

RF Test Report

For

Applicant Name:

TECNO MOBILE LIMITED

Address:

EUT Name:

Brand Name:

Model Number:

FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG Laptop Computer TECNO **T15AA** Series Model Number: Refer to section 2

Issued By

Company Name:

BTF Testing Lab (Shenzhen) Co., Ltd. F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

Report Number: Test Standards:

Address:

BTF230918R00502 47 CFR Part 15.247

Test Conclusion: FCC ID: Test Date: Date of Issue:

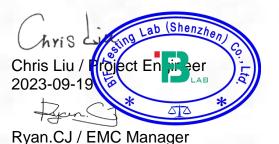
Pass 2ADYY-T15AA 2023-08-25 to 2023-09-18 2023-09-19

Prepared By:

Date:

Approved By:

Date:



Note: All the test results in this report only related to the testing samples. Which can be duplicated completely for the legal use with approval of applicant; it shall not be reproduced except in full without the written approval of BTF Testing Lab (Shenzhen) Co., Ltd., All the objections should be raised within thirty days from the date of issue. To validate the report, you can contact us.

Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.

2023-09-19

Page 1 of 84

F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Test Report Number: BTF230918R00502

Revision History			
Version	Issue Date	Revisions Content	
R_V0	2023-09-19	Original	

Note: Once the revision has been made, then previous versions reports are invalid.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 2 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Table of Contents

1	INTR	ODUCTION	5
	1.1	Identification of Testing Laboratory	5
	1.2	Identification of the Responsible Testing Location	
	1.3	Announcement	
2	PRO	DUCT INFORMATION	6
	2.1	Application Information	6
	2.2	Manufacturer Information	
	2.3	Factory Information	
	2.4	General Description of Equipment under Test (EUT)	
	2.5	Technical Information	
3	SUM	MARY OF TEST RESULTS	
	3.1	Test Standards	
	3.2	Uncertainty of Test	
	3.3	Summary of Test Result	
4	TEST	CONFIGURATION	
	4.1	Test Equipment List	
	4.2	Test Auxiliary Equipment	
	4.3	Test Modes	
5	EVAL	UATION RESULTS (EVALUATION)	14
	5.1	Antenna requirement	14
		5.1.1 Conclusion:	14
6	RAD	O SPECTRUM MATTER TEST RESULTS (RF)	15
	6.1	Conducted Emission at AC power line	15
	•	6.1.1 E.U.T. Operation:	
		6.1.2 Test Setup Diagram:	
		6.1.3	
	6.2	Occupied Bandwidth	18
		6.2.1 E.U.T. Operation:	
		6.2.2 Test Setup Diagram:	
		6.2.3 Test Data:	
	6.3	Maximum Conducted Output Power	
		6.3.1 E.U.T. Operation:	
		6.3.2 Test Setup Diagram: 6.3.3 Test Data:	
	C 4		
	6.4		
		6.4.3 Test Data:	
	6.5		
	0.0	6.5.1 E.U.T. Operation:	
		6.5.2 Test Setup Diagram:	
		6.5.3 Test Data:	
	6.6	Dwell Time	26
		6.6.1 E.U.T. Operation:	
		6.6.2 Test Setup Diagram:	
		6.6.3 Test Data:	
	6.7	Emissions in non-restricted frequency bands	28



Test Report Number: BTF230918R00502

		6.7.1 E.U.T. Operation:	
		6.7.2 Test Setup Diagram:	
		6.7.3 Test Data:	
	6.8	Band edge emissions (Radiated)	
		6.8.1 E.U.T. Operation:	
		6.8.2 Test Data:	
	6.9	Emissions in restricted frequency bands (below 1GHz)	
		6.9.1 E.U.T. Operation:	
		6.9.2 Test Data:	
	6.10	Emissions in restricted frequency bands (above 1GHz)	
		6.10.1 E.U.T. Operation:	
		6.10.2 Test Data:	
APF	PENDIX		



1 Introduction

1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.	
Address: F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China		
Phone Number:	+86-0755-23146130	
Fax Number:	+86-0755-23146130	

1.2 Identification of the Responsible Testing Location

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address: F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China	
Phone Number: +86-0755-23146130	
Fax Number:	+86-0755-23146130
FCC Registration Number:	518915
Designation Number: CN1330	

1.3 Announcement

(1) The test report reference to the report template version v0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2 **Product Information**

2.1 Application Information

Company Name:	TECNO MOBILE LIMITED
Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG

2.2 Manufacturer Information

Company Name:	TECNO MOBILE LIMITED
Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG

2.3 Factory Information

Company Name:	GUANGXI SHANCHAUN TECHNOLOGY CO LTD
Address:	The Second Floor of Plant C01, Plant C02, Plant C03 and Plant D03 Guangxi Sannuo Smart Industrial Park, No.3, Gaoke Road, Beihai Industrial Park, BEIHAI, 536000 Guangxi, P.R.China

2.4 General Description of Equipment under Test (EUT)

EUT Name:	Laptop Computer		
Test Model Number:	T15AA		
Series Model Number:	N/A		
Software Version:	Win 11 home		
Hardware Version:	N156EAL01_MB_V11		

2.5 Technical Information

	Li-ion Battery: 156	
	Rated Voltage: 11.55V	
Power Supply:	Rated Capacity: 6060mAh/70Wh	
	Typical Capacity: 6160mAh/71.14Wh	
	Limited Charge Voltage: 13.2V	
	Adapter1:TCW-A61S-65W	
	Input: 100-240V~50/60Hz 1.5A Max	
	Output: PD: 5V-3A 9V-3A 12V-3A 15V-3A 20V-3.25A	
Power Adaptor:	PPS:3.3-11V 5A Max	
	Adapter2: DS65-2	
	Input: 100-240V~50/60Hz 1.5A Max	
	Output: 5.0V 3.0A 9.0V 3.0A 12.0V 3.0A 15.0V 3.0A 20.0V 3.25A 65.0W	
Operation Frequency:	2402MHz to 2480MHz	
Number of Channels:	79	
Modulation Type:	GFSK, π/4 DQPSK, 8DPSK	
Antenna Type:	Integral Antenna	
Antenna Gain [#] :	3.49 dBi	

Note:

#: The antenna gain provided by the applicant, and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.

F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Summary of Test Results 3

Test Standards 3.1

The tests were performed according to following standards: 47 CFR Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

3.2 Uncertainty of Test

Item	Measurement Uncertainty			
Conducted Emission (150 kHz-30 MHz)	±2.64dB			
The following measurement uncertainty levels have been estimated for tests performed on the EUT as				
specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately				

3.3 Summary of Test Result

the 95% confidence level using a coverage factor of k=2

Item	Standard	Requirement	Result
Antenna requirement	47 CFR Part 15.247	Part 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.215(c)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(1)	Pass
Channel Separation	47 CFR Part 15.247	47 CFR 15.247(a)(1)	Pass
Number of Hopping Frequencies	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
Dwell Time	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions in restricted frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Emissions in restricted frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d)	Pass

Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd. F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Test Configuration 4

Test Equipment List 4.1

Conducted Emission at AC power line									
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date				
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	00953	2022-11-24	2023-11-23				
Coaxial Switcher	SCHWARZBECK	CX210	CX210	2022-11-24	2023-11-23				
V-LISN	SCHWARZBECK	NSLK 8127	01073	2022-11-24	2023-11-23				
LISN	AFJ	LS16/110VAC	16010020076	2023-02-23	2024-02-22				
EMI Receiver	ROHDE&SCHWA RZ	ESCI3	101422	2022-11-24	2023-11-23				

Occupied Bandwidth							
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date		
RFTest software	/	V1.00	/	/	/		
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23		
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23		
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23		
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2022-11-24	2023-11-23		
WIDEBAND RADIO COMMNUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2022-11-24	2023-11-23		
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23		

Maximum Conducted Output Power								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
RFTest software	/	V1.00	/	/	/			
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23			
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23			
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23			
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2022-11-24	2023-11-23			
WIDEBAND RADIO COMMNUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2022-11-24	2023-11-23			
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23			

Channel Separation					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RFTest software	/	V1.00	/	/	/

Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd. F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

Page 8 of 84



Test Report Number: BTF230918R00502

RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2022-11-24	2023-11-23
WIDEBAND RADIO COMMNUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2022-11-24	2023-11-23
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23

Number of Hopping Frequencies								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
RFTest software	/	V1.00	/	/	/			
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23			
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23			
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23			
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2022-11-24	2023-11-23			
WIDEBAND RADIO COMMNUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2022-11-24	2023-11-23			
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23			

Dwell Time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2022-11-24	2023-11-23
WIDEBAND RADIO COMMNUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2022-11-24	2023-11-23
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23

Emissions in non-restricted frequency bands

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 9 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., LTD	etm-6050c	20211026123	2022-11-24	2023-11-23
WIDEBAND RADIO COMMNUNICATION TESTER	Rohde & Schwarz	CMW500	161997	2022-11-24	2023-11-23
MXA Signal Analyzer	KEYSIGHT	N9020A	MY50410020	2022-11-24	2023-11-23

Band edge emissions	Band edge emissions (Radiated)								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date				
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-03-24	2024-03-23				
Preamplifier	SCHWARZBECK	BBV9744	00246	2022-11-24	2023-11-23				
RE Cable	REBES Talent	UF1-SMASMAM-1 0m	21101566	2022-11-24	2023-11-23				
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2022-11-24	2023-11-23				
RE Cable	REBES Talent	UF1-SMASMAM-1 m	21101568	2022-11-24	2023-11-23				
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2022-11-24	2023-11-23				
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2022-11-24	2023-11-23				
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/				
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2021-11-28	2023-11-27				
EMI TEST RECEIVER	ROHDE&SCHWA RZ	ESCI7	101032	2022-11-24	2023-11-23				
SIGNAL ANALYZER	ROHDE&SCHWA RZ	FSQ40	100010	2022-11-24	2023-11-23				
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/				
Broadband Preamplilifier	SCHWARZBECK	BBV9718D	00008	2023-03-24	2024-03-23				
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2022-05-22	2024-05-21				
EZ_EMC	Frad	FA-03A2 RE+	/	/	/				
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/				
Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2021-11-28	2023-11-27				

Emissions in restricted frequency bands (below 1GHz)									
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date				
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-03-24	2024-03-23				
Preamplifier	SCHWARZBECK	BBV9744	00246	2022-11-24	2023-11-23				

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 10 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

