

TEST REPORT

FCC ID: 2AJN9-BTA003

Product: Amour Airbuds

Model No.: BTA003

Additional Model No.: N/A

Trade Mark: N/A

Report No.: TCT190716E011

Issued Date: Jul. 31, 2019

Issued for:

U2O GLOBAL CO., LTD.

Huanzhu Road No.385, 4 Floor, Jimei District, Xiamen, China

Issued By:

Shenzhen Tongce Testing Lab.

1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District,

Shenzhen, Guangdong, China

TEL: +86-755-27673339

FAX: +86-755-27673332

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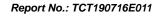




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1. Test Certification

Product:	Amour Airbuds	
Model No.:	BTA003	
Additional Model No.:	N/A	
Trade Mark:	N/A (c) (c)	
Applicant:	U2O GLOBAL CO., LTD.	
Address:	Huanzhu Road No.385, 4 Floor, Jimei District, Xiamen, China	
Manufacturer:	U2O GLOBAL CO., LTD.	
Address:	Huanzhu Road No.385, 4 Floor, Jimei District, Xiamen, China	
Date of Test:	Jul. 17, 2019 - Jul. 30, 2019	
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10:2013	(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.

	(,C)		
Tested By:	Brens Xu	Date:	Jul. 30, 2019
(c ^r)	Brews Xu	((c [*])
Reviewed By:	Bery zhao	Date:	Jul. 31, 2019
	Beryl Zhao		
Approved By:	Tomsin	Date:	Jul. 31, 2019
(c)	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)	PASS
20dB Occupied Bandwidth	§15.247 (a)(1)	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	PASS
Band Edge	§15.247(d)	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.



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3. EUT Description

 	Report No 101130110E011

Product:	Amour Airbuds
Model No.:	BTA003
Additional Model No.:	N/A
Trade Mark:	N/A
Hardware Version:	V1.2
Software Version:	V2.1
Bluetooth Version:	V5.0
Operation Frequency: 2402MHz~2480MHz	
Transfer Rate: 1/2/3 Mbits/s	
Number of Channel:	79
Modulation Type: GFSK, π/4-DQPSK, 8DPSK	
Modulation Technology:	FHSS
Antenna Type:	Ceramic Antenna
Antenna Gain:	1dBi
Power Supply:	Rechargeable Li-ion Battery DC 3.7V

Operation Frequency each of channel for GFSK, π/4-DQPSK, 8DPSK

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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
G`11	2413MHz	31	2433MHz	51	2453MHz	O 71	2473MHz
···						·	
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz		-
D	1 0 1 10 00 0701 1 1 1 1 1 1 0 000K 4 DODOK 0DDOK						

Remark: Channel 0, 39 &78 have been tested for GFSK, π/4-DQPSK, 8DPSK modulation mode.



4. General 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 (Z axis) 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
1	1) 1	

Note:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 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:

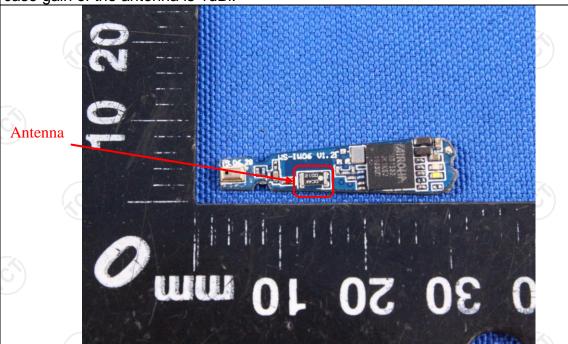
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 ceramic antenna which permanently attached, and the best case gain of the antenna is 1dBi.







6.2. Conducted Emission

6.2.1. Test Specification

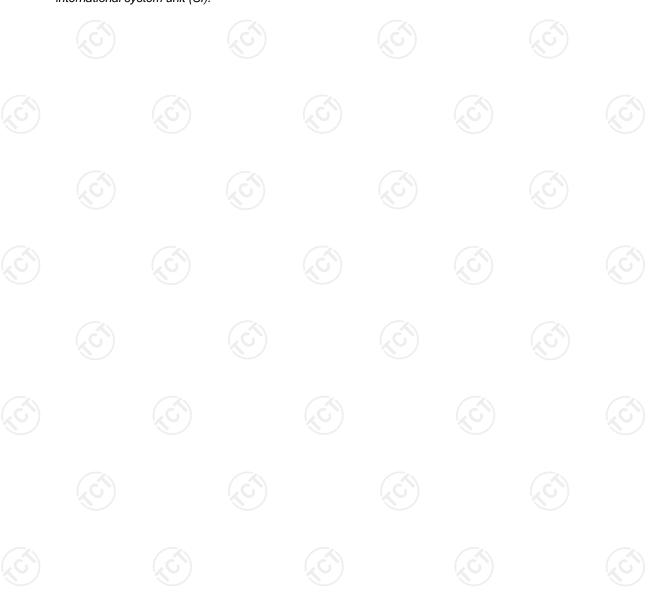
Test Requirement:	FCC Part15 C Section	15.207	Ke		
Test Method:	ANSI C63.10:2013				
Frequency Range:	150 kHz to 30 MHz				
Receiver setup:	RBW=9 kHz, VBW=30	RBW=9 kHz, VBW=30 kHz, Sweep time=auto			
Limits:	Frequency range (MHz) 0.15-0.5 0.5-5 5-30	Limit (Quasi-peak 66 to 56* 56 60	dBuV) Average 56 to 46* 46 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	Refer to item 4.1			
Test Procedure:	provides a 50ohm/5 measuring equipmer 2. The peripheral device power through a LI coupling impedance refer to the block photographs). 3. Both sides of A.C. conducted interferer emission, the relative the interface cables	ation network 50uH coupling in nt. es are also conne SN that provides with 50ohm terr diagram of the line are checkence. In order to fi e positions of equ must be changed	(L.I.S.N.). This appedance for the ected to the main a 500hm/50uH mination. (Please test setup and ed for maximum and the maximum all of according to		
	ANSI C63.10:2013 C	on conducted mea	asurement.		



6.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)						
Equipment	Manufacturer	Model	Serial Number	Calibration Due		
Test Receiver	R&S	ESPI	101402	Sep. 17, 2019		
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 20, 2019		
Coax cable (9KHz-30MHz)	тст	CE-05	N/A	Sep. 16, 2019		
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A		

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



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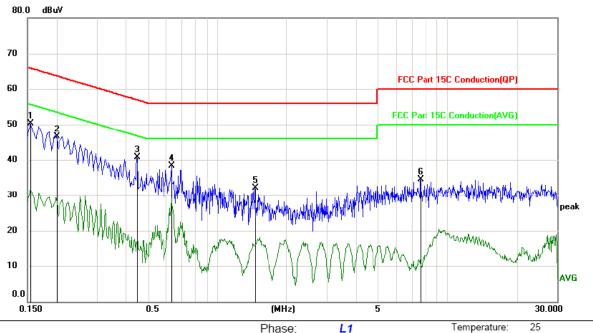
Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com



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:

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1545	40.11	10.22	50.33	65.75	-15.42	peak	
2	0.1997	36.33	10.22	46.55	63.62	-17.07	peak	
3	0.4470	30.49	10.22	40.71	56.93	-16.22	peak	
4	0.6360	28.14	10.23	38.37	56.00	-17.63	peak	
5	1.4595	21.78	10.40	32.18	56.00	-23.82	peak	
6	7.6335	23.89	10.52	34.41	60.00	-25.59	peak	

Note:

Site

Freq. = Emission frequency in MHz

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

Corr. Factor (dB) = LISN 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

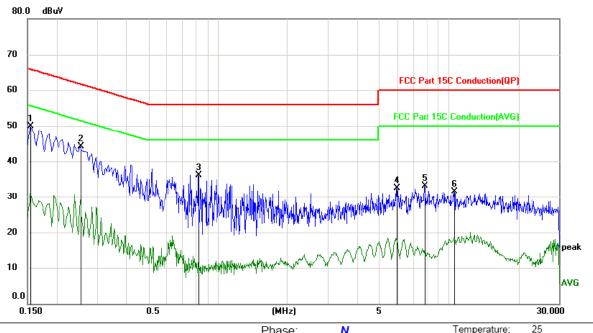
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55 %





