

Page 1 of 44

Report No.: HK2307263275-E

# **FCC Test Report**

## FCC PART 15 SUBPART C 15.247

Test report On Behalf of Dongguan Jintai Electronic Technology Co., LTD. For Smart li-polymer Battery Pack

Model No.: KEC-5000

FCC ID: 2BB9G-KEC5000

## Prepared For :

Dongguan Jintai Electronic Technology Co., LTD. Third floor, Building A, 217 South Jie Road, Xiaojie Jiao Community, Humen Town, Dongguan City, China

Prepared By :

Shenzhen HUAK Testing Technology Co., Ltd.

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

 Date of Test:
 Jul. 26, 2023 ~ Aug. 04, 2023

 Date of Report:
 Aug. 04, 2023

 Report Number:
 HK2307263275-E

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



Page 2 of 44

Report No.: HK2307263275-E

FIF

## **Test Result Certification**

Applicant's name	Dongguan Jintai Electronic Technology Co., LTD.
Address	Third floor, Building A, 217 South Jie Road, Xiaojie Jiao Community, Humen Town, Dongguan City, China
Manufacture's Name:	Dongguan Jintai Electronic Technology Co., LTD.
Address:	Third floor, Building A, 217 South Jie Road, Xiaojie Jiao Community, Humen Town, Dongguan City, China
Product description	
Trade Mark:	N/A me sme mutit
Product name:	Smart li-polymer Battery Pack
Model and/or type reference:	KEC-5000
Standards	47 CFR FCC Part 15 Subpart C 15.247

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAK Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAK Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Date of Test	
Date (s) of performance of tests:	Jul. 26, 2023 ~ Aug. 04, 2023
Date of Issue	Aug. 04, 2023
Test Result:	Pass

Prepared by:

Project Engineer

Reviewed by:

28

Project Supervisor

Approved by:

ason Thou

Technical Director

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



Page

NG

PB PB

Contents

1	Те	st Summary			5
	1.1	Test Description			5
	1.2	Measurement Uncertainty			6
	1.3	Information of the Test Laboratory	The MANY TEST	MANNA TEST	6
2	Ge	eneral Information	<u> </u>	<u>()</u> .	7
	2.1	General Description of EUT		NAK TESTING	7
	2.2	Description of Test Conditions	CALL CONTRACTOR OF	····	
	2.3	Description of Test Setup			10
	2.4	Description of Support Units		2002	11
3	Eq	uipments List for All Test Items	and the second second	a stand	
4		st Result			
	4.1	Antenna Requirement			14
	4.2	Conduction Emissions Measurement	200		
	4.3	Radiated Emissions Measurement	TIAK TE-	AN A	19
	4.4	Maximum Output Power Measurement		<u> </u>	
	4.5	Power Spectral Density			
	4.6	6db Bandwidth		NUME -	
	4.7	Occupied Bandwidth	HUMAN .		35
	4.8	Band Edge			
	4.9	Conducted Spurious Emissions			
5	Те	st Setup Photo	NAK TESTIN W	W TESTING	
0					
6	Pn	otos of the EUT			44

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



Т 691

## \*\* Modified History \*\*

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Aug. 04, 2023	Jason Zhou
- (h		.0	a
INK TESTING	STREE WETESTREE	TESTING IN TESTIN	OK TESTING

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## 1 Test Summary

## 1.1 Test Description

UTES'	TES.	V TED.
Test Item	Test Requirement	Result
Antenna Requirement	§15.203/§15.247(b)(4)	) PASS
Conducted Emission	FCC Part 15.207	PASS
Radiated Emissions	FCC Part 15.205/15.20	9 PASS
Maximum Peak Output Powe	er FCC Part 15.247(b)	PASS
Power Spectral Density	FCC Part 15.247(e)	PASS
6dB Bandwidth & 99% Bandwi	idth FCC Part 15.247(a)(2)	) PASS
Spurious RF Conducted Emiss	sion FCC Part 15.247(d)	PASS
Band Edge	FCC Part 15.247(d)	PASS

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

FICATION



## **1.2 Measurement Uncertainty**

All measurements involve certain levels of uncertainties. The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. The maximum value of the uncertainty as below:

No.	ltem	Uncertainty
HI ANTES	Conducted Emission Test	±2.71dB
2	All emissions, radiated(<1G)	±3.90dB
3	All emissions, radiated(>1G)	±4.28dB

## **1.3 Information of the Test Laboratory**

Shenzhen HUAK Testing Technology Co., Ltd. Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01. FCC Designation Number is CN1229. Canada IC CAB identifier is CN0045. CNAS Registration Number is L9589.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

## 2 General Information

HUAK TESTING

## 2.1 General Description of EUT

EUT Name:	Smart li-polymer Battery Pack	HAUR
Model No:	KEC-5000	0
Series Model:	N/A series and ser	
Model Difference:	N/A	ESTINC
Trade Mark:	N/A O	
Operation Frequency:	2402 MHz to 2480 MHz	
Channel Separation:	2MHz	10
Number of Channel:	40	NAK
Modulation Technology:	GFSK	
Hardware Version:	V3	
Software Version:	V3 come come	
Antenna Type:	PCB Antenna	HUAN
Antenna Gain:	1.81dBi	
STA	DC5V From Type-C or DC 3.7V From Battery	MNC
Power Supply:	Output: DC 5V, 2A	
	Output: power 10W MAX	

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



AK TESTING		Description o	f Channel:		
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
UAKTED 1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5	2412	o 19	2440	33	2468
6	2414	20	2442	34	2470
7	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476
10	2422	24	2450	38	2478
<sup>UAM</sup> 11 @	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456	- automatics and	

The EUT has been operated in modulations: GFSK independently.

