



# FCC TEST REPORT

## FCC ID: 2AQURZW38M-V3

|                                                                                                        |   |                      |
|--------------------------------------------------------------------------------------------------------|---|----------------------|
| Product Name                                                                                           | : | SMART PLUG           |
| Model Name                                                                                             | : | ZEN04 800LR, ZW38M   |
| Brand Name                                                                                             | : | Minoston             |
| Report No.                                                                                             | : | PTC23041905705E-FC01 |
| <b>Prepared for</b>                                                                                    |   |                      |
| NIE-TECH Co., Ltd                                                                                      |   |                      |
| Jinlian commercial center 9001, Jinxiu road No.2, Changan Town,Dongguan City,<br>GuangDongProv., CHINA |   |                      |
| <b>Prepared by</b>                                                                                     |   |                      |
| Precise Testing & Certification Co., Ltd.                                                              |   |                      |
| Building 1, No. 6, Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China                          |   |                      |



## 1 TEST RESULT CERTIFICATION

Applicant's name : NIE-TECH Co., Ltd  
Address : Jinlian commercial center 9001, Jinxiu road No.2, Changan Town, Dongguan City, Guangdong Prov., CHINA  
Manufacture's name : NIE-TECH Co., Ltd  
Address : Jinlian commercial center 9001, Jinxiu road No.2, Changan Town, Dongguan City, Guangdong Prov., CHINA  
Product name : SMART PLUG  
Model name : ZEN04 800LR, ZW38M  
Standards : FCC Part15 Subpart C, Paragraph 15.249  
Test procedure : ANSI C63.10: 2013  
Test Date : May. 15, 2023 to Jun. 14, 2023  
Date of Issue : Jun. 14, 2023  
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 "Simon Pu".

Simon Pu/ Engineer

Technical Manager:

A handwritten signature in black ink that appears to read "Ronnie Liu".

Ronnie Liu/ Manager



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## 2 Test Summary

| Standard Section                                            | Test Item           | Result |
|-------------------------------------------------------------|---------------------|--------|
| 15.203                                                      | Antenna Requirement | PASS   |
| 15.207                                                      | Conducted Emission  | PASS   |
| 15.249                                                      | Radiated Emission   | PASS   |
| 15.215(c)                                                   | 20dB Bandwidth      | PASS   |
| <b>Remark:</b> "N/A" is an abbreviation for Not Applicable. |                     |        |



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### **3 TEST FACILITY**

Precise Testing & Certification Co., Ltd.

Address: Building 1, No. 6, Tongxin Road, Dongcheng Street, Dongguan, Guangdong, China

FCC Registration Number: 790290

A2LA Certificate No.: 4408.01

IC Registration Number: 12191A

FCC Designation Number: CN1219



## 4 General Information

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

|                     |   |                                     |
|---------------------|---|-------------------------------------|
| Product Name        | : | SMART PLUG                          |
| Model Name          | : | ZEN04 800LR                         |
| Additional model    | : | ZW38M                               |
| Model difference    | : | Only the model names are different  |
| Operating frequency | : | 908.40MHz,908.42 MHz,916.00MHz      |
| Numbers of Channels | : | 3 Channels                          |
| Antenna Type        | : | PCB antenna                         |
| Antenna Gain        | : | -6.16 dBi                           |
| Type of Modulation  | : | 908.40MHz<br>908.42MHz<br>916.00MHz |
| Power supply        | : | AC 120V/60Hz 15A                    |
| Hardware Version    | : | 1.0                                 |
| Software Version    | : | 1.0                                 |



## 4.2 Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Channel | Frequency (MHz) | Modulation |
|--------------|---------|-----------------|------------|
| Mode 1       | CH0     | 908.40          | 2FSK       |
| Mode 2       | CH1     | 908.42          | 2FSK       |
| Mode 3       | CH3     | 916.00          | 2GFSK      |

| For Conducted Emission |             |
|------------------------|-------------|
| Final Test Mode        | Description |
| Mode 1                 | CH0         |
| Mode 2                 | CH1         |
| Mode 3                 | CH2         |

| For Radiated Emission |             |
|-----------------------|-------------|
| Final Test Mode       | Description |
| Mode 1                | CH0         |
| Mode 2                | CH1         |
| Mode 3                | CH2         |

Note:

1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.





#### 4.3 List of Channels

| Channel | Frequency (MHz) | Modulation |
|---------|-----------------|------------|
| CH0     | 908.40          | 2FSK       |
| CH1     | 908.42          | 2FSK       |
| CH2     | 916.00          | 2GFSK      |



## 5 Equipment During Test

### 5.1 Equipments List

#### RF Conducted Test

| Name of Equipment   | Manufacturer | Model   | Serial No.    | Characteristics | Calibration Due |
|---------------------|--------------|---------|---------------|-----------------|-----------------|
| MXG Signal Analyzer | Agilent      | N9020A  | SER MY5111038 | 10Hz-30GHz      | Aug. 21, 2023   |
| Coaxial Cable       | CDS          | 79254   | 46107086      | 10Hz-30GHz      | Aug. 21, 2023   |
| Power Meter         | Anritsu      | ML2495A | 0949003       | 300MHz-40GHz    | Aug. 21, 2023   |
| Power Sensor        | Anritsu      | MA2411B | 0917017       | 300MHz-40GHz    | Aug. 21, 2023   |

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

| Name of Equipment            | Manufacturer  | Model      | Serial No.   | Characteristics | Calibration Due |
|------------------------------|---------------|------------|--------------|-----------------|-----------------|
| EMI Test Receiver            | Rohde&Schwarz | ESCI       | 101417       | 9KHz-3GHz       | Aug. 21, 2023   |
| Loop Antenna                 | Schwarzbeck   | FMZB 1519  | 012          | 9 KHz -30MHz    | Aug. 21, 2023   |
| Bilog Antenna                | SCHWARZBECK   | VULB9160   | 9160-3355    | 25MHz-2GHz      | Aug. 21, 2023   |
| Preamplifier (low frequency) | SCHWARZBECK   | BBV 9475   | 9745-0013    | 1MHz-1GHz       | Aug. 21, 2023   |
| Cable                        | Schwarzbeck   | PLF-100    | 549489       | 9KHz-3GHz       | Aug. 21, 2023   |
| Spectrum Analyzer            | Agilent       | E4407B     | MY45109572   | 9KHz-40GHz      | Aug. 21, 2023   |
| Horn Antenna                 | SCHWARZBECK   | 9120D      | 9120D-1246   | 1GHz-18GHz      | Aug. 21, 2023   |
| Power Amplifier              | LUNAR EM      | LNA1G18-40 | J10100000081 | 1GHz-26.5GHz    | Aug. 21, 2023   |
| Horn Antenna                 | SCHWARZBECK   | BBHA 9170  | 9170-181     | 14GHz-40GHz     | Aug. 21, 2023   |
| Amplifier                    | SCHWARZBECK   | BBV 9721   | 9721-205     | 18GHz-40GHz     | Aug. 21, 2023   |
| Cable                        | H+S           | CBL-26     | N/A          | 1GHz-26.5GHz    | Aug. 21, 2023   |
| RF Cable                     | R&S           | R204       | R21X         | 1GHz-40GHz      | Aug. 21, 2023   |



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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       | Aug. 19, 2023   |
| Artificial Mains Network | Rohde&Schwarz | ENV216 | 102453     | 9KHz-300MHz     | Aug. 19, 2023   |
| Artificial Mains Network | Rohde&Schwarz | ENV216 | 101342     | 9KHz-300MHz     | Aug. 19, 2023   |



## 5.2 Measurement Uncertainty

|                        |   |                          |
|------------------------|---|--------------------------|
| Radiation Uncertainty  | : | Ur = 3.9 dB (Horizontal) |
|                        | : | Ur = 3.8 dB (Vertical)   |
| Bandwidth              | : | $\pm 1.5 \times 10^{-6}$ |
| Conduction Uncertainty | : | Uc = 3.4 dB              |



