# RF TEST REPORT

SIEMIC
GLOBAL TESTING & CERTIFICATIONS
YOUR CHOICE FOR- TCB FCB CB NB CAB RCB

**Report No.:** 15050023-FCC-R1

| | |
|---|---|
| Applicant | Fenghua Tiancheng Plastic Electronics Co.,Ltd |
| Product Name | INTELLIGENT CONTROLLER |
| Model No. | CRZ-16X0/CRZ-12X4 |
| Test Standard | FCC Part 15.249: 2014; C63.10: 2013 |
| Test Date | July 06 to July 13, 2015 |
| Issue Date | July 14, 2015 |
| Test Result | ☑ Pass ☐ Fail |
| **Equipment complied with the specification** | ☑ |
| **Equipment did not comply with the specification** | ☐ |

| | | |
|---|---|---|
| Winnie Zhang | David Huang | |
| **Winnie Zhang**<br>**Test Engineer** | **David Huang**<br>**Checked By** | |

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**Test result presented in this test report is applicable to the tested sample only**


**Issued by:**

**SIEMIC (SHENZHEN-CHINA) LABORATORIES**

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: China@siemic.com.cn

# Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.


In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

## Accreditations for Conformity Assessment

| Country/Region | Scope |
| --- | --- |
| USA | EMC, RF/Wireless, SAR, Telecom |
| Canada | EMC, RF/Wireless, SAR, Telecom |
| Taiwan | EMC, RF, Telecom, SAR, Safety |
| Hong Kong | RF/Wireless, SAR, Telecom |
| Australia | EMC, RF, Telecom, SAR, Safety |
| Korea | EMI, EMS, RF, SAR, Telecom, Safety |
| Japan | EMI, RF/Wireless, SAR, Telecom |
| Singapore | EMC, RF, SAR, Telecom |
| Europe | EMC, RF, SAR, Telecom, Safety |

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# CONTENTS

# 1. Report Revision History

| Report No. | Report Version | Description | Issue Date |
|---|---|---|---|
| 15050023-FCC-R1 | NONE | Original | July 14, 2015 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# 2. Customer information

| | |
|---|---|
| Applicant Name | Fenghua Tiancheng Plastic Electronics Co.,Ltd |
| Applicant Add | No.66 Dongfeng Road Fenghua Zhejiang China |
| Manufacturer | Fenghua Tiancheng Plastic Electronics Co.,Ltd |
| Manufacturer Add | No.66 Dongfeng Road Fenghua Zhejiang China |

# 3. Test site information

| | |
|---|---|
| Lab performing tests | SIEMIC (Shenzhen-China) LABORATORIES |
| Lab Address | Zone A, Floor 1, Building 2 Wan Ye Long Technology Park<br>South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong<br>China 518108 |
| FCC Test Site No. | 718246 |
| IC Test Site No. | 4842E-1 |
| Test Software | Radiated Emission Program-To Shenzhen v2.0 |

# 4. Equipment under Test (EUT) Information

| | |
|---|---|
| Description of EUT: | INTELLIGENT CONTROLLER |
| Main Model: | CRZ-16X0/CRZ-12X4 |
| Serial Model: | N/A |
| Date EUT received: | July 02, 2015 |
| Test Date(s): | July 06 to July 13, 2015 |
| Antenna Gain: | WIFI: -0.5 dBi<br>15.249: 4.5 dBi |
| Input Power: | AC 120V 60Hz |
| Trade Name : | CRZ |
| FCC ID: | 2AENLCRZ |

Port: Power Port,

Equipment Category： DXT

Type of Modulation: 802.11b/g/n: DSSS, OFDM
15.249: DSSS

RF Operating Frequency (ies): WIFI:802.11b/g/n(20M): 2412-2462 MHz
WIFI:802.11n(40M): 2422-2452 MHz
15.249: 1 Channel

| Revision Number | Model | Report Number | Description of Revision | Date of Revision |
|---|---|---|---|---|
| 0 | CRZ-8X8 | 15050006-FCC-R1 | Original Report | 4th June, 2015 |
| 1 | CRZ-12X4, CRZ-16X0 | 15050023-FCC-R1 | C2PC Report | 14th July, 2015 |

These three models CRZ-8X8, CRZ-12X4, CRZ-16X0 have the same constructions, only the relay board is different .Because the 120V socket uses 1 relay and 240V socket uses 2 relays, so the RELAY board circuit diagram and PCB layout are different, but the basic principle is the same. This test (Radiated Spurious Emissions Bands below 1GHz) shall be performed against due to the above difference. The difference among them was explained in the declaration letter.

# 5. Tes Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

| FCC Rules | Description of Test | Result |
|---|---|---|
| §15.203 | Antenna Requirement | N/A |
| §15.207(a) | AC Line Conducted Emissions | N/A |
| §15.205, §15.209, §15.249(a), §15.249(d) | Radiated Fundamental / Radiated Spurious Emissions | Compliance |
| §15.249(a) | Field Strength Measurement | N/A |
| §15.249© | 20 dB Bandwidth | N/A |
| §15.249(d) | Band Edge | N/A |

**Measurement Uncertainty**

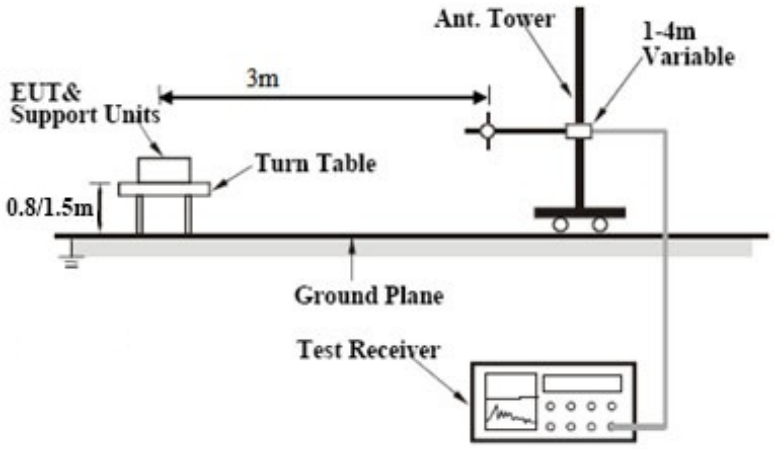
| Emissions | | |
|---|---|---|
| **Test Item** | **Description** | **Uncertainty** |
| Band Edge and Radiated Spurious Emissions | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | +5.6dB/-4.5dB |
| - | - | - |

# 6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

## 6.1 Radiated Spurious Emissions

| | |
|---|---|
| Temperature | 22oC |
| Relative Humidity | 55% |
| Atmospheric Pressure | 1013mbar |
| Test date : | July 13, 2015 |
| Tested By : | Winnie Zhang |

