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	TEST REPORT				
FCC ID :	2AFW2-B009				
Test Report No::	TCT230327E025				
Date of issue:	Apr. 04, 2023				
Testing laboratory::	SHENZHEN TONGCE TESTING LA	В			
Testing location/ address:	2101 & 2201, Zhenchang Factory Re Subdistrict, Bao'an District, Shenzhe People's Republic of China				
Applicant's name: :	Shenzhen DZH Industrial Co., Ltd	enzhen DZH Industrial Co., Ltd			
Address:	3th Floor, YiTuo Mike Industrial A bu zone, ShaJing, Shenzhen, China	th Floor, YiTuo Mike Industrial A building, Bu Yong Industrial D one, ShaJing, Shenzhen, China			
Manufacturer's name :	Shenzhen DZH Industrial Co., Ltd				
Address:	3th Floor, YiTuo Mike Industrial A bu zone, ShaJing, Shenzhen, China				
Standard(s):	FCC CFR Title 47 Part 15 Subpart C ANSI C63.10:2013	Section 15.249			
Test item description :	2.4G Wireless Keyboard				
Trade Mark:	N/A				
Model/Type reference :	B009 C				
Rating(s):	DC 3V (2*AAA Battery)				
Date of receipt of test item	Mar. 27, 2023				
Date (s) of performance of test:	Mar. 27, 2023 - Apr. 04, 2023				
Tested by (+signature) :	Yannie ZHONG	nnie Zostecezz			
Check by (+signature) :	Beryl ZHAO	Boy Creet PCT)			
Approved by (+signature):	Tomsin 7	misites at			
General disclaimer: This report shall not be repr	oduced except in full, without the wri	tten approval of SHENZHEN			

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TCT通测检测 TESTING CENTRE TECHNOLOGY

TCT 通测检测 TESTING CENTRE TECHNOLOGY

1. General Product Information

1.1. EUT description

Test item description:	2.4G Wireless Keyboard		
Model/Type reference:	B009		
Sample Number	TCT230327E025-0101		
Operation Frequency:	2405MHz - 2470MHz		
Number of Channel:	8		
Modulation Technology:	GFSK		(\mathbf{c})
Antenna Type:	PCB Antenna		
Antenna Gain:	-0.61dBi		
Rating(s):	DC 3V (2*AAA Battery)	No.	

Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

1.2. Model(s) list

None.

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1.3. Operation Frequency

C	hannel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
	. 1	2405MHz	3	2422MHz	5	2440MHz	7	2460MHz
	2	2413MHz	4	2430MHz	6	2450MHz	8	2470MHz
No	to.	9		9		2		

Note:

In section 15.31(*m*), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel	2405MHz
The Middle channel	2430MHz
The Highest channel	2470MHz



2. Test Result Summary

Requirement	CFR 47 Section	Result		
Antenna Requirement	§15.203	PASS	K.	
AC Power Line Conducted Emission	§15.207	N/A		
Field Strength of Fundamental	§15.249 (a)	PASS		
Spurious Emissions	§15.249 (a) (d)/ §15.209	PASS	G	
Band Edge	§15.249 (d)/ §15.205	PASS	N.	
20dB Occupied Bandwidth	§15.215 (c)	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. General Information

3.1. Test Environment and Mode

Operating Environment:		
Condition	Conducted Emission	Radiated Emission
Temperature:	25.0 °C	25.0 °C
Humidity:	55 % RH	55 % RH
Atmospheric Pressure:	1010 mbar	1010 mbar

Test Mode:

Engineering mode: Keep the EUT in continuous transmitting by select channel and modulations

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.

3.2.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
, 8				

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.



