

FCC DoC Test Report

Report No.: FD161118D04

Test Model: IP8160-W

Received Date: Oct. 31, 2016

Test Date: Nov. 25 ~ 28, 2016

Issued Date: Dec. 6, 2016

Applicant: VIVOTEK INC.

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R.O.C.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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(R.O.C.)



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Release Control Record

| Issue No. | Description | Date Issued |
|-------------|-------------------|--------------|
| FD161118D04 | Original release. | Dec. 6, 2016 |

2 Summary of Test Results

47 CFR FCC Part 15, Subpart B / ICES-003:2016 Issue 6, Class B

ANSI C63.4:2014

| FCC Clause | ICES-003 Clause | Test Item | Result/Remarks | Verdict |
|------------|-----------------|-----------------------------------|--|---------|
| 15.107 | 6.1 | AC Power Line Conducted Emissions | Minimum passing Class B margin is -14.96 dB at 0.48203 MHz | Pass |
| 15.109 | 6.2.1 | Radiated Emissions up to 1 GHz | Minimum passing Class B margin is -3.09 dB at 51.67 MHz | Pass |
| | 6.2.2 | Radiated Emissions above 1 GHz | Minimum passing Class B margin is -17.20 dB at 5603.87 MHz | Pass |

Note: There is no deviation to the applied test methods and requirements covered by the scope of this report.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

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 | Frequency | Expanded Uncertainty (k=2) (\pm) |
|------------------------------------|----------------|--------------------------------------|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 2.77 dB |
| Radiated Emissions up to 1 GHz | 30MHz ~ 1GHz | 3.99 dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 6GHz | 4.92 dB |
| | 6GHz ~ 18GHz | 4.91 dB |

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 VIVOTEK INC., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

| | |
|---------------------|-------------------------|
| Product | Network Camera |
| Brand | VIVOTEK |
| Test Model | IP8160-W |
| Sample Status | Engineering sample |
| Operating Software | N/A |
| Power Supply Rating | Refer to table as below |
| Accessory Device | Adapter |
| Data Cable Supplied | N/A |

Note:

1. The EUT is a Network Camera with built-in a wireless module.
2. The EUT uses following adapters.

| | |
|--------------|---------------------------------------|
| Adapter 1 | |
| Brand | HONOTO |
| Model | ADS-12EA-05 05010E |
| Input Power | 100-240V, 50/60Hz, 0.3A |
| Output Power | 5V, 2.0A |
| Power Line | AC 2 Pin Shielded USB cable (1.2m) |
| Adapter 2 | |
| Brand | Zzu |
| Model | ZZU1001-200050U |
| Input Power | 100-240V, 50-60Hz, 0.5A |
| Output Power | 5V, 2.0A |
| Power Line | AC 2 Pin Shielded USB cable (1.2m) |

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

1. The EUT is consumes DC power from AC adapter, which designed with AC power supply of rating 100-240Vac, 50/60Hz. For radiated emission evaluation, 230Vac/50Hz & 110Vac/60Hz (for EN 55032 & AS/NZS CISPR 32), 100Vac/50Hz (for VCCI), 120Vac/60Hz (for FCC Part 15) had been covered during the pre-test. The worst data was found at **230Vac/50Hz** and recorded in the applied test report. Then the other test items were tested at 120Vac/60Hz.
2. EUT has been pre-tested under following test modes, and test Pre-test mode 1 was the worst case for final test.

| Pre-test Mode | Test Condition |
|---------------|--------------------|
| 1 | EUT with adapter 1 |
| 2 | EUT with adapter 2 |

3. Test modes are presented in the report as below.

| Mode | Test Condition | Input Power |
|-------------------------|--|-------------|
| Conducted emission test | | |
| 1 | EUT with adapter 1 + wireless function | 120Vac/60Hz |
| 2 | EUT with adapter 2 + wireless function | 120Vac/60Hz |
| Radiated emission test | | |
| 1 | EUT with adapter 1 + wireless function | 230Vac/50Hz |

3.4 Test Program Used and Operation Descriptions

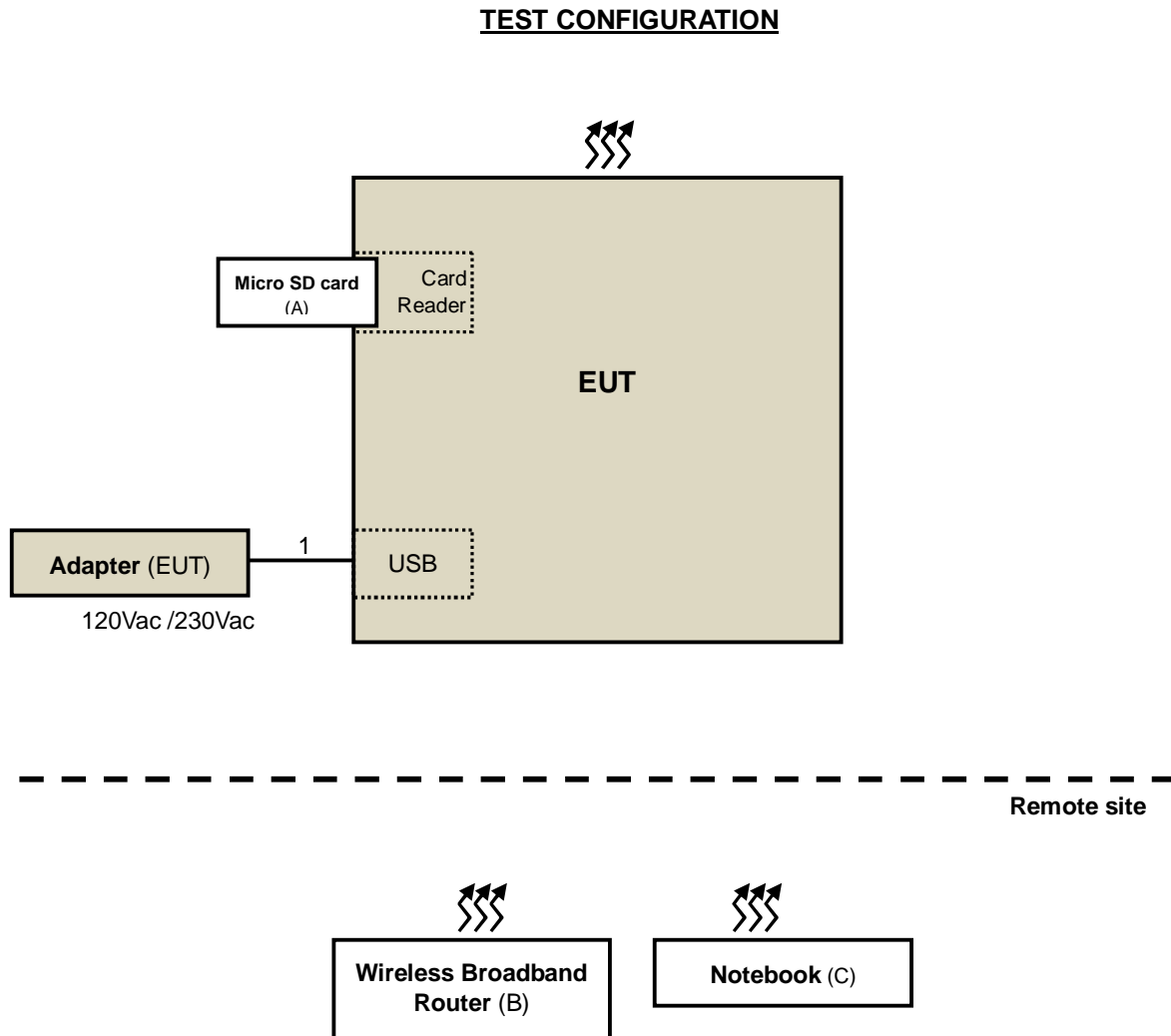
- a. Connected the EUT with AC adapter.
- b. Turned on the power of all equipment.
- c. EUT captured video signal.
- d. EUT captured video signal to notebook (kept in a remote area) then it displayed messages on its screen simultaneously via Wireless Broadband Router.
- e. Steps c-d were repeated.

