

RF Test Report

For

Applicant Name: TECNO MOBILE LIMITED

Address: FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25

SHAN MEI STREET FOTAN NT HONGKONG

EUT Name: Laptop
Brand Name: TECNO
Model Number: T14TA

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,

Address: Tantou Community, Songgang Street, Bao'an District, Shenzhen,

China

Report Number: BTF230612R00502 Test Standards: 47 CFR Part 15.247

Test Conclusion: Pass

FCC ID: 2ADYY-T14TA

Test Date: 2023-03-10 to 2023-05-29

Date of Issue: 2023-06-14

Prepared By:

Chris Liu / Project Engineer

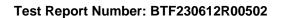
Date: 2023-06-14

Approved By:

Ryan.CJ / EMC Manager

Date: 2023-06-14

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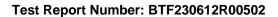


Revision History			
Version	Issue Date	Revisions Content	
R_V0	2023-06-14	Original	
Note: Once the	revision has been made, then pre	vious vorsions raports are invalid	



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Introduction

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.



Test Report Number: BTF230612R00502

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
Address:	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
Address.	STREET FOTAN NT HONGKONG

2.3 Factory Information

Company Name:	GUANGXI SHANCHAUN TECHNOLOGY CO LTD
	2nd floor of building1 in zone 3, building2 in zone 3, 1st floor of building 2 in zone
Address:	4, Guangxi 3nod Smart Industrial Park, No. 3 Gaoke Road, Haicheng District,
	Beihai City, Guangxi Zhuang Autonomous Region

2.4 General Description of Equipment under Test (EUT)

EUT Name:	Laptop
Test Model Number:	T14TA
Series Model Number:	N/A

2.5 Technical Information

Power Supply:	Li-ion Battery: 528252-3S1P Rated Voltage: 11.61V Rated Capacity: 6460mAh/75Wh Limited Capacity: 6550mAh/76.04Wh Limited Charge Voltage: 13.35V
Power Adaptor:	Adapter1: TCW-A61S-65W Input: 100-240V~50/60Hz 1.5A Max Output: DP:5V 3A 9V 3A 12V 3A 15V 3A 20V 3.25A PPS: 3.3-11V 5A Max Adapter2: ADT-65NS-D00 Input: 100-240V~1.6A 50/60Hz Output: 5.0V 3.0A 15.0W or 9.0V 3.0A 27.0W or 12.0V 5.0A 60.0W or 15.0V 4.33A 64.95W or 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 [#] :	3.57 dBi
N. 1	

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.



Test Report Number: BTF230612R00502

3 Summary of Test Results

3.1 Test Standards

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

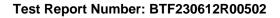
3.2 Uncertainty of Test

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

3.3 Summary of Test Result

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





Test Configuration

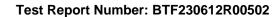
Test Equipment List

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	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	/	/	/



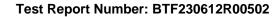


RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
Adjustable Direct Current Regulated Power Supply	Dongguan Tongmen Electronic Technology Co., 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

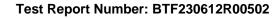




Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RFTest software	/	V1.00	/	/	/
RF Control Unit	Techy	TR1029-1	/	2022-11-24	2023-11-23
RF Sensor Unit	Techy	TR1029-2	/	2022-11-24	2023-11-23
Programmable constant temperature and humidity box	ZZCKONG	ZZ-K02A	20210928007	2022-11-24	2023-11-23
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 (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	1	/	/			
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	1	/	/			
Broadband Preamplilifier	SCHWARZBECK	BBV9718D	80000	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			





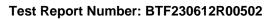
RE Cable	REBES Talent	UF1-SMASMAM-1 0m	21101566	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-10m	21101570	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF1-SMASMAM-1 m	21101568	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-1m	21101576	2022-11-24	2023-11-23
RE Cable	REBES Talent	UF2-NMNM-2.5m	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	/	/
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	1	/	1			
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	1	/	/			
Broadband Preamplilifier	SCHWARZBECK	BBV9718D	80000	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	/	/	/			



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Log periodic antenna SCHWARZBECK VULB 9168 01328 2021-11-28 2023-11-27
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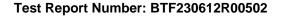
4.2 Test Auxiliary Equipment

The EUT was tested as an independent device.

4.3 Test Modes

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

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.





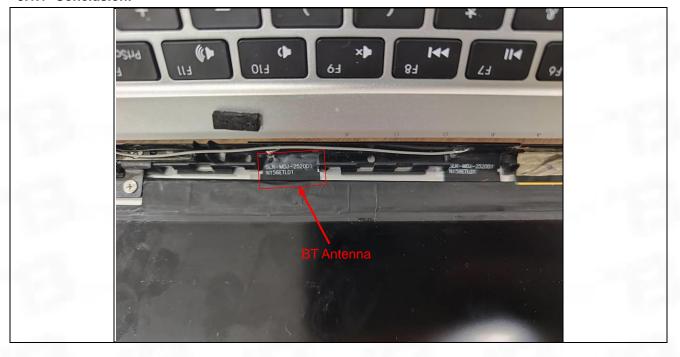
5 Evaluation Results (Evaluation)

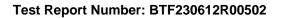
5.1 Antenna requirement

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:







6 Radio Spectrum Matter Test Results (RF)

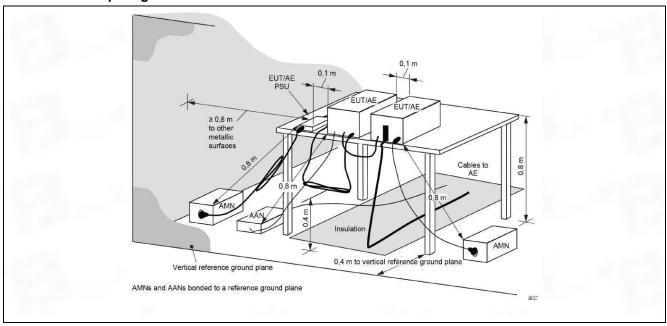
6.1 Conducted Emission at AC power line

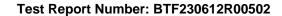
Test Requirement:	Except as shown in paragraphs (b) that is designed to be connected to frequency voltage that is conducted or frequencies, within the band 15 the following table, as measured ustabilization network (LISN).	the public utility (AC) p d back onto the AC pow 0 kHz to 30 MHz, shall r	ower line, the radio ver line on any frequency not exceed the limits in
Test Method:	Refer to ANSI C63.10-2013 section conducted emissions from unlicen		hod for ac power-line
	Frequency of emission (MHz)	Conducted limit (dB)	ıV)
		Quasi-peak	Average
Test Limit:	0.15-0.5	66 to 56*	56 to 46*
rest Limit:	0.5-5	56	46
	5-30	60	50
	*Decreases with the logarithm of t	ne frequency.	

6.1.1 E.U.T. Operation:

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

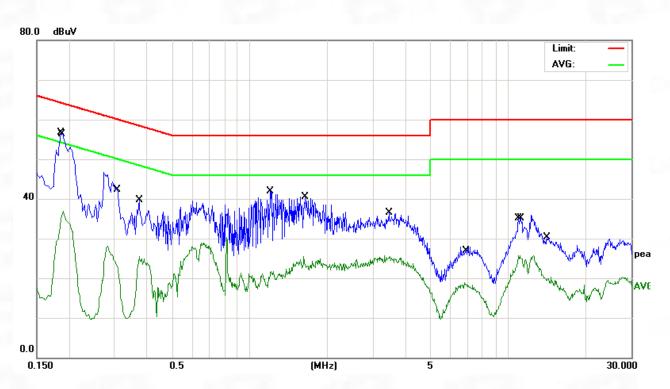
6.1.2 Test Setup Diagram:





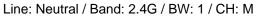


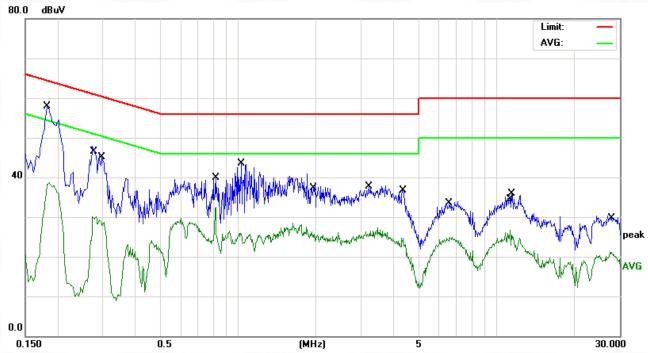
6.1.3 Line: Line / Band: 2.4G / BW: 1 / CH: M



