FCC TEST REPORT

Test report

On Behalf of

Shenzhen Huafurui Technology Co., Ltd.

For

Smart Phone

Model No.: QUEST

FCC ID: 2AHZ5QUEST

Prepared for :	**Shenzhen Huafurui Technology Co., Ltd.** **Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. 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:	**Dec. 28, 2018~Feb. 18, 2019**
Date of Report:	**Feb. 18, 2019**
Report Number:	**HK1812211953E**

TEST RESULT CERTIFICATION

Applicant's name ..... :	Shenzhen Huafurui Technology Co., Ltd.
Address..... :	Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China
Manufacture's Name..... :	Shenzhen Huafurui Technology Co., Ltd.
Address..... :	Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China
Factory's Name	Shenzhen Huafurui Technology Co., Ltd.
Address..... :	Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China
Product description	Smart Phone
Brand Name	CUBOT
Mode Name	QUEST
Standards ..... :	FCC Rules and Regulations Part 15 Subpart C Section 15.247ANSI C63.10: 2013

Date of Test ..... :	
Date (s) of performance of tests..... :	**Dec. 28, 2018~Feb. 18, 2019**
Date of Issue ..... :	**Feb. 18, 2019**
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	Feb. 18, 2019	Initial Issue	Jason Zhou

TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY

1.1. PRODUCT DESCRIPTION

Equipment	Smart Phone
Model Name	QUEST
Hardware Version	A799_MAIN_PCB_V1.1
Software Version	CUBOT_CUBOT_QUEST_8123C_V01_20181122
FCC ID	2AHZ5QUEST
Antenna Type	PIFA Antenna
Antenna Gain	3.90dBi
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	DC3.85V 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: 2AHZ5QUEST** 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

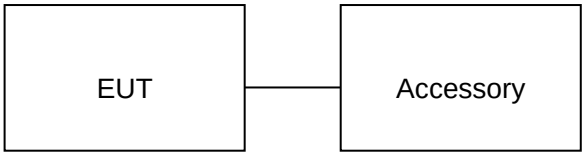
NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel π /4-DQPSK
5	Middle channel π /4-DQPSK
6	High channel π /4-DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	Normal Hopping

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	QUEST	2AHZ5QUEST	EUT
2	Adapter	QUEST	DC 5.0V 2A	Accessory
3	Battery	QUEST	DC3.85V/ 4000mAh	Accessory
4	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

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power meter	Agilent	E4417B	HKE-107	Dec. 29, 2017	Dec. 28 2018
Power meter	Agilent	E4417B	HKE-107	Dec. 27, 2018	Dec. 26, 2019
Power Sensor	Agilent	E9327A	HKE-113	Dec. 29, 2017	Dec. 28 2018
Power Sensor	Agilent	E9327A	HKE-113	Dec. 27, 2018	Dec. 26, 2019
RF cable	Times	1-40G	HKE-034	Dec. 29, 2017	Dec. 28 2018
RF cable	Times	1-40G	HKE-034	Dec. 27, 2018	Dec. 26, 2019
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 29, 2017	Dec. 28 2018
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 27, 2018	Dec. 26, 2019
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 29, 2017	Dec. 28 2018
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	Dec. 26, 2019
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 29, 2017	Dec. 28 2018
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 27, 2018	Dec. 26, 2019
Signal generator	Agilent	N5183A	HKE-071	Dec. 29, 2017	Dec. 28 2018
Signal generator	Agilent	N5183A	HKE-071	Dec. 27, 2018	Dec. 26, 2019
Receiver	R&S	ESCI-7	HKE-010	Dec. 29, 2017	Dec. 28 2018
Receiver	R&S	ESCI-7	HKE-010	Dec. 27, 2018	Dec. 26, 2019
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 29, 2017	Dec. 28 2018
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	Dec. 26, 2019
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 29, 2017	Dec. 28 2018
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 27, 2018	Dec. 26, 2019
Preamplifier	Agilent	83051A	HKE-016	Dec. 29, 2017	Dec. 28 2018
Preamplifier	Agilent	83051A	HKE-016	Dec. 27, 2018	Dec. 26, 2019
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 29, 2017	Dec. 28 2018
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 27, 2018	Dec. 26, 2019
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 29, 2017	Dec. 28 2018

Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 27, 2018	Dec. 26, 2019
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 29, 2017	Dec. 28 2018
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 27, 2018	Dec. 26, 2019
Antenna Mast	Keleto	CC-A-4M	N/A	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 27, 2018	Dec. 26, 2019
RF cable	Times	1-40G	HKE-034	Dec. 27, 2018	Dec. 26, 2019

6. PEAK OUTPUT POWER

6.1. MEASUREMENT PROCEDURE

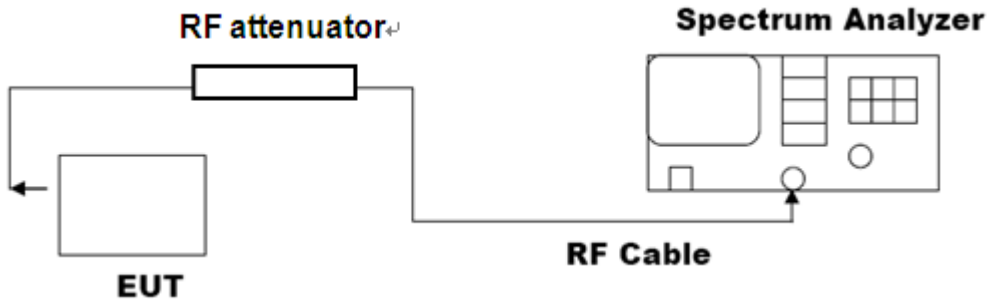
For peak power test:

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



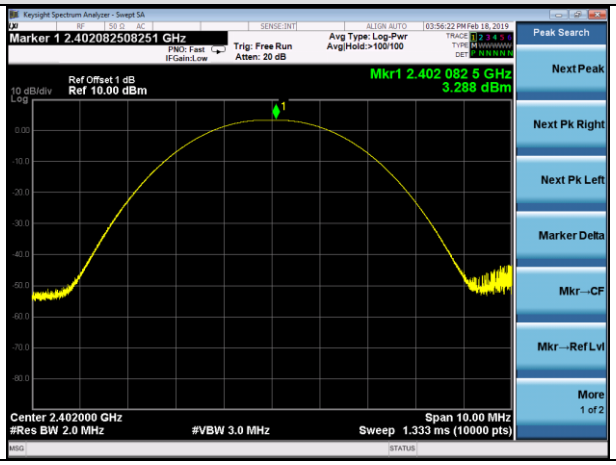
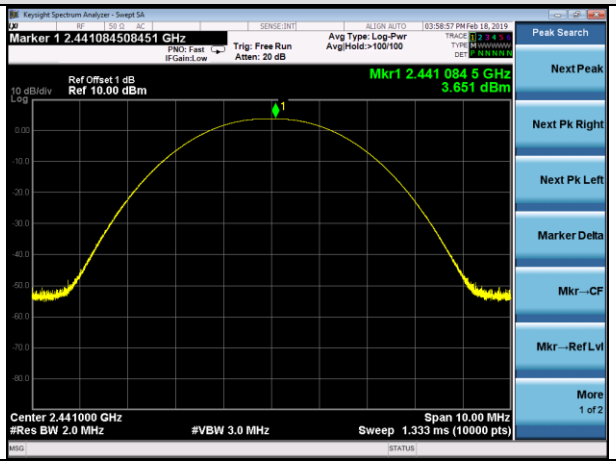
6.3. LIMITS AND MEASUREMENT RESULT

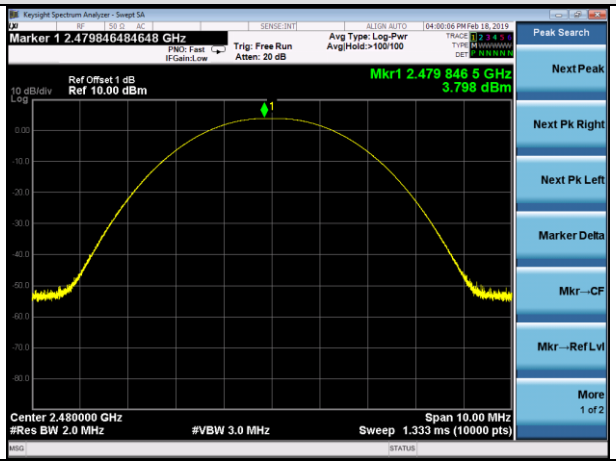
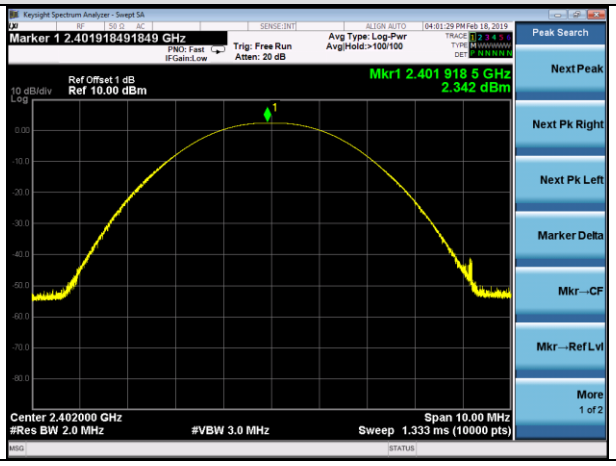
Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
GFSK	2.402	3.288	30	Pass
	2.441	3.651	30	Pass
	2.480	3.798	30	Pass

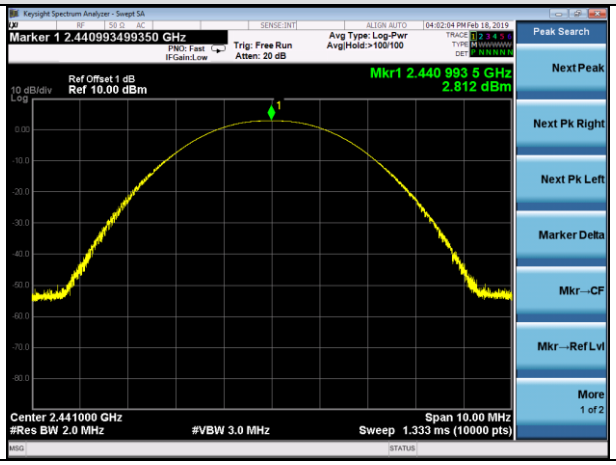
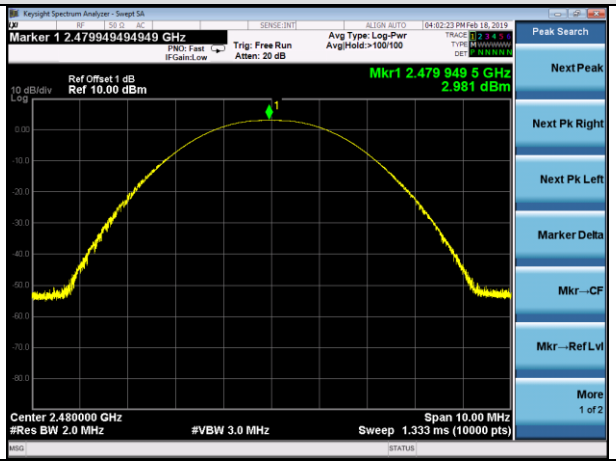
Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
π /4-DQPSK	2.402	2.342	30	Pass
	2.441	2.812	30	Pass
	2.480	2.981	30	Pass

