**SPORTON International Inc.**
**No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.**
**Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw**

# FCC RADIO TEST REPORT

| | |
|---|---|
| Applicant's company | **Libratone A/S** |
| Applicant Address | Mileparken 20E, 2740 Skovlunde, Denmark |
| FCC ID | **Y2SBEATLT100** |
| Manufacturer's company | **Libratone A/S** |
| Manufacturer Address | Mileparken 20E, 2740 Skovlunde, Denmark |

| | |
|---|---|
| Product Name | Libratone Beat |
| Brand Name | Libratone |
| Model Name | BEATLT100 |
| Test Rule | 47 CFR FCC Part 15 Subpart C § 15.247 |
| Test Freq. Range | 2400 ~ 2483.5MHz |
| Received Date | Nov. 26, 2010 |
| Final Test Date | Jan. 19, 2011 |
| Submission Type | Original Equipment |

## 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 C63.10-2009**, **47 CFR FCC Part 15 Subpart C and FCC Public Notice DA00705**.

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

Testing Laboratory
1190

**ILAC MRA**

# Table of Contents

# History of This Test Report

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FR0N2625 | Rev. 01 | Initial issue of report | May 18, 2011 |
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Certificate No.: CB10003026

# 1. CERTIFICATE OF COMPLIANCE

| | | |
|---|---|---|
| **Product Name** | : | **Libratone Beat** |
| **Brand Name** | : | **Libratone** |
| **Model Name** | : | **BEATLT100** |
| **Applicant** | : | **Libratone A/S** |
| **Test Rule Part(s)** | : | **47 CFR FCC Part 15 Subpart C § 15.247** |

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Nov. 26, 2010 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Jordan Hsiao 2011.5.18

**Jordan Hsiao**

**SPORTON INTERNATIONAL INC.**

## 2. SUMMARY OF THE TEST RESULT

| Applied Standard: 47 CFR FCC Part 15 Subpart C | | | | |
|---|---|---|---|---|
| **Part** | **Rule Section** | **Description of Test** | **Result** | **Under Limit** |
| 4.1 | 15.207 | AC Power Line Conducted Emissions | Complies | 0.92 dB |
| 4.2 | 15.247(b)(1) | Maximum Peak Conducted Output Power | Complies | 1.11 dB |
| 4.3 | 15.247(a)(1) | Hopping Channel Separation | Complies | - |
| 4.4 | 15.247(b)(1) | Number of Hopping Frequency | Complies | - |
| 4.5 | 15.247(a)(1) | Dwell Time | Complies | - |
| 4.6 | 15.247(d) | Radiated Emissions | Complies | 3.05 dB |
| 4.7 | 15.247(d) | Band Edge Emissions | Complies | 7.59 dB |
| 4.8 | 15.203 | Antenna Requirements | Complies | - |

| Test Items | Uncertainty | Remark |
|---|---|---|
| AC Power Line Conducted Emissions | ±2.3dB | Confidence levels of 95% |
| Maximum Peak Conducted Output Power | ±0.8dB | Confidence levels of 95% |
| Hopping Channel Separation | $\pm 8.5\times10^{-8}$ | Confidence levels of 95% |
| Radiated Emissions (9kHz~30MHz) | ±0.8dB | Confidence levels of 95% |
| Radiated Emissions (30MHz~1000MHz) | ±1.9dB | Confidence levels of 95% |
| Radiated / Band Edge Emissions (1GHz~18GHz) | ±1.9dB | Confidence levels of 95% |
| Radiated Emissions (18GHz~40GHz) | ±1.9dB | Confidence levels of 95% |
| Temperature | ±0.7℃ | Confidence levels of 95% |
| Humidity | ±3.2% | Confidence levels of 95% |
| DC / AC Power Source | ±1.4% | Confidence levels of 95% |

# 3. GENERAL INFORMATION

## 3.1. Product Details

| Items | Description |
|---|---|
| Power Type | From AC Power Supply |
| Modulation | FHSS (FSK) |
| Frequency Range | 2400 ~ 2483.5MHz |
| Channel Number | 50 |
| Channel Spacing | 1.536 MHz |
| Channel Band Width (99%) | 2240.00 kHz |
| Conducted Output Power | 19.89 dBm |
| Carrier Frequencies | Please refer to section 3.4 |
| Antenna | Please refer to section 3.3 |
| Remark:<br>A channel palette of 50 channels, which are spaced by 1.536 MHz starting at 2402.049 MHz. From this palette, 20 channels are used by the system at any given moment. Upon startup the system beings to hop on 20 random channels. The hopping sequence is a pseudo random ordered list of the 20 channels, and is 20 elements long.<br>20 hopping channels are always used at any given point in time. The system has a regular hopping rate of ranging from 100 hops per second to 1000 hops per second, and has a dwell time ranging between 1 ms to 10 ms. During normal operation all channels are used equally and transmissions never span more than 1 hop time. Every hop cycle contains a single transmission from the transmitter and receiver and no channels in the current list of 20 are skipped. This guarantees that all 20 channels are used equally on average, and that the total dwell time on any channel within the hop set is less than 0.4 s in any 8 s period. | |

## 3.2. Accessories

| Items | Brand Name | Model No. | Description |
|---|---|---|---|
| Ferrite core | EROCORE | FH0500B | FH 20 x 5.1 x 9.9 |
| Ferrite core | EROCORE | FH0900B | FH 33.3 x 8.25 x 16.4 |
| Power Cable, 200 cm, Non-shielded | | | |

Note: Please refer to Appendix A. for detail information.

## 3.3. Table for Filed Antenna

| Ant. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|---|---|---|---|---|---|
| 1 | Eleven Engineering Incorporated | AN4914-R1409 | Omini Antenna | U.FL/IPEX | 0.38 |

## 3.4. Table for Carrier Frequencies

| Frequency Band | Channel No. | Frequency | Channel No. | Frequency |
|---|---|---|---|---|
| 2400~2483.5MHz | 1 | 2402.049 MHz | 26 | 2440.449 MHz |
| | 2 | 2403.585 MHz | : | : |
| | 3 | 2405.121 MHz | 48 | 2474.241 MHz |
| | : | : | 49 | 2475.777 MHz |
| | 24 | 2437.377 MHz | 50 | 2477.313 MHz |
| | 25 | 2438.913 MHz | - | - |

## 3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. 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 | Channel | Antenna |
|---|---|---|---|
| AC Power Conducted Emissions | Hopping Mode | - | 1 |
| Max. Conducted Output Power | Hopping Mode | 1/25/50 | NA |
| Hopping Channel Separation | Hopping Mode | 49~50 | NA |
| Number of Hopping Frequency | Hopping Mode | Hopping 1~50 | NA |
| Dwell Time | Hopping Mode | Hopping 1~50 | NA |
| Radiated Emissions Below 1GHz | Hopping Mode | - | 1 |
| Radiated Emissions Above 1GHz | Hopping Mode | 1/25/50 | 1 |
| Band Edge Emissions | Hopping Mode | 1/25/50 | 1 |

All the test modes were listed as below.

**For Conducted Emissions Test:**

Mode 1: Line-in Mode

Mode 2: Wireless Mode

Due to Mode 2 generated the worst test result, so it was recorded in this report.

**Radiated Emissions Test Below 1GHz:**

Mode 1: Line-in Mode

Mode 2: Wireless Mode

Due to Mode 1 generated the worst test result, so it was recorded in this report.

**Radiated Emissions Test above 1GHz:**

Mode 1: Wireless Mode

All the test result was recorded in the report.

## 3.6. Table for Testing Locations

| Test Site No. | Site Category | Location | FCC Reg. No. | IC File No. | VCCI Reg. No |
|---|---|---|---|---|---|
| 03CH01-CB | SAC | Hsin Chu | 187376 | IC 4086D | - |
| CO01-CB | Conduction | Hsin Chu | 187376 | IC 4086D | - |
| TH01-CB | OVEN Room | Hsin Chu | - | - | - |

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 Supporting Units

| Support Unit | Brand | Model | FCC ID |
|---|---|---|---|
| iPod | Apple | JQ545UTOTXK | DoC |

## 3.8. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

**Power Parameters**

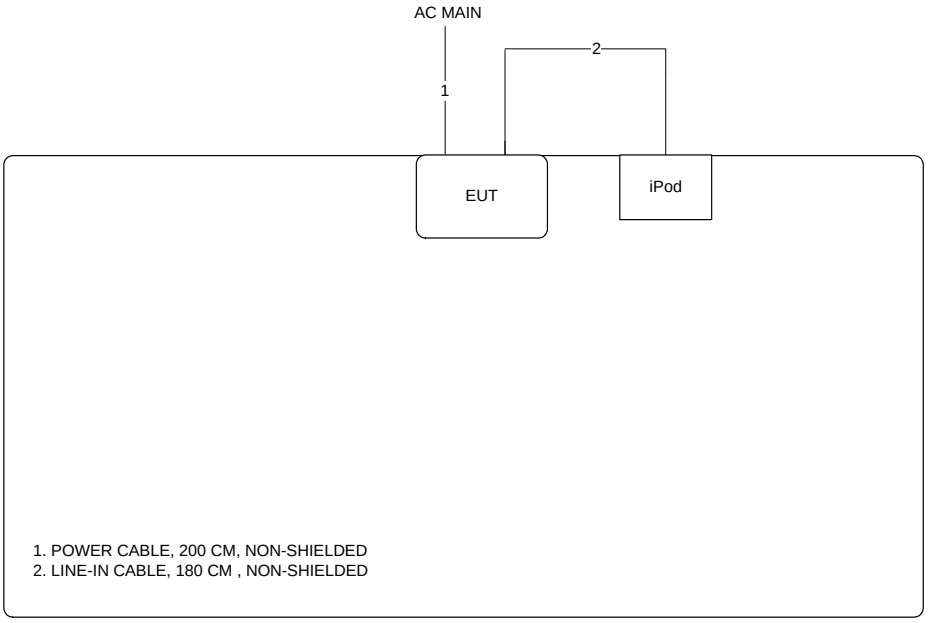
| Test Software Version | No Test Software | | |
|---|---|---|---|
| Frequency | 2402.049 MHz | 2438.913 MHz | 2477.313 MHz |
| Power Parameters | Default | Default | Default |

