

## TEST REPORT

**FCC ID: 2ACMYAHS8R**

**Product: Control Hub**

**Model No.: AHS-8R**

**Additional Model: N/A**

**Trade Mark: N/A**

**Report No.: TCT170213E006**

**Issued Date: Feb. 20, 2017**

Issued for:

**Atoms Labs LLC**

**2670 Firewheel Dr. Suite D Flower Mound, TX 75028 UAS**

Issued By:

**Shenzhen Tongce Testing Lab.**

**1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China**

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## 1. Test Certification

<b>Product:</b>	Control Hub
<b>Model No.:</b>	AHS-8R
<b>Additional Model:</b>	N/A
<b>Applicant:</b>	Atoms Labs LLC
<b>Address:</b>	2670 Firewheel Dr. Suite D Flower Mound, TX 75028 UAS
<b>Manufacturer:</b>	Atoms Labs LLC
<b>Address:</b>	2670 Firewheel Dr. Suite D Flower Mound, TX 75028 UAS
<b>Date of Test:</b>	Feb. 14 – Feb. 20, 2017
<b>Applicable Standards:</b>	FCC CFR Title 47 Part 15 Subpart C Section 15.249

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:** \_\_\_\_\_

**Beryl Zhao**

**Date:** **Feb. 20, 2017**

**Reviewed By:** \_\_\_\_\_

**Joe Zhou**

**Date:** **Feb. 20, 2017**

**Approved By:** \_\_\_\_\_

**Tomsin**

**Date:** **Feb. 20, 2017**

## 2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Field Strength of Fundamental	§15.249 (a)	PASS
Spurious Emissions	§15.249 (a) (d)/ §15.209	PASS
Band Edge	§15.249 (d)/ §15.205	PASS
20dB Occupied Bandwidth	§15.215 (c)	PASS

**Note:**

1. Pass: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 3. EUT Description

<b>Product Name:</b>	Control Hub
<b>Model :</b>	AHS-8R
<b>Additional Model:</b>	N/A
<b>Trade Mark:</b>	<b>N/A</b>
<b>Operation Frequency:</b>	916.8MHz
<b>Modulation Technology:</b>	FSK
<b>Antenna Type:</b>	Internal Antenna
<b>Antenna Gain:</b>	1dBi
<b>Power Supply:</b>	Adapter 1 Information: Model: KSAS0121200100HU Input: AC 100-240V, 50/60Hz, 0.4A Output: DC 12V, 1A Adapter 2 Information: Model: GQ15-120100-AU Input: AC 100-240V, 50/60Hz, 0.5A Max Output: DC 12V, 1A Adapter 3 Information: Model: CS12N120100FUF Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 12V, 1A

## 4. Genera Information

### 4.1. Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel
<p>The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y &amp; Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p>	

### 4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

**Note:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 5. Facilities and Accreditations

### 5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 572331

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

- CNAS - Registration No.: CNAS L6165

Shenzhen TCT Testing Technology Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6165.

### 5.2. Location

Shenzhen Tongce Testing Lab

Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

Tel: 86-755-36638142

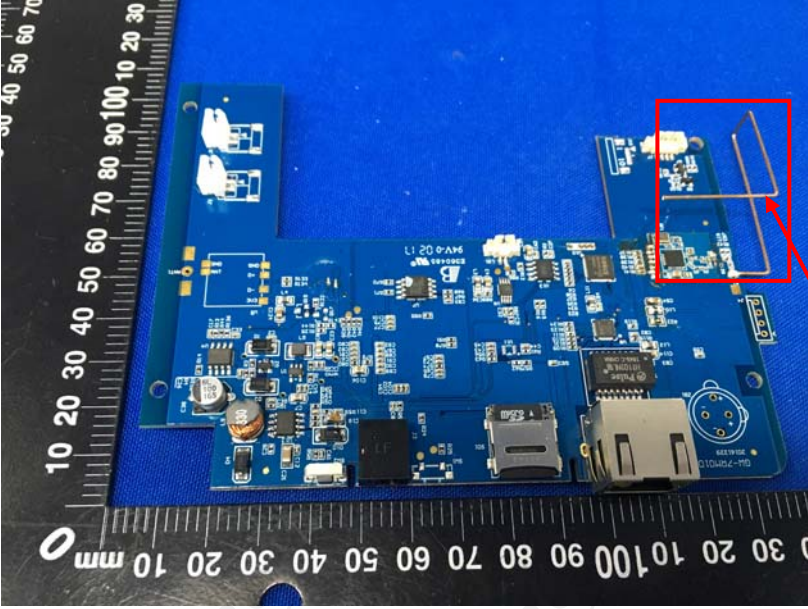
### 5.3. Measurement Uncertainty

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	MU
1	Conducted Emission	$\pm 2.56\text{dB}$
2	RF power, conducted	$\pm 0.12\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
4	All emissions, radiated(<1GHz)	$\pm 3.92\text{dB}$
5	All emissions, radiated(>1GHz)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^\circ\text{C}$
7	Humidity	$\pm 1.0\%$

## 6. Test Results and Measurement Data

### 6.1. Antenna Requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203
15.203 requirement: 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.	
<b>E.U.T Antenna:</b>	
The antenna is an internal antenna which permanently attached, and the best case gain of the antenna is 1dBi.	
	



## 6.2. Conducted Emission

### 6.2.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.207														
<b>Test Method:</b>	ANSI C63.10:2013														
<b>Frequency Range:</b>	150 kHz to 30 MHz														
<b>Receiver setup:</b>	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
<b>Limits:</b>	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
<b>Test Setup:</b>	<p><i>Remark</i>  <i>E.U.T: Equipment Under Test</i>  <i>LISN: Line Impedance Stabilization Network</i>  <i>Test table height=0.8m</i></p>														
<b>Test Mode:</b>	Transmitting mode with modulation														
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The E.U.T is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.</li> </ol>														
<b>Test Result:</b>	PASS														

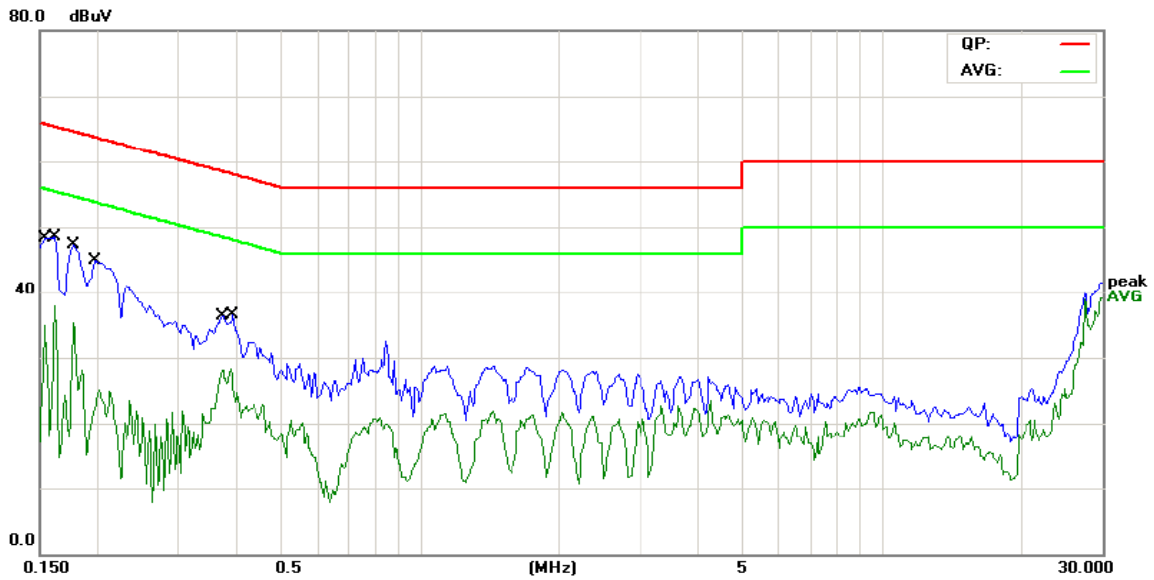
## 6.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCS30	100139	Aug. 11, 2017
LISN	Schwarzbeck	NSLK 8126	8126453	Aug. 16, 2017
Coax cable (9KHz-40GHz)	TCT	CE-05	N/A	Aug. 11, 2017
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

*Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

## 6.2.3. Test data

Please refer to following diagram for individual  
**Adapter 1 Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)**



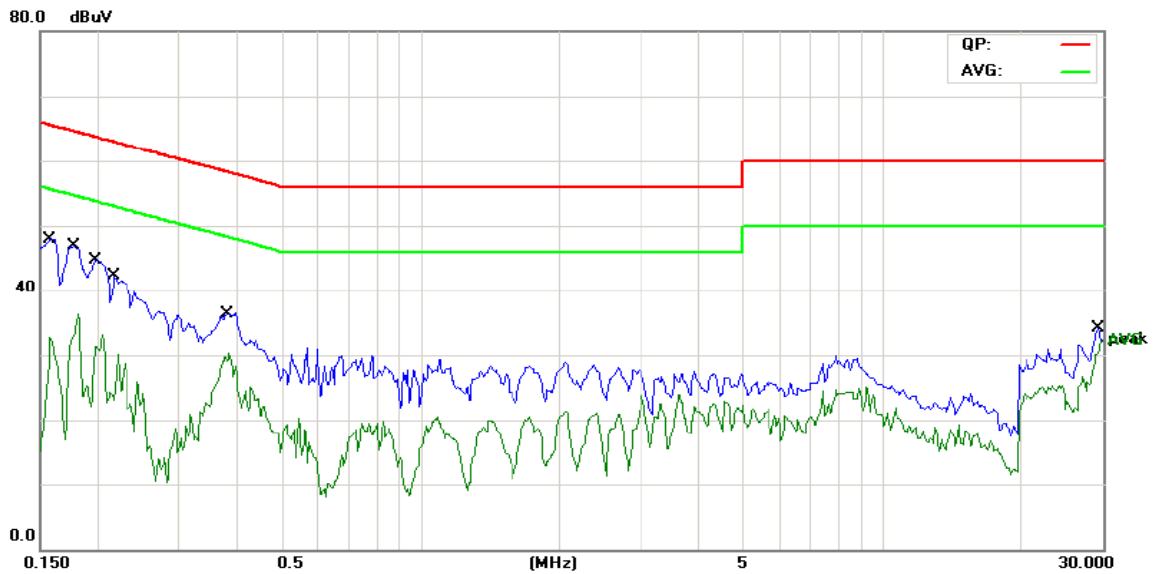
Site Chamber #2 Phase: **L1** Temperature: 23 (C)  
 Limit: FCC Part 15B Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1539	33.76	11.47	45.23	65.78	-20.55	QP	
2		0.1539	15.41	11.47	26.88	55.78	-28.90	AVG	
3		0.1617	33.20	11.47	44.67	65.37	-20.70	QP	
4		0.1617	13.86	11.47	25.33	55.37	-30.04	AVG	
5		0.1773	32.54	11.46	44.00	64.61	-20.61	QP	
6		0.1773	14.92	11.46	26.38	54.61	-28.23	AVG	
7		0.1969	29.58	11.45	41.03	63.74	-22.71	QP	
8		0.1969	12.32	11.45	23.77	53.74	-29.97	AVG	
9		0.3727	21.73	11.36	33.09	58.44	-25.35	QP	
10		0.3727	16.00	11.36	27.36	48.44	-21.08	AVG	
11		0.3922	20.74	11.35	32.09	58.02	-25.93	QP	
12		0.3922	14.31	11.35	25.66	48.02	-22.36	AVG	

**Note:**

- Freq. = Emission frequency in MHz
- Reading level (dBuV) = Receiver reading
- Corr. Factor (dB) = Antenna factor + Cable loss
- Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Measurement (dBuV) – Limits (dBuV)
- Q.P. =Quasi-Peak
- AVG =average
- \* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz

## Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



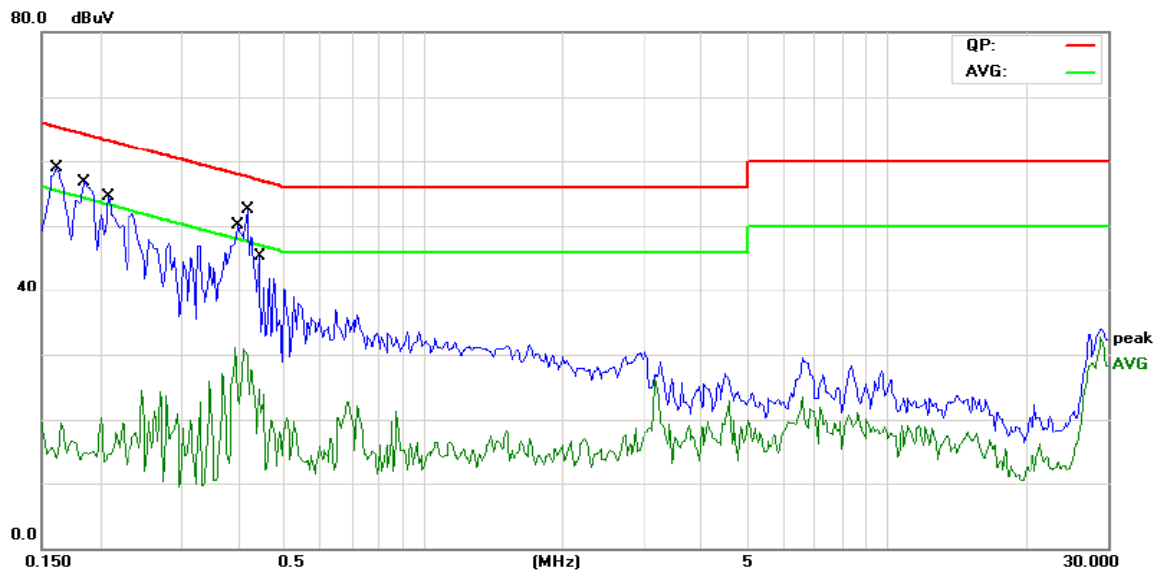
Site Chamber #2 Phase: **N** Temperature: 23 (C)  
 Limit: FCC Part 15B Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1578	33.75	11.47	45.22	65.57	-20.35	QP	
2		0.1578	21.77	11.47	33.24	55.57	-22.33	AVG	
3		0.1773	31.75	11.46	43.21	64.61	-21.40	QP	
4		0.1773	20.75	11.46	32.21	54.61	-22.40	AVG	
5		0.1969	28.89	11.45	40.34	63.74	-23.40	QP	
6		0.1969	17.08	11.45	28.53	53.74	-25.21	AVG	
7		0.2164	26.43	11.44	37.87	62.95	-25.08	QP	
8		0.2164	11.98	11.44	23.42	52.95	-29.53	AVG	
9		0.3805	22.67	11.36	34.03	58.27	-24.24	QP	
10	*	0.3805	18.33	11.36	29.69	48.27	-18.58	AVG	
11		29.3008	23.04	10.62	33.66	60.00	-26.34	QP	
12		29.3008	17.20	10.62	27.82	50.00	-22.18	AVG	

**Note:**

- Freq. = Emission frequency in MHz
- Reading level (dBuV) = Receiver reading
- Corr. Factor (dB) = Antenna factor + Cable loss
- Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Measurement (dBuV) – Limits (dBuV)
- Q.P. =Quasi-Peak AVG =average
- \* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