**Requirement(s):**

<table>
<tr><th>Spec</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§15.209, §15.205, §15.249(a) & §15.249(d)</td><td>The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.<br>The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:
<table>
<tr><th>Fundamental frequency</th><th>Field strength of fundamental (millivolts/meter)</th><th>Field strength of harmonics (microvolts/meter)</th></tr>
<tr><td>902– 928 MHz</td><td>50</td><td>500</td></tr>
<tr><td>2400– 2483.5 MHz</td><td>50</td><td>500</td></tr>
<tr><td>5725– 5875 MHz</td><td>50</td><td>500</td></tr>
<tr><td>24.0– 24.25 GHz</td><td>250</td><td>2500</td></tr>
</table></td><td>☑</td></tr>
<tr><td>Test Setup</td><td colspan="2"> 
</td></tr>
<tr><td>Procedure</td><td colspan="2">- Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function</td></tr>
</table>

| | |
|---|---|
| | - For emission frequencies measured below 1GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1GHZ, a pre-scan also be performed with a meter measuring distance before final test.<br>- For emission frequencies measured below and above 1GHz, set the spectrum analyzer on a 100kHz and 1MHz resolution bandwidth respectively for each frequency measured in step 2.<br>- The search antenna is to be raised and lowered over a range from 1 to 4m in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, the change the orientation of EUT on the test table over a range from 0 to 360°. With a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.<br>- Repeat step 4 until all frequencies need to be measured was complete.<br>- Repeat step5 with search antenna in vertical polarized orientations. |
| Remark | |
| Result | ☑ Pass ☐ Fail |

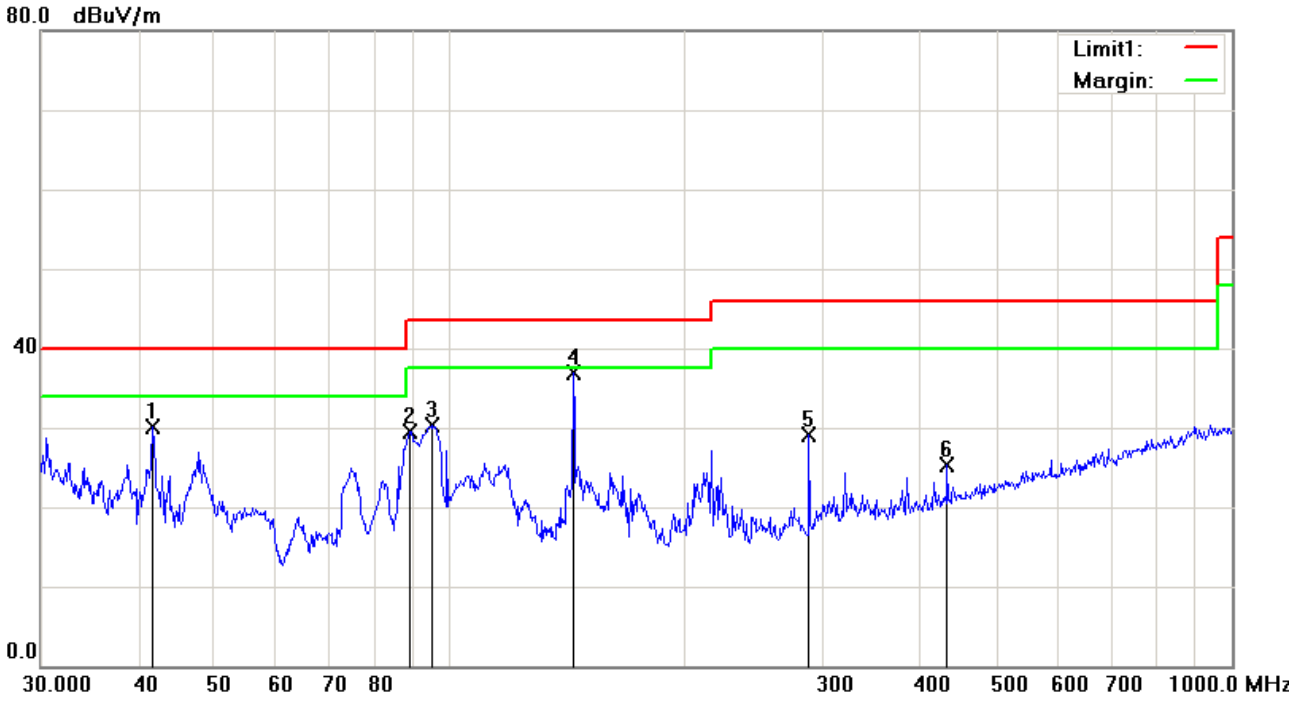
**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☑ Yes (See below) ☐ N/A

Model: CRZ-16X0

| Test Mode: | Transmitting Mode |
|---|---|

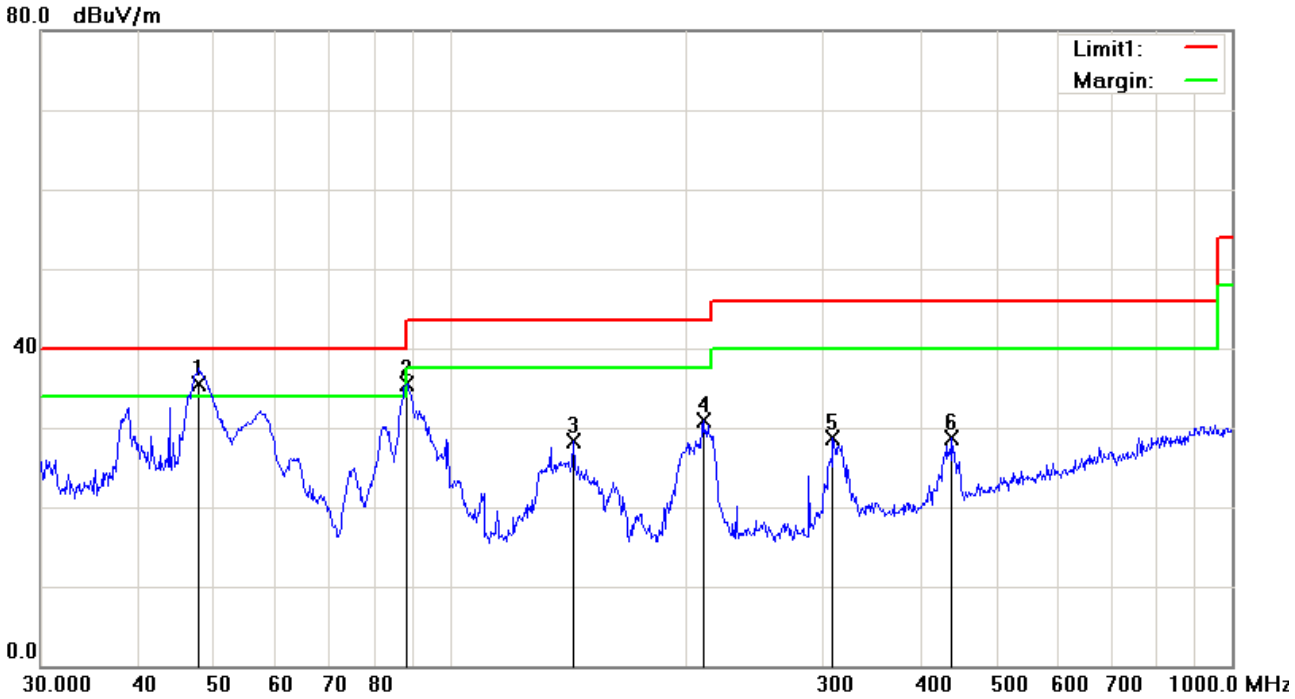
(Below 1GHz)




