CE

SPORTON LAB.

Certificate No: EH0N1818

# CERTIFICATE

TAF
Testing Laboratory
1190

- **EQUIPMENT : Rugged Tablet Computer**
- **MODEL NO. : RTC-1000xx (xx is D1 or blank)**
- **APPLICANT : AAEON Technology Inc.**
  5F, No. 135, Lane 235, Pao Chiao Rd., Hsin-Tien City, Taipei, Taiwan, R.O.C.

SPORTON LAB.

**I HEREBY CERTIFY THAT:**

The measurements shown in this test report were made in accordance with the procedures given in **EN 301 489-1 V1.8.1 (2008-04) EN 301 489-17 V2.1.1 (2009-05)**. Testing was carried out on **Jan. 11, 2011** at SPORTON International Inc. LAB.

2011.1.20

**Wayne Hsu**
**Vice Manager**

# CE EMC TEST REPORT

according to

EN 301 489-1 V1.8.1 (2008-04)
EN 301 489-17 V2.1.1 (2009-05)

| | | |
|---|---|---|
| **Equipment** | : | **Rugged Tablet Computer** |
| **Model No.** | : | **RTC-1000xx (xx is D1 or blank)** |
| **Brand Name** | : | **AAEON** |
| **Filing Type** | : | **New Application** |
| **Applicant** | : | **AAEON Technology Inc.**<br>5F, No. 135, Lane 235, Pao Chiao Rd.,<br>Hsin-Tien City, Taipei, Taiwan, R.O.C. |
| **Manufacturer** | : | **AAEON Technology Inc.**<br>5F, No. 135, Lane 235, Pao Chiao Rd.,<br>Hsin-Tien City, Taipei, Taiwan, R.O.C. |
| **Received Date** | : | Nov. 24, 2010 |
| **Final Test Date** | : | Jan. 11, 2011 |

## Statement

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Testing Laboratory
1190

***SPORTON International Inc.***

*No. 52 Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.*

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# History of This Test Report

Original Issue Date: Jan. 12, 2011
Report No.: EH0N1818

| Attachment No. | Issue Date | Description |
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# CERTIFICATE OF COMPLIANCE

according to

EN 301 489-1 V1.8.1 (2008-04)
EN 301 489-17 V2.1.1 (2009-05)

| | | |
|---|---|---|
| Equipment | : | Rugged Tablet Computer |
| Model No. | : | RTC-1000xx (xx is D1 or blank) |
| Brand Name | : | AAEON |
| Applicant | : | AAEON Technology Inc.<br>5F, No. 135, Lane 235, Pao Chiao Rd.,<br>Hsin-Tien City, Taipei, Taiwan, R.O.C. |

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Nov. 24, 2010 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

2011. 1. 10

**Wayne Hsu / Vice Manager**

***SPORTON International Inc.***

*No. 52 Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.*

# 1 SUMMARY OF THE TEST RESULT

## 1.1 Emission Tests

| Applicable Standard : EN 301 489-1 V1.8.1 (2008-04) | | | | |
|---|---|---|---|---|
| **Part** | **Test Standard** | **Description of Test** | **Result** | **Under Limit** |
| 3.1 | EN 55022:2006/A1:2007 | AC Power Conducted Emissions | Complies | 6.30 dB |
| 3.2 | EN 55022:2006/A1:2007 | Telecom Line Conducted Emissions | Complies | 5.16 dB |
| 3.3 | EN 55016-2-3:2006 | Radiated Emissions (Below 1GHz) | Complies | 3.32 dB |
| | | Radiated Emissions (Above 1GHz) | Complies | 23.51 dB |
| 3.4 | EN 61000-3-2:2006 | Harmonic Current Emissions | - | - |
| 3.5 | EN 61000-3-3:1995/A2:2005 | Voltage Fluctuations and Flicker | Complies | - |

## 1.2 Immunity Tests

| Applicable Standard : EN 301 489-1 V1.8.1 (2008-04) | | | | |
|---|---|---|---|---|
| **Part** | **Test Standard** | **Description of Test** | **Result** | **Criteria** |
| 4.1 | EN 61000-4-2:2001 | ESD (EUT of Enclosure) | Complies | B |
| 4.2 | EN 61000-4-3:2006 | RS (EUT of Enclosure) | Complies | A |
| 4.3 | EN 61000-4-4:2004 | EFT (EUT of AC Power Port) | Complies | A |
| 4.3 | EN 61000-4-4:2004 | EFT (EUT of Telecom Port) | Complies | A |
| 4.4 | EN 61000-4-5:2006 | Surge (EUT of AC Power Port) | Complies | A |
| 4.4 | EN 61000-4-5:2006 | Surge (EUT of Telecom Port) | Complies | B |
| 4.5 | EN 61000-4-6:2008 | CS (EUT of AC Power Port) | Complies | A |
| 4.5 | EN 61000-4-6:2008 | CS (EUT of Telecom Port) | Complies | A |
| 4.6 | EN 61000-4-11:2004 | DIP (EUT of AC Power Port) | Complies | C/A/A |

## 1.3 Uncertainty

| Test Items | Uncertainty | Remark |
|---|---|---|
| Conducted Emissions | ±2.3dB | Confidence levels of 95% |
| Radiated Emissions | ±3.7dB | Confidence levels of 95% |

## 1.4 EMS Performance Criteria Description

| Criteria | During test | After test |
|---|---|---|
| A | Shall operate as intended.<br>May show degradation of performance (see note 1).<br>Shall be no loss of function.<br>Shall be no unintentional transmissions. | Shall operate as intended.<br>Shall be no degradation of performance (see note 2).<br>Shall be no loss of function.<br>Shall be no loss of stored data or user programmable functions. |
| B | May show loss of function (one or more).<br>May show degradation of performance (see note 1).<br>No unintentional transmissions. | Functions shall be self-recoverable.<br>Shall operate as intended after recovering.<br>Shall be no degradation of performance (see note 2).<br>Shall be no loss of stored data or user programmable functions. |
| C | May be loss of function (one or more). | Functions shall be recoverable by the operator.<br>Shall operate as intended after recovering.<br>Shall be no degradation of performance (see note 2). |

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

## 1.5 LAN performance criteria:

Executed the LAN Test is a utility designed to accurately measure LAN speeds.
Please check the LAN speeds throughput and bit error percentage.
Before EMS test, bit error percentage below 1%.

During continuous immunity test, criteria A (CT/CR) has bit error percentage is below 1%;
After continuous immunity test, criteria A (CT/CR) has bit error percentage is below 1%.
During continuous immunity test, criteria B (CT/CR) has bit error percentage is below 10%;
After continuous immunity test, criteria B (CT/CR) has bit error percentage is below 1%.
After continuous immunity test, criteria C (CT/CR) has bit error percentage is 100%.

During transient immunity test, criteria A (TT/TR) has bit error percentage is below 10%.
After transient immunity test, criteria A (TT/TR) has bit error percentage is below 1%.
During transient immunity test, criteria B (CT/CR) has bit error percentage is below 20%.
After transient immunity test, criteria A (TT/TR) has bit error percentage is below 1%.
After transient immunity test, criteria C (CT/CR) has bit error percentage is 100%.

# 2 GENERAL INFORMATION

## 2.1 Product Category

For more detailed features description, please refer to the manufacturer's specifications or user's manual.

## 2.2 Accessories

| Power | Brand | Model | Rating |
|---|---|---|---|
| AC ADAPTER | LI SHIN | 0335A2065 | Input: 100-240V~, 50-60Hz 1.7A<br>Output: 20V 3.25A |
| **Other** | | | |
| USB cable, Power cord | | | |

## 2.3 Table for Testing Locations

| Test Site No. | Site Category | Location | Test Site No. | Site Category | Location |
|---|---|---|---|---|---|
| CO04-HY | Conduction | Hwa Ya | RS01-HY | RS | Hwa Ya |
| OS05-LK (Below 1GHz) | OATS | Lin Kou | EX01-HY | EFT, DIP, Surge | Hwa Ya |
| 10CH02-HY (Above 1GHz) | SAC | Hwa Ya | EX01-HY | CS, Magnetic | Hwa Ya |
| ES01-HY | ESD | Hwa Ya | - | - | - |

Semi Anechoic Chamber (SAC).

## 2.4 Test Manner

a. The following test modes were for conducted and radiated emissions test:
Mode 1. LCD+D-SUB 1024*600 60Hz

b. The following test modes were for telecommunication test:
Mode 1 (a). ISN LAN 100Mbps 10%
Mode 2 (b). ISN LAN 10Mbps 10%

c. The following test modes were for EMS test:
Mode 1. EUT with adapter : LI SHIN / 0335A2065 stand mode

d. Frequency range investigated: Conduction 150 kHz to 30 MHz, Radiation 30 MHz to 6,000 MHz.

## 2.5 Table for Supporting Units

| Support Unit | Brand | Model | FCC ID | Remark |
|---|---|---|---|---|
| LCD Monitor | DELL | 2408WFPb | N/A | EMI |
| Modem | ACEEX | DM1414 | IFAXDM1414 | |
| Headset | HAWK | 03-MSB301 | N/A | |
| CF Card | pqi | CompactFlash 256MB | N/A | |
| iPod nano*2 | Apple | A1199 | N/A | |
| USB Mouse | Microsoft | 1004 | N/A | |
| CF Card+PCMCIA | pqi | CompactFlash 40X | N/A | |
| USB Keyboard | DELL | SK-8115 | N/A | |
| Notebook (Remote Workstation) | DELL | PP32LB | DoC | |
| Bluetooth Headset (Remote Workstation) | Sony Ericsson | HBH-PV702 | N/A | |
| AP (Remote Workstation) | D-Link | DNS-G120 | N/A | |
| LCD Monitor | ViewSonic | VX1940W | DoC | EMS |
| Headset | KOKA | HD-305 | N/A | |
| USB 2.0 HDD*4 | TERASYS | F12-UF | DoC | |
| Memory Card | SanDisk | 1GB | N/A | |
| Notebook (Remote Workstation) | DELL | PP01L | N/A | |
| AP (Remote Workstation) | D-Link | DNS-G120 | N/A | |
| Mobile Phone (Remote Workstation) | Sony Ericsson | K800i | N/A | |

## 2.6 EUT Operation during Test

**< EMI >**

An executive program, “WINEMC.EXE” under WIN XP, which generates a complete line of continuously repeating “H“ pattern was used as the test software.

The program was executed as follows:

a. Turn on the power of all equipment.
b. The EUT reads the test program from the hard disk drive and runs it.
c. The EUT sends "H" messages to the monitor, and the monitor displays "H" patterns on the screen.
d. The EUT sends "H" messages to the internal hard disk, and the hard disk reads and writes the message.
e. Repeat the steps from c to d.

At the same time, the following programs were executed:
- Executed "BurnIn.exe" to read and write data from USB 2.0 HDD and CF card.
- Executed "Windows Media Player.exe" to play audio and video to headset.
- Executed "Wireless" to link with the remote workstation to receive and transmit data by AP.
- Executed "Bluetooth.exe" to link with the remote workstation to receive and transmit data by bluetooth.
- Executed "Ping.exe" to link with the remote workstation to receive and transmit data via RJ45 cable.

**< EMS >**

An executive program, “EMCTEST.EXE” under WIN XP, which generates a complete line of continuously repeating “H“ pattern was used as the test software.

The program was executed as follows:

a. Turn on the power of all equipment.
b. The EUT reads the test program from the hard disk drive and runs it.
c. The EUT sends "H" messages to the monitor, and the monitor displays "H" patterns on the screen.
d. The EUT sends "H" messages to the internal hard disk, and the hard disk reads and writes the message.
e. Repeat the steps from c to d.

At the same time, the following programs were executed:
- Executed "Winthrax.exe" to read and write data from USB 2.0 HDD and memory card.
- Executed "Windows Media Player.exe" to play audio and video to headset.
- Executed "Ping.exe" to link with the remote workstation to receive and transmit data via RJ45 cable.
- Executed "Wireless" to link with the remote workstation to receive and transmit data by AP.
- Executed "Bluetooth.exe" to link with the remote workstation to receive and transmit data by bluetooth.

# 3 EMISSION TESTS RESULT

## 3.1 AC Power Line Conducted Emissions Measurement

### 3.1.1 Limit

For this product, which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

**Class B**

| Frequency (MHz) | QP Limit (dBuV) | AV Limit (dBuV) |
|---|---|---|
| 0.15~0.5 | 66~56 | 56~46 |
| 0.5~5 | 56 | 46 |
| 5~30 | 60 | 50 |

### 3.1.2 Measuring Instruments and Setting

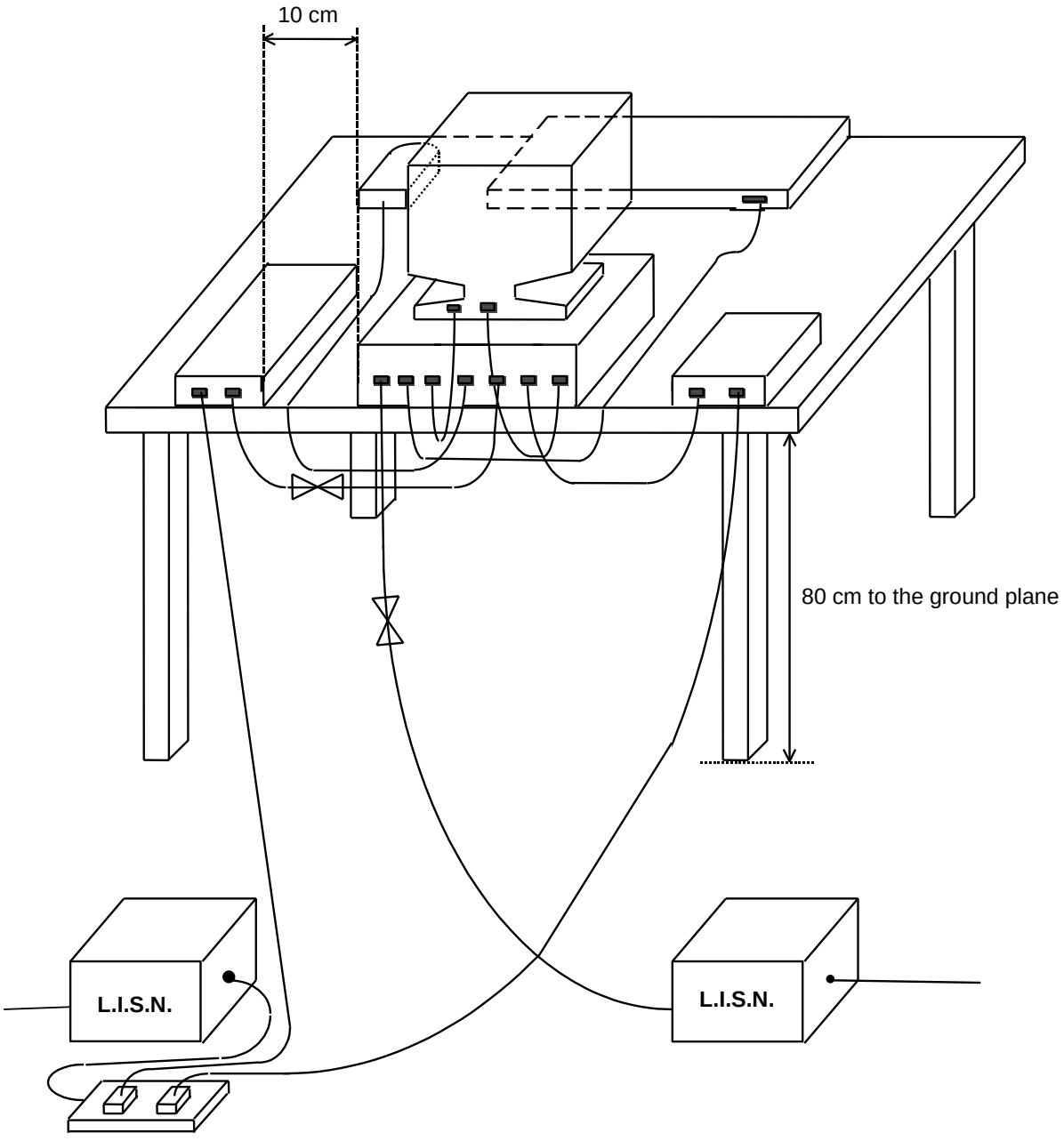
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

| Receiver Parameters | Setting |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 KHz |

### 3.1.3 Test Procedures

1. The EUT warm up about 15 minutes then start test.
2. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. The measurement has to be done between each power line and ground at the power terminal.

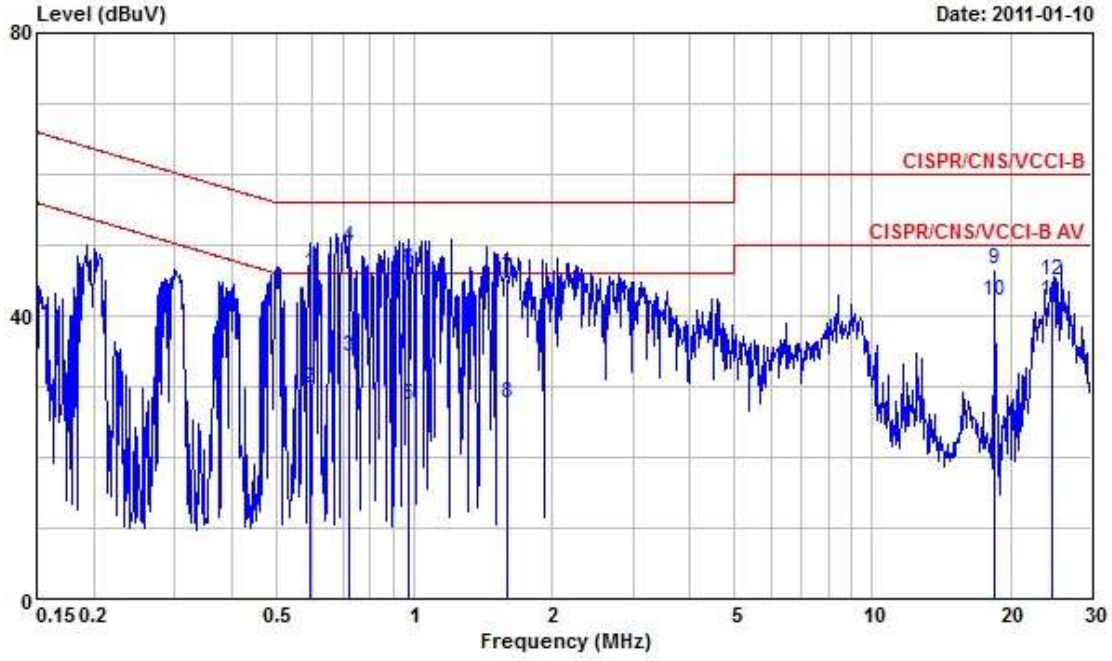
### 3.1.4 Typical Test Setup Layout of Conducted Powerline



### 3.1.5 Results of AC Power Line Conducted Emissions Measurement

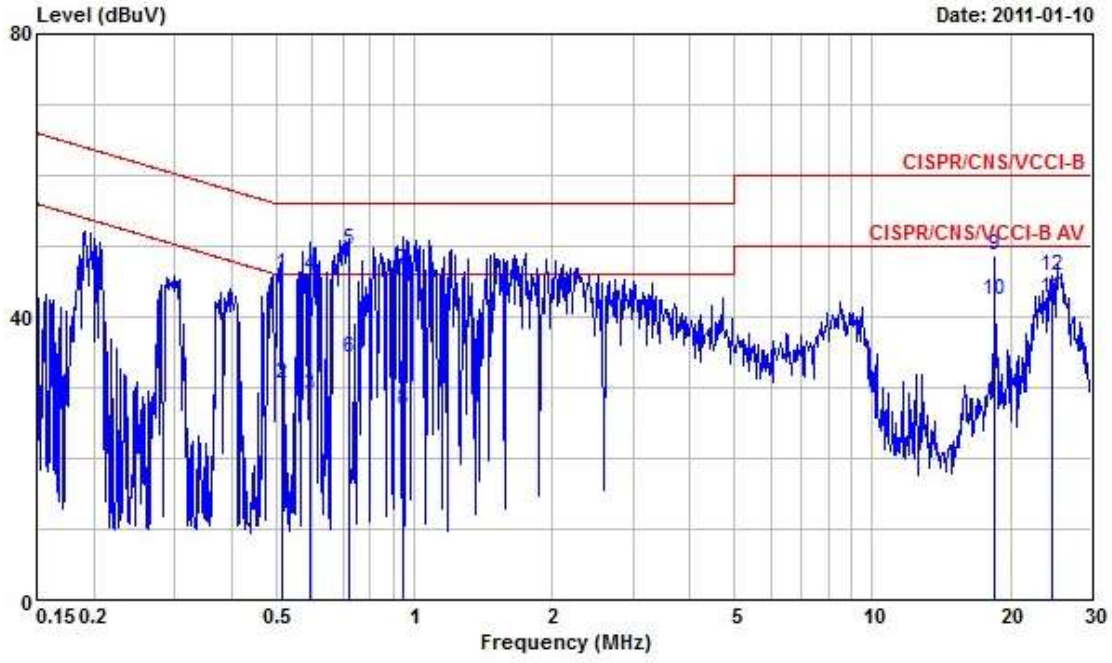
| Final Test Date | Jan. 10, 2011 | Test Site No. | CO04-HY |
|---|---|---|---|
| Temperature | 20.8℃ | Humidity | 53.4% |
| Test Engineer | Jason | Configuration | Mode 1 |

***Line***




| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.5916410 | 46.04 | -9.96 | 56.00 | 45.90 | 0.10 | 0.04 | QP |
| 2 | 0.5916410 | 29.65 | -16.35 | 46.00 | 29.51 | 0.10 | 0.04 | Average |
| 3 | 0.7197740 | 34.21 | -11.79 | 46.00 | 34.05 | 0.10 | 0.06 | Average |
| 4 | 0.7197740 | 49.70 | -6.30 | 56.00 | 49.54 | 0.10 | 0.06 | QP |
| 5 | 0.9683980 | 27.31 | -18.69 | 46.00 | 27.10 | 0.11 | 0.10 | Average |
| 6 | 0.9683980 | 46.61 | -9.39 | 56.00 | 46.40 | 0.11 | 0.10 | QP |
| 7 | 1.590 | 45.35 | -10.65 | 56.00 | 45.13 | 0.12 | 0.10 | QP |
| 8 | 1.590 | 27.51 | -18.49 | 46.00 | 27.29 | 0.12 | 0.10 | Average |
| 9 | 18.514 | 46.49 | -13.51 | 60.00 | 45.95 | 0.38 | 0.16 | QP |
| 10 | 18.514 | 42.02 | -7.98 | 50.00 | 41.48 | 0.38 | 0.16 | Average |
| 11 | 24.575 | 42.06 | -7.94 | 50.00 | 41.31 | 0.47 | 0.28 | Average |
| 12 | 24.575 | 45.07 | -14.93 | 60.00 | 44.32 | 0.47 | 0.28 | QP |

***Neutral***




| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.5155030 | 46.03 | -9.97 | 56.00 | 45.91 | 0.09 | 0.03 | QP |
| 2 | 0.5155030 | 30.47 | -15.53 | 46.00 | 30.35 | 0.09 | 0.03 | Average |
| 3 | 0.5907410 | 28.95 | -17.05 | 46.00 | 28.82 | 0.09 | 0.04 | Average |
| 4 | 0.5907410 | 45.73 | -10.27 | 56.00 | 45.60 | 0.09 | 0.04 | QP |
| 5 | 0.7197740 | 49.49 | -6.51 | 56.00 | 49.34 | 0.09 | 0.06 | QP |
| 6 | 0.7197740 | 34.11 | -11.89 | 46.00 | 33.96 | 0.09 | 0.06 | Average |
| 7 | 0.9480900 | 46.65 | -9.35 | 56.00 | 46.46 | 0.10 | 0.09 | QP |
| 8 | 0.9480900 | 26.73 | -19.27 | 46.00 | 26.54 | 0.10 | 0.09 | Average |
| 9 | 18.515 | 48.57 | -11.43 | 60.00 | 48.04 | 0.38 | 0.15 | QP |
| 10 | 18.515 | 42.24 | -7.76 | 50.00 | 41.71 | 0.38 | 0.15 | Average |
| 11 | 24.576 | 42.60 | -7.40 | 50.00 | 41.84 | 0.48 | 0.28 | Average |
| 12 | 24.576 | 45.91 | -14.09 | 60.00 | 45.15 | 0.48 | 0.28 | QP |

Note:
Level = Read Level + LISN Factor + Cable Loss.

## 3.2 Telecommunication Line Conducted Emissions Measurement

### 3.2.1 Limit

For a device, which is designed to be connected to the telecommunication line, the radio frequency voltage that is conducted back onto the telecommunication line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

**Class B**

| | Voltage | | Current | |
|---|---|---|---|---|
| **Frequency (MHz)** | **QP Limit (dBuV)** | **AV Limit (dBuV)** | **QP Limit (dBuA)** | **AV Limit (dBuA)** |
| 0.15~0.5 | 84~74 | 74~64 | 40~30 | 30~20 |
| 0.5~30 | 74 | 64 | 30 | 20 |

### 3.2.2 Measuring Instruments and Setting

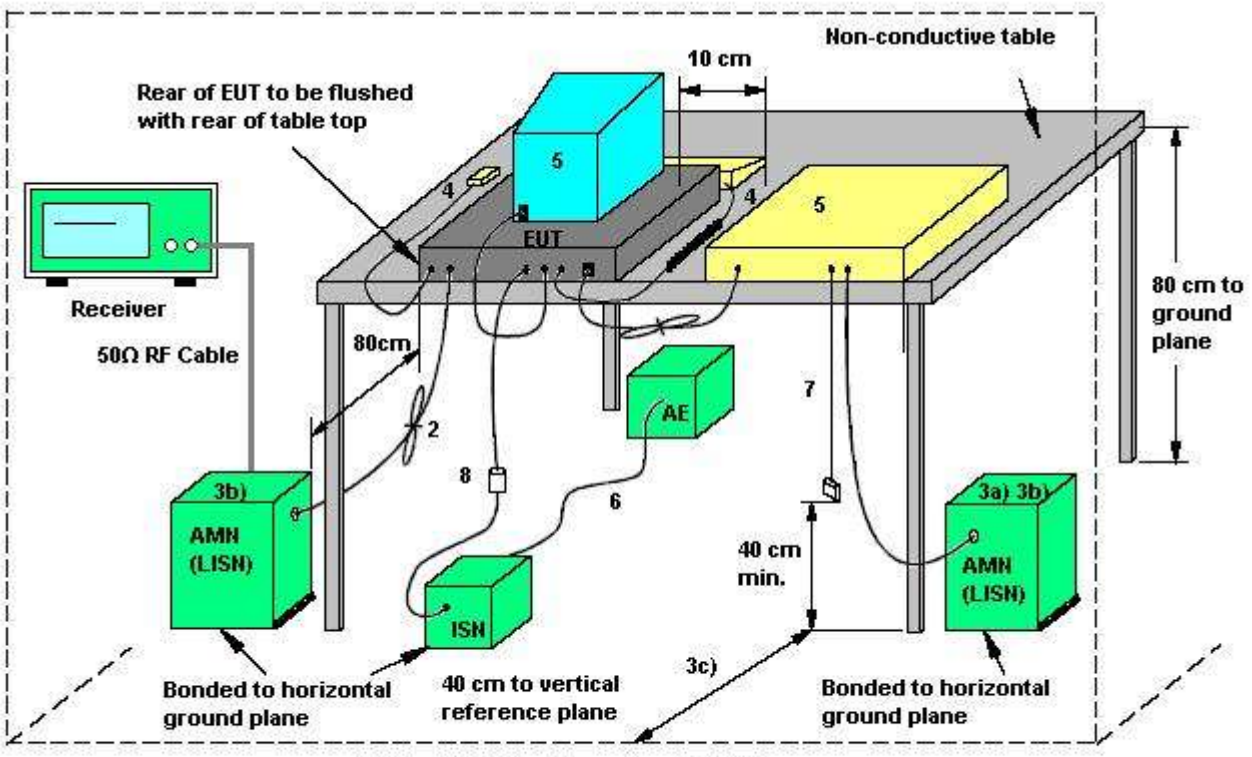
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

| Receiver Parameters | Setting |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 KHz |

### 3.2.3 Test Procedures

1. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect telecommunication line of EUT to the associated equipment through a impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done different categories of telecommunication lines.

### 3.2.4 Typical Test Setup Layout of Disturbances at Telecommunication Ports

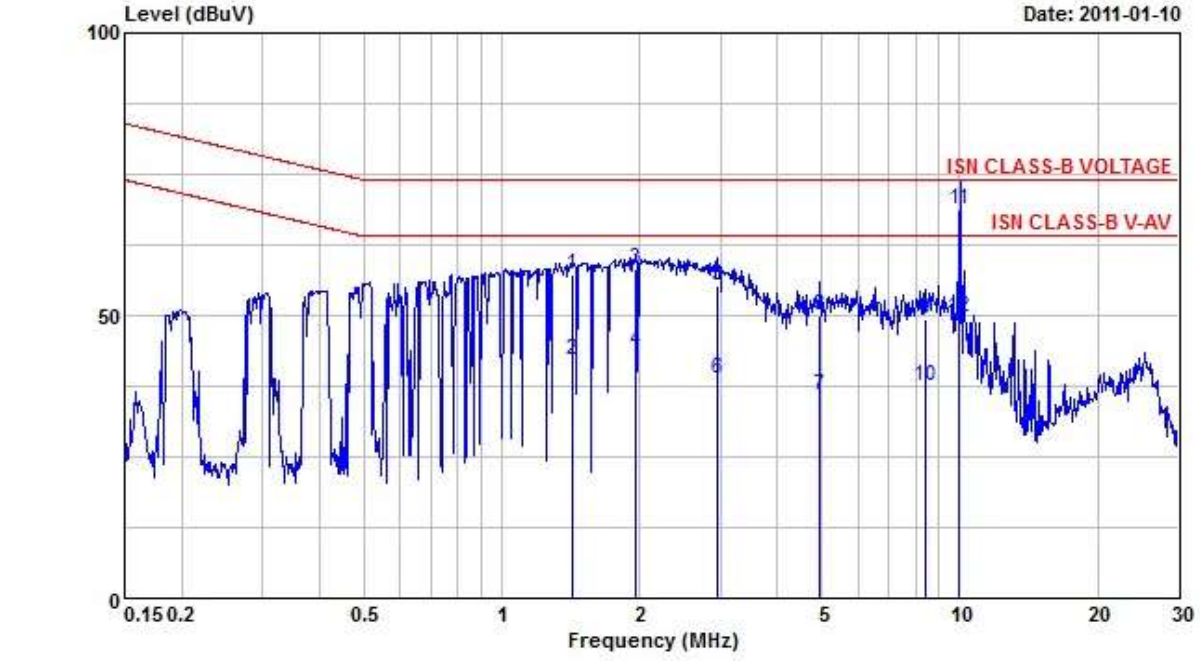



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

1. If cables, which hang closer than 40 cm to the horizontal metal groundplane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
2. Excess mains cord shall be bundled in the centre or shortened to appropriate length.
3. EUT is connected to one artificial mains network (AMN). All AMNs and ISNs may alternatively be connected to a vertical reference plane or metal wall.
   a. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
   b. AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.
   c. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
4. Cables of hand operated devices, such as keyboards, mouses, etc. shall be placed as for normal usage.
5. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
6. I/O signal cable intended for external connection.
7. The end of the I/O signal cables which are not connected to an AE may be terminated, if required, using correct terminating impedance.
8. If used, the current probe shall be placed at 0,1 m from the ISN.

### 3.2.5 Test Result for Telecommunication Line Conducted Emissions Measurement

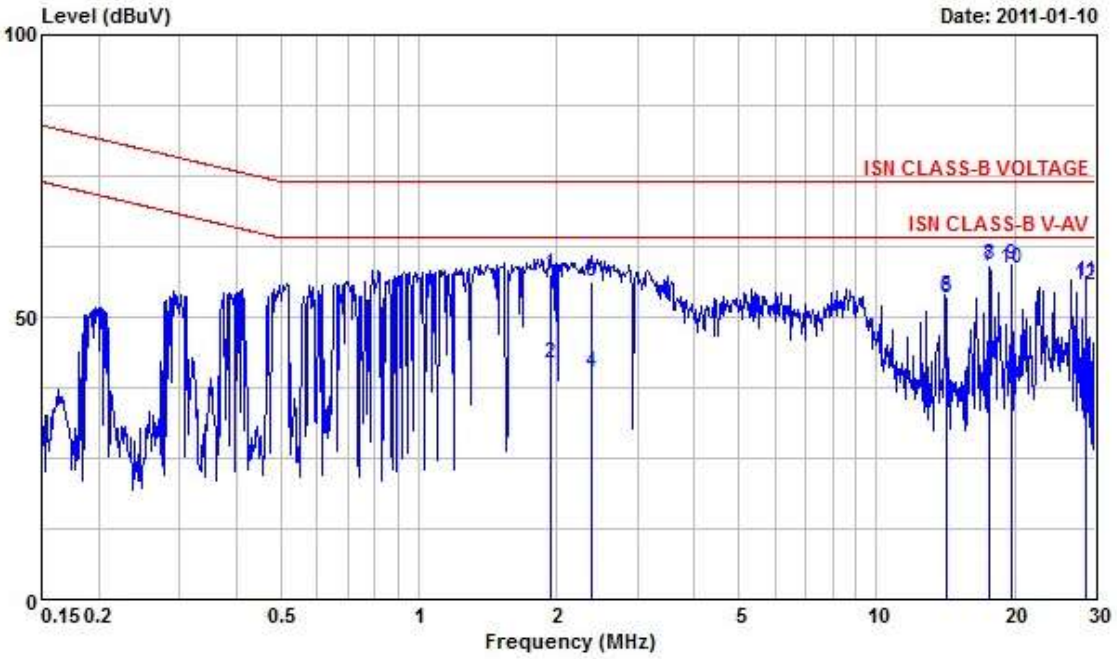
| Final Test Date | Jan. 10, 2011 | Test Site No. | CO04-HY |
|---|---|---|---|
| Temperature | 20.8℃ | Humidity | 53.4% |
| Test Engineer | Jason | Configuration | Mode 1 (a) |




| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 1.420 | 57.12 | -16.88 | 74.00 | 47.37 | 9.65 | 0.10 | QP |
| 2 | 1.420 | 42.06 | -21.94 | 64.00 | 32.31 | 9.65 | 0.10 | Average |
| 3 | 1.960 | 58.24 | -15.76 | 74.00 | 48.49 | 9.65 | 0.10 | QP |
| 4 | 1.960 | 43.83 | -20.17 | 64.00 | 34.08 | 9.65 | 0.10 | Average |
| 5 | 2.950 | 55.13 | -18.87 | 74.00 | 45.38 | 9.65 | 0.10 | QP |
| 6 | 2.950 | 38.74 | -25.26 | 64.00 | 28.99 | 9.65 | 0.10 | Average |
| 7 | 4.951 | 36.00 | -28.00 | 64.00 | 26.25 | 9.65 | 0.10 | Average |
| 8 | 4.951 | 50.02 | -23.98 | 74.00 | 40.27 | 9.65 | 0.10 | QP |
| 9 | 8.410 | 49.45 | -24.55 | 74.00 | 39.70 | 9.65 | 0.10 | QP |
| 10 | 8.410 | 37.62 | -26.38 | 64.00 | 27.87 | 9.65 | 0.10 | Average |
| 11 @ | 10.000 | 68.84 | -5.16 | 74.00 | 59.09 | 9.65 | 0.10 | QP |
| 12 | 10.000 | 49.53 | -14.47 | 64.00 | 39.78 | 9.65 | 0.10 | Average |

Note: Level = Read Level + ISN Factor + Cable Loss.

| Final Test Date | Jan. 10, 2011 | Test Site No. | CO04-HY |
|---|---|---|---|
| Temperature | 20.8℃ | Humidity | 53.4% |
| Test Engineer | Jason | Configuration | Mode 2 (b) |




| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 1.940 | 57.49 | -16.51 | 74.00 | 47.74 | 9.65 | 0.10 | QP |
| 2 | 1.940 | 41.94 | -22.06 | 64.00 | 32.19 | 9.65 | 0.10 | Average |
| 3 | 2.380 | 56.27 | -17.73 | 74.00 | 46.52 | 9.65 | 0.10 | QP |
| 4 | 2.380 | 40.04 | -23.96 | 64.00 | 30.29 | 9.65 | 0.10 | Average |
| 5 | 14.212 | 53.67 | -20.33 | 74.00 | 43.74 | 9.66 | 0.27 | QP |
| 6 | 14.212 | 53.40 | -10.60 | 64.00 | 43.47 | 9.66 | 0.27 | Average |
| 7 | 17.694 | 58.79 | -5.21 | 64.00 | 48.94 | 9.66 | 0.19 | Average |
| 8 | 17.694 | 59.34 | -14.66 | 74.00 | 49.49 | 9.66 | 0.19 | QP |
| 9 | 19.709 | 59.05 | -14.95 | 74.00 | 49.28 | 9.66 | 0.11 | QP |
| 10 | 19.709 | 58.43 | -5.57 | 64.00 | 48.66 | 9.66 | 0.11 | Average |
| 11 | 28.686 | 56.23 | -17.77 | 74.00 | 46.04 | 9.67 | 0.52 | QP |
| 12 | 28.686 | 55.58 | -8.42 | 64.00 | 45.39 | 9.67 | 0.52 | Average |

Note: Level = Read Level + ISN Factor + Cable Loss.

## 3.3 Radiated Emissions Measurement

### 3.3.1 Limit

Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 MHz to 1000 MHz and bandwidth of 1 MHz for above 1 GHz 5th harmonic of the highest frequency or 6 GHz, whichever is lower.The quasi-peak measuring receiver shall be in accordance with clause 2 of EN55016-1. Receivers with peak detectors shall be in accordance with clause 3 of EN55016-1, and shall have a 6 dB bandwidth in accordance with clause 2 of EN55016-1 and above 1GHz measurement mothed shall be as specified in 7.3 of EN55016-2-3.