## 3.9. Test Configurations

### 3.9.1. Radiation Emissions Test Configuration

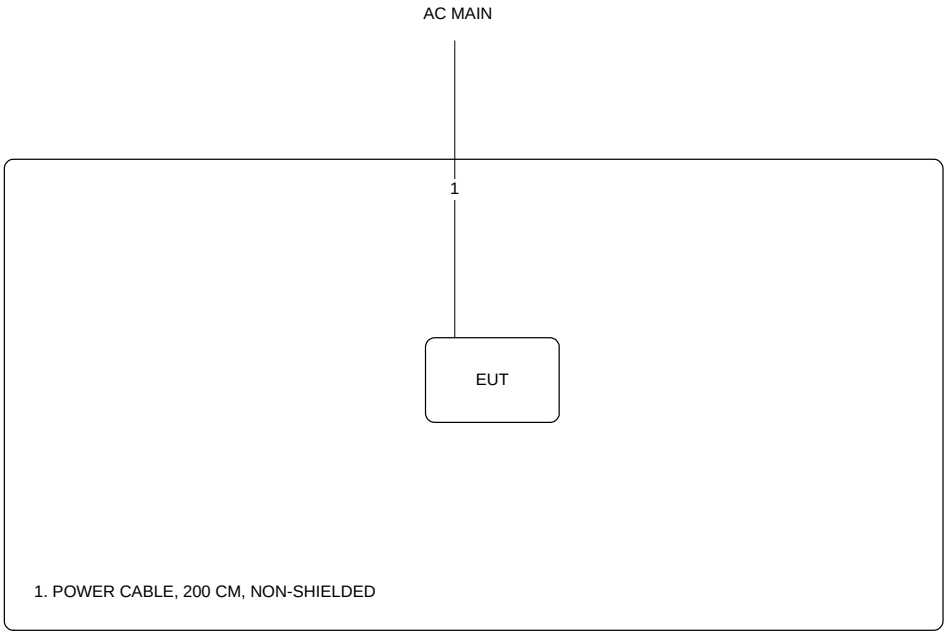
Test Configuration: 30MHz~1GHz

Test Mode: Mode 1



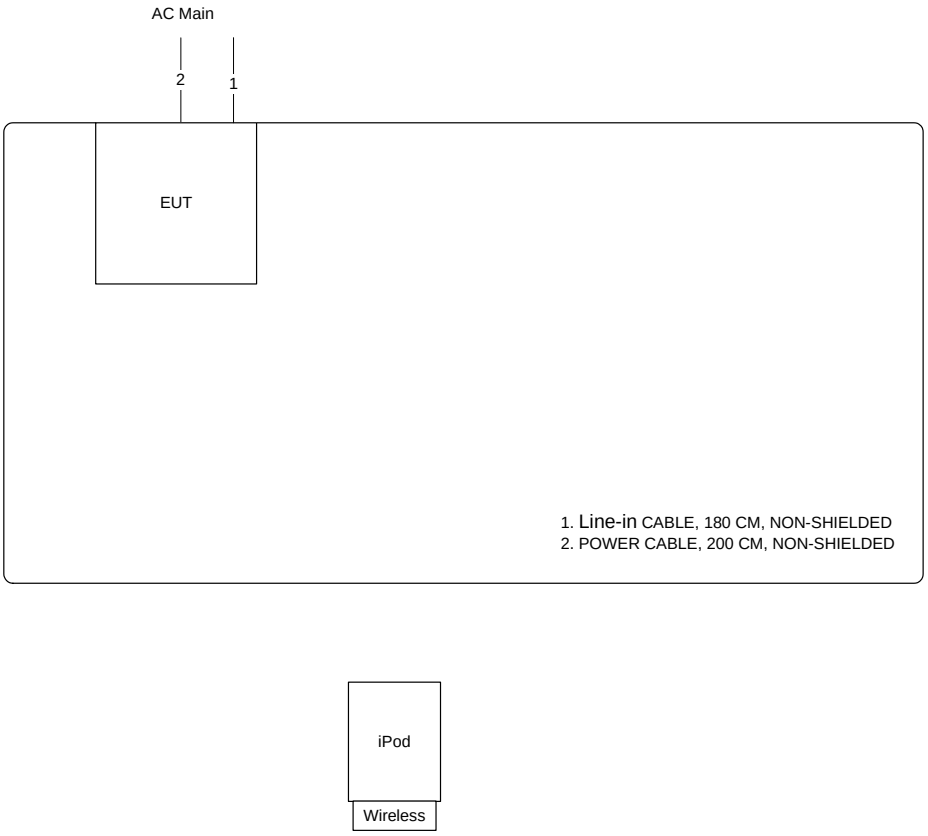

Test Configuration: Above 1GHz

Test Mode: Mode 1



### 3.9.2. AC Power Line Conduction Emissions Test Configuration

Test Mode: Mode 2



# 4. TEST RESULT

## 4.1. AC Power Line Conducted Emissions Measurement

### 4.1.1. Limit

For a Low-power Radio-frequency Device 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

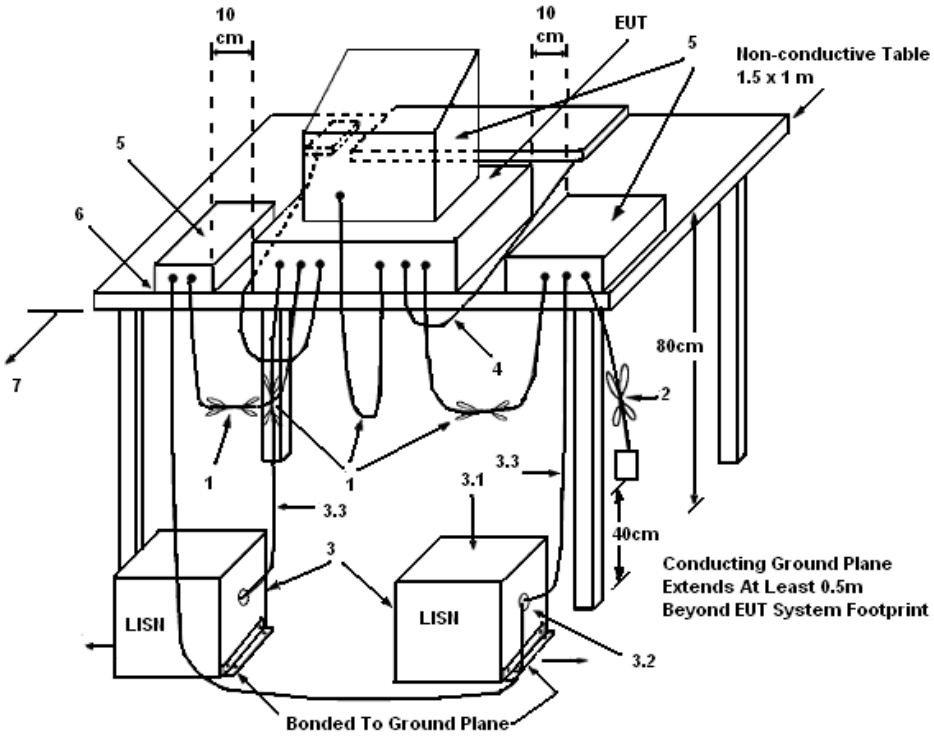
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

| 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. Configure the EUT according to ANSI C63.10. 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.

### 4.1.4. Test Setup Layout




LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

### 4.1.5. Test Deviation

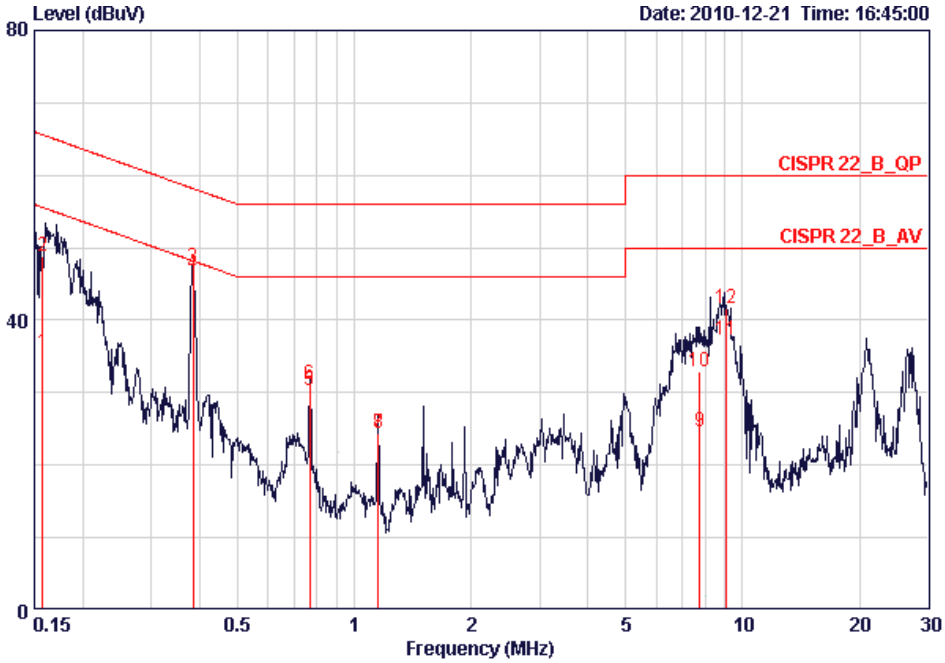
There is no deviation with the original standard.

