☒ EN 61326-1:2006 ☒ EN 61000-4-2:2009 ☒ EN 61000-4-3:2006/A2:2010
Deviations from standard test methods & any other specifications : NONE	

Remark：

This report details the results of the test carried out on one sample. This report applies to the above sample only and shall not be reproduced in part without written approval of HongAn Technology Co. Ltd.

Documented by：

ZOE CHEN / ADM. Dept Staff

Tested by：

M.S.SHI / ENG. Dept. Staff

Approved by：

Date：2012-02-08

Peter Chin/ Section Manager

Summary of Test Result

Emission Class B			
Test Standard	**Test Item**	**Test Result**	**Remark**
CISPR11 Group 1 Class B	Radiated Emission	Compliance	Highest Emission: Vertical: 84.46 MHz 24.41 dBuV (Peak), Margin -5.59 dB, Antenna Height 100 cm, Turntable Angle 85°.

Immunity				
Test Standard	**Test Item**	**Performance Criteria**	**Observed Result Class**	**Test Result**
EN61000-4-2	Electrostatic Discharge	B	B	Compliance
EN61000-4-3	Radiated Susceptibility	A	A	Compliance

1 General Description

1.1 Description of EUT

Equipment Under Test	**:**	RF Three-Axis Field Strength Meter
Model Number of EUT	**:**	TM-196
Product Series	**:**	N/A
Power Supply	**:**	DC：Input __9__Vdc Power Cord __2__ Pin ☐Shielded ☒Non-Shielded ☐Detachable, __m ☒Un-Detachable, _0_m ☐w Ferrite Core___ ☒w/o Ferrite Core
I/O Port	**:**	Antenna Port*1
Data Cable	**:**	N/A
Specification	**:**	Position：☒Table-top / ☐Floor-standing Dimensions(mm)：270(L) X 80 (W) X 30(H) ※For more detail specification, please refer to the User Manual.

1.2 Test Instruments

1.2.1. Instruments Used for Emission Measurement

Instrument Name	Manufacture Mode	Model Number	Serial Number	Last Cal. Date	Next Cal. Date	Test Item
LISN	EMCO	3810/2NM	9702-1820	30-Sep-2011	29-Sep-2012	Conducted Emission
LISN	Rolf Heine Hochfrequenz technik	NNB-4/32T	00001	17-FEB-2011	17-FEB-2012	Conducted Emission
RF Current Probe	FCC	F-33-4	53	02-MAY-2011	01-MAY-2012	Conducted Emission
Impedance Stabilization Network (ISN)	SCHAFFNER	ISN T400	16832	08-OCT-2011	08-OCT-2012	Conducted Emission
EMI Test Signal Analyzer	PMM	PMM 9000	4410J10302	05-AUG-2011	04-AUG-2012	Conducted Emission, Radiation Emission
Spectrum Analyzer	ADVANTEST	R3172	101202158	15-AUG-2011	14-AUG-2012	Radiated Emission
Preamplifier	CHASE	CPA 9231A	3310	08-JUL-2011	07-JUL-2012	Radiated Emission
Preamplifier	HD	HD17187	004	23-AUG-2011	22-AUG-2012	Radiated Emission
Bilog Antenna	CHASE	CBL 6112B	2860	17-AUG-2011	16-AUG-2012	Radiated Emission
Large Loop Antenna	LAPLACE	RF300	9048	26-JAN-2009	26-JAN-2012	Radio Disturbance
Double-Ridged Waveguide Horn	EMCO	3115	9912-5992	02-MAY-2011	01-MAY-2012	Radiated Emission
Harmonics /Flicker Module	EMC PARTNER	Harmonics-1000	HAR1000-38	25-FEB-2011	25-FEB-2012	Harmonics

※ The test equipments used are calibrated and can be traced to National ITRI and International Standards.

1.2.2. Instruments Used for Immunity Measurement

Instrument Name	Manufacture Mode	Model Number	Serial Number	Last Cal. Date	Next Cal. Date	Test Item
ESD Simulator	KeyTek	MZ-15/EC	9805460	12-JUL-2011	11-JUL-2012	ESD
Power Generator, Mains Coupler/ Decoupler	KeyTek	EMC Pro	0002255	02-MAR-2011	01-MAR-2012	EFT. Surge, Magnetic Field, Dip
Wide Band Amplifier	ifi	CMX50	D019-0200	25-FEB-2011	25-FEB-2012	RS
RF Amplifier	ar	15S1G3	306578	02-AUG-2011	02-AUG-2012	RS
Double-Ridged Waveguide Horn	EMCO	3115	9912-5992	02-MAY-2011	01-MAY-2012	RS
Signal Generator	HP	HP8648C	3623A03457	19-JAN-2011	19-JAN-2012	RS
Bilog Antenna	EMCO	3142	9710-1221	11-JAN-2011	11-JAN-2012	RS
CDN	FCC	FCC-801-M3-32A	2019	19-JAN-2011	19-JAN-2012	CS
CDN	FCC	FCC-801-M3-32A	20116	19-JAN-2011	19-JAN-2012	CS
EM Injection clamp	FCC	F-2031-23mm	337	24-JAN-2011	24-JAN-2012	CS

※ The test equipments used are calibrated and can be traced to National ITRI and International Standards.

