

# Global United Technology Services Co., Ltd.

Report No: GTSE11040019502

# FCC REPORT (Bluetooth)

**Applicant:** Corporativo Lanix S.A.de C.V.

Address of Applicant: Carrtera internacional Hermosillo-Nogale Km 8.5

**Equipment Under Test (EUT)** 

Product Name: GSM Dual Band GPRS Digital Mobile Phone

Model No.: T60

Trade mark: LANIX

FCC ID: ZC4T60

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247:2010

Date of sample receipt: 22 Apr., 2011

**Date of Test:** 25-27 Apr., 2011

Date of report issued: 28 Apr., 2011

Test Result : PASS \*

\* In the configuration tested, the EUT complied with the standards specified above. Authorized Signature:

Robinson Lo Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of GTS International Electrical Approvals or testing done by GTS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by GTS International Electrical Approvals in writing.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only."



# 2 Version

Version No.	Date	Description
00	2011-04-28	Original

Prepared By:	Collin.He	Date:	2011-04-28	
	Project Engineer			
Check By:	Hans.Hu	Date:	2011-04-28	
	Reviewer	_		

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



# 3 Contents

			Page
1	COV	/ER PAGE	1
2	VER	SION	2
3		ITENTS	
4	TES	T SUMMARY	4
5	GEN	IERAL INFORMATION	5
	5.1	CLIENT INFORMATION	5
	5.2	GENERAL DESCRIPTION OF E.U.T	5
	5.3	E.U.T OPERATION MODE	7
	5.4	TEST FACILITY	7
	5.5	TEST LOCATION	7
		OTHER INFORMATION REQUESTED BY THE CUSTOMER	
	5.7	TEST INSTRUMENTS LIST	8
6	TES	T RESULTS AND MEASUREMENT DATA	9
	6.1	ANTENNA REQUIREMENT:	9
		CONDUCTED PEAK OUTPUT POWER	
	6.3	20dB Occupy Bandwidth	16
		CARRIER FREQUENCIES SEPARATION	
		HOPPING CHANNEL NUMBER	
	6.6 l	DWELL TIME	32
		BAND EDGE	
		PSEUDORANDOM FREQUENCY HOPPING SEQUENCE	
		RADIATED EMISSION	
	6.9.1	11000100000 0711011000 77 1 0112	
	6.9.2		
	6.10	CONDUCTED EMISSION	43
7	TES	T SETUP PHOTO	46
8	EUT	CONSTRUCTIONAL DETAILS	48



# 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	PASS
Conducted Emission	15.207	PASS
Conducted Peak Output Power	15.247 (b)(1)	PASS
20dB Occupied Bandwidth	15.247 (a)(1)	PASS
Carrier Frequencies Separation	15.247 (a)(1)	PASS
Hopping Channel Number	15.247 (a)(1)	PASS
Dwell Time	15.247 (a)(1)	PASS
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)&TCB Exclusion List	PASS
Radiated Emission	15.205/15.209	PASS
RF Exposure Compliance Requirement	15.247(b)(4)& TCB Exclusion List (7 July 2002)	PASS

Remark:

Pass: The EUT complies with the essential requirements in the standard.

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

Project No.: GTSE110400195RF

Page 4 of 53



# 5 General Information

## **5.1 Client Information**

Applicant:	Corporativo Lanix S.A.de C.V.
Address of Applicant:	Carrtera internacional Hermosillo-Nogale Km 8.5
Manufacturer/Factory:	SHENZHEN KONKA TELECOMMUNICATION TECHNOLOGY CO.,LTD
Address of Manufacturer/Factory :	No.9008 Shennan Road, Overseas Chinese Town, Shen Zhen, Guangdong, China

# 5.2 General Description of E.U.T.

Product Name:	GSM Dual Band GPRS Digital Mobile Phone
Model No.:	T60
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK, Pi-4QPSK, 8DPSK
Antenna Type:	Integral
Antenna gain:	2dBi
Power supply:	DC 3.7V Li-ion rechargeable Battery

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

#### Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

Project No.: GTSE110400195RF

Page 6 of 53



Project No.: GTSE110400195RF

## 5.3 E.U.T Operation mode

Operating Environment	Operating Environment:				
Temperature:	24.0 °C				
Humidity:	52 % RH				
Atmospheric Pressure:	1012 mbar				
Test mode:	Test mode:				
Bluetooth mode	Keep the EUT in communicating mode on Bluetooth function.				

## 5.4 Test Facility

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

● FCC —Registration No.: 600491

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, July 20, 2010.

Industry Canada (IC)

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-1.

#### 5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen,

China

Tel: 0755-27798480 Fax: 0755-27798960

## 5.6 Other Information Requested by the Customer

None.

Global United Technology Services Co., Ltd. 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China 518102

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960 Page 7 of 53



## 5.7 Test Instruments list

Radia	Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)	
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS201	Mar. 30 2011	Mar. 30 2012	
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS202	N/A	N/A	
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Sept. 10 2010	Sept. 10 2011	
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS204	Feb. 26 2011	Feb. 26 2012	
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS205	June 30 2010	June 30 2011	
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A	
7	Coaxial Cable	GTS	N/A	GTS400	Apr. 01 2011	Apr. 01 2012	
8	Coaxial Cable	GTS	N/A	GTS401	Apr. 01 2011	Apr. 01 2012	
9	Coaxial cable	GTS	N/A	GTS402	Apr. 01 2011	Apr. 01 2012	
10	Coaxial Cable	GTS	N/A	GTS407	Apr. 01 2011	Apr. 01 2012	
11	Coaxial Cable	GTS	N/A	GTS408	Apr. 01 2011	Apr. 01 2012	
12	Amplifier(10KHz- 5GHz)	Sonnoma Instrument	305-1052	GTS210	Apr. 01 2011	Apr. 01 2012	
13	Amplifier(2GHz- 20GHz)	HP	8349B	GTS231	Apr. 01 2011	Apr. 01 2012	
14	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	May 11 2010	May 11 2011	
15	Signal Generator	Rohde & Schwarz	SML03	GTS236	May 11 2010	May 11 2011	
16	Temp. Humidity/ Barometer	Oregon Scientific	BA-888	GTS248	May 11 2010	May 11 2011	
17	D.C. Power Supply	Instek	PS-3030	GTS232	NA	NA	
18	Splitter	Agilent	11636B	GTS237	May 11 2010	May 11 2011	

Cond	Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)	
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS206	Apr. 10 2011	Apr. 10 2012	
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS208	Sept. 14 2010	Sept. 14 2011	
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS209	Sept. 14 2010	Sept. 14 2011	
4	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS207	Apr. 14 2011	Apr. 14 2012	
5	Coaxial Cable	GTS	N/A	GTS406	Apr. 01 2011	Apr. 01 2012	
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A	

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

Project No.: GTSE110400195RF

Page 8 of 53



#### 6 Test results and Measurement Data

## **6.1 Antenna requirement:**

**Standard requirement:** FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

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.

