TEST REPORT

FCC PART 15 SUBPART B

Test report
On Behalf of
Guangzhou Rigal Electronics Co., Ltd
For
Projector

Model No.: RD-606

FCC ID: 2AK43RD-606

Prepared for :	**Guangzhou Rigal Electronics Co., Ltd** **First Building, No.30 Hongmiandadao, Xiuquan Street Huadu District, Guangzhou, China**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**
Date of Test:	**Dec. 07, 2018 ~ Dec. 14, 2018**
Date of Report:	**Dec. 14, 2018**
Report Number:	**HK1812131870E**

TEST RESULT CERTIFICATION

Applicant's name.....:	Guangzhou Rigal Electronics Co., Ltd
Address .....:	First Building, No.30 Hongmiandadao, Xiuquan Street Huadu District , Guangzhou, China
Manufacture's Name .....:	Guangzhou Rigal Electronics Co., Ltd
Address .....:	First Building, No.30 Hongmiandadao, Xiuquan Street Huadu District , Guangzhou, China

Product description

Trade Mark:	N/A
Product name .....:	projector
Model and/or type reference ...:	RD-606, RD-601, RD-602, RD-603, RD-604, RD-605, RD-607, RD-608, RD-609,RD-610, RD-611, RD-612, RD-613, RD-614, RD-615, RD-616, RD-617, RD-618, RD-619, RD-620, RD-621, RD-622, RD-623, RD-624, RD-625, RD-626, RD-627, RD-628, RD-629, RD-630, PJ308B
Difference description	All the same except for the model name and the color
Standards.....:	**47 CFR FCC Part 15 Subpart B 15.107&15.109**

Date of Test ..... :	
Date (s) of performance of tests ..... :	Dec. 07, 2018 ~ Dec. 14, 2018
Date of Issue ..... :	Dec. 14, 2018
Test Result ..... :	**Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

TABLE OF CONTENTS

1.SUMMARY

1.1 TEST STANDARDS

This submittal(s) (test report) is intended to comply with Section 15.107&109 of the FCC Part 15, Subpart B Rules.

1.2 TEST DESCRIPTION

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.109	Radiated Emission	Compliant
§15.107	Conducted Emission	Compliant

1.3 TEST FACILITY

1.3.1 Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd.
Add.:1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park,Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

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

IC Registration No.: 21210

The 3m alternate test site of Shenzhen HUAK Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 21210 on May 24, 2016.

FCC Registration No.: CN1229

Test Firm Registration Number : 616276

1.4 STATEMENT OF THE MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen HUAK Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for HUAK laboratory is reported:

Test	Measurement Uncertainty	Notes
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.GENERAL INFORMATION

2.1 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2 GENERAL DESCRIPTION OF EUT

Product Name:	projector
Model/Type reference:	RD-606, PJ308B
Power supply:	DC 5V by adapter or DC 3.7V by Battery
Highest Operation Frequency	2.462GHz
Hardware Version:	ZY-3A202-MAIN-V2
Software Version:	V1.0

Note: For more details, refer to the user's manual of the EUT.

2.3. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Date exchange with PC by HDMI
2	USB mode
Note: All the test modes had been tested, the mode 1 was the worst case recorded in the test report.	

2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended to comply with Section 15.107&109 of the FCC Part 15, Subpart B Rules.

2.5. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2014). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.6. ACCESSORIES USED

Item	Equipment	Model No.	Specification	Remark
1	Dell PC	Ins 14-7460-D1525S	N/A	Provided by test lab
2	PC adapter	YH-195-462	DC19.5V/4.62A	Provided by test lab
3	Adapter	FJ-SW268D0503000U	DC 5V/3A	Market with EUT

2.7 EQUIPMENT USED

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 28, 2017	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2017	1 Year
4.	Horn Antenna	Schewarzbeck	BBHA 9170	HKE-090	Dec. 28, 2017	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2017	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
11.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 28, 2017	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2017	N/A
14.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2017	3 Year

The calibration interval was one year

3. RADIATED EMISSION

3.1. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 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 below 1GHz, use 120KHz RBW and VBW>=3RBW for QP reading.
7. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
8. 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.
9. 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.
10. 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.
11. Only the worst case is reported.

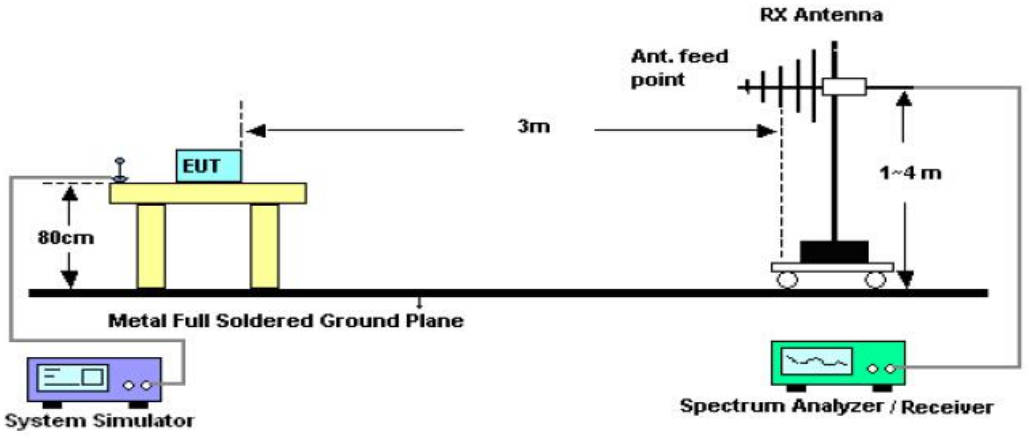
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP
Start ~Stop Frequency	1GHz~12.5GHz 1MHz/3MHz for Peak, 1MHz/10Hz for Average

