



FCC TEST REPORT

47 CFR FCC Part 15 Subpart C

FCC ID.....: OWOMW-RF-L

Report Reference No......: TRE12070081 R/C:69284

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Date of issue.....: Sep 28, 2012

Testing Laboratory Name: **Shenzhen Huatongwei International Inspection Co., Ltd**

Address: Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China

Applicant's name: **Shenzhen Mingwah Aohan Electronics Technology Co.Ltd**

Address: Room569, Build 202, SHANGBU INDUSTRIAL, HUAQIANG NORTH ROAD, FUTIAN DISTRICT, SHENZHEN, China

Test specification:

Standard: **47 CFR FCC Part 15 Subpart C - Intentional Radiators**

ANSI C63.4: 2009

TRF Originator: Shenzhen Huatongwei International Inspection CO., Ltd

Master TRF: Dated 2006-06

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Test item description: Card Reader

Trade Mark: /

Model/Type reference: MW-RF-L

Listed Models: /

Operation Frequency: 125KHz

Result: **Positive**

TEST REPORT

Test Report No. :	TRE12070081	Sep 28, 2012 Date of issue
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Equipment under Test : Card Reader

Model /Type : MW-RF-L

Listed Models : /

Applicant : Shenzhen Mingwah Aohan Electronics Technology Co.Ltd

Address : Room569, Build 202, SHANGBU INDUSTRIAL, HUAQIANG NORTH ROAD, FUTIAN DISTRICT, SHENZHEN, China

Manufacturer : Shenzhen Mingwah Aohan Electronics Technology Co.Ltd

Address : Room569, Build 202, SHANGBU INDUSTRIAL, HUAQIANG NORTH ROAD, FUTIAN DISTRICT, SHENZHEN, China

Test Result according to the standards on page 4:	Positive
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. TEST STANDARDS

The tests were performed according to following standards:

[**47 CFR FCC Part 15 Subpart C - Intentional Radiators**](#)

[**ANSI C63.4: 2009**](#) – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Aug 20, 2012
Testing commenced on	:	Aug 20, 2012
Testing concluded on	:	Sep 28, 2012

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input type="radio"/> Other (specified in blank below)	

DC 5V

2.3. Short description of the Equipment under Test (EUT)

2.4GHz (Card Reader (MW-RF-L))

For more details, refer to the user's manual of the EUT.

Serial number: Prototype

2.4. EUT operation mode

The EUT has been tested under typical operating condition.

2.5. Related Submittal(s) / Grant (s)

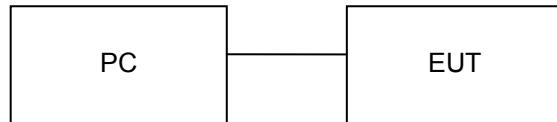
This submittal(s) (test report) is intended for FCC ID: **OWOMW-RF-L** filing to comply with the FCC Part 15, Subpart B Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

2.7. Configuration of Tested System

Configuration of Tested System



Equipment Used in Tested System

No.	Equipment	Manufacturer	Model No.	Serial No.	Notes
1	PC	DELL	D610	CN-0D4571-48643-51S-0236	DOC

2.8. NOTE

The EUT is a Card Reader, The functions of the EUT listed as below:

	Test Standards	Reference Report
EMC REPORT	FCC PART 15 Subpart C	TRE12070081
EMC REPORT	FCC PART 15 Subpart B	TRE12070080

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Huatongwei International Inspection Co., Ltd
Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China
Phone: 86-755-26715686 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Test Facility

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

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: Mar. 29, 2012. Valid time is until Feb. 28, 2015.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until Sept. 30, 2013.

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 662850, Renewal date June. 01, 2012, valid time is until June. 01, 2015.

IC-Registration No.: 5377A

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Jan. 25, 2011, valid time is until Jan. 24, 2014.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

NEMKO-Aut. No.: ELA125

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10, the authorization is valid through July 07, 2013

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2010. Valid time is until Dec. 23, 2013.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2009. Valid time is until Dec. 19, 2012.

Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2010. Valid time is until May 06, 2013.

