



FCC ID: S26-WMP235
Issued on Aug. 05, 2005

Report No.: FR533150-01

FCC TEST REPORT

CATEGORY : Portable
PRODUCT NAME : Wireless Media Player
FCC ID. : S26-WMP235
FILING TYPE : Certification
BRAND NAME : Tao
MODEL NAME : WMP235

APPLICANT : **Giant International (USA), Ltd.**
3500 Lenox Road, Suite 680, Atlanta, GA 30326, U.S.A.

MANUFACTURER : **DONG GUAN G-COM COMPUTER CO., LTD.**
1st Row Yin Shan Rd., Yin Hwu Industrial Area Qingxi Town
DongGuan City Guang Dong China

ISSUED BY : **SPORTON INTERNATIONAL INC.**
6F, No. 106, Sec. 1, Hsin Tai Wu Rd., His Chih, Taipei Hsien,
Taiwan, R.O.C.

Statements:

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.

Certificate or Test Report could not be used by the applicant to claim the product endorsement by NVLAP and any agency of U.S. government.

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



Lab Code: 200079-0

SPORTON International Inc.

TEL : 886-2-2696-2468

FAX : 886-2-2696-2255



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HISTORY OF THIS TEST REPORT

Received Date: Mar. 31, 2005

Test Date: Jul. 22, 2005

Original Report Issue Date: Aug. 05, 2005

Report No.: FR533150-01

☒ No additional attachment.

☐ Additional attachment were issued as following record:

| Attachment No. | Issue Date | Description |
|----------------|------------|-------------|
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CERTIFICATE OF COMPLIANCE

with

47 CFR FCC Part 15 Subpart C

PRODUCT NAME : Wireless Media Player

BRAND NAME : Tao

MODEL NAME : WMP235

APPLICANT : **Giant International (USA), Ltd.**

3500 Lenox Road, Suite 680, Atlanta, GA 30326, U.S.A.

MANUFACTURER : **DONG GUAN G-COM COMPUTER CO., LTD.**

1st Row Yin Shan Rd., Yin Hwu Industrial Area Qingxi Town
DongGuan City Guang Dong China

I **HEREBY** CERTIFY THAT:

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4-2003 and all test are performed according to 47 CFR FCC Part 15 Subpart C. Testing was carried out on Jul. 22, 2005 at SPORTON International Inc. LAB.

Wayne Hsu / Supervisor
Sporton International Inc.



1. General Description of Equipment under Test

1.1. Applicant

Giant International (USA), Ltd.
3500 Lenox Road, Suite 680, Atlanta, GA 30326, U.S.A.

1.2. Manufacturer

DONG GUAN G-COM COMPUTER CO., LTD.
1st Row Yin Shan Rd., Yin Hwu Industrial Area Qingxi Town DongGuan City Guang Dong China

1.3. Basic Description of Equipment under Test

This product is a Media player with 802.11b wireless solution and FM Transmitter. Only WLAN test result was shown in the test report. The technical data has been listed on section " Features of Equipment under Test ".

1.4. Features of Equipment under Test (DSSS)

| Items | Description |
|-------------------------------|---|
| Type of Modulation | DSSS (CCK / DQPSK / DBPSK) |
| Number of Channels | 11 |
| Carrier Frequency Range | 2412.0 MHz ~ 2462.0 MHz |
| Carrier Frequency | See section 1.7 for details |
| Data Rate | 1, 2, 5.5, 11 Mbps |
| Max. Conducted Output Power | 14.48 dBm |
| Antenna Type | See section 1.6 for details |
| Communication Type | Half-Duplex |
| Testing Duty Cycle | 100.00% |
| Power Rating (DC, Voltage) | 3.6VDC from battery / 5.0 VDC from charger |
| Test Power Source | 120.00V AC (charger) |
| Temperature Range (Operating) | 0 ~ 45 °C |

1.5. Features of Equipment under Test (FM)

| Items | Description |
|-------------------------------|---|
| Type of Modulation | FM |
| Number of Channels | 100 |
| Carrier Frequency Range | 88.1 MHz ~ 107.9 MHz |
| Antenna | Loop Antenna |
| Communication Type | Half-Duplex |
| Testing Duty Cycle | 100.00% |
| Power Rating (DC/AC, Voltage) | 3.6VDC from battery / 5.0 VDC from charger |
| Test Power Source | 120.00V AC (charger) |
| Temperature Range (Operating) | 0 ~ 45 °C |

1.6. Antenna Description

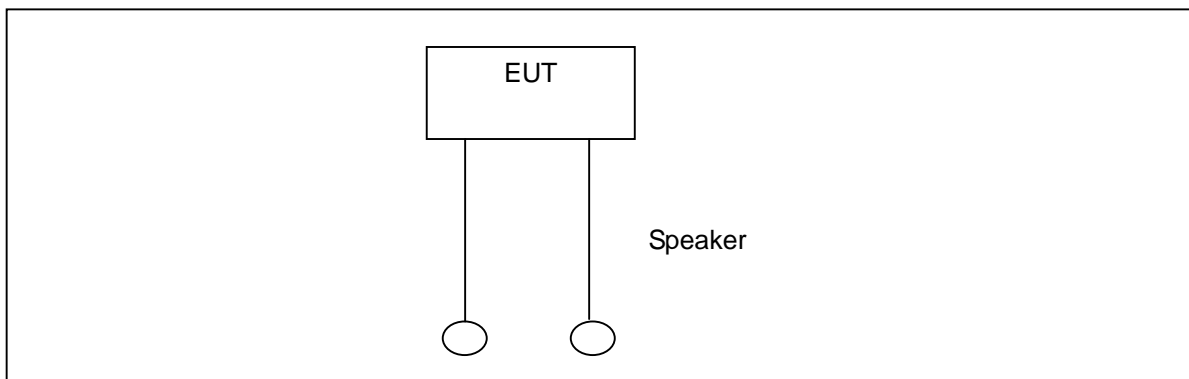
| No. | Antenna Type | Gain (dBi) |
|-----|--------------|------------|
| 1 | PIFA Antenna | -2.68 |

1.7. Table for Carrier Frequencies

| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|---------|-----------|
| 01 | 2412 MHz | 05 | 2432 MHz | 09 | 2452 MHz | - | - |
| 02 | 2417 MHz | 06 | 2437 MHz | 10 | 2457 MHz | - | - |
| 03 | 2422 MHz | 07 | 2442 MHz | 11 | 2462 MHz | - | - |
| 04 | 2427 MHz | 08 | 2447 MHz | - | - | - | - |

2. Test Configuration of the Equipment under Test

2.1. Connection Diagram of Test System



2.2. The Test Mode Description

1. For DSSS modulation, CCK (11 Mbps) is the worst case on all test items.
2. According to ANSI C63.4-2003: If frequency range of EUT is more than 10 MHz, we have to test the lowest, middle and highest channels of EUT.
3. Spurious emission below 1GHz is independent of channel selection and modulation types. So only channel 06 was tested.

AC conduction emission, the EUT was powered by charger and linked with AP wirelessly.

2.3. Description of Test Supporting Units

| Support unit | Brand | Model No. | FCC ID |
|--------------|---------------------------|-----------|--------|
| Speaker | Provided by the applicant | - | DoC |

3. General Information of Test

3.1. Test Facility

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao
Yuan Hsien, Taiwan, R.O.C.
: TEL 886-3-327-3456
: FAX 886-3-318-0055
Test Site No : 03CH03-HY / TH01-HY / CO04-HY

3.2. Standards for Methods of Measurement

Here is the list of the standards followed in this test report.

ANSI C63.4-2003

47 CFR FCC Part 15 Subpart C

3.3. DoC Statement

This EUT is also classified as a device of computer peripheral Class B which DoC has to be followed. It has been verified according to the rule of 47 CFR part 15 Subpart B, and found that all the requirements has been fulfilled.

3.4. Frequency Range Investigated

Radiated emission test: from 9 kHz to 10th carrier harmonic

3.5. Test Distance

The test distance of radiated emission (9kHz~1GHz) test from antenna to EUT is 3 M.

The test distance of radiated emission (1GHz~10th carrier harmonic) test from antenna to EUT is 3 M.

3.6. Test Software

Conduction: Executed "Ping.exe " was executed to link with AP to receive and transmit data wirelessly.

Radiation: EUT was transmitting continuously steadily.



Power Parameter Table

Software Version : Controlled by hardware

Power Set CH01 / DSSS : -

Power Set CH06 / DSSS : -

Power Set CH11 / DSSS : -

4. List of Measurements

4.1. Summary of the Test Results

| Applied Standard: 47 CFR FCC Part 15 Subpart C | | | |
|--|----------------------|-------------------------------------|--------|
| Paragraph | FCC Section | Description of Test | Result |
| 5.1 | 15.247(a)(2) | 6dB Spectrum Bandwidth | Pass |
| 5.2 | 15.247(b)(3) | Maximum Peak Conducted Output Power | Pass |
| 5.3 | 15.247(e) | Peak Power Spectral Density | Pass |
| 5.4 | 15.247(d) | Band Edges Emission | Pass |
| 5.5 | 15.207 | AC Power Line Conducted Emission | Pass |
| 5.6 | 15.247(d) | Spurious Radiated Emission | Pass |
| 5.7 | 15.203/15.247(b)/(c) | Antenna Requirement | Pass |
| 錯誤! 找不到參照來源。 | 2.1091 | Maximum Permissible Exposure | Pass |

5. Test Result

5.1. Test of 6dB Spectrum Bandwidth

5.1.1. Applicable Standard

Section 15.247(a)(2): For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

5.1.2. Measuring Instruments

Item 16 of the table on section 6.

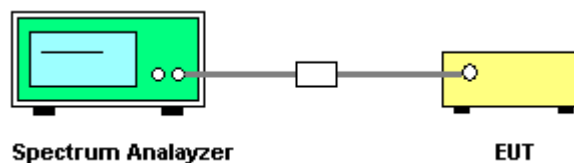
5.1.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP30
- Attenuation : Auto
- Center Frequency : 2412 MHz / 2437 MHz / 2462 MHz
- Span Frequency : > 6dB Bandwidth
- RB : 100 kHz
- VB : 100 kHz
- Detector : Peak
- Trace : Max Hold
- Sweep Time : Auto

5.1.4. Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz. Trace to Max hold and Detector PK.
3. The 26dB bandwidth is the spectrum width with level higher than 6dB below the peak level.
4. Repeat above 1~3 points for the lowest, middle and highest channel of the EUT.

