

RF TEST REPORT



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 ☐		
<i>Winnie Zhang</i>	<i>David Huang</i>	
Winnie Zhang Test Engineer	David Huang Checked By	
This test report may be reproduced in full only 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

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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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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 South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong 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
15.249: 4.5 dBi

Input Power: AC 120V 60Hz

Trade Name : CRZ

FCC ID: 2AENLCRZ

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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):

Spec	Requirement	Applicable															
§15.209, §15.205, §15.249(a) & §15.249(d)	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. The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following: <table border="1"> <thead> <tr> <th>Fundamental frequency</th><th>Field strength of fundamental (millivolts/meter)</th><th>Field strength of harmonics (microvolts/meter)</th></tr> </thead> <tbody> <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> </tbody> </table>	Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)	902– 928 MHz	50	500	2400– 2483.5 MHz	50	500	5725– 5875 MHz	50	500	24.0– 24.25 GHz	250	2500	☒
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)															
902– 928 MHz	50	500															
2400– 2483.5 MHz	50	500															
5725– 5875 MHz	50	500															
24.0– 24.25 GHz	250	2500															

Test Setup	
Procedure	Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function

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	- 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. - 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. - 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. - Repeat step 4 until all frequencies need to be measured was complete. - Repeat step5 with search antenna in vertical polarized orientations.
Remark	
Result	☒ Pass ☐ Fail

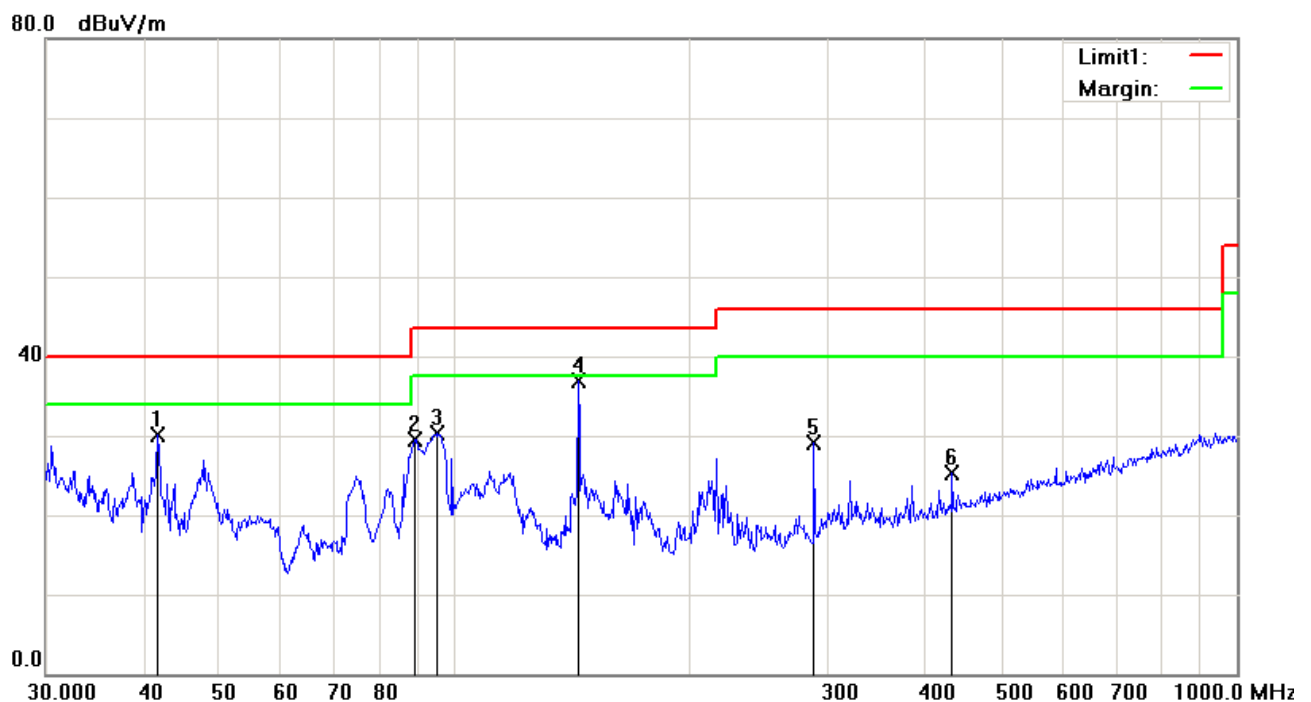
Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Model: CRZ-16X0

