FCC TEST REPORT

Test report

On Behalf of

MOVEON TECHNOLOGY LIMITED

For

Smart Phone

Model No.: LitePro

FCC ID: 2AFD9LITEPRO

Prepared for :	**MOVEON TECHNOLOGY LIMITED** **World Trade Plaza-A block #3201-3202 Fuhong Road, Futian, Shenzhen, China**
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China**
Date of Test:	**Sep. 26, 2018~Oct. 17, 2018**
Date of Report:	**Oct. 17, 2018**
Report Number:	**HK1809271160E**

TEST RESULT CERTIFICATION

Applicant's name	:	MOVEON TECHNOLOGY LIMITED
Address	:	World Trade Plaza-A block #3201-3202 Fuhong Road, Futian, Shenzhen, China
Manufacture's Name	:	MOVEON TECHNOLOGY LIMITED
Address	:	World Trade Plaza-A block #3201-3202 Fuhong Road, Futian, Shenzhen, China
Product description		Smart Phone
Brand Name		ZOOM
Mode Name		LitePro
Standards	:	FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.10: 2013

Date of Test	:	
Date (s) of performance of tests	:	**Sep. 26, 2018~Oct. 17, 2018**
Date of Issue	:	**Oct. 17, 2018**
Test Result	:	**Pass**

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

Revision	Issue Date	Revisions	Revised By
V1.0	Oct. 17, 2018	Initial Issue	Jason Zhou

TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY 6
1.1. PRODUCT DESCRIPTION 6
1.2. TABLE OF CARRIER FREQUENCYS 7
1.3. RECEIVER INPUT BANDWIDTH 8
1.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE 8
1.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR 8
1.6. RELATED SUBMITTAL(S) / GRANT (S) 9
1.7. TEST METHODOLOGY 9
1.8. SPECIAL ACCESSORIES 9
1.9. EQUIPMENT MODIFICATIONS 9
2. MEASUREMENT UNCERTAINTY 10
3. DESCRIPTION OF TEST MODES 11
4. SYSTEM TEST CONFIGURATION 12
4.1. CONFIGURATION OF EUT SYSTEM 12
4.2. EQUIPMENT USED IN EUT SYSTEM 12
4.3. SUMMARY OF TEST RESULTS 12
5. TEST FACILITY 13
6. PEAK OUTPUT POWER 14
6.1. MEASUREMENT PROCEDURE 14
6.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 14
6.3. LIMITS AND MEASUREMENT RESULT 15
7. 20DB BANDWIDTH 18
8.1. MEASUREMENT PROCEDURE 18
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 18
7.3. LIMITS AND MEASUREMENT RESULTS 18
8. CONDUCTED SPURIOUS EMISSION 21
8.1. MEASUREMENT PROCEDURE 21
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) 21
8.3. MEASUREMENT EQUIPMENT USED 22
8.4. LIMITS AND MEASUREMENT RESULT 22
9. RADIATED EMISSION 28
9.1. MEASUREMENT PROCEDURE 28
9.2. TEST SETUP 29
9.3. LIMITS AND MEASUREMENT RESULT 30
9.4. TEST RESULT 31

10. BAND EDGE EMISSION 34
10.1. MEASUREMENT PROCEDURE 34
10.2. TEST SET-UP 34
10.3. RADIATED TEST RESULT 35
10.4 CONDUCTED TEST RESULT 36
11. NUMBER OF HOPPING FREQUENCY 38
11.1. MEASUREMENT PROCEDURE 38
11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION) 38
11.3. MEASUREMENT EQUIPMENT USED 38
11.4. LIMITS AND MEASUREMENT RESULT 38
12. TIME OF OCCUPANCY (DWELL TIME) 39
12.1. MEASUREMENT PROCEDURE 39
12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION) 39
12.3. MEASUREMENT EQUIPMENT USED 39
12.4. LIMITS AND MEASUREMENT RESULT 40
13. FREQUENCY SEPARATION 41
13.1. MEASUREMENT PROCEDURE 41
13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION) 41
13.3. MEASUREMENT EQUIPMENT USED 41
13.4. LIMITS AND MEASUREMENT RESULT 41
14. FCC LINE CONDUCTED EMISSION TEST 42
15.1. LIMITS OF LINE CONDUCTED EMISSION TEST 42
14.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST 42
14.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST 43
14.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST 43
14.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST 44
APPENDIX A: PHOTOGRAPHS OF TEST SETUP 46

