

FCC TEST REPORT
FOR
ShenZhen Aoni Electronic Industry Co., Ltd.
Bluetooth Headset
Model No.: B032
Additional Model No.: Please refer to page 6

Prepared for : ShenZhen Aoni Electronic Industry Co., Ltd.
Address : HongHui Industrial Park, 2nd LiuXian Road, Xin'An streets, District 68, Bao'an District, ShenZhen, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

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Date of receipt of test sample : April 17, 2017
Number of tested samples : 1
Serial number : Prototype
Date of Test : April 17, 2017~May 17, 2017
Date of Report : May 17, 2017

FCC TEST REPORT

FCC CFR 47 PART 15 C(15.247): 2015

Report Reference No. : **LCS170417133AE**

Date of Issue : **May 17, 2017**

Testing Laboratory Name : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address : **1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China**

Testing Location/ Procedure..... : **Full application of Harmonised standards**
Partial application of Harmonised standards
Other standard testing method

Applicant's Name..... : **ShenZhen Aoni Electronic Industry Co., Ltd.**

Address : **HongHui Industrial Park,2nd LiuXian Road, Xin'An streets, District 68, Bao'an District, ShenZhen, China**

Test Specification

Standard..... : **FCC CFR 47 PART 15 C(15.247): 2017**

Test Report Form No. : **LCSEMC-1.0**

TRF Originator : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Master TRF : **Dated 2011-03**

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Test Item Description. : **Bluetooth Headset**

Trade Mark..... : **Aoni, Ausdom, Mixcder**

Model/ Type reference..... : **806, 860, 881, 853, B031, B021, B033, B025, B040, B043, B030, B037**

Ratings : **DC 3.7V by battery**
Recharging parameter: DC 5V/500mA

Result : **Positive**

Compiled by:



Kyle Yin/ File administrators

Supervised by:



Glin Lu/ Technique principal

Approved by:



Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS170417133AE	<u>May 17, 2017</u> Date of issue
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EUT.....	: Bluetooth Headset
Type / Model.....	: B032
Applicant.....	: ShenZhen Aoni Electronic Industry Co., Ltd.
Address.....	: HongHui Industrial Park,2nd LiuXian Road, Xin'An streets, District 68, Bao'an District, ShenZhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: ShenZhen Aoni Electronic Industry Co., Ltd.
Address.....	: HongHui Industrial Park,2nd LiuXian Road, Xin'An streets, District 68, Bao'an District, ShenZhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	: ShenZhen Aoni Electronic Industry Co., Ltd.
Address.....	: HongHui Industrial Park,2nd LiuXian Road, Xin'An streets, District 68, Bao'an District, ShenZhen, China
Telephone.....	: /
Fax.....	: /

Test Result	Positive
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
00	2017-05-19	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1 Description of Device (EUT)

Name of EUT	Bluetooth Headset
Model Number	B023, 869, 897, 872, 877, 861, 850, 862, 863, 894, 895, 883, 304, 806, 860, 881, 853, B031, B021, B033, B025, B040, B043, B030, B037
Antenna Gain	1.0dBi (max.) For BT
Hardware version	1.1
Software version	1.0
Antenna Type	Integral Antenna
BT Modulation Type	GFSK,8DPSK, π /4DQPSK(BT V4.2)
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	3.40VDC to 4.2VDC (nominal: 3.70VDC)

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
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1.3. External I/O Cable

I/O Port Description	Quantity	Cable
USB	1	N/A
Earphone	1	N/A

1.4. Description of Test Facility

CNAS Registration Number. is L4595.
 FCC Registration Number. is 899208.
 Industry Canada Registration Number. is 9642A-1.
 VCCI Registration Number. is C-4260 and R-3804.
 ESMD Registration Number. is ARCB0108.
 UL Registration Number. is 100571-492.
 TUV SUD Registration Number. is SCN1081.
 TUV RH Registration Number. is UA 50296516-001

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

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Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty	9KHz~30MHz	±3.10dB	(1)
	30MHz~200MHz	±2.96dB	(1)
	200MHz~1000MHz	±3.10dB	(1)
	1GHz~26.5GHz	±3.80dB	(1)
	26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	150kHz~30MHz	±1.63dB	(1)
Power disturbance	30MHz~300MHz	±1.60dB	(1)

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

1.7 Description of Test Modes

Bluetooth operates in the unlicensed ISM Band at 2.4GHz. With basic data rate feature, the data rates can be up to 1 Mb/s by modulating the RF carrier using GFSK techniques. The EUT works in the X-axis, Y-axis, Z-axis. The following operating modes were applied for the related test items. All test modes were tested, only the result of the worst case was recorded in the report.

Mode of Operations	Frequency Range (MHz)	Data Rate (Mbps)
BT V 3.0	2402	1/2/3
	2441	1/2/3
	2480	1/2/3
For Conducted Emission		
Test Mode		TX Mode
For Radiated Emission		
Test Mode		TX Mode

Worst-case mode and channel used for 150 KHz-30 MHz power line conducted emissions was the mode and channel with the highest output power that was determined to be TX (1Mbps).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be TX(1Mbps-Low Channel).

AC conducted emission pre-test at both at AC 120V/60Hz and AC 240V/50Hz modes, recorded worst case;

AC conducted emission pre-test at both at power adapter and power from PC modes, recorded worst case;

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR PART 15C 15.207, 15.209, 15.247 and DA 00-705.

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209, 15.247 under the FCC Rules Part 15 Subpart C.

2.3 General Test Procedures

2.3.1 Conducted Emissions

The EUT is directly placed on the ground. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turntable, which is directly placed on the ground. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a continuous transmits condition.

3.2 EUT Exercise Software

The sample will control by special test software (RF Test Tool) to control sample change channel, modulation provided by application;

3.3 Special Accessories

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/ unshielded	Notes
1	PC	Lenovo	Ideapad	A13110155 0	/	/	DOC
2	Power adapter	Lenovo	CPA-A090	36200414	1.00m	unshielded	DOC

3.4 Block Diagram/Schematics

Please refer to the related document.