Page 10 of 84



RE Cable	REBES Talent	UF1-SMASMAM-1 0m	21101566	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF1-SMASMAM-1 m	21101568	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2022-11-24	2023-11-23
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2021-11-28	2023-11-27
EMI TEST RECEIVER	ROHDE&SCHWA RZ	ESCI7	101032	2022-11-24	2023-11-23
SIGNAL ANALYZER	ROHDE&SCHWA RZ	FSQ40	100010	2022-11-24	2023-11-23
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/
Broadband Preamplilifier	SCHWARZBECK	BBV9718D	00008	2023-03-24	2024-03-23
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2022-05-22	2024-05-21
EZ_EMC	Frad	FA-03A2 RE+	/	/	/
POSITIONAL CONTROLLER	SKET	PCI-GPIB	1	1	1
Log periodic antenna	SCHWARZBECK	VULB 9168	01328	2021-11-28	2023-11-27

Emissions in restricted frequency bands (above 1GHz)								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
Coaxial cable Multiflex 141	Schwarzbeck	N/SMA 0.5m	517386	2023-03-24	2024-03-23			
Preamplifier	SCHWARZBECK	BBV9744	00246	2022-11-24	2023-11-23			
RE Cable	REBES Talent	UF1-SMASMAM-1 0m	21101566	2022-11-24	2023-11-23			
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2022-11-24	2023-11-23			
RE Cable	REBES Talent	UF1-SMASMAM-1 m	21101568	2022-11-24	2023-11-23			
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2022-11-24	2023-11-23			
RE Cable	REBES Talent	UF2-NMNM-2.5m	21101573	2022-11-24	2023-11-23			
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/			
Horn Antenna	SCHWARZBECK	BBHA9170	01157	2021-11-28	2023-11-27			
EMI TEST RECEIVER	ROHDE&SCHWA RZ	ESCI7	101032	2022-11-24	2023-11-23			
SIGNAL ANALYZER	ROHDE&SCHWA RZ	FSQ40	100010	2022-11-24	2023-11-23			
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/			
Broadband Preamplilifier	SCHWARZBECK	BBV9718D	00008	2023-03-24	2024-03-23			
Horn Antenna	SCHWARZBECK	BBHA9120D	2597	2022-05-22	2024-05-21			
EZ_EMC	Frad	FA-03A2 RE+	/	/	/			
POSITIONAL CONTROLLER	SKET	PCI-GPIB	/	/	/			

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 11 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Log periodic	antenna	SCHWAF	ZBECK	VUL	3 9168	3 013	28	2021-11-28	2023-11-27



4.2 Test Auxiliary Equipment

The EUT was tested as an independent device.

4.3 Test Modes

Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
est Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged batt

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



5 Evaluation Results (Evaluation)

5.1 Antenna requirement

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

5.1.1 Conclusion:



BT Antenna

Total or partial reproduction of this document without permission of the Laboratory is not allowed. Page 14 of 84 BTF Testing Lab (Shenzhen) Co., Ltd. F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Radio Spectrum Matter Test Results (RF) 6

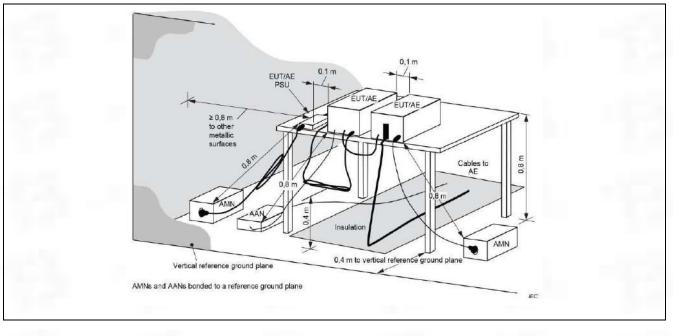
Conducted Emission at AC power line 6.1

Test Requirement:	Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that 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 the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).						
Test Method:	Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices						
	Frequency of emission (MHz)	Conducted limit (dBµV)					
		Quasi-peak	Average				
Test Limit:	0.15-0.5	66 to 56*	56 to 46*				
Test Linnt.	0.5-5	56	46				
	5-30 60 50						
	*Decreases with the logarithm of the frequency.						

6.1.1 E.U.T. Operation:

Operating Environment:	
Temperature:	22.4 °C
Humidity:	52.7 %
Atmospheric Pressure:	1010 mbar

6.1.2 Test Setup Diagram:

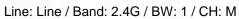


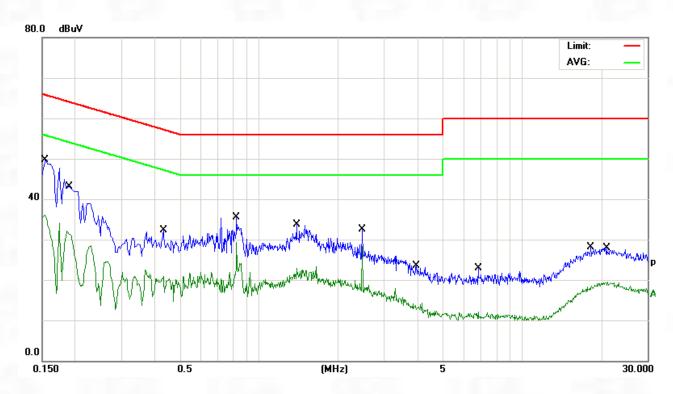
Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd. F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Test Report Number: BTF230918R00502

6.1.3





No. M	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1 *	0.1539	39.33	10.45	49.78	65.78	-16.00	QP
2	0.1874	21.45	10.45	31.90	54.15	-22.25	AVG
3	0.4340	21.85	10.50	32.35	57.18	-24.83	QP
4	0.8260	18.68	10.54	29.22	46.00	-16.78	AVG
5	1.3940	23.17	10.61	33.78	56.00	-22.22	QP
6	1.3940	12.37	10.61	22.98	46.00	-23.02	AVG
7	2.4700	21.78	10.71	32.49	56.00	-23.51	QP
8	2.4700	17.66	10.71	28.37	46.00	-17.63	AVG
9	3.9700	12.71	10.73	23.44	56.00	-32.56	QP
10	6.8380	1.29	10.77	12.06	50.00	-37.94	AVG
11	18.3260	16.97	11.10	28.07	60.00	-31.93	QP
12	21.2300	8.39	11.07	19.46	50.00	-30.54	AVG

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 16 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Line: Neutral / Band: 2.4G / BW: 1 / CH: M 80.0 dBuV Limit: AVG: 40 , ĂN MANA X . . Mal peak AVG 0.0 30.000 0.150

mw VN	runt M	when he we we	W hydrones	Martin Anger	Allina War War War	Manananan mananan	storestander	and the second sec
		0.5		(MHz)		5		
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	25.65	10.45	36.10	55.99	-19.89	AVG
2		0.1660	37.21	10.45	47.66	65.15	-17.49	QP
3		0.8260	28.73	10.54	39.27	56.00	-16.73	QP
4	*	0.8260	19.79	10.54	30.33	46.00	-15.67	AVG
5		1.5900	22.78	10.64	33.42	56.00	-22.58	QP
6		1.6460	12.63	10.65	23.28	46.00	-22.72	AVG
7		2.4700	17.43	10.71	28.14	46.00	-17.86	AVG
8		4.0860	18.42	10.73	29.15	56.00	-26.85	QP
9		7.6980	8.21	10.79	19.00	50.00	-31.00	AVG
10		10.7940	21.46	10.89	32.35	60.00	-27.65	QP
11		16.1940	25.76	11.16	36.92	60.00	-23.08	QP
12		17.6020	17.10	11.12	28.22	50.00	-21.78	AVG

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 17 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.2 Occupied Bandwidth

Procedure: Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 16.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. Test Method: Occupied bandwidth—relative measurement procedure Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 16.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. a) The spectrum analyzer carter frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be aproximately three times BW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be down" requirement; that is, if the requirement calls for measuring the –20 dB OBW, the instrument noise floor at the selected RBW shall be more than 10 dB below the target ⁺ -xx x dB down" requirement		
Procedure: Intentional radiators operating under the atternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than 100 g(OBW/RBW) below the reference level. Specific guidance is given in 4.1.5.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target xx dB down requirement, that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trac		emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Procedure: emission limits, as contained in §§ 15.217 through 16.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment is operated. a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EWI receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "-xx dB down" requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the "-xx dB down amplitude" using [(reference value) – xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.	Test Method:	Occupied bandwidth—relative measurement procedure
 Procedure: center frequency. The span range for the ÉM receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB REW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "-xx dB down" requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the "-xx dB down amplitude" using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step i). j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at	Test Limit:	emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.	Procedure:	center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "-xx dB down" requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the "-xx dB down amplitude" using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace or the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j). j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference be

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 18 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

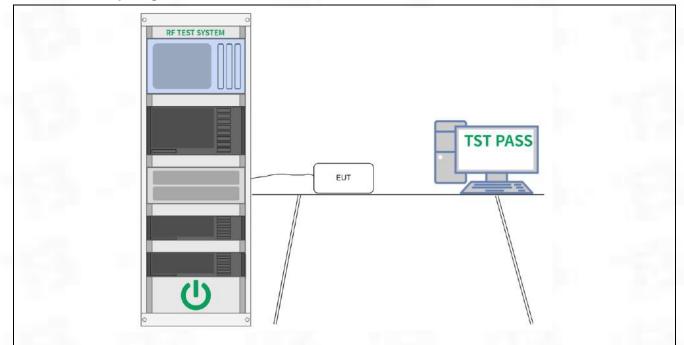


	k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).
--	---

6.2.1 E.U.T. Operation:

Operating Environment:				
Temperature:	25.6 °C			
Humidity:	50.6 %			
Atmospheric Pressure:	1010 mbar			

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Please Refer to Appendix for Details.



