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# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
# INTENTIONAL RADIATOR CERTIFICATION TO
# FCC PART 15 SUBPART C
# REQUIREMENT

*OF*

## STRIKE NX Gamepad - Wireless - for PS3, black,
## STRIKE NX Gamepad - Wireless - for PC, black

## MODEL No.: SL-440401-BK, SL-650100-BK

## Trademark: Speedlink

## FCC ID: 2AEDNA04

## REPORT NO: ES150204043E1

## ISSUE DATE: May 06, 2015

*Prepared for*

**Winspeed Co., Ltd**
**14 F-1,No.2,Jian-Ba Rd., Chung-Ho District,**
**New Taipei City, Taiwan**

*Prepared by*

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# VERIFICATION OF COMPLIANCE

| | |
|---|---|
| Applicant: | Winspeed Co., Ltd<br>14 F-1,No.2,Jian-Ba Rd., Chung-Ho District, New Taipei City, Taiwan |
| Manufacturer: | Winspeed Co., Ltd<br>14 F-1,No.2,Jian-Ba Rd., Chung-Ho District, New Taipei City, Taiwan |
| Product Description: | STRIKE NX Gamepad - Wireless - for PS3, black,<br>STRIKE NX Gamepad - Wireless - for PC, black |
| Model Number: | SL-440401-BK, SL-650100-BK |
| Date of Test: | February 04, 2015 to May 06, 2015 |

**We hereby certify that:**
The above equipment was tested by SHENZHEN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : February 04, 2015 to May 06, 2015

Prepared by : Yaping Shen

Yaping Shen/Editor

Reviewer : Joe Xia

Joe Xia/Supervisor

Approve & Authorized Signer :

Lisa Wang/Manager

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# 1. GENERAL INFORMATION

## 1.1. Product Description

Winspeed Co., Ltd. Model: SL-440401-BK, SL-650100-BK,
The product consists of two parts **dongle** and **gamepad,** The two parts are transceiver, It is designed by way of utilizing the FSK modulation achieves the system operating.

| **Gamepad information:** | |
|---|---|
| Power supply: | DC 3.7V by battery or DC 5V by external power |
| Operating Frequency Range: | 2402-2480MHz |
| Modulation: | FSK |
| Number of Channels: | 79 channels |
| Antenna Type: | PCB antenna |
| Antenna Gain: | 0dBi |

## 1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AEDNA04 filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

## 1.3. Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2009). Radiated testing was performed at an antenna to EUT distance 3 meters.

## 1.4. Special Accessories

Not available for this EUT intended for grant.

## 1.5. Equipment Modifications

Not available for this EUT intended for grant.

## 1.6. Measurement Uncertainty

| Measurement Type | Range | Confidence Level (%) | Calculated Uncertainty |
|---|---|---|---|
| AC Conducted Spurious Emissions | 0.15 MHz to 30 MHz | 95% | ±3.00dB |
| Fundamental Fieldstrength | Not Applicable | 95% | ±2.94dB |
| Transmitter 20 dB Bandwidth | Not Applicable | 95% | ±0.92PPm |
| Radiated Spurious Emissions | 30 MHz to 40 GHz | 95% | ±3.00dB |

## 1.7. Test Facility

Site Description

EMC Lab. : Accredited by CNAS, 2013.10.29
The certificate is valid until 2016.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Shenzhen, 2010.5.25
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Name of Firm : Accredited by FCC, July 24, 2013
The Certificate Registration Number is 406365.

Site Location : Accredited by FCC, April 17, 2013
The Certificate Registration Number is 709623.

# 2. SYSTEM TEST CONFIGURATION

## 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

## 2.2. EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

## 2.3. Test Procedure

### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. Emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013.

## 2.4. Description of test modes

The EUThas been tested under normal operating condition.
Pre-scanned tests, X, Y, Z in the three orthogonal panels, were conducted to determine the final configuration from all possible combinations. Let EUT transmit with highest power, and the worst result was reported with modulation FSK. The 3 channels of lower, medium and higher were chosen for test.

| Pretest Mode | Description |
|---|---|
| Mode 1 | Low – 2402MHz |
| Mode 2 | Middle – 2441MHz |
| Mode 3 | High -2480MHz |

| For Conducted Test | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | Wireless ON |

| For Radiated Test | |
|---|---|
| Mode 1 | Low – 2402MHz |
| Mode 2 | Middle – 2441MHz |
| Mode 3 | High -2480MHz |

# 3. SUMMARY OF TEST RESULTS

| FCC Part15, Subpart C (15.249)&Canada RSS-Gen:2010 | | |
|---|---|---|
| **Standard Section** | **Test Item** | **Result** |
| **FCC** | | |
| 15.207 | Conducted Emission | Pass |
| 15.209 | Radiated Emission | Pass |
| 15.249 | Radiated Spurious Emission | Pass |
| 15.249 | Band edge test | Pass |
| 15.249 | 20dB Bandwidth | Pass |

Note: (1)"N/A" denotes test is not applicable in this test report.

## 3.1. CONFIGURATION OF TESTED SYSTEM

**Fig. 2-1 Configuration of Tested System**


## 3.2. DESCRIPTION OF SUPPORT UNITS

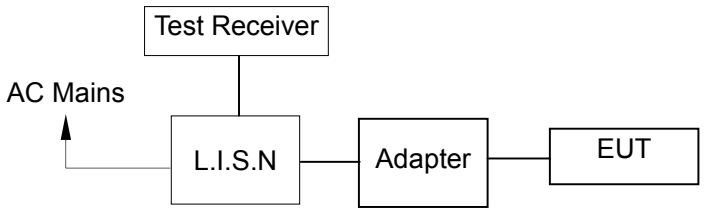
| | |
|---|---|
| EUT(Gamepad) | Model: SL-440401-BK, SL-650100-BK<br>Band: Speedlink<br>Serial No.: N/A |

# 4. CONDUCTED EMISSIONS TEST

## 4.1. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

## 4.2. Test SET-UP (Block Diagram of Configuration)




## 4.3. Measurement Equipment Used:

| Conducted Emission Test Site # 1 | | | | | |
|---|---|---|---|---|---|
| **EQUIPMENT TYPE** | **MFR** | **MODEL NUMBER** | **SERIAL NUMBER** | **LAST CAL.** | **CAL DUE.** |
| Test Receiver | Rohde & Schwarz | ESCS30 | 828985/018 | May 17, 2014 | May 16, 2015 |
| L.I.S.N | Rohde & Schwarz | ESH2-Z5 | 834549/005 | May 17, 2014 | May 16, 2015 |
| L.I.S.N | Rohde & Schwarz | ENV216 | 834549/005 | May 17, 2014 | May 16, 2015 |
| 50ΩCoaxial Switch | Anritsu | MP59B | M20531 | May 17, 2014 | May 16, 2015 |

