# FCC TEST REPORT

| | | |
|---|---|---|
| **CATEGORY** | : | Mobile |
| **PRODUCT NAME** | : | RF2.4GHz Wireless Gamepad |
| **FCC ID.** | : | Q2VPADPS2900D-H |
| **FILING TYPE** | : | Certification |
| **BRAND NAME** | : | Datel, Psyclone, Maxwise, Titan |
| **MODEL NAME** | : | PS21A0MIE3, PS2800D, PS2900D, PS2350D, PSY935, PSY960, PYP27, PPO28, PPR26, PSS12, PSY970, PSY973, COK01 |
| **APPLICANT** | : | **Maxwise Production Enterprise Limited**<br>No. 28, Bai Shui Jing Street, Zhongshan City, Guangdong, China |
| **MANUFACTURER** | : | **Eternal Manufacturing Ltd.**<br>No. 2, Fu Zhong Street, Ban Fu Town, Zhongshan City, Guangdong, China |
| **ISSUED BY** | : | **SPORTON INTERNATIONAL INC.**<br>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 CNLA and any agency of U.S. government.

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

CNLA

**1190**

**ILAC MRA**

# Table of Contents

**HISTORY OF THIS TEST REPORT** ..... **II**

**CERTIFICATE OF COMPLIANCE** ..... **III**

**1. GENERAL DESCRIPTION OF EQUIPMENT UNDER TEST** ..... **1**

1.1. Applicant ..... 1
1.2. Manufacturer ..... 1
1.3. Basic Description of Equipment under Test ..... 1
1.4. Features of Equipment under Test ..... 1
1.5. Table for Carrier Frequencies ..... 2

**2. TEST CONFIGURATION OF THE EQUIPMENT UNDER TEST** ..... **3**

2.1. Connection Diagram of Conduction Test System ..... 3
2.2. The Test Mode Description ..... 3
2.3. Description of Test Supporting Units ..... 3

**3. GENERAL INFORMATION OF TEST** ..... **4**

3.1. Test Facility ..... 4
3.2. Standards for Methods of Measurement ..... 4
3.3. Frequency Range Investigated ..... 4
3.4. Test Distance ..... 4
3.5. Test Software ..... 4

**4. LIST OF MEASUREMENTS** ..... **5**

4.1. Summary of the Test Results ..... 5

**5. TEST RESULT** ..... **6**

5.1. Field Strength of Fundamental Emissions Measurement ..... 6
5.2. Test of AC Power Line Conducted Emission ..... 11
5.3. Test of Spurious Radiated Emission ..... 15
5.4. Antenna Requirements ..... 22

**6. LIST OF MEASURING EQUIPMENTS USED** ..... **23**

**7. COMPANY PROFILE** ..... **25**

7.1. Certificate of Accreditation ..... 25
7.2. Test Location ..... 25

**8. CNLA CERTIFICATE OF ACCREDITATION** ..... **26**

**APPENDIX A. PHOTOGRAPHS OF EUT** ..... **A1 ~ A3**

# HISTORY OF THIS TEST REPORT

Received Date: May 13, 2005
Test Date: July 01, 2005
Original Report Issue Date: July 06, 2005
Report No.: FR551329-01

■ No additional attachment.

☐ Additional attachment were issued as following record:

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

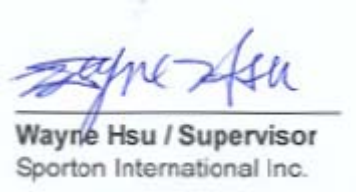
with

## 47 CFR FCC Part 15 Subpart C

| | | |
|---|---|---|
| **PRODUCT NAME** | : | RF2.4GHz Wireless Gamepad |
| **BRAND NAME** | : | Datel, Psyclone, Maxwise, Titan |
| **MODEL NAME** | : | PS21A0MIE3, PS2800D, PS2900D, PS2350D, PSY935, PSY960, PYP27, PPO28, PPR26, PSS12, PSY970, PSY973, COK01 |
| **APPLICANT** | : | **Maxwise Production Enterprise Limited**<br>No. 28, Bai Shui Jing Street, Zhongshan City, Guangdong, China |
| **MANUFACTURER** | : | **Eternal Manufacturing Ltd.**<br>No. 2, Fu Zhong Street, Ban Fu Town, Zhongshan City, Guangdong, 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 July 01, 2005 at SPORTON International Inc. LAB.



# 1. General Description of Equipment under Test

## 1.1. Applicant

**Maxwise Production Enterprise Limited**
No. 28, Bai Shui Jing Street, Zhongshan City, Guangdong, China

## 1.2. Manufacturer

**Eternal Manufacturing Ltd.**
No. 2, Fu Zhong Street, Ban Fu Town, Zhongshan City, Guangdong, China

## 1.3. Basic Description of Equipment under Test

This product is a 2.4GHz Wireless Gamepad. The technical data has been listed on section " Features of Equipment under Test ". There are 2 units for the whole set. One is the hand held master powered by battery. The other is the slave which can be plugged on the PS2 host. This report is for the slave part.

