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# FCC Test Report

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Report No.: PTC-DQ-01170310201-FC01

**FCC ID** : 2AMBYYPHSH01

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION** : Y-cam Protect Hub

**BRAND NAME** : 

**MODEL NAME** : YPHSH01

**CLIENT** : Y-cam Solutions Ltd

**DATE OF ISSUE** : June 05, 2017

**STANDARD(S)** : FCC Part 15 Rules

**REPORT VERSION** : V1.0

DongGuan Precise Testing Service Co., Ltd.

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### Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	June 05, 2017	Valid	Original Report

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## 1. VERIFICATION OF CONFORMITY

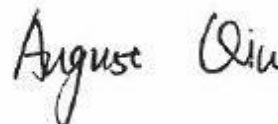
<b>Applicant</b>	Y-cam Solutions Ltd
<b>Address</b>	2nd Floor Allied House, 29-39 London Road, Twickenham, TW1 3SZ, United Kingdom
<b>Manufacturer</b>	Y-cam Solutions Ltd
<b>Address</b>	2nd Floor Allied House, 29-39 London Road, Twickenham, TW1 3SZ, United Kingdom
<b>Product Designation</b>	Y-cam Protect Hub
<b>Brand Name</b>	
<b>Test Model:</b>	YPHSH01
<b>Date of test</b>	June 01, 2017 to June 02, 2017
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal
<b>Report Template</b>	AGCRT-US-BR/RF (2013-03-01)

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.231.

Testing Engineer

August Qiu June 02, 2017



Technical Manager

Hack Ye June 05, 2017



Authorized Signatory

Chris Du June 05, 2017



## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

<b>Operation Frequency</b>	433.92MHz
<b>Field Strength(3m)</b>	74.22BuV/m(Average)@3m
<b>Modulation</b>	ASK
<b>Number of channels</b>	1
<b>Hardware Version</b>	Y_CAM_V3
<b>Software Version</b>	N/A
<b>Antenna Designation</b>	Fixed antenna
<b>Antenna Gain</b>	0dBi
<b>Power Supply</b>	DC 7.4V by battery or DC 12V by adapter

### 2.2. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AMBYYPHSH01** filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules.

### 2.3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 2.4. SPECIAL ACCESSORIES

Refer to section 5.1.

### 2.5. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 3.18\text{dB}$
2	All emissions, radiated	$\pm 3.91\text{dB}$
3	Temperature	$\pm 0.5^\circ\text{C}$
4	Humidity	$\pm 2\%$

### 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Transmitting mode
Note: 1. Only the data of the worst case recorded in the test report. 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode. 3. After activation, the device will automatically deactivate within 5 seconds.	

## 5. SYSTEM TEST CONFIGURATION

### 5.1. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Y-Cam Solutions Ltd	YPHSH01	2AMBYYPHSH01	EUT
2	Adapter	FJ_SW1202000N	DC 12V/2A	Marketed

### 5.2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.231(a)(1)	Manually	N/A
§15.231(a)(2)	automatically	Compliant
§15.231(a)(3)	periodic	N/A
§15.231(a)(4)	emergency(alarm)	N/A
§15.231(a)(5)	security	N/A
§15.231(b)	Average Factor	Compliant
§15.231(b) & §15.209	Field Strength of Fundamental and Spurious Emission	Compliant
§15.231(c)	Bandwidth	Compliant
§15.231(d)	Frequency Tolerance	N/A
§15.231(e)	Field Strength(periodic trasmitter)	N/A
§15.207	Conducted Emission	Compliant



## 6. TEST FACILITY

<b>Site</b>	Dongguan Precise Testing Service Co., Ltd.
<b>Location</b>	Building D, Baoding Technology Park, Guangming Road 2, Dongcheng District, Dongguan, Guangdong, China,
<b>FCC Registration No.</b>	371540
<b>Description</b>	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014.

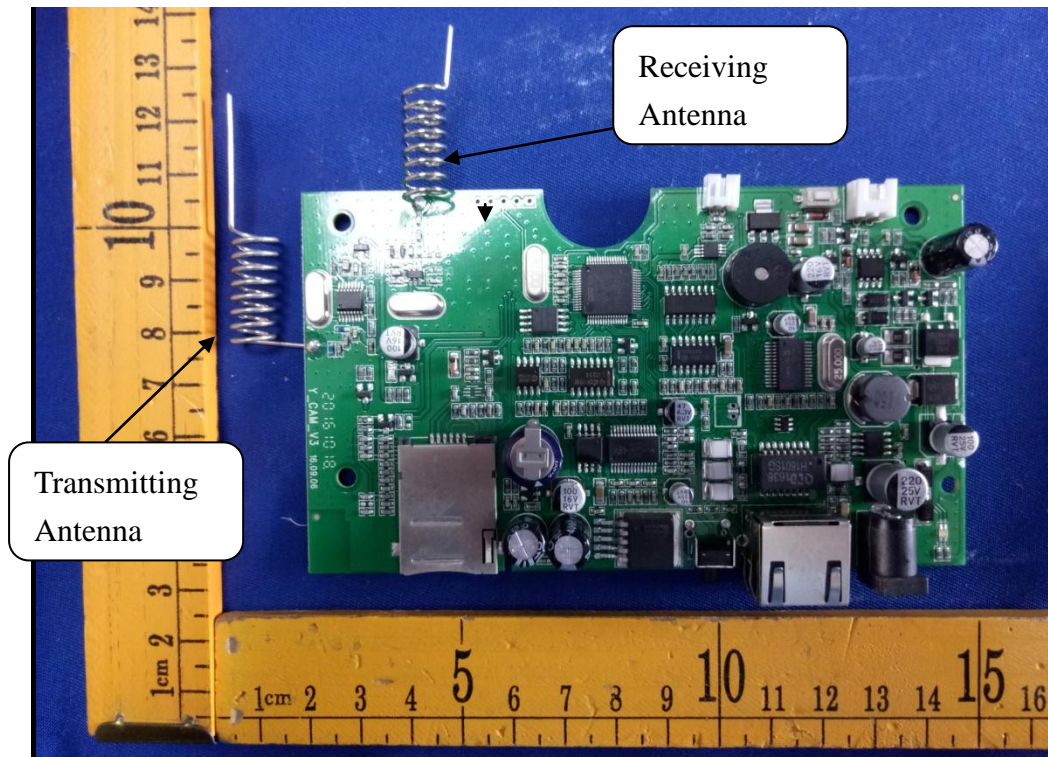
Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 3, 2016	July 2, 2017
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96221	July 3, 2016	July 2, 2017
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 3, 2016	June 2, 2017
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 3, 2016	June 2, 2017
Spectrum analyzer	Agilent	E4407B	MY46185649	June 3, 2016	June 2, 2017
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	June 3, 2016	June 2, 2017
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 3, 2016	June 2, 2017

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
Artificial Mains Network	Narda	L2-16B	000WX31025	July 3, 2016	July 2, 2017
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96222	July 3, 2016	July 2, 2017
Shielded Room	CHENGYU	843	PTS-002	June 3, 2016	June 2, 2017

## 7. ANTENNA REQUIREMENT

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The EuT has fixed antenna, which accordance to the above sections, is considered sufficient to comply with the provisions of these sections. Please see EuT photo for details.



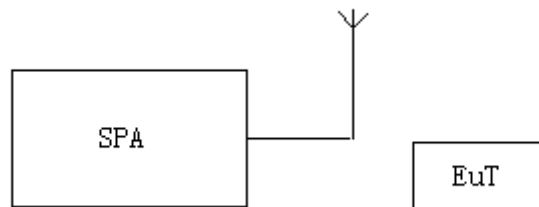
The requirements of section 15.203 are **FULFILLED**.

## 8. PROVISION FOR MOMENTARY OPERATION

### 8.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:  
Centre frequency = Operation Frequency  
RBW=1MHz, VBW=3MHz  
Span: 0Hz  
Sweep time: 10S
2. Set the EUT to transmit by manually operated. Use the “View” function of SPA to find the transmission time of being released.
3. Record the data and Reported.