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



Site Phase: N Temperature: 25
Limit: FCC Part 15C Conduction(QP) Power: Humidity: 55 %

No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.1545	39.69	10.22	49.91	65.75	-15.84	peak	
2	0.2535	33.80	10.23	44.03	61.64	-17.61	peak	
3	0.8250	25.83	10.28	36.11	56.00	-19.89	peak	
4	5.9460	22.06	10.49	32.55	60.00	-27.45	peak	
5	7.8180	22.67	10.52	33.19	60.00	-26.81	peak	
6	10.5225	20.90	10.58	31.48	60.00	-28.52	peak	

Note1:

Freq. = Emission frequency in MHz

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

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

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

 $Limit (dB\mu V) = Limit stated in standard$

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

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 three modulation (GFSK, Pi/4DQPSK, 8DPSK), and the worst case Mode (Highest channel and 8DPSK) 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:	KDB 558074 D01 v05r02			
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	R&S	FSU	200054	Sep. 20, 2019
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 20, 2019
Antenna Connector	TCT	RFC-01	N/A	Sep. 20, 2019

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



6.3.3. Test Data

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GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	1.24	30.00	PASS
Middle	2.37	30.00	PASS
Highest	4.12	30.00	PASS

Pi/4DQPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	2.18	21.00	PASS
Middle	3.10	21.00	PASS
Highest	4.45	21.00	PASS

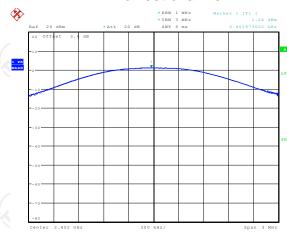
8DPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	2.51	21.00	PASS
Middle	3.44	21.00	PASS
Highest	4.63	21.00	PASS

Test plots as follows:



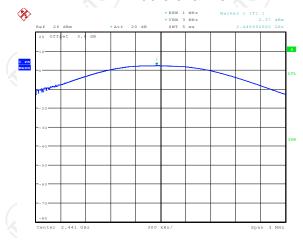


Lowest channel



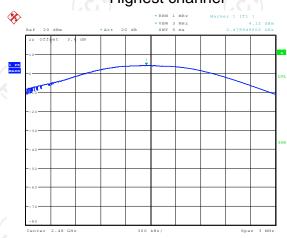
Date: 26.JUL.2019 16:18:39

Middle channel



Date: 26.JUL.2019 16:18:17

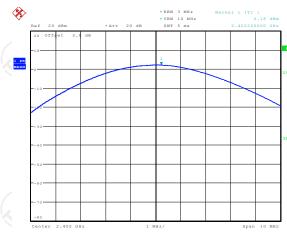
Highest channel



Date: 26.JUL.2019 16:15:55

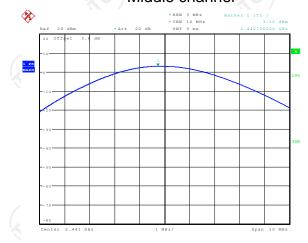


Lowest channel



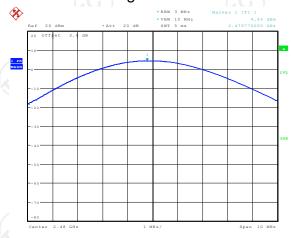


Middle channel



Date: 26.JUL.2019 16:08:15

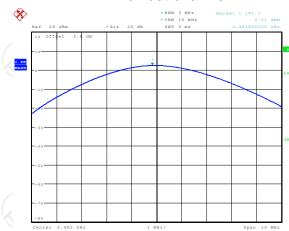
Highest channel



Date: 26.JUL.2019 16:08:37

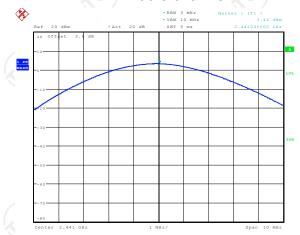


Lowest channel



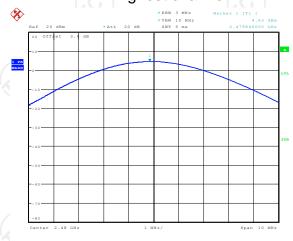
Date: 26.JUL.2019 16:01:53

Middle channel



Date: 26.JUL.2019 16:01:30

Highest channel



Date: 26.JUL.2019 16:01:02



6.4. 20dB Occupy Bandwidth

6.4.1. Test Specification

		(.ch) (.ch				
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)					
Test Method:	KDB 558074 D01 v05r02					
Limit:	N/A					
Test Setup:	Spectrum Analyzer	EUT				
Test Mode:	Transmitting mode with modulation					
Test Procedure:	 Transmitting mode with modulation 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 = maxhold. 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	R&S	FSU	200054	Sep. 20, 2019
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 20, 2019
Antenna Connector	TCT	RFC-01	N/A	Sep. 20, 2019

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

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Test channel

GFSK

6.4.3. Test data

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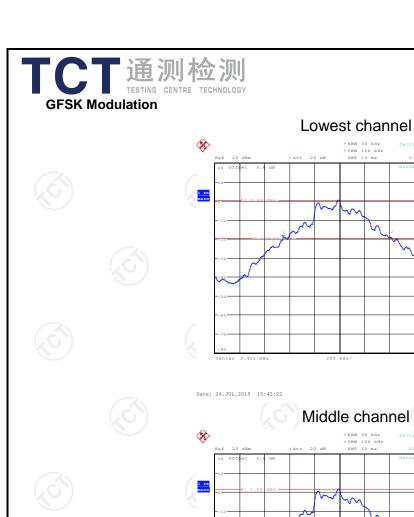
Conclusion

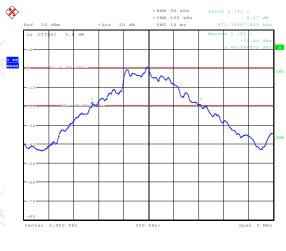
(O)	Lowest	871.79	1206.7	' 3 12	206.73	PASS	(60)
	Middle	846.15	1216.3	35 12	211.54	PASS	
	Highest	846.15	1221.1	5 12	211.54	PASS	-
Test pl	ots as follows:						

20dB Occupy Bandwidth (kHz)

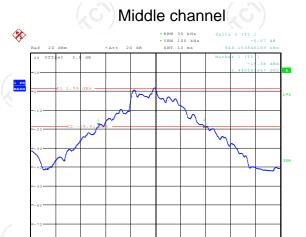
8DPSK

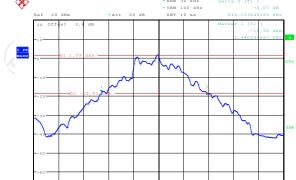
π/4-DQPSK



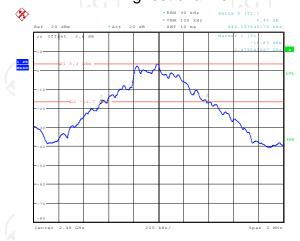












Date: 26.JUL.2019 15:46:02

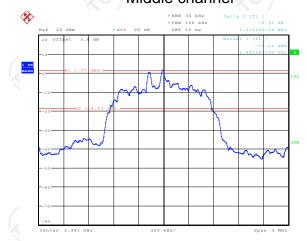


Lowest channel



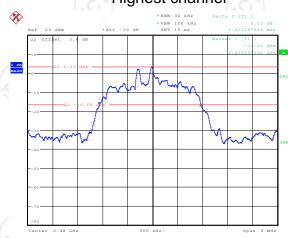


Middle channel



Date: 26.JUL.2019 15:49:22

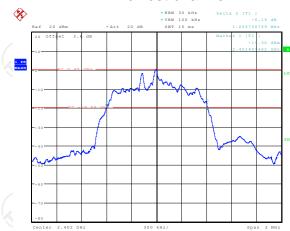
Highest channel



Date: 26.JUL.2019 15:48:24

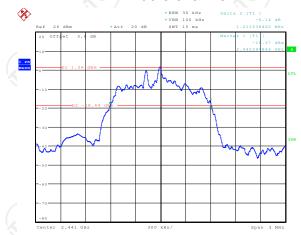


Lowest channel



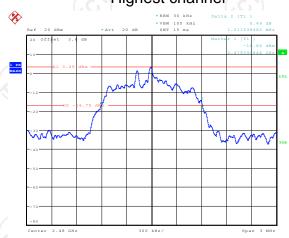
Date: 26.JUL.2019 15:51:36

Middle channel



Date: 26.JUL.2019 15:58:18

Highest channel



Date: 26.JUL.2019 15:59:55



6.5. Carrier Frequencies Separation

6.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	KDB 558074 D01 v05r02
Limit:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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, provided the systems operate with an output power no greater than 125 mW.
Test Setup:	Spectrum Analyzer EUT
Test Mode:	Hopping mode
Test Procedure:	 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 approximately10% of the channel spacing, adjust as necessary to best identify the center of each individual channel; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Record the value in report.
Test Result:	PASS