## Adapter 2 Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



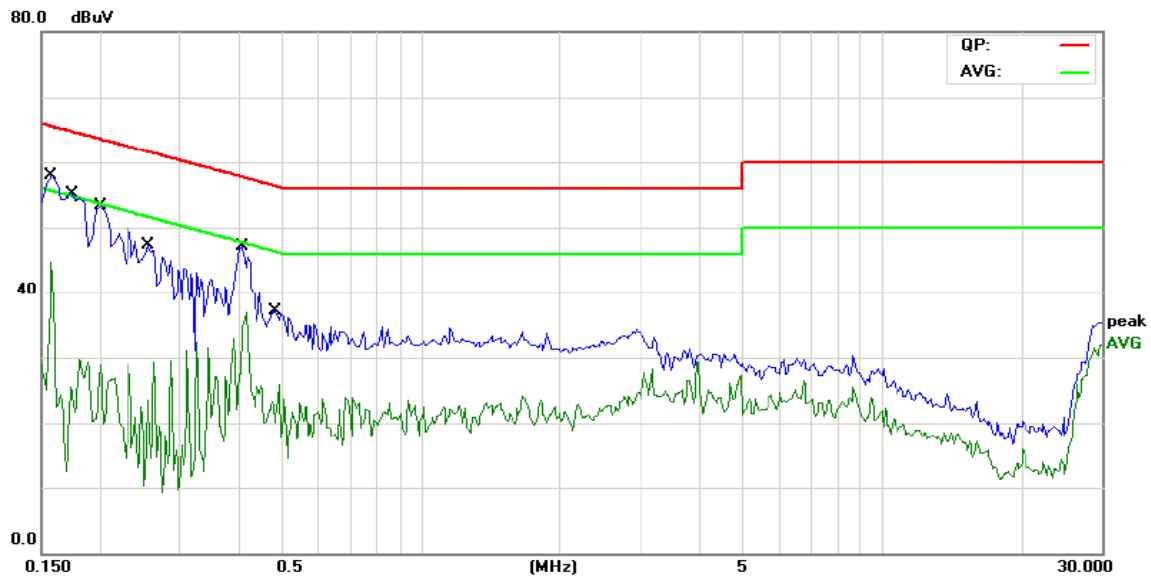
Site Chamber #2 Phase: **L1** Temperature: 23 (C)  
 Limit: FCC Part 15B Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1617	42.54	11.47	54.01	65.37	-11.36	QP	
2		0.1617	19.28	11.47	30.75	55.37	-24.62	AVG	
3		0.1852	40.25	11.46	51.71	64.24	-12.53	QP	
4		0.1852	16.59	11.46	28.05	54.24	-26.19	AVG	
5		0.2086	37.95	11.45	49.40	63.26	-13.86	QP	
6		0.2086	14.40	11.45	25.85	53.26	-27.41	AVG	
7		0.3961	32.35	11.35	43.70	57.93	-14.23	QP	
8		0.3961	15.87	11.35	27.22	47.93	-20.71	AVG	
9		0.4156	33.81	11.34	45.15	57.53	-12.38	QP	
10		0.4156	16.75	11.34	28.09	47.53	-19.44	AVG	
11		0.4430	26.77	11.33	38.10	57.00	-18.90	QP	
12		0.4430	8.79	11.33	20.12	47.00	-26.88	AVG	

**Note:**

- Freq. = Emission frequency in MHz
- Reading level (dBuV) = Receiver reading
- Corr. Factor (dB) = Antenna factor + Cable loss
- Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Measurement (dBuV) – Limits (dBuV)
- Q.P. =Quasi-Peak
- AVG =average
- \* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz

## Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



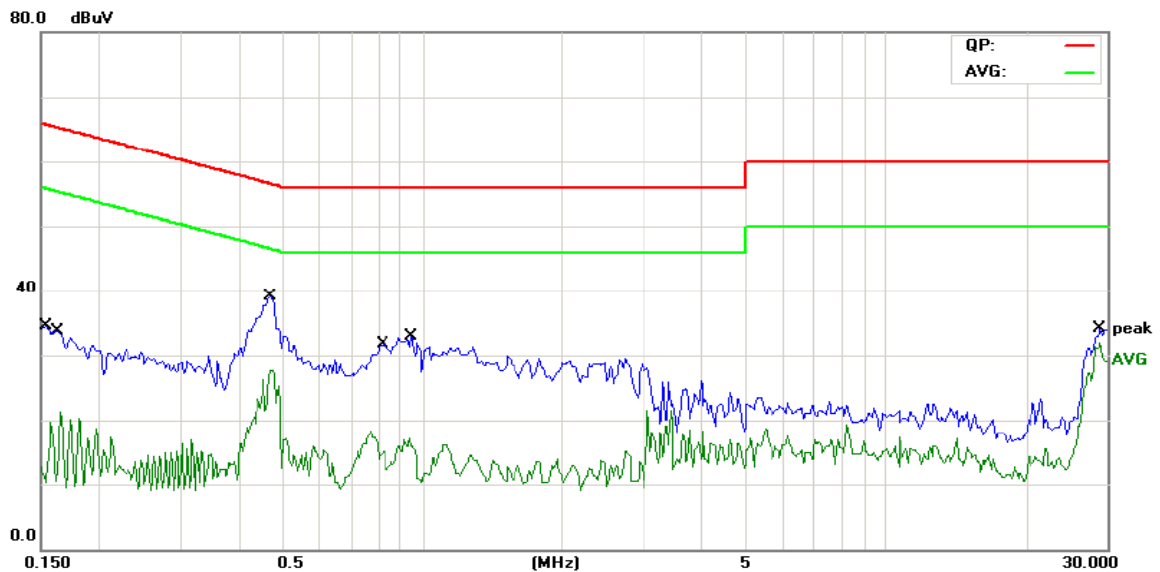
Site Chamber #2 Phase: **N** Temperature: 23 (C)  
 Limit: FCC Part 15B Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1578	42.48	11.47	53.95	65.57	-11.62	QP	
2		0.1578	20.59	11.47	32.06	55.57	-23.51	AVG	
3		0.1758	41.07	11.46	52.53	64.68	-12.15	QP	
4		0.1758	17.16	11.46	28.62	54.68	-26.06	AVG	
5		0.2008	38.05	11.45	49.50	63.57	-14.07	QP	
6		0.2008	17.00	11.45	28.45	53.57	-25.12	AVG	
7		0.2555	31.93	11.42	43.35	61.57	-18.22	QP	
8		0.2555	10.43	11.42	21.85	51.57	-29.72	AVG	
9		0.4078	31.14	11.35	42.49	57.69	-15.20	QP	
10		0.4078	21.06	11.35	32.41	47.69	-15.28	AVG	
11		0.4820	21.80	11.31	33.11	56.30	-23.19	QP	
12		0.4820	10.00	11.31	21.31	46.30	-24.99	AVG	

**Note:**

- Freq. = Emission frequency in MHz
- Reading level (dBuV) = Receiver reading
- Corr. Factor (dB) = Antenna factor + Cable loss
- Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Measurement (dBuV) – Limits (dBuV)
- Q.P. =Quasi-Peak AVG =average
- \* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

## Adapter 3 Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



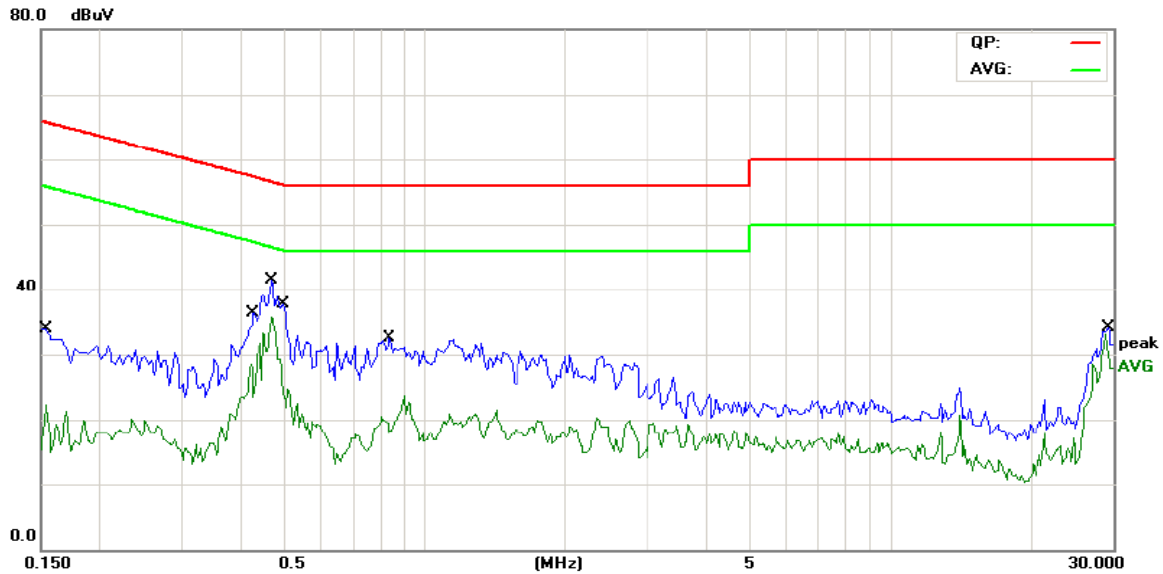
Site Chamber #2 Phase: **L1** Temperature: 23 (C)  
 Limit: FCC Part 15B Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1539	19.16	11.47	30.63	65.78	-35.15	QP	
2		0.1539	3.62	11.47	15.09	55.78	-40.69	AVG	
3		0.1641	17.96	11.47	29.43	65.25	-35.82	QP	
4		0.1641	3.20	11.47	14.67	55.25	-40.58	AVG	
5	*	0.4703	23.97	11.31	35.28	56.51	-21.23	QP	
6		0.4703	13.90	11.31	25.21	46.51	-21.30	AVG	
7		0.8258	14.55	11.22	25.77	56.00	-30.23	QP	
8		0.8258	2.60	11.22	13.82	46.00	-32.18	AVG	
9		0.9469	14.41	11.21	25.62	56.00	-30.38	QP	
10		0.9469	1.13	11.21	12.34	46.00	-33.66	AVG	
11		28.9844	20.34	10.63	30.97	60.00	-29.03	QP	
12		28.9844	15.09	10.63	25.72	50.00	-24.28	AVG	

