



# TEST REPORT

Report No.: ARFR-ESH-P200324369B-2  
FCC ID: 2ANDLTY-R8807  
Product: Smart Doorbell  
Test Model: SC222-WH2  
Received: Mar.24, 2020  
ISSUED: Apr.18, 2020

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)

This test report consists of 22 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product certification, approval, or endorsement by A2LA, CNAS, or any government agency. The test results in the report only apply to the tested item. The test results in this report are traceable to the national or international standards.





**BUREAU  
VERITAS**

# Contents

<b>1. TEST PROGRAM.....</b>	<b>3</b>
<b>2. Summary of Test Procedure and Test Results .....</b>	<b>4</b>
<b>3. Test Configuration of Equipment under Test .....</b>	<b>5</b>
3.1 Manufacturer information.....	5
3.2 Feature of Equipment under Test.....	5
3.3 Description of support units .....	5
3.4 Measurement Uncertainty .....	6
<b>4 Test of Conducted Emission .....</b>	<b>7</b>
4.1 Test Limit .....	7
4.2 Test Procedures .....	8
4.3 Typical Test Setup .....	8
4.4 Measurement Equipment .....	9
4.5 Test Result and Data .....	10
4.6 Test Photographs .....	12
<b>5 Test of Radiated Emission .....</b>	<b>13</b>
5.1 Test Limit .....	13
5.2 Test Procedures .....	14
5.3 Typical Test Setup .....	14
5.4 Measurement Equipment .....	15
5.5 Test Result and Data (30MHz ~ 1GHz).....	16
5.6 Test Result and Data (1GHz ~ 18GHz).....	18
5.7 Test Photographs (30MHz ~ 1000MHz).....	20
5.8 Test Photographs (1000MHz ~ 18000MHz).....	21
<b>6 Photographs of EUT .....</b>	<b>22</b>



## 1. TEST PROGRAM

**PRODUCT:** Smart Doorbell  
**TEST MODEL:** SC222-WH2  
**SERIES MODEL:** --  
**APPLICANT:** Hangzhou Tuya Information Technology Co., Ltd  
**TESTED:** Mar.27 to Apr.10, 2020  
**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 :** Will YAN, **DATE:** Apr.18, 2020  
Project Engineer

**APPROVED BY :** Daniel Sun, **DATE:** Apr.18, 2020  
EMC Lab manager





**BUREAU  
VERITAS**

## 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



### 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

<b>Product Name:</b>	Smart Doorbell
<b>Test Model:</b>	SC222-WH2
<b>Series Model:</b>	--
<b>EUT Power Rating:</b>	12-24Vac~

Note: Please refer to user manual.

Special Common: Mechanical bell is just a matching test, not a shipping product

#### 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 (dB $\mu$ V)		Class B (dB $\mu$ V)	
	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.

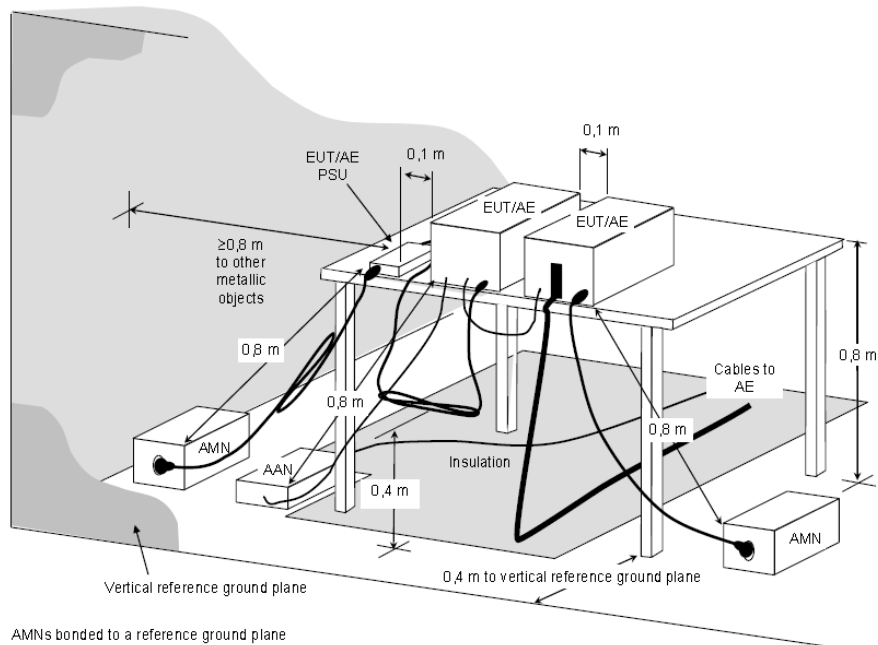
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