### 4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

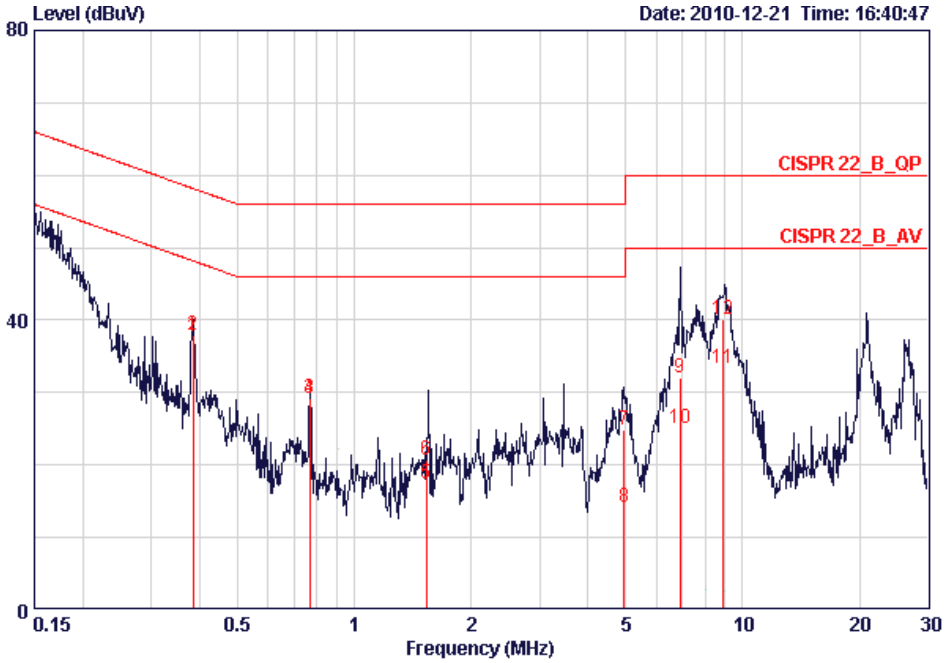
### 4.1.7. Results of AC Power Line Conducted Emissions Measurement

| Temperature | 23℃ | Humidity | 61% |
|---|---|---|---|
| Test Engineer | Peter Wu | Phase | Line |
| Configuration | Normal Link / Mode 2 | | |




| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.15735 | 35.63 | -19.97 | 55.60 | 35.36 | 0.07 | 0.20 | AVERAGE |
| 2 | 0.15735 | 48.89 | -16.71 | 65.60 | 48.62 | 0.07 | 0.20 | QP |
| 3 @ | 0.38519 | 47.25 | -0.92 | 48.17 | 47.02 | 0.03 | 0.20 | AVERAGE |
| 4 | 0.38519 | 46.50 | -11.67 | 58.17 | 46.27 | 0.03 | 0.20 | QP |
| 5 | 0.76702 | 30.28 | -15.72 | 46.00 | 30.05 | 0.03 | 0.20 | AVERAGE |
| 6 | 0.76702 | 31.17 | -24.83 | 56.00 | 30.94 | 0.03 | 0.20 | QP |
| 7 | 1.153 | 24.46 | -21.54 | 46.00 | 24.26 | 0.03 | 0.17 | AVERAGE |
| 8 | 1.153 | 24.47 | -31.53 | 56.00 | 24.27 | 0.03 | 0.17 | QP |
| 9 | 7.769 | 24.66 | -25.34 | 50.00 | 23.98 | 0.28 | 0.40 | AVERAGE |
| 10 | 7.769 | 32.99 | -27.01 | 60.00 | 32.31 | 0.28 | 0.40 | QP |
| 11 | 9.046 | 37.32 | -12.68 | 50.00 | 36.70 | 0.32 | 0.30 | AVERAGE |
| 12 | 9.046 | 41.64 | -18.36 | 60.00 | 41.02 | 0.32 | 0.30 | QP |

| Temperature | 23℃ | Humidity | 61% |
|---|---|---|---|
| Test Engineer | Peter Wu | Phase | Neutral |
| Configuration | Normal Link / Mode 2 | | |




| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.38519 | 37.78 | -20.39 | 58.17 | 37.51 | 0.07 | 0.20 | QP |
| 2 @ | 0.38519 | 38.03 | -10.14 | 48.17 | 37.76 | 0.07 | 0.20 | AVERAGE |
| 3 | 0.76702 | 29.11 | -26.89 | 56.00 | 28.84 | 0.07 | 0.20 | QP |
| 4 | 0.76702 | 29.31 | -16.69 | 46.00 | 29.04 | 0.07 | 0.20 | AVERAGE |
| 5 | 1.534 | 17.42 | -28.58 | 46.00 | 17.23 | 0.08 | 0.11 | AVERAGE |
| 6 | 1.534 | 20.65 | -35.35 | 56.00 | 20.46 | 0.08 | 0.11 | QP |
| 7 | 4.952 | 24.94 | -31.06 | 56.00 | 24.44 | 0.20 | 0.30 | QP |
| 8 | 4.952 | 14.15 | -31.85 | 46.00 | 13.65 | 0.20 | 0.30 | AVERAGE |
| 9 | 6.914 | 32.02 | -27.98 | 60.00 | 31.42 | 0.29 | 0.31 | QP |
| 10 | 6.914 | 25.00 | -25.00 | 50.00 | 24.40 | 0.29 | 0.31 | AVERAGE |
| 11 | 8.924 | 33.34 | -16.66 | 50.00 | 32.68 | 0.36 | 0.30 | AVERAGE |
| 12 | 8.924 | 40.10 | -19.90 | 60.00 | 39.44 | 0.36 | 0.30 | QP |

Note:

Level = Read Level + LISN Factor + Cable Loss.

## 4.2. Maximum Peak Output Power Measurement

### 4.2.1. Limit

For frequency hopping systems operating in the 2400 ~ 2483.5MHz band employing at least 15 non-overlapping hopping channels, the limit for peak output power is 1Watt (30dBm). For all other frequency hopping systems in the 2400 ~ 2483.5MHz band: 0.125 watts (21dBm). The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

### 4.2.2. Measuring Instruments and Setting

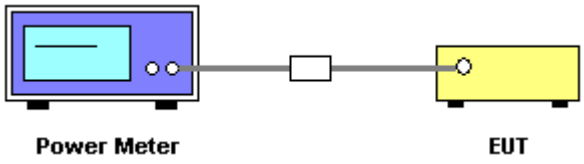
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

| Power Meter Parameter | Setting |
|---|---|
| Filter No. | Auto |
| Measurement time | 0.135 s ~ 26 s |
| Used Peak Sensor | MA2411B |

### 4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the peak power value.
3. Repeat above procedures on all channels needed to be tested.

### 4.2.4. Test Setup Layout




### 4.2.5. Test Deviation

There is no deviation with the original standard.

### 4.2.6. EUT Operation during Test

The EUT was programmed to be in hopping mode.

### 4.2.7. Test Result of Maximum Peak Output Power

| Temperature | 22℃ | Humidity | 65% |
|---|---|---|---|
| Test Engineer | Sean Ku | Configurations | Hopping mode |
| Test Date | Dec. 29, 2010 | | |

| Channel | Frequency | Conducted Power (dBm) | Max. Limit (dBm) | Result |
|---|---|---|---|---|
| 1 | 2402.049 MHz | 19.89 | 21.00 | **Complies** |
| 25 | 2438.913 MHz | 18.94 | 21.00 | **Complies** |
| 50 | 2477.313 MHz | 17.85 | 21.00 | **Complies** |

## 4.3. Hopping Channel Separation Measurement

### 4.3.1. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

### 4.3.2. Measuring Instruments and Setting

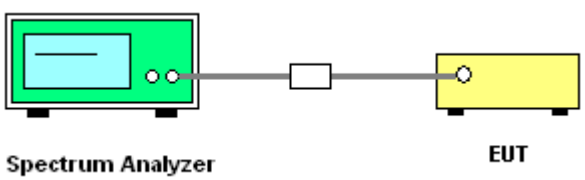
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Measurement Bandwidth or Channel Separation |
| RB | 30 kHz (20dB Bandwidth) / 100 kHz (Channel Separation) |
| VB | 100 kHz (20dB Bandwidth) / 100k Hz (Channel Separation) |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

### 4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
3. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.
4. Test was performed in accordance with Measurement under FCC Public Notic DA00-705.

### 4.3.4. Test Setup Layout




### 4.3.5. Test Deviation

There is no deviation with the original standard.

### 4.3.6. EUT Operation during Test

The EUT was programmed to be in hopping mode.

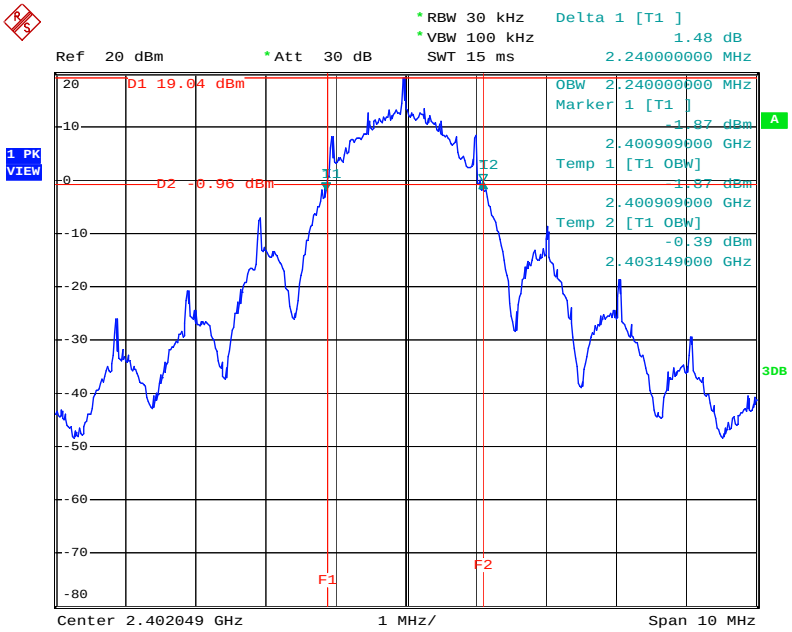
### 4.3.7. Test Result of Hopping Channel Separation

| Temperature | 22℃ | Humidity | 65% |
|---|---|---|---|
| Test Engineer | Sean Ku | Configurations | Hopping mode |

| Frequency | 20dB Bandwidth (kHz) | 99% Occupied BW (kHz) | Channel Specing (kHz) | Channel Specing Min. Limits (kHz) | Result |
|---|---|---|---|---|---|
| 2402.049 MHz | 2240.00 | 2240.00 | 1536.00 | 1493.33 | **Complies** |
| 2438.913 MHz | 2220.00 | 2220.00 | 1536.00 | 1480.00 | **Complies** |
| 2477.313 MHz | 2240.00 | 2220.00 | 1536.00 | 1493.33 | **Complies** |

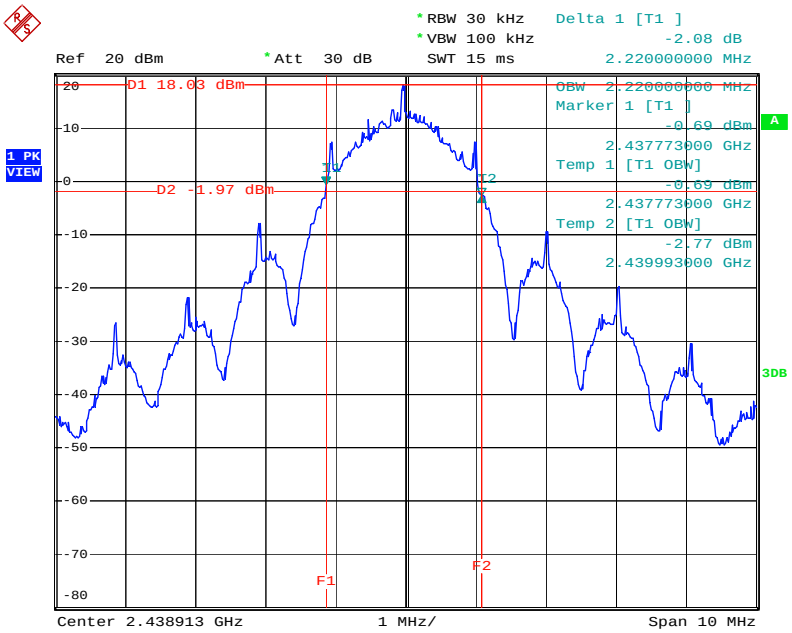
Note: The limit should be the greater of 25 kHz or 2/3 of 20 dB bandwidth for device operates with an output power not greater than 125 mW.

