

R&TTE (EMC) TEST REPORT  
for  
Jinan USR IOT Technology Limited

WIFI Remote control device  
Model No.: USR-WP1, USR-WM1s, USR-WM1h,  
USR-WL1, USR-WP3, USR-HTW, USR-WIFIIO-83,  
USR-WSA, USR-WSC, USR-R16

Prepared for : Jinan USR IOT Technology Limited  
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Report Number : R011408276E  
Date of Test : Aug. 21~ Sept. 26, 2014  
Date of Report : Sept. 28, 2014

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## TEST REPORT

Applicant : Jinan USR IOT Technology Limited  
Manufacturer : Jinan USR IOT Technology Limited  
EUT : WIFI Remote control device  
Model No. : USR-WP1, USR-WM1s, USR-WM1h, USR-WL1, USR-WP3,  
USR-HTW, USR-WIFIIO-83, USR-WSA, USR-WSC, USR-R16  
Serial No. : N.A.  
Trade Mark : USR IOT  
Rating : AC 100-240V, 50/60Hz, 10A

Measurement Procedure Used:

ETSI EN 301 489-1 V1.9.2 (2011-09)

ETSI EN 301 489-17 V2.2.1 (2012-09)

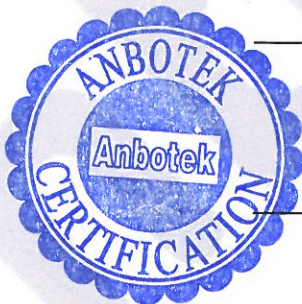
The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 301 489-1 & EN 301 489-17 requirements.

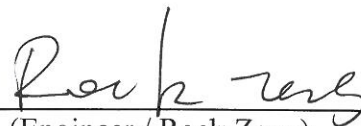
This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test :

Aug. 21~ Sept. 26, 2014

Prepared by :




  
(Engineer / Rock Zeng)

Reviewer :

  
(Project Manager/Amy Ding)

Approved & Authorized Signer :

  
(Manager/Tom Chen)

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

EUT	: WIFI Remote control device
Model Number	: USR-WP1, USR-WM1s, USR-WM1h, USR-WL1, USR-WP3, USR-HTW, USR-WIFIIO-83, USR-WSA, USR-WSC, USR-R16 (Note: All samples are the same except the model number and appearance, so we prepare “USR-WP1” for EMC test only.)
Test Power Supply	: AC 230V, 50Hz
Frequency	: 2412 ~ 2472MHz (13 channels)
Antenna Gain	: 1.5 dBi
Applicant Address	: Jinan USR IOT Technology Limited : #1-724~729, Huizhan Guoji Cheng, Gaoxin District, Jinan City, Shandong Province, 250101, China
Manufacturer Address	: Jinan USR IOT Technology Limited : #1-724~729, Huizhan Guoji Cheng, Gaoxin District, Jinan City, Shandong Province, 250101, China
Factory Address	: Jinan USR IOT Technology Limited : #1-724~729, Huizhan Guoji Cheng, Gaoxin District, Jinan City, Shandong Province, 250101, China
Date of receipt	: Aug. 21, 2014
Date of Test	: Aug. 21~ Sept. 26, 2014

## 1.2. Auxiliary Equipment Used during Test

N/A

## 1.3. Description of Test Facility

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

### **FCC-Registration No.: 752021**

Shenzhen Anbotek Compliance Laboratory Limited, 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 752021, July 10, 2013.

### **IC-Registration No.: 8058A-1**

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, February. 22, 2013.

### **CNAS - LAB Code: L3503**

Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing Laboratories.

### **Test Location**

All Emissions tests were performed

Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

## 1.4. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.3 dB

Conduction Uncertainty : Uc = 3.4 dB

### 1.5. Test Standards

**ETSI EN 301 489-1 V1.9.2 (2011-09)**

Electromagnetic compatibility and Radio spectrum Matters (ERM);  
Electromagnetic Compatibility (EMC) standard for radio equipment and  
services;

Part 1: Common technical requirements

**ETSI EN 301 489-17 V2.2.1 (2012-09)**

Electromagnetic compatibility and Radio spectrum Matters (ERM);  
Electromagnetic Compatibility (EMC) standard for radio equipment and  
services;

Part 17: Specific conditions for 2,4GHz wideband transmission systems and  
5GHz high performance RLAN equipment



## 2. MEASURING DEVICE AND TEST EQUIPMENT

Test equipments list of Shenzhen Anbotek Compliance Laboratory Limited.

### 2.1. Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 23, 2014	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 23, 2014	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 23, 2014	1 Year

### 2.2. Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 23, 2014	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 14, 2013	3 Year
3.	Pre-amplifier	SONOMA	310N	186860	Aug. 09, 2014	1 Year

### 2.3. Harmonic and Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Programmable AC Power source	SOPH POWER	PAG-1050	630250	Apr. 23, 2014	1 Year
2.	Harmonic and Flicker Analyzer	LAPLACE	AC2000A	272629	Apr. 23, 2014	1 Year

### 2.4. Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	KIKUSUI	KES4021	LJ003477	Apr. 25, 2014	1 Year

## 2.5. R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 29, 2014	1 year
2.	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	May 29, 2014	1 year
3.	Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120 L3F	332	May 29, 2014	1 year
4.	Power Amplifier	PRANA	AP32MT215	N/A	May 29, 2014	1 year
5.	Power Amplifier	MILMEGA	AS0102-55	N/A	May 29, 2014	1 year
6.	Signal Generator	AEROFLEX	2023B	N/A	May 29, 2014	1 year
7.	Field Strength Meter	HOLADAY	HI-6005	N/A	May 29, 2014	1 year
8.	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 29, 2014	1 year
9.	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 29, 2014	1 year

## 2.6. Electrical Fast Transient/Burst Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EFT Burst Simulator	PRIMA	EFT61004B	PR10114282	Apr. 23, 2014	1 Year

## 2.7. Surge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	6kV Surge Generator	EMPEK	LSG-5060G	06010017N	Apr. 23, 2014	1 Year
2.	CDN	EMPEK	CDN-5110G	06110005N	Apr. 23, 2014	1 Year

## 2.8. Injected Currents Susceptibility Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	C/S Conducted Immunity Test System	FRANKONIA	CIT-10	126A1196/2012	Jul. 23, 2014	1 Year
2.	CDN	FRANKONIA	CDN - M2+ M3	A2210178/2012	Apr. 23, 2014	1 Year
3.	6dB attenuator	FRANKONIA	DAM 26W	1172202	Apr. 23, 2014	1 Year

## 2.9. Voltage Dips and Interruptions Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	CYCLE SAG Simulator	PRIMA	DRP61011A G	PR12046234	Apr. 23, 2014	1 Year



### 3. Technical Test

#### 3.1. Summary of Test Results

No Deviations from the technical specification(s) were ascertained in the course of the tests Performed	
Final Verdict: (only "Passed" if all single measurements are "Passed")	Passed

#### 3.2. Test Report

##### Emission (EMI)

EMI Phenomenon	Port	Requirement		EUT Setup	Result	Applicability
		Standard	Basic Standard			
Conducted Interference Voltage	AC Mains	ETSI EN 301 489-1 Clause 8.4	EN 55022	Refer to Section 5	Complies	Applicable
Conducted Interference Voltage	DC Mains	ETSI EN 301 489-1 Clause 8.3	EN 55022	Refer to Section 4	N/A	Not Applicable
Radiated Interference Field Strength 30~1000MHz	Enclosure	ETSI EN 301 489-1 Clause 8.2	EN 55022	Refer to Section 4	Complies	Applicable
Harmonic Current Emissions	AC Mains Input Port	ETSI EN 301 489-1 Clause 8.5	EN 61000-3-2	Refer to Section 5	N/A	Not Applicable
Flicker & Voltage Fluctuation	AC Mains Input Port	ETSI EN 301 489-1 Clause 8.6	EN 61000-3-3	Refer to Section 5	Complies	Applicable

