# FCC TEST REPORT

## FOR

# Qingdao Hisense Intelligent Commercial System Co., Ltd.

# Tablet POS

## Test Model: HM388

Prepared for Address	<ul><li> Qingdao Hisense Intelligent Commercial System Co.,Ltd.</li><li> Bldg 3, 151 Zhuzhou Lu, Laoshan, Qingdao, China</li></ul>
Prepared by	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	<ul> <li>I/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China</li> </ul>
Tel	: (+86)755-82591330
Fax	: (+86)755-82591332
Web	: www.LCS-cert.com
Mail	: webmaster@LCS-cert.com
Date of receipt of test sample	: Aug 01, 2016
Number of tested samples	: 1
Sample number	: 16072534
Date of Test	: Aug 01, 2016~Aug 16, 2016

: Aug 16, 2016

Date of Report

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 1 of 49

	FCC TEST REPORT				
FCC CFR 47 PART 15 C(15.247): 2015					
Report Reference No	: LCS1608010016E				
Date of Issue	: Aug 16, 2016				
Testing Laboratory Name	: Shenzhen LCS Compliance Testing Laboratory Ltd.				
Address	: 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China				
Testing Location/ Procedure.	: Full application of Harmonised standards				
	Partial application of Harmonised standards $\Box$				
	Other standard testing method $\Box$				
Applicant's Name	: Qingdao Hisense Intelligent Commercial System Co.,Ltd.				
Address	: Bldg 3, 151 Zhuzhou Lu, Laoshan, Qingdao, China				
Test Specification					
Standard	: FCC CFR 47 PART 15 C(15.247): 2015 / ANSI C63.10: 2013				
Test Report Form No	: LCSEMC-1.0				
TRF Originator	: Shenzhen LCS Compliance Testing Laboratory Ltd.				
Master TRF	: Dated 2011-03				
Shenzhen LCS Compliance	Testing Laboratory Ltd. All rights reserved.				
Shenzhen LCS Compliance T of the material. Shenzhen LC	oduced in whole or in part for non-commercial purposes as long as the Testing Laboratory Ltd. is acknowledged as copyright owner and source S Compliance Testing Laboratory Ltd. takes no responsibility for and amages resulting from the reader's interpretation of the reproduced and context.				
Test Item Description	: Tablet POS				
Trade Mark	: Hisense				
Test Model	: HM388				
Ratings	: DC 3.8V by Li-ion battery(4000mAh)				
	Recharged input: 5V,3A by adapter				
Result	: Positive				

Compiled by:

Calvin Weng

Supervised by:

Approved by:

Gavin Liang/ Manager

Calvin Weng / Administrators

Glin Lu/ Technique principal

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 2 of 49

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD.	FCC ID:GQK-HM388	Report No.: LCS1608010016E

# FCC -- TEST REPORT

# Test Report No. : LCS1608010016E

Aug 16, 2016 Date of issue

Test Model	: HM388
EUT	: Tablet POS
Amplicant	· Oingdog Higgnag Intelligent Commencial System Co. 141
	: Qingdao Hisense Intelligent Commercial System Co.,Ltd.
	: Bldg 3, 151 Zhuzhou Lu, Laoshan, Qingdao, China
Telephone	:/
Fax	:/
Manufacturer	: Shenzhen Yifang Digital Technology Co Ltd
Address	: Building #23, Zone 5, Baiwangxin industrial Park, Songbai Road,
	Nanshan district, Shenzhen, China
Telephone	:/
Fax.	:/
Factory	: Shenzhen Yifang Digital Technology Co Ltd
-	: Building #23, Zone 5, Baiwangxin industrial Park, Songbai Road,
	Nanshan district, Shenzhen, China
Telephone	
Fax	

Test Result	Positive

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

# **Revision History**

Revision	Issue Date	Revisions	Revised By	
00	2016-08-16	Initial Issue	Gavin Liang	

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 4 of 49

# TABLE OF CONTENTS

1. GENERAL INFORMATION	6
1.1 Description of Device (EUT)	6
1.2 Support Equipment List	
1.3 External I/O	
1.4 Description of Test Facility	
1.5 List Of Measuring Equipments	
1.6 Statement of The Measurement Uncertainty	
1.7 Measurement Uncertainty	
1.8 Description Of Test Modes	
2. TEST METHODOLOGY	
2.1 EUT Configuration	
2.2 EUT Exercise	
2.3 General Test Procedures	
3. SYSTEM TEST CONFIGURATION	
3.1 Justification	
3.2 EUT Exercise Software	
3.3 Special Accessories	
3.4 Block Diagram/Schematics	
3.5 Equipment Modifications	
3.6 Test Setup	
4. SUMMARY OF TEST RESULTS	
5. ANTENNA PORT MEASUREMENT	
5.1 Conducted Peak Output Power	
5.2 Frequency Separation And 20 dB Bandwidth	
5.3 Number Of Hopping Frequency	
5.4 Time Of Occupancy (Dwell Time)	
5.5 Conducted Spurious Emissions and Band Edges Test	
6. RADIATED MEASUREMENT	
6.1 Block Diagram of Test Setup	
6.2 Radiated Emission Limit	
6.3 Instruments Setting	
6.4 Test Procedures	
6.5 Results for Radiated Emissions	
6.6 Results for Band edge Testing (Radiated)	
7. LINE CONDUCTED EMISSIONS	
7. LINE CONDUCTED EMISSIONS	
7.1 Standard Applicable	<b> 47</b>
<ul><li>7.1 Standard Applicable</li><li>7.2 Block Diagram of Test Setup</li><li>7.3 Test Results</li></ul>	47 47 47 47
<ul> <li>7.1 Standard Applicable</li> <li>7.2 Block Diagram of Test Setup</li> <li>7.3 Test Results</li> <li>8. ANTENNA REQUIREMENT</li> </ul>	47 47 47 47 47 47 47
<ul><li>7.1 Standard Applicable</li><li>7.2 Block Diagram of Test Setup</li><li>7.3 Test Results</li></ul>	47 47 47 47 47 49 49

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 5 of 49

# **1. GENERAL INFORMATION**

# 1.1 Description of Device (EUT)

EUT	: Tablet POS
Test Model	: HM388
Hardware Version	: PCB/CHT05/V1.3
Software Version	: BIOS:M883CWP_20160519_020
Power Supply	: DC 3.8V by Li-ion battery(4000mAh)
	Recharged input: 5V,3A by adapter
Bluetooth Technology	:
Frequency Range	: 2402.00-2480.00MHz
Channel Spacing	: 1MHz for Bluetooth V3.0 (DSS)
	2MHz for Bluetooth V4.0 (DTS)
Channel Number	: 79 channels for Bluetooth V3.0 (DSS)
	40 channels for Bluetooth V4.0 (DTS)
Modulation Type	: GFSK, $\pi$ /4-DQPSK, 8-DPSK for Bluetooth V3.0 (DSS)
Bluetooth Version	GFSK for Bluetooth V4.0 (DTS) : V4.0
Antenna Description	: PIFA Antenna, 3dBi(Max.)
WIFI(2.4GHz Band)	:
Operating Frequency	: 2412-2462MHz
Channel Spacing	: 5MHz
Channel Number	: 13 Channel for 20MHz bandwidth(2412~2462MHz)
	• 19 Chamber for 2000112 build width(2112 210200112)
Modulation Type	: 802.11b: DSSS; 802.11g/n: OFDM
Modulation Type Antenna Description	
• •	: 802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	: 802.11b: DSSS; 802.11g/n: OFDM : PIFA Antenna, 3 dBi(Max.) :
Antenna Description RFID Technology	: 802.11b: DSSS; 802.11g/n: OFDM : PIFA Antenna, 3 dBi(Max.) :
Antenna Description RFID Technology Operating Frequency	: 802.11b: DSSS; 802.11g/n: OFDM : PIFA Antenna, 3 dBi(Max.) : : 13.56MHz

## 1.2 Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
SHENZHEN HONOR ELECTRONIC CO LTD	Adapter for EUT	ADS-25FSG-0 6 05015EPCU	/	FCC

## 1.3 External I/O

I/O Port Description	Quantity	Cable
USB Port	1	N/A
HDMI Port	1	N/A
Earphone	1	N/A
DC in port	1	1.5m, unshielded cable

## 1.4 Description of Test Facility

CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

VCCI Registration Number. is C-4260 and R-3804.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

There is one 3m semi-anechoic chamber and one line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.10: 2013, CISPR 22/EN 55022 and CISPR16-1-4 SVSWR requirements.

