

# FC

## Test Report

|              |                      |
|--------------|----------------------|
| Product Name | Joystick             |
| Model No.    | Wireless MetalStrike |
| FCC ID.      | FSUGG000G            |

|           |  |
|-----------|--|
| Applicant | KYE SYSTEMS CORP.  |
| Address   | No. 492 Sec.5, Chung Hsin Rd., San Chung, Taipei<br>Hsien, 24160, Taiwan, R.O.C. |

|                 |                      |
|-----------------|----------------------|
| Date of Receipt | Sep. 20, 2007        |
| Issued Date     | Nov. 28, 2007        |
| Report No.      | 079268R-RFUSP07V01-A |

The Test Results relate only to the samples tested.

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# Test Report Certification

Issued Date: Nov. 28, 2007

Report No.: 079268R-RFUSP07V01-A



|                     |   |
|---------------------|---|
| Product Name        | Joystick  |
| Applicant           | KYE SYSTEMS CORP.   |
| Address             | No. 492 Sec.5, Chung Hsin Rd., San Chung, Taipei Hsien, 24160, Taiwan, R.O.C. |
| Manufacturer        | KYE SYSTEMS CORP.   |
| Model No.           | Wireless MetalStrike  |
| Rated Voltage       | AC 120V/60Hz  |
| Working Voltage     | DC 5V (Power by PC)   |
| Trade Name          | Genius  |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C: 2006<br>ANSI C63.4: 2003                  |
| Test Result         | Complied  |



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## 1. GENERAL INFORMATION

### 1.1. EUT Description

|                    |                      |
|--------------------|----------------------|
| Product Name       | Joystick             |
| Trade Name         | Genius               |
| FCC ID.            | FSUGG000G            |
| Model No.          | Wireless MetalStrike |
| Frequency Range    | 2410-2474.872MHz     |
| Number of Channels | 81                   |
| Channel Separation | 810.9KHz             |
| Channel Control    | Auto                 |
| Type of Modulation | MSK                  |
| Antenna Type       | Printed on PCB       |
| Antenna Gain       | -4.84dBi             |

| Working Frequency of Each Channel |               |             |               |             |               |             |               |
|-----------------------------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| Channel                           | Frequency     | Channel     | Frequency     | Channel     | Frequency     | Channel     | Frequency     |
| Channel 01:                       | 2410MHz       | Channel 22: | 2427.0289 MHz | Channel 43: | 2444.0578 MHz | Channel 64: | 2461.0867 MHz |
| Channel 02:                       | 2410.8109 MHz | Channel 23: | 2427.8398 MHz | Channel 44: | 2444.8687 MHz | Channel 65: | 2461.8976 MHz |
| Channel 03:                       | 2411.6218 MHz | Channel 24: | 2428.6507 MHz | Channel 45: | 2445.6796 MHz | Channel 66: | 2462.7085 MHz |
| Channel 04:                       | 2412.4327 MHz | Channel 25: | 2429.4616 MHz | Channel 46: | 2446.4905 MHz | Channel 67: | 2463.5194 MHz |
| Channel 05:                       | 2413.2436 MHz | Channel 26: | 2430.2725 MHz | Channel 47: | 2447.3014 MHz | Channel 68: | 2464.3303 MHz |
| Channel 06:                       | 2414.0545 MHz | Channel 27: | 2431.0834 MHz | Channel 48: | 2448.1123 MHz | Channel 69: | 2465.1412 MHz |
| Channel 07:                       | 2414.8654 MHz | Channel 28: | 2431.8943 MHz | Channel 49: | 2448.9232 MHz | Channel 70: | 2465.9521 MHz |
| Channel 08:                       | 2415.6763 MHz | Channel 29: | 2432.7052 MHz | Channel 50: | 2449.7341 MHz | Channel 71: | 2466.763 MHz  |
| Channel 09:                       | 2416.4872 MHz | Channel 30: | 2433.5161 MHz | Channel 51: | 2450.545 MHz  | Channel 72: | 2467.5739 MHz |
| Channel 10:                       | 2417.2981 MHz | Channel 31: | 2434.327 MHz  | Channel 52: | 2451.3559 MHz | Channel 73: | 2468.3848 MHz |
| Channel 11:                       | 2418.109 MHz  | Channel 32: | 2435.1379 MHz | Channel 53: | 2452.1668 MHz | Channel 74: | 2469.1957 MHz |
| Channel 12:                       | 2418.9199 MHz | Channel 33: | 2435.9488 MHz | Channel 54: | 2452.9777 MHz | Channel 75: | 2470.0066 MHz |
| Channel 13:                       | 2419.7308 MHz | Channel 34: | 2436.7597 MHz | Channel 55: | 2453.7886 MHz | Channel 76: | 2470.8175 MHz |
| Channel 14:                       | 2420.5417 MHz | Channel 35: | 2437.5706 MHz | Channel 56: | 2454.5995 MHz | Channel 77: | 2471.6284 MHz |
| Channel 15:                       | 2421.3526 MHz | Channel 36: | 2438.3815 MHz | Channel 57: | 2455.4104 MHz | Channel 78: | 2472.4393 MHz |
| Channel 16:                       | 2422.1635 MHz | Channel 37: | 2439.1924 MHz | Channel 58: | 2456.2213 MHz | Channel 79: | 2473.2502 MHz |
| Channel 17:                       | 2422.9744 MHz | Channel 38: | 2440.0033 MHz | Channel 59: | 2457.0322 MHz | Channel 80: | 2474.0611 MHz |
| Channel 18:                       | 2423.7853 MHz | Channel 39: | 2440.8142 MHz | Channel 60: | 2457.8431 MHz | Channel 81: | 2474.872 MHz  |
| Channel 19:                       | 2424.5962 MHz | Channel 40: | 2441.6251 MHz | Channel 61: | 2458.654 MHz  |             |               |
| Channel 20:                       | 2425.4071 MHz | Channel 41: | 2442.436 MHz  | Channel 62: | 2459.4649 MHz |             |               |
| Channel 21:                       | 2426.218 MHz  | Channel 42: | 2443.2469 MHz | Channel 63: | 2460.2758 MHz |             |               |