##### Immunity (EMS)

EMS Phenomenon	Port	Requirement		EUT Setup	Result	Applicability
		Standard	Basic Standard			
Electronic Discharge (ESD)	Enclosure	ETSI EN 301 489-1 Clause 9.3	IEC 61000-4-2	Refer to Section 5	Complies	Applicable
RF-Electro-Magnetic Field (80-1000MHz and 1400-2000 MHz)	Enclosure	ETSI EN 301 489-1 Clause 9.2	IEC 61000-4-3	Refer to Section 5	Complies	Applicable
Fast Transients, Burst	Power Line	ETSI EN 301 489-1 Clause 9.4	IEC 61000-4-4	Refer to Section 5	Complies	Applicable
Surge	Power Line (1 Phase)	ETSI EN 301 489-1 Clause 9.8	IEC 61000-4-5	Refer to Section 5	Complies	Applicable

Transients & Surges Vehicular Environment	Power Line (Car Charge)	ETSI EN 301 489-1 Clause 9.6	ISO 7367-1 ISO 7367-2	N/A	N/A	Not Applicable
RF Common Mode (0.15-80MHz)	Power Line	ETSI EN 301 489-1 Clause 9.5	IEC 61000-4-6	Refer to Section 5	Complies	Applicable
Vol. Dips, Interruptions & Fluctuations (AC Power)	Power Line	ETSI EN 301 489-1 Clause 9.7	IEC 61000-4-11	Refer to Section 5	Complies	Applicable

N/A=Not Applicable

- Performance criteria A for immunity tests with phenomena of a continuous nature;  
Communication between the Tx and Rx in the front of pings should not drop during the test.
- Performance criteria B for immunity tests with phenomena of a transient nature;  
N/A
- Performance criteria C for immunity tests with power interruptions exceeding a certain time.  
N/A

Note: For details see subclause 6.2 ETSI EN 301 489-17.

### 3.2.1. Emission Test – Radiated Emissions

This test assesses that ability of ancillary equipment to limit their internal noise from being radiated from the enclosure.

#### According to EMC basic standard (EN 55022)

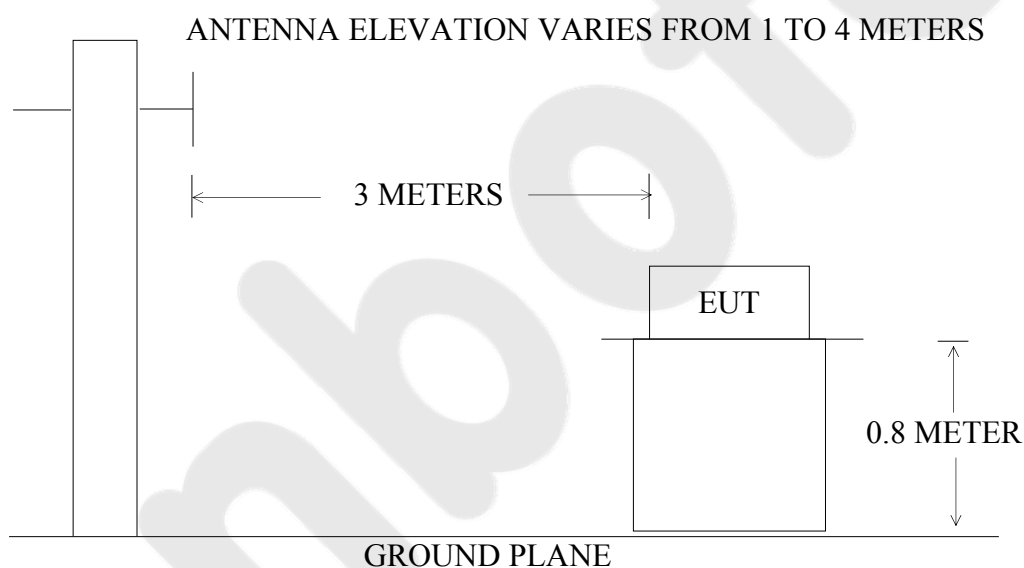
Measurement according to EMC basic standard, The test results correspond to the 3m-OATS result. The EUT and its simulators are placed on a turntable which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to EN 55013 and EN 55022 on radiated measurement.

Radiated emissions were investigated over the frequency range from 30MHz to 1GHz using a receiver bandwidth of 120kHz. Radiated was performed at an antenna to EUT distance of 3 meters.

#### Test Setup

EUT was setup on a 3m standard OATS



#### Limits

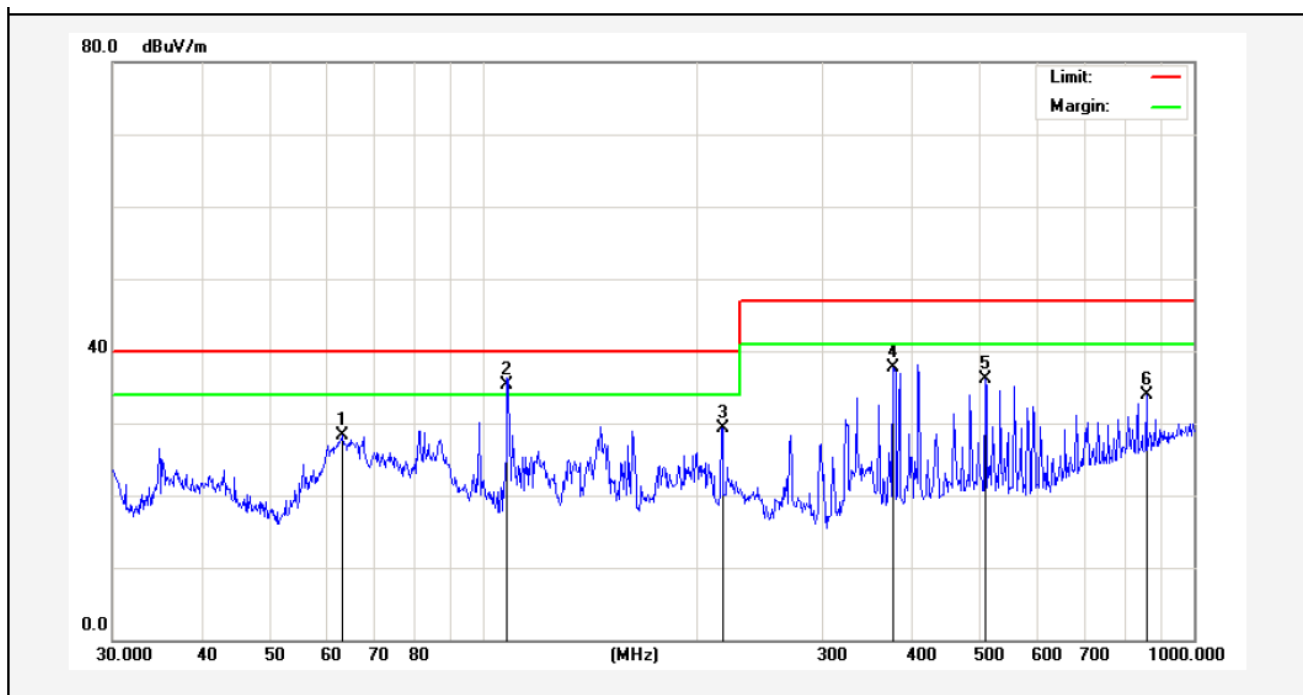
Freq. Range (MHz)	Distance (m)	Field Strength (dBμV/m)
30 – 230	3	40
230 – 1000	3	47

