

FCC
EMC
TEST REPORT

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, Aiqun Shiyan Street, Baoan District,
Shenzhen



Prepared by:

Cao Shandong

(Reporting Specialist)

Date 2014.6.16

Approved by:

Wei Yanquan

(Chief Engineer)

Date 2014.6.16

Report No.: BL-SZ1440086-401

EUT Type: Ultrathin Backlit keyboard for iPad

Model Name: HCD-008, HCD-006

Brand Name: N/A

Test Standard: 47 CFR Part 15 Subpart B

FCC ID: 2ACDJ-HCD008

Test conclusion: PASS

Test Date: May 10, 2014 ~ Jun 16, 2014

Date of Issue: Jun 16, 2014

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Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Jun 12, 2014</u>	<u>Initial Issue</u>
<u>Rev. 02</u>	<u>Jun 16, 2014</u>	<u>The Second Issue</u>

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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, 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, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	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. 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.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi 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
Address	Buliding 2, Tongfuyu Industrial Zone, Aiqun Shiyan Street, Baoan District, Shenzhen

2.2 Manufacturer

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

2.3 General Description for Equipment under Test (EUT)

EUT Type	Ultrathin Backlit keyboard for iPad
Series Model Name	HCD-008, HCD-006
Description of Model name differentiation	The equipment model HCD-008 and HCD-006 are Ultrathin Backlit keyboard for iPad, the electrical parameters and internal structure of RF 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 connectivity	BT 3.0
About the Product	The equipment is Ultrathin Backlit keyboard for iPad, it contains BT Module operating at 2.4GHz ISM band.

2.4 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No	253080-001
	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 B (10-1-09 Edition)	Unintentional Radiators
2	ANSI C63.4-2009	American National Standard for 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

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

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	☒
Attenuator	KMW	20dB	110617091	2014.05.10	2015.05.09	☒
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	☒
Test Antenna- Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1148	2013.07.02	2014.07.01	☒
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	☒

Conducted disturbance Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2014.06.04	2015.06.03	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2014.06.04	2015.06.03	☒
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 with core	☐
HDMI Cable	N/A	N/A	N/A	1.5m	Shielded with core	☐
DVI Cable	N/A	N/A	N/A	1.5m	Shielded with core	☐
IPhone	Apple	A1387	N/A	N/A	N/A	☐
Cement Resistor	N/A	N/A	N/A	N/A	2.5Ω, 100W	☐
Laptop	LENOVO	K29	N/A	N/A	N/A	☒

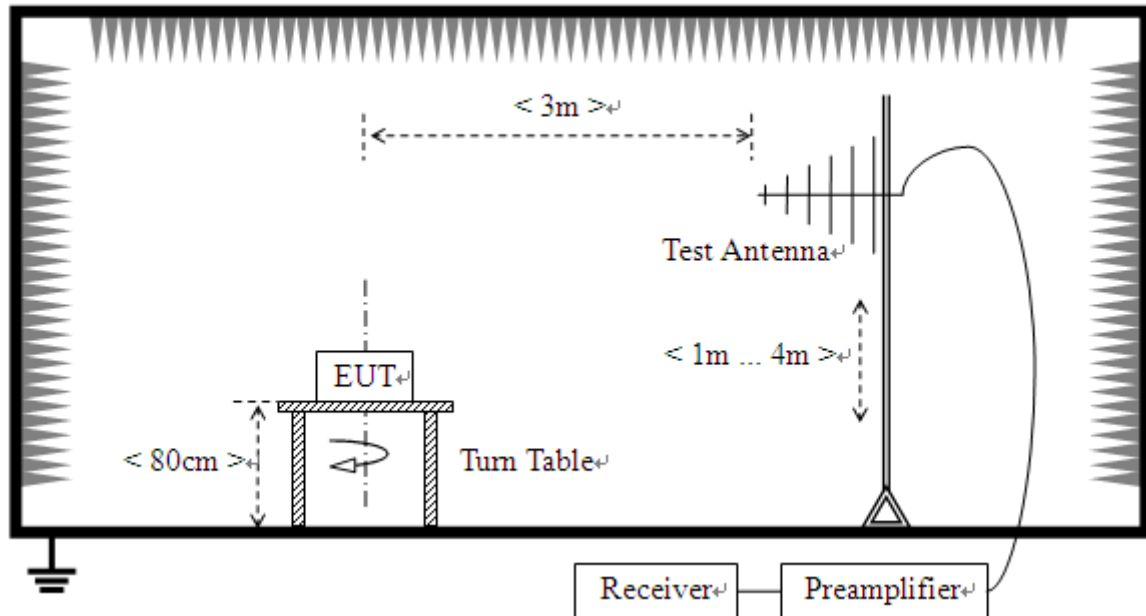
4.4 Test Configurations

Test Configurations (TC) No.	Description
TC01	<u>The Bluetooth test mode</u> The EUT configuration of the emission tests is EUT + Laptop. 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.
TC02	<u>The Idle test mode</u> 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.

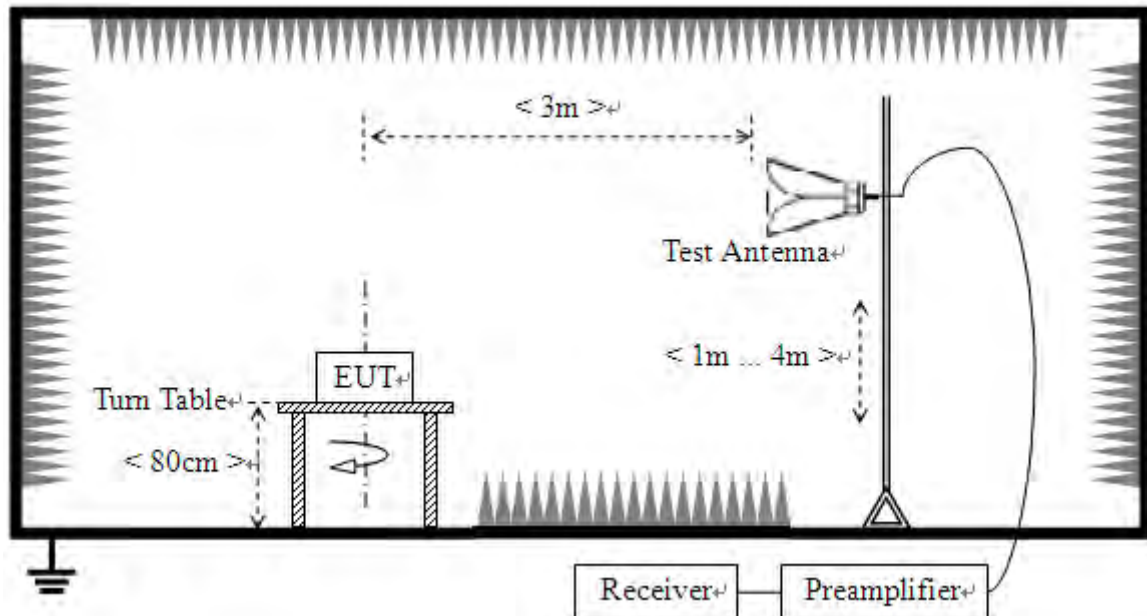
4.5 Test Setups

Test Setup 1



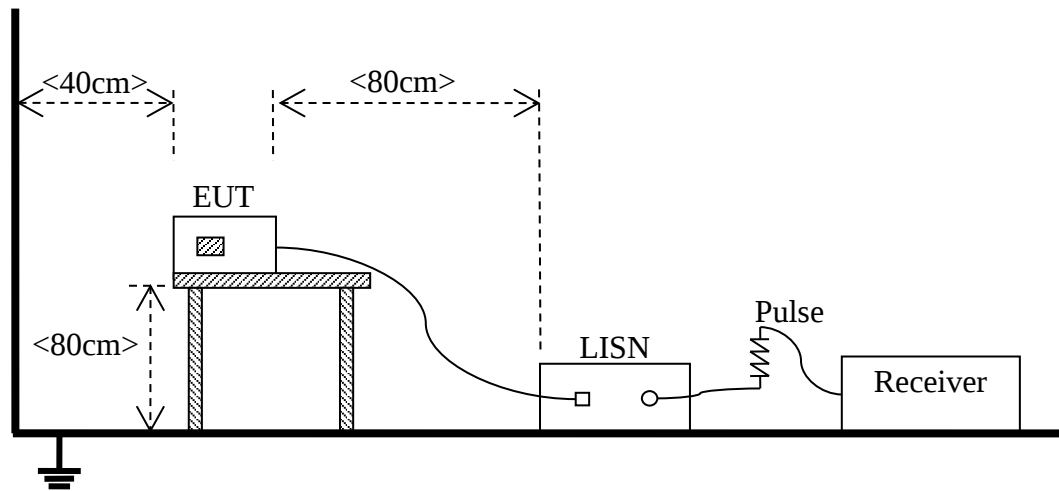
(For Radiated Emission Test (30MHz-1GHz))

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	
Radiated Emission	Test Env.	NTNV
	Test Setup	Test Setup 1&2
	Test Configuration	TC01~TC02
Conducted Emission, AC Ports	Test Env.	NTNV
	Test Setup	Test Setup 4
	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 ($\mu\text{V/m}$)	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 ($\text{dB}\mu\text{V/m}$) = $20 \cdot \log[\text{Field Strength } (\mu\text{V/m})]$.
- 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

Frequency range (MHz)	Conducted Limit (dB μ V)	
	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 Ω /50 μ 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.