NO.	Test Mode Description
HUAK IL 1 O HUA	Low channel TX
2	Middle channel TX
3	High channel TX

Note:

1. All the test modes can be supply by Built-in Li-ion battery, only the result of the worst case was recorded in the report if no any records.

2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

Page 9 of 44

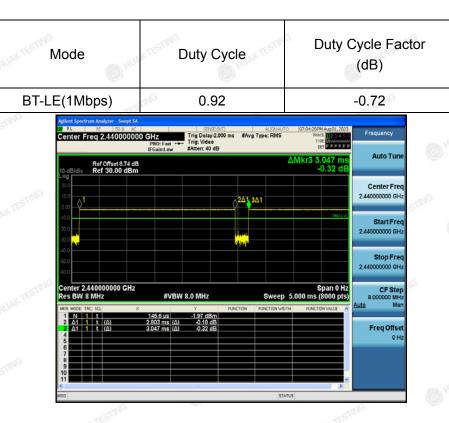


## 2.2 Description of Test Conditions

(1) E.U.T. test conditions:

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

- (2) Frequency range of radiated measurements:The test range will be up to the tenth harmonic of the highest fundamental frequency.
- (3) Pre-test the EUT in all transmitting mode at the lowest (2402 MHz), middle (2440 MHz) and highest (2480 MHz) channel with different data packet and conducted to determine the worst-case mode, only the worst-case results are recorded in this report.



(4) Mode Test Duty Cycle

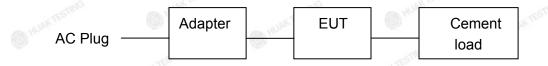
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## 2.3 Description of Test Setup

Operation of EUT during conducted and radiation below 1GHz testing:



Operation of EUT during radiation above 1GHz testing:



The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The worst case is X position.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## 2.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ltem	Equipment	Trade Mark	Model/Type No.	Specification	Remark
1	Smart li-polymer Battery Pack	N/A	KEC-5000	N/A	EUT
2	Cement load	N/A	N/A	2.5Ω	Peripheral
<b>3</b> <sup>14</sup> <sup>16</sup>	Adapter	Huawei	HW-059200CHQ	Input: 100-240V, 50/60Hz, 0.5A Output: 5VDC, 2A	Peripheral
4					2

#### Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
 For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



FICATION

## **3** Equipments List for All Test Items

ltem	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
TESTING 1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Feb. 17, 2023	1 Year
2.	L.I.S.N.	R&S	ENV216	HKE-059	Feb. 17, 2023	1 Year
3.	Receiver	R&S	ESR-7	HKE-010	Feb. 17, 2023	1 Year
4.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	1 Year
5.5	Spectrum analyzer	R&S	FSP40	HKE-025	Feb. 17, 2023	1 Year
6.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	1 Year
7.	High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Feb. 17, 2023	1 Year
8.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Feb. 17, 2023	1 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Feb. 17, 2023	1 Year
10.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Feb. 17, 2023	1 Year
11.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Feb. 17, 2023	1 Year
12.	Pre-amplifier	EMCI	EMC051845SE	HKE-015	Feb. 17, 2023	1 Year
13.	Pre-amplifier	Agilent	83051A	HKE-016	Feb. 17, 2023	1 Year
14.	High pass filter unit	Tonscend	JS0806-F	HKE-055	Feb. 17, 2023	1 Year
15.	Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A
16.	Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A	N/A
17.	RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	N/A	<sup>∋</sup> N/A
18.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	1 Year
19.	RF test software	Tonscend	JS1120-4	HKE-113	N/A	N/A
20.	RF test software	Tonscend	JS1120-3	HKE-114	N/A	N/A
21.	RF test software	Tonscend	JS1120-1	HKE-115	N/A	N/A
22.	Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	1 Year
23.	Signal generator	Agilent	N5182A	HKE-029	Feb. 17, 2023	1 Year
24.	Signal Generator	Agilent	83630A	HKE-028	Feb. 17, 2023	1 Year
25.	Power meter	Agilent	E4419B	HKE-085	Feb. 17, 2023	<sup>5</sup> 1 Year

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



Report No.: HK2307263275-E

IJAK

26.	Power Sensor	Agilent	E9300A	HKE-086	Feb. 17, 2023	1 Year
27.	RF Cable(below1GHz)	Times	9kHz-1GHz	HKE-117	Feb. 17, 2023	1 Year
28.	RF Cable(above 1GHz)	Times	1-40G	HKE-034	Feb. 17, 2023	1 Year
29.	RF Cable (9KHz-40GHz)	Tonscend	170660	N/A	Feb. 17, 2023	1 Year
30.	Shielded room	Shiel Hong	4*3*3	HKE-039	<sup>o</sup> Dec. 09, 2021	3 Year
31.	High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	Feb. 17, 2023	1 Year
32.	10dB Attenuator	Schwarzbeck	VTSD9561F	HKE-153	Feb. 17, 2023	1 Year

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## 4 Test Result

## 4.1 Antenna Requirement

#### 4.1.1 Standard Requirement

#### **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, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

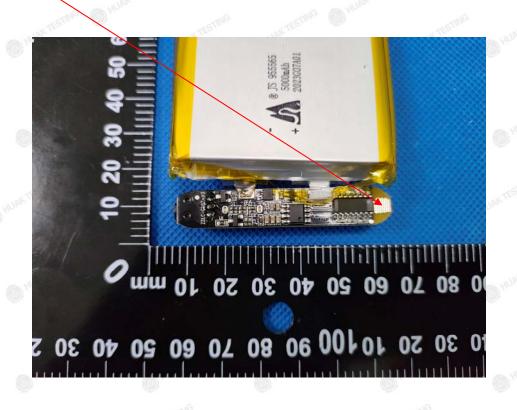
#### Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

#### **Antenna Connected Construction**

The antenna used in this product is a PCB Antenna, which permanently attached. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 1.81dBi.