5.1.5. Test Setup Layout



5.1.6. Test Criteria

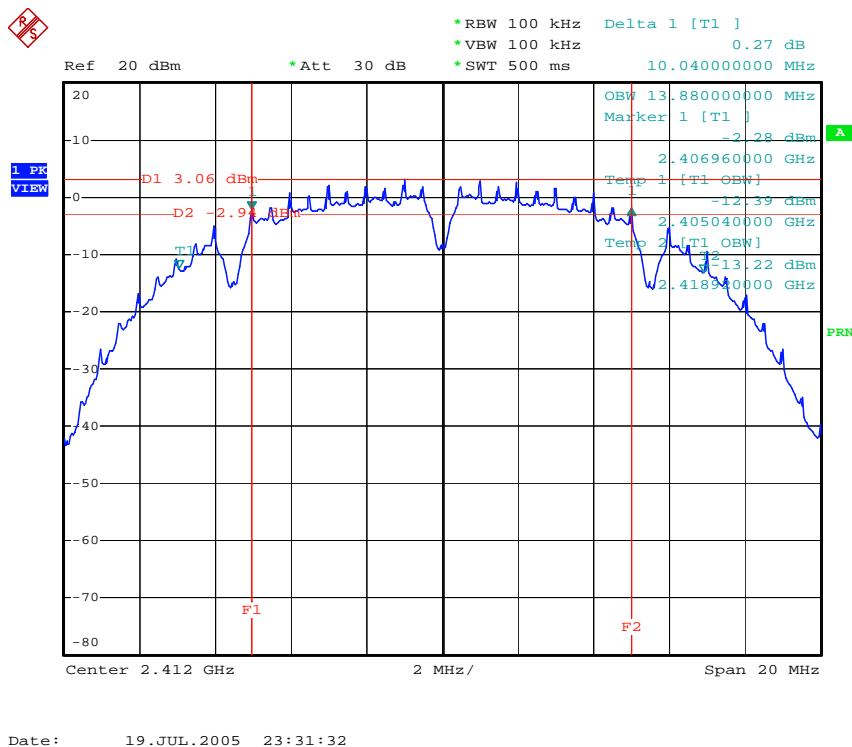
All test results complied with the requirements of 15.247(a)(2). Measurement Uncertainty is 1×10^{-5} .

5.1.7. Test Result

- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Eason Lu

| Modulation Type | Channel No. | Frequency (MHz) | 6dB Bandwidth | Min. Limit |
|-----------------|-------------|-----------------|---------------|------------|
| DSSS | 01 | 2412 MHz | 10.04 | 0.5 |
| DSSS | 06 | 2437 MHz | 10.00 | 0.5 |
| DSSS | 11 | 2462 MHz | 9.56 | 0.5 |

Modulation Type: DSSS (Channel 01) :



5.2. Test of Maximum Peak Conducted Output Power

5.2.1. Applicable Standard

Section 15.247(b)(3): The maximum peak output power shall not exceed 1 watt (30dBm). Except as shown below, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the above stated values by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

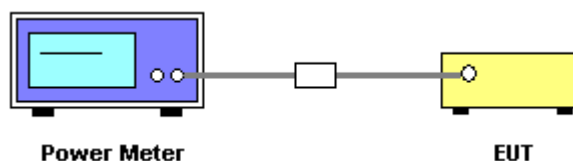
5.2.2. Measuring Instruments

Item 19, 21 of the table on section 6.

5.2.3. Test Procedures and Test Instruments Setting

1. The transmitter output was connected to the peak power meter through an attenuator.
2. Repeated point 1 for the lowest, middle and highest channel of the EUT.

5.2.4. Test Setup Layout



5.2.5. Test Criteria

All test results complied with the requirements of 15.247(b)(3). Measurement Uncertainty is 1.5dB.



5.2.6. Test Result of Conducted Power

- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Eason Lu

| Modulation Type | Channel No. | Frequency (MHz) | Output Power (dBm) | Limits (dBm) |
|-----------------|-------------|-----------------|--------------------|--------------|
| DSSS | 01 | 2412 MHz | 14.33 | 30 |
| DSSS | 06 | 2437 MHz | 14.24 | 30 |
| DSSS | 11 | 2462 MHz | 14.48 | 30 |

5.3. Test of Peak Power Spectral Density

5.3.1. Applicable Standard

Section 15.247(e): For digital modulation systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.3.2. Measuring Instruments

Item 16 of the table on section 6.

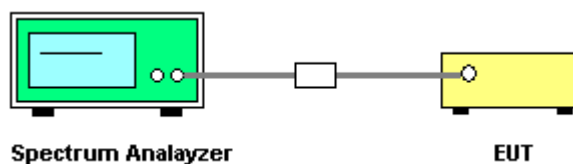
5.3.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP30
 - Attenuation : Auto
 - Center Frequency : 2412 MHz / 2437 MHz / 2462 MHz
 - Span Frequency : 1.5MHz
 - RB : 3 kHz
 - VB : 30 kHz
 - Detector : Peak
 - Trace : Max Hold
 - Sweep Time : 500s

5.3.4. Test Procedures

1. The transmitter output is connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 3kHz and VBW to 30kHz. Set Detector to Peak, Trace to Max Hold.
3. Mark the frequency with maximum peak power as the center of the display of the spectrum.
4. Set the span to 1.5MHz and the sweep time to 500s and record the maximum peak value.
5. Repeated the 1~4 for the lowest, middle and highest channel of the EUT.

5.3.5. Test Setup Layout



5.3.6. Test Criteria

All test results complied with the requirements of 15.247(e). Measurement Uncertainty is 1.5dB.

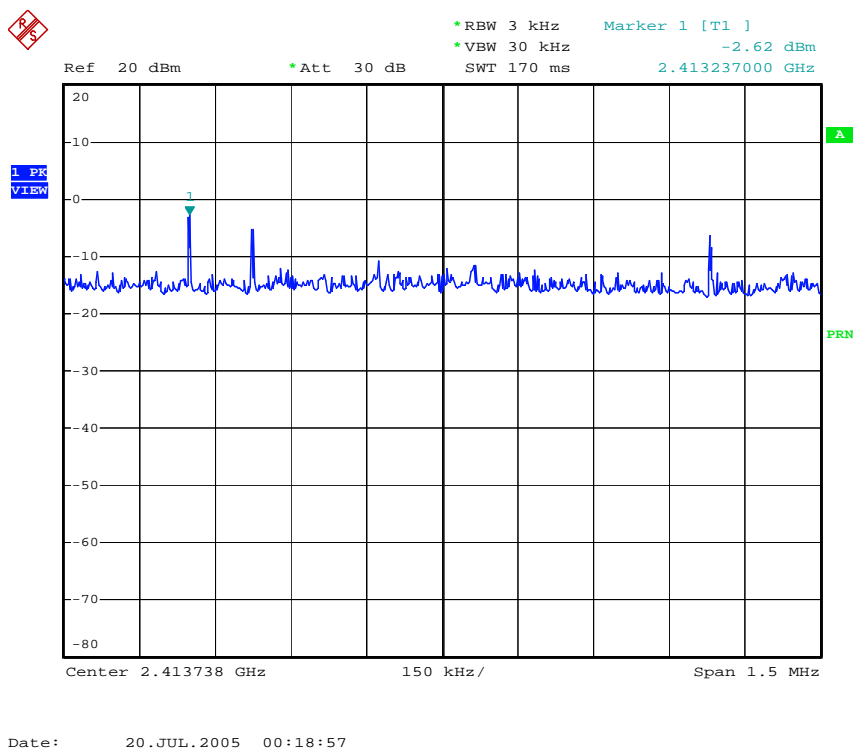


5.3.7. Test Result

- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Eason Lu

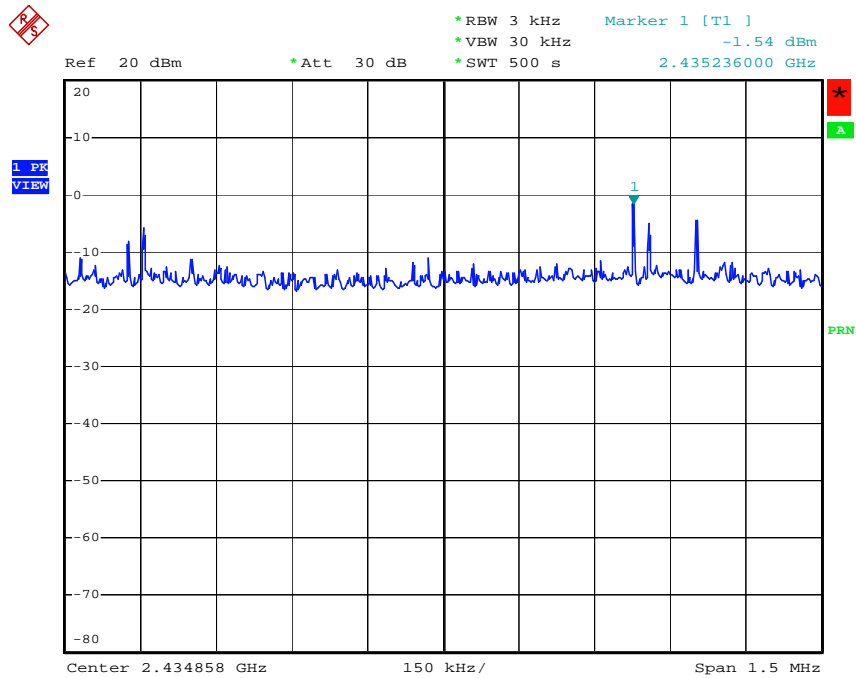
| Modulation Type | Channel No. | Frequency (MHz) | Power Density (dBm) | Limits (dBm) |
|-----------------|-------------|-----------------|---------------------|--------------|
| DSSS | 01 | 2412 MHz | -2.62 | 8 |
| DSSS | 06 | 2437 MHz | -1.54 | 8 |
| DSSS | 11 | 2462 MHz | -2.07 | 8 |

Modulation Type: DSSS (Channel 01) :



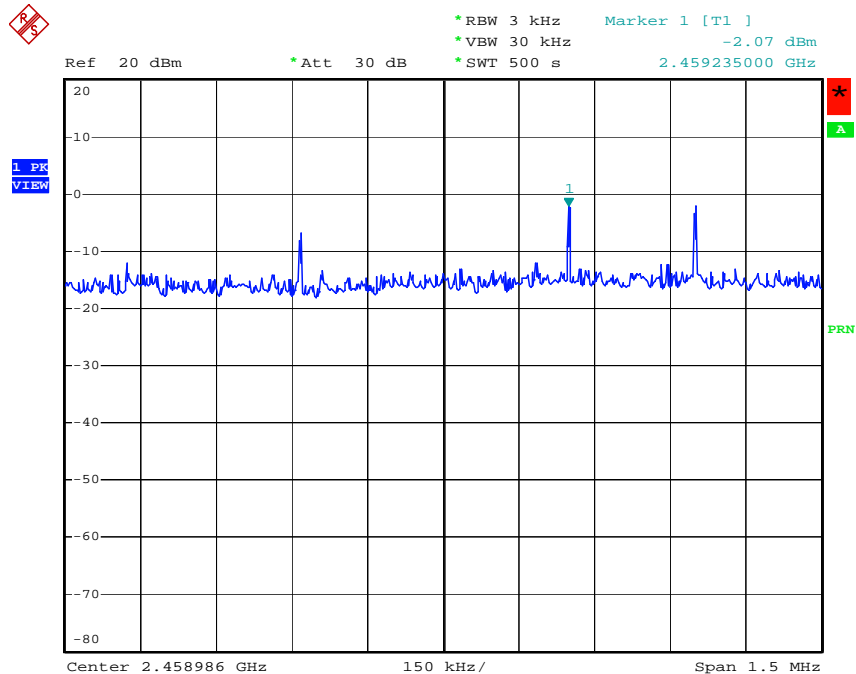


Modulation Type: DSSS (Channel 06) :



Date: 19.JUL.2005 23:37:01

Modulation Type: DSSS (Channel 11) :



Date: 19.JUL.2005 23:44:54

5.4. Test of Band Edges Emission

5.4.1. Applicable Standard

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

5.4.2. Measuring Instruments

Item 1~15 of the table on section 6 for radiated measurement.
Item 16 of the table on section 6 for conducted measurement.

