

# FCC TEST REPORT

Report No.: ARFR-19OC2067VTSHPB-2

Test Model: SC021-WR2

Received: Oct.24, 2019

ISSUED: Dec.10, 2019

Applicant: Hangzhou Tuya Information Technology Co., Ltd

Address: Room701, Building3, More Center, No.87 GuDun Road, Hangzhou,  
Zhejiang, China

Issued By: BUREAU VERITAS ADT (Shanghai) Corporation

Lab Location: No. 829, Xinzhuan Road, Shanghai, P.R.China (201612)

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## 1. TEST PROGRAM

**PRODUCT:** Video Doorbell  
**TEST MODEL:** SC021-WR2  
**SERIES MODEL:** --  
**APPLICANT:** Hangzhou Tuya Information Technology Co., Ltd  
**TESTED:** Nov.07 to Nov.17, 2019  
**STANDARDS:** 47 CFR FCC Part15, Subpart B, Class B  
ANSI C63.4:2014

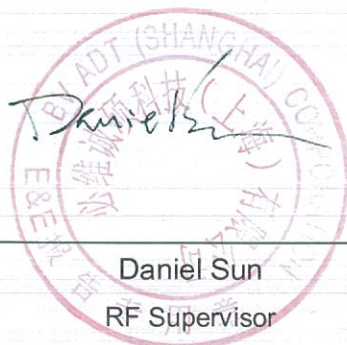
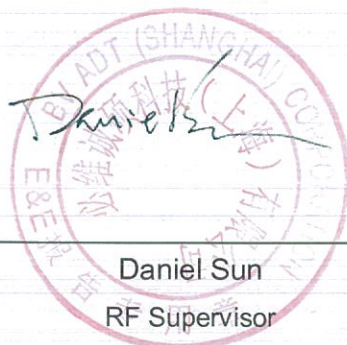
We, BUREAU VERITAS ADT (Shanghai) Corporation, declare that the equipment above has been tested and found compliance with the requirement limits of applicable standards. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate under the standards herein specified.



**PREPARED BY :** \_\_\_\_\_, **DATE:** Dec.10, 2019

Will YAN

Project Engineer



**APPROVED BY :** \_\_\_\_\_, **DATE:** Dec.10, 2019

Daniel Sun  
RF Supervisor



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## 2. Summary of Test Procedure and Test Results

| EMISSION(47 CFR FCC Part15, Subpart B) |                                     |                                |
|----------------------------------------|-------------------------------------|--------------------------------|
| Test Item                              | Normative References                | Test Result                    |
| Conducted Emission                     | 47 CFR FCC Part15, Subpart B 15.107 | Meets the Class B requirements |
| Radiated Emission                      | 47 CFR FCC Part15, Subpart B 15.109 | Meets the Class B requirements |

Special Comment: All tests were performed on 120Vac 60Hz.



### 3. Test Configuration of Equipment under Test

#### 3.1 Manufacturer information

Manufacturer : Hangzhou Tuya Information Technology Co., Ltd

Address : Room701, Building3, More Center, No.87 GuDun Road, Hangzhou, Zhejiang,  
China

#### 3.2 Feature of Equipment under Test

|                    |                         |
|--------------------|-------------------------|
| Product Name:      | Video Doorbell          |
| Test Model:        | SC021-WR2               |
| Series Model:      | --                      |
| Model Discrepancy: | --                      |
| EUT Power Rating:  | 12-24Vac~,50/60Hz, 0.2A |

Note: Please refer to user manual.

#### 3.3 Description of support units

| NO. | PRODUCT         | BRAND | MODEL NO. |
|-----|-----------------|-------|-----------|
| 1   | Mechanical bell | --    | --        |
| 2   | Mobile Phone    | Vivo  | --        |
| 3   | Cable           | --    | --        |

### 3.4 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

This listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

| Measurement         |               | Value   |
|---------------------|---------------|---------|
| Conducted emissions |               | 2.55 dB |
| Radiated emissions  | 30 MHz ~ 1GHz | 3.22 dB |
|                     | Above 1GHz    | 2.89 dB |

## 4 Test of Conducted Emission

### 4.1 Test Limit

**TEST STANDARD:**

**CFR 47 FCC Part 15, Subpart B (Section: 15.107)**

| FREQUENCY (MHz) | Class A (dBμV) |         | Class B (dBμV) |         |
|-----------------|----------------|---------|----------------|---------|
|                 | Quasi-peak     | Average | Quasi-peak     | Average |
| 0.15 - 0.5      | 79             | 66      | 66 - 56        | 56 - 46 |
| 0.50 - 5.0      | 73             | 60      | 56             | 46      |
| 5.0 - 30.0      | 73             | 60      | 60             | 50      |

- NOTES:**
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 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