3.5 Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6 Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C		
FCC Rules	Description of Test	Result
§15.247(b)(1)	Maximum Conducted Output Power	Compliant
§15.247(c)	Frequency Separation And 20 dB Bandwidth	Compliant
§15.247(a)(1)(ii)	Number Of Hopping Frequency	Compliant
§15.247(a)(1)(iii)	Time Of Occupancy (Dwell Time)	Compliant
§15.209, §15.205	Conducted Spurious Emissions and Band Edges Test	Compliant
§15.209, §15.247(d)	Radiated and Conducted Spurious Emissions	Compliant
§15.205	Emissions at Restricted Band	Compliant
§15.207(a)	Conducted Emissions	Compliant
§15.203	Antenna Requirements	Compliant
§15.247(i)§2.1093	RF Exposure	Compliant

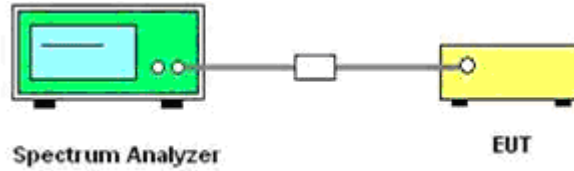
5. SUMMARY OF TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Power Sensor	R&S	NRV-Z51	100458	2016-06-18	2017-06-17
2	Power Sensor	R&S	NRV-Z32	10057	2016-06-18	2017-06-17
3	Power Meter	R&S	NRVS	100444	2016-06-18	2017-06-17
4	DC Filter	MPE	23872C	N/A	2016-06-18	2017-06-17
5	RF Cable	Harbour Industries	1452	N/A	2016-06-18	2017-06-17
6	SMA Connector	Harbour Industries	9625	N/A	2016-06-18	2017-06-17
7	Spectrum Analyzer	Agilent	N9020A	MY50510140	2016-10-27	2017-10-26
8	Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	2016-06-16	2017-06-15
9	RF Cable	Hubersuhne	Sucoflex104	FP2RX2	2016-06-18	2017-06-17
10	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2016-06-18	2017-06-17
11	Amplifier	SCHAFFNER	COA9231A	18667	2016-06-18	2017-06-17
12	Amplifier	Agilent	8449B	3008A02120	2016-06-16	2017-06-15
13	Amplifier	MITEQ	AMF-6F-260400	9121372	2016-06-16	2017-06-15
14	Loop Antenna	R&S	HFH2-Z2	860004/001	2016-06-18	2017-06-17
15	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2016-06-10	2017-06-09
16	Horn Antenna	EMCO	3115	6741	2016-06-10	2017-06-09
17	Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	2016-06-10	2017-06-09
18	RF Cable-R03m	Jye Bao	RG142	CB021	2016-06-18	2017-06-17
19	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2016-06-18	2017-06-17
20	EMI Test Receiver	R&S	ESCI	101142	2016-06-18	2017-06-17
21	Artificial Mains	R&S	ENV216	101288	2016-06-18	2017-06-17
22	EMI Test Software	AUDIX	E3	N/A	2016-06-18	2017-06-17

6. ANTENNA PORT MEASUREMENT

6.1 Peak Power

6.1.1 Block Diagram of Test Setup



6.1.2 Limit

According to §15.247(b)(1), 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.

6.1.3 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

6.1.4 Test Results

Test Mode	Channel	Frequency (MHz)	Measured Maximum Power (dBm)	Limits (dBm)	Verdict
GFSK	0	2402	5.487	30.00	PASS
	39	2441	5.796		
	78	2480	6.520		
π/4DQPSK	0	2402	4.826	30.00	PASS
	39	2441	5.423		
	78	2480	6.189		
8DPSK	0	2402	4.932	30.00	PASS
	39	2441	5.499		
	78	2480	6.250		

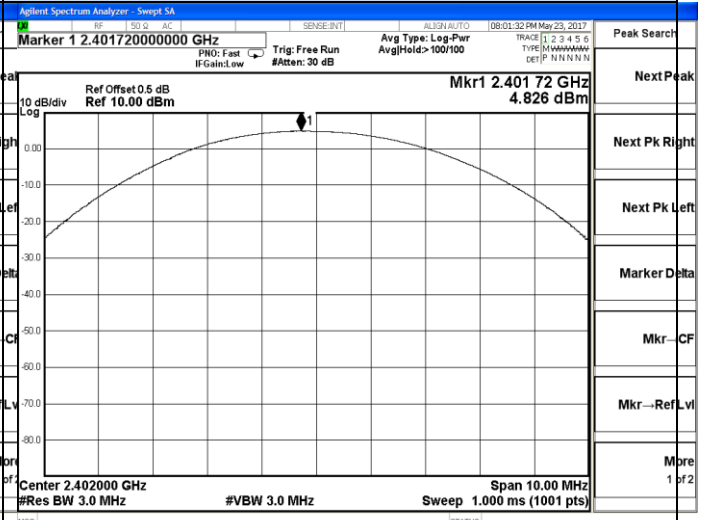
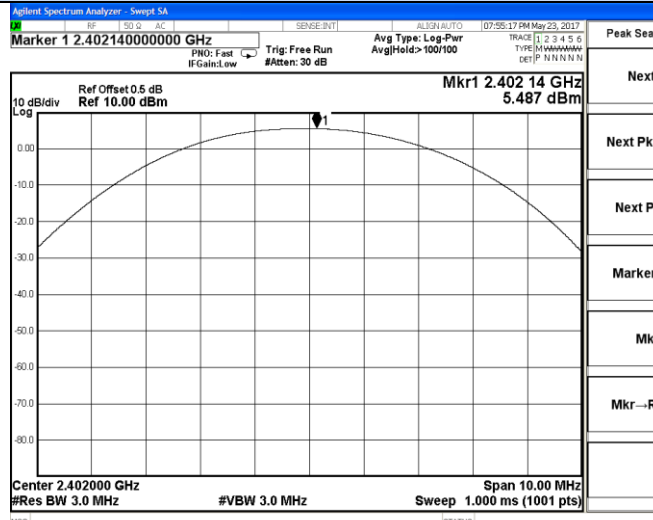
Remark:

1. Test results including cable loss;
2. Measured output power at difference Packet Type for each mode and recorded worst case for each mode.
3. Worst case data at DH1 for GFSK, 2DH1 for π/4DQPSK, 3DH1 for 8DPSK modulation type;

Peak Output Power

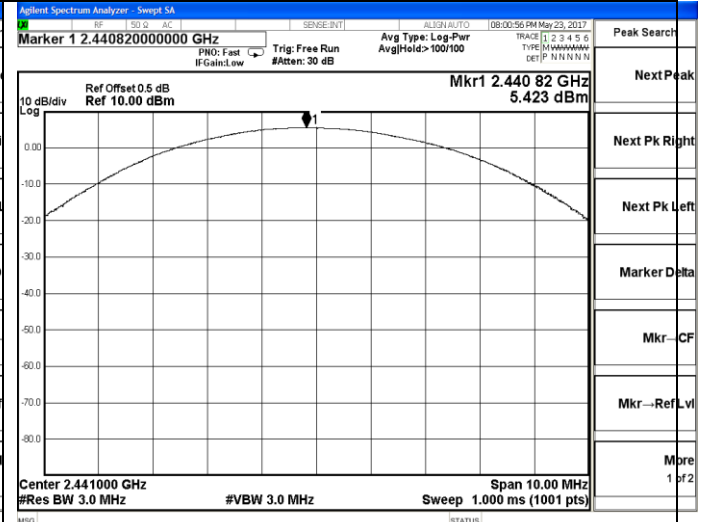
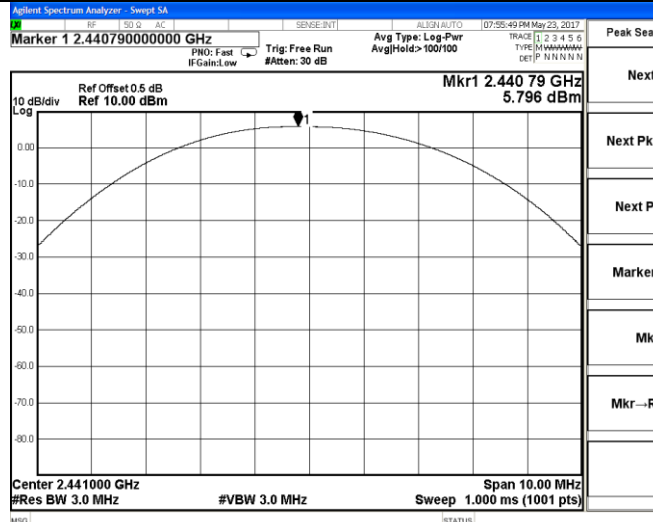
GFSK