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

1. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
2. Connect EUT to the power mains through a Artificial Mains Network (AMN).
3. All the support units are connecting to the other AMN.
4. The AMN provides 50 ohm coupling impedance for the measuring instrument.
5. The CISPR states that a 50 ohm, 50 micro-Henry AMN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched
8. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

## 4.3 Typical Test Setup



NOTE The 0,8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be  $\geq 0,8$  m.

**Figure D.2 – Example measurement arrangement for table-top EUT  
(Conducted emission measurement – alternative 1)**





#### 4.4 Measurement Equipment

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	E1R1001	Mar.03, 2021
LISN ROHDE & SCHWARZ	ENV216	E1L1011	Jul.17, 2020
Software ADT	ADT_Cond_V7.3.0	N/A	N/A

## 4.5 Test Result and Data

### a. Conducted Emission Test Data

Phase: LINE

Location: Conduction 1

Date: 4/6/2020

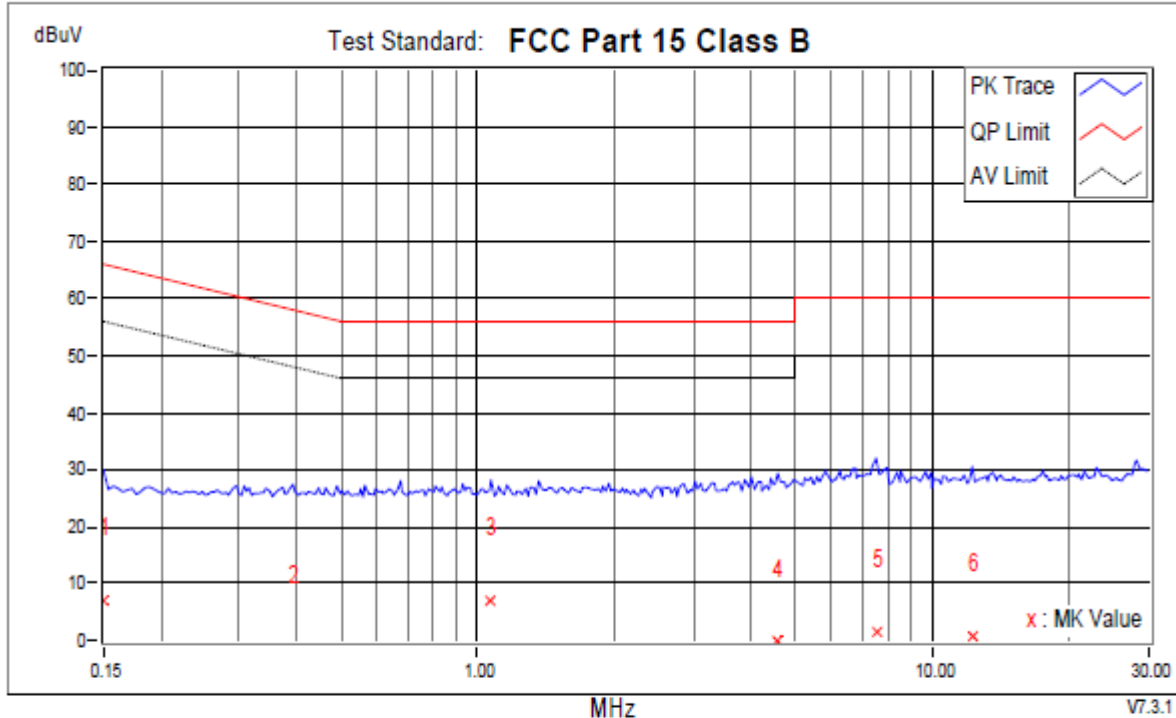
Time: 5:28:22 PM

Phase L1

Temperature (C): 22

Humidity (%): 48

Approved by:



No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
1	0.15000	9.84	-2.87	-13.69	6.97	-3.85	66.00	56.00	-59.03	-59.85	
2	0.39242	9.72	-10.91	-15.10	-1.19	-5.38	58.01	48.01	-59.20	-53.39	
+3	1.07038	9.60	-2.75	-4.30	6.85	5.30	56.00	46.00	-49.15	-40.70	
4	4.58156	10.01	-10.06	-14.36	-0.05	-4.35	56.00	46.00	-56.05	-50.35	
5	7.54143	10.23	-8.83	-13.14	1.40	-2.91	60.00	50.00	-58.60	-52.91	
6	12.27562	10.35	-9.53	-13.77	0.82	-3.42	60.00	50.00	-59.18	-53.42	

#### 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.



Phase : NEUTRAL

Location: Conduction 1

Date: 4/6/2020

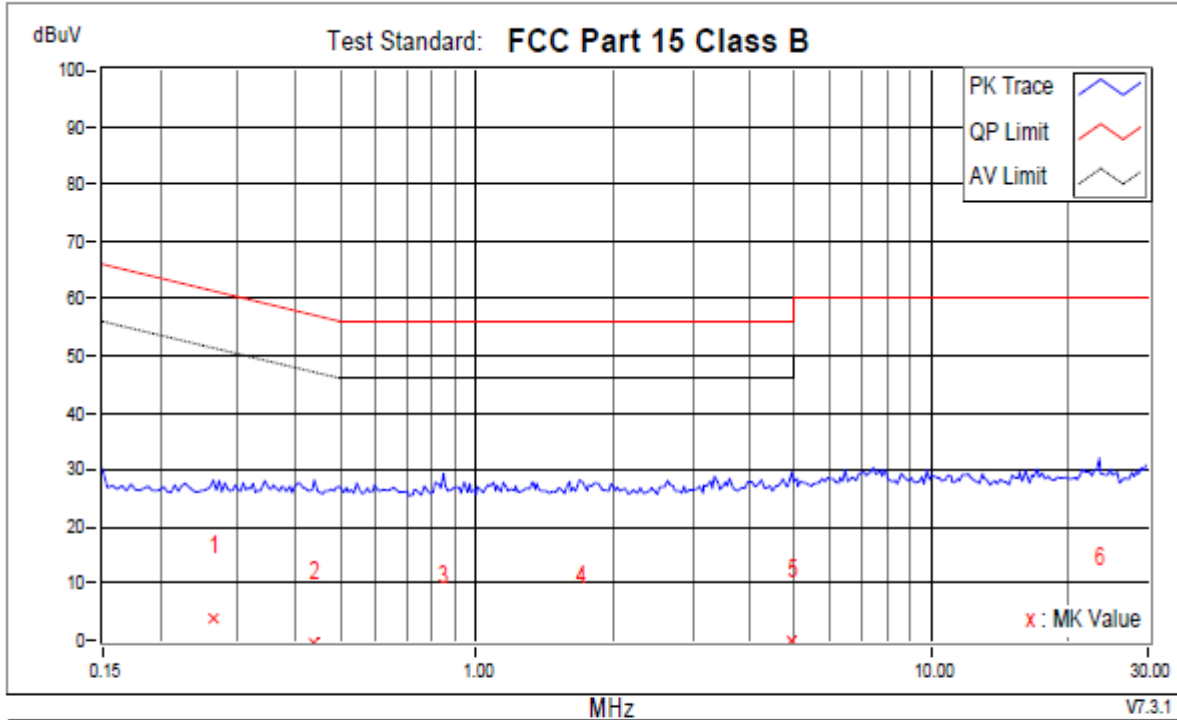
Time: 5:24:20 PM

Phase N

Temperatuer (C): 22

Humidity (%): 48

Approved by:

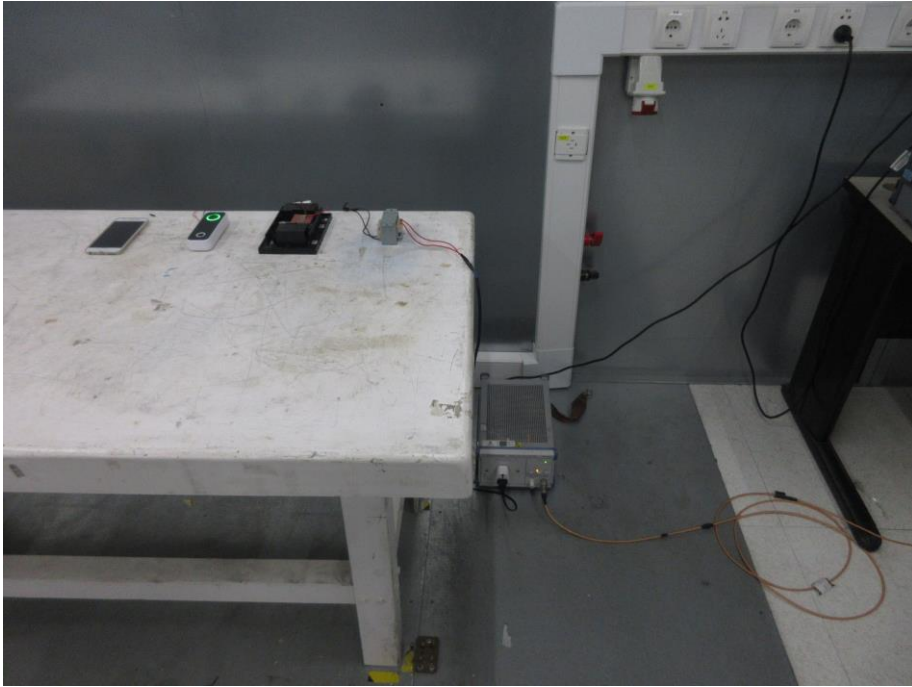


No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
1	0.26339	9.84	-5.75	-8.92	4.09	0.92	61.32	51.32	-57.23	-50.40	
2	0.43934	9.86	-10.26	-14.36	-0.40	-4.50	57.07	47.07	-57.48	-51.58	
3	0.84598	9.89	-11.04	-15.24	-1.15	-5.35	56.00	46.00	-57.15	-51.35	
4	1.68425	9.92	-11.01	-15.25	-1.09	-5.33	56.00	46.00	-57.09	-51.33	
+5	4.94519	9.72	-9.75	-14.11	-0.03	-4.39	56.00	46.00	-56.03	-50.39	
6	23.51296	10.29	-8.51	-12.98	1.78	-2.69	60.00	50.00	-58.22	-52.69	

**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.





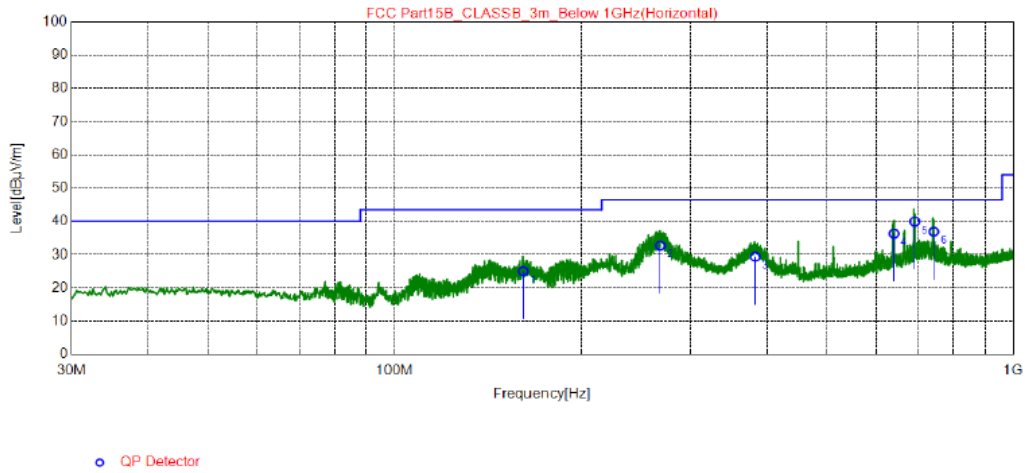
## 5.4 Measurement Equipment

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
EMI Test Spectrum ROHDE & SCHWARZ	ESR7	E1R1005	Dec.02, 2020
Spectrum Analyzer Keysight	N9030B	E1S1003	Jul.22, 2020
Broad-Band Antenna Schwarzbeck	VULB9168	E1A1012	Aug.25, 2020
Double Riaged Vroadband Horn Antenna Schwarzbeck	BBHA9120D	E1A1017	Jan.25, 2021
Preamplifier Agilent	8447D	E1A2001	Oct.13, 2020
Preamplifier Agilent	EMC051845SE	E1A2009	Jul.18, 2020

