



FCC PART 15 SUBPART B TEST REPORT

FCC PART 15 B

Report Reference No.....: TRE13010037 R/C:53635

FCC ID.....: N9STY-T2

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Wenliang Li

Date of issue.....: Mar 15, 2013

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

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

Applicant's name.....: TOYO ELECTRIC MFG. Co., LTD

Address: 9TH,FL 30 SEC 3 RENAI RD DAAN DISTRICT, TAIPEI 106
TAIWAN

Manufacturer's name: T&Y ELECTRIC(SHENZHEN)Co., LTD

Address: ANLIANG INDUSTRIAL ZONE, HENGGANG, LONGGANG
DISTRICT,GD,CHINA

Test specification:

Standard: FCC Part 15 B- Unintentional Radiators

TRF Originator.....: Shenzhen Huatongwei International Inspection CO., Ltd

Master TRF.....: Dated 2006-06

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Test item description: MAIN CONTROLLER

Trade Mark: /

Model/Type reference.....: TY-T2,TY-T1

Listed Models: /

Result.....: Positive

TEST REPORT

Test Report No. : TRE13010037	Mar 15, 2013 Date of issue
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Equipment under Test : MAIN CONTROLLER

Model /Type : TY-T2,TY-T1

Listed Models : /

Applicant : TOYO ELECTRIC MFG. Co., LTD

Address : 9TH,FL 30 SEC 3 RENAI RD DAAN DISTRICT, TAIPEI
106 TAIWAN

Manufacturer T&Y ELECTRIC(SHENZHEN)Co., LTD

Address ANLIANG INDUSTRIAL ZONE, HENGGANG,
LONGGANG DISTRICT,GD,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:

[FCC Rules Part 15 Subpart B - Unintentional 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 9kHz to 40GHz.

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Jan 08, 2013
Testing commenced on	:	Jan 10, 2013
Testing concluded on	:	Mar 15, 2013

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input checked="" 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)	

AC 120V/60Hz

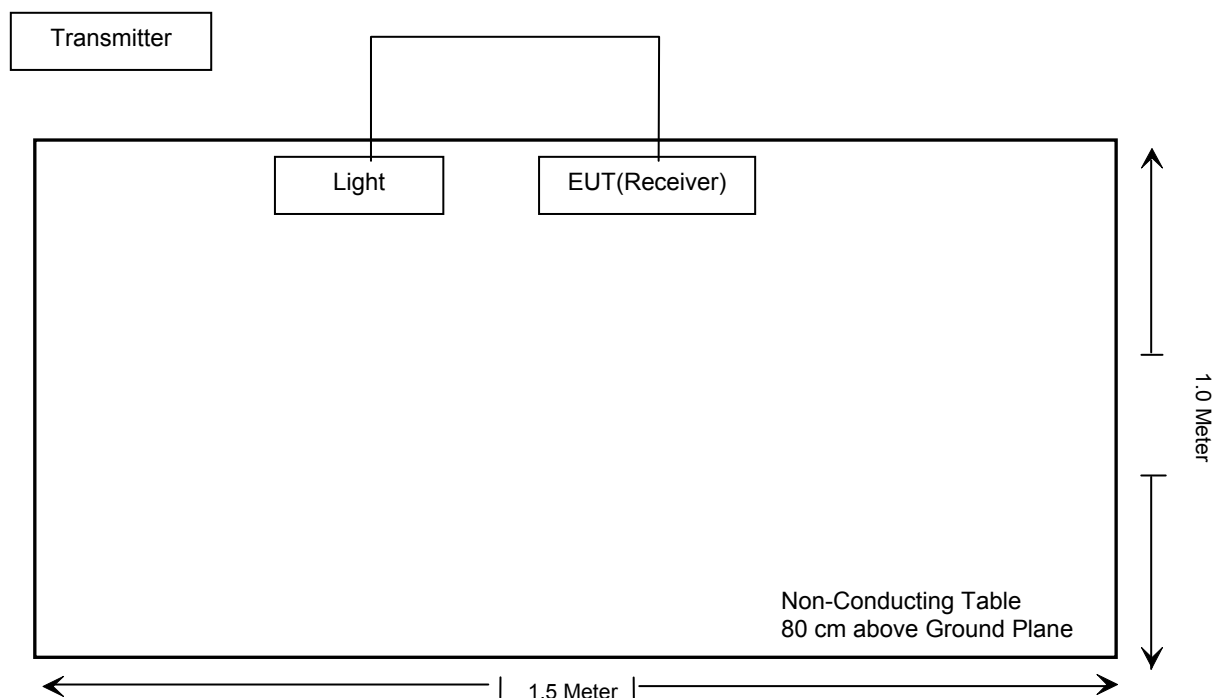
2.3. Short description of the Equipment under Test (EUT)

The EUT is a MAIN CONTROLLER, the Sample models are as follow:

Serial number: Prototype

2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- - supplied by the lab

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
TOYO	REMOTE TRANSMITTER	TY-R-433	N/A	N9STY-R-433

2.6. EUT operation mode

The EUT has been tested under typical operating condition.

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

This submittal(s) (test report) is intended for FCC ID:**N9STY-T2** filing to comply with the FCC Part 15, Subpart B Rules.

2.8. Modifications

No modifications were implemented to meet testing criteria.

