# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
# INTENTIONAL RADIATOR CERTIFICATION

| | | |
|---|---|---|
| **Product Name** | : | Wireless Digital Microscope |
| **Model Number** | : | 738 |
| **Trade Name** | : | N/A |
| **FCC ID** | : | YPR73802 |
| **Report Number** | : | SZEE100727118405-2 |
| **Date** | : | Aug. 23, 2010 |

| Standards | Results |
|---|---|
| ☒ 47 CFR FCC Part 15 Subpart C 15.249 | PASS |

Prepared for

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Prepared by

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***(Note: N/A means not applicable)***

# 1. GENERAL INFORMATION

| | |
|---|---|
| **Applicant:** | Zhongshan Sunpet Plastics & Electronics Mfy. Ltd.<br>109 Zhongshan Port Avenue, Zhongshan Torch Development Zone, Zhongshan City, Guangdong Province, China, 528437 |
| **Manufacturer:** | Zhongshan Sunpet Plastics & Electronics Mfy. Ltd.<br>109 Zhongshan Port Avenue, Zhongshan Torch Development Zone, Zhongshan City, Guangdong Province, China, 528437 |
| **Sample Description:** | Wireless Digital Microscope |
| **Technical Date:** | DC 5V by USB port |
| **Model Name:** | 738 |
| **Trade Name:** | N/A |
| **FCC ID:** | YPR73802 |
| **Report Number:** | SZEE100727118405-2 |
| **Date of Test:** | Jul. 27, 2010 to Aug. 23, 2010 |

The above equipment was tested by CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION for compliance with the requirements set forth in FCC Rules and the measurement procedure according to ANSI C63.4-2009.
The test results of this report relate only to the tested sample identified in this report.

Prepared by : Christy Chen

Reviewed by : Louisa Lu

Approved by : Lily Yan
Supervisor

Date : Aug. 23, 2010

## 2. TEST SUMMARY

The complete list of measurements is given below:

| Clause | Test Item | Rule | Result |
|---|---|---|---|
| 7 | 20dB Bandwidth | FCC 15.215(c) | **PASS** |
| 8 | Radiated Emission | FCC 15.209<br>FCC 15.249(a) (d) | **PASS** |
| 9 | Out of Band Emission | FCC 15.249 (d) | **PASS** |

## 3. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| Measurement items | Uncertainty |
|---|---|
| Radiated Emissions / Band edge Emission | 4.6 dB |

## 4. PRODUCT INFORMATION

| Items | Description |
|---|---|
| Rating | DC 5V by USB port |
| Intentional Transceiver | Intentional Transceiver |
| Modulation | GFSK |
| Frequency Range | 2404.125 ～ 2478.375 MHz |
| Channel Number | 64 (at intervals of 1.125MHz) |
| Type | PCB Antenna |
| Connector | fixed on board |
| Gain | 2.0dBi |

| Channels | Frequency |
|---|---|
| 0～63 | 2404.125MHz; 2405.25MHz; 2406.375MHz; 2407.5MHz; 2408.625MHz; 2409.75MHz; 2410.875MHz; 2412MHz; 2413.125MHz; 2414.25MHz; 2415.375MHz; 2416.5MHz; 2417.625MHz; 2418.75MHz; 2419.875MHz; 2421MHz; 2423.25MHz; 2424.375MHz; 2425.5MHz; 2426.625MHz; 2427.75MHz; 2428.875MHz; 2430MHz; 2431.125MHz; 2432.25MHz; 2433.375MHz; 2434.5MHz; 2435.625MHz; 2436.75MHz; 2437.875MHz; 2439MHz; 2440.125MHz; 2442.375MHz; 2443.5MHz; 2444.625MHz; 2445.75MHz; 2446.875 MHz; 2448 MHz; 2449.125MHz; 2450.25MHz; 2451.375MHz; 2452.5MHz; 2453.625MHz; 2454.75MHz; 2455.875MHz; 2457MHz; 2458.125MHz; 2459.25MHz; 2461.5MHz; 2462.625MHz; 2463.75MHz; 2464.875MHz; 2466MHz; 2467.125MHz; 2468.25MHz; 2469.375MHz; 2470.5MHz; 2471.625MHz; 2472.75MHz; 2473.875MHz; 2475MHz; 2476.125MHz; 2477.25MHz; 2478.375MHz |

## 5. TEST EQUIPMENT LIST

| Equipment | Manufacturer | Model Number | Serial Number | Due Date |
|---|---|---|---|---|
| 3M Chamber & Accessory Equipment | ETS-LINDGREN | FACT-3 | 3510 | 01/19/2011 |
| Spectrum Analyzer | Agilent | E4443A | MY46185649 | 01/19/2011 |
| Biconilog Antenna | ETS-LINGREN | 3142C | 920250 | 01/19/2011 |
| Multi device Controller | ETS-LINGREN | 2090 | 00057230 | 01/19/2011 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00057407 | 07/31/2011 |
| Loop Antenna | ETS-LINDGREN | 6502 | 00071730 | 08/24/2011 |