$\pi/4$ -DQPSK



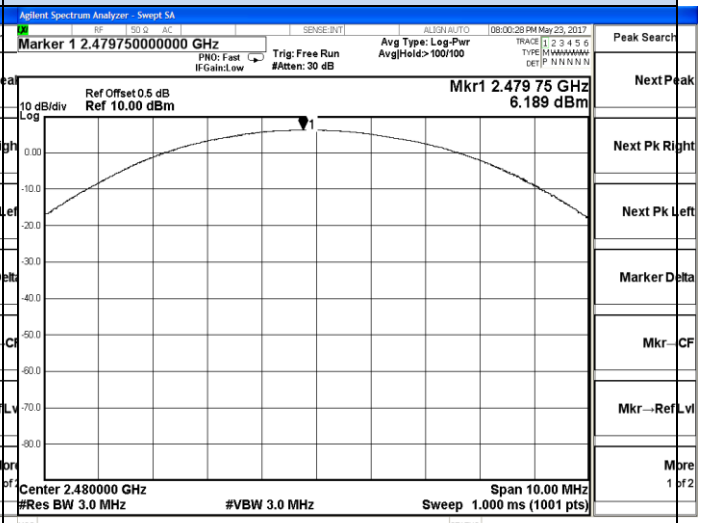
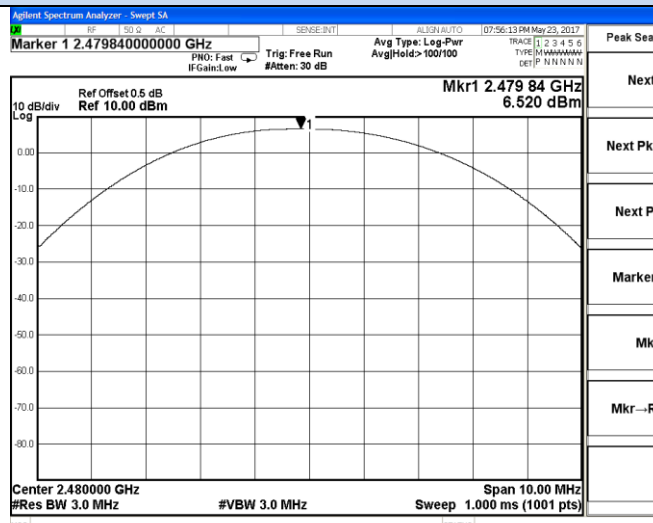
Channel 0 / 2402 MHz

Channel 0 / 2402 MHz



Channel 39 / 2441 MHz

Channel 39 / 2441 MHz

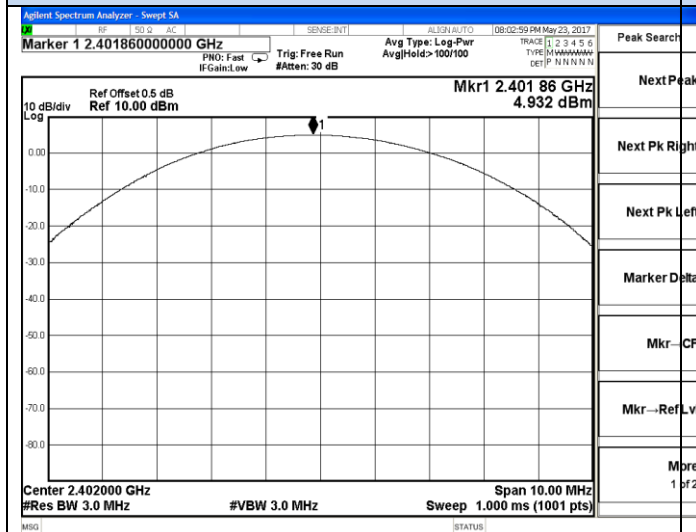


Channel 78 / 2480 MHz

Channel 78 / 2480 MHz

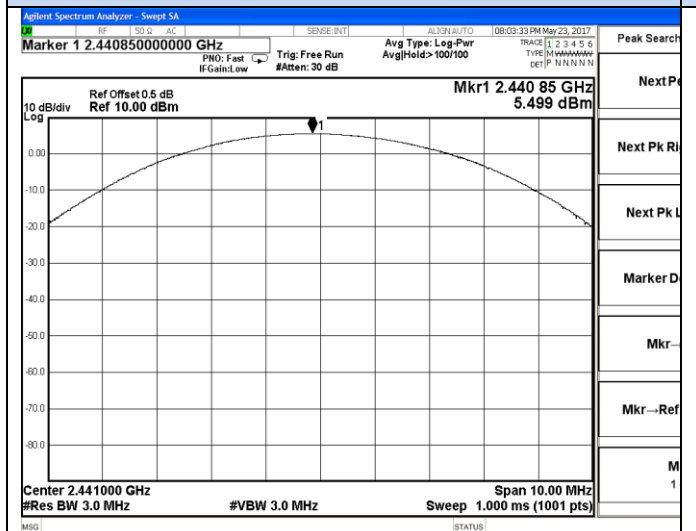
Peak Output Power

8DPSK



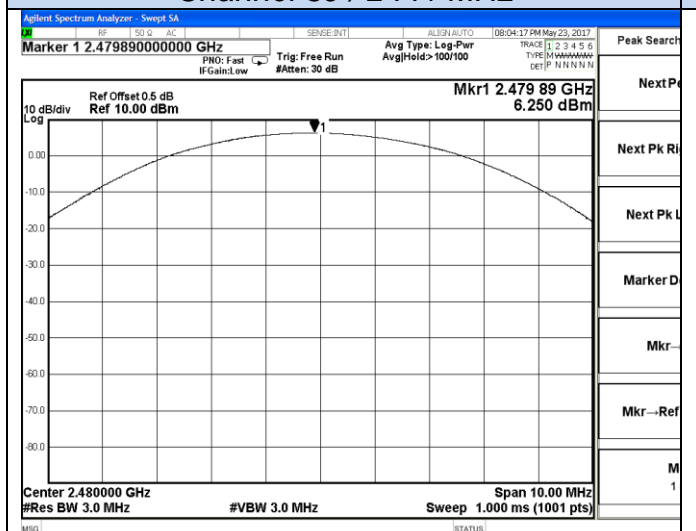
- Peak Search
- Next Peak
- Next Pk Right
- Next Pk Left
- Marker Delta
- Mkr--CF
- Mkr--Ref Lvl
- Mpre 1 of 2