1.3 Auxiliary Equipments

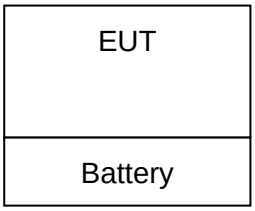
1.3.1. Provided by HongAn Technology Co., Ltd. for Immunity Test.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Description	
						Data Cable	Power Cable
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1.3.2. Provided by the Manufacturer.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Description	
						Data Cable	Power Cable
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1.4 EUT SETUP



Note:

1. Main Test Sample: TM-196

   The series products were not tested.

2. I/O Port Setup

Type of Port	Total Q'ty	Test Status
Antenna Port	1	Operating 1

3. Legend:

UUD	: Undetachable Unshielded Data cable.	UUP	: Undetachable Unshielded Power cord.
USD	: Undetachable Shielded Data cable.	USP	: Undetachable Shielded Power cord.
DSD	: Detachable Shielded Data cable.	DUP	: Detachable Unshielded Power cord.
DUD	: Detachable Unshielded Data cable.	DSP	: Detachable Shielded Power cord.
UTP	: Unshielded Data Twisted Pair Cable.	STP	: Shielded Data Twisted Pair Cable.

1.5 Identifying the Final Test Mode

1. Operation Mode 1: Operation mode.

Note: After pre-test, we identified that the Operation Mode 1(the worst case) was most likely to cause maximum disturbance and most likely to be susceptible to disturbance. Therefore, the Final EMC Assessment was performed for the worst case. All pre-test data show at appendix.

1.6 Final Test Mode

Operation Mode 1: Operation mode.

1.7 Condition of Power Supply

DC 9 V

1.8 EUT Configuration

1. Setup the EUT as shown in Sec.1.4 Block Diagram.
2. Turn on the power of all equipments.
3. Activate the selected Final Test Mode.

1.9 Qualification of Test Facility

BSMI Certificate No.	**:**	SL2-IS-E-0023, SL2-IN-E-0023, SL2-R1-E-0023, SL2-R2-E-0023, SL2-A1-E-0023, SL2-L1-E-0023.
FCC Designation No.	**:**	TW1001
Nemko Authorization No.	**:**	ELA 184
TAF Accreditation No.	**:**	1163
VCCI Certificate No.	**:**	R-2156, C-2329, T-219

2 Radiated Emission Test

2.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

2.2 Test Arrangement and Procedure

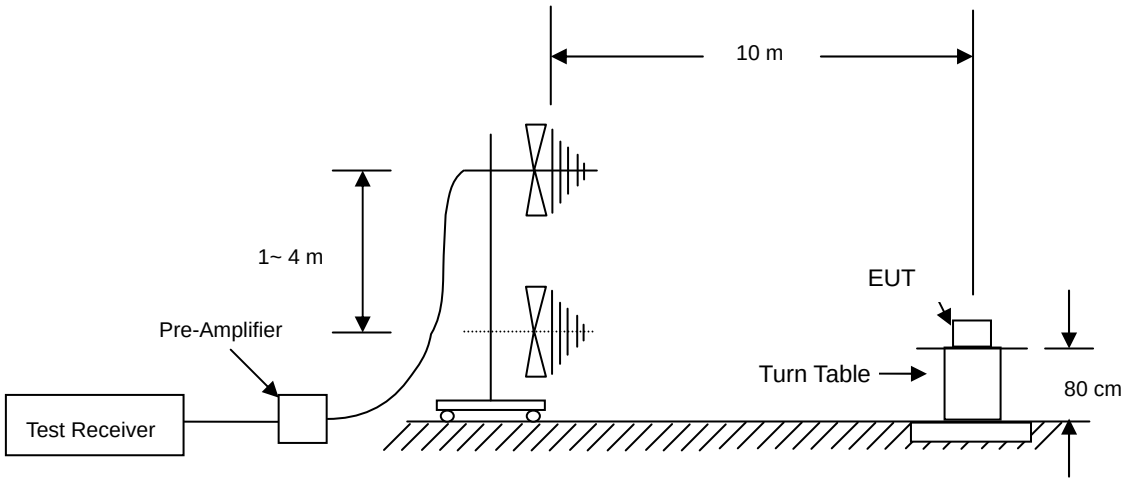


Table-top Equipment

- The EUT was place on a non-conductive turntable which was 80 cm above the horizontal ground plane. The EUT was set 10 m away from the receiving antenna that was mounted on a non-conductive mast.
- Main cables draped to the ground plane and were routed to the mains power outlet. The mains power outlet was bonded to and did not protrude above the ground plane.
- The antenna was adjusted between 1 m and 4 m in height above the ground plane and the Antenna-to-EUT azimuth was also varied during the measurements to find the top 6 maximum meter readings within the frequency range limit as indicated in Sec 2.3.
- The radiated emissions were measured when the Antenna-to-EUT polarization was set horizontally and vertically.
- The values were recorded.