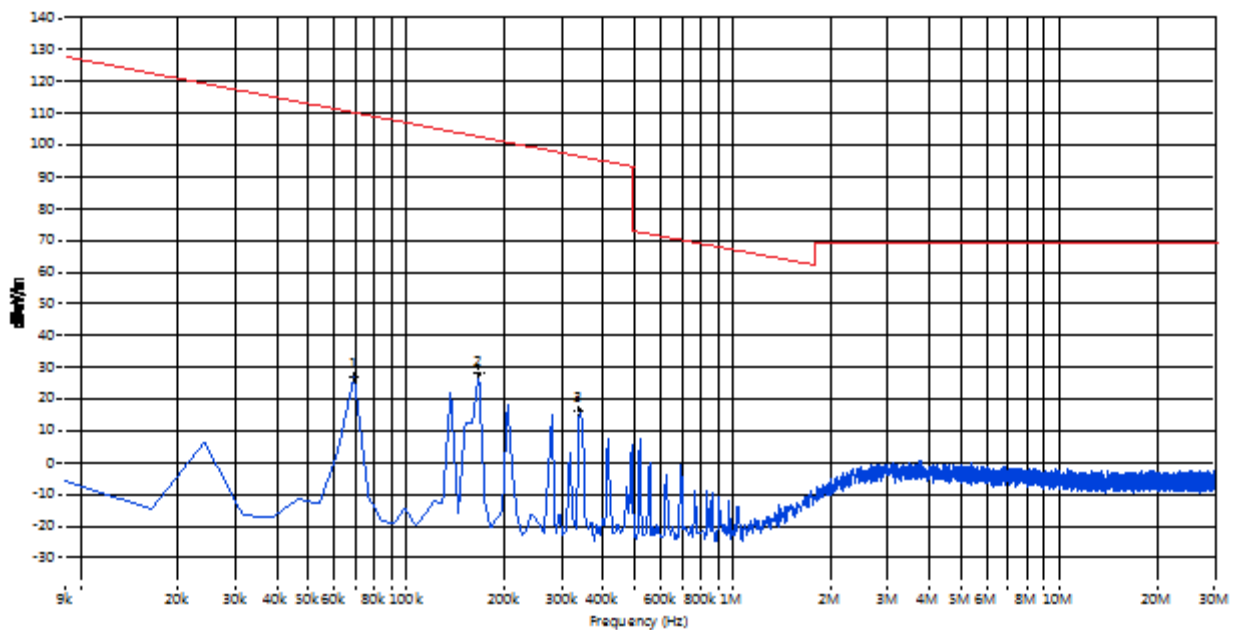
ANNEX A TEST RESULTS

A.1 Radiated Emission

Test Data(The model name HCD - 008)

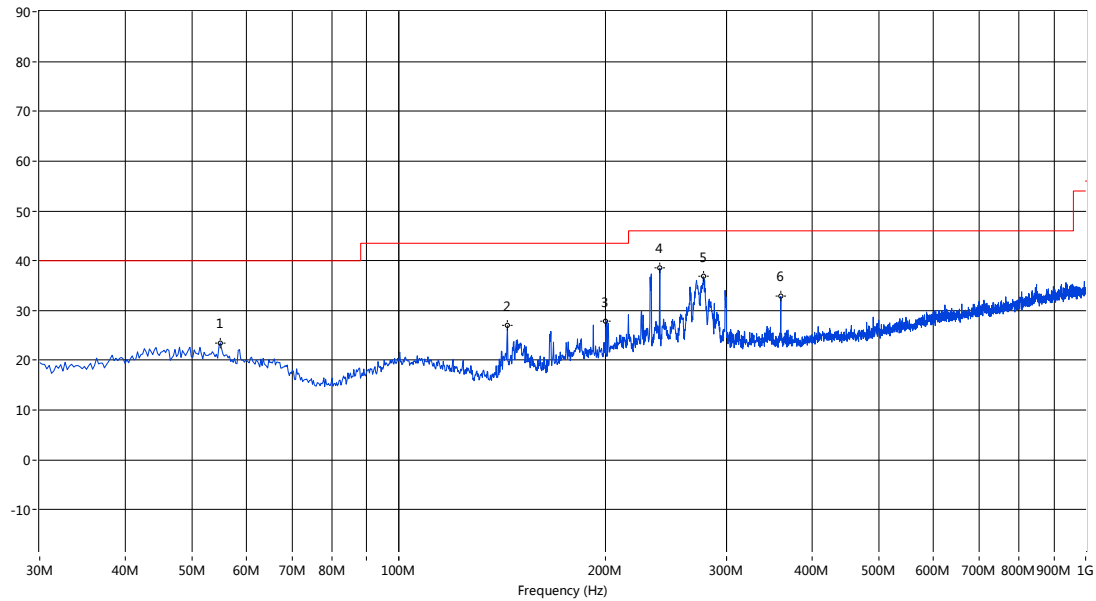
Note: The marked spikes near 2400MHz with circle should be ignored because they are Bluetooth carrier frequency.

A.1.1 9kHz – 30MHz



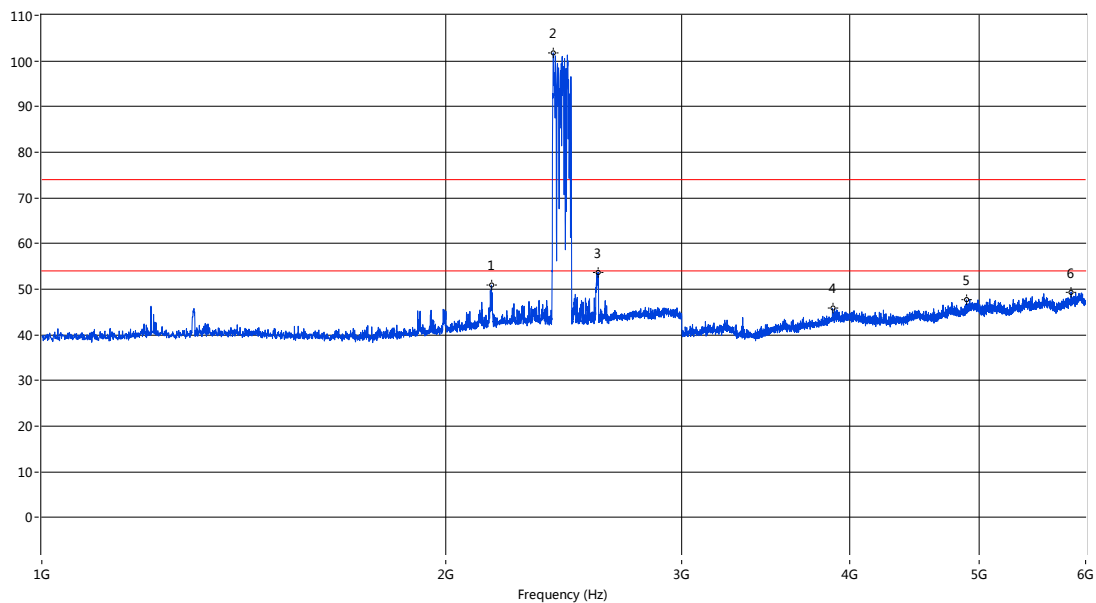
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Verdical
0.069	28.75	--	--	--	110.8	--	--	Pass
0.166	29.01	--	--	--	103.2	--	--	Pass
0.339	18.40	--	--	--	97.0	--	--	Pass

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



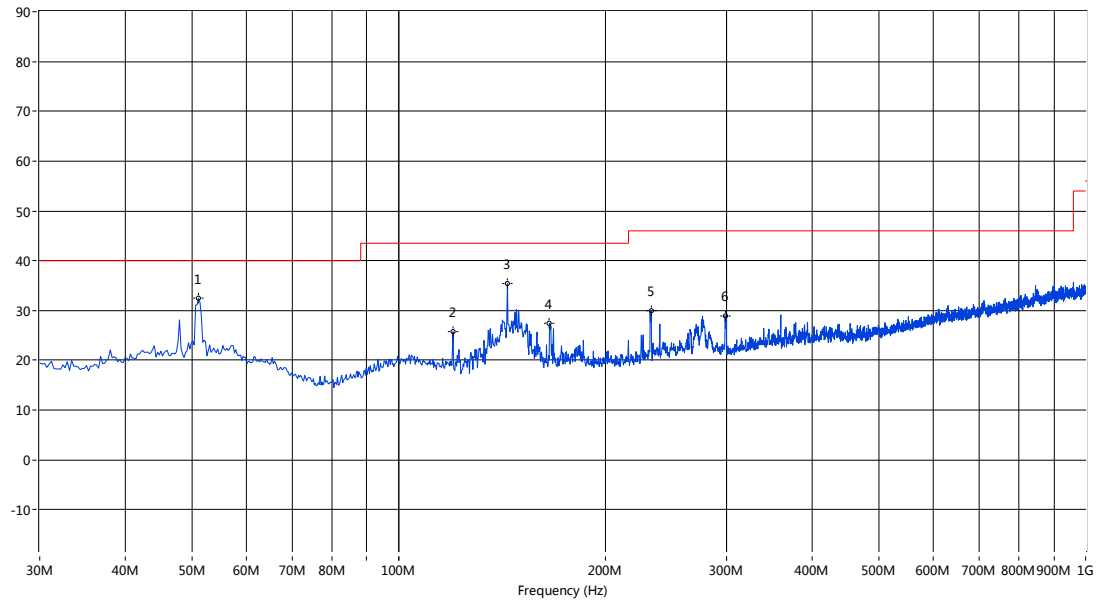
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
54.971	23.50	--	--	--	40.0	--	180.4	Vertical	Pass
143.947	26.93	--	--	--	43.5	--	144.0	Vertical	Pass
200.192	27.96	--	--	--	43.5	--	304.6	Vertical	Pass
239.953	38.49	--	--	--	46.0	--	359.5	Vertical	Pass
277.531	36.79	--	--	--	46.0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

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



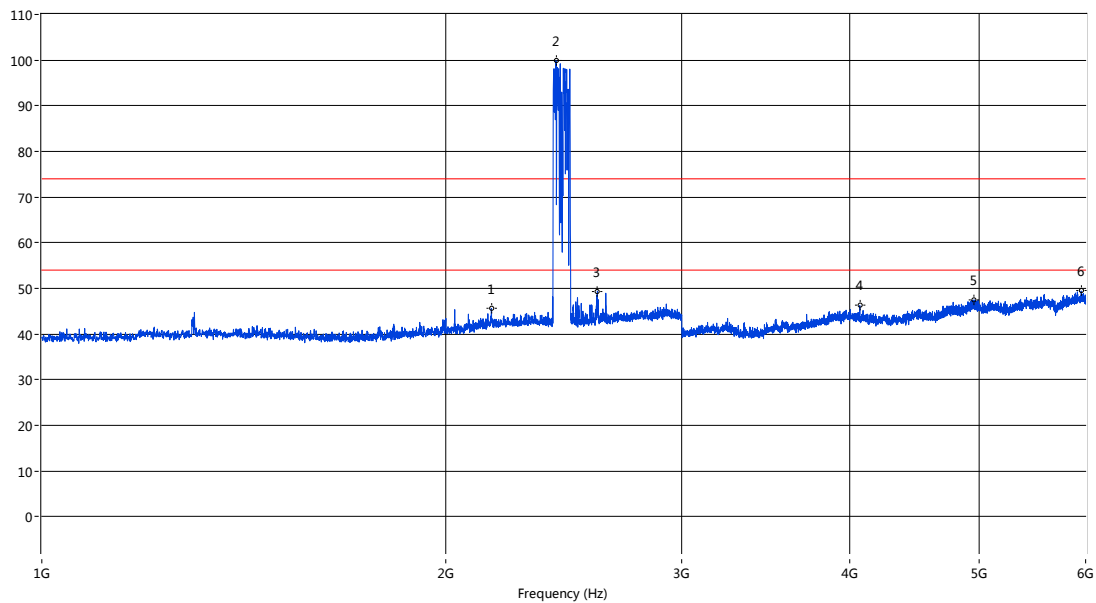
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
2163.709	50.90	--	--	74.0	--	54.0	146.1	Vertical	Pass
2405.649	101.76	--	--	74.0	--	54.0	317.9	Vertical	--
2597.601	53.61	--	46.54	74.0	--	54.0	344.5	Vertical	Pass