**< Limit: Below 1GHz >**

| Frequency of Emission (MHz) | Field Strength QP Limit (dBuV/m) at 10m |
|---|---|
| 30 ~ 230 | 30 |
| 230 ~ 1000 | 37 |

**< Limit: Above 1GHz >**

| Frequency of Emission (GHz) | Field Strength Limit (dBuV/m) at 3m | |
|---|---|---|
| | Average | Peak |
| 1 ~ 3 | 50 | 70 |
| 3 ~ 6 | 54 | 74 |

### 3.3.2 Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |
| Start ~ Stop Frequency | 1GHz~6GHz / 1MHz for Peak, Average |

### 3.3.3 Test Procedures

**< Below 1GHz >**

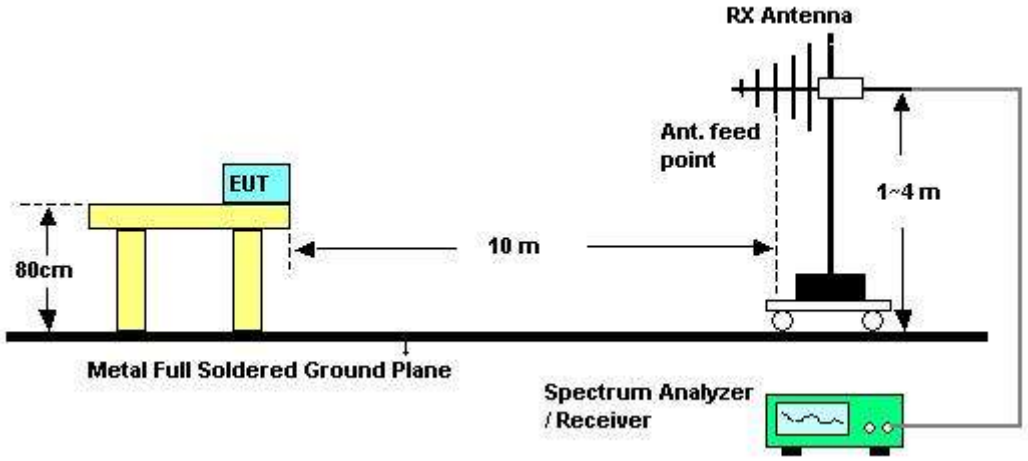
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 10 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

**< Above 1GHz >**

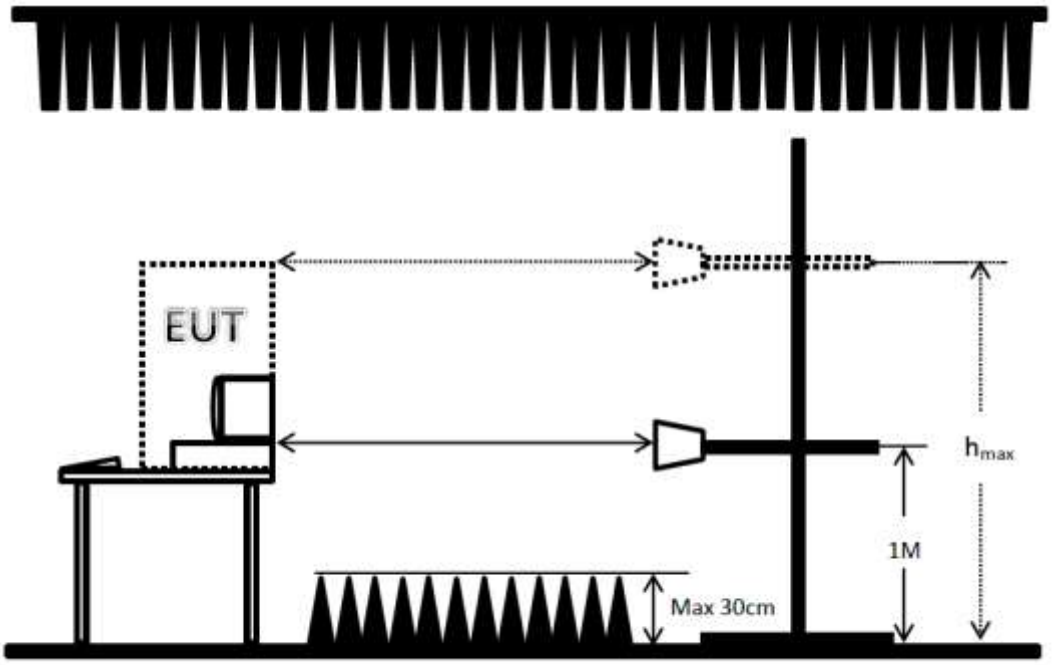
a. Same test set up as below 1GHz radiated testing.
b. The EUT was set 3 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
c. There should be absorber placed between the EUT and Antenna and its located size should let the test site meet CISPR16-1-4 requirement.
d. The table was rotated 360 degrees to determine the position of the highest radiation.
e. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
f. Set the DRG Horn Antenna (Model: 3115) at 1M height, then run the turn table to get the maximum noise reading from Horizontal and Vertical polarity separately.
g. When EUT locating on the turn-table, and its height is over 172cm (Antenna's 3dB beam width of 6GHz is 27∘ ), the DRG Horn Antenna must be raised up and descended down, then turning around the turn-table to get the maximum noise reading of the Horizontal and Vertical polarity separately. Note the maximum raise up height is same as the top of EUT.
h. If emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

### 3.3.4 Test Setup Layout

**< Below 1GHz >**




**< Above 1GHz >**

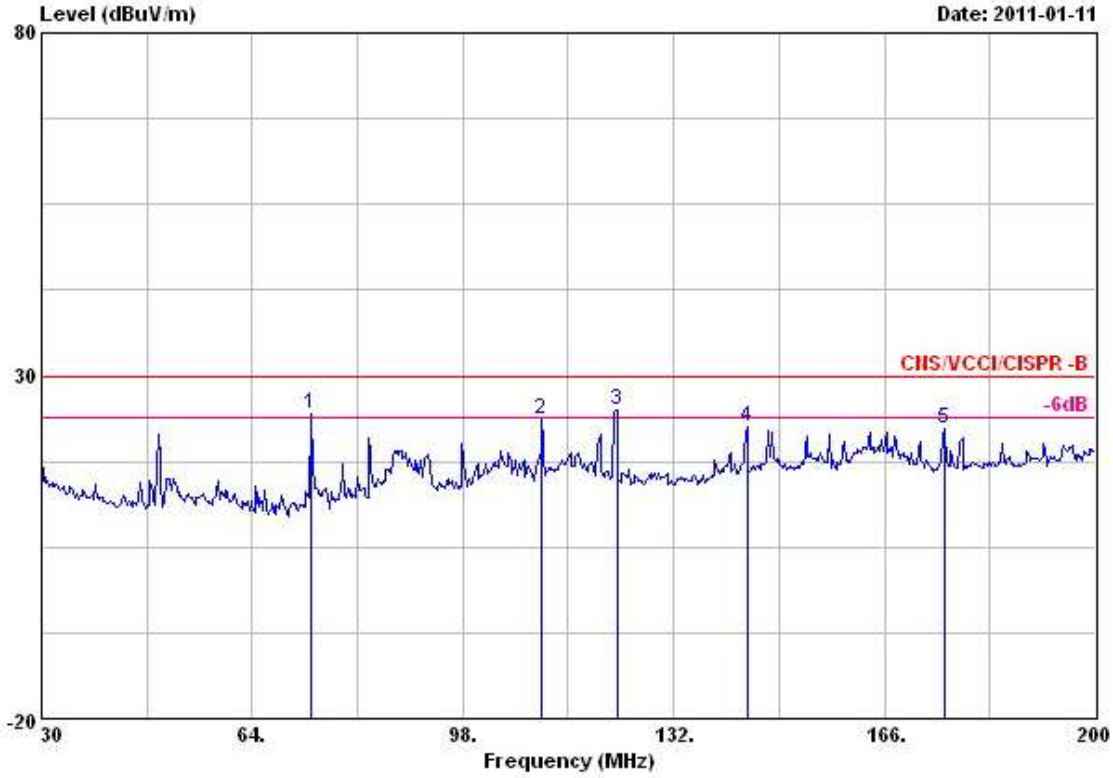



Remark: When EUT's height is over 172cm, $h_{max}$ = top of EUT

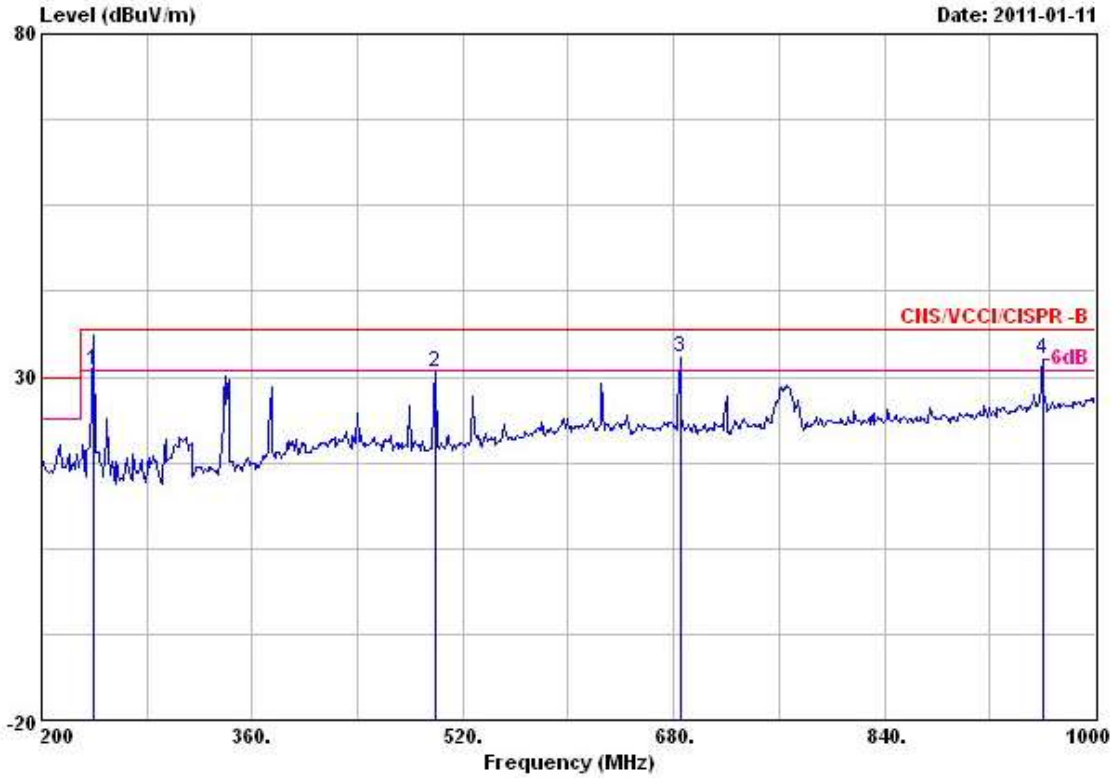
### 3.3.5 Results for Radiated Emissions (30MHz~1GHz)

| Final Test Date | Jan. 11, 2010 | Test Site No. | 10CH02-HY |
|---|---|---|---|
| Temperature | 19℃ | Humidity | 54% |
| Test Engineer | Nicky | Configurations | Mode 1 |

***Horizontal***

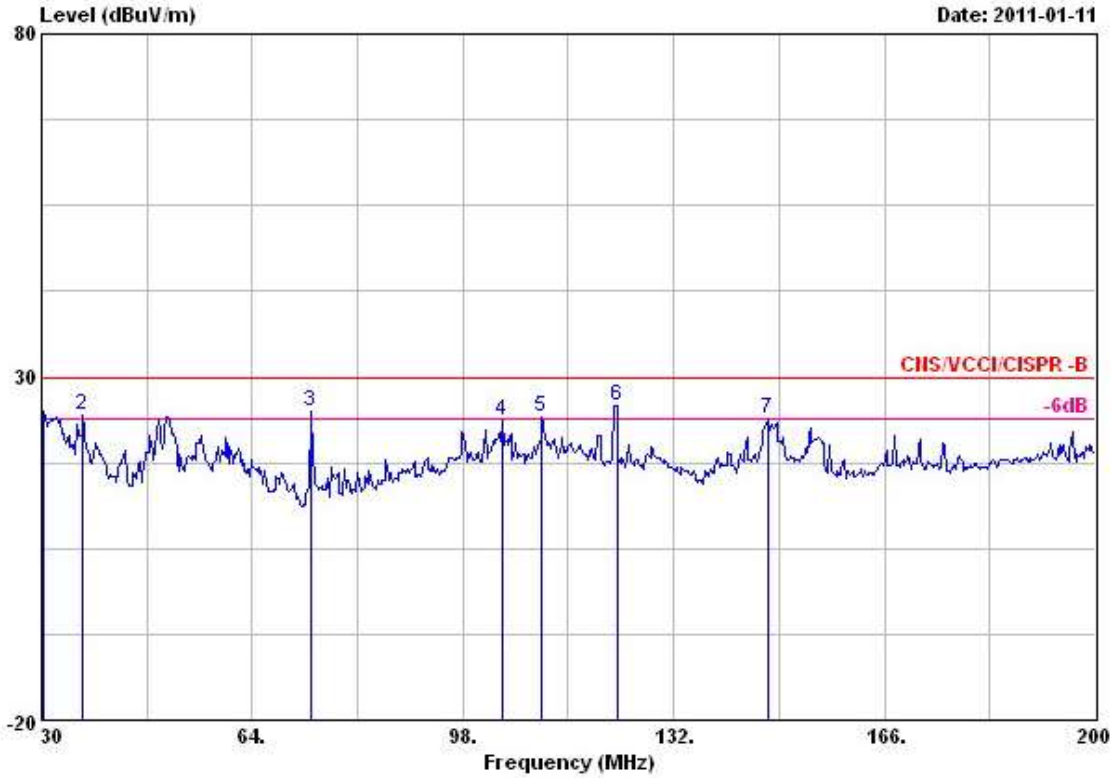



| | Freq | Level | Over Limit | Limit Line | Read Level | Preamp Factor | Cable Loss | Antenna Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB/m | | cm | deg |
| 1 ! | 73.350 | 24.35 | -5.65 | 30.00 | 42.05 | 28.15 | 2.10 | 8.35 | Peak | --- | --- |
| 2 | 110.750 | 23.67 | -6.33 | 30.00 | 38.32 | 28.05 | 2.54 | 10.86 | Peak | --- | --- |
| 3 ! | 122.820 | 25.07 | -4.93 | 30.00 | 38.47 | 27.99 | 2.69 | 11.90 | Peak | --- | --- |
| 4 | 143.900 | 22.48 | -7.52 | 30.00 | 35.23 | 27.88 | 2.86 | 12.27 | Peak | --- | --- |
| 5 | 175.860 | 22.24 | -7.76 | 30.00 | 33.41 | 27.72 | 3.14 | 13.41 | Peak | --- | --- |

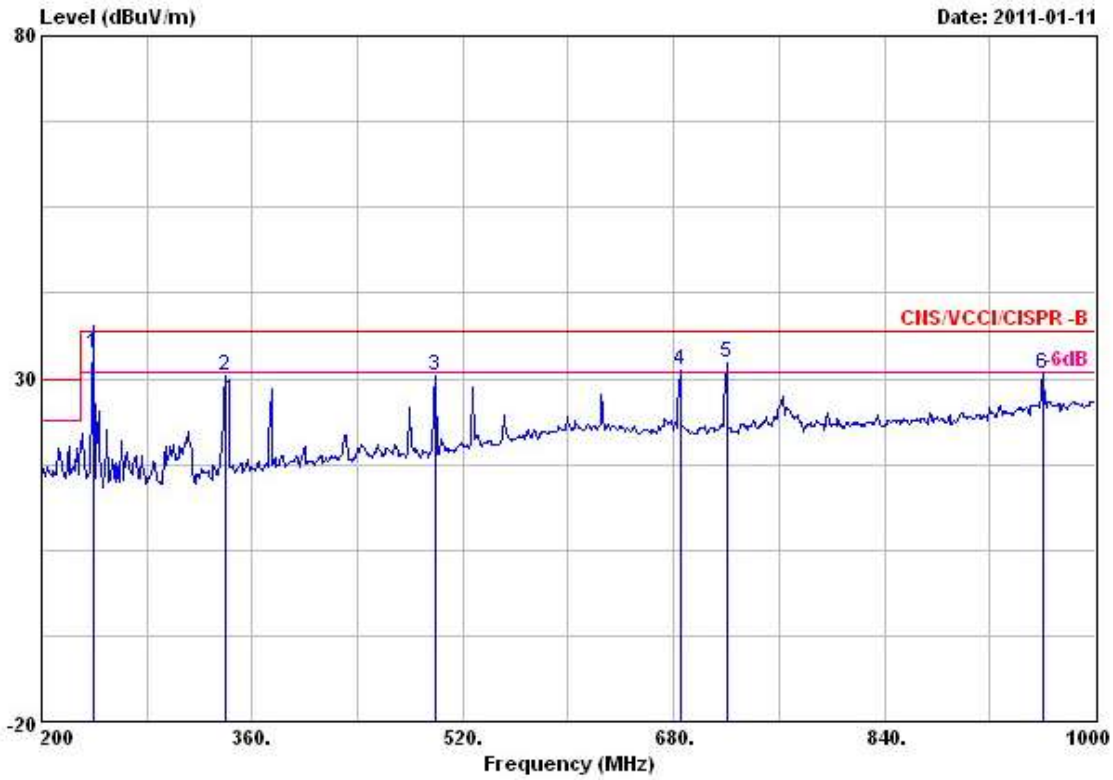



| | Freq | Level | Over Limit | Limit Line | Read Level | Preamp Factor | Cable Loss | Antenna Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB/m | | cm | deg |
| 1 ! | 240.000 | 31.07 | -5.93 | 37.00 | 42.66 | 27.52 | 2.74 | 13.19 | QP | 400 | 100 |
| 2 | 499.200 | 30.66 | -6.34 | 37.00 | 37.84 | 28.59 | 4.02 | 17.39 | Peak | --- | --- |
| 3 @ | 684.800 | 32.90 | -4.10 | 37.00 | 36.30 | 28.33 | 4.69 | 20.24 | Peak | --- | --- |
| 4 ! | 960.000 | 32.61 | -4.39 | 37.00 | 31.79 | 27.46 | 5.83 | 22.45 | Peak | --- | --- |

***Vertical***




| | Freq | Level | Over Limit | Limit Line | Read Level | Preamp Factor | Cable Loss | Antenna Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB/m | | cm | deg |
| 1 ! | 30.340 | 24.91 | -5.09 | 30.00 | 37.85 | 28.25 | 1.46 | 13.85 | Peak | --- | --- |
| 2 ! | 36.630 | 24.36 | -5.64 | 30.00 | 39.05 | 28.23 | 1.58 | 11.96 | Peak | --- | --- |
| 3 ! | 73.350 | 24.94 | -5.06 | 30.00 | 42.64 | 28.15 | 2.10 | 8.35 | Peak | --- | --- |
| 4 | 104.460 | 23.59 | -6.41 | 30.00 | 38.95 | 28.08 | 2.46 | 10.26 | Peak | --- | --- |
| 5 ! | 110.750 | 24.07 | -5.93 | 30.00 | 38.72 | 28.05 | 2.54 | 10.86 | Peak | --- | --- |
| 6 @ | 122.820 | 25.86 | -4.14 | 30.00 | 39.26 | 27.99 | 2.69 | 11.90 | Peak | --- | --- |
| 7 | 147.300 | 23.98 | -6.02 | 30.00 | 36.63 | 27.87 | 2.90 | 12.32 | Peak | --- | --- |



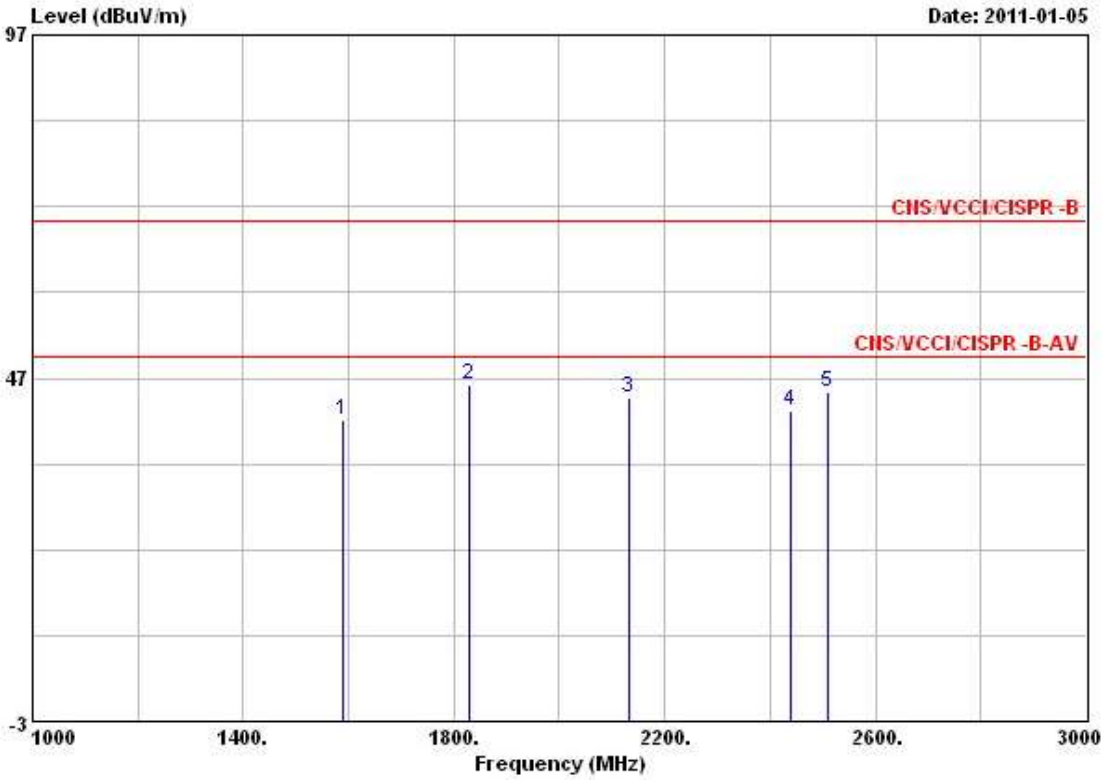

| | Freq | Level | Over Limit | Limit Line | Read Level | Preamp Factor | Cable Loss | Antenna Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB/m | | cm | deg |
| 1 @ | 240.000 | 33.68 | -3.32 | 37.00 | 45.27 | 27.52 | 2.74 | 13.19 | QP | 100 | 180 |
| 2 | 339.200 | 30.42 | -6.58 | 37.00 | 40.55 | 27.67 | 3.34 | 14.20 | Peak | --- | --- |
| 3 | 499.200 | 30.39 | -6.61 | 37.00 | 37.57 | 28.59 | 4.02 | 17.39 | Peak | --- | --- |
| 4 ! | 684.800 | 31.30 | -5.70 | 37.00 | 34.70 | 28.33 | 4.69 | 20.24 | Peak | --- | --- |
| 5 ! | 720.000 | 32.29 | -4.71 | 37.00 | 35.41 | 28.24 | 4.82 | 20.30 | Peak | --- | --- |
| 6 | 960.000 | 30.69 | -6.31 | 37.00 | 29.87 | 27.46 | 5.83 | 22.45 | Peak | --- | --- |

Note: Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.
V: Vertical Polarization ; H: Horizontal Polarization.

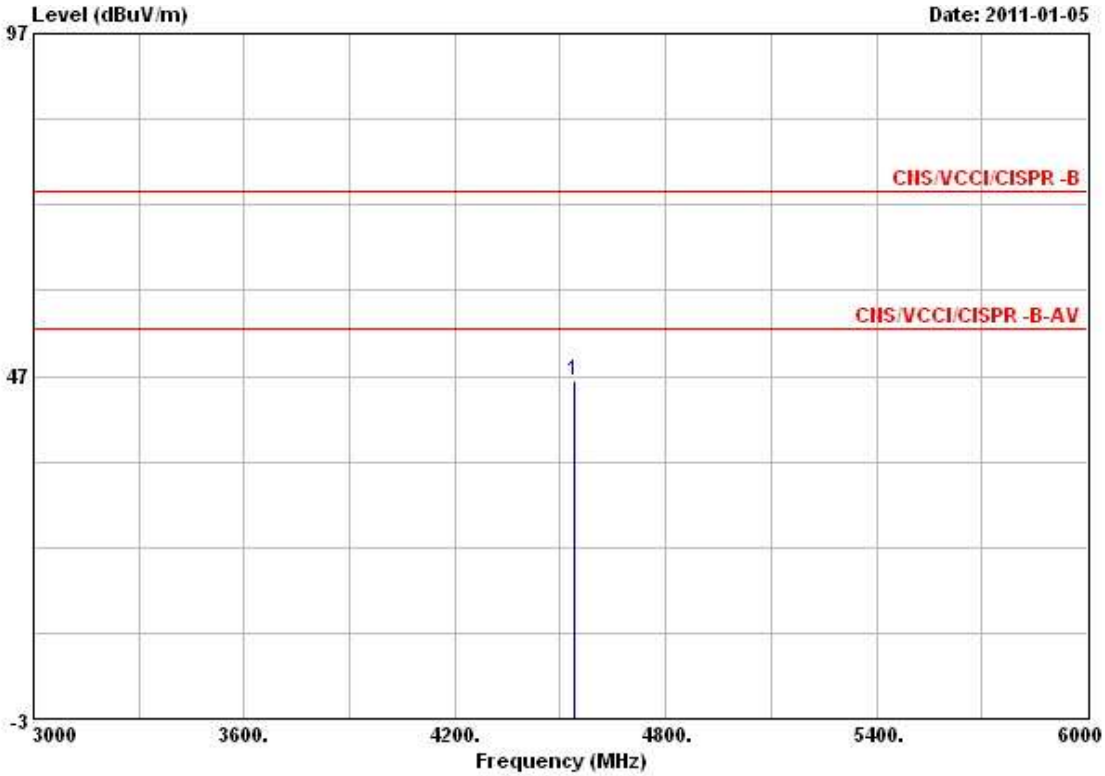
### 3.3.6 Results for Radiated Emissions (1GHz to 6GHz)

| Final Test Date | Jan. 05, 2010 | Test Site No. | 10CH02-HY |
|---|---|---|---|
| Temperature | 25℃ | Humidity | 55% |
| Test Engineer | Chun Chi | Configurations | Mode 1 |

***Horizontal***

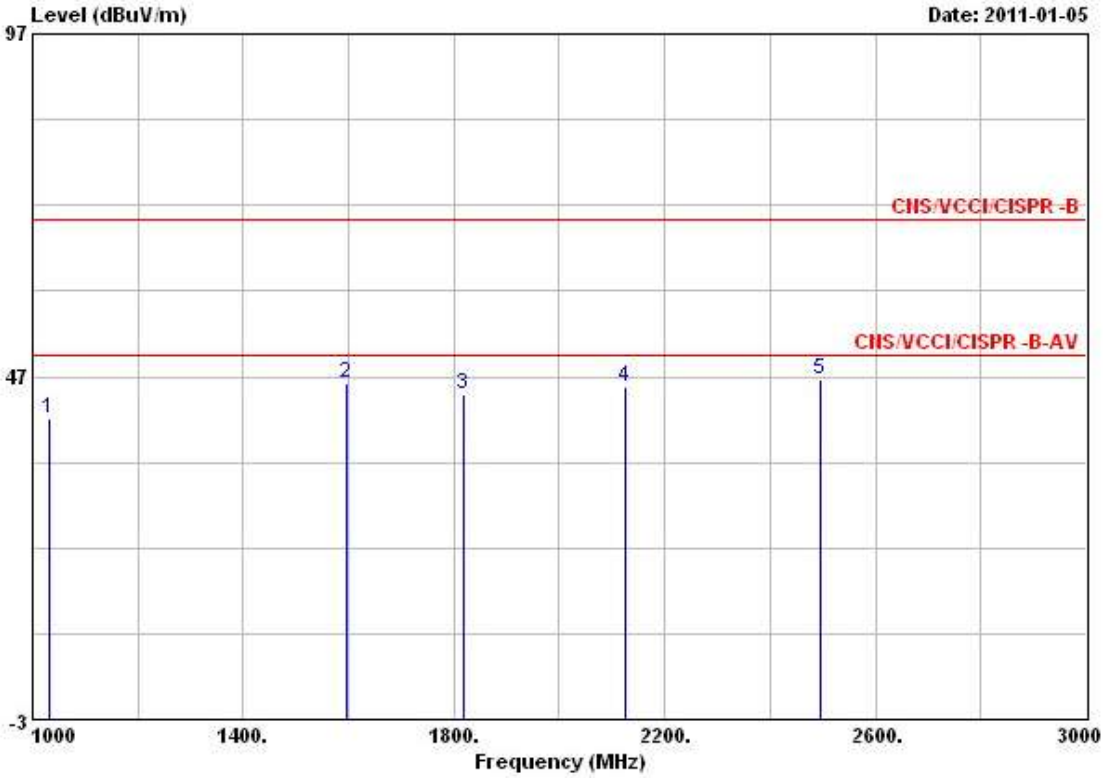



| | Freq | Level | Over Limit | Limit Line | Read Level | Preamp Factor | Cable Loss | Antenna Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB/m | | cm | deg |
| 1 | 1590.000 | 40.96 | -29.04 | 70.00 | 40.69 | 30.93 | 5.42 | 25.78 | Peak | --- | --- |
| 2 | 1830.000 | 46.16 | -23.84 | 70.00 | 44.98 | 31.27 | 5.78 | 26.67 | Peak | --- | --- |
| 3 | 2132.000 | 44.09 | -25.91 | 70.00 | 41.70 | 31.45 | 6.24 | 27.60 | Peak | --- | --- |
| 4 | 2438.000 | 42.14 | -27.86 | 70.00 | 38.39 | 31.33 | 6.79 | 28.29 | Peak | --- | --- |
| 5 | 2508.000 | 44.93 | -25.07 | 70.00 | 40.86 | 31.29 | 6.90 | 28.46 | Peak | --- | --- |

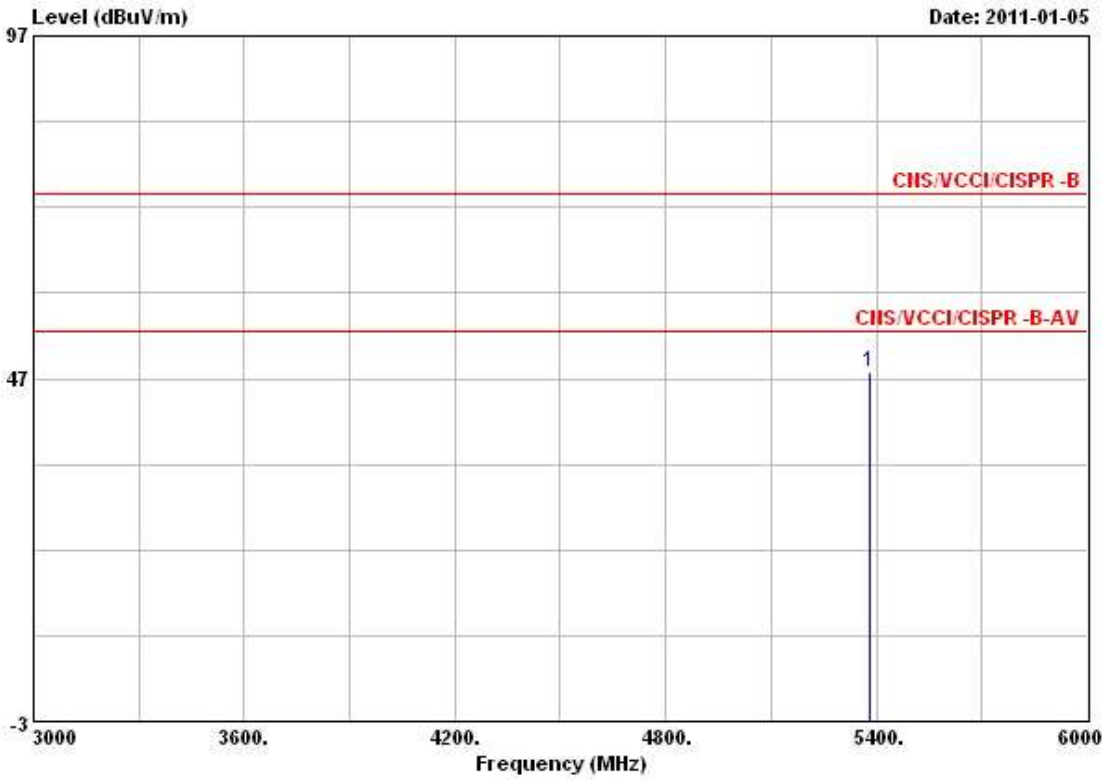



| | Freq | Level | Over Limit | Limit Line | Read Level | Preamp Factor | Cable Loss | Antenna Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB/m | | cm | deg |
| 1 | 4542.000 | 46.20 | -27.80 | 74.00 | 33.16 | 29.88 | 10.35 | 32.57 | Peak | --- | --- |

***Vertical***




| | Freq | Level | Over Limit | Limit Line | Read Level | Preamp Factor | Cable Loss | Antenna Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB/m | | cm | deg |
| 1 | 1030.000 | 40.95 | -29.05 | 70.00 | 44.35 | 32.03 | 4.35 | 24.28 | Peak | --- | --- |
| 2 | 1596.000 | 46.18 | -23.82 | 70.00 | 45.89 | 30.94 | 5.45 | 25.78 | Peak | --- | --- |
| 3 | 1820.000 | 44.44 | -25.56 | 70.00 | 43.34 | 31.25 | 5.75 | 26.60 | Peak | --- | --- |
| 4 | 2126.000 | 45.44 | -24.56 | 70.00 | 43.08 | 31.45 | 6.24 | 27.57 | Peak | --- | --- |
| 5 | 2494.000 | 46.49 | -23.51 | 70.00 | 42.51 | 31.30 | 6.88 | 28.40 | Peak | --- | --- |




| | Freq | Level | Over Limit | Limit Line | Read Level | Preamp Factor | Cable Loss | Antenna Factor | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB | dB | dB/m | | cm | deg |
| 1 | 5382.000 | 48.05 | -25.95 | 74.00 | 33.41 | 31.18 | 11.94 | 33.88 | Peak | --- | --- |

Note: Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.
V: Vertical Polarization ; H: Horizontal Polarization.

## 3.4 Harmonic Current Emissions Measurement

### 3.4.1 Limit

Harmonic current emissions evaluate the potential for the EUT to cause distortion on the AC power lines. It is applicable to electrical and electronic equipment having an input current ≦16 A par phase, and intended to be connected to public low-voltage distribution systems. EUT has been specified power less than or equal to 600 W and complies with Class D equipment and limits.

**Class D Limits Table**

| Harmonic Order | Max. permissible harmonic current per watt (mA/W) | Max. permissible harmonic current (A) |
|---|---|---|
| 3 | 3.4 | 2.30 |
| 5 | 1.9 | 1.14 |
| 7 | 1.0 | 0.77 |
| 9 | 0.5 | 0.40 |
| 11 | 0.35 | 0.33 |
| 13 ≦ n ≦ 39 | 3.85/n | 0.15×15/n |

### 3.4.2 Measuring Instruments and Setting

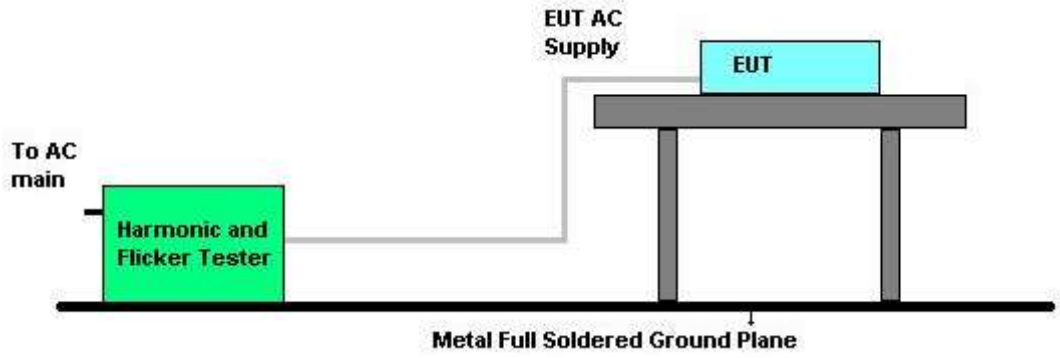
Please refer to section 5 of equipments list in this report. The following table is the setting of harmonic and flicker Tester.

| Harmonic and Flicker Tester | Setting |
|---|---|
| Line Voltage | 230 V |
| Line Frequency | 50 Hz |
| Device Class | D |
| Current Measurement Range | High |
| Measurement Delay | 10.0 seconds |
| Test Duration | 2.00 minutes |

### 3.4.3 Test Procedures

The measurement of harmonic currents shall be performed as follows:
– for each harmonic order, measure the 1.5 s smoothed r.m.s. harmonic current in each DFT time window as defined in IEC 61000-4-7.
– calculate the arithmetic average of the measured values from the DFT time windows, over the entire observation period Short cyclic (Tcycle ≦ 2.5 min). Because of synchronisation to meet the requirements for repeatability in 5%.

### 3.4.4 Test Setup Layout




### 3.4.5 Test Deviation

There is no deviation with the original standard.

### 3.4.6 Results of Harmonic Current Emissions

As specified on clause 7 and figure Z1 of EN 61000-3-2:2006, the limits are not specified for equipment with a rated power of 75W or less.

The EUT meets the above condition, so it conforms to EN 61000-3-2.

## 3.5 Voltage Fluctuation and Flicker Measurement

### 3.5.1 Limit

The objective of voltage changes, voltage fluctuations and flicker in public low voltage supply systems during equipment with rated current ≦ 16 A per phase, ensures that home appliances and certain other electrical equipment do not adversely affect lighting equipment when connected to the same power system.

**Voltage Fluctuation and Flicker Limits**

— The value of $P_{st}$ shall not be greater than 1.0.
— The value of $P_{lt}$ shall not be greater than 0.65.
— The value of d (t) during a voltage change shall not exceed 3.3 % for more than 500 ms.
— The relative steady-state voltage change, dc, shall not exceed 3.3 %.
— The maximum relative voltage change, dmax, shall not exceed 4.0 %.

### 3.5.2 Measuring Instruments and Setting

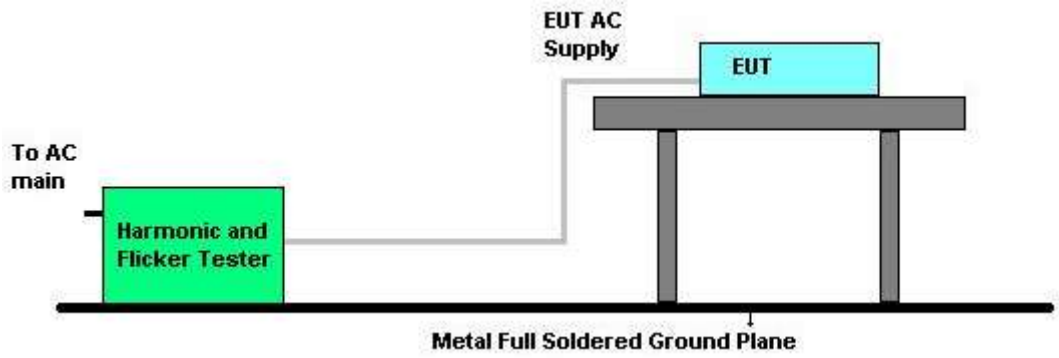
Please refer to section 5 of equipments list in this report. The following table is the setting of the harmonic and flicker Tester.

| Harmonic and Flicker Tester | Setting |
|---|---|
| Line Voltage | 230 V |
| Line Frequency | 50 Hz |
| Measurement Delay | 10.0 seconds |
| Pst Integration Time | 10 minutes |
| Pst Integration Periods | 1 |

### 3.5.3 Test Procedures

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of ±8% is achieved during the whole assessment procedure

### 3.5.4 Test Setup Layout



### 3.5.5 Test Deviation

There is no deviation with the original standard.