## 1.4. Features of Equipment under Test

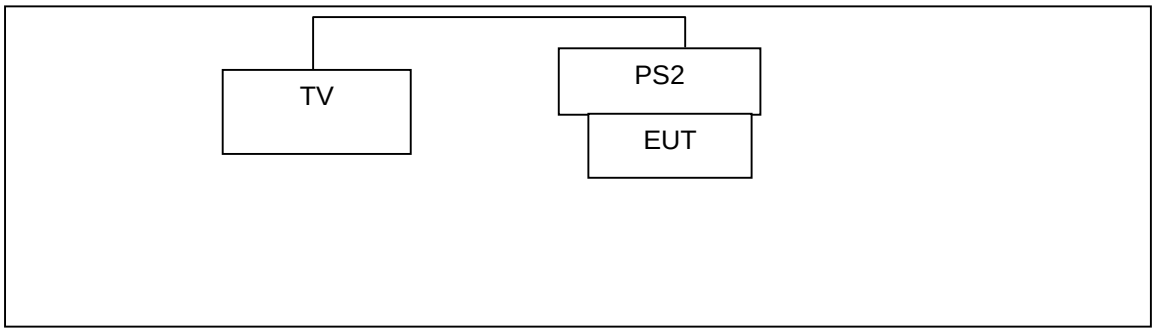
| Items | Description |
|---|---|
| Type of Modulation | GFSK |
| Number of Channels | 87 |
| Frequency Band | 2404.512MHz ~ 2478.816MHz |
| Carrier Frequency | See section 1.5 for details |
| Antenna Type | PCB Antenna |
| Testing Duty Cycle | 100.00% |
| Test Power Source | DC 5.0 from host |
| Temperature Range (Operating) | 0 ~ 50 °C |

### 1.5. Table for Carrier Frequencies

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 04 | 2404.512 | 30 | 2426.976 | 56 | 2449.440 | 82 | 2471.904 |
| 05 | 2405.376 | 31 | 2427.840 | 57 | 2450.304 | 83 | 2472.768 |
| 06 | 2406.240 | 32 | 2428.704 | 58 | 2451.168 | 84 | 2473.632 |
| 07 | 2407.104 | 33 | 2429.568 | 59 | 2452.032 | 85 | 2474.496 |
| 08 | 2407.968 | 34 | 2430.432 | 60 | 2452.896 | 86 | 2475.360 |
| 09 | 2408.832 | 35 | 2431.296 | 61 | 2453.760 | 87 | 2476.224 |
| 10 | 2409.696 | 36 | 2432.160 | 62 | 2454.624 | 88 | 2477.088 |
| 11 | 2410.560 | 37 | 2433.024 | 63 | 2455.488 | 89 | 2477.952 |
| 12 | 2411.424 | 38 | 2433.888 | 64 | 2456.352 | 90 | 2478.816 |
| 13 | 2412.288 | 39 | 2434.752 | 65 | 2457.216 | | |
| 14 | 2413.152 | 40 | 2435.616 | 66 | 2458.080 | | |
| 15 | 2414.016 | 41 | 2436.480 | 67 | 2458.944 | | |
| 16 | 2414.880 | 42 | 2437.344 | 68 | 2459.808 | | |
| 17 | 2415.744 | 43 | 2438.208 | 69 | 2460.672 | | |
| 18 | 2416.608 | 44 | 2439.072 | 70 | 2461.536 | | |
| 19 | 2417.472 | 45 | 2439.936 | 71 | 2462.400 | | |
| 20 | 2418.336 | 46 | 2440.800 | 72 | 2463.264 | | |
| 21 | 2419.200 | 47 | 2441.664 | 73 | 2464.128 | | |
| 22 | 2420.064 | 48 | 2442.528 | 74 | 2464.992 | | |
| 23 | 2420.928 | 49 | 2443.392 | 75 | 2465.856 | | |
| 24 | 2421.792 | 50 | 2444.256 | 76 | 2466.720 | | |
| 25 | 2422.656 | 51 | 2445.120 | 77 | 2467.584 | | |
| 26 | 2423.520 | 52 | 2445.984 | 78 | 2468.448 | | |
| 27 | 2424.384 | 53 | 2446.848 | 79 | 2469.312 | | |
| 28 | 2425.248 | 54 | 2447.712 | 80 | 2470.176 | | |
| 29 | 2426.112 | 55 | 2448.576 | 81 | 2471.040 | | |

# 2. Test Configuration of the Equipment under Test

## 2.1. Connection Diagram of Conduction Test System




## 2.2. The Test Mode Description

1. According to ANSI C63.4-2003: Frequency range of EUT is more than 10 MHz, we have to test the lowest, middle and highest channels of EUT.
2. Spurious emission below 1GHz is independent of channel selection and there will be no effect on test results so only channel 47 with GFSK modulation was tested.
3. The EUT is powered by host so it is required to test conduction test.

## 2.3. Description of Test Supporting Units

| Support unit | Brand | Model No. | FCC ID |
|---|---|---|---|
| TV | JVC | TM-1700PN | DoC |
| PS2 | SONY | - | 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 / 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. Frequency Range Investigated

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

## 3.4. 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.

## 3.5. Test Software

During testing, there is no test software for the test.

# 4. List of Measurements

## 4.1. Summary of the Test Results

| Applied Standard: 47 CFR FCC Part 15 Subpart C | | | |
|---|---|---|---|
| **Paragraph** | **FCC Rule** | **Description of Test** | **Result** |
| 5.1 | 15.249(a) | Field Strength of Fundamental Emissions Measurement | Pass |
| 5.2 | 15.207 | AC Power Line Conducted Emission | Pass |
| 5.2 | 15.249(d) | Spurious Radiated Emission | Pass |
| 5.4 | 15.203 | Antenna Requirement | Pass |

# 5. Test Result

## 5.1. Field Strength of Fundamental Emissions Measurement

5.1.1. Applicable Standard

47 CFR FCC Part 15 Subpart C, section 15.249(a): The field strength of emissions within these bands specified at a distance of 3 meters (measurement instrumentation employing an average detector) shall comply with the following table.

| Frequency Band (MHz) | Fundamental Emissions Limit (dBuV/m) at 3m |
|---|---|
| 2400-2483.5 | 94 |
| 5725-5875 | 94 |

5.1.2. Measuring Instruments

Refer to section 6 in this report.