*Test Data*

Horizontal Polarity Plot @3m

| No. | P/L | Frequency (MHz) | Reading (dBμV/m) | Detector | Corrected (dB/m) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Degree (°) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | H | 41.7130 | 38.77 | peak | -8.73 | 30.04 | 40.00 | -9.96 | 100 | 217 |
| 2 | H | 88.9639 | 42.95 | peak | -13.40 | 29.55 | 43.50 | -13.95 | 200 | 177 |
| 3 | H | 95.0930 | 42.39 | peak | -12.11 | 30.28 | 43.50 | -13.22 | 200 | 195 |
| 4 | H | 143.8295 | 45.31 | peak | -8.48 | 36.83 | 43.50 | -6.67 | 200 | 82 |
| 5 | H | 287.9904 | 36.49 | peak | -7.45 | 29.04 | 46.00 | -16.96 | 100 | 194 |
| 6 | H | 432.5457 | 28.87 | peak | -3.50 | 25.37 | 46.00 | -20.63 | 100 | 330 |




*Test Data*

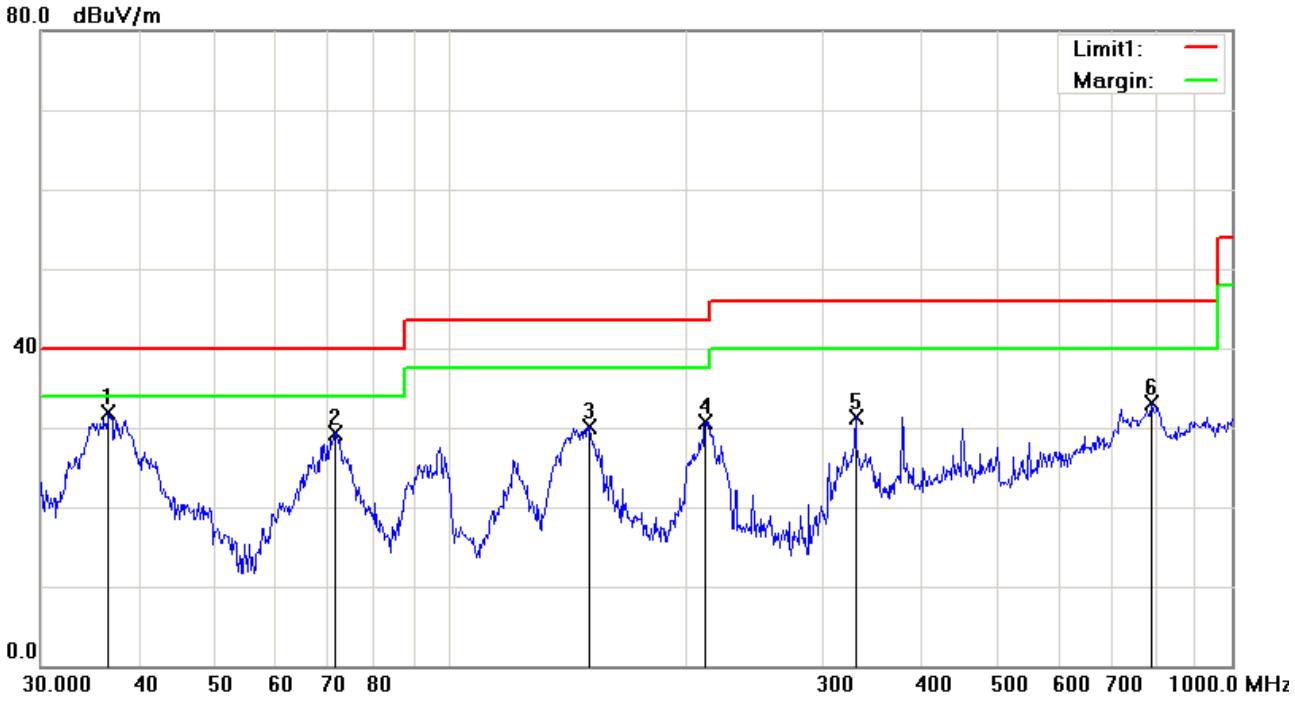
Vertical Polarity Plot @3m

| No. | P/L | Frequency (MHz) | Reading (dBµV/m) | Detector | Corrected (dB/m) | Result (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Height (cm) | Degree (°) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | V | 47.8260 | 47.64 | QP | -12.20 | 35.44 | 40.00 | -4.56 | 100 | 100 |
| 2 | V | 88.0329 | 48.91 | peak | -13.42 | 35.49 | 43.50 | -8.01 | 100 | 10 |
| 3 | V | 143.8295 | 36.75 | peak | -8.48 | 28.27 | 43.50 | -15.23 | 200 | 250 |
| 4 | V | 210.7860 | 39.74 | peak | -8.84 | 30.90 | 43.50 | -12.60 | 200 | 50 |
| 5 | V | 308.9126 | 35.30 | peak | -6.65 | 28.65 | 46.00 | -17.35 | 200 | 240 |
| 6 | V | 438.6554 | 32.11 | peak | -3.36 | 28.75 | 46.00 | -17.25 | 100 | 200 |

Model: CRZ-12X4

| Test Mode: | Transmitting Mode |
|---|---|

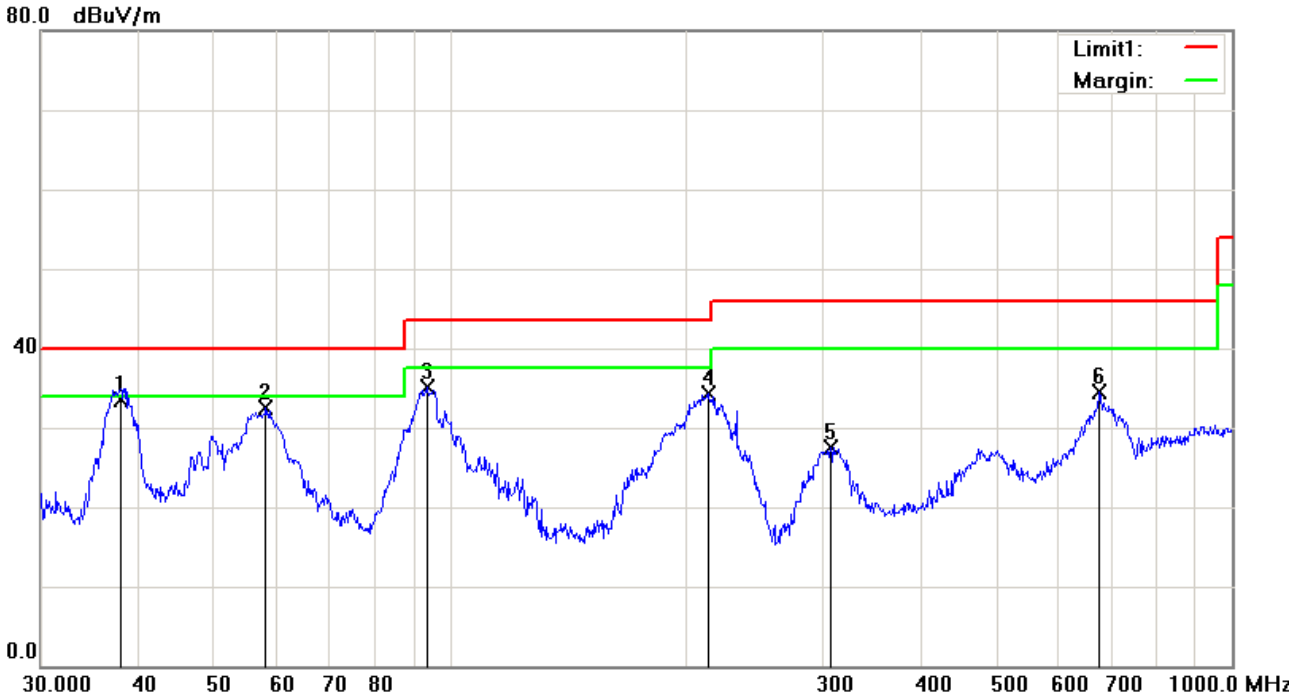
(Below 1GHz)




