



# FCC TEST REPORT

## FCC ID: 2AJUNSST-LSB02

|                                                                                                                            |   |                         |
|----------------------------------------------------------------------------------------------------------------------------|---|-------------------------|
| Product                                                                                                                    | : | Fan and LED control BOX |
| Model Name                                                                                                                 | : | SST-LSB02               |
| Brand                                                                                                                      | : | SilverStone             |
| Report No.                                                                                                                 | : | PTC18110505001E-FC01    |
| <b>Prepared for</b>                                                                                                        |   |                         |
| SilverStone Technology Co., Ltd                                                                                            |   |                         |
| 12F., No.168, Jiankang Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)                                            |   |                         |
|                                                                                                                            |   |                         |
| <b>Prepared by</b>                                                                                                         |   |                         |
| Dongguan Precise Testing & Certification Corp., Ltd.                                                                       |   |                         |
| Building D, Baoding Technology Park, Guangming Road 2, Guangming Community, Dongcheng District, Dongguan, Guangdong, China |   |                         |
|                                                                                                                            |   |                         |



## 1 TEST RESULT CERTIFICATION

Applicant's name : SilverStone Technology Co., Ltd

Address : 12F., No.168, Jiankang Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)

Manufacture's name : DONG GUAN YI XUN ELECTRONIC CO.,LTD

Address : Qiaozhi Road, No.1, Changping Town, Dongguan City, Guangdong Province, China

Product name : Fan and LED control BOX

Model name : SST-LSB02

Standards : FCC CFR47 Part 15 Section 15.231

Test procedure : ANSI C63.10:2013

Test Date : November 20, 2018 to December 03, 2018

Date of Issue : December 03, 2018

Test Result : Pass

This device described above has been tested by PTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Engineer:

A handwritten signature in black ink that reads 'Leo Yang'.

Leo Yang / Engineer

Technical Manager:

A handwritten signature in black ink that appears to read 'Chris Du'.

Chris Du / Manager



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## 2 Test Summary

| Test Items                                  | Test Requirement | Result |
|---------------------------------------------|------------------|--------|
| Conducted Emission                          | 15.207           | N/A    |
| Radiated Spurious Emissions                 | 15.209           | PASS   |
| Restricted Bands of Operation               | 15.205(a)        | PASS   |
| Field Strength of Fundamental and Harmonics | 15.231(b)        | PASS   |
| Occupied Bandwidth                          | 15.231(c)        | PASS   |
| Transmission Time                           | 15.231(a)(1)     | PASS   |
| Duty Cycle                                  | 15.231           | PASS   |
| Antenna Requirement                         | 15.203           | PASS   |
| Remark:<br>N/A: Not Applicable              |                  |        |



### 3 General Information

#### 3.1 General Description of E.U.T.

|                      |   |                         |
|----------------------|---|-------------------------|
| Product Name         | : | Fan and LED control BOX |
| Model Name           | : | SST-LSB02               |
| Operation Frequency  | : | 433.92MHz               |
| Number of Channel    | : | 1                       |
| Type of Modulation   | : | ASK                     |
| Antenna installation | : | Internal PCB Antenna    |
| Antenna Gain         | : | 0.8 dBi                 |
| Power supply         | : | DC 3V Battery           |
| Hardware Version     | : | V2                      |
| Software Version     | : | V2                      |



### **3.2 Test Methodology**

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.

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

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.



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### **3.3 Test Site**

Dongguan Precise Testing & Certification Corp., Ltd.

Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A-1



## 4 Equipment During Test

### 4.1 Equipments List

RF Conducted Test

| Name of Equipment   | Manufacturer    | Model  | Serial No. | Characteristics | Calibration Due |
|---------------------|-----------------|--------|------------|-----------------|-----------------|
| MXG Signal Analyzer | Agilent         | N9020A | MY56070279 | 10Hz-30GHz      | Sep. 19, 2019   |
| Coaxial Cable       | CDS             | 79254  | 46107086   | 10Hz-30GHz      | Sep. 19, 2019   |
| Antenna Connector   | Florida RF Labs | N/A    | RF01#      | N/A             | Sep. 19, 2019   |

Remark: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

Radiated Emissions(Test Frequency from 9KHz-18GHz)

| Name of Equipment            | Manufacturer  | Model      | Serial No.   | Characteristics | Calibration Due |
|------------------------------|---------------|------------|--------------|-----------------|-----------------|
| EMI Test Receiver            | Rohde&Schwarz | ESCI       | 101417       | 9KHz-3GHz       | Sep. 19, 2019   |
| Loop Antenna                 | Schwarzbeck   | FMZB 1519  | 012          | 9 KHz -30MHz    | Sep. 19, 2019   |
| Bilog Antenna                | SCHWARZBECK   | VULB 9168  | 9168-572     | 25MHz-2GHz      | Sep. 21, 2019   |
| Preamplifier (low frequency) | SCHWARZBECK   | BBV 9475   | 9745-0013    | 1MHz-1GHz       | Sep. 19, 2019   |
| Cable                        | Schwarzbeck   | PLF-100    | 549489       | 9KHz-3GHz       | Sep. 19, 2019   |
| Spectrum Analyzer            | Agilent       | E4407B     | MY45109572   | 9KHz-40GHz      | Oct. 12, 2019   |
| Horn Antenna                 | SCHWARZBECK   | 9120D      | 9120D-1246   | 1GHz-18GHz      | Sep. 26, 2019   |
| Power Amplifier              | LUNAR EM      | LNA1G18-40 | J10100000081 | 1GHz-26.5GHz    | Sep. 19, 2019   |
| Cable                        | H+S           | CBL-26     | N/A          | 1GHz-26.5GHz    | Sep. 19, 2019   |



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Conducted Emissions

| Name of Equipment        | Manufacturer  | Model  | Serial No. | Characteristics | Calibration Due |
|--------------------------|---------------|--------|------------|-----------------|-----------------|
| EMI Test Receiver        | Rohde&Schwarz | ESCI   | 101417     | 9KHz-3GHz       | Sep. 19, 2019   |
| Artificial Mains Network | Rohde&Schwarz | L2-16B | 000WX31025 | 9KHz-300MHz     | Sep. 19, 2019   |
| Artificial Mains Network | Rohde&Schwarz | ENV216 | 101342     | 9KHz-300MHz     | Sep. 19, 2019   |