Test Mode: Transmitting Mode

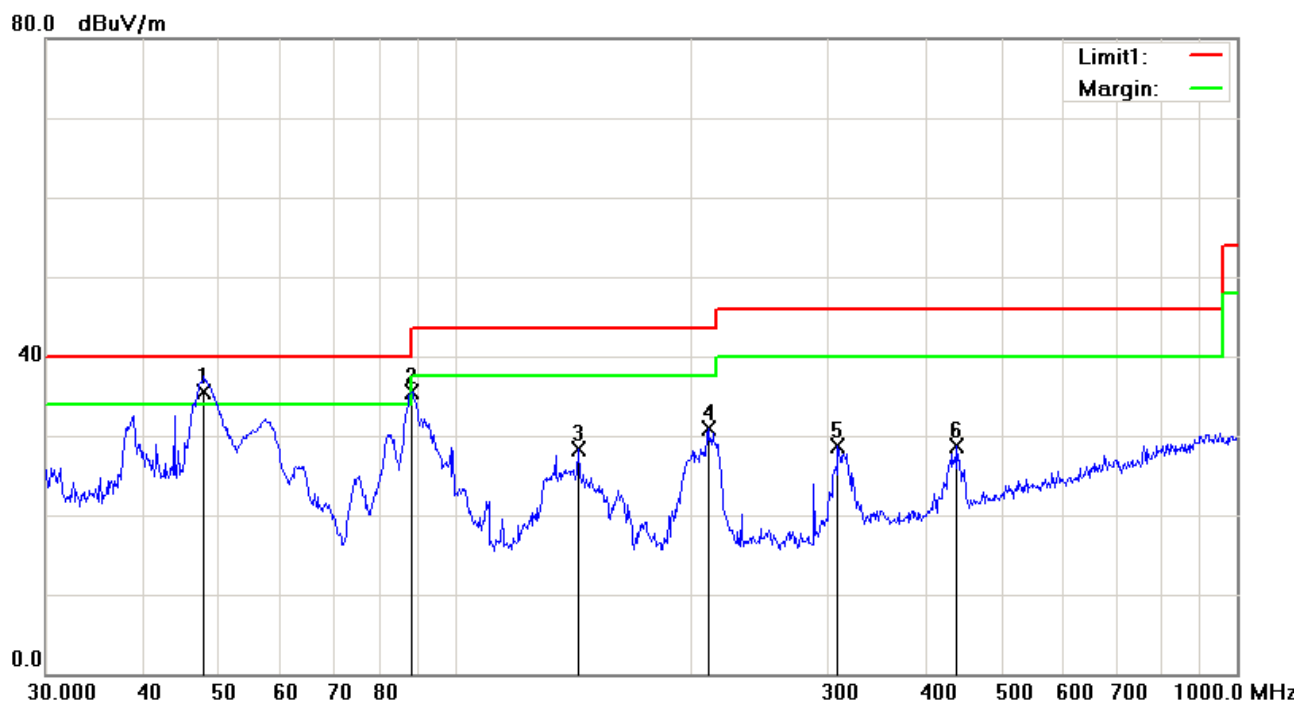
(Below 1GHz)