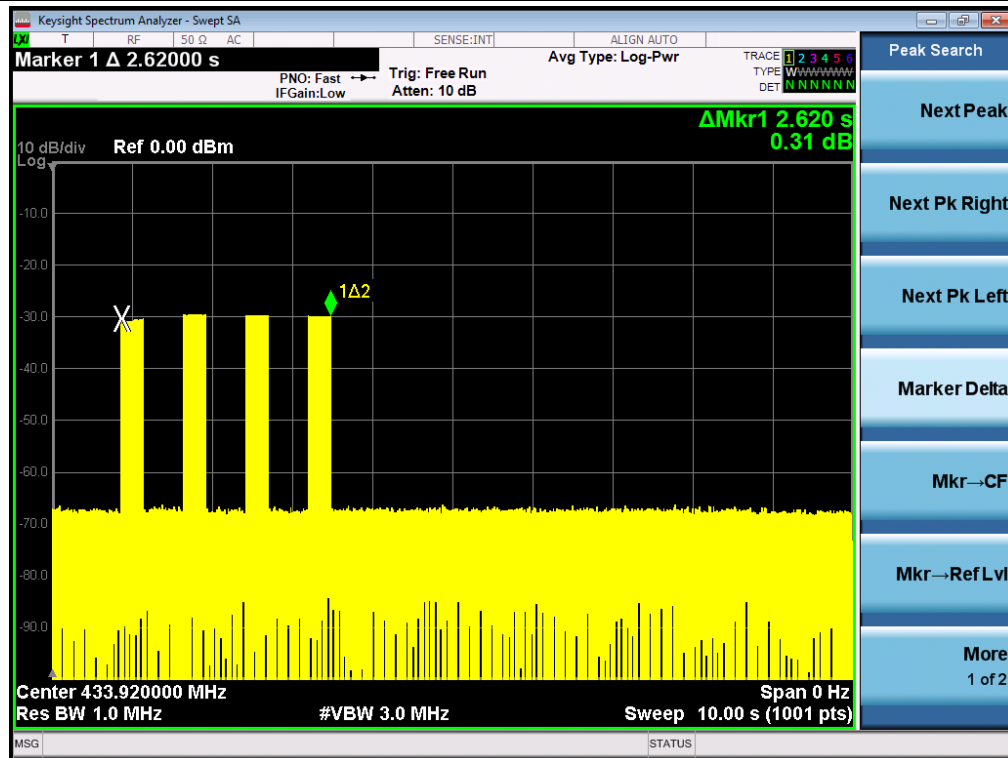
### 8.2 TEST SETUP



### 8.3 TEST RESULT

Test Mode: EUT @ 433.92MHz for RF Transmitter

The time of stopping transmission after activation (s)	Limit (s)
2.620	5.00



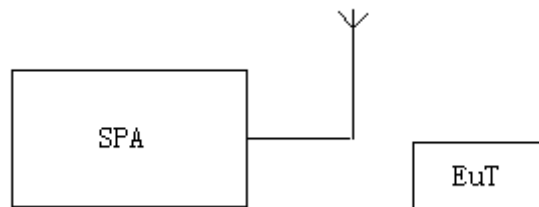
**RESULT: PASS**

## 9. DUTY CYCLE CORRECTION FACTOR

### 9.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:  
Centre frequency = Operation Frequency  
RBW=1MHz; VBW=3MHz  
Span: 0Hz  
Sweep time: more than two pulse trains or more than each type of pulse occupancy time
2. Set the EUT to transmit by manually operated. Use the “Delta mark” function of SPA to find the period time between two pulse trains and each type of pulse occupancy time.
3. Record the plots and Reported.