#### 4.2 Measurement Uncertainty

| Parameter                          | Uncertainty              |
|------------------------------------|--------------------------|
| RF output power, conducted         | ±1.0dB                   |
| Power Spectral Density, conducted  | ±2.2dB                   |
| Radio Frequency                    | ± 1 x 10 <sup>-6</sup>   |
| Bandwidth                          | ± 1.5 x 10 <sup>-6</sup> |
| Time                               | ±2%                      |
| Duty Cycle                         | ±2%                      |
| Temperature                        | ±1°C                     |
| Humidity                           | ±5%                      |
| DC and low frequency voltages      | ±3%                      |
| Conducted Emissions (150kHz~30MHz) | ±3.64dB                  |
| Radiated Emission(30MHz~1GHz)      | ±5.03dB                  |
| Radiated Emission(1GHz~25GHz)      | ±4.74dB                  |



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#### 4.3 Description of Support Units

| Equipment | Model No. | Series No. |
|-----------|-----------|------------|
| N/A       | N/A       | N/A        |

## 5 Conducted Emission

Test Requirement: : FCC CFR 47 Part 15 Section 15.207

Test Method: : ANSI C63.10: 2013

Test Result: : PASS

Frequency Range: : 150kHz to 30MHz

Class/Severity: : Class B

### 5.1 E.U.T. Operation

Operating Environment :

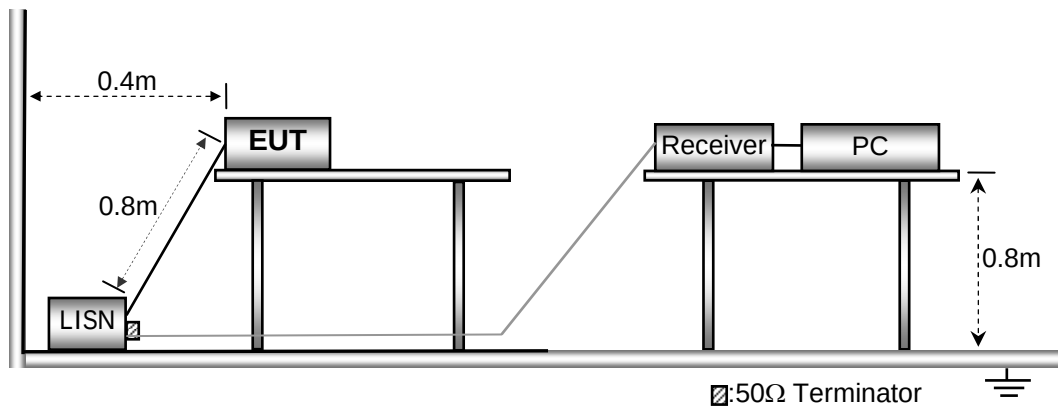
Temperature: : 25.5 °C

Humidity: : 51 % RH

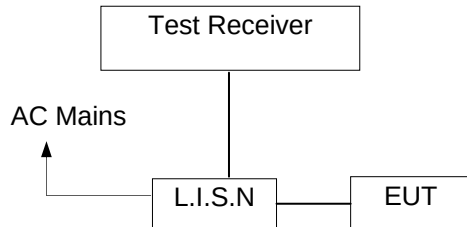
Atmospheric Pressure: : 101.2kPa

### 5.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



### 5.3 Test SET-UP (Block Diagram of Configuration)



### 5.4 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.

### 5.5 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.

### 5.6 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

### 5.7 Conducted Emission Test Result

Not applicable.

The EUT is only powered by battery, it no need to conducted emission.



## 6 Radiated Spurious Emissions

Test Requirement: : FCC CFR47 Part 15 Section 15.209  
 Test Method: : ANSI C63.10:2013  
 Test Result: : PASS  
 Measurement Distance: : 3m  
 Limit: : See the follow table

FCC 15.205 Restricted bands of operation

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138             | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2690 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |

FCC 15.209 Limit:

| Frequencies<br>(MHz) | Field Strength<br>(micorvolts/meter) | Measurement Distance<br>(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                                |
| Above 960            | 500                                  | 3                                |



FCC 15.231 Limit:

| Fundamental Frequency (MHz) | Field Strength of Fundamental (microvolts/meter) | Field Strength of Spurious Emissions (microvolts/meter) |
|-----------------------------|--------------------------------------------------|---------------------------------------------------------|
| 40.66 - 40.70               | 2,250                                            | 225                                                     |
| 70 - 130                    | 1,250                                            | 125                                                     |
| 130 - 174                   | 1,250 to 3,750 **                                | 125 to 375 **                                           |
| 174 - 260                   | 3,750                                            | 375                                                     |
| 260 - 470                   | 3,750 to 12,500 **                               | 375 to 1,250 **                                         |
| Above 470                   | 12,500                                           | 1,250                                                   |

\*\* linear interpolations

The field intensity in micro-volts per meter can then be determined by the following equation:  $FI(V/m) = 10FI(dBV/m) / 20$  The FCC specified emission limits were calculated according the EUT operating frequency and obtained by following linear interpolation equations:

(a) For fundamental frequency:

fEUT : EUT Operating Frequency Emission Limit (V/m)

$$= [fEUT(MHz) - 260(MHz)] \times \frac{12500(V/m) - 3750(V/m)}{470(MHz) - 260(MHz)} + 3750(V/m)$$

(b) For spurious frequencies:

fEUT : EUT Operating Frequency Emission Limit (V/m)

$$= [fEUT(MHz) - 260(MHz)] \times \frac{1250(V/m) - 375(V/m)}{470(MHz) - 260(MHz)} + 375(V/m)$$

Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20 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).



| FCC Part15 (15.231) , Subpart C |                                   |                                         |
|---------------------------------|-----------------------------------|-----------------------------------------|
| Fundamental Frequency           | Field Strength<br>Of Fundamental  | Field Strength of Spurious<br>Emissions |
| 433.92MHz                       | AV:80.82 dBuV/m at 3m<br>distance | AV:60.82 dBuV/m at 3m<br>distance       |
|                                 | PK:100.82dBuV/m at 3m<br>distance | PK:80.82 dBuV/m at 3m<br>distance       |