### 3.5.6 Test Result of Voltage Fluctuation and Flicker

| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 24, 2010 | **Test Site** | EX01-HY |
| **Temperature** | 24℃ | **Humidity** | 54% |
| **Test Engineer** | Eric | **Configuration** | Normal Mode |

**Test Result: Pass** **Status: Test Completed**

**Parameter values recorded during the test:**

| | | | | |
|---|---|---|---|---|
| Vrms at the end of test (Volt): | 230.23 | | | |
| Highest dt (%): | 0.72 | Test limit (%): | 3.30 | Pass |
| Time(mS) > dt: | 0.0 | Test limit (mS): | 500.0 | Pass |
| Highest dc (%): | 0.00 | Test limit (%): | 3.30 | Pass |
| Highest dmax (%): | 0.45 | Test limit (%): | 4.00 | Pass |
| Highest Pst (10 min. period): | 0.164 | Test limit: | 1.000 | Pass |
| Highest Plt (2 hr. period): | 0.072 | Test limit: | 0.650 | Pass |

# 4 IMMUNITY TESTS RESULT

## 4.1 Electrostatic Discharge Immunity Measurement (ESD)

### 4.1.1 Limit

Air discharges and contact charges are estimated to enclosure of EUT on all connectors and conducting surfaces.
Contact Discharges to the conductive surfaces and to coupling planes:
The EUT shall be exposed to at least 20 discharges 10 each at negative and positive polarity One of the test points shall be subjected to at least 50 indirect discharges (contact) to the center of the front edge of the horizontal coupling plane(HCP). The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode [see IEC 61000-4-2 for use of the Vertical Conducting Plane (VCP)]. Tests shall be performed at a maximum repetition rate of one discharge per second.
Air Discharge at seam between apertures and insulation surfaces:
On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. This investigation should be restricted to those areas normally handled by the user. A minimum of 10 single air discharges of each polarity and test level shall be applied to the selected test point for each area.
The preferential range of test levels for the ESD test is given in following levels:
Contact discharge Test voltage ±4 kV; Air discharge Test voltage ±8 kV
Performance criteria is the criteria B (Transient Phenomena for Transmitter / Receiver).

### 4.1.2 Measuring Instruments and Setting

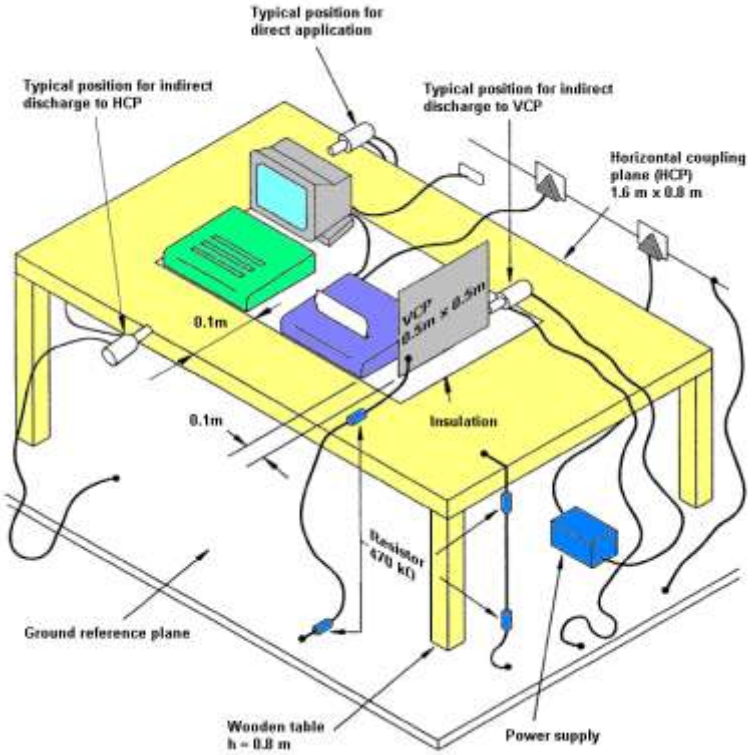
Please refer to section 5 of equipments list in this report. The following table is the setting of the electrostatic discharge simulator.

| Electrostatic Discharge Simulator | Discharge Setting |
|---|---|
| Contact Charge Voltage | ±2 / ±4 kV |
| Air Charge Voltage | ±2 / ±4 / ±8 kV |
| Rise Time | 5nS + 30% |
| Half-Value width | 30nS + 30% |
| Polarity | Positive/Negative |
| Single Discharge Mode | 1 discharge per 1s |

### 4.1.3 Test Procedures

1. In the case of air discharge testing the climatic conditions shall be within the following ranges:
   Ambient temperature: 15℃ to 35℃;
   Relative humidity: 30% to 60%;
   Atmospheric pressure: 86 kPa (860 mbar) to 106 kPa (1060 mbar).
2. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.
3. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.
4. The test shall be performed with both air discharge and contact discharge. On pre-selected points at least 10 single discharges (in the most sensitive polarity) shall be applied on air discharge. On pre-selected points at least 10 single discharges (in the most sensitive polarity) shall be applied on contact discharge.
5. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
6. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
7. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted:
   - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
   - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
   - The contact discharge test shall not be applied to such surfaces.
8. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then re-triggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

### 4.1.4 Test Setup Layout




A ground reference plane was provided on the floor of the test site. It was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. In the SPORTON EMC LAB, we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system.
The EUT was arranged and connected according to its functional requirements. A distance of 1m minimums was provided between the EUT and the wall of the lab. And any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2m to other conductive parts in the test setup.
Where the EUT is installed on a metal table, the table was connected to the reference plane via a cable with a 470k-ohm resister located at each end, to prevent a build-up of charge. The test setup was consisting a wooden table, 0.8m high, standing on the ground reference plane. A HCP, 1.6 m x 0.8 m, was placed on the table. The EUT and cables was isolated from the HCP by an insulating support 0.5 mm thick. The VCP size, 0.5 m x 0.5 m.

### 4.1.5 Test Deviation

There is no deviation with the original standard.

### 4.1.6 Test Result of Electrostatic Discharge Immunity

| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 24, 2010 | **Test Site** | ES01-HY |
| **Temperature** | 24℃ | **Humidity** | 54% |
| **Pressure** | 101 kPa | **Test Engineer** | Eric |
| **Discharge Mode** | Contact Discharge | **Test Voltage** | ±2 / ±4 kV |
| **Tested No.** | 10 single | **Configuration** | Normal Mode |
| **Performance** | Required Criteria B | | |

| Test Point | Observation | Criteria |
|---|---|---|
| HCP (At front, left, right, rear) | No performance degradation was observed. | A |
| VCP (At front, left, right, rear) | | |
| D-SUB port | | |
| RS232 port | | |
| LAN port | | |
| Screw | When testing the contact discharge at ±4 KV the image shown on the screen flickered and ping loss. After the test, the equipment continued to operate as intended without operator intervention. | B |

| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 24, 2010 | **Test Site** | ES01-HY |
| **Temperature** | 24℃ | **Humidity** | 54% |
| **Pressure** | 101 kPa | **Test Engineer** | Eric |
| **Discharge Mode** | Air Discharge | **Test Voltage** | ±2 / ±4 / ±8 kV |
| **Tested No.** | 10 single | **Configuration** | Normal Mode |
| **Performance** | Required Criteria B | | |

| Test Point | Observation | Criteria |
|---|---|---|
| Case | No performance degradation was observed. | A |
| LED | | |
| Power switch | | |
| DC input jack | | |
| USB port | | |
| Control button | | |
| Panel | | |
| Speaker jack | | |
| Memort card | | |

## 4.2 Radio Frequency Electromagnetic Field Immunity Measurement (RS)

### 4.2.1 Limit

Most electronic equipment is in some manner affected by electromagnetic radiation. RF immunity test entails subjecting the equipment under test to a uniform field of radiated electromagnetic energy of specified electromagnetic field strength and frequency and monitoring the functionality of the device as the frequency is swept over a specified frequency range.
The preferential range of test field strength levels for the RS test is given in following levels:
80~1GHz: 3V/m / 1.4~2.7GHz: 3V/m
Performance criteria is the criteria A (Continuous Phenomena for Transmitter/ Receiver).

### 4.2.2 Measuring Instruments and Setting

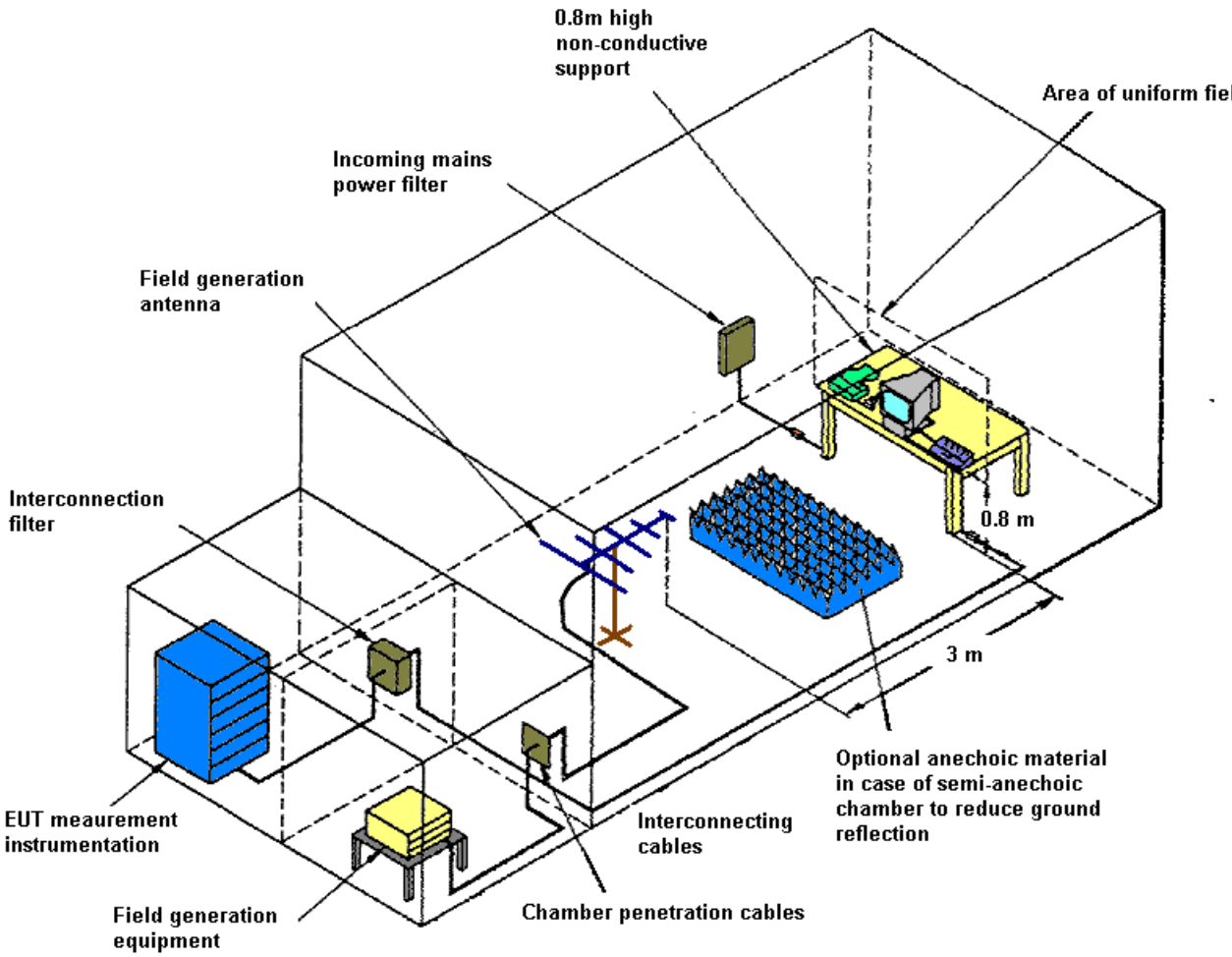
Please refer to section 5 of equipments list in this report. The following table is the setting of the RS Immunity Test System.

| RS Immunity Test System | Setting |
|---|---|
| Method Used | Bilog antenna and semi-anechoic chamber |
| Field Strength Exposure | 3 V/m |
| Frequency Range/Modulation | 80-1000MHz and 1400-2700 MHz, 80% AM modulation |
| Antenna Polarization | Vertical & Horizontal |
| Test Distance | 3m |
| Frequency Steps | 1% step |
| Dwell Time | 2.9 sec |
| Exposures | Front, Back, Left and Right of the EUT |

### 4.2.3 Test Procedures

1. The equipment to be tested is placed in the center of the enclosure on a wooden table. The equipment is then connected to power and signal leads according to pertinent installation instructions.
2. The Bilog antenna which is enabling the complete frequency range of 80-1000MHz and 1400-2700 MHz is placed 3m away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the applicable antennae.
3. The test is normally performed with the generating antenna facing each of four sides of the EUT. The polarization of the field generated by the bi-conical antenna necessitates testing each position twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. The circular polarization of the field from the log-spiral antenna makes a change of position of the antenna unnecessary.
4. At each of the above conditions, the frequency range is swept 80-1000MHz and 1400-2700 MHz pausing to adjust the R.F. signal level or to switch oscillators and antenna. The rate of sweep is in the order of 1.5*10-3 decades/s. The sensitive frequencies or frequencies of dominant interest may be discretely analyzed.

### 4.2.4 Test Setup Layout




NOTE: The chamber is compliance with the sixteen points uniform field requirement as stated in IEC 61000-4-3 Section 6.2.
The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semi-anechoic chamber.

### 4.2.5 Test Deviation

There is no deviation with the original standard.

### 4.2.6 Test Result of Radio Frequency Electromagnetic Field Immunity

| Final Test Date | Nov. 24, 2010 | Test Site | RS01 |
|---|---|---|---|
| Temperature | 24℃ | Humidity | 54% |
| Pressure | 101 kPa | Test Engineer | Eric |
| Performance | Required Criteria A | Configurations | Normal Mode |

| EUT Face Exposed | Observation | Performance |
|---|---|---|
| Front | No performance degradation was observed. | A |
| Back | No performance degradation was observed. | A |
| Left | No performance degradation was observed. | A |
| Right | No performance degradation was observed. | A |

## 4.3 Electrical Fast Transient/Burst Immunity Measurement (EFT)

### 4.3.1 Limit

**Test on Power Line:**

The EFT/B-generator was located on the GRP. The lengths from the EFT/B-generator to the EUT as not exceed 1 m.

The EFT/B-generator provides the ability to apply the test voltage in a non-symmetrical condition to the power supply input terminals of the EUT.

**Test on Communication Lines:**

1. The coupling clamp is composed of a clamp unit for housing the cable (length more than 3 m), and was placed on the GRP.
2. The coupling clamp provides the ability of coupling the fast transient/bursts to the cable under test.

The preferential range of test peak voltage levels for the EFT test is given in following levels:
Power Line: ±1kV; Telecommunication Lines: Line to ground: ±0.5kV
Performance criteria is the criteria B (Transient Phenomena for Transmitter / Receiver).

### 4.3.2 Measuring Instruments and Setting

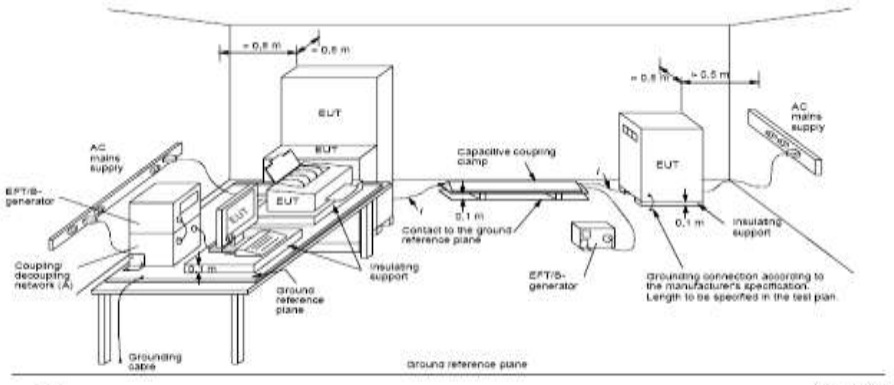
Please refer to section 5 of equipments list in this report. The following table is the setting of the EMC Test Station.

| EMC Test Station (EFT) | Setting |
|---|---|
| Test Voltage | Power Line: ±1kV; Telecommunication Lines: ±0.5kV |
| Polarity | Positive/Negative |
| Impulse Frequency | 5 kHz |
| Impulse Wave shape ($T_r/T_h$) | 5/50 ns |
| Burst Duration | 15 ms |

### 4.3.3 Test Procedures

1. In order to minimize the effect of environmental parameters on test results, the climatic conditions when test is carrying out shall comply with the following requirements:
   - ambient temperature: 15℃ to 35℃;
   - relative humidity : 45% to 75%;
   - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
2. In order to minimize the effect of environmental parameters on test results, the electromagnetic environment of the laboratory shall not influence the test results.
3. The variety and diversity of equipment and systems to be tested make it difficult to establish general criteria for the evaluation of the effects of fast transients/bursts on equipment and systems.
4. The test results may be classified on the basic of the operating conditions and the functional specification of the equipment under test, according to the following performance criteria :
   - Normal performance within the specification limits.
   - Temporary degradation or loss of function or performance which is self-recoverable.
   - Temporary degradation or loss of function or performance which requires operator intervention or system reset.
   - Degradation or loss of function which is not recoverable due to damage of equipment (components).

### 4.3.4 Test Setup Layout




Key
*l* length between clamp and the EUT to be tested (should be 0.5 m ± 0.05 m)
(A) location for supply line coupling
(B) location for signal lines coupling

The EUT was placed on a ground reference plane and was insulated from it by an insulating support about 0.1m thick. If the EUT is table-top equipment, it was located approximately 0.8m above the GRP.. The GRP. was a metallic sheet (copper or aluminum) of 0.25 mm ,minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. It shall project beyond the EUT by at least 0.1m on all sides and connected to the protective earth. In the SPORTON EMC LAB. we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system. The EUT was arranged and connected according to its functional requirements. The minimum distance between the EUT and other conductive structures, except the GRP. beneath the EUT, was more than 0.5 m. Using the coupling clamp, the minimum distance between the coupling plates and all other conductive structures, except the GRP. beneath the EUT, was more than 0.5 m. The length of the signal and power lines between the coupling device and the EUT was 1m or less.

### 4.3.5 Test Deviation

There is no deviation with the original standard.

### 4.3.6 Test Result of Electrical Fast Transient/Burst Immunity

| Final Test Date | Nov. 24, 2010 | Test Site | RS01 |
|---|---|---|---|
| Temperature | 24℃ | Humidity | 54% |
| Pressure | 101 kPa | Test Engineer | Eric |
| Performance | Required Criteria B | Configurations | Normal Mode |

| AC Power Port | | |
|---|---|---|
| **Peak Voltage** | **Observation** | **Performance** |
| ±1 kV | No performance degradation was observed. | A |

| Clamp on Telecommunication Line (RJ-45) | | |
|---|---|---|
| **Peak Voltage** | **Observation** | **Performance** |
| ±0.5 kV | No performance degradation was observed. | A |

## 4.4 Surge Immunity Measurement (Surge)

### 4.4.1 Limit

This test simulates a lightning event by inducing transients onto the AC/DC power supply lines in common and differential mode.
Each device was tested in a total of two surge Configuration:
Line to Ground (L-G): Combination Wave, Line to Protective Earth with 9uF and 10Ohm and Neutral to Protective Earth with 9uF and 10Ohm, common mode, generator earthed.
Line-to-Line (L-L): Combination Wave, Line to Neutral with 18uF, differential mode, generator floated.
The preferential range of test peak voltage levels for the Surge test is given in following levels:
AC/DC power Line: Line to line: ±1kV ; Line to ground: ±2kV;
Outdoor Telecommunication Line : Line to ground: Line to ground: ±0.5kV
Indoor Telecommunication Line : Line to ground: ±0.5kV
Performance criteria is the criteria B (Transient Phenomena for Transmitter / Receiver).

### 4.4.2 Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the EMC Test Station.

| EMC Test Station (Surge) | Setting |
|---|---|
| Combination Wave Shape | 1.2/50us Open Circuit Voltage; 8/20us Short Circuit Current |
| Power Line Test Voltage | Line to line: ±1kV; Line to ground: ±2kV |
| Telecom Lines Test Voltage | Outdoor Line to ground ±1kV; Indoor Line to ground: ±0.5kV |
| Polarity | Positive/Negative |
| Phase Angle | 0° /90°/180°/270° |
| Pulse Repetition Rate | 1 time / min. (maximum) |
| Number of Tests | 5 positive and 5 negative at selected points |

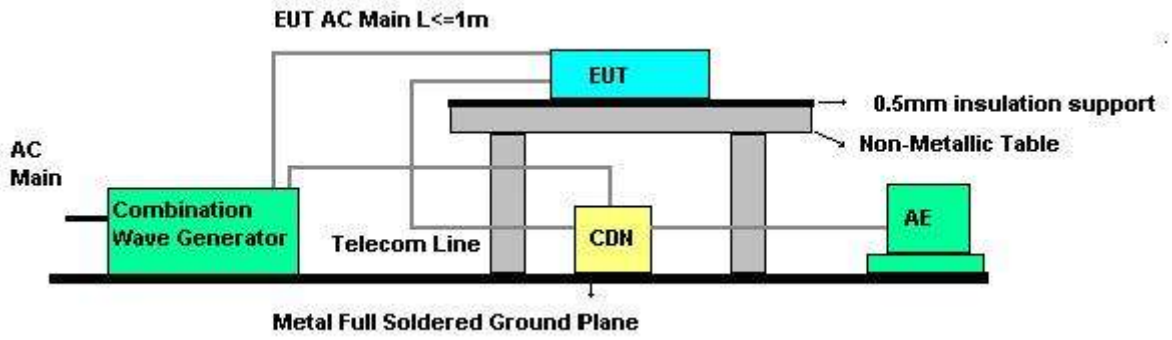
### 4.4.3 Test Procedures

1. The climatic conditions shall comply with the following requirements :
   -- ambient temperature : 15 ℃ to 35 ℃
   -- relative humidity : 10 % to 75 %
   -- atmospheric pressure : 86 kPa to 106 kPa ( 860 mbar to 1060 mbar )
2. Electromagnetic conditions, the electromagnetic environment of the laboratory shall not influence the test results.
3. The test shall be performed according the test plan that shall specify the test set-up with
   -- generator and other equipment utilized;
   -- test level (voltage/current);
   -- generator source impedance;
   -- internal or external generator trigger;
   -- number of tests: at least five positive and five negative at the selected points;
   -- repetition rate: maximum 1/min.
   -- inputs and outputs to be tested;
   -- representative operating conditions of the EUT;
   -- sequence of application of the surge to the circuit;
   -- phase angle in the case of AC power supply;
   -- actual installation conditions, for example :
   AC : neutral earthed,
   DC : ( + ) or ( - ) earthed to simulated the actual earth conditions.
4. If not otherwise specified the surges have to be applied synchronized to the voltage phase at the zero crossing and the peak value of the a.c. voltage wave (positive and negative).
5. The surges have to be applied line to line and line(s) and earth. When testing line to earth, the test voltage has to be applied successively between each of the lines and earth, if there is no other specification.
6. The test procedure shall also consider the non-linear current-voltage characteristics of the

equipment under test. Therefore the test voltage has to be increased by steps up to the test level specified in the product standard or test plan.

7. All lower levels including the selected test level shall be satisfied. For testing the secondary protection, the output voltage of the generator shall be increased up to the worst-case voltage breakdown level (let-through level) of the primary protection.
8. If the actual operating signal sources are not available, the may be simulated. Under no circumstances may the test level exceed the product specification. The test shall be carried out according to the test plan.
9. To find all critical points of the duty cycle of the equipment, a sufficient number of positive and negative test pulses shall be applied. For acceptance test previously unstressed equipment shall be used to the protection devices shall be replaced.

### 4.4.4 Test Setup Layout




### 4.4.5 Test Deviation

There is no deviation with the original standard.

### 4.4.6 Test Result of Surge Immunity

| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 24, 2010 | **Test Site** | EX01-HY |
| **Temperature** | 24℃ | **Humidity** | 54% |
| **Pressure** | 101 kPa | **Test Engineer** | Eric |
| **Performance** | Required Criteria B | **Configurations** | Normal Mode |

| **AC Power Port on Line to Line** | | |
|---|---|---|
| **Peak Voltage** | **Observation** | **Performance** |
| ±1 kV | No performance degradation was observed. | A |

| **AC Power Port on Line to Ground** | | |
|---|---|---|
| **Peak Voltage** | **Observation** | **Performance** |
| ±2 kV | No performance degradation was observed. | A |

| **Signal / Communication Port RJ11 / RJ45 on Line to Ground (Outdoor)** | | |
|---|---|---|
| **Peak Voltage** | **Observation** | **Performance** |
| ±1 kV | During the test will be ping loss. After the test, the equipment continued to operate as intended without operator intervention. | B |

| **Signal / Communication Port RJ11 / RJ45 on Line to Ground (Intdoor)** | | |
|---|---|---|
| **Peak Voltage** | **Observation** | **Performance** |
| ±0.5 kV | During the test will be ping loss. After the test, the equipment continued to operate as intended without operator intervention. | B |

## 4.5 Conducted Disturbances Induced by RF Field Immunity Measurement (CS)

### 4.5.1 Limit

Injected the conducted disturbances directly into AC/DC power and signal I/O cables.
The preferential range of test field strength levels for the CS test is given in following levels:
150kHz~80MHz: 3Vrms.
Performance criteria is the criteria A (Continuous Phenomena for Transmitter/ Receiver).

### 4.5.2 Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the CS Immunity Test.

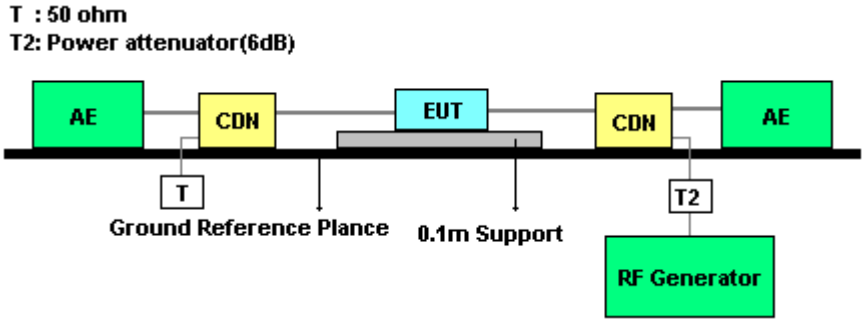
| CS Immunity Test System | Setting |
|---|---|
| Method Used | CDN-M3; CDN-RJ45 |
| Field Strength Exposure | 3Vrms |
| Frequency Range/Modulation | 150kHz~80MHz, 80% AM modulation |
| Frequency Steps | 1% step |
| Dwell Time | 2.9 sec |

| Tested port | CDN terminated with 50 Ω | Other ports |
|---|---|---|
| AC | RJ45 | Decoupling networks shall be installed on all other ports to which cables are attached. In this manner there is only one loop terminated with 150 Ω at each end. |
| RJ45 | AC | |

### 4.5.3 Test Procedures

1. This test method test can be performed without using a sell-shielded enclosure. This is because the disturbance levels applied and the geometry of the setups are not likely to radiated a high amount of energy, especially at the lower frequencies. If under certain circumstances the radiated energy is too high, a shielded enclosure has to be used.
2. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF-input ports of the coupling devices are terminated by a 50-ohm load resistor.
3. The frequency range is swept from 150 KHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave, pausing to adjust the RF-signal level or to switch coupling devices as necessary. The rate of sweep shall no exceed $1.5 \times 10^{-3}$ decades/s. where the frequency is swept incrementally; the step size shall no exceed 1% of the start and thereafter 1% of the preceding frequency value.
4. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies e.g. clock frequencies and harmonics or frequencies of dominant interest shall be analyzed separately.
5. In cases of dispute, the test procedure using a step size not exceeding 1% of the start and thereafter 1% of preceding frequency value shall take precedence.

### 4.5.4 Test Setup Layout




### 4.5.5 Test Deviation

There is no deviation with the original standard.

### 4.5.6 Test Result of Conducted Disturbances Induced by RF Field Immunity

| Final Test Date | Nov. 24, 2010 | Test Site | EX01-HY |
|---|---|---|---|
| Temperature | 24℃ | Humidity | 54% |
| Pressure | 101 kPa | Test Engineer | Eric |
| Performance | Required Criteria A | Configurations | Normal Mode |

| Input AC Power Port (M16 SW M3) | |
|---|---|
| Observation | Performance |
| No performance degradation was observed. | A |

| Signal Port (RJ-45) | |
|---|---|
| Observation | Performance |
| No performance degradation was observed. | A |

## 4.6 Voltage Dips and Voltage Interruption Immunity Measurement (DIP)

### 4.6.1 Limit

Voltage failures occur following switching operations, short-circuits, response of fuses and when running up heavy loads. The following table is the limits of the dips and Interruption Immunity Test.

| Voltage Reduction | Periods | Performance Criterion |
|---|---|---|
| 0% | 5000 ms | C |
| 0% | 10/20 ms | B |
| 70% | 500 ms | C |

### 4.6.2 Measuring Instruments and Setting

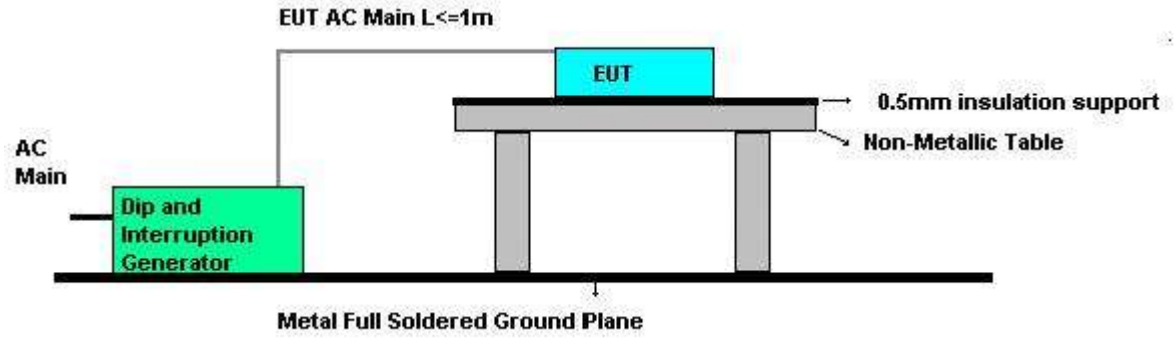
Please refer to section 5 of equipments list in this report. The following table is the setting of the EMC Test Station.

| EMC Test Station (Dip Interruption) | Setting |
|---|---|
| Voltage Reduction (Periods) | 0% (10/20 ms); 70% (500 ms); 0% (5000 ms) |
| Test Interval | 10 sec for each event |

### 4.6.3 Test Procedures

1. The climatic conditions shall comply with the following requirements :
   -- ambient temperature : 15 ℃ to 35 ℃
   -- relative humidity : 10 % to 75 %
   -- atmospheric pressure : 86 kPa to 106 kPa ( 860 mbar to 1060 mba)
2. The EUT is powered up to a nominal voltage of 240VAC/50Hz & 100VAC/50Hz, and then software-controlled voltage dips and interruptions are introduced.

### 4.6.4 Test Setup Layout




### 4.6.5 Test Deviation

There is no deviation with the original standard.

### 4.6.6 Test Result of Voltage Dips and Voltage Interruption Immunity

| | | | |
|---|---|---|---|
| **Final Test Date** | Nov. 24, 2010 | **Test Site** | EX01-HY |
| **Temperature** | 24℃ | **Humidity** | 54% |
| **Pressure** | 101 kPa | **Test Engineer** | Eric |
| **Performance on 5000 ms** | Required Criteria C | **Performance on 10/20 ms** | Required Criteria B |
| **Performance on 500 ms** | Required Criteria C | **Configuration** | Normal mode |
| **Test Voltage** | 100V/50Hz; 240V/50Hz | | |

| **Voltage Reduction (Periods) on 0% (5000 ms) - Interruptions** | |
|---|---|
| **Observation** | **Performance** |
| After the interruption, the power of EUT was off. The power of the EUT must be reset by the operator. | C |

| **Voltage Reduction (Periods) on 0% (10/20 ms) - Dips** | |
|---|---|
| **Observation** | **Performance** |
| No performance degradation was observed. | A |

| **Voltage Reduction (Periods) on 70% (500 ms) - Dips** | |
|---|---|
| **Observation** | **Performance** |
| No performance degradation was observed. | A |

# 5 LIST OF MEASURING EQUIPMENTS

**Conducted Emissions**

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| EMC Receiver | R&S | ESCS 30 | 100174 | 9kHz – 2.75GHz | Apr. 06, 2010 | Conduction (CO04-HY) |
| LISN | MessTec | NNB-2/16Z | 99041 | 9kHz – 30MHz | Mar. 23, 2010 | Conduction (CO04-HY) |
| LISN (Support Unit) | EMCO | 3810/2NM | 9703-1839 | 9kHz – 30MHz | Apr. 29, 2010 | Conduction (CO04-HY) |
| RF Cable-CON | UTIFLEX | 3102-26886-4 | CB049 | 9kHz – 30MHz | Apr. 20, 2010 | Conduction (CO04-HY) |
| ISN | SCHAFFNER | ISN T400 | 21653 | 9kHz –30MHz | Jun. 10, 2010 | Conduction (CO04-HY) |
| EMI Filter | LINDGREN | LRE-2030 | 2651 | < 450 Hz | N/A | Conduction (CO04-HY) |

Note: Calibration Interval of instruments listed above is one year.

**Radiation Emission Below 1GHz**

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| 10m Semi Anechoic Chamber | TDK | SAC-10M | 10CH02-HY | 30MHz~1GHz 10m,3m | Nov. 28, 2010 | Radiation (10CH02-HY) |
| Amplifier | AGILENT | 8447D | 2944A10827 | 100KHz – 1.3GHz | May 14, 2010 | Radiation (10CH02-HY) |
| Amplifier | AGILENT | 8447D | 2944A10828 | 100KHz – 1.3GHz | May 14, 2010 | Radiation (10CH02-HY) |
| Receiver | R&S | ESI | 838496/008 | 20Hz - 7GHz | Apr. 26, 2010 | Radiation (10CH02-HY) |
| Spectrum Analyzer | R&S | FSP7 | 100645 | 9KHz – 7GHz | Aug. 10, 2010 | Radiation (10CH02-HY) |
| Biconical Antenna | Schwarzbeck | VHBB 9124 | 287 | 30MHz –200MHz | Dec. 20, 2010 | Radiation (10CH02-HY) |
| Log Antenna | Schwarzbeck | VUSLP 9111 | 207 | 200MHz -1GHz | Dec. 20, 2010 | Radiation (10CH02-HY) |
| Turn Table | HD | DS 430 | 430/360 | 0 ~ 360 degree | N/A | Radiation (10CH02-HY) |
| Antenna Mast | HD | MA240 | 240/664 | 1 m - 4 m | N/A | Radiation (10CH02-HY) |
| Antenna Mast | HD | MA240 | 240/667 | 1 m - 4 m | N/A | Radiation (10CH02-HY) |
| RF Cable-R10m | Jye Bao | RG142 | CB027-INSIDE | 30MHz~1GHz | Feb. 12, 2010 | Radiation (10CH02-HY) |
| RF Cable-R10m | Suhner Switzerland + BELDEN | RG223/U + RG8/U | CB026-DOOR | 30MHz~1GHz | Feb. 12, 2010 | Radiation (10CH02-HY) |

Note: Calibration Interval of instruments listed above is one year.

**Radiation Emission Above 1GHz**

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| Amplifier | EMCI | EMC330 | 980007 | 1 -8GHz | May 13, 2010 | Radiation (10CH02-HY) |
| Horn antenna | EMCO | 3115 | 6903 | 1~18GHz | May 03, 2010 | Radiation (10CH02-HY) |
| Receiver | R&S | ESI | 838496/008 | 20Hz - 7GHz | Apr. 26, 2010 | Radiation (10CH02-HY) |
| RF Cable 5M | SUHNER | SUCOFLEX 104 | SN：304379/4 | 1GHz~18GHz | Mar. 10, 2010 | Radiation (10CH02-HY) |
| RF Cable 13M | SUHNER | SUCOFLEX 104 | SN：16647/4 | 1GHz~18GHz | Mar. 10, 2010 | Radiation (10CH02-HY) |
| 10m Semi Anechoic Chamber | TDK | SAC-10M | 10CH02-HY | 1G~6G 3m | Mar. 13, 2010 | Radiation (10CH02-HY) |

Note: Calibration Interval of instruments listed above is one year.

**EMS**

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| ESD Simulator | KEYTEK | MZ-15/EC | 0711355 | Air: 0 kV - 15 kV Contact: 0 kV - 8 kV | Mar. 10, 2010 | ESD |
| EMCPro System | KeyTek | EMCPro | 030194 | 0 kV - 4.4 kV | Jul. 22, 2010 | EFT SURGE |
| EFT/Clamp | KEYTEK | CCL-4/S | -- | 0 kV - 1 kV | N/A | EFT |
| SURGE/CDN | EMC -PARTNER | DN-T1+CN-T1 | CDNKIT1000T-22 | 0.5 kV - 2 kV | N/A | SURGE |
| Conducted Immunity Test System | FRANKONIA | CIT-10/75 | 1999010443 | 100 kHz - 266 MHz | Oct. 07, 2010 | CS |
| Conducted Immunity Test System Amplifier | A.R | 75A220 | 16980 | 15 - 230 MHz FM 1 kHz 80% 75W | May 11, 2010 | CS |
| Coupling and Decoupling Network | SCHAFFNER | CDN M016 | 16672 | 150 kHz - 230 MHz | Jun. 01, 2010 | CS |
| Coupling and Decoupling Network | FRANKONIA | CDN RJ45 | A3023001 | 150 kHz - 230 MHz | May 25, 2010 | CS |
| Coupling and Decoupling Network | FRANKONIA | CDN S1/75Ω | A3005008 | 150 kHz - 230 MHz | May 25, 2010 | CS |
| EMCPro System | KeyTek | EMCPro | 030194 | 230VA/50Hz/60Hz 0%Open/5S 0%Short/5S 40%0.10S 70%/0.01S | Jul. 22, 2010 | DIP |
| Harmonic/Flicker Test System | SCHAFFNER | CNN1000-1 | 72471 | 4000VA 16A PEAK | Feb. 02. 2010 | Harmonics, Flicker |

Note: Calibration Interval of instruments listed above is one year.