## 20 dB Bandwidth Plot on Channel 1 / 2402.049 MHz




Date: 29.DEC.2010 18:09:31

## 20 dB Bandwidth Plot on Channel 25 / 2438.913 MHz

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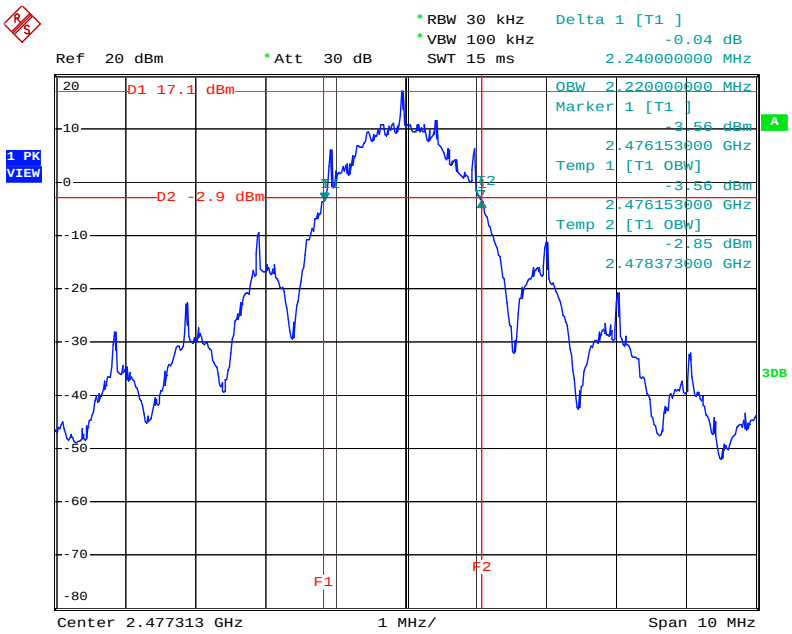
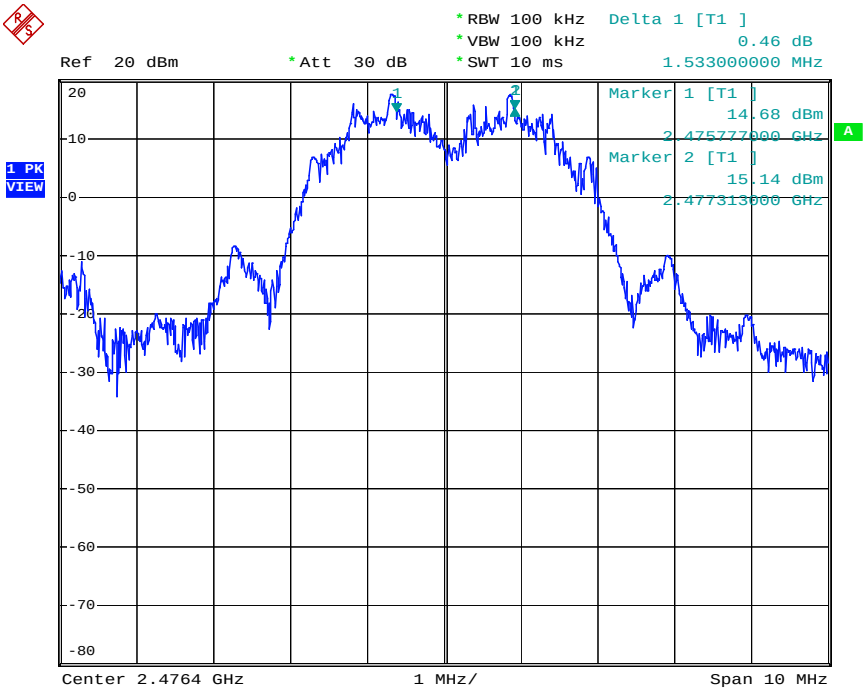
## 20 dB Bandwidth Plot on Channel 50 / 2477.313 MHz




Date: 29.DEC.2010 17:55:09

## Channel Separation Plot on Channel 49~50 / 2475.777 MHz ~ 2477.313 MHz

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## 4.4. Number of Hopping Frequency Measurement

### 4.4.1. Limit

For frequency hopping systems operating in the 2400 ~ 2483.5MHz band employing at least 15 non-overlapping hopping channels.

### 4.4.2. Measuring Instruments and Setting

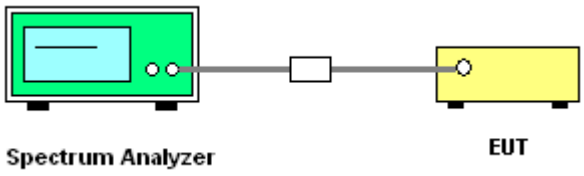
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Operating Frequency Range |
| RB | 100 kHz |
| VB | 100 kHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

### 4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were utilised.
3. Observe frequency hopping in 2400 ~ 2483.5MHz, there are at least 15 non-overlapping channels.

### 4.4.4. Test Setup Layout




### 4.4.5. Test Deviation

There is no deviation with the original standard.

### 4.4.6. EUT Operation during Test

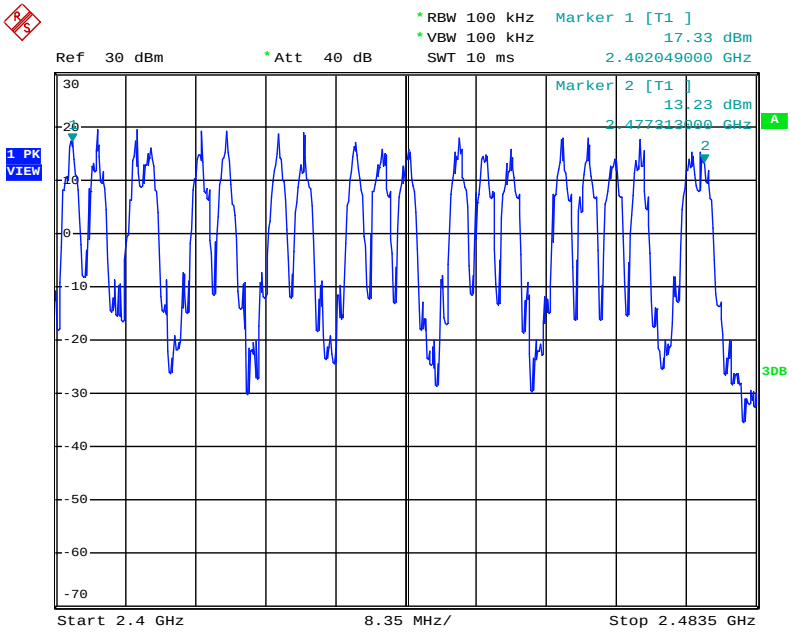
The EUT was programmed to be in hopping mode.

## 4.4.7. Test Result of Number of Hopping Frequency

| Temperature | 22℃ | Humidity | 65% |
|---|---|---|---|
| Test Engineer | Sean Ku | Configurations | Hopping mode |

| Channel No. | Frequency (MHz) | Hopping Ch. (Channels) | Min. Limit (Channels) | Test Result |
|---|---|---|---|---|
| 1~50 | 2402.049 MHz ~ 2477.313 MHz | 20 | 15 | **Complies** |

**Number of Hopping Channel Plot on Channel 1~50 / 2402.049 MHz ~ 2477.313 MHz**




Date: 30.DEC.2010 09:31:59

## 4.5. Dwell Time Measurement

### 4.5.1. Limit

Frequency hopping systems in the 2400 ~ 2483.5MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 4.5.2. Measuring Instruments and Setting

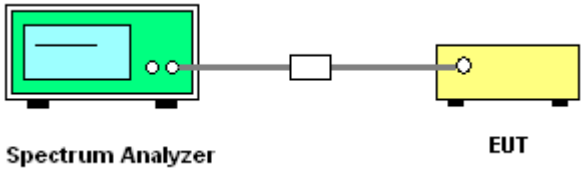
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | 0 MHz |
| RB | 1 MHz |
| VB | 1 MHz |
| Detector | Peak |
| Trace | Single Trigger |

### 4.5.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer
2. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz.
3. Use a video trigger with the trigger level set to enable triggering only on full pulses.
4. Sweep Time is more than once pulse time.
5. Set the center frequency on any frequency would be measure and span to zero span.
6. Measure the maximum time duration of one single pulse.
7. Count the number of pulses in the dwell time duration (0.4 seconds multiplied by the number of hopping channels).
8. Dwell time=pulse duration x number of pulses / measure time x dwell time duration.

### 4.5.4. Test Setup Layout




### 4.5.5. Test Deviation

There is no deviation with the original standard.

### 4.5.6. EUT Operation during Test

The EUT was programmed to be in hopping Mode.