## 6. SUPPORT EQUIPMENT LIST

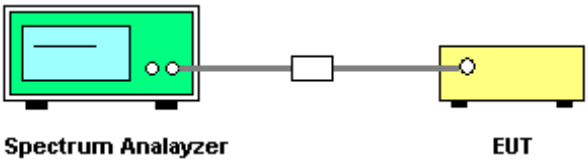
| No. | Device Type | Manufacturer | Model | Series No. | Data Cable | Power Cord |
|---|---|---|---|---|---|---|
| 1. | PC | Lenovo | PCG-3G1T | 282170999014058 | N/A | N/A |
| 2. | Monitor | IBM | 9205-AB6 | VK-KZ133 | Un-shielded 1.2M | N/A |
| 3. | Mouse | IBM | M028UOL | 23-468157 | Un-shielded 1.2M | N/A |
| 4. | Keyboard | IBM | 89P8300 | 02284699 | Un-shielded 1.2M | N/A |

# 7. 20DB BANDWIDTH MEASUREMENT

## 7.1 LIMITS

None

## 7.2 BLOCK DIAGRAM OF TEST SETUP




## 7.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.

2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.

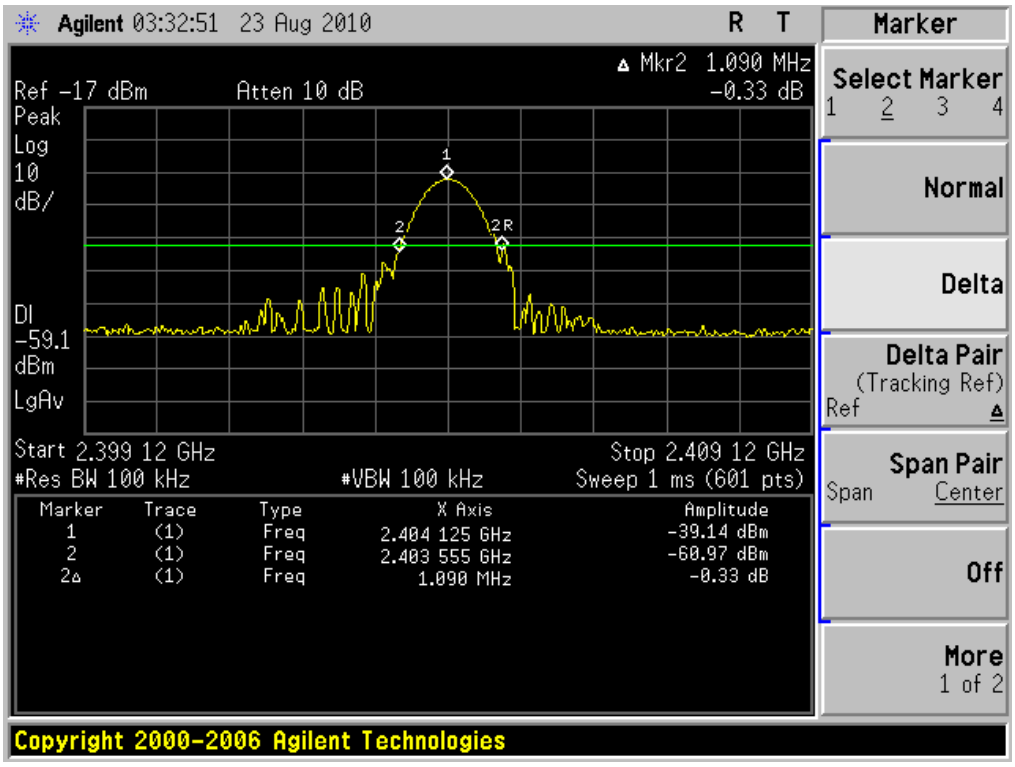
3. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level.