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 (2009) 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. 01, 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 Jun. 01, 2012, valid time is until Jun. 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, 2012. Valid time is until Dec. 19, 2015.

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	30~1000MHz	4.65 dB	(1)
Radiated Emission	1~18GHz	5.16 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

AC Power Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI	100106	2012/10/27
2	ARTIFICIAL MAINS	ROHDE & SCHWARZ	ESH2-Z5	100028	2012/10/27
3	PULSE LIMITER	ROHDE & SCHWARZ	ESHSZ2	100044	2012/10/27
4	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ES-K1 1.71	N/A	2012/10/27

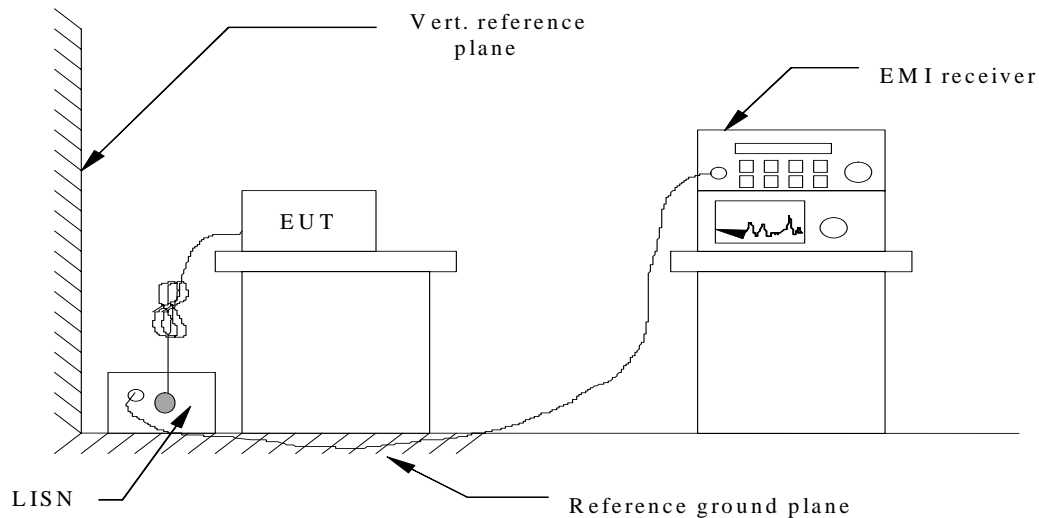
Radiated Emission& Spurious Emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	2012/10/27
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2012/10/27
3	RF TEST PANEL	Rohde&Schwarz	TS / RSP	335015/ 0017	2012/10/27
4	TURNTABLE	ETS	2088	2149	2012/10/27
5	ANTENNA MAST	ETS	2075	2346	2012/10/27
6	EMI TEST SOFTWARE	Rohde&Schwarz	ESK1	N/A	2012/10/27
7	HORN ANTENNA	Rohde&Schwarz	HF906	100039	2012/10/27
8	Amplifer	Sonoma	310N	E009-13	2012/10/27
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2012/10/27
10	High pass filter	Compliance Direction systems	BSU-6	34202	2012/10/27
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	470	2012/10/27
12	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	539	2012/10/27
13	HORN ANTENNA	ShwarzBeck	9120D	1011	2012/10/27
14	TURNTABLE	MATURO	TT2.0	----	2012/10/27
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	2012/10/27

The Calibration Interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

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 the 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 :

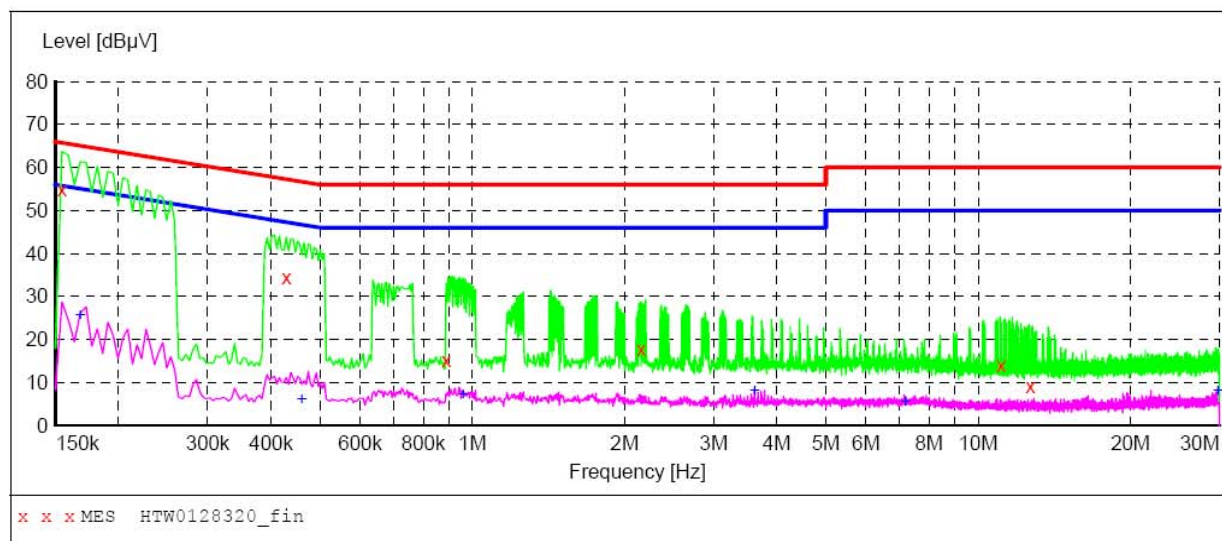
Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