2.3 Radiated Limit

CISPR11

Frequency (MHz)	☐Class A Group 1 (10m)	☒Class B Group 1 (10m)
	Quasi-Peak (dBμV/m)	Quasi-Peak (dBμV/m)
0.15-30	Under Consideration	Under Consideration
30-230	40	30
230-1000	47	37

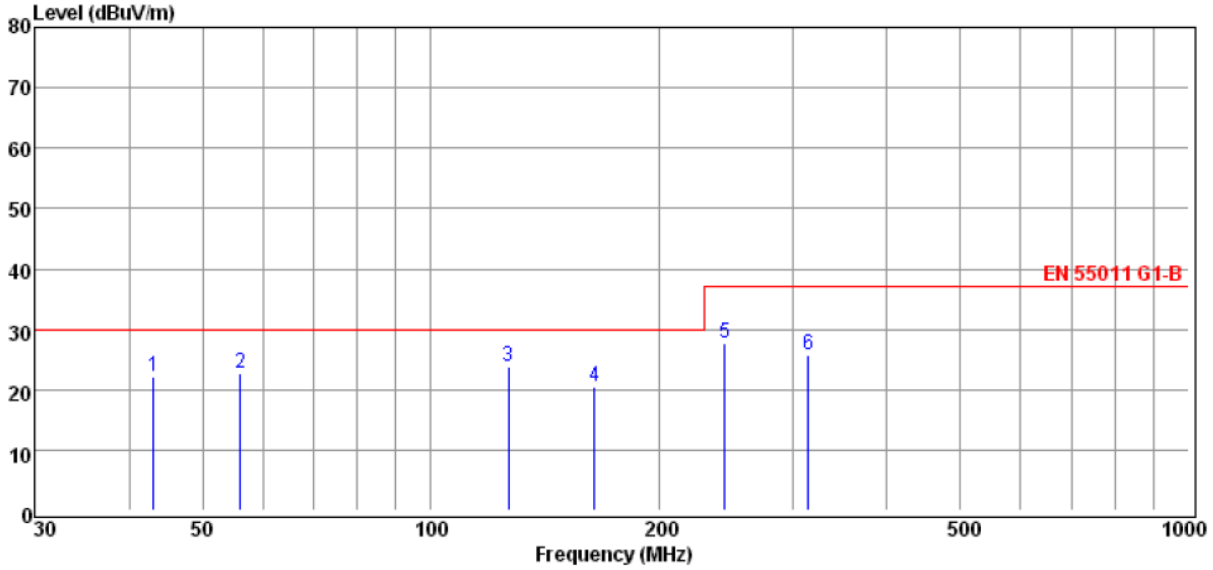
2.4 Test Result

Compliance.

The final test data are shown on the following page(s).

Radiated Emission Test Data - Horizontal

Test Date	: 04-FEB-2012	Tested by	: M.S.SHI
Temp.	: 21 ℃	Humidity	: 51 %
Description	: N/A		

