1 COVER PAGE

# TEST REPORT

| | | |
|---|---|---|
| **Product** | : | Scalextric ARC Powerbase |
| **Trade mark** | : | Scalextric® |
| **Model/Type reference** | : | SSA-00185 |
| **Serial Number** | : | N/A |
| **Report Number** | : | EED32H001228-1 |
| **FCC ID** | : | 2ACUF-SSA00185 |
| **Date of Issue** | : | Sep. 23, 2015 |
| **Test Standards** | : | 47 CFR Part 15 Subpart C (2014) |
| **Test result** | : | PASS |

Prepared for:

**Hornby Hobbies Ltd.**
**Enterprise Road, Westwood Industrial Estate, CT9 4JX, United Kingdom**

Prepared by:

**Centre Testing International Group Co., Ltd.**
**Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China**
**TEL: +86-755-3368 3668**
**FAX: +86-755-3368 3385**

Tested by: Ware Xin Reviewed by: Ewen_Li

Approved by: Sheek.Luo Date: Sep. 23, 2015

Sheek Luo
Lab supervisor

Check No.: 1022503909

# 2 Version

| Version No. | Date | Description |
|---|---|---|
| 00 | Sep. 23, 2015 | Original |
| | | |
| | | |

# 3 Test Summary

| Test Item | Test Requirement | Test method | Result |
|---|---|---|---|
| **Antenna Requirement** | 47 CFR Part 15, Subpart C Section 15.203/15.247 (c) | ANSI C63.10-2013 | PASS |
| **AC Power Line Conducted Emission** | 47 CFR Part 15, Subpart C Section 15.207 | ANSI C63.10-2013 | PASS |
| **Conducted Peak Output Power** | 47 CFR Part 15, Subpart C Section 15.247 (b)(3) | ANSI C63.10-2013 | PASS |
| **6dB Occupied Bandwidth** | 47 CFR Part 15, Subpart C Section 15.247 (a)(2) | ANSI C63.10-2013 | PASS |
| **Power Spectral Density** | 47 CFR Part 15, Subpart C Section 15.247 (e) | ANSI C63.10-2013 | PASS |
| **Band-edge for RF Conducted Emissions** | 47 CFR Part 15, Subpart C Section 15.247(d) | ANSI C63.10-2013 | PASS |
| **RF Conducted Spurious Emissions** | 47 CFR Part 15, Subpart C Section 15.247(d) | ANSI C63.10-2013 | PASS |
| **Radiated Spurious Emissions** | 47 CFR Part 15, Subpart C Section 15.205/15.209 | ANSI C63.10-2013 | PASS |
| **Restricted bands around fundamental frequency (Radiated Emission)** | 47 CFR Part 15, Subpart C Section 15.205/15.209 | ANSI C63.10-2013 | PASS |

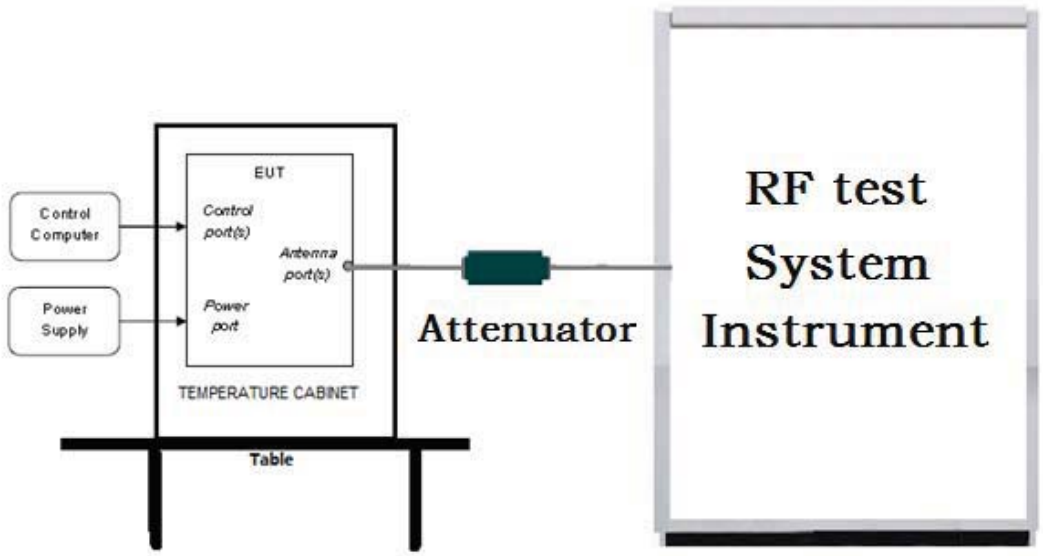
Remark:
The tested sample(s) and the sample information are provided by the client.
Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

# 4 Content

# 5 Test Requirement

## 5.1 Test setup

### 5.1.1 For Conducted test setup




### 5.1.2 For Radiated Emissions test setup

**Radiated Emissions setup:**

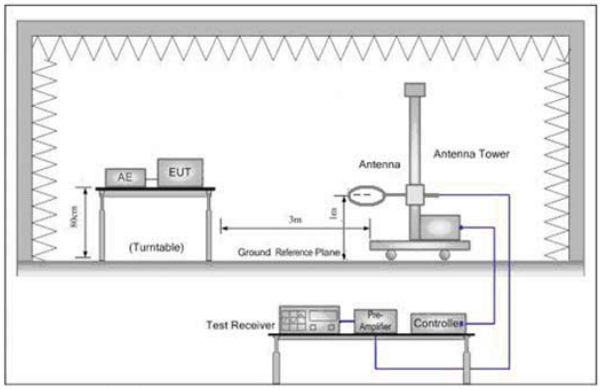



Figure 1. Below 30MHz

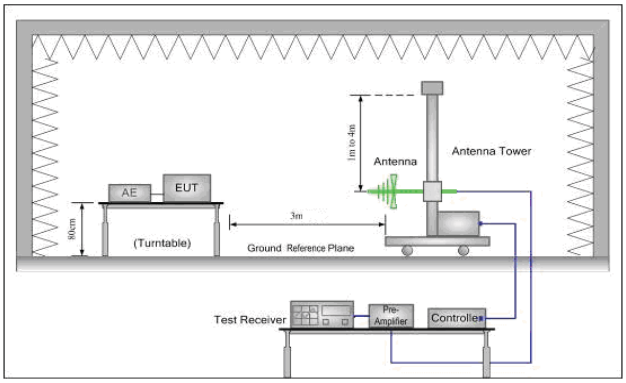



Figure 2. 30MHz to 1GHz

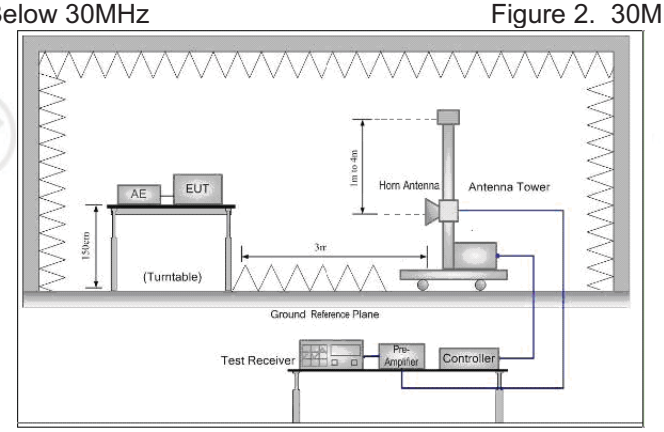
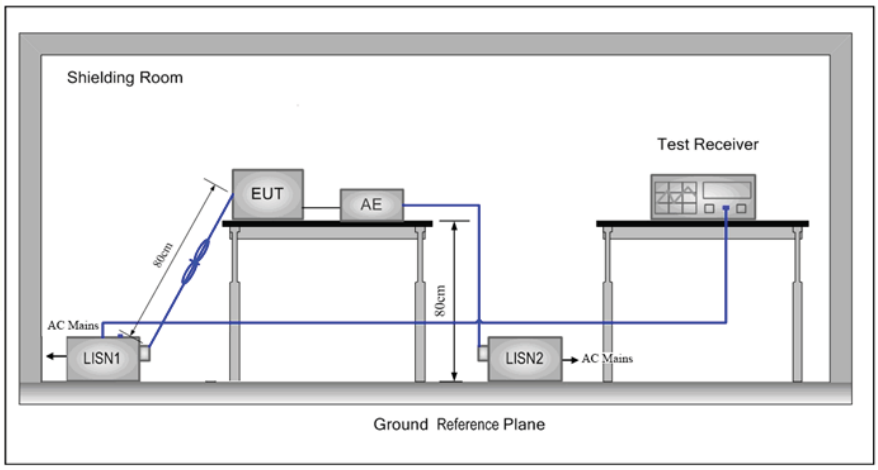



Figure 3. Above 1GHz

### 5.1.3 For Conducted Emissions test setup

**Conducted Emissions setup**




## 5.2 Test Environment

| Operating Environment: | |
|---|---|
| Temperature: | 25.0 °C |
| Humidity: | 53 % RH |
| Atmospheric Pressure: | 995mbar |

## 5.3 Test Condition

Test channel:

| Test Mode | Tx/Rx | RF Channel | | |
|---|---|---|---|---|
| | | Low(L) | Middle(M) | High(H) |
| GFSK | 2402MHz ~2480 MHz | Channel 1 | Channel 30 | Channel40 |
| | | 2402MHz | 2440MHz | 2480MHz |
| Transmitting mode: | Keep the EUT transmitted the continuous modulation test signal at the specific channel(s). | | | |

# 6 General Information

## 6.1 Client Information

| | |
|---|---|
| Applicant: | Hornby Hobbies Ltd. |
| Address of Applicant: | Enterprise Road Westwood Industrial Estate CT9 4JX United Kingdom |
| Manufacturer: | The Refined Industry Co., Ltd. |
| Address of Manufacturer: | 7/F., Sun King Factory Building, 1-7, shing chuen Road, Shatin, N.T. Hong Kong. |

## 6.2 General Description of EUT

| | |
|---|---|
| Product Name: | Scalextric ARC Powerbase |
| Model No.(EUT): | SSA-00185 |
| Trade Mark: | Scalextric® |
| EUT Supports Radios application: | Bluetooth V4.0 BLE |
| Power Supply: | Model: P9603W<br>Input: 120V AC 60Hz 0.5A<br>Output: 15V DC 1.2A |
| Sample Received Date: | Sep. 01, 2015 |
| Sample tested Date: | Sep. 01, 2015 to Sep. 23, 2015 |

## 6.3 Product Specification subjective to this standard

| | |
|---|---|
| Carrier Frequency: | 2402MHz-2480MHz |
| Modulation Type: | GFSK |
| Number of Channel: | 40 |
| Test Software of EUT: | NORDIC(manufacturer declare ) |
| Antenna Gain: | 0dBi |
| Test Voltage: | AC 120V/60Hz |

Operation Frequency each of channel

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---|---|---|---|---|---|---|---|
| 1 | 2402MHz | 11 | 2422MHz | 21 | 2442MHz | 31 | 2462MHz |
| 2 | 2404MHz | 12 | 2424MHz | 22 | 2444MHz | 32 | 2464MHz |
| 3 | 2406MHz | 13 | 2426MHz | 23 | 2446MHz | 33 | 2466MHz |
| 4 | 2408MHz | 14 | 2428MHz | 24 | 2448MHz | 34 | 2468MHz |
| 5 | 2410MHz | 15 | 2430MHz | 25 | 2450MHz | 35 | 2470MHz |
| 6 | 2412MHz | 16 | 2432MHz | 26 | 2452MHz | 36 | 2472MHz |
| 7 | 2414MHz | 17 | 2434MHz | 27 | 2454MHz | 37 | 2474MHz |
| 8 | 2416MHz | 18 | 2436MHz | 28 | 2456MHz | 38 | 2476MHz |
| 9 | 2418MHz | 19 | 2438MHz | 29 | 2458MHz | 39 | 2478MHz |
| 10 | 2420MHz | 20 | 2440MHz | 30 | 2460MHz | 40 | 2480MHz |

## 6.4 Description of Support Units

The EUT has been tested independently.