1. VERIFICATION OF CONFORMITY

1.1. PRODUCT DESCRIPTION

Equipment	Smart Phone
Model Name	LitePro
Hardware Version	7130D-MMI-V10
Software Version	Zoom_LitePro_001_20180903
FCC ID	2AFD9LITEPRO
Antenna Type	PIFA Antenna
Antenna Gain	1.0dBi
BT Operation frequency	2.402 GHz to 2.480GHz
Number of Channels	79(For BR/EDR)
Modulation Type	GFSK, π /4-DQPSK, 8DPSK
Power Supply	DC3.7V by Battery

1.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

1.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHZ,In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection(e.g. single of multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

1.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a 79 hopping sequence in data mode:
40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67
56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59
72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75
09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06
01, 51, 03, 55, 05, 04

1.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:
1. LAP/UAP of the master of the connection.
2. Internal master clock

The LAP(lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP(upper address part) are the 24MSB's of the 48BD_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For ehavior zation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us.The clock has a cycle of about one day(23h30).In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire. LAP(24 bits),4LSB's(4bits)(Input 1) and the 27MSB's of the clock(Input 2) are used. With this input values different mathematical procedures(permutations, additions, XOR-operations)are performed to generate te Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following ehavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended.

The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth clock has a different value, because the period between the two transmission is longer(and it Cannot be shorter) than the minimum resolution of the clock(312.5us).The hopping sequence will always Differ from the first one.

1.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AFD9LITEPRO** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

1.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.8. SPECIAL ACCESSORIES

Refer to section 5.2.

1.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2. MEASUREMENT UNCERTAINTY

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

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

3. DESCRIPTION OF TEST MODES

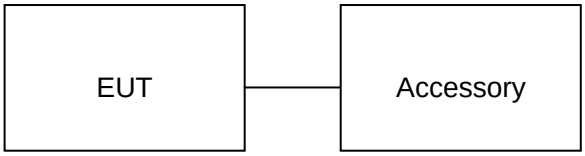
NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel π /4-DQPSK
5	Middle channel π /4-DQPSK
6	High channel π /4-DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	Normal Hopping

Note:
1. All the test modes can be supply by Built-in Li-ion battery, only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

4. SYSTEM TEST CONFIGURATION

4.1. CONFIGURATION OF EUT SYSTEM

Configuration:



4.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Smart Phone	LitePro	2AFD9LITEPRO	EUT
2	Adapter	LitePro	DC 5.0V 1A	Accessory
3	Battery	LitePro	DC 3.7V/2500mAh	Accessory
4	Earphone	N/A	N/A	Accessory
5	USB	N/A	N/A	Accessory

4.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Peak Output Power	Compliant
§15.247	20 dB Bandwidth	Compliant
§15.247	Spurious Emission	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Power Line Conduction Emission	Compliant
§15.247	Number of Hopping Frequency	Compliant
§15.247	Time of Occupancy	Compliant
§15.247	Frequency Separation	Compliant

5. TEST FACILITY

Site	Shenzhen HUAK Testing Technology Co., Ltd.
Location	1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China
Designation Number	CN1229
Test Firm Registration Number : 616276	

ALL TEST EQUIPMENT LIST

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Power Sensor	Agilent	E9327A	HKE-113	Dec. 28, 2018
RF cable	Times	1-40G	HKE-034	Dec. 28, 2018
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2018
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 28, 2018
Signal generator	Agilent	N5183A	HKE-071	Dec. 28, 2018
Receiver	R&S	ESCI-7	HKE-010	Dec. 28, 2018
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2018
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 28, 2018
Preamplifier	Agilent	83051A	HKE-016	Dec. 28, 2018
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2018
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 28, 2018
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 28, 2018
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 28, 2018
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A
RF cable (9KHz-1GHz)	Times	381806-001	N/A	N/A
RF cable	Times	1-40G	HKE-034	Dec. 28, 2018

