

**ISSUED BY** Shenzhen BALUN Technology Co., Ltd.



**FOR** 

## Ultrathin Backlit keyboard for iPad

**ISSUED TO** Shenzhen Huichuangda Technology Co., Ltd

Buliding 2, Tongfuyu Industrial Zone, Aigun Shiyan Street, Baoan District, Shenzhen





EUT Type: Brand Name: Test conclusion: PASS Test Date: Date of Issue:

Report No.:

BL-SZ1440086-401 Ultrathin Backlit keyboard for iPad Model Name: HCD-008, HCD-006 N/A Test Standard: 47 CFR Part 15 Subpart B FCC ID: 2ACDJ-HCD008 May 10, 2014 ~ Jun 16, 2014 Jun 16, 2014

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## **Revision History**

VersionIssue DateRevisionsRev. 01Jun 12, 2014Initial IssueRev. 02Jun 16, 2014The Second Issue

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## 1 GENERAL INFORMATION

# 1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.	
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road,	
Address	Nanshan District, Shenzhen, Guangdong Province, P. R. China	
Phone Number	+86 755 6683 3402	
Fax Number	+86 755 6182 4271	

# 1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.	
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road,	
Address	Nanshan District, Shenzhen, Guangdong Province, P. R. China	
	The laboratory has been listed by Industry Canada to perform	
	electromagnetic emission measurements. The recognition numbers of	
	test site are 11524A-1.	
	The laboratory has been listed by US Federal Communications	
	Commission to perform electromagnetic emission measurements. The	
	recognition numbers of test site are 832625.	
Accreditation Certificate	The laboratory has met the requirements of the IAS Accreditation Criteria	
	for Testing Laboratories (AC89), has demonstrated compliance with	
	ISO/IEC Standard 17025:2005. The accreditation certificate number is	
	TL-588.	
	The laboratory is a testing organization accredited by China National	
	Accreditation Service for Conformity Assessment (CNAS) according to	
	ISO/IEC 17025. The accreditation certificate number is L6791.	
	All measurement facilities used to collect the measurement data are	
Description	located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi	
Description	Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China	
	518055	

## 1.3 Test Environment Condition

Ambient Temperature	15 to 35°C
Ambient Relative Humidity	30 to 60%
Ambient Pressure	86 to 106kPa



### 1.4 Announce

- (1) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (2) The test report is invalid if there is any evidence and/or falsification.
- (3) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (4) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.



## **2 PRODUCT INFORMATION**

# 2.1 Applicant

Applicant	Shenzhen Huichuangda Technology Co., Ltd
Addroop	Buliding 2, Tongfuyu Industrial Zone, Aiqun Shiyan Street, Baoan District,
Address	Shenzhen

# 2.2 Manufacturer

Manufacturer Shenzhen Huichuangda Technology Co., Ltd	
Address	Buliding 2, Tongfuyu Industrial Zone, Aiqun Shiyan Street, Baoan District,
Address	Shenzhen

# 2.3 General Description for Equipment under Test (EUT)

EUT Type	Ultrathin Backlit keyboard for iPad	
Series Model Name	HCD-008, HCD-006	
	The equipment model HCD-008 and HCD-006 are Ultrathin Backlit	
Description of Model	keyboard for iPad, the electrical parameters and internal structure of RF	
name differentiation	module circuit are same. So, For the Radiated Emission test, the all	
	models are tested in this report.	
Hardware Version	V2.1	
Software Version	V3.0	
Network and Wireless	BT 3.0	
connectivity	B1 3.0	
About the Product	The equipment is Ultrathin Backlit keyboard for iPad, it contains BT	
About the Floudet	Module operating at 2.4GHz ISM band.	



# 2.4 Ancillary Equipment

	Battery		
	Brand Name	N/A	
	Model No	253080-001	
Ancillary Equipment 1	Serial No	N/A	
	Capacitance	450 mAh	
	Rated Voltage	3.7V	
	Extreme Voltage	Low: 3.0V / High:4.2V	



## 3 SUMMARY OF TEST RESULTS

### 3.1 Test Standards

No.	Identity	Document Title	
1	FCC 47 CFR Part 15 Subpart	Unintentional Radiators	
ı	B (10-1-09 Edition)		
	ANSI C63.4-2009	American National Standard for Standard for Methods of	
		Measurement of Radio-Noise Emissions from Low-Voltage	
2		Electrical and Electronic Equipment in the Range of 9 kHz to	
		40 GHz	

### 3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.109	PASS	Annex A .1
2	Conducted Emission, AC Ports	15.107	PASS	Annex A .2

## 3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT 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.

Measurement	Value
Conducted emissions (9KHz-30MHz)	1.12dB
Radiated emissions (30MHz-1GHz)	2.11dB
Radiated emissions (1GHz-25GHz)	3.31dB