Channel 0 / 2402 MHz



- Peak Search
- Next Pk
- Next Pk Ri
- Next Pk Li
- Marker D
- Mkr--
- Mkr--Ref
- M 1

Channel 39 / 2441 MHz



- Peak Search
- Next Pk
- Next Pk Ri
- Next Pk Li
- Marker D
- Mkr--
- Mkr--Ref
- M 1

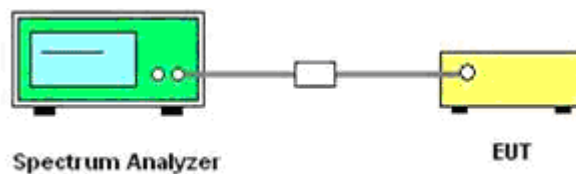
Channel 78 / 2480 MHz

6.2 Frequency Separation and 20 dB Bandwidth

6.2.1 Limit

According to §15.247(c) or A8.1(a), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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).

6.2.2 Block Diagram of Test Setup



6.2.3 Test Procedure

Frequency separation test procedure :

- 1). Place the EUT on the table and set it in transmitting mode.
- 2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
- 3). Set center frequency of Spectrum Analyzer = middle of hopping channel.
- 4). Set the Spectrum Analyzer as RBW = 100 KHz, VBW = 300 KHz, Span = wide enough to capture the peaks of two adjacent channels, Sweep = auto.
- 5). Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

20dB bandwidth test procedure :

- 1). Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel.
- 2). RBW = 30 KHz, VBW = 100 KHz.
- 3). Detector function = peak.
- 4). Trace = max hold.

6.2.4 Test Results

6.2.4.1 20dB Bandwidth

Test Mode	Channel	Frequency (MHz)	Measured Bandwidth (KHz)		Limits (KHz)	Verdict
			99%	20dB		
GFSK	0	2402	871.32	866.00	No Limits	PASS
	39	2441	869.05	892.50		
	78	2480	793.38	744.30		
$\pi/4$ DQPSK	0	2402	1160.10	1208.00	No Limits	PASS
	39	2441	1168.90	1316.00		
	78	2480	1163.30	1184.00		
8DPSK	0	2402	1153.00	1237.00	No Limits	PASS
	39	2441	1156.10	1229.00		
	78	2480	1159.60	1208.00		

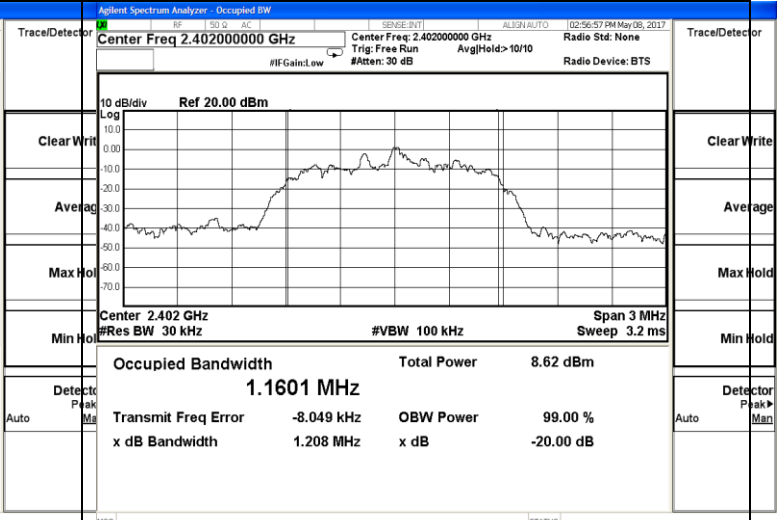
Remark:

1. Test results including cable loss;
2. Measured output power at difference Packet Type for each mode and recorded worst case for each mode.
3. Worst case data at DH1 for GFSK, 2DH1 for $\pi/4$ DQPSK, 3DH1 for 8DPSK modulation type;
4. Please refer following test plots;

20dB Bandwidth and 99% Bandwidth

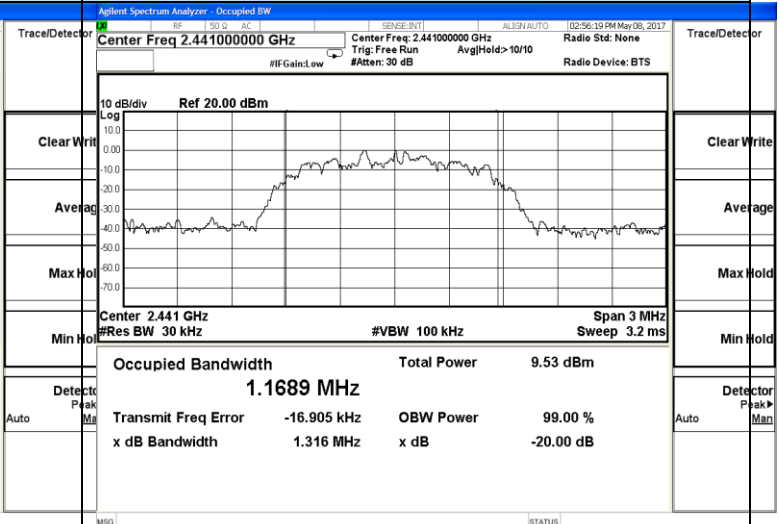
GFSK

$\pi/4$ DQPSK



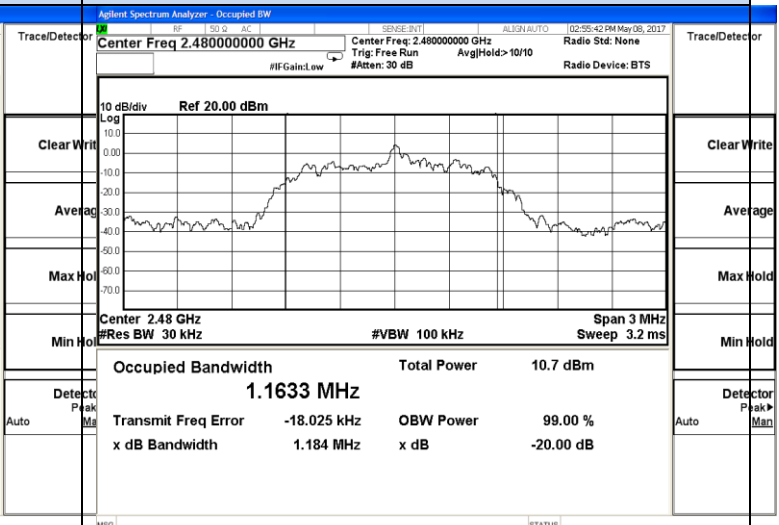
Channel 0 / 2402 MHz

Channel 0 / 2402 MHz



Channel 39 / 2441 MHz

Channel 39 / 2441 MHz



Channel 78 / 2480 MHz

Channel 78 / 2480 MHz

20dB Bandwidth and 99% Bandwidth

8DPSK

Agilent Spectrum Analyzer - Occupied BW

Center Freq 2.402000000 GHz Center Freq: 2.402000000 GHz Radio Std: None
 Trig: Free Run Avg/Hold: 10/10
 #IF Gain: Low #Atten: 30 dB Radio Device: BTS