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 2500 MHz, provided by VIVOTEK INC., 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



4.2 Configuration of Peripheral Devices and Cable Connections

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|---------------------------|---------|--------------|------------------|------------------|--------------------|
| A. | Micro SD Card | SP | SPCTMV1W 16G | SP016GBSTH004V81 | N/A | Provided by Lab |
| B. | Wireless Broadband Router | Netgear | D7000 | 4BC156B300005 | N/A | Supplied by client |
| C. | Notebook PC | DELL | P41G | 6BZY242 | FCC DoC Approved | Provided by Lab |

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items B-C acted as communication partners to transfer data.
3. The

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------|------|------------|--------------------|--------------|--------------------|
| 1. | USB cable | 1 | 1.2 | Y | 0 | Supplied by client |

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

5 Conducted Emissions 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

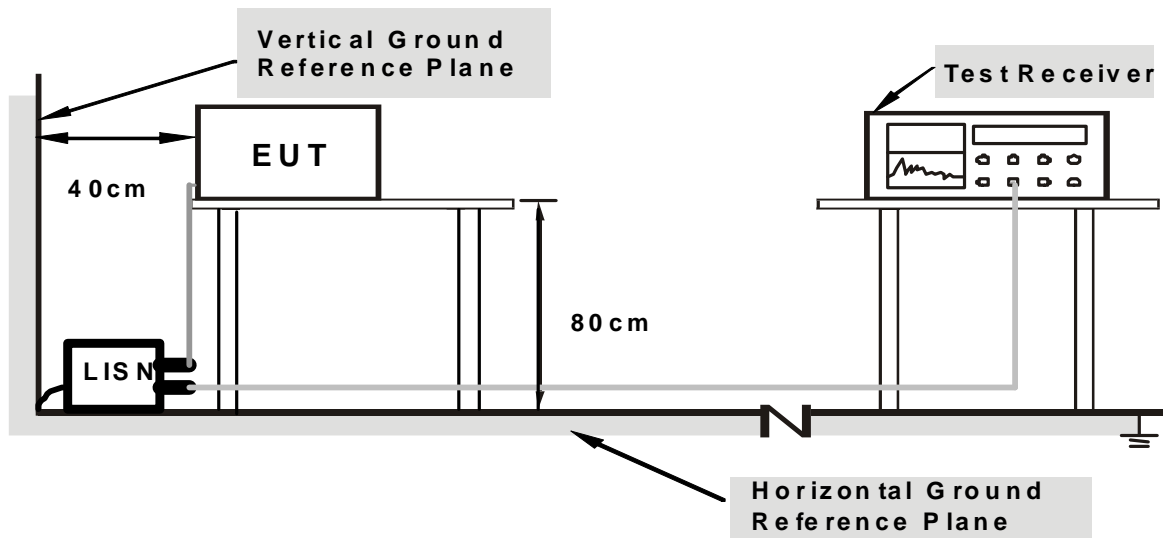
| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|--|---------------|--------------|---------------|---------------|
| ROHDE & SCHWARZ TEST RECEIVER | ESCS 30 | 100290 | Dec. 24, 2015 | Dec. 23, 2016 |
| ROHDE & SCHWARZ Artificial Mains Network (for EUT) | ESH2-Z5 | 100104 | Dec. 07, 2015 | Dec. 06, 2016 |
| LISN With Adapter (for EUT) | AD10 | C09Ada-001 | Dec. 07, 2015 | Dec. 06, 2016 |
| ROHDE & SCHWARZ Artificial Mains Network (for peripherals) | ESH3-Z5 | 847265/023 | Oct. 27, 2016 | Oct. 26, 2017 |
| SCHWARZBECK Artificial Mains Network (For EUT) | NNLK8129 | 8129229 | May 04, 2016 | May 03, 2017 |
| Software | Cond_V7.3.7.4 | NA | NA | NA |
| RF cable (JYEBAO) With 10dB PAD | 5D-FB | Cable-C09.01 | Feb. 23, 2016 | Feb. 22, 2017 |
| SUHNER Terminator (For ROHDE & SCHWARZ LISN) | 65BNC-5001 | E1-010789 | May 12, 2016 | May 11, 2017 |
| ROHDE & SCHWARZ Artificial Mains Network (For TV EUT) | ESH3-Z5 | 100220 | Nov. 08, 2016 | Nov. 07, 2017 |
| LISN With Adapter (for TV EUT) | 100220 | N/A | Nov. 08, 2016 | Nov. 07, 2017 |

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: Nov. 25, 2016.