## **4 GENERAL TEST CONFIGURATIONS**

## **4.1 Test Environments**

Environment Parameter	Se	Selected Values During Tests						
Environment Parameter	Temperature	Voltage	Relative Humidity					
Normal Temperature,								
Normal Voltage	23°C~25°C	15.0V	50%-55%					
(NTNV)								

# 4.2 Test Equipment List

	Radiated Emission Test										
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use					
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2014.06.04	2015.06.03	$\boxtimes$					
Attenuator	KMW	20dB	110617091	2014.05.10	2015.05.09	$\boxtimes$					
Test Antenna- Loop(9kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2013.07.02	2014.07.01						
Test Antenna- Bi-Log(30MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2013.07.03	2014.07.02	$\boxtimes$					
Test Antenna- Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2013.07.02	2014.07.01	$\boxtimes$					
Test Antenna- Horn(15-26.5 GHz)	SCHWARZBECK	BBHA 9170	9170-305	2013.07.02	2014.07.01						
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2013.10.07	2014.10.06	$\boxtimes$					

Conducted disturbance Test											
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use					
EMI Receiver	ROHDE&SCHWA RZ	ESRP	101036	2014.06.04	2015.06.03	$\boxtimes$					
LISN	SCHWARZBECK	NSLK 8127	8127-687	2014.06.04	2015.06.03	$\boxtimes$					
AMN	SCHWARZBECK	NNBM812 4	8124-509	2013.06.29	2014.06.28						
AMN	SCHWARZBECK	NNBM812 4	8124-510	2013.06.29	2014.06.28						
ISN	TESEQ	ISN T800	34449	2013.06.29	2014.06.28						



### 4.3 Test Enclosure list

Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	SOEYI	B123	N/A	N/A	N/A	
Printer	HP	DESKJET 1000	N/A	N/A	N/A	
Keyboard	logitech	Y-BP62a	N/A	N/A	N/A	
Mouse	logitech	M100	N/A	N/A	N/A	
USB disk	Kingston	N/A	N/A	N/A	N/A	
TF Card	Kingston	N/A	N/A	N/A	N/A	
VGA Cable	N/A	N/A	N/A	1.5m	Shielded	
VGA Cable	IN/A	IN/A	IN/A	1.5111	with core	
HDMI Cable	N/A	N/A	N/A	1.5m	Shielded	
HDIVII Cable	IN/A	IN/A	IN/A	1.5111	with core	
DVI Cable	N/A	N/A	N/A	1.5m	Shielded	
DVI Cable	IN/A	IN/A	IN/A	1.5111	with core	
IPhone	Apple	A1387	N/A	N/A	N/A	
Cement Resistor	N/A	N/A	N/A	N/A	2.5Ω,	
Cement Nesistor	IN/A	IN/A	IN/A	IN/A	100W	
Laptop	LENOVO	K29	N/A	N/A	N/A	$\boxtimes$

## 4.4 Test Configurations

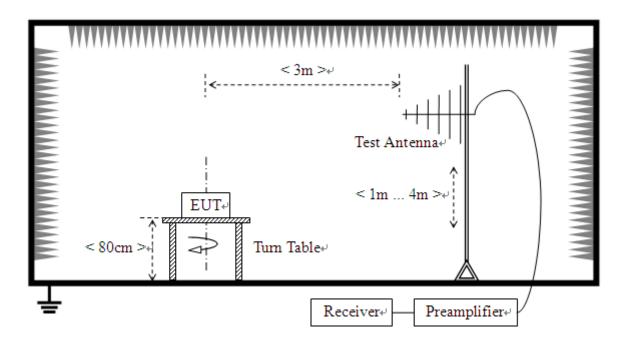
Test Configurations (TC) No.	Description
	The Bluetooth test mode
TC01	The EUT configuration of the emission tests is EUT + Laptop.
1001	During the measurement, A communication link was established between the EUT
	and the Laptop via Bluetooth and EUT was charging, and maintained until test end.
	The Idle test mode
TC02	The EUT configuration of the emission tests is EUT + Laptop.
	In this mode, EUT was only charged by the Laptop. No other function running.

Note: Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report.