4. The 20dB bandwidth was determined from where the channel output spectrum intersected the display line.

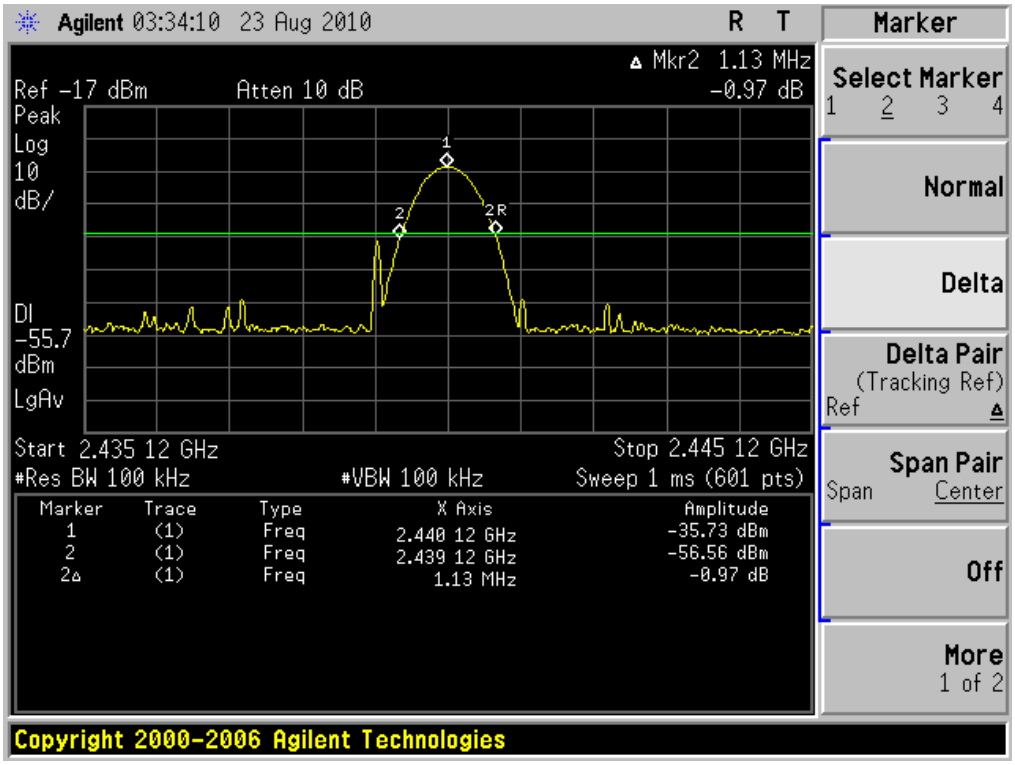
## 7.4 TEST RESULT

Worst case-- Modulation Type: GFSK

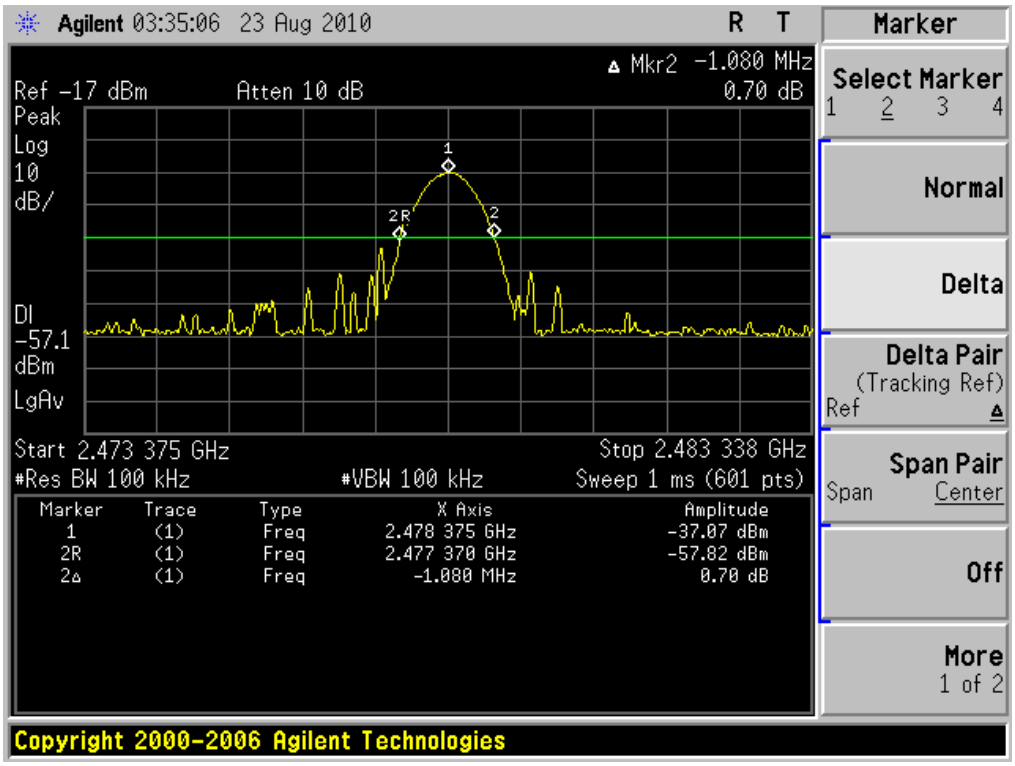
| Channel | Frequency (MHz) | 20 dB BW (MHz) | Result |
|---|---|---|---|
| CH0 | 2404.125 | 1.09 | 1.09 MHz |
| CH31 | 2440.125 | 1.13 | |
| CH63 | 2478.375 | 1.08 | |




Channel 0




Channel 31


Agilent 03:35:06 23 Aug 2010
R T
Marker
Mkr2 -1.080 MHz
0.70 dB
Ref -17 dBm
Atten 10 dB
Peak
Log
10
dB/
DI
-57.1
dBm
LgAv
Start 2.473 375 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 2.483 338 GHz
Sweep 1 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.478 375 GHz -37.07 dBm
2R (1) Freq 2.477 370 GHz -57.82 dBm
2Δ (1) Freq -1.080 MHz 0.70 dB
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2006 Agilent Technologies

Channel 63

# 8. RADIATED EMISSIONS MEASUREMENT

## 8.1 LIMITS

(1) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental frequency | Field strength of fundamental (millivolts/ meter) | Field strength of harmonics (microvolts/ meter) |
|---|---|---|
| 902–928 MHz | 50 | 500 |
| 2400–2483.5 MHz | 50 | 500 |
| 5725–5875 MHz | 50 | 500 |
| 24.0–24.25 GHz | 250 | 2500 |