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

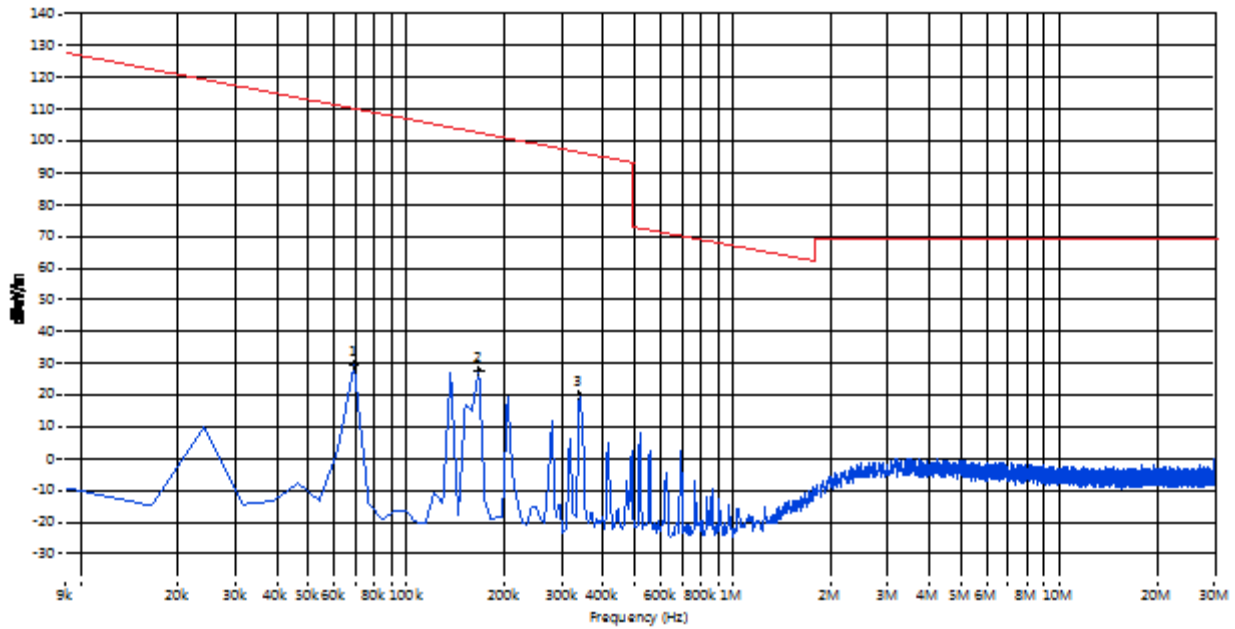


Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
2163.709	45.59	--	--	74.0	--	54.0	343.0	Horizontal	--
2417.146	99.87	--	--	74.0	--	54.0	348.9	Horizontal	Pass
2595.601	49.40	--	--	74.0	--	54.0	327.9	Horizontal	Pass

Test Data(The model name HCD - 006)

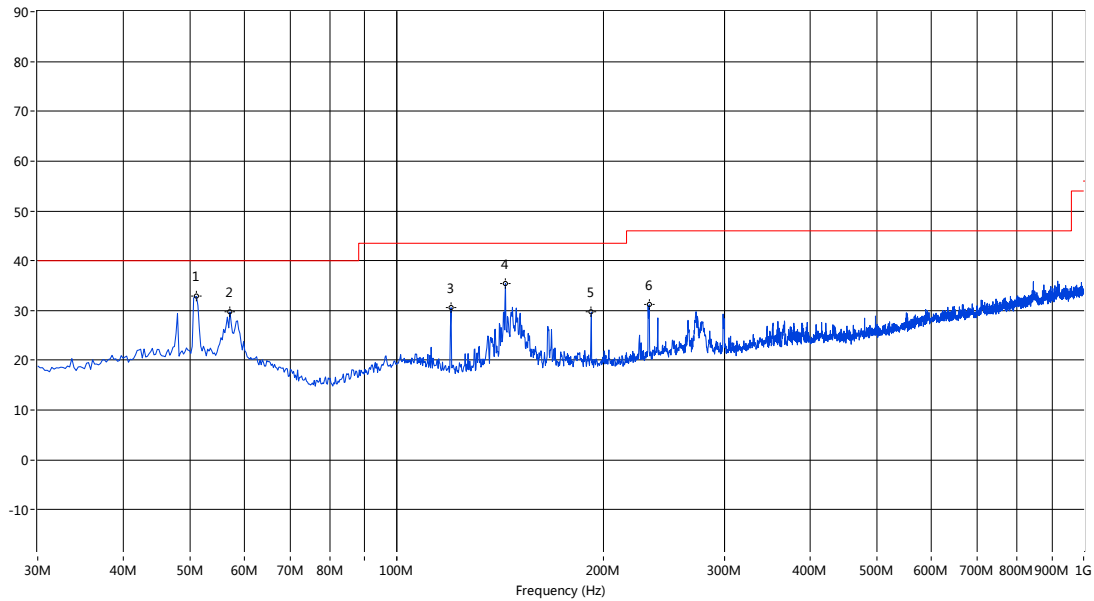
Note: The marked spikes near 2400MHz with circle should be ignored because they are Bluetooth carrier frequency.

A.1.6 9kHz – 30MHz



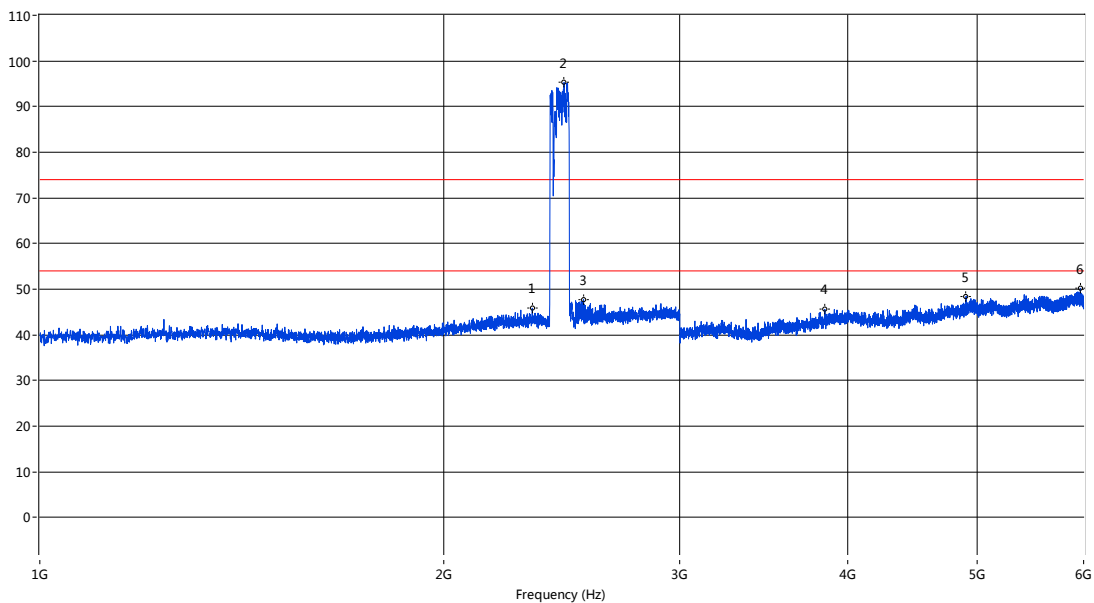
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Verdical
0.069	29.23	--	--	--	110.8	--	--	Pass
0.166	27.73	--	--	--	103.2	--	--	Pass
0.339	20.08	--	--	--	97.0	--	--	Pass

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



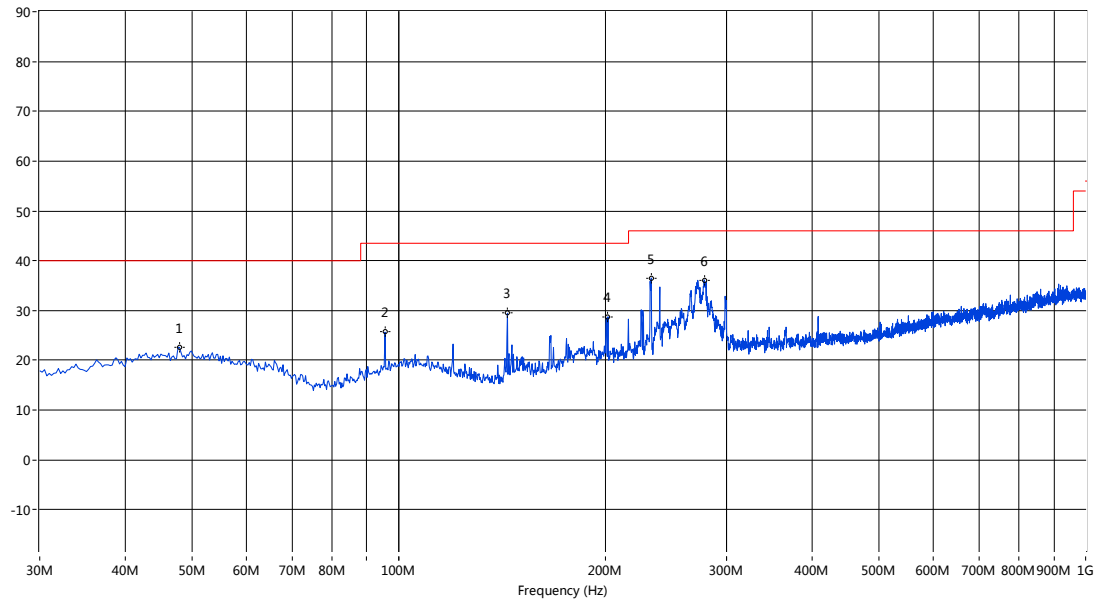
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
51.092	32.82	--	--	--	40.0	--	81.2	Vertical	Pass
57.153	29.70	--	--	--	40.0	--	103.8	Vertical	Pass
119.945	30.56	--	--	--	43.5	--	92.3	Vertical	Pass
143.947	35.47	--	--	--	43.5	--	68.7	Vertical	Pass
191.950	29.66	--	--	--	43.5	--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