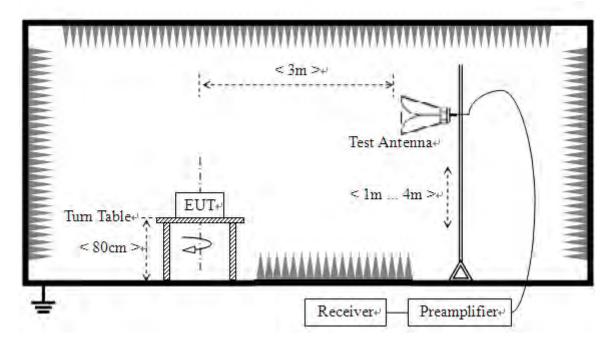
### 4.5 Test Setups

### Test Setup 1



(For Radiated Emission Test (30MHz-1GHz))

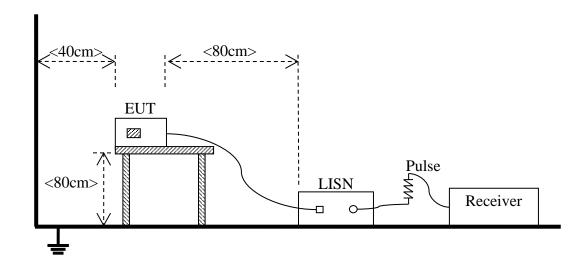
### Test Setup 2



(For Radiated Emission Test (above 1GHz))



### Test Setup 3



(For Conducted Emission, AC Ports Test)

## 4.6 Test Conditions

Test Case	Test Conditions				
	Test Env.	NTNV			
Radiated Emission	Test Setup	Test Setup 1&2			
	Test Configuration	TC01~TC02			
Conducted Emission AC	Test Env.	NTNV			
Conducted Emission, AC Ports	Test Setup	Test Setup 4			
FUILS	Test Configuration	TC01~TC02			



### 5 TEST ITEMS

### 5.1 Emission Tests

#### 5.1.1 Radiated Emission

#### 5.1.1.1 Limit

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

### NOTE:

- 1) Field Strength ( $dB\mu V/m$ ) = 20\*log[Field Strength ( $\mu V/m$ )].
- 2) In the emission tables above, the tighter limit applies at the band edges.
- 3) For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

#### 5.1.1.2 Test Procedure

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.



#### 5.1.2 Conducted Emission

#### 5.1.2.1 Test Limit

Eroguanov rango (MUz)	Conducted I	Limit (dBµV)
Frequency range (MHz)	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

#### NOTE:

- 1) The limit is applicable to Class B ITE.
- 2) The lower limit shall apply at the band edges.
- 3) The limit decreases linearly with the logarithm of the frequency in the range 0.15 0.50MHz.

#### 5.1.2.2 Test Procedure

The EUT is connected to the power mains through a LISN which provides  $50\Omega/50\mu H$  of coupling impedance for the measuring instrument. The test frequency range is from 150kHz to 30MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.



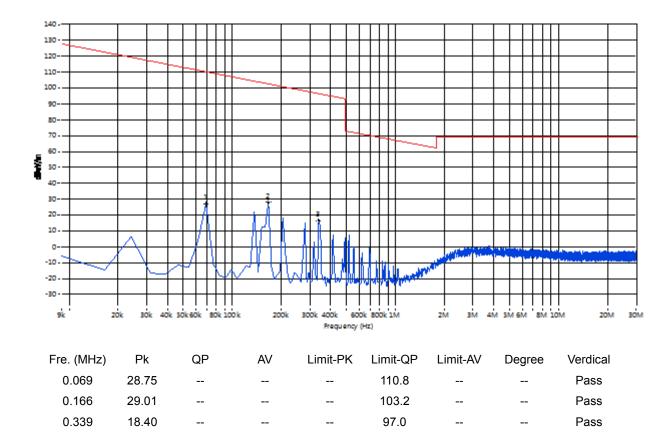
## **ANNEX A TEST RESULTS**

### A.1 Radiated Emission

### Test Data(The model name HCD - 008)

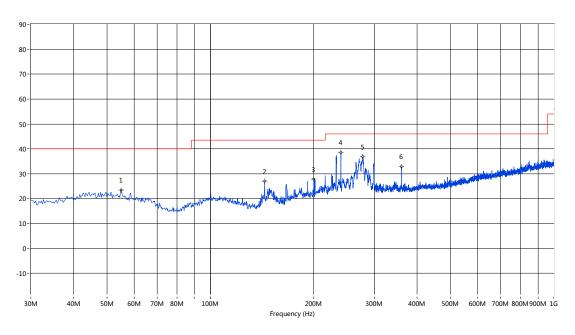
Note: The marked spikes near 2400MHz with circle should be ignored because they are Bluetooth carrier frequency.