15.247(c) (1)(i) requirement:

(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.

#### E.U.T Antenna:

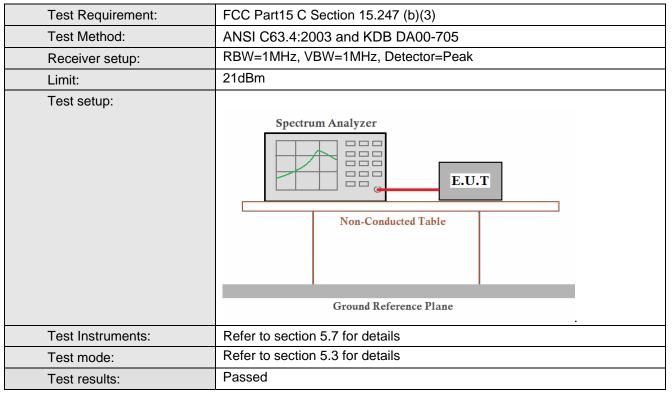
The antenna is unique, the typical gain of the antenna is 2dBi.



Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



## 6.2 Conducted Peak Output Power



#### **Measurement Data**

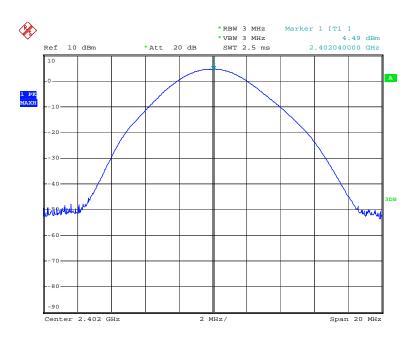
Measurement Data					
GFSK mode					
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
Lowest	4.49	21.00	Pass		
Middle	3.06	21.00	Pass		
Highest	2.87	21.00	Pass		
	Pi/4QPSK m	ode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
Lowest	3.64	21.00	Pass		
Middle	2.14	21.00	Pass		
Highest	2.08	21.00	Pass		
	8DPSK mod	de			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
Lowest	3.80	21.00	Pass		
Middle	2.46	21.00	Pass		
Highest	2.29	21.00	Pass		

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

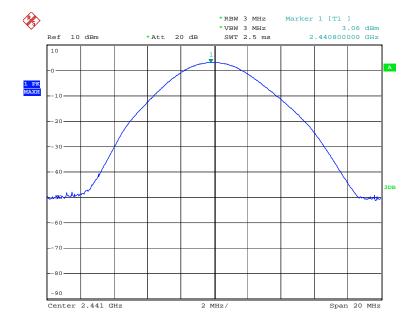
Page 10 of 53





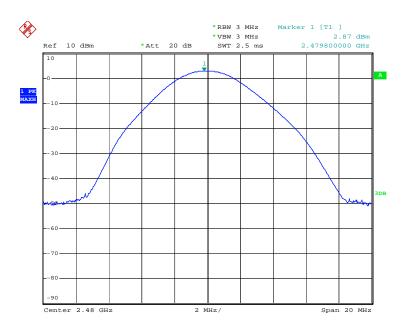


Test mode: GFSK Test channel: Middle

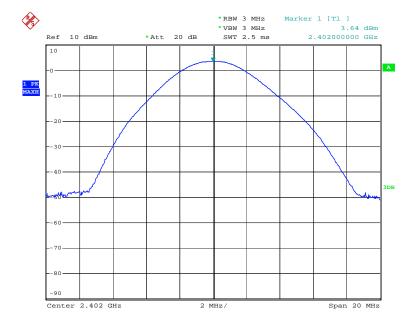






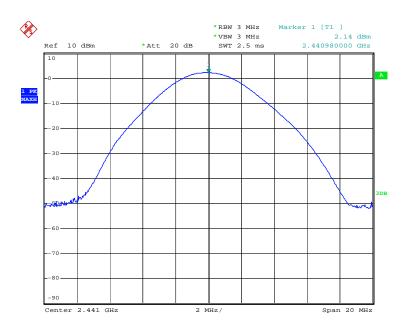


Test mode: Pi/4QPSK Test channel: Lowest

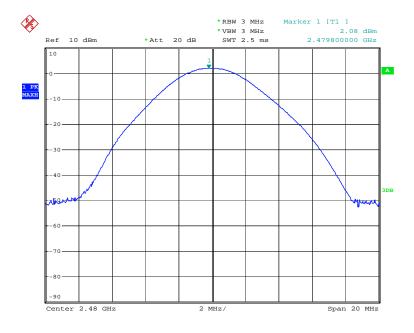




Test mode: Pi/4QPSK Test channel: Middle

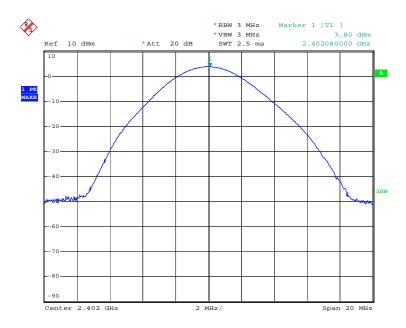


Test mode: Pi/4QPSK Test channel: Highest

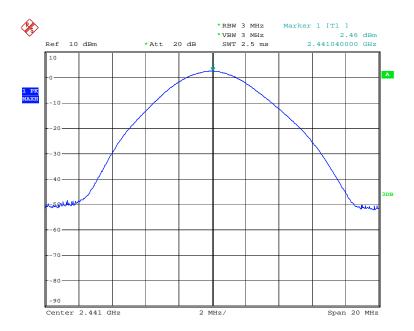




Test mode:	8DPSK	Test channel:	Lowest
i cot inodo.	ODI OIL	i cot oriaririor.	LOWCOL