## 6.1 EUT Operation

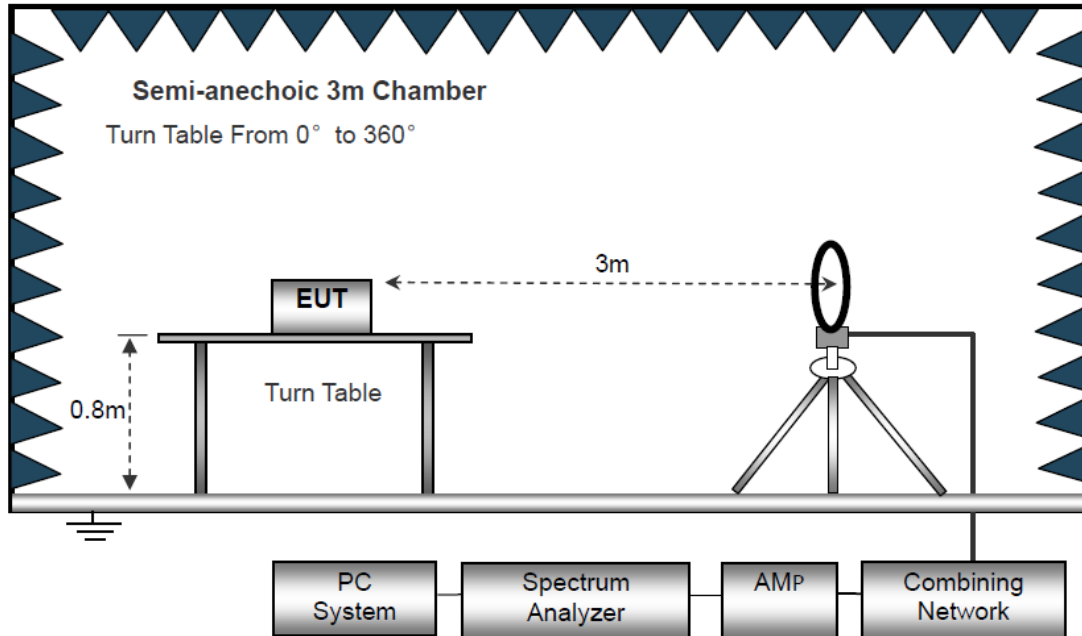
Operating Environment :

Temperature: : 23.5 °C  
Humidity: : 51.1 % RH  
Atmospheric Pressure: : 101.2kPa

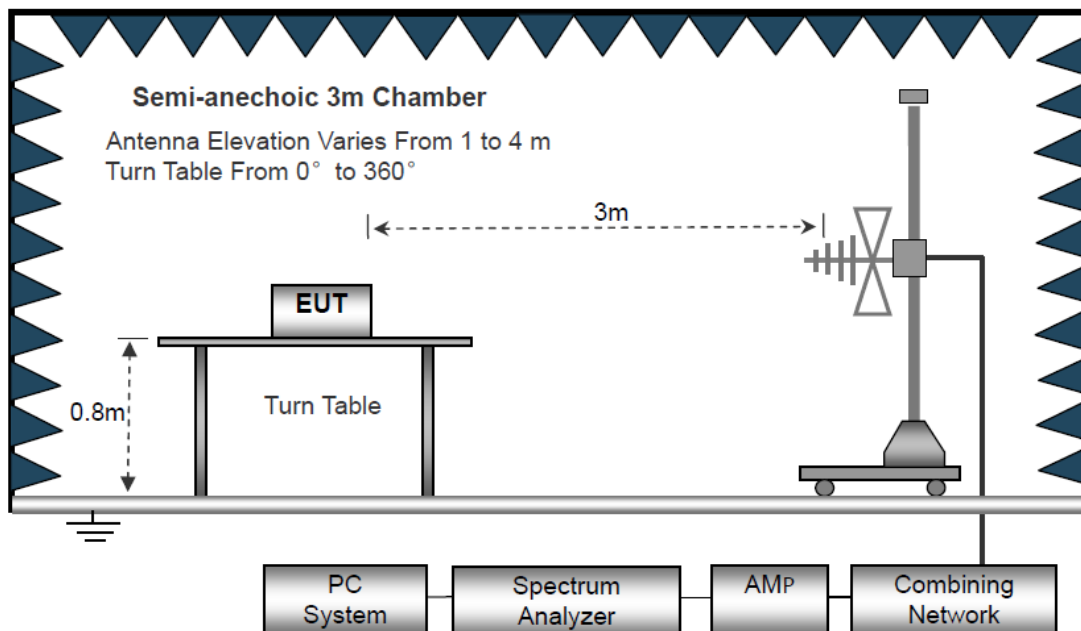
## 6.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

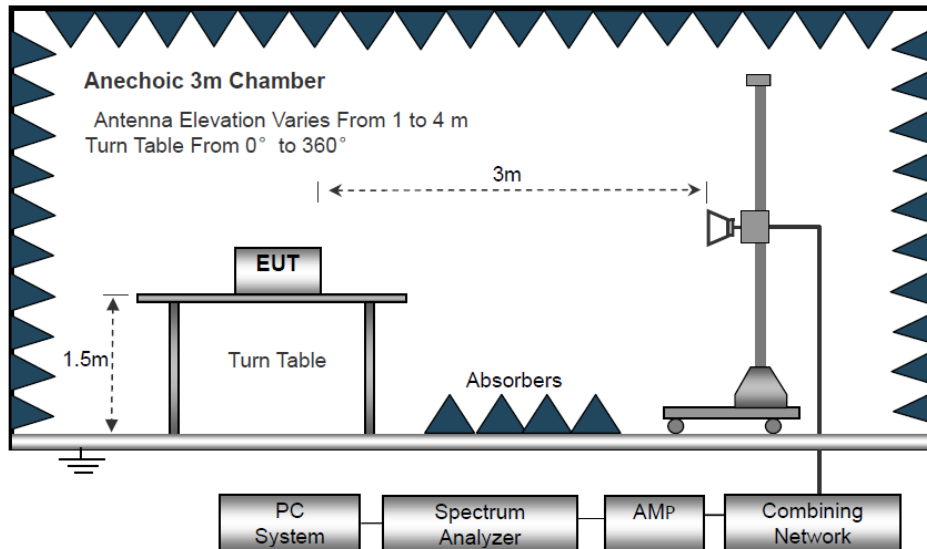
The test setup for emission measurement below 30MHz