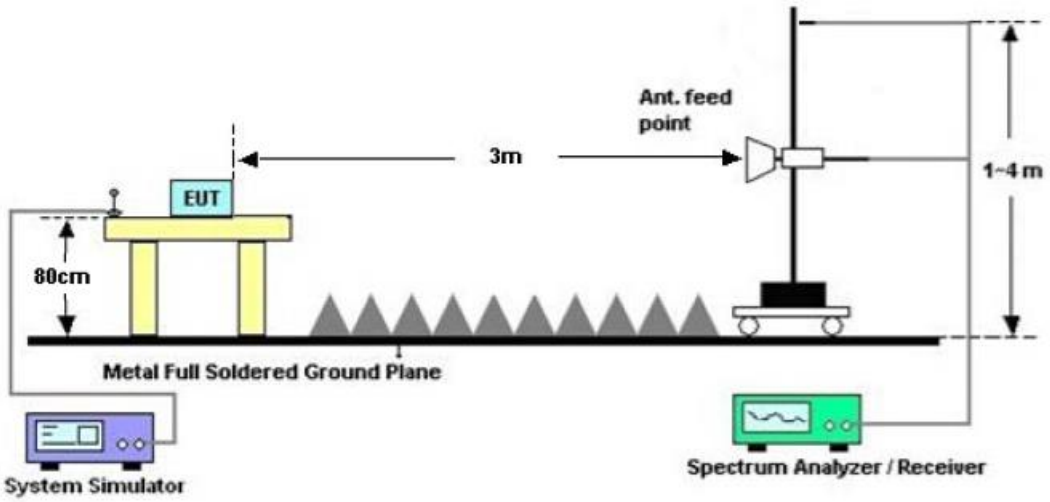
Receiver Parameter	Setting
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP

3.2. TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz

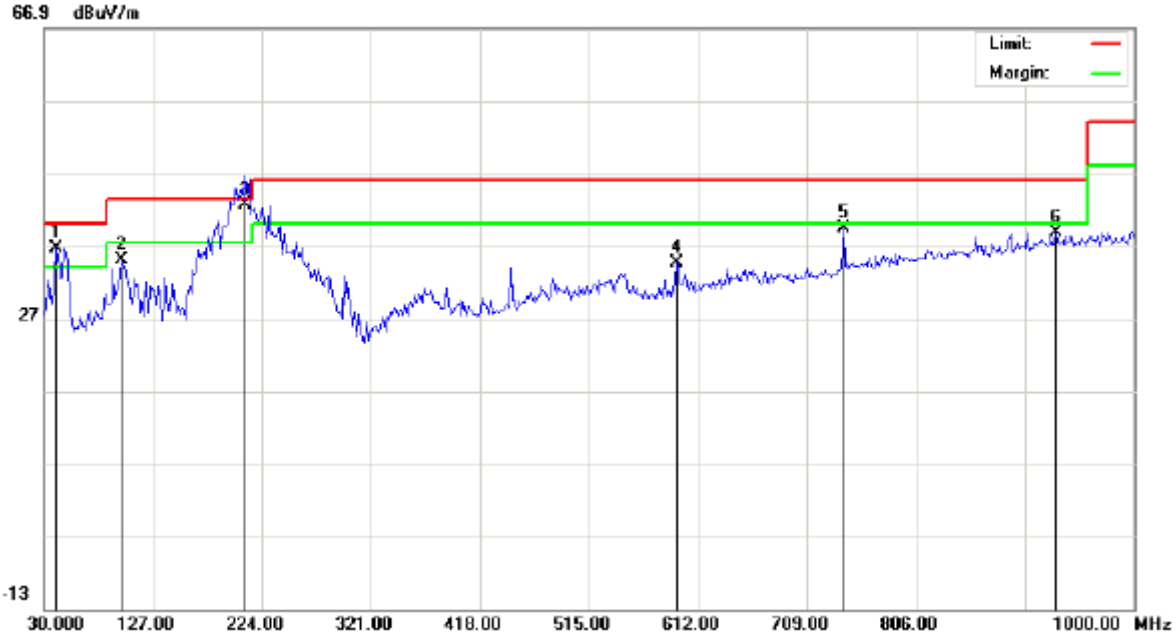


RADIATED EMISSION TEST SETUP ABOVE 1000MHz



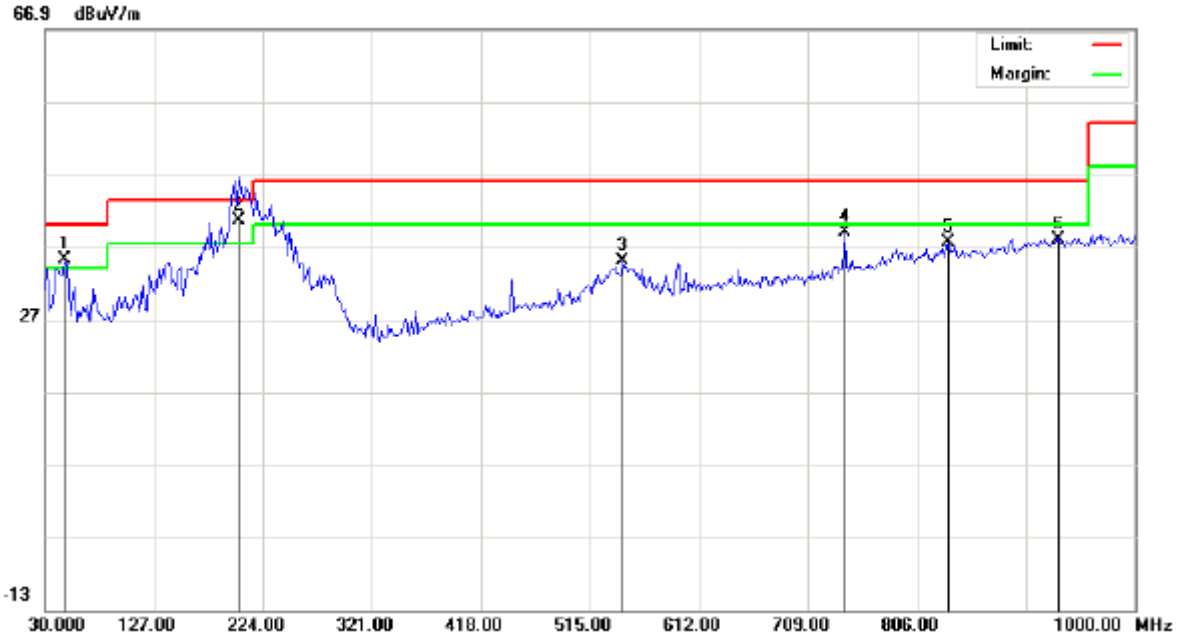
3.3. TEST RESULT

RADIATED EMISSION BELOW 1GHZ-Horizontal



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	!	41.3167	14.98	21.60	36.58	40.00	-3.42	QP			
2		99.5167	15.32	19.71	35.03	43.50	-8.47	QP			
3	*	209.4500	24.56	17.97	42.53	43.50	-0.97	QP			
4		592.6000	5.48	29.06	34.54	46.00	-11.46	QP			
5		741.3333	7.56	31.75	39.31	46.00	-6.69	QP			
6		930.4833	3.76	34.97	38.73	46.00	-7.27	QP			

RADIATED EMISSION BELOW 1GHZ-Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	!	47.7832	13.76	21.41	35.17	40.00	-4.83	QP			
2	*	202.9833	23.06	17.56	40.62	43.50	-2.88	QP			
3		544.1000	6.99	28.05	35.04	46.00	-10.96	QP			
4		741.3333	7.35	31.75	39.10	46.00	-6.90	QP			
5		833.4833	4.00	33.67	37.67	46.00	-8.33	QP			
6		932.1000	3.11	34.99	38.10	46.00	-7.90	QP			

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 range from 1GHz to 12.5GHz have 20dB margin. No recording in the test report.