**Note:**

1. The EUT is a USB Receiver with built-in 2.4GHz transceiver.
2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. Part 15 Subpart B compliance for spread spectrum devices is shown on the report no. 079268R-RFUSP01V02.
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

## 1.2. Operation Description

The EUT is a USB Receiver. The operation frequency is 2410-2474.872MHz Seventy-seven manually selectable channels are built in the EUT. The signals modulated by MSK are transmitted from the printed antenna on PCB of the EUT. DC 5V (Power by PC) shall be provided for EUT operation.

|           |                     |
|-----------|---------------------|
| Test Mode | Mode 1: Transmitter |
|-----------|---------------------|

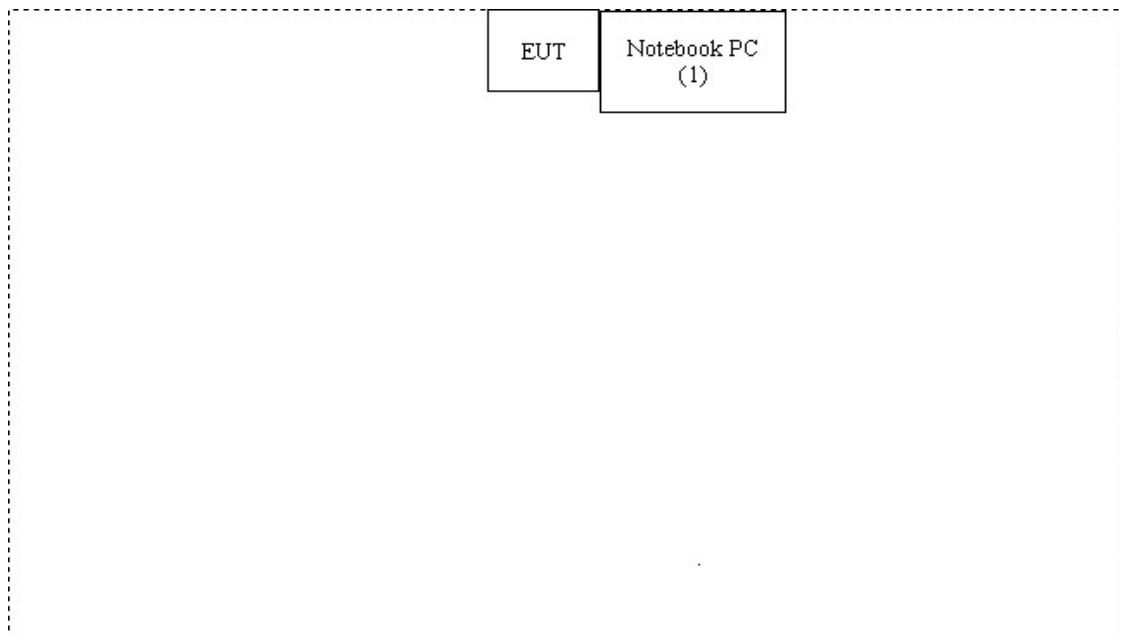
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product         | Manufacturer | Model No. | Serial No. | FCC ID | Power Cord         |
|-----------------|--------------|-----------|------------|--------|--------------------|
| (1) Notebook PC | DELL         | PPT       | N/A        | DoC    | Non-Shielded, 0.8m |

| Signal Cable Type | Signal cable Description |
|-------------------|--------------------------|
| A. N/A            | N/A                      |

### 1.4. Configuration of Tested System



## **1.5. EUT Exercise Software**

- (1) Setup the EUT as shown in section 1.4.
- (2) Install the batteries of the EUT.
- (3) Press the right button two times to start continuous transmitting.
- (4) Press the left button to switch the channel.



## 1.6. Test Facility

Ambient conditions in the laboratory:

| Items                      | Required (IEC 68-1) | Actual   |
|----------------------------|---------------------|----------|
| Temperature (°C)           | 15-35               | 20-35    |
| Humidity (%RH)             | 25-75               | 50-65    |
| Barometric pressure (mbar) | 860-1060            | 950-1000 |

Site Description: File on  
Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046  
Reference 31040/SIT1300F2



Accreditation on NVLAP  
NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation  
Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,  
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Taiwan, R.O.C.  
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789  
E-Mail : [service@quietek.com](mailto:service@quietek.com)

FCC Accreditation Number: TW1014



## 2. Conducted Emission

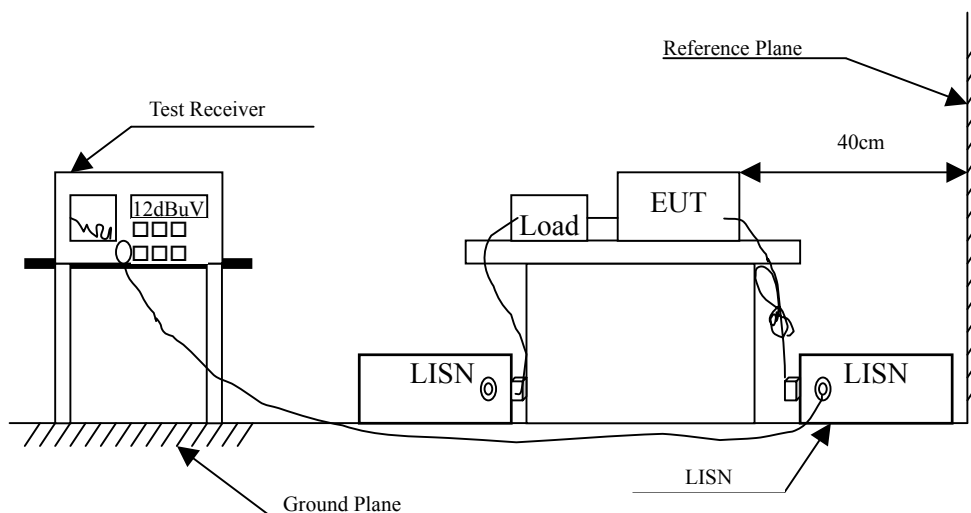
### 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

