

FCC RADIO TEST REPORT

According to

47 CFR FCC Part 15 Subpart C § 15.231

Equipment : Remote Controller
Brand Name : KAB
Model No. : TR-016
Filing Type : New Application
Applicant : **KAB Enterprise Co., Ltd.**
21F, -1, No. 33, Sec. 1, Minsheng Rd., Banqiao Dist.,
New Taipei City 220, Taiwan (R.O.C)
FCC ID : **PAGTR-016**
Manufacturer : **Verdant Electronics (Dong Guan) Co., Ltd.**
Langxie Administrative District, Qiaotou,
Dongguan City, Guang Dong Sheng, China.
Received Date : May 16, 2012
Final Test Date : Jun. 18, 2012

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 C**.

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



SPORTON International Inc.

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

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CERTIFICATE OF COMPLIANCE

According to

47 CFR FCC Part 15 Subpart C § 15.231

Equipment : Remote Controller

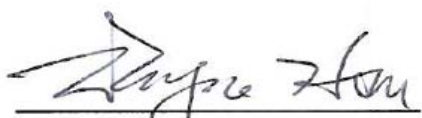
Brand Name : KAB

Model No. : TR-016

Applicant : KAB Enterprise Co., Ltd.

21F, -1, No. 33, Sec. 1, Minsheng Rd., Banqiao
Dist., New Taipei City 220, Taiwan (R.O.C)

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on May 16, 2012 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.



Wayne Hsu / Assistant Manager

SPORTON International Inc.

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

1. SUMMARY OF THE TEST RESULT

| Applied Standard: 47 CFR FCC Part 15 Subpart C | | | | |
|-------------------------------------------------------|---------------------|-----------------------------------------|----------------|--------------------|
| Part | Rule Section | Description of Test | Result | Under Limit |
| 3.1 | 15.207 | AC Power Line Conducted Emissions | Not Applicable | - |
| 3.2 | 15.231(b)/(e) | Field Strength of Fundamental Emissions | Complies | 10.04 dB |
| 3.3 | 15.231(c) | 20dB Spectrum Bandwidth | Complies | - |
| 3.4 | 15.231(a)/(e) | Deactivating time | Complies | - |
| 3.5 | 15.231(b)/(e) | Radiated Emissions | Complies | 4.87 dB |
| 3.6 | 15.231(b)/(e) | Band Edge Emissions | Complies | - |
| 3.7 | 15.203 | Antenna Requirements | Complies | - |

| Test Items | Uncertainty | Remark |
|-----------------------------------------|------------------------|--------------------------|
| AC Power Line Conducted Emissions | ±2.26dB | Confidence levels of 95% |
| Field Strength of Fundamental Emissions | ±3.72dB | Confidence levels of 95% |
| 20dB Spectrum Bandwidth | ±6.25×10 ⁻¹ | Confidence levels of 95% |
| Radiated Emissions/ Band Edge Emissions | ±3.72dB | Confidence levels of 95% |

2. GENERAL INFORMATION

2.1 Product Details

| Items | Description |
|---------------------------------|---------------------------------------|
| Power Rating | DC 12V Type A23 pre-installed battery |
| Modulation | ASK |
| Frequency Range | 315 MHz |
| Channel Number | 1 |
| Channel Band Width (99%) | 94 kHz |
| Max. Fundamental Field Strength | 65.56 dBuV/m at 3m (Average) |
| Antenna | Integrated Antenna |

2.2 Table for Carrier Frequencies

| Frequency Band | Channel No. | Frequency |
|----------------|-------------|-------------|
| 315 MHz | 1 | 314.856 MHz |

2.3 Test Signal Duty Cycle

| Test Signal Duty Cycle (x) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|------------------|---------------------|--------------|------------|---|------|---------|-----|-----------|----------------|----------------|--------------|---------------|--|-----|-----|---|--------|-----------------------|-----------------|--------------|------------|--|------|-----|------|---|---------|
| Modulation Mode | Duty Factor [dB] = (20 log x); x=duty cycle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Transmissions occur regularly in time – 29.9% | -10.48 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Ref -10 dBm Att 0 dB RBW 1 MHz VBW 1 MHz SWT 100 ms Marker 1 [T1] -50.77 dBm 10.000000 μs</p> <p>Date: 16 JUN 2012 17:50:17</p> | <table border="1"> <tr> <td>VISA session</td> <td>Marker 1 (sec)</td> <td>Set Points (501)</td> <td>Space Time of Point</td> <td>No. of Pulse</td> </tr> <tr> <td>CP1B1::21:</td> <td>0</td> <td>2001</td> <td>0.00005</td> <td>458</td> </tr> <tr> <td>FSP & FSL</td> <td>Marker 2 (sec)</td> <td>Set Sweep Time</td> <td>Mark 1 Point</td> <td>Close TX Time</td> </tr> <tr> <td></td> <td>0.1</td> <td>0.1</td> <td>1</td> <td>0.0229</td> </tr> <tr> <td>Total Trace of Points</td> <td>Threshold (dBm)</td> <td>Mark 2 Point</td> <td>Trace Data</td> <td></td> </tr> <tr> <td>2001</td> <td>-60</td> <td>2001</td> <td>0</td> <td>-50.766</td> </tr> </table> <p>Total transmission time bin 458 [0.0299 s]; Total period time bin 2001 [0.1 s]; Total transmission time 0.0299 s in 0.1 s period Duty cycle = 29.9%</p> | VISA session | Marker 1 (sec) | Set Points (501) | Space Time of Point | No. of Pulse | CP1B1::21: | 0 | 2001 | 0.00005 | 458 | FSP & FSL | Marker 2 (sec) | Set Sweep Time | Mark 1 Point | Close TX Time | | 0.1 | 0.1 | 1 | 0.0229 | Total Trace of Points | Threshold (dBm) | Mark 2 Point | Trace Data | | 2001 | -60 | 2001 | 0 | -50.766 |
| VISA session | Marker 1 (sec) | Set Points (501) | Space Time of Point | No. of Pulse | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CP1B1::21: | 0 | 2001 | 0.00005 | 458 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FSP & FSL | Marker 2 (sec) | Set Sweep Time | Mark 1 Point | Close TX Time | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.1 | 0.1 | 1 | 0.0229 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Trace of Points | Threshold (dBm) | Mark 2 Point | Trace Data | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2001 | -60 | 2001 | 0 | -50.766 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EUT has been operated using the worst-case duty cycle in continuously transmitter mode (regardless normally operated different key function mode). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

2.4 Table for Test Modes

The following table is a list of the test modes shown in this test report.

| Test Items | Mode | Channel |
|-----------------------------------------------------------------------------------------------------------|------------|---------|
| AC Power Line Conducted Emissions | N/A | N/A |
| Field Strength of Fundamental Emissions 20dB Spectrum Bandwidth | CTX | 1 |
| Deactivating Time | Normal Use | 1 |
| Radiated Emissions 9kHz~30MHz Radiated Emissions 9kHz~10 th Harmonic Band Edge Emissions | CTX | 1 |

Note: CTX=continuously transmitter.