## 4.4. Conducted Emission Limit

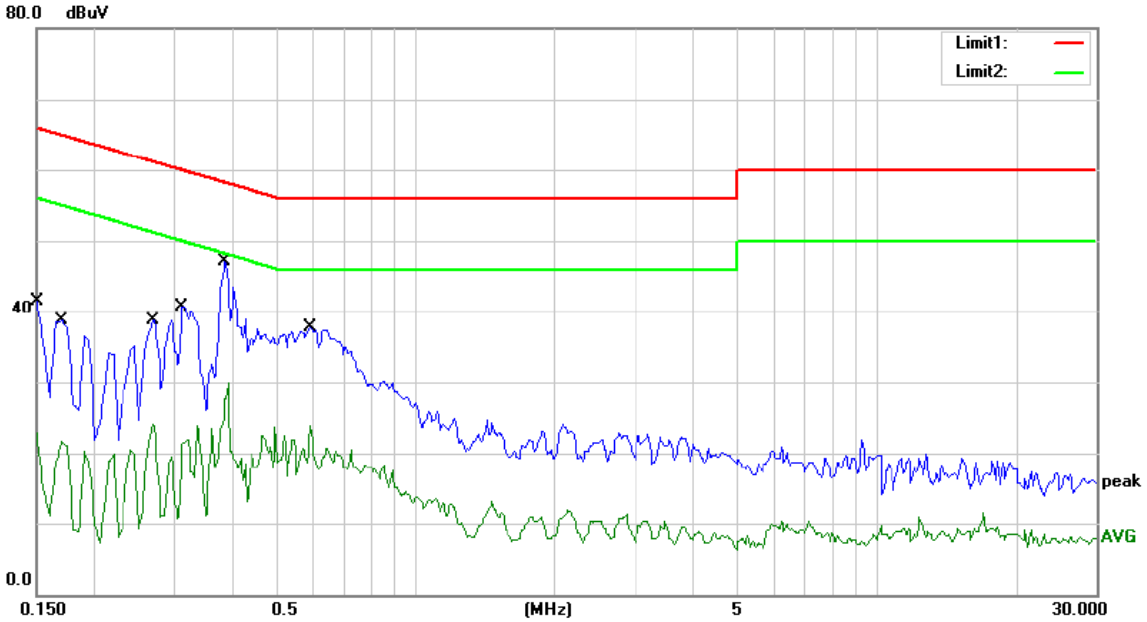
**Conducted Emission**

| Frequency(MHz) | Quasi-peak | Average |
|---|---|---|
| 0.15-0.5 | 66-56 | 56-46 |
| 0.5-5.0 | 56 | 46 |
| 5.0-30.0 | 60 | 50 |

**Note:**

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

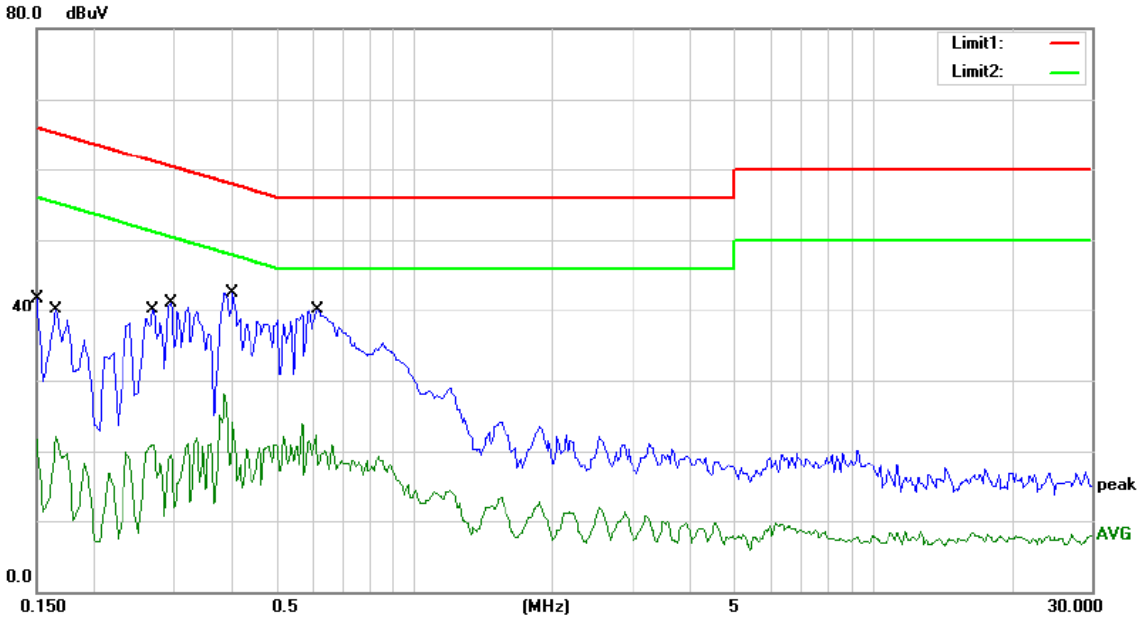
## 4.5. Measurement Result:




Site Conduction #1 Phase: L1 Temperature: 24
Limit: (CE)FCC PART 15 C Power: AC 120V/60Hz Humidity: 53 %
Mode: Wireless ON
Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1500 | 41.57 | 0.00 | 41.57 | 66.00 | -24.43 | QP | |
| 2 | | 0.1500 | 22.94 | 0.00 | 22.94 | 56.00 | -33.06 | AVG | |
| 3 | | 0.1700 | 38.68 | 0.00 | 38.68 | 64.96 | -26.28 | QP | |
| 4 | | 0.1700 | 21.62 | 0.00 | 21.62 | 54.96 | -33.34 | AVG | |
| 5 | | 0.2700 | 38.70 | 0.00 | 38.70 | 61.12 | -22.42 | QP | |
| 6 | | 0.2700 | 24.01 | 0.00 | 24.01 | 51.12 | -27.11 | AVG | |
| 7 | | 0.3100 | 40.80 | 0.00 | 40.80 | 59.97 | -19.17 | QP | |
| 8 | | 0.3100 | 23.92 | 0.00 | 23.92 | 49.97 | -26.05 | AVG | |
| 9 | * | 0.3850 | 47.02 | 0.00 | 47.02 | 58.17 | -11.15 | QP | |
| 10 | | 0.3850 | 29.81 | 0.00 | 29.81 | 48.17 | -18.36 | AVG | |
| 11 | | 0.5900 | 37.70 | 0.00 | 37.70 | 56.00 | -18.30 | QP | |
| 12 | | 0.5900 | 23.80 | 0.00 | 23.80 | 46.00 | -22.20 | AVG | |

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Vern




Site Conduction #1 Phase: *N* Temperature: 24
Limit: (CE)FCC PART 15 C Power: AC 120V/60Hz Humidity: 53 %
Mode: Wireless ON
Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1500 | 41.73 | 0.00 | 41.73 | 66.00 | -24.27 | QP | |
| 2 | | 0.1500 | 21.74 | 0.00 | 21.74 | 56.00 | -34.26 | AVG | |
| 3 | | 0.1650 | 40.17 | 0.00 | 40.17 | 65.21 | -25.04 | QP | |
| 4 | | 0.1650 | 22.03 | 0.00 | 22.03 | 55.21 | -33.18 | AVG | |
| 5 | | 0.2700 | 40.08 | 0.00 | 40.08 | 61.12 | -21.04 | QP | |
| 6 | | 0.2700 | 20.94 | 0.00 | 20.94 | 51.12 | -30.18 | AVG | |
| 7 | | 0.2950 | 41.03 | 0.00 | 41.03 | 60.38 | -19.35 | QP | |
| 8 | | 0.2950 | 21.08 | 0.00 | 21.08 | 50.38 | -29.30 | AVG | |
| 9 | * | 0.4000 | 42.49 | 0.00 | 42.49 | 57.85 | -15.36 | QP | |
| 10 | | 0.4000 | 28.17 | 0.00 | 28.17 | 47.85 | -19.68 | AVG | |
| 11 | | 0.6150 | 40.15 | 0.00 | 40.15 | 56.00 | -15.85 | QP | |
| 12 | | 0.6150 | 23.93 | 0.00 | 23.93 | 46.00 | -22.07 | AVG | |