6.3 Maximum Conducted Output Power

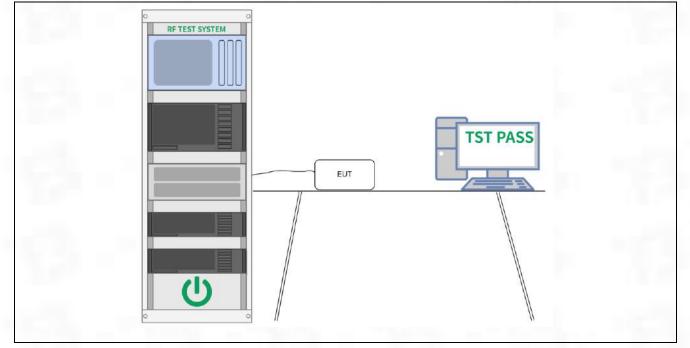
Test Requirement:	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Test Method:	Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices
Test Limit:	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Procedure:	 This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test: a) Use the following spectrum analyzer settings: 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel. 2) RBW > 20 dB bandwidth of the emission being measured. 3) VBW >= RBW. 4) Sweep: Auto. 5) Detector function: Peak. 6) Trace: Max hold. b) Allow trace to stabilize. c) Use the marker-to-peak function to set the marker to the peak of the emission. d) The indicated level is the peak output power, after any corrections for external attenuators and cables. e) A plot of the test results and setup description shall be included in the test report. NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

6.3.1 E.U.T. Operation:

Operating Environment:			
Temperature:	25.6 °C		
Humidity:	50.6 %		
Atmospheric Pressure:	1010 mbar		



6.3.2 Test Setup Diagram:



6.3.3 Test Data:

Please Refer to Appendix for Details.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 21 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Channel Separation 6.4

Test 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
Test Method:	greater than 125 mW. Carrier frequency separation
Test Limit:	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.
Procedure:	 The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Wide enough to capture the peaks of two adjacent channels. b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. c) Video (or average) bandwidth (VBW) ≥ RBW. d) Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

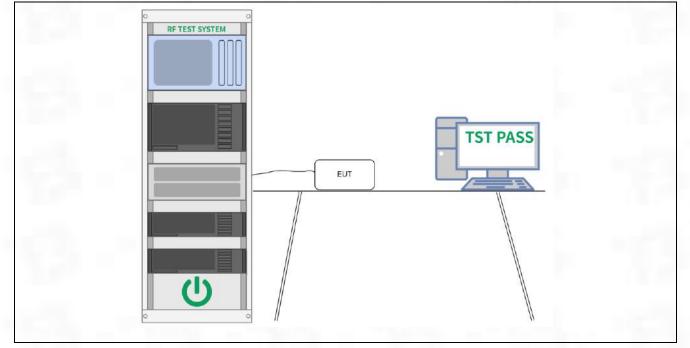
6.4.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.6 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 22 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.4.2 Test Setup Diagram:



6.4.3 Test Data:

Please Refer to Appendix for Details.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 23 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Number of Hopping Frequencies 6.5

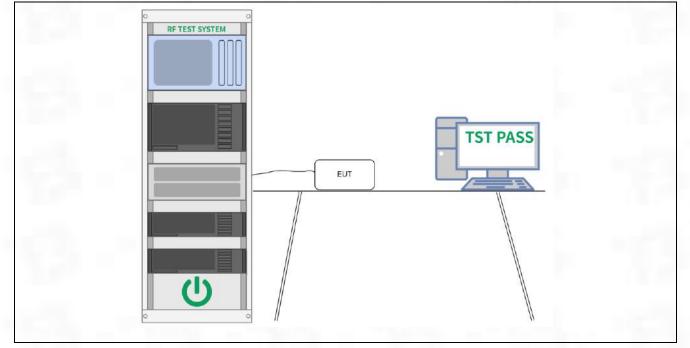
Test Requirement:	Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Method:	Number of hopping frequencies
Test Limit:	Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen. b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. c) VBW ≥ RBW. d) Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize. It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report.

6.5.1 E.U.T. Operation:

Operating Environment:			
Temperature:	25.6 °C		
Humidity:	50.6 %		
Atmospheric Pressure:	1010 mbar		



6.5.2 Test Setup Diagram:



6.5.3 Test Data:

Please Refer to Appendix for Details.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 25 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.6 Dwell Time

Test Requirement:	Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Method:	Time of occupancy (dwell time)
Test Limit:	Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Zero span, centered on a hopping channel. b) RBW shall be <= channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel. c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel. d) Detector function: Peak. e) Trace: Max hold. Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation: (Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time) The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.
	The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.
	· · · ·

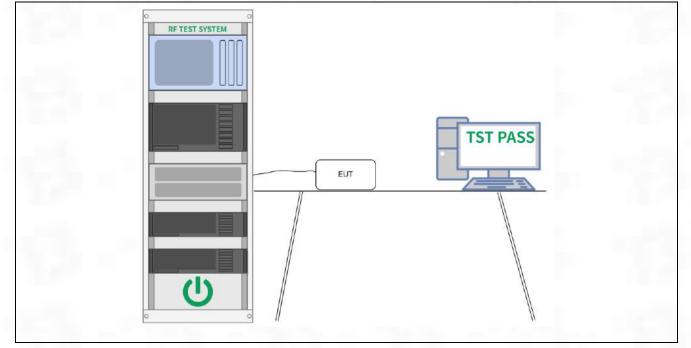
6.6.1 E.U.T. Operation:

Operating Environment:		
Temperature:	25.6 °C	
Humidity:	50.6 %	
Atmospheric Pressure:	1010 mbar	

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 26 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.6.2 Test Setup Diagram:



6.6.3 Test Data:

Please Refer to Appendix for Details.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 27 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.7 Emissions in non-restricted frequency bands

Test Requirement:	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.
Test Method:	Conducted spurious emissions test methodology
Test 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.
Procedure:	Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the maximum transmit powers. Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.

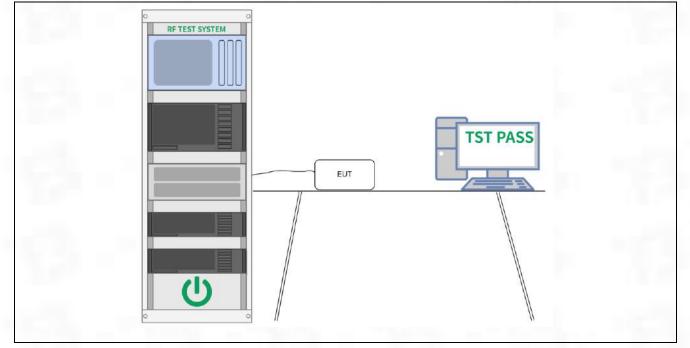
6.7.1 E.U.T. Operation:

Operating Environment:	
Temperature:	25.6 °C
Humidity:	50.6 %
Atmospheric Pressure:	1010 mbar

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 28 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.7.2 Test Setup Diagram:



6.7.3 Test Data:

Please Refer to Appendix for Details.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 29 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.8 Band edge emissions (Radiated)

Test Requirement:		issions which fall in the restricte mply with the radiated emission (c)).`	· · · · · ·			
Test Method:	Radiated emissions test	Radiated emissions tests				
	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			
Test Limit:	88-216	150 **	3			
	216-960	200 **	3			
	Above 960	Above 960 500 3				
	radiators operating unde 54-72 MHz, 76-88 MHz,	** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.				
Procedure:	ANSI C63.10-2013 sect	ion 6.6.4				
6.8.1 E.U.T. Operation	n:					

Operating Environment:	
Temperature:	24.9 °C
Humidity:	49.4 %
Atmospheric Pressure:	1010 mbar



6.8.2 Test Data:

Test result for GFSK Mode(the worst case)

Frequency	Reading	Correct Factor	Emission Level	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
			Low Cha	nnel			
2390	66.47	-8.73	57.74	74	-16.26	Н	PK
2390	48.63	-8.73	39.90	54	-14.10	Н	AV
2390	66.47	-8.73	57.74	74	-16.26	V	PK
2390	50.83	-8.73	42.10	54	-11.90	V	AV
High Channel							
2483.5	68.14	-8.17	59.97	74	-14.03	Н	PK
2483.5	49.54	-8.17	41.37	54	-12.63	Н	AV
2483.5	67.80	-8.17	59.63	74	-14.37	V	PK
2483.5	46.26	-8.17	38.09	54	-15.91	V	AV

Note: Freq. = Emission frequency in MHz Reading level $(dB\mu V)$ = Receiver reading Corr. Factor (dB) = Attenuation factor + Cable loss Level $(dB\mu V)$ = Reading level $(dB\mu V)$ + Corr. Factor (dB)Limit $(dB\mu V)$ = Limit stated in standard Margin (dB) = Level $(dB\mu V)$ – Limits $(dB\mu V)$

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 31 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.9 Emissions in restricted frequency bands (below 1GHz)

Test Requirement:	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)).				
Test Method:	Radiated emissions test	Radiated emissions tests			
	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		
Test Limit:	1.705-30.0	30	30		
	30-88	100 **	3		
	88-216	150 **	3		
	216-960	200 **	3		
	Above 960	500	3		
	radiators operating unde 54-72 MHz, 76-88 MHz,	** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.			
Procedure:	ANSI C63.10-2013 sect	ion 6.6.4			
691 EUT Operation	p:				

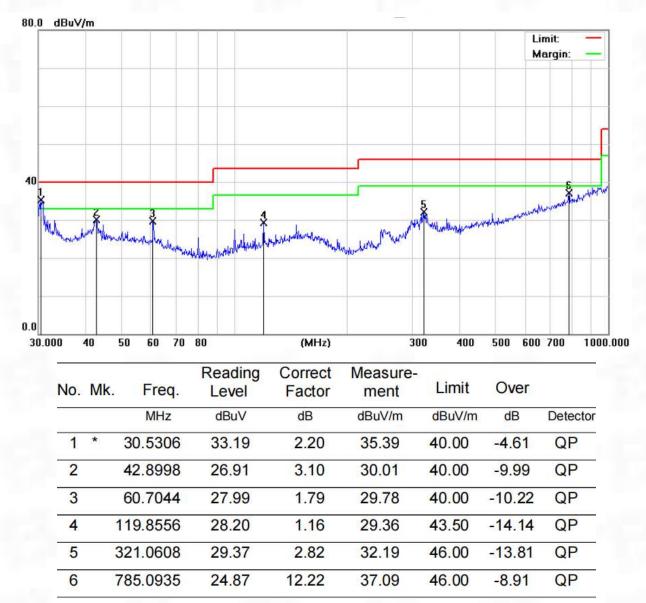
6.9.1 E.U.T. Operation:

Operating Environment:	
Temperature:	24.9 °C
Humidity:	49.4 %
Atmospheric Pressure:	1010 mbar



6.9.2 Test Data:

Note: All the mode have been tested, and only the worst case of GFSK mode are in the report Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: H



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.