# 1.5 List Of Measuring Equipments

Instrument	Manufacture	Model No.	Serial No.	Characteristics	Cal Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Jun 18, 2016	Jun 17, 2017
Signal analyzer	Agilent	E4448A(Externa I mixers to 40GHz)	US443004 69	9kHz~40GHz	Jul 16, 2016	Jul 15, 2017
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	Jun 18, 2016	Jun 17, 2017
LISN	EMCO	3819/2NM	9703-1839	9KHz-30MHz	Jun 18, 2016	Jun 17, 2017
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	Jun 18, 2016	Jun 17, 2017
ISN	SCHAFFNE	ISN ST08	21653	9KHz-30MHz	Jun 18, 2016	Jun 17, 2017
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-H Y	30M-18GHz	Jun 18, 2016	Jun 17, 2017
Amplifier	SCHAFFNE	COA9231A	18667	9kHz-2GHzz	Apr 18, 2016	Apr 17, 2017
Amplifier	Agilent	8449B	3008A021	1GHz-26.5GHz	Apr 18, 2016	Apr 17, 2017
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	Apr 18, 2016	Apr 17, 2017
Loop Antenna	R&S	HFH2-Z2	860004/00	9k-30MHz	Apr 18, 2016	Apr 17, 2017
By-log Antenna	SCHWARZB	VULB9163	9163-470	30MHz-1GHz	Apr 18, 2016	Apr 17, 2017
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	Apr 18, 2016	Apr 17, 2017
Horn Antenna	SCHWARZB	BBHA9170	BBHA9170	15GHz-40GHz	Apr 18, 2016	Apr 17, 2017
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	Jun 18, 2016	Jun 17, 2017
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-H	1GHz-40GHz	Jun 18, 2016	Jun 17, 2017
Power Meter	R&S	NRVS	100444	DC-40GHz	Jun 18, 2016	Jun 17, 2017
Power Sensor	R&S	NRV-Z51	100458	DC-30GHz	Jun 18, 2016	Jun 17, 2017
Power Sensor	R&S	NRV-Z32	10057	30MHz-6GHz	Jun 18, 2016	Jun 17, 2017
AC Power Source	HPC	HPA-500E	HPA-9100	AC 0~300V	Jun 18, 2016	Jun 17, 2017
DC power Soure	GW	GPC-6030D	C671845	DC 1V-60V	Jun 18, 2016	Jun 17, 2017
Temp. and Humidigy Chamber	Giant Force	GTH-225-20-S	MAB0103- 00	N/A	Jun 18, 2016	Jun 17, 2017
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	Jun 18, 2016	Jun 17, 2017
RF CABLE-2m	JYE Bao	RG142	CB035-2m	20MHz-1GHz	Jun 18, 2016	Jun 17, 2017
Signal Generator	R&S	SMR40	10016	10MHz~40GHz	Jul 16, 2016	Jul 15, 2017
Universal Radio Communication Tester	R&S	CMU200	112012	N/A	Oct 27, 2015	Oct 26, 2016
Wideband Radia Communication Tester	R&S	CMW500	1201.0002 K50	N/A	Nov 19, 2016	Nov 18, 2016
MXG Vector Signal Generator	Agilent	N5182A	MY470711 51	250KHz~6GHz	Oct 27, 2015	Oct 26, 2016
MXG Vector Signal Generator	Agilent	E4438C	MY420813 96	250KHz~6GHz	Oct 27, 2015	Oct 26, 2016
PSG Analog Signal Generator	Agilent	N8257D	MY465205 21	250KHz~20GHz	Nov 19, 2016	Nov 18, 2016
MXA Signal Analyzer	Agilent	N9020A	MY505101 40	10Hz~26.5GHz	Oct 27, 2015	Oct 26, 2016
DC Power Supply	Agilent	E3642A	/	0-8V,5A/0-20V,2	May 20,	May 19, 2017
RF Control Unit	Tonscend	JS0806-1	/	/	Nov 19, 2016	Nov 18, 2016

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 8 of 49 SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID:GQK-HM388

Report No.: LCS1608010016E

LTE Test Software	Tonscend	JS1120-1	/	Version: 2.5.7.0	N/A	N/A
X-series USB Peak an d Average Power Sens or Agilent	Agilent	U2021XA	MY540800 22	/	Oct 27, 2015	Oct 26, 2016
4 Ch.Simultaneous Sa mpling 14 Bits 2 MS/s	Agilent	U2531A	MY540800 16	1	Oct 27, 2015	Oct 26, 2016
Test Software	Ascentest	AT890-SW	20141230	Version:	N/A	N/A
Splitter/Combiner(Qty: 2)	Mini-Circuits	ZAPD-50W 4.2-6.0 GHz	NN256400 424	1	Oct 27, 2015	Oct 26, 2016
Splitter/Combine(Qty: 2)	MCLI	PS3-7	4463/4464	1	Oct 27, 2015	Oct 26, 2016
ATT (Qty: 1)	Mini-Circuits	VAT-30+	30912	1	Oct 27, 2015	Oct 26, 2016

# 1.6 Statement of The 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 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.

Test Item		Frequency Range	Uncertainty	Note
		9KHz~30MHz	3.10dB	(1)
	:	30MHz~200MHz	2.96dB	(1)
Radiation Uncertainty		200MHz~1000MHz	3.10dB	(1)
		1GHz~26.5GHz	3.80dB	(1)
		26.5GHz~40GHz	3.90dB	(1)
Conduction Uncertainty :		150kHz~30MHz	1.63dB	(1)
Power disturbance :		30MHz~300MHz	1.60dB	(1)

### 1.7 Measurement Uncertainty

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

# 1.8 Description Of Test Modes

Bluetooth operates in the unlicensed ISM Band at 2.4GHz. With the introduction of the enhanced data rate (EDR) feature, the data rates can be up to 3 Mb/s. An increase in the peak data rate beyond the basic rate of 1 Mb/s is achieved by modulating the RF carrier using GFSK techniques, resulting in an increase of two to three times the number of bits

per symbol. The 2 Mb/s EDR packets use  $a\pi/4$ -DQPSK modulation and the 3 Mb/s EDR packets use 8DPSK modulation. The following operating modes were applied for the related test items. For radiated measurement, the test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position. All test modes were tested, only the result of the worst case was recorded in the report.

Mode of Operations	Frequency Range	Data Rate				
	(MHz)	(Mbps)				
	2402	1				
GFSK	2441	1				
	2480	1				
	2402	2				
$\pi$ /4 DQPSK	2441	2				
	2480	2				
	2402	3				
8-DPSK	2441	3				
	2480	3				
F	for Conducted Emission	on				
Test Mode		TX Mode				
For Radiated Emission						
Test Mode		TX Mode				

For pre-testing, when performed with AC ADAPTER, the input Voltage/Frequency AC 120V/60Hz and AC 240V/60Hz were used. Only recorded the worst case in this report.

Worst-case mode and channel used for 150kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power, that was determined to be TX(3Mbps-Hopping Mode).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be TX(3Mbps-Low Channel).

\*\*\*Note: Using a temporary antenna connector for the EUT when conducted measurements are performed.

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013, FCC CFR PART 15C 15.207, 15.209, 15.247 and DA 00-705.

## 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209, 15.247 under the FCC Rules Part 15 Subpart C.

### 2.3 General Test Procedures

### **2.3.1 Conducted Emissions**

According to the requirements in Section 6.2 of ANSI C63.10: 2013, AC power-line conducted emissions shall be measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

### 2.3.2 Radiated Emissions

The EUT is placed on a turn table and the turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10: 2013

# **3. SYSTEM TEST CONFIGURATION**

# 3.1 Justification

The system was configured for testing in a continuous transmit condition.

# 3.2 EUT Exercise Software

N/A.

## 3.3 Special Accessories

N/A.

## 3.4 Block Diagram/Schematics

Please refer to the related document.

## 3.5 Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

# 3.6 Test Setup

Please refer to the test setup photo.

# 4. SUMMARY OF TEST RESULTS

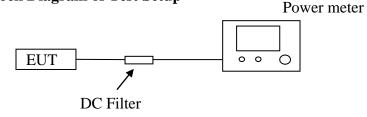
Applied Standard: FCC Part 15 Subpart C								
FCC Rules	Result							
§15.247(b)(1)	Maximum Conducted Output Power	Compliant						
§15.247(a)(1)	Frequency Separation And 20 dB Bandwidth	Compliant						
§15.247(a)(1)(iii)	Number Of Hopping Frequency	Compliant						
§15.247(a)(1)(iii)	Time Of Occupancy (Dwell Time)	Compliant						
§15.209, §15.247(d)	Radiated and Conducted Spurious Emissions	Compliant						
§15.205	Emissions at Restricted Band	Compliant						
§15.207(a)	Line Conducted Emissions	Compliant						
§15.203	Antenna Requirements	Compliant						
Note: This is a DSS test rep	Note: This is a DSS test report for Tablet POS (HM388), please refer to other document for							

the DTS test report (LCS1608010042E).

# 5. ANTENNA PORT MEASUREMENT

## 5.1 Conducted Peak Output Power

### 5.1.1 Block Diagram of Test Setup



### 5.1.2 Limit

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

### 5.1.3 Test Procedure

The transmitter output is connected to the Power Meter.