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver. Operator: Vern

# 5. RADIATED EMISSION TEST

## 5.1. Measurement Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013

Below 30MHz：

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

30GHz-1GHz：

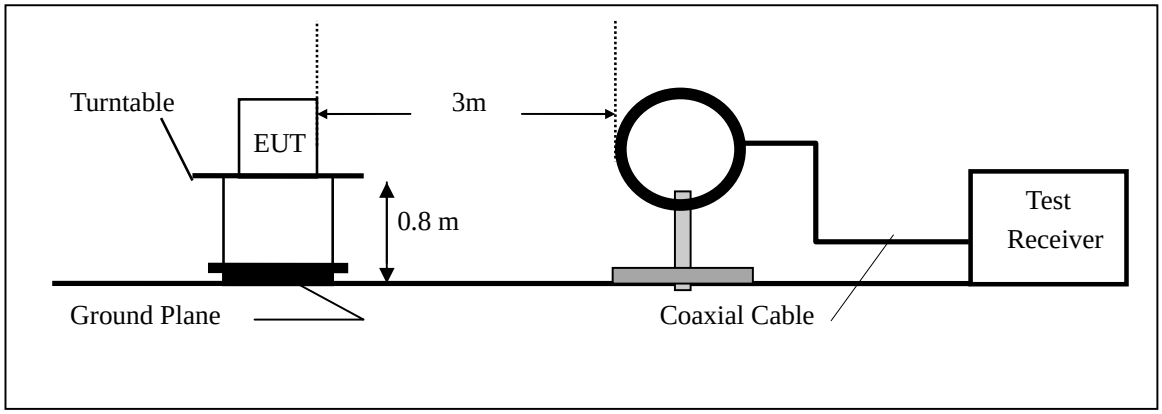
The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz：

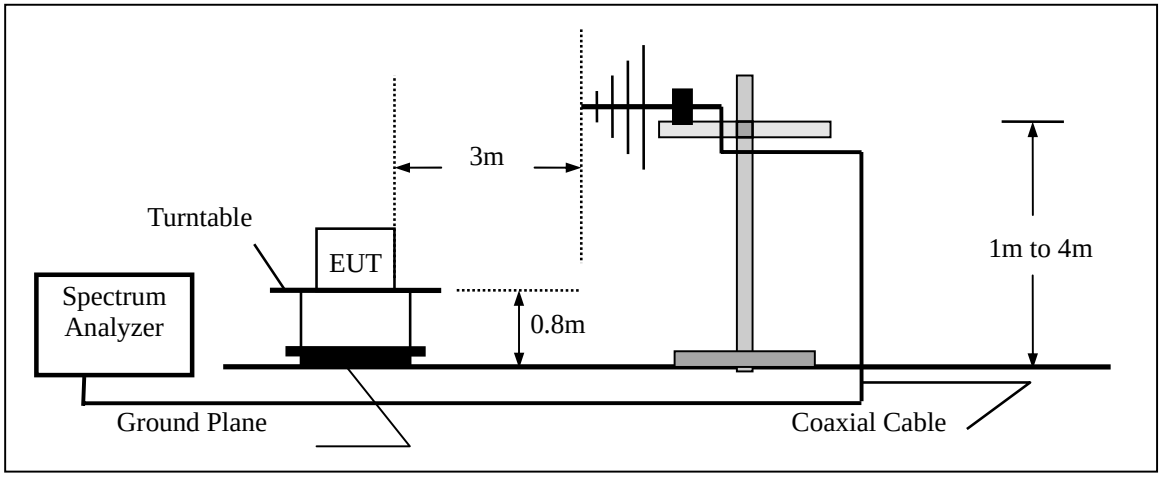
The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

## 5.2. Test SET-UP (Block Diagram of Configuration)

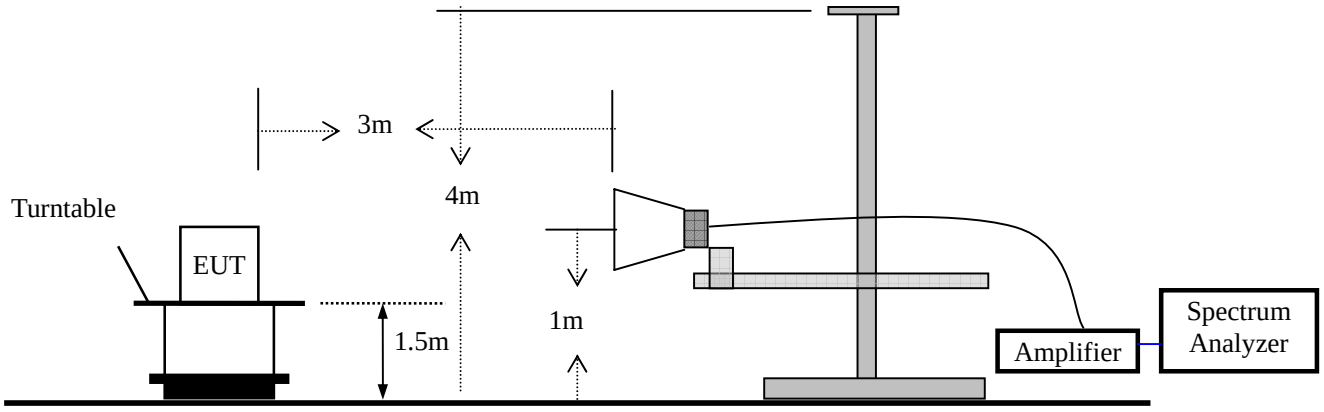
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz




(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz




(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



## 5.3 Measurement Equipment Used:

| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | FSP7 | 839511/010 | May 17, 2014 | May 16, 2015 |
| Spectrum Analyzer | HP | E4407B | 839840481 | May 17, 2014 | May 16, 2015 |
| EMI Test Receiver | Rohde & Schwarz | ESCS30 | 828985/018 | May 17, 2014 | May 16, 2015 |
| Pre-Amplifier | HP | 8447D | 2944A07999 | May 17, 2014 | May 16, 2015 |
| Bilog Antenna | Schwarzbeck | VULB9163 | 142 | May 17, 2014 | May 16, 2015 |
| Loop Antenna | ARA | PLA-1030/B | 1029 | May 17, 2014 | May 16, 2015 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | BBHA9170399 | May 17, 2014 | May 16, 2015 |
| Horn Antenna | Schwarzbeck | BBHA 9120 | D143 | May 17, 2014 | May 16, 2015 |

## 5.4 Radiated Emission Limit

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| 960~1000 | 500 | 3 |

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other 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 comply with the radiated emissions limits specified in section 1 5.209(a) limit in the table below has to be followed.

Note:

(1) The tighter limit applies at the band edges.

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

Limits of radiated emission measurement (FCC 15.209)

| FREQUENCY (MHz) | (dBuV/m) (at 3m) | |
|---|---|---|
| | PEAK | AVERAGE |
| Above 1000 | 74 | 54 |

Notes:
(1) The limit for radiated test was performed according to FCC PART 15C.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m) =20log Emission level (uV/m).