F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



								imit: largin:	=
	un star	manundar	* *	muumuhasharing	and the manual of the	Myterization and a second	and the second	mand	
0.000	40	50 60 70	80	(MHz)	30	10 400	500 600	700	1000.0
0.000	40 Mk		80 Reading Level	(MHz) Correct Factor	30 Measure- ment		500 600 Over	1 700	1000.0
0.000			Reading	Correct	Measure-	2 101		700 Detec	
0.000		. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		ctor
0.000 No.	Mk	. Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detec	ctor
No.	Mk	. Freq. MHz 30.4238	Reading Level dBuV 51.06	Correct Factor dB -16.60	Measure- ment dBuV/m 34.46	Limit dBuV/m 40.00	Over dB -5.54	Detec	
No.	Mk *	. Freq. MHz 30.4238 42.8998	Reading Level dBuV 51.06 45.52	Correct Factor dB -16.60 -16.51	Measure- ment dBuV/m 34.46 29.01	Limit dBuV/m 40.00 40.00	Over dB -5.54 -10.99	Detec QP QP	
No.	Mk *	. Freq. MHz 30.4238 42.8998 80.3619	Reading Level dBuV 51.06 45.52 46.81	Correct Factor dB -16.60 -16.51 -16.67	Measure- ment dBuV/m 34.46 29.01 30.14	Limit dBuV/m 40.00 40.00 40.00	Over dB -5.54 -10.99 -9.86	Detec QP QP	

Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 34 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.10 Emissions in restricted frequency bands (above 1GHz)

Test Requirement:	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)).`						
Test Method:	Radiated emissions tests						
	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	30-88 100 **					
Test Limit:	88-216	150 **	3				
	216-960	200 **	3				
	Above 960	500	3				
	radiators operating unde 54-72 MHz, 76-88 MHz,	** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.					
Procedure:	ANSI C63.10-2013 sect	ANSI C63.10-2013 section 6.6.4					
6.10.1 E.U.T. Operation	n:						

Operating Environment:						
Temperature:	24.9 °C					
Humidity:	49.4 %					
Atmospheric Pressure:	1010 mbar					



6.10.2Test Data:

GFSK

Freq.	Low channel: 2402MHz							
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)		
(MHz)	H/V	PK	AV	PK	AV	PK	AV	
4804	V	58.35	41.53	74	54	-15.65	-14.03	
7206	V	58.29	39.28	74	54	-15.71	-14.87	
4804	Н	59.70	39.88	74	54	-14.30	-14.07	
7206	Н	59.05	40.05	74	54	-14.95	-14.17	

Freq.	Middle channel: 2441MHz							
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)		
(MHz)	H/V	PK	AV	PK	AV	PK	AV	
4882	V	59.41	39.44	74	54	-14.59	-14.56	
7323	V	58.18	39.03	74	54	-15.82	-14.97	
4882	Н	59.28	40.19	74	54	-14.72	-13.81	
7323	Н	58.97	39.97	74	54	-15.03	-14.03	

Freq. (MHz)	High channel: 2480MHz							
	Ant.Pol	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)		
	H/V	PK	AV	PK	AV	PK	AV	
4960	V	60.25	39.23	74	54	-13.75	-14.77	
7440	V	58.08	40.30	74	54	-15.92	-13.70	
4960	Н	59.63	39.08	74	54	-14.37	-14.92	
7440	Н	59.64	40.64	74	54	-14.36	-13.36	

Note:

- 1. The emission levels of other frequencies are very lower than the limit and not show in test report.
- Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. 2.
- З. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
- Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (GFSK) 4. was submitted only.



Appendix

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 37 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



1. Bandwidth

1.1 OBW

1.1.1 Test Result

Test channel	20dB Occupy Bandwidth (MHz)							
rest channer	GFSK	π/4-DQPSK		Conclusion				
Lowest	0.994	1.428	1.48	PASS				
Middle	0.997	1.536	1.477	PASS				
Highest	0.936	1.426	1.483	PASS				

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 38 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

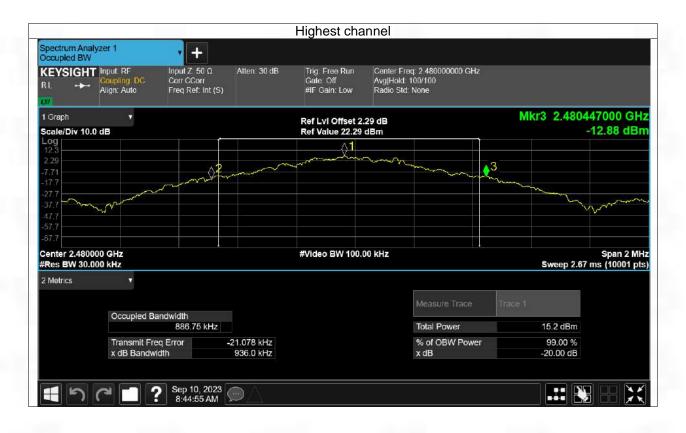


1.1.2 Test Graph



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 40 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Pi/4DQPSK Modulation



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 42 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

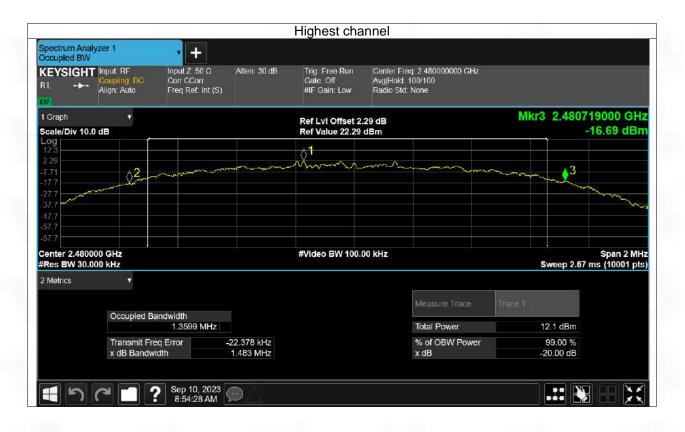


8DPSK Modulation



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 44 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



2. Maximum Conducted Output Power

2.1 Power

2.1.1 Test Result

GFSK mode								
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result					
Lowest	5.25	20.97	PASS					
Middle	4.92	20.97	PASS					
Highest	4.82	20.97	PASS					

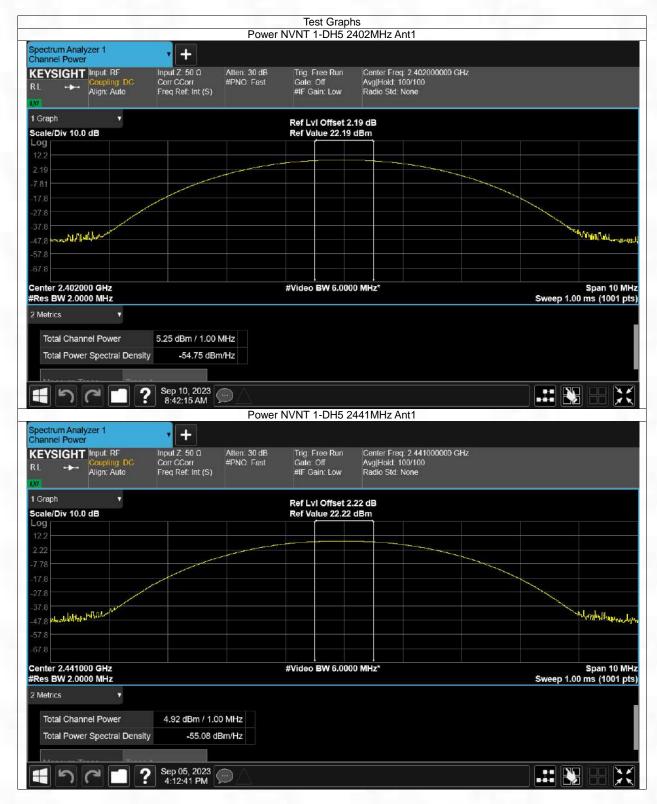
Pi/4DQPSK mode							
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result				
Lowest	2.14	20.97	PASS				
Middle	2.2	20.97	PASS				
Highest	2.11	20.97	PASS				

8DPSK mode								
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result					
Lowest	2.2	20.97	PASS					
Middle	2.19	20.97	PASS					
Highest	2.09	20.97	PASS					

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 45 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

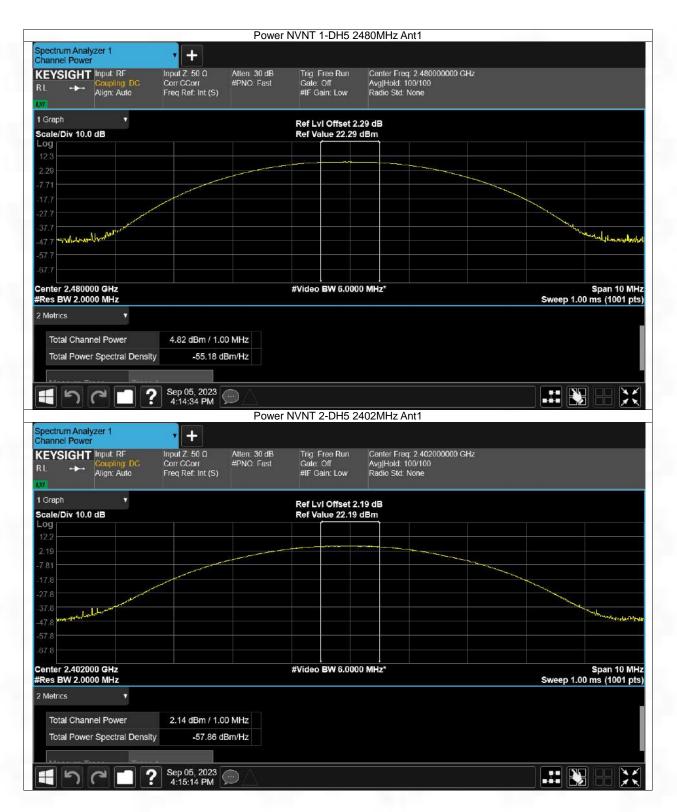


2.1.2 Test Graph

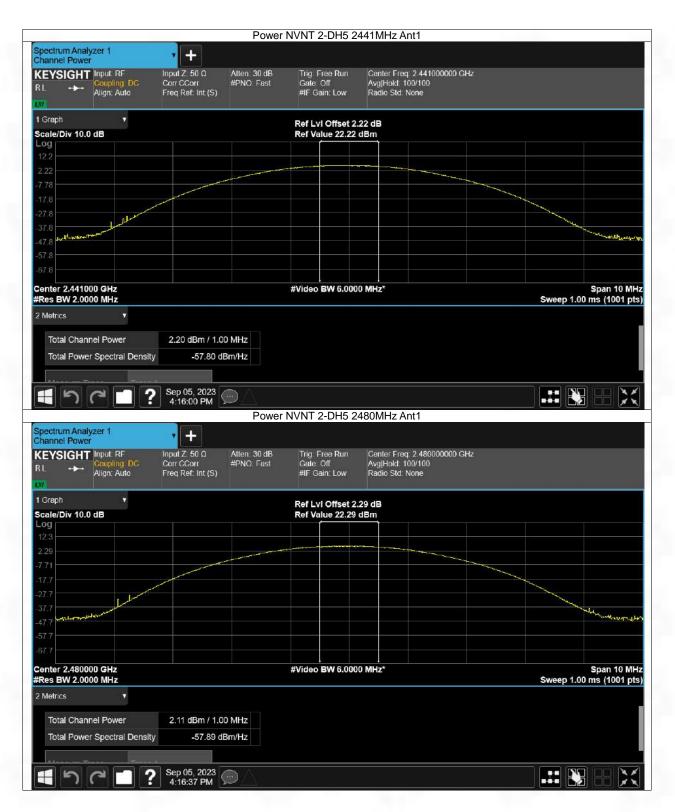


Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.