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz



### 6.3 Spectrum Analyzer Setup

|                      |   |        |        |
|----------------------|---|--------|--------|
| Below 30MHz          |   |        |        |
| IF Bandwidth         | : | 10kHz  |        |
| Resolution Bandwidth | : | 10kHz  |        |
| Video Bandwidth      | : | 10kHz  |        |
| 30MHz ~ 1GHz         |   |        |        |
| Detector             | : | PK     | QP     |
| Resolution Bandwidth | : | 100kHz | 120kHz |
| Video Bandwidth      | : | 300kHz | 300kHz |
| Above 1GHz           |   |        |        |
| Detector             | : | PK     | AV     |
| Resolution Bandwidth | : | 1MHz   | 1MHz   |
| Video Bandwidth      | : | 3MHz   | 10Hz   |



## 6.4 Test Procedure

1. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane, And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
8. The test above 1GHz must be use the fully anechoic room, and the test below 1GHz use the half anechoic room



## 6.5 Summary of Test Results

### Test Frequency: 9KHz-30MHz

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | Emission Level<br>(dBuV/m) | Limit 3m<br>(dBuV/m) | Over<br>(dB) |
|----------------|-----------------|----------------------------|----------------------|--------------|
| --             | --              | --                         | --                   | >20          |

#### Note:

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

Distance extrapolation factor =  $40\log(\text{Specific distance} / \text{test distance})$  (dB);

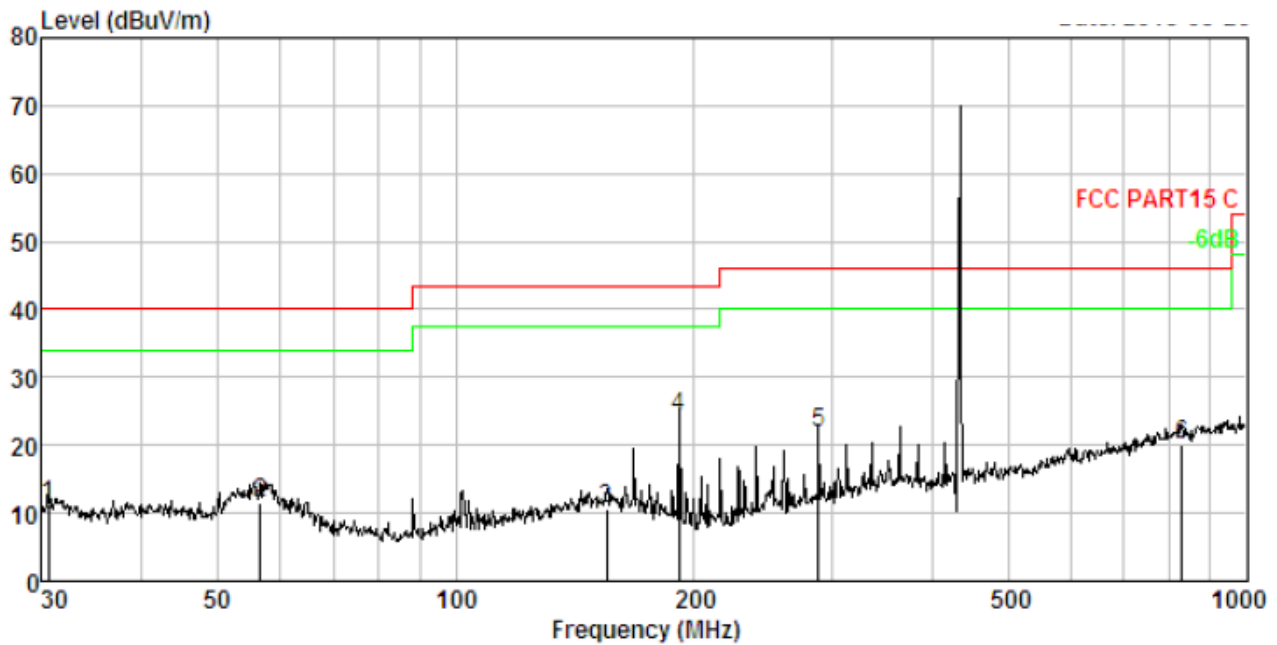
Limit line = Specific limits (dBuV) + distance extrapolation factor.

### Test Frequency: 30MHz ~ 1GHz

Please refer to the following test plots:



Antenna Polarization: Horizontal

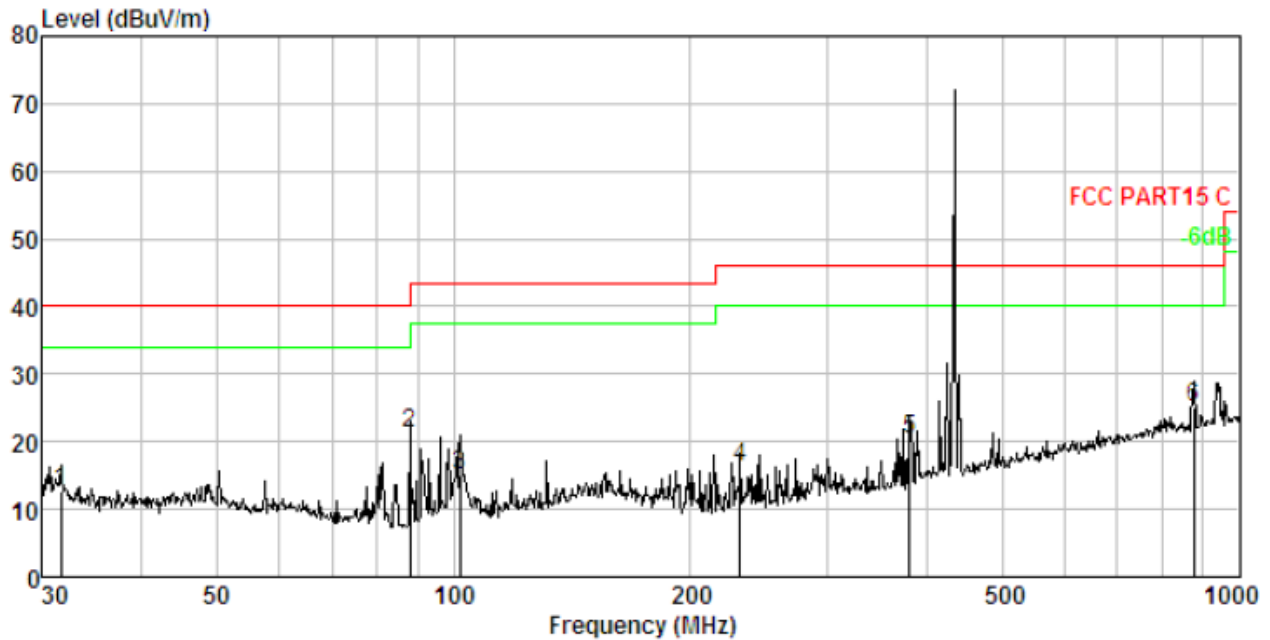


| No. | Freq<br>MHz | Cable<br>Loss<br>dB | ANT<br>Factor<br>dB/m | Receiver<br>Reading<br>dBuV | Preamp<br>Factor<br>dB | Emission<br>Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark |
|-----|-------------|---------------------|-----------------------|-----------------------------|------------------------|-----------------------------|-----------------|---------------------|--------|
| 1.  | 30.531      | 1.07                | 13.24                 | 27.00                       | 29.98                  | 11.33                       | 40.00           | -28.67              | QP     |
| 2.  | 56.593      | 1.63                | 11.99                 | 28.10                       | 30.19                  | 11.53                       | 40.00           | -28.47              | QP     |
| 3.  | 155.364     | 2.54                | 13.89                 | 24.77                       | 30.54                  | 10.66                       | 43.50           | -32.84              | QP     |
| 4.  | 191.745     | 2.73                | 10.97                 | 41.25                       | 30.62                  | 24.33                       | 43.50           | -19.17              | QP     |
| 5.  | 287.990     | 3.10                | 12.96                 | 36.41                       | 30.76                  | 21.71                       | 46.00           | -24.29              | QP     |
| 6.  | 827.493     | 4.06                | 21.94                 | 25.12                       | 31.12                  | 20.00                       | 46.00           | -26.00              | QP     |

Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor



Antenna Polarization: Vertical



| No. | Freq<br>MHz | Cable<br>Loss<br>dB | ANT<br>Factor<br>dB/m | Receiver<br>Reading<br>dBuV | Preamp<br>Factor<br>dB | Emission<br>Level<br>dBuV/m | Limit<br>dBuV/m | Over<br>Limit<br>dB | Remark |
|-----|-------------|---------------------|-----------------------|-----------------------------|------------------------|-----------------------------|-----------------|---------------------|--------|
| 1.  | 31.620      | 1.10                | 13.23                 | 28.28                       | 29.99                  | 12.62                       | 40.00           | -27.38              | QP     |
| 2.  | 88.033      | 2.03                | 9.06                  | 40.40                       | 30.34                  | 21.15                       | 43.50           | -22.35              | QP     |
| 3.  | 102.001     | 2.16                | 10.41                 | 32.93                       | 30.40                  | 15.10                       | 43.50           | -28.40              | QP     |
| 4.  | 231.718     | 2.91                | 11.33                 | 32.76                       | 30.68                  | 16.32                       | 46.00           | -29.68              | QP     |
| 5.  | 381.249     | 3.36                | 14.91                 | 33.07                       | 30.85                  | 20.49                       | 46.00           | -25.51              | QP     |
| 6.  | 875.247     | 4.11                | 22.06                 | 29.99                       | 31.14                  | 25.02                       | 46.00           | -20.98              | QP     |

Remark: Emission Level = Reading + Cable Loss + ANT Factor - AMP Factor



### Fundamental and Harmonics Average Result

| Frequency<br>(MHz) | Ant.Pol. | Emission<br>Level(dBuV/m) |       | Limit 3m<br>(dBuV/m) |       | Margin<br>(dB) |        |
|--------------------|----------|---------------------------|-------|----------------------|-------|----------------|--------|
|                    |          | PK                        | AV    | PK                   | AV    | PK             | AV     |
| 433.92             | H        | 70.12                     | 66.9  | 100.82               | 80.82 | -30.7          | -13.92 |
| 433.92             | V        | 73.26                     | 70.04 | 100.82               | 80.82 | -27.56         | -10.78 |
| 867.84             | H        | 56.32                     | 53.1  | 80.82                | 60.82 | -24.5          | -7.72  |
| 867.84             | V        | 53.49                     | 50.27 | 80.82                | 60.82 | -27.33         | -10.55 |

### Test Frequency: From 1GHz to 5GHz

| Freq.<br>(MHz) | Ant.Pol. | Emission<br>Level(dBuV/m) |       | Limit 3m(dBuV/m) |       | Margin(dB) |        |
|----------------|----------|---------------------------|-------|------------------|-------|------------|--------|
|                |          | PK                        | AV    | PK               | AV    | PK         | AV     |
| 1301.76        | V        | 58.32                     | 55.1  | 80.82            | 60.82 | -22.5      | -5.72  |
| 1735.68        | V        | 57.14                     | 53.92 | 80.82            | 60.82 | -23.68     | -6.9   |
| 2169.60        | V        | 56.29                     | 53.07 | 80.82            | 60.82 | -24.53     | -7.75  |
| 2603.52        | V        | 54.02                     | 50.8  | 80.82            | 60.82 | -26.8      | -10.02 |
| 1301.76        | H        | 57.19                     | 53.97 | 80.82            | 60.82 | -23.63     | -6.85  |
| 1735.68        | H        | 56.32                     | 53.1  | 80.82            | 60.82 | -24.5      | -7.72  |
| 2169.60        | H        | 55.04                     | 51.82 | 80.82            | 60.82 | -25.78     | -9.00  |
| 2603.52        | H        | 54.29                     | 51.07 | 80.82            | 60.82 | -26.53     | -9.75  |

Note:

1. All other emissions more than 30dB below the limit.
2. Average=Peak Value+20log(Duty Cycle)=Peak-3.22  
Margin=Emission Level-Limit
3. X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.