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### 5.3 Description of Support Units

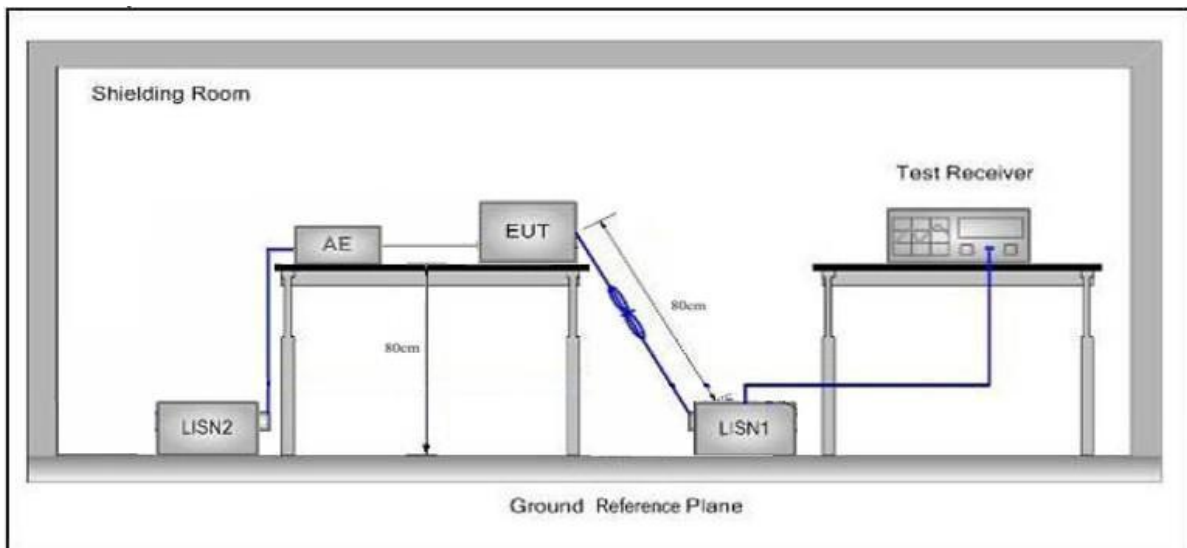
| Equipment         | Model No. | Series No. |
|-------------------|-----------|------------|
| Incandescent lamp | N/A       | N/A        |

## 6 Test Standard and Limit

| Test Standard | FCC Part15 Section 15.207 |                                |               |
|---------------|---------------------------|--------------------------------|---------------|
| Test Limit    | Frequency                 | Maximum RF Line Voltage (dBuV) |               |
|               |                           | Quasi-peak Level               | Average Level |
|               | 150kHz~500kHz             | 66 ~ 56 *                      | 56 ~ 46 *     |
|               | 500kHz~5MHz               | 56                             | 46            |
|               | 5MHz~30MHz                | 60                             | 50            |

**Remark:** (1) \*Decreasing linearly with logarithm of the frequency.  
(2) The lower limit shall apply at the transition frequency.

### 6.1. Test Setup



### 6.2. Test Procedure

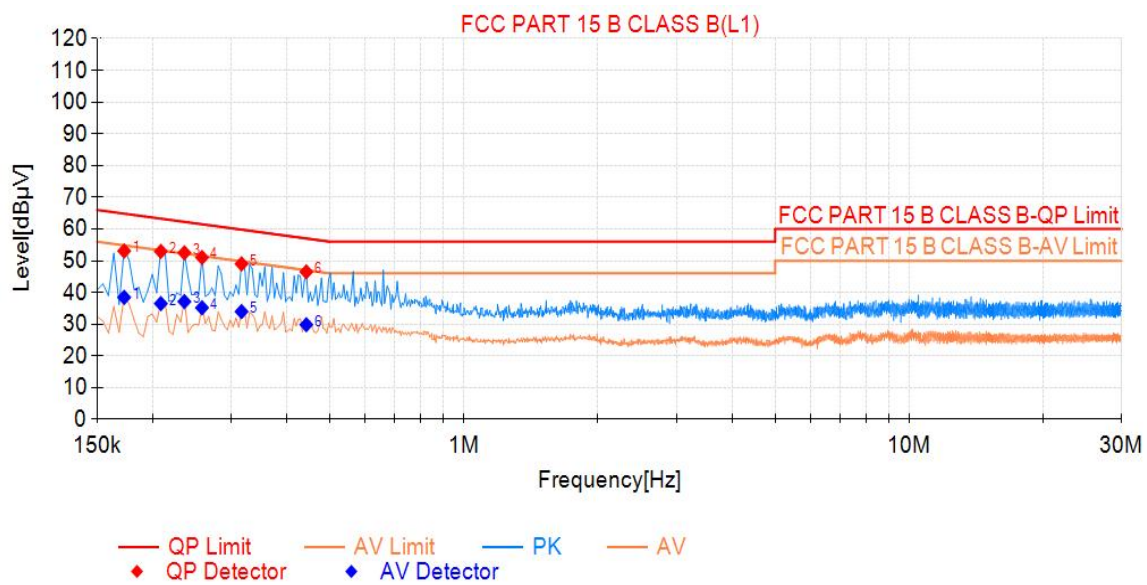
The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test iSurpass Smart Gateway (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

### 6.3. Test Data

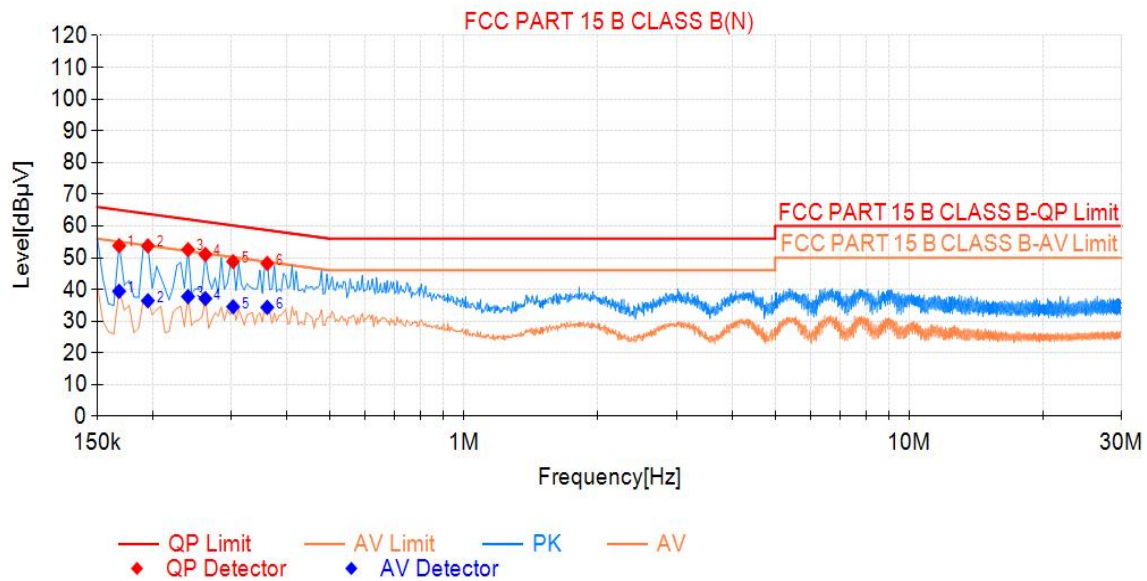
Test Mode: CH1  
Power Source: AC 120V/60Hz  
Polarization: LINE  
Temp.(°C)/Hum.(%RH): 24.5°C/52%RH



| Final Data List |                |             |             |              |             |             |              |         |
|-----------------|----------------|-------------|-------------|--------------|-------------|-------------|--------------|---------|
| NO.             | Freq.<br>[MHz] | QP<br>Value | QP<br>Limit | QP<br>Margin | AV<br>Value | AV<br>Limit | AV<br>Margin | Verdict |
| 1               | 0.173          | 53.07       | 64.84       | 11.77        | 38.46       | 54.84       | 16.38        | PASS    |
| 2               | 0.209          | 52.93       | 63.26       | 10.33        | 36.50       | 53.26       | 16.76        | PASS    |
| 3               | 0.236          | 52.49       | 62.25       | 9.76         | 37.12       | 52.25       | 15.13        | PASS    |
| 4               | 0.258          | 51.04       | 61.50       | 10.46        | 35.18       | 51.50       | 16.32        | PASS    |
| 5               | 0.317          | 49.01       | 59.80       | 10.79        | 33.96       | 49.80       | 15.84        | PASS    |
| 6               | 0.443          | 46.50       | 57.01       | 10.51        | 29.82       | 47.01       | 17.19        | PASS    |