| Item | Instrument         | Manufacturer | Type No./Serial No | Last Cal. | Remark      |
|------|--------------------|--------------|--------------------|-----------|-------------|
| 1    | Test Receiver      | R & S        | ESCS 30/825442/17  | May, 2007 |             |
| 2    | L.I.S.N.           | R & S        | ESH3-Z5/825016/6   | May, 2007 | EUT         |
| 3    | L.I.S.N.           | Kyoritsu     | KNW-407/8-1420-3   | May, 2007 | Peripherals |
| 4    | Pulse Limiter      | R & S        | ESH3-Z2            | May, 2007 |             |
| 5    | No.1 Shielded Room |              |                    | N/A       |             |

Note: All equipments are calibrated every one year.

### 2.2. Test Setup



### 2.3. Limits

| FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit |        |       |
|---|--------|-------|
| Frequency<br>MHz                                    | Limits |       |
|   | QP     | AV    |
| 0.15 - 0.50   | 66-56  | 56-46 |
| 0.50-5.0  | 56     | 46    |
| 5.0 - 30  | 60     | 50    |

Remarks: In the above table, the tighter limit applies at the band edges.

## **2.4. Test Procedure**

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## **2.5. Uncertainty**

$\pm 2.26$  dB

## 2.6. Test Result of Conducted Emission

Product : Joystick  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Transmitter (2442.4MHz)

| Frequency         | Correct | Reading | Measurement | Margin  | Limit  |
|-------------------|---------|---------|-------------|---------|--------|
| MHz               | Factor  | Level   | Level       |         |        |
|                   | dB      | dBuV    | dBuV        | dB      | dBuV   |
| <b>Quasi-Peak</b> |         |         |             |         |        |
| 0.315             | 0.300   | 41.720  | 42.020      | -19.266 | 61.286 |
| 0.474             | 0.300   | 34.970  | 35.270      | -21.473 | 56.743 |
| 0.705             | 0.310   | 33.380  | 33.690      | -22.310 | 56.000 |
| 1.474             | 0.330   | 30.840  | 31.170      | -24.830 | 56.000 |
| 3.248             | 0.380   | 20.970  | 21.350      | -34.650 | 56.000 |
| 12.744            | 0.855   | 20.270  | 21.125      | -38.875 | 60.000 |
| <b>Average</b>    |         |         |             |         |        |
| 0.315             | 0.300   | 39.420  | 39.720      | -11.566 | 51.286 |
| 0.474             | 0.300   | 28.520  | 28.820      | -17.923 | 46.743 |
| 0.705             | 0.310   | 27.010  | 27.320      | -18.680 | 46.000 |
| 1.474             | 0.330   | 25.160  | 25.490      | -20.510 | 46.000 |
| 3.248             | 0.380   | 14.800  | 15.180      | -30.820 | 46.000 |
| 12.744            | 0.855   | 15.070  | 15.925      | -34.075 | 50.000 |

### Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Joystick  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Transmitter (2442.4MHz)

| Frequency         | Correct | Reading | Measurement | Margin  | Limit  |
|-------------------|---------|---------|-------------|---------|--------|
| MHz               | Factor  | Level   | Level       |         |        |
|                   | dB      | dBuV    | dBuV        | dB      | dBuV   |
| <b>Quasi-Peak</b> |         |         |             |         |        |
| 0.185             | 0.300   | 44.070  | 44.370      | -20.630 | 65.000 |
| 0.302             | 0.300   | 36.420  | 36.720      | -24.937 | 61.657 |
| 0.638             | 0.310   | 32.390  | 32.700      | -23.300 | 56.000 |
| 1.076             | 0.320   | 27.470  | 27.790      | -28.210 | 56.000 |
| 3.521             | 0.390   | 19.310  | 19.700      | -36.300 | 56.000 |
| 6.810             | 0.450   | 19.450  | 19.900      | -40.100 | 60.000 |
| <b>Average</b>    |         |         |             |         |        |
| 0.185             | 0.300   | 33.910  | 34.210      | -20.790 | 55.000 |
| 0.302             | 0.300   | 27.270  | 27.570      | -24.087 | 51.657 |
| 0.638             | 0.310   | 22.840  | 23.150      | -22.850 | 46.000 |
| 1.076             | 0.320   | 18.450  | 18.770      | -27.230 | 46.000 |
| 3.521             | 0.390   | 13.770  | 14.160      | -31.840 | 46.000 |
| 6.810             | 0.450   | 13.750  | 14.200      | -35.800 | 50.000 |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