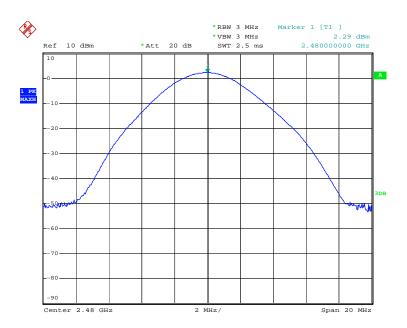


Test mode: 8DPSK Test channel: Middle





Test mode: 8DPSK Test channel: Highest





# 6.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.4:2003 and KDB DA00-705	
Receiver setup:	RBW=30KHz, VBW=100KHz,detector=Peak	
Limit:	NA	
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane	
Test Instruments:	Refer to section 5.7 for details	
Test mode:	Refer to section 5.3 for details	
Test results:	Passed	

Measurement Data			
Test channel	20dB Occupy Bandwidth (KHz)		
	GFSK	Pi/4QPSK	8DPSK
Lowest	796	1204	1208
Middle	800	1220	1208
Highest	804	1220	1208

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

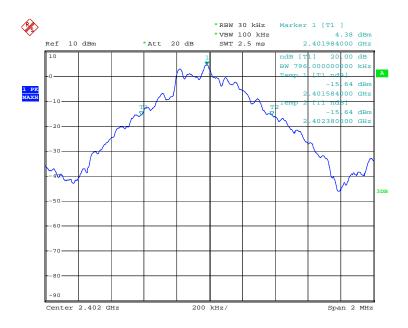
Project No.: GTSE110400195RF

Page 16 of 53

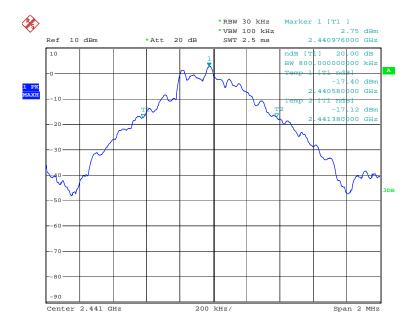


#### Test plot as follows:

Test mode: GFSK Test channel: Lowest

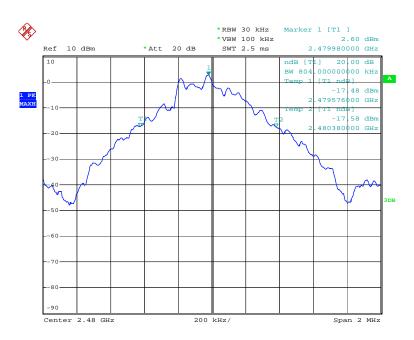


Test mode: GFSK Test channel: Middle

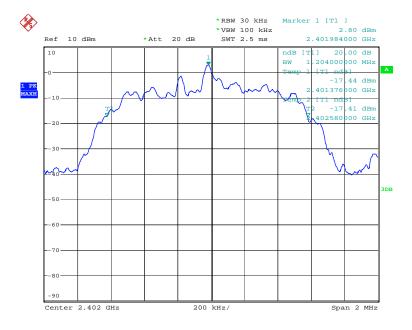






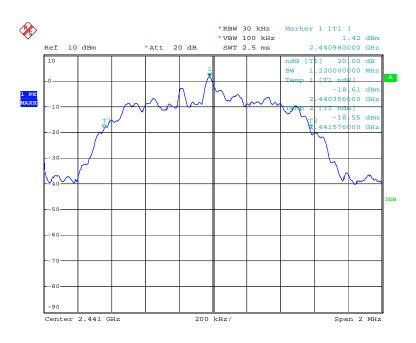


Test mode: Pi/4QPSK Test channel: Lowest

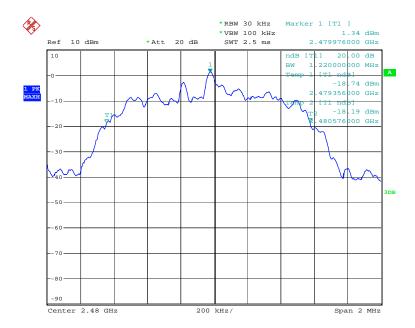






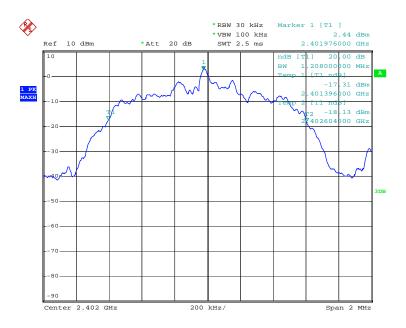


Test mode: Pi/4QPSK Test channel: Highest

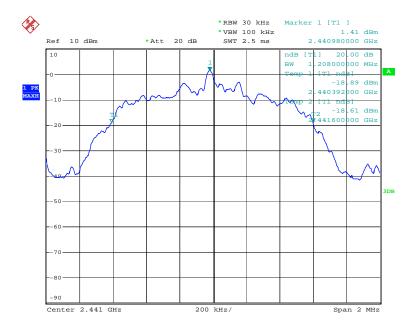






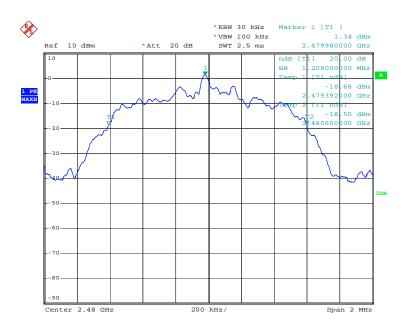


Test mode: 8DPSK Test channel: Middle





Test mode: 8DPSK Test channel: Highest



Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



# **6.4 Carrier Frequencies Separation**

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.4:2003 and KDB DA00-705	
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak	
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)	
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane	
Test Instruments:	Refer to section 5.7 for details	
Test mode:	Refer to section 5.3 for details	
Test results:	Passed	

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



Measurement Data			
	GFSK mode		
Test channel	Carrier Frequencies Separation (KHz)	Limit (KHz)	Result
Lowest	1004	536.0	Pass
Middle	1004	536.0	Pass
Highest	1004	536.0	Pass
	Pi/4QPSK m	ode	
Test channel	Carrier Frequencies Separation (KHz)	Limit (KHz)	Result
Lowest	1004	813.3	Pass
Middle	1000	813.3	Pass
Highest	1004	813.3	Pass
	8DPSK mo	de	
Test channel	Carrier Frequencies Separation (KHz)	Limit (KHz)	Result
Lowest	1004	805.3	Pass
Middle	1004	805.3	Pass
Highest	1000	805.3	Pass