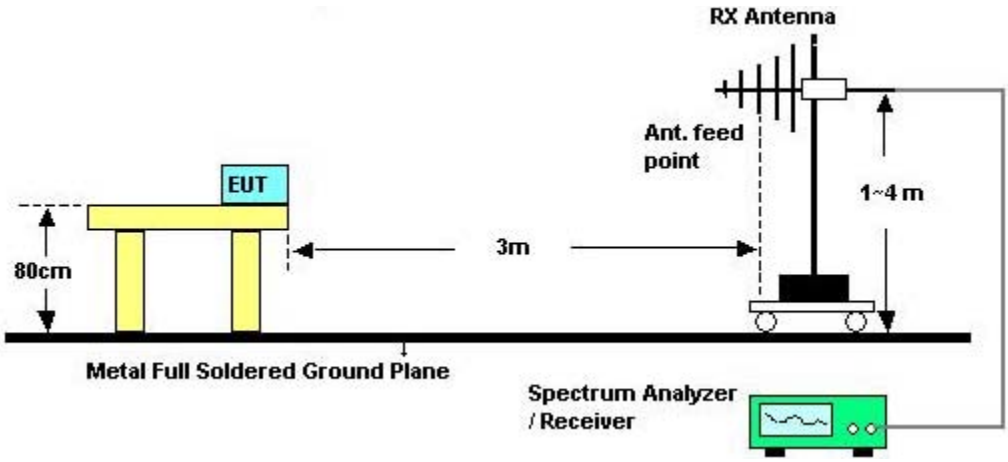
5.1.3. Major Test Instruments Setting

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | 1.5MHz |
| RB | 1 MHz Peak / 1MHz Average |
| VB | 1 MHz Peak / 10Hz Average |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

5.1.4. 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 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
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.

5.1.5. Test Setup Layout




5.1.6. Test Deviation

The measurement uncertainty is 2.54dB. Test methods have no deviation with original standard.

5.1.7. Test Mode(s)

Measurements have been done on 3 channels: low (channel 04, 2404.512MHz), middle (channel 47, 2441.664MHz) and high (Channel 90, 2478.816MHz) channels. Since the 2.4GHz external antennas are all in the same type, so only one antenna with highest gain has to be tested.

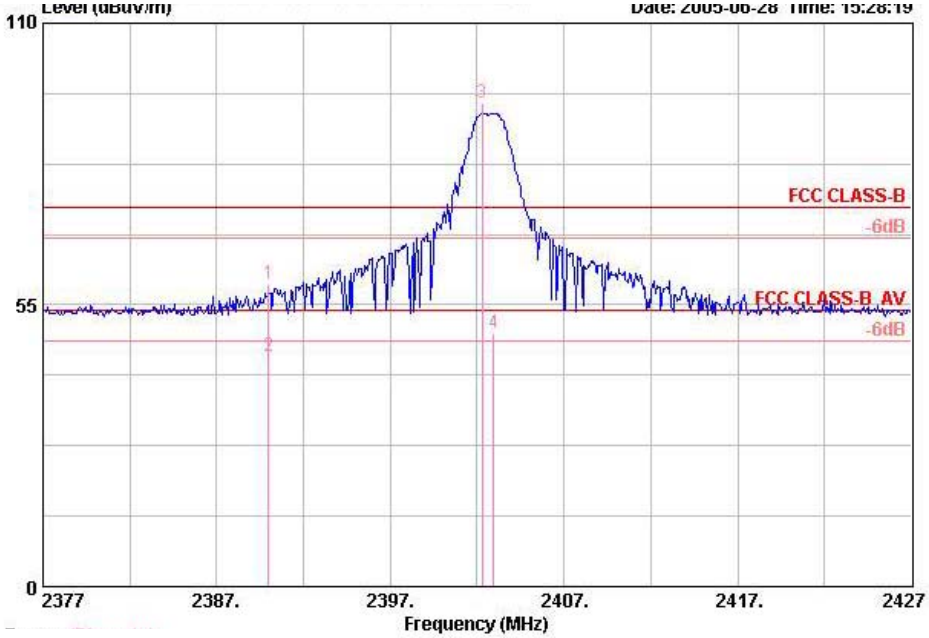
5.1.8. Calculation of Voltage Levels

Measurements are reported in units of dB relative to one microvolt per metre (dBμV/m).
The field strength was calculated automatically by the software using all the pre-stored calibration data. The method of calculation is shown below:
E = V + AF - G + L Where:
E = Radiated Field Strength in dBμV/m.
V = EMI Receiver Voltage in dBμV. (measured value)
AF = Antenna Factor in dB($m^{-1}$). (stored as a data array)
G = Preamplifier Gain in dB. (stored as a data array)
L = Cable insertion loss in dB. (stored as a data array of Insertion Loss versus frequency)
Level = Read Level + Factor.
Factor = AF - G + L.
When 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.
So duty factor is show below:
duty factor = 20 x $\log_{10}$(duty cycle) = -6.9dB
Average value = Peak value + duty factor

5.1.9. Test Result

| | |
|---|---|
| **Test Site** | 03CH03-HY |
| **Temperature** | 19℃ |
| **Humidity** | 60% |
| **Test Engineer** | Ted Chiu |