### 3. Radiated Emission

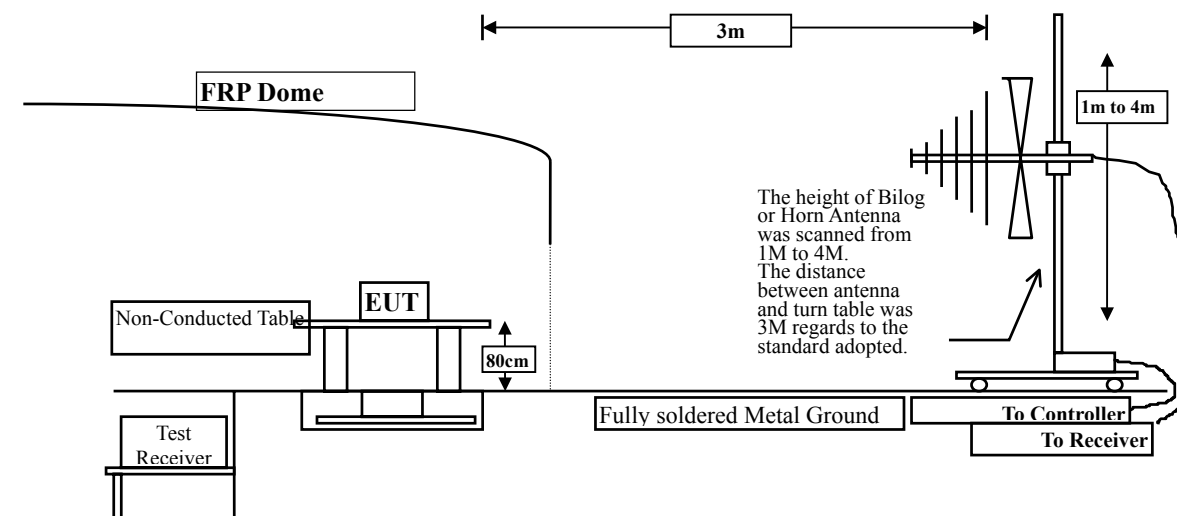
#### 3.1. Test Equipment

The following test equipment are used during the radiated emission test:

| Test Site                                    |   | Equipment         | Manufacturer | Model No./Serial No.   | Last Cal.  |
|--|---|-------------------|--------------|------------------------|------------|
| <input type="checkbox"/> Site # 1            |   | Test Receiver     | R & S        | ESVS 10 / 834468/003   | May, 2007  |
|  |   | Spectrum Analyzer | Advantest    | R3162/ 00803480        | May, 2007  |
|  |   | Pre-Amplifier     | Advantest    | BB525C/ 3307A01812     | May, 2007  |
|  |   | Bilog Antenna     | SCHAFFNER    | CBL6112B / 2697        | Sep., 2007 |
| <input type="checkbox"/> Site # 2            |   | Test Receiver     | R & S        | ESCS 30 / 836858 / 022 | May, 2007  |
|  |   | Spectrum Analyzer | Advantest    | R3162 / 100803466      | May, 2007  |
|  |   | Pre-Amplifier     | Advantest    | BB525C/3307A01814      | May, 2007  |
|  |   | Bilog Antenna     | SCHAFFNER    | CBL6112B / 2705        | May, 2007  |
|  |   | Horn Antenna      | ETS          | 3115 / 0005-6160       | Sep., 2007 |
|  |   | Pre-Amplifier     | QTK          | QTK-AMP-01/ 0001       | May, 2007  |
| <input checked="" type="checkbox"/> Site # 3 | X | Test Receiver     | R & S        | ESI 26 / 838786/004    | May, 2007  |
|  | X | Spectrum Analyzer | Agilent      | E4407B / US39440758    | May, 2007  |
|  | X | Bilog Antenna     | SCHAFFNER    | CBL6112B / 2697        | May, 2007  |
|  | X | Horn Antenna      | Schwarzbeck  | BBHA9120D / 305, 306   | July, 2007 |
|  | X | Horn Antenna      | Schwarzbeck  | BBHA9170 / 208, 209    | July, 2007 |
|  | X | Pre-Amplifier     | QTK          | QTK-AMP-01 / 0001      | July, 2007 |
|  | X | Pre-Amplifier     | QTK          | QTK-AMP-03 / 0003      | May, 2007  |
|  | X | Pre-Amplifier     | HP           | 8449B / 3008A01123     | July, 2007 |

- Note:
1. All equipments are calibrated every one year.
  2. The test instruments marked by "X" are used to measure the final test results.

#### 3.2. Test Setup



### 3.3. Limits

#### ➤ Fundamental and Harmonics Emission Limits

| FCC Part 15 Subpart B Paragraph 15.249 Limits |                               |              |                             |              |
|---|-------------------------------|--------------|-----------------------------|--------------|
| Frequency<br>MHz                              | Field Strength of Fundamental |              | Field Strength of Harmonics |              |
|   | (mV/m @3m)                    | (dBuV/m @3m) | (uV/m @3m)                  | (dBuV/m @3m) |
| 902-928                                       | 50                            | 94           | 500                         | 54           |
| 2400-2483.5                                   | 50                            | 94           | 500                         | 54           |
| 5725-5875                                     | 50                            | 94           | 500                         | 54           |

- Remarks :
1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
  2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

#### ➤ General Radiated Emission Limits

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

| FCC Part 15 Subpart B Paragraph 15.209 Limits |          |           |
|---|----------|-----------|
| Frequency<br>MHz                              | uV/m @3m | dBuV/m@3m |
| 30-88   | 100      | 40        |
| 88-216  | 150      | 43.5      |
| 216-960                                       | 200      | 46        |
| Above 960                                     | 500      | 54        |

- Remarks :
1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

### 3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

### 3.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz



### 3.6. Test Result of Radiated Emission

Product : Joystick  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmitter (2410MHz)

| Frequency<br>MHz        | Correct<br>Factor<br>dB | Reading<br>Level<br>dBuV | Measurement<br>Level<br>dBuV/m | Margin<br>dB | Limit<br>dBuV/m |
|-------------------------|-------------------------|--------------------------|--------------------------------|--------------|-----------------|
| <b>Horizontal</b>       |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| Channel                 |                         |                          |                                |              |                 |
| 2410.300                | -1.325                  | 87.220                   | 85.895                         | -28.105      | 114.000         |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |
| <b>Vertical</b>         |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| Channel                 |                         |                          |                                |              |                 |
| 2409.800                | -1.328                  | 85.960                   | 84.632                         | -29.368      | 114.000         |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : Joystick  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmitter (2442.4MHz)