## 4.2 Test Procedures

#### 4.4 Measurement Equipment

| DESCRIPTION & MANUFACTURER       | MODEL NO.       | SERIAL NO. | CALIBRATED UNTIL |
|----------------------------------|-----------------|------------|------------------|
| Test Receiver<br>ROHDE & SCHWARZ | ESCS30          | E1R1001    | Mar.04, 2020     |
| LISN<br>ROHDE & SCHWARZ          | ENV216          | E1L1011    | Jul.17, 2020     |
| Software<br>ADT                  | ADT_Cond_V7.3.0 | N/A        | N/A              |



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## 4.5 Test Result and Data

### a. Conducted Emission Test Data

Phase : LINE

Location: Conduction 1

Date: 11/8/2019

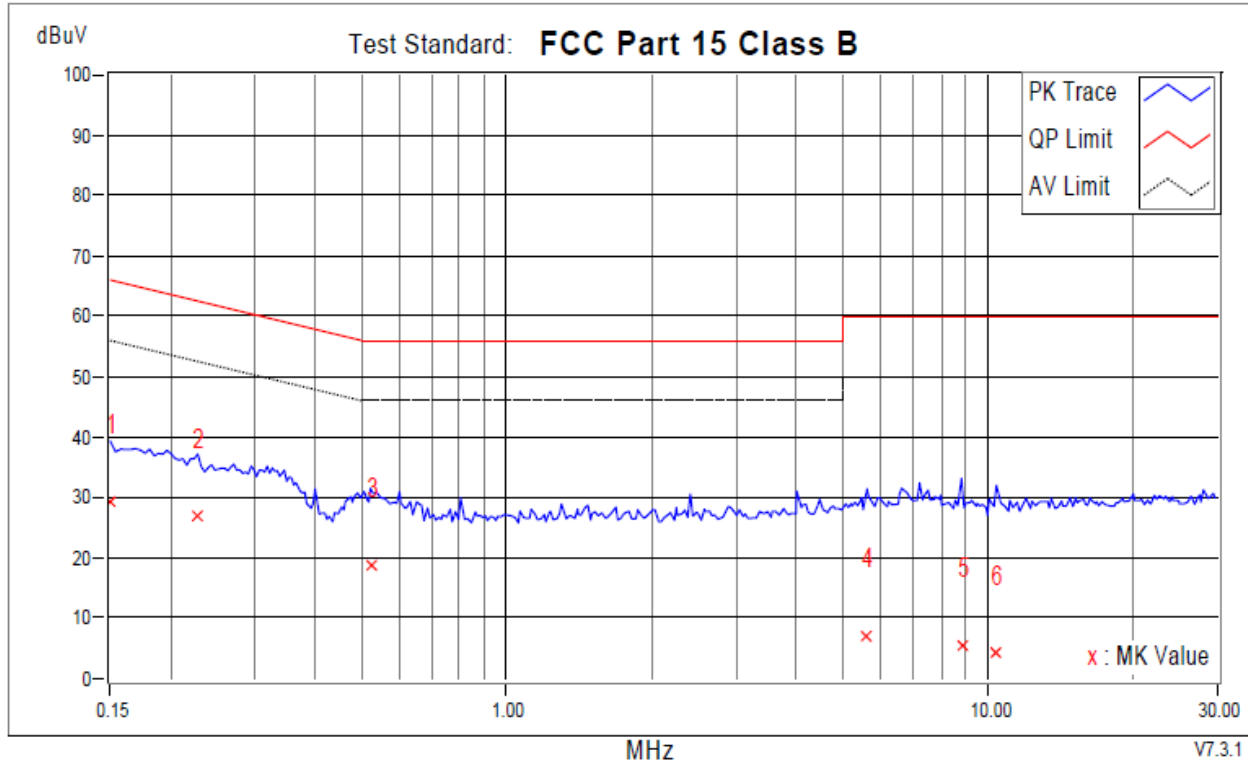
Time: 4:16:52 PM

Phase L1

Temperatuer (C): 22

Humidity (%): 48

Approved by:



| No. | Frequency | Corr. Factor | Reading dBuV |        | Emission dBuV |       | Limit dBuV |       | Margins dB |        | Notes |
|-----|-----------|--------------|--------------|--------|---------------|-------|------------|-------|------------|--------|-------|
|     | MHz       | dB           | QP           | AV     | QP            | AV    | QP         | AV    | QP         | AV     |       |
| 1   | 0.15000   | 9.84         | 19.35        | -6.36  | 29.19         | 3.48  | 66.00      | 56.00 | -36.81     | -52.52 |       |
| +2  | 0.22820   | 9.81         | 17.15        | -8.35  | 26.96         | 1.46  | 62.51      | 52.51 | -35.55     | -51.05 |       |
| 3   | 0.52145   | 9.71         | 9.21         | -12.01 | 18.92         | -2.30 | 56.00      | 46.00 | -37.08     | -48.30 |       |
| 4   | 5.61771   | 10.09        | -2.94        | -8.08  | 7.15          | 2.01  | 60.00      | 50.00 | -52.85     | -47.99 |       |
| 5   | 8.83173   | 10.31        | -4.71        | -9.37  | 5.60          | 0.94  | 60.00      | 50.00 | -54.40     | -49.06 |       |
| 6   | 10.43792  | 10.40        | -6.21        | -10.87 | 4.19          | -0.47 | 60.00      | 50.00 | -55.81     | -50.47 |       |

### REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



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Phase : NEUTRAL

Location: Conduction 1

Date: 11/8/2019

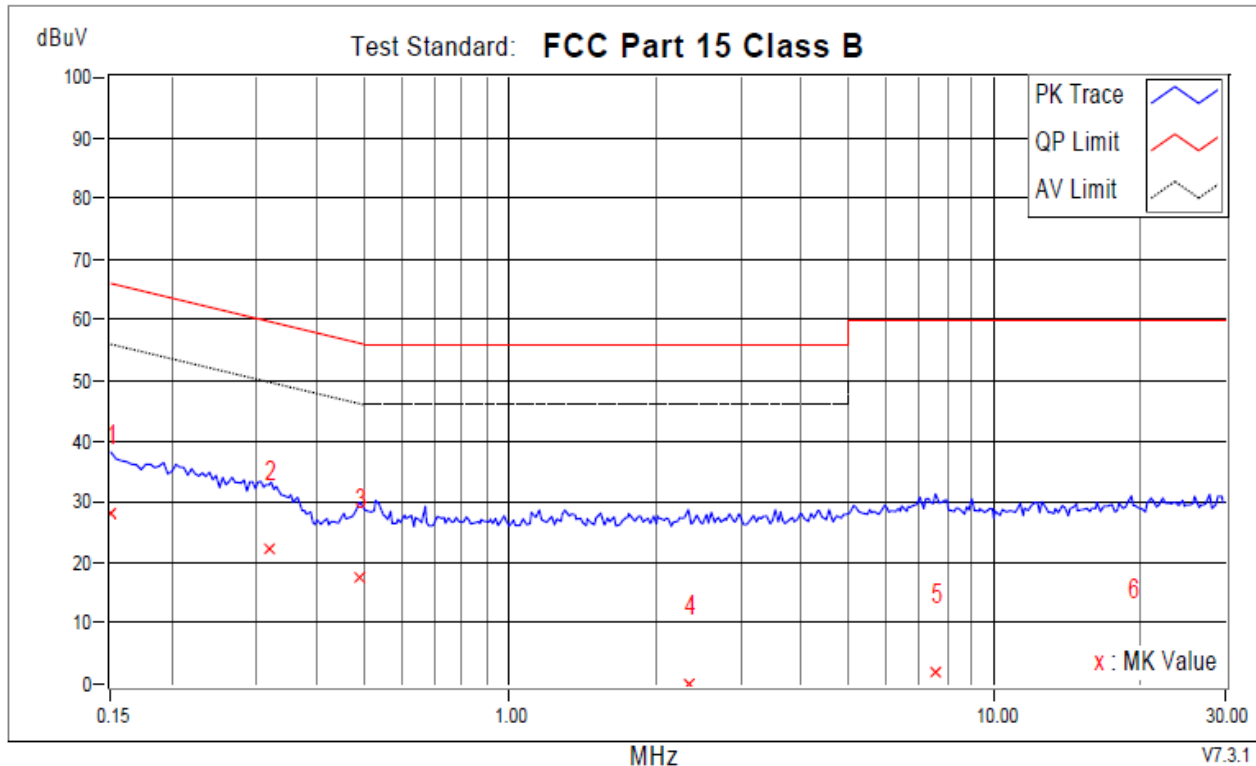
Time: 4:04:31 PM

Phase N

Temperatuer (C): 22

Humidity (%): 48

Approved by:



|     | Frequency | Corr.<br>Factor | Reading<br>dBuV |        | Emission<br>dBuV |       | Limit<br>dBuV |       | Margins<br>dB |        | Notes |
|-----|-----------|-----------------|-----------------|--------|------------------|-------|---------------|-------|---------------|--------|-------|
| No. | MHz       | dB              | QP              | AV     | QP               | AV    | QP            | AV    | QP            | AV     |       |
| 1   | 0.15000   | 9.85            | 18.30           | -6.62  | 28.15            | 3.23  | 66.00         | 56.00 | -37.85        | -52.77 |       |
| +2  | 0.31813   | 9.87            | 12.45           | -10.61 | 22.32            | -0.74 | 59.76         | 49.76 | -37.44        | -50.50 |       |
| 3   | 0.49017   | 9.84            | 7.62            | -11.72 | 17.46            | -1.88 | 56.16         | 46.16 | -38.70        | -48.04 |       |
| 4   | 2.34113   | 9.97            | -9.96           | -14.17 | 0.01             | -4.20 | 56.00         | 46.00 | -55.99        | -50.20 |       |
| 5   | 7.58053   | 10.20           | -8.08           | -12.48 | 2.12             | -2.28 | 60.00         | 50.00 | -57.88        | -52.28 |       |
| 6   | 19.25888  | 10.39           | -7.69           | -12.24 | 2.70             | -1.85 | 60.00         | 50.00 | -57.30        | -51.85 |       |