TEST RESULTS**SCAN TABLE: "Voltage (9K-30M) FIN"**

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "HTW0128320_fin"**

1/28/2013 11:59AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.154500	54.80	10.2	66	11.0	QP	N	GND
0.429000	34.50	10.2	57	22.8	QP	N	GND
0.888000	15.20	10.2	56	40.8	QP	N	GND
2.157000	17.80	10.4	56	38.2	QP	N	GND
11.098500	13.90	10.6	60	46.1	QP	N	GND
12.664500	9.10	10.6	60	50.9	QP	N	GND

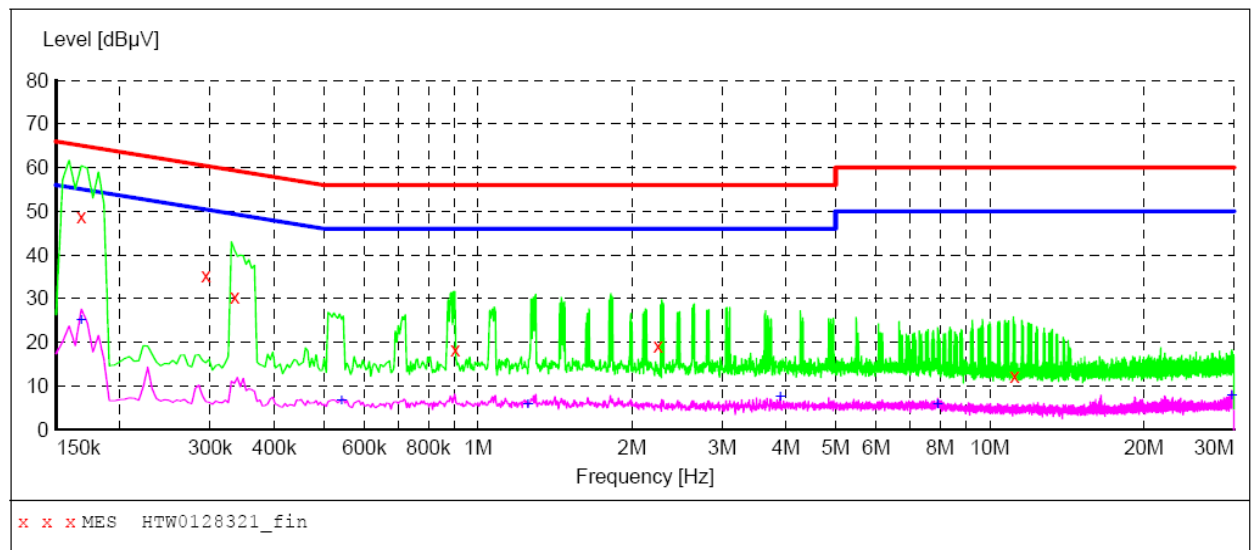
MEASUREMENT RESULT: "HTW0128320_fin2"

1/28/2013 11:59AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.168000	25.60	10.2	55	29.5	AV	N	GND
0.460500	5.90	10.2	47	40.8	AV	N	GND
0.960000	7.20	10.3	46	38.8	AV	N	GND
3.615000	8.10	10.4	46	37.9	AV	N	GND
7.179000	5.40	10.4	50	44.6	AV	N	GND
29.827500	8.00	11.3	50	42.0	AV	N	GND

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "HTW0128321_fin"**

1/28/2013 12:02PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.168000	48.90	10.2	65	16.2	QP	L1	GND
0.294000	35.20	10.2	60	25.2	QP	L1	GND
0.334500	30.30	10.2	59	29.0	QP	L1	GND
0.901500	18.20	10.2	56	37.8	QP	L1	GND
2.247000	19.20	10.4	56	36.8	QP	L1	GND
11.175000	12.40	10.6	60	47.6	QP	L1	GND

MEASUREMENT RESULT: "HTW0128321_fin2"

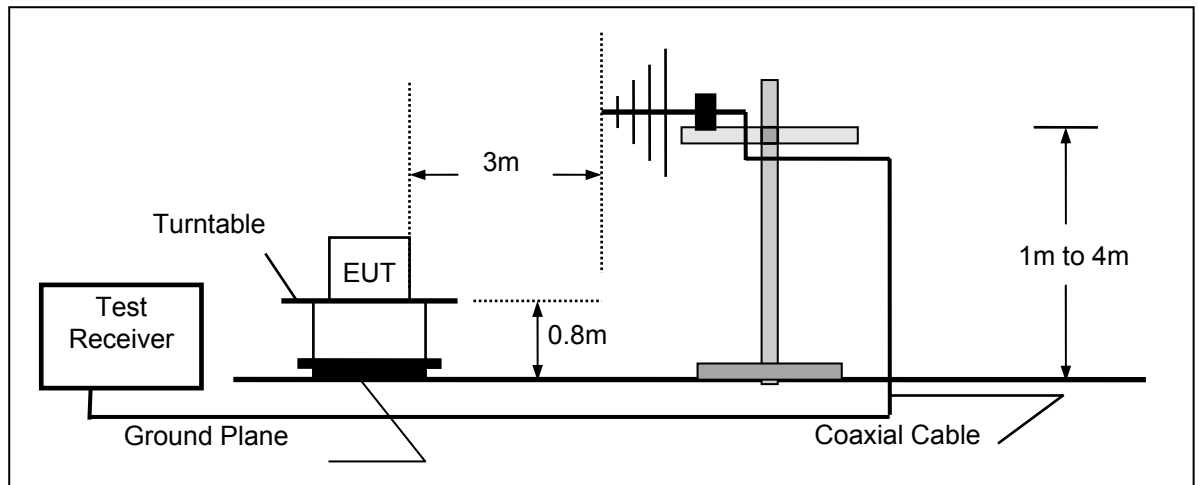
1/28/2013 12:02PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.168000	25.00	10.2	55	30.1	AV	L1	GND
0.541500	6.60	10.2	46	39.4	AV	L1	GND
1.252500	5.80	10.3	46	40.2	AV	L1	GND
3.898500	7.30	10.4	46	38.7	AV	L1	GND
7.917000	5.70	10.5	50	44.3	AV	L1	GND
29.715000	7.80	11.3	50	42.2	AV	L1	GND