6.5.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200054	Sep. 20, 2019
RF Cable (9KHz-26.5GHz)	тст	RE-06	N/A	Sep. 20, 2019
Antenna Connector	тст	RFC-01	N/A	Sep. 20, 2019

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



6.5.3. Test data

GFSK mode				
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result	
Lowest	1000	871.79	PASS	
Middle	1000	871.79	PASS	
Highest	1004	871.79	PASS	

Pi/4DQPSK mode				
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result	
Lowest	1000	814.10	PASS	
Middle	1002	814.10	PASS	
Highest	1000	814.10	PASS	

8DPSK mode				
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result	
Lowest	1000	807.69	PASS	
Middle	1004	807.69	PASS	
Highest	998	807.69	PASS	

Note: According to section 6.4

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	871.79	871.79
π/4-DQPSK	1221.15	814.10
8DPSK	1211.54	807.69

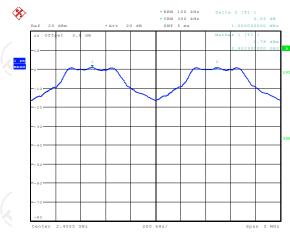
Test plots as follows:



Report No.: TCT190716E011

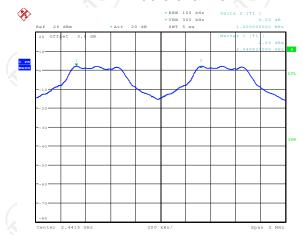


Lowest channel



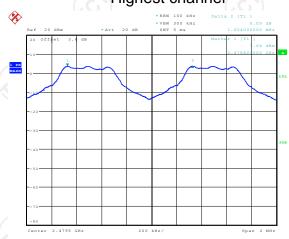
Date: 26.JUL.2019 16:27:52

Middle channel



Date: 26.JUL.2019 16:29:53

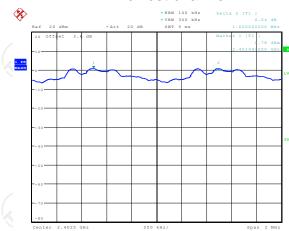
Highest channel



Date: 26.JUL.2019 16:37:58

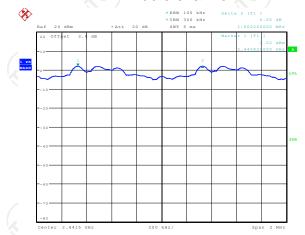


Lowest channel



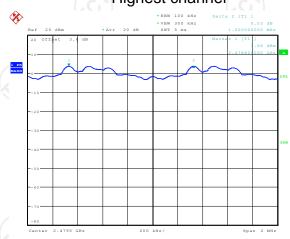
Date: 26.JUL.2019 16:42:35

Middle channel



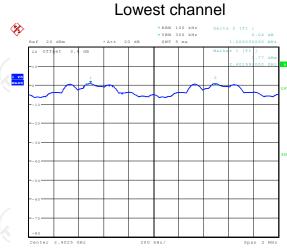
Date: 26.JUL.2019 16:40:25

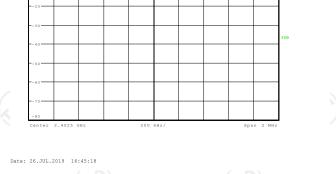
Highest channel

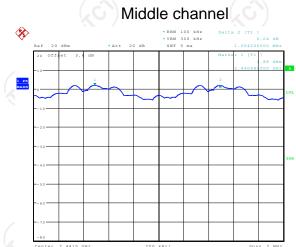


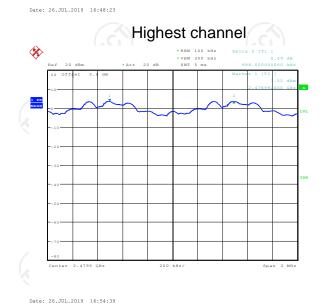
Date: 26.JUL.2019 16:39:09













6.6. Hopping Channel Number

6.6.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)		
Test Method:	KDB 558074 D01 v05r02		
Limit:	Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.		
Test Setup:	Structure Andrews EUT		
Test Mode:	Spectrum Analyzer Hopping mode		
	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.		
	2. Set to the maximum power setting and enable the EUT transmit continuously.		
	3. Enable the EUT hopping function.		
Test Procedure:	4. Use the following spectrum analyzer settings: Span = the frequency band of operation; set the RBW to less than 10% of the channel spacing or the 20 dB		
	bandwidth, whichever is smaller; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold.		
	5. The number of hopping frequency used is defined as the number of total channel.		
	6. Record the measurement data in report.		
Test Result:	PASS		

6.6.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200054	Sep. 20, 2019
RF Cable (9KHz-26.5GHz)	тст	RE-06	N/A	Sep. 20, 2019
Antenna Connector	TCT	RFC-01	N/A	Sep. 20, 2019

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



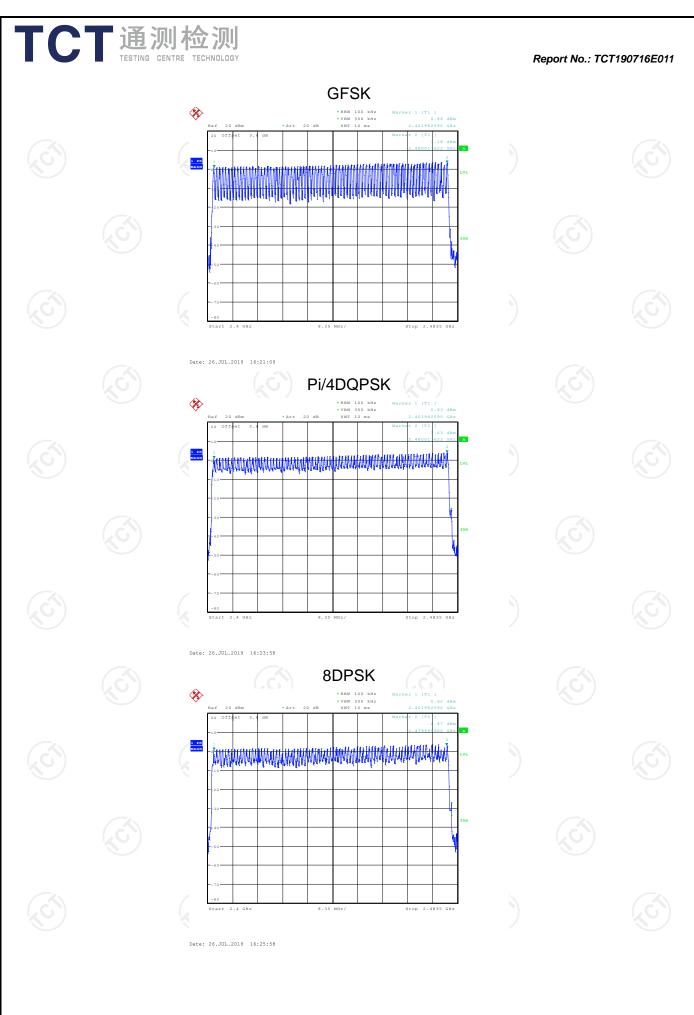
6.6.3. Test data

Report	No.:	TCT190	716E011
, topoit			,,,,,,,

Mode	Hopping channel numbers	Limit	Result
GFSK, Pi/4DQPSK, 8DPSK	79	15	PASS

Test plots as follows:







6.7. Dwell Time

6.7.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)		
Test Method:	KDB 558074 D01 v05r02		
Limit:	The average time of occupancy on any channel shall not 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 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	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200054	Sep. 20, 2019
RF Cable (9KHz-26.5GHz)	тст	RE-06	N/A	Sep. 20, 2019
Antenna Connector	TCT	RFC-01	N/A	Sep. 20, 2019

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



6.7.3. Test Data

Mode	Packet	Hops Over Occupancy Time (hops)	Package Transfer Time (ms)	Dwell time (second)	Limit (second)	Result
GFSK	DH1	320	0.410	0.131	0.4	PASS
GFSK	DH3	160	1.675	0.268	0.4	PASS
GFSK	DH5	106.67	2.941	0.314	0.4	PASS
Pi/4 DQPSK	2-DH1	320	0.419	0.134	0.4	PASS
Pi/4 DQPSK	2-DH3	160	1.680	0.269	0.4	PASS
Pi/4 DQPSK	2-DH5	106.67	2.949	0.315	0.4	PASS
8DPSK	3-DH1	320	0.419	0.134	0.4	PASS
8DPSK	3-DH3	160	1.674	0.268	0.4	PASS
8DPSK	3-DH5	106.67	2.948	0.314	0.4	PASS

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

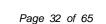
For DH1, With channel hopping rate (1600/2/79) in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600/2/79) \times (0.4 \times 79) = 320$ hops

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

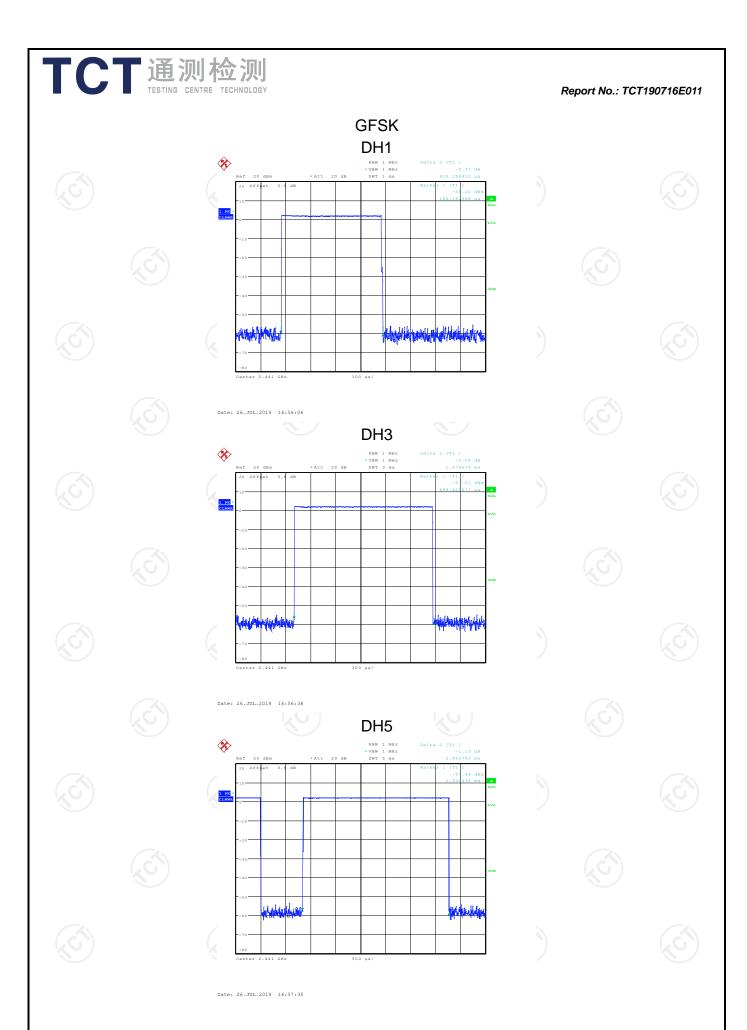
For DH5, With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops

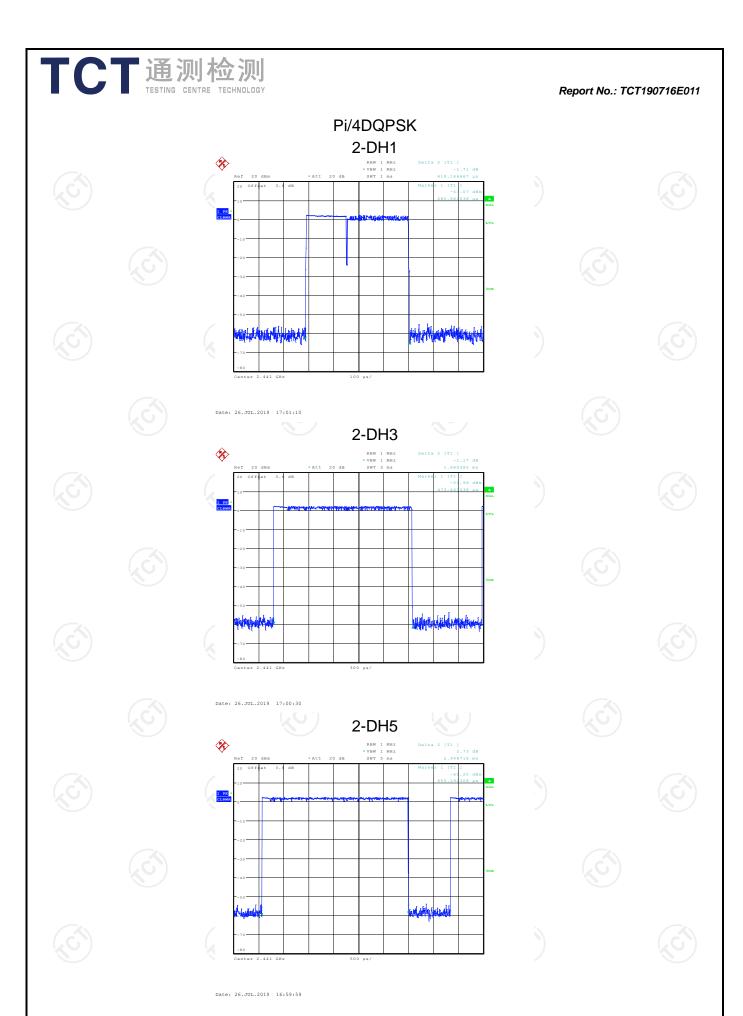
2. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

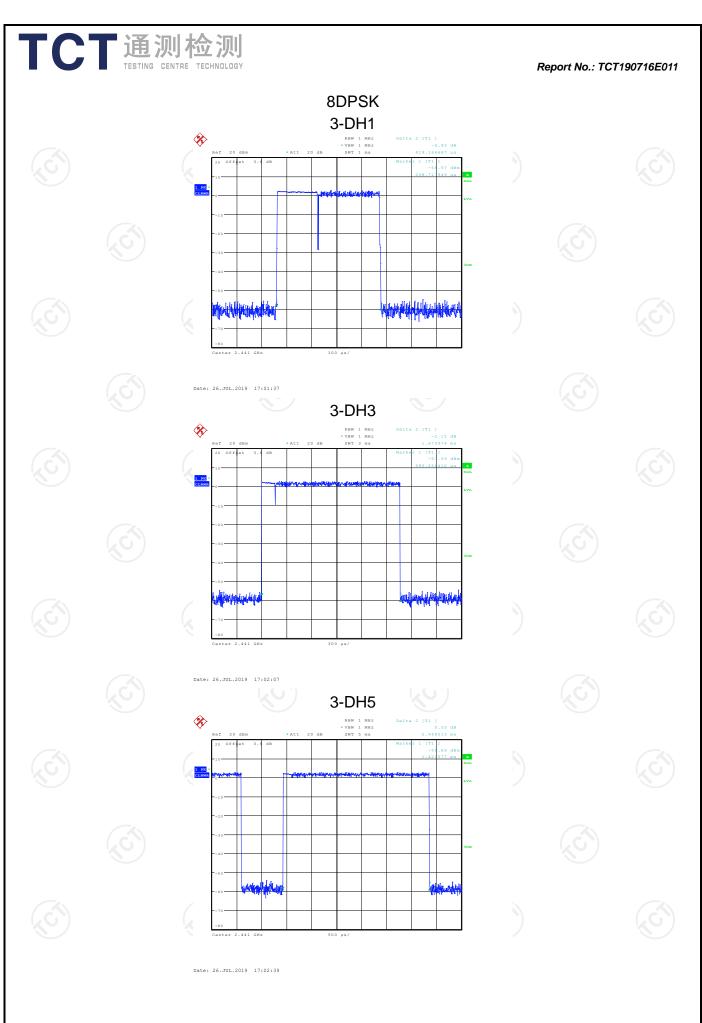
Test plots as follows:



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6.8. Pseudorandom Frequency Hopping Sequence

Test Requirement:

FCC Part15 C Section 15.247 (a)(1) requirement:

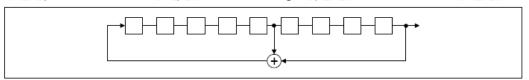
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. 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, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence

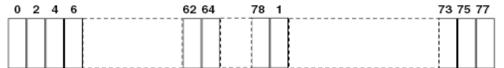
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 29-1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter. The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.