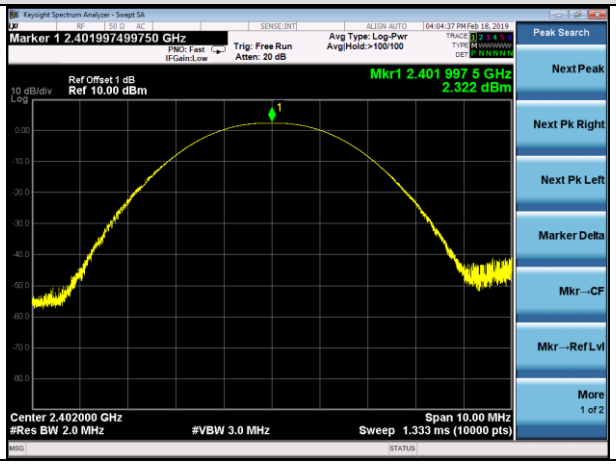
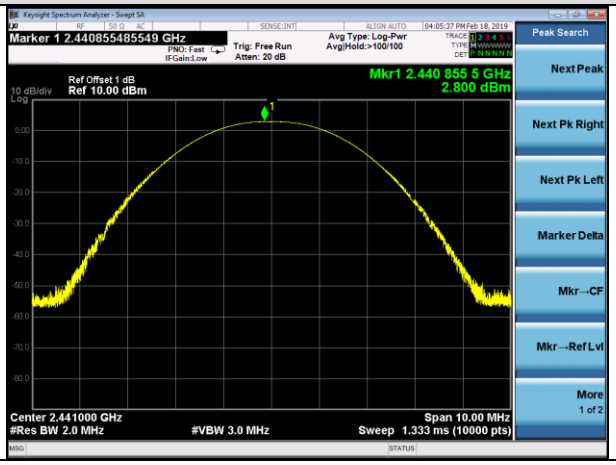
Mode	Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
8DPSK	2.402	2.322	30	Pass
	2.441	2.800	30	Pass
	2.480	2.950	30	Pass

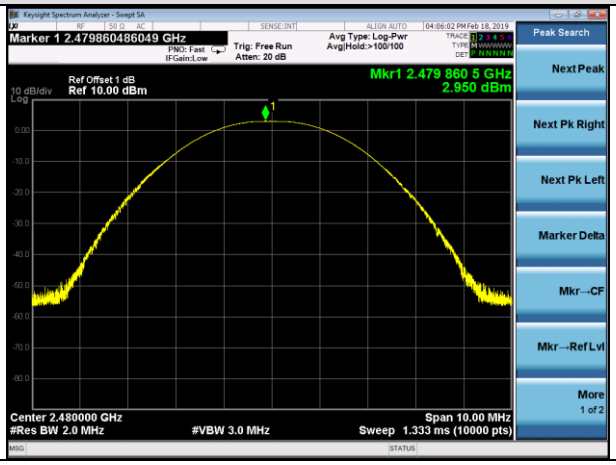
Test Graph

GFSK-LCH	GFSK-MCH
	

GFSK-HCH	π/4DQPSK-LCH
	

π/4DQPSK-MCH	π/4DQPSK-HCH
	

8DPSK-LCH	8DPSK-MCH
	

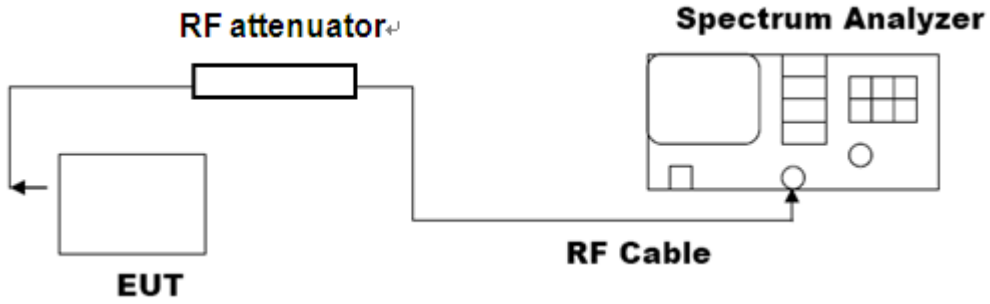
8DPSK-HCH	
	

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.

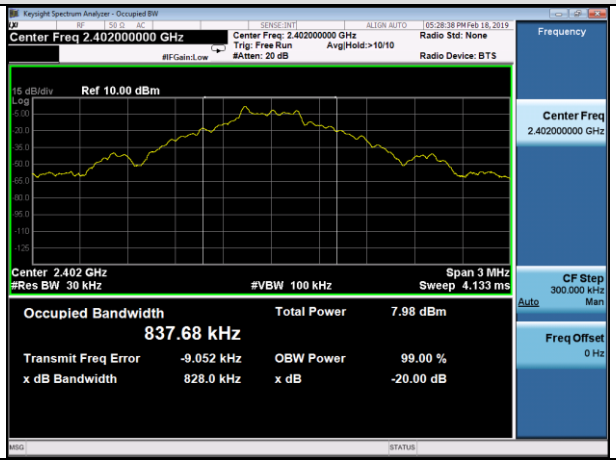
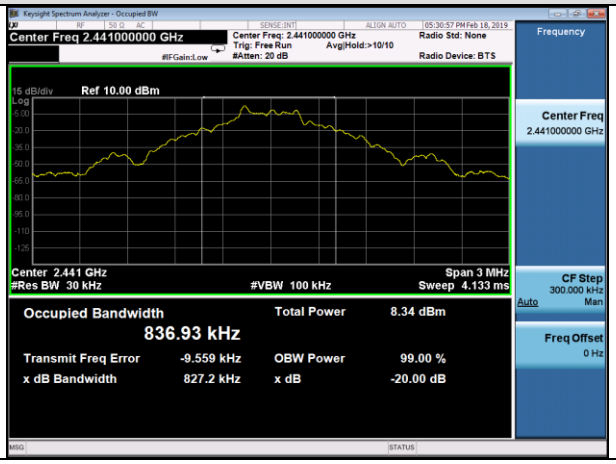
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

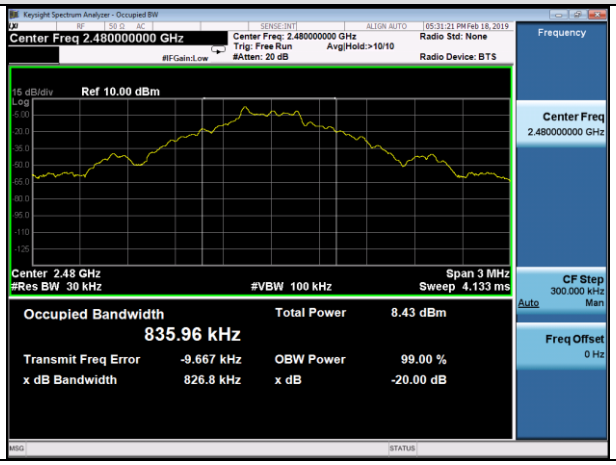
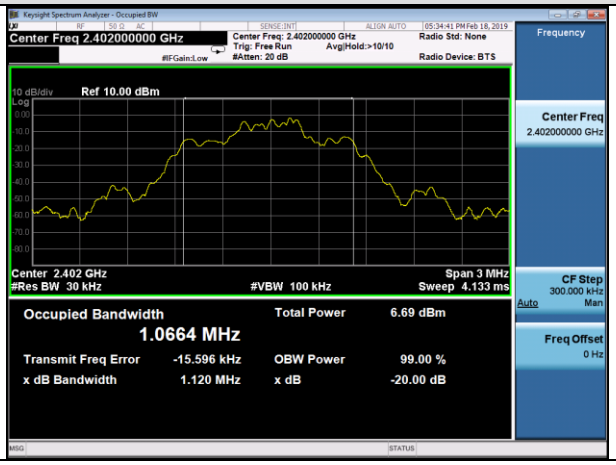