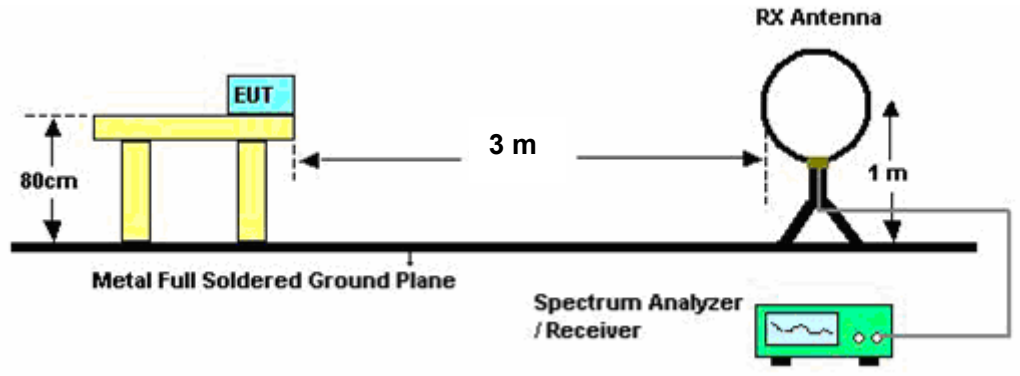
(2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209 as the following , whichever is the lesser attenuation.

| Frequency (MHz) | Field strength (μV/m) | Distance (m) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

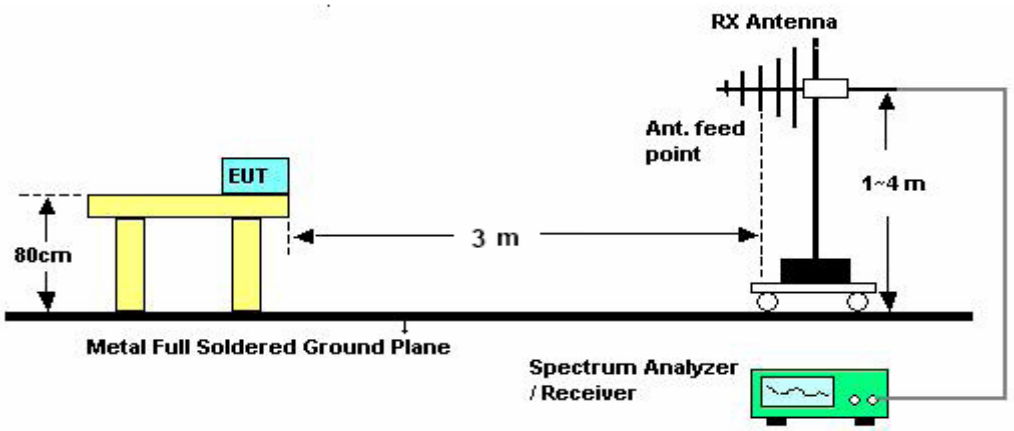
**Note:** the tighter limit applies at the band edges.

## 8.2 BLOCK DIAGRAM OF TEST SETUP

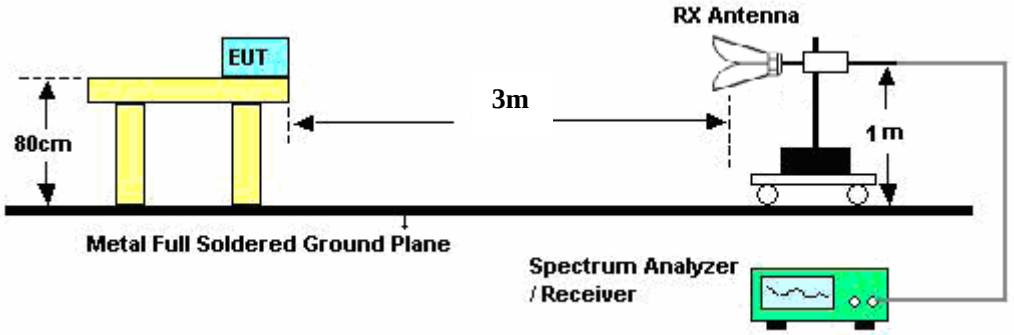
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30 - 1000MHz




For radiated emissions from 1GHz to 25GHz




**8.3 TEST PROCEDURE**

**A. Above 30MHz**

a. The EUT was placed on the top of a turntable 0.8 meters above the ground in the chamber, 3 meters away from the antenna (wideband antenna), which was mounted on the top of a variable-height antenna tower. The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.

b. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

c. The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

**B. Below 30MHz**

a. The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 1 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.