| Frequency<br>MHz        | Correct<br>Factor<br>dB | Reading<br>Level<br>dBuV | Measurement<br>Level<br>dBuV/m | Margin<br>dB | Limit<br>dBuV/m |
|-------------------------|-------------------------|--------------------------|--------------------------------|--------------|-----------------|
| <b>Horizontal</b>       |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| Channel                 |                         |                          |                                |              |                 |
| 2442.600                | -1.198                  | 85.800                   | 84.602                         | -29.398      | 114.000         |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |
| <b>Vertical</b>         |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| Channel                 |                         |                          |                                |              |                 |
| 2442.400                | -1.199                  | 85.330                   | 84.130                         | -29.870      | 114.000         |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : Joystick  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmitter (2474.8MHz)

| Frequency<br>MHz        | Correct<br>Factor<br>dB | Reading<br>Level<br>dBuV | Measurement<br>Level<br>dBuV/m | Margin<br>dB | Limit<br>dBuV/m |
|-------------------------|-------------------------|--------------------------|--------------------------------|--------------|-----------------|
| <b>Horizontal</b>       |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| Channel                 |                         |                          |                                |              |                 |
| 2475.000                | -1.073                  | 84.760                   | 83.687                         | -30.313      | 114.000         |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |
| <b>Vertical</b>         |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| Channel                 |                         |                          |                                |              |                 |
| 2475.000                | -1.073                  | 87.180                   | 86.107                         | -27.893      | 114.000         |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : Joystick  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2410MHz)

| Frequency<br>MHz        | Correct<br>Factor<br>dB | Reading<br>Level<br>dBuV | Measurement<br>Level<br>dBuV/m | Margin<br>dB | Limit<br>dBuV/m |
|-------------------------|-------------------------|--------------------------|--------------------------------|--------------|-----------------|
| <b>Horizontal</b>       |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| 4820.000                | 2.856                   | 44.078                   | 46.934                         | -27.066      | 74.000          |
| 7230.000                | 7.693                   | 40.070                   | 47.763                         | -26.237      | 74.000          |
| 9640.000                | 9.296                   | 36.837                   | 46.133                         | -27.867      | 74.000          |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |
| <b>Vertical</b>         |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| 4820.000                | 2.856                   | 50.282                   | 53.138                         | -20.862      | 74.000          |
| 7230.000                | 7.693                   | 40.933                   | 48.626                         | -25.374      | 74.000          |
| 9640.000                | 9.296                   | 36.624                   | 45.920                         | -28.080      | 74.000          |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Joystick  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2442.4MHz)

| Frequency<br>MHz        | Correct<br>Factor<br>dB | Reading<br>Level<br>dBuV | Measurement<br>Level<br>dBuV/m | Margin<br>dB | Limit<br>dBuV/m |
|-------------------------|-------------------------|--------------------------|--------------------------------|--------------|-----------------|
| <b>Horizontal</b>       |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| 4884.800                | 3.030                   | 44.706                   | 47.736                         | -26.264      | 74.000          |
| 7327.200                | 7.910                   | 38.379                   | 46.289                         | -27.711      | 74.000          |
| 9769.600                | 9.367                   | 37.006                   | 46.373                         | -27.627      | 74.000          |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |
| <b>Vertical</b>         |                         |                          |                                |              |                 |
| <b>Peak Detector:</b>   |                         |                          |                                |              |                 |
| 4884.800                | 3.030                   | 50.764                   | 53.794                         | -20.206      | 74.000          |
| 7327.200                | 7.910                   | 40.270                   | 48.180                         | -25.820      | 74.000          |
| 9769.600                | 9.367                   | 37.354                   | 46.721                         | -27.279      | 74.000          |
| <b>Average Detector</b> |                         |                          |                                |              |                 |
| --                      |                         |                          |                                |              |                 |

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Joystick  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2474.8MHz)

| Frequency | Correct | Reading | Measurement | Margin | Limit  |
|-----------|---------|---------|-------------|--------|--------|
| MHz       | Factor  | Level   | Level       | dB     | dBuV/m |
|           | dB      | dBuV    | dBuV/m      |        |        |

#### Horizontal

##### Peak Detector:

|          |       |        |        |         |        |
|----------|-------|--------|--------|---------|--------|
| 4949.600 | 3.209 | 42.894 | 46.102 | -27.898 | 74.000 |
| 7424.400 | 8.128 | 37.909 | 46.036 | -27.964 | 74.000 |
| 9899.200 | 9.436 | 36.811 | 46.246 | -27.754 | 74.000 |

##### Average Detector

--

#### Vertical

##### Peak Detector:

|          |       |        |        |         |        |
|----------|-------|--------|--------|---------|--------|
| 4949.600 | 3.209 | 49.205 | 52.413 | -21.587 | 74.000 |
| 7424.400 | 8.128 | 37.922 | 46.049 | -27.951 | 74.000 |
| 9899.200 | 9.436 | 37.401 | 46.836 | -27.164 | 74.000 |

##### Average Detector

--

#### Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Joystick  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2442.4MHz)

| Frequency         | Correct | Reading | Measurement | Margin  | Limit  |
|-------------------|---------|---------|-------------|---------|--------|
|                   | Factor  | Level   | Level       |         |        |
| MHz               | dB      | dBuV    | dBuV/m      | dB      | dBuV/m |
| <b>Horizontal</b> |         |         |             |         |        |
| 258.920           | 13.318  | 11.720  | 25.038      | -20.962 | 46.000 |
| 311.300           | 12.748  | 13.012  | 25.760      | -20.240 | 46.000 |
| 363.680           | 14.570  | 15.975  | 30.545      | -15.455 | 46.000 |
| 398.600           | 15.304  | 17.115  | 32.419      | -13.581 | 46.000 |
| 499.480           | 16.909  | 17.652  | 34.561      | -11.439 | 46.000 |
| 755.560           | 19.867  | 12.179  | 32.046      | -13.954 | 46.000 |
| <b>Vertical</b>   |         |         |             |         |        |
| 57.160            | 5.784   | 30.312  | 36.096      | -3.904  | 40.000 |
| 84.320            | 7.929   | 27.315  | 35.244      | -4.756  | 40.000 |
| 105.660           | 10.590  | 26.392  | 36.982      | -6.518  | 43.500 |
| 167.740           | 8.846   | 26.595  | 35.441      | -8.059  | 43.500 |
| 208.480           | 9.151   | 20.181  | 29.332      | -14.168 | 43.500 |
| 307.420           | 12.704  | 19.257  | 31.961      | -14.039 | 46.000 |

**Note:**

1. The reading levels below 1GHz are quasi-peak values.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested.  
Only the worst case is shown on the report.