5.4.3. Description of Major Test Instruments Setting

- Spectrum Analyzer : R&S FSP30 (Conducted Measurement)
 - Attenuation : Auto
 - Center Frequency : 2412 MHz / 2462 MHz
 - Span Frequency : 100MHz
 - RB : 100 kHz
 - VB : 100 kHz
 - Detector : Peak
 - Trace : Max Hold
 - Sweep Time : Auto
- Spectrum Analyzer : R&S FSP40 (Radiated Measurement)
 - Attenuation : Auto
 - Center Frequency : 2412 MHz / 2462 MHz
 - Span Frequency : 100MHz
 - RB : 1 MHz for PK value / 1 MHz for AV value
 - VB : 1 MHz for PK value / 10 Hz for AV value
 - Detector : Peak
 - Trace : Max Hold
 - Sweep Time : Auto

5.4.4. Test Procedures and Test Instruments Setting

Conducted Measurement

1. The transmitter is set to the lowest channel.
2. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
3. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100MHz bandwidth from lower band edge. Then detector set to peak and max hold this trace.
4. The lowest band edges emission was measured and recorded.

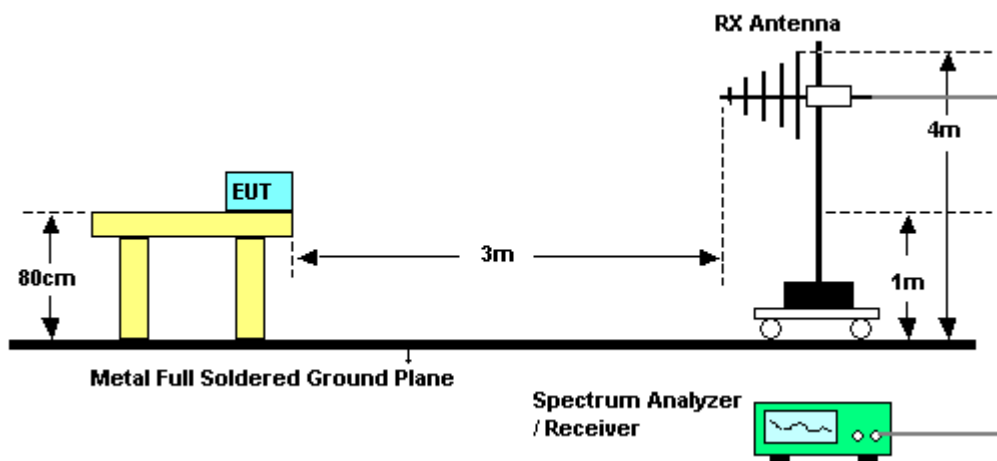
5. The transmitter set to the highest channel and repeated 2~4.

Radiated Measurement

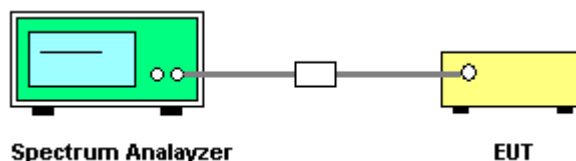
1. Configure the EUT according to ANSI C63.4.-2003
2. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For band edge emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For band edge emission in restriction bands, use 10Hz VBW and 1MHz RBW for reading under AV and use 1MHz VBW and 1 MHz RBW for reading under PK.
6. The transmitter was set to the highest channel and repeated item 2~5.

5.4.5. Test Setup

Radiated Method



Conducted Method



5.4.6. Test Criteria

All test results complied with the requirements of 15.247(d). Measurement Uncertainty is 1×10^{-5} .

5.4.7. Test Results for CH 00 / 2402 MHz

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Eason Lu

| | Freq | Level | Over Limit | Read Level | Limit Line | Factor | Remark |
|---|----------|--------|---------------|---------------|---------------|--------|---------|
| | MHz | dBuV/m | dB | dBuV | dBuV/m | dB | |
| 1 | 2389.990 | 55.00 | -19.00 | 24.82 | 74.00 | 30.18 | Peak |
| 2 | 2389.990 | 43.00 | -11.00 | 12.82 | 54.00 | 30.18 | Average |

5.4.8. Test Results for CH 11 / 2462 MHz

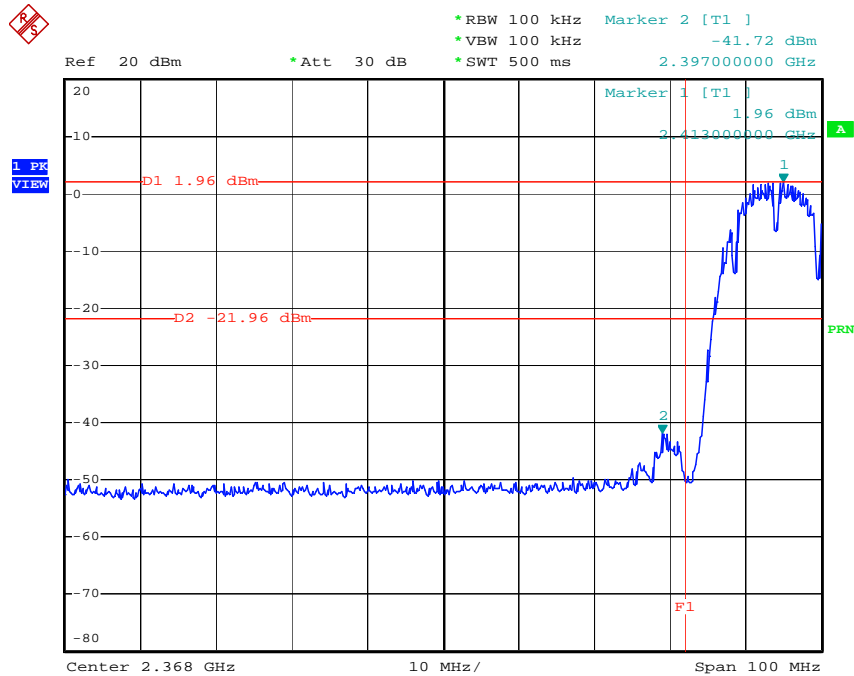
- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Eason Lu

| | Freq | Level | Over Limit | Read Level | Limit Line | Factor | Remark |
|---|----------|--------|---------------|---------------|---------------|--------|---------|
| | MHz | dBuV/m | dB | dBuV | dBuV/m | dB | |
| 1 | 2463.660 | 55.10 | -18.90 | 24.68 | 74.00 | 30.42 | Peak |
| 2 | 2463.660 | 43.43 | -10.57 | 13.01 | 54.00 | 30.42 | Average |

Level*: The max field strength in the restricted bands.

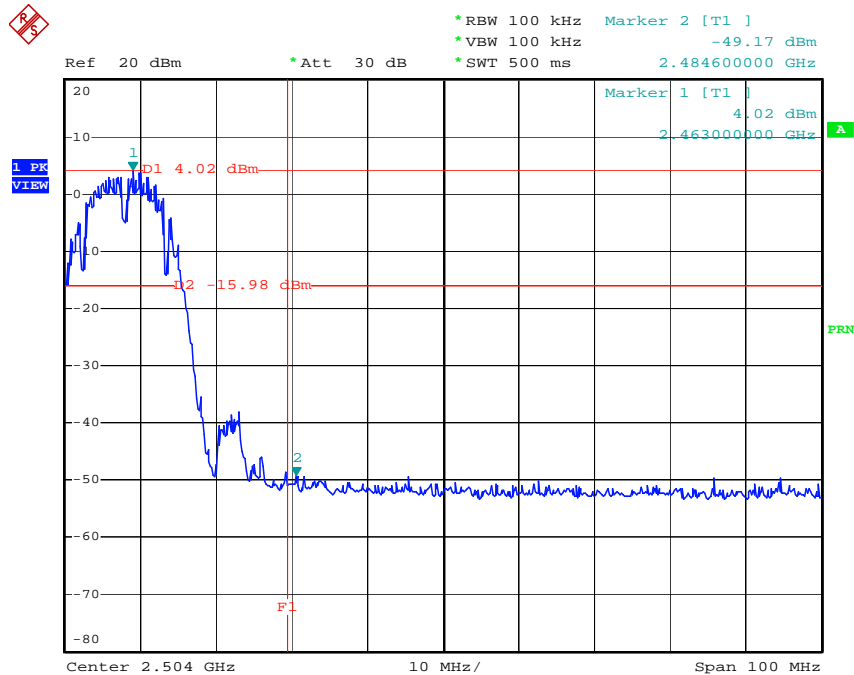
Test Result of Conducted Emission

Modulation Type: DSSS (Channel 01) :



Date: 19.JUL.2005 23:32:53

Modulation Type: DSSS (Channel 11) :



Date: 19.JUL.2005 23:43:27

5.5. Test of AC Power Line Conducted Emission

5.5.1. Applicable Standard

Section 15.207: For a Low-power Radio-frequency Device 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 |

5.5.2. Measuring Instruments

Please reference item 28~32 in chapter 6 for the instruments used for testing.

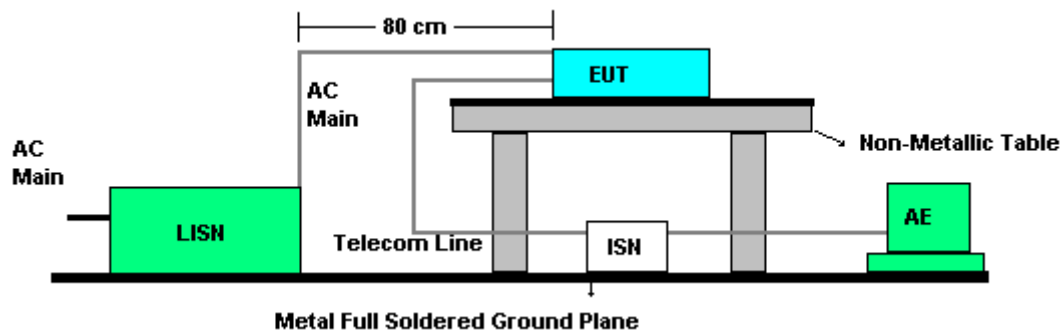
5.5.3. Description of Major Test Instruments Setting

- Test Receiver : R&S ESCS 30
- Attenuation : 10 dB
- Start Frequency : 0.15 MHz
- Stop Frequency : 30 MHz
- IF Bandwidth : 9 KHz

5.5.4. Test Procedures

1. Configure the EUT according to ANSI C63.4.-2003
2. The 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.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN)
4. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. The measurement has to be done between each power line and ground at the power terminal for each RF channel. Only one RF channel has to be investigated since this test is independent with the RF channel selection.