6. PEAK OUTPUT POWER

6.1. MEASUREMENT PROCEDURE

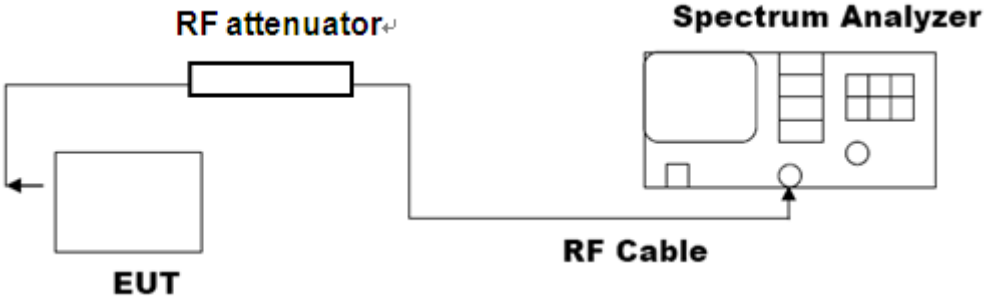
For peak power test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, middle and the bottom operation frequency individually.
3. 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.
4. Record the maximum power from the Spectrum Analyzer.

Note：The EUT was tested according for compliance ANSI C63.10 (2013) requirements.

6.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

PEAK POWER TEST SETUP



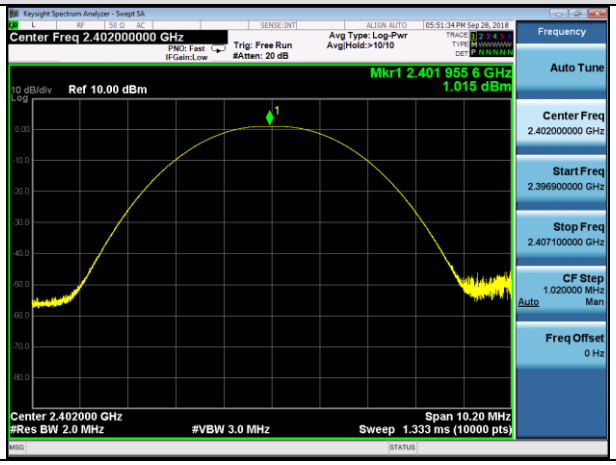
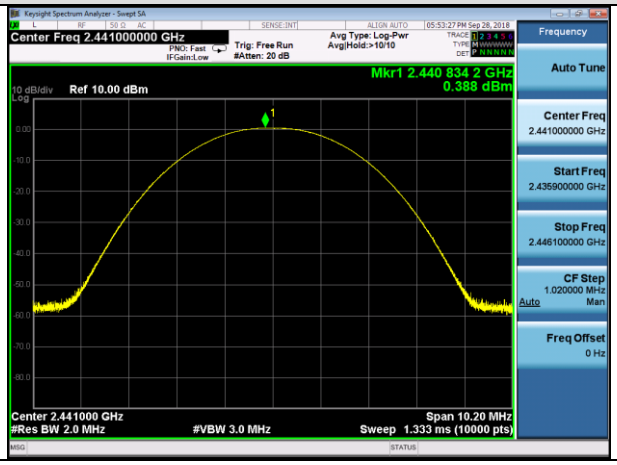
6.3. LIMITS AND MEASUREMENT RESULT