4. FCC LINE CONDUCTED EMISSION TEST

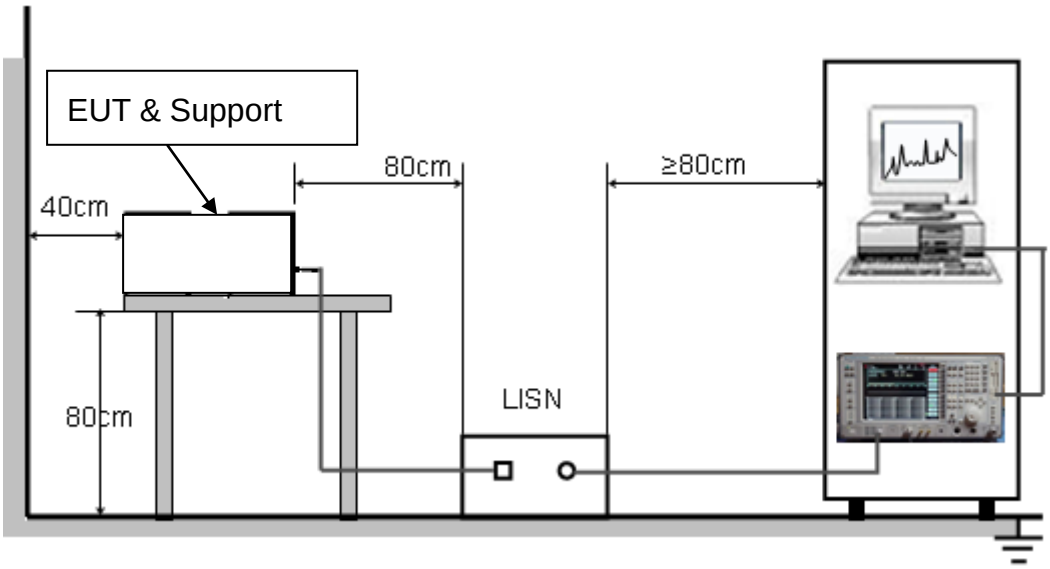
4.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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.

4.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



4.3. 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 C63.4 (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 C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
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/60Hzpower 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.

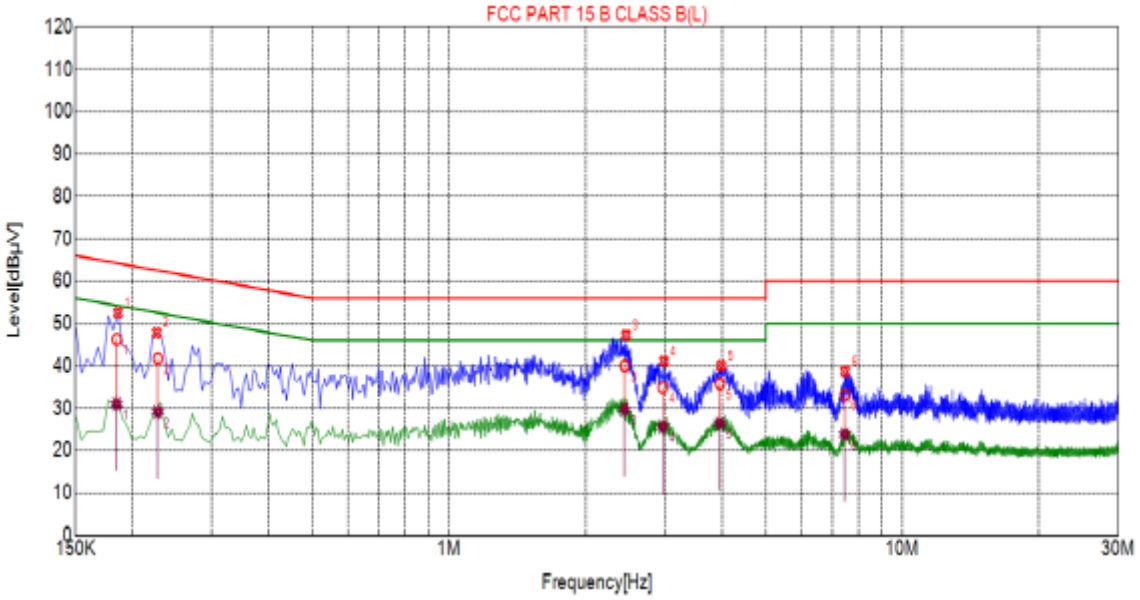
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

4.4. 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.