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

Position: Horizontal

### Test Graph



NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	161.3	33.98	-8.99	24.99	43.50	18.51	200	170	Horizontal
2	268.8	42.64	-9.92	32.72	46.50	13.78	100	112	Horizontal
3	382.6	37.21	-7.82	29.39	46.50	17.11	100	149	Horizontal
4	641.4	39.59	-3.25	36.34	46.50	10.16	100	112	Horizontal
5	692.8	42.73	-2.79	39.94	46.50	6.56	100	94	Horizontal
6	743.9	38.44	-1.53	36.91	46.50	9.59	100	112	Horizontal

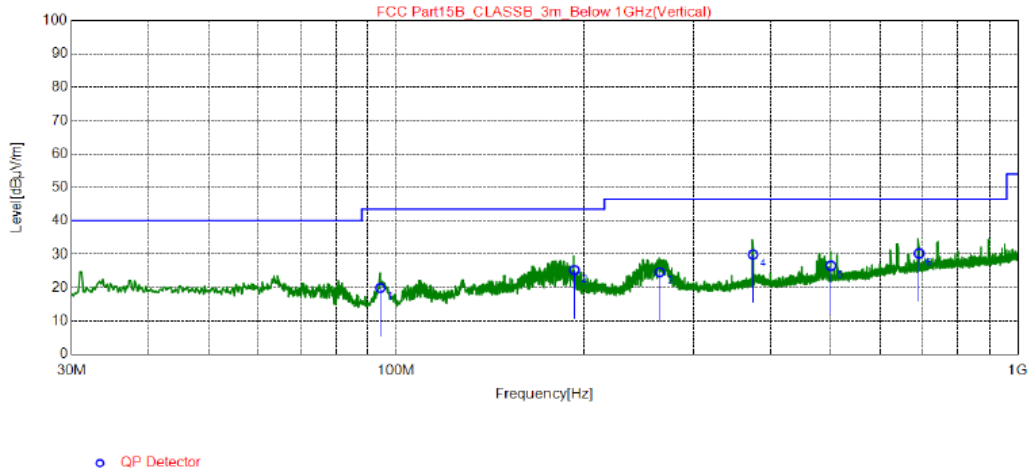
### REMARKS:

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. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	94.21	33.99	-14.07	19.92	43.50	23.58	100	56	Vertical
2	193.3	37.29	-12.07	25.22	43.50	18.28	100	151	Vertical
3	265.3	34.58	-9.98	24.60	46.50	21.90	100	346	Vertical
4	374.9	37.92	-7.99	29.93	46.50	16.57	100	118	Vertical
5	500.0	32.37	-5.84	26.53	46.50	19.97	100	32	Vertical
6	693.2	33.04	-2.79	30.25	46.50	16.25	100	36	Vertical

**REMARKS:**

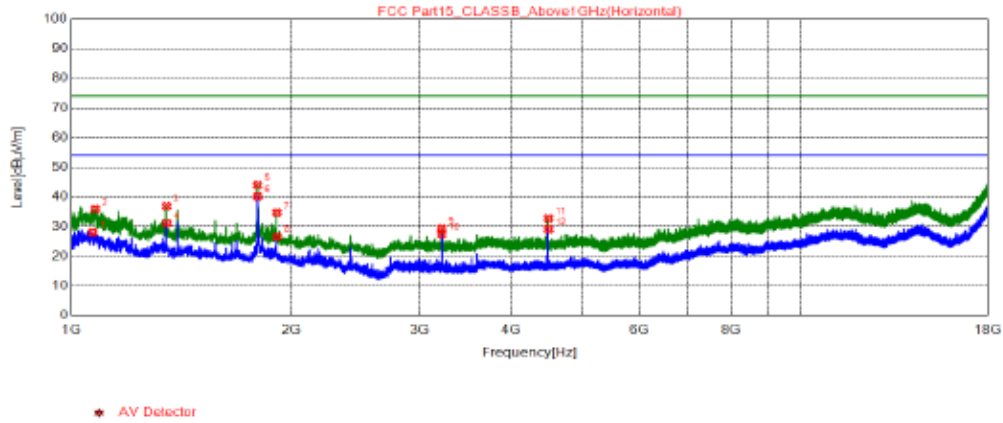
1. Q.P. is abbreviation of quasi-peak individually.
2. The emission levels of other frequencies were very low against the limit.
3. QP Margin value = QP Limit value – QP value
4. Factor = Antenna Factor + Amplifier Factor + Cable loss
5. QP value = Factor + Reading Value.