DNV

Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2013.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	9K-30MHz	3.22 dB	(1)
Radiated Emission	30~1000MHz	4.24 dB	(1)
Radiated Emission	1~18GHz	5.16 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.39 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Equipments Used during the Test

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI TEST RECEIVER	Rohde & Schwarz	ESCI	100106	2011/10/23
2	ARTIFICIAL MAINS	Rohde & Schwarz	ESH2-Z5	100028	2011/10/23
3	PULSE LIMITER	Rohde & Schwarz	ESHSZ2	100044	2011/10/23
4	EMI TEST SOFTWARE	Rohde & Schwarz	ES-K1	N/A	2011/10/23

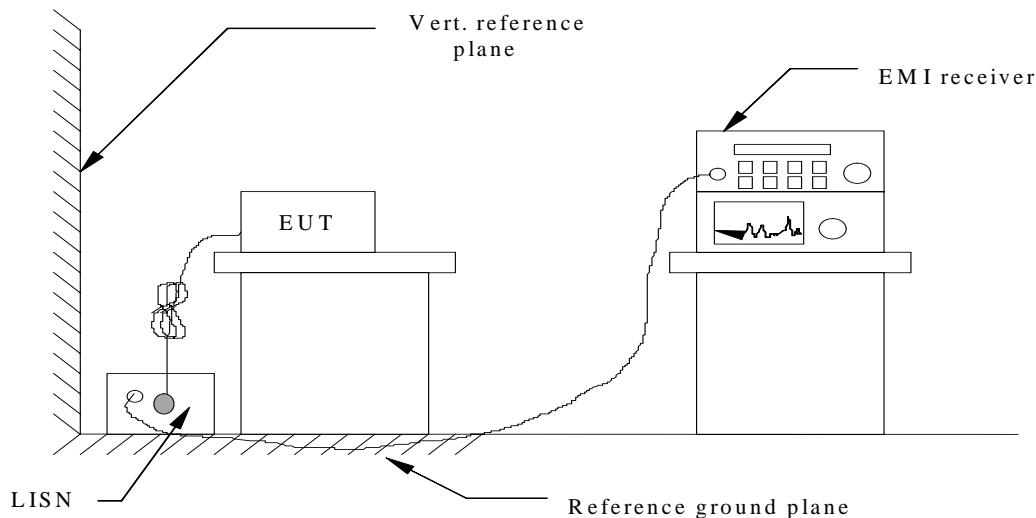
Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Rohde & Schwarz	HL562	100015	2011/05/30
2	EMI TEST RECEIVER	Rohde & Schwarz	ESI 26	100009	2011/10/23
3	RF TEST PANEL	Rohde & Schwarz	TS / RSP	335015/ 0017	2011/10/23
4	TURNTABLE	ETS	2088	2149	2011/10/23
5	ANTENNA MAST	ETS	2075	2346	2011/10/23
6	EMI TEST OFTWARE	Rohde & Schwarz	ESK1	N/A	2011/10/23
7	HORN ANTENNA	Rohde & Schwarz	HF906	100039	2011/10/23
8	Amplifier	Sonoma	310N	E009-13	2011/10/23
9	JS amplifier	Rohde & Schwarz	JS4-00101800-28-5A	F201504	2011/10/23
10	High pass filter	Compliance Direction systems	BSU-6	34202	2011/10/23
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2011/10/23

The calibration interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test (Not applicable to this device)

TEST CONFIGURATION



TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4-2009.
- 2 Support equipment, if needed, was placed as per ANSI C63.4-2009.
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2009.
- 4 The EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

CONDUCTED POWER LINE EMISSION LIMIT

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dB μ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

