# CE EMC Test Report

| | |
|---|---|
| **Report No.:** | CE151201D13 |
| **Test Model:** | UE-1008 |
| **Series Model:** | Vecow UE Series, UE-1004,<br>UE-XXXXXXXXXX (“X” can be 0-9, A-Z or blank for marketing purpose) |
| **Received Date:** | Dec. 1, 2015 |
| **Test Date:** | Dec. 4 ~ 10, 2015 |
| **Issued Date:** | Dec. 14, 2015 |
| **Applicant:** | Vecow Co., Ltd. |
| **Address:** | 12F., No. 111, Zhongcheng Rd., Tucheng Dist., New Taipei City 23674 Taiwan (R. O. C.) |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch |
| **Lab Address:** | No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.) |

LAB CODE: 200836-0

Testing Laboratory
2021

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| CE151201D13 | Original release. | Dec. 14, 2015 |

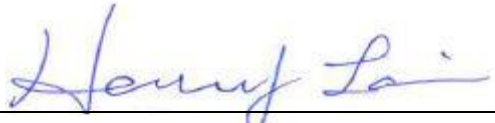
## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | PCI Express x4, 8 Ports/ 4 Ports USB 3.0 Expansion Card |
| **Brand:** | Vecow |
| **Test Model:** | UE-1008 |
| **Series Model:** | Vecow UE Series, UE-1004,<br>UE-XXXXXXXXXX ("X" can be 0-9, A-Z or blank for marketing purpose) |
| **Sample Status:** | Engineering sample |
| **Applicant:** | Vecow Co., Ltd. |
| **Test Date:** | Dec. 4 ~ 10, 2015 |
| **Standards:** | **EN 55022:2010 +AC:2011, Class B**<br>**CISPR 22:2008, Class B**<br>**AS/NZS CISPR 22:2009 +A1:2010, Class B**<br>**EN 61000-3-2:2014 (Not Applicable)**<br>**EN 61000-3-3:2013 (Not Applicable)**<br>**EN 55024:2010**<br>EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0<br>EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2<br>EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0 (Not Applicable)<br>EN 61000-4-5:2006 / IEC 61000-4-5:2005 ED. 2.0 (Not Applicable)<br>EN 61000-4-6:2014 / IEC 61000-4-6:2013 ED. 4.0 (Not Applicable)<br>EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0<br>EN 61000-4-11:2004 / IEC 61000-4-11:2004 ED. 2.0 (Not Applicable) |

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :**  , **Date:** Dec. 14, 2015

Sandra Lin / Specialist

**Approved by :**  , **Date:** Dec. 14, 2015

Henry Lai / Director

## 2 Summary of Test Results

| Emission | | | | |
|---|---|---|---|---|
| Standard | Clause | Test Item | Result/Remarks | Verdict |
| EN 55022:2010 +AC:2011<br><br>CISPR 22:2008<br><br>AS/NZS CISPR 22:2009 +A1:2010 | 5.1 | Mains terminal disturbance voltage | Minimum passing Class B margin is -6.82 dB at 0.19297 MHz | Pass |
| | 5.2 | Conducted common mode (asymmetric mode) disturbance at telecommunication ports | Without telecom port of the EUT | N/A |
| | 6.1 | Radiated disturbance 30-1000 MHz | Minimum passing Class B margin is -3.39 dB at 145.20 MHz | Pass |
| | 6.2 | Radiated disturbance above 1GHz | Minimum passing Class B margin is -5.24 dB at 1999.23 MHz | Pass |
| EN 61000-3-2:2014 | - | Harmonic current emissions | Test not applicable because port does not exists | N/A |
| EN 61000-3-3:2013 | - | Voltage fluctuations and flicker | Test not applicable because port does not exists | N/A |

| Immunity | | | | |
|---|---|---|---|---|
| EN 55024 Clause | Basic standard | Test Item | Result/Remarks | Verdict |
| 4.2.1 | EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0 | Electrostatic discharges (ESD) | Performance Criterion B | Pass |
| 4.2.3.2 | EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2 | Continuous radiated disturbances (RS) | Performance Criterion A | Pass |
| 4.2.2 | EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0 | Electrical fast transients (EFT) | EUT's cable length is not greater than 3m and EUT consumes DC power | N/A |
| 4.2.5 | EN 61000-4-5:2006 / IEC 61000-4-5:2005 ED. 2.0 | Surges | EUT doesn't connect directly to outdoor cables and EUT consumes DC power | N/A |
| 4.2.3.3 | EN 61000-4-6:2014/ IEC 61000-4-6:2013 ED. 4.0 | Continuous conducted disturbances (CS) | EUT's cable length is not greater than 3m and EUT consumes DC power | N/A |
| 4.2.4 | EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0 | Power-frequency magnetic fields (PFMF) | Performance Criterion A | Pass |
| 4.2.6 | EN 61000-4-11:2004 / IEC 61000-4-11:2004 ED. 2.0 | Voltage dips and interruptions | Test not applicable because AC power port does not exist. | N/A |

Note:
1. There is no deviation to the applied test methods and requirements covered by the scope of this report.2. The above EN/IEC basic standards are applied with latest version if customer has no special requirement.
3. N/A: Not Applicable

## 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

| Measurement | Expended Uncertainty (k=2) (±) | Maximum allowable uncertainty (±) |
|---|---|---|
| Conducted disturbance at mains port using AMN, 150kHz ~ 30MHz | 2.78 dB | 3.4 dB ($U_{cispr}$) |
| Radiated disturbance, 30MHz ~ 1GHz | 3.73 dB | 6.3 dB ($U_{cispr}$) |
| Radiated disturbance, 1GHz ~ 6GHz | 3.36 dB | 5.2 dB ($U_{cispr}$) |

## 2.2 Modification Record

There were no modifications required for compliance.

## 3 General Information

### 3.1 Features of EUT

The tests reported herein were performed according to the method specified by Vecow Co., Ltd., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

### 3.2 General Description of EUT

| | |
|---|---|
| Product | PCI Express x4, 8 Ports/ 4 Ports USB 3.0 Expansion Card |
| Brand | Vecow |
| Test Model | UE-1008 |
| Series Model | Vecow UE Series, UE-1004,<br>UE-XXXXXXXXXX ("X" can be 0-9, A-Z or blank for marketing purpose) |
| Model Difference | Marketing Differentiation |
| Sample Status | Engineering sample |
| Operating Software | N/A |
| Power Supply Rating | DC 5.0V from PC |

Note:

The EUT is a PCI Express x4, 8 Ports/ 4 Ports USB 3.0 Expansion Card with 4 independent USB controllers and up to 8 USB ports interface (including USB 3.0 & USB 2.0).

### 3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode

The EUT is consumes power from PC, which designed with AC power supply of rating 100-240Vac, 50-60Hz. For radiated emission evaluation, 230Vac/50Hz (for EN 55022), 120Vac/60Hz (for FCC Part 15) had been covered during the pre-test. The worst radiated emission data was founded at **230Vac/50Hz** and recorded in the applied test report.

The EUT were pre-tested with USB 3.0 & USB 2.0 modes, the worst emission level was found on USB 3.0 mode. Therefore this mode was applied for final test and only its test data was recorded in this report.

### 3.4 Test Program Used and Operation Descriptions

- **For Conducted & Radiated test:**
  a. Installed PCI Express x4, 8 Ports/ 4 Ports USB 3.0 Expansion Card (EUT) into PC.
  b. Turned on the power of all equipment.
  c. PC ran a test program to enable all functions.
  d. PC read and wrote messages from/to HDD & ext. USB HDDs via EUT.
  e. PC sent "H" messages to monitor and it displayed "H" patterns on its screen.
  f. PC sent messages to printer, and then printer printed out.
  g. PC sent messages to modem.
  h. Repeated steps c-g.

- **For Harmonics, Flicker, Immunity tests:**
  a. Installed PCI Express USB3.0 4 port Express card (EUT) into PC.
  b. Turned on the power of all equipment.
  c. PC ran WinEMC test program to enable all functions.
  d. PC read and wrote messages from/to ext. USB HDDs via EUT.
  e. PC sent "H" messages to monitor and it displayed "H" patterns on its screen.
  f. Repeated steps c-e.