**Note:**

- Freq. = Emission frequency in MHz
- Reading level (dBuV) = Receiver reading
- Corr. Factor (dB) = Antenna factor + Cable loss
- Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)
- Limit (dBuV) = Limit stated in standard
- Margin (dB) = Measurement (dBuV) – Limits (dBuV)
- Q.P. =Quasi-Peak
- AVG =average
- \* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz

## Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Site Chamber #2 Phase: **N** Temperature: 23 (C)  
 Limit: FCC Part 15B Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1539	17.28	11.47	28.75	65.78	-37.03	QP	
2		0.1539	5.44	11.47	16.91	55.78	-38.87	AVG	
3		0.4273	17.16	11.34	28.50	57.30	-28.80	QP	
4		0.4273	10.79	11.34	22.13	47.30	-25.17	AVG	
5		0.4664	25.25	11.32	36.57	56.58	-20.01	QP	
6	*	0.4664	23.01	11.32	34.33	46.58	-12.25	AVG	
7		0.4994	15.00	11.30	26.30	56.01	-29.71	QP	
8		0.4994	7.78	11.30	19.08	46.01	-26.93	AVG	
9		0.8414	13.54	11.22	24.76	56.00	-31.24	QP	
10		0.8414	6.97	11.22	18.19	46.00	-27.81	AVG	
11		29.2773	20.97	10.62	31.59	60.00	-28.41	QP	
12		29.2773	16.12	10.62	26.74	50.00	-23.26	AVG	

**Note:**

Freq. = Emission frequency in MHz

Reading level (dBuV) = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement (dBuV) = Reading level (dBuV) + Corr. Factor (dB)

Limit (dBuV) = Limit stated in standard

Margin (dB) = Measurement (dBuV) – Limits (dBuV)

Q.P. =Quasi-Peak AVG =average

\* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.



## 6.3. Radiated Emission Measurement

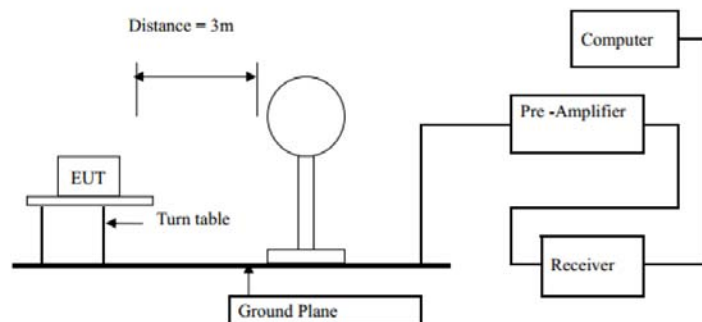
### 6.3.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.209				
<b>Test Method:</b>	ANSI C63.10:2013				
<b>Frequency Range:</b>	9 kHz to 25 GHz				
<b>Measurement Distance:</b>	3 m				
<b>Antenna Polarization:</b>	Horizontal & Vertical				
<b>Receiver Setup:</b>	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
<b>Limit(Field strength of the fundamental signal):</b>	Frequency	Limit (dBuV/m @3m)		Remark	
	902MHz-928MHz	94.00		Quasi-peak Value	
<b>Limit(Spurious Emissions):</b>	Frequency	Limit (dBuV/m @3m)		Remark	
	0.009-0.490	2400/F(KHz)		Quasi-peak Value	
	0.490-1.705	24000/F(KHz)		Quasi-peak Value	
	1.705-30	30		Quasi-peak Value	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	960MHz-1GHz	54.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
74.0		Peak Value			
<b>Limit (band edge) :</b>	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.				
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> </ol>				

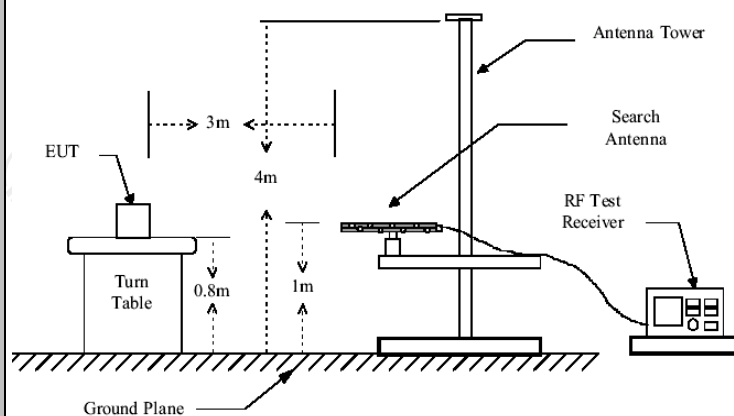
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**Test setup:**

