

FCC TEST REPORT

Product Name: IP Set-top Box
Trade Mark: N/A
Model No.: Z123
Report Number: 181011019EMC-1
Test Standards: FCC 47 CFR Part 15 Subpart B
Test Result: PASS
Date of Issue: October 24, 2018

Prepared for:

Zhongshan Hybroad Vision Trading Co., Ltd
Room 102, Yuxing Industrial Park, No.50 Yanjiangdongsi RD, Huoju
Development Zone, Zhongshan, Guangdong Province, China

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
16/F, Block A, Building 6, Baoneng Science and Technology Park,
Qingxiang Road No.1, Longhua New District, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Tested by: Jason Zhong
 Eason Zhong
 Engineer

Reviewed by: Kevin Liang
 Assistant Manager

Approved by: Billy Li
 Technical Director



Date: October 24, 2018

Version

Version No.	Date	Description
V1.0	October 24, 2018	Original



CONTENTS

1. GENERAL INFORMATION	4
1.1 CLIENT INFORMATION	4
1.2 EUT INFORMATION	4
1.2.1 GENERAL DESCRIPTION OF EUT	4
1.2.2 DESCRIPTION OF ACCESSORIES.....	4
1.3 DESCRIPTION OF SUPPORT UNITS	4
1.4 TEST LOCATION	5
1.5 TEST FACILITY	5
1.6 DEVIATION FROM STANDARDS	5
1.7 ABNORMALITIES FROM STANDARD CONDITIONS	5
1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER	5
1.9 MEASUREMENT UNCERTAINTY	6
2. TEST SUMMARY	7
3. EQUIPMENT LIST	8
4. TEST CONFIGURATION	9
4.1 ENVIRONMENTAL CONDITIONS FOR TESTING	9
4.1.1 NORMAL OR EXTREME TEST CONDITIONS	9
4.1.2 RECORD OF NORMAL ENVIRONMENT.....	9
4.2 TEST MODES	9
4.3 TEST SETUP	9
4.3.1 FOR RADIATED EMISSIONS TEST SETUP	9
4.3.2 FOR CONDUCTED EMISSIONS TEST SETUP	10
4.4 SYSTEM TEST CONFIGURATION	10
5. REFERENCE DOCUMENTS FOR TESTING	11
6. EMC REQUIREMENTS SPECIFICATION	11
6.1 RADIATED EMISSION	11
6.2 CONDUCTED EMISSION	16
APPENDIX 1 PHOTOS OF TEST SETUP	19
APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS	22
EUT EXTERNAL PHOTOS	22
EUT INTERNAL PHOTOS	26

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Zhongshan Hybroad Vision Trading Co., Ltd
Address of Applicant:	Room 102, Yuxing Industrial Park, No.50 Yanjiangdongsi RD, Huoju Development Zone, Zhongshan, Guangdong Province, China
Manufacturer:	Zhongshan Hybroad Vision Trading Co., Ltd
Address of Manufacturer:	Room 102, Yuxing Industrial Park, No.50 Yanjiangdongsi RD, Huoju Development Zone, Zhongshan, Guangdong Province, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	IP Set-top Box
Model No.:	Z123
Add. Model No.:	N/A
Trade Mark:	N/A
DUT Stage:	Production Unit
Power Supply:	120V~60Hz
Classification of digital devices:	Class B
Highest Internal Frequency:	Below 108MHz
Sample Received Date:	October 18, 2018
Sample Tested Date:	October 19, 2018 to October 22, 2018

1.2.2 Description of Accessories

Adapter	
Model No.:	TS-A012-120010AY
Input:	100-240 V~50/60 Hz 0.4 A
Output:	12 V \equiv 1 A
AC Cable:	N/A
DC Cable:	1.50 Meter, 选择一项。
Manufacturer:	SHENZHEN TRANSIN TECHNOLOGIES CO., LTD

1.3 DESCRIPTION OF SUPPORT UNITS

选择一项。

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	E450	SL10G10780	UnionTrust
Monitor	DELL	P2416Db	N/A	UnionTrust

1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.5 TEST FACILITY

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

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1194
Test Firm Registration Number: 259480

1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.9 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart B Test Cases			
Test Item	Test Requirement	Test Method	Result
Conducted Emission	FCC 47 CFR Part 15.107	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109	ANSI C63.4-2014	PASS



3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 20, 2015	Dec. 19, 2018
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 17, 2017	Dec. 17, 2018
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 22, 2018	May 22, 2019
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	LISN	R&S	ESH2-Z5	860014/024	Dec. 10, 2017	Dec. 10, 2018
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160323		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	120V~60Hz	20 to 75
Remark:			
1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

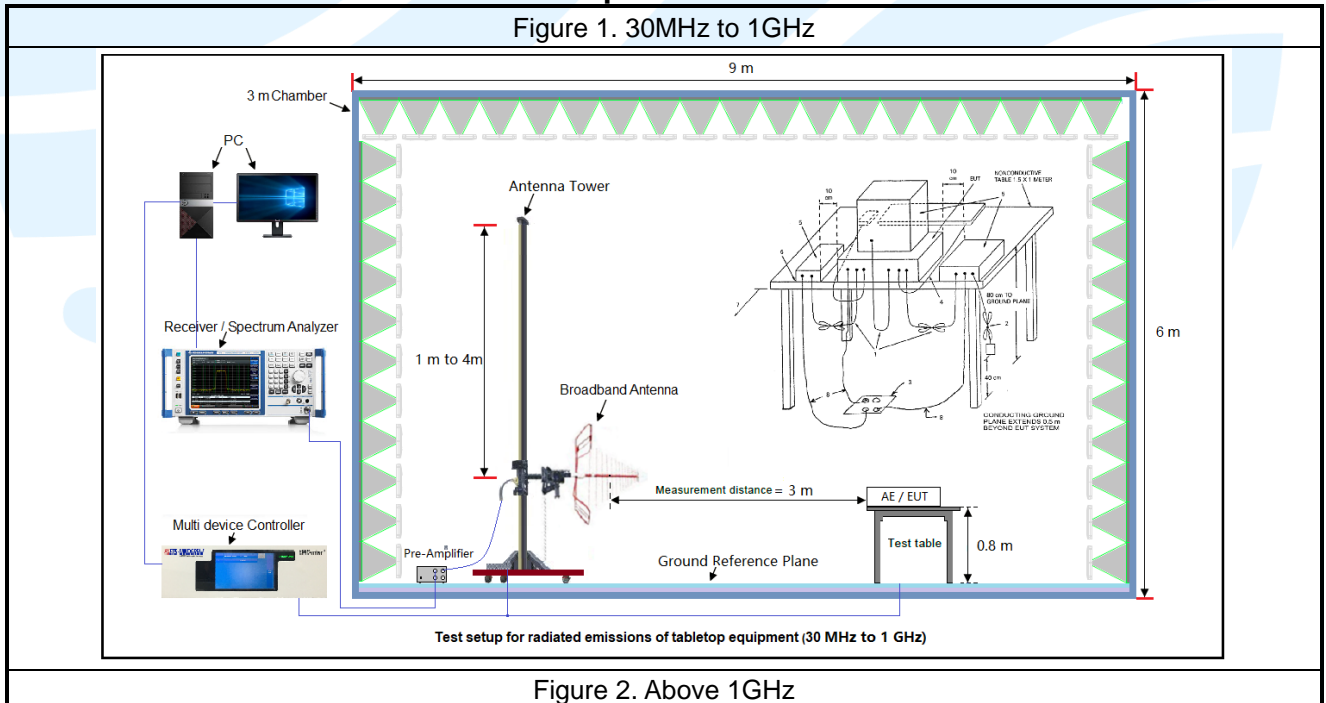
Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)	Tested by
Conducted Emission	25	46	100.54	Gemini Huang
Radiated Emission	24	43	100.10	Andy Lin

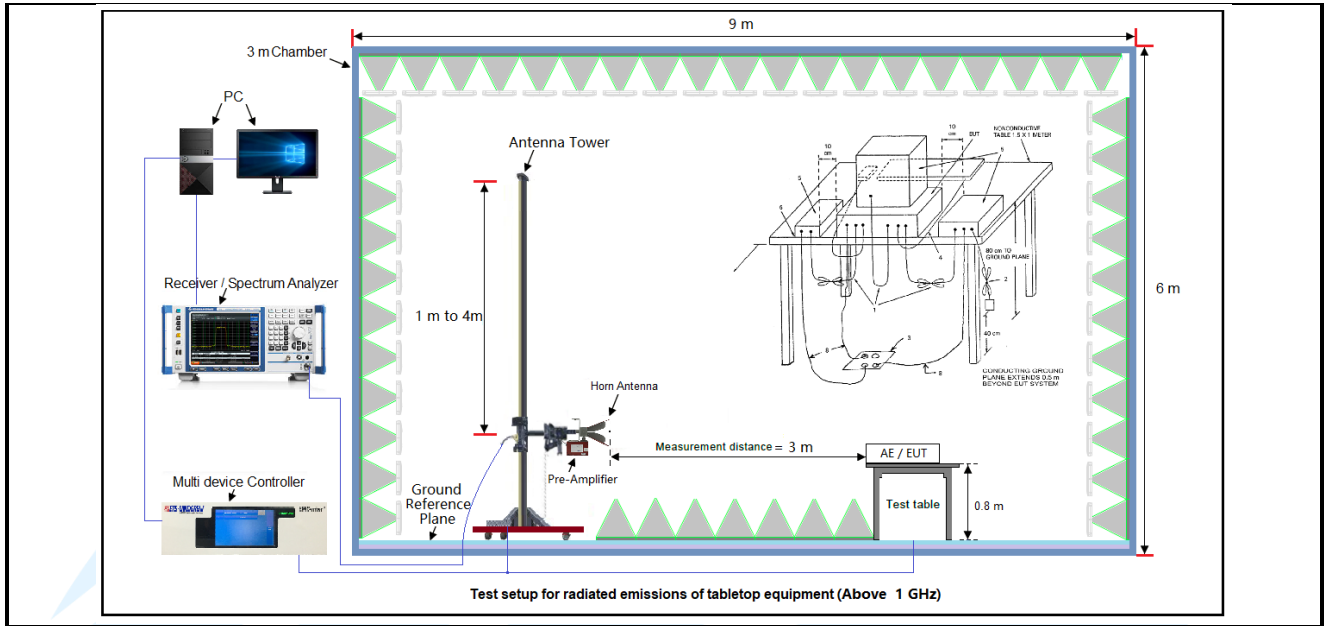
4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	Mode 1: Charging+HDMI+USB
Conducted Emission	Mode 1: Charging+HDMI+USB

