# TEST REPORT

**Applicant:** Dragino Technology Co., Limited.

**Address of Applicant:** Room 7009, Zi'An Commercial Building, Qian Jin 1 Road, Xin'An 6thDistrict, Baoan, Shenzhen, China

**Equipment Under Test (EUT)**

Product Name: Wireless Sensor Node / ATA

Model No.: DT01, MP2.0 Phone, MP2.0 Basic, MS14-P, MS14-S, MS14-HEV

**Applicable standards:** EN 55022:2010/AC:2011
EN 55024:2010
EN 61000-3-2:2014
EN 61000-3-3:2013

**Date of sample receipt:** December 01, 2015

**Date of Test:** December 02-14, 2015

**Date of report issued:** December 15, 2015

**Test Result :** PASS *

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/30/EU are considered.

**Robinson Lo**
**Laboratory Manager**

## 2 Version

| *Version No.* | *Date* | *Description* |
|---|---|---|
| *00* | *December 15, 2015* | *Original* |
| | | |
| | | |
| | | |
| | | |

***Prepared By:*** Edward.Pan ***Date:*** *December 15, 2015*

***Project Engineer***

***Check By:*** hank.yan ***Date:*** *December 15, 2015*

***Reviewer***

# 3 Contents

# 4 Test Summary

| Test item | Test Requirement | Test Method | Class / Severity | Result |
|---|---|---|---|---|
| Radiated Emission | EN 55022 | EN 55022 | Class B | Pass |
| Conducted Emission | EN 55022 | EN 55022 | Class B | Pass |
| Harmonic Emission | EN 61000-3-2 | EN 61000-3-2 | N/A | N/A |
| Flicker Emission | EN 61000-3-3 | EN 61000-3-3 | Clause 5 | Pass |
| Electrostatic discharge | EN 55024 | EN 61000-4-2:2009 | Contact ±2,±4 kV<br>Air ±2,±4,±8 kV | Pass |
| Radio-frequency electromagnetic field Amplitude modulated | EN 55024 | EN 61000-4-3: 2006+A1: 2008 +A2: 2010 | 3V/m<br>80%, 1kHz, AM | Pass |
| Electrical fast transients | EN 55024 | EN 61000-4-4: 2004+A1:2010 | AC ± 1.0kV | Pass |
| Surges | EN 55024 | EN 61000-4-5: 2006 | ±1kV D.M<br>±2kV C.M | Pass |
| Radio-frequency continuous conducted | EN 55024 | EN 61000-4-6: 2009 | 3Vrms (emf), 80%, 1kHz Amp. Mod. | Pass |
| Voltage dips and Voltage interruptions | EN 55024 | EN 61000-4-11: 2004 | 0 % $U_T$* for 0.5per<br>0 % $U_T$* for 250per<br>70 % $U_T$* for 25per | Pass |

*Remark:*

1. *Pass: Comply with the essential requirements in the standard.*
2. *N/A: not applicable*
3. *$U_T$: the nominal supply voltage; D.M: Differential Mode; C.M: Common Mode.*

# 5 General Information

## 5.1 Client Information

| | |
|---|---|
| Applicant: | Dragino Technology Co., Limited. |
| Address of Applicant: | Room 7009, Zi'An Commercial Building, Qian Jin 1 Road, Xin'An 6thDistrict, Baoan, Shenzhen, China |
| Manufacturer/ Factory: | Dragino Technology Co., Limited. |
| Address of Manufacturer/ Factory: | Room 7009, Zi'An Commercial Building, Qian Jin 1 Road, Xin'An 6thDistrict, Baoan, Shenzhen, China |

## 5.2 General Description of EUT

| | |
|---|---|
| Product Name: | Wireless Sensor Node / ATA |
| Model No.: | DT01, MP2.0 Phone, MP2.0 Basic, MS14-P, MS14-S, MS14-HEV |
| Power Supply: | Adapter:<br>Model:F05W-120050SPAV<br>Input:AC100-240V~50/60Hz, 190mA<br>Output:DC 12V 0.5A |

## 5.3 Test mode and Test voltage

| | |
|---|---|
| **Test mode:** | |
| WAN mode | Keep the EUT in ping with external network by PC mode |
| Phone mode | Keep the EUT in dialing mode |
| USB mode | Keep the EUT in USB storage mode |
| **Test voltage:** | |
| AC 230V 50Hz | |

## 5.4 Description of Support Units

| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| Apple | PC | A1278 | C1MN99ERDTY3 |

## 5.5 Deviation from Standards

| |
|---|
| None. |

## 5.6 Abnormalities from Standard Conditions

| |
|---|
| None. |

## 5.7 Monitoring of EUT for All Immunity Test

| | |
|---|---|
| Visual: | Monitored Display of LCD |
| Audio: | N/A |

## 5.8 Test Facility

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

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 28, 2013.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been

Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

## 5.9 Test Location

| RI test was performed at: |
|---|
| SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,<br>No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057. |
| All other tests were performed at: |
| Global United Technology Services Co., Ltd.<br>Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China<br>Tel: 0755-27798480<br>Fax: 0755-27798960 |

# 6 Test Instruments List

| Radiated Emission | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | 3m Semi- Anechoic Chamber | ZhongYu Electron | 9.0(L)*6.0(W)* 6.0(H) | GTS250 | July. 03 2015 | July. 02 2020 |
| 2 | Control Room | ZhongYu Electron | 6.2(L)*2.5(W)* 2.4(H) | GTS251 | N/A | N/A |
| 3 | ESU EMI Test Receiver | R&S | ESU26 | GTS203 | July. 03 2015 | July. 02 2016 |
| 4 | BiConiLog Antenna | SCHWARZBECK | VULB9163 | GTS214 | July. 06 2015 | July. 05 2016 |
| 5 | RF Amplifier | HP | 8347A | GTS204 | July. 03 2015 | July. 02 2016 |
| 6 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 7 | Coaxial cable | GTS | N/A | GTS210 | Jul. 05 2015 | Jul. 04 2016 |
| 8 | Thermo meter | N/A | N/A | GTS256 | July. 07 2015 | July. 06 2016 |

| Conducted Emission: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Shielding Room | ZhongYu Electron | 7.3(L)x3.1(W)x2.9(H) | GTS252 | May. 16 2014 | May. 15 2019 |
| 2 | EMI Test Receiver | R&S | ESCI 7 | GTS552 | April. 29 2015 | April. 29 2016 |
| 3 | Pulse Limiter | R&S | ESH3-Z2 | GTS224 | July. 03 2015 | July. 02 2016 |
| 4 | Coaxial Switch | ANRITSU CORP | MP59B | GTS225 | July. 03 2015 | July. 02 2016 |
| 5 | Artificial Mains Network | SCHWARZBECK MESS | NSLK8127 | GTS226 | July. 03 2015 | July. 02 2016 |
| 6 | Coaxial Cable | GTS | N/A | GTS227 | Jul. 05 2015 | Jul. 04 2016 |
| 7 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| 8 | Thermo meter | KTJ | TA328 | GTS233 | July. 07 2015 | July. 06 2016 |

| ESD: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | ESD Simulator | EMPEK | ESD-2030A | GTS257 | July. 07 2015 | July. 06 2016 |

| Conducted Immunity: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Signal Generator | SCHLODER | CDG-6000-25 | GTS553 | April. 14 2015 | April. 13 2016 |
| 2 | CDN | SCHLODER | CDN-M2+3 | GTS554 | April. 14 2015 | April. 13 2016 |
| 3 | EM-Clapm | SCHLODER | EMCL-20 | GTS555 | April. 14 2015 | April. 13 2016 |
| 4 | ATT | SCHLODER | ATT-6DB-100 | GTS556 | April. 14 2015 | April. 13 2016 |

| Harmonic/ Flicker: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | Power Analyzer | EMTEST | DPA500 | GTS235 | July. 03 2015 | July. 02 2016 |
| 2 | AC Power Source | EMTEST | ACS500 | GTS236 | July. 03 2015 | July. 02 2016 |
| 3 | Test software | EMTEST | ACS | N/A | N/A | N/A |
| 4 | Thermo meter | KTJ | TA328 | GTS256 | July. 07 2015 | July. 06 2016 |

| EFT, Surge, Voltage dips and Interruption: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | EMTEST system | EMTEST | UCS 500N-M6 | GTS239 | July. 03 2015 | July.02 2016 |
| 2 | capacitive Clamp | EMTEST | HFK | GTS557 | July. 14 2015 | July. 13 2016 |
| 3 | Thermo meter | KTJ | TA328 | GTS238 | July. 07 2015 | July. 06 2016 |

| Radiated Immunity: | | | | | | |
|---|---|---|---|---|---|---|
| **Item** | **Test Equipment** | **Manufacturer** | **Model No.** | **Inventory No.** | **Cal.Date (mm-dd-yy)** | **Cal.Due date (mm-dd-yy)** |
| 1 | 3m Semi-Anechoic Chamber | ETS-LINDGREN | N/A | SEL0017 | June 12 2015 | June 11 2016 |
| 2 | Signal Generator | Rohde & Schwarz | SML03 | SEL0068 | June 19 2015 | June 18 2016 |
| 3 | RF Amplifier 30M-1GHz | Amplifier Research | 250W1000A | SEL0066 | Nov. 01 2015 | Oct. 31 2016 |
| 4 | RF Amplifier 0.8-3.0GHz | Amplifier Research | 60S1G3 | SEL0065 | Nov. 01 2015 | Oct. 31 2016 |
| 5 | Power Meter | Rohde & Schwarz | NRVD | SEL0069 | June 19 2015 | June 18 2016 |
| 6 | Power Sensor | Rohde & Schwarz | URV5-Z2 | SEL0071 | June 19 2015 | June 18 2016 |
| 7 | Power Sensor | Rohde & Schwarz | URV5-Z2 | SEL0072 | June 19 2015 | June 18 2016 |
| 8 | Software EMC32 | Rohde & Schwarz | EMC32-S | SEL0082 | N/A | N/A |
| 9 | Log-periodic Antenna | Amplifier Research | AT1080 | SEL0073 | N/A | N/A |
| 10 | Antenna Tripod | Amplifier Research | TP1000A | SEL0074 | N/A | N/A |
| 11 | High Gain Horn Antenna (0.8-5GHz) | Amplifier Research | AT4002A | SEL0075 | N/A | N/A |
| 12 | Audio Analyzer | Rohde & Schwarz | UPL 16 | SEL0076 | June 19 2015 | June 18 2016 |
| 13 | Nexus conditioning amplifier | B&K | 2690 | SEL0078 | June 19 2015 | June 18 2016 |
| 14 | Mouth simulator | B&K | 4227 | SEL0079 | June 19 2015 | June 18 2016 |
| 15 | Sound level calibrator | B&K | 4231 | SEL0080 | June 19 2015 | June 18 2016 |
| 16 | Universal radio communication tester | Rohde & Schwarz | CMU200 | SEL0081 | June 19 2015 | June 18 2016 |