Note: According to section 6.3,

Mode	20dB bandwidth (KHz)	Limit (KHz)
Wode	(worse case)	(Carrier Frequencies Separation)
GFSK	804	536.0
PI/4QPSK	1220	813.3
8DPSK	1208	805.3

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

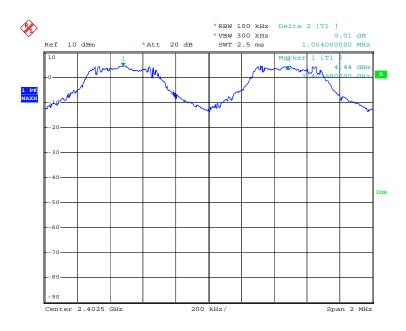
Project No.: GTSE110400195RF

Page 23 of 53

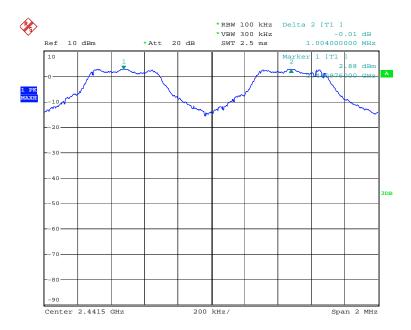


#### Test plot as follows:

Test mode: GFSK Test channel: Lowest

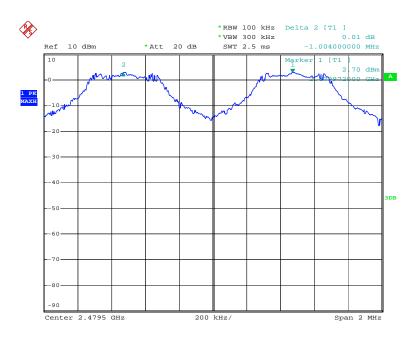


Test mode: GFSK Test channel: Middle

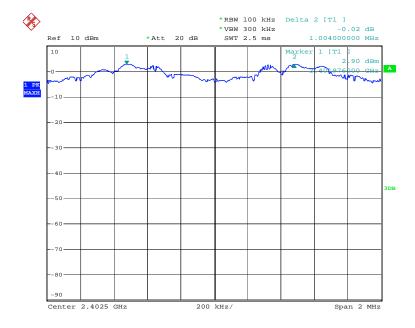




Test mode:	GFSK	Test channel:	Highest
i cot illoac.	OI OIX	i cot oriaririor.	i ligitost

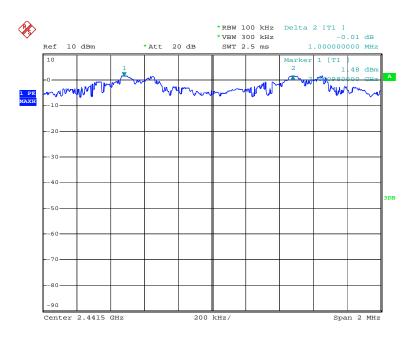


Test mode: Pi/4QPSK Test channel: Lowest

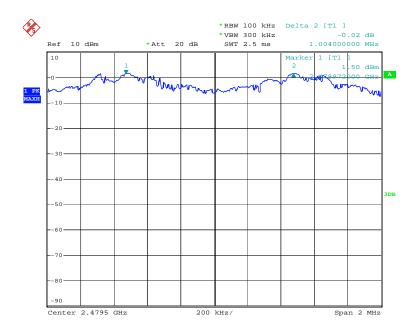




Test mode:	Pi/4QPSK	Test channel:	Middle
i cot illoac.	1 1/ + Q1 O1 (	i cot oriaririor.	ivildale

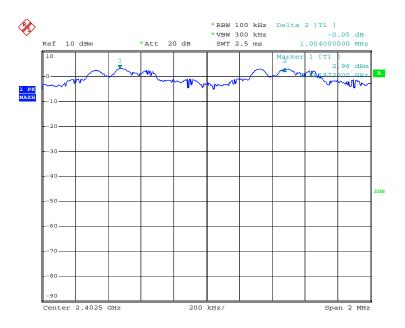


Test mode: Pi/4QPSK Test channel: Highest

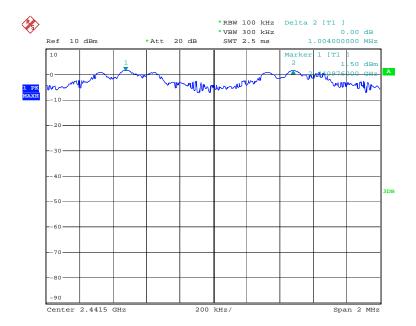




Test mode:	8DPSK	Test channel:	Lowest
i oot iiioao.	ODI OIL	i oot onamion	=011001



Test mode: 8DPSK Test channel: Middle

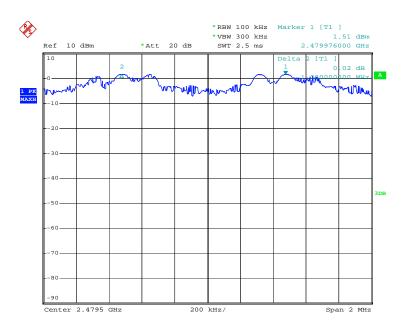


Project No.: GTSE110400195RF

Page 27 of 53



Test mode: 8DPSK Test channel: Highest



Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



# **6.5 Hopping Channel Number**

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.4:2003 and KDB DA00-705	
Receiver setup:	RBW=100KHz, VBW=300KHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak	
Limit:	15channels	
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane	
Test Instruments:	Refer to section 5.7 for details	
Test mode:	Refer to section 5.3 for details	
Test results:	Passed	

Measurement Data		
Mode	Hopping channel numbers	Limit
GFSK	79	15
Pi/4QPSK	79	15
8DPSK	79	15