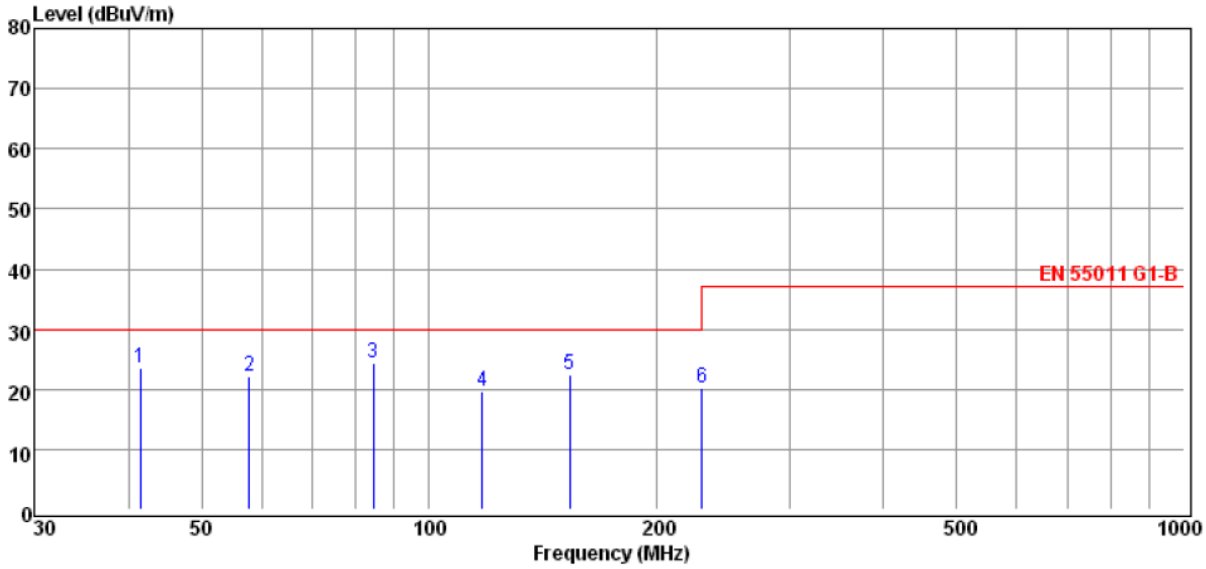


No.	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Antenna	Remark
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	Pol.	
1	43.11	40.53	-18.47	22.06	30.00	-7.94	400	100	HORIZONTAL	Peak
2	56.04	45.00	-22.20	22.80	30.00	-7.20	400	140	HORIZONTAL	Peak
3	126.72	40.97	-17.03	23.94	30.00	-6.06	399	125	HORIZONTAL	Peak
4	164.38	39.69	-19.13	20.56	30.00	-9.44	397	133	HORIZONTAL	Peak
5	244.20	44.50	-16.77	27.73	37.00	-9.27	395	190	HORIZONTAL	Peak
6	314.60	40.70	-15.00	25.70	37.00	-11.30	389	50	HORIZONTAL	Peak

- Negative number in the margin column indicates the amount (in dB) that the recorded emission is Below the limit.
- V means in Vertical Antenna Polarization, H means in Horizontal, and QP means in Quasi-Peak.
- Corrected Factor =Insertion loss (Antenna Factor) + Cable loss.
- Corrected Reading = Reading + Corrected Factor.
- Margin limit = Correction Reading - limit value.

Radiated Emission Test Data - Vertical

Test Date	: 04-FEB-2012	Tested by	: M.S.SHI
Temp.	: 21 ℃	Humidity	: 51 %
Description	: N/A		



No.	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Antenna	Remark
	MHz	dBµV	dB	dBµV/m	dBµV/m	dB	cm	deg	Pol.	
1	41.48	41.12	-17.57	23.55	30.00	-6.45	100	60	VERTICAL	Peak
2	57.78	44.71	-22.56	22.15	30.00	-7.85	100	45	VERTICAL	Peak
3	84.46	45.72	-21.31	24.41	30.00	-5.59	100	85	VERTICAL	Peak
4	117.60	36.58	-16.99	19.59	30.00	-10.41	102	92	VERTICAL	Peak
5	153.41	41.00	-18.69	22.31	30.00	-7.69	105	140	VERTICAL	Peak
6	230.00	38.78	-18.54	20.24	30.00	-9.76	108	133	VERTICAL	Peak

- Negative number in the margin column indicates the amount (in dB) that the recorded emission is Below the limit.
- V means in Vertical Antenna Polarization, H means in Horizontal, and QP means in Quasi-Peak.
- Corrected Factor =Insertion loss (Antenna Factor) + Cable loss.
- Corrected Reading = Reading + Corrected Factor.
- Margin limit = Correction Reading - limit value.

3 Electrostatic Discharge Immunity Test

3.1 Test Instrument

Refer to Sec. 1.2 Test Instruments.