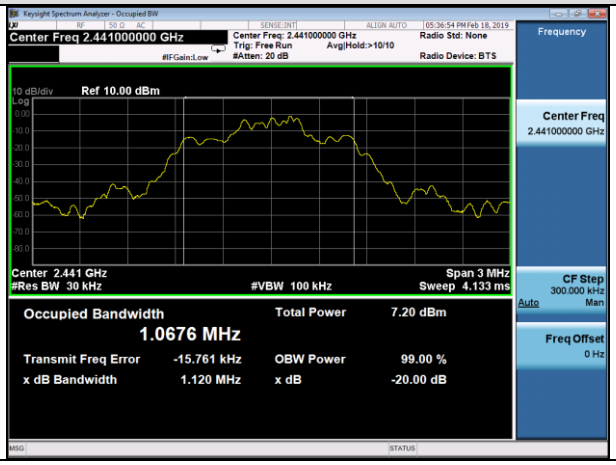
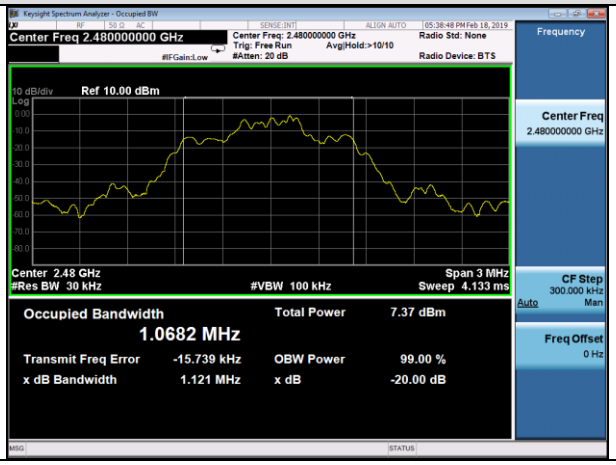
7.3. LIMITS AND MEASUREMENT RESULTS

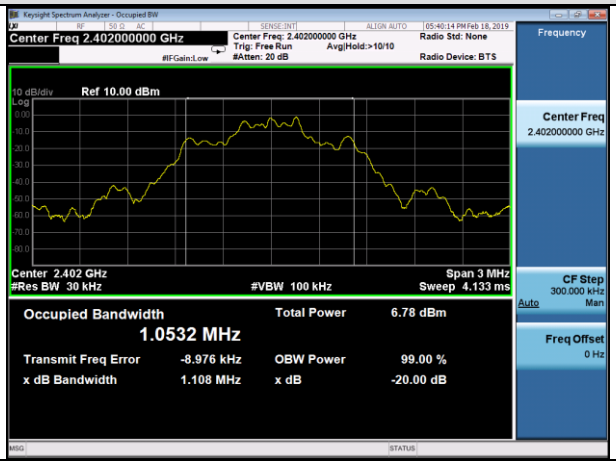
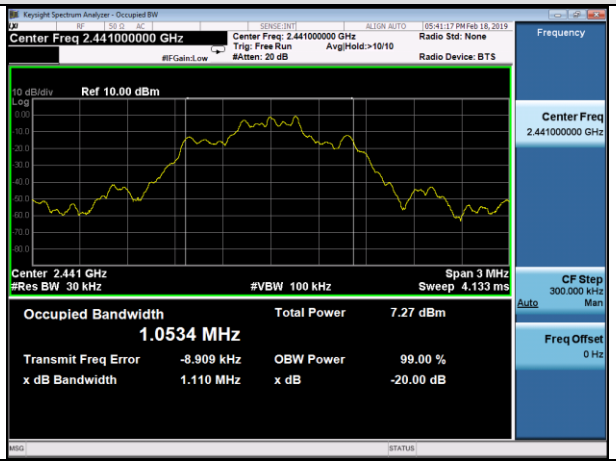
Mode	Channel.	20dB Bandwidth [KHz]	Verdict
GFSK	LCH	828.0	PASS
GFSK	MCH	827.2	PASS
GFSK	HCH	826.8	PASS
π/4DQPSK	LCH	1120	PASS
π/4DQPSK	MCH	1120	PASS
π/4DQPSK	HCH	1121	PASS
8DPSK	LCH	1108	PASS
8DPSK	MCH	1110	PASS
8DPSK	HCH	1111	PASS

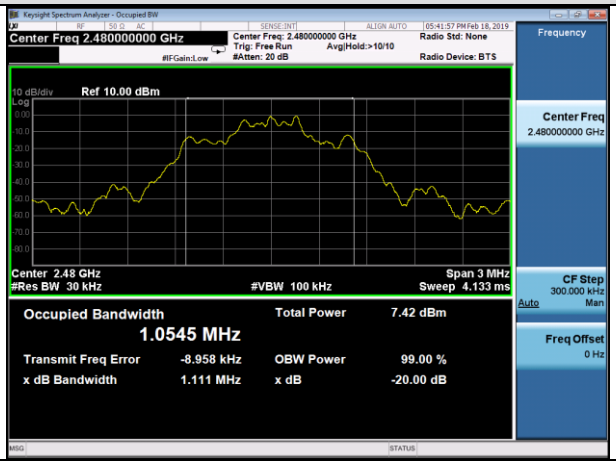
Test Graph

GFSK-LCH	GFSK-MCH
	

GFSK-HCH	π/4DQPSK-LCH
	

π/4DQPSK-MCH	π/4DQPSK-HCH
	

8DPSK-LCH	8DPSK-MCH
	

8DPSK-HCH	
	

8. CONDUCTED SPURIOUS EMISSION

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 the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
   RBW = 100 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according for compliance ANSI C63.10 (2013) requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW＞RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW＞RBW) are conform to the requirement.