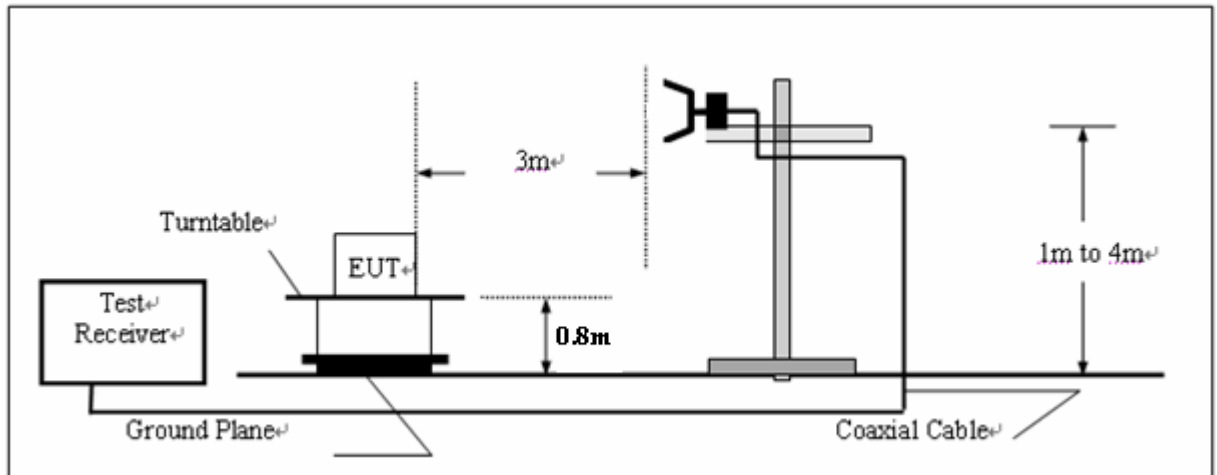
4.2. Radiated Emission Test

TEST CONFIGURATION

(A) Radiated Emission Test Set-Up, Frequency below 1000MHz



(B) Radiated Emission Test Set-Up, Frequency above 1000MHz



TEST PROCEDURE

- 1 The EUT was placed on a turn table which is 0.8m above ground plane.
- 2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

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:

$$FS = RA + AF + CL - AG$$

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

RADIATION LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
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 above table.

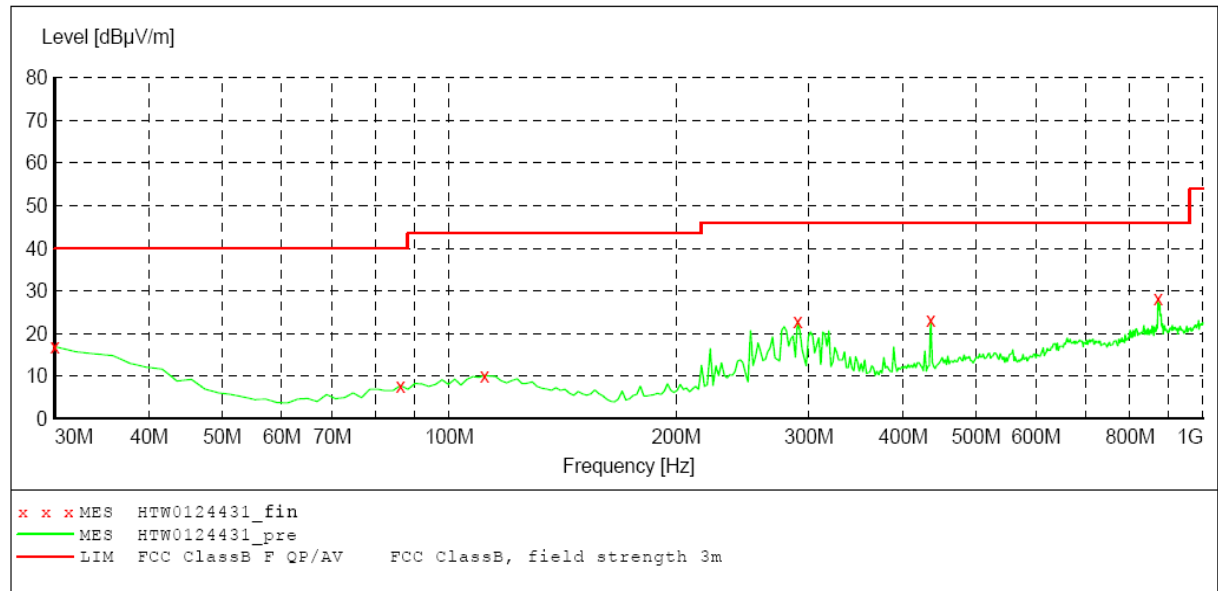
Test Procedure

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.
7. the highest crystal frequency is 433.9MHz So the radiation emissions frequency range were tested from 30MHz to 5GHz.

