TEST REPORT

Product	:	9.7 inch 3G PhoneTablet
Trade mark	:	Dragon Touch, KINGPAD, KINGSLIM, AKASO
Model/Type reference	:	E97, E97 PRO, E97X, E97 PLUS, E970, E97 ULTIMATE
Serial Number	:	N/A
Report Number	:	EED32H00097802
FCC ID	:	S5V-D970E1
Date of Issue	:	Dec. 30, 2015
Test Standards	:	47 CFR Part 15 Subpart C (2014)
Test result	:	PASS

Prepared for:

Proexpress Distributor LLC
11011 GREENWOOD AVE. N APT 5, SEATTLE, WA 98103.

Prepared by:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Compiled by: Eman_Li Reviewed by: Kevin Yang

Approved by: Sheek.Luo Date: Dec. 30, 2015

Sheek Luo
Lab supervisor

Check No.: 2212890594

2 Version

Version No.	Date	Description
00	Dec. 30, 2015	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10-2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10-2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS

Remark:

Test according to KDB558074 D01 & ANSI C63.10-2013.

The tested sample(s) and the sample information are provided by the client.

Model No.: E97, E97 PRO, E97X, E97 PLUS, E970, E97 ULTIMATE

Only the model E97 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being model name and brand name.

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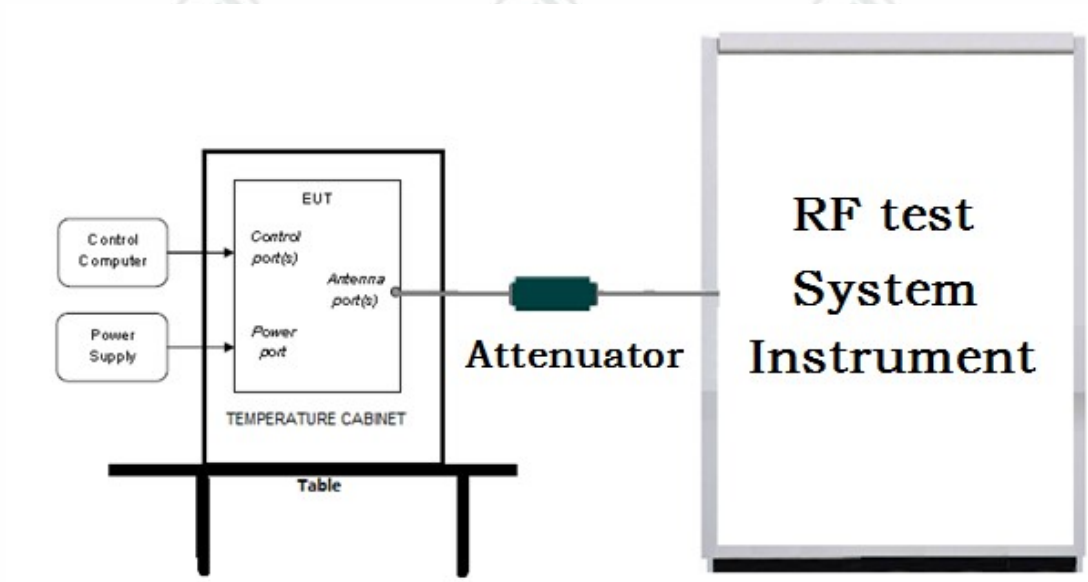
5 Test Requirement

5.1 Test setup

5.1.1 For Conducted test setup



5.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

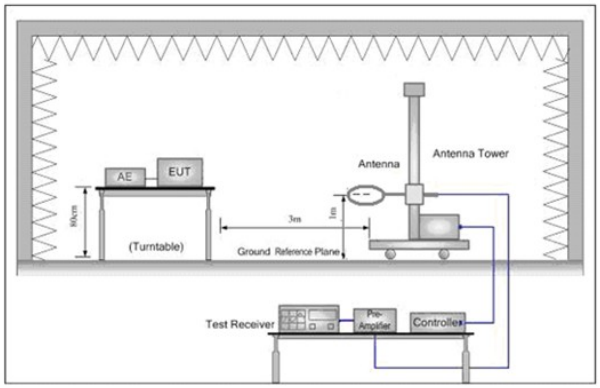


Figure 1. Below 30MHz

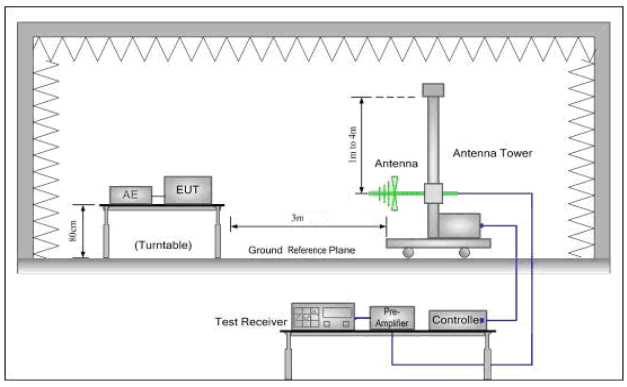


Figure 2. 30MHz to 1GHz

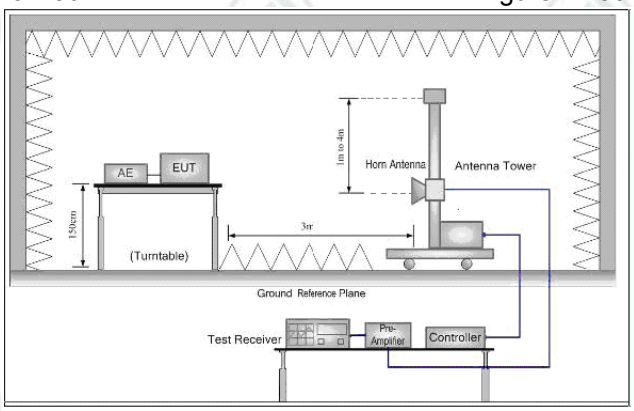
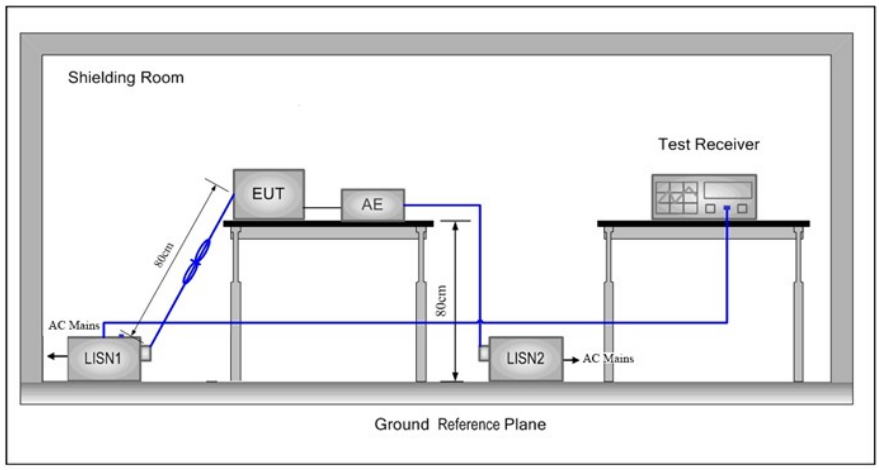


Figure 3. Above 1GHz

5.1.3 For Conducted Emissions test setup

Conducted Emissions setup



5.2 Test Environment

Operating Environment:	
Temperature:	24°C
Humidity:	50% RH
Atmospheric Pressure:	1010mbar

5.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
GFSK	2402MHz ~2480 MHz	Channel 1	Channel 20	Channel40
		2402MHz	2440MHz	2480MHz
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.			

6 General Information

6.1 Client Information

Applicant:	Proexpress Distributor LLC
Address of Applicant:	11011 GREENWOOD AVE. N APT 5, SEATTLE, WA 98103.
Manufacturer:	Proexpress Distributor LLC
Address of Manufacturer:	11011 GREENWOOD AVE. N APT 5, SEATTLE, WA 98103.

6.2 General Description of EUT

Product Name:	9.7 inch 3G Phone Tablet	
Model No.:	E97, E97 PRO, E97X, E97 PLUS, E970, E97 ULTIMATE	
Test Mode No.:	E97	
Trade Mark:	Dragon Touch, KINGPAD, KINGSLIM, AKASO	
EUT Supports Radios application:	Bluetooth V4.0 for BLE mode	
Duty Cycle:	100%	
Power Supply:	Adapter:	Model: WTA0502000USB1 Input: AC 100-240V, 50/60Hz, 0.3A Output: DC 5.0V=2000mA
	Battery:	Li-ion 3.7V/6000mAH
Sample Received Date:	Jul. 22, 2015	
Sample tested Date:	Jul. 22, 2015 to Dec. 30, 2015	

6.3 Product Specification subjective to this standard

Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	4.0
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	Portable production
Test Power Grade:	N/A (manufacturer declare)
Test Software of EUT:	N/A (manufacturer declare)
Antenna Type and Gain::	Type: Integral antenna Gain: -1.45dBi
Test Voltage:	120V~60Hz

Operation Frequency each of channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
3	2406MHz	13	2426MHz	23	2446MHz	33	2466MHz
4	2408MHz	14	2428MHz	24	2448MHz	34	2468MHz
5	2410MHz	15	2430MHz	25	2450MHz	35	2470MHz
6	2412MHz	16	2432MHz	26	2452MHz	36	2472MHz

7	2414MHz	17	2434MHz	27	2454MHz	37	2474MHz
8	2416MHz	18	2436MHz	28	2456MHz	38	2476MHz
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

6.4 Description of Support Units

The EUT has been tested independently.

6.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China518101

Telephone: +86 (0) 755 33683668 Fax:+86 (0) 755 33683385

No tests were sub-contracted.

6.6 Test Facility

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

CNAS-Lab Code: L1910

Centre Testing International Group Co., Ltd.has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories..

A2LA-Lab Cert. No. 3061.01

Centre Testing International Group Co., Ltd. EMC Laboratory 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-Registration No.: 565659

Centre Testing International Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 565659.

IC-Registration No.: 7408A

The 3m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408A .

IC-Registration No.: 7408B

The 10m Alternate Test Site of Centre Testing International Group Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 7408B.

NEMKO-Aut. No.: ELA503

Centre Testing International Group Co., Ltd. has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10.

VCCI

The Radiation 3 &10 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-4096.

Main Ports Conducted Interference Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-4563.

Telecommunication Ports Conducted Disturbance Measurement of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-2146.

The Radiation 3 meters site of Centre Testing International Group Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-758

6.7 Deviation from Standards

None.

6.8 Abnormalities from Standard Conditions

None.

6.9 Other Information Requested by the Customer

None.

6.10 Measurement Uncertainty(95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.31dB (30MHz-1GHz)
		0.57dB(1GHz-18GHz)
3	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB(1GHz-12.75GHz)
4	Conduction emission	3.6dB (9kHz to 150kHz)
		3.2dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	2.8%
7	DC power voltages	0.025%

7 Equipment List

RF test system					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. Date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Signal Generator	Keysight	E8257D	MY53401106	04-14-2015	04-13-2016
Communication test set test set	Agilent	N4010A	MY47230124	04-02-2015	04-01-2016
Spectrum Analyzer	Keysight	N9010A	MY54510339	04-01-2015	03-31-2016
Attenuator	HuaXiang	SHX370	15040701	04-01-2015	03-31-2016
Signal Generator	Keysight	N5182B	MY53051549	03-31-2015	03-30-2016
High-pass filter(3-18GHz)	Sinoscite	FL3CX03WG18 NM12-0398-002	---	01-13-2015	01-12-2016
High-pass filter(5-18GHz)	MICRO-TRONICS	SPA-F-63029-4	---	01-13-2015	01-12-2016
band rejection filter (GSM900)	Sinoscite	FL5CX01CA09C L12-0395-001	---	01-13-2015	01-12-2016
band rejection filter (GSM850)	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-13-2015	01-12-2016
band rejection filter (GSM1800)	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-13-2015	01-12-2016
band rejection filter (GSM1900)	Sinoscite	FL5CX02CA03C L12-0394-001	---	01-13-2015	01-12-2016
DC Power	Keysight	E3642A	MY54436035	03-31-2015	03-30-2016
PC-1	Lenovo	R4960d	---	04-01-2015	03-31-2016
BT&WI-FI Automatic control	R&S	OSPB157	101374	04-01-2015	03-31-2016
RF control unit	JS Tonscend	JS0806-2	2015860006	04-01-2015	03-31-2016
BT&WI-FI Automatic test software	JS Tonscend	JSTS1120-2	---	04-01-2015	03-31-2016

Conducted disturbance Test					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Receiver	R&S	ESCI	100435	06-30-2015	06-28-2016
Receiver	R&S	ESCI	100009	06-30-2015	06-28-2016
Temperature/ Humidity Indicator	Belida	TT-512	101	07-09-2015	07-07-2016
Communication test set	Agilent	E5515C	GB47050533	01-13-2015	01-12-2016
Communication test set	R&S	CMW500	152394	04-19-2015	04-18-2016
LISN	R&S	ENV216	100098	06-30-2015	06-28-2016
LISN	schwarzbeck	NNLK8121	8121-529	06-30-2015	06-28-2016
Voltage Probe	R&S	ESH2-Z3	100042	07-09-2014	07-08-2017
Current Probe	R&S	EZ17	100106	07-09-2014	07-08-2017
ISN	TESEQ GmbH	ISN T800	30297	01-29-2015	01-27-2017

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Mode No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber	TDK	SAC-3	---	06-02-2013	06-01-2016
TRILOG Broadband Antenna	schwarzbeck	VULB9163	9163-617	07-31-2015	07-29-2016
Microwave Preamplifier	Agilent	8449B	3008A02425	02-05-2015	02-04-2016
Horn Antenna	ETS-LINDGREN	3117	00057410	06-30-2015	06-28-2018
Loop Antenna	ETS	6502	00071730	07-30-2015	07-28-2017
Spectrum Analyzer	R&S	FSP40	100416	06-30-2015	06-28-2018
Receiver	R&S	ESCI	100435	06-30-2015	06-28-2018
Multi device Controller	maturo	NCD/070/10711112	---	01-13-2015	01-12-2016
LISN	schwarzbeck	NNBM8125	81251547	06-30-2015	06-28-2016
LISN	schwarzbeck	NNBM8125	81251548	06-30-2015	06-28-2016
Signal Generator	Agilent	E4438C	MY45095744	04-19-2015	04-18-2016
Signal Generator	Keysight	E8257D	MY53401106	04-14-2015	04-13-2016
Temperature/ Humidity Indicator	TAYLOR	1451	1905	07- 08-2015	07-06-2016
Communication test set	Agilent	E5515C	GB47050533	01-13-2015	01-12-2016
Cable line	Fulai(7M)	SF106	5219/6A	01-13-2015	01-12-2016
Cable line	Fulai(6M)	SF106	5220/6A	01-13-2015	01-12-2016
Cable line	Fulai(3M)	SF106	5216/6A	01-13-2015	01-12-2016
Cable line	Fulai(3M)	SF106	5217/6A	01-13-2015	01-12-2016
Communication test set	R&S	CMW500	152394	04-19-2015	04-18-2016
High-pass filter(3-18GHz)	Sinoscite	FL3CX03WG18NM 12-0398-002	---	01-13-2015	01-12-2016
High-pass filter(5-18GHz)	MICRO-TRONICS	SPA-F-63029-4	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX01CA09CL1 2-0395-001	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX01CA08CL1 2-0393-001	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX02CA04CL1 2-0396-002	---	01-13-2015	01-12-2016
band rejection filter	Sinoscite	FL5CX02CA03CL1 2-0394-001	---	01-13-2015	01-12-2016

8 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15C (2014)	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices

Test Results List:

Test Requirement	Test method	Test item	Verdict	Note
Part15C Section 15.247 (a)(2)	ANSI C63.10	6dB Occupied Bandwidth	PASS	Appendix A)
Part15C Section 15.247 (b)(3)	ANSI C63.10	Conducted Peak Output Power	PASS	Appendix B)
Part15C Section 15.247(d)	ANSI C63.10	Band-edge for RF Conducted Emissions	PASS	Appendix C)
Part15C Section 15.247(d)	ANSI C63.10	RF Conducted Spurious Emissions	PASS	Appendix D)
Part15C Section 15.247 (e)	ANSI C63.10	Power Spectral Density	PASS	Appendix E)
Part15C Section 15.203/15.247 (c)	ANSI C63.10	Antenna Requirement	PASS	Appendix F)
Part15C Section 15.207	ANSI C63.10	AC Power Line Conducted Emission	PASS	Appendix G)
Part15C Section 15.205/15.209	ANSI C63.10	Restricted bands around fundamental frequency (Radiated Emission)	PASS	Appendix H)
Part15C Section 15.205/15.209	ANSI C63.10	Radiated Spurious Emissions	PASS	Appendix I)

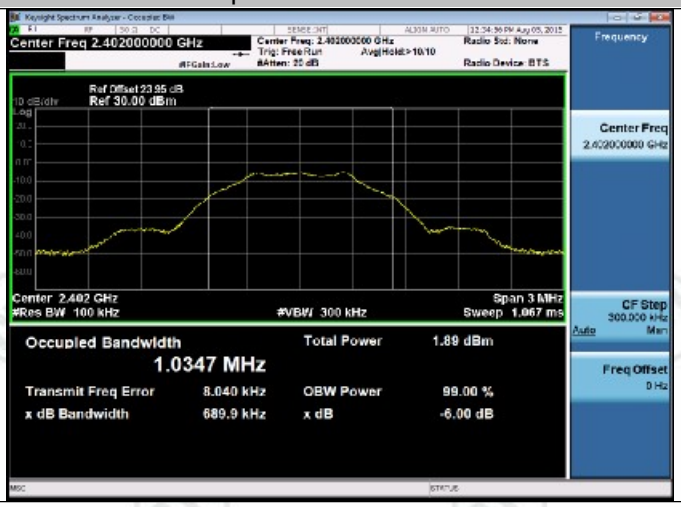
Appendix A) 6dB Occupied Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10-2013
Test Setup:	Refer to section 5 for details
Limit:	≥ 500 kHz
Test Mode:	Non-hopping transmitting with GFSK modulation.
Instruments Used:	Refer to section 7 for details
Test Results:	Pass

Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Limit(MHz)	Verdict	Remark
BLE	LCH	0.6899	1.0347	>0.5	PASS	Peak detector
BLE	MCH	0.6843	1.0355	>0.5	PASS	
BLE	HCH	0.6990	1.0353	>0.5	PASS	

Test Graphs

Graphs			
LCH			

MCH		 Center Freq 2.440000000 GHz Ref Offset 23.76 dB Ref 30.00 dBm Center 2.44 GHz #Res BW 100 kHz #VBW 300 kHz Span 3 MHz Sweep 1.067 ms Occupied Bandwidth 1.0355 MHz Total Power 2.35 dBm Transmit Freq Error 4.736 kHz OBW Power 99.00 % x dB Bandwidth 684.3 kHz x dB -6.00 dB Frequency Center Freq CF Step Freq Offset
HCH		 Center Freq 2.480000000 GHz Ref Offset 23.76 dB Ref 30.00 dBm Center 2.48 GHz #Res BW 100 kHz #VBW 300 kHz Span 3 MHz Sweep 1.067 ms Occupied Bandwidth 1.0353 MHz Total Power 2.30 dBm Transmit Freq Error 4.954 kHz OBW Power 99.00 % x dB Bandwidth 699.0 kHz x dB -6.00 dB Frequency Center Freq CF Step Freq Offset

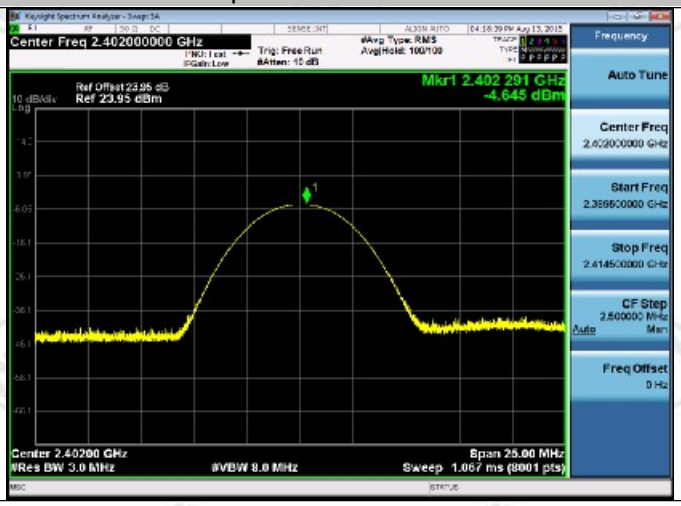
Appendix B) Conducted Peak Output Power

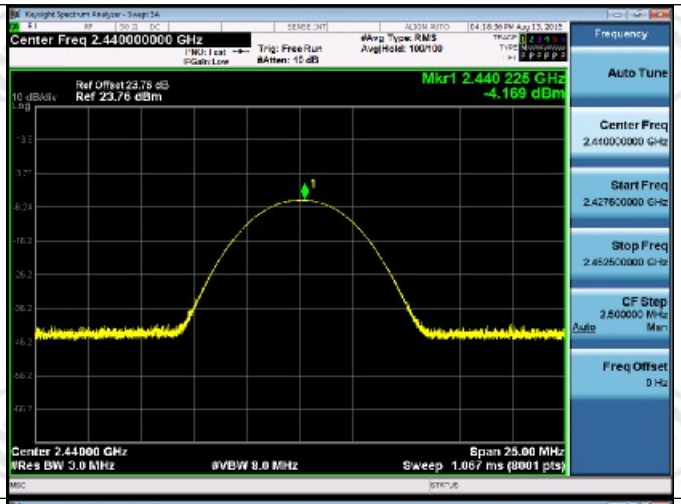
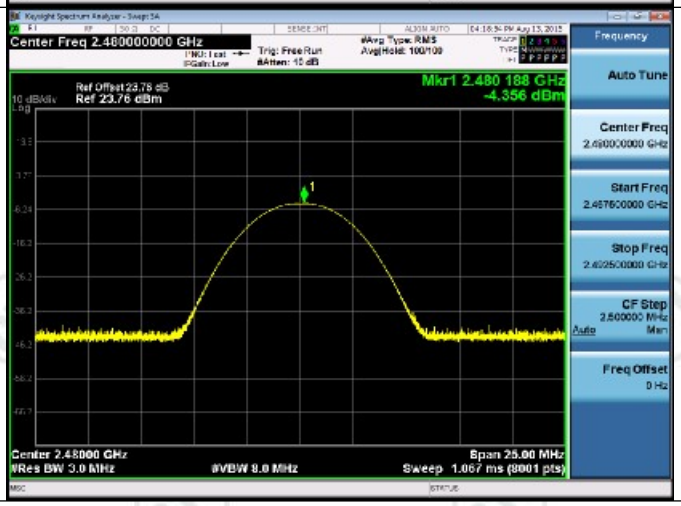
Test Requirement:	47 CFR Part 15C Section 15.247 (b)(1)
Test Method:	ANSI C63.10-2013
Test Setup:	Refer to section 5 for details
Limit:	30dBm
Test Mode:	Non-hopping transmitting with GFSK modulation.
Instruments Used:	Refer to section 7 for details
Test Results:	Pass

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Limit(dBm)	Verdict
BLE	LCH	-4.645	30	PASS
BLE	MCH	-4.169	30	PASS
BLE	HCH	-4.356	30	PASS

Test Graphs

Graphs		
LCH		

MCH		 Center Freq 2.440000000 GHz Trig: Free Run #Atten: 10 dB #Avg Type: RMS Avg|Hold: 100/100 Ref Offset 23.78 dB 10 dB/div Ref 23.76 dBm Mkr1 2.440 225 GHz -4.169 dBm Center 2.44000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Span 25.00 MHz Sweep 1.067 ms (8001 pts) Frequency Auto Tune Center Freq Start Freq Stop Freq CF Step Auto Man Freq Offset 0 Hz
HCH		 Center Freq 2.480000000 GHz Trig: Free Run #Atten: 10 dB #Avg Type: RMS Avg|Hold: 100/100 Ref Offset 23.78 dB 10 dB/div Ref 23.76 dBm Mkr1 2.480 188 GHz -4.356 dBm Center 2.48000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Span 25.00 MHz Sweep 1.067 ms (8001 pts) Frequency Auto Tune Center Freq Start Freq Stop Freq CF Step Auto Man Freq Offset 0 Hz

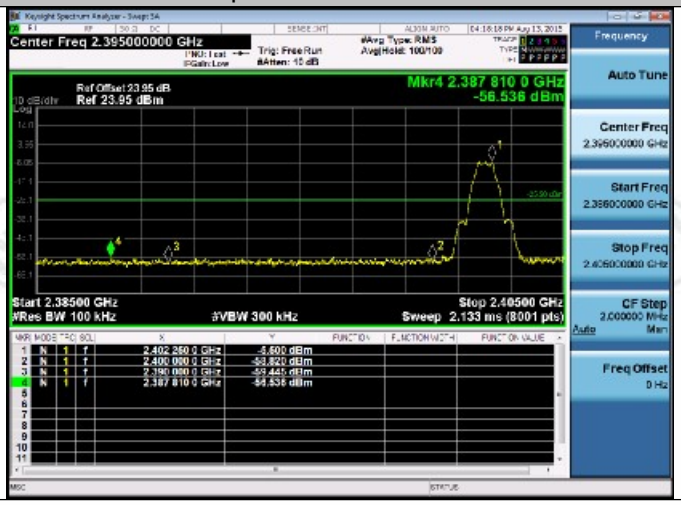
Appendix C) Band-edge for RF Conducted Emissions

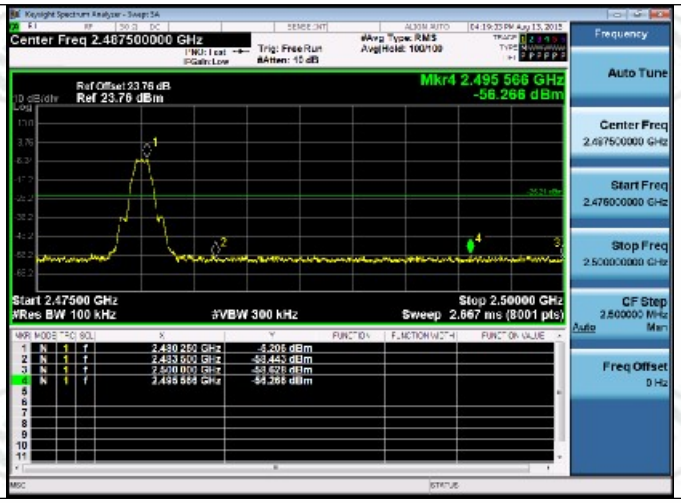
Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10-2013
Test Setup:	Refer to section 5 for details
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Mode:	Non-hopping and hopping transmitting with GFSK modulation.
Instruments Used:	Refer to section 7 for details
Test Results:	Pass

Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
BLE	LCH	-5.500	-56.536	-25.5	PASS
BLE	HCH	-5.206	-56.266	-25.21	PASS

Test Graphs

Graphs		
LCH		

HCH	

Center Freq 2.487500000 GHz
Trig: Free Run
#Atten: 10 dB
#Avg Type: RMS
Avg|Hold: 100/100
Ref Offset 23.76 dB
10 dB/div Ref 23.76 dBm
Mkr4 2.495 566 GHz
-56.266 dBm
Start 2.47500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 2.867 ms (8001 pts)
1 N 1 f 2.480 250 GHz -5.205 dBm
2 N 1 f 2.483 500 GHz -53.443 dBm
3 N 1 f 2.500 000 GHz -53.625 dBm
4 N 1 f 2.495 566 GHz -56.266 dBm
Frequency
Auto Tune
Center Freq
2.487500000 GHz
Start Freq
2.475000000 GHz
Stop Freq
2.500000000 GHz
CF Step
2.500000 MHz
Auto
Man
Freq Offset
0 Hz

Appendix D) RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10-2013
Test Setup:	Refer to section 5 for details
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test Mode:	Non-hopping transmitting with GFSK modulation.
Instruments Used:	Refer to section 7 for details
Test Results:	Pass

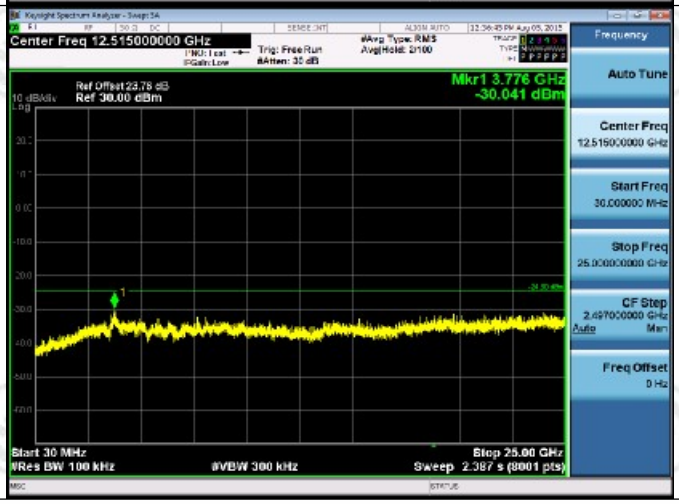
Result Table

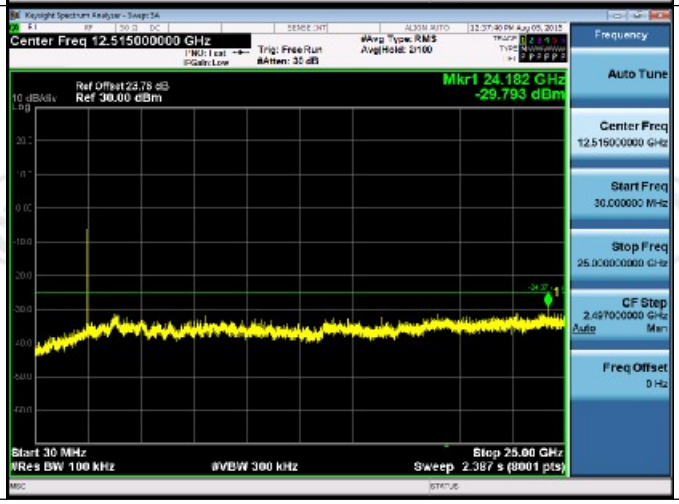
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
BLE	LCH	-5.264	<Limit	PASS
BLE	MCH	-4.801	<Limit	PASS
BLE	HCH	-4.872	<Limit	PASS

Test Graphs

BLE_LCH_Graphs	
Pref/BLE/LCH	

Puw/BLE/LCH	

BLE_MCH_Graphs	
Pref/BLE/MCH	
Puw/BLE/MCH	

BLE_HCH_Graphs			
Pref/BLE/HCH			
Puw/BLE/HCH			

Appendix E) Power Spectral Density

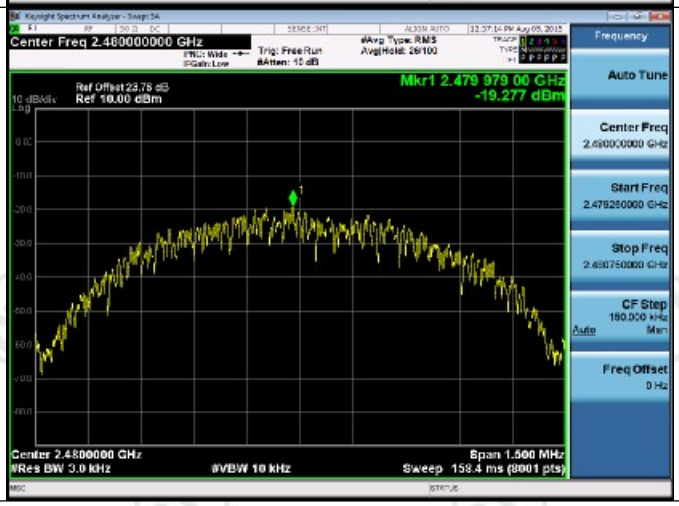
Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10-2013
Test Setup:	Refer to section 5 for details
Limit:	≤8.00dBm
Test Mode:	Non-hopping transmitting with GFSK modulation.
Instruments Used:	Refer to section 7 for details
Test Results:	Pass