## 6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China518101
Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385
No tests were sub-contracted.

## 6.6 Test Facility

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

**CNAS-Lab Code: L1910**

Centre Testing International Group 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..

**A2LA-Lab Cert. No. 3061.01**

Centre Testing International Group 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.

**FCC-Registration No.: 565659**

Centre Testing International Group 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 565659.

**IC-Registration No.: 7408A**

The 3m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408A .

**IC-Registration No.: 7408B**

The 10m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408B.

**NEMKO-Aut. No.: ELA503**

Centre Testing International Group 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.

**VCCI**

The Radiation 3 &10 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-4096.
Main Ports Conducted Interference Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-4563.
Telecommunication Ports Conducted Disturbance Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-2146.
The Radiation 3 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-758

## 6.7 Deviation from Standards

None.

## 6.8 Abnormalities from Standard Conditions

None.

## 6.9 Other Information Requested by the Customer

None.

## 6.10 Measurement Uncertainty(95% confidence levels, k=2)

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Radio Frequency | $7.9 \times 10^{-8}$ |
| 2 | RF power, conducted | 0.31dB (30MHz-1GHz) |
| | | 0.57dB(1GHz-18GHz) |
| 3 | Radiated Spurious emission test | 4.5dB (30MHz-1GHz) |
| | | 4.8dB(1GHz-12.75GHz) |
| 4 | Conduction emission | 3.6dB (9kHz to 150kHz) |
| | | 3.2dB (150kHz to 30MHz) |
| 5 | Temperature test | 0.64°C |
| 6 | Humidity test | 2.8% |
| 7 | DC power voltages | 0.025% |

# 7 Equipment List

| RF test system | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Mode No.** | **Serial Number** | **Cal. Date (mm-dd-yyyy)** | **Cal. Due date (mm-dd-yyyy)** |
| Signal Generator | Keysight | E8257D | MY53401106 | 04-14-2015 | 04-13-2016 |
| Communication test set test set | Agilent | N4010A | MY47230124 | 04-02-2015 | 04-01-2016 |
| Spectrum Analyzer | Keysight | N9010A | MY54510339 | 04-01-2015 | 03-31-2016 |
| Attenuator | HuaXiang | SHX370 | 15040701 | 04-01-2015 | 03-31-2016 |
| Signal Generator | Keysight | N5182B | MY53051549 | 03-31-2015 | 03-30-2016 |
| High-pass filter(3-18GHz) | Sinoscite | FL3CX03WG18 NM12-0398-002 | --- | 01-13-2015 | 01-12-2016 |
| High-pass filter(5-18GHz) | MICRO-TRONICS | SPA-F-63029-4 | --- | 01-13-2015 | 01-12-2016 |
| band rejection filter (GSM900) | Sinoscite | FL5CX01CA09C L12-0395-001 | --- | 01-13-2015 | 01-12-2016 |
| band rejection filter (GSM850) | Sinoscite | FL5CX01CA08C L12-0393-001 | --- | 01-13-2015 | 01-12-2016 |
| band rejection filter (GSM1800) | Sinoscite | FL5CX02CA04C L12-0396-002 | --- | 01-13-2015 | 01-12-2016 |
| band rejection filter (GSM1900) | Sinoscite | FL5CX02CA03C L12-0394-001 | --- | 01-13-2015 | 01-12-2016 |
| DC Power | Keysight | E3642A | MY54436035 | 03-31-2015 | 03-30-2016 |
| PC-1 | Lenovo | R4960d | --- | 04-01-2015 | 03-31-2016 |
| BT&WI-FI Automatic control | R&S | OSPB157 | 101374 | 04-01-2015 | 03-31-2016 |
| RF control unit | JS Tonscend | JS0806-2 | 2015860006 | 04-01-2015 | 03-31-2016 |
| BT&WI-FI Automatic test software | JS Tonscend | JSTS1120-2 | --- | 04-01-2015 | 03-31-2016 |

| Conducted disturbance Test | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Mode No.** | **Serial Number** | **Cal. date (mm-dd-yyyy)** | **Cal. Due date (mm-dd-yyyy)** |
| Receiver | R&S | ESCI | 100009 | 06-30-2015 | 06-28-2016 |
| Temperature/ Humidity Indicator | Belida | TT-512 | 101 | 01-14-2015 | 01-13-2016 |
| Communication test set | Agilent | E5515C | GB47050533 | 01-13-2015 | 01-12-2016 |
| Communication test set | R&S | CMW500 | 152394 | 04-19-2015 | 04-18-2016 |
| LISN | R&S | ENV216 | 100098 | 06-30-2015 | 06-28-2016 |
| LISN | schwarzbeck | NNLK8121 | 8121-529 | 06-30-2015 | 06-28-2016 |
| Voltage Probe | R&S | ESH2-Z3 | 100042 | 07-09-2014 | 07-08-2017 |
| Current Probe | R&S | EZ17 | 100106 | 07-09-2014 | 07-08-2017 |
| ISN | TESEQ GmbH | ISN T800 | 30297 | 01-29-2015 | 01-27-2017 |

| 3M Semi/full-anechoic Chamber | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Mode No.** | **Serial Number** | **Cal. date (mm-dd-yyyy)** | **Cal. Due date (mm-dd-yyyy)** |
| 3M Chamber | TDK | SAC-3 | --- | 06-02-2013 | 06-01-2016 |
| TRILOG Broadband Antenna | schwarzbeck | VULB9163 | 9163-617 | 07-31-2015 | 07-29-2016 |
| Microwave Preamplifier | Agilent | 8449B | 3008A02425 | 02-05-2015 | 02-04-2016 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00057410 | 06-30-2015 | 06-28-2018 |
| Loop Antenna | ETS | 6502 | 00071730 | 07-30-2015 | 07-28-2017 |
| Spectrum Analyzer | R&S | FSP40 | 100416 | 06-30-2015 | 06-28-2016 |
| Receiver | R&S | ESCI | 100435 | 06-30-2015 | 06-28-2016 |
| Multi device Controller | maturo | NCD/070/10711112 | --- | 01-13-2015 | 01-12-2016 |
| LISN | schwarzbeck | NNBM8125 | 81251547 | 06-30-2015 | 06-28-2016 |
| LISN | schwarzbeck | NNBM8125 | 81251548 | 06-30-2015 | 06-28-2016 |
| Signal Generator | Agilent | E4438C | MY45095744 | 04-19-2015 | 04-18-2016 |
| Signal Generator | Keysight | E8257D | MY53401106 | 04-14-2015 | 04-13-2016 |
| Temperature/Humidity Indicator | TAYLOR | 1451 | 5190 | 07-09-2015 | 07-08-2016 |
| Communication test set | Agilent | E5515C | GB47050533 | 01-13-2015 | 01-12-2016 |
| Cable line | Fulai(7M) | SF106 | 5219/6A | 01-13-2015 | 01-12-2016 |
| Cable line | Fulai(6M) | SF106 | 5220/6A | 01-13-2015 | 01-12-2016 |
| Cable line | Fulai(3M) | SF106 | 5216/6A | 01-13-2015 | 01-12-2016 |
| Cable line | Fulai(3M) | SF106 | 5217/6A | 01-13-2015 | 01-12-2016 |
| Communication test set | R&S | CMW500 | 152394 | 04-19-2015 | 04-18-2016 |
| High-pass filter(3-18GHz) | Sinoscite | FL3CX03WG18NM 12-0398-002 | --- | 01-13-2015 | 01-12-2016 |
| High-pass filter(5-18GHz) | MICRO-TRONICS | SPA-F-63029-4 | --- | 01-13-2015 | 01-12-2016 |
| band rejection filter | Sinoscite | FL5CX01CA09CL1 2-0395-001 | --- | 01-13-2015 | 01-12-2016 |
| band rejection filter | Sinoscite | FL5CX01CA08CL1 2-0393-001 | --- | 01-13-2015 | 01-12-2016 |
| band rejection filter | Sinoscite | FL5CX02CA04CL1 2-0396-002 | --- | 01-13-2015 | 01-12-2016 |
| band rejection filter | Sinoscite | FL5CX02CA03CL1 2-0394-001 | --- | 01-13-2015 | 01-12-2016 |

# 8 Radio Technical Requirements Specification

**Reference documents for testing:**

| No. | Identity | Document Title |
|---|---|---|
| 1 | FCC Part15C (2014) | Subpart C-Intentional Radiators |
| 2 | ANSI C63.10-2013 | American National Standard for Testing Unlicesed Wireless Devices |

**Test Results List:**

| Test Requirement | Test method | Test item | Verdict | Note |
|---|---|---|---|---|
| Part15C Section 15.247 (a)(2) | ANSI C63.10 | 6dB Occupied Bandwidth | PASS | Appendix A) |
| Part15C Section 15.247 (b)(3) | ANSI C63.10 | Conducted Peak Output Power | PASS | Appendix B) |
| Part15C Section 15.247(d) | ANSI C63.10 | Band-edge for RF Conducted Emissions | PASS | Appendix C) |
| Part15C Section 15.247(d) | ANSI C63.10 | RF Conducted Spurious Emissions | PASS | Appendix D) |
| Part15C Section 15.247 (e) | ANSI C63.10 | Power Spectral Density | PASS | Appendix E) |
| Part15C Section 15.203/15.247 (c) | ANSI C63.10 | Antenna Requirement | PASS | Appendix F) |
| Part15C Section 15.207 | ANSI C63.10 | AC Power Line Conducted Emission | PASS | Appendix G) |
| Part15C Section 15.205/15.209 | ANSI C63.10 | Restricted bands around fundamental frequency (Radiated Emission) | PASS | Appendix H) |
| Part15C Section 15.205/15.209 | K ANSI C63.10 | Radiated Spurious Emissions | PASS | Appendix H) |

# Appendix A) 6dB Occupied Bandwidth

## Test Result

| Mode | Channel | 6dB Bandwidth [MHz] | 99% OBW[MHz] | Verdict |
|---|---|---|---|---|
| BLE | LCH | 0.6621 | 1.0561 | PASS |
| BLE | MCH | 0.6788 | 1.0452 | PASS |
| BLE | HCH | 0.6777 | 1.1064 | PASS |

**Remark:** Peak detector.

## Test Graphs

| Graphs | | | |
|---|---|---|---|
| LCH | |  | |
| MCH | |  | |

| | |
|---|---|
| HCH |  |

Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 10/10
#IFGain:Low
#Atten: 20 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 23.76 dB
10 dB/div
Ref 30.00 dBm
Log
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1.067 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1064 MHz
Total Power
4.28 dBm
Transmit Freq Error
25.997 kHz
OBW Power
99.00 %
x dB Bandwidth
677.7 kHz
x dB
-6.00 dB
Freq Offset
0 Hz
MSG
STATUS

# Appendix B) Conducted Peak Output Power

## Test Result

| Mode | Channel | Conduct Peak Power[dBm] | Verdict |
|---|---|---|---|
| BLE | LCH | -3.395 | PASS |
| BLE | MCH | -2.731 | PASS |
| BLE | HCH | -2.223 | PASS |