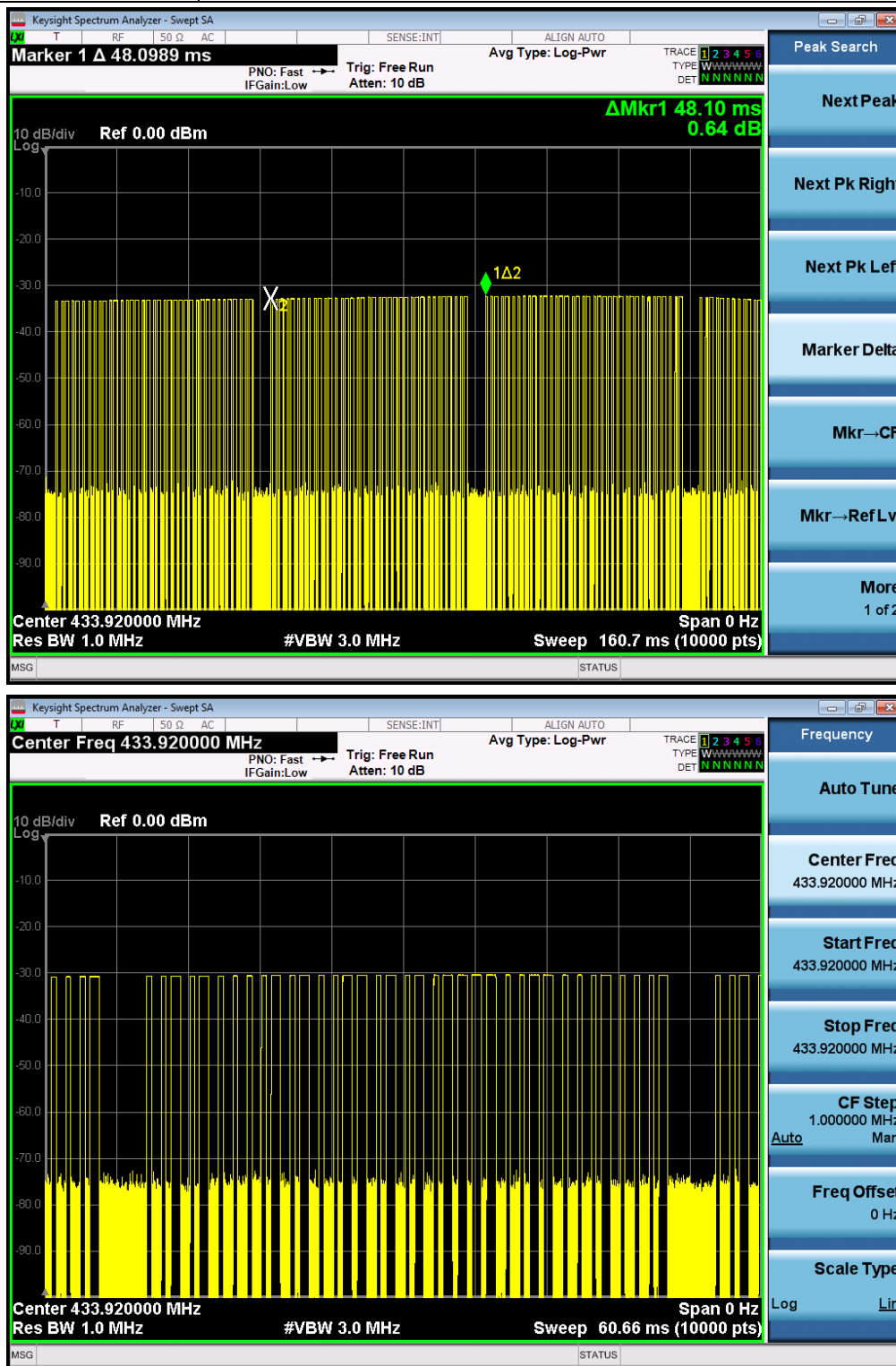
### 9.2 TEST SETUP

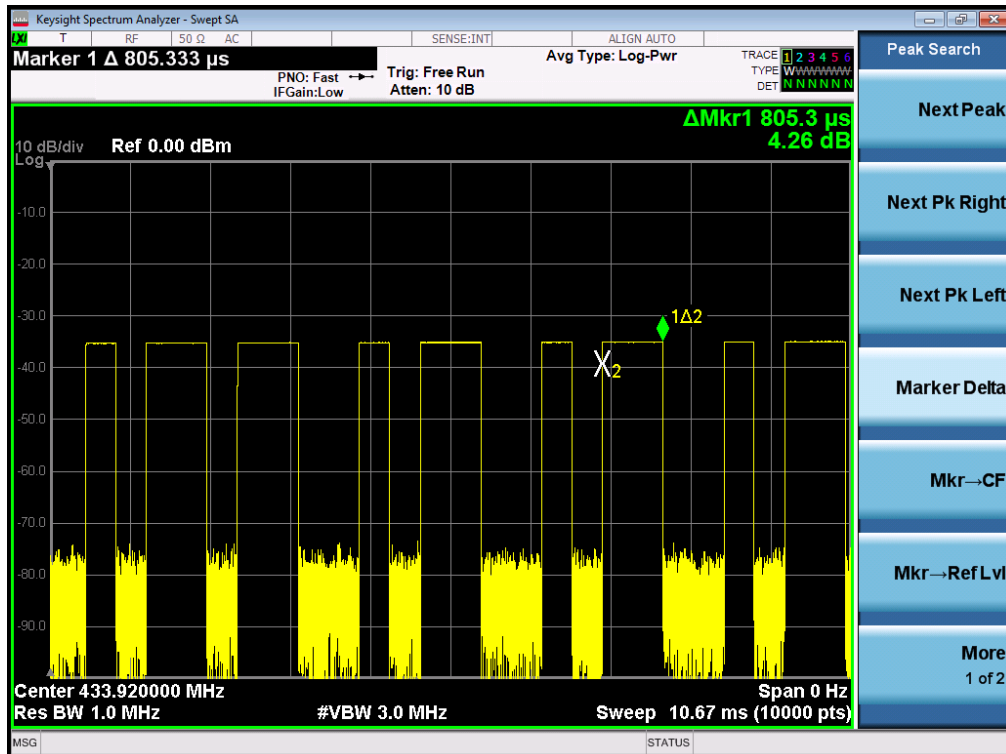
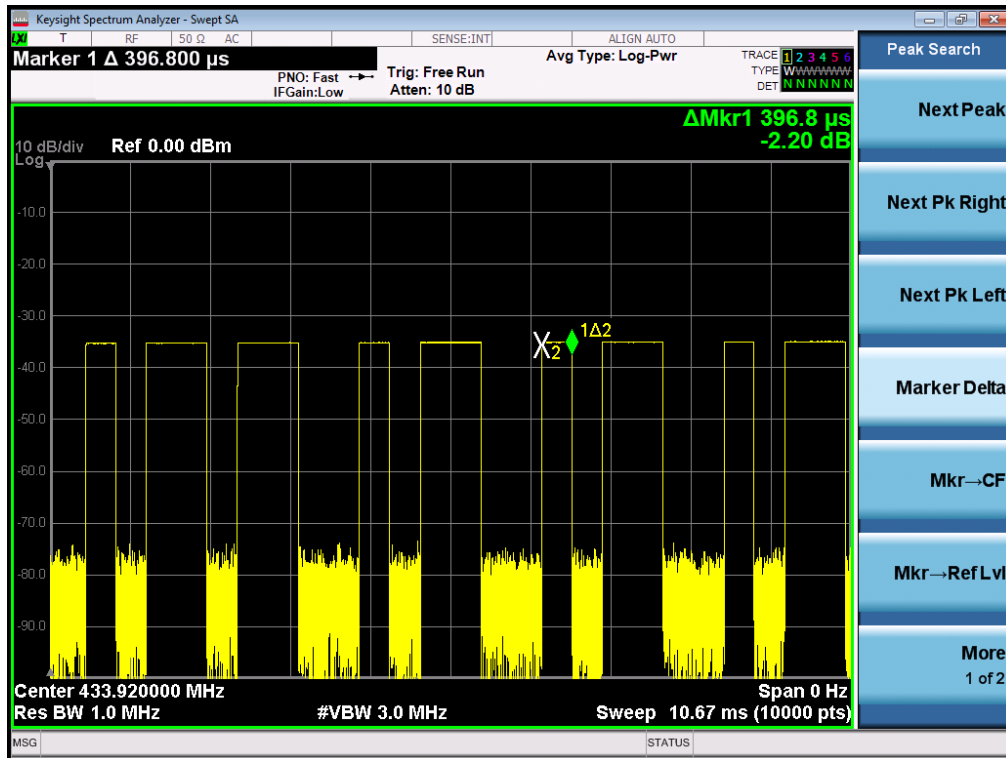


### 9.3 TEST RESULT

Test Mode: EUT @ 433.92MHz for RF Transmitter

Duty Cycle:	$(0.8053\text{ms} \times 16 + 0.3968\text{ms} \times 21) / 48.10\text{ms} = 0.4411$
Duty Cycle Correction Factor:	$20\lg(0.4411) = -7.11\text{dB}$





## **10. RADIATED EMISSION**

### **10.1. MEASUREMENT PROCEDURE**

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. 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.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average 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 for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.



The following table is the setting of spectrum analyzer and receiver.

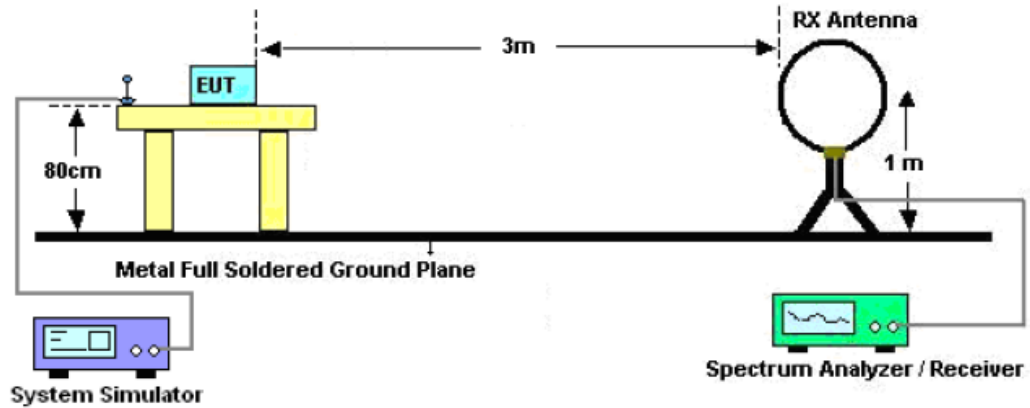
<b>Spectrum Parameter</b>	<b>Setting</b>
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for Peak
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for Peak
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for Peak
Start ~Stop Frequency	1GHz~5GHz 1MHz/3MHz for Peak

<b>Receiver Parameter</b>	<b>Setting</b>
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for Peak
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for Peak
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for Peak

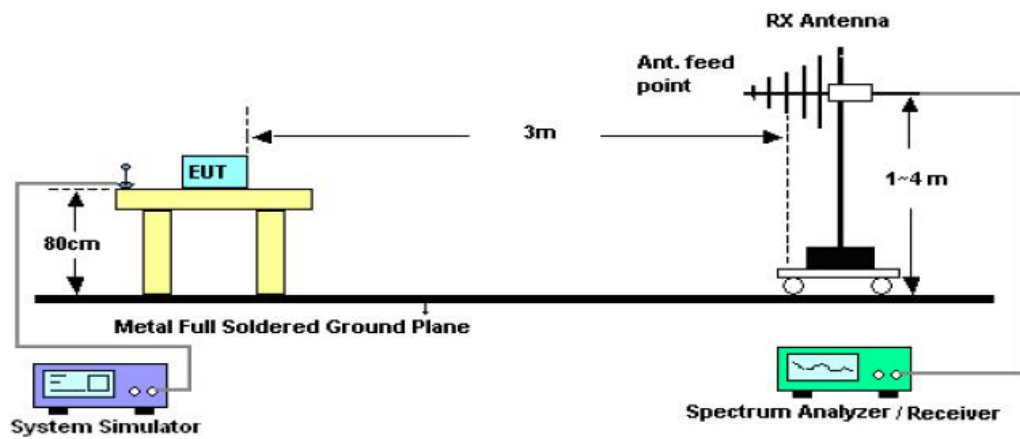
Note: Duty Cycle correction factor would be used for the AVG value measurement.

## 10.2. TEST SETUP

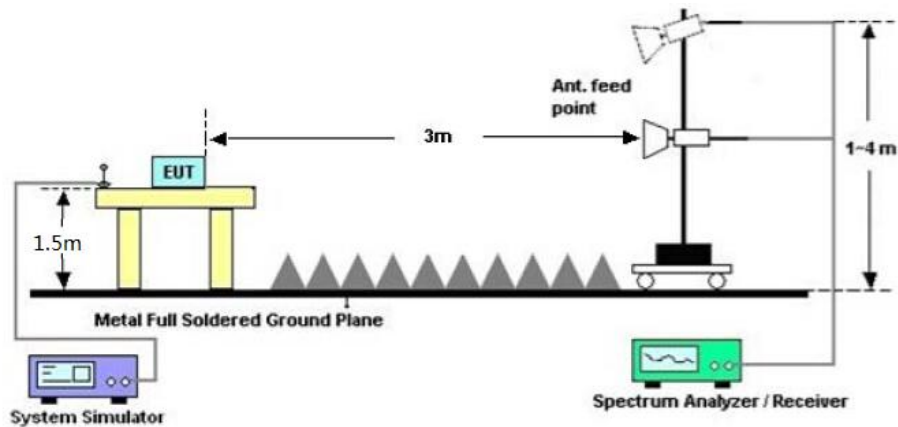
### Radiated Emission Test-Setup Frequency Below 30MHz



### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



### RADIATED EMISSION TEST SETUP ABOVE 1000MHz



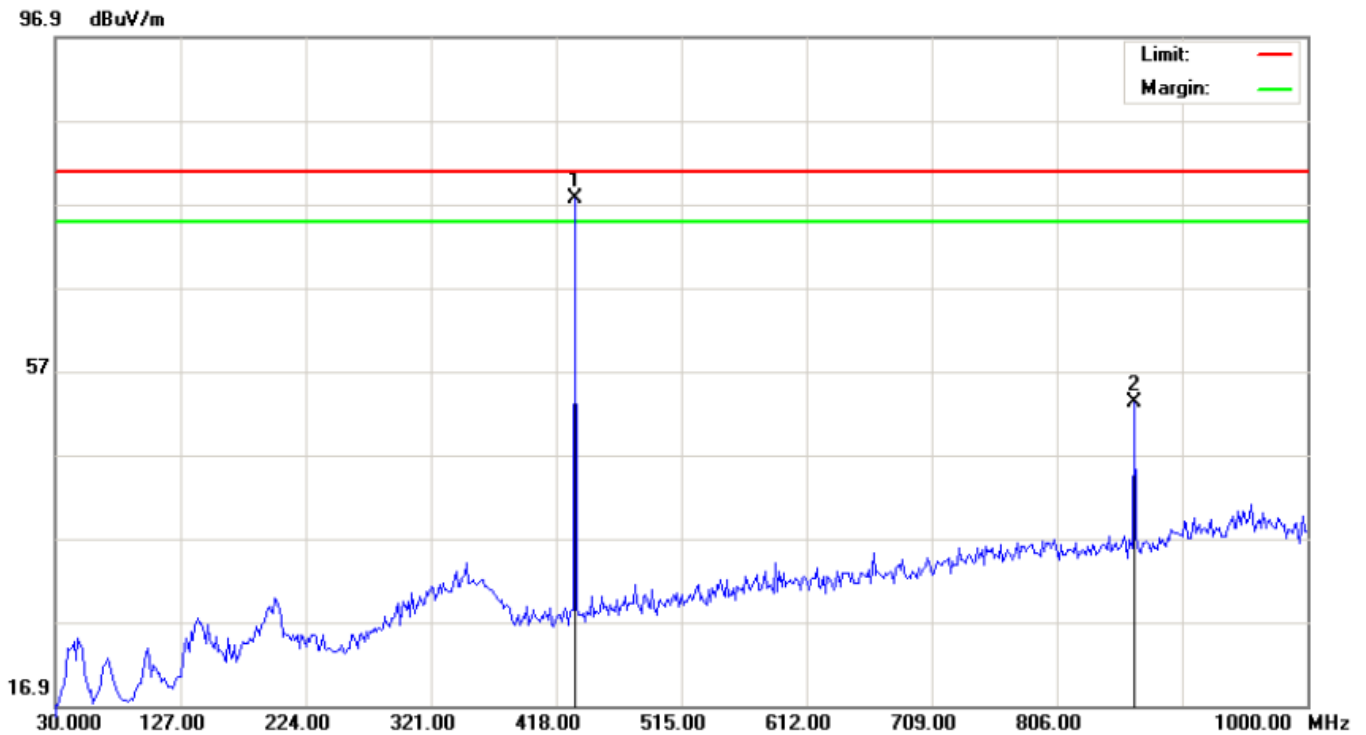
### 10.3. TEST RESULT

Test Mode: EUT @ 433.92MHz for RF Transmitter

RADIATED EMISSION BELOW 30MHz

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ-Horizontal



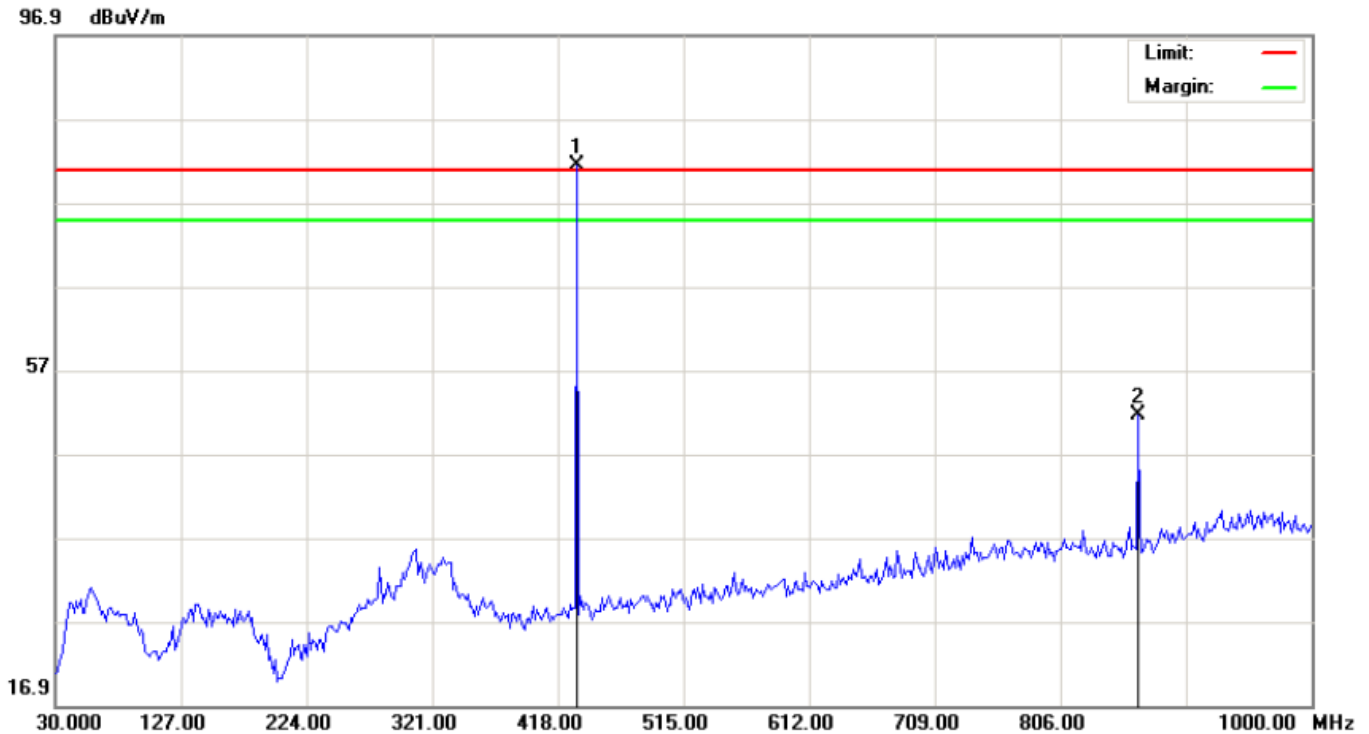
#### PK list

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail	Remark
433	H	57.49	20.11	77.60	100.8	-23.20	Pass	Fundamental
866	H	25.36	27.76	53.12	80.8	-27.68	Pass	Harmonic

#### AV list

Frequency MHz	Polarization	PK Level dB(uV/m)	Duty Cycle Correction Factor: dB	AV Level dB(uV/m)	Limit dB(uV/m) AV	Margin dB	Pass/Fail	Remark
433	H	77.60	-7.11	70.49	80.8	-10.31	Pass	Fundamental
866	H	53.12	-7.11	46.01	60.8	-14.79	Pass	Harmonic

### RADIATED EMISSION BELOW 1GHZ-Vertical



#### PK list

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail	Remark
433.927	V	61.22	20.11	81.33	100.8	-19.47	Pass	Fundamental
867.854	V	23.82	27.76	51.58	80.8	-29.22	Pass	Harmonic

#### AV list

Frequency MHz	Polarization	PK Level dB(uV/m)	Duty Cycle Correction Factor: dB	AV Level dB(uV/m)	Limit dB(uV/m) AV	Margin dB	Pass/Fail	Remark
433.927	V	79.38	-7.11	74.22	80.8	-6.58	Pass	Fundamental
867.854	V	52.14	-7.11	44.47	60.8	-16.33	Pass	Harmonic

### RESULT: PASS

**Note:** 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

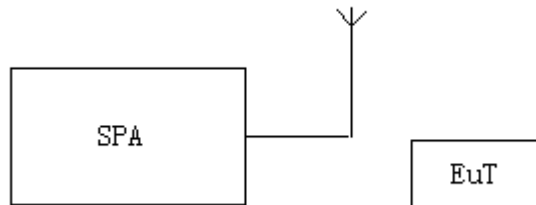
3. Emissions of frequency range from 1GHz to 5GHz have 20dB margin. No recording in the test report.

## 11. BANDWIDTH

### 11.1. MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:  
Centre frequency = Operation Frequency  
RBW=1KHz  
VBW=3KHz  
Span: 100kHz  
Sweep time: Auto
2. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the “N dB down” function of SPA to define the bandwidth.
3. Record the plots and Reported.