#### Test plot as follows

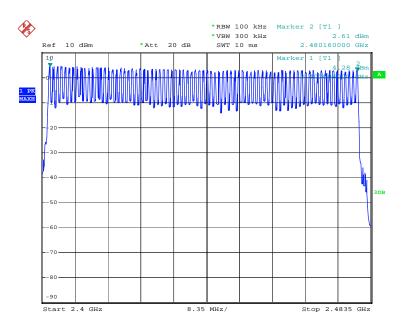
Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

Project No.: GTSE110400195RF

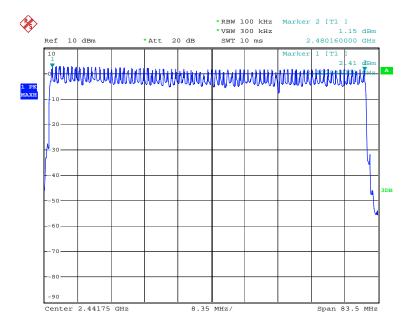
Page 29 of 53





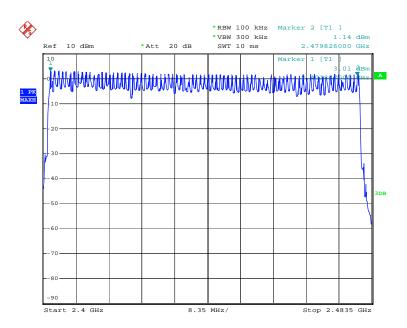


Test mode: Pi/4QPSK











#### 6.6 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)	
Test Method:	ANSI C63.4:2003 and KDB DA00-705	
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak	
Limit:	0.4 Second	
Test setup:	Spectrum Analyzer  E.U.T  Non-Conducted Table  Ground Reference Plane	
Test Instruments:	Refer to section 5.7 for details	
Test mode:	Refer to section 5.3 for details	
Test results:	Passed	

Measurement Data										
Mode	Packet	Dwell time (second)	Limit (second)							
GFSK	DH1	0.1397	0.4							
Pi/4QPSK	DH3	0.2725	0.4							
8DPSK	DH5	0.3154	0.4							

#### Dwell time

DH1: Dwell time = Pulse time\*(1600/2/79)\*31.6S; DH3: Dwell time = Pulse time\*(1600/4/79)\*31.6S; DH5: Dwell time = Pulse time\*(1600/6/79)\*31.6S;

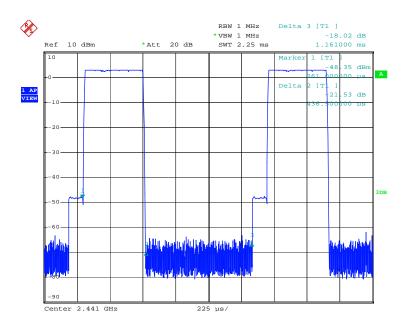
Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

Page 32 of 53

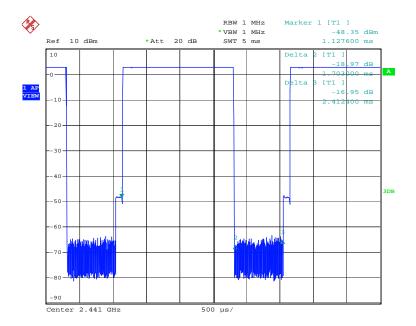


Test plot as follows

Test mode: GFSK/ Pi/4QPSK / 8DPSK Test Packet: DH1

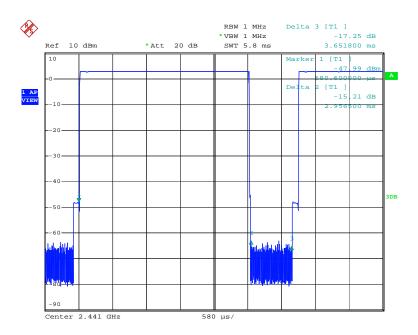


Test mode: GFSK/ Pi/4QPSK / 8DPSK Test Packet: DH3





Test mode: GFSK/ Pi/4QPSK / 8DPSK Test Packet: DH5





# 6.7 Band Edge

Requirement:	FCC Dort1F C									
	FCC Part15 C Section 15.209 and 15.205									
Method:	ANSI C63.4: 20	03								
Frequency Range:	2400MHz to 24	83.5MHz								
site:	Measurement D	Distance: 3m (Se	emi-Anecho	ic Chamber	·)					
eiver setup:										
	Frequency	Detector	RBW	VBW	Remark					
	Above 1GHz				Peak Value Average Value					
		I Gan	TIVITIZ	10112	Average value					
	Abovo 1	CH-	54.0	)	Average Value					
					Peak Value					
setup:	rotated 360 radiation. b. The EUT wantenna, what tower. c. The antennal ground to day horizontal at the measured. For each succase and the meters and degrees to e. The test-recespecified B f. If the emiss the limit specified B f. If the emiss the limit specified B peak or average. g. The radiation	degrees to determine the maind vertical polar ement.  Ispected emissionen the rotable table find the maximulation level of the ecified, then test would be report margin would be rage method as a set of measurement.	away from ed on the to ed from one eaximum valurizations of on, the EUT was tuned e was turneum reading. Fas set to Peragnament of the ed. Otherwise re-tested is specified auts are performed on the error of the ed.	the interfered point of the interfered point of a varial meter to folue of the fiesthe antennation was arranged to heights from 0 deepend and the end was a stopped a dise the emissione by one and then represent the in X, with in the reserved in X, with in the reserved in X, with a stopped and the end of the	ence-receiving ble-height antenna ur meters above the ld strength. Both a are set to make ged to its worst rom 1 meter to 4 grees to 360.  Function and a 10dB lower than and the peak values sions that did not using peak, quasi-ported in a data  Y, Z axis					
	Turn Table	4m  A  V V V 0.8m		Spectro Analyz						
	Frequency Range: site: eiver setup:  Procedure:	Frequency Range:  Site:  Measurement Exercises  Frequency Above 1GHz   Above 1  Abov	Frequency Range:  Site:  Measurement Distance: 3m (Solution Server Setup:  Frequency Detector Above 1GHz  Above 1GHz  Above 1GHz  a. The EUT was placed on the the ground at a 3 meter servotated 360 degrees to deteradiation. b. The EUT was set 3 meters antenna, which was mount tower. c. The antenna height is varied ground to determine the machorizontal and vertical pola the measurement. d. For each suspected emissic case and then the antenna meters and the rotable table degrees to find the maximum. e. The test-receiver system we specified Bandwidth with M. f. If the emission level of the the limit specified, then tess of the EUT would be report have 10dB margin would be peak or average method as sheet. g. The radiation measurement positioning. Only the worst	Frequency Range:    Site   Measurement Distance: 3m (Semi-Anecho Server setup:   Measurement Distance: 3m (Semi-Anecho Server setup:   Frequency   Detector   RBW   Above 1GHz   Peak   1MHz   Peak   1MHz   Peak   1MHz	Frequency Range:  Measurement Distance: 3m (Semi-Anechoic Chamber Webster Setup:  Frequency Detector RBW VBW Above 1GHz Peak 1MHz 3MHz Peak 1MHz 10Hz   Above 1GHz 54.0  Above 1GHz 74.0  a. The EUT was placed on the top of a rotating table the ground at a 3 meter semi-anechoic camber. To rotated 360 degrees to determine the position of the radiation.  b. The EUT was set 3 meters away from the interferse antenna, which was mounted on the top of a variatower.  c. The antenna height is varied from one meter to forground to determine the maximum value of the file horizontal and vertical polarizations of the antenna the measurement.  d. For each suspected emission, the EUT was arrange case and then the antenna was tuned to heights film eters and the rotable table was turned from 0 dedegrees to find the maximum reading.  e. The test-receiver system was set to Peak Detect Specified Bandwidth with Maximum Hold Mode.  f. If the emission level of the EUT in peak mode was the limit specified, then testing could be stopped a of the EUT would be re-tested one by one peak or average method as specified and then repsheet.  g. The radiation measurements are performed in X, positioning. Only the worst case is shown in the resetup:					