2.5 Table for Testing Locations

| Test Site No. | Site Category | Location |
|---------------|---------------|----------|
| TH01-HY | OVEN Room | Hwa Ya |
| 03CH02-HY | SAC | Hwa Ya |

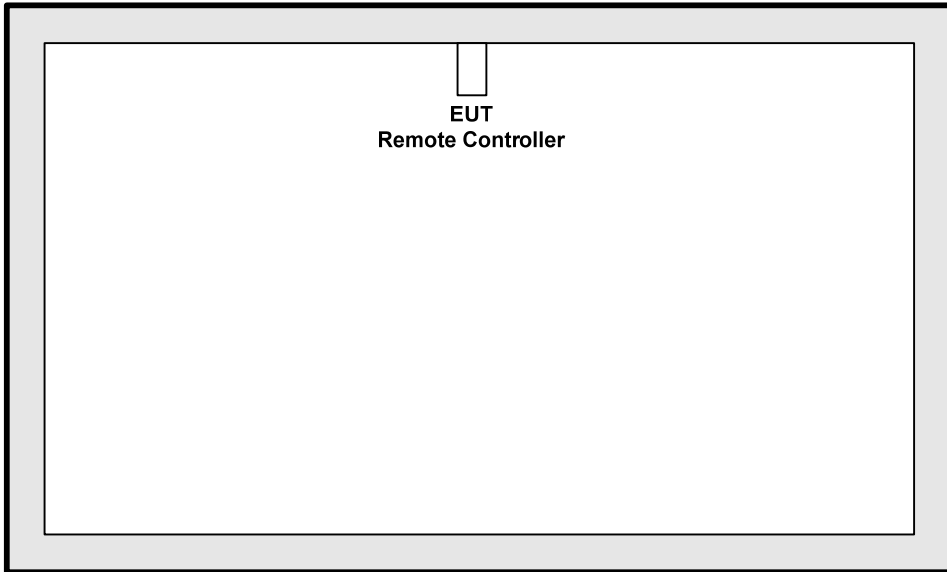
Semi Anechoic Chamber (SAC).

2.6 Table for Supporting Units

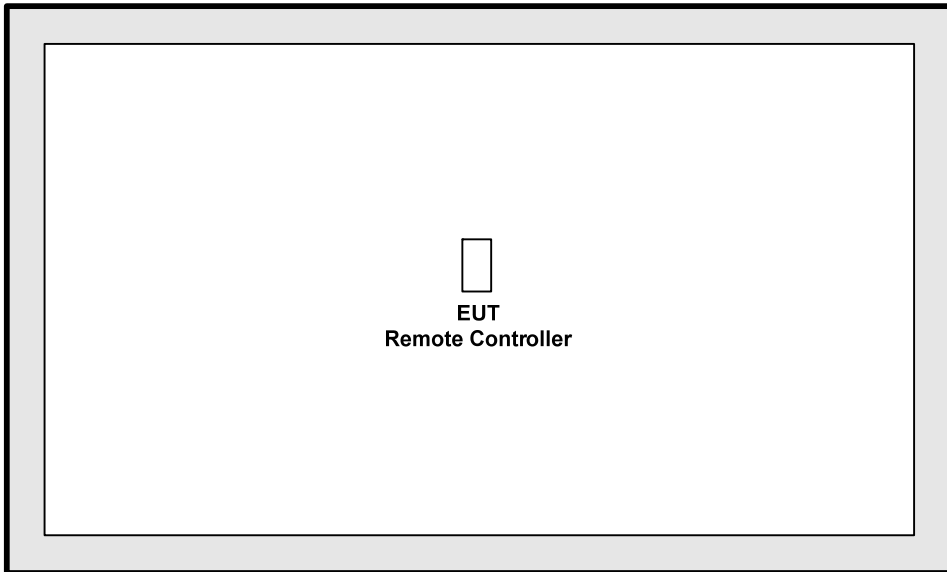
The EUT was tested alone.

2.7 Test Configurations

For radiated emissions 9kHz~1GHz



For radiated emissions above 1GHz



3. TEST RESULT

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit

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

Class B

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

3.1.2 Measuring Instruments and Setting

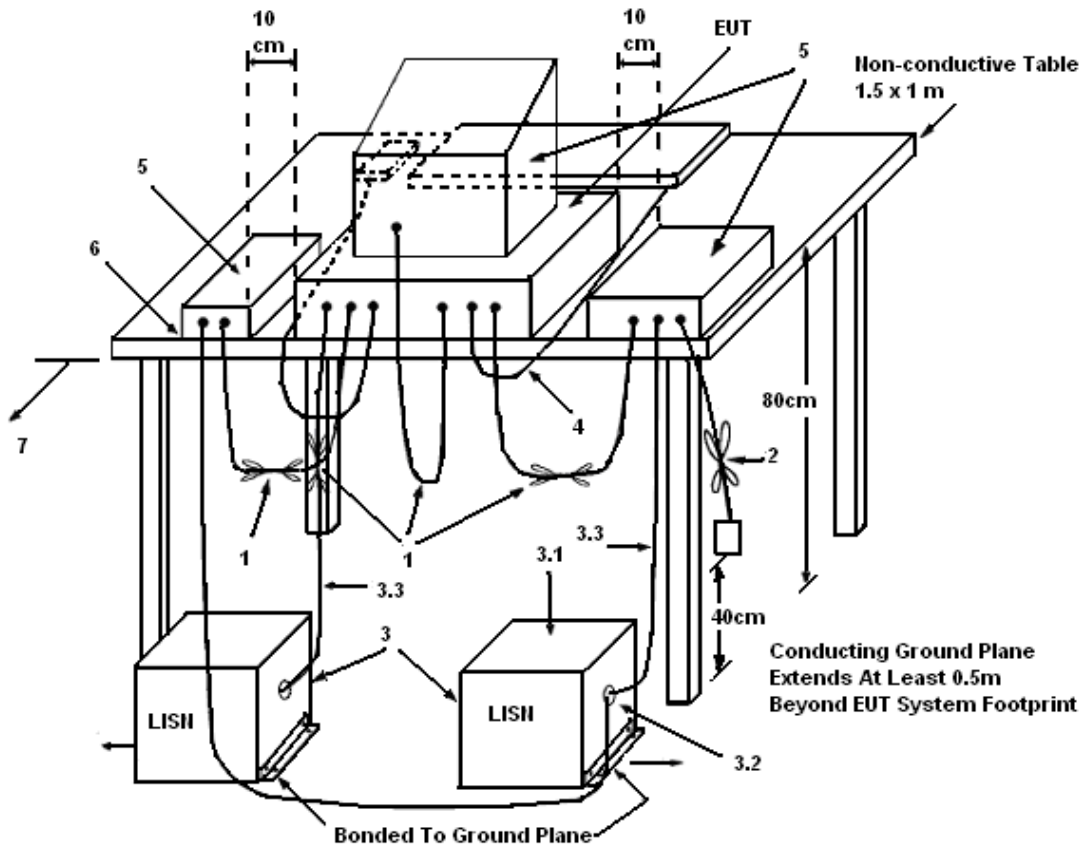
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

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

3.1.3 Test Procedures

1. The EUT was warmed up for 15 minutes before testing started.
2. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connect to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The CISPR states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

3.1.4 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.

3.1.5 Test Deviation

There is no deviation with the original standard.

3.1.6 EUT Operation during Test

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

3.1.7 Results of AC Power Line Conducted Emissions Measurement

The EUT is battery powered; there is no need to do this testing.

3.2 Field Strength of Fundamental Emissions Measurement

3.2.1 Limit

Devices complying with 47 CFR FCC Part 15 Subpart C, section 15.231(a). The field strength of emissions from intentional radiators at 3 meters operated under this Section shall not exceed the following:

| Frequency Band (MHz) | Fundamental Emissions Limit (uV/m) at 3m |
|----------------------|------------------------------------------|
| 40.66-40.70 | 2250 |
| 70-130 | 1250 |
| 130-174 | 1250-3750(**) |
| 174-260 | 3750 |
| 260-470 | 3750-12500(**) |
| Above 470 | 12500 |

**1. Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1) for the band 130 - 174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818 \times (\text{operating frequency, MHz}) - 6136.3636$;

(2) for the band 260 - 470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667 \times (\text{operating frequency, MHz}) - 7083.3333$.