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

Position: Horizontal

**Test Graph**



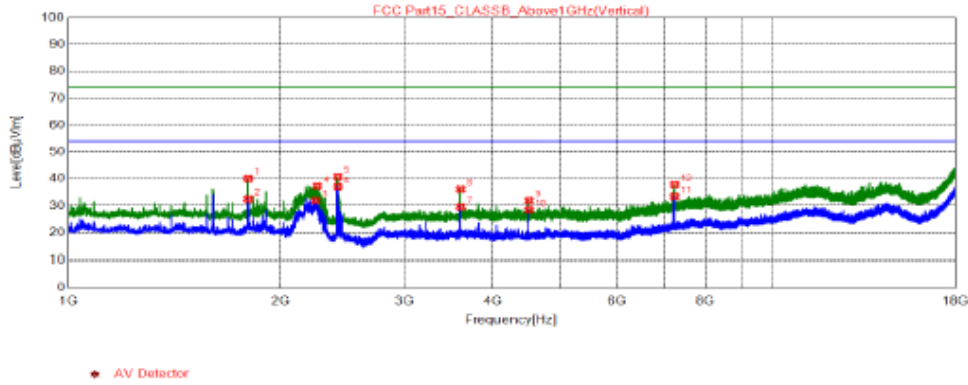
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Detector
1	1069.7000	47.29	28.03	54.00	25.97	100	108	Horizontal	AV
2	1078.2000	55.17	35.93	74.00	38.07	100	108	Horizontal	PK
3	1350.2000	55.30	36.92	74.00	37.08	100	70	Horizontal	PK
4	1351.0500	49.53	31.15	54.00	22.85	100	70	Horizontal	AV
5	1799.8500	61.24	44.03	74.00	29.97	100	70	Horizontal	PK
6	1800.7000	57.43	40.22	54.00	13.78	100	108	Horizontal	AV
7	1912.0500	51.70	34.73	74.00	39.27	100	108	Horizontal	PK
8	1912.9000	43.64	26.67	54.00	27.33	100	108	Horizontal	AV
9	3215.9500	43.07	29.36	74.00	44.64	100	70	Horizontal	PK
10	3216.8000	41.15	27.44	54.00	26.56	100	262	Horizontal	AV
11	4500.3000	43.08	32.78	74.00	41.22	100	108	Horizontal	PK
12	4501.1500	39.46	29.16	54.00	24.84	100	147	Horizontal	AV