Limits of radiated emission measurement (FCC 15.249)

| FCC Part15 (15.249) , Subpart C | |
|---|---|
| Limit | Frequency Range (MHz) |
| Field strength of fundamental<br>50000uV/m (94 dBV/m) @ 3 m | 2400-2483.5 |
| Field strength of harmonics<br>500uV/m (54 dBV/m) @ 3 m | Above 2483.5 |

## 5.5 Measurement Result

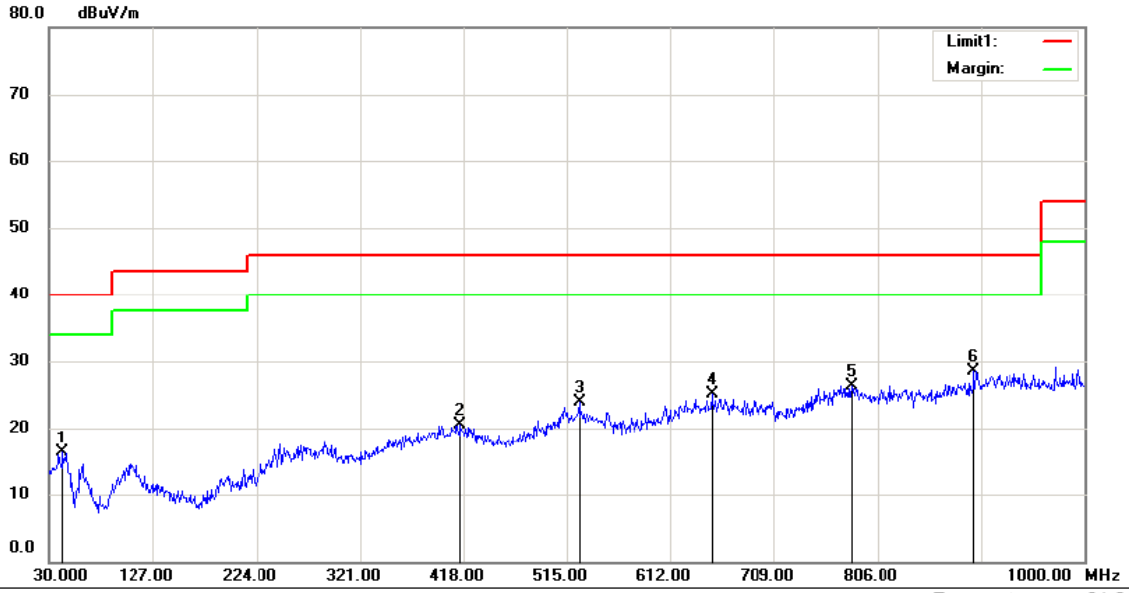
| | | | |
|---|---|---|---|
| Operation Mode: | TX | Test Date : | May 04, 2015 |
| Frequency Range: | 9KHz~30MHz | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |

| Freq. (MHz) | Ant.Pol. H/V | Emission Level (dBuV/m) | Limit 3m (dBuV/m) | Over (dB) |
|---|---|---|---|---|
| -- | -- | -- | -- | -- |

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

**All the x/y/z orientation has been investigated, and only worst case is presented in this report.**

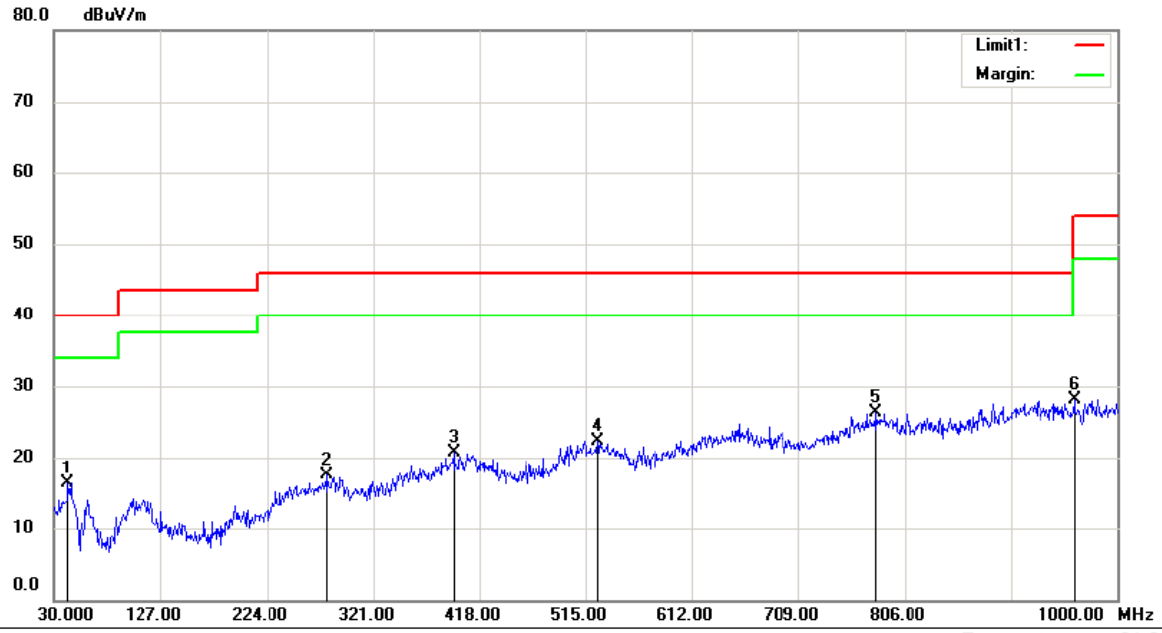
| | | | |
|---|---|---|---|
| Operation Mode: | 2402MHz | Test Date : | May 04, 2015 |
| Frequency Range: | 30~1000MHz | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |




Site 3m Chamber #1 Polarization: ***Horizontal*** Temperature: 24 C
Limit: ( RE)FCC PART 15 C Power: Humidity: 53 %
Mode:TX 2402
Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 42.6100 | 28.48 | -12.26 | 16.22 | 40.00 | -23.78 | QP | | | |
| 2 | | 415.0900 | 28.64 | -8.11 | 20.53 | 46.00 | -25.47 | QP | | | |
| 3 | | 526.6400 | 30.00 | -6.04 | 23.96 | 46.00 | -22.04 | QP | | | |
| 4 | | 650.8000 | 30.09 | -4.93 | 25.16 | 46.00 | -20.84 | QP | | | |
| 5 | | 781.7500 | 29.15 | -2.77 | 26.38 | 46.00 | -19.62 | QP | | | |
| 6 | * | 896.2100 | 30.38 | -1.84 | 28.54 | 46.00 | -17.46 | QP | | | |