# 7 Emission Test Results

## 7.1 Radiated Emission

| | |
|---|---|
| Test Requirement: | EN 55022 |
| Test Method: | EN 55022 |
| Test Frequency Range: | 30MHz to 6GHz |
| Class / Severity: | Class B |
| Test site: | Measurement Distance: 3m |
| Receiver setup: | |

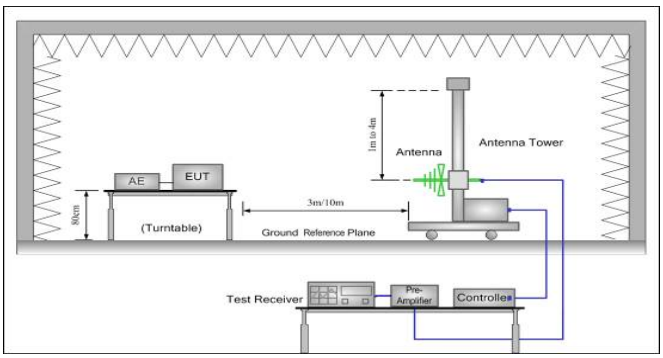
| Frequency | Detector | RBW | VBW | Value |
|---|---|---|---|---|
| 30MHz-1GHz | Quasi-peak | 120KHz | 300KHz | Quasi-peak |
| Above 1GHz | Peak | 1MHz | 3MHz | Peak |
| | AV | 1MHz | 3MHz | Average |

Limit:

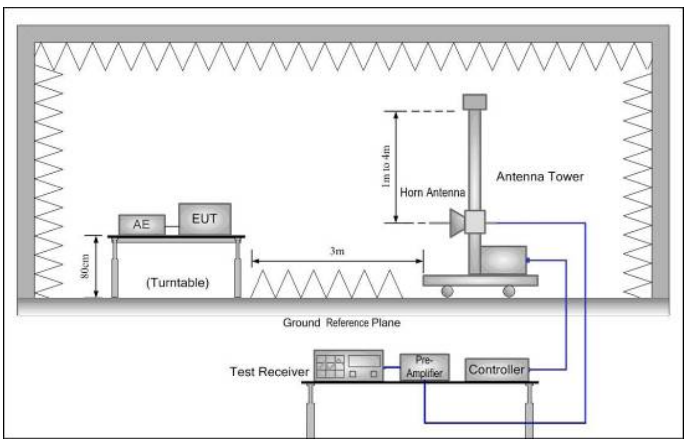
| Frequency | Limit (dBµV/m @3m) | Value |
|---|---|---|
| 30MHz-230MHz | 40.00 | Quasi-peak |
| 230MHz-1GHz | 47.00 | Quasi-peak |
| 1GHz-3GHz | 70.00 | Peak |
| 1GHz-3GHz | 50.00 | Average |
| 3GHz-6GHz | 74.00 | Peak |
| 3GHz-6GHz | 54.00 | Average |

Test setup:

Below 1GHz:




Above 1GHz:

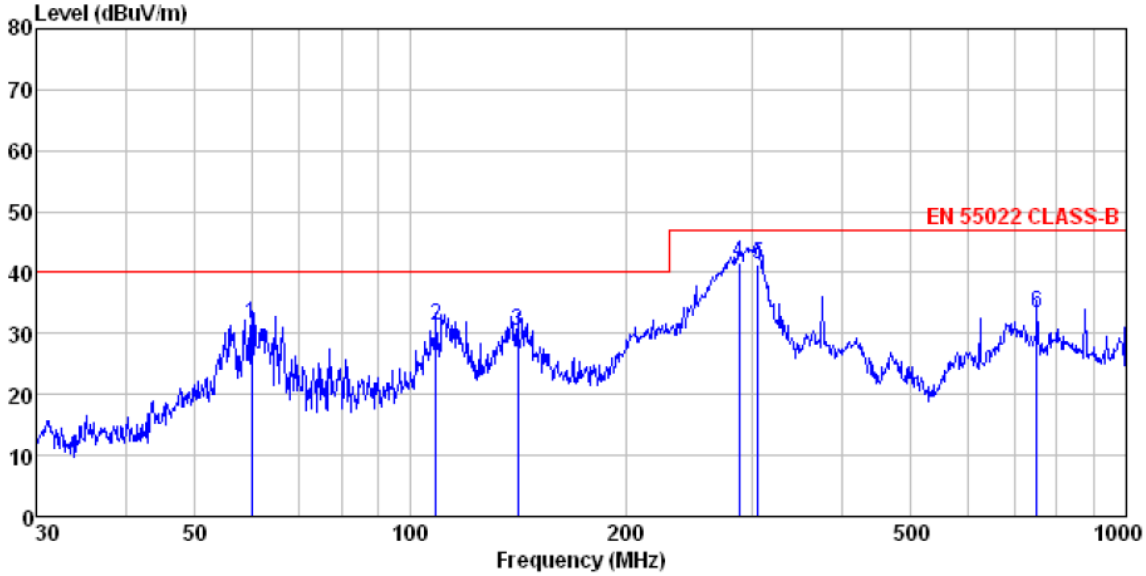


| | |
|---|---|
| Test Procedure: | **From 30MHz to 1GHz:**<br>1. The radiated emissions test was conducted in a semi-anechoic chamber.<br>2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.<br>3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT.<br>4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.<br>**Above 1GHz:**<br>1. The radiated emissions test was conducted in a fully-anechoic chamber.<br>2. 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, but separated from metallic contact with the ground reference plane by 0.1m of insulation.<br>3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum plots of the EUT.<br>4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization. |
| Test environment: | Temp.: 25 °C \| Humid.: 52% \| Press.: 1 012mbar |
| Measurement Record: | Uncertainty: ± 4.50dB |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details. Only the data of worst mode is reported. |
| Test results: | Pass |

**Measurement Data**

**Below 1GHz:**

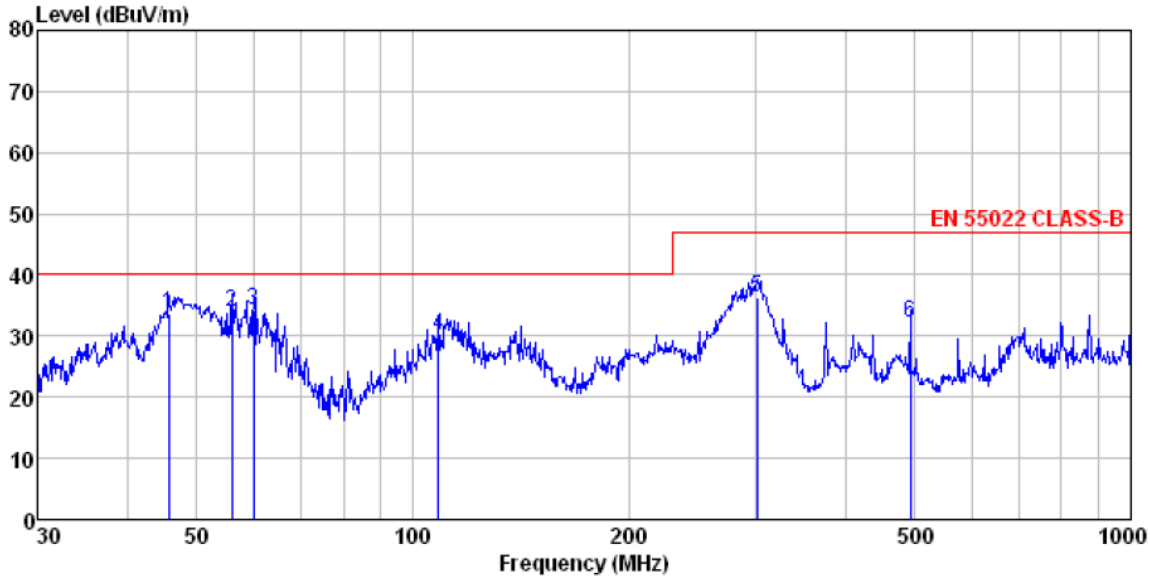
Horizontal:




Condition : EN 55022 CLASS-B VULB9163-2013M HORIZONTAL
Job No. : 2067RF
Test Mode : WAN mode
Test Engineer: He

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 60.069 | 46.08 | 14.69 | 0.86 | 29.92 | 31.71 | 40.00 | -8.29 | QP |
| 2 | 108.647 | 45.20 | 14.39 | 1.27 | 29.64 | 31.22 | 40.00 | -8.78 | QP |
| 3 | 141.330 | 48.03 | 10.20 | 1.51 | 29.45 | 30.29 | 40.00 | -9.71 | QP |
| 4 | 287.990 | 54.40 | 14.84 | 2.31 | 29.92 | 41.63 | 47.00 | -5.37 | QP |
| 5 | 305.680 | 53.89 | 15.13 | 2.39 | 29.96 | 41.45 | 47.00 | -5.55 | QP |
| 6 | 750.108 | 36.96 | 21.43 | 4.28 | 29.20 | 33.47 | 47.00 | -13.53 | QP |

Vertical:

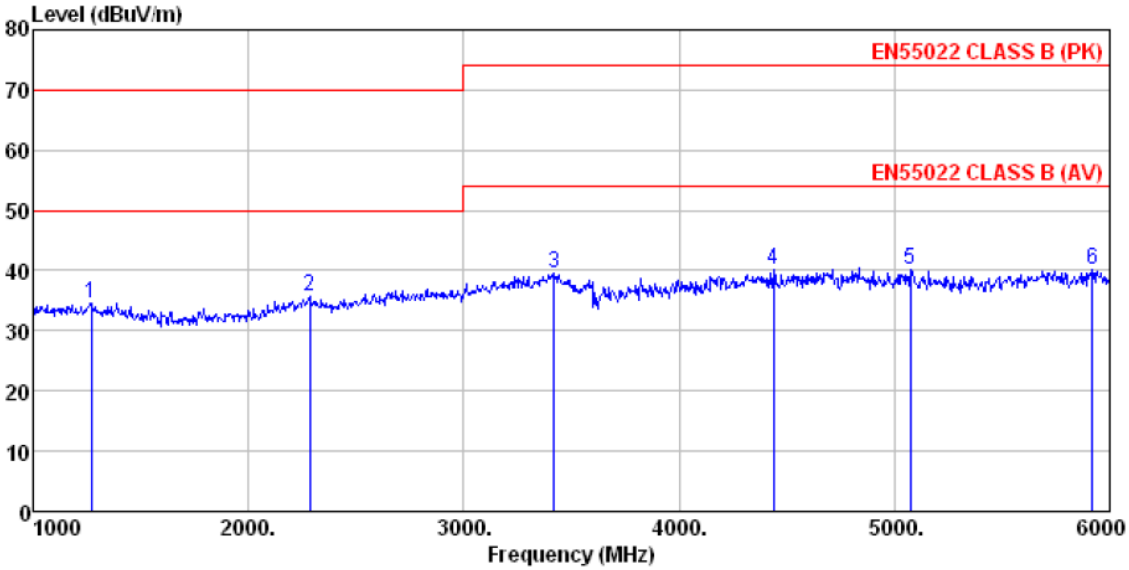



Condition : EN 55022 CLASS-B VULB9163-2013M VERTICAL
Job No. : 2067RF
Test Mode : WAN mode
Test Engineer: He

| | Freq | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 45.695 | 47.49 | 15.51 | 0.73 | 30.02 | 33.71 | 40.00 | -6.29 | QP |
| 2 | 56.001 | 48.08 | 14.95 | 0.83 | 29.95 | 33.91 | 40.00 | -6.09 | QP |
| 3 | 60.069 | 48.70 | 14.69 | 0.86 | 29.92 | 34.33 | 40.00 | -5.67 | QP |
| 4 | 108.647 | 44.07 | 14.39 | 1.27 | 29.64 | 30.09 | 40.00 | -9.91 | QP |
| 5 | 301.422 | 48.85 | 15.08 | 2.37 | 29.99 | 36.31 | 47.00 | -10.69 | QP |
| 6 | 492.469 | 39.92 | 18.39 | 3.27 | 29.32 | 32.26 | 47.00 | -14.74 | QP |

**Above 1GHz:**

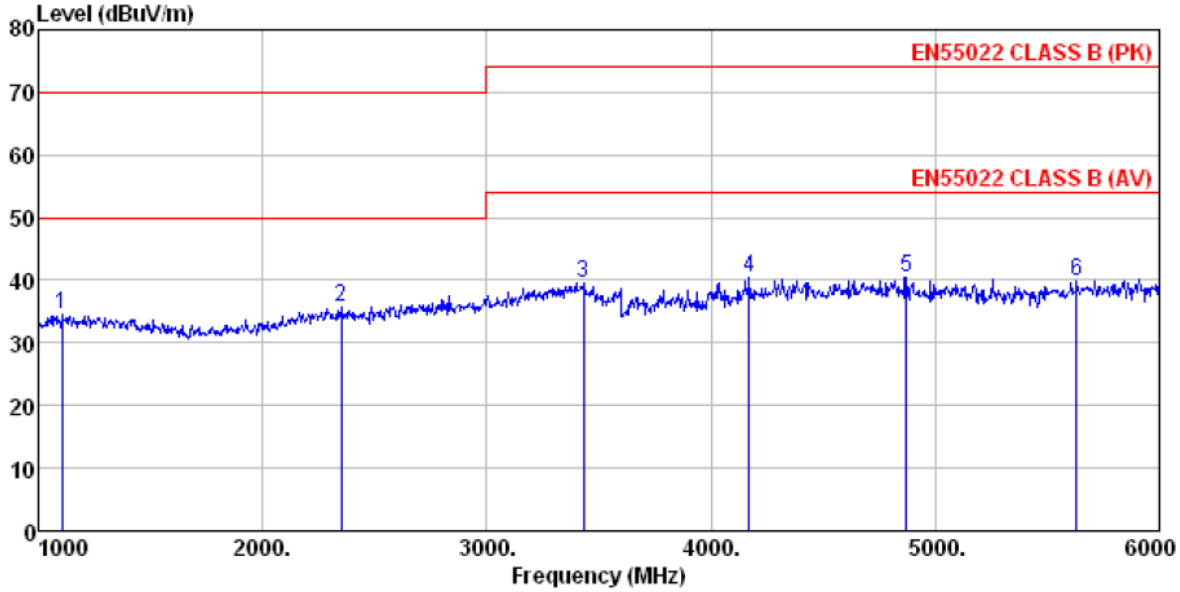
Horizontal:




Condition : EN55022 CLASS B (PK) BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 2067RF
Test Mode : WAN mode
Test Engineer: HE

| | Freq | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 1270.000 | 37.66 | 25.57 | 4.52 | 33.21 | 34.54 | 70.00 | -35.46 | Peak |
| 2 | 2285.000 | 36.44 | 27.99 | 5.28 | 34.13 | 35.58 | 70.00 | -34.42 | Peak |
| 3 | 3420.000 | 36.94 | 28.67 | 6.80 | 32.85 | 39.56 | 74.00 | -34.44 | Peak |
| 4 | 4440.000 | 32.60 | 31.20 | 8.29 | 31.91 | 40.18 | 74.00 | -33.82 | Peak |
| 5 | 5075.000 | 31.44 | 32.02 | 8.87 | 32.22 | 40.11 | 74.00 | -33.89 | Peak |
| 6 | 5920.000 | 29.41 | 32.78 | 10.09 | 32.18 | 40.10 | 74.00 | -33.90 | Peak |

Vertical:

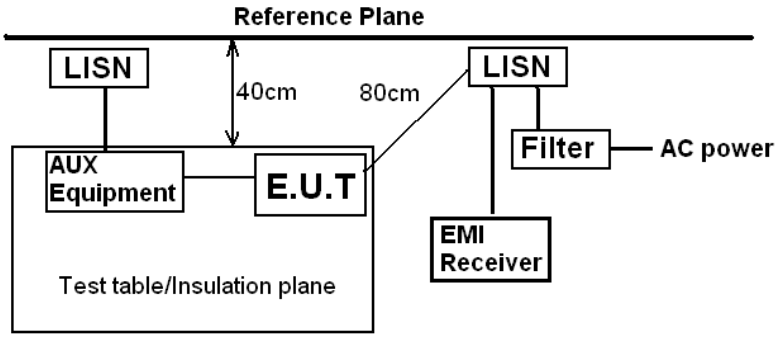



Condition : EN55022 CLASS B (PK) BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 2067RF
Test Mode : WAN mode
Test Engineer: HE

| | Freq | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dB | |
| 1 | 1105.000 | 38.43 | 24.78 | 4.39 | 32.92 | 34.68 | 70.00 | -35.32 | Peak |
| 2 | 2350.000 | 36.74 | 27.71 | 5.34 | 34.07 | 35.72 | 70.00 | -34.28 | Peak |
| 3 | 3430.000 | 36.81 | 28.72 | 6.82 | 32.83 | 39.52 | 74.00 | -34.48 | Peak |
| 4 | 4170.000 | 34.41 | 30.10 | 8.03 | 32.00 | 40.54 | 74.00 | -33.46 | Peak |
| 5 | 4870.000 | 32.15 | 31.85 | 8.66 | 32.12 | 40.54 | 74.00 | -33.46 | Peak |
| 6 | 5630.000 | 30.30 | 32.32 | 9.70 | 32.36 | 39.96 | 74.00 | -34.04 | Peak |

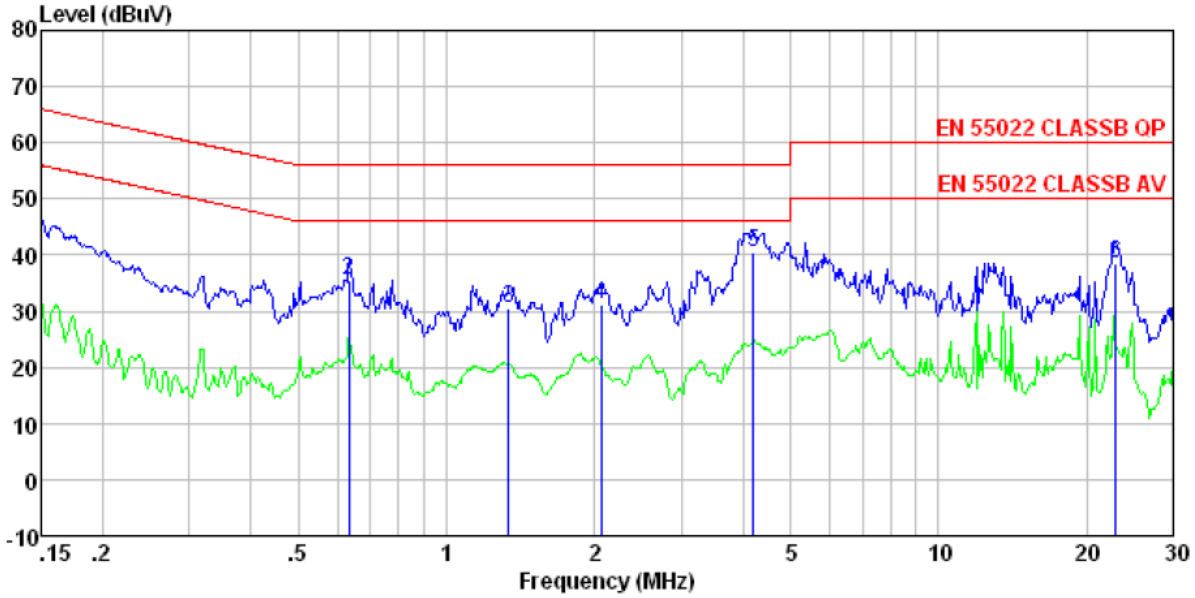
Remark:
1. If the average limit is met when using a Peak detector, the EUT shall be deemed to meet both peak and average limits. And measurement with the average detector is unnecessary.