5.3 Test Arrangement

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

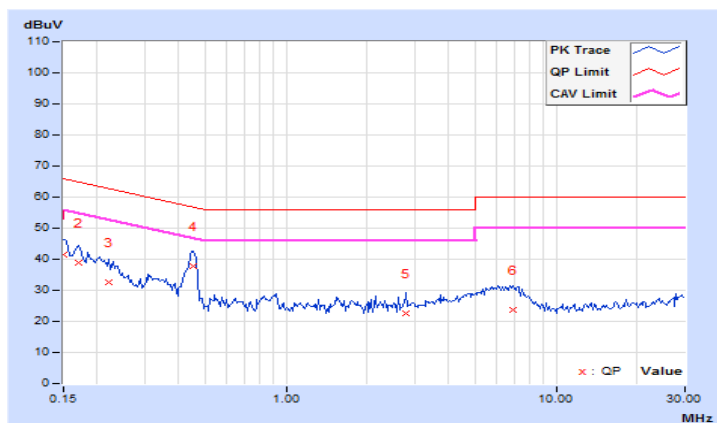
5.4 Test Results

| | | | |
|-----------------|----------------|--|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120Vac, 60Hz | Environmental Conditions | 24°C, 73%RH |
| Tested by | ED. Lin | | |
| Test Mode | Mode 1 | | |

| 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 | 0.15000 | 10.24 | 31.10 | 12.46 | 41.34 | 22.70 | 66.00 | 56.00 | -24.66 | -33.30 |
| 2 | 0.16953 | 10.26 | 28.45 | 12.70 | 38.71 | 22.96 | 64.98 | 54.98 | -26.27 | -32.02 |
| 3 | 0.22031 | 10.28 | 22.27 | 8.92 | 32.55 | 19.20 | 62.81 | 52.81 | -30.26 | -33.61 |
| 4 | 0.45078 | 10.26 | 27.43 | 20.08 | 37.69 | 30.34 | 56.86 | 46.86 | -19.17 | -16.52 |
| 5 | 2.76563 | 10.56 | 12.03 | 3.89 | 22.59 | 14.45 | 56.00 | 46.00 | -33.41 | -31.55 |
| 6 | 6.91797 | 10.81 | 12.88 | 10.40 | 23.69 | 21.21 | 60.00 | 50.00 | -36.31 | -28.79 |

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

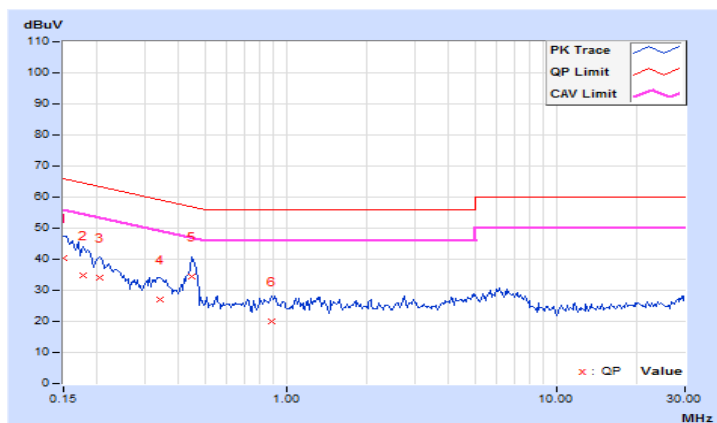


| | | | |
|------------------------|----------------|---|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120Vac, 60Hz | Environmental Conditions | 24°C, 73%RH |
| Tested by | ED. Lin | | |
| Test Mode | Mode 1 | | |

| 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 | 0.15000 | 10.26 | 30.28 | 10.03 | 40.54 | 20.29 | 66.00 | 56.00 | -25.46 | -35.71 |
| 2 | 0.17734 | 10.24 | 24.63 | 6.11 | 34.87 | 16.35 | 64.61 | 54.61 | -29.74 | -38.26 |
| 3 | 0.20469 | 10.23 | 23.81 | 7.82 | 34.04 | 18.05 | 63.42 | 53.42 | -29.38 | -35.37 |
| 4 | 0.34141 | 10.21 | 17.00 | 7.62 | 27.21 | 17.83 | 59.17 | 49.17 | -31.96 | -31.34 |
| 5 | 0.44688 | 10.21 | 24.25 | 18.18 | 34.46 | 28.39 | 56.93 | 46.93 | -22.47 | -18.54 |
| 6 | 0.88047 | 10.26 | 9.90 | 1.52 | 20.16 | 11.78 | 56.00 | 46.00 | -35.84 | -34.22 |

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

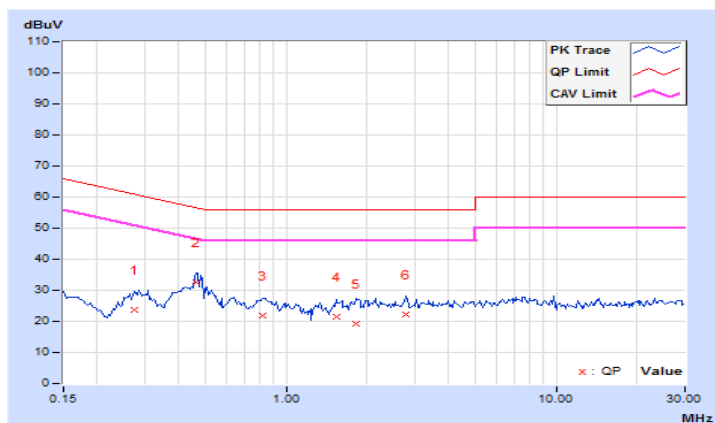


| | | | |
|------------------------|----------------|---|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120Vac, 60Hz | Environmental Conditions | 24°C, 73%RH |
| Tested by | ED. Lin | | |
| Test Mode | Mode 2 | | |

| 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 | 0.27500 | 10.27 | 13.42 | 8.34 | 23.69 | 18.61 | 60.97 | 50.97 | -37.28 | -32.36 |
| 2 | 0.46250 | 10.26 | 22.30 | 21.38 | 32.56 | 31.64 | 56.65 | 46.65 | -24.09 | -15.01 |
| 3 | 0.81406 | 10.33 | 11.38 | 6.40 | 21.71 | 16.73 | 56.00 | 46.00 | -34.29 | -29.27 |
| 4 | 1.53906 | 10.44 | 11.11 | 7.00 | 21.55 | 17.44 | 56.00 | 46.00 | -34.45 | -28.56 |
| 5 | 1.82422 | 10.48 | 8.60 | 1.33 | 19.08 | 11.81 | 56.00 | 46.00 | -36.92 | -34.19 |
| 6 | 2.76563 | 10.56 | 11.56 | 7.30 | 22.12 | 17.86 | 56.00 | 46.00 | -33.88 | -28.14 |