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



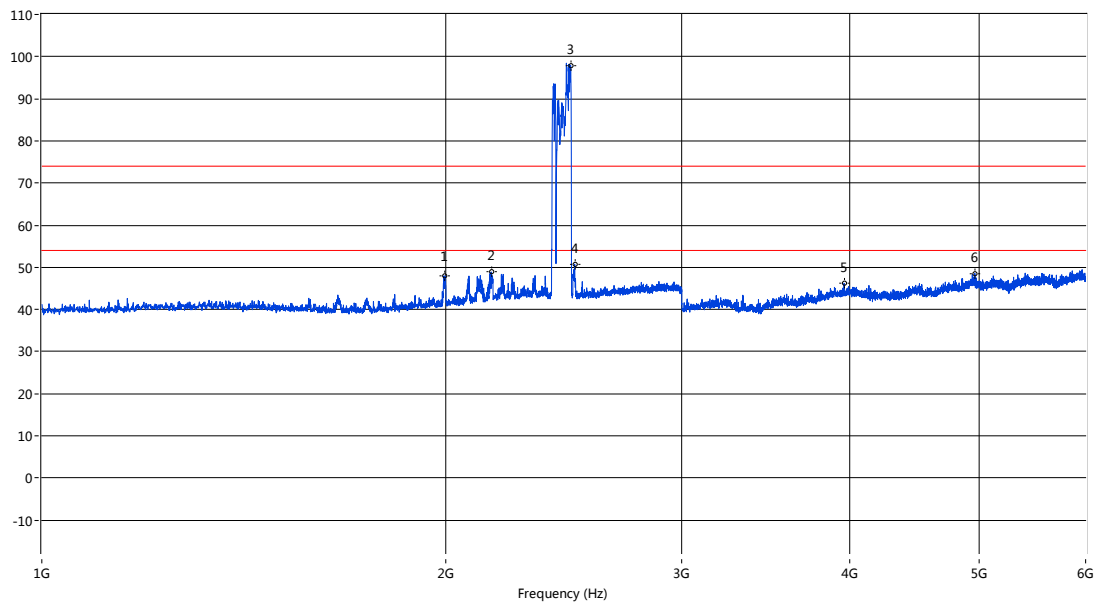
Fre. (MHz)	Pk	QP	AV	Limit-PK	Limit-QP	Limit-AV	Degree	Antenna	Verdical
1995.751	47.92	--	--	74.0	--	54.0	174.8	Vertical	Pass
2163.709	48.88	--	--	74.0	--	54.0	163.7	Vertical	Pass
2478.630	97.90	--	--	74.0	--	54.0	183.1	Vertical	--

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)

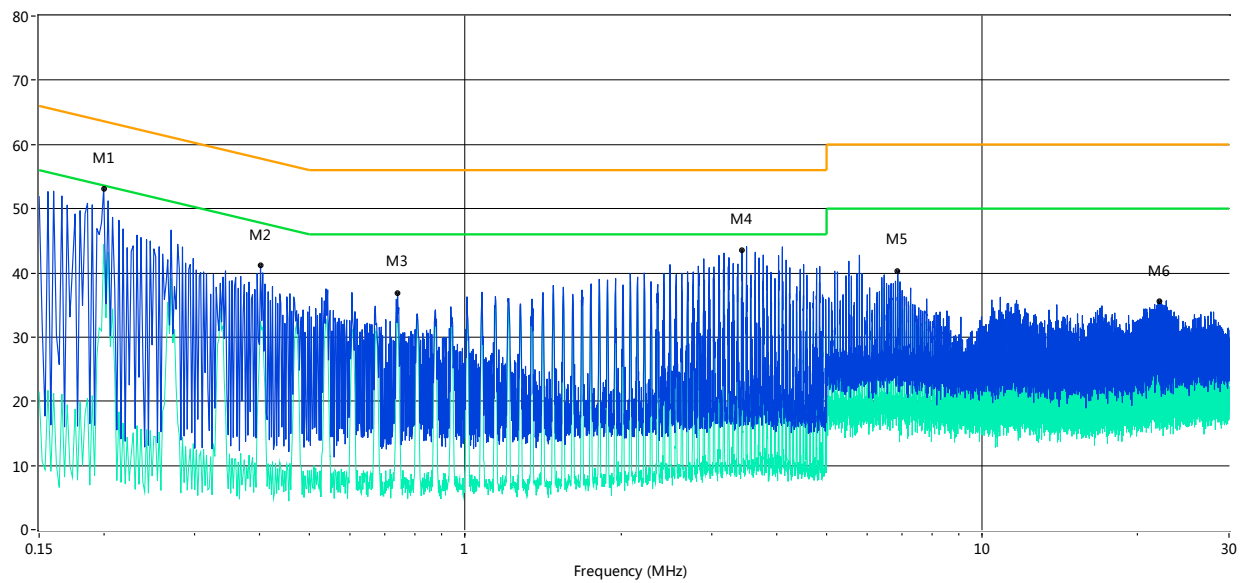
No.	Frequency (MHz)	Peak (dBuV)	Q-peak (dBuV)	Average (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
1	0.20	54.46	50.22	39.61	10.00	64.6	54.6	14.38	L Line	PASS
2	0.40	41.1	--	32.4	10.00	58.8	48.8	16.40	L Line	PASS
3	0.74	36.8	--	33.2	10.00	56.0	46.0	12.80	L Line	PASS
4	3.43	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)

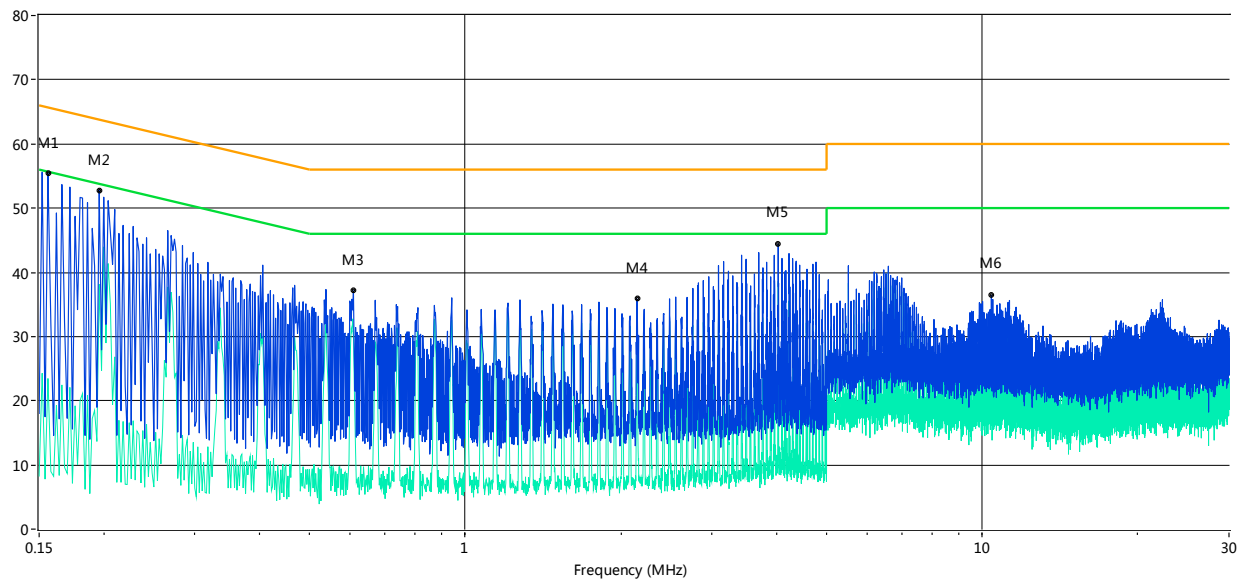
No.	Frequency (MHz)	Peak (dBuV)	Q-peak (dBuV)	Average (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
1	0.20	51.5	--	38.7	10.00	64.5	54.5	15.80	L Line	PASS
2	0.54	38.8	--	29.6	10.00	56.0	46.0	16.40	L Line	PASS
3	2.16	40.4	--	38.7	10.00	56.0	46.0	7.30	L Line	PASS
4	3.44	44.8	--	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