Result Table

Mode	Channel	PSD [dBm]	Limit(dBm)	Verdict
BLE	LCH	-19.713	<8dBm	PASS
BLE	MCH	-19.266	<8dBm	PASS
BLE	HCH	-19.277	<8dBm	PASS

Test Graphs

Graphs		
LCH		

MCH		 Center Freq 2.440000000 GHz Mkr1 2.439 979 00 GHz -19.266 dBm Ref Offset 23.78 dB 10 dB/div Ref 10.00 dBm Center 2.440000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 1.500 MHz Sweep 158.4 ms (8001 pts)
HCH		 Center Freq 2.480000000 GHz Mkr1 2.479 979 00 GHz -19.277 dBm Ref Offset 23.78 dB 10 dB/div Ref 10.00 dBm Center 2.480000 GHz #Res BW 3.0 kHz #VBW 10 kHz Span 1.500 MHz Sweep 158.4 ms (8001 pts)

Appendix F) Antenna Requirement

15.203 requirement:

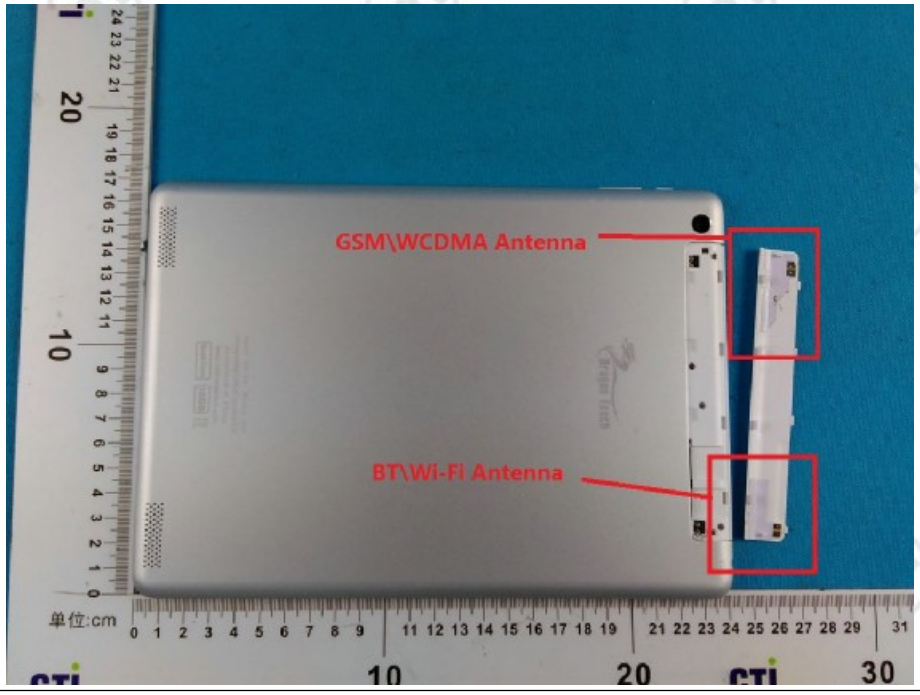
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:	

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -1.45dBi.



Appendix G) AC Power Line Conducted Emission

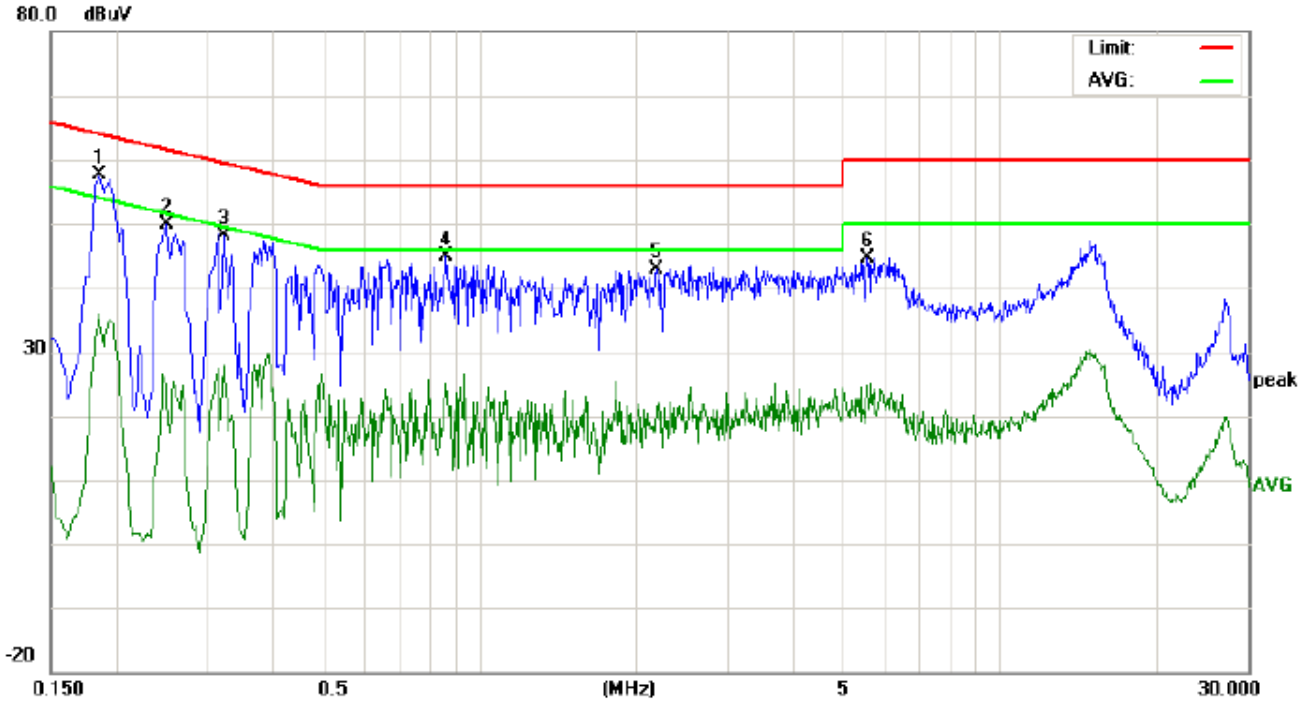
<table>
<tr><td>Test Procedure:</td><td>Test frequency range :150KHz-30MHz
1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) 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 on conducted measurement.</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr>
<tr><th>Quasi-peak</th><th>Average</th></tr>
<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>
</table>
* The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.
NOTE : The lower limit is applicable at the transition frequency</td></tr>
</table>

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

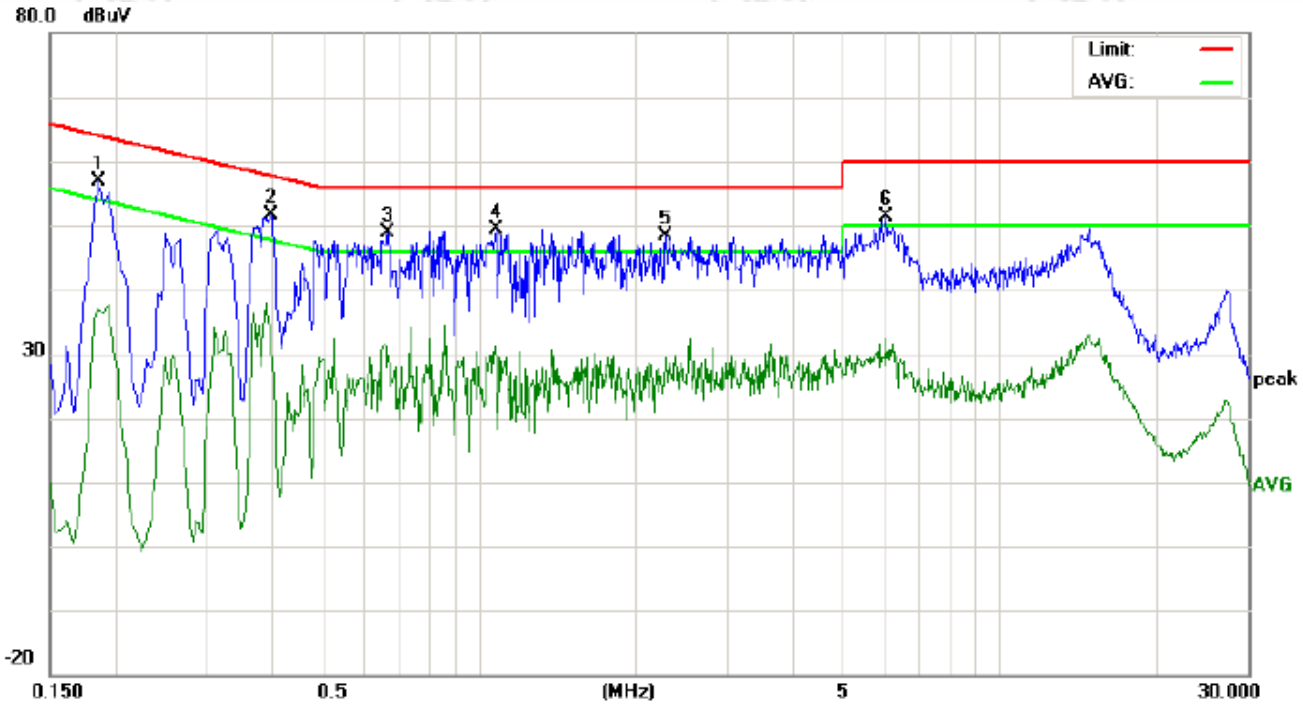
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Live line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1860	47.80	43.05	21.10	9.80	57.60	52.85	30.90	64.21	54.21	-11.36	-23.31	P	
2	0.2500	40.00		15.17	9.80	49.80		24.97	61.75	51.75	-11.95	-26.78	P	
3	0.3220	38.34		18.05	9.82	48.16		27.87	59.65	49.65	-11.49	-21.78	P	
4	0.8660	35.03		15.09	9.97	45.00		25.06	56.00	46.00	-11.00	-20.94	P	
5	2.1940	32.95		11.68	10.00	42.95		21.68	56.00	46.00	-13.05	-24.32	P	
6	5.5700	34.65		14.92	10.00	44.65		24.92	60.00	50.00	-15.35	-25.08	P	

Neutral line:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	0.1860	47.20	41.35	23.78	9.80	57.00	51.15	33.58	64.21	54.21	-13.06	-20.63	P	
2	0.3980	41.73	38.91	22.41	9.90	51.63	48.81	32.31	57.89	47.89	-9.08	-15.58	P	
3	0.6700	38.98	35.34	17.79	9.90	48.88	45.24	27.69	56.00	46.00	-10.76	-18.31	P	
4	1.0820	39.34	34.26	11.27	10.00	49.34	44.26	21.27	56.00	46.00	-11.74	-24.73	P	
5	2.2860	38.25	33.02	15.44	10.00	48.25	43.02	25.44	56.00	46.00	-12.98	-20.56	P	
6	6.0820	41.28	33.71	17.15	10.00	51.28	43.71	27.15	60.00	50.00	-16.29	-22.85	P	

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

3.Pretest the Voltage at 120V AC and 240V AC ,Find the worst Voltage is 120V AC,only show the worst data is the test report.

Appendix H) Restricted bands around fundamental frequency (Radiated)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. . Test the EUT in the lowest channel , the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

Frequency	Limit (dBμV/m @3m)	Remark
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

Test plot as follows:

Frequency (MHz)	Read Level (dBμV)	Level (dBμV/m)	Antenna Factor (dB/m)	Cable Loss (dB)	Premap Factor (dB)	Limit (dBμV/m)	Over Limit (dB)	Antenna Polaxis	Remark	Test channel
2390.00	44.14	43.74	32.53	4.28	37.21	74	-30.26	H	PK	Lowest
2390.00	45.32	44.92	32.53	4.28	37.21	74	-29.08	V	PK	Lowest
2483.50	45.26	45.29	32.71	4.51	37.19	74	-28.71	H	PK	Highest
2483.50	44.90	44.93	32.71	4.51	37.19	74	-29.07	V	PK	Highest

Remark:
1) Scan from the Restricted bands around fundamental frequency (Radiated) test data, The test data which are more than 20dB but below the Average limit not be reported.
2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading - Correct Factor
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

3)Pretest the Voltage at 120V AC and 240V AC ,Find the worst Voltage is 120V AC,only show the worst data is the test report.

Appendix I) Radiated Spurious Emissions

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Procedure:

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. 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.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit:

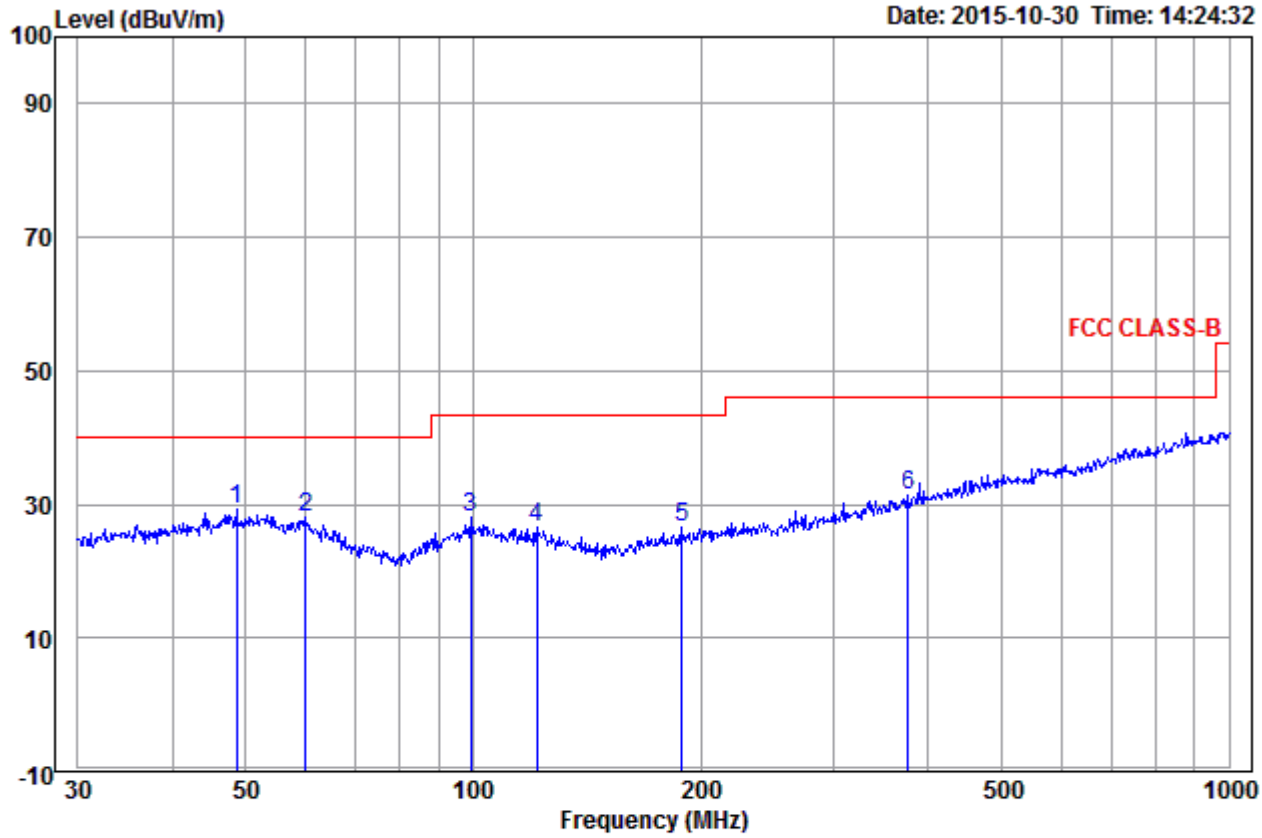
Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

