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FCC EMC TEST REPORT

| | |
|------------------------|--|
| Applicant's company | Aruba Networks, Inc. |
| Applicant Address | 1344 Crossman Avenue Sunnyvale CA 94089, USA |
| Manufacturer's company | Wistron NeWeb Corporation |
| Manufacturer Address | 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C. |

| | |
|-----------------------|---|
| Product Name | ARUBA 134 WIRELESS ACCESS POINT, EXT ANTENNA / ARUBA 135 WIRELESS ACCESS POINT |
| Brand Name | Aruba |
| Model Name | AP-134 / AP-135 |
| Test Standard | 47 CFR FCC Part 15 Subpart B |
| Classification of ITE | Class B |
| Received Date | Dec. 10, 2010 |
| Final Test Date | Mar. 09, 2011 |
| Submission Type | Original Equipment |
| Multiple Listing | Please refer to section 3.7 |

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 measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart B**.

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



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History of This Test Report

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|------------|---------|-------------------------|---------------|
| FD0D2823 | Rev. 01 | Initial issue of report | Mar. 14, 2011 |
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1. CERTIFICATE OF COMPLIANCE

Product Name : ARUBA 134 WIRELESS ACCESS POINT, EXT ANTENNA /
ARUBA 135 WIRELESS ACCESS POINT

Brand Name : Aruba

Model Name : AP-134 / AP-135

Applicant : Aruba Networks, Inc.

Test Standard : 47 CFR FCC Part 15 Subpart B

Sporton International as requested by the applicant to evaluate the EMI performance of the product sample received on Dec. 10, 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 EMI nature.

Jordan Hsiao 2011.4.13

Jordan Hsiao

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

| Applied Standard: 47 CFR FCC Part 15 Subpart B | | | | |
|--|--------------|-----------------------------------|----------|-------------|
| Part | Rule Section | Description of Test | Result | Under Limit |
| 4.1 | 15.107 | AC Power Line Conducted Emissions | Complies | 3.49 dB |
| 4.2 | 15.109 | Radiated Emissions | Complies | 3.13 dB |

| Test Items | Uncertainty | Remark |
|-----------------------------------|-------------|--------------------------|
| AC Power Line Conducted Emissions | ±2.3dB | Confidence levels of 95% |
| Radiated Emissions | ±1.9dB | Confidence levels of 95% |

3. GENERAL INFORMATION

3.1. Product Details

<For 5GHz Band>:

| Items | Description |
|---------------------|---|
| Product Type | WLAN (3TX, 3RX) |
| Radio Type | Intentional Transceiver |
| Power Type | From POE and Power Adapter |
| Modulation | IEEE 802.11a: OFDM; IEEE 802.11an: see the below table |
| Data Modulation | OFDM (BPSK / QPSK / 16QAM / 64QAM) |
| Data Rate (Mbps) | IEEE 802.11a: OFDM (6/9/12/18/24/36/48/54); IEEE 802.11an: see the below table |
| Frequency Range | 5150 ~ 5250MHz / 5725 ~ 5850MHz |
| Channel Number | IEEE 802.11a: 9 IEEE 802.11an: 9 for 20MHz bandwidth ; 4 for 40MHz bandwidth |
| Carrier Frequencies | Please refer to section 3.4 |
| Antenna | Please refer to section 3.3 |

<For 2.4GHz Band>:

| Items | Description |
|---------------------|---|
| Product Type | WLAN (3TX, 3RX) |
| Radio Type | Intentional Transceiver |
| Power Type | From POE and Power Adapter |
| Modulation | IEEE 802.11b: DSSS; IEEE 802.11g: OFDM; IEEE 802.11n: see the below table |
| Data Modulation | IEEE 802.11b: DSSS (BPSK / QPSK / CCK) IEEE 802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) |
| Data Rate (Mbps) | IEEE 802.11b: DSSS (1/ 2/ 5.5/11) IEEE 802.11g: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n: see the below table for IEEE 802.11n |
| Frequency Range | 2400 ~ 2483.5MHz |
| Channel Number | IEEE 802.11b/g: 11 IEEE 802.11n: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth |
| Carrier Frequencies | Please refer to section 3.4 |
| Antenna | Please refer to section 3.3 |

Antenna & Band width

| Antenna | Single (TX) | | Three (TX) | |
|---------|-------------|--------|------------|--------|
| | 20 MHz | 40 MHz | 20 MHz | 40 MHz |
| 802.11a | X | X | V | X |
| 802.11b | X | X | V | X |
| 802.11g | X | X | V | X |
| 802.11n | X | X | V | V |

802.11n Spec

| MCS Index | Nss | Modulation | R | NBPS | NCBPS | | NDBPS | | Datarate(Mbps) | | | |
|-----------|-----|------------|-----|------|-------|-------|-------|-------|----------------|-------|---------|-------|
| | | | | | 20MHz | 40MHz | 20MHz | 40MHz | 800nsGI | | 400nsGI | |
| | | | | | | | | | 20MHz | 40MHz | 20MHz | 40MHz |
| 0 | 1 | BPSK | 1/2 | 1 | 52 | 108 | 26 | 54 | 6.5 | 13.5 | 7.200 | 15 |
| 1 | 1 | QPSK | 1/2 | 2 | 104 | 216 | 52 | 108 | 13.0 | 27.0 | 14.400 | 30 |
| 2 | 1 | QPSK | 3/4 | 2 | 104 | 216 | 78 | 162 | 19.5 | 40.5 | 21.700 | 45 |
| 3 | 1 | 16-QAM | 1/2 | 4 | 208 | 432 | 104 | 216 | 26.0 | 54.0 | 28.900 | 60 |
| 4 | 1 | 16-QAM | 3/4 | 4 | 208 | 432 | 156 | 324 | 39.0 | 81.0 | 43.300 | 90 |
| 5 | 1 | 64-QAM | 2/3 | 6 | 312 | 648 | 208 | 432 | 52.0 | 108.0 | 57.800 | 120 |
| 6 | 1 | 64-QAM | 3/4 | 6 | 312 | 648 | 234 | 486 | 58.5 | 121.5 | 65.000 | 135 |
| 7 | 1 | 64-QAM | 5/6 | 6 | 312 | 648 | 260 | 540 | 65.0 | 135.0 | 72.200 | 150 |
| 8 | 2 | BPSK | 1/2 | 1 | 104 | 216 | 52 | 108 | 13.0 | 27.0 | 14.444 | 30 |
| 9 | 2 | QPSK | 1/2 | 2 | 208 | 432 | 104 | 216 | 26.0 | 54.0 | 28.889 | 60 |
| 10 | 2 | QPSK | 3/4 | 2 | 208 | 432 | 156 | 324 | 39.0 | 81.0 | 43.333 | 90 |
| 11 | 2 | 16-QAM | 1/2 | 4 | 416 | 864 | 208 | 432 | 52.0 | 108.0 | 57.778 | 120 |
| 12 | 2 | 16-QAM | 3/4 | 4 | 416 | 864 | 312 | 648 | 78.0 | 162.0 | 86.667 | 180 |
| 13 | 2 | 64-QAM | 2/3 | 6 | 624 | 1296 | 416 | 864 | 104.0 | 216.0 | 115.556 | 240 |
| 14 | 2 | 64-QAM | 3/4 | 6 | 624 | 1296 | 468 | 972 | 117.0 | 243.0 | 130.000 | 270 |
| 15 | 2 | 64-QAM | 5/6 | 6 | 624 | 1296 | 520 | 1080 | 130.0 | 270.0 | 144.444 | 300 |

802.11n Bandwidth

| Symbol | Explanation |
|--------|---|
| NSS | Number of spatial streams |
| R | Code rate |
| NBPS | Number of coded bits per single carrier |
| NCBPS | Number of coded bits per symbol |
| NDBPS | Number of data bits per symbol |
| GI | guard interval |

3.2. Accessories

N/A

3.3. Table for Filed Antenna

| Ant. | Brand | Model Name | Antenna Type | Connector | Antenna Gain | | Cable Loss | | Test Antenna gain | |
|------|-------|------------|---------------------|-----------|--------------|------|------------|------|-------------------|------|
| | | | | | 2.4GHz | 5GHz | 2.4GHz | 5GHz | 2.4GHz | 5GHz |
| | | | | | Band | Band | Band | Band | Band | Band |
| 1 | ARUBA | AP-ANT-1B | Omni Antenna | RP-SMA | 3.8 | 5.8 | 1.8 | 3.3 | 2 | 2.5 |
| 2 | ARUBA | AP-ANT-13B | Omni Antenna | RP-SMA | 4.4 | 3.3 | 1.8 | 3.3 | 2.6 | 0 |
| 3 | ARUBA | AP-ANT-16 | Omni Antenna | RP-SMA | 3.9 | 4.7 | 1.8 | 3.3 | 2.1 | 1.4 |
| 4 | ARUBA | AP-ANT-17 | Directional Antenna | RP-SMA | 6 | 5 | 1.8 | 3.3 | 4.2 | 1.7 |
| 5 | ARUBA | AP-ANT-18 | Directional Antenna | RP-SMA | 7 | 7.5 | 1.8 | 3.3 | 5.2 | 4.2 |
| 6 | ARUBA | AP-ANT-19 | Omni Antenna | RP-SMA | 3 | 6 | 1.8 | 3.3 | 1.2 | 2.7 |
| 7 | ARUBA | AP-ANT-93 | Directional Antenna | RP-SMA | - | 13 | - | 3.3 | - | 9.7 |
| 8 | WNC | - | Embedded Antenna | I-PEX | 4.5 | 6 | 1.8 | 3.3 | 3.5 | 4.5 |

Note 1: There are two types of EUT, one will collocate with external antennas (Ant. 1~Ant. 7) and another will collocate with internal antenna (Ant. 8).