## Test Graphs

| Graphs | | | |
|---|---|---|---|
| LCH | |  | |
| MCH | |  | |

| | |
|---|---|
| HCH |  |

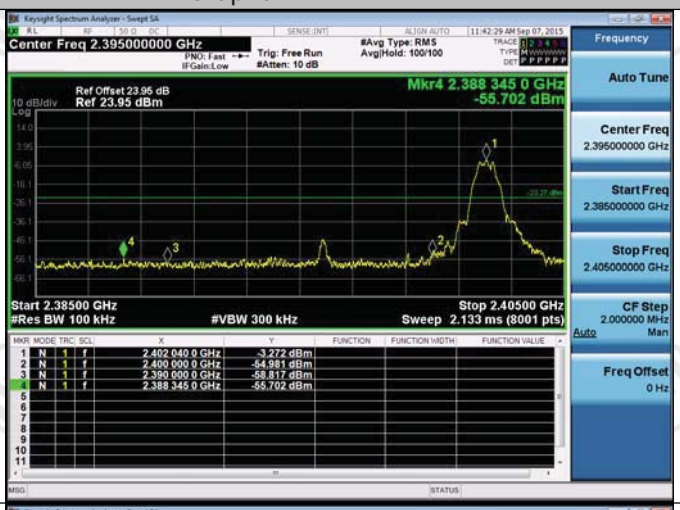
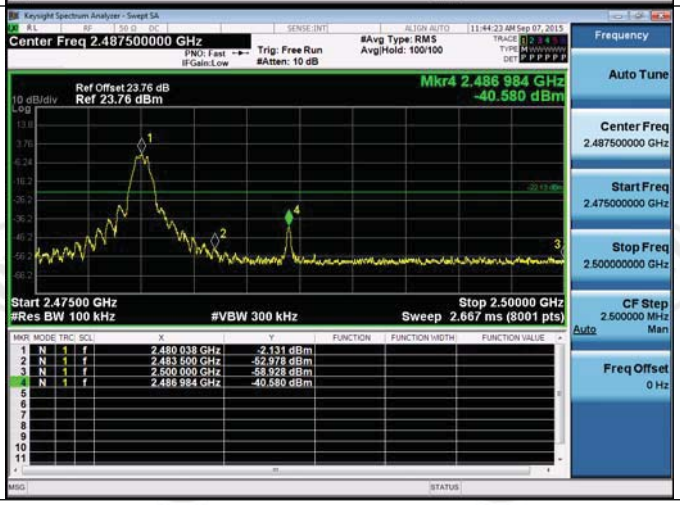
Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 100/100
11:44:00 AM Sep 07, 2015
Frequency
Mkr1 2.480 097 500 GHz
-2.223 dBm
Ref Offset 23.76 dB
10 dB/div
Ref 23.76 dBm
Log
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.482500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 5.000 MHz
Sweep 1.067 ms (8001 pts)
MSG
STATUS

# Appendix C) Band-edge for RF Conducted Emissions

## Result Table

| Mode | Channel | Carrier Power[dBm] | Max.Spurious Level [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|
| BLE | LCH | -3.272 | -55.702 | -23.27 | PASS |
| BLE | HCH | -2.131 | -40.580 | -22.13 | PASS |

## Test Graphs

| Graphs | | | | |
|---|---|---|---|---|
| LCH |  | | |
| HCH |  | | |

# Appendix D) RF Conducted Spurious Emissions

## Result Table

| Mode | Channel | Pref [dBm] | Puw[dBm] | Verdict |
|---|---|---|---|---|
| BLE | LCH | -3.480 | <Limit | PASS |
| BLE | MCH | -2.807 | <Limit | PASS |
| BLE | HCH | -2.314 | <Limit | PASS |

## Test Graphs

| BLE_LCH_Graphs | | | |
|---|---|---|---|
| Pref/BLE/LCH | |  | |
| Puw/BLE/LCH | |  | |

| BLE_MCH_Graphs | | |
|---|---|---|
| Pref/BLE/MCH | |   |
| Puw/BLE/MCH | |   |

| BLE_HCH_Graphs | | |
|---|---|---|
| Pref/BLE/HCH | |   |

| | |
|---|---|
| Puw/BLE/HCH |  |

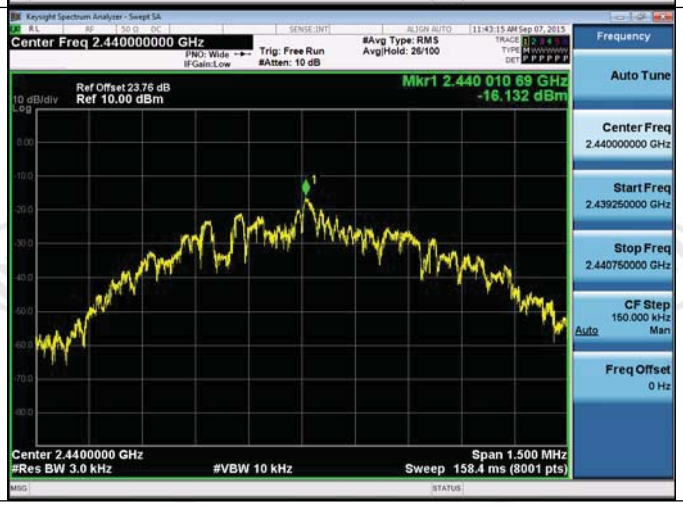
Keysight Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 8/100
11:45:10 AM Sep 07, 2015
Ref Offset 23.76 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 23.951 GHz
-30.164 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (8001 pts)
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz

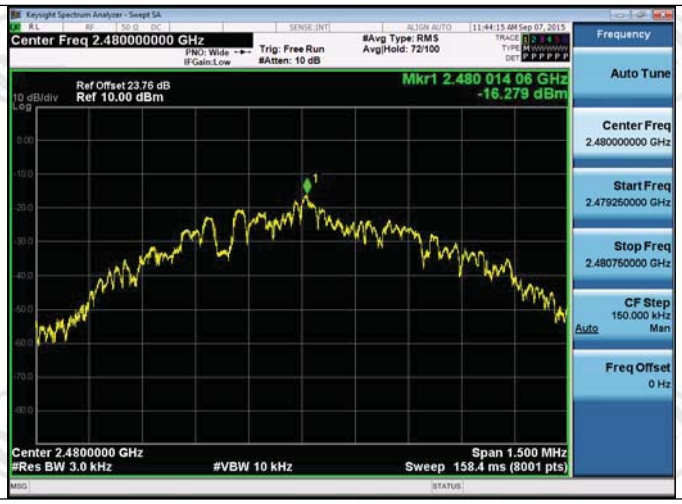
# Appendix E) Power Spectral Density

## Result Table

| Mode | Channel | PSD [dBm] | Verdict |
|---|---|---|---|
| BLE | LCH | -16.477 | PASS |
| BLE | MCH | -16.132 | PASS |
| BLE | HCH | -16.279 | PASS |

## Test Graphs

| Graphs | | | |
|---|---|---|---|
| LCH |  | |
| MCH |  | |

| | |
|---|---|
| HCH |  |

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 72/100
11:44:15 AM Sep 07, 2015
Ref Offset 23.76 dB
10 dB/div
Ref 10.00 dBm
Log
Mkr1 2.480 014 06 GHz
-16.279 dBm
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.500 MHz
Sweep 158.4 ms (8001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479250000 GHz
Stop Freq
2.480750000 GHz
CF Step
150.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

# Appendix F)Antenna Requirement

**15.203 requirement:**

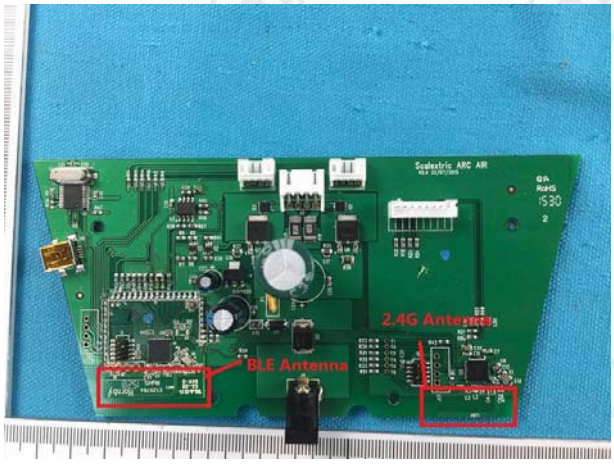
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

| **EUT Antenna:** | |
|---|---|

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.



# Appendix G) AC Power Line Conducted Emission

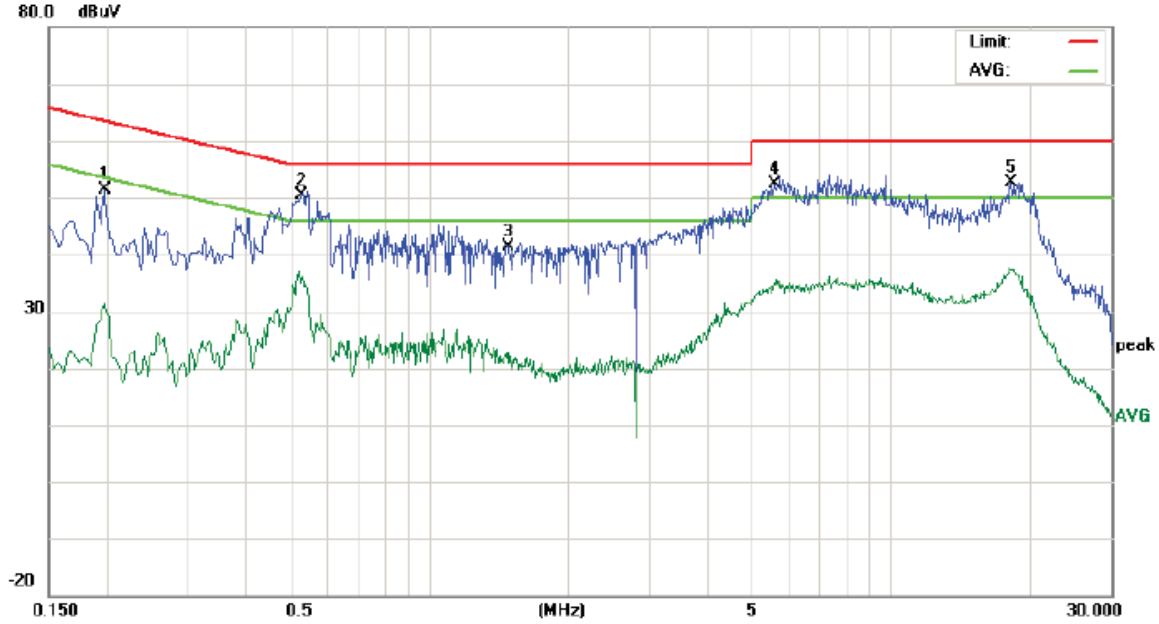
<table>
<tr><td>Test Procedure:</td><td>Test frequency range :150KHz-30MHz<br>1) The mains terminal disturbance voltage test was conducted in a shielded room.<br>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.<br>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,<br>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.<br>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>Quasi-peak</th><th>Average</th></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.<br>NOTE : The lower limit is applicable at the transition frequency</td></tr>
</table>

**Measurement Data**

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:




Site site #1 Phase: L1 Temperature: 24

Limit: FCC Class B CE(QP) Power: AC 120V/60Hz Humidity: 55 %

EUT: ARC AIR ACCESSORY PACK

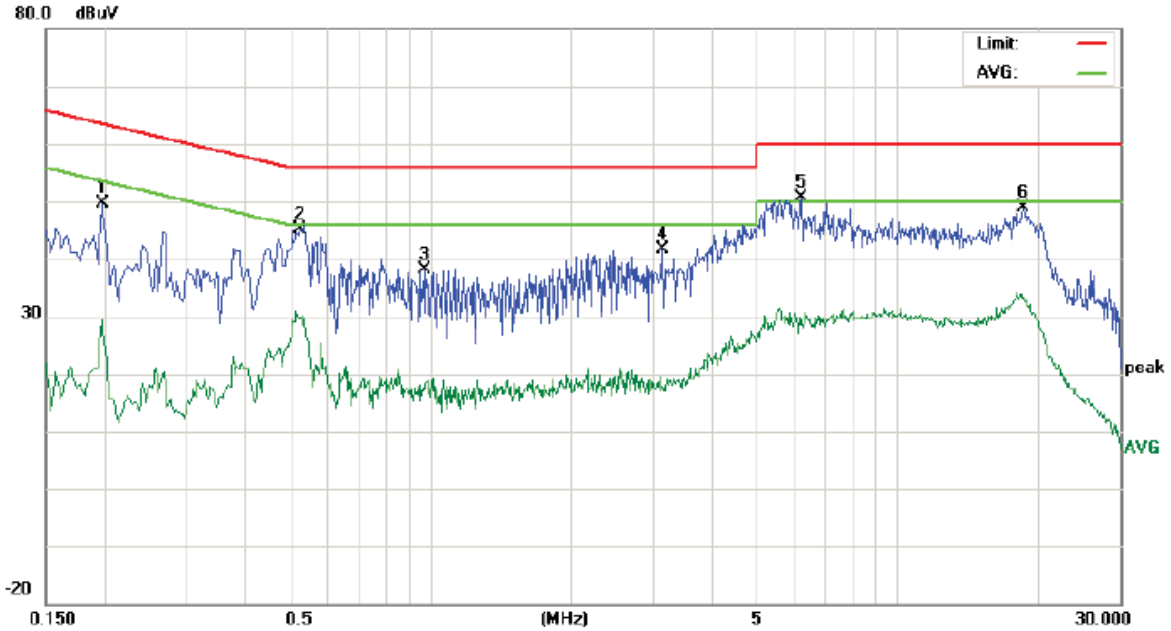
M/N: C8384

Mode: RUNNING

Note:

| No. | Freq. | Reading_Level (dBuV) | | | Correct Factor | Measurement (dBuV) | | | Limit (dBuV) | | Margin (dB) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | Peak | QP | AVG | dB | peak | QP | AVG | QP | AVG | QP | AVG | P/F | Comment |
| 1 | 0.1980 | 41.48 | 36.47 | 19.24 | 9.80 | 51.28 | 46.27 | 29.04 | 63.69 | 53.69 | -17.42 | -24.65 | P | |
| 2 | 0.5220 | 39.53 | 37.14 | 25.60 | 9.90 | 49.43 | 47.04 | 35.50 | 56.00 | 46.00 | -8.96 | -10.50 | P | |
| 3 | 1.4900 | 31.31 | 24.68 | 10.50 | 10.00 | 41.31 | 34.68 | 20.50 | 56.00 | 46.00 | -21.32 | -25.50 | P | |
| 4 | 5.6420 | 41.38 | 35.21 | 22.84 | 10.00 | 51.38 | 45.21 | 32.84 | 60.00 | 50.00 | -14.79 | -17.16 | P | |
| 5 | 18.2099 | 40.84 | 34.51 | 25.76 | 10.36 | 51.20 | 44.87 | 36.12 | 60.00 | 50.00 | -15.13 | -13.88 | P | |

Neutral line:




Site site #1 Phase: N Temperature: 24

Limit: FCC Class B CE(QP) Power: AC 120V/60Hz Humidity: 55 %

EUT: ARC AIR ACCESSORY PACK

M/N: C8384

Mode: RUNNING

Note:

| No. | Freq. | Reading_Level (dBuV) | | | Correct Factor | Measurement (dBuV) | | | Limit (dBuV) | | Margin (dB) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | Peak | QP | AVG | dB | peak | QP | AVG | QP | AVG | QP | AVG | P/F | Comment |
| 1 | 0.1980 | 39.75 | 34.40 | 13.53 | 9.80 | 49.55 | 44.20 | 23.33 | 63.69 | 53.69 | -19.49 | -30.36 | P | |
| 2 | 0.5180 | 34.54 | 31.13 | 19.68 | 9.90 | 44.44 | 41.03 | 29.58 | 56.00 | 46.00 | -14.97 | -16.42 | P | |
| 3 | 0.9780 | 28.14 | 19.47 | 7.40 | 10.00 | 38.14 | 29.47 | 17.40 | 56.00 | 46.00 | -26.53 | -28.60 | P | |
| 4 | 3.1500 | 31.52 | 19.25 | 7.04 | 10.00 | 41.52 | 29.25 | 17.04 | 56.00 | 46.00 | -26.75 | -28.96 | P | |
| 5 | 6.2260 | 40.52 | 31.58 | 17.70 | 10.00 | 50.52 | 41.58 | 27.70 | 60.00 | 50.00 | -18.42 | -22.30 | P | |
| 6 | 18.6780 | 38.41 | 30.94 | 21.41 | 10.39 | 48.80 | 41.33 | 31.80 | 60.00 | 50.00 | -18.67 | -18.20 | P | |

*Notes:*

*1. The following Quasi-Peak and Average measurements were performed on the EUT:*

*2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.*

# Appendix H) Restricted bands around fundamental frequency (Radiated)/Radiated Spurious Emissions

**Receiver Setup:**

| Frequency | Detector | RBW | VBW | Remark |
|---|---|---|---|---|
| 0.009MHz-0.090MHz | Peak | 10kHz | 30kHz | Peak |
| 0.009MHz-0.090MHz | Average | 10kHz | 30kHz | Average |
| 0.090MHz-0.110MHz | Quasi-peak | 10kHz | 30kHz | Quasi-peak |
| 0.110MHz-0.490MHz | Peak | 10kHz | 30kHz | Peak |
| 0.110MHz-0.490MHz | Average | 10kHz | 30kHz | Average |
| 0.490MHz -30MHz | Quasi-peak | 10kHz | 30kHz | Quasi-peak |
| 30MHz-1GHz | Quasi-peak | 120 kHz | 300kHz | Quasi-peak |
| Above 1GHz | Peak | 1MHz | 3MHz | Peak |
| | Peak | 1MHz | 10Hz | Average |

**Test Procedure:**

**Below 1GHz test procedure as below:**

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**Above 1GHz test procedure as below:**

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre( Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel
i. Repeat above procedures until all frequencies measured was complete.

Limit:

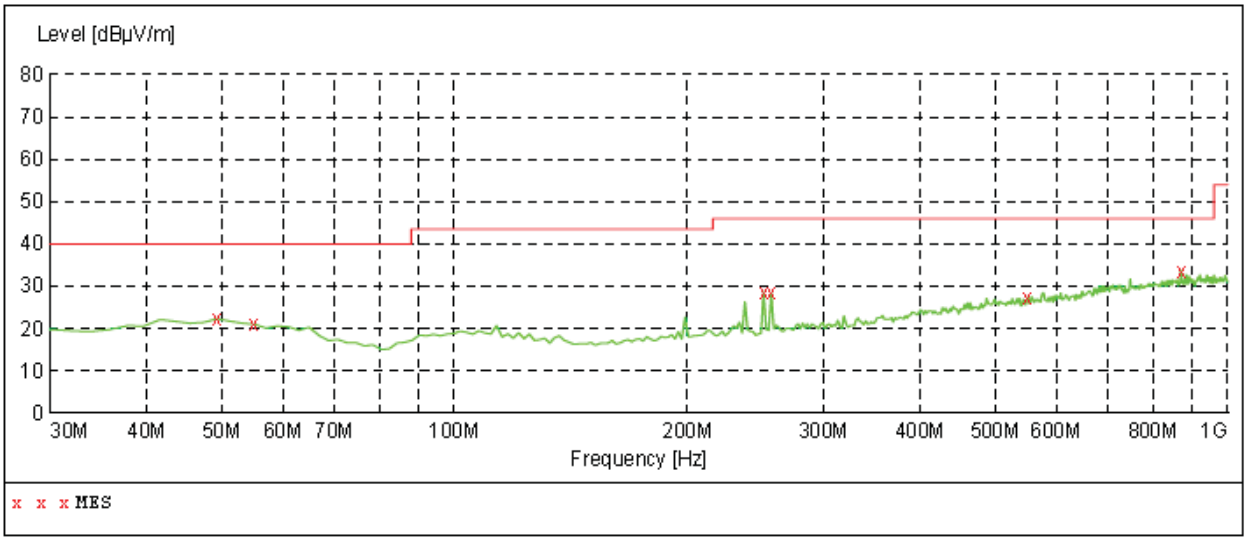
| Frequency | Field strength (microvolt/meter) | Limit (dBμV/m) | Remark | Measurement distance (m) |
|---|---|---|---|---|
| 0.009MHz-0.490MHz | 2400/F(kHz) | - | - | 300 |
| 0.490MHz-1.705MHz | 24000/F(kHz) | - | - | 30 |
| 1.705MHz-30MHz | 30 | - | - | 30 |
| 30MHz-88MHz | 100 | 40.0 | Quasi-peak | 3 |
| 88MHz-216MHz | 150 | 43.5 | Quasi-peak | 3 |
| 216MHz-960MHz | 200 | 46.0 | Quasi-peak | 3 |
| 960MHz-1GHz | 500 | 54.0 | Quasi-peak | 3 |
| Above 1GHz | 500 | 54.0 | Average | 3 |

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

## Radiated Spurious Emissions test Data:

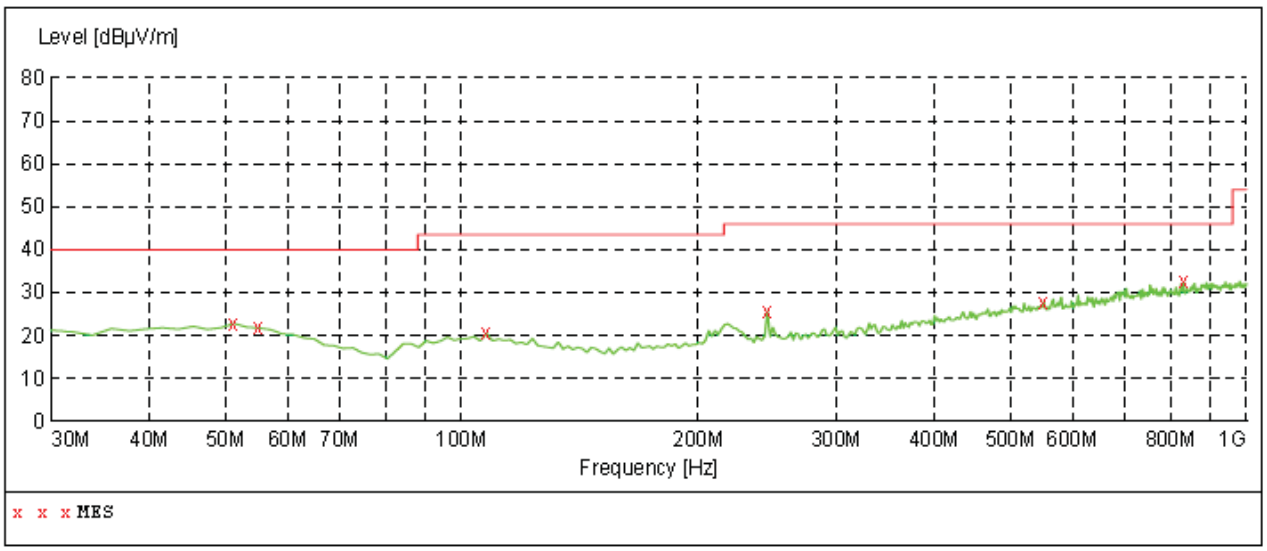
### Radiated Emission below 1GHz

30MHz~1GHz (QP)