**< RS > -- to 1G test**

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| RS immunity Test system | ROHDE& SCHWARZ | RSF | RS-02 | 80M~3GHz | NA | RS |
| Probe | ETS-LINDGREN | HI-6005 | 00052473 | 0.1 MHz - 5 GHz | Sep. 03, 2010 | RS |
| Antenna | FRANKONIA | BTA-L | 02002L | 26 MHz - 1 GHz | May 03, 2010 | RS |
| Amplifier | AR | 250W 1000AM1 | 320482 | 80 MHz - 1 GHz | Sep. 24, 2010 | RS |
| DUAL DIRECTIONAL COUPLER | AMPLIFIER& RESEARCH | DC7144A | 312782 | 80-1GHz | Sep. 23, 2010 | RS |
| INTEGRATED MEASUREMENT SYSTEM | ROHDE& SCHWARZ | IMS | 100007 | 9kHz~3GHz | Nov. 02, 2010 | RS |
| NRP-Z91 POWER SENSOR 6GHZ | ROHDE& SCHWARZ | NRP-Z91 1168.8004.02 | 100095 | 9kHz~3GHz | Nov. 02, 2010 | RS |

Note: Calibration Interval of instruments listed above is one year.

**< RS > -- to 3G test**

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| Amplifier | AMPLIFIER& RESEARCH | 30S1G3 | 312505 | 80M~3GHz | Sep. 24, 2010 | RS |
| DUAL DIRECTIONAL COUPLER | AMPLIFIER& RESEARCH | DC6180A | 312453 | 0.8-4.2GHz | Sep. 23, 2010 | RS |
| Antenna | ETS | 3115 | 6744 | 1GHz - 18 GHz | May 03, 2010 | RS |
| INTEGRATED MEASUREMENT SYSTEM | ROHDE& SCHWARZ | IMS | 100007 | 9kHz~3GHz | Nov. 02, 2010 | RS |
| NRP-Z91 POWER SENSOR 6GHZ | ROHDE& SCHWARZ | NRP-Z91 1168.8004.02 | 100095 | 9kHz~3GHz | Nov. 02, 2010 | RS |

Note: Calibration Interval of instruments listed above is one year.

# 6 TEST LOCATION

| | | | |
|---|---|---|---|
| SHIJR | ADD | : | 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. |
| | TEL | : | 886-2-2696-2468 |
| | FAX | : | 886-2-2696-2255 |
| HWA YA | ADD | : | No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. |
| | TEL | : | 886-3-327-3456 |
| | FAX | : | 886-3-318-0055 |
| LINKOU | ADD | : | No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C |
| | TEL | : | 886-2-2601-1640 |
| | FAX | : | 886-2-2601-1695 |
| DUNGHU | ADD | : | No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. |
| | TEL | : | 886-2-2631-4739 |
| | FAX | : | 886-2-2631-9740 |
| JUNGHE | ADD | : | 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. |
| | TEL | : | 886-2-8227-2020 |
| | FAX | : | 886-2-8227-2626 |
| NEIHU | ADD | : | 4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C. |
| | TEL | : | 886-2-2794-8886 |
| | FAX | : | 886-2-2794-9777 |
| JHUBEI | ADD | : | No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. |
| | TEL | : | 886-3-656-9065 |
| | FAX | : | 886-3-656-9085 |

# 7 TAF CERTIFICATE OF ACCREDITATION

Certificate No. : L1190-100529

財團法人全國認證基金會
Taiwan Accreditation Foundation

## Certificate of Accreditation

This is to certify that

**Sporton International Inc.**
**EMC & Wireless Communications Laboratory**
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

**is accredited in respect of laboratory**

| | | |
|---|---|---|
| **Accreditation Criteria** | : | ISO/IEC 17025:2005 |
| **Accreditation Number** | : | 1190 |
| **Originally Accredited** | : | December 15, 2003 |
| **Effective Period** | : | January 10, 2010 to January 09, 2013 |
| **Accredited Scope** | : | Testing Field, see described in the Appendix |
| **Specific Accreditation Program** | : | Accreditation Program for Designated Testing Laboratory for Commodities Inspection<br>Accreditation Program for Telecommunication Equipment Testing Laboratory<br>Accreditation Program for BSMI Mutual Recognition Arrangment with Foreign Authorities |

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : May 29, 2010

P1, total 23 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix

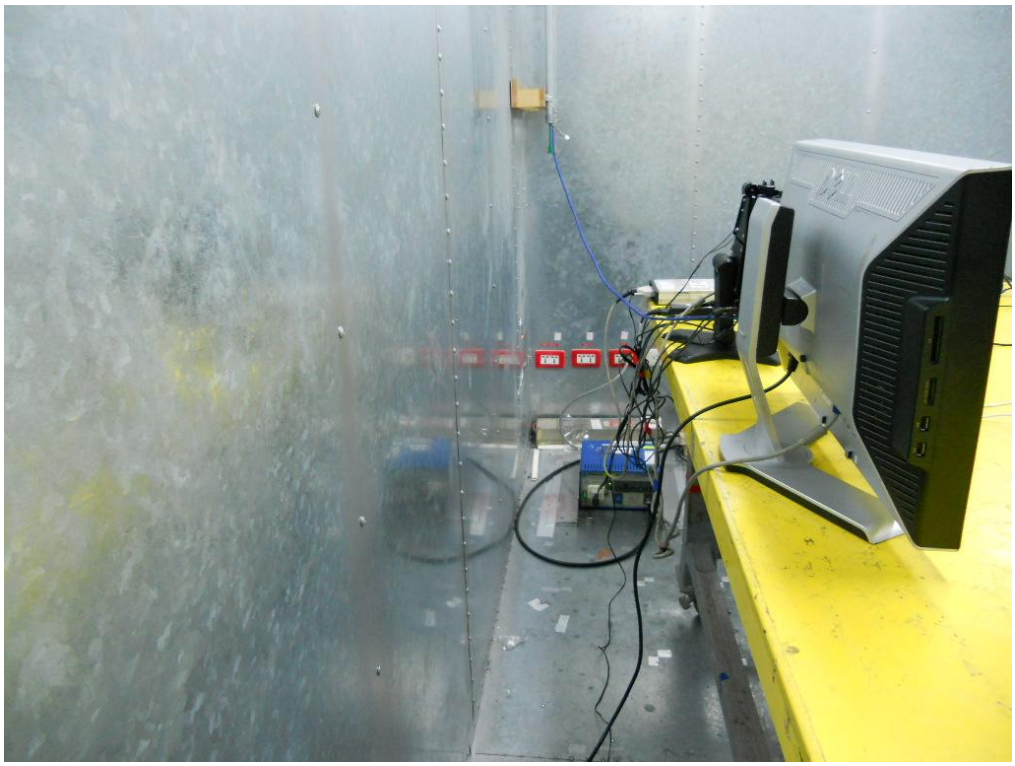
# Appendix A. Test Photos

# 1 Photographs of Conducted Emissions Test Configuration

**FRONT VIEW**



**REAR VIEW**



**SIDE VIEW**



## 2 Telecommunication Line Conducted Emissions Test Configuration

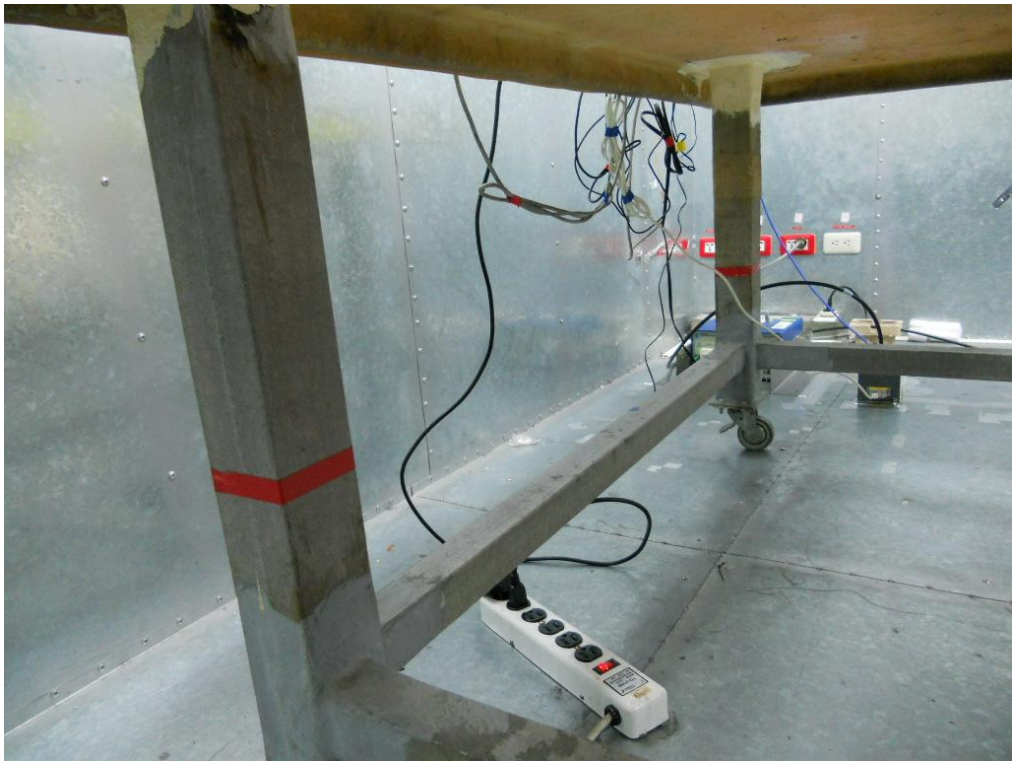
**FRONT VIEW**



**REAR VIEW**



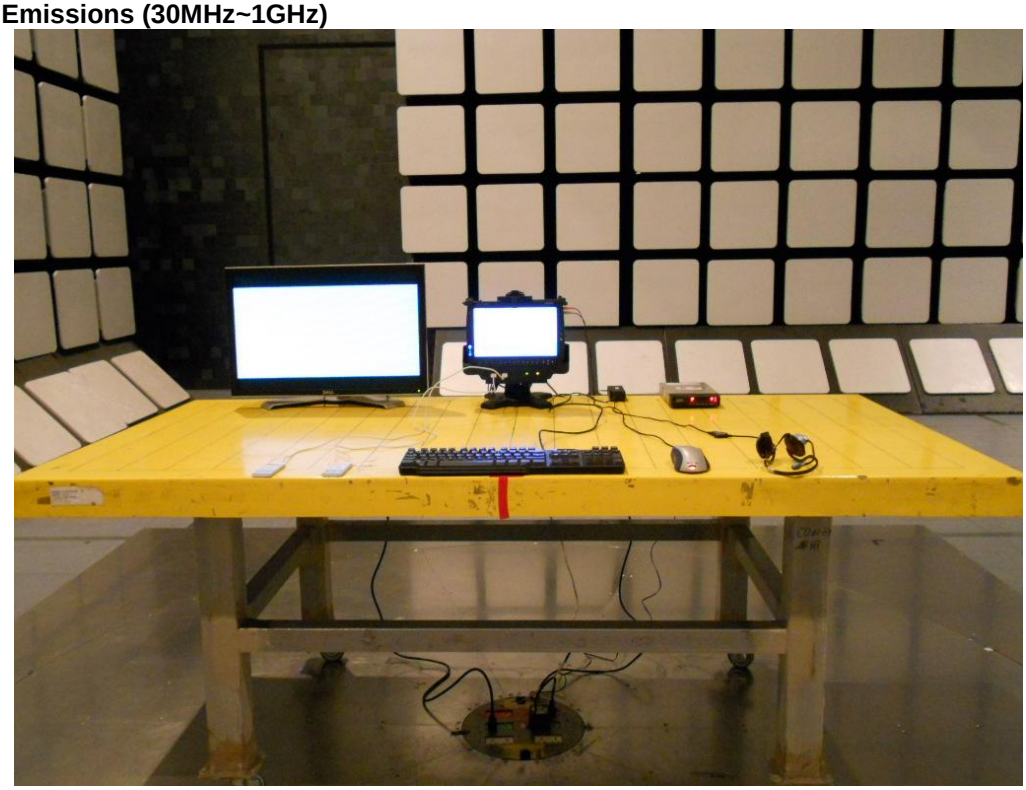
**SIDE VIEW**



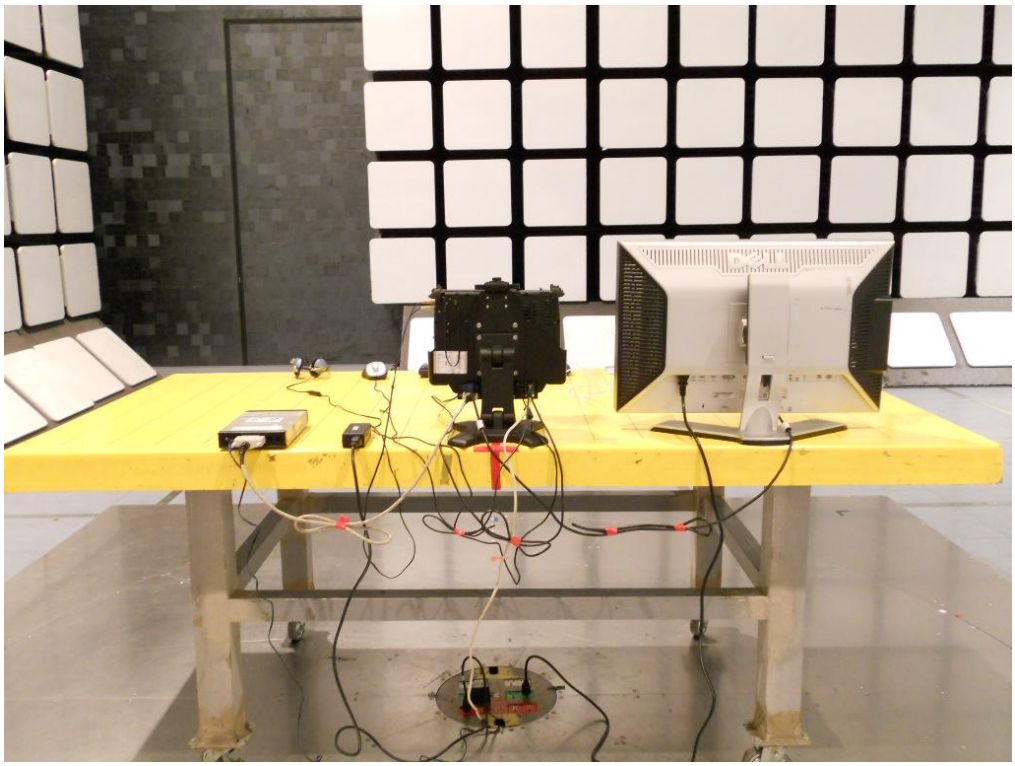
# 3 Photographs of Radiated Emission Test Configuration