#### 4.1.2 EUT Antenna



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



NG

IE.

## 4.2 Conduction Emissions Measurement

## 4.2.1 Applied Procedures / Limit

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

HUM TESTING	Limit (	dBuV)
Frequency range (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

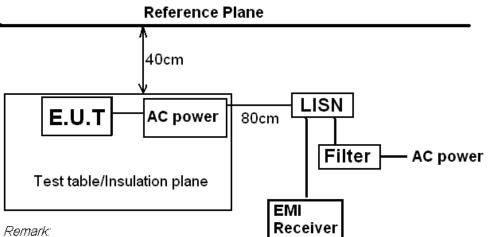
## 4.2.2 Test Procedure

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
- 2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
- 4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5. All support equipments received AC power from a second LISN, if any.
- 6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com



### 4.2.3 Test Setup



Remark E.U.T: Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

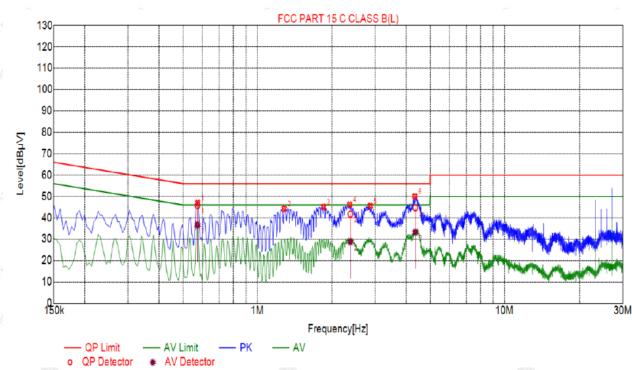


ЯL

### 4.2.4 Test Results

#### PASS

Only the worst result of GFSK Low channel TX was reported as below: Test Specification: Line



## Suspected List

NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Туре
1	0.5730	46.98	20.05	56.00	9.02	26.93	PK	L
2	1.2840	44.23	20.09	56.00	11.77	24.14	PK	L
3	1.8510	45.05	20.14	56.00	10.95	24.91	PK	L
4	2.3640	46.17	20.18	56.00	9.83	25.99	PK	L
5	2.8635	45.57	20.21	56.00	10.43	25.36	PK	L
6	4.3395	50.07	20.25	56.00	5.93	29.82	PK	L

#### **Final Data List**

2	NO.	Freq. [MHz]	Correction factor[dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	QP Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	A∨ Margin [dB]	AV Reading [dBµV]	Туре
	1	0.5719	20.05	45.77	56.00	10.23	25.72	36.69	46.00	9.31	16.64	L
3	2	2.3787	20.18	41.72	56.00	14.28	21.54	28.78	46.00	17.22	8.60	L
	3	4.3567	20.25	44.75	56.00	11.25	24.50	33.28	46.00	12.72	13.03	L

#### Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

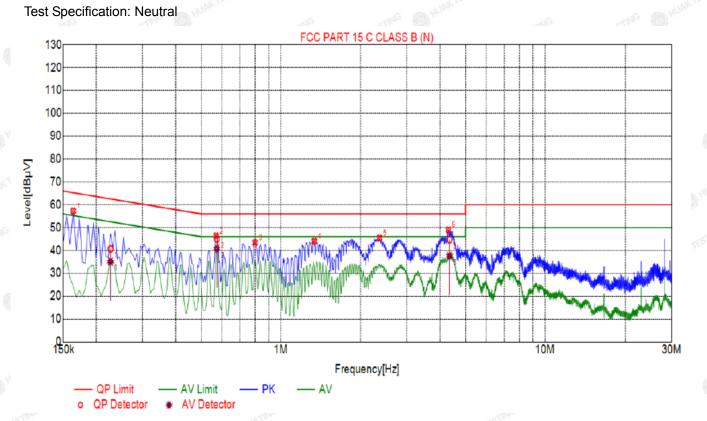
Level=Test receiver reading + correction factor

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



ICATIO,



	Sus	spected	l List						
2	NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Туре
8	1	0.1635	57.30	19.98	65.28	7.98	37.32	PK	N
	2	0.5685	46.41	20.05	56.00	9.59	26.36	PK	Ν
2	3	0.7980	43.39	20.06	56.00	12.61	23.33	PK	Ν
	4	1.3380	44.04	20.10	56.00	11.96	23.94	PK	N
3	5	2.3640	45.48	20.18	56.00	10.52	25.30	PK	N
	6	4.3080	49.03	20.25	56.00	6.97	28.78	PK	Ν

## **Final Data List**

NO	Freq. [MHz]	Correction factor[dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	QP Reading [dBµV]	AV Value [dBµV]	AV Limit [dBμV]	A∨ Margin [dB]	AV Reading [dBµV]	Туре
1	0.2261	20.04	40.66	62.59	21.93	20.62	35.11	52.59	17.48	15.07	N
2	0.5717	20.05	44.99	56.00	11.01	24.94	40.78	46.00	5.22	20.73	N
3	4.3492	20.25	44.73	56.00	11.27	24.48	37.67	46.00	8.33	17.42	N
	8	Ser	•	1864		1500		156		1864	

#### Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## 4.3 Radiated Emissions Measurement