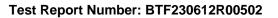
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB	dBuV	dBu∀	dB	Detector
1	*	0.1860	46.18	10.45	56.63	64.21	-7.58	QP
2		0.1900	26.48	10.45	36.93	54.03	-17.10	AVG
3		0.3100	30.48	10.48	40.96	59.97	-19.01	QP
4		0.3740	15.04	10.49	25.53	48.41	-22.88	AVG
5		1.1980	31.34	10.58	41.92	56.00	-14.08	QP
6		1.6260	14.90	10.65	25.55	46.00	-20.45	AVG
7		3.4580	25.87	10.72	36.59	56.00	-19.41	QP
8		3.4940	14.70	10.72	25.42	46.00	-20.58	AVG
9		6.7980	8.04	10.77	18.81	50.00	-31.19	AVG
10		10.9620	22.11	10.90	33.01	60.00	-26.99	QP
11		11.1020	14.85	10.91	25.76	50.00	-24.24	AVG
12		14.1620	19.20	11.14	30.34	60.00	-29.66	QP







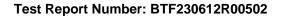
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB	dBu∀	dBu∨	dB	Detector
1	*	0.1819	47.39	10.45	57.84	64.39	-6.55	QP
2		0.2819	19.67	10.47	30.14	50.76	-20.62	AVG
3		0.2980	34.55	10.47	45.02	60.30	-15.28	QP
4		0.8180	21.87	10.54	32.41	46.00	-13.59	AVG
5		1.0300	32.93	10.55	43.48	56.00	-12.52	QP
6		1.9340	15.66	10.70	26.36	46.00	-19.64	AVG
7		3.2220	27.01	10.72	37.73	56.00	-18.27	QP
8		4.4140	24.02	10.73	34.75	56.00	-21.25	QP
9		6.6220	14.15	10.77	24.92	50.00	-25.08	AVG
10		11.2780	15.82	10.92	26.74	50.00	-23.26	AVG
11		11.4620	24.92	10.94	35.86	60.00	-24.14	QP
12		27.7420	10.00	11.17	21.17	50.00	-28.83	AVG





6.2 Occupied Bandwidth

0.2 Occupied Baild	
Test Requirement:	Intentional radiators operating under the alternative 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 is operated.
Test Method:	Occupied bandwidth—relative measurement procedure
Test Limit:	Intentional radiators operating under the alternative 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 is operated.
Procedure:	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 [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 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 do



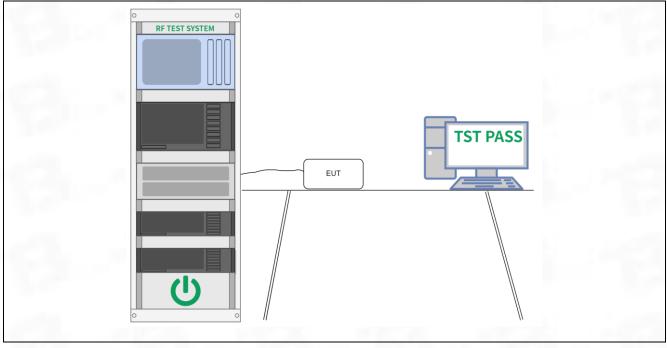


k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly
labeled. Tabular data may be reported in addition to the plot(s).

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:



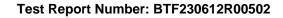


6.3 Maximum Conducted Output Power

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.

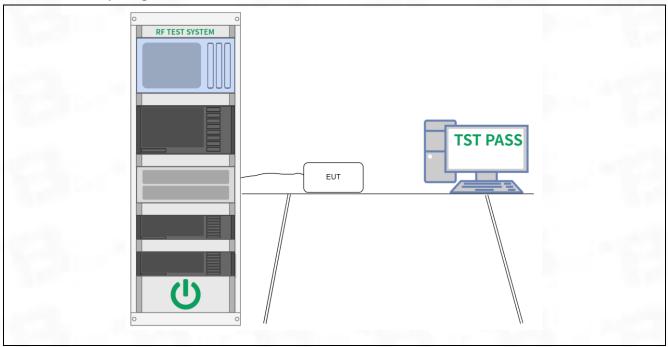
6.3.1 E.U.T. Operation:

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





6.3.2 Test Setup Diagram:



6.3.3 Test Data:



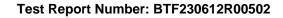


6.4 Channel Separation

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:	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.			

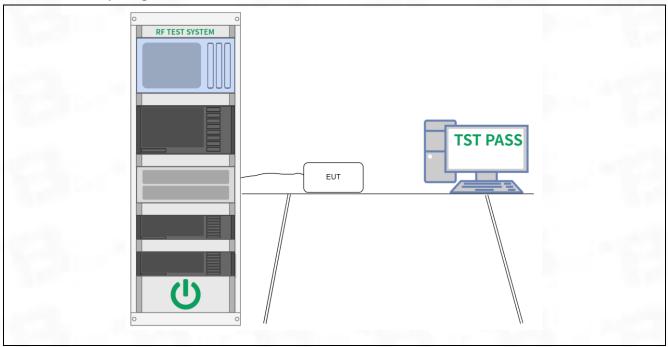
6.4.1 E.U.T. Operation:

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





6.4.2 Test Setup Diagram:



6.4.3 Test Data:



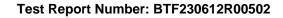


6.5 Number of Hopping Frequencies

_		
-	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
-	Геst 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.
ſ	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.

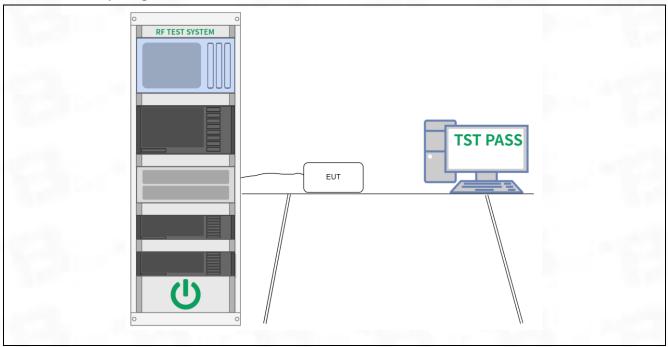
6.5.1 E.U.T. Operation:

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

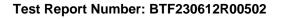




6.5.2 Test Setup Diagram:



6.5.3 Test Data:



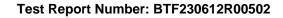


6.6 Dwell Time

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 lead channels. The average time of occupancy on any channel shall not be green 0.4 seconds within a period of 0.4 seconds multiplied by the number of hochannels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum 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. The sweep time shall be equal to, or less than, the period specified in the requirements, using the following equation: (Number of hops in the period specified in the requirements, using the following equation: (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.	

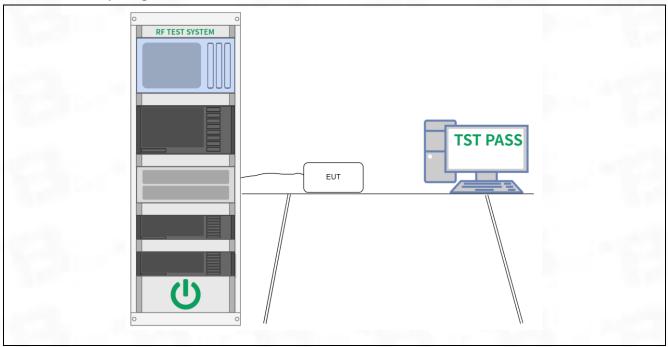
6.6.1 E.U.T. Operation:

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

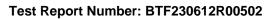




6.6.2 Test Setup Diagram:



6.6.3 Test Data:



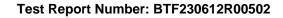


6.7 Emissions in non-restricted frequency bands

	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.
١	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.