10 dB/div Ref 20.00 dBm

Center 2.402 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms

Occupied Bandwidth	Total Power	8.42 dBm
1.1530 MHz		
Transmit Freq Error	2.648 kHz	OBW Power
x dB Bandwidth	1.237 MHz	x dB
		99.00 %
		-20.00 dB

Trace/Detector: Auto Peak: Man

Channel 0 / 2402 MHz

Agilent Spectrum Analyzer - Occupied BW

Center Freq 2.441000000 GHz Center Freq: 2.441000000 GHz Radio Std: None
 Trig: Free Run Avg/Hold: 10/10
 #IF Gain: Low #Atten: 30 dB Radio Device: BTS

10 dB/div Ref 20.00 dBm

Center 2.441 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms

Occupied Bandwidth	Total Power	10.1 dBm
1.1561 MHz		
Transmit Freq Error	2.491 kHz	OBW Power
x dB Bandwidth	1.229 MHz	x dB
		99.00 %
		-20.00 dB

Trace/Detector: Auto Peak: Man

Channel 39 / 2441 MHz

Agilent Spectrum Analyzer - Occupied BW

Center Freq 2.480000000 GHz Center Freq: 2.480000000 GHz Radio Std: None
 Trig: Free Run Avg/Hold: 10/10
 #IF Gain: Low #Atten: 30 dB Radio Device: BTS

10 dB/div Ref 20.00 dBm

Center 2.48 GHz Span 3 MHz
 #Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms

Occupied Bandwidth	Total Power	11.1 dBm
1.1596 MHz		
Transmit Freq Error	8.545 kHz	OBW Power
x dB Bandwidth	1.208 MHz	x dB
		99.00 %
		-20.00 dB

Trace/Detector: Auto Peak: Man

Channel 78 / 2480 MHz

6.2.4.2 Frequency Separation

The Measurement Result With 1Mbps For GFSK Modulation				
Channel	20dB Bandwidth (KHz)	Channel Separation (MHz)	Limit (KHz)	Result
Low	866.00	1.000	1000.00	Pass
Middle	892.50		1000.00	Pass
High	744.30		1000.00	Pass
The Measurement Result With 2Mbps For $\pi/4$ -DQPSK Modulation				
Channel	20dB Bandwidth (KHz)	Channel Separation (MHz)	Limit (KHz)	Result
Low	1208.00	1.000	1000.00	Pass
Middle	1316.00		1000.00	Pass
High	1184.00		1000.00	Pass
The Measurement Result With 3Mbps For 8-DPSK Modulation				
Channel	20dB Bandwidth (KHz)	Channel Separation (MHz)	Limit (KHz)	Result
Low	1237.00	1.000	1000.00	Pass
Middle	1229.00		1000.00	Pass
High	1208.00		1000.00	Pass

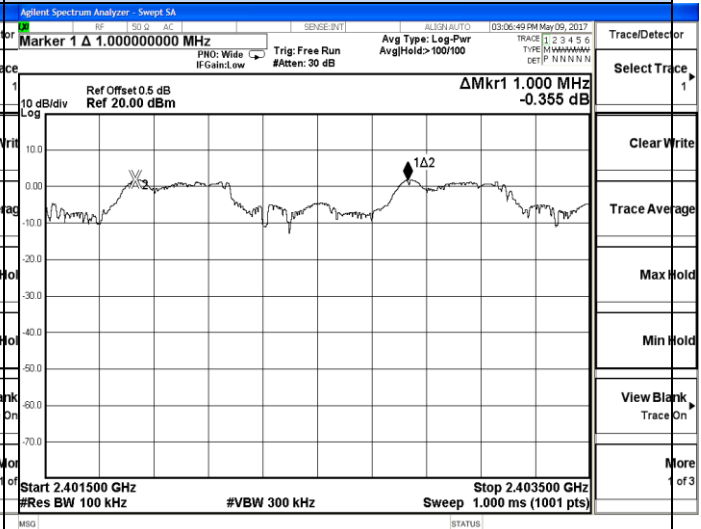
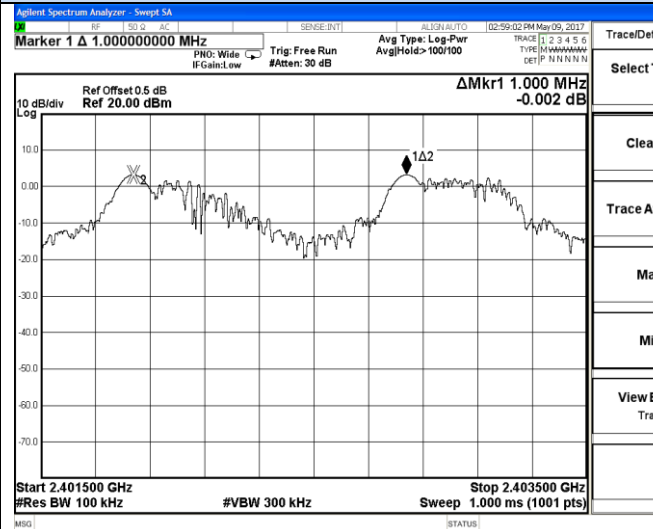
Remark:

1. Test results including cable loss;
2. Please refer to following plots;
3. Measured at difference Packet Type for each mode and recorded worst case for each mode.
4. Worst case data at DH1 for GFSK, 2DH1 for $\pi/4$ -DQPSK, 3DH1 for 8DPSK modulation type;