**Results for Radiated Emissions (30MHz~1GHz)**

**FRONT VIEW**

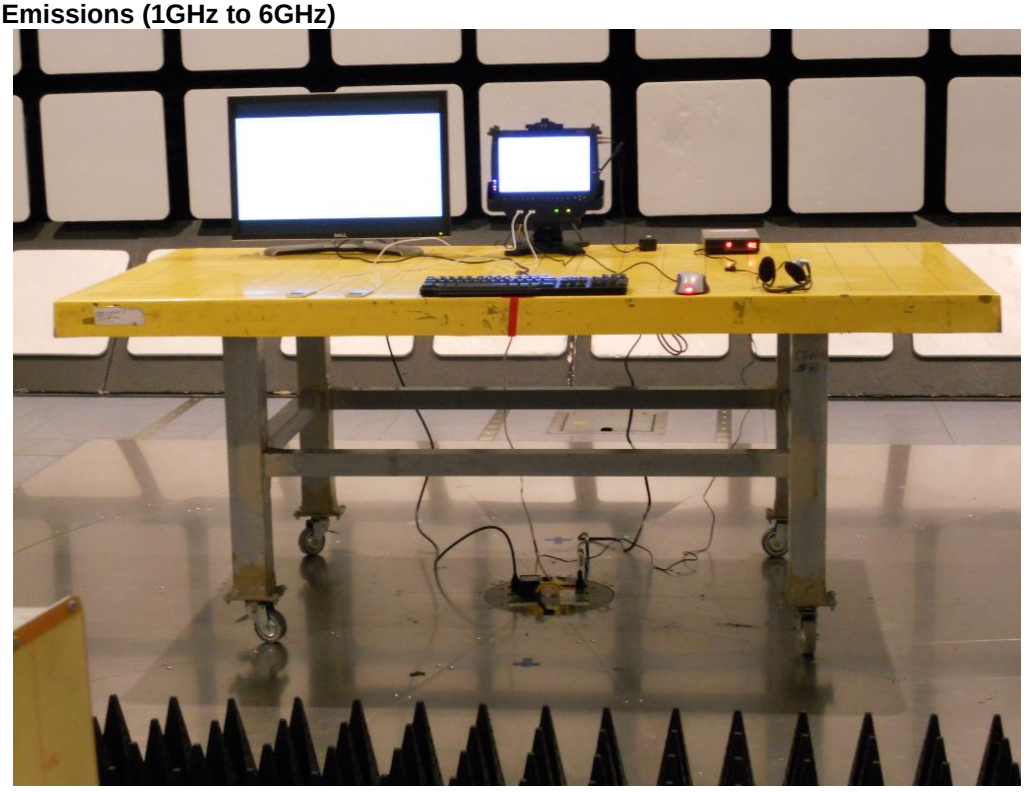


**REAR VIEW**

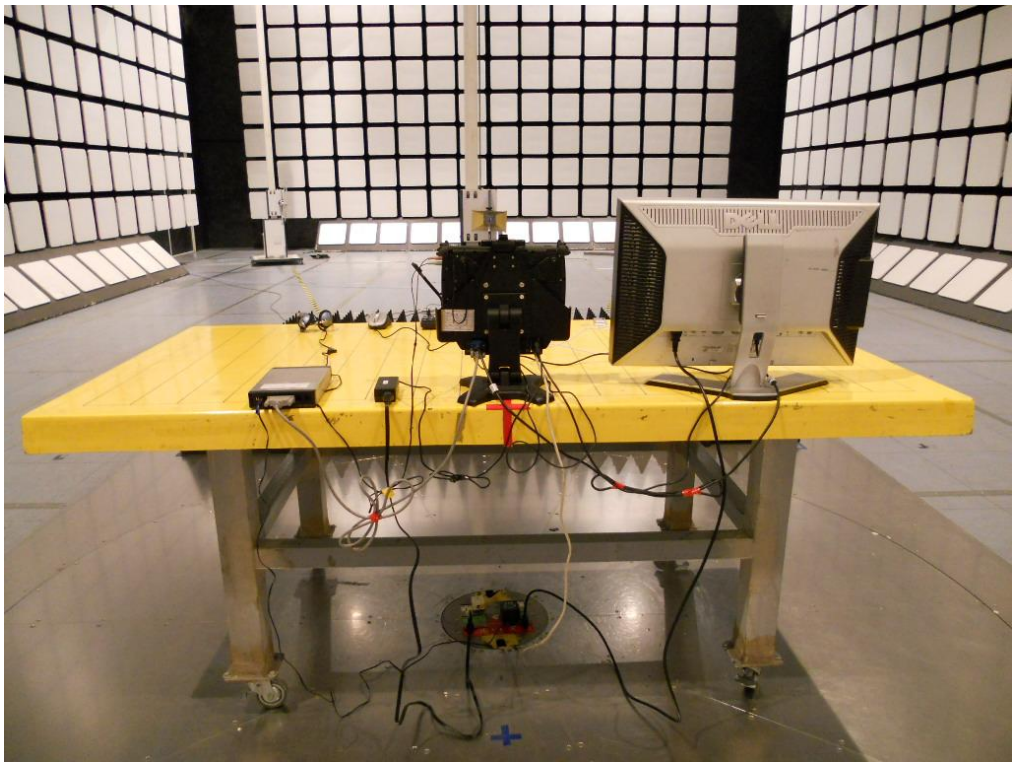


**Results for Radiated Emissions (1GHz to 6GHz)**

**FRONT VIEW**

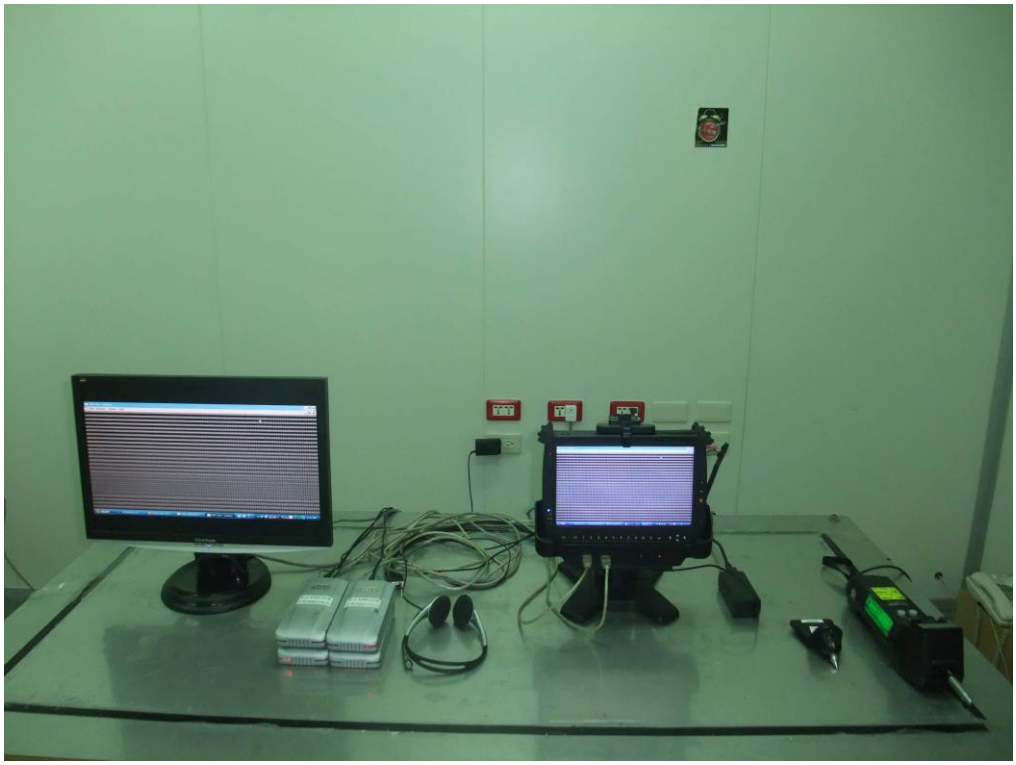


**REAR VIEW**



# 4 Photographs of ESD Immunity Test Configuration

**FRONT VIEW**



**REAR VIEW**



# 5 Photographs of RS Immunity Test Configuration

**FRONT VIEW**

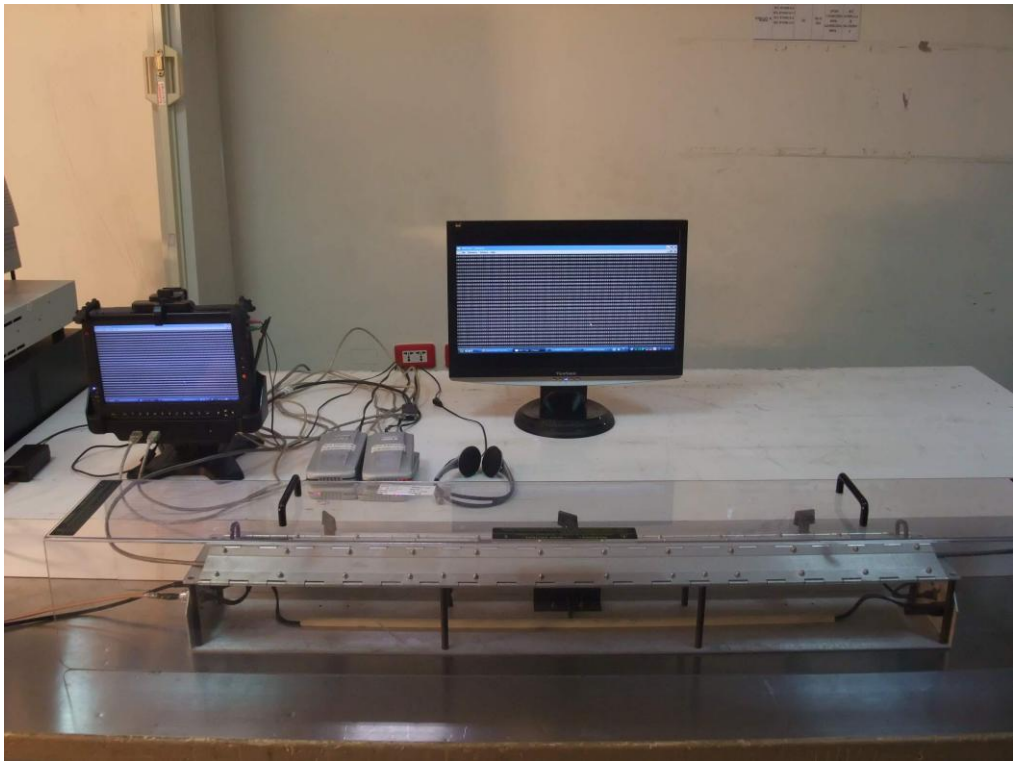



**REAR VIEW**



# 6 Photographs of EFT Test Configuration

**FRONT VIEW**

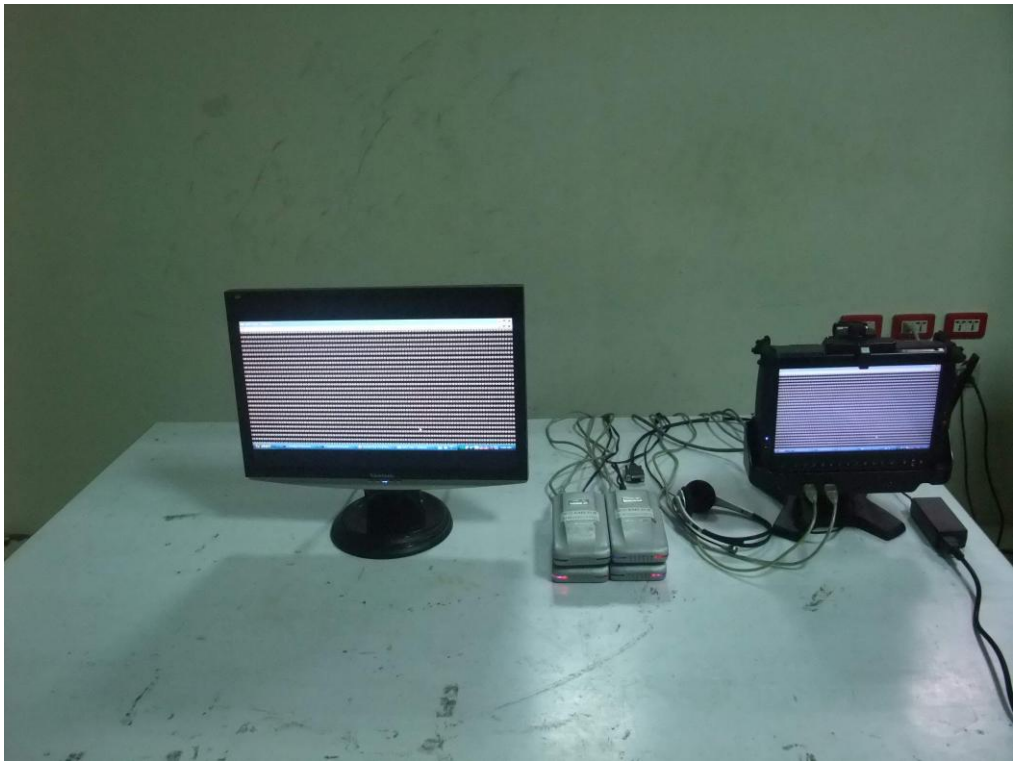


**REAR VIEW**



# 7 Photographs of Flicker, Surge, DIP Test Configuration

**FRONT VIEW**



**REAR VIEW**



# 8 Photographs of CS Immunity Test Configuration

**FRONT VIEW**

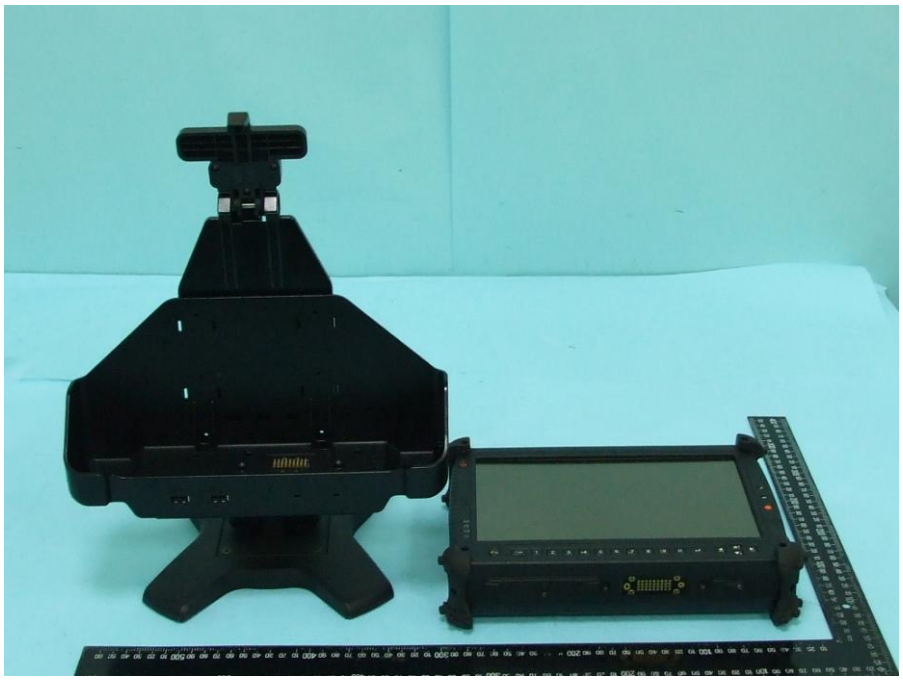


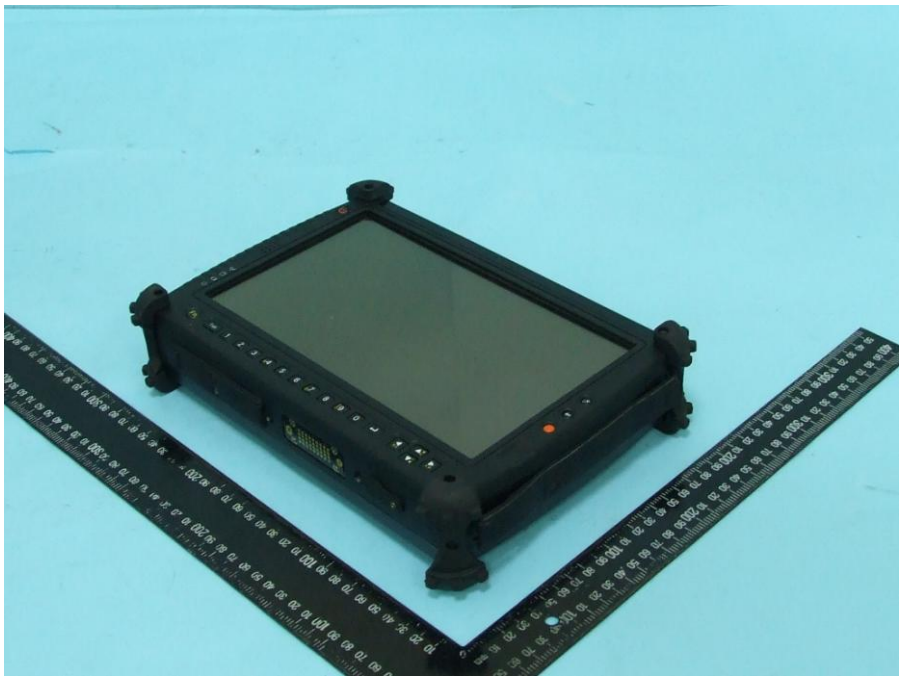
**REAR VIEW**



# APPENDIX B. Photographs of EUT

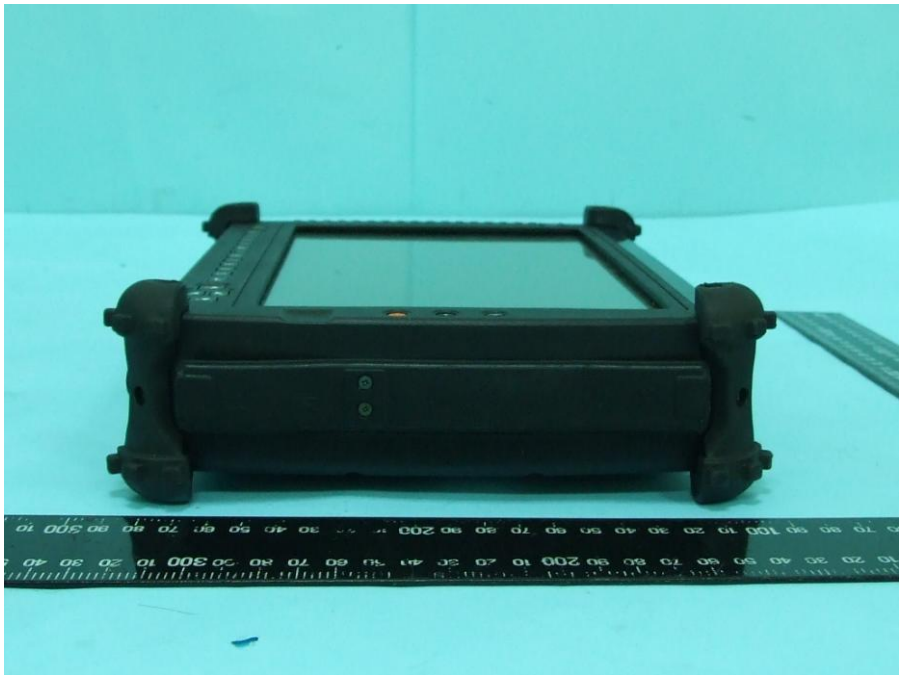




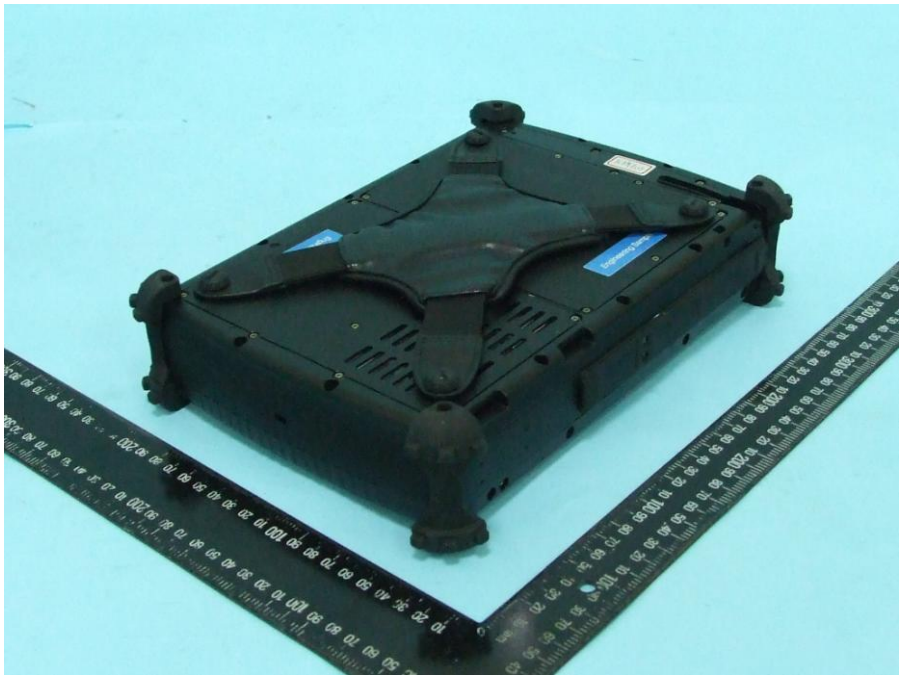




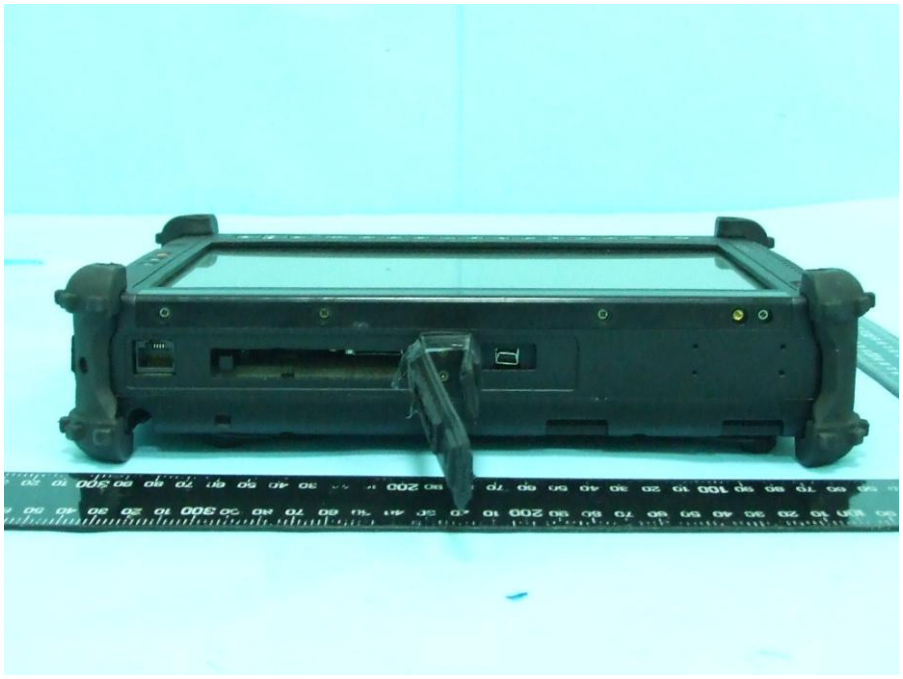






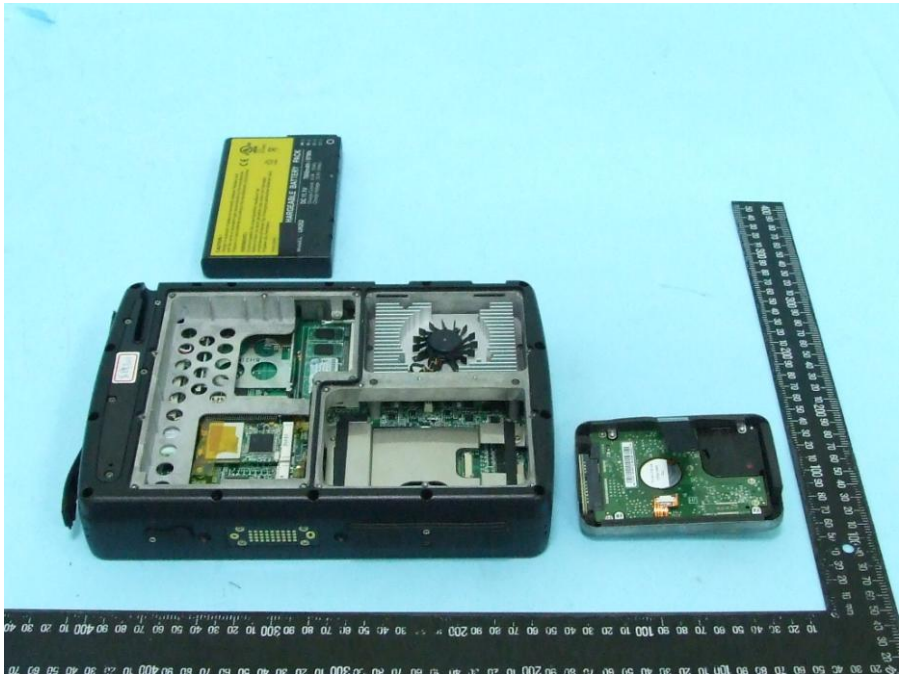


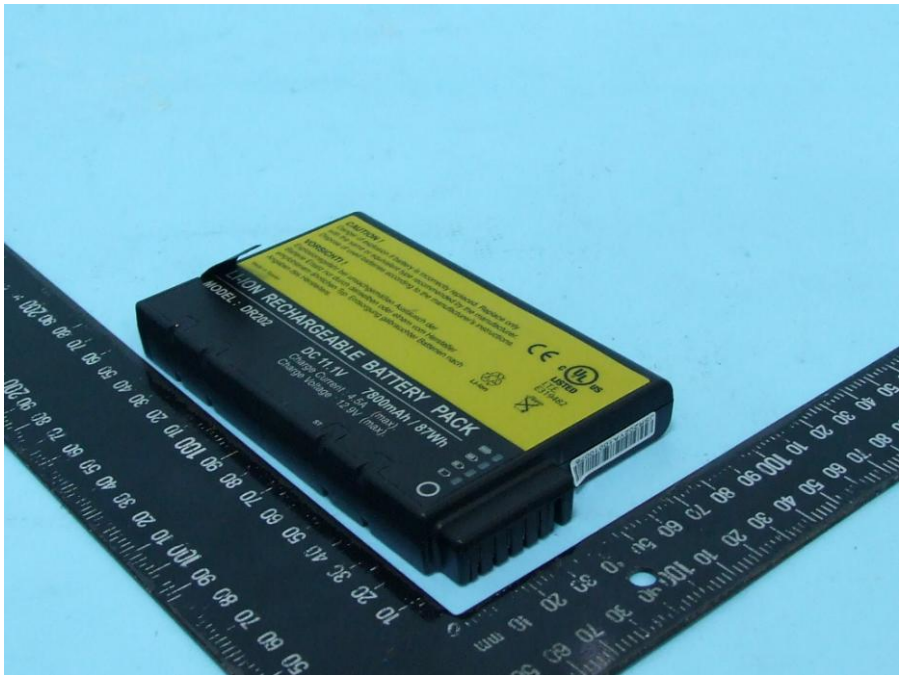


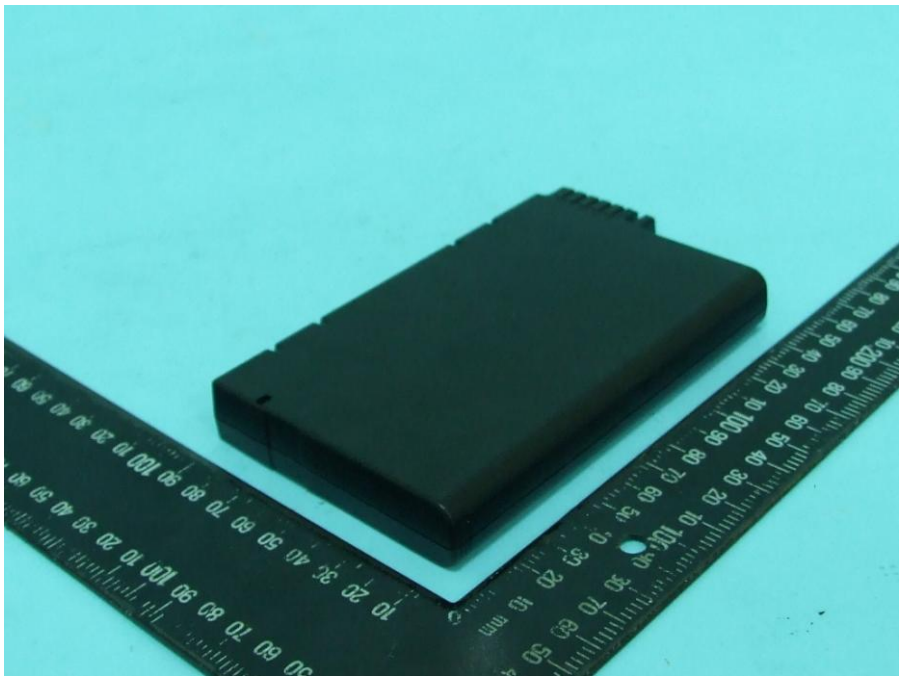



Engineering Sample


RECHARGEABLE BATTERY PACK



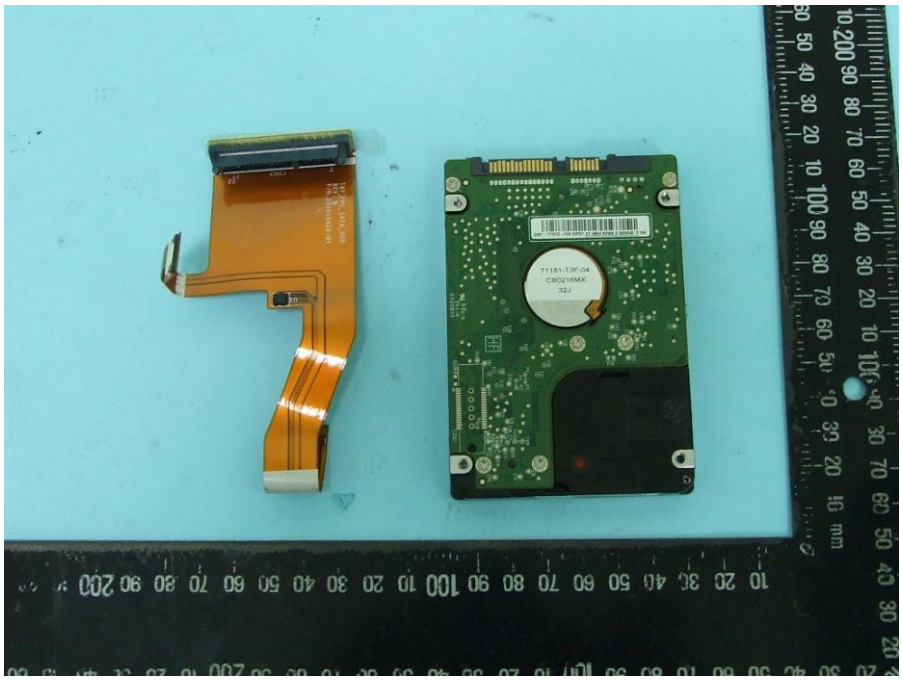

ION RECHARGEABLE BATTERY PACK
DC 11.1V
7800mAh / 87Wh

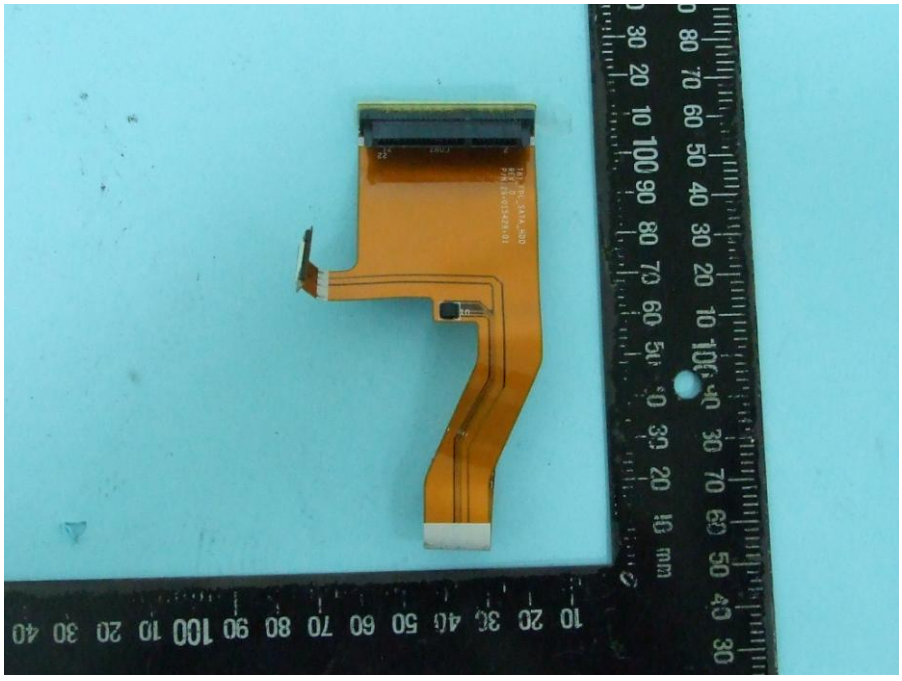


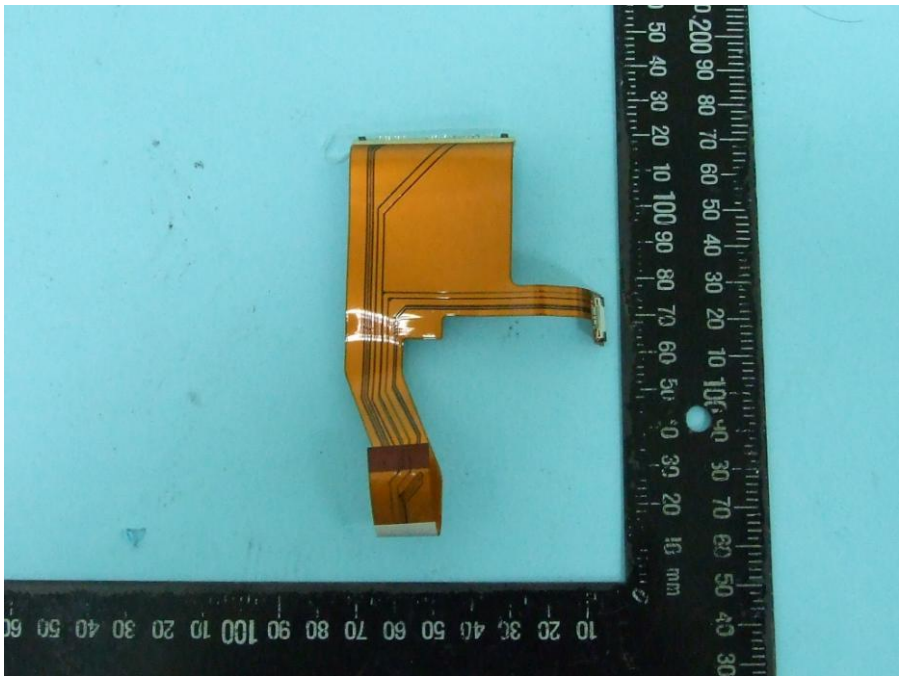

CAUTION !
Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
VORSICHTI !
Explosionsgefahr bei unsachgemäßen Austausch der Batterie Ersatz nur durch denselben oder elnem vom Hersteller empfohlenem ähnlichen Typ. Entsorgung gabrauchter Batterien nach Angaben des Herstellers.
LISTED
I.T.E.
E319482
Li-ion
Made in Taiwan
LI-ION RECHARGEABLE BATTERY PACK
MODEL : DR202
DC 11.1V 7800mAh / 87Wh
Charge Current : 4.5A (max).
Charge Voltage : 12.9V (max).









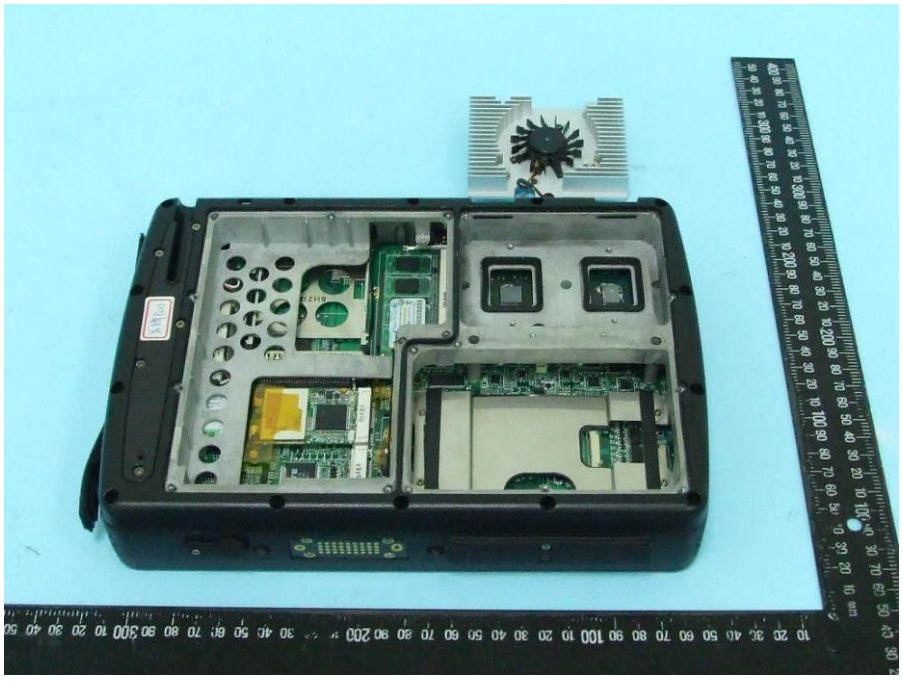


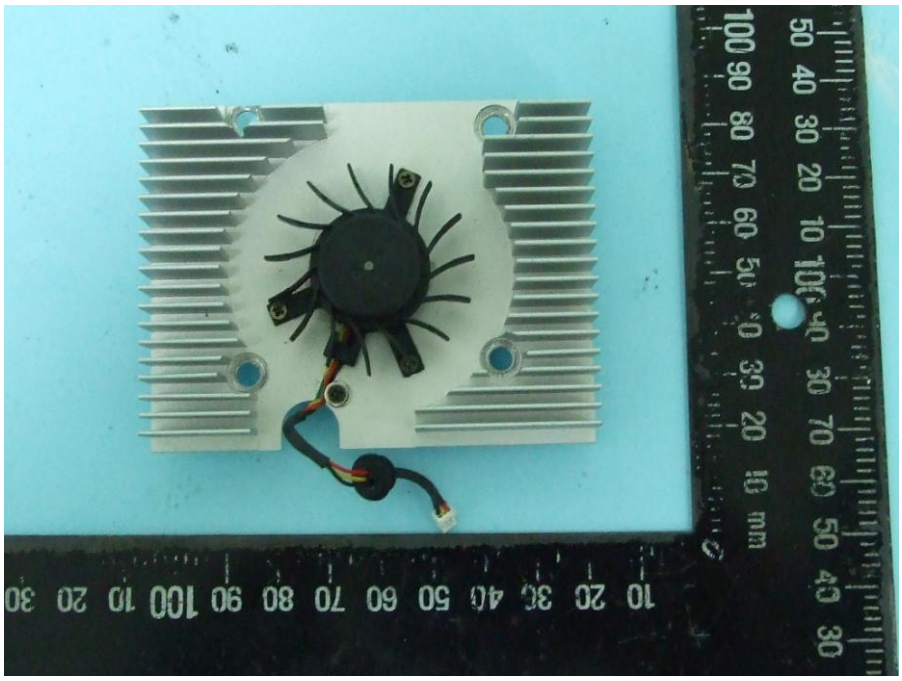

80GB
WD800BEVT
WD Scorpio Blue

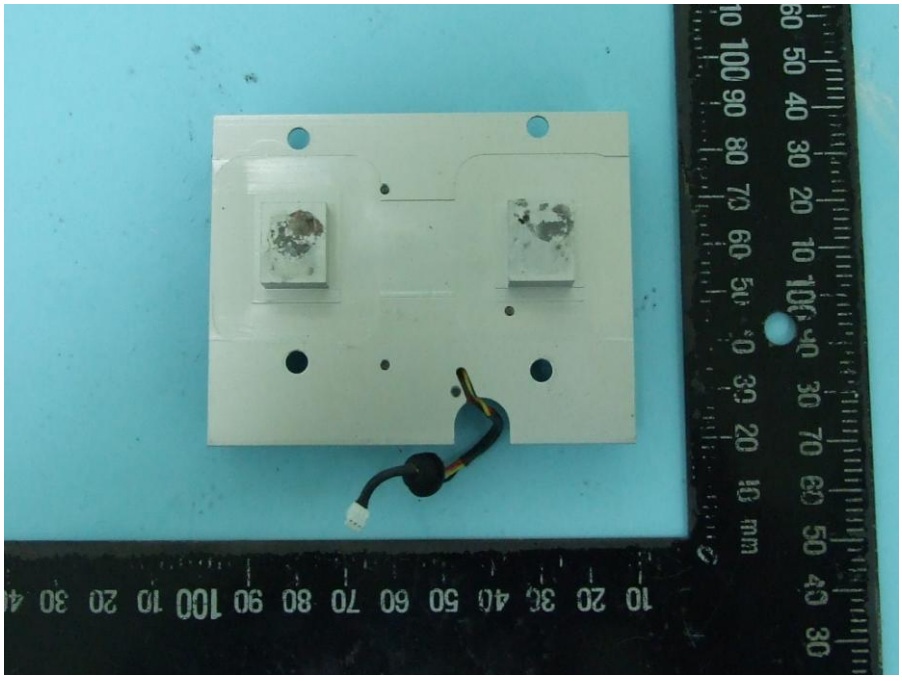


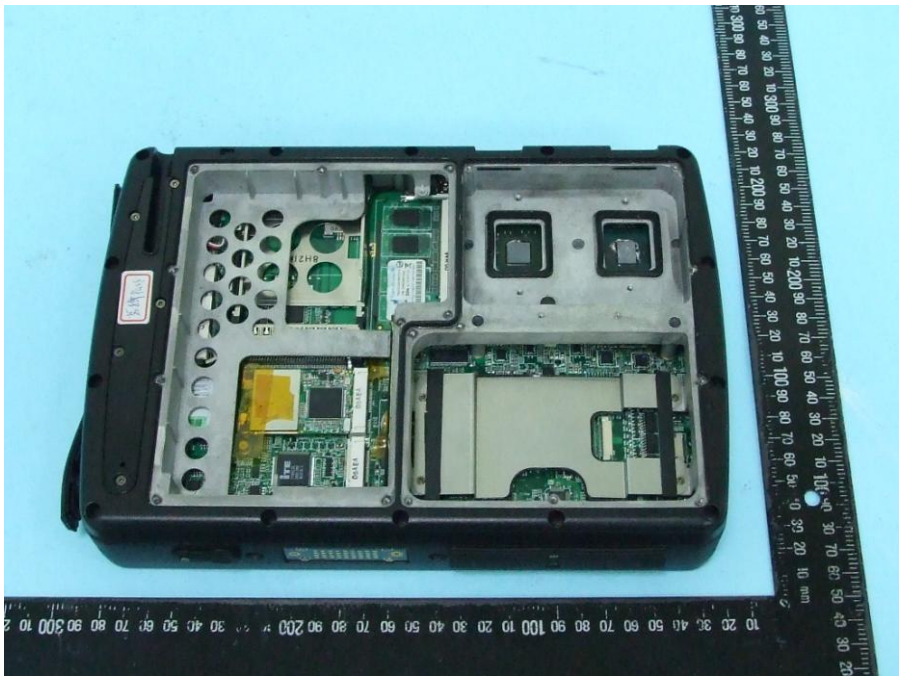

FRAGILE
DO NOT COVER
ANY DRIVE HOLES
WD
www.westerndigital.com
80GB
WD800BEVT
S/N : WX81A2007019
MDL : WD800BEVT – 00A23T0
Product warranty will be void if seal,
label or cover is removed or damaged.
Do not press
on top cover.
WWN:50014EE2AED5E8E0
DATE: 28 FEB 2010
LBA : 156301488
DCM : HHCTJHBB
5VDC : 0.55A
DCX : 0A0122137
R/N : 771672
U.S. Patents: 6178056, 5956196,6289484, 6263459
Product of Thailand
Canada ICES – 003 Class B/
NMB – 003 Classe B
RoHS
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N3565
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WD Scorpio® Blue™