**REMARKS:**

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

Position: Vertical

**Test Graph**

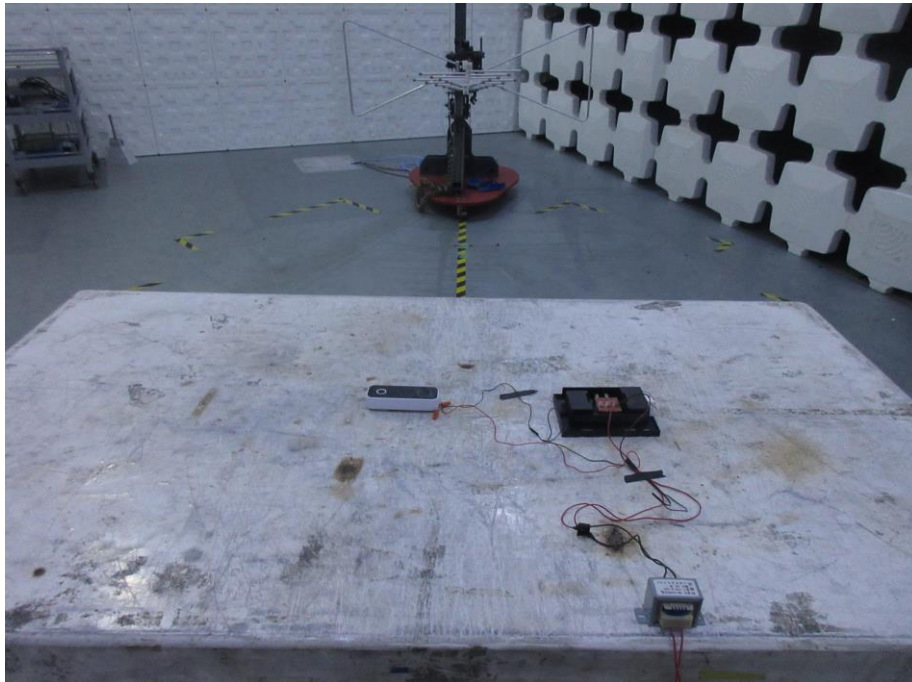


NO.	Freq. [MHz]	Reading [dBuV/m]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Detector
1	1800.7000	57.21	40.00	74.00	34.00	100	329	Vertical	PK
2	1800.7000	49.71	32.50	54.00	21.50	100	20	Vertical	AV
3	2241.0000	48.26	31.98	54.00	22.02	100	59	Vertical	AV
4	2253.7500	53.48	37.23	74.00	36.77	100	97	Vertical	PK
5	2410.1500	56.67	40.75	74.00	33.25	100	97	Vertical	PK
6	2411.0000	52.98	37.06	54.00	16.94	100	59	Vertical	AV
7	3600.1500	42.06	29.58	54.00	24.42	100	174	Vertical	AV
8	3600.1500	48.62	36.14	74.00	37.86	100	213	Vertical	PK
9	4500.3000	42.28	31.98	74.00	42.02	100	213	Vertical	PK
10	4501.1500	38.73	28.43	54.00	25.57	100	174	Vertical	AV
11	7237.3000	38.03	33.41	54.00	20.59	100	20	Vertical	AV
12	7239.0000	42.42	37.80	74.00	36.20	100	59	Vertical	PK

**REMARKS:**

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

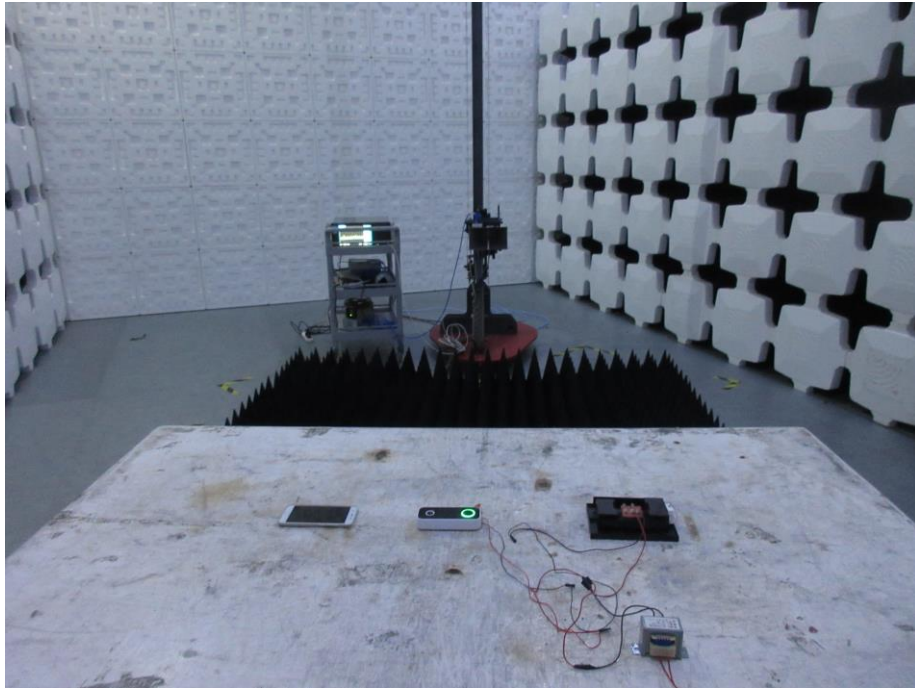
## 5.7 Test Photographs (30MHz ~ 1000MHz)





**BUREAU  
VERITAS**

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



## 6 Photographs of EUT



--- END ---