***MEASUREMENT RESULT:***

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Det. | Height cm | Azimuth deg | Polarization |
|---|---|---|---|---|---|---|---|---|
| 49.400000 | 22.30 | 16.5 | 40.0 | 17.7 | --- | 100.0 | 106.00 | HORIZONTAL |
| 55.220000 | 21.00 | 15.8 | 40.0 | 19.0 | --- | 200.0 | 359.00 | HORIZONTAL |
| 251.160000 | 28.60 | 14.8 | 46.0 | 17.4 | --- | 200.0 | 141.00 | HORIZONTAL |
| 256.980000 | 28.40 | 14.9 | 46.0 | 17.6 | --- | 200.0 | 141.00 | HORIZONTAL |
| 551.860000 | 27.40 | 21.8 | 46.0 | 18.6 | --- | 200.0 | 98.00 | HORIZONTAL |
| 870.020000 | 33.70 | 26.3 | 46.0 | 12.3 | --- | 200.0 | 203.00 | HORIZONTAL |




***MEASUREMENT RESULT:***

| Frequency MHz | Level dBµV/m | Transd dB | Limit dBµV/m | Margin dB | Det. | Height cm | Azimuth deg | Polarization |
|---|---|---|---|---|---|---|---|---|
| 51.340000 | 22.80 | 16.3 | 40.0 | 17.2 | --- | 200.0 | 299.00 | VERTICAL |
| 55.220000 | 21.80 | 15.8 | 40.0 | 18.2 | --- | 200.0 | 322.00 | VERTICAL |
| 107.600000 | 20.50 | 14.1 | 43.5 | 23.0 | --- | 200.0 | 89.00 | VERTICAL |
| 245.340000 | 25.70 | 14.7 | 46.0 | 20.3 | --- | 100.0 | 221.00 | VERTICAL |
| 551.860000 | 27.90 | 21.8 | 46.0 | 18.1 | --- | 100.0 | 10.00 | VERTICAL |
| 831.220000 | 32.50 | 25.8 | 46.0 | 13.5 | --- | 200.0 | 232.00 | VERTICAL |

## Transmitter Emission above 1GHz

| Test Frequency: 2402MHz | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Measurement (dBμV/m) | Limit (dBμV/m) | Margin(dB) | Type | Antenna (H/V) | Result (P/F) |
| 2390 | 45.2 | 74 | 28.8 | PK | H | Pass |
| 4804 | 59.0 | 74 | 25.6 | PK | H | Pass |
| 4804 | 40.7 | 54 | 13.3 | AV | H | Pass |
| 7206 | 51.0 | 74 | 23.0 | PK | H | Pass |
| 2390 | 44.7 | 74 | 29.3 | PK | V | Pass |
| 4804 | 54.1 | 74 | 19.9 | PK | V | Pass |
| 4804 | 42.7 | 54 | 11.3 | AV | V | Pass |
| 7206 | 52.5 | 74 | 21.5 | PK | V | Pass |

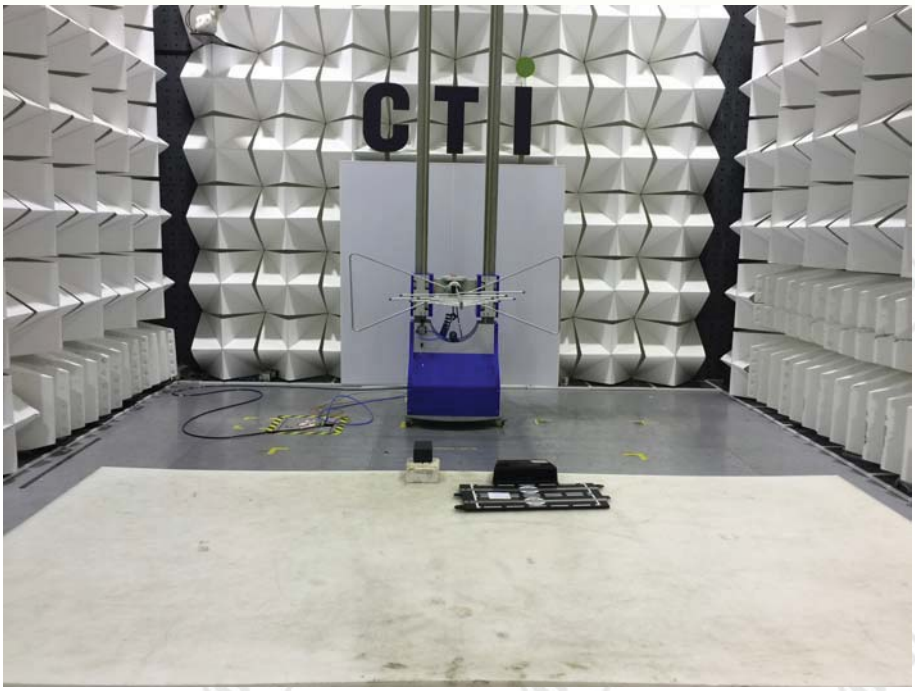
| Test Frequency: 2440MHz | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Measurement (dBμV/m) | Limit (dBμV/m) | Margin(dB) | Type | Antenna (H/V) | Result (P/F) |
| 4880 | 55.6 | 74 | 18.4 | PK | H | Pass |
| 4880 | 39 | 54 | 15.0 | AV | H | Pass |
| 7320 | 51.9 | 74 | 22.1 | PK | H | Pass |
| 9760 | 60.4 | 74 | 13.6 | PK | H | Pass |
| 9760 | 44.2 | 54 | 9.8 | AV | H | Pass |
| 4880 | 48.8 | 74 | 25.2 | PK | V | Pass |
| 7320 | 53.6 | 74 | 20.4 | PK | V | Pass |
| 9760 | 55.8 | 74 | 18.3 | PK | V | Pass |
| 9760 | 42.3 | 54 | 11.7 | AV | V | Pass |

| Test Frequency: 2480MHz | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Measurement (dBμV/m) | Limit (dBμV/m) | Margin(dB) | Type | Antenna (H/V) | Result (P/F) |
| 2483.5 | 49.1 | 74 | 24.6 | PK | H | Pass |
| 4960 | 55.1 | 74 | 18.9 | PK | H | Pass |
| 4960 | 40.2 | 54 | 13.8 | AV | H | Pass |
| 7440 | 53.5 | 74 | 20.5 | PK | H | Pass |
| 2483.5 | 49.4 | 74 | 24.6 | PK | V | Pass |
| 4960 | 53.5 | 74 | 20.5 | PK | V | Pass |
| 7440 | 54.1 | 74 | 19.9 | PK | V | Pass |
| 7440 | 40 | 54 | 14.0 | AV | V | Pass |

Note:
1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading - Correct Factor
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