**(channel 04, 2404.512MHz) / Maximum Polarization :**



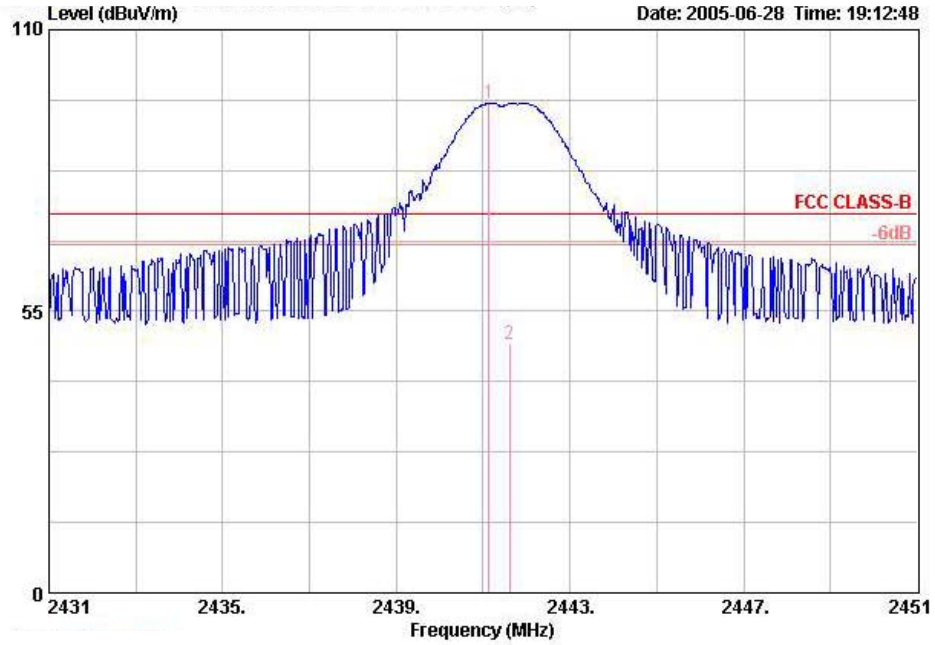

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 | 2390.000 | 58.94 | -15.06 | 74.00 | 28.13 | 2.00 | 0.00 | 28.81 | HORIZONTAL | PEAK |
| 2 | 2390.000 | 44.89 | -9.11 | 54.00 | 28.13 | 2.00 | 0.00 | 14.76 | HORIZONTAL | AVERAGE |
| 3 X | 2402.300 | 94.31 | 20.31 | 74.00 | 28.13 | 2.00 | 0.00 | 64.18 | HORIZONTAL | Peak |
| 4 ! | 2402.960 | 49.45 | -4.55 | 54.00 | 28.18 | 2.00 | 0.00 | 19.27 | HORIZONTAL | AVERAGE |

**Remark:**

**Item 1, 2 are Band Edge Emissions.**

**Item 3, 4 are Field Strength of Fundamental Emissions.**

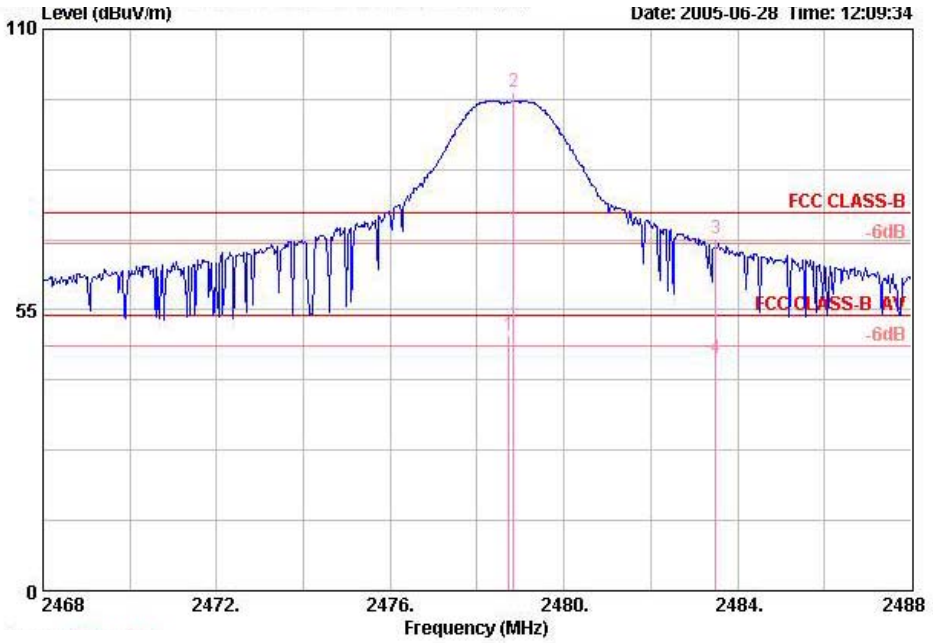
**(channel 47, 2441.664MHz) / Maximum Polarization :**




L

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 X | 2441.140 | 95.58 | 21.58 | 74.00 | 28.27 | 2.02 | 0.00 | 65.29 | HORIZONTAL | Peak |
| 2 | 2441.600 | 48.51 | -25.49 | 74.00 | 28.27 | 2.02 | 0.00 | 18.22 | HORIZONTAL | AVERAGE |

**(Channel 90, 2478.816 MHz)/ Maximum Polarization :**




| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 ! | 2478.740 | 50.10 | -3.90 | 54.00 | 28.36 | 2.04 | 0.00 | 19.71 | VERTICAL | AVERAGE |
| 2 @ | 2478.840 | 97.82 | 23.82 | 74.00 | 28.36 | 2.04 | 0.00 | 67.42 | VERTICAL | Peak |
| 3 ! | 2483.500 | 68.92 | -5.08 | 74.00 | 28.36 | 2.04 | 0.00 | 38.52 | VERTICAL | PEAK |
| 4 | 2483.500 | 45.43 | -8.57 | 54.00 | 28.36 | 2.04 | 0.00 | 15.03 | VERTICAL | AVERAGE |

**Remark:**

**Item 1, 2 are Field Strength of Fundamental Emissions**

**Item 3, 4 are Band Edge Emissions.**

Note:

Correct Factor = Antenna Factor + Cable Loss - Preamp Factor.