*Test Data*

Horizontal Polarity Plot @3m

| No. | P/L | Frequency (MHz) | Reading (dBμV/m) | Detector | Corrected (dB/m) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Degree (°) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | H | 36.6375 | 36.97 | peak | -5.14 | 31.83 | 40.00 | -8.17 | 100 | 231 |
| 2 | H | 71.3300 | 43.02 | peak | -13.65 | 29.37 | 40.00 | -10.63 | 125 | 138 |
| 3 | H | 151.0666 | 38.58 | peak | -8.38 | 30.20 | 43.50 | -13.30 | 100 | 301 |
| 4 | H | 212.2695 | 39.48 | peak | -8.85 | 30.63 | 43.50 | -12.87 | 100 | 46 |
| 5 | H | 330.1949 | 37.44 | peak | -6.04 | 31.40 | 46.00 | -14.60 | 200 | 89 |
| 6 | H | 790.6188 | 30.02 | peak | 3.06 | 33.08 | 46.00 | -12.92 | 200 | 341 |




*Test Data*

Vertical Polarity Plot @3m

| No. | P/L | Frequency (MHz) | Reading (dBμV/m) | Detector | Corrected (dB/m) | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Height (cm) | Degree (°) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | V | 37.9450 | 39.68 | QP | -6.09 | 33.59 | 40.00 | -6.41 | 100 | 16 |
| 2 | V | 58.2030 | 46.58 | peak | -14.14 | 32.44 | 40.00 | -7.56 | 200 | 45 |
| 3 | V | 93.4402 | 47.65 | peak | -12.51 | 35.14 | 43.50 | -8.36 | 100 | 128 |
| 4 | V | 213.7634 | 43.17 | peak | -8.87 | 34.30 | 43.50 | -9.20 | 135 | 57 |
| 5 | V | 306.7537 | 34.30 | peak | -6.71 | 27.59 | 46.00 | -18.41 | 200 | 357 |
| 6 | V | 677.5798 | 33.36 | peak | 1.12 | 34.48 | 46.00 | -11.52 | 100 | 200 |

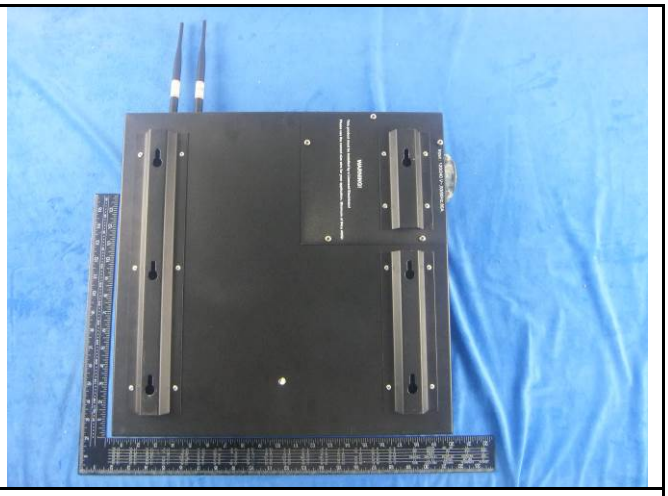
# Annex A. TEST INSTRUMENT

| Instrument | Model | Serial # | Cal Date | Cal Due | In use |
|---|---|---|---|---|---|
| **AC Line Conducted** | | | | | |
| EMI test receiver | ESCS30 | 8471241027 | 09/18/2014 | 09/17/2015 | ☑ |
| Line Impedance | LI-125A | 191106 | 09/26/2014 | 09/25/2015 | ☑ |
| Line Impedance | LI-125A | 191107 | 09/26/2014 | 09/25/2015 | ☑ |
| LISN | ISN T800 | 34373 | 09/26/2014 | 09/25/2015 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71283 | 09/25/2014 | 09/24/2015 | ☑ |
| Transient Limiter | LIT-153 | 531118 | 09/02/2014 | 09/01/2015 | ☑ |
| **RF conducted test** | | | | | |
| Agilent ESA-E SERIES | E4407B | MY45108319 | 09/18/2014 | 09/17/2015 | ☑ |
| Power Splitter | 1# | 1# | 09/02/2014 | 09/01/2015 | ☑ |
| DC Power Supply | E3640A | MY40004013 | 09/18/2014 | 09/17/2015 | ☑ |
| **Radiated Emissions** | | | | | |
| EMI test receiver | ESL6 | 100262 | 09/18/2014 | 09/17/2015 | ☑ |
| Positioning Controller | UC3000 | MF780208282 | 11/20/2014 | 11/19/2015 | ☑ |
| OPT 010 AMPLIFIER (0.1-1300MHz) | 8447E | 2727A02430 | 09/02/2014 | 09/01/2015 | ☑ |
| Microwave Preamplifier (1 ~ 26.5GHz) | 8449B | 3008A02402 | 03/25/2015 | 03/24/2016 | ☑ |
| Bilog Antenna (30MHz~6GHz) | JB6 | A110712 | 09/22/2014 | 09/21/2015 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71283 | 09/25/2014 | 09/24/2015 | ☑ |
| Universal Radio Communication Tester | CMU200 | 121393 | 09/26/2014 | 09/25/2015 | ☑ |

# Annex B. EUT And Test Setup Photographs

**Model: CRZ-16X0**

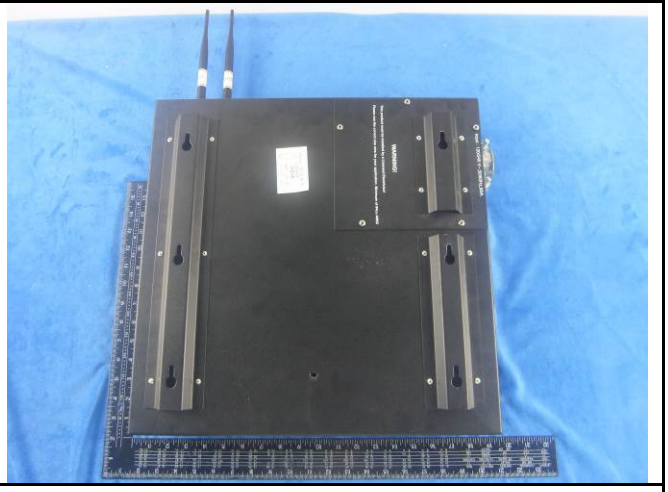
## Annex B.i. Photograph: EUT External Photo