## 4.3.1 Applied Procedures / Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

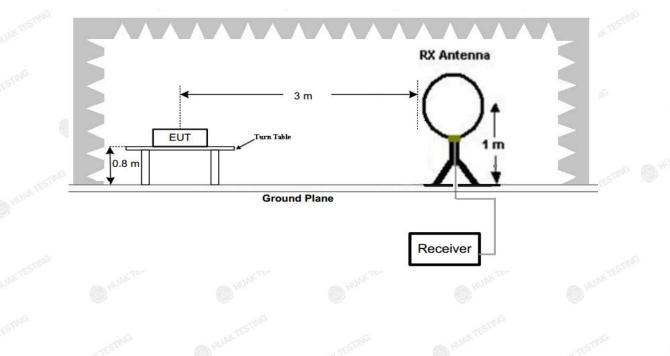
Except when the requirements applicable to a given device state otherwise, emissions from license-exempt transmitters shall comply with the field strength limits shown in table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

		Rac	liated emission limits	
ŝ	Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
	0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
	0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
3	1.705-30	3	20log(30)+ 40log(30/3)	30
	30-88	3	40.0	100
5	» <sup>©</sup> 88-216	3 sing	43.5	150
	216-960	3	46.0	200
	Above 960	3	54.0	500
-	Vill97		Same and Sam	34897

## 4.3.2 Test Setup

#### **Test Configuration:**

1) 9 kHz to 30 MHz emissions:

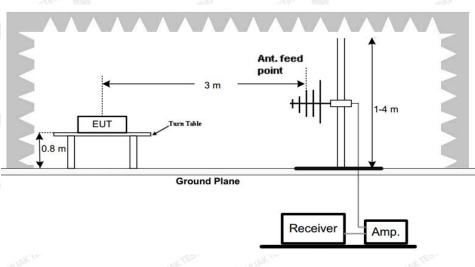


The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

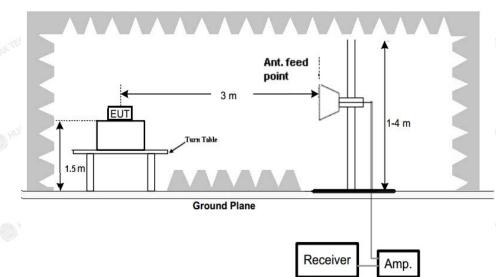
TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 25 GHz emissions:



### Test Procedure

- 1. The EUT was placed on turn table which is 0.8m above ground plane for below 1GHz test, and on a low permittivity and low loss tangent turn table which is 1.5m above ground plane for above 1GHz test.
- 2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from  $0^{\circ}$ C to  $360^{\circ}$ C to acquire the highest emissions from EUT.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measurements have been completed.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



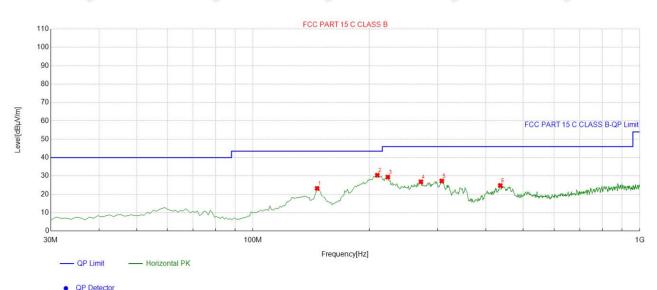
NG

#### 4.3.3 Test Result

#### Below 1GHz Test Results:

All modes have been tested, only the worst mode of GFSK Low channel TX is reflected.

#### Antenna polarity: H



	• Gr Deteet								
	- PAT*		12007	- PAT*		104707		+ PAT*	
Sus	pected List								
NO	Freq.	Factor	Reading	Level	Limit	Margin	Height	Angle	Polarity
	[MHz]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[dB]	[cm]	[°]	Folanty
1	146.51651	-1 <mark>8</mark> .53	41.76	23.23	43.50	20.27	100	344	Horizontal
2	209.62963	-14.60	45.01	30.41	43.50	13.09	100	71	Horizontal
3	223.22322	-14.11	43.52	29.41	46.00	16.59	100	63	Horizontal
4	271.77177	-12.63	39.46	26.83	46.00	19.17	100	341	Horizontal
5	307.69769	-11.88	39.14	27.26	46.00	18.74	100	339	Horizontal
6	435.86586	-8.21	33.00	24.79	46.00	21.21	100	82	Horizontal

Remark: Factor = Cable loss + Antenna factor - Preamplifier; Level = Reading + Factor; Margin = Limit - Level

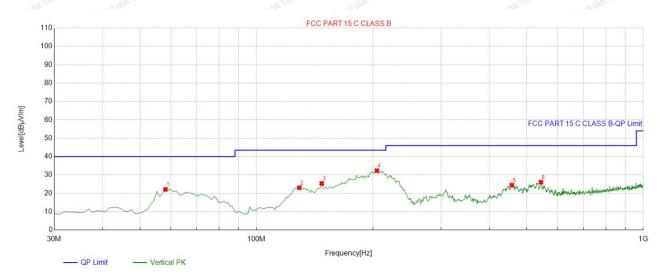
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



#### Report No.: HK2307263275-E

Antenna polarity: V



QP Detector

Suspe	ected List								
NO	Freq.	Factor	Reading	Level	Limit	Margin	Height	Angle	Delerity
NO.	[MHz]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[dB]	[cm]	[°]	Polarity
1	58.158158	-14.51	36.64	22.13	40.00	17.87	100	64	Vertical
2	129.03903	-16.76	39.79	23.03	43.50	20.47	100	139	Vertical
3	147.48748	-18.58	43.99	25.41	43.50	18.09	100	193	Vertical
4	204.77477	-14.64	47.01	32.37	43.50	11.13	100	144	Vertical
5	457.22722	-8.38	32.84	24.46	46.00	21.54	100	215	Vertical
6	543.64364	-6.44	32.49	26.05	46.00	19.95	100	156	Vertical
		a	HUM			The HUM			

Remark: Factor = Cable loss + Antenna factor – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

#### Harmonics and Spurious Emissions

#### Frequency Range (9kHz-30MHz)

_	PENAL PENAL	PENGE .	PENAL PENAL
G	Frequency (MHz)	Level@3m (dBµV/m)	Limit@3m (dBµV/m)
	104	estina	- INK TESTING
ſ	HANTESIN OH	ALAN TEST	A PRO - MARTESIN
Ī	- · · ·		
	TAK TESTIC		testu.