b. For each suspected emission, the EUT was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

c. The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

## 8.4 TEST RESULT

Note: Limit dBμV/m @3m = Limit dBμV/m @300m+ 80
Limit dBμV/m @3m = Limit dBμV/m @30m + 40

| Test Results-(Measurement Distance: 3m)_Channel 0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Measurement value | | | Limit | | | Antenna | Result |
| | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | (H/V) | (P/F) |
| 240.1667 | 41.05 | 39.63 | ---- | ---- | 46 | ---- | H | P |
| 335.5500 | 40.64 | 39.02 | ---- | ---- | 46 | ---- | H | P |
| 432.5500 | 39.82 | ---- | ---- | ---- | 46 | ---- | H | P |
| 1201.667 | 46.66 | ---- | ---- | 74 | ---- | 54 | H | P |
| ***2404.125** | 90.55 | ---- | ---- | 114 | ---- | 94 | H | P |
| **4808.250 | 55.10 | ---- | 42.32 | 74 | ---- | 54 | H | P |
| **7212.375 | 45.74 | ---- | ---- | 94 | ---- | 74 | H | P |
| 7930.000 | 45.89 | ---- | ---- | 74 | ---- | 54 | H | P |
| 10240.00 | 46.60 | ---- | ---- | 74 | ---- | 54 | H | P |
| | | | | | | | | |
| 240.1667 | 40.39 | ---- | ---- | ---- | 46 | ---- | V | P |
| 335.5500 | 30.31 | ---- | ---- | ---- | 46 | ---- | V | P |
| 408.3000 | 41.88 | ---- | ---- | ---- | 46 | ---- | V | P |
| 1238.333 | 36.96 | ---- | ---- | 74 | ---- | 54 | V | P |
| ***2404.125** | 91.74 | ---- | ---- | 114 | ---- | 94 | V | P |
| **4808.250 | 53.62 | ---- | 40.25 | 74 | ---- | 54 | V | P |
| **7212.375 | 46.46 | ---- | ---- | 94 | ---- | 74 | V | P |
| 9891.667 | 45.99 | ---- | ---- | 74 | ---- | 54 | V | P |

*: fundamental frequency

**: harmonics frequency

**Note:**

1. The test data below 30MHz are very low, so they are not recorded.
2. The harmonics inside restricted bands meet the limits of FCC part 15.209.

| Test Results-(Measurement Distance: 3m)_Channel 31 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Measurement value | | | Limit | | | Antenna | Result |
| | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | (H/V) | (P/F) |
| 240.1667 | 42.32 | ---- | ---- | ---- | 46 | ---- | H | P |
| 335.5500 | 39.62 | ---- | ---- | ---- | 46 | ---- | H | P |
| 432.5500 | 38.63 | ---- | ---- | ---- | 46 | ---- | H | P |
| 1110.000 | 41.85 | ---- | ---- | 74 | ---- | 54 | H | P |
| ***2440.125** | 90.85 | ---- | ---- | 114 | ---- | 94 | H | P |
| **4880.250 | 56.98 | ---- | 43.58 | 74 | ---- | 54 | H | P |
| **7320.375 | 46.23 | ---- | ---- | 74 | ---- | 54 | H | P |
| 7453.333 | 46.36 | ---- | ---- | 74 | ---- | 54 | H | P |
| 9708.333 | 47.55 | ---- | ---- | 74 | ---- | 54 | H | P |
| | | | | | | | | |
| 240.1667 | 41.23 | ---- | ---- | ---- | 46 | ---- | V | P |
| 335.5500 | 32.32 | ---- | ---- | ---- | 46 | ---- | V | P |
| 408.3000 | 42.02 | ---- | ---- | ---- | 46 | ---- | V | P |
| 1605.000 | 37.03 | ---- | ---- | 74 | ---- | 54 | V | P |
| ***2440.125** | 91.02 | ---- | ---- | 114 | ---- | 94 | V | P |
| **4880.250 | 53.65 | ---- | 40.02 | 74 | ---- | 54 | V | P |
| **7320.375 | 48.63 | ---- | ---- | 74 | ---- | 54 | V | P |
| 8021.667 | 46.04 | ---- | ---- | 74 | ---- | 54 | V | P |

*: fundamental frequency

**: harmonics frequency

**Note:**

1. The test data below 30MHz are very low, so they are not recorded.
2. The harmonics inside restricted bands meet the limits of FCC part 15.209.

| Test Results-(Measurement Distance: 3m)_Channel 63 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Measurement value | | | Limit | | | Antenna | Result |
| | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | PK (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | (H/V) | (P/F) |
| 240.1667 | 43.69 | 41.63 | ---- | ---- | 46 | ---- | H | P |
| 335.5500 | 39.66 | ---- | ---- | ---- | 46 | ---- | H | P |
| 432.5500 | 40.22 | ---- | ---- | ---- | 46 | ---- | H | P |
| 1641.667 | 40.33 | ---- | ---- | 74 | ---- | 54 | H | P |
| ***2478.375** | 89.23 | ---- | ---- | 114 | ---- | 94 | H | P |
| **4956.750 | 56.26 | ---- | 43.62 | 74 | ---- | 54 | H | P |
| **7435.125 | 48.21 | ---- | ---- | 74 | ---- | 54 | H | P |
| 9708.333 | 46.21 | ---- | ---- | 74 | ---- | 54 | H | P |
| 11450.00 | 48.96 | ---- | ---- | 74 | ---- | 54 | H | P |
| | | | | | | | | |
| 240.1667 | 39.99 | ---- | ---- | ---- | 46 | ---- | V | P |
| 335.5500 | 33.21 | ---- | ---- | ---- | 46 | ---- | V | P |
| 408.3000 | 40.21 | ---- | ---- | ---- | 46 | ---- | V | P |
| 2118.333 | 39.19 | ---- | ---- | 74 | ---- | 54 | V | P |
| ***2478.375** | 90.22 | ---- | ---- | 114 | ---- | 94 | V | P |
| **4956.750 | 46.22 | ---- | ---- | 74 | ---- | 54 | V | P |
| **7435.125 | 45.23 | ---- | ---- | 74 | ---- | 54 | V | P |
| 8021.667 | 46.03 | ---- | ---- | 74 | ---- | 54 | V | P |