**REMARKS:**

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

#### 4.6 Test Photographs



## 5 Test of Radiated Emission

### 5.1 Test Limit

**TEST STANDARD:**

**CFR 47 FCC Part 15, Subpart B (Section: 15.109)**

#### **FOR FREQUENCY BELOW 1000 MHz**

| FREQUENCY (MHz) | Class A (at 10m) |                          | Class B (at 3m) |                          |
|-----------------|------------------|--------------------------|-----------------|--------------------------|
|                 | $\mu\text{V/m}$  | $\text{dB}\mu\text{V/m}$ | $\mu\text{V/m}$ | $\text{dB}\mu\text{V/m}$ |
| 30 – 88         | 90               | 39.1                     | 100             | 40.0                     |
| 88 – 216        | 150              | 43.5                     | 150             | 43.5                     |
| 216 – 960       | 210              | 46.4                     | 200             | 46.0                     |
| 960 – 1000      | 300              | 49.5                     | 500             | 54.0                     |

#### **LIMIT OF RADIATED EMISSION OF FCC PART 15, SUBPART B FOR FREQUENCY ABOVE 1000 MHz**

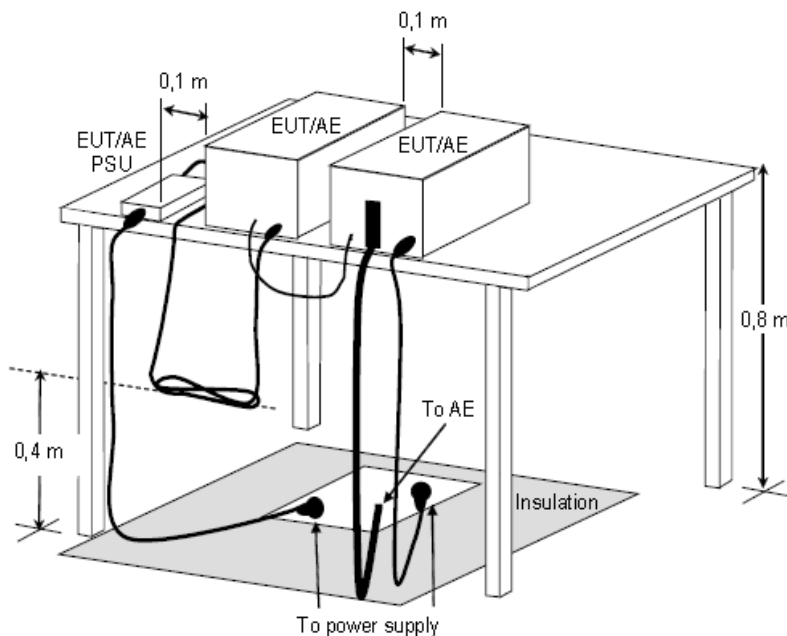
| FREQUENCY (MHz) | Class A ( $\text{dB}\mu\text{V/m}$ ) (at 3m) |         | Class B ( $\text{dB}\mu\text{V/m}$ ) (at 3m) |         |
|-----------------|----------------------------------------------|---------|----------------------------------------------|---------|
|                 | PEAK                                         | AVERAGE | PEAK                                         | AVERAGE |
| Above 1000      | 80.0                                         | 60.0    | 74.0                                         | 54.0    |

- Note:** (1) The lower limit shall apply at the transition frequencies.  
 (2) Emission level ( $\text{dB}\mu\text{V/m}$ ) =  $20 \log$  Emission level ( $\mu\text{V/m}$ ).  
 (3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

## 5.2 Test Procedures

- The EUT was placed on a rotatable table top 0.8 meter above ground.
- The EUT was set 3/10 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

## 5.3 Typical Test Setup



**Figure D.8 – Example measurement arrangement for table-top EUT  
(Radiated emission measurement)**

## 5.4 Measurement Equipment

| DESCRIPTION & MANUFACTURER                             | MODEL NO.   | SERIAL NO. | CALIBRATED UNTIL |
|--------------------------------------------------------|-------------|------------|------------------|
| EMI Test Spectrum<br>ROHDE & SCHWARZ                   | ESR7        | E1R1005    | Dec.02, 2019     |
| Spectrum Analyzer<br>Keysight                          | N9030B      | E1S1003    | Jul.22, 2020     |
| Broad-Band Antenna<br>Schwarzbeck                      | VULB9168    | E1A1012    | Aug.25, 2020     |
| Double Riaged Vroadband Horn<br>Antenna<br>Schwarzbeck | BBHA9120D   | E1A1017    | Jan.26, 2020     |
| Preamplifier<br>Agilent                                | 8447D       | E1A2001    | Oct.13, 2020     |
| Preamplifier<br>Agilent                                | EMC051845SE | E1A2009    | Jul.18, 2020     |