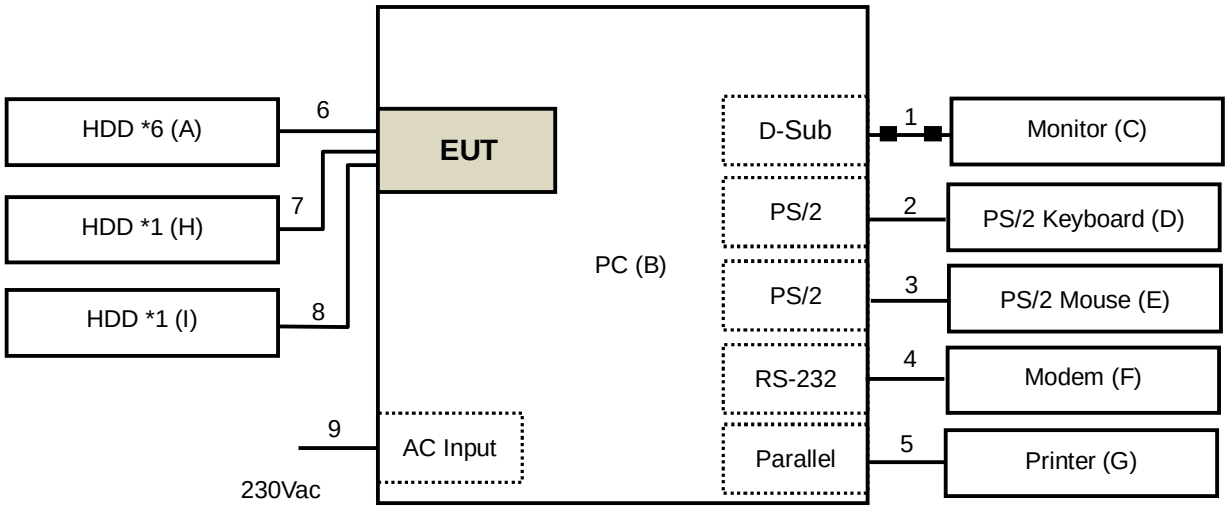
### 3.5 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 5Gbps, provided by Vecow Co., Ltd., for detailed internal source, please refer to the manufacturer's specifications.

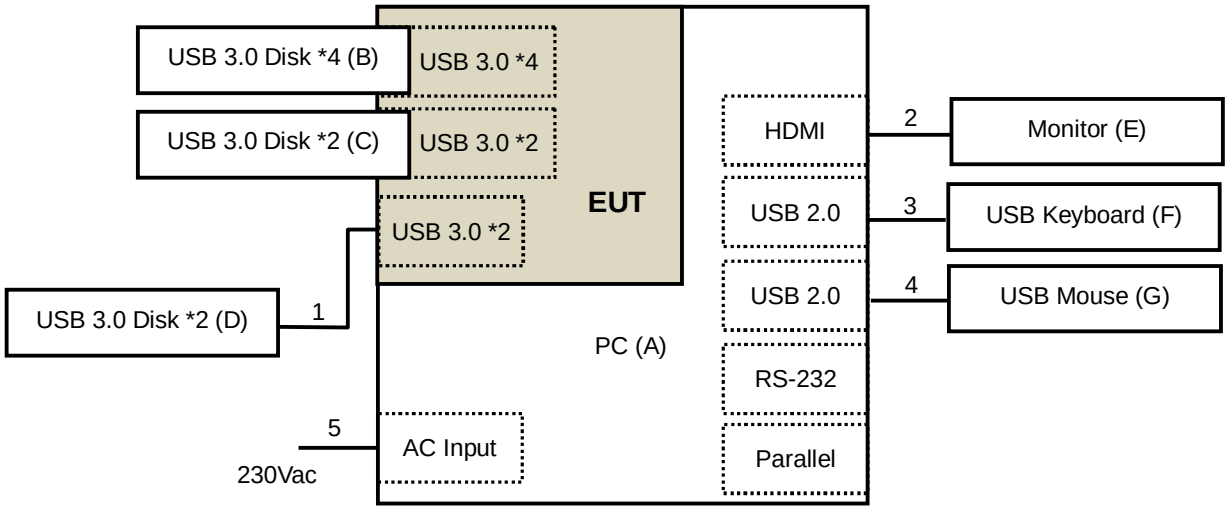
## 4 Configuration and Connections with EUT

### 4.1 Connection Diagram of EUT and Peripheral Devices

Emission tests (Harmonics & Flicker excluded):




Harmonics, Flicker, Immunity tests:



## 4.2 Configuration of Peripheral Devices and Cable Connections

Emission tests (Harmonics & Flicker excluded):

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|---|---|---|---|---|---|---|
| A. | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WX11E91JE773 | FCC DoC Approved | Provided by Lab |
| | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WXG1A91A9208 | FCC DoC Approved | Provided by Lab |
| | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WX71E91FXHL1 | FCC DoC Approved | Provided by Lab |
| | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WX61A9115393 | FCC DoC Approved | Provided by Lab |
| | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WXA1A81U3670 | FCC DoC Approved | Provided by Lab |
| | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WXH1A91A6872 | FCC DoC Approved | Provided by Lab |
| B. | PC | HP | DX-7400MT | SGH8460H2S | FCC DoC Approved | Provided by Lab |
| C. | 24" LCD Monitor | DELL | U2410 | CN082WXD728720CC0 KDL | FCC DoC Approved | Provided by Lab |
| D. | PS/2 Keyboard | HP | KB-0316 | BC3520GVBWT0XZ | FCC DoC Approved | Provided by Lab |
| E. | PS/2 Mouse | BTC | M851 | N/A | E5XMSM860 | Provided by Lab |
| F. | Modem | ACEEX | 1414 | 980020506 | IFAXDM1414 | Provided by Lab |
| G. | Printer | EPSON | LQ-300+II | G88Y058151 | FCC DoC Approved | Provided by Lab |
| H. | USB 3.0 Hard Disk | WD | WDBACY5000ABL-PESN | WXD1E91KNHR8 | FCC DoC Approved | Provided by Lab |
| I. | External Hard Disk | Seagate | SRD00F2 | NA4M1SB3 | FCC DoC Approved | Provided by Lab |

Note: All power cords of the above support units are non-shielded (1.8m).

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|---|---|---|---|---|---|---|
| 1. | D-SUB cable | 1 | 1.8 | Y | 2 | Provided by Lab |
| 2. | PS/2 cable | 1 | 1.5 | Y | 0 | Provided by Lab |
| 3. | PS/2 cable | 1 | 1.2 | Y | 0 | Provided by Lab |
| 4. | RS-232 cable | 1 | 1.8 | Y | 0 | Provided by Lab |
| 5. | Parallel cable | 1 | 1.8 | Y | 0 | Provided by Lab |
| 6. | USB cable | 6 | 0.4 | Y | 0 | Provided by Lab |
| 7. | USB cable | 1 | 1.2 | Y | 0 | Provided by Lab |
| 8. | USB cable | 1 | 1.2 | Y | 0 | Provided by Lab |
| 9. | AC power cable | 1 | 1.8 | N | 0 | Provided by Lab |

Note: The core(s) is(are) originally attached to the cable(s).

Harmonics, Flicker, Immunity tests:

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|---|---|---|---|---|---|---|
| A. | Personal Computer | DELL | VOSTRO 470 | 4VBJYBX | FCC DOC Approved | Provided by Lab |
| B. | USB 3.0 Hard Disk *4 | HP | X750W | N/A | FCC DoC Approved | Provided by Lab |
| C. | USB 3.0 Hard Disk *2 | Verbatim | Type-C OTG Drive | N/A | FCC DoC Approved | Provided by Lab |
| D. | USB 3.0 Hard Disk | BUFFALO | HD-HX1 | 45564801200012 | FCC DoC Approved | Provided by Lab |
| | USB 2.0 Hard Disk | BUFFALO | HD-LBU2 | 55519210504241 | FCC DoC Approved | Provided by Lab |
| E. | 24" LCD MONITOR | DELL | U2413f | CN-06VNX5-72872-46D-A89L | FCC DoC Approved | Provided by Lab |
| F. | USB Keyboard | HP | SK-2085 | N/A | FCC DoC Approved | Provided by Lab |
| G. | USB Mouse | HP | M-U0031-O | N/A | FCC DoC Approved | Provided by Lab |

Note: All power cords of the above support units are non-shielded (1.8m).

