	FCC TEST REPORT
	FOR
ShenZ	Zhen Aoni Electronic Industry Co., Ltd.
	Bluetooth Headset
	Model No.: B032
Additic	onal Model No.: Please refer to page 6
Prepared for Address Prepared by Address Tel Fax Web Mail	 ShenZhen Aoni Electronic Industry Co., Ltd. HongHui Industrial Park,2nd LiuXian Road, Xin'An streets, District 68, Bao'an District, ShenZhen, China Shenzhen LCS Compliance Testing Laboratory Ltd. 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China (+86)755-82591330 (+86)755-82591332 www.LCS-cert.com webmaster@LCS-cert.com
Date of receipt of test sample Number of tested samples Serial number Date of Test Date of Report	 April 17, 2017 1 Prototype April 17, 2017~May 17, 2017 May 17, 2017

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SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. FCC ID: Z63-D7B032 Report No.: LCS170417133AE

FCC TEST REPORT					
FCC C	FCC CFR 47 PART 15 C(15.247): 2015				
Report Reference No::	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				
Shenzhen LCS Compliance Testing	a Laboratory Ltd. All rights reserved.				

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Test Item Description :	Bluetooth Headset
Trade Mark:	Aoni, Ausdom, Mixcder
Model/ Type reference :	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
Ratings:	DC 3.7V by battery Recharging parameter: DC 5V/500mA
Result:	Positive

Compiled by:

Supervised by:

Kyle Yin/ File administrators

Glin Lu/ Technique principal

Gavin Liang/ Manager

Approved by:

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Report No.: LCS170417133AE

FCC -- TEST REPORT

Test Report No. :	LCS170417133AE	May 17, 2017 Date of issue
EUT	: Bluetooth Headset	
Type / Model	: B032	
Applicant	: ShenZhen Aoni Electi	onic Industry Co., Ltd.
Address	: HongHui Industrial Parl 68, Bao'an District, She	k,2nd LiuXian Road, Xin'An streets, District enZhen, China
Telephone		
Fax	: /	
Marco Cardo anos		
Manufacturer	: ShenZhen Aoni Electi	K,2nd LiuXian Road, Xin'An streets, District
Address	68, Bao'an District, She	
Telephone		
Fax	: /	
Factory	: ShenZhen Aoni Electi	ronic Industry Co., Ltd.
Address	: HongHui Industrial Parl 68, Bao'an District, She	k,2nd LiuXian Road, Xin'An streets, District enZhen, China
Telephone		
Fax	: /	

Test Result

Positive

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	

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)		
	2402	1/2/3		
BT V 3.0	2441	1/2/3		
	2480	1/2/3		
For Conducted Emission				
Test Mode	-	TX Mode		
For Radiated Emission				
Test Mode	-	FX 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	Manufactur er	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

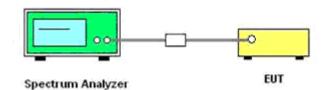
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Power Sensor	R&S	NRV-Z51	100458	2016-06-18	2017-06-17
2	Power Sensor	R&S	NRV-Z32	10057	2016-06-18	2017-06-17
3	Power Meter	R&S	NRVS	100444	2016-06-18	2017-06-17
4	DC Filter	MPE	23872C	N/A	2016-06-18	2017-06-17
5	RF Cable	Harbour Industries	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(Exter nal 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-2604 00	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

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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

 $\mathsf{VBW} \geq \mathsf{RBW}$

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	
	0	2402	5.487			
GFSK	39	2441	5.796	30.00	PASS	
	78	2480	6.520			
	0		4.826			
π/4DQPSK	39	2441	5.423	30.00	PASS	
	78	2480	6.189			
	0	2402	4.932			
8DPSK	39	2441	5.499	30.00	PASS	
	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;