3.2 Test Configuration and Procedure

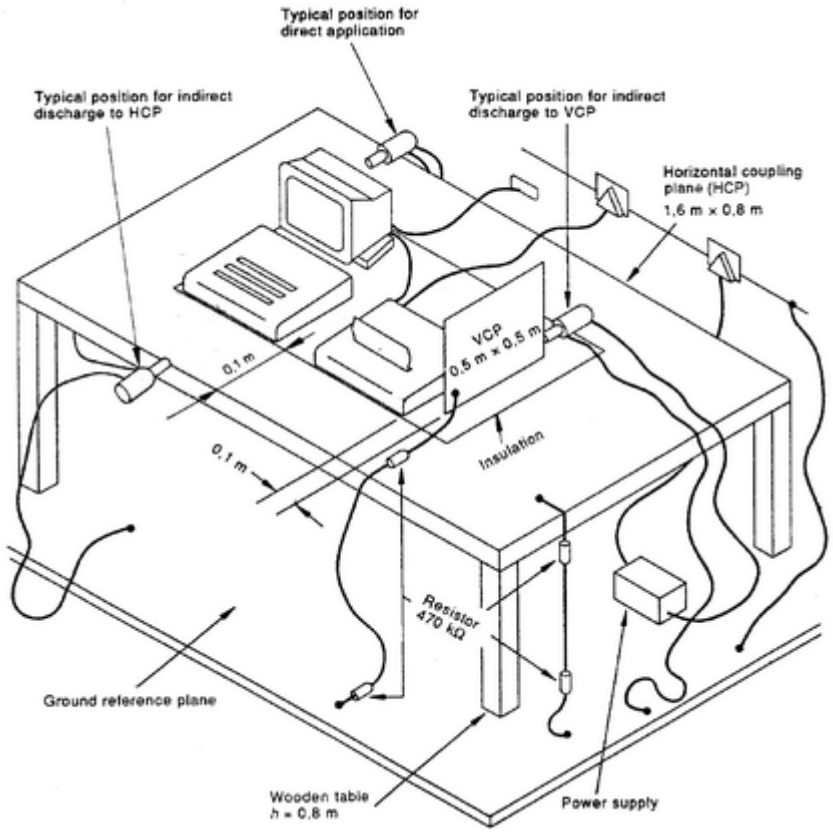


Table-top Equipment

- The EUT was located on a 0.8 m high wooden table standing on the ground reference plane with a 1.6 * 0.8 m horizontal coupling plane on the top. The EUT and cables was isolated from the coupling plane by an insulating support 0.5 mm thick.
- In Contact Discharge, the EUT was exposed to minimum 200 discharges, 10 each at negative and positive polarity on the selected test points (the selected test points were marked with red labels on the EUT)
- In Air Discharge, the EUT exposed to minimum of 10 single discharges on the selected test points.
- The result was observed and analyzed.

3.3 Test Result

Test Date	: 04 - FEB - 2012	Tested By	: M.S. SHI
Temp.	: 22 °C	Pressure In Bar	: 1013 mB
Humidity	: 50 %	Test Condition Mains	: 9VDC
Description	: N/A		

Basic Standard : EN 61000-4-2

Level.

Customer Apply to	Contact Discharge		Customer Apply to	Air Discharge	
	Level	Test Voltage (KV)		Level	Test Voltage (KV)
☐	1	± 2	☐	1	± 2
☒	2	± 4	☒	2	± 4
☐	3	± 6	☐	3	± 8
☐	4	± 8	☐	4	± 15

Test Data.

By Product Standard : EN 61326-1, Performance Criteria : ☐ A ☒ B ☐ C ☐ D

Direct Discharge.

Test Point on EUT	Polarity	Test Voltage (KV)		Performance Criteria (observed)		Result	
		Contact	Air	Contact	Air	Contact	Air
Surface of case	+	2, 4	2, 4	B	B	P	P
	−	2, 4	2, 4	B	B	P	P
Junction of case	+	2, 4	2, 4	B	B	P	P
	−	2, 4	2, 4	B	B	P	P
ALL I/O Port & Bracket	+	2, 4	2, 4	B	B	P	P
	−	2, 4	2, 4	B	B	P	P

Indirect Discharge.

Test Point on EUT	Polarity	Test Voltage (KV)		Performance Criteria (observed)		Result	
		VCP	HCP	VCP	HCP	VCP	HCP
Front	+	2, 4	2, 4	B	B	P	P
	−	2, 4	2, 4	B	B	P	P
Rear	+	2, 4	2, 4	B	B	P	P
	−	2, 4	2, 4	B	B	P	P
Left	+	2, 4	2, 4	B	B	P	P
	−	2, 4	2, 4	B	B	P	P
Right	+	2, 4	2, 4	B	B	P	P
	−	2, 4	2, 4	B	B	P	P
Bottom	+	2, 4	2, 4	B	B	P	P
	−	2, 4	2, 4	B	B	P	P

Performance Criteria (observed) : [A] means " No loss of function " [B] means " Self-restoring "
: [C] means " Reset by operator " [D] means " Damage "

Result : [P] means " Pass " [F] means " Fail "
: [N/A] means "Not Tested"