## 7.2 Conducted Emission

| | |
|---|---|
| Test Requirement: | EN 55022 |
| Test Method: | EN 55022 |
| Test Frequency Range: | 150kHz to 30MHz |
| Class / Severity: | Class B |
| Receiver setup: | RBW=9kHz, VBW=30kHz |
| Limit: | Frequency range (MHz) / Limit (dBµV): Quasi-peak / Average<br>0.15-0.5: 66 to 56* / 56 to 46*<br>0.5-5: 56 / 46<br>5-30: 60 / 50<br>* Decreases with the logarithm of the frequency. |
| Test setup: |  <br>*Remark:*<br>*E.U.T: Equipment Under Test*<br>*LISN: Line Impedence Stabilization Network*<br>*Test table height=0.8m* |
| Test procedure | 1. The E.U.T is connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment.<br>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs).<br>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to EN55022 Class B on conducted measurement. |
| Test environment: | Temp.: 24 °C \| Humid.: 51% \| Press.: 1012mbar |
| Measurement Record: | Uncertainty: ±3.45dB |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details. Only the data of worst mode is reported. |
| Test results: | Pass |

**Measurement Data**

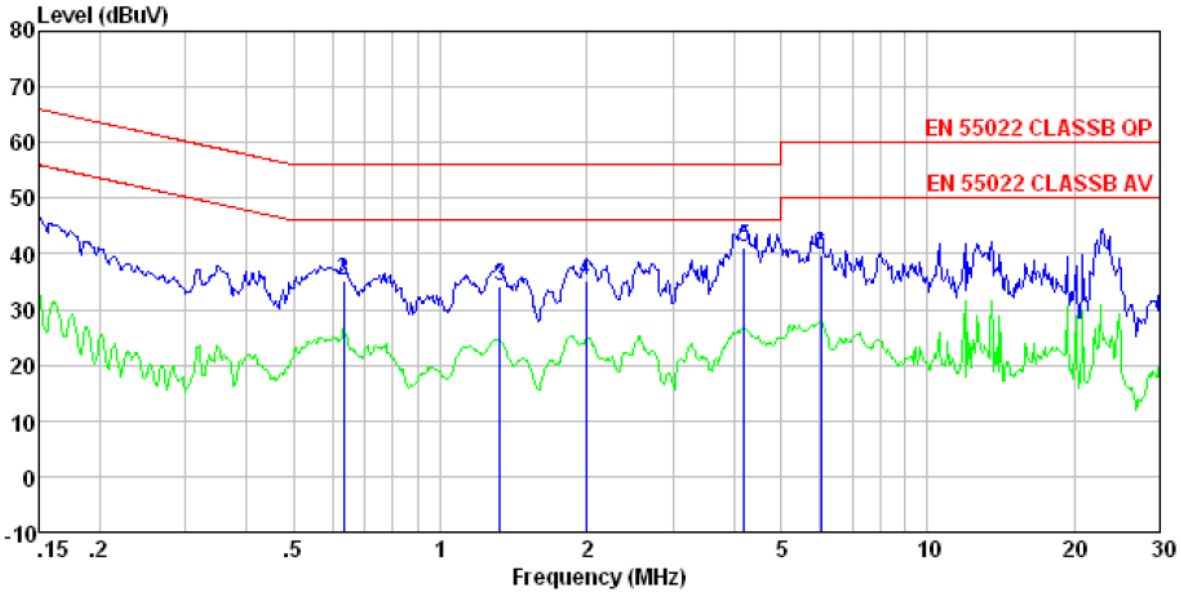
Line:




Condition : EN 55022 CLASSB QP LISN-2013 LINE
Job No. : 2067RF
Test mode : WAN mode
Test Engineer: Rong

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.150 | 42.16 | 0.15 | 0.12 | 42.43 | 66.00 | -23.57 | QP |
| 2 | 0.634 | 35.39 | 0.13 | 0.13 | 35.65 | 56.00 | -20.35 | QP |
| 3 | 1.338 | 30.36 | 0.12 | 0.13 | 30.61 | 56.00 | -25.39 | QP |
| 4 | 2.066 | 30.75 | 0.12 | 0.15 | 31.02 | 56.00 | -24.98 | QP |
| 5 | 4.202 | 40.26 | 0.20 | 0.15 | 40.61 | 56.00 | -15.39 | QP |
| 6 | 22.896 | 37.26 | 0.96 | 0.23 | 38.45 | 60.00 | -21.55 | QP |

Neutral:




Condition : EN 55022 CLASSB QP LISN-2013 NEUTRAL
Job No. : 2067RF
Test mode : WAN mode
Test Engineer: Rong

| | Freq | Read Level | LISN Factor | Cable Loss | Level | Limit Line | Over Limit | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dBuV | dBuV | dB | |
| 1 | 0.150 | 42.32 | 0.07 | 0.12 | 42.51 | 66.00 | -23.49 | QP |
| 2 | 0.634 | 34.84 | 0.07 | 0.13 | 35.04 | 56.00 | -20.96 | QP |
| 3 | 1.324 | 34.00 | 0.09 | 0.13 | 34.22 | 56.00 | -21.78 | QP |
| 4 | 1.991 | 34.93 | 0.09 | 0.15 | 35.17 | 56.00 | -20.83 | QP |
| 5 | 4.202 | 40.80 | 0.14 | 0.15 | 41.09 | 56.00 | -14.91 | QP |
| 6 | 6.056 | 39.55 | 0.16 | 0.16 | 39.87 | 60.00 | -20.13 | QP |

*Notes:*

1. *An initial pre-scan was performed on the live and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss*
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

## 7.3 Harmonic Emission

| | |
|---|---|
| Test Requirement: | EN 61000-3-2 |
| Test Method: | N/A: See Remark Below |
| Remark | There is no need for Harmonics test to be performed on this product (rated power is less than 75W) in accordance with EN 61000-3-2.<br>For further details, please refer to Clause 7, Note 1 of EN 61000-3-2 which states:<br>"For the following categories of equipment limits are not specified in this edition of the standard.<br>Note 1: Equipment with a rated power of 75W or less, other than lighting equipment." |

## 7.4 Flicker Emission

| | | | | | | |
|---|---|---|---|---|---|---|
| Test Requirement: | EN 61000-3-3 | | | | | |
| Test Method: | EN 61000-3-3 | | | | | |
| Class/Severity: | Clause 5 of EN 61000-3-3 | | | | | |
| Measurement Time: | 10 min | | | | | |
| Detector: | As per EN 61000-3-3 | | | | | |
| Test environment: | Temp.: | 24 °C | Humid.: | 51% | Press.: | 1 012mbar |
| Test Instruments: | Refer to section 6.0 for details | | | | | |
| Test mode: | Refer to section 5.3 for details | | | | | |
| Test results: | Pass | | | | | |

**Measurement Data**

Test Data of Voltage Fluctuation and Flicker

| | |
|---|---|
| Final Test Result | Pass |
| Nominal Voltage | 230 V |
| Nominal Frequency | 50 Hz |
| Plt Test Duration | 600 s |
| Flicker Margin | 10 % |
| d Measurement Margin | 10 % |

| Segment | Pst | dmax(%) | dc(%) | d(t)>3.3%(ms) | Judge |
|---|---|---|---|---|---|
| Limit | 1.000 | 4.000 | 3.300 | 500 | |
| Seg. 1 | 0.006 | 0.039 | 0.000 | 0 | Pass |

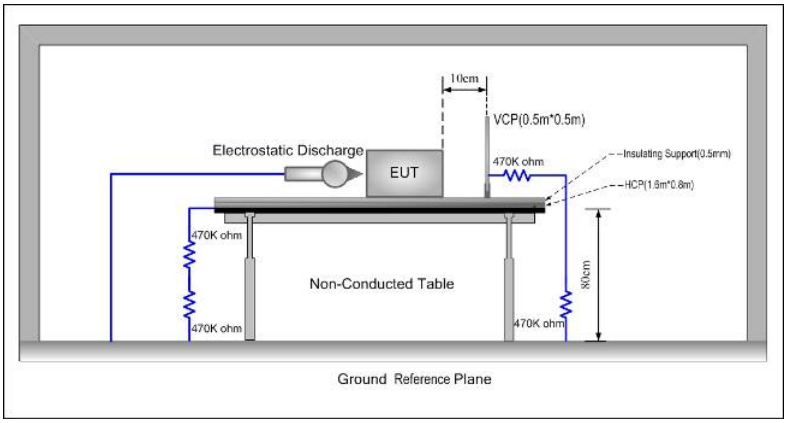
| Plt | Value | Judge |
|---|---|---|
| Limit | 0.650 | |
| Measurement | 0.003 | Pass |

# 8 Immunity Test Results

## 8.1 Performance Criteria Description in Clause 7 of EN 55024

| | |
|---|---|
| Criterion A: | The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended. |
| Criterion B: | After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.<br>During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.<br>If the minimum performance level ( or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended. |
| Criterion C: | Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.<br>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost. |