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|---|---|---|---|---|---|---|
| 1. | USB 3.0 cable | 1 | 1.0 | Y | 0 | Provided by Lab |
| 2. | HDMI cable | 1 | 1.8 | Y | 0 | Provided by Lab |
| 3. | USB cable | 1 | 1.8 | Y | 0 | Provided by Lab |
| 4. | USB cable | 1 | 1.8 | Y | 0 | Provided by Lab |
| 5. | AC power cable | 1 | 1.8 | N | 0 | Provided by Lab |

Note: The core(s) is(are) originally attached to the cable(s).

## 5 Conducted Disturbance at Mains Ports

### 5.1 Limits

| Frequency (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 - 0.5 | 79 | 66 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 73 | 60 | 56 | 46 |
| 5.0 - 30.0 | 73 | 60 | 60 | 50 |

Notes: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

### 5.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| ROHDE & SCHWARZ TEST RECEIVER | ESCS 30 | 100290 | Dec. 27, 2014 | Dec. 26, 2015 |
| ROHDE & SCHWARZ Artificial Mains Network (for EUT) | ENV 216 | 101196 | Apr. 17, 2015 | Apr. 16, 2016 |
| LISN With Adapter (for EUT) | AD10 | C09Ada-001 | Apr. 17, 2015 | Apr. 16, 2016 |
| ROHDE & SCHWARZ Artificial Mains Network (for peripherals) | ESH3-Z5 | 847265/023 | Oct. 21, 2015 | Oct. 20, 2016 |
| SCHWARZBECK Artificial Mains Network (For EUT) | NNLK8129 | 8129229 | May 06, 2015 | May 05, 2016 |
| Software | Cond_V7.3.7 | NA | NA | NA |
| RF cable (JYEBAO) With 10dB PAD | 5D-FB | Cable-C09.01 | Feb. 24, 2015 | Feb. 23, 2016 |
| SUHNER Terminator (For ROHDE & SCHWARZ LISN) | 65BNC-5001 | E1-010789 | May 19, 2015 | May 18, 2016 |
| ROHDE & SCHWARZ Artificial Mains Network (For TV EUT) | ESH3-Z5 | 100220 | Nov. 13, 2015 | Nov. 12, 2016 |
| LISN With Adapter (for TV EUT) | 100220 | N/A | Nov. 13, 2015 | Nov. 12, 2016 |

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 9.
3. The VCCI Site Registration No. C-1312.
4. Tested Date: Dec. 4, 2015.

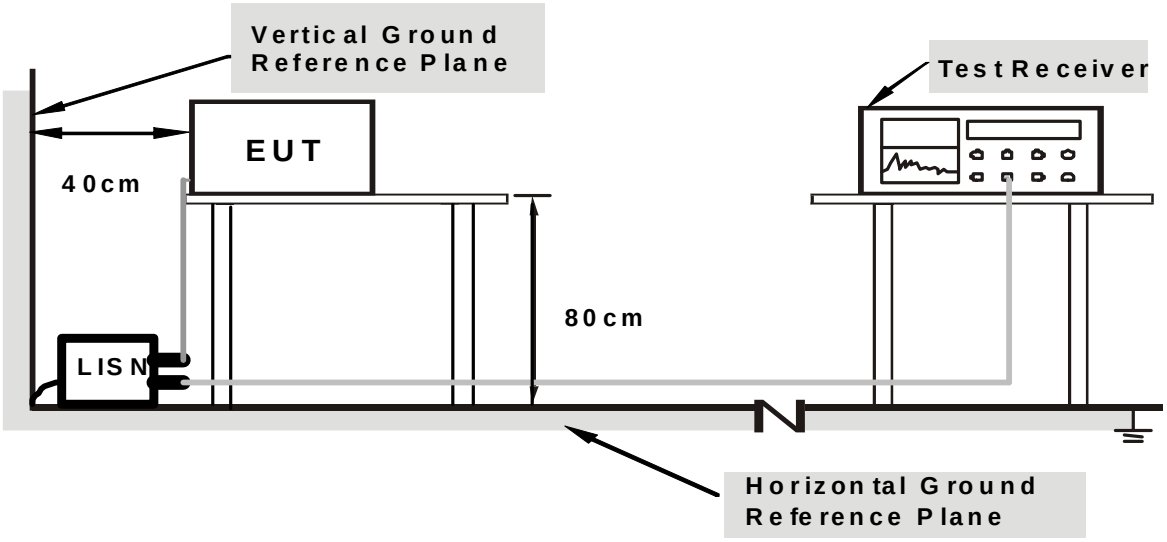
### 5.3 Test Arrangement

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.




**Note: Support units were connected to second LISN.**

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

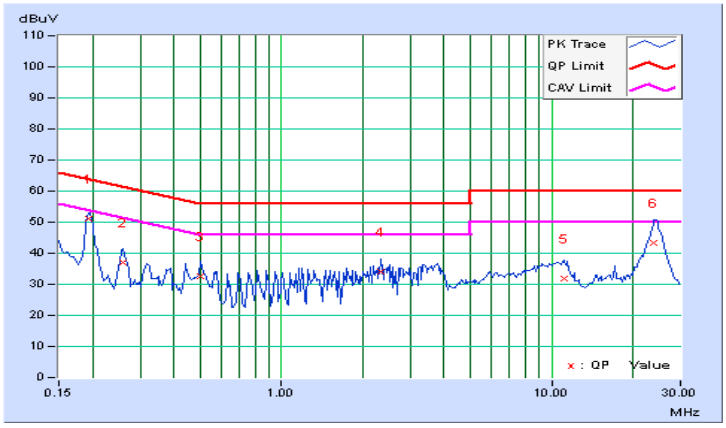
## 5.4 Test Results

| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
|---|---|---|---|
| Input Power <From system> | 230Vac, 50Hz | Environmental Conditions | 18℃, 75%RH |
| Tested by | Vincent Lin | | |
| Test Mode | With system | | |

| Phase Of Power : Line (L) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.19304 | 9.71 | 41.50 | 37.01 | 51.21 | 46.72 | 63.90 | 53.90 | -12.70 | -7.19 |
| 2 | 0.25810 | 9.72 | 27.34 | 25.43 | 37.06 | 35.15 | 61.49 | 51.49 | -24.43 | -16.34 |
| 3 | 0.50284 | 9.76 | 22.85 | 18.30 | 32.61 | 28.06 | 56.00 | 46.00 | -23.39 | -17.94 |
| 4 | 2.32813 | 9.87 | 24.23 | 19.37 | 34.10 | 29.24 | 56.00 | 46.00 | -21.90 | -16.76 |
| 5 | 11.08203 | 10.00 | 21.96 | 16.78 | 31.96 | 26.78 | 60.00 | 50.00 | -28.04 | -23.22 |
| 6 | 23.96222 | 10.06 | 33.31 | 23.43 | 43.37 | 33.49 | 60.00 | 50.00 | -16.63 | -16.51 |

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

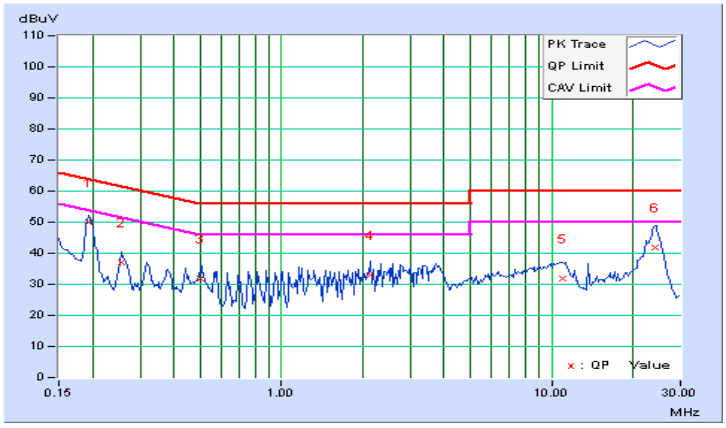


| | | | |
|---|---|---|---|
| **Frequency Range** | 150kHz ~ 30MHz | **Detector Function & Bandwidth** | Quasi-Peak (QP) / Average (AV), 9kHz |
| **Input Power <From system>** | 230Vac, 50Hz | **Environmental Conditions** | 18℃, 75%RH |
| **Tested by** | Vincent Lin | | |
| **Test Mode** | With system | | |