Note 2: Ant. 7 only for IEEE 802.11a/n Band 4 uses.

Note 3: For IEEE 802.11b/g/n:

Ant. 2, Ant. 5 and Ant. 8 were selected to be tested and recorded in the report.

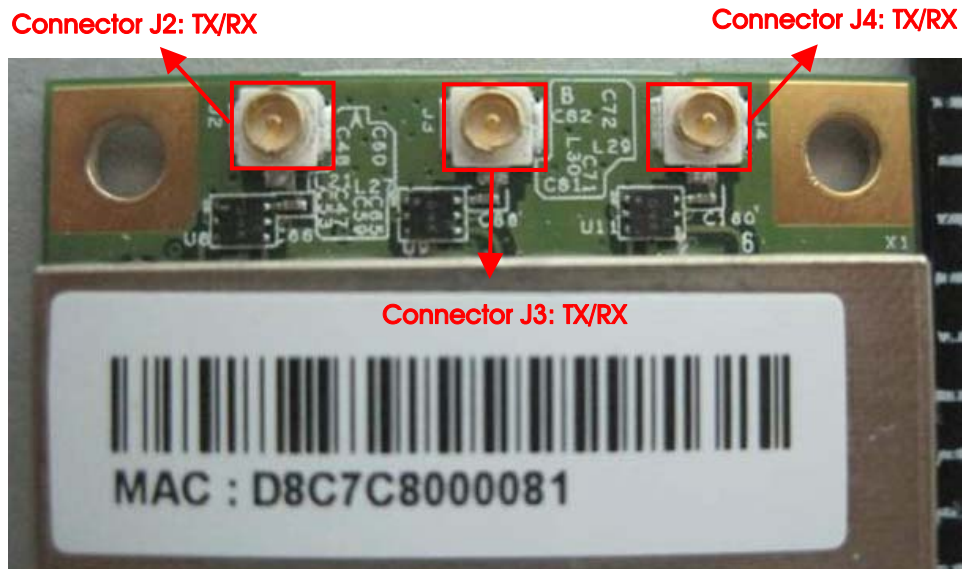
For IEEE 802.11a/n Band 1:

Ant. 5, Ant. 6 and Ant. 8 were selected to be tested and recorded in the report.

For IEEE 802.11a/n Band 4:

Ant. 5, Ant. 6, Ant. 7 and Ant. 8 were selected to be tested and recorded in the report.

Note 4: The EUT has three antenna connectors (Connector J2, J3 and J4) that can be used for transmitting and receiving simultaneously as 3TX and 3RX.



3.4. Table for Carrier Frequencies

For 2.4GHz Band:

For IEEE 802.11b/g, use Channel 1~Channel 11.

There are two bandwidth systems for 802.11n.

For both 20MHz bandwidth systems, use Channel 1~Channel 11.

For both 40MHz bandwidth systems, use Channel 3~Channel 9.

| Frequency Band | Channel No. | Frequency | Channel No. | Frequency |
|----------------|-------------|-----------|-------------|-----------|
| 2400~2483.5MHz | 1 | 2412 MHz | 7 | 2442 MHz |
| | 2 | 2417 MHz | 8 | 2447 MHz |
| | 3 | 2422 MHz | 9 | 2452 MHz |
| | 4 | 2427 MHz | 10 | 2457 MHz |
| | 5 | 2432 MHz | 11 | 2462 MHz |
| | 6 | 2437 MHz | | |

For 5GHz Band:

For IEEE 802.11a, use Channel 36, 40, 44, 48, 149, 153, 157, 161, 165.

There are two bandwidth systems for 802.11n.

For both 20MHz bandwidth systems, use Channel 36, 40, 44, 48, 149, 153, 157, 161, 165.

For both 40MHz bandwidth systems, use Channel 38, 46, 151, 159.

| Frequency Band | Channel No. | Frequency | Channel No. | Frequency |
|-------------------------|-------------|-----------|-------------|-----------|
| 5150~5250 MHz Band 1 | 36 | 5180 MHz | 44 | 5220 MHz |
| | 38 | 5190 MHz | 46 | 5230 MHz |
| | 40 | 5200 MHz | 48 | 5240 MHz |
| 5725~5850 MHz Band 4 | 149 | 5745 MHz | 159 | 5795 MHz |
| | 151 | 5755 MHz | 161 | 5805 MHz |
| | 153 | 5765 MHz | 165 | 5825 MHz |
| | 157 | 5785 MHz | | |

3.5. Table for Test Modes

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

| Test Items | Mode | Antenna |
|-----------------------------------|----------------|-----------|
| AC Power Line Conducted Emissions | Normal Use | - |
| Radiated Emissions | CRX/Normal Use | 2/5/6/7/8 |

Note: CRX=continuously receiving

All the test modes were listed as below:

Mode 1. EUT 1 with external antenna + Adapter

Mode 2. EUT 1 with external antenna + POE

Mode 3. EUT 2 with internal antenna + Adapter

Mode 4. EUT 2 with internal antenna + POE

<For Conducted Emissions Test>:

Due to Mode 1 and Mode 4 generated the worst test result, so both of them were recorded in this report.

<For Radiated Emissions Test>:

Adapter Mode and POE Mode were performed at Horizontal and Vertical and the worst-case was found at Horizontal, thus measurement will follow this same test mode.

Due to Mode 2 and Mode 4 generated the worst test result, so both of them were recorded in this report.

3.6. Table for Testing Locations

| Test Site No. | Site Category | Location | FCC Reg. No. | IC File No. | VCCI Reg. No |
|---------------|---------------|----------|--------------|-------------|--------------|
| 03CH0-CB | SAC | Hwa Ya | 187376 | IC 4086D | - |
| CO01-CB | Conduction | Hwa Ya | 187376 | IC 4086D | - |

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 6 for Test Site Address.

3.7. Table for Multiple Listing

The model names in the following table are all refer to the identical product.

| EUT | Product Name | Model No. | Description |
|-----|--|-----------|---------------------------|
| 1 | ARUBA 134 WIRELESS ACCESS POINT, EXT ANTENNA | AP-134 | EUT with external antenna |
| 2 | ARUBA 135 WIRELESS ACCESS POINT | AP-135 | EUT with internal antenna |

3.8. Table for Supporting Units

| Support Unit | Brand | Model | FCC ID |
|--------------|-------|-----------------|--------------|
| Notebook | DELL | D420 | E2KWM3945ABG |
| Notebook | DELL | D420 | E2KWM3945ABG |
| Notebook | DELL | 1340 | E2K4965AGNM |
| POE | HiPoE | N/A | 9001G |
| Adaptor | LEI | IU18-2120150-WP | DOC |
| Notebook | DELL | D400 | E2K24GBRL |

3.9. EUT Operation during Test

During the test, the following programs under WIN XP were executed:

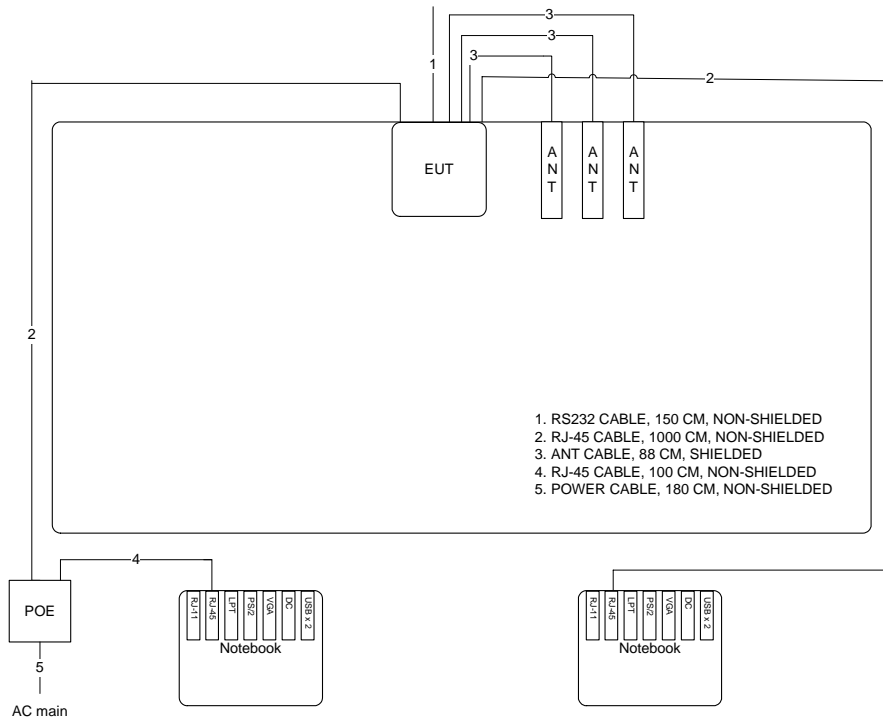
Executed "Hyper Terminal" to link with the remote workstation to receive and transmit data via RJ45 cables via EUT.

Executed "iperf" to receive and transmit data through EUT to notebook.