TEST RESULTS

Radiated emission (below 1G)**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	120 kHz	HL562

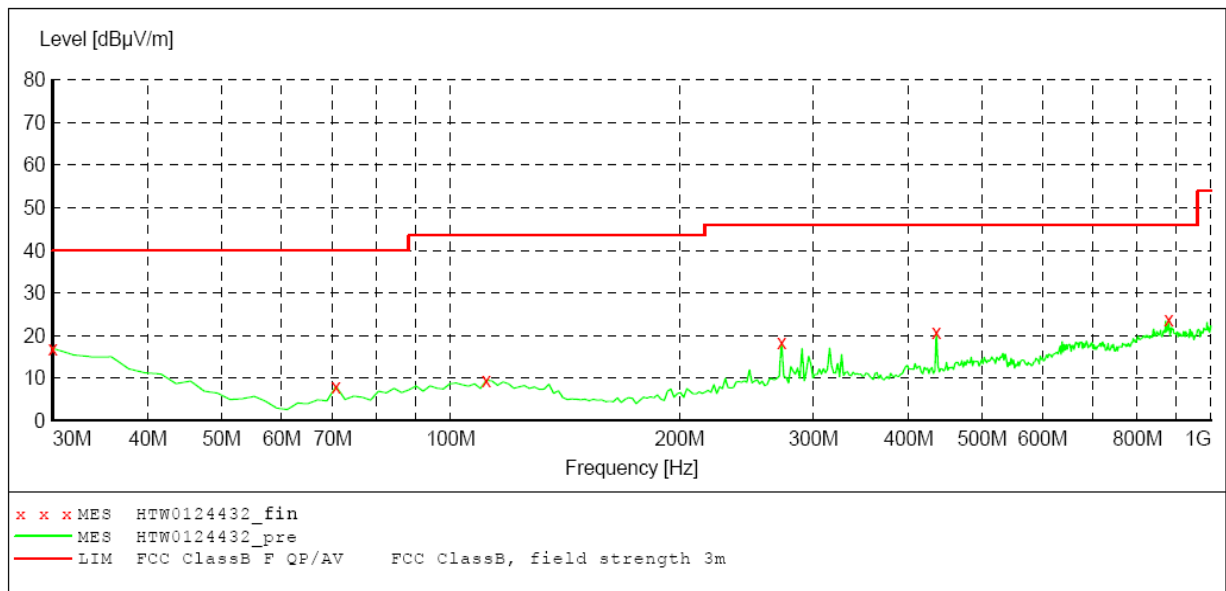
**MEASUREMENT RESULT: "HTW0124431_fin"**

1/24/2013 7:17PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	17.00	-11.1	40.0	23.0	QP	300.0	-186.00	HORIZONTAL
86.260000	7.80	-20.9	40.0	32.2	QP	100.0	-9.00	HORIZONTAL
111.480000	10.20	-19.5	43.5	33.3	QP	300.0	-357.00	HORIZONTAL
289.960000	22.90	-17.7	46.0	23.1	QP	100.0	-126.00	HORIZONTAL
435.460000	23.30	-15.6	46.0	22.7	QP	100.0	-289.00	HORIZONTAL
871.960000	28.20	-6.9	46.0	17.8	QP	100.0	-126.00	HORIZONTAL

SWEEP TABLE: "test (30M-1G) "

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	120 kHz	HL562

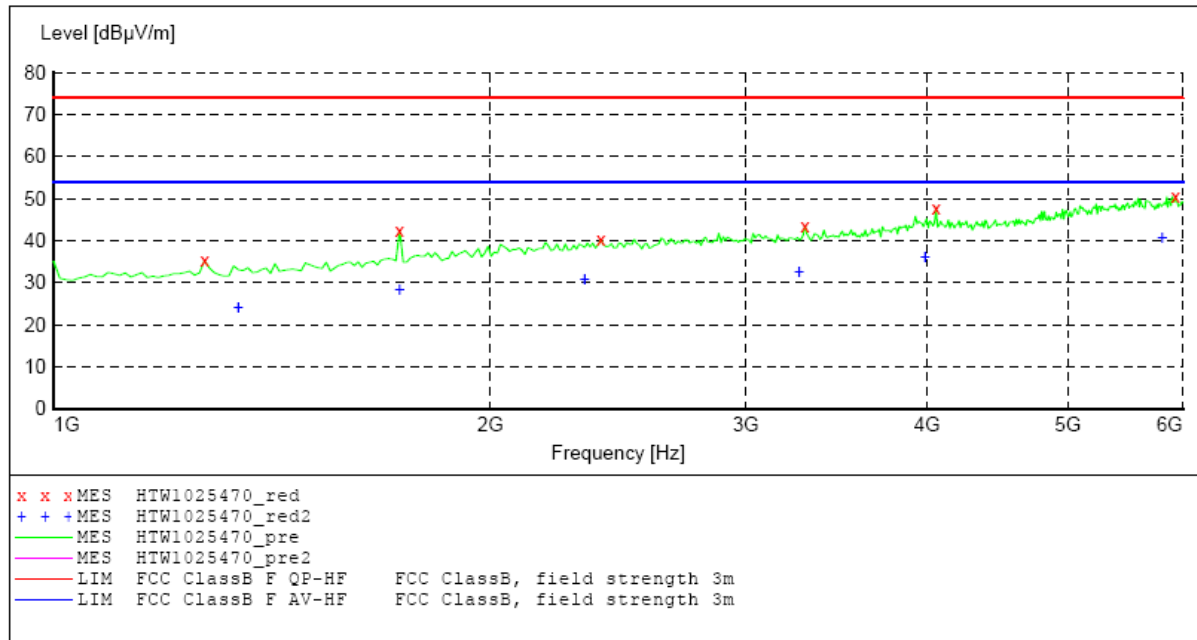
***MEASUREMENT RESULT: "HTW0124432_fin"***