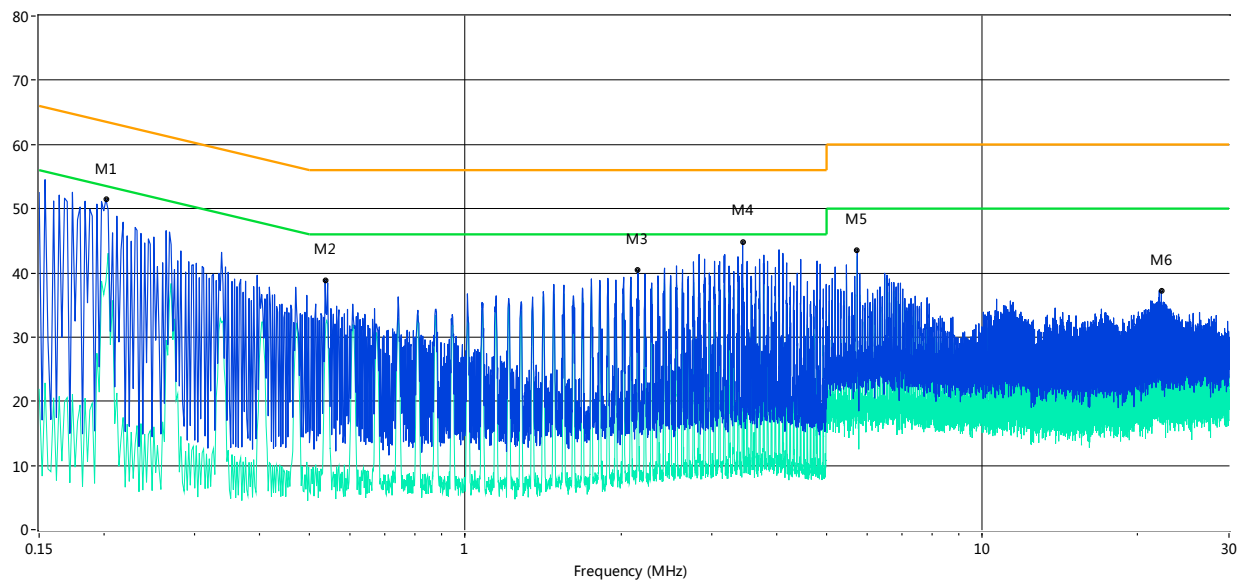


A.2.2 N Phase

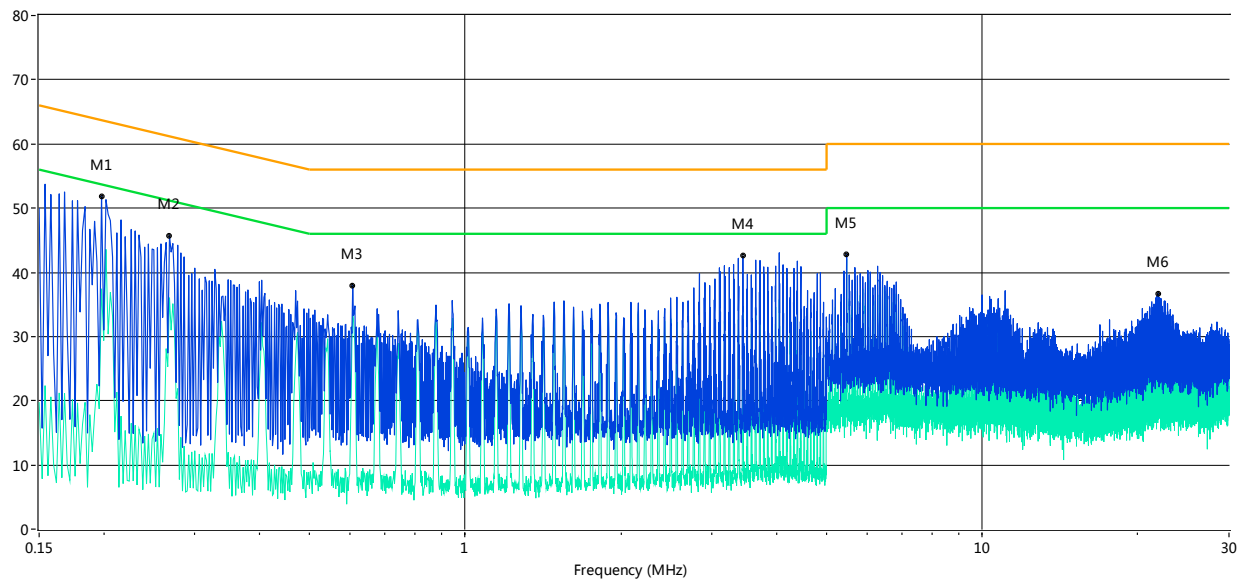


Test Plots(The model name HCD - 006)

A.2.3 L Phase



A.2.4 N Phase



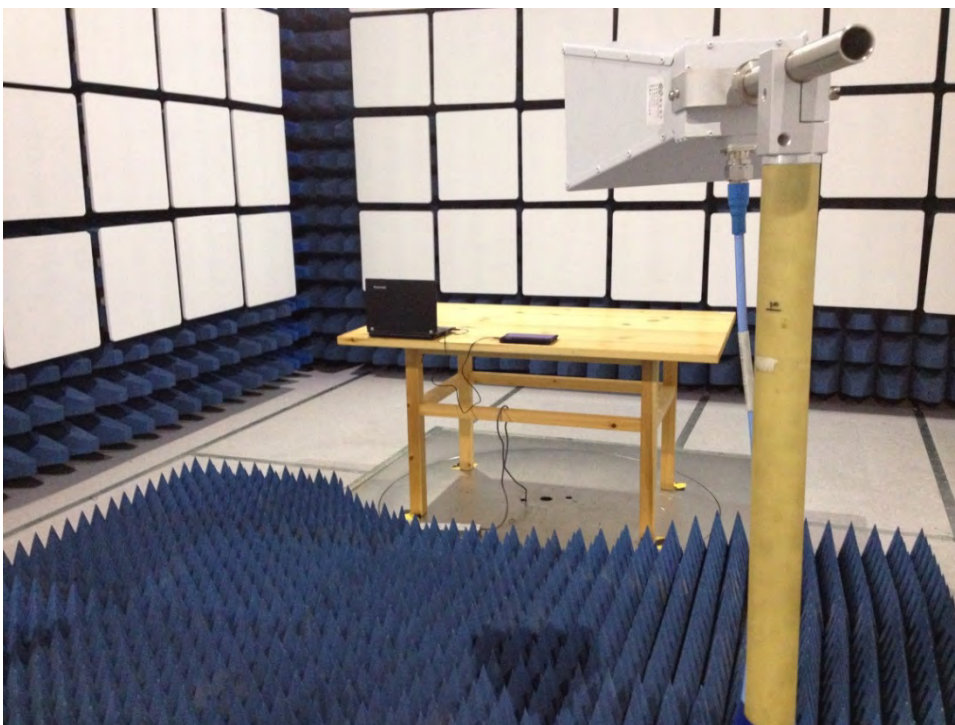
ANNEX B TEST SETUP PHOTOS

B.1 Radiated Field Strength Measurement

The model name HCD - 006



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

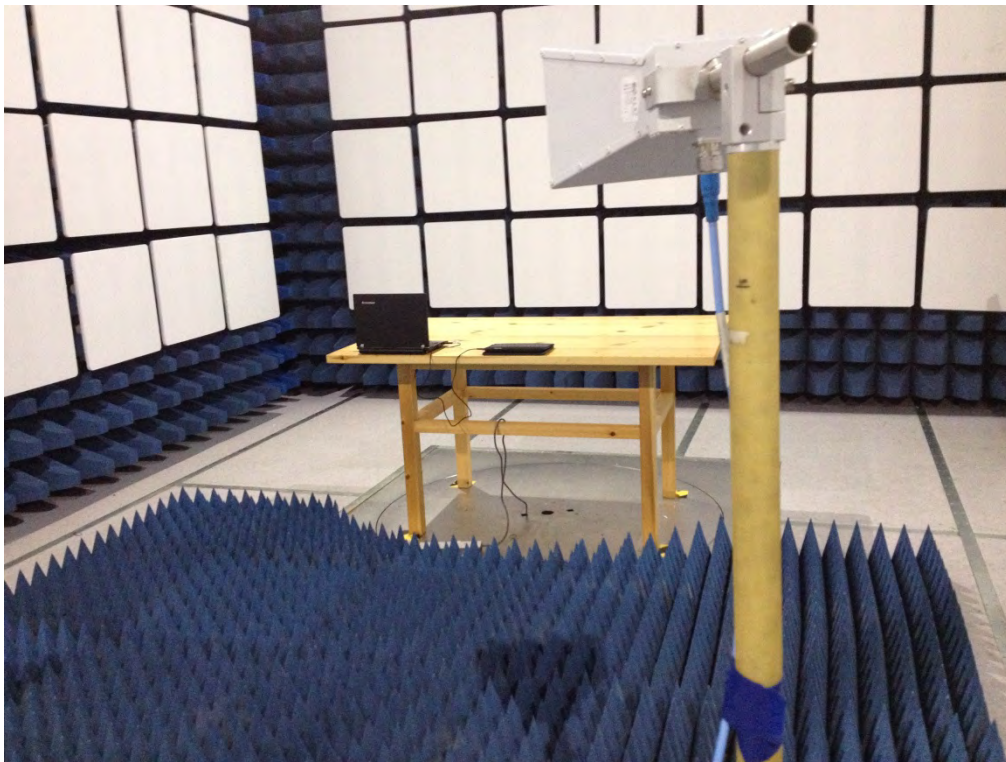


Above 1GHz(The model name HCD-006)

The model name HCD - 008

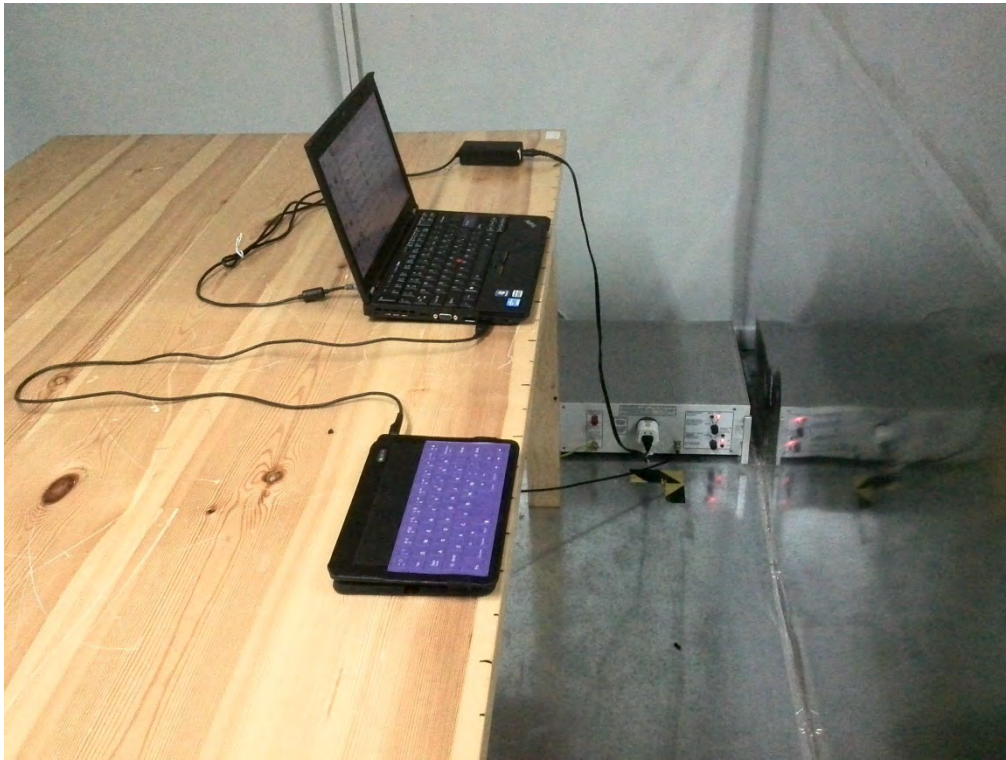


30MHz-1GHz(The model name HCD-008)