5.5.5. Test Setup Layout



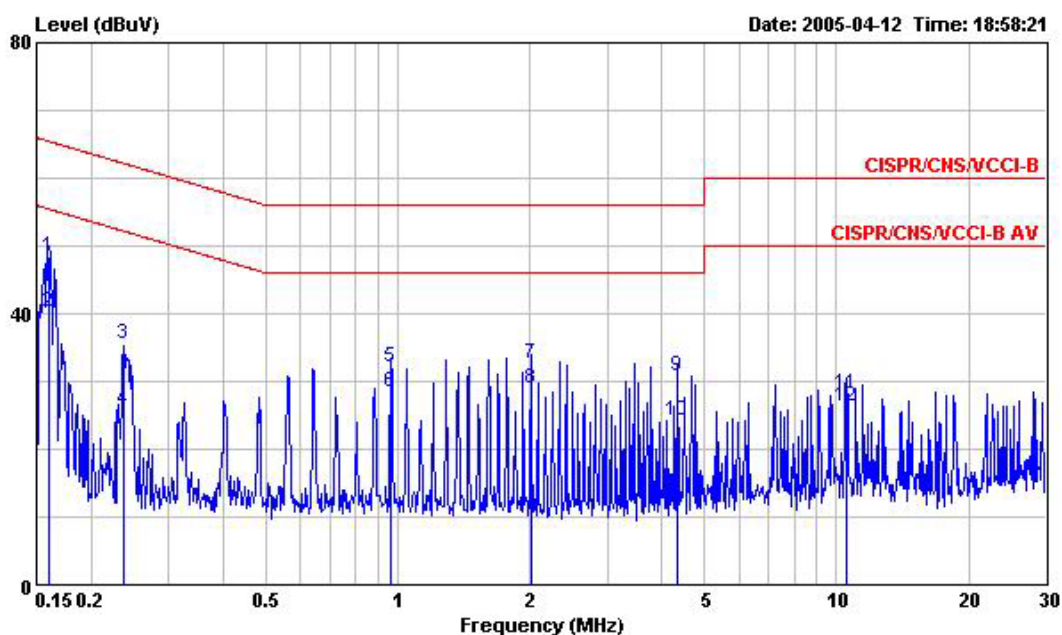
5.5.6. Test Criteria

All test results complied with the requirements of 15.207. Measurement Uncertainty is 2.54dB.

5.5.7. Test Result of Conducted Emission

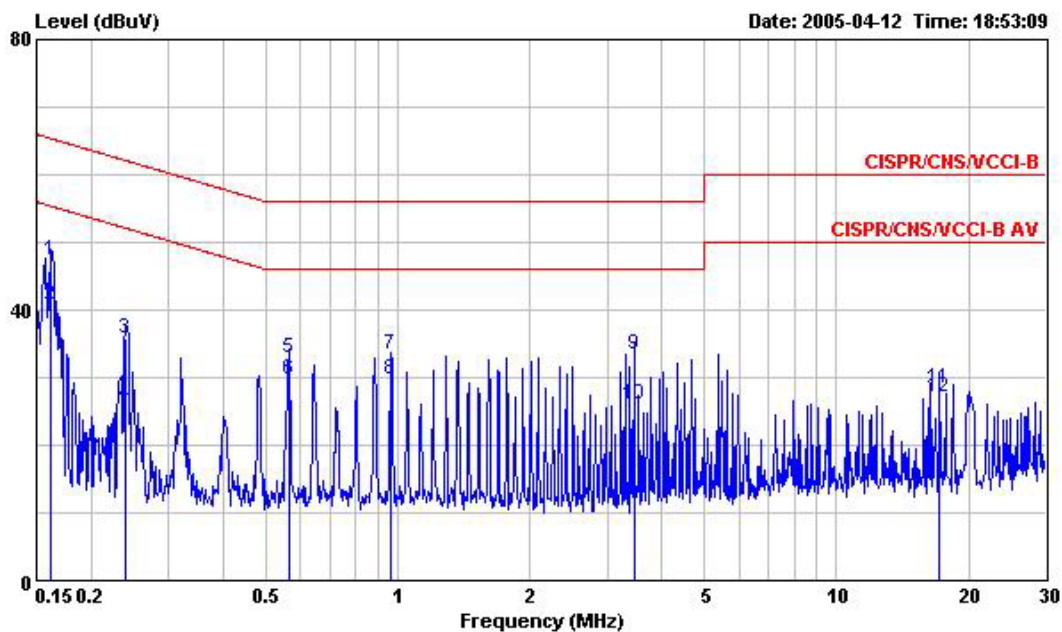
- Test Mode: WLAN Link
- Temperature: 26°C
- Relative Humidity: 64%
- Test Engineer: Sky Wu

Line to Ground



| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|----|-----------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.1598470 | 48.36 | -17.11 | 65.47 | 48.04 | 0.06 | 0.26 | QP |
| 2 | 0.1598470 | 40.34 | -15.13 | 55.47 | 40.02 | 0.06 | 0.26 | Average |
| 3 | 0.2378610 | 35.45 | -26.72 | 62.17 | 35.34 | 0.06 | 0.05 | QP |
| 4 | 0.2378610 | 25.72 | -26.45 | 52.17 | 25.61 | 0.06 | 0.05 | Average |
| 5 | 0.9632810 | 32.03 | -23.97 | 56.00 | 31.47 | 0.11 | 0.45 | QP |
| 6 | 0.9632810 | 28.33 | -17.67 | 46.00 | 27.77 | 0.11 | 0.45 | Average |
| 7 | 2.009 | 32.62 | -23.38 | 56.00 | 32.49 | 0.11 | 0.02 | QP |
| 8 | 2.009 | 28.82 | -17.18 | 46.00 | 28.69 | 0.11 | 0.02 | Average |
| 9 | 4.340 | 30.72 | -25.28 | 56.00 | 30.42 | 0.21 | 0.09 | QP |
| 10 | 4.340 | 24.18 | -21.82 | 46.00 | 23.88 | 0.21 | 0.09 | Average |
| 11 | 10.530 | 28.07 | -31.93 | 60.00 | 27.40 | 0.21 | 0.46 | QP |
| 12 | 10.530 | 26.23 | -23.77 | 50.00 | 25.56 | 0.21 | 0.46 | Average |

Neutral to Ground



| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|----|-----------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.1615500 | 47.34 | -18.04 | 65.38 | 46.98 | 0.11 | 0.25 | QP |
| 2 | 0.1615500 | 40.68 | -14.70 | 55.38 | 40.32 | 0.11 | 0.25 | Average |
| 3 | 0.2403720 | 35.90 | -26.18 | 62.08 | 35.74 | 0.11 | 0.05 | QP |
| 4 | 0.2403720 | 26.12 | -25.96 | 52.08 | 25.96 | 0.11 | 0.05 | Average |
| 5 | 0.5628110 | 32.85 | -23.15 | 56.00 | 32.43 | 0.23 | 0.19 | QP |
| 6 | 0.5628110 | 29.82 | -16.18 | 46.00 | 29.40 | 0.23 | 0.19 | Average |
| 7 | 0.9645610 | 33.44 | -22.56 | 56.00 | 32.76 | 0.23 | 0.45 | QP |
| 8 | 0.9645610 | 29.84 | -16.16 | 46.00 | 29.16 | 0.23 | 0.45 | Average |
| 9 | 3.456 | 33.43 | -22.57 | 56.00 | 33.12 | 0.23 | 0.08 | QP |
| 10 | 3.456 | 25.93 | -20.07 | 46.00 | 25.62 | 0.23 | 0.08 | Average |
| 11 | 17.203 | 28.45 | -31.55 | 60.00 | 27.83 | 0.38 | 0.24 | QP |
| 12 | 17.203 | 27.23 | -22.77 | 50.00 | 26.61 | 0.38 | 0.24 | Average |

5.5.8. Photographs of Conducted Emission Test Configuration

FRONT VIEW



REAR VIEW





5.6. Test of Spurious Radiated Emission

5.6.1. Applicable Standard

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

5.6.2. Measuring Instruments

Please reference item 1~15 in chapter 6 for the instruments used for testing.

5.6.3. Description of Major Test Instruments Setting

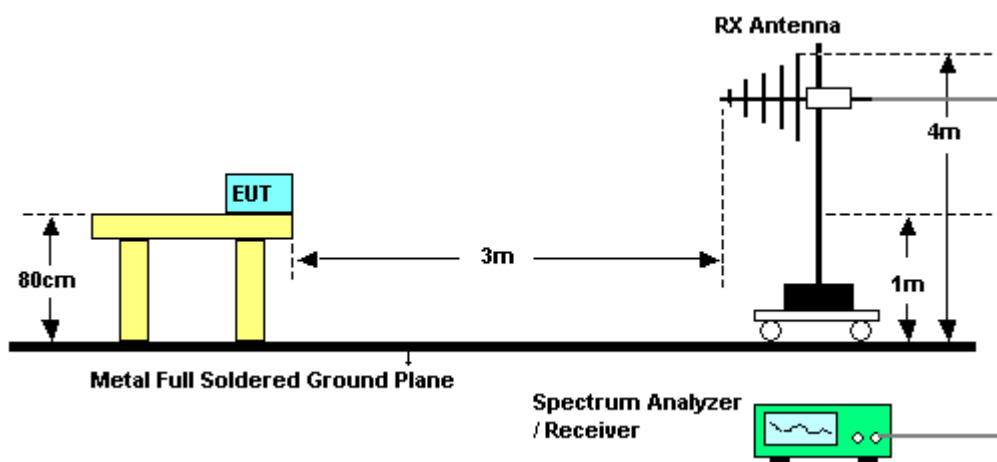
- Spectrum Analyzer : R&S FSP40
 - Attenuation : Auto
 - Start Frequency : 1000 MHz
 - Stop Frequency : 10th carrier harmonic
 - RB / VB : 1 MHz / 1MHz for Peak
 - RB / VB : 1 MHz / 10Hz for Average
- Test Receiver : R&S ESCS 30
 - Attenuation : Auto
 - Start Frequency : 9 kHz
 - Stop Frequency : 1000 MHz
 - RB : 120 KHz for QP or PK

5.6.4. Test Procedures

1. Configure the EUT according to ANSI C63.4.-2003
2. The EUT was placed on the top of the turntable 0.8 meter above ground.
3. 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.
4. Power on the EUT and all the supporting units.
5. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, 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.
8. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
9. For emission above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.