## 8.2 Electrostatic discharge

| | |
|---|---|
| Test Requirement: | EN 55024 |
| Test Method: | EN 61000-4-2 |
| Discharge Voltage: | Contact Discharge: ±2kV, ±4kV<br>Air Discharge: ±2kV, ±4kV, ±8kV<br>HCP/VCP: ±2kV, ±4kV |
| Polarity: | Positive & Negative |
| Number of Discharge: | Contact Discharge: Minimum 25 times at each test point,<br>Air Discharge: Minimum 10 times at each test point. |
| Discharge Mode: | Single Discharge |
| Discharge Period: | 1 second minimum |
| Performance Criterion: | Criterion B |
| Test setup: |  |
| Test Procedure: | **1. Air discharge:**<br>The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure was repeated until all the air discharge completed<br>**2. Contact Discharge:**<br>The test was applied on conductive surfaces of EUT. the generator was re-triggered for a new single discharge and repeated 25 times for each pre-selected test point. the tip of the discharge electrode was touch the EUT before the discharge switch was operated.<br>**3. Indirect discharge for horizontal coupling plane**<br>At least 10 single discharges shall be applied at the front edge of each HCP opposite the centre point of each unit of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.<br>Consideration should be given to exposing all sides of the EUT.<br>**4. Indirect discharge for vertical coupling plane**<br>At least 10 single discharges were applied to the center of one vertical |

| | | | | | | |
|---|---|---|---|---|---|---|
| | edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated. | | | | | |
| Test environment: | Temp.: | 24 °C | Humid.: | 51% | Press.: | 1 012mbar |
| Test mode: | Refer to section 6.0 for details | | | | | |
| Test Instruments: | Refer to section 5.3 for details | | | | | |
| Test results: | Pass | | | | | |

**Measurement Record:**

| Test points: | I: LAN port, Screws |
|---|---|
| | II: Cover seams, Holes, USB port, DC port. Phone port |

**Direct discharge**

| Discharge Voltage (KV) | Type of discharge | Test points | Observations (Performance Criterion) | Result |
|---|---|---|---|---|
| ± 2, ± 4 | Contact | I | A | Pass |
| ± 2, ± 4,± 8 | Air | II | A | Pass |

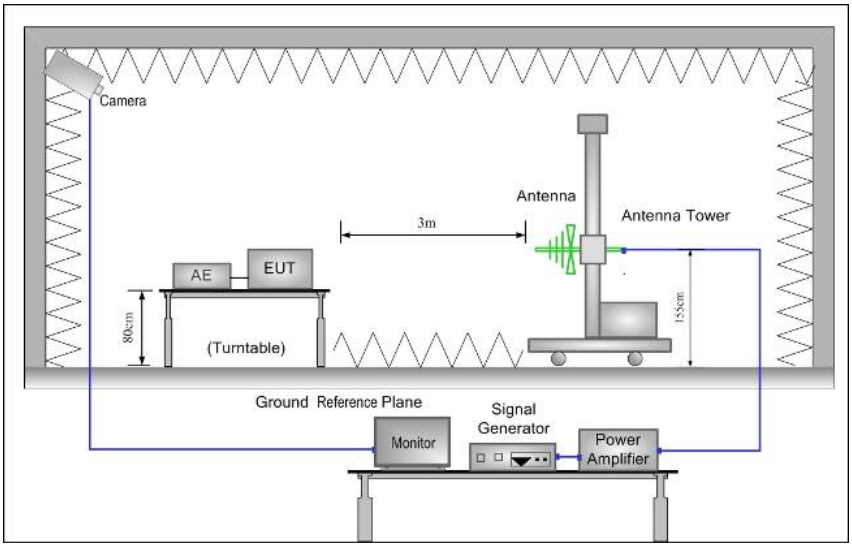
**Indirect discharge**

| Discharge Voltage (KV) | Type of discharge | Test points | Observation Performance | Result |
|---|---|---|---|---|
| ± 2, ± 4 | HCP-Bottom/Top/ Front/Back/Left/Right | Edge of the HCP | A | Pass |
| ± 2, ± 4 | VCP-Front/Back /Left/Right | Center of the VCP | A | Pass |

*Remark:*

*A: No degradation in performance of the EUT was observed.*

## 8.3 Radio-frequency electromagnetic field Amplitude modulated

| | |
|---|---|
| Test Requirement: | EN 55024 |
| Test Method: | EN 61000-4-3 |
| Frequency range: | 80MHz to 1GHz |
| Test Level: | 3V/m |
| Modulation: | 80%, 1kHz Amplitude Modulation |
| Performance Criterion: | Criterion A |
| Test setup: |  |
| Test Procedure: | 1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items.<br>2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length.<br>3. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area).<br>4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary.Where the frequency range was swept incrementally, the step size was not exceed 1 % of the preceding frequency value.<br>5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0,5 s.<br>6. The test normally was performed with the generating antenna facing each side of the EUT.<br>7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned |

| | | | | | | |
|---|---|---|---|---|---|---|
| | vertically and again with the antenna positioned horizontally.<br>8. The EUT was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to monitor the performance of the EUT. | | | | | |
| Test environment: | Temp.: | 25 °C | Humid.: | 52% | Press.: | 1 012mbar |
| Test Instruments: | Refer to section 6.0 for details | | | | | |
| Test mode: | Refer to section 5.3 for details | | | | | |
| Test results: | Pass | | | | | |

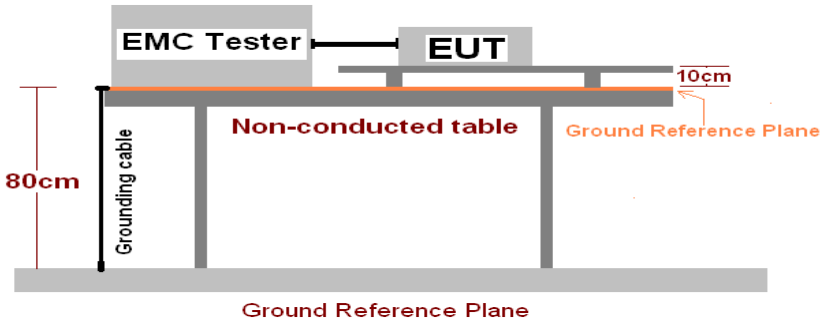
**Measurement Record:**

| Frequency | Level | Modulation | Antenna Polarization | EUT Face | Observations (Performance Criterion) | Result |
|---|---|---|---|---|---|---|
| 80 MHz-1 GHz | 3 V/m | 1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds | V | Front | A | Pass |
| | | | H | | A | Pass |
| | | | V | Rear | A | Pass |
| | | | H | | A | Pass |
| | | | V | Left | A | Pass |
| | | | H | | A | Pass |
| | | | V | Right | A | Pass |
| | | | H | | A | Pass |
| | | | V | Top | A | Pass |
| | | | H | | A | Pass |
| | | | V | Bottom | A | Pass |
| | | | H | | A | Pass |

*Remark:*

*A: No degradation in performance of the EUT was observed.*

## 8.4 Electrical fast transients

| | |
|---|---|
| Test Requirement: | EN 55024 |
| Test Method: | EN 61000-4-4 |
| Test Level: | 1.0kV on AC port |
| Polarity: | Positive & Negative |
| Test signal specification: | Rise time=5ns, Duration time=50ns;<br>Burst Duration=15ms, Burst Period=300ms;<br>Repetition Frequency=5KHz |
| Test Duration: | 2 minute per level & polarity |
| Performance Criterion: | Criterion B |
| Test setup: |  |
| Test Procedure: | 1. The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness.<br>2. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m.<br>3. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.<br>4. The length of the signal and power lines between the coupling device and the EUT is 0.5m<br>5. The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal.<br>6. Each of the Line and Neutral conductors is impressed with burst noise for 2 minutes. |
| Test environment: | Temp.: 26 °C \| Humid.: 54% \| Press.: 1 012mbar |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Pass |

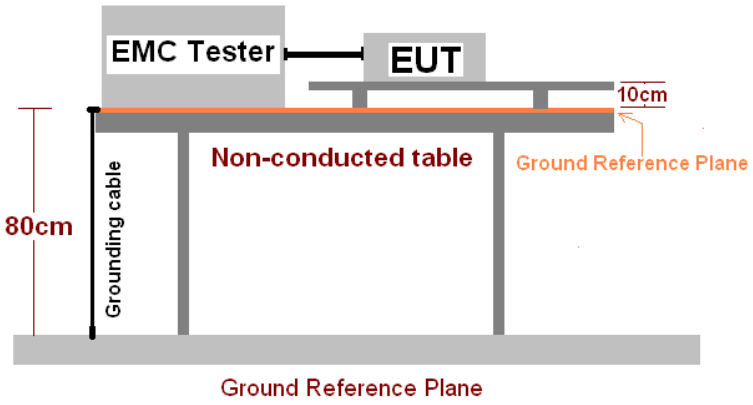
**Measurement Record:**

| Lead under Test | Level (±kV) | Coupling Direct/Clamp | Observations (Performance Criterion) | Result |
|---|---|---|---|---|
| L | ± 1.0 | Direct | A | Pass |
| N | ± 1.0 | Direct | A | Pass |
| L-N | ± 1.0 | Direct | A | Pass |

*Remark:*

*A: No degradation in performance of the EUT was observed.*

## 8.5 Surges

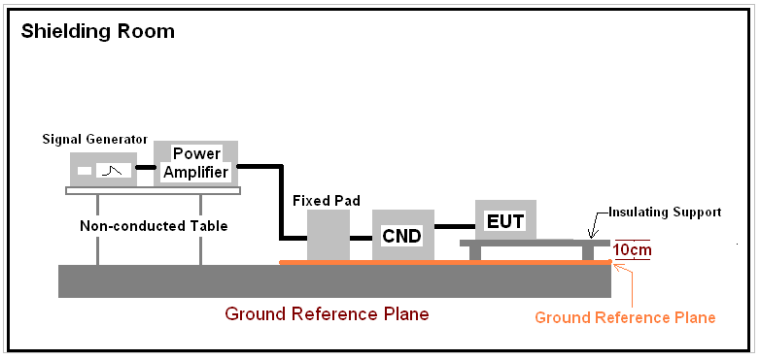
| | | | | | | |
|---|---|---|---|---|---|---|
| Test Requirement: | EN 55024 | | | | | |
| Test Method: | EN 61000-4-5 | | | | | |
| Test Level: | 1kV line to line: Differential mode<br>2kV Line to Earth or Neutral to Earth: Common mode | | | | | |
| Polarity: | Positive & Negative | | | | | |
| Generator source impedance: | 2Ω (line-line coupling)<br>12Ω (line-earth coupling) | | | | | |
| Test signal specification: | Rise time=1.2us, Duration time=50us;<br>Test Interval: 60s between each surge; | | | | | |
| No. of surges: | 5 positive, 5 negative at 0°, 90°, 180°, 270°. | | | | | |
| Performance Criterion: | Criterion B | | | | | |
| Test setup: |  | | | | | |
| Test Procedure: | 1. For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV.<br>2. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.<br>3. Different phase angles are done individually.<br>4. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test. | | | | | |
| Test environment: | Temp.: | 26 °C | Humid.: | 53% | Press.: | 1 012mbar |
| Test Instruments: | Refer to section 6.0 for details | | | | | |
| Test mode: | Refer to section 5.3 for details | | | | | |
| Test results: | Pass | | | | | |