4. Facilities and Accreditations

4.1.Facilities

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

• FCC - Registration No.: 645098

SHENZHEN TONGCE TESTING LAB

Designation Number: CN1205

The testing lab 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

SHENZHEN TONGCE TESTING LAB

CAB identifier: CN0031

The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

4.2.Location

SHENZHEN TONGCE TESTING LAB

Address: 2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China TEL: +86-755-27673339

4.3. Measurement Uncertainty

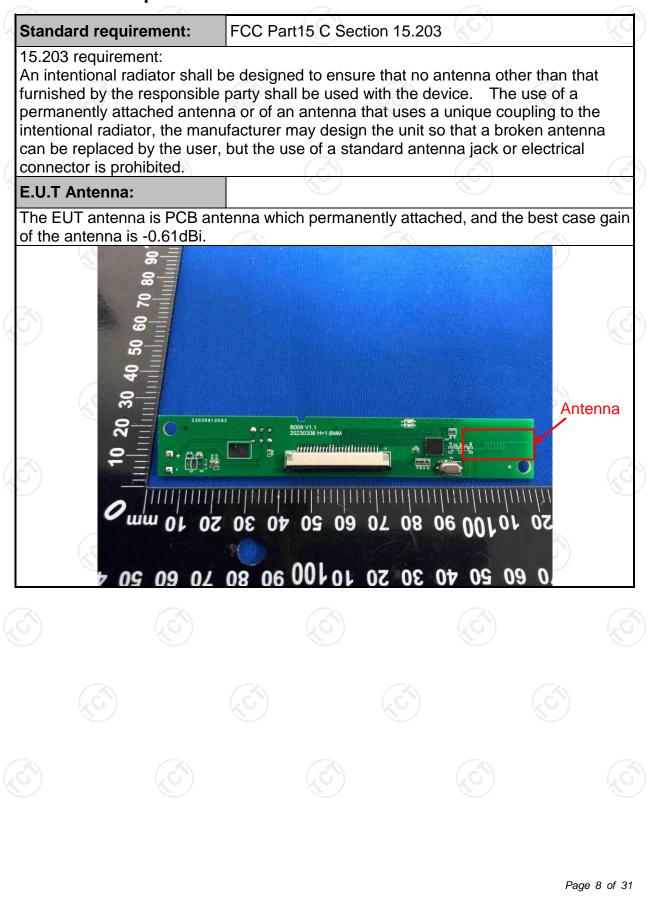
The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	± 3.10 dB
2	RF power, conducted	± 0.12 dB
3	Spurious emissions, conducted	± 0.11 dB
4	All emissions, radiated(<1 GHz)	± 4.56 dB
5	All emissions, radiated(1 GHz - 18 GHz)	± 4.22 dB
6	All emissions, radiated(18 GHz- 40 GHz)	± 4.36 dB



