

TEST REPORT

FCC ID: 2APU8CQL1668-B

Product: Bluetooth Speaker

Model No.: CQL1668-B

Additional Model No.: SBT624, PBT865

Trade Mark: SURE, Sharper Image, Polaroid, Limitedtoo, Darta

Report No.: TCT180816E021 Issued Date: Aug. 24, 2018

Issued for:

A-703, Building 2, Tianan Cyber Park, HuangGe North Road, LongGang District, Shenzhen, 518172 China

Issued By:

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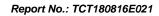




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1. Test Certification

Product:	Bluetooth Speaker	
Model No.:	CQL1668-B	(C)
Additional Model:	SBT624, PBT865	
Trade Mark:	SURE, Sharper Image, Polaroid, Limitedtoo, Darta	
Applicant:	Conquer Industry Co., Ltd	
Address:	A-703, Building 2, Tianan Cyber Park, HuangGe North Road, LongGang District, Shenzhen, 518172 China	(C)
Manufacturer:	Conquer Industry Co., Ltd	(
Address:	A-703, Building 2, Tianan Cyber Park, HuangGe North Road, LongGang District, Shenzhen, 518172 China	
Date of Test:	Aug. 17, 2018 – Aug. 23, 2018	
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247	(C)

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:	Jerry Xie	Date:	Aug. 23, 2018
	Jerry Xie		
Reviewed By:	Beryl shao	Date:	Aug. 24, 2018
	Beryl Zhao		
Approved By:	Tomsm	Date:	Aug. 24, 2018
	Tomsin		



2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247 (b)(1) §2.1046	PASS
20dB Occupied Bandwidth	§15.247 (a)(1) §2.1049	PASS
Carrier Frequencies Separation	§15.247 (a)(1)	PASS
Hopping Channel Number	§15.247 (a)(1)	PASS
Dwell Time	§15.247 (a)(1)	PASS
Radiated Emission	§15.205/§15.209 §2.1053, §2.1057	PASS
Band Edge	§15.247(d) §2.1051, §2.1057	PASS

Note:

- 1. PASS: Test item meets the requirement.
- 2. Fail: Test item does not meet the requirement.
- 3. N/A: Test case does not apply to the test object.
- 4. The test result judgment is decided by the limit of test standard.



3. EUT Description

Product:	Bluetooth Speaker		
Model No.:	CQL1668-B		
Additional Model:	SBT624, PBT865		
Trade Mark:	SURE, Sharper Image, Polaroid, Limitedtoo, Darta		
Bluetooth version:	V4.2		
Operation Frequency:	2402MHz~2480MHz		
Transfer Rate:	1/2 Mbits/s		
Number of Channel:	79		
Modulation Type:	GFSK, π/4-DQPSK		
Modulation Technology:	FHSS		
Antenna Type:	PCB Antenna		
Antenna Gain:	0dBi		
Power Supply:	Rechargeable Li-ion Battery DC 3.7V		
Remark:	All models above are identical in interior structure, electrical circuits and components, and just colors are different for the marketing requirement.		

Operation Frequency each of channel for GFSK, π/4-DQPSK

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
10	2412MHz	30	2432MHz	- 50	2452MHz	- 70	2472MHz
9 11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
					•••		
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		-
Remark: Channel 0, 39 &78 have been tested for GFSK, π/4-DQPSK modulation mode.							



4. Genera Information

4.1. Test environment and mode

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

The sample was placed 0.8m & 1.5m for the measurement below & above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Adapter	CSGN-LP5V1000- 3C-W			lephone

Note:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3. For conducted measurements (Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

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5. Facilities and Accreditations

5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

• FCC - Registration No.: 645098

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

• IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

5.2. Location

Shenzhen Tongce Testing Lab

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

Tel: 86-755-27673339

5.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

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6. Test Results and Measurement Data

6.1. Antenna requirement

Standard requirement: FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

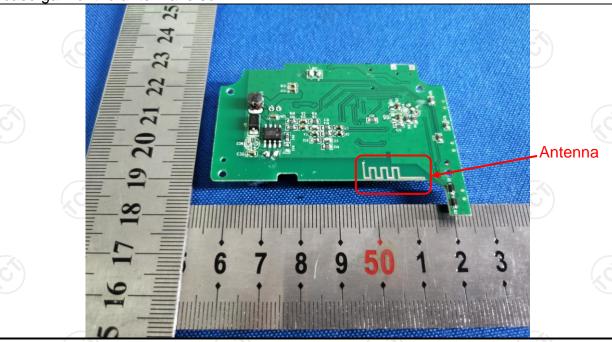
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

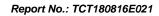
15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The Bluetooth antenna is PCB antenna which permanently attached, and the best case gain of the antenna is 0dBi.