*:Maximum data x:Over limit l:over margin Operator: ZHL




Site 3m Chamber #1 Polarization: *Vertical* Temperature: 24 C

Limit: ( RE)FCC PART 15 C Power: Humidity: 53 %

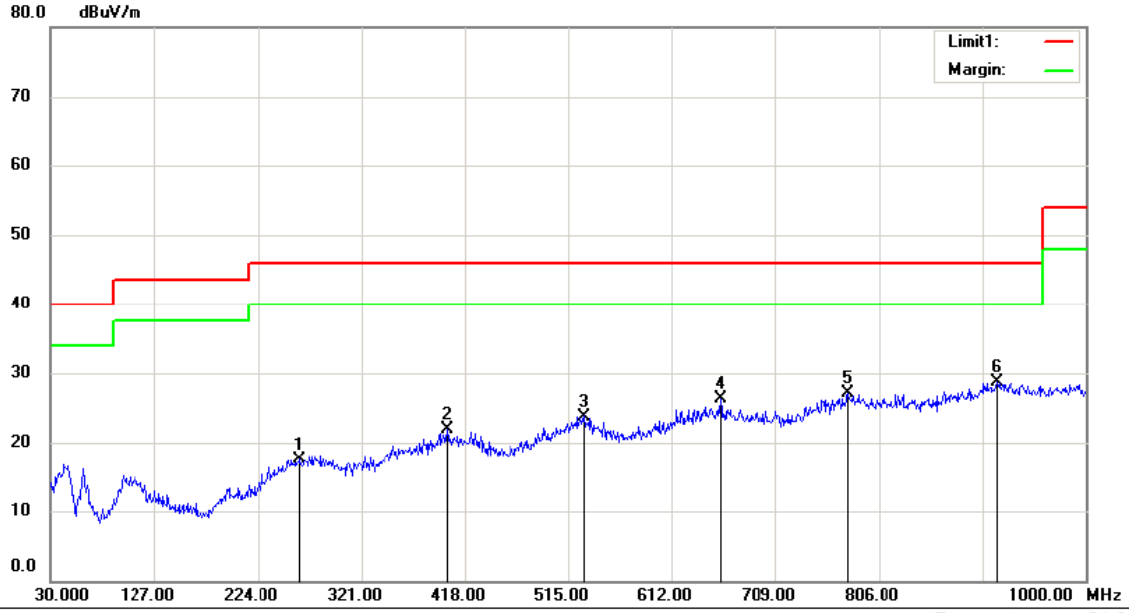
Mode:TX 2402

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 42.6100 | 27.94 | -11.57 | 16.37 | 40.00 | -23.63 | QP | | | |
| 2 | | 279.2900 | 28.24 | -10.83 | 17.41 | 46.00 | -28.59 | QP | | | |
| 3 | | 394.7200 | 28.88 | -8.19 | 20.69 | 46.00 | -25.31 | QP | | | |
| 4 | | 525.6700 | 28.44 | -6.08 | 22.36 | 46.00 | -23.64 | QP | | | |
| 5 | * | 779.8100 | 29.13 | -2.74 | 26.39 | 46.00 | -19.61 | QP | | | |
| 6 | | 961.2000 | 29.73 | -1.59 | 28.14 | 54.00 | -25.86 | QP | | | |

*:Maximum data x:Over limit !:over margin Operator: ZHL

| | | | |
|---|---|---|---|
| Operation Mode: | 2441MHz | Test Date : | May 04, 2015 |
| Frequency Range: | 30~1000MHz | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |




Site 3m Chamber #1 Polarization: ***Horizontal*** Temperature: 24 C

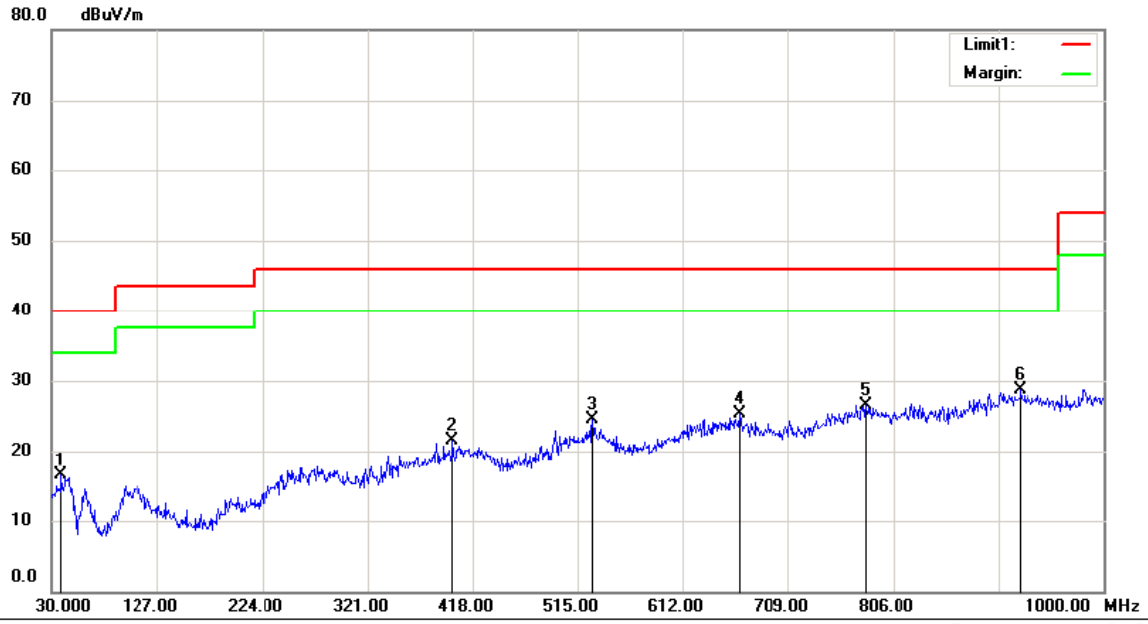
Limit: ( RE)FCC PART 15 C Power: Humidity: 53 %

Mode:TX 2441

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 263.7700 | 28.70 | -11.29 | 17.41 | 46.00 | -28.59 | QP | | | |
| 2 | | 401.5100 | 29.86 | -7.98 | 21.88 | 46.00 | -24.12 | QP | | | |
| 3 | | 529.5500 | 29.73 | -5.93 | 23.80 | 46.00 | -22.20 | QP | | | |
| 4 | | 657.5900 | 31.05 | -4.78 | 26.27 | 46.00 | -19.73 | QP | | | |
| 5 | | 776.9000 | 30.03 | -2.86 | 27.17 | 46.00 | -18.83 | QP | | | |
| 6 | * | 916.5800 | 29.64 | -0.88 | 28.76 | 46.00 | -17.24 | QP | | | |