### 5.1.4 Test Results

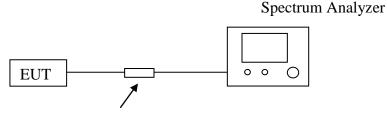
Mode	Frequency (MHz)	Output Power (dBm,Peak)	Limit (dBm)	Result
	2402	0.79	21	Pass
GFSK	2441	0.43	21	Pass
	2480	0.11	21	Pass
π /4	2402	2.65	21	Pass
$\pi/4$	2441	2.34	21	Pass
DQPSK	2480	1.63	21	Pass
	2402	2.81	21	Pass
8-DPSK	2441	2.42	21	Pass
	2480	1.96	21	Pass

# 5.2 Frequency Separation And 20 dB Bandwidth

### 5.2.1 Limit

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

### 5.2.2 Block Diagram of Test Setup



DC Filter

### 5.2.3 Test Procedure

A. Place the EUT on the table and set it in transmitting mode.

- B. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
- C. Set to the maximum power setting and enable the EUT transmit continuously.
- D. For carrier frequency separation measurement, use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels; RBW / VBW=100KHz / 300KHz; Sweep = auto; Detector function = peak; Trace = max hold.

 E. For 20dB bandwidth measurement, use the following spectrum analyzer settings: Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW/VBW=30KHz / 100KHz; Sweep = auto; Detector function = peak; Trace = max hold.

### **5.2.4 Test Results**

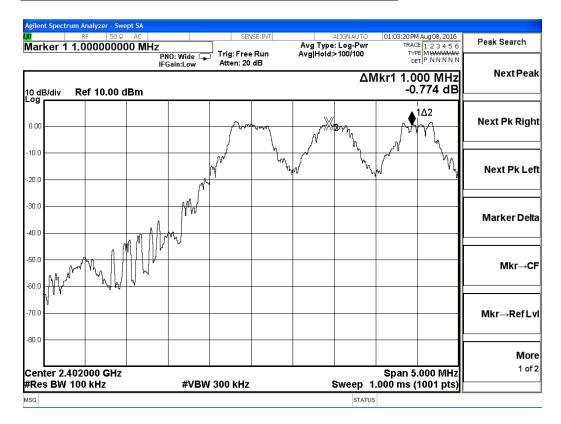
	The Measurement Result With 1Mbps For GFSK Modulation								
20dB Bandwidth Measurement									
C	hannel	20dB Ban	dwidth (MHz)	Lin	nit				
	Low		1.040	Non-spe	ecified				
I	Middle 1			Non-spe	ecified				
	High			Non-specified					
	C	hannel Separa	tion Measuremen	t					
Channel	Channel Separ	ation (MHz)	Limit (N	(Hz)	Result				
Low	1.00	0	>=25 KHz or 2/	Pass					
Middle	1.00	0	>=25 KHz or 2/	Pass					
High	1.00	0	>=25 KHz or 2/	3 20dB BW	Pass				

The Measurement Result With 2Mbps For Pi/4 DQPSK Modulation									
20dB Bandwidth Measurement									
C	hannel	20dB Ban	dwidth (MHz)	Lin	nit				
	Low	]	1.358	Non-spe	ecified				
1	Middle	]	1.359	Non-spe	ecified				
	High	1.360	Non-specified						
	C	hannel Separa	tion Measuremen	t					
Channel	Channel Separ	ation (MHz)	Limit (N	(Hz)	Result				
Low	1.03	0	>=25 KHz or 2/	3 20dB BW	Pass				
Middle	1.03	0	>=25 KHz or 2/	3 20dB BW	Pass				
High	1.03	0	>=25 KHz or 2/	3 20dB BW	Pass				

	The Measurement Result With 3Mbps For 8-DPSK Modulation								
20dB Bandwidth Measurement									
C	hannel	20dB Ban	dwidth (MHz)	Lin	nit				
	Low		1.300	Non-spe	ecified				
I	Middle	1.301	Non-specified						
	High			Non-specified					
	C	hannel Separa	tion Measuremen	t					
Channel	Channel Separ	ation (MHz)	Limit (N	(Hz)	Result				
Low	1.00	00	>=25 KHz or 2/	3 20dB BW	Pass				
Middle	1.00	00	>=25 KHz or 2/	Pass					
High	1.00	00	>=25 KHz or 2/	3 20dB BW	Pass				

The test data refer to the following page.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 17 of 49 For Frequency Separation Measurement, the Low, Mid and High channels were performed and only recorded the worst test plots for Low in this report. **The Worst Test Plot Of Frequency Separation (1Mbps)** 



### **Test Plot Of Frequency Separation (2Mbps)**

gilent Spectrum Analyzer - Swep					
RF 50 Ω Marker 1 1.03000000	AC O MHz PNO: Wide C	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	01:02:34 PM Aug 08, 2016 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Peak Search
0_dB/div Ref 10.00 di	IFGain:Low	Atten: 20 dB		<sub>Det</sub>  ۹ NNNN /kr1 1.030 MHz -0.780 dB	NextPeak
0.00		markany	1Δ2 mm mm	ward ward	Next Pk Right
20.0					Next Pk Lef
30.0 40.0	Man and a second				Marker Delta
	φ4. ÛI k. k.				Mkr→Cl
70.0					Mkr→RefLv
80.0					More 1 of 2
Center 2.402000 GHz Res BW 100 kHz	#VBW	300 kHz	Sweep 1	Span 5.000 MHz .000 ms (1001 pts)	1 of 2

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 18 of 49

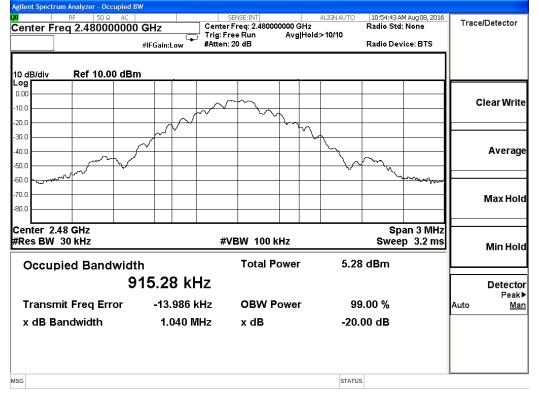
Agilent Spectrum Analyzer - Swept SA		·			
Marker 1 1.000000000 Μ	IHz PNO: Wide 🕟	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	12:56:17 PM Aug 08, 2016 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Peak Search
10 dB/div Ref 10.00 dBm	IFGain:Low	Atten: 20 dB		DET P N N N N Mkr1 1.000 MHz 0.341 dB	Next Peak
0.00	hand	WWW ~~~		∆2 nhuhmnnnnnn	Next Pk Righ
20.0	M	. ү <sup>с</sup>			Next Pk Le
40.0 A May May A	í 				Marker Delt
50.0 MM V V					Mkr→C
70.0					Mkr→RefL
tart 2.400000 GHz				Stop 2.405000 GHz	<b>Mo</b> i 1 of
sg BW 100 kHz	#VBW	300 kHz		1.000 ms (1001 pts)	

## **Test Plot Of Frequency Separation (3Mbps)**

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 19 of 49

### Measurement of 20dB Bandwidth

#### Test frequency: 2402MHz(1Mbps)



#### Test frequency: 2441MHz(1Mbps)

Agilent Spectrum Analyzer - Occupied	BW							li -	
RF 50 Ω AC     Center Freq 2.44100000	10 GHz #IFGain:Low				ALIGN AUTO Hz Hold:> 10/10	Radio Std		Trac	e/Detector
10 dB/div Ref 10.00 dE	sm								
0.00		~~~	$\sim$						Clear Writ
20.0 30.0 40.0									Averag
50.0									Max Hol
enter 2.441 GHz Res BW 30 kHz		#VB	SW 100 KI	Hz			an 3 MHz p   3.2 ms		Min Hol
Occupied Bandwic	ied Bandwidth			Total Power					
9	914.19 kl	Hz							Detecto Peak
Transmit Freq Error	-13.799	kHz	OBW Po	ower	9	99.00 %		Auto	Ma
x dB Bandwidth	1.038 N	ЛНz	x dB		-20	0.00 dB			
SG					STAT	บร			

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 20 of 49

	trum Analyzer - Oc											
l XI	RF 50 Ω				ENSE:INT			ALIGN AUTO		M Aug 08, 2016	Trac	e/Detector
Center F	Freq 2.48000	00000 GH	lz		Freq: 2.4800			- 40/40	Radio Std	: None	ITac	erDetector
	7	#IE	C Gain:Low	➡ Trig: Fr #Atten::		AVŞ	3111010	> 10/10	Radio Dev	vice: BTS		
		<b>#11</b> *	Gam.Low							1		
10 dB/div	Ref 10.0	0 dBm										
Log												
0.00												Clear Write
-10.0												orear mile
-20.0				4								
-30.0			$\sim$				M	h				
		N										Average
-40.0	~~~	کر کہ							~~~~			Average
-50.0	~~~	- <u></u>				-			- in h			
-60.0 -				-					<u>۲</u>	man -		
-70.0						_						
-80.0												Max Hold
-00.0												
Center 2	2 48 GH7					_			Sn	an 3 MHz		
#Res BM				#V	#VBW 100 kHz				Sweep 3.2 ms			
										<b></b>		Min Hold
Occu	pied Band	lwidth			Total F	owe	r	5.22	2 dBm			
		913	8.98 k	(HZ								Detector
<b>T</b>			40.040		00144				0.00 0/			Peak►
Trans	mit Freq Eri	ror	-13.215	KHZ	OBW I	-owe	r	95	9.00 %		Auto	Man
x dB l	Bandwidth		1.039	MHz	x dB			-20.	00 dB			
MSG								STATU	s			
L												