Test Result : ☒ **Compliance** ☐ **Noncompliance**

4 Radio-frequency, Electromagnetic Field Immunity Test

4.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

4.2 Test Configuration and Procedure

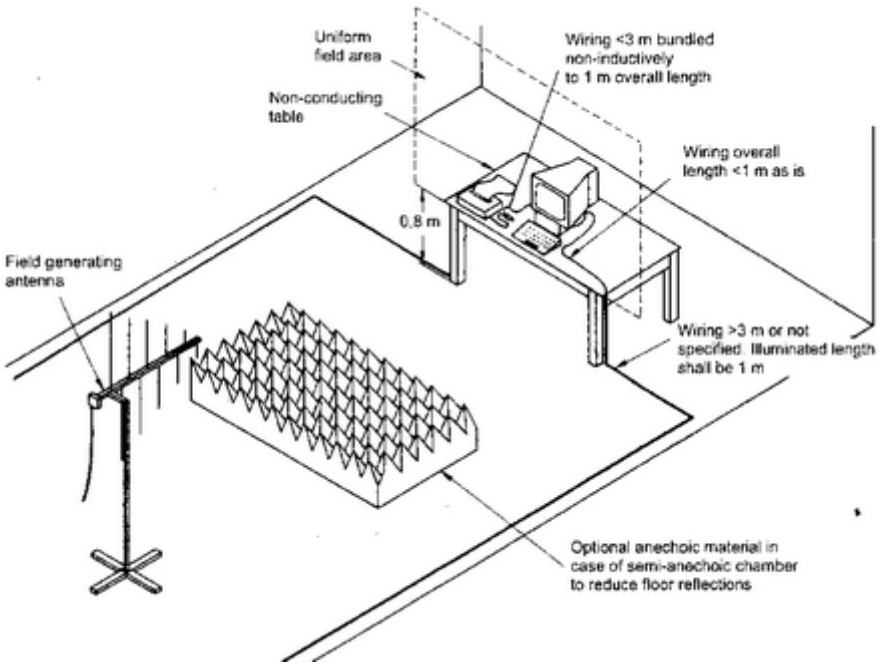


Table-top Equipment

- The field calibration was executed to create a uniform field area (UFA), 3 m away from the antenna, to ensure the validity of the test results.
- The EUT was placed on a non-conductive table 0.8 m high in the UFA.
- The EUT was then connected to power and signal wires according to relevant installation instruction.
- The EUT was positioned so that the four sides of the EUT were exposed to the electromagnetic field in sequence. In each position, the performance of the EUT was investigated and monitored by a CCD camera..

4.3 Test Result

Test Date	: 04 - FEB - 2012	Tested By	: M.S. SHI
Temp.	: 22 °C	Pressure In Bar	: 1013 mB
Humidity	: 48 %	Test Condition Mains	: 9VDC
Description	: N/A		

Basic Standard：EN 61000-4-3

Level.

Customer Apply to			Level	Test field strength (V/m)
80 to 1000 (MHz)	1400 to 2000 (MHz)	2000 to 2700 (MHz)		
☐	☐	☒	1	1
☒	☒	☐	2	3
☐	☐	☐	3	10

Test Data.

By Product Standard : EN 61326-1, Performance Criteria：☒ A ☐ B ☐ C ☐ D

Modulation：**1KHz, AM 80% sinusoidal.**

Frequency Range (MHz)	Table Position (°)	Field (V/m)	Performance Criteria (observed). Antenna Polarization		Result	
			Horizontal.	Vertical.	Horizontal.	Vertical.
80 to 1000	0	3	A	A	P	P
80 to 1000	90	3	A	A	P	P
80 to 1000	180	3	A	A	P	P
80 to 1000	270	3	A	A	P	P
1400 to 2000	0	3	A	A	P	P
1400 to 2000	90	3	A	A	P	P
1400 to 2000	180	3	A	A	P	P
1400 to 2000	270	3	A	A	P	P
2000 to 2700	0	1	A	A	P	P
2000 to 2700	90	1	A	A	P	P
2000 to 2700	180	1	A	A	P	P
2000 to 2700	270	1	A	A	P	P

Performance Criteria (observed) : [A] means " No loss of function " [B] means " Self-restoring "
: [C] means " Reset by operator " [D] means " Damage "

Result : [P] means " Pass " [F] means " Fail "
: [N/A] means "Not Tested"