*:Maximum data x:Over limit !:over margin Operator: ZHL




Site 3m Chamber #1 Polarization: *Vertical* Temperature: 24 C

Limit: ( RE)FCC PART 15 C Power: Humidity: 53 %

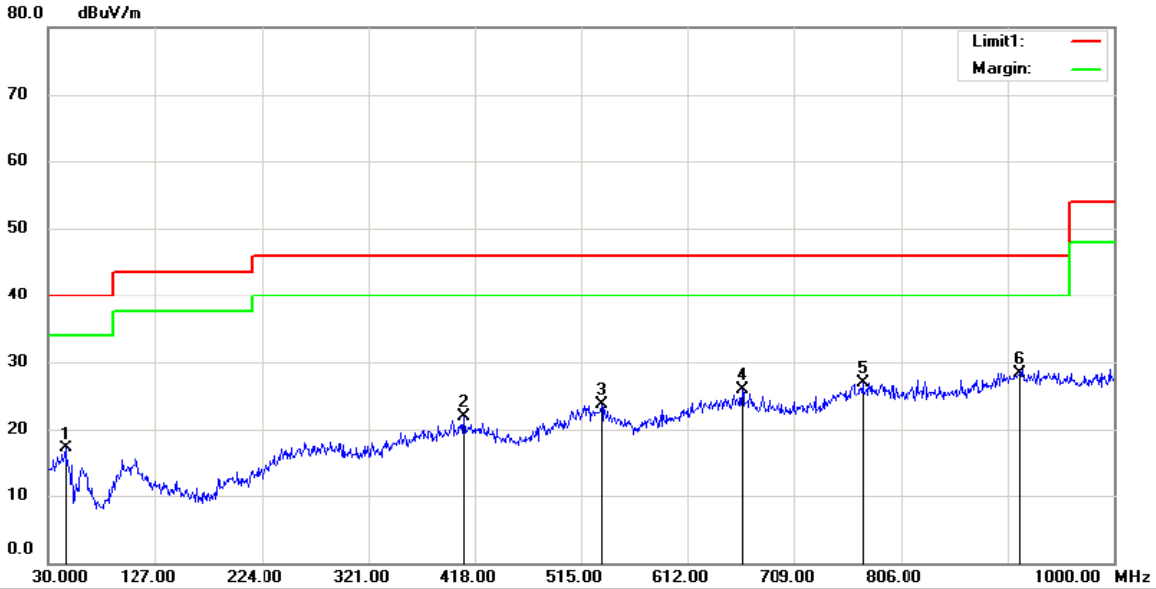
Mode:TX 2441

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 38.7300 | 29.06 | -12.58 | 16.48 | 40.00 | -23.52 | QP | | | |
| 2 | | 399.5700 | 29.50 | -8.02 | 21.48 | 46.00 | -24.52 | QP | | | |
| 3 | | 528.5800 | 30.46 | -5.97 | 24.49 | 46.00 | -21.51 | QP | | | |
| 4 | | 664.3800 | 30.17 | -4.90 | 25.27 | 46.00 | -20.73 | QP | | | |
| 5 | | 780.7800 | 29.21 | -2.75 | 26.46 | 46.00 | -19.54 | QP | | | |
| 6 | * | 923.3700 | 29.70 | -0.97 | 28.73 | 46.00 | -17.27 | QP | | | |

*:Maximum data x:Over limit !:over margin Operator: ZHL

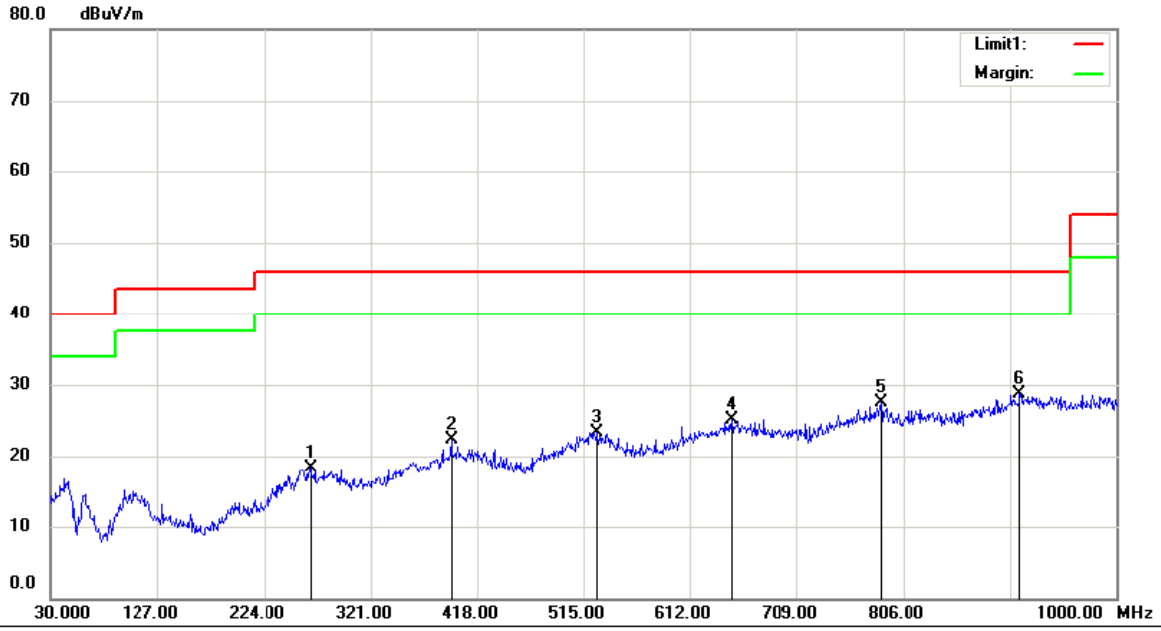
| | | | |
|---|---|---|---|
| Operation Mode: | 2480MHz | Test Date : | May 04, 2015 |
| Frequency Range: | 30~1000MHz | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |




Site 3m Chamber #1 Polarization: *Horizontal* Temperature: 24 C
Limit: ( RE)FCC PART 15 C Power: Humidity: 53 %
Mode:TX 2480
Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 45.5200 | 29.40 | -12.37 | 17.03 | 40.00 | -22.97 | QP | | | |
| 2 | | 408.3000 | 29.87 | -7.96 | 21.91 | 46.00 | -24.09 | QP | | | |
| 3 | | 533.4300 | 29.83 | -6.22 | 23.61 | 46.00 | -22.39 | QP | | | |
| 4 | | 661.4700 | 30.63 | -4.79 | 25.84 | 46.00 | -20.16 | QP | | | |
| 5 | | 771.0800 | 30.03 | -3.11 | 26.92 | 46.00 | -19.08 | QP | | | |
| 6 | * | 913.6700 | 29.13 | -0.89 | 28.24 | 46.00 | -17.76 | QP | | | |

*:Maximum data x:Over limit !:over margin Operator: ZHL




Site 3m Chamber #1 Polarization: *Vertical* Temperature: 24 C

Limit: ( RE)FCC PART 15 C Power: Humidity: 53 %

Mode:TX 2480

Note:

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | Antenna Height | Table Degree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | cm | degree | Comment |
| 1 | | 266.6800 | 29.47 | -11.17 | 18.30 | 46.00 | -27.70 | QP | | | |
| 2 | | 394.7200 | 30.50 | -8.19 | 22.31 | 46.00 | -23.69 | QP | | | |
| 3 | | 527.6100 | 29.39 | -6.01 | 23.38 | 46.00 | -22.62 | QP | | | |
| 4 | | 649.8300 | 30.06 | -4.95 | 25.11 | 46.00 | -20.89 | QP | | | |
| 5 | | 785.6300 | 30.39 | -2.84 | 27.55 | 46.00 | -18.45 | QP | | | |
| 6 | * | 911.7300 | 29.54 | -0.90 | 28.64 | 46.00 | -17.36 | QP | | | |