# Test frequency: 2480MHz(1Mbps)

### Test frequency: 2402MHz(2Mbps)

Agilent Spectr	um Analyzer - Occ	AC		-	NSE:INT		ALIGN AUTO	10/50/07 4	M Aug 08, 2016	<b>I</b> r	
	req 2.40200		łz	Center F	req: 2.40200			Radio Std		Trac	e/Detector
			Gain:Low	Trig: Free #Atten: 20		Avg Hold	:>10/10	Radio Dev	vice: BTS		
10 dB/div	Ref 10.0	0 dBm						-			
Log 0.00											
-10.0				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	harmondown	$\sim$				·	Clear Write
-20.0		~	~~~			<u>س ا</u>	<b>\</b>				
-30.0											
-40.0							- hong	~			Average
-50.0									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u> </u>	
-60.0											
-70.0											Max Hold
-80.0											
Center 2.									an 3 MHz		
#Res BW	30 kHz			#VE	3W 100 k	Hz		Sweep 3.2 ms			Min Hold
Occur	bied Band	width			Total P	ower	5.29 dBm				
		1 19	74 MI	-17							Detector
_											Peak▶
Transn	nit Freq Err	or	-6.117	κHz	OBW P	ower	99	0.00 %		Auto	<u>Man</u>
x dB B	x dB Bandwidth 1.358 M		/IHz xdB -2			-20.	-20.00 dB				
MSG							STATUS	5			

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 21 of 49

	pectrum Analyzer - C RF 50			CE	NSE:INT		ALIGN AUTO	10:52:50/	M Aug 08, 2016	[	
	r Freq 2.4410		-17		reg: 2.44100	0000 GHz	ALIGNAUTO	Radio Sto		Trac	e/Detector
Conto	11109 2.4410		<u> </u>	🚽 Trig: Fre	e Run	Avg Hold	l:>10/10				
		#IF	Gain:Low	#Atten: 2	0 dB			Radio De	vice: BTS		
10 dB/c	liv Ref 10.	.00 dBm									
Log							1			-	
0.00											Clear Write
-10.0			~~~~	$\sim\sim\sim\sim$	$\sim$	$\sim$					Clear write
-20.0		_	<u></u>	•		<u>~</u>	┥			-	
-30.0							$\square$			-	
-40.0											Average
	n- ma mon	~~~~					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	$\sim \sim$		Average
-50.0 🛹									- ~~~ -		
-60.0		_								-	
-70.0		_									Max Hold
-80.0											Muxinoid
	r 2.441 GHz								an 3 MHz		
#Res I	BW 30 kHz			#VE	3W 100 k	Hz		Swee	ep 3.2 ms		Min Hold
					T-4-1 D		4.05	dBm			
	cupied Ban	dwidth			Total P	ower	4.83	aem			
		1.19	978 MH	Ηz							Detector
											Peak▶
Tra	nsmit Freq E	rror	-6.265 I	٢Hz	OBW P	ower	99	0.00 %		Auto	Man
l x di	3 Bandwidth		1.359 <b>№</b>	1H7	x dB		-20	00 dB			
_ ^ u	Banamatri				A GD		20.	00 42			
MSG							STATUS	3			

# Test frequency: 2441MHz(2Mbps)

### Test frequency: 2480MHz(2Mbps)

	um Analyzer - Occ										
XI Center Fr	RF 50 ຊ req 2.48000		łz	Center F	NSE:INT req: 2.48000	0000 GHz	ALIGN AUTO	10:54:19 A Radio Std	M Aug 08, 2016 : None	Trac	e/Detector
	- 1		Gain:Low	Trig: Free #Atten: 20		Avg Hold	:>10/10	Radio Dev	vice: BTS		
10 dB/div	Ref 10.0	0 dBm									
Log 0.00											
-10.0				$\sim$	$\sim \sim$	~~				· ·	Clear Write
-20.0		~	$\sim$	· · · v							
-30.0											
-40.0		$\sim$						~			Average
-50.0 -50.0								V · June	$\sim$		
-60.0											
-70.0											Max Hold
-80.0											
Center 2.							•		an 3 MHz		
#Res BW	30 kHz			#VE	3W 100 k	Hz		Swee	p 3.2 ms		Min Hold
Occur	bied Band	width			Total P	ower	4.30	) dBm			
			76 MI	47							Detector
_											Peak►
Transn	nit Freq Err	or	-6.236	кНz	OBW P	ower	99	9.00 %		Auto	<u>Man</u>
x dB B	andwidth		1.360 N	1Hz	x dB		-20.	00 dB			
								_			
MSG							STATUS	S			

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 22 of 49

Trace/Detector

**Clear Write** 

Average

Max Hold

Min Hold

Detector Peak► <u>Man</u>

Auto

Span 3 MHz Sweep 3.2 ms

5.04 dBm

99.00 %

-20.00 dB

STATUS

	um Analyzer - Οcc RF 50 Ω eq 2.40200	AC	lz _		vse:INT req: 2.40200 ∋ Run		ALIGN AUTO	10:52:41 Af Radio Std:	
		#IF	Gain:Low 🕈	#Atten: 20		0.		Radio Dev	ice: BTS
I0 dB/div	Ref 10.0	0 dBm							
-og			İ						
0.00									
10.0				$\sim$	m	$\sim$			
20.0			↓`				\		
30.0		5							
40.0		1					\ <sub>\</sub>		
L .	~~~~						~~~\ /	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\sim \sim \sim \sim$
50.0	- M <sup></sup>							~~~	
60.0									
70.0	_								
80.0									

#VBW 100 kHz

x dB

**Total Power** 

**OBW Power** 

### Test frequency: 2402MHz(3Mbps)

#### Test frequency: 2441MHz(3Mbps)

1.1734 MHz

-5.755 kHz

1.300 MHz

Center 2.402 GHz #Res BW 30 kHz

**Occupied Bandwidth** 

Transmit Freq Error

x dB Bandwidth

MSG

Agilent Spectrum	n Analyzer - Occupied RF 50 Ω AC	3W	- CET	VSE:INT		ALIGN AUTO	10-50-00 44	M Aug 08, 2016	1	
	eq 2.44100000	) GHz #IFGain:Low		req: 2.44100 e Run	00000 GHz Avg Hold		Radio Std: Radio Dev	None	Trac	e/Detector
10 dB/div Log	Ref 10.00 dB	m	1		1		1			
0.00			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m					Clear Write
20.0 30.0 40.0										Averaq
50.0 60.0							www.	$\sim$		
70.0										Max Hol
enter 2.44 Res BW 3			#VE	3W 100 k	Hz	11		an 3 MHz p 3.2 ms		Min Hol
Occupi	ed Bandwid	th		Total P	ower	4.69	) dBm			
	1.	.1750 M	Hz							Detecto Peak
Transmi	it Freq Error	-5.536	kHz	OBW P	ower	99	9.00 %		Auto	Ma
x dB Ba	ndwidth	1.301	ИНz	x dB		-20.	00 dB			
G						STATUS	s			

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 23 of 49

Agilent		nalyzer - Occ F 50 ຊ										
Cent		F 50 Ω <b>2.48000</b>		lz	Center F	NSE:INT req: 2.48000		ALIGN AUTO	Radio Std	M Aug 08, 2016 : <b>None</b>	Trac	e/Detector
				Gain:Low	Trig: Fre #Atten: 2		Avg Hold	l:>10/10	Radio Dev	vice: BTS		
				Sumeon								
10 dB	/div	Ref 10.00	0 dBm									
Log												
-10.0				<u> </u>	$\sim$							Clear Write
-20.0				$\int \nabla \nabla $			$\sim$ $\sim$					
-30.0			٢					$\square$				
-40.0												Average
-50.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~	V V						h~~~~	mm		-
-60.0												
-70.0												Max Hold
-80.0												Maxinoia
L	er 2.48	CH-7							Sn	an 3 MHz		
	BW 30				#VE	SW 100 k	Hz			p 3.2 ms		Min Hold
	cupie	d Band	width			Total P	ower	4,19	dBm			minnona
1	cupie			45 BAI	1-	- ota - i						
			1.17	45 MI	٦Z							Detector Peak►
Tra	ansmit	Freq Err	or	-5.473 I	κHz	OBW P	ower	99	0.00 %		Auto	Man
x	dB Band	dwidth		1.300 N	۱Hz	x dB		-20.	00 dB			
MSG								STATUS	6			

# Test frequency: 2480MHz(3Mbps)

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 24 of 49

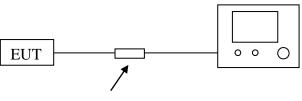
### 5.3 Number Of Hopping Frequency

### 5.3.1 Limit

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

### 5.3.2 Block Diagram of Test Setup

#### Spectrum Analyzer



DC Filter

#### 5.3.3 Test Procedure

- A. Place the EUT on the table and set it in transmitting mode.
- B. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
- C. Set Spectrum Analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- D. Set the Spectrum Analyzer as RBW, VBW=1MHz.
- E. Max hold, view and count how many channel in the band.