Test Result : ☒ **Compliance** ☐ **Noncompliance**

5 Photographs of the Tests

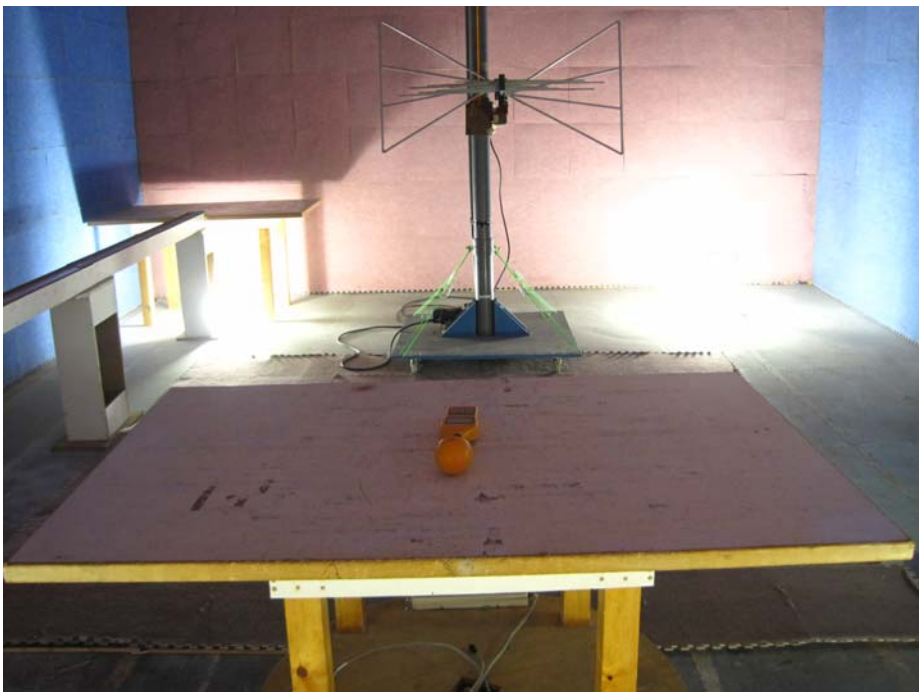
5.1 Radiated Emission Test

Front View

Rear View

5.2 Electrostatic Discharge Immunity Test

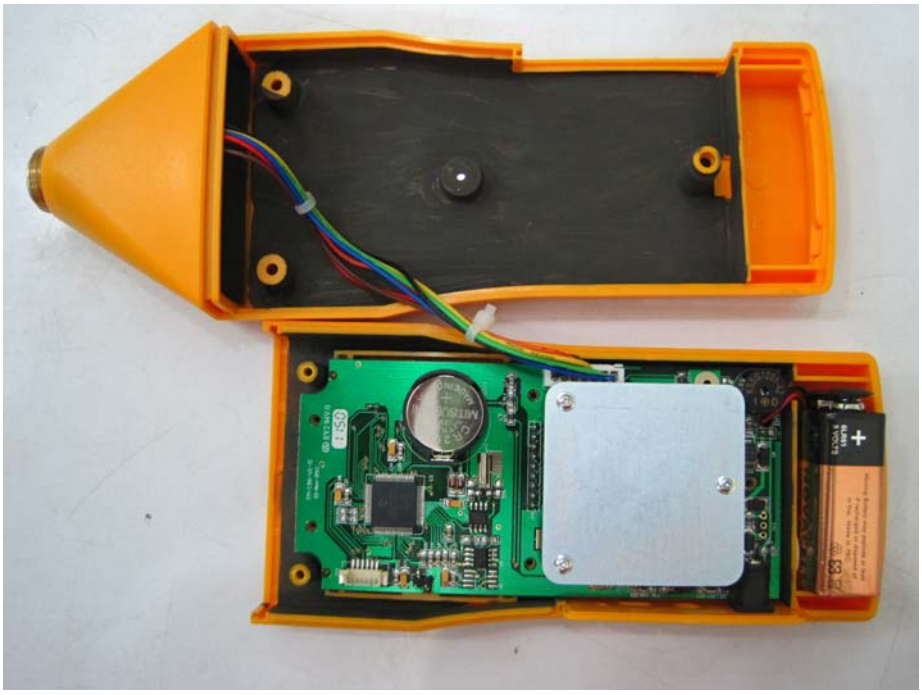
5.3 Radio-frequency, Radio-frequency, Electromagnetic Field Immunity Test