#### A.1.1 9kHz – 30MHz



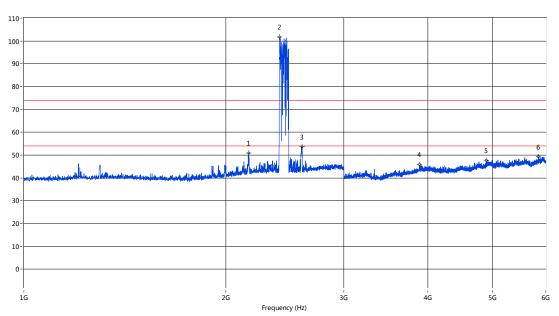


### A.1.2 Test Antenna Vertical, 30MHz – 1GHz



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
54.971	23.50				40.0		180.4	Vertical	Pass
143.947	26.93				43.5		144.0	Vertical	Pass
200.192	27.96				43.5		304.6	Vertical	Pass
239.953	38.49				46.0		359.5	Vertical	Pass
277.531	36.79				46.0		142.6	Vertical	Pass
359.960	32.81				46.0		210.2	Vertical	Pass

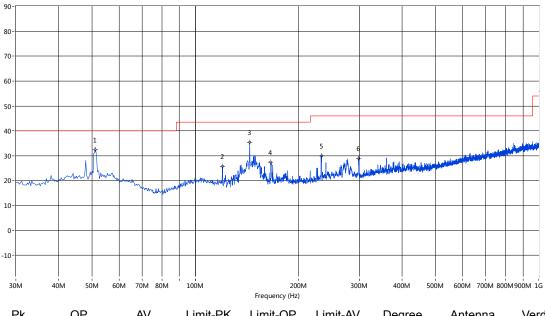
### A.1.3 Test Antenna Vertical, 1GHz – 6GHz



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
2163.709	50.90			74.0		54.0	146.1	Vertical	Pass
2405.649	101.76			74.0		54.0	317.9	Vertical	
2597.601	53.61		46.54	74.0		54.0	344.5	Vertical	Pass

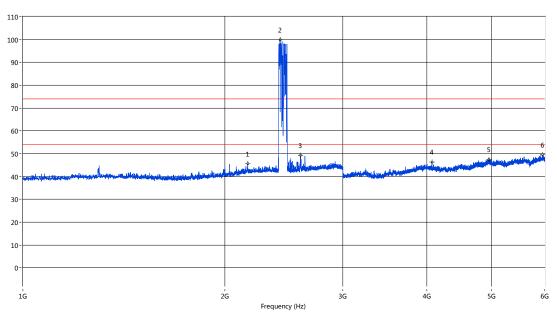


### A.1.4 Test Antenna Horizontal, 30MHz – 1GHz



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
51.092	32.47				40.0		136.6	Horizontal	Pass
119.945	25.75				43.5		21.9	Horizontal	Pass
143.947	35.37				43.5		334.5	Horizontal	Pass
165.766	27.39				43.5		154.1	Horizontal	Pass
233.164	29.90				46.0		358.3	Horizontal	Pass
298.623	28.95				46.0		179.9	Horizontal	Pass

### A.1.5 Test Antenna Horizontal, 1GHz – 6GHz



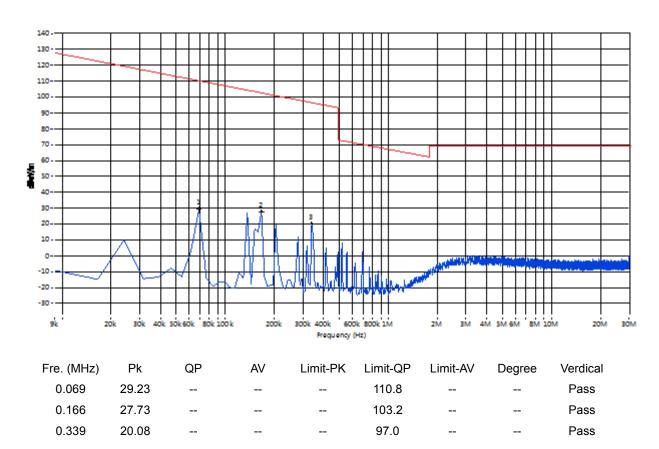
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
2163.709	45.59			74.0		54.0	343.0	Horizontal	
2417.146	99.87			74.0		54.0	348.9	Horizontal	Pass
2595.601	49.40			74.0		54.0	327.9	Horizontal	Pass



### Test Data(The model name HCD - 006)

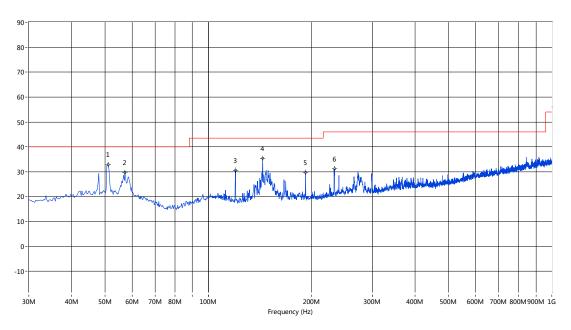
Note: The marked spikes near 2400MHz with circle should be ignored because they are Bluetooth carrier frequency.