| Phase Of Power : Neutral (N) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Frequency (MHz)** | **Correction Factor (dB)** | **Reading Value (dBuV)** | | **Emission Level (dBuV)** | | **Limit (dBuV)** | | **Margin (dB)** | |
| | | | **Q.P.** | **AV.** | **Q.P.** | **AV.** | **Q.P.** | **AV.** | **Q.P.** | **AV.** |
| **1** | **0.19297** | **9.68** | **40.25** | **37.41** | **49.93** | **47.09** | **63.91** | **53.91** | **-13.98** | **-6.82** |
| 2 | 0.25676 | 9.69 | 27.34 | 24.16 | 37.03 | 33.85 | 61.54 | 51.54 | -24.51 | -17.69 |
| 3 | 0.50419 | 9.72 | 22.14 | 18.08 | 31.86 | 27.80 | 56.00 | 46.00 | -24.14 | -18.20 |
| 4 | 2.13808 | 9.82 | 23.15 | 18.57 | 32.97 | 28.39 | 56.00 | 46.00 | -23.03 | -17.61 |
| 5 | 10.93359 | 9.96 | 21.80 | 16.70 | 31.76 | 26.66 | 60.00 | 50.00 | -28.24 | -23.34 |
| 6 | 24.15234 | 10.09 | 31.68 | 22.34 | 41.77 | 32.43 | 60.00 | 50.00 | -18.23 | -17.57 |

**Remarks:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



## 6 Radiated Disturbance up to 1 GHz

### 6.1 Limits

| Frequency (MHz) | Class A (at 10m) | Class B (at 10m) |
|---|---|---|
| | dBuV/m | dBuV/m |
| 30 - 230 | 40 | 30 |
| 230 - 1000 | 47 | 37 |

Notes: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 6.2 Test Instruments

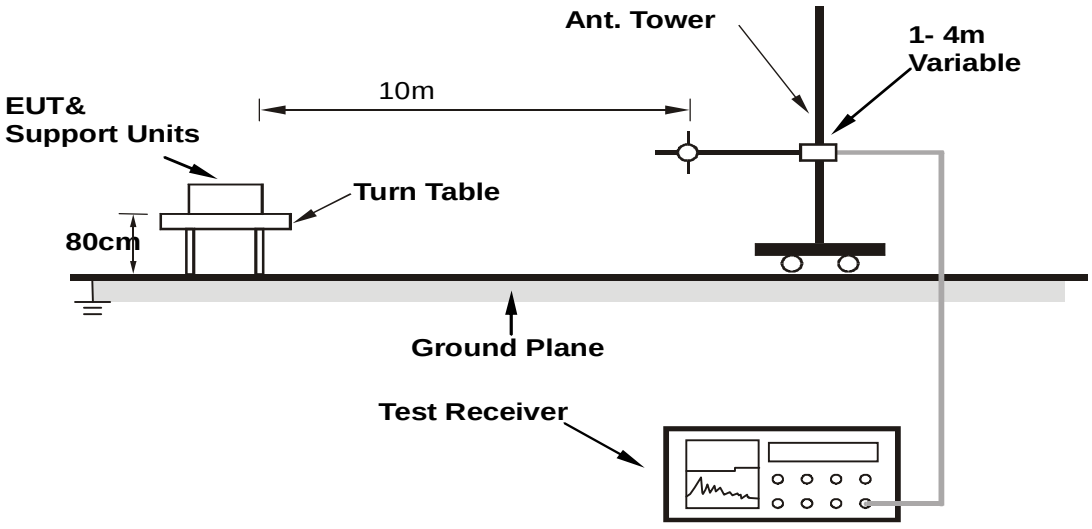
| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| ROHDE & SCHWARZ TEST RECEIVER | ESCI | 100744 | Apr. 24, 2015 | Apr. 23, 2016 |
| Schaffner BILOG Antenna | CBL6111D | 22270 | Feb. 03, 2015 | Feb. 02, 2016 |
| CT Turn Table | TT100 | CT-080 | NA | NA |
| CT Tower | AT100 | CT-080 | NA | NA |
| Software | Radiated_V7.6.15.9.4 | NA | NA | NA |
| ANRITSU RF Switches | MP59B | N/A | Nov. 20, 2015 | Nov. 19, 2016 |
| WOKEN RF cable | 8D | CABLE-ST3-01 | Nov. 20, 2015 | Nov. 19, 2016 |

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Open Site No. 3.
3. The VCCI Site Registration No. is R-269.
4. The FCC Site Registration No. 90424.
5. Tested Date: Dec. 4, 2015.

### 6.3 Test Arrangement

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.




For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

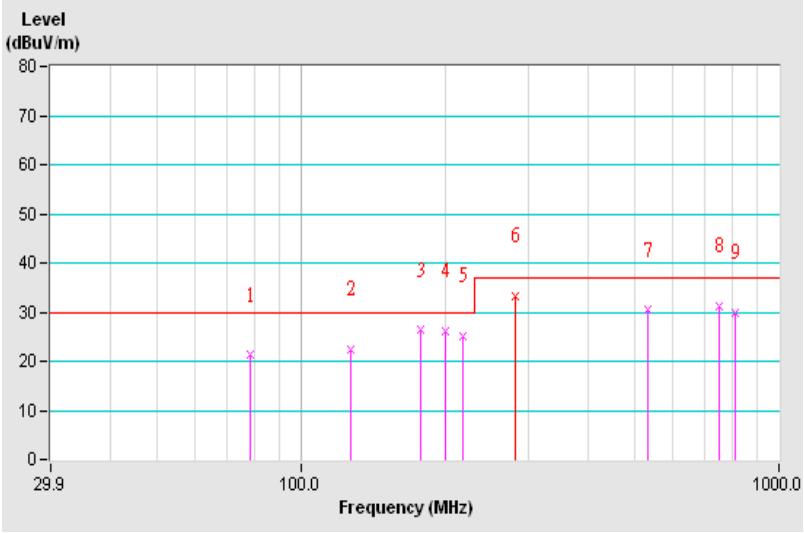
### 6.4 Test Results

| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
|---|---|---|---|
| Tested by | Chin Wen Wang | Environmental Conditions | 20℃, 64%RH |
| Test Mode | With system | | |

| Antenna Polarity & Test Distance : Horizontal at 10 m | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 78.40 | 21.26 QP | 30.00 | -8.74 | 4.00 H | 277 | 12.90 | 8.36 |
| 2 | 126.75 | 22.33 QP | 30.00 | -7.67 | 4.00 H | 134 | 8.88 | 13.45 |
| 3 | 178.40 | 26.28 QP | 30.00 | -3.72 | 4.00 H | 1 | 14.96 | 11.32 |
| 4 | 200.05 | 26.20 QP | 30.00 | -3.80 | 4.00 H | 2 | 14.77 | 11.43 |
| 5 | 218.15 | 25.01 QP | 30.00 | -4.99 | 4.00 H | 249 | 13.18 | 11.83 |
| 6 | 280.90 | 33.28 QP | 37.00 | -3.72 | 2.82 H | 241 | 17.62 | 15.66 |
| 7 | 532.75 | 30.38 QP | 37.00 | -6.62 | 1.66 H | 330 | 8.27 | 22.11 |
| 8 | 750.25 | 31.17 QP | 37.00 | -5.83 | 1.32 H | 329 | 4.74 | 26.43 |
| 9 | 810.25 | 29.77 QP | 37.00 | -7.23 | 1.18 H | 16 | 3.25 | 26.52 |

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
   – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