So the field strength of emission limits have been calculated in below table.

| Carrier Frequency (MHz) | Fundamental Emissions Limit (dBuV/m) at 3m |
|-------------------------|--------------------------------------------|
| 314.856 MHz | 75.61 (Average) |
| 314.856 MHz | 95.61 (Peak) |

3.2.2 Measuring Instruments and Setting

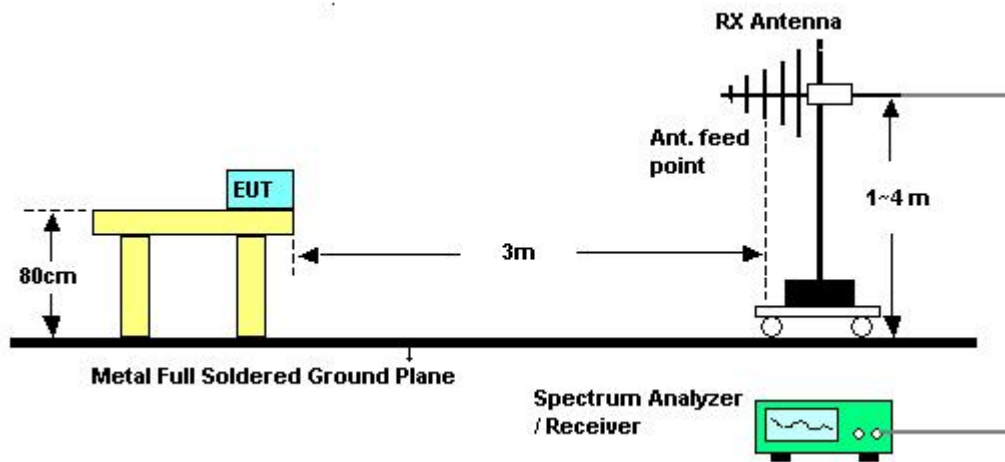
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

| Receiver Parameter | Setting |
|--------------------|-----------------------|
| Attenuation | Auto |
| Center Frequency | Fundamental Frequency |
| RB | 120 kHz |
| Detector | Peak / Average |

3.2.3 Test Procedures

1. Configure the EUT according to ANSI C63.4. 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. For Fundamental emissions, use the receiver to measure peak and average reading.
6. 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.

3.2.4 Test Setup Layout



3.2.5 Test Deviation

There is no deviation with the original standard.

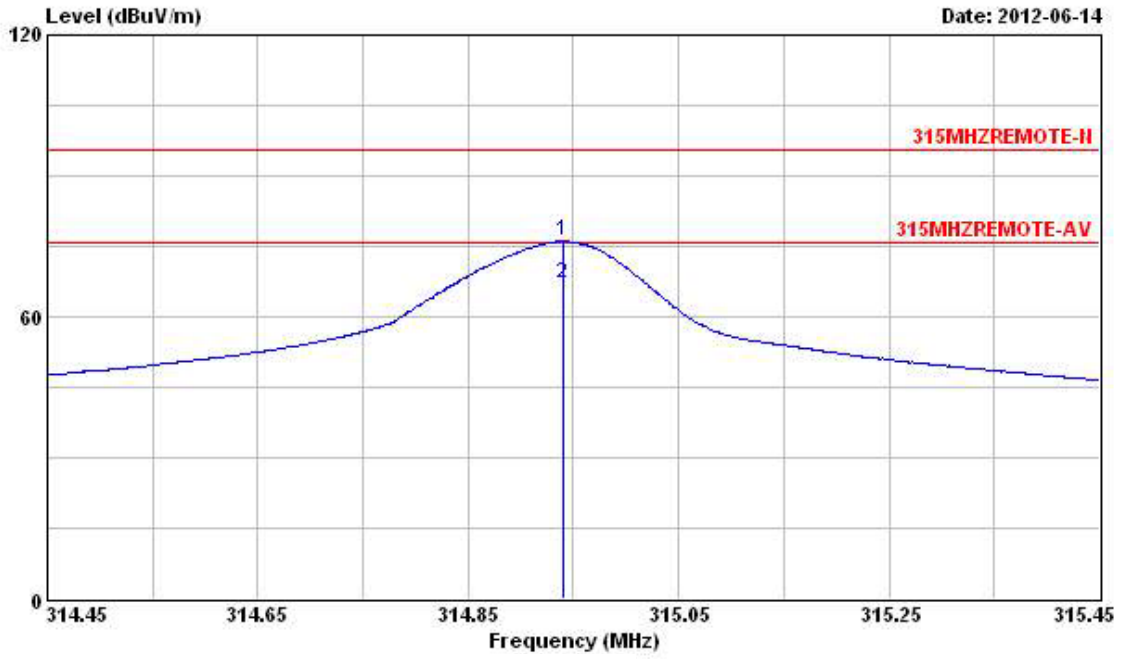
3.2.6 EUT Operation during Test

The EUT was manually operated to be in transmitting mode.

3.2.7 Test Result of Field Strength of Fundamental Emissions

| | | | |
|-----------------|---------------|----------------|-----------|
| Final Test Date | Jun. 14, 2012 | Test Site No. | 03CH02-HY |
| Temperature | 24.1°C | Humidity | 60% |
| Test Engineer | Streak | Configurations | Channel 1 |

Horizontal



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 314.940 | 76.04 | -19.58 | 95.62 | 86.34 | 13.93 | 3.03 | 27.26 | Peak | --- | --- |

Note:

For pulsed transmitter emissions, average measurements are dependent on the pulse width or pulse train characteristics. Following as formula:
 Average emission = peak emission + 20 log (duty cycle); duty cycle = on time/100 ms period = 29.9%.
 Average emission = 76.04 -10.48 = 65.56 dBuV/m at 3m under limit 75.6 dBuV/m.

3.3 20dB Spectrum Bandwidth Measurement

3.3.1 Limit

The bandwidth of the emissions shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. So the emission bandwidth limits have been calculated in below table.

| Fundamental Frequency | 20dB Bandwidth Limits (kHz) |
|-----------------------|-----------------------------|
| 314.856 MHz | 790 |

3.3.2 Measuring Instruments and Setting

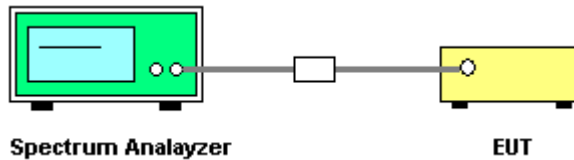
Please refer to section 4 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|---------------------|------------------|
| Attenuation | Auto |
| Span Frequency | > 20dB Bandwidth |
| RB | 10 kHz |
| VB | 10 kHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

3.3.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 10 kHz and the video bandwidth of 10 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

3.3.4 Test Setup Layout



3.3.5 Test Deviation

There is no deviation with the original standard.