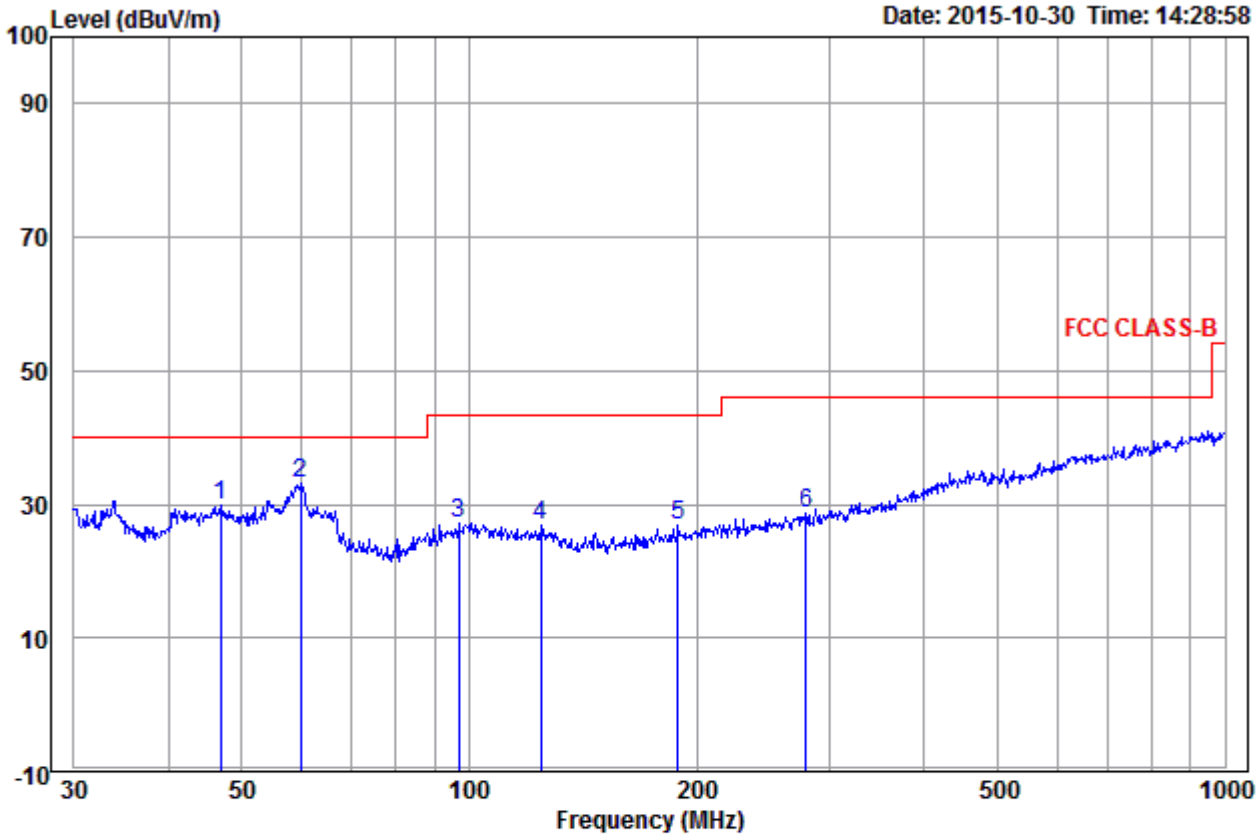
Radiated Spurious Emissions test Data:

Radiated Emission below 1GHz

30MHz~1GHz (QP)



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1 pp	48.67	14.99	1.30	12.97	29.26	40.00	-10.74	Horizontal	
2	60.07	13.77	1.43	12.92	28.12	40.00	-11.88	Horizontal	
3	99.18	13.04	1.57	13.31	27.92	43.50	-15.58	Horizontal	
4	121.55	11.52	1.57	13.44	26.53	43.50	-16.97	Horizontal	
5	189.07	11.23	2.09	13.27	26.59	43.50	-16.91	Horizontal	
6	375.94	15.60	2.76	13.11	31.47	46.00	-14.53	Horizontal	



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	46.83	14.84	1.14	13.98	29.96	40.00	-10.04	Vertical	
2 pp	59.86	13.82	1.43	17.84	33.09	40.00	-6.91	Vertical	
3	96.77	12.58	1.58	13.02	27.18	43.50	-16.32	Vertical	
4	124.57	11.30	1.58	13.96	26.84	43.50	-16.66	Vertical	
5	189.07	11.23	2.09	13.57	26.89	43.50	-16.61	Vertical	
6	279.04	13.06	2.37	13.30	28.73	46.00	-17.27	Vertical	

Transmitter Emission above 1GHz

Test Frequency:	2402MHz

Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Cable Loss (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Antenna Polaxis
1257.465	30.36	38.37	2.58	47.12	41.69	74	-32.31	H
1663.803	31.17	37.72	2.97	46.92	43.34	74	-30.66	H
3299.775	33.34	37.03	5.56	47.11	48.98	74	-25.02	H
4804.000	34.69	36.82	5.11	42.73	45.71	74	-28.29	H
7206.000	36.42	37.46	6.66	42.75	48.37	74	-25.63	H
9608.000	37.88	37.82	7.73	44.66	52.45	74	-21.55	H
1364.182	30.60	38.18	2.69	46.32	41.43	74	-32.57	V
1668.044	31.18	37.72	2.98	47.40	43.84	74	-30.16	V
3291.385	33.34	37.04	5.56	46.71	48.57	74	-25.43	V
4804.000	34.69	36.82	5.11	42.20	45.18	74	-28.82	V
7206.000	36.42	37.46	6.66	42.89	48.51	74	-25.49	V
9608.000	37.88	37.82	7.73	44.14	51.93	74	-22.07	V

Test Frequency:	2440MHz

Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Cable Loss (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Antenna Polaxis
1518.111	30.90	37.94	2.84	46.87	42.67	74	-31.33	H
1759.638	31.33	37.60	3.05	46.49	43.27	74	-30.73	H
3266.346	33.36	37.04	5.57	46.43	48.32	74	-25.68	H
4880.000	34.85	36.81	5.08	43.21	46.33	74	-27.67	H
7320.000	36.43	37.43	6.77	43.12	48.89	74	-25.11	H
9760.000	38.05	37.85	7.60	44.06	51.86	74	-22.14	H
1257.465	30.36	38.37	2.58	47.52	42.09	74	-31.91	V
1668.044	31.18	37.72	2.98	46.78	43.22	74	-30.78	V
3241.498	33.38	37.05	5.57	46.48	48.38	74	-25.62	V
4880.000	34.85	36.81	5.08	41.46	44.58	74	-29.42	V
7320.000	36.43	37.43	6.77	44.09	49.86	74	-24.14	V
9760.000	38.05	37.85	7.60	44.71	52.51	74	-21.49	V

Test Frequency:	2480MHz

Frequency (MHz)	Antenna Factor (dB/m)	Preamp Gain (dB)	Cable Loss (dB)	Read Level (dBμV)	Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Antenna Polaxis
1118.517	30.02	38.64	2.42	47.60	41.40	74	-32.60	H
1668.044	31.18	37.72	2.98	46.54	42.98	74	-31.02	H
3216.838	33.41	37.05	5.58	46.34	48.28	74	-25.72	H
4960.000	35.02	36.80	5.05	42.57	45.84	74	-28.16	H
7440.000	36.45	37.41	6.88	43.83	49.75	74	-24.25	H
9920.000	38.22	37.88	7.47	45.22	53.03	74	-20.97	H
1663.803	31.17	37.72	2.97	46.59	43.01	74	-30.99	V
2086.856	31.90	37.28	3.48	45.25	43.35	74	-30.65	V
3283.018	33.35	37.04	5.56	46.12	47.99	74	-26.01	V
4960.000	35.02	36.80	5.05	41.52	44.79	74	-29.21	V
7440.000	36.45	37.41	6.88	43.86	49.78	74	-24.22	V
9920.000	38.22	37.88	7.47	45.48	53.29	74	-20.71	V

Note:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading - Correct Factor

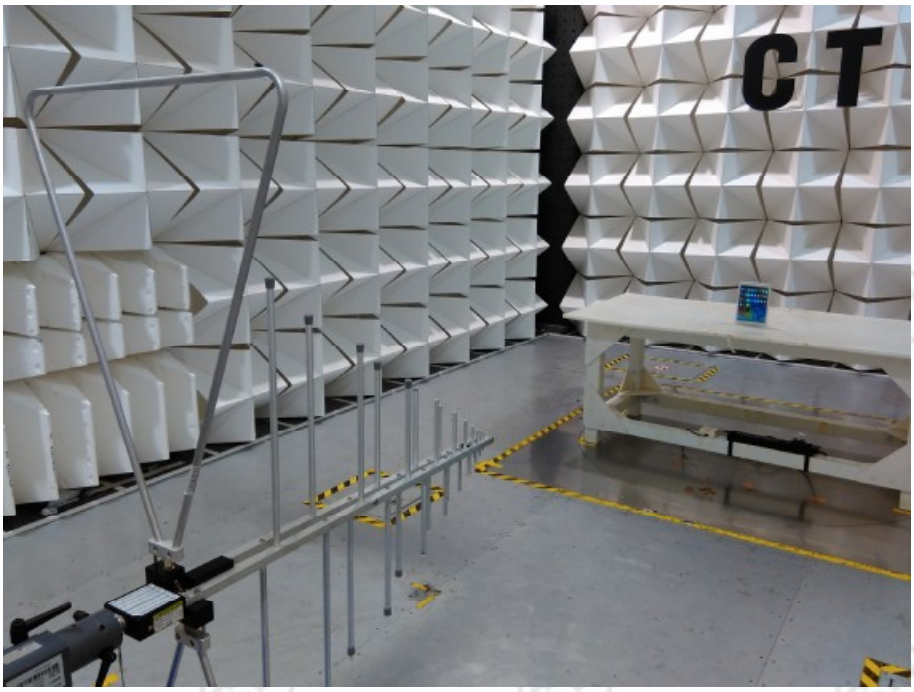
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

2) Scan from 9kHz to 25GHz, the disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

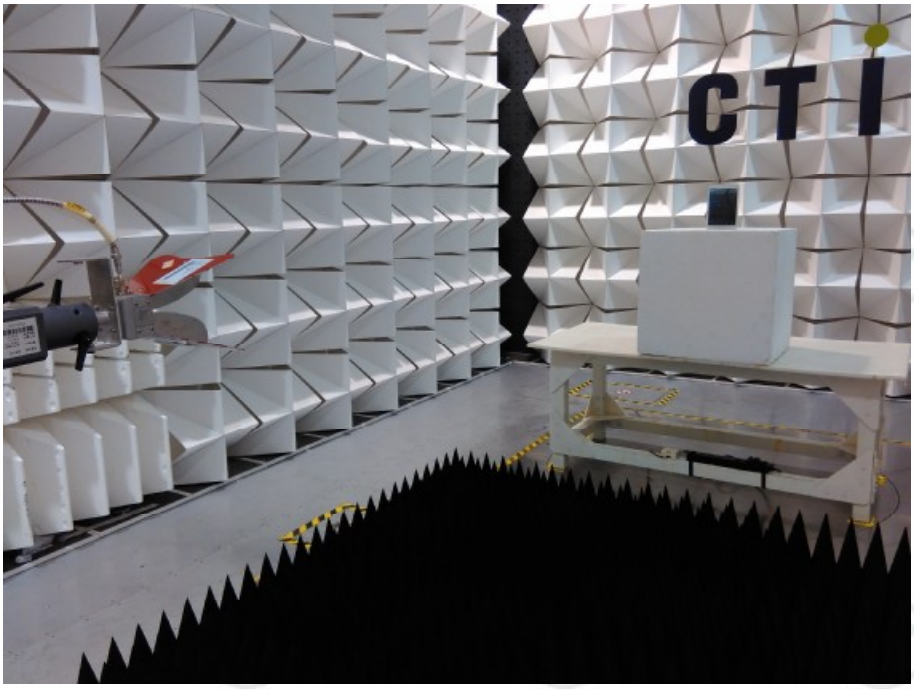
3)Pretest the Voltage at 120V AC and 240V AC ,Find the worst Voltage is 120V AC,only show the worst data is the test report.

PHOTOGRAPHS OF TEST SETUP

Test mode No.: E97



Radiated spurious emission Test Setup-1(Below 1GHz)