Test Mode: CH1  
Power Source: AC 120V/60Hz  
Polarization: NEUTRAL  
Temp.(°C)/Hum.(%RH): 24.5°C/52%RH



### Final Data List

| NO. | Freq.<br>[MHz] | QP<br>Value | QP<br>Limit | QP<br>Margin | AV<br>Value | AV<br>Limit | AV<br>Margin | Verdict |
|-----|----------------|-------------|-------------|--------------|-------------|-------------|--------------|---------|
| 1   | 0.168          | 53.78       | 65.06       | 11.28        | 39.42       | 55.06       | 15.64        | PASS    |
| 2   | 0.195          | 53.73       | 63.82       | 10.09        | 36.45       | 53.82       | 17.37        | PASS    |
| 3   | 0.240          | 52.55       | 62.10       | 9.55         | 37.75       | 52.10       | 14.35        | PASS    |
| 4   | 0.263          | 51.03       | 61.35       | 10.32        | 37.11       | 51.35       | 14.24        | PASS    |
| 5   | 0.303          | 48.78       | 60.16       | 11.38        | 34.54       | 50.16       | 15.62        | PASS    |
| 6   | 0.362          | 48.21       | 58.69       | 10.48        | 34.35       | 48.69       | 14.34        | PASS    |

Note:1.All test mode have been tested. Only the worst case have been recorded in the report.

2.QP Margin[dB]= QP Limit[dBμV]- QP Value[dBμV], AV Margin[dB]= AV Limit[dBμV]- AV Value[dBμV].



## 7 . Radiated Emission and Band Edge

### 7.1. Test Standard and Limit

| Test Standard | FCC Part15 C Section 15.209 and 15.205 |                                     |                   |            |                             |
|---------------|----------------------------------------|-------------------------------------|-------------------|------------|-----------------------------|
| Test Limit    | Frequency<br>(MHz)                     | Field strength<br>(microvolt/meter) | Limit<br>(dBuV/m) | Remark     | Measurement<br>distance (m) |
|               | 0.009MHz~0.490MHz                      | 2400/F(kHz)                         | -                 | -          | 300                         |
|               | 0.490MHz~1.705MHz                      | 24000/F(kHz)                        | -                 | -          | 30                          |
|               | 1.705MHz~30MHz                         | 30                                  | -                 | -          | 30                          |
|               | 30MHz~88MHz                            | 100                                 | 40.0              | Quasi-peak | 3                           |
|               | 88MHz~216MHz                           | 150                                 | 43.5              | Quasi-peak | 3                           |
|               | 216MHz~960MHz                          | 200                                 | 46.0              | Quasi-peak | 3                           |
|               | 960MHz~1000MHz                         | 500                                 | 54.0              | Quasi-peak | 3                           |
|               | Above 1000MHz                          | 500                                 | 54.0              | Average    | 3                           |
|               |                                        | -                                   | 74.0              | Peak       | 3                           |

**Remark:**

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

| Test Standard | FCC Part15 C Section 15.249 |                                                          |                                                      |                   |            |                             |
|---------------|-----------------------------|----------------------------------------------------------|------------------------------------------------------|-------------------|------------|-----------------------------|
| Test Limit    | Frequency<br>(MHz)          | Field Strength of<br>fundamental<br>((millivolts /meter) | Field Strength of<br>Harmonics<br>(microvolts/meter) | Limit<br>(dBuV/m) | Remark     | Measurement<br>distance (m) |
|               | 902~928                     | 50                                                       | -                                                    | 94.0              | Quasi-peak | 3                           |
|               |                             | -                                                        | -                                                    | -                 | -          | -                           |

**Remark:**

(1) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

## 7.2. Test Setup

Figure 1. Below 30MHz

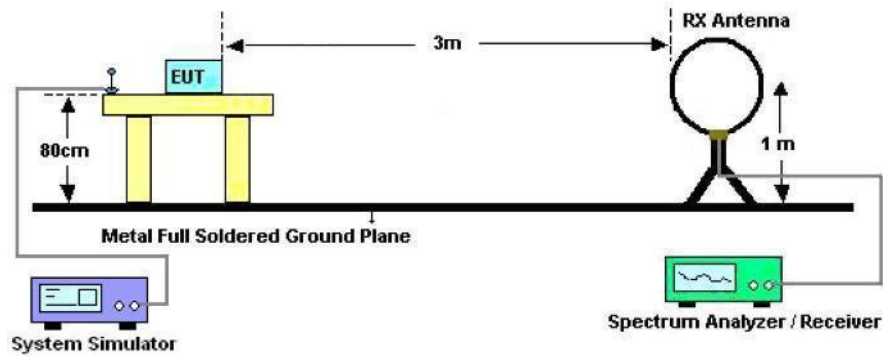


Figure 2. 30MHz to 1GHz

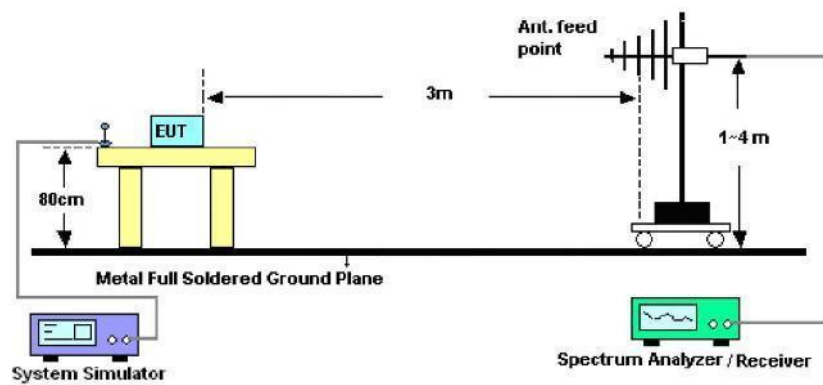
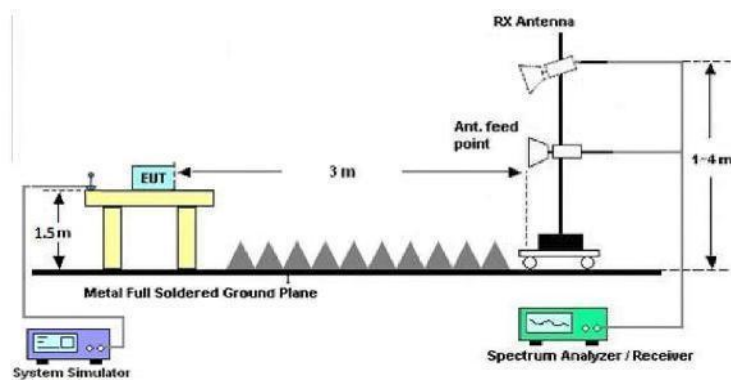


Figure 3. Above 1 GHz





### 7.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9\*6\*6 Chamber. The device is evaluated in xyz orientation.

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

.