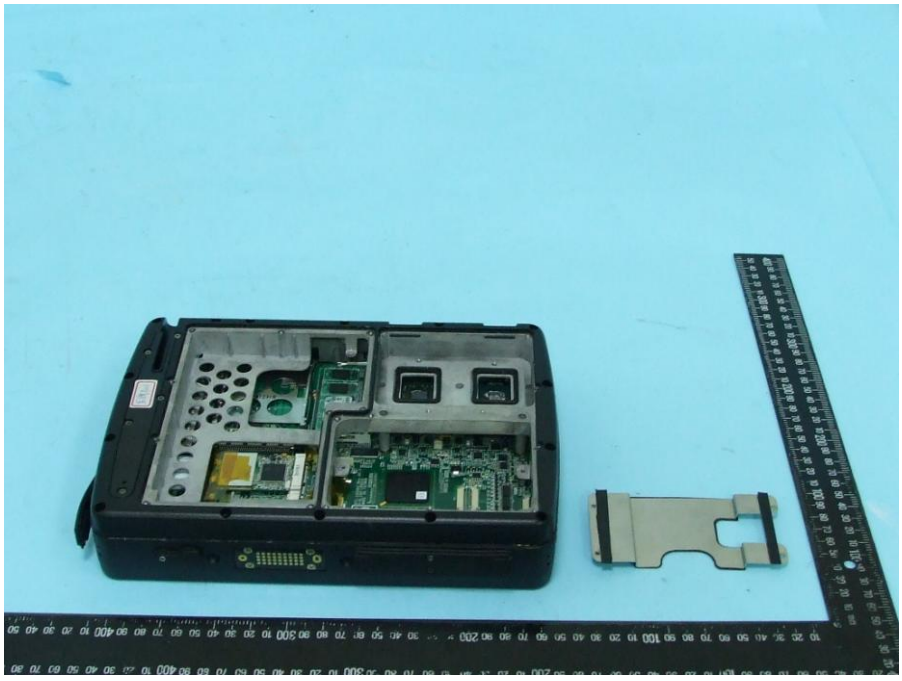




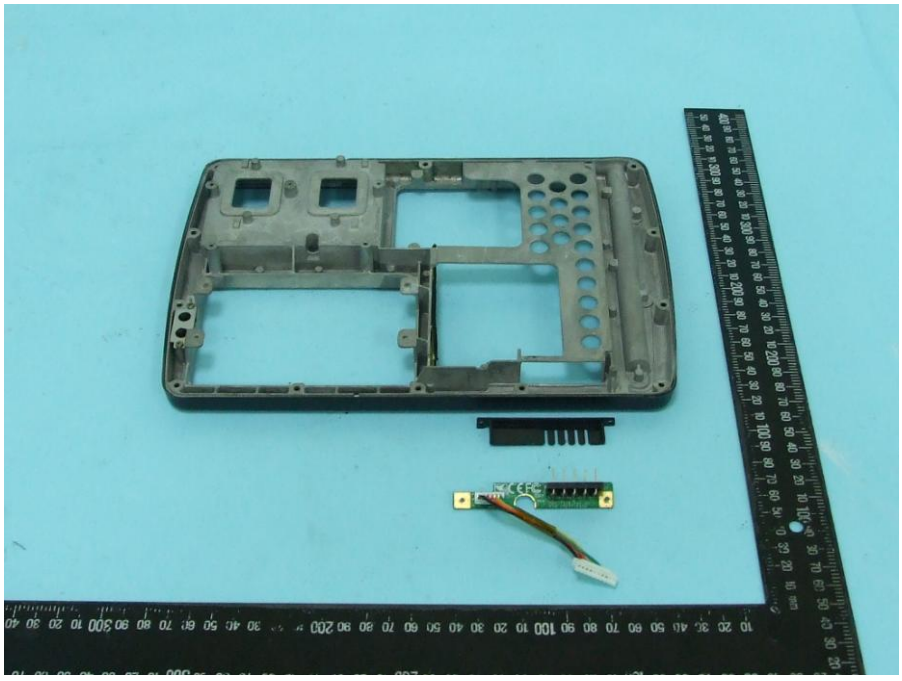






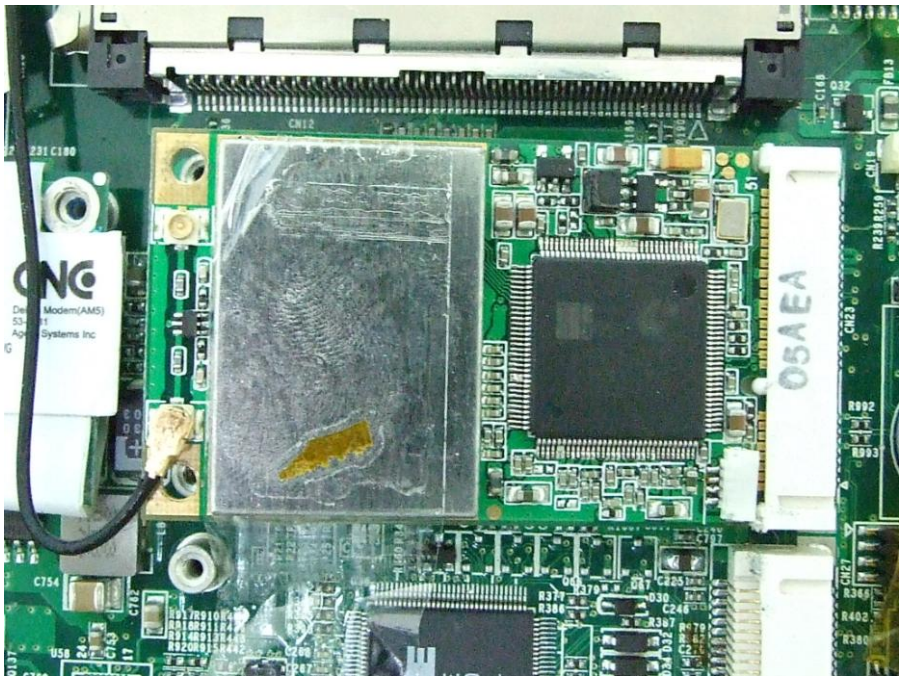


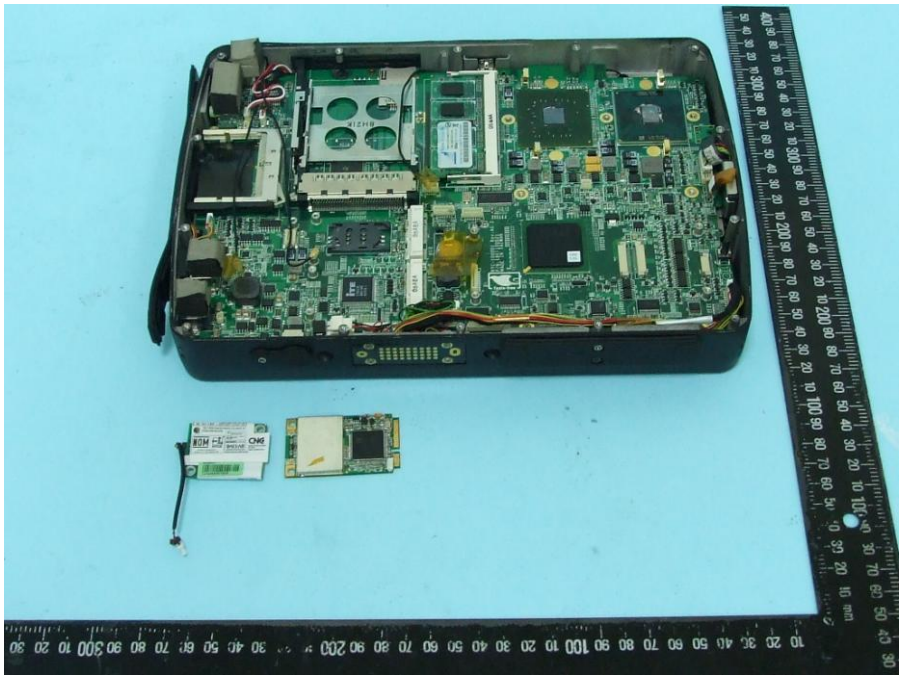


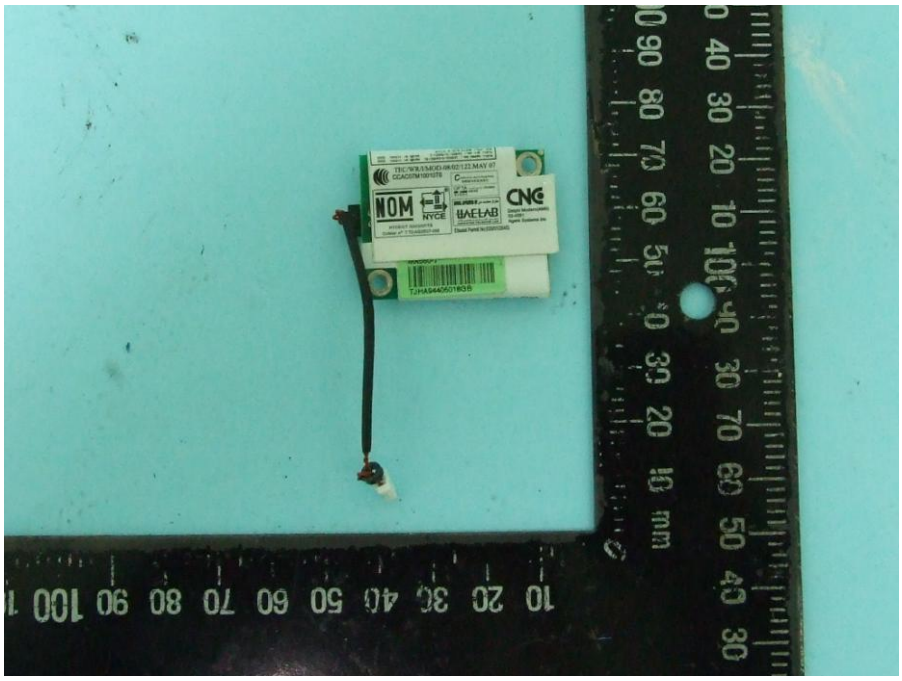


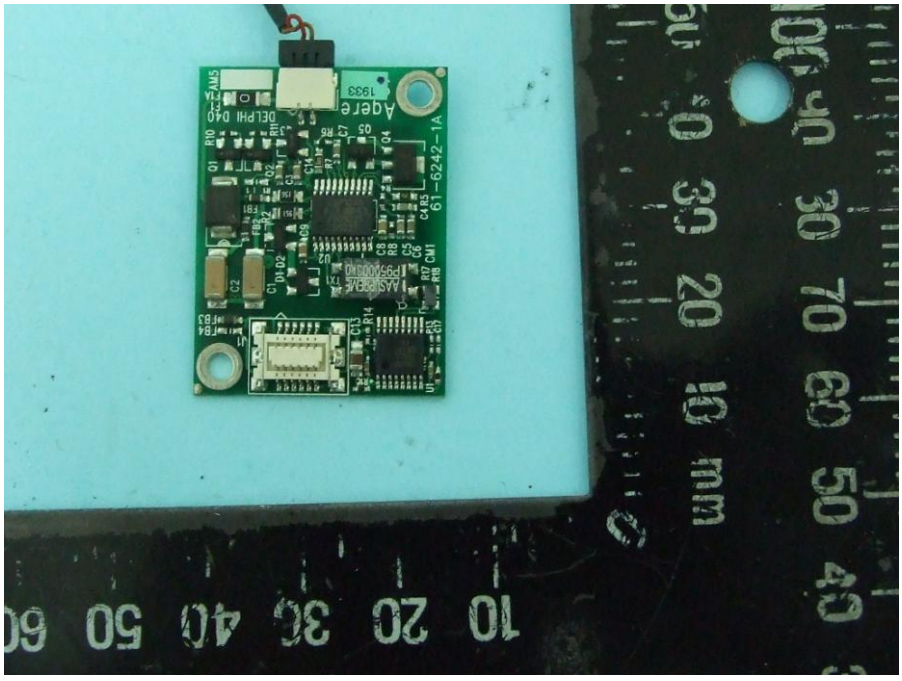


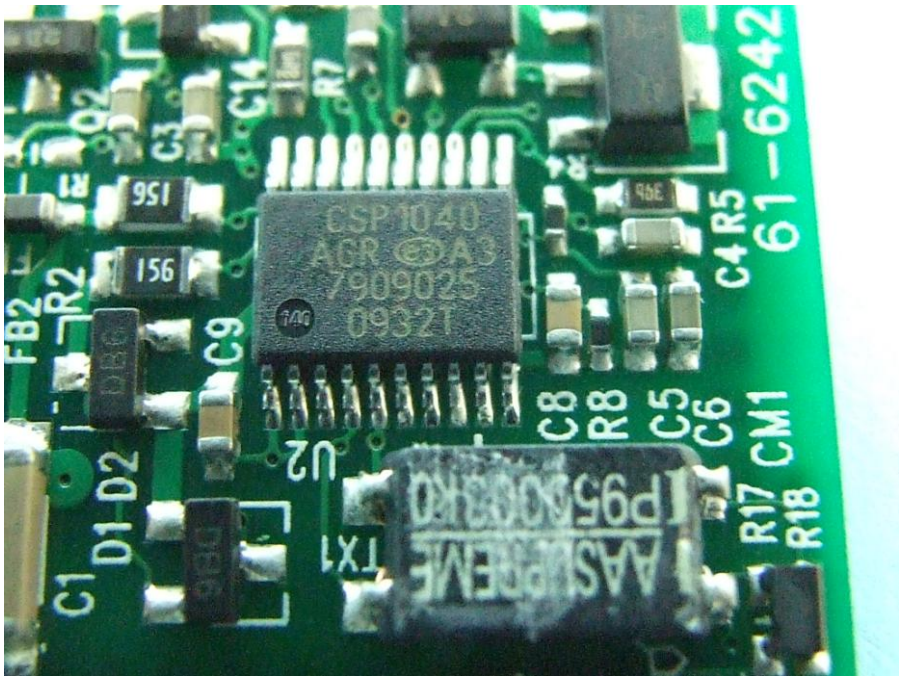


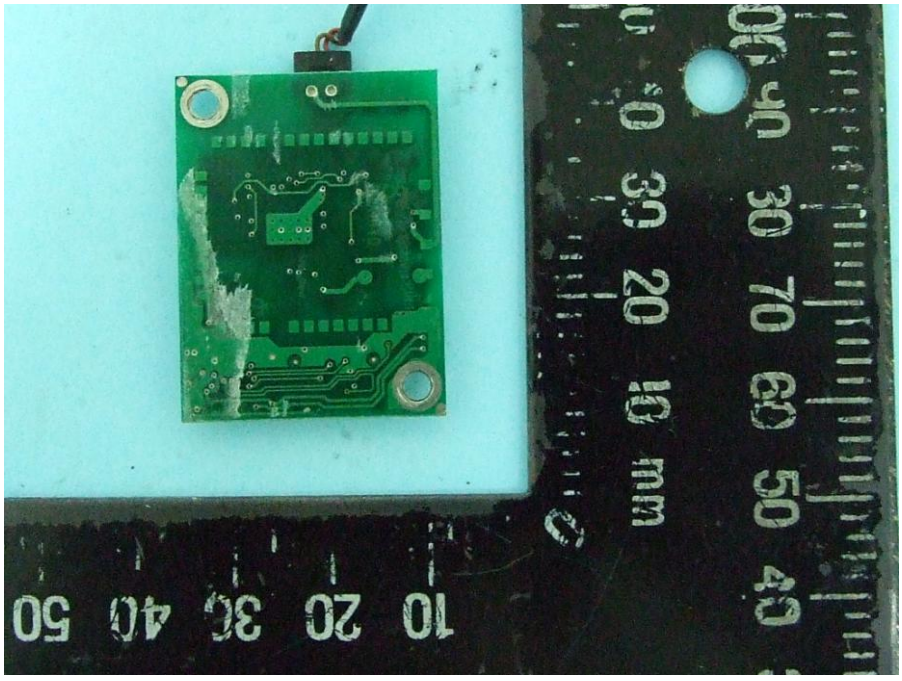


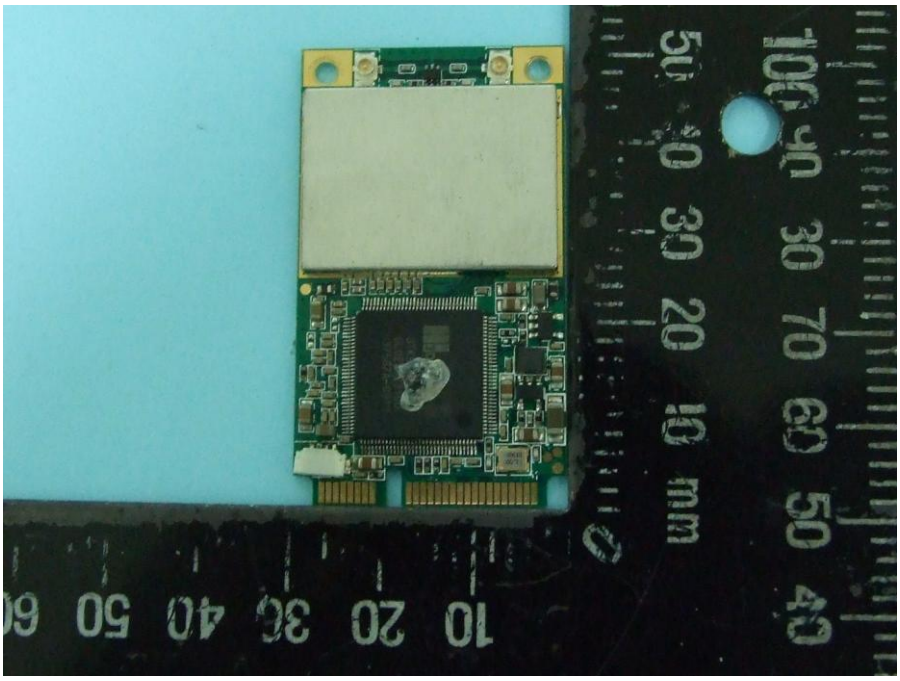


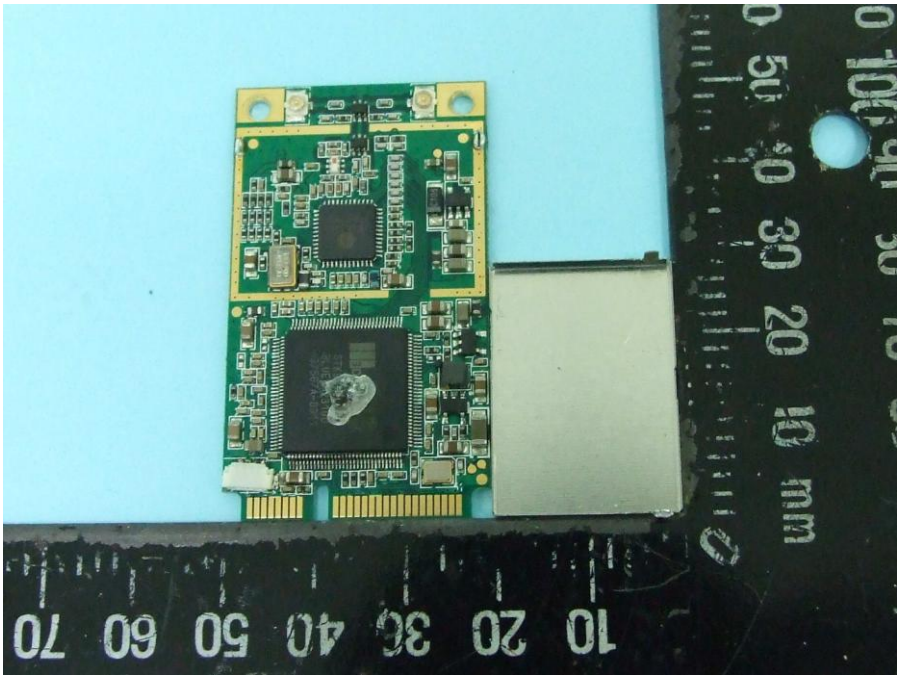

NOM
CNG
BAE-LAB

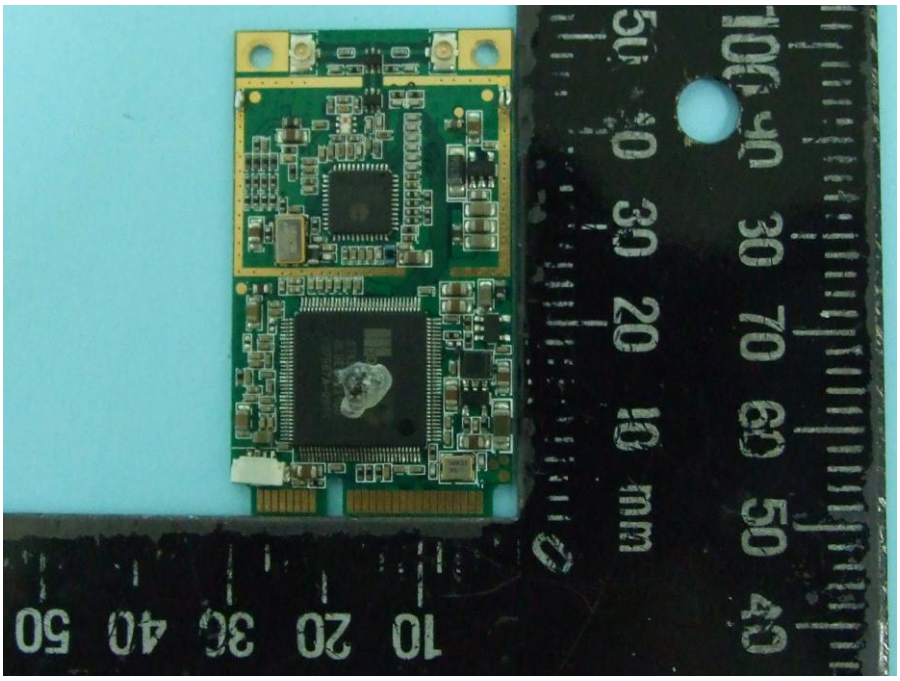

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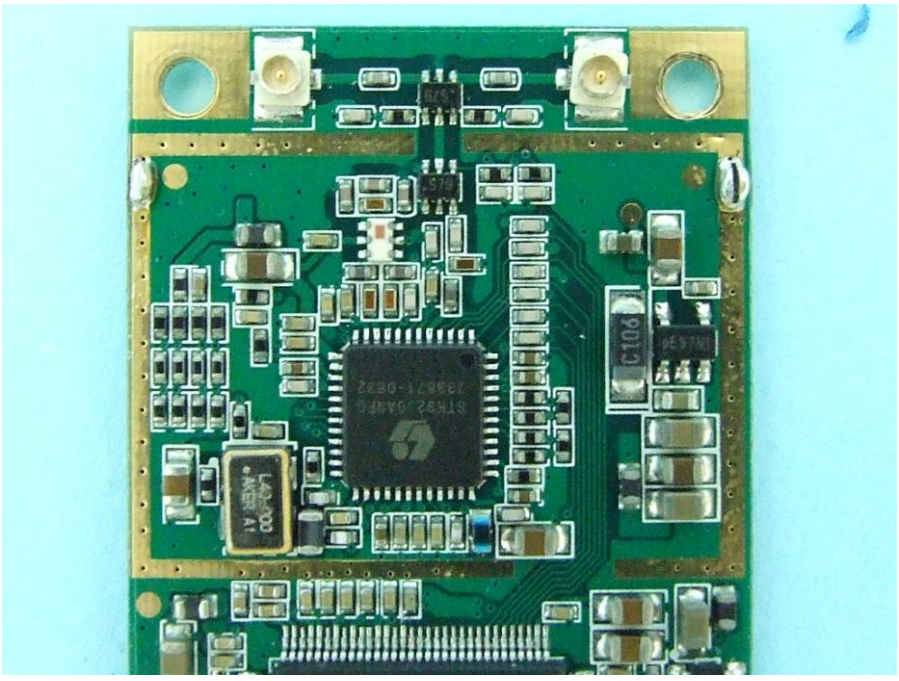

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AGR
A3
7909025
09321
61-6242
C4 R5
C8
R8
C5
C6
CM1
R17
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D1 D2
C1
U2
TX1

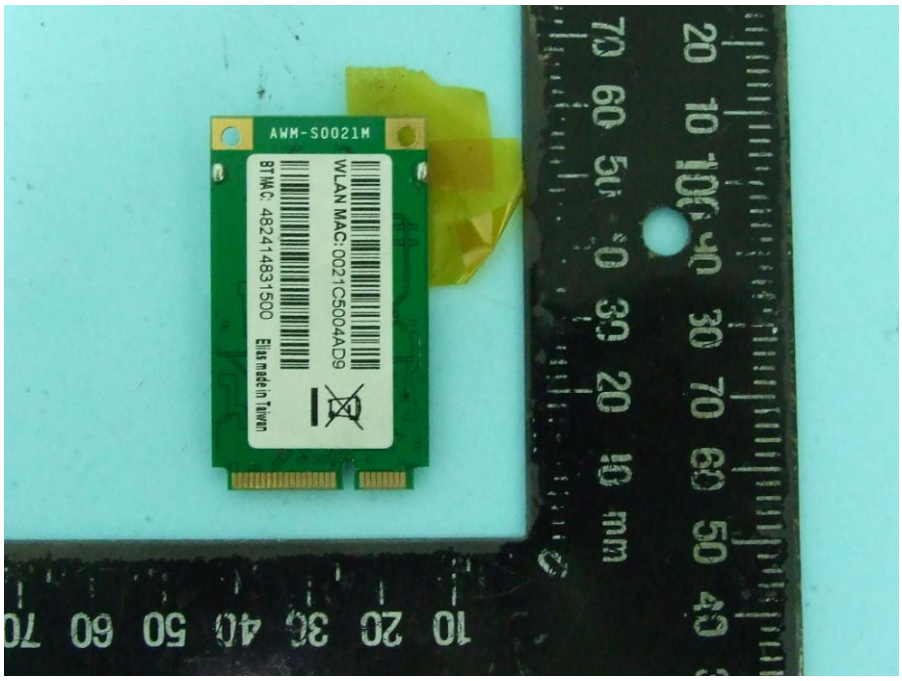

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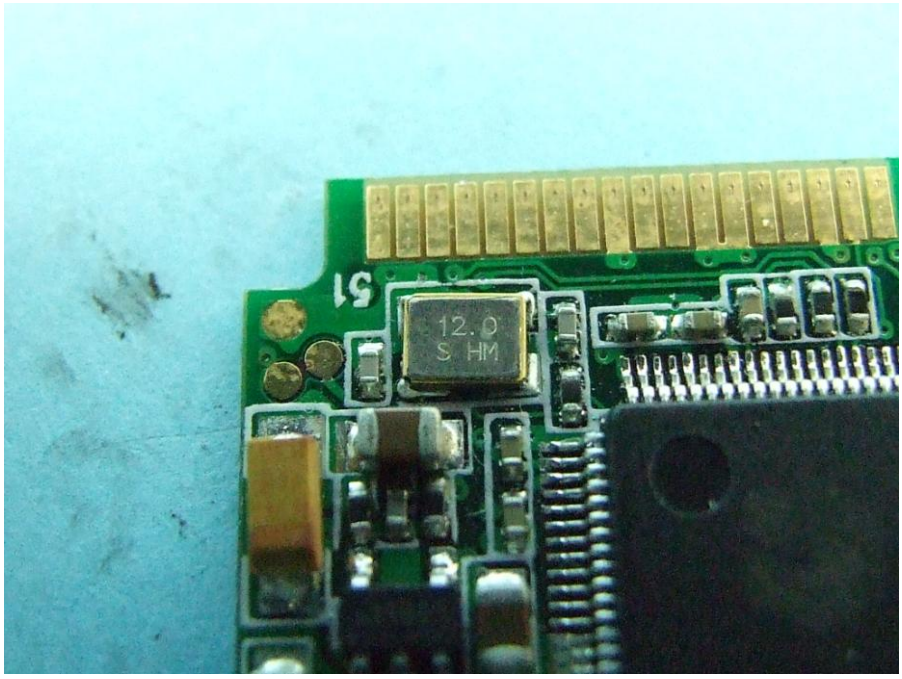




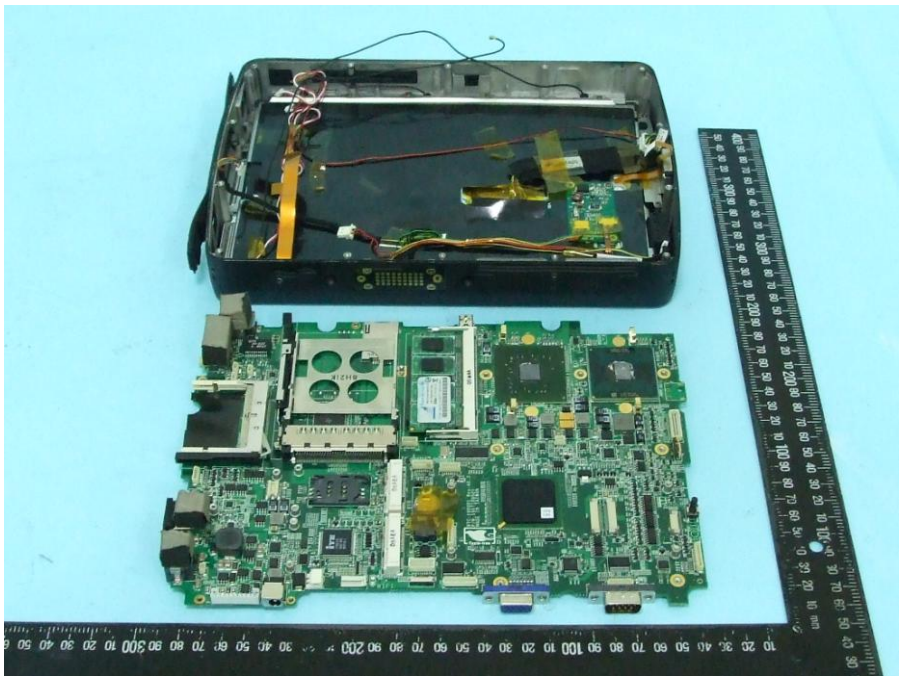


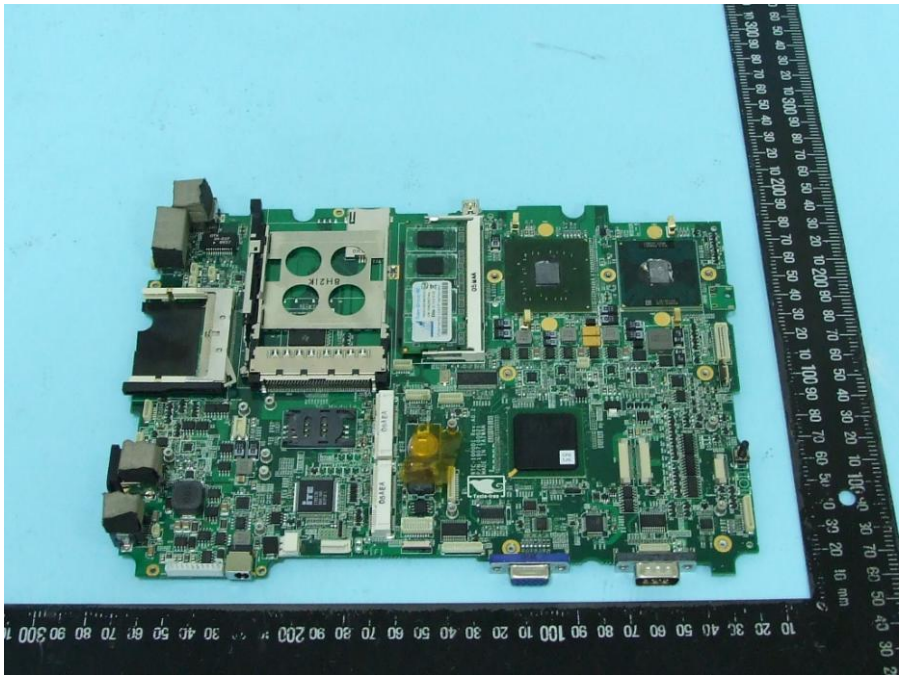

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WLAN MAC: 0021C5004AD9
BT MAC: 482414831500
Elitegroup made in Taiwan

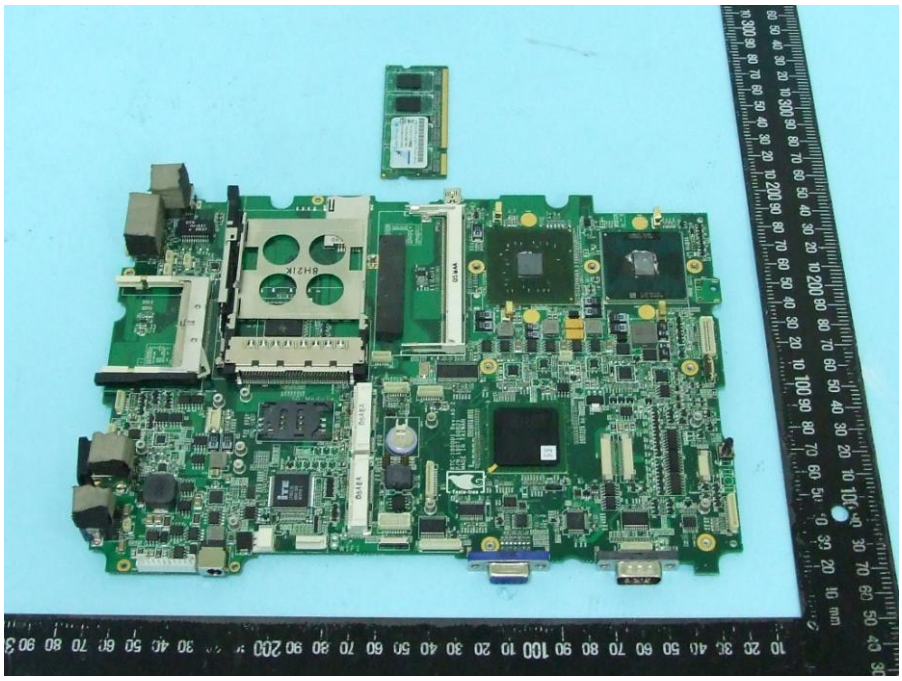

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S HM



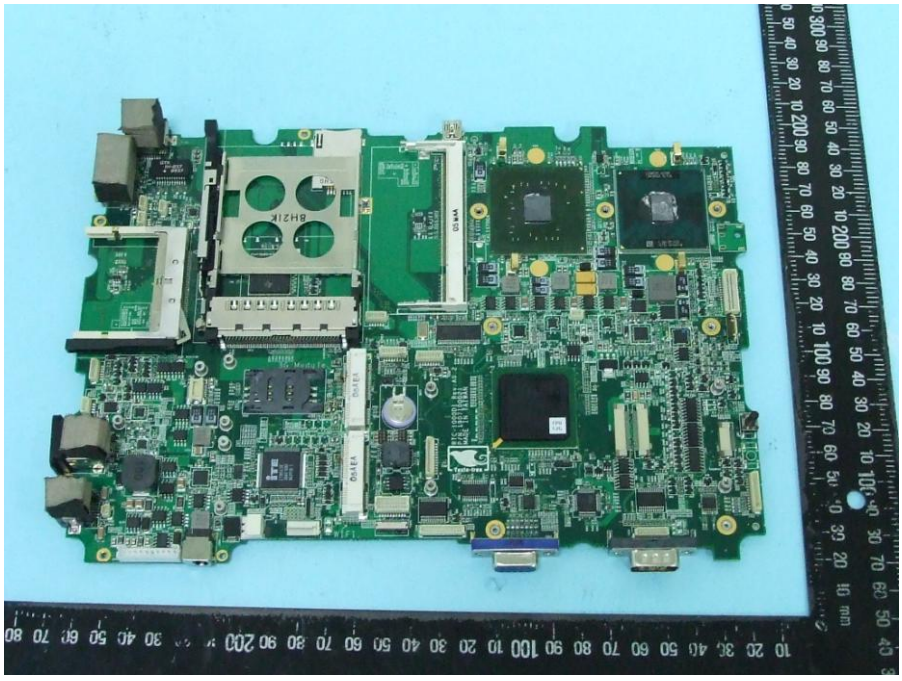







U1
U2
U3
U4
Team Group INC
TSDD1024M667C5-E
1GB DDRII667MHz
Elite CL=5-5-5-15
Warranty void if removed

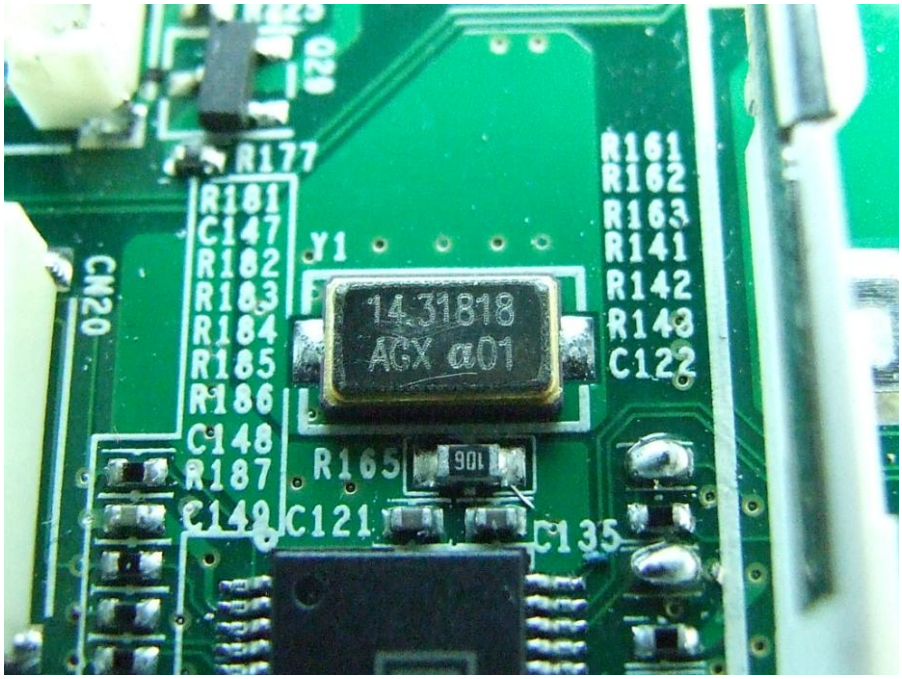

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U7
U8
U9

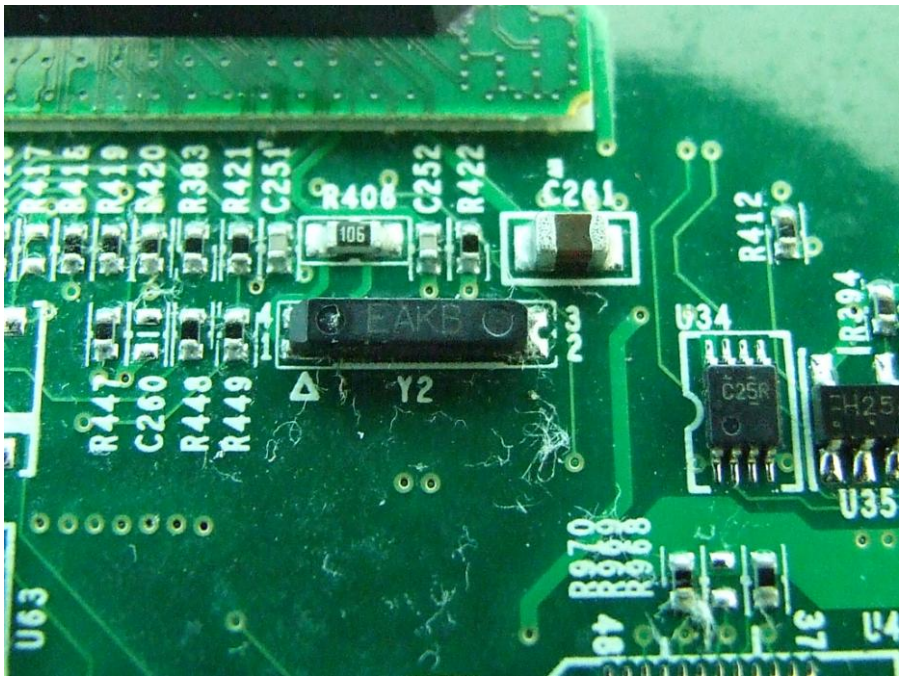


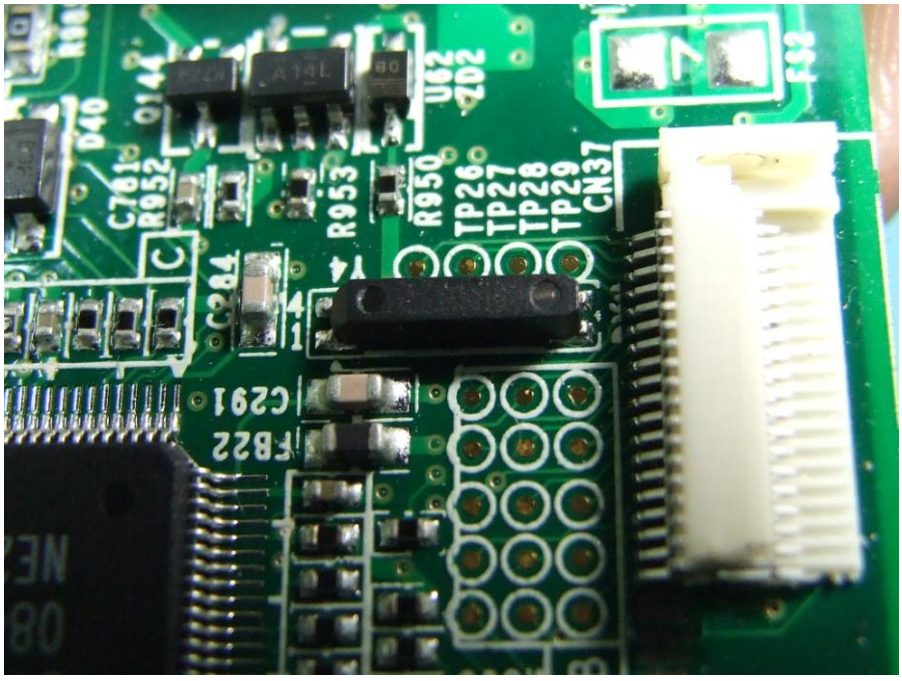

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INTEL ©04
PAD5
PAD7
CN11

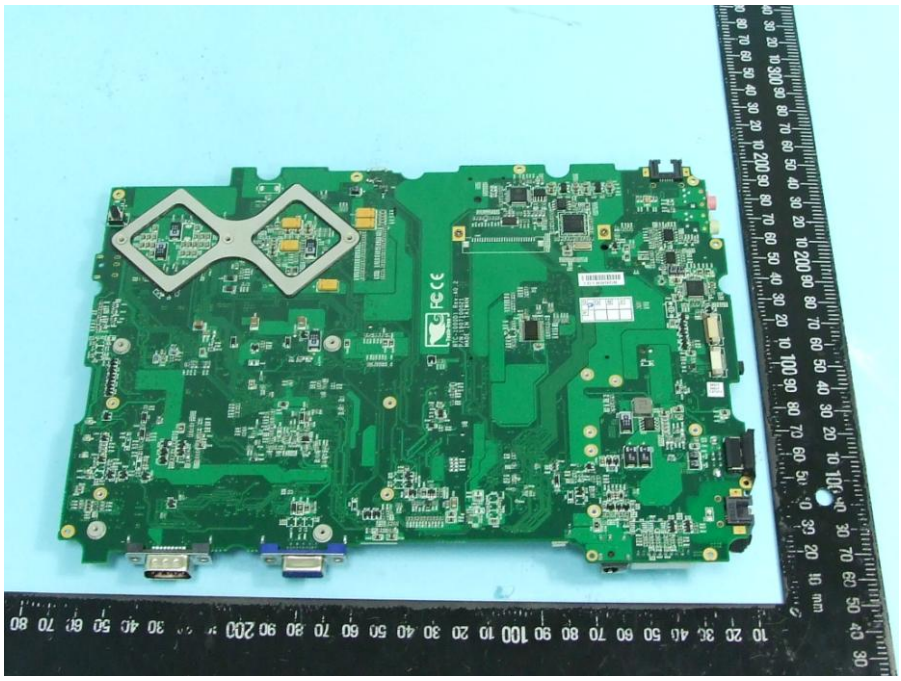

intel
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L012NA70
SL8YB
©04
TAIWAN
CPU
1.2G

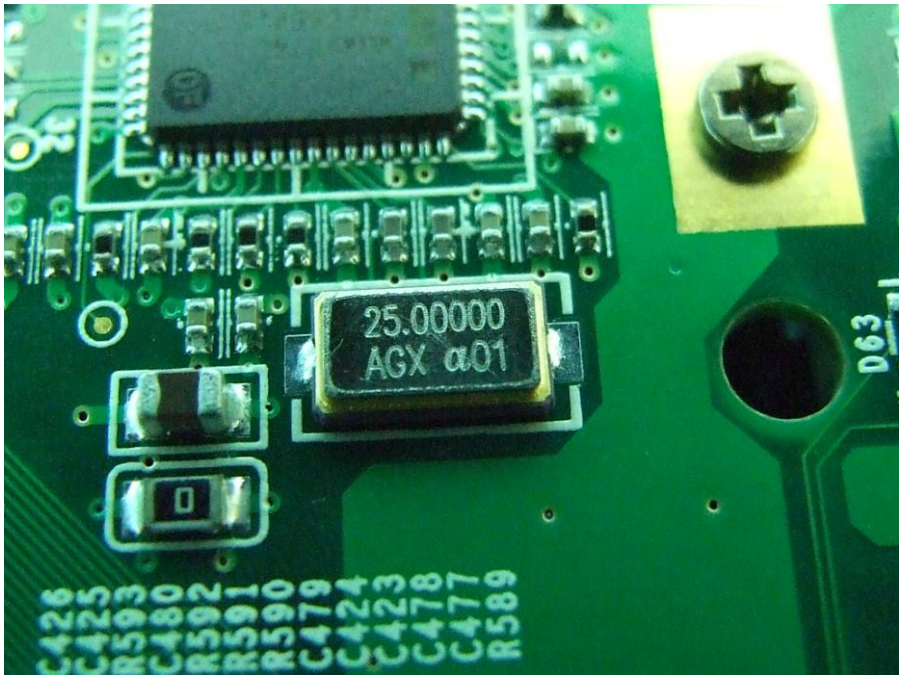

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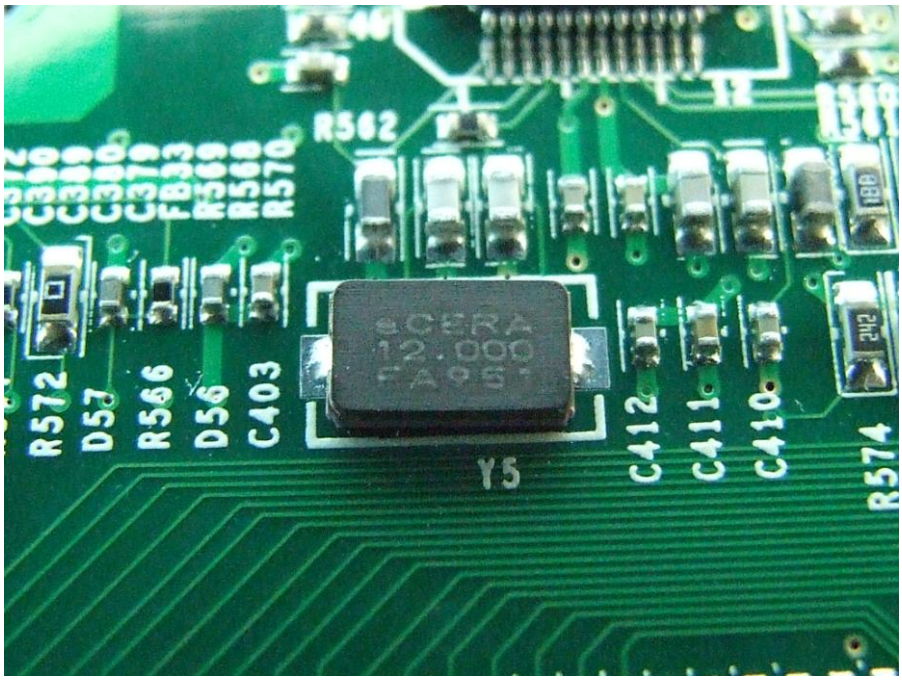

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R161
R162
R163
R141
R142
R143
C122
R165
C121
C135


R417
R418
R419
R420
R383
R421
C251
R408
C252
R422
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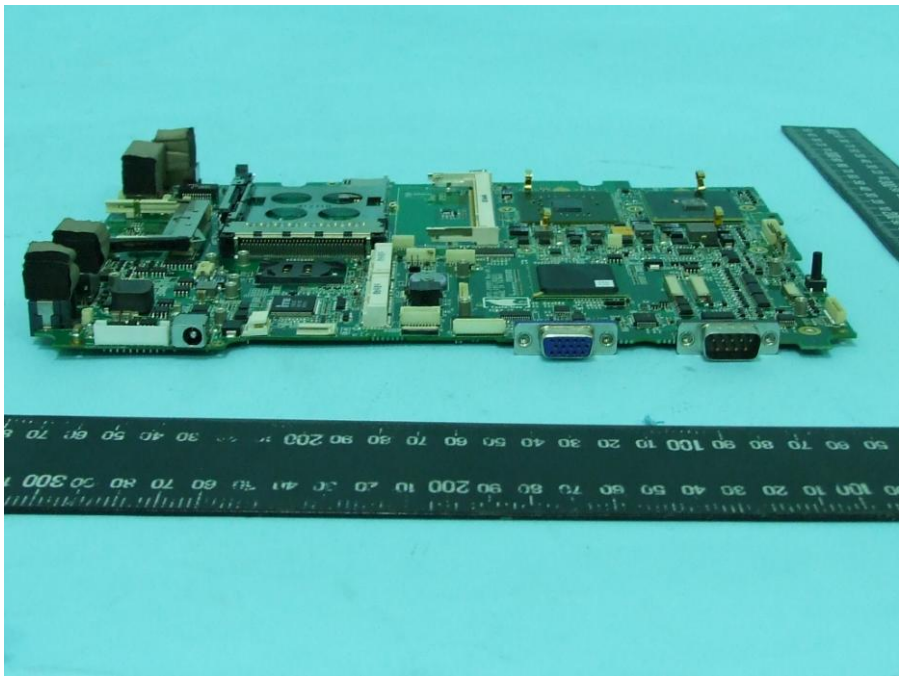

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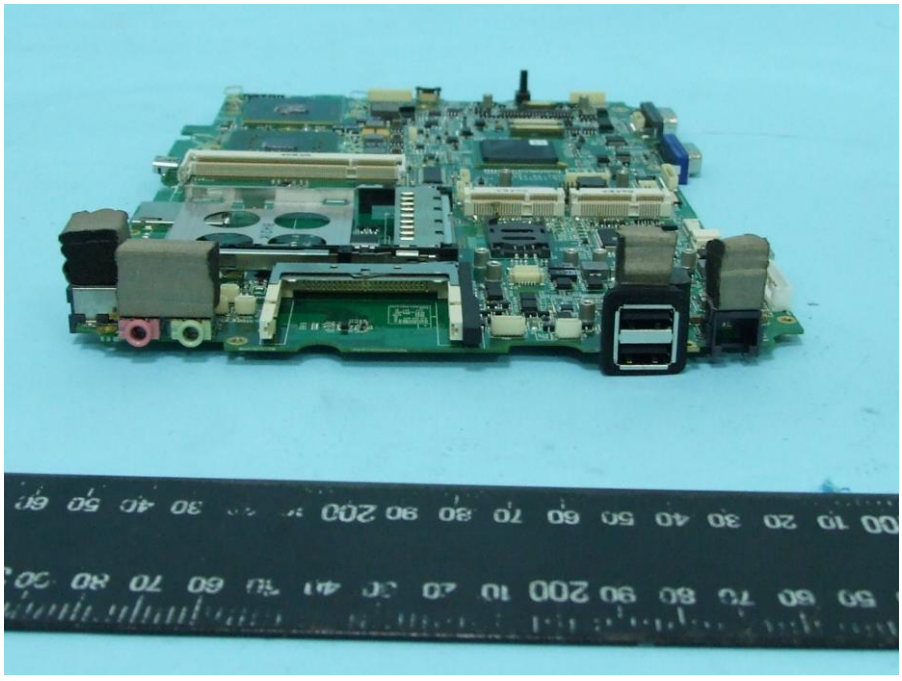


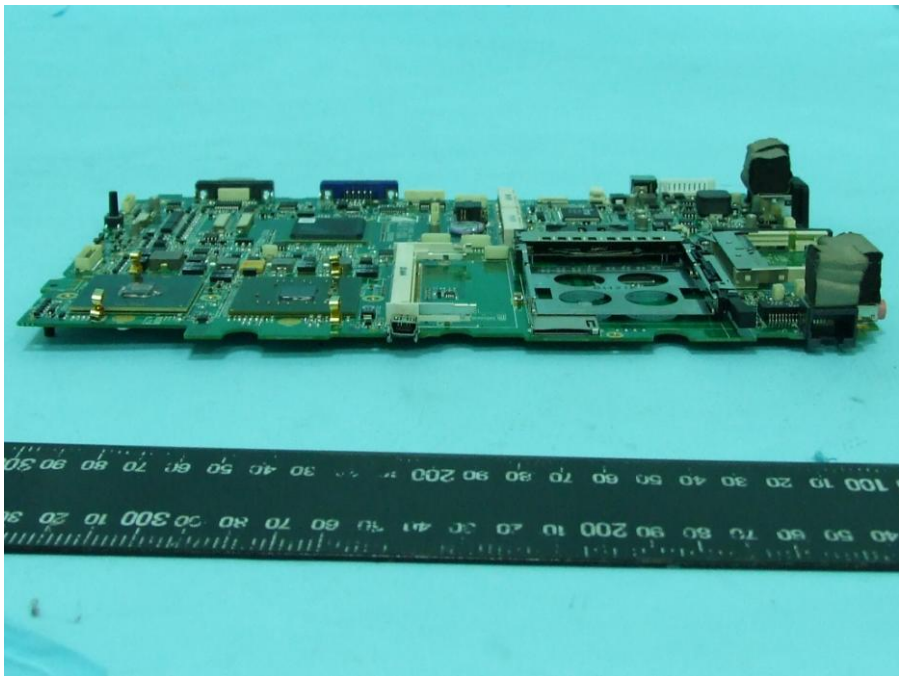

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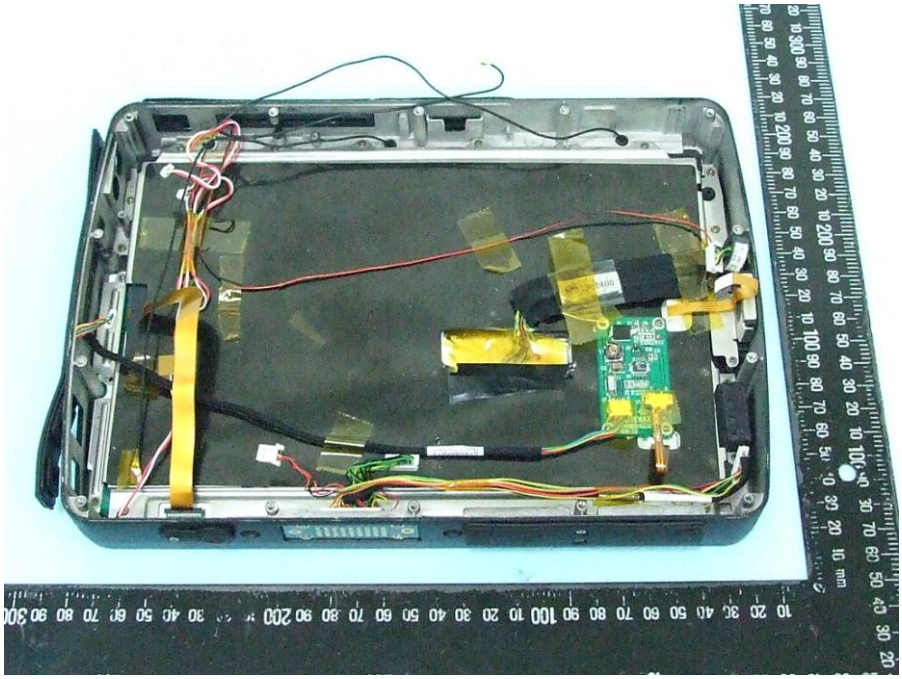