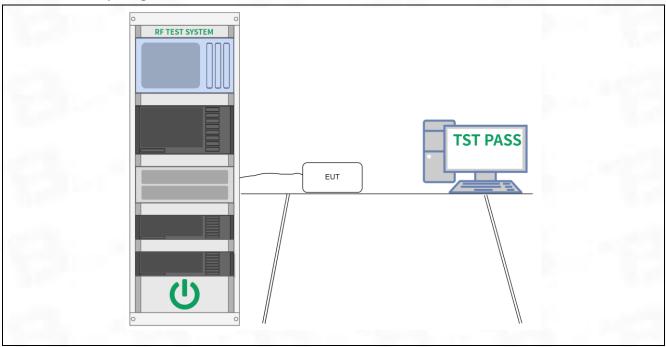
6.7.1 E.U.T. Operation:

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

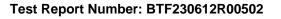




6.7.2 Test Setup Diagram:



6.7.3 Test Data:





6.8 Band edge emissions (Radiated)

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			
	1.705-30.0	30	30			
	30-88	100 **	3			
Test Limit:	88-216	150 **	3			
	216-960	200 **	3			
	Above 960	500	3			
	radiators operating unde 54-72 MHz, 76-88 MHz,	paragraph (g), fundamental emer this section shall not be located 174-216 MHz or 470-806 MHz is permitted under other sections.	ed in the frequency bands . However, operation within			
Procedure:	ANSI C63.10-2013 secti	ANSI C63.10-2013 section 6.6.4				

6.8.1 E.U.T. Operation:

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



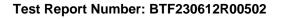


6.8.2 Test Data:

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	61.18	-8.76	52.42	74	-21.58	Н	PK
2390	55.56	-8.76	46.80	54	-7.20	Н	AV
2390	60.57	-8.73	51.84	74	-22.16	V	PK
2390	55.07	-8.73	46.34	54	-7.66	V	AV
	High Channel						
2483.5	60.81	-8.76	52.05	74	-21.95	Н	PK
2483.5	55.29	-8.76	46.53	54	-7.47	Н	AV
2483.5	59.56	-8.73	50.83	74	-23.17	V	PK
2483.5	55.96	-8.73	47.23	54	-6.77	V	AV

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



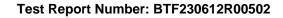


6.9 Emissions in restricted frequency bands (below 1GHz)

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		
	1.705-30.0	30	30		
	30-88	100 **	3		
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 section 6.6.4				

6.9.1 E.U.T. Operation:

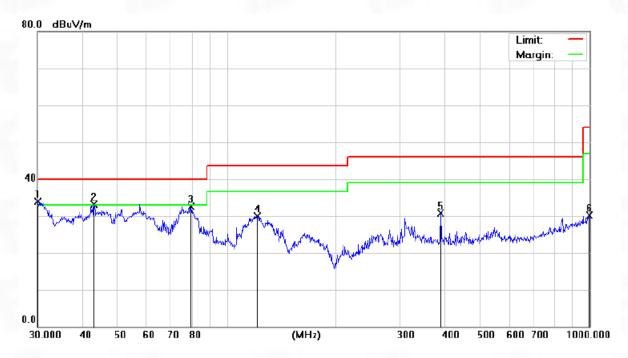
Operating Environment:	
Temperature:	24.9 °C
Humidity:	49.4 %
Atmospheric Pressure:	1010 mbar



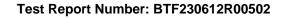


6.9.2 Test Data:

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

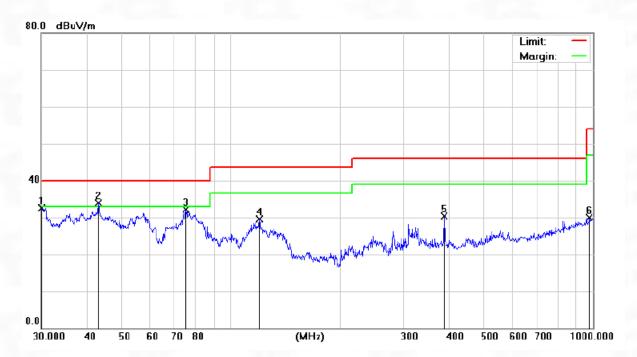


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	30.0000	29.13	4.79	33.92	40.00	-6.08	QP
2	İ	42.8998	34.29	-1.21	33.08	40.00	-6.92	QP
3		79.5209	39.76	-7.17	32.59	40.00	-7.41	QP
4		121.1231	32.89	-2.91	29.98	43.50	-13.52	QP
5	,	387.9920	31.78	-1.13	30.65	46.00	-15.35	QP
6	,	996.4996	22.88	7.25	30.13	54.00	-23.87	QP

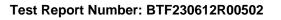




Polarization: Vertical / Band: 2.4G / BW: 1 / CH: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		30.1054	27.83	4.75	32.58	40.00	-7.42	QP
2	*	43.0505	35.17	-1.27	33.90	40.00	-6.10	QP
3		75.1822	39.19	-7.09	32.10	40.00	-7.90	QP
4		119.8556	32.27	-2.82	29.45	43.50	-14.05	QP
5		387.9920	31.38	-1.13	30.25	46.00	-15.75	QP
6		975.7529	23.05	6.89	29.94	54.00	-24.06	QP





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	100 **	3						
Test Limit:	88-216	150 **	3						
	216-960	200 **	3						
	Above 960	500	3						
	** 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 secti	ANSI C63.10-2013 section 6.6.4							

6.10.1 E.U.T. Operation:

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



Test Report Number: BTF230612R00502

6.10.2Test Data:

GFSK

~									
F	Low channel: 2402MHz								
Freq.	Ant.Pol	Emission I	ssion Level(dBuV) Limit 3m(dBuV/m) Ov	Ove	er(dB)				
(MHz)	H/V	PK	AV	PK	AV	PK	AV		
4804	V	58.30	40.12	74	54	-15.70	-13.88		
7206	V	59.18	40.74	74	54	-14.82	-13.26		
4804	Н	59.74	39.99	74	54	-14.26	-14.01		
7206	Н	59.41	40.41	74	54	-14.59	-13.59		

_										
	Гиал	Middle channel: 2441MHz								
	Freq.	Ant.Pol	Emission I	_evel(dBuV)	Limit 3m(dBuV/m)		Over(dB)			
	(MHz)	H/V	PK	AV	PK	AV	PK	AV		
	4882	V	60.82	40.04	74	54	-13.18	-13.96		
	7323	V	58.89	40.19	74	54	-15.11	-13.81		
	4882	Н	59.80	40.96	74	54	-14.20	-13.04		
	7323	Н	59.10	40.10	74	54	-14.90	-13.90		

F===	High channel: 2480MHz								
Freq.	Ant.Pol	Emission I	_evel(dBuV)	Limit 3m(dBuV/m)		Over(dB)			
(MHz)	H/V	PK	AV	PK	AV	PK	AV		
4960	V	58.72	39.61	74	54	-15.28	-14.39		
7440	V	58.15	40.21	74	54	-15.85	-13.79		
4960	Н	58.22	39.02	74	54	-15.78	-14.98		
7440	Н	59.56	40.56	74	54	-14.44	-13.44		

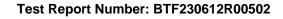
Note:

- 1. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 2. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 3. 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.
- 4. Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (GFSK) was submitted only.





Appendix

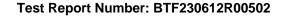




1. Bandwidth

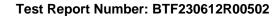
1.1 OBW

Test channel	20dB Occupy Bandwidth (MHz)				
	GFSK	π/4-DQPSK	8DPSK	Conclusion	
Lowest	0.934	1.487	1.429	PASS	
Middle	0.953	1.43	1.524	PASS	
Highest	0.945	1.508	1.429	PASS	