3.3.6 EUT Operation during Test

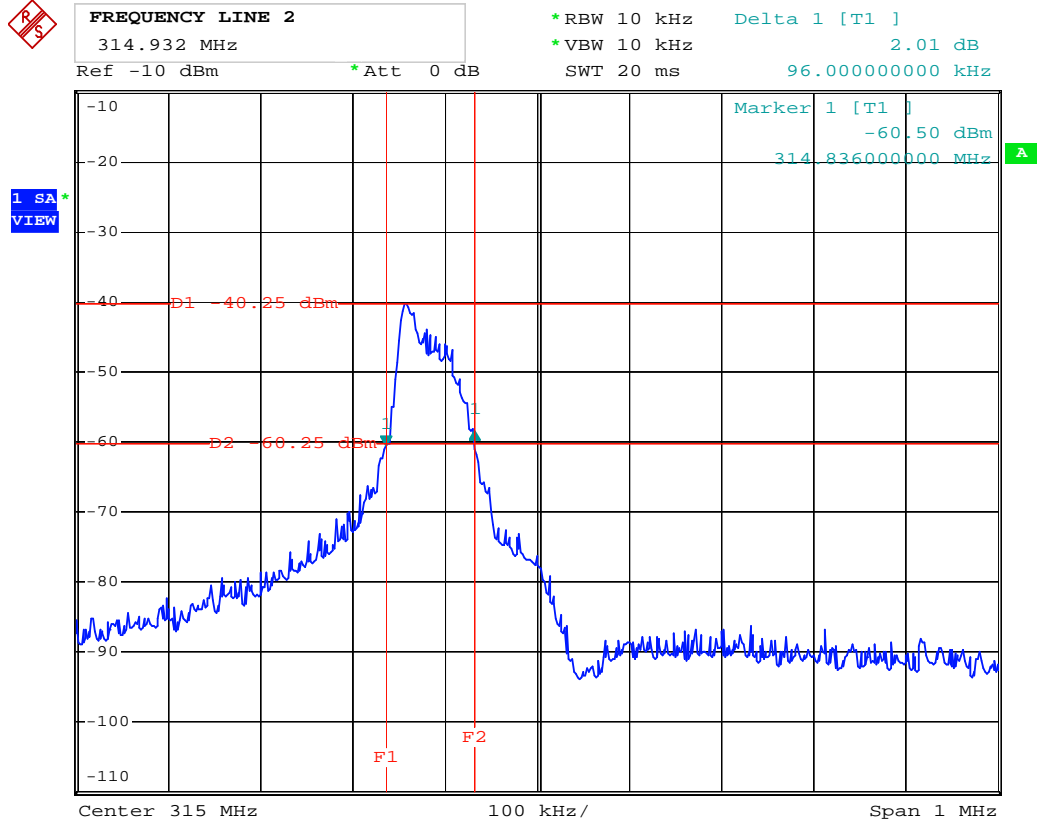
The EUT was manually operated to be in transmitting mode.

3.3.7 Test Result of 20dB Spectrum Bandwidth

| | | | |
|-----------------|---------------|----------------|-----------|
| Final Test Date | Jun. 18, 2012 | Test Site No. | TH01-HY |
| Temperature | 25.6°C | Humidity | 39% |
| Test Engineer | Bear | Configurations | Channel 1 |

| Frequency | 20dB BW (kHz) | 99% OBW (kHz) | Limits (MHz) | Test Result |
|-------------|---------------|---------------|--------------|-------------|
| 314.856 MHz | 96.00 | 94.00 | 0.79 | Complies |

20 dB Bandwidth Plot on 314.856 MHz



Date: 17.APR.2012 09:33:51

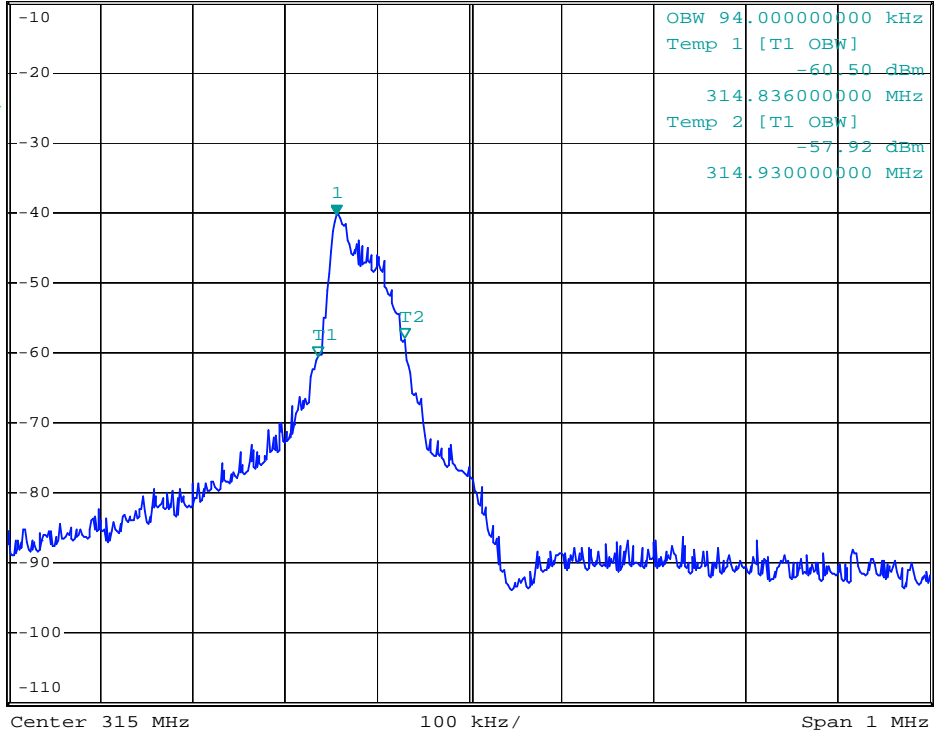
99% Bandwidth Plot on 314.856 MHz



POWER BW (%)
 99 %
 Ref -10 dBm *Att 0 dB

*RBW 10 kHz Marker 1 [T1]
 *VBW 10 kHz -40.25 dBm
 SWT 20 ms 314.856000000 MHz

1 SA*
 VIEW



Date: 17.APR.2012 09:34:25

3.4 Deactivating Time

3.4.1 Limit

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

3.4.2 Measuring Instruments and Setting

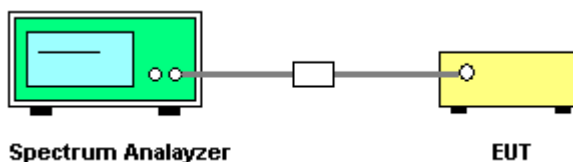
Please refer to section 4 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting |
|----------------------------|----------------|
| Attenuation | Auto |
| Span Frequency | 0 MHz |
| RB | 1000 kHz |
| VB | 1000 kHz |
| Detector | Peak |
| Trace | Single Trigger |
| Attenuation | Auto |

3.4.3 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser
2. Set RBW of spectrum analyzer to 1000kHz and VBW to 1000kHz.
3. Use a video trigger with the trigger level set to enable triggering only on full pulses.
4. Sweep Time is more than one pulse time.
5. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
6. Measure the maximum time duration of one single pulse.