6.2. Conducted Emission

6.2.1. Test Specification

	/ 4	/				
Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.10:2013	ANSI C63.10:2013				
Frequency Range:	150 kHz to 30 MHz					
Receiver setup:	RBW=9 kHz, VBW=30	RBW=9 kHz, VBW=30 kHz, Sweep time=auto				
Limits:	Frequency range (MHz) 0.15-0.5 0.5-5	Quasi-peak 66 to 56* 56	Average 56 to 46*			
	5-30	60	50			
Test Setup:	Reference Plane 40cm 80cm Filter AC power E.U.T AC power EMI Receiver Remark: E.U.T. Equipment Under Test LISN: Line Impedence Stabilization Network Test table height=0.8m					
Test Mode:	Refer to item 4.1					
Test Procedure:	 The E.U.T is connected to an adapter through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement. 					
Test Result:	PASS					



6.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)						
Equipment	Manufacturer	Model	Serial Number	Calibration Due		
Test Receiver	R&S	ESPI	101401	Sep. 27, 2018		
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 27, 2018		
Coax cable (9KHz-30MHz)	тст	CE-05	N/A	Sep. 27, 2018		
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A		

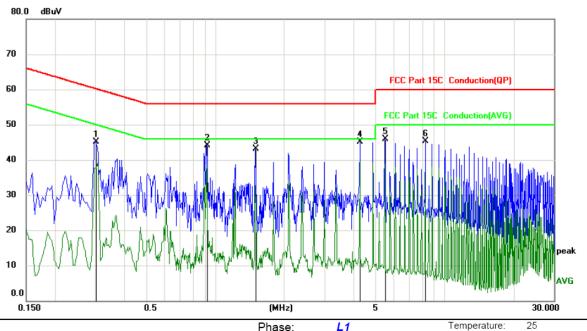




6.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Limit: FCC Part 15C Conduction(QP)

Power:

Humidity: 55 %

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Reading Correct Measure-No. Mk. Freq. Limit Over Level Factor ment MHz dBuV dB dBuV dBuV dB Detector Comment 0.3030 34.82 10.20 45.02 60.16 -15.14 peak 34.01 2 0.9195 10.17 44.18 56.00 -11.82 peak 32.95 56.00 -12.88 3 1.5000 10.17 43.12 peak 4.2765 34.96 10.20 45.16 56.00 -10.84 peak 5 5.4960 35.66 10.21 45.87 60.00 -14.13 peak 8.2455 35.03 10.22 45.25 60.00 -14.75 peak

Note:

Site

Freq. = Emission frequency in MHz

Reading level $(dB\mu V)$ = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement $(dB\mu V)$ = Reading level $(dB\mu V)$ + Corr. Factor (dB)

Limit (dBµV) = Limit stated in standard

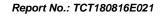
 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

Q.P. =Quasi-Peak

AVG =average

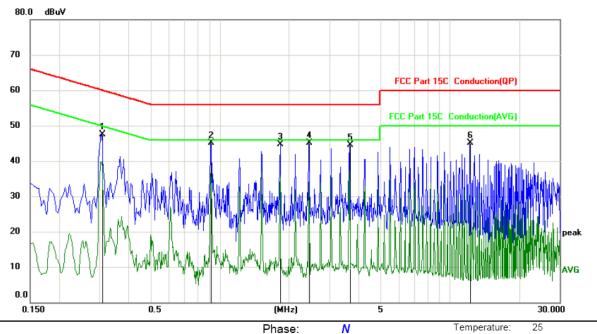
Any value more than 10dB below limit have not been specifically reported.

^{*} is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz





Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Limit: FCC Part 15C Conduction(QP) Power: Humidity: 55 %

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBu∀	dB	Detector	Comment
1	0.3075	37.33	10.20	47.53	60.04	-12.51	peak	
2 *	0.9150	35.02	10.17	45.19	56.00	-10.81	peak	
3	1.8330	34.61	10.18	44.79	56.00	-11.21	peak	
4	2.4405	34.84	10.18	45.02	56.00	-10.98	peak	
5	3.6645	34.21	10.20	44.41	56.00	-11.59	peak	
6	12.2145	34.93	10.24	45.17	60.00	-14.83	peak	

Note1:

Freq. = Emission frequency in MHz

Reading level $(dB\mu V)$ = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement ($dB\mu V$) = Reading level ($dB\mu V$) + Corr. Factor (dB)

Limit (dBµV) = Limit stated in standard

 $Margin (dB) = Measurement (dB\mu V) - Limits (dB\mu V)$

Q.P. =Quasi-Peak AVG =average

Any value more than 10dB below limit have not been specifically reported.

* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

Note2:

Measurements were conducted in all three channels (high, middle, low) and two modulation (GFSK, Pi/4DQPSK), and the worst case Mode (Middle channel and Pi/4DQPSK) was submitted only.



6.3. Conducted Output Power

6.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)			
Test Method:	ANSI C63.10:2013			
Limit:	Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (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.			
Test Setup:	Spectrum Analyzer EUT			
Test Mode:	Transmitting mode with modulation			
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.			
Test Result:	PASS			

6.3.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-26.5GHz)	ТСТ	RE-06	N/A	Sep. 27, 2018
Antenna Connector	тст	RFC-01	N/A	Sep. 27, 2018



6.3.3. Test Data

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TESTING CENTRE	TECHNOLOGY Report No.: 7	CT180816E021

GFSK mode							
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result				
Lowest	-3.12	30.00	PASS				
Middle	-2.56	30.00	PASS				
Highest	-3.15	30.00	PASS				

Pi/4DQPSK mode						
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result			
Lowest	-1.76	21.00	PASS			
Middle	-1.25	21.00	PASS			
Highest	-1.83	21.00	PASS			



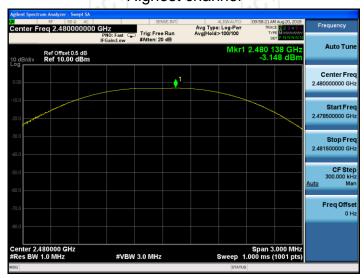


Lowest channel



Middle channel







Lowest channel



Middle channel







6.4. 20dB Occupy Bandwidth

6.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)			
Test Method:	ANSI C63.10:2013			
Limit:	N/A			
Test Setup:	Spectrum Analyzer EUT			
Test Mode:	Transmitting mode with modulation			
Test Procedure:	 The testing follows ANSI C63.10:2013 Measurement Guidelines. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel; 1% RBW ≤ 5% of the 20 dB bandwidth; VBW≥3RBW; Sweep = auto; Detector function = peak; Trace = max hold. Measure and record the results in the test report. 			
Test Result:	PASS			

6.4.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-26.5GHz)	тст	RE-06	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018



6.4.3. Test data

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Toot obonnol	20dB Occupy Bandwidth (kHz)				
Test channel	GFSK	π/4-DQPSK	Conclusion		
Lowest	850.7	1213	PASS		
Middle	849.1	1217	PASS		
Highest	846.8	1212	PASS		
ots as follows:					

Test p





Lowest channel



Middle channel







Lowest channel



Middle channel







6.5. Carrier Frequencies Separation

6.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)				
Test Method:	ANSI C63.10:2013				
Limit:	Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.				
Test Setup:	Spectrum Analyzer EUT				
Test Mode:	Hopping mode				
Test Procedure:	 The testing follows ANSI C63.10:2013 Measurement Guidelines. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Enable the EUT hopping function. Use the following spectrum analyzer settings: Span = wide enough to capture the peaks of two adjacent channels; RBW is set to approximately 30% of the channel spacing, adjust as necessary to best identify the center of each individual channel; VBW≥RBW; Sweep = auto;				
Test Result:	PASS (O)				

6.5.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-26.5GHz)	тст	RE-06	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018



6.5.3. Test data

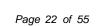
GFSK mode						
Test channel Carrier Frequencies Limit (kHz) Result						
Lowest	1000	850.7	PASS			
Middle	1000	850.7	PASS			
Highest	1000	850.7	PASS			

Pi/4 DQPSK mode					
Test channel Carrier Frequencies Limit (kHz) Result					
Lowest	1000	811.33	PASS		
Middle	1000	811.33	PASS		
Highest	998	811.33	PASS		

Note: According to section 6.4

Hoto. Hodoranig to coolidir or i			
Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)	
GFSK	850.7	850.7	
π/4-DQPSK	1217	811.33	

Test plots as follows:



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GFSK Modulation

Report No.: TCT180816E021

Lowest channel



Middle channel







Lowest channel



Middle channel







6.6. Hopping Channel Number

6.6.1. Test Specification

15.247 (a)(1)			
toma in the 2400 2422 F MILE			
tomo in the OAOO CANLL			
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.			
EUT			
ANSI C63.10:2013 Measurement JT was connected to the y RF cable and attenuator. The ensated to the results for each power setting and enable the uously. ping function. ectrum analyzer settings: Span = of operation; set the RBW to less nnel spacing or the 20 dB er is smaller; VBW≥RBW; Sweep ction = peak; Trace = max hold. ing frequency used is defined as channel.			