*: fundamental frequency

**: harmonics frequency

**Note:**

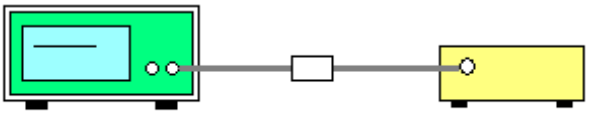
1. The test data below 30MHz are very low, so they are not recorded.
2. The harmonics inside restricted bands meet the limits of FCC part 15.209.

# 9. BAND EDGE EMISSION MEASUREMENT

## 9.1 LIMITS

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 § 15.209, whichever is the lesser attenuation.

## 9.2 BLOCK DIAGRAM OF TEST SETUP



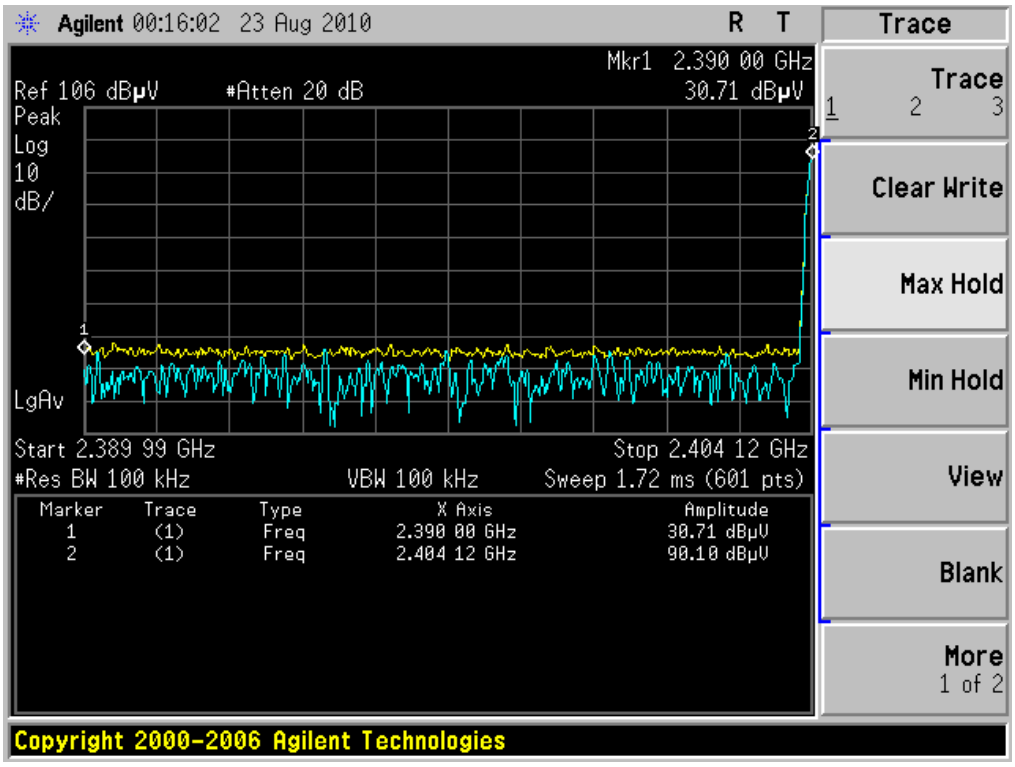

## 9.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. Record the emission drops at the band-edge relative to the highest fundamental emission level.
4. Use the marker-delta method to determine band-edge compliance as required.