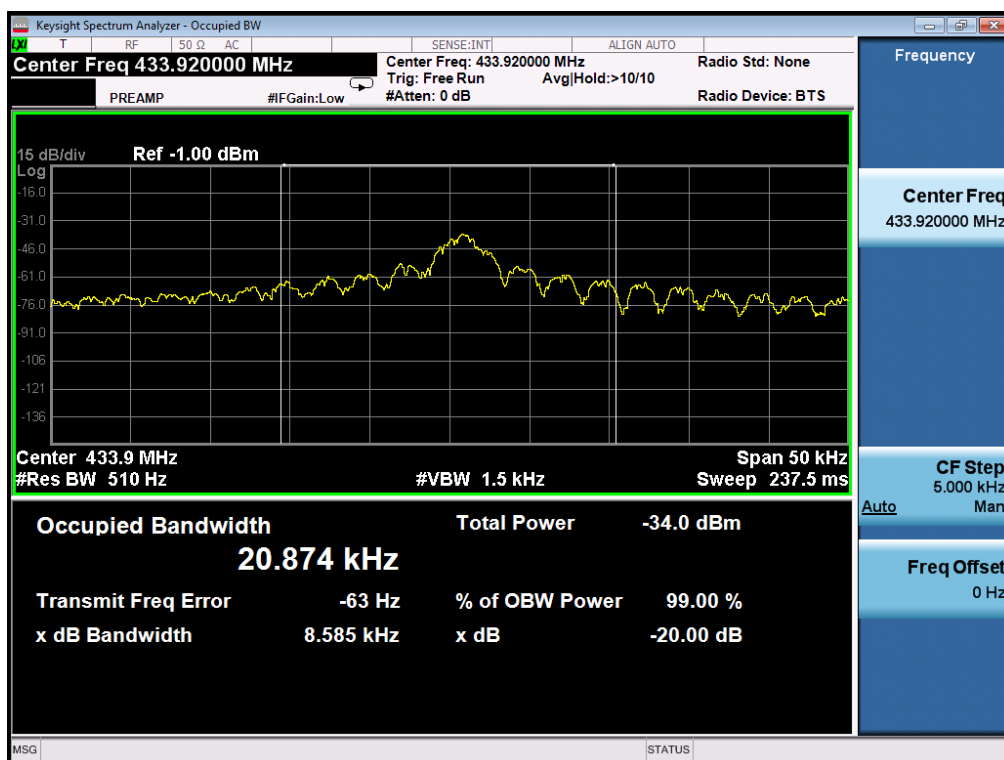
### 11.2. TEST SETUP



### 11.3. TEST RESULT

Test Mode: EUT @ 433.92MHz for RF Transmitter

-20dB bandwidth	LIMIT	RESULT
8.585kHz	1084.8KHz	Pass
Note: Limit= Operation Frequency x0.25%		



## 12. FCC LINE CONDUCTED EMISSION TEST

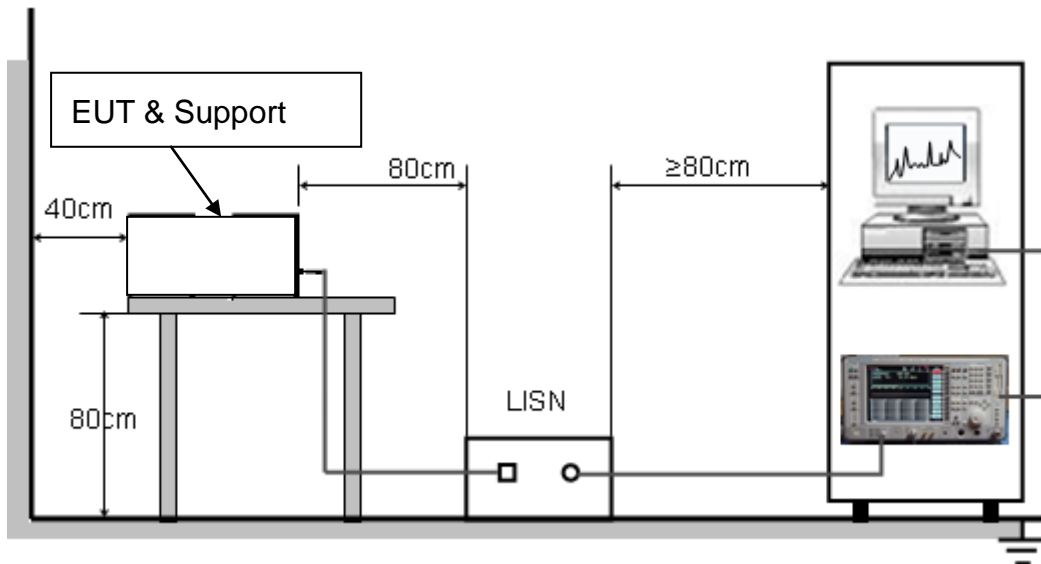
### 12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.( dBuV)	Average( dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



### **12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST**

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by PC which received 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

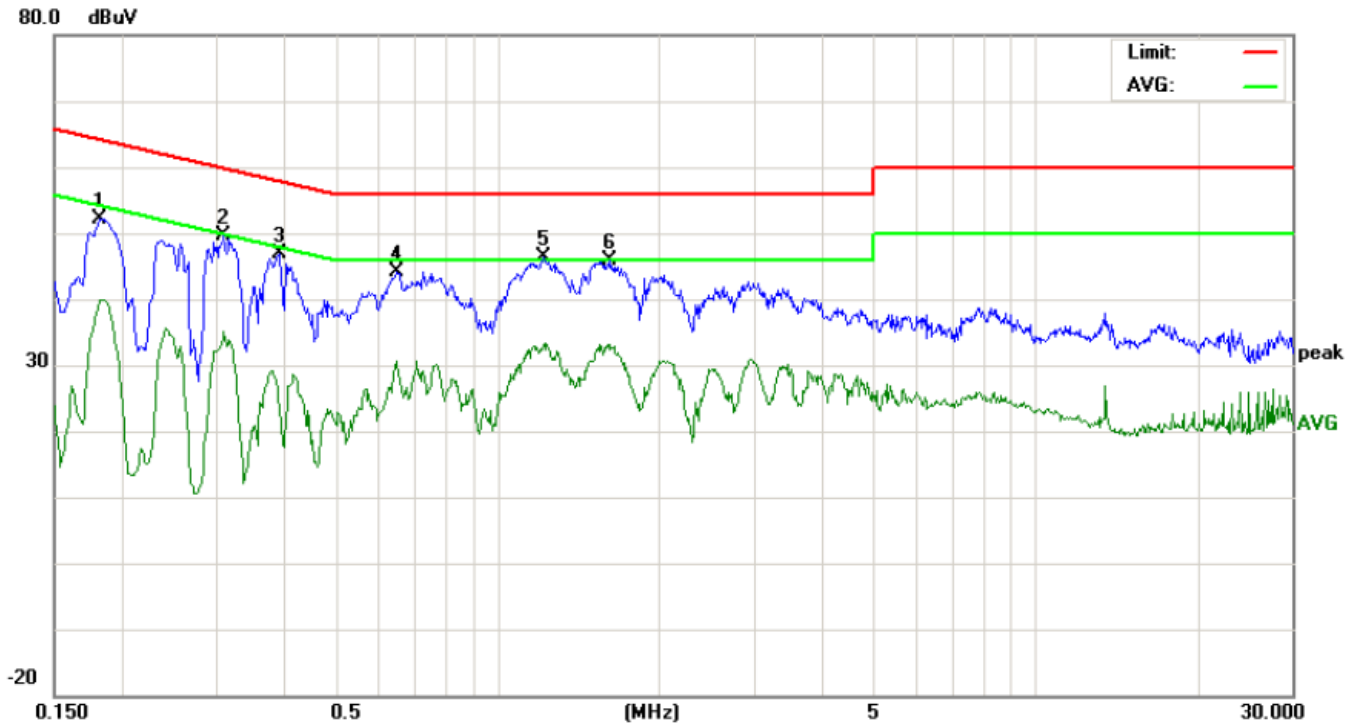
### **12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST**

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.