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

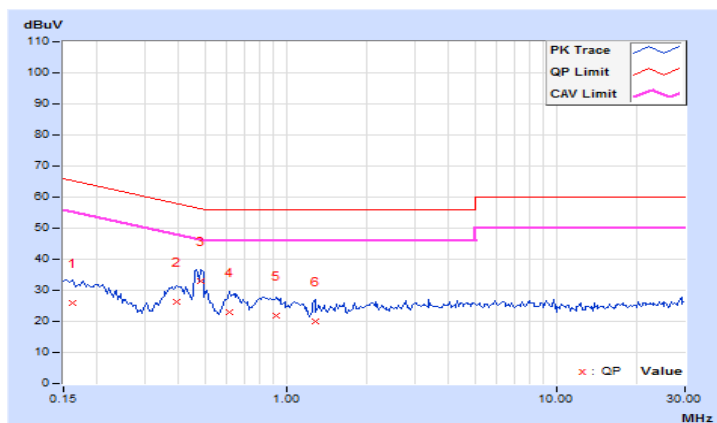


| | | | |
|-----------------|----------------|--|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120Vac, 60Hz | Environmental Conditions | 24°C, 73%RH |
| Tested by | ED. Lin | | |
| Test Mode | Mode 2 | | |

| 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 | 0.16172 | 10.25 | 15.54 | 8.85 | 25.79 | 19.10 | 65.38 | 55.38 | -39.59 | -36.28 |
| 2 | 0.39219 | 10.20 | 15.92 | 11.33 | 26.12 | 21.53 | 58.02 | 48.02 | -31.90 | -26.49 |
| 3 | 0.48203 | 10.21 | 22.79 | 21.13 | 33.00 | 31.34 | 56.30 | 46.30 | -23.30 | -14.96 |
| 4 | 0.61484 | 10.23 | 12.80 | 8.91 | 23.03 | 19.14 | 56.00 | 46.00 | -32.97 | -26.86 |
| 5 | 0.92344 | 10.27 | 11.41 | 8.71 | 21.68 | 18.98 | 56.00 | 46.00 | -34.32 | -27.02 |
| 6 | 1.27734 | 10.32 | 9.78 | 3.57 | 20.10 | 13.89 | 56.00 | 46.00 | -35.90 | -32.11 |

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 Emissions up to 1 GHz

6.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

| Radiated Emissions Limits at 10 meters (dB μ V/m) | | | | |
|---|-----------------------------|-----------------------------|-------------------|-------------------|
| Frequencies (MHz) | FCC 15B / ICES-003, Class A | FCC 15B / ICES-003, Class B | CISPR 22, Class A | CISPR 22, Class B |
| 30-88 | 39 | 29.5 | 40 | 30 |
| 88-216 | 43.5 | 33.1 | | |
| 216-230 | 46.4 | 35.6 | | |
| 230-960 | | | 47 | 37 |
| 960-1000 | 49.5 | 43.5 | | |

| Radiated Emissions Limits at 3 meters (dB μ V/m) | | | | |
|--|-----------------------------|-----------------------------|-------------------|-------------------|
| Frequencies (MHz) | FCC 15B / ICES-003, Class A | FCC 15B / ICES-003, Class B | CISPR 22, Class A | CISPR 22, Class B |
| 30-88 | 49.5 | 40 | 50.5 | 40.5 |
| 88-216 | 54 | 43.5 | | |
| 216-230 | 56.9 | 46 | | |
| 230-960 | | | 57.5 | 47.5 |
| 960-1000 | 60 | 54 | | |

- Notes: 1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (uV/m).
 3. QP detector shall be applied if not specified.

6.2 Test Instruments

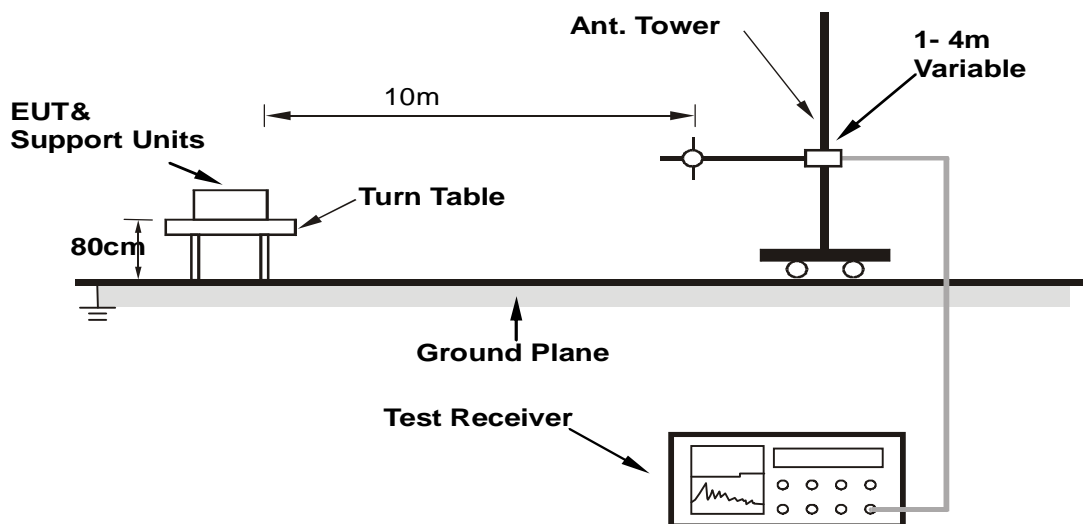
| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|----------------------------------|----------------------|--------------|---------------|---------------|
| ROHDE & SCHWARZ TEST RECEIVER | ESCS 30 | 845552/004 | Sep. 19, 2016 | Sep. 18, 2017 |
| Schaffner Bilog Antenna | CBL6111D | 22262 | Jan. 07, 2016 | Jan. 06, 2017 |
| ADT. Turn Table | TT100 | 0205 | NA | NA |
| ADT. Tower | AT100 | 0205 | NA | NA |
| Software | Radiated_V7.6.15.9.5 | NA | NA | NA |
| ADT RF Switches BOX | EMH-011 | 1001 | Feb. 15, 2016 | Feb. 14, 2017 |
| Pacific RF cable With 5dB PAD | 8D | CABLE-ST2-01 | Feb. 15, 2016 | Feb. 14, 2017 |

- 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. 2.
 3. The VCCI Site Registration No. R-237.
 4. The FCC Site Registration No. 90424.
 5. Tested Date: Nov. 25, 2016.