# PHOTOGRAPHS OF TEST SETUP

Test mode No.: SSA-00185




**Radiated spurious emission Test Setup-1 (Below 1GHz)**


**Radiated spurious emission Test Setup-2(Above 1GHz)**

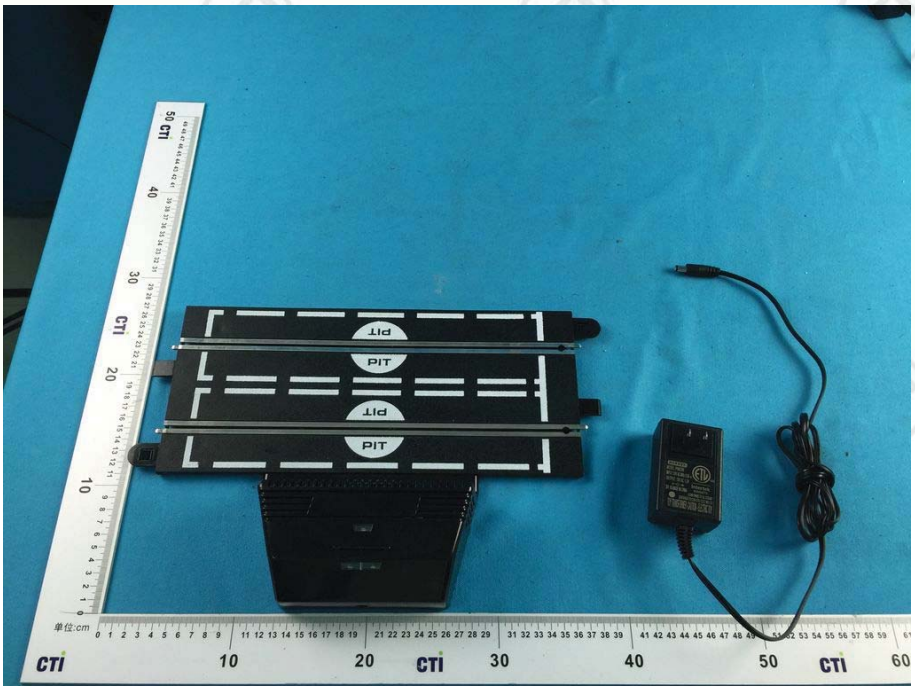

**Conducted emission Test Setup**

# PHOTOGRAPHS OF EUT Constructional Details

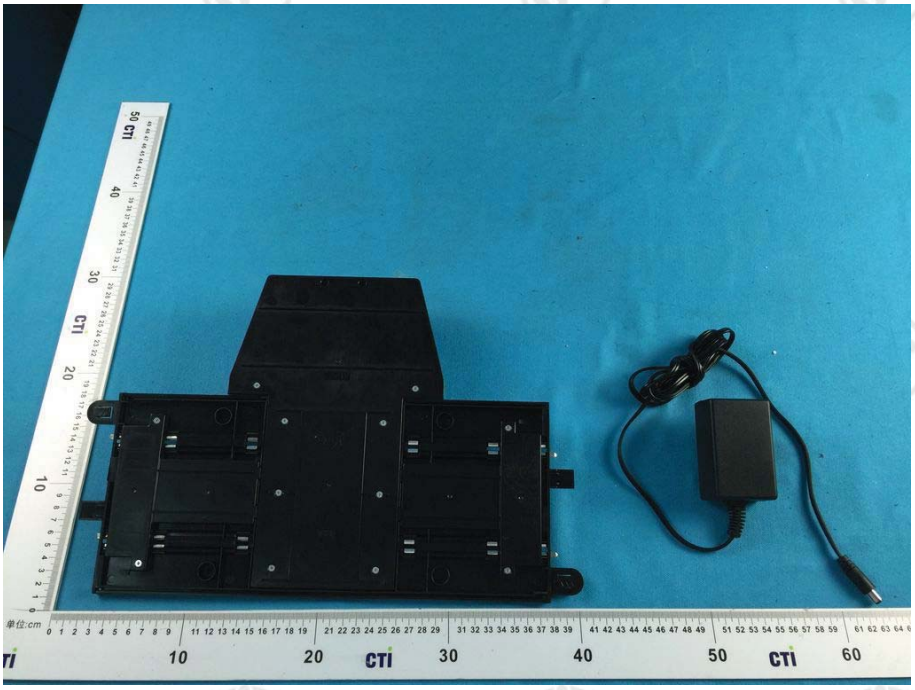
Test mode No.: SSA-00185

View of Product-1

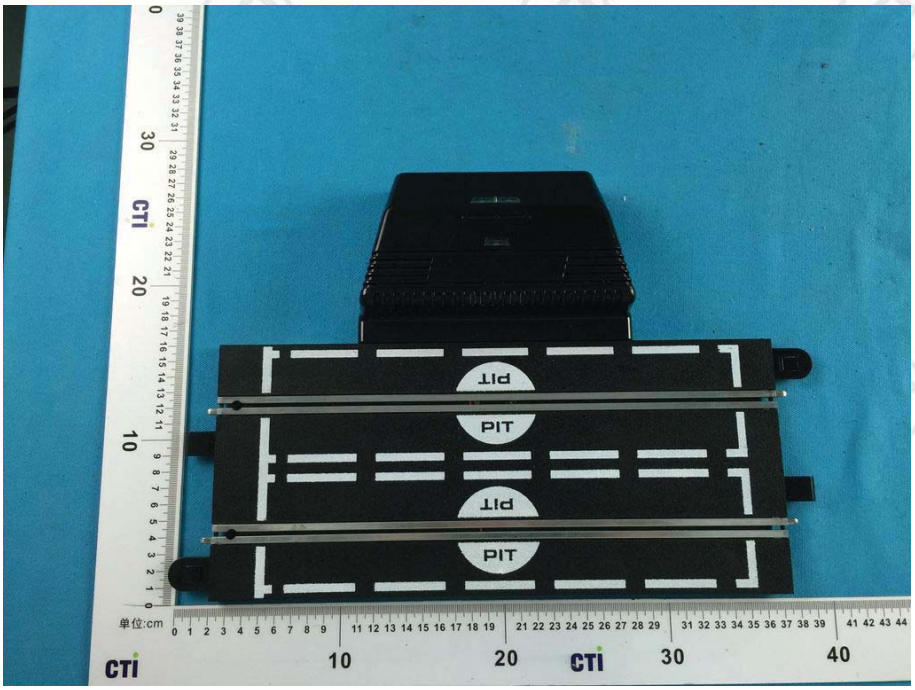
View of Product-2



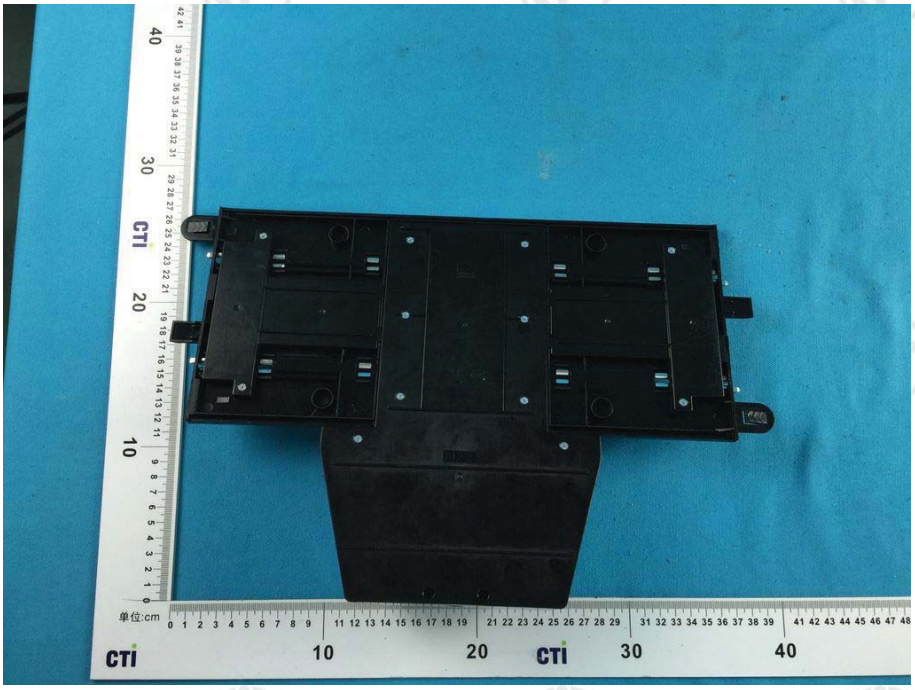

View of Product-3



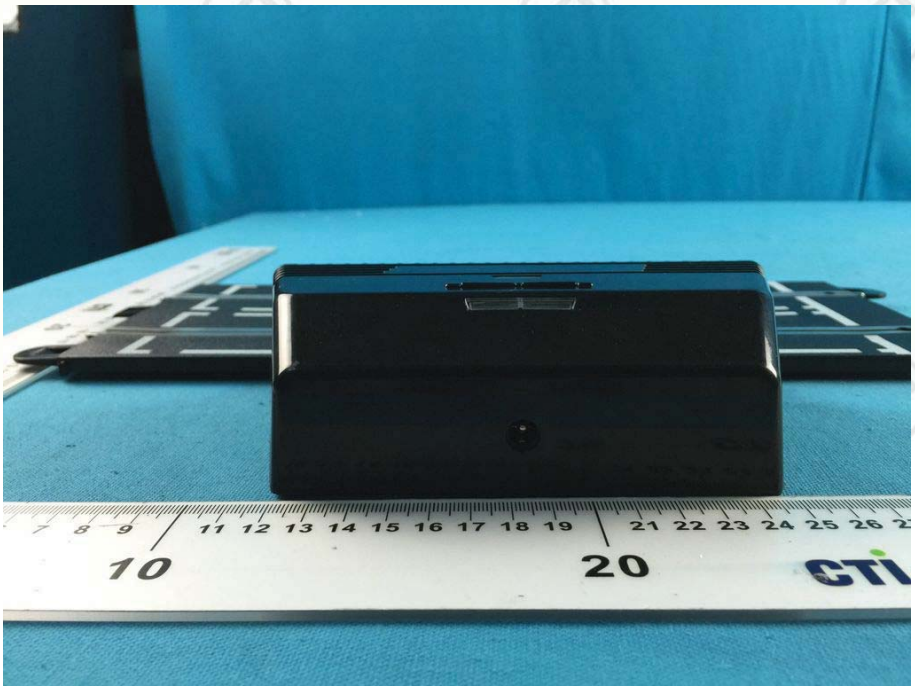
View of Product-4