For above 1GHz,Set the spectrum analyzer as:

RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.



#### **7.4. Test Data**

##### **PASS**

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

During the test, pre-scan all the modes, and found the CH 01 channel which is the worst case, only the worst case is recorded in the report



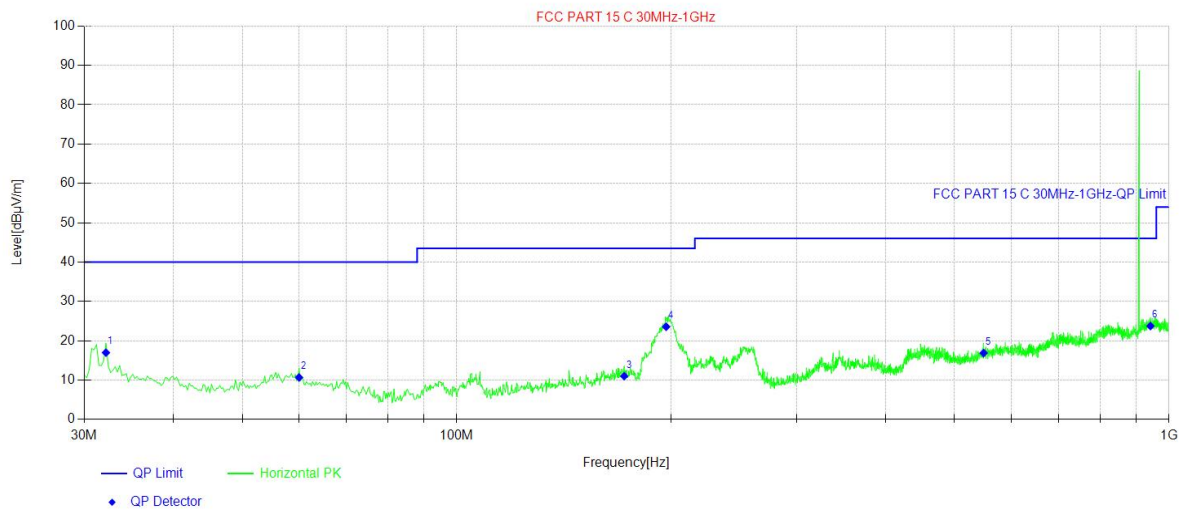
# Test Results (30~1000MHz)

Test Mode: CH1

Power Source: AC 120V/60Hz

Polarization: Vertical

Temp.(°C)/Hum.(%RH): 24.5°C/52%RH

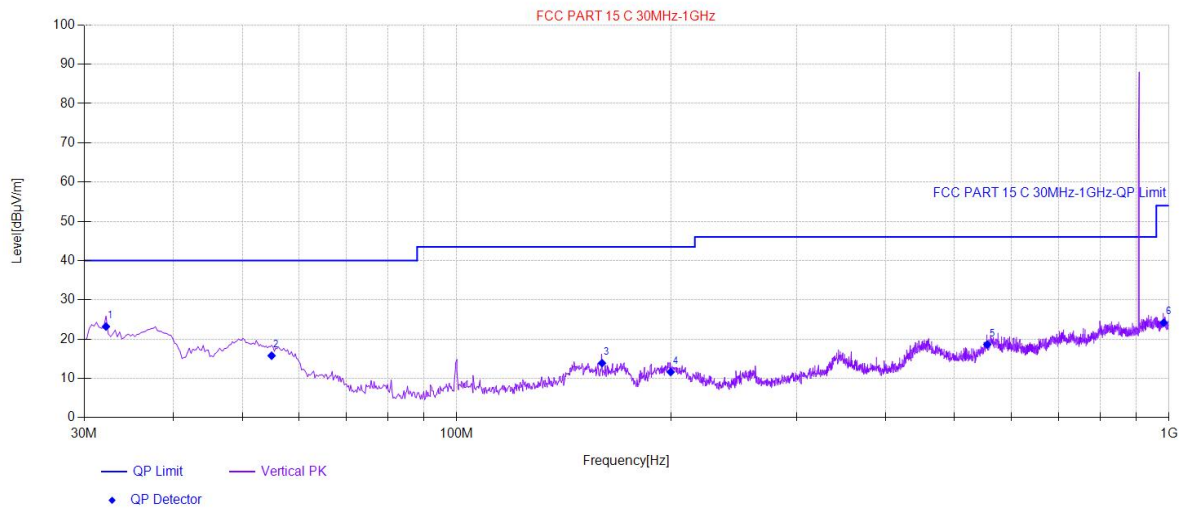


## Final Data List[QP]

| NO. | Freq.<br>[MHz] | QP<br>Reading<br>[dBμV/<br>m] | Factor<br>[dB] | QP<br>Value<br>[dBμV/m] | QP Limit<br>[dBμV/m] | QP Margin<br>[dB] | Polarity   | Verdict |
|-----|----------------|-------------------------------|----------------|-------------------------|----------------------|-------------------|------------|---------|
| 1   | 32.18          | 35.21                         | -18.22         | 16.99                   | 40.00                | 23.01             | Horizontal | PASS    |
| 2   | 60.07          | 28.49                         | -17.81         | 10.68                   | 40.00                | 29.32             | Horizontal | PASS    |
| 3   | 171.86         | 27.45                         | -16.44         | 11.01                   | 43.50                | 32.49             | Horizontal | PASS    |
| 4   | 196.84         | 42.17                         | -18.60         | 23.57                   | 43.50                | 19.93             | Horizontal | PASS    |
| 5   | 549.19         | 26.29                         | -9.40          | 16.89                   | 46.00                | 29.11             | Horizontal | PASS    |
| 6   | 941.80         | 26.12                         | -2.36          | 23.76                   | 46.00                | 22.24             | Horizontal | PASS    |

**Test Results (30~1000MHz)**

Test Mode: CH1  
Power Source: AC 120V/60Hz  
Polarization: Horizontal  
Temp.(°C)/Hum.(%RH): 24.5°C/52%RH

**Final Data List[QP]**

| NO. | Freq.<br>[MHz] | QP<br>Reading<br>[dBμV/<br>m] | Factor<br>[dB] | QP<br>Value<br>[dBμV/m] | QP Limit<br>[dBμV/m] | QP Margin<br>[dB] | Polarity | Verdict |
|-----|----------------|-------------------------------|----------------|-------------------------|----------------------|-------------------|----------|---------|
| 1   | 32.18          | 41.42                         | -18.22         | 23.20                   | 40.00                | 16.80             | Vertical | PASS    |
| 2   | 54.98          | 33.67                         | -17.89         | 15.78                   | 40.00                | 24.22             | Vertical | PASS    |
| 3   | 159.98         | 29.73                         | -15.85         | 13.88                   | 43.50                | 29.62             | Vertical | PASS    |
| 4   | 199.75         | 30.45                         | -18.82         | 11.63                   | 43.50                | 31.87             | Vertical | PASS    |
| 5   | 555.74         | 27.96                         | -9.31          | 18.65                   | 46.00                | 27.35             | Vertical | PASS    |
| 6   | 983.03         | 25.88                         | -1.72          | 24.16                   | 54.00                | 29.84             | Vertical | PASS    |

Note: 1. All test mode have been tested. Only the worst case have been recorded in the report.  
2. QP Margin[dB] = QP Limit[dBμV/m] - QP Value[dBμV/m], QP Value[dBμV/m] = QP Reading[dBμV] + Factor[dB/m].