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.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



ΗL

For 1GHz to 25GHz

CH Low (2402MHz)

#### Horizontal:

P	WTE	WTE-	W TE		. WIL	14.1
Frequency	Meter Reading	Factor	Emission Level	Limits 🌒	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4804	54.37	-3.65	50.72	74.00	-23.28	peak
4804	42.32	-3.65	38.67	54.00	-15.33	AVG
7206	50.56	-0.95	49.61	74.00	-24.39	peak
7206	40.46	-0.95	39.51	54.00	-14.49	AVG

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4804	53.94	-3.65	50.29	74.00	-23.71	peak
4804	44.16	-3.65	40.51	54.00	-13.49	AVG
7206	50.75	-0.95	49.80	74.00	-24.20	peak
7206	40.97	-0.95	40.02	54.00	-13.98	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



FICATION

#### CH Middle (2440MHz)

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4880.00	53.57	-3.54	50.03	74.00	-23.97	peak
4880.00	41.52	-3.54	37.98	54.00	-16.02	AVG
7320.00	52.42	-0.81	51.61	74.00	-22.39	peak
7320.00	40.74	-0.81	39.93	54.00	-14.07	AVG

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4880.00	52.21	-3.54	48.67	74.00	-25.33	peak
4880.00	44.93	-3.54	41.39	54.00	-12.61	AVG
7320.00	50.46	-0.81	49.65	74.00	-24.35	peak
7320.00	42.25	-0.81	41.44	54.00	-12.56	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



CH High (2480MHz)

#### Horizontal:

Frequency	Meter Reading	Factor	Emission Level	🔊 Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4960	52.96	-3.43	49.53	74.00	-24.47	peak
4960	44.31	-3.44	40.87	54.00	-13.13	AVG
7440	50.74	-0.77	49.97	74.00	-24.03	peak
7440	42.24	-0.77	41.47	54.00	-12.53	AVG

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
4960	55.72	-3.43	52.29	74.00	-21.71	peak
4960	44.34	-3.44	40.90	54.00	-13.10	AVG
7440	51.51	-0.77	50.74	74.00	-23.26	peak
7440	40.15	-0.77	39.38	54.00	-14.62	AVG

#### Remark:

(1) Measuring frequencies from 1 GHz to the 25 GHz.

(2) "F" denotes fundamental frequency; "H" denotes spurious frequency; "E" denotes band edge frequency.

(3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

(4) The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report.
(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video

bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.

(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed. (7) All modes of operation were investigated and the worst-case emissions are reported.</p>

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.



AF

Radiated Band Edge Test:

## Operation Mode: TX CH Low (2402MHz)

### Horizontal (Worst case):

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2310.00	56.32	-5.81	50.51	74	-23.49	peak
2310.00	1	-5.81		54	1 🔍	AVG
2390.00	54.18	-5.84	48.34	74	-25.66	peak
2390.00	HUAK TEST	-5.84	ESTING / HUAKTES	54	WAX TESTING	AVG
2400.00	51.92	-5.84	46.08	74	-27.92	peak
2400.00	1	-5.84	1	54	1	AVG

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2310.00	55.48	-5.81	49.67	74	-24.33	peak
2310.00	1	-5.81	1	54	1	AVG
2390.00	54.61	-5.84	48.77	5 <sup>mG</sup> 74	-25.23	peak
2390.00	HO I	-5.84	10 Hor	54	1	AVG
<sup>©</sup> 2400.00	51.79	-5.84	45.95	74	-28.05	peak
2400.00	TESTIN	-5.84	AKTESTIN	54	1	AVG

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



### Operation Mode: TX CH High (2480MHz)

Horizontal (Worst case)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2483.50	56.37	-5.81	50.56	74	-23.44	peak
2483.50	TESTING /	-5.81	MAKTESTING	54	/	AVG
2500.00	54.58	-6.06	48.52	74	-25.48	peak
2500.00	10	-6.06	1	54	1	AVG

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре
2483.50	56.71	-5.81	50.9	74	-23.1	peak
2483.50	1	-5.81	1	54	1	AVG
2500.00	52.46	-6.06	46.4	74	-27.6	peak
2500.00	1	-6.06	1	54	/	AVG

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Remark:

1. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

2. In restricted bands of operation, the spurious emissions below the permissible value more than 20dB.

3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## 4.4 Maximum Output Power Measurement

#### 4.4.1 Limit

The Maximum Peak Output Power Measurement is 30dBm.

### 4.4.2 Test Procedure

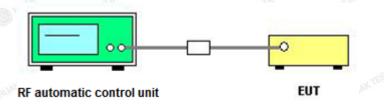
The maximum peak conducted output power may be measured using a broadband peak RF automatic control unit. The RF automatic control unit shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The maximum Average conducted output power may be measured using a wideband RF automatic control unit with a thermocouple detector or equivalent. The RF automatic control unit shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

## 4.4.3 Deviation From Standard

No deviation.