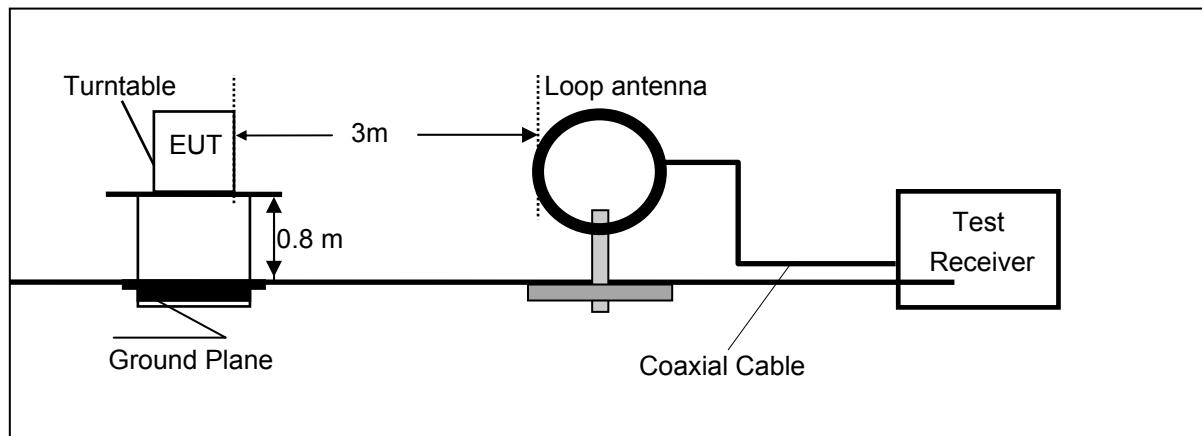
TEST RESULTS

Not applicable to this device (because the equipment is powered by PC)

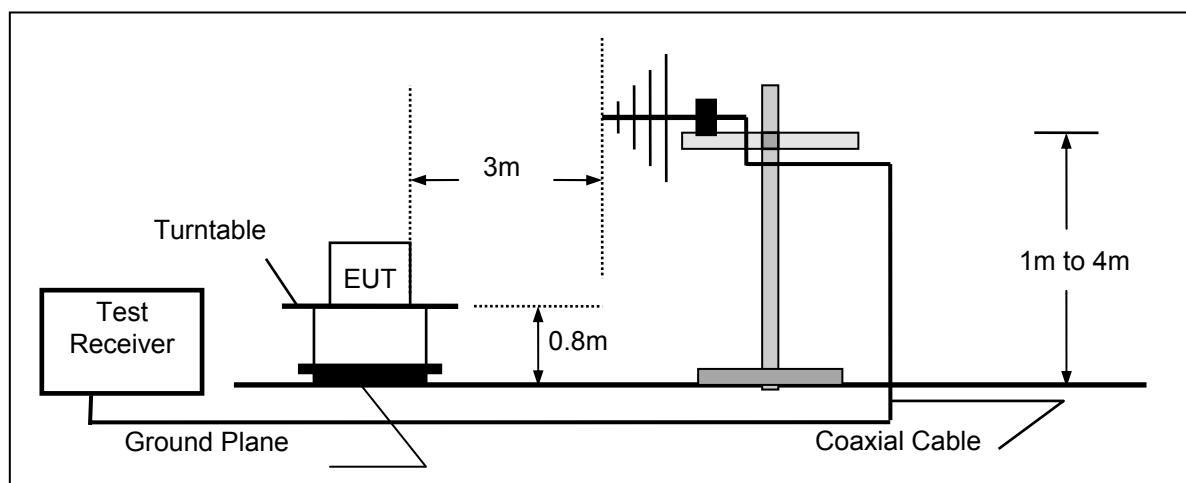
4.2. Radiated Emission Test

TEST CONFIGURATION

a) Radiated Emission Test Set-Up, Frequency below 30MHz



b) Radiated Emission Test Set-Up, Frequency above 30MHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$\mathbf{FS = RA + AF + CL - AG}$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dB μ V/m)	RA (dB μ V/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

RADIATION LIMIT

According to § 15.209(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	300	20log(2400/F(KHz))	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))	24000/F(KHz)
1.705-30	30	20log(30)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following table.