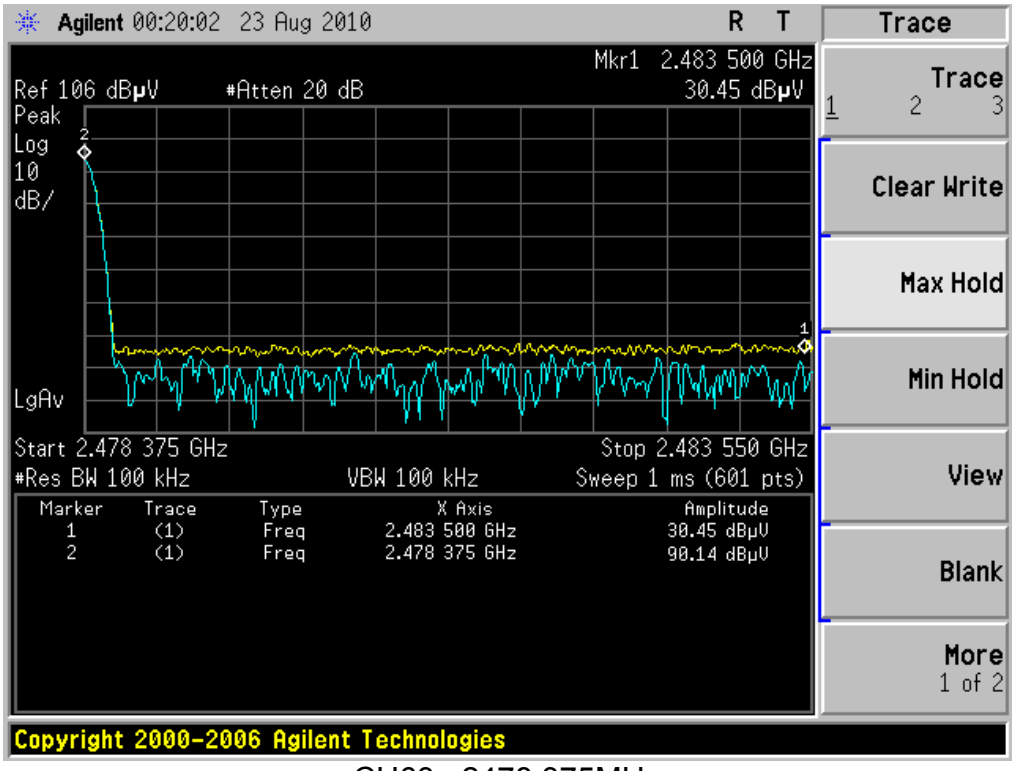
## 9.4 TEST RESULT

Worst case-- Modulation Type: GFSK

| Channel Frequency (MHz) | Fundamental Emission (dBμV/m) | Final Emission ( dBμV/m) | Result (Pass / Fail) |
|---|---|---|---|
| CH0 _ 2404.125 | 90.10 | 30.71 | Pass |
| CH63_ 278.375 | 90.14 | 30.45 | Pass |