4.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

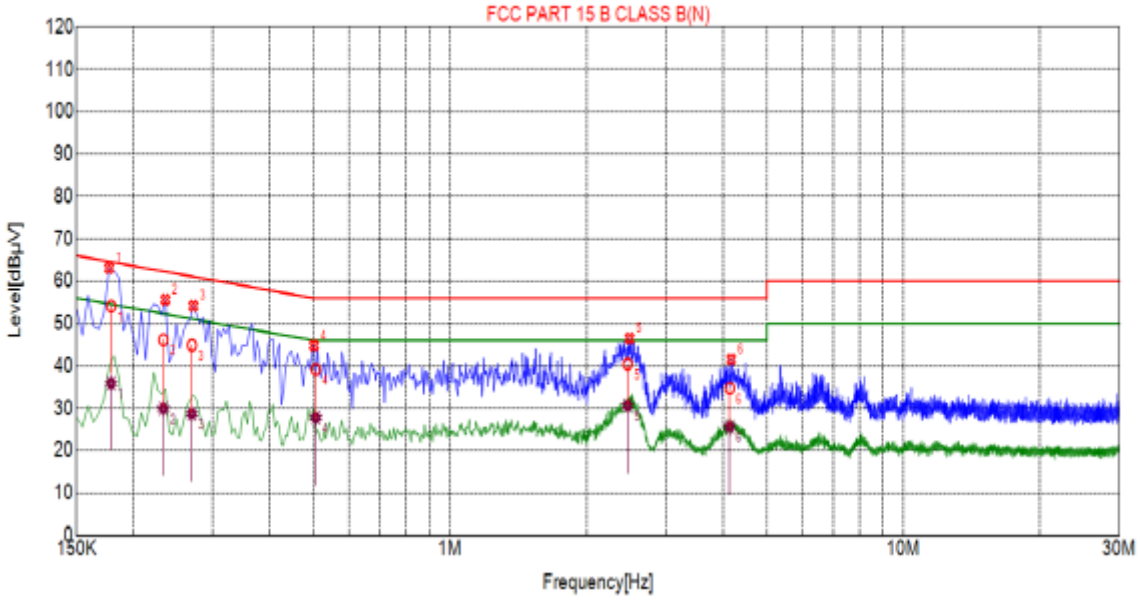
Line Conducted Emission Test Line 1-L



Suspected List						
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.1860	52.51	10.05	64.21	11.70	PK
2	0.2265	47.81	10.03	62.58	14.77	PK
3	2.4585	47.23	10.19	56.00	8.77	PK
4	2.9805	41.09	10.22	56.00	14.91	PK
5	3.9840	40.06	10.25	56.00	15.94	PK
6	7.4805	38.69	10.18	60.00	21.31	PK

Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.1848	10.05	46.29	64.27	17.98	31.01	54.27	23.26
2	0.2277	10.03	41.76	62.53	20.77	29.16	52.53	23.37
3	2.4404	10.18	40.05	56.00	15.95	29.71	46.00	16.29
4	2.9603	10.21	34.88	56.00	21.12	25.61	46.00	20.39
5	3.9597	10.25	35.83	56.00	20.17	26.48	46.00	19.52
6	7.4664	10.18	33.20	60.00	26.80	23.85	50.00	26.15

Line Conducted Emission Test Line 2-N



Suspected List						
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector
1	0.1770	63.11	10.05	64.63	1.52	PK
2	0.2355	55.63	10.03	62.25	6.62	PK
3	0.2715	54.14	10.03	61.07	6.93	PK
4	0.5010	44.84	10.04	56.00	11.16	PK
5	2.4900	46.52	10.19	56.00	9.48	PK
6	4.1730	41.53	10.25	56.00	14.47	PK

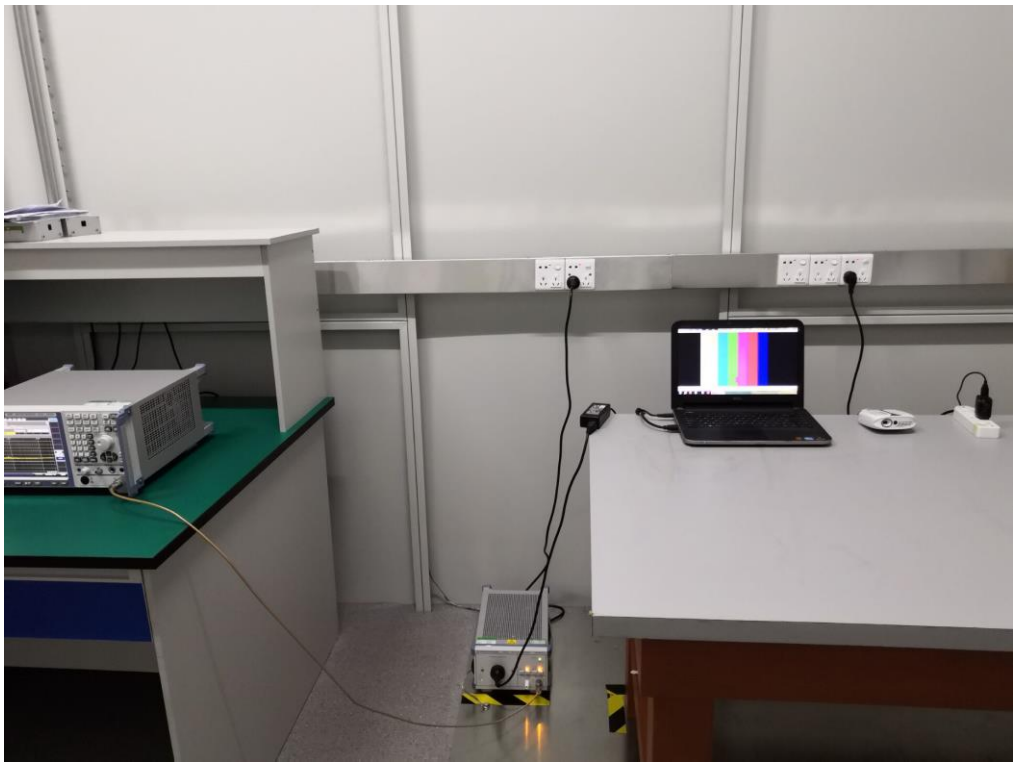
Final Data List								
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]
1	0.1788	10.06	54.08	64.54	10.46	35.89	54.54	18.65
2	0.2331	10.03	46.19	62.34	16.15	29.94	52.34	22.40
3	0.2695	10.03	44.90	61.13	16.23	28.73	51.13	22.40
4	0.5059	10.04	39.15	56.00	16.85	27.75	46.00	18.25
5	2.4651	10.19	40.43	56.00	15.57	30.64	46.00	15.36
6	4.1429	10.25	34.72	56.00	21.28	25.61	46.00	20.39