3.4.4 Test Setup Layout



3.4.5 Test Deviation

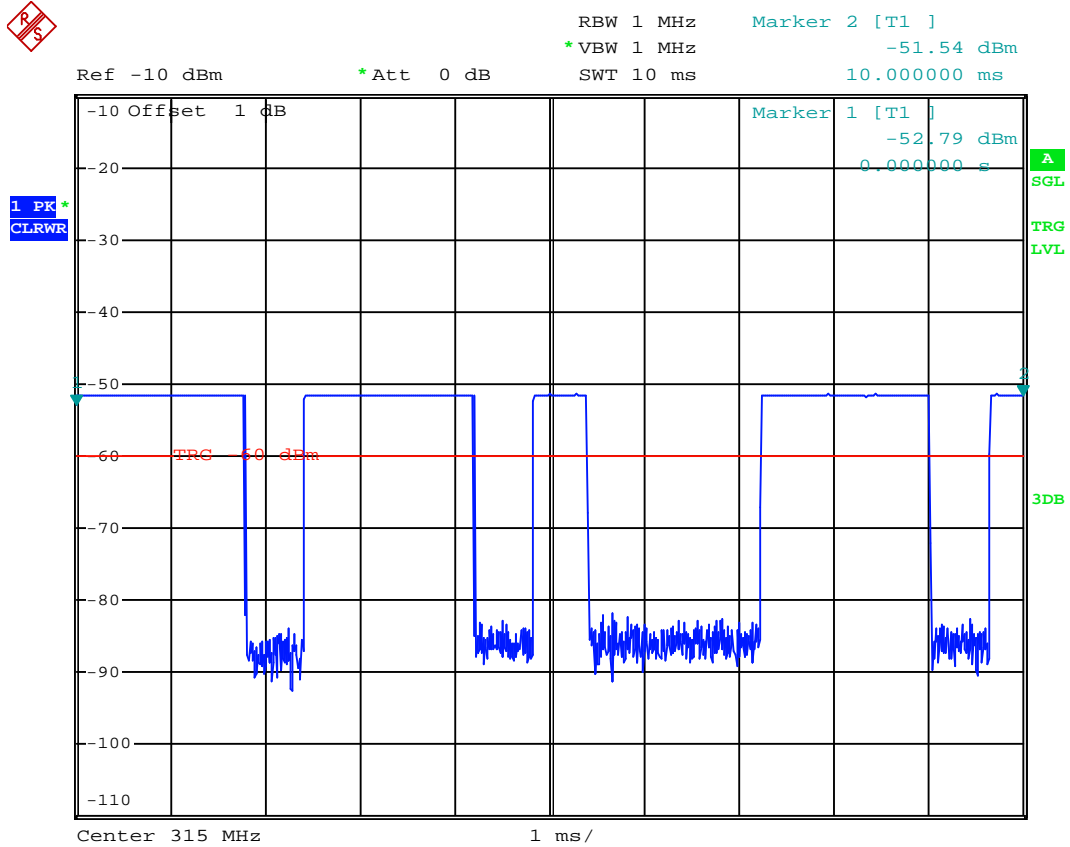
There is no deviation with the original standard.

3.4.6 EUT Operation during Test

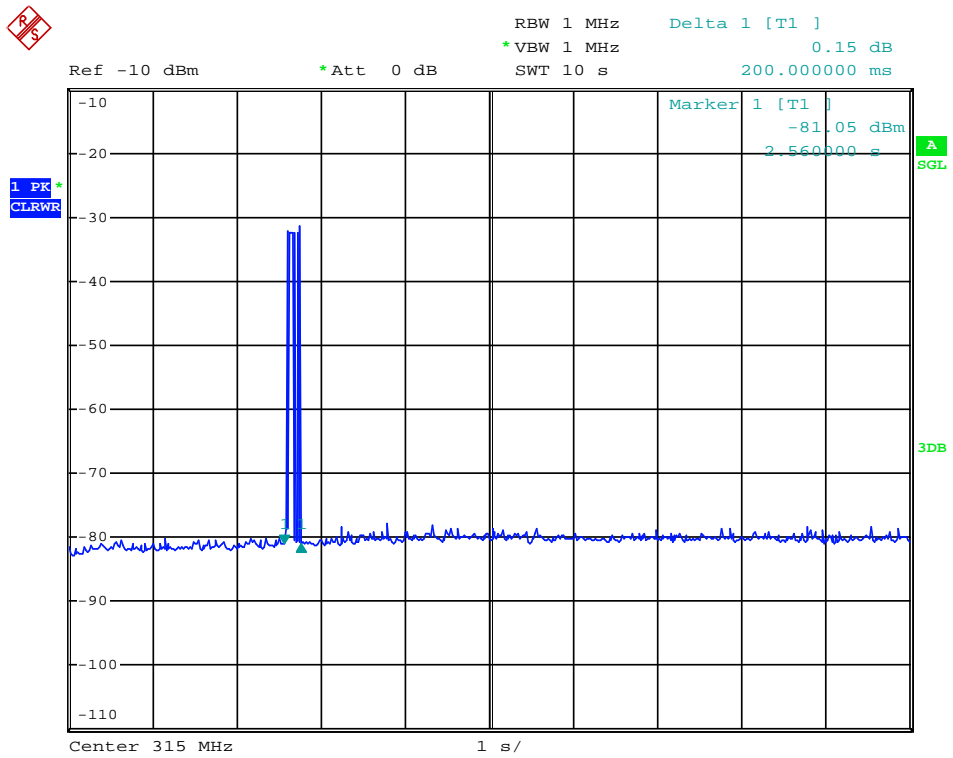
The EUT was manually operated to be in transmitting mode.

3.4.7 Deactivating Time

| | | | |
|-----------------|--------------|----------------|-----------|
| Final Test Date | May 24, 2012 | Test Site No. | TH01-HY |
| Temperature | 25.6°C | Humidity | 39% |
| Test Engineer | Bear | Configurations | Channel 1 |



Date: 16.JUN.2012 17:56:08



Date: 24.MAY.2012 10:30:37

Note: The EUT is deactivated immediately after being released.

3.4.8 Test Result of Operation Restriction

| Periodic Operation Restriction | Applicable | Declared by applicant | Test performance | Passed |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|
| The transmitter is used for | | | | |
| <input type="checkbox"/> security or safety applications <input checked="" type="checkbox"/> other applications | | <input checked="" type="checkbox"/> | | |
| The transmitter is operated | | | | |
| <input checked="" type="checkbox"/> manually <input type="checkbox"/> automatically | | <input checked="" type="checkbox"/> | | |
| Periodic operation according to | | | | |
| <input checked="" type="checkbox"/> 47 CFR FCC Part 15 Subpart C <input checked="" type="checkbox"/> 15.231(a)/(e) | | | | |
| Only control signals are sent and there is on continuous transmission. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (3) Periodic transmissions at regular predetermined intervals are <input checked="" type="checkbox"/> not permitted <input type="checkbox"/> permitted with total transmission time of two seconds per hour or less (for polling or supervision transmission to determine system integrity of transmitters used in security or safety applications) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> 47 CFR FCC Part 15 Subpart C 15.231(e) | | | | |
| The device is provided with a means for automatically limiting operation so that the duration of each transmissions is not greater than one second and the silent period between transmissions is at least 30 times the duration of the transmission but in no case less than 10 seconds. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Note: Result may be based on the applicant declaration (i.e. no test is performed). However, in this casethere is no verification by the test laboratory.

3.5 Radiated Emissions Measurement

3.5.1 Limit

Devices complying with 47 CFR FCC Part 15 Subpart C, section 15.231(a). The field strength of emissions from intentional radiators at 3 meters operated under this Section shall not exceed the following:

| Frequency Band (MHz) | Spurious Emissions Limit (uV/m) at 3m |
|----------------------|---------------------------------------|
| 40.66-40.70 | 225 |
| 70-130 | 125 |
| 130-174 | 125-375(**) |
| 174-260 | 375 |
| 260-470 | 375-1250(**) |
| Above 470 | 1250 |

**1. Linear interpolations, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

(1) for the band 130 - 174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818 \times (\text{operating frequency, MHz}) - 6136.3636$;

(2) for the band 260 - 470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667 \times (\text{operating frequency, MHz}) - 7083.3333$.