## Test Frequency 1GHz-10GHz

### CH0:

| Frequency | Antenna | Reading | Cable Loss | Ant Factor | Amplifier | Level    | Limits   | Margin | Det. |
|-----------|---------|---------|------------|------------|-----------|----------|----------|--------|------|
| (MHz)     | Pol.    | (dBuV)  | (dB)       | (dB/m)     | (dB)      | (dBuV/m) | (dBuV/m) | (dB)   | Mode |
| 1816.84   | H       | 47.95   | 6.58       | 34.04      | 34.09     | 54.48    | 74       | 19.52  | PK   |
| 1816.84   | H       | 32.52   | 6.58       | 34.04      | 34.09     | 39.05    | 54       | 14.95  | AV   |
| 2725.26   | H       | 39.83   | 7.73       | 37.11      | 34.79     | 49.88    | 74       | 24.12  | PK   |
| 2725.26   | H       | 35.13   | 7.73       | 37.11      | 34.79     | 45.18    | 54       | 8.82   | AV   |
| 1816.84   | V       | 41.44   | 6.58       | 35.28      | 34.09     | 49.21    | 74       | 24.79  | PK   |
| 1816.84   | V       | 24.32   | 6.58       | 35.28      | 34.09     | 32.09    | 54       | 21.91  | AV   |
| 2725.26   | V       | 39.34   | 7.73       | 39.31      | 34.79     | 51.59    | 74       | 22.41  | PK   |
| 2725.26   | V       | 22.67   | 7.73       | 39.31      | 34.79     | 34.92    | 54       | 19.08  | AV   |

### Fundamental

| Frequency | Antenna | Reading | Factor | Results  | Limits   | Det. |
|-----------|---------|---------|--------|----------|----------|------|
| (MHz)     | Pol.    | (dBuV)  | (dB/m) | (dBuV/m) | (dBuV/m) | Mode |
| 908.40    | H       | 87.16   | 3.01   | 90.17    | 94       | QP   |
| 908.40    | V       | 86.39   | 3.01   | 89.40    | 94       | QP   |

Note: 1. The testing has been conformed to  $10 \times 908.40 \text{ MHz} = 9084 \text{ MHz}$ .

- All other emissions more than 30dB below the limit.
- Factor = Antenna Factor + Cable Loss – Pre-amplifier.  
Emission Level = Reading + Factor  
Margin=Limit-Emission Level



| Frequency | Antenna | Reading  | Cable Loss | Ant Factor | Amplifier | Level    | Limits   | Margin | Det. |
|-----------|---------|----------|------------|------------|-----------|----------|----------|--------|------|
| (MHz)     | Pol.    | (dBuV/m) | (dB)       | (dB/m)     | (dB)      | (dBuV/m) | (dBuV/m) | (dB)   | Mode |
| 1816.84   | H       | 46.00    | 6.58       | 34.04      | 34.09     | 52.53    | 74       | 21.47  | PK   |
| 1816.84   | H       | 30.14    | 6.58       | 34.04      | 34.09     | 36.67    | 54       | 17.33  | AV   |
| 2725.26   | H       | 42.34    | 7.73       | 37.11      | 34.79     | 52.39    | 74       | 21.61  | PK   |
| 2725.26   | H       | 33.20    | 7.73       | 37.11      | 34.79     | 43.25    | 54       | 10.75  | AV   |
| 1816.84   | V       | 41.13    | 6.58       | 35.28      | 34.09     | 48.90    | 74       | 25.10  | PK   |
| 1816.84   | V       | 25.41    | 6.58       | 35.28      | 34.09     | 33.18    | 54       | 20.82  | AV   |
| 2725.26   | V       | 38.70    | 7.73       | 39.31      | 34.79     | 50.95    | 74       | 23.05  | PK   |
| 2725.26   | V       | 24.91    | 7.73       | 39.31      | 34.79     | 37.16    | 54       | 16.84  | AV   |

## Fundamental

| Frequency | Antenna | Reading | Factor | Results  | Limits   | Det. |
|-----------|---------|---------|--------|----------|----------|------|
| (MHz)     | Pol.    | (dBuV)  | (dB/m) | (dBuV/m) | (dBuV/m) | Mode |
| 908.42    | H       | 86.35   | 3.01   | 89.36    | 94       | QP   |
| 908.42    | V       | 86.59   | 3.01   | 89.6     | 94       | QP   |

Note: 1. The testing has been conformed to  $10 \times 908.42 \text{ MHz} = 9084.2 \text{ MHz}$ .

2. All other emissions more than 30dB below the limit.

3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

Margin=Limit-Emission Level





## CH2:

| Frequency | Antenna | Reading | Cable Loss | Ant Factor | Amplifier | Level    | Limits   | Margin | Det. |
|-----------|---------|---------|------------|------------|-----------|----------|----------|--------|------|
| (MHz)     | Pol.    | (dBuV)  | (dB)       | (dB/m)     | (dB)      | (dBuV/m) | (dBuV/m) | (dB)   | Mode |
| 1832.00   | H       | 47.19   | 6.58       | 34.04      | 34.09     | 53.72    | 74       | 20.28  | PK   |
| 1832.00   | H       | 29.81   | 6.58       | 34.04      | 34.09     | 36.34    | 54       | 17.66  | AV   |
| 2748.00   | H       | 39.62   | 7.73       | 37.11      | 34.79     | 49.67    | 74       | 24.33  | PK   |
| 2748.00   | H       | 33.38   | 7.73       | 37.11      | 34.79     | 43.43    | 54       | 10.57  | AV   |
| 1832.00   | V       | 40.77   | 6.58       | 35.28      | 34.09     | 48.54    | 74       | 25.46  | PK   |
| 1832.00   | V       | 25.87   | 6.58       | 35.28      | 34.09     | 33.64    | 54       | 20.36  | AV   |
| 2748.00   | V       | 38.77   | 7.73       | 39.31      | 34.79     | 51.02    | 74       | 22.98  | PK   |
| 2748.00   | V       | 23.16   | 7.73       | 39.31      | 34.79     | 35.41    | 54       | 18.59  | AV   |

## Fundamental

| Frequency | Antenna | Reading | Factor | Results  | Limits   | Det. |
|-----------|---------|---------|--------|----------|----------|------|
| (MHz)     | Pol.    | (dBuV)  | (dB/m) | (dBuV/m) | (dBuV/m) | Mode |
| 916.00    | H       | 87.06   | 3.01   | 90.07    | 94       | QP   |
| 916.00    | V       | 86.71   | 3.01   | 89.72    | 94       | QP   |

Note: 1. The testing has been conformed to 10\*916.00MHz=9160MHz.

2. All other emissions more than 30dB below the limit.
3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.  
Emission Level = Reading + Factor  
Margin=Limit-Emission Level

**Spurious Emission in Restricted Band :**

| Test Mode: Channel 908.4MHz |                   |                     |                |                |           |              |          |
|-----------------------------|-------------------|---------------------|----------------|----------------|-----------|--------------|----------|
| Frequency (MHz)             | Read Level (dBuV) | Corr. Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Polarity H/V | Detector |
| 902.00                      | 38.49             | -2.97               | 35.52          | 46             | -10.48    | H            | Peak     |
| 902.00                      | 39.73             | -2.97               | 36.76          | 46             | -9.24     | V            | Peak     |

| Test Mode: Channel 916MHz |                   |                     |                |                |           |              |          |
|---------------------------|-------------------|---------------------|----------------|----------------|-----------|--------------|----------|
| Frequency (MHz)           | Read Level (dBuV) | Corr. Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Polarity H/V | Detector |
| 928.00                    | 38.88             | -2.50               | 36.38          | 46             | -9.62     | H            | Peak     |
| 928.00                    | 36.55             | -2.50               | 34.05          | 46             | -11.95    | V            | Peak     |

**Note:**

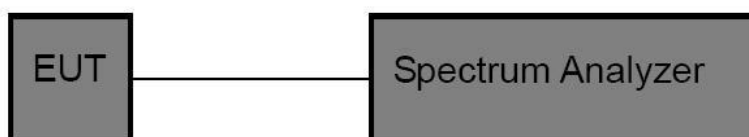
1. Correction Factor = Antenna factor + Cable loss - Preamplifier.
2. Level = Read Level + Corr. Factor.
3. Over = Level - Limit.