1/24/2013 7:19PM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	17.00	-11.1	40.0	23.0	QP	100.0	-85.00	VERTICAL
70.740000	8.10	-23.1	40.0	31.9	QP	100.0	-70.00	VERTICAL
111.480000	9.50	-19.5	43.5	34.0	QP	100.0	-243.00	VERTICAL
272.500000	18.50	-18.1	46.0	27.5	QP	100.0	-20.00	VERTICAL
435.460000	20.90	-15.6	46.0	25.1	QP	100.0	-47.00	VERTICAL
879.720000	23.80	-7.0	46.0	22.2	QP	100.0	-79.00	VERTICAL

Radiated emission (above 1G)**SWEEP TABLE: "test (1G-18G) P"**

Short Description: EN 55022 Field Strength
 Start Stop Detector Meas. IF Transducer
 Frequency Frequency Time Bandw.
 1.0 GHz 6.0 GHz MaxPeak Coupled 1 MHz HF906
 Average

**MEASUREMENT RESULT: "HTW1025470_red"**

02/15/2013 6:32PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
1270.541082	35.30	-11.0	74.0	38.7	PK	100.0	205.00	HORIZONTAL
1731.462926	42.50	-8.3	74.0	31.5	PK	100.0	271.00	HORIZONTAL
2382.765531	40.20	-5.0	74.0	33.8	PK	100.0	241.00	HORIZONTAL
3294.589178	43.60	-2.8	74.0	30.4	PK	100.0	331.00	HORIZONTAL
4056.112224	47.90	-0.4	74.0	26.1	PK	100.0	331.00	HORIZONTAL
5929.859719	50.70	2.6	74.0	23.3	PK	100.0	342.00	HORIZONTAL

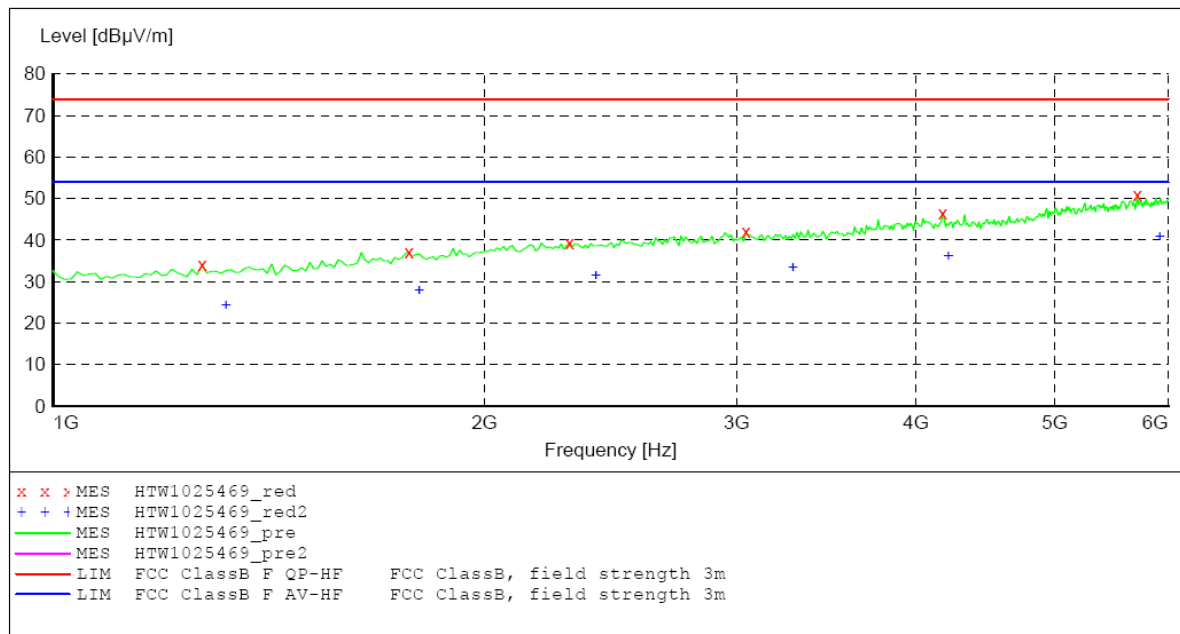
MEASUREMENT RESULT: "HTW1025470_red2"