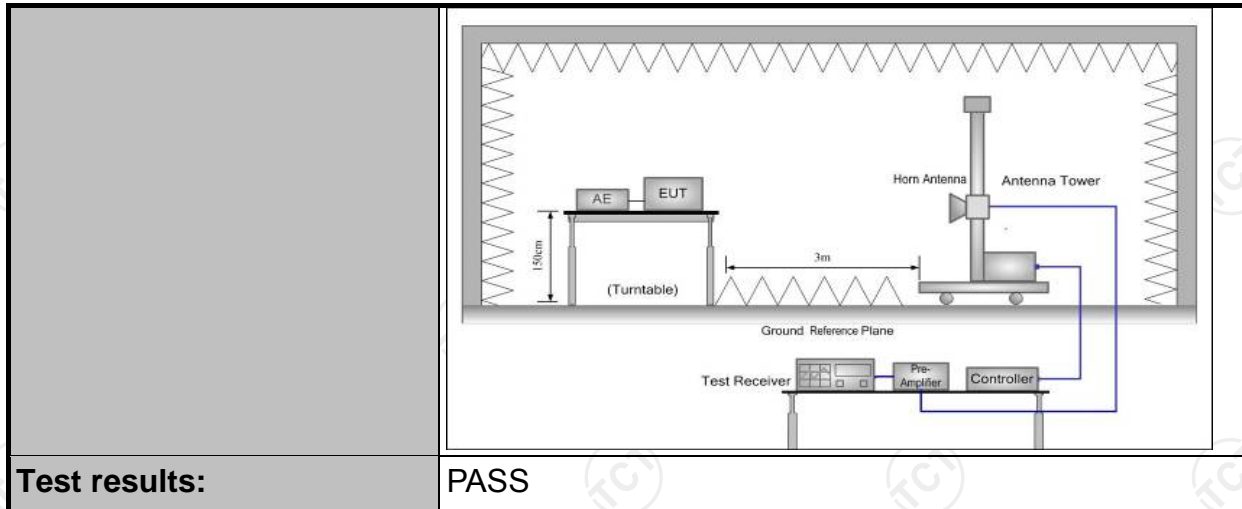
For radiated emissions below 30MHz



30MHz to 1GHz



Above 1GHz



**Test results:**

**PASS**

### 6.3.2. Test Instruments

ESPI Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Aug. 11, 2017
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Aug. 11, 2017
Spectrum Analyzer	Agilent	N9020A	MY49100060	Aug. 12, 2017
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Aug. 11, 2017
Pre-amplifier	HP	8447D	2727A05017	Aug. 11, 2017
Loop antenna	ZHINAN	ZN30900A	12024	Aug. 13, 2017
Broadband Antenna	Schwarzbeck	VULB9163	340	Aug. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Aug. 13, 2017
Horn Antenna	Schwarzbeck	BBHA 9170	373	Aug. 13, 2017
Coax cable (9kHz-40GHz)	TCT	RE-low-01	N/A	Aug. 11, 2017
Coax cable (9kHz-40GHz)	TCT	RE-high-02	N/A	Aug. 11, 2017
Coax cable (9kHz-40GHz)	TCT	RE-low-03	N/A	Aug. 11, 2017
Coax cable (9kHz-40GHz)	TCT	RE-high-04	N/A	Aug. 11, 2017
Antenna Mast	CCS	CC-A-4M	N/A	N/A
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 6.3.3. Test Data

#### Field Strength of Fundamental

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horizontal /Vertical	Limits PK/AV (dBuV/m)	Margin (dB)
916.8	93.22(PK)	H	114/94	-20.78
916.8	84.58(AV)	H	114/94	-9.42
916.8	91.49(PK)	V	114/94	-22.51
916.8	82.81(AV)	V	114/94	-11.19

#### Spurious Emissions

##### Frequency Range (9 kHz-30MHz)

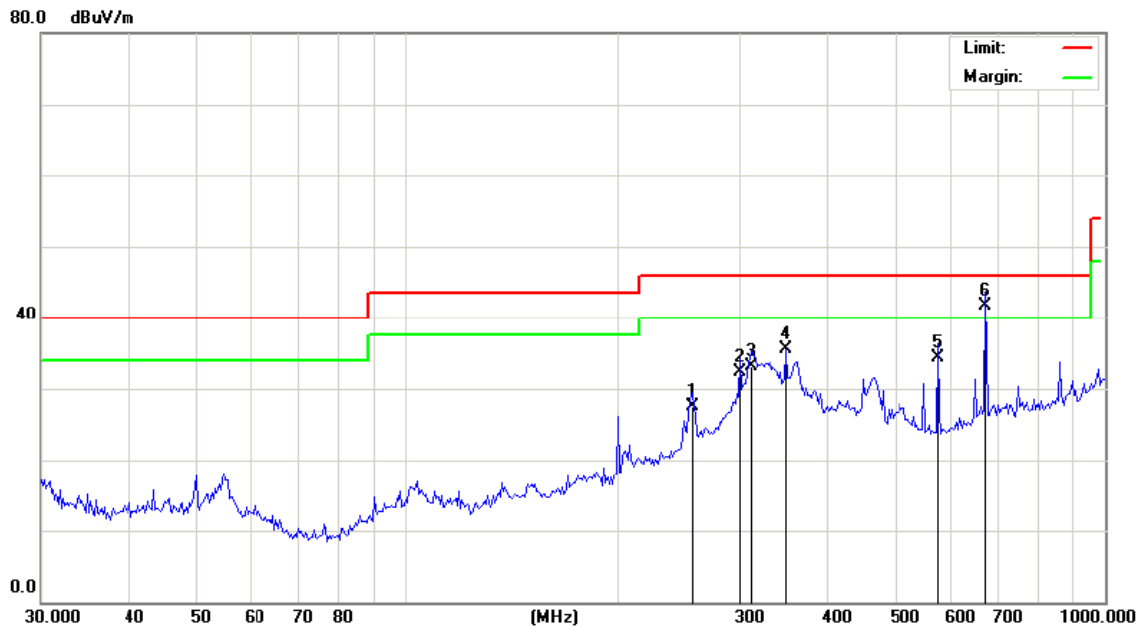
Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

**Note:** 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

## Frequency Range (30MHz-1GHz)

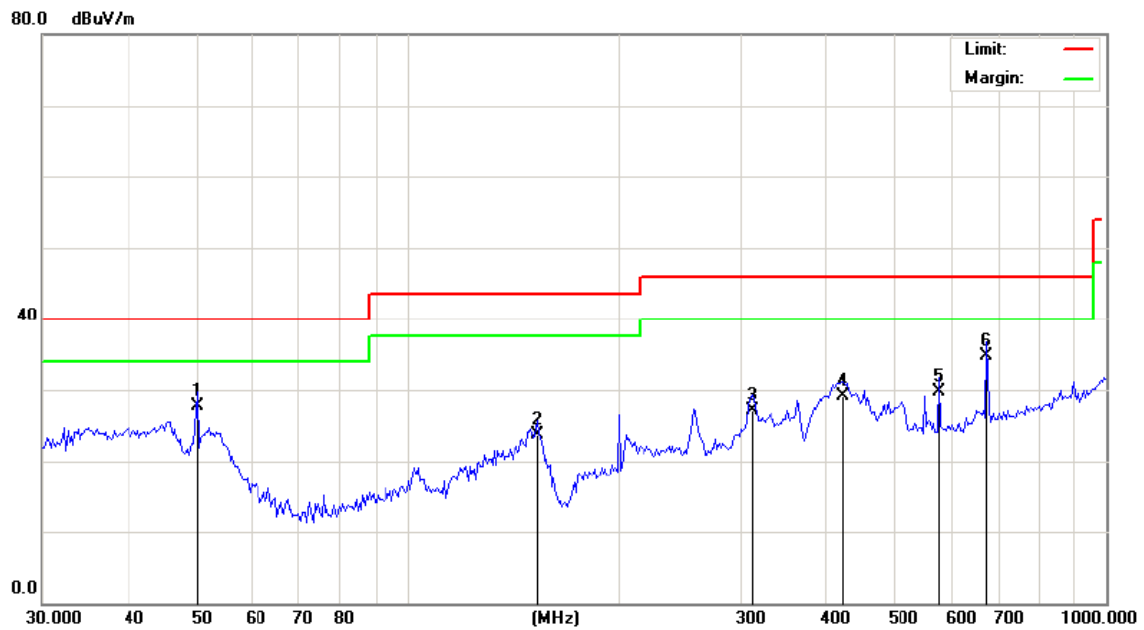
Horizontal:



Site: Polarization: **Horizontal** Temperature: 25  
 Limit: FCC Part 15B Class B RE\_3 m Power: AC 120V/60Hz Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		256.6825	37.20	-9.73	27.47	46.00	-18.53	QP	
2		300.4211	40.50	-8.24	32.26	46.00	-13.74	QP	
3		310.7232	41.20	-8.02	33.18	46.00	-12.82	QP	
4		349.6426	42.70	-7.23	35.47	46.00	-10.53	QP	
5		576.5407	36.40	-2.17	34.23	46.00	-11.77	QP	
6	*	674.7830	42.10	-0.39	41.71	46.00	-4.29	QP	

Vertical:



Site: Polarization: **Vertical** Temperature: 25  
 Limit: FCC Part 15B Class B RE\_3 m Power: AC 120V/60Hz Humidity: 54 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		50.0274	39.80	-12.03	27.77	40.00	-12.23	QP	
2		153.9252	38.50	-14.88	23.62	43.50	-19.88	QP	
3		310.7232	35.20	-8.02	27.18	46.00	-18.82	QP	
4		420.8830	34.60	-5.51	29.09	46.00	-16.91	QP	
5		576.5407	31.90	-2.17	29.73	46.00	-16.27	QP	
6	*	674.7831	35.10	-0.39	34.71	46.00	-11.29	QP	

**Note:** Measurements were conducted in all adapters (adapter1, adapter2, adapter3), and the worst case (adapter1) was submitted only.