4.3 TEST SETUP

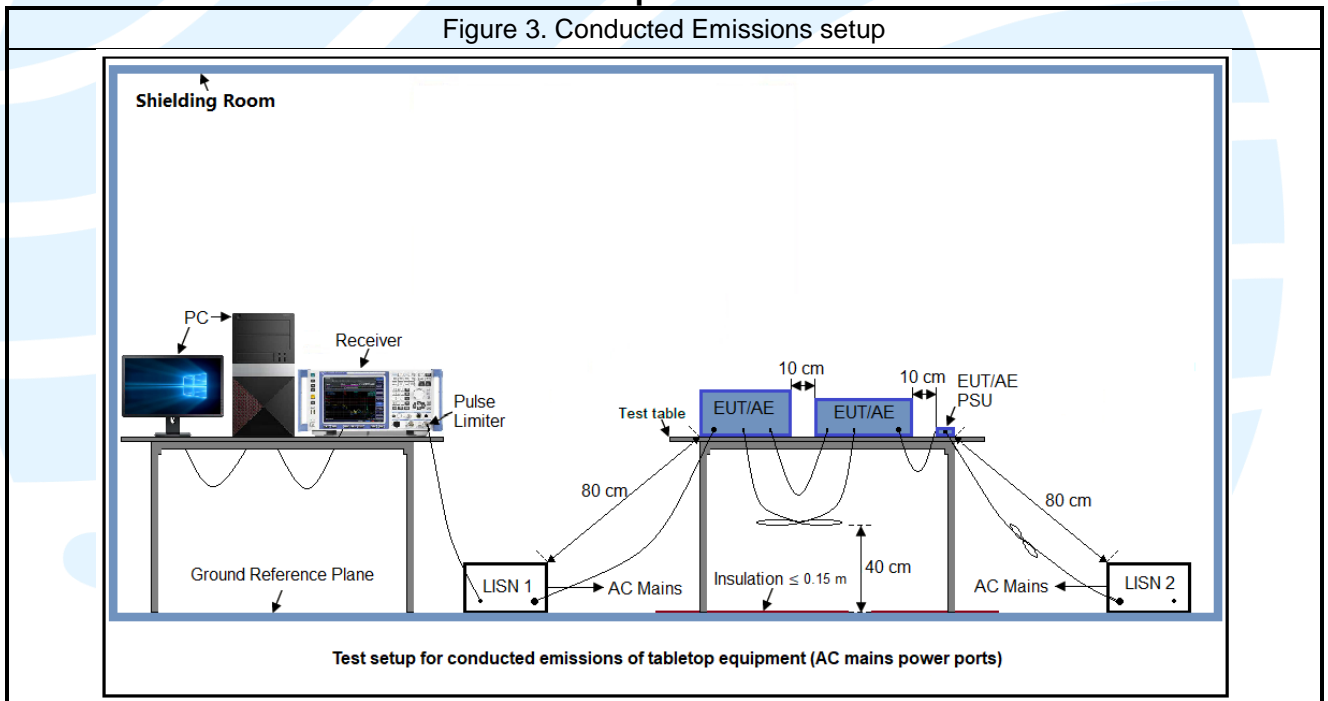
4.3.1 For Radiated Emissions test setup





4.3.2 For Conducted Emissions test setup

Figure 3. Conducted Emissions setup



4.4 SYSTEM TEST CONFIGURATION

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic (according to KDB 896810 D02 SDoC FAQ v01r01) of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part15 Subpart B	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
3	KDB 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
4	KDB 896810 D02 SDoC FAQ v01r02	Supplier's Declaration of Conformity frequency asked questions

6. EMC REQUIREMENTS SPECIFICATION

6.1 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15.109

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f) (MHz)	Detector type	Measurement receiver bandwidth	
		RBW	VBW
$30 \leq f \leq 1\,000$	Quasi Peak	120 kHz	300 kHz
$f \geq 1000$	Peak	1 MHz	3 MHz
	Average	1 MHz	3 MHz

Measured frequency range

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Limits:

Limits for Class B devices

Frequency (MHz)	limits at 3m (dB μ V/m)		
	QP Detector	PK Detector	AV Detector
30-88	40.0	--	--
88-216	43.5	--	--
216-960	46.0	--	--
960 to 1000	54.0	--	--
Above 1000	--	74.0	54.0

Remark:

- The lower limit shall apply at the transition frequencies.
- Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.3.1 for details.

Test Procedures:

- From 30 MHz to 1GHz test procedure as below:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

[Http://www.uttlab.com](http://www.uttlab.com)

- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 3) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

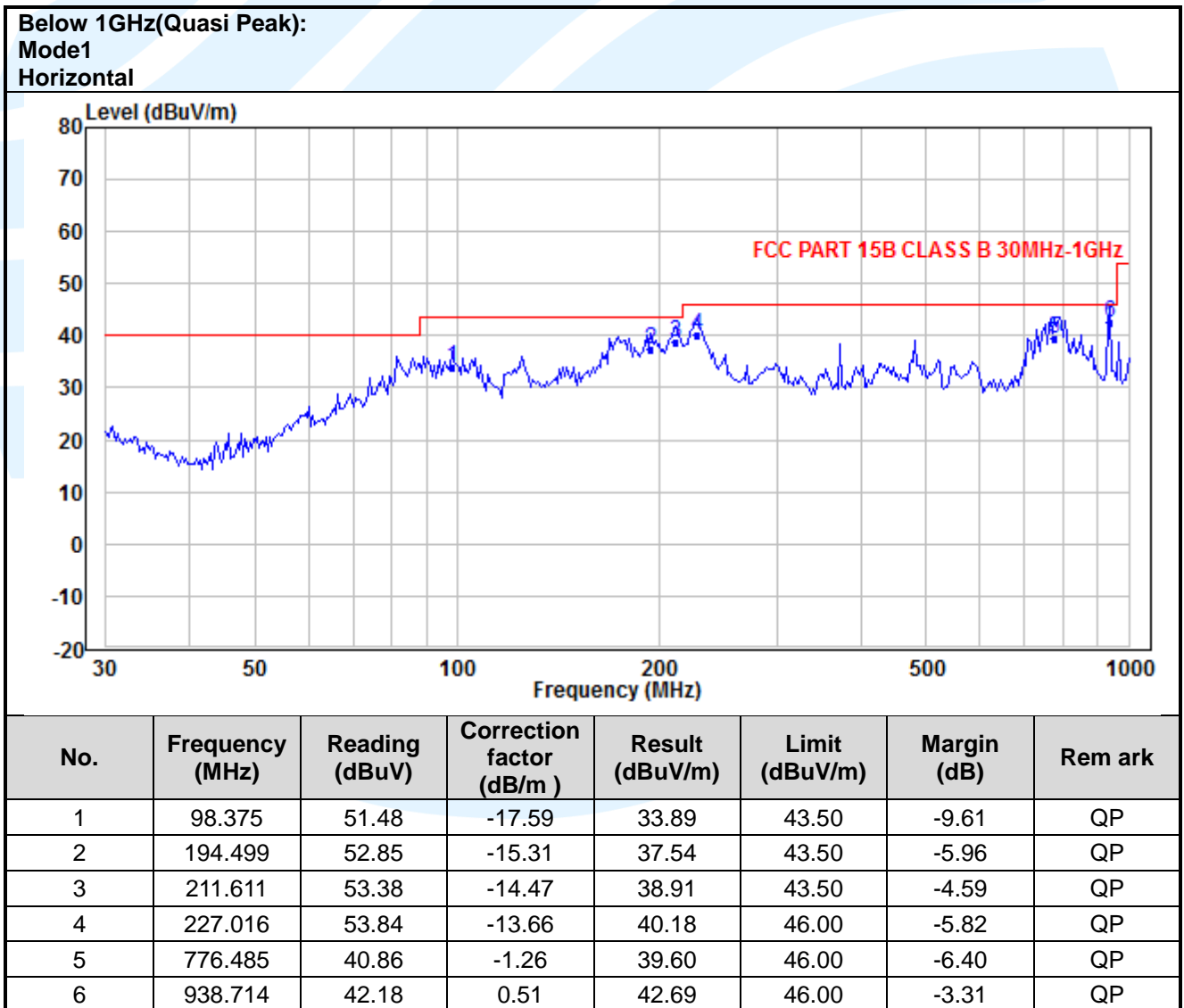
2. Above 1GHz test procedure as below:

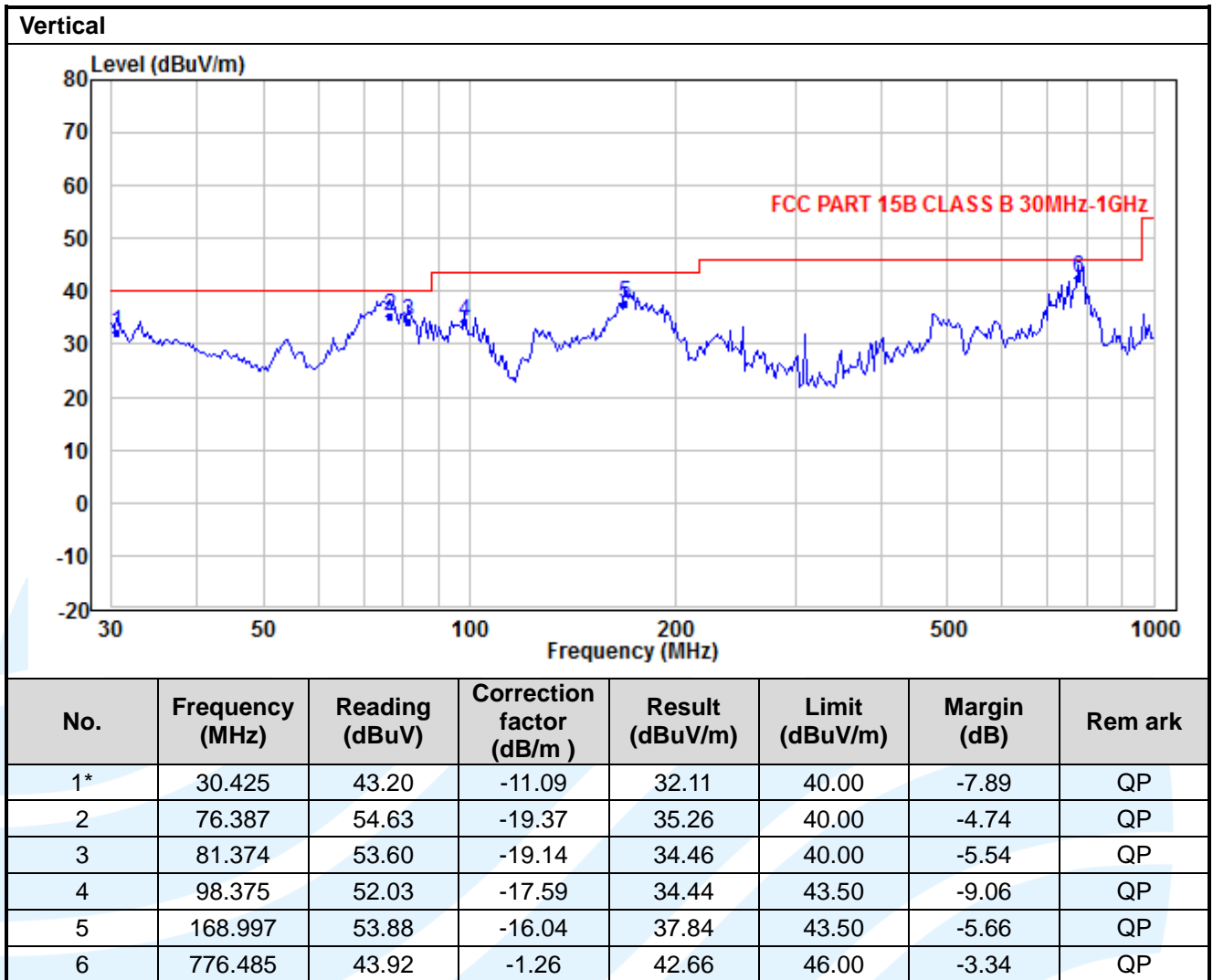
- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Equipment Used: Refer to section 3 for details.