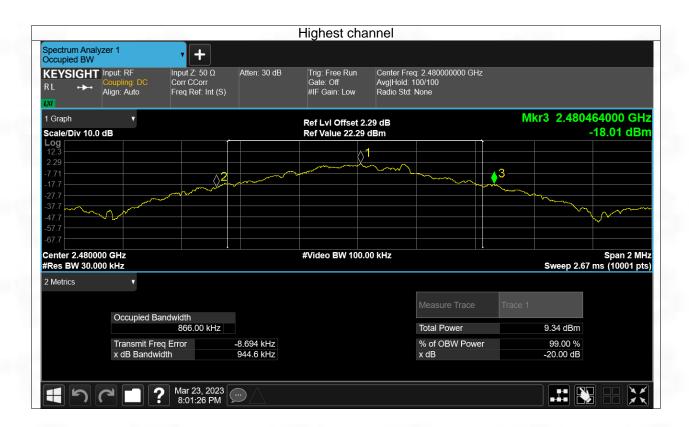


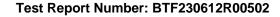






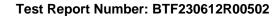




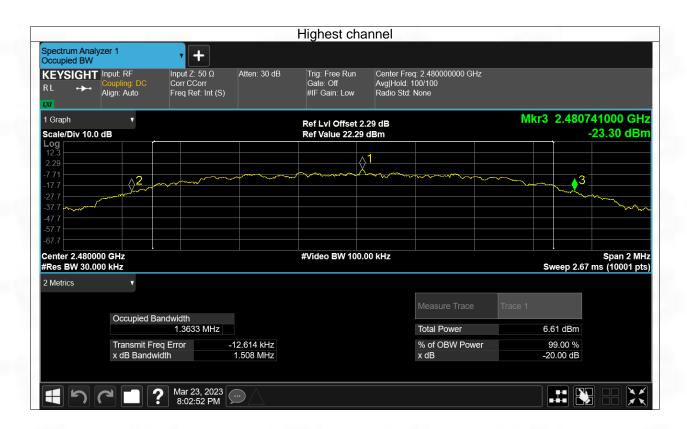




Pi/4DQPSK Modulation Lowest channel Spectrum Analyzer 1 Occupied BW Center Freq: 2.402000000 GHz Avg|Hold: 100/100 Input Z: 50 Ω Corr CCorr Freq Ref: Int (S) Trig: Free Run Gate: Off #IF Gain: Low KEYSIGHT Input: RF Atten: 30 dB Align: Auto Radio Std: None Mkr3 2.402733000 GHz 1 Graph Ref Lvi Offset 2.19 dB Ref Value 22.19 dBm -23.90 dBm Scale/Div 10.0 dB \Diamond^2 <u>3</u> Span 2 MHz Sweep 2.67 ms (10001 pts) Center 2.402000 GHz #Res BW 30.000 kHz #Video BW 100.00 kHz 2 Metrics Occupied Bandwidth 1.3627 MHz Total Power 5.39 dBm Transmit Freq Error -10.414 kHz % of OBW Power 99.00 % x dB Bandwidth 1.487 MHz x dB -20.00 dB Mar 23, 2023 7:53:48 PM Middle channel Spectrum Analyzer 1 Occupied BW + Center Freq: 2.441000000 GHz Avg|Hold: 100/100 Radio Std: None KEYSIGHT Input: RF Input Z: 50 Ω Atten: 30 dB Trig: Free Run Corr CCorr Freq Ref: Int (S) Gate: Off #IF Gain: Low Align: Auto Mkr3 2.441700000 GHz 1 Graph Ref Lvl Offset 2.22 dB Scale/Div 10.0 dB Ref Value 22.22 dBm -24.61 dBm 3 Center 2.441000 GHz #Res BW 30.000 kHz Span 2 MHz Sweep 2.67 ms (10001 pts) #Video BW 100.00 kHz 2 Metrics Occupied Bandwidth 1.3605 MHz Total Power 5.24 dBm Transmit Freq Error x dB Bandwidth % of OBW Power -14.704 kHz 99.00 % 1.430 MHz -20.00 dB x dB

Mar 23, 2023 7:58:17 PM 

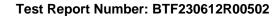






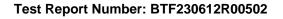
8DPSK Modulation













2. Maximum Conducted Output Power

2.1 Power

GFSK mode					
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result		
Lowest	-1.11	20.97	PASS		
Middle	-4.16	20.97	PASS		
Highest	-0.97	20.97	PASS		

Pi/4DQPSK mode					
Test channel Peak Output Power (dBm) Limit (dBm) Result					
Lowest	-3.68	20.97	PASS		
Middle	-4.21	20.97	PASS		
Highest	-2.37	20.97	PASS		

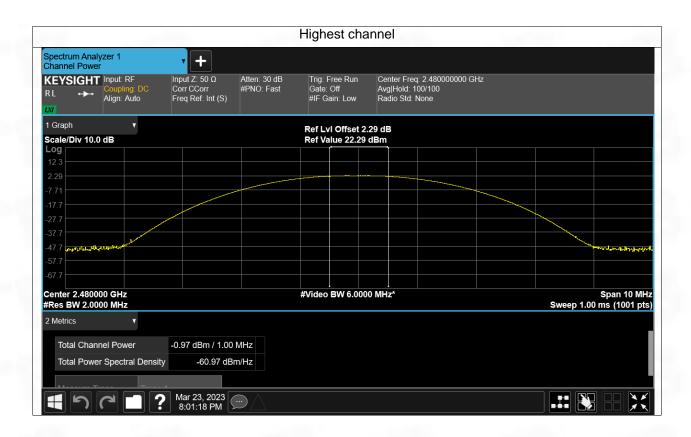
8DPSK mode					
Test channel Peak Output Power (dBm) Limit (dBm) Result					
Lowest -4.09		20.97	PASS		
Middle	-4.25	20.97	PASS		
Highest	-2.77	20.97	PASS		

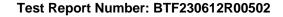


GFSK Modulation







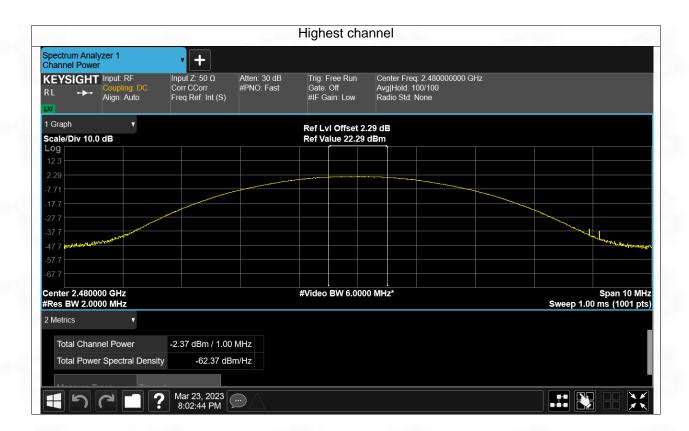


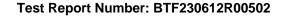


Pi/4DQPSK Modulation









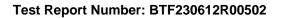


8DPSK Modulation











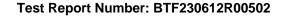
3. Carrier Frequency Separation

3.1 Ant1

GFSK mode					
Test channel Carrier Frequencies Limit (MHz) Result					
Lowest	1.01	2/3*20dB BW	PASS		
Middle	1.004	2/3*20dB BW	PASS		
Highest	1.162	2/3*20dB BW	PASS		

Pi/4 DQPSK mode					
Test channel Carrier Frequencies Separation (MHz) Limit (MHz) Result					
Lowest	0.998	2/3*20dB BW	PASS		
Middle	0.998	2/3*20dB BW	PASS		
Highest	1.002	2/3*20dB BW	PASS		

8DPSK mode					
Test channel Carrier Frequencies Limit (MHz) Resu					
Lowest	1	2/3*20dB BW	PASS		
Middle	0.994	2/3*20dB BW	PASS		
Highest	0.992	2/3*20dB BW	PASS		