**Measurement Record:**

| Location | Level(kV) | Pulse No | Surge Interval | Phase(deg) | Observations (Performance Criterion) | Result |
|---|---|---|---|---|---|---|
| L-N | ± 1 | 5 | 60s | 0° | A | Pass |
| | | | | 90° | A | Pass |
| | | | | 180° | A | Pass |
| | | | | 270° | A | Pass |

*Remark:*
*A: No degradation in performance of the EUT was observed.*

## 8.6 Radio-frequency continuous conducted

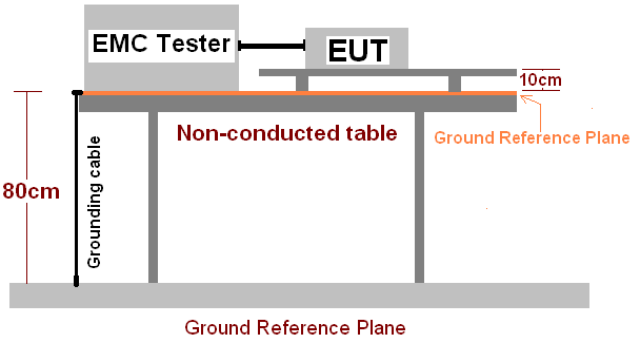
| | |
|---|---|
| Test Requirement: | EN 55024 |
| Test Method: | EN 61000-4-6 |
| Frequency range: | 0.15MHz to 80MHz |
| Test Level: | 3V rms on AC Ports (unmodulated emf into 150 Ω) |
| Modulation: | 80%, 1kHz Amplitude Modulation |
| Performance Criterion: | Criterion A |
| Test setup: |  |
| Test Procedure: | 1. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).<br>2. The disturbance signal described below is injected to EUT through CDN.<br>3. The EUT operates within its operational mode(s) under intended climatic conditions after power on.<br>4. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion. |
| Test environment: | Temp.: 24 °C \| Humid.: 51% \| Press.: 1 012mbar |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Pass |

**Measurement Record:**

| Frequency | Injected Position | Level | Modulation | Observations (Performance Criterion) | Result |
|---|---|---|---|---|---|
| 150kHz to 80MHz | AC Mains | 3Vrms | 1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=2seconds | A | Pass |

*Remark:*
*A: No degradation in performance of the EUT was observed.*

## 8.7 Voltage dips and Voltage interruptions

| | |
|---|---|
| Test Requirement: | EN 55024 |
| Test Method: | EN 61000-4-11 |
| Test Level: | 0% of VT(Supply Voltage) for 0.5 period<br>70% of VT(Supply Voltage) for 25 period<br>0% of VT(Supply Voltage) for 250 period |
| Number of Dips / Interruptions: | 3 per Level |
| Performance Criterion: | >95% VD, 0.5 period----Performance criterion: B<br>30% VD, 25 period----Performance criterion: C<br>>95% VI, 250 period----Performance criterion: C |
| Test setup: |  |
| Test Procedure: | 1. The EUT and test generator were setup as shown on above setup photo.<br>2. The interruptions are introduced at selected phase angles with specified duration.<br>3. Record any degradation of performance. |
| Test environment: | Temp.: 26 °C \| Humid.: 53% \| Press.: 1 012mbar |
| Test Instruments: | Refer to section 6.0 for details |
| Test mode: | Refer to section 5.3 for details |
| Test results: | Pass |

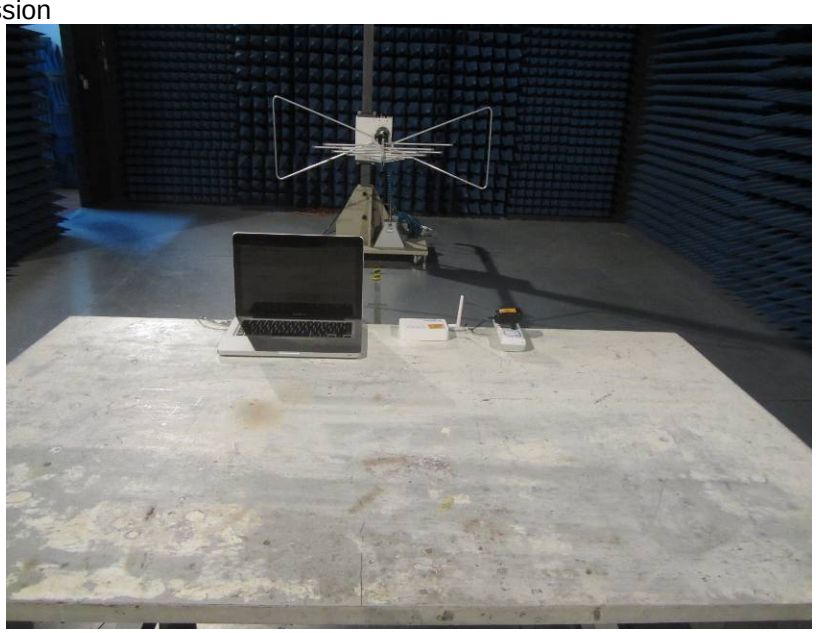
**Measurement Record:**

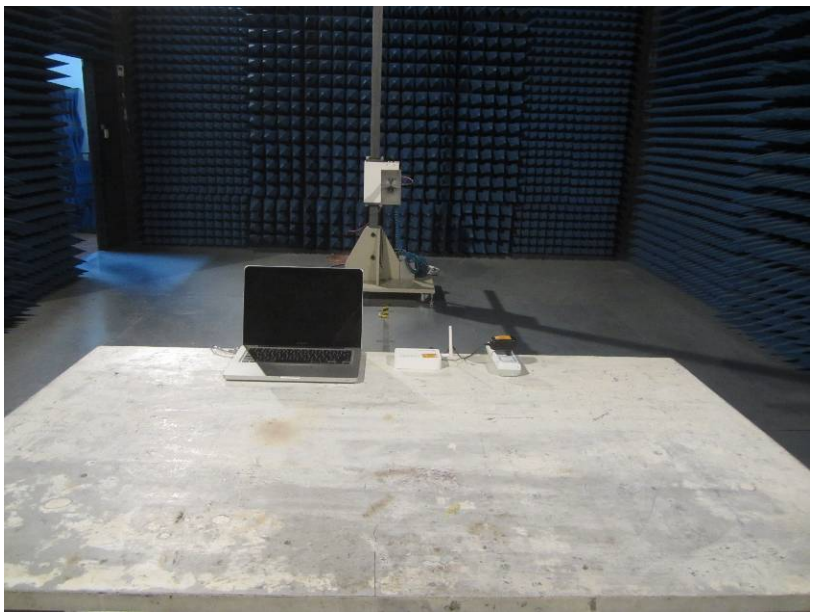
| Test Level % $U_T$ | Duration (Periods) | Phase angle | No. of drop out | Time between dropout | Observations (Performance Criterion) | Result |
|---|---|---|---|---|---|---|
| 0 | 0.5 | 0°, 90°, 180°, 270° | 3 | 10s | A | Pass |
| 70 | 25 | 0°, 90°, 180°, 270° | 3 | 10s | A | Pass |
| 0 | 250 | 0°, 90°, 180°, 270° | 3 | 10s | B | Pass |

*Remark:*
*A: No degradation in performance of the EUT was observed.*
*B: During the test, the charging stopped, but after the test, the power charger can automatically return to normal*