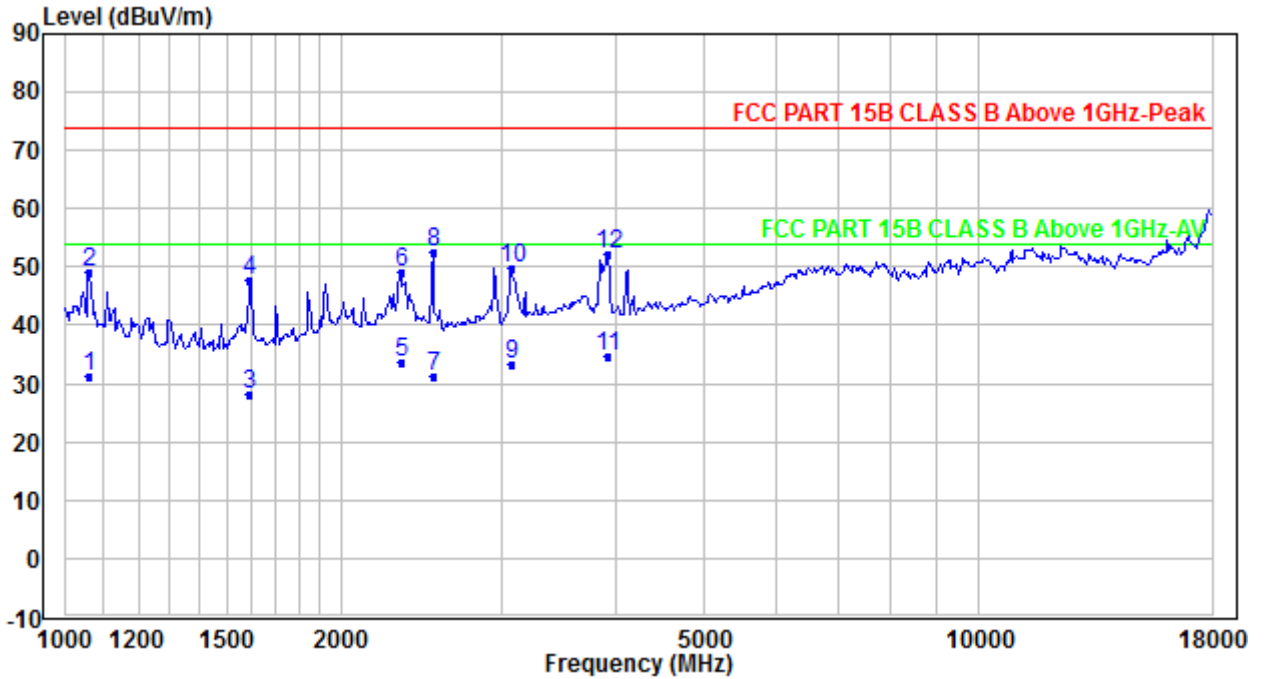
Test Result: Pass

The measurement data as follows:

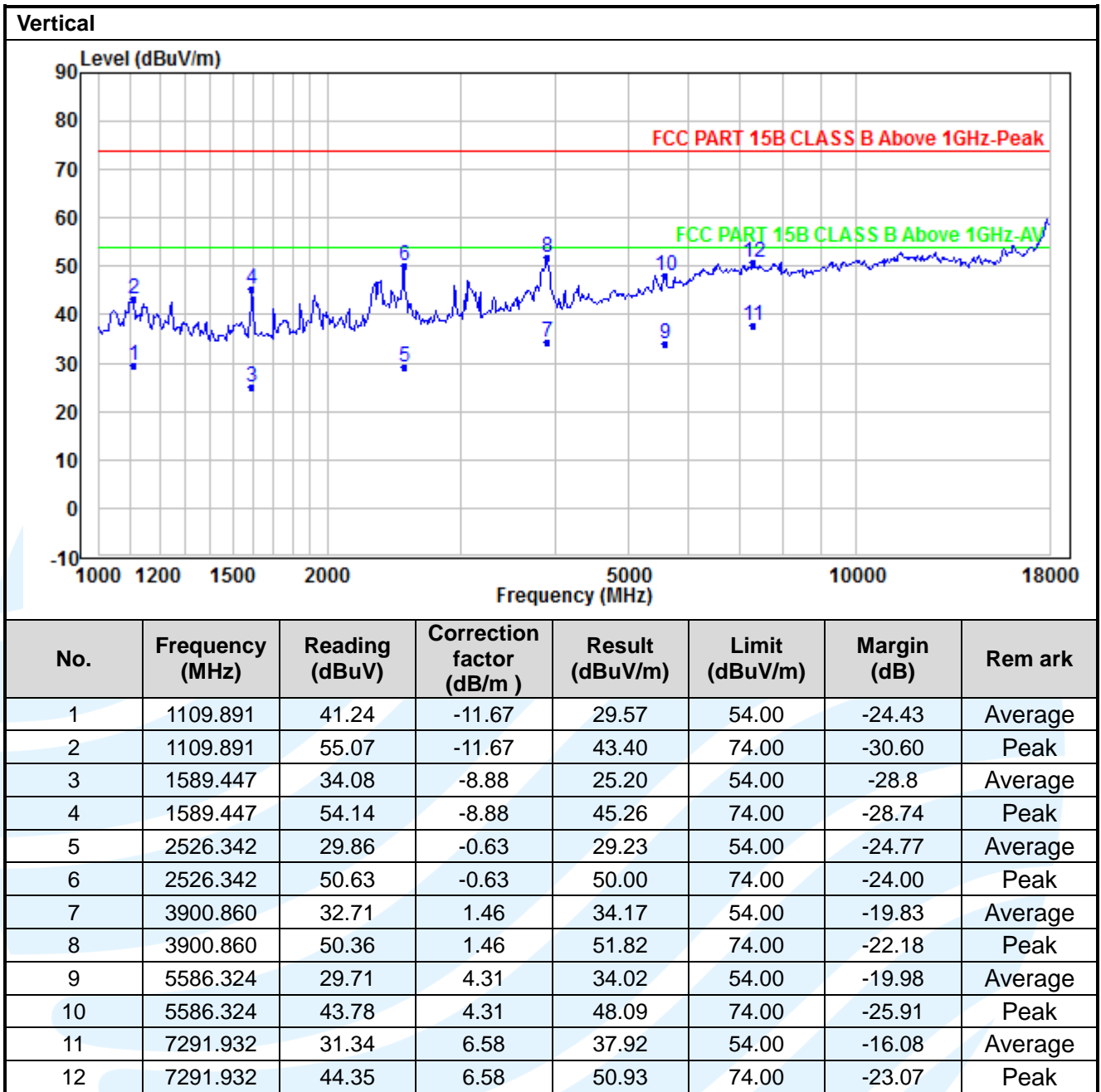




Above 1GHz(Peak & Average)
 Mode1
 Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1059.634	43.18	-11.88	31.30	54.00	-22.70	Average
2	1059.634	60.90	-11.88	49.02	74.00	-24.98	Peak
3	1589.447	37.04	-8.88	28.16	54.00	-25.84	Average
4	1589.447	56.73	-8.88	47.85	74.00	-26.15	Peak
5	2329.561	34.94	-1.46	33.48	54.00	-20.52	Average
6	2329.561	50.65	-1.46	49.19	74.00	-24.81	Peak
7	2526.342	31.83	-0.63	31.20	54.00	-22.80	Average
8	2526.342	53.32	-0.63	52.69	74.00	-21.31	Peak
9	3076.251	33.13	0.20	33.33	54.00	-20.67	Average
10	3076.251	49.59	0.20	49.79	74.00	-24.21	Peak
11	3923.521	33.22	1.40	34.62	54.00	-19.38	Average
12	3923.521	50.69	1.40	52.09	74.00	-21.91	Peak



Remark:

1. N/A, since there are not any ancillary equipments connected to the radio equipment. The Radiated Emission test is only applicable to ancillary equipment not incorporated in the radio equipment and intended to be measured on a stand-alone basis, as declared by the manufacturer.

6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

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

Test Setup: Refer to section 4.3.2 for details.

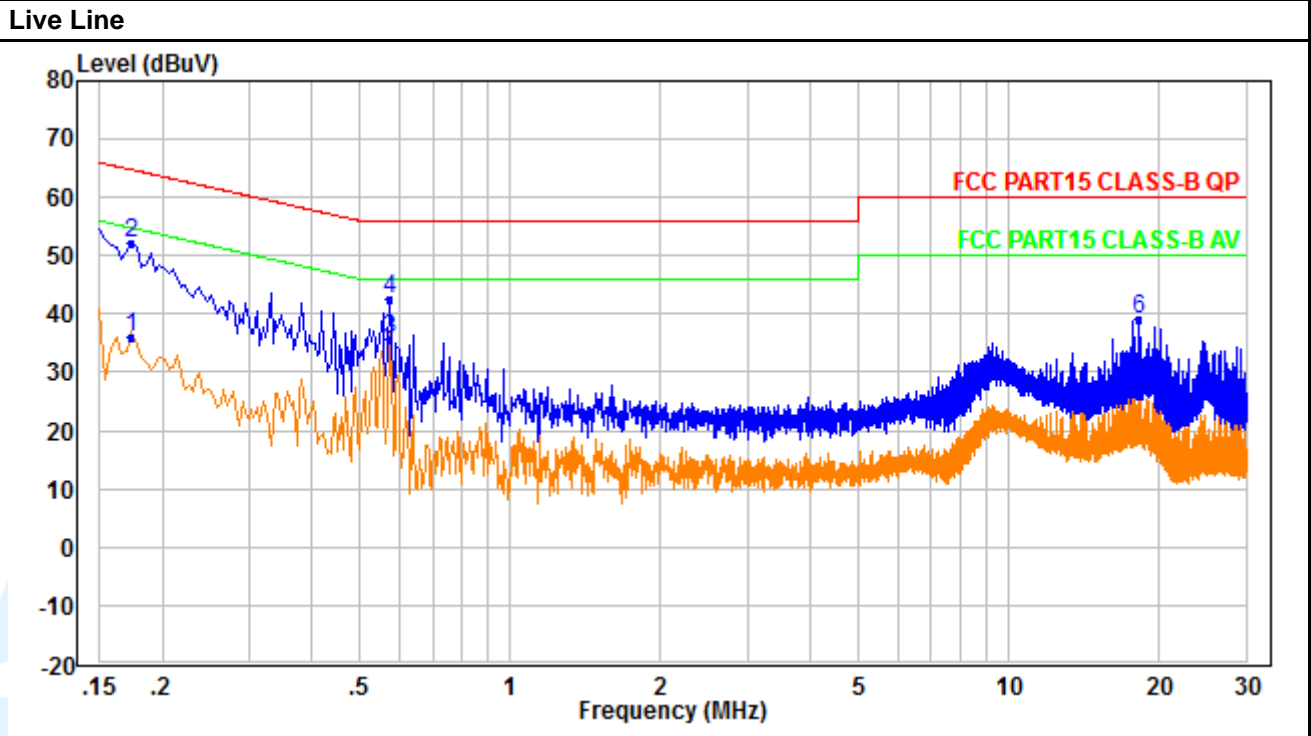
Test Procedures:

- 1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- 2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- 3) For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