Global United Technology Services Co., Ltd. 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China 518102

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960 Page 35 of 53



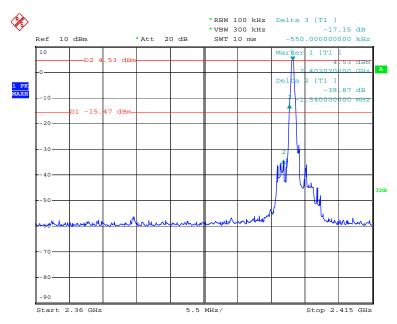
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

#### Remark:

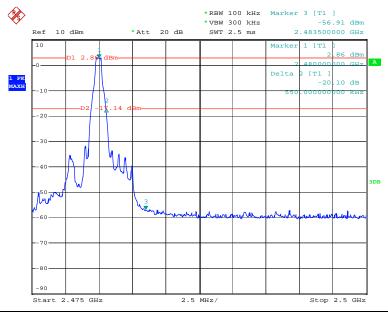
During test the item, Pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.

#### Test plot as follows:

Worse case mode: GFSK Test channel: Lowest
--



Worse case mode: GFSK Test channel: Highest



Global United Technology Services Co., Ltd. 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China 518102

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960 Page 36 of 53



## 6.8 Pseudorandom Frequency Hopping Sequence

#### Test Requirement: FCC Part15 C Section 15.247 (a)(1) requirement:

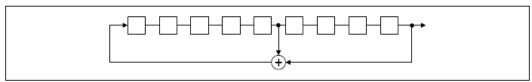
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom 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 hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

#### **EUT Pseudorandom Frequency Hopping Sequence**

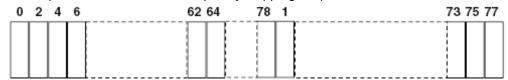
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 2<sup>9</sup> -1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

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

Global United Technology Services Co., Ltd. 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China 518102

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960 Page 37 of 53

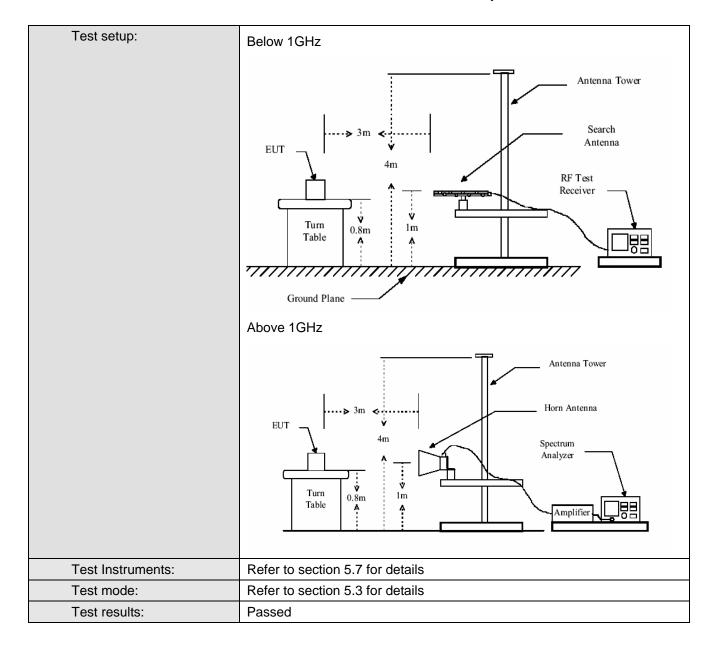


## 6.9 Radiated Emission

Test Requirement:	FCC Part15 C S	Section 15.209	and 15.205					
Test Method:	ANSI C63.4: 20	03						
Test Frequency Range:	30MHz to 25GH	łz						
Test site:	Measurement D	Distance: 3m (S	emi-Anecho	ic Chamber	r)			
Receiver setup:		· · · · · · · · · · · · · · · · · · ·			,			
ricooiver cotup.	Frequency	Detector	RBW	VBW	Remark			
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value			
	Above 1GHz	Peak Value						
	Peak 1MHz 10Hz Average Value							
Limit:				/ O2 \				
	Frequency Limit (dBuV/m @3m) Remail 30MHz-88MHz 40.0 Quasi-pea							
			40.0		Quasi-peak Value			
	88MHz-21 216MHz-9		43.5 46.0		Quasi-peak Value			
	960MHz-9	•	54.0		Quasi-peak Value Quasi-peak Value			
	900101112-	10112	54.0		Average Value			
	Above 1	GHz	74.0		Peak Value			
Test Procedure:	the ground rotated 360 radiation.  b. The EUT wantenna, whatower.  c. The antennation ground to depress and the measure.  d. For each succase and the meters and degrees to e. The test-reading specified B.  f. If the emiss the limit specified B.  f. If the emiss the limit specified B.  f. If the emiss the limit specified B.  g. The radiation for the field of the field beautiful to the fie	at a 3 meter se degrees to det as set 3 meters ich was mount a height is varie etermine the mind vertical polarement. Ispected emissien the antennathe rotable tab find the maximulation level of the ecified, then tes would be repormargin would be	mi-anechoice ermine the parameter away from away from the ed on the total ed from one aximum valuatizations of the ed from the	ccamber. To position of the the interference of a varial meter to form of the the antennation was arranged to heights find from 0 decays and the emissione by one and then represent to the control of the the emissione by one and then represent the emissione of the	ence-receiving able-height antenna ur meters above the ld strength. Both a are set to make ged to its worst rom 1 meter to 4 agrees to 360.  Function and a 10dB lower than and the peak values assions that did not using peak, quasi-ported in a data.			