# 9 Test Setup Photo

Radiated Emission

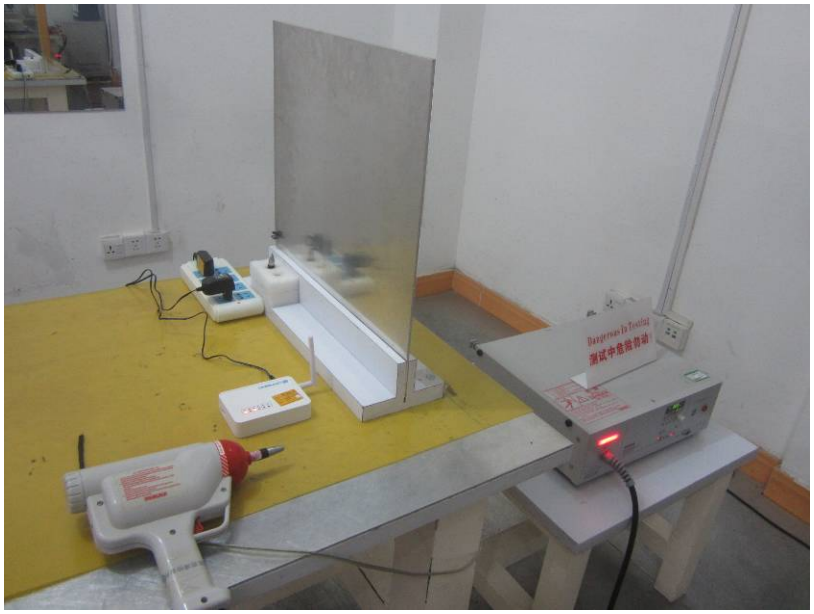




Conducted Emission

Flicker

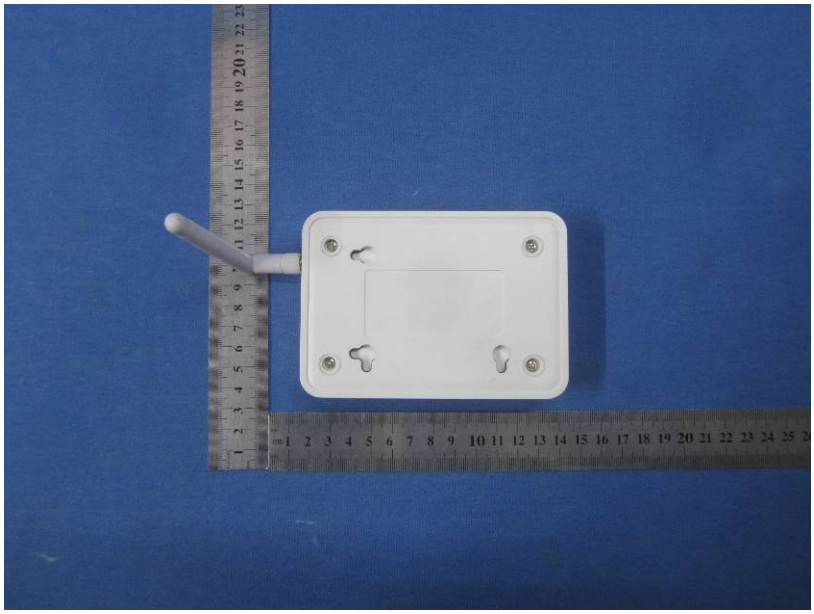
ESD



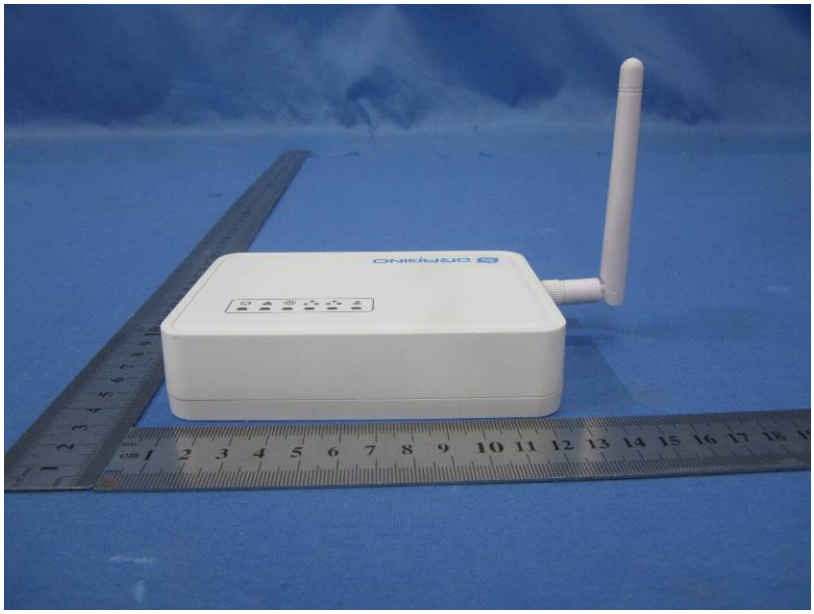
Surges/EFT/V-dips

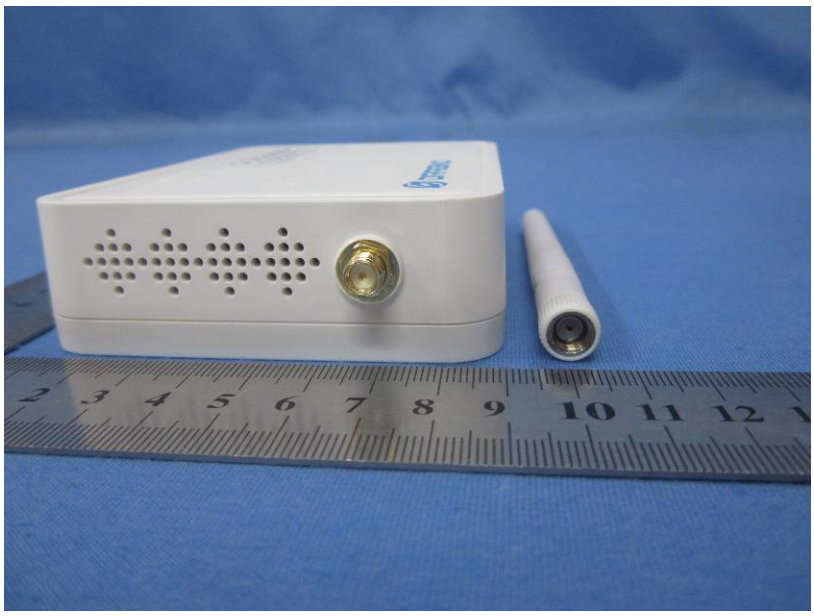
CS

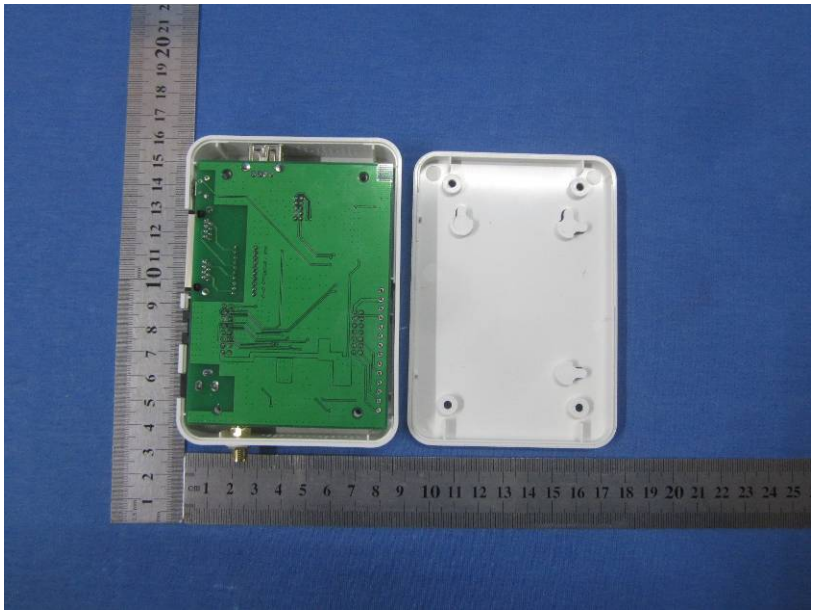
# 10 EUT Constructional Details

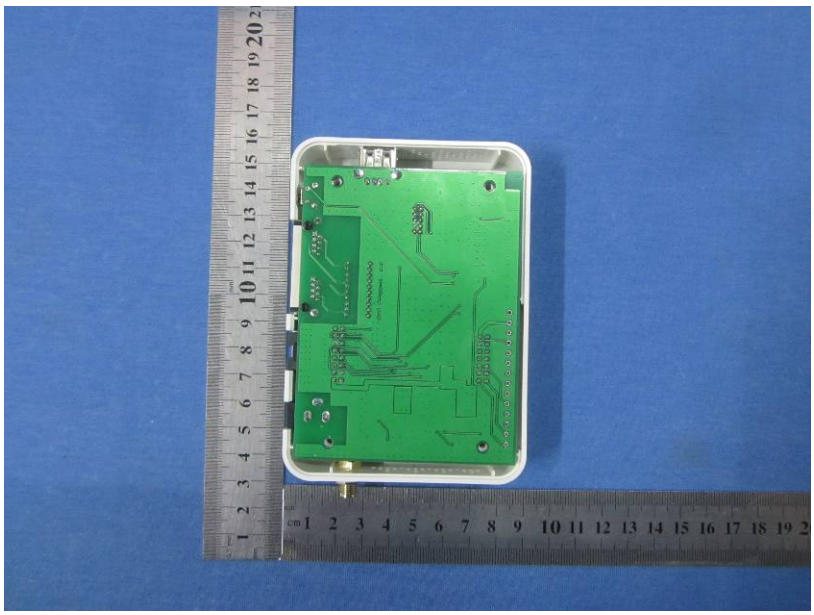



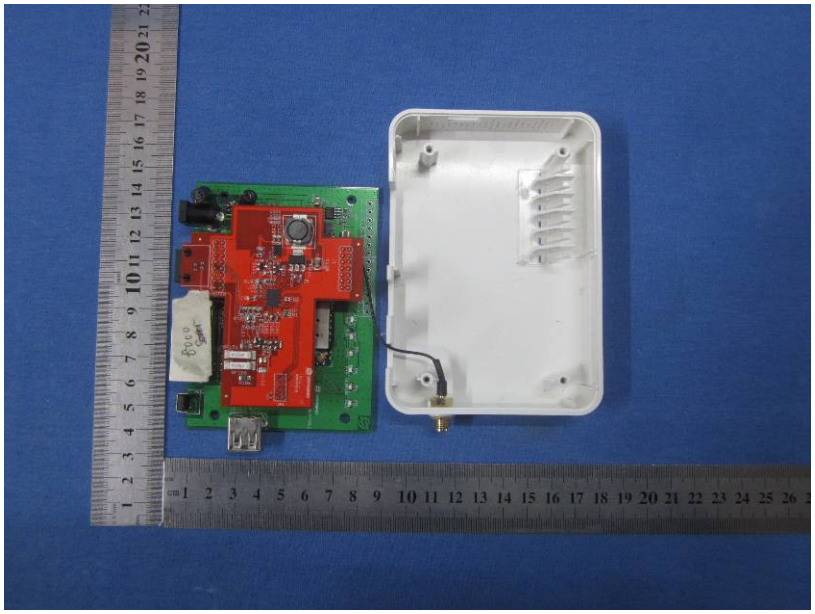

DRAGINO
PWR
9-15V
PHONE
WAN
LAN
toggle

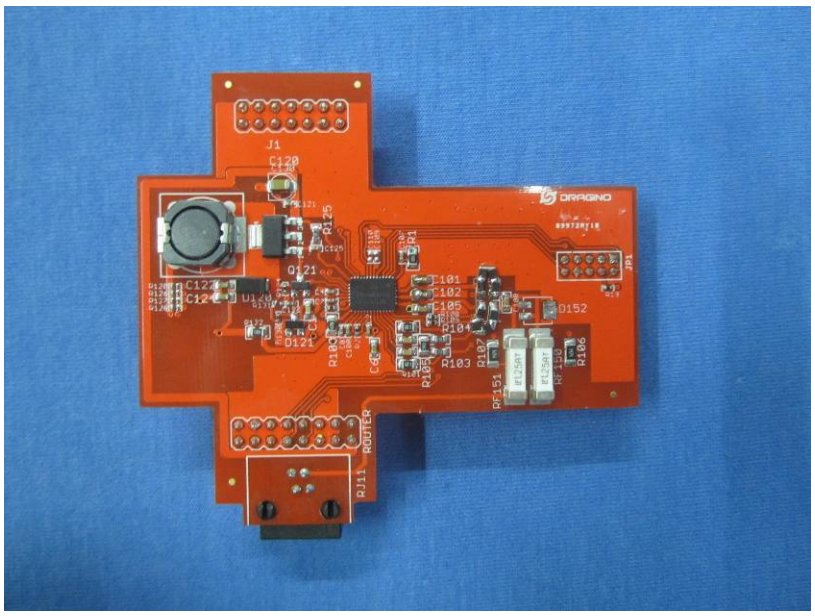








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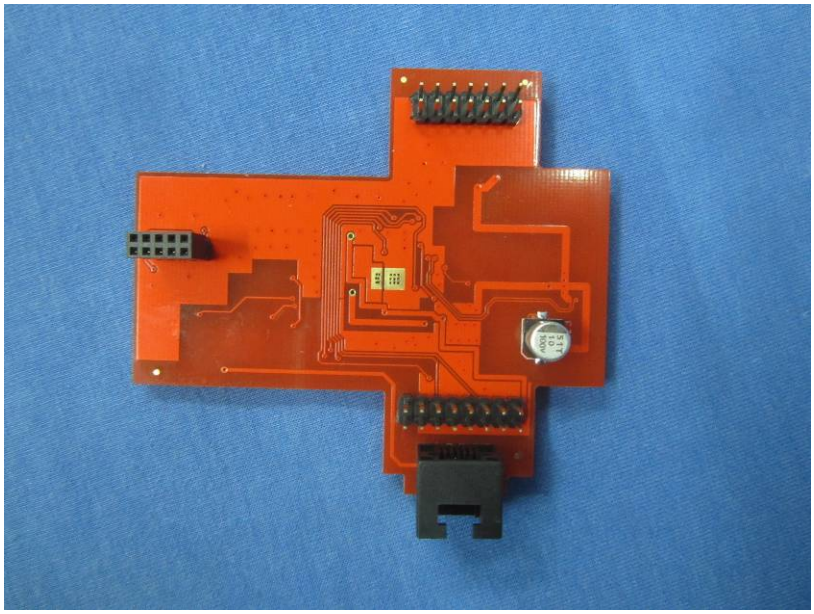