## 8. 20dB Bandwidth Test

### 8.1. Test Standard and Limit

|               |                             |
|---------------|-----------------------------|
| Test Standard | FCC Part15 C Section 15.249 |
|---------------|-----------------------------|

### 8.2. Test Setup



### 8.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
  - RBW in the range of 1% to 5% of the OBW,  $VBW \geq 3 \times RBW$ ,
  - Detector= Average
  - Trace mode= Max hold.
  - Sweep- auto couple.
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

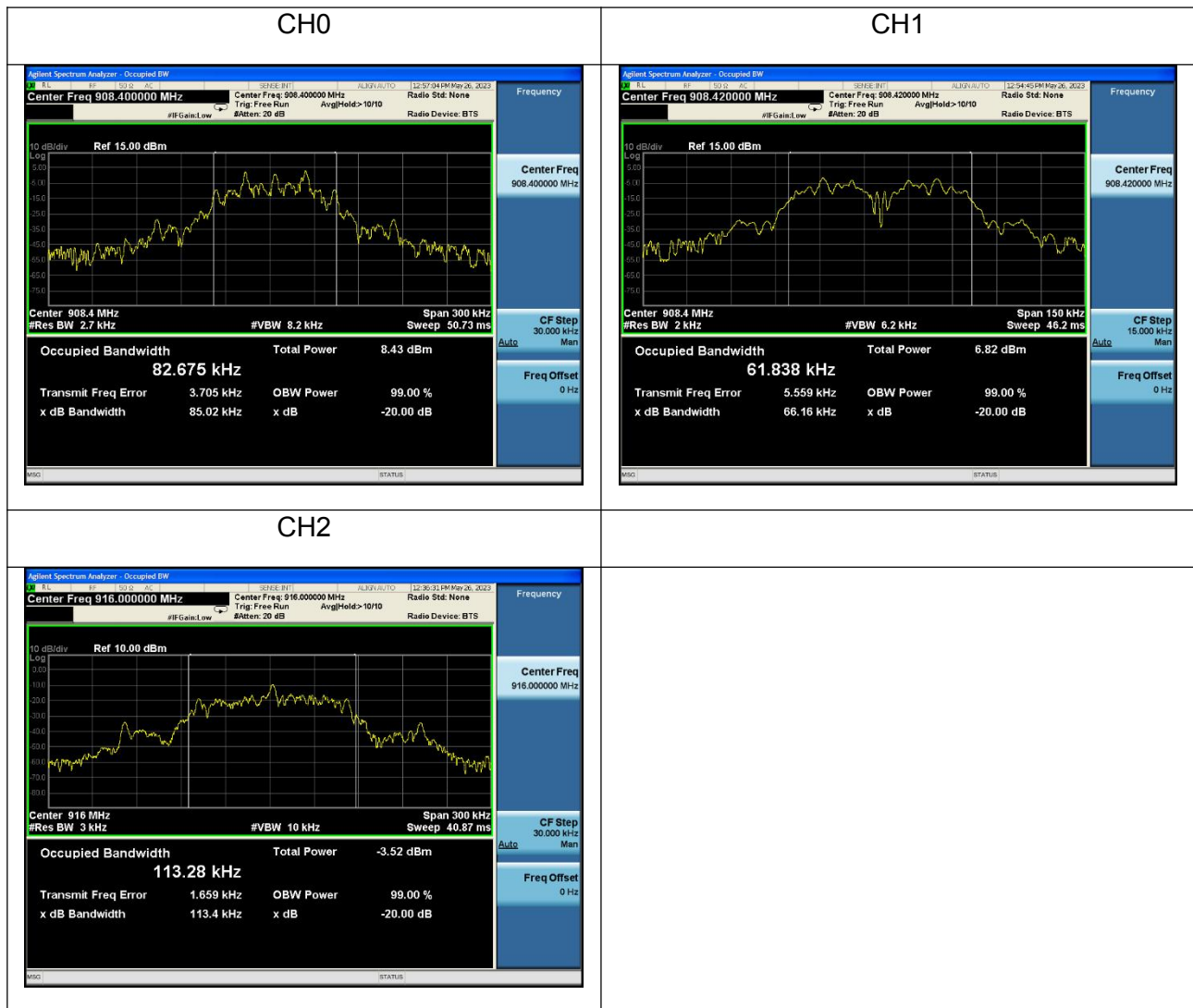
### 8.4. Test Data

|              |   |                |             |   |        |
|--------------|---|----------------|-------------|---|--------|
| Test Item    | : | 20dB Bandwidth | Test Mode   | : | Mode 1 |
| Test Voltage | : | AC 120/60Hz    | Temperature | : | 22.4°C |
| Test Result  | : | PASS           | Humidity    | : | 55%RH  |



| Channel | Frequency (MHz) | 20dB Bandwidth(kHz) | Result |
|---------|-----------------|---------------------|--------|
| CH0     | 908.40          | 85.02               | PASS   |
| CH1     | 908.42          | 66.16               | PASS   |
| CH2     | 916.00          | 113.4               | PASS   |

Test Graphs:





## 9. Antenna Requirement

### 9.1. Test Standard and Requirement

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Standard | FCC Part15 Section 15.203                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Requirement   | <p>1) 15.203 requirement:</p> <p>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, 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.</p> |

### 9.2. Antenna Connected Construction

The antenna is a PCB antenna which permanently attached, and the best case gain of the antenna is -6.16 dBi. It complies with the standard requirement.

## 10 TEST PHOTO

### CONDUCTED EMISSION TEST



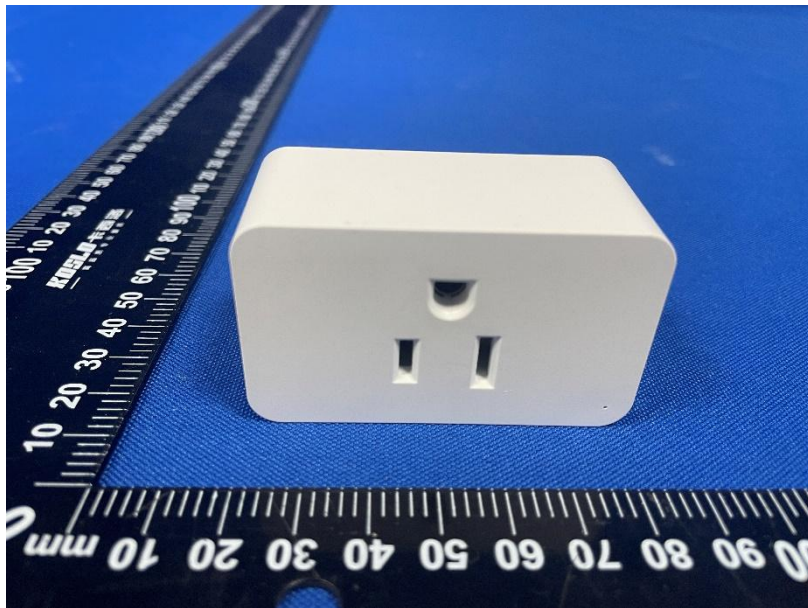
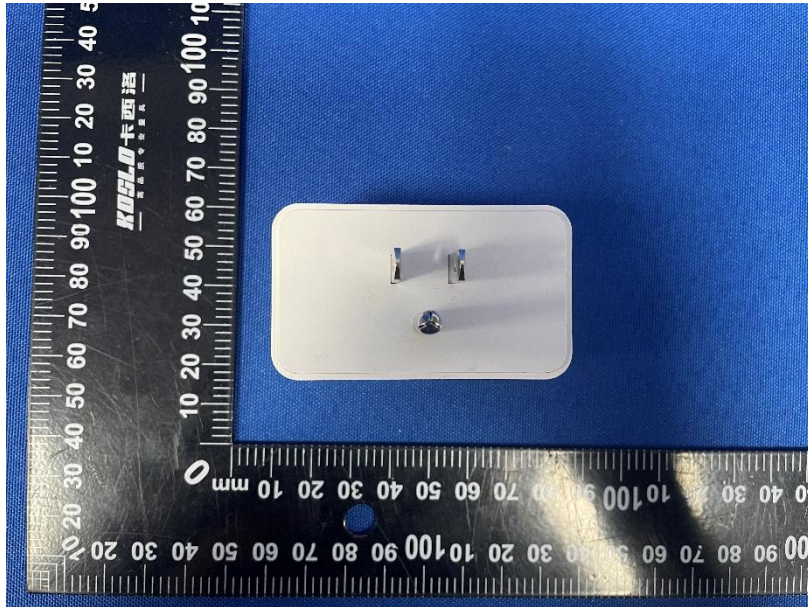
### RADIATED EMISSION TEST