RESULT: PASS

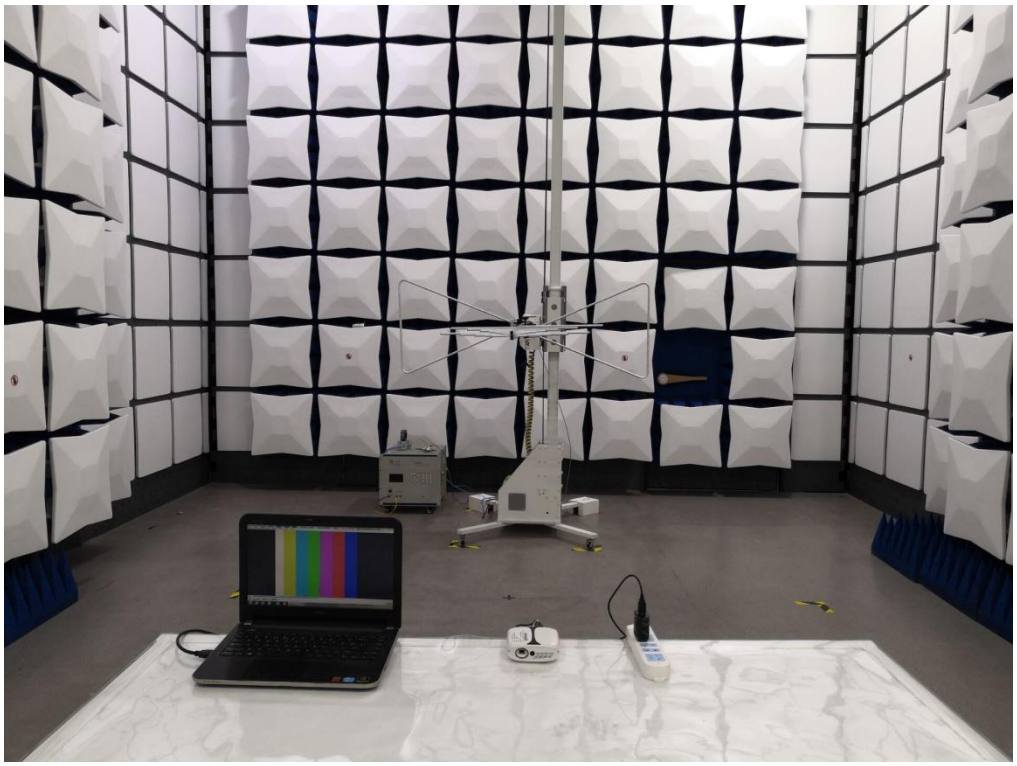
Note: All the test modes had been tested, the mode 1 was the worst case. Only the data of the worst case would be record in this test report.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

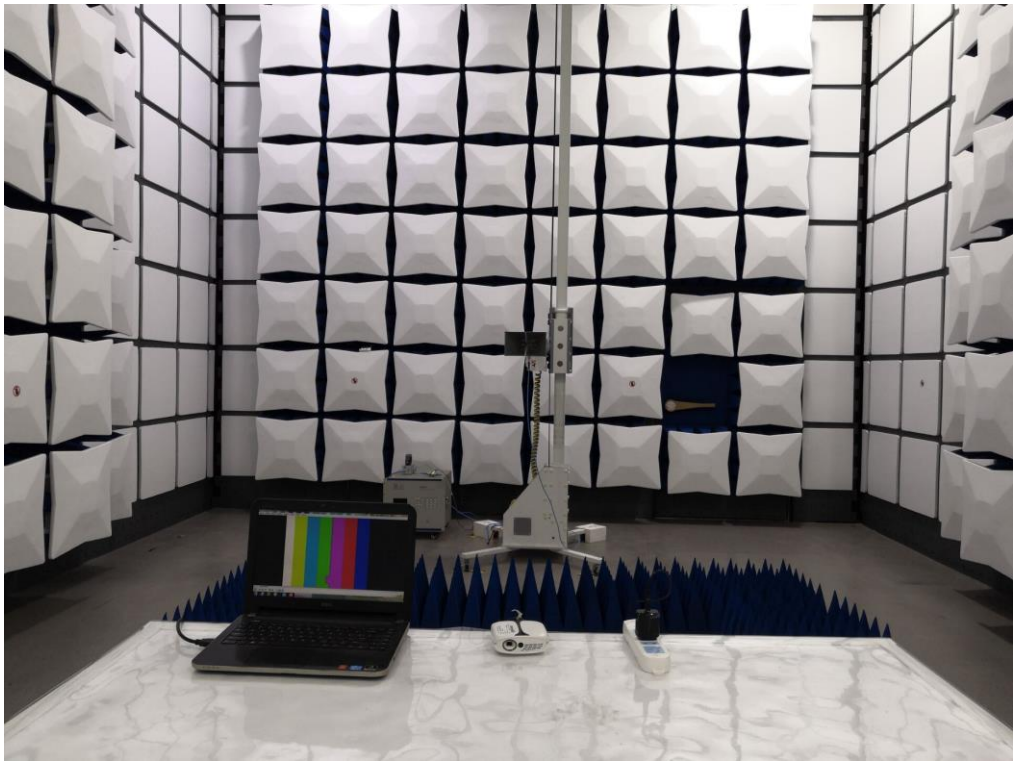
FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP BELOW 1GHZ