02/15/2013 6:32PM

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
1340.681363	24.10	-10.7	54.0	29.9	AV	100.0	277.00	HORIZONTAL
1731.462926	28.40	-8.3	54.0	25.6	AV	100.0	271.00	HORIZONTAL
2322.645291	30.80	-5.3	54.0	23.2	AV	100.0	224.00	HORIZONTAL
3264.529058	32.50	-2.9	54.0	21.5	AV	100.0	99.00	HORIZONTAL
3985.971944	36.10	-0.4	54.0	17.9	AV	100.0	247.00	HORIZONTAL
5809.619238	40.70	2.5	54.0	13.3	AV	100.0	45.00	HORIZONTAL

SWEEP TABLE: "test (1G-18G) P"

Short Description: EN 55022 Field Strength
 Start Stop Detector Meas. IF Transducer
 Frequency Frequency Time Bandw.
 1.0 GHz 6.0 GHz MaxPeak Coupled 1 M HF906
 Average

***MEASUREMENT RESULT: "HTW1025469_red"***

02/15/2013 6:30PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
1270.541082	34.00	-11.0	74.0	40.0	PK	100.0	331.00	VERTICAL
1771.543086	37.10	-8.1	74.0	36.9	PK	100.0	272.00	VERTICAL
2292.585170	39.30	-5.4	74.0	34.7	PK	100.0	290.00	VERTICAL
3044.088176	42.00	-3.2	74.0	32.0	PK	100.0	111.00	VERTICAL
4176.352705	46.50	-0.5	74.0	27.5	PK	100.0	248.00	VERTICAL
5709.418838	51.00	2.4	74.0	23.0	PK	100.0	349.00	VERTICAL

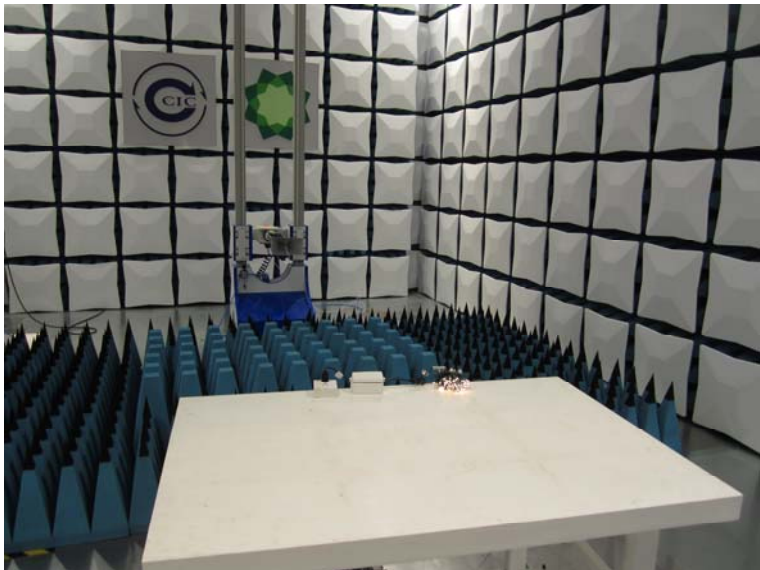
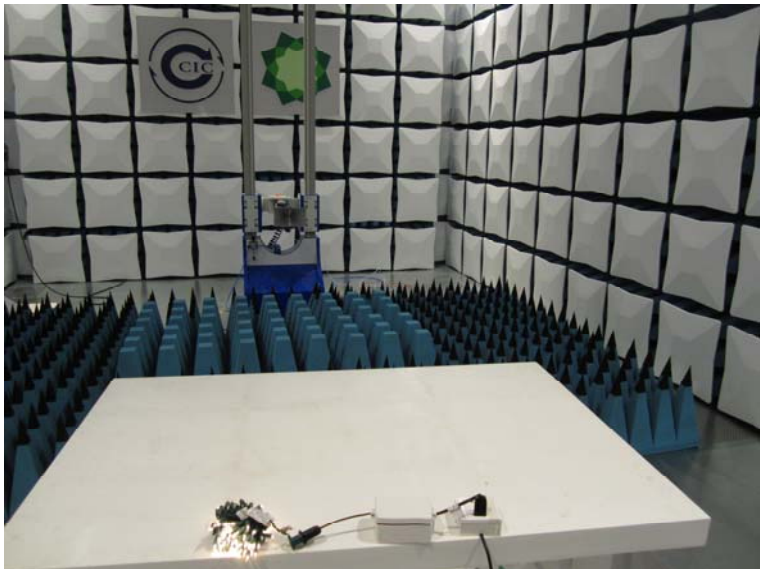
MEASUREMENT RESULT: "HTW1025469_red2"

02/15/2013 6:30PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
1320.641283	24.20	-10.8	54.0	29.8	AV	100.0	129.00	VERTICAL
1801.603206	27.90	-7.9	54.0	26.1	AV	100.0	177.00	VERTICAL
2392.785571	31.30	-5.0	54.0	22.7	AV	100.0	356.00	VERTICAL
3284.569138	33.20	-2.8	54.0	20.8	AV	100.0	129.00	VERTICAL
4216.432866	36.00	-0.5	54.0	18.0	AV	100.0	266.00	VERTICAL
5929.859719	41.30	2.6	54.0	12.7	AV	100.0	69.00	VERTICAL