(3) The maximum permitted unwanted emissions level is 20 dB below the maximum permitted fundamental level. In addition field strength of any emissions which appear inside of the restriction band shall not exceed the general radiated emissions limits in Section 15.209(a).

| Frequencies (MHz) | Field Strength (micovolts/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 |

3.5.2 Measuring Instruments and Setting

Please refer to section 4 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 (other emission) | 1MHz / 1MHz for peak |

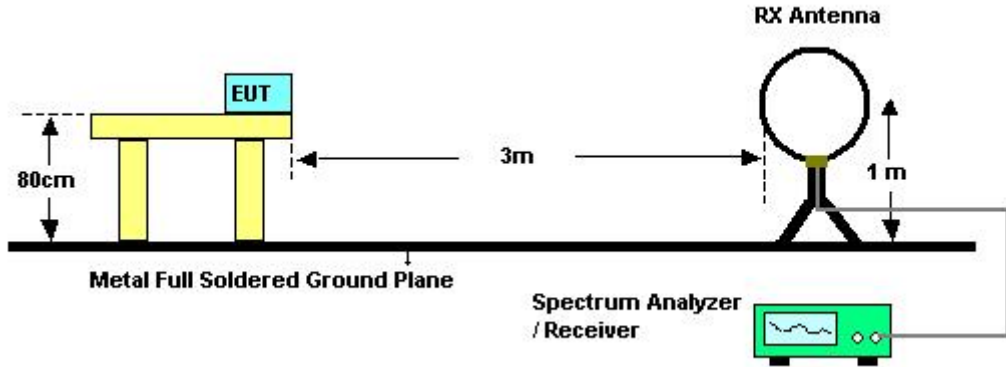
| Receiver Parameter | Setting |
|---------------------------|----------------------------------|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

3.5.3 Test Procedures

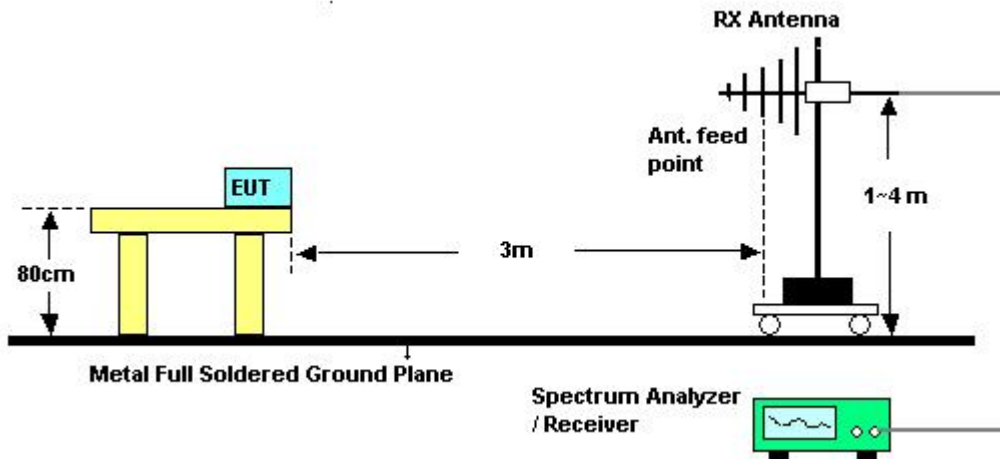
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

3.5.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.5.5 Test Deviation

There is no deviation with the original standard.

3.5.6 EUT Operation during Test

The EUT was manually operated to be in transmitting mode.

3.5.7 Results of Radiated Emissions (9kHz~30MHz)

| | | | |
|------------------------|---------------|-----------------------|-----------|
| Final Test Date | Jun. 14, 2012 | Test Site No. | 03CH02-HY |
| Temperature | 24.1°C | Humidity | 60% |
| Test Engineer | Streak | Configurations | Channel 1 |

| 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 20 dB below the permissible value has no need to be reported.

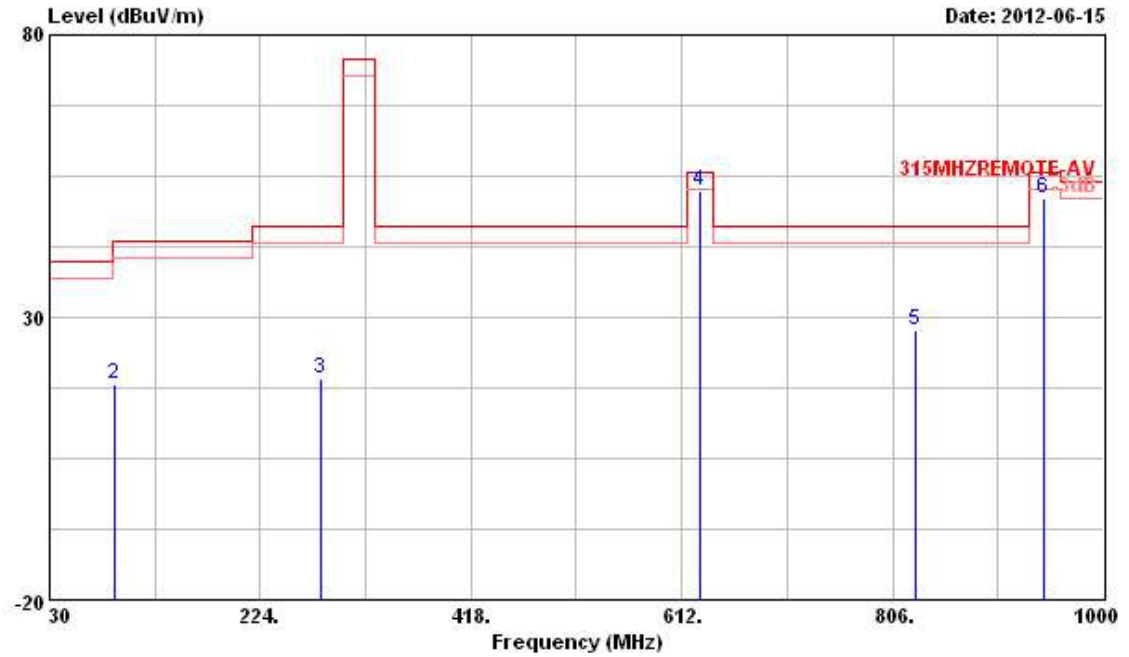
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

| | | | |
|-----------------|---------------|----------------|-----------|
| Final Test Date | Jun. 15, 2012 | Test Site No. | 03CH02-HY |
| Temperature | 24.1°C | Humidity | 60% |
| Test Engineer | Streak | Configurations | Channel 1 |

Horizontal



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp | Remark | Ant Pos | Table Pos |
|---|---------|--------|------------|------------|-------------------|----------------|------------|--------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 30.000 | 18.56 | -21.44 | 40.00 | 29.40 | 16.22 | 0.89 | 27.95 | Peak | --- | --- |
| 2 | 90.140 | 18.05 | -25.45 | 43.50 | 34.82 | 9.50 | 1.58 | 27.85 | Peak | --- | --- |
| 3 | 280.260 | 19.04 | -26.96 | 46.00 | 29.93 | 13.43 | 2.89 | 27.21 | Peak | --- | --- |
| 4 | 629.460 | 52.26 | -3.36 | 55.62 | 56.55 | 19.79 | 4.33 | 28.41 | Peak | --- | --- |
| 5 | 827.340 | 27.81 | -18.19 | 46.00 | 30.47 | 20.20 | 4.98 | 27.84 | Peak | --- | --- |
| 6 | 944.710 | 51.15 | -4.47 | 55.62 | 51.95 | 21.13 | 5.50 | 27.43 | Peak | --- | --- |

Note:

Peak limit 75.6 dBuV/m in non-restricted bands

Average limit 55.6 dBuV/m in non-restricted bands

629.46MHz and 944.71MHz are harmonic pulsed transmitter emissions in non-restricted bands.