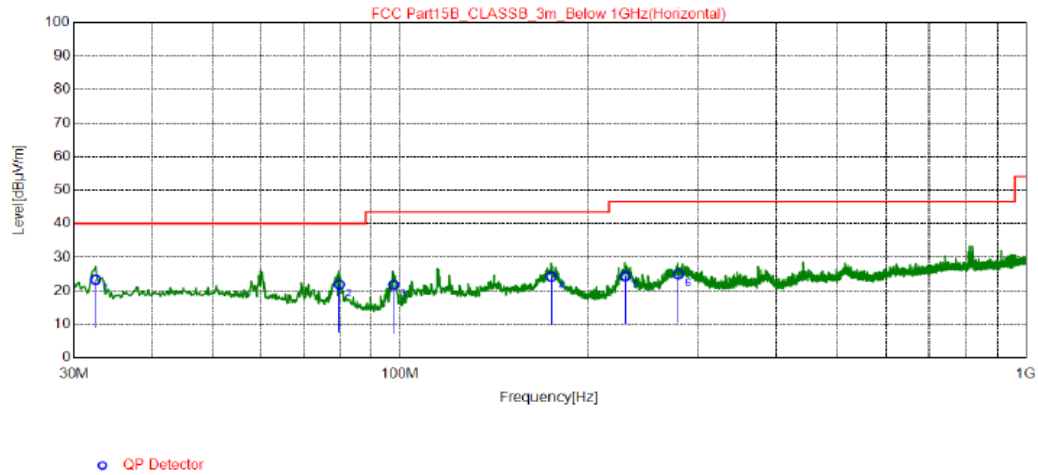


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## 5.5 Test Result and Data (30MHz ~ 1GHz)

Position: Horizontal

### Test Graph



| NO. | Freq.<br>[MHz] | QP Reading<br>[dB μV/m] | Factor<br>[dB] | QP Value<br>[dB μV/m] | QP Limit<br>[dB μV/m] | QP Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   |
|-----|----------------|-------------------------|----------------|-----------------------|-----------------------|-------------------|----------------|--------------|------------|
| 1   | 32.52          | 33.65                   | -10.39         | 23.26                 | 40.00                 | 16.74             | 100            | 343          | Horizontal |
| 2   | 79.85          | 35.58                   | -13.73         | 21.85                 | 40.00                 | 18.15             | 100            | 23           | Horizontal |
| 3   | 97.51          | 35.51                   | -13.72         | 21.79                 | 43.50                 | 21.71             | 100            | 324          | Horizontal |
| 4   | 174.5          | 34.51                   | -10.33         | 24.18                 | 43.50                 | 19.32             | 200            | 186          | Horizontal |
| 5   | 229.2          | 35.53                   | -11.15         | 24.38                 | 46.50                 | 22.12             | 100            | 321          | Horizontal |
| 6   | 278.9          | 34.62                   | -9.72          | 24.90                 | 46.50                 | 21.60             | 100            | 331          | Horizontal |

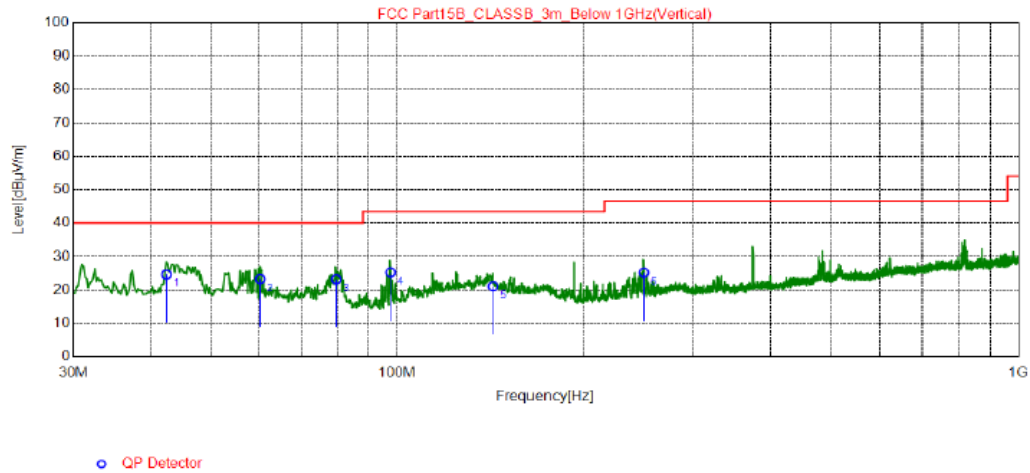
### REMARKS:

1. Q.P. is abbreviation of quasi-peak individually.
2. The emission levels of other frequencies were very low against the limit.
3. QP Margin value = QP Limit value – QP value.
4. Factor = Antenna Factor + Amplifier Factor + Cable loss.
5. QP value = Factor + Reading Value.