Read Level = Level of Receiver or Spectrum.

Level = Read Level + Correct Factor.

## 5.2. Test of AC Power Line Conducted Emission

5.2.1. 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 |

5.2.2. Measuring Instruments

Please reference item 1~5 in chapter 6 for the instruments used for testing.

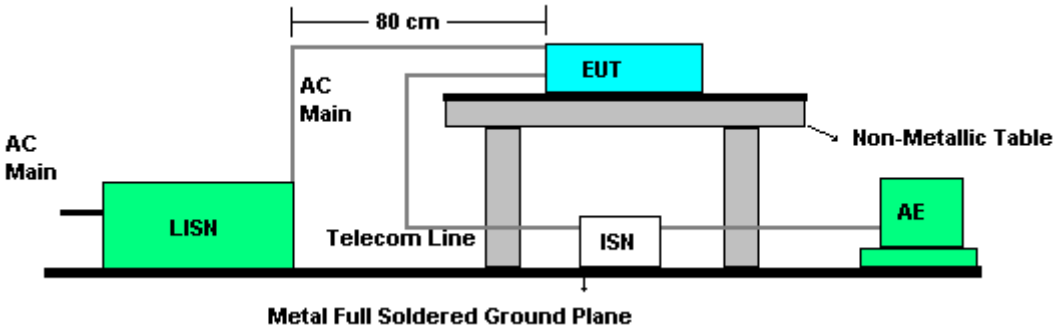
5.2.3. Description of Major Test Instruments Setting

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

5.2.4. 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.

5.2.5. Test Setup Layout




5.2.6. Test Criteria

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

5.2.7. Test Result of Conducted Emission for CH 90 / 2478.816 MHz

- Temperature: 25°C
- Relative Humidity: 60%
- 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 @ | 0.17491 | 42.42 | -12.30 | 54.72 | 40.42 | 1.80 | 0.20 | AVERAGE |
| 2 | 0.17491 | 52.34 | -12.38 | 64.72 | 50.34 | 1.80 | 0.20 | QP |
| 3 | 0.35765 | 21.57 | -27.21 | 48.78 | 20.67 | 0.70 | 0.20 | AVERAGE |
| 4 | 0.35765 | 26.86 | -31.92 | 58.78 | 25.96 | 0.70 | 0.20 | QP |
| 5 | 0.54068 | 27.15 | -28.85 | 56.00 | 26.55 | 0.40 | 0.20 | QP |
| 6 | 0.54068 | 22.95 | -23.05 | 46.00 | 22.35 | 0.40 | 0.20 | AVERAGE |
| 7 | 0.71597 | 25.51 | -30.49 | 56.00 | 24.91 | 0.40 | 0.20 | QP |
| 8 | 0.71597 | 19.65 | -26.35 | 46.00 | 19.05 | 0.40 | 0.20 | AVERAGE |
| 9 | 2.678 | 31.84 | -24.16 | 56.00 | 31.34 | 0.30 | 0.20 | QP |
| 10 | 2.678 | 23.97 | -22.03 | 46.00 | 23.47 | 0.30 | 0.20 | AVERAGE |
| 11 | 2.854 | 22.95 | -23.05 | 46.00 | 22.45 | 0.30 | 0.20 | AVERAGE |
| 12 | 2.854 | 31.86 | -24.14 | 56.00 | 31.36 | 0.30 | 0.20 | QP |