## 7 OCCUPIED BANDWIDTH

### 7.1 Applicable Standard

According to FCC Part 2.1049 and part 15.231(c)

### 7.2 Conformance Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### 7.3 Test Procedure

The EUT was operating in transmit mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1% occupied bandwidth (30KHz).

Set the video bandwidth (VBW) =100KHz.

Set Span= approximately 2 to 3 times the occupied bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 99% down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 99% bandwidth of the emission.

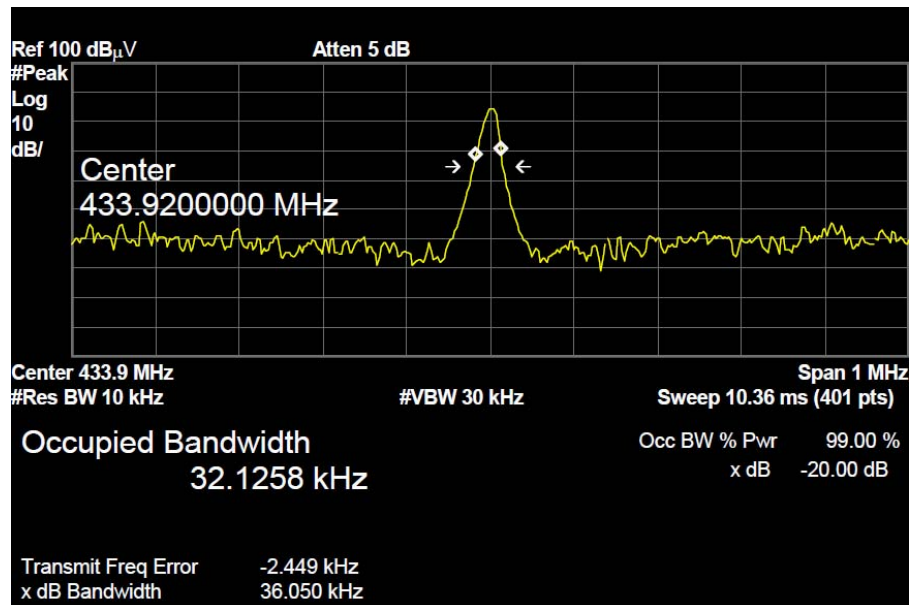
If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.



## 7.4 Test Result

| Modulation                                                       | Channel Frequency(MHz) | Measurement Bandwidth(KHz) | Limit(KHz) | Verdict |
|------------------------------------------------------------------|------------------------|----------------------------|------------|---------|
| ASK                                                              | 433.92                 | 36.050                     | ≤1084.8    | PASS    |
| Note: Limit=Fundamental Frequency* 0.25%=433.92MHz*0.25%=1084KHz |                        |                            |            |         |





## 8 TRANSMISSION REQUIREMENT

### 8.1 Applicable Standard

According to FCC Part 15.231.

### 8.2 Conformance Limit

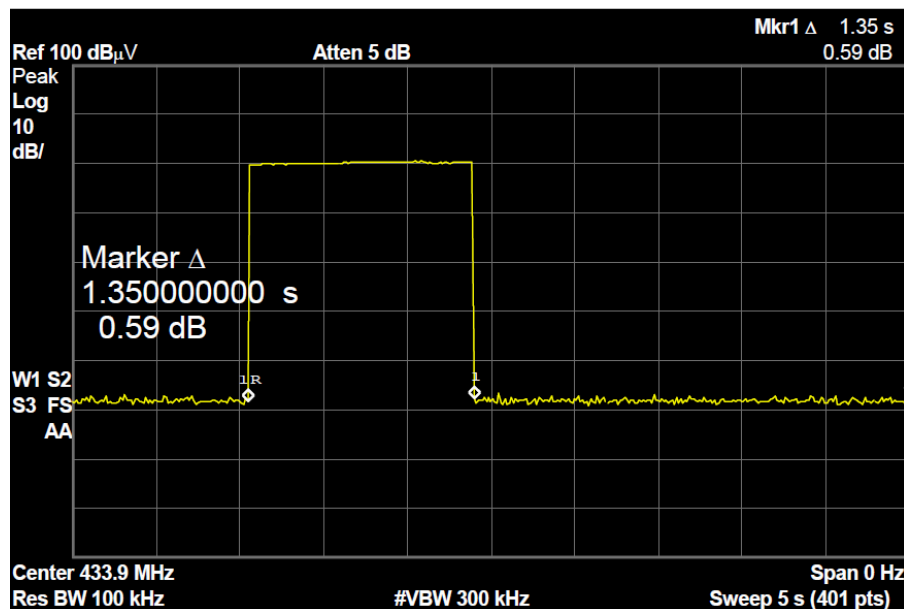
According to FCC 15.231a, A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### 8.3 Test Procedure

- (1) Set Spectrum Analyzer Center Frequency=Fundamental Frequency. RBW=100KHz, VBW=300KHz.
- (2) Setup the EUT as normal operation and press transmitter button.
- (3) Set Spectrum Analyzer View. Delta Mark time.

### 8.4 Test Result

| Frequency(MHz) | Release Time (s) | Limit (s) | Verdict |
|----------------|------------------|-----------|---------|
| 433.92         | 1.35             | 5         | PASS    |





## 9 DUTY CYCLE

### 9.1 Test Procedure

Place the EUT on the table and set it in the transmitting mode.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Set centre frequency of spectrum analyzer=operating frequency.

Set the spectrum analyzer as RBW=100KHz, VBW=100KHz to obtain the “worst-case” pulse on time

Repeat above procedures until all frequency measured was complete.

### 9.2 Test Result

Plot 1, Plot 2: Transmit once in 70ms, and each cycle is 26.25ms there are three kinds of pulse in each cycle, the large pulses total 8, the small pulses total 10.