Position: Vertical

**Test Graph**



| NO. | Freq.<br>[MHz] | QP Reading<br>[dB μV/m] | Factor<br>[dB] | QP Value<br>[dB μV/m] | QP Limit<br>[dB μV/m] | QP Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity |
|-----|----------------|-------------------------|----------------|-----------------------|-----------------------|-------------------|----------------|--------------|----------|
| 1   | 42.41          | 34.15                   | -9.52          | 24.63                 | 40.00                 | 15.37             | 100            | 136          | Vertical |
| 2   | 60.07          | 33.8                    | -10.56         | 23.24                 | 40.00                 | 16.76             | 100            | 171          | Vertical |
| 3   | 79.66          | 36.87                   | -13.70         | 23.17                 | 40.00                 | 16.83             | 100            | 136          | Vertical |
| 4   | 97.51          | 38.94                   | -13.72         | 25.22                 | 43.50                 | 18.28             | 200            | 111          | Vertical |
| 5   | 142.7          | 31.02                   | -9.94          | 21.08                 | 43.50                 | 22.42             | 100            | 190          | Vertical |
| 6   | 249.9          | 35.59                   | -10.43         | 25.16                 | 46.50                 | 21.34             | 100            | 139          | Vertical |

**REMARKS:**

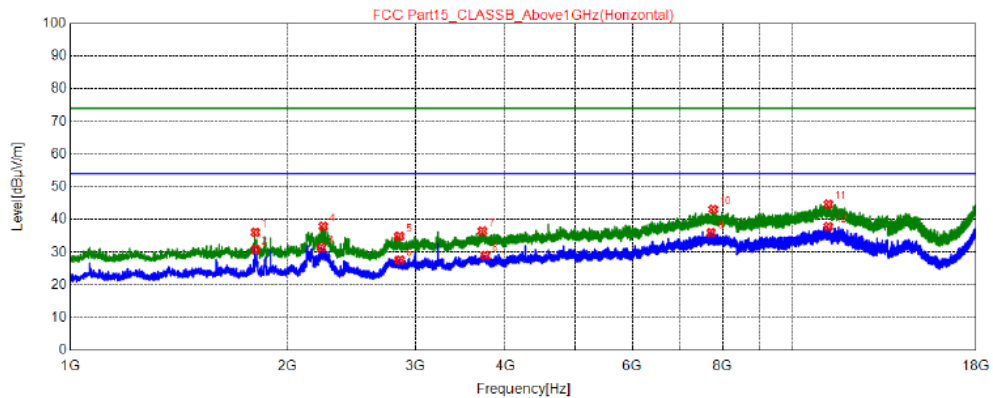
1. Q.P. is abbreviation of quasi-peak individually.
2. The emission levels of other frequencies were very low against the limit.
3. QP Margin value = QP Limit value – QP value
4. Factor = Antenna Factor + Amplifier Factor + Cable loss
5. QP value = Factor + Reading Value.



## 5.6 Test Result and Data (1GHz ~ 18GHz)

Position: Horizontal

### Test Graph



★ AV Detector

| NO. | Freq.<br>[MHz] | Reading<br>[dBμV/m] | Level<br>[dBμV/m] | Limit<br>[dBμV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity   | Detector |
|-----|----------------|---------------------|-------------------|-------------------|----------------|----------------|--------------|------------|----------|
| 1   | 1806.6500      | 53.32               | 36.12             | 74.00             | 37.88          | 100            | 330          | Horizontal | PK       |
| 2   | 1807.5000      | 48.04               | 30.85             | 54.00             | 23.15          | 100            | 298          | Horizontal | AV       |
| 3   | 2233.3500      | 47.67               | 31.38             | 54.00             | 22.62          | 100            | 330          | Horizontal | AV       |
| 4   | 2245.2500      | 54.21               | 37.94             | 74.00             | 36.06          | 100            | 236          | Horizontal | PK       |
| 5   | 2853.0000      | 49.64               | 34.87             | 74.00             | 39.13          | 100            | 330          | Horizontal | PK       |
| 6   | 2857.2500      | 42.41               | 27.65             | 54.00             | 26.35          | 100            | 298          | Horizontal | AV       |
| 7   | 3716.6000      | 48.72               | 36.51             | 74.00             | 37.49          | 100            | 330          | Horizontal | PK       |
| 8   | 3752.3000      | 41.14               | 29.01             | 54.00             | 24.99          | 100            | 204          | Horizontal | AV       |
| 9   | 7720.1000      | 39.45               | 36.03             | 54.00             | 17.97          | 100            | 360          | Horizontal | AV       |
| 10  | 7770.2500      | 46.45               | 43.13             | 74.00             | 30.87          | 100            | 360          | Horizontal | PK       |
| 11  | 11228.0500     | 43.03               | 44.69             | 74.00             | 29.31          | 100            | 360          | Horizontal | PK       |
| 12  | 11228.9000     | 36.18               | 37.84             | 54.00             | 16.16          | 100            | 330          | Horizontal | AV       |