#### Results

Receiving Antenna Directed to	Angle of Turntable	Hori. / Vert.	Comment	Result (Passed / Failed)
--	0° - 360°	H/V	EUT Operating Normal	Passed

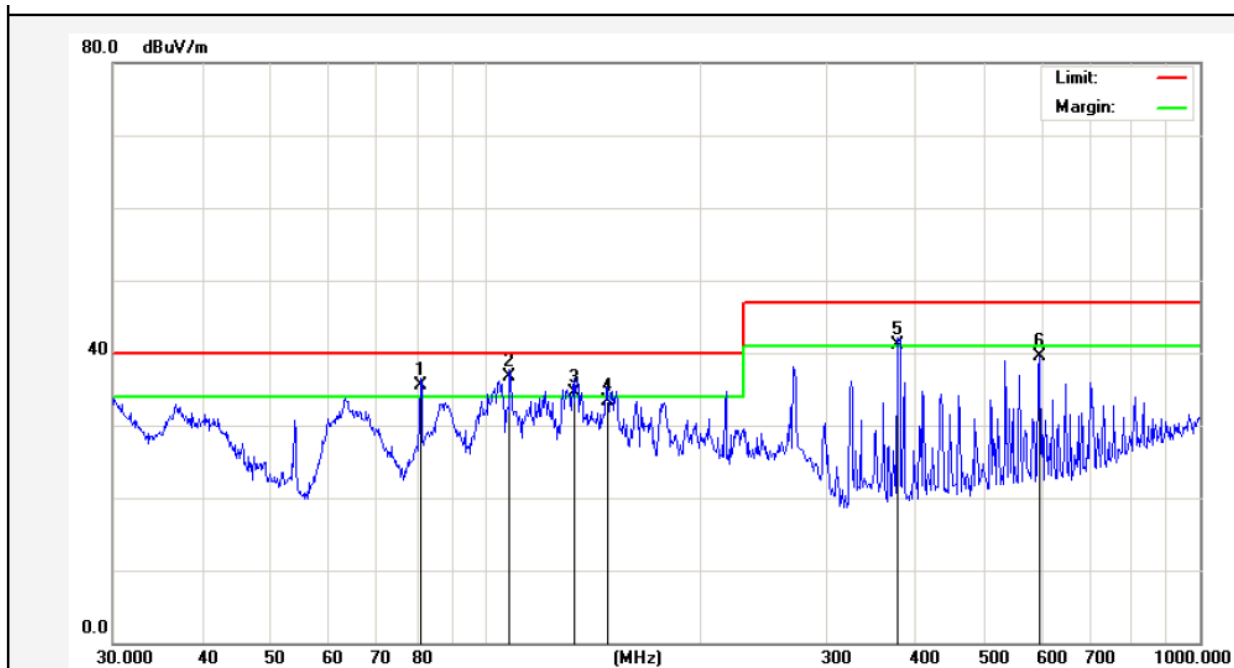
Please refer the following pages.

Job No.:	AT011408276S	Polarization:	Horizontal
Standard:	(RE)EN301489_Class B_3m	Power Source:	AC 230V, 50Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3( C)/55%RH
Note:	On	Distance:	3m



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	63.0916	44.97	-16.67	28.30	40.00	-11.70	peak			
2	107.8877	55.92	-20.66	35.26	40.00	-4.74	QP	300	360	
3	216.7828	49.58	-20.23	29.35	40.00	-10.65	peak			
4	377.2591	50.98	-13.32	37.66	47.00	-9.34	peak			
5	508.2582	47.10	-10.97	36.13	47.00	-10.87	peak			
6	857.0247	39.36	-5.49	33.87	47.00	-13.13	peak			

Job No.:	AT011408276S	Polarization:	Vertical
Standard:	(RE)EN301489_Class B_3m	Power Source:	AC 230V, 50Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3( C)/55%RH
Note:	On	Distance:	3m



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	80.9274	55.16	-19.68	35.48	40.00	-4.52	QP	100	0	
2	107.8876	52.31	-15.66	36.65	40.00	-3.35	QP	100	360	
3	133.1511	52.54	-18.02	34.52	40.00	-5.48	QP	100	0	
4	147.9214	51.66	-18.37	33.29	40.00	-6.71	QP	100	360	
5	377.2591	53.33	-12.32	41.01	47.00	-5.99	QP	100	0	
6	595.1329	48.77	-9.32	39.45	47.00	-7.55	peak			

### 3.2.2. Emission Test – AC Mains Power Line Conducted Emissions

This test is applicable for radio equipment and ancillary equipment for fixed use that may have DC cables longer than 3 m (see clause 5.1 - manufacturer's declaration) and for vehicular use irrespective of cable length.

#### According to EMC basic standard (EN 55022)

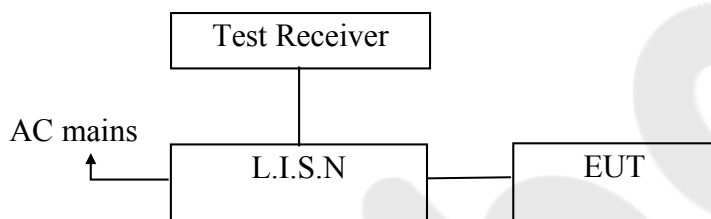
The test method shall be in accordance with EN 55022 [7] and the Artificial Mains Networks (AMNs) shall be connected to the AC mains power source.

The measurement frequency range extends from 150 kHz to 30 MHz. When the EUT is a transmitter operating at frequencies below 30 MHz, then the exclusion band for transmitters applies (see clause 4.3) for measurements in the transmit mode of operation.

For emission measurements on AC output ports of the EUT the relevant port shall be connected via an AMN to a load drawing the rated current of the source. In case where the AC output port is directly connected (or via a circuit breaker) to the AC power input port of the EUT the AC power output port need not to be tested.

#### Test Setup

EUT was setup as before.



#### Limits

Frequency (MHz)	Limit (dB $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

NOTE1-The lower limit shall apply at the transition frequencies.

NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

#### Results

PASS

Please refer the following pages.

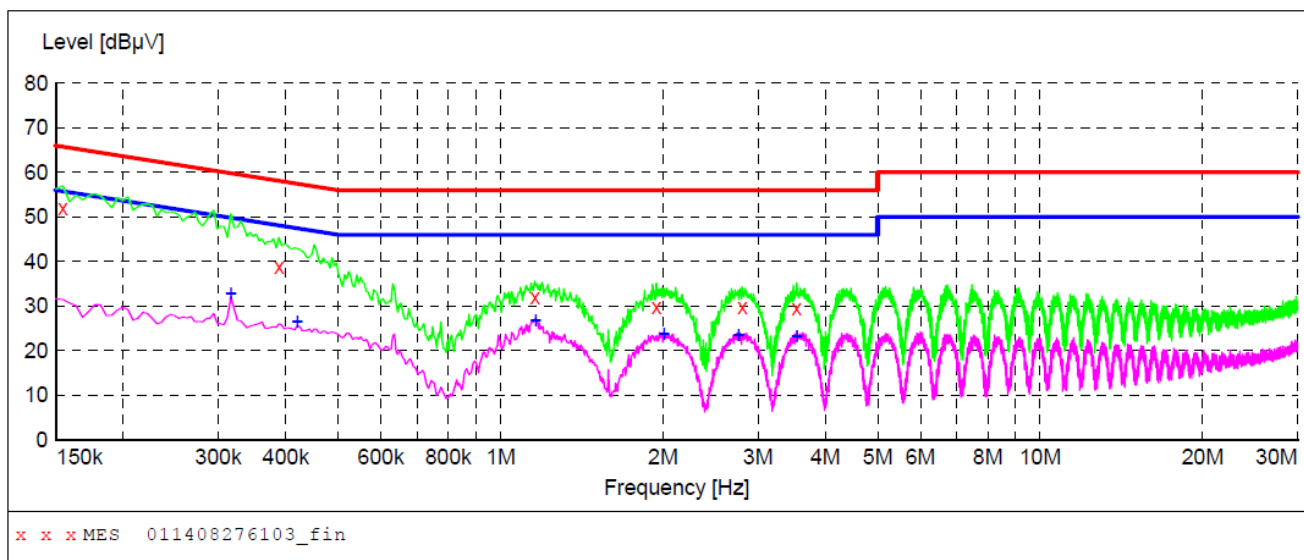


## CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room  
Operating Condition: On  
Test Specification: AC 230V, 50Hz  
Comment: Live Line  
Tem:25°C Hum:50%

### SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



### MEASUREMENT RESULT: "011408276103\_fin"

8/21/2014 9:49PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.154500	51.90	20.1	66	13.9	QP	L1	GND
0.388500	38.80	20.1	58	19.3	QP	L1	GND
1.157500	31.90	20.2	56	24.1	QP	L1	GND
1.945000	29.80	20.3	56	26.2	QP	L1	GND
2.804500	29.90	20.4	56	26.1	QP	L1	GND
3.538000	29.50	20.4	56	26.5	QP	L1	GND

### MEASUREMENT RESULT: "011408276103\_fin2"

8/21/2014 9:49PM

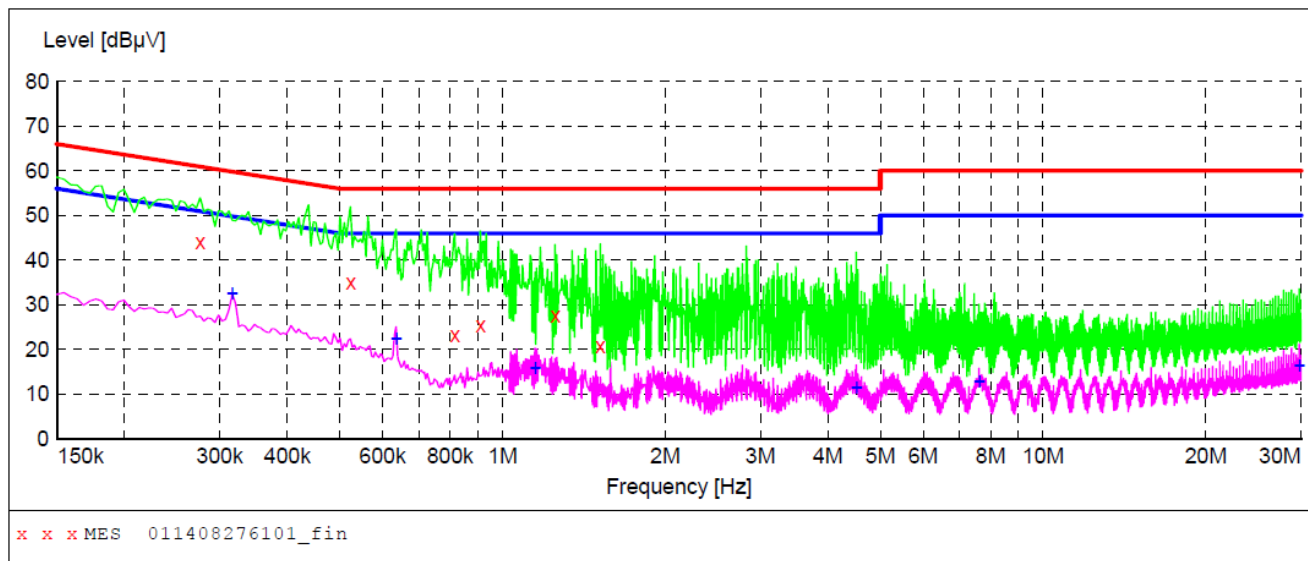
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.316500	32.90	20.1	50	16.9	AV	L1	GND
0.420000	26.60	20.1	47	20.8	AV	L1	GND
1.162000	26.80	20.2	46	19.2	AV	L1	GND
2.008000	23.80	20.3	46	22.2	AV	L1	GND
2.759500	23.50	20.4	46	22.5	AV	L1	GND
3.542500	23.30	20.4	46	22.7	AV	L1	GND

## CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room  
Operating Condition: On  
Test Specification: AC 230V, 50Hz  
Comment: Neutral Line  
Tem:25°C Hum:50%

### SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



### MEASUREMENT RESULT: "011408276101\_fin"

8/21/2014 9:32PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.276000	43.90	20.1	61	17.0	QP	N	GND
0.523500	35.10	20.1	56	20.9	QP	N	GND
0.816000	23.20	20.1	56	32.8	QP	N	GND
0.910500	25.30	20.1	56	30.7	QP	N	GND
1.252000	27.50	20.2	56	28.5	QP	N	GND
1.517500	20.70	20.3	56	35.3	QP	N	GND

### MEASUREMENT RESULT: "011408276101\_fin2"

8/21/2014 9:32PM

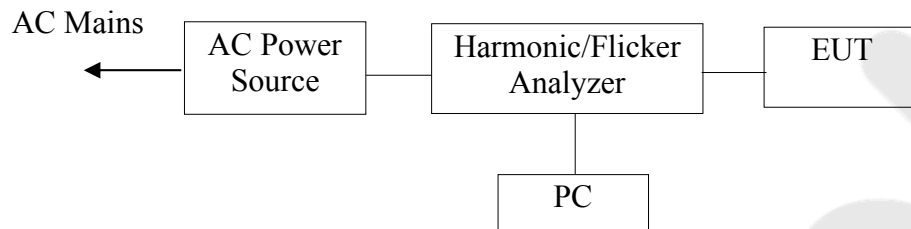
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.316500	32.40	20.1	50	17.4	AV	N	GND
0.636000	22.40	20.1	46	23.6	AV	N	GND
1.148500	15.70	20.2	46	30.3	AV	N	GND
4.514500	11.50	20.5	46	34.5	AV	N	GND
7.610500	12.70	20.5	50	37.3	AV	N	GND
29.777500	16.30	20.9	50	33.7	AV	N	GND

### 3.2.3. Emission Test –Harmonic current emissions (AC mains input port)

The appropriate requirements of EN 61000-3-2/A1 [16] for harmonic current emission apply for equipment covered by the scope of the present document with an input current up to and including 16A per phase.

#### Test Setup

EUT was setup as before.



#### Results

#### PASS

Please refer the following pages.

## Harmonic Current Test Result Summary (Run time)

HA-PC Link Plus. Software v2.02. Firmware v2.81  
Tested On : Aug. 25, 2014 14:35 for 150 Seconds.

Supply Voltage : 229.4 to 229.6 Vrms 328.1 Vpk Frequency : 50.00 Hz  
Supply Pass : Harmonic Requirements Crest Limits.