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

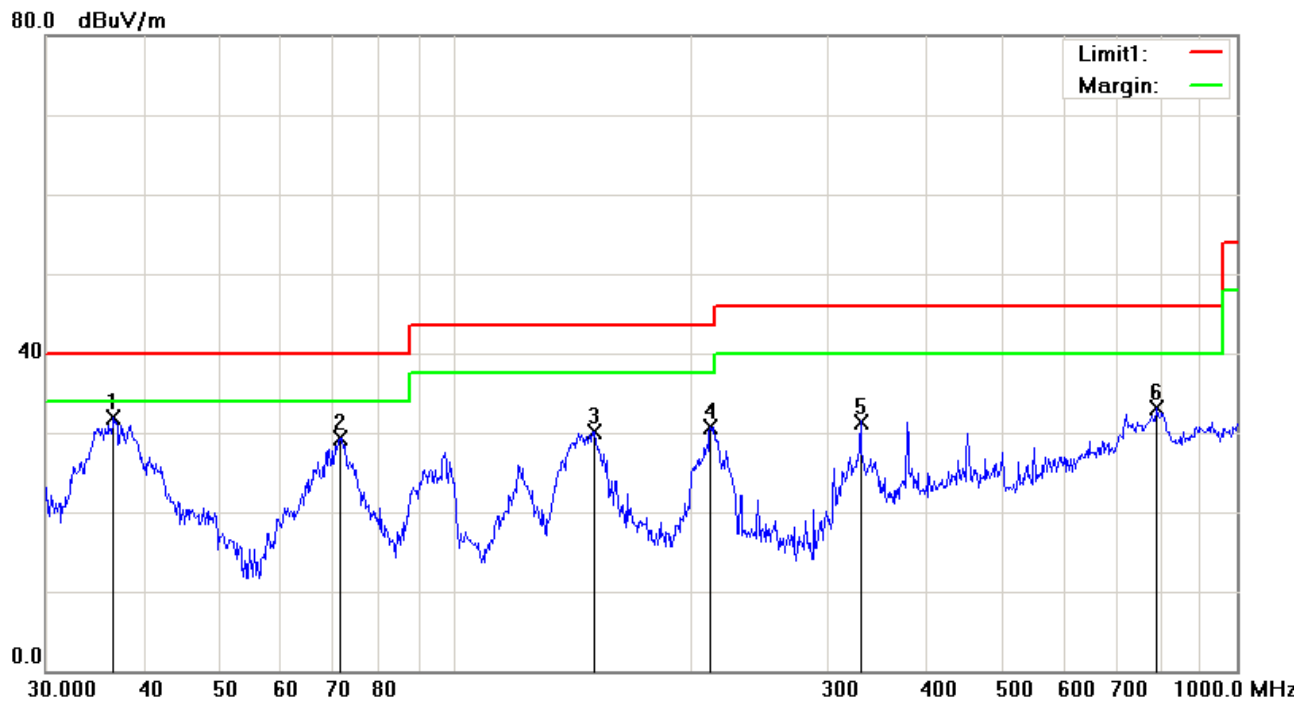
Vertical Polarity Plot @3m

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
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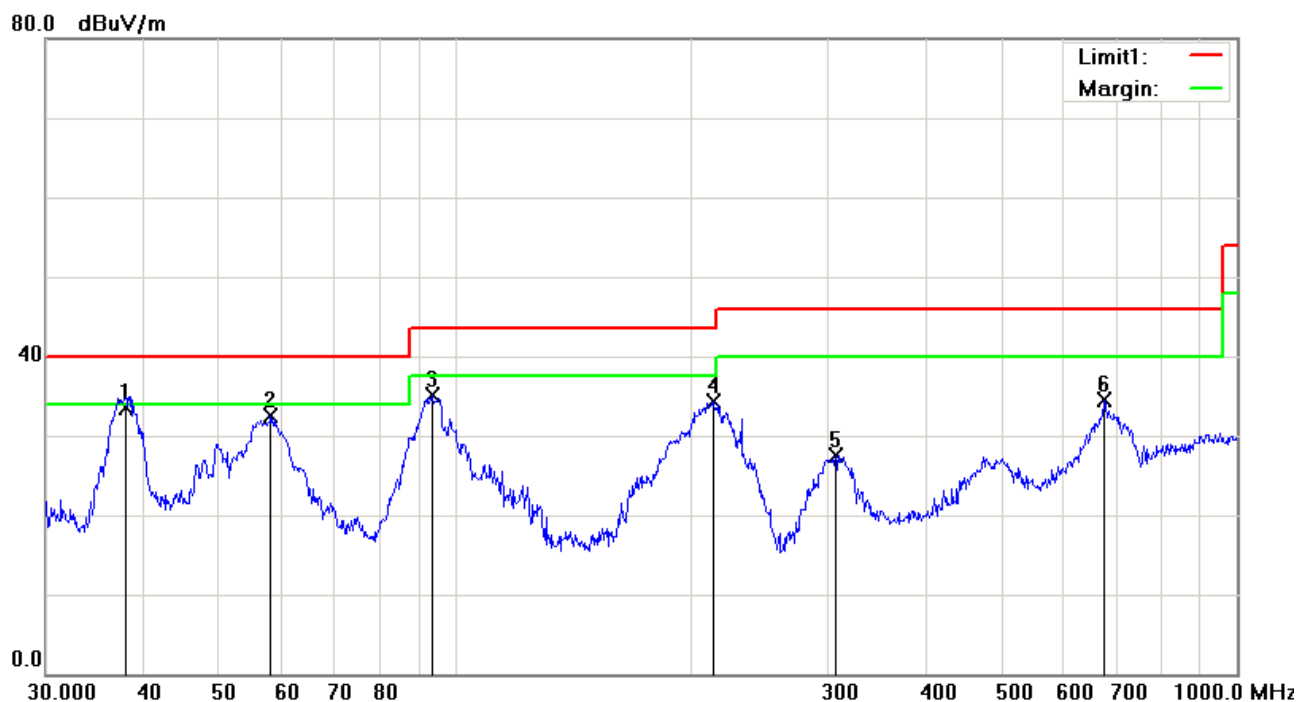
(Below 1GHz)



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 (dBuV/m)	Detector	Corrected (dB/m)	Result (dBuV/m)	Limit (dBuV/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	☒