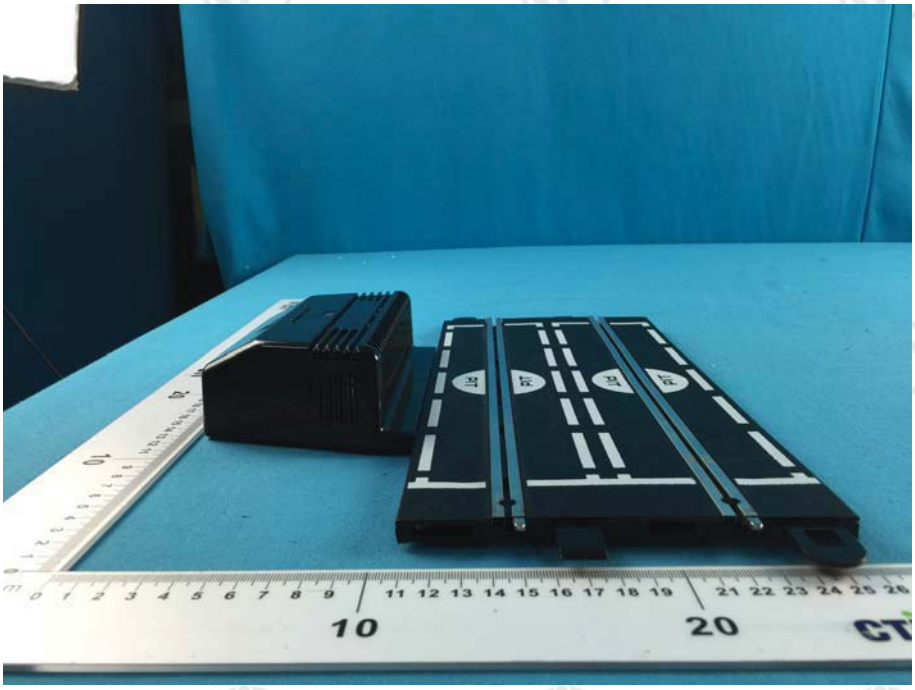

View of Product-5




View of Product-6

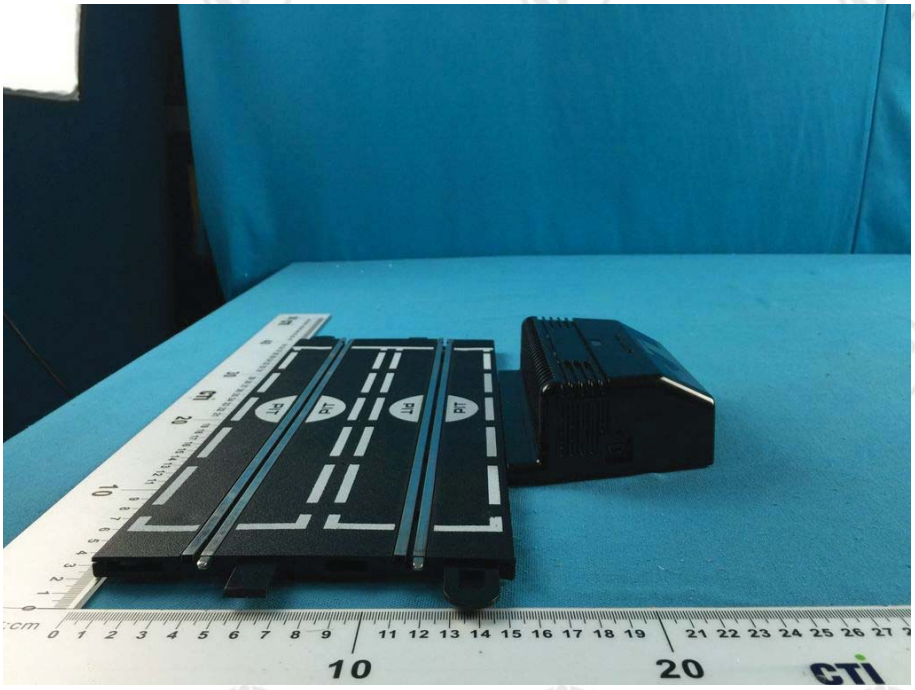


View of Product-7

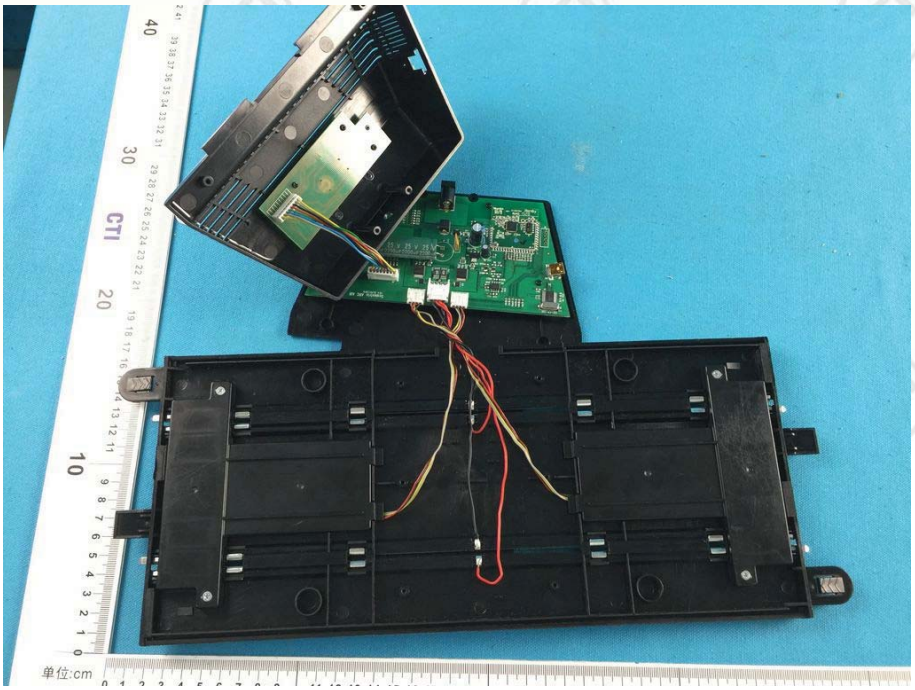


View of Product-8

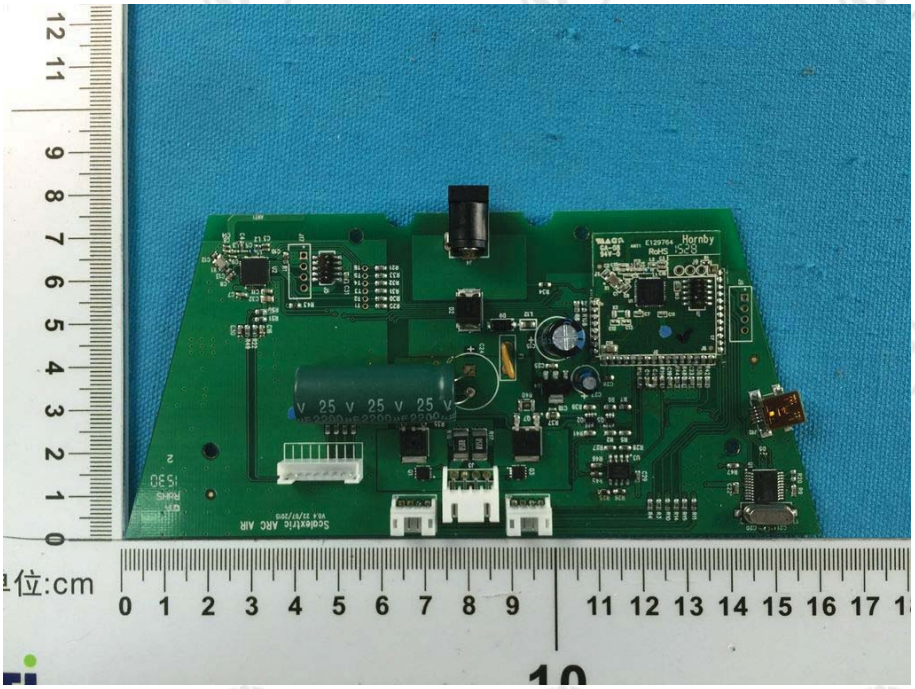

View of Product-9



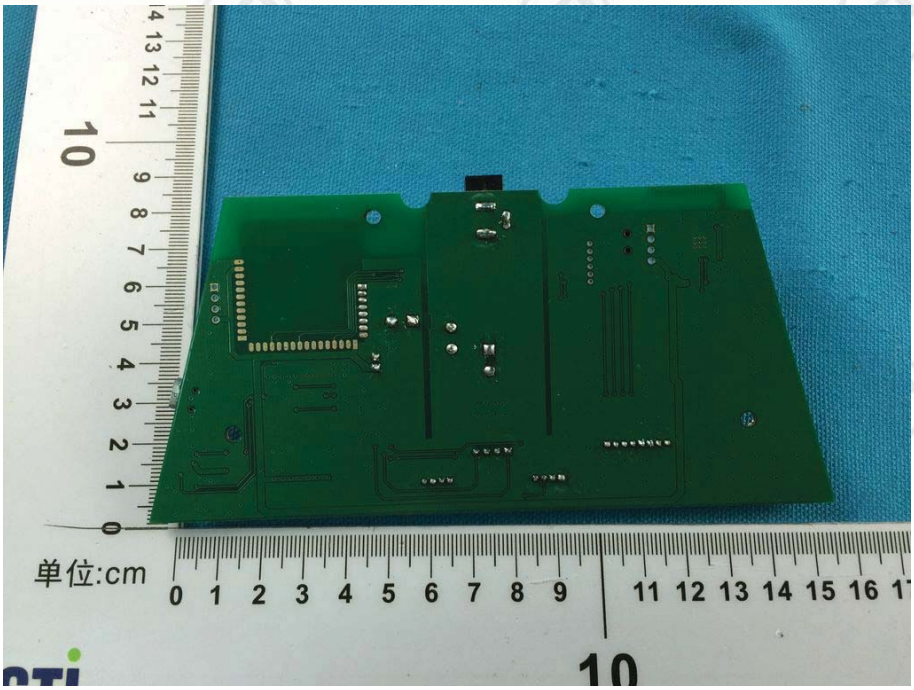

View of Product-10



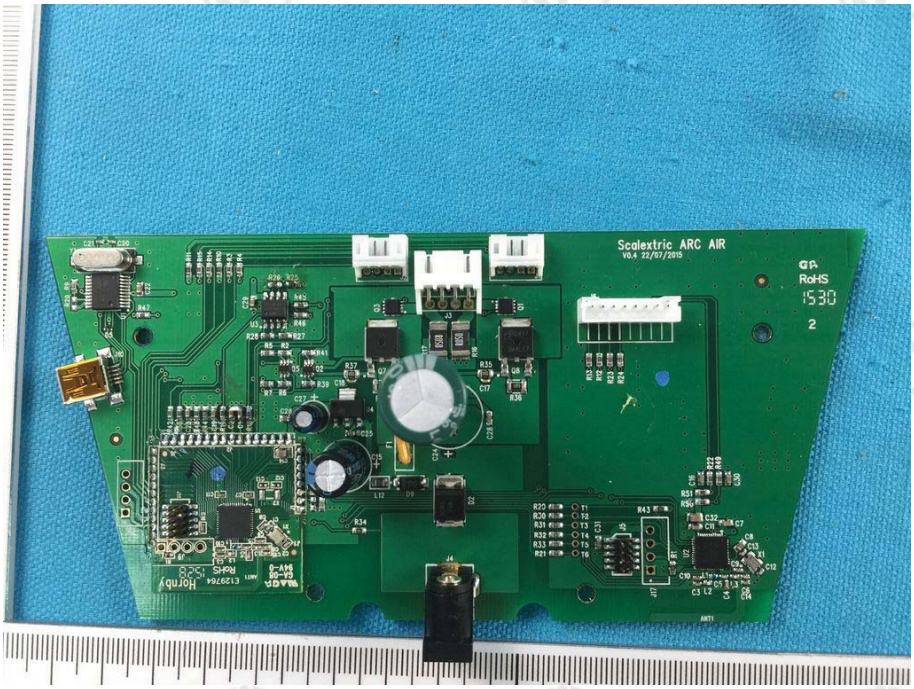

View of Product-11



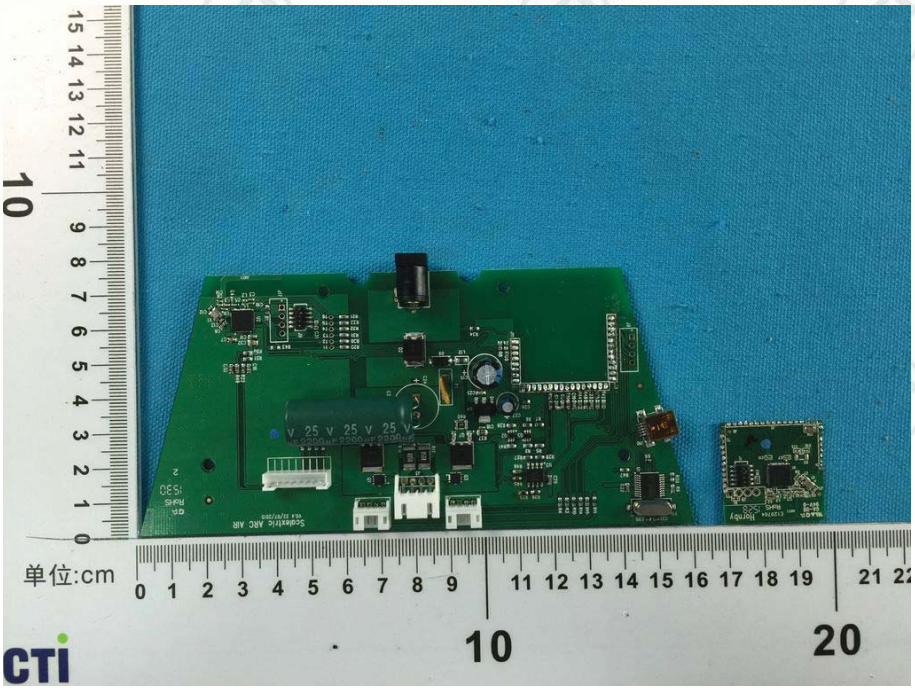

View of Product-12



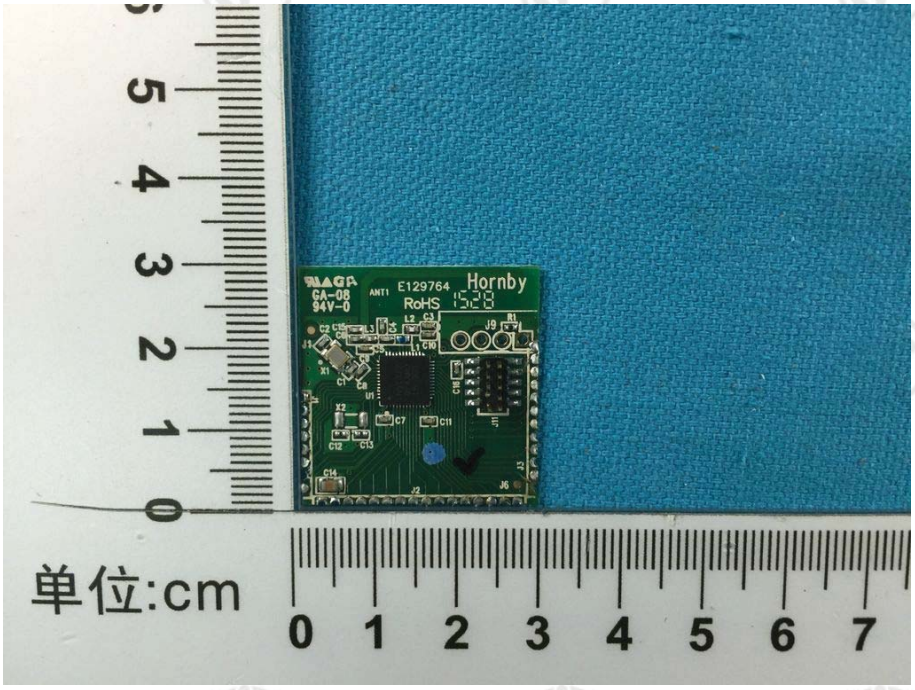

View of Product-13



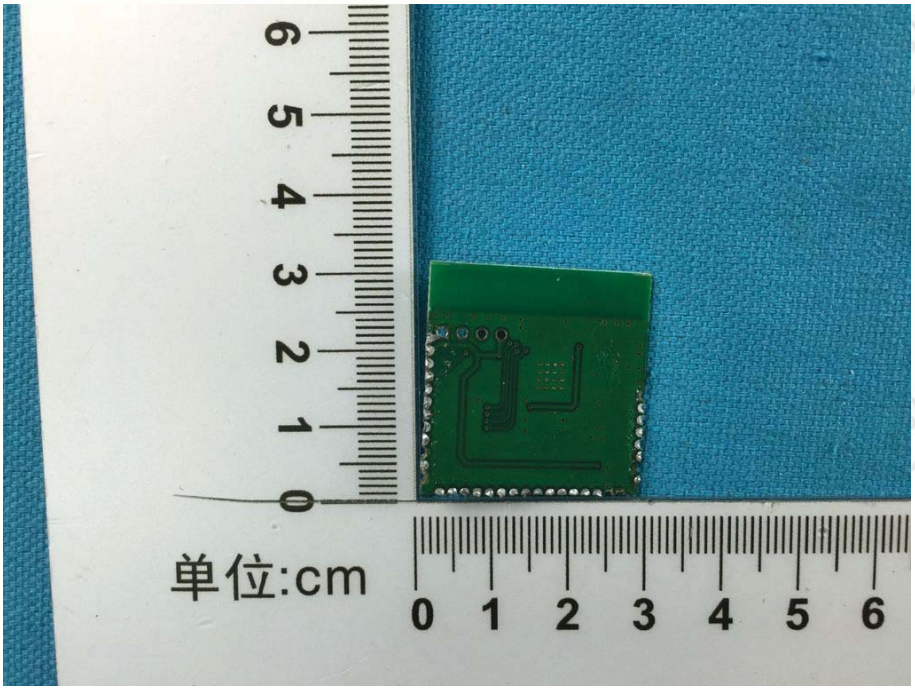