6.6.2. Test Instruments

(C , Y)		[C, ') [C, ')			
Equipment	Manufacturer	Model	Serial Number	Calibration Due	
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018	
RF Cable (9KHz-26.5GHz)	тст	RE-06	N/A	Sep. 27, 2018	
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018	



6.6.3. Test data

Report	No.:	TCT1	80816	E021
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Mode	Hopping channel numbers	Limit	Result
GFSK, Pi/4DQPSK	79	15	PASS

Test plots as follows:

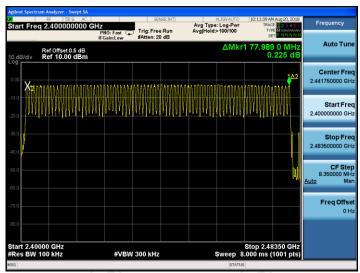




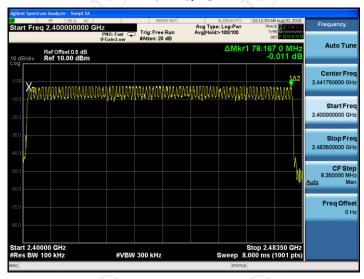




GFSK



Pi/4DQPSK





6.7. Dwell Time

6.7.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)				
Test Method:	ANSI C63.10:2013				
Limit:	The average time of occupancy on any channel shall no be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.				
Test Setup:	Spectrum Analyzer EUT				
Test Mode:	Hopping mode				
Test Procedure:	 The testing follows ANSI C63.10:2013 Measurement Guidelines. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Enable the EUT hopping function. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel; VBW≥RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold. Measure and record the results in the test report. 				
Test Result:	PASS				

6.7.2. Test Instruments

Equipment	pment Manufacturer		Serial Number	Calibration Due	
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018	
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 27, 2018	
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018	



6.7.3. Test Data

Mode	Packet	Hops Over Occupancy	Package Transfer	Dwell time	Limit (second)	Result
		Time (hops)	Time (ms)	(second)	(6000114)	
GFSK	DH1	320	0.418	0.134	0.4	PASS
GFSK	DH3	160	1.683	0.269	0.4	PASS
GFSK	DH5	106.67	2.928	0.312	0.4	PASS
Pi/4 DQPSK	2-DH1	320	0.425	0.136	0.4	PASS
Pi/4 DQPSK	2-DH3	160	1.683	0.269	0.4	PASS
Pi/4	2-DH5	106.67	2.936	0.313	0.4	PASS

Note: 1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels.

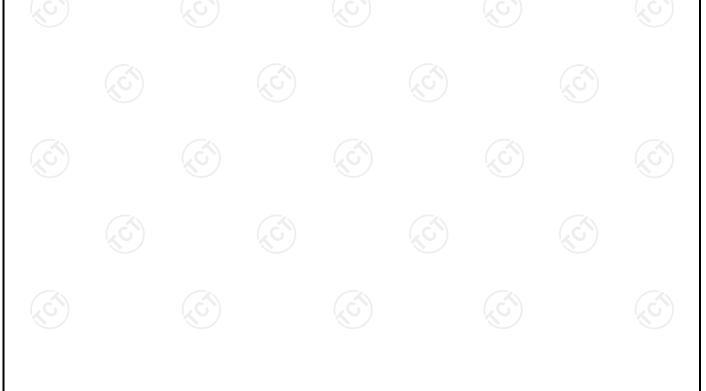
For DH1, With channel hopping rate (1600 / 2 / 79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to $(1600 / 2 / 79) \times (0.4 \times 79) = 320$ hops

For DH3, With channel hopping rate (1600/6/79) in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600/4/79) \times (0.4 \times 79) = 160$ hops

For DH5, With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops

2. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

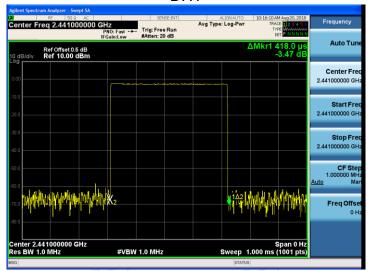
Test plots as follows:



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GFSK DH1



DH3



DH₅