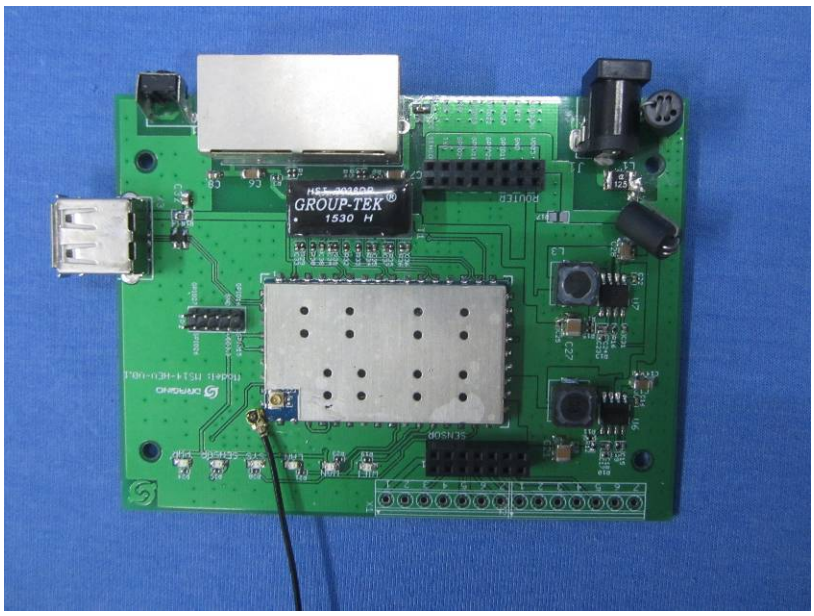
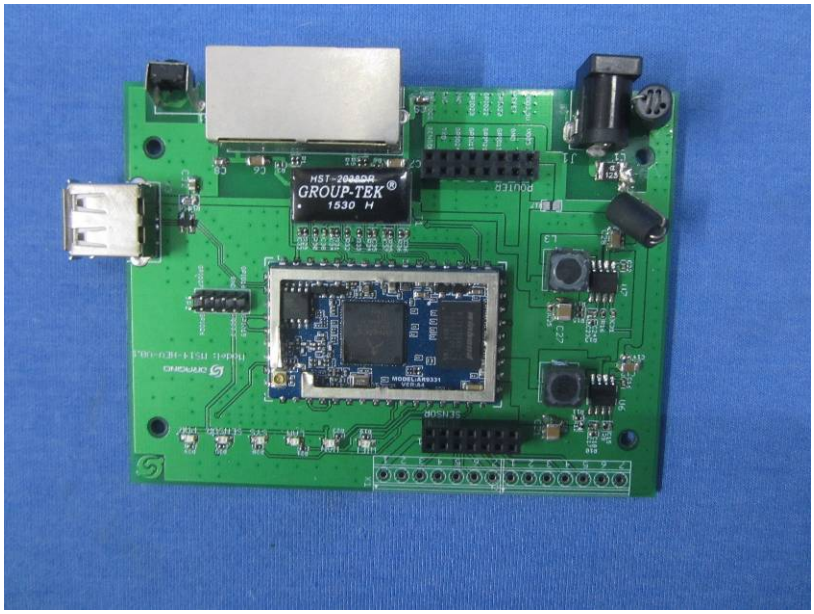
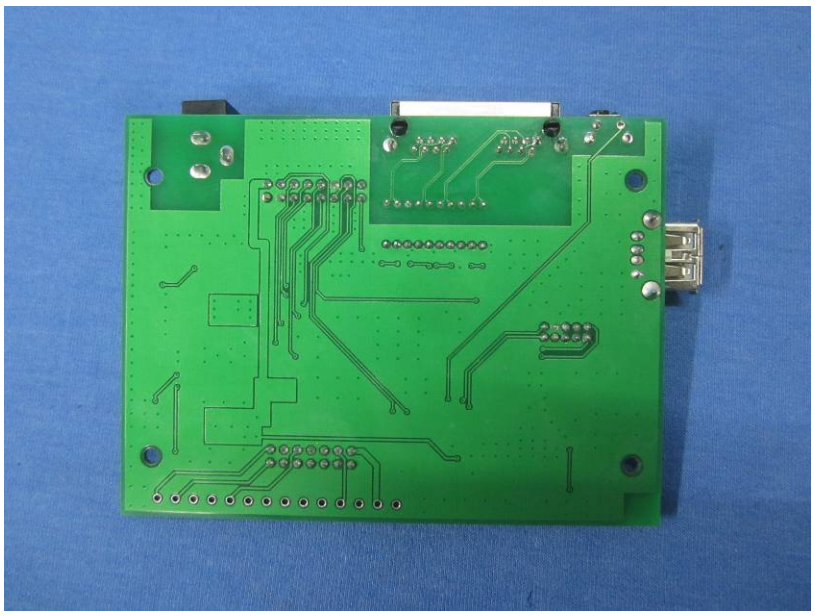
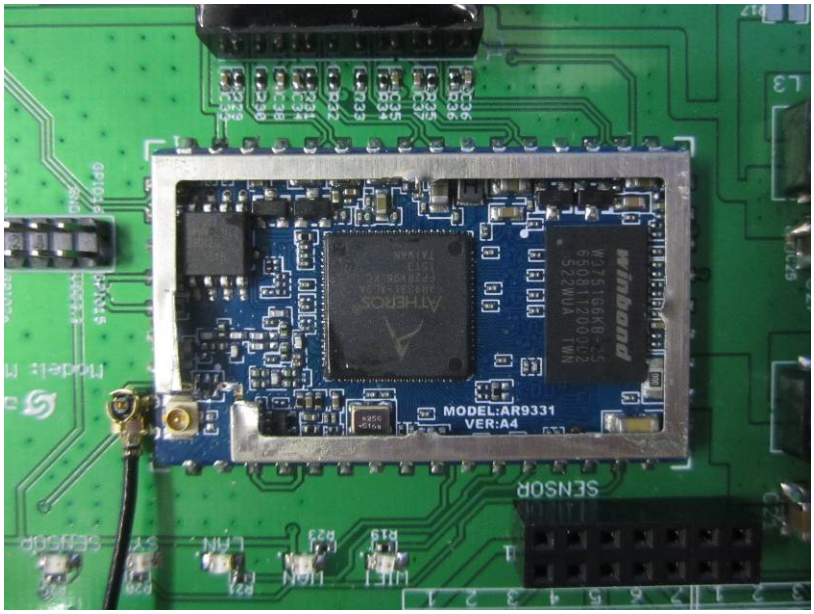
C101
C102
C105
D152
R103
R107
R106
RF151
ROUTER
RJ11




GROUP-TEK
1530 H


GROUP-TEK
1530 H




MODEL:AR9331
VER:A4
SENSOR


Switching Mode Power Adaptor
MODEL:F05W-120050SPAV L.P.S.
INPUT:100-240V～50/60Hz 190mA
OUTPUT:12V ⎓ 0.5A
I.T.E. POWER SUPPLY
SHENZHEN FRECOM
ELECTRONICS CO.,LTD.
MADE IN CHINA F0935SAR

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