Plot 3: one large pulse in a time period of 1.575ms

Plot 4: one middle pulse in a time period of 0.55ms

Duty cycle=ON/Total= $(8*1.575+10*0.55)/26.25=18.1/26.25=68.95\%$

$20 \log(\text{Duty Cycle}) = -3.22$

Average =Peak Value+  $20 \log(\text{Duty Cycle})$ , AV =PK-3.22

The smallest pulse width(PW)=0.55ms

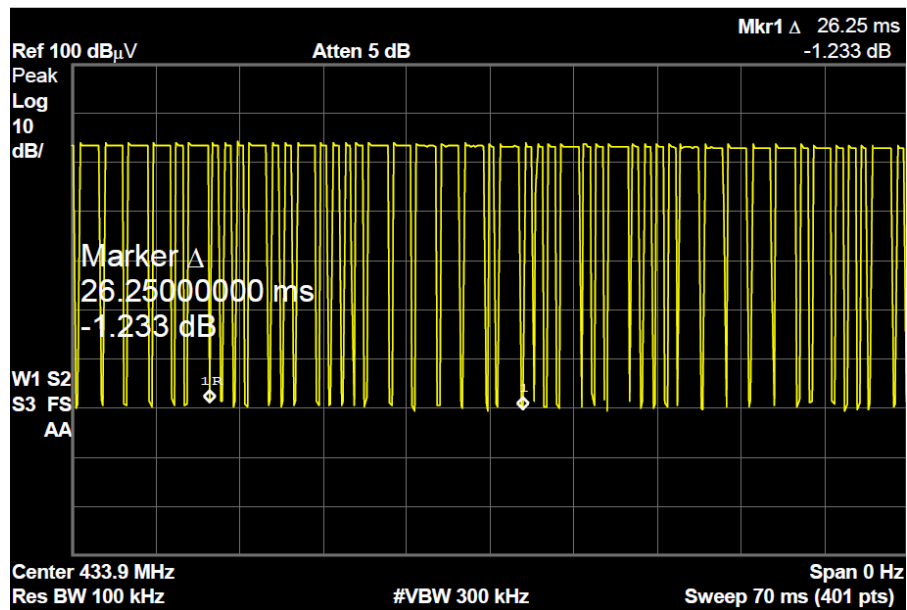
$2/PW=2/0.55(\text{ms})=3.636\text{KHz}<100\text{KHz}$

Because  $2/PW<\text{RBW}$ , so the PDCF is not needed.

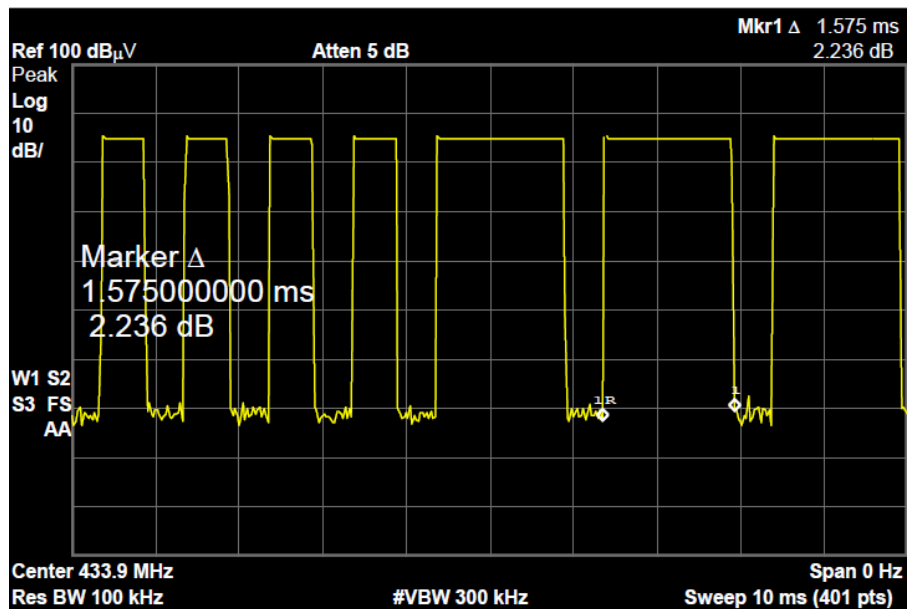
Please see below test plots:



Plot 1

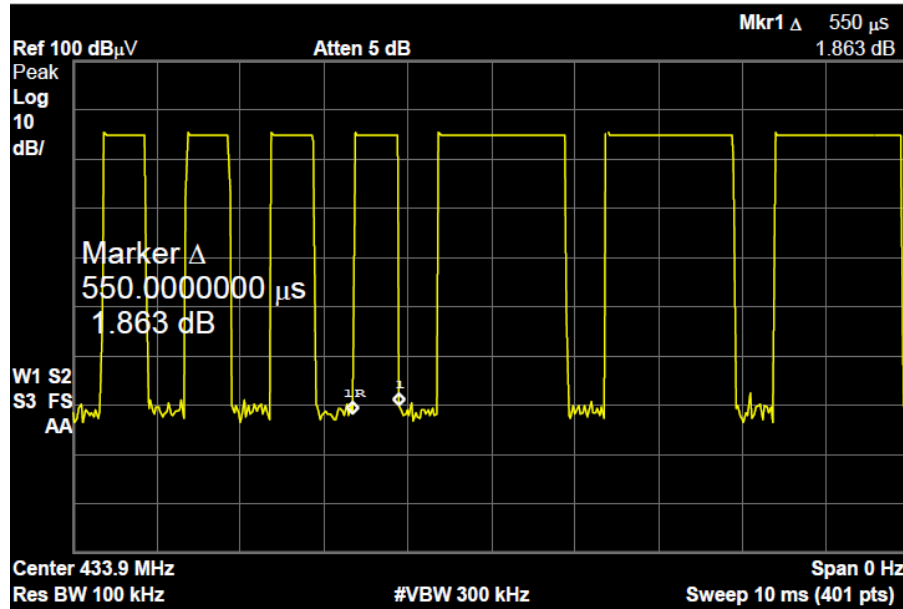


Plot 2





Plot 3





## **10 Antenna Application**

### **10.1 Antenna Requirement**

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 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.

### **10.2 Result**

The EUT'S antenna, permanent attached antenna, is internal PCB antenna. The antenna's gain is 0.8 dBi and meets the requirement.