### 4.4.4 Test Setup



## 4.4.5 Test Results

Channel	Channel frequency (MHz)	Output power (dBm)	Cable loss	Maximum Output power (dBm)	Limit (dBm)	Result
Low	2402	-2.06	0.8	-1.26		Pass
Middle	2440	-2.74	0.8	-1.94	30.00	Pass
High	2480	-3.82	0.8	-3.02	0	Pass

Note: Maximum Output power (dBm)= Output Power(dBm)+ Cable loss

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

4.5 Power Spectral Density

**HUAK TESTING** 

### 4.5.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 4.5.2 Test Procedure

Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.

Set the RBW =10 kHz.

Set the VBW =30 KHz.

Set the span to 1.5 times the DTS channel bandwidth.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum power level. If measured value exceeds limit, reduce RBW(no less than 3 kHz)and repeat.

The resulting peak PSD level must be 8 dBm.

### 4.5.3 Deviation From Standard

No deviation.

#### 4.5.4 Test Setup



SPECTRUM ANALYZER

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



AFICATION.

## 4.5.5 Test Results

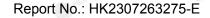
Channel Channel frequency (MHz)	Result (dBm/3kHz)	Offset	Test Result (dBm/3kHz)	Limit (dBm/3KHz)	Result	
Low	2402	-20.39	8.74	-11.65	O HOIM	Pass
Middle	2440	-21.26	8.74	-12.52	8.00	Pass
High	2480	-22.25	8.74	-13.51	ESTIM	Pass

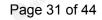


CH 00

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com







#### CH 19



#### CH 39



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL:+86-755 2302 9901 FAX:+86-755 2302 9901 E-mail: service@cer-mark.com



## 4.6 6db Bandwidth

### 4.6.1 Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

#### 4.6.2 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300 KHz. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

- 1. Set RBW = 100 kHz.
- 2. Set the video bandwidth (VBW)  $\geq$  3 RBW.
- 3. Detector = Peak.
- 4. Trace mode = max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.

7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 4.6.3 Deviation From Standard

No deviation.

#### 4.6.4 Test Setup

	HUN ON	HO!
E LI T		SPECTRUM
EUT		ANALYZER
6	CSTING	CSTIN CSTIN

### 4.6.5 Test Result

Channel	Channel frequency (MHz)	6dB Bandwidth (MHz)	Limit (KHz)	Result
Low	2402	0.716	WAKTES	Pass
Middle	2440	0.672	≥500	Pass
High	2480	0.704	O HUM	Pass

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

NG

IK.

PB



#### Page 33 of 44

#### CH 00

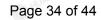


CH 19



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com





CH 39



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## 4.7 Occupied Bandwidth

## 4.7.1 Test Procedure

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

RBW=1% to 5% of the OBW

VBW=approximately 3 X RBW

Detector=Peak

Trace Mode: Max Hold

Use the 99% power bandwidth function of the instrument to measure the Occupied Bandwidth and recorded.

### 4.7.2 Deviation From Standard

No deviation.

## 4.7.3 Test Setup



## 4.7.4 Test Result

N/A

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



FICATION

## 4.8 Band Edge

#### 4.8.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under FCC rules in section 5.8.1, the attenuation required shall be 30 dB instead of 20 dB.

#### 4.8.2 Test Procedure

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation, RBW ≥ 1% of the span, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold.

#### 4.8.3 Deviation From Standard

No deviation.

### 4.8.4 Test Setup



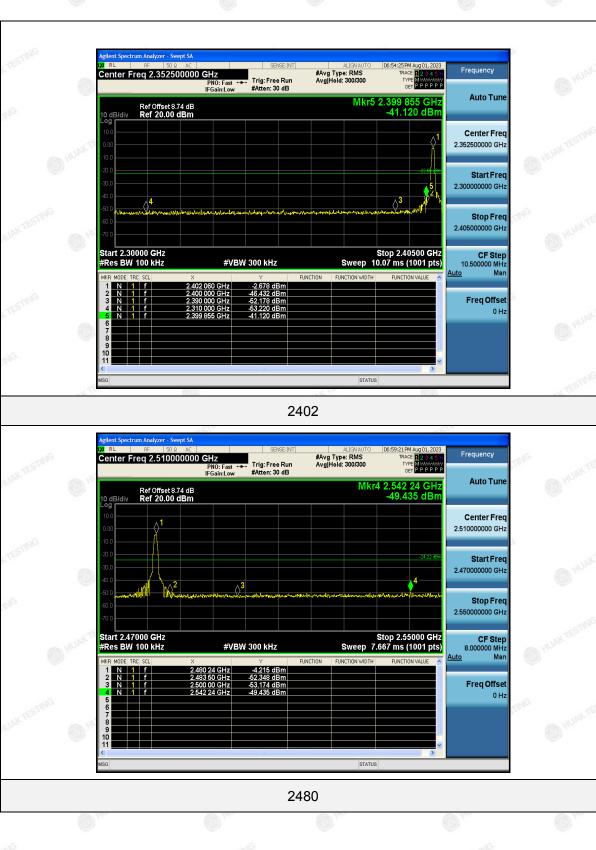
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## 4.8.5 Test Results

PASS



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

## 4.9 Conducted Spurious Emissions

#### 4.9.1 Applied Procedures / Limit

**HUAK TESTING** 

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section (b)(3) of RSS 5.4(4), the attenuation required shall be 30 dB instead of 20 dB.

For below 30MHz,For 9KHz-150kHz,150K-10MHz,We use the RBW 1KHz,10KHz, So the limit need to calculated by "10lg(BW1/BW2)". for example For9KHz-150kHz,RBW 1KHz, The Limit= the highest emission level-20-10log(100/1)= the highest emission level-40.