Load Power : 0.52 to 525.80 W 525.2 VA Power Factor 1.000  
Load Current : 2.3 Arms 3.4 Apk Crest Factor: 1.467

Measurement Standard : EN61000-4-7:2009  
Limits Applied : EN61000-3-2 Class A Limits Apply. Professional,

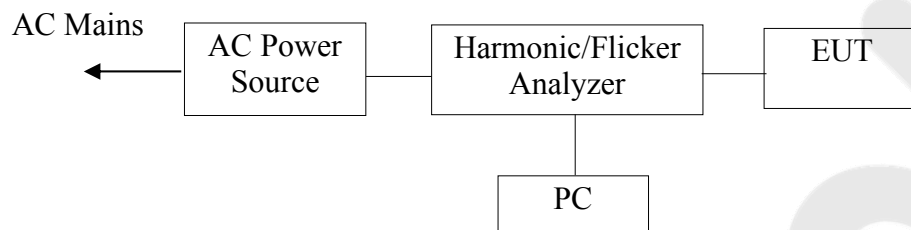
Harmonic Number	Limit Current mA	Average (filtered) mA	% Limit	max. Value (Filtered)	% Limit	Assessment
Fundamental :		2288.9				
2 :	1080.0	9.1	0.8	9.3	0.9	Pass
3 :	2300.0	26.0	1.1	28.2	1.2	Pass
4 :	430.0	4.1	1.0	4.3	1.0	Pass
5 :	1140.0	9.8	0.9	10.6	0.9	Pass
6 :	300.0	4.5	1.5	4.6	1.5	Pass
7 :	770.0	7.7	1.0	8.2	1.1	Pass
8 :	230.0	5.8	2.5	5.9	2.6	Pass
9 :	400.0	6.2	1.5	6.2	1.5	Pass
10 :	184.0	2.1	1.1	2.1	1.1	Pass
11 :	330.0	2.0	0.6	2.1	0.6	Pass
12 :	153.3	4.4	2.9	4.4	2.9	Pass
13 :	210.0	4.4	2.1	4.4	2.1	Pass
14 :	131.4	2.6	2.0	2.6	2.0	Pass
15 :	150.0	2.3	1.5	2.3	1.5	Pass
16 :	115.0	3.0	2.6	3.0	2.6	Pass
17 :	132.3	3.1	2.3	3.2	2.4	Pass
18 :	102.2	2.3	2.3	2.3	2.3	Pass
19 :	118.4	1.9	1.6	1.9	1.6	Pass
20 :	92.0	2.3	2.5	2.3	2.5	Pass
21 :	107.1	1.9	1.8	1.9	1.8	Pass
22 :	83.6	1.6	1.9	1.6	1.9	Pass
23 :	97.8	1.5	1.5	1.6	1.6	Pass
24 :	76.7	1.4	1.8	1.4	1.8	Pass
25 :	90.0	0.7	0.8	0.8	0.9	Pass
26 :	70.8	1.3	1.8	1.4	2.0	Pass
27 :	83.3	1.7	2.0	1.7	2.0	Pass
28 :	65.7	0.6	0.9	0.7	1.1	Pass
29 :	77.6	0.8	1.0	0.8	1.0	Pass
30 :	61.3	0.8	1.3	0.8	1.3	Pass
31 :	72.6	0.4	0.6	0.5	0.7	Pass
32 :	57.5	0.4	0.7	0.5	0.9	Pass
33 :	68.2	0.4	0.6	0.5	0.7	Pass
34 :	54.1	0.3	0.6	0.3	0.6	Pass
35 :	64.3	0.3	0.5	0.3	0.5	Pass
36 :	51.1	0.2	0.4	0.3	0.6	Pass
37 :	60.8	0.4	0.7	0.5	0.8	Pass
38 :	48.4	0.1	0.2	0.1	0.2	Pass
39 :	57.7	0.6	1.0	0.7	1.2	Pass
40 :	46.0	0.3	0.7	0.3	0.7	Pass
21 - 39 :	251.4	3.3	1.3	3.5	1.4	-

### 3.2.4. Emission Test – Voltage fluctuations and flicker (AC mains input port)

The appropriate requirements of EN 61000-3-3 [17] for voltage fluctuations and flicker apply for equipment covered by the scope of the present document with an input current up to and including 16A per phase.

#### Test Setup

EUT was setup as before.



#### Results

#### PASS

Please refer the following pages.

## Flicker Test Summary per EN/IEC61000-3-3 (Run time)

HA-PC Link Plus. Software v2.02. Firmware v2.81

Tested On : Aug. 25, 2014 15:16 for 600 Seconds.

Supply Voltage : 229.4 to 229.6 Vrms 328.2 Vpk Frequency : 49.98 to 50.04 Hz  
Load Current : 2.3 to 2275.1 Arms 3.4 to 3162.8 Apk Crest Factor: 1.470

Test Method: EN61000-3-3:2013

### Voltage Variations :

Highest Level: -0.04%

Lowest Level: -0.47%

d(max): 0.44%

PASS

Highest d(t) of 500ms: 0.00%

PASS

Present d(t) over 3.33%: 0.00 Seconds

Longest d(t) over 3.33%: 0.00 Seconds

Highest Steady State: -0.21%

Lowest Steady State: -0.21%

Max d(c) Between Adjacent: 0.00%

PASS

Max d(c) Between Any: 0.00%

Short Term Flicker Pst: 0.07

PASS

### Flicker Results :

Pst Classifier	Plt Calculation	
Duration	Flicker Interval	Pst
0.1%	0.10	
0.7%	0.02	
1.0%	0.02	
1.5%	0.01	
2.2%	0.01	
3%	0.01	
4%	0.01	
6%	0.01	
8%	0.01	
10%	0.01	
13%	0.00	
17%	0.00	
30%	0.00	
50%	0.00	
80%	0.00	



### 3.2.5. Immunity Test – Radiated, RF Electromagnetic Fields

#### According to EMC basic standard (IEC 61000-4-3)

- Type of Port: Enclosure
- Performance Criterion: CT/CR
- The distance between the turn-table axis and TX&RX antenna is 3m.
- Field strength = 3V/m
- Start Frequency: 80MHz ~ 1000MHz, 1400MHz ~ 2700 MHz
- Frequency Step = lin 1MHz
- Modulation = AM, 400Hz, 1kHz, 80%
- Test Mode: On

#### Results

Frequency (MHz)	Antenna Polarity	Radiation to	Reaction of the EUT During and after test	Result
80-1000, 1400-2700	Horizontal	Front	No reactions recognized	Passed
80-1000, 1400-2700	Vertical	Front	No reactions recognized	Passed
80-1000, 1400-2700	Horizontal	Rear	No reactions recognized	Passed
80-1000, 1400-2700	Vertical	Rear	No reactions recognized	Passed
80-1000, 1400-2700	Horizontal	Left	No reactions recognized	Passed
80-1000, 1400-2700	Vertical	Left	No reactions recognized	Passed
80-1000, 1400-2700	Horizontal	Right	No reactions recognized	Passed
80-1000, 1400-2700	Vertical	Right	No reactions recognized	Passed

Note: Performance criteria A observed.

#### Test Procedure

The EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters. Both horizontal and vertical polarization of the antenna and four sides of the EUT are set on measurement.

In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

### 3.2.6. Immunity Test – Electrostatic Discharge

#### According to EMC basic standard (IEC 61000-4-2)

- Type of Port: Enclosure
- Performance Criterion: CT/CR  
For the table top EUT the distance to the reference ground plane should be 80cm.  
Direct contact discharge on conducting surfaces of EUT  
Indirect air discharge on insulating surfaces of EUT  
±2kV, ±4kV direct discharge & ±2kV, ±4kV, ±8kV air discharge
- Test Mode: On

#### Test Results

Item	Contact Discharge to conducted surfaces and to coupling planes		Air Discharge at insulating surfaces
	Direct Contact Discharge	Indirect Contact Discharge	
Test Voltage	Reaction of EUT / Result	Reaction of EUT / Result	Reaction of EUT / Result
+2kV	n.r.r. Passed	n.r.r. Passed	n.r.r. Passed
-2kV	n.r.r. Passed	n.r.r. Passed	n.r.r. Passed
+4kV	n.r.r. Passed	n.r.r. Passed	n.r.r. Passed
-4kV	n.r.r. Passed	n.r.r. Passed	n.r.r. Passed
+6kV	-	-	-
-6kV	-	-	-
+8kV	-	-	n.r.r. Passed
-8kV	-	-	n.r.r. Passed

Remarks: n.r.r. = no reaction recognized

Performance Criteria A observed and No any function degraded during the tests.