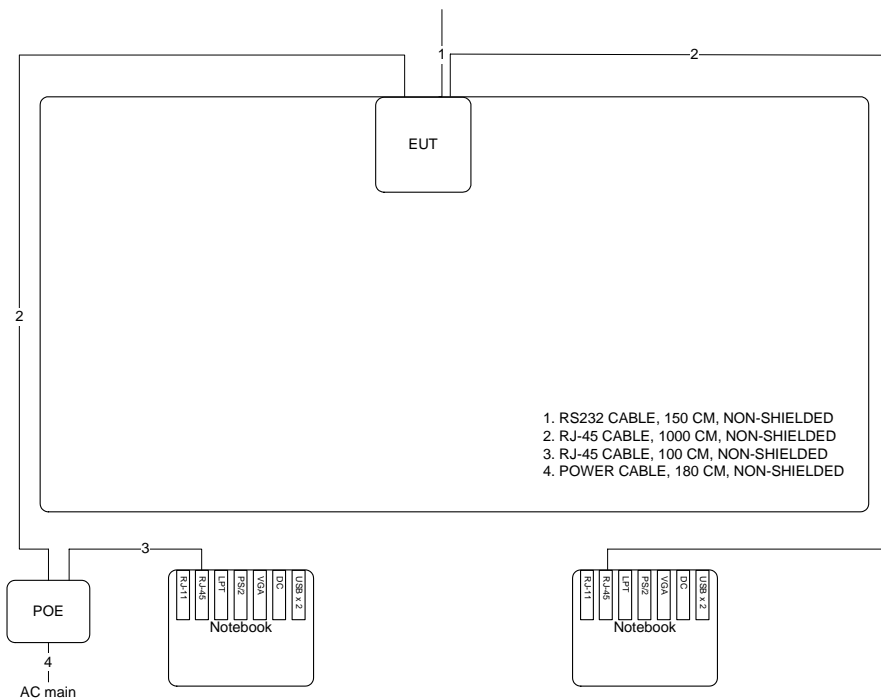
3.10. Test Configurations

3.10.1. Radiation Emissions Test Configuration

Test Mode: Mode 2

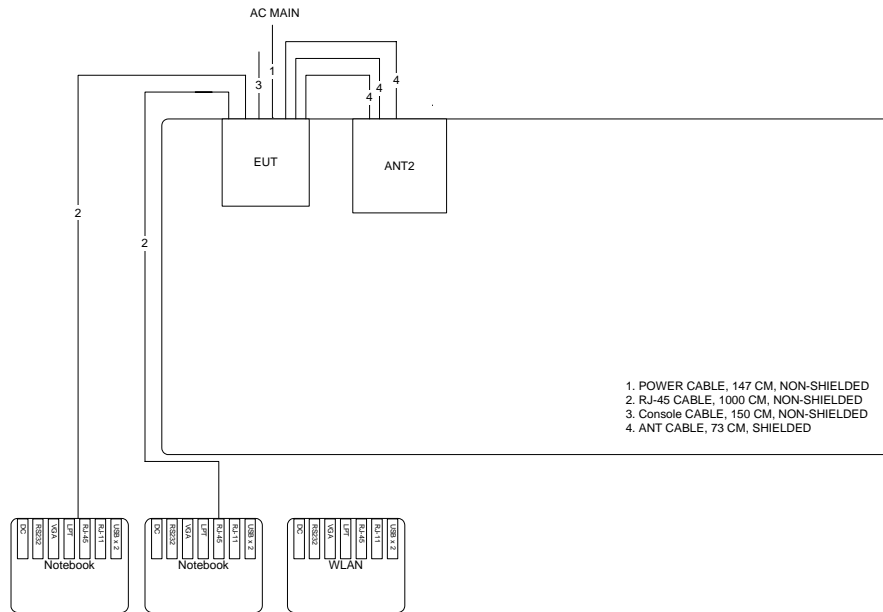


Test Mode: Mode 4

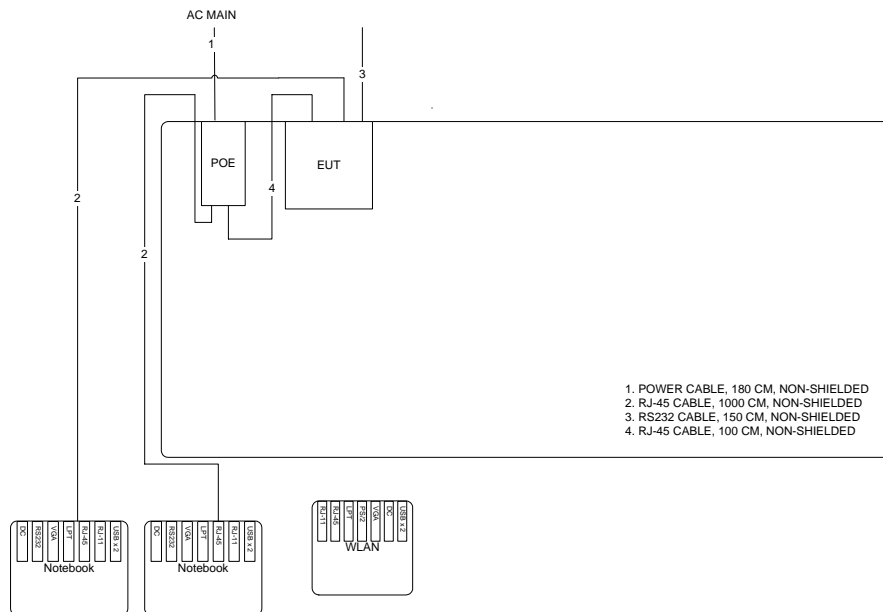


3.10.2.AC Power Line Conduction Emissions Test Configuration

Test Mode: Mode 1



Test Mode: Mode 4



4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. 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.

| 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 |

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 receiver.

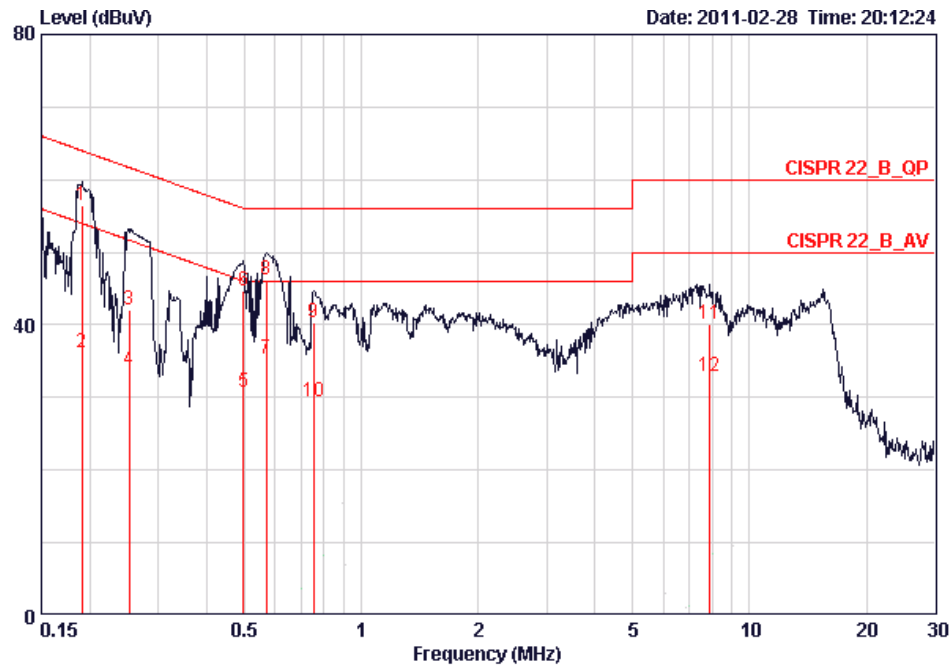
| Receiver Parameters | Setting |
|---------------------|----------|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 KHz |

4.1.3. 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 EUT or host of EUT to the power mains through a line 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 between each power line and ground at the power terminal.

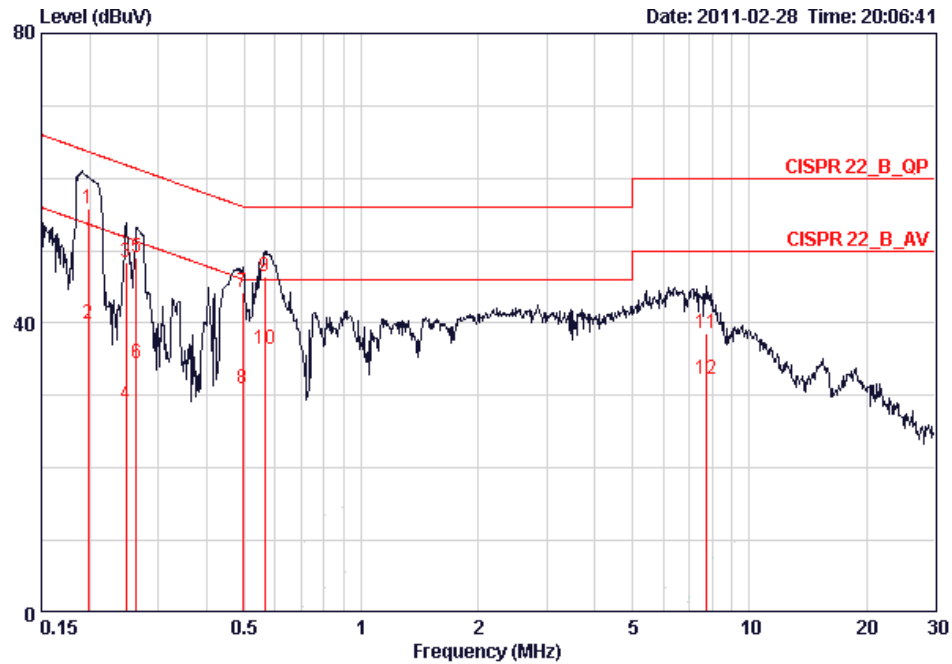
4.1.6. Results of AC Power Line Conducted Emissions Measurement

| | | | |
|---------------|----------------------|----------|------|
| Temperature | 21°C | Humidity | 58% |
| Test Engineer | Ryo Fan | Phase | Line |
| Configuration | Normal Link / Mode 1 | | |



| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|----|---------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.19039 | 56.49 | -7.53 | 64.02 | 56.24 | 0.05 | 0.20 | QP |
| 2 | 0.19039 | 36.18 | -17.84 | 54.02 | 35.93 | 0.05 | 0.20 | AVERAGE |
| 3 | 0.25211 | 42.01 | -19.67 | 61.69 | 41.77 | 0.04 | 0.20 | QP |
| 4 | 0.25211 | 33.81 | -17.87 | 51.69 | 33.57 | 0.04 | 0.20 | AVERAGE |
| 5 | 0.49673 | 30.81 | -15.25 | 46.05 | 30.60 | 0.03 | 0.18 | AVERAGE |
| 6 | 0.49673 | 44.67 | -11.39 | 56.05 | 44.46 | 0.03 | 0.18 | QP |
| 7 | 0.57010 | 35.33 | -10.67 | 46.00 | 35.10 | 0.03 | 0.20 | AVERAGE |
| 8 | 0.57010 | 46.24 | -9.76 | 56.00 | 46.01 | 0.03 | 0.20 | QP |
| 9 | 0.75493 | 40.35 | -15.65 | 56.00 | 40.12 | 0.03 | 0.20 | QP |
| 10 | 0.75493 | 29.40 | -16.60 | 46.00 | 29.17 | 0.03 | 0.20 | AVERAGE |
| 11 | 7.893 | 40.05 | -19.95 | 60.00 | 39.37 | 0.28 | 0.40 | QP |
| 12 | 7.893 | 32.93 | -17.07 | 50.00 | 32.25 | 0.28 | 0.40 | AVERAGE |

| | | | |
|---------------|----------------------|----------|---------|
| Temperature | 21°C | Humidity | 58% |
| Test Engineer | Ryo Fan | Phase | Neutral |
| Configuration | Normal Link / Mode 1 | | |

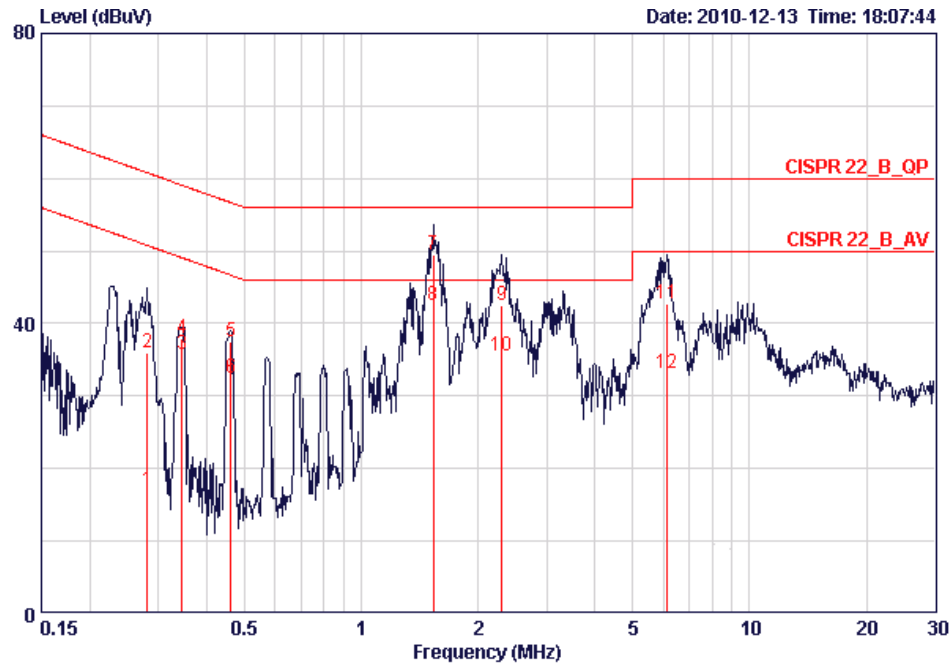


| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|----|---------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.19789 | 55.81 | -7.89 | 63.70 | 55.53 | 0.08 | 0.20 | QP |
| 2 | 0.19789 | 39.98 | -13.72 | 53.70 | 39.70 | 0.08 | 0.20 | AVERAGE |
| 3 | 0.24814 | 48.36 | -13.46 | 61.82 | 48.08 | 0.08 | 0.20 | QP |
| 4 | 0.24814 | 28.80 | -23.02 | 51.82 | 28.52 | 0.08 | 0.20 | AVERAGE |
| 5 | 0.26303 | 49.08 | -12.26 | 61.34 | 48.80 | 0.08 | 0.20 | QP |
| 6 | 0.26303 | 34.40 | -16.94 | 51.34 | 34.12 | 0.08 | 0.20 | AVERAGE |
| 7 | 0.49411 | 44.33 | -11.77 | 56.10 | 44.08 | 0.07 | 0.18 | QP |
| 8 | 0.49411 | 31.00 | -15.10 | 46.10 | 30.75 | 0.07 | 0.18 | AVERAGE |
| 9 | 0.56409 | 46.52 | -9.48 | 56.00 | 46.25 | 0.07 | 0.20 | QP |
| 10 | 0.56409 | 36.48 | -9.52 | 46.00 | 36.21 | 0.07 | 0.20 | AVERAGE |
| 11 | 7.769 | 38.51 | -21.49 | 60.00 | 37.79 | 0.32 | 0.40 | QP |
| 12 | 7.769 | 32.22 | -17.78 | 50.00 | 31.50 | 0.32 | 0.40 | AVERAGE |

Note:

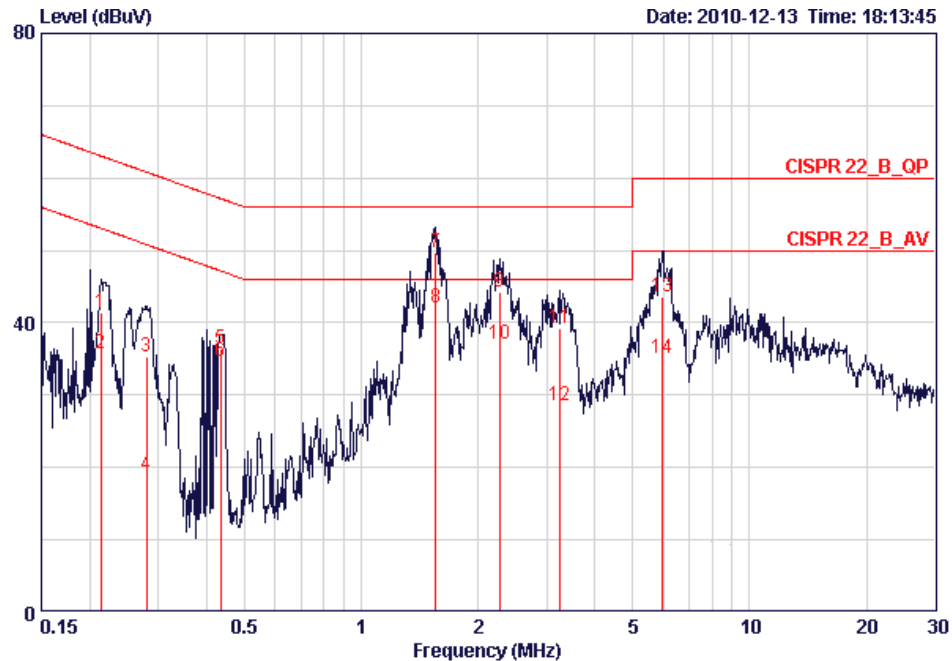
Level = Read Level + LISN Factor + Cable Loss.

| | | | |
|---------------|----------------------|----------|------|
| Temperature | 21°C | Humidity | 58% |
| Test Engineer | Ryo Fan | Phase | Line |
| Configuration | Normal Link / Mode 4 | | |



| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|----|---------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.28178 | 17.03 | -33.73 | 50.76 | 16.79 | 0.04 | 0.20 | AVERAGE |
| 2 | 0.28178 | 35.99 | -24.77 | 60.76 | 35.75 | 0.04 | 0.20 | QP |
| 3 | 0.34463 | 35.74 | -13.35 | 49.09 | 35.51 | 0.03 | 0.20 | AVERAGE |
| 4 | 0.34463 | 37.87 | -21.22 | 59.09 | 37.64 | 0.03 | 0.20 | QP |
| 5 | 0.46122 | 37.59 | -19.08 | 56.67 | 37.36 | 0.03 | 0.20 | QP |
| 6 | 0.46122 | 32.48 | -14.19 | 46.67 | 32.25 | 0.03 | 0.20 | AVERAGE |
| 7 | 1.535 | 49.55 | -6.45 | 56.00 | 49.40 | 0.04 | 0.11 | QP |
| 8 | 1.535 | 42.51 | -3.49 | 46.00 | 42.36 | 0.04 | 0.11 | AVERAGE |
| 9 | 2.297 | 42.47 | -13.53 | 56.00 | 42.21 | 0.06 | 0.20 | QP |
| 10 | 2.297 | 35.50 | -10.50 | 46.00 | 35.24 | 0.06 | 0.20 | AVERAGE |
| 11 | 6.153 | 42.76 | -17.24 | 60.00 | 42.21 | 0.22 | 0.34 | QP |
| 12 | 6.153 | 33.23 | -16.77 | 50.00 | 32.68 | 0.22 | 0.34 | AVERAGE |

| | | | |
|---------------|----------------------|----------|---------|
| Temperature | 21°C | Humidity | 58% |
| Test Engineer | Ryo Fan | Phase | Neutral |
| Configuration | Normal Link / Mode 4 | | |



| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|----|---------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.21392 | 41.52 | -21.53 | 63.05 | 41.24 | 0.08 | 0.20 | QP |
| 2 | 0.21392 | 35.72 | -17.33 | 53.05 | 35.44 | 0.08 | 0.20 | AVERAGE |
| 3 | 0.28029 | 35.35 | -25.46 | 60.81 | 35.07 | 0.08 | 0.20 | QP |
| 4 | 0.28029 | 19.03 | -31.78 | 50.81 | 18.75 | 0.08 | 0.20 | AVERAGE |
| 5 | 0.43511 | 36.47 | -20.68 | 57.15 | 36.20 | 0.07 | 0.20 | QP |
| 6 | 0.43511 | 34.62 | -12.53 | 47.15 | 34.35 | 0.07 | 0.20 | AVERAGE |
| 7 | 1.552 | 49.76 | -6.24 | 56.00 | 49.57 | 0.08 | 0.11 | QP |
| 8 | 1.552 | 42.04 | -3.96 | 46.00 | 41.85 | 0.08 | 0.11 | AVERAGE |
| 9 | 2.273 | 44.24 | -11.76 | 56.00 | 43.94 | 0.10 | 0.20 | QP |
| 10 | 2.273 | 37.14 | -8.86 | 46.00 | 36.84 | 0.10 | 0.20 | AVERAGE |
| 11 | 3.241 | 39.34 | -16.66 | 56.00 | 38.96 | 0.12 | 0.25 | QP |
| 12 | 3.241 | 28.54 | -17.46 | 46.00 | 28.16 | 0.12 | 0.25 | AVERAGE |
| 13 | 5.961 | 43.65 | -16.35 | 60.00 | 43.10 | 0.25 | 0.30 | QP |
| 14 | 5.961 | 35.01 | -14.99 | 50.00 | 34.46 | 0.25 | 0.30 | AVERAGE |

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Radiated Emissions Measurement

4.2.1. Limit

Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 MHz to 5th harmonic of highest frequency. The quasi-peak measuring receiver shall be in accordance with clause 2 of CISPR 16-1. Receivers with peak detectors shall be in accordance with clause 3 of CISPR 16-1, and shall have a 6 dB bandwidth in accordance with clause 2 of CISPR 16-1.

| Frequency of Emission (MHz) | Field Strength QP Limit (dBuV/m) at 3m |
|-----------------------------|--|
| 30~88 | 40 |
| 88~216 | 43.5 |
| 216~960 | 46 |
| Above 960 | 54 |

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 spectrum analyzer and receiver.

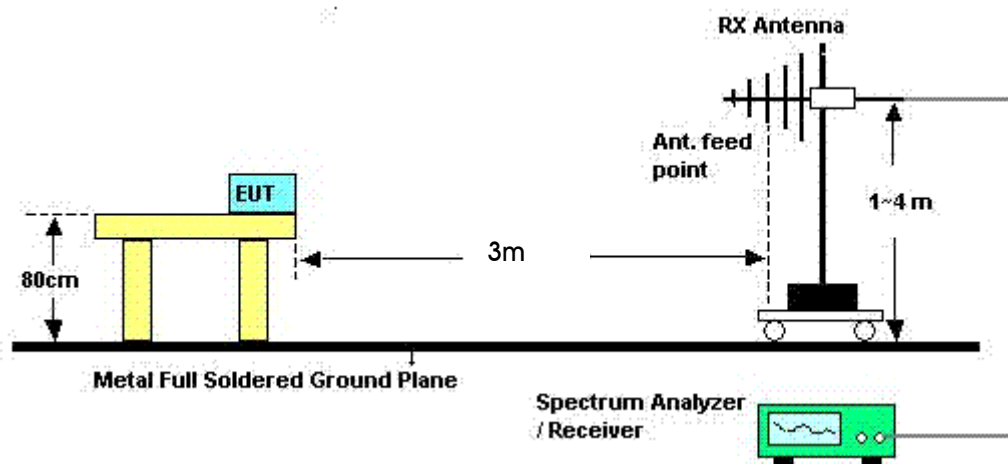
| Receiver Parameter | Setting |
|------------------------|----------------------------------|
| Attenuation | Auto |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

| Spectrum Parameter | Setting |
|--------------------|-----------------------------------|
| Start Frequency | 1000 MHz |
| Stop Frequency | 5th harmonic of highest frequency |
| RB / VB | 1 MHz / 1MHz for Peak |

4.2.3. Test Procedures

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.

4.2.4. Test Setup Layout



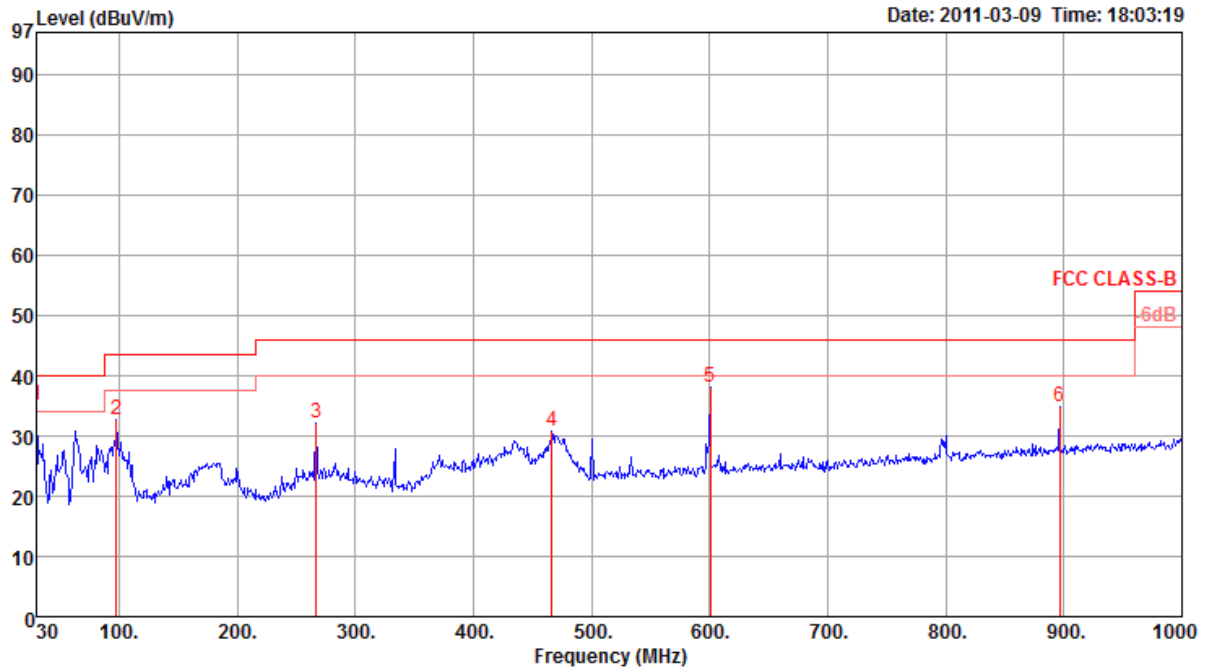
4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. Results of Radiated Emissions (30MHz~1GHz)

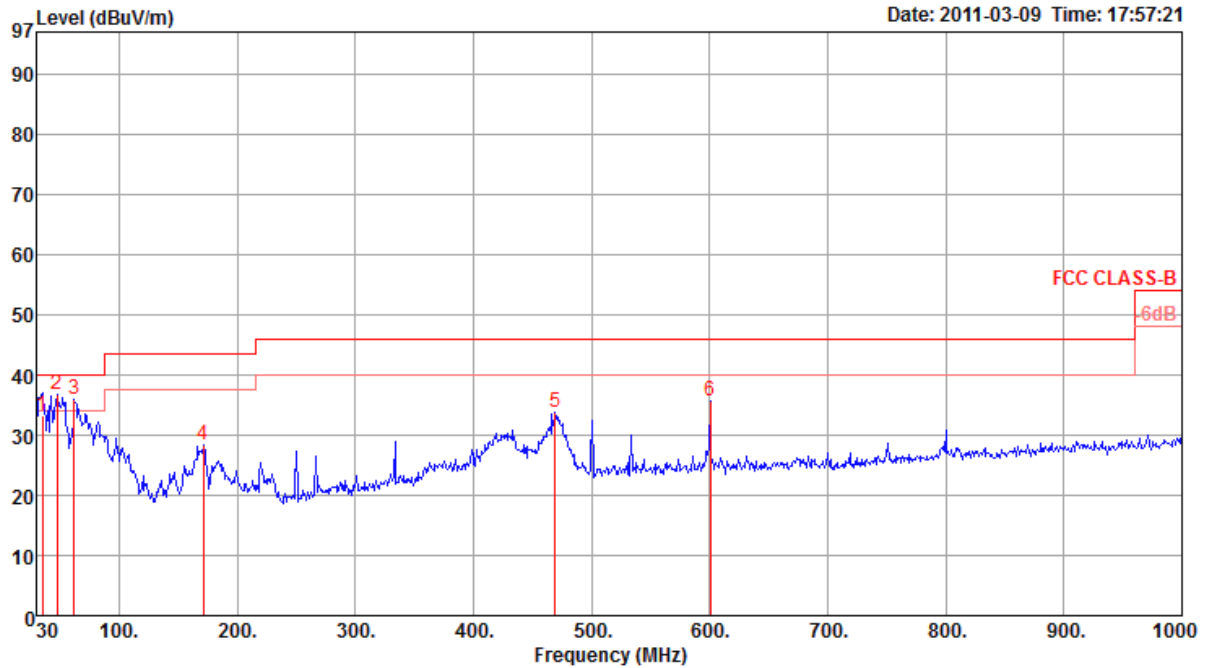
| | | | |
|---------------|---------|----------------|----------------------|
| Temperature | 23°C | Humidity | 61% |
| Test Engineer | Sean Ku | Configurations | Normal Link / Mode 2 |