#### 5.3.4 Test Results

Test Mode	Measurement Result (No. of Ch)	Limit (No. of Ch)	Result
Hopping(GFSK)	79	≥15	Pass
Hopping(Pi/4-DQPSK)	79	≥15	Pass
Hopping(8-DPSK)	79	≥15	Pass

The worst test data refer to the following page.

## Test Plot For Number of Hopping Channel(GFSK)

RF 50	Ω AC	SENSE:I	NT ALIG	NAUTO 11:17:25 AM Aug 08, 20	16
rker 1 78.00000	0000 MHz PNO: Fas	Trig: Free Ru	Avg Type: Lo n Avg Hold:>100		w.
	IFGain:Lo			DET P N N N	Next Deek
			2	∆Mkr1 78.000 0 MH -0.789 d	IZ
B/div Ref 10.0	JdBm			-0.789 u	
_∕X <del>_</del>	<u></u>	<u>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</u>		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
					Next Pk Right
{					
					_
					Next Pk Left
					Υ <b>1</b>
					Marker Delta
					Warker Deita
t 2.40000 GHz				Stop 2.48350 GH	
s BW 1.0 MHz	#	VBW 1.0 MHz	SWe	eep 1.000 ms (1001 pt	s) Mkr→CF
MODE TRC SCL	×	Υ (Δ) -0.789 dB	FUNCTION FUNCTIO	N WIDTH FUNCTION VALUE	
	78.000 0 MHz				
<u>Δ2</u> f (Δ) F f	2.402 000 0 GHz	1.802 dBm			
	2.402 000 0 GHz	: 1.802 dBm			Mkr→RefLvl
	2.402 000 0 GHz	2 1.802 dBm			Mkr→RefLvl
	2.402 000 0 GHz	1.802 dBm			Mkr→RefLv
	2.402 000 0 GHz	: 1.802 dBm			
	2.402 000 0 GHz	: 1.802 dBm			More 1 of 2
	2.402 000 0 GHz	: <u>1.802 dBm</u>			Mkr→RefLvl More 1 of 2

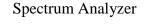
This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 26 of 49

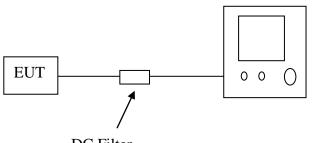
### 5.4 Time Of Occupancy (Dwell Time)

### 5.4.1 Limit

According to § 15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 5.4.2 Block Diagram of Test Setup





DC Filter

#### 5.4.3 Test Procedure

- A. Place the EUT on the table and set it in transmitting mode.
- B. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
- C. Set center frequency of Spectrum Analyzer = operating frequency.
- D. Set the Spectrum Analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
- E. Repeat above procedures until all frequency measured were complete.

### 5.4.4 Test Results

The Measuremen	nt Result With The Wo	orst Case of 3Mbps Fo	or 8-DPSK Mo	dulation
Channel	Time of Pulse for 3DH5 (ms)	Period Time (s)	Sweep Time (ms)	Limit (ms)
Low	2.868	31.6	305.92	400
Middle	2.880	31.6	307.20	400
High	2.880	31.6	307.20	400

### Low Channel

2.868\*(1600/6)/79\*31.6=305.92ms

### **Middle Channel**

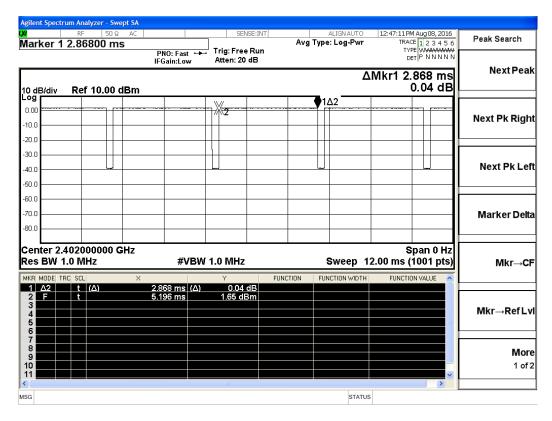
2.880\*(1600/6)/79\*31.6=307.20ms

### **High Channel**

2.880\*(1600/6)/79\*31.6=307.20ms

The test data refer to the following:

#### Low Channel



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 28 of 49

### Middle Channel

	Spectru		ılyzer - S															
w Mark	er 1	RF 2.88	50 000 n					1	NSE:INT		Avg		LIGN AUTO		12:48:09 P TRA	M Aug 08, 2 CE 1 2 3 4 PE W <del>WW</del>	156	Peak Search
10 dB	/div	Ref	10.00	dBm	IFO	10: Fast Gain:Lov		Atten: 20						ΔM	⊳ kr1 2	et P N N M	ns.	Next Peak
Log 0.00 - -10.0 -	*****	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	***************************************			¥ <del>2</del>		del,™unglant gebentngt i ∕*us pa		1 <u>4</u> 2		(4)4~~	****	~				Next Pk Right
-20.0 -30.0 -40.0 -50.0	<b>.</b>									}								Next Pk Left
-60.0 -70.0 -80.0 -																		Marker Delta
Res I	BW 1.	<b>.0 M</b>		GHz				1.0 MHz Y		FUNC	TION		Sweep		)0 ms (	pan 0 1001 p	Hz its)	Mkr→CF
	\2 F	t	<u>(Δ)</u>			80 ms 32 ms	( <u>(</u> )	-0.13 1.64 d										Mkr→RefLvl
7 8 9 10 11																	~	More 1 of 2
MSG													STATU	JS				

# **High Channel**

	4 Aug 08, 2016	12:48:47 PM	LIGNAUTO		E:INT	SEN			- Swept SA 50 Ω AC	m Analyzer	nt Spectru
Peak Search	<sup>∞</sup> E 1 2 3 4 5 6 Normann	TRAC	Log-Pwr	Avg Ty		Trig: Free		PNO: Fast		2.88000	ker 1
Next Peak	880 ms 0.45 dB	/kr1 2.	Δ			Atten: 20		IFGain:Lov	00 dDm	Def 40	
	0.40 0.0			1∆2 —					00 dBm	Ref 10.	B/div
Next Pk Righ							2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		**** <u>********************************</u>	
Next Pk Lef				-						-	
Marker Delta											
	pan 0 Hz	s							00 GHz	800000	L nter 2.4
Mkr→CF	1001 pts)	.00 ms (	-			1.0 MHz	ΒW	#V		0 MHz	
	IN VALUE	FUNCTIO	CTION WIDTH	CTION F	в	Y 0.45	(Δ)	2.880 ms	×	t (Δ)	MODE TR
Mkr→RefLv	====				m	1.58 dE		4.332 ms		t	F
More 1 of 2											
1 01 2	~										
			STATUS								

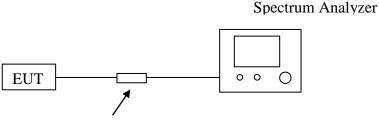
This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 29 of 49

# 5.5 Conducted Spurious Emissions and Band Edges Test

### 5.5.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a)is not required. 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) (see §15.205(c)).

### 5.5.2 Block Diagram of Test Setup



DC Filter

#### 5.5.3 Test Procedure

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 KHz. The video bandwidth is set to 300 KHz.

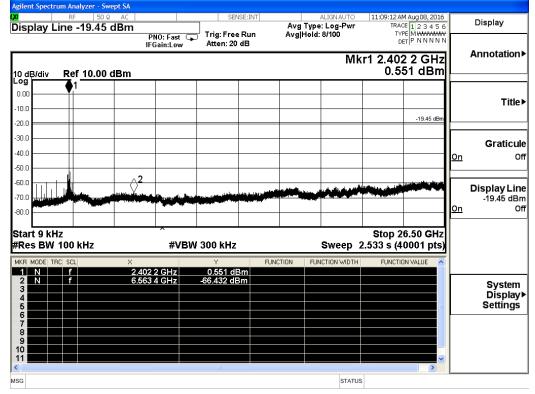
Measurements are made over the 9kHz to 26.5GHz range with the transmitter set to the lowest, middle, and highest channels

### 5.5.4 Test Results of Conducted Spurious Emissions

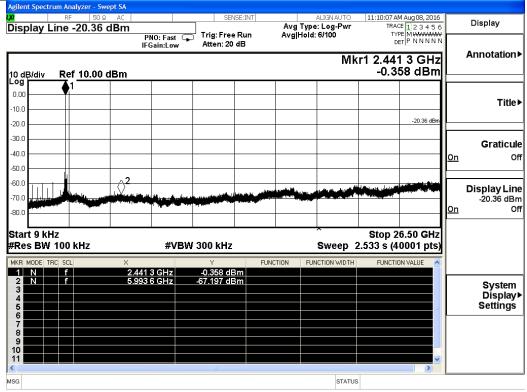
No non-compliance noted. Only record the worst test result (TX-8-DPSK) in this report. The test data refer to the following page.