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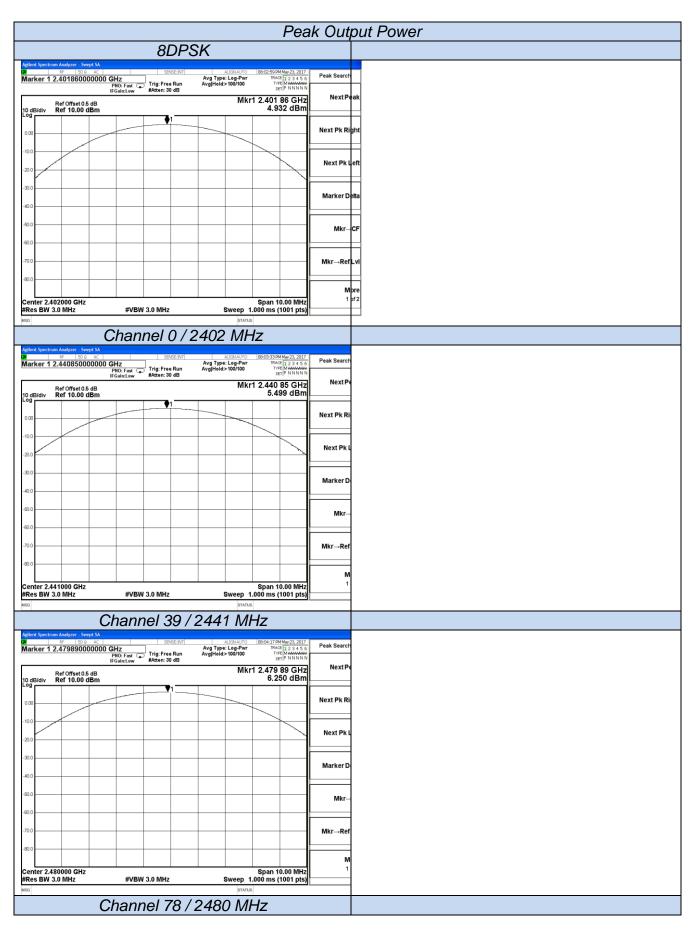
	Peak Out	put Power			
GFSK		1-Beet Facebases backness From Fi	π/4-DQI	PSK	
Marker 1 2.402140000000 GHz Avg Type: Log-Pwr TRAC	May 23, 2017 = 1 2 3 4 5 6 = M M M M M M M = P N N N N N	Agilent Spectrum Analyzer - Swept SA Ø RF S0 Ω AC Marker 1 2.401720000000 GH PN0 PN0 IFG PN0 IFG	Z in: Fast ain:Low #Atten: 30 dB	ALIGN AUTO 08:01:32 PM May 23, 2017 Avg Type: Log-Pwr Avg Hold>100/100 TVPE Mwawww DET P N N N N	Peak Search
Mkr1 2.402	14 GHz Next P 87 dBm	eal Ref Offset 0.5 dB 10 dB/div Ref 10.00 dBm		Mkr1 2.401 72 GHz 4.826 dBm	NextPea
	Next Pk Ri		<u>♦</u> 1		Next Pk Rigl
-10.0	Next Pk I	.ef			Next Pk Le
40.0	Marker D	-30.0			Marker Del
800	Mkr_	-cf -50.0			Mkr–C
-70.0	Mkr→Ref	Lv -70.0			Mkr⊸RefL
	0.00 MHz 1	of Center 2.402000 GHz		Span 10.00 MHz	Moi 1 of
#Res BW 3.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (MSO STATUS	1001 pts)	#Res BW 3.0 MHz	#VBW 3.0 MHz	Sweep 1.000 ms (1001 pts)	
Channel 0 / 2402 MHz		Agilent Spectrum Analyzer - Swept SA	hannel 0 / 2	402 MHz	
D RF 50.0 A.C SENSE INT ALIGNATIO 07:559-49P Marker 1 2.440790000000 GHz Trig: Free Run Avg Type: Log-Pwr TRAC PMO: Evel Trig: Free Run Avg Type: Log-Pwr TRAC	May 23, 2017 # 1 2 3 4 5 6 # MWWWWW TP N N N N N	Marker 1 2.440820000000 GH	O: Faet C Trig: Free Run	ALIGN AUTO 08:00:56 PM May 23, 2017 Avg Type: Log-Pwr TRACE 1 2 3 4 5 6 Avg Hold>100/100 DFF N NN N	Peak Search
Ref Offeet 0.5 dB Mkr1 2.440		Ref Offset 0.5 dB 10 dB/div Ref 10.00 dBm	ain:Low #Atten: 30 dB	Mkr1 2.440 82 GHz 5.423 dBm	Next Pea
	Next Pk Ri	0.00			Next Pk Rig
-100	Next Pk I	-20.0			Next Pk Le
	Marker D	-30.0			Marker Del
60.0	Mkr-	-50.0			Mkr–C
70.0	Mkr→Ref	-70.0			Mkr→RefL
80.0 Center 2.441000 GHz Span 11 FRes BW 3.0 MHz Sweep 1.000 ms (0.00 MHz 1	**************************************	#VBW 3.0 MHz	Span 10.00 MHz Sweep 1.000 ms (1001 pts)	Moi 1 of
MSG STATUS		MSG		STATUS	
Channel 39 / 2441 MHz Against Spectrum Analyzer - Swegt SA		Agilent Spectrum Analyzer - Swept SA	annel 39 / 2		
Marker 1 2.47984000000 GHz PR0: Feet IFGain.tew Atten: 30 dB Marker 2 2.47984000000 GHz Avg Type: Log-Pwr Magleid>100100 PR0: Feet PR0:	May23, 2017 Peak Search #[123456] Peak Search #May23, 2017 Peak Search #May24, 2017 Peak Search #May25, 2017 Peak Search #May26, 2017 Peak Search #May27, 2017 Peak Search <td< td=""><td>eal IFG</td><td>Z 0: Fast Trig: Free Run ain:Low #Atten: 30 dB</td><td>AUGNAUTO 08:00:28 PM May 23, 2017 Avg Type: Log-Pwr AvgHold>100/100 TYPE MWWWWW DET P NNNN DET P NNNN</td><td>Peak Search Next Pea</td></td<>	eal IFG	Z 0: Fast Trig: Free Run ain:Low #Atten: 30 dB	AUGNAUTO 08:00:28 PM May 23, 2017 Avg Type: Log-Pwr AvgHold>100/100 TYPE MWWWWW DET P NNNN DET P NNNN	Peak Search Next Pea
	20 dBm	Ref Offset 0.5 dB 10 dB/div Ref 10.00 dBm gh 0.00	¥1	6.189 dBm	Next Pk Rigl
-10.0	Next Pk I	-10.0			Next Pk Le
30.0	Marker D	-20.0			Marker Del
40.0	Mkr_	-40.0			Mar Ner Der
700	Mkr⊸Ref	-60.0			Mkr→RefL
80.0		-80.0			Mo
#Res BW 3.0 MHz #VBW 3.0 MHz Sweep 1.000 ms (0.00 MHz 1	^{of} Center 2.480000 GHz #Res BW 3.0 MHz	#VBW 3.0 MHz	Span 10.00 MHz Sweep 1.000 ms (1001 pts)	1 of
Channel 78 / 2480 MHz		MSG Ch	annel 78 / 2	2480 MHz	