6.3 Test Arrangement

- 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.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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

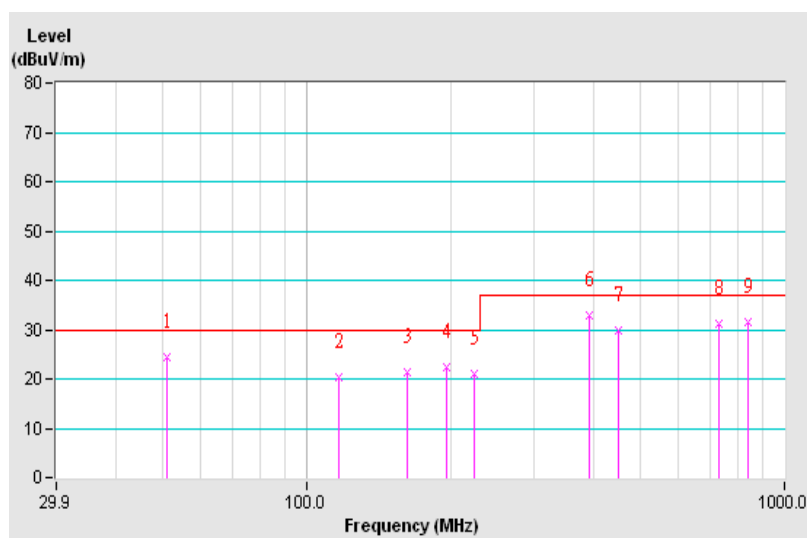
| | | | |
|------------------------|--------------|---|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP), 120kHz |
| Tested by | Vincent Lin | Environmental Conditions | 25°C, 75%RH |
| Test Mode | Mode 1 | | |

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 | 51.08 | 24.40 QP | 30.00 | -5.60 | 4.00 H | 148 | 40.50 | -16.10 |
| 2 | 116.60 | 20.39 QP | 30.00 | -9.61 | 4.00 H | 1 | 32.56 | -12.17 |
| 3 | 162.35 | 21.29 QP | 30.00 | -8.71 | 4.00 H | 294 | 33.93 | -12.64 |
| 4 | 196.25 | 22.27 QP | 30.00 | -7.73 | 4.00 H | 202 | 35.89 | -13.62 |
| 5 | 223.47 | 20.96 QP | 30.00 | -9.04 | 4.00 H | 144 | 33.74 | -12.78 |
| 6 | 389.30 | 32.90 QP | 37.00 | -4.10 | 3.50 H | 20 | 38.85 | -5.95 |
| 7 | 450.37 | 29.69 QP | 37.00 | -7.31 | 2.54 H | 352 | 34.73 | -5.04 |
| 8 | 729.25 | 31.24 QP | 37.00 | -5.76 | 1.00 H | 169 | 30.51 | 0.73 |
| 9 | 841.75 | 31.39 QP | 37.00 | -5.61 | 1.00 H | 13 | 28.65 | 2.74 |

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

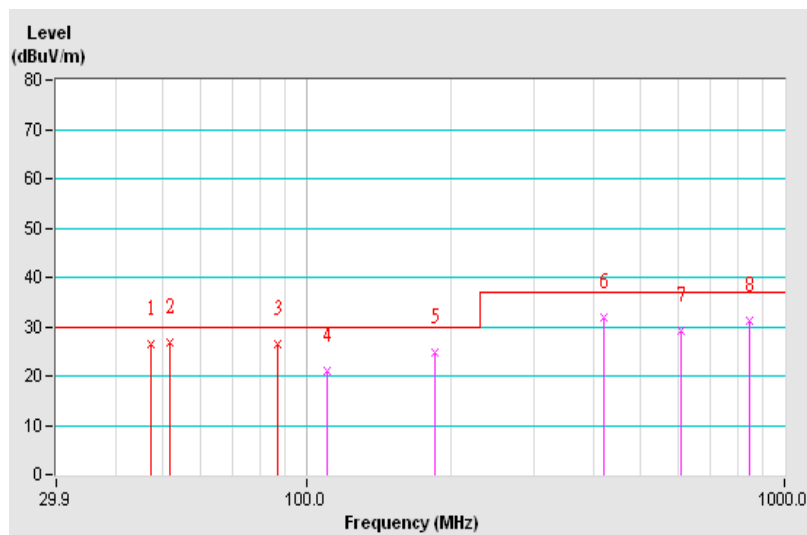


| | | | |
|------------------------|--------------|---|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP), 120kHz |
| Tested by | Vincent Lin | Environmental Conditions | 25°C, 75%RH |
| Test Mode | Mode 1 | | |

| 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 | 47.08 | 26.28 QP | 30.00 | -3.72 | 1.39 V | 310 | 40.86 | -14.58 |
| 2 | 51.67 | 26.91 QP | 30.00 | -3.09 | 1.51 V | 313 | 43.27 | -16.36 |
| 3 | 86.65 | 26.35 QP | 30.00 | -3.65 | 1.34 V | 3 | 41.84 | -15.49 |
| 4 | 110.19 | 21.04 QP | 30.00 | -8.96 | 1.00 V | 225 | 33.56 | -12.52 |
| 5 | 185.60 | 24.71 QP | 30.00 | -5.29 | 1.00 V | 20 | 38.51 | -13.80 |
| 6 | 417.82 | 31.70 QP | 37.00 | -5.30 | 2.99 V | 228 | 36.85 | -5.15 |
| 7 | 608.48 | 29.12 QP | 37.00 | -7.88 | 1.61 V | 347 | 30.93 | -1.81 |
| 8 | 847.75 | 31.35 QP | 37.00 | -5.65 | 1.99 V | 31 | 28.60 | 2.75 |