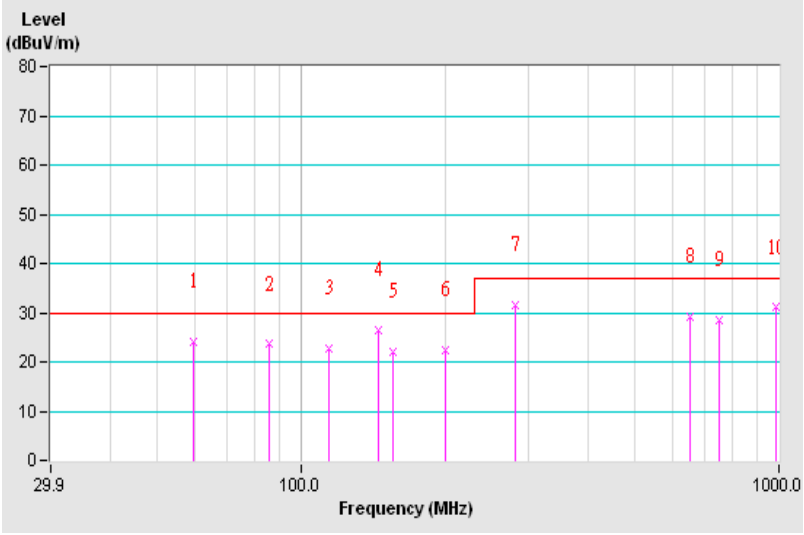


| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
|---|---|---|---|
| Tested by | Chin Wen Wang | Environmental Conditions | 20℃, 64%RH |
| Test Mode | With system | | |

| Antenna Polarity & Test Distance : Vertical at 10 m | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 59.40 | 24.02 QP | 30.00 | -5.98 | 1.23 V | 75 | 16.78 | 7.24 |
| 2 | 85.45 | 23.59 QP | 30.00 | -6.41 | 1.65 V | 270 | 14.05 | 9.54 |
| 3 | 114.10 | 22.80 QP | 30.00 | -7.20 | 1.00 V | 236 | 9.53 | 13.27 |
| **4** | **145.20** | **26.61 QP** | **30.00** | **-3.39** | **1.00 V** | **78** | **13.23** | **13.38** |
| 5 | 155.95 | 22.17 QP | 30.00 | -7.83 | 1.00 V | 258 | 9.19 | 12.98 |
| 6 | 200.05 | 22.41 QP | 30.00 | -7.59 | 1.00 V | 121 | 10.98 | 11.43 |
| 7 | 281.00 | 31.61 QP | 37.00 | -5.39 | 1.00 V | 230 | 15.95 | 15.66 |
| 8 | 652.00 | 29.15 QP | 37.00 | -7.85 | 2.03 V | 160 | 4.72 | 24.43 |
| 9 | 750.25 | 28.55 QP | 37.00 | -8.45 | 1.72 V | 285 | 2.12 | 26.43 |
| 10 | 987.25 | 31.04 QP | 37.00 | -5.96 | 2.86 V | 196 | 1.37 | 29.67 |

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
   – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



## 7 Radiated Disturbance above 1 GHz

### 7.1 Limits

| Frequency (GHz) | Class A (dBuV/m) (at 3m) | | Class B (dBuV/m) (at 3m) | |
|---|---|---|---|---|
| | Average | Peak | Average | Peak |
| 1 to 3 | 56 | 76 | 50 | 70 |
| 3 to 6 | 60 | 80 | 54 | 74 |

Notes: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

Frequency Range (For unintentional radiators)

| Highest frequency generated or used in the EUT or on which the EUT operates or tunes (MHz) | Upper frequency of measurement range (MHz) |
|---|---|
| Below 108 | 1000 |
| 108-500 | 2000 |
| 500-1000 | 5000 |
| Above 1000 | Up to 5 times of the highest frequency or 6 GHz, whichever is less |

### 7.2 Test Instruments

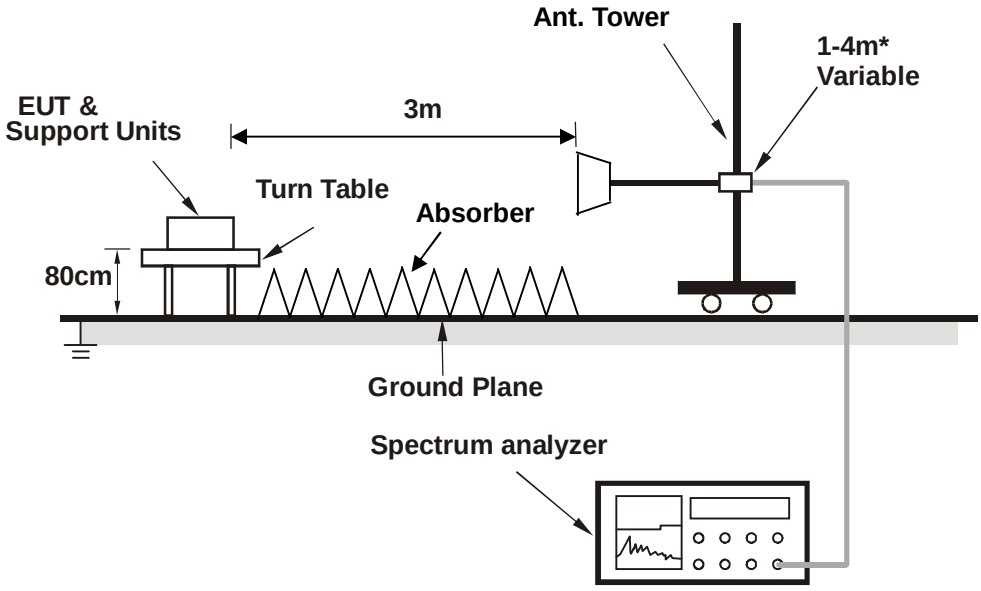
| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| Agilent Spectrum | E4446A | MY51100009 | May 30, 2015 | May 29, 2016 |
| Agilent Test Receiver | N9038A | MY51210137 | Jul. 13, 2015 | Jul. 12, 2016 |
| Agilent Preamplifier | 8449B | 3008A01292 | Feb. 26, 2015 | Feb. 25, 2016 |
| MITEQ Preamplifier | AMF-6F-260400-33-8P | 892164 | Mar. 01, 2015 | Feb. 28, 2016 |
| EMCI Preamplifier | EMC184045B | 980235 | Mar. 01,2015 | Feb. 28, 2016 |
| Schwarzbeck Horn Antenna | BBHA-9170 | 212 | Feb. 09, 2015 | Feb. 08, 2016 |
| EMCO Horn Antenna | 3115 | 6714 | Feb. 06, 2015 | Feb. 05, 2016 |
| Max Full. Turn Table | MF7802 | MF780208216 | NA | NA |
| Software | Radiated_V8.7.07 | NA | NA | NA |
| SUHNER RF cable With 4dB PAD | SF106-18 | Cable-CH10 | Aug. 15, 2015 | Aug. 14, 2016 |
| SUHNER RF cable With 3dB PAD | SF102 | Cable-CH8-3.6m | Aug. 15, 2015 | Aug. 14, 2016 |

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The 3dB beamwidth of the horn antenna is minimum 30 degree (or w = 1.6m at 3m distance) for 1~6 GHz.
3. The test was performed in Chamber No. 10.
4. The Industry Canada Reference No. IC 7450E-11.
5. The VCCI Site Registration No. G-427
6. The FCC Site Registration No. 367016
7. Tested Date: Dec. 5, 2015.

### 7.3 Test Arrangement

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The spectrum analyzer system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.




* :depends on the EUT height and the antenna 3dB beamwidth both.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

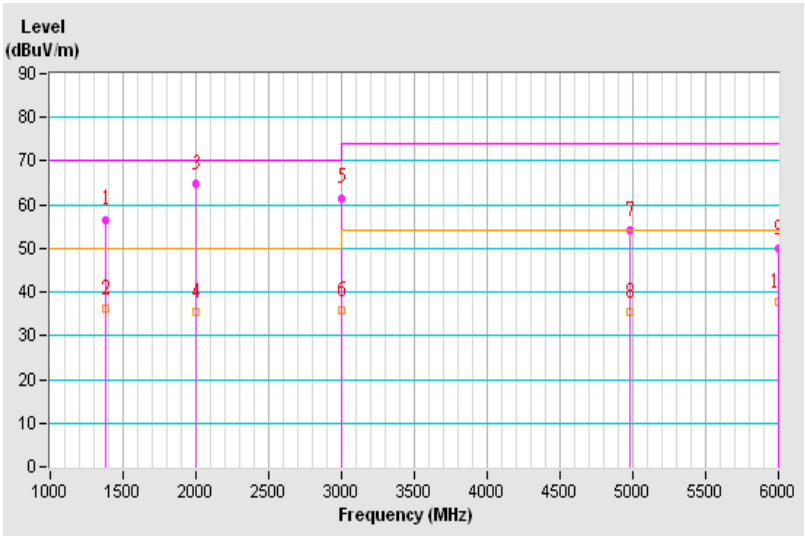
## 7.4 Test Results

| Frequency Range | 1GHz ~ 6GHz | Detector Function & Bandwidth | Peak (PK) / Average (AV), 1MHz |
|---|---|---|---|
| Tested by | Vincent Lin | Environmental Conditions | 18℃, 75%RH |
| Test Mode | With system | | |

