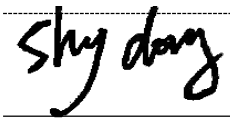
TEST REPORT

Report No. ……:	**KS2203S1107E02**
FCC ID……:	**2AHYV-GCMOUSE**
Applicant……:	**PEAG, LLC dba JLab Audio**
Address……:	5927 Landau Ct, Carlsbad, CA 92008, USA
Manufacturer……:	GuangDong Simpreal Intelligent Technology Co., Ltd
Address……:	Room 2408, JiaHong ZhenXing DaSha, DongGuan Avenue #13, DongCheng District, DongGuan City, GuangDong Province, P.R. China
Factory……:	GuangDong Simpreal Intelligent Technology Co., Ltd
Address……:	Room 2408, JiaHong ZhenXing DaSha, DongGuan Avenue #13, DongCheng District, DongGuan City, GuangDong Province, P.R. China
Product Name……:	**Mouse**
Trade Mark……:	JLAB
Model/Type reference……:	GO CHARGE MOUSE
Standard……:	**FCC 15.247**
Date of receipt of test sample…:	March 23, 2022
Date of testing……...:	March 23, 2021~August 9, 2022
Date of issue……....:	August 9, 2022
Test Result……:	**Pass**

Prepared by: (Printed name+ signature)	Pai Zheng	
Approved by: (Printed name + Signature)	Sky Dong	

Testing Laboratory Name……:	**KSIGN(Guangdong) Testing Co., Ltd.**
Address……:	West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu,Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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TABLE OF CONTENTS Page

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

KDB 558074 D01：The measurement guidance provided herein is applicable only to Digital Transmission System (DTS) devices operating in the 902-928 MHz. 2400-2483.5 MHz and/or 5725-5850 MHz bands under §15.247 of the FCC rules (Title 47 of the Code of Federal Regulations).

ANSI C63.10-2020: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	August 9, 2022	Original

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1.3. Test Description

FCC Part 15 Subpart C(15.247)			
Test Item	Standard Section	Result	Test Engineer
	FCC		
Antenna Requirement	15.203	Pass	Tom Chen
Conducted Emission	15.207	Pass	Tom Chen
Restricted Bands	15.205	Pass	Tom Chen
Hopping Channel Separation	15.247(a)(1)	Pass	Tom Chen
Dwell Time	15.247(a)(1)	Pass	Tom Chen
Peak Output Power	15.247(b)(1)	Pass	Tom Chen
Number of Hopping Frequency	15.247 (a)(1)	Pass	Tom Chen
Band Edge Emissions	15.247(d)	Pass	Tom Chen
Radiated Spurious Emission	15.247(c)&15.209	Pass	Tom Chen
99% Occupied Bandwidth & 20dB Bandwidth	15.247(a)(1)	Pass	Tom Chen
Pseudorandom Frequency Hopping Sequence	15.247 (a)(1)	Pass	Tom Chen

Note:

The measurement uncertainty is not included in the test result.

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1.4. Test Facility

Address of the report laboratory

KSIGN(Guangdong) Testing Co., Ltd.

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu,Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China

Laboratory accreditation

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

CNAS-Lab Code: L13261

KSIGN(Guangdong) Testing Co., Ltd. has been assessed and proved to be in Compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 5457.01

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED#: 25693 CAB identifier.: CN0096

KSIGN(Guangdong) Testing Co., Ltd. has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

FCC-Registration No.: 294912 Designation Number: CN1328

KSIGN(Guangdong) Testing Co., Ltd. EMC Laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

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1.5. Measurement Uncertainty

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 TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the KSIGN(Guangdong) Testing Co., Ltd. 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. Below is the best measurement capability for KSIGN(Guangdong) Testing Co., Ltd.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.6. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

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2. GENERAL INFORMATION

2.1. General Description of EUT

Test Sample Number:	1-1-1(Normal Sample),1-1-2(Engineering Sample)
Product Name:	Mouse
Trademark:	JLAB
Model/Type reference:	GO CHARGE MOUSE
Model Difference:	N/A
Power supply(Adapter):	DC 5V
Power supply(Battery):	DC 3.7V
Hardware version:	Lithium battery V3.1 Dry cell batteries V3.1
Software version:	Lithium battery: V3.2, Dry cell batteries: V3.1
Bluetooth	
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Max Peak Output Power:	GFSK：-0.61dBm
Channel number:	79
Channel separation:	1MHz
Antenna type:	PCB Antenna
Antenna gain:	2.97dBi

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2.2. Operation state

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
00	**2402**
01	2403
⋮	⋮
38	2440
39	**2441**
40	2442
⋮	⋮
77	2479
78	**2480**

Note: The display in gray were the channel selected for testing.

Test mode

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Hopping mode GFSK

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2.The test software is the fcc test tool v1.6 which can set the EUT into the individual test modes.

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2.3. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	Spectrum Analyzer	R&S	FSV40-N	101798	03/04/2023
2	Vector Signal Generator	Agilent	N5182A	MY50142520	03/04/2023
3	Analog Signal Generator	HP	83752A	3344A00337	03/04/2023
4	Power Sensor	Agilent	E9304A	MY50390009	03/04/2023
5	Power Sensor	Agilent	E9300A	MY41498315	03/04/2023
6	Wideband Radio Communication Tester	R&S	CMW500	157282	03/04/2023
7	Climate Chamber	Angul	AGNH80L	1903042120	03/04/2023
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	03/04/2023
9	RF Control Unit	Tonscend	JS0806-2	/	03/04/2023

Transmitter spurious emissions & Receiver spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	EMI Test Receiver	R&S	ESR	102525	03/04/2023
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	03/04/2023
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	03/04/2023
4	Spectrum Analyzer	HP	8593E	3831U02087	03/04/2023
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	12/04/2023
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	03/04/2023
7	Spectrum Analyzer	R&S	FSV40-N	101798	03/04/2023
8	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	03/29/2023
9	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	03/04/2023
10	Pre-Amplifier	EMCI	EMC051835SE	980662	03/04/2023
11	Pre-Amplifier	Schwarzbeck	BBV-9721	57	03/04/2023
12	Horn Antenna	Schwarzbeck	BBHA 9170	00939	03/04/2023

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV432	1326.6105.02	03/04/2023
2	EMI Test Receiver	R&S	ESR	102524	03/04/2023
3	Manual RF Switch	JS TOYO	/	MSW-01/002	03/04/2023

Note:
1)The Cal. Interval was one year.
2)The cable loss has calculated in test result which connection between each test instruments.

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2.4. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE
Bluetooth and WIFI Test System	JS1120-3	2.5.77.0418

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3. TEST ITEM AND RESULTS

3.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

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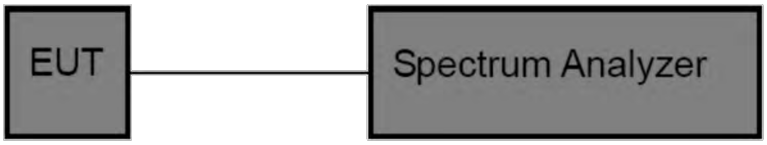
3.2. Peak Output Power

Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125mW(21dBm)	2400~2483.5

Test Configuration



Test Procedure

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
   Peak Detector:
   RBW=3 MHz, VBW=10 MHz
   （RBW > 20 dB bandwidth of the emission being measured, VBW≥RBW）
   Sweep: Auto
   Trace: Max hold.

   Allow trace to stabilize.

   Use the marker-to-peak function to set the marker to the peak of the emission.

Test Mode

Please refer to the clause 2.2

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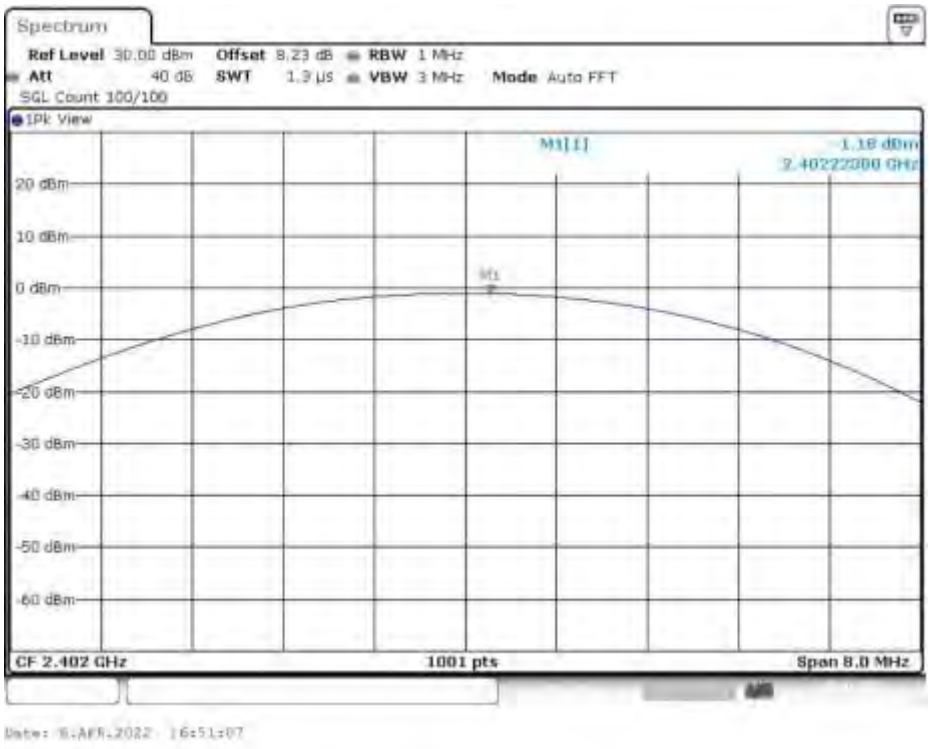
Test Result

Test Mode:	DH5	
Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)
2402	-1.18	⩽20.97
2441	-0.61	
2480	-0.77	
DH5-2402 MHz		



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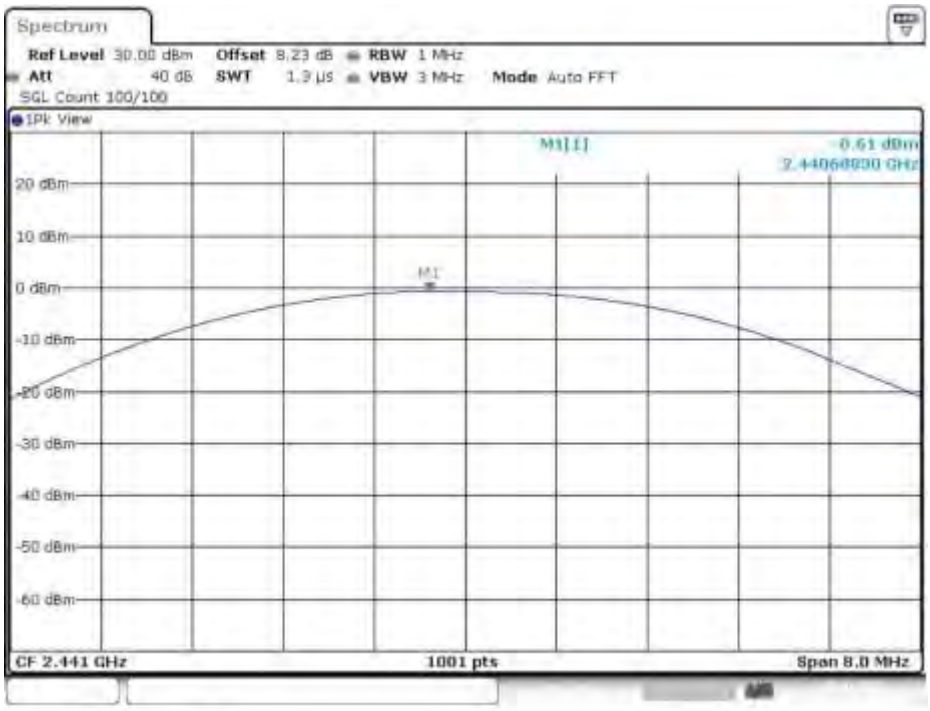
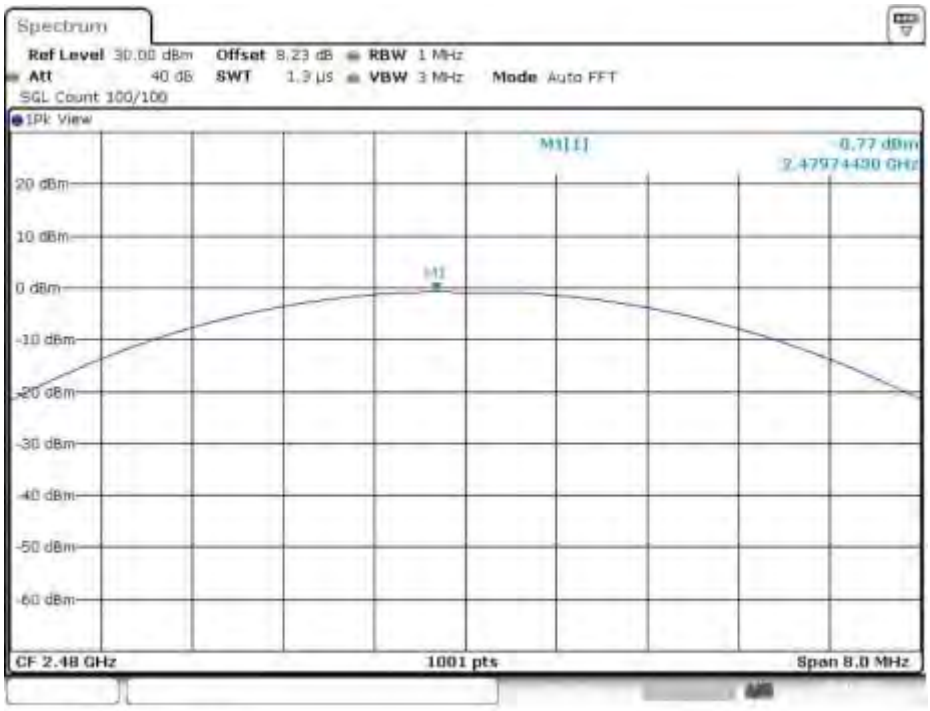
DH5-2441 MHz



DH5-2480 MHz



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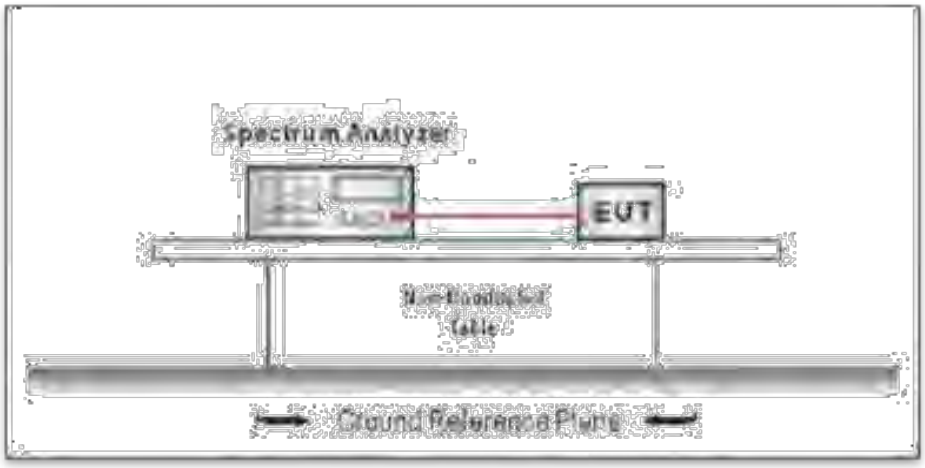
3.3. 20dB Bandwidth

Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	N/A	2400~2483.5

Test Configuration



Test Procedure

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:

   (1) Set RBW = 30 kHz.
   (2) Set the video bandwidth (VBW) ≥ 3*RBW.
   (3) Detector = Peak.
   (4) Trace mode = Max hold.
   (5) Sweep = Auto couple.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

Please refer to the clause 2.2.