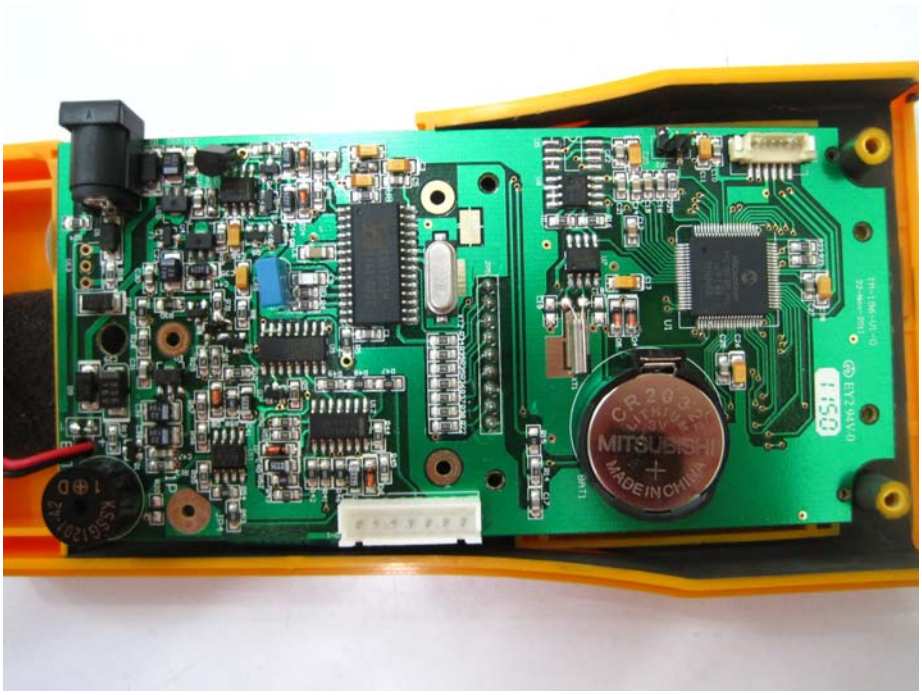
6 Photographs of the EUT

Front View of the EUT

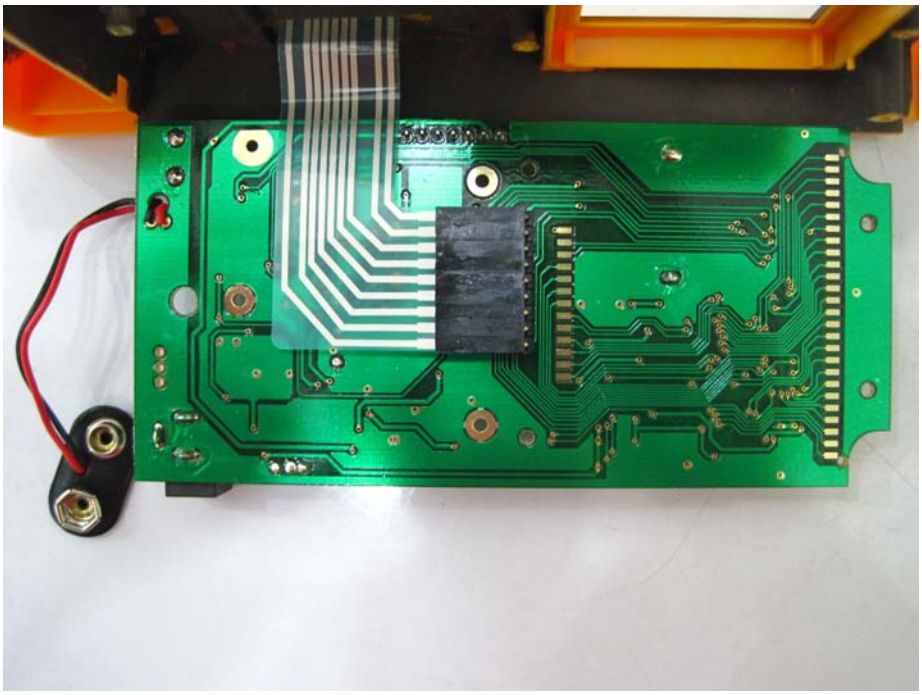
Rear View of the EUT



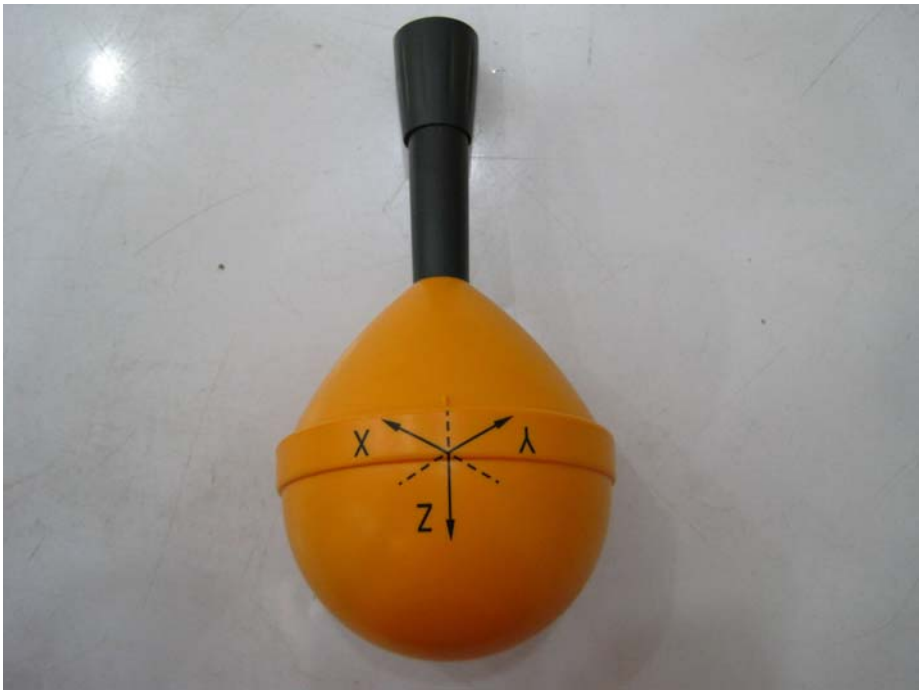
Inside View of the EUT 1



Front View of the PCB



Rear View of the PCB



View of the EUT Sensor

View of the Battery