### Above 1GHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	AV reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level		Peak limit (dB $\mu$ V/m)	AV limit (dB $\mu$ V/m)	Margin (dB)
					Peak (dB $\mu$ V/m)	AV (dB $\mu$ V/m)			
1833.6	H	51.62	---	-3.98	47.64	---	74.00	54.00	-6.36
2750.4	H	44.15	---	0.57	44.72	---	74.00	54.00	-9.28
---	---	---	---	---	---	---	---	---	---
1833.6	V	50.59	---	-3.98	46.61	---	74.00	54.00	-7.39
2750.4	V	43.31	---	0.57	43.88	---	74.00	54.00	-10.12
---	---	---	---	---	---	---	---	---	---

### Band Edge Requirement


Frequency (MHz)	Ant. Pol. H/V	Peak reading (dB $\mu$ V)	Correction Factor (dB/m)	Emission Level (dB $\mu$ V/m)	QP limit (dB $\mu$ V/m)	Margin (dB)
902	H	33.15	5.65	38.80	46.00	-7.20
928	H	30.49	5.74	36.23	46.00	-9.77
902	V	32.68	5.65	38.33	46.00	-7.67
928	V	31.33	5.74	37.07	46.00	-8.93

#### Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dB $\mu$ V/m)-Average limit (dB $\mu$ V/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
5. Data of measurement shown "---" in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

## 6.4.20dB Occupied Bandwidth

### 6.4.1. Test Specification

<b>Test Requirement:</b>	FCC Part15 C Section 15.215(c)
<b>Test Method:</b>	ANSI C63.10: 2013
<b>Limit:</b>	N/A
	<ol style="list-style-type: none"> <li>1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT.</li> <li>2. Set to the maximum power setting and enable the EUT transmit continuously.</li> <li>3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW<math>\geq</math>1% of the 20 dB bandwidth; VBW<math>\geq</math>RBW; Sweep = auto; Detector function = peak; Trace = max hold.</li> <li>4. Measure and record the results in the test report.</li> </ol>
<b>Test setup:</b>	 <p>The diagram illustrates the test setup. On the left is a Spectrum Analyzer, represented by a green rectangular box with a screen and two knobs. On the right is the EUT (Equipment Under Test), represented by a yellow rectangular box. A horizontal line with a small circle in the middle connects the two boxes, representing a cable or antenna connection.</p>
<b>Test Mode:</b>	Transmitting mode with modulation
<b>Test results:</b>	PASS

### 6.4.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200054	Aug. 11, 2017

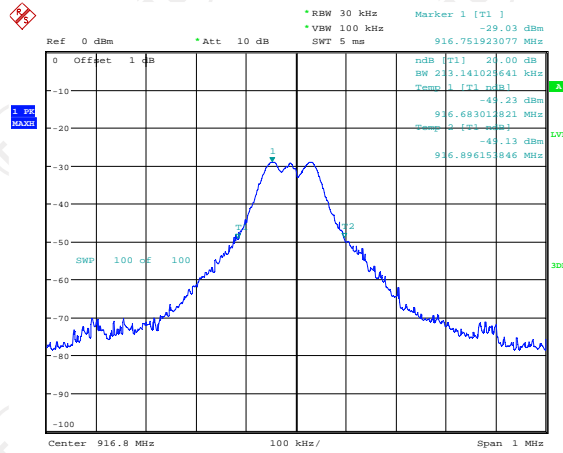
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



### 6.4.3. Test data

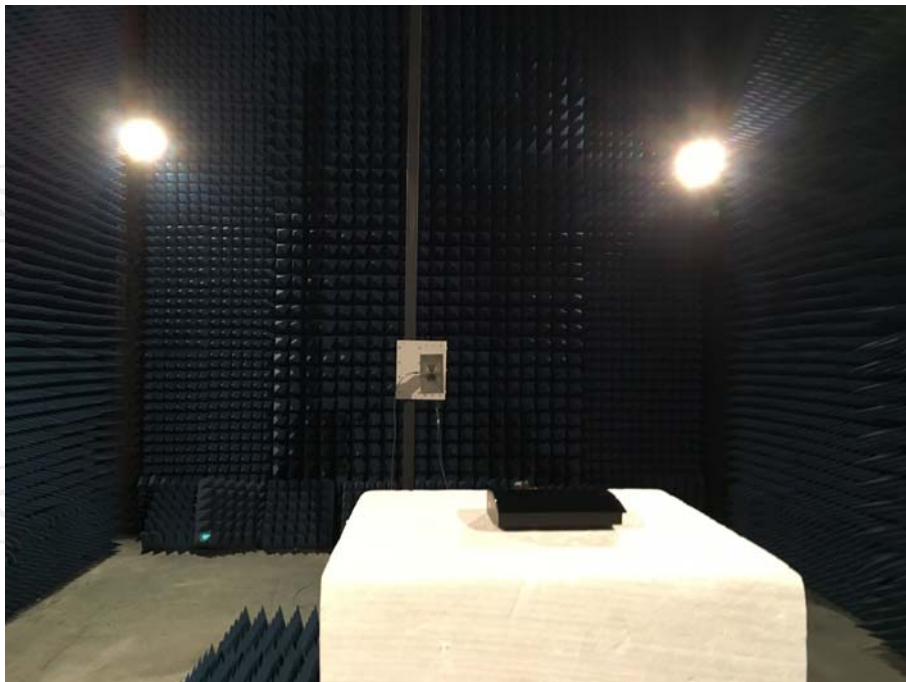
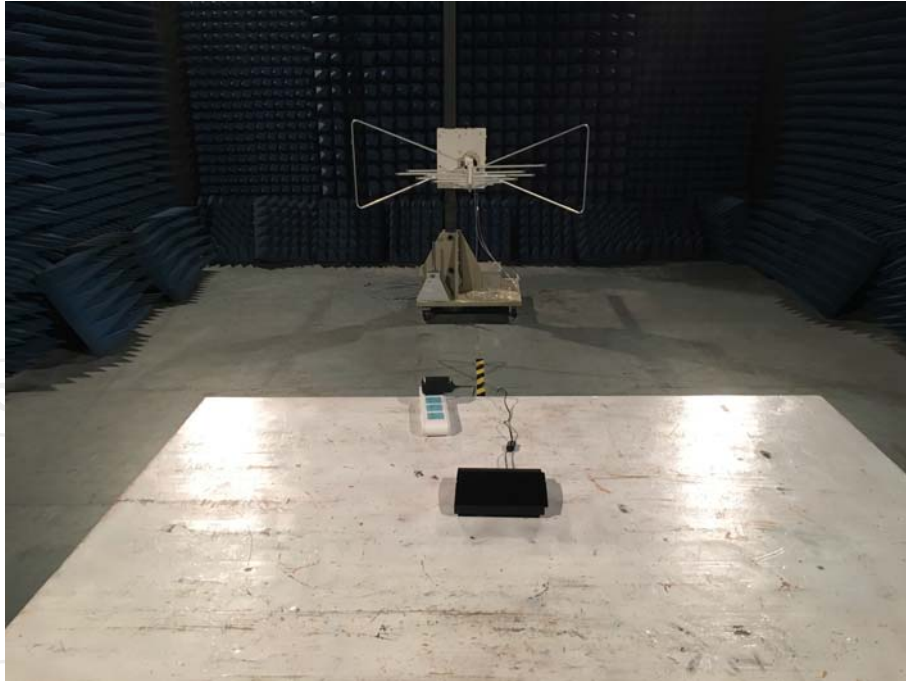
Frequency (MHz)	20dB Occupy Bandwidth (kHz)	Limit	Conclusion
916.8	213.14	---	PASS

Test plots as follows:



Date: 20.FEB.2017 11:18:36

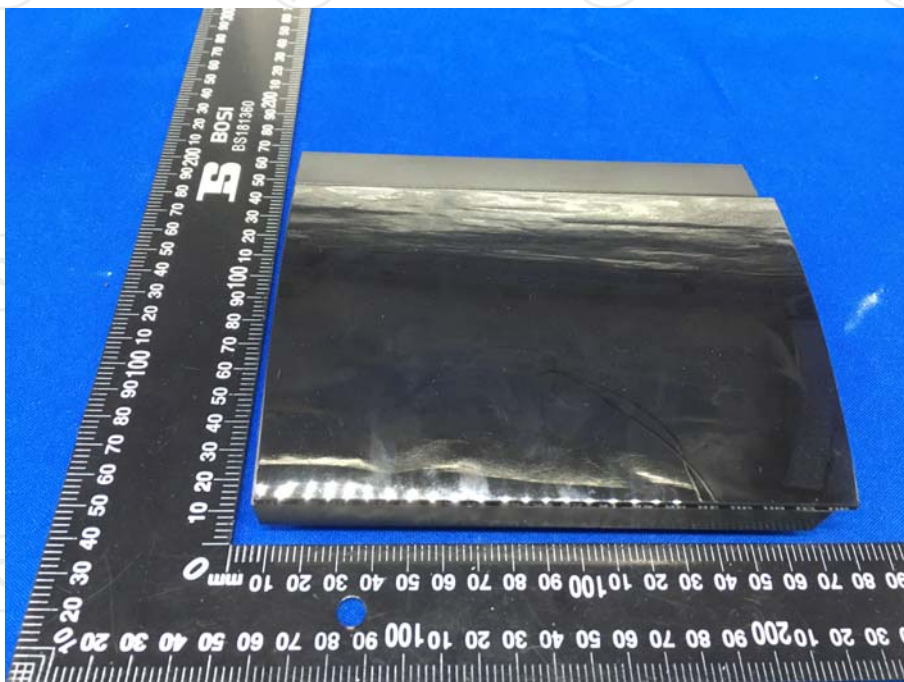
**Appendix A: Photographs of Test Setup**  
**Product: Control Hub**  
**Model: AHS-8R**  
**Radiated Emission**



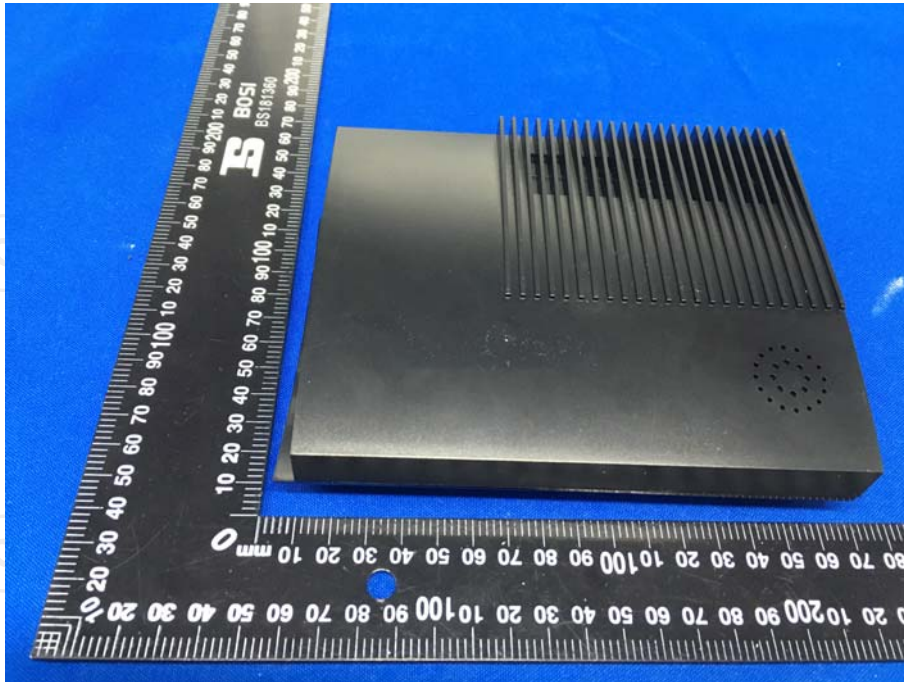
## Conducted Emission

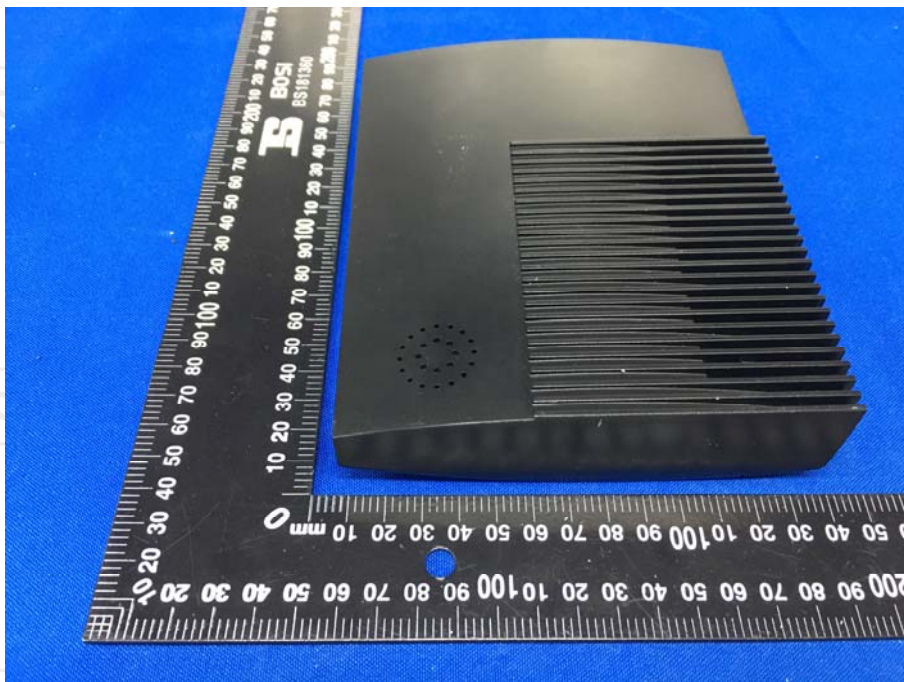
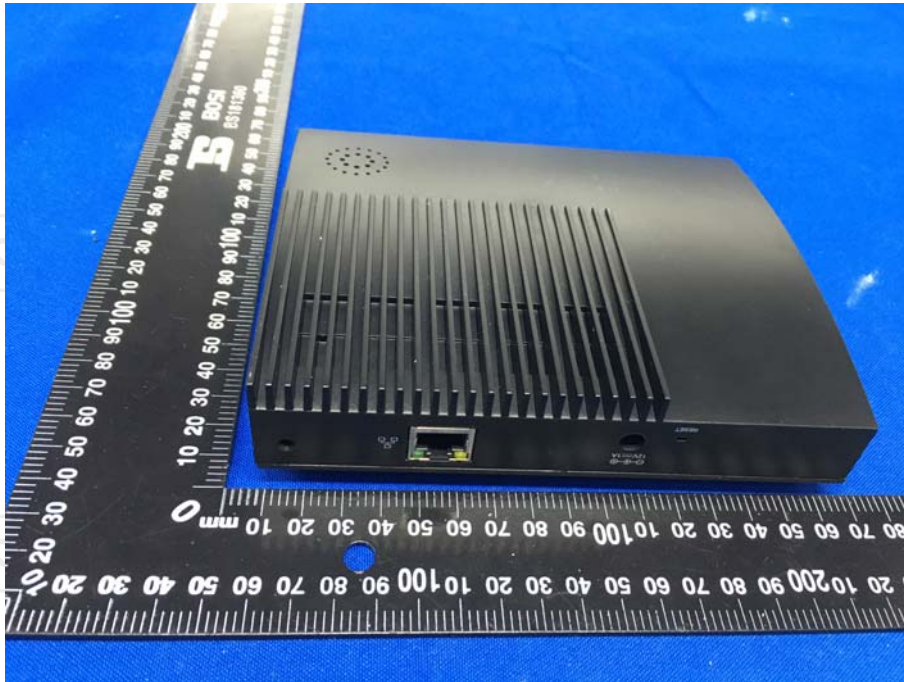