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

Conducted emission Test Setup

PHOTOGRAPHS OF EUT Constructional Details

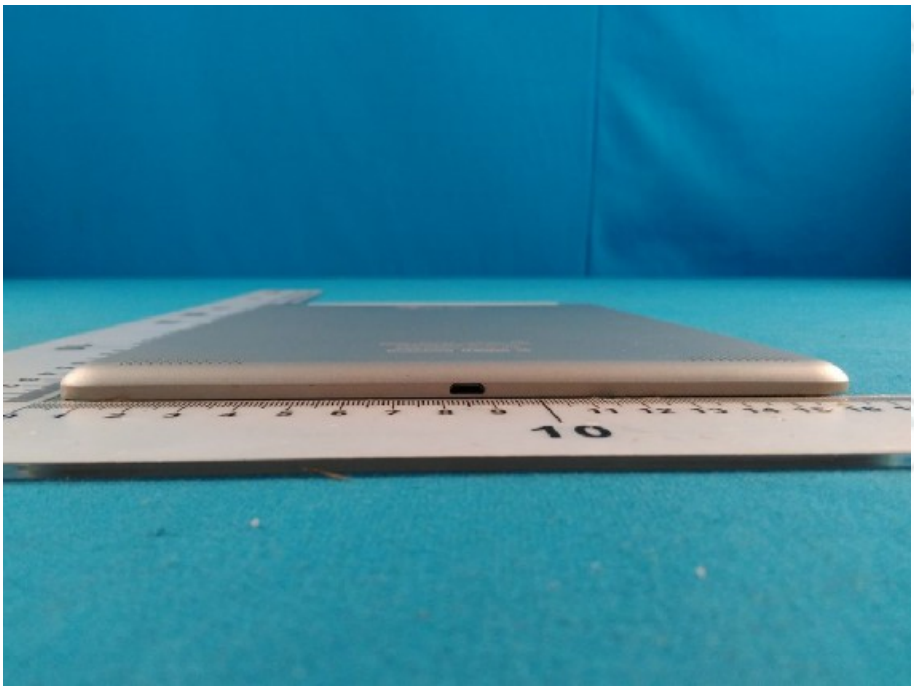
Test mode No.: E97

View of product-1

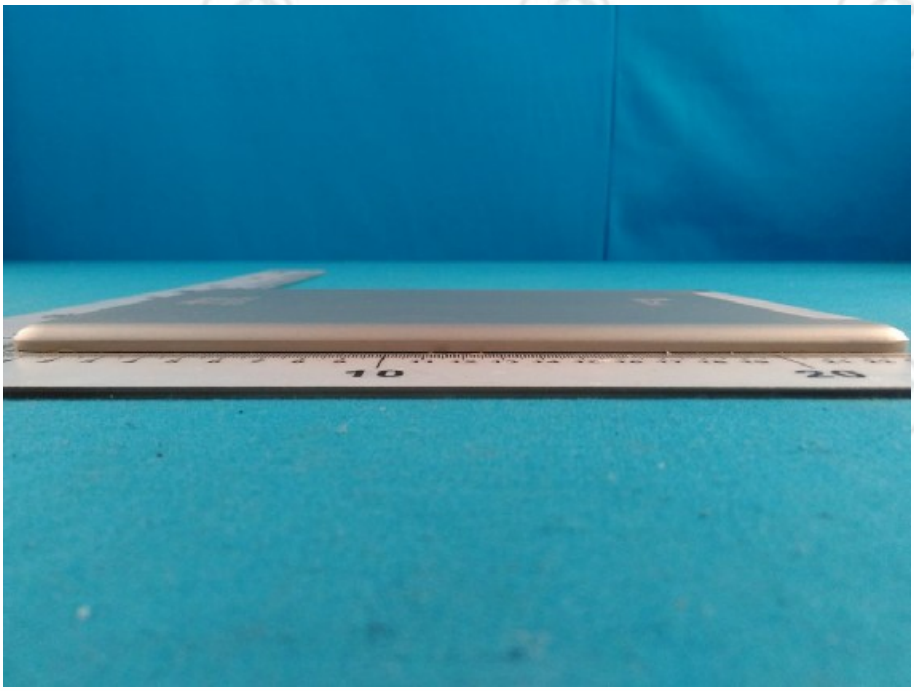
View of product-2

View of product-3

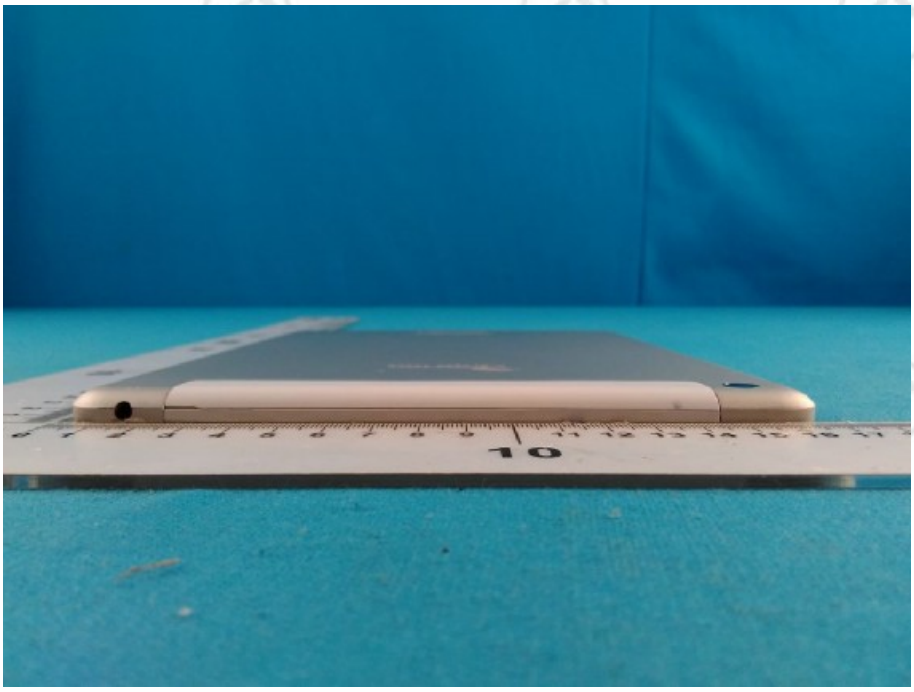
View of product-4



View of product-5



View of product-6

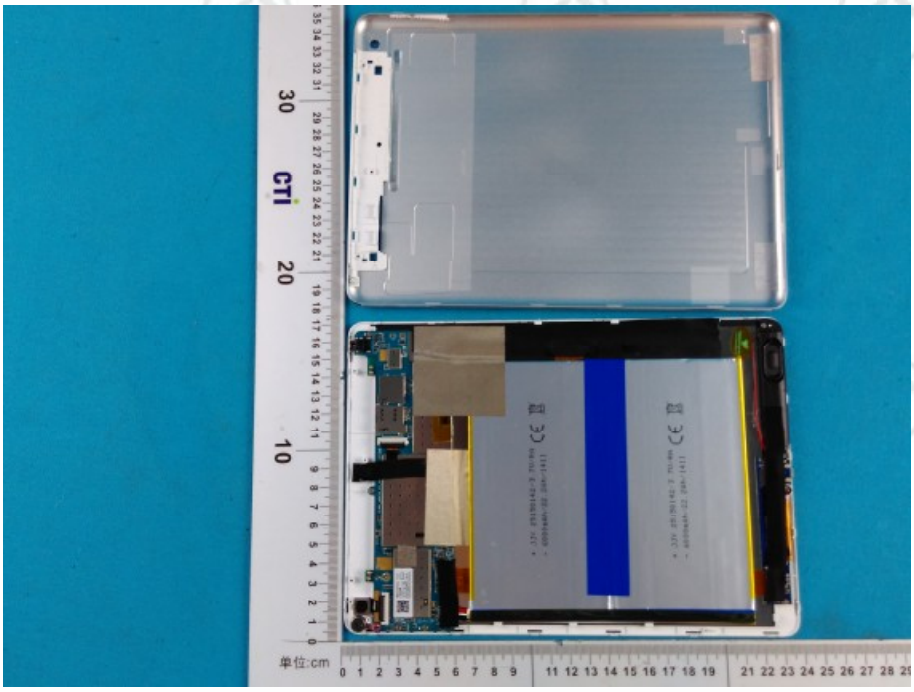


View of product-7

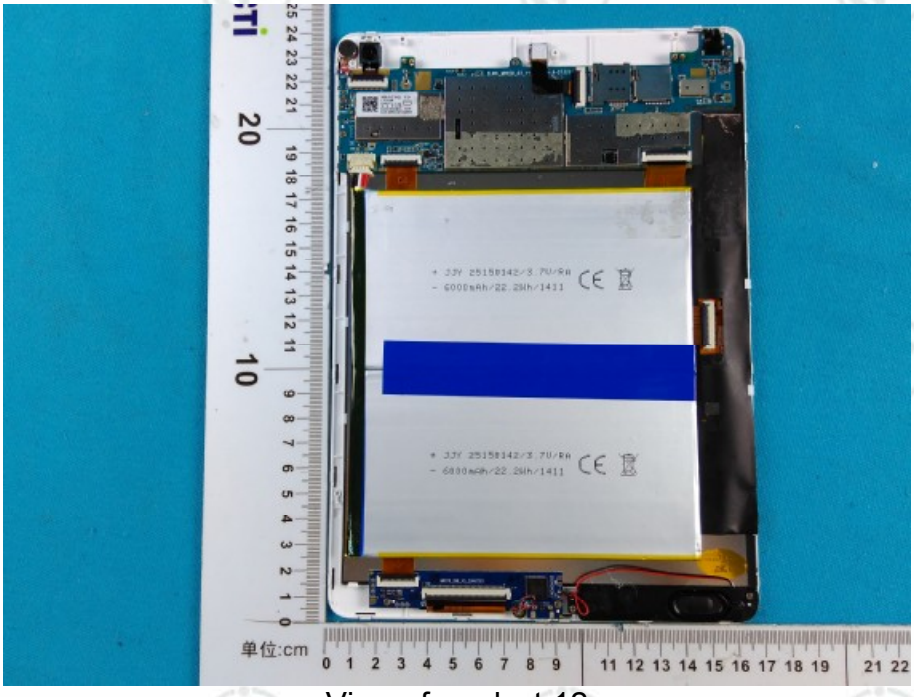
View of product-8

View of product-9

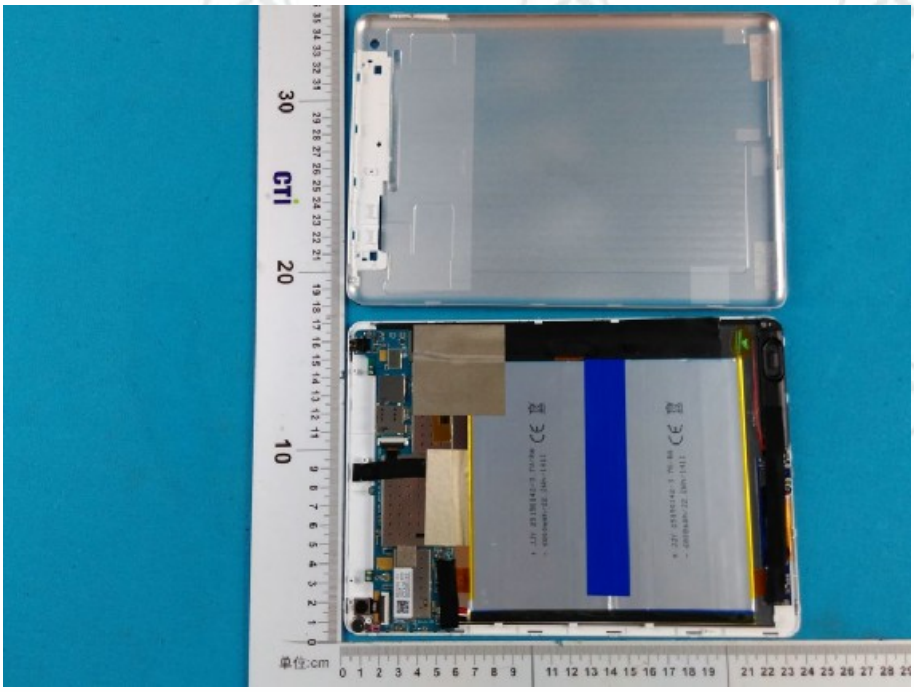
View of product-10



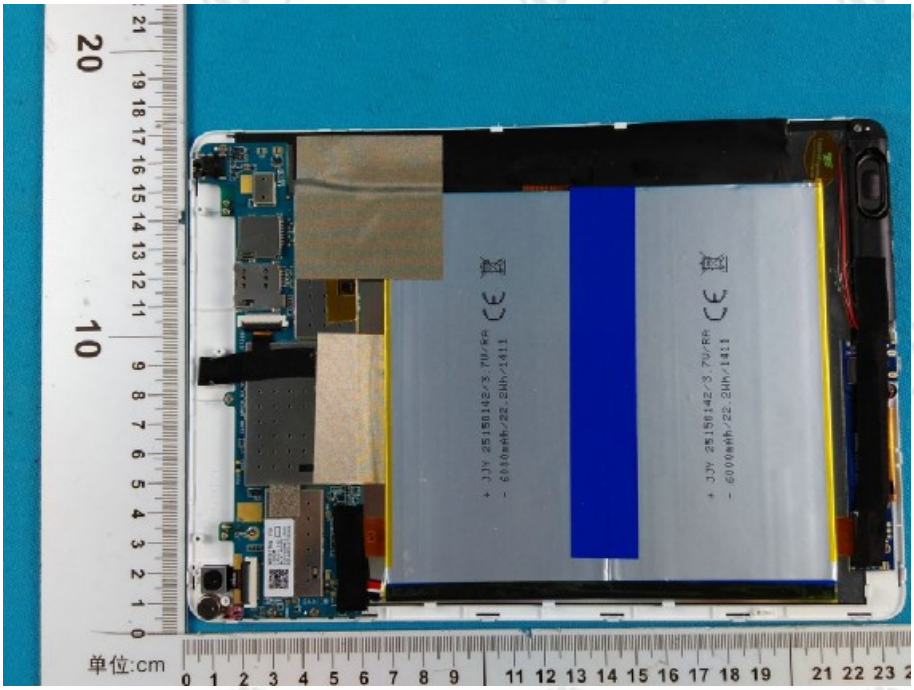
View of product-11