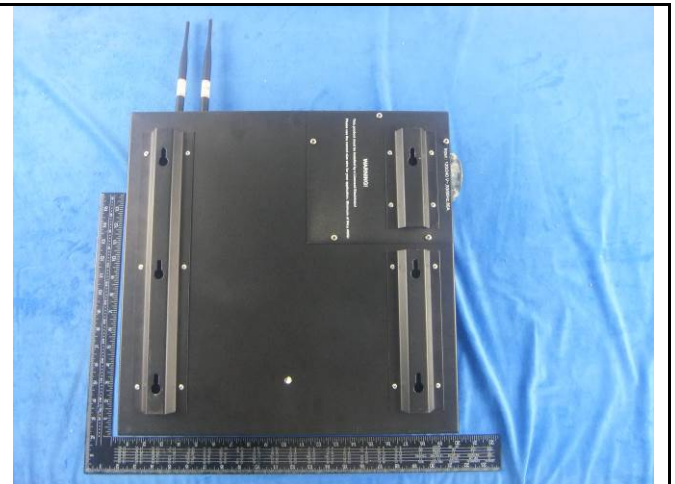
Annex B. EUT And Test Setup Photographs

Model: CRZ-16X0

Annex B.i. Photograph: EUT External Photo



Whole Package - Top View



EUT - Rear View



EUT - Left View



EUT - Right View

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EUT - Top View



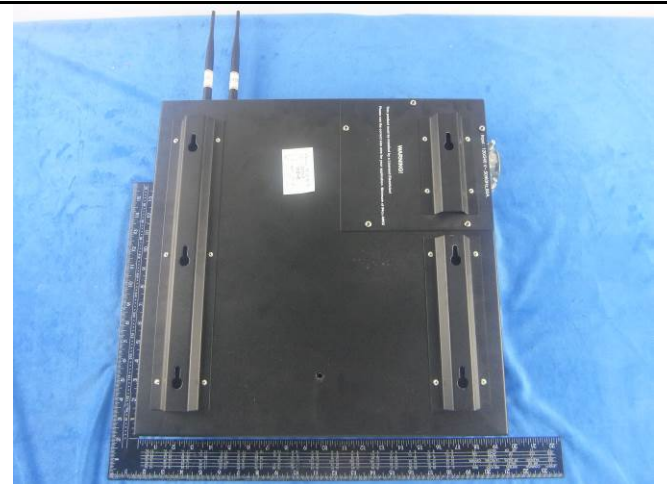
EUT - Bottom View

Model: CRZ-12X4

Annex B.i. Photograph: EUT External Photo



Whole Package - Top View



EUT - Rear View



EUT - Left View



EUT - Right View

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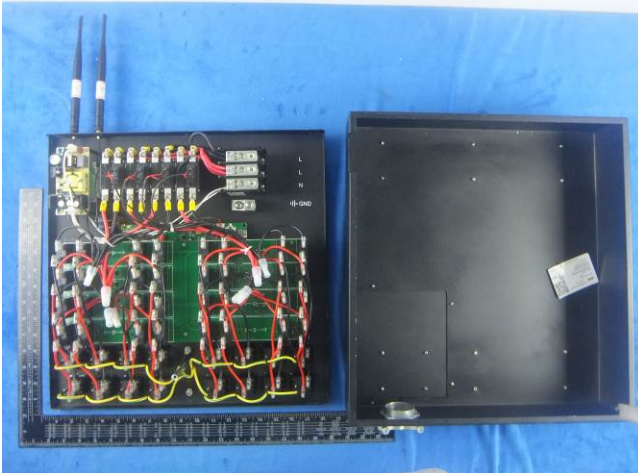
EUT - Top View



EUT - Bottom View

Model: CRZ-16X0

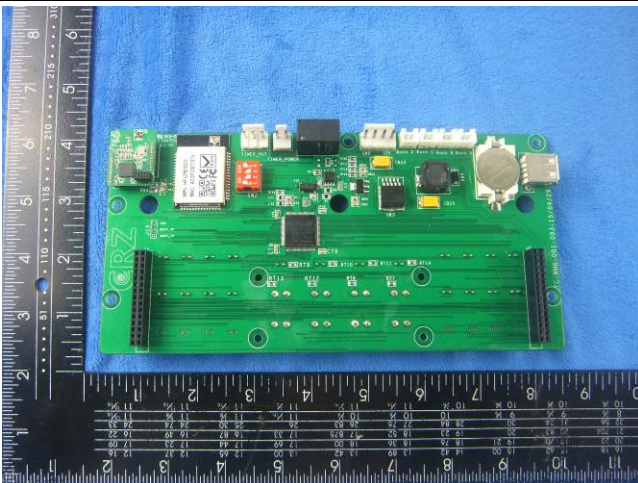
Annex B.ii. Photograph: EUT Internal Photo