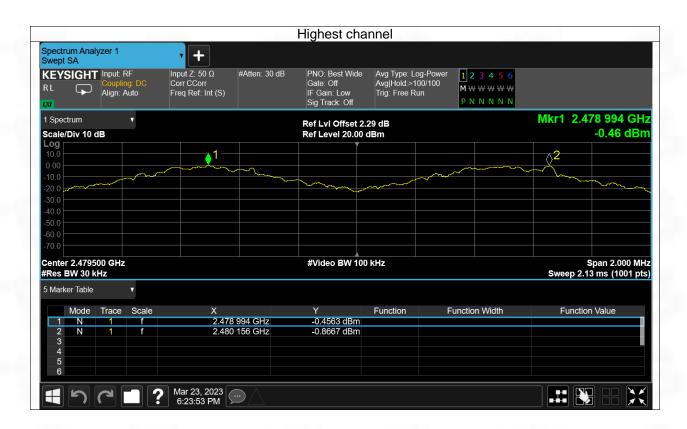


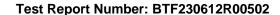


GFSK Modulation



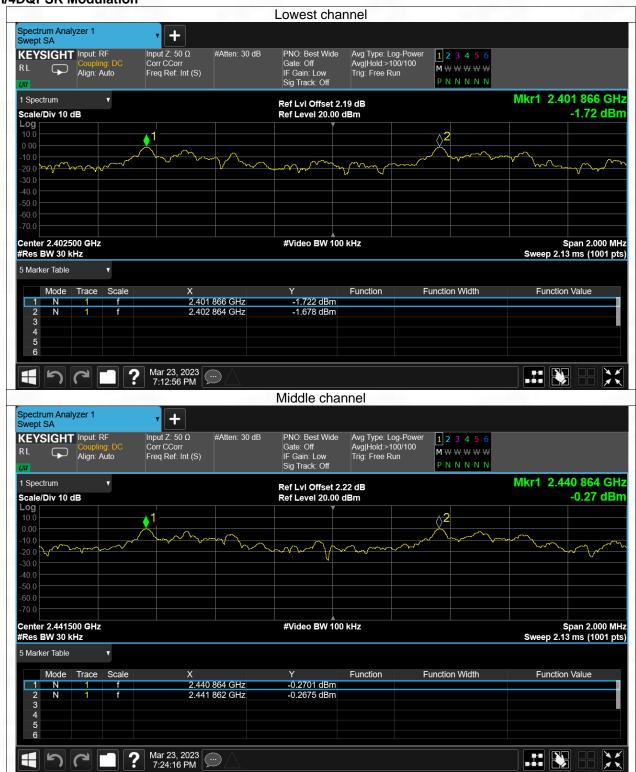


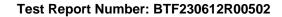




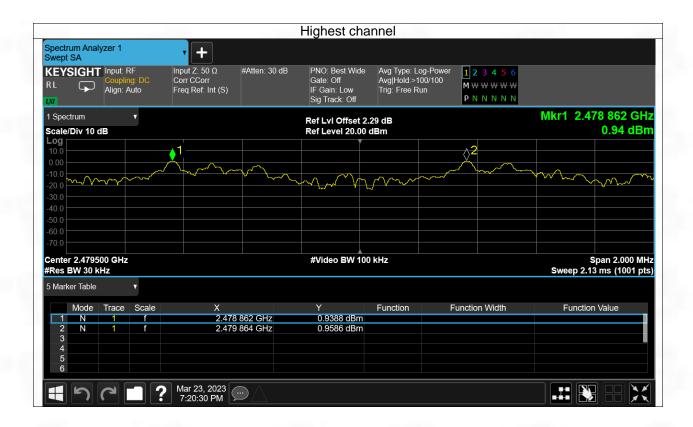


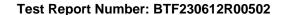
Pi/4DQPSK Modulation





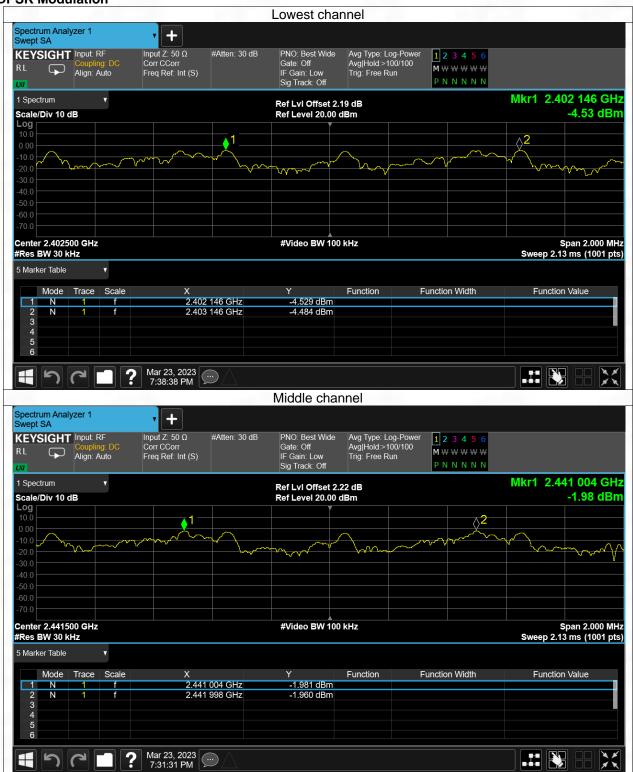


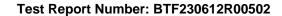




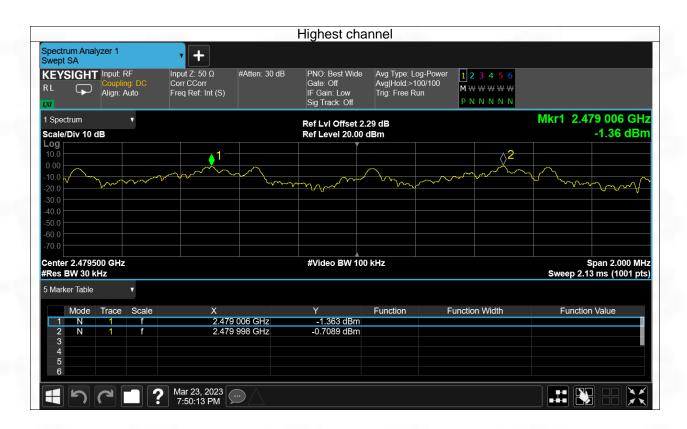


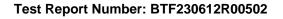
8DPSK Modulation









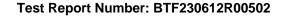




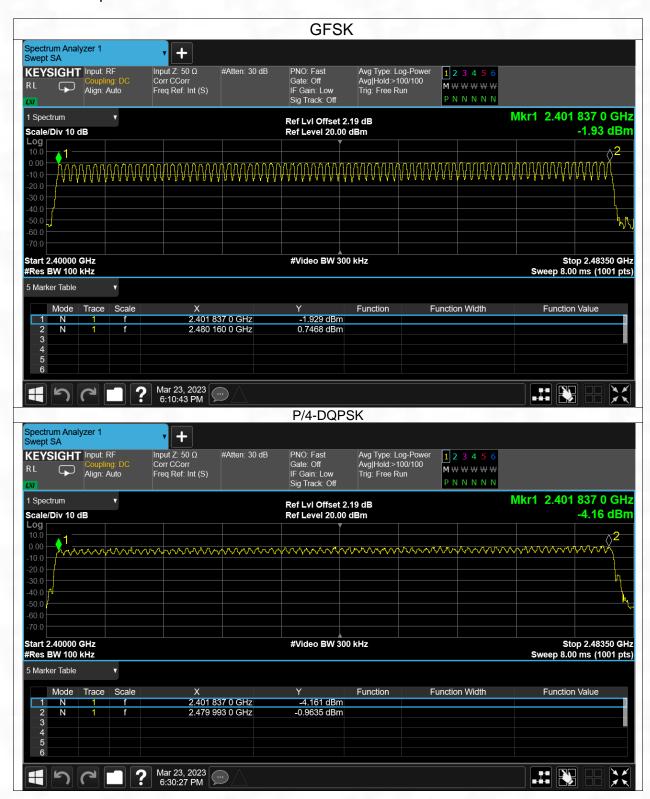
4. Number of Hopping Frequencies

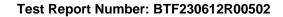
4.1 HoppNum

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



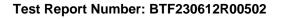










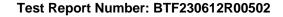




5. Time of Occupancy (Dwell Time)

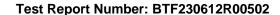
5.1 Ant1

Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
1-DH1	2402	0.381	120.777	317	31600	400	Pass
1-DH1	2441	0.381	120.015	315	31600	400	Pass
1-DH1	2480	0.381	119.634	314	31600	400	Pass
1-DH3	2402	1.637	273.379	167	31600	400	Pass
1-DH3	2441	1.637	265.194	162	31600	400	Pass
1-DH3	2480	1.637	245.55	150	31600	400	Pass
1-DH5	2402	2.885	302.925	105	31600	400	Pass
1-DH5	2441	2.885	328.89	114	31600	400	Pass
1-DH5	2480	2.885	297.155	103	31600	400	Pass