### 3.2.7. Immunity Test –Fast transients, common mode

#### Severity Levels and Performance Criterion (IEC 61000-4-4)

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 kV	0.25 kV
2.	1 kV	0.5 kV
3.	2 kV	1 kV
4.	4 kV	2 kV
X	Special	Special

Severity Level, Level 2: 1kV

Performance criterion: B

#### Test Procedure

The EUT is put on the table which is 0.8 meter high above the ground. 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.

#### Test Results

Passed.

### 3.2.8. Immunity Test –Radio frequency, common mode

#### According to EMC basic standard (IEC 61000-4-6)

The test method shall be in accordance with IEC 61000-4-6 [12].

The following requirements and evaluation of test results shall apply:

- the test level shall be severity level 2 as given in IEC 61000-4-6 [12] corresponding to 3 V rms unmodulated.

The test signal shall then be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 000 Hz.

If the wanted signal is modulated at 1 000 Hz, then the test signal of 400 Hz shall be used;

- the test shall be performed over the frequency range 150 kHz to 80 MHz with the exception of an exclusion band for transmitters, and for receivers and duplex transceivers, (see clause 4);
- for receivers and transmitters the stepped frequency increments shall be 1 % frequency increment of the momentary frequency in the frequency range 150 kHz to 80 MHz, unless specified otherwise in the part of EN 301 489 series [22] dealing with the particular type of radio equipment;
- the injection method to be used shall be selected according to the basic standard IEC 61000-4-6 [12];
- responses on receivers or receiver parts of transceivers occurring at discrete frequencies which are narrow band responses (spurious responses), are disregarded from the test, (see clause 4);
- the frequencies of the immunity test signal selected and used during the test shall be recorded in the test report.

#### Severity Levels and Performance Criterion

Level	Field Strength V(rms)
1.	1
2.	3
3.	10
X	Special

Performance criterion: A

#### Test Procedure

The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

#### Test Results

Passed.

### 3.2.9. Immunity Test – Voltage dips and interruptions

#### According to EMC basic standard (IEC 61000-4-11)

The following requirements and evaluation of test results shall apply.

The test method shall be in accordance with IEC 61000-4-11 [13].

The test levels shall be:

- a voltage dip corresponding to a reduction of the supply voltage of 30 % for 10 ms; and
- a voltage dip corresponding to a reduction of the supply voltage of 60 % for 100 ms; and
- a voltage interruption corresponding to a reduction of the supply voltage of greater than 95 % for 5 000 ms.

#### Severity Levels and Performance Criterion

Test Level %U <sub>T</sub>	Voltage dip and short interruptions %U <sub>T</sub>	Duration (in period)
0	100	0.5
40	60	1
70	30	5
		10
		25
		50
		*

Performance criterion: **B&C**

#### Test Results

Passed.

### 3.2.10. Immunity Test – Surges

#### According to EMC basic standard (IEC 61000-4-5)

The test method shall be in accordance with IEC 61000-4-5 [11].

The requirements and evaluation of test results given in clause 9.8.2.1 (telecommunication ports, outdoor cables),

clause 9.8.2.2 (telecommunication ports, indoor cables) and clause 9.8.2.3 (mains ports) shall apply, but no test shall be required where normal functioning cannot be achieved, because of the impact of the CDN on the EUT.

#### Severity Levels and Performance Criterion

Severity Level	Open-Circuit Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

Performance criterion: **B**

#### Test Results

Passed.