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

The same as described in section 8.2

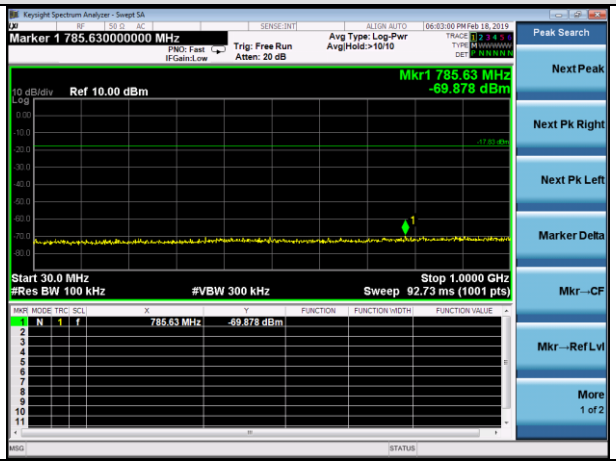
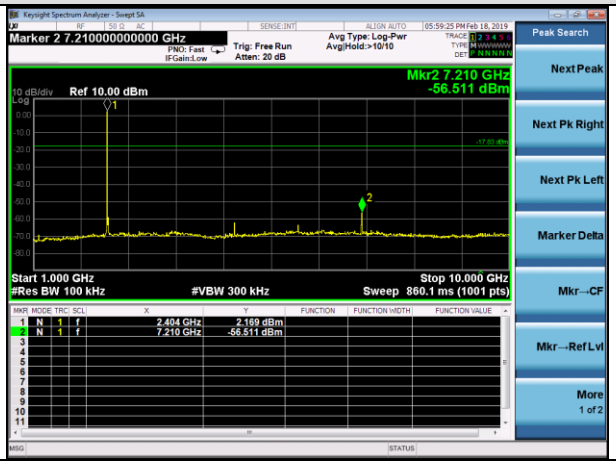
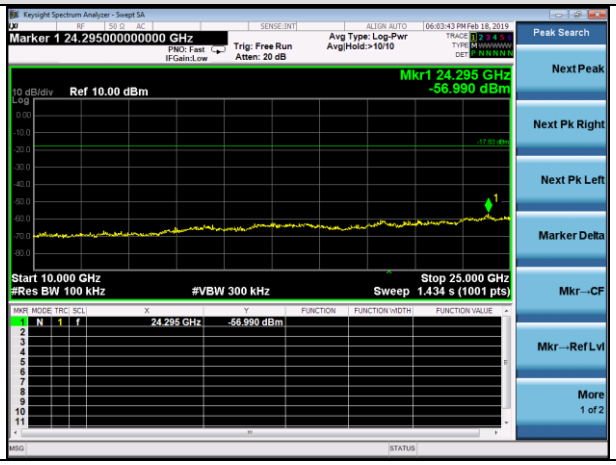
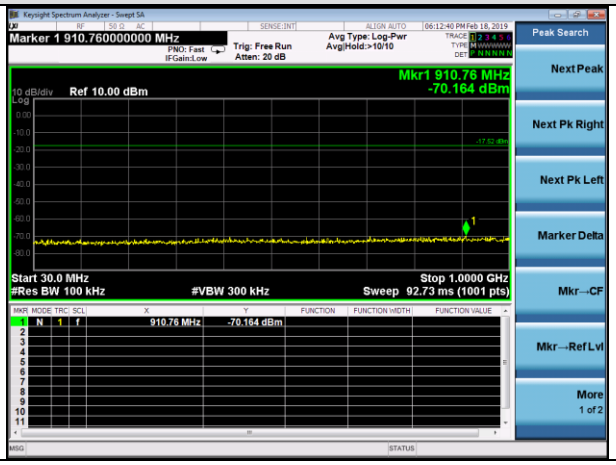
8.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

8.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Criteria**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation 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))	Refer Test Graph	PASS

Test Graph

GFSK-LCH	GFSK-LCH
	
GFSK-LCH	GFSK-MCH
	
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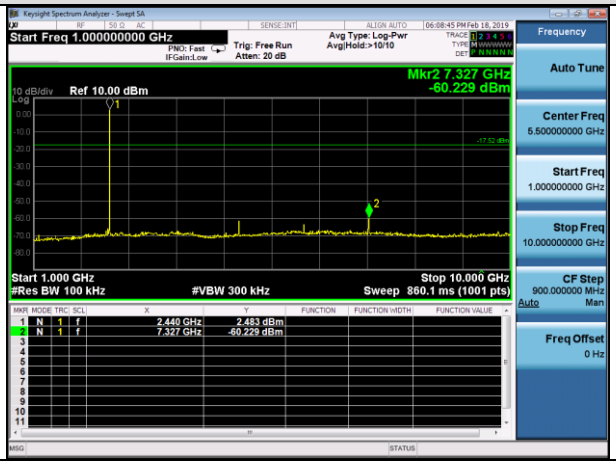	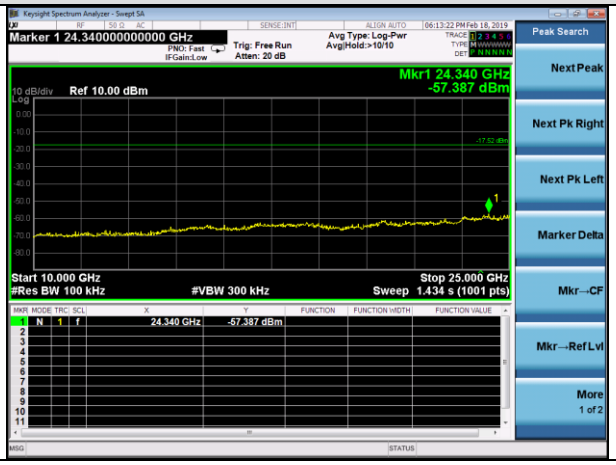