Frequency Separation

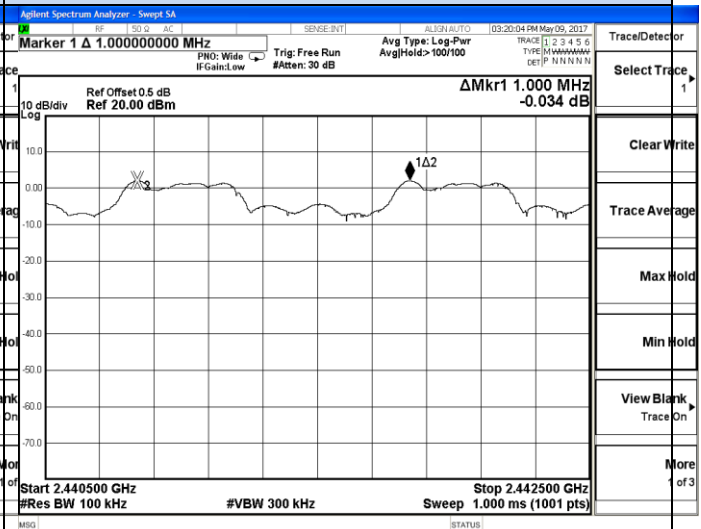
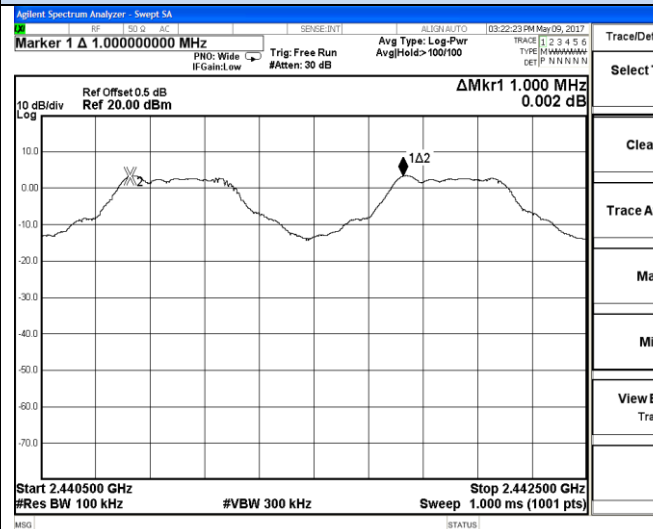
GFSK

$\pi/4$ DQPSK



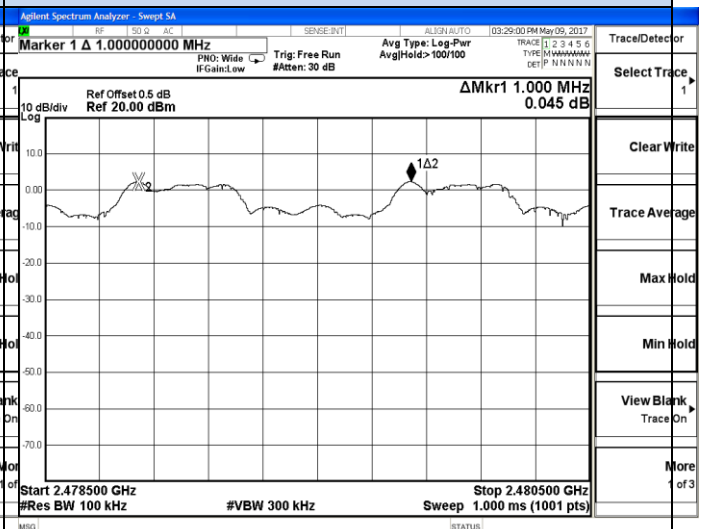
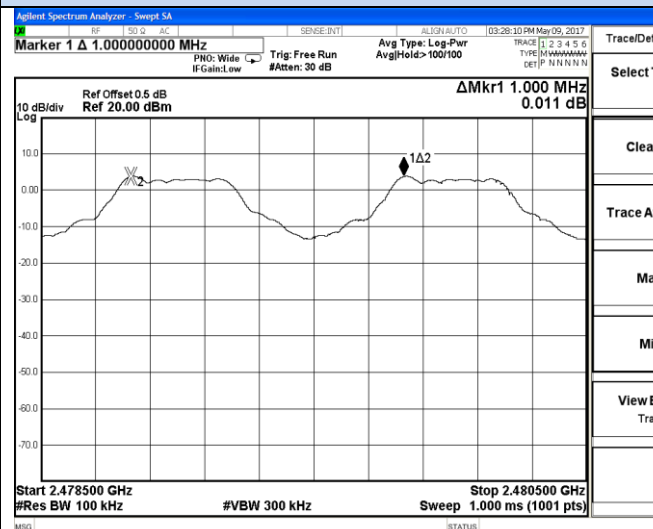
Channel 0 / 2402 MHz