10. If the emission 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 and average method for above the 1GHz. the reported.
11. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB higher than average limit (that means the emission 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.

5.6.5. Test Setup Layout



5.6.6. Test Criteria

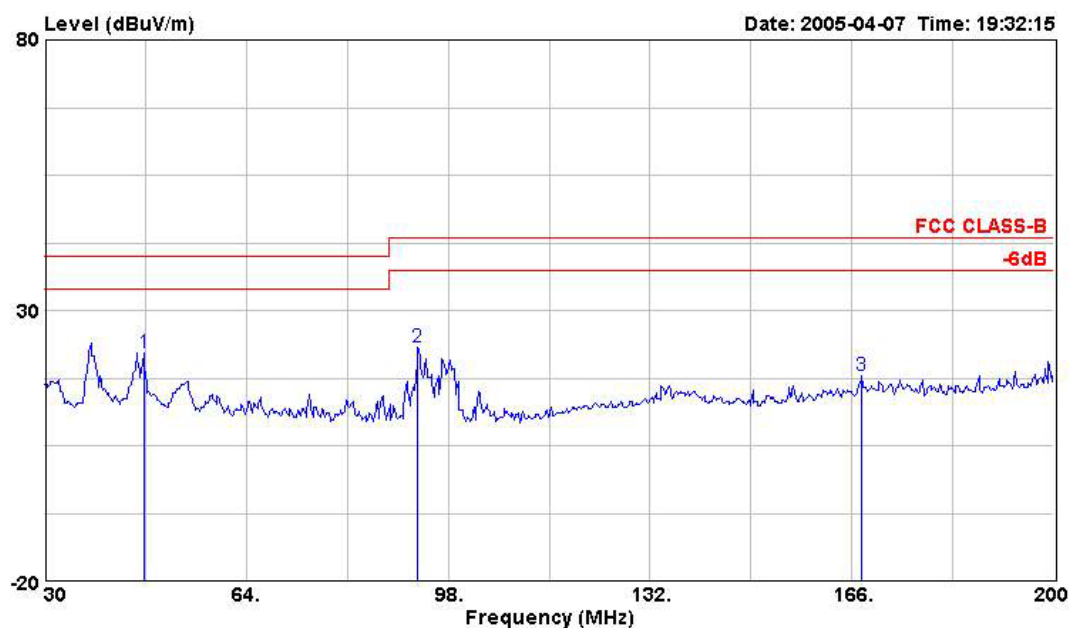
All test results complied with the requirements of 15.247(d). Measurement Uncertainty is 2.26dB.



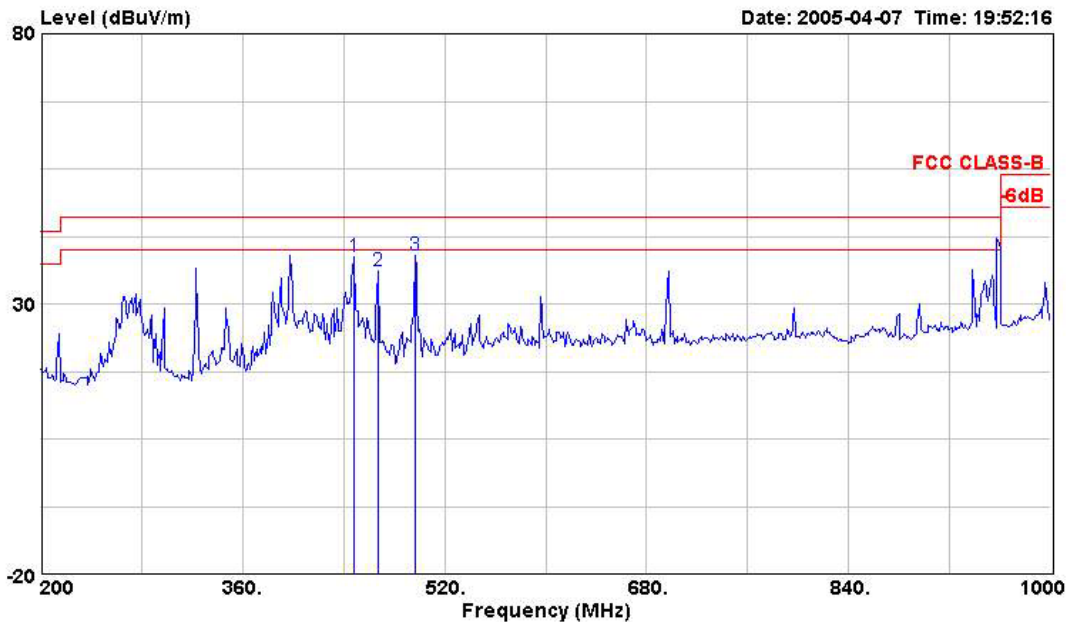
5.6.7. Test Results for CH 06 / 2437 MHz (for emission below 1GHz)

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

(A) Polarization: Horizontal



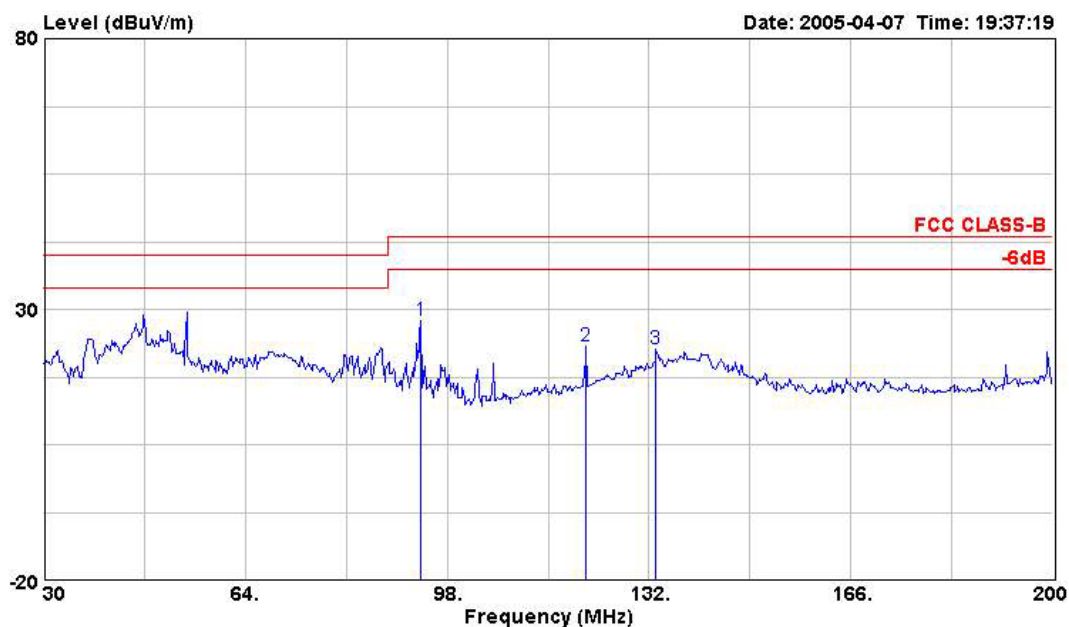
| | Freq | Level | Over | Read | Limit | | Cable | Preamp | | Ant | Table |
|-----|---------|--------|--------|-------|--------|--------|-------|--------|--------|-----|-------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Loss | Factor | Remark | Pos | Pos |
| | MHz | dBuV/m | dB | dBuV | dBuV/m | dB | dB | dB | | cm | deg |
| 1 0 | 46.660 | 22.05 | -17.95 | 9.33 | 40.00 | 12.72 | 0.66 | 0.00 | Peak | --- | --- |
| 2 | 92.900 | 23.23 | -20.27 | 13.66 | 43.50 | 9.57 | 0.92 | 0.00 | Peak | --- | --- |
| 3 | 167.700 | 17.80 | -25.70 | 3.10 | 43.50 | 14.70 | 1.28 | 0.00 | Peak | --- | --- |



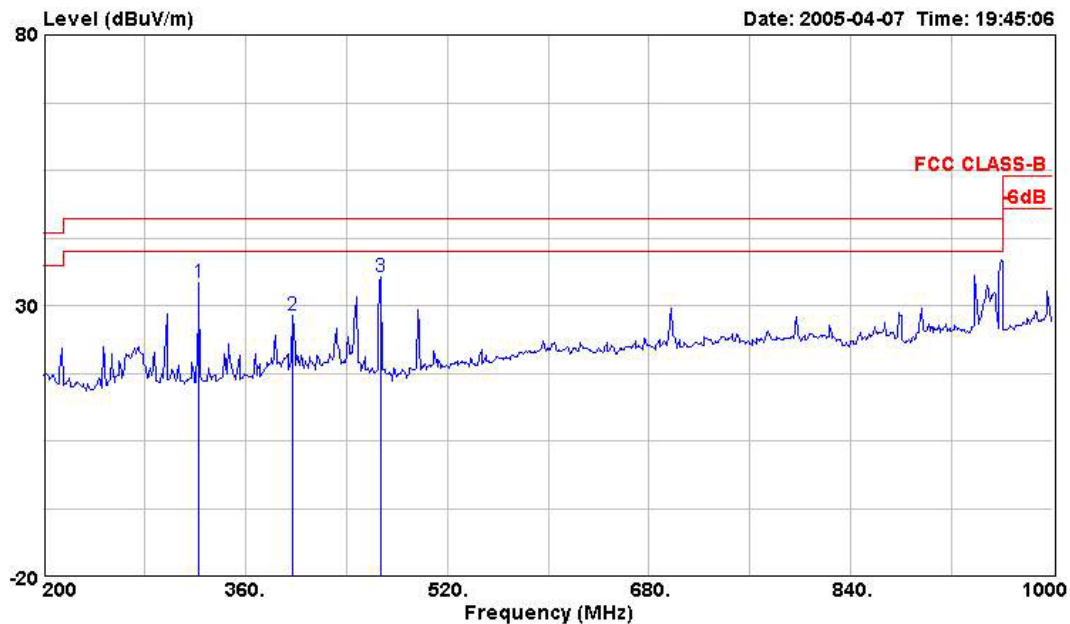
| | Freq | Level | Over | Read | Limit | | Cable | Preamp | | Ant | Table |
|-----|---------|--------|--------|-------|--------|--------|-------|--------|--------|-----|-------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Loss | Factor | Remark | Pos | Pos |
| | | | dB | dBuV | dBuV/m | dB | dB | dB | | cm | deg |
| 1 0 | 448.000 | 38.63 | -7.37 | 20.09 | 46.00 | 18.54 | 2.12 | 0.00 | Peak | --- | --- |
| 2 0 | 467.200 | 35.98 | -10.02 | 17.59 | 46.00 | 18.39 | 2.13 | 0.00 | Peak | --- | --- |
| 3 0 | 496.800 | 39.08 | -6.92 | 20.88 | 46.00 | 18.20 | 2.17 | 0.00 | Peak | --- | --- |