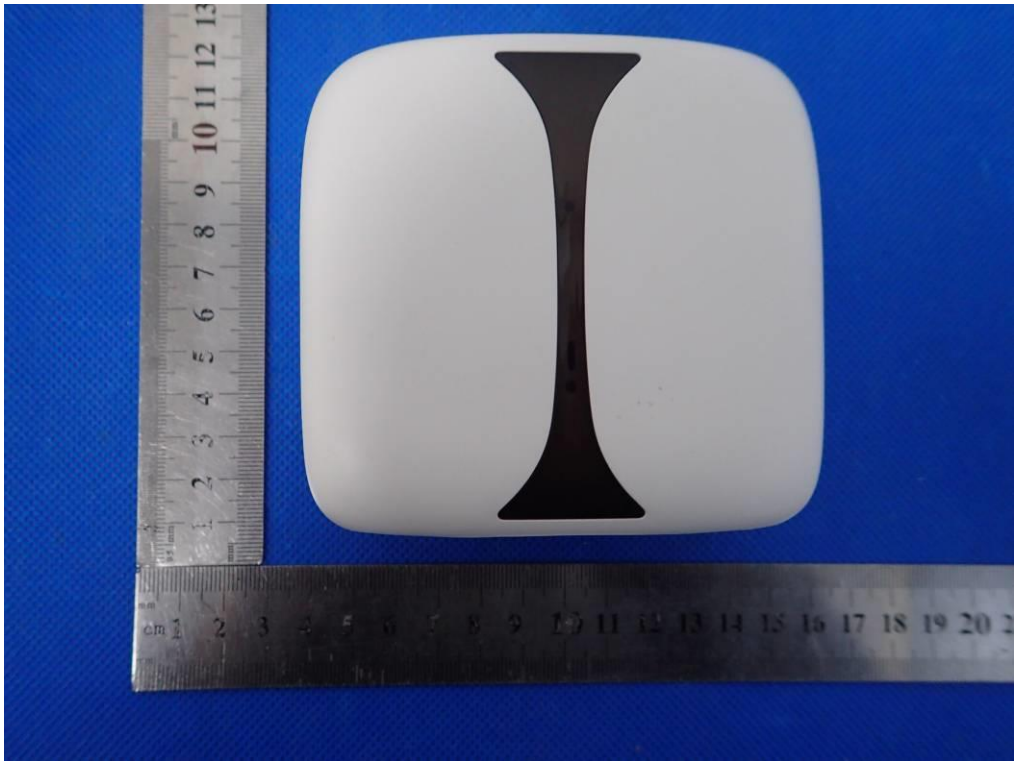
FCC RADIATED EMISSION TEST SETUP ABOVE 1GHZ



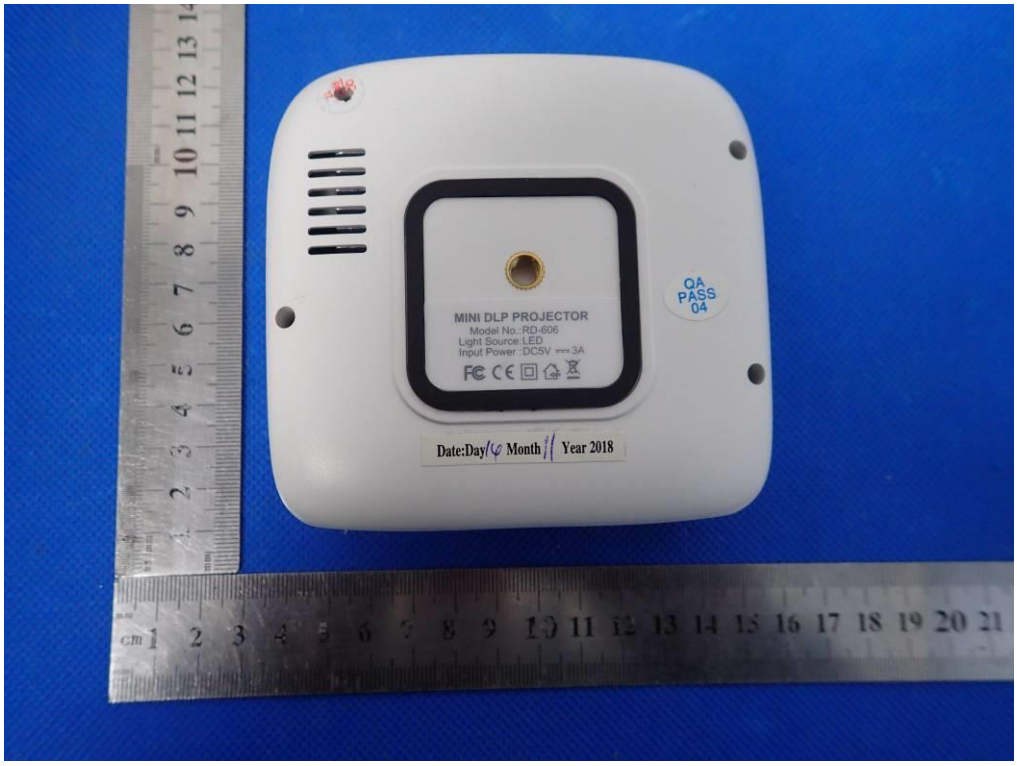
APPENDIX B: PHOTOGRAPHS OF EUT

ALL VIEW OF EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