***Neutral to Ground***

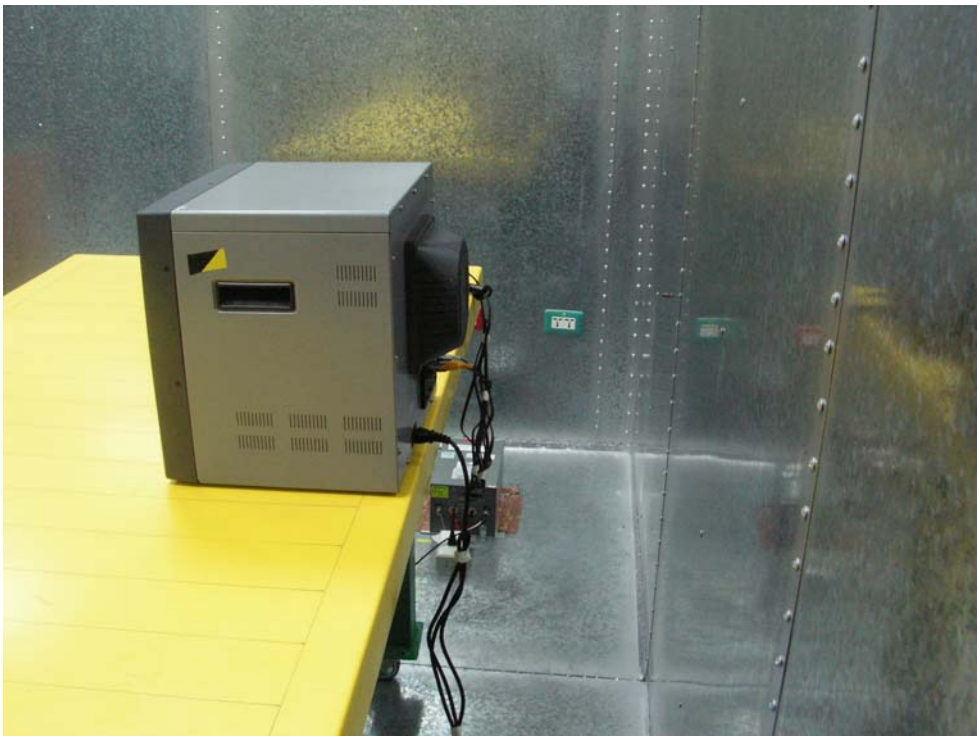
| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.16677 | 22.30 | -32.82 | 55.12 | 20.33 | 1.77 | 0.20 | AVERAGE |
| 2 | 0.16677 | 48.67 | -16.45 | 65.12 | 46.70 | 1.77 | 0.20 | QP |
| 3 @ | 0.17807 | 44.79 | -9.79 | 54.58 | 43.05 | 1.54 | 0.20 | AVERAGE |
| 4 | 0.17807 | 52.85 | -11.73 | 64.58 | 51.11 | 1.54 | 0.20 | QP |
| 5 | 0.35765 | 32.30 | -26.48 | 58.78 | 31.50 | 0.60 | 0.20 | QP |
| 6 | 0.35765 | 29.82 | -18.96 | 48.78 | 29.02 | 0.60 | 0.20 | AVERAGE |
| 7 | 0.54068 | 28.28 | -27.72 | 56.00 | 27.78 | 0.30 | 0.20 | QP |
| 8 | 0.54068 | 24.67 | -21.33 | 46.00 | 24.17 | 0.30 | 0.20 | AVERAGE |
| 9 | 0.70468 | 17.12 | -28.88 | 46.00 | 16.62 | 0.30 | 0.20 | AVERAGE |
| 10 | 0.70468 | 28.61 | -27.39 | 56.00 | 28.11 | 0.30 | 0.20 | QP |
| 11 | 2.678 | 31.78 | -24.22 | 56.00 | 31.28 | 0.30 | 0.20 | QP |
| 12 | 2.678 | 21.84 | -24.16 | 46.00 | 21.34 | 0.30 | 0.20 | AVERAGE |

Note:
Corrected Reading: Probe (LISN / ISN) Factor + Cable Loss + Read Level = Level.

5.2.8. Photographs of Conducted Emission Test Configuration

FRONT VIEW

REAR VIEW



## 5.3. Test of Spurious Radiated Emission

5.3.1. Applicable Standard

Section 15.249(d): Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

5.3.2. Measuring Instruments

Please reference item 6~20 in chapter 6 for the instruments used for testing.

5.3.3. 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

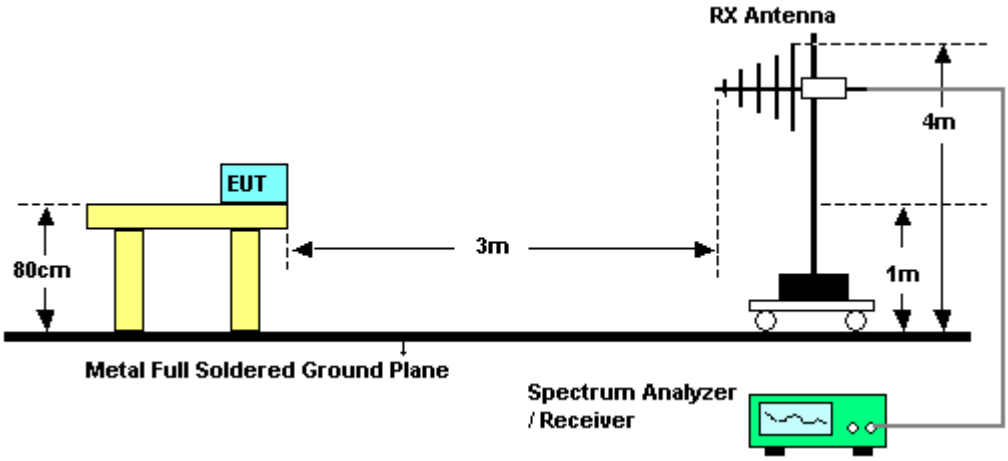
- Test Receiver : R&S ESCS 30
  Attenuation : Auto
  Start Frequency : 9 kHz
  Stop Frequency : 1000 MHz
  RB : 120 KHz for QP or PK

5.3.4. 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.

5.3.5. Test Setup Layout




5.3.6. Results of Bandedge Emissions

Please refer to section 5.1 of test result.

5.3.7. Test Criteria

All test results complied with the requirements of Section 15.249(d). Measurement Uncertainty is 2.26dB.

5.3.8. Test Results for CH 47 / 2441.664 (for emission below 1GHz)

- Temperature: 19°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steven Lu

***(A) Polarization: Horizontal***

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 ! | 294.000 | 44.67 | -1.33 | 46.00 | 12.88 | 1.36 | 30.09 | 60.52 | HORIZONTAL | QP |
| 2 | 358.830 | 38.37 | -7.63 | 46.00 | 14.76 | 1.50 | 30.57 | 52.68 | HORIZONTAL | Peak |
| 3 | 404.420 | 39.49 | -6.51 | 46.00 | 16.10 | 1.60 | 30.35 | 52.14 | HORIZONTAL | Peak |
| 4 | 479.110 | 39.79 | -6.21 | 46.00 | 17.07 | 1.74 | 30.62 | 51.61 | HORIZONTAL | Peak |
| 5 ! | 589.000 | 40.79 | -5.21 | 46.00 | 18.61 | 1.91 | 30.82 | 51.09 | HORIZONTAL | QP |
| 6 | 885.540 | 39.81 | -6.19 | 46.00 | 20.35 | 2.40 | 29.08 | 46.14 | HORIZONTAL | Peak |