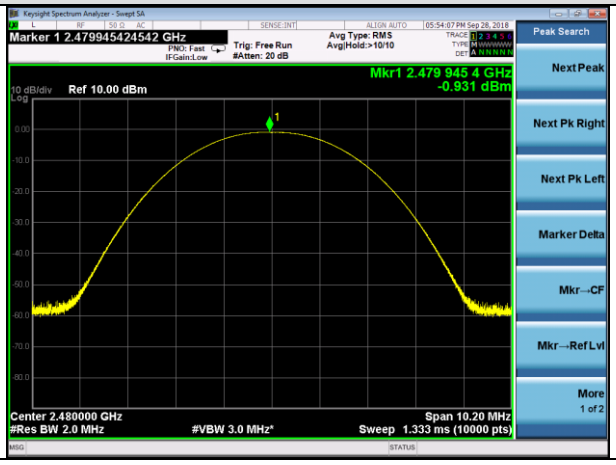
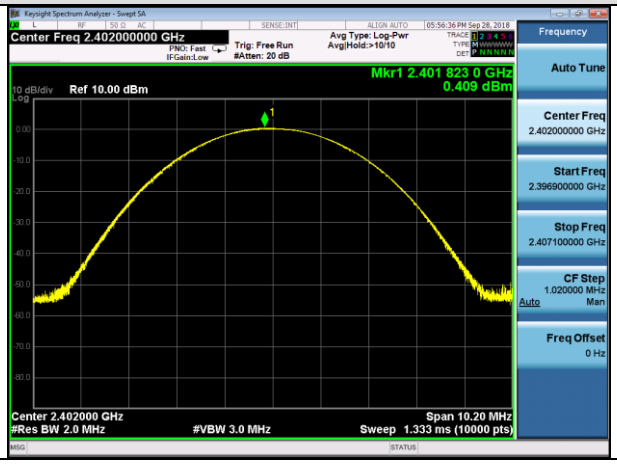
Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
GFSK	2.402	1.015	30	Pass
	2.441	0.388	30	Pass
	2.480	-0.931	30	Pass

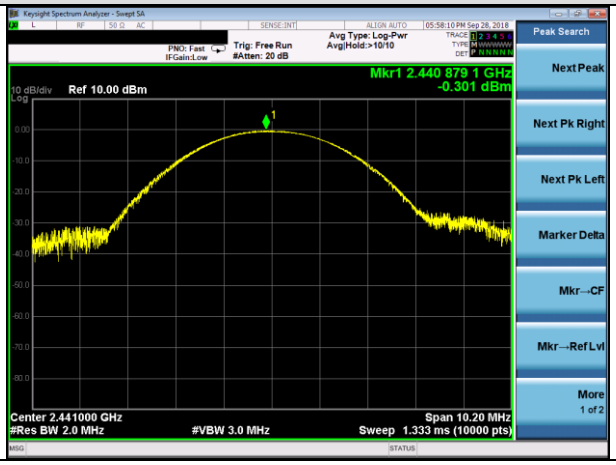
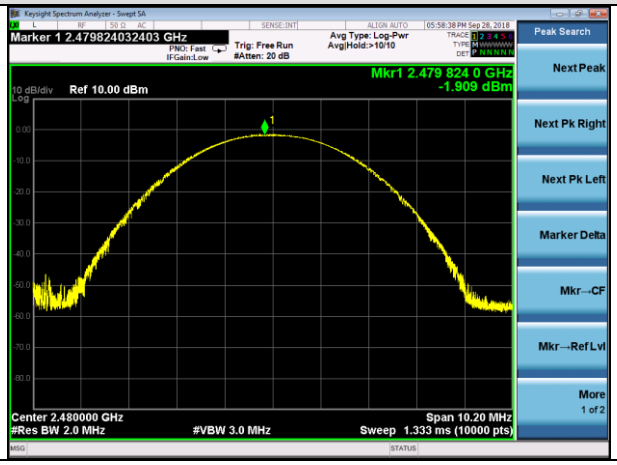
Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
π /4-DQPSK	2.402	0.409	30	Pass
	2.441	-0.301	30	Pass
	2.480	-1.909	30	Pass