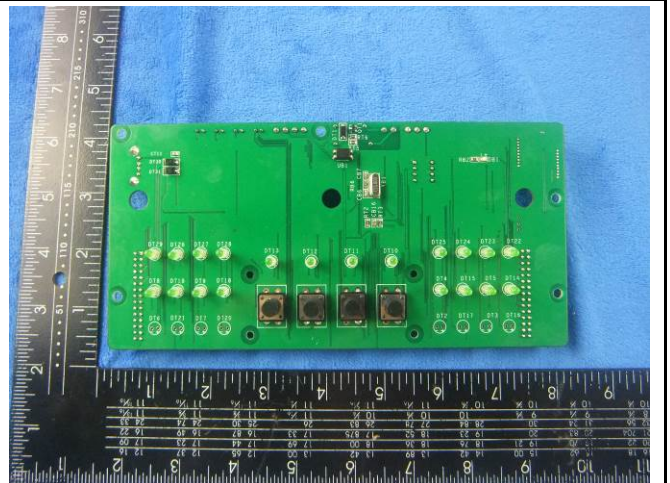
Cover Off - Top View 1



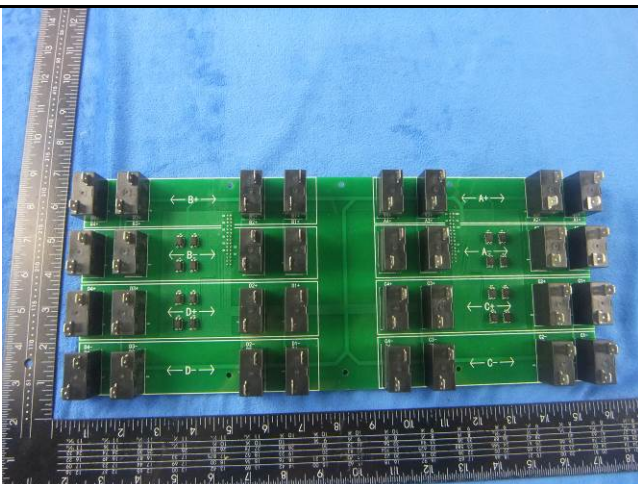
Cover Off - Top View 2



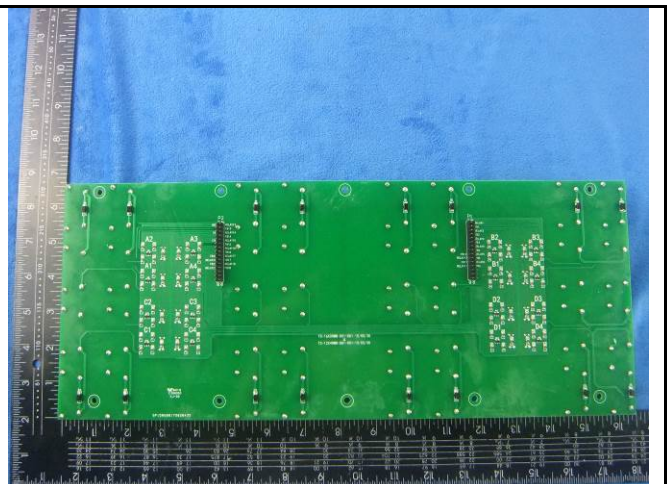
Main board - Top View



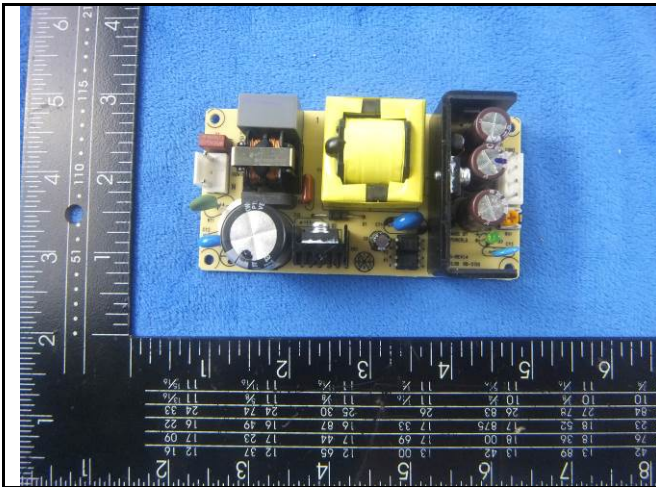
Main board - Rear View



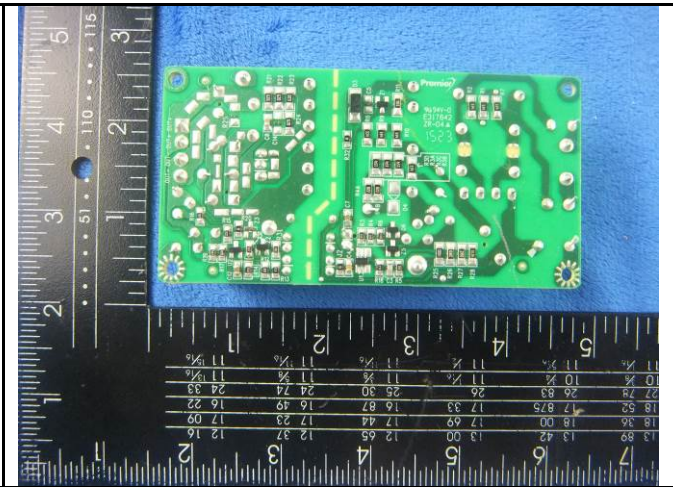
Switch board - Front View



Switch board - Rear View



Power board - Front View



Power board - Rear View



WIFI - Antenna View