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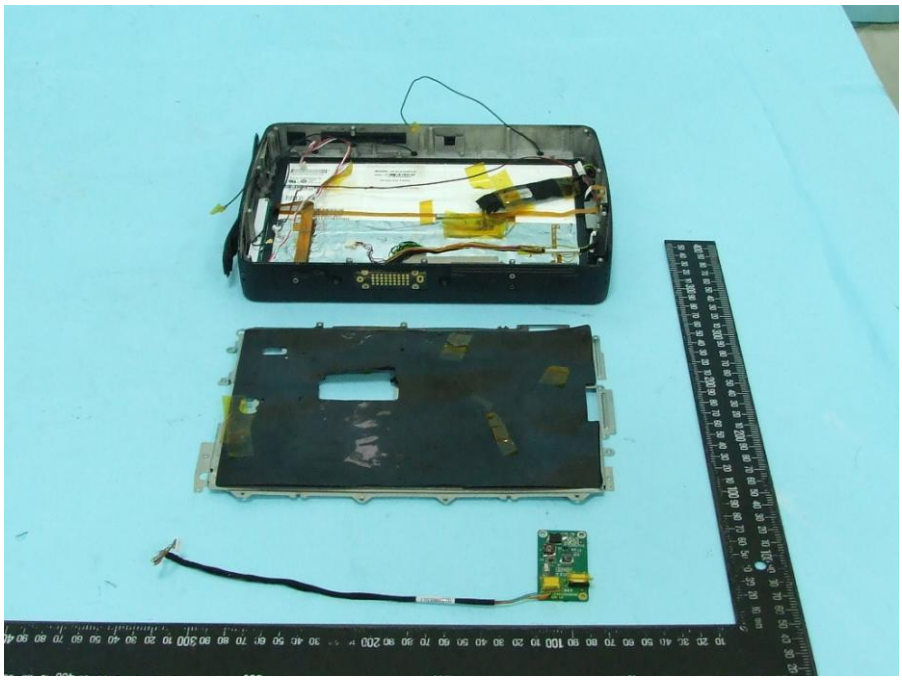

INTEL
TAIWAN

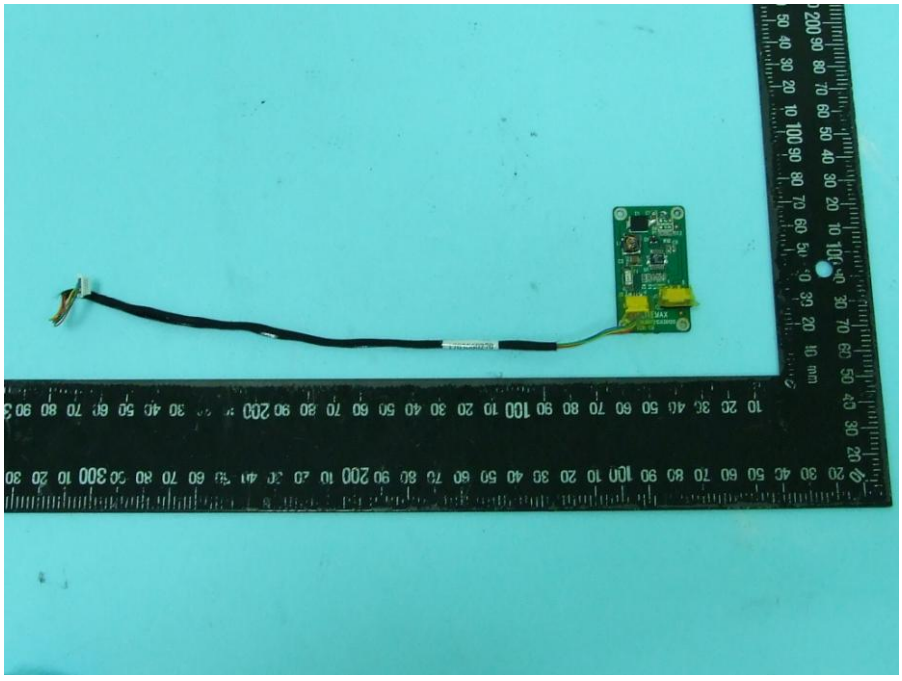


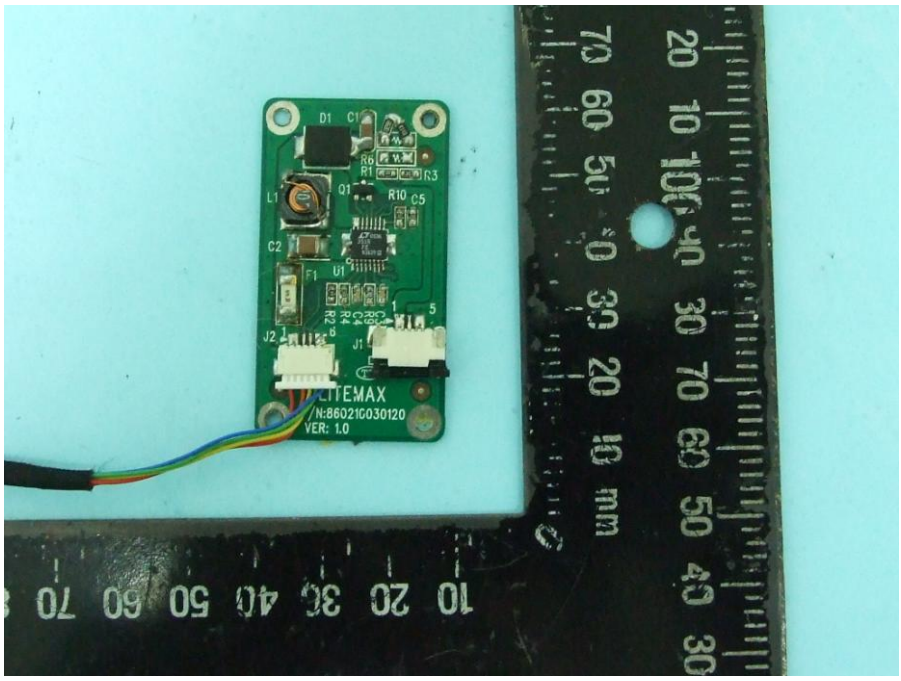


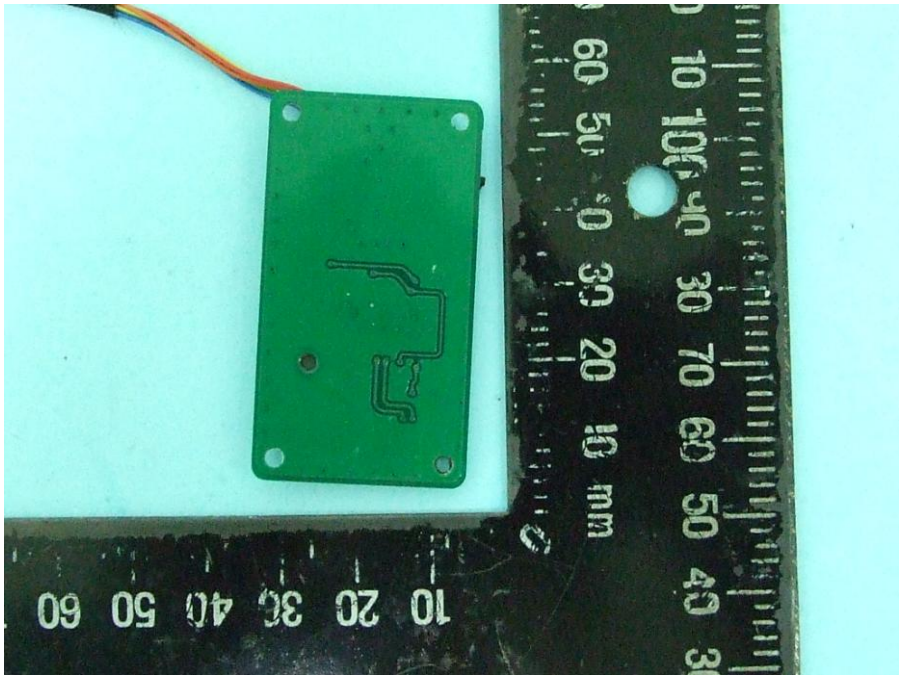


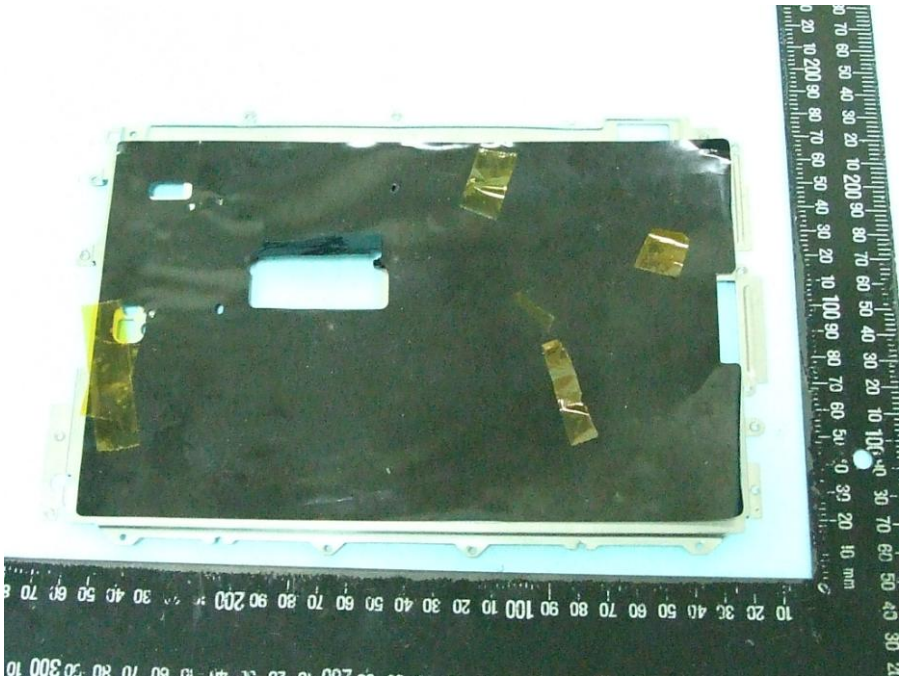


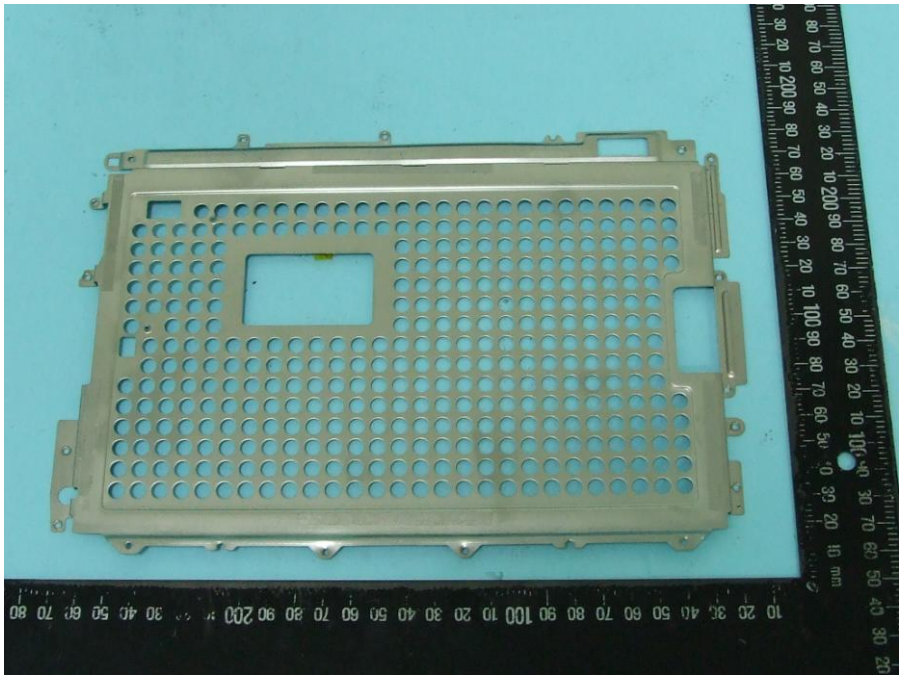


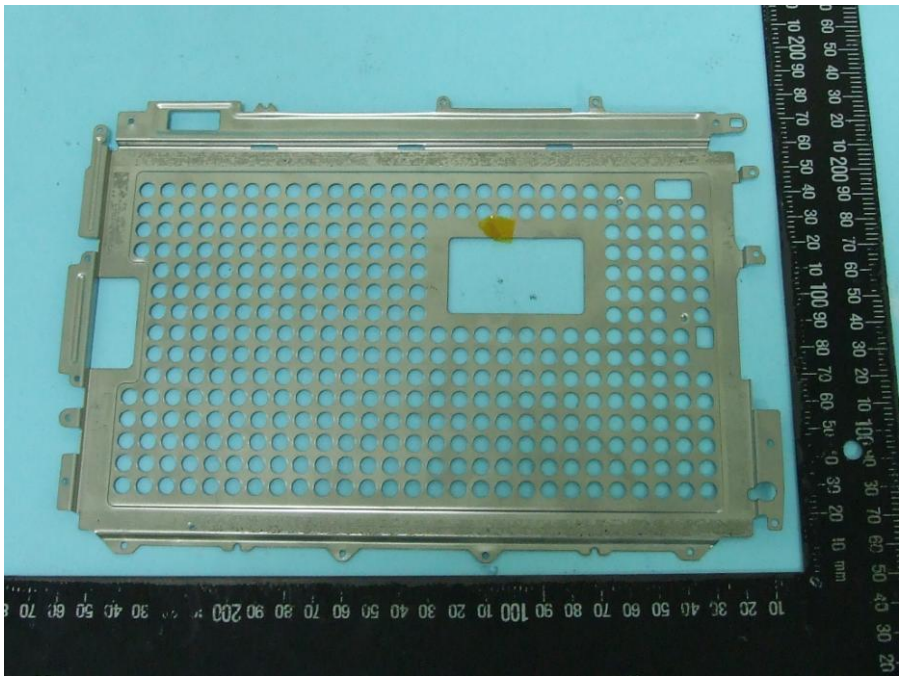


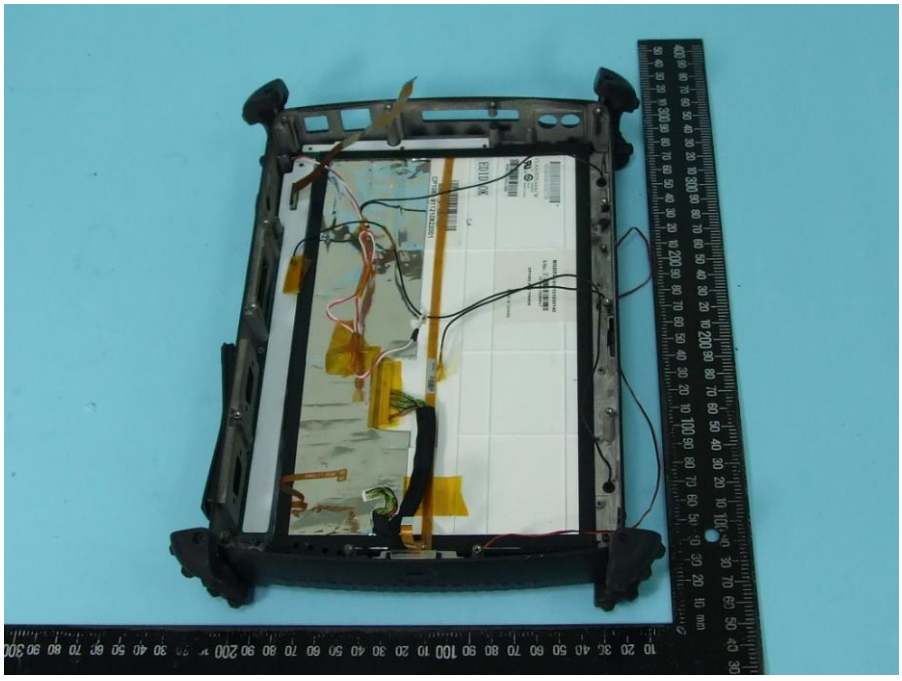

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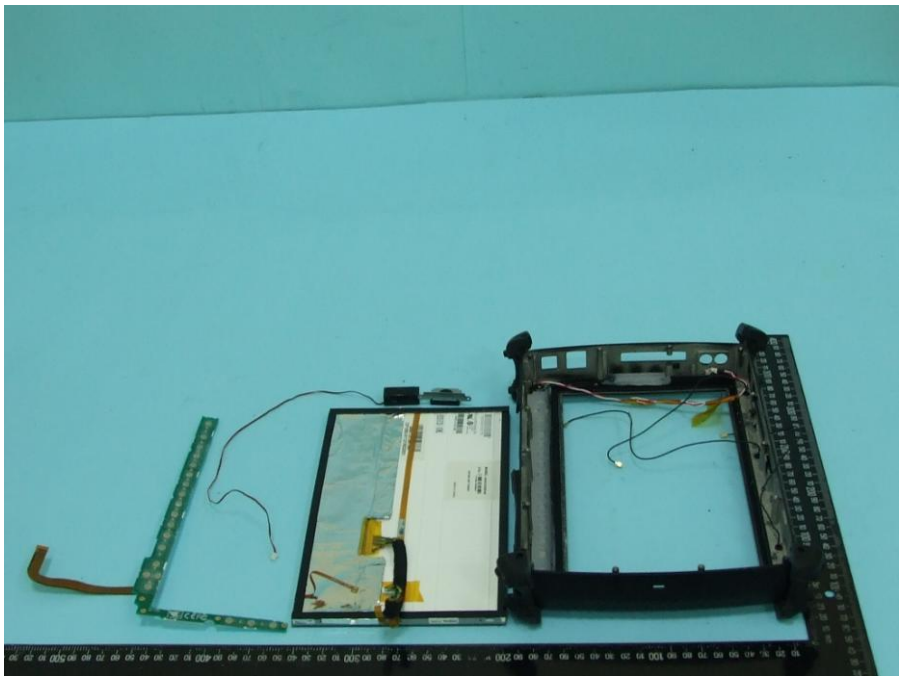


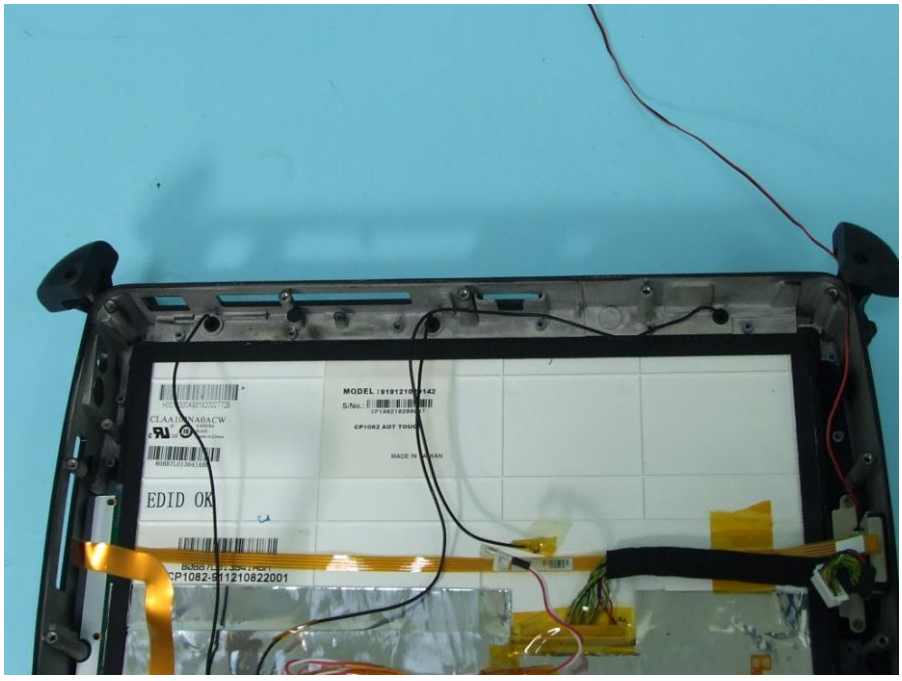


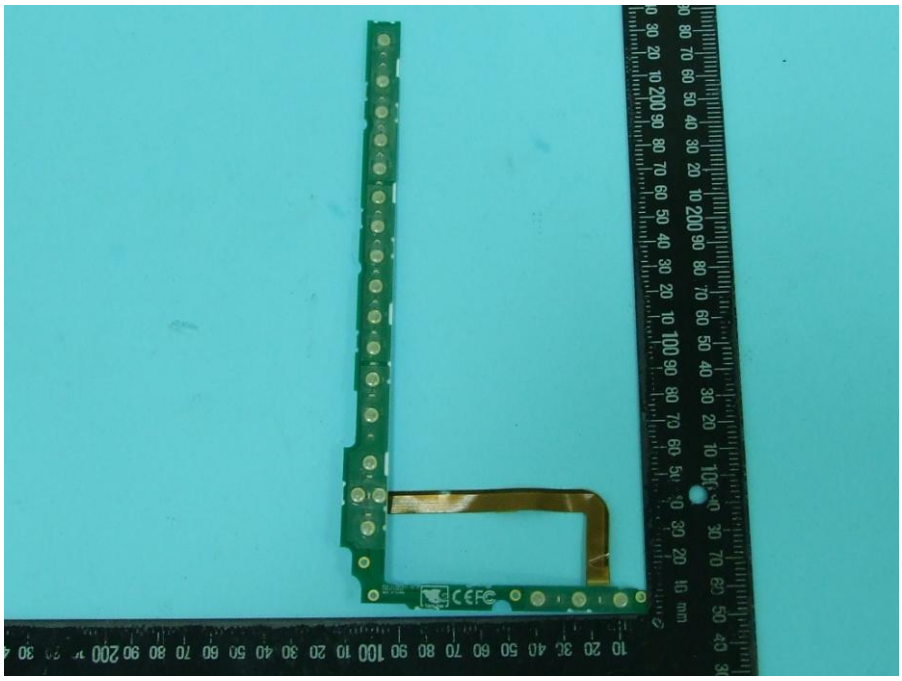


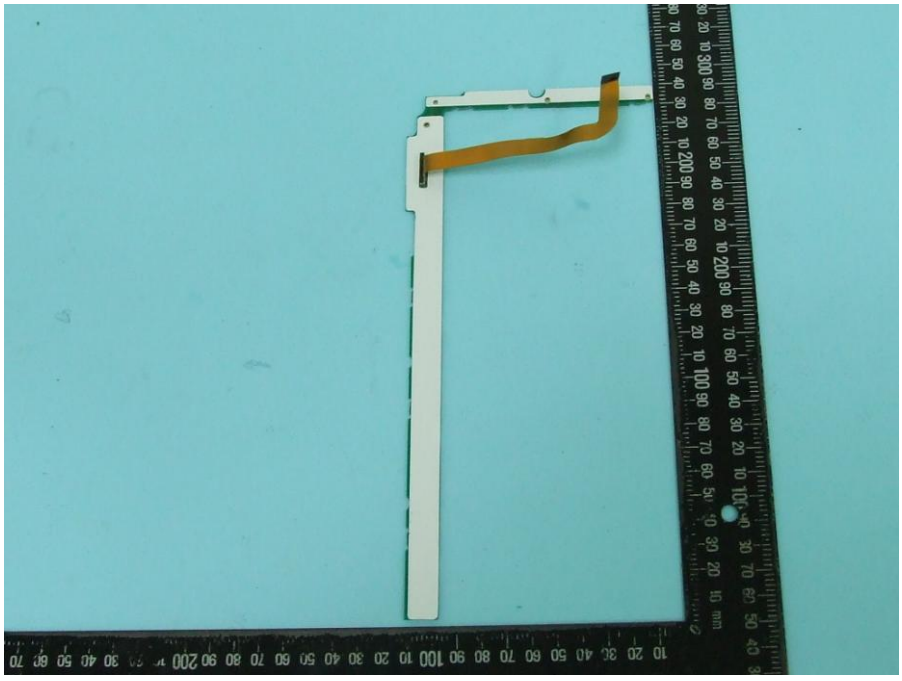




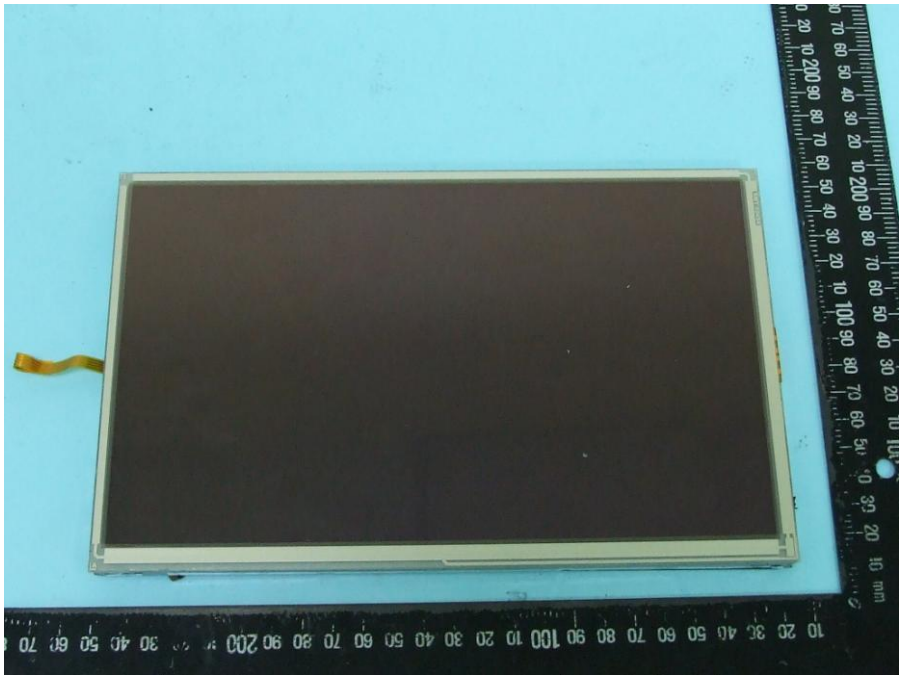


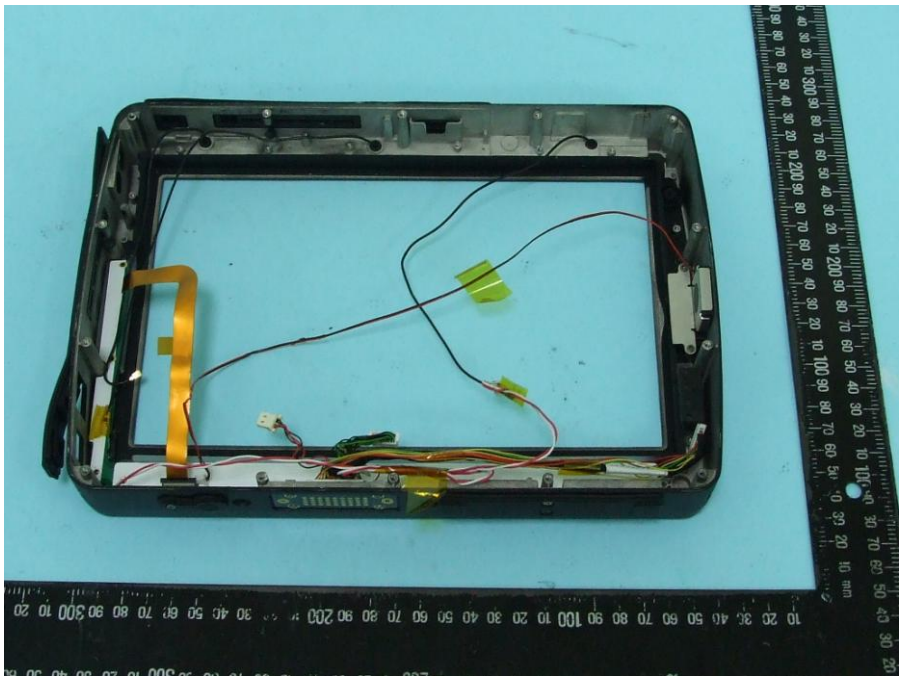

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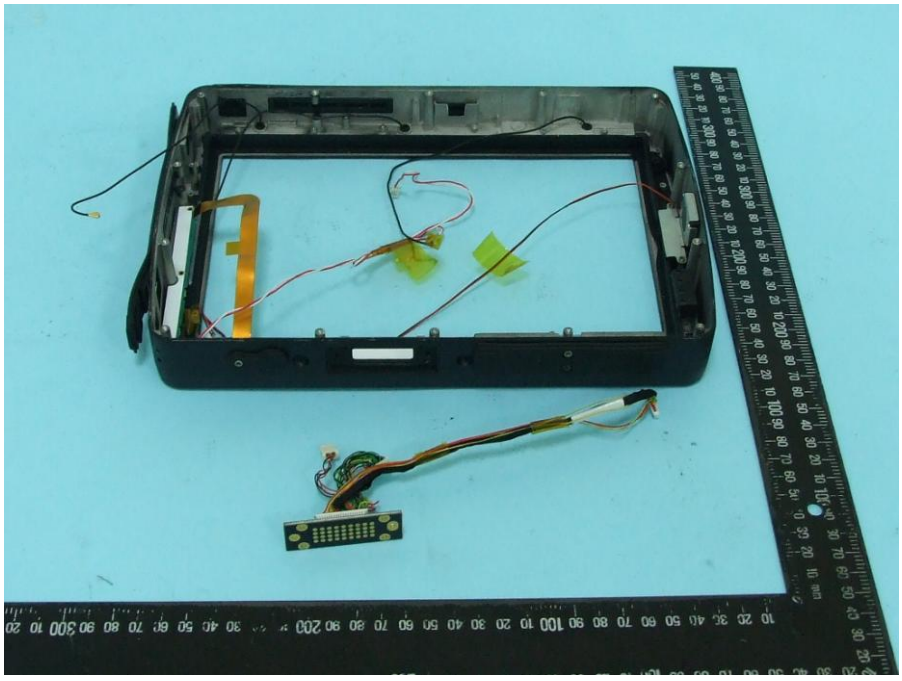


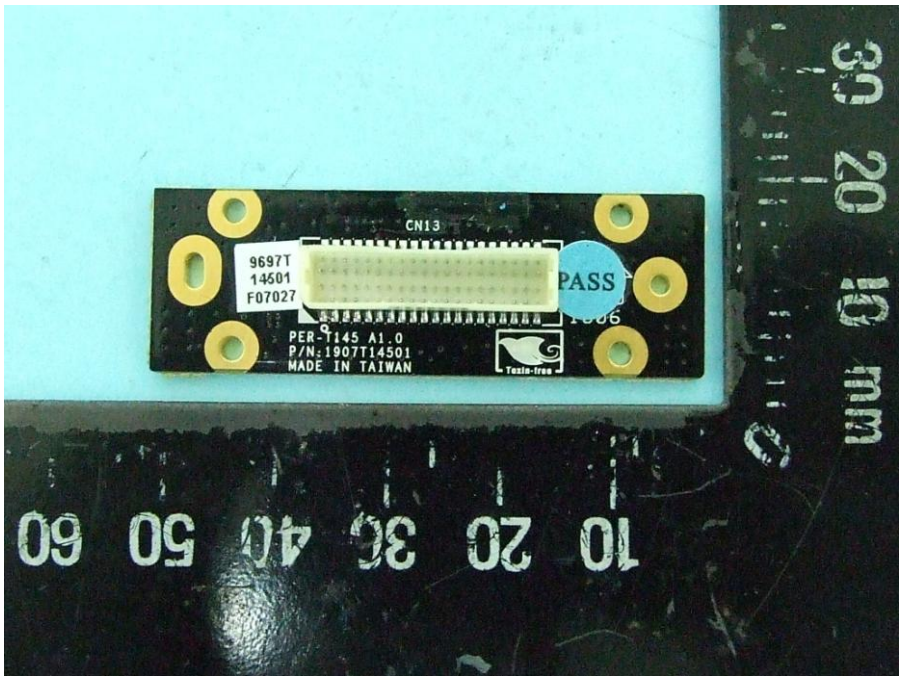


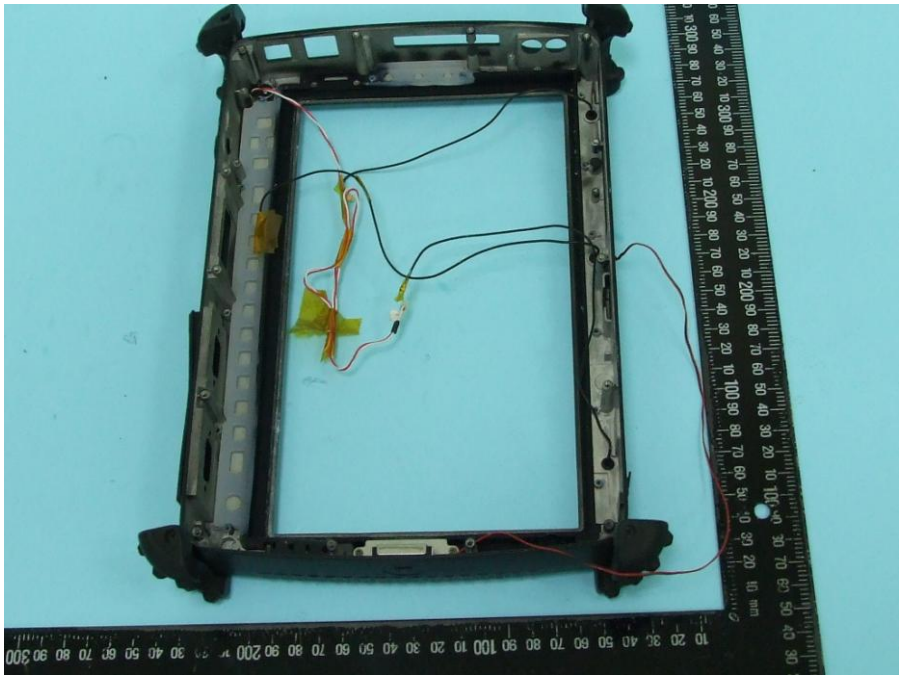

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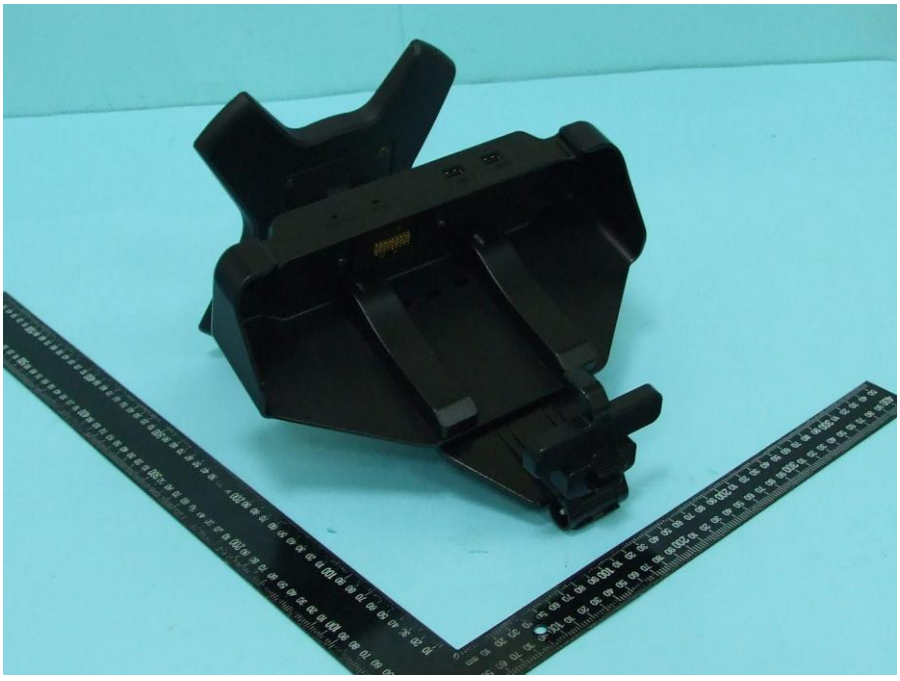


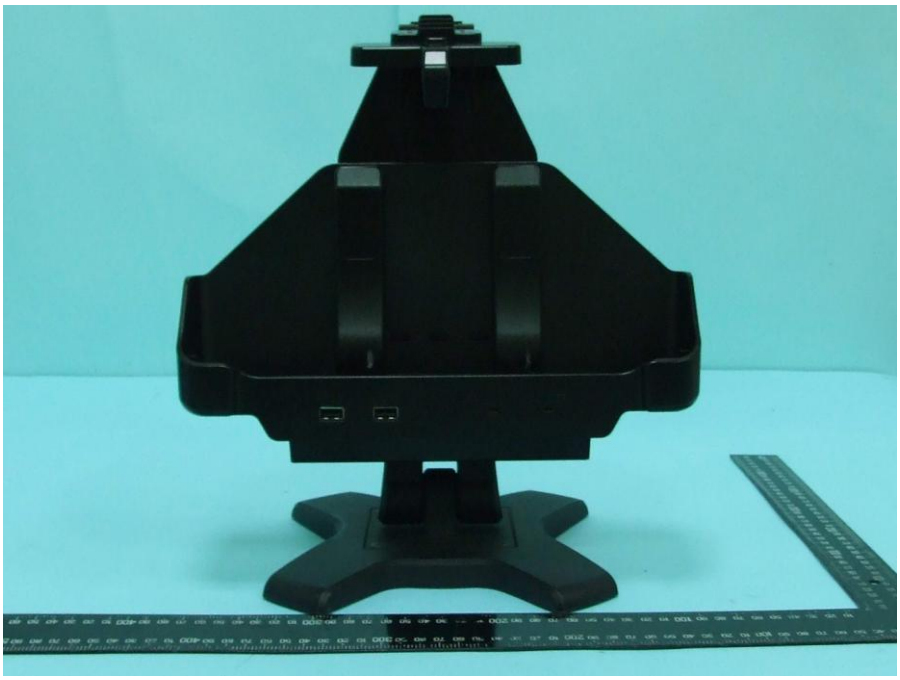



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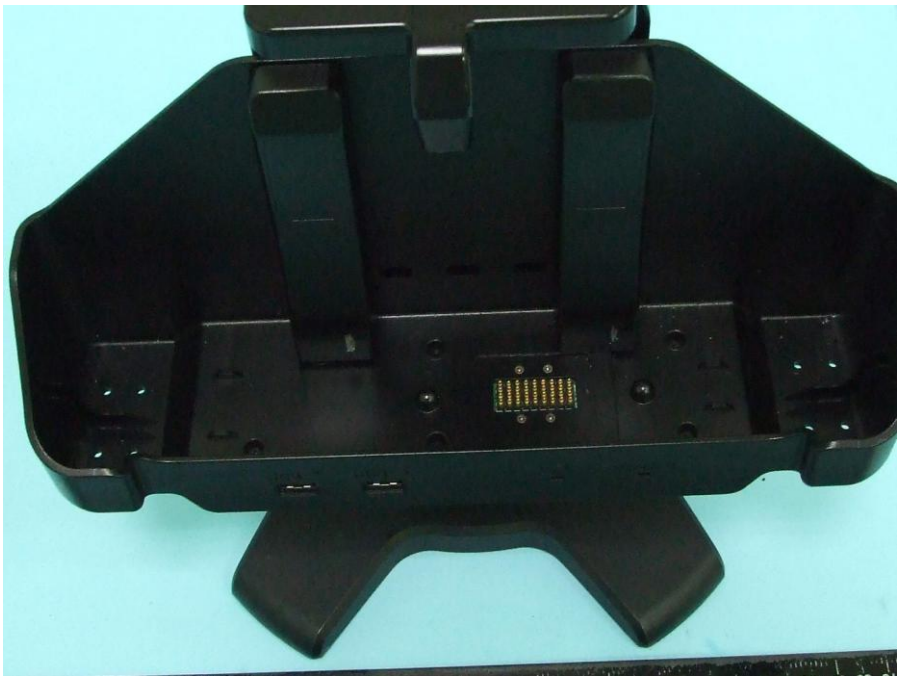