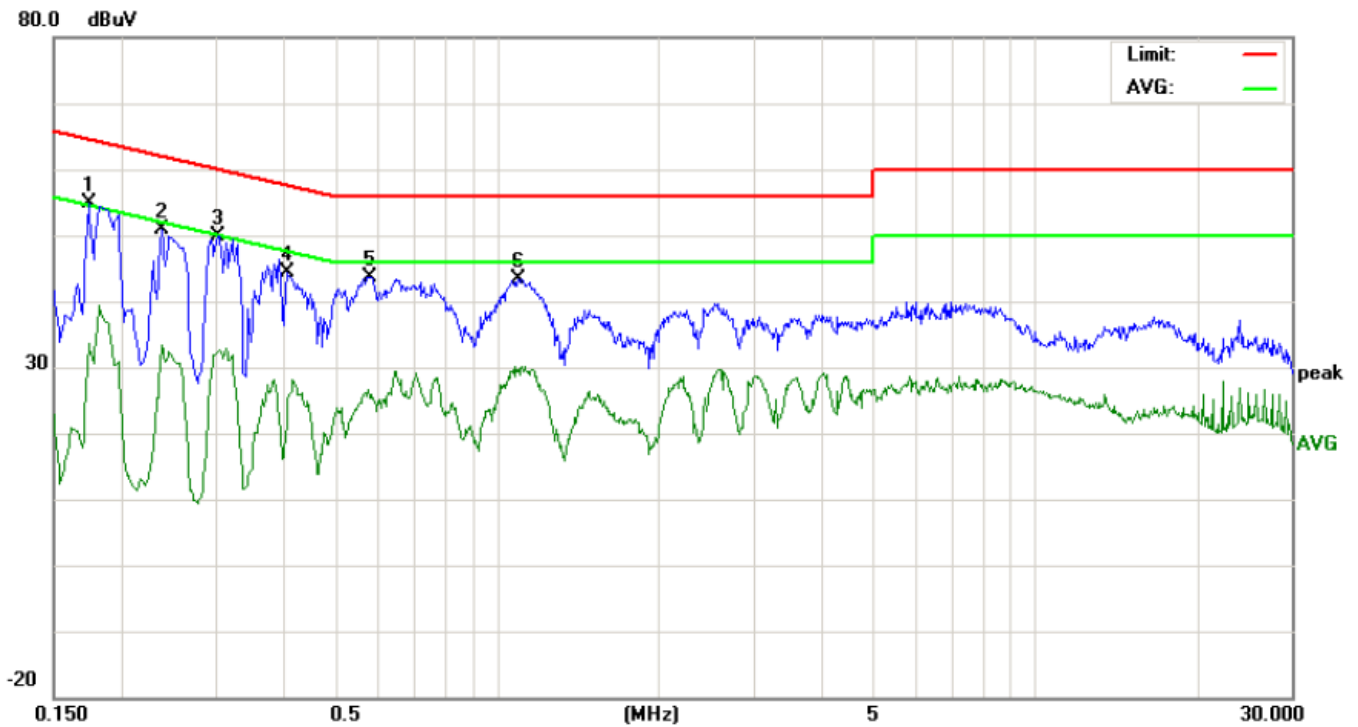
## 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1819	41.96		29.68	10.20	52.16		39.88	64.39	54.39	-12.23	-14.51	P	
2	0.3099	39.36		24.71	10.29	49.65		35.00	59.97	49.97	-10.32	-14.97	P	
3	0.3940	36.50		13.14	10.33	46.83		23.47	57.98	47.98	-11.15	-24.51	P	
4	0.6540	33.78		19.22	10.33	44.11		29.55	56.00	46.00	-11.89	-16.45	P	
5	1.2218	36.13		22.70	10.37	46.50		33.07	56.00	46.00	-9.50	-12.93	P	
6	1.6220	35.45		22.67	10.34	45.79		33.01	56.00	46.00	-10.21	-12.99	P	

Line Conducted Emission Test Line 2-N



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1737	44.71		23.44	10.19	54.90		33.63	64.78	54.78	-9.88	-21.15	P	
2	0.2379	40.56		23.04	10.26	50.82		33.30	62.17	52.17	-11.35	-18.87	P	
3	0.3019	39.55		22.03	10.29	49.84		32.32	60.19	50.19	-10.35	-17.87	P	
4	0.4098	34.02		15.15	10.34	44.36		25.49	57.65	47.65	-13.29	-22.16	P	
5	0.5818	33.32		14.92	10.33	43.65		25.25	56.00	46.00	-12.35	-20.75	P	
6	1.0980	33.02		19.28	10.37	43.39		29.65	56.00	46.00	-12.61	-16.35	P	

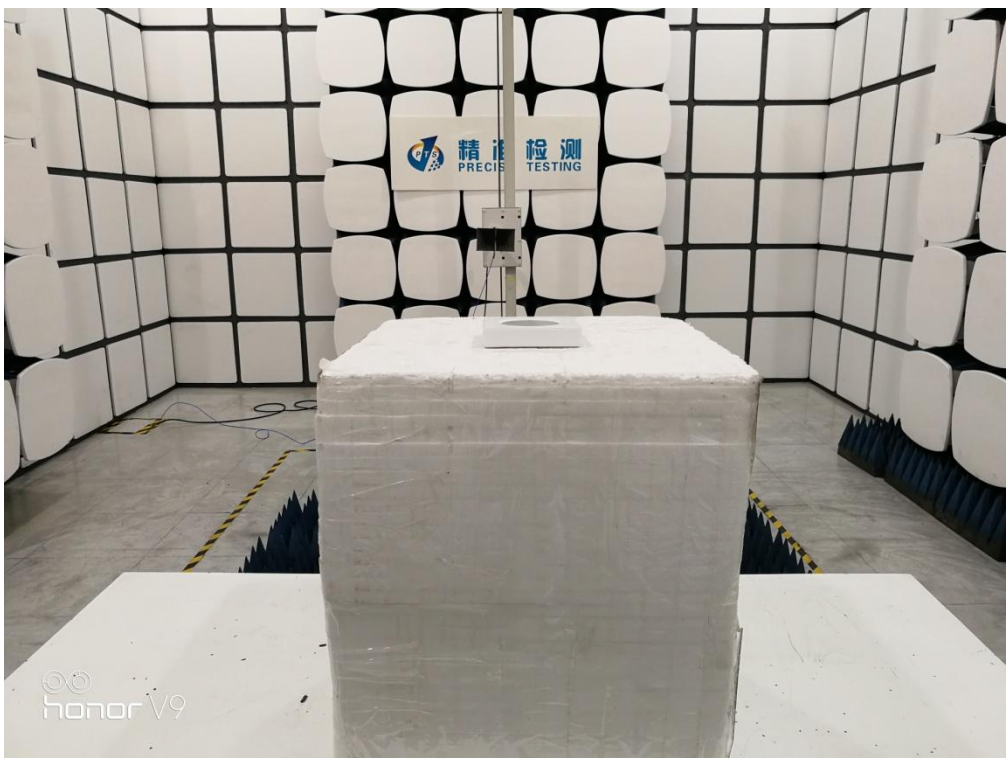
**RESULT: PASS**

## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

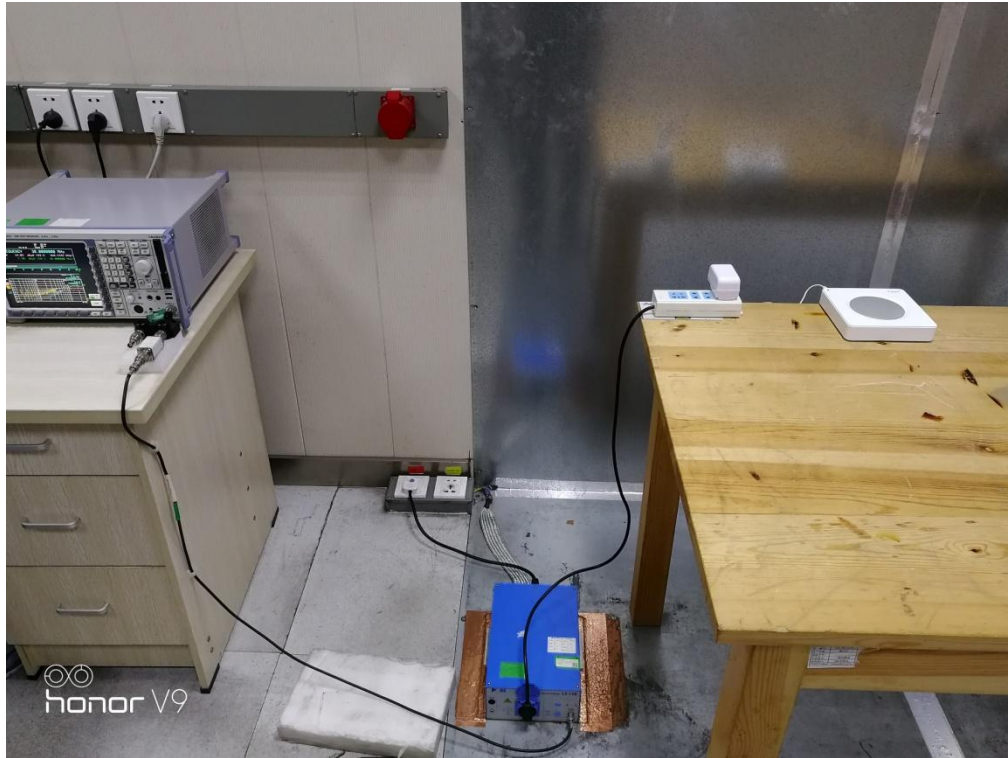
### RADIATED EMISSION TEST SETUP BELOW 1GHz