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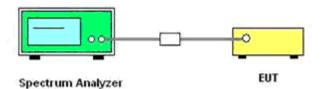
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6.2 Frequency Separation and 20 dB Bandwidth

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 in 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 in15.209(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	Measured Ba	ndwidth (KHz)	Limits	Verdict
Test Mode	Channel	(MHz)	99%	20dB	(KHz)	veruici
	0	2402	871.32	866.00		
GFSK	39	2441	869.05	892.50	No Limits	PASS
	78	2480	793.38	744.30		
	0	2402	1160.10	1208.00		
π/4DQPSK	39	2441	1168.90	1316.00	No Limits	PASS
	78	2480	1163.30	1184.00		
	0	2402	1153.00	1237.00		
8DPSK	39	39 2441 1156.10 1229.0		1229.00	No Limits	PASS
	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 π /4DQPSK, 3DH1 for 8DPSK modulation type;

4. Please refer following test plots;

Report No.: LCS170417133AE

Number of Links of the state of the sta	20dB Bandw	vidth and 99% Bandwidth
Description of the state of the stat		
All Direct All Direct Prove Usa Mir and	RF S0.2 AC SEMEENTI ALIGNAUTO 0254/04 PM May/08, 2037 Ref Value 20.00 dBm Center Freq: 2.40200000 GHz Radio Std: None Radio Std: None Trig: Free Run Avg Hold>10/10 Avg Hold>10/10 Avg Hold>10/10	17 Trace/Detector Mail Mail Mail Mar(06, 2017) Trace/Detector Center Freq 2.402000000 GHz Center Freq 2.402000000 GHz Center Freq 2.402000000 GHz Trace/Detector
An equipart of the second of t		Clear Writ
Image: Section of the section of t		Averag 00 Avera
Market Bit 2 MAX WARE 100 MAX Devry 1 2 MAX Devry 2 Jml Market Bit 2 MAX Coccipied Bandwidth Total Power 6.82 dBm Doccipied Bandwidth Total Power 6.82 dBm S71.32 ALH Z Transmit Preg Free X 1.1601 MHz Transmit Preg Free X 0.00 dBm X add Bandwidth DBM Power 8.82 dBm 0.00 dBm Doccipied Bandwidth Total Power 6.82 dBm Mark Mark Mark Mark Mark Doccipied Bandwidth Total Power 6.82 dBm Mark Mark Mark Mark Mark Mark Doccipied Bandwidth Total Power 6.82 dBm Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark Mark M		
871.32 kHz memory Frequency Frequenc		#Pac BW 30 kHz #V/BW 100 kHz Swaap 3.2 mc
Transmit Prog Error 15.88 M/z OPW Prever 98.00 % Area Bit wid Bindwidth 15.08 M/z vid Bindwidth 12.08 M/z vid Bindwidth 2.00.0 dB vid Bindwidth <t< td=""><td></td><td>Detecte 1.1601 MHz Detec</td></t<>		Detecte 1.1601 MHz Detec
Channel 0 / 2402 MHz Channel 0 / 2402 MHz Channel 0 / 2402 MHz Mark Manual Mark Mark Mark Mark Mark Mark Mark Mark	•	Auto Ma Transmit Freq Error -8.049 kHz OBW Power 99.00 %
Control Description Description <thdescription< th=""> <thdescription< th=""> <th< td=""><td></td><td></td></th<></thdescription<></thdescription<>		
Image: Market Str. Market Str. <td>RF 50 Ω AC SBNSE:INT ALIGNAUTO 02:54:53 PM May08, 2017 Center Freq: 2.441000000 GHz Center Freq: 2.441000000 GHz Radio Std: None</td> <td>17 Trace/Detector Conter Freq: 241000000 GHz Center Freq: 2441000000 GHz Center Freq: 2441000000 GHz Center Freq: 2441000000 GHz</td>	RF 50 Ω AC SBNSE:INT ALIGNAUTO 02:54:53 PM May08, 2017 Center Freq: 2.441000000 GHz Center Freq: 2.441000000 GHz Radio Std: None	17 Trace/Detector Conter Freq: 241000000 GHz Center Freq: 2441000000 GHz Center Freq: 2441000000 GHz Center Freq: 2441000000 GHz
Clear Will and a set of the set o	IFGaint.ov #Atten: 30 dB Avgirioid>10/10 Radio Device: BTS	Ing: ree kun Avginoid> iuno ITGain:Low #Atten: 30 dB Radio Device: BTS
Image: Second		ClearWrit 0.00 ClearW
The set of the green with the set of the green with the set of the s		
Occupied Bandwidth Total Power 10.6 dBm Occupied Bandwidth Total Power 9.53 dBm Interest in the second	Center 2.441 GHz Span 3 MHz	Z Center 2.441 GHz Span 3 MHz Span 3 me