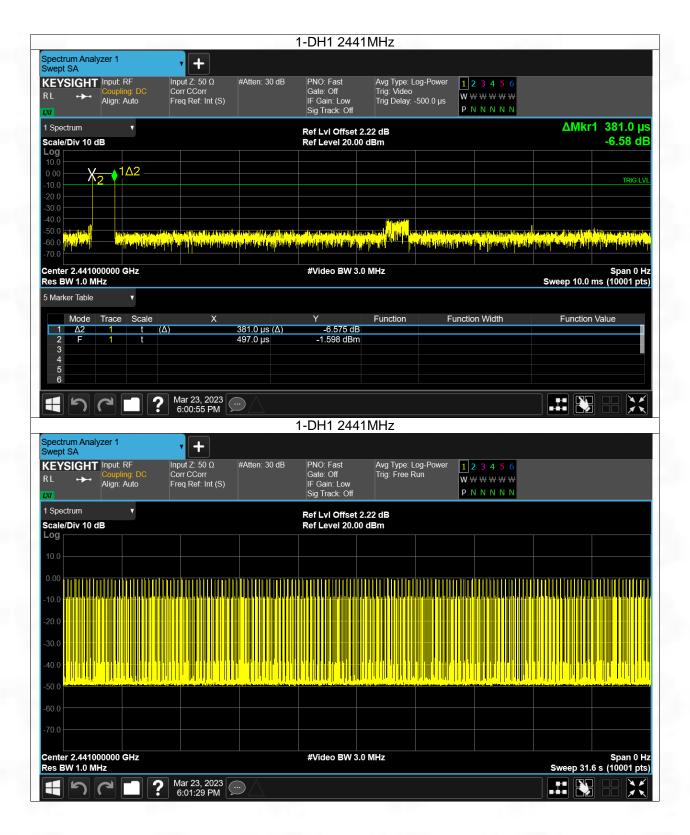


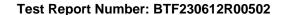




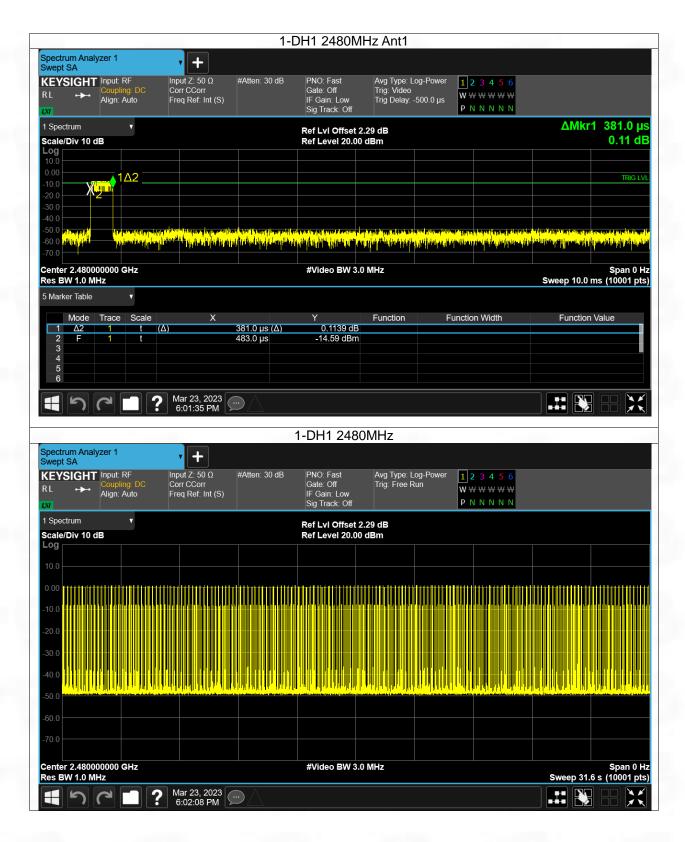


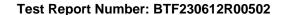




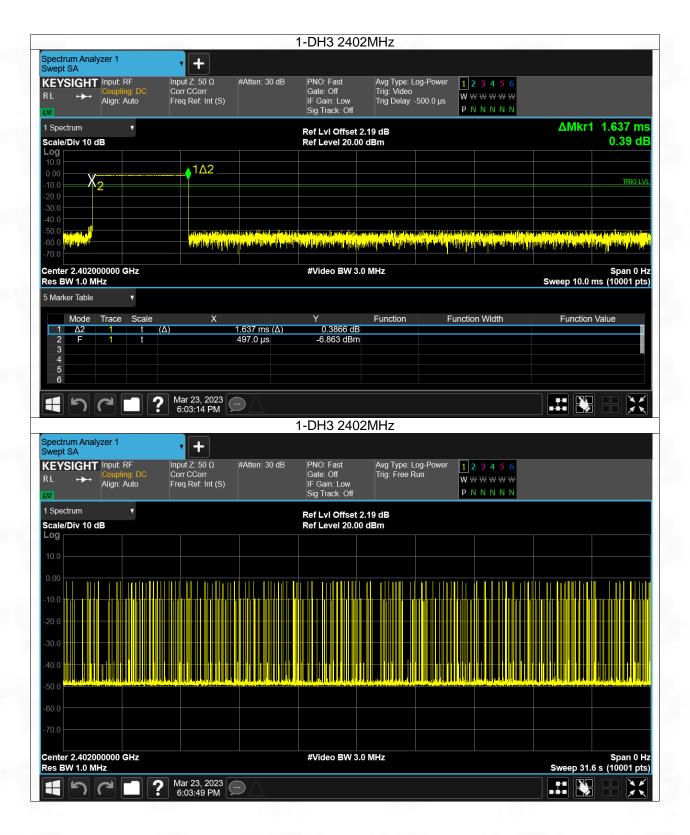


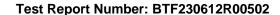




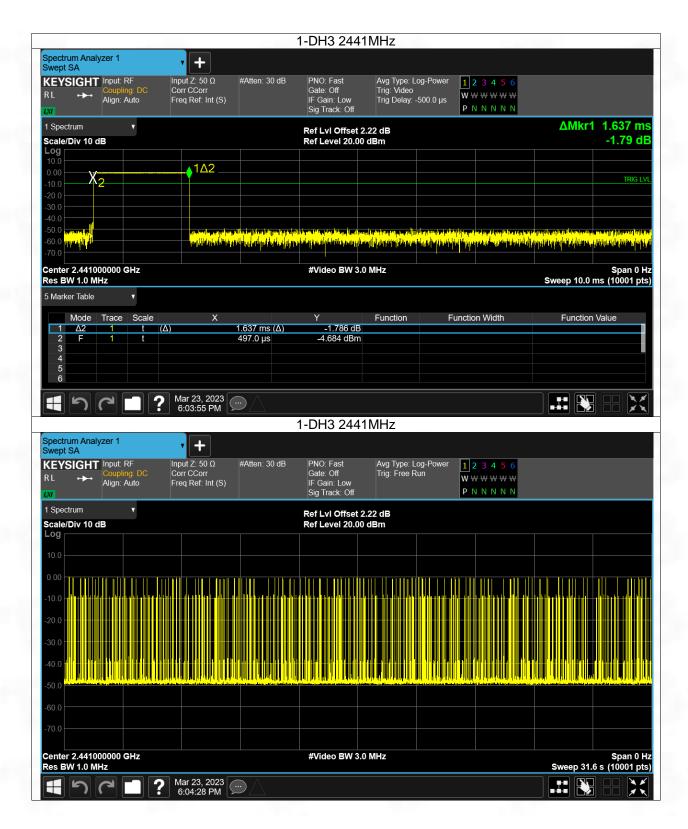


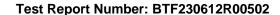




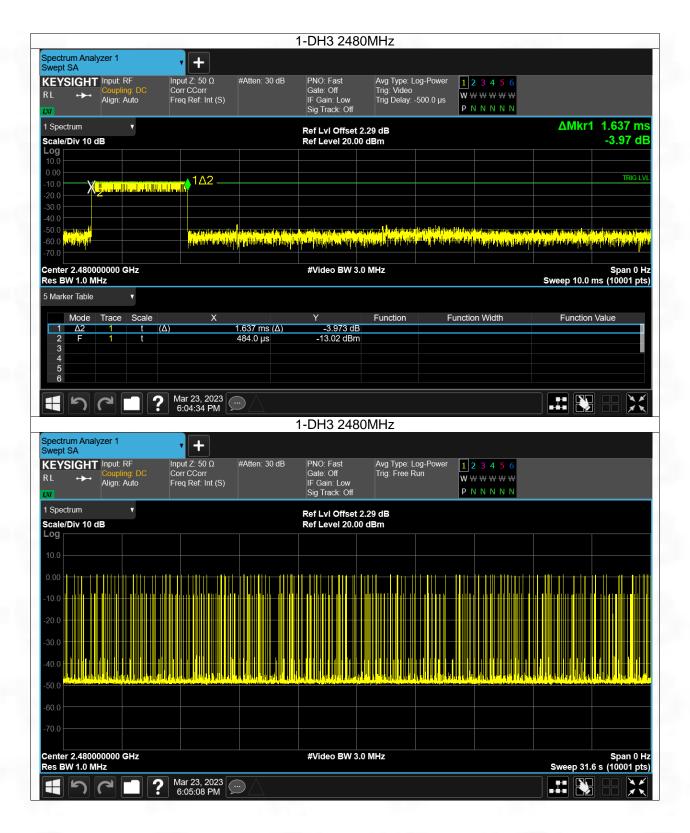


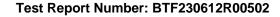




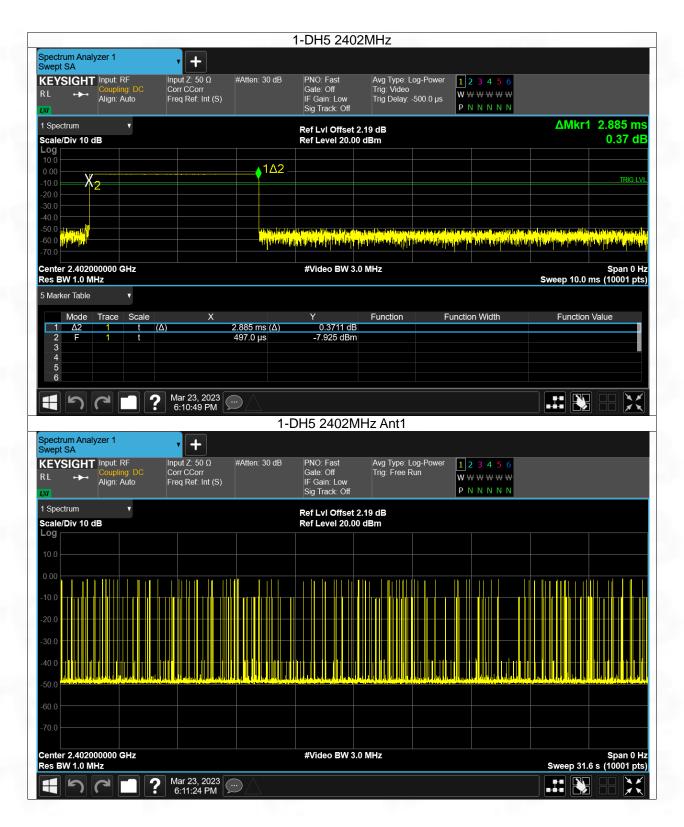




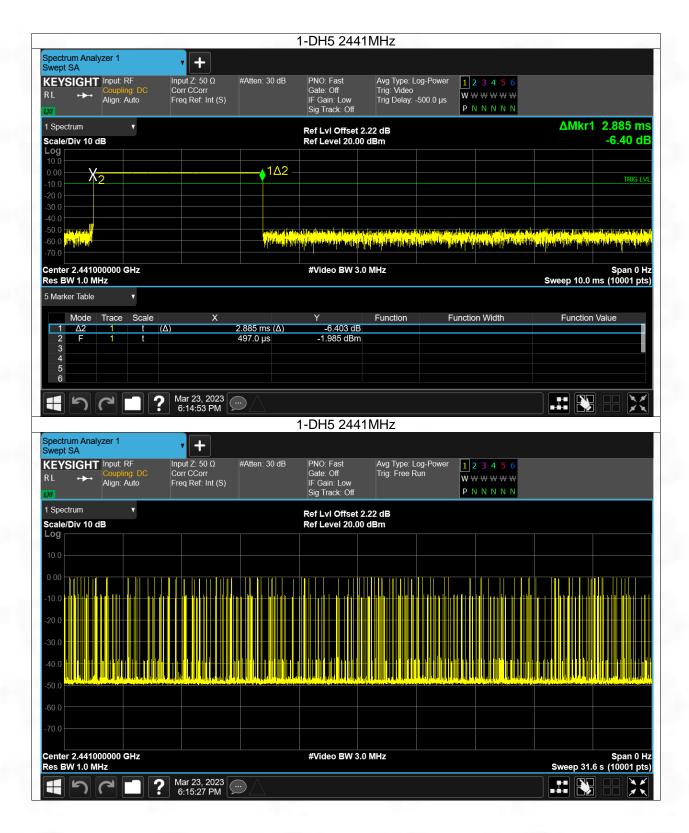


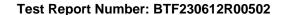




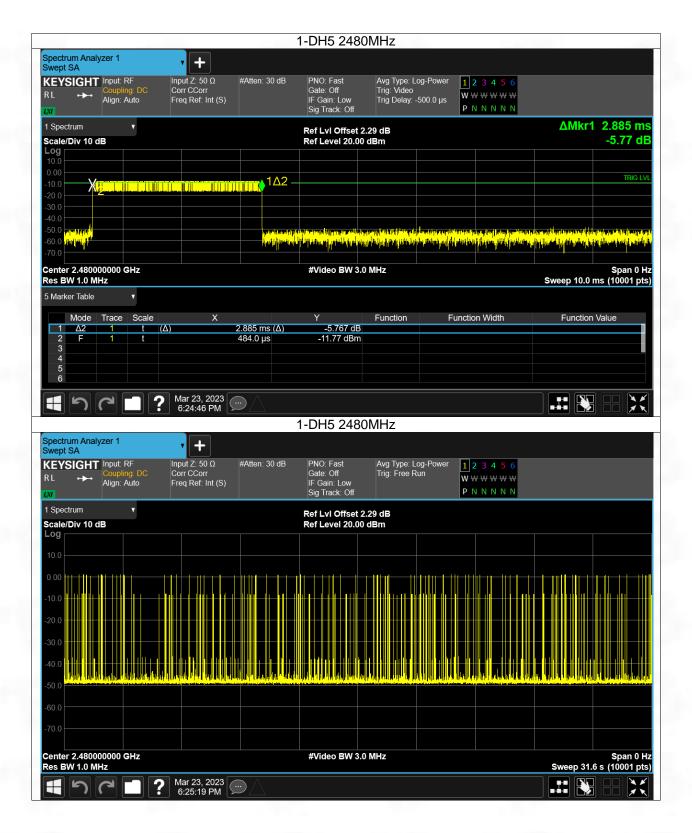


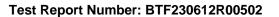






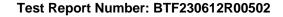








- 6. Unwanted Emissions In Non-restricted Frequency Bands
- 6.1 CSE
- 6.1.1 Test Result(pass)



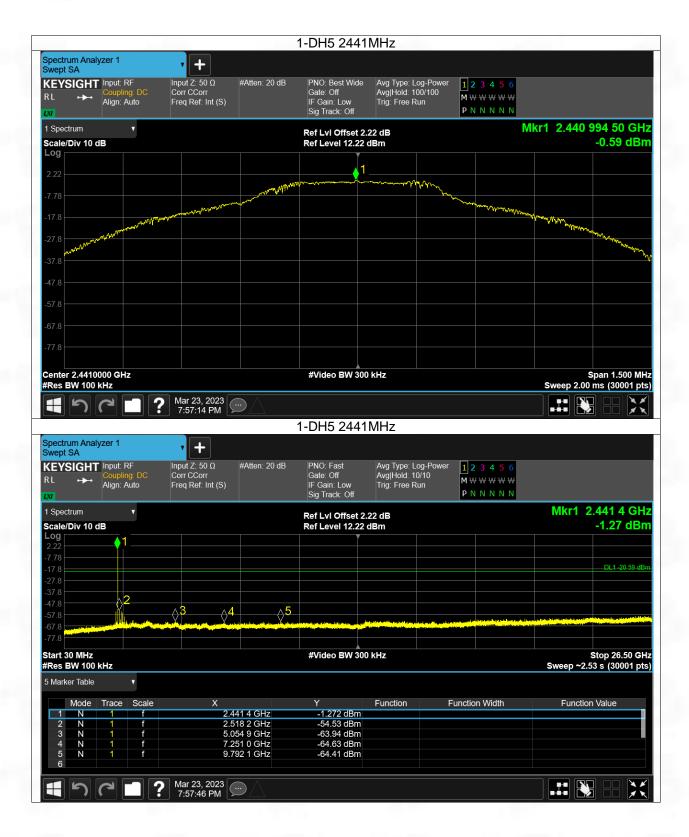


6.1.2 Test Graph

GFSK mode