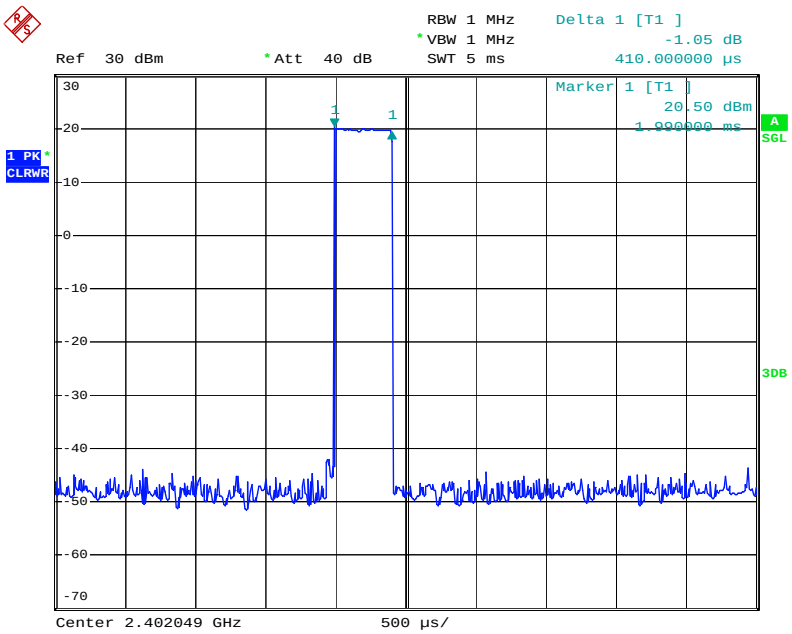
### 4.5.7. Test Result of Dwell Time

| Temperature | 22℃ | Humidity | 65% |
|---|---|---|---|
| Test Engineer | Sean Ku | Configurations | Hopping Mode |

| Frequency | Pulse Duration (ms) | Number of Pulses | Measure Time (s) | Dwell time duration (s) | Dwell Time (s) | Limits (s) | Test Result |
|---|---|---|---|---|---|---|---|
| 2402.049 MHz | 0.0004100 | 77 | 8.00 | 8.0 | 0.0316 | 0.4000 | **Complies** |
| 2438.913 MHz | 0.0004000 | 77 | 8.00 | 8.0 | 0.0308 | 0.4000 | **Complies** |
| 2477.313 MHz | 0.0004100 | 77 | 8.00 | 8.0 | 0.0316 | 0.4000 | **Complies** |

Note: (pluse duration × number of pulses / measure time) × dwell time duration is right.

## Single Pulse Plot on Channel 1 / 2402.049 MHz

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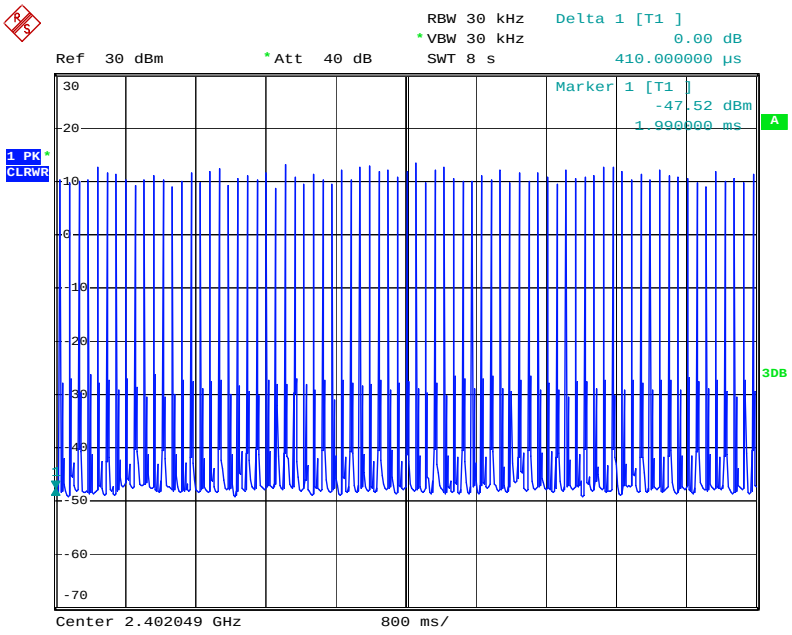
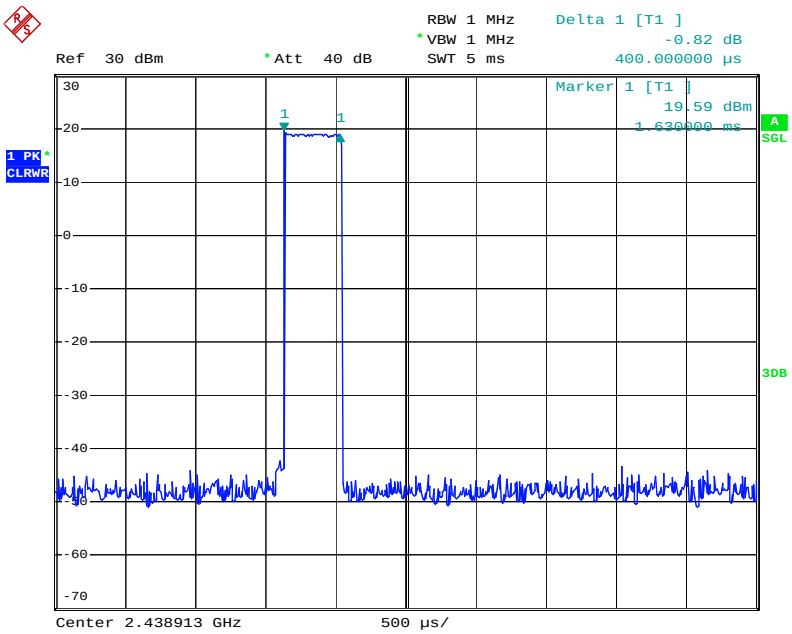
## Number of Pulses Plot on Channel 1 / 2402.049 MHz



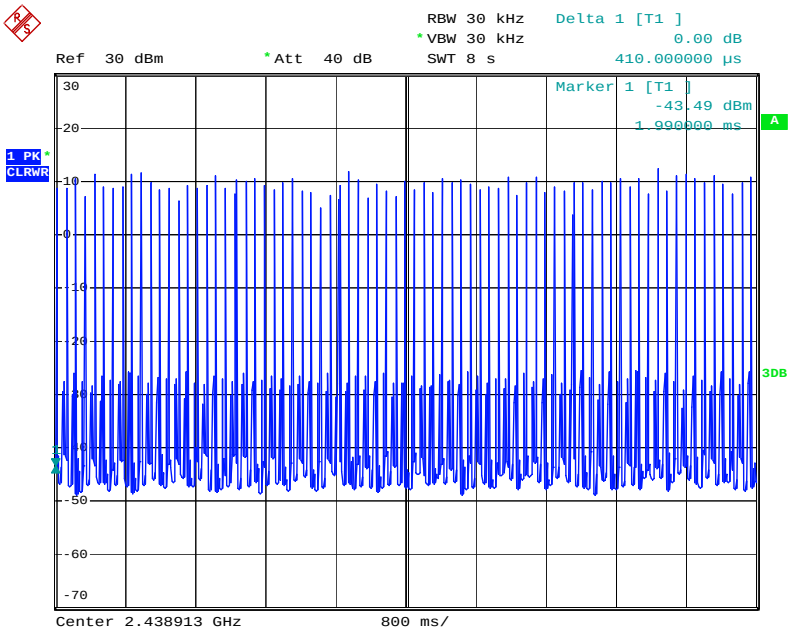

Date: 29.DEC.2010 18:32:13

## Single Pulse Plot on Channel 25 / 2438.913 MHz



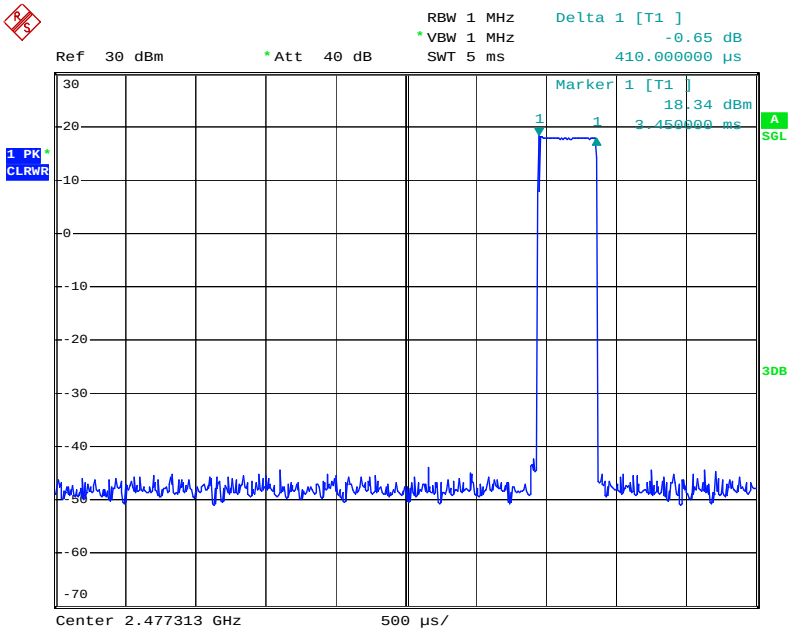

Date: 29.DEC.2010 18:37:57

## Number of Pulses Plot on Channel 25 / 2438.913 MHz



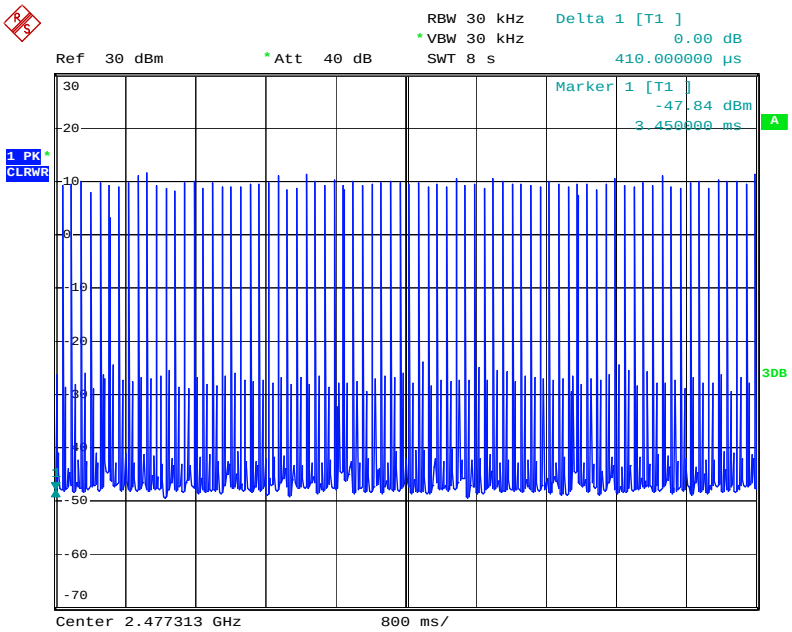

Date: 29.DEC.2010 18:36:17

## Single Pulse Plot on Channel 50 / 2477.313 MHz




Date: 29.DEC.2010 18:40:12

## Number of Pulses Plot on Channel 50 / 2477.313 MHz




Date: 29.DEC.2010 18:41:11

## 4.6. Radiated Emissions Measurement

### 4.6.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

### 4.6.2. Measuring Instruments and Setting

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

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 1000KHz / 1000KHz for peak |