| Antenna Polarity & Test Distance : Horizontal at 3 m | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 1380.62 | 56.59 PK | 70.00 | -13.41 | 1.80 H | 186 | 61.20 | -4.61 |
| 2 | 1380.62 | 36.19 AV | 50.00 | -13.81 | 1.80 H | 186 | 40.80 | -4.61 |
| **3** | **1999.23** | **64.76 PK** | **70.00** | **-5.24** | **1.50 H** | **177** | **66.85** | **-2.09** |
| 4 | 1999.23 | 35.30 AV | 50.00 | -14.70 | 1.50 H | 177 | 37.39 | -2.09 |
| 5 | 2999.99 | 61.56 PK | 70.00 | -8.44 | 1.33 H | 328 | 60.12 | 1.44 |
| 6 | 2999.99 | 35.71 AV | 50.00 | -14.29 | 1.33 H | 328 | 34.27 | 1.44 |
| 7 | 4977.70 | 54.08 PK | 74.00 | -19.92 | 2.21 H | 328 | 48.52 | 5.56 |
| 8 | 4977.70 | 35.48 AV | 54.00 | -18.52 | 2.21 H | 328 | 29.92 | 5.56 |
| 9 | 5999.99 | 49.93 PK | 74.00 | -24.07 | 2.06 H | 265 | 43.03 | 6.90 |
| 10 | 5999.99 | 37.58 AV | 54.00 | -16.42 | 2.06 H | 265 | 30.68 | 6.90 |

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

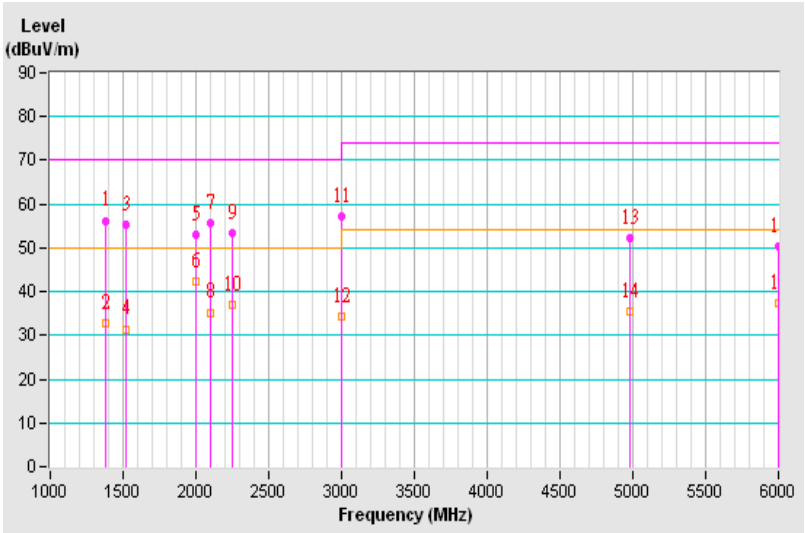


| Frequency Range | 1GHz ~ 6GHz | Detector Function & Bandwidth | Peak (PK) / Average (AV), 1MHz |
|---|---|---|---|
| Tested by | Vincent Lin | Environmental Conditions | 18℃, 75%RH |
| Test Mode | With system | | |

| Antenna Polarity & Test Distance : Vertical at 3 m | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 1376.02 | 56.24 PK | 70.00 | -13.76 | 2.10 V | 147 | 60.87 | -4.63 |
| 2 | 1376.02 | 32.77 AV | 50.00 | -17.23 | 2.10 V | 147 | 37.40 | -4.63 |
| 3 | 1521.61 | 55.43 PK | 70.00 | -14.57 | 1.39 V | 217 | 59.64 | -4.21 |
| 4 | 1521.61 | 31.43 AV | 50.00 | -18.57 | 1.39 V | 217 | 35.64 | -4.21 |
| 5 | 1999.95 | 52.99 PK | 70.00 | -17.01 | 1.25 V | 1 | 55.08 | -2.09 |
| 6 | 1999.95 | 42.21 AV | 50.00 | -7.79 | 1.25 V | 1 | 44.30 | -2.09 |
| 7 | 2099.86 | 55.71 PK | 70.00 | -14.29 | 1.00 V | 29 | 57.65 | -1.94 |
| 8 | 2099.86 | 35.24 AV | 50.00 | -14.76 | 1.00 V | 29 | 37.18 | -1.94 |
| 9 | 2249.95 | 53.52 PK | 70.00 | -16.48 | 2.14 V | 158 | 54.86 | -1.34 |
| 10 | 2249.95 | 37.05 AV | 50.00 | -12.95 | 2.14 V | 158 | 38.39 | -1.34 |
| 11 | 2999.20 | 57.31 PK | 70.00 | -12.69 | 1.31 V | 48 | 55.87 | 1.44 |
| 12 | 2999.20 | 34.37 AV | 50.00 | -15.63 | 1.31 V | 48 | 32.93 | 1.44 |
| 13 | 4981.31 | 52.20 PK | 74.00 | -21.80 | 1.32 V | 110 | 46.64 | 5.56 |
| 14 | 4981.31 | 35.30 AV | 54.00 | -18.70 | 1.32 V | 110 | 29.74 | 5.56 |
| 15 | 5999.97 | 50.35 PK | 74.00 | -23.65 | 2.20 V | 346 | 43.45 | 6.90 |
| 16 | 5999.97 | 37.36 AV | 54.00 | -16.64 | 2.20 V | 346 | 30.46 | 6.90 |

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



## 8 General Immunity Requirements

| EN 55024:2010, Immunity requirements | | | | |
|---|---|---|---|---|
| Clause | Reference standard | Table | Test specification | Performance Criterion |
| 4.2.1 | EN/IEC 61000-4-2 ESD | 1.3 | Enclosure port:<br>±8kV Air discharge, ±4kV Contact discharge | B |
| 4.2.3.2 | EN/IEC 61000-4-3 RS | 1.2 | Enclosure port:<br>80-1000 MHz, 3V/m, 80% AM (1kHz) | A |
| 4.2.4 | EN/IEC 61000-4-8 PFMF | 1.1 | Enclosure port:<br>50 or 60 Hz, 1A/m | A |

### 8.1 Performance Criteria

**General Performance Criteria**

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test. If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

**Product Specific Performance Criteria**

The particular performance criteria which are specified in the normative annexes of EN 55024 take precedence over the corresponding parts of the general performance criteria.

Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.

## 9 Electrostatic Discharge Immunity Test (ESD)

### 9.1 Test Specification

| | |
|---|---|
| **Basic Standard:** | EN/IEC 61000-4-2 |
| **Discharge Impedance:** | 330 ohm / 150 pF |
| **Discharge Voltage:** | Air Discharge: ±2, ±4, ±8kV (Direct)<br>Contact Discharge: ±2, ±4kV (Direct & Indirect) |
| **Number of Discharge:** | Air – Direct: 10 discharges per location (each polarity)<br>Contact – Direct & Indirect: 25 discharges per location (each polarity) and min. 200 times in total |
| **Discharge Mode:** | Single Discharge |
| **Discharge Period:** | 1-second minimum |

### 9.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| KeyTek, ESD Simulator | MZ-15/EC | 0401299 | Oct. 16, 2015 | Oct. 15, 2016 |

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in ESD Room No. 3.
3. Tested Date: Dec. 10, 2015.