Transmit Freq Error -7.799 MHz DBW Power 99.00 %, Audo Pask Transmit Freq Error -10.905 MHz DBW Power 99.00 %, Audo Pask x dB Bandwidth 892.5 MHz x dB -20.00 dB Mmi Mmi 1.316 MHz x dB -20.00 dB Mmi Mmi Mmi Mmi 1.316 MHz x dB -20.00 dB Mmi Mmi -20.00 dB Mmi Mmi -20.00 dB Mmi Mmi -20.00 dB Mmi -20.00 dB Mmi -20.00 dB	Occupied Bandwidth Total Power 10.6 dBm	Occupied Bandwidth Total Power 9.53 dBm
Channel 39 / 2441 MHz Channel 39 / 2441 MHz State Section Modernel Concept 18 Genter Freq 248000000 GHz #Genter Freq 248000000 GHz #Genter Freq 248000000 GHz #Genter Freq 248000000 GHz #Genter Freq 248000000 GHz Center Freq 248000000 GHz #Genter Freq 248000000 GHz #Genter Freq 248000000 GHz Center Freq 248000000 GHz Genter Freq 248000000 GHz #Genter Freq 248000000 GHz Center Freq 248000000 GHz #Genter Freq 248000000 GHz Center Freq 248000000 GHz #Genter Freq 248000000 GHz Center Freq 248000000 GHz Genter Freq 24800000 GHz Center Freq 248000000 GHz Genter Freq 24800000 GHz Center Freq 248000000 GHz Genter Freq 24800000 GHz Center Freq 24800000 GHz Genter Freq Error Center 24800000 GHz Genter Freq Error Center 24800000 GHz Genter Freq Error Span 3 MHz Sweep 32.2 ms Min foil Occupied Bandwidth x dB Bandwidth Total Power 11.5 dBm Freq Error Center 24800000 GHz Genter Freq Error Center Freq Error 18.025 kHz Sweep 32.2 ms Min foil Min foil Min foil Center Freq Error 18.025 kHz OBW Power 90.00 % Audo Min foil Min foil </td <td>Transmit Freq Error -7.799 kHz OBW Power 99.00 %</td> <td>Peak Auto Ma Transmit Freq Error -16.905 kHz OBW Power 99.00 % Auto M</td>	Transmit Freq Error -7.799 kHz OBW Power 99.00 %	Peak Auto Ma Transmit Freq Error -16.905 kHz OBW Power 99.00 % Auto M
Advertis Spectrum Andread Direct Direct 2000 Center Freq 2.4800000000 GHz Trace/Detector Center Freq 2.480000000 GHz Trace/Detector Center Case Center Case Cen	MSG STATUS	
W BOD ALSHARD DOESS JEMMEND, JEMME		
Log 000 000 000 000 000 000 000 0	PF S0.2 SENEERIT ALISHAUTO 0255:13PM May08, 2037 Center Freq 2.480000000 GHz Center Freq 2.48000000 GHz Radio Std: None Trig: Free Run Avg Hold>10/10	I//
0000 00000 0000 0000 0000 0000 0000 0000 0000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 0000000 000000 000000	Log	
300 Average 300 Average <td< td=""><td>-10.0</td><td>100 Martine Martine</td></td<>	-10.0	100 Martine Martine
200 max max <td></td> <td>Averag 300 Avera</td>		Averag 300 Avera
##Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms Min of #Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms Min fold Occupied Bandwidth 793.38 kHz Total Power 11.5 dBm Image: Complete Large Bandwidth 793.38 kHz Total Power 10.7 dBm Image: Complete Large Bandwidth 794.3 kHz Total Power 99.00 % Image: Complete Large Bandwidth 8440 Transmit Freq Error -18.025 kHz OBW Power 99.00 % Auto Min Auto Min	-70.0	
793.38 kHz Detect Pack 1.1633 MHz Detect Pack Transmit Freq Error -16.630 kHz OBW Power 99.00 % Auto Min x dB Bandwidth 744.3 kHz x dB -20.00 dB Image: Colspan="2">Mino Image: Colspan="2">Detect Pack Mino Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">OBW Power 99.00 % Mino Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Image: Colspan="2" Image: C	#Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms	s Min Hot #Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms Min Hot
Transmit Freq Error -16.630 kHz OBW Power 99.00 % Auto Mail Transmit Freq Error -18.025 kHz OBW Power 99.00 % Auto Mail x dB Bandwidth 744.3 kHz x dB -20.00 dB x x dB Bandwidth 1.184 MHz x dB -20.00 dB Image: Comparison of the text of text o	793.38 kHz	Detecty 1.1633 MHz Detecty Peak
		Auto Ma Transmit Freq Error -18.025 kHz OBW Power 99.00 %
	Mig STATUS	MIG STATUS
		Channel 78 / 2480 MHz