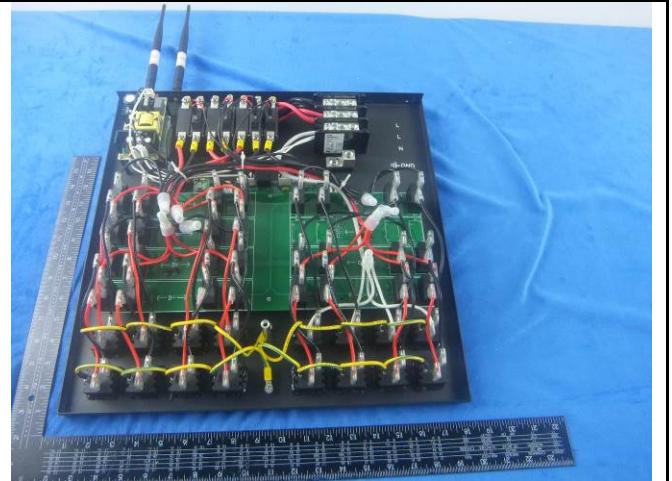
ZIGBEE - Antenna View

Model: CRZ-12X4

Annex B.ii. Photograph: EUT Internal Photo



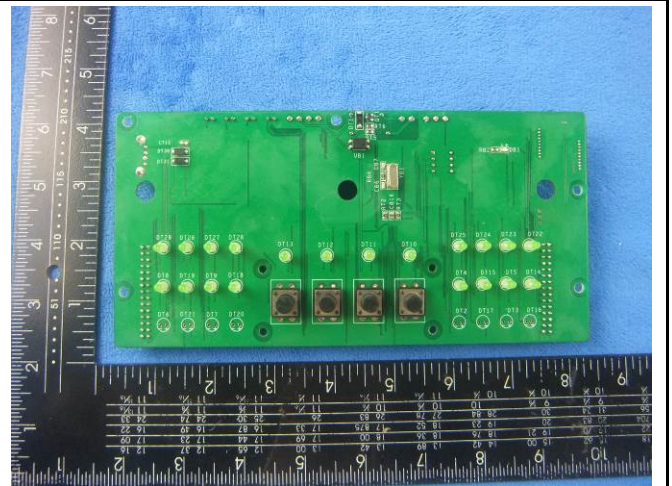
Cover Off - Top View 1



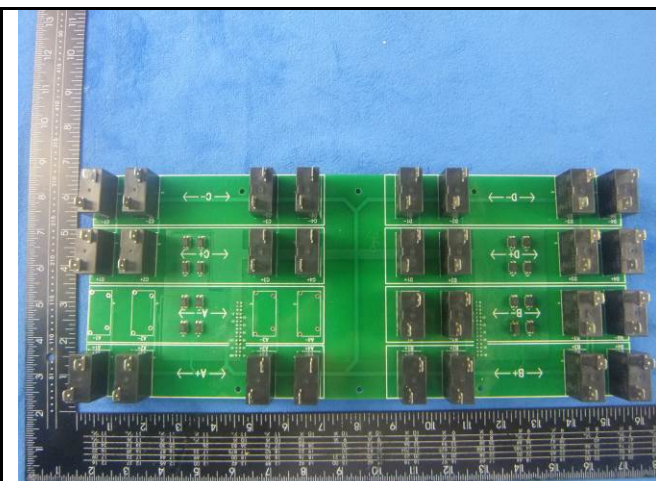
Cover Off - Top View 2



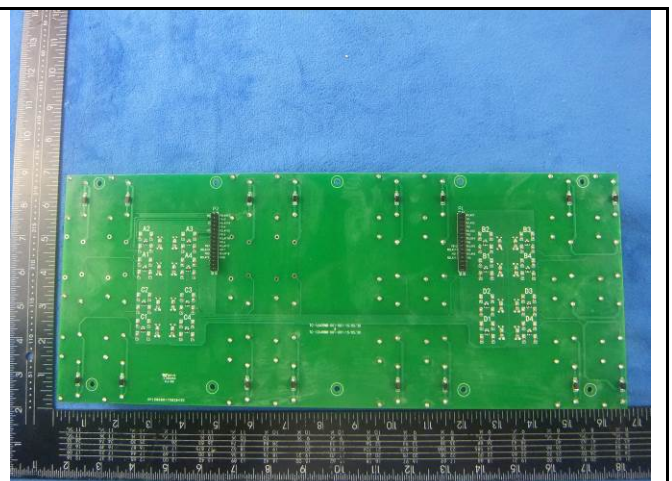
Main board - Top View



Main board - Rear View

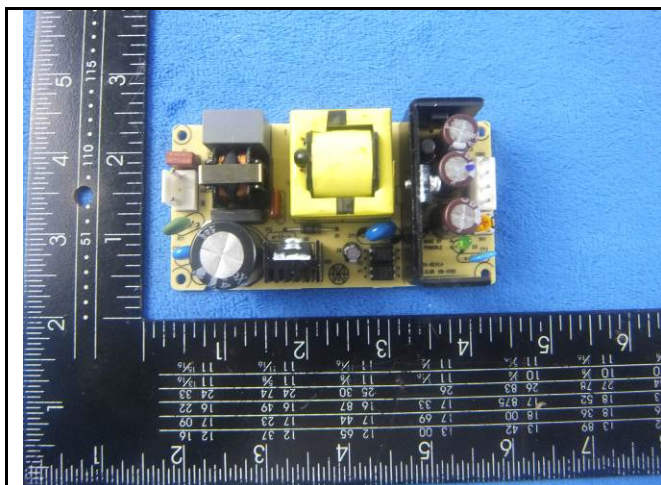


Switch board - Front View

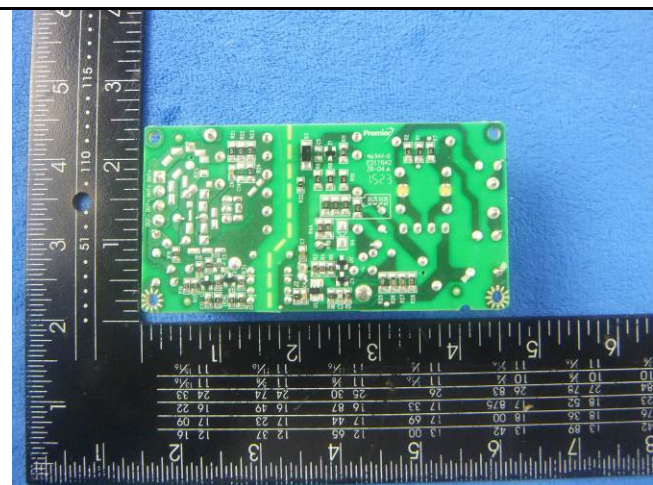