(B) Polarization: Vertical



| | Freq | Level | Over | Read | Limit | | Cable | Preamp | | Ant | Table |
|---|---------|--------|--------|-------|--------|--------|-------|--------|--------|-----|-------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Loss | Factor | Remark | Pos | Pos |
| | | | dB | dBuV | dBuV/m | dB | dB | dB | | cm | deg |
| 1 | 93.580 | 27.88 | -15.62 | 18.28 | 43.50 | 9.60 | 0.92 | 0.00 | Peak | --- | --- |
| 2 | 121.460 | 23.22 | -20.28 | 10.14 | 43.50 | 13.08 | 1.09 | 0.00 | Peak | --- | --- |
| 3 | 133.190 | 22.66 | -20.84 | 9.09 | 43.50 | 13.57 | 1.15 | 0.00 | Peak | --- | --- |



| | Freq | Level | Over | Read | Limit | | Cable | Preamp | | Ant | Table |
|---|---------|--------|--------|-------|--------|--------|-------|--------|--------|-----|-------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Loss | Factor | Remark | Pos | Pos |
| | | | dB | dBuV | dBuV/m | dB | dB | dB | | cm | deg |
| 1 | 323.200 | 34.22 | -11.78 | 17.95 | 46.00 | 16.27 | 1.75 | 0.00 | Peak | --- | --- |
| 2 | 397.600 | 28.19 | -17.81 | 9.50 | 46.00 | 18.69 | 1.97 | 0.00 | Peak | --- | --- |
| 3 | 467.200 | 35.36 | -10.64 | 16.97 | 46.00 | 18.39 | 2.13 | 0.00 | Peak | --- | --- |

Note:

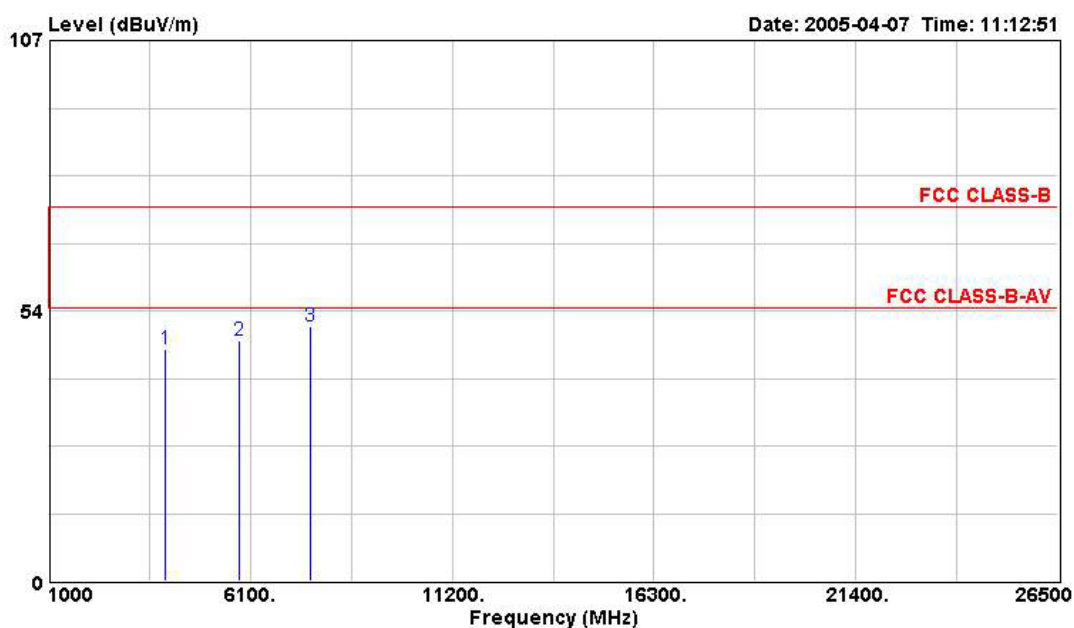
Emission level (dBuV/m) = 20 log Emission level (uV/m)

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

5.6.8. Test Results for CH 01 / 2412 MHz (for emission above 1GHz)

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

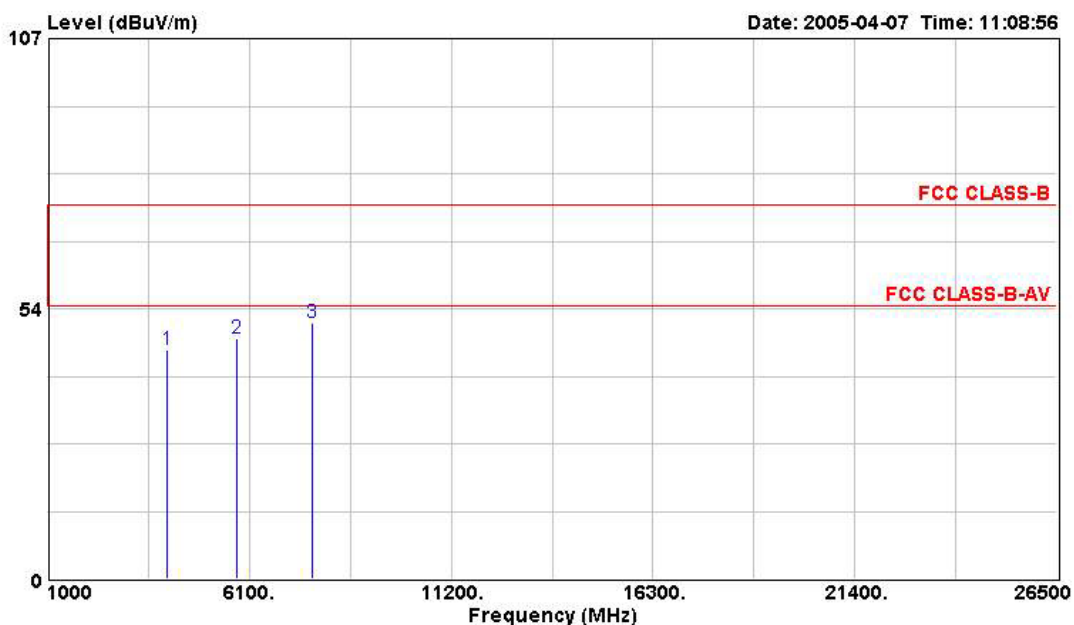
(A) Polarization: Horizontal



| | Freq | Level | Over | Read | Limit | | |
|---|------|----------|-------|--------|--------|--------|------------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Remark |
| | | | dB | dBuV | dBuV/m | dB | |
| 1 | 0 | 3964.000 | 45.95 | -28.05 | 50.47 | 74.00 | -4.52 PEAK |
| 2 | 0 | 5816.000 | 47.62 | -26.38 | 50.26 | 74.00 | -2.64 PEAK |
| 3 | 0 | 7612.000 | 50.48 | -23.52 | 49.36 | 74.00 | 1.11 PEAK |



(B) Polarization: Vertical



| | Freq | Level | Over | Read | Limit | | |
|---|----------|--------|--------|-------|--------|--------|--------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Remark |
| | | | dB | dBuV | dBuV/m | dB | |
| 1 | 4008.000 | 45.45 | -28.55 | 49.90 | 74.00 | -4.45 | PEAK |
| 2 | 5780.000 | 47.60 | -26.40 | 50.27 | 74.00 | -2.68 | PEAK |
| 3 | 7680.000 | 50.76 | -23.24 | 49.54 | 74.00 | 1.22 | PEAK |

Note:

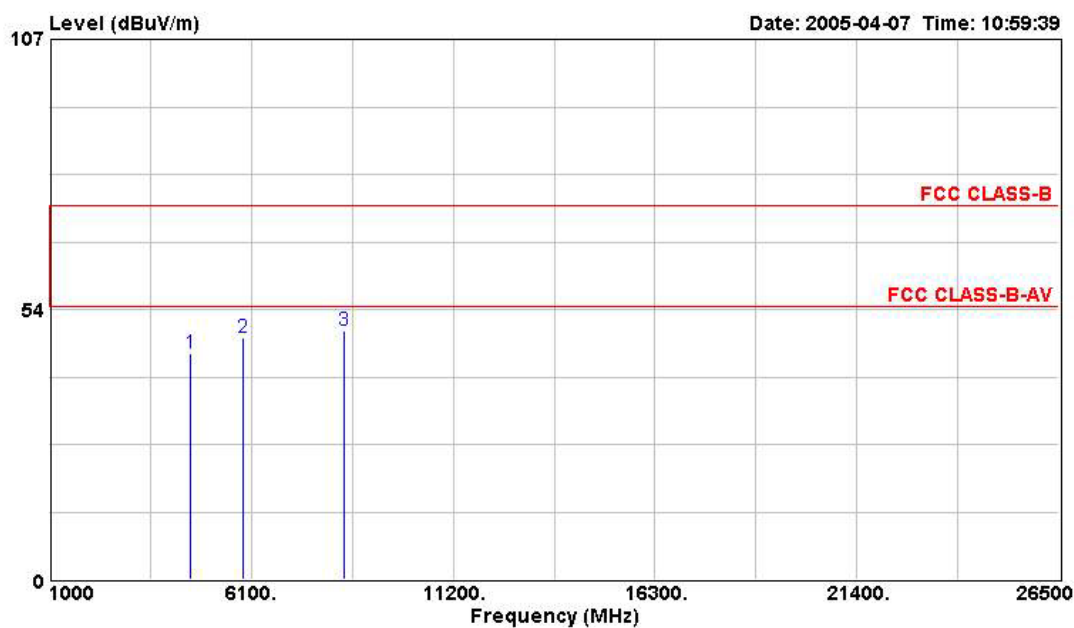
Emission level (dBuV/m) = 20 log Emission level (uV/m)