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Whole Package - Top View</td><td>EUT - Rear View</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>EUT - Left View</td><td>EUT - Right View</td></tr>
</table>

| | |
| --- | --- |
|  |  |
| EUT - Top View | EUT - Bottom View |

## Model: CRZ-12X4

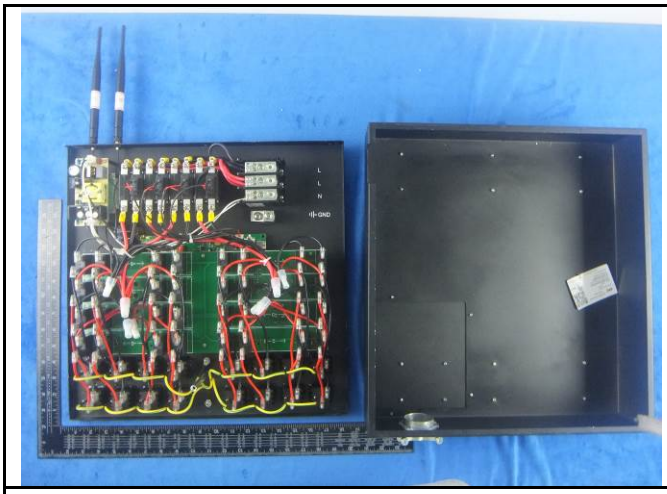
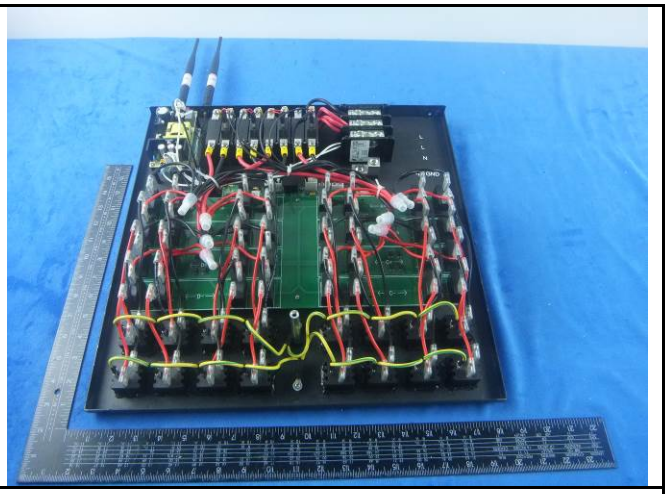
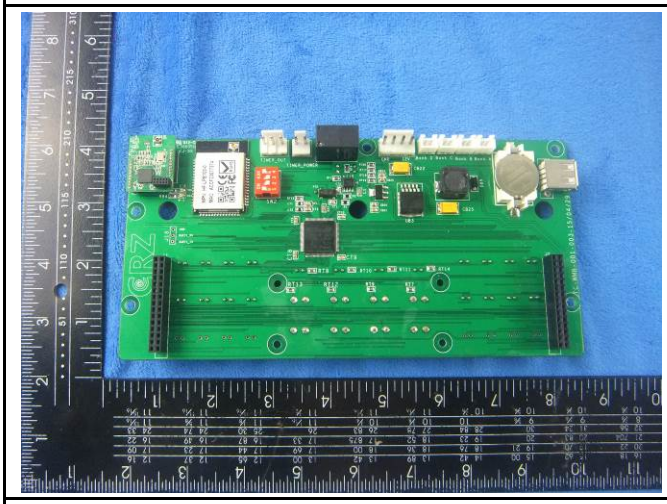
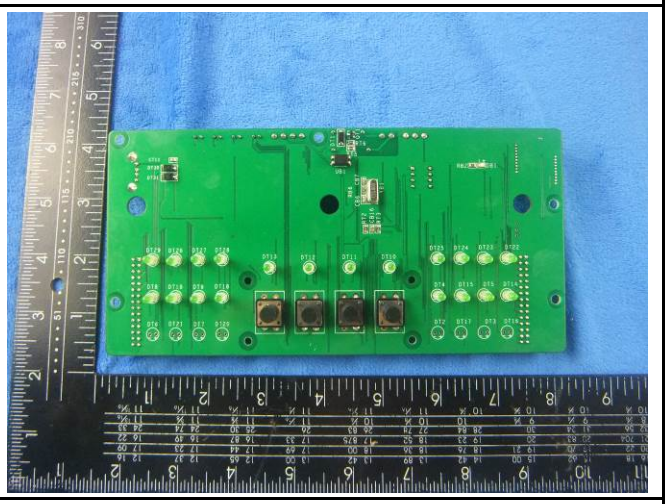
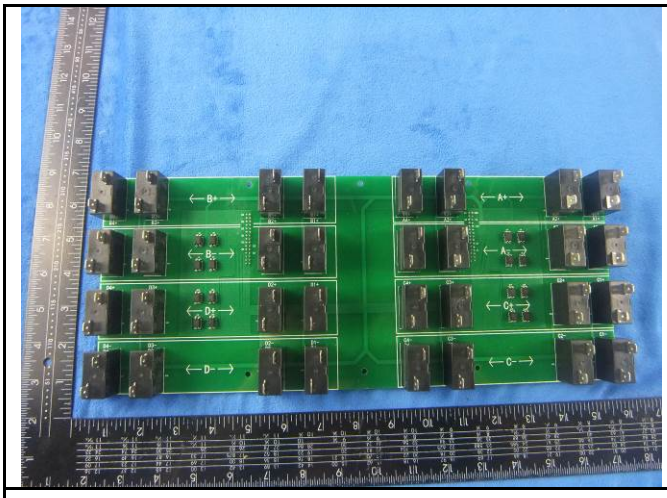
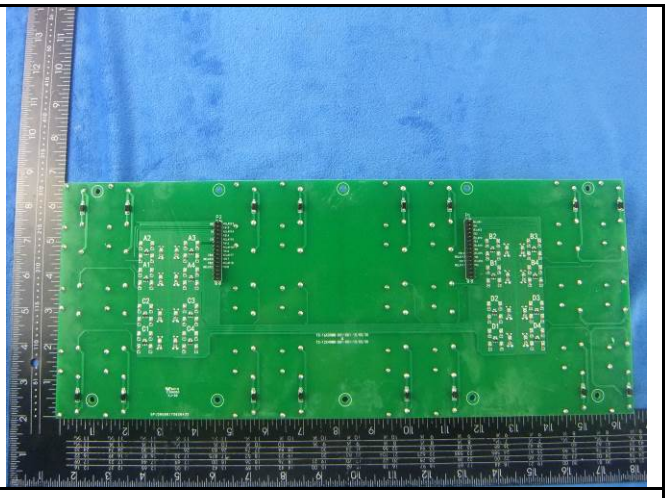
## Annex B.i. Photograph: EUT External Photo