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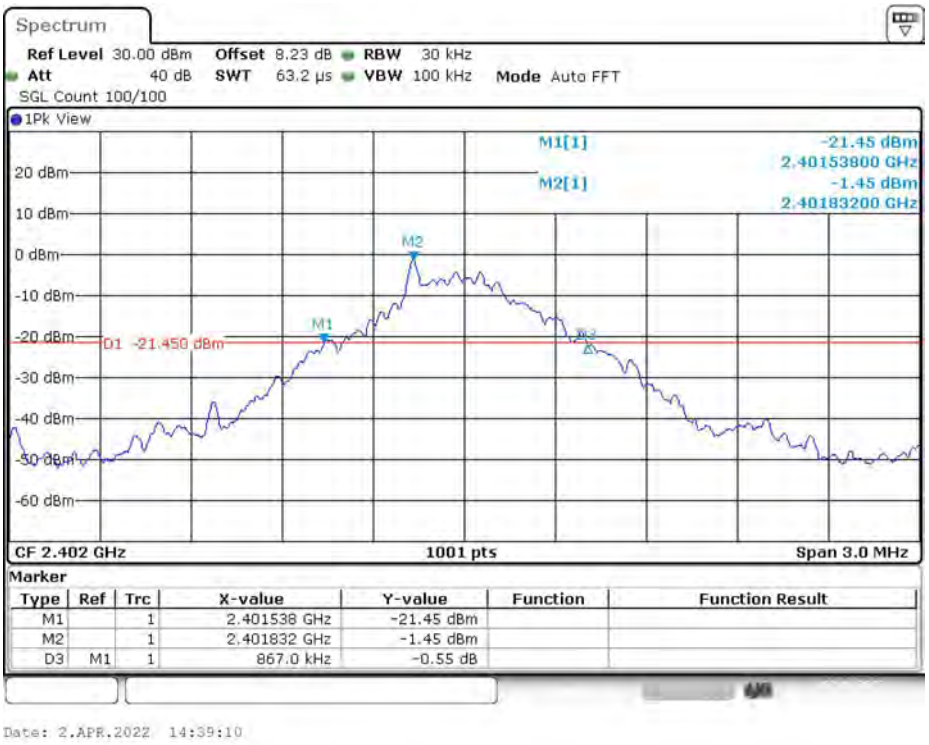
Test Results

Test Mode:	DH5			
Channel frequency (MHz)	20dB Bandwidth [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	0.87	2401.52	2402.41	PASS
2441	0.87	2440.52	2441.41	PASS
2480	0.86	2479.52	2480.41	PASS
2402 MHz				



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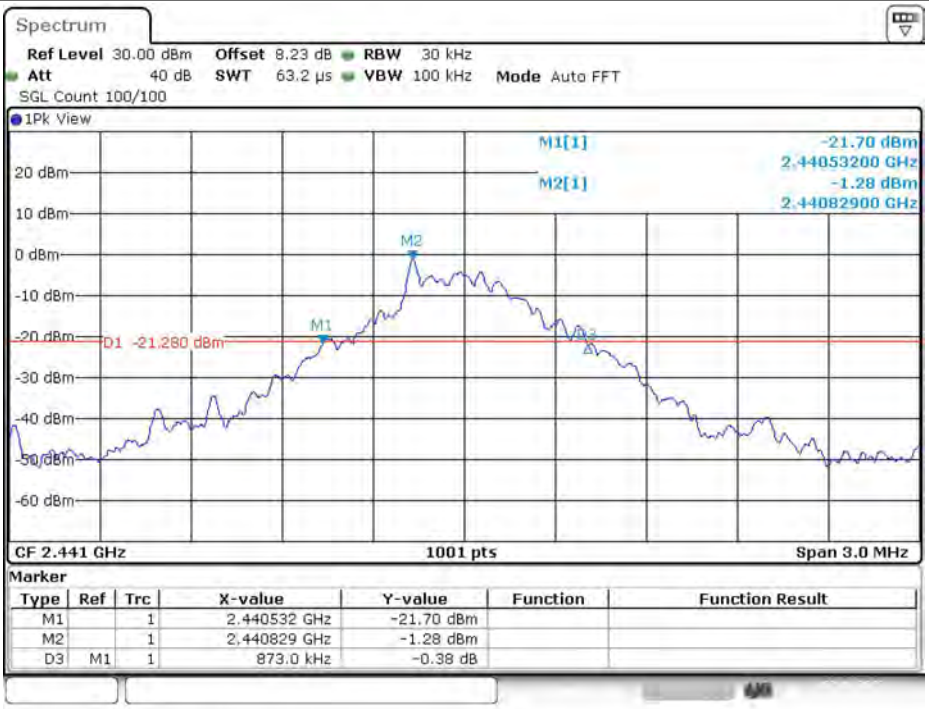
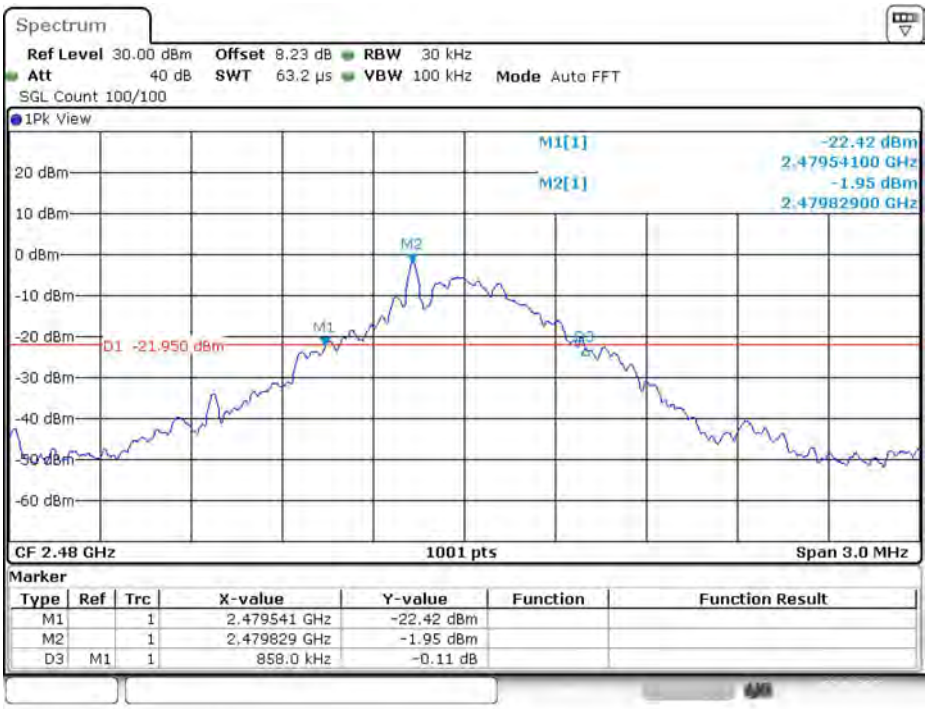
2441 MHz



2480 MHz



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Test Mode:	DH5			
Channel frequency (MHz)	99% OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
2402	0.923	2401.544	2402.408	PASS
2441	0.920	2440.541	2441.408	PASS
2480	0.929	2479.541	2480.408	PASS
2402 MHz				

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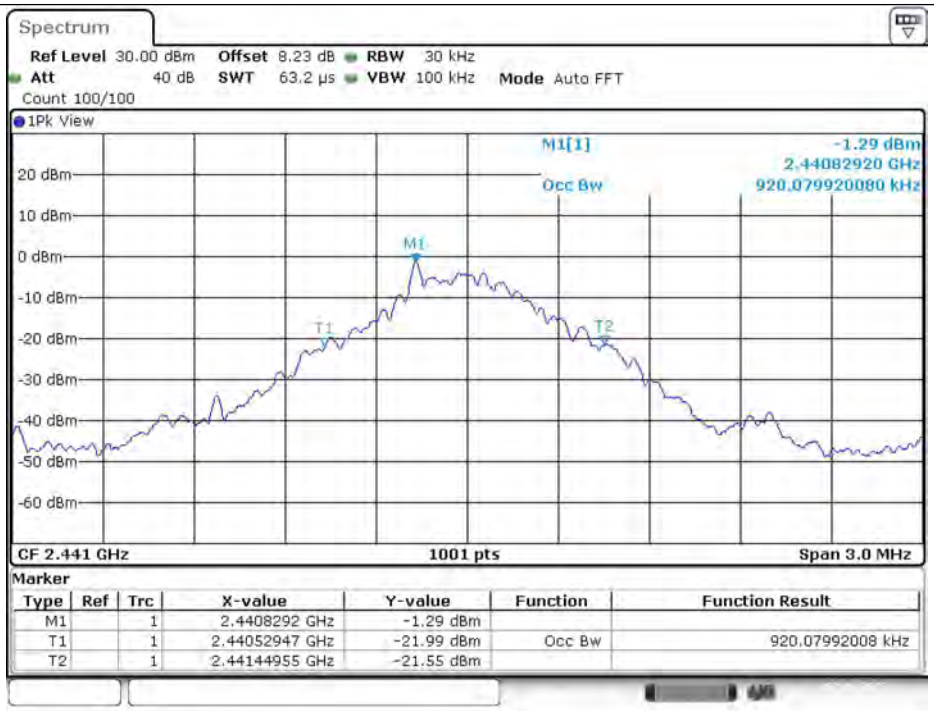
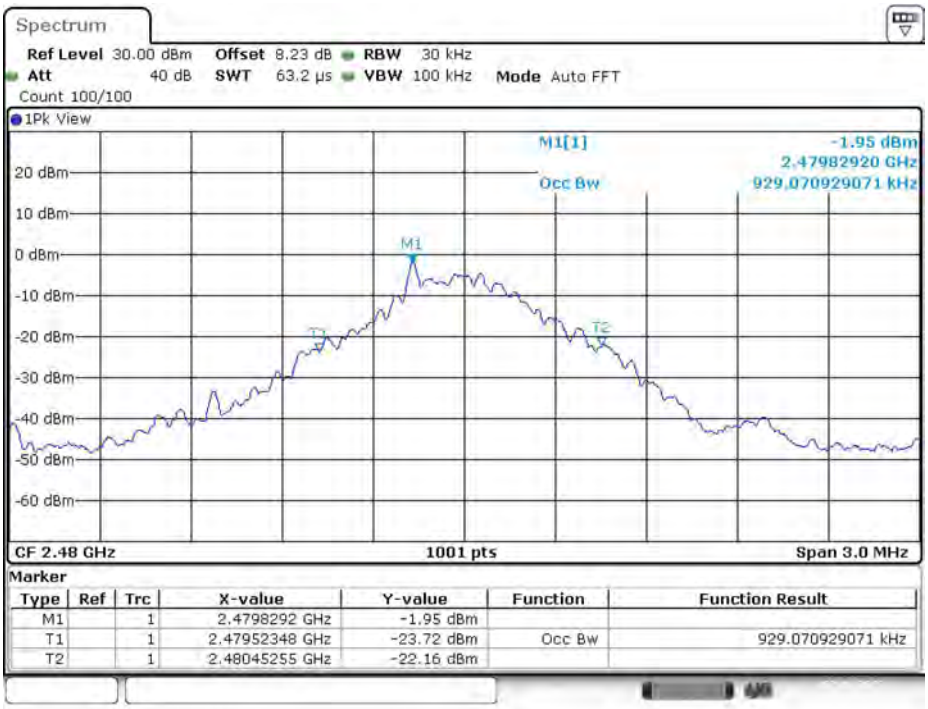
2441 MHz



2480 MHz



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3.4. Carrier Frequencies Separation

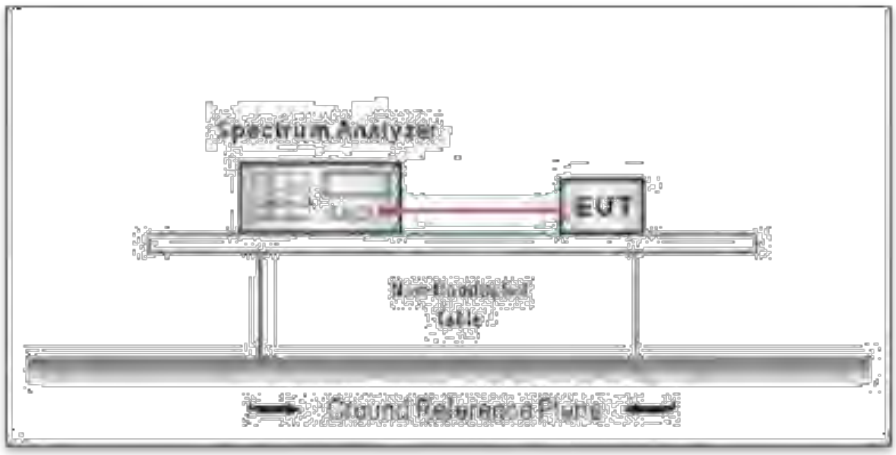
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

Test Item	Limit	Frequency Range(MHz)
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

Test Configuration



Test Procedure

1.Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2.Spectrum Setting:

(1) Set RBW = 100 kHz.
(2) Set the video bandwidth (VBW) ≥ 3 RBW.
(3) Detector = Peak.
(4) Trace mode = Max hold.
(5) Sweep = Auto couple.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

Please refer to the clause 2.2.

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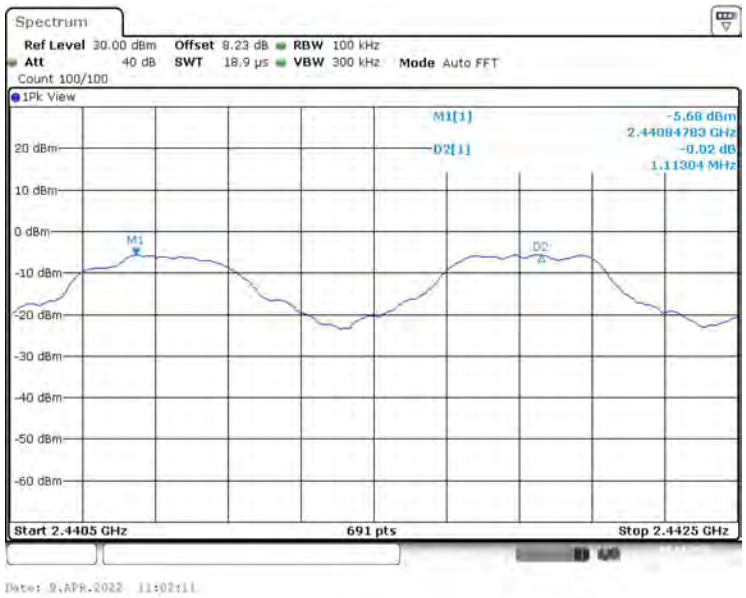
Test Results

Test Mode:	DH5 Hopping Mode		
Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	1.113	>=0.593	PASS
DH5 Hopping Mode			



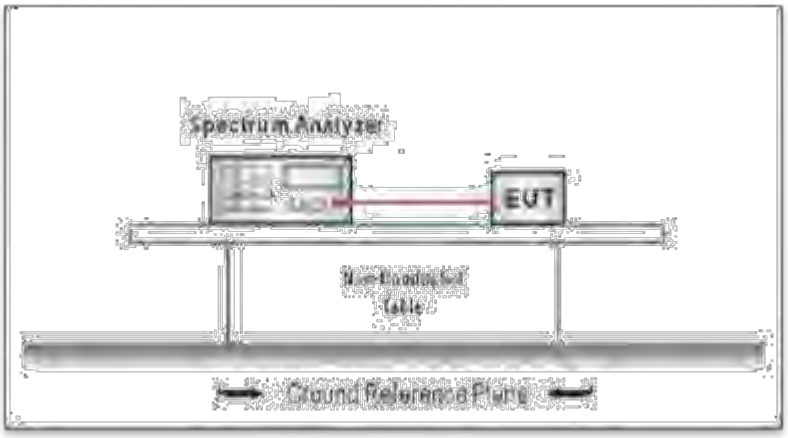
Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
Tel：+(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail：info@gdksign.cn Web: www.gdksign.com

3.5. Number of Hopping Channel

Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

Test Configuration



Test Procedure

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
   (1) Peak Detector: RBW=100 kHz, VBW≥RBW, Sweep time= Auto.

Test Mode

Please refer to the clause 2.2.

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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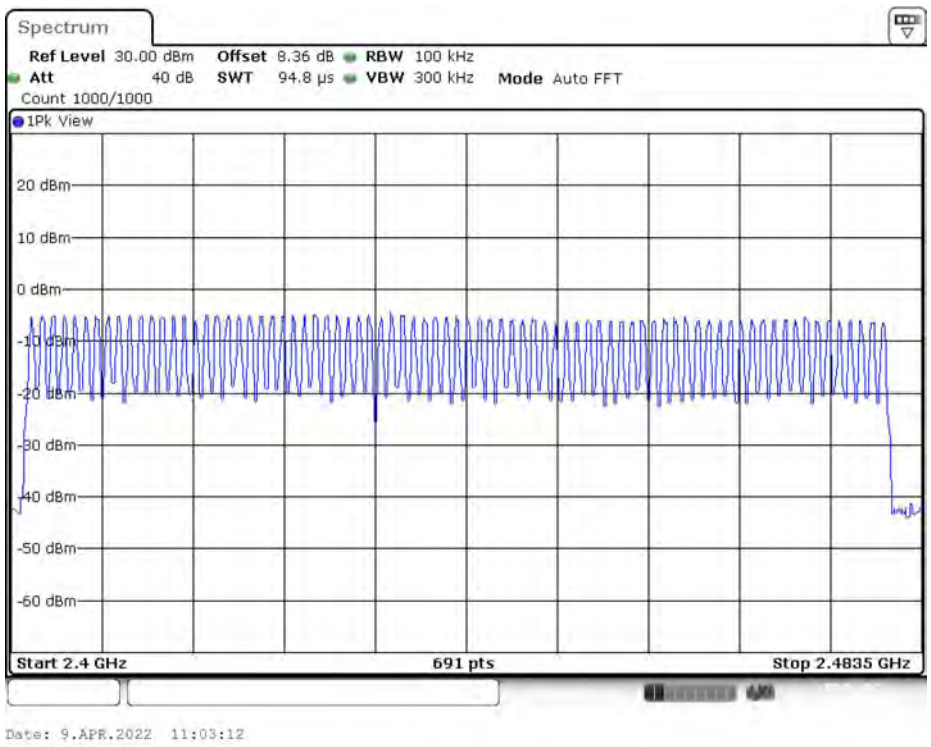
Test Result

Test Mode:	Hopping Mode	
Frequency Range	Quantity of Hopping Channel	Limit
2402MHz~2480MHz	79	>15

DH5 Mode



Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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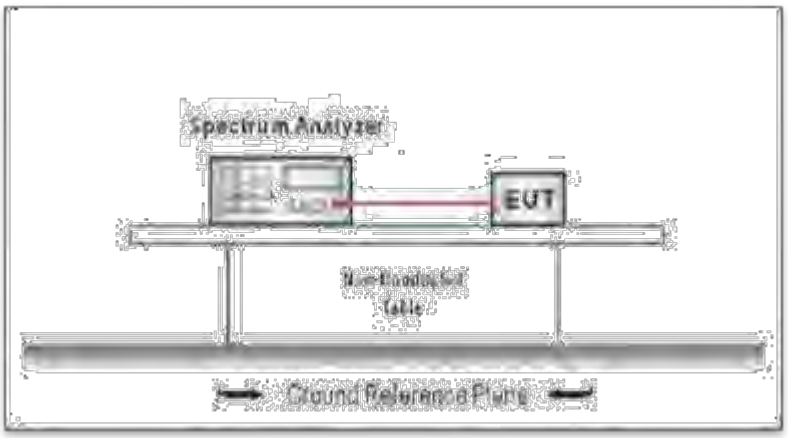
3.6. Dwell Time

Limit

Section	Test Item	Limit
15.247(a)(1)	Average Time of Occupancy	0.4 sec

Test Configuration



Test Procedure

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:
   (1) Spectrum Setting: RBW=1MHz, VBW≥RBW.
   (2) Use video trigger with the trigger level set to enable triggering only on full pulses.
   (3) Sweep Time is more than once pulse time.
   (4) Set the center frequency on any frequency would be measure and set the frequency span to zero.
   (5) Measure the maximum time duration of one single pulse.
   (6) Set the EUT for packet transmitting.

Test Mode

Please refer to the clause 2.2

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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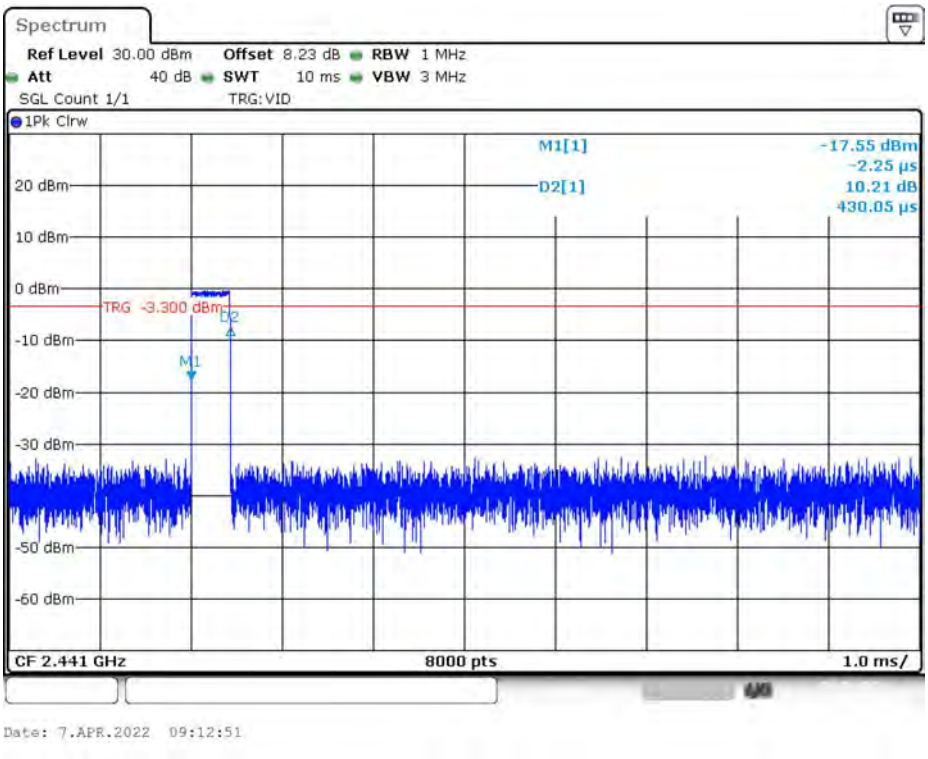
Test Result

Mode	Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (ms)	Limit(s)	Conclusion
GFSK	DH1	2441	0.43	121.60	<0.4	Pass
	DH3	2441	1.62	260.80	<0.4	Pass
	DH5	2441	2.81	306.13	<0.4	Pass

Note:
1. A period time = 0.4 (s) * 79 = 31.6(s)
2. DH1 time slot = Pulse Duration * (1600/(2*79)) * A period time
   DH3 time slot = Pulse Duration * (1600/(4*79)) * A period time
   DH5 time slot = Pulse Duration * (1600/(6*79)) * A period time
3. For GFSK, π/4-DQPSK and 8DPSK: The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

Test plots

GFSK mode-DH1



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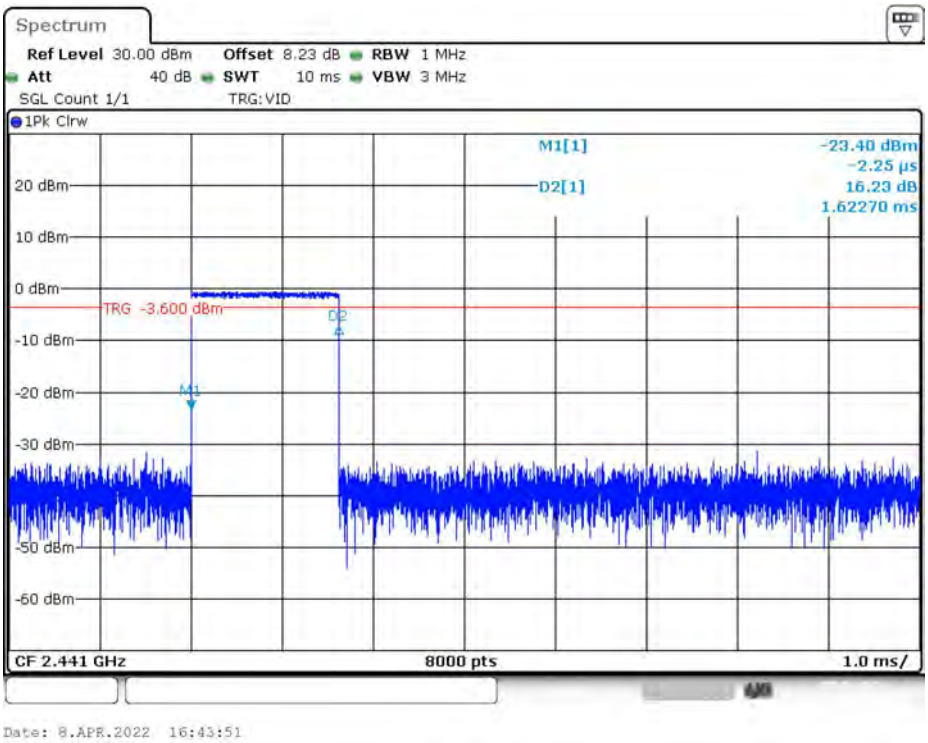
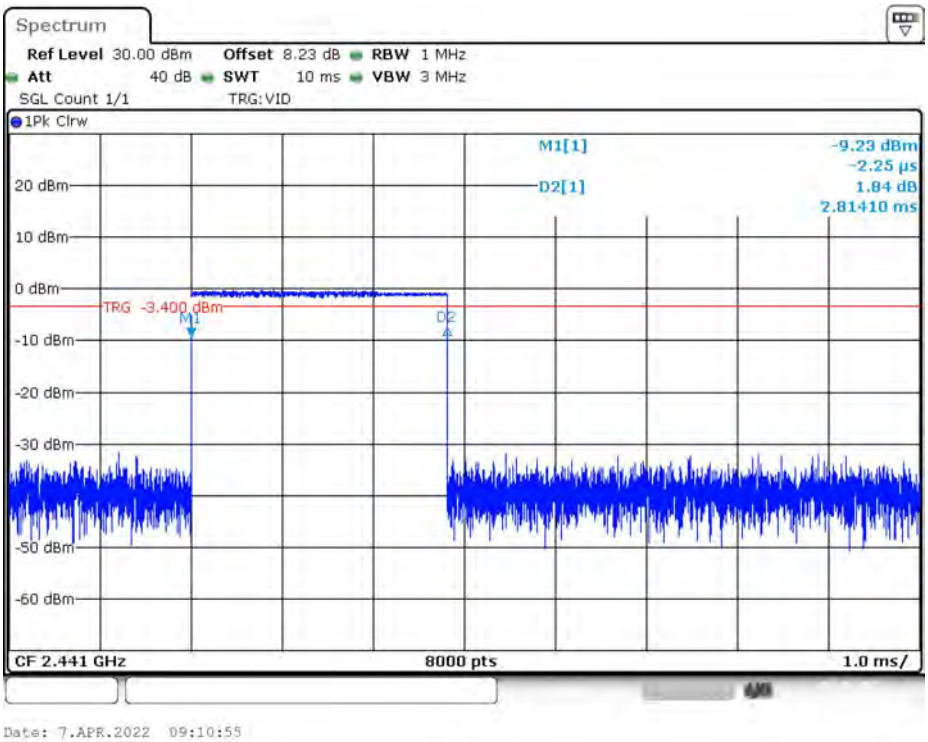
Tel：+(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail：info@gdksign.cn Web: www.gdksign.com

GFSK mode-DH3



GFSK mode-DH5



Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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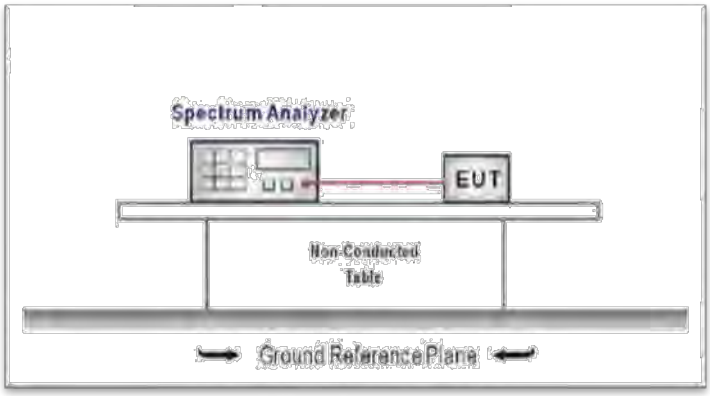
3.7. Band Edge and Spurious Emission (conducted)

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section15.247 (d):
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect EUT RF Output port to the Spectrum Analyzer through an RF attenuator.
2. Spectrum Setting:

   RBW=100KHz

   VBW=3*RBW.

   Detector function: Peak.
   Trace: Max hold.
   Sweep = Auto couple.

   Allow the trace to stabilize.

TEST MODE:

Please refer to the clause 2.2.

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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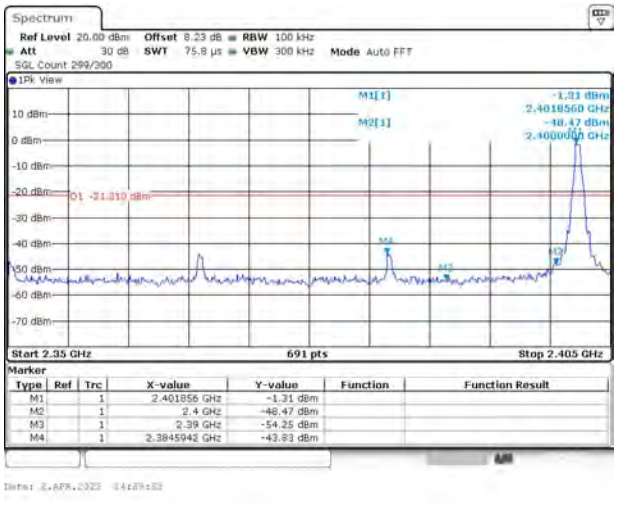
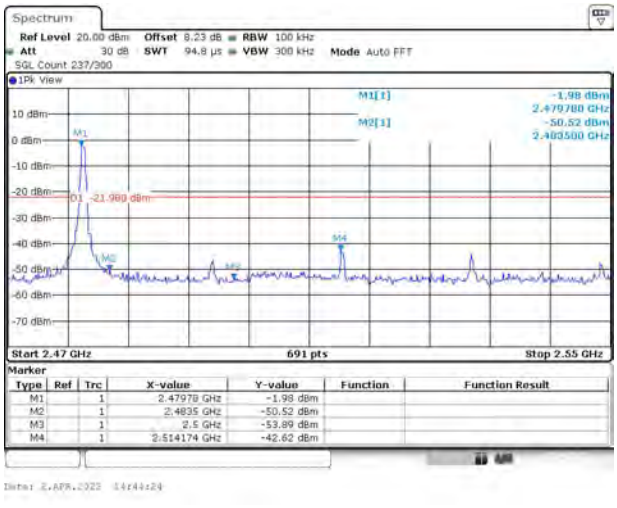
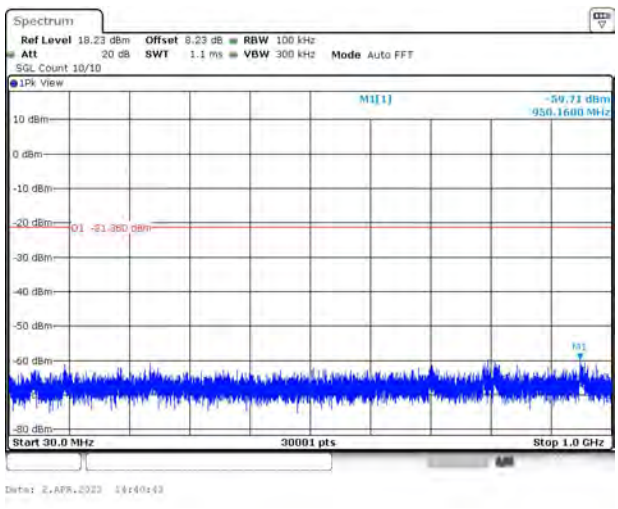
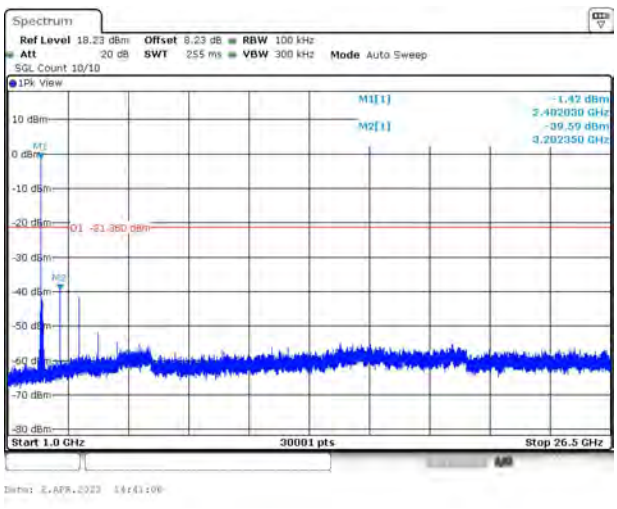
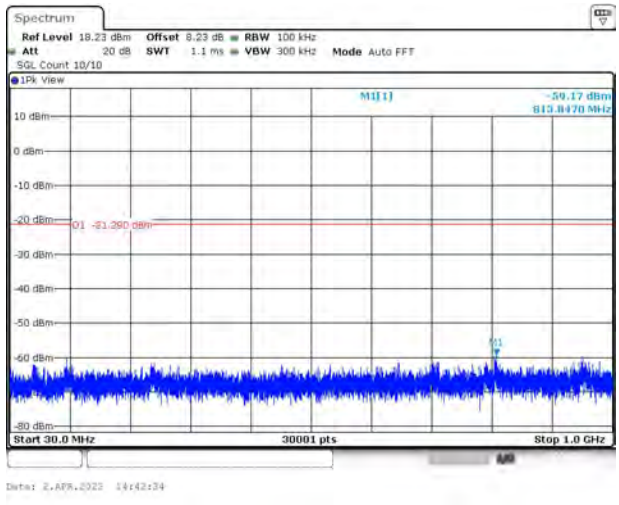
TEST RESULTS

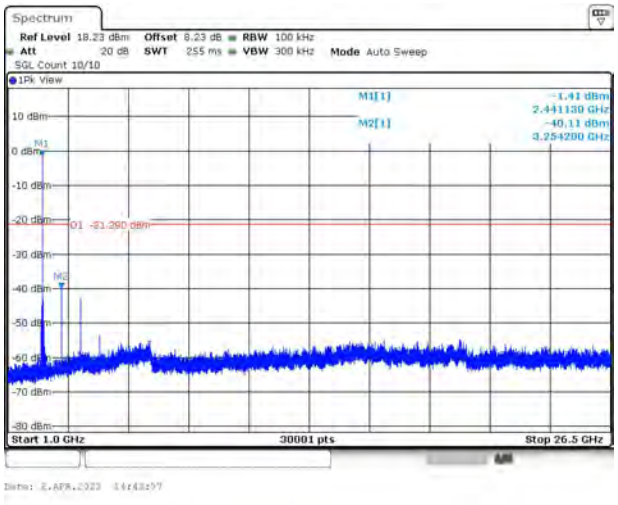
DH5	
CH00-Bandedge	CH78-Bandedge
	

DH5	
CH00-SE	
	

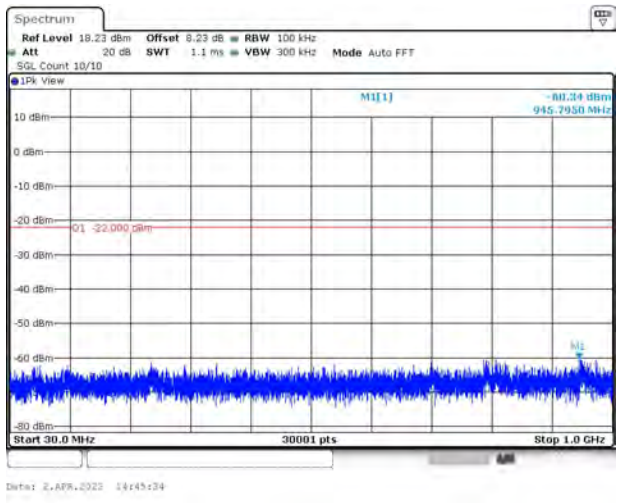
Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
Tel：+(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail：info@gdksign.cn Web: www.gdksign.com

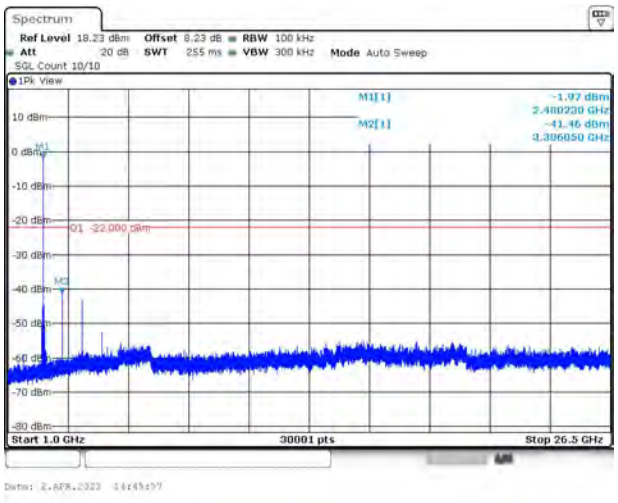
CH39-SE





CH78-SE





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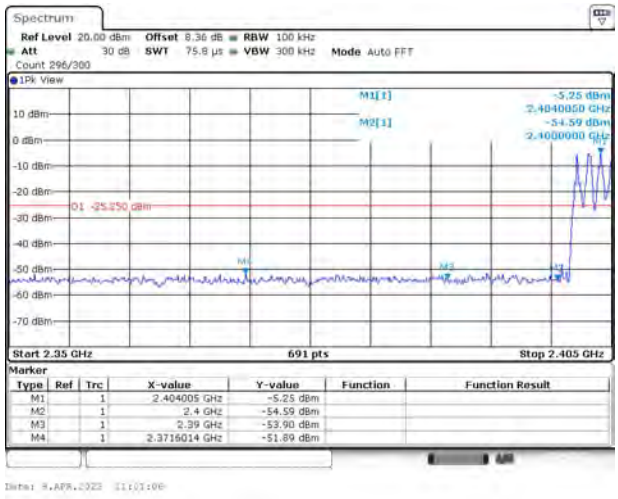
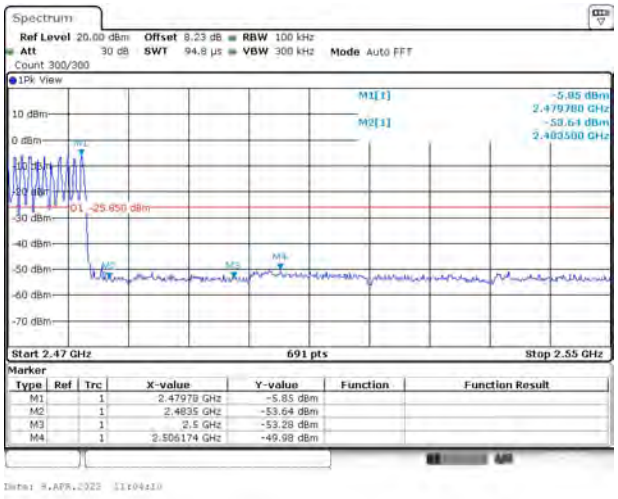
DH5(2402)-Hopping on	DH5(2480)-Hopping on
	

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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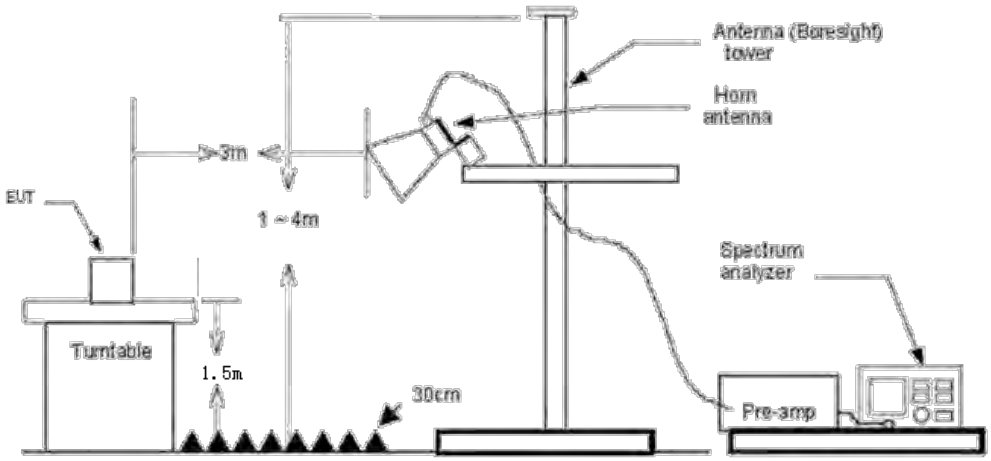
3.8. Band Edge Emissions(Radiated)

Limit

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54
Note: All restriction bands have been tested, only the worst case is reported.		

Test Configuration



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2020 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2020on radiated measurement.
5. The receiver set as follow:
   RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
   RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value.

Test Mode

Please refer to the clause 2.2.

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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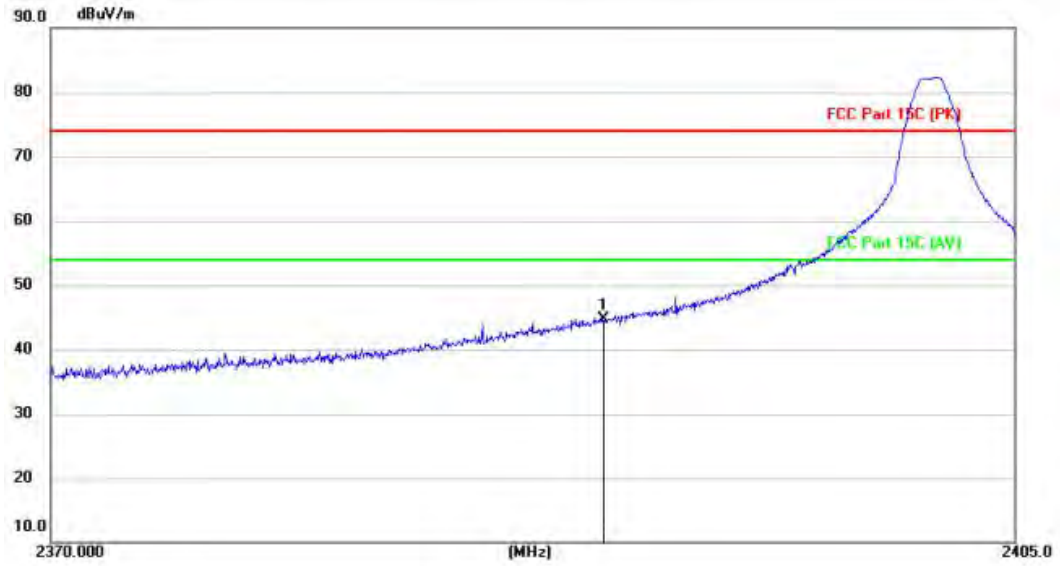
Test Results

Note:

1. Measurement = Reading level + Correct Factor

2.Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor

Test Voltage	DC 3.7V
Ant. Pol.	Horizontal
Test Mode:	DH5 Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2390.000	55.55	-10.92	44.63	74.00	-29.37	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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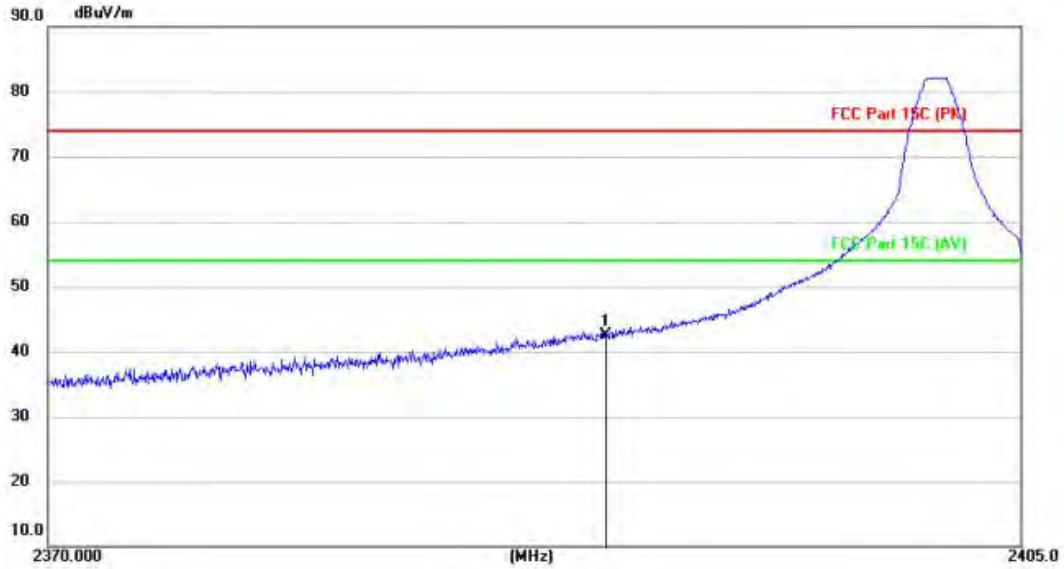
Test Voltage	DC 3.7V
Ant. Pol.	Vertical
Test Mode:	DH5 Mode 2402 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2390.000	53.39	-10.92	42.47	74.00	-31.53	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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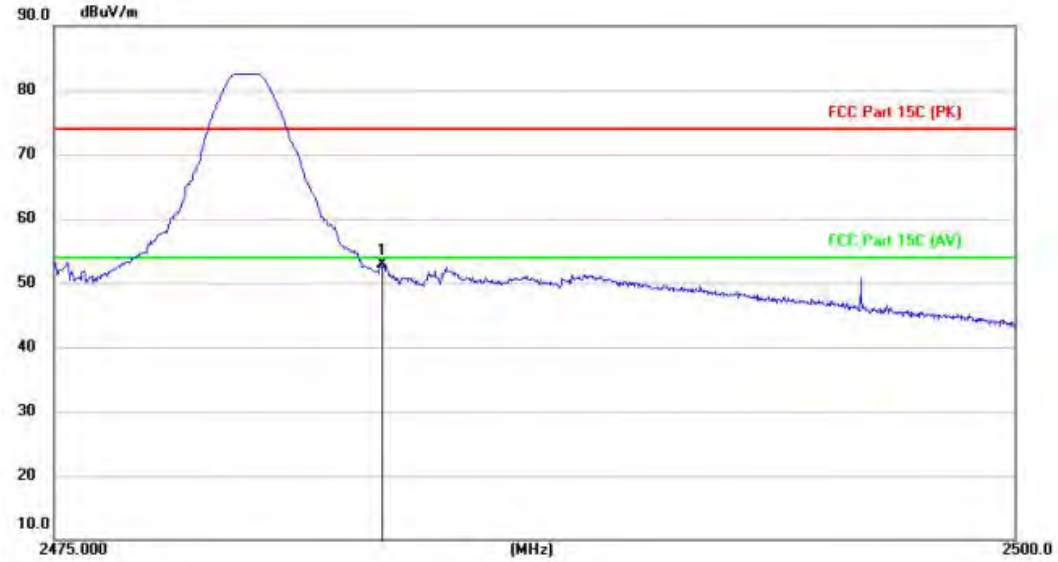
Test Voltage	DC 3.7V
Ant. Pol.	Horizontal
Test Mode:	DH5 Mode 2480MHz

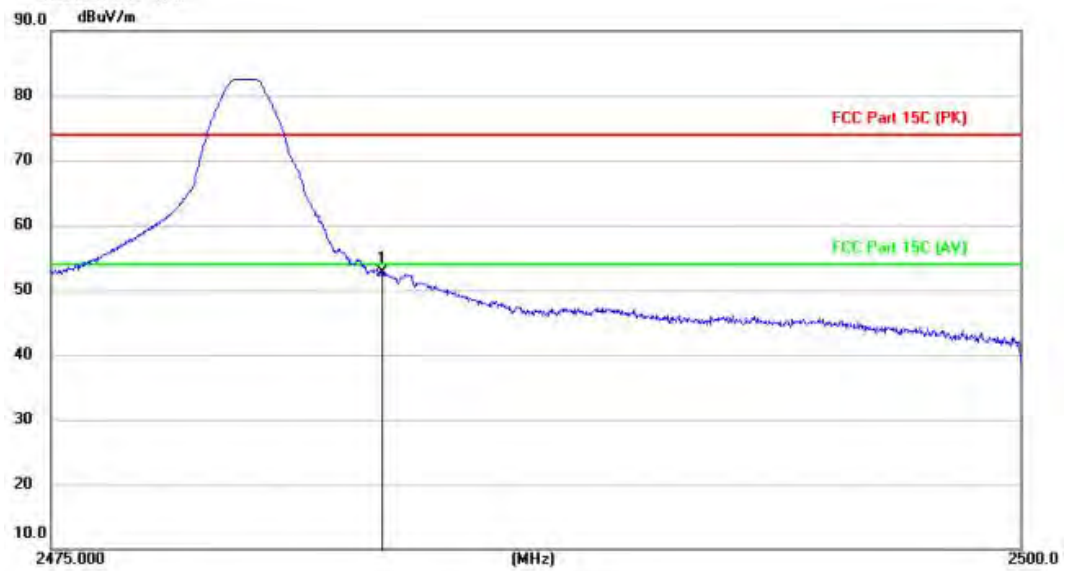


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2483.500	63.83	-10.88	52.95	74.00	-21.05	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
Tel：+(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail：info@gdksign.cn Web: www.gdksign.com

Test Voltage	DC 3.7V
Ant. Pol.	Vertical
Test Mode:	DH5 Mode 2480 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2483.500	63.51	-10.88	52.63	74.00	-21.37	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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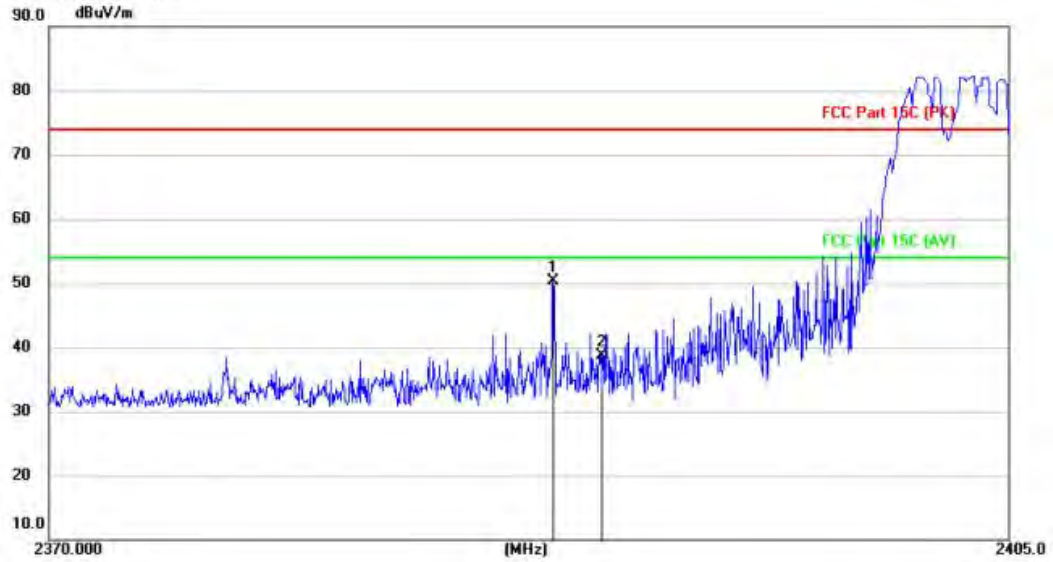
Test Voltage	DC 3.7V
Ant. Pol.	Horizontal
Test Mode:	DH5-Hopping Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2388.329	61.22	-10.92	50.30	74.00	-23.70	peak
2		2390.073	49.68	-10.92	38.76	74.00	-35.24	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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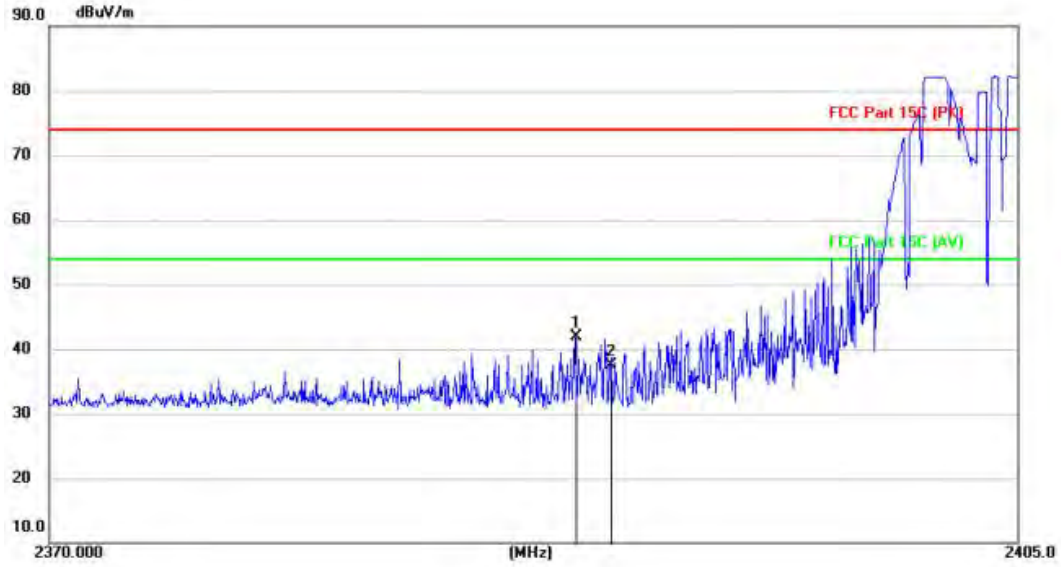
Test Voltage	DC 3.7V
Ant. Pol.	Vertical
Test Mode:	DH5-Hopping Mode 2402 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2388.949	52.89	-10.93	41.96	74.00	-32.04	peak
2		2390.258	48.47	-10.92	37.55	74.00	-36.45	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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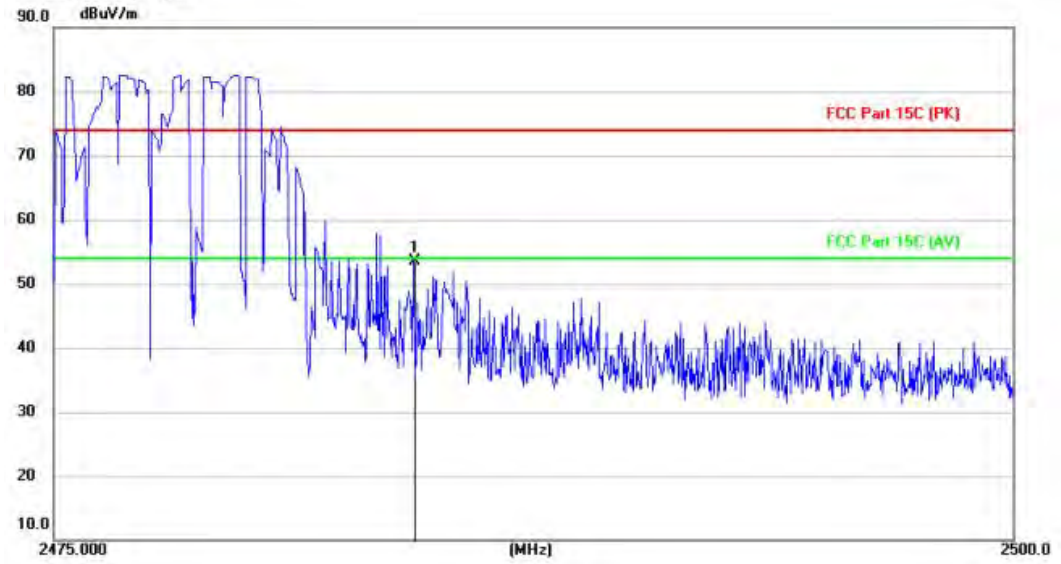
Test Voltage	DC 3.7V
Ant. Pol.	Horizontal
Test Mode:	DH5-Hopping Mode 2480MHz

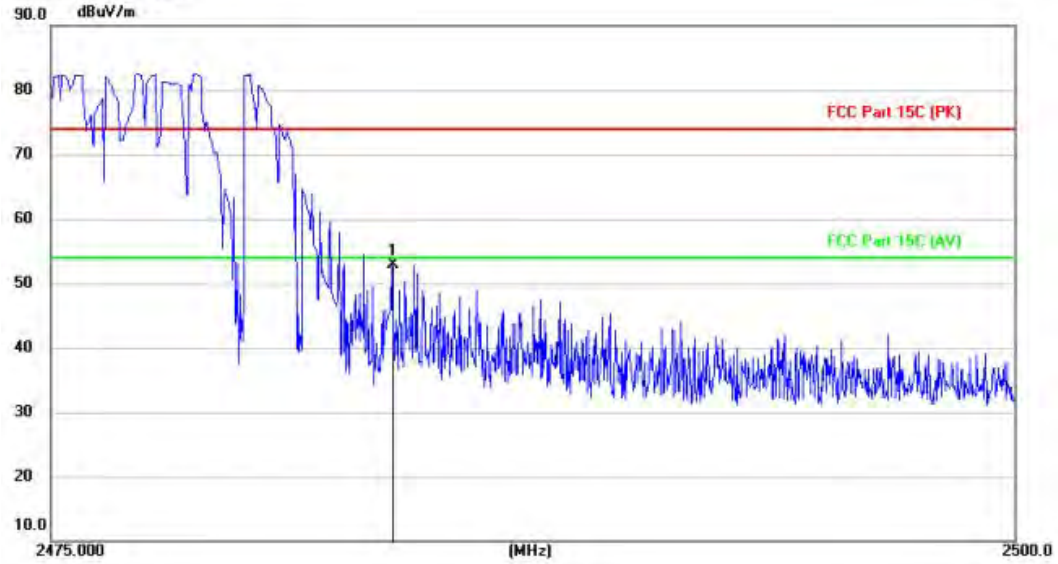


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2484.367	64.48	-10.88	53.60	74.00	-20.40	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
Tel：+(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail：info@gdksign.cn Web: www.gdksign.com

Test Voltage	DC 3.7V
Ant. Pol.	Vertical
Test Mode:	DH5-Hopping Mode 2480 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1	*	2483.830	63.86	-10.88	52.98	74.00	-21.02	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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3.9. Radiated Spurious Emissions

Limit

Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Radiated Emission Limit (Above 1000MHz)

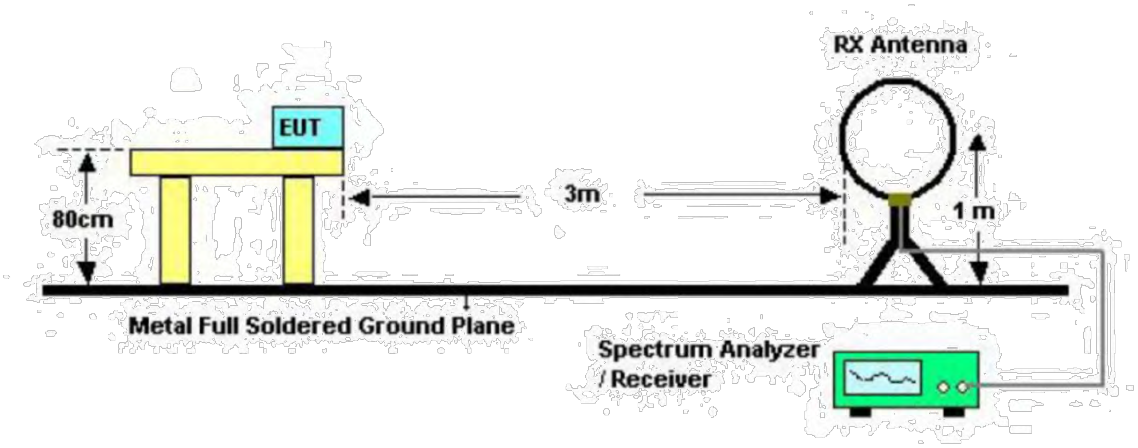
Frequency (MHz)	Distance Meters(at 3m)	
	Peak	Average
Above 1000	74	54

Note:

(1) The tighter limit applies at the band edges.

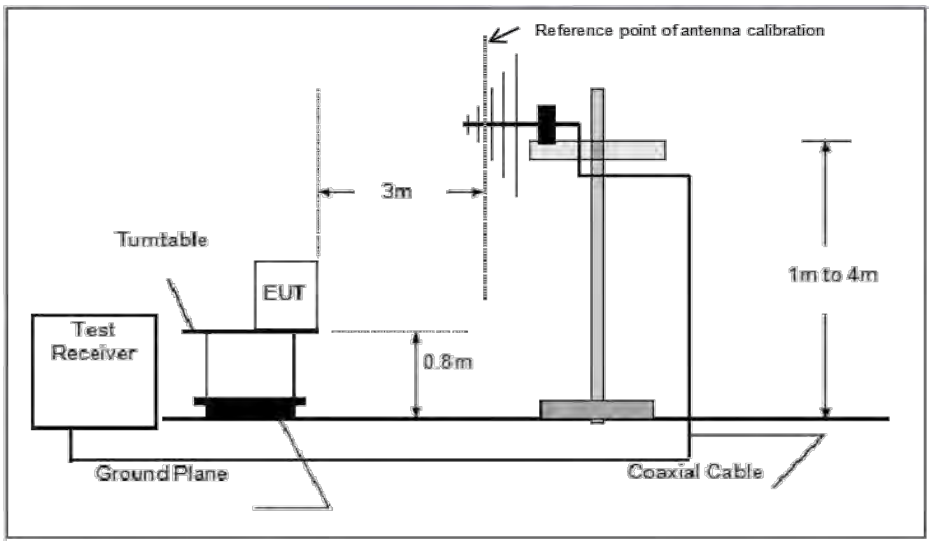
(2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

Test Configuration

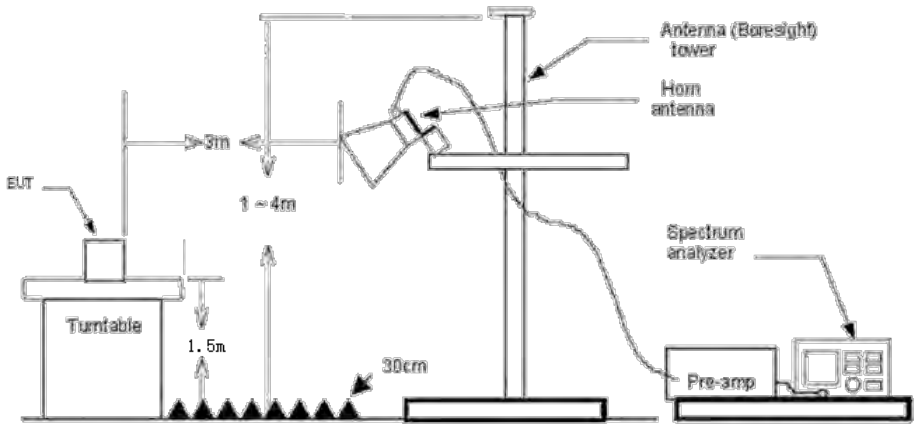


Below 30MHz Test Setup

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
Tel：+(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail：info@gdksign.cn Web: www.gdksign.com



Below 1000MHz Test Setup



Above 1GHz Test Setup

Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2020
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Below 1 GHz:
   RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
   If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
   (3) From 1 GHz to 10th harmonic:
   RBW=1MHz, VBW=3MHz Peak detector for Peak value.
   RBW=1MHz, VBW=10Hz Peak detector for Peak value.

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Test Mode

Please refer to the clause 2.2.

Test Result

PASS

Note:

1) Measurement = Reading level + Correct Factor

Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor

2) From 9 KHz~30 MHz and 18GHz~25GHz,the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3) Pre-scan DH5, 2DH5 and 3DH5 modulation, found the DH5-CH00 Channel Below 1GHz and found the DH5 modulation which it is worse case for above 1GHz, so only show the test data for worse case.

RADIATED EMISSION BELOW 30MHz

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

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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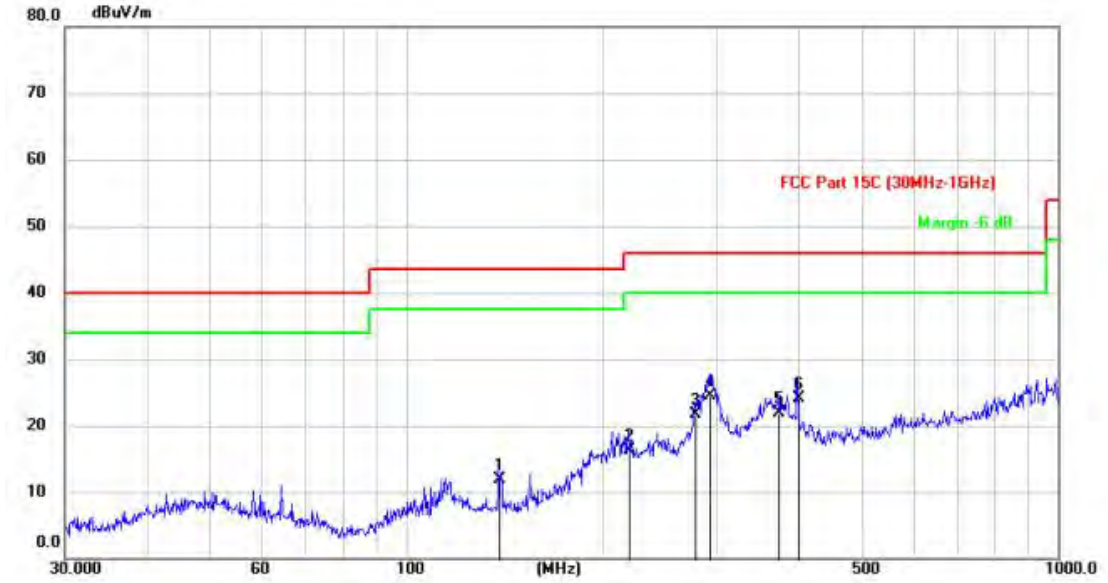
30MHz-1GHz

Test Voltage	DC 3.7V
Ant. Pol.	Horizontal
Test Mode:	DH5 Mode 2402 MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		139.3120	33.10	-21.28	11.82	43.50	-31.68	QP
2		219.6134	33.48	-17.13	16.35	46.00	-29.65	QP
3		277.7744	36.97	-15.19	21.78	46.00	-24.22	QP
4	*	293.0842	39.38	-14.82	24.56	46.00	-21.44	QP
5		372.6573	33.75	-11.80	21.95	46.00	-24.05	QP
6		399.8706	34.95	-10.91	24.04	46.00	-21.96	QP

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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Test Voltage	DC 3.7V
Ant. Pol.	Vertical
Test Mode:	DH5 Mode 2402 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		55.0080	32.62	-16.70	15.92	40.00	-24.08	QP
2	*	59.2323	36.91	-17.43	19.48	40.00	-20.52	QP
3		140.0961	34.10	-21.27	12.83	43.50	-30.67	QP
4		206.1082	33.81	-17.74	16.07	43.50	-27.43	QP
5		300.0514	33.19	-14.66	18.53	46.00	-27.47	QP
6		399.8706	33.67	-10.91	22.76	46.00	-23.24	QP

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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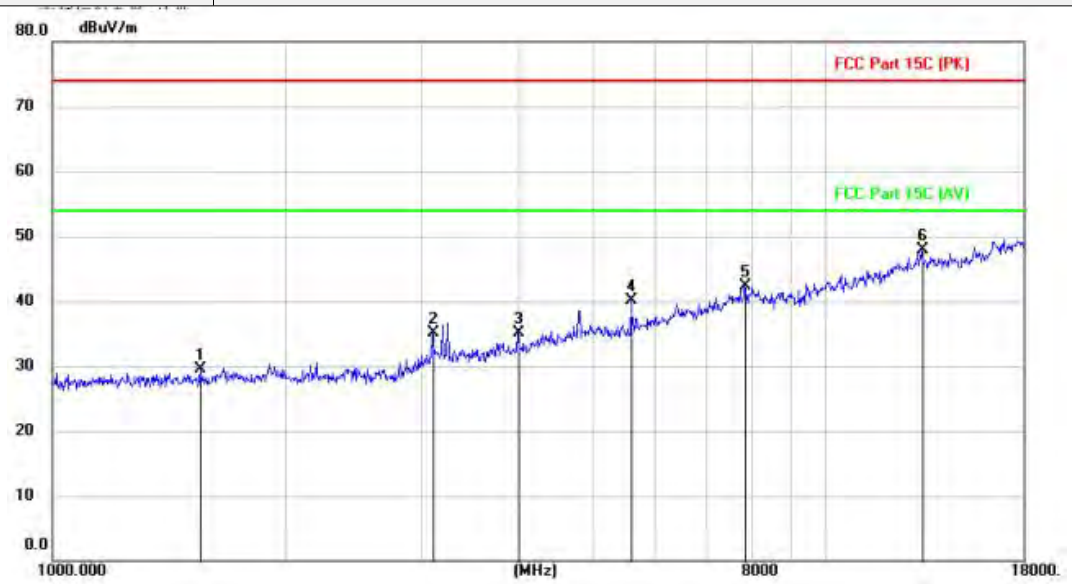
Adobe 1GHz

Test Voltage	DC 3.7V
Ant. Pol.	Horizontal
Test Mode:	TX DH5 Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		1552.500	41.13	-11.67	29.46	74.00	-44.54	peak
2		3097.800	45.50	-10.41	35.09	74.00	-38.91	peak
3		4003.900	43.55	-8.42	35.13	74.00	-38.87	peak
4		5605.300	44.84	-4.69	40.15	74.00	-33.85	peak
5		7852.700	40.67	1.70	42.37	74.00	-31.63	peak
6	*	13289.300	37.57	10.32	47.89	74.00	-26.11	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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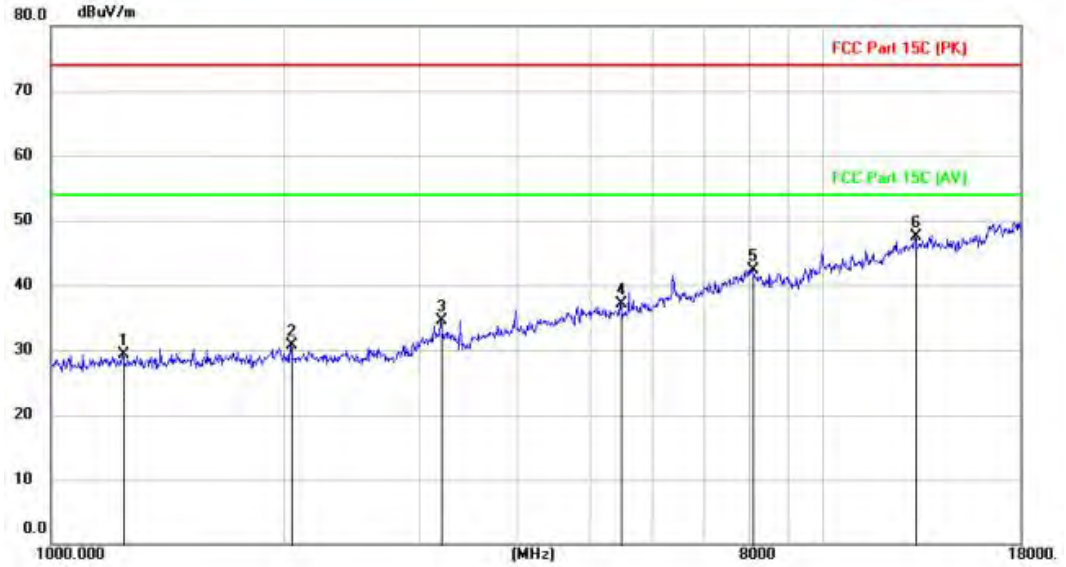
Test Voltage	DC 3.7V
Ant. Pol.	Vertical
Test Mode:	TX DH5 Mode 2402MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		1239.700	41.26	-12.00	29.26	74.00	-44.74	peak
2		2045.500	41.65	-11.04	30.61	74.00	-43.39	peak
3		3203.200	44.75	-10.22	34.53	74.00	-39.47	peak
4		5457.400	42.10	-4.97	37.13	74.00	-36.87	peak
5		8114.500	40.33	2.04	42.37	74.00	-31.63	peak
6	*	13170.300	37.30	10.16	47.46	74.00	-26.54	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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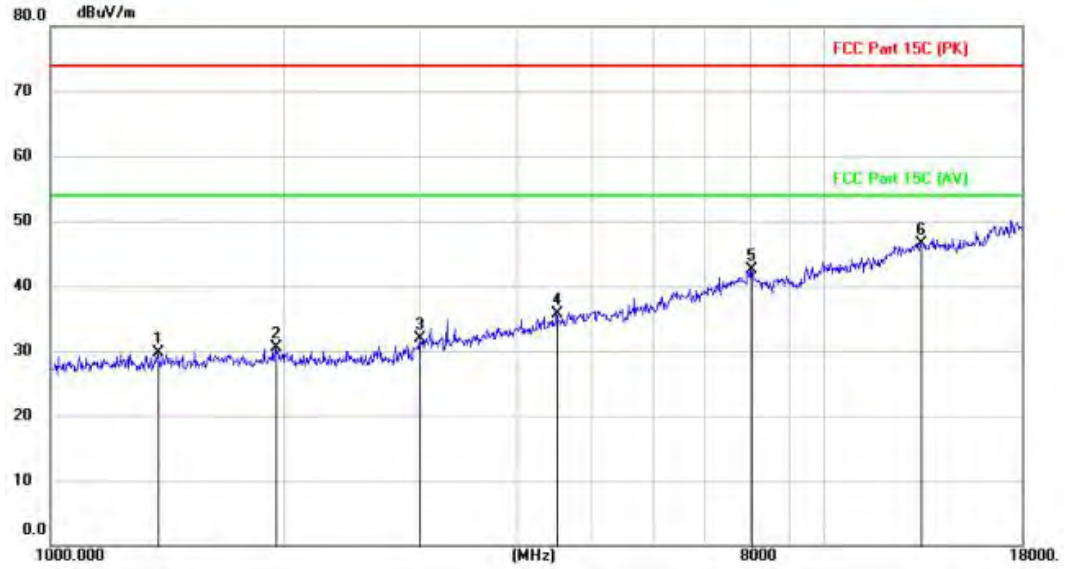
Test Voltage	DC 3.7V
Ant. Pol.	Horizontal
Test Mode:	TX DH5 Mode 2441MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		1377.400	41.61	-11.93	29.68	74.00	-44.32	peak
2		1952.000	41.53	-11.11	30.42	74.00	-43.58	peak
3		3004.300	42.43	-10.59	31.84	74.00	-42.16	peak
4		4517.300	42.43	-6.70	35.73	74.00	-38.27	peak
5		8049.900	40.49	2.06	42.55	74.00	-31.45	peak
6	*	13299.500	36.25	10.34	46.59	74.00	-27.41	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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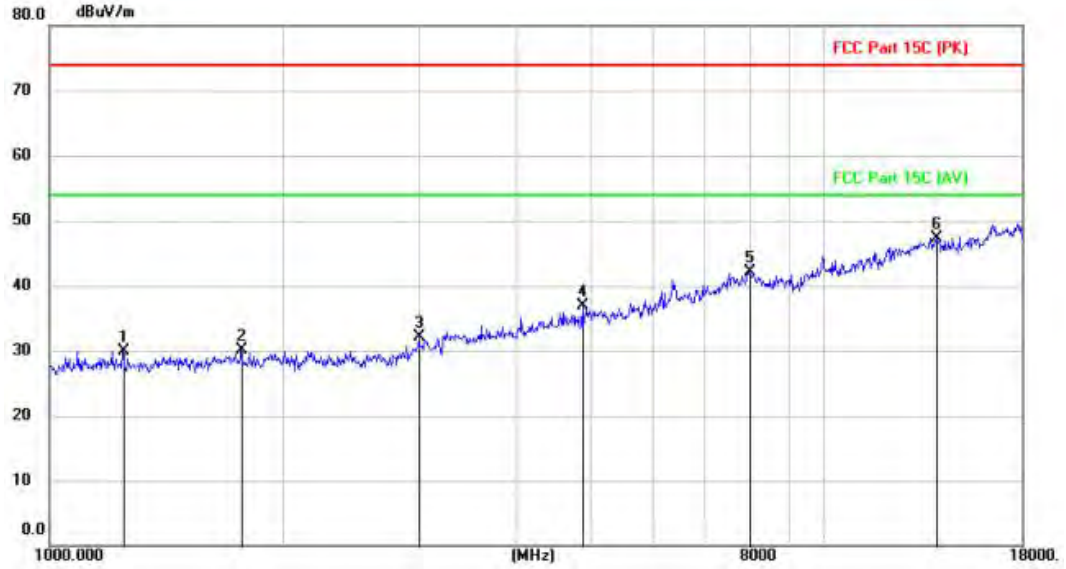
Test Voltage	DC 3.7V
Ant. Pol.	Vertical
Test Mode:	TX DH5 Mode 2441MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		1244.800	41.94	-12.01	29.93	74.00	-44.07	peak
2		1770.100	41.37	-11.29	30.08	74.00	-43.92	peak
3		3002.600	42.68	-10.59	32.09	74.00	-41.91	peak
4		4881.100	42.56	-5.71	36.85	74.00	-37.15	peak
5		7993.800	39.97	2.06	42.03	74.00	-31.97	peak
6	*	13965.900	36.10	11.18	47.28	74.00	-26.72	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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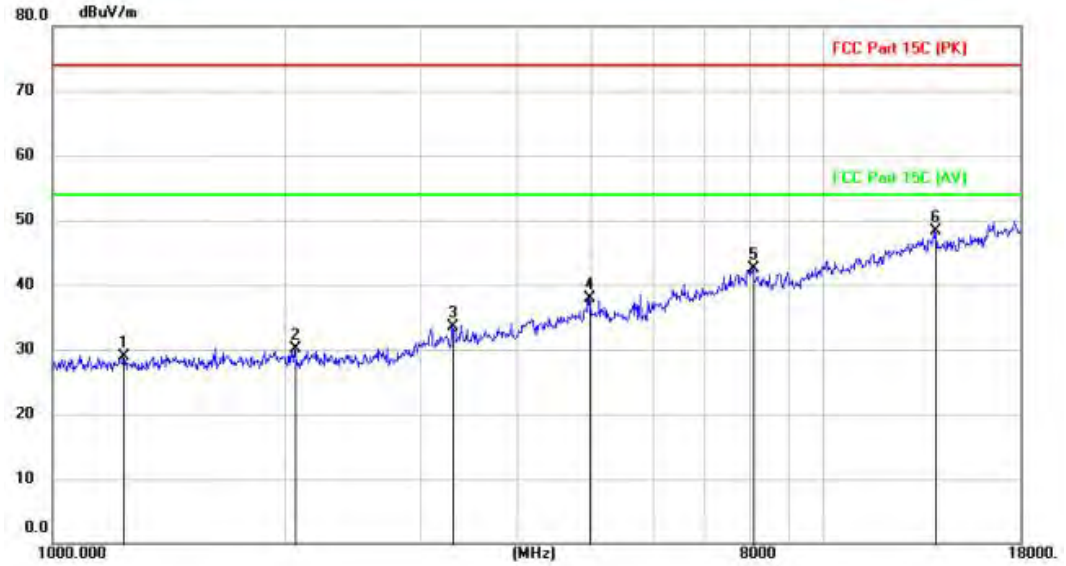
Test Voltage	DC 3.7V
Ant. Pol.	Horizontal
Test Mode:	TX DH5 Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		1236.300	40.92	-12.01	28.91	74.00	-45.09	peak
2		2064.200	41.05	-11.03	30.02	74.00	-43.98	peak
3		3306.900	43.55	-10.04	33.51	74.00	-40.49	peak
4		4961.000	43.39	-5.50	37.89	74.00	-36.11	peak
5		8099.200	40.47	2.04	42.51	74.00	-31.49	peak
6	*	13945.500	37.11	11.17	48.28	74.00	-25.72	peak

Measurement = Reading level + Correct Factor

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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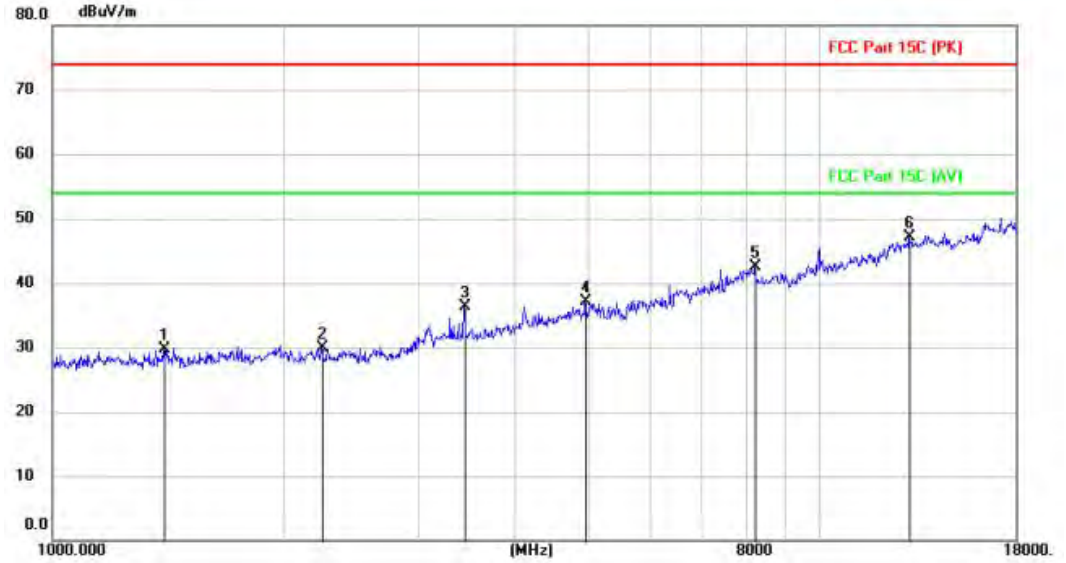
Test Voltage	DC 3.7V
Ant. Pol.	Vertical
Test Mode:	TX DH5 Mode 2480MHz



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector
1		1396.100	41.67	-11.91	29.76	74.00	-44.24	peak
2		2242.700	40.88	-10.98	29.90	74.00	-44.10	peak
3		3442.900	46.14	-9.78	36.36	74.00	-37.64	peak
4		4959.300	42.60	-5.51	37.09	74.00	-36.91	peak
5		8238.600	40.53	2.00	42.53	74.00	-31.47	peak
6	*	13087.000	37.00	10.05	47.05	74.00	-26.95	peak

Measurement = Reading level + Correct Factor

Note:

1.All test modes had been tested. The GFSK(DH5) modulation is the worst case and recorded in the report.

2. 18GHz-26.5GHz is the background of the site, there is no radiated spurious.

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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3.10. Conducted Emission

Limit

Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

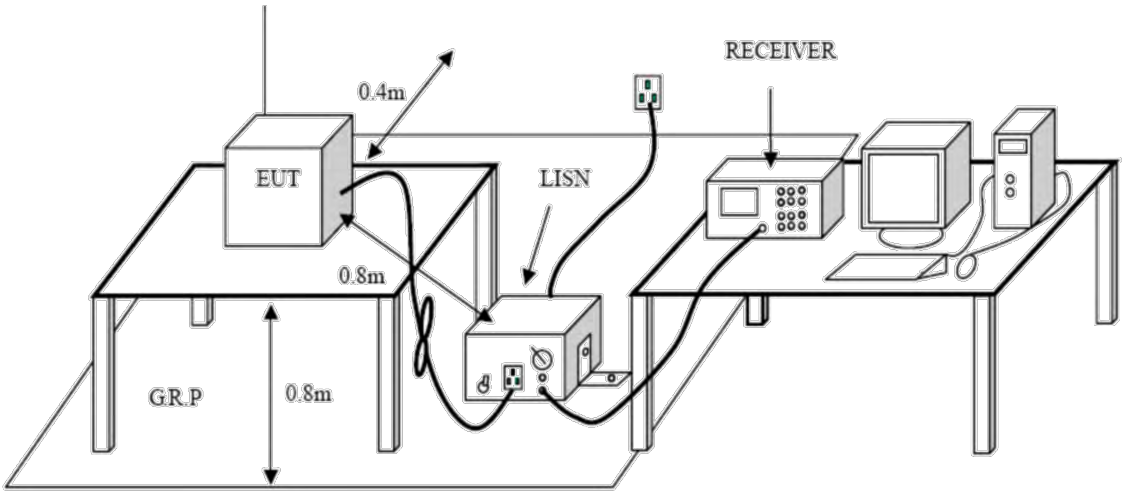
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

(2) The lower limit shall apply at the transition frequencies.

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

1. The EUT was setup according to ANSI C63.10:2020 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment.
   The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

Test Mode:

Please refer to the clause 2.2

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China

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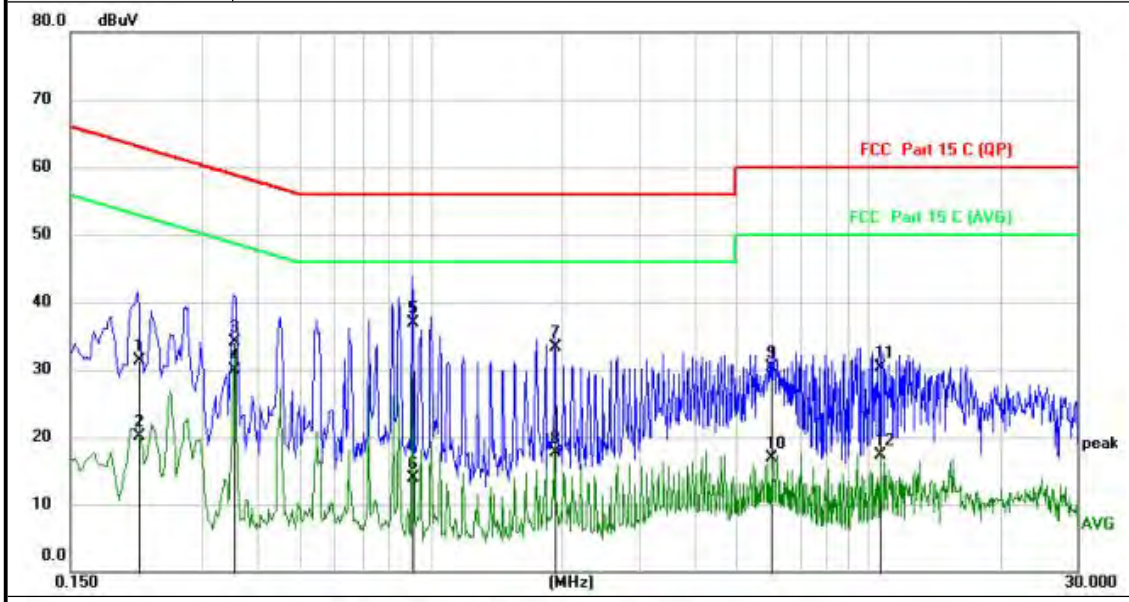
Test Results

Test Voltage:	AC 120V/60Hz
Terminal:	Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.2140	20.32	10.94	31.26	63.05	-31.79	QP
2		0.2140	9.18	10.94	20.12	53.05	-32.93	AVG
3		0.3540	23.15	10.97	34.12	58.87	-24.75	QP
4	*	0.3540	18.87	10.97	29.84	48.87	-19.03	AVG
5		0.9060	25.78	11.06	36.84	56.00	-19.16	QP
6		0.9060	2.83	11.06	13.89	46.00	-32.11	AVG
7		1.9213	22.11	11.10	33.21	56.00	-22.79	QP
8		1.9213	6.55	11.10	17.65	46.00	-28.35	AVG
9		6.0137	19.08	11.16	30.24	60.00	-29.76	QP
10		6.0137	5.68	11.16	16.84	50.00	-33.16	AVG
11		10.6339	19.10	11.11	30.21	60.00	-29.79	QP
12		10.6339	6.10	11.11	17.21	50.00	-32.79	AVG

Remarks:
1.Measurement = Reading Level+ Correct Factor
2.Over = Measurement -Limit

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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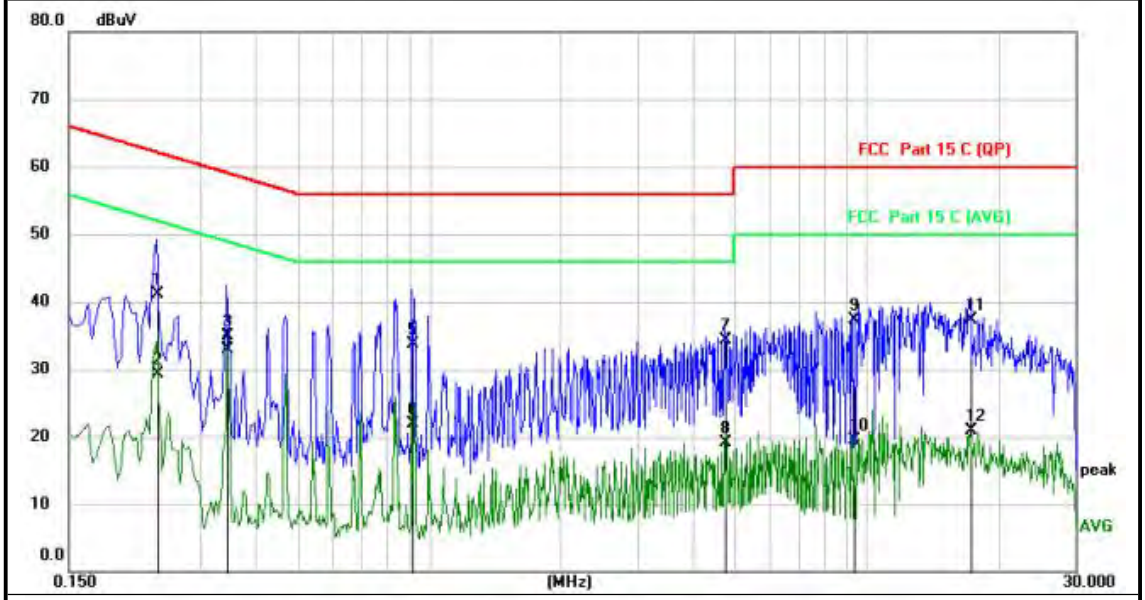
Test Voltage:	AC 120V/60Hz
Terminal:	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.2380	30.51	10.51	41.02	62.17	-21.15	QP
2		0.2380	18.81	10.51	29.32	52.17	-22.85	AVG
3		0.3460	24.38	10.56	34.94	59.06	-24.12	QP
4	*	0.3460	22.30	10.56	32.86	49.06	-16.20	AVG
5		0.9140	22.98	10.78	33.76	56.00	-22.24	QP
6		0.9140	11.08	10.78	21.86	46.00	-24.14	AVG
7		4.7339	23.15	11.06	34.21	56.00	-21.79	QP
8		4.7339	7.96	11.06	19.02	46.00	-26.98	AVG
9		9.3658	26.12	11.11	37.23	60.00	-22.77	QP
10		9.3658	8.45	11.11	19.56	50.00	-30.44	AVG
11		17.2332	25.64	11.59	37.23	60.00	-22.77	QP
12		17.2332	9.30	11.59	20.89	50.00	-29.11	AVG

Remarks:
1.Measurement = Reading Level+ Correct Factor
2.Over = Measurement -Limit

Add：West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China
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3.11. Pseudorandom Frequency Hopping Sequence

LIMIT

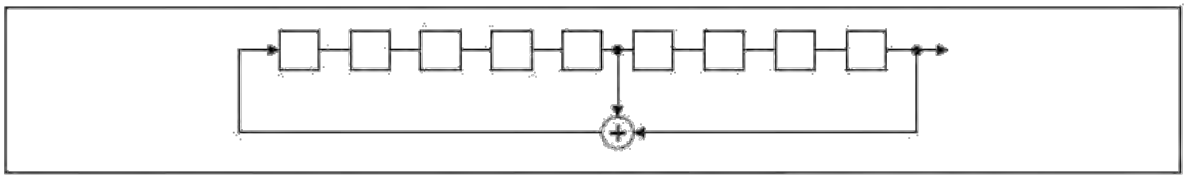
FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

TEST RESULTS

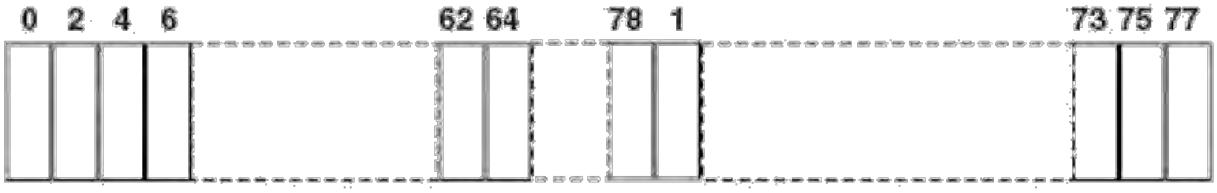
The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5^{th} and 9^{th} stage outputs are added in a modulo-two addition stage.And the result is fed back to the input of the friststage.The sequence begins with the frist one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.

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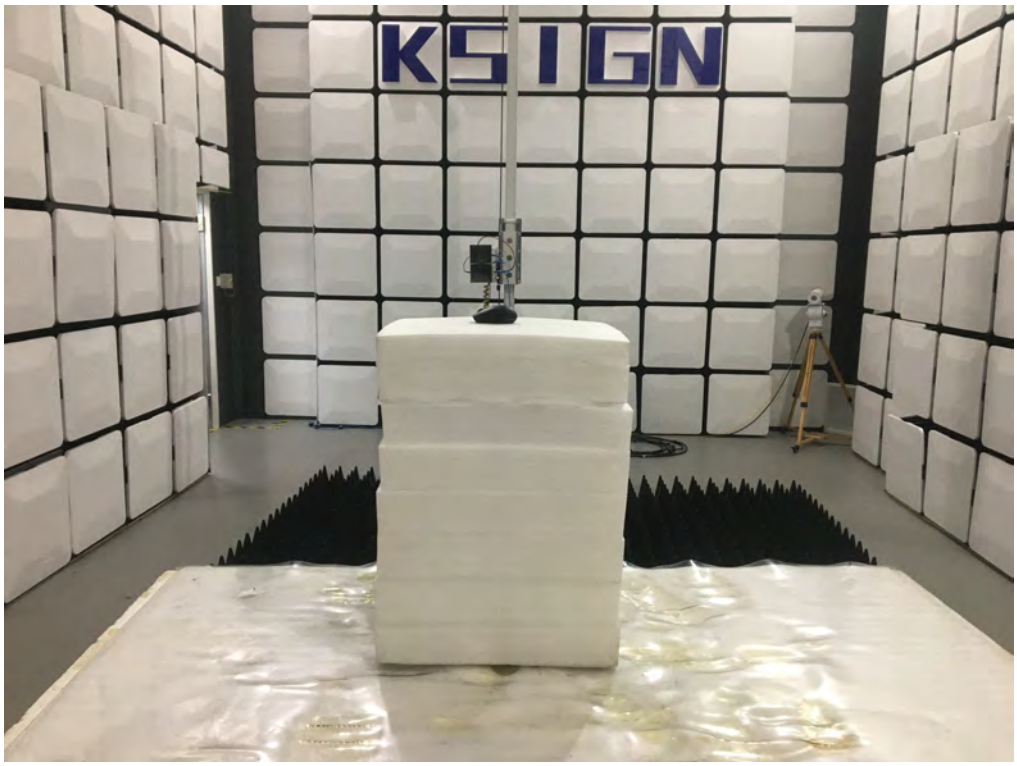
4.EUT TEST PHOTOS

Radiated Measurement (Below 1GHz)

Radiated Measurement (Above 1GHz)


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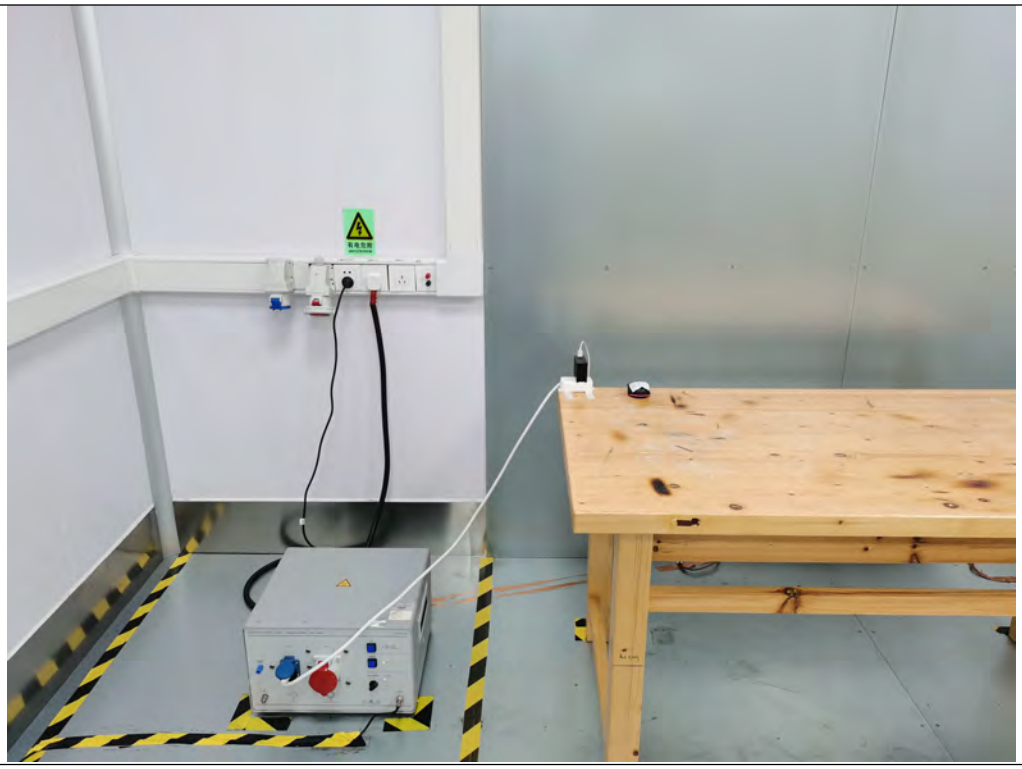
Conducted Emission


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PHOTOGRAPHS OF EUT CONSTRUCTIONAL

External Photographs

Photo 1

Photo 2

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Photo 3

Photo 4


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Photo 5

Photo 6

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Photo 7

Photo 8

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Internal Photographs

Photo 1

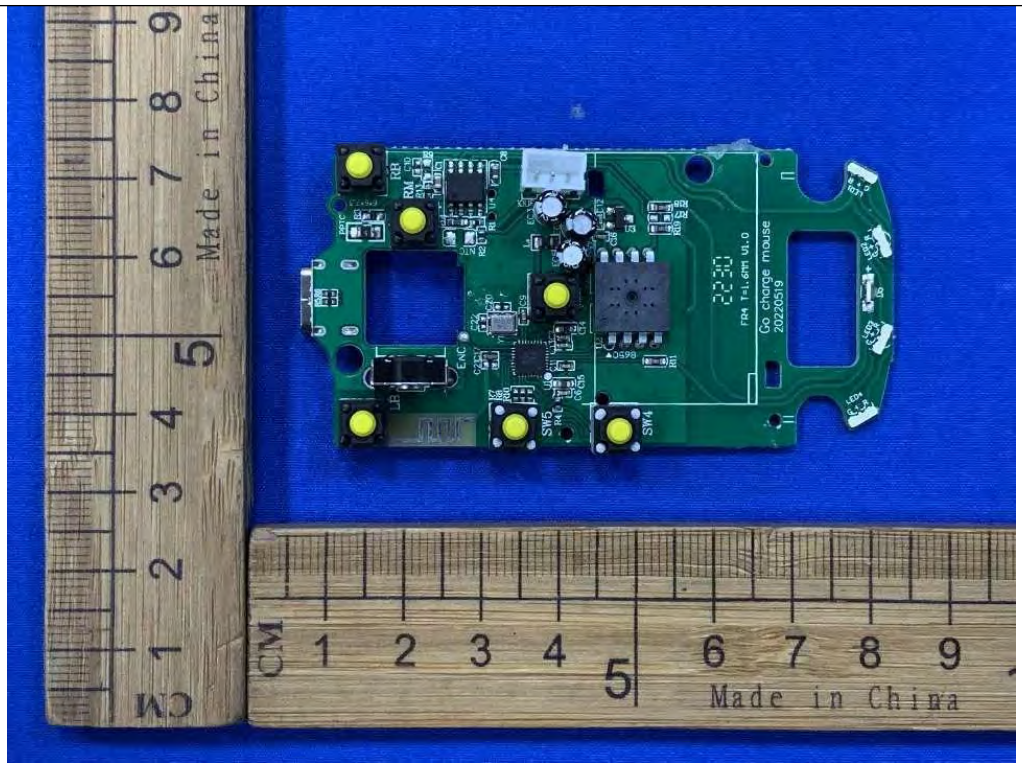
Photo 2


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Photo 3

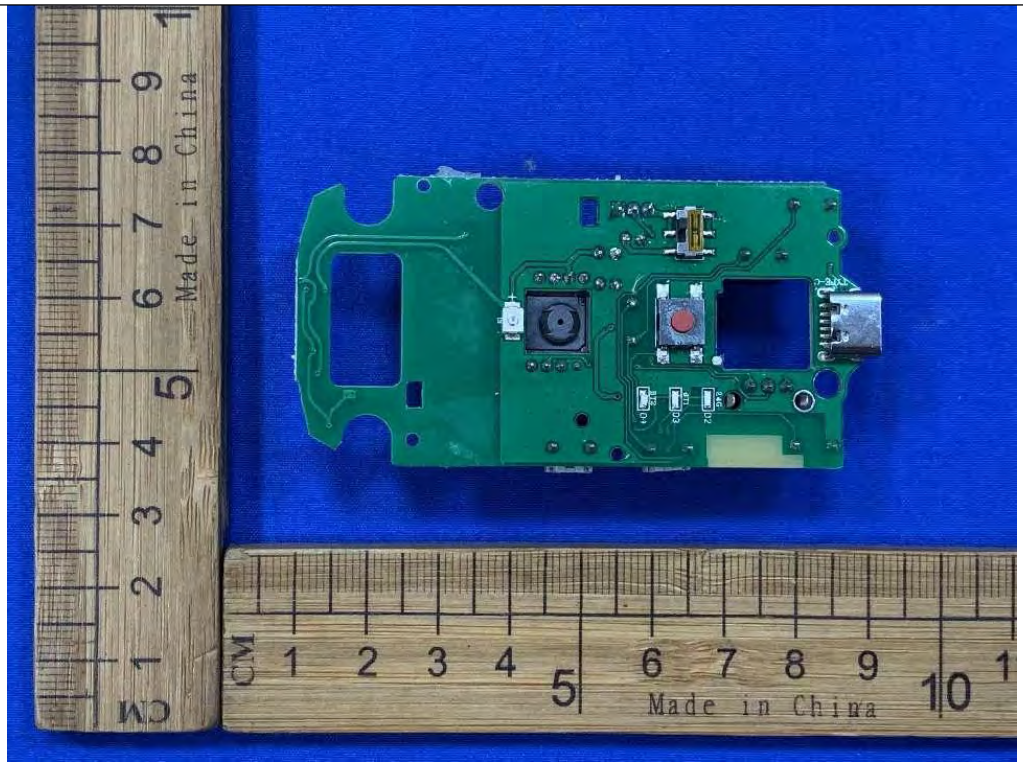

Photo 4

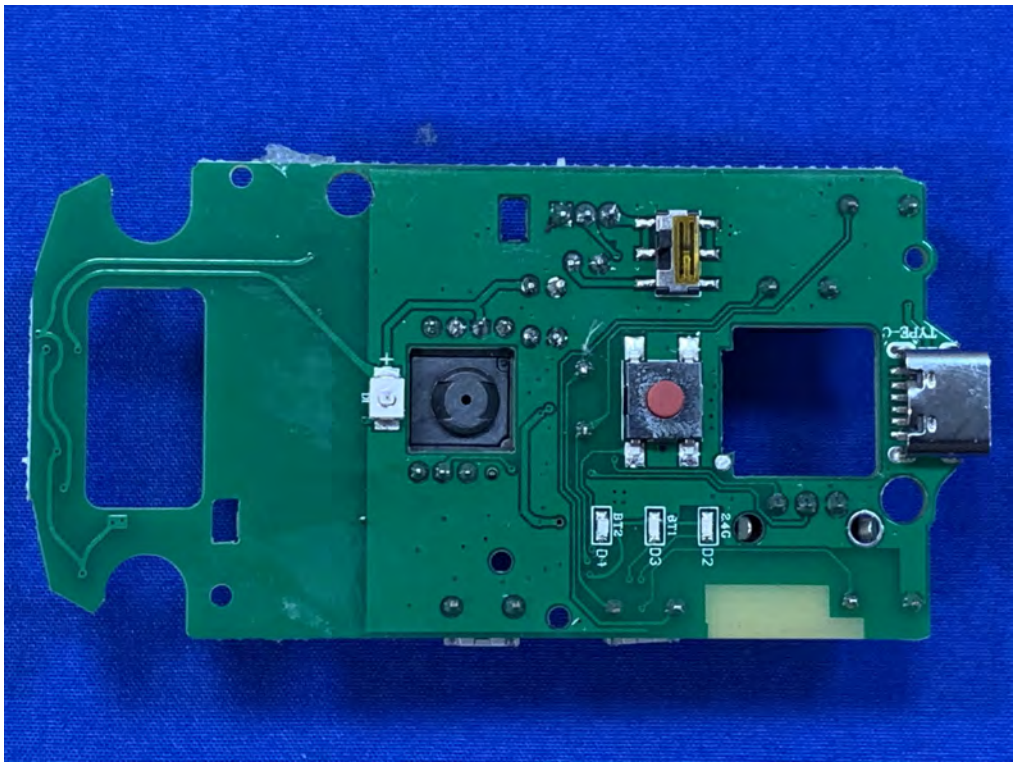

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Photo 5

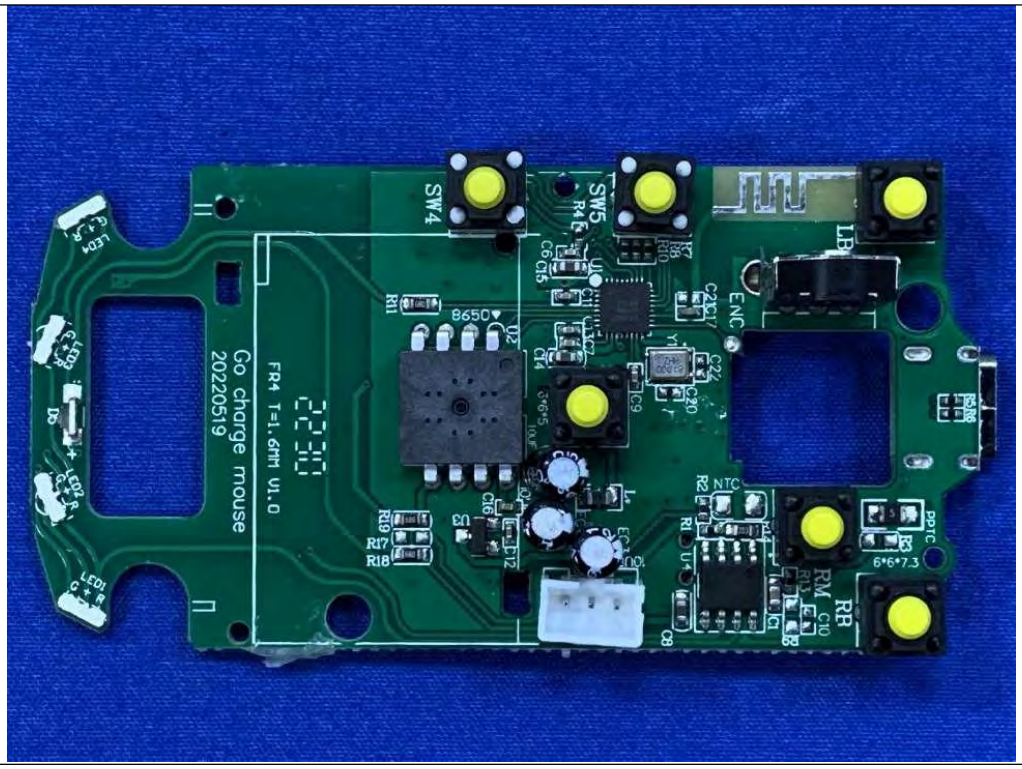

Photo 6

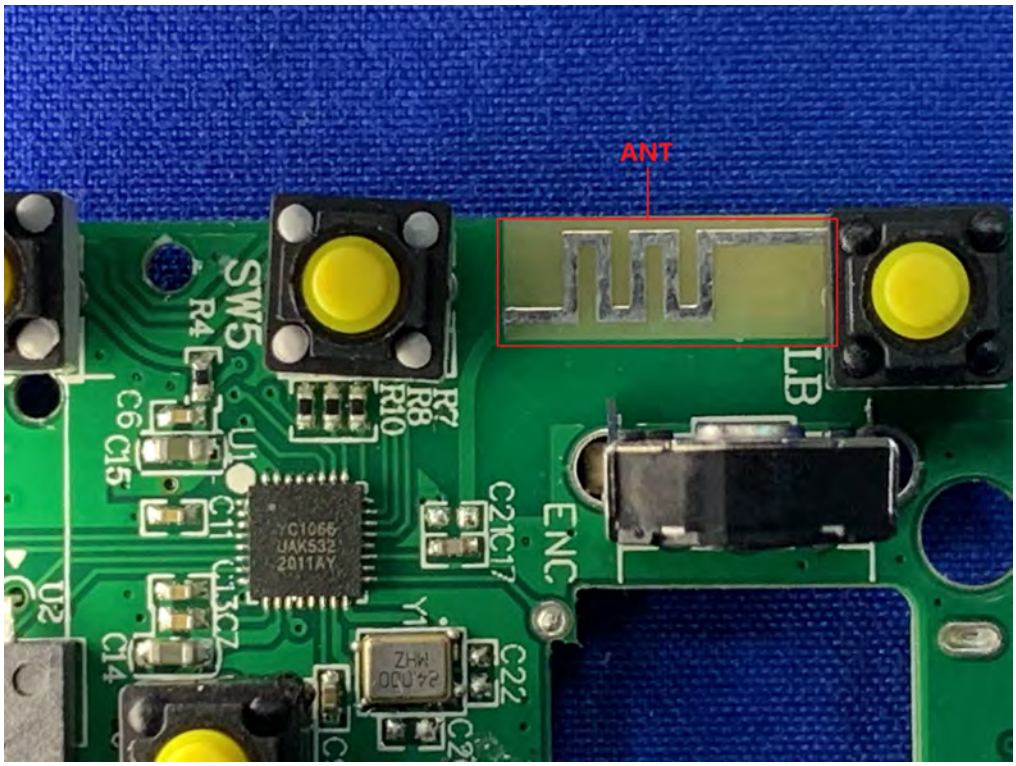

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Photo 7

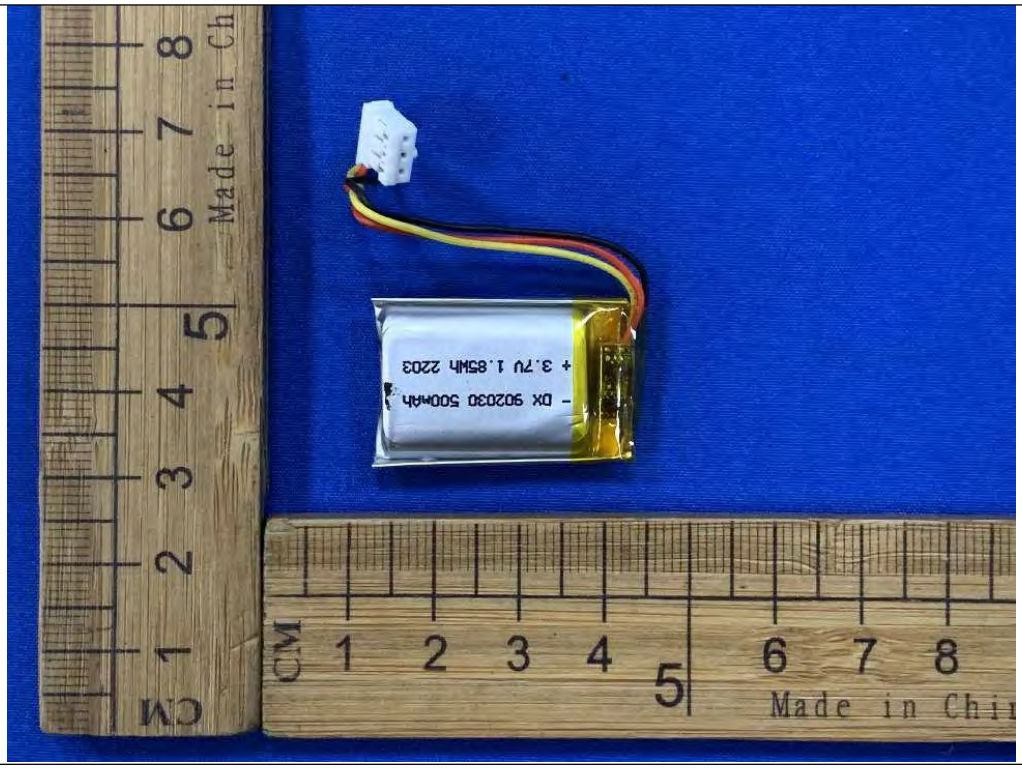

Photo 8

--THE END--

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