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)
1.705-30	3	20log(30)+ 40log(30/3)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

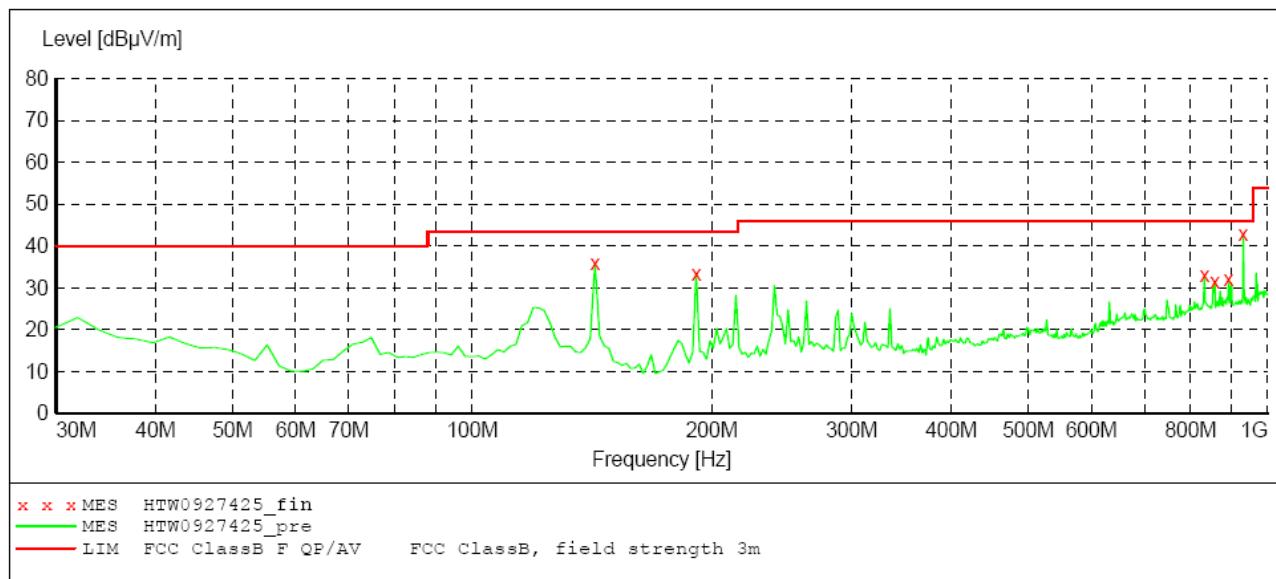
TEST RESULTS

Below 30MHz

Frequency (KHz)	Corrected Reading (dB μ V/m)@3m	FCC Limit (dB μ V/m) @3m	Margin (dB)	Detector	Result
125	75.03	125.67	50.64	PK	Pass
125	73.66	105.67	32.01	AV	Pass
250	39.21	119.65	80.44	PK	Pass
250	30.27	99.65	69.38	AV	Pass
375	35.75	116.12	80.37	PK	Pass
375	26.94	96.12	69.18	AV	Pass
No suspicious signal found in other frequency					

Above 30MHz**SCAN TABLE: "test Field (30M-1G) QP"**

Short Description:			Field Strength (30M-1G)			
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	QuasiPeak	1.0 s	120 kHz	HL562