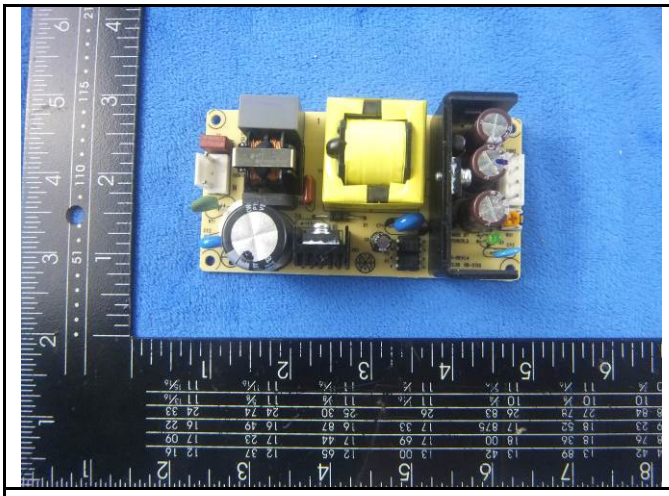
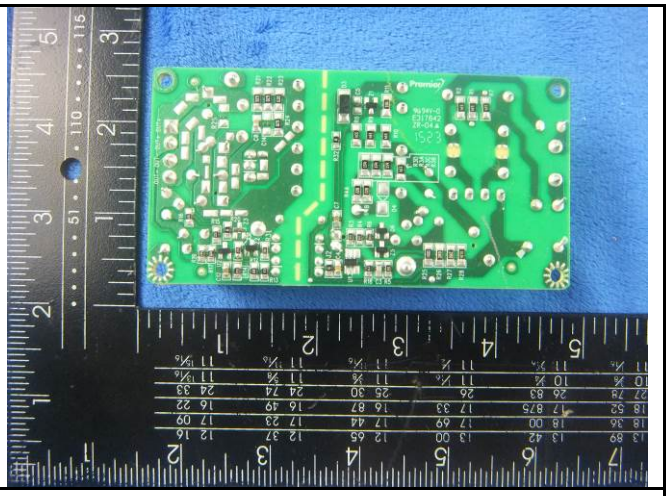
<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Whole Package - Top View</td><td>EUT - Rear View</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>EUT - Left View</td><td>EUT - Right View</td></tr>
</table>

| | |
|---|---|
|  |  |
| EUT - Top View | EUT - Bottom View |

## Model: CRZ-16X0

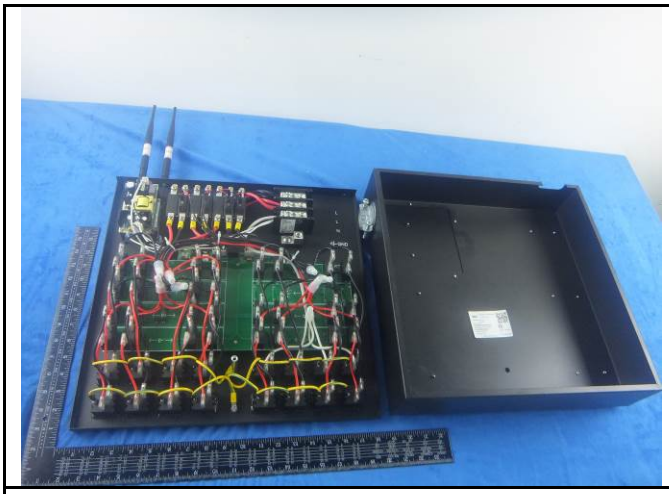
## Annex B.ii. Photograph: EUT Internal Photo

| | |
|---|---|
|  |  |
| Cover Off - Top View 1 | Cover Off - Top View 2 |
|  |  |
| Main board - Top View | Main board - Rear View |
|  |  |
| Switch board - Front View | Switch board - Rear View |

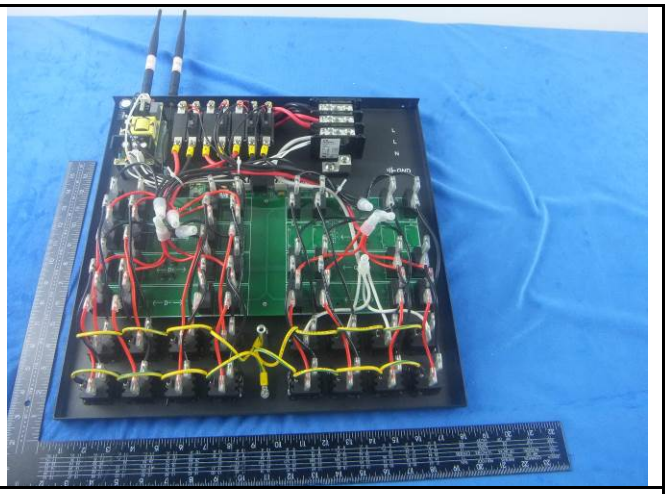
| | |
|---|---|
|  |  |
| Power board - Front View | Power board - Rear View |
|  |  |
| WIFI - Antenna View | ZIGBEE - Antenna View |

## Model: CRZ-12X4

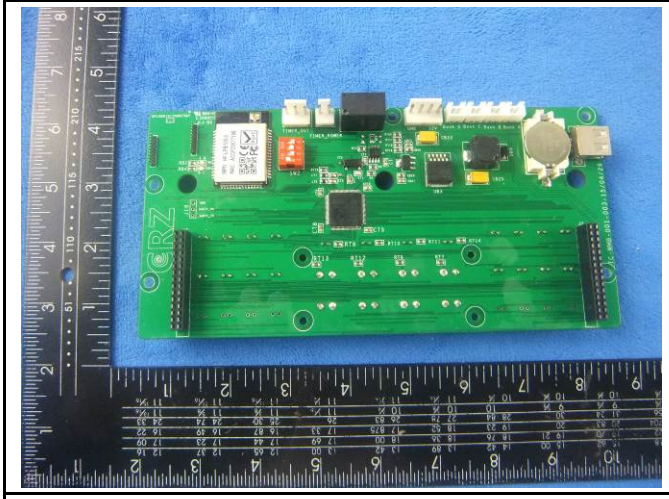
## Annex B.ii. Photograph: EUT Internal Photo