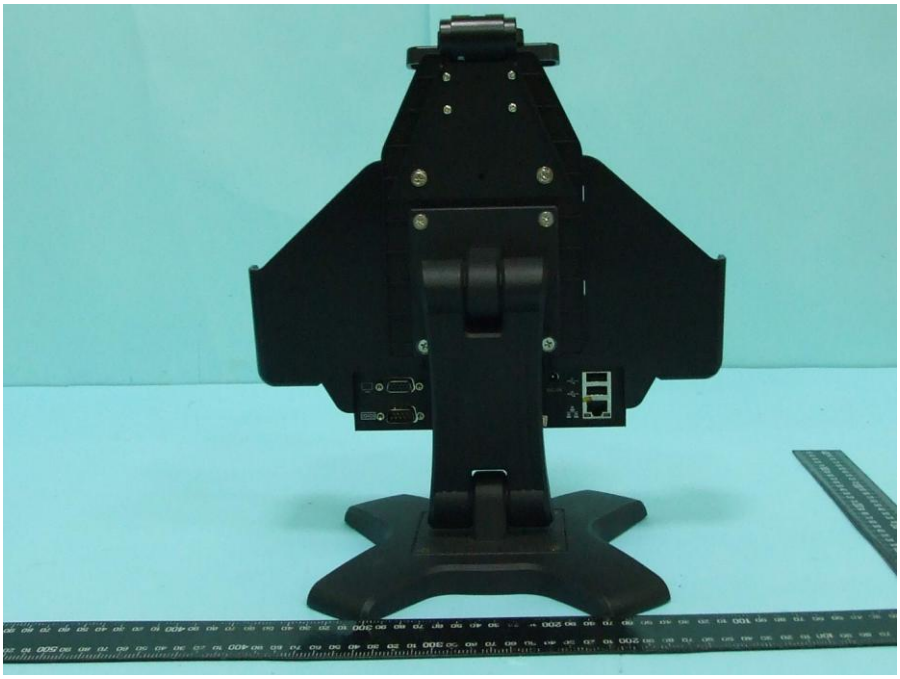




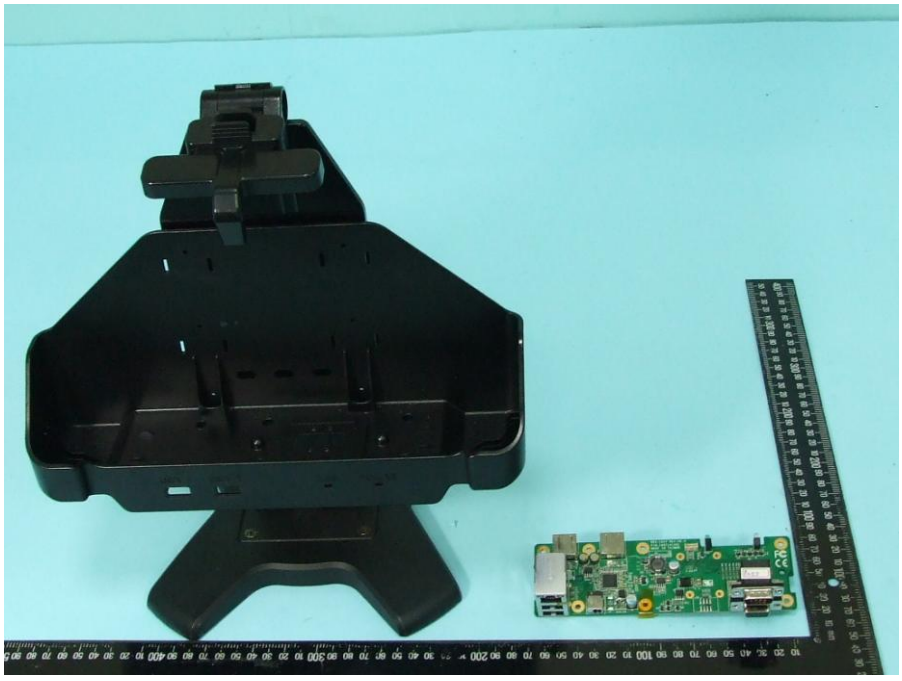


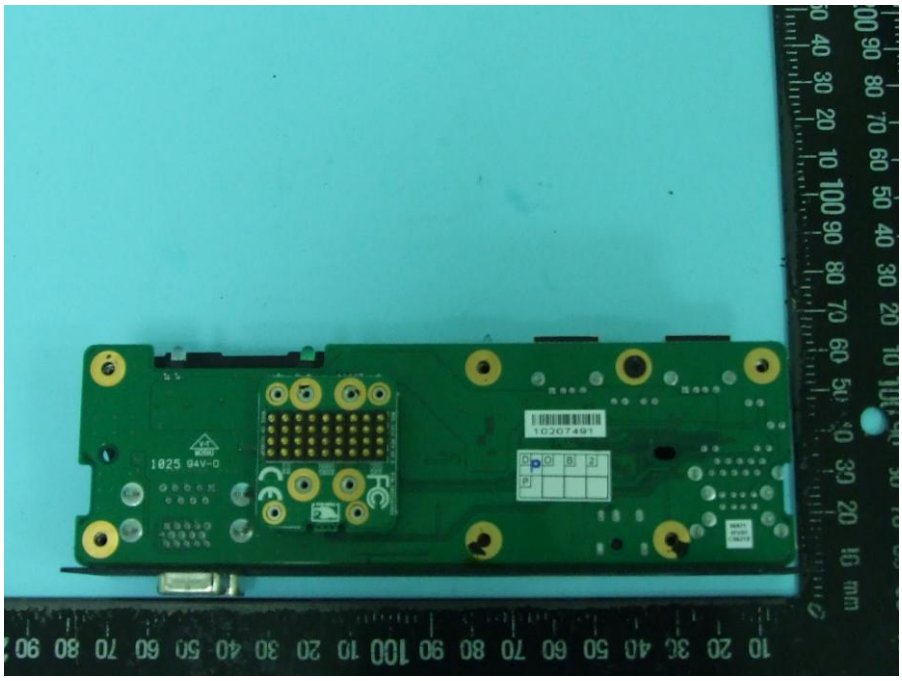


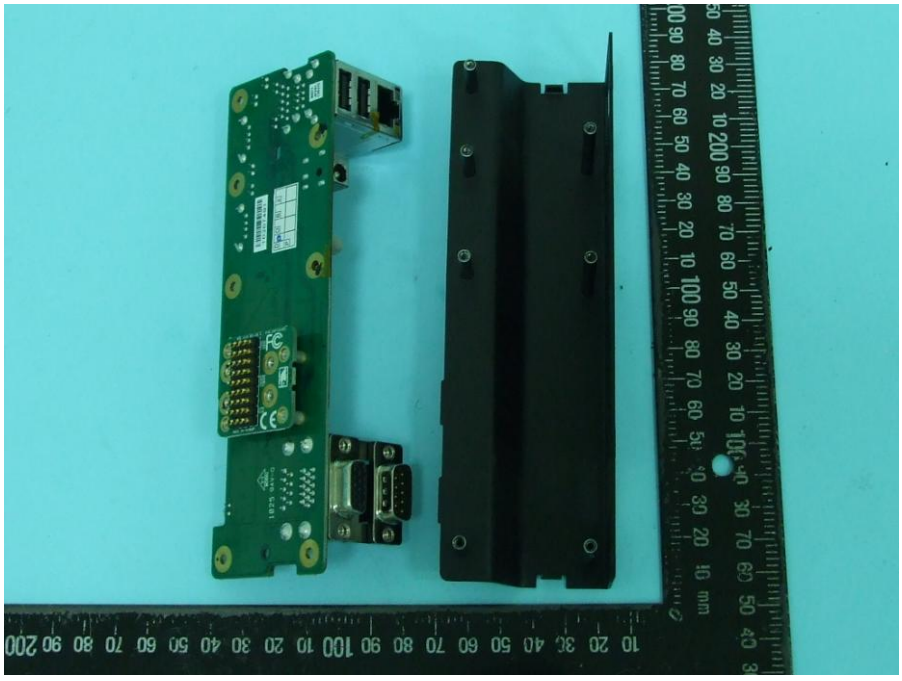


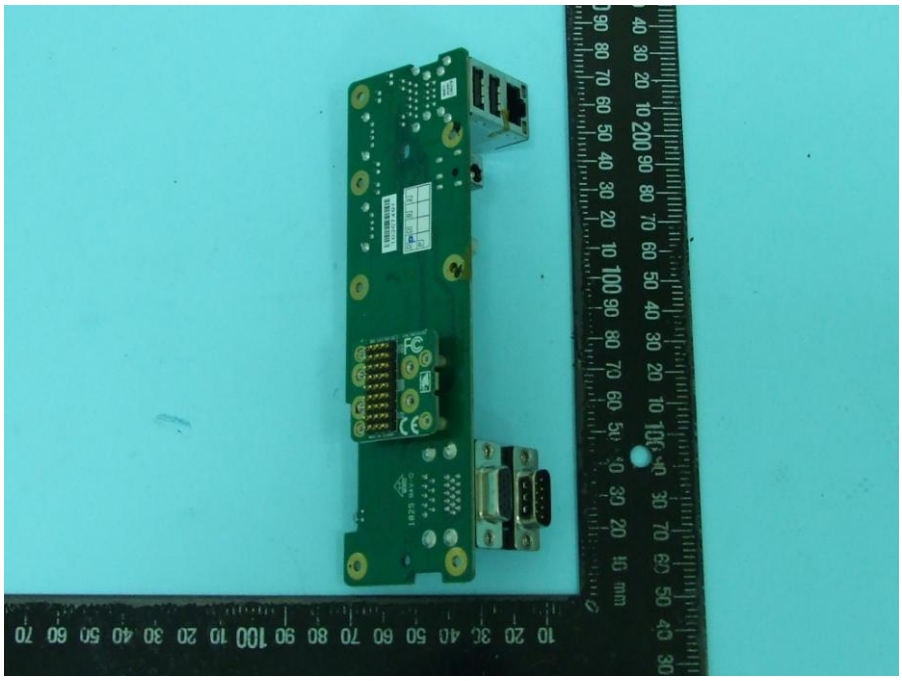


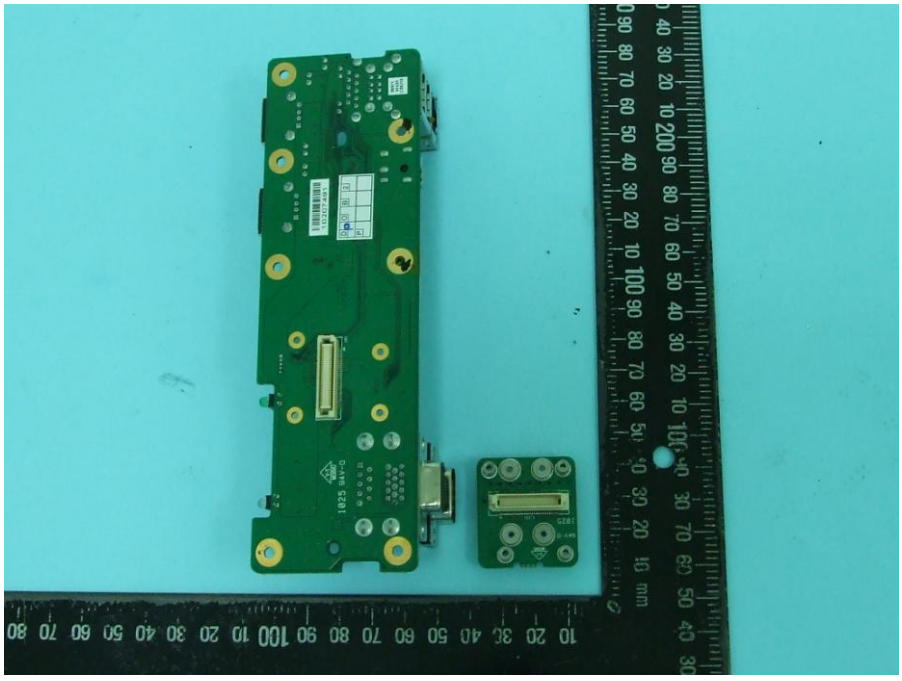

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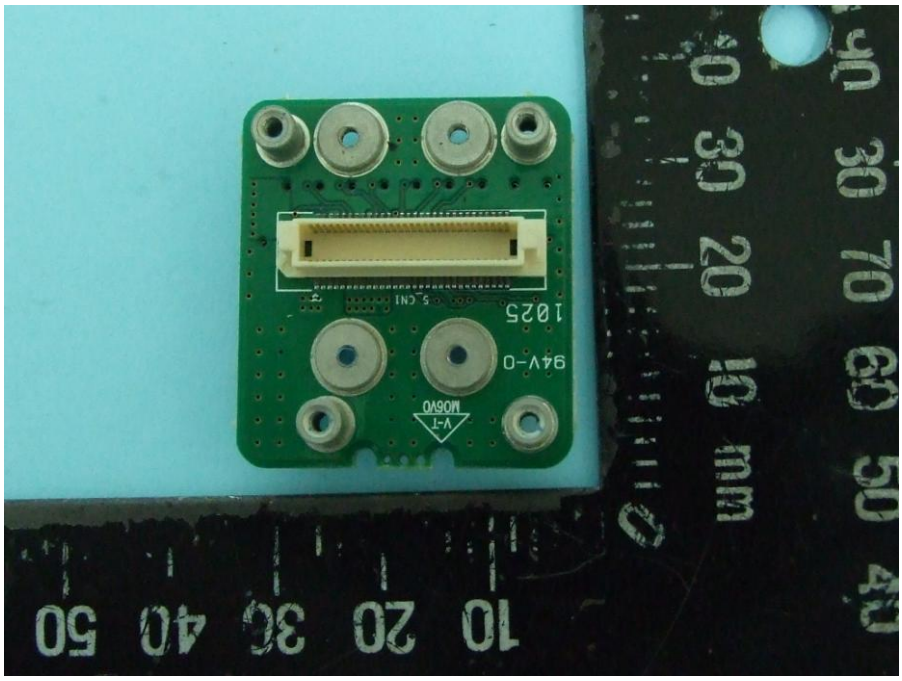


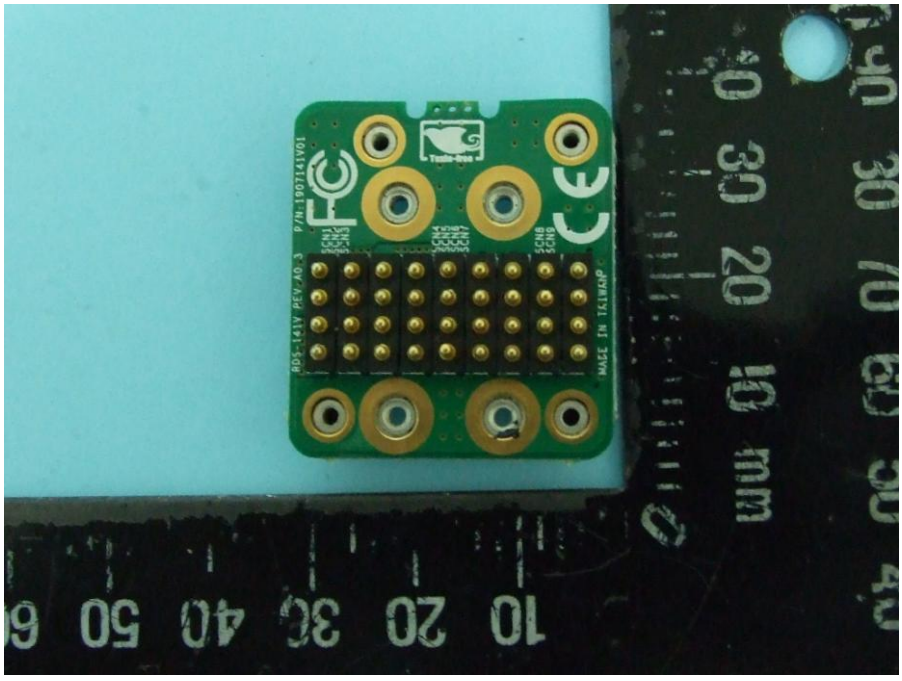


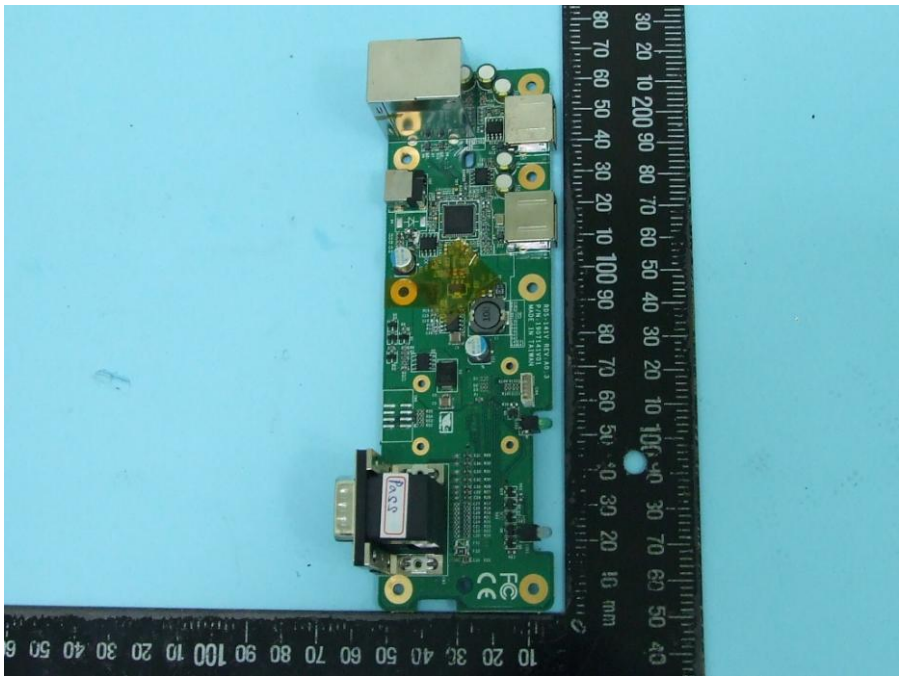


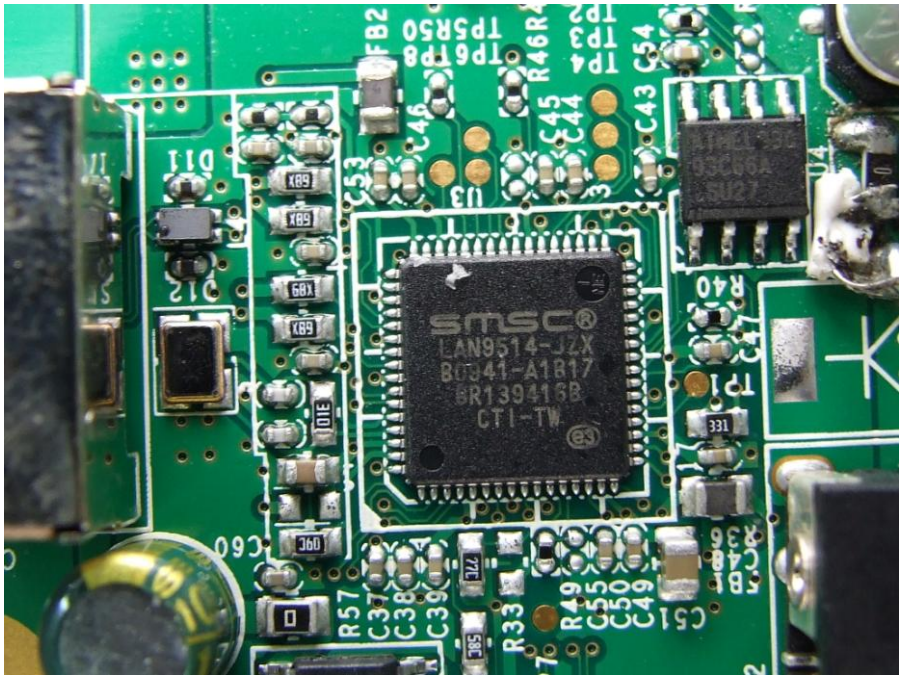


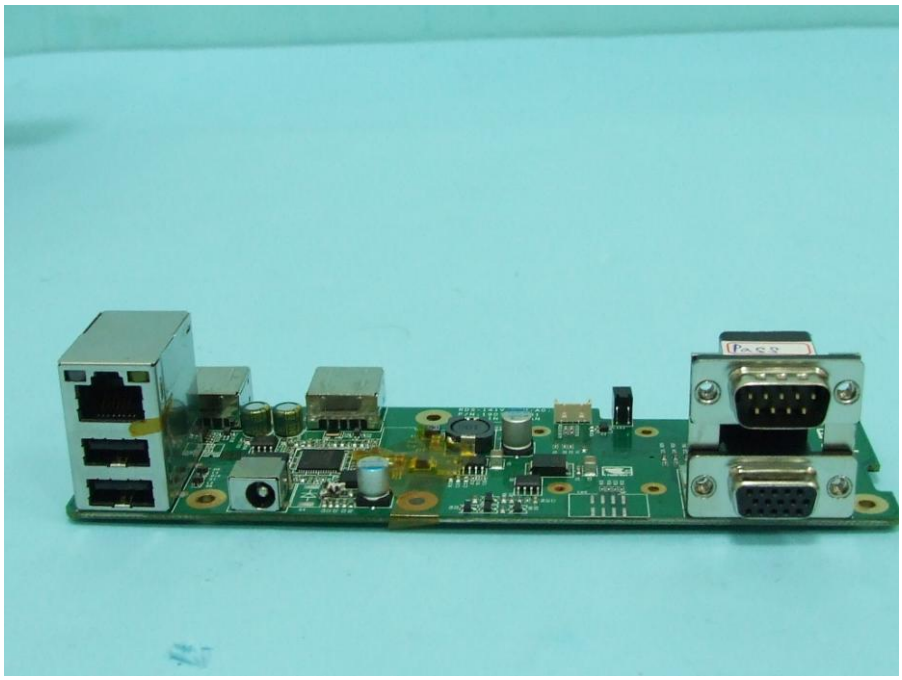


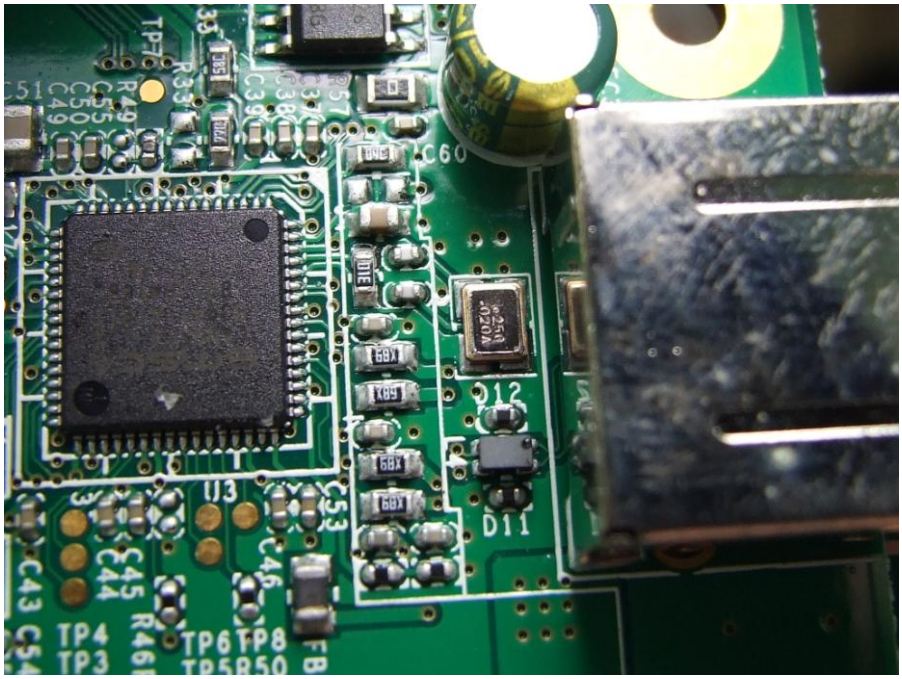

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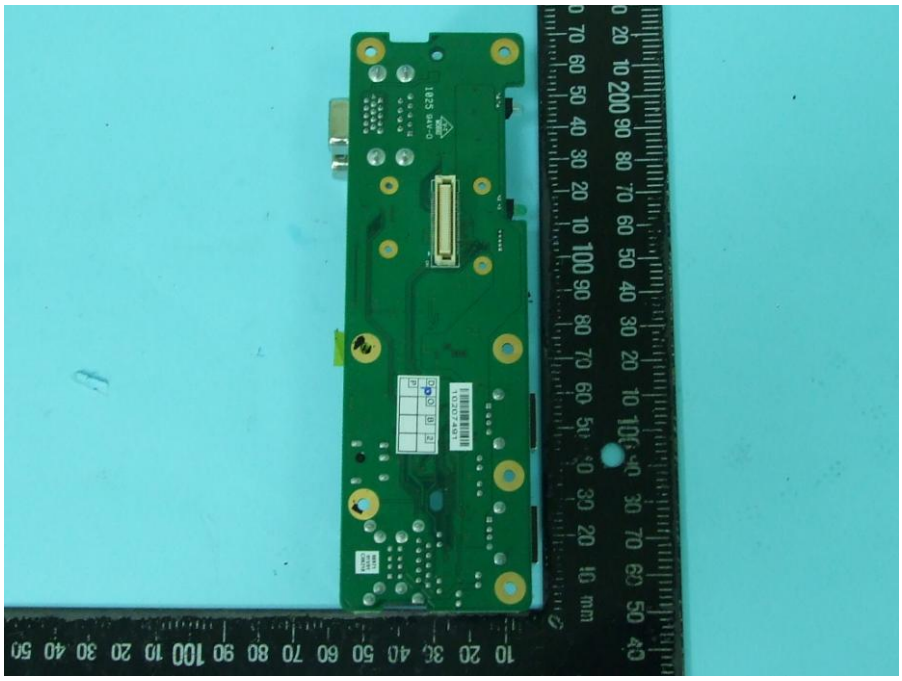

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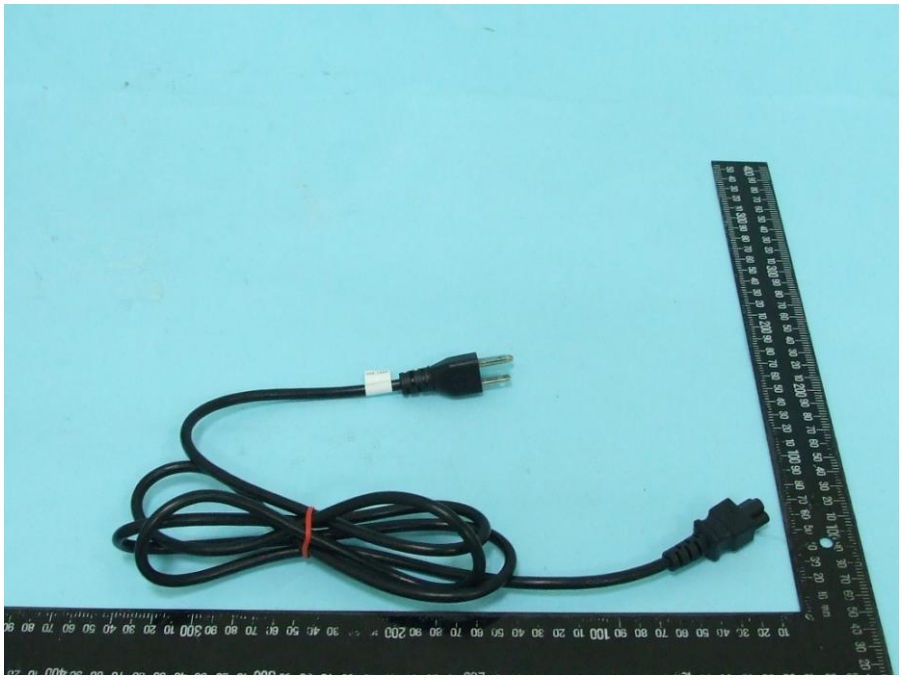



smsc
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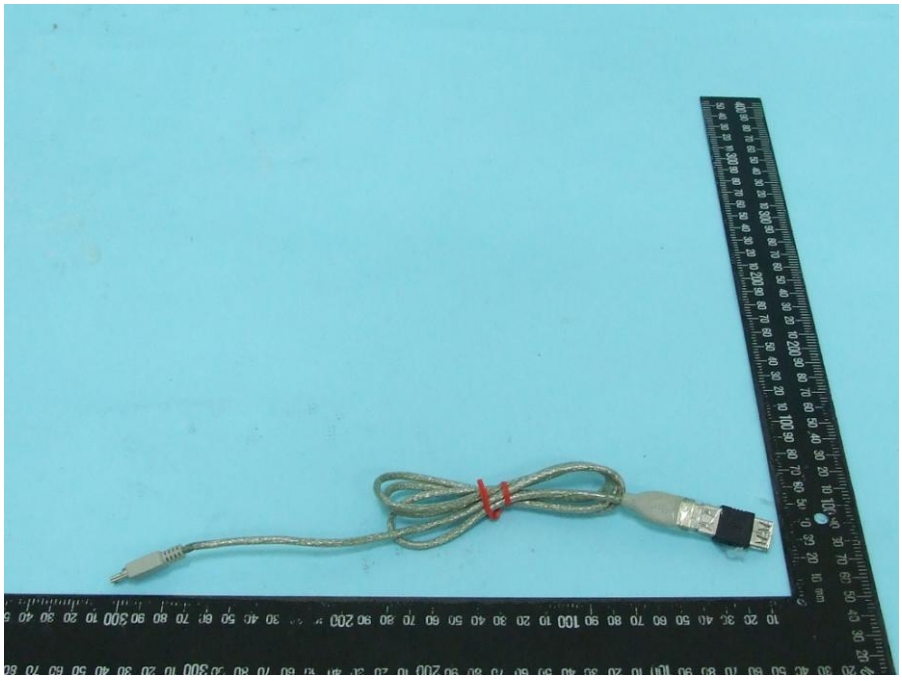


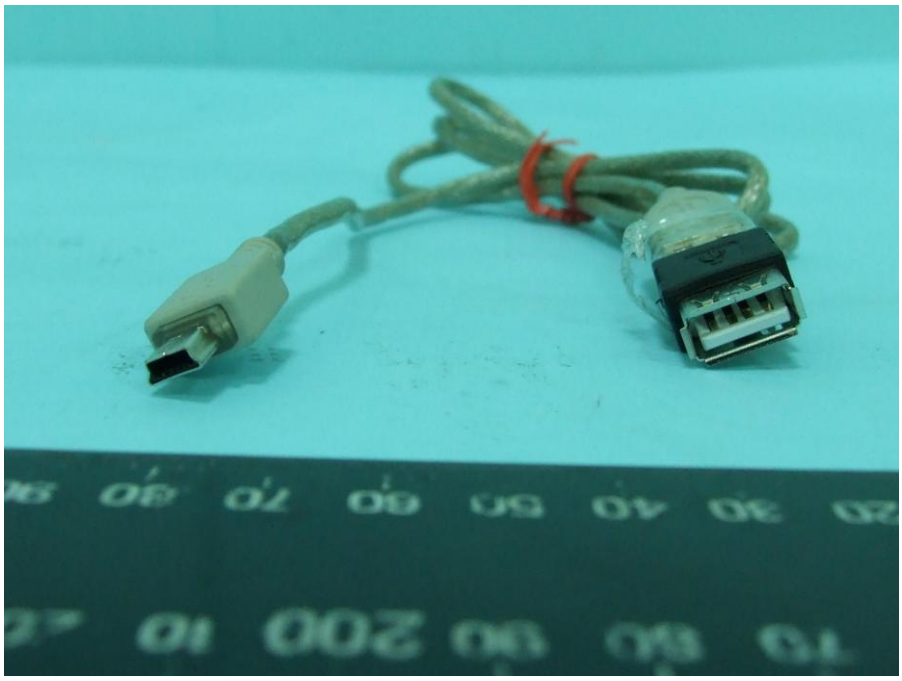

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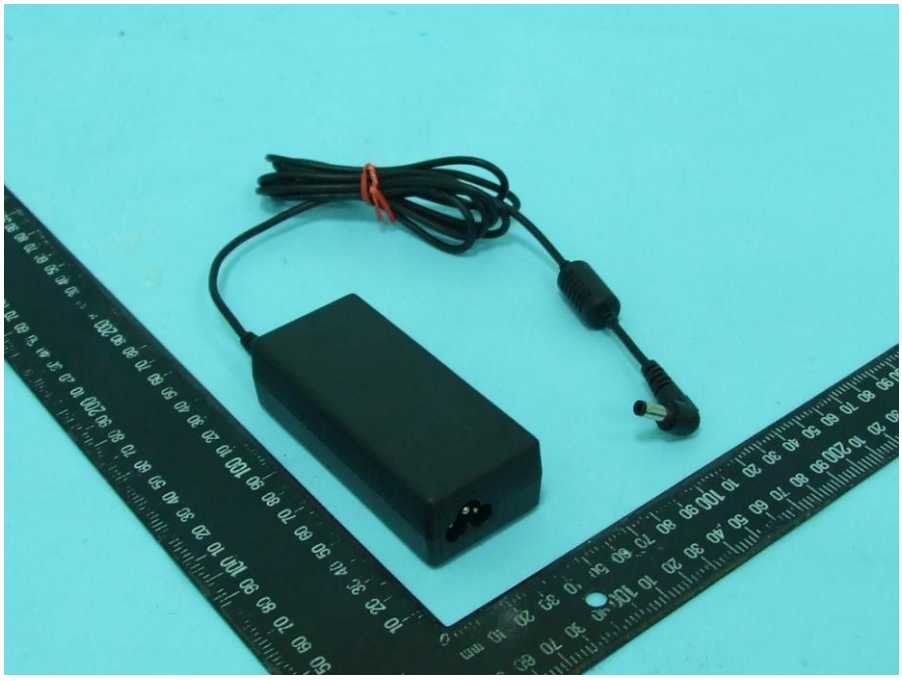


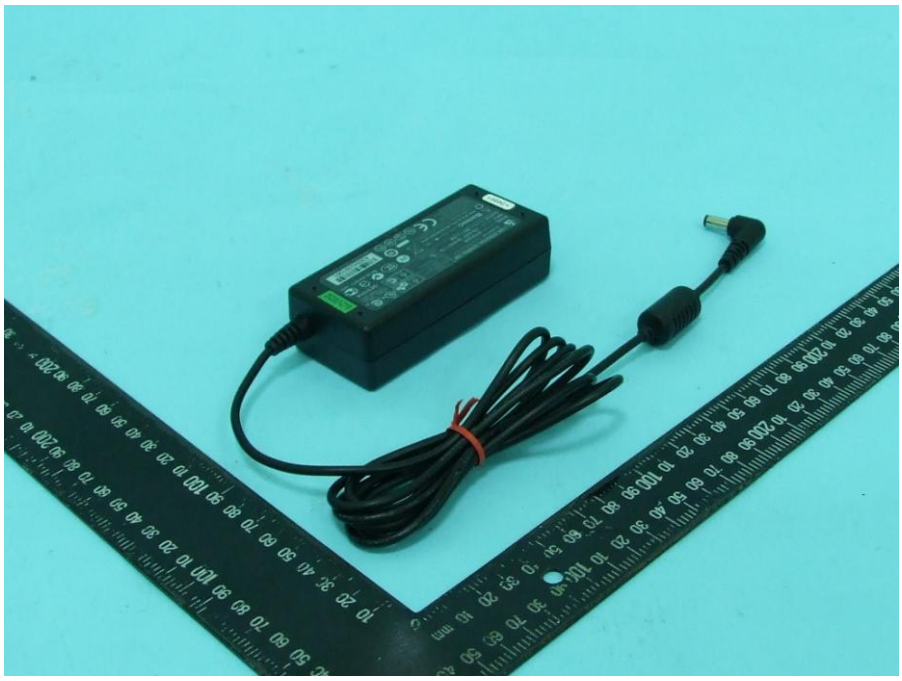













LI SHIN INTERNATIONAL ENTERPRISE CORP.
AC ADAPTER 交流适配器/電源供應器
MODEL : 型号/型號: 0335A2065
INPUT : 输入/輸入: 100-240V~,50-60Hz 1.7A
OUTPUT : 输出/輸出: 20V ⎓ 3.25A
WARNING: 注意:
RISK OF ELECTRIC SHOCK DO NOT OPEN
For Indoor Use Only 仅限室内使用/ 僅限室內使用
"Apparatet må tilkoples jordet stikkontakt"
"Apparaten skall anslutas till jordat uttag"
"Laite on liitettävä suojamaadoitus-
koskettimilla varustettuun pistorasiaan"
For IEC60950-1 products only
LISTED LEVEL3
E193430 LR114321
I.T.E. POWER SUPPLY
Q031514
N136 R43011 BZ02
A30942091061
MADE IN CHINA 中国制造/中國製造 TY03