### 9.3 Test Arrangement

The discharges shall be applied in two ways:

a. Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. 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. Test shall be performed at a maximum repetition rate of one discharge per second.

b. Air discharges at slots and apertures and insulating 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. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with EN/IEC 61000-4-2:

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

g. At least ten single discharges (in the most sensitive polarity) were applied to the **H**orizontal **C**oupling **P**lane at points on each side of the EUT. The ESD generator was positioned at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP.**

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **V**ertical **C**oupling **P**lane in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

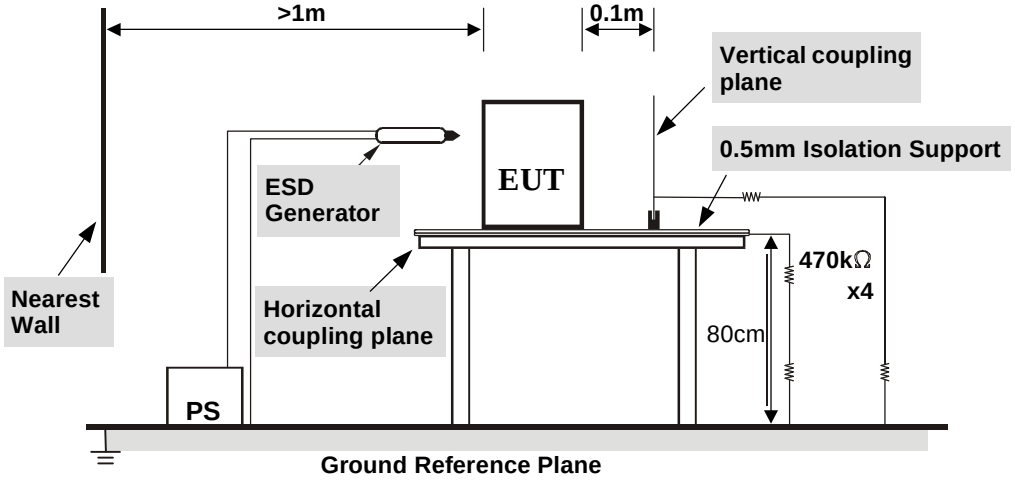



TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **G**round **R**eference **P**lane. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **H**orizontal **C**oupling **P**lane (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of EN/IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 9.4 Test Results

| | | | |
|---|---|---|---|
| Test mode | With system | Input Power **< From system >** | 230 Vac, 50 Hz |
| Enviromental conditions | 25°C, 46% RH 1012mbar | Tested by | Todd Chang |

| Test Results of Direct Application | | | | | |
|---|---|---|---|---|---|
| Discharge Level (kV) | Polarity (+/-) | Test Point | Contact Discharge | Air Discharge | Performance Criterion |
| 2 | +/- | 1 | Note 1 | NA | A |
| 4 | +/- | 1 | Note 2 | NA | B |
| 2, 4, 8 | +/- | 2 | NA | Note 1 | A |

Description of test points of direct application: Please refer to following page for representative mark only.

| Test Results of Indirect Application | | | | | |
|---|---|---|---|---|---|
| Discharge Level (kV) | Polarity (+/-) | Test Point | Horizontal Coupling Plane | Vertical Coupling Plane | Performance Criterion |
| 2, 4 | +/- | Four Sides | Note 1 | Note 1 | A |

Description of test points of indirect application:

1. Front side 2. Rear side 3. Right side 4. Left side

Note: 1. The EUT function was correct during the test.
2. The WinEMC R/W delay 1~ 2 seconds during the test, but could self-recover after the test.

Description of Test Points

## 10 Radiated, Radio-frequency, Electromagnetic Field Immunity Test (RS)

### 10.1 Test Specification

| | |
|---|---|
| Basic Standard: | EN/IEC 61000-4-3 |
| Frequency Range: | 80 MHz - 1000 MHz |
| Field Strength: | 3 V/m |
| Modulation: | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step: | 1 % of preceding frequency value |
| Polarity of Antenna: | Horizontal and Vertical |
| Antenna Height: | 1.5m |
| Dwell Time: | 3 seconds |

### 10.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| Agilent<br>Signal Generator | E8257D | MY48050465 | Jul. 21, 2015 | Jul. 20, 2016 |
| PRANA<br>RF Amplifier | AP32DP280 | 0811-894 | NA | NA |
| TESEQ RF Amplifier | CBA1G-150 | T44220 | NA | NA |
| AR RF Amplifier | 35S4G8AM4 | 0326094 | NA | NA |
| AR RF Amplifier | 100S1G4M3 | 0329249 | NA | NA |
| AR Controller | SC1000M3 | 305910 | NA | NA |
| Radisense<br>Electric Field Sensor | CTR1002A | 08D00057SNO-07 | Nov. 25, 2015 | Nov. 24, 2016 |
| BOONTON<br>RF Voltage Meter | 4232A | 10180 | Jun. 01, 2015 | May 31, 2016 |
| BOONTON Power Sensor | 51011-EMC | 34152 | Jun. 01, 2015 | May 31, 2016 |
| BOONTON Power Sensor | 51011-EMC | 34153 | Jun. 01, 2015 | May 31, 2016 |
| AR<br>Log-Periodic Antenna | AT6080 | 0329465 | NA | NA |
| EMCO<br>BiconiLog Antenna | 3141 | 1001 | NA | NA |
| AR<br>High Gain Antenna | AT4002A | 306533 | NA | NA |
| AR<br>High Gain Horn Antenna | AT4010 | 0329800 | NA | NA |
| CHANCE MOST<br>Full Anechoic<br>Chamber (9x5x3m) | Chance Most | RS-002 | Feb. 05, 2015 | Feb. 04, 2016 |
| Software | RS_V7.6 | NA | NA | NA |

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in RS Room No.2.
3. Tested Date: Dec. 9, 2015.

### 10.3 Test Arrangement

The test procedure was in accordance with EN/IEC 61000-4-3.

a. The testing was performed in a modified semi-anechoic chamber.

b. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.

c. The field strength level was 3 V/m.

d. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

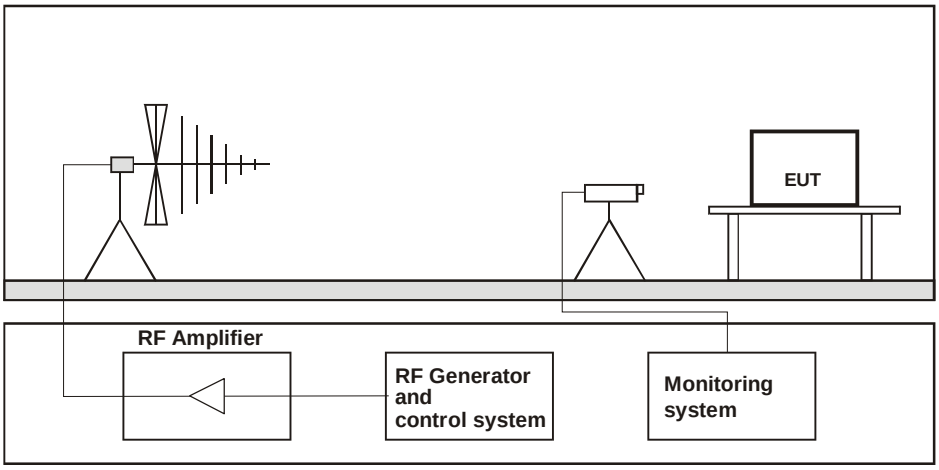



Table-top Equipment

The EUT installed in a representative system as described in section 7 of EN/IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 10.4 Test Results

| | | | |
|---|---|---|---|
| Test mode | With system | Input Power **< From system >** | 230 Vac, 50 Hz |
| Enviromental conditions | 21 °C, 65% RH | Tested by | Thomas Cheng |

| Frequency (MHz) | Polarity | Azimuth(°) | Applied Field Strength | | Observation | Performance Criterion |
|---|---|---|---|---|---|---|
| | | | (V/m) | Modulation | | |
| 80 -1000 | V&H | 0 | 3 | 80% AM (1kHz) | Note | A |
| 80 -1000 | V&H | 90 | 3 | 80% AM (1kHz) | Note | A |
| 80 -1000 | V&H | 180 | 3 | 80% AM (1kHz) | Note | A |
| 80 -1000 | V&H | 270 | 3 | 80% AM (1kHz) | Note | A |

Note: The EUT function was correct during the test.