Pi/4DQPSK mode 2-DH5 2402MHz Spectrum Analyzer 1 Swept SA + Input Z: 50 Ω Corr CCorr Freq Ref: Int (S) PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off KEYSIGHT Input: RF #Atten: 20 dB Avg Type: Log-Power Avg|Hold: 100/100 Trig: Free Run 1 2 3 4 5 6 M ₩ ₩ ₩ ₩ Align: Auto PNNNNN Mkr1 2.401 991 10 GHz 1 Spectrum Ref LvI Offset 2.19 dB Ref Level 12.19 dBm -1.48 dBm Scale/Div 10 dB Loa 47.8 Center 2.4020000 GHz #Video BW 300 kHz Span 1.500 MHz #Res BW 100 kHz Sweep 2.00 ms (30001 pts) Mar 23, 2023 7:53:55 PM 照 2-DH5 2402MHz Spectrum Analyzer 1 Swept SA + PNO: Fast Gate: Off IF Gain: Low Avg Type: Log-Power Avg|Hold: 10/10 Trig: Free Run KEYSIGHT Input: RF Input Z: 50 Ω #Atten: 20 dB 1 2 3 4 5 6 Corr CCorr Freq Ref: Int (S) Align: Auto PNNNNN Mkr1 2.401 7 GHz Ref Lvi Offset 2.19 dB Ref Level 12.19 dBm -1.97 dBm Scale/Div 10 dB 12 47.8 \Diamond^4 Start 30 MHz #Res BW 100 kHz Stop 26.50 GHz Sweep ~2.53 s (30001 pts) #Video BW 300 kHz 5 Marker Table Trace Scale Function Function Width Function Value Mode 2.401 7 GHz -1.968 dBm 2.632 9 GHz 4.822 8 GHz 7.170 7 GHz 9.742 7 GHz ZZZ -56.35 dBm -64.70 dBm -64.43 dBm 3 4 5 6 -64.35 dBm