6.9. Conducted Band Edge Measurement

6.9.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB 558074 D01 v05r02
Limit:	In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.
Test Setup:	Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	 Set to the maximum power setting and enable the EUT transmit continuously. Set RBW = 100 kHz (≥1% span=10MHz), VBW = 300 kHz (≥RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used. Enable hopping function of the EUT and then repeat step 2 and 3. Measure and record the results in the test report.
Test Result:	PASS

6.9.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200054	Sep. 20, 2019
RF Cable (9KHz-26.5GHz)	тст	RE-06	N/A	Sep. 20, 2019
Antenna Connector	TCT	RFC-01	N/A	Sep. 20, 2019

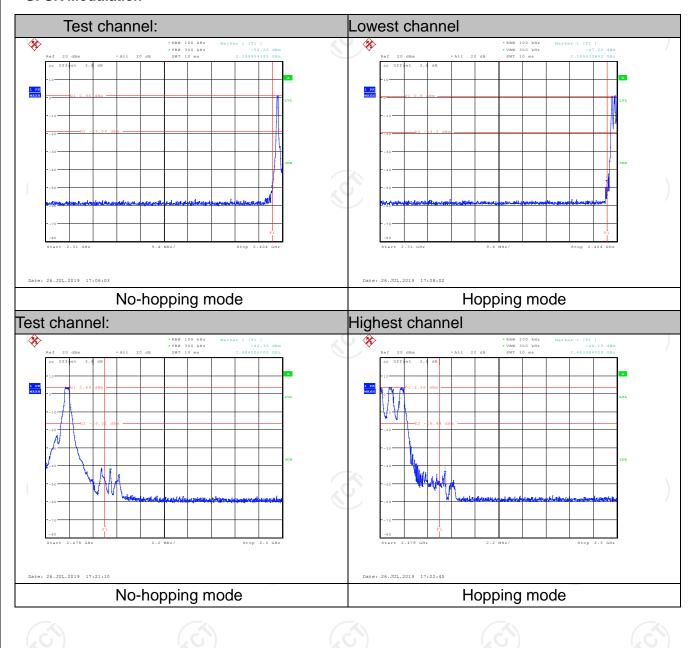
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



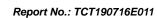
6.9.3. Test Data

Report No.: TCT190716E011

GFSK Modulation

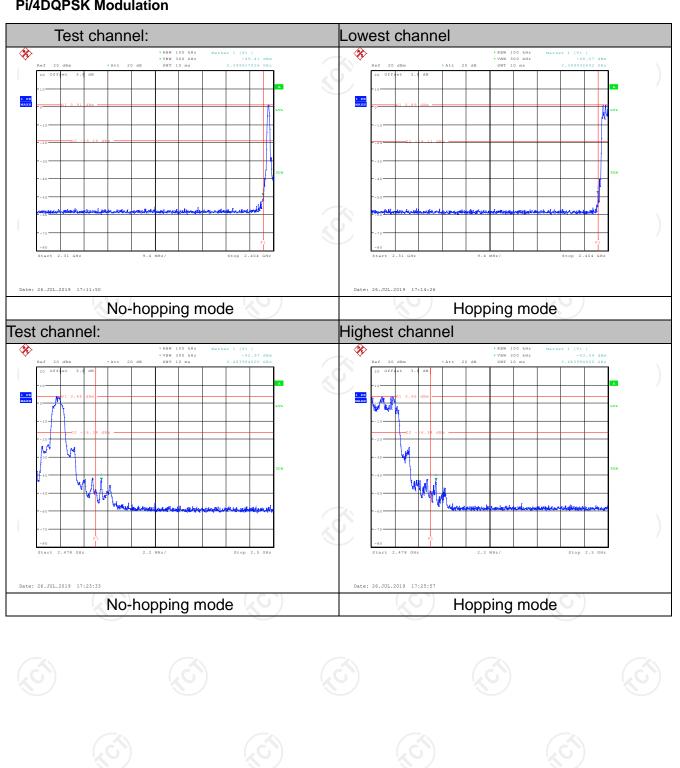






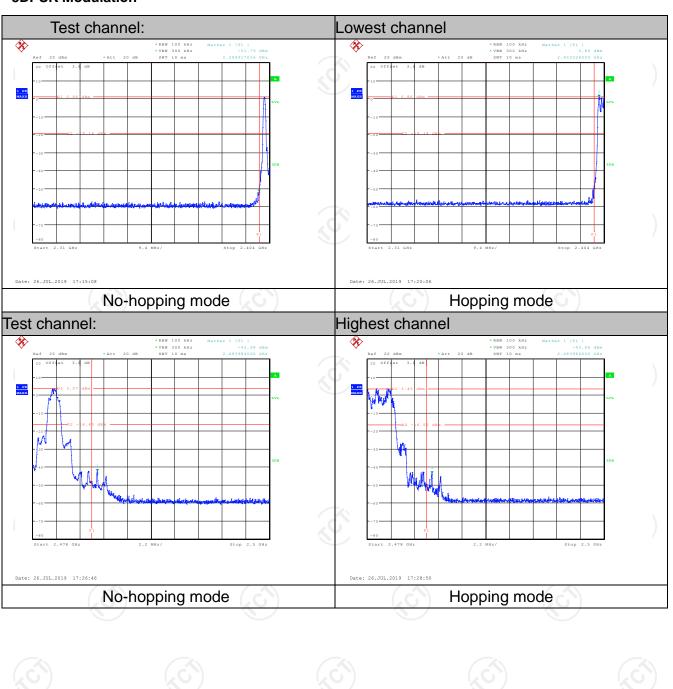


Pi/4DQPSK Modulation





8DPSK Modulation







6.10. Conducted Spurious Emission Measurement

6.10.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d)					
Test Method:	In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which in the restricted bands must also comply with the radiated emission limits. Transmitting mode with modulation 1. 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. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must at least 20 dB down from the highest emission lev within the authorized band as measured with a 10 kHz RBW. 4. Measure and record the results in the test report. 5. The RF fundamental frequency should be excluded.					
Limit:	radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the					
Test Setup:	Spectrum Analyzer EUT					
Test Mode:	Transmitting mode with modulation					
Test Procedure:	 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. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. 					
Test Result:	PASS					

6.10.2. Test Instruments

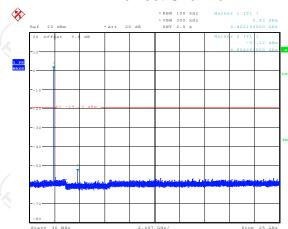
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	R&S	FSU	200054	Sep. 20, 2019
Spectrum Analyzer	ROHDE&SCH WARZ	FSQ40	200061	Sep. 20, 2019
RF Cable (9KHz-26.5GHz)	тст	RE-06	N/A	Sep. 20, 2019
Antenna Connector	TCT	RFC-01	N/A	Sep. 20, 2019

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

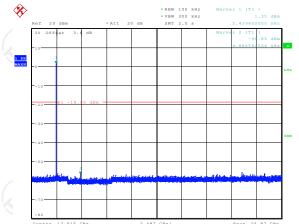


6.10.3. Test Data

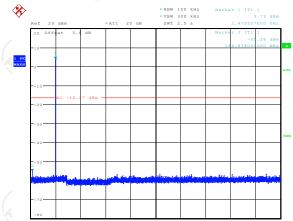
GFSK mode Lowest Channel **RBN 100 kHz** **WBN 300 kHz** **W