Channel 0 / 2402 MHz



Channel 39 / 2441 MHz

Channel 39 / 2441 MHz

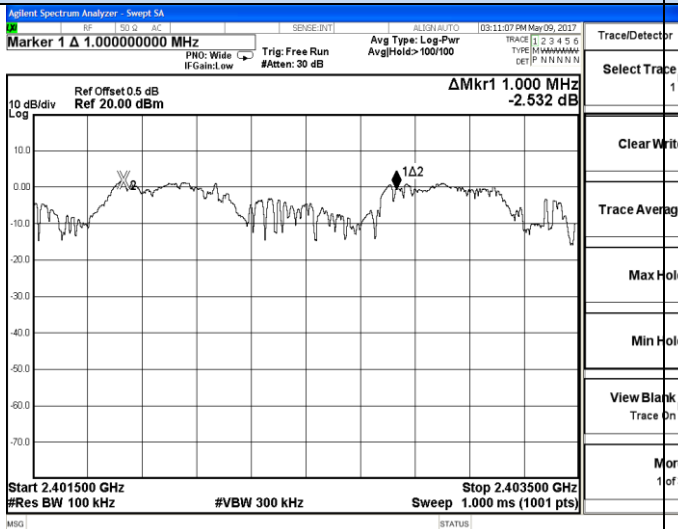


Channel 78 / 2480 MHz

Channel 78 / 2480 MHz

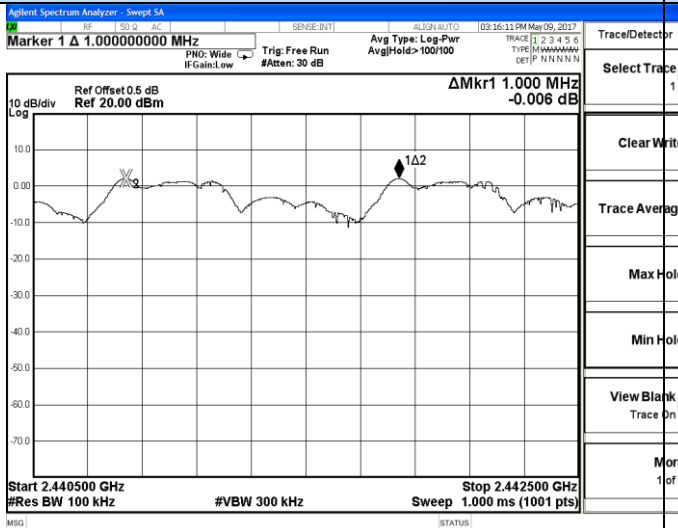
Frequency Separation

8DPSK



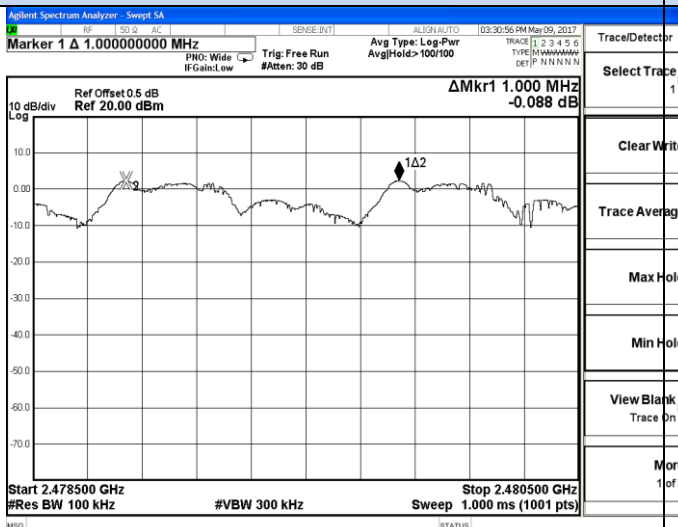
- Trace/Detector
- Select Trace 1
- Clear Write
- Trace Average
- Max Hold
- Min Hold
- View Blank Trace On
- More 1 of 3

Channel 0 / 2402 MHz



- Trace/Detector
- Select Trace 1
- Clear Write
- Trace Average
- Max Hold
- Min Hold
- View Blank Trace On
- More 1 of 3

Channel 39 / 2441 MHz



- Trace/Detector
- Select Trace 1
- Clear Write
- Trace Average
- Max Hold
- Min Hold
- View Blank Trace On
- More 1 of 3

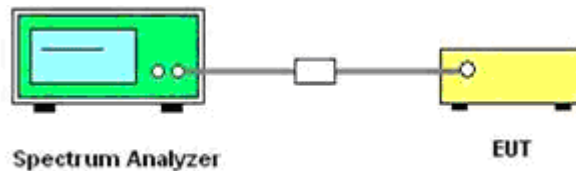
Channel 78 / 2480 MHz

6.3 Number of Hopping Frequency

6.3.1 Limit

According to §15.247(a)(1)(ii) or A8.1 (d), Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels.

6.3.2 Block Diagram of Test Setup



6.3.3 Test Procedure

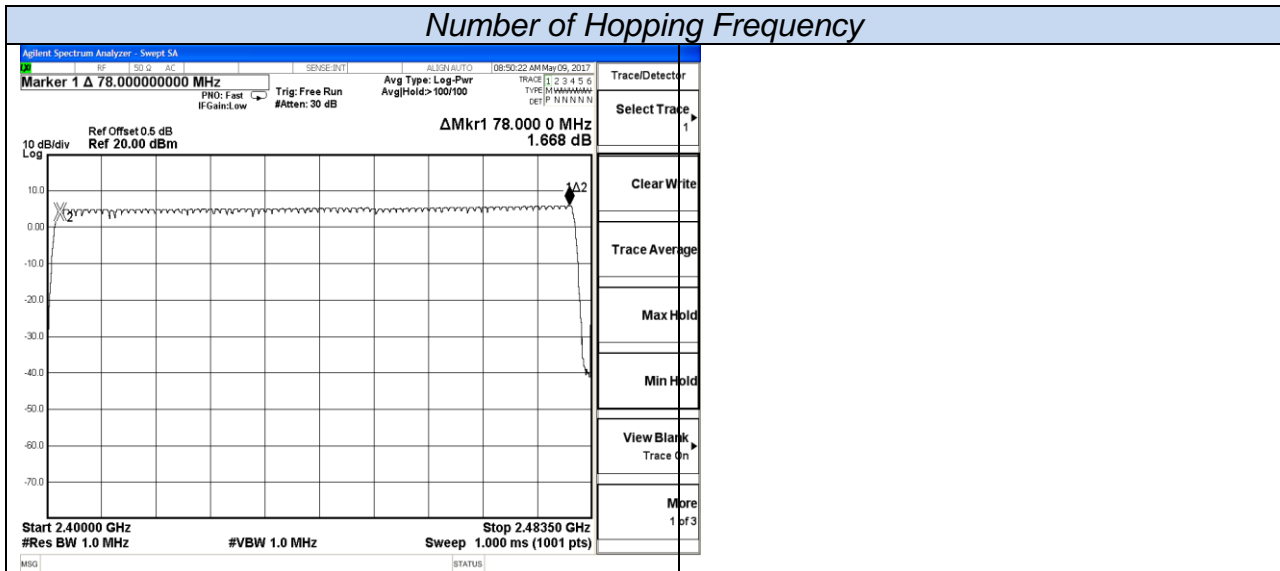
- 1). Place the EUT on the table and set it in transmitting mode.
- 2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
- 3). Set Spectrum Analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- 4). Set the Spectrum Analyzer as RBW = 1 MHz, VBW=1MHz.
- 5). Max hold, view and count how many channel in the band.

6.3.4 Test Results

Test Mode	Measurement Result (No. of Channels)	Limit (No. of Channels)	Result
GFSK	79	≥15	PASS
$\pi/4$ DQPSK	79	≥15	PASS
8DPSK	79	≥15	PASS

Remark:

1. Test results including cable loss;
2. Measured output power at difference Packet Type for each mode and recorded worst case for each mode.
3. Worst case data at DH1 for GFSK, 2DH1 for $\pi/4$ DQPSK, 3DH1 for 8DPSK modulation type;
4. Record test plots only for GFSK;
5. Please refer following test plots;

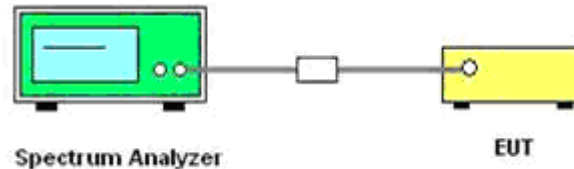


6.4 Time of Occupancy (Dwell Time)

6.4.1 Limit

According to §15.247(a)(1)(iii) or A8.1 (d), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

6.4.2 Block Diagram of Test Setup



6.4.3 Test Procedure

- 1). Place the EUT on the table and set it in transmitting mode.
- 2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
- 3). Set center frequency of Spectrum Analyzer = operating frequency.
- 4). Set the Spectrum Analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
- 5). Repeat above procedures until all frequency measured was complete.

6.4.4 Test Results

The Dwell Time=Burst Width*Total Hops. The detailed calculations are showed as follows:

The duration for dwell time calculation: $0.4[s] \times \text{hopping number} = 0.4[s] \times 79[\text{ch}] = 31.6[s \cdot \text{ch}]$;

The burst width [ms/hop/ch], which is directly measured, refers to the duration on one channel hop.