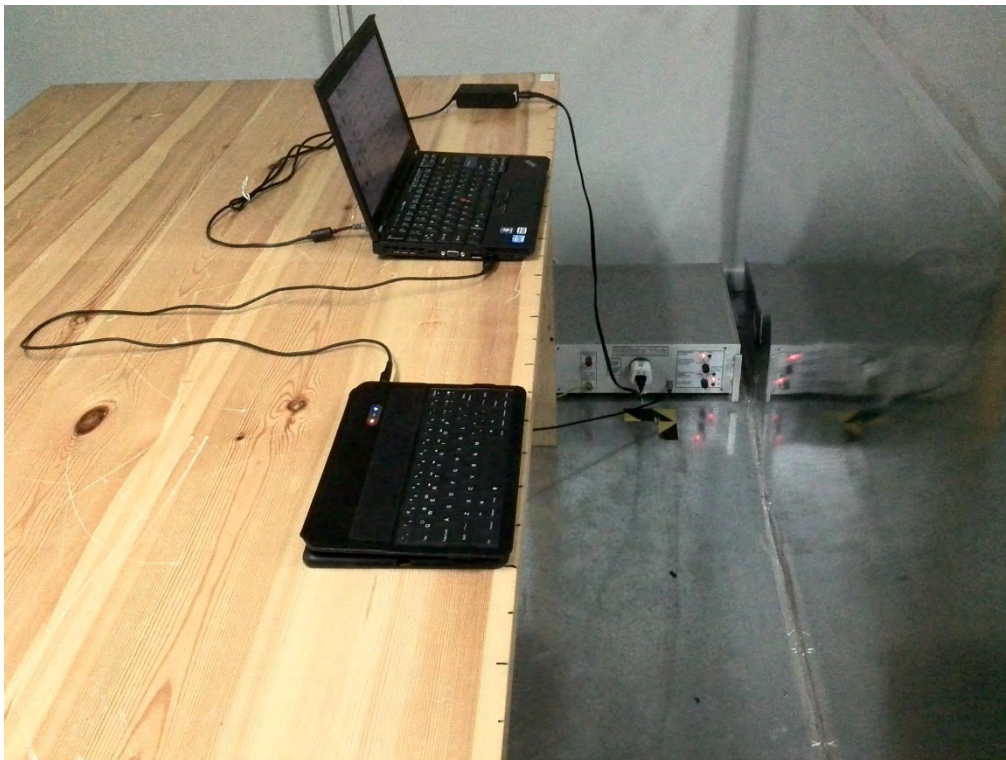


Above 1GHz(The model name HCD-008)