Horizontal



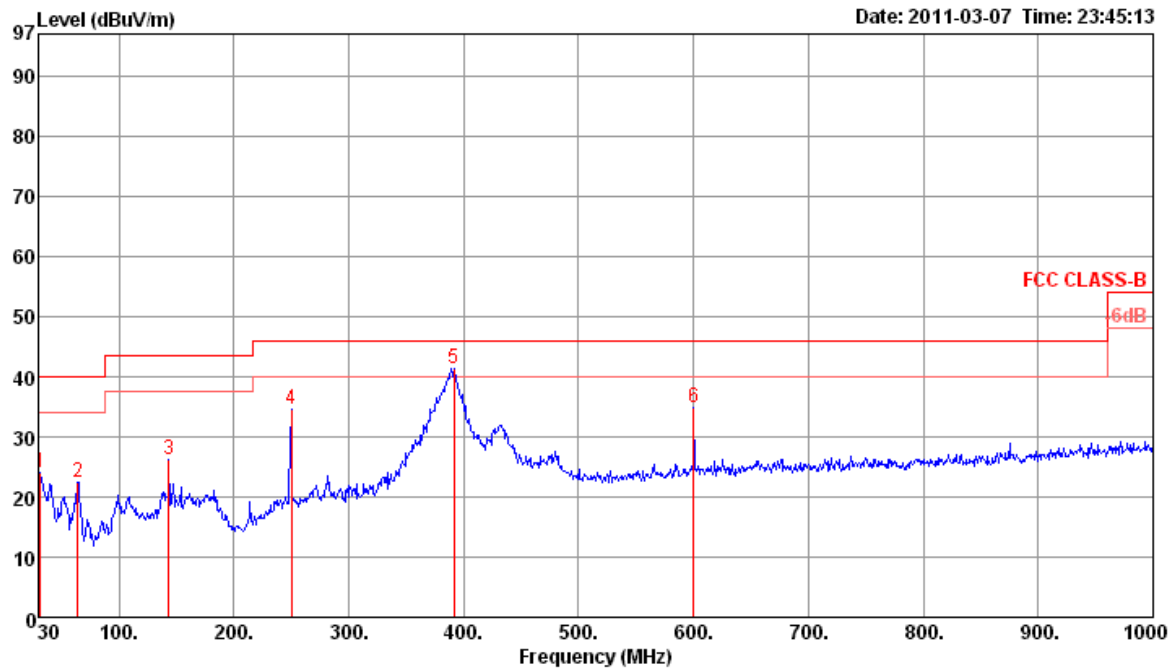
| | Freq | Level | Limit | Over | Read | Cable | Preamp | Antenna | T/Pos | A/Pos | Remark | Pol/Phase |
|-----|--------|--------|--------|--------|-------|-------|--------|---------|-------|-------|--------|------------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB | dB/m | deg | cm | | |
| 1 p | 30.00 | 35.03 | 40.00 | -4.97 | 43.92 | 0.50 | 27.80 | 18.41 | 0 | 100 | Peak | HORIZONTAL |
| 2 | 97.90 | 32.74 | 43.50 | -10.76 | 48.76 | 1.16 | 27.61 | 10.43 | 0 | 100 | Peak | HORIZONTAL |
| 3 | 266.68 | 32.16 | 46.00 | -13.84 | 44.23 | 1.97 | 26.97 | 12.93 | 0 | 100 | Peak | HORIZONTAL |
| 4 | 466.50 | 30.81 | 46.00 | -15.19 | 38.99 | 2.63 | 27.93 | 17.12 | 0 | 100 | Peak | HORIZONTAL |
| 5 | 600.36 | 38.12 | 46.00 | -7.88 | 44.50 | 2.90 | 28.10 | 18.82 | 0 | 100 | Peak | HORIZONTAL |
| 6 | 896.21 | 34.84 | 46.00 | -11.16 | 37.53 | 3.58 | 27.41 | 21.14 | 0 | 100 | Peak | HORIZONTAL |

Vertical



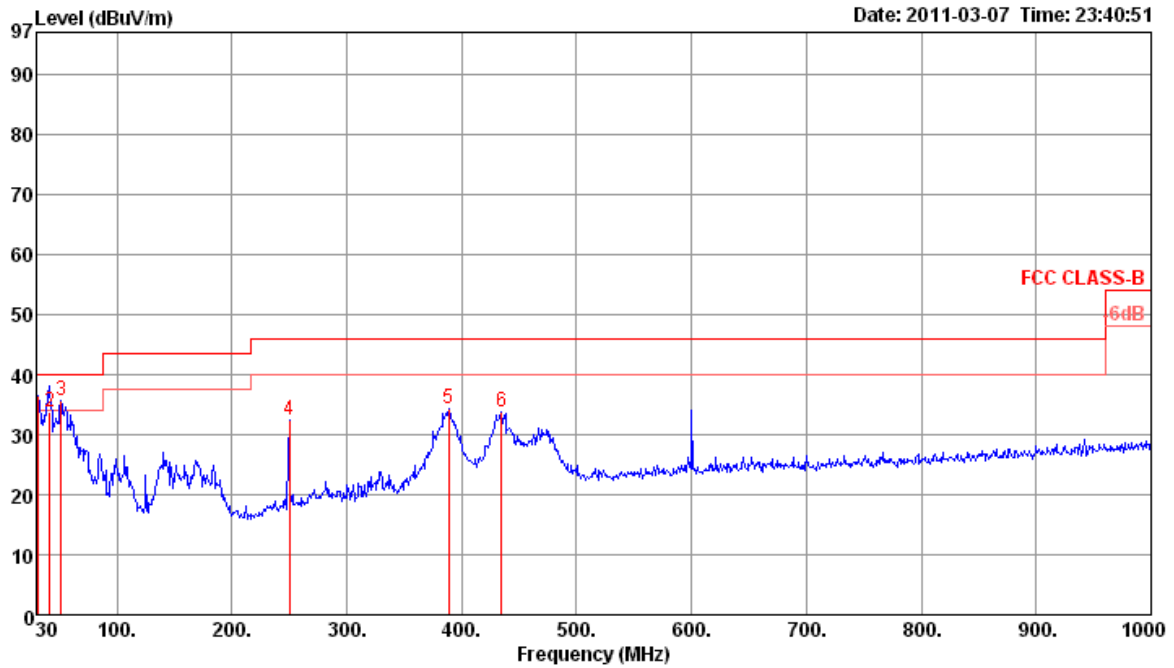
| | Freq | Level | Limit | Over | Read | Cable | Preamp | Antenna | T/Pos | A/Pos | Remark | Pol/Phase |
|---|--------|--------|--------|--------|-------|-------|--------|---------|-------|-------|--------|-----------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB | dB/m | deg | cm | | |
| 1 | 34.85 | 33.30 | 40.00 | -6.70 | 45.27 | 0.50 | 27.80 | 15.33 | 256 | 135 | QP | VERTICAL |
| 2 | 47.46 | 36.87 | 40.00 | -3.13 | 55.47 | 0.70 | 27.80 | 8.50 | 0 | 400 | Peak | VERTICAL |
| 3 | 62.01 | 36.03 | 40.00 | -3.97 | 56.67 | 0.84 | 27.75 | 6.27 | 0 | 400 | Peak | VERTICAL |
| 4 | 171.62 | 28.37 | 43.50 | -15.13 | 44.73 | 1.56 | 27.24 | 9.32 | 0 | 400 | Peak | VERTICAL |
| 5 | 469.41 | 33.86 | 46.00 | -12.14 | 42.01 | 2.64 | 27.95 | 17.16 | 0 | 400 | Peak | VERTICAL |
| 6 | 600.36 | 35.78 | 46.00 | -10.22 | 42.16 | 2.90 | 28.10 | 18.82 | 0 | 400 | Peak | VERTICAL |

| | | | |
|---------------|---------|----------------|----------------------|
| Temperature | 23°C | Humidity | 61% |
| Test Engineer | Sean Ku | Configurations | Normal Link / Mode 4 |

Horizontal


| | Freq | Level | Limit | Over | Read | Cable | Preamp | Antenna | T/Pos | A/Pos | Remark | Pol/Phase |
|---|--------|--------|--------|--------|-------|-------|--------|---------|-------|-------|--------|------------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB | dB/m | deg | cm | | |
| 1 | 31.94 | 24.02 | 40.00 | -15.98 | 33.63 | 0.50 | 27.80 | 17.69 | 0 | 100 | Peak | HORIZONTAL |
| 2 | 63.95 | 22.54 | 40.00 | -17.46 | 42.68 | 0.88 | 27.74 | 6.72 | 0 | 100 | Peak | HORIZONTAL |
| 3 | 143.49 | 26.10 | 43.50 | -17.40 | 39.89 | 1.42 | 27.38 | 12.17 | 0 | 100 | Peak | HORIZONTAL |
| 4 | 250.19 | 34.53 | 46.00 | -11.47 | 46.86 | 1.90 | 27.00 | 12.77 | 0 | 100 | Peak | HORIZONTAL |
| 5 | 391.81 | 41.35 | 46.00 | -4.65 | 50.77 | 2.28 | 27.55 | 15.85 | 0 | 100 | Peak | HORIZONTAL |
| 6 | 600.36 | 34.72 | 46.00 | -11.28 | 41.15 | 2.90 | 28.10 | 18.77 | 0 | 100 | Peak | HORIZONTAL |