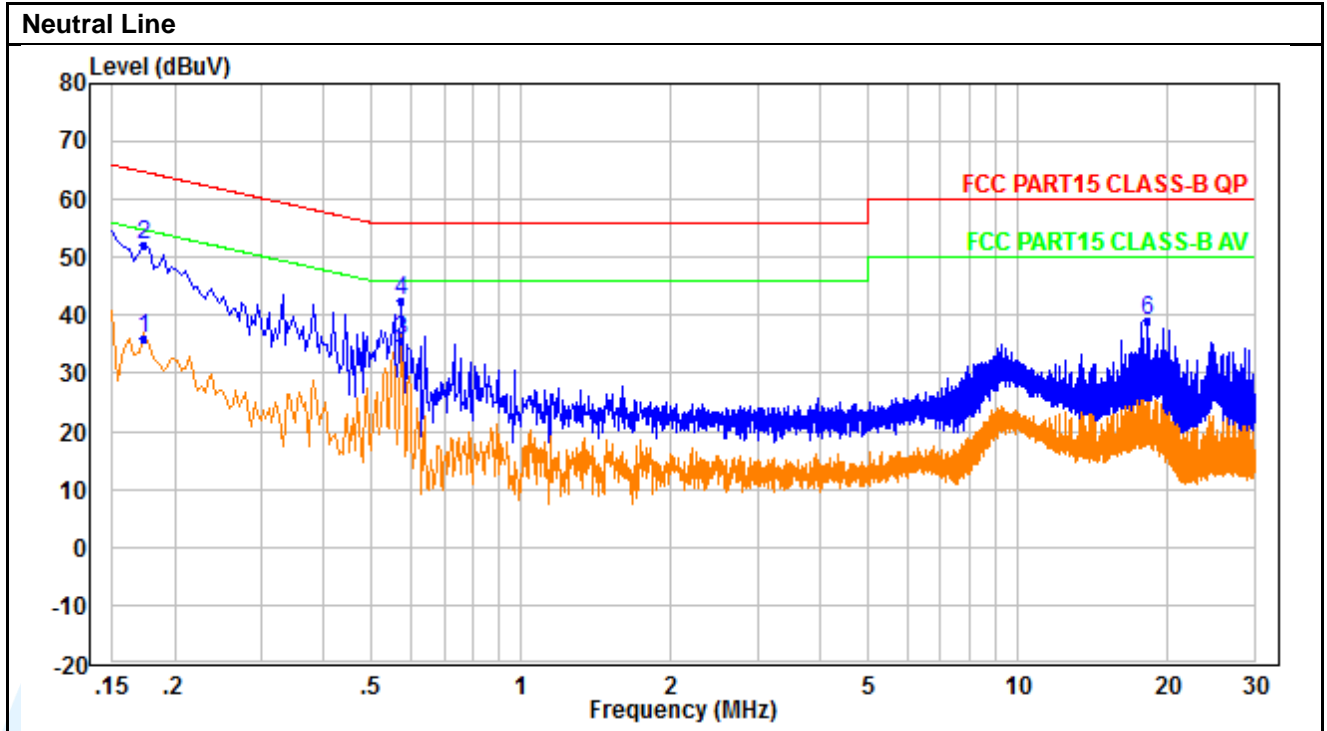
Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:
 Quasi Peak and Average:
 Mode 1



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.174	25.89	10.19	36.08	54.77	-18.69	Average
2	0.174	41.83	10.19	52.02	64.77	-12.75	QP
3	0.574	25.49	10.25	35.74	46.00	-10.26	Average
4	0.574	32.46	10.25	42.71	56.00	-13.29	QP
5	18.241	13.69	12.49	26.18	50.00	-23.82	Average
6	18.241	26.64	12.49	39.13	60.00	-20.87	QP



No.	Frequency (MHz)	Reading (dBUV)	Correction factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Remark
1	0.174	25.89	10.19	36.08	54.77	-18.69	Average
2	0.174	41.83	10.19	52.02	64.77	-12.75	QP
3	0.574	25.49	10.25	35.74	46.00	-10.26	Average
4	0.574	32.46	10.25	42.71	56.00	-13.29	QP
5	18.241	13.69	12.49	26.18	50.00	-23.82	Average
6	18.241	26.64	12.49	39.13	60.00	-20.87	QP

Remark:

1. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

APPENDIX 1 PHOTOS OF TEST SETUP

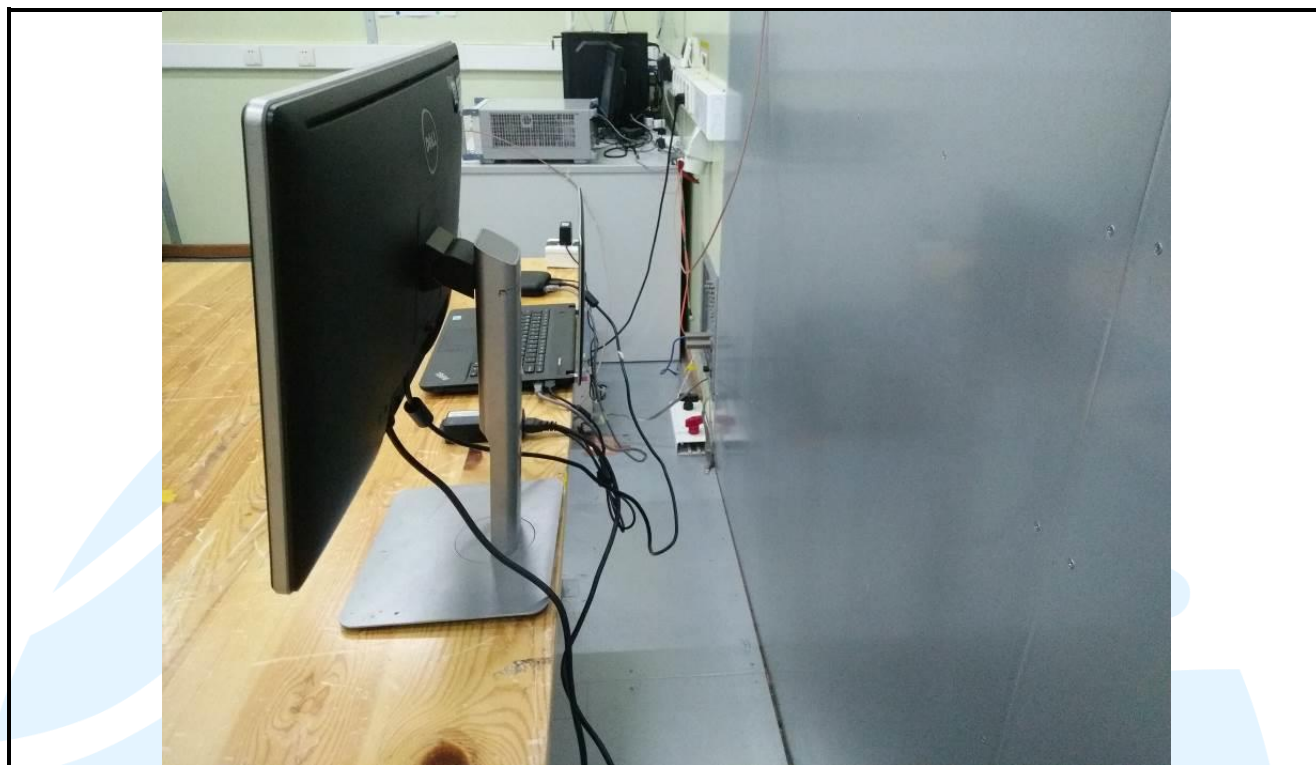


Radiated emission Test Setup-2 (Above 1 GHz) - Mode 1



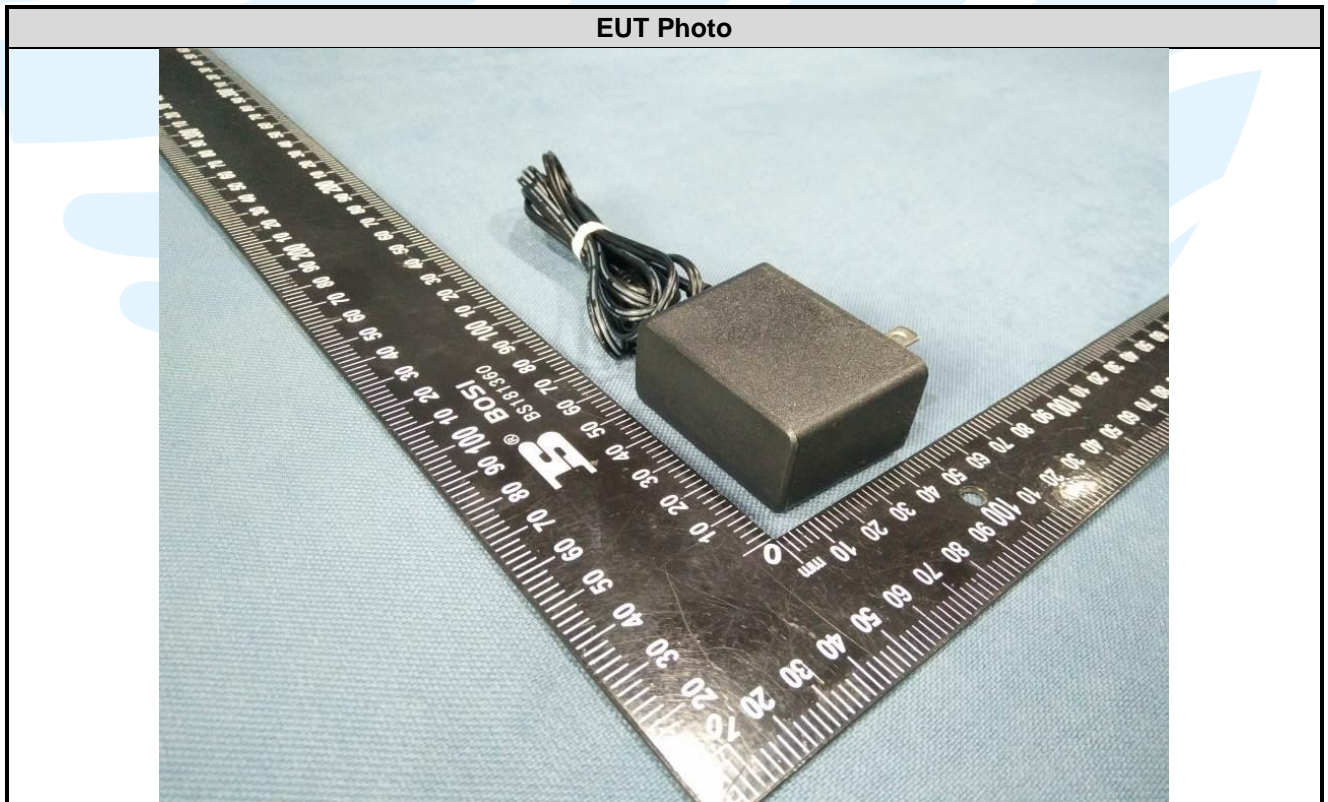
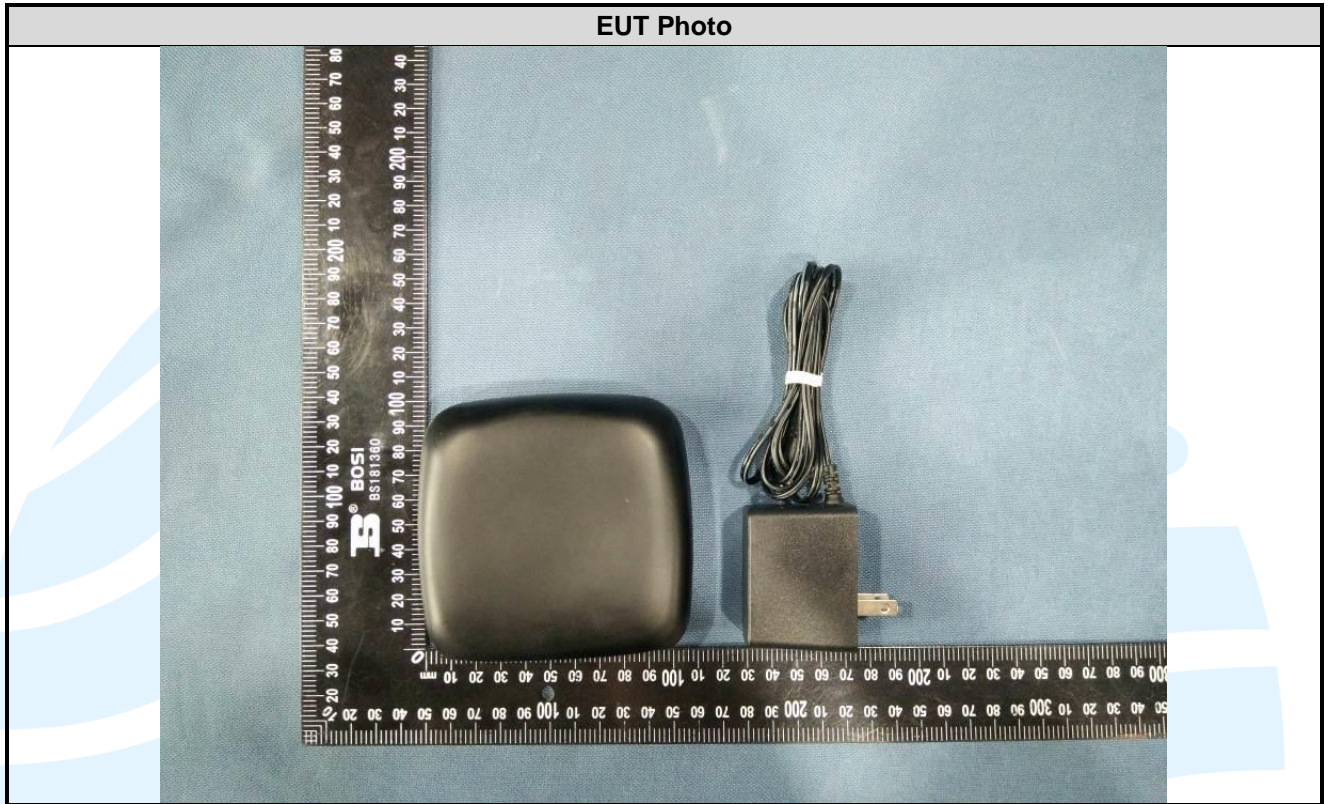
Conducted Emission Test Setup-3 - Mode 1