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 model name HCD - 006



THE FRONT OF EUT1



THE FRONT OF EUT2



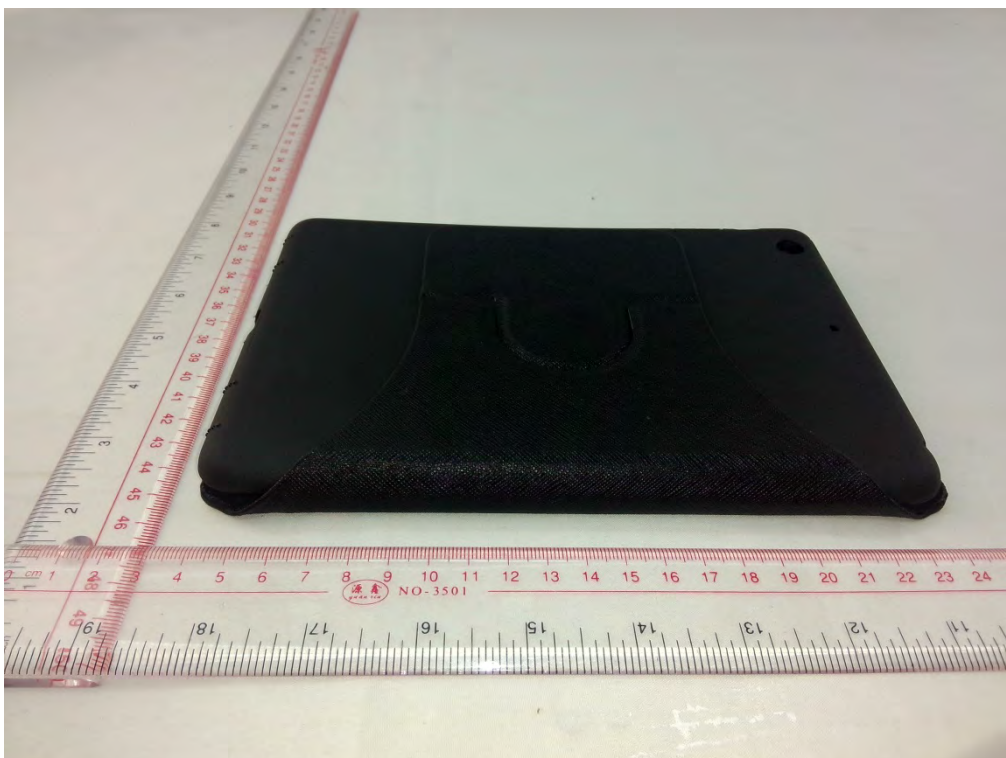
THE BACK OF EUT



THE LEFT OF EUT



THE RIGHT OF EUT



THE UP OF EUT



THE DOWN OF EUT

The model name HCD - 008



THE FRONT OF EUT1



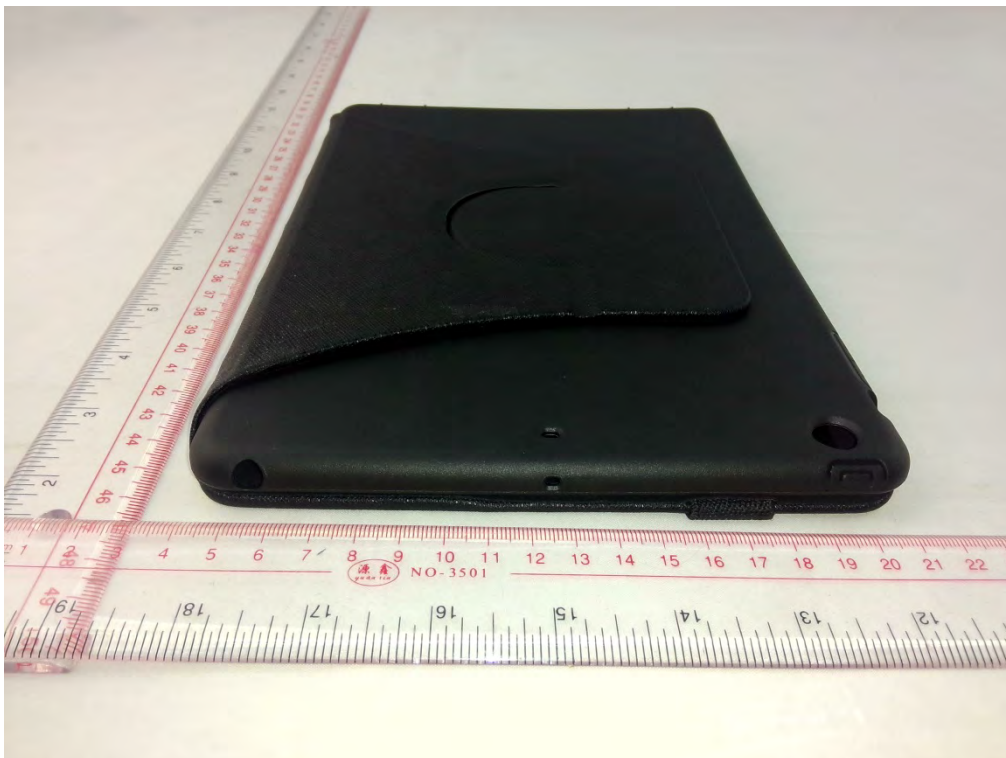
THE FRONT OF EUT2



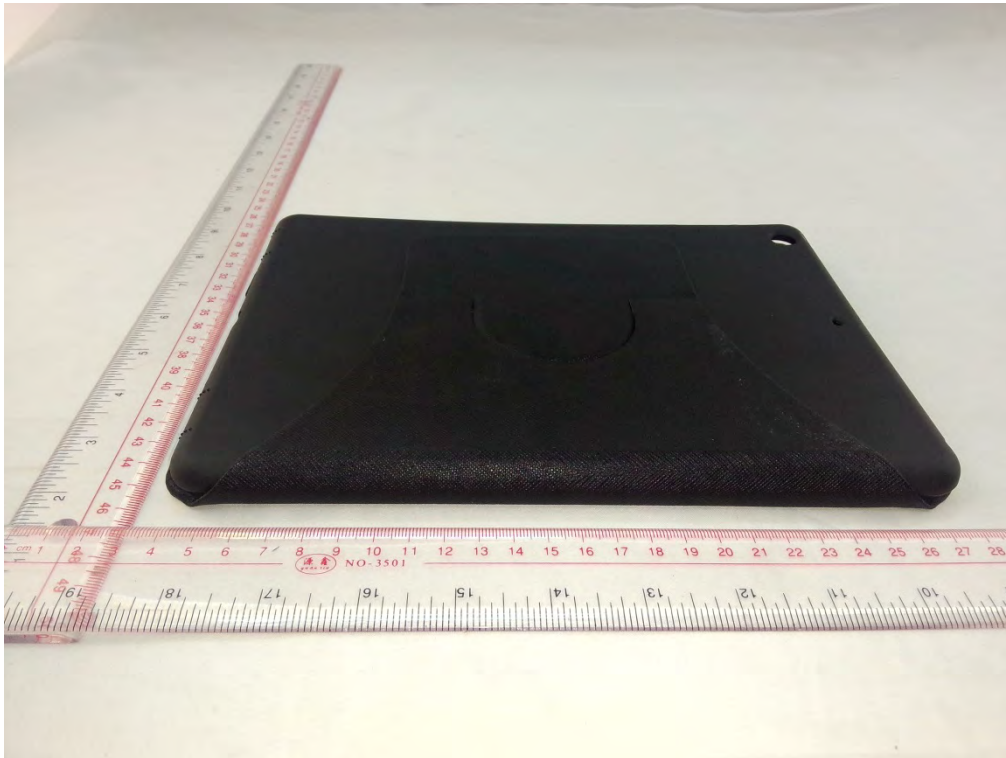
THE BACK OF EUT



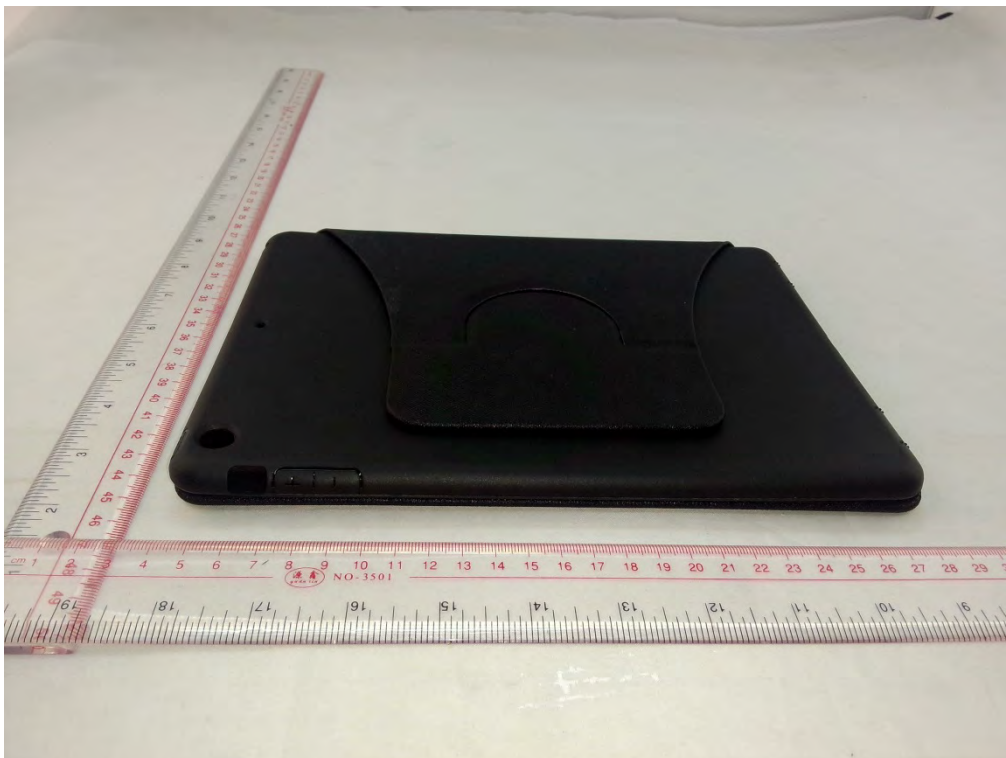
THE LEFT OF EUT



THE RIGHT OF EUT



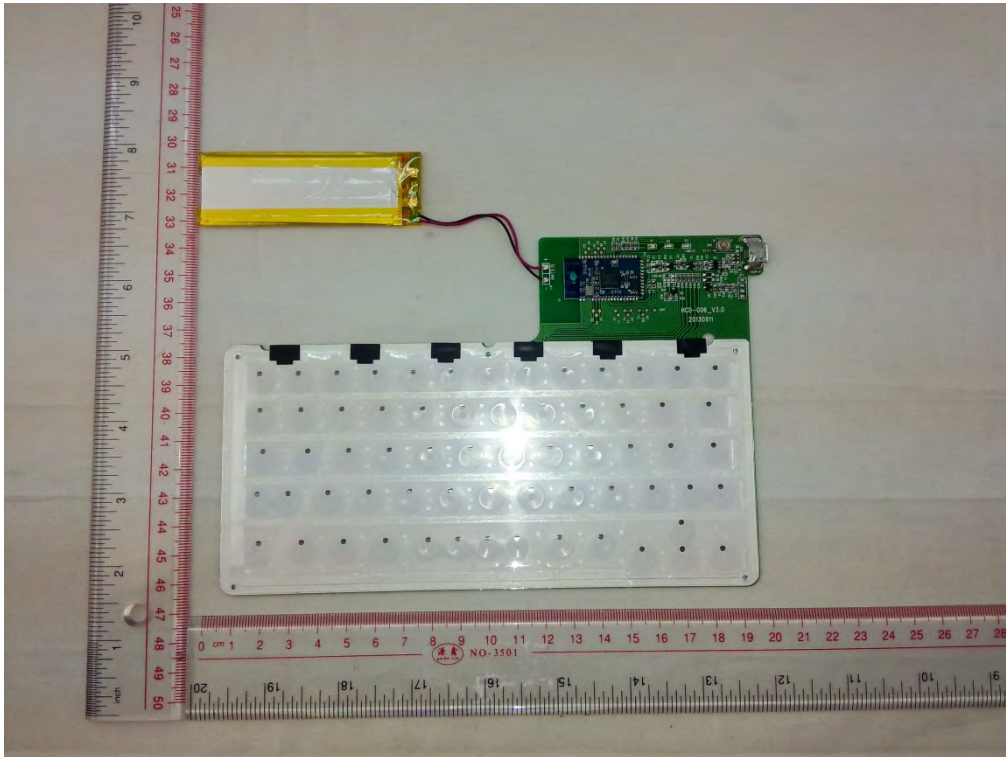