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960





#### Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



#### 6.9.1 Radiated emission below 1GHz

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
57.84	0.69	12.61	25.71	37.18	24.77	40.00	-15.23	Vertical
97.79	0.96	12.14	25.68	38.57	25.99	40.00	-14.01	Vertical
146.92	1.50	10.06	25.64	41.54	27.46	43.50	-16.04	Vertical
172.79	1.64	13.36	25.63	38.85	28.22	43.50	-15.28	Vertical
309.83	2.09	16.66	25.59	36.32	29.48	46.00	-16.52	Vertical
334.20	2.11	16.86	25.58	37.68	31.07	46.00	-14.93	Vertical
56.99	0.69	10.55	25.71	40.77	26.30	40.00	-13.70	Horizontal
126.45	1.35	11.41	25.65	39.46	26.57	43.50	-16.93	Horizontal
148.92	1.50	10.20	25.64	38.07	24.13	43.50	-19.37	Horizontal
172.79	1.64	10.58	25.63	40.54	27.13	43.50	-16.37	Horizontal
194.77	1.74	11.28	25.62	39.64	27.04	43.50	-16.46	Horizontal
559.73	2.58	21.34	25.54	36.52	34.90	46.00	-11.10	Horizontal

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



#### 6.9.2 Transmitter emission above 1GHz

Worse case n	node:	GFSK	Test c	hannel:	Lowest	Remark:		Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2394	4.97	32.24	37.65	60.08	59.64	74.00	-14.36	Vertical
2400	4.97	32.25	37.65	66.14	65.71	74.00	-8.29	Vertical
4804	6.61	34.04	38.18	55.99	58.46	74.00	-15.54	Vertical
7206	7.63	36.29	38.55	45.61	50.98	74.00	-23.02	Vertical
9608	8.58	37.06	39.16	44.91	51.39	74.00	-22.61	Vertical
2394	4.97	32.24	37.65	60.08	59.64	74.00	-14.36	Horizontal
2400	4.97	32.25	37.65	64.51	64.08	74.00	-9.92	Horizontal
4804	6.61	34.04	38.18	57.55	60.02	74.00	-13.98	Horizontal
7206	7.63	36.29	38.55	44.04	49.41	74.00	-24.59	Horizontal
9608	8.58	37.06	39.16	44.65	51.13	74.00	-22.87	Horizontal

Worse case r	node: GF	SK	Test c	hannel:	Lowest	Remark	C:	Average
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2394	4.97	32.24	37.65	40.40	39.96	54.00	-14.04	Vertical
2400	4.97	32.25	37.65	44.85	44.42	54.00	-9.58	Vertical
4804	6.61	34.04	38.18	37.08	39.55	54.00	-14.45	Vertical
7206	7.63	36.29	38.55	32.08	37.45	54.00	-16.55	Vertical
9608	8.58	37.06	39.16	32.97	39.45	54.00	-14.55	Vertical
2394	4.97	32.24	37.65	39.50	39.06	54.00	-14.94	Horizontal
2400	4.97	32.25	37.65	46.75	46.32	54.00	-7.68	Horizontal
4804	6.61	34.04	38.18	35.72	38.19	54.00	-15.81	Horizontal
7206	7.63	36.29	38.55	32.02	37.39	54.00	-16.61	Horizontal
9608	8.58	37.06	39.16	32.91	39.39	54.00	-14.61	Horizontal

Worse case	mode: GF	SK	Test	channel:	Middle	Remar	k:	Peak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2483.5	5.08	32.29	37.64	61.70	61.43	74.00	-12.57	Vertical
2496	5.10	32.30	37.64	55.69	55.45	74.00	-18.55	Vertical
4882	6.63	34.03	38.22	50.81	53.25	74.00	-20.75	Vertical
7323	7.62	36.25	38.54	43.37	48.70	74.00	-25.30	Vertical
9764	8.62	37.08	39.18	44.93	51.45	74.00	-22.55	Vertical
2411	4.99	32.25	37.65	51.19	50.78	74.00	-23.22	Horizontal
2496	5.10	32.30	37.64	45.73	45.49	74.00	-28.51	Horizontal
4882	6.63	34.03	38.22	53.11	55.55	74.00	-18.45	Horizontal
7323	7.62	36.25	38.54	44.67	50.00	74.00	-24.00	Horizontal
9764	8.62	37.08	39.18	45.43	51.95	74.00	-22.05	Horizontal

Global United Technology Services Co., Ltd. 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China 518102

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

Project No.: GTSE110400195RF

Page 41 of 53



Worse case	mode: GF	SK	Test channel:		Middle	Remar	k:	Average
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2411	4.99	32.25	37.65	35.16	34.75	54.00	-19.25	Vertical
2496	5.10	32.30	37.64	33.62	33.38	54.00	-20.62	Vertical
4882	6.62	34.03	38.21	35.95	38.39	54.00	-15.61	Vertical
7323	7.59	36.14	38.52	31.90	37.11	54.00	-16.89	Vertical
9764	8.85	37.30	39.30	32.53	39.38	54.00	-14.62	Vertical
2411	4.99	32.25	37.65	32.80	32.39	54.00	-21.61	Horizontal
2496	5.10	32.30	37.64	33.87	33.63	54.00	-20.37	Horizontal
4882	6.62	34.03	38.21	36.64	39.08	54.00	-14.92	Horizontal
7323	7.59	36.14	38.52	32.14	37.35	54.00	-16.65	Horizontal
9764	8.85	37.30	39.30	33.21	40.06	54.00	-13.94	Horizontal