*:Maximum data x:Over limit !:over margin Operator: ZHL

| | | | |
|---|---|---|---|
| Operation Mode: | 2402MHz | Test Date : | May 04, 2015 |
| Frequency Range: | 1-25GHz | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |

| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Margin(dB) | |
|---|---|---|---|---|---|---|---|
| (MHz) | H/V | PK | AV | PK | AV | PK | AV |
| 9534.00 | V | 60.98 | 43.50 | 74.00 | 54.00 | -13.02 | -10.50 |
| 12033.00 | V | 60.60 | 39.80 | 74.00 | 54.00 | -13.40 | -14.20 |
| 16504.00 | V | 66.57 | 42.35 | 74.00 | 54.00 | -7.43 | -11.65 |
| 8565.00 | H | 59.33 | 42.35 | 74.00 | 54.00 | -14.67 | -11.65 |
| 9551.00 | H | 60.07 | 43.53 | 74.00 | 54.00 | -13.93 | -10.47 |
| 16487.00 | H | 66.73 | 46.78 | 74.00 | 54.00 | -7.27 | -7.22 |

**Note:** (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| Operation Mode: | 2441MHz | Test Date : | May 04, 2015 |
| Frequency Range: | 1-25GHz | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |

| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Margin(dB) | |
|---|---|---|---|---|---|---|---|
| (MHz) | H/V | PK | AV | PK | AV | PK | AV |
| 8395.00 | V | 57.72 | 42.35 | 74.00 | 54.00 | -16.28 | -11.65 |
| 9619.00 | V | 60.52 | 41.60 | 74.00 | 54.00 | -13.48 | -12.40 |
| 15331.00 | V | 65.68 | 42.80 | 74.00 | 54.00 | -8.32 | -11.20 |
| 9483.00 | H | 59.64 | 41.25 | 74.00 | 54.00 | -14.36 | -12.75 |
| 14549.00 | H | 66.13 | 42.53 | 74.00 | 54.00 | -7.87 | -11.47 |
| 16470.00 | H | 66.77 | 43.60 | 74.00 | 54.00 | -7.23 | -10.40 |

**Note:** (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| Operation Mode: | 2480MHz | Test Date : | May 04, 2015 |
| Frequency Range: | 1-25GHz | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |

| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Margin(dB) | |
|---|---|---|---|---|---|---|---|
| (MHz) | H/V | PK | AV | PK | AV | PK | AV |
| 9568.00 | V | 60.16 | 40.25 | 74.00 | 54.00 | -13.84 | -13.75 |
| 14549.00 | V | 65.13 | 43.57 | 74.00 | 54.00 | -8.87 | -10.43 |
| 17558.00 | V | 67.86 | 41.95 | 74.00 | 54.00 | -6.14 | -12.05 |
| 9534.00 | H | 60.72 | 40.25 | 74.00 | 54.00 | -13.28 | -13.75 |
| 14651.00 | H | 64.59 | 43.50 | 74.00 | 54.00 | -9.41 | -10.50 |
| 16436.00 | H | 66.50 | 41.80 | 74.00 | 54.00 | -7.50 | -12.20 |

**Note:** (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

## Transmitter Fundamental Field Strength

| | | | |
|---|---|---|---|
| Operation Mode: | CH1: 2402MHz | Test Date : | May 04, 2015 |
| FCC Part: | 15.249(a) | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |
| Test Method Used: | | | |

| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Over(dB) | |
|---|---|---|---|---|---|---|---|
| (MHz) | H/V | PK | AV | PK | AV | PK | AV |
| 2402 | V | 91.89 | 70.23 | 114 | 94 | -22.11 | -23.77 |
| 2402 | H | 91.39 | 69.87 | 114 | 94 | -22.61 | -24.13 |

| | | | |
|---|---|---|---|
| Operation Mode: | CH23: 2441MHz | Test Date : | May 04, 2015 |
| FCC Part: | 15.249(a) | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |
| Test Method Used: | | | |

| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Over(dB) | |
|---|---|---|---|---|---|---|---|
| (MHz) | H/V | PK | AV | PK | AV | PK | AV |
| 2441 | V | 91.52 | 70.32 | 114 | 94 | -22.48 | -23.68 |
| 2441 | H | 93.76 | 70.14 | 114 | 94 | -20.24 | -23.86 |

| | | | |
|---|---|---|---|
| Operation Mode: | CH45: 2480MHz | Test Date : | May 04, 2015 |
| FCC Part: | 15.249(a) | Temperature : | 24℃ |
| Test Result: | PASS | Humidity : | 55 % |
| Measured Distance: | 3m | Test By: | SYP |
| Test Method Used: | | | |

| Freq. | Ant.Pol. | Emission Level(dBuV/m) | | Limit 3m(dBuV/m) | | Over(dB) | |
|---|---|---|---|---|---|---|---|
| (MHz) | H/V | PK | AV | PK | AV | PK | AV |
| 2480 | V | 91.37 | 74.35 | 114 | 94 | -22.63 | -19.65 |
| 2480 | H | 94.02 | 76.35 | 114 | 94 | -19.98 | -17.65 |

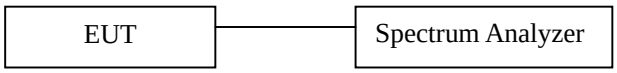
**Note:** (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(4) All the x/y/z orientation has been investigated, and only worst case is presented in this report.

# 6. BANDWIDTH TEST

## 6.1. Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

## 6.2. Test SET-UP (Block Diagram of Configuration)




## 6.3. Measurement Equipment Used:

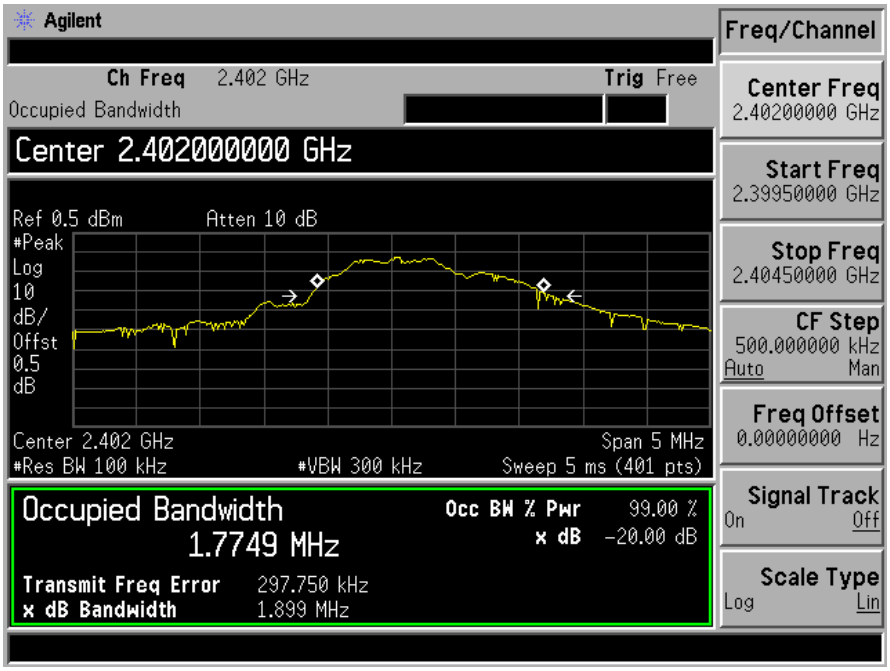
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4407B | 88156318 | 05/17/2014 | 05/16/2015 |

