

## **FCC ID TEST REPORT**

for

scissors feet ABS bluetooth keyboard

Model: HB023A

FCC ID: QZMHB023A

Prepared for: Shenzhen Bluekey Technology Co., Ltd.  
16B, Yongfu, Guoqi Building, Shangbu South Road, Futian District,  
Shenzhen, China.

Prepared by: Shenzhen TCT Testing Technology Co., Ltd  
1F, Building 1, Yibaolai Industrial Park, Qiaotou Village, Fuyong Town,  
Baoan District, Shenzhen, Guangdong, China

TEL: +86-0755-27363466

FAX: +86-0755-27673332

Report Number: TCS1211014-1

Date of Test: January 04~10, 2013

Date of Report: January 10, 2013

*The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced except in full, without written approval from TCT Testing Technology.*

## Table of Contents

<b>1.0</b>	<b>General Details .....</b>	<b>3</b>
1.1	Test Lab Details.....	3
1.2	Applicant Details.....	3
1.3	Description of EUT .....	4
1.4	Submitted Sample.....	4
1.5	Test Duration.....	4
1.6	Test By.....	4
<b>2.0</b>	<b>List of Measurement Equipment.....</b>	<b>5</b>
<b>3.0</b>	<b>Technical Details.....</b>	<b>6</b>
3.1	Summary of Test Results.....	6
3.2	Test Standards.....	6
<b>4.0</b>	<b>EUT Modification.....</b>	<b>6</b>
<b>5.0</b>	<b>Measurement Uncertainty.....</b>	<b>6</b>
<b>6.0</b>	<b>Power Line Conducted Emission Test.....</b>	<b>7</b>
6.1	Schematics of the test.....	7
6.2	Test Method and Test Procedure.....	7
6.3	EUT Operating Condition.....	7
6.4	Test Equipment.....	7
6.5	Conducted Emission Limit.....	8
6.6	Photo documentation of the test set-up .....	8
6.7	Test specification.....	8
6.8	Test result.....	8
<b>7.0</b>	<b>20 dB Bandwidth Measurement.....</b>	<b>11</b>
7.1	Test Equipment.....	11
7.2	Test Specification.....	11
7.3	Limit.....	11
7.4	Test Result.....	11
<b>8.0</b>	<b>Maximum Peak Output Power.....</b>	<b>14</b>
<b>9.0</b>	<b>Carrier Frequency Separation.....</b>	<b>15</b>
<b>10.0</b>	<b>Number of Hopping Channels.....</b>	<b>18</b>
<b>11.0</b>	<b>Time of Occupancy (Dwell Time).....</b>	<b>20</b>
<b>12.0</b>	<b>Band age Measurement.....</b>	<b>23</b>
<b>13.0</b>	<b>Spurious Emission Test.....</b>	<b>28</b>
<b>14.0</b>	<b>Antenna Requirement.....</b>	<b>37</b>
<b>15.0</b>	<b>Maximum Permissible Exposure.....</b>	<b>38</b>
<b>16.0</b>	<b>FCC ID Label.....</b>	<b>39</b>
<b>17.0</b>	<b>Photos of testing.....</b>	<b>40</b>
<b>18.0</b>	<b>Photos for the EUT.....</b>	<b>42</b>

Shenzhen TCT Testing Technology Co., Ltd.

## 1.0 General Details

### 1.1 Test Lab Details

Name : Shenzhen Tongce Testing Lab  
Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan District, Shenzhen City, China  
Telephone: +86-755-33026382  
Fax: +86-755-27952656

Site Listed with Federal Communication Commission

Registration Number: 572331

For 3m chamber

Site Listed with Industry Canada of Ottawa, Canada

Registration Number IC: 10668A-1

For 3m chamber

### 1.2 Applicant Details

Applicant: Shenzhen Bluekey Technology Co., Ltd.  
Address: 16B, Yongfu, Guoqi Building, Shangbu South Road, Futian District, Shenzhen, China  
Telephone: 0755-22303034  
Fax: 0755-82150362

Manufacturer: Shenzhen Bluekey Technology Co., Ltd.  
Address: 16B, Yongfu, Guoqi Building, Shangbu South Road, Futian District, Shenzhen, China  
Telephone: 0755-22303034  
Fax: 0755-82150362

Shenzhen TCT Testing Technology Co., Ltd.

### 1.3 Description of EUT

Product: scissors feet ABS bluetooth keyboard  
Model No.: HB023A  
Additional Model No.: BL-1030,BL-1030-2,BL-1028,BL-1028-2,BL-1022,BL-1022-2,HB023B,  
BL-1068,BL-1068-2,BL-1090,BL-1090-2  
Brand Name: N/A  
Additional Trade Name: N/A  
Rating: DC 3.7V (lithium battery)  
Modulation Type: GFSK  
Transfer Data Rate 1 Mbps  
Channel number: 79  
Channel spacing: 1 MHz  
Operation Frequency: 2402~2480MHz  
Antenna Designation: An integral antenna and the maximum gain is 0 dBi.

1.4 Statement: These models are identical in interior structure, electrical circuits and components, and just model names, shape and colour are different for the marketing requirement.

### 1.5 Test Duration

2013-01-04 to 2013-01-10

### 1.6 Test Engineer

The sample tested by



Printed name: Jack Kang

Shenzhen TCT Testing Technology Co., Ltd.

## 2.0 Test equipments and Associated Equipment used during the test.

### 2.1 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2012-12-03	2013-12-02
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2012-12-03	2013-12-02
System Controller	CT	SC100	-	2012-02-17	2013-02-16
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	2012-02-17	2013-02-16
Pre-amplifier	Teseq	LAN6900	--	2012-02-17	2013-02-16
Pre-amplifier	Agilent	8447D	83153007374	2012-02-17	2013-02-16
Pre-amplifier	Agilent	8449B	3008A01738	2012-02-17	2013-02-16
Triple-loop antenna	ROHDE&SCHWARZ	HM020	843885/002	2012-02-17	2013-02-16
Horn Antenna	ETS LINDGREN	3117	--	2012-02-17	2013-02-16
Horn Antenna	ETS LINDGREN	3160	--	2012-02-17	2013-02-16

### 2.2 AE used during the test

Equipment type	Manufacturer	Model
N/A		
N/A		
N/A		
N/A		

### 3.0 Technical Details

#### 3.1 Summary of test results

The EUT has been tested according to the following specifications

Requirement	CFR 47 Section	Result	Notes
Power Line Conducted Emission Test	15.207(a)	PASS	Complies
20dB Channel Bandwidth	15.247 (a)(1), 15.215(c)	PASS	Complies
Maximum Peak Output Power	15.247(b)(1)	PASS	Complies
Carrier Frequency Separation	15.247 (a)(1)	PASS	Complies
Number of Hopping Channels	15.247(a)(iii)	PASS	Complies
Time of Occupancy (Dwell Time)	15.247(a)(iii)	PASS	Complies
Band age Measurement, Spurious Emission Test	15.247 (d), 15.205 (a), 15.209 (a)	PASS	Complies
Antenna Requirement	15.203	PASS	Complies
RF Exposure	15.247(b), 1.1307(b)	PASS	Complies

#### 3.2 Test Standards

FCC Part 15:2011 Subpart C, Paragraph 15.247

### 4.0 EUT Modification

No modification by Shenzhen TCT Testing Technology Co., Ltd

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

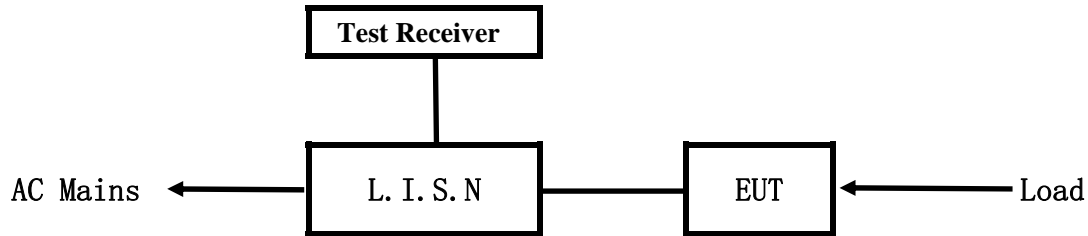
No.	Item	MU
1.	Radio Frequency	$\pm 1 \times 10^{-9}$
2.	Temperature	$\pm 0.1^{\circ}\text{C}$
3.	Humidity	$\pm 1.0\%$
4.	RF power, conducted	$\pm 0.34\text{dB}$
5.	RF power density, conducted	$\pm 1.45\text{dB}$
6.	Spurious emissions, conducted	$\pm 3.70\text{dB}$
7.	All emissions, radiated	$\pm 4.50\text{dB}$

Note: 1) The EUT is a Bluetooth device, which has a USB port. USB port is used to charge to the built-in battery by a PC with AC120V/60Hz

2) Low channel: 2402MHz, Middle channel: 2441MHz, High channel: 2480MHz

## 6.0 Power Line Conducted Emission Test

### 6.1 Schematics of the test



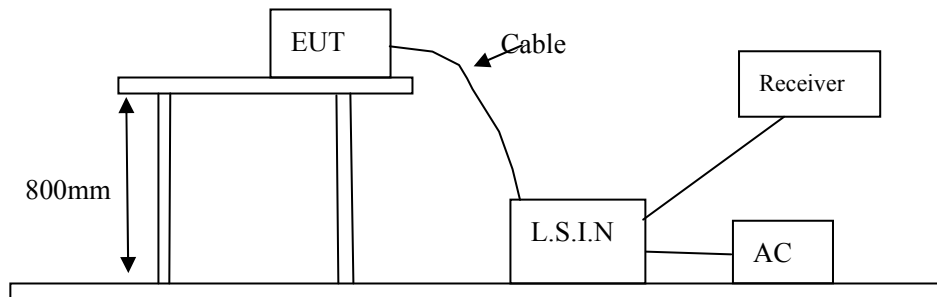
EUT: Equipment Under Test

### 6.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2009. The Frequency spectrum From 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



### 6.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009

- 1) Setup the EUT and simulators as shown on the following
- 2) Enable AF signal and confirm EUT active to normal condition

### 6.4 Test Equipment

Please refer to the Section 2

#### 6.5 Conducted Emission Limit

Frequency(MHz)	Class A Limits (dB $\mu$ V)		Class B Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

Notes: 1) \*Decreasing linearly with logarithm of frequency.  
2) The tighter limit shall apply at the transition frequencies

#### 6.6 Photo documentation of the test set-up

Please refer to the Section 17

#### 6.7 Test specification:

Environmental conditions: Temperature: 22° C Humidity: 52% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

The test was carried out in the following operation mode(s):

- Charging mode

#### 6.8 Test result

Min. limit margin 11.12 dB at 1.4273 MHz

The requirements are FULFILLED

Remarks: 1) According to FCC part 15.207(a)

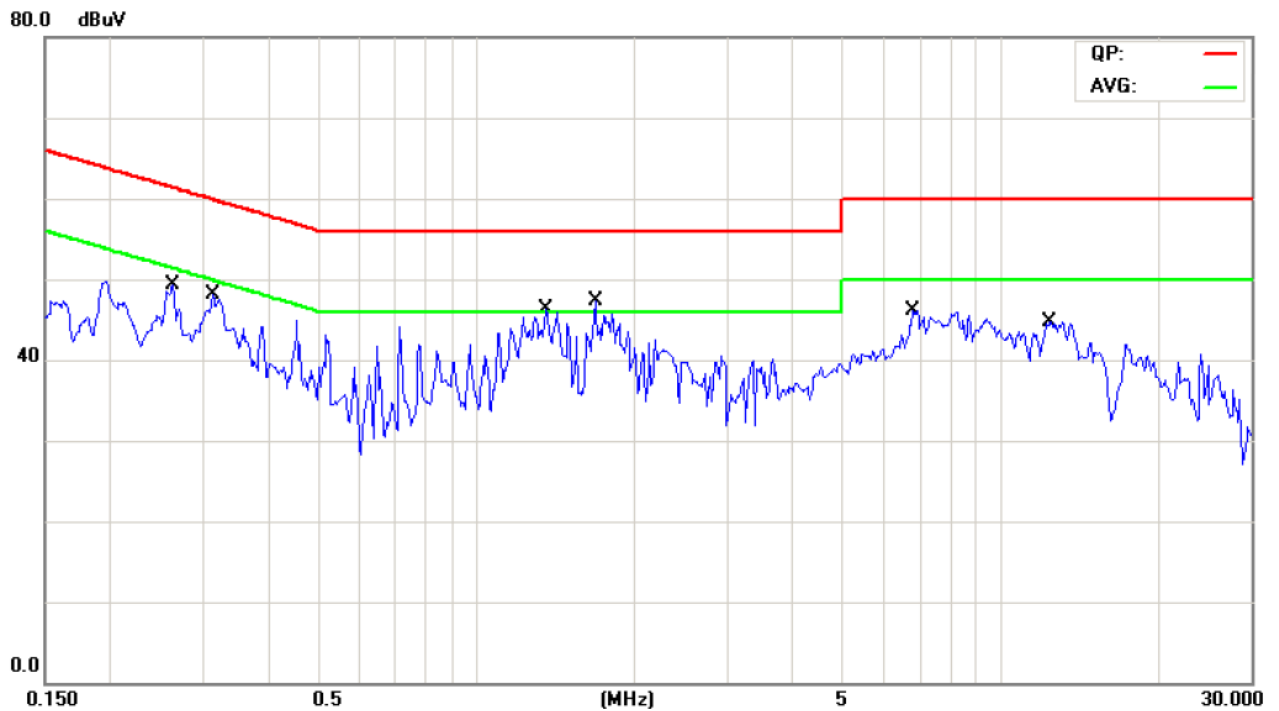
2) The EUT can operate in charging mode



**A Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)**

EUT Description: scissors feet ABS bluetooth keyboard  
Operation Mode: Charging mode  
Tested By: Charlle Lai  
Test date: January 05, 2013