## 11 Power Frequency Magnetic Field Immunity Test

### 11.1 Test Specification

| | |
|---|---|
| Basic Standard: | EN/IEC 61000-4-8 |
| Frequency Range: | 50Hz |
| Field Strength: | 1 A/m |
| Observation Time: | 1 minute |
| Inductance Coil: | Rectangular type, 1 m x 1 m |

### 11.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| HAEFELY Magnetic Field Tester | MAG 100 | 083794-06 | NA | NA |
| COMBINOVA Magnetic Field Meter | MFM10 | 224 | Apr. 24, 2015 | Apr. 23, 2016 |

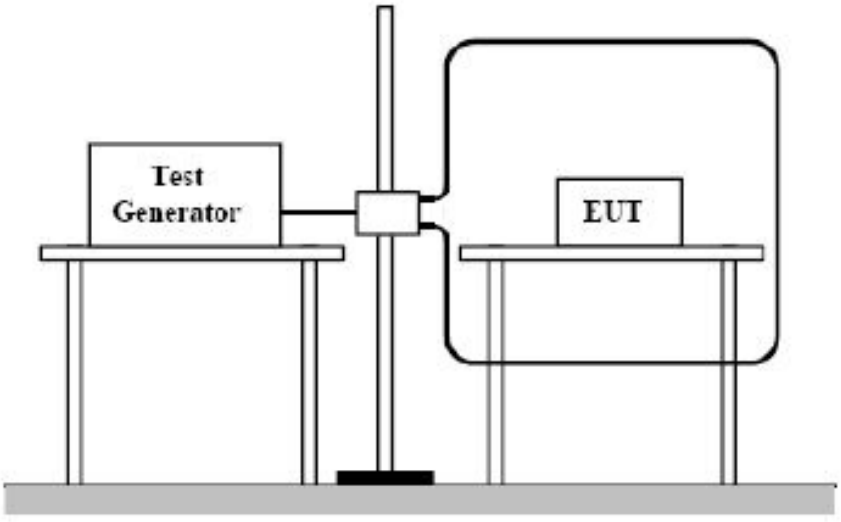
Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in EMS Room No. 1
3. Tested Date: Dec. 9, 2015.

### 11.3 Test Arrangement

a. The equipment is configured and connected to satisfy its functional requirements.

b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.

c. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.




TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 11.4 Test Results

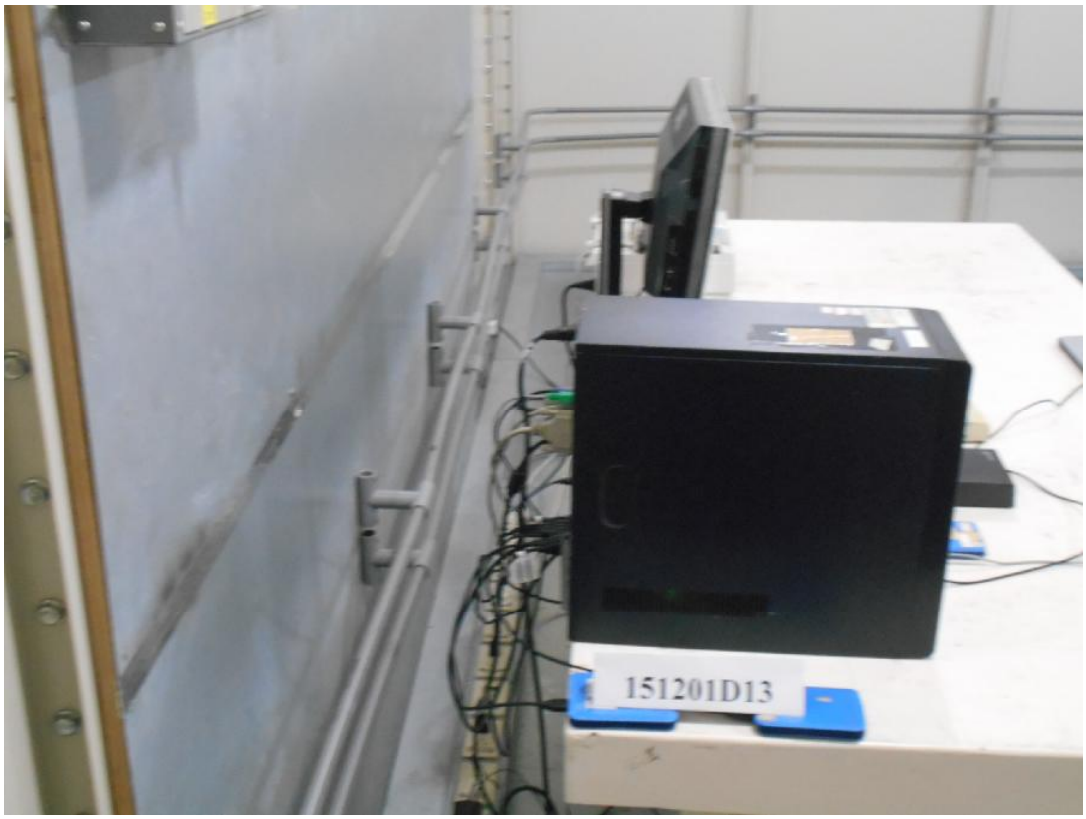
| | | | |
|---|---|---|---|
| Test mode | With system | Input Power<br>**< From system >** | 230 Vac, 50 Hz |
| Enviromental conditions | 25 °C, 70% RH | Tested by | Chiming Li |

| Application | Frequency (Hz) | Field Strength (A/m) | Observation | Performance Criterion |
|---|---|---|---|---|
| X - Axis | 50 | 1 | Note | A |
| Y - Axis | 50 | 1 | Note | A |
| Z - Axis | 50 | 1 | Note | A |

Note: The EUT function was correct during the test.

## 12 Pictures of Test Arrangements

### 12.1 Conducted Disturbance at Mains Ports

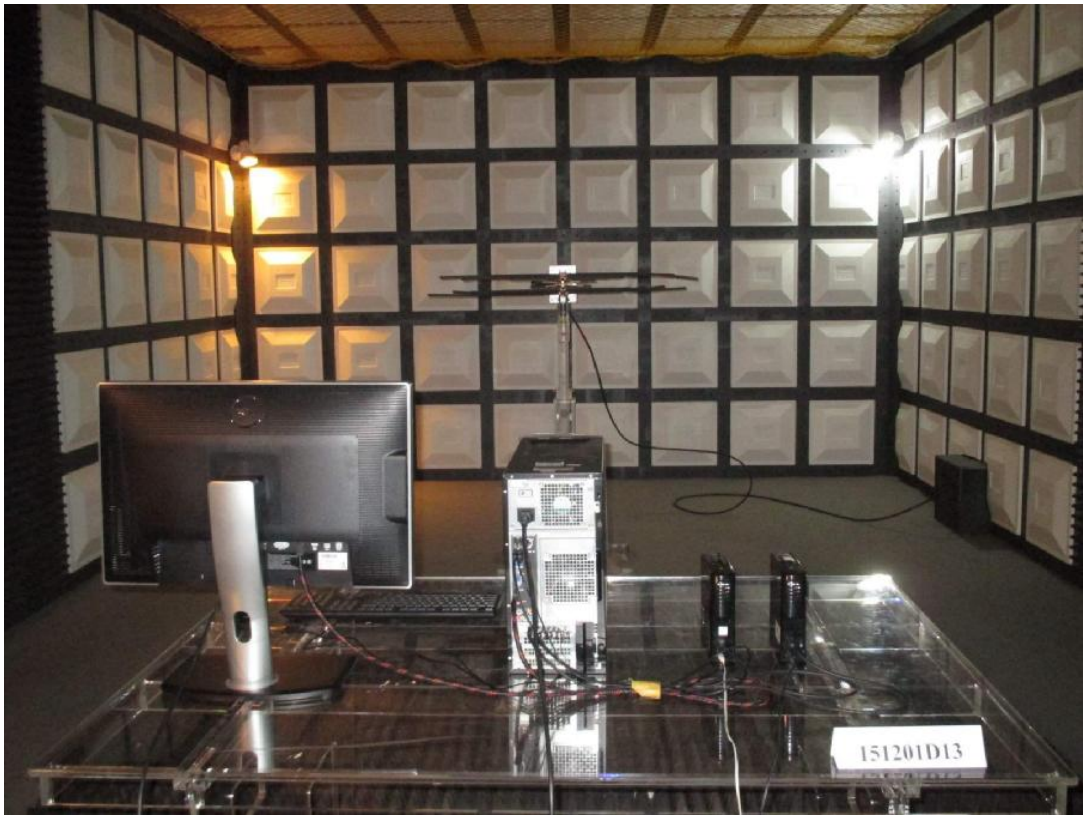



## 12.2 Radiated Disturbance up to 1 GHz


## 12.3 Radiated Disturbance above 1 GHz


## 12.4 Electrostatic Discharge Immunity Test (ESD)

## 12.5 Radio-frequency, Electromagnetic Field Immunity Test (RS)

## 12.6 Power Frequency Magnetic Field Immunity Test (PFMF)

**Appendix – Information on the Testing Laboratories**

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following: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The address and road map of all our labs can be found in our web site also.

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