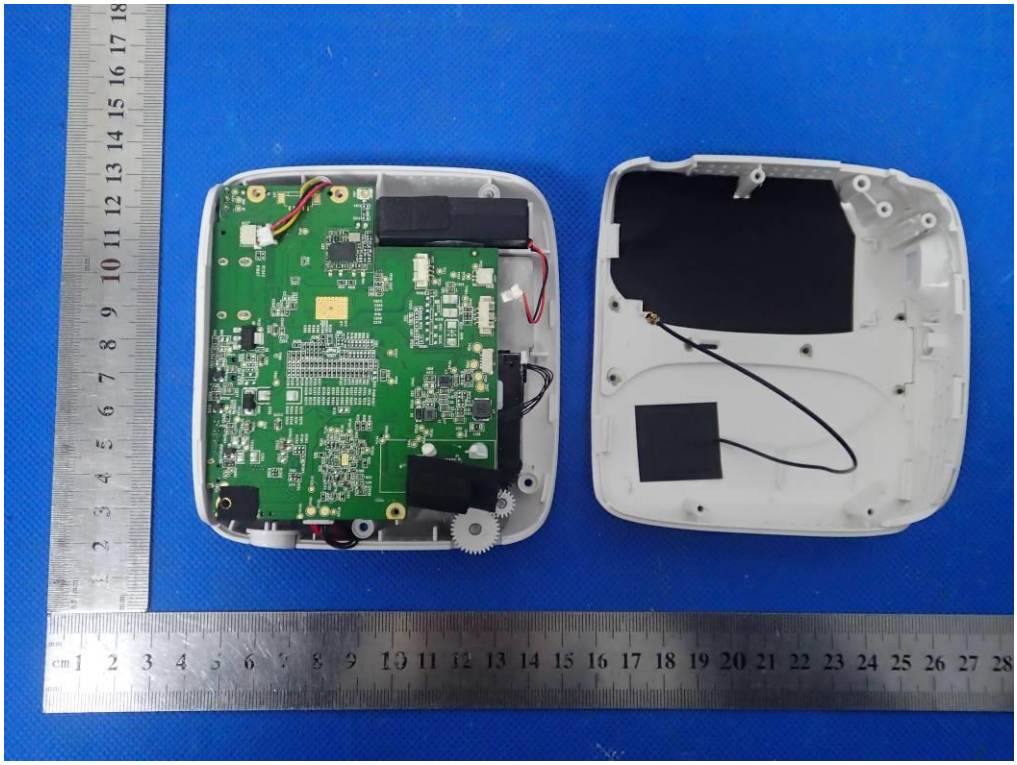
FRONT VIEW OF EUT

BACK VIEW OF EUT

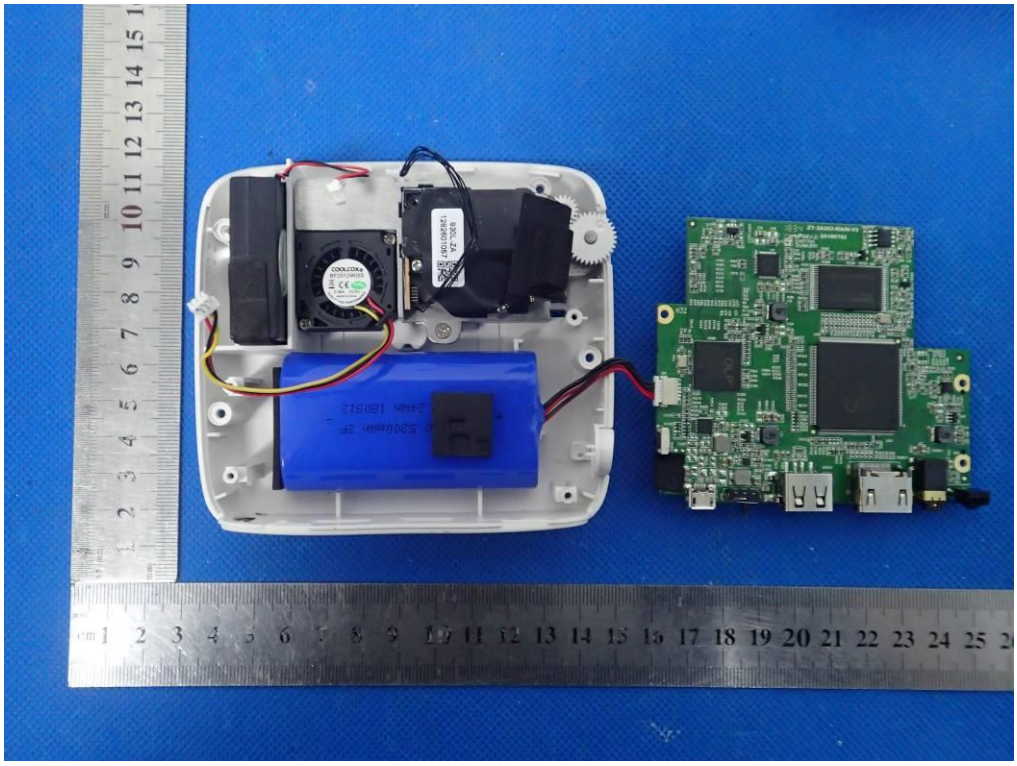
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