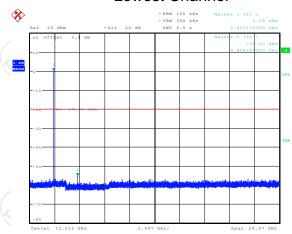


Date: 26.JUL.2019 17:36:53



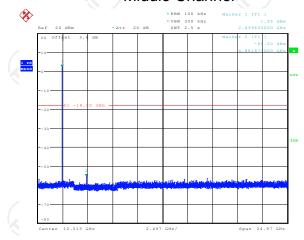
Pi/4DQPSK mode

Lowest Channel



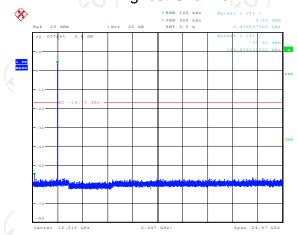
Date: 26.JUL.2019 17:41:48

Middle Channel

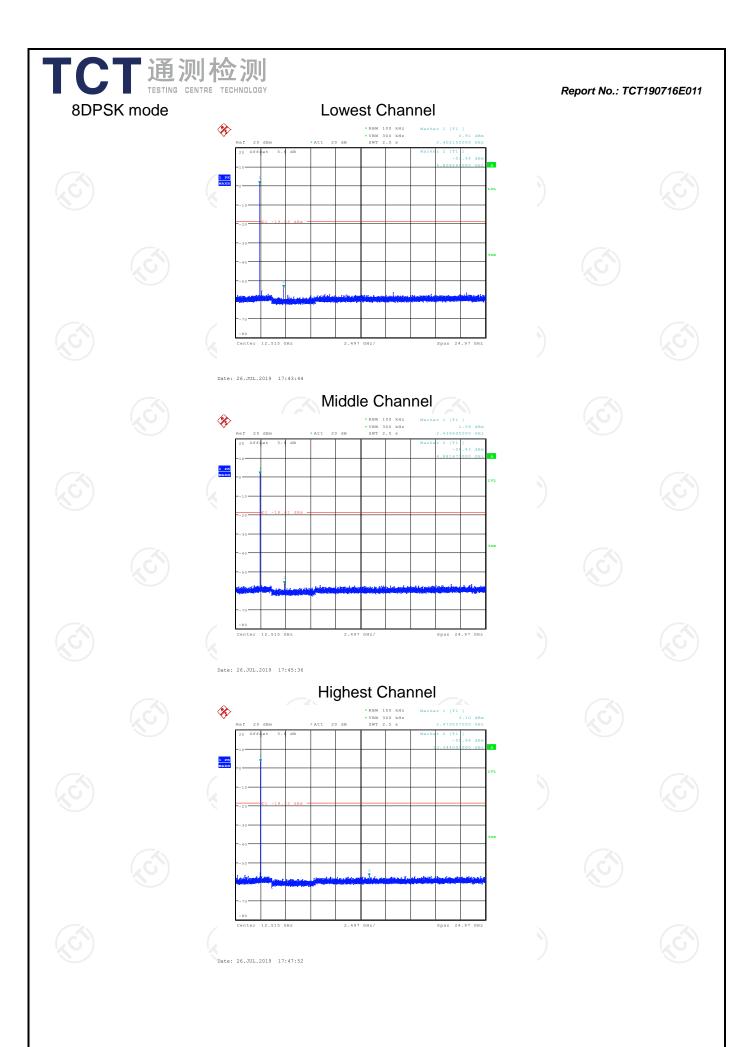


Date: 26.JUL.2019 17:40:12

Highest Channel



Date: 26.JUL.2019 17:38:41

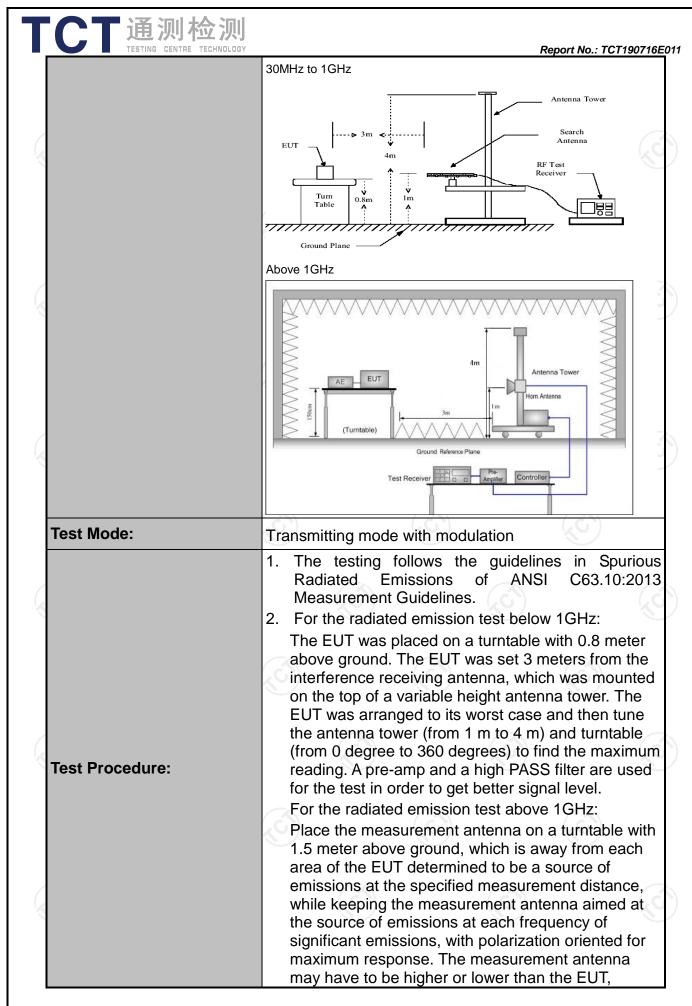




6.11. Radiated Spurious Emission Measurement

6.11.1. Test Specification

Test Requirement:	FCC Part15	C Section	15.209			(C
Test Method:	ANSI C63.10	0:2013				
Frequency Range:	9 kHz to 25 (GHz	3			
Measurement Distance:	3 m				160)
Antenna Polarization:	Horizontal &	Vertical				
	Frequency	Detector	RBW	VBW		Remark
	9kHz- 150kHz	Quasi-pea		1kHz		i-peak Value
Receiver Setup:	150kHz- 30MHz	Quasi-pea	k 9kHz	30kHz	Quas	si-peak Value
	30MHz-1GHz	Quasi-pea		300KHz	1 0	si-peak Value
	Above 1GHz	Peak Peak	1MHz 1MHz	3MHz 10Hz		eak Value erage Value
	Frequen	ісу	Field Stre (microvolts	ength /meter)	Mea	asurement nce (meters)
	0.009-0.4 0.490-1.7		2400/F(I 24000/F(300
	1.705-3		30	/	30	
	30-88		100		3	
Limit:	88-216		150 200		3	
Lillit.		216-960 Above 960			3	
	II Fredilency		ld Strength ovolts/meter)	Measure Distan (mete	ice	Detector Average
	Above 1GHz	z 🗀	5000	3		Peak
Test setup:		Turn table	30MHz		Compu	
			(,			Çć



ГС Т通测检测	
TESTING CENTRE TECHNOLOGY	Report No.: TCT190716E011
	depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
	3. Set to the maximum power setting and enable the EUT transmit continuously.4. Use the following spectrum analyzer settings:
	(1) Span shall wide enough to fully capture the emission being measured;
	(2) Set RBW=120 kHz for f < 1 GHz, RBW=1MHz for f>1GHz; VBW≥RBW;
	Sweep = auto; Detector function = peak; Trace = max hold for peak
	(3) For average measurement: use duty cycle correction factor method per
	15.35(c). Duty cycle = On time/100 milliseconds On time =N1*L1+N2*L2++Nn-1*LNn-1+Nn*Ln
	Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.
	Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
	Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level



PASS

Test results:





6.11.2. Test Instruments

	Radiated Em	ission Test Site	e (966)	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Test Receiver	ROHDE&SCHW ARZ	ESIB7	100197	Sep. 17, 2019
Spectrum Analyzer	ROHDE&SCHW ARZ	FSQ40	200061	Sep. 20, 2019
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 16, 2019
Pre-amplifier	HP	8447D	2727A05017	Sep. 16, 2019
Loop antenna	ZHINAN	ZN30900A	12024	Oct. 20, 2019
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 02, 2019
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Oct. 20, 2019
Horn Antenna	A-INFO	LB-180400-KF	J211020657	Sep. 16, 2019
Antenna Mast	Keleto	RE-AM	N/A	N/A
Coax cable (9KHz-1GHz)	тст	RE-low-01	N/A	Sep. 16, 2019
Coax cable (9KHz-40GHz)	тст	RE-high-02	N/A	Sep. 16, 2019
Coax cable (9KHz-1GHz)	тст	RE-low-03	N/A	Sep. 16, 2019
Coax cable (9KHz-40GHz)	тст	RE-high-04	N/A	Sep. 16, 2019
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

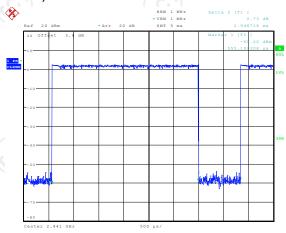
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



6.11.3. Test Data

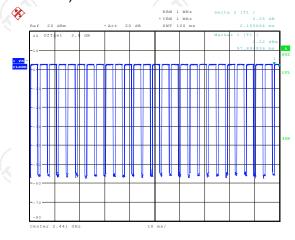
Duty cycle correction factor for average measurement

2DH5 on time (One Pulse) Plot on Channel 39



Date: 26.JUL.2019 16:59:59

2DH5 on time (Count Pulses) Plot on Channel 39



Date: 26.JUL.2019 17:03:22

Note:

- 1. Worst case Duty cycle = on time/100 milliseconds = (2.949*26+2.105)/100=0.7878
- 2. Worst case Duty cycle correction factor = 20*log (Duty cycle) = -2.07dB
- 3. 2DH5 has the highest duty cycle worst case and is reported.
- 4. The average levels were calculated from the peak level corrected with duty cycle correction factor (-2.07dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

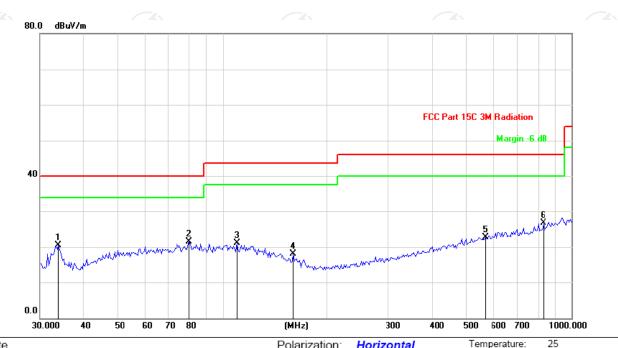


Please refer to following diagram for individual

Report No.: TCT190716E011

Below 1GHz

Horizontal:

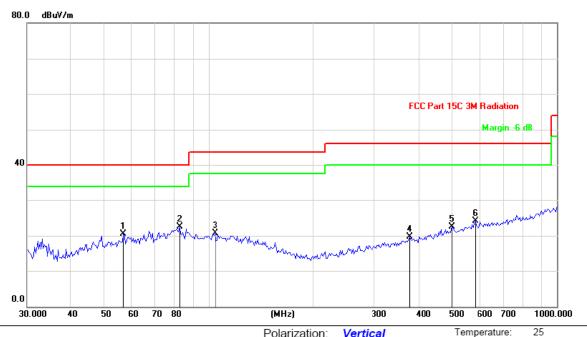


Site Polarization: Horizontal Temperature: 25
Limit: FCC Part 15C 3M Radiation Power: DC 3.7V Humidity: 55 %

	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
_	1		33.8067	31.45	-11.02	20.43	40.00	-19.57	peak
G ⁻	2	*	80.2383	38.15	-16.55	21.60	40.00	-18.40	peak
-	3		110.0818	30.02	-8.89	21.13	43.50	-22.37	peak
-	4		159.7586	33.87	-15.82	18.05	43.50	-25.45	peak
-	5		565.9776	29.39	-6.60	22.79	46.00	-23.21	peak
_	6		833.0127	30.79	-4.10	26.69	46.00	-19.31	peak



Vertical:



Site Polarization: Vertical Temperature: 25
Limit: FCC Part 15C 3M Radiation Power: DC 3.7V Humidity: 55 %

	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
-			MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
	1		56.8644	32.07	-11.64	20.43	40.00	-19.57	peak
	2	*	82.5257	37.54	-15.11	22.43	40.00	-17.57	peak
	3		104.0640	29.14	-8.36	20.78	43.50	-22.72	peak
	4		376.5227	29.04	-9.29	19.75	46.00	-26.25	peak
-	5		498.7303	29.94	-7.42	22.52	46.00	-23.48	peak
-	6		582.1122	30.38	-6.22	24.16	46.00	-21.84	peak

Note: 1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported

2. Measurements were conducted in all three channels (high, middle, low) and three modulation (GFSK, Pi/4DQPSK, 8DPSK) and the worst case Mode (Middle channel and Pi/4DQPSK) was submitted only.



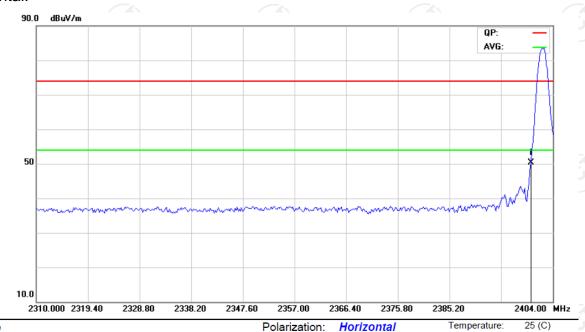


Humidity:

Test Result of Radiated Spurious at Band edges

Lowest channel 2402:

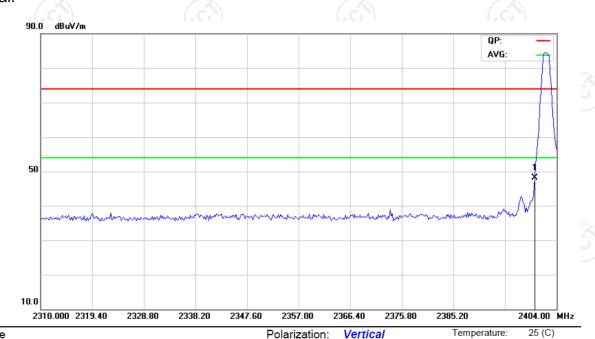
Horizontal:



Power: DC 3.7V

Vertical:

Limit: FCC part 15 (PK)



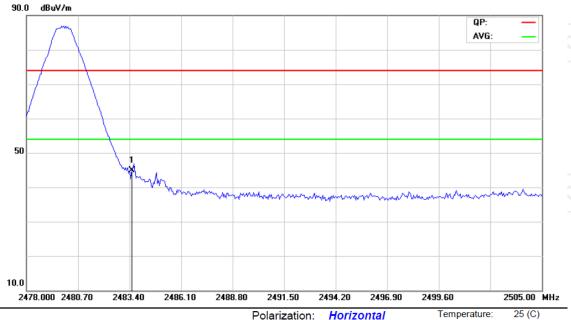
Limit: FCC part 15 (PK) Power: DC 3.7V Humidity: 55 %

Frequency (MHz)	Ant. Pol. H/V	Peak (dBµV/m)	Dutycycle factor (dB/m)	AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	PK Margin (dB)	AVG Margin (dB)
2400	Н	50.30	-2.07	48.23	74	54	-23.7	-5.77
2400	V	48.19	-2.07	46.12	74	54	-25.81	-7.88



Highest channel 2480:

Horizontal:



Power:

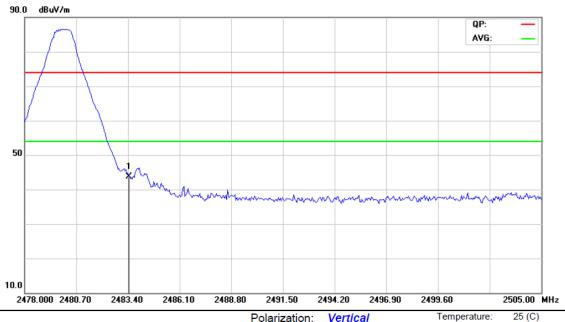
Limit: FCC part 15 (PK)

Horizontal Polarization: DC 3.7V

Humidity: 55 %

Vertical:

Site



Limit: FCC part 15 (PK)

Polarization: Vertical

DC 3.7V

Temperature:

55 %

Humidity:

Ant. Dutycycle PK AVG Frequency ΑV Peak Peak limit **AV limit** factor Pol. Margin Margin (MHz) (dBµV/m) $(dB\mu V/m)$ $(dB\mu V/m)$ $(dB\mu V/m)$ H/V (dB/m) (dB) (dB) 2483.5 44.85 42.78 74 54 Н -2.07 -29.1<u>5</u> -11.22 43.96 -2.07 74 -30.04 -12.112483.5 41.89 54

Power:

Note: Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (Pi/4 DQPSK) was submitted only.