## Appendix B: Photographs of EUT Product: Control Hub Model: AHS-8R External Photos



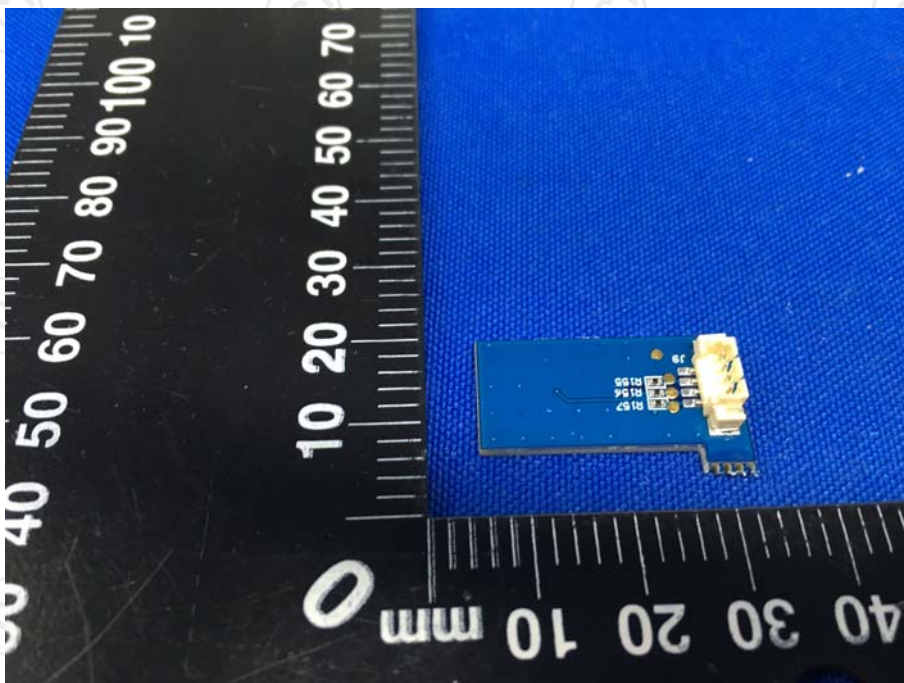


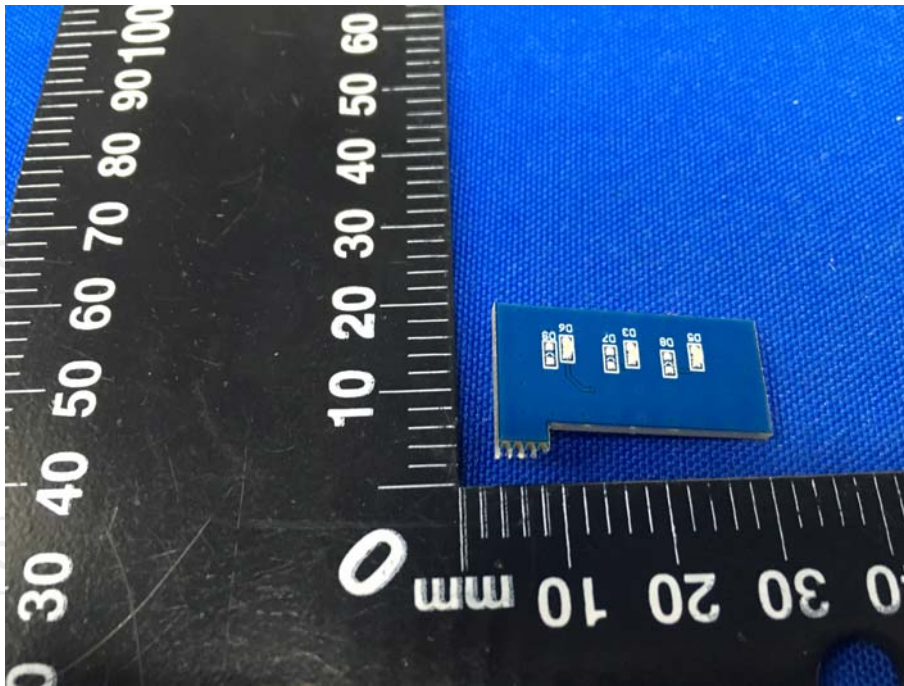




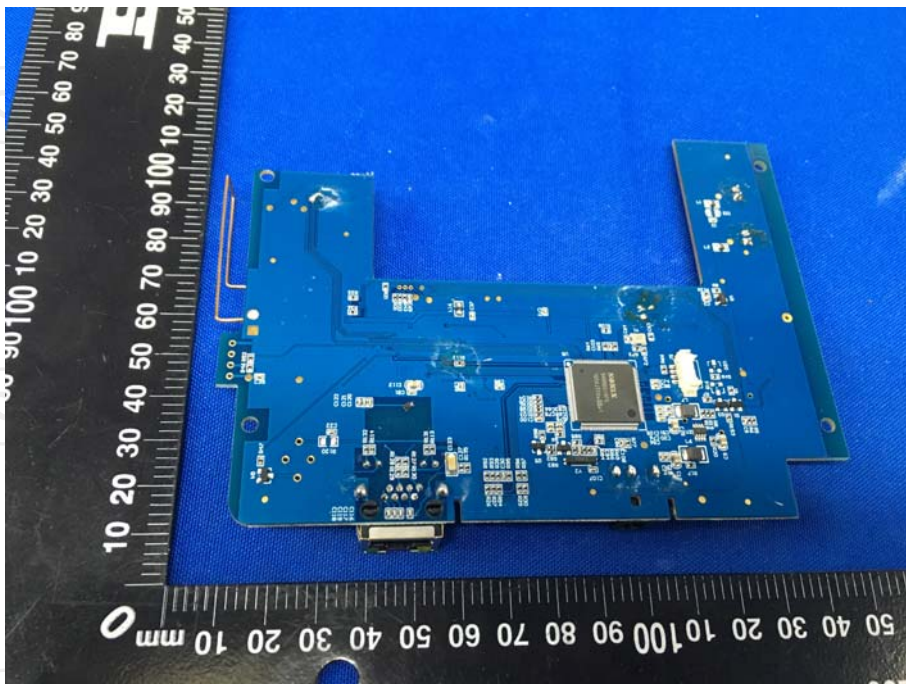
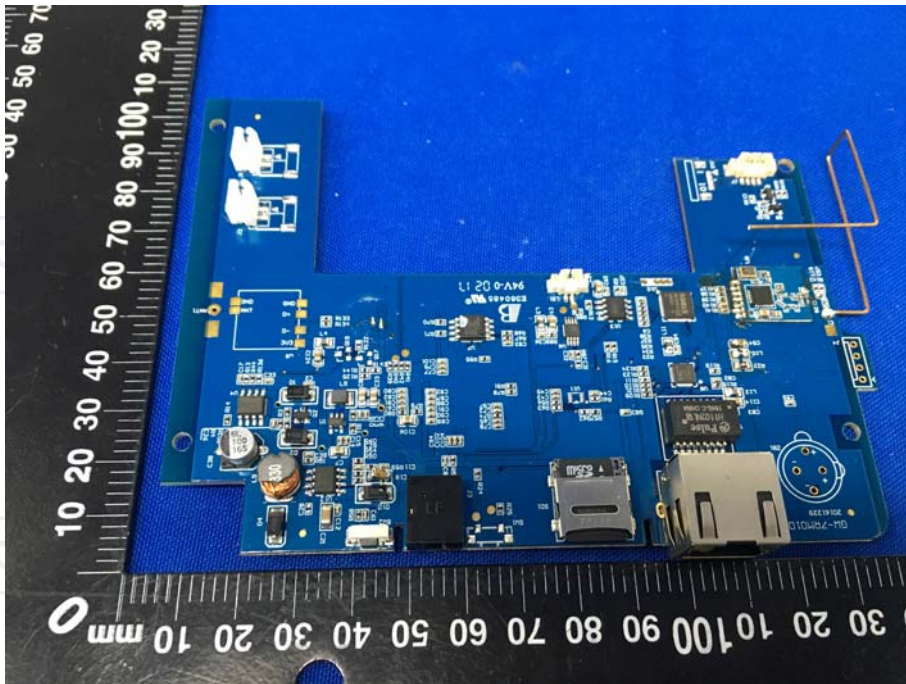


**Product: Control Hub  
Model: AHS-8R  
Internal Photos**









**\*\*\*\*\*END OF REPORT\*\*\*\*\***