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20dB Bandw	h and 99% Band	width
8DPSK		
Center Freq 2.4022000000 GHz #FGelinLow Augusto 10 (257319M May 02,2017) Center Freq 2.4022000000 GHz #FGelinLow Augusto 10 (257319M May 02,2017) Tig Free Run Avg Held>10/10 Radio Device:BTS	e/Detector	
10 dB/div Ref 20.00 dBm	Clear Write	
	Average	
	Max Hold	
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	Min Hold	
1.1530 MHz Transmit Freq Error 2.648 kHz OBW Power 99.00 % x dB Bandwidth 1.237 MHz x dB -20.00 dB	Detector Peak► Man	
Channel 0 / 2402 MHz		
Appliend Systems Analyzer - Decessed DV Stride Envi ALX/NU/TO 002-2725/94 Mar/00,2017 Center Freq 2.441000000 GHz Center Freq 2.44100000 GHz Trig: Free Runn AvgHold>- 10/10 Radio Std: None #IFGalin:Low #IFGalin:Low Addition: 30 dB Radio Device: BTS Radio Device: BTS	e/Detector	
10 dB/div Ref 20.00 dBm Log 100 000	Clear Write	
and	Average	
600 600 700 Center 2.441 GHz Span 3 MHz	Max Hold	
#Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms Occupied Bandwidth Total Power 10.1 dBm	Min Fold	
1.1561 MHz Transmit Freq Error 2.491 kHz OBW Power 99.00 % x dB Bandwidth 1.229 MHz x dB -20.00 dB	Detector Peak► <u>Man</u>	
Channel 39 / 2441 MHz		
Agient Spectrum Analyzer - Dicaujind EW SPISE_ENT ALIGNAUTO ID254-86PM May 08, 2017 Center Freq 2.480000000 GHz Trig: Free Runn AvgiHold>10/10 Radio Std: None #IF Sol 2.480000000 GHz Trig: Free Runn AvgiHold>10/10 Radio Device: BTS	e/Detector	
10 dB/div Ref 20.00 dBm	Clear Write	
	Average	
500	MaxHold	
Center 2.48 GHz Span 3 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 3.2 ms	Min Hold	
Occupied Bandwidth Total Power 11.1 dBm 1.1596 MHz Transmit Freq Error 8.545 kHz OBW Power 99.00 % x dB Bandwidth 1.208 MHz x dB -20.00 dB	Detector Peak► Man	
Channel 78 / 2480 MHz		