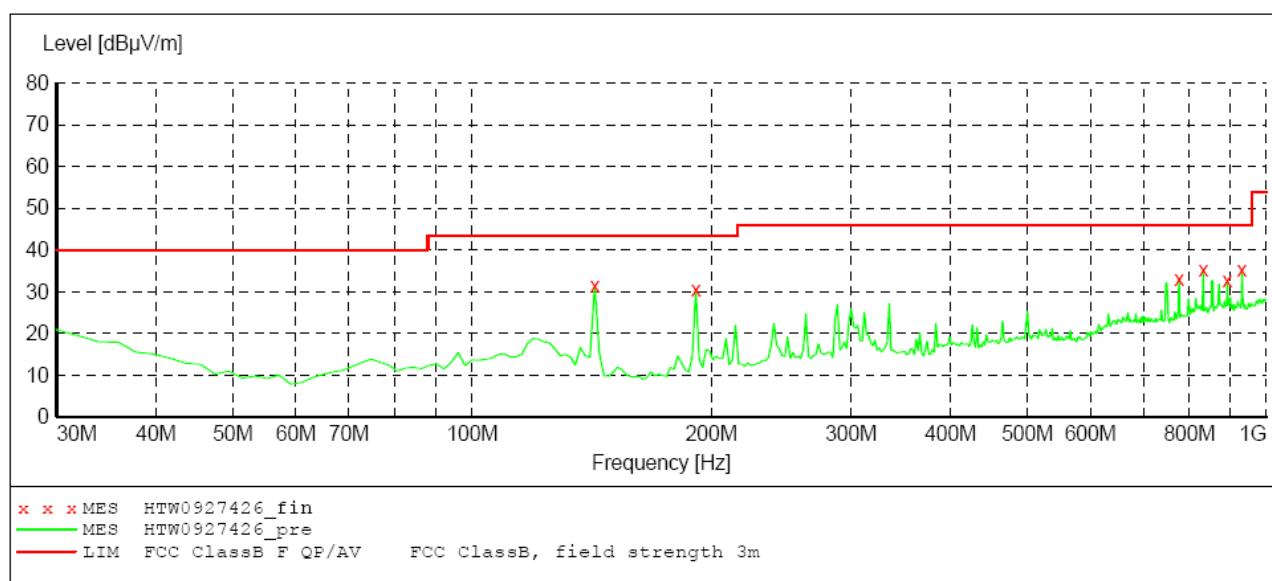
**MEASUREMENT RESULT: "HTW0927425_fin"**

9/27/2012 10:24PM

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
142.745491	36.00	-22.0	43.5	7.5	QP	100.0	27.00	VERTICAL
191.342685	33.50	-22.3	43.5	10.0	QP	100.0	264.00	VERTICAL
832.825651	33.10	-7.7	46.0	12.9	QP	100.0	277.00	VERTICAL
858.096192	31.60	-7.5	46.0	14.4	QP	100.0	0.00	VERTICAL
893.086172	32.00	-6.8	46.0	14.0	QP	100.0	31.00	VERTICAL
931.963928	42.90	-7.3	46.0	3.1	QP	100.0	0.00	VERTICAL

SCAN TABLE: "test Field (30M-1G) QP"

Short Description:			Field Strength (30M-1G)			
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	QuasiPeak	1.0 s	120 kHz	HL562

**MEASUREMENT RESULT: "HTW0927426_fin"**

9/27/2012 10:27PM

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
142.745491	31.50	-22.0	43.5	12.0	QP	300.0	29.00	HORIZONTAL
191.342685	30.50	-22.3	43.5	13.0	QP	300.0	222.00	HORIZONTAL
776.452906	33.10	-9.5	46.0	12.9	QP	100.0	197.00	HORIZONTAL
832.825651	35.10	-7.7	46.0	10.9	QP	100.0	207.00	HORIZONTAL
893.086172	32.80	-6.8	46.0	13.2	QP	100.0	207.00	HORIZONTAL
931.963928	35.10	-7.3	46.0	10.9	QP	100.0	222.00	HORIZONTAL

