FCC TEST REPORT

Report No.:	ARFR-ESH-P19122504B-3
Product:	Smart Camera
Test Model:	SC111-WK2
Received:	Sept.05, 2019
ISSUED:	Jan.15, 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)

ACCREDITED
Test Lab
Cert 2343.01

Contents

1. TEST PROGRAM

PRODUCT: Smart Camera
TEST MODEL: SC111-WK2
APPLICANT: Hangzhou Tuya Information Technology Co., Ltd
TESTED: Dec.27,2019 to Jan.09, 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 : _____ , **DATE:** Jan.15, 2020
Will YAN
Project Engineer

APPROVED BY : _____ , **DATE:** Jan.15, 2020
Daniel Sun
RF Supervisor

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:	Smart Camera
Test Model:	SC111-WK2
EUT Power Rating:	5VDC/2A with adaptor 100-240Vac~, 50/60Hz

Note: 1.Please refer to user manual.

3.3 Description of support units

NO.	PRODUCT	BRAND	MODEL NO.
1	AC adapter	--	KA1517-0502000USU
2	Mobile Phone	Vivo	--

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

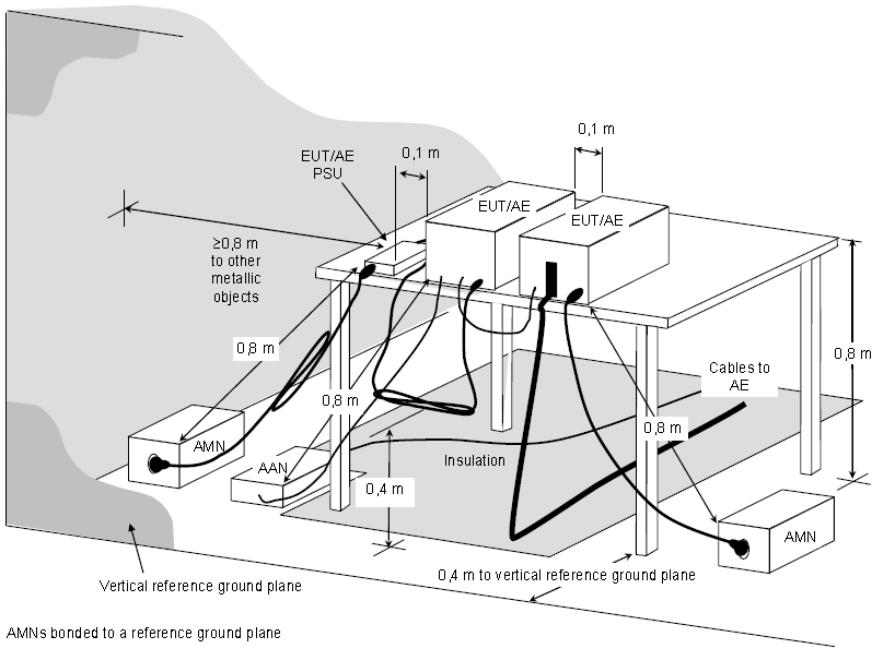
NOTES: 1.The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
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 ≥0,8 m.