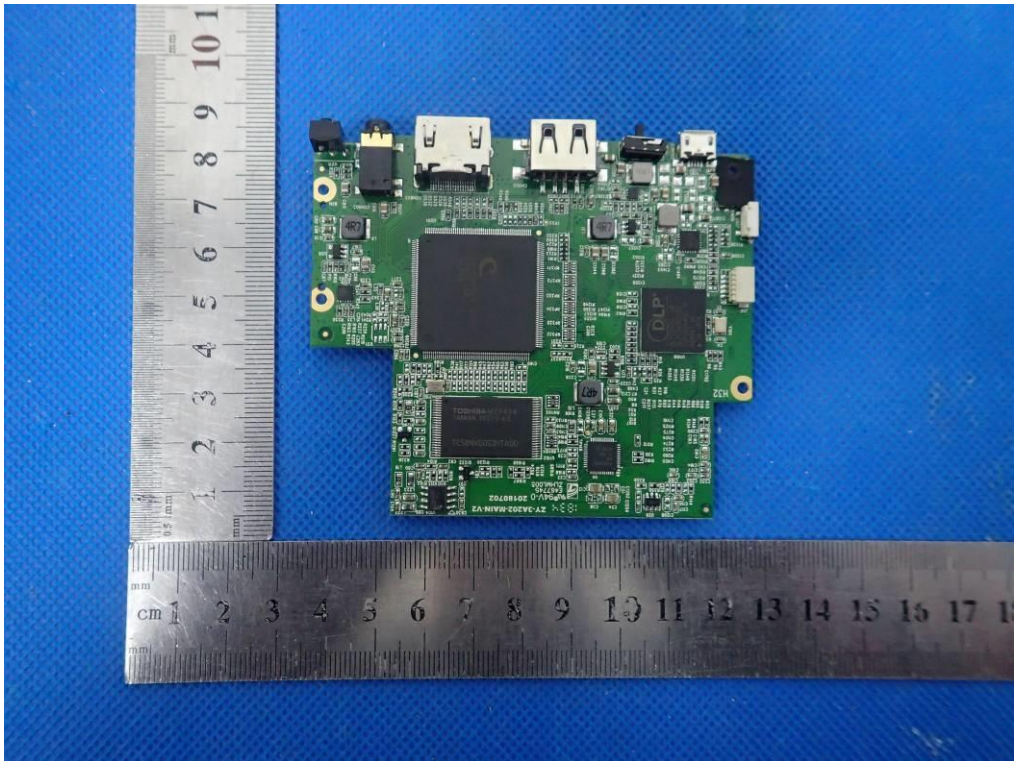
OPEN VIEW OF EUT-1



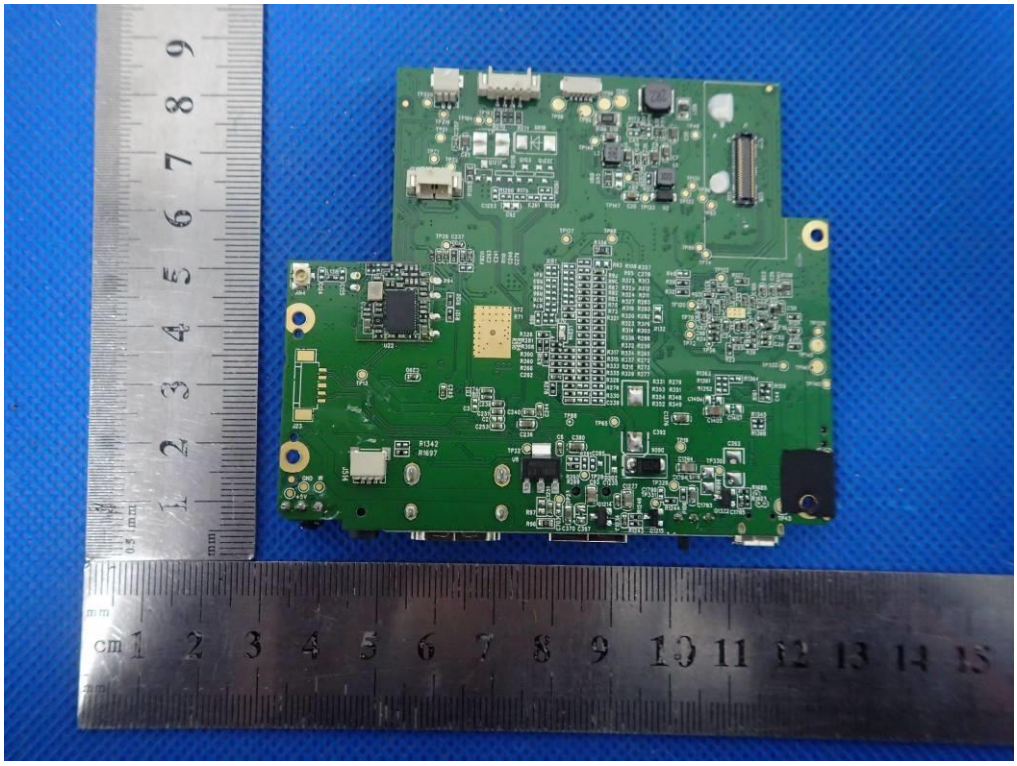
OPEN VIEW OF EUT-2



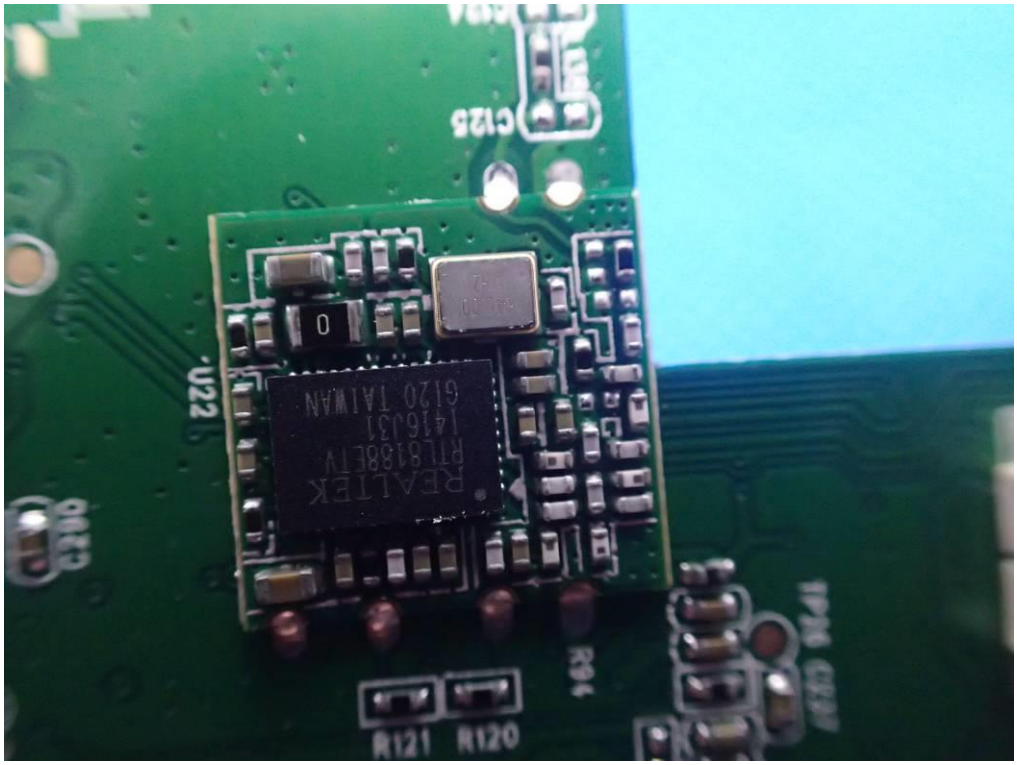
INTERNAL VIEW OF EUT-1



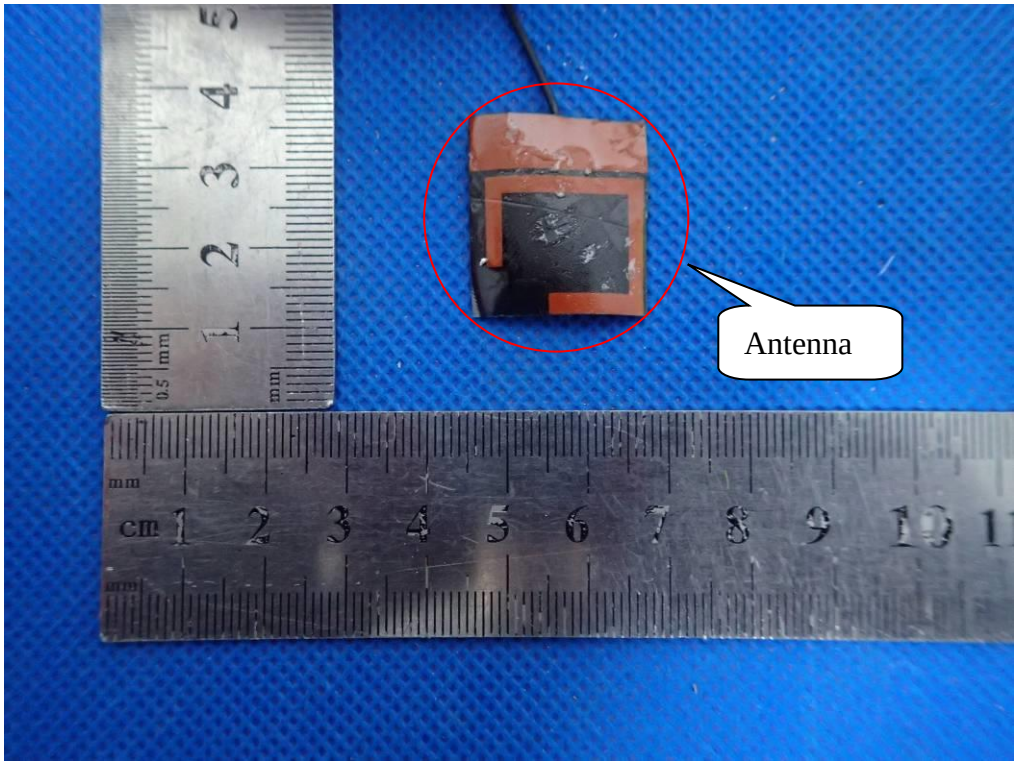
INTERNAL VIEW OF EUT-2



INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



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