5. Test Results and Measurement Data

5.1. Antenna Requirement



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5.2. Conducted Emission

5.2.1. Test Specification

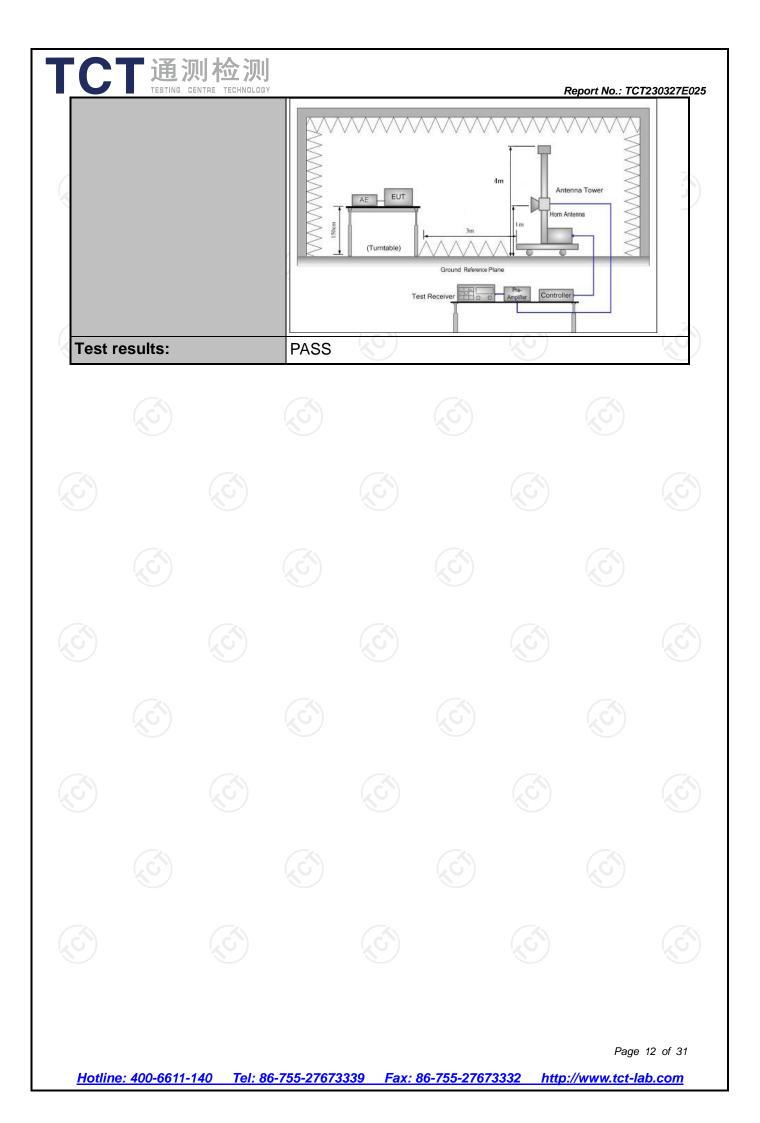
z.i. rest opecification							
Test Requirement:	FCC Part15 C Section	15.207	No.				
Test Method:	ANSI C63.10:2013	ANSI C63.10:2013					
Frequency Range:	150 kHz to 30 MHz	150 kHz to 30 MHz					
Receiver setup:	RBW=9 kHz, VBW=30) kHz, Sweep time	e=auto				
	Frequency range	Limit (dBuV)				
	(MHz)	Quasi-peak	Average				
Limits:	0.15-0.5	66 to 56*	56 to 46*				
	0.5-5	56	46				
	5-30	60	50				
	Refere	ence Plane					
Test Setup:	AUX Equipment Equipment Test table/Insulation plate Remark: E.U.T: Equipment Under Test LISN: Line Impedence Stabilization Test table height=0.8m Transmitting mode witt	U.T ane Dr Network	ter — AC power				
Test Mode:							
Test Procedure:	 The E.U.T and simulators are connected to the main power 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:	N/A; Because the EUT item is not applicable.	•	e battery, so the				

5.3. Radiated Emission Measurement

5.3.1. Test Specification

Test Requirement:	FCC Part15	5 C Section	n 15.209		
Test Method:	ANSI C63.1	0:2013			
Frequency Range:	9 kHz to 25	GHz			
Measurement Distance:	3 m	K	9		
Antenna Polarization:	Horizontal 8	& Vertical			
	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
Receiver Setup:	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
		Peak	1MHz	3MHz	Peak Value
	Above 1GHz	Peak	1MHz	10Hz	Average Value
Limit(Field strength of the	Freque	ency	Limit (dBu	V/m @3m)	Remark
fundamental signal):	2400MHz-24	183 5111-7	94.	00	Average Value
runuamentai signai).	240010172-24	403.5IMITZ	114	.00	Peak Value
	Freque	ency	Limit (dBu	V/m @3m)	Remark
	0.009-0.490		2400/F	1	Quasi-peak Value
imit/Courious Emissions)	0.490-1.705		24000/F(KHz)		Quasi-peak Value
	1.705-30		30		Quasi-peak Value
	30MHz-88MHz		40.0		Quasi-peak Value
Limit(Spurious Emissions):	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
			74.0		Peak Value
Limit (band edge) :	bands, exce least 50 dB general rae whichever i	ept for har below the diated em s the lesse	monics, s level of t ission lir er attenua	shall be a he funda nits in s tion.	cified frequency attenuated by a mental or to the Section 15.209
Test Procedure:	 whichever is the lesser attenuation. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber in below 1GHz, 1.5m above the ground in above 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 				