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

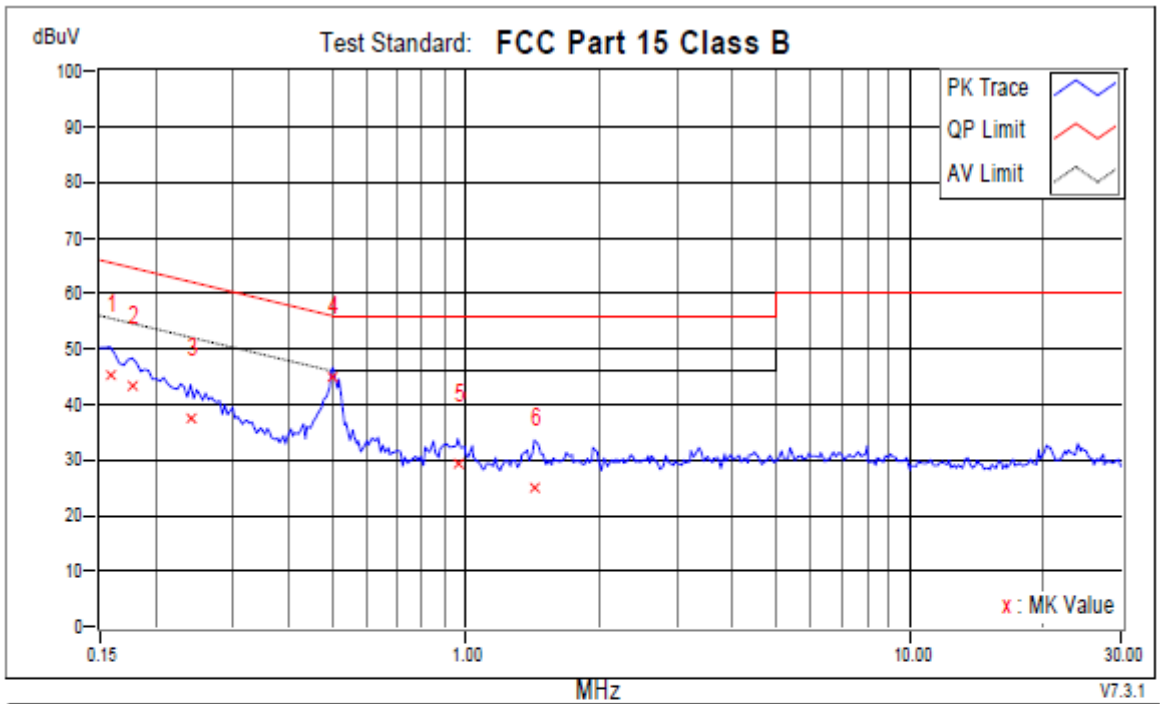
4.4 Measurement Equipment

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	E1R1001	Mar.04, 2020
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