Start Frequency 0.15MHz Stop Frequency 30MHz Step 4.5KHz IF BW 10KHz Detector QP+AV Final M-Time 1s



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral		Quasi-peak	Average
	Quasi-peak	Average	Quasi-peak	Average		
0.2631	46.29	31.99	--	--	61.33	51.33
0.3140	46.01	33.21	--	--	59.86	49.86
1.3568	42.31	26.61	--	--	56.00	46.00
1.6812	43.37	27.77	--	--	56.00	46.00
6.7690	44.15	29.75	--	--	60.00	50.00
12.4335	41.69	28.19	--	--	60.00	50.00

**B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)**

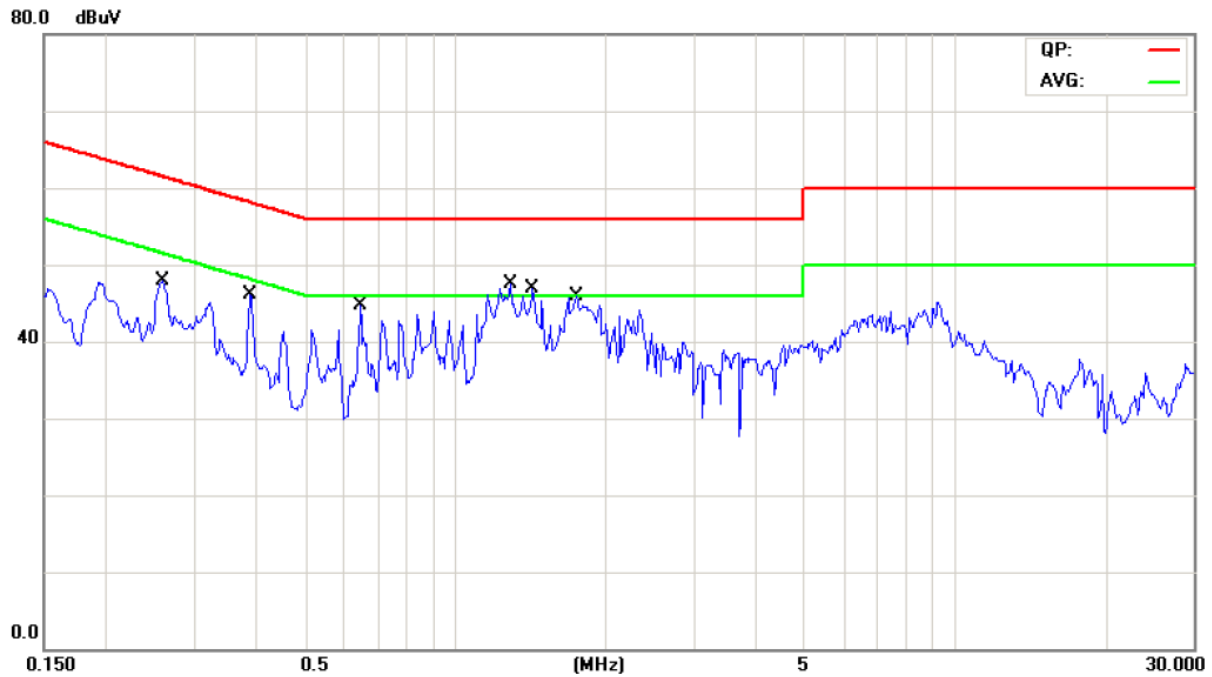
EUT Description: scissors feet ABS bluetooth keyboard

Operation Mode: Charging mode

Tested By: Charlie Lai

Test Data: January 05, 2013

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average		
0.2590	--	--	44.91	31.41	61.46	51.46
0.3881	--	--	44.19	29.69	58.10	48.10
0.6460	--	--	41.75	27.25	56.00	46.00
1.2943	--	--	43.48	27.88	56.00	46.00
1.4273	--	--	44.88	27.48	56.00	46.00
1.7437	--	--	42.82	25.92	56.00	46.00

## 7.0 20dB Bandwidth Measurement

### 7.1 Test Equipment

Please refer to the Section 2

### 7.2 Test Specification:

Environmental conditions:    Temperature    23° C    Humidity:    52%    Atmospheric pressure:    103kPa

### 7.3 Limit

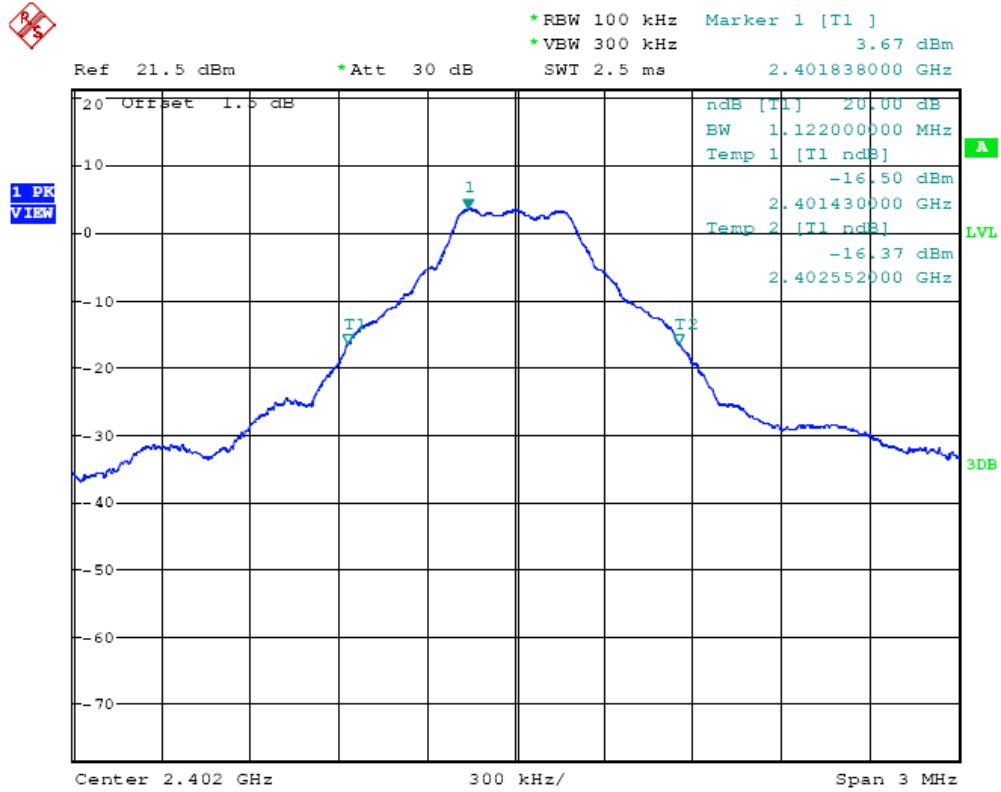
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 7.4 Test Result:

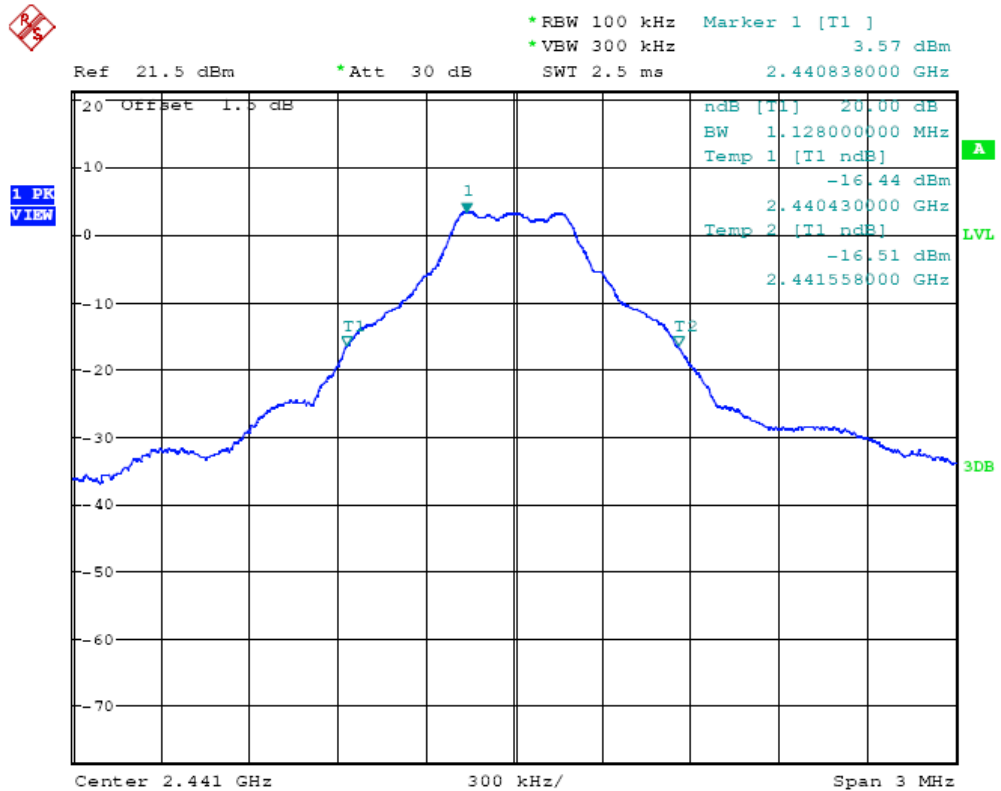
Modulation Type	Channel number	20dB Bandwidth (kHz)	Limit (kHz)	Conclusion
GFSK	Low	1122	---	PASS
	Middle	1128	---	PASS
	High	1122	---	PASS

Modulation: GFSK

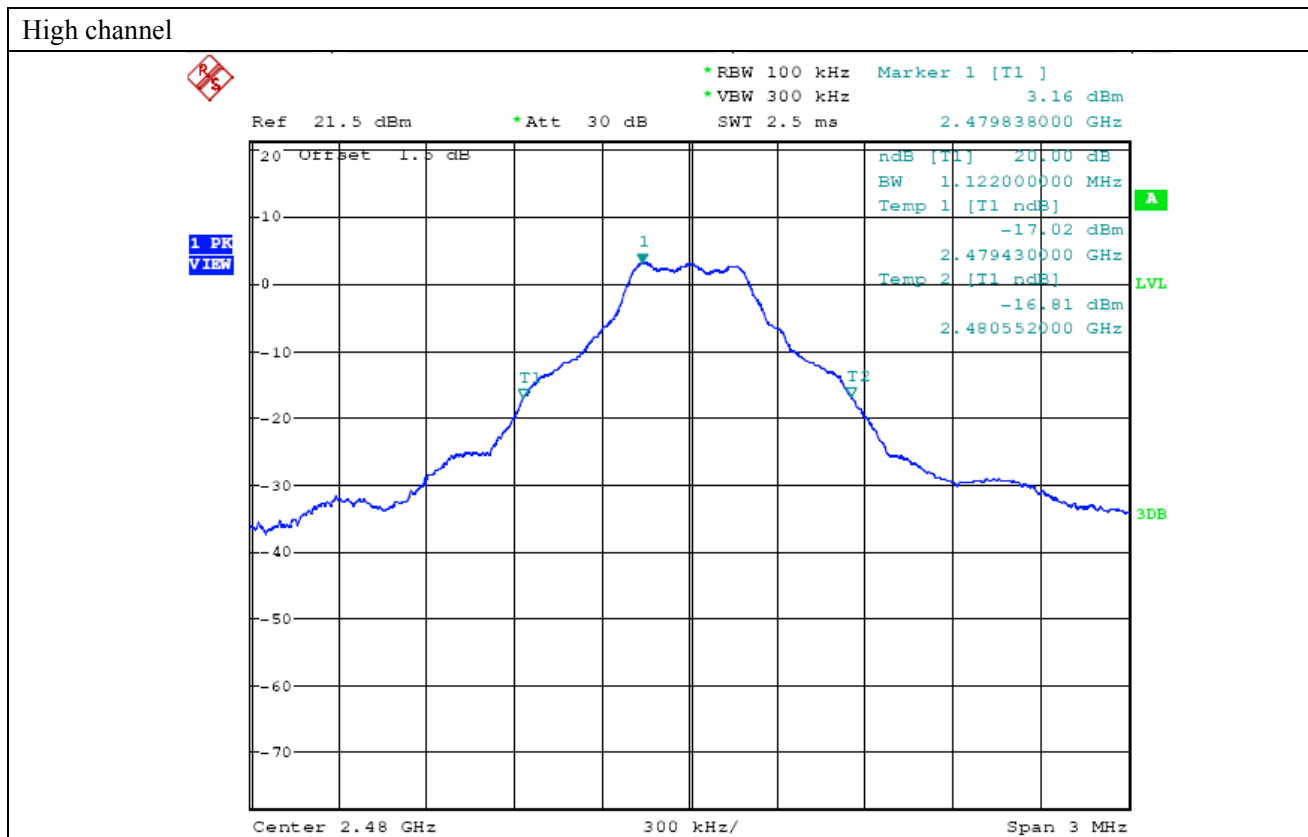
Low channel



Middle channel



## High channel



## 8.0 Maximum Peak Output Power

### 8.1 Test Equipment

Please refer to the Section 2

### 8.2 Test specification:

Environmental conditions: Temperature 23° C Humidity: 51% Atmospheric pressure: 103kPa