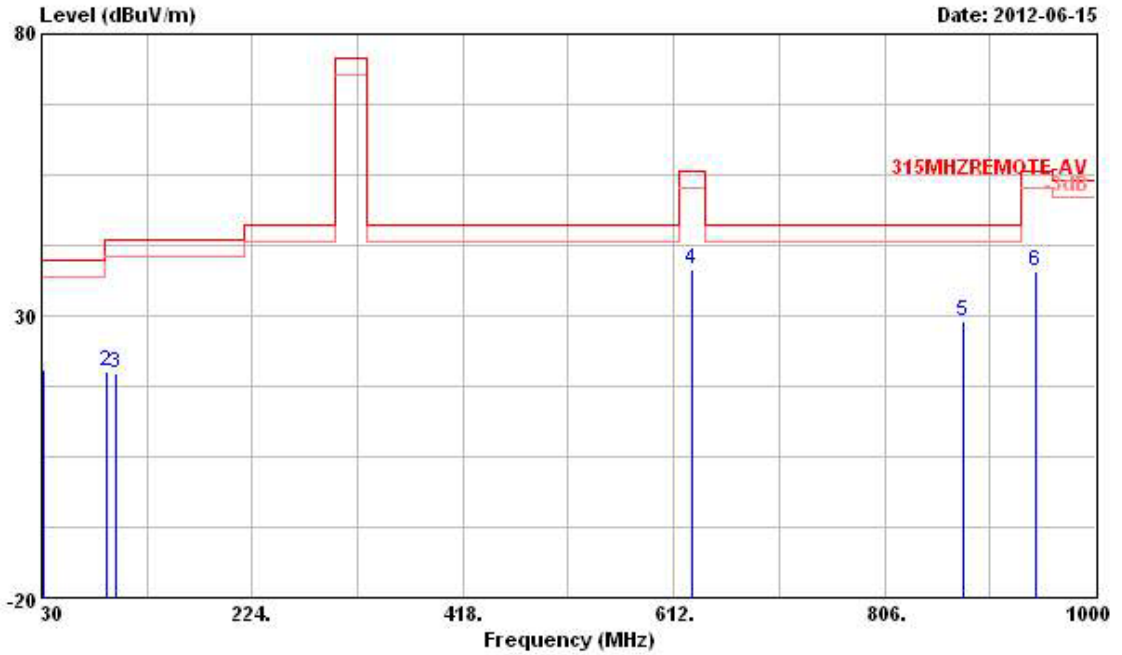
Non-restricted bands emissions complied with peak and average limits. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition. For pulsed transmitter emissions, average measurements are dependent on the pulse width or pulse train characteristics. Following as formula:

Average emission = peak emission + 20 log (duty cycle); duty cycle = on time/100 ms period = 29.9%.

629.46MHz - AV = 52.26 -10.48 = 41.78 dBuV/m at 3m under limit 55.6 dBuV/m

944.71MHz - AV = 51.15 -10.48 = 40.67 dBuV/m at 3m under limit 55.6 dBuV/m

Vertical



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|---------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 31.940 | 20.61 | -19.39 | 40.00 | 32.15 | 15.48 | 0.92 | 27.94 | Peak | --- | --- |
| 2 | 90.140 | 20.19 | -23.31 | 43.50 | 36.96 | 9.50 | 1.58 | 27.85 | Peak | --- | --- |
| 3 | 98.870 | 19.94 | -23.56 | 43.50 | 35.13 | 11.01 | 1.65 | 27.85 | Peak | --- | --- |
| 4 | 629.460 | 38.13 | -17.49 | 55.62 | 42.42 | 19.79 | 4.33 | 28.41 | Peak | --- | --- |
| 5 | 878.750 | 28.96 | -17.04 | 46.00 | 31.39 | 20.08 | 5.16 | 27.67 | Peak | --- | --- |
| 6 | 944.710 | 37.83 | -17.79 | 55.62 | 38.63 | 21.13 | 5.50 | 27.43 | Peak | --- | --- |

Note:

Peak limit 75.6 dBuV/m in non-restricted bands

Average limit 55.6 dBuV/m in non-restricted bands

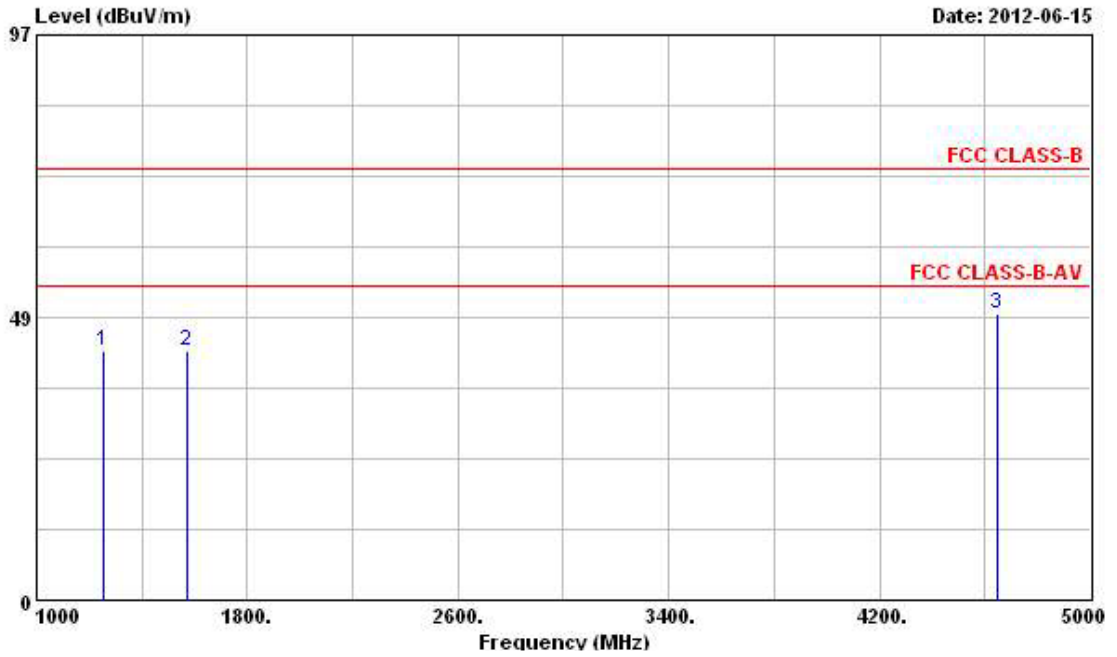
629.46MHz and 944.71MHz are harmonic pulsed transmitter emissions in non-restricted bands.

Non-restricted bands emissions complied with peak and average limits. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

3.5.9 Results for Radiated Emissions (1GHz~10th harmonic of highest frequency)

| | | | |
|-----------------|---------------|----------------|-----------|
| Final Test Date | Jun. 15, 2012 | Test Site No. | 03CH02-HY |
| Temperature | 24.1°C | Humidity | 60% |
| Test Engineer | Streak | Configurations | Channel 1 |

Horizontal



| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 1252.000 | 42.89 | -11.11 | 54.00 | 48.72 | 27.31 | 2.03 | 35.17 | PK | --- | --- |
| 2 | 1568.000 | 42.81 | -11.19 | 54.00 | 47.35 | 27.86 | 2.36 | 34.76 | PK | --- | --- |
| 3 | 4644.000 | 49.13 | -4.87 | 54.00 | 44.06 | 35.49 | 4.42 | 34.84 | PK | --- | --- |

Note:

Peak limit 75.6 dBuV/m in non-restricted bands

Average limit 55.6 dBuV/m in non-restricted bands

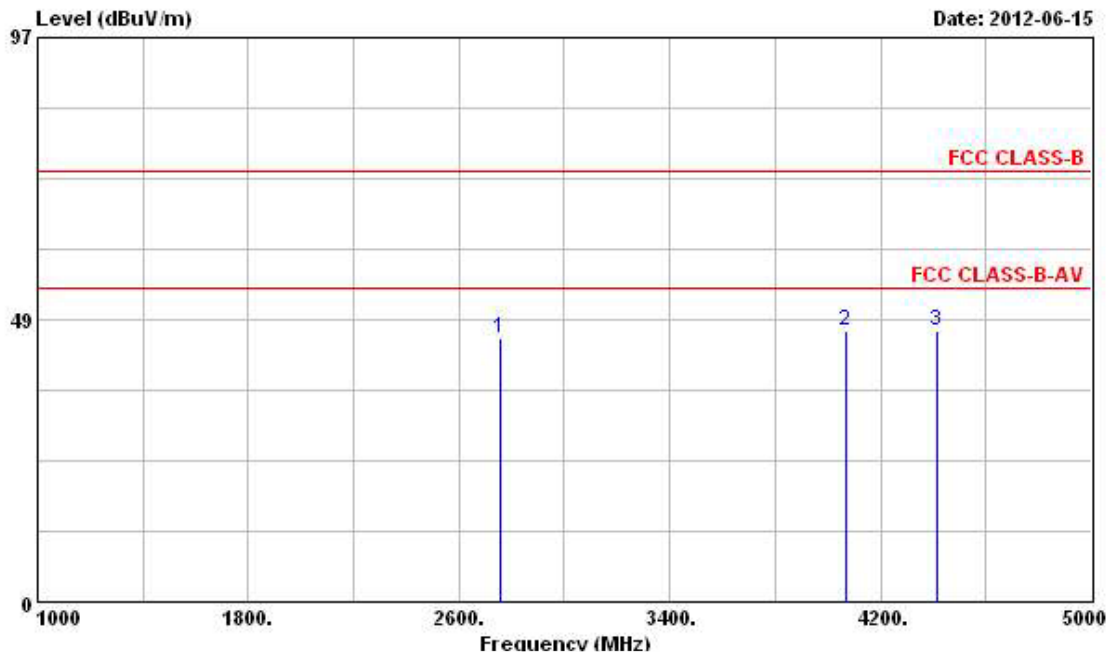
1252MHz is harmonic pulsed transmitter emissions in non-restricted bands. Non-restricted bands emissions complied with peak and average limits. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Peak limit 74 dBuV/m in restricted bands

Average limit 54 dBuV/m in restricted bands

1568MHz and 4644MHz are harmonic pulsed transmitter emissions in restricted bands. Restricted bands emissions complied with peak and average limits. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Vertical



| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 2756.000 | 45.31 | -8.69 | 54.00 | 44.13 | 32.80 | 3.26 | 34.88 | PK | --- | --- |
| 2 | 4068.000 | 46.56 | -7.44 | 54.00 | 42.95 | 34.28 | 4.18 | 34.85 | PK | --- | --- |
| 3 | 4416.000 | 46.62 | -7.38 | 54.00 | 42.51 | 34.70 | 4.29 | 34.88 | PK | --- | --- |

Note:

Peak limit 74 dBuV/m in restricted bands

Average limit 54 dBuV/m in restricted bands

2756MHz, 4068MHz and 4416MHz are harmonic pulsed transmitter emissions in restricted bands. Restricted bands emissions complied with peak and average limits. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

3.6 Antenna Requirements

3.6.1 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.

3.6.2 Antenna Connector Construction

Please refer to section 2.1 in this test report, all antenna connectors comply with the requirements.

4. LIST OF MEASURING EQUIPMENTS

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|----------------------------|--------------|------------------|-------------|-----------------|------------------|---------------------|
| Spectrum Analyzer | R&S | FSP 40 | 100305 | 9KHz~40GHz | Feb. 21, 2012 | Conducted (TH01-HY) |
| DC Power Source | G.W. | GPC-6030D | C671845 | DC 1V ~ 60V | Jun. 02, 2012 | Conducted (TH01-HY) |
| Temp. and Humidity Chamber | Giant Force | GTH-225-20-SP-SD | MAA1112-007 | -20 ~ 100°C | Dec. 07, 2011 | Conducted (TH01-HY) |
| Signal Generator | R&S | SMR40 | 100302 | 10MHz ~ 40GHz | Nov. 22, 2011 | Conducted (TH01-HY) |
| Power Sensor | Anritsu | MA2411B | 1027452 | 300MHz ~ 40GHz | Jan. 12, 2012 | Conducted (TH01-HY) |
| Power Meter | Anritsu | ML2495A | 1124009 | 300MHz ~ 40GHz | Jan. 12, 2012 | Conducted (TH01-HY) |
| RF Cable-2m | HUBER+SUHNER | SUCOFLEX_104 | SN 345672/4 | 1GHz ~ 26.5GHz | Dec. 03, 2011 | Conducted (TH01-HY) |
| RF Cable-3m | HUBER+SUHNER | SUCOFLEX_104 | SN 345668/4 | 1GHz ~ 26.5GHz | Dec. 03, 2011 | Conducted (TH01-HY) |

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

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|--------------------------|----------------|-------------|------------|--------------------|------------------|-----------------------|
| Spectrum Analyzer | R&S | FSP40 | 100593 | 9kHz ~ 40GHz | Sep. 01, 2011 | Radiation (03CH02-HY) |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH02-HY | 30MHz ~ 1GHz 3m | May 10, 2012 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8447D | 2944A11146 | 100kHz ~ 1.3GHz | Jul. 25, 2011 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8449B | 3008A02373 | 1 Hz ~ 26.5GHz | Jul. 25, 2011 | Radiation (03CH02-HY) |
| Horn Antenna | ETS-LINDGREN | 3117 | 00091920 | 1GHz ~ 18GHz | Nov. 15, 2011 | Radiation (03CH02-HY) |
| RF Cable-R03m | Jye Bao | RG142 | CB021 | 30MHz ~ 1GHz | Nov. 11, 2011 | Radiation (03CH02-HY) |
| RF Cable-high | SUHNER | SUCOFLEX106 | 03CH02-HY | 1GHz ~ 40GHz | Mar. 06, 2012 | Radiation (03CH02-HY) |
| Bilog Antenna | SCHAFFNER | CBL61128 | 2723 | 30MHz ~ 2GHz | Oct. 22, 2011 | Radiation (03CH02-HY) |
| Turn Table | HD | DS 420 | 420/649/00 | 0~ 360 degree | N/A | Radiation (03CH02-HY) |
| Antenna Mast | HD | MA 240 | 240/559/00 | 1 ~ 4 m | N/A | Radiation (03CH02-HY) |

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

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|--------------|--------------|---------------|------------|-----------------|------------------|-----------------------|
| Loop Antenna | R&S | HFH2-Z2 | 860004/001 | 9 kHz - 30 MHz | Jul. 29, 2010* | Radiation (03CH02-HY) |
| Amplifier | MITEQ | AMF-6F-260400 | 9121372 | 26.5GHz ~ 40GHz | Apr. 19, 2011* | Radiation (03CH02-HY) |

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

5. TEST LOCATION

| | |
|--------|----------------------------------------------------------------------------------------------------------------------------------------|
| SHIJR | ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei 221, Taiwan, 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 : 886-3-327-0973 |
| LINKOU | ADD : No. 30-2, Dingfu Vil., Linkou Dist., New Taipei City 244, Taiwan, R.O.C. TEL : 886-2-2601-1640 FAX : 886-2-2601-1695 |
| DUNGHU | ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei 114, Taiwan, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740 |
| JUNGHE | ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei 235, Taiwan, 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 |

6. TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-111208

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
President, Taiwan Accreditation Foundation
Date : December 08, 2011

P1, total 24 pages

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