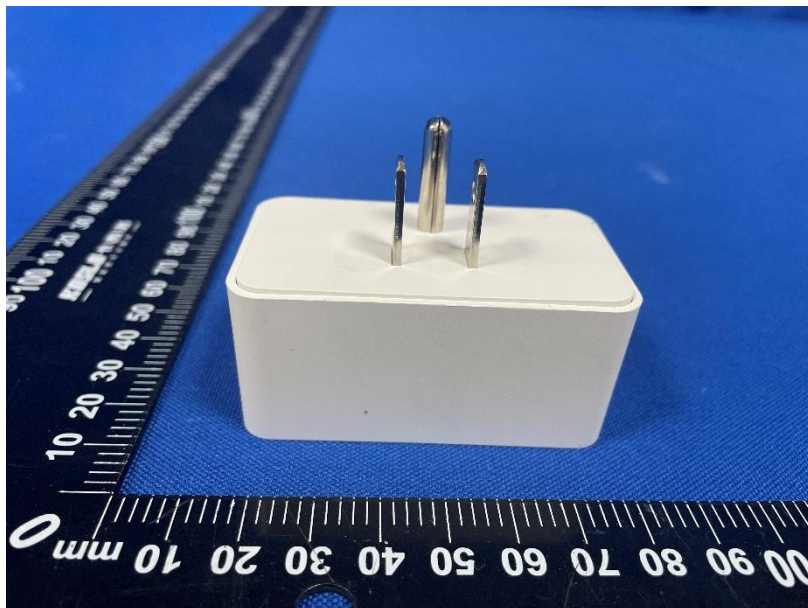
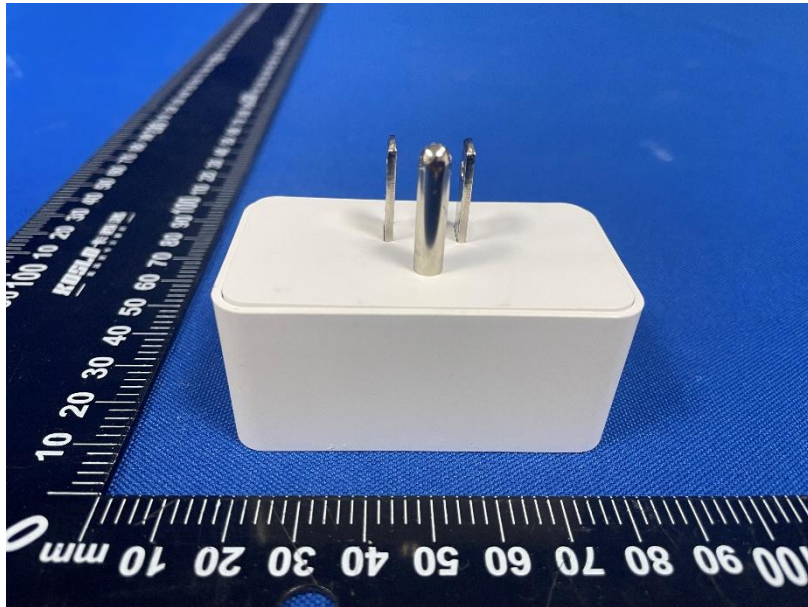


## 11 EUT PHOTO

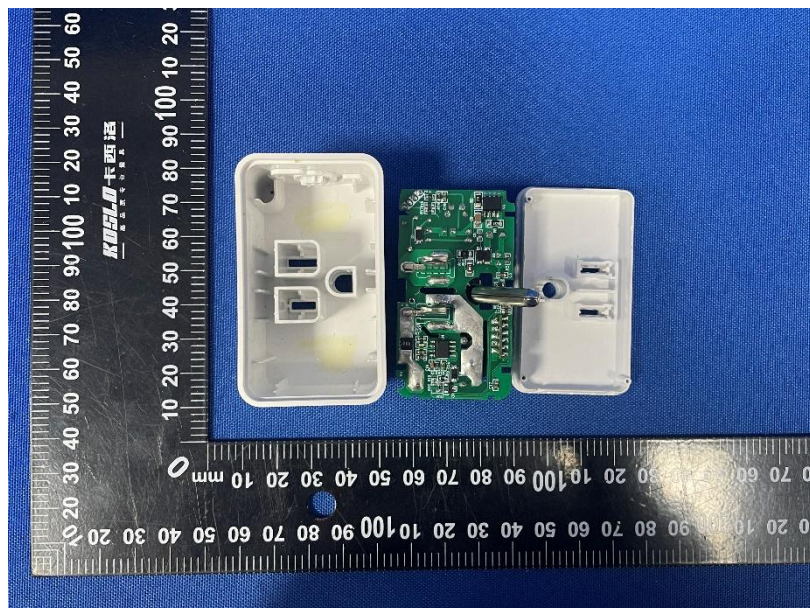
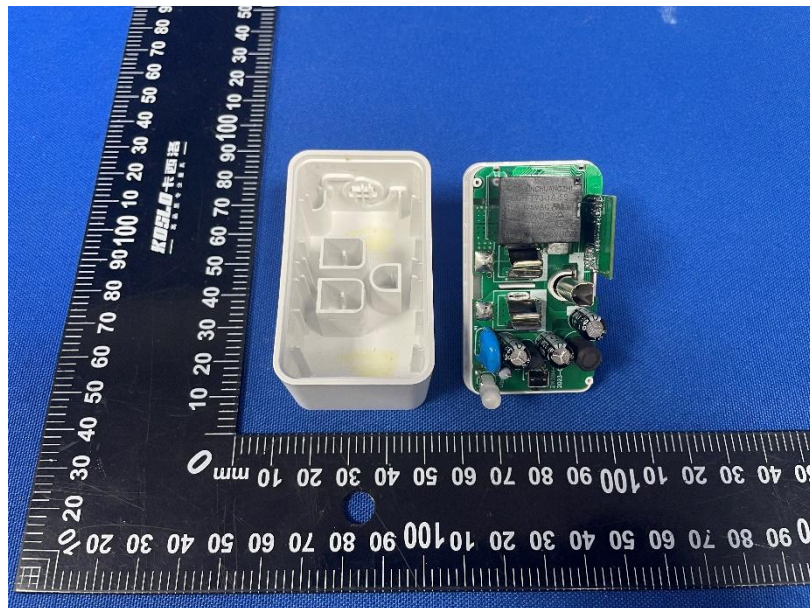