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 Emissions above 1 GHz

7.1 Limits

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

| Radiated Emissions Limits at 10 meters (dB μ V/m) | | | | |
|---|-----------------------------|-----------------------------|-------------------|-------------------|
| Frequencies (MHz) | FCC 15B / ICES-003, Class A | FCC 15B / ICES-003, Class B | CISPR 22, Class A | CISPR 22, Class B |
| 1000-3000 | Avg: 49.5 | Avg: 43.5 | Not defined | Not defined |
| Above 3000 | Peak: 69.5 | Peak: 63.5 | Not defined | Not defined |

| Radiated Emissions Limits at 3 meters (dB μ V/m) | | | | |
|--|-----------------------------|-----------------------------|---------------------|---------------------|
| Frequencies (MHz) | FCC 15B / ICES-003, Class A | FCC 15B / ICES-003, Class B | CISPR 22, Class A | CISPR 22, Class B |
| 1000-3000 | Avg: 60 | Avg: 54 | Avg: 56 Peak: 76 | Avg: 50 Peak: 70 |
| Above 3000 | Peak: 80 | Peak: 74 | Avg: 60 Peak: 80 | Avg: 54 Peak: 74 |

- Notes:
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dB μ V/m) = 20 log Emission level (uV/m).
 3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Frequency Range (For unintentional radiators)

| Highest frequency generated or used in the device or on which the device operates or tunes (MHz) | Upper frequency of measurement range (MHz) |
|--|--|
| Below 1.705 | 30 |
| 1.705-108 | 1000 |
| 108-500 | 2000 |
| 500-1000 | 5000 |
| Above 1000 | 5th harmonic of the highest frequency or 40GHz, whichever is lower |

7.2 Test Instruments

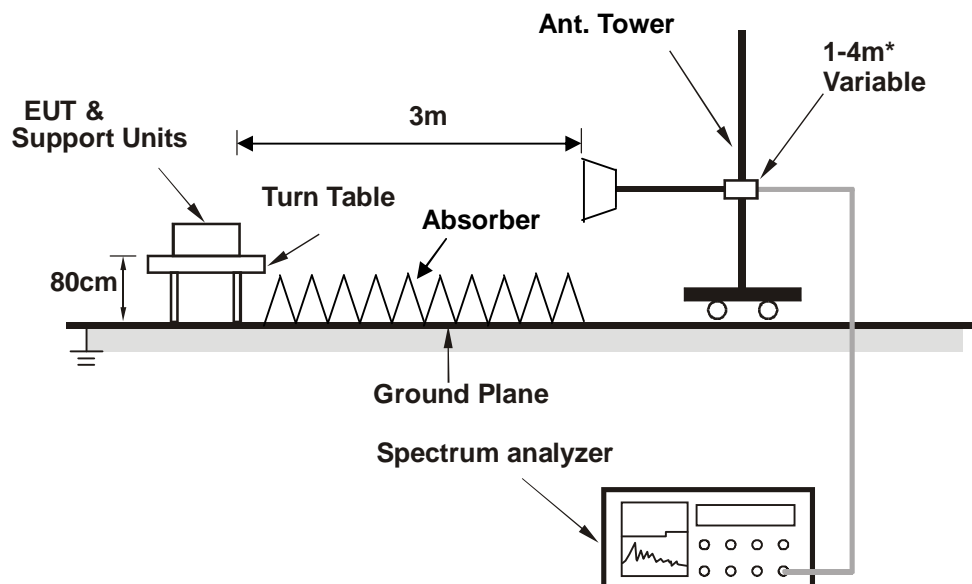
| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---------------------------------|---------------------|-----------------|---------------|---------------|
| Agilent Spectrum | E4446A | MY51100009 | May 30, 2016 | May 29, 2017 |
| Agilent Test Receiver | N9038A | MY51210137 | Jul. 27, 2016 | Jul. 26, 2017 |
| Agilent Preamplifier | 8449B | 3008A01292 | Feb. 26, 2016 | Feb. 25, 2017 |
| MITEQ Preamplifier | AMF-6F-260400-33-8P | 892164 | Mar. 01, 2016 | Feb. 28, 2017 |
| EMCI Preamplifier | EMC184045B | 980235 | Mar. 01, 2016 | Feb. 28, 2017 |
| Schwarzbeck Horn Antenna | BBHA-9170 | 212 | Jan. 08, 2016 | Jan. 07, 2017 |
| EMCO Horn Antenna | 3115 | 6714 | Jan. 19, 2016 | Jan. 18, 2017 |
| Max Full. Turn Table | MF7802 | MF780208216 | NA | NA |
| Software | Radiated_V8.7.08 | NA | NA | NA |
| SUHNER RF cable With 3dB PAD | SF102 | Cable-CH10-3.6m | Aug. 15, 2016 | Aug. 14, 2017 |

- 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 Chamber No. 10.
 3. The Industry Canada Reference No. IC 7450E-11.
 4. The VCCI Site Registration No. G-427
 5. The FCC Site Registration No. 367016
 6. Tested Date: Nov. 28, 2016.

7.3 Test Arrangement

- 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.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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.

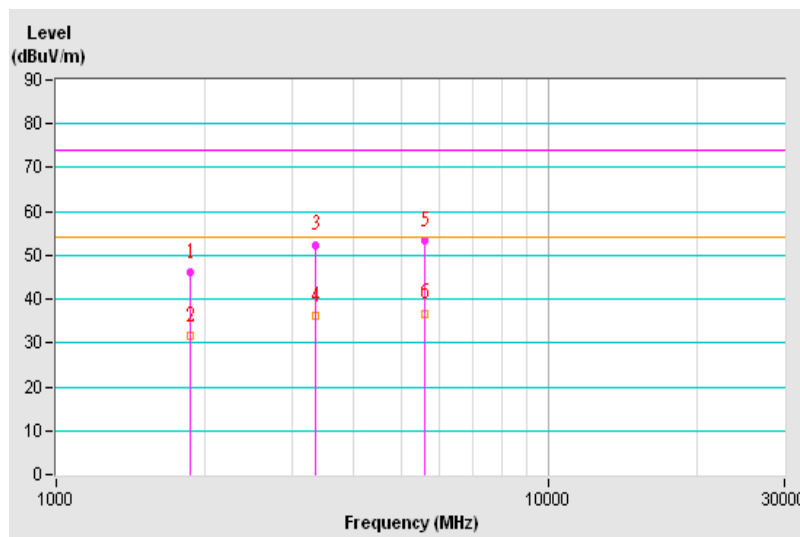
7.4 Test Results

| | | | |
|------------------------|----------------|---|--------------------------------|
| Frequency Range | 1GHz ~ 12.5GHz | Detector Function & Resolution Bandwidth | Peak (PK) / Average (AV), 1MHz |
| Tested by | Kobe Lu | Environmental Conditions | 23°C, 72%RH |
| Test Mode | Mode 1 | | |