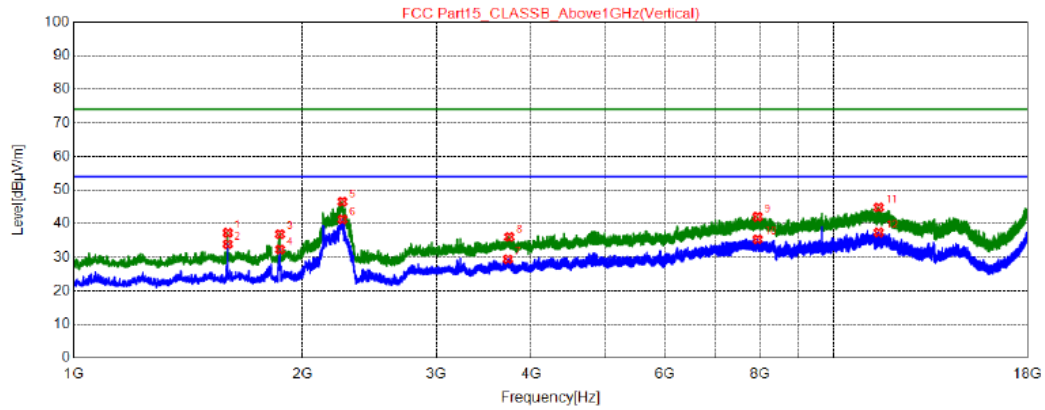
### REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin = Limit –Level