## RADIATED EMISSION TEST SETUP ABOVE 1GHz



## CONDUCTED EMISSION TEST SETUP





## APPENDIX B: PHOTOGRAPHS OF EUT

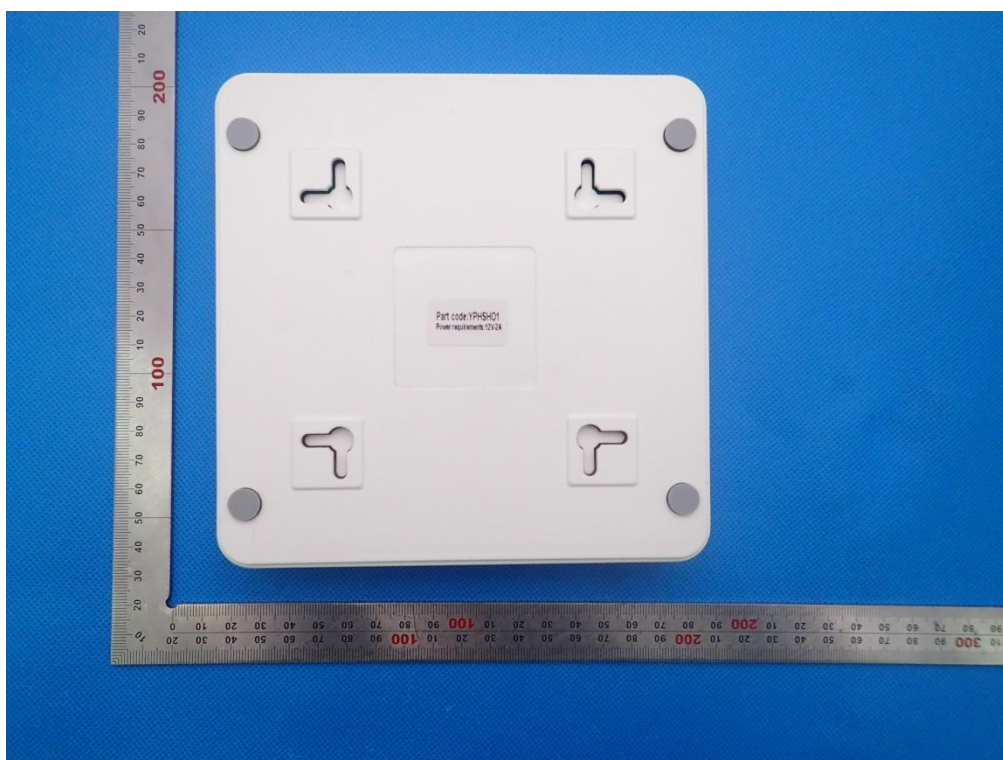
### ALL VIEW OF EUT



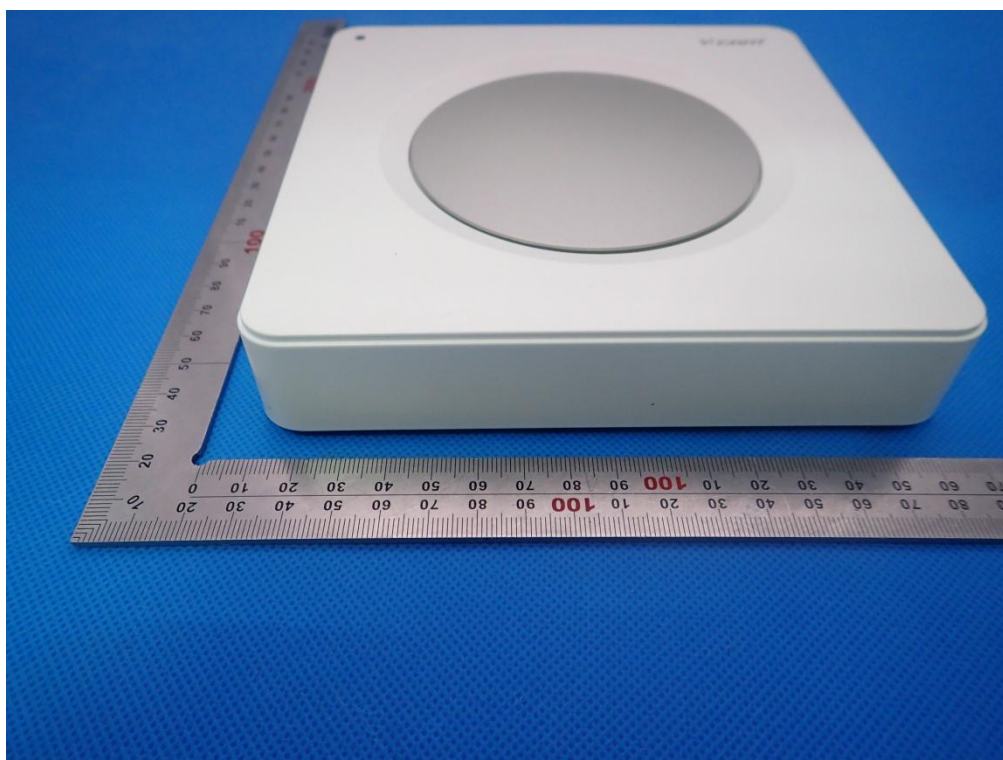
### TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT

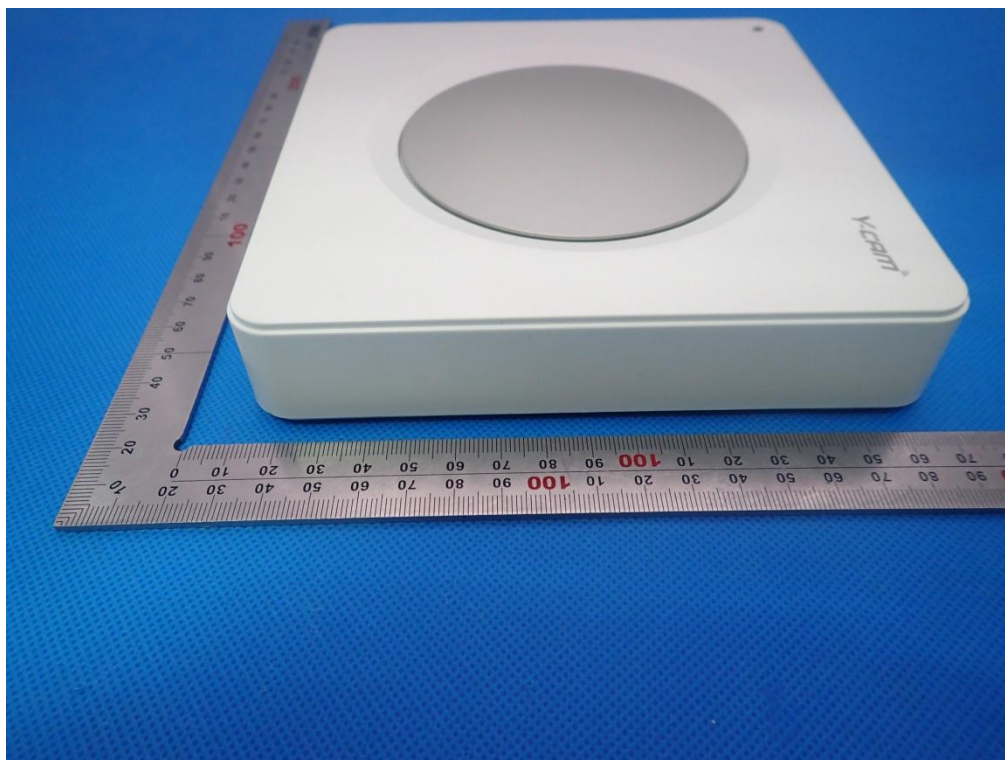




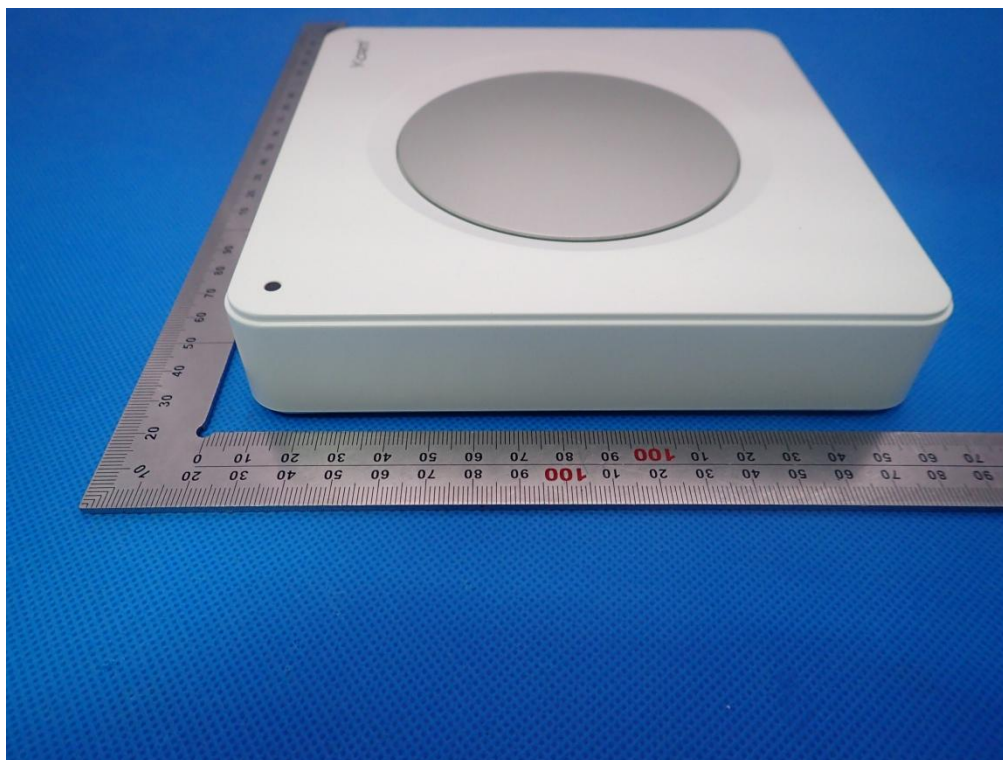
BACK VIEW OF EUT



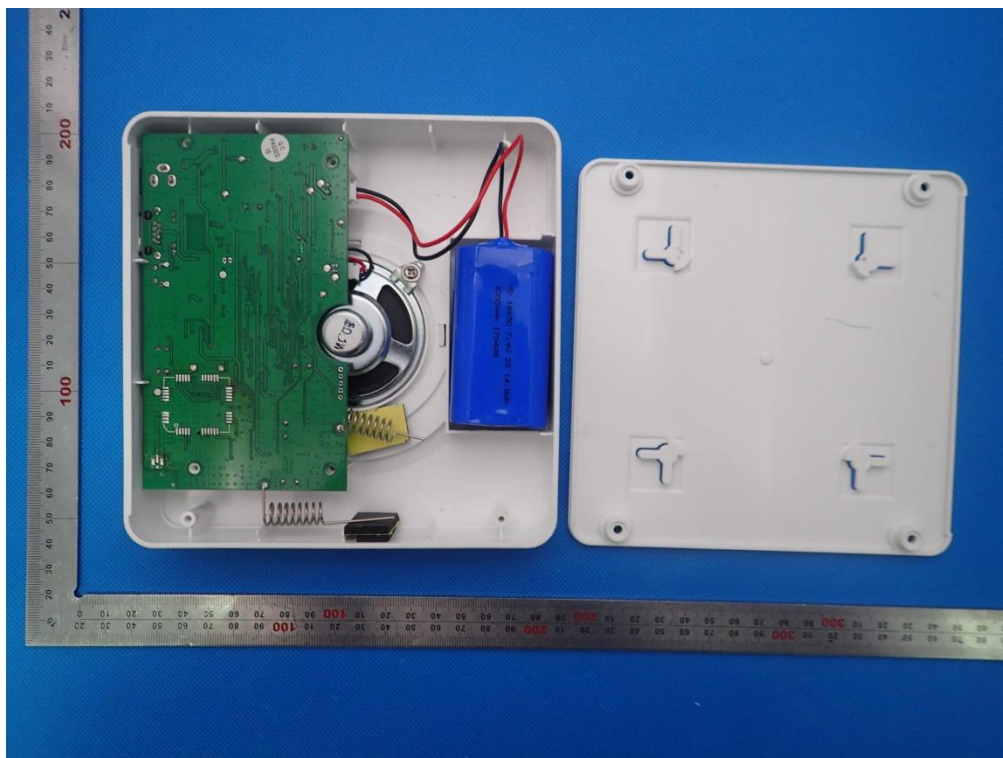
LEFT VIEW OF EUT



RIGHT VIEW OF EUT

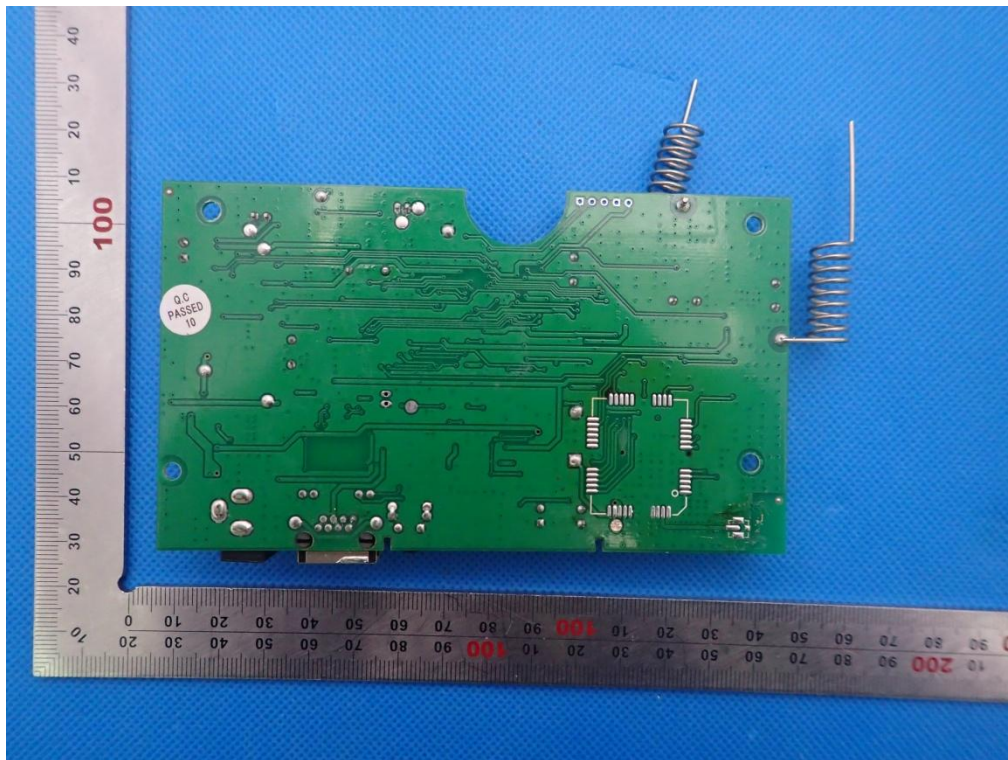


OPEN VIEW OF EUT

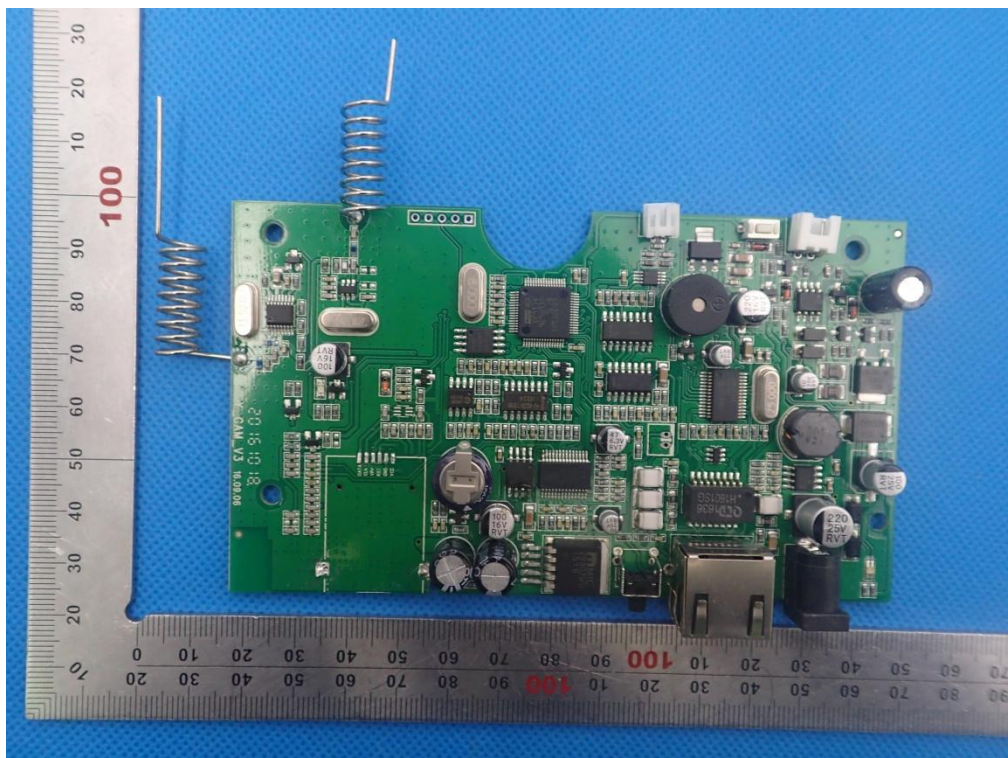




INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----