### A.1.6 9kHz – 30MHz



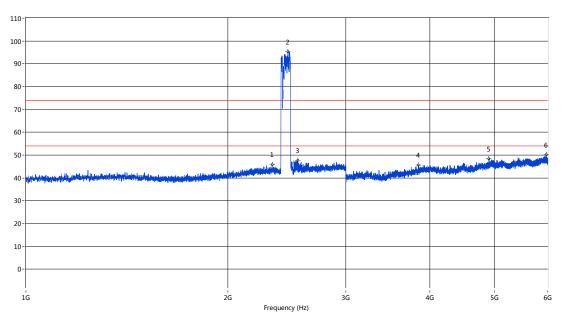


### A.1.7 Test Antenna Vertical, 30MHz – 1GHz



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
51.092	32.82				40.0		81.2	Vertical	Pass
57.153	29.70				40.0		103.8	Vertical	Pass
119.945	30.56				43.5		92.3	Vertical	Pass
143.947	35.47				43.5		68.7	Vertical	Pass
191.950	29.66				43.5		214.7	Vertical	Pass
233.164	31.16				46.0		314.0	Vertical	Pass

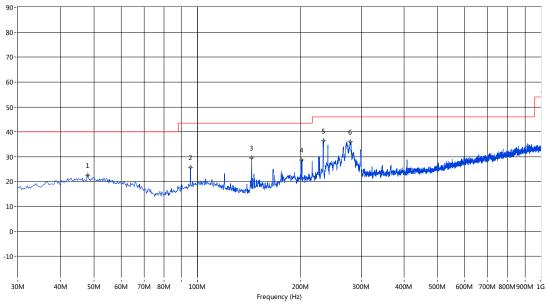
### A.1.8 Test Antenna Vertical, 1GHz – 6GHz



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
1995.751	47.92			74.0		54.0	174.8	Vertical	Pass
2163.709	48.88			74.0		54.0	163.7	Vertical	Pass
2478.630	97.90			74.0		54.0	183.1	Vertical	

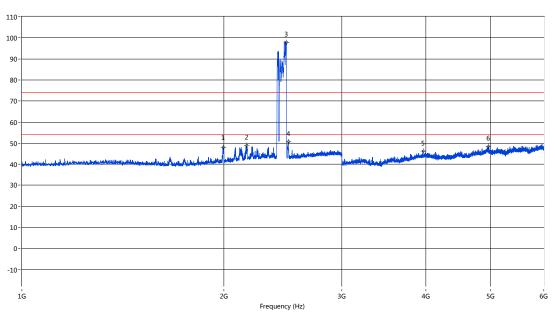


### A.1.9 Test Antenna Horizontal, 30MHz – 1GHz



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
47.941	22.62				40.0		268.3	Horizontal	Pass
95.459	25.66				43.5		66.3	Horizontal	Pass
143.947	29.46				43.5		92.9	Horizontal	Pass
201.647	28.74				43.5		283.6	Horizontal	Pass
233.164	36.54				46.0		172.5	Horizontal	Pass
278.500	36.14				46.0		171.3	Horizontal	Pass

### A.1.10 Test Antenna Horizontal, 1GHz – 6GHz



Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
1995.751	47.92			74.0		54.0	174.8	Horizontal	Pass
2163.709	48.88			74.0		54.0	163.7	Horizontal	Pass
2478.630	97.90			74.0		54.0	183.1	Horizontal	



### A.2 Conducted Emission

Test Data(The model name HCD - 008)

No.	Frequency	Peak	Q-peak	Average	Factor	QP Limit	AV Limit	Margin	Line	Verdict
	(MHz)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1	0.20	54.46	50.22	39.61	10.00	64.6	54.6	14.38	L Line	PASS
2	0.40	41.1		32.4	10.00	58.8	48.8	16.40	L Line	PASS
3	0.74	36.8		33.2	10.00	56.0	46.0	12.80	L Line	PASS
4	3.43	43.5		36.5	10.00	56.0	46.0	9.50	L Line	PASS
5	6.86	40.2		39.0	10.00	60.0	50.0	11.00	L Line	PASS
6	22.02	35.5		29.9	10.00	60.0	50.0	20.10	L Line	PASS
7	0.16	55.4		23.5	10.00	65.8	55.8	32.30	N Line	PASS
8	0.20	52.8		38.1	10.00	64.7	54.7	16.60	N Line	PASS
9	0.61	37.1		31.0	10.00	56.0	46.0	15.00	N Line	PASS
10	2.15	35.8		34.0	10.00	56.0	46.0	12.00	N Line	PASS
11	4.03	44.4		38.6	10.00	56.0	46.0	7.40	N Line	PASS
12	10.41	36.4		33.0	10.00	60.0	50.0	17.00	N Line	PASS