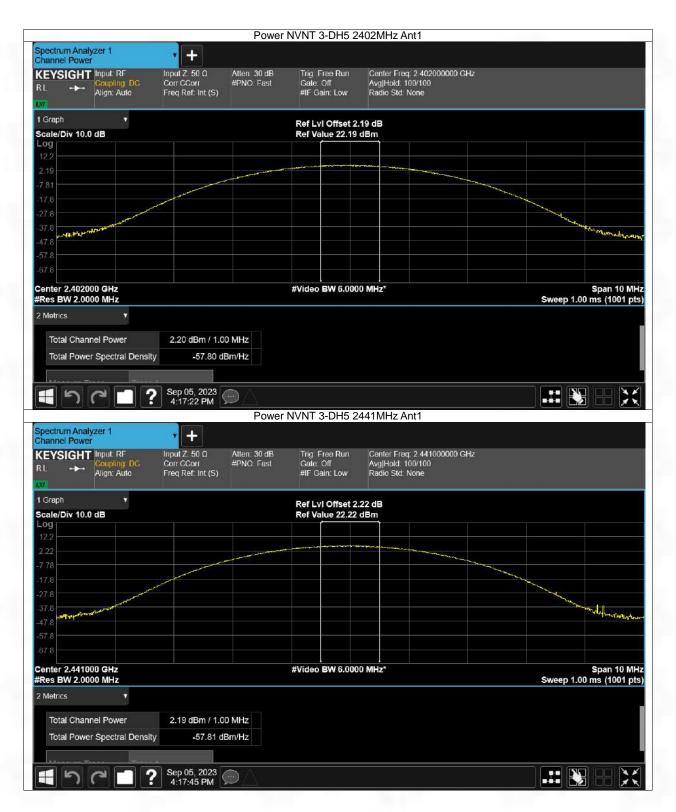




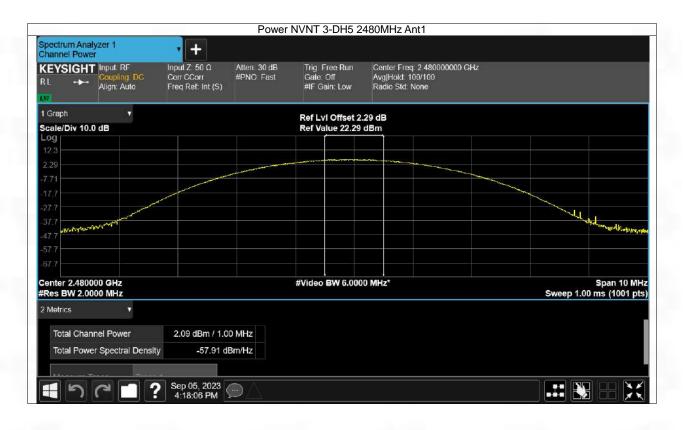












Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 50 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



3. Carrier Frequency Separation

3.1 Ant1

3.1.1 Test Result

GFSK mode								
Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result					
Lowest	0.98	2/3*20dB BW	PASS					
Middle	1.008	2/3*20dB BW	PASS					
Highest	1.006	2/3*20dB BW	PASS					

Pi/4 DQPSK mode								
Test channel	Test channelCarrier Frequencies Separation (MHz)Limit (MHz)							
Lowest	1	2/3*20dB BW	PASS					
Middle	1.006	2/3*20dB BW	PASS					
Highest	0.998	2/3*20dB BW	PASS					

8DPSK mode									
Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result						
Lowest	1.002	2/3*20dB BW	PASS						
Middle	1.002	2/3*20dB BW	PASS						
Highest	1.008	2/3*20dB BW	PASS						

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 51 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



3.1.2 Test Graph

GFSK Modulation



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.

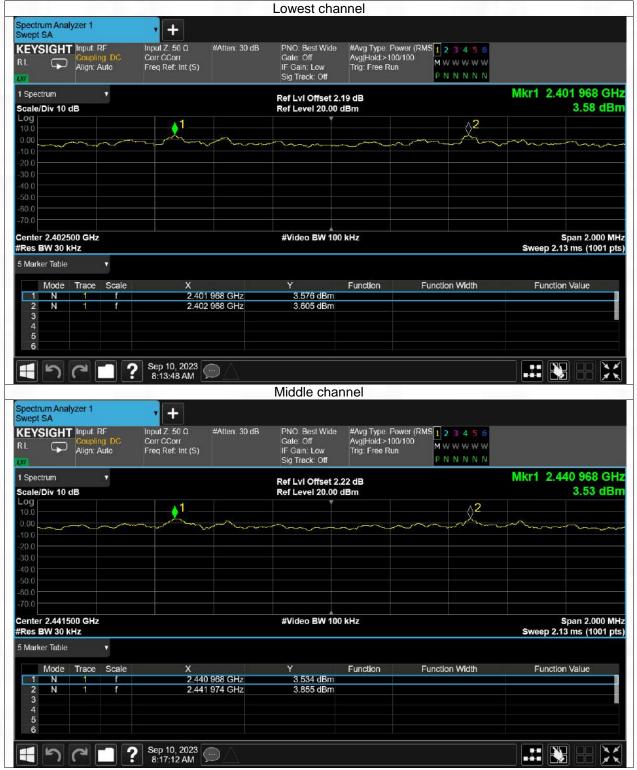




Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 53 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



Pi/4DQPSK Modulation



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.

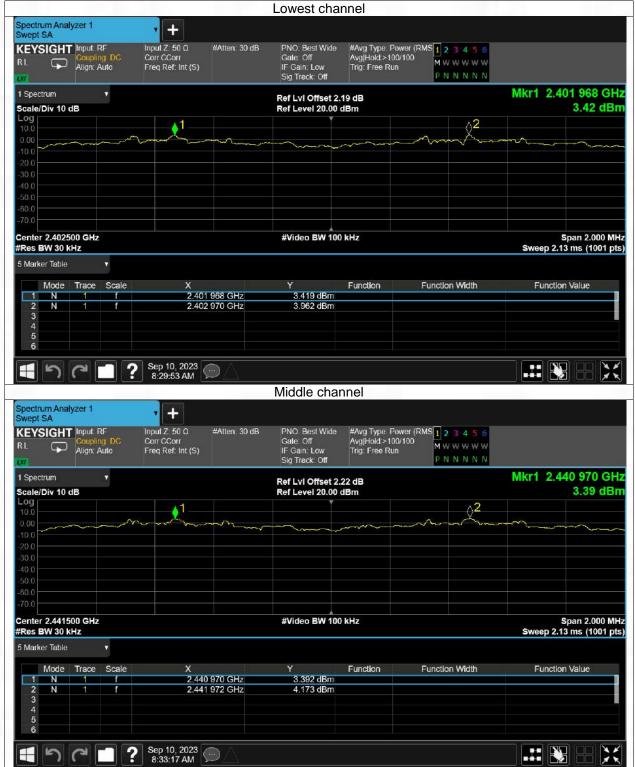


					Highest cha	nnel				
Spectrum Swept SA	Analyzer	1	+							
KEYSIC RL		ut: RF upling: DG gn: Auto	Input Z: 50 0 Corr CCorr Freq Ref: Int (S)	#Atten: 30 dB	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: P Avg[Hold:>10 Trig: Free Ru	in M W	3456 wwww NNNN		
1 Spectrur Scale/Div		1			Ref LvI Offset 2. Ref Level 20.00				Mkr1 2.4	78 962 GHz 2.58 dBm
10.0 0.00							~~~~~	2 2		
-10.0						~~~~				
-30.0										
-50.0 -60.0										
	.479500 G	SHz			#Video BW 100	kHz				Span 2.000 MHz
#Res BW 5 Marker 1	COLUMN A	v							Sweep 2.1	13 ms (1001 pts)
M	lode Tra	ice Scale	X		Y	Function	Function	n Width	Functio	n Value
	N 1	f		3 962 GHz	2.582 dBm					
2	N 1	ſ	2.479	960 GHz	2.970 dBm					
4										
5										
	21.7									
	って		Sep 10, 2023 8:20:36 AM	\square						

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 55 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



8DPSK Modulation



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.



					Highest cha	nnel				
Spectrum Ana Swept SA	ilyzer 1		+							
KEYSIGH RL 🖵	T Input I Couplin Align: A	ng DG	Input Ζ΄ 50 Ω Corr CCorr Freq Ref: Int (S)	#Atten: 30 dB	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Avg[Hold.>10 Trig: Free Rur	n Milli	3456 WWWW NNNN		
l Spectrum Scale/Div 10	dB	•			Ref LvI Offset 2.: Ref Level 20.00 d				Mkr1 2.4	78 964 GH 2.81 dBr
_og 10.0 0.00		^	1				- ^ ~	2		
10.0										
0.0 0.0										
50.0 50.0 70.0										
enter 2.479 Res BW 30					#Video BW 100	kHz			Sweep 2.	Span 2.000 Mi 13 ms (1001 pt
Marker Table										
Mode	Trace	Scale	Х		Y	Function	Functio	n Width	Function	on Value
1 N	1	f		8 964 GHz	2.814 dBm					
2 N 3 4		f	2.479	972 GHz	4.017 dBm					
5										
15	3		Sep 10, 2023 8:40:23 AM	\square						

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 57 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