Switch board - Rear View

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Power board - Front View



Power board - Rear View



WIFI - Antenna View



ZIGBEE - Antenna View

Annex B.iii. Photograph: Test Setup Photo

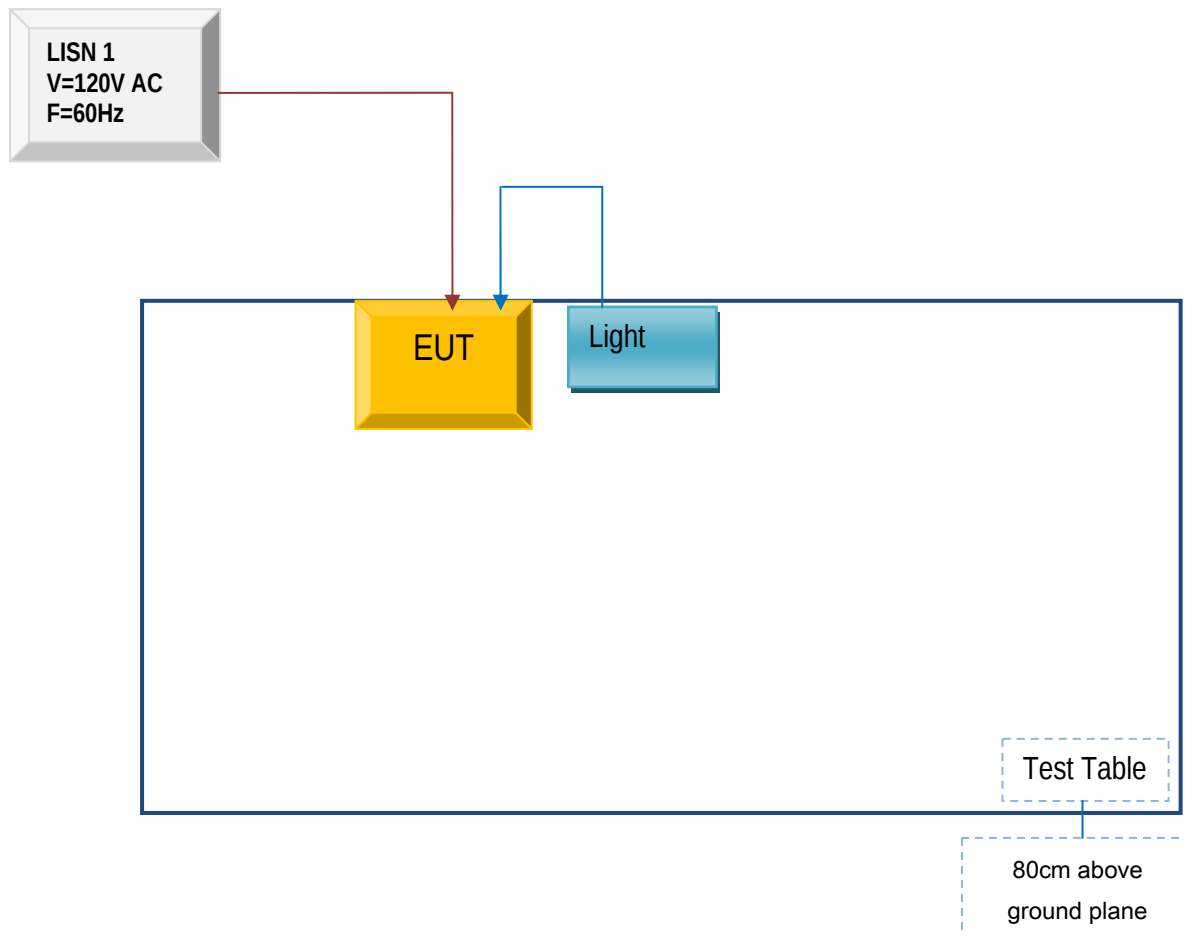


Radiated Spurious Emissions Test Setup Below 1GHz

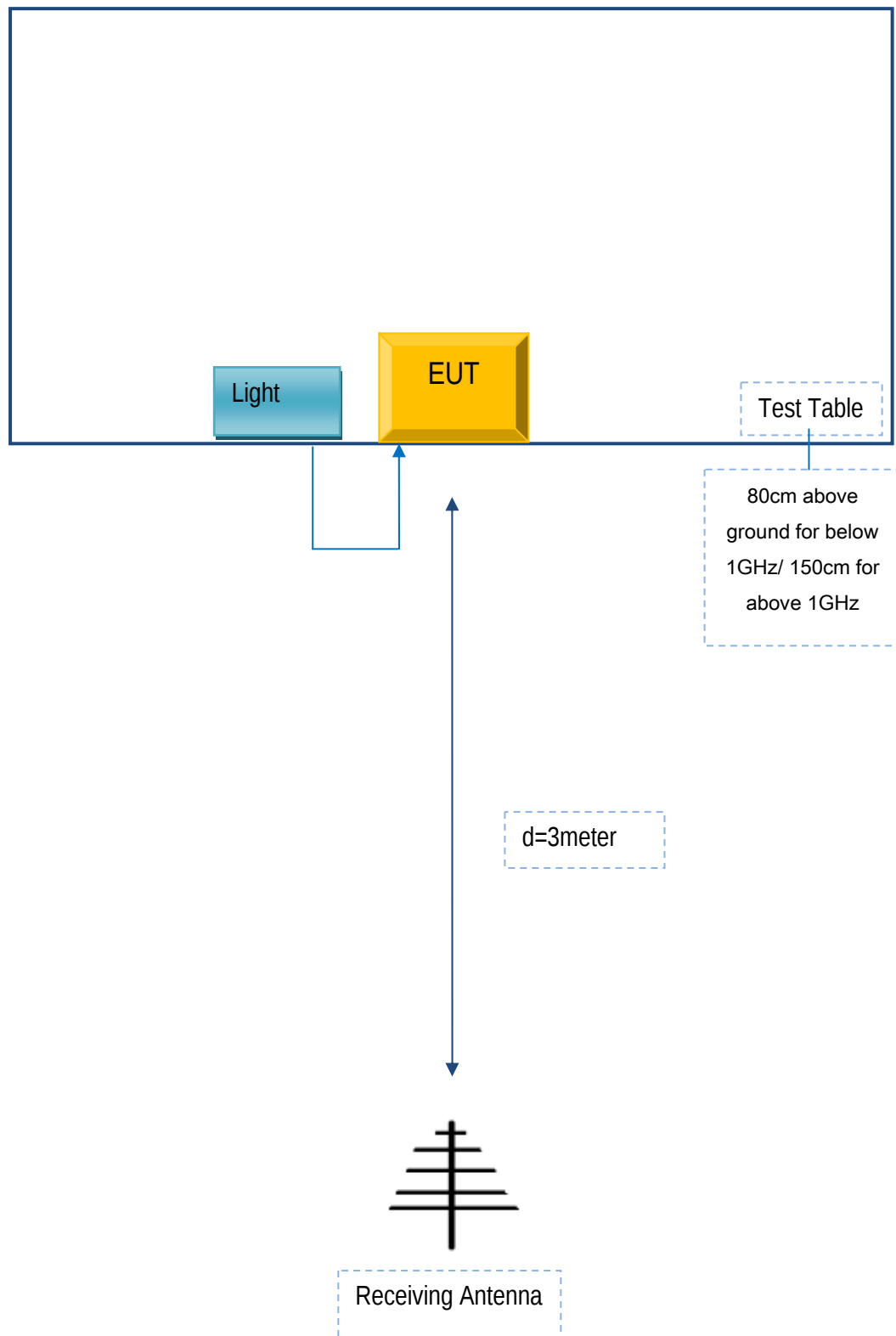
Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions



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Annex C. ii. 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

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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

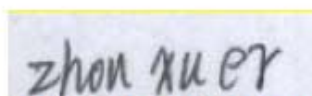
Product : INTELLIGENT CONTROLLER

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



E-mail: nbtcquality@163.com

Phone: 0574-28518277

Fax: 0574-28526111

Address: No.66 Dongfeng Road Fenghua Zhejiang China