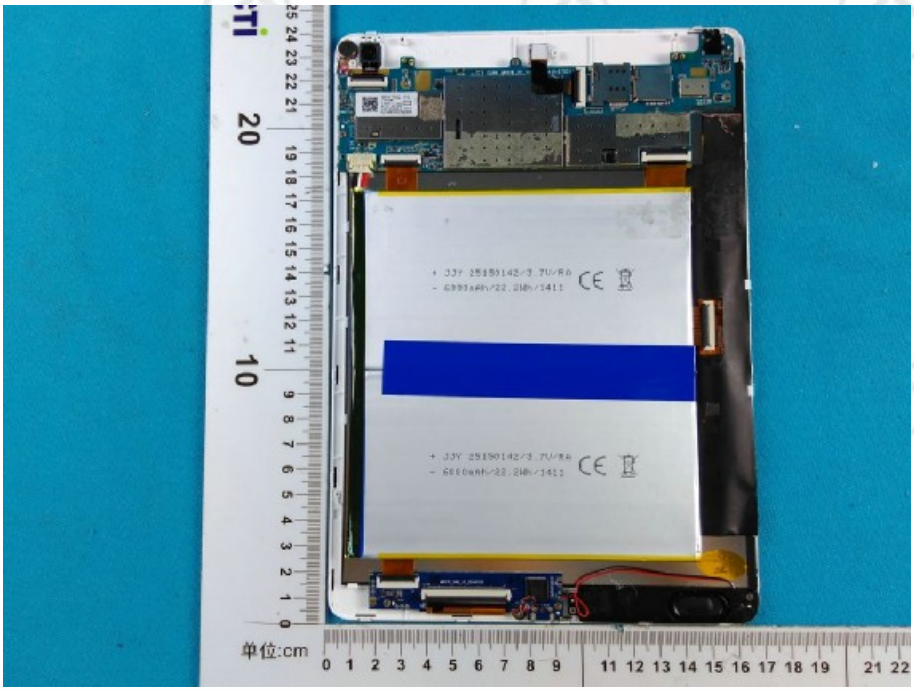
View of product-12



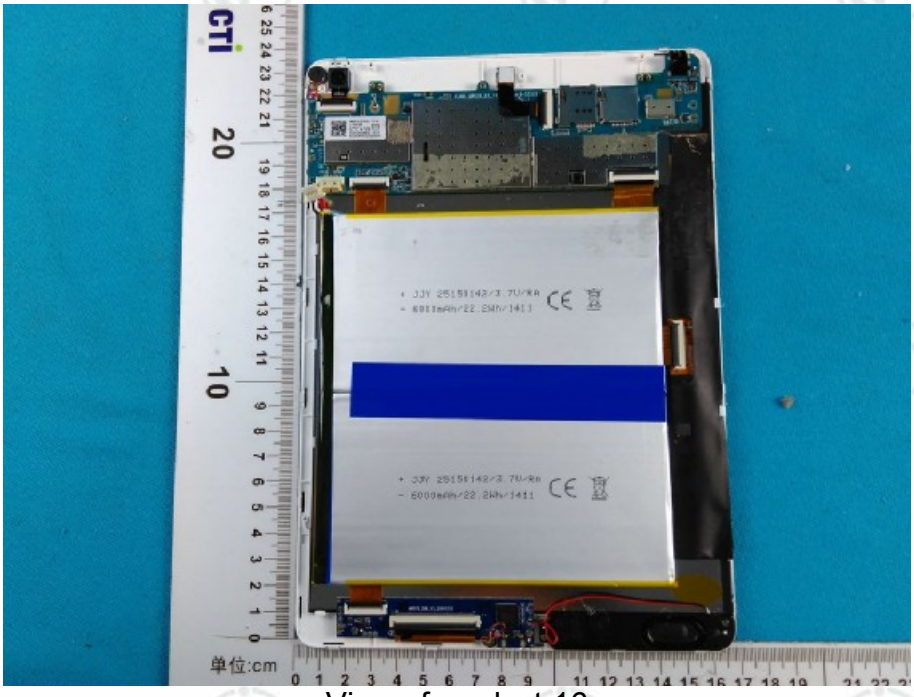
View of product-13



View of product-14

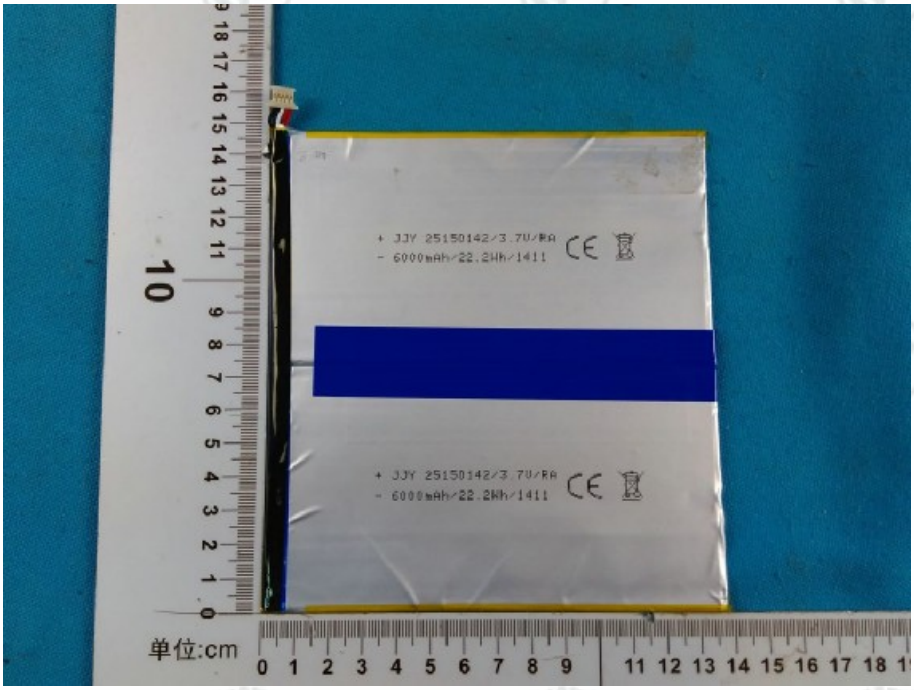


View of product-15

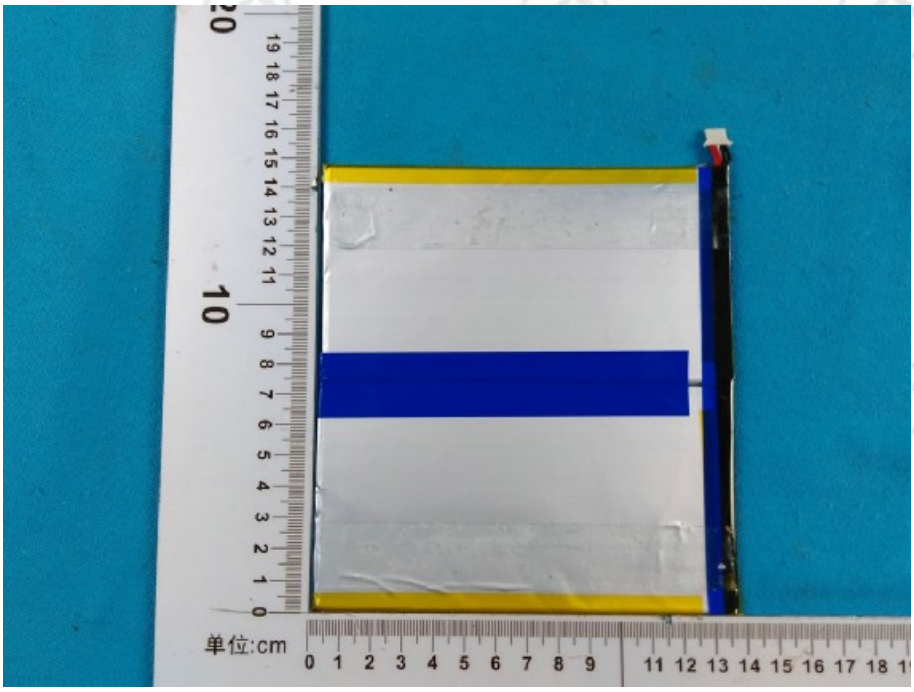


View of product-16

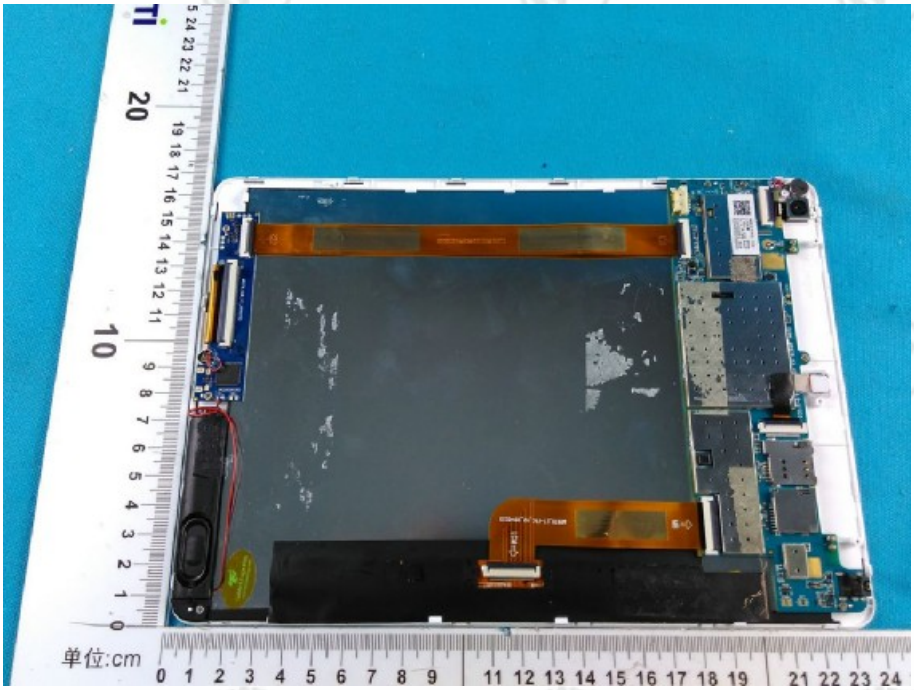
View of product-17



View of product-18

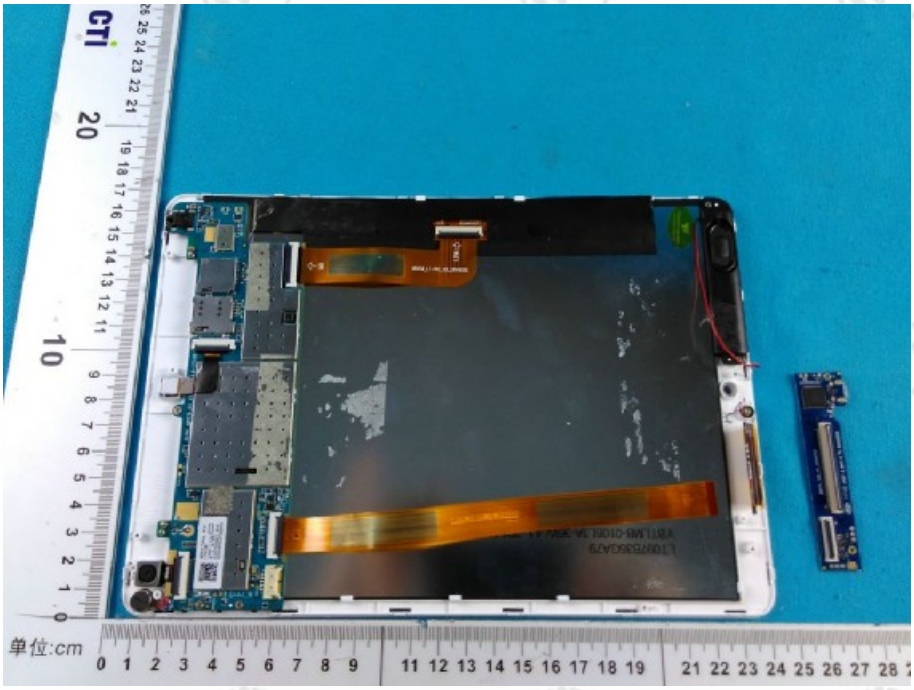


View of product-19

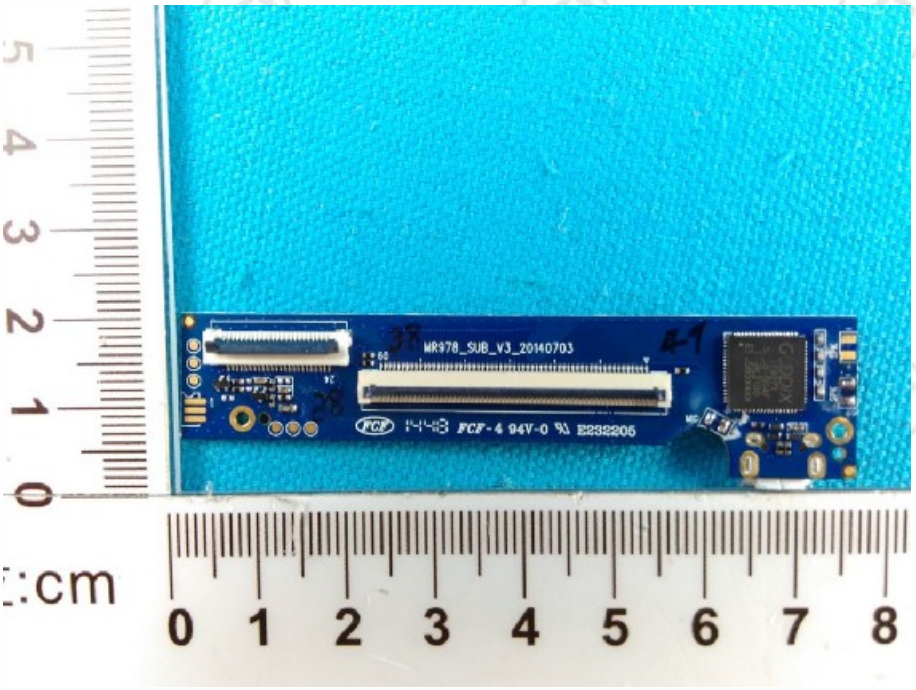


View of product-20

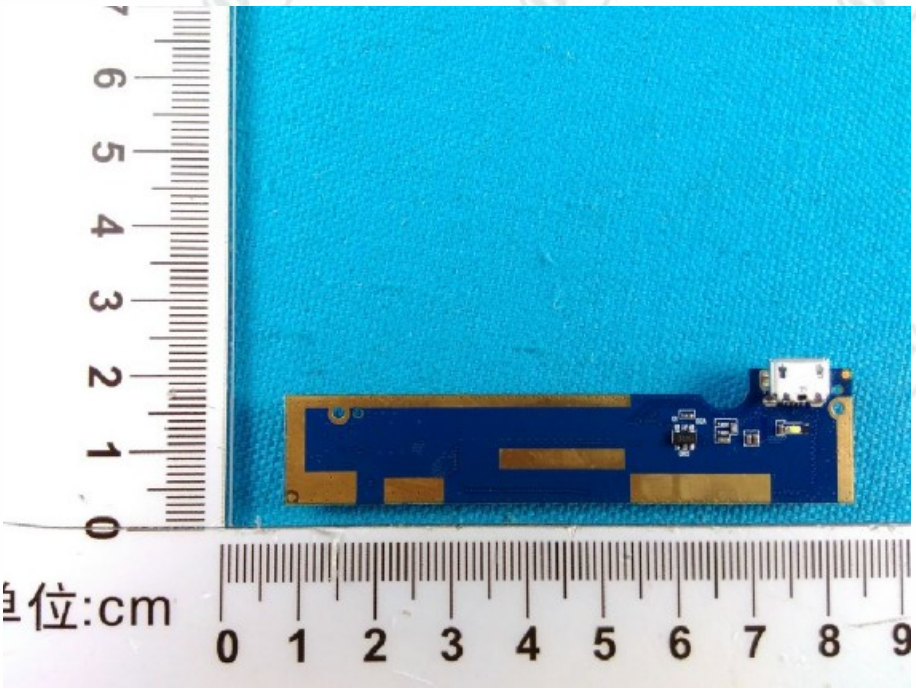
View of product-21



View of product-22

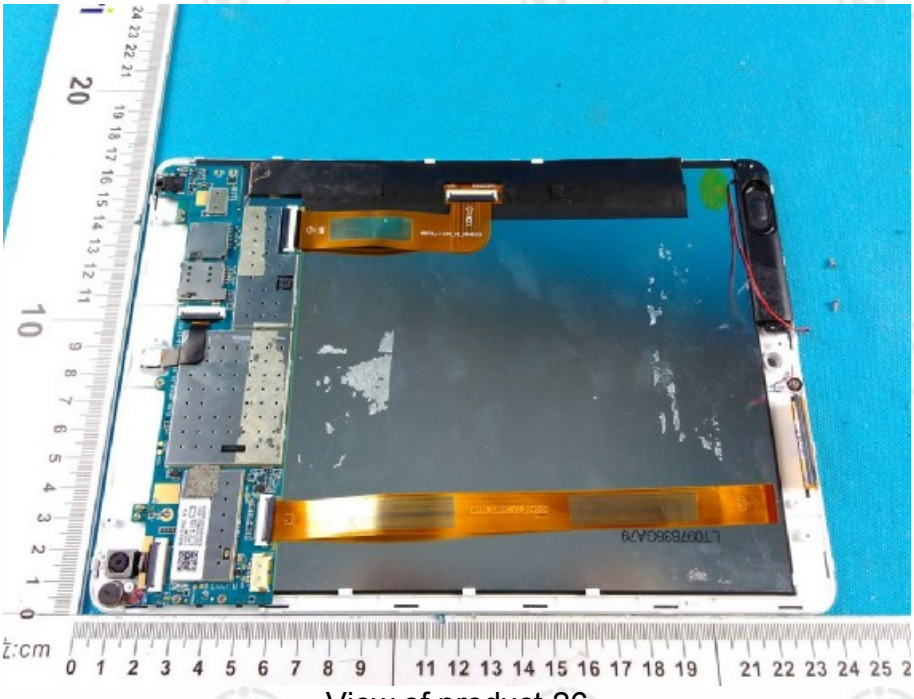


View of product-23

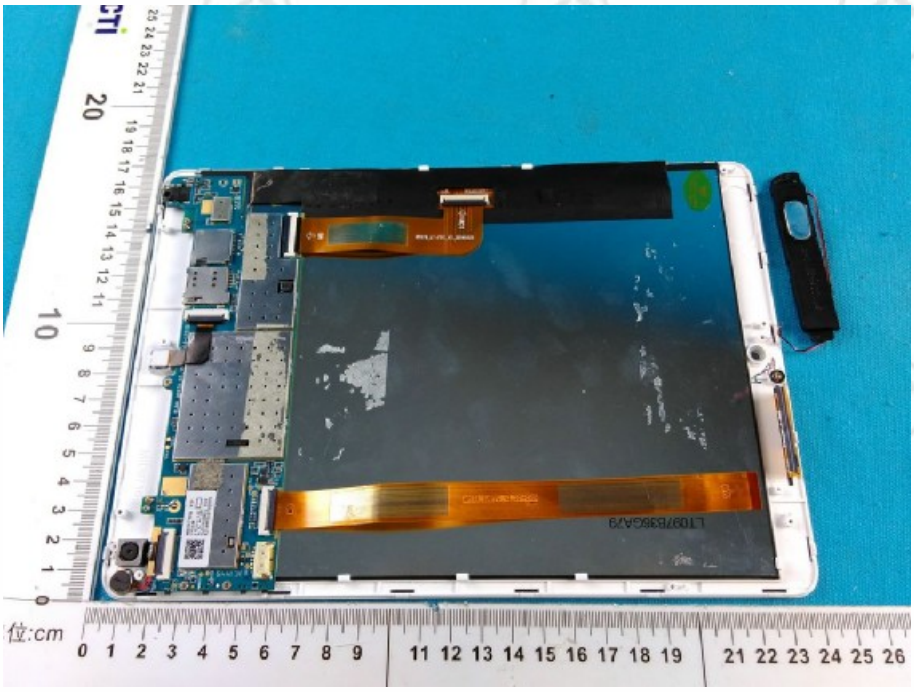


View of product-24