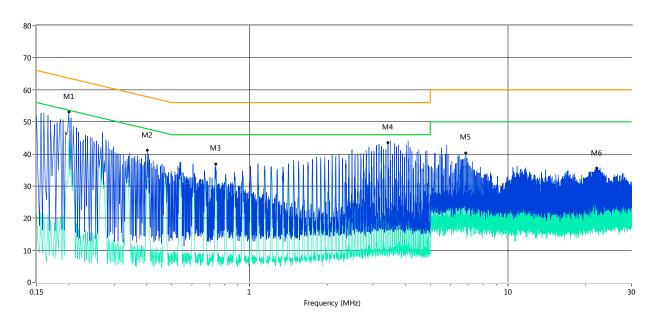
### Test Data(The model name HCD - 006)

No.	Frequency	Peak	Q-peak	Average	Factor	QP Limit	AV Limit	Margin	Line	Verdict
	(MHz)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1	0.20	51.5		38.7	10.00	64.5	54.5	15.80	L Line	PASS
2	0.54	38.8		29.6	10.00	56.0	46.0	16.40	L Line	PASS
3	2.16	40.4		38.7	10.00	56.0	46.0	7.30	L Line	PASS
4	3.44	44.8		38.5	10.00	56.0	46.0	7.50	L Line	PASS
5	5.73	43.5		42.6	10.00	60.0	50.0	7.40	L Line	PASS
6	22.20	37.2		34.8	10.00	60.0	50.0	15.20	L Line	PASS
7	0.20	51.8		37.4	10.00	64.6	54.6	17.20	N Line	PASS
8	0.27	45.7		36.0	10.00	62.6	52.6	16.60	N Line	PASS
9	0.61	38.0		33.4	10.00	56.0	46.0	12.60	N Line	PASS
10	3.44	42.5		34.1	10.00	56.0	46.0	11.90	N Line	PASS
11	5.47	42.8		42.1	10.00	60.0	50.0	7.90	N Line	PASS
12	21.88	36.7		32.2	10.00	60.0	50.0	17.80	N Line	PASS

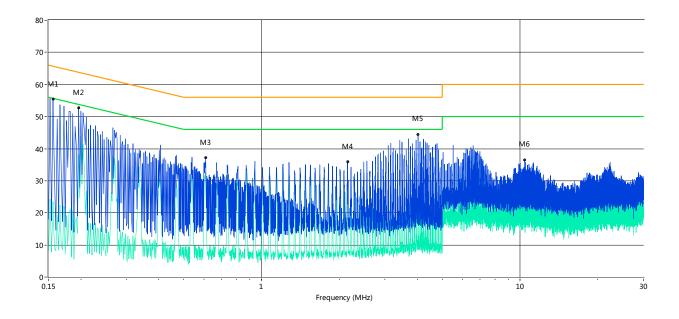


### Test Plots(The model name HCD - 008)

### A.2.1 L Phase



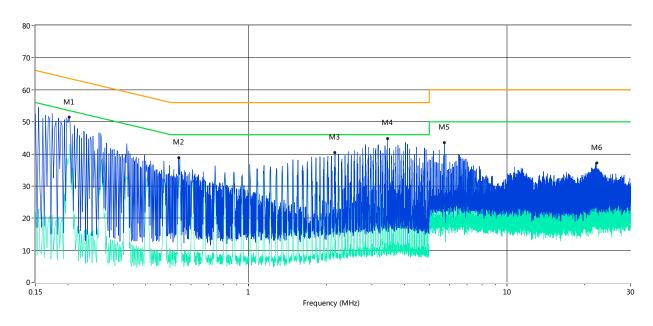
### A.2.2 N Phase



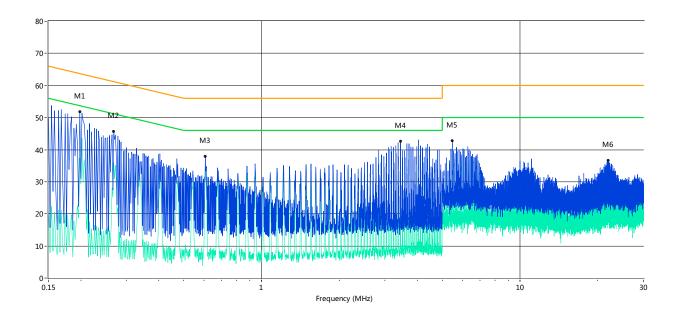


### Test Plots(The model name HCD - 006)

### A.2.3 L Phase



### A.2.4 N Phase



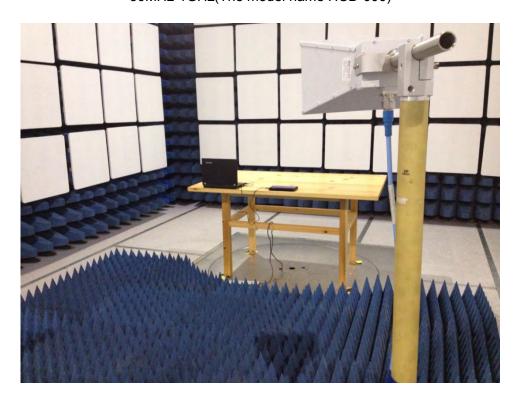


# **ANNEX B TEST SETUP PHOTOS**

## **B.1** Radiated Field Strength Measurement



30MHz-1GHz(The model name HCD-006)