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

6.2.4.2 Frequency Separation

Remark:

1. Test results including cable loss;

2. Please refer to following plots;

Measured at difference Packet Type for each mode and recorded worst case for each mode.
 Worst case data at DH1 for GFSK, 2DH1 for π/4-DQPSK, 3DH1 for 8DPSK modulation type;

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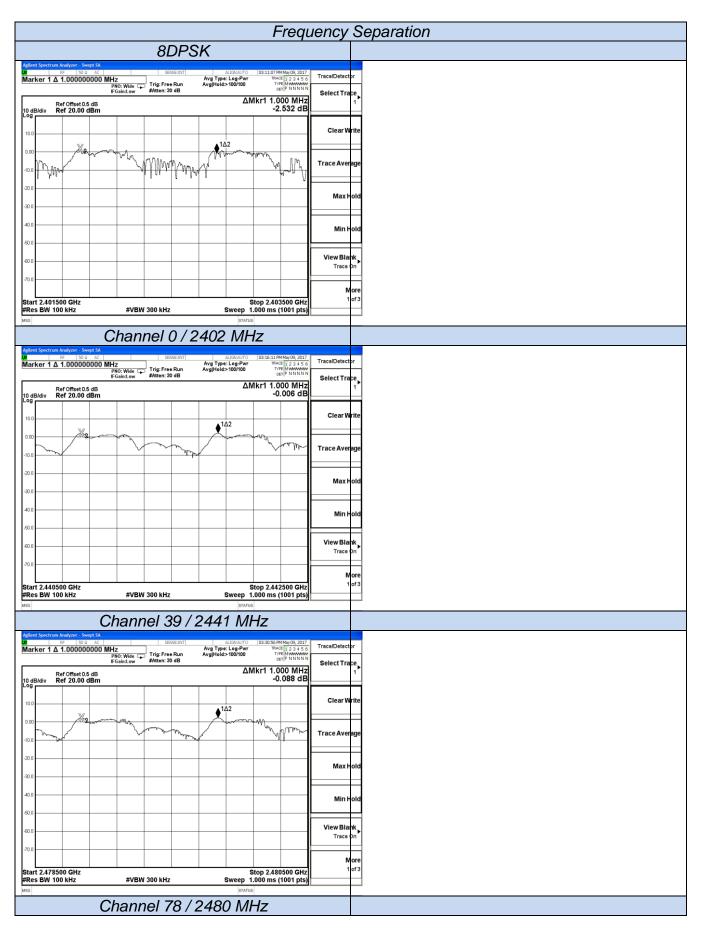
	Freq	uency	Separation			
GFS	SK			π/4DQ	PSK	
Ağınd Sysetran Analyzır - Sweyt SA	ALIGNAUTO 02-59-02 PM May 09, 2013 Avg Type: Log-Pwr Avg Hold>100100 TYPE Mwwww cer P NINNI AMkr1 1.000 MHz -0.002 dB	Select Tra	Aglent Spectrum Analyzer - Swept SA or Marker 1 △ 1.0000000000 (Ce 1 Ref Offset 0.5 dB 10 dB/div Ref 20.00 dBm	D MHz PNO: Wide Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>100/100	36:49 PM May 09, 2017 Trace/Detect TRACE [1 2 3 4 5 6 Trace/Detect TYPE [M WWWWW Select Tr 1.000 MHz -0.355 dB
10 abldiv Ref 20.00 dBm	102	ClearW	Log		▲ 1∆2	Clear
100 200 month and a second a		Trace Ave	ag	and had been allowed and have a second	my month	Trace Ave
-300	Ŷ	Max	-20.0 -30.0			Max
400		Min	101 -40.0			Min
60.0		View Bla Trace				View Bl Trace
Start 2.401500 GHz #Res BW 100 kHz #VBW 300 kHz	Stop 2.403500 GHz Sweep 1.000 ms (1001 pts		or ^{of} Start 2.401500 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep 1.000	2.403500 GHz ms (1001 pts)
Channel 0 /	2402 MHz		MSG	Channel 0 / 2	2402 MHz	
Aglent Spectrum Analyzer - Swept SA 0 10 10 50 Δ AC Marker 1 Δ 1.000000000 MHz IFGialcium Trig: Free Run IFGialcium Atten: 30 dB	ALISNAUTO 03:22:23 PM May 09, 2017 Avg Type: Log-Pwr TRACE 1, 2, 3, 4, 5 Avg[Hoid>100/100 TYPE MWWWW DEP N N N N	Frace/Detect	Agilent Spectrum Analyzer - Swept SA Or RF 50 Ω AC Marker 1 Δ 1.000000000000000000000000000000000000	SENSE:INT		20:04 PM May 09, 2017 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P NNNNN
Ref Offset 0.5 dB 10 dB/div Ref 20.00 dBm	ΔMkr1 1.000 MHz 0.002 dE	Select Tra	ce 1 Ref Offset 0.5 dB 10 dB/div Ref 20.00 dBm Log		∆Mkr1	1.000 MHz -0.034 dB
10.0 0.00 <u>2</u> <u>m</u> m		ClearW	rit 10.0		↓1∆2	Clear
-10.0		Trace Ave	ag -10.0			Trace Ave
-30.0		Max	-30.0			Max
50.0		Min H View Bla	-50.0			Min View Bl
70.0		Trace	-60.0			Trace
Start 2.440500 GHz #Res BW 100 kHz #VBW 300 kHz	Stop 2.442500 GHz Sweep 1.000 ms (1001 pts		^{of} Start 2.440500 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop Sweep 1.000	2.442500 GHz
Channel 39 /	2441 MHz		MSG	Channel 39 /	2441 MHz	•
Agilent.Spectrum Analyzer - Swept SA Val RF 50.2 AC SENSE:INT Marker 1.0.0000000000 MHz Image: Sense:INT Sense:INT	ALIGN AUTO 03:28:10 PM May 09, 2017		Agilent Spectrum Analyzer - Swept SA σr RF 50 Ω AC Marker 1 Δ 1.000000000000000000000000000000000000	SENSE:INT	ALIGNAUTO 03:2	29:00 PM May 09, 2017 TRACE 1 2 3 4 5 6 TYPE MWWWWW
PRO: Wride Ing: Free Run IFGain:Low #Atten: 30 dB 10 dB/div Ref 20.00 dBm	Avg Type: Log-Pwr Avg Hold>100/100 TMACE : 2 3 4 5. TYPE (MAXMANN CET N NN NN CET NN N	Select Tra	ce 1 Ref Offset 0.5 dB 10 dB/div Ref 20.00 dBm	PNO: Wide 🆵 Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Hoid>100/100 ∆Mkr1	1.000 MHz 0.045 dB
10.0 X2		ClearW	10.0		1∆2	Clear
		Trace Ave	ag .10.0			Trace Ave
-20.0		Max	-20.0			Max
40.0		Min	-40.0 -50.0			Min
60.0		View Bla Trace				View Bl
-70.0						
70.0 Start 2.478500 GHz #Res BW 100 kHz #VBW 300 kHz	Stop 2.480500 GHz Sweep 1.000 ms (1001 pts		of ^{of} Start 2.478500 GHz #Res BW 100 kHz	#VBW 300 kHz	Stop Stop 1.000	2.480500 GHz ms (1001 pts)