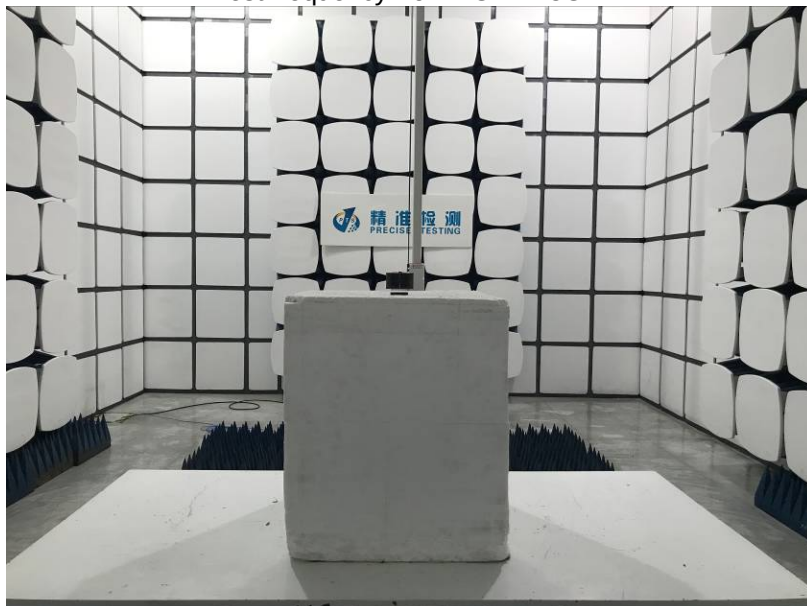


## 11 Test Setup

Radiated Spurious Emissions  
From 30MHz-1000MHz



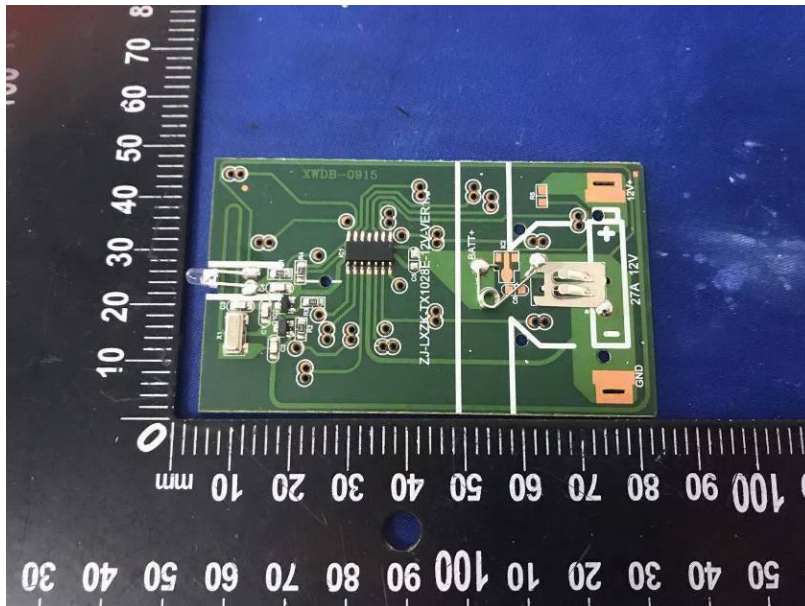
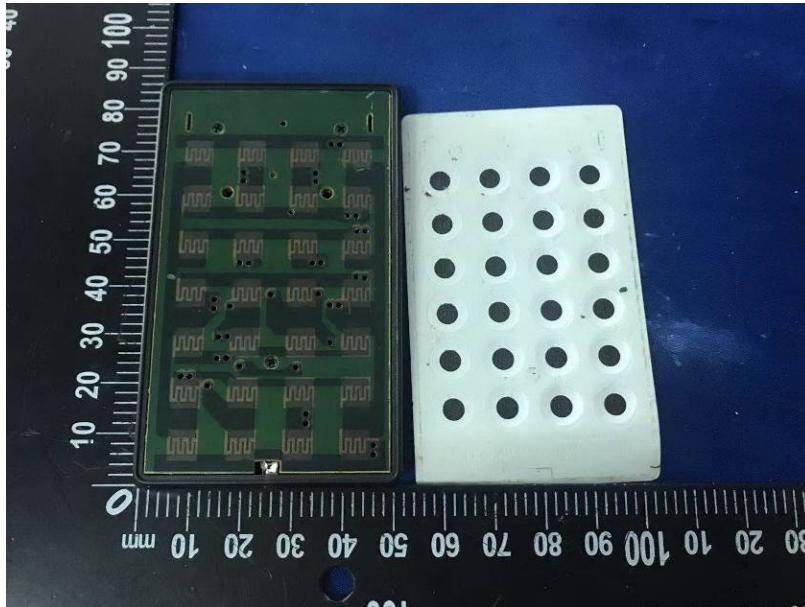
Test frequency from 1GHz-18GHz

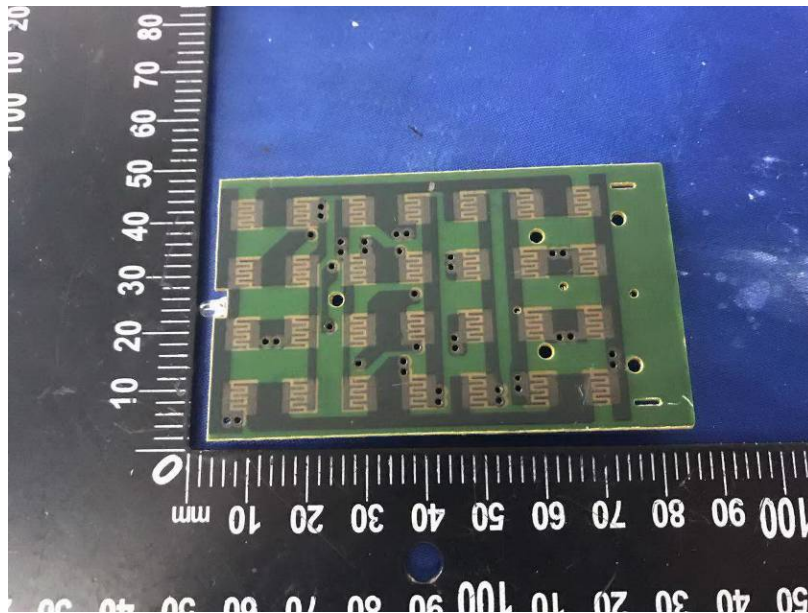




## 12 EUT Photos







\*\*\*\*\*THE END REPORT\*\*\*\*\*