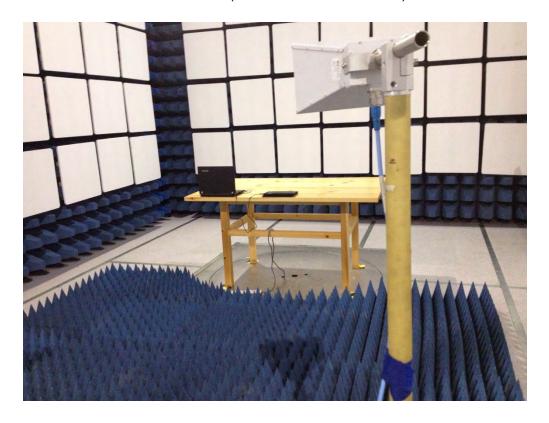


Above 1GHz(The model name HCD-006)





30MHz-1GHz(The model name HCD-008)



Above 1GHz(The model name HCD-008)



## **B.2** Conducted Emission



The model name HCD-006

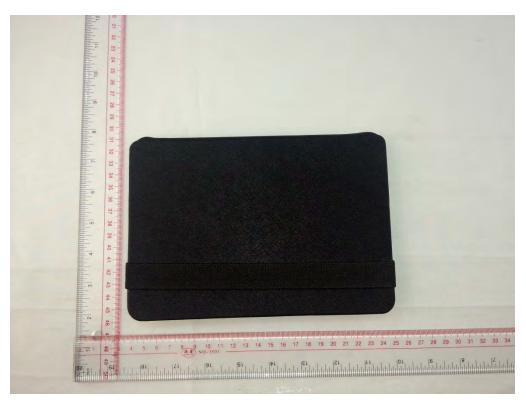


The model name HCD-008



## **ANNEX C EUT PHOTOS**

## C.1 Appearance of the EUT



THE FRONT OF EUT1



THE FRONT OF EUT2





THE BACK OF EUT



THE LEFT OF EUT





THE RIGHT OF EUT



THE UP OF EUT





THE DOWN OF EUT



THE FRONT OF EUT1





THE FRONT OF EUT2



THE BACK OF EUT



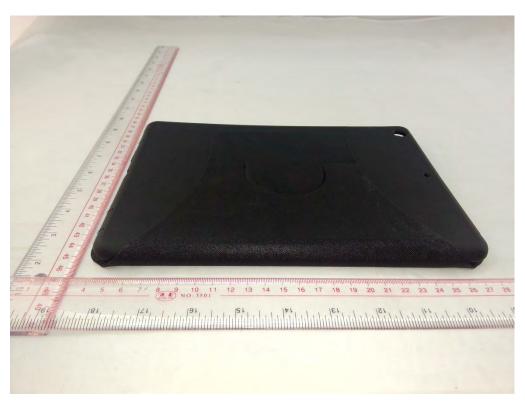