## 4. Band Edge

### 4.1. Test Equipment

The following test equipments are used during the band edge tests:

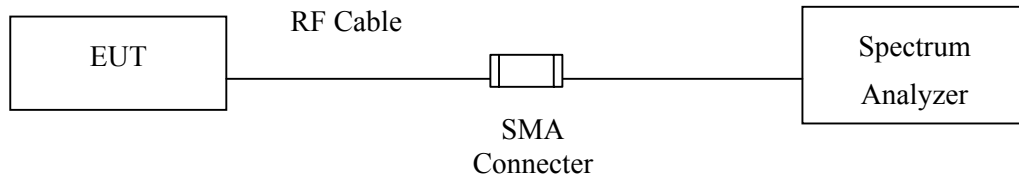
| Equipment        |                   | Manufacturer | Model No./Serial No. | Last Cal.  |
|------------------|-------------------|--------------|----------------------|------------|
| X                | Test Receiver     | R & S        | ESI 26 / 838786/004  | May, 2007  |
| X                | Spectrum Analyzer | Agilent      | E4407B / US39440758  | May, 2007  |
| X                | Bilog Antenna     | SCHAFFNER    | CBL6112B / 2697      | May, 2007  |
| X                | Horn Antenna      | Schwarzbeck  | BBHA9120D / 305, 306 | July, 2007 |
| X                | Horn Antenna      | Schwarzbeck  | BBHA9170 / 208, 209  | July, 2007 |
| X                | Pre-Amplifier     | QTK          | QTK-AMP-01 / 0001    | July, 2007 |
| X                | Pre-Amplifier     | QTK          | QTK-AMP-03 / 0003    | May, 2007  |
| X                | Pre-Amplifier     | HP           | 8449B / 3008A01123   | July, 2007 |
| Test Site: Site3 |                   |              |                      |            |

Note: 1. All equipments are calibrated every one year.  
2. The test instruments marked by "X" are used to measure the final test results.

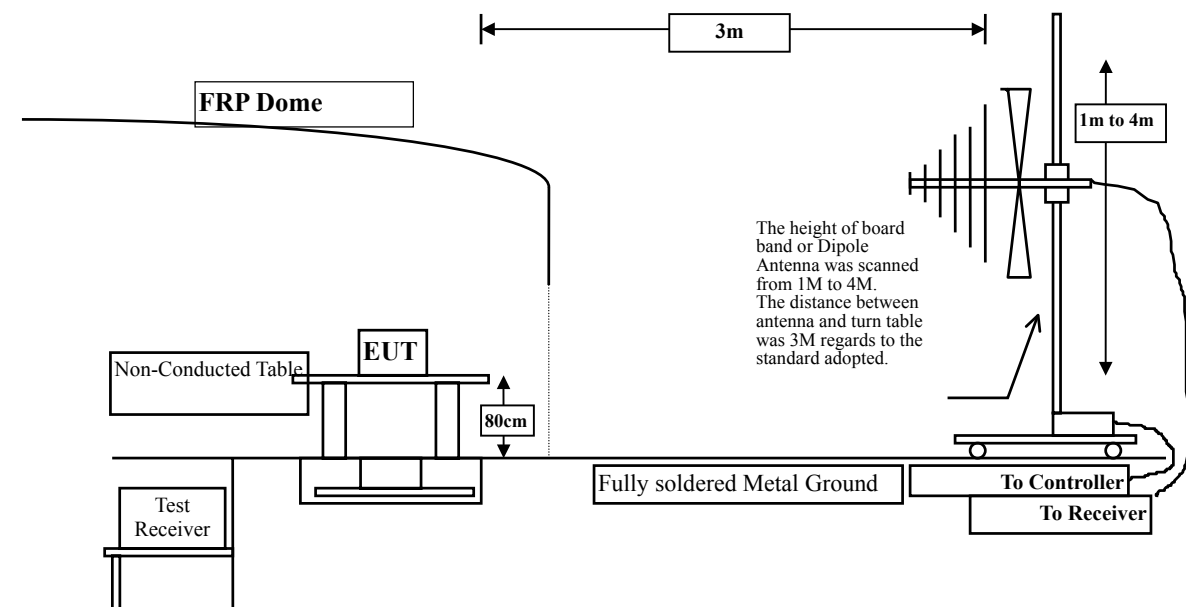


## 4.2. Test Setup

### RF Conducted Measurement:



### RF Radiated Measurement:



## 4.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

#### **4.4. Test Procedure**

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2003 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

#### **4.5. Uncertainty**

Conducted is  $\pm 1.27$  dB

Radiated is  $\pm 3.9$  dB

#### 4.6. Test Result of Band Edge

Product : Joystick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2410MHz)