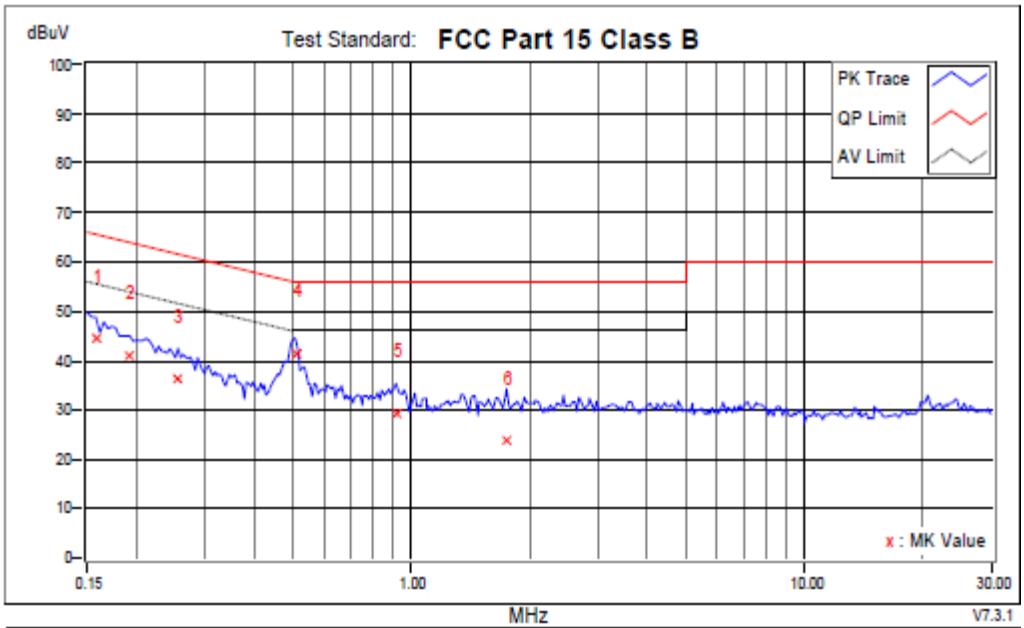


	Frequency	Corr. Factor	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
No.	MHz	dB	QP	AV	QP	AV	QP	AV	QP	AV	
1	0.15782	9.84	35.46	15.05	45.30	24.89	65.58	55.58	-20.27	-30.68	
2	0.17737	9.85	33.42	13.45	43.27	23.30	64.61	54.61	-21.34	-31.31	
3	0.23993	9.80	27.65	11.63	37.45	21.43	62.10	52.10	-24.65	-30.67	
+4	0.50190	9.72	35.08	24.98	44.80	34.70	56.00	46.00	-11.20	-11.30	
5	0.95937	9.59	19.60	7.35	29.19	16.94	56.00	46.00	-26.81	-29.06	
6	1.42619	9.67	15.44	0.77	25.11	10.44	56.00	46.00	-30.89	-35.56	

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



No.	Frequency MHz	Corr. Factor dB	Reading dBuV QP	Reading dBuV AV	Emission dBuV QP	Emission dBuV AV	Limit dBuV QP	Limit dBuV AV	Margins dB QP	Margins dB AV	Notes
1	0.15782	9.84	34.58	16.38	44.42	26.22	65.58	55.58	-21.16	-29.36	
2	0.19301	9.81	31.36	15.06	41.17	24.87	63.91	53.91	-22.74	-29.04	
3	0.25557	9.84	26.34	12.69	36.18	22.53	61.57	51.57	-25.40	-29.05	
+4	0.50972	9.84	31.51	23.37	41.35	33.21	56.00	46.00	-14.65	-12.79	
5	0.91636	9.89	19.26	13.62	29.15	23.51	56.00	46.00	-26.85	-22.49	
6	1.75072	9.93	13.72	7.56	23.65	17.49	56.00	46.00	-32.35	-28.51	

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)	
	μV/m	dBμV/m	μV/m	dBμV/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 (dBμV/m) (at 3m)		Class B (dBμV/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 (dBuV/m) = 20 log Emission level (uV/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

1. The EUT was placed on a rotatable table top 0.8 meter above ground.
2. The EUT was set 3/10 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. 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.
5. 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.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
7. 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

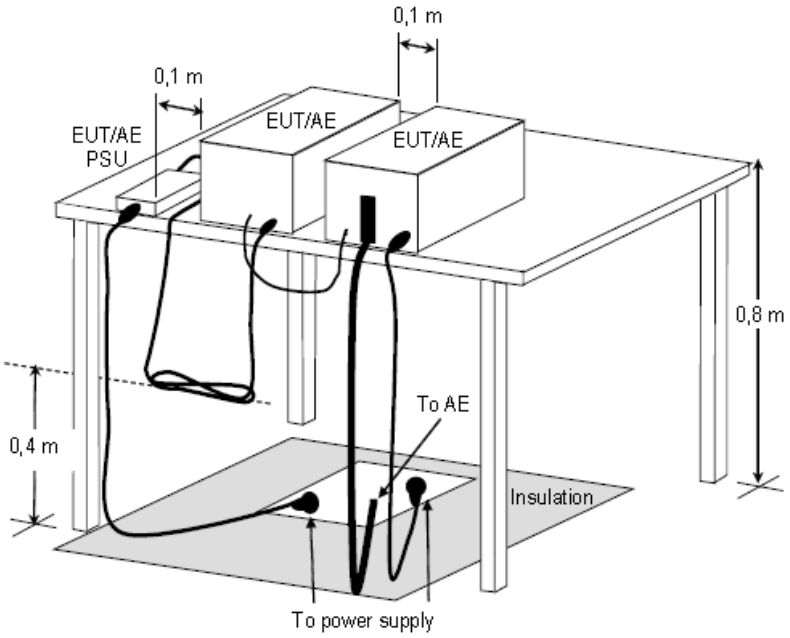


Figure D.8 – Example measurement arrangement for table-top EUT (Radiated emission measurement)