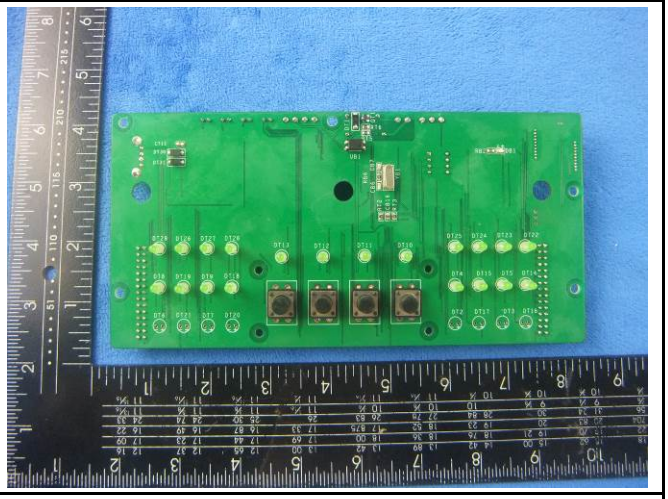
Cover Off - Top View 1



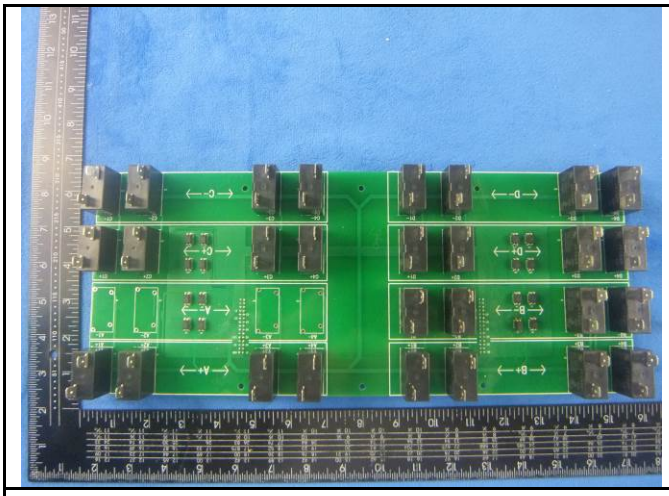
Cover Off - Top View 2



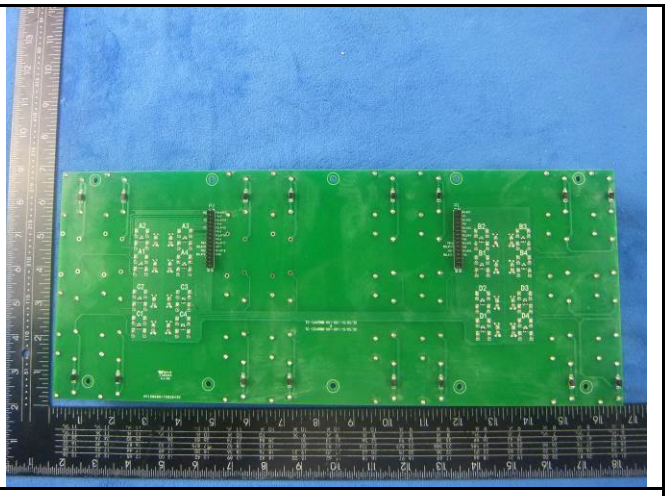
Main board - Top View



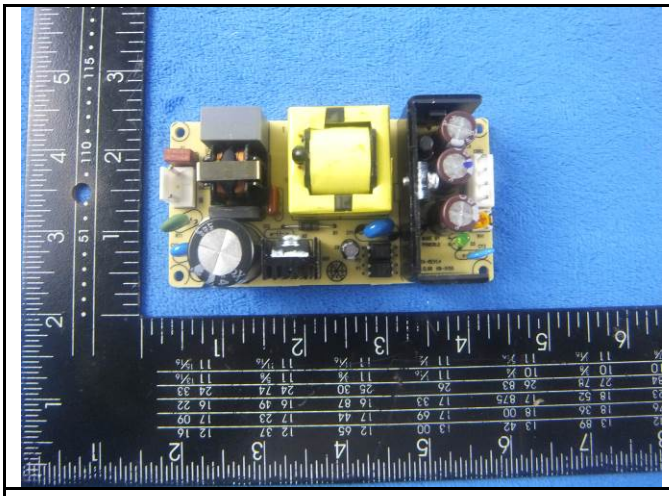
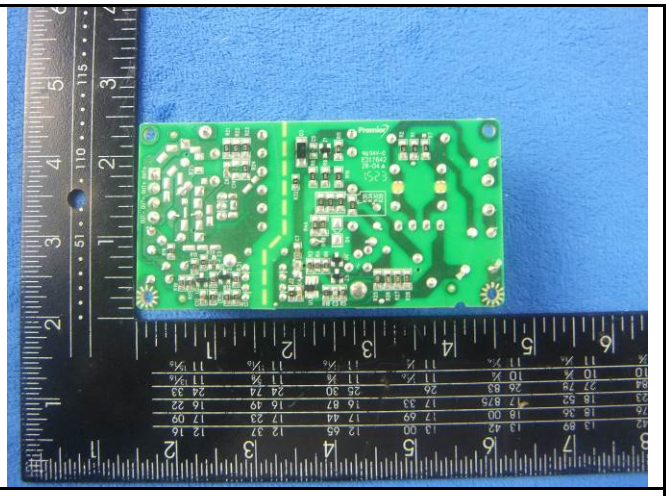
Main board - Rear View



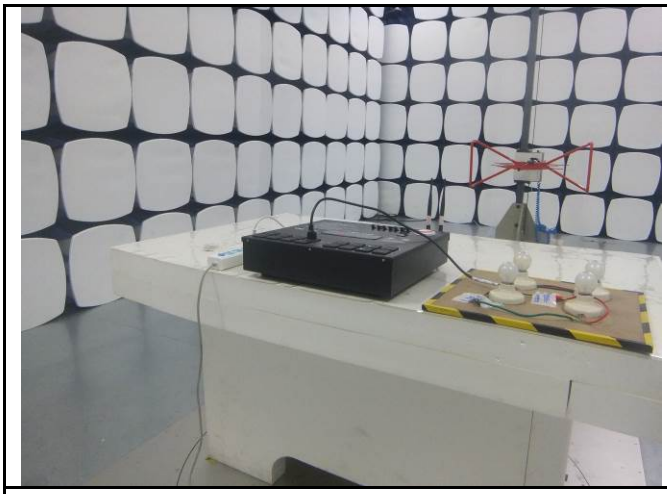
Switch board - Front View



Switch board - Rear View

| | |
|---|---|
|  |  |
| Power board - Front View | Power board - Rear View |
|  |  |
| WIFI - Antenna View | ZIGBEE - Antenna View |

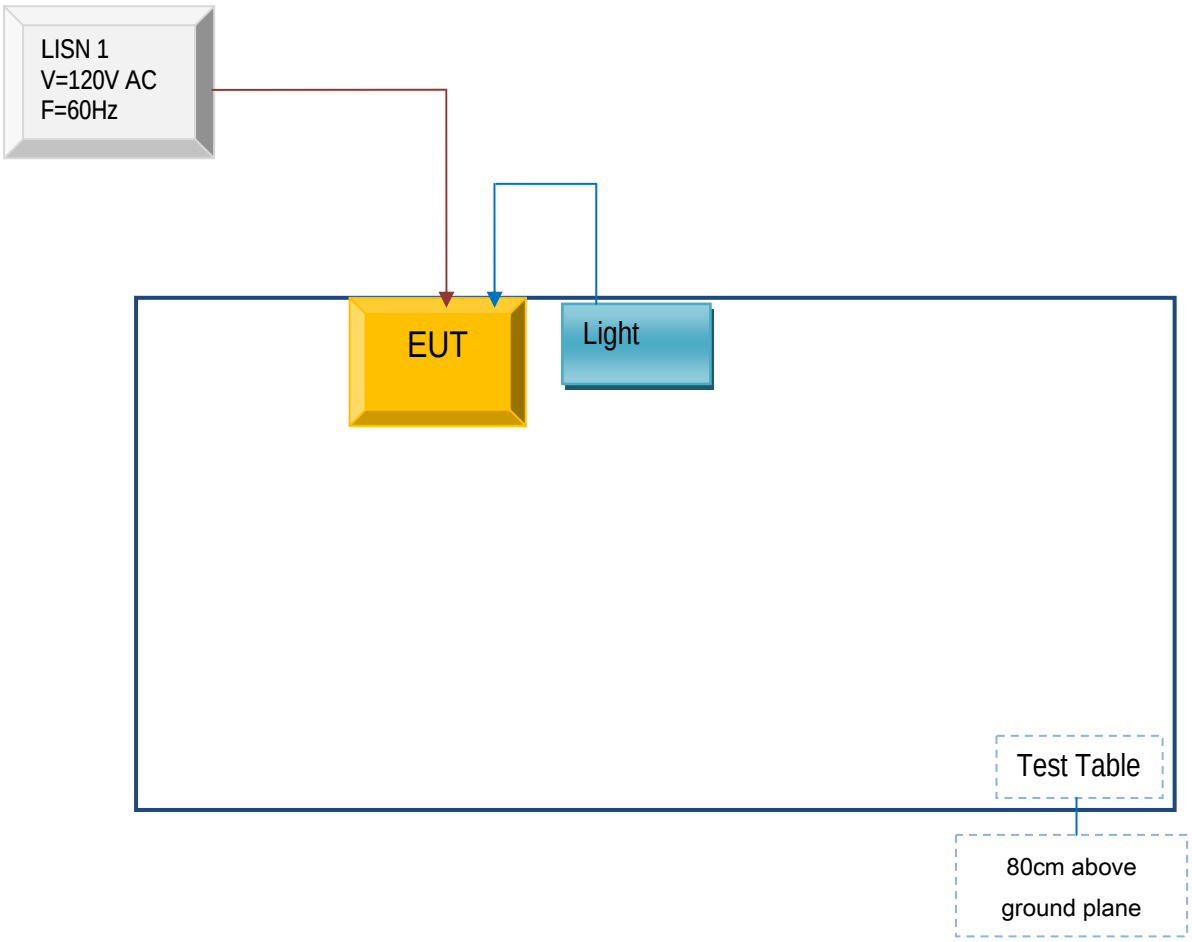
## Annex B.iii. Photograph: Test Setup Photo