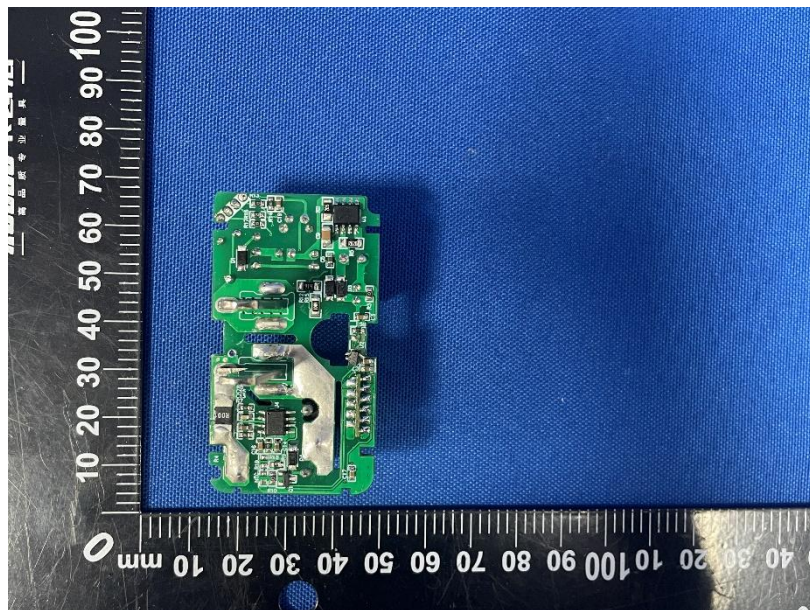
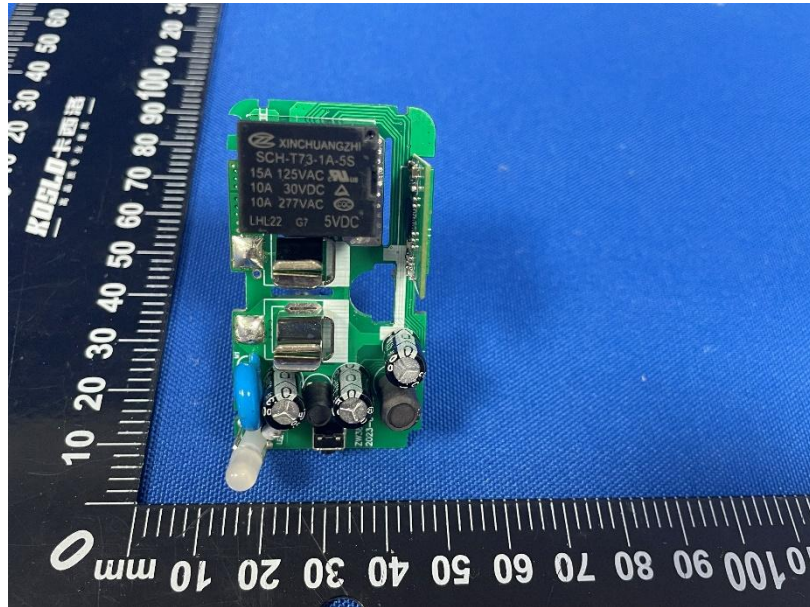




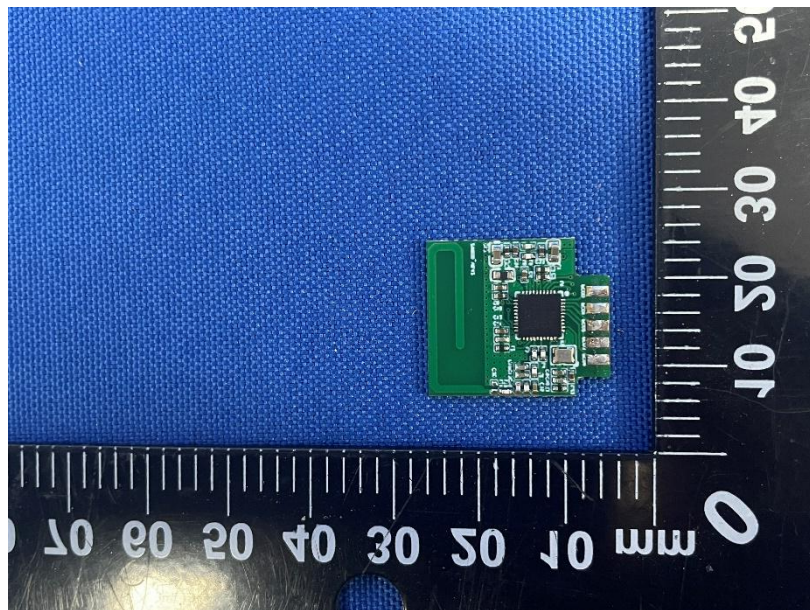
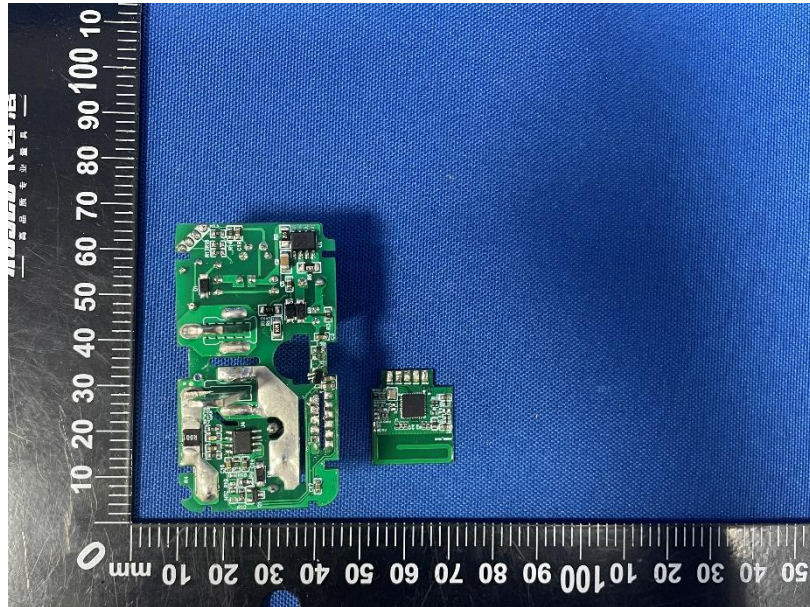


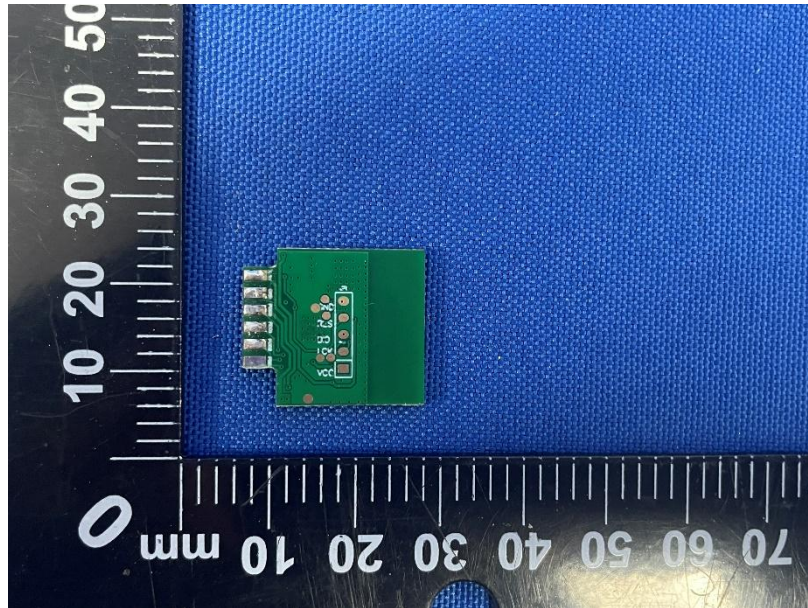












\*\*\*\*\*THE END REPORT\*\*\*\*\*