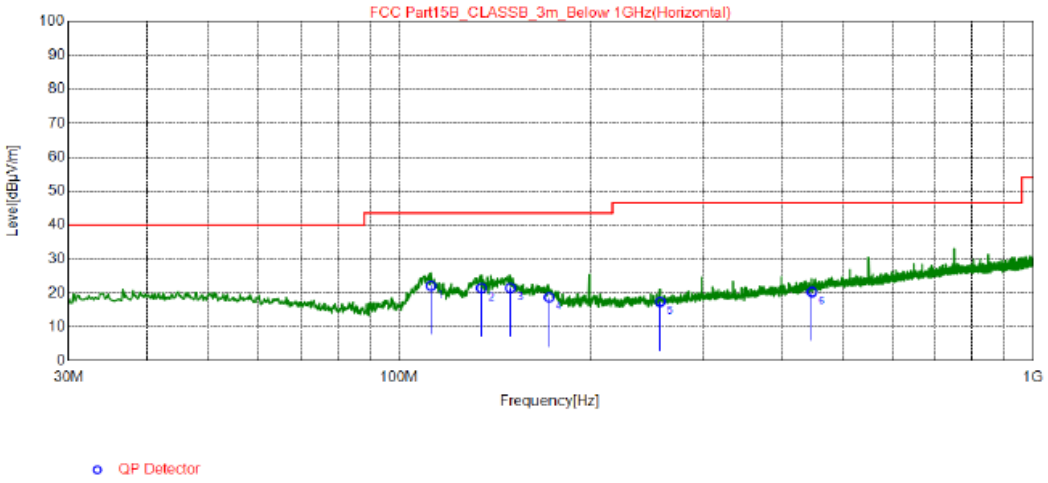
5.4 Measurement Equipment

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
EMI Test Spectrum 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.26, 2020
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



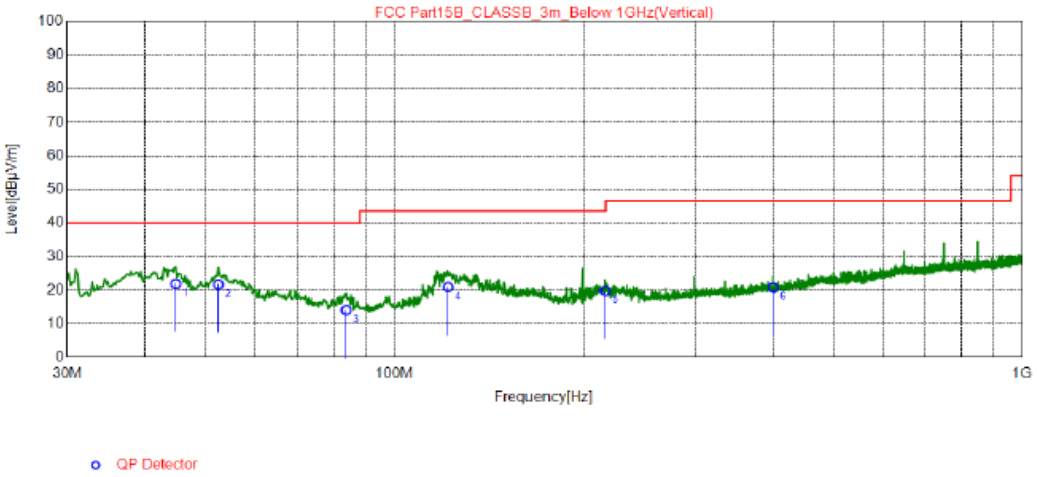
NO.	Freq. [MHz]	QP Reading [dBµV/m]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	112.2	34.14	-12.00	22.14	43.50	21.36	200	116	Horizontal
2	134.9	31.86	-10.46	21.40	43.50	22.10	200	88	Horizontal
3	149.8	30.74	-9.31	21.43	43.50	22.07	200	107	Horizontal
4	172.5	28.58	-9.92	18.66	43.50	24.84	200	97	Horizontal
5	257.1	27.57	-10.18	17.39	46.50	29.11	100	250	Horizontal
6	446.9	27.04	-6.75	20.29	46.50	26.21	100	300	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	44.74	31.44	-9.57	21.87	40.00	18.13	100	336	Vertical
2	52.31	31.56	-9.90	21.66	40.00	18.34	100	295	Vertical
3	83.73	28.04	-14.04	14.00	40.00	26.00	100	13	Vertical
4	121.7	32.43	-11.54	20.89	43.50	22.61	100	200	Vertical
5	216.0	31.4	-11.64	19.76	46.50	26.74	100	104	Vertical
6	399.9	28.62	-7.84	20.78	46.50	25.72	100	250	Vertical