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

5.6.9. Test Results for CH 06 / 2437 MHz (for emission above 1GHz)

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

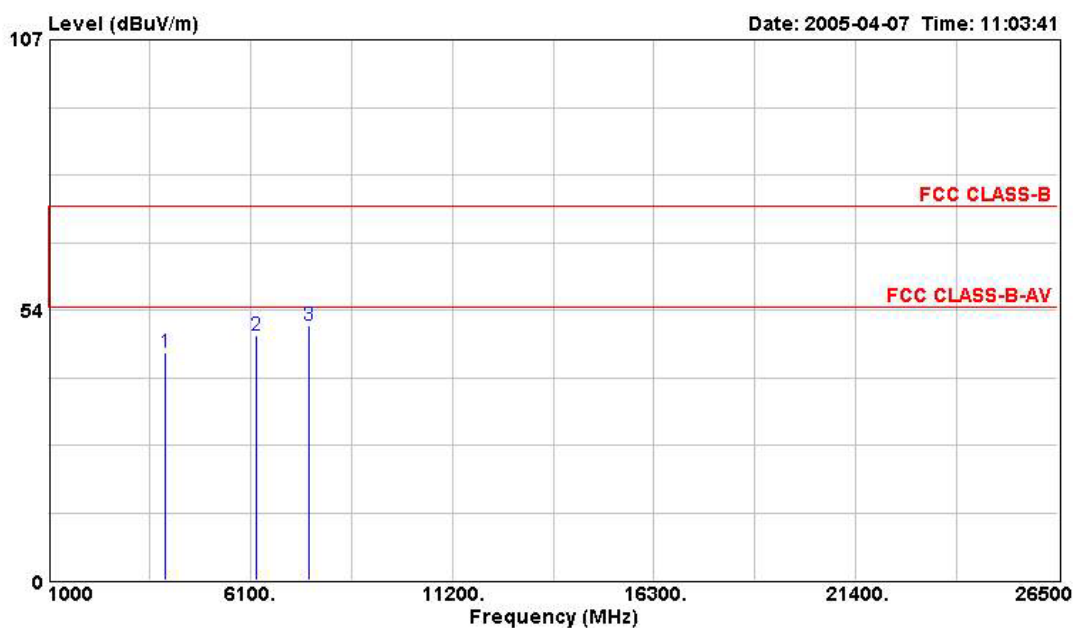
(A) Polarization: Horizontal



| | Freq | Level | Over | Read | Limit | | |
|---|------|----------|-------|--------|--------|--------|------------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Remark |
| | | | dB | dBuV | dBuV/m | dB | |
| 1 | 0 | 4568.000 | 44.91 | -29.09 | 49.77 | 74.00 | -4.86 Peak |
| 2 | 0 | 5884.000 | 47.82 | -26.18 | 50.40 | 74.00 | -2.58 Peak |
| 3 | 0 | 8432.000 | 49.35 | -24.65 | 46.54 | 74.00 | 2.81 Peak |



(B) Polarization: Vertical



| | Freq | Level | Over | Read | Limit | | |
|---|----------|--------|--------|-------|--------|--------|--------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Remark |
| | | | dB | dBuV | dBuV/m | dB | |
| 1 | 3952.000 | 45.14 | -28.86 | 49.64 | 74.00 | -4.50 | PEAK |
| 2 | 6252.000 | 48.30 | -25.70 | 50.55 | 74.00 | -2.25 | PEAK |
| 3 | 7576.000 | 50.35 | -23.65 | 49.30 | 74.00 | 1.05 | PEAK |

Note:

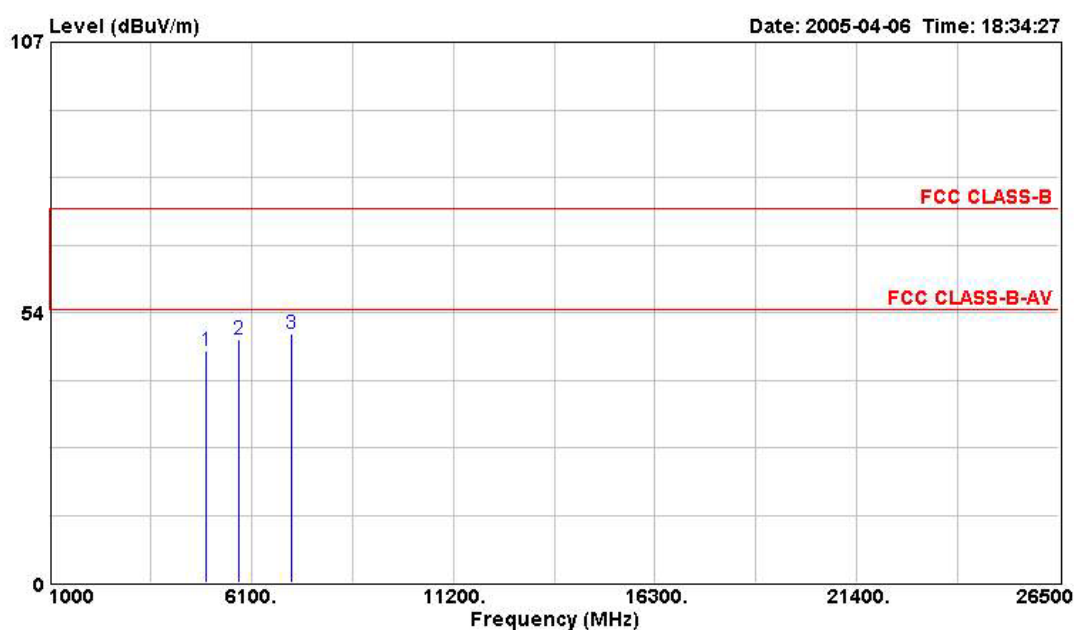
Emission level (dBuV/m) = 20 log Emission level (uV/m)

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

5.6.10. Test Results for CH 11 / 2462 MHz (for emission above 1GHz)

- Modulation Type: DSSS
- Temperature: 26°C
- Relative Humidity: 64%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Ted Chiu

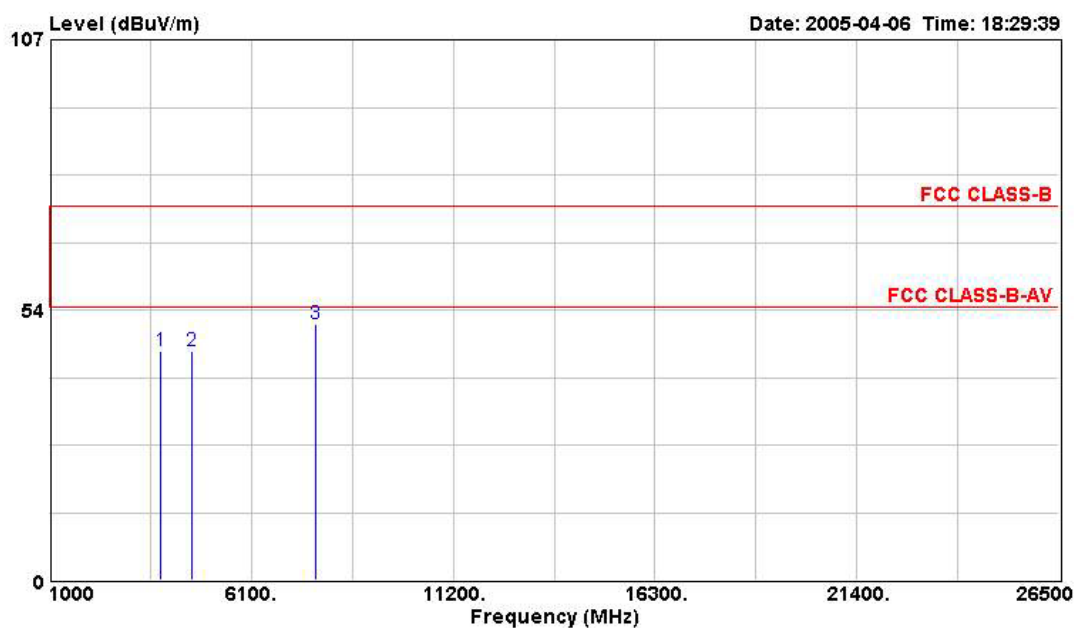
(A) Polarization: Horizontal



| | Freq | Level | Over | Read | Limit | | |
|---|----------|--------|--------|-------|--------|--------|--------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Remark |
| | MHz | dBuV/m | dB | dBuV | dBuV/m | dB | |
| 1 | 4960.000 | 45.99 | -28.01 | 50.00 | 74.00 | -4.00 | Peak |
| 2 | 5780.000 | 48.03 | -25.97 | 50.71 | 74.00 | -2.68 | Peak |
| 3 | 7108.000 | 49.15 | -24.85 | 49.68 | 74.00 | -0.53 | Peak |



(B) Polarization: Vertical



| | Freq | Level | Over | Read | Limit | | |
|---|------|----------|-------|--------|--------|--------|------------|
| | MHz | dBuV/m | Limit | Level | Line | Factor | Remark |
| | | | dB | dBuV | dBuV/m | dB | |
| 1 | 0 | 3816.000 | 45.36 | -28.64 | 50.11 | 74.00 | -4.75 Peak |
| 2 | 0 | 4596.000 | 45.42 | -28.58 | 50.22 | 74.00 | -4.80 Peak |
| 3 | 0 | 7720.000 | 50.75 | -23.25 | 49.46 | 74.00 | 1.28 Peak |

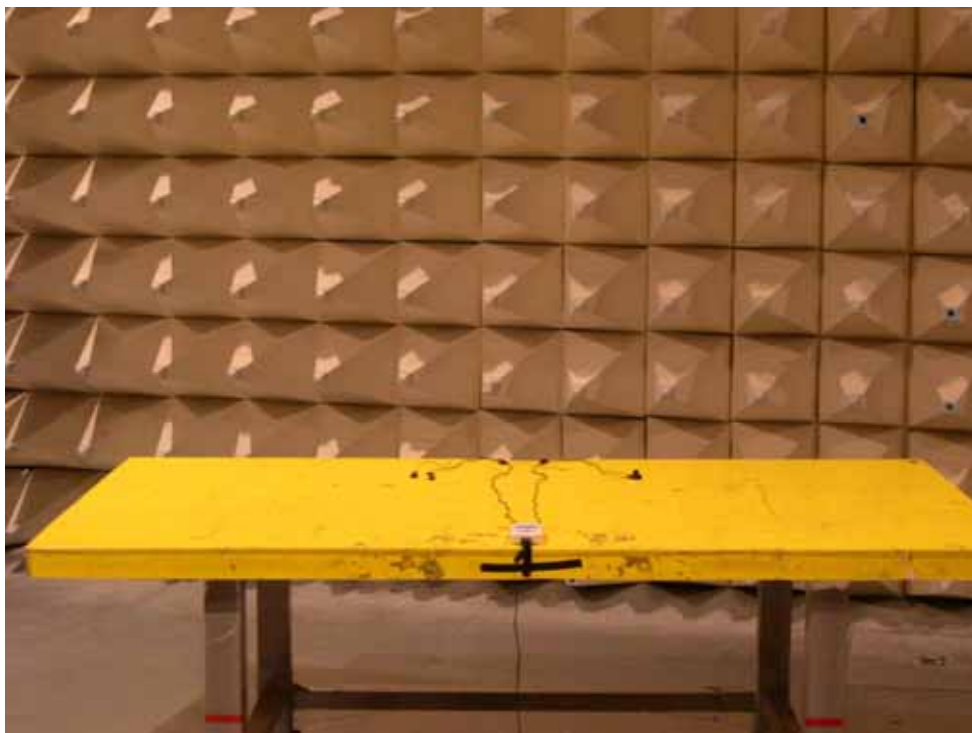
Note:

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

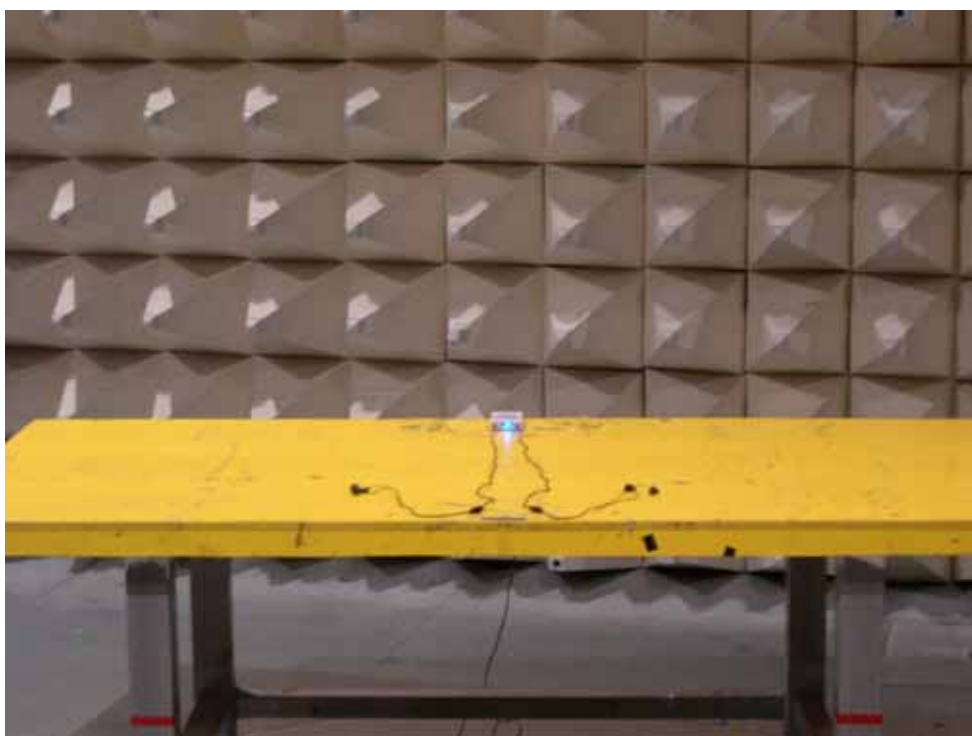
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.6.11. Photographs of Radiated Emission Test Configuration

FRONT VIEW



REAR VIEW





5.7. Antenna Requirements

5.7.1. Standard Applicable

Section 15.203:

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 a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Section 15.247(b)/(c):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

5.7.2. Antenna Connected Construction

UFL is the antenna connector for PIFA antenna.

5.7.3. Antenna Gain

Antenna gain of EUT is less than 6dBi. Therefore peak conducted power limit shall not be degraded any more. Antenna report of manufacturer will have more detail antenna gain or antenna pattern.

5.7.4. Test Criteria

All test results complied with the requirements of 15.203/15.247(b)/(c).

6. List of Measuring Equipments Used

| Items | Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|-------|--------------------------|----------------|--------------|------------|--------------------|------------------|--------------------------|
| 1 | 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 30MHz ~ 1GHz 3m | Jun. 16, 2005 | Radiation (03CH03-HY) |
| 2 | Spectrum analyzer | R&S | FSP40 | 100004 | 9KHZ ~ 40GHz | Aug. 31, 2004 | Radiation (03CH03-HY) |
| 3 | Amplifier | SCHAFFNER | CPA9231A | 18667 | 9KHZ ~ 2GHz | Jan. 10, 2005 | Radiation (03CH03-HY) |
| 4 | Amplifier | Agilent | 8449B | 3008A02120 | 1GHz ~ 26.5GHz | May 31, 2005 | Radiation (03CH03-HY) |
| 5 | Biconical Antenna | SCHWARZBECK | VHBB 9124 | 301 | 30MHz ~ 200MHz | Jul. 28, 2004 | Radiation (03CH03-HY) |
| 6 | Log Antenna | SCHWARZBECK | VUSLP 9111 | 221 | 200MHz ~ 1GHz | Jul. 28, 2004 | Radiation (03CH03-HY) |
| 7 | Horn Antenna | EMCO | 3115 | 6741 | 1GHz ~ 18GHz | Apr. 22, 2005 | Radiation (03CH03-HY) |
| 9 | RF Cable-R03m | Jye Bao | RG142 | CB021 | 30MHz ~ 1GHz | Feb. 22, 2005 | Radiation (03CH03-HY) |
| 10 | RF Cable-HIGH | SUHNER | SUCOFLEX 106 | 03CH03-HY | 1GHz ~ 40GHz | Dec.01, 2004 | Radiation (03CH03-HY) |
| 11 | Turn Table | HD | DS 420 | 420/650/00 | 0 ~ 360 degree | N/A | Radiation (03CH03-HY) |
| 12 | Antenna Mast | HD | MA 240 | 240/560/00 | 1 m - 4 m | N/A | Radiation (03CH03-HY) |

Calibration Interval of instruments listed above is one year.

| Items | Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|-------|--------------|--------------|---------------|-------------|-----------------|------------------|--------------------------|
| 13 | Amplifier | MITEQ | AMF-6F-260400 | 923364 | 26.5GHz ~ 40GHz | Jan. 05, 2004* | Radiation (03CH03-HY) |
| 14 | Loop Antenna | R&S | HFH2-Z2 | 860004/001 | 9kHz ~ 30MHz | May 24, 2004* | Radiation (03CH03-HY) |
| 15 | Horn Antenna | SCHWARZBECK | BBHA9170 | BBHA9170154 | 15GHz ~ 40GHz | Jun. 09, 2004* | Radiation (03CH03-HY) |

※ Calibration Interval of instruments listed above is two years.

| Items | Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|-------|----------------------------|--------------|--------------|-------------|-----------------|------------------|----------------------|
| 16 | Spectrum analyzer | R&S | FSP30 | 100023 | 9kHz ~ 30GHz | Aug. 02, 2004 | Conducted (TH01-HY) |
| 17 | Power meter | R&S | NRVS | 100444 | DC ~ 40GHz | Jul. 06, 2005 | Conducted (TH01-HY) |
| 18 | Power sensor | R&S | NRV-Z55 | 100049 | DC ~ 40GHz | Jul. 06, 2005 | Conducted (TH01-HY) |
| 19 | Power Sensor | R&S | NRV-Z32 | 100057 | 30MHz ~ 6GHz | Apr. 28, 2005 | Conducted (TH01-HY) |
| 20 | AC power source | HPC | HPA-500W | HPA-9100024 | AC 0 ~ 300V | Apr. 21, 2005 | Conducted (TH01-HY) |
| 21 | DC power source | G.W. | GPC-6030D | C671845 | DC 1V ~ 60V | Nov. 28, 2004 | Conducted (TH01-HY) |
| 22 | Temp. and Humidity Chamber | KSON | THS-C3L | 612 | N/A | Oct. 01, 2004 | Conducted (TH01-HY) |
| 23 | RF CABLE-1m | Jye Bao | RG142 | CB034-1m | 20MHz ~ 7GHz | Jan. 01, 2005 | Conducted (TH01-HY) |
| 24 | RF CABLE-2m | Jye Bao | RG142 | CB035-2m | 20MHz ~ 1GHz | Jan. 01, 2005 | Conducted (TH01-HY) |
| 25 | Oscilloscope | Tektronix | TDS1012 | CO38515 | 100MHz / 1GS/s | Apr. 15, 2005 | Conducted (TH01-HY) |
| 26 | Signal Generator | R&S | SMR40 | 100116 | 10MHz ~ 40GHz | Dec. 31, 2004 | Conducted (TH01-HY) |
| 27 | Data Generator | Tektronix | DG2030 | 063-2920-50 | 0.1Hz~400MHz | Jun. 02, 2005 | Conducted (TH01-HY) |
| 28 | EMC Receiver | R&S | ESCS 30 | 100174 | 9kHz ~ 2.75GHz | Feb. 16, 2005 | Conduction (CO04-HY) |
| 29 | LISN | MessTec | NNB-2/16Z | 2001/004 | 9kHz ~ 30MHz | Apr. 20, 2005 | Conduction (CO04-HY) |
| 30 | LISN (Support Unit) | MessTec | NNB-2/16Z | 99041 | 9kHz ~ 30MHz | May. 05, 2005 | Conduction (CO04-HY) |
| 31 | RF Cable-CON | UTIFLEX | 3102-26886-4 | CB049 | 9kHz ~ 30MHz | Apr. 20, 2005 | Conduction (CO04-HY) |
| 32 | EMI Filter | LINDGREN | LRE-2030 | 2651 | < 450 Hz | N/A | Conduction (CO04-HY) |

※ Calibration Interval of instruments listed above is one year.

7. Company Profile

SPORTON Lab. was established in 1986 with one shielded room: the first private EMI test facility, offering local manufacturers an alternative EMI test facility apart from ERSO. In 1988, one 3M and 10M/3M open area test site were setup and also obtained official accreditation from FCC, VCCI and NEMKO. In 1993, a Safety laboratory was founded and obtained accreditation from UL of USA, CSA of Canada and TUV (Rhineland & PS) of Germany. In 1995, one EMC lab, including EMI and EMS test facilities was setup. In 1997, SPORTON Group has provided financial expense to relocate the headquarter to Orient Scientific Park in Taipei Hsien to offer more comprehensive, more qualified and better service to local suppliers and manufactures. In 1999, Safety Group and Component Group were setup. In 2001, SPORTON has established 3M/10M chamber in Hwa Ya Technology Park.

7.1. Certificate of Accreditation

| | |
|--------|-----------------|
| Taiwan | BSMI, CNLA, DGT |
| USA | FCC, NVLAP, UL |
| EU | Nemko, TUV |
| Japan | VCCI |
| Canada | Industry Canada |

7.2. Test Location

| | |
|--------|--|
| SHIJR | ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 02-2696-2468 FAX : 02-2696-2255 |
| HWA YA | ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 03-327-3456 FAX : 03-318-0055 |
| LINKOU | ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 02-2601-1640 FAX : 02-2601-1695 |
| DUNGHU | ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 02-2631-4739 FAX : 02-2631-9740 |
| JUNGHE | ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 02-8227-2020 FAX : 02-8227-2626 |
| NEIHU | ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 02-2794-8886 FAX : 02-2794-9777 |

8. Certificate of NVLAP Accreditation

| | |
|---|--|
| United States Department of Commerce National Institute of Standards and Technology | |
|  | |
| ISO/IEC 17025:1999 ISO 9002:1994 |  |
| Certificate of Accreditation | |
| SPORTON INTERNATIONAL, INC. TAIPEI HSIEN 221 TAIWAN | |
| <i>is recognized by the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria set forth in NIST Handbook 150:2001, all requirements of ISO/IEC 17025:1999, and relevant requirements of ISO 9002:1994. Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:</i> | |
| ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS | |
| December 31, 2005 <i>Effective through</i> |  For the National Institute of Standards and Technology NVLAP Lab Code: 200079-0 |

NVLAP-01C (06-01)