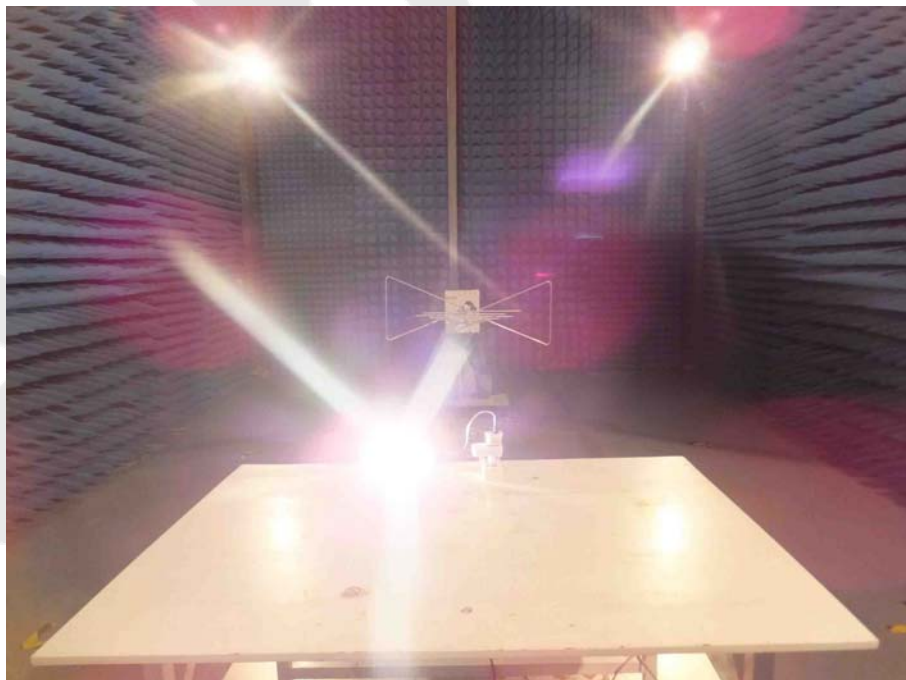


## APPENDIX I (TEST PHOTOGRAPHS)

### 1. Photo of Power Line Conducted Emission Test



### 2. Photo of Radiated Emission Test



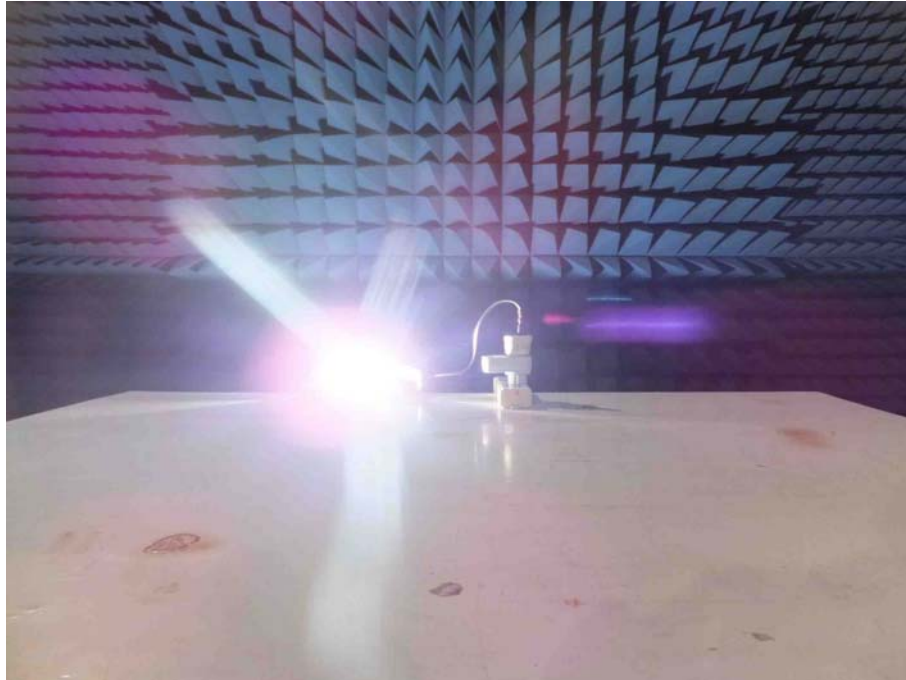
### 3. Photo of Flicker/ Harmonic Test



### 4. Photo of Electrostatic Discharge Test



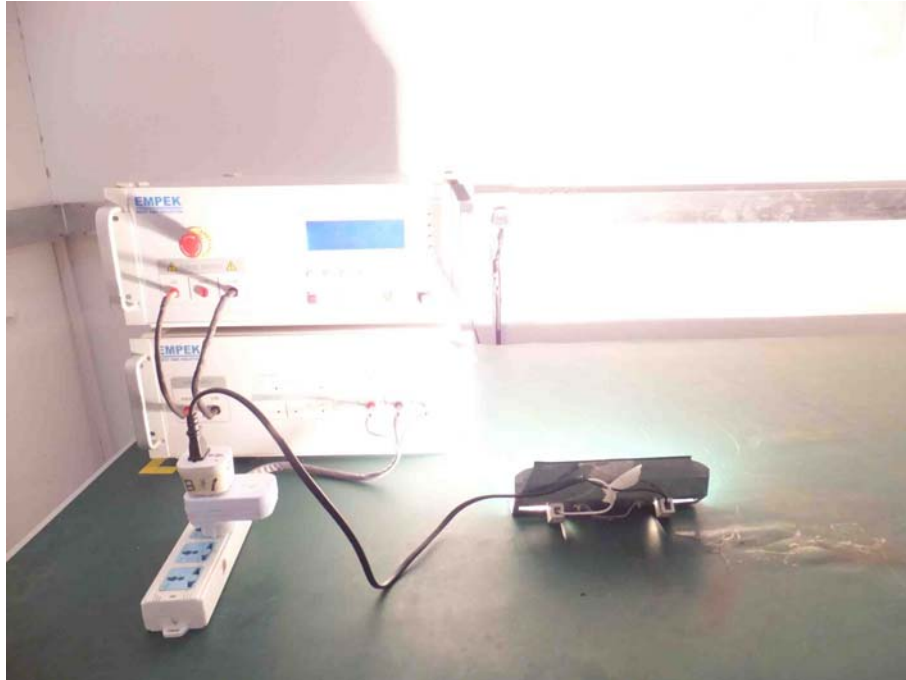
5. Photo of RF Field Strength Susceptibility Test



6. Photo of Electrical Fast Transient /Burst Immunity Test



### 7. Photo of Surge Test



### 8. Photo of Dips Immunity Test





9. Photo of C/S Test



## APPENDIX II (EXTERNAL PHOTOS)

Figure 1  
The EUT-Top View



Figure 2  
The EUT-Bottom View





Figure 3  
The EUT-Left View



Figure 4  
The EUT-Right View



Figure 5  
The EUT-Front View

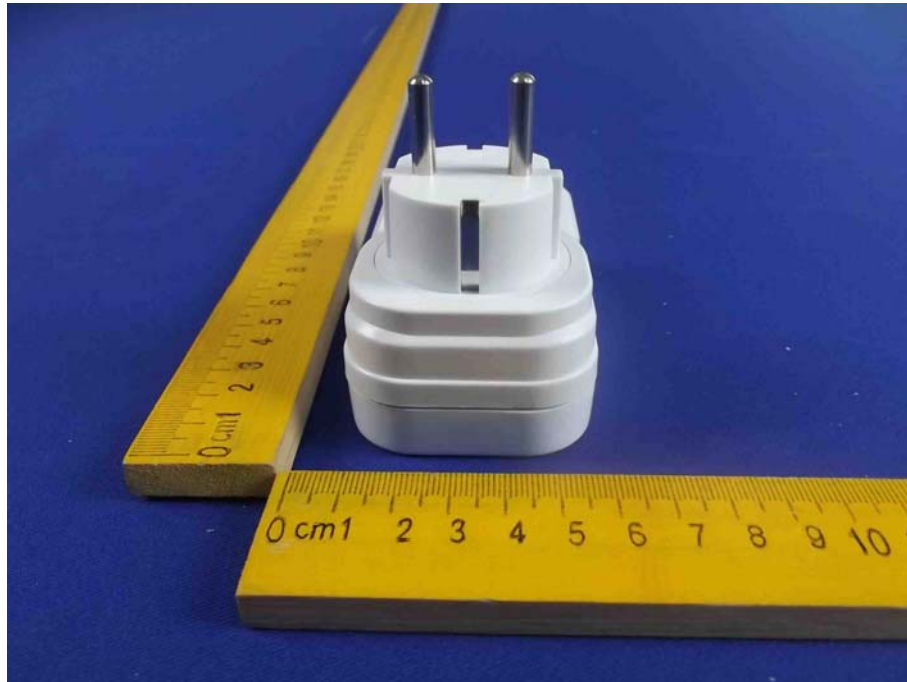
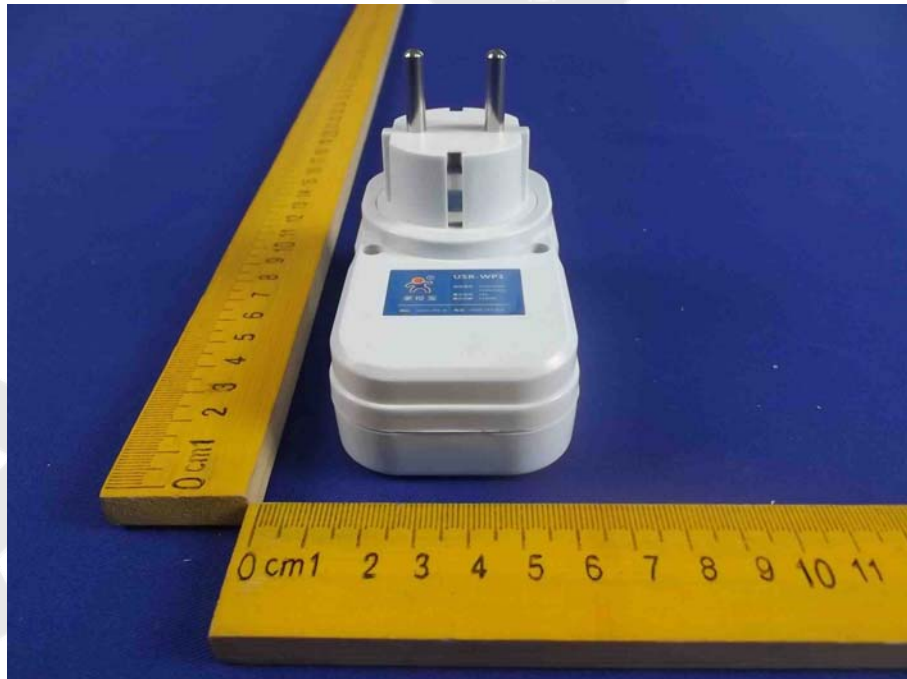