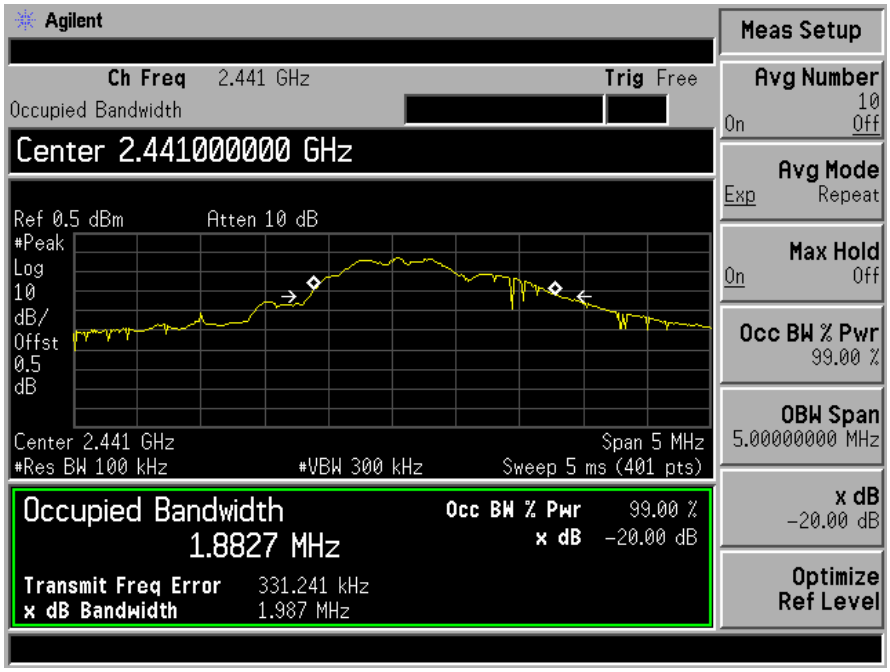
## 6.4. Measurement Results:

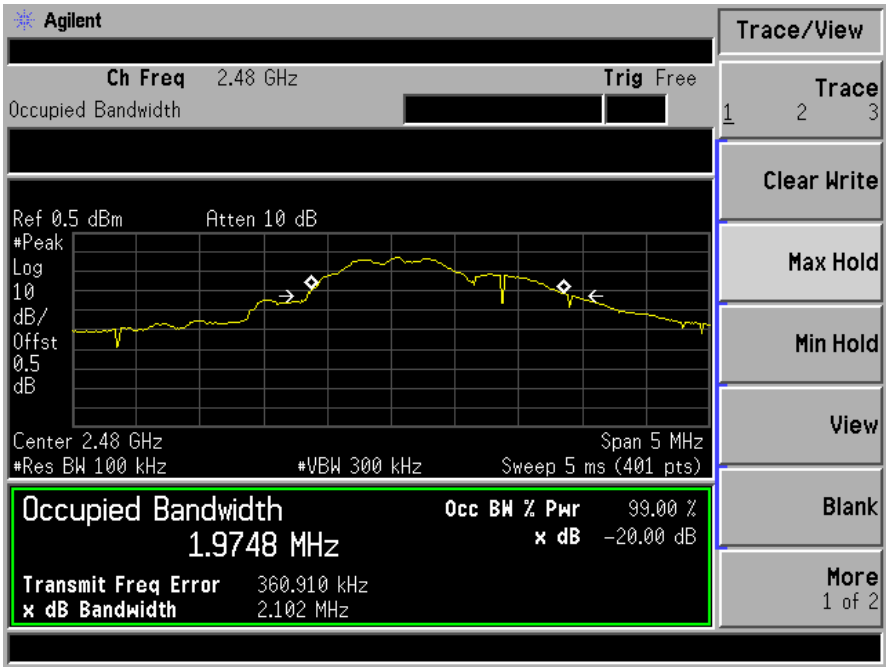
20dB Bandwidth test data Chart:
Refer to attached data chart.

| | | | |
|---|---|---|---|
| Spectrum Detector: | PK | Test Date: | May 04, 2015 |
| Test By: | SYP | Temperature: | 24℃ |
| Test Result: | PASS | Humidity: | 55 % |
| Modulation: | FSK | | |

| Channel number | Channel frequency (MHz) | 20dB Down BW(kHz) |
|---|---|---|
| CH1 | 2402 | 1899 |
| CH39 | 2441 | 1987 |
| CH78 | 2480 | 2102 |


Agilent
Ch Freq 2.402 GHz
Trig Free
Occupied Bandwidth
Center 2.402000000 GHz
Ref 0.5 dBm
Atten 10 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Center 2.402 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.7749 MHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error 297.750 kHz
x dB Bandwidth 1.899 MHz
Freq/Channel
Center Freq
2.40200000 GHz
Start Freq
2.39950000 GHz
Stop Freq
2.40450000 GHz
CF Step
500.000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Scale Type
Log Lin


Agilent
Ch Freq 2.441 GHz
Trig Free
Occupied Bandwidth
Center 2.441000000 GHz
Ref 0.5 dBm
Atten 10 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Center 2.441 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.8827 MHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error 331.241 kHz
x dB Bandwidth 1.987 MHz
Meas Setup
Avg Number
10
On Off
Avg Mode
Exp Repeat
Max Hold
On Off
Occ BW % Pwr
99.00 %
OBW Span
5.00000000 MHz
x dB
-20.00 dB
Optimize
Ref Level


Agilent
Trace/View
Ch Freq 2.48 GHz
Trig Free
Occupied Bandwidth
Trace
1 2 3
Clear Write
Ref 0.5 dBm
Atten 10 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Max Hold
Min Hold
View
Center 2.48 GHz
Span 5 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.9748 MHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error 360.910 kHz
x dB Bandwidth 2.102 MHz
Blank
More
1 of 2

# 7. BAND EDGE TEST

## 7.1. Measurement Procedure

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

## 7.2. Test SET-UP (Block Diagram of Configuration)

As 5.2 Test set up (B) and (C)

## 7.3. Measurement Equipment Used:

Same as 5.3 Radiated Emission Measurement.

## 7.4. Measurement Results:

| | | | |
|---|---|---|---|
| Spectrum Detector: | PK/AV | Test Date : | May 04, 2015 |
| Test By: | SYP | Temperature : | 24℃ |
| Test channel: | CH1(2402MHz) | Humidity : | 55 % |

| Frequency (MHz) | Polarity | Level (dBuV/m) | | Limited (dBuV/m) | |
|---|---|---|---|---|---|
| | | PK | AV | PK | AV |
| 2390.00 | H | 41.84 | 32.51 | 74 | 54 |
| 2390.00 | V | 44.27 | 31.68 | 74 | 54 |

| | | | |
|---|---|---|---|
| Spectrum Detector: | PK/AV | Test Date : | May 04, 2015 |
| Test By: | SYP | Temperature : | 24℃ |
| Test channel: | CH3(2480MHz) | Humidity : | 55 % |

| Frequency (MHz) | Polarity | Level (dBuV/m) | | Limited (dBuV/m) | |
|---|---|---|---|---|---|
| | | PK | AV | PK | AV |
| 2483.50 | H | 46.65 | 40.33 | 74 | 54 |
| 2483.50 | V | 47.81 | 40.96 | 74 | 54 |

# 8. Antenna Application

## 8.1. Antenna Requirement

| Standard | Requirement |
|---|---|
| FCC CRF Part 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. |

For intentional device, according to FCC 47 CFR 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

## 8.2. Result

The EUT has a PCB antenna, the gain is 0 dBi, which in accordance to section 15.203, please refer to the internal photos.