| | |
|---|---|
|  | |
| Radiated Spurious Emissions Test Setup Below 1GHz | |

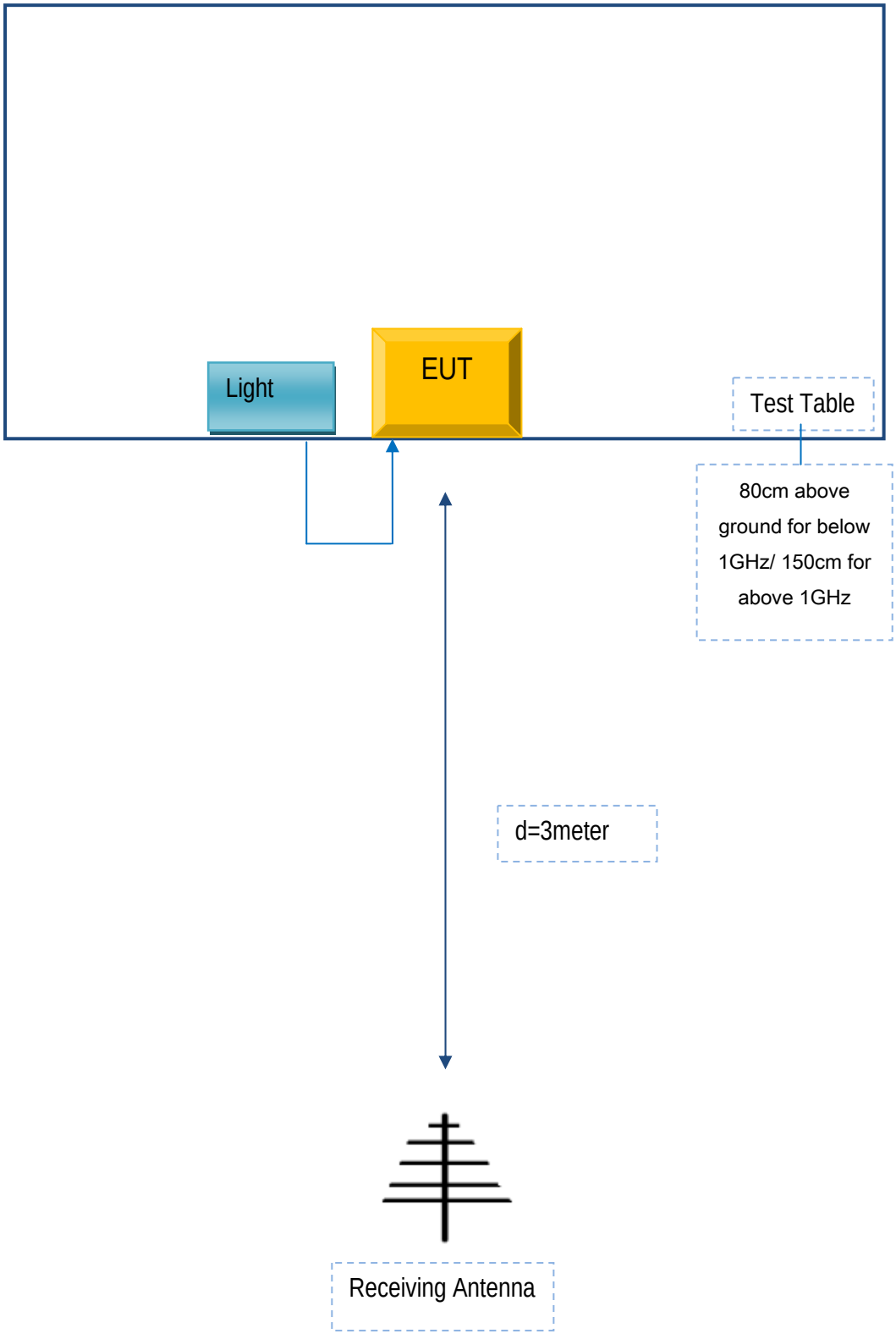
# Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

## Annex C.ii. TEST SET UP BLOCK

### Block Configuration Diagram for AC Line Conducted Emissions



## Block Configuration Diagram for Radiated Emissions



## Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

| Manufacturer | Equipment Description | Model | Calibration Date | Calibration Due Date |
|---|---|---|---|---|
| N/A | N/A | N/A | N/A | N/A |

# Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

# Annex E. DECLARATION OF SIMILARITY

## Fenghua Tiancheng Plastic Electronics Co.,Ltd

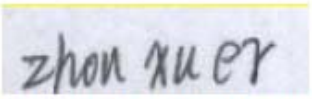
## Statement

We Company name: Fenghua Tiancheng Plastic Electronics Co.,Ltd
Of
Address : No.66 Dongfeng Road Fenghua Zhejiang China
hereby state that
Product : INTELLIGENT CONTROLLER
Model Number : CRZ-16X0/CRZ-12X4

All models have the same constructions 、power board and MCU board, only the RELAY board is different. Because the 120V socket uses 1 relay and the 240V socket uses 2 relays, so the RELAY board circuit diagram and PCB layout are different, but the basic principle is the same.16X0 has 16 sockets of 240V, no any sockets of 120V;12X4 has 12 sockets of 240V, 4 sockets of 120V;The16X0 and 12X4 Share the relay PCB, but 12 x4 relay board doesn't weld the relays of A1-, A2-, A3- and A4 –.In a word, 16X0 will use 32 relays,12X4 will use 28 relays.

Sincerely,

Signature



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