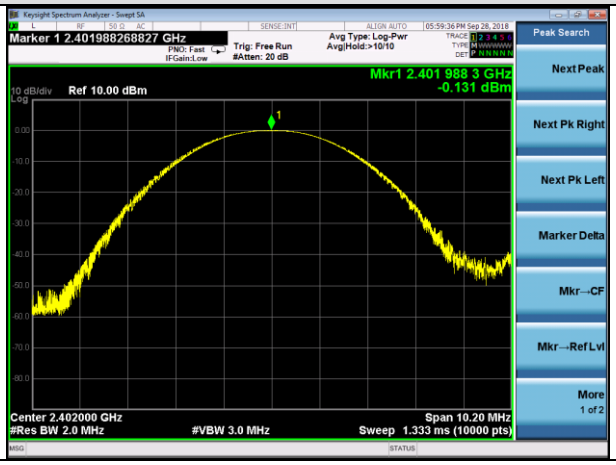
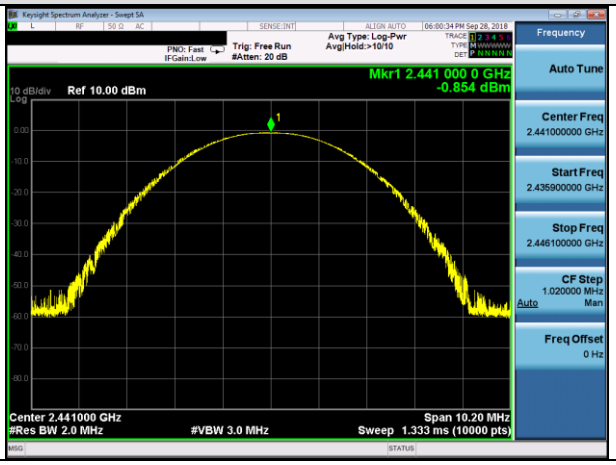
Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
8DPSK	2.402	-0.131	30	Pass
	2.441	-0.854	30	Pass
	2.480	-1.866	30	Pass

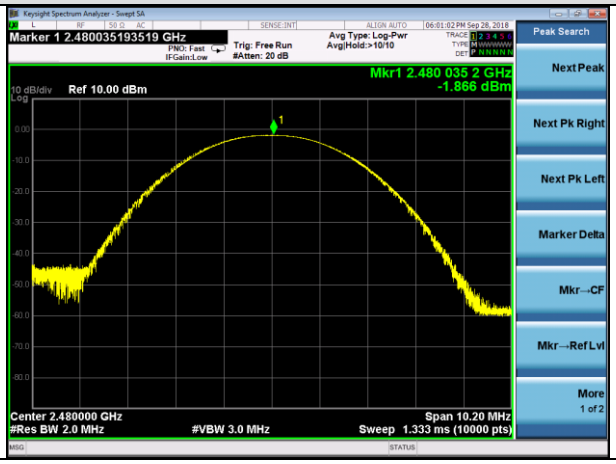
Test Graph

GFSK-LCH	GFSK-MCH
	

GFSK-HCH	π/4DQPSK-LCH
	

π/4DQPSK-MCH	π/4DQPSK-HCH
	

8DPSK-LCH	8DPSK-MCH
	

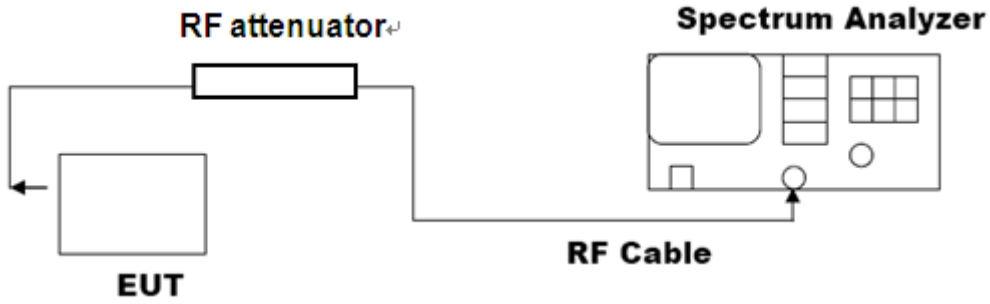
8DPSK-HCH	
	

7. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel
   RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