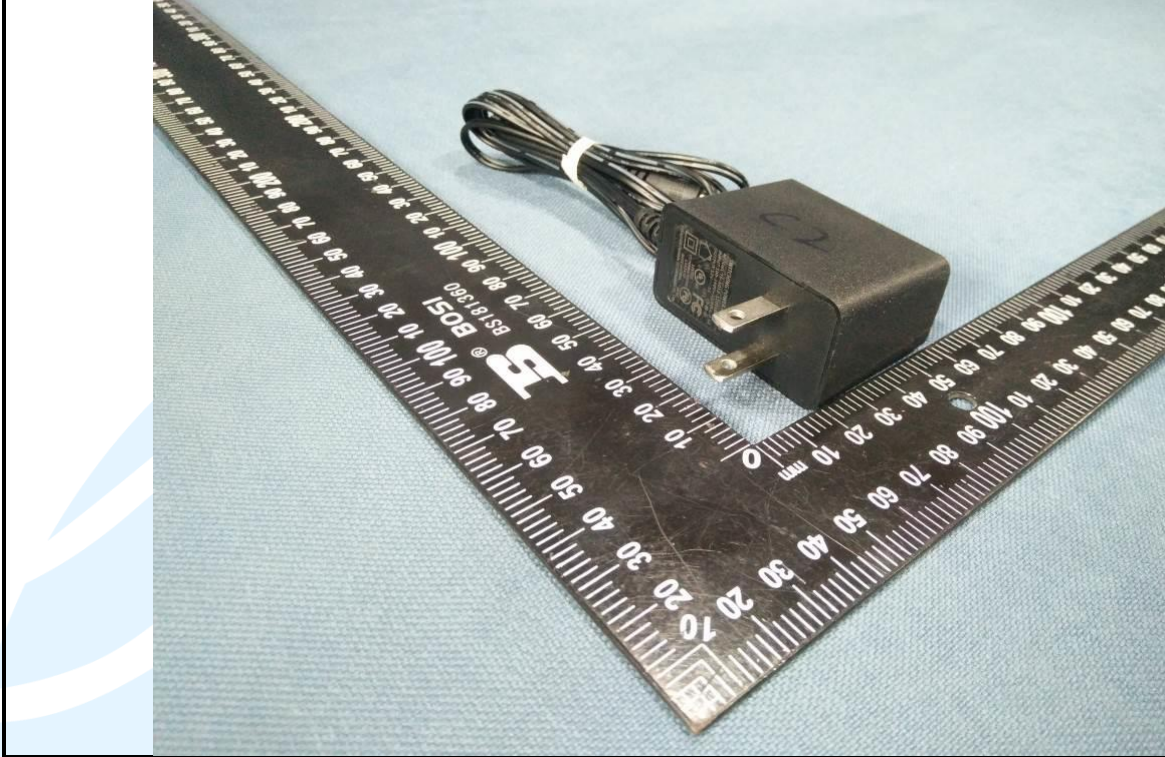


APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

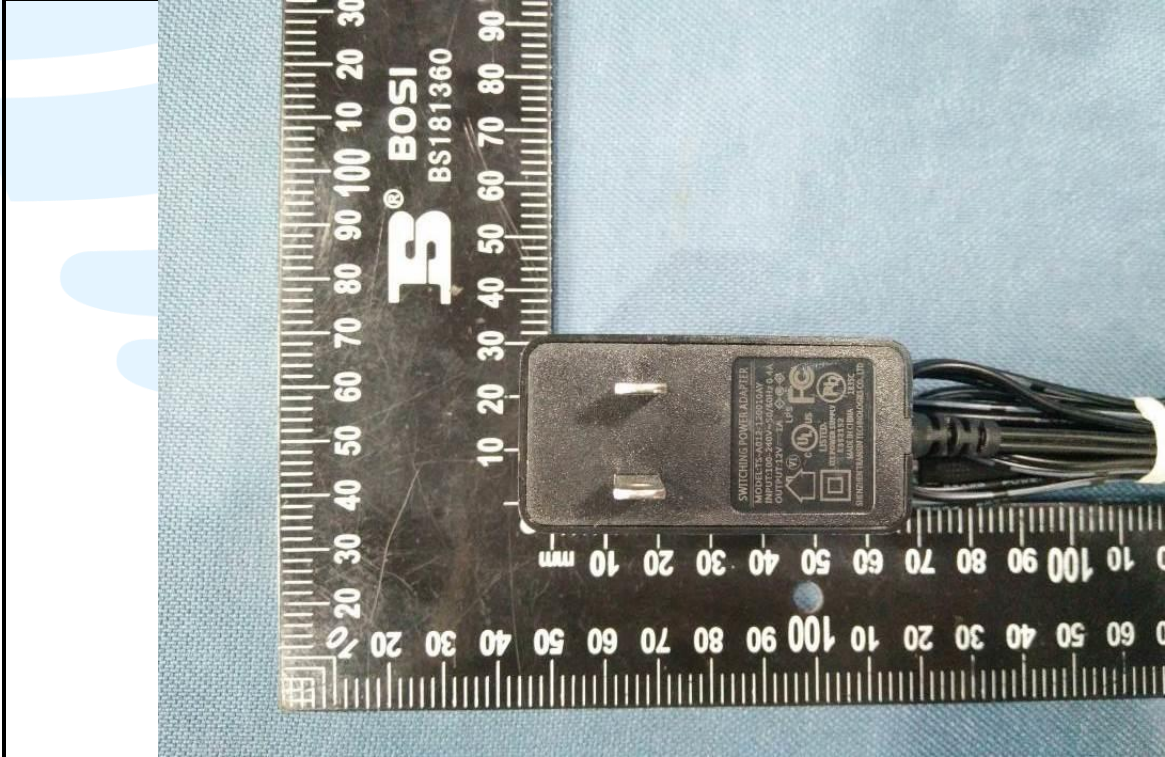
EUT EXTERNAL PHOTOS

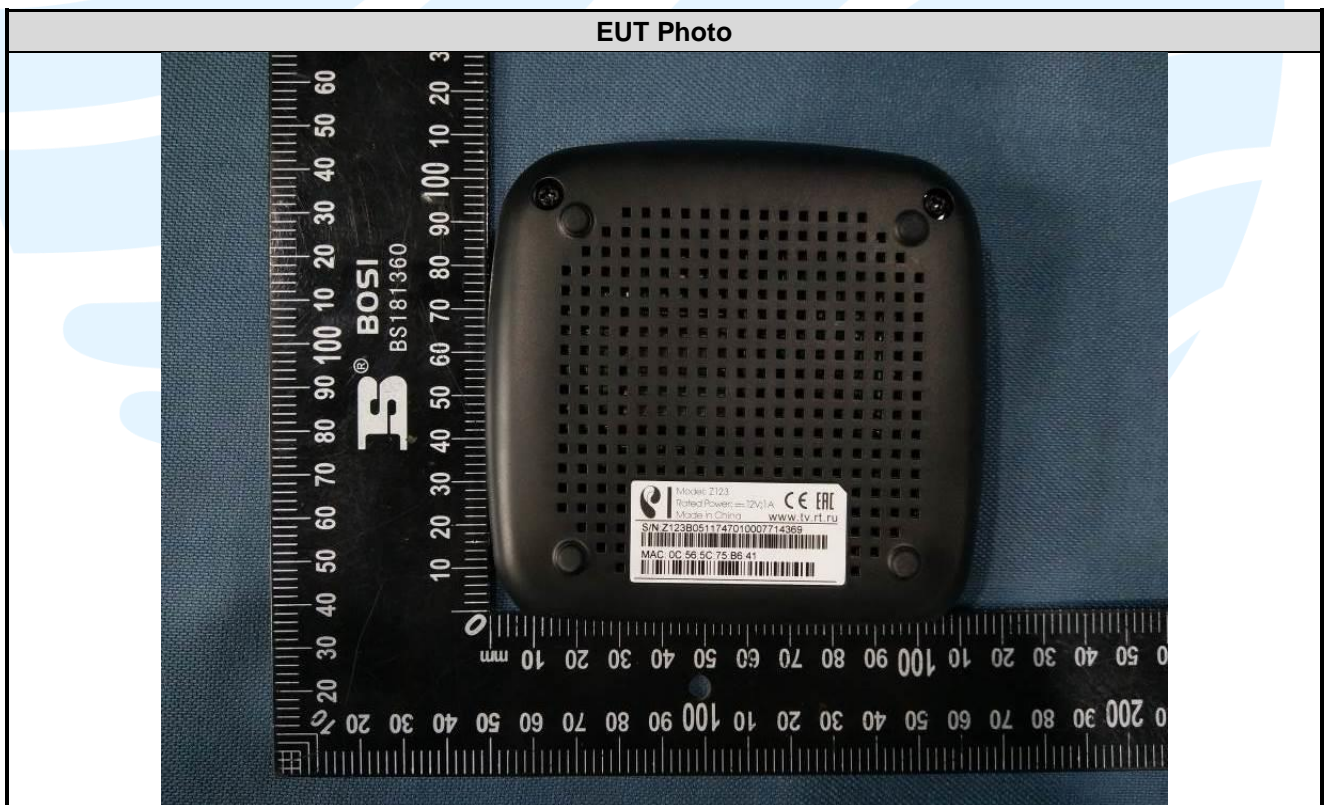