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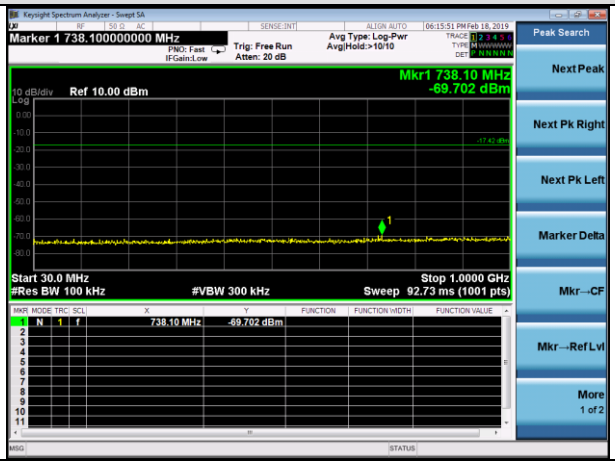
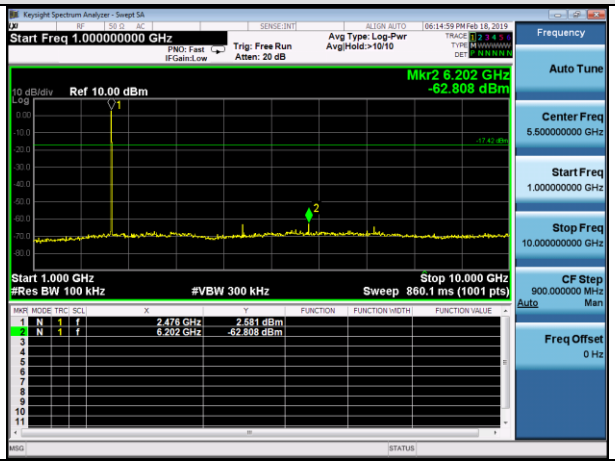
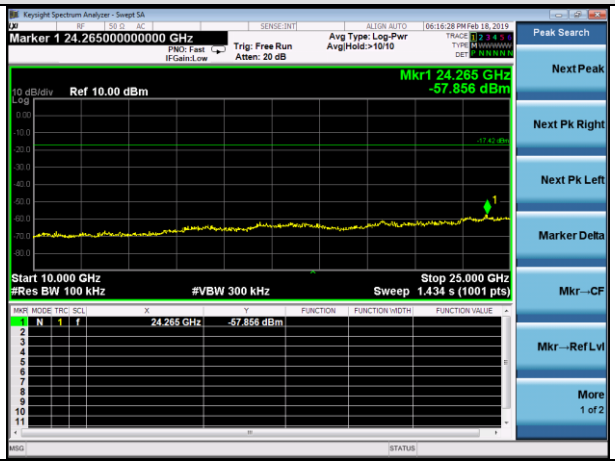
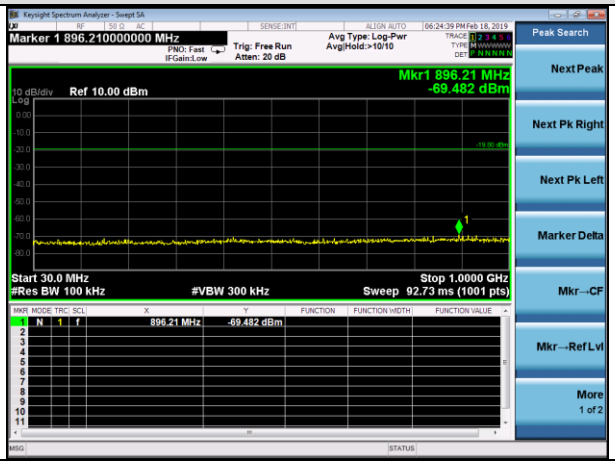
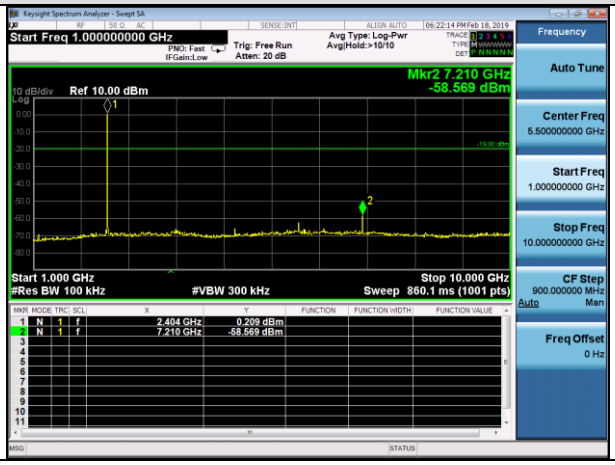
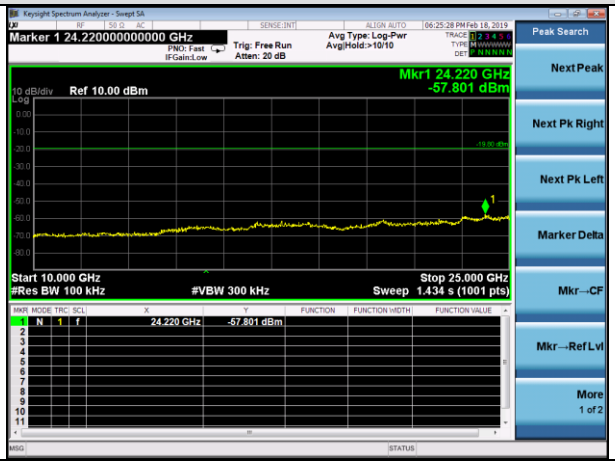
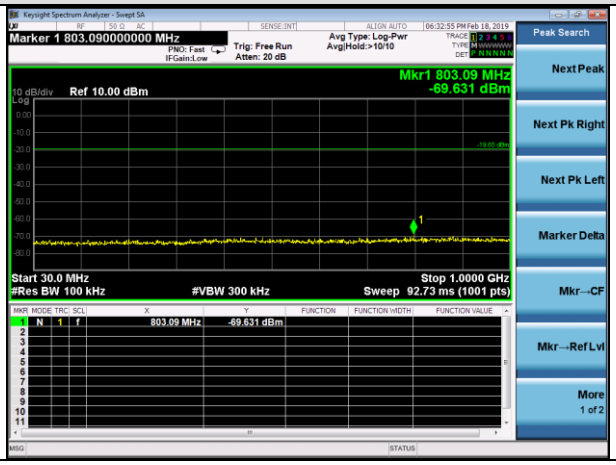
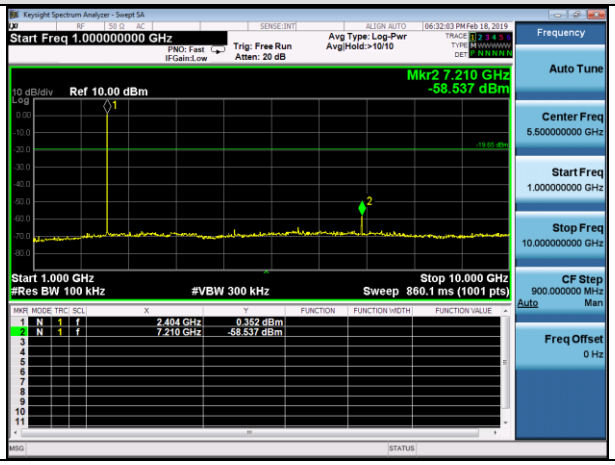
	