View of product-25

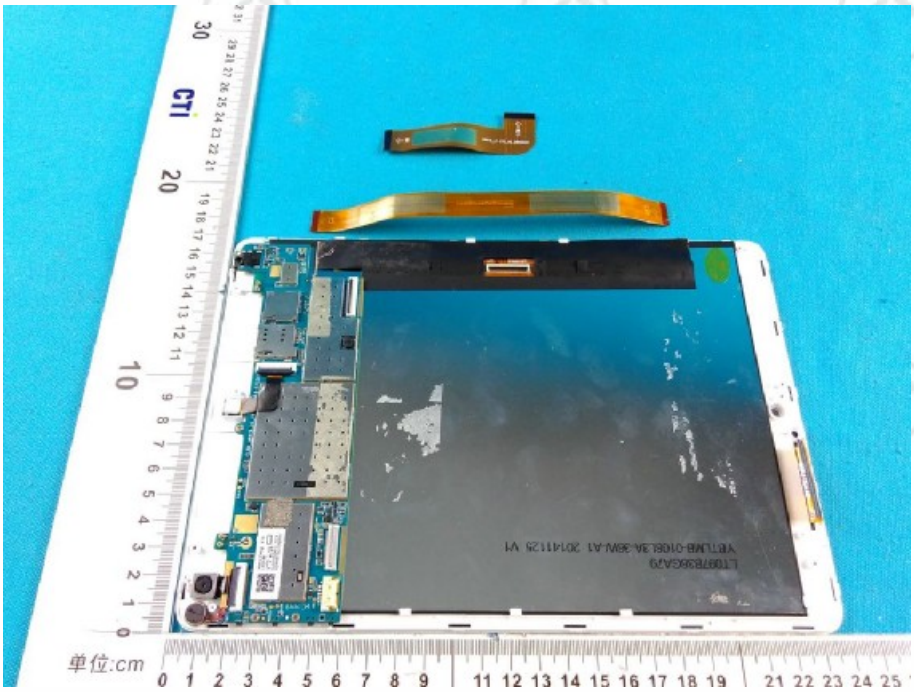


View of product-26



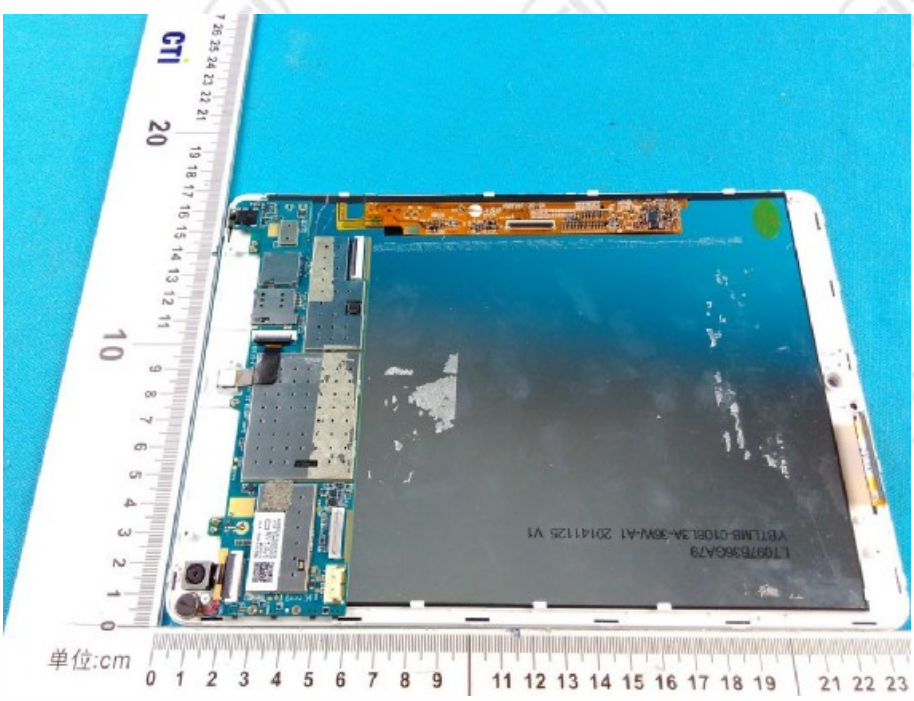
View of product-27

View of product-28



View of product-29

View of product-30



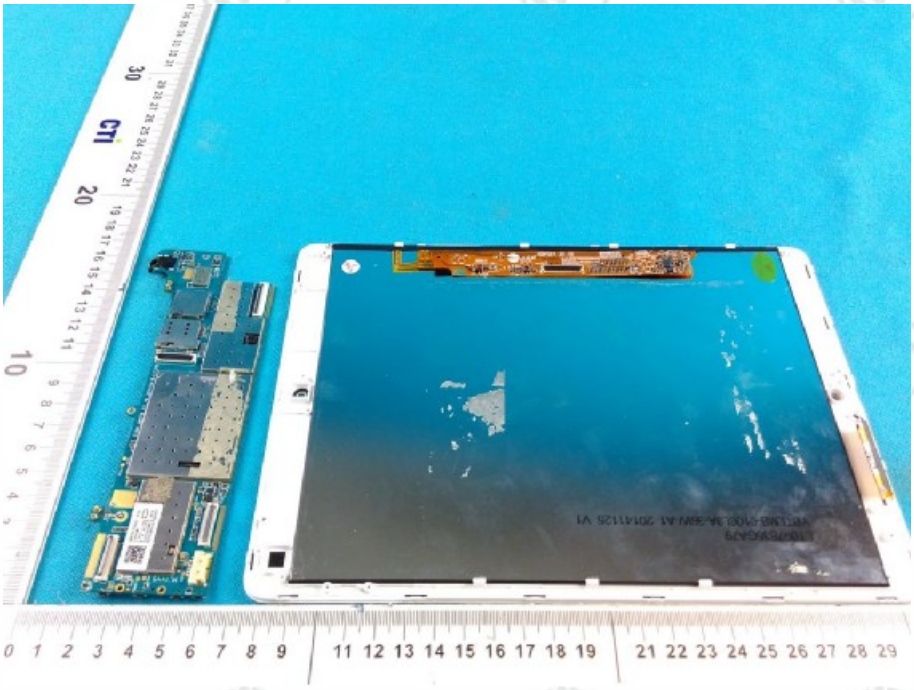
View of product-31

View of product-32

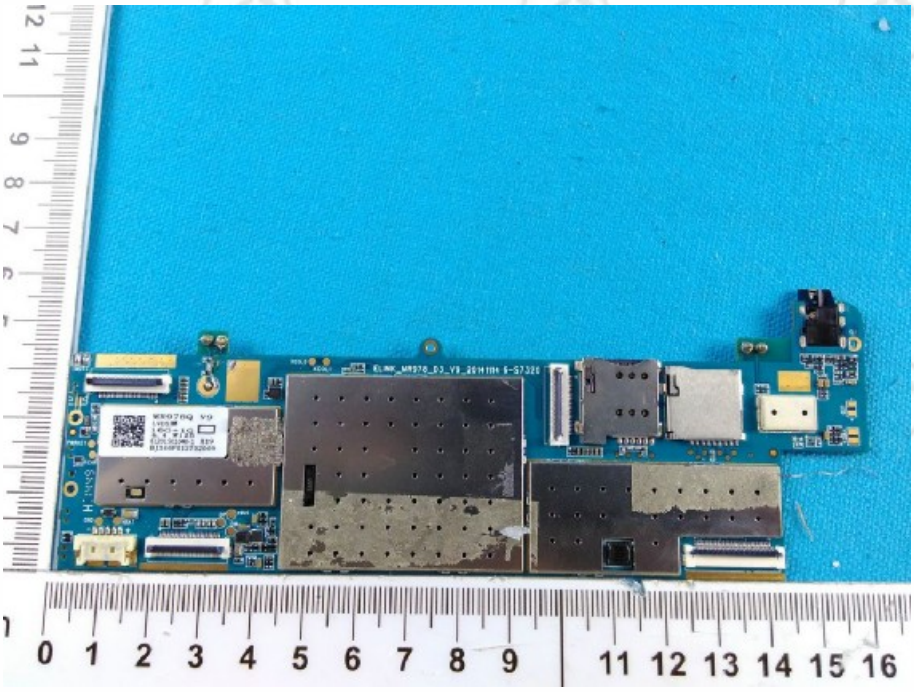
View of product-33

View of product-34

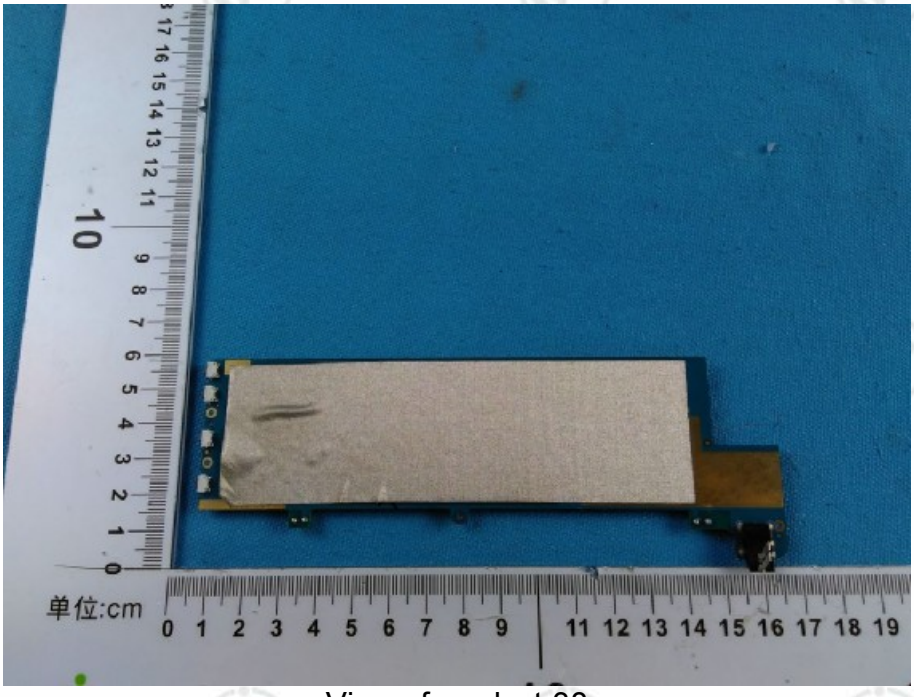
View of product-35



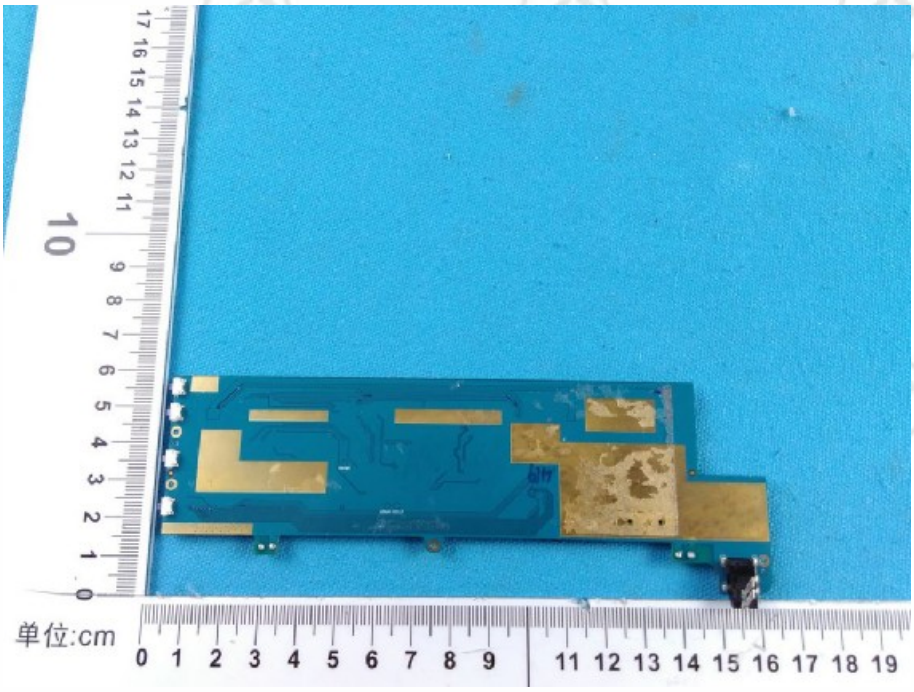
View of product-36



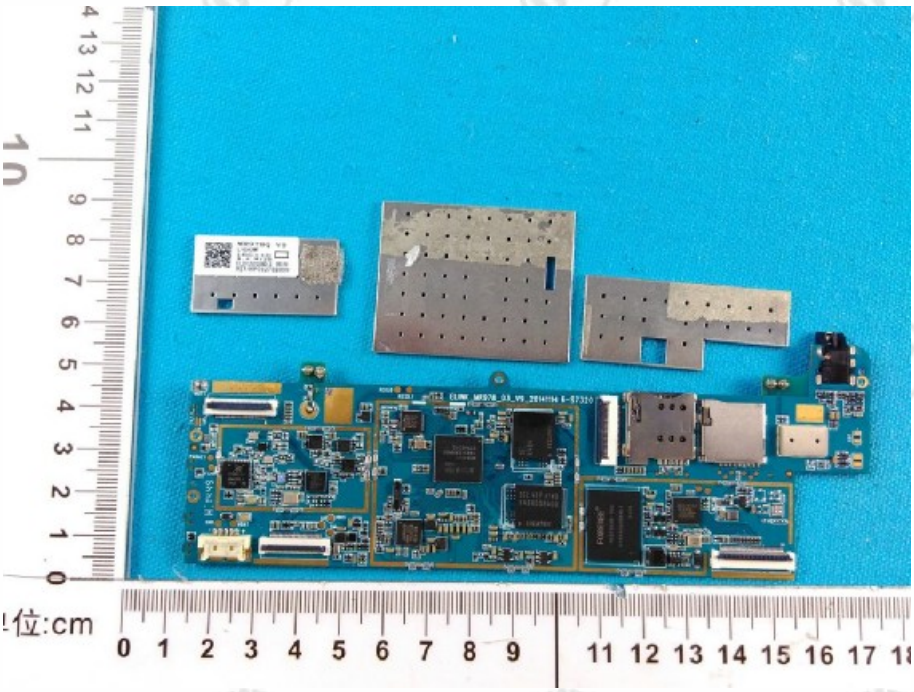
View of product-37



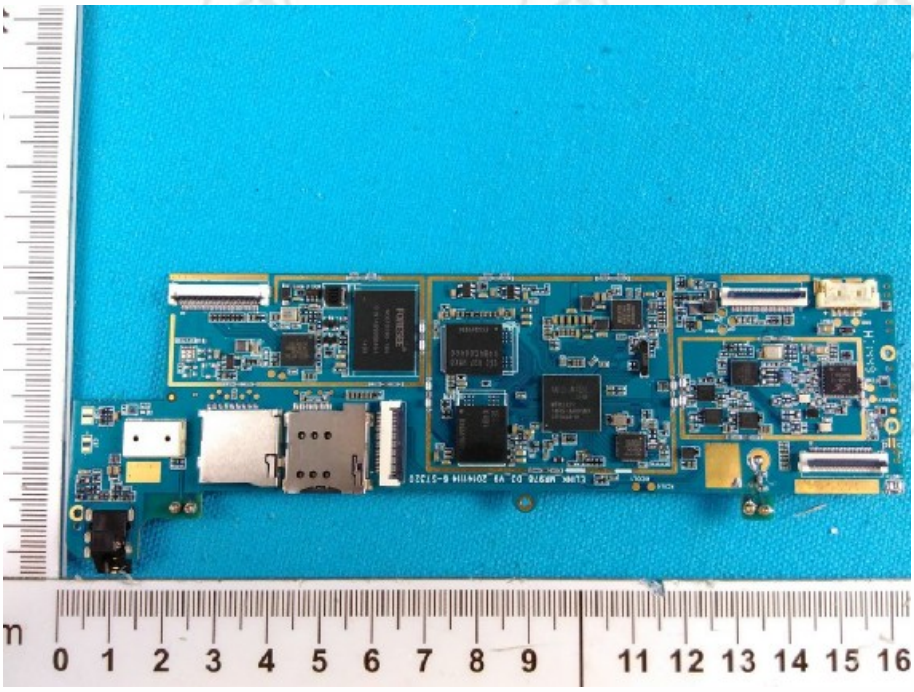
View of product-38



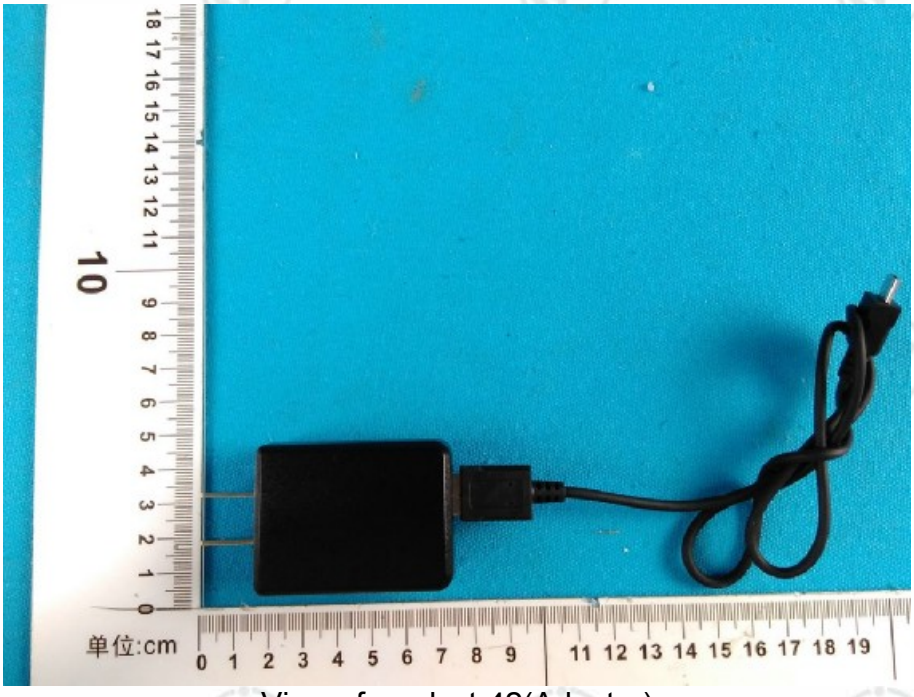
View of product-39