***(B) Polarization: Vertical***

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 | 292.870 | 38.63 | -7.37 | 46.00 | 12.86 | 1.36 | 30.08 | 54.49 | VERTICAL | Peak |
| 2 | 404.420 | 30.18 | -15.82 | 46.00 | 16.10 | 1.60 | 30.35 | 42.84 | VERTICAL | Peak |
| 3 ! | 590.660 | 42.92 | -3.08 | 46.00 | 18.61 | 1.91 | 30.83 | 53.23 | VERTICAL | Peak |
| 4 | 785.630 | 30.23 | -15.77 | 46.00 | 19.83 | 2.23 | 30.11 | 38.28 | VERTICAL | Peak |
| 5 | 847.710 | 31.96 | -14.04 | 46.00 | 20.28 | 2.36 | 29.96 | 39.28 | VERTICAL | Peak |
| 6 | 885.540 | 37.65 | -8.35 | 46.00 | 20.35 | 2.40 | 29.08 | 43.98 | VERTICAL | Peak |

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.3.9. Test Results for CH 04 / 2404.512 (for emission above 1GHz)

- Temperature: 19°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steven Lu

***(A) Polarization: Horizontal***

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 | 4804.540 | 67.34 | -6.66 | 74.00 | 33.18 | 3.20 | 35.10 | 66.06 | HORIZONTAL | PEAK |
| 2 | 4805.230 | 36.74 | -17.26 | 54.00 | 33.18 | 3.20 | 35.10 | 35.45 | HORIZONTAL | AVERAGE |
| 3 ! | 7206.760 | 69.90 | -4.10 | 74.00 | 36.00 | 4.39 | 35.28 | 64.80 | HORIZONTAL | PEAK |
| 4 | 7207.790 | 39.34 | -14.66 | 54.00 | 36.00 | 4.39 | 35.28 | 34.24 | HORIZONTAL | AVERAGE |

***(B) Polarization: Vertical***

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 | 4806.100 | 60.60 | -13.40 | 74.00 | 33.18 | 3.20 | 35.10 | 59.31 | VERTICAL | PEAK |
| 2 | 4806.100 | 36.40 | -17.60 | 54.00 | 33.18 | 3.20 | 35.10 | 35.11 | VERTICAL | Average |
| 3 | 7206.970 | 62.37 | -11.63 | 74.00 | 36.00 | 4.39 | 35.28 | 57.27 | VERTICAL | PEAK |
| 4 | 7207.400 | 38.30 | -15.70 | 54.00 | 36.00 | 4.39 | 35.28 | 33.20 | VERTICAL | Average |

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.3.10. Test Results for CH 47 / 2441.664 (for emission above 1GHz)

- Temperature: 19°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steven Lu

***(A) Polarization: Horizontal***

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 | 4882.800 | 67.00 | -7.00 | 74.00 | 33.33 | 3.23 | 35.10 | 65.53 | HORIZONTAL | Peak |
| 2 | 4882.800 | 36.50 | -17.50 | 54.00 | 33.33 | 3.23 | 35.10 | 35.03 | HORIZONTAL | Average |
| 3 ! | 7322.480 | 70.00 | -4.00 | 74.00 | 36.29 | 4.44 | 35.33 | 64.60 | HORIZONTAL | Peak |
| 4 | 7322.480 | 39.00 | -15.00 | 54.00 | 36.29 | 4.44 | 35.33 | 33.60 | HORIZONTAL | Average |

***(B) Polarization: Vertical***

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 | 4883.400 | 62.00 | -12.00 | 74.00 | 33.33 | 3.23 | 35.10 | 60.53 | VERTICAL | Peak |
| 2 | 4883.400 | 38.00 | -16.00 | 54.00 | 33.33 | 3.23 | 35.10 | 36.53 | VERTICAL | Average |
| 3 | 7323.100 | 36.10 | -17.90 | 54.00 | 36.29 | 4.44 | 35.33 | 30.70 | VERTICAL | Average |
| 4 | 7323.100 | 59.40 | -14.60 | 74.00 | 36.29 | 4.44 | 35.33 | 54.00 | VERTICAL | Peak |

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.3.11. Test Results for CH 90 / 2478.816 (for emission above 1GHz)

- Temperature: 19°C
- Relative Humidity: 60%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steven Lu

***(A) Polarization: Horizontal***

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 | 4958.300 | 37.20 | -16.80 | 54.00 | 33.52 | 3.25 | 35.10 | 35.53 | HORIZONTAL | Average |
| 2 | 4958.300 | 67.10 | -6.90 | 74.00 | 33.52 | 3.25 | 35.10 | 65.43 | HORIZONTAL | Peak |
| 3 ! | 7437.000 | 69.20 | -4.80 | 74.00 | 36.58 | 4.50 | 35.37 | 63.49 | HORIZONTAL | Peak |
| 4 | 7437.000 | 39.00 | -15.00 | 54.00 | 36.58 | 4.50 | 35.37 | 33.29 | HORIZONTAL | Average |

***(B) Polarization: Vertical***

| | Freq | Level | Over Limit | Limit Line | Antenna Factor | Cable Loss | Preamp Factor | Read Level | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dB/m | dB | dB | dBuV | | |
| 1 | 4958.200 | 59.00 | -15.00 | 74.00 | 33.52 | 3.25 | 35.10 | 57.33 | VERTICAL | Peak |
| 2 | 4958.200 | 36.80 | -17.20 | 54.00 | 33.52 | 3.25 | 35.10 | 35.13 | VERTICAL | Average |
| 3 | 7437.000 | 38.80 | -15.20 | 54.00 | 36.58 | 4.50 | 35.37 | 33.09 | VERTICAL | Average |
| 4 | 7437.000 | 62.20 | -11.80 | 74.00 | 36.58 | 4.50 | 35.37 | 56.49 | VERTICAL | Peak |

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.3.12. Photographs of Radiated Emission Test Configuration

FRONT VIEW


REAR VIEW

## 5.4. Antenna Requirements

5.4.1. 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.