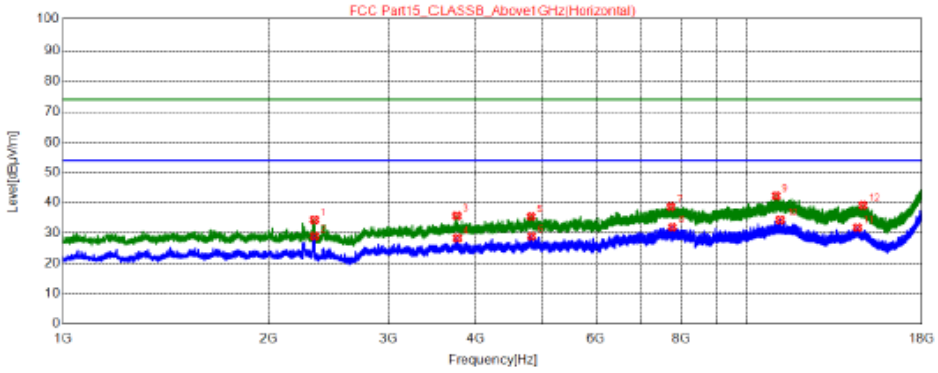
REMARKS:

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



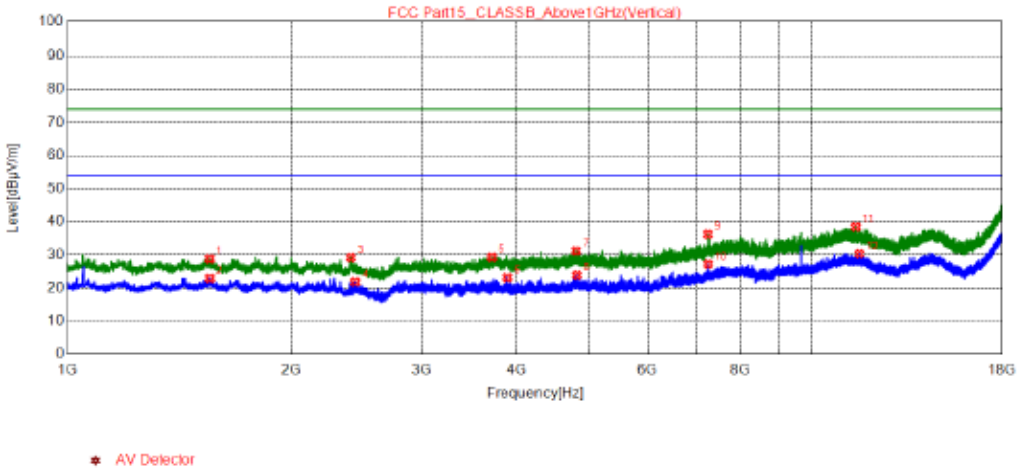
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Detector
1	2335.3500	50.37	34.29	74.00	39.71	100	343	Horizontal	PK
2	2336.2000	45.05	28.97	54.00	25.03	100	343	Horizontal	AV
3	3751.4500	47.71	35.58	74.00	38.42	100	218	Horizontal	PK
4	3758.2500	40.39	28.28	54.00	25.72	100	155	Horizontal	AV
5	4820.7500	44.74	35.34	74.00	38.66	100	312	Horizontal	PK
6	4829.2500	38.31	28.92	54.00	25.08	100	343	Horizontal	AV
7	7720.9500	41.98	38.56	74.00	35.44	100	155	Horizontal	PK
8	7754.9500	35.24	31.89	54.00	22.11	100	186	Horizontal	AV
9	11007.9000	40.81	42.20	74.00	31.80	100	249	Horizontal	PK
10	11166.0000	32.66	34.28	54.00	19.72	100	155	Horizontal	AV
11	14471.6500	27.97	31.75	54.00	22.25	100	91	Horizontal	AV
12	14744.5000	35.79	39.05	74.00	34.95	100	280	Horizontal	PK