| 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 | 1866.50 | 46.04 PK | 74.00 | -27.96 | 1.15 H | 168 | 46.92 | -0.88 |
| 2 | 1866.50 | 31.79 AV | 54.00 | -22.21 | 1.15 H | 168 | 32.67 | -0.88 |
| 3 | 3359.87 | 52.43 PK | 74.00 | -21.57 | 1.96 H | 67 | 47.86 | 4.57 |
| 4 | 3359.87 | 36.05 AV | 54.00 | -17.95 | 1.96 H | 67 | 31.48 | 4.57 |
| 5 | 5603.87 | 53.29 PK | 74.00 | -20.71 | 1.43 H | 182 | 44.10 | 9.19 |
| 6 | 5603.87 | 36.80 AV | 54.00 | -17.20 | 1.43 H | 182 | 27.61 | 9.19 |

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



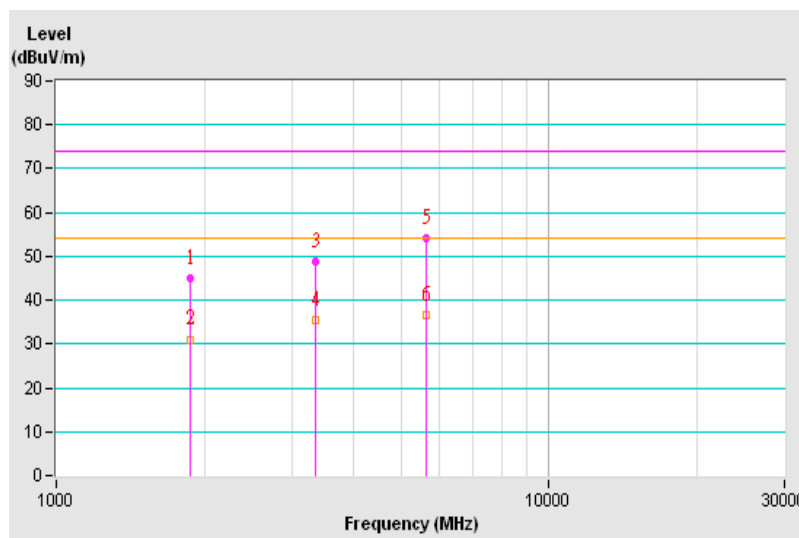
| | | | |
|------------------------|----------------|---|--------------------------------|
| Frequency Range | 1GHz ~ 12.5GHz | Detector Function & Resolution Bandwidth | Peak (PK) / Average (AV), 1MHz |
| Tested by | Kobe Lu | Environmental Conditions | 23°C, 72%RH |
| Test Mode | Mode 1 | | |

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 | 1866.00 | 45.11 PK | 74.00 | -28.89 | 1.00 V | 31 | 45.99 | -0.88 |
| 2 | 1866.00 | 31.06 AV | 54.00 | -22.94 | 1.00 V | 31 | 31.94 | -0.88 |
| 3 | 3356.12 | 48.85 PK | 74.00 | -25.15 | 1.75 V | 286 | 44.30 | 4.55 |
| 4 | 3356.12 | 35.36 AV | 54.00 | -18.64 | 1.75 V | 286 | 30.81 | 4.55 |
| 5 | 5610.35 | 54.02 PK | 74.00 | -19.98 | 1.25 V | 92 | 44.84 | 9.18 |
| 6 | 5610.35 | 36.75 AV | 54.00 | -17.25 | 1.25 V | 92 | 27.57 | 9.18 |