##### RF Radiated Measurement

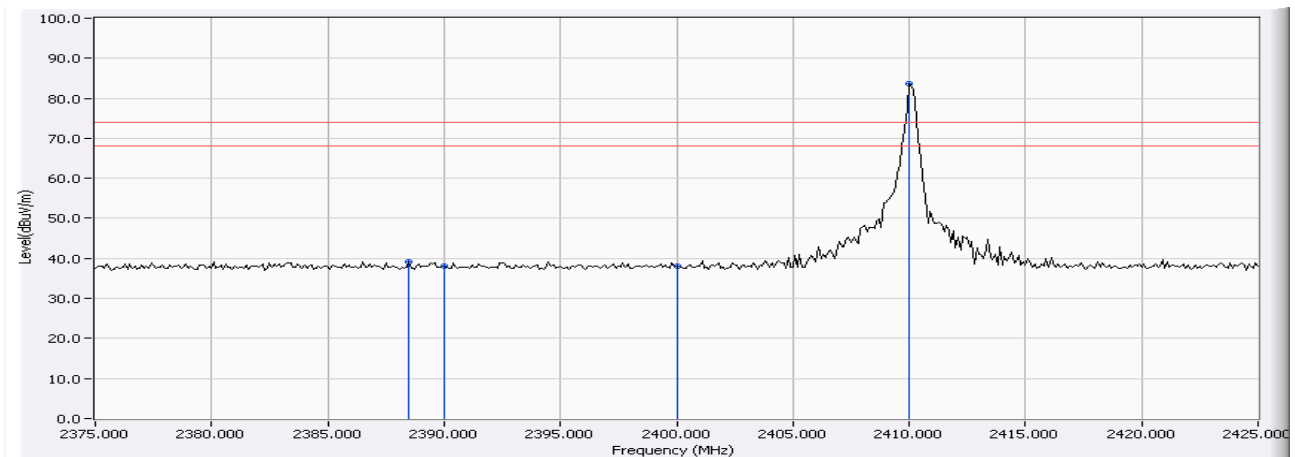
| Channel No. | Frequency (MHz) | Required Limit (dBc) | Result |
|-------------|-----------------|----------------------|--------|
| 01          | <2400           | >20                  | Pass   |

##### RF Radiated Measurement (Horizontal):

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|-------------|-----------------|---------------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 01 (Peak)   | 2388.500        | -1.412              | 40.458               | 39.046                  | 74.00               | 54.00                  | Pass   |
| 01 (Peak)   | 2390.000        | -1.407              | 39.568               | 38.161                  | 74.00               | 54.00                  | Pass   |
| 01 (Peak)   | 2400.000        | -1.363              | 39.471               | 38.108                  | 74.00               | 54.00                  | Pass   |
| 01 (Peak)   | 2410.000        | -1.327              | 85.027               | 83.700                  | 74.00               | 54.00                  | Pass   |
| 01(Average) | --              | --                  | --                   | --                      | 74.00               | 54.00                  | Pass   |

Figure Channel 01:

Horizontal (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Joystick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2410MHz)

### RF Radiated Measurement

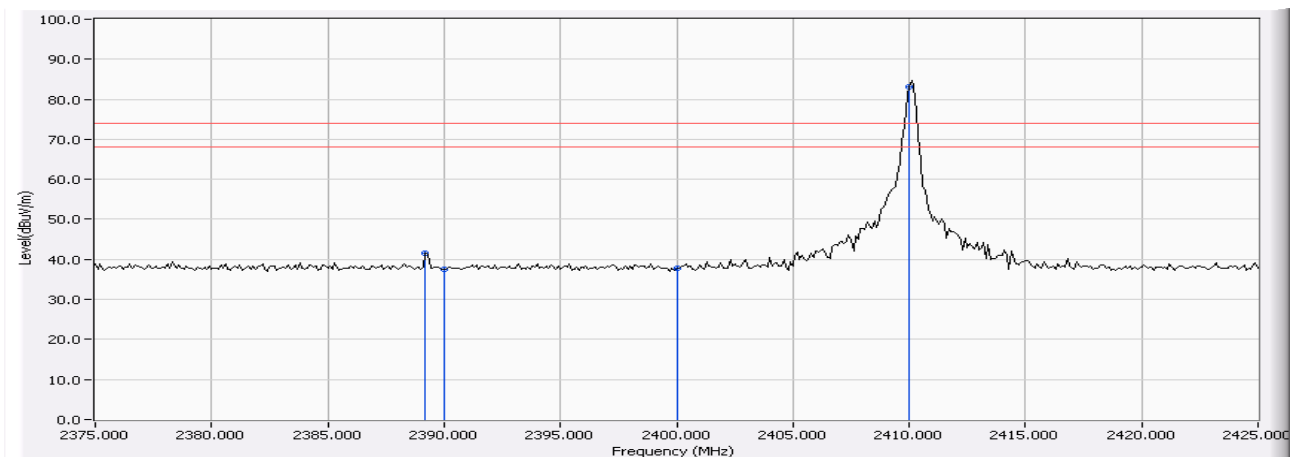
| Channel No. | Frequency (MHz) | Required Limit (dBc) | Result |
|-------------|-----------------|----------------------|--------|
| 01          | <2400           | >20                  | Pass   |

### RF Radiated Measurement (Vertical):

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|-------------|-----------------|---------------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 01 (Peak)   | 2389.200        | -1.409              | 43.014               | 41.605                  | 74.00               | 54.00                  | Pass   |
| 01 (Peak)   | 2390.000        | -1.407              | 39.008               | 37.601                  | 74.00               | 54.00                  | Pass   |
| 01 (Peak)   | 2400.000        | -1.363              | 39.199               | 37.836                  | 74.00               | 54.00                  | Pass   |
| 01 (Peak)   | 2410.000        | -1.327              | 84.384               | 83.057                  | 74.00               | 54.00                  | Pass   |
| 01(Average) | --              | --                  | --                   | --                      | 74.00               | 54.00                  | Pass   |

Figure Channel 01:

Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Joystick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2474.8MHz)