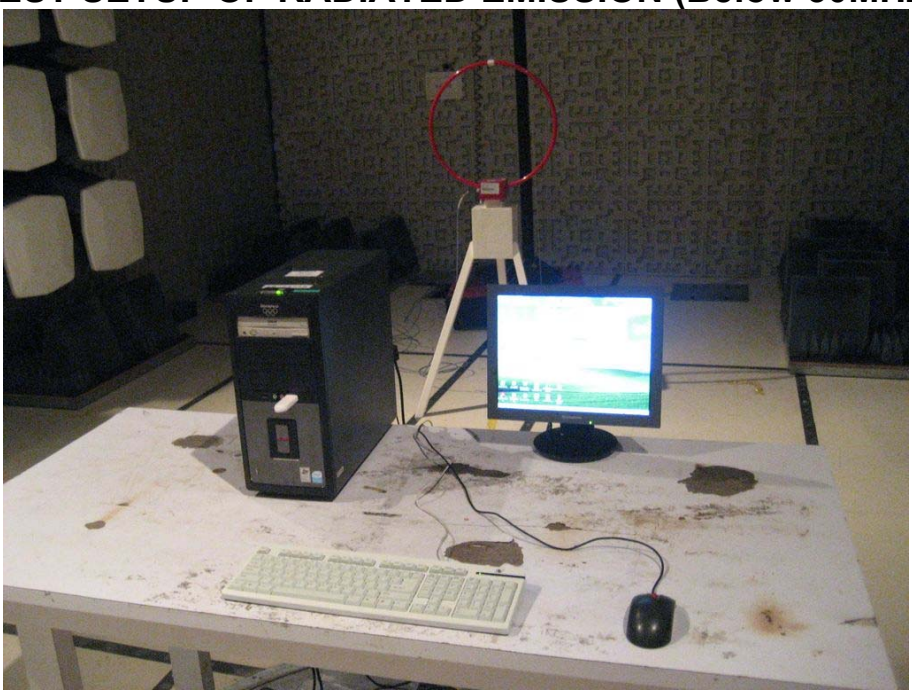

CH0 _ 2404.125MHz



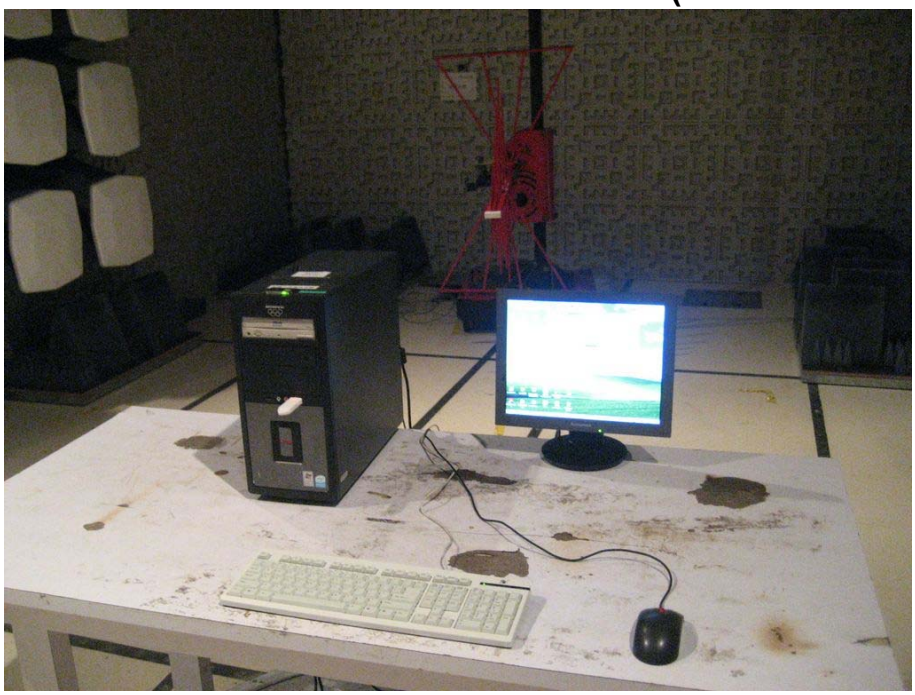

CH63_ 2478.375MHz

# APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

## TEST SETUP OF RADIATED EMISSION (Below 30MHz)



## TEST SETUP OF RADIATED EMISSION (30MHz～1GHz)



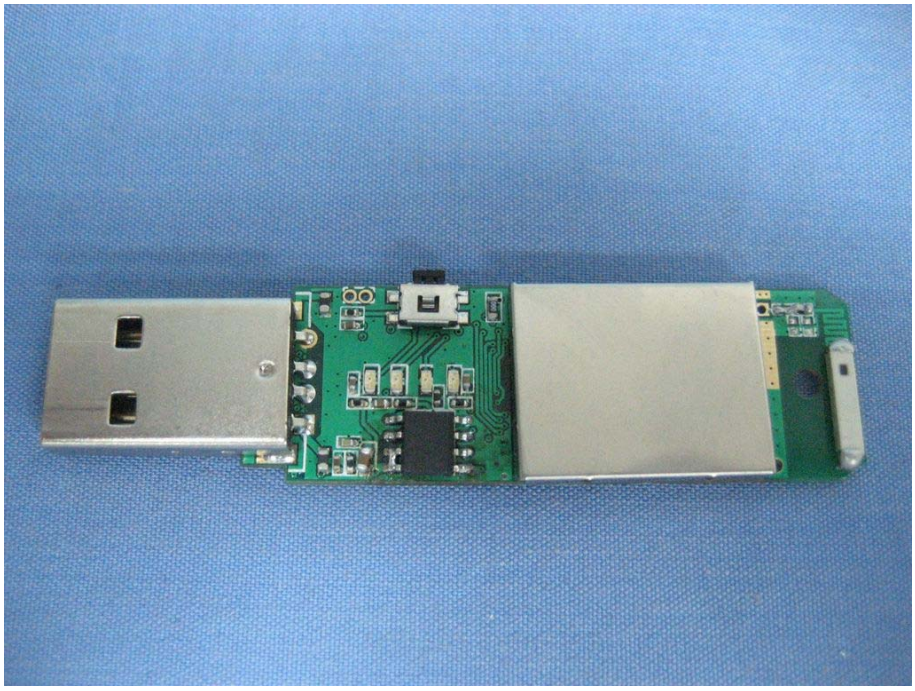
# TEST SETUP OF RADIATED EMISSION (Above1GHz)

# APPENDIX 2 PHOTOGRAPHS OF EUT

View of external EUT-1

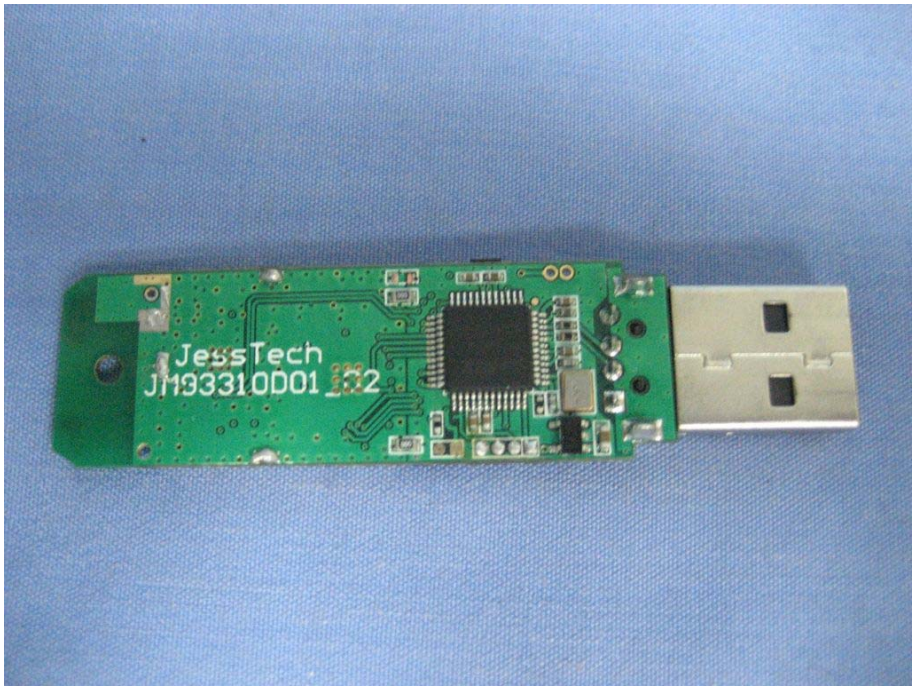
View of external EUT-2

View of internal EUT-1



View of internal EUT-2

View of internal EUT-3




View of internal EUT-4

------- End of report -------