#### 4.9.2 Test Procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b.Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation,  $RBW \ge 1\%$  of the span,  $VBW \ge RBW$ , Sweep = auto, Detector function = peak, Trace = max hold.

#### 4.9.3 Deviation From Standard

No deviation.

#### 4.9.4 Test Setup



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



CH 00

#### Report No.: HK2307263275-E

**H**F

## 4.9.5 Test Results

		CH	00		
RL	rum Analyzer - Swept SA RF 50 Q AC req 2.40200000	PNO: Wide Irig: Free Run	ALIGNAUTO #Avg Type: RMS Avg Hold: 10/10	06:54:31 PM Aug 01, 2023 TRACE 2 3 4 5 7 TYPE	Frequen
	D. ( 08-1071 JD	IFGain:Low #Atten: 30 dB		2.402 276 GHz	Auto
10 dB/div Log	Ref Offset 8.74 dB Ref 28.74 dBm			-2.814 dBm	
					Center
18.7					2.40200000
8.74					Start
-1.26			<u>}</u>		2.40050000
-11.3		May an an	Mr.		Stop
-21.3			My		2.40350000
			w.n.		CF
-31.3	. Mar	J I	l.	Α.	300.00 Auto
-41.3	A A A A A A A A A A A A A A A A A A A	<i>ve</i>		m .	
-51.3 M	Walt			"WWW	FreqC
-61.3					
Center 2. #Res BW	402000 GHz 100 kHz	#VBW 300 kHz	Sweep 1	Span 3.000 MHz .000 ms (1001 pts)	
//50			STATUS		
Agilent Spect	rum Analyzer - Swept SA RF 50.9 AC	SENSE:INT	ALIGNAUTO	06:54:35PM Aug 01, 2023	
Center F	req 515.000000	PNO: East ++++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10	TRACE 23456 TYPE M	Frequenc
	Ref Offset 8.74 dB		М	kr1 800.86 MHz	Auto
10 dB/div Log	Ref Offset 8.74 dB Ref 18.74 dBm			-52.986 dBm	
8.74					Center 515.00000
					010.00000
-1.26					Start
-11.3					30.00000
-21.3				-22.91 @m	Stop
-31.3					1.00000000
-41.3					CF
-51.3				1	97.00000 <u>Auto</u>
					FreqC
-61.3	taskalashi sherina daga	and an instance of the state of the second state of the	pringent disention they are not in the	antholi iyelandali andala	riege
-71.3 <mark>6-1-1</mark> -1	<mark>sel lebolencer</mark>	hispirates here in the second states and st	the water of the second	in the second	
Start 30.0	MH2			Stop 1.0000 GHz	
#Res BW		#VBW 300 kHz		.00 ms (30001 pts)	
MSG			STATUS		
RL	rum Analyzer - Swept SA RF 50 Q AC	SENSE:INT	ALIGN AUTO	06:55:09PM Aug 01, 2023	Frequenc
Center F	req 13.7500000	PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 20 dB	#Avg Type: RMS Avg Hold: 10/10	TRACE	
	Ref Offset 8.74 dB Ref 18.74 dBm		Mkr	2 4.003 90 GHz -34.995 dBm	Auto
10 dB/div Log 8.74	Ref 18.74 dBm			-34.883 UBII	
-1.26					Center 13.75000000
-11.3				-22.81 d <del>De</del> s	
-31.3	2				Start 1.00000000
-41.3					
-61.3	and the second	and the second second second	Mary and the second of the sec		Stop 26.50000000
-71.3					
Start 1.00 #Res BW		#VBW 300 kHz	Sweep 2	Stop 26.50 GHz 2.438 s (30001 pts)	CF 2.55000000
MKR MODE T		401 65 GHz -2.880 dBm 003 90 GHz -34.995 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto
2 N ' 3 4	4	003 90 GHz -34.995 dBm			FreqC
5					
7 8 9					
10				~	
< MSG			STATUS	>	

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com

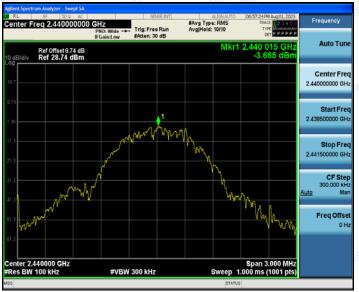


## Report No.: HK2307263275-E

١G

K

#### CH 19



RL	um Analyzer - Swept SA RF 50 Q AC req 515.000000 M	MHZ PNO: Fast			#Avg Type Avg Hold:		TRA	4 Aug 01, 2023 19 <b>1 2 3 4 5</b> 6 PE MUNUMUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU	Frequency
10 dB/div	Ref Offset 8.74 dB Ref 18.74 dBm					М	kr1 813. -53.8	44 MHz 91 dBm	Auto Tur
8.74									Center Fre 515.000000 MH
1.26									Start Fre 30.000000 MH
31.3								-23.67 d <del>0m</del>	Stop Fre 1.000000000 GH
41.3 51.3							1		CF Ste 97.000000 Mi Auto Ma
61.3	ing damakan alahadarak	teliştiye direke	daulti au	and one of	Act of the set of the set		in the shirt of the		Freq Offs 0 F
Start 30.0			300 kHz		pu <sup>ta</sup> paéréji S		Stop 1.0	0000 GHz	