Worse case	mode:	GFSK	Test	channel:	Highest	Remar	k:	Peak
Frequency (MHz)	Cable Loss (d	l ⊢actor	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2483.5	5.08	32.29	37.64	59.55	59.28	74.00	-14.72	Vertical
2496	5.10	32.30	37.64	54.70	54.46	74.00	-19.54	Vertical
4960	6.67	34.01	38.29	55.59	57.98	74.00	-16.02	Vertical
7440	7.57	36.06	38.50	44.06	49.19	74.00	-24.81	Vertical
9920	8.82	37.28	39.29	45.05	51.86	74.00	-22.14	Vertical
2483.5	5.08	32.29	37.64	62.47	62.20	74.00	-11.80	Horizontal
2496	5.10	32.30	37.64	55.99	55.75	74.00	-18.25	Horizontal
4960	6.67	34.01	38.29	54.57	56.96	74.00	-17.04	Horizontal
7440	7.55	35.99	38.49	43.96	49.01	74.00	-24.99	Horizontal
9920	8.85	37.30	39.30	44.97	51.82	74.00	-22.18	Horizontal

Worse case	orse case mode: GFSK		Test	channel:	Highest	Remar	k:	Average
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2483.5	5.08	32.29	37.64	46.73	46.46	54.00	-7.54	Vertical
2496	5.10	32.30	37.64	40.98	40.74	54.00	-13.26	Vertical
4960	6.67	34.01	38.29	32.84	35.23	54.00	-18.77	Vertical
7440	7.57	36.06	38.50	31.13	36.09	54.00	-17.91	Vertical
9920	8.82	37.28	39.29	32.43	39.17	54.00	-14.83	Vertical
2483.5	5.08	32.29	37.64	44.66	44.39	54.00	-9.61	Horizontal
2496	5.10	32.30	37.64	39.60	39.36	54.00	-14.64	Horizontal
4960	6.67	34.01	38.29	36.79	39.18	54.00	-14.82	Horizontal
7440	7.57	36.06	38.50	31.91	37.04	54.00	-16.96	Horizontal
9920	8.82	37.28	39.29	32.44	39.25	54.00	-14.75	Horizontal

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960



## 6.10 Conducted Emission

Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.4: 2003					
Test Frequency Range:	150kHz to 30MHz					
Limit:	Frequency	Limits dB(uV)				
		Quasi-peak	Average			
	0.15MHz-0.50MHz	66-56	56-46			
	0.50MHz-5MHz	56	46			
	5MHz-30MHz	60	50			
Test Procedure:	<ul> <li>a. The EUT was placed on a table which is 0.8m above ground plane.</li> <li>b. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.</li> <li>c. Repeat above procedures until all frequency measured were complete.</li> </ul>					
Test setup:	AUX LISN Equipment EUT  Test table / insulation plane	1 1	Power VI Receiver ation Network			
Test Instruments:	Refer to section 5.7 for details					
Test mode:	Refer to section 5.3 for details	Refer to section 5.3 for details				
Test results:	Passed					

Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

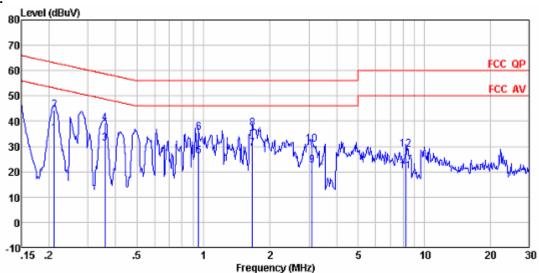
Page 43 of 53



#### **Measurement Result:**

Test mode: Bluetooth mode

#### Line:



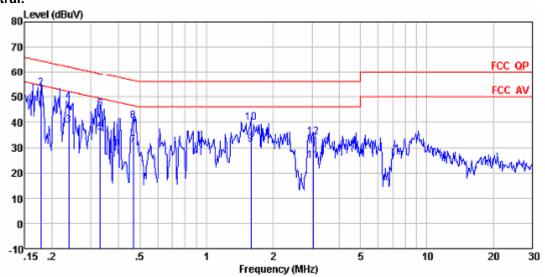
Condition : FCC QP LISN(2011) LINE

: 195RF Read Job No.

Jub .	NO.	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
		MHz	dBu₹	dB	dB	dBuV	dBuV	dB	
1		0.212	34.55	0.65	0.10	35.30	53.14	-17.84	Average
2		0.212	43.81	0.65	0.10	44.56	63.14	-18.58	QP
3		0.360	30.62	0.59	0.10	31.31	48.74	-17.43	Average
4		0.360	38.39	0.59	0.10	39.08	58.74	-19.66	QP
4 5 6 7		0.953	25.66	0.48	0.10	26.24	46.00	-19.76	Average
6		0.953	34.84	0.48	0.10	35.42	56.00	-20.58	QP
		1.662	28.57	0.42	0.10	29.09	46.00	-16.91	Average
8		1.662	36.49	0.42	0.10	37.01		-18.99	
9		3.090	22. 25	0.35	0.10	22.70			Average
10		3.090	30.43	0.35	0.10	30.88		-25.12	
11			19.69	0.24	0.18	20.11			Average
12		8. 235	28.35	0.24	0.18	28. 77	60.00	-31.23	QΡ



#### Neutral:



: FCC QP LISN(2011) NEUTRAL : 195RF Condition

Job No.

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
-	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1 2	0.179 0.179	43.58 52.60	0.67 0.67	0.10 0.10	44.35 53.37		-10.20 -11.18	Average
2 3 4	0. 238 0. 238	38. 11 47. 40	0.64	0.10	38. 85 48. 14	52.17		Average
4 5 6	0. 330 0. 330	35. 28 44. 51	0.60	0.10	35. 98 45. 21	49.44		Average
6 7 8 9	0. 466 0. 466	30. 21 39. 80	0.56 0.56	0.10 0.10	30. 87 40. 46		-15.71 -16.12	Average QP
10	1.585 1.585	30.62 39.25	0. 43 0. 43	0.10 0.10	31.15 39.78	56.00	-16.22	-4-
11 12	3. 025 3. 025	24.55 33.70	0.35 0.35	0.10 0.10	25.00 34.15		-21.00 -21.85	Average QP