5.4.2. Antenna Connected Construction

There is no antenna connector for PCB Antenna.

5.4.3. Test Criteria

All test results complied with the requirements of Section 15.203.

# 6. List of Measuring Equipments Used

| Items | Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|---|---|---|---|---|---|---|---|
| 1 | EMC Receiver | R&S | ESCS 30 | 100174 | 9kHz – 2.75GHz | Feb. 16, 2005 | Conduction (CO04-HY) |
| 2 | LISN | MessTec | NNB-2/16Z | 2001/004 | 9kHz – 30MHz | Apr. 20, 2005 | Conduction (CO04-HY) |
| 3 | LISN (Support Unit) | MessTec | NNB-2/16Z | 99041 | 9kHz – 30MHz | May. 05, 2005 | Conduction (CO04-HY) |
| 4 | RF Cable-CON | UTIFLEX | 3102-26886-4 | CB049 | 9kHz – 30MHz | Apr. 20, 2005 | Conduction (CO04-HY) |
| 5 | EMI Filter | LINDGREN | LRE-2030 | 2651 | < 450 Hz | N/A | Conduction (CO04-HY) |
| 6 | 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 30MHz ~ 1GHz 3m | Jun. 16, 2005 | Radiation (03CH03-HY) |
| 7 | Spectrum analyzer | R&S | FSP40 | 100004 | 9KHZ ~ 40GHz | Aug. 31, 2004 | Radiation (03CH03-HY) |
| 9 | Amplifier | SCHAFFNER | CPA9231A | 18667 | 9KHz ~ 2GHz | Jan. 10, 2005 | Radiation (03CH03-HY) |
| 10 | Amplifier | Agilent | 8449B | 3008A02120 | 1GHz ~ 26.5GHz | May 31, 2005 | Radiation (03CH03-HY) |
| 11 | Biconical Antenna | SCHWARZBECK | VHBB 9124 | 301 | 30MHz ~ 200MHz | Jul. 28, 2004 | Radiation (03CH03-HY) |
| 12 | Log Antenna | SCHWARZBECK | VUSLP 9111 | 221 | 200MHz ~ 1GHz | Jul. 28, 2004 | Radiation (03CH03-HY) |
| 1 | Horn Antenna | EMCO | 3115 | 6741 | 1GHz ~ 18GHz | Apr. 22, 2005 | Radiation (03CH03-HY) |
| 14 | RF Cable-R03m | Jye Bao | RG142 | CB021 | 30MHz ~ 1GHz | Feb. 22, 2005 | Radiation (03CH03-HY) |
| 15 | RF Cable-HIGH | SUHNER | SUCOFLEX 106 | 03CH03-HY | 1GHz ~ 40GHz | Dec.01, 2004 | Radiation (03CH03-HY) |
| 16 | Turn Table | HD | DS 420 | 420/650/00 | 0 ~ 360 degree | N/A | Radiation (03CH03-HY) |
| 17 | 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 |
|---|---|---|---|---|---|---|---|
| 18 | Amplifier | MITEQ | AMF-6F-260400 | 923364 | 26.5GHz ~ 40GHz | Jan. 05, 2004* | Radiation (03CH03-HY) |
| 19 | Loop Antenna | R&S | HFH2-Z2 | 860004/001 | 9kHz ~ 30MHz | May 24, 2004* | Radiation (03CH03-HY) |
| 20 | Horn Antenna | SCHWARZBECK | BBHA9170 | BBHA9170154 | 15GHz ~ 40GHz | Jun. 09, 2004* | Radiation (03CH03-HY) |

※ Calibration Interval of instruments listed above is two 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 familial 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 2nd Rd., Taipei 114, Taiwan, R.O.C. |
| | TEL： | 02-2794-8886 |
| | FAX： | 02-2794-9777 |

# 8. CNLA Certificate of Accreditation

| | | |
|---|---|---|
| Test Lab. | : | Sporton International Inc. |
| Accreditation Number | : | 1190 |
| Originally Accredited | : | 2003/12/15 |
| Effective Period | : | 2003/12/15~2006/12/14 |
| Accredited Scope | : | 47 CFR FCC Part 15 Subpart C (9kHz~40GHz) |

Taiwan Accreditation Foundation
Chinese National Laboratory Accreditation
Certificate of Accreditation

| | |
|---|---|
| Accreditation Criteria: | ISO 17025 |
| Accreditation Number: | 1190 |
| Organization/Laboratory: | EMC & Wireless Communications Laboratory,Sporton International Inc. |
| Originally Accredited: | December 15, 2003 |
| Effective Period: | December 15, 2003 To December 14, 2006 |
| Accredited Scope: | Electrical Testing Field, 7 items, details shown in the following pages. |
| Specific Accreditation Program: | Recognition and Approval of Designated Laboratory for Commodities Inspection |

President, Taiwan Accreditation Foundation
Date:July 19, 2004

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CNLA-ZL03191E Page 1 of 4