### **Test Plot**

#### 9KHz-26.5GHz Low Channel(8-DPSK)



#### 9KHz-26.5GHz Middle Channel(8-DPSK)



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 31 of 49

# 9KHz-26.5GHz High Channel(8-DPSK)

Agilent Spectrum Analyzer										
₩ RF Display Line -20.4	50 Ω AC 44 dBm			BE:INT	Avg Type	ALIGNAUTO : Log-Pwr	TRAC	4 Aug 08, 2016 )E 1 2 3 4 5 6		Display
	P IF(	NO: Fast 🔾 Gain:Low	Trig: Free Atten: 20		Avg Hold:		r1 2.47			Annotation
10 dB/div Ref 10.	00 dBm	<u> </u>					-0.44	44 dBm		
0.00										Title
-10.0								-20.44 dBm		
-30.0										0
-40.0									On	Graticul 0
-50.0										
-60.0			الفعاطية السيبين ورجين	والالالم والمريد الم	and the state of the					Display Lin -20.44 dBr
-80.0				- (	. besteller				<u>On</u>	-20.44 dBr O
Start 9 kHz							Stop 2	6.50 GHz		
#Res BW 100 kHz		#VBV	V 300 kHz			Sweep 3	2.533 s (4	0001 pts)		
MKR MODE TRC SCL	×	7.011-	Y O 444 HD	FUNC	TION FUN	ICTION WIDTH	FUNCTIO	IN VALUE		
2 N f 3 4 5 6		7 GHz 8 GHz	-0.444 dB -66.376 dB	m m						System Display Settings
7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9										
11 <b></b>								>		
SG						STATUS	\$			

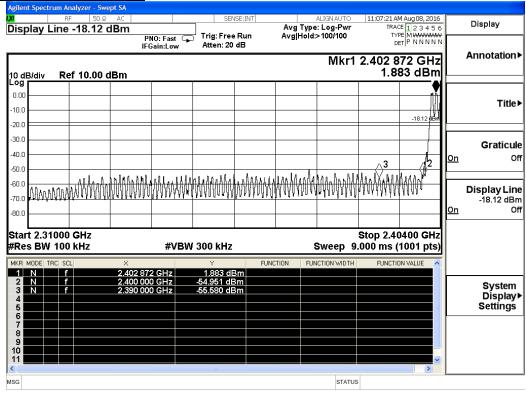
This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 32 of 49

### 5.5.5 Test Results of Band Edges Test

No non-compliance noted. Only record the worst test result in this report. The test data refer to the following page.

### Test Plot

### Hopping On - (GFSK)



Display	5	1 Aug 08, 2016 E 1 2 3 4 5 6 E M MANANAN	TRAC	LIGNAUTO		SEM			50 Ω -19.04 c	v Line	splay
Annotatio	1	76 GHz	2.478 1			Atten: 20	IO: Fast 🖵 Jain:Low	IFG	f 10.00 d	, Re	dB/di
Titl		-19.04 dBm							۱ <u>۱۵.00 u</u>	m v	9 10 .0
Gratic	<u>On</u>	-10.04 dbit									.0 0
Display Li -19.04 di	<u>On</u>		$\wedge \wedge \vee$	ph h							.0 .0 .0
		1000 GHz 1001 pts)	Stop 2.50 133 ms (1 FUNCTIO	Sweep 2.	EUN	300 kHz	#VBW	×	kHz	47800 W 100	es B
Syster Displa Setting			Tonena		3m	0.962 df -67.879 df		2.478 176 2.483 500		f	N
		~									
				STATUS							

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 33 of 49

# Hopping Off - (GFSK)

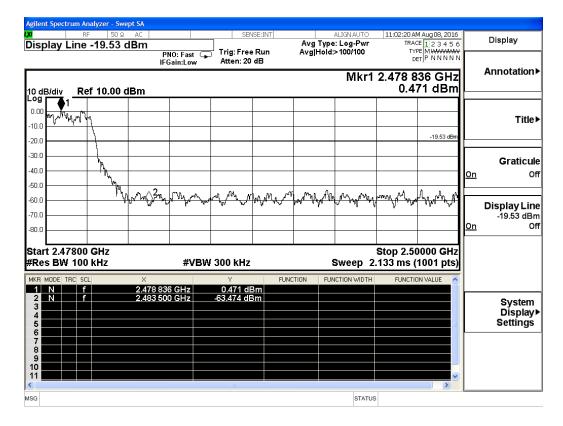
gilent Spectrum Analyzer - Swept SA							
splay Line -18.91 dBm	<u> </u>	SENSE:INT	ΑναΤνο	ALIGNAUTO e: Log-Pwr		Aug 08, 2016	Display
isplay Line - 10.91 UBI	PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 20 dB	Avg Hold	>100/100	TYPE DE1		Annotation
dB/div Ref 10.00 dBm				Mkr1	2.402 02 1.08	26 GHz 5 dBm	Annotation
og ).00							Title
D.0						-18.91 plBm	
1.0						<u>+</u> +	Graticu
0.0						/2	<u>On</u> (
			ι Λ			www.	Display Li
),0	an a	°n,γ∕ kys <sup>r</sup> age <sup>n</sup> in,nellik <sup>er</sup> sisterer	how we have the server of the	gramer aller	2702 00000 VFT		-18.91 dE <u>On</u>
art 2.31000 GHz Res BW 100 kHz	#VBW	300 kHz			Stop 2.40 .000 ms (1		
R MODE TRC SCL >	402 026 GHz	Y 1.085 dBm	FUNCTION FUI	NCTION WIDTH	FUNCTION	N VALUE	
N <u>f</u> <u>2.</u> N <u>f</u> 2.3	400 000 GHz 390 000 GHz	-57.123 dBm -66.506 dBm					Syster Displa Setting
6 7 8 9							
0						~	
				1	5		U

Agilent Spectrum Analyzer - Swept SA						
RF 50Ω AC	SE	NSE:INT	ALIGN AUTO	10:57:08 AM Aug 08, 2010		Display
Display Line -20.59 dBm	BNO: East Trig: Fre		pe:Log-Pwr d:>100/100	TRACE 1 2 3 4 5 TYPE MWWWAAA		Biopiay
	PNO: Fast Fre IFGain:Low Atten: 20			DET P NNNN 2.480 002 GH2		Annotation►
10 dB/div Ref 10.00 dBm				-0.591 dBm	<u> </u>	
0.00 -10.0						Title►
-20.0				-20.59 dBr		
-30.0						
						Graticule
-40.0					<u>On</u>	Off
-50.0	2					
-60.0	-D					<b>Display Line</b>
-70.0	······································	on mar and mar and a sector	Kan the state of t	and a mart at the later of	<u>On</u>	-20.59 dBm Off
tart 2.47800 GHz Res BW 100 kHz	#VBW 300 kHz	2	Sweep 2.	Stop 2.50000 GHz 133 ms (1001 pts	z )	
MKR MODE TRC SCL X	Y		UNCTION WIDTH	FUNCTION VALUE		
1 N f 2.480	0 002 GHz -0.591 d 3 500 GHz -63.916 d	Bm				
2 N f 2.483 3 4 5 6	3 500 GHz -63.916 di					System Display▶ Settings
7 8						
9						
11				×		
				>		
SG			STATUS			

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 34 of 49

### Hopping On - (8-DPSK)

SENSE	ALIGNAUTO	11:03:55 AM Aug 08, 2016	<b>D</b> : 1
		TRACE 1 2 3 4 5 6	Display
PNO: Fast  Trig: Free F IFGain:Low Atten: 20 d	8	2.403 812 GHz 1.900 dBm	Annotation►
		1 /VÝ -18.10 dBm	Title▶
		$3$ $\phi^2$	Graticule <u>On</u> Off
			Display Line -18.10 dBm On Off
#VBW 300 kHz	Sweep 9	Stop 2.40400 GHz .000 ms (1001 pts)	
00 000 GHz -53.501 dBn		FUNCTION VALUE	System Display≯ Settings
	IFGain:Low         Atten: 20 dl           المحالي         المحالي           المحالي	IFGain:Low     Atten: 20 dB       IFGain:Low     Mkr1       Image: Strate in the strate in	IFGain:Low         Atten: 20 dB         Mkr1 2.403 812 GHz 1.900 dBm           Image: Stop 2.40400 GHz