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	 4. For each suspected emission, the EUT was arrang to its worst case and then the antenna was tuned heights from 1 meter to 4 meters and the rotatal table was turned from 0 degrees to 360 degrees find the maximum reading. 5. The test-receiver system was set to Peak Deter Function and Specified Bandwidth with Maximu Hold Mode. 6. If the emission level of the EUT in peak mode w 10dB lower than the limit specified, then testing course be stopped and the peak values of the EUT would reported. Otherwise the emissions that did not ha 10dB margin would be re-tested one by one usi peak, quasi-peak or average method as specified a then reported in a data sheet. 	l to ble to ect um vas uld be ave
	For radiated emissions below 30MHz	
	Distance = 3m Computer Pre -Amplifier UT U.Sm Computer Pre -Amplifier Receiver Ground Plane 30MHz to 1GHz	
Test setup:	EUT Tum Table Ground Plane	
	Above 1GHz	
	(The diagram below shows the test setup that is utilize to make the measurements for emission from 1GHz to the tenth harmonic of the highest fundamental frequency or to 40GHz emissions, whichever is lower	0
		_



5.3.2. Test Instruments

	Radiated Em	nission Test Site	e (966)		
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due	
EMI Test Receiver	R&S	ESIB7	100197	Jul. 03, 2023	
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 03, 2023	
Pre-amplifier	SKET	LNPA_0118G- 45	SK2021012 102	Feb. 20, 2024	
Pre-amplifier	SKET	LNPA_1840G- 50	SK2021092 03500	Feb. 20, 2024	
Pre-amplifier	HP	8447D	2727A05017	Jul. 03, 2023	
Loop antenna	Schwarzbeck	FMZB1519B	00191	Jun. 11, 2023	
Broadband Antenna	Schwarzbeck	VULB9163	340	Jul. 05, 2023	
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jul. 05, 2023	
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Feb. 24, 2024	
Antenna Mast	Keleto	RE-AM	1		
Coaxial cable	SKET	RC-18G-N-M	1	Feb. 24, 2024	
Coaxial cable	SKET	RC_40G-K-M	1	Feb. 24, 2024	
EMI Test Software	Shurple Technology	EZ-EMC		1	

5.3.3. Test Data

Field Strength of Fundamental

	Frequency (MHz)	Emission PK (dBuV/m)	Horizontal /Vertical	Limits PK (dBuV/m)	Margin (dB)
	2405	91.13	Н	114	-22.87
	2405	81.79	V	114	-32.21
	2430	91.63	н	114	-22.37
	2430	81.39	V	114	-32.61
6	2470	90.75	(C H	114	-23.25
	2470	81.30	\sim v	114	-32.70

Frequency (MHz)	Emission AV (dBuV/m)	Horizontal /Vertical	Limits AV (dBuV/m)	Margin (dB)
2405	90.49	Н	94	-3.51
2405	81.21	V	94	-12.79
2430	90.81	Н	94	-3.19
2430	80.77	V	94	-13.23
2470	90.06	H (C	94	-3.94
2470	80.27	V	94	-13.73

Spurious Emissions

Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@	ິ3m (dBµ	ıV/m)	Limit@3m (dBµV/m)
		-		

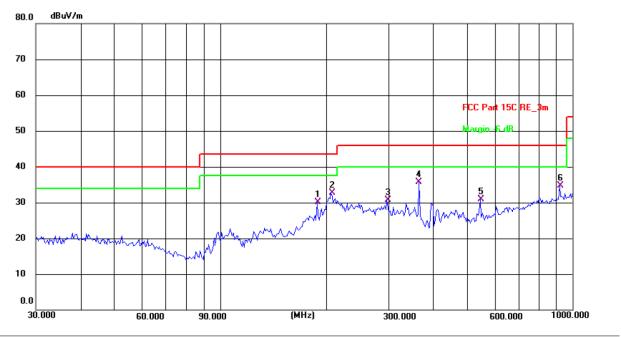
Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor.

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.

3. For fundamental frequency, RBW >20dB BW , VBW>=RBW, PK detector is for PK value, RMS detector is for AV value.



Horizontal:



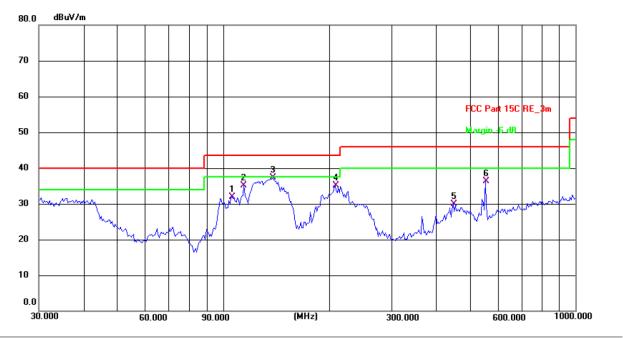
Site: #1 3m Anechoic Chamber Polarization: Horizontal Temperature: 24.9(C) Humidity: 51 %