Vertical



| | Freq | Level | Limit | Over | Read | Cable | Preamp | Antenna | T/Pos | A/Pos | Remark | Pol/Phase |
|-----|--------|--------|--------|--------|-------|-------|--------|---------|-------|-------|--------|-----------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB | dB/m | deg | cm | | |
| 1 p | 30.97 | 36.59 | 40.00 | -3.41 | 45.67 | 0.50 | 27.80 | 18.22 | 0 | 400 | Peak | VERTICAL |
| 2 q | 41.63 | 33.89 | 40.00 | -6.11 | 49.00 | 0.70 | 27.80 | 11.99 | 178 | 100 | QP | VERTICAL |
| 3 † | 51.34 | 35.66 | 40.00 | -4.34 | 54.38 | 0.72 | 27.79 | 8.35 | 0 | 400 | Peak | VERTICAL |
| 4 | 250.19 | 32.53 | 46.00 | -13.47 | 44.86 | 1.90 | 27.00 | 12.77 | 0 | 400 | Peak | VERTICAL |
| 5 | 388.90 | 34.33 | 46.00 | -11.67 | 43.80 | 2.28 | 27.52 | 15.77 | 0 | 400 | Peak | VERTICAL |
| 6 | 434.49 | 33.70 | 46.00 | -12.30 | 42.36 | 2.51 | 27.77 | 16.60 | 0 | 400 | Peak | VERTICAL |

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.2.7. Results for Radiated Emissions (1GHz~5th harmonic of highest frequency)

| | | | |
|----------------------|---------------|-----------------------|----------------------|
| Temperature | 23°C | Humidity | 61% |
| Test Engineer | Sean Ku | Configurations | Normal Link / Mode 2 |
| Test Date | Mar. 10, 2011 | | |

Horizontal

| | Freq | Level | Limit | Over | Read | Cable | Preamp | Antenna | T/Pos | A/Pos | Remark | Pol/Phase |
|-----|---------|--------|--------|--------|-------|-------|--------|---------|-------|-------|---------|------------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB | dB/m | deg | cm | | |
| 1 p | 1496.29 | 45.23 | 74.00 | -28.77 | 52.90 | 1.56 | 34.73 | 25.50 | 200 | 100 | Peak | HORIZONTAL |
| 2 a | 1498.12 | 34.91 | 54.00 | -19.09 | 42.59 | 1.57 | 34.75 | 25.50 | 200 | 100 | Average | HORIZONTAL |

Vertical

| | Freq | Level | Limit | Over | Read | Cable | Preamp | Antenna | T/Pos | A/Pos | Remark | Pol/Phase |
|-----|---------|--------|--------|--------|-------|-------|--------|---------|-------|-------|---------|-----------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB | dB/m | deg | cm | | |
| 1 p | 1496.38 | 45.11 | 74.00 | -28.89 | 52.78 | 1.56 | 34.73 | 25.50 | 280 | 121 | Peak | VERTICAL |
| 2 a | 1497.39 | 42.00 | 54.00 | -12.00 | 49.68 | 1.57 | 34.75 | 25.50 | 280 | 121 | Average | VERTICAL |

| | | | |
|----------------------|---------------|-----------------------|----------------------|
| Temperature | 23°C | Humidity | 61% |
| Test Engineer | Sean Ku | Configurations | Normal Link / Mode 4 |
| Test Date | Feb. 11, 2011 | | |

Horizontal

| | Freq | Level | Limit Line | Over Limit | Read Level | CableAntenna Loss | Antenna Factor | Preamp Factor | T/Pos | A/Pos | Remark | Pol/Phase |
|---|---------|--------|------------|------------|------------|-------------------|----------------|---------------|-------|-------|---------|------------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB/m | dB | deg | cm | | |
| 1 | 3863.27 | 42.59 | 54.00 | -11.41 | 43.10 | 2.84 | 31.81 | 35.16 | 14 | 127 | Average | HORIZONTAL |
| 2 | 3863.29 | 46.83 | 74.00 | -27.17 | 47.34 | 2.84 | 31.81 | 35.16 | 14 | 127 | Peak | HORIZONTAL |

Vertical

| | Freq | Level | Limit Line | Over Limit | Read Level | CableAntenna Loss | Antenna Factor | Preamp Factor | T/Pos | A/Pos | Remark | Pol/Phase |
|---|---------|--------|------------|------------|------------|-------------------|----------------|---------------|-------|-------|---------|-----------|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB/m | dB | deg | cm | | |
| 1 | 3863.17 | 44.73 | 74.00 | -29.27 | 45.24 | 2.84 | 31.81 | 35.16 | 328 | 101 | Peak | VERTICAL |
| 2 | 3863.33 | 38.31 | 54.00 | -15.69 | 38.82 | 2.84 | 31.81 | 35.16 | 328 | 101 | Average | VERTICAL |

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5. LIST OF MEASURING EQUIPMENTS

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|-------------------|--------------|------------------|-------------|------------------|------------------|-----------------------|
| EMI Test Receiver | R&S | ESCS 30 | 100377 | 9kHz ~ 2.75GHz | Sep. 01, 2010 | Conduction (CO01-CB) |
| LISN | F.C.C. | FCC-LISN-50-16-2 | 04083 | 150kHz ~ 100MHz | Apr. 24, 2010 | Conduction (CO01-CB) |
| V- LISN | Schwarzbeck | NSLK 8127 | 8127-478 | 9K ~ 30MHz | Oct. 30, 2010 | Conduction (CO01-CB) |
| PULSE LIMITER | R&S | ESH3-Z2 | 100430 | 9K~30MHz | Jan. 04, 2010 | Conduction (CO01-CB) |
| PULSE LIMITER | R&S | ESH3-Z2 | 100430 | 9K~30MHz | Jan. 04, 2011 | Conduction (CO01-CB) |
| COND Cable | - | Cable | - | 0.15MHz~30MHz | Dec. 01, 2010 | Conduction (CO01-CB) |
| BILOG ANTENNA | Schaffner | CBL6112D | 22021 | 20MHz ~ 2GHz | Oct. 17, 2010 | Radiation (03CH01-CB) |
| Horn Antenna | EMCO | 3115 | 00075790 | 750MHz~18GHz | Nov. 13, 2010 | Radiation (03CH01-CB) |
| Horn Antenna | SCHWARZBEAK | BBHA 9170 | BBHA9170252 | 15GHz ~ 40GHz | Oct. 08, 2010 | Radiation (03CH01-CB) |
| Pre-Amplifier | Agilent | 8447D | 2944A10991 | 0.1MHz ~ 1.3GHz | Nov. 17, 2010 | Radiation (03CH01-CB) |
| Pre-Amplifier | Agilent | 8449B | 3008A02310 | 1GHz ~ 26.5GHz | Nov. 06, 2010 | Radiation (03CH01-CB) |
| Pre-Amplifier | WM | TF-130N-R1 | 923365 | 26.5GHz ~ 40GHz | Nov. 17, 2010 | Radiation (03CH01-CB) |
| Spectrum analyzer | R&S | FSP | 100304 | 9kHz ~ 40GHz | Nov. 06, 2010 | Radiation (03CH01-CB) |
| EMI Test Receiver | R&S | ESCS 30 | 100355 | 9KHz ~ 2.75GHz | Mar. 06, 2010 | Radiation (03CH01-CB) |
| EMI Test Receiver | R&S | ESCS 30 | 100355 | 9KHz ~ 2.75GHz | Mar. 06, 2011 | Radiation (03CH01-CB) |
| Loop Antenna | R&S | HFH2-Z2 | 860004/001 | 9 kHz - 30 MHz | Sep. 09, 2010* | Radiation (03CH01-CB) |
| Turn Table | INN CO | CO 2000 | N/A | 0 ~ 360 degree | N/A | Radiation (03CH01-CB) |
| Antenna Mast | INN CO | CO2000 | N/A | 1 m - 4 m | N/A | Radiation (03CH01-CB) |
| RF Cable-low | Woken | Low Cable-1 | - | 30 MHz - 1 GHz | Nov. 17, 2010 | Radiation (03CH01-CB) |
| RF Cable-high | Woken | High Cable-1 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Radiation (03CH01-CB) |
| RF Cable-high | Woken | High Cable-2 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Radiation (03CH01-CB) |
| RF Cable-high | Woken | High Cable-3 | - | 1 GHz - 40 GHz | Nov. 17, 2010 | Radiation (03CH01-CB) |
| RF Cable-high | Woken | High Cable-4 | - | 1 GHz - 40 GHz | Nov. 17, 2010 | Radiation (03CH01-CB) |

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

* Calibration Interval of instruments listed above is two year.

NCR means Non-Calibration required.