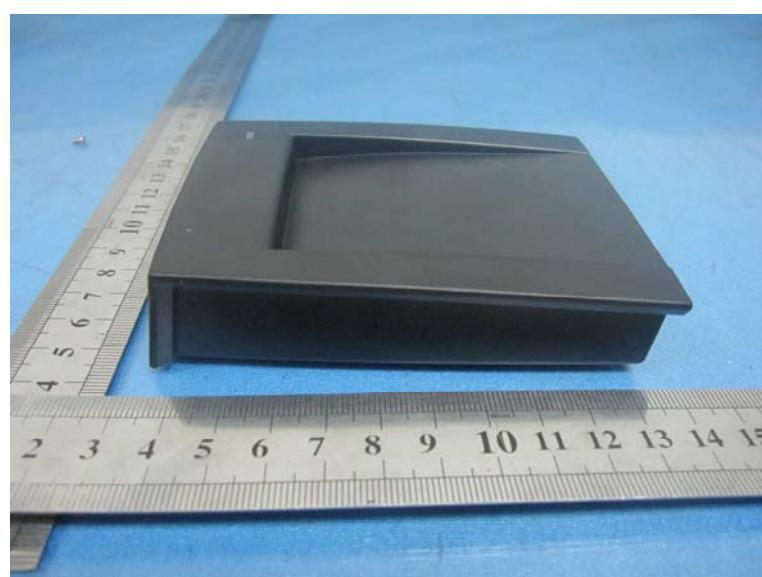
5. Test Setup Photos of the EUT



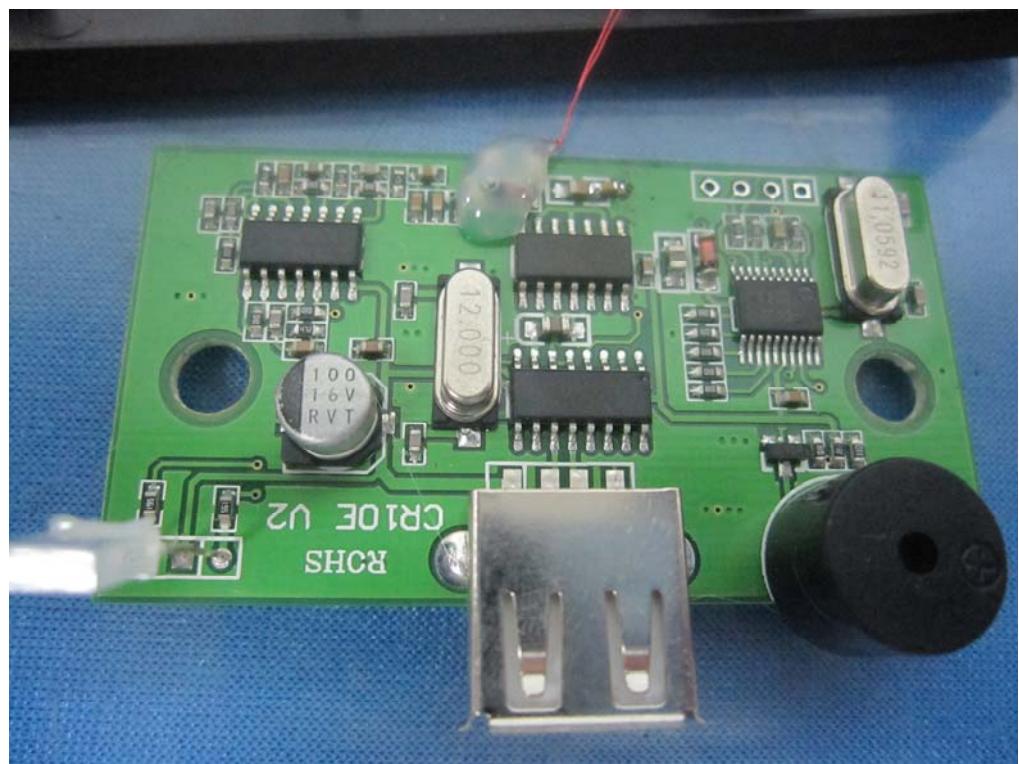
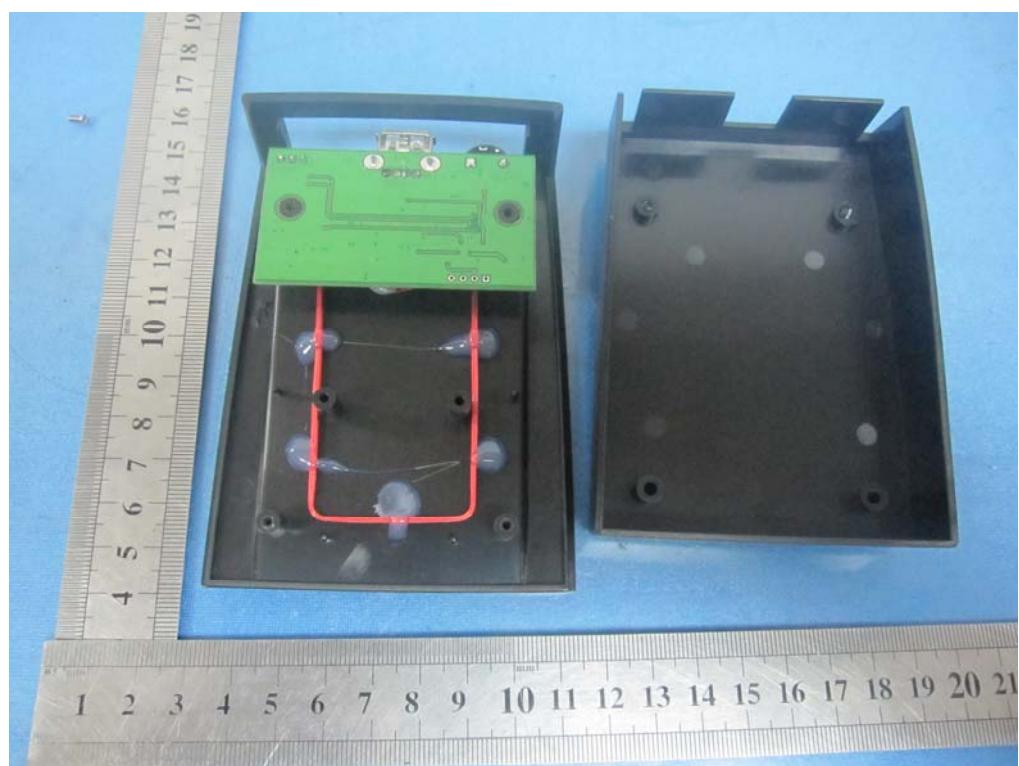
6. External and internal Photos of the EUT