Limit: FCC Part 15C RE_3m

Power: DC 3 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	188.4125	19.18	11.00	30.18	43.50	-13.32	QP	Р	
2	206.3976	22.14	10.53	32.67	43.50	-10.83	QP	Р	
3	297.2241	16.81	13.89	30.70	46.00	-15.30	QP	Р	
4 *	366.8231	20.19	15.57	35.76	46.00	-10.24	QP	Р	
5	547.0977	11.65	19.23	30.88	46.00	-15.12	QP	Р	
6	919.2866	10.03	24.73	34.76	46.00	-11.24	QP	Ρ	

Vertical:



Temperature: 24.9(C) Humidity: 51 % Site: #1 3m Anechoic Chamber Polarization: Vertical

Limit: FCC Part 15C RE_3	m
--------------------------	---

.imit: F	CC Part 15C R			P	Power: DC 3 V				
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)		Margin (dB)	Detector	P/F	Remark
1	106.0126	20.65	11.18	31.83	43.50	-11.67	QP	Ρ	
2	114.5146	23.14	11.90	35.04	43.50	-8.46	QP	Ρ	
3 *	138.3873	23.64	13.74	37.38	43.50	-6.12	QP	Ρ	
4	207.8501	24.56	10.58	35.14	43.50	-8.36	QP	Ρ	
5	449.5558	12.41	17.53	29.94	46.00	-16.06	QP	Ρ	
6	554.8254	16.87	19.46	36.33	46.00	-9.67	QP	Ρ	

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CT		则检 河	-					Report No.: 1	TCT230327E
				Above	e 1GHz			-	
				channel:	2405MHz				
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBuV)	Correction Factor (dB/m)	Peak	on Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4810	Н	51.37		-3.94	47.43		74	54	-6.57
7215	Н	46.82		0.52	47.34		74	54	-6.66
		\sim					<u> </u>		
4810	V	49.64		-3.94	45.70		74	54	-8.30
7215	V	42.10	-+ 6	0.52	42.62	<u> </u>	74	54	-11.38
				/		<u> </u>			

			N	liddle chann	el: 2430M	Hz			
Frequency	Ant Pol	Peak	AV	Correction		on Level	Peak limit	AV/ limit	Margin
(MHz)	H/V	reading	reading	Factor	Peak	AV	(dBu\//m)	(dBµV/m)	(dB)
(101112)	I 1/ V	(dBµV)	(dBµV)	(dB/m)	(dBµV/m)	(dBµV/m)		(ubµ v/m)	(UD)
4860	Н	51.03		-3.98	47.05		74	54	-6.95
7290	Н	45.58		0.57	46.15		74	54	-7.85
4860	V	51.95		-3.98	47.97	\sim	74	54	-6.03
7290	V	44.26		0.57	44.83		74	54	-9.17

				High chann	el: 2470MH	Ηz			
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBµV)	AV reading (dBµV)	Correction Factor (dB/m)	Peak	on Level AV (dBµV/m)	Peak limit (dBµV/m)	AV limit (dBµV/m)	Margin (dB)
4940	Н	52.41		-3.98	48.43		74	54	-5.57
7410	H	47.79		0.57	48.36		74	54	-5.64
4940	V	51.36		-3.98	47.38		74	54	-6.62
7410	V	45.84		0.57	46.41		74	54	-7.59
					J				

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)