The hops per second for all channels: The selected EUT Conf uses a slot type of 5-Tx&1-Rx and a hopping rate of 1600 [ch*hop/s] for all channels. So the final hopping rate for all channels is $1600/6=266.67$ [ch*hop/s]

The hops per second on one channel: $266.67 [\text{ch} \cdot \text{hops/s}] / 79 [\text{ch}] = 3.38 [\text{hop/s}]$;

The total hops for all channels within the dwell time calculation duration: $3.38 [\text{hop/s}] \times 31.6[s \cdot \text{ch}] = 106.67$ [hop*ch];

The dwell time for all channels hopping: $106.67 [\text{hop} \cdot \text{ch}] \times \text{Burst Width} [\text{ms/hop/ch}]$.

Mode	Frequency (MHz)	Burst Type	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Verdict
GFSK	2441	DH1	0.392	0.1254	0.4	PASS
		DH3	1.640	0.2624	0.4	PASS
		DH5	2.896	0.3089	0.4	PASS
π/4-DQPSK	2441	2DH1	0.400	0.1280	0.4	PASS
		2DH3	1.648	0.2637	0.4	PASS
		2DH5	2.880	0.3072	0.4	PASS
8DPSK	2441	3DH1	0.404	0.1293	0.4	PASS
		3DH3	1.648	0.2637	0.4	PASS
		3DH5	2.880	0.3072	0.4	PASS

Remark:

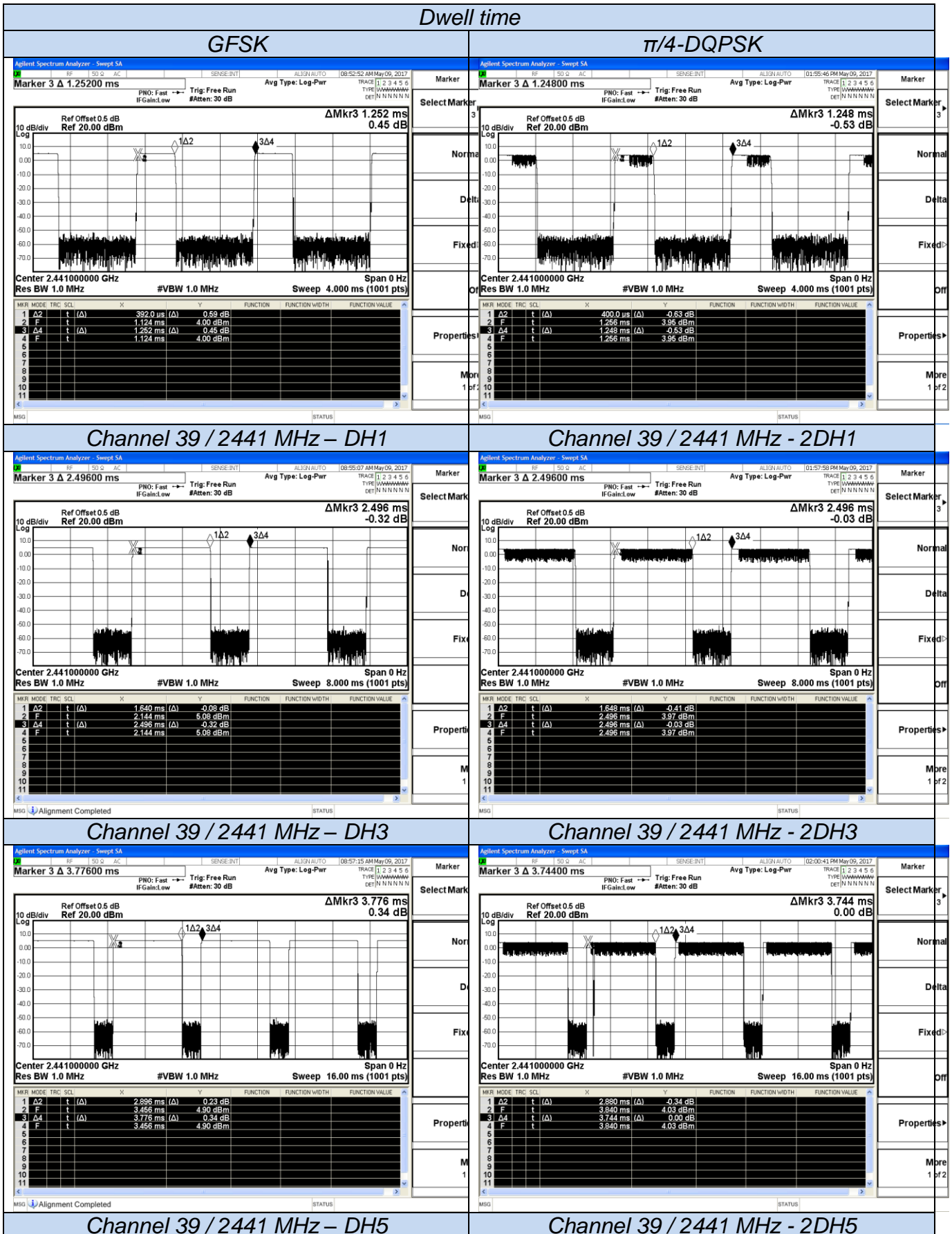
1. Test results including cable loss;
2. Please refer to following plots;
3. Measured at difference Packet Type for each mode and recorded worst case for each mode.
4. Dwell Time Calculate formula:

DH1: Dwell time=Pulse time (ms) $\times (1600 \div 2 \div 79) \times 31.6$ Second

DH3: Dwell time=Pulse time (ms) $\times (1600 \div 4 \div 79) \times 31.6$ Second

DH5: Dwell time = Pulse Time (ms) × (1600 ÷ 6 ÷ 79) × 31.6 Second

5. Measured at low, middle and high channel, recorded worst at middle channel;



Dwell time

8DPSK

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	t	(Δ)	404.0 μs	(Δ)	-1.33 dB		
2	F	t	(Δ)	1.236 ms	(Δ)	3.75 dBm		
3	Δ4	t	(Δ)	1.248 ms	(Δ)	-0.93 dB		
4	F	t	(Δ)	1.236 ms	(Δ)	3.75 dBm		

Channel 39 / 2441 MHz – 3DH1

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	t	(Δ)	1.648 ms	(Δ)	-0.65 dB		
2	F	t	(Δ)	1.920 ms	(Δ)	3.99 dBm		
3	Δ4	t	(Δ)	2.496 ms	(Δ)	-0.02 dB		
4	F	t	(Δ)	1.920 ms	(Δ)	3.99 dBm		

Channel 39 / 2441 MHz – 3DH3

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	t	(Δ)	2.680 ms	(Δ)	0.14 dB		
2	F	t	(Δ)	3.232 ms	(Δ)	3.98 dBm		
3	Δ4	t	(Δ)	3.744 ms	(Δ)	0.00 dB		
4	F	t	(Δ)	3.232 ms	(Δ)	3.98 dBm		

Channel 39 / 2441 MHz – 3DH5