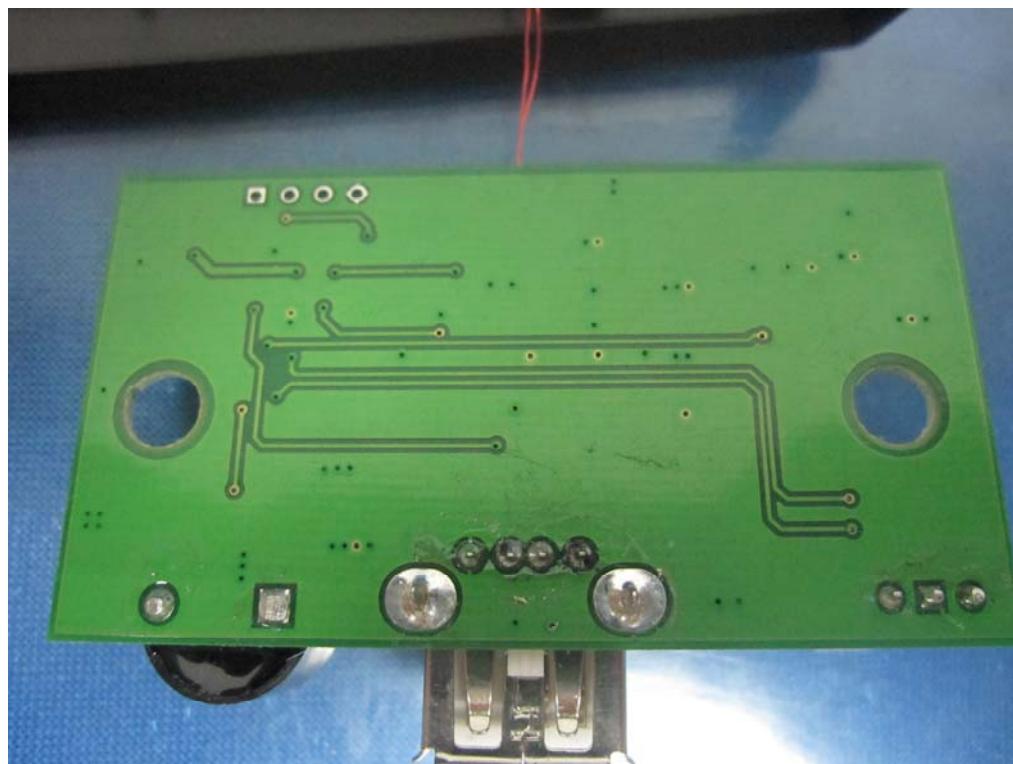
External Photos





The internal photos of EUT





.....End of Report.....