4. Number of Hopping Frequencies

4.1 HoppNum

4.1.1 Test Result

Mode	Hopping channel numbers	Limit	Result	
GFSK, P/4-DQPSK, 8DPSK	79	15	PASS	



4.1.2 Test Graph

		GFSK	ζ.		
Spectrum Analyzer 1 Swept SA	· +				
CEYSIGHT Input: RF Ir Coupling: DC C	nput Z' 50 Ω #Atten: 30 dB Jorr CCorr req Ref: Int (S)	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Pov Avg[Hold:>100/ Trig: Free Run	ver (RMS 1 2 3 4 5 6 100 M W W W W W P N N N N N	
Spectrum v Scale/Div 10 dB		Ref Lvi Offset 2. Ref Level 20.00			Mkr1 2.401 837 0 G 8.41 dl
9 0.00 10.0 10			AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	Ananan ananan ana ana ana ana ana ana an	
50.0 70.0 tart 2.40000 GHz Res BW 100 kHz		#Video BW 300	kHz		Stop 2.48350 Sweep 8.00 ms (1001
Marker Table ▼ Mode Trace Scale 1 N 1 f 2 N 1 f 3 4	X 2.401 837 0 GHz 2.480 160 0 GHz	Y 8.406 dBm 8.512 dBm	Function	Function Width	Function Value
pectrum Analyzer 1 wept SA	Sep 10, 2023	P/4-DQPS	SK SK		
	and the second s				
L Coupling DC C Align: Auto F	ppul Z: 50 Ω #Atten: 30 dB aur CCorr req Ref: Int (S)	PNO:Fast Gate:Off IFGain:Low Sig Track:Off	#Avg Type: Pov Avg[Hold > 100/ Trig: Free Run	ver (RMS 1 2 3 4 5 6 100 M W W W W W P N N N N N	
Align: Auto F Spectrum F Scale/Div 10 dB	Corr CCorr	Gate: Off IF Gain: Low	Avg Hold > 100/ Trig: Free Run 19 dB	100 M W W W W	Mkr1 2.401 586 5 G 1.52 di
AL Coupling: DC C Align: Auto F Spectrum F Scale/Div 10 dB F 00 1 00 1 00 1 00 1 00 1 00 1 00 1 00 1 00 1 00 1 00 1 00 1	Corr CCorr	Gate: Off IF Gain: Low Sig Track: Off Ref LvI Offset 2. Ref Level 20.00	Avg Hold >100/ Trig: Free Run 19 dB dBm	100 MWWWWW PNNNN	1.52 df
IL Coupling: DC C Align: Auto F Spectrum C cale/Div 10 dB F 00 1	Sorr CCorr req Ref: Int (S)	Gate: Off IF Gain: Low Sig Track: Off Ref LvI Offset 2. Ref Level 20.00	Avg Hold > 100/ Trig: Free Run 19 dB dBm	100 MWWWWW PNNNN	1.52 df
IL Coupling: DC C Align: Auto F Spectrum F scale/Div 10 dB F 00 1	Sorr CCorr req Ref: Int (S)	Gale Off IF Gain: Low Sig Track: Off Ref LvI Offset 2. Ref Level 20.00	Avg Hold > 100/ Trig: Free Run 19 dB dBm	100 MWWWWW PNNNN	1.52 df
Spectrum Scale/Div 10 dB	Sorr CCorr req Ref: Int (S)	Gale Off IF Gain: Low Sig Track: Off Ref LvI Offset 2. Ref Level 20.00	Avg Hold > 100/ Trig: Free Run 19 dB dBm	100 MWWWWW PNNNN	1.52 df

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 59 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



					8DPS	SK			
Spectrum Anal Swept SA	lyzer 1		+						
KEYSIGHT RL 😱	Input RF Coupling Align: Aut		Input Ζ: 50 Ω Corr CCorr Freq Ref: Int (S)	#Atten: 30 dB	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Avg[Hold:> Trig: Free F		v	
1 Spectrum Scale/Div 10 (Log	dB T				Ref Lvi Offse Ref Level 20			Mkr1 2.401	837 0 GH 5.35 dBm
10.0 0.00 -10.0 -20.0 -30.0 -30.0 -50.0 -60.0 -70.0		γ \Γ.^γ				ብ እን እስለ እር በ እር			M
Start 2.40000 Res BW 100					#Video BW	300 kHz			op 2.48350 GH 0 ms (1001 pts
5 Marker Table	•								
Mode	Trace S	Scale	X		Y	Function	Function Width	Functio	n Value
1 N	1	f		37 0 GHz	5.352 dB				
2 N 3 4 5	1	ſ	2.480 3	27 0 GHz	1.524 dB	m			
6									
15	3	1?	Sep 10, 2023 8:26:28 AM						

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 60 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

5. Time of Occupancy (Dwell Time)

5.1 Ant1

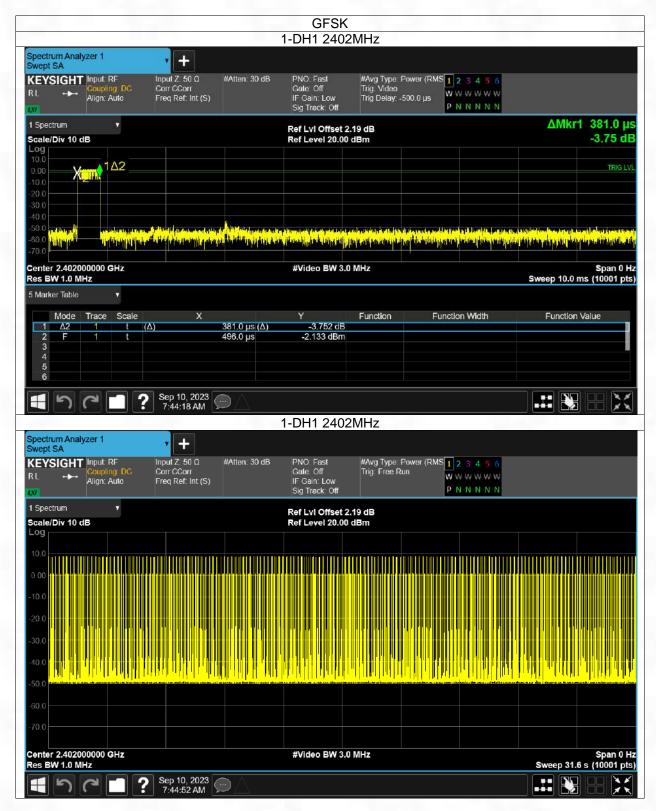
5.1.1 Test Result

Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2402	0.381	121.539	319	31600	400	Pass
1-DH1	2441	0.381	121.158	318	31600	400	Pass
1-DH1	2480	0.381	121.158	318	31600	400	Pass
1-DH3	2402	1.636	248.672	152	31600	400	Pass
1-DH3	2441	1.637	258.646	158	31600	400	Pass
1-DH3	2480	1.637	270.105	165	31600	400	Pass
1-DH5	2402	2.885	300.04	104	31600	400	Pass
1-DH5	2441	2.885	288.5	100	31600	400	Pass
1-DH5	2480	2.884	294.168	102	31600	400	Pass

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 61 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

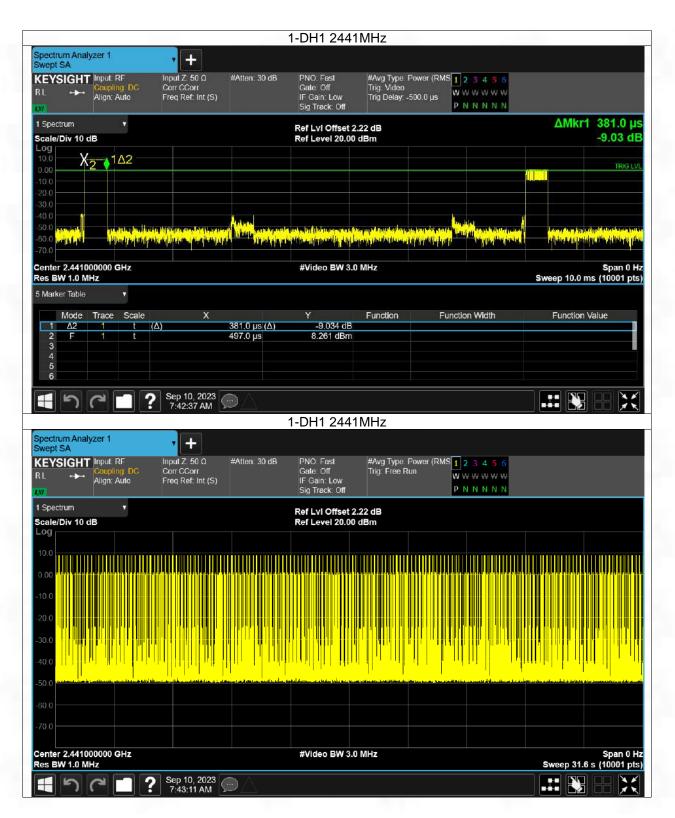


5.1.2 Test Graph



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.







			1-C	DH1 2480MH	Hz Ant1			
Spectrum Analy: Swept SA	zer 1	+						
KEYSIGHT	Input: RF Coupling: DC Align: Auto	Input Z: 50 Ω Corr CCorr Freq Ref: Int (S)	#Atten: 30 dB	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Pov Trig: Video Trig Delay: -500	wer(RMS <mark>1</mark> 2_3 0.0 µs ₩₩₩ PNN	w w w	
1 Spectrum Scale/Div 10 dB Log 10.0 0.00	s 1Δ2			Ref LvI Offset 2. Ref Level 20.00				ΔMkr1 381.0 μs -6.93 dB
-10.0 -20.0 -30.0 -40.0 -50.0 -60.0 -70.0		na dina sa kaja sa kaj Na kaja sa kaja		alia di katangan kata kata ka	en en fallet uitet tilhe seine Hunnels ster en false falle	an parameter a state of the state	lay a contract of the second secon	
Center 2.48000 Res BW 1.0 MH				#Video BW 3.0	MHz		S	Span 0 Hz sweep 10.0 ms (10001 pts)
5 Marker Table Mode 1 Δ2 2 F 3 4 5 6	Trace Scale	<u>Χ</u>	381.0 μs (Δ) 497.0 μs	Y -6.931 dB 7.347 dBm	Function	Function W	idth	Function Value
4) (a 🗖 🤅	Sep 10, 2023 7:43:17 AM		1-DH1 2480	MHz			
Spectrum Analyz Swept SA		• +						
KEYSIGHT RL ↔	Input: RF Coupling: DC Align: Auto	Input Ζ: 50 Ω Corr CCorr Freq Ref: Int (S)	#Atten: 30 dB	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Pov Trig: Free Run	wer (RMS <mark>123</mark> ₩₩₩ ₽NN	₩₩₩	
1 Spectrum Scale/Div 10 dB	т З			Ref Lvi Offset 2. Ref Level 20.00				
10.0								
-10.0 -20.0 -30.0 -40.0								
-50.0 -60.0 -70.0 Center 2.48000	0000 GHz			#Video BW 3.0	MHz	ane dhark ek, die die oo yee		Span 0 Hz
Res BW 1.0 MH		Sep 10, 2023		#video BW 5.0				Sweep 31.6 s (10001 pts)
	? □ ?	7:43:50 AM						II 🔛 🔣 🔀

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 64 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