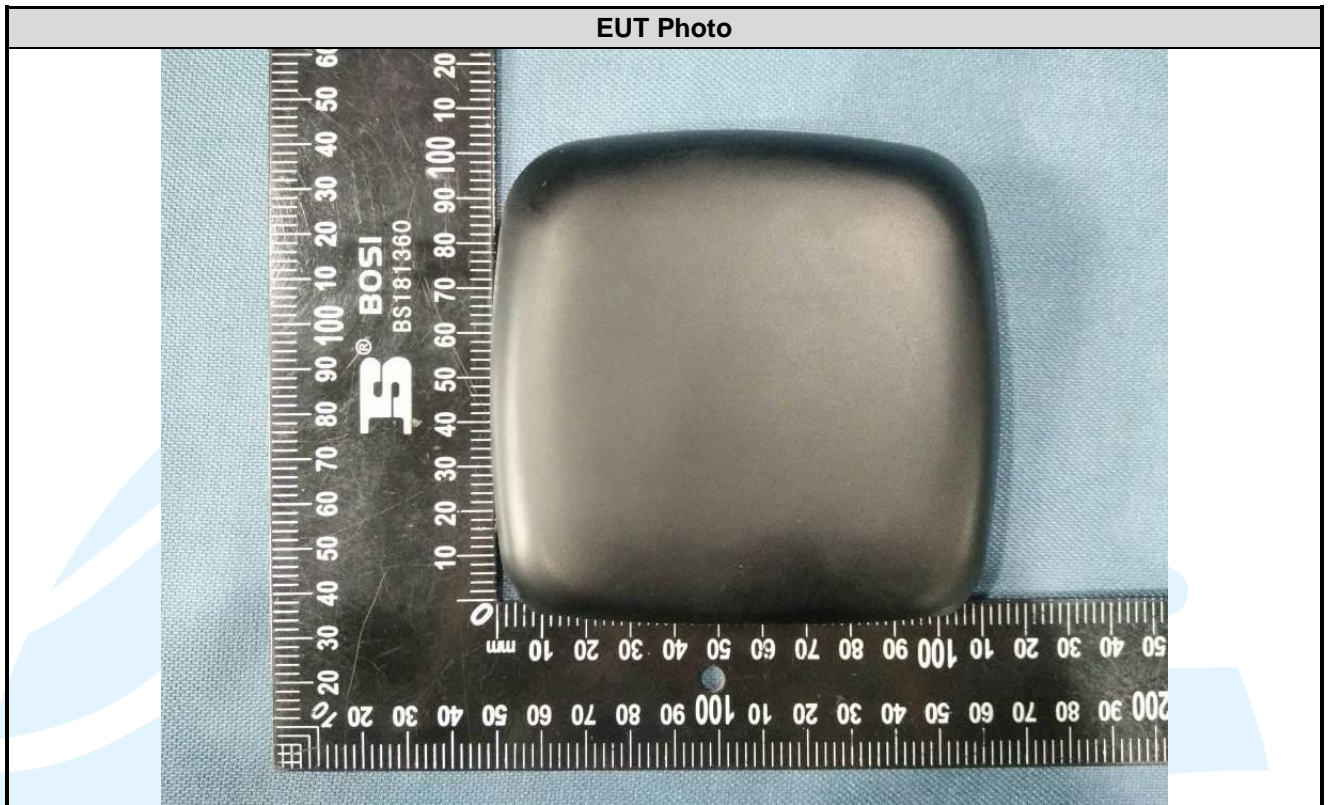


EUT Photo



EUT Photo





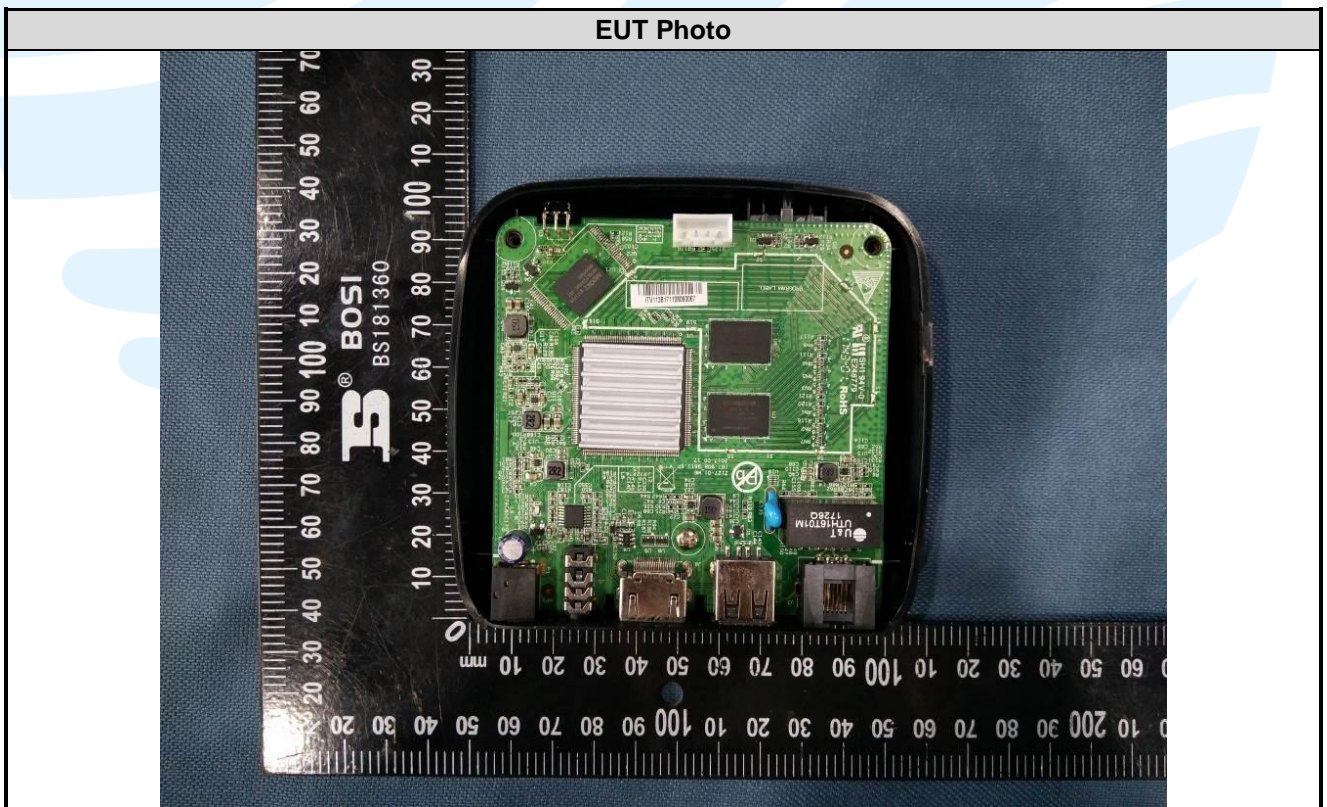
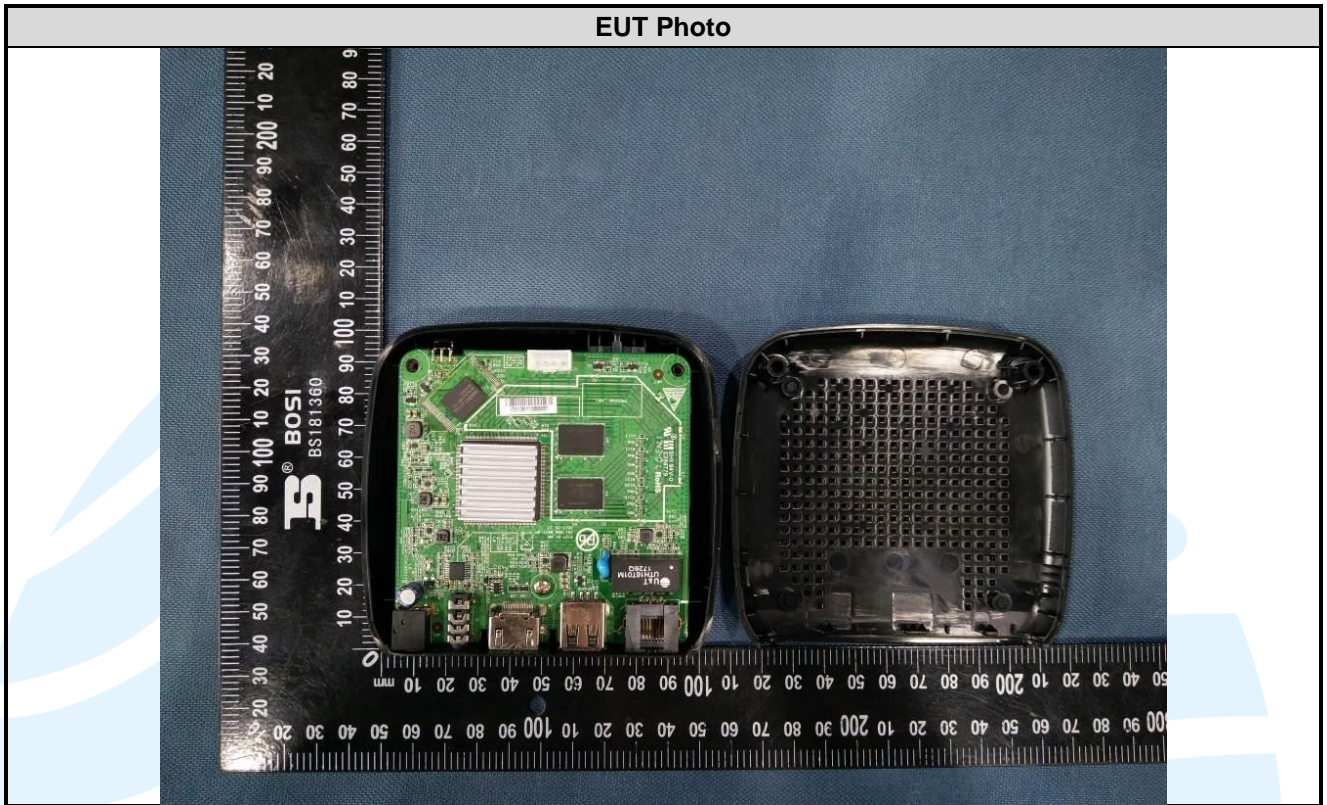
EUT Photo