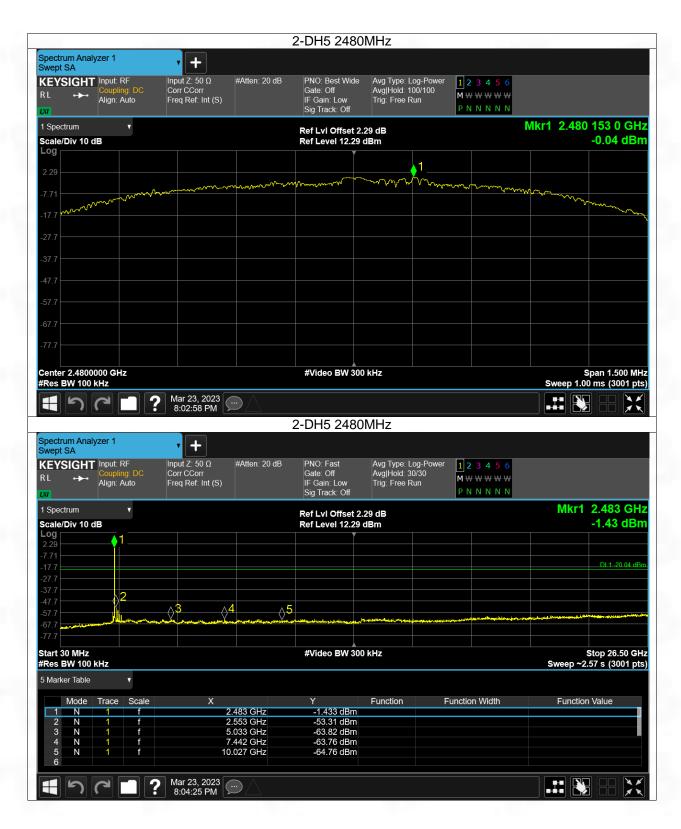
Mar 23, 2023 7:54:28 PM

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8DPSK mode 3-DH5 2402MHz Spectrum Analyzer 1 Swept SA + Input Z: 50 Ω Corr CCorr Freq Ref: Int (S) PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off KEYSIGHT Input: RF #Atten: 20 dB Avg Type: Log-Power Avg|Hold: 100/100 Trig: Free Run 1 2 3 4 5 6 M ₩ ₩ ₩ ₩ Align: Auto Mkr1 2.402 151 70 GHz 1 Spectrum Ref LvI Offset 2.19 dB Ref Level 12.19 dBm -1.40 dBm Scale/Div 10 dB Loa 47.8 Center 2.4020000 GHz #Video BW 300 kHz Span 1.500 MHz #Res BW 100 kHz Sweep 2.00 ms (30001 pts) Mar 23, 2023 7:55:19 PM 照 3-DH5 2402MHz Spectrum Analyzer 1 Swept SA + PNO: Fast Gate: Off IF Gain: Low Avg Type: Log-Power Avg|Hold: 10/10 Trig: Free Run KEYSIGHT Input: RF Input Z: 50 Ω #Atten: 20 dB 1 2 3 4 5 6 Corr CCorr Freq Ref: Int (S) Align: Auto PNNNNN Mkr1 2.401 7 GHz Ref Lvi Offset 2.19 dB Ref Level 12.19 dBm Scale/Div 10 dB -5.37 dBm 2 47.8 **⊘**⁴ Start 30 MHz #Res BW 100 kHz Stop 26.50 GHz Sweep ~2.53 s (30001 pts) #Video BW 300 kHz 5 Marker Table Trace Scale Function Function Width Function Value Mode 2.401 7 GHz -5.370 dBm ZZZ 2.555 2 GHz 4.942 8 GHz 7.128 4 GHz -55.93 dBm -64.20 dBm -64.96 dBm 3 4 5 6

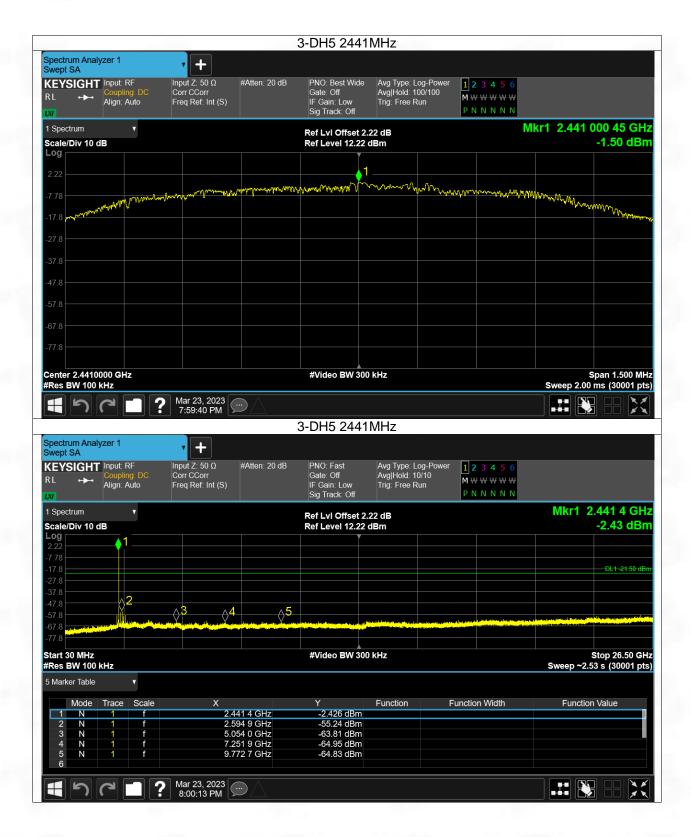
9.805 4 GHz

Mar 23, 2023 7:55:51 PM

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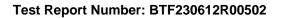
-65.22 dBm







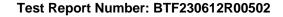






6.2 Band Edge

6.2.1 Test Result(Pass)

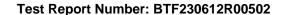




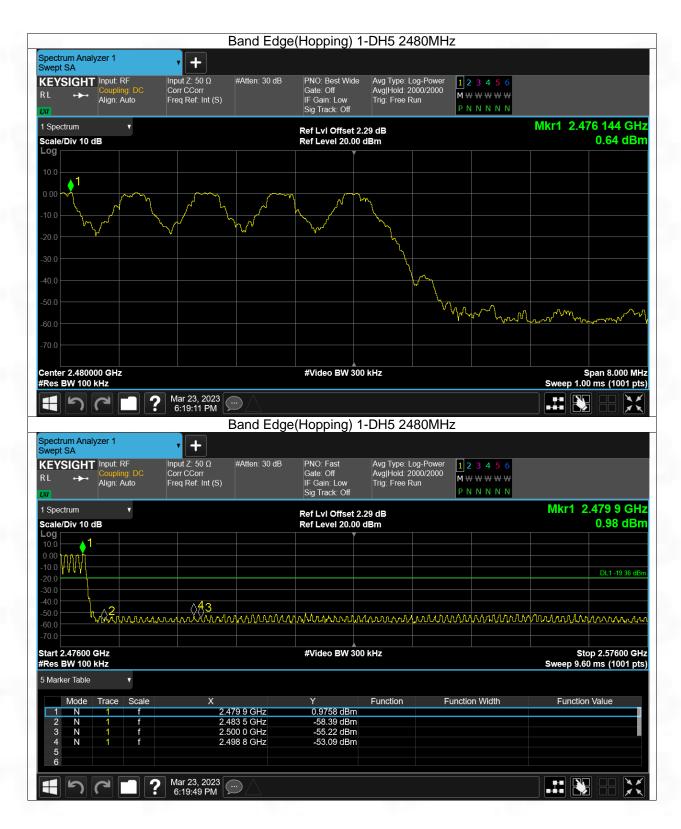
6.2.2 Test Graph

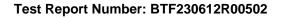
GFSK Modulation (the worst case)















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www.btf-lab.com

-- END OF REPORT --