THE LEFT OF EUT



THE RIGHT OF EUT





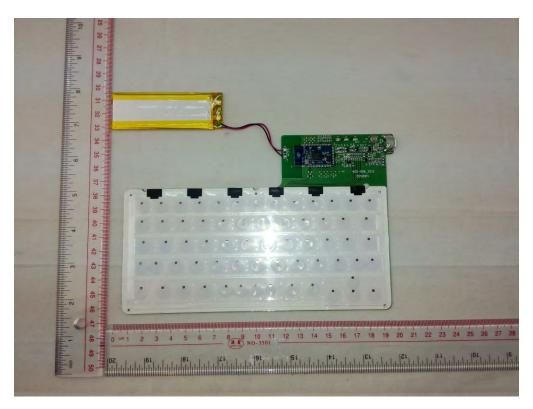
THE UP OF EUT



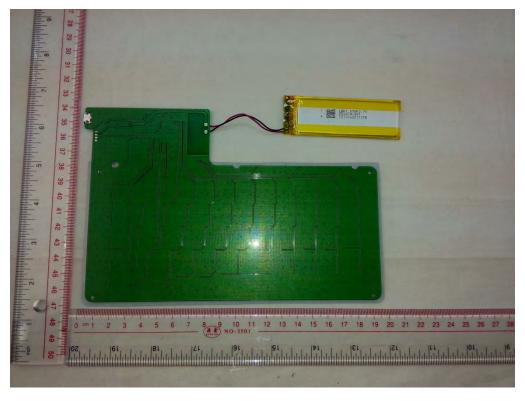
THE DOWN OF EUT



### C.2 Inside of the EUT

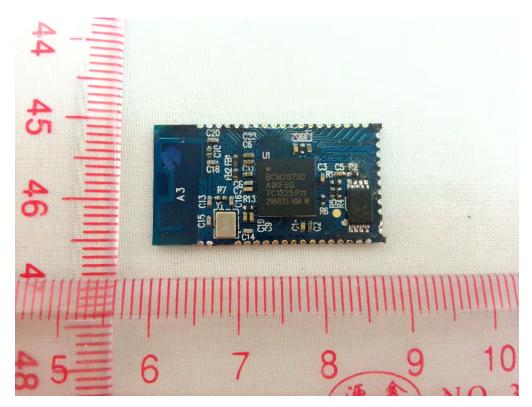


Main Board

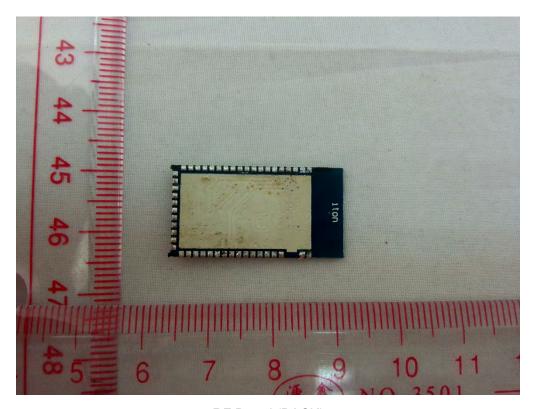


Main Board



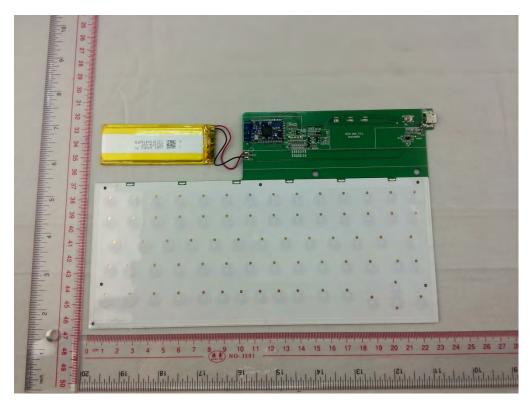


RF Board (FRONT)

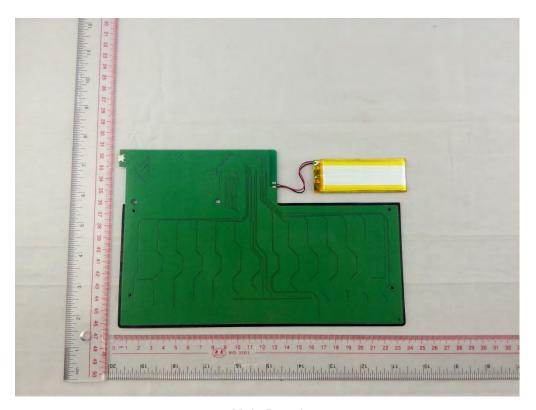


RF Board (BACK)



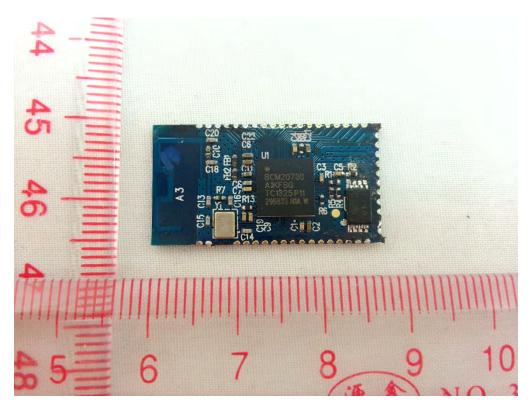


Main Board

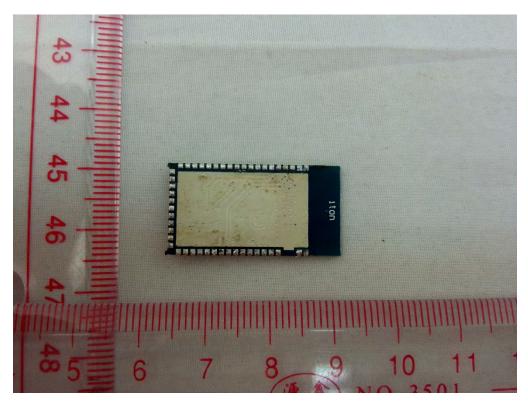


Main Board





RF Board (FRONT)



RF Board (BACK)
--END OF REPORT--