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

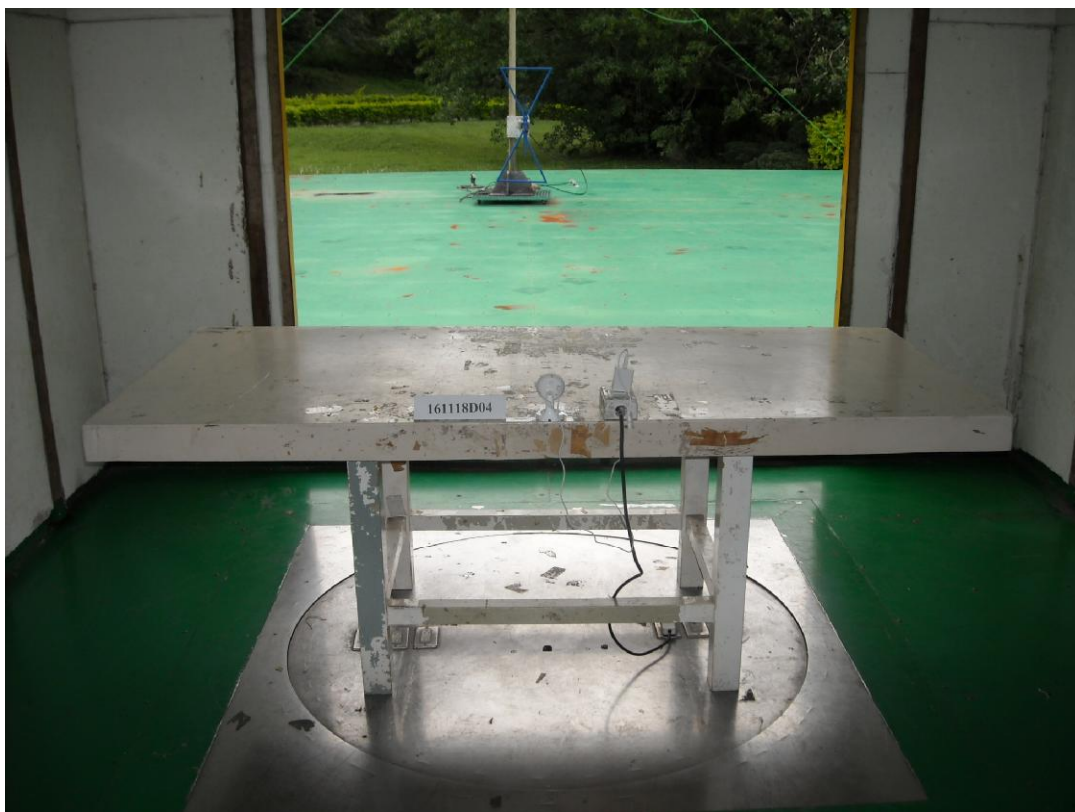
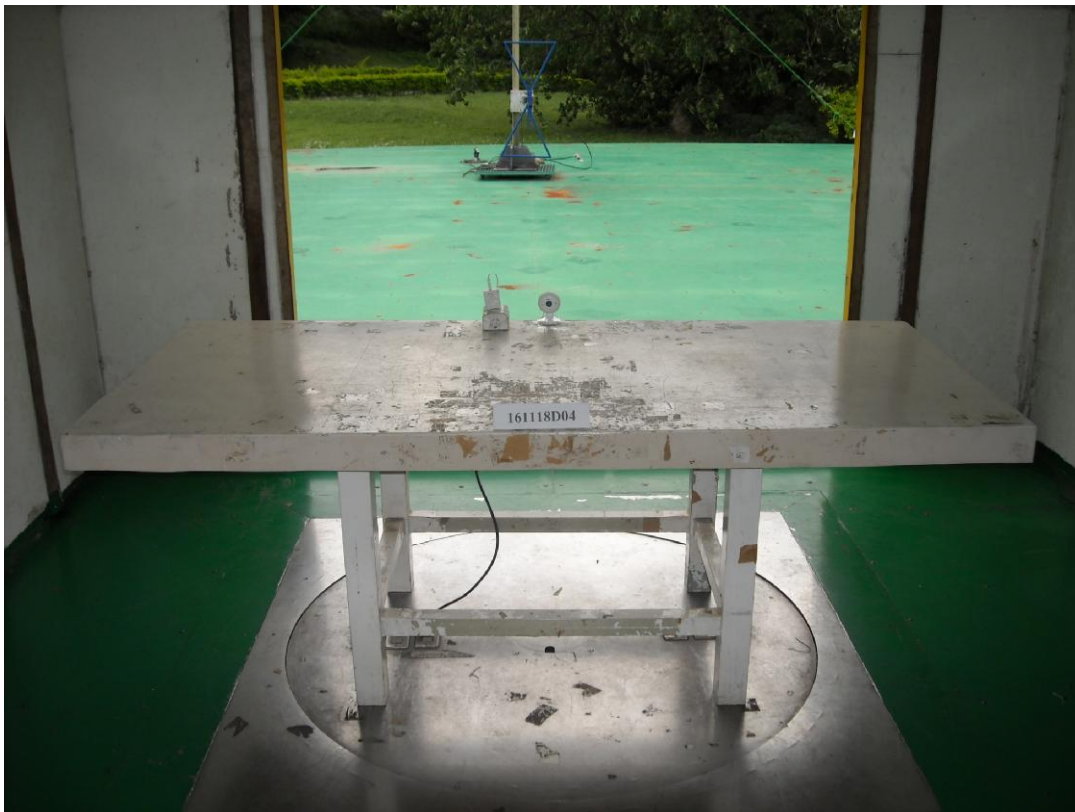


8 Pictures of Test Arrangements

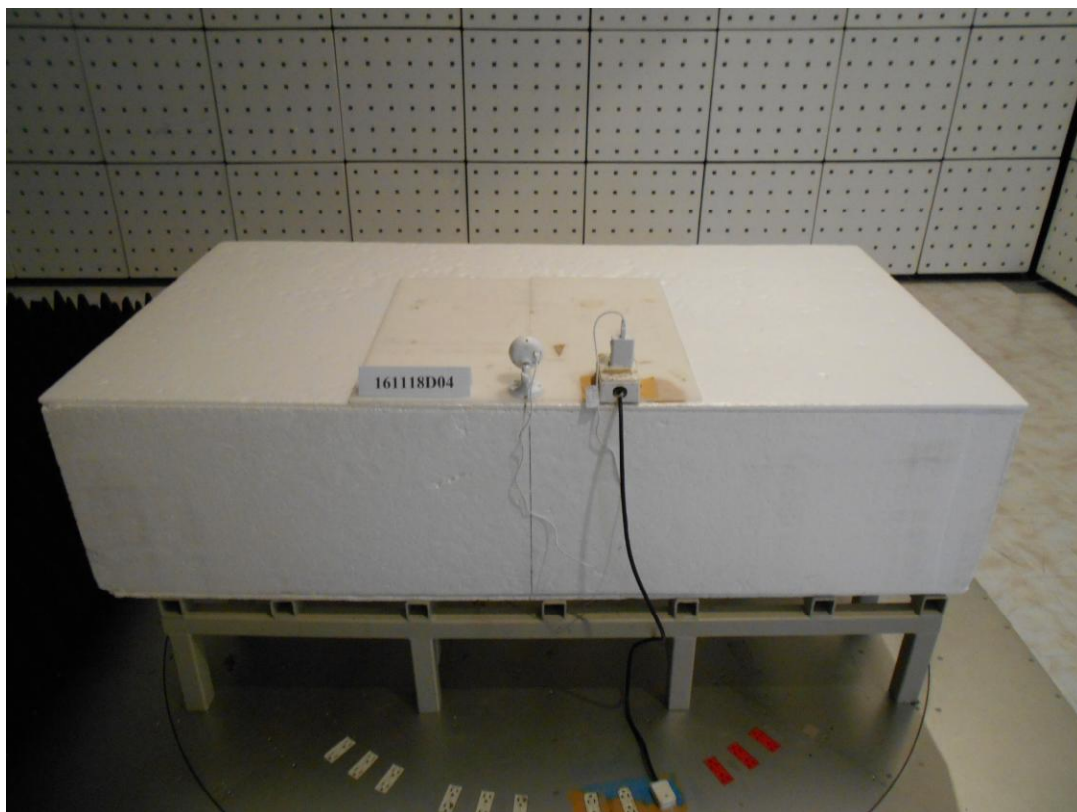
8.1 Conducted Emissions at Mains Ports



8.2 Radiated Emissions up to 1 GHz



8.3 Radiated Emissions above 1 GHz



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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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