REMARKS:

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

Position: Vertical

Test Graph



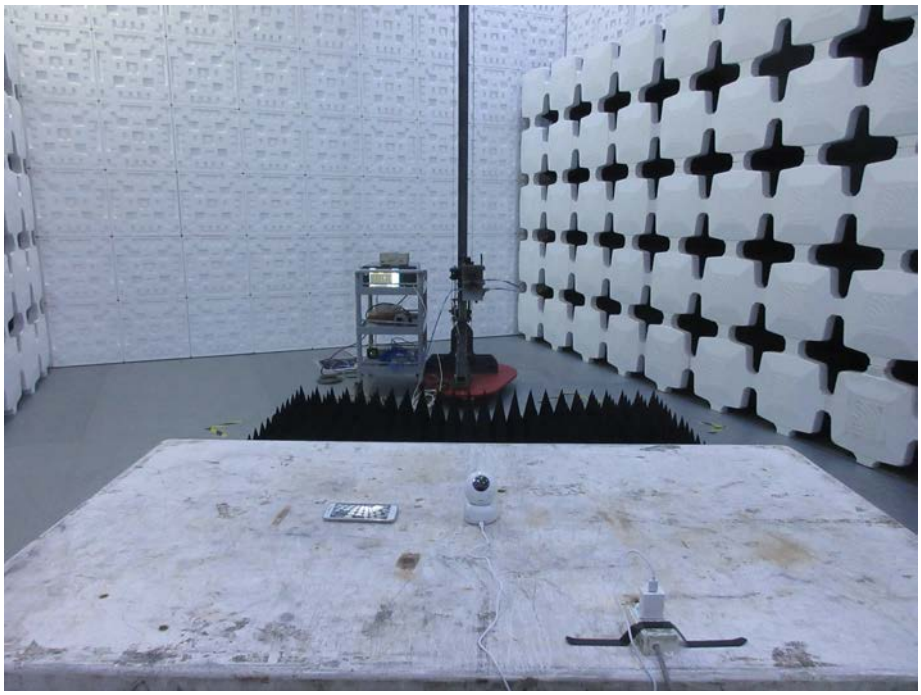
NO.	Freq. [MHz]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Detector
1	1554.2000	46.56	28.79	74.00	45.21	100	330	Vertical	PK
2	1555.0500	40.68	22.91	54.00	31.09	100	330	Vertical	AV
3	2406.7500	45.09	29.16	74.00	44.84	100	236	Vertical	PK
4	2441.6000	37.62	21.75	54.00	32.25	100	330	Vertical	AV
5	3705.5500	41.49	29.26	74.00	44.74	100	360	Vertical	PK
6	3886.6000	34.95	23.14	54.00	30.86	100	330	Vertical	AV
7	4808.8500	40.62	31.20	74.00	42.80	100	174	Vertical	PK
8	4819.9000	33.25	23.85	54.00	30.15	100	268	Vertical	AV
9	7234.7500	40.82	36.19	74.00	37.81	100	142	Vertical	PK
10	7239.8500	31.74	27.13	54.00	26.87	100	360	Vertical	AV
11	11431.2000	36.71	38.39	74.00	35.61	100	205	Vertical	PK
12	11564.6500	28.71	30.26	54.00	23.74	100	236	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)

5.8 Test Photographs (1000MHz ~ 18000MHz)



6 Photographs of EUT

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