Above 1GHz

Modulation	Type: Pi/4	4DQPSK							
Low chann	el: 2402 N	1Hz							
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Peak (dBµV/m)	n Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
2390	Н	45.95		-8.27	37.68		74	54	-16.32
4804	Н	47.61		0.66	48.27		74	54	-5.73
7206	Н	38.37		9.50	47.87		74	54	-6.13
	Н		(/				
	(0)		KO			(0)		(0)	
2390	٧	43.82		-8.27	35.55	<u> </u>	74	54	-18.45
4804	V	44.54		0.66	45.20		74	54	-8.80
7206	V	38.29		9.50	47.79		74	54	-6.21
	V			(c					(ć

Middle cha	Middle channel: 2441 MHz										
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)		
4882	Н	43.08		0.99	44.07	-	74	54	-9.93		
7323	Ή	38.73		9.87	48.60	:	74	54	-5.40		
	Н										
					X \						
4882	V	44.40		0.99	45.39		74	54	-8.61		
7323	V	37.16		9.87	47.03		74	54	-6.97		
	V										

High channel: 2480 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Emissic Peak (dBµV/m)	l AV	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4960	Н	48.94		1.33	50.27		74	54	-3.73
7440	Н	38.52		10.22	48.74		74	54	-5.26
(0 ')	Н			(<	ر (ر)		(XCr)		120
4960	V	47.36		1.33	48.69		74	54	-5.31
7440	V	37.08	-	10.22	47.30		74	54	-6.70
/	V				/				

Note:

- 1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss Pre-amplifier
- 2. Margin (dB) = Emission Level (Peak) (dB μ V/m)-Average limit (dB μ V/m)
- 3. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
- 5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
- 6. Measurements were conducted in all three modulation (GFSK, Pi/4DQPSK, 8DPSK), and the worst case Mode (Pi/4DQPSK) was submitted only.

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Appendix A: Photographs of Test Setup

Product: Amour Airbuds Model: BTA003 Radiated Emission







Conducted Emission















Appendix B: Photographs of EUT Product: Amour Airbuds

Model: BTA003 External Photos





















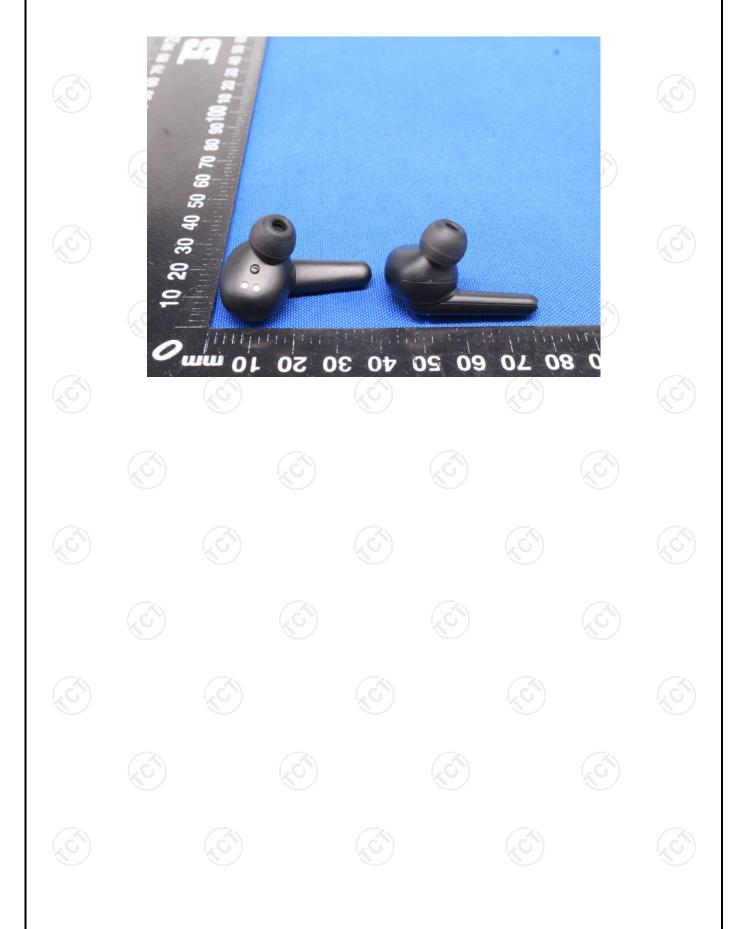














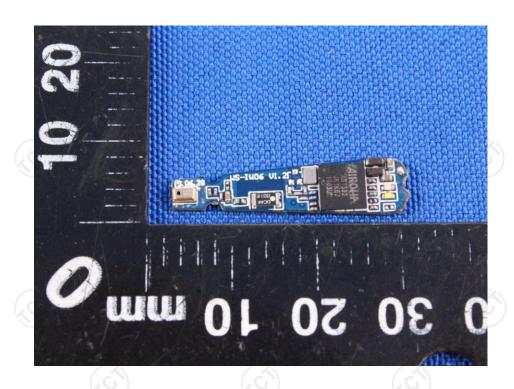
Product: Amour Airbuds Model: BTA003 Internal Photos

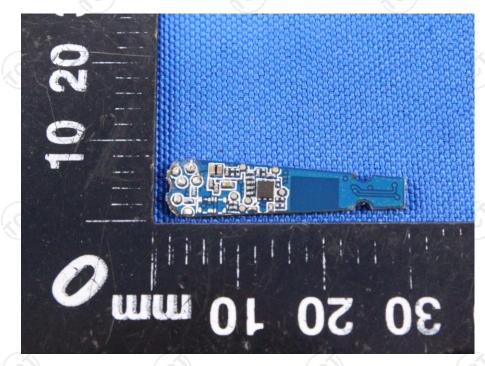




TCT通测检测 testing centre technology

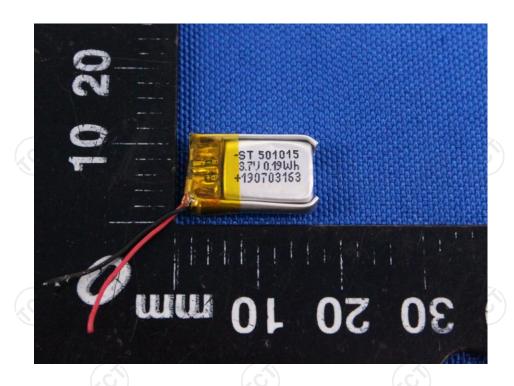
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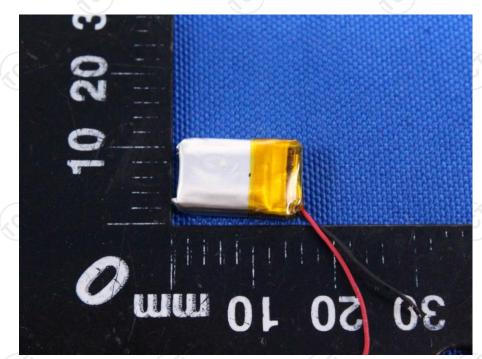




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*****END OF REPORT*****