This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 35 of 49

# Hopping Off - (8-DPSK)

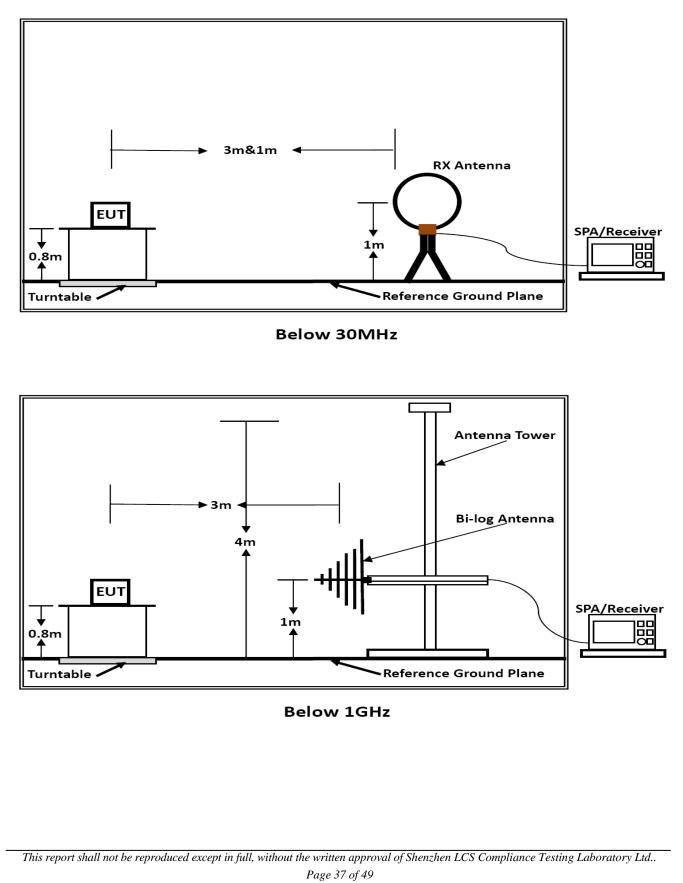
LXI			50 Ω AC		SE	NSE:INT	Aug Tur	ALIGNAUTO		M Aug 08, 2016 CE 1 2 3 4 5 6		Display
Disp	Diay Li	ne -21.4	is aBm	PNO: Fast IFGain:Lov				d:>100/100	TY		-	
10 di	B/div	Ref 10.0	)0 dBm					Mkr1		14 GHz 53 dBm		Annotation
Log 0.00										<b></b>	F	
-10.0										-21.45 dBm		Title▶
-20.0 -30.0										-21.45 gdbm		Graticule
-40.0										2	<u>On</u>	Off
-50.0 -60.0		A			rtu.	Iòi			3		F	Display Line
-70.0 -80.0	<b>୷</b> ୲୳ୣ୷ୖ୲୶୶ଋ	water 15 le		متهمة المعاصلين المعينة	marine boirger	mens Une	alimnanal	Y Kumuluum		and the	On	-21.45 dBm
	+ 2 31	000 GHz							Stop 2 4	0400 GHz	F	
		100 GH2		#V	/BW 300 kHz			Sweep 9				
1	MODE TRI	f		2214 GHz	۲ -1.453 d	Зm	ICTION FL	JNCTION WIDTH	FUNCTI	ON VALUE		
	N N	f		0 000 GHz 0 000 GHz	-56.035 d -68.253 d	3m 3m						System Display≯
5 6 7										3	-	Settings
8												
10 11										~		
MSG								STATUS	s			

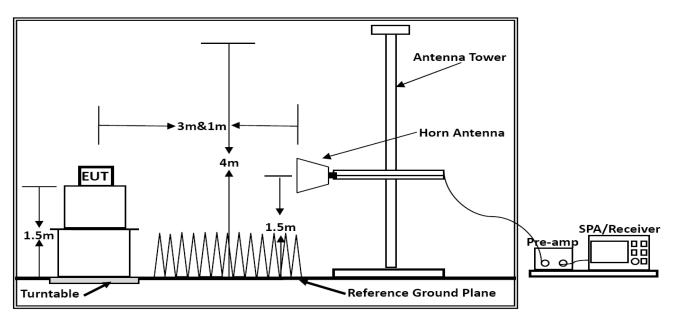
Agrient Spectrum Analyz									
₩ RF Display Line -22		<b>_</b>	SENSE:INT		ALIGNAUTO e: Log-Pwr	TRAC	MAug 08, 2016 E 1 2 3 4 5 6 E M <del>WW/WWW</del>		Display
10 dB/div Ref 10			g: Free Run ten: 20 dB	Avginoid	l≫100/100 Mkr1	DI 2.480 2	00 GHz		Annotation►
Log 0.00 -10.0							22.40 dBm		Title►
-30.0 -40.0								<u>0n</u>	<b>Graticule</b> Off
-60.0 -70.0 -80.0	2 Lunnoun	Mar Mar Marine Marine Strate Constraints	roller	าหาะการแก่งให้และค่	in generation with the	terror about	<u>~~1/1-/1362~~1</u>	<u>0n</u>	Display Line -22.40 dBm Off
Start 2.47800 GH #Res BW 100 kH	z	#VBW 300			Sweep 2	.133 ms (			
MKR         MODE         TRC         SCL           1         N         f         2           2         N         f         3           4         5         5         5           5         5         5         6           7         5         5         5           8         5         5         16           9         5         5         10           10         5         5         11           5         5         5         5         5           11         5         5         5         5	× 2.480 200 2.483 500	GHz -2.	Y FL 404 dBm 998 dBm	INCTION FU	NCTION WIDTH	FUNCTIO			System Display▶ Settings

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 36 of 49 SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID: GQK-HM388 Report No.: LCS1608010016E

# 6. RADIATED MEASUREMENT

6.1 Block Diagram of Test Setup





Above 1GHz

# 6.2 Radiated Emission Limit

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
\1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293.	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510MHz.

\2\ Above 38.6

Part 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 38 of 49 Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector.

Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

Part 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/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

## 6.3 Instruments Setting

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

## 6.4 Test Procedures

## 1) Sequence of testing 9 kHz to 30 MHz

## Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

## **Premeasurement:**

- --- The turntable rotates from 0  $^{\circ}$  to 315  $^{\circ}$  using 45  $^{\circ}$  steps.
- --- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

## **Final measurement:**

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0 ° to 360 °) and by rotating the elevation axes (0 ° to 360 °).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

## 2) Sequence of testing 30 MHz to 1 GHz

### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

- --- The measurement distance is 3 meter.
- --- The EUT was set into operation.

#### **Premeasurement:**

- --- The turntable rotates from 0 ° to 315 ° using 45 ° steps.
- --- The antenna is polarized vertical and horizontal.
- --- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

### **Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm 45$ ) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

## 3) Sequence of testing 1 GHz to 18 GHz

### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

#### **Premeasurement:**

- --- The turntable rotates from 0  $^{\circ}$  to 315  $^{\circ}$  using 45  $^{\circ}$  steps.
- --- The antenna is polarized vertical and horizontal.
- --- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

#### **Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm 45$  °) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

### 4) Sequence of testing above 18 GHz

#### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

#### **Premeasurement:**

--- The antenna is moved spherical over the EUT in different polarisations of the antenna.

#### **Final measurement:**

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

## 6.5 Results for Radiated Emissions

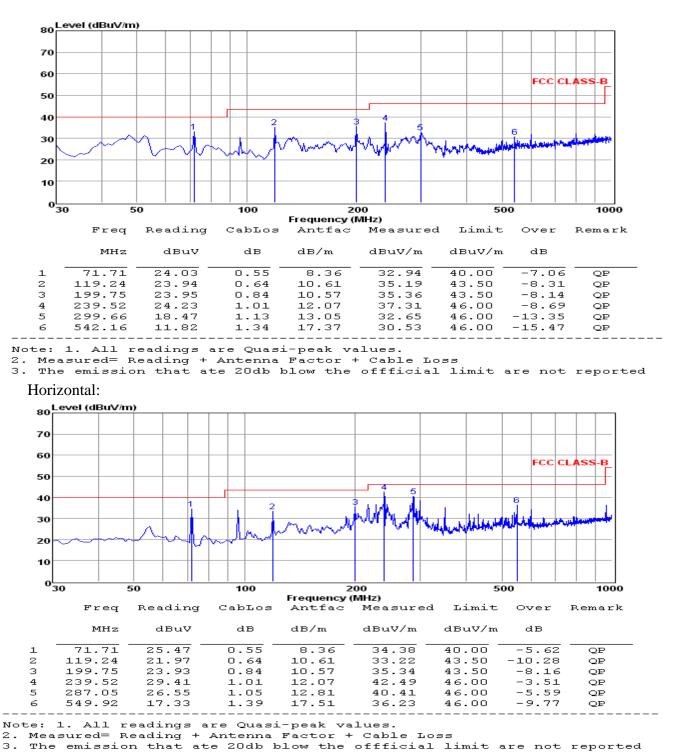
## PASS.