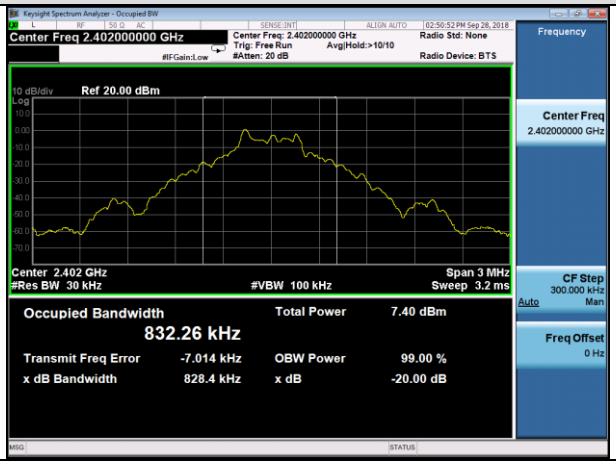
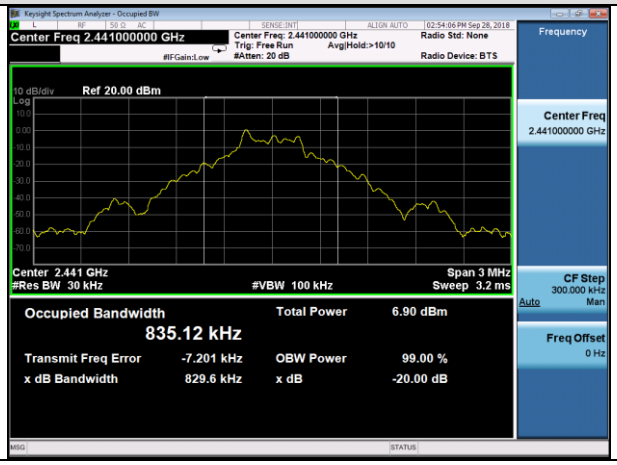
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

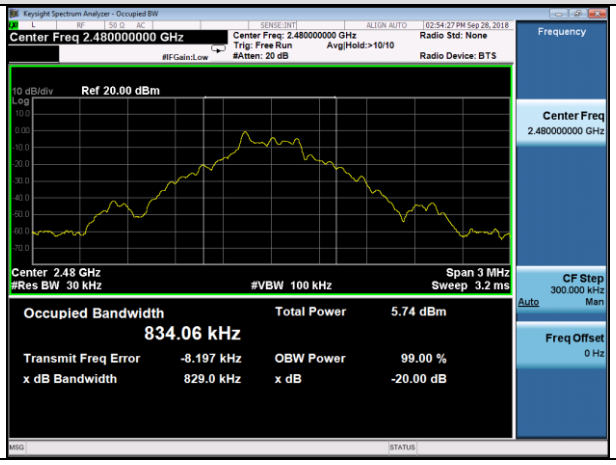
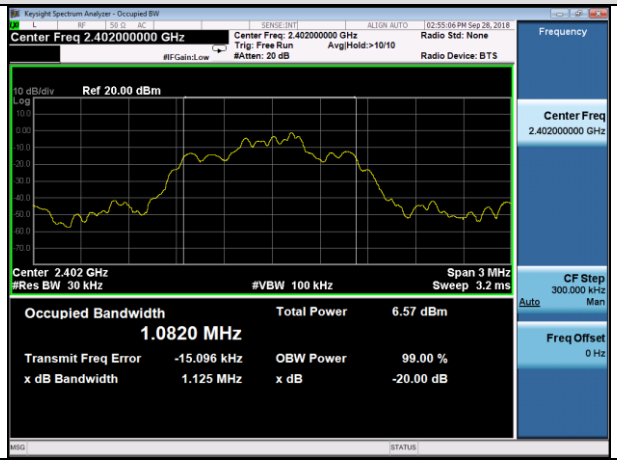