	1-DH3 2402	MHz		
Spectrum Analyzer 1				
KEYSIGHT Input: RF Input: Z 50 Ω R L →→ Coupling: DC Corr CCorr Align: Auto Freq Ref. Int (S)	#Atten: 30 dB PNO. Fast Gate: Off IF Gain: Low Sig Track: Off	Ind Delay500.0 µs	W W W W W N N N N N	
1 Spectrum v	Ref LvI Offset 2.		ΔM	kr1 1.636 ms
Scale/Div 10 dB	Ref Level 20.00	dBm		-2.34 dB
10.0 0.00 X111 111 111 111 111 112				TRIG LVL
-20.0				
-40.0	ra darhunaithí ar siú i deis an an sann dachtar, maraite a bin siada			
	an a			
Center 2.402000000 GHz Res BW 1.0 MHz	#Video BW 3.0	MHz	Sweep	Span 0 Hz 10.0 ms (10001 pts)
5 Marker Table V				
Mode Trace Scale X	Y	Function Funct	tion Width Fun	ction Value
2 F 1 t	1.636 ms (Δ) -2.344 dB 484.0 μs -1.448 dBm			
3 4				
5				
E C C Sep 10, 2023 7:46:37 AM	ÐA			
	1-DH3 2402	MHz		
Spectrum Analyzer 1 Swept SA				
KEYSIGHT Input: RF Input Z: 50 Ω R L → Coupling: DC Corr CCorr Align: Auto Freq Ref: Int (S)	#Atten: 30 dB PNO. Fast Gate: Off IF Gain: Low Sig Track: Off		2 3 4 5 6 ₩₩₩₩₩ N N N N N	
1 Spectrum v Scale/Div 10 dB	Ref Lvi Offset 2. Ref Level 20.00	.19 dB		
Log				
0.00				
-10.0				
-20.0				
-20.0				
-20.0 -30.0 -40.0				
-40.0				
-40.0 -50.0 -60.0				
-40.0				
-40.0 -50.0 -60.0	#Video BW 3.0	MHz	Sweer	Span 0 Hz 2 31.6 s (10001 pts)

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 65 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



	1-DH3 2441	MHz		
Spectrum Analyzer 1 The Swept SA				
KEYSIGHT Input: RF Input: Z 50 C R L ++ Coupling: DC Corr CCorr Align: Auto Freq Ref: Inf	Gate: Off	Ing Delay500.0 µs	W W W W W P N N N N N	
1 Spectrum Scale/Div 10 dB Log	Ref LvI Offset 2.: Ref Level 20.00 d		ΔMk	(r1 1.637 ms -3.45 dB
10.0 0.00 -10.0 -20.0 -30.0				TRIG LVL
	n te en ser en ser le tradicional en la familia de la ser en la familia de la ser en la familia de la ser en l La familia de la ser en la familia de la ser en la familia de la ser en			
Center 2.441000000 GHz Res BW 1.0 MHz	#Video BW 3.0	MHz	Sweep 10	Span 0 Hz 0.0 ms (10001 pts)
5 Marker Table v				
	X Y 1.637 ms (Δ) -3.448 dB 483.0 μs -4.447 dBm	Function Fun	nction Width Funct	ion Value
10,20 7:47:18 A	223 M DA 1-DH3 2441	MH7		
Spectrum Analyzer 1				
KEYSIGHT Input: RF Input: Z 50 C RL → Align: Auto Court Z' 50 C LV → Align: Auto Freq Ref: Inf	Gate: Off		1 2 3 4 5 6 W W W W W W P N N N N N	
1 Spectrum ▼ Scale/Div 10 dB	Ref LvI Offset 2. Ref Level 20.00 o			
10.0				
Center 2.441000000 GHz	#Video BW 3.0	MHz		Span 0 Hz
Res BW 1.0 MHz)23 M			31.6 s (10001 pts)

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 66 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



		1-DH3 2480N	ИНz			
Spectrum Analyzer 1 Swept SA	· +					
Coupling DG Co	put Z: 50 Ω #Atten: 30 dB orr CCorr req Ref: Int (S)	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS Trig: Video Trig Delay: -500.0 µs	1 2 3 4 5 6 W W W W W W P N N N N N		
1 Spectrum v		Ref LvI Offset 2.2			ΔMkr1	1.637 ms
Scale/Div 10 dB		Ref Level 20.00 d	Bm			-3.09 dB
10.0 -10.0 -20.0 -30.0	142					TRIG LVL
-40.0 -50.0 -60.0 11 10 10 10 -70.0			n an	fanning an tean that a standard faile		en <mark>Heisen (</mark> er "Heisen
Center 2.480000000 GHz Res BW 1.0 MHz		#Video BW 3.0 N	ЛНz		Sweep 10.0 m	Span 0 Hz s (10001 pts)
5 Marker Table 🔹						
Mode Trace Scale	x	Y	Function Fu	nction Width	Function V	alue
1 Δ2 1 t (Δ) 2 F 1 t	1.637 ms (Δ) 482.0 μs	-3.085 dB -4.533 dBm				
3 4						
5 6						
まって」 ?*	Sep 10, 2023					
		1-DH3 2480N	ИНz			
Spectrum Analyzer 1 Swept SA	• +					
Coupling: DC Co	put Z: 50 Ω #Atten: 30 dB orr CCorr req Ref: Int (S)	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS Trig: Free Run	8 1 2 3 4 5 6 W W W W W W P N N N N N		
1 Spectrum v Scale/Div 10 dB		Ref LvI Offset 2.2 Ref Level 20.00 d				
10.0						
	The sense had been not been set of the set o			TERRETERIE DE LA COMPANYA DE LA COMP		
0.00 -10.0 -20.0						
0.00						
0.00 -10.0 -20.0 -30.0 -40.0						
0.00 -10.0 -20.0 -30.0 -40.0 -50.0 -60.0 -70.0						
0.00 -10.0 -20.0 -30.0 -40.0 -50.0 -60.0		#Video BW 3.0 M			Sweep 31.6 s	Span 0 Hz s (10001 pts)

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 67 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China













6. Unwanted Emissions In Non-restricted Frequency Bands

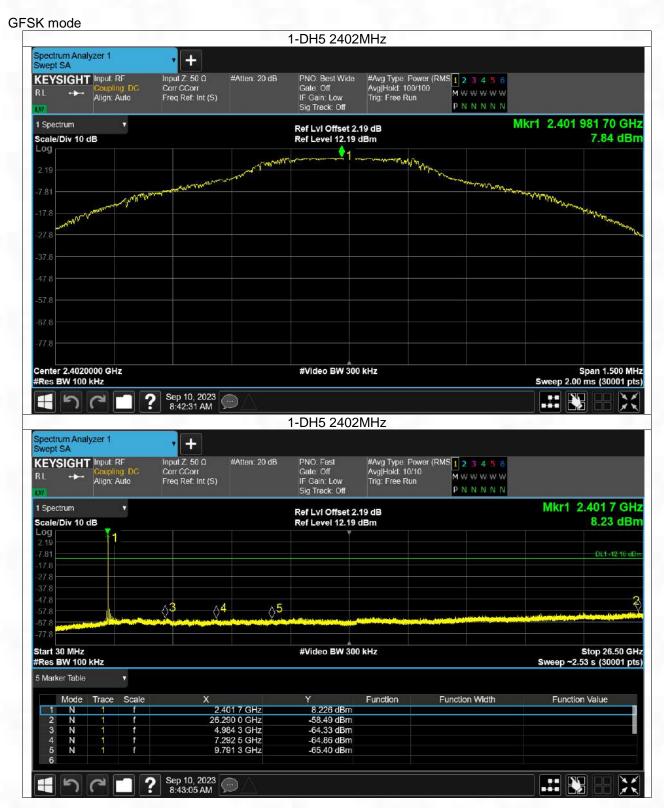
6.1 CSE

6.1.1 Test Result(pass)

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 71 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

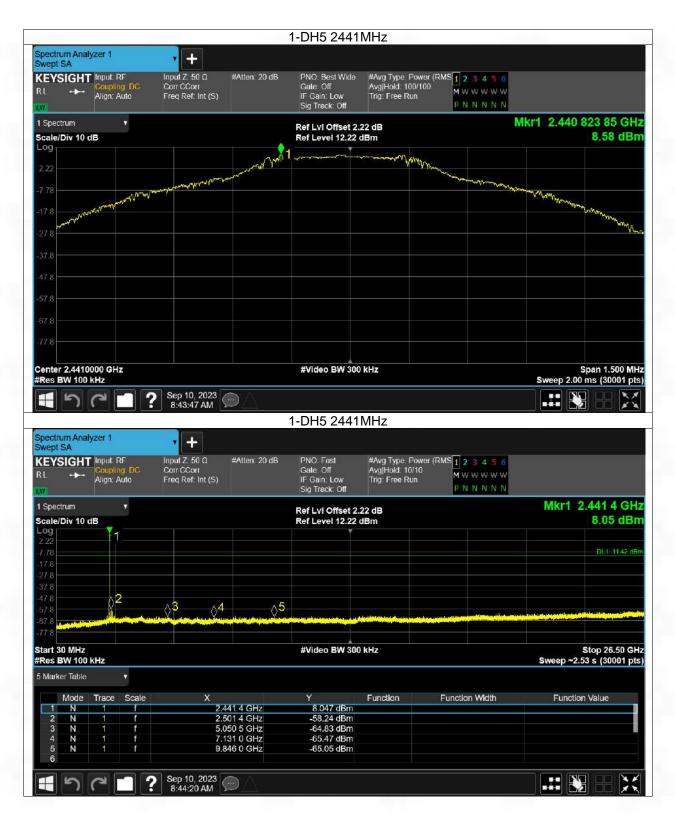


6.1.2 Test Graph



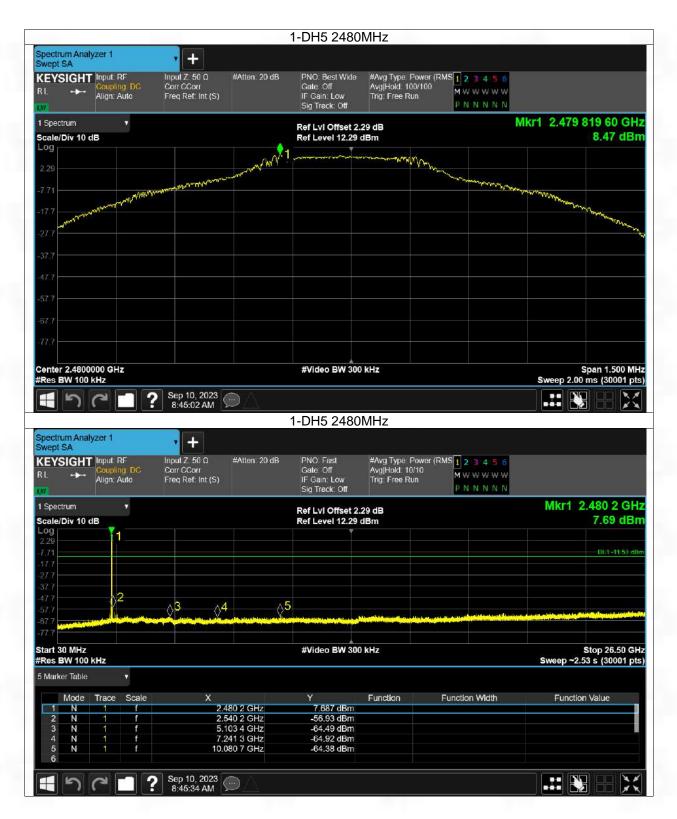
Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.