5. Test Setup Photos of the EUT



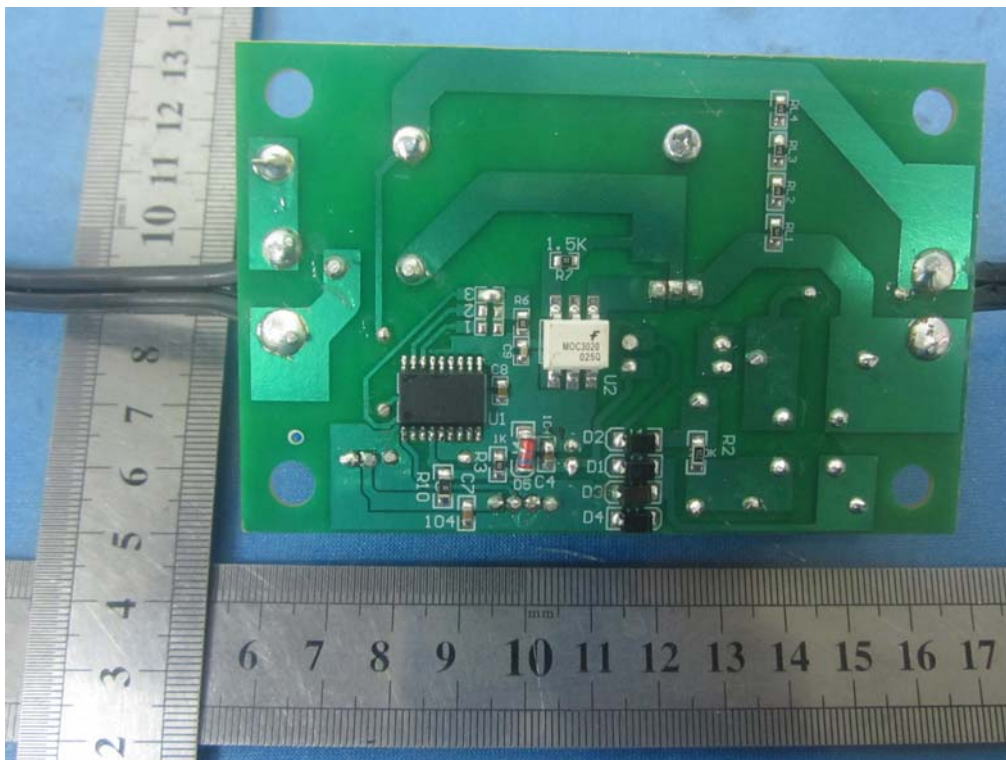
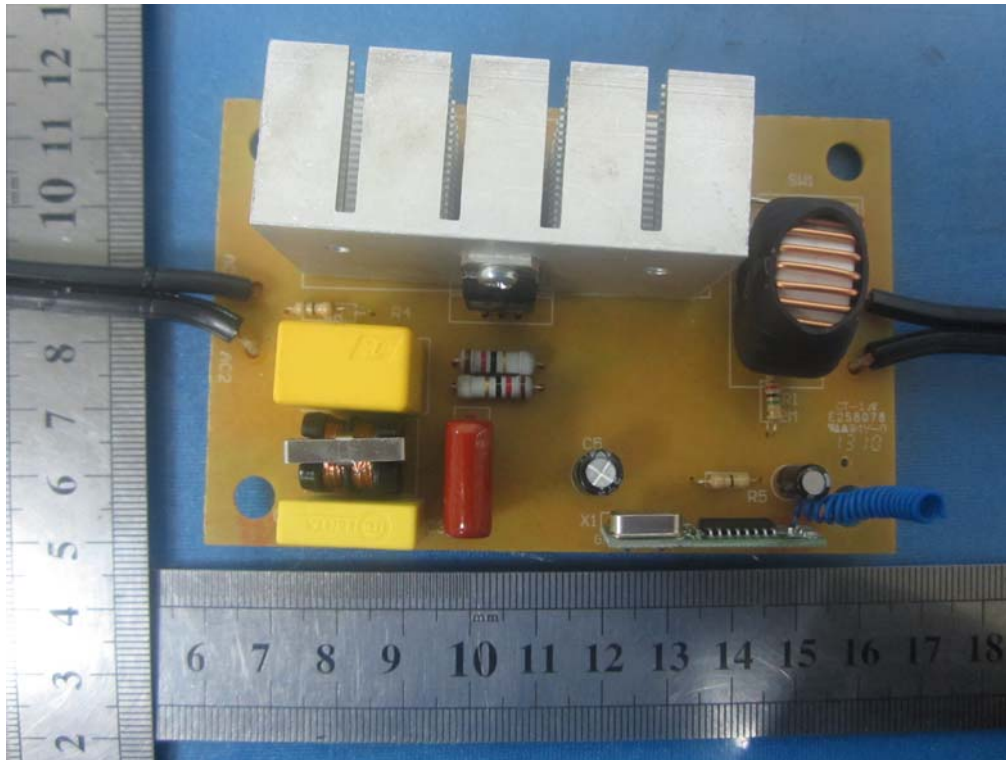


6. External and Internal Photos of the EUT

External Photos





Internal Photos

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