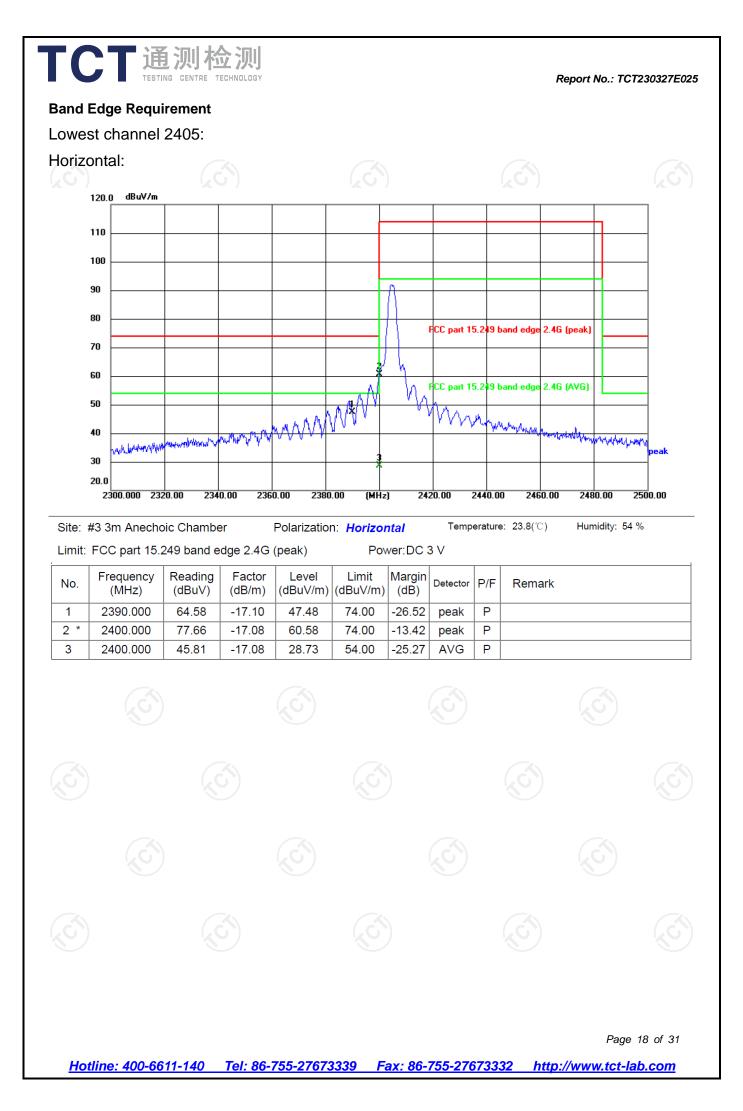
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.

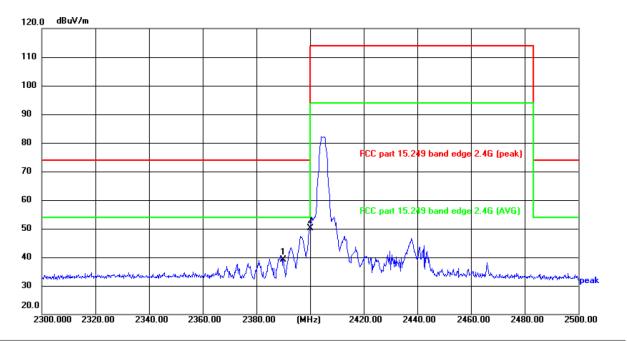
5. Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

6. All the restriction bands are compliance with the limit of 15.209.

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Vertical:



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Site: #3 3m Anechoic Chamber Polarization: Vertical Temperature: 23.8(°C) Humidity: 54 %