Position: Vertical

Test Graph



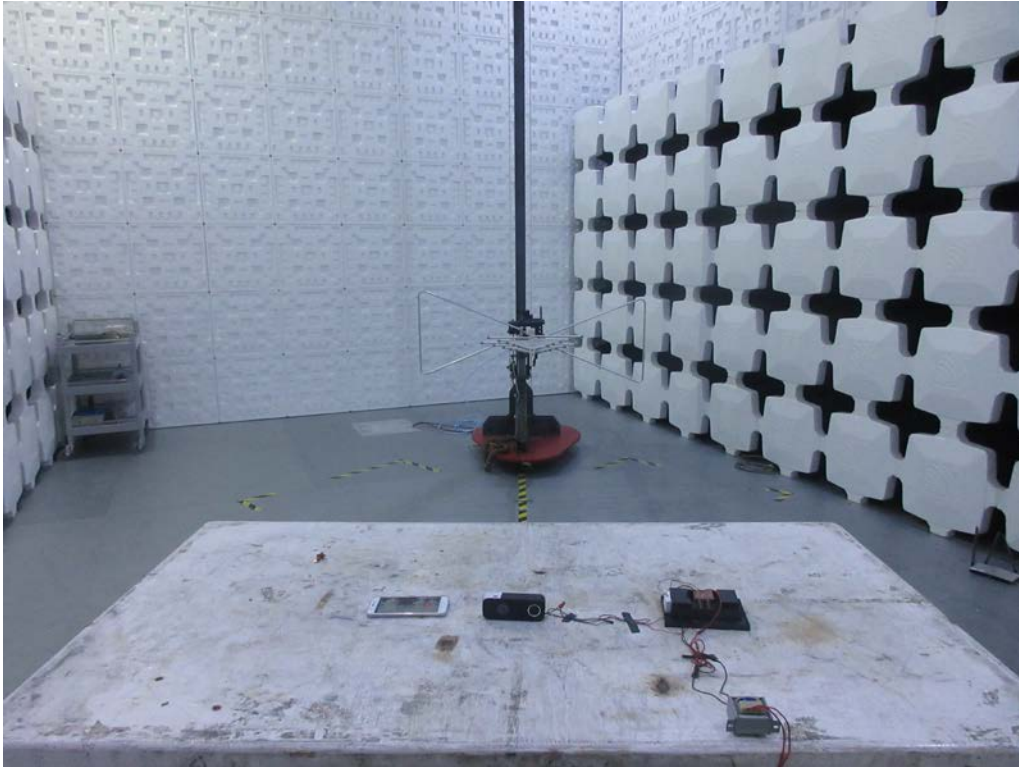
\* AV Detector

| NO. | Freq.<br>[MHz] | Reading<br>[dBμV/m] | Level<br>[dBμV/m] | Limit<br>[dBμV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[°] | Polarity | Detector |
|-----|----------------|---------------------|-------------------|-------------------|----------------|----------------|--------------|----------|----------|
| 1   | 1595.0000      | 54.91               | 37.24             | 74.00             | 36.76          | 100            | 281          | Vertical | PK       |
| 2   | 1595.0000      | 51.55               | 33.88             | 54.00             | 20.12          | 100            | 312          | Vertical | AV       |
| 3   | 1867.8500      | 53.91               | 36.84             | 74.00             | 37.16          | 100            | 156          | Vertical | PK       |
| 4   | 1868.7000      | 49.35               | 32.28             | 54.00             | 21.72          | 100            | 187          | Vertical | AV       |
| 5   | 2257.1500      | 62.74               | 46.50             | 74.00             | 27.50          | 100            | 156          | Vertical | PK       |
| 6   | 2258.0000      | 57.49               | 41.25             | 54.00             | 12.75          | 100            | 156          | Vertical | AV       |
| 7   | 3725.9500      | 41.59               | 29.40             | 54.00             | 24.60          | 100            | 124          | Vertical | AV       |
| 8   | 3742.1000      | 48.18               | 36.03             | 74.00             | 37.97          | 100            | 249          | Vertical | PK       |
| 9   | 7937.7000      | 45.06               | 42.01             | 74.00             | 31.99          | 100            | 218          | Vertical | PK       |
| 10  | 7938.5500      | 38.36               | 35.31             | 54.00             | 18.69          | 100            | 218          | Vertical | AV       |
| 11  | 11454.1500     | 43.14               | 44.82             | 74.00             | 29.18          | 100            | 93           | Vertical | PK       |
| 12  | 11454.1500     | 35.66               | 37.34             | 54.00             | 16.66          | 100            | 124          | Vertical | AV       |

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin = Limit –Level

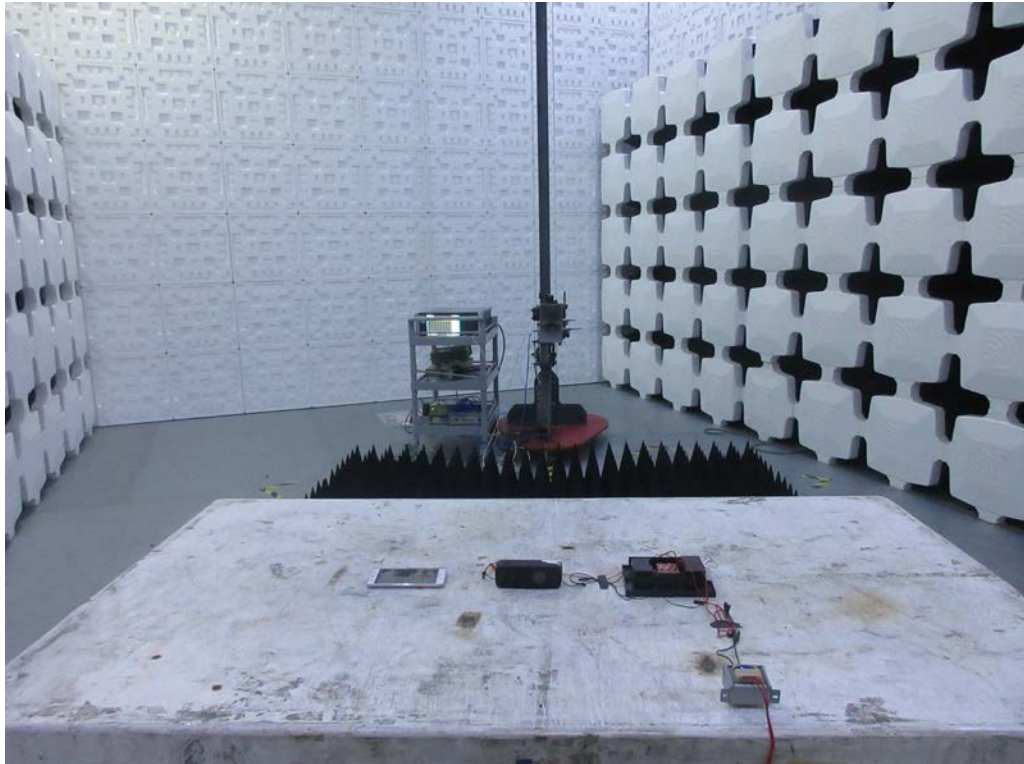
## 5.7 Test Photographs (30MHz ~ 1000MHz)





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## 5.8 Test Photographs (1000MHz ~ 18000MHz)





## **6 Photographs of EUT**



**--- END ---**