						16.3
Agilent Spectrum Analyzer -	Swept SA					
RL RF 5	DA AC	SENSE:INT	r I	ALIGNAUTO	06:58:02 PM Aug 01, 2023	-
Center Freg 13.75	0000000 GHz		#Avg	Type: RMS	TRACE 1 2 3 4 5 (	Frequency
oonton moq romo	PNO: Fast	🛻 Trig: Free Run	Avgit	lold: 10/10	DET P P P P P	
	IFGain:Low	#Atten: 20 dB			DET PPPPP	
				Miles	2 4.066 80 GHz	Auto Tune
Ref Offset	8.74 dB			IVINI		
10 dB/div Ref 18.7	4 dBm				-35,969 dBm	
Log						
8.74						Center Fred
1.25 <b>1</b>						13.75000000 GH
-1.25 Y						13.750000000 GH
11.3						
A						
-21.3					23.67 dbn	Start Free
ata						1.00000000 GHz
						1.00000000 GHz
-41.3						
.51.3					ليقره فراقين	
	And the second second	and the state of the state	and the state of the second	with the second s		Stop Free
-61.3		and the second second	a del del a			26.50000000 GHz
.71.3						26.50000000 GHz
41.5						
					04+++ 00 C0 0U+	
Start 1.00 GHz				-	Stop 26.50 GHz	CF Step
#Res BW 100 kHz	#VE	W 300 kHz		Sweep 2	2.438 s (30001 pts)	2.55000000 GHz
MKR MODE TRC SCL	X	×	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto Man
1 N 1 C	2.439 90 GHz	-3.622 dBm	Ponchora	Ponchiger morth	PONCTION TREDE	
2 N 1 7	4.066 80 GHz	-35.969 dBm				
3						Freq Offset
4						0 Hz
5						UHA
6						
7						
8						
10						
11						
<						
/50				STATUS		

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



## Report No.: HK2307263275-E

#### CH 39



Agilent Spectrum Analyzer - Swept SA RL RF 50 Q AC Center Freq 515.00000		SENSE:INT	ALIGNAUT #Avg Type: RMS	TRACI	123456	Frequency
	PNO: Fast +++ IFGain:Low	Trig: Free Run #Atten: 20 dB	Avg Hold: 10/10	TYP	PPPPP	
Ref Offset 8.74 dE	3			Mkr1 826. -52.61	6 MHz 3 dBm	Auto Tune
8.74					_	Center Freq 515.000000 MHz
1.26						Start Freq 30.000000 MHz
31.3					-24.84 dBm	Stop Freq 1.00000000 GHz
41.3				<b>↓</b> 1		CF Step 97.000000 MHz Auto Man
.61.3	a la a alter de Mille de la a	ngal south and an definition of the	difference a radie in com-	anti Masenni i V	and dependent of the	Freq Offset 0 Hz
	liftern optatelinge	en ander	in, grand stad the state of the state			
Start 30.0 MHz #Res BW 100 kHz	#VBW	300 kHz	Sweep	Stop 1.0 94.00 ms (3		

gilent Spectri R L	um Analyzer - Swe		449-446-9-00			
	req 13.7500	00000 GHz PNO: Fast	SENSE:INT	#Avg Type: RMS Avg Hold: 10/10	07:00:05 PM Aug 01, 2023 TRACE 2 3 4 5 6 TYPE M	Frequency
0 dB/div	Ref Offset 8.7 Ref 18.74 d	IFGain:Low 4 dB IBM	#Atten: 20 dB	Mkr	2 4.133 10 GHz -36.852 dBm	Auto Tune
og 8.74 1.26 → ↓	)1					Center Free 13.750000000 GH
11.3 11.3 11.3	<sup>2</sup>				-24.04 abn	Start Fre 1.000000000 GH
51.3 51.3 71.3	al a lui			and and a second se		Stop Fre 26.500000000 GH
tart 1.00 Res BW	100 kHz		300 kHz		Stop 26.50 GHz 2.438 s (30001 pts)	CF Ste 2.550000000 GH Auto Ma
MR MODE TR	7	× 2.479 85 GHz 4.133 10 GHz	-5.670 dBm -36.852 dBm	FUNCTION FUNCTION WIDTH	FUNCTION WALUE	Freq Offse
4 5 6 7 8						0 H
9					×	
50				STATU	8	

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

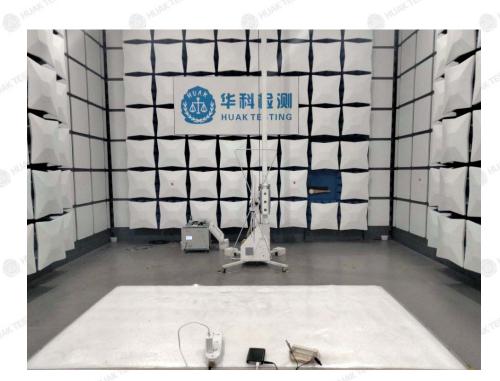
TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



'el

## 5 Test Setup Photo

**Radiated Emissions** 





The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com

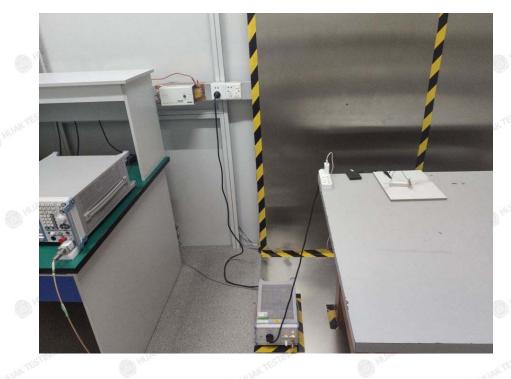
TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



Page 43 of 44

## Report No.: HK2307263275-E

#### Conducted Emission



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com/

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com



ACATIA

## 6 Photos of the EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos.

--End of test report---

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannont be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at http://www.cer-mark.com.

TEL: +86-755 2302 9901 FAX: +86-755 2302 9901 E-mail: service@cer-mark.com