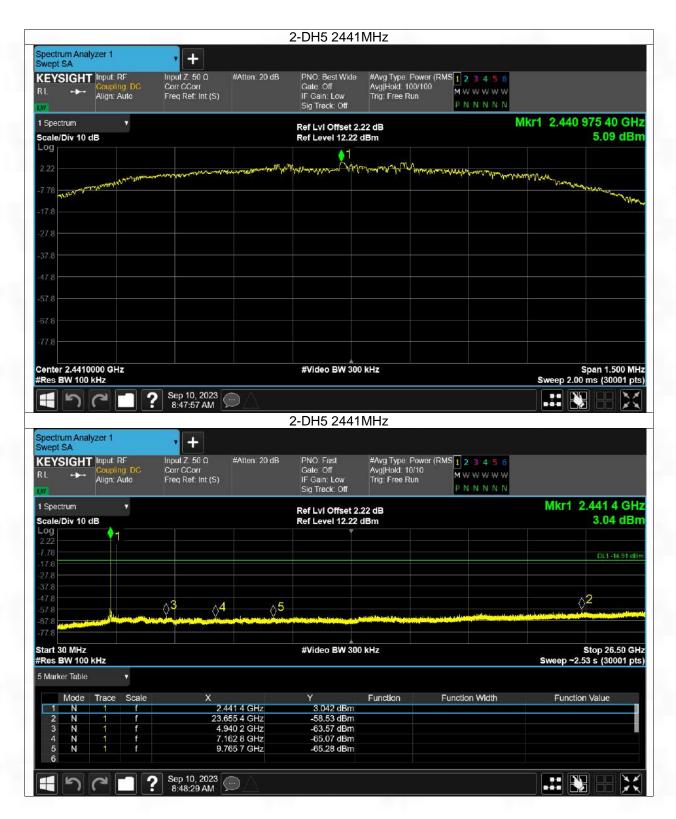


Pi/4DQPSK mode

				2-DH5 2402	2MHz			
Spectrum An Swept SA	alyzer 1	+						
KEYSIGH RL ++-	T Input: RF Goupling: DC Align: Auto	Input Ζ΄ 50 Ω Corr CCorr Freq Ref: Int (S)	#Atten: 20 dB	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Avg Hold: 100 Trig: Free Rur			
1 Spectrum Scale/Div 10	, dB			Ref Lvi Offset 2 Ref Level 12.19			Mkr1 2.401 979 25	5 GHz I dBm
Log				(1				
2.19	provident and property and	In a market was a second was a s	manananan	Agen - May and a general and a g	and the here and	and and the contract of the for the second	ىكىمىدىلىرىلىرالىرالىرىكىمىرىلىكىرىلىرىلىرىلىرىلى مەرىلىرىلىرىلىرىلىرىلىرىلىرىلىرىلىرىلىرىل	
-7.81 vm/vm/	and the second						- martine	and the same
-17.8								
-27.8								
-37.8								
-47.8								
-57.8								
-67.8								
-77.8								
Center 2.402 #Res BW 10				#Video BW 30	0 KHZ		5,0 Span Sweep 2.00 ms	
ר ד	2	Sep 10, 2023 8:46:33 AM	$\Box \Delta$					X
6				2-DH5 2402	2MHz			
Spectrum An Swept SA		· · ·						
KEYSIGH	Couplina DC	Input Ζ: 50 Ω Corr CCorr Freq Ref: Int (S)	#Atten: 20 dB	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Avg[Hold: 10/ Trig: Free Rur			
1 Spectrum Scale/Div 10	T			Ref LvI Offset 2 Ref Level 12.19			Mkr1 2.402	6 GHz 3 dBm
Log	↓1	295 C		Rei Level 12.19	dBm		1.75	ubii
-7.81							DL1-	14 76 dBr
-17.8								
-37.8								2
-57.8	ر	_0304	<u>}</u> 5		ar carried with a string of	the start suggested and the story of the starting story in	un des sous et este des la sous de la sous d	Y and the
-77.8								
Start 30 MHz #Res BW 10				#Video BW 30	0 kHz		5top 26 Sweep ~2.53 s (30	
5 Marker Table								
Mode	Trace Scale	X		Y	Function	Function Width	Function Value	
1 N 2 N		26.23	02 6 GHz 36 2 GHz	1.732 dBm -58.95 dBm				
3 N 4 N	1 f 1 f	7.28	32 8 GHz 30 1 GHz	-64.50 dBm -64.78 dBm				
5 N 6	1 f	9.78	31 5 GHz	-65.17 dBm				
1	6	Sep 10, 2023 8:47:05 AM	ÐA					X

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 75 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China





Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.



8DPSK mode

			3-DH5 2402				
Spectrum Analyzer 1 Swept SA	• +						
KEVSIGHT Input RF	Input Z: 50 Ω	#Atten: 20 dB	PNO: Best Wide	#Avg Type: Powe	r (RMS 1 2 3 4 5 6		
R L + Coupling: DC Align: Auto	Corr CCorr Freq Ref: Int (S)		Gate: Off IF Gain: Low	Avg Hold: 100/10 Trig: Free Run	M W W W W		
NI.			Sig Track: Off		PNNNN		
1 Spectrum ▼ Scale/Div 10 dB			Ref LvI Offset 2. Ref Level 12.19			Mkr1 2.402	5.39 dB
Log							
2.19	ംഗ്നീഗ് ലെക്സ്	and the second states	Manus and a start of the	ward man Mary	20.0.00 0000000 to 200	No. Mar	
7.81	and the second s				an a	an a server of the server	maria
17.8							and the second
27.8							
37.8							
17.8							
57.8							
57.8							
77.8							
enter 2.4020000 GHz			#Video BW 300	kHz			Span 1.500 I
Res BW 100 kHz							ms (30001
570	? Sep 10, 2023 8:51:57 AM	\square					
			3-DH5 2402	MHz			
Spectrum Analyzer 1 Swept SA							
CEYSIGHT Input RF	Input Z: 50 Ω	#Atten: 20 dB	PNO: Fast	#Avg Type: Powe	r (RMS 1 2 3 4 5 6		
L Coupling DG Align: Auto	Corr CCorr Freq Ref: Int (S)		Gate: Off IF Gain: Low	Avg Hold: 10/10 Trig: Free Run	M w w w w w		
M.			Sig Track: Off		PNNNN	Allowd 1	2.401 7 G
Spectrum v cale/Div 10 dB			Ref LvI Offset 2.	10 dB		MIKET	
			Ref evel 12 10				
			Ref Level 12.19				
.19			Ref Level 12.19				2.78 dl
2.19 7.81 7.8			Ref Level 12.19				2.78 dl
2.19 7.81 77.8 77.8 77.8			Ref Level 12.19				2.78 dl
1.19		∧5	Ref Level 12.19				2.78 dl
2.19 7.81 7.78 7.78 7.78 7.78 5.7.8 5.7.8	<u></u>	\$5	Ref Level 12.19				2.78 dE
2.19 7.81 77.8 27.8 47.8 47.8 57.8 57.8 77.8	_ <u></u> ∂ ³ _ <u></u> ∕ ⁴	\$5					2.78 dE
2.19 7.81 77.8 77.8 77.8 57.8 57.8 57.8 57.8 57.8	_ <u>∂</u> 3⁄4	<u></u> 5	Ref Level 12.19 #Video BW 300				2.78 dE
2.19 7.81 77.8 77.8 77.8 77.8 77.8 77.8 10 77.8 10 10 10 10 10 10 10 10 10 10 10 10 10	_ <u></u>	\$5					2.78 dE
2.19 7.81 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	x		#Video EW 300		Function Width	Sweep ~2.	2.78 dE
2.19 7.81 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	X 2.4	01 7 GHz 106 5 GHz	#Video BW 300 Y 2.783 dBm	dBm	Function Width	Sweep ~2.	2.78 df
2.19 7.81 7.81 7.81 7.81 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	X 25.8 4.6	101 7 GHz 106 5 GHz 106 5 GHz 107 8 GHz	¥Video BW 300 Y 2.783 dBm -58.84 dBm -64.92 dBm	dBm	Function Width	Sweep ~2.	2.78 df
Mode Trace Scale 1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 N 1 f	X 24 25.8 4.6 7.1	101 7 GHz 306 5 GHz	#Video BW 300 Y 2.783 dBm -58.84 dBm	dBm	Function Width	Sweep ~2.	2.78 dE
2.19 7.81 7.81 7.81 7.81 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	X 24 25.8 4.6 7.1 9.7	101 7 GHz 306 5 GHz 57 8 GHz 178 7 GHz	¥Video BW 300 Y 2.783 dBm -64.92 dBm -64.84 dBm	dBm	Function Width	Sweep ~2.	2.78 dE

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 78 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China





Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.



6.2 Band Edge

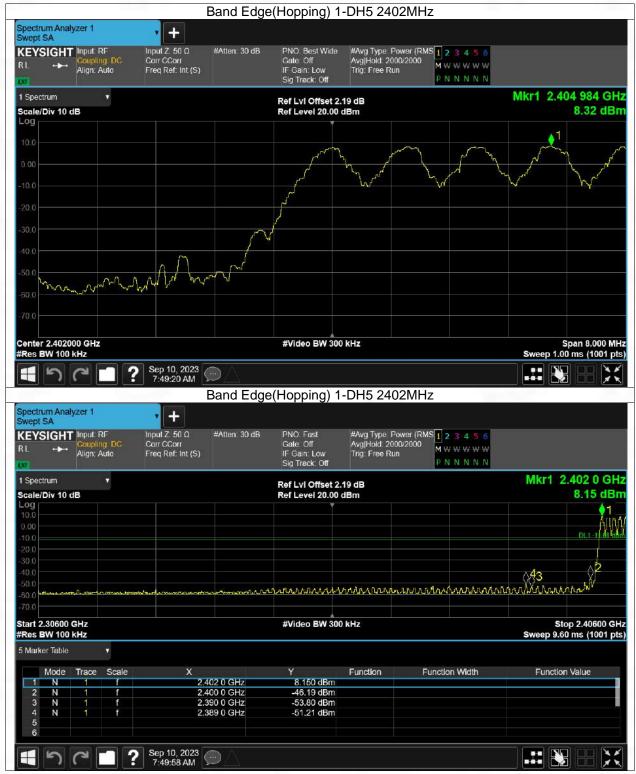
6.2.1 Test Result(Pass)

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 81 of 84BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China



6.2.2 Test Graph

GFSK Modulation (the worst case)



Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





Total or partial reproduction of this document without permission of the Laboratory is not allowed. BTF Testing Lab (Shenzhen) Co., Ltd.





BTF Testing Lab (Shenzhen) Co., Ltd.

F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

www.btf-lab.com

-- END OF REPORT --

Total or partial reproduction of this document without permission of the Laboratory is not allowed.Page 84 of 8BTF Testing Lab (Shenzhen) Co., Ltd.F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China Page 84 of 84