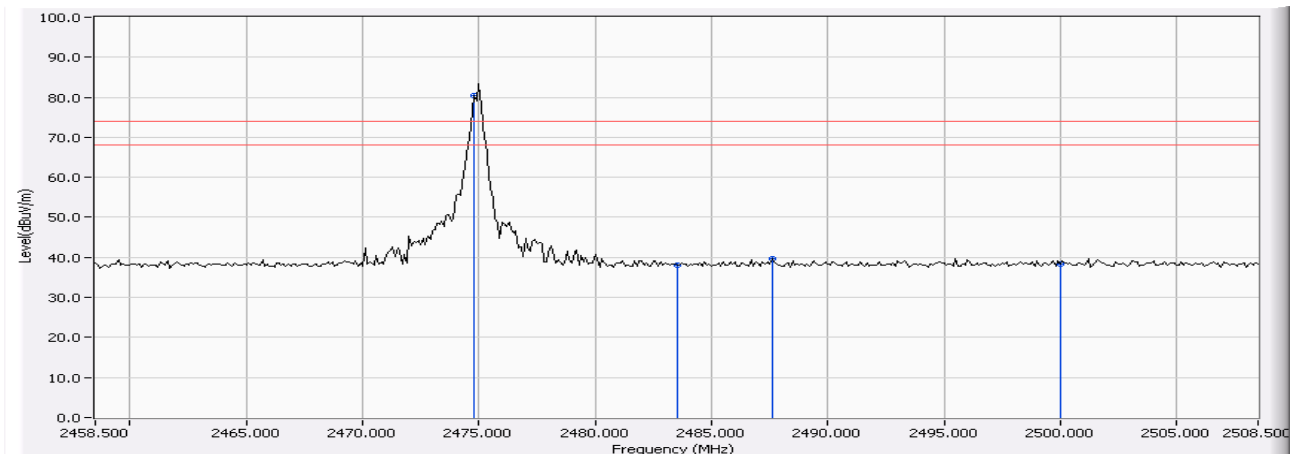
### RF Radiated Measurement

| Channel No. | Frequency (MHz) | Required Limit (dBc) | Result |
|-------------|-----------------|----------------------|--------|
| 81          | >2483.5         | >20                  | Pass   |

### RF Radiated Measurement (Horizontal):

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|-------------|-----------------|---------------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 81 (Peak)   | 2474.800        | -1.074              | 81.472               | 80.398                  | 74.00               | 54.00                  | Pass   |
| 81 (Peak)   | 2483.500        | -1.037              | 39.031               | 37.994                  | 74.00               | 54.00                  | Pass   |
| 81 (Peak)   | 2487.600        | -1.027              | 40.655               | 39.628                  | 74.00               | 54.00                  | Pass   |
| 81 (Peak)   | 2500.000        | -0.988              | 39.458               | 38.470                  | 74.00               | 54.00                  | Pass   |
| 81(Average) | --              | --                  | --                   | --                      | 74.00               | 54.00                  | Pass   |

**Figure Channel 81: Horizontal (Peak)**



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Joystick  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2474.8MHz)

#### RF Radiated Measurement

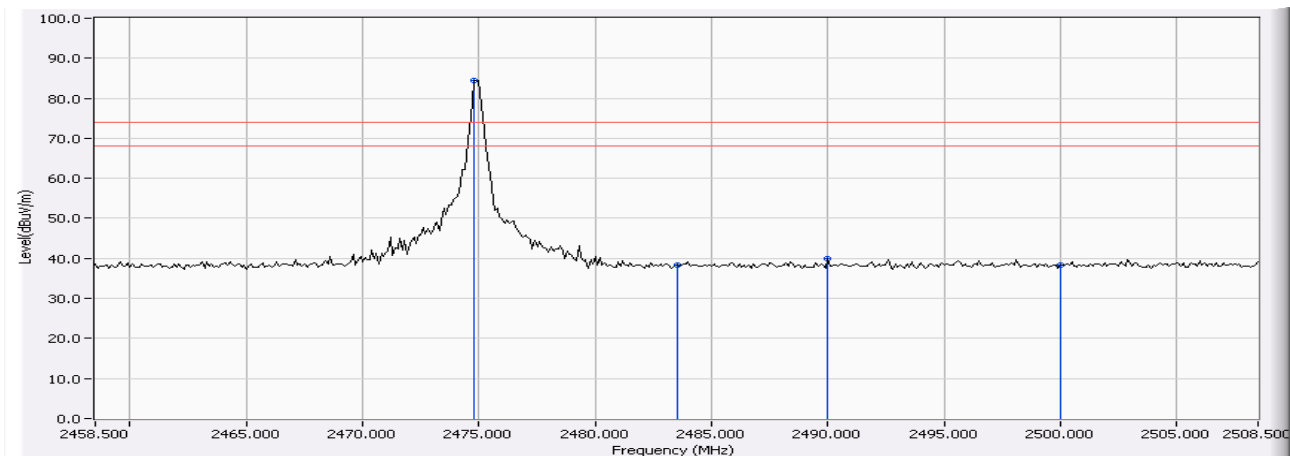
| Channel No. | Frequency (MHz) | Required Limit (dBc) | Result |
|-------------|-----------------|----------------------|--------|
| 81          | >2483.5         | >20                  | Pass   |

#### RF Radiated Measurement (Vertical):

| Channel No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Peak Limit (dBuV/m) | Average Limit (dBuV/m) | Result |
|-------------|-----------------|---------------------|----------------------|-------------------------|---------------------|------------------------|--------|
| 81 (Peak)   | 2474.800        | -1.074              | 85.426               | 84.352                  | 74.00               | 54.00                  | Pass   |
| 81 (Peak)   | 2483.500        | -1.037              | 39.245               | 38.208                  | 74.00               | 54.00                  | Pass   |
| 81 (Peak)   | 2490.000        | -1.022              | 41.030               | 40.008                  | 74.00               | 54.00                  | Pass   |
| 81 (Peak)   | 2500.000        | -0.988              | 39.321               | 38.333                  | 74.00               | 54.00                  | Pass   |
| 81(Average) | --              | --                  | --                   | --                      | 74.00               | 54.00                  | Pass   |

Figure Channel 81:

Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

## **5. EMI Reduction Method During Compliance Testing**

No modification was made during testing.