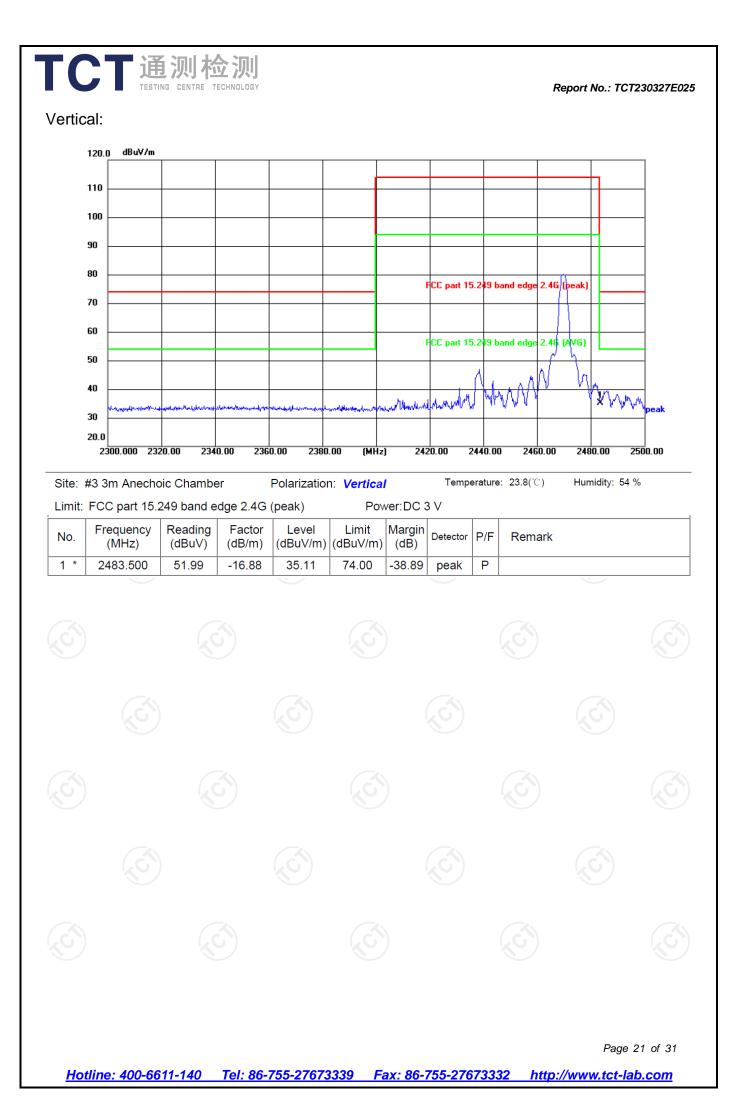
Limit: FCC part 15.249 band edge 2.4G (peak)

Factor Reading Level Limit Margin Frequency No. Detector P/F Remark (MHz) (dBuV) (dB/m) (dBuV/m) (dBuV/m) (dB) -17.10 2390.000 56.18 39.08 74.00 -34.92 Ρ 1 peak -17.08 74.00 2 2400.000 67.14 50.06 -23.94 Ρ * peak

Power: DC 3 V



TCT通测检测 TESTING CENTRE TECHNOLOGY Report No.: TCT230327E025 Highest channel 2470: Horizontal: dBu¥/m 120.0 110 100 90 80 FCC part 15.249 band edge 2.4G (peak) 70 60 2.46 (AVE) FCC part 15.249 band edg 50 M an and the second se 40 she handle 30 20.0 2300.000 2320.00 2340.00 2360.00 2420.00 2460.00 2380.00 (MHz) 2440.00 2480.00 2500.00 Site: #3 3m Anechoic Chamber Polarization: Horizontal Temperature: 23.8(℃) Humidity: 54 % Limit: FCC part 15.249 band edge 2.4G (peak) Power: DC 3 V Frequency Reading Factor Level Limit Margin Detector P/F No. Remark (MHz) (dBuV) (dB/m) (dBuV/m) (dBuV/m) (dB) 1 * 2483,500 61.95 -16.88 45.07 74.00 -28.93 peak Ρ Page 20 of 31 Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com





5.4. 20dB Occupied Bandwidth

5.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.215(c)
Test Method:	ANSI C63.10: 2013
Limit:	N/A
	 According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 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 3 times the 20 dB bandwidth, centered on a hopping channel; RBW≥1% of the 20 dB bandwidth; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. Measure and record the results in the test report.
Test setup:	Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test results:	PASS

5.4.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due		
Spectrum Analyzer	R&S	FSU	200054	Jul. 04, 2023		
\mathcal{O}						
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5.4.3. Test data

Report No.: TCT230327E025

Test Channel	20dB Occupy Bandwidth (kHz)	Limit	Conclusion
2405MHz	2134.62	(3)	PASS
2430MHz	2134.62		PASS
2470MHz	2128.21		PASS
Tost plate as follows		$\langle \mathcal{O} \rangle$	(\mathbf{C})

Test plots as follows:						
					Page	23 of 31
					5	