GFSK-HCH	**π/4DQPSK-LCH**
	
π/4DQPSK-LCH	**π/4DQPSK-LCH**
	

π/4DQPSK-MCH	π/4DQPSK-MCH
	

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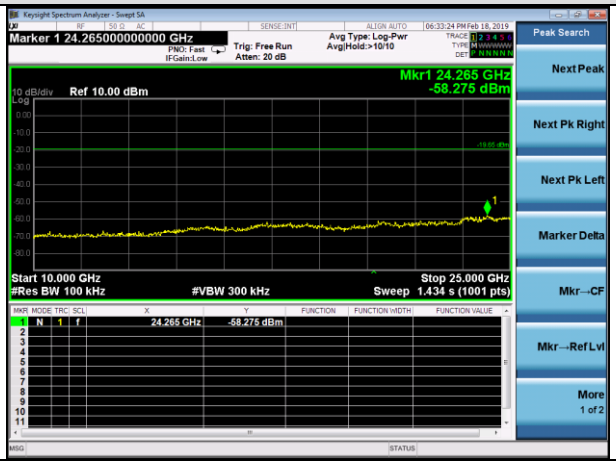	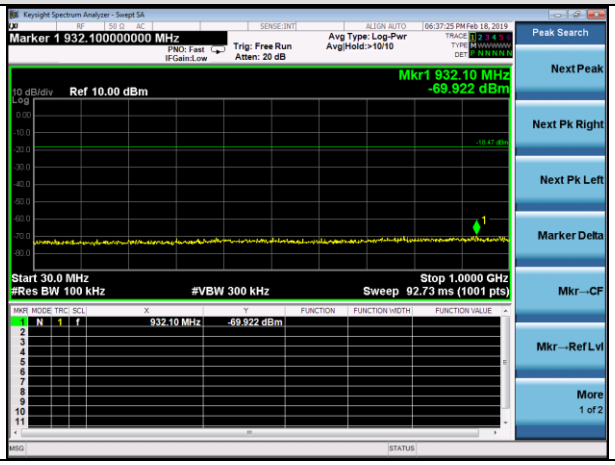

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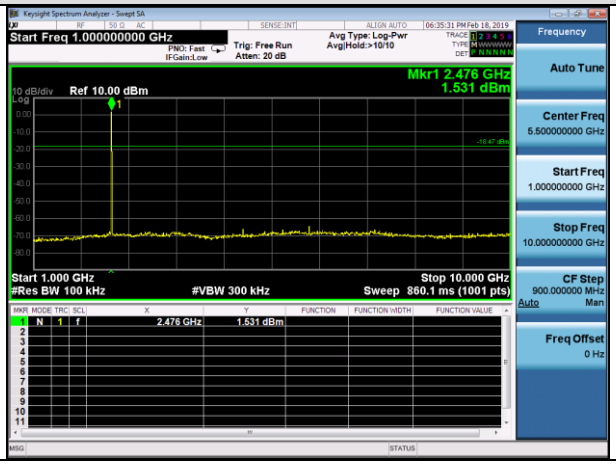
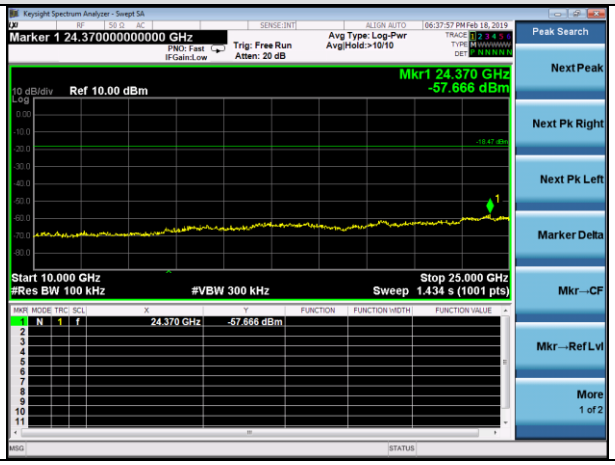
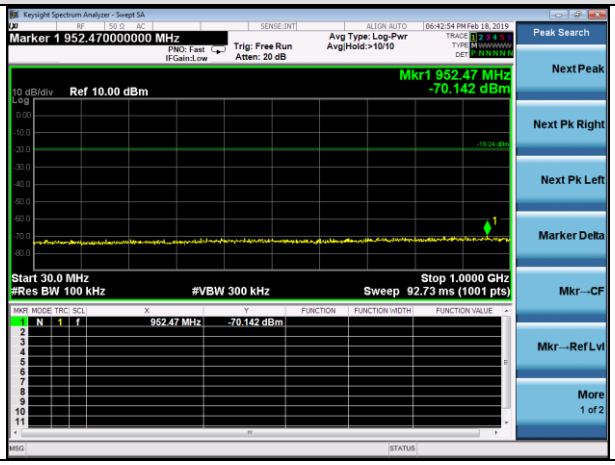
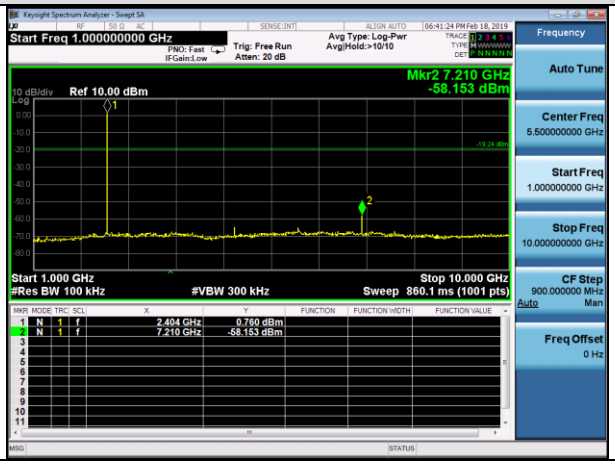
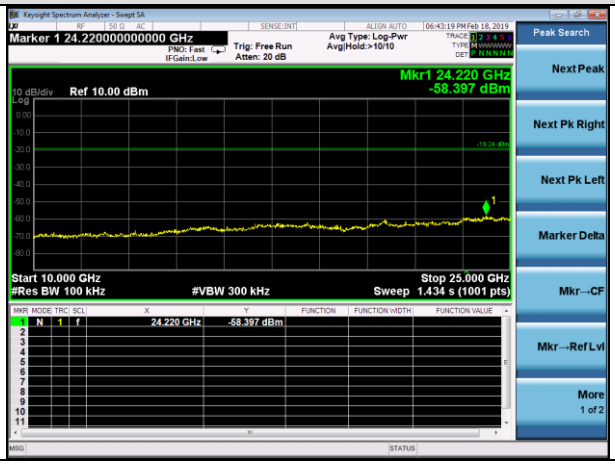
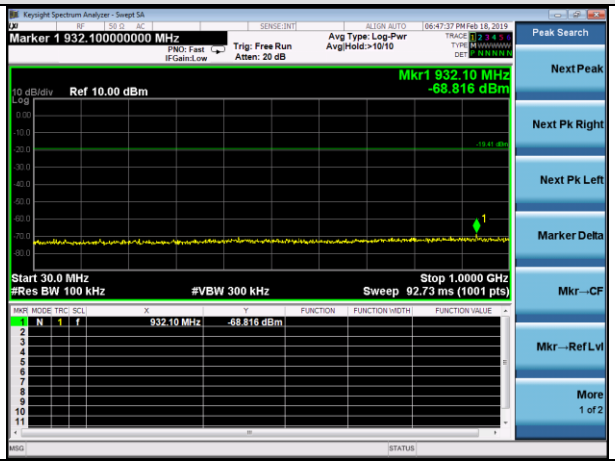
	