Figure 6  
The EUT-Back View



### APPENDIX III (INTERNALPHOTOS)

Figure 7  
The EUT-Inside View



Figure 8  
PCB of The EUT-Front View

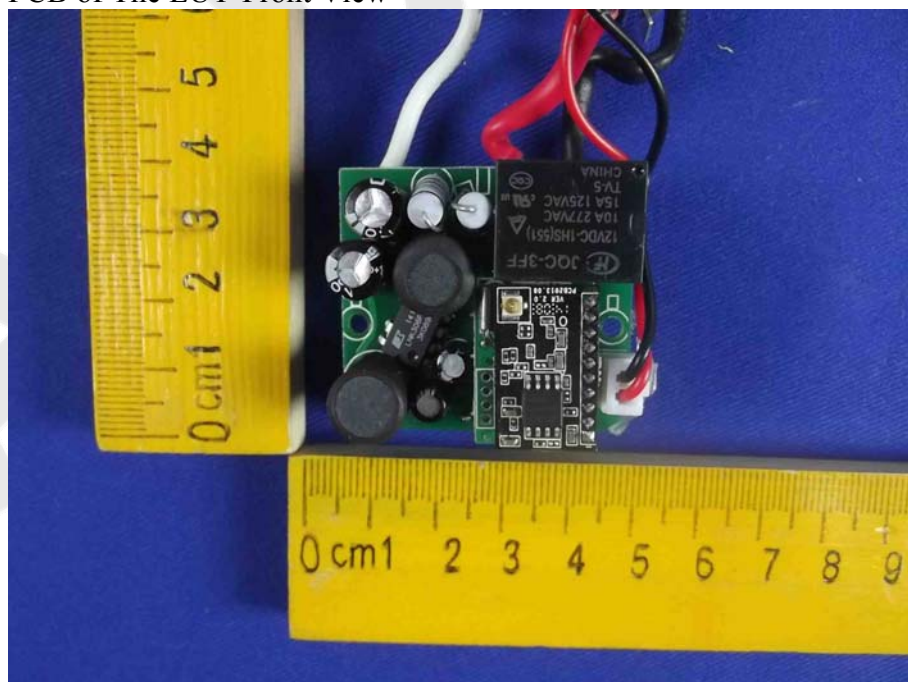




Figure 9  
PCB of The EUT-Front View

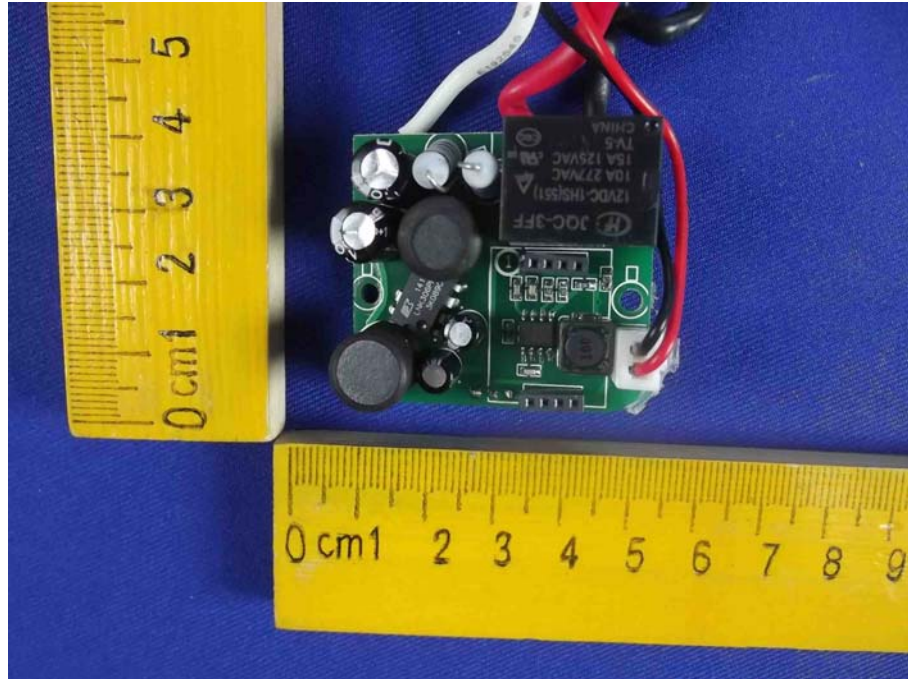


Figure 10  
PCB of The EUT-Back View

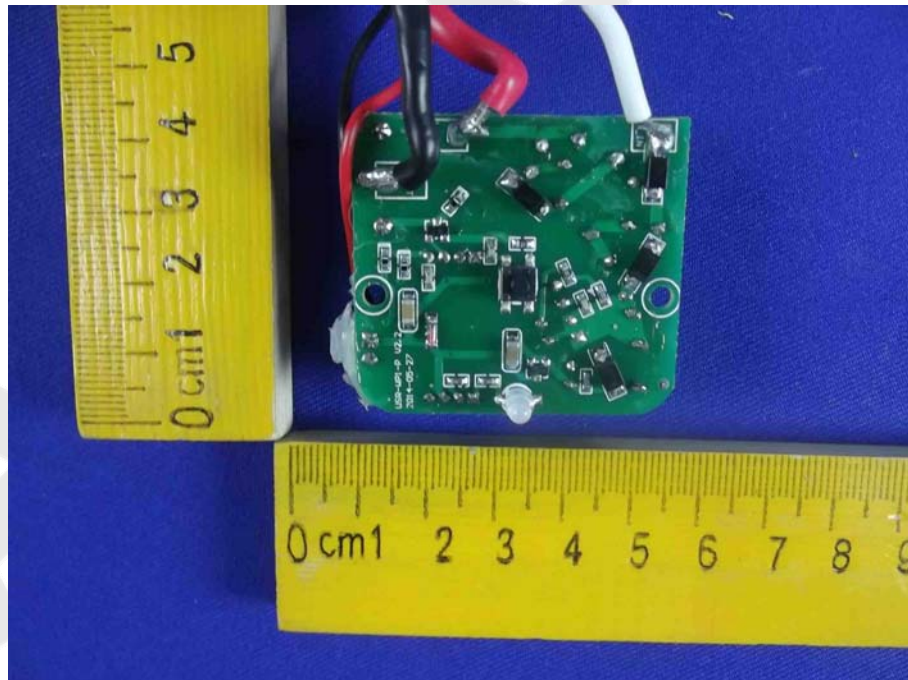


Figure 11  
PCB of The EUT-Front View



Figure 12  
PCB of The EUT-Back View

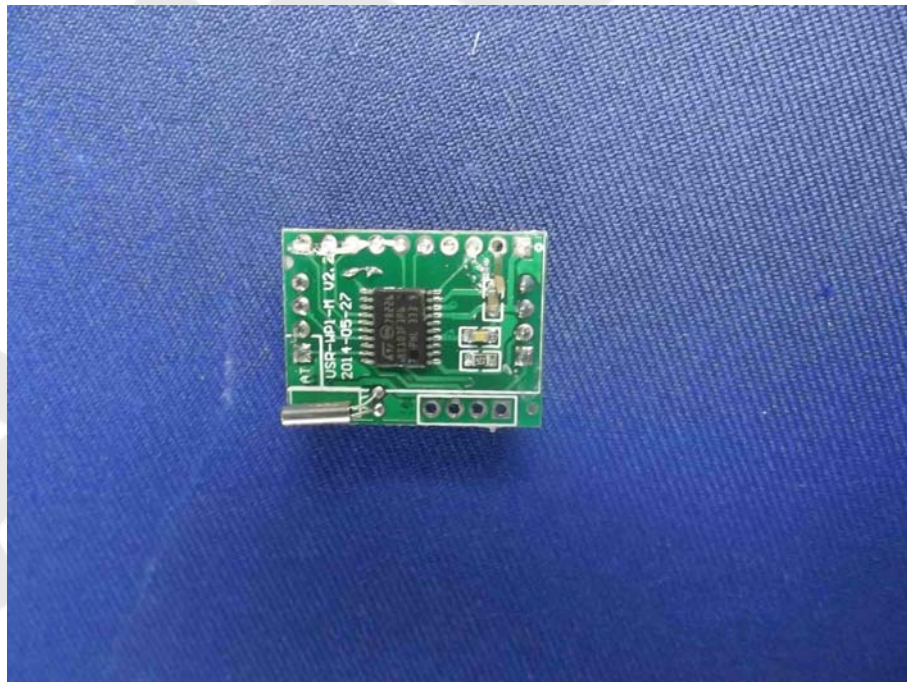




Figure 13  
PCB of The EUT-Front View



Figure 14  
PCB of The EUT-Back View