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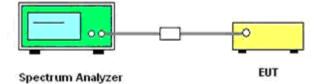
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6.3 Number of Hopping Frequency

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
π/4DQPSK	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 π /4DQPSK, 3DH1 for 8DPSK modulation type;
- 4. Record test plots only for GFSK;
- 5. Please refer following test plots;

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								Nun	nber	of	Hoppi	ng
	F	Malyzer - Sw ≆ 50 ລ 78.00000	AC 10000 MH PI	NO: Fast 🗔	Trig: Free	ISE:INT		ALIGN AUTO	08:50:22 A	4 May 09, 201 E 1 2 3 4 5 E MWHWWW T P N N N N	7	
3/	Re div R e	ef Offset 0.5 ef 20.00 (dB	Gain:Low	#Atten: 30) dB	_	ΔMkr	1 78.000		Select T	race 1
	Marrow					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			g		Clear	Write
	//2//	11									Trace Av	erage
ĺ											Max	Hold
1-											Min	Hold
											View Bl	ank
-											Trac	_
	2.40000 BW 1.0			#VBW	/ 1.0 MHz		<u> </u>	Sweep 1	Stop 2.48 .000 ms (350 GH 1001 pts		More 1 of 3
								STATUS		-	· [

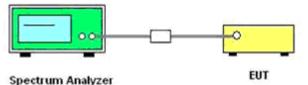
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6.4 Time of Occupancy (Dwell Time)

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]*hopping number=0.4[s]*79[ch]=31.6[s*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 [ch*hops/s]/79 [ch]=3.38 [hop/s];

The total hops for all channels within the dwell time calculation duration: 3.38 [hop/s]*31.6[s*ch]=106.67 [hop*ch];

The dwell time for all channels hopping: 106.67 [hop*ch]*Burst Width [ms/hop/ch].