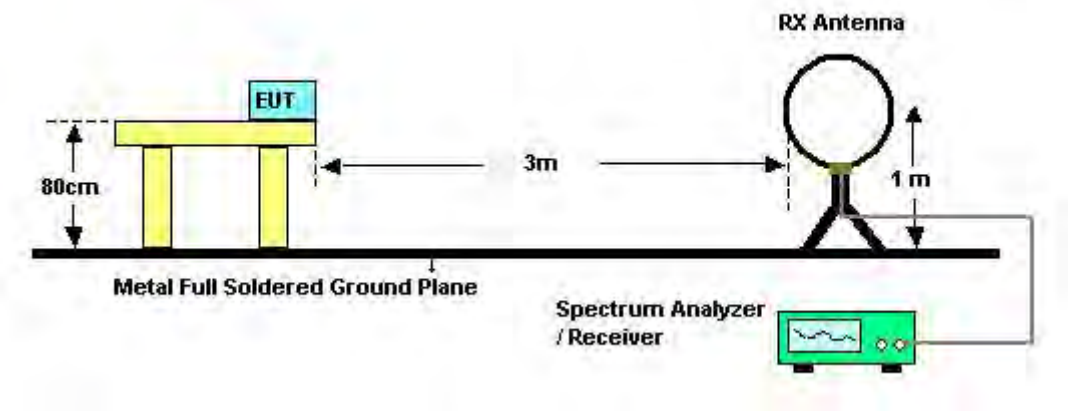
| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

### 4.6.3. Test Procedures

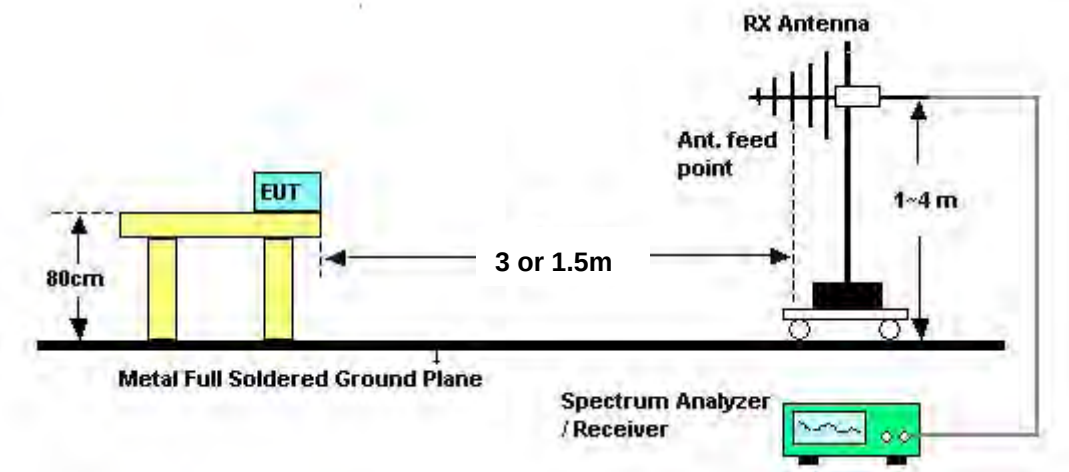
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

### 4.6.4. Test Setup Layout

**For radiated emissions below 1GHz**




**For radiated emissions above 1GHz**




Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

### 4.6.5. Test Deviation

There is no deviation with the original standard.

### 4.6.6. EUT Operation during Test

The EUT was programmed to be in hopping mode.

### 4.6.7. Results of Radiated Emissions (9kHz~30MHz)

| Temperature | 23℃ | Humidity | 61% |
|---|---|---|---|
| Test Engineer | Magic Lai | Test Date | Dec. 21, 2010 |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Limit Line (dBuV) | Remark |
|---|---|---|---|---|
| - | - | - | - | See Note |

Note:

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

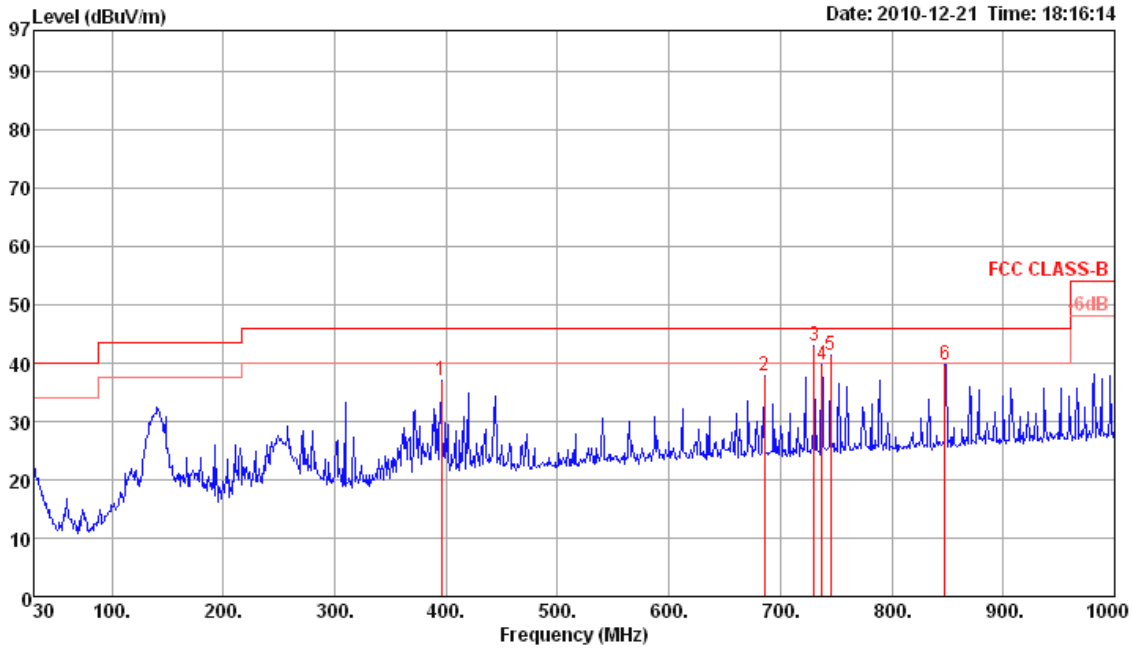
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

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

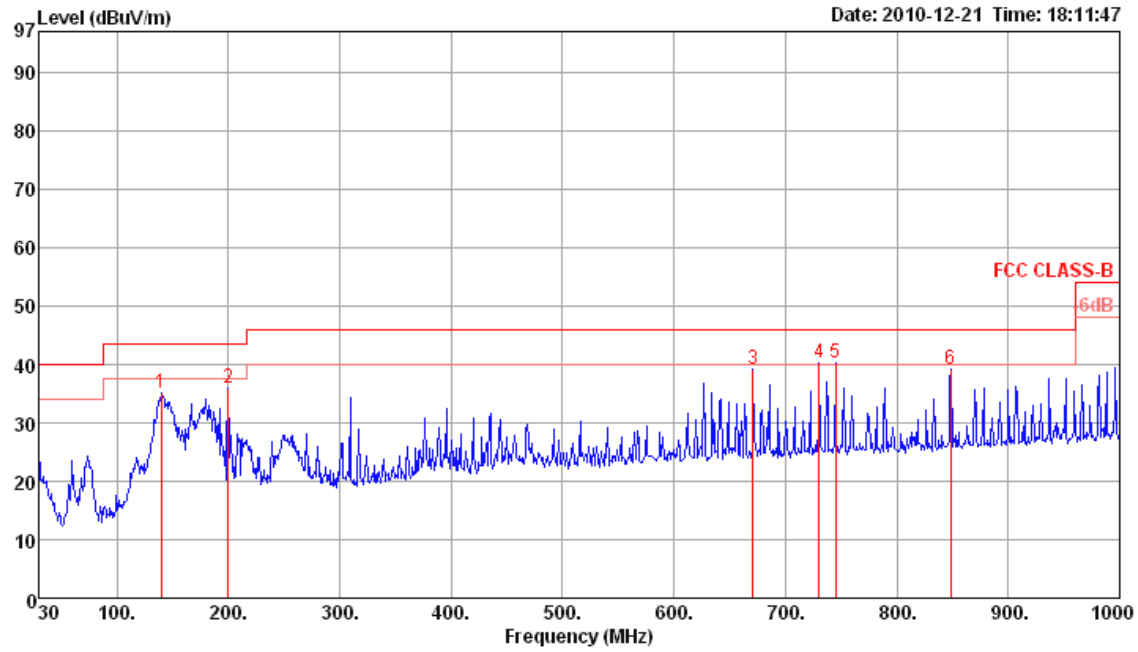
| Temperature | 23℃ | Humidity | 61% |
|---|---|---|---|
| Test Engineer | Magic Lai | Configurations | Hopping / Mode 1 |

***Horizontal***




| | | Freq | Level | Limit Line | Over Limit | Read Level | Cable Loss | Preamp Factor | Antenna Factor | T/Pos | A/Pos | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB | dB/m | deg | cm | | |
| 1 | | 395.69 | 36.96 | 46.00 | -9.04 | 46.28 | 2.29 | 27.57 | 15.96 | 0 | 100 | Peak | HORIZONTAL |
| 2 | | 685.72 | 37.83 | 46.00 | -8.17 | 43.44 | 3.36 | 28.01 | 19.04 | 0 | 100 | Peak | HORIZONTAL |
| 3 | p | 730.34 | 42.95 | 46.00 | -3.05 | 48.12 | 3.42 | 27.88 | 19.29 | 0 | 100 | Peak | HORIZONTAL |
| 4 | | 737.13 | 39.67 | 46.00 | -6.33 | 44.73 | 3.45 | 27.85 | 19.34 | 0 | 100 | Peak | HORIZONTAL |
| 5 | ! | 744.89 | 41.40 | 46.00 | -4.60 | 46.35 | 3.48 | 27.82 | 19.39 | 0 | 100 | Peak | HORIZONTAL |
| 6 | | 847.71 | 39.80 | 46.00 | -6.20 | 43.78 | 3.40 | 27.51 | 20.13 | 0 | 100 | Peak | HORIZONTAL |

***Vertical***




| | Freq | Level | Limit Line | Over Limit | Read Level | Cable Loss | Preamp Factor | Antenna Factor | T/Pos | A/Pos | Remark | Pol/Phase |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB | dB | dB/m | deg | cm | | |
| 1 | 139.61 | 35.14 | 43.50 | -8.36 | 48.79 | 1.40 | 27.40 | 12.35 | 0 | 400 | Peak | VERTICAL |
| 2 | 199.75 | 35.84 | 43.50 | -7.66 | 52.19 | 1.70 | 27.10 | 9.05 | 0 | 400 | Peak | VERTICAL |
| 3 | 671.17 | 39.11 | 46.00 | -6.89 | 44.72 | 3.42 | 28.03 | 19.00 | 0 | 400 | Peak | VERTICAL |
| 4 p | 730.34 | 40.32 | 46.00 | -5.68 | 45.49 | 3.42 | 27.88 | 19.29 | 0 | 400 | Peak | VERTICAL |
| 5 ! | 744.89 | 40.15 | 46.00 | -5.85 | 45.10 | 3.48 | 27.82 | 19.39 | 0 | 400 | Peak | VERTICAL |
| 6 | 848.68 | 39.06 | 46.00 | -6.94 | 43.02 | 3.40 | 27.50 | 20.14 | 0 | 400 | Peak | VERTICAL |

Note:

The amplitude of spurious emissions which 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.