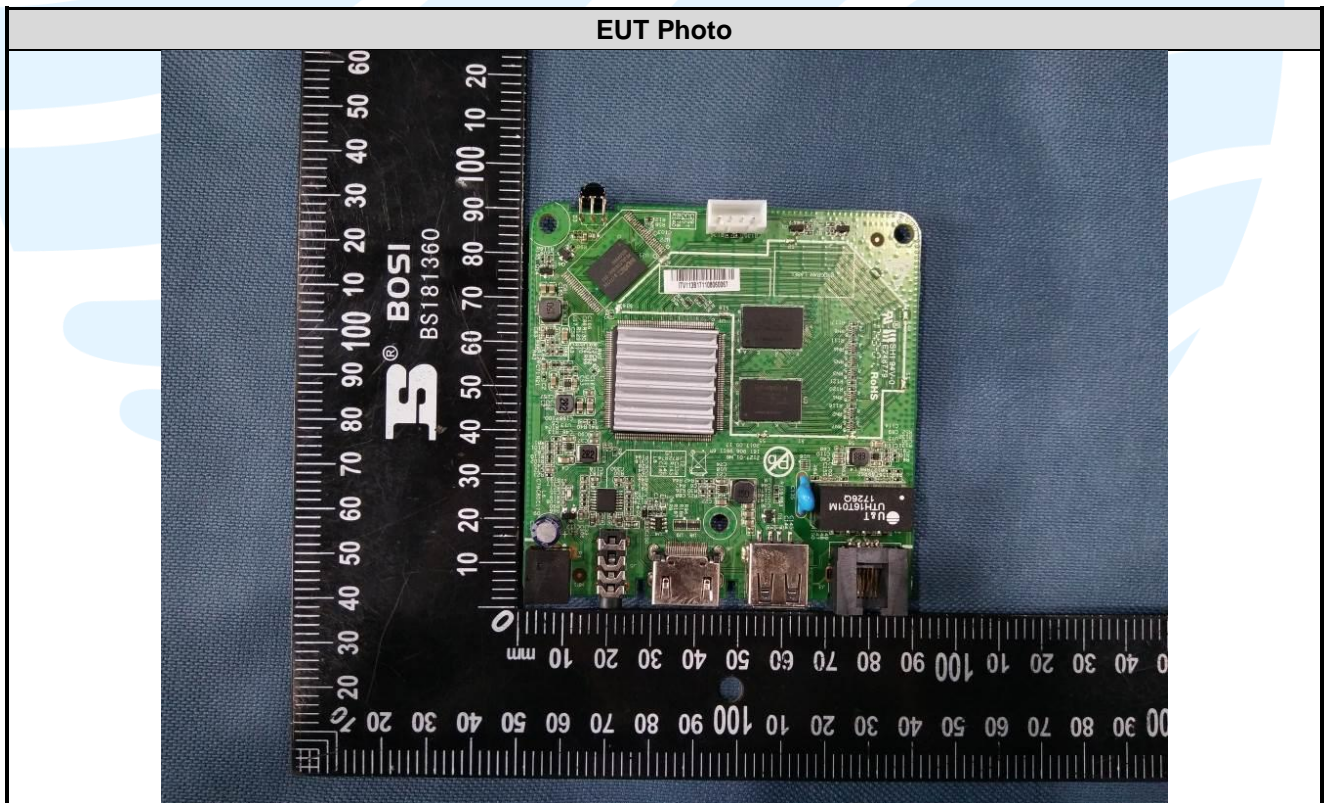
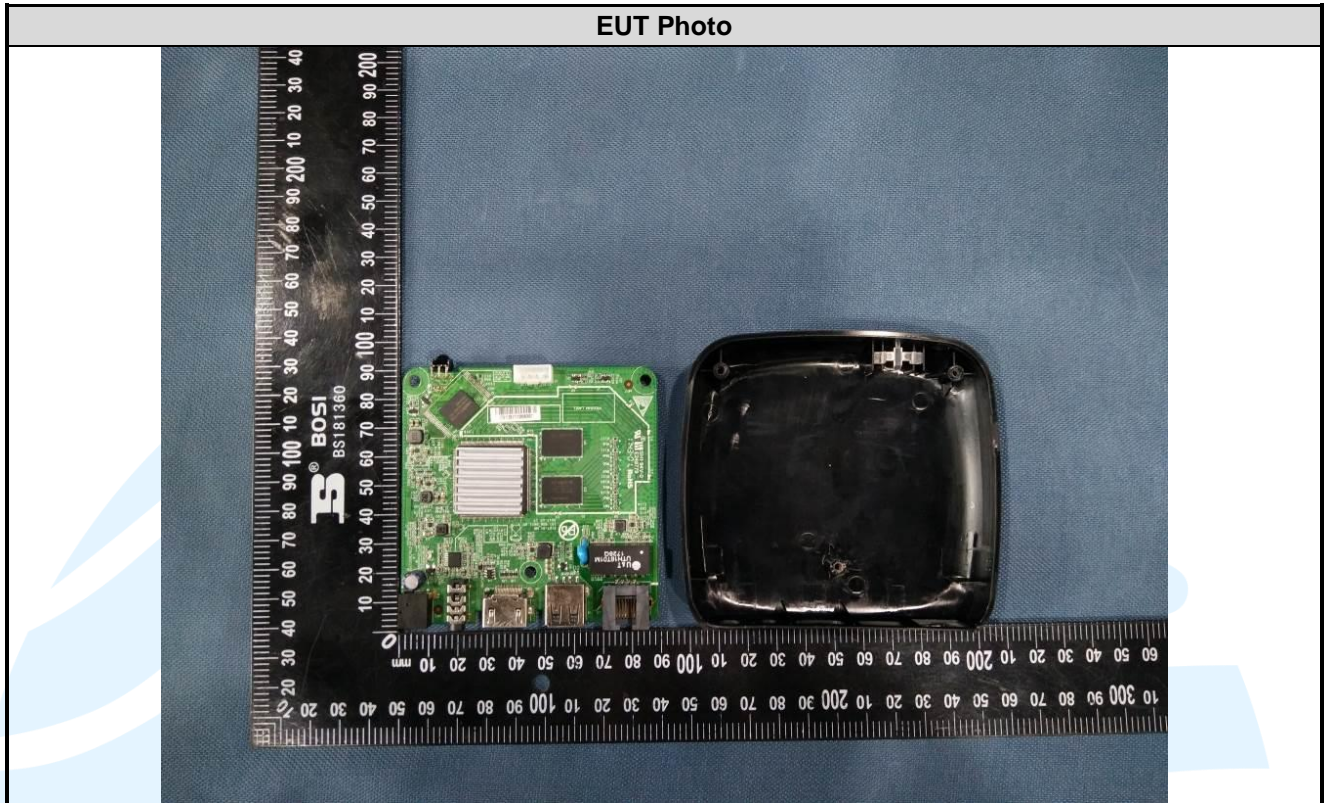


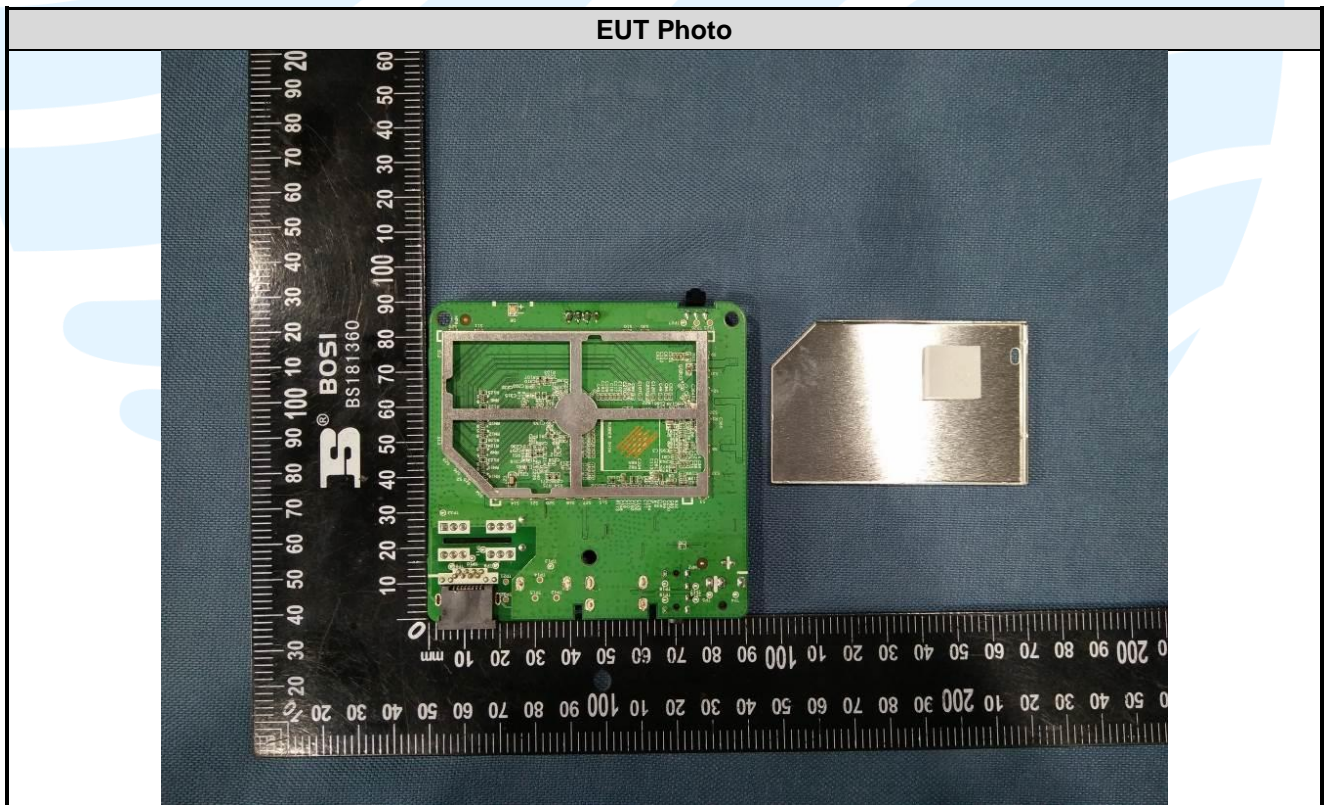
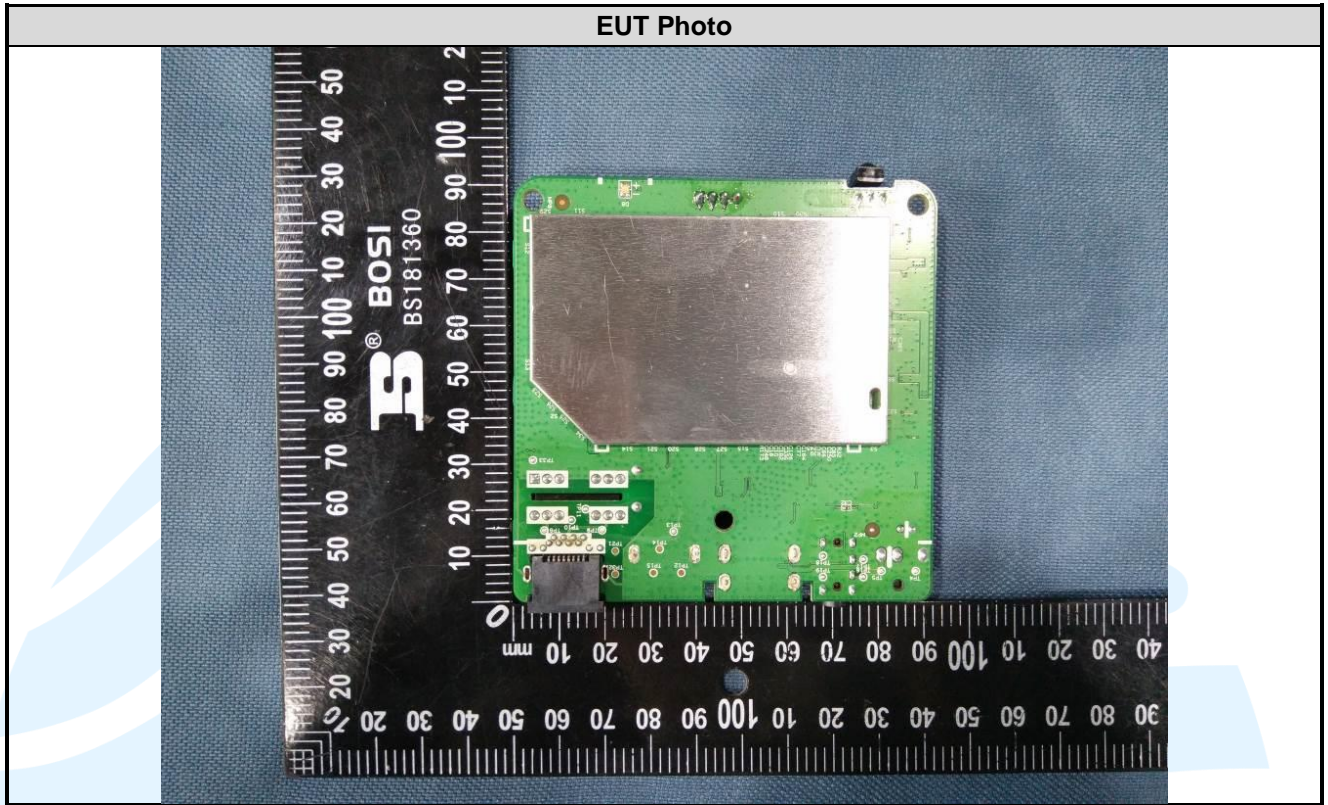
EUT Photo