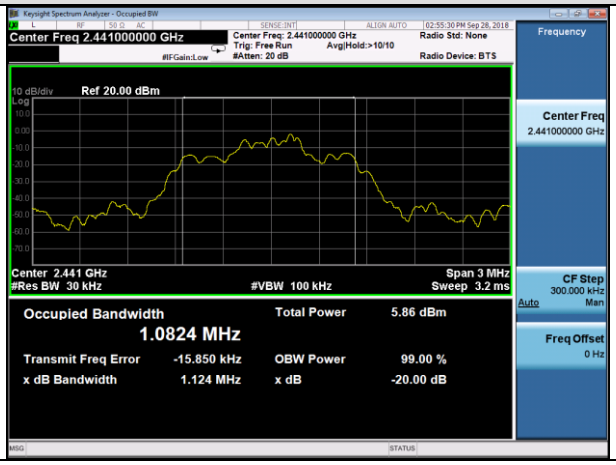
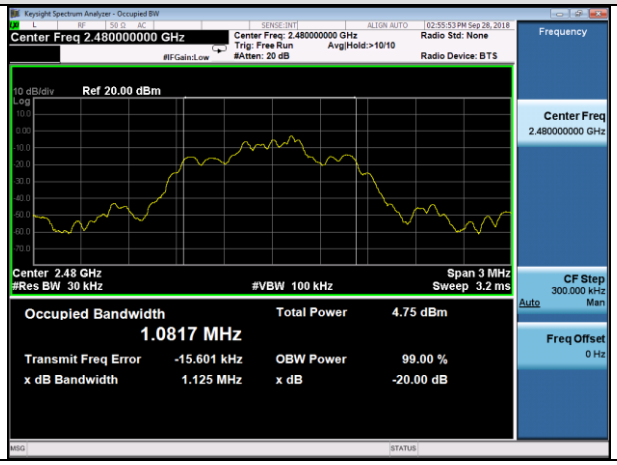
7.3. LIMITS AND MEASUREMENT RESULTS

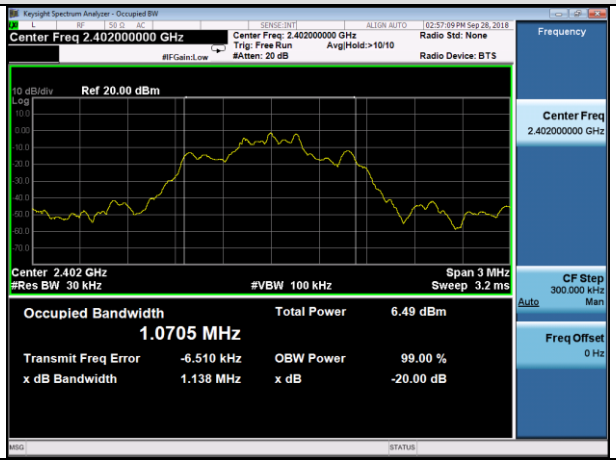
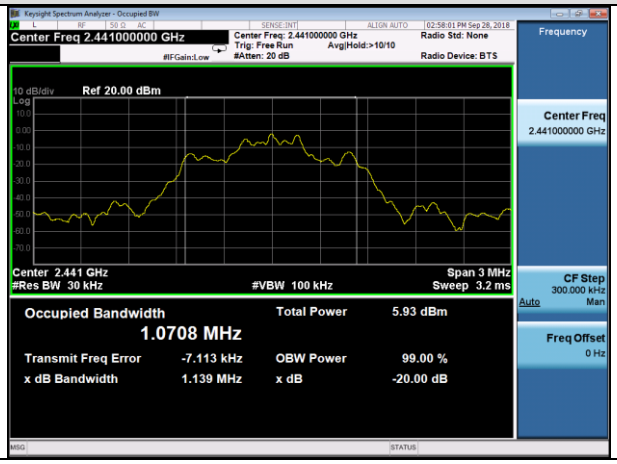
Mode	Channel.	20dB Bandwidth [KHz]	Verdict
GFSK	LCH	828.4	PASS
GFSK	MCH	829.6	PASS
GFSK	HCH	829.0	PASS
π/4DQPSK	LCH	1.125	PASS
π/4DQPSK	MCH	1.124	PASS
π/4DQPSK	HCH	1.125	PASS
8DPSK	LCH	1.138	PASS
8DPSK	MCH	1.139	PASS
8DPSK	HCH	1.136	PASS

Test Graph

GFSK-LCH	GFSK-MCH
	

GFSK-HCH	π/4DQPSK-LCH
	

π/4DQPSK-MCH	π/4DQPSK-HCH
	

8DPSK-LCH	8DPSK-MCH
	

8DPSK-HCH