### 8.3 Test Procedure

- 1) Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2) Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centred on a hopping channel; RBW > the 20 dB bandwidth of the emission being measured; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold
- 3) Measure the highest amplitude appearing on spectral display and record the level to calculate results.
- 4) Repeat above procedures until all frequencies measured were complete.

### 8.4 Limits

According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band: 0.125 watts. According to §15.247(b)(4), 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.

### 8.5 Test Result

Modulation Type	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
GFSK	2402	3.45	30	Pass
	2441	3.37	30	Pass
	2480	3.03	30	Pass

Note: Peak Power Output = Peak Power Reading + Cable loss + Attenuator

## 9.0 Carrier Frequency Separation

### 9.1 Test Equipment

Please refer to the Section 2

### 9.2 Test specification:

Environmental conditions: Temperature 23° C Humidity: 52% Atmospheric pressure: 103kPa

### 9.3 Test Procedure

1. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span; Video (or Average) Bandwidth (VBW)  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold
2. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
3. Repeat above procedures until all frequencies measured were complete.

### 9.4 Limits

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 9.5 Test Result

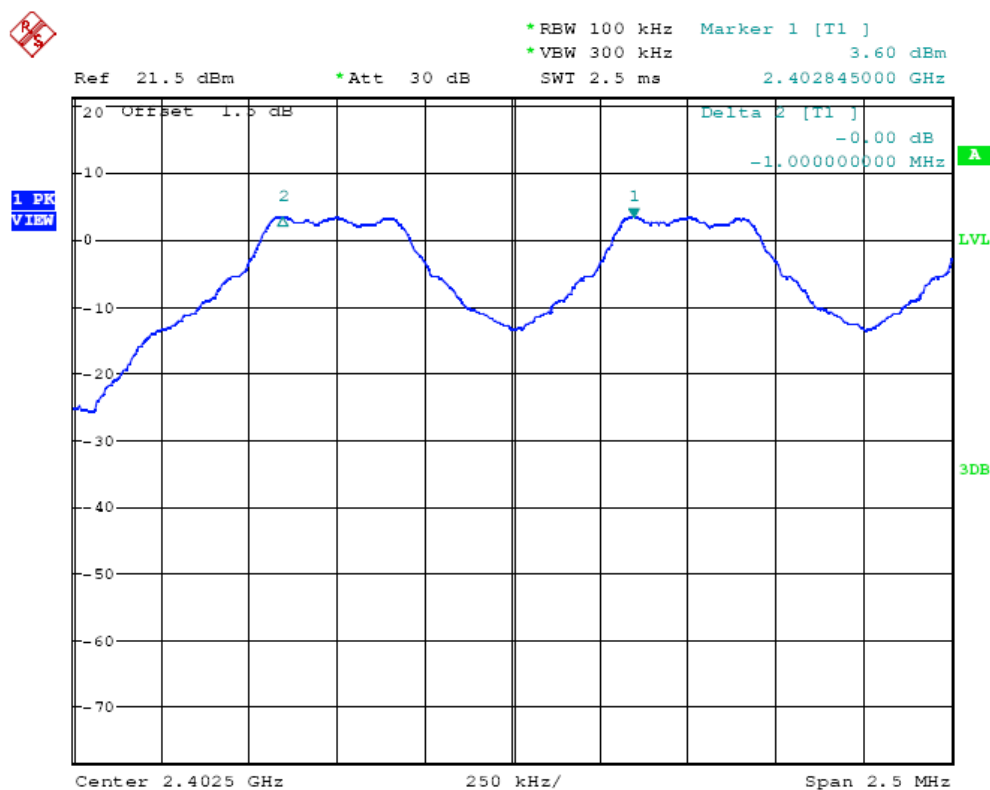
Modulation Type	Channel number	Carrier Frequency Separation	Limit	Pass/ Fail
GFSK	Low	1.000MHz	$\geq$ 25 kHz or two-thirds 20 dB bandwidth	Pass
	Middle	1.000MHz		Pass
	High	1.000MHz		Pass

Note: Two-thirds 20 dB bandwidth: 752 kHz

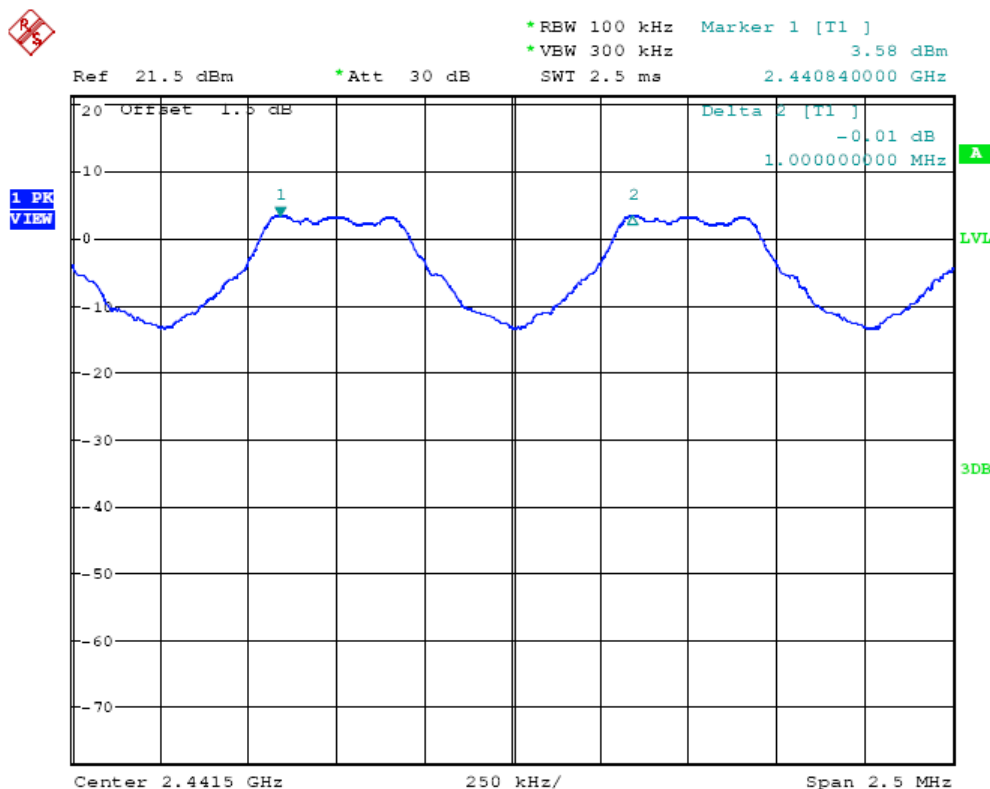
Shenzhen TCT Testing Technology Co., Ltd.

Modulation: GFSK

Low channel



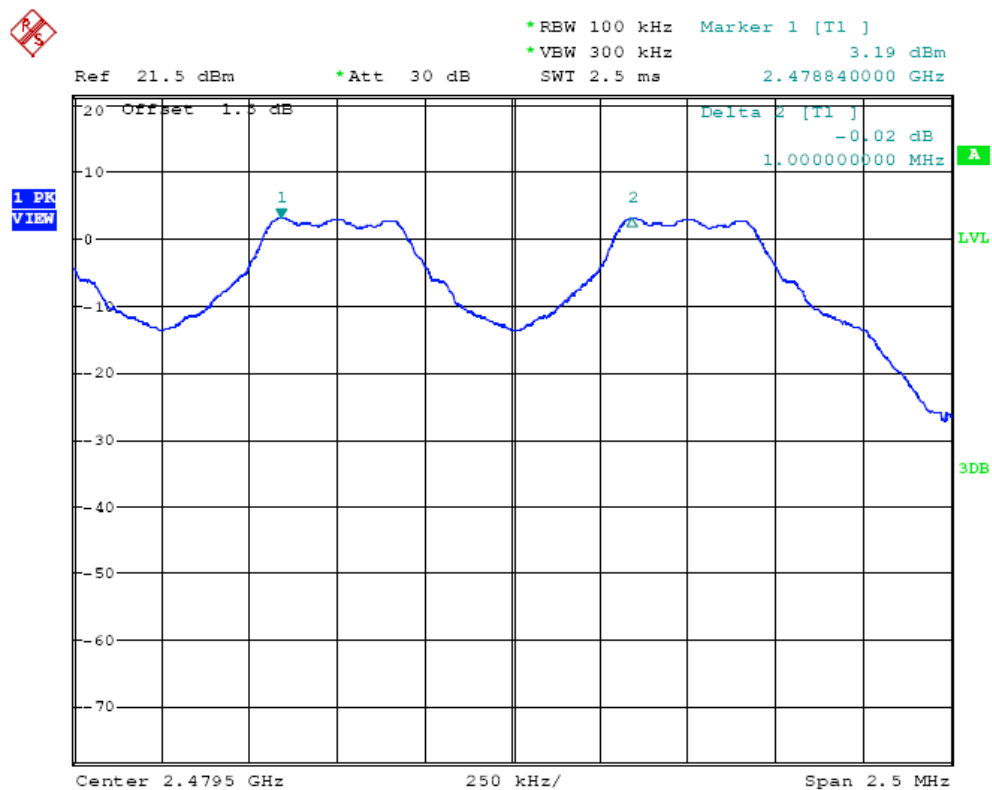
Middle channel





Shenzhen TCT Testing Technology Co., Ltd.