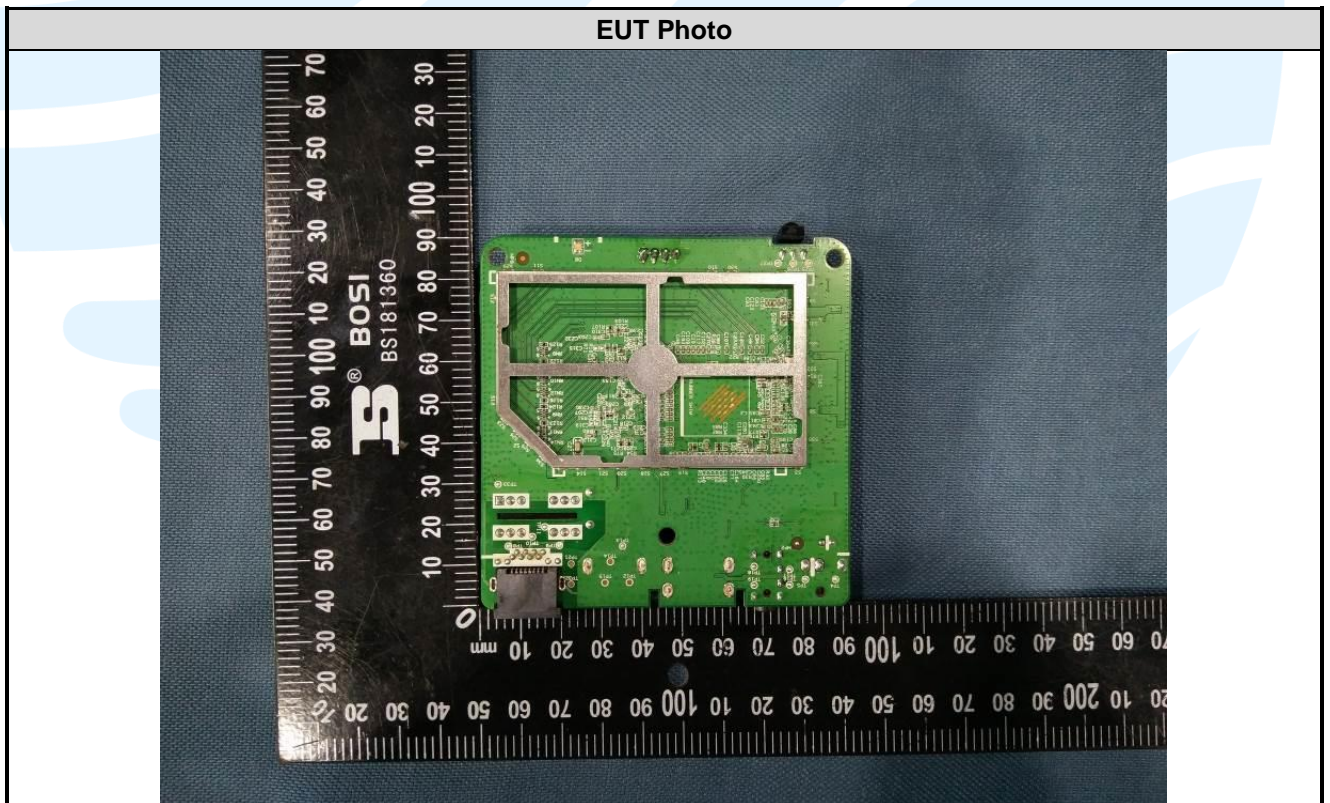
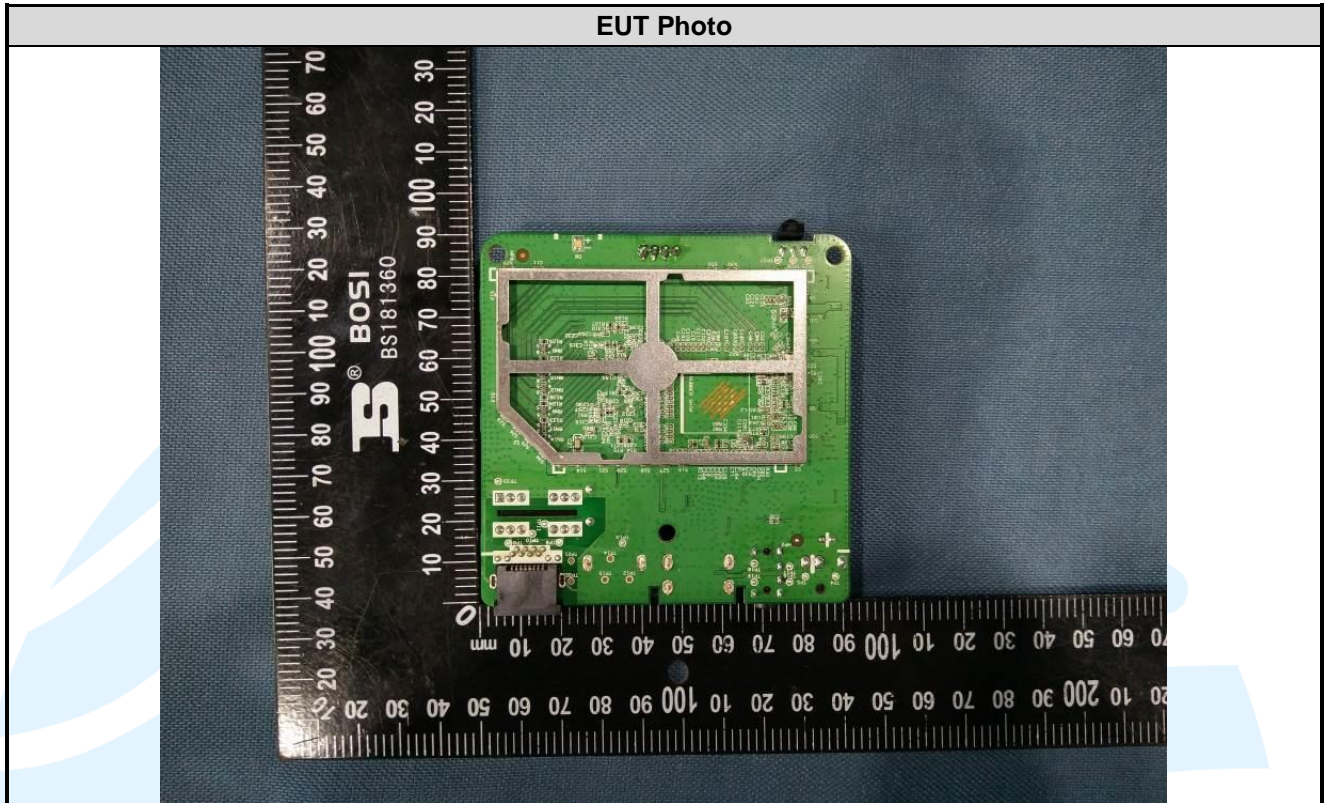


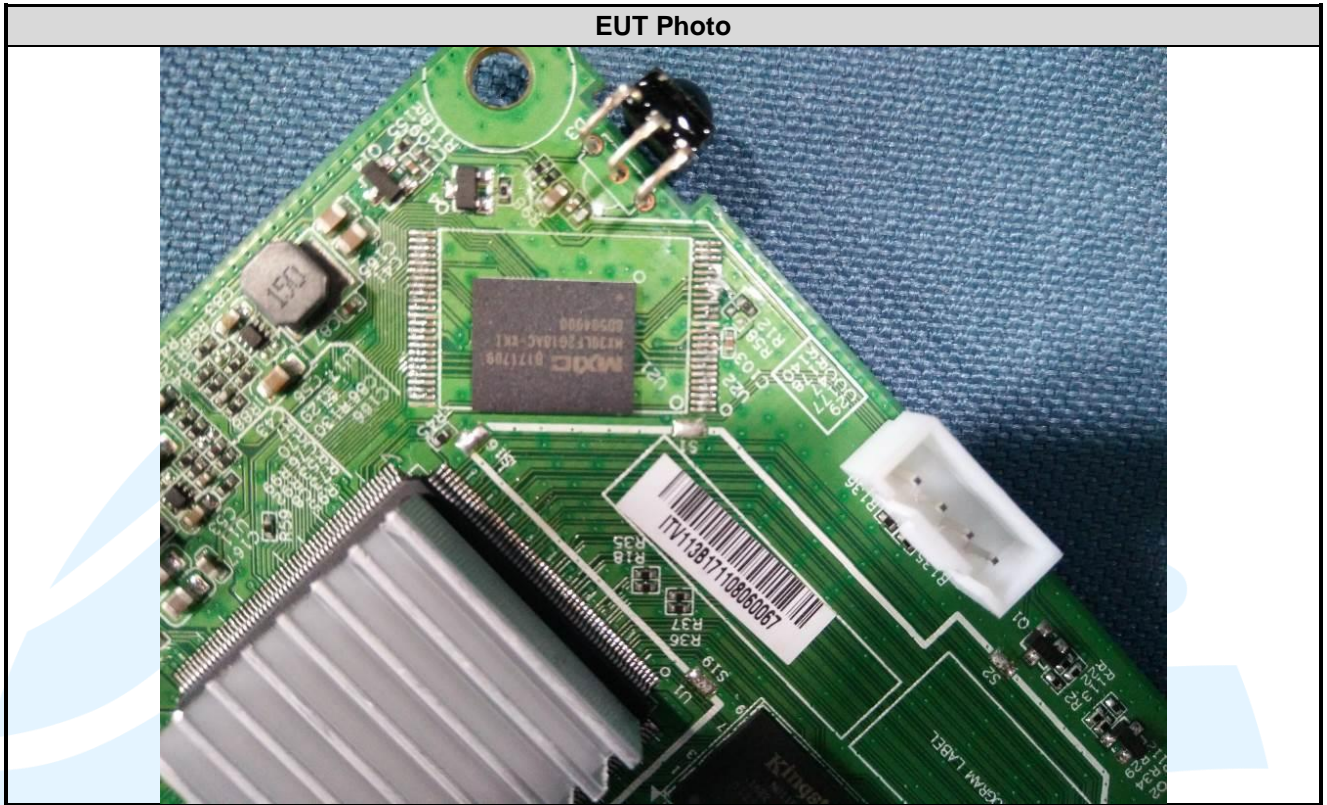
EUT INTERNAL PHOTOS











***** End of Report *****

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