### 4.6.9. Results for Radiated Emissions (1GHz~10th Harmonic)

| Temperature | 23℃ | Humidity | 61% |
|---|---|---|---|
| Test Engineer | Magic Lai | Configurations | Channel 1 / Mode 1 |
| Test Date | Dec. 29, 2010 | | |

***Horizontal***

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 4803.24 | 52.88 | 74.00 | -21.12 | 51.61 | 3.29 | 33.02 | 35.04 | 18 | 120 | Peak | HORIZONTAL |
| 2 | 4805.01 | 42.78 | 54.00 | -11.22 | 41.51 | 3.29 | 33.02 | 35.04 | 18 | 120 | Average | HORIZONTAL |

***Vertical***

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 4803.01 | 54.46 | 74.00 | -19.54 | 53.19 | 3.29 | 33.02 | 35.04 | 258 | 126 | Peak | VERTICAL |
| 2 | 4804.26 | 45.07 | 54.00 | -8.93 | 43.80 | 3.29 | 33.02 | 35.04 | 258 | 126 | Average | VERTICAL |

| Temperature | 23℃ | Humidity | 61% |
|---|---|---|---|
| Test Engineer | Magic Lai | Configurations | Channel 25 / Mode 1 |
| Test Date | Dec. 29, 2010 | | |

***Horizontal***

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 4878.60 | 52.82 | 74.00 | -21.18 | 51.36 | 3.33 | 33.16 | 35.03 | 36 | 108 | Peak | HORIZONTAL |
| 2 | 4878.77 | 43.20 | 54.00 | -10.80 | 41.74 | 3.33 | 33.16 | 35.03 | 36 | 108 | Average | HORIZONTAL |
| 3 | 7315.22 | 56.58 | 74.00 | -17.42 | 51.96 | 4.06 | 35.96 | 35.40 | 157 | 110 | Peak | HORIZONTAL |
| 4 | 7315.51 | 47.50 | 54.00 | -6.50 | 42.88 | 4.06 | 35.96 | 35.40 | 157 | 110 | Average | HORIZONTAL |

***Vertical***

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 4878.64 | 56.79 | 74.00 | -17.21 | 55.33 | 3.33 | 33.16 | 35.03 | 261 | 108 | Peak | VERTICAL |
| 2 | 4878.70 | 47.60 | 54.00 | -6.40 | 46.14 | 3.33 | 33.16 | 35.03 | 261 | 108 | Average | VERTICAL |
| 3 | 7315.10 | 57.66 | 74.00 | -16.34 | 53.04 | 4.06 | 35.96 | 35.40 | 216 | 100 | Peak | VERTICAL |
| 4 | 7315.53 | 48.60 | 54.00 | -5.40 | 43.98 | 4.06 | 35.96 | 35.40 | 216 | 100 | Average | VERTICAL |

| Temperature | 23℃ | Humidity | 61% |
|---|---|---|---|
| Test Engineer | Magic Lai | Configurations | Channel 50 / Mode 1 |
| Test Date | Dec. 29, 2010 | | |

***Horizontal***

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 4953.53 | 43.84 | 54.00 | -10.16 | 42.18 | 3.37 | 33.30 | 35.01 | 346 | 185 | Average | HORIZONTAL |
| 2 | 4953.55 | 53.13 | 74.00 | -20.87 | 51.47 | 3.37 | 33.30 | 35.01 | 346 | 185 | Peak | HORIZONTAL |
| 3 | 7430.28 | 55.32 | 74.00 | -18.68 | 50.45 | 4.07 | 36.20 | 35.40 | 164 | 100 | Peak | HORIZONTAL |
| 4 | 7430.68 | 45.84 | 54.00 | -8.16 | 40.97 | 4.07 | 36.20 | 35.40 | 164 | 100 | Average | HORIZONTAL |

***Vertical***

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 4955.45 | 46.89 | 54.00 | -7.11 | 45.23 | 3.37 | 33.30 | 35.01 | 111 | 107 | Average | VERTICAL |
| 2 | 4955.45 | 56.08 | 74.00 | -17.92 | 54.42 | 3.37 | 33.30 | 35.01 | 111 | 107 | Peak | VERTICAL |
| 3 | 7432.87 | 49.18 | 54.00 | -4.82 | 44.31 | 4.07 | 36.20 | 35.40 | 263 | 101 | Average | VERTICAL |
| 4 | 7433.11 | 57.97 | 74.00 | -16.03 | 53.10 | 4.07 | 36.20 | 35.40 | 263 | 101 | Peak | VERTICAL |

Note:

The amplitude of spurious emissions which 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.

## 4.7. Band Edge Emissions Measurement

### 4.7.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

### 4.7.2. Measuring Instruments and Setting

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

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | 100 MHz |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 100 KHz /100 KHz for Peak |

### 4.7.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

### 4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

### 4.7.5. Test Deviation

There is no deviation with the original standard.

### 4.7.6. EUT Operation during Test

The EUT was programmed to be in hopping mode.

### 4.7.7. Test Result of Band Edge and Fundamental Emissions

| Temperature | 23℃ | Humidity | 61% |
|---|---|---|---|
| Test Engineer | Magic Lai | Configurations | Channel 1, 25, 50 / Mode 1 |
| Test Date | Dec. 29, 2010 | | |

**Channel** 1

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 2387.80 | 54.84 | 74.00 | -19.16 | 24.46 | 2.21 | 28.17 | 0.00 | 344 | 103 | Peak | HORIZONTAL |
| 2 | 2389.80 | 44.79 | 54.00 | -9.21 | 14.40 | 2.22 | 28.17 | 0.00 | 344 | 103 | Average | HORIZONTAL |
| 3 | 2401.60 | 119.13 | 74.00 | | | 2.22 | 28.21 | 0.00 | 344 | 103 | Peak | HORIZONTAL |
| 4 | 2402.00 | 116.40 | 54.00 | | | 2.22 | 28.21 | 0.00 | 344 | 103 | Average | HORIZONTAL |

Item 3, 4 are the fundamental frequency at 2402.049 MHz.

**Channel** 25

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 2438.40 | 118.60 | 74.00 | | | 2.23 | 28.29 | 0.00 | 360 | 164 | Peak | HORIZONTAL |
| 2 | 2438.80 | 115.61 | 54.00 | | | 2.23 | 28.29 | 0.00 | 360 | 164 | Average | HORIZONTAL |
| 3 | 2483.50 | 42.16 | 54.00 | -11.84 | 11.52 | 2.26 | 28.38 | 0.00 | 360 | 164 | Average | HORIZONTAL |
| 4 | 2485.50 | 53.58 | 74.00 | -20.42 | 22.90 | 2.26 | 28.42 | 0.00 | 360 | 164 | Peak | HORIZONTAL |

Item 1, 2 are the fundamental frequency at 2438.913 MHz.

**Channel** 50

| | Freq | Level | Limit Line | Over Limit | Read Level | Cable 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 | 2477.20 | 110.13 | 54.00 | | | 2.26 | 28.38 | 0.00 | 76 | 100 | Average | HORIZONTAL |
| 2 | 2477.80 | 113.17 | 74.00 | | | 2.26 | 28.38 | 0.00 | 76 | 100 | Peak | HORIZONTAL |
| 3 | 2483.50 | 46.41 | 54.00 | -7.59 | 15.77 | 2.26 | 28.38 | 0.00 | 76 | 100 | Average | HORIZONTAL |
| 4 | 2483.50 | 56.89 | 74.00 | -17.11 | 26.25 | 2.26 | 28.38 | 0.00 | 76 | 100 | Peak | HORIZONTAL |

Item 1, 2 are the fundamental frequency at 2477.313 MHz.

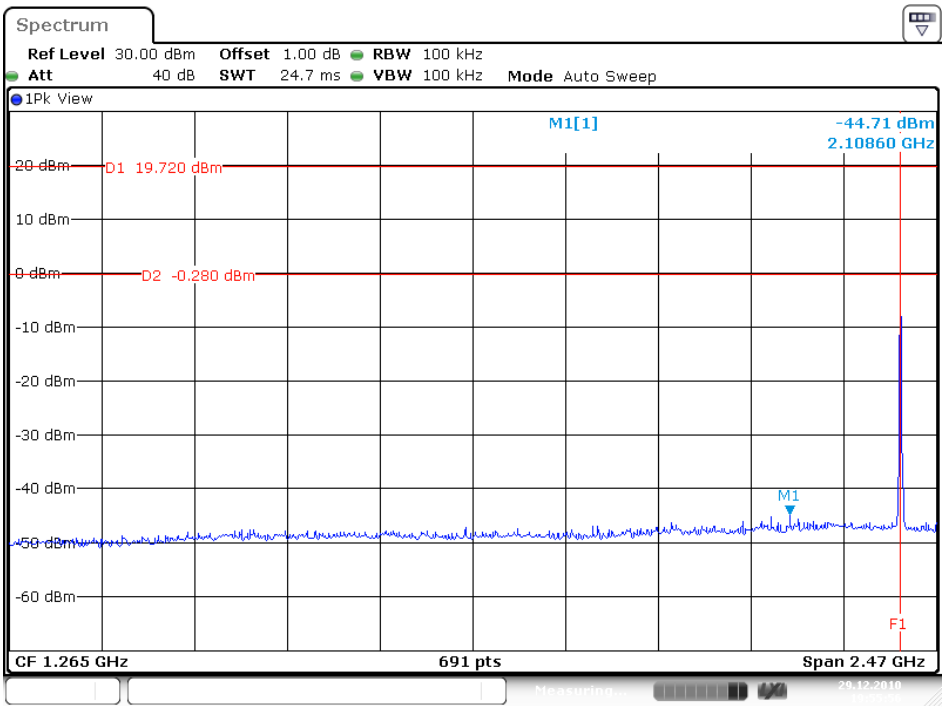
Note:

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

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

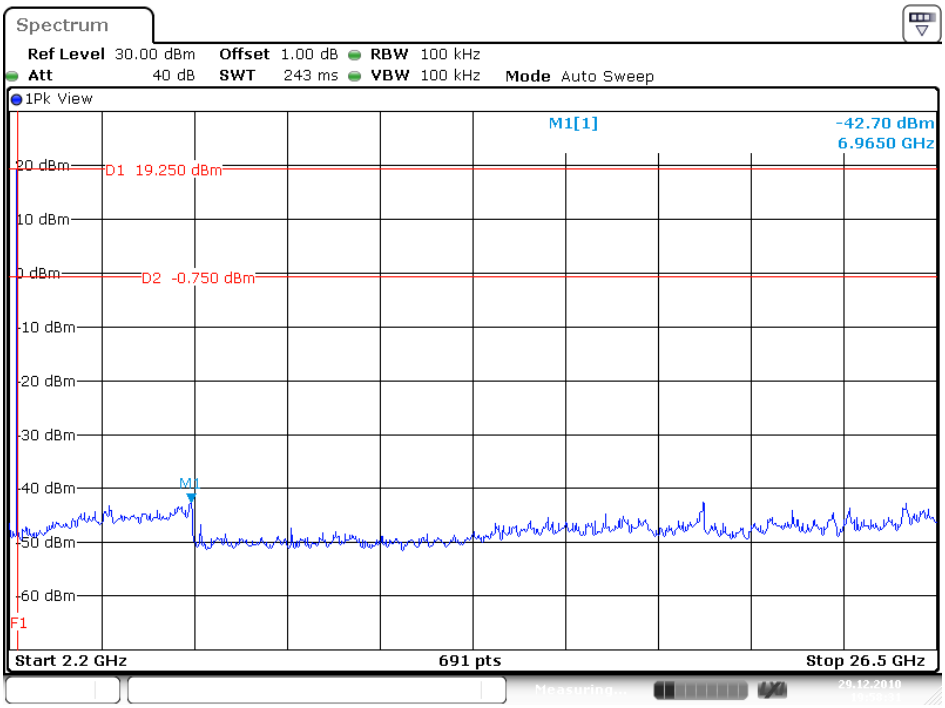
**For Emission not in Restricted Band**

**Low Band Edge Plot on Channel 1 / 2402.049 MHz**



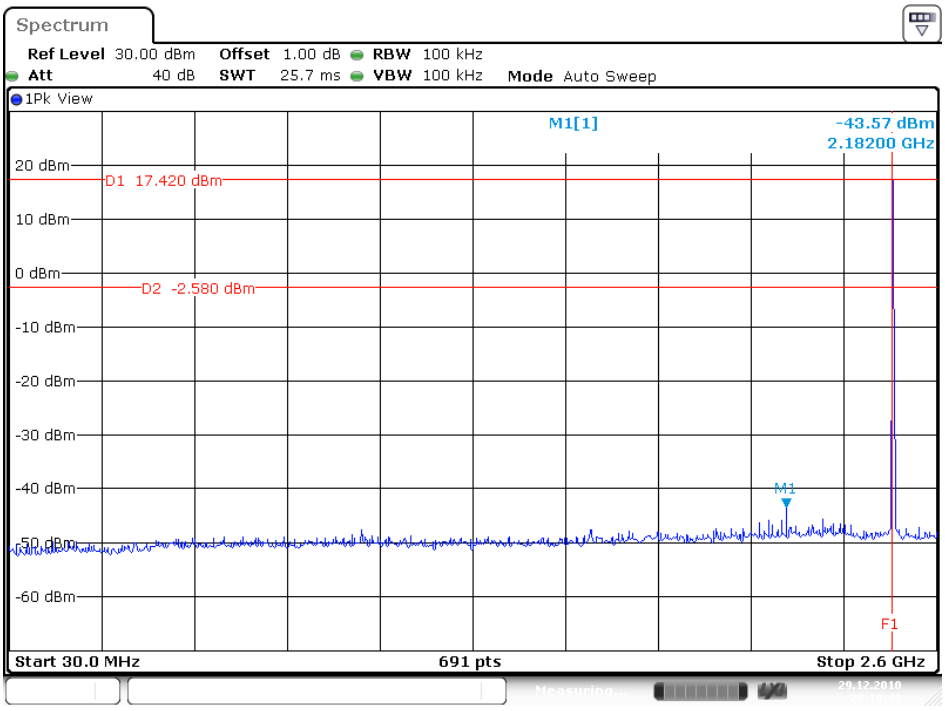

Date: 29.DEC.2010 19:55:56

**High Band Edge Plot on Channel 1 / 2402.049 MHz**



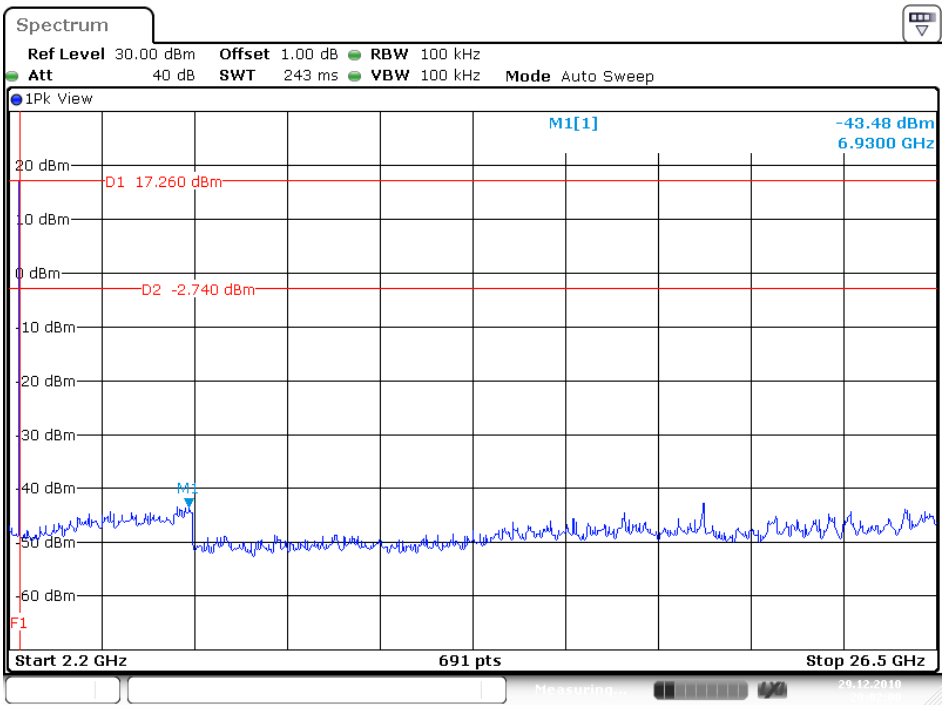

Date: 29.DEC.2010 19:58:31

## Low Band Edge Plot on Channel 50 / 2477.313 MHz




Date: 29.DEC.2010 20:10:49

## High Band Edge Plot on Channel 50 / 2477.313 MHz




Date: 29.DEC.2010 20:02:00

## 4.8. Antenna Requirements

### 4.8.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### 4.8.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

# 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 | Oct. 28, 2010 | Conduction (CO01-CB) |
| V- LISN | Schwarzbeck | NSLK 8127 | 8127-478 | 9K ~ 30MHz | Nov. 16, 2010 | Conduction (CO01-CB) |
| PULSE LIMITER | R&S | ESH3-Z2 | 100430 | 9K~30MHz | Jan. 04, 2010 | Conduction (CO01-CB) |
| COND Cable | - | Cable | - | 0.15MHz~30MHz | Dec. 04, 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) |
| 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) |
| Spectrum analyzer | R&S | FSP30 | 100023 | 9KHz~30GHz | Mar. 05, 2010 | Conducted (TH01-CB) |
| Temp. and Humidity Chamber | Ten Billion | TTH-D3SP | TBN-931011 | -30~100 degree | May. 21, 2010 | Conducted (TH01-CB) |
| Signal Generator | R&S | SMR40 | 100302 | 10MHz-40GHz | Nov. 19, 2010 | Conducted (TH01-CB) |
| RF Power Divider | HP | 11636A | 00306 | 2GHz ~ 18GHz | N/A | Conducted (TH01-CB) |
| RF Power Splitter | Anaren | 44100 | 1839 | 2GHz ~ 18GHz | N/A | Conducted (TH01-CB) |

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|
| Signal generator | R&S | SMU200A | 102782 | 10MHz-40GHz | Mar. 09, 2010 | Conducted (TH01-CB) |
| Horn Antenna | COM-POWER | AH-118 | 071187 | 1GHz – 18GHz | Apr. 16, 2010 | Conducted (TH01-CB) |
| Horn Antenna | COM-POWER | AH-118 | 071042 | 1GHz – 18GHz | Oct. 14, 2010 | Conducted (TH01-CB) |
| RF Cable-high | Woken | High Cable-7 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Conducted (TH01-CB) |
| RF Cable-high | Woken | High Cable-8 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Conducted (TH01-CB) |
| RF Cable-high | Woken | High Cable-9 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Conducted (TH01-CB) |
| RF Cable-high | Woken | High Cable-10 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Conducted (TH01-CB) |
| RF Cable-high | Woken | High Cable-11 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Conducted (TH01-CB) |
| RF Cable-high | Woken | High Cable-12 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Conducted (TH01-CB) |
| RF Cable-high | Woken | High Cable-13 | - | 1 GHz – 26.5 GHz | Nov. 17, 2010 | Conducted (TH01-CB) |
| Power Sensor | Anritsu | MA2411B | 0917223 | 300MHz~40GHz | Sep. 13, 2010 | Conducted (TH01-CB) |

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

Note: *Calibration Interval of instruments listed above is two years.

# 6. TEST LOCATION

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

# 7. TAF CERTIFICATE OF ACCREDITATION

Certificate No.：L1190-091230

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<br>Accreditation Program for Telecommunication Equipment Testing Laboratory<br>Accreditation Program for BSMI Mutual Recognition Arrangment with Foreign Authorities |

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

P1, total 22 pages

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