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

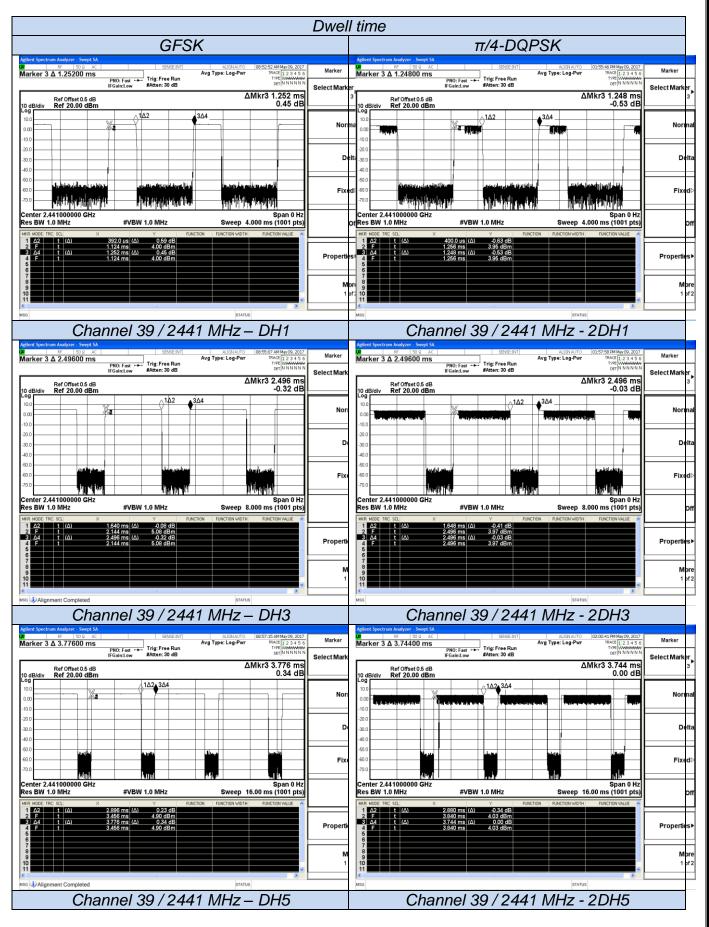
DH1: Dwell time=Pulse time (ms) \times (1600 \div 2 \div 79) \times 31.6 Second DH3: Dwell time=Pulse time (ms) \times (1600 \div 4 \div 79) \times 31.6 Second

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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;

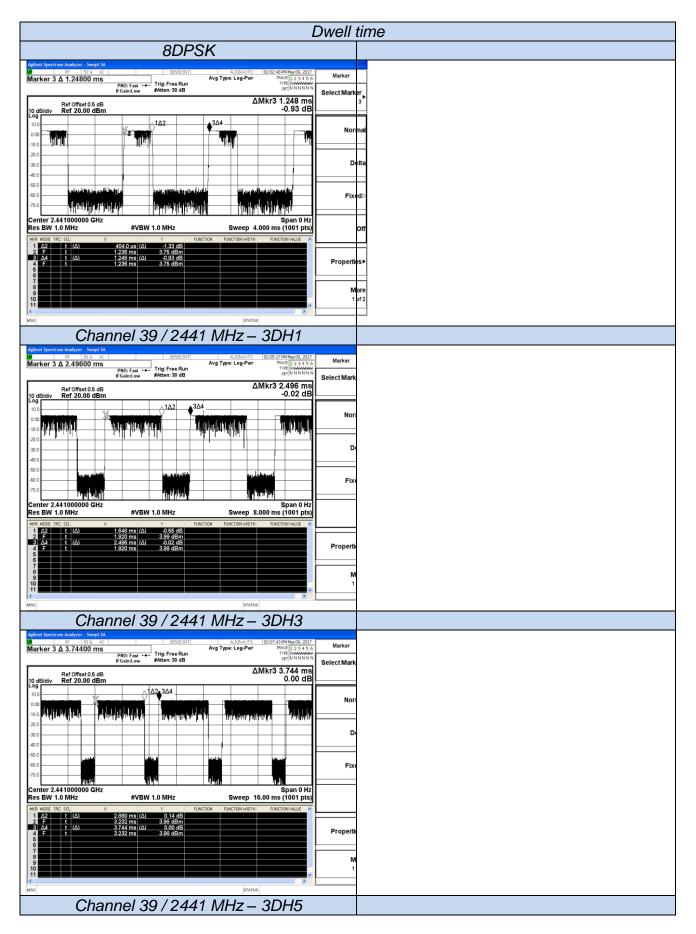


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