View of Product-14



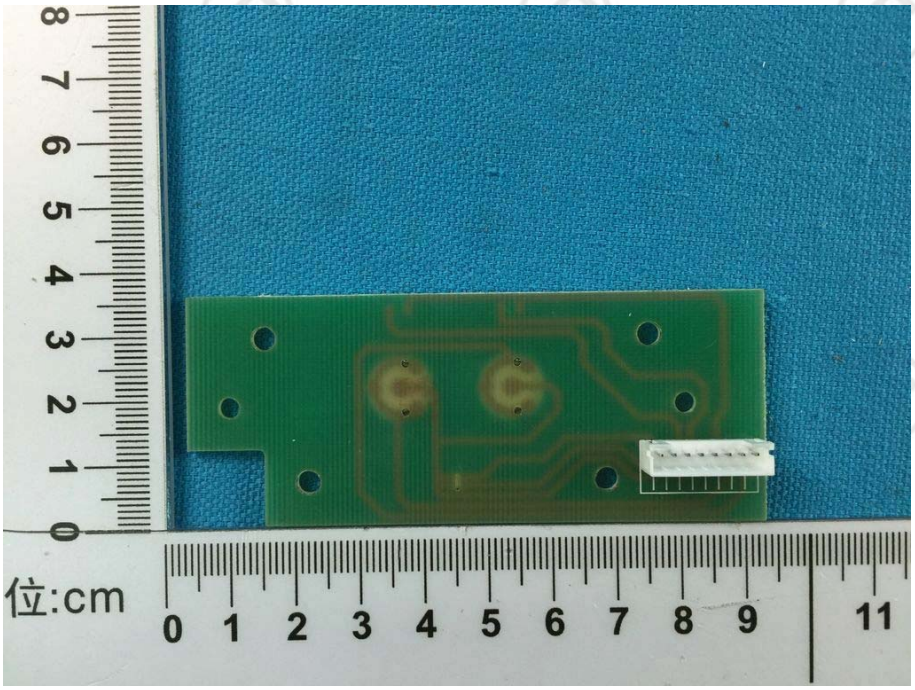

View of Product-15



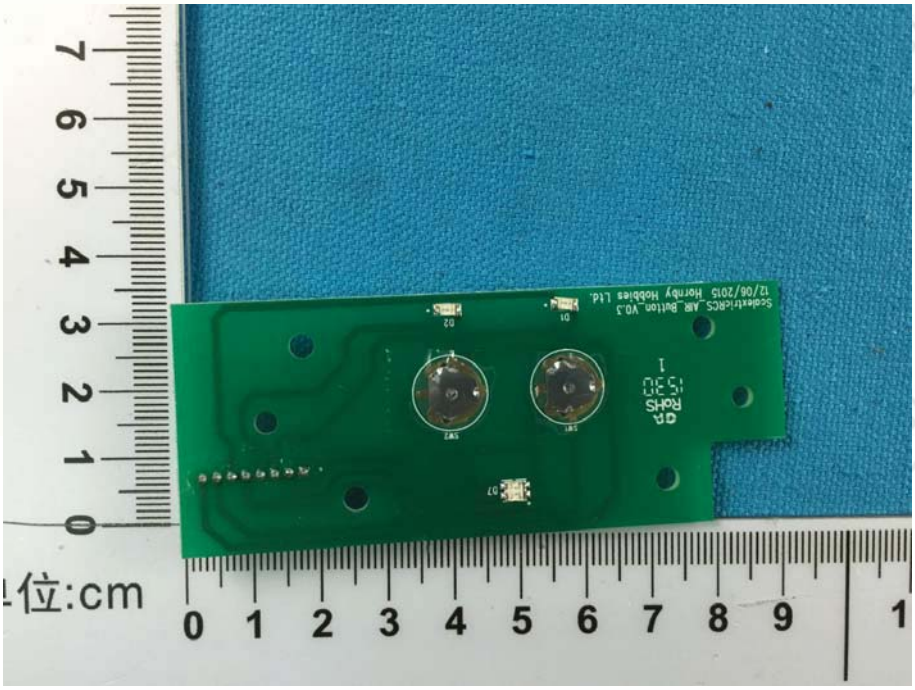

View of Product-16



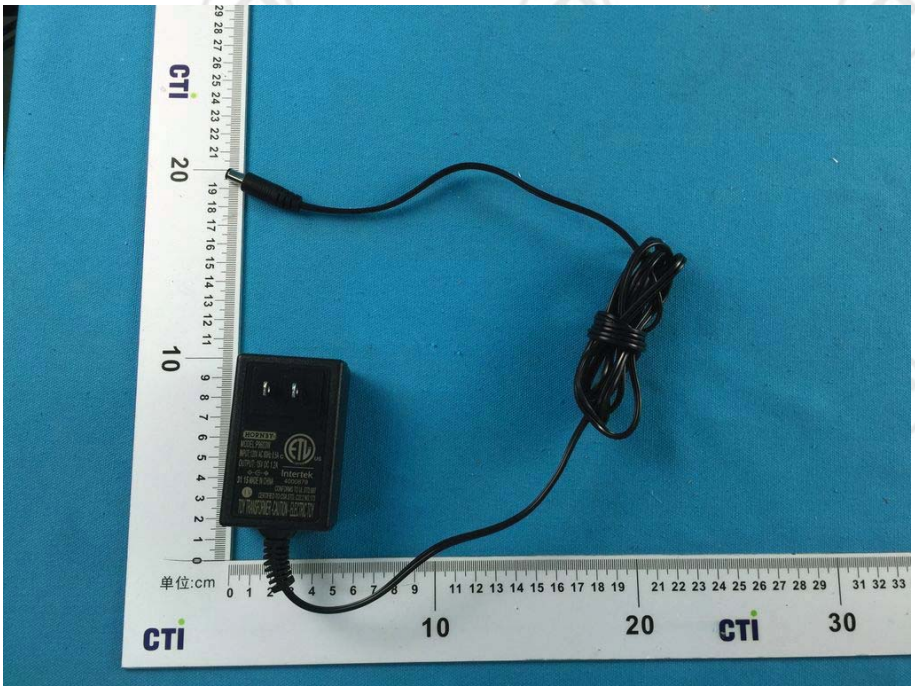

View of Product-17




View of Product-18




View of Product-19

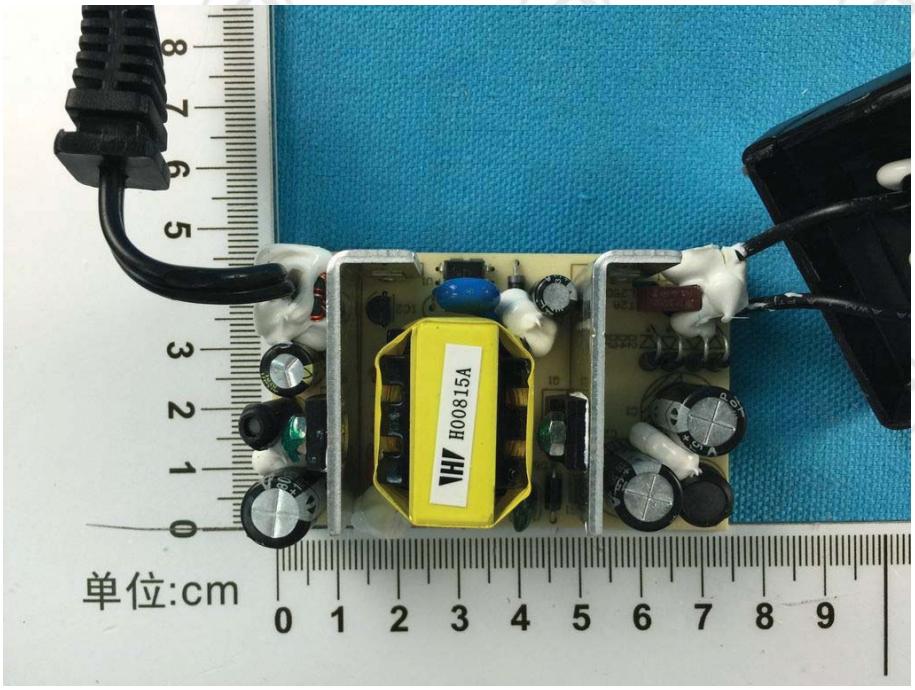



View of Product-20

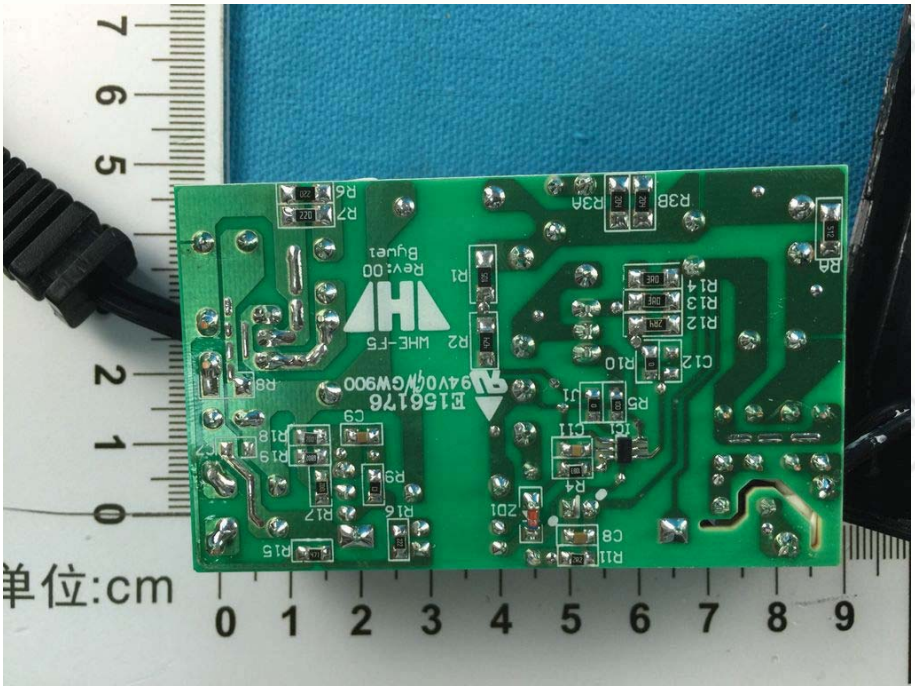

View of Product-21


View of Product-22


View of Product-23




View of Product-24




View of Product-25

*** End of Report ***

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.