THE UP OF EUT



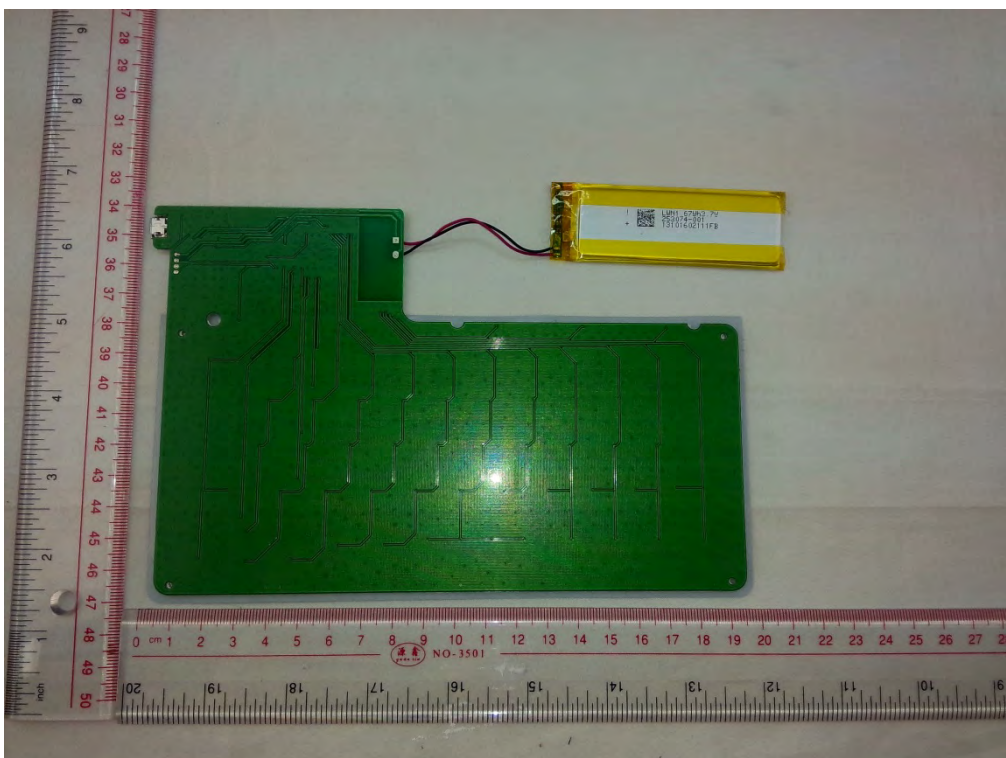
THE DOWN OF EUT

C.2 Inside of the EUT

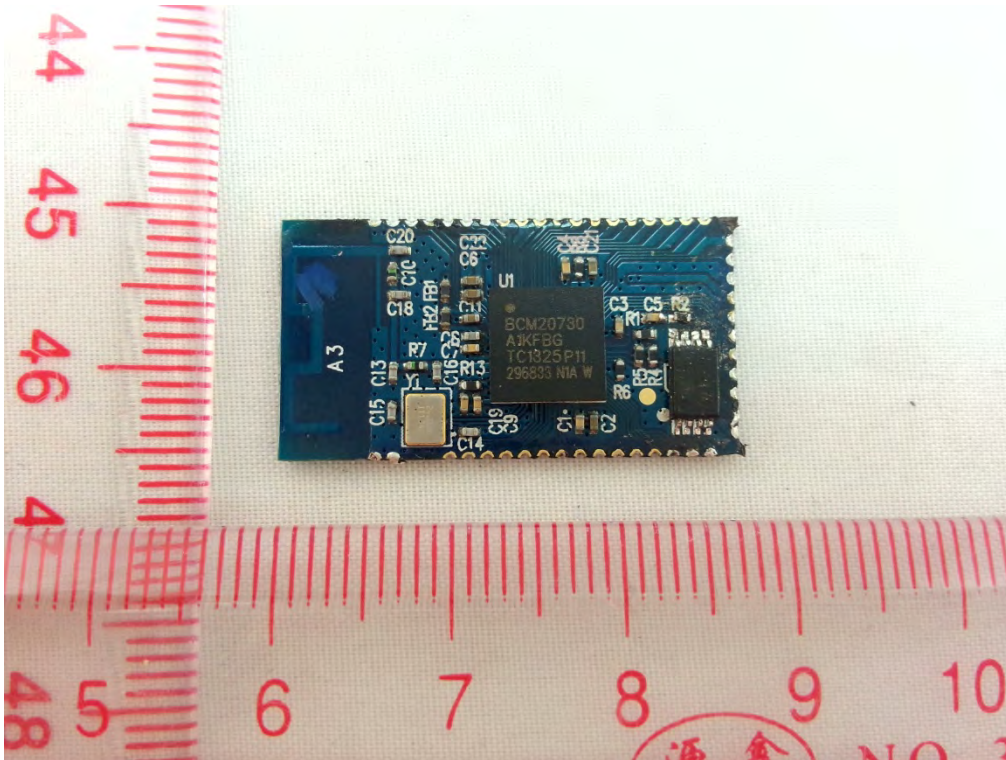
The model name HCD - 006



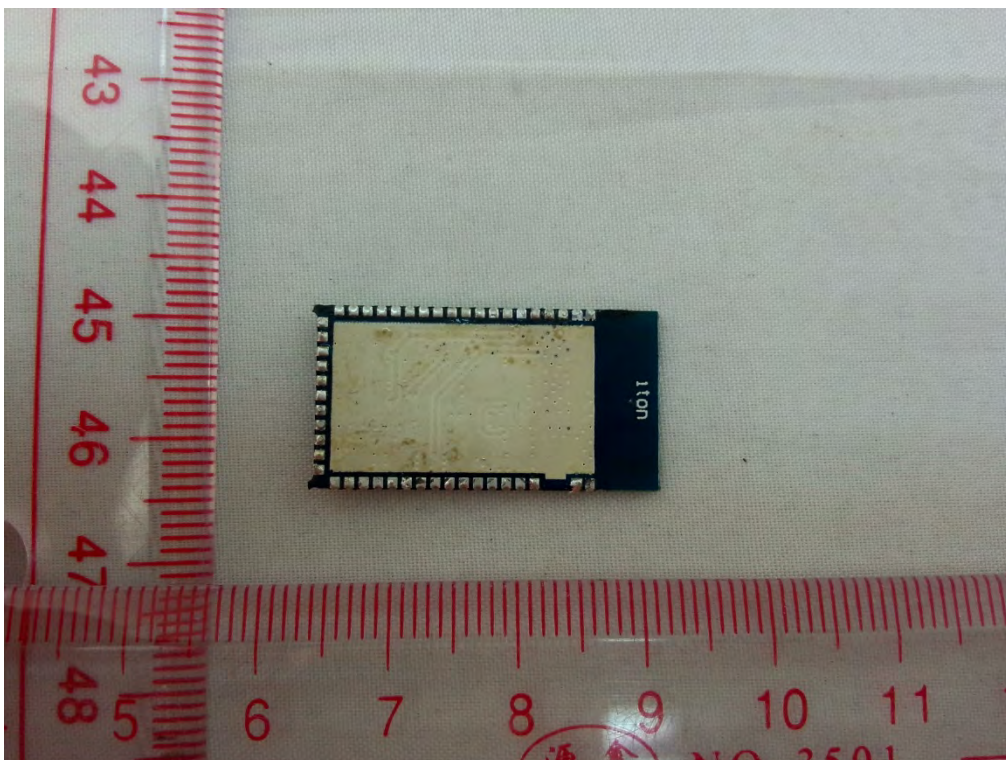
Main Board



Main Board

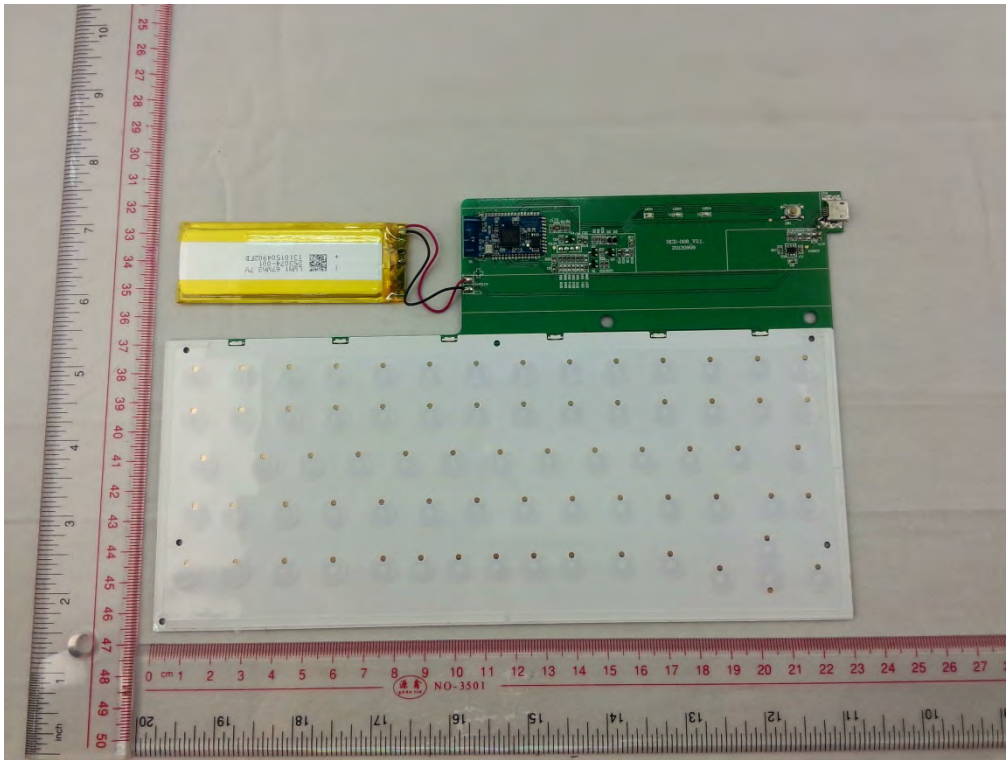


RF Board (FRONT)

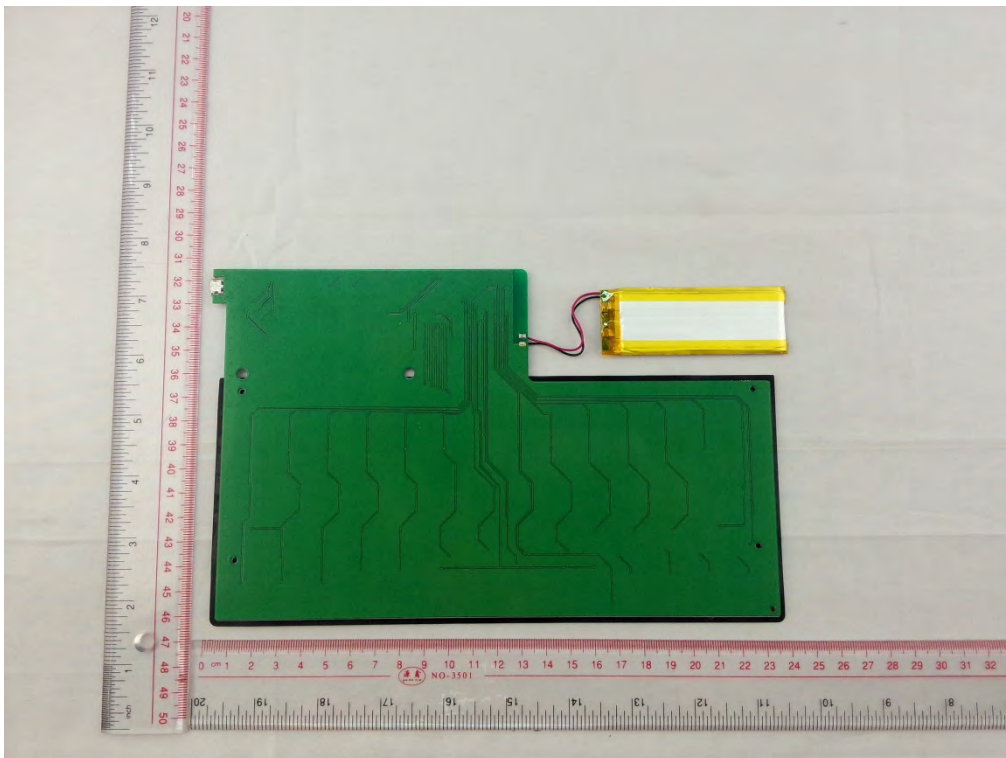


RF Board (BACK)

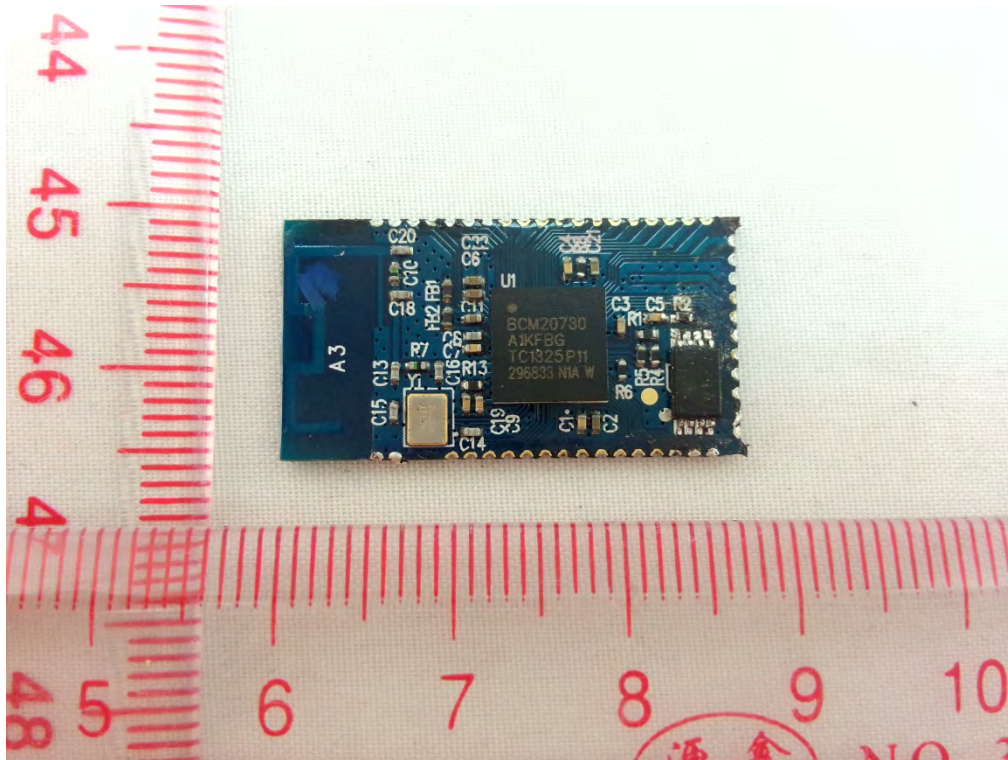
The model name HCD - 008



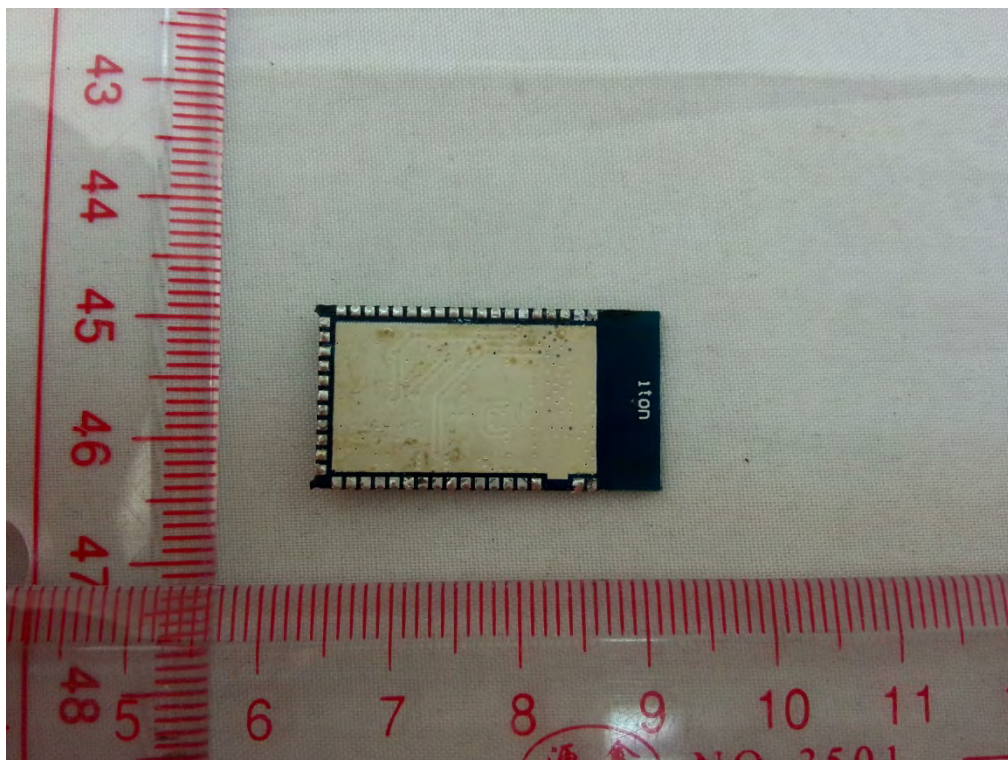
Main Board



Main Board



RF Board (FRONT)



RF Board (BACK)

--END OF REPORT--