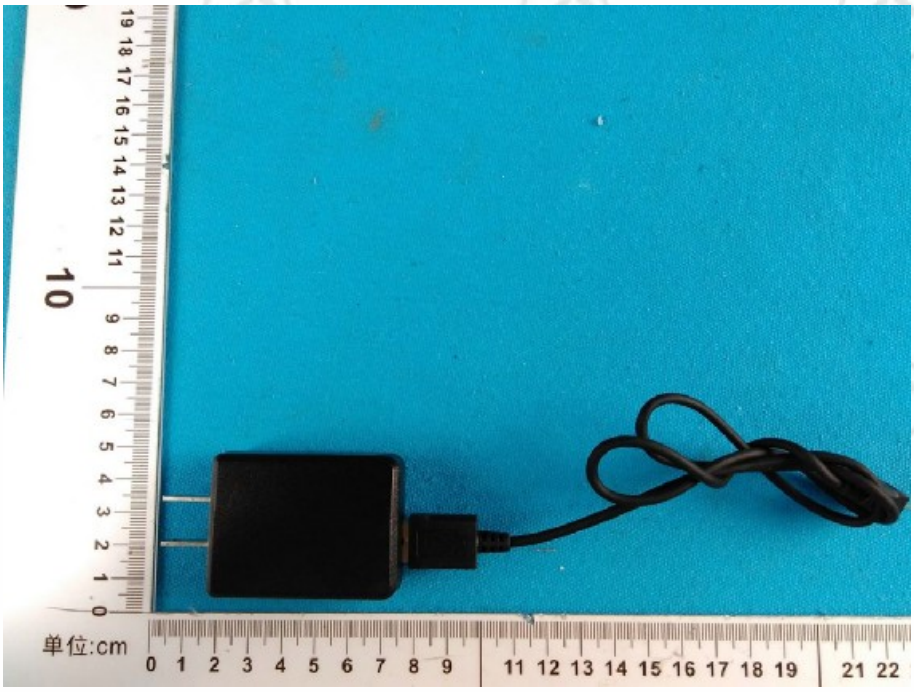
View of product-40



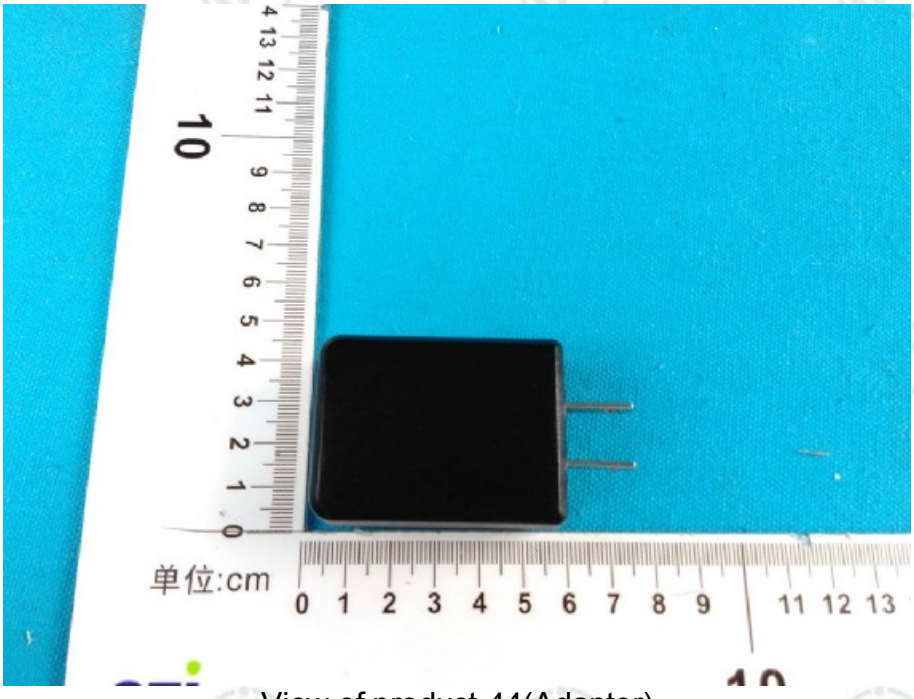
View of product-41



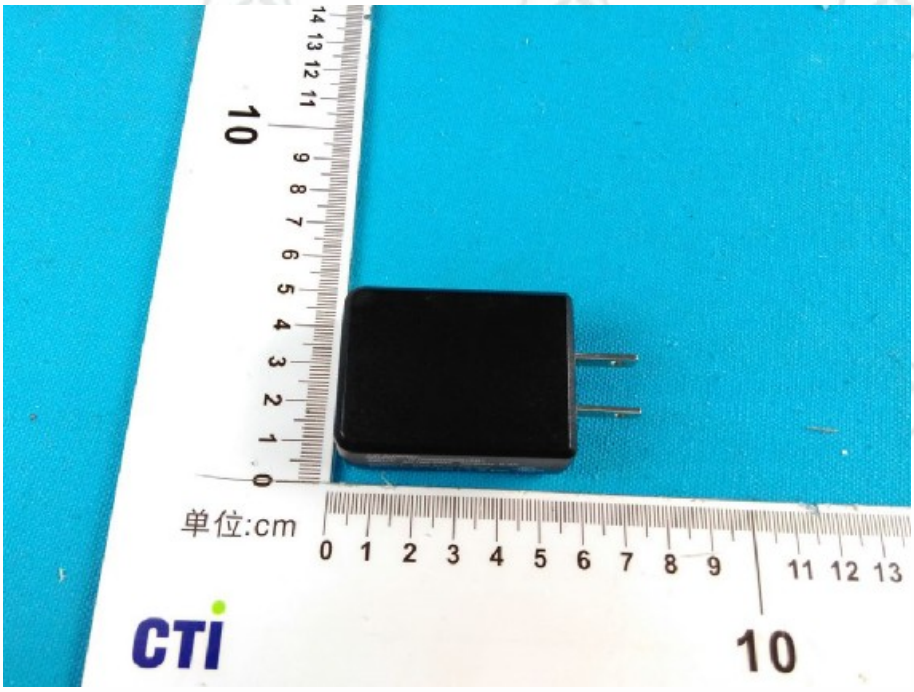
View of product-42(Adapter)



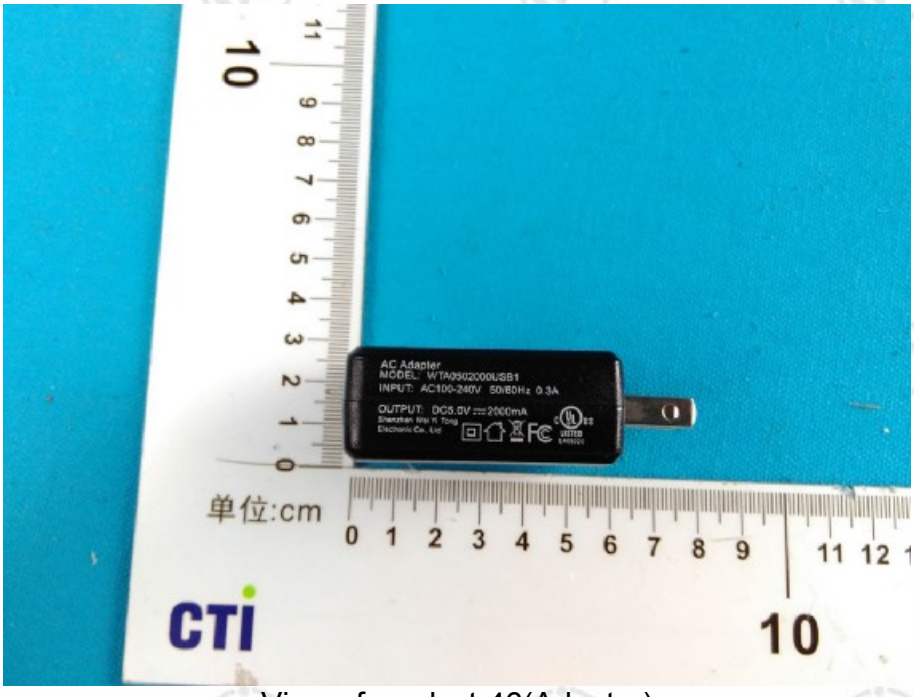
View of product-43(Adapter)



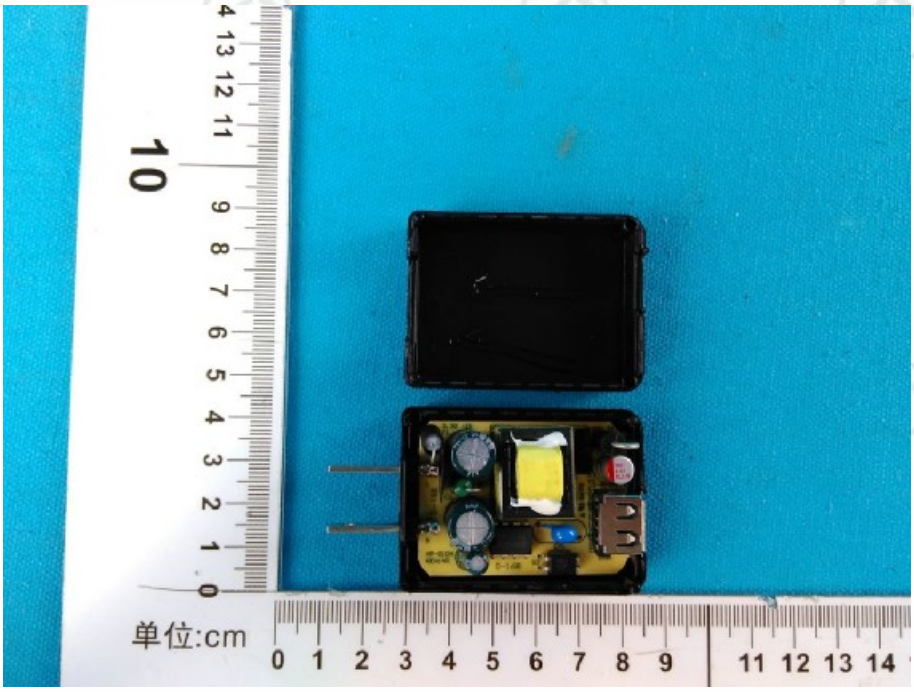
View of product-44(Adapter)



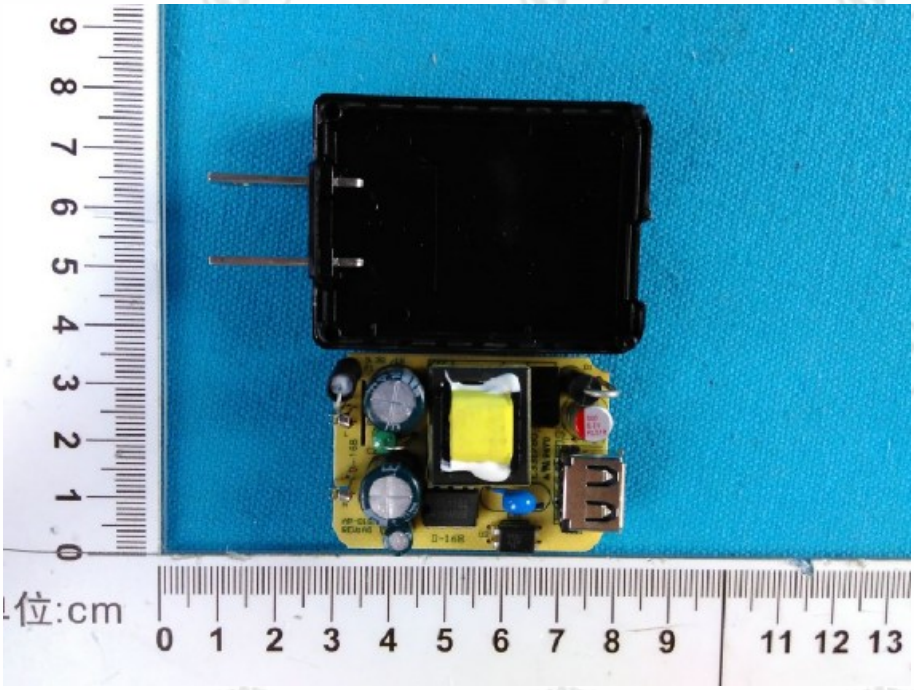
View of product-45(Adapter)



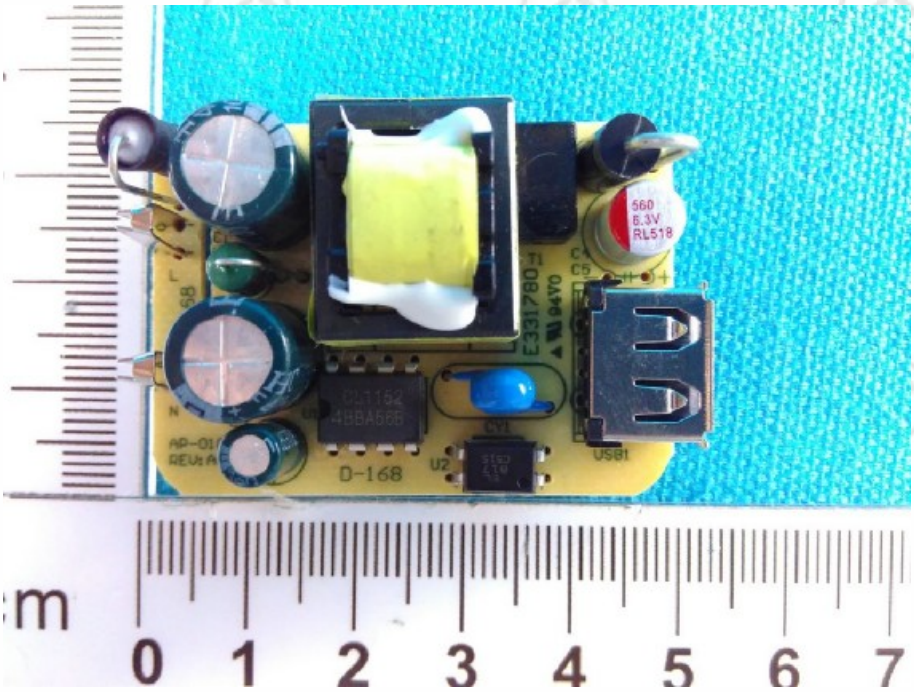
View of product-46(Adapter)



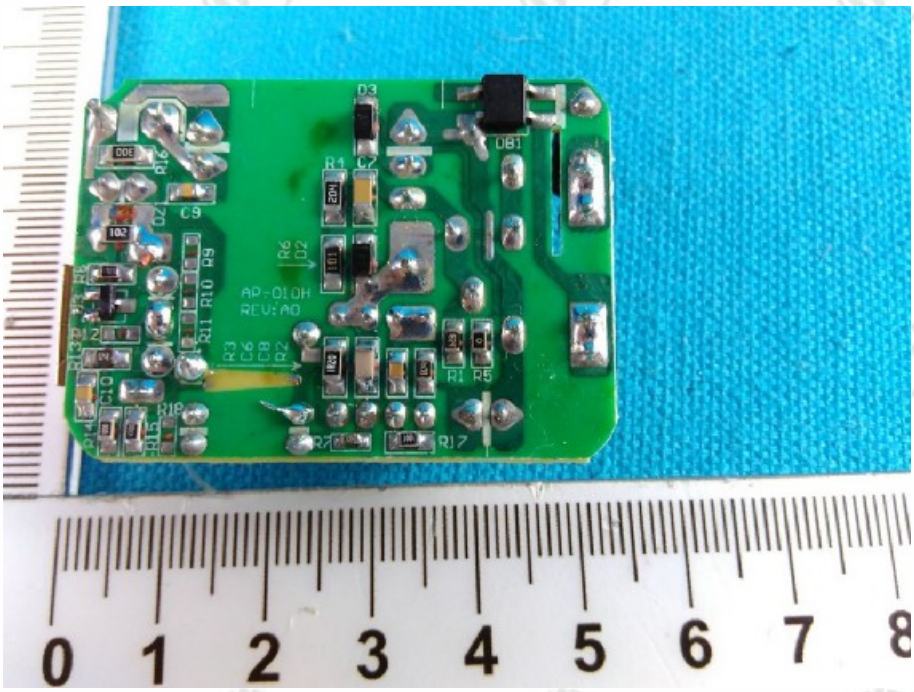
View of product-47(Adapter)



View of product-48(Adapter)



View of product-49(Adapter)



View of product-50(Adapter)

*** End of Report ***