8DPSK-LCH	8DPSK-LCH
	

8DPSK-LCH	8DPSK-MCH
	

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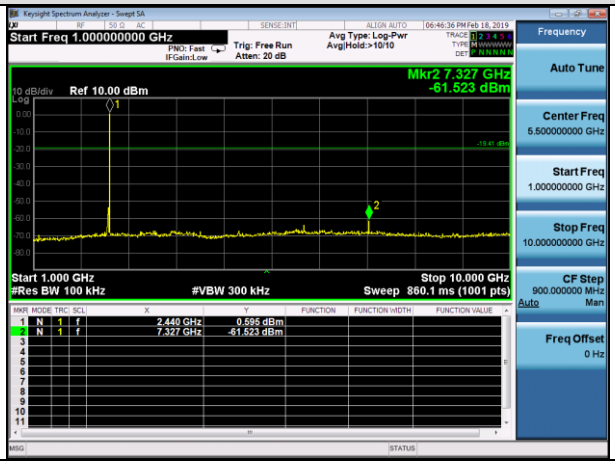	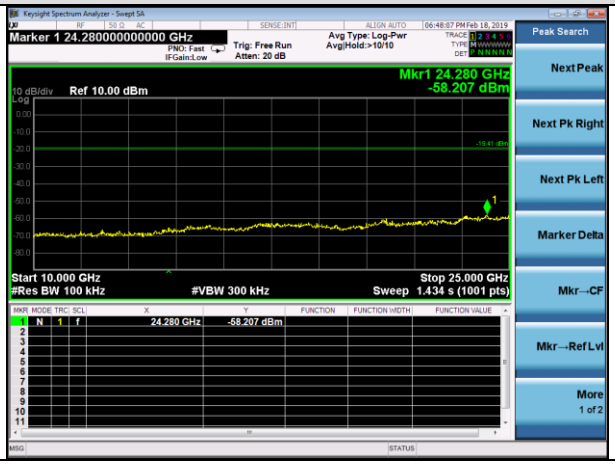

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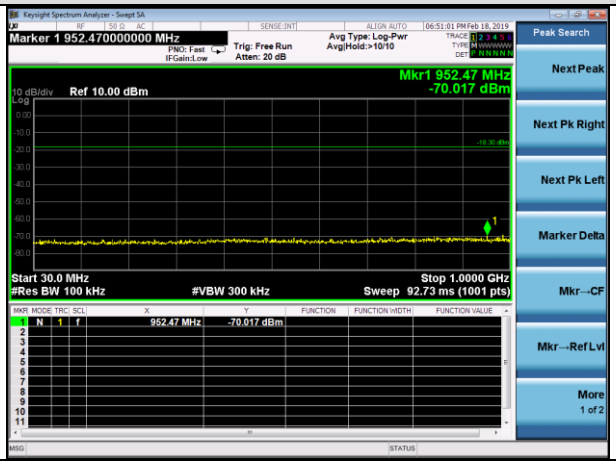	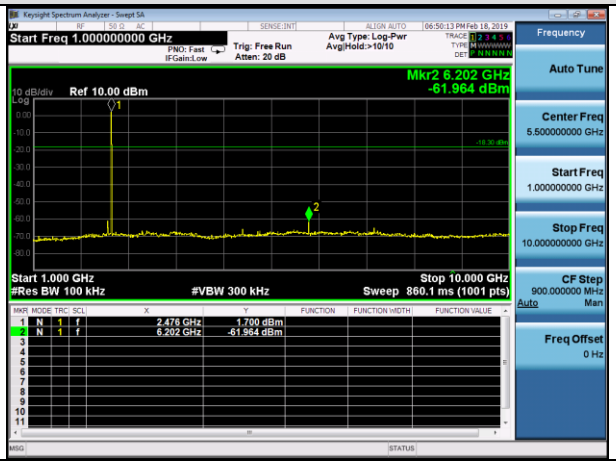

8DPSK-HCH