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 2 nd 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. : L1190-091230

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 Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities |

Jay-san Chen

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : December 30, 2009

PI, total 22 pages

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

Appendix A. Test Photos

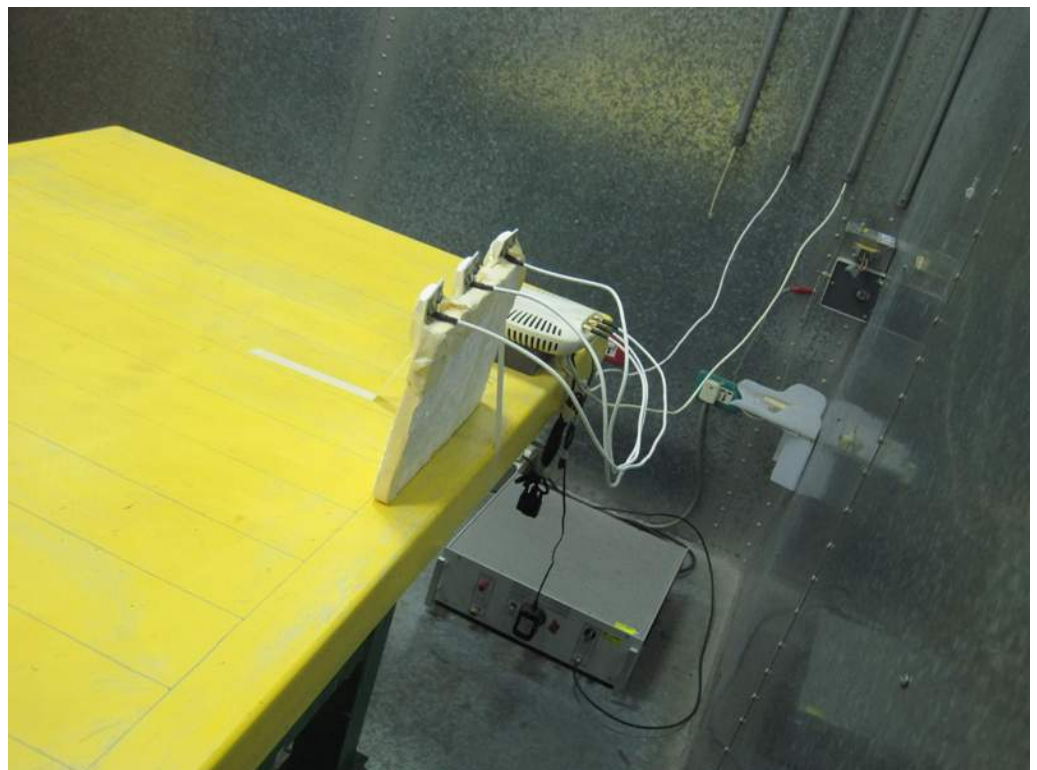
1. Photographs of Conducted Emissions Test Configuration

Test Mode: Mode 1

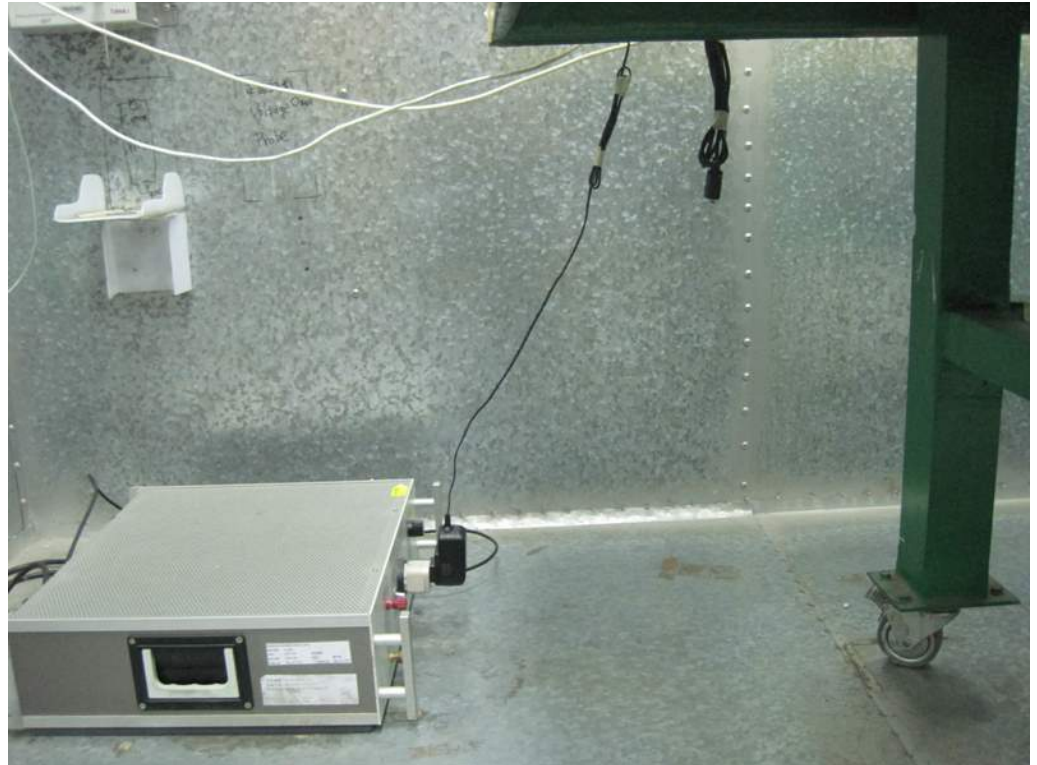
FRONT VIEW



REAR VIEW



SIDE VIEW

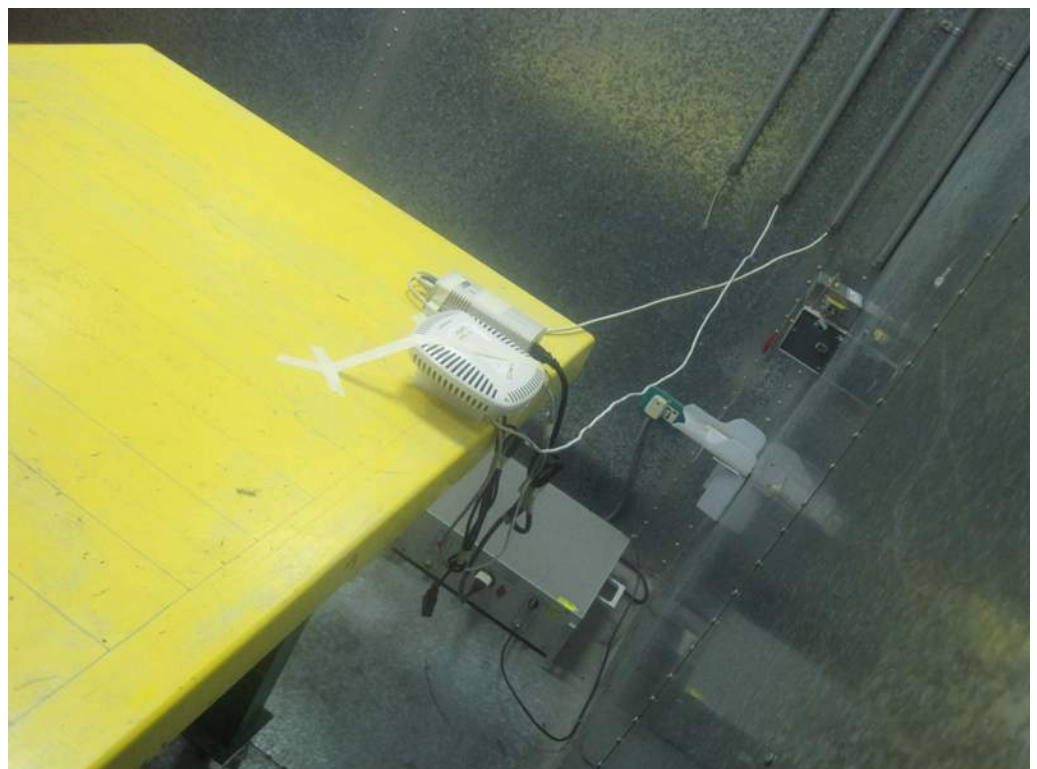


Test Mode: Mode 4

FRONT VIEW



REAR VIEW



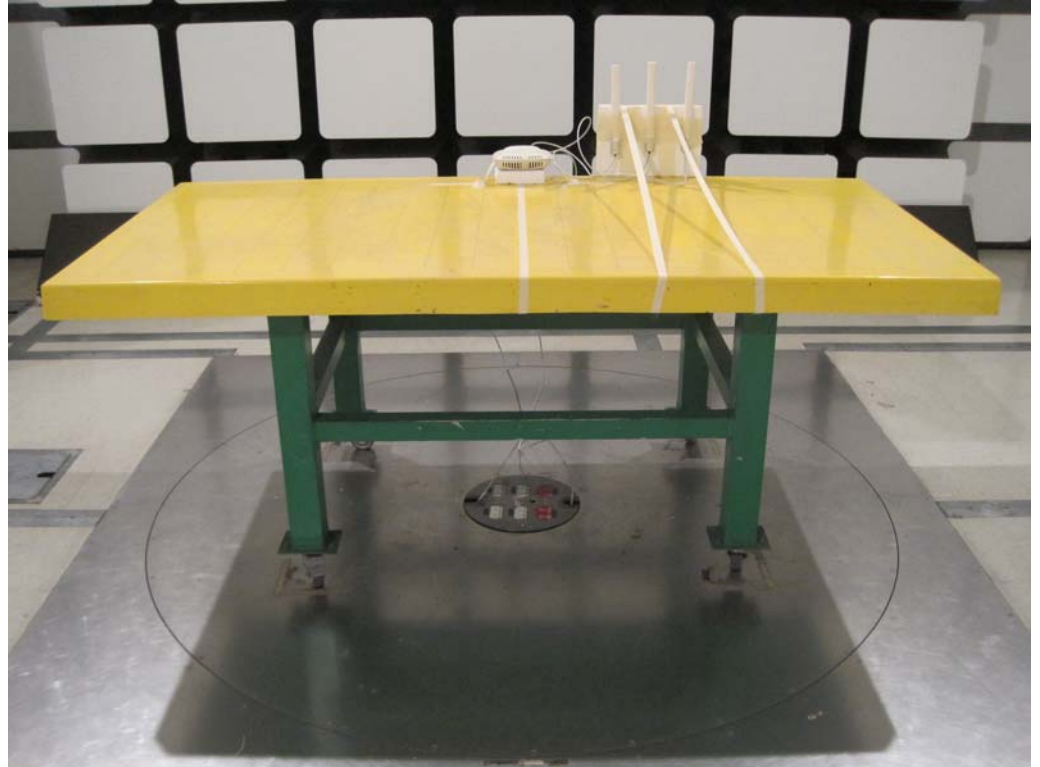
SIDE VIEW



2. Photographs of Radiated Emissions Test Configuration

Test Mode: Mode 2

FRONT VIEW



REAR VIEW



Test Mode: Mode 4

FRONT VIEW



REAR VIEW