High channel



## 10.0 Number of Hopping Channels

### 10.1 Test Equipment

Please refer to the Section 2

### 10.2 Test specification:

Environmental conditions: Temperature 22° C Humidity: 52% Atmospheric pressure: 103kPa

### 10.3 Test Procedure

Set the spectrum analyzer as follows: Span = the frequency band of operation;  $RBW \geq 1\%$  of the span;  $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold

### 10.4 Limits

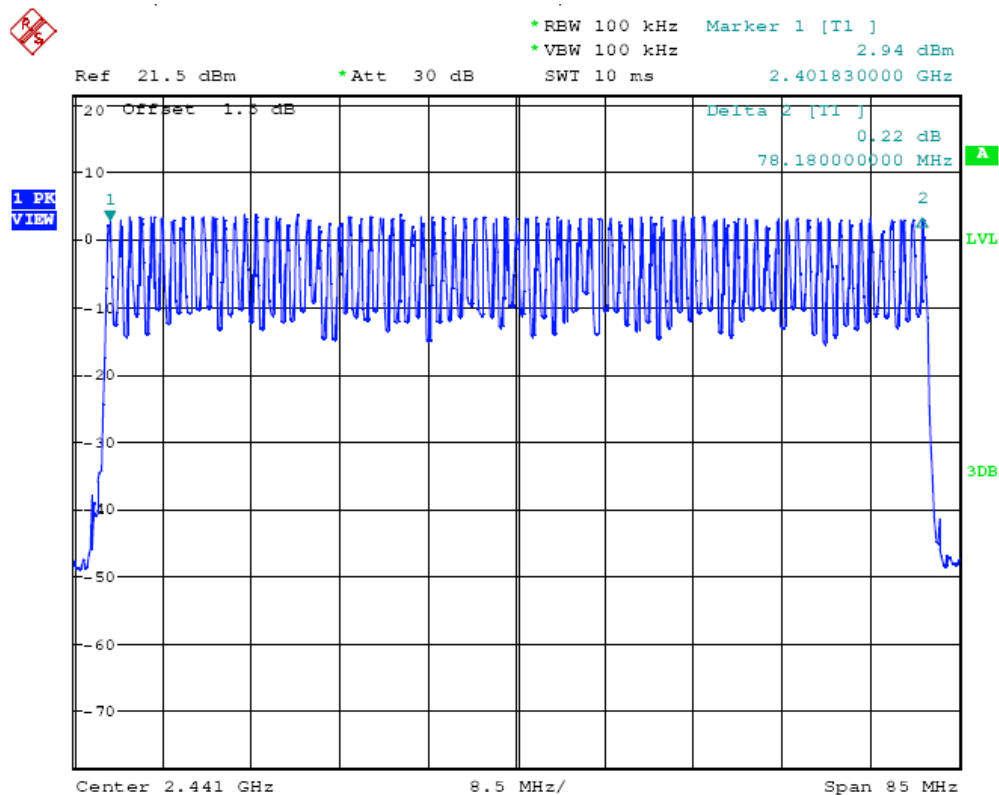
According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### 10.5 Test Result

Modulation Type	Operating Frequency	Number of hopping channels	Limit	Pass/ Fail
GFSK	2402-2480MHz	79	$\geq 15$	Pass

Test Plot:

Modulation Type: GFSK



## 11.0 Time of Occupancy (Dwell Time)

### 11.1 Test Equipment

Please refer to the Section 2

### 11.2 Test specification:

Environmental conditions: Temperature 22° C Humidity: 52% Atmospheric pressure: 103kPa

### 11.3 Test Procedure

Span = zero span, centred on a hopping channel; RBW = 1 MHz; VBW  $\geq$  RBW; Detector function = peak;

Sweep = as necessary to capture the entire dwell time per hopping channel; Trace = max hold

Measure the dwell time using the marker-delta function.

Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

### 11.4 Limits

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed

### 11.5 Test Result

Modulation Type	Packet	Reading (ms)	Hopping Rate	Actual (s)	Limit (s)
GFSK	DH1	0.410	800hop/s	0.1312	0.4
	DH3	1.670	400hop/s	0.2672	0.4
	DH5	2.915	266.667hop/s	0.3109	0.4

Note: 1) The measurements were conducted in High, Middle, Low channel. The Low channel could represent the character of the other channels, so the low channel measurement was submitted in the report only.

2) Actual = Reading  $\times$  (Hopping rate / Number of channels)  $\times$  Test period

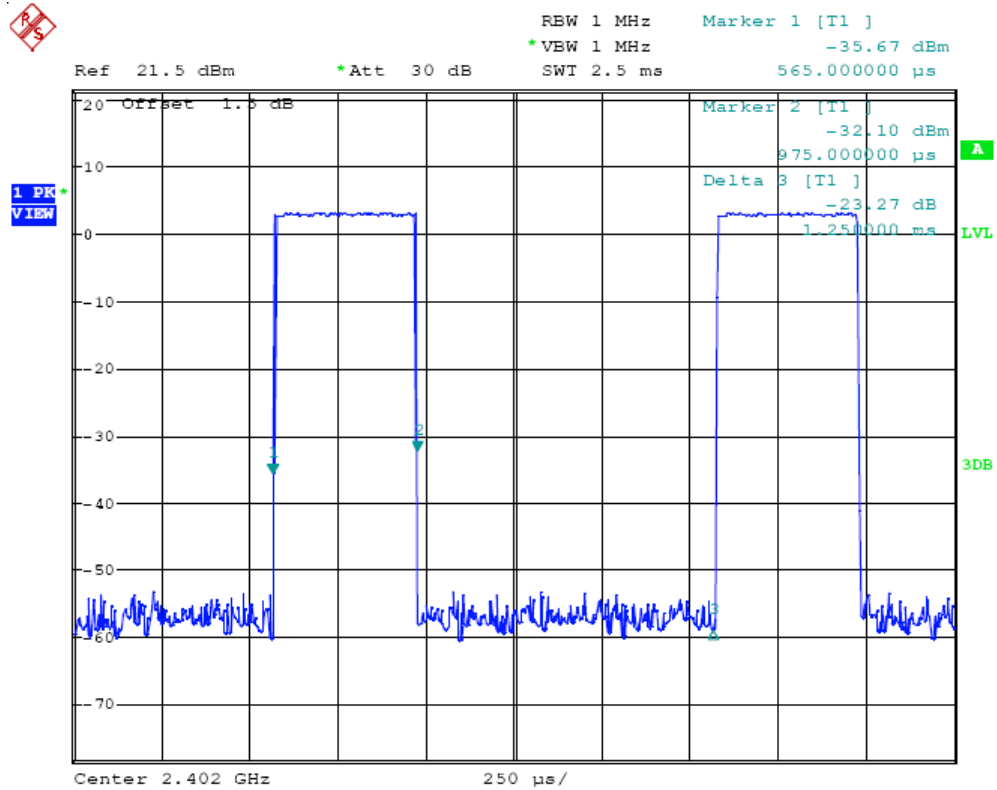
3) The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625 $\mu$ s with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. So the EUT makes worst case 266.667 hops per second with 79 channels, and the DH5 is the worst case.

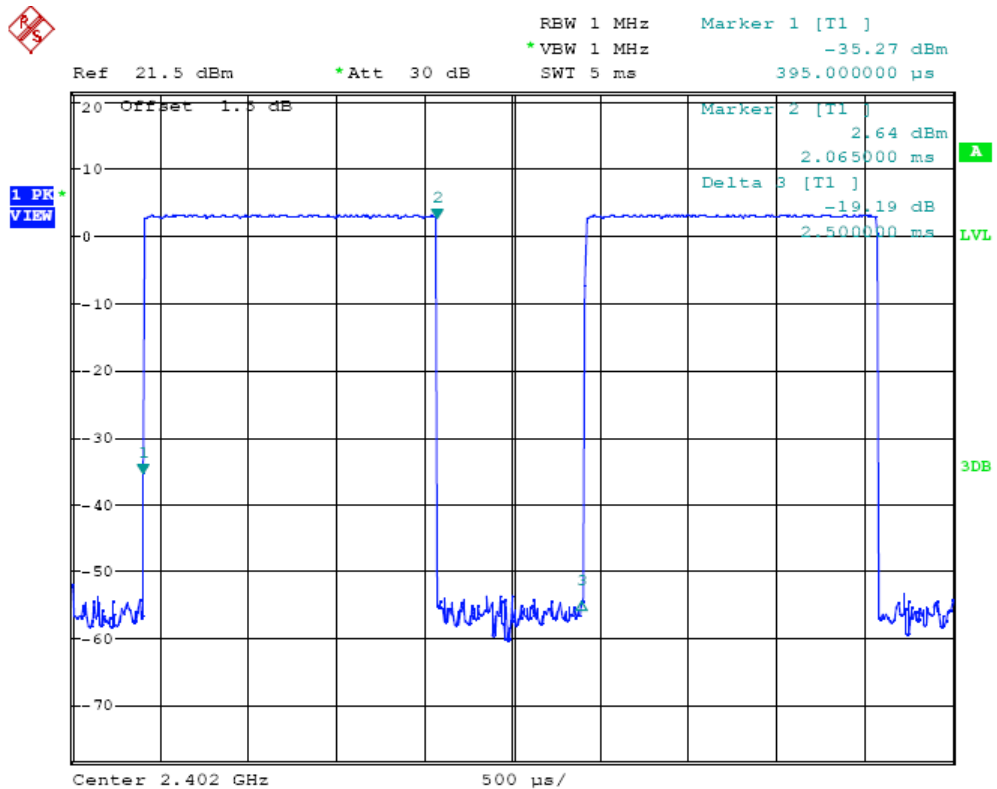
Shenzhen TCT Testing Technology Co., Ltd.

Modulation Type: GFSK

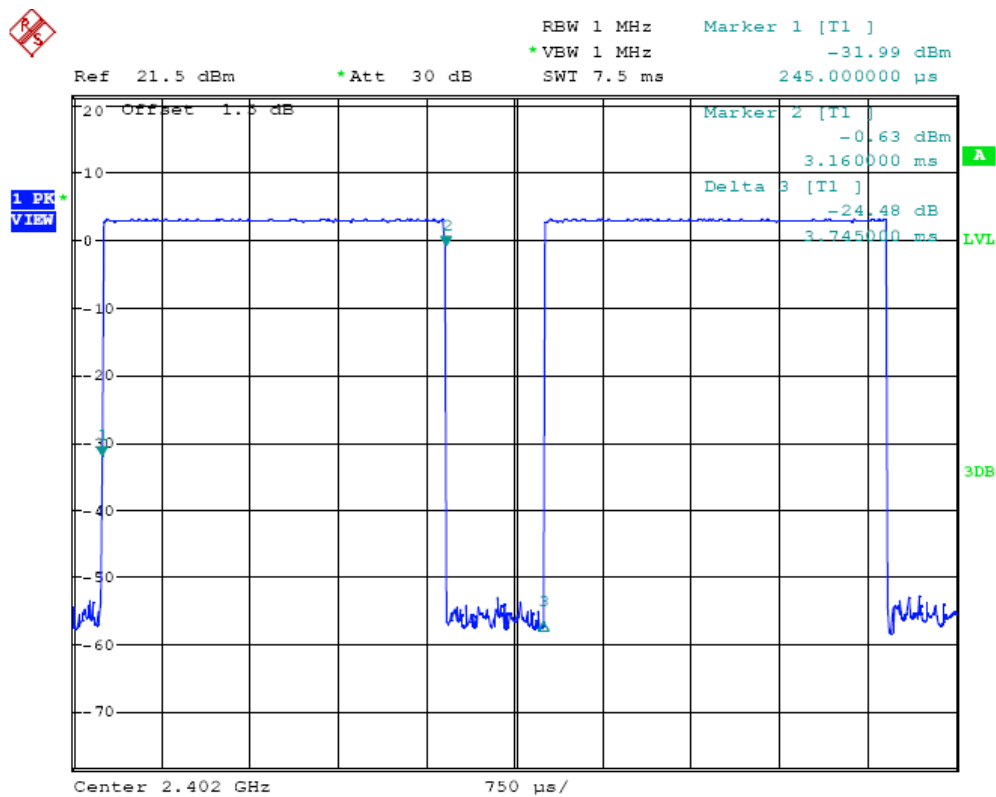
Packet Type: DH1



Packet Type: DH3



Packet Type: DH5



## **12.0 Band age Measurement**

### **12.1 Test Equipment**

Please refer to the Section 2

### **12.2 Test specification:**

Environmental conditions: Temperature 24° C Humidity: 52% Atmospheric pressure: 103kPa

### **12.3 Test Procedure**

For bandage test, the spectrum set as follows: RBW=VBW=100 kHz. A conducted measure method is used

For signals allocated in the restricted bands above and below the 2.4-2.483GHz, a radiated measurement is made

(Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz

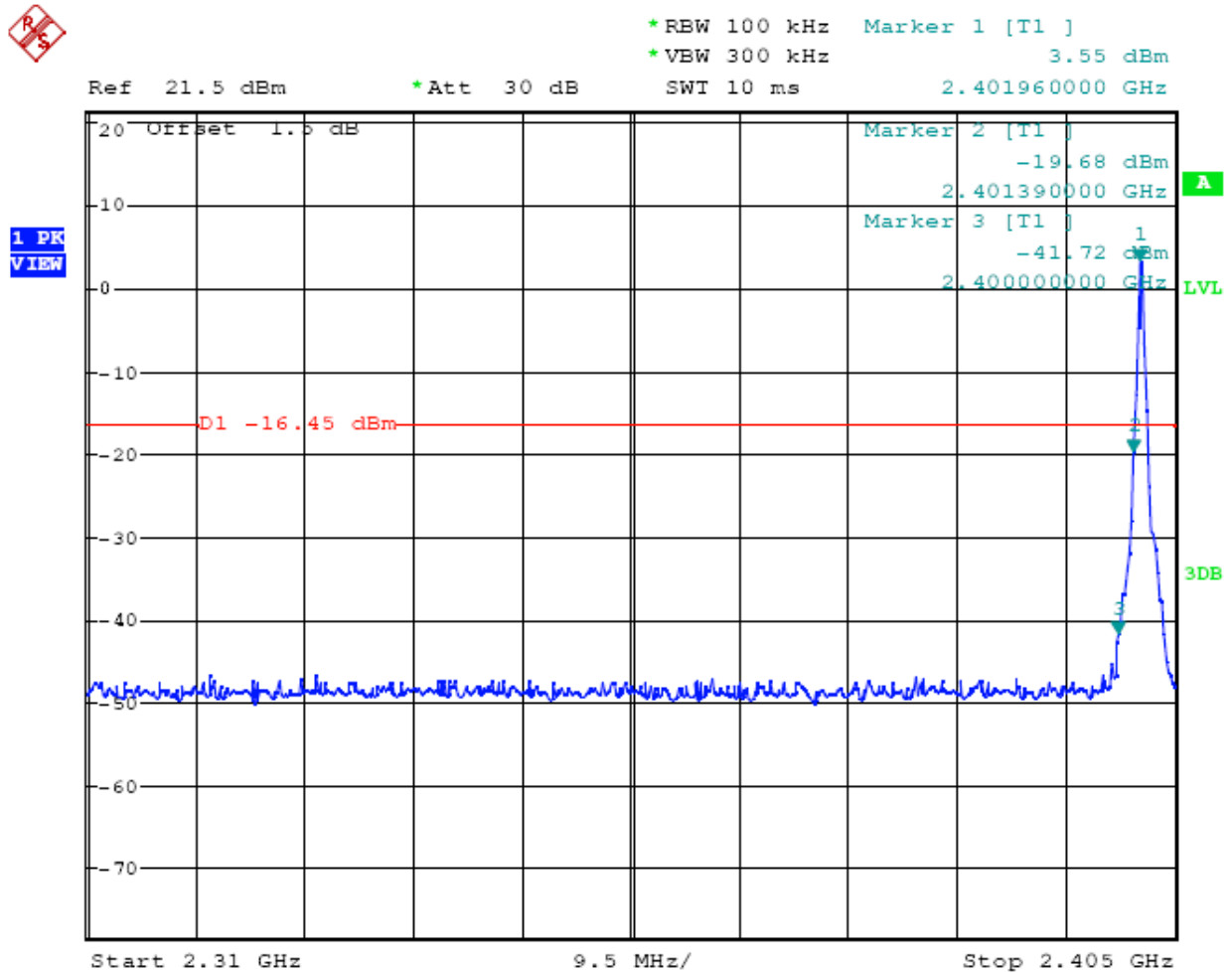
and PK detector)

### **12.4 Limit**

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

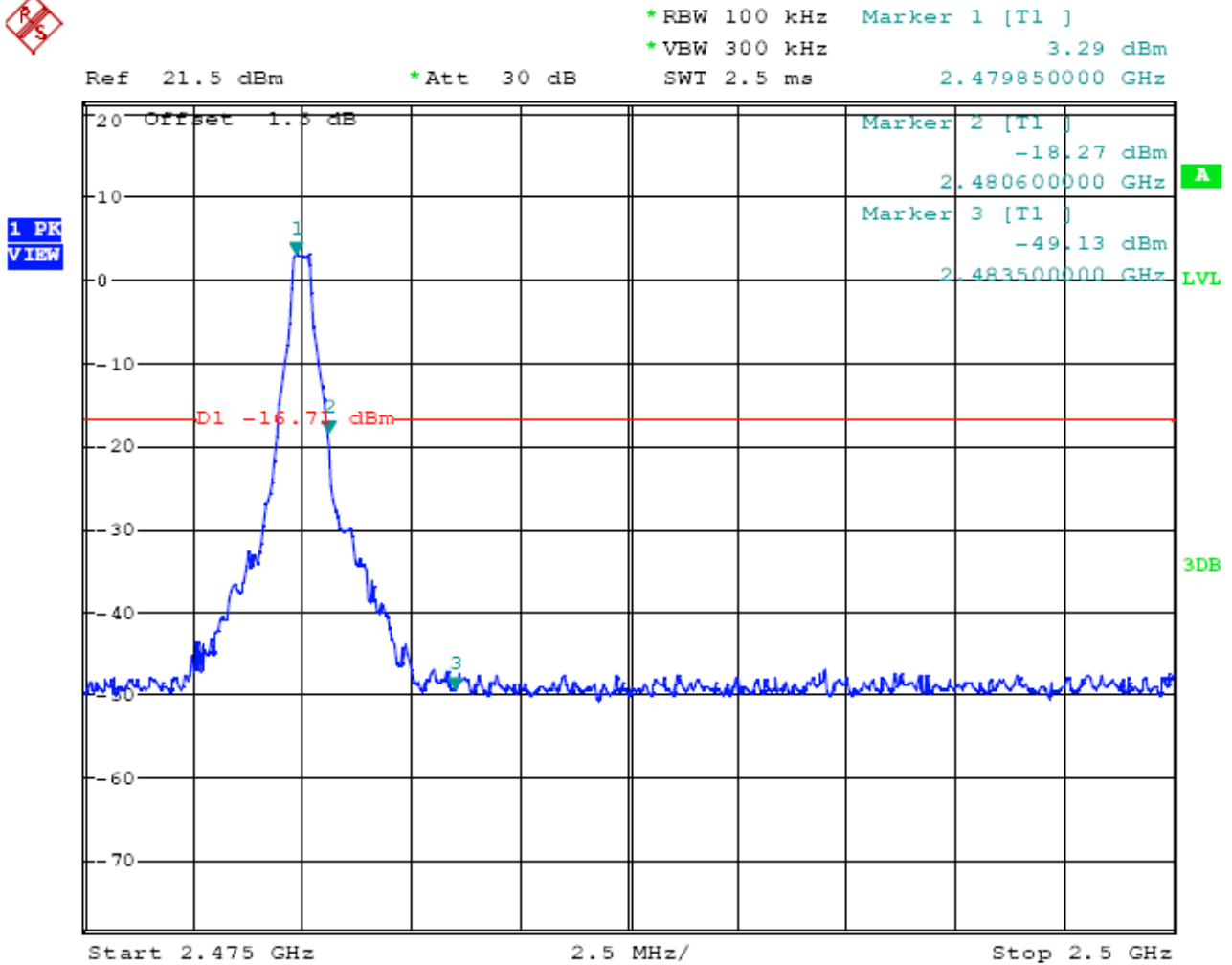
EUT operation mode: Keep transmitting in low channel



- Remark: 1) The radiated measurement was made in horizontal and vertical polarity;
- 2) The maximum emission was 49.05dBuV at 2351.9 MHz, which is more than 10 dB below the limit.
- 3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).



EUT operation mode: Keep transmitting in high channel

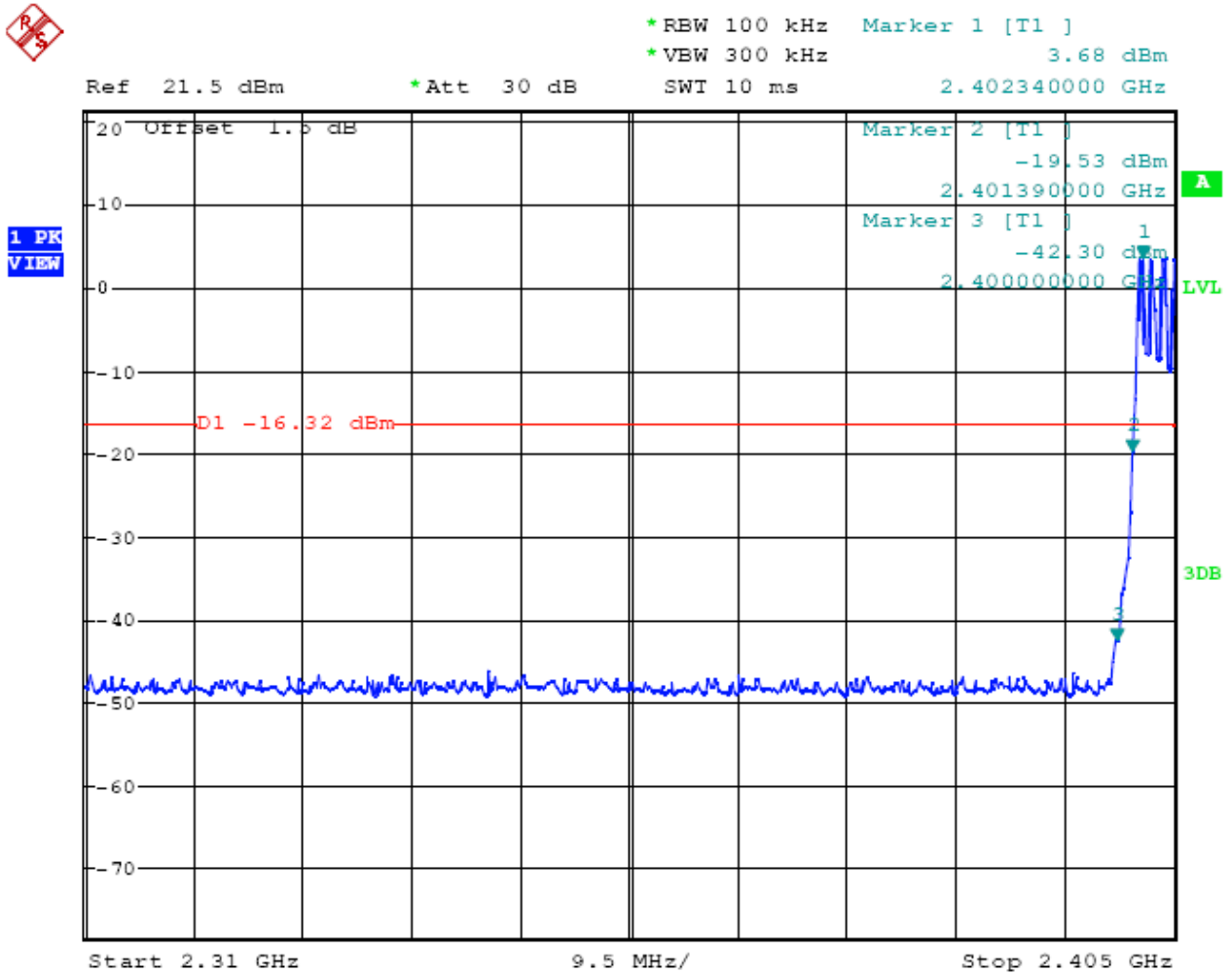


Remark: 1) The radiated measurement was made in horizontal and vertical polarity;

2) The maximum emission was 50.59dBuV at 2492.2 MHz, which is more than 10 dB below the limit;  
AV measurement is conducted, and the maximum emission is more than 10 dB below the limit.

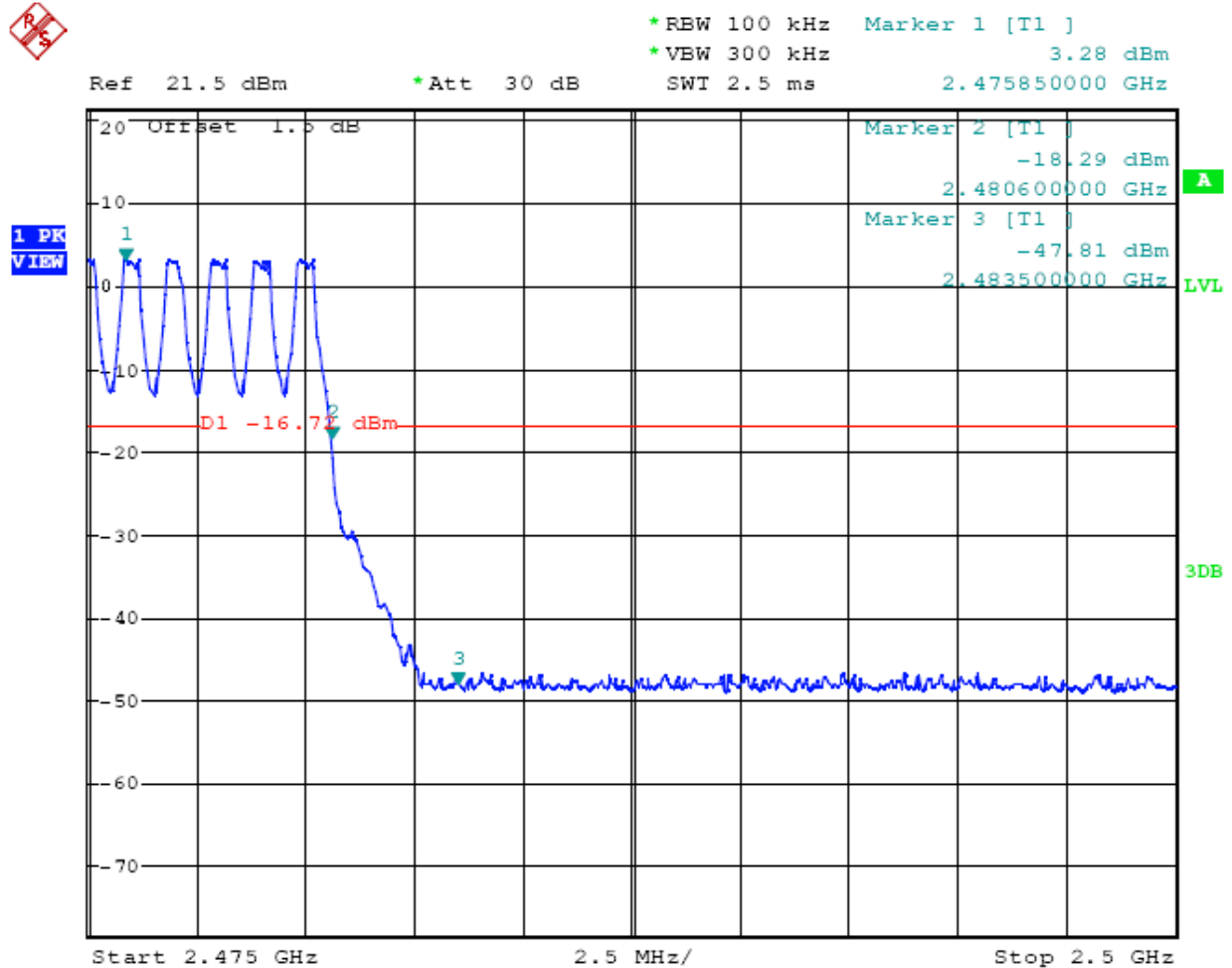
3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

EUT operation mode: Keep hopping



- Remark: 1) The radiated measurement was made in horizontal and vertical polarity;
- 2) The maximum emission was 50.13dBuV at 2351.1 MHz, which is more than 10 dB below the limit;
- 3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

EUT operation mode: Keep hopping



- Remark: 1) The radiated measurement was made in horizontal and vertical polarity;
- 2) The maximum emission was 51.06dBuV at 2485.5 MHz, which is more than 10 dB below the limit;
- 3) Radiated emissions which fall in the restricted band, as defined in 15.205(a), comply with the radiated emission limits specified in 15.209(a).

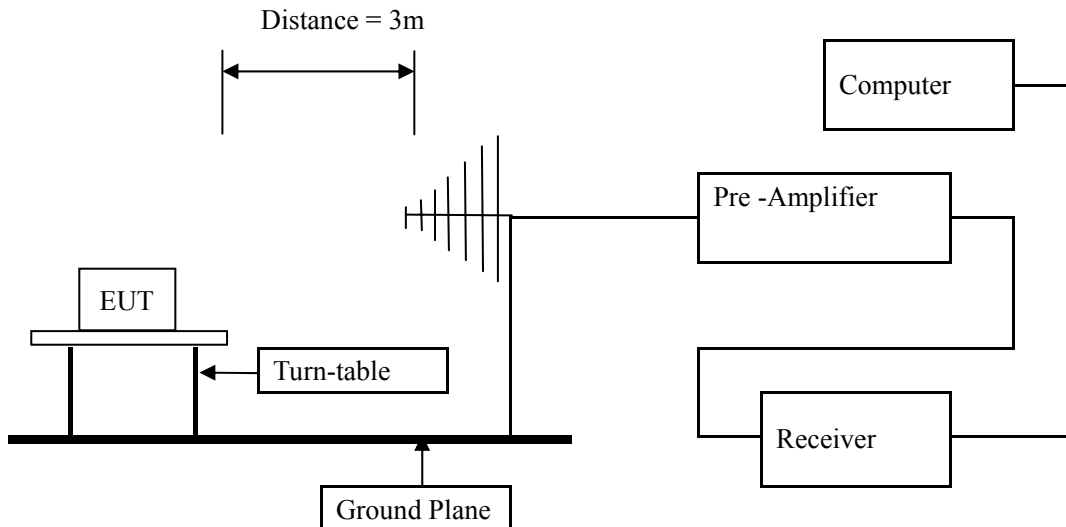
### 13.0 Spurious Emission Test

#### 13.1 Radiated emissions

##### 13.1.1 Test Method and test Procedure:

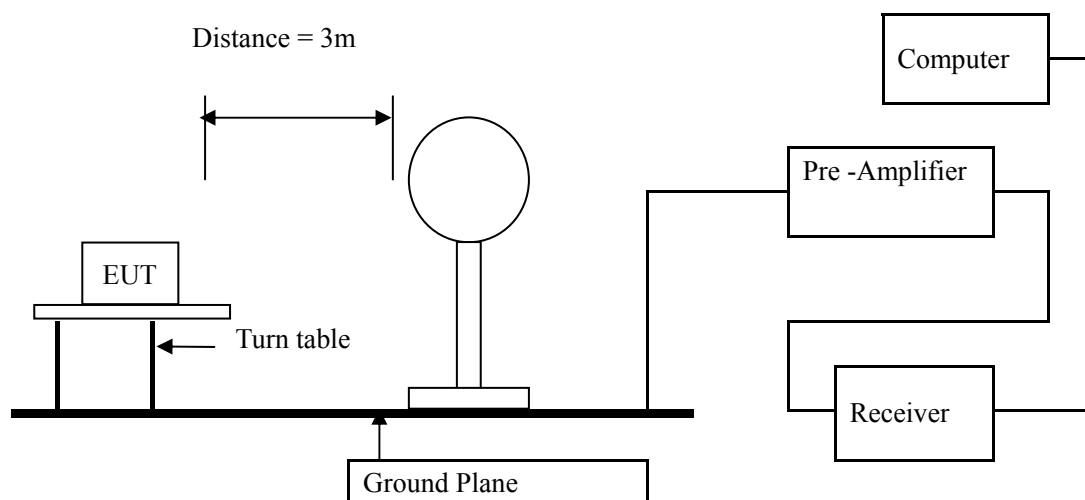
- 1) The EUT was tested according to ANSI C63.10 –2009.
- 2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2009.
- 3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
- 4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- 5) The antenna polarization: Vertical polarization and Horizontal polarization.

##### 13.1.2 Block diagram of Test setup

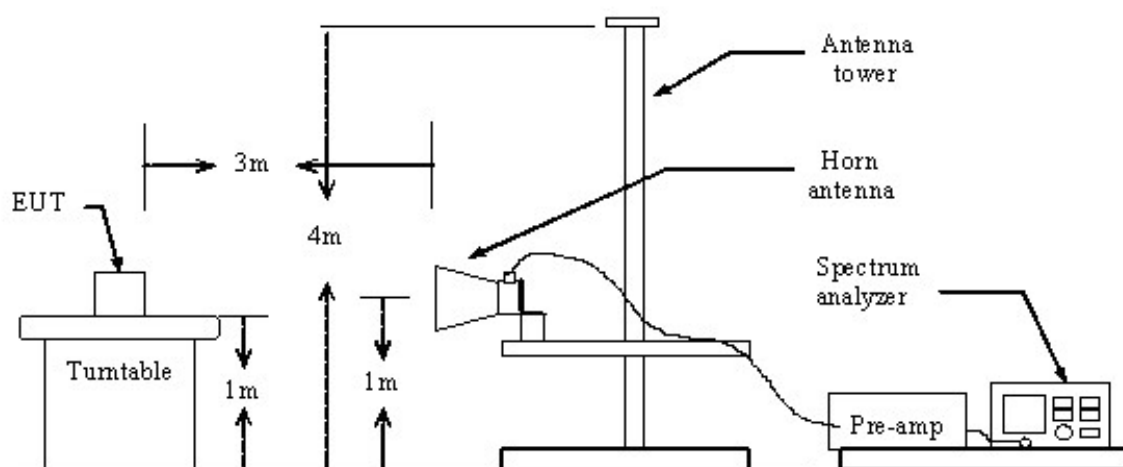


Shenzhen TCT Testing Technology Co., Ltd.

Block diagram of Test setup for frequency below 30MHz



Block diagram of Test setup for frequency above 1GHz



### 13.1.3 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2009

### 13.1.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

**Frequencies in restricted band are complied to limit on Paragraph 15.209.**

Frequency Range (MHz)	Distance (m)	Field strength (dB $\mu$ V/m)
0.009-0.490	3	$20\log 2400/F$ (kHz) + 80
0.490-1.705	3	$20\log 24000/F$ (kHz) + 40
1.705-30	3	$20\log 30 + 40$
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
- 1) RF Voltage (dBuV) = 20 log RF Voltage ( $\mu$ V)
  - 2) In the Above Table, the tighter limit applies at the band edges.
  - 3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT
  - 4) This is a handheld device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
  - 5) All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz. As to 1G-25G, the final emission level got using PK and AV detector.
  - 6) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula  $Ld1 = Ld2 * (d2/d1)$

### 13.1.5 Photo documentation of the test set-up

Please refer to the Section 16

### 13.1.6 Test Equipment:

Please refer to the Section 2

### 13.1.7 Test specification:

Environmental conditions: Temperature 23° C Humidity: 50% Atmospheric pressure: 103kPa

### 13.1.8 Test result

#### A Radiated Emission (9 kHz---30 MHz)

Note: 1) Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor  
2) The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

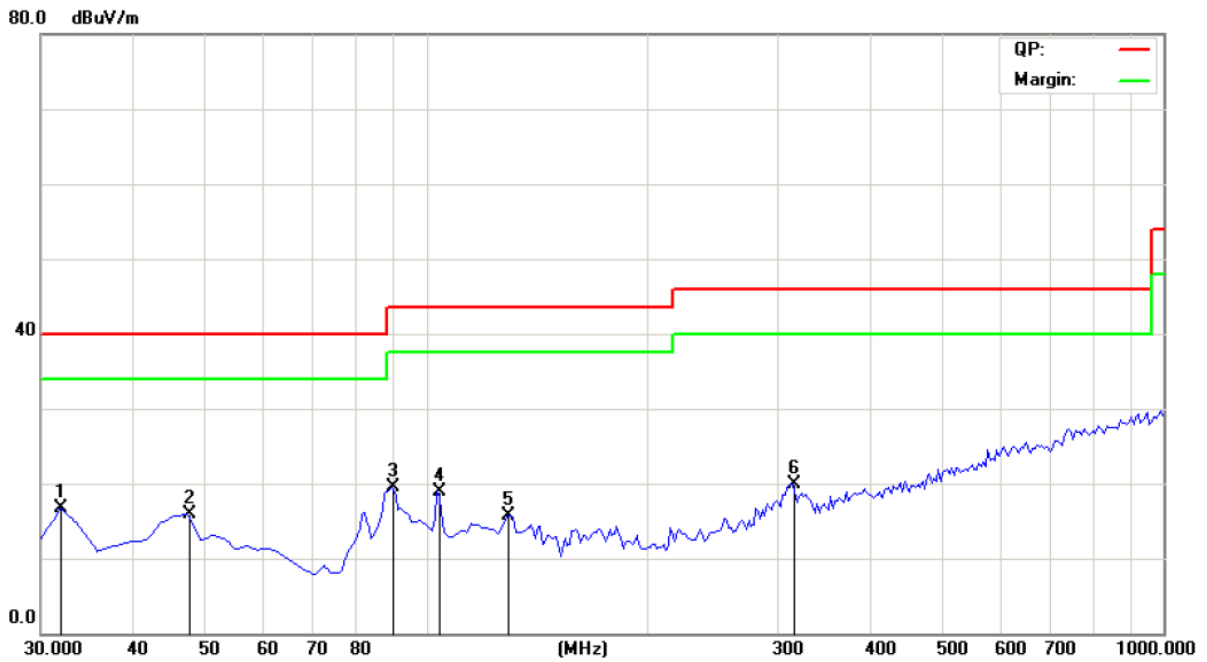
Result: Pass

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
--	--	V	--
--	--	H	--
--	--	V	--
--	--	H	--

**B General Radiated Emissions Data**  
**Radiated Emission In Horizontal (30MHz----1000MHz)**

Please refer to following diagram for individual

High channel: 2480 MHz



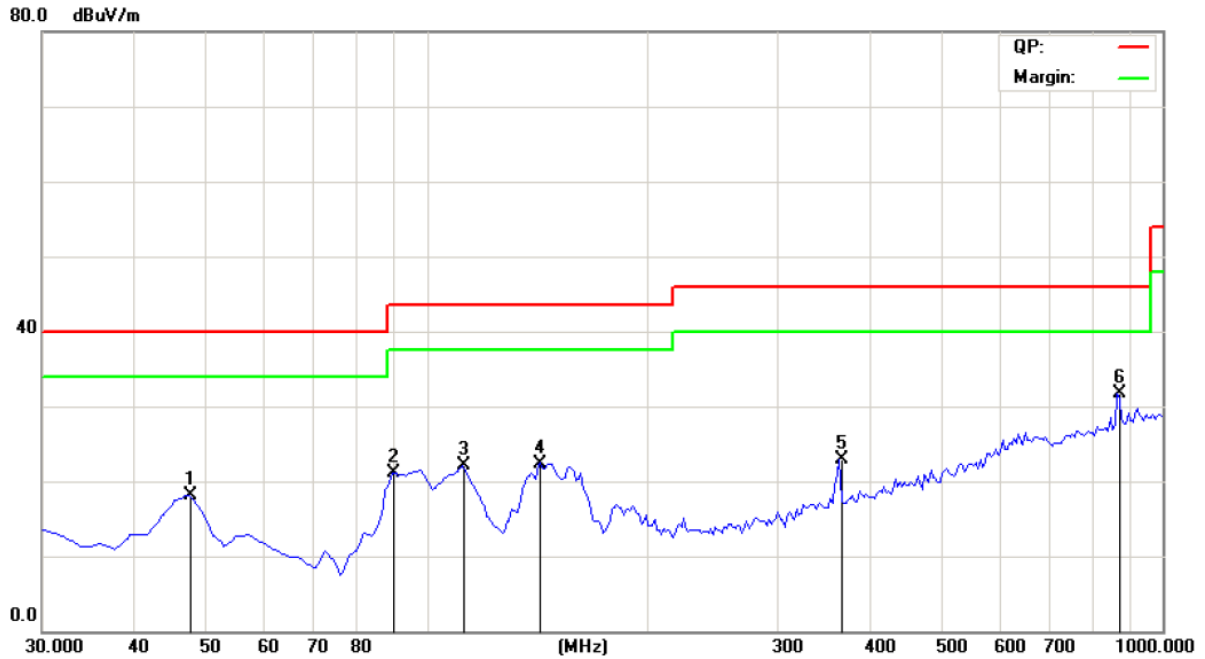
Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
31.9435	16.68	H	40.00
47.4950	15.95	H	40.00
90.2604	19.49	H	43.50
103.8675	18.81	H	43.50
129.1382	15.79	H	43.50
313.8075	19.95	H	46.00



### Radiated Emission In Vertical (30MHz----1000MHz)

Please refer to following diagram for individual

High channel: 2480 MHz



Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
47.4950	18.18	V	40.00
90.4196	21.17	V	43.50
111.6431	22.07	V	43.50
142.7692	22.40	V	43.50
364.3487	22.89	V	46.00
871.7033	31.78	V	46.00

Note: Measurements were conducted in all three channels (high, middle, low), and the worst case (high channel) was submitted only.

**C Fundamental & Harmonics Radiated Emission Data (1000MHz-25000MHz)**

Modulation Type: GFSK

<b>Low channel: 2402 MHz</b>									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1301.58	H	50.23	---	-4.20	46.03	---	74.00	54.00	-7.97
4804.00	H	52.11	---	-3.94	48.17	---	74.00	54.00	-5.83
5600.12	H	49.31	---	-2.83	46.48	---	74.00	54.00	-7.52
7206.00	H	46.83	---	0.52	47.35	---	74.00	54.00	-6.65
16814.00	H	41.18	---	6.73	47.91	---	74.00	54.00	-6.09
24020.00	H	39.40	---	8.11	47.51	---	74.00	54.00	-6.49
1308.69	V	51.59	---	-4.25	47.34	---	74.00	54.00	-6.66
4804.00	V	51.14	---	-3.94	47.2	---	74.00	54.00	-6.8
5620.84	V	49.18	---	-2.87	46.31	---	74.00	54.00	-7.69
7206.00	V	44.16	---	0.52	44.68	---	74.00	54.00	-9.32
16814.00	V	39.23	---	6.73	45.96	---	74.00	54.00	-8.04
24020.00	V	41.65	---	8.11	49.76	---	74.00	54.00	-4.24

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak readings were greater than the average limit.

4) Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

<b>Middle channel: 2441 MHz</b>									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1301.58	H	50.01	---	-4.20	45.81	---	74.00	54.00	-8.19
4882.00	H	50.45	---	-3.98	46.47	---	74.00	54.00	-7.53
5600.31	H	50.32	---	-2.83	47.49	---	74.00	54.00	-6.51
7323.00	H	46.63	---	0.57	47.2	---	74.00	54.00	-6.8
17087.00	H	43.05	---	6.79	49.84	---	74.00	54.00	-4.16
24410.00	H	41.23	---	8.16	49.39	---	74.00	54.00	-4.61
1308.89	V	50.49	---	-4.25	46.24	---	74.00	54.00	-7.76
4804.00	V	51.55	---	-3.98	47.57	---	74.00	54.00	-6.43
5623.25	V	49.69	---	-2.87	46.82	---	74.00	54.00	-7.18
7206.00	V	46.95	---	0.57	47.52	---	74.00	54.00	-6.48
17087.00	V	40.41	---	6.79	47.2	---	74.00	54.00	-6.8
24410.00	V	30.01	---	8.16	38.17	---	74.00	54.00	-15.83

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak result were greater than the average limit.

4) Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

High channel: 2480 MHz									
Freq. (MHz)	Ant. Pol. H/V	Peak reading (dBuV)	AV reading (dBuV)	Correction Factor (dB)	Emission Level		Peak limit (dBuV/m)	AV limit (dBuV/m)	Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
1302.01	H	49.78	---	-4.20	45.58	---	74.00	54.00	-8.42
4960.00	H	50.01	---	-3.98	46.03	---	74.00	54.00	-7.97
5601.39	H	50.63	---	-2.83	47.8	---	74.00	54.00	-6.2
7440.00	H	47.18	---	0.57	47.75	---	74.00	54.00	-6.25
17360.00	H	41.33	---	6.79	48.12	---	74.00	54.00	-5.88
24800.00	H	40.05	---	8.16	48.21	---	74.00	54.00	-5.79
1308.43	V	49.85	---	-4.25	45.6	---	74.00	54.00	-8.4
4804.00	V	49.50	---	-3.98	45.52	---	74.00	54.00	-8.48
5624.55	V	48.29	---	-2.87	45.42	---	74.00	54.00	-8.58
7440.00	V	47.89	---	0.57	48.46	---	74.00	54.00	-5.54
17360.00	V	40.30	---	6.79	47.09	---	74.00	54.00	-6.91
24800.00	V	39.18	---	8.16	47.34	---	74.00	54.00	-6.66

Notes: 1) Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

2) Radiated emissions measured in frequencies above 1GHz were made with peak detector and Average (AV) detector.

3) Average test would be performed if the peak result were greater than the average limit.

4) Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5) Emission Level=Peak (AV) Reading + Correction Factor;

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

6) Margin (dB) = Emission Level (Peak) (dBuV/m)-Average limit (dBuV/m)

## 14.0 Antenna Requirement

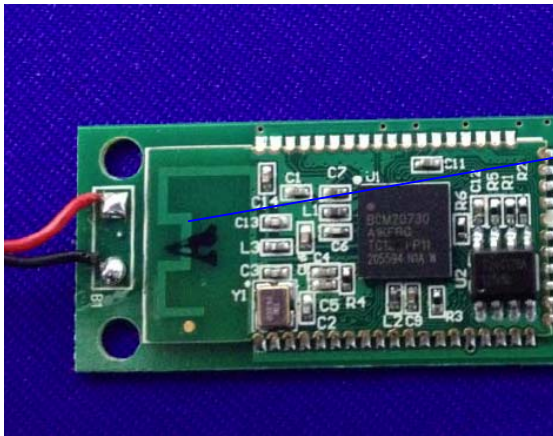
### 14.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 14.2 Antenna Specification

According to the manufacturer declared, the EUT has an integral printed antenna; the directional gain of antenna is 0 dBi, and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.



Antenna

### 15.0 Maximum Permissible Exposure

According to KDB 447498 D01 General RF Exposure Guidance V05, RF Expose Evaluation Method:

#### SAR Test Exclusion Thresholds for 100 MHz-6 GHz and $\leq 50$ mm

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	
MHz	30	35	40	45	50	mm
150	232	271	310	349	387	SAR Test Exclusion Threshold (mW)
300	164	192	219	246	274	
450	134	157	179	201	224	
835	98	115	131	148	164	
900	95	111	126	142	158	
1500	73	86	98	110	122	
1900	65	76	87	98	109	
2450	57	67	77	86	96	
3600	47	55	63	71	79	
5200	39	46	53	59	66	
5400	39	45	52	58	65	
5800	37	44	50	56	62	

The maximum output power measured is 2.213 mW, which is less than the SAR Test Exclusion Threshold for 2450 MHz: 10 mW. No SAR test is required.

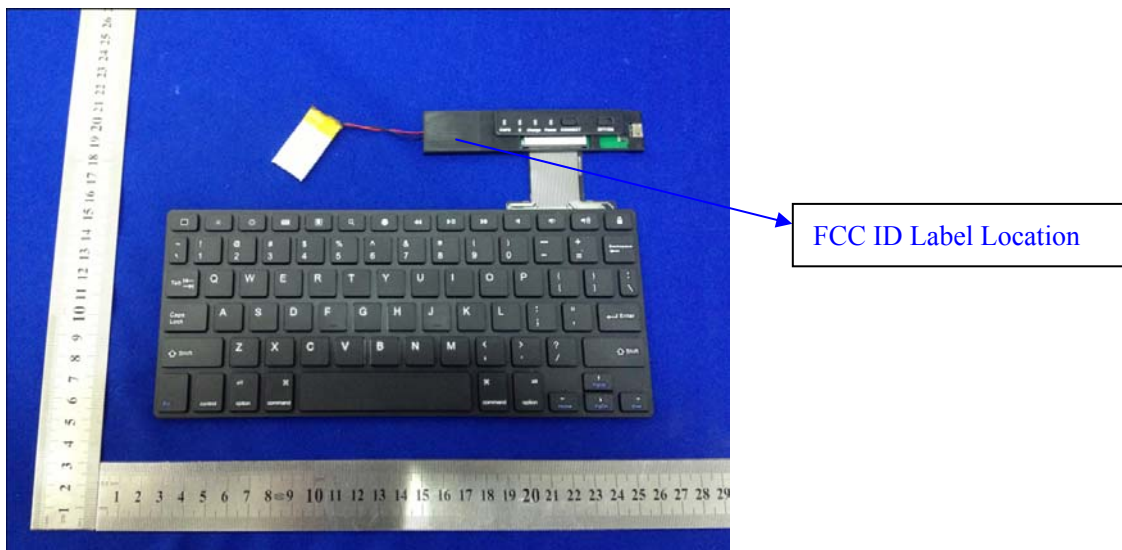
## 16.0 FCC ID Label

### FCC ID: QZMHB023A

**This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

#### Mark Location:



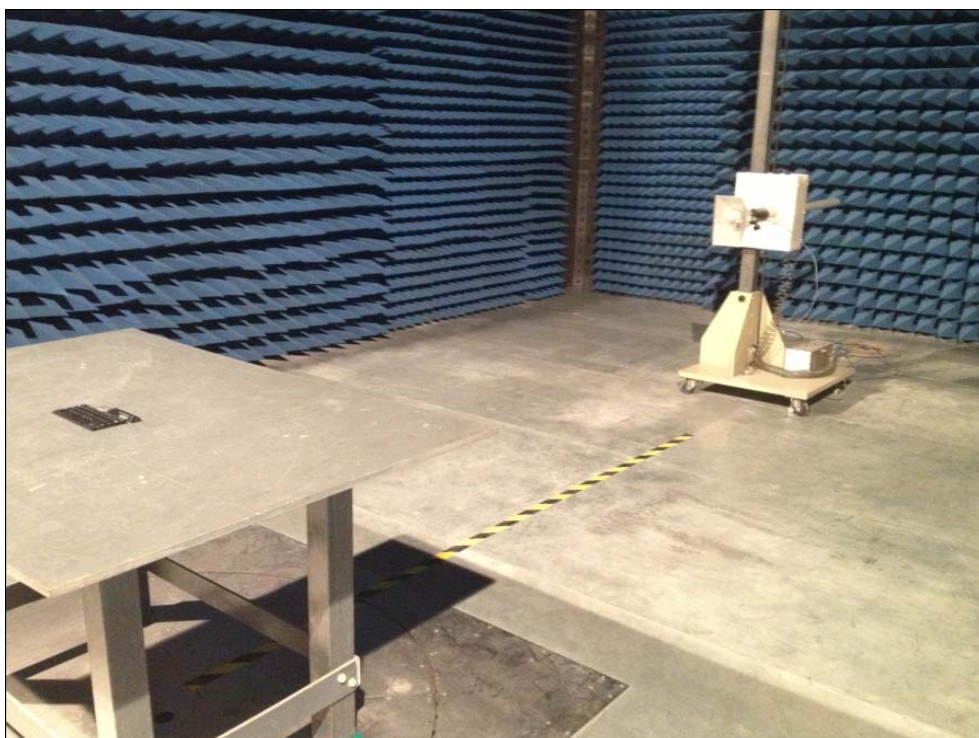
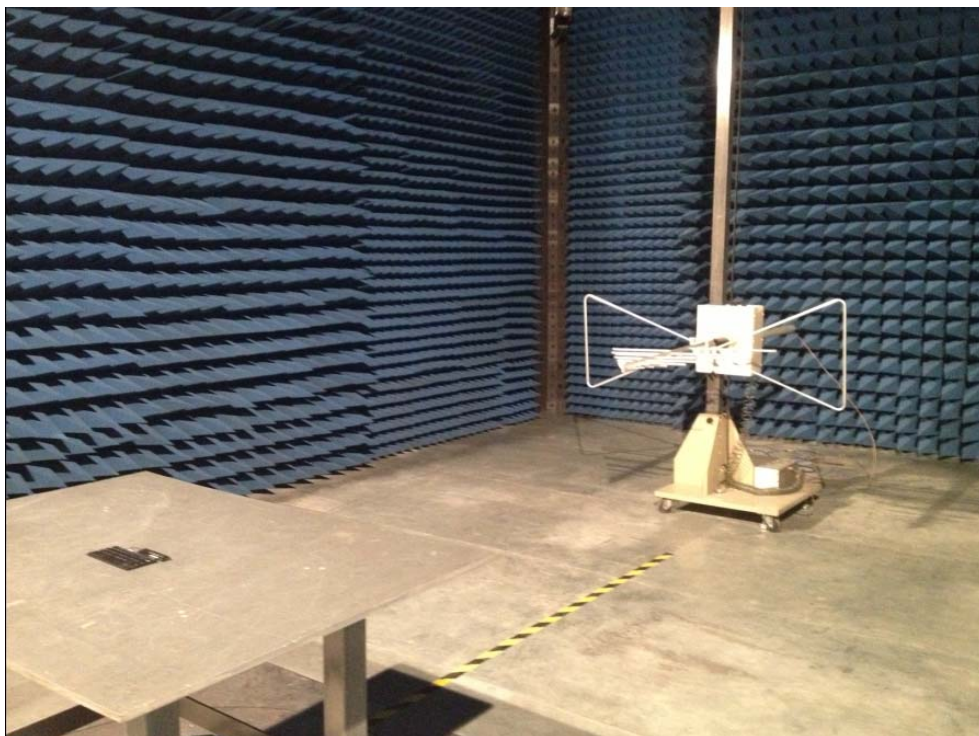
**17.0** Photos of testing

17.1 Conducted test View



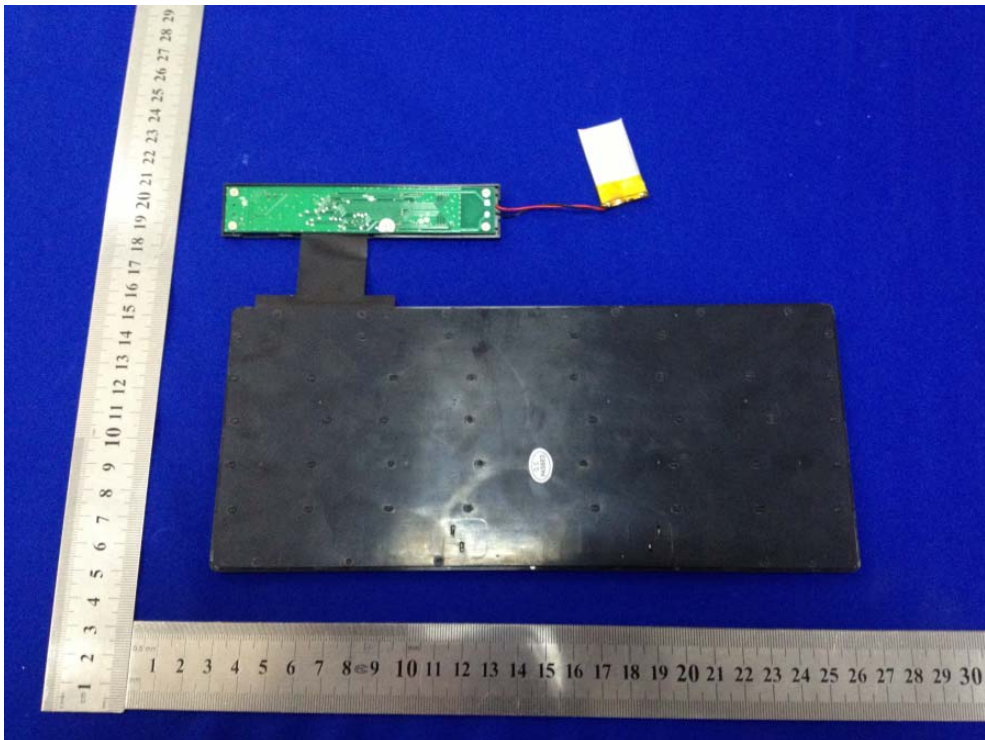


17.2 Radiated emission test view



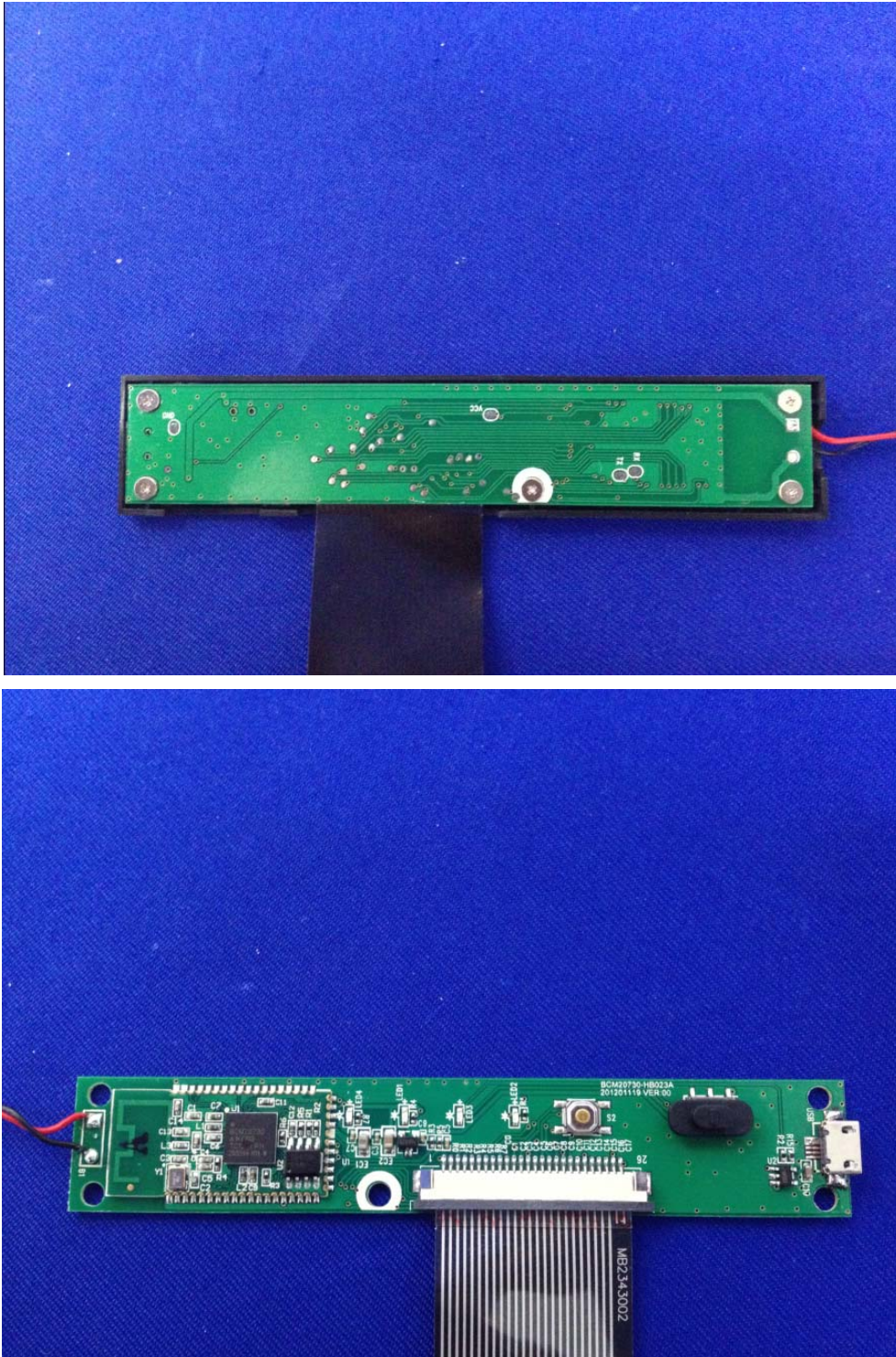
## 18.0 Photos for the EUT

Outside View of the EUT



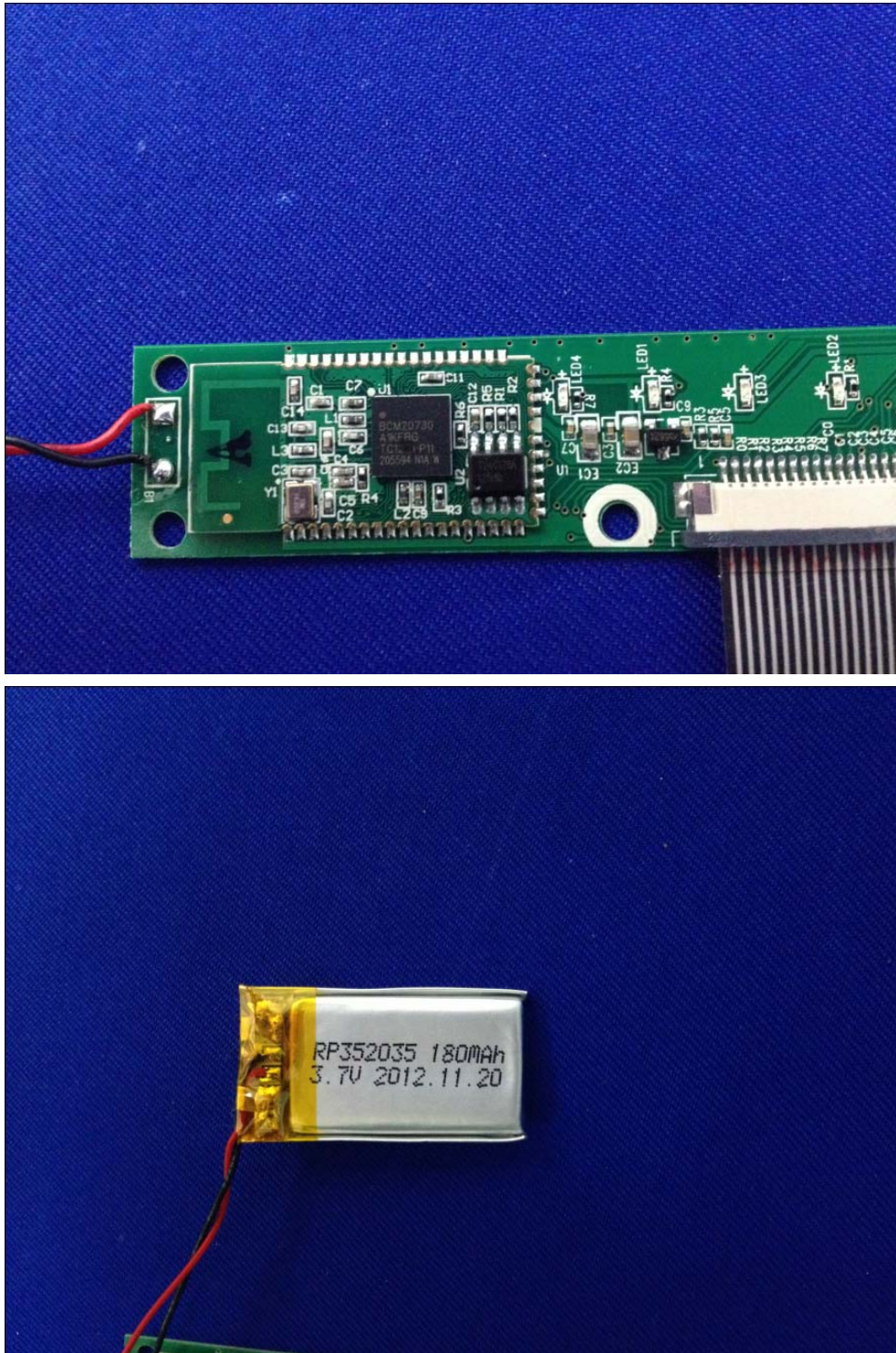


Inside View of the EUT





Inside View of the EUT



--End of the report--