Only record the worst test result in this report. The radiated emissions from 9kHz to 30MHz are at least 20dB below the official limit and no need to report. The test data please refer to following page:

The test data please refer to following page:

#### **Below 1GHz**

Vertical:



\*\*\*Note:

Pre-scan all mode and recorded the worst case results in this report (TX-Low Channel(3Mbps)). Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 44 of 49 SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID:GQK-HM388 Report No.: LCS1608010016E

## Above 1GHz

Note: Only recorded the worst test result. The worst test result for 8-DPSK, TX-Low Channel:

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4804.00	44.66	33.06	35.04	3.94	46.62	74	-27.38	Peak	Horizontal
4804.00	35.93	33.06	35.04	3.94	37.89	54	-16.11	Average	Horizontal
4804.00	45.60	33.06	35.04	3.94	47.56	74	-26.44	Peak	Vertical
4804.00	36.58	33.06	35.04	3.94	38.54	54	-15.46	Average	Vertical

The worst test result for 8-DPSK, TX-Middle Channel:

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4882.00	43.78	33.16	35.15	3.96	45.75	74	-28.25	Peak	Horizontal
4882.00	34.15	33.16	35.15	3.96	36.12	54	-17.88	Average	Horizontal
4882.00	45.44	33.16	35.15	3.96	47.41	74	-26.59	Peak	Vertical
4882.00	35.42	33.16	35.15	3.96	37.39	54	-16.61	Average	Vertical

The worst test result for 8-DPSK, TX-High Channel:

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4960.00	44.48	33.26	35.14	3.98	46.58	74	-27.42	Peak	Horizontal
4960.00	34.71	33.26	35.14	3.98	36.81	54	-17.19	Average	Horizontal
4960.00	44.42	33.26	35.14	3.98	46.52	74	-27.48	Peak	Vertical
4960.00	37.72	33.26	35.14	3.98	39.82	54	-14.18	Average	Vertical

Notes:

1. Measuring frequencies from 9k~10th harmonic (ex. 26GHz), No emission found between lowest internal used/generated frequency to 30MHz.

2. Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 26GHz) were made with an instrument using Peak detector mode.

3. 18~25GHz at least have 20dB margin. No recording in the test report.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 45 of 49

# 6.6 Results for Band edge Testing (Radiated)

Note: Only recorded the worst test result.

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
2377.51	43.44	33.06	35.18	3.6	44.92	74	-29.08	Peak	Horizontal
2377.53	34.95	33.08	35.18	3.6	36.45	54	-17.55	Average	Horizontal
2390.00	45.87	33.08	35.18	3.62	47.39	74	-26.61	Peak	Horizontal
2389.98	36.90	33.08	35.18	3.62	38.42	54	-15.58	Average	Horizontal
2400.00	51.63	33.06	35.18	3.6	53.11	74	-20.89	Peak	Horizontal
2399.98	41.87	33.08	35.18	3.6	43.37	54	-10.63	Average	Horizontal
2377.51	43.50	33.08	35.18	3.62	45.02	74	-28.98	Peak	Vertical
2377.53	34.72	33.08	35.18	3.62	36.24	54	-17.76	Average	Vertical
2390.00	46.00	33.06	35.18	3.6	47.48	74	-26.52	Peak	Vertical
2389.98	36.34	33.08	35.18	3.6	37.84	54	-16.16	Average	Vertical
2400.00	51.48	33.08	35.18	3.62	53.00	74	-21.00	Peak	Vertical
2399.98	43.46	33.08	35.18	3.62	44.98	54	-9.02	Average	Vertical

TX-Low Channel, 8-DPSK, Non-hopping

TX-High Channel, 8-DPSK, Non-hopping

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
2483.50	46.10	33.06	35.18	3.6	47.58	74	-26.42	Peak	Horizontal
2483.53	36.64	33.08	35.18	3.6	38.14	54	-15.86	Average	Horizontal
2487.41	42.83	33.08	35.18	3.62	44.35	74	-29.65	Peak	Horizontal
2487.44	33.02	33.08	35.18	3.62	34.54	54	-19.46	Average	Horizontal
2483.50	46.69	33.06	35.18	3.6	48.17	74	-25.83	Peak	Vertical
2483.53	37.13	33.08	35.18	3.6	38.63	54	-15.37	Average	Vertical
2487.41	44.26	33.08	35.18	3.62	45.78	74	-28.22	Peak	Vertical
2487.44	34.87	33.08	35.18	3.62	36.39	54	-17.61	Average	Vertical

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 46 of 49

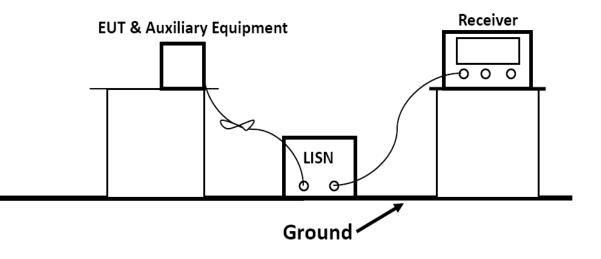
# 7. LINE CONDUCTED EMISSIONS

## 7.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Erromonov Dongo (MHz)	Limits (dBµV)				
Frequency Range(MHz)	Quasi-peak	Average			
0.15 to 0.50	66 to 56	56 to 46			
0.50 to 5	56	46			
5 to 30	60	50			

# 7.2 Block Diagram of Test Setup



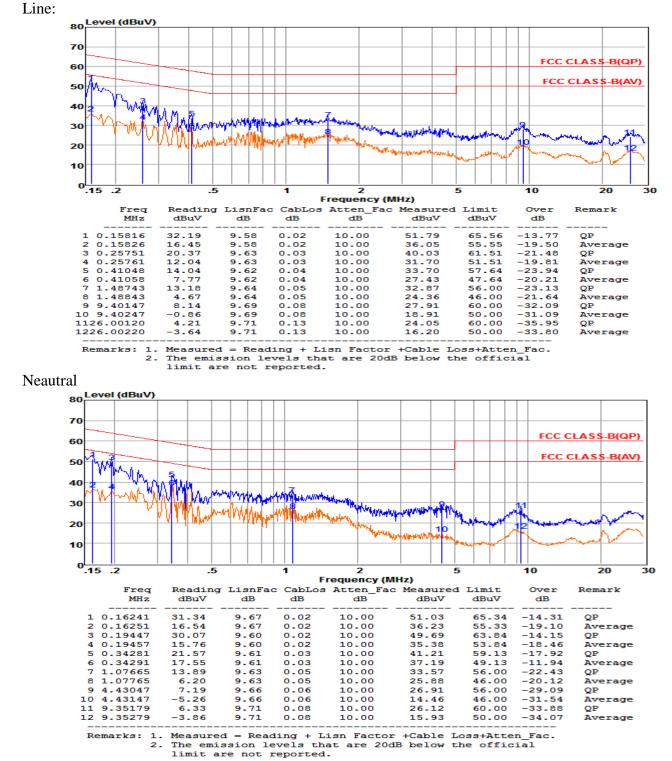
## 7.3 Test Results

## PASS.

The test data please refer to following page. only the worst test data was recorded.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 47 of 49

Report No.: LCS1608010016E



## Test Result For Line Power Input AC 120V/60Hz

Note: Pre-scan all modes and recorded the worst case results in this report.

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 48 of 49

# 8. ANTENNA REQUIREMENT

## 8.1 Standard Applicable

According to §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 shall be considered sufficient to comply with the provisions of this section. 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.

## 8.2 Antenna Connected Construction

## 8.2.1. Antenna Connector Construction

The antenna(3dBi Max.) used for transmitting is permanently attached and no consideration of replacement. Please see EUT photo for details.

8.2.2. Results: Compliance.

## 8.2.3. Instruments Setting

Parameter Setting					
Detector:	Peak				
Sweep Time:	Auto				
Resolution bandwidth:	3MHz				
Video bandwidth:	3MHz				
Span:	5MHz				
Trace-Mode:	Max hold				

Note: The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal Bluetooth devices, the 8-DPSK mode is used.

824	Test	Result
0.2.7.	IUSU	Result

0.2.1. Tobi Robult				
T <sub>nom</sub>	V <sub>nom</sub>	Lowest Channel 2402 MHz	Middle Channel 2441 MHz	Highest Channel 2480 MHz
Conducted power [dBm] Measured with 8-DPSK modulation		2.81	2.42	1.96
Radiated power [dBm] Measured with 8-DPSK modulation		3.35	2.78	2.51
Gain [dBi] Calculated		0.54	0.36	0.55
Measurement uncertainty			$\pm$ 1.6 dB (cond.) / ± 